NMS8280 programmers information

Gathered by HansO, 2001

In this document all available information known is gathered concerning the programming concepts for the NMS8280. If and how this is applicable to the Sony 900P (besides the Basic commands) is unknown

1 The SET VIDEO command

From the book MSX-2 Basic by A.Sickler

SET VIDEO<X>[,<Y>[,<Z>[,<XX>[,<YY>[,<ZZ> [<XXX>]]]]]]

Hiermee kan men de zogenoemde superimpose-modus aangeven.
Superimpose wil zeggen, dat er beelden kunnen worden gemengd (gesuperponeerd).

De volgende tabellen geven de mogelijkheden aan:

<X>	Waar komt het beeld vandaan?
0	Van de computer
1	Van de computer
2	Te zamen met een ander beeld (superimposed)
3	Van de video-input

In 0 is er geen externe synchronisatie mogelijk en in l, 2 of 3 is er geen 'composite output' (gemengde beelden of output) mogelijk.

<Y>	Hoe groot is de intensiteit?
0	Half
l	Vol

Zonder nadere aanduiding is Y gelijk aan 0.

<Z>	Regelt de kleurenbesturing
O	Alleen voor output (uitvoer)
l	Alleen voor input (invoer)

Zonder nadere opgave wordt 0 aangenomen.

<XX>	Regelt de synchronisatie
O	Intern
l	Extern

Zonder nadere opgave wordt 0 aangenomen.

<YY>	Regelt het audiosignaal
O	Alleen van computer
1	Meng externe input van rechterkanaal met computer
2	Meng externe input van linkerkanaal met computer
3	Meng externe kanalen met computer

Zonder nadere opgave wordt 0 aangenomen.

<ZZ>	Regelt de externe video-input
O	RGB-euroconnector
l	TV-connector

Zonder nadere aanduiding wordt 0 aangenomen.

<XXX> Selectie van audio/video-output van RGB-euroconnector
l   Wordt gekozen
O   Wordt niet gekozen
Zonder nadere aanduiding wordt 0 aangenomen.

Voorbeeld: SET VIDEO 2

Waarschuwing: deze instructie werkt alleen als de computer is voorzien van 'super imposed'.

2 Ports F6 and F7 and relevant VDP registers

Ports and VDP registers which are important for the video facilities as used in the NMS8280.

2.1 Ports

Port F6h

bit 7	self test (1 = on)
bit 6	digitize enable (0 = on)
bit 5	mix (0 = 1/2 impose)
bit 4	black / white (0 = on)
bits 3-0	unused

Thanks to Albert Beevendorp and Koen van Hartingsveldt for the information.

Note that the Basic SET VIDEO command does not control port F6 in anyway. Bit 5 and 6 has to be altered in combination with the SET VIDEO command.

F7 A/V control

b0	audio R write Low mixing off
b1	audio L write Low mixing off
b2	select video input low RGB SCART connector
b3	detect video input read low no video present
b4	AV control write low: TV
b5	YM control write low TV
b6	inverse of bit 4 of VDP register 9 (CBD), write
b7	inverse of bit 5 of VDP register 9 (TP), write

Note that the SET VIDEO command in Basic controls the I/O port F7.

2.2 VDP registers

Relevant VDP registers, controlled by the SET VIDEO command

VDP()	reg.	7	6	5	4	3	2	1	0
0	0	0	DG	IEO	IE1	M5	M4	M3	D
1	1	0	BLK	IE2	M1	M2	0	SZ	MAG
9	8	MSE	LCS	TP	CBD	VRS1	VRS0	SBD	B/W
10	9	LN	0	SYM1	SYM0	IL	E/O	NTSC	DCD

DG   -Digitize
IE0 -Vertical Retrace Interrupt Enable
IE1 -Horizontal Retrace inerrupt Enable
IE2 -Light pen/mouse Interrupt Enable

M5/1	M5	M4	M3	M2	M1	
	0	0	0	0	0	SCREEN-1
	0	0	0	0	1	SCREEN-0 (40 chars)
	0	0	0	1	0	SCREEN-3
	0	0	1	0	0	SCREEN-2
	0	1	0	0	0	SCREEN-4
	0	1	0	0	1	SCREEN-0 (80 tekens)
	0	1	1	0	0	SCREEN-5
	1	0	0	0	0	SCREEN-6
	1	0	1	0	0	SCREEN-7
	1	1	1	0	0	SCREEN-8

D   -External VDP-input
BLK -Enable/Disable Display
SZ   -Sprite size
MAG -Magnify Sprites
MSE -Light pen/mouse (1=muis)
LC5 -Light pen/coincidence select (1=light pen)
TP   -Transparant mode (1= color 0 niet transparant)
CBD -Color bus Direction

VRS1/0-Video RAM select

VRS1	VRS0	
0	0	16 Kb
0	1	4*16 Kb
1	0	1*64 Kb
1	1	64 Kb High Speed

SPD -Sprite disable

SYM0/1-Synchronisatie Mode

SYM1	SYM0	
0	0	Intern
0	1	Mix
1	0	Extern (Digitize)
1	1	none

IL   -Interlaced Mode
E/O -Even/odd Display
NTSC -TV/Monitor Select
DCD -Dot Clock Direction

3 Video on and off program

A program handwritten to set the super impose on or off.
By MSXHans, 1992.

Enter the code in a program and save as .COM file.

```
VIDEO ON                          VIDEO OFF

C5          PUSH BC      →)
OE 09       LD C,9       →)
06 12       LD B,18                        LD B,2
F7          RST 30
00          NOP
47          LD B,A
00          NOP
C1          POP BC
3E 9F       LD A,9F              LD A,DF
D3 F7       OUT F7,A             OUT F7,A
C9          RET
```

4 Pascal program to experiment with video

(requires Pascal libraries from Kari Lammassaari)

program setvideo ;

{ experiments on using ports F6 and F7 in combination with SET VIDEO command

  port F7 bit 6 is superimpose on (0), off (1)
  port F6 bit 6 half (0) full (1) computer image intensity

 MSXHans 1999-2001}

 {$I grpprint.inc }
 {$i setvideo.inc }

begin

writeln;

writeln ('test') ;

color (15,0,0);

set_video (2,1,0,1,3,1,0) ;
readln ;
inline ($3e/$bf/$d3/$f7);
writeln('F7 bit 6 uit') ;
readln;

{set_video (2,0,0,1,3,1,0);
}
readln ;
inline($3e/$dF/$d3/$f6) ;
readln;
set_video (0,0,0,0,0,0,0) ;
{restore ports F6 and F7)
inline ($3e/$ff/$d3/$f7/$d3/$f6) ;

color (15,4,4);

end.

5 Digitise

The NMS8280 is capable of digitizing (capture) a video image.
This chapter shows the background and an example.

5.1 Background

Onderwerp :Digitaliseren

1. sync extern, reg9 bit5,0 bit4,l
    (=vdp(10)) F7 out bit7, l bit 6,0 rest 1
2. color ,,255 (voor screen 8)
3. a/d converter aan out f6 bit 6,0 rest l
4. inlezen, reg 0 bit 6,l voor minstens 1/50 sec.
5. stop lezen converter uit enz.

Information from Erik de Boer, 1989

5.2 ML program

With handwritten comments by MSXHans

```
L0001    EQU      #0001
L0005    EQU      #0005
L0007    EQU      #0007
L000E    EQU      #000E
L0018    EQU      #0018
L001C    EQU      #001C
L005F    EQU      #005F
L0098    EQU      #0098
L009C    EQU      #009C
L009F    EQU      #009F
L00D2    EQU      #00D2
         LD       A,#08
         LD       IX,L005F
         LD       IY,(LFCC0)
         CALL     L001C
         LD       A,(LF3E6)
         PUSH     AF
         LD       BC,LFF07
         CALL     L01E7
         LD       A,(LFFE8)
         AND      #CF
         OR       #10
         LD       B,A
         LD       C,#09
         CALL     L01E7
         LD       A,(LFAF7)
         AND      #3F
         OR       #80
         OUT      (#F7),A
L012D    LD       A,(LFFE7)
         OR       #32
         LD       B,A
         LD       C,#08
         CALL     L01E7
L0138    CALL     L01A2
         LD       IX,L009C
         LD       IY,(LFCC0)
         CALL     L001C
         JP       Z,L0138
L0149    LD       IX,L009F
         LD       IY,(LFCC0)
         CALL     L001C
         PUSH     AF
         CALL     L01BE
         LD       A,(LFFE7)
         AND      #EF
         LD       B,A
         LD       C,#08
         CALL     L01E7
         POP      AF
         CP       #20
         JP       Z,L0149
         AND      #DF
         CP       #53
         JP       Z,L020B
         CP       #1B
         JP       NZ,L012D
         LD       A,(LFAF7)
         OUT      (#F7),A
```

Handwritten annotations:

A = Screenmode

CALL CHGMOD

RG7SAV

H.REAP

register 7
bit 5 = 0   S0
bit 6 = 1   S1

reserve AV control port

·AVCStV

bit 7 = 1
bit 6 = 0

color 0   CB input
0 0 1 1 0 0 1 0
/1   disable
Son   Sprite

register 8

CH SNS.

it is character

CHGET   one character input

wait scan. of.

colorbus off } becomes black

space balk?

Save.

escape.

ACVSV } alles wieder witreden

1 1 1 1 F
1 0 E
4 0
1 1 0 0 C

1 1 1 1
1 1 0 0
1 1 0 1
1 1 0 0
     6 5
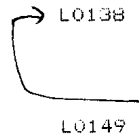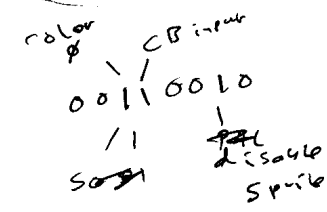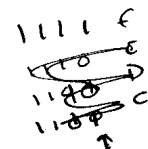
```
            LD      A,(LFFE8)
            AND     #CF
            LD      B,A
            LD      C,#09
            CALL    L01E7
            LD      A,(LFFE7)
            AND     #FD
            LD      B,A
            LD      C,#08
            CALL    L01E7
            POP     BC
            LD      C,#07
            CALL    L01E7
            LD      IX,L00D2
            LD      IY,(LFCC0)
            CALL    L001C
            RET
L01A2       CALL    L01BE
            LD      A,(LF3DF)
            OR      #40
            LD      B,A
            LD      C,#00
            CALL    L01E7
            CALL    L01BE
            LD      A,(LF3DF)
            AND     #BF
            LD      B,A
            LD      C,#00
            JP      L01E7
L01BE       CALL    L01CF
            AND     #40
            JP      Z,L01BE
L01C6       CALL    L01CF
            AND     #40
            JP      NZ,L01C6
            RET
L01CF       LD      A,#02
            DI
            OUT     (#99),A
            LD      A,#8F
            OUT     (#99),A
            EX      (SP),HL
            EX      (SP),HL
            IN      A,(#99)
            EX      AF,AF'
            XOR     A
            OUT     (#99),A
            LD      A,#8F
            OUT     (#99),A
            EI
            EX      AF,AF'
            RET
L01E7       LD      A,B
            DI
            OUT     (#99),A
            LD      A,C
            AND     #3F
            OR      #80
            OUT     (#99),A
```
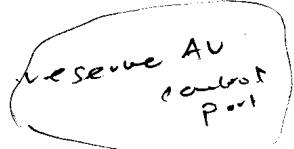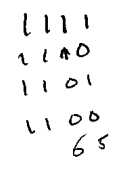
(handwritten annotations:)

alles neo unstreken

— TO TEXT
— erf. value
— end of program

— mode register β } set to disible
— DG aan
set regin
— set veu uit
wait for vertical scan begin
wait for vertical scan end
— Read VBP status register 2

— status register 15.
vang na suns register 0
return in A.

write control register C
value = β

bit 6=0 bit 7=1
— bit 7 = 1

```
        EI
        LD      D,B
        LD      A,C
        LD      B,#00
        CP      #08
        JP      NC,L0202
        LD      HL,LF3DF
        JP      L0208
L0202   CP      #18
        RET     NC
        LD      HL,LFFDF
L0208   ADD     HL,BC
        LD      (HL),D
        RET
L020B   LD      HL,L02B0
        LD      DE,L02B1
        LD      BC,L0018
        LD      (HL),#00
        LDIR
        LD      DE,L02A4
        LD      C,#16
        CALL    L0005
        OR      A
        JP      NZ,L012D
        LD      HL,L0001
        LD      (L02B2),HL
        LD      DE,L029D
        LD      C,#1A
        CALL    L0005
        LD      HL,L0007
        LD      DE,L02A4
        LD      C,#26
        CALL    L0005
        OR      A
        JP      NZ,L027B
        LD      DE,L02C9
        LD      C,#1A
        CALL    L0005
        LD      BC,L000E
        CALL    L01E7
        XOR     A
        DI
        OUT     (#99),A
        EX      (SP),HL
        EX      (SP),HL
        OUT     (#99),A
        EI
        LD      B,#04
L025A   PUSH    BC
        LD      HL,L02C9
        LD      BC,L0098
        LD      A,#35
L0263   INIR
        DEC     A
        JP      NZ,L0263
        LD      HL,L3500
        LD      DE,L02A4
        LD      C,#26
        CALL    L0005
        POP     BC
        OR      A
```

Handwritten annotations:

3

Set shadow of control vectors

FEDE0 register scr
E0 1
E1 2
E2 3
E3 4
E4 15
E5 16
E6 17
E7 18
EC 9

write screen dump to file

clear work space.

BDOS. create bit.

Gone?

set DMA address.

write random block

set DMA address

want even!

destination
port 98.
36 x 256 bytes

FCB.

write random block

```
          JP      NZ,L027B
          DJNZ    L025A
L027B     LD      DE,L02A4
          LD      C,#10
          CALL    L0005
          LD      B,#04
          LD      HL,L02AC
L0288     CALL    L0293
          JP      C,L012D
          DJNZ    L0288
          JP      L012D
L0293     LD      A,(HL)
          INC     A
          LD      (HL),A
          CP      #3A
          RET     C
          LD      (HL),#30
          DEC     HL
          RET
L029D     CP      #00
          NOP
          RST     #38
          OUT     (#00),A
          NOP
L02A4     NOP
          LD      D,B
          LD      C,C
          LD      B,E
          LD      D,H
          JR      NC,L02DB
          JR      NC,L02DD
          LD      D,E
          LD      B,E
          JR      C,L02B1
L02B1     NOP
L02B2     NOP
          NOP
          NOP
          NOP
          NOP
          NOP
          NOP
          NOP
          NOP
          NOP
          NOP
          NOP
          NOP
          NOP
          NOP
          NOP
          NOP
          NOP
          NOP
          NOP
          NOP
          NOP
L02C9     NOP
```

close file.

u cisos

prepare next filenam

next filenam
max ??? screen dumps

screen 8 BSAVE header. 7 bytes.

Data ?
Disk address.

filenam
SCR -- -- .. SCB

zero voor fill.

FCB .

Data buffer

```
                    NOP
                    NOP
                    NOP
                    NOP
                    NOP
                    NOP
                    NOP
                    NOP
                    NOP
                    NOP
                    NOP
                    NOP
                    NOP
                    NOP
                    NOP
                    NOP
                    NOP
         LO2DB      NOP
                    NOP
         LO2DD      NOP
         L3500      EQU      #3500
         LF3DF      EQU      #F3DF
         LF3E6      EQU      #F3E6
         LFAF7      EQU      #FAF7
         LFCCO      EQU      #FCCO
         LFF07      EQU      #FF07
         LFFDF      EQU      #FFDF
         LFFE7      EQU      #FFE7
         LFFE8      EQU      #FFE8
```