

The CLONE
IBM PC Compatibility Support
for the NCR Decision Mate V

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- o Execution Parameters:
 - ON/OFF Switch
 - Function/Directional Keys Assignment
 - Keyboard Layout
 - Usage Message

- o Interrupt Support for:
 - Print Screen
 - Video Services
 - Equipment-List
 - Cassette (inop return)
 - Keyboard Services (with scan codes)
 - Printer Services - Parallel & Serial

- o DOS/BASIC level PC key assignments

- o Print Screen Key

- o Only 3K Memory Resident Program

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INT 05h
INT 10h
INT 11h
INT 15h
INT 16h
INT 17h

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INTRODUCTION

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The CLONE provides a subset level of compatibility with an IBM & Compatible PC's (PC) ROM BIOS services relating to Video, Keyboard, Printer I/O and other functions.

The Video Services are implemented via Interrupt 10 hex and are performed using the NEC 7220 Graphic Chip within the Decision Mate V (DMV). Not all service functions have been implemented; refer to the VIDEO SERVICES for specific details.

The Keyboard Services of the DMV, via Interrupt 16 hex, are enhanced to support PC scan code return values. A revised keyboard mapping, optionally installed by the CLONE, provides full Functional/Directional keys simulation at the DOS/BASIC levels. In addition, a PrtSc key that provides a CRT Screen dump to the printer is simulated at both the Keyboard Service and DOS level using the Shift "*" key on the numeric key pad. Not all PC keys are available; specifically, the Alt alpha/numeric keys are not emulated.

The Printer Services are implemented via Interrupt 17 hex and support the K210 Centronics-Interface and the K212/K801 Serial-Interface Modules. The normal PC implementation supports only a Parallel interface as LPTx; the CLONE simulates the parallel interface for the K212/K801, thereby needing no changes to programs requiring parallel printer usage.

The functions of Equipment Check (Interrupt 11 hex) and Cassette (Interrupt 15 hex) are implemented to return simulated status values.

The PrtSc key is implemented via the addition of Interrupt 05 hex, Print Screen Service.

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VIDEO SERVICES

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- o Set Video Mode AH = 00
 - Perform Clear Screen only
- o Set Cursor Size AH = 011
 - Support Cursor display ON/OFF
 - Sizes for raster lines 0 - 7
- o Set Cursor Position AH = 021
 - Within Page 0 only
- o Read Cursor Position AH = 031
- o Scroll Window UP AH = 06h
- o Scroll Window DOWN AH = 07h
- o Read Character and Attribute AH = 08h
- o Write Character and Attribute AH = 09h
- o Write Character AH = 0Ah
- o Write Character as TTY AH = 0Eh
- o Read Video Mode AH = 0Fh
 - 80x25 black and white text; value 02
 - or-
 - 80x25 Color text; value 03

The others services and video paging have yet to be implemented.

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- o WORDSTAR — Release 4; MicroPro Int. Corp.
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- o NORTON UTILITIES 3.10; Peter Norton Computing, Inc.
— NU, TS, etc.
- o SIDEWAYS 2.0 & 3.0; Funk Software, Inc.
- o XTREE 2.00; Executive System, Inc.
- o PRINT MASTER; Unison World, Inc.
(non-graphic mode only)
- o CED — DOS Command Editor 1.0; C. J. Dunford

The general compatibility of a program written for the PC and its successful execution under the CLONE is affected greatly by the use and/or access of data via direct port level I/O. The various adapter boards and support circuits of the PC may be addressed via direct port I/O. This practice is normally used for status verification and/or special PC feature implementation. The assignment of the port addresses varies even between the PC models and are much different and/or non-existent in the DMV.

The conflict of address assignments and usage between the DMV and the PC cause different failure indications, depending on the DMV hardware interface configuration. Known conflicts are the DMV and the PC differences in programs using sound and interrupt controller programming. These types of programs may cause the printer to slew continuously or to hang the machine. The most common symptom is the latter.

For programs which allow configuration options, try turning off sound. For video options, try specifying ones that have snow or flicker and, if available, use a ROM BIOS interface.

Programs which use only ROM BIOS Video Services, Interrupt 10 hex, for output to the CRT and which do not use Graphic Mode operations are functional under the CLONE.

Programs wishing to obtain maximum performance on a PC have gone to using direct movement of display data to the video RAM. The video RAM on the DMV is not directly accessible, so there is no simulation. Programs that use this technique to avoid 'flicker' or 'snow' on the CRT directly access the video controller status port. A check is made for the presence of bit 0 or 3 to be on, which indicates that access to video RAM at that time will not cause interference.

The following is the assembler code normally used for this test:

the dx register will be loaded with 03DA hex

```
st_ck:  in  al, dx      EC  ;hex object
        test al, 01h   A8 01
        jnz st_ck     75 FB
```

As you can see from the above code example, it is an endless loop waiting for bit 0 to come on. When this type of code is executed on the DMV, the system will be hung and the only recourse is the reset the machine.

Using the DEBUG command, a search can be made of the test program looking for the above binary code sequence. The above specific example has been found to present in several programs.

An example DEBUG search would be:

```
s 0 xxxx EC A8 01      xxxx = program size
```

The PC to DMV key mapping is the same with the exception of:

- o Alternate F01 - F10 mapped to Shift F11 - F20
- o Special Keys
 - Shift TAB - F15
 - END - F16 Cntl END - Cntl F16
 - INS - F17
 - PgDn - F18 Cntl PgDn - Cntl F18
 - PgUp - F19 Cntl PgUp - Cntl F19
 - BREAK - F20
 - DEL - CLR key
- o Numeric Pad
 - PrtSc - Shift '**'
 - Shift/Cntl Numbers equate to PC Directional Keys
- o DOS Command Line Edit Support
 - Copy 1 char - F11
 - Copy to - F12
 - Dup - F13
 - Skip to - F14

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Programs written for the PC normally use ROM BIOS Keyboard Services, Interrupt 16 hex, for access to the keyboard. The two service functions of reading characters, AH = 00 - read character; AH = 01 - Character ready, return in the AH register (auxiliary byte) the assigned scan code for the specific key depressed and in the AL register (main byte) is its actual assigned ASCII code hex value. The group of special keys on the PC have a fixed ASCII code hex value of zero (00) and the scan code (auxiliary byte) is used to identify which specific special key was depressed.

When using DOS/BASIC level keyboard access routines, the return values are somewhat different. These routines return a single character equal to the ASCII code hex value for the key. For the special keys, a return of zero (00) indicates a second character is available to identify the specific key depressed.

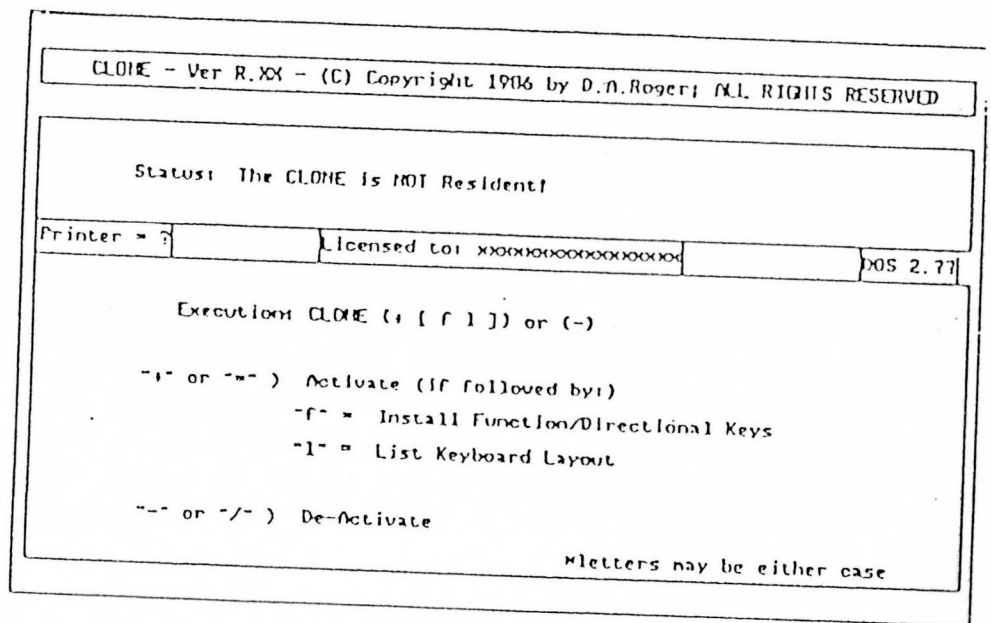
The CLONE support both of the above access methods. The optional activate parameter of 'F' will install the DOS/BASIC level key code values using the DMV keyboard programming escape sequences. The Interrupt 16 keyboard return values are unaffected by this parameter and always return appropriate AH/AL values.

Normal first-time execution of the CLONE need not specify DOS/BASIC level activate parameter. A subsequent reactivation of the CLONE with the 'F' parameter option will reprogram the DMV keyboard. The state of all DMV programmable keys will be saved before the CLONE starts keyboard re-programming. Upon de-activation of the CLONE a restore the original keys values will be made. Not all programmable keys are affected, refer to the keyboard layout screen for the specific keys.

For DOS Command Line Edit support four DMV function keys are optionally programmed ('F' parameter option) for your convenience:

- 1. Copy 1 F11
- 2. Copy to F12
- 3. Copy F13
- 4. Skip to F14

1. First-time Usage message, CLONE execution w/no parameters.



R.XX - CLONE Version and Point Release number.
 Printer = ? - Printer type: P for Parallel, S for Serial.
 xxxxxx's - Name of Licensee and Serial Number.
 DOS 2.?? - DOS Version number of 00 or 11.

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R

o Execution Parameters:

CLONE { + [F L] } or { - }

Activate: '+' or '='

Optional: 'F' for Install Function/Directional Keys
'L' for List of Keyboard Layout Display

De-Activate: '-' or '/'

Letters may be either case.

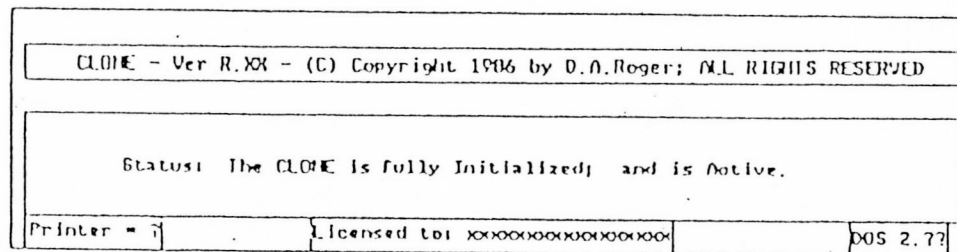
o PrtSc Key:

- Shift Numeric Pad '*' is the PrtSc Key

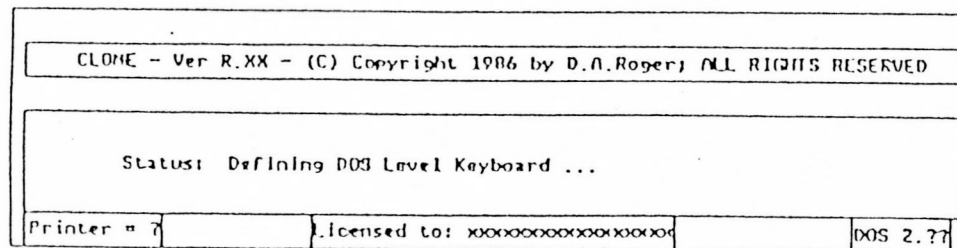
If the printer is inoperative, a flashing "P" will appear in the upper right corner of screen.

o First time usage type "CLONE +FL", New Line; then depress the PrtSc Key to capture keyboard layout.

1. Normal initialization/installation message.



2. Momentary message while defining DOS Level Keyboard.



R.XX - CLONE Version and Point Release number.
 Printer = ? - Printer type; P for Parallel, S for Serial.
 xxxxxx's - Name of Licensee and Serial Number.
 DOS 2.?? - DOS Version number of 00 or 11.

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SCREEN DISPLAYS

Norna

1. CLONE - Active.

CLONE - Ver R.XX - (C) Copyright 1986 by D.A.Roger; ALL RIGHTS RESERVED			
Status: The CLONE is fully initialized, and is Active!			
Printer = ?	xxxxxx's	Licensed to: xxxxxxxxxxxxxxxxxxxxxx	DOS 2.??

3. CLONE Re-Activated complete.

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CLONE - Ver R.XX - (C) Copyright 1986 by D.A.Roger; ALL RIGHTS RESERVED			
Status: The CLONE has been Re-Activated.			
Printer = ?	xxxxxx's	Licensed to: xxxxxxxxxxxxxxxxxxxxxx	DOS 2.??

2. CLONE - NOT Active.

CLONE - Ver R.XX - (C) Copyright 1986 by D.A.Roger; ALL RIGHTS RESERVED			
Status: The CLONE is fully initialized, but is NOT Active!			
Printer = ?	xxxxxx's	Licensed to: xxxxxxxxxxxxxxxxxxxxxx	DOS 2.??

4. CLONE De-Activation complete.

CLONE - Ver R.XX - (C) Copyright 1986 by D.A.Roger; ALL RIGHTS RESERVED			
Status: The CLONE has been De-Activated.			
Printer = ?	xxxxxx's	Licensed to: xxxxxxxxxxxxxxxxxxxxxx	DOS 2.??

R.XX - CLONE Version and Point Release number.
 Printer = ? - Printer type: P for Parallel, S for Serial.
 xxxxxx's - Name of Licensee and Serial Number.
 DOS 2.?? - DOS Version number of 00 or 11.

R.XX - CLONE Version and Point Release number.
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 DOS 2.?? - DOS Version number of 00 or 11.

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2. Keyboard Layout - DOS 2.11

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```

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*** All DMV Keys are the same with the exception of: ***
-----
Ctrl  |  |  |  |  |  | ^E^D |  | ^PgDn | ^PgUp | SysRst |
Shft | Alt-F1 | Alt-F2 | Alt-F3 | Alt-F4 | Alt-F5 | Alt-F6 | Alt-F7 | Alt-F8 | Alt-F9 | Alt-F10 |
| Cpy | Cpy to | Dup | Skp to | Sft | Alt | E^D | DIS | PgDn | PgUp | Break |
Key | F11 | F12 | F13 | F14 | F15 | F16 | F17 | F18 | F19 | F20 |
-----
| TAB | Home | Left | Down | Up | Right |
))) F11-14 DOS Edit Keys (((
| Shft | Home | Up | PgUp |
)) All Decision Make V Keys
are expanded to include
their scancode when input
through Interrupt 16h. For
DOS access of Function and
Directional keys; execute
CLONE with "if" option. (( supported.
| M^o^t | 4 | 5 | 6 | * |
| Control key |
| E^D^M | Down | PgDn |
| 1 | 2 | 3 | ML |
-----
DOS 2.11
    
```

R.XX - CLONE Version and Point Release number.
 Printer = ? - Printer type; P for Parallel, S for Serial.
 xxxxxx's - Name of Licensee and Serial Number.
 DOS 2.?? - DOS Version number of 00 or 11.

1. Attempt made to activate an already active CLONE.

```

CLONE - Ver R.XX - (C) Copyright 1986 by D.A.Roger; ALL RIGHTS RESERVED
-----
Status: The CLONE is already Activel
-----
Printer = ? Licensed to: xxxxxxxxxxxxxxxxxxxx DOS 2.??
    
```

2. Attempt made to deactivate an already deactivated CLONE.

```

CLONE - Ver R.XX - (C) Copyright 1986 by D.A.Roger; ALL RIGHTS RESERVED
-----
Status: The CLONE is already De-Activated!
-----
Printer = ? Licensed to: xxxxxxxxxxxxxxxxxxxx DOS 2.??
    
```

R.XX - CLONE Version and Point Release number.
 Printer = ? - Printer type; P for Parallel, S for Serial.
 xxxxxx's - Name of Licensee and Serial Number.
 DOS 2.?? - DOS Version number of 00 or 11.

Erro

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3. CLONE execution with invalid parameters.

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CLONE - Ver R.XX - (C) Copyright 1986 by D.A.Roger; ALL RIGHTS RESERVED			
Status: Parameter Error - The CLONE's status is NOT affected!			
Printer = ?	Licensed to: xxxxxxxxxxxxxxxxxxxx		DOS 2.??
Execution: CLONE ([f l]) or (-)			
-i or -m) Activate (if followed by):			
-f = Install Function/Directional Keys			
-l = List Keyboard Layout			
-o or -/) De-Activate			
*letters may be either case			

4. Initialization Error - incorrect DOS memory values.

CLONE - Ver R.XX - (C) Copyright 1986 by D.A.Roger; ALL RIGHTS RESERVED			
Status: Initialization Error - The CLONE has NOT been Installed!			
Printer = ?	Licensed to: xxxxxxxxxxxxxxxxxxxx		DOS 2.??

5. Non-supported DOS version error.

System prompt display:

The CLONE requires DOS 2.00 or 2.11

R.XX - CLONE Version and Point Release number.
Printer = ? - Printer type; P for Parallel, S for Serial.
xxxxxx's - Name of Licensee and Serial Number.
DOS 2.?? - DOS Version number of 00 or 11.

R.XX - CLONE Version and Point Release number.
Printer = ? - Printer type; P for Parallel, S for Serial.
xxxxxx's - Name of Licensee and Serial Number.
DOS 2.?? - DOS Version number of 00 or 11.

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PROGRAMMERS
Reference Guide

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Print Screen	Interrupt 05h
Video Services:	Interrupt 10h
Set Video Mode	AH = 00h
Set Cursor Size	AH = 01h
Set Cursor Position	AH = 02h
Read Cursor Position	AH = 03h
Scroll Window UP	AH = 06h
Scroll Window DOWN	AH = 07h
Read Character and Attribute	AH = 08h
Write Character and Attribute	AH = 09h
Write Character	AH = 0Ah
Write Character via TTY	AH = 0Eh
Read Video Mode	AH = 0Fh
Equipment - List Service	Interrupt 11h
Cassette Tape Service	Interrupt 15h
Keyboard Services:	Interrupt 16h
Read Character	AH = 00h
Read Character	AH = 01h
Shift/Cntl/Alt Status	AH = 02h
Printer Services:	Interrupt 17h
Send byte to printer	K210 AH = 00h
Send byte to printer	K212/K801 AH = 00h
Initialize printer	AH = 01h
Get printer status	AH = 02h

Character Set/Translation Charts

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Print Screen

none

Input Registers:

none

Return Registers:

none

int 5

21

Set Video Mode

AIH = 00

Input Registers:

AL = video mode settings in hex:

02 - 80x25 black/white text

03 - 80x25 color text

Return Registers:

none

int 10

22

This service is used to print the video screen (text mode) to the printer. It can be use with programs for output of the current display screen by coding of the assembler 'INT' command with an operand of 05 hex.

The CLONE simulated PrtSc key, numeric pad shift '**', invokes this service.

This service is normally used to set the various video display modes. A by-product of this service is the clearing of the screen when changing modes.

Under the CLONE's control only a clearing of the screen will occur. The above AL register values are shown only as a reminder of the supported modes available on the DMV. The specific mode is determined by a flag set by the operating system software at boot time on the DMV. This flag reflects only a Color or a Monochrome type CRT installed and has nor relationship to PC modes.

interrupt 10 hex

Set Cursor Size

AH = 01

Input Registers:

CH = start raster line number
CL = ending raster line number

Bit 5 of the CH register determines:
one = cursor is not displayed, turned off
zero = cursor is displayed, turned on

Return Registers:

none

23

Set Cursor Position

AH = 02

Input Registers:

BH = video page value
DH = Row value
DL = Column value

Return Registers:

none

24

This service is used to control the cursor display. The CH/CL registers specify the raster line values ranging from 0 (zero), being the top most line number, to 7 (seven), being the bottom line number. The range reflects the 8x8 character matrix of the IBM PC. Normal value setting are CH = 06, CL = 07; resulting in a double line cursor display.

The state of bit 5 in the CH register is used to control the overall display of the cursor. If the bit is on, value 1, the display of the cursor will be turned OFF. If the bit is off, value 0, the display of the cursor will be turned ON.

This service is used to position the cursor within the video display page. The video page or text screen has a matrix of 25 Rows by 80 Columns. The upper left corner is assigned Row 0, Column 0. DH/DL registers specify the point of placement of the cursor within the screen matrix.

The BH register value on a compatible selects a specific target page, but the CLONE currently supports page ZERO only.

Read Cursor Position

25
AH = 03

Input Registers:

BH = video page value

Return Registers:

CH = start raster line number
CL = ending raster line number
DH = Row value
DL = Column value

This service is used to obtain the current position of the cursor within the video display page. The video page or text screen has a matrix of 25 Rows by 80 Columns. The upper left corner is assigned Row 0, Column 0.

The CH/CL registers return values specify the cursor size information, they are currently preset to a return with values of 07 hex each. The DH/DL registers return values specify the current position of the cursor within the screen matrix.

The BH register value on a compatible selects a specific target page, but the CLONE currently supports page ZERO only.

Scroll Window UP

26
AH = 06

Input Registers:

AL = number of lines to scroll up
BH = attribute to fill blank line
CH = top Row value 4
CL = left Column value X
DH = bottom Row value 4
DL = right Column value X

Return Registers:

None

This service is used to scroll a window from bottom to top in an upward direction as specified by the top/left corner and bottom/right matrix coordinate combinations: CH/CL - DH/DL.

The AL register value specifies the number of blank lines to scroll within the window. If the AL register value is ZERO or greater than the window size the entire window is cleared using the fill attribute.

The BH register value specifies the fill color attribute for blank lines.

Scroll Window DOWN

AH = 07

27

Input Registers:

AL = number of lines to scroll up
 BH = attribute to fill blank line
 CH = top Row value
 CL = left Column value
 DH = bottom Row value
 DL = right Column value

Return Registers:

None

This service is used to scroll a window from top to bottom in an downward direction as specified by the top/left corner and bottom/right matrix coordinate combinations: CH/CL - DH/DL.

The AL register value specifies the number of blank lines to scroll within the window. If the AL register value is ZERO or greater than the window size the entire window is cleared using the fill attribute.

The BH register value specifies the fill color attribute for blank lines.

Read Character and Attribute

AH = 08

28

Input Registers:

BH = video page value.

Return Registers:

AH = character
 AL = display attribute

This service is used to read the current character and its video display attribute at the current cursor position.

The AH register return value will be the actual DMV CRT display character from video memory. This character may be a result of a conversion to a DMV displayable character and not the original PC display character. The AL register return value, display attribute, will be the converted PC equivalent of the characters' DMV attribute value.

The BH register value on a compatible selects a specific target page, but the CLONE currently supports page ZERO only. dn

Write Character and Attribute

AH = 09

Input Registers:

AL = display character
BH = video page
BL = attribute
CX = repeat counter

Return Registers:

None

This service is used to write a character with a video display attribute at the current cursor position.

The AL register value, display character, will be translated to an available DMV displayable character. The BL register value will be converted to an equivalent display attribute appropriate to the DMV.

The BH register value on a compatible selects one of 4 color pages, but the CLONE currently only supports page ZERO.

The CX register value specifies the number of repeats of the character with its attribute to be displayed. Line wrap will occur.

The current cursor position is not incremented by the service.

Write Character

AH = 0A

Input Registers:

AL = display character
BH = video page
CX = repeat counter

Return Registers:

None

This service is used to write a character using the last specified video display attribute at the current cursor position.

The AL register value, display character, will be translated to an available DMV displayable character.

The BH register value on a compatible selects one of 4 color pages, but the CLONE currently only supports page ZERO.

The CX register value specifies the number of repeats of the character to be displayed. Line wrap will occur.

The current cursor position is not incremented by the service.

Write Character via TTY

AH = 0E

31

Input Registers:

- AL = display character
- BH = video page

Return Registers:

None

This service is used to write a character using the TTY as the output device. The effect of this service is that the character can be redirected and the cursor position is incremented.

The AL register value, display character, will be converted to a displayable character available on the DMV.

The BH register value on a Compatible selects a specific target page, but the CLONE currently supports page ZERO only.

Read Video Mode

AH = 0F

32

Input Registers:

None

Return Registers:

- AH = display width (fixed - 80 characters)
- AL = video mode return settings for:

- Monochrome CRT: 02 - 80x25 black and white text display
- Color CRT: 03 - 80x25 color text display

This service is normally used to read the current setting of the video mode.

The CLONE return only two values matching the configuration of the DMV for a Color CRT or Monochrome CRT.

Interrupt 11 hex

Equipment - List

none

Input Registers:

none

33

Return Registers:

AX = equipment flags:

bits	description	set to
15,14	# of Printers	01
13	Serial Printer?	0 (1=serial)
12	Game Adapter	0 (1=installed)
11,10,9	# of RS-232c Ports	001 (1 port)
8	DMA Chip installed	0 (0=installed)
7,6	# of 5 1/4" Drives	01 (+1=number)
5,4	Initial video mode	10 (80x25 Color) or 11 (80x25 Monochrome)
3,2	System board RAM	11 (64k normal)
1	Math coprocessor	0 (not necessary)
0	IPL from diskette	1 (drives exist)

This service is used to obtain an equipment list status of the PC. The CLONE returns a preset value varying only in the initial mode setting which is dependent on the type of CRT monitor in the MV, see above.

Cassette Tape Services

Interrupt 15 hex

Cassette Tape Access

none

Input Registers:

none

34

Return Registers:

AH= 86

Cflag set on at return

This service is used to access the Cassette tape unit. The CLONE always returns with the AH register having an error status of 86 and the Cflag set on.

Interrupt 16 hex

Read Character

AH = 00

Input Registers:

35

none

Return Registers:

AH = scan code (auxiliary byte)
AL = ASCII character (main byte)

This service is used to read a character from the keyboard. The character is removed from keyboard buffer and its contents count is decremented by one. The return registers AH/AL identify the actual key depressed (entered). The auxiliary byte (scan code) will identify the special key values when the main byte (ASCII character) is zero. Refer to Keyboard Code Chart for scan code and special key assignments.

Interrupt 16 hex

Character ready

AH = 01

Input Registers:

36

none

Return Registers:

AH = scan code (auxiliary byte)
AL = ASCII character (main byte)

ZF flag settings:

off (0) = character ready
on (1) = character not present

This service is used to determine if a character has been entered at the keyboard. The character, if present, is not removed from the keyboard buffer and its contents counter is not decremented by one. The return registers AH/AL identify the actual key if entered. The auxiliary byte (scan code) will identify the special key values when the main byte (ASCII character) is zero. Refer to Keyboard Code Chart for scan code and special key assignments.

The state of the ZF flag indicates if a key was entered. If off (0) a key is present and is in the keyboard buffer. Note that the ZF flag has a reverse meaning, another way of looking at it is:

NZ = character ready
ZR = character not ready

Keyboard Services

Interrupt 16 hex

Get shift status

AH = 02

Input Registers:

37

none

Return Registers:

AL = shift status bits:

- 0 - right shift depressed
- 1 - left shift depressed
- 2 - Ctrl depressed
- 3 - Alt depressed
- 4 - Scroll Lock active
- 5 - Num Lock active
- 6 - Caps Lock active
- 7 - Insert state active

This service is normally used to obtain the status of the keyboard control keys.

The DMV keyboard hardware has no equivalent function, so the CLONE returns a fixed value of zero, all states off.

Cube 17

Send byte to the printer

AH = 00

Input Registers:

38

AL = character

Return Registers:

AH = . output status:

Because of the Serial interface only the following status values can be returned:

- 90 hex - operational printer
- 60 hex - inoperative printer

This service is used to output a character to the printer.

The K212/K801 Serial interface modules can not return but operative and inoperative status values.

Send byte to the printer

interrupt 17 hex
AH = 00

Input Registers:

AL = character

Return Registers:

AH = output status:

bit	description
7	not busy
6	acknowledge
5	out-paper
4	selected
3	I/O error
2	not used
1	not used
0	time-out

This service is used to output a character to the printer. The return I/O status, AH register bits, reflect an on state (1).

The K210 Centronics Parallel interface module can return the above status setting. The normal return value for an operational printer is 90 hex.

interrupt 17 hex

Initialize printer

AH = 01

Input Registers:

none

Return Registers:

AH = output status:

Refer to specific interface type Service 00 for status return values.

This service is used to initialize the printer by sending it the following two hex characters: 08, 0C.

42

Get printer status

AH = 02

Input Registers:

none

Return Registers:

AH = output status:

Refer to specific interface type Service 00 for status return values.

This service is used to obtain the current status of the printer.

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	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
0	ä	ä		ø	ø	ø	'	ø								
1	Æ	æ	l	l	À	Q	a	q								
2	å	å	"	Z	B	R	b	r								
3	ƒ	ff		3	C	S	c	s								
4	É	é	§	4	D	T	d	t								
5	Ë	ë	∕	5	E	U	e	u								
6	Ö	ö	&	6	F	V	f	v								
7	ß	ss	'	7	G	W	g	w								
8	ç	ç	(	8	H	X	h	x								
9	Û	ü	)	9	I	Y	i	y								
A	à	à	*	:	J	Z	j	z								
B	è	è	†	;	K	I	k	(
C	'	ç	,	<	L	\	l	|								
D	°	ç	-	=	M	I	m)								
E	†	ø	.	>	N	^	n	-								
F	..	l	/	?	0	-	o	□								

Characters 80 - FF duplicate 00 - 7F, with high bit off.

27

THE CLONE - TRANSLATION SET w/hex

43

	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
0	20	3C	>	0	0	P	'	P	88	04	61	π	2B	π	61	30
1	00	3C	<	1	A	Q	a	q	19	11	69	π	2B	π	62	2B
2	00	1F	"	2	B	R	b	r	14	01	6F	π	2B	π	47	3C
3	00	0F	"	3	C	S	c	s	61	6F	75	π	2B	π	78	3C
4	00	0F	\$	4	D	T	d	t	10	16	15	π	2B	π	53	0F
5	00	1C	%	5	E	U	e	u	0A	18	05	π	2B	π	73	3F
6	00	0E	&	6	F	V	f	v	12	75	61	π	π	π	60	2F
7	00	0C	'	7	G	W	g	w	88	1A	6F	π	π	π	74	π
8	00	0C	(	8	H	X	h	x	65	79	10	π	π	π	58	00
9	00	76	)	9	I	Y	i	y	65	06	2B	π	π	π	54	00
A	00	3C	*	:	J	Z	j	z	00	07	2B	π	π	π	4F	00
B	00	3C	<	;	K	[	k	(	69	63	2F	π	π	π	64	2F
C	00	3F	?	,	L	\	l	|	69	03	2F	π	π	π	3F	6E
D	00	3F	?	-	M	]	m	)	19	59	1F	π	π	π	17	32
E	00	0E	↑	.	N	^	n	-	00	50	2C	π	π	π	65	17
F	13	76	v	/	0	-	o	0	82	66	3E	π	π	π	4E	20

44

	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
0		)		0	e	P	'	P	88	04	61	π	2B	π	61	30
1	0	<	1	1	A	Q	a	q	19	11	69	π	2B	π	62	2B
2	0	↑	"	2	B	R	b	r	14	01	6F	π	2B	π	47	3C
3	0	↑	"	3	C	S	c	s	61	6F	75	π	2B	π	78	3C
4	0	↑	\$	4	D	T	d	t	10	16	15	π	2B	π	53	0F
5	0	↑	%	5	E	U	e	u	0A	18	05	π	2B	π	73	3F
6	0	↑	&	6	F	V	f	v	12	75	61	π	π	π	60	2F
7	0	↑	'	7	G	W	g	w	88	1A	6F	π	π	π	74	π
8	0	↑	(	8	H	X	h	x	65	79	10	π	π	π	58	00
9	0	↑	)	9	I	Y	i	y	65	06	2B	π	π	π	54	00
A	0	↑	*	:	J	Z	j	z	00	07	2B	π	π	π	4F	00
B	0	↑	<	;	K	[	k	(	69	63	2F	π	π	π	64	2F
C	0	↑	?	,	L	\	l	|	69	03	2F	π	π	π	3F	6E
D	0	↑	?	-	M	]	m	)	19	59	1F	π	π	π	17	32
E	0	↑	↑	.	N	^	n	-	00	50	2C	π	π	π	65	17
F	13	76	v	/	0	-	o	0	82	66	3E	π	π	π	4E	20

KEYBOARD RETURNS

47

Main Keyboard - Row 1

Locations: F0 - F14

	Unshifted			
	Char	Hex	Alt	Alt
F0	F1	E0	3B	00
F1	F2	E1	3C	00
F2	F3	E2	3D	00
F3	F4	E3	3E	00
F4	F5	E4	3F	00
F5	F6	E5	40	00
F6	F7	E6	41	00
F7	F8	E7	42	00
F8	F9	E8	43	00
F9	F10	E9	44	00
F10	F11	EA	00	EA
F11	F12	EB	00	EB
F12	F13	EC	00	EC
F13	F14	ED	00	ED
F14	STAB	EE	0F	00

	Shifted			
	Char	Hex	Alt	Alt
F1	C0	54	00	
F2	C1	55	00	
F3	C2	56	00	
F4	C3	57	00	
F5	C4	58	00	
F6	C5	59	00	
F7	C6	5A	00	
F8	C7	5B	00	
F9	C8	5C	00	
F10	C9	5D	00	
F11	AltF1	CA	00	29
F12	AltF2	CB	0C	5F
F13	AltF3	CC	00	2B
F14	AltF4	CD	0E	08
F15	AltF5	CE	0F	09

	Control			
	Char	Hex	Alt	Alt
F1	A0	5E	00	
F2	A1	5F	00	
F3	A2	60	00	
F4	A3	61	00	
F5	A4	62	00	
F6	A5	63	00	
F7	A6	64	00	
F8	A7	65	00	
F9	A8	66	00	
F10	A9	67	00	
F11	AA	00	AA	
F12	AB	00	AB	
F13	AC	00	AC	
F14	AD	00	AD	
F15	AE	00	AE	

Main Keyboard - Row 2

Locations: E0 - E14

48

	Unshifted			
	Char	Hex	Alt	Alt
E0	ESC	1B	01	1B
E1	1	31	02	31
E2	2	32	03	32
E3	3	33	04	33
E4	4	34	05	34
E5	5	35	06	35
E6	6	36	07	36
E7	7	37	08	38
E8	8	38	09	38
E9	9	39	0A	39
E10	0	30	0B	30
E11	-	2D	0C	2D
E12	=	3D	0D	3D
E13	BlkSp	0B	0E	0B
E14	TAB	09	0F	09

	Shifted			
	Char	Hex	Alt	Alt
E0	ESC	1B	01	1B
E1	!	21	02	21
E2	@	40	03	40
E3	#	23	04	23
E4	\$	24	05	24
E5	%	25	06	25
E6	^	5E	07	5E
E7	&	26	08	26
E8	*	2B	09	2A
E9	(	28	0A	28
E10	)	29	0B	29
E11	_	5F	0C	5F
E12	+	2B	0D	2B
E13	BlkSp	0B	0E	0B
E14	TAB	09	0F	09

	Control			
	Char	Hex	Alt	Alt
E0	ESC	1B	01	1B
E1				
E2				
E3				
E4				
E5				
E6				
E7				
E8				
E9				
E10				
E11	^_	1F	0C	1F
E12				
E13	BlkSp	0B	0E	7F
E14	TAB	09	0F	09

Main Keyboard - Row 3

Locations: D0 - D13

49

	Unshifted			Shifted			Control		
	Char	Hex	AH AL	Char	Hex	AH AL	Char	Hex	AH AL
D0	Cntl			Cntl			Cntl		
D1	q	71	10 71	Q	51	10 51	^Q	11	10 11
D2	w	77	11 77	W	57	11 57	^W	17	11 17
D3	e	65	12 65	E	45	12 45	^E	05	12 04
D4	r	72	13 72	R	52	13 52	^R	12	13 12
D5	t	74	14 74	T	54	14 54	^T	14	14 14
D6	y	79	15 79	Y	59	15 59	^Y	19	15 19
D7	u	75	16 75	U	55	16 55	^U	15	16 15
D8	i	69	17 69	I	49	17 49	^I	09	0E 09
D9	o	6F	18 6F	O	4F	18 4F	^O	0F	18 0F
D10	p	70	19 70	P	50	19 50	^P	10	19 10
D11	[	5B	1A 5B	(	7B	1A 7B	^[	1B	01 1B
D12	]	5D	1B 5D	)	7D	1B 7D	^]	1D	1B 1D
D13	Cntl			Cntl			Cntl		

Main Keyboard - Row 4

Locations: C0 - C13

50

	Unshifted			Shifted			Control		
	Char	Hex	AH AL	Char	Hex	AH AL	Char	Hex	AH AL
C0	CpLk			CpLk			CpLk		
C1	a	61	1E 61	A	41	1E 41	^A	01	1E 01
C2	s	73	1F 73	S	53	1F 53	^S	11	1F 13
C3	d	64	20 64	D	44	20 44	^D	04	20 04
C4	f	66	21 66	F	46	21 46	^F	06	21 06
C5	g	67	22 67	G	47	22 47	^G	07	22 07
C6	h	68	23 68	H	48	23 48	^H	08	23 08
C7	j	6A	1C 6A	J	4A	1C 4A	^J	0A	1C 0A
C8	k	6B	25 6B	K	4B	25 4B	^K	0B	25 0B
C9	l	6C	26 6C	L	4C	26 6C	^L	0C	26 0C
C10	;	3B	27 3B	:	3A	27 3A			
C11	'	27	28 27	-	22	28 22	^^	00	00 00
C12	`	60	29 60	~	7E	29 7E	^^	1E	07 1E
C13	N/L	88	1C 00	N/L	88	1C 00	^N/L	98	1C 0A

Main Keyboard - Rows 5 & 6 Locations: B99, B0 - B11, A5

51

	Unshifted			Shifted			Control		
	Char	Hex	Alt AL	Char	Hex	Alt AL	Char	Hex	Alt AL
B99	Shft			Shft			Shft		
B0	\	5C	2B 5C	|	7C	2B 7C	^|	1C	2B 1C
B1	z	7A	2C 7A	Z	5A	2C 5A	^Z	1A	2C 1A
B2	x	78	2D 78	X	58	2D 58	^X	18	2D 18
B3	c	63	2E 63	C	43	2E 43	^C	03	2E 03
B4	v	76	2F 76	V	56	2F 56	^V	16	2F 16
B5	b	62	30 62	B	42	30 42	^B	02	30 02
B6	n	6E	31 6E	N	4E	31 4E	^N	0E	31 0E
B7	m	6D	32 6D	M	4D	32 4D	^M	0D	32 0D
B8	,	2C	33 2C	<	3C	33 3C			
B9	.	2E	34 2E	)	3E	34 3E			
B10	/	2F	35 2F	?	3F	35 3F			
B11	Shft			Shft			Shft		
A5	Sp	20	39 20	Sp	20	39 20	Sp	20	39 20

	Unshifted			Shifted			Control		
	Char	Hex	Alt AL	Char	Hex	Alt AL	Char	Hex	Alt AL
F50	END	EF	4F 00	Alt F6	CF	6D 00	^END	AF	75 00
F51	INS	F0	52 00	Alt F7	D0	6E 00		00	00 00
F52	PgDn	F1	51 00	Alt F8	D1	6F 00	^PgDn	B1	76 00
F53	PgUp	F2	49 00	Alt F9	D2	70 00	^PgUp	B2	84 00
54	Brk	F4	2E 03	Alt F10	D3	71 00	Reset	B3	
E50	↖	81	47 00	↖	81	47 00	^↖	91	77 00
E51	←	82	4B 00	←	82	4B 00	^←	92	73 00
E52	↓	83	50 00	↓	83	50 00	+	93	4E 2B
E53	↑	84	4B 00	↑	84	4B 00	-	94	4A 2D
E54	→	85	4D 00	→	85	4D 00	→	95	74 00
D50	DEL	86	53 00	CLR	7F	00 7F	^CLR	96	00 96
D51	7	37	08 37	Home	D7	47 00	^Home	B7	77 00
D52	8	38	09 38	↑	D8	48 00	8	B8	60 38
D53	9	39	0A 39	PgUp	D9	49 00	^PgUp	B9	84 00
D54	/	2F	35 2F	/	DF	37 2F	/	BF	37 2F

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Numeric Pad - Rows 4 - 6 Locations: C50/54, B50/54, A50/53

	Unshifted			Shifted			Control		
	Char	Hex	AH AL	Char	Hex	AH AL	Char	Hex	AH AL
C50	-	2D	0C 2D	-	F4	6B 2D	-	F5	6B 2D
C51	1	34	05 34	LtAw	D4	4B 00	LtAw	B4	73 00
C52	5	35	06 35	5	D5	06 35	5	B5	61 35
C53	6	36	07 36	RtAw	D6	4D 00	RtAw	B6	74 00
C54	*	2A	09 2A	PrtSc	DA		*PrtSc	BA	72 00
B50	+	2B	0D 2B	+	DB	6C 2B	+	BB	6C 2B
B51	1	31	02 31	END	DC	4F 00	^END	BC	75 00
B52	2	32	03 32	DnAw	DD	5B 00	2	BD	62 32
B53	3	33	04 33	PgDn	DE	51 00	^PgDn	BE	76 00
B54	N/L	8B	1C 00	N/L	8B	1C 00	N/L	9B	1C 00
A50	0	30	0B 30	0	30	0B 30	0	3B	0B 30
A52	00	30	0B 30	00	30	0B 30	00	3B	0B 30
A53	.	2E	34 2E	.	2E	34 2E			

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55

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#####
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# *** All DMV Keys are the same with the exception of: *** #
# +-----+ +-----+ +-----+ +-----+ +-----+ +-----+ +-----+ +-----+ #
#Ctrlb      ö      ö      ö      ö      ö ö^END  ö      ö^PgDn ö^PgUp öSysRstö #
#ShftöAlt-F1öAlt-F2öAlt-F3öAlt-F4öAlt-F5ö  öAlt-F6öAlt-F7öAlt-F8öAlt-F9öAltF10ö #
#      öCpy 1 öCpy toö Dup  öSkp toöSftTABö  ö END  ö INS  ö PgDn ö PgUp öBreak ö #
# +-----+ +-----+ +-----+ +-----+ +-----+ +-----+ +-----+ +-----+ #
# Keyö F11  ö F12  ö F13  ö F14  ö F15  ö  ö F16  ö F17  ö F18  ö F19  ö F20  ö #
# +-----+ +-----+ +-----+ +-----+ +-----+ +-----+ +-----+ +-----+ #
#                                     ö TAB  ö  ö Home*ö LtAw*ö DnAw  ö UpAw  ö RtAw*ö #
# >>> F11-14 DOS Edit Keys <<< +-----+ +-----+ +-----+ +-----+ +-----+ #
#                                     Shftö      ö Home*ö UpAw  ö PgUp*ö      ö #
# >>All Decision Mate V Keys      ö"DEL" ö 7  ö 8  ö 9  ö /  ö #
# are expanden to include          +-----+ +-----+ +-----+ +-----+ +-----+ #
# their scancode when input      ^CLR^ ö LtAw*ö      ö RtAw*öPrtSc*ö #
# through Interrupt 16h. For *Note:  ö 4  ö 5  ö 6  ö *  ö #
# DOS access of Function and Control key +-----+ +-----+ +-----+ +-----+ #
# Directional keys; execute definition ö END* ö DnAw  ö PgDn*ö      ö #
# CLONE with "+f" option.<< supported. ö 1  ö 2  ö 3  ö NL  ö #
#                                     +-----+ +-----+ +-----+ +-----+ #
#####DOS 2.11##
A:ö>

```