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COLEX-3240 operations manual

October 1984

dit document = niet van belang (handwritten)

inhalte voor het 68000board! (handwritten)

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1.1 CP/M-68K operating system

The COLEX-3240 is shipped with a fully configured version of the CP/M-68K operating system. This configuration supports all the I/O ports of the basic computer, plus the optional built-in video display.

1.2 STD bus

The STD bus was first released in 1978. Now a proposed standard from the American IEEE (P691), the bus forms the basis of the highest volume standardized bus card family today. Advances in technology have allowed significantly increased densities on the basic card so that today the Colex computer can be built with 4 times the memory in less than half the space of an equivalent machine built only 3 years ago. Colex also has made significant innovations in proprietary logic to expand the bus beyond the original limitations, without losing STD bus compatibility. The basic COLEX-3240 can be expanded in I/O and memory functions with Colex cards such as voice output (WORDS), more serial I/O interfaces (SIO4 or PSIO), Video displays (CRT and IGDC), dedicated slave processors (Slave) or parallel TTL I/O (PIO2). New products now in design will further expand the system's capabilities. Also, other companies offer products which will plug into to the 5 free slots of the COLEX-3240.

Even the central processor of the system can be replaced with the other generations of 8/16/32 bit internal data path machines. The Colex Z80 card is one example. With this card, the system can be converted to CP/M operation. The Colex design of the 68000 and 256K ram cards allow 16 megabytes of data to be addressed on the STD bus, which previously allowed only 64k.

1.3 68000 processor, STD-68000

The heart of the computer is the STD-68000 board. This board contains the 68000 CPU chip and a 4K byte Read Only Memory for initially starting the system. It also contains system control functions including memory refresh, system timing, bank switch and common memory control. The 4k byte ROM contains a boot program and a debugger.

1.4 256K dynamic memory, STD-256RAM

Memory for the system is provided by the 256K bytes memory boards. Eight banks of 8-64K ram chips are used on the card, the bank select logic is controlled by the MCSYNC output from the 68000 card.

1.5 I/O interfaces, STD-PSIO

The STD-PSIO card interfaces the COLEX-3240 to external I/O devices. They are, 2 serial channels for virtually any type of serial protocol, plus a parallel interface IC which can be used for a wide range of timing and control functions. The standard COLEX-3240 uses this port for printer interfaces.

The board uses the Z80-SCC chip for serial I/O which includes software baud rate generation, and the Z80-CIO chip for the parallel interface. Both of these chips offer a wide range of programmable options.

1.5.1 Connection for Centronics printers

The 20 bit parallel interface on the PSIO card is programmed for connecting the computer to any Centronics compatible printer. The CP/M-68K operating system supports these interfaces. The pinout matches the lower 25 pins of the standard 36 pin Centronics interface. This way a cable can simply be built by crimping the upper 25 pins of a 36 pin male connector to a 25 pin cable.

Connector J5 is the primary printer port. Connector J6 is the auxiliary printer port. This allows for example a letter printer and a dot matrix printer to be connected to the computer at the same time.

1.5.2 Connection for a Modem (Serial Printer)

A serial port with the configuration 'DTE' is provided on connector J14. This allows direct connection to a standard modem. This port may also be used with serial printers if a cable is used which changes the 'DTE' pinning into 'DCE'. The standard system does not support the serial printer port.

1.5.3 Connection for a Video display

Connector J13 is provided for use of the system with an external terminal. The 'DCE' pinout of this connector matches directly with all standard terminals. The standard baud rate used is 9600 baud.

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1.6 Floppy disk drives

The Colex COLEX-3240 uses high density Teac 55F disk drives which store 758 Kilobytes of data on each 5.25" diskette. Data is written in double density format, on both sides, and with 96 tracks per inch. A high quality Colex Floppy disk controller board assures reliable data storage. A total of 160 tracks with 10 sectors of 512 bytes each are used. Either 1 or 2 floppy disk drives may be specified to be supplied with the system. The controller can support up to 4 drives.

1.7 Floppy disk controller STD-FLP2

Control and data encoding/decoding of the floppy disk is done by the FLP2 card. It uses the WD1797 controller chip with matching data separation chips. DMA transfers are used between the disk and memory, allowing fullest use of the processor, and faster disk transfer rates.

1.8 10 megabyte hard disk

The Colex system is supplied with a 10 Megabyte (formatted capacity) TEAC 412 winchester Hard disk. This disk holds the equivalent of 13 floppy disks. Larger disk drives may be connected externally to the system via the SASI interface card. With this external connection, disk drives with virtually unlimited capacity may be added. The BIOS would have to be modified to support this option.

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1.10 Built-in video display STD-CRT

The Colex system can be expanded to have a VT52 upward compatible video display interface built-in. The advantages of this solution are that one serial interface otherwise used for the terminal becomes available for a second printer or other device, and that the built-in controller operates at a much higher data transfer rate. The Colex STD-CRT card contains it's own processor which relieves the system's 68000 from display oriented tasks. The features of this interface exceed that of the VT52, and match those of the Heath/Zenith H19, which most install programs support. The Video display option comes with a detached VT100 style keyboard which uses a telephone like cord for connection to the system.

The COLEX STD-CRT video card is installed into any free slot in the STD bus backplane, the video connector is installed into J16, this is then wired to any standard video monitor. The keyboard connector is installed into J15, this 5 pin 'DIN' connector mates with the cable on the serial keyboard. The system software automatically uses the STD-CRT card if it is installed.

1.11 Expansion slots

The Colex COLEX-3240 was designed for expandability. The basic unit has 5 STD bus slots free for user expansion. The power supply can provide up to 5 Ampere for these extensions.

1.12 Z80 based COLEX systems

A lower cost version of the COLEX-3240 is the Z80 based system. This system uses CP/M 3.0 together with a Z80 to provide a power environment for the vast library of CP/M compatible SW. Like the COLEX-3240, the system uses the STD bus, the 68000 CPU card can be replaced by a Z80 card for converting to CP/M-3.0. Ask for more details on the Colex Z80 based system product line.

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2.0 Setting up the COLEX-3240 system

2.1 Connecting the serial terminal

Using a 25 pin male connector, and a 25 pin male or female connector which matches your terminal, connect the terminal of your choice to the COLEX-3240. The terminal connector is J13. Colex does not recommend any particular type of display unit, but the terminal chosen should be supported by the applications software you wish to use. Virtually every type of terminal can be supported by the CP/M-68K system.

The COLEX-3240 connector J13 is wired to match 95% of all terminals available which have an RS232 interface. This should be a simple 'one to one' connection, in which all pins on the system are connected to the same pins on the terminal. The STD-PSIO manual, which is attached, can be referenced for more details on this connection.

The standard baud rate used is 9600 baud, full duplex. Set your terminal to this speed, also no parity is used, set your terminal to ignore parity. The system supports XON/XOFF, so the terminal may use these codes to control the rate of characters from the system, use the 'device' utility to enable XON/XOFF in your 'profile.sub' routine. Other baud rates may

likewise be supported.

2.2 Connecting a Centronics printer

A cable is required which has a 25 pin male connector on the system end, and a 36 pin male connector on the printer end. Pin one of the 25 pin connector is connected to pin 1 on the printer connector, and the next 24 pins are connected, typically by mass termination, to the alternating 24 pins of the printer connector. This cable is the same as used on most other small computers. The 25 pin connector is plugged into J5 or J6.

2.3 Connecting a Modem

The COLEX-3240 connector J14 is wired to match most modems available. This should be a simple 'one to one' connection, in which all pins on the system are connected to the same pins on the modem. The STD-PSIO manual, which is attached, can be referenced for more details on this connection.

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2.4 Connecting power

The COLEX computer should be ordered with the power option required by your location. Should you have to change the power supply voltage, you must open the computer, open the power supply and change the strap to either 110 or 220 volt as required. A philips screwdriver is all that is required for this change. Be sure to change the marking on the back panel after doing this.

If the voltage is correct, (the back panel is marked) then insert a grounded cable which matches the local type of plug into the 3 prong standard connector on the back panel.

2.5 Inserting a floppy disk

The floppy disk should be inserted with the top to the left side (write protect notch down). Be sure to handle the floppy disks properly.

2.6 Formatting a floppy disk

The program 'FORMAT' allows a floppy diskete to be initialized. The system will prompt the user to select the number of sides (usually 2) and the drive letter (usually c). The floppy diskette is then formatted for future use.

3.0 Operation of the COLEX-3240

The system will start (boot) automatically from the disk after power is applied, once the hard disk has reached full speed. The reset key may also be used to restart the system, in this case, the system will wait 5 seconds, then boot from the hard disk. The system is delivered with the CP/M-68K operating system installed and ready for operation. For details concerning the use of CP/M-68K, the Digital Research operating system manual, also supplied, is the complete guide.

To enter the prom based debug facility, press the 'd' key within 5 seconds of reset. See the COLEX 68000 debug manual for an explanation of the operation of this program.

3.1 Installation

In the event that CP/M-68K is to be installed onto a system hard disk, the following procedure should be followed.

After reset or power-on, the system will wait 5 seconds or until the hard disk has reached full speed, whichever is longer. Should the disk not contain the CPM.SYS file, or the boot track; then the system will attempt to boot from the floppy disk. Should the user not want to boot from the hard disk, then pressing the 'ESC' key during the initial delay interval will cause the floppy disk to be read as the boot device.

For initializing the system, COLEX provides 2 floppy disks. The floppy diskette labeled 'BOOT' contains a backup copy of the operating system, the diskette 'UTILITIES' contains the operting system commands.

The procedure is as follows: (the hard disk will be erased)

1) insert 'boot' diskette is drive, press reset
2) press escape on the terminal   .
3) enter "C: <cr>"
4) enter "makesys <cr>" (this is a batch file, let it run)
5) press reset, wait until the system boots, insert 'utilities' diskette
6) enter "c:pip.rel a:=c:[vr] <cr>"
7) enter "reloc <cr>"

The installation is complete.

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APPENDIX A.

INTERNAL BOARD STRAPPING

Each card in the system has several strapping options for use in a wide variety of applications. In the COLEX COLEX-3240 systems, the strapping is as shown in the following tables. Please refer to the appropriate board manual for more details on the significance of the strapping options.

STD-68000

        Address at power on: 0000H   (4Kb EPROM)
        U1 contains system boot EPROM
        J1 is strapped 3-4

STD-256DRAM (card 1)

        Populated with 256K RAM
        Address space 00000-3FFFF
        U13 row is 0-FFFF
        U14 row is 10000-1FFFF
        U15 row is 20000-2FFFF
        U16 row is 30000-3FFFF

        J1: 1-2, 3-4, 5-6, 7-8
        J2: open
        J3: 1-2,3-4,
        J4: 1-2
        J5: 1-2
        J7: open

STD-256DRAM (card 2)   (optional)

        Populated with 256K RAM
        Address space 40000-7FFFFH
        U13 row is 40000-4FFFF
        U14 row is 50000-5FFFF
        U15 row is 60000-6FFFF
        U16 row is 70000-7FFFF

        J1: 1-2, 3-4, 5-6, 7-8
        J2: 2 to J4 pin 2 (see note)
        J3: 3-4
        J4: 3-4 (not required on rev c)
        J5: open
        J7: open

Early systems may have a connection from J4 pin 2 to U12 pin 3. (pin 3 is disconnected from VCC.) In these systems, J2 pin 2 must not be wired.

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STD-PSIO

    Address of ports is:
        SCC DCE port status : 1   Channel A   J13
                      data   : 3
        SCC DTE port status : 0   Channel B   J14
                      data   : 2
        CIO port : 4-7
    IOEXP line is decoded as : 0
    J2: 1-2, 3-4, 5-6, 7-8, 9-10, 11-12
    J3: 3-4, 21-22
    J4: not used
    J5: Open
    J6: Open
    J7: Open

STD-FLP2

    Address is E0
    J2: open
    J4: 1-2
    J5: Open
    J6: 2-3
    J7: 2-3, 1-4
    J8: 1-2, 5-6
    J9: Open
    The 5.25" floppy cable connects to pins 17-50 of the J3
        connector, pin 1 of the cable mates to pin 17 of J3.

STD-SASI

    Address is A0
     J2: 1-2, 3-4, 5-6, 7-8, 11-12
    J3: closed
    JA: open

STD-CRT

    Address is DC
    J2: 5-6
    J3: (internal use only, do not change)

Sequence of card positions: (slot 1 is left side)

                    COLEX-3240
    STD-FLP2   1
    STD-SASI   2
    STD-256DRAM 1   3
    STD-256DRAM 2   4 (if present)
    STD-PSIO   5
    STD-68000   6

No gaps may exist between the cards.

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Standard connections (all 25 pin female 'D' type connections).

Device codes (dev code) are noted as major:minor.

CP/M-68K device	Connector	Description
printer	J5	Centronics printer interface.
	J6	is reserved for future auxiliary printer use.
console	J13	Display terminal (DCE). dev code 6:0
modem	J14	Modem (DTE).
STD-CRT {	J15	Serial keyboard interface (5 pin DIN).
{	J16	Video connection (75 ohm BNC).

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Backpanel connector pinouts

Pin	J14	J13	J5	J6	J15
1	ground	ground	/STROBE	/STROBE	not used
2	Transmit data	Receive data	data 0	data 0	KB data
3	Receive data	Transmit data	1	1	LED data
4	RTS out	RTS in	2	2	Ground
5	CTS in	CTS out	3	3	+ 5 volt
6	DSR in	DSR out	4	4	chassis
7	ground	ground	5	5	
8	-	-	6	6	
9	-	-	7	7	
10	-	-	-	-	
11	-	-	BUSY	BUSY	
12	-	-	-	-	
13	-	-	-	-	
14	-	-	ground	ground	
15	sync I/O	sync I/O	ground	ground	
16	-	-	ground	ground	
17	clock I/O	clock I/O	ground	ground	
18	-	-	ground	ground	
19	-	-	ground	ground	
20	DTR out	DTR in	ground	ground	
21	-	-	ground	ground	
22	-	-	ground	ground	
23	-	-	ground	ground	
24	-	-	ground	ground	
25	clock I/O	clock I/O	ground	ground	

Power connections.

    110/220 Volts (internally selectable).
        Max. 160 watts required.

Reset push button.

        Forces the Processor to start as if power had just been
        applied. Located on the front panel.

Power switch.

        Applies power to the system when depressed.

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APPENDIX C

FLOPPY DISK FORMAT

CP/M-68K supports several common floppy formats. The built-in 5.25" floppy disk drive is capable of:

    double sided
    double density
    40 track, 360 Kb IBM-CP/M format (9 sector/track)
    80 track, 760 Kb COLEX-850 format (10 sectors/track)

CP/M-68K will identify which of the 2 formats is in use when the diskette is logged in, this occurs during the first access after a ^C (disk change) command. Subsequent   accesses   will   automatically   match   the   format determined.

Two 5.25" drives are supported in the firmware, they are labeled C: and D:.

8 INCH FLOPPY DISK INTERFACE

An 8 inch floppy drive can be connected to the system if a cable is added to the STD-FLP2 card.   This cable is 50 pins, pin one of J3 mates to pin 1 of the 8 inch floppy disk. The drive must be strapped as radial select unit 2 (DS3). It is possible for both 5.25" and 8 inch drives to be connected at the same time, no straps need be changed on the STD-FLP2 card.

The label of the 8" drive is E:.

HARD DISK FORMAT

The hard disk is split into 2 units. Each unit (A: and B:) has 5 megabytes of storage space.

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Ordering information.

The Colex COLEX-3240 computer is available in the following configuration:

COLEX-3240   68000 computer basic configuration. 4 free STD bus
              slots. CP/M-68K operating system supplied. 256KB
              RAM, 1 10Mb hard disk, 1 Floppy disk drive (758KB),
              2 serial ports, 1 parallel port. Includes system
              manual, and CP/M-68K users manual.

VT52U   A built-in video display controller allows VT52
              emulation at low cost. The VT52U includes the STD-
              CRT video display interface card plus a detachable
              VT100 style keyboard.

    For more information on any Colex product, including the COLEX range
of computers or the STD and VME bus board products, please contact your
local Colex sales agent or Colex office.

    Standard versions are all 110 volt, 50/60 Hz. To specify a 220 volt
version, add an 'E' after the product name.

VT52 is a trademark of DEC.
CP/M-68K is a trademark of Bell Labs.
CP/M is a trademark of Digital Research.

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APPLICATION NOTE 1

Setting up the 3240 for autoexecution.

The following commands can be entered in Debug to allow the system to perform some function automatically on power-on.

In step 2, note the starting address listed by DDT after loading. The address "zzzz" is this address plus 28 hex.


```
1) pip ocpm.sys=com.sys       (saves old copy of cp/m)
2) ddt
  -rcpm.sys

  -szzzz

zzzz    xx 03       (length of string, in this case 3)
zzzz+1  xx 44       (text string, in this case DIR)
zzzz+2  xx 49
zzzz+3  xx 52
zzzz+4  xx .        (end of s command)

  -wcpm.sys

3) type reset to test change
```

Introduction.

The COLEX-3240 is designed to provide a truly expandable 68000 based computer for system integrators and other OEMs. This Colex computer uses the industry standard 68000 microprocessor and the industry standard STD bus. The combination of these two well established computer concepts gives the Colex customer the most powerful software and hardware combination at an affordable price.

The COLEX-3240 uses the CP/M-68K operating system and contains the following features as key elements:

    68000 processor operating at 8.0 MHz
    256K bytes of dynamic memory
    2 Centronics printer interfaces
    A Modem interface
    A video display or serial printer interface
    1 - 5.25" floppy disk unit with 720 Kilobytes
    10 megabyte hard disk
    built-in video display (optional)