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Product Release Notes

MON960 Debug Monitor Release 3.2

These product release notes are divided into the following sections:

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† In this document Win32 refers to both Windows*95 and Windows NT*

Product Checklist

Item   Description

1. *MON960 Debug Monitor User's Guide*

2. *i960® Processor Tools License Guide*

3. Product Release Notes: *MON960 Debug Monitor Release 3.1*

4. Tape, CD-ROM, or diskettes containing the executables and source code for MON960, HDIL, HDILCOMM, and MONDB.

Product Enhancements and New Features

- The Cyclone IQ80960RD evaluation board is supported by this release of MON960.

- The Cyclone IQ80960RP evaluation board is supported by MON960 release 3.1 and later.

- MON960 R3.1 and later supports PCI communication for the following hosts and hardware:

    any Win32 host PC with a PCI bus, and a PCI-compliant BIOS, *and*

    any MON960-based target that includes a supported PCI interface.

    Intel's Cyclone baseboards meet these requirements, using PLX's PCI9060 PCI bus master interface chip or the Intel i960 RP processor. Note that the Cyclone baseboard requires a PC host that has sufficient physical space to accept a full-sized PCI card. For more information, see the "MON960 PCI Communication" section in these release notes.

- MONDB now supports modification of memory-mapped registers, using the `mm` debug command and modification/display of PCI registers. The `ph` command dumps the PCI registers (ATU registers on the i960 RP processor) from the host side while the `pp` (PLX9060) or (RP) commands dump the PCI registers from the target board side. A set of new commands to dump the CPU tables is also available. See Appendix B of the *MON960 Debug Monitor User's Guide.*

- MONDB and GDB960 now run under both Windows 95 and Windows NT. Install the device drivers for PCI as described in the "Changes in Operation" section in these release notes.

- MONDB now allows a remote workstation to access a host system's evaluation board via TCP/IP network connection. The same MONDB executable functions as both the client and the server based upon the command line options used. For details, see Appendix B of the *MON960 Debug Monitor User's Guide.* Note that this is beta-quality support. Please see the note in the "Known Problems" section in these release notes.

Finding Updates to the Release Notes

Updates to this document can be found on Intel's World-Wide Web site at:

http://developer.intel.com/design/i960/devtools/relnotes/

Use an HTML browser such as Microsoft* Internet Explorer* or Netscape* Navigator* to view the documents in this area.

IQ80960RD Evaluation Board Support

This section describes support for the IQ80960RD PCI evaluation boards.

Power-on Self-tests

The self-test (POST) for the Cyclone board is called from the user interface command `po`.

Cyclone Board DIP Switches

Switch ON	Function
SW1-1 OFF	Unused.
SW1-2 ROM Disable OFF	Disables booting from either Flash.
SW1-3 ROM Swap OFF	When off, the board boots from the Flash in location U9. When on, the board boots from the socketed Flash in location U10.
SW1-4 OFF	Unused.

NOTE. *On the IQ80960RD board, the orientation of SW1 is rotated 180 degrees from that of the IQ80960RP board. Switches are ON when set to the left and OFF when set to the right.*

Cyclone Board LEDs

LED	When Lit, Indicates
0	MON960 is listening to the serial port.
1	MON960 is writing to the serial port.
2	An application program is being executed.
3	MON960 is listening for a parallel download.
4-7	Only used during boot-up.

Note that LED 0 is the one closest to the serial connector. During boot-up, the Cyclone IQ80960RP baseboard LEDs (eight small red LEDs) indicate the following conditions:

- LED 0-2 on when memory tests are complete

- LED 3 on when core initialization is complete

- LED 4 on when Flash initialization is complete

- LED 5 on when ATU and MU initialization is complete

- LED 6 on when bridge initialization is complete

- LED 7 on when the UART test has passed

- all LEDs off when tests are complete

Thereafter, the LEDs indicate the conditions described in Table A-4 of the *MON960 Debug Monitor User's Guide*.

Downloading MON960 to the IQ80960RD Evaluation Platform

1. Identify the Flash on the Cyclone baseboard.
   U10 contains a socketed Flash device and U9 contains a board-mounted Flash device.
   You cannot program a Flash device placed in socket U10. The Flash located at U9 is
   provided for this purpose.

2. Power up or reset the host to reset the Cyclone baseboard.

3. Write the Flash.
   To write the Flash, use the `mondb.exe` utility located in the `intel960\bin\`
   directory. If you are going to use the pre-built MON960 files, they are located in the
   `intel960\roms` directory. For example, if you used the default installation directory
   and are using the pre-built MON960 files for the 80960RD, enter:

```
mondb –ser com1 –ef –ne c:\intel960\roms\cyrd.fls
```

The options in this command are:

`–ser com1`	use serial port 1
`–ne`	no execute
`–ef`	erase Flash
`cyrd.fls`	input Flash filename

Note also that if you built a version of MON960 from the source code as described previously, the `cyrd.fls` file will be located in the `c:\intel960\src\mon960\common\` directory. To build a `cyrd.fls` file, you must use the `moncyrd.ld` linker directive file, which contains the correct Flash device address settings.

4. Set board to boot from U9 socket.
   Locate the four-position DIP switch labeled SW1. Set SW1.3 ROMSWAP to the *ON* position. This exchanges the addresses of the U9 and U10 ROMs. When the switch is *OFF* the processor boots from the U9 ROM; when the switch is *ON* the processor boots from the U10 ROM.

5. Reset the baseboard.
   Reset the baseboard by rebooting the host PC. There is no reset switch on the IQ80960RP/RD evaluation boards.

NOTE. *There are two different Flash devices on the IQ80960RD board; a N28F020 Flash device at location U10, and a PA28F008SA Flash device at location U9.*

Notes on IQ80960RD Evaluation Board Support

- MON960 R3.2 includes support for the Cyclone IQ80960RD baseboard. Look for the Hex file `cyrd.hex` or the Flash monitor `cyrd.fls` in the `ROMS` directory.

- The Cyclone IQ80960RD memory map is `0xa0000000` for DRAM, `0xfec00000` for baseboard Flash in socket U9 and `0xfee00000` for baseboard Flash in socket U10. The romswap switch ON selects U10 Flash for booting or romswap switch OFF selects U9 Flash for booting. Led 1 is the right led on the 8 led block.

Notes on IQ80960RP Evaluation Board Support

- MON960 R3.1 and later includes support for the Cyclone IQ80960RP baseboard. Look for the Hex file `cyrp.hex` or the Flash monitor `cyrp.fls` in the `ROMS` directory.

- The `cyt*.*` files (in the `src/mon960/common` directory) contain the Cyclone PCI80960DP evaluation board test code. The `cyr_*.*` files (in the `src\mon960\common` directory) contain the Cyclone IQ80960RP evaluation board test code.

- The Cyclone IQ80960RP memory map is `0xa0000000` for DRAM, `0xfef80000` for baseboard Flash in socket U3 and `0xfefc0000` for baseboard Flash in socket U4. The romswap switch OFF selects U4 Flash for booting or romswap switch ON selects U3 Flash for booting. Led 1 is the right led on the 8 led block.

MON960 PCI Communication

MON960 supports PCI communication on the Cyclone IQ80960RP/RD or PCI80960DP evaluation boards. You can connect using either PCI or serial communications on either board, or alternate between the two. You can interrupt a running target via serial and PCI communication paths. For information on PCI communication semantics and mechanics, refer to the *MON960 Debug Monitor User's Guide*, Appendix B.

IQ80960RP Interface

MON960 requires the following resources of the IQ80960RP interface:

- Exclusive use of the IQ80960RP ATU input message register 1, which is used to transfer 32-bit data

- Exclusive use of the IQ80960RP ATU Output Message register 1, which provides status bits to implement a state machine for transferring data

- ATU Inbound Doorbell register bit 31, which is used to interrupt the target

- ATU Inbound Doorbell register bit 30, which is reserved

- ATU Outbound Doorbell register bits 30 and 31, which are reserved

Compatibility Notes

- MON960 R3.1 and later PCI download protocol is not backward-compatible with MON960 version 2.2.4 beta.

- MON960 R3.1 and later supports PCI communication using MONDB. The version of MONDB included in R3.1 is incompatible with the PCI download feature included with MON960 R2.2. To use PCI download with the MONDB included in this release, you must upgrade to MON960 R3.0.1 or later.

- MON960 R3.2 is built and tested for use with CTOOLS R.5.1 tools. Because of this, building MON960 with previous versions of CTOOLS is not supported.

Building MONDB in the WIN32 Environment

To build MONDB in Windows 95 or Windows NT:

1. Change to the `hdilcomm\common` directory.

2. Type the command:

   nmake -fmakefile.w32

3. Change to the `hdil\common` directory and repeat step 2.

4. Change to the `mondb\common` directory and repeat step 2.

Building MON960 in the WIN32 Environment

There are four makefiles that can be used to make the MON960 executable in Windows 95 or Windows NT. They are as follows:

> `makefile.gc` (gcc960/COFF format)
>
> `makefile.ic` (ic960/COFF format)
>
> `makefile.ge` (gcc960/ELF format)
>
> `makefile.ie` (ic960/ELF format)

To build MON960 in Windows 95 or Windows NT:

1. Rename any of the makefiles listed above to:

    `makefile`

2. Type the command:

    nmake cyxx

    where `xx` represents the desired i960 architecture (e.g., `rp, jx, hx`).

NOTE. *Make sure that you are using Microsoft nmake version 1.5 or later.*

Changes In Operation

*   Windows NT requires that the PCI driver (`pci_wnt.sys`) is installed before any PCI functions can operate. Windows 95 does not need its VXD driver (`pci_w95.vxd`) for operation, however, downloads run five times faster when the VXD driver is available. To install the Windows 95 VXD, copy `pci_w95.vxd` to any directory in your path. To install the Windows NT device driver you need to run `reg_ntdd.exe` from a command window and then reboot your system. Run this program with two parameters:

    reg_ntdd *CTOOLS-root-dir   WinNT-dir*

See `set_ntdd.bat` for an example assuming `pci_wnt.sys` in the "Intel tools directory/bin". These files are usually found in the directory `c:\intel960\bin`. If `pci_wnt.sys` is in `C:\intel960\bin` then to install the NT drive you type the following in a command window:

```
reg_ntdd c:\intel960 %SystemRoot%
```

Note that `reg_ntdd` looks for `pci_wnt.sys` in the bin directory under the directory specified. After running `reg_ntdd` you must shutdown and restart your Windows NT system. Now the driver is loaded after every Windows NT boot. You can verify this by looking in the Control Panel Devices icon. Look for `PCI_WNT` in the device list and it should be started and automatic.

- MON960 R3.1 and later now requires six carriage returns (`<Enter>`) to connect in user interface mode. This change was made to resolve a problem caused by Windows NT writing data on the serial port during boot-up. This resulted in the monitor attempting to connect in user interface mode, and unsuccessful serial and PCI connections. Users of previous versions of MON960 should disconnect the serial line during boot-up.

- MONDB has been split into seven files. See Appendix B of the *MON960 Debug Monitor User's Guide* for details.

- MON960 now supports linking user programs to the monitor without changing the MON960 source code. See Chapter 7 of the *MON960 Debug Monitor User's Guide* for details.

- MONDB and GDB960 executables now run on either Window 95 or Windows NT systems.

- MON960 now supports the i960 Rx processor and the new Cyclone IQ80960RP and IQ80960RD evaluation boards. Files `rp.s, rp_break.c, rp_step.c, rp_cpu.c` and `rp_ibr.c` support the i960 Rx processor. Files `cyrp.asm, cyrp_hw.c, cyrp.hw_c, cyr_eep.c, moncyrp.ld, pci_bios.h, pci_devs.h` and `pci_serv.c` support the new Cyclone IQ80960RP/RD boards. Files `rp_80960.h` and `plx_9060.h` replace `cyc9060.h`.

- The HDIL interface now supports both Windows 95 and Windows NT. It automatically determines which system is running and loads the correct device driver. This allows a single version of a debugger (MONDB) to run on both systems.

- The HDIL interface includes the following changes to files:

  DOS files `dos_pci.c`, `dos_io.c`, `ser_dos.asm`, `8250.h`, `pcirmode.asm`, `pcirmode.inc`, `timer.c`, `invects.asm`, `makefile.msc`, and `maklib.msc` are removed.

  The PCI routines now support the PLX chip and the i960 Rx processor.

  `Plx_pci.c` becomes `pci_drvr.c`.

  `dos_pci.c` becomes `win_pci.c`.

  `cyc9060.h` becomes `rp80960.h` and `plx9060.h`.

  `Xltbaud.c` is merged into `unix_io.c`.

  `Pci_w95.asm` is the source code for the Windows 95 VXD.

  > **NOTE.** To build `pci_w95.vxd`, you must have Microsoft MASM installed and in your `AUTOEXEC.BAT` PATH statement. To build `pci_w95.vxd` change to the `hdilcomm\common` directory and type:
  > **`nmake -fmakefile.w32 pci_w95.vxd`**

  All makefiles use `w32` instead of `w95`.

  A separate device driver for Windows NT is in directory `hdilcomm/winnt_dd` where file `pci_wnt.c` is the source code for the device driver.

- The MON960 makefile now provides defaults for all parameters in the `make make` operation. The makefile has added the parameter `OBJ_FMT` to select either COFF or ELF output.

- MONDB now supports erasing a single Flash chip when two or more are connected in the same region. The `-pcil` option now displays the first 64 bytes of PCI configuration space for each PCI device found.

- The example minimum MON960 monitor built by `minimal.mak` (see Chapter 5 of the *MON960 Debug Monitor User's Guide*) is now included in the standard MON960 makefile.

- INSTALL now adds an `src` directory before directories `mon960`, `mondb`, `hdilcomm`, and `hdil`. For example:

  `c:\intel960\src\mon960\common.`

Known Problems

Manual Correction

On page 3-11 of the MON960 Debug Monitor User's Guide, step 8 should read "SW 1.2" instead of "SW 1.3".

i960 CF Processor Module Does Not Run At 40 MHz

The Cyclone CF processor module cannot run reliably at 40 MHz on a Cyclone PCI baseboard; use the 33 MHz setting instead. 40 MHz operations are supported on a non-PCI Cyclone baseboard if a Squall module is not installed.

Windows NT Puts Data on the Serial Port During Boot-Up

The data on the serial port causes the monitor to connect in user interface mode, resulting in unsuccessful serial and PCI connections. To resolve this problem, MON960 R3.1 and later now requires six carriage returns (`<Enter>`) to connect in user interface mode. Users of previous versions of MON960 should disconnect the serial line during boot-up.

Windows NT Beta2 `nmake` Fails When Deleting Non-Existent Files.

Running `nmake` on only Windows NT Beta 2 4.0 for MON960, HDIL, or MONDB fails when trying to delete non-existing files. Use Windows NT version 3.51, Beta 4.0 or release 4.0, which work correctly.

TCP/IP Communication Timeouts

The TCPCOMM driver included with this release is functional at a beta level. Communications timeouts may occur on some client/server combinations.

End of Support

MON960 does not support these features:

- The i960 Kx and Sx CPU-specific code will not be maintained on future releases of the monitor. However, the code will remain in the source base, to serve as an example for users who wish to have i960 Kx or Sx targets.

- DOS batch files for building MON960. Future releases will require Microsoft `nmake.exe` to make MON960.

- After release 3.1, MON960 will no longer support the ApLink hardware/software probe.

* Other brands and names are the property of their respective owners.

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