OCDS Debugging with µVision2

Application Note 146

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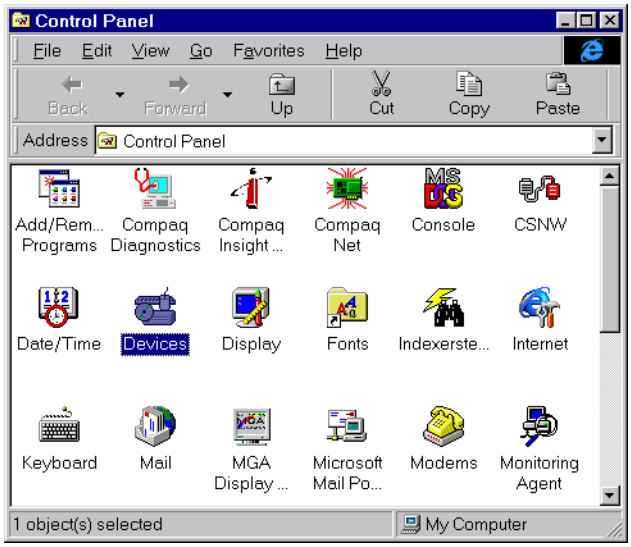
This application note describes the beta release of the OCDS Debugger interface. Excuse the uncomfortable way to install the OCDS driver. We will include all the files in our next uVision installation as soon as the OCDS driver is officially released. The current version is a beta version.

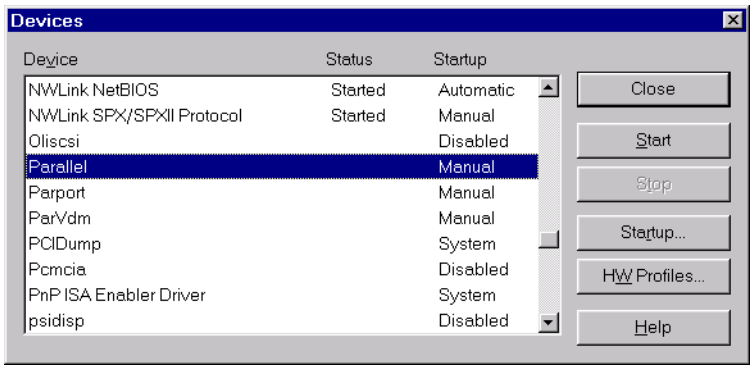
With the OCDS interface you can download your application into the RAM of your target system. Starting the application or performing single steps is possible when the application is located in RAM or in ROM. When it is located in ROM, a monitor must be linked to the application which enables the debugger to access the instruction pointer.

Please follow the instructions below to add OCDS debugging to µVision2.

1. Expand the OCDS.EXE file into a new directory with directory path information.
2. If you are using Windows NT 4.0 you need to install the WINRT system driver to be able to access the printer port with the debugger. If you are not using Windows NT, please skip this paragraph and proceed to paragraph 3.
   All files necessary to install the WINRT system driver are located in the directory 'winrt_nt'. These files are provided by Infineon. Since I got some WinNT blue screens when I tried to install the driver the way it was described in the README.PDF file, I want to show you how it worked on my PC
   - Copy WinRT.sys into your driver directory (usually C:\Winnt\system32\driver)
   - Run WinRT_NT_Reg.exe to enter all registry keys. Be aware that at this time you should know about the resources of your PC port. Details are given when you start WinRT_NT_Reg.exe! Typical values are: Port Address = 378, Port Address Length = 3 and Interrupt = 0.
   - Reboot your PC to activate the new registry keys
   - All devices that use the parallel port must be disabled and the WINRT driver must be enabled. This is done the following way:
   Open the Control Panel and select 'Devices'

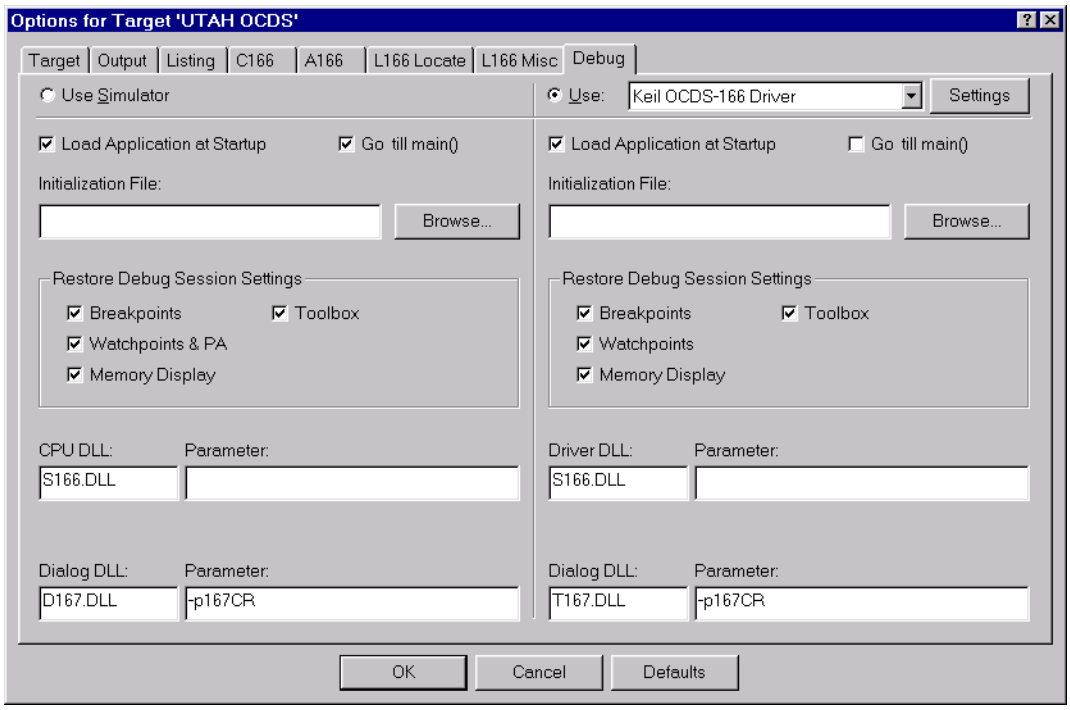


Then, the following dialog shows up:

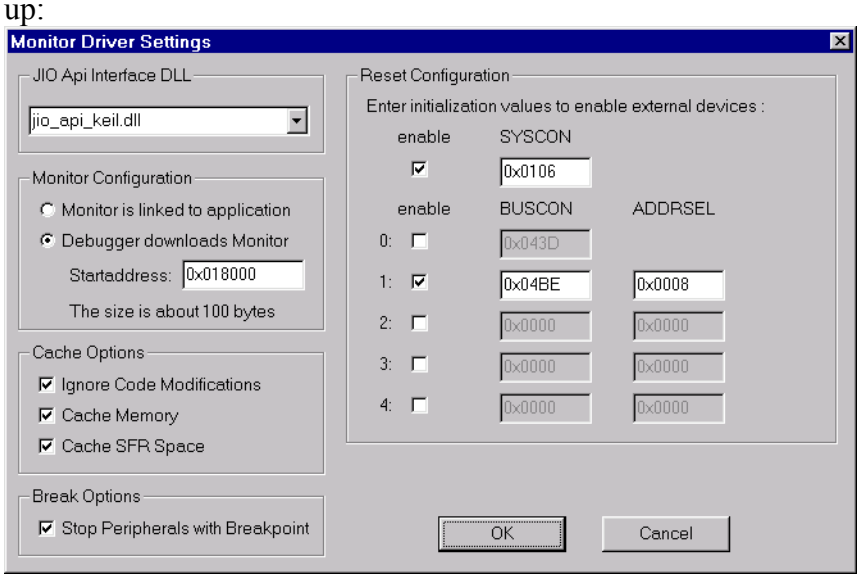


Set the 'Startup' type to 'Manual' for the devices 'Parallel', 'Parport', 'ParVdm' and 'Sentinel' if present. Then, set the 'Startup' type to 'Automatic' for the 'WinRT' device. If you have more devices connected to the printer port such as security devices (dongles), external ZIP drives etc. please disconnect them and set their device driver to 'Manual'.
– Reboot your PC again. Manually starting or stopping the devices without rebooting the PC caused a blue screen on my PC.

3. Copy the folder OCDS with all files into the directory '<your_drive>:\Keil\C166'.
4. Add the line 'TDRV1...' directly after the 'TDRV0 ...' line in the TOOLS.INI file (directory: <your_drive>:\Keil) as shown below:
```
TDRV0=MONITOR\MON166.DLL ("Keil Monitor-166 Driver")
TDRV1=OCDS\CBC166.DLL ("Keil OCDS-166 Driver")
```
5. Setup the debugger to use the OCDS interface.
   - Select the OCDS driver in your target options as shown below:



Then, select 'Settings' on the upper right corner of the dialog and the following dialog shows up:



The settings above are suitable for the C165UTAH board.
Here are all settings in detail:

JIO API Interface DLL:
Currently, there is only one DLL available (jio_api_keil.dll). Future versions will support different wigglers.

Monitor Configuration:
The µVision2 debugger needs to have a monitor on the target system because the OCDS interface does not support reading or writing the instruction pointer. This monitor allocates

the debug trap 8 (address 20H) and about 100 bytes of code. There are two choices.
Select 'Monitor is linked to application' when your have linked the monitor to your application. In this case the application can be downloaded into RAM, or can be already programmed into (Flash) ROM.
Select 'Debugger downloads Monitor' when your application does not contain the monitor. This is the recommended option when the application is downloaded into RAM. When this option is selected, you have to specify the start address of the monitor to be downloaded. This address must not be equal to zero. It is recommended to locate the monitor to the end of the RAM area to avoid conflicts with your application. You have to reserve the debug trap 8 (address 20H) of your application in this case.

Cache Options:
These controls improve µVision performance during target debugging by caching target memory areas in the PC memory. All of these options are selected by default to gain maximum performance.
'Ignore Code Modifications' selects that once downloaded program code is never changed and therefore never read from the target system. Deselect this option if you are using self modifying code.
'Cache Memory' selects that the memory content is considered to be constant until the next single step, procedure step or go command is executed. Deselect this option if you want to see the actual memory content (e.g. of memory mapped peripherals) even if the debugger is halted.
'Cache SFR Space' is the same as 'Cache Memory' in the memory area 0xF000 – 0xF1FF and 0xFE00 – 0xFFFF.

Break Options:
'Stop Peripherals with Breakpoint' selects that all on-chip peripherals (e.g. timers) are stopped when the application is stopped manually or because of a breakpoint.

Reset Configuration
In order to download the application or the monitor into a RAM which is connected to a chip select line other than 0, the bus system (BUSCONx and ADDRSELx) needs to be initialized after a reset to enable this device. Enter suitable values for your target system if necessary.

6. Known problems:
- Currently there is no way to stop the CPU after a reset without executing the first instruction at address 0. In most hardware designs, there is (Flash) ROM connected to chip select 0 (CS0) and RAM to CS1. Therefore, the first instruction in the ROM must be a valid instruction which must not cause any traps or system lock up. The Easy UTAH board is shipped with a preprogrammed flash device and even erased EPROM or flash devices do not cause a problem. Problems may arise when no device is active on the bus at address 0 or when the device contains random data.

- When you download and start your application in external RAM which is not connected to chip-select 0 and you press the reset button on the target system, the system crashes. This is because only chip-select 0 is active after a reset and the RAM cannot be accessed in this case.

This does not apply if you press the reset button within the µVision2 debugger.