Connecting the EMUL166 and EMULST10 Emulators to Your Target Hardware.

Application Note # 101 *Version 2.1*

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Nohau Case Studies: Getting an Emulator to Run On A Real Life Target

Connecting an emulator to a target system can require some careful work. The Nohau EMUL166 mimics the C166 family as closely as possible. There are a few issues that can cause particular problems. Here are some useful hints:

1) Try the emulator in stand-alone mode first. Get it to work this way first. You do not need to have the complications of your target buses making things harder to resolve. Keep things simple at first.

2) If you connect the emulator to the target without making any changes to your jumper or software settings: the emulator should still work. If it does not, check for shorted or incorrect signal lines on the target. Get someone else to check your board layout. Many problems are finally traced to crossed lines. Nohau makes a set of useful isolation boards. Please call your local rep or Nohau direct.

3) Once you have the emulator working from its internal memory - you can switch to the target memory.

4) Remove the RESET and READY jumpers. If your reset stays on too long, the emulator will never run.

5) Measure the CPU frequency at the ECLK pad on the emulator. See Figure 3 in Chapter 1 of the Getting Started Manual for the EMUL166-PC. Make sure it is what you expect it to be. If your program crashes, make sure the frequency is not changing unexpectedly.

6) Most users prefer to bring the target's clock up to the bondout controller. Make sure your target clock pins are correct. JP10 and JP7 should be in the lower position. Please note that the microcontroller documentation specifies the two crystal capacitors to be of different values. Having the same value for both can create some startup problems when the added distance of the emulator adapters is added.

7) If you are supplying power to the target and the emulator separately, make sure JP6 T-PWR is not connected. Make sure you use the proper power sequence to protect the bondout. Never allow the target to have power without the emulator being powered up. This can damage the bondout.

8) Consider purchasing an evaluation board to serve as a reference design. Phytec boards are good choices but you should consider that some do not use the Siemens chip selects but rather a GAL device for addressing. The C161 and C164 boards are like this. The early C161 board does not use the Siemens bootstrap mode. The C167 board uses CS0 for the FLASH and CS1 for the RAM and this setup is very easy to use. Adapters are very inexpensive for these boards. See www.phytec.com.

9) To test target RAM, use the data window to change a memory location to different values such as FF or 00. The emulator must return the same value that you entered. You can use any erroneous bit patterns to help determine where the error is. Stuck bits, flakey values and croswed bits are very common and will obviously stop the system from working properly.

10) Design small test programs that you can send to Nohau technical support. Please include the source and any compiler project files if these are used. The ability to replicate the problem is important and helps a great deal.

11) The reset location (00 0000) will normally contain a valid jump instruction after the user code has been loaded. If it does not, make sure you are in the correct address space such as external or single-chip mode and that you are not accessing some ROM.

12) If you have some RAM on your target and you have this mapped to your emulator: you should be able to write values to this RAM from within a Data window and get the same value returned. You should be able to do this on adjacent bytes and also on a whole word. If you do not get the same value returned, you are either in some sort of ROM, nonexistent or defective RAM or a setting could be incorrect.

If you can write correctly to one byte yet not to the next byte, this nearly always means adapter problems or crossed data lines on your target.

13) Pay special attention to the Port0 configuration resistors at startup. Many problems result from incorrect settings. Do not trust the target schematic diagram - ohm out the connections by hand in case there are layout errors. Make sure the RPOH register (visible in the register window) is what you expect.

14) Make sure your target is in bootstrap mode or not - whichever you expect. The EMUL166 emulator has an icon labeled "BSL" in the Seehau software to indicate whether bootstrap mode is selected or not according to what the emulator sees on Port0. The ST10 does not have this icon. Call Nohau technical support if you need help. The bootstrap mode is set with Port0 bit 4 (POL.4) being low at RESET.

15) Make sure the chip on the target board is indeed in Adapt Mode. Consult the Infineon or STMicroelectronics datasheet for more information. The emulator uses a 10 Kohm pulldown resistor on Port0 POl.1 and under normal circumstances this is sufficient. In cases where the target circuitry provides pullup resistance on this pin, an additional external 10 K resistor may be needed. Erratic operation will result from the target CPU being marginally in Adapt mode.

15) If you find a problem - fix it before you move one to the next hint. Ignoring a problem will not help you get your system working. Your problem will not get fixed until each anomaly is corrected. Do not assume a problem is insignificant to your situation. These are valuable clues that must be attended to.

16) Please remember that there are many legitimate reasons that the emulator will not work in the target and the real chip will. This is an important clue and I believe this document clearly illustrates the importance of understanding the appropriate issues that cause this effect.

For more information, contact your local Nohau representative or Nohau at www.nohau.com.

For more applicable Application Notes see www.nohau.com.