POD51–EH–SAB–C515

Figure 1. POD51–EH–SAB–C515

Operating Instructions

The POD51-EH-SAB-C515 supports the Siemens C515 controller which is based on the C500 core.

This pod is supported by the EMUL51–PC Windows software version 2.1G or later. To work with this pod, you need to choose processor C515 in the Hardware Configuration window.

The EPROM on the emulator board must be version COM 1.4 or later. If it is an older version, you need to replace it with a newer EPROM.

The pod assembly consists of two sub-assemblies. The universal Port Replacement Unit (PRU), is the larger board that carries the small Processor Module (PM) daughterboard.

The PRU has three headers on the bottom that carry the signals to the target. For the packages with the small pinout (44-pin), it also provides a 44-pin PGA socket on the bottom that you can connect to the target using an adapter. The PRU also has a 50-pin header J1 that connects through the ribbon cable to the emulator board.

The target headers plug into an adapter that you select depending on the type of the controller. For example, the SAB-C515 microcontroller uses the following adapters.

- Emulation Solutions 180–5550–40 (socketable)

- Emulation Solutions 180–5550–45 (non-socketable)

    The adapters plug into the target system, replacing the C515 controller IC. These adapters can be ordered from Nohau Corporation or directly from Emulation Solutions.

    POD51-EH-SAB-C515 runs to a maximum frequency of 24 MHz, and has two operating modes.

- Single-Chip

- Expanded

    The active mode is selected by the EA pin (Pin 49 of the target adapter) during Reset signal rise (also sampled on internal watchdog timer reset). It is recommended that you connect this pin to either Constant Low or Constant High. This pin defaults to High (selecting Single-Chip mode), which is implemented by a 22K pull-up resistor on the pin.

    When using the Expanded mode, the code memory can be mapped either to the target or to the emulator (with boundaries of 4 Kbytes). In Expanded mode, addresses are seen on the Port2 and Port0 pins for every bus cycle, regardless of where it is mapped to. The data, however, reads or writes to the Port0 pins only for addresses that are mapped to the target.

    When using Single-Chip mode, all code memory must be mapped to the emulator board. In this mode, Port2 and Port0 can be used as I/O ports. These pins carry the address and data information only for XRAM data access to an address that is mapped to the target. In all other cases (for example, code access), these pins do not carry the address or data information. All of the code is fetched from an internal code memory of the chip.

Jumpers

Ground SeLect (GSL)—VAGND Grounding Select

This jumper selects how to ground the VAGND pin of the controller. When the jumper top is across Pins 1 and 2, VAGND is connected to emulator ground. When the jumper top is across Pins 2 and 3, VAGND is grounded through Pin 4 of the target adapter.Pin 3 of the jumper is marked by the letter T to show connection to the target. The default position of the jumper top is across Pins 1 and 2 (emulator ground selected).

Reference SeLect (RSL)—VAREF Source Select

This jumper selects how to power the VAREF pin of the controller. When the jumper top is across Pins 1 and 2, VAREF is connected to emulator. When the jumper top is across Pins 2 and 3, VAREF is connected to the target through Pin 3 of the target adapter. Pin 3 of the jumper is marked by the letter T to show connection to the target. The default position of the jumper top is across Pins 1 and 2 (emulator selected as the voltage source).

VCC SeLect (VSL)—Controller VCC Source Select

This jumper selects how to power the VCC pins of the controller. When the jumper top is on Pins 1 and 2, the controller VCC pins are connected to the VCC of the emulator. When the jumper top is on Pins 2 and 3, the controller VCC pins are connected to Pins 33 and 69 of the adapter. This allows the controller VCC pins to be powered by the target. The default position of the jumper top is across Pins 1 and 2 (emulator selected as VCC source).

Note: *Taking power from the target system is **not recommended**. Both VCC pins of the controller are shorted together.*

X1S, X2S—XTAL1 and XTAL2 Source Select

These two jumpers select the clock source for the controller. With the jumper tops on Pins 1 and 2, the controller XTAL1 and XTAL2 pins are connected to a 24 MHz crystal on the pod. When these two jumpers have jumper tops on Pins 2 and 3, the controller XTAL1 and XTAL2 pins are connected to Pins 37 and 36 of the adapter. This allows the target to supply the clock to the controller XTAL1 and XTAL2 pins. The default position of the jumper top is across Pins 1 and 2 (the pod crystal).

Note: *Both of the jumper tops need to be placed in the same position with either both selecting the pod crystal source, or both selecting the target clock source.*

JP8—Monitor Stop/Break Select

This jumper determines whether all or only part of the internal MCU peripherals stop in monitor mode after an emulation break occurs. When the jumper top is out, the STOP mode is selected. In this case, all of the internal MCU peripherals are stopped in monitor mode. This includes the following controller peripherals.

- Interrupts

- Watchdog Timer

- Timer0

- Timer1

- Timer2

- Timer2 Capture

When the jumper top is on, the BREAK mode is selected. In this case, only some of the internal peripherals are stopped. This includes the following controller peripherals.

- Interrupts

- Watchdog Timer

- Timer2

  Timer0, Timer1, and Timer2 Capture are not stopped in this mode.

  In STOP and BREAK, all of the internal peripherals start working from the same point they stopped before the break as soon as the user program starts running again when you press the GO or STEP buttons. When changing this jumper, the new STOP/BREAK mode takes effect after the next RESET sequence. The default setup of the jumper is STOP mode selection (jumper top out).

  Note: *It is recommended to work in STOP mode only. The break mode needs to be se-lected only if your application has limitations that do not allow the timers to be stopped in monitor mode.*

XL0..XL7—Port Select Jumpers

These eight 3-pin jumpers select the signals that are routed to the trace board and are shown in the trace window under the header P1. For any jumper in this group the jumper top position Pin2–Pin3 means that the corresponding pin of the recreated Port0 is traced. Pin 1 of each jumper is left free and can be connected to any signal on the target or port headers on the pod. For example setting XL4 in position 2–3 means that pin P0.4 is traced. If pin XL4.1, for exam-ple, is connected to a signal P4.3 on the target, you can choose between tracing signal P0.4 or P4.3 by moving the jumper between positions 2–3 and 1–2.

XH0..XH7—Port Select Jumpers

This group of jumpers is similar to XL0..XL7, except Pin 3 of each jumper is connected to the recreated Port2 and Pin 1 is left free.

JP7 (External Code Enable)

This jumper enables access to the external code if the single-chip mode is emulated and part of the code is mapped into the target code memory. The external code is enabled if the jumper top is out (default jumper configuration).

Reset Button

When pressed, this switch resets the pod (including the controller). You can use this button to recover from a Map Error status. (See the following "Map Error LED" section.)

Reset LED

The Reset LED (red LED) is turned on whenever the microcontroller Reset is active. There are five possible sources of the controller reset.

1. Reset from the target starts whenever a Low level is detected on the Reset pin of the adapter.

2. Reset from the S1 button starts by pressing the S1 button on the pod.

3. Reset from the emulator starts by clicking the Reset button in the user interface EMUL51–PC Windows software.

4. Reset from the internal watchdog timer starts if the internal watchdog is enabled, and the watchdog was not fed by the user software for a long period.

Note: *It is important to feed the watchdog periodically, otherwise, problems during the debug process might occur.*

5. When a Map Error occurs. (See the following "Map Error LED" section.)

During all of these reset sequences, the Reset LED is turned on for a short or long period depending on the sequence).

Map Error LED

The red LED signals a map error that happens when all of the following conditions occur.

- Single-Chip mode is selected by the EA pin from the target.

- All or part of the internal MCU code (address 0 to 8K) is mapped to the target

- Code is accessed to one of the addresses in this range.

  This state is illegal. In the single-chip mode, the first 8K of the code memory needs to be mapped to the emulator and not to the target.

  If this illegal state occurs, the Map Error LED turns on simultaneously. The the controller enters the reset state, signaling to the user that this illegal state has occurred. This state is maintained until the you push the Reset button.

  To reset the pod in order to leave the Map Error state, press the RESET button S1 on the pod. This prevents repetitive occurrences of the illegal state until you fix the problem.

Emulation LED

The Emulation LED (green LED) turns on whenever the user program is running, and turns off whenever the user program is stopped (emulation break). The user code can be fetched from RAM on the emulator board or from Code memory on the target (usually PROM).

Monitor LED

The Monitor LED (yellow LED) turns on whenever the Monitor Mode is active. In this mode, the C515 controller executes internal emulator code that communicates with the host PC. The emulator enters this mode upon power-up or after emulation break.

Headers

JP10—SY0, SY1

This header contains two pins: Pin1 (SY0), and Pin 2 (SY1). These two signals are carried to the emulator and trace boards, and can be used in the trace and breakpoint logic.

JP9—EMUL, FLF, ANB

This header contains three pins: Pin 1 (EMUL), Pin 2 (FLF), and Pin 3 (ANB). Pin1 signals emulation or monitor mode. It is low when emulation is active (when the user program is running). Pins 2 and 3 are not used currently, but can be used in the future.

J2—P3.6, P3.7

This header carries the recreated signals; P3.6/WR (Pin J2.1) and P3.7/RD (Pin J2.2). These pins observe the signals or route them to the trace board through the headers XL0..XL7, XH0..XH7.

JP1—PE, EA, ALE, PSEN

This header carries the signal listed previously and is used for testing, or can be connected to the trace board through the headers XL0..XL7, XH0..XH7.

P1, P3, P4, P5, P6—Port Headers

These headers carry signals for the corresponding ports. The port pin numbers are marked on the silkscreen. For example, Pin 5 of header P4 connects to Pin P4.5 of the microcontroller.

Note: *Earlier revisions of POD51–EH–SAB–C515 might have header JP15 installed on the board. This header is for factory testing only and is not for any user functions.*

Differences between the Emulator and the C515 Controller

The EA Pin—The EA pin is an input pin that during Reset, is sampled by the controller in order to select between Single-Chip mode (program in internal ROM) and expanded mode (program in external memory). This input pin on the C515 controller floats, meaning it does not have a pull-up or pull-down resistor. On the POD51-EH-SAB-C515, a 22K pull-up resistor connects to this pin to select a default state of Single-Chip mode when this pin is not forced by the target. This difference must be taken into account if the target pin is tied to a pull-down resistor. A sufficiently low pull-down (1.5K or lower) is required to overcome the 22K pull-up resistor on the pod.

Port0 and Port2 Pins—These 16 port pins, used as the address/data bus and as port pins, are emulated by the POD51–EH–SAB–C515. These pins have slightly different AC and DC characteristics from the Port0 and Port2 pins of the C515 controller. These pins sink up to 12mA and source up to 4mA, while maintaining valid TTL output logic levels. Port2 pins also have pull-up resistors of 22K, which might be different from the C515 controller internal pull-ups.

Connecting the Pod to a Target System

1. Make sure the power is turned off in both the host PC and the target system.

2. Connect the black EZ-hook from the pod to the target GND.

3. Turn on the power to the PC first, and then turn on the power to the target.

4. When turning the power off, turn off the target power first, and then turn off the PC power.