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# **M68ICS08JB**

## **In-Circuit Simulator**

**User's Manual**



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**User's Manual — M68ICS08JB In-Circuit Simulator**


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## **Section 1. General Information**

### **1.1 Introduction**

This section provides general information about the Motorola M68ICS08JB in-circuit simulator (JBICS).

The M68ICS08JB JBICS board is a stand-alone development and debugging tool. It contains the hardware and software needed to develop and simulate source code and to program Motorola's MC68HC908JB8 microcontroller unit (MCU).

The JBICS and its software form a complete editor, assembler, programmer, simulator, and limited real-time input/output emulator for the MCU. When connection is made between a host PC (personal computer) and target hardware (your prototype product), actual inputs and outputs of the target system may be used during code simulation.

The JBICS can interface with any IBM® Windows 95®-based computer (or later version) through connection of a single RS-232 serial port using a DB-9 serial cable.

Connection to the target system is accomplished by a ribbon cable, a Motorola M6CLB05C flex cable, a MONO8 cable, or one of two DIP emulation cables (low cost alternatives to the flex cable). The ribbon cable or flex cable or DIP cable is used when an MCU is resident on the JBICS for emulation or simulation, and the MONO8 cable is used to debug or program a target system's MCU, directly, when the MCU resides on the target hardware.



**Figure 1-1 M68ICS08JB In-Circuit Simulator Board**

The JBICS is a low-cost development system that supports editing, assembling, in-circuit simulation, in-circuit emulation, and FLASH memory programming. Its features include:

- Editing with WinIDE
- Assembling with CASM08Z
- Programming FLASH memory with PROG08SZ
- Simulating in-circuit and stand-alone MC68HC908JB MCUs with ICS08JBZ software, providing:
  - Simulation of all instructions, memory, and peripherals
  - Simulation of pin inputs from the target system
  - Installation of conditional breakpoints, script files, and logfiles
- Debugging and emulation (limited real-time) with ICD08SZ, including:
  - Loading code into RAM

- Executing real-time in RAM or FLASH
- Placing one hardware breakpoint in FLASH
- Placing multiple breakpoints in RAM
- On-line help documentation for all software
- Software integrated into the WinIDE environment, allowing function key access to all applications
- MON08 emulation connection to the target system allowing:
  - In-circuit emulation
  - In-circuit simulation
  - In-circuit programming
- Four modes of operation:
  - Standalone — using the JBICS as a standalone system without a target board
  - Simulation — using the JBICS as an in-circuit simulator/emulator with a target cable
  - Evaluation - using the JBICS for real-time evaluation of the MCU and to debug user developed hardware and software
  - Programming — using the JBICS as a programmer
- With the ICD08SZ debugging software, code may be run directly out of the MCU's internal FLASH at real-time speeds.
- With the WinIDE, CASM08Z, editor, simulator, and assembler software - the function is as a limited real-time emulator.
- With the PROG08SZ software - the function is to program MCU FLASH memory.
- With the ICS08JBZ simulation software, the MCU provides the required input/output information that lets the host computer simulate code, performing all functions except for maintaining port values. (The internal FLASH memory on the device is downloaded with a program that generates the appropriate port values.) The ICS08JBZ software on the host computer lets the host computer become a simulator.
- With using the ICD08SZ debugging software, code can be run directly out of the MCU's internal FLASH at real-time speeds.

- Timing is accomplished through a 6.0 MHz crystal

### 1.2 JBICS Components

The complete JBICS system includes hardware, software, and documentation. **Table 1-1** lists the JBICS product components.

**Table 1-1 JBICS Product Components**

Part Number	Description
ICS08JB	JBICS software development package
ICS08JBZ	JBICS simulator
ICD08SZ	JBICS debugger/emulation
MC68HC908JB8FB	MCU (44-pin QFP package)
MC68HC908JB8ADW	MCU (SOIC Package)
MC68HC908JB8JP	MCU (PDIP Package)
M68CLB05C	Flex target cable
KRISTA 22-122	Serial cable
FRIWO 11.8999-P5	Power supply
M68ICS08JB	Hardware board
M68ICS08SOM/D	<i>M68ICS08JB In-circuit Simulator Software Operator's Manual</i>
M68ICS08JBHOM/D	<i>M68ICS08 In-circuit Simulator Hardware Operator's Manual</i>

## 1.2.1 JBICS Hardware

**Table 1-2** lists the JBICS hardware components.

**Table 1-2. Hardware Connector Components**

Components	Description
XU1	Clam shell test socket for Motorola MC68HC908JB8 MCU; 64-pin QFP (quad flat pack)
XU2	28-pin SOIC test socket for Motorola MC68HC908JB8 MCU
XU3	20-pin PDIP test socket for Motorola MC68HC908JB8
J1 & J2	Two 2-row × 20-pin, 0.1-inch spacing connectors to connect JBICS to a target using M68CLB05C flex cable
J3	Connector to connect 28-pin DIP emulation cable between JBICS and target.
J4	Connector to connect 20-pin DIP emulation cable between JBICS and target.
J5	One 2-row × 8-pin, 0.1-inch spacing connector to connect to target via MON08 debug circuit.
P1	+5 Vdc input voltage ( $V_{DD}$ )
P2	RS-232 to interface JBICS to host computer serial connector (DEKL-9SAT-F)
P3	Power Terminal
P4	USB Series "B" Receptacle to interface JBICS to host computer



### 1.2.2 ICS Interface Software

Windows-optimized software components are referred to, collectively, as the JBICS software (part number ICS08JB). It is a product of *P&E Microcomputer Systems, Inc.*, and is included in the JBICS kit (**Table 1-3**).

**Table 1-3 Software Components**

Components	Description
WINIDE.EXE	Integrated development environment (IDE) software interface for editing and performing software or in-circuit simulation
CASM08Z.EXE	CASM08Z command-line cross-assembler
ICSO8SZ.EXE	In-circuit/stand-alone simulator software for the MC68HC908JB8 MCU
PROG08SZ.EXE	FLASH memory programming software
ICD08SZ.EXE	In-circuit debugging software for limited, real-time emulation

### 1.3 Hardware and Software Requirements

The JBICS software requires this minimum hardware and software configuration:

- Windows 95 or later version operating system
- Approximately 2 Mbytes of available random-access memory (RAM) and 5 Mbytes of free disk space
- An RS232 serial port for communications between the JBICS and the host computer

## 1.4 Specifications

**Table 1-4** summarizes the JBICS hardware specifications.

**Table 1-4 JBICS Board Specifications**

Characteristic	Specification
Temperature: Operating Storage	0° to 40°C -40° to +85°C
Relative humidity	0 to 95%, non-condensing
Power requirement	+5 Vdc, from included AC/DC adapter

## 1.5 About This Manual

The procedural instructions in this manual assume that the user is familiar with the Windows interface and selection procedures.

## 1.6 Customer Support

To obtain information about technical support or ordering parts, call the Motorola help desk at 800-521-6274.



## Section 2. Preparation and Installation

### 2.1 Introduction

This section provides information and instruction for configuring, installing, and readying the M68ICS08JB (JBICS) for use.

### 2.2 Hardware Preparation

This paragraph explains:

- Limitations of the JBICS
- Configuration of the JBICS
- Installation of the JBICS
- Connection of the JBICS to a target system

**ESD CAUTION:** *Ordinary amounts of static electricity from clothing or the work environment can damage or degrade electronic devices and equipment. For example, the electronic components installed on the printed circuit board are extremely sensitive to electrostatic discharge (ESD). Wear a grounding wrist strap whenever handling any printed circuit board. This strap provides a conductive path for safely discharging static electricity to ground.*

### 2.2.1 JBICS Limitations

These sub-paragraphs describe system limitations of the JBICS.

#### 2.2.1.1 Port Bit PTA0

Port A0 is used for host to MCU communications, so it is unavailable for emulation.

#### 2.2.1.2 DDRA0

Setting DDRA0, in the Data Direction Register, will stop communications with the simulation or debugger software and will require a system reset to regain communication with the MCU.

#### 2.2.1.3 Port bits PTA1, PTA2, and PTA3

Port bits PTA1, PTA2, and PTA3 are temporarily disconnected from the target system during reset.

#### 2.2.1.4 RST\* signal

RST\* signal is limited because the signal is not a bidirectional, open-drain signal. It is emulated as either an input or output when using the target connectors or as two pins (one input and one output) when using the MONO8 cable.

### 2.2.2 Configuring JBICS Jumper Headers




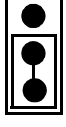

The JBICS supports four configuration options: standalone, simulation, evaluation, and programming.

- Standalone — ICS08JBZ.exe running on the host computer (the JBICS is not connected.) Emulation of the MCU CPU, registers, and I/O ports are done within the host computer environment.
- Simulation — Host computer connected to the JBICS via the RS-232 cable and ICS08JBZ.exe running on the host computer. This provides access to the M68HC908JB8 MCU, internal registers, and I/O ports.

- Evaluation — Host computer connected to the JBICS and the JBICS connected to the target system via the flex cable. This method provides limited real-time evaluation of the MCU and debugging user developed hardware and software.
- Programming — Host computer connected to the JBICS, and the JBICS connected to the target system via the MON08 cable. Use the PROG08SZ.exe to program the MCU FLASH module. In the programming mode there is limited evaluation (port A0 is used for communications, so it is unavailable for emulation).

Five jumper headers (**Table 2-1**) on the JBICS are used to configure the hardware options.

**Table 2-1 JBICS Jumper Header Description**

Jumper Header	Type (Factory Default Shown)	Description
W1 ICS_ OSC or OSC1		<b>Jumpers W1 and W4 are configured together for the Oscillator Source.</b>  <b>W1 ON and W4 ON:</b> JBICS MCU and target board clock signals supplied by the JBICS board oscillator Y1. <b>W1 ON and W4 OFF:</b> JBICS MCU clock signal supplied by oscillator Y1 - Target board has its own clock source.
W4 OSC1 or TGT_ OSC1		<b>W1 OFF and W4 ON:</b> JBICS MCU clock signal supplied by target board. <b>W1 OFF and W4 OFF:</b> JBICS has no clock source.
W2 Target System Power		<b>Jumper:</b> ICS board system power applied to target cable VDD pin. <b>No Jumper:</b> Allows using a separate power supply for target system.
W3 Reset Source		<b>Jumper on position 1&amp;2:</b> RST_IN* from target resets on-board ripple counters and MCU. <b>Jumper on position 2&amp;3:</b> ICS RST_OUT (from RST*) resets target.
W5 USB Pull-up Resistor		<b>Jumper:</b> Connects 1.5Kohm pull-up resistor from USB D- data line to 3.3V <b>No Jumper:</b> 1.5K ohm pull-up is disabled and PTE4/D should only be used as I/O Port

## 2.2.3 Target Interface Connection Options

There are four ways to connect the JBICS simulator board to your target system:

- Flex cable — low-noise target interface connection
- 20- pin DIP Emulation Cable — low cost flex cable replacement
- 28- pin DIP Emulation Cable — low cost flex cable replacement
- MON08 cable — target interface connection with MCU FLASH programming and limited emulation

Table 2-2 is a quick reference for defining the cable/connector setup to use with the JBICS.

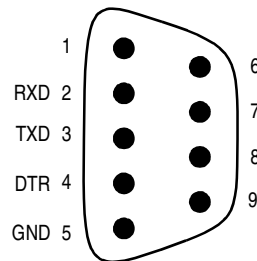
**Table 2-2. Cable/Connector Options for MCUs**

MCU	Flex Cable	DIP Emulation Cable	DIP Emulation Cable	MON08 Cable
MC68HC90 8JB8	J1 and J2	J3	J4	J5

### 2.2.4 Host Computer - JBICS Interconnection (P2)

The host computer to JBICS interface is via the single system connector P2, which is a 9-pin, D-type connector (Amp part number AMP-9726-A) (**Figure 2-1**), mounted on the top side of the board.

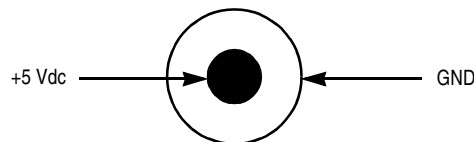
Connection requires the cable assembly supplied with your JBICS kit, a DB9-male-to-female, 6-ft. (3 m) long serial cable.



**Figure 2-1. P2 Host Computer to JBICS Interconnection**

### 2.2.5 Power Connector (P1)

Connect +5-Vdc power directly to the JBICS via connector P1 (**Figure 2-2**) using the provided power supply.



**Figure 2-2. P1 Power Connector**



### 2.2.6 USB Connector

The USB connector is directly connected to the MCU USB interface through the USB data pins (D+ and D-). If the development starts without the target board, the user can connect the USB interface to the host by using a USB standard detachable cable (Series "A" plug to Series "B" plug). In this case, a shunt should be placed in the jumper W5 to connect the 1.5Kohm pull-up resistor.

Refer to Section 3, Support Information for pin assignment information.

## 2.3 Connecting the JBICS

The following steps provide instructions for connecting the JBICS to the host PC and power connection.

**ESD CAUTION:** *Ordinary amounts of static electricity from clothing or the work environment can damage or degrade electronic devices and equipment. For example, the electronic components installed on the printed circuit board are extremely sensitive to electrostatic discharge (ESD). Wear a grounding wrist strap whenever handling any printed circuit board. This strap provides a conductive path for safely discharging static electricity to ground (common).*

- a. Configure the jumpers W-1 through W-5 (Table 2-1) on the JBICS for your application.
- b. Install an MCU into the appropriate socket, for your application, onto the JBICS board.

*Note: Observe the pin 1 orientation with the silkscreened dot. The top (label side) of the MCU package must be visible when looking at the component side of the board.*

- c. Plug the serial cable into P2 on the JBICS.
- d. Plug the serial cable into the COM port on the host PC.

**NOTE:** *Steps e. through g. should not be completed until all connections to the target are completed (**Paragraph 2.4**).*

- e. Connect the power cable to P1 on the JBICS board.
- f. Plug the power cable into an ac power outlet, using one of the country-specific adapters.
- g. The JBICS power LED (green) lights.

## 2.4 Connecting the JBICS to the Target System

Connect the JBICS to the target system using one of these methods:

- Emulating using a flex cable for low-noise connection