Real-time Emulator Motorola 146805E2

Model 64195S

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Description

The Model 64195S Emulator provides real-time, transparent emulation for Motorola 146805E2 microprocessor-based systems. As an integrated subsystem of the HP 64000 Logic Development System, the HP 64195S adds the power of emulation to all phases of 146805E2-product design, development, and maintenance.

The Model 64195S consists of an emulation control card with self-contained memory, emulation pod, and operating system software. Connection to the target system is made with a 303 mm (12 in.) cable that terminates in a 40-pin probe. A typical 146805E2 emulation system includes an HP 64195S Emulation Subsystem and an HP 64302A Emulation Bus Analyzer. With this configuration, the HP 64000 system's extensive set of development aids can be readily applied to 146805E2-based designs.

Directed-syntax softkeys and an easy-to-use editor streamline software development and documentation. Logic state and timing analysis can be combined with emulation for a wide variety of interactive, cross-triggered measurements. With the Model 64195S Emulator and the many compatible HP 64000 development tools, you can produce a better 146805E2-based product in less time, to gain a competitive edge.

Features

- Real-time execution up to 5 MHz, independent of emulator/target system memory assignment
- Nonintrusive, real-time traces of all 146805E2 memory activity
- Disassembly of 146805E2 instruction set
- Symbolic addressing for all operations
- Flexible memory mapping for emulator and target systems
- Full complement of emulation memory (8 kbytes) provided on the control board
- Wait/Stop operations displayed as target system status
- Simulated I/O supports software debugging before target system hardware is operational
- Expanded measurement systems through interactive operation with other HP 64000 subsystems:
  Another 146805E2 emulator or any other HP 64000 emulator
  HP 64610S High-speed Timing/State Analyzer
  HP 64620S Logic State/Software Analyzer
  HP 64310A Software Performance Analyzer

Getting Started

Analysis and debugging can begin immediately, with or without functional target system hardware. A 5 MHz internal clock and the provided emulation memory support real-time execution and evaluation as soon as the first code is written. Real-time operation is fully maintained to ensure accurate duplication of the final 146805E2-product performance.

Flexible mapping allows you to assign memory to the emulation or target system in 64-byte blocks. Blocks are assigned as emulation ROM/RAM, target system ROM/RAM, or guarded across the full address range of the 146805E2 microprocessor (figure 1). The 64-byte blocks are a convenient size for efficiently transferring newly developed resources from the emulator to the target system.

Simulated I/O supports concurrent software and hardware development and debugging. Program development can continue uninterrupted using the HP 64000 facilities for I/O signals. The printer, display, keyboard, disc, and RS-232 channel can all be simulated by the HP 64000 development station.

Nonintrusive Analysis: A Must for Real-time Systems

Many 146805E2-based products are applied to controlling or monitoring critical real-time processes. With an HP 64195S Emulator, your development tools support a wide variety of real-time measurements without intruding on target system operation. The Model 64195S Emulator allows you to monitor all 146805E2 memory activity nonintrusively and in real time while the target system is operating at full speed.

Information monitored by the emulator is passed to the HP 64302A Emulation Bus Analyzer, where trigger and storage directives are applied. Triggers can be defined for any event and set for the start, center, or end of the trace measurement. Storage qualifiers let you specify which kinds of events are captured and stored in analyzer memory. Commands are entered with easy-to-use softkeys. Trigger and store specifications may include address, data, status, ranges, don't-care bits, and occurrence counts (figure 2).

Controlling Your 146805E2 System

With the HP 64195S Emulator, you have direct control over your evolving 146805E2 system. You can display and modify any register, memory location, or I/O port. You also have complete control of the program flow with single-step, run-from, and run-until directives. Run controls initiate or terminate program execution at a specified address or symbol. These functions allow you to thoroughly investigate the details of target system operation.

Register displays are comprehensive, yet easily understood. All registers are clearly identified, and status bits are labeled for easy interpretation (figure 3).
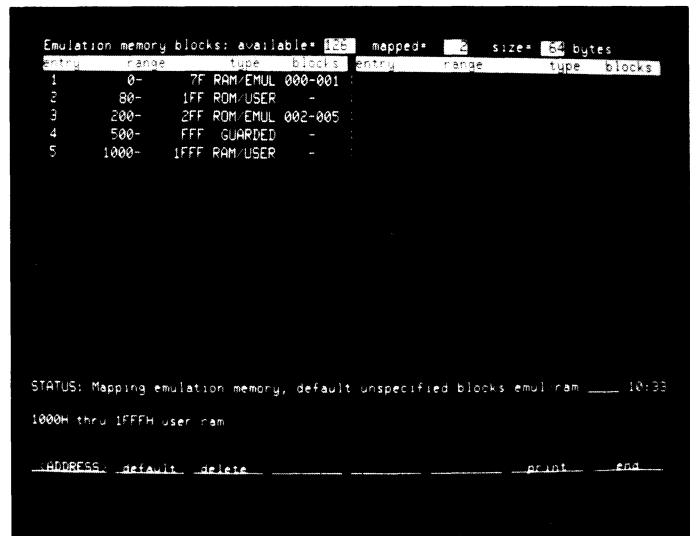

Figure 1. *Flexible mapping allows assignment of memory as emulation ROM/RAM, target system ROM/RAM, or guarded in convenient 64-byte blocks.*
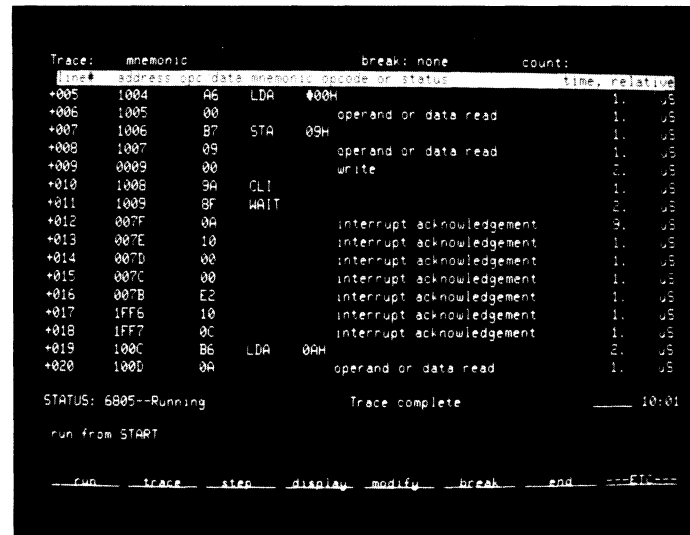

Figure 2. *Nonintrusive, real-time analysis permits evaluation of all 146805E2 memory activity, including address, data, status, ranges, don't-care bits, and occurrence counts.*
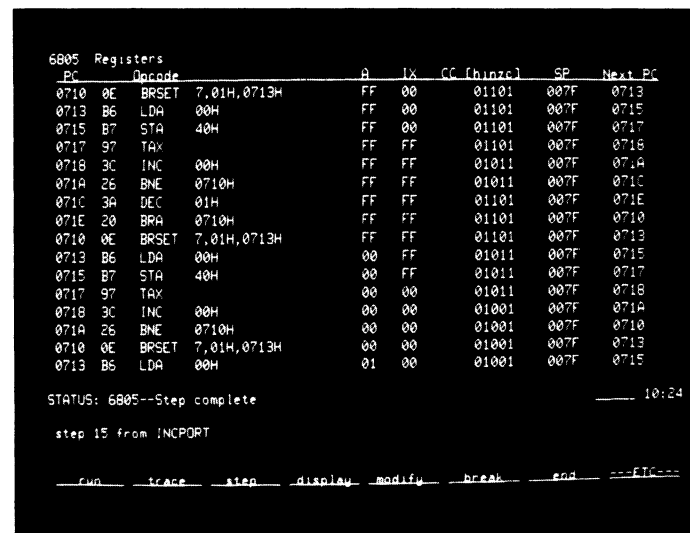

Figure 3. *Register displays are labeled for easy interpretation of all registers and status bits.*

Memory displays can show any location or range of locations; selectable display formats include words, and ASCII equivalents, or memory locations translated into 146805E2 mnemonics (figure 4). Ports A and B can also be displayed and modified as defined by the 146805E2 specifications. Memory and port addresses can also be referenced symbolically as they are defined in the software symbol table (figure 5).

Advanced Analysis Power — from Micro to Macro Measurements

As your 146805E2 system grows, it becomes increasingly more complicated. You can add correspondingly more powerful HP 64000 measurement tools as they are needed to serve new levels of analysis. Analyzers are available for the whole spectrum of logic measurements—from a bit-by-bit analysis of individual signal lines for a micro view, to a total system performance analysis for a macro view.

As the target system evolves, an HP 64610S High-speed Timing/State Analyzer may be added to check timing relationships at speeds up to 400 MHz. Postprocessing capabilities capture and store timing traces for detailed comparisons, statistical calculations, and documentation. An External Clock Mode provides state analysis capabilities at clock speeds to 125 MHz with up to 32 input channels. This allows you to analyze the operation of high-speed logic in bit-slice and state machines in real time.

For more powerful analysis, the HP 64620S Logic State/Software Analyzer supports intricate state analysis: up to 120 input channels, 15 levels of sequential triggering, broad definitions for storage qualifiers, and measurement window specifications. The HP 64620S analyzer can be added to the emulation subsystem through the HP 64304A Emulation Bus Preprocessor to enhance or replace the HP 64302A Emulation Bus Analyzer.

For optimizing and characterizing software performance, the HP 64310A Software Performance Analyzer provides macro views of total system performance by activity, interaction, or duration. The performance analyzer becomes an integral part of the emulation system, so you can begin optimizing your 146805E2 programs as soon as code exists.

For multiprocessor applications, the HP 64195S Emulator can be used interactively with other HP 64000 system emulators through the HP 64964A Intermodule Bus (IMB). The IMB also supports cross-triggering between analysis tools and emulators. The larger measurement system possible with the IMB is not restricted to analysis and emulation subsystems in a single development station; the HP 64303A IMB Extender board gives you access to measurement tools resident in other development stations.

Making a Difference

The Model 64195S Emulator offers development support for all phases of 146805E2 microprocessor-based designs. HP 64000 tools have the flexibility, power, and convenience required for designing and implementing effective 146805E2-based products, quickly and efficiently. Friendliness and the powerful measurement subsystems of the logic development system foster good design practices and complete debugging, from the first design statements to the finished product.

Figure 4. *Memory locations can be displayed in the mnemonics of the 146805E2 microprocessor.*

Figure 5. *Memory and port address displays can be referenced symbolically using the symbols defined in the software symbol table.*

Specifications

Processor compatibility: compatible with Motorola 146805E2 microprocessor and any other processor that complies with the specifications of these devices.

Electrical

Maximum clock speed: 5 MHz.

Data inputs: all inputs meet Motorola specifications plus approx 40 pF capacitance; IRQ and Reset, low input, one-half TTL load; Timer, low input, one TTL load.

Power: 6 mA drawn from the target system; all other power supplied by the development station.

Physical

Cable length: development station to emulation pod, approx 1.5 m (5 ft); emulation pod to target system interface, approx 305 mm (1 ft).

Environmental

Temperature: operating, 0° to 40°C (32° to 104°F); nonoperating, −40° to 75°C (−40° to 167°F).

Altitude: operating, 4600 m (15 000 ft); nonoperating, 15 300 m (50 000 ft).

Relative humidity: 5% to 80%.

Accessories Supplied

Model 64195S Emulation Subsystem consists of Model 64195A 146805E2 Emulation Pod, Model 64197A 6805 Emulation Control Board; appropriate cables for connections from the control board to the pod and from the pod to the target system; operating software supplied on flexible disc; and operator and service manuals. Emulation/Analysis Bus cables must be ordered separately.

Ordering Information

Model	Description
64195S	146805E2 Emulation Subsystem
64302A	48-channel Emulation Bus Analyzer
64844S	146805/6809 Assembler/Linker on flexible disc

Components

Model	Description
64195A	146805E2 Emulation Pod (includes software)
64197A	6805 Emulation Control Board

Software Support

Model	Description
64195AX	One-time Update of HP 64195S operating system software
64195A/S00	Monthly Software Materials Subscription for HP 64195S operating system software
64195A/W00	Extended Software Materials Subscription for HP 64195A/S00
64844SR	Right-to-copy HP 64844S
64844SX	One-time Update of HP 64844S
64844S/S00	Monthly Software Materials Subscription for HP 64844S assembler/linker
64844S/W00	Extended Software Materials Subscription for HP 64844S/S00

Accessories

Model	Description
64960A	2-position Emulation/Analysis Bus Cable
Opt 001	3-position Emulation/Analysis Bus Cable
Opt 002	4-position Emulation/Analysis Bus Cable