HEWLETT PACKARD

User-Definable Emulator

MODEL 64274S

TECHNICAL DATA 1 DEC 82

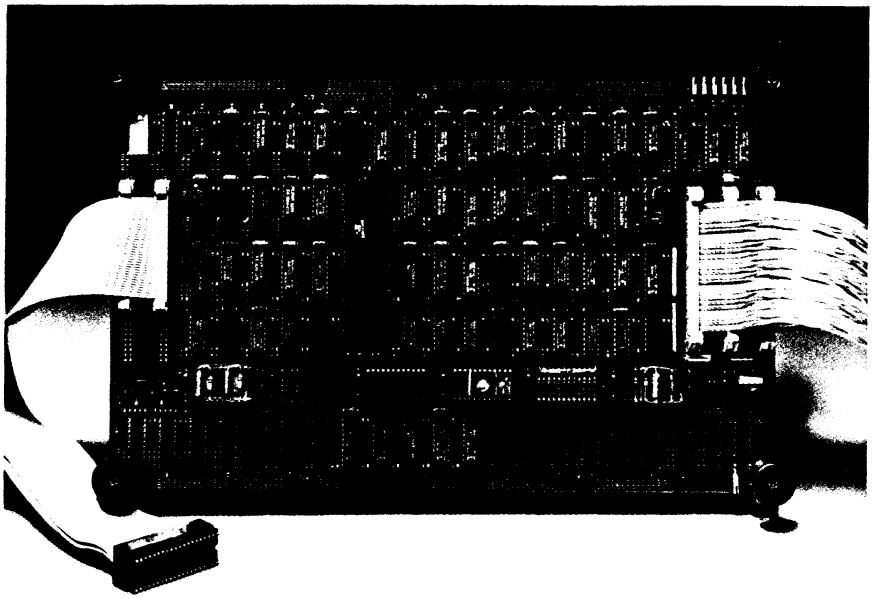


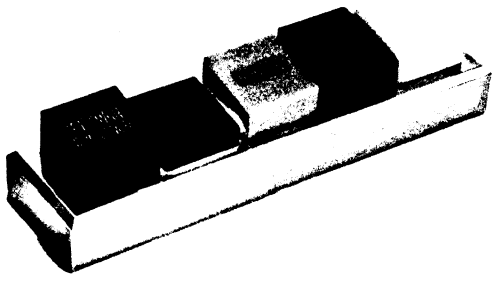
Figure 1. When an HP 64000 emulator is not available for a specific microprocessor, an alternative solution may be to develop an emulator from the basis of Model 64274S User-Definable Emulator subsystem.

Description

Model 64274S User-Definable Emulator provides the elements to design and build microprocessor emulators for use with the Hewlett-Packard 64000 Logic Development System. This opens the full range of 64000 System capabilities in developing microprocessor systems, even when the target processor is not supported by an HP emulator. Emulation is a powerful technique for accelerating all phases of microprocessor-based product design, development, and maintenance. As a subsystem of the 64000 System, Model 64274S also accesses the other sophisticated software and hardware development tools. The User-Definable Emulator is suitable for a broad selection of 8 and 16-bit microprocessors, including proprietary, low volume, or older processors.

Model 64274S is a part of an integrated set of design and development aids. Compilers and assembler/linkers are available for many popular microprocessors. A custom assembler can be developed from the base of Model 64851A User-Definable Assembler to facilitate software design. Directed syntax softkeys and an easy-to-use, responsive editor streamline software development and documentation. Logic State/Software Analysis and Logic Timing/Hardware Analysis may be used interactively with emulation to provide the power and flexibility in integrating and optimizing today's complex microprocessor-based systems. With Model 64856A User-Definable Inverse Assembler, an inverse assembler can be developed to display memory and traces in the mnemonics of the target microprocessor.

The 64000 Logic Development System offers a comprehensive set of design aids to digital designers. User-definable modules bring the convenience and power of the 64000 System to any design project, regardless of which target system microprocessor is selected.



Emulator Features and Functions

Each emulator developed with Model 64274S User-Definable Emulator is tailored for the environment in which it will be used. Features and functions are implemented at the designer's discretion to suit the application. Some modes cannot be operated simultaneously; in this case, it is possible to implement these modes as selectable emulation operations. A representative set of features for an HP 64274S emulator includes:

- User-definable monitor that allows
  Display/modify memory
  Display/modify internal processor registers
  Display/modify I/O ports
- Run-time controls
- Single cycling
- Memory mapping
  Define 256-byte blocks over 1M-byte memory or 4k-byte blocks over 16M-byte memory
  Allow blocks to be assigned to emulation memory or target system memory
  Designate blocks as RAM, ROM, or illegal memory
- Up to 1M byte of emulation memory
- Bus rates up to 2 MHz with no emulation-generated wait states
- An emulation mode that is fully transparent to the target system
- Compatibility with 64600S Logic Timing/Hardware Analysis and 64620S Logic State/Software Analysis subsystems for interactive analysis and emulator/analyzer measurements.
- Software breakpoints.
- Simulated I/O for emulator access to 64000 System resources: disc files, printer, and development station keyboard, display, and RS-232 port.

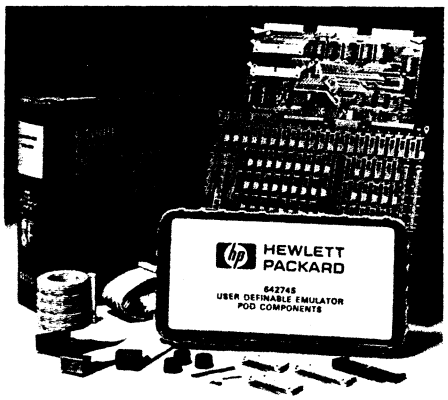


Figure 2. Model 64274S User-Definable Emulator subsystem provides the software and hardware components required to implement a new emulator.

Components

Architecture of the User-Definable Emulator (UDE) is modeled on the architecture of the 68000 and 8086 emulators (Model 64242S and 64222S). The components required to interface the 64000 System are included in Model 64274S:

- Model 64274A General Purpose Emulator Controller board.
  This is the interface between the UDE pod and the 64000 host system. It is installed in the 64100A/64110A development station card cage.
- Wire-wrap board and special connectors and cables
- Software drivers to develop the emulation operating system
- Comprehensive manual
  A detailed description of the process for designing and implementing a specific emulator, the manual also includes debug techniques. A design example for an 1802 microprocessor is included.

Microprocessor Compatibility

There are limitations to the applicability of the UDE, even though it can be adapted for a very wide selection of microprocessors. Further, it is not always possible to emulate every feature of a microprocessor. Basic criteria a compatible microprocessor must meet are

(1) Maximum width of address bus, 24 bits

(2) Maximum width of data bus, 16 bits

(3) Emulator control over microprocessor by either
  Highest priority interrupt, or
  Jamming (if processor does not use prefetched instructions)

(4) Memory cycle rates (not clock rates)
  1.8 MHz real-time dual access
  1.8 to 3.9 MHz real-time emulation memory access with no wait states

(5) Accessible address and data buses

If a microprocessor meets the criteria for compatibility with the User-Definable Emulator, it must still satisfy one further set of limits. The specific timing characteristics of the processor must conform to the timing constraints of the UDE as defined in the User-Definable Emulation manual.

Implementing an emulator with the UDE is typically a one to three-month design task. Time required is a function of the complexity of the target processor emulator features included, and the designer's level of expertise.

Characteristics

ELECTRICAL
Power Restrictions:

Input Voltage	Current Limit
+12 V	200 mA
+5 V	3A
−5 V	200 mA

PHYSICAL
Cable Length: development station to emulation board, approx 1.5 m (5 ft); emulation board 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); operating survival, −20° to +50° C (−4° to +122° F).
Altitude: operating, 4600 m (15 000 ft); nonoperating, 15 300 m (50 000 ft).
Relative Humidity: 5% to 80%.

NOTE

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Figure 3. Typically, a new emulator can be designed and implemented in about one to three months, using the base provided by the 64274S UDE.

Ordering Information

A complete user-definable emulator consists of Model 64274S User-Definable Emulator subsystem and Model 64156S Emulation Memory system; Model 64302A 48-channel Internal Logic Analyzer is available to display activity on the emulator bus. Emualtor software is available on flexible disc (64274SF) or tape cartridge (64274ST) for transfer of the emulator operating system to mass storage. Assemblers are available for a variety of microprocessors, including several which are not supported with an HP emulator. There are also a user-definable assembler (64851 AF/AT) and inverse assembler (64856 AF/AT) available. Only one set of software modules is required for each 64000 System cluster.

Model 64274S User-Definable Subsystem
Model 64274SF User-Definable Emulation Software on flexible disc
Model 64274ST User-Definable Emulation Software on tape cassette
Model 64156S 32k-byte Emulation Memory System
  Option 011 64k-byte Emulation Memory System
  Option 012 128k-byte Emulation Memory System
Model 64302A 48-Channel Internal Logic Analyzer
Model 64851AF User-Definable Assembler on flexible disc
Model 64851AT User-Definable Assembler on tape cartridge
Model 64856AF User-Definable Assembler on flexible disc
Model 64856AT User-Definable Assembler on flexible cartridge

INDIVIDUAL COMPONENTS
Model 64155A Wide-Address Memory Controller Board

Your HP Instrumentation Field Engineer can help you determine the best configuration to meet your needs.

5953-9202 Data subject to change. PRINTED IN U.S.A.

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