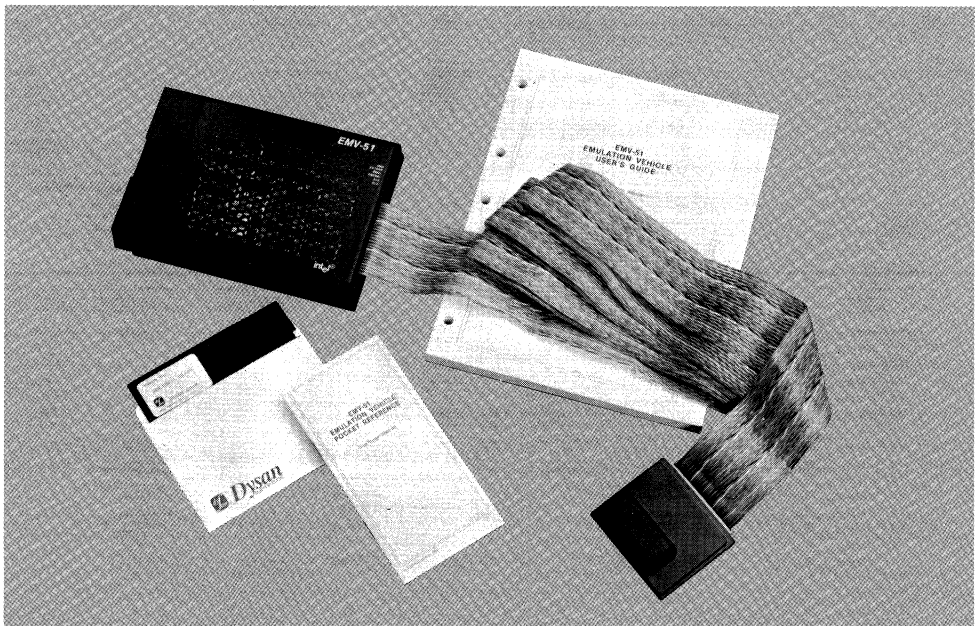




EMV-51 8051 EMULATION VEHICLE

- **Precise, 8051 full speed real-time emulation**
 - Load, drive, timing characteristics
 - Full speed program RAM
 - Serial and parallel ports
- **Breakpoints/trace**
 - 4 execution address breakpoints
 - 1 range breakpoint
 - Branch and value breakpoints
- **Full symbolic debug**
- **Standalone operation for software debugging**
- **Advanced ease of use features**
 - Programmable function keys
 - Macros
- **Help Facility: EMV-51**
Command reference at console
- **Hosted on Intel's Personal Development System**

EMV-51 interfaces to any user-designed 8051 system and assists in the debug and development of that system. The EMV-51 consists of an emulator plug, serving as the direct communication link to the user system, an 80 inch cable, and a module hosted by an Intel Personal Development System (iPDS™). The electrical and timing characteristics of the user's 8051 are accurately emulated when using the EMV-51. A friendly human interface presents commands in a menu display, and organizes commands in an easy-to-learn fashion. The EMV-51 allows the designer to emulate the system's 8051 in real time or single-step mode. Breakpoints allow the user to stop emulation at user specified conditions, and trace qualifiers allow for conditional display of trace information. Program memory can be displayed and altered using ASM51 mnemonics and symbolic references. Advanced capabilities allow for programmable keys, macros, and control constructs.



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ORDER NUMBER: 210392-002

FUNCTIONAL DESCRIPTION

EMV-51 hardware consists of three parts; the controller, the emulator module and the cable assembly. The controller contains all the logic to support break, trace, emulation, and communication with the host and the emulator module. The emulator module contains the hardware used to execute 8051 code, and supplies all MCS-51 signals to the user's system. This module connects to the controller via a 6 foot cable, and the controller connects to an iPDS host thru the EMV/Prom Programming adaptor board. This optional board is required for use of the EMV-51 on the iPDS.

EMV-51 software contains all the control for user interaction. The software programs the controller, implements all emulator functions, and displays information to the user. This software is run on the iPDS host, and is packaged on a 5 1/4" diskette. An additional software diagnostic routine, included on the disk, thoroughly exercises the EMV-51 hardware.

EMV-51 software will accept and interpret commands entered by the user. These commands will be communicated as a set of micro-commands via

a host interface to the controller. Command registers in the controller direct micro-operations to various sections of the break, map or trace circuitry. Some commands control the emulator board, others interrogate the user system. When appropriate, the controller will pass information back to the host where the information will be processed and displayed to the user. See Fig. 1 for a block diagram of the EMV-51 hardware.

The EMV-51 package includes the 8051 Relocating Macro Assembler and the Relocating and Linking utility. This assembler provides full macro capabilities, supports symbolic development for both code development and debug, and supports modular code development with relocation features. RL51 will relocate, link, and generate loadable object files from the relocatable modules produced by the assembler. EMV-51 fully supports all mnemonics, object file formats, and symbolic references generated by ASM51 and RL51.

EMV-51 includes a complete documentation kit containing a comprehensive user's manual and a command dictionary reference guide.

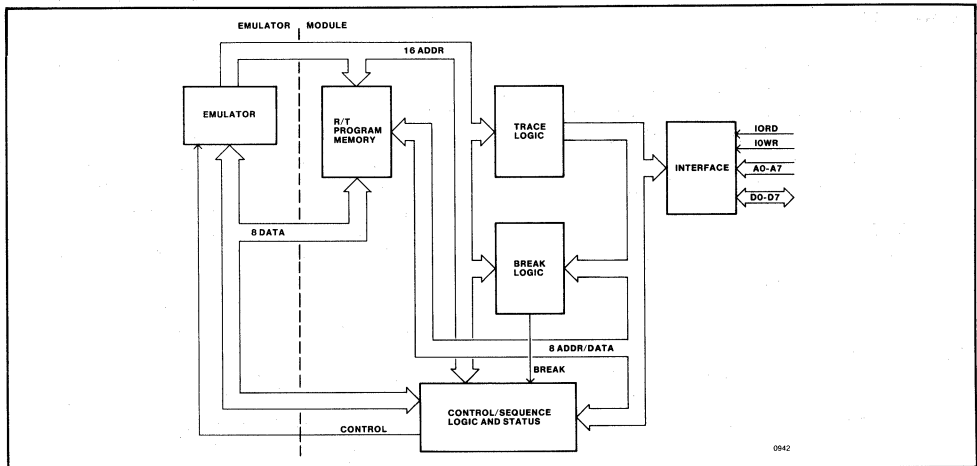


Figure 1. EMV-51 Block Diagram

FEATURE SET

EMV-51 provides fundamental capabilities to debug an 8051 microprocessor system. These basic and general capabilities are:

Real Time Breakpoint

EMV-51 allows a user system to execute user code at full clock speed, until a predefined condition occurs. These breakpoints may be a combination of four execution addresses or a combination of an execution address range and single execution address. These break capabilities allow the user to stop the user system at various states in the normal processing cycle and interrogate the state of the system.

Real Time Memory

EMV-51 supplies 4K of high speed RAM memory. This RAM can be used to execute the user program and allows easy change to the user code. This memory can be used either in place of the user's memory before the memory exists in the user system, or used in lieu of the user's memory to ease the debug effort.

Real-Time Trace

EMV-51 maintains an active real-time trace buffer which tracks the last two executed addresses from the user's system. This trace is collected in real-time during execution of the user system. This information can be used to discover where the user's program has been prior to breaking.

Software Break

During step mode, EMV-51 iteratively single steps, then executes a short software interrogation routine. This slow-down mode of operation continues until a register is set to a specific value, any branch instruction occurs, or until a specified number of instructions have been executed. These additional break features provide users added execution control and microprocessor state information in exchange for real-time emulation.

Software Trace

The EMV-51 will automatically query the 8051 processor and optionally display up to 4 lines of information. This display can show execution address, disassembled code, current register values or processor status information.

COMMANDS

EMV-51 has a friendly and easy to use human interface, and commands which are well organized and easy to learn. Menu displays prompt the user and assist in learning the different commands. Sample EMV-51 menu displays are shown in Figure 2. Commands fall into four categories: Utility Commands, Display/Modify Commands, Emulation Commands and Advanced Commands. Once these basic command categories are understood, locating any command becomes simple. Table 1 lists a summary of EMV-51 commands and the command categories.

EMV-51 is a full symbolic emulator, and hence all commands and displays allow for symbolic entry. Thus EMV-51 and users communicate by referring explicitly to symbols defined in the user's source program or symbols defined during the debug session.

Utility Commands

Utility commands perform functions not directly related to the task of emulation and debug. These commands access the iPDS resources and display information about the emulator. Some examples of utility commands are RESET, LOAD, HELP, and EVALUATE.

Display/Modify Commands

These commands change or display any register, port, or memory addressable by the 8051 processor chip. Examples of Display/Modify commands include REGISTER, ASM/DASM, CBYTE, DBYTE, RBYTE, and PBYTE.

Emulation Commands

All commands causing execution displays, or execution initiation, fall into the Emulation Category. Thus, the GO, BREAK, and TRACE commands are in this category along with BRO, 1, 2, 3, BV, TR0, 1, 2, 3, TS, and STEP.

Advanced Commands

The advanced commands offer the user an easy way to increase the power of the EMV-51 and thus increase the debug capability of this product. These advanced features allow EMV-51 command sequences to be programmatically combined, executed, and stored. Examples of advanced commands include MACROS, FUNCTION KEYS, and CONTROL CONSTRUCTS.

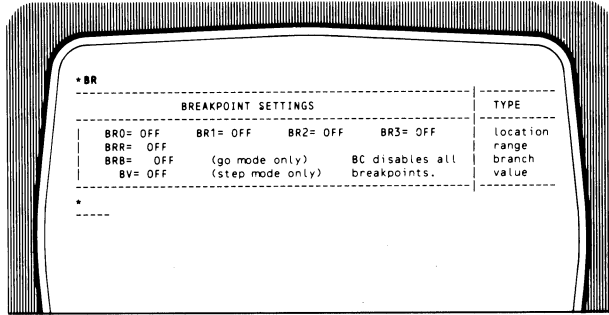
EMULATION MODES

EMV-51 combines two approaches to emulation, real-time emulation with software emulation. Programs with time critical sections of code or critical interrupt routines can be emulated, traced and debugged in real time. Real-time emulation supports specific execution breakpoints or range breakpoints. The real-time trace will display up to two instruction addresses last executed. Real-time emulation mode is entered by initiating emulation with the GO command. All break and trace commands associated with the GO command act in real-time emulation mode.

When full speed emulation is not critical to the debug effort, EMV-51 will emulate one instruction, check for a variety of breakpoint and trace point conditions, display the trace information, and

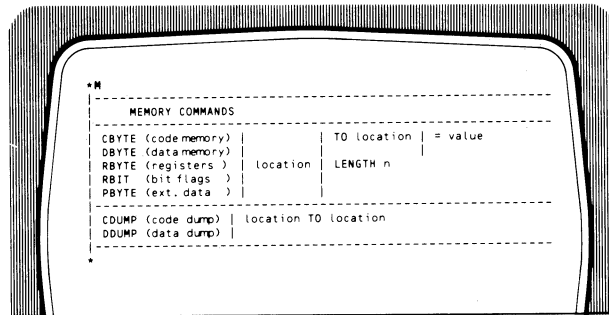
Emulation Commands	Utility Commands
<p>BREAK - Display breakpoint menu BR0, 1, 2, 3 - Breakpoint register for execution address BRR - Breakpoint register for execution range BRB - Break on branch BV - Break on value BC - Clear all breaks DTRACE - Display trace menu TB0, 1, 2, 3 - Enable/disable display by bit value TR0, 1, 2, 3 - Enable/disable display by execution address TV - Enable/disable display by register value TR - Enable/disable display of registers TS - Enable/disable display of PSW TD - Enable/disable display of code disassembly STEP - Enter slow down emulation mode GO - Enter real-time emulation mode</p>	<p>HELP - Displays command syntax LOAD - Loads object file in mapped memory LIST - Generates copy of emulation work session DEFINE - Defines symbol or macro SYMBOL - Displays symbols ENABLE/DISABLE - Control for expanded display EVALUATE - Evaluate any expression SUFFIX/BASE - Sets input and display numeric base SAVE - Save code memory to file RESET - Resets emulation processor EXIT - Terminate EMV-51 session</p>
Advanced Commands	Display Modify Commands
<p>MACRO - define, and display macro IF THEN COUNT REPEAT WHILE UNTIL FUNCTION KEY - invoke macro assigned to function key</p> <p style="text-align: center;">} CONTROL CONSTRUCTS</p>	<p>REGISTER - Change/display 8051 registers INTERRUPT - Change/display interrupt status MEMORY - Display menu</p> <p>CBYTE } DBYTE } change/display memory PBYTE } RBYTE }</p> <p>RBIT - Change/display bit memory CDUMP } display memory as ASCII and DDUMP } Hexadecimal ASM/DASM - change/display code memory as assembly language mnemonics</p>

Table 1. Summary of EMV-51 Commands and Command Categories



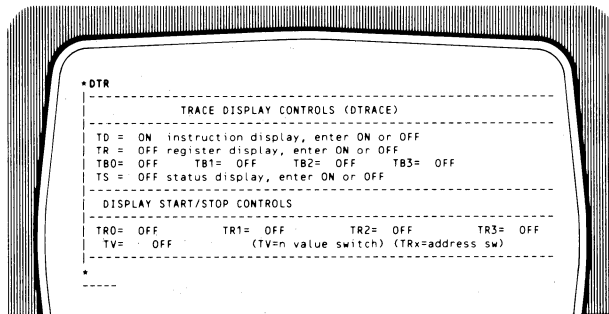
a) Menu Display for Setting Breakpoint

0344



b) Menu Display For Accessing Memory

0330



c) Menu Display For Setting Trace

0348

Figure 2. Typical EMV-51 Menu Displays

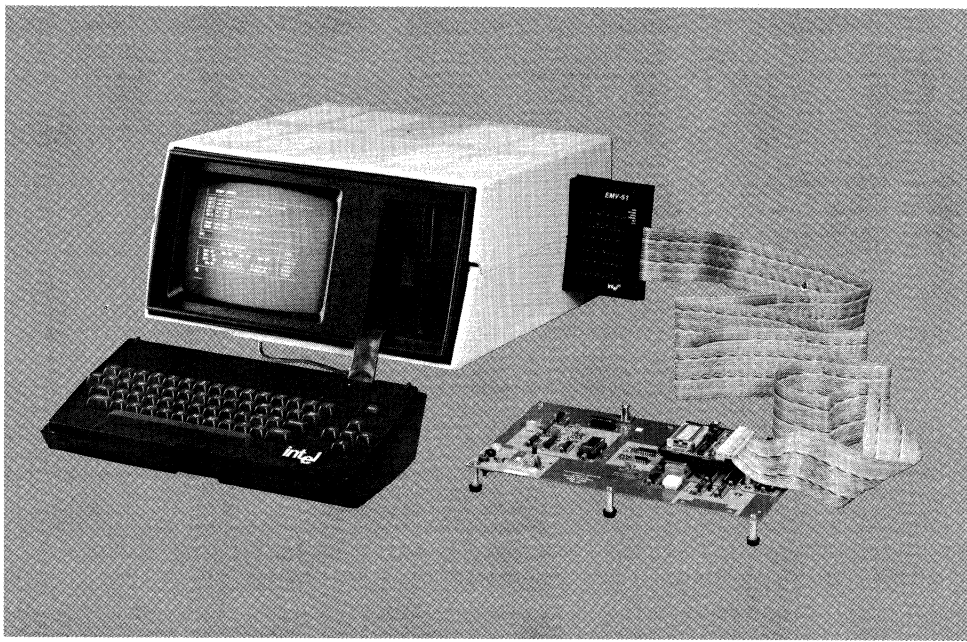


Figure 3. EMV-51 in iPDS™ Debugging Environment

continue with another instruction. This slow-down mode of operation provides enhanced break and trace facilities at the expense of non-real-time execution. Slow down mode emulation is entered by initiating emulation with the STEP command.

INTENDED USE

The EMV-51 design criteria targets this product to a certain class of programs. EMV-51 is particularly well suited to assist in debugging small to medium sized programs whose program complexity level is low to moderate in terms of interrupts, program nesting, and stochastic execution flow.

SPECIFICATIONS

EMV-51 Operating Requirements

EMV-51 operates with an iPDS system. The iPDS system must be configured with the EMV/iUP adaptor option iPDS-140.

Equipment Supplied

- EMV-51 Emulator
- User's Manual
- Pocket Reference
- EMV-51 Software and Diagnostic Diskette
- MCI-51-ASM

Emulation Clock Rate

Users' System: 1.2 to 12 MHz
EMV supplied crystal: 12 MHz

Environmental Characteristics

Operating temperature: 0-40° C
Operating humidity: 50-90%, RH non-condensing

Physical Characteristics

Controller: 7.8" x 1.5" x 5.8"
Emulator: 3.3" X 3.3" x 1.5"
Total Weight: 1 lb. 7 oz.

Electrical Characteristics

Power Requirements from iPDS: +5 V \pm 5%
@ 1.9A

*Power requirements from user system: +5 V
 \pm 5% @ 200 ma MAX

Characteristics of User Socket: Same as 8031,
8051, or 8751

*The emulator can be strapped to draw its power
from either the iPDS or the user system.

Ordering Information

Part Number	Description
iPDS-EMV-51	Emulation Vehicle for 8051 micro-controller with diskette and documentation



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Printed in U.S.A./BP-184/0783/20k/TPN/WCP
Order Number: 210392-002