

# **DS-51**

## **Microprocessor Development System**



*In-Circuit Emulator for 8051 Family of Microcontrollers*

## **FEATURES**

- **Real-Time and Transparent In-Circuit Emulator**
- **Supports Most of the 8051 Derivatives**
- **Emulates 1.5V to 6V Microcontrollers**
- **Maximum Frequency of 42MHz**
- **64K/512K of Internal Memory with Banking Support**
- **32K Trace Memory "on the Fly"**
- **64K Hardware and Conditional Breakpoints**
- **MS-Windows and Keil Vision Debuggers**
- **Source-Level Debugger for Assembler, PLM and C**
- **On-Line Assembler and Disassembler**
- **Performance Analyzer**
- **Serially linked to IBM PC at 115 Kbaud**

## DESCRIPTION

DS-51 is a real-time in-circuit emulator dedicated to the 8051 family of microcontrollers. It is serially linked to PC or compatible systems and carries out a transparent emulation on the target microcontroller. The system emulates almost every 8051 derivative in the complete voltage and frequency range specified by the microcontroller manufacturer. DS-51 also supports the new low-power and low-voltage 8051 microcontrollers and derivatives and can emulate the microcontrollers using either the built-in 5V power supply or any voltage applied to the target circuitry. The permitted voltage range is from 1.5V to 6V or higher. The MS-Windows software includes Source-Level Debugger for PLM and C/C++, a unique Assembler Debugger, Performance Analyzer, On-line Assembler and Disassembler, Conditional Breakpoints and many other features. Files generated by the most common 8051 Assemblers and High-Level Language Compilers are accepted by DS-51. Also DOS debugger and DLLs to support Keil Vision are supplied. Standard systems are supplied with 64/512 KBytes of internal memory with mapping capabilities, 64K hardware breakpoints, 32K real-time trace memory and logic analyzer with triggers and external test points, and personality probe C51 supporting most of the 40-pin DIP or 44-pin PLCC/QFP microcontrollers.

## SUPPORTED DEVICES

<b><i>Probe</i></b>	<b><i>Supported Devices</i></b>
P-C51	8051, 8751, 8031, 8052, 8752, 8032, 80C51, 87C51, 80C31, 80C52, 87C52, 80C32, 87C51FA, 87C51FB, 87C51FC, 87C51Rx, 87C51Rx+, 87C54, 87C58, 83C504, 87C504, 83C508, 87C508, 83C524, 87C524, 80C528, 83C528, 87C528, 80C550, 83C550, 87C550, 80C652, 83C652, 87C652, 83C654, 87C654.
P-C51LV	As Probe C51 for 5V and 3V. Also 89C51Rx2, 89C66x and many others with 6/12 clock/cycle
P-C32	As Probe C51 for ROMless applications only without special emulation devices.
P-C32LV	As Probe C51 for ROMless applications only without special emulation devices. For 3.3V applications.
P-C323	DS80C323, 3.3V
P-C055	83C054, 87C054, 83C055, 87C055.
P-C168	8xCL167/8, 8xCL267/8
P-C434	8xCL134, 8xCL434, 8xCL834
P-C451	8xC451/3
P-C501	SAB-C501
P-C504	SAB-C504

<b>Probe</b>	<b>Supported Devices</b>
P-C505C	SAB-C505C in 44 QFP
P-C505CA	SAB-C505CA in 44 QFP
P-C505L	SAB-C505 in 80 QFP
P-C508	SAB-C508
P-C509Q	SAB-C509
P-C513	SAB-C513
P-C515P	SAB-C515, 80C515/535A in 68 PLCC
P-C515Q	SAB-C515 in 80 QFP
P-C517P	SAB-C517, 80C517/537A in 84 PLCC
P-C517Q	SAB-C517 in 100 QFP
P-C517	80512, 80532, 80C515, 80C515A, 83C515A, 80C535, 80C517, 80C517A, 83C517A, 80C537
P-C530	DS80C310/320, DS87C520/530
P-C550	P8xC550 in 44 PLCC
P-DS550R	DS87C550 ROMless
P-C552	8xC552, 8xC554 (PLCC), 8xC562 in 68 PLCC
P-C554	8xC554 in 80 QFP
P-C558	8xCL558/9
P-C575	8xC575
P-C591	8xC591
P-C592	8xC592
P-C598	8xCL598
P-C752	8xC748/9, 8xC750/1/2
P-C782	80CL31/2, 80CL51/2, 8xCL781/2, from 1.5V to 6V
P-W77	W77C32, W77C58, W77C516, W77E58, W77LE58, W77E532
P-W78	W78C32C, W78E51B, W78E52B, W78E54B, W78E58B, W78E516B, W78E858, W78C51D, W78C52D, W78C54, W78C58, W78C516, W78C801, W78E365

As the list of supported devices and available probes is continuously evolving, call Ceibo to receive the latest update.

## **SPECIFICATIONS**

### **EMULATOR MEMORY**

DS-51 provides 64KBytes of code memory with software mapping and banking capabilities.

DS-51/512K system has a universal memory bank switching configuration for any 32K or 64K banks and up to 32 memory pages.

### **HARDWARE BREAKPOINTS**

Breakpoints allow real-time program execution until an opcode is executed at a specified address. Breakpoints on data read or write and an AND/OR combination of two external signals are also implemented.

### **CONDITIONAL BREAKPOINTS**

A complete set of conditional breakpoints permit halting program emulation on code addresses, source code lines, access to external and on-chip memory, port and register contents.

### **SOFTWARE ANALYZER**

A 64 KByte buffer is used to record any software and hardware events of your program, such as executed code, memory accesses, port and internal register states, external or on-chip data memory contents and more.

### **LANGUAGES AND FILE FORMATS**

DS-51 accepts files with many different formats. Assemblers and high-level languages such as C/C++ and PLM may be used with DS-51. Supported vendors are Intel, IAR, BSO/Tasking, Keil, Archimedes, 2500AD, MCC, etc.

### **SOURCE-LEVEL DEBUGGER**

The DS-51 Software includes a Source-Level Debugger. This function may be used to debug code written in Assembler, PLM and C/C++. The Source Level Debugger includes commands, which allow the user to get all the information necessary for testing the programs and hardware in real-time. The commands permit setting breakpoints on high-level language lines, adding a watch window with the symbols and variables of interest, modifying variables, displaying floating point values, showing the trace buffer, executing assembly steps and many more useful functions.

### **PERSONALITY PROBES**

DS-51 uses standard and bond-out microcontrollers for hardware and software emulation. The selection of a different microcontroller is made by replacing the microcontroller on the probe or changing the probe. The Personality Probes run at the frequency of the crystal on them or from the clock source supplied by the user hardware. Therefore, the same probe may be adapted to your frequency requirements. The minimum and maximum frequencies are determined by the emulated chip characteristics, while the emulator maximum frequency is 42MHz.

## **TRACE AND LOGIC ANALYZER**

The 32 KBytes trace memory is used to record the microprocessor activities. Eight lines are user selectable test points. Trigger inputs and conditions are available for starting and stopping the trace recording. The trace buffer can be viewed in disassembled instructions or high-level language lines embedded with the related instructions. The trace window may be displayed on the fly, thus without stopping the emulation.

## **ITEMS SUPPLIED AS STANDARD**

In-circuit emulator with 64 KBytes breakpoints, 64 KBytes internal code memory. Personality probe C51 for 8051 microcontrollers. User software including Source-Level Debugger, On-line Assembler and Disassembler. Users Manual and Operating Instructions. RS-232 cable. Power supply.

## **OPTIONS**

Personality probes for the different microcontrollers. 512K Memory bank setup. Adapter for 44-pin PLCC devices.

## **PERFORMANCE ANALYZER**

This useful function checks the software trace buffer and provides time statistics on modules and procedures as a percentage of the total execution time.

## **WINDOWS MENU**

The available functions include: FILE (load, save), VIEW (watches, variables, module, CPU, dump, registers, trace, file), RUN (run, go, trace into, step over, execute, animate, halt, reset), BREAKPOINTS (toggle, expression true global, hardware breakpoint, delete all), DATA (inspect, evaluate, add watch), OPTIONS (environment, path, communications, architecture, mode, save, load), WINDOW (zoom, next, size, move, close), HELP (index, previous topic).

## **INPUT POWER**

5VDC/1.5A.

## **MECHANICAL DIMENSIONS**

## **WARRANTY**

Two years, limited warranty, parts and labor.

## **DS-51 WINDOWS DEBUGGER**

DS-51 is supplied with a Source-Level Debugger and Simulator for the 8051 architecture. The program allows fast and reliable debugging at source-level for PLM, C/C++ and Assembler of most of the available vendors. The Debugger may be operated with or without the DS-51 Emulator. Together with DS-51, the software executes all functions in real-time. The debugger may be used as a stand-alone simulator to test software without hardware, although not in real-time and at a speed depending on your PC.

The Debugger includes an On-line Assembler, which can be invoked to change the executable code during the debugging session. As the Debugger is fully MS-Windows oriented, multiple windows and multi-tasking are permitted.

### **GLOBAL AND LOCAL MENUS**










A Global Menu lists the commands and is accessible through a menu bar that runs along the top of the window. From there, pull-down menus are available for every item on the menu bar. The Debugger is context-sensitive and uses Local Menus tailored to the particular window you are in.

### **INPUT BOXES**

Many of the Windows Debugger Command Options are available in Input Boxes. An Input Box prompts you to type in a string. All your entries are recorded in a History Buffer, so you can pick up any entry just by selecting it with the arrow keys.

### **TOOLBAR**

The buttons on the Toolbar are the commands you need to operate the most useful functions:

-  get help information
-  open a File Dialog Box
-  open the list of Modules Dialog Box
-  select the CPU window
-  select the Watches window
-  run a program
-  instruction step
-  halt a program
-  step with skip calls

## STATUS LINE

The Status Line on the bottom of the main application window displays messages related to the cursor position in the Module window, chip type, operating mode (simulation, emulation or in-circuit simulation) and current status (program running, ready, error). It also provides on-line help information on selected menus.

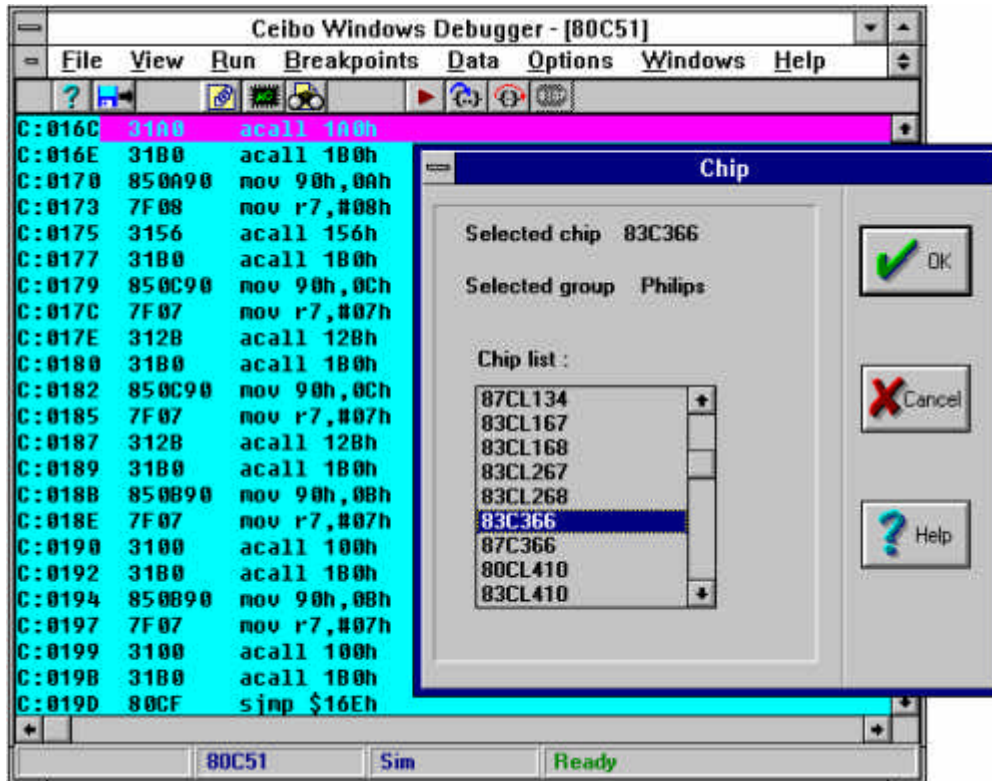


Figure 1: DS-51 Windows Debugger

## TRACE OPTIONS

A selection of source code, disassembled instruction or mixed source and disassembled code is available to display the Trace Memory without stopping the emulation. Time Stamps can be used to display absolute or relative cycles or time. Filters may be defined to specify instructions or sequences of interest. The software also has the capability to save the trace buffer in a disk file.

## EXTERNAL TRACE START/STOP TRIGGERS

DS-51 has two External Trigger signals that allow starting and stopping of the trace recording upon external events.

### Stop Trace when Full or Continuous Recording Mode

There are two trace recording modes: Cyclic and Trace Full. In the Cyclic Mode the trace is continuously filled with recorded data. In the Full Mode recording stops when trace is full.

### Selectable Trace Trigger Levels

The trigger state permits selecting the way trigger signals behave. The active mode may be either level or edge for the external start and stop trigger signals.

## Trace Status on the Fly

Trace Status allows viewing information without stopping emulation. The Trace Status includes buffer full, buffer empty, length, etc.

## Trace Filtering on Address Ranges

Up to 10 different ranges are allowed to filter the recorded data into the trace memory. The start and stop addresses of modules and procedures can be entered using special prefixes.

## Trace Trigger Conditions

The bus cycle type, address and data bus contents are used to trigger the trace collection. Trace triggers recognize user-defined events, such as cycles, address matches and passcounts. A cycle specifies the execution state. The address match selects the address value or range. Addresses can be entered as symbols, modules and line numbers or as physical addresses. Passcount selects the number of times the event will be recognized before the trace trigger occurs.

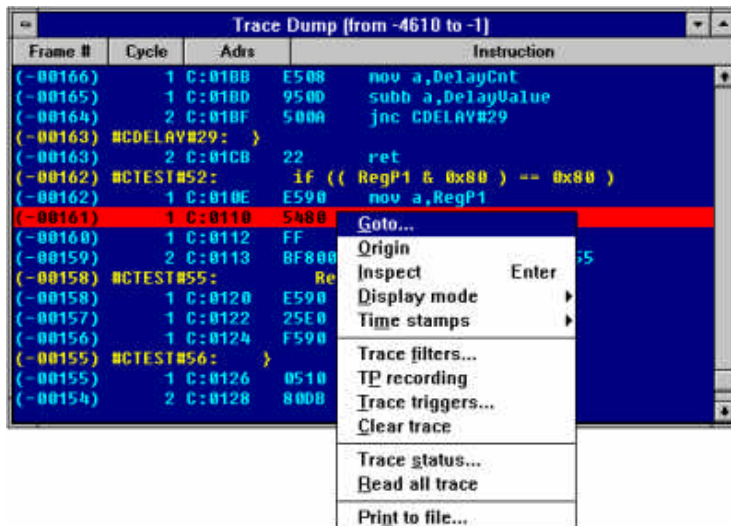


Figure 2: Trace Window

## BREAKPOINT OPTIONS

DS-51 commands let Breakpoints be displayed, set and cleared. The different options are used to stop the emulation upon execution of simple events as well as combinations of complex hardware and software conditions. The program may be halted according to a selection of cycle type, address match condition, address range and passcount.

### Breakpoint on Data Read/Write and Address

Real-time Hardware Breakpoints can be set on Data Read, Data Write, Data Read or Write and Opcode Fetch in any address range.

### Stop Emulation on Passcount

Passcount on any event including opcode may be specified by the number of occurrences.



## Breakpoint on External Events

Trace Testpoints may be used as External Breakpoints on hardware events if enabled. The External Breakpoint Triggers may also be used as a Trace Full Condition; in this case, program execution will stop once it is full. The Logic Operator Commands allow selection of AND/OR combinations of the two External Breakpoints. The options are both low, any one is low, both are high, only one is high, both are leading edge, etc.

## Expression True Global

The Expression True Global Command allows setting a breakpoint that will occur when the value of the specified memory space location matches the specified data value.

## Change Memory Global

This command may be used to set a breakpoint on access to any specified memory space, regardless of the data contents.

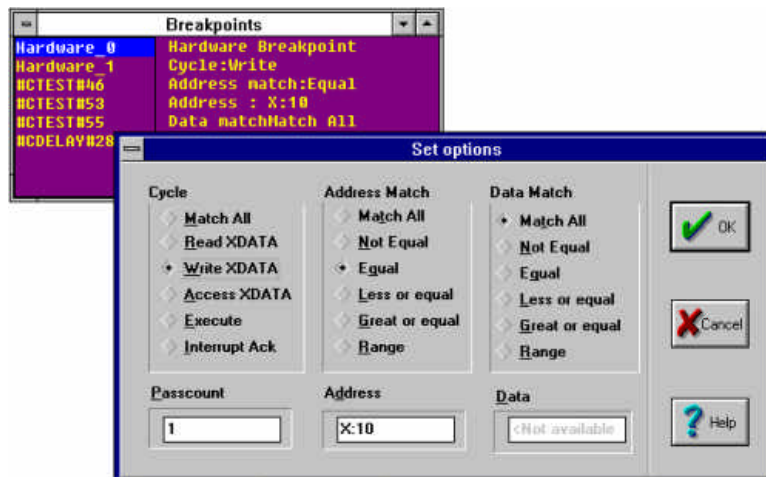


Figure 3: Breakpoint Window

## PERFORMANCE ANALYZER

This function processes the information recorded in the trace buffer and provides a graphics representation of the executed modules and the percentage of time spent in each of them. The local menu of this window may be used to get more useful information about software performance.

### Configuration

A dialog box allows the function selection belonging to the module that may be included in the performance analysis; thus, the performance analyzer may be configured according to the relevant parameters.

### Real-Time Analysis

The window may be refreshed with the new data accumulated in the trace buffer without stopping the emulation.

### Software Information

The Performance Analyzer provides all the relevant information related to a selected software module in the window.

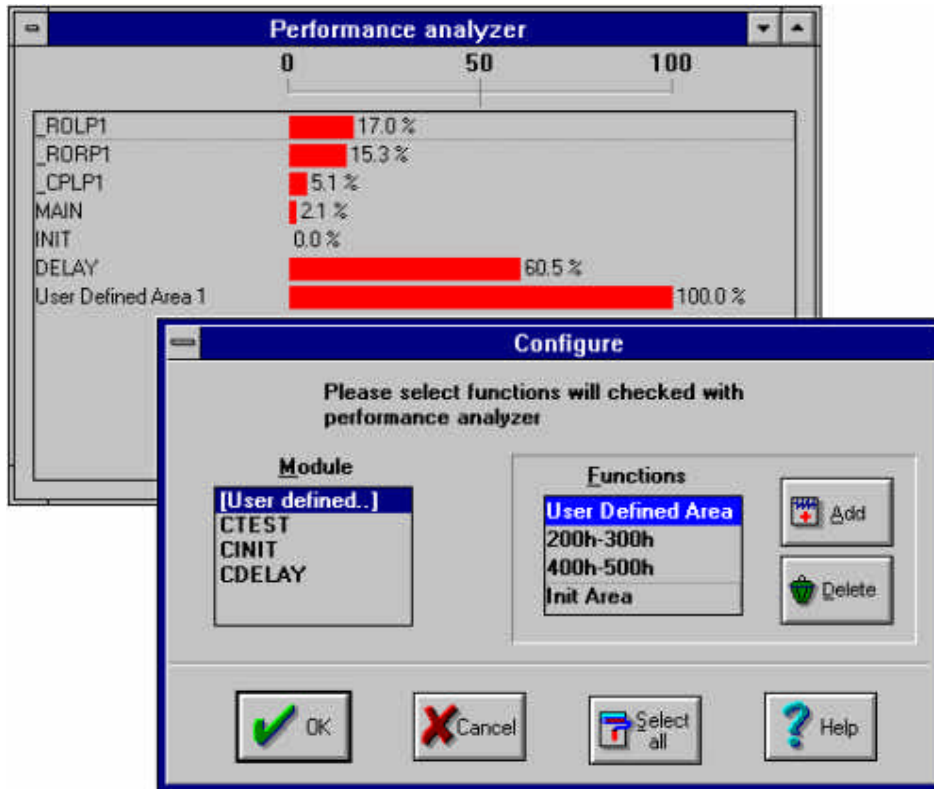


Figure 4: Performance Analysis

## PERSONALITY PROBES

### Probe P-C51

Most of the 80C51 devices are emulated by this personality probe. The technology used consists of using standard devices operating in a special licensed emulation mode. Therefore, you may use the same probe for many derivatives just by replacing the microcontroller on the probe. The maximum frequency of this probe is related to emulation mode and it is 20MHz to 33MHz, although it may change according to the innovations of the microcontrollers and derivatives. Both the probe and the emulator are prepared to run up to 42MHz. It emulates microcontrollers at 5V only and with 12 clocks/cycle. An example of the capabilities of a personality probe is given in the following table:

<b>Microcontroller on the Probe</b>	<b>Supported Microcontrollers</b>
P80C32 or P87C52	80C31/2, 8xC51/2/4/8, 89C55, 89C536/8
P87C51FB or P87L51FB	8xC51FA/B/C
P87C51RD+	8xC51RA/B/C/D+
P87C550 (DIP)	8xC550 (DIP)
P87C654	8xC652/4

*Probe P-C51 and Supported Microcontrollers*

The standard emulation header is 40-pin DIP and adapters for 44-PLCC and 44-QFP are available.

Clock is jumper selectable from the built-in crystal oscillator installed on a socket (the user may replace it by any other) or any external source.

The emulation header supplied with the probe is:

<b><i>Emulation Header</i></b>	<b><i>Description</i></b>
H-51-40D	40-pin DIP

Support for AT89C1051/2051/4051 20-pin devices is provided using Philips P80C32 or P87C52 microcontroller on the probe and ADP-20D 40-pin DIP to 20-pin DIP adapter. Also 20-SO adapters are available. The analog comparator option of AT89C1051/2051/4051 cannot be emulated.

### **Probe P-C51LV**

Most of the 80C51 devices are emulated by this personality probe and has all the features of Probe C51. Additionally it emulates the devices with 6 clock/cycle such as 89C51RD2 and many others. The technology used consists of using standard devices operating in a special licensed emulation mode to support ROM/ROMless applications. Also any devices without this special mode can be emulated; in that case the chip will work in ROMless mode only, where Port 0 and 2 are bus and not I/O (this is not important if the user code has MOVX instructions to access off chip memory or peripherals). More information about this can be found in technologies.pdf available in [www.ceibo.com](http://www.ceibo.com). Therefore, you may use the same probe for many derivatives just by replacing the microcontroller on the probe. The maximum frequency of this probe is related to emulation mode and it is 42MHz, although it may change according to the innovations of the microcontrollers and derivatives. Probe P-C51LV has an optional 64K data memory that can be mapped to the emulator and accessed by MOVX instructions. It supports 3V and 5V (jumper selectable), as well as 6 and 12clocks/cycle microcontrollers. An example of the capabilities of a personality probe is given in the following table:

<b><i>Microcontroller on the Probe</i></b>	<b><i>Supported Microcontrollers</i></b>
P80C32 or P87C52	80C31/2, 8xC51/2/4/8, 89C55, 89C536/8
P87C51FB or P87L51FB	8xC51FA/B/C
P87C51RD+	8xC51RA/B/C/D+
P87C654	8xC652/4
P89C51RD2	8xC51RA2/RB2/RC2/RD2
T89C51RD2	T8xC51RA2/RB2/RC2/RD2 (*)
AT89C51RD2	AT8xC51RA2/RB2/RC2/RD2 (*)
P89C668	8xC66X

(\*) see technologies.pdf in [www.ceibo.com](http://www.ceibo.com)

*Probe P-C51LV and Supported Microcontrollers*

The standard emulation header is 44-pin PLCC and adapters for 40-DIP and 44-QFP are available.

Clock is jumper selectable from the programmable clock source (controlled by software) or any external source.

The emulation header supplied with the probe is:

<b><i>Emulation Header</i></b>	<b><i>Description</i></b>
H-51-44P/C51LV	44-pin PLCC

Support for AT89C1051/2051/4051 20-pin devices is provided using Philips 80C32 or 87C52 microcontroller on the probe and ADP-20D 40-pin DIP to 20-pin DIP adapter. The analog comparator option of AT89C1051/2051/4051 cannot be emulated.

Support for AT89C1051/2051/4051 20-pin devices is provided using Philips 80C32 or 87C52 microcontroller on the probe and ADP-20D 40-pin DIP to 20-pin DIP adapter. The analog comparator option of AT89C1051/2051/4051

The main differences between Probe C51 and probe P-C51LV are:

<b><i>Feature</i></b>	<b><i>Probe P-C51</i></b>	<b><i>Probe P-C51LV</i></b>
Voltage	5V	3V and 5V
Frequency	33MHz	42MHz
Clock Source	Crystal	Programmable
Off-chip Xdata	no	64K
12 clock/cycle	yes	yes
6 clock/cycle	no	yes
Special Emulation Mode (*)	yes	yes
Devices w/o Emulation Mode (*)	no	yes

(\*) see technologies.pdf in [www.ceibo.com](http://www.ceibo.com)

### **Probe P-C32**

This probe is similar to C51, but does not use the microcontrollers in emulation mode. The advantage is that frequency is completely defined by the microcontroller on the probe. You may replace the microcontroller by any derivative from any vendor. As this probe does not require the special emulation mode, microcontrollers are emulated in ROMless mode only and up to 42MHz if the chip on the probe allows it. The standard emulation header is 40-pin DIP and adapters for 44-PLCC and 44-QFP are available. Clock is jumper selectable from the built-in oscillator or any external source. Probe P-C32 includes 64 KByte data memory that can be mapped to the emulator and accessed by MOVX instructions. Emulation is at 5V only.

The emulation header supplied with the probe is:

<b><i>Emulation Header</i></b>	<b><i>Description</i></b>
H-51-40D	40-pin DIP

### Probe P-C591

This probe is similar in features to P-C51LV and dedicated to Philips P8xC591, running at 6 clock/cycle.

The emulation header supplied with the probe is:

<b><i>Emulation Header</i></b>	<b><i>Description</i></b>
H-591-44P	44-pin PLCC

### Probe P-C554

This probe is similar in features to P-C51LV and dedicated to Philips P8xC554, running at 6 or 12 clock/cycle and with QFP-80 package.

The emulation header supplied with the probe is:

<b><i>Emulation Header</i></b>	<b><i>Description</i></b>
H-554-80Q	80-pin QFP

### Probe P-C323

This probe supports emulation of the Dallas 80C323 microcontroller at 3.3V, using the standard 80C323 device (ROMless mode). The maximum frequency is only limited by the 80C323 microcontroller on the probe. Clock is jumper selectable from the built-in oscillator or any external source.

The emulation header supplied with this probe is:

<b><i>Emulation Header</i></b>	<b><i>Description</i></b>
H-51-40D	40-pin DIP

### Probes P-C168 and P-C434

These Probes use special bond-out devices for emulation. The maximum frequency of this probe is related to emulation mode and it is 20MHz to 25MHz, although it may change according to the innovations of the microcontrollers and derivatives. Both the probe and the emulator are prepared to run up to 42MHz. Clock is jumper selectable from the built-in oscillator or any external source.

The emulation headers supplied with the probes are:

<b><i>Emulation Header</i></b>	<b><i>Description</i></b>
H-168-64D	64-pin SDIP
H-434-42D	42-pin SDIP

### **Probes P-C410, P-C580 and P-C782**

These personality probes incorporate a variable voltage technology that allows emulation of the microcontrollers from 1.5V to 6V and in the complete frequency range specified by Philips. Special bond-out chips are used for the emulation.

The user may select the power source either from the internal 5V power supply or by any external power source. This selection is defined by a Jumper. This probe has another XTAL Jumper that allows selecting the clock source from the crystal on the probe or from an external source.

The crystal on the probe is mounted on a socket and may also be replaced by any other one within the frequency range specified by the emulated microcontroller. In some cases a crystal will not be appropriate for low frequencies and a crystal oscillator is required. The probe allows a crystal oscillator to be replaced by another.

Probes P-C410 and P-C782 come with a 40-pin DIP emulation header. 44-PLCC and 44-QFP adapters are also available.

Probe P-C580 is supplied with a 56-pin VSO or 64-pin QFP adapter that must be soldered on your target board.

The emulation headers supplied with the probes are:

<b><i>Emulation Header</i></b>	<b><i>Description</i></b>
H-51-40D	40-pin DIP
H-580-56V	56-pin VSO
H-580-64Q	64-pin QFP

### **Probes P-C451, P-C552, P-C558, P-C575, P-C592, P-C598, P-C055**

All these probes use standard devices operating in a special emulation mode. The maximum frequency of this probe is related to emulation mode and it is 20MHz to 25MHz, although it may change according to the innovations of the microcontrollers and derivatives. Clock is jumper selectable from the built-in oscillator or any external source.

The emulation headers supplied with the probes are:

<b><i>Emulation Header</i></b>	<b><i>Description</i></b>
H-552-68P	68-pin PLCC
H-51-40D	40-pin DIP
H-451-68P	68-pin PLCC
H-558-80R	Row of 80 pins, requires ADP-80Q
H-592-68P	68-pin PLCC
H-598-80R	Row of 80 pins, requires ADP-80Q
H-055-42S	42-pin SDIP

**Probes P-C501, P-C504, P-C505C, P-C505CA, P-C505L, P-C508,  
P-C509Q, P-C513, P-515P, P-515Q, P-517P, P-517Q**

These probes are dedicated to emulation of Siemens / Infineon SAB-C500 and 80C5xx family of microcontrollers. All these probes use standard Siemens devices operating in a special emulation mode. The maximum frequency of this probe is related to emulation mode and it is 20MHz to 40MHz, although it may change according to the innovations of the microcontrollers and derivatives. Clock is jumper selectable from the built-in oscillator or any external source. The emulation headers for the probes are:

<b><i>Probe</i></b>	<b><i>Header Description</i></b>
P-C501	44-pin PLCC
P-C504	44-pin QFP
P-C505C	44-pin QFP
P-C505CA	44-pin QFP
P-C505L	80-pin QFP
P-C508	64-pin QFP
P-C509Q	100-pin QFP
P-C513	44-pin PLCC
P-C515P	68-pin PLCC
P-C515Q	80-pin QFP
P-C517P	84-pin PLCC
P-C517Q	100-pin QFP

**Probe P-C530**

Dallas microcontrollers are supported by probe P-C530, which is based on a special Dallas bond-out chip. The maximum frequency of the probe is 33 MHz and this is the limit of the current Dallas bond-out chip. Clock is jumper selectable from the built-in oscillator or any external source. Different derivatives are emulated by just using the appropriate emulation header: 40-pin DIP, 44-pin PLCC and 52-pin PLCC.

The emulation headers supplied with the probe are:

<b><i>Emulation Header</i></b>	<b><i>Description</i></b>
H-530-40D	40-pin DIP
H-530-44P	44-pin PLCC
H-530-52P	52-pin PLCC

Although Dallas 80C320 is supported by a different dedicated bond-out device, the new P-C530 bond-out chip supports it with minor timing differences, not relevant in the most common designs. However, Probe P-C320 based on the old bond-out chip is also available from Ceibo, but with support for 80C320 only. Probe P-C530 includes 64 KByte data memory that can be mapped to the emulator and accessed by MOVX instructions.

### **Probe P-C550**

This probe is for Philips P8xC550 and not Dallas DS87C550. Although P8xC550 is supported by probe C51, for PLCC packages this special probe is required. The electrical characteristics are similar to those of probe C51.

The emulation header supplied with this probe is:

<b><i>Emulation Header</i></b>	<b><i>Description</i></b>
H-550-44P	44-pin PLCC

### **Probe P-DSC550R**

This probe is for Dallas DS87C550 and not Philips P8xC550. As a bond-out is not available, the chip will work in ROMless mode only, where Port 0 and 2 are bus and not I/O (this is not important if the user code has MOVX instructions to access off chip memory or peripherals). More information about this can be found in technologies.pdf available in [www.ceibo.com](http://www.ceibo.com).

The emulation header supplied with this probe is:

<b><i>Emulation Header</i></b>	<b><i>Description</i></b>
H-DS550-68P	68-pin PLCC

### **Probe P-C752**

This personality probe supports the 8xC750/1/2 and 8xC748/9 microcontrollers by using a standard 87C752 with the security bits programmed. This probe has a XTAL Jumper that allows selecting the clock source from the crystal on the probe or from an external source.

The crystal on the probe is mounted on a socket and may also be replaced by any other one within the frequency range specified by the emulated microcontroller. While selecting the chip type 8xC749 or 8xC752 from the software menu, the AVcc and AVss signals are rerouted to the target board and should be connected to the appropriate voltages in order to use Port 1.

Probe P-C752 uses a standard 87C752 operating in emulation mode to emulate 8xC748 and 8xC750/1 microcontrollers. The main software difference between both types of chips is found in the Interrupt Enable Register (IE - address A8h). The ETI bit of the IE Register has different addresses. The 87C752 locates the ETI bit at bit address ADh, while 8xC748 and 8xC750/1 chips have that bit at address ABh.

Therefore, when emulating an 8xC748 or 8xC750/1 with 87C752, the assembler or high-level language compiler must be set up so that the target chip is an 8xC752 to generate the file for the emulator. Once software



debugging is complete, the target chip must be redefined and recompiled to generate the file for the 8xC748 or 8xC750/1 programmer.

The above manipulations are only necessary if the software is using the ETI register bit for an 8xC750/1. The 8xC748 is equivalent to the 8xC750 and the 8xC749 is equivalent to the 8xC752. Frequency is limited by the 87C752 operating in emulation mode.

Probe P-C752 comes with two emulation headers, 28-pin DIP and 24-pin DIP. Adapters for 28-pin PLCC are also available.

<b><i>Emulation Header</i></b>	<b><i>Description</i></b>
H-752-28D	28-pin DIP
ADP-24D	24-pin DIP

### **Probes P-W77 and P-W78**

#### **P-W77:**

This probe supports W77xxx Turbo microcontrollers (4 clocks per cycle). DS-51 maximum frequency for this configuration is up to 35-40 MHz, depending on the normal deviations of the chip characteristics.

Two modes are implemented: Romed and Romless.

- a. Romed mode selection can be done via Ceibo Windows debugger. If the selected chip in the menu has any ROM/Flash, then the emulator configures the probe in Romed mode. In this mode P0 and P2 are ports only. Up to 32 kBytes of On-Chip code can be used (0000-7FFFh) in this mode.

Two modes are available for this setup: Normal and Advanced.

In Normal mode up to 32 kBytes of On-Chip code can be used (0000-7FFFh). 64 kBytes of internal/external xData available and can be accessed by MOVX @DPRT and MOVX @Ri instructions.

In Advanced mode up to 64kBytes of On-Chip code can be used. XData access is via MOVX @Ri only.

- b. Romless mode selection can be done via Ceibo Windows debugger. If the selected chip does not contain any ROM/Flash, the emulator configures the probe in Romless mode. In this mode P0 and P2 are address/data bus only.

MOVX @DPRT and MOVX @Ri can be used to access 64K Xdata. Also 64K/512K code can be accessed in this mode.

The standard package is PLCC-44. Ceibo provides also adapters for DIP-40 and QFP-44. Maximum frequency is supported. 3V and 5V emulation is also possible as the probe has voltage translators.

PROBE	CLK/CYCLE	Fmax	ROMed				ROMless	
			NORMAL		ADVANCED		CODE	XDATA
			CODE	XDATA	CODE	XDATA		
W77	4	35-40	32K	64K any MOVX	64k	MOVX @Ri only	64k/512 k	64K any MOVX

**P-W78:**

This probe supports W78xxx microcontrollers working in x1 mode (12 clocks per cycle, as the standard 8051 core). DS-51 maximum frequency for this configuration is up to 40-50 MHz, depending on the normal deviations of the chip characteristics.

Two modes are implemented: Romed and Romless.

- a. Romed mode selection can be done via Ceibo Windows debugger. If the selected chip in the menu has any ROM/Flash, then the emulator configures the probe in Romed mode. In this mode P0 and P2 are ports only.

Only external XData access via short MOVX @Ri and up to 32kBytes of On-Chip code can to be used (0000-7FFFh) in this mode.

- b. Romless mode selection can to be done via Ceibo Windows debugger. If the selected chip does not contain any ROM/Flash, the emulator configures the probe in Romless mode. In this mode P0 and P2 are address/data bus only.

MOVX @DPRT and MOXV @Ri can be used to access 64K Xdata. Also 64K/512K code can be accessed in this mode.

The standard package is PLCC-44. Ceibo provides also adapters for DIP-40 and QFP-44. Maximum frequency is supported. 3V and 5V emulation is also possible as probe has voltage translators.

PROBE	CLK/CYCLE	Fmax	ROMed				ROMless	
			NORMAL		ADVANCED		CODE	XDATA
			CODE	XDATA	CODE	XDATA		
W78	12	40-50	32K	MOVX @Ri only	32K	MOVX @Ri only	64k/512 k	64K any MOVX

## DS-51 - ORDERING INFORMATION

<i>Item</i>	<i>Description</i>
DS-51	Emulator, Trace, Software, Power Supply, Cables
P-C51	Personality Probe Includes H-51-40D.
P-C51LV	Personality Probe Includes H-51-44P
P-C32	Personality Probe Includes H-51-40D or H-51-44P
P-C32LV	Personality Probe Includes H-51-40D.
P-C323	Personality Probe Includes H-51-40D.
P-C055	Personality Probe Includes H-055-42S.
P-C168	Personality Probe Includes H-168-64D.
P-C434	Personality Probe Includes H-434-42D.
P-C451	Personality Probe Includes H-451-68P.
P-C501	Personality Probe H-C501-44 PLCC.
P-C504	Personality Probe Includes H-C504-44 QFP.
P-C505C	Personality Probe Includes H-C505-44 QFP.
P-C505CA	Personality Probe Includes H-C505-44 QFP.
P-C505L	Personality Probe (needs ADP-80Q /C505).
P-C508	Personality Probe (needs ADP-64Q).
P-C-509Q	Personality Probe (needs ADP-100Q/C509).
P-C513	Personality Probe Includes H-C513-44 PLCC.
P-C515P	Personality Probe Includes H-C515-68 PLCC.
P-C515Q	Personality Probe (needs ADP-80Q/C515).
P-C517P	Personality Probe
P-C517Q	Personality Probe (needs ADP-100LQ/C517).
P-C517	Personality Probe Includes one the headers HD-517-40D, HD-517-68P or HD-517-84P.
P-C530	Personality Probe Includes one of the headers HD-530-40D, HD-530-44P or HD-530-52P.
P-C550	Personality Probe Includes H-550-44P.
P-DS550R	Personality Probe.
P-C552	Personality Probe Includes H-552-68P.
P-C554	Personality Probe.

<b><i>Item</i></b>	<b><i>Description</i></b>
P-C558	Personality Probe Includes H-558-80R (needs ADP-80Q not included).
P-C575	Personality Probe Includes H-51-40D.
P-C591	Personality Probe Includes Header H-591-44P.
P-C592	Personality Probe Includes H-592-68P.
P-C598	Personality Probe Includes H-598-80R (needs ADP-80Q not included).
P-C752	Personality Probe Includes H-752-28D.
P-W77	Includes H-51-44P (44-PLCC Header).
P-W78	Includes H-51-44P (44-PLCC Header).
ADP-20D	40-pin DIP to 20-pin DIP Adapter.
ADP-24D	28-pin DIP to 24-pin DIP Adapter.
ADP-28P	28-pin DIP to 28-pin PLCC Adapter.
ADP-28P-751	28-pin DIP to 28-pin PLCC Adapter.
ADP-44P	40-pin DIP to 44-pin PLCC Adapter.
ADP-44P-E	44-pin PLCC to 44-pin PLCC Adapter.
ADP-44Q	40-pin DIP to 44-pin QFP Adapter.
ADP-44Q-P	44-pin PLCC to 44-pin QFP Adapter.
ADP-56V	Row of pins to 56-pin VSO Adapter.
ADP-64Q	Row of pins to 64-pin QFP Adapter.
ADP-64LQ	Row of pins to 64-pin LQFP Adapter.
ADP-80Q	Row of pins to 80-pin QFP Adapter.
ADP100Q	Row of pins to 100-pin QFP Adapter.
ADP-100LQ	Row of pins to 100-pin QFP Adapter.
DS-51MB	DS-51 Main Board Replacement.
DS-51/512K MB	DS-51/512K Main Board Replacement.
DS-51/512K Upgrade	DS-51 to DS-51/512K Mother Board with 512K banking.
FC-50	Spare 50-pin flat cable.
FC-100	Spare 100-pin flat cable.
RS-232	Spare RS-232 Cable.
PS5V	Spare Power Supply.