DS5000TK USER'S GUIDE

INTRODUCTION

The DS5000TK allows immediate evaluation of any DS5000 series device in an existing application. The kit comes supplied with DS5000T with 32K bytes of memory, software diskette, and In–System Loader hardware. The kit supports in–system serial downloading of DS5000T from an IBM PC host. In addition, the DS5000T allows evaluation of all functions with the added feature of a real–time clock. Programs may be downloaded/verified from an Intel hex absolute object files residing on IBM PC. Demo routines are provided on diskette for evaluation of the timekeeping function.

DESCRIPTION

The In–System Loader hardware included in the DS5000TK allows application software to be loaded into the DS5000 series device while it is connected to the target system, eliminating the need for removal of the device when reprogramming is required. KIT5K is a user–friendly PC software package which controls the loading process to the DS5000 while it is installed into the In–System Loader hardware. KIT5K provides a high–level user interface to the DS5000T via its Serial Load mode. When the program command is executed, the user is walked through a series of system configuration questions so that the DS5000T can be properly initialized before downloading takes place. Parameters such as the device's program/data memory mapping and software encryption operation are initialized in the proper order in this fashion. KIT5K manages all of the communication with the DS5000T during the downloading process so that the details of the serial download operation can remain transparent to the user.

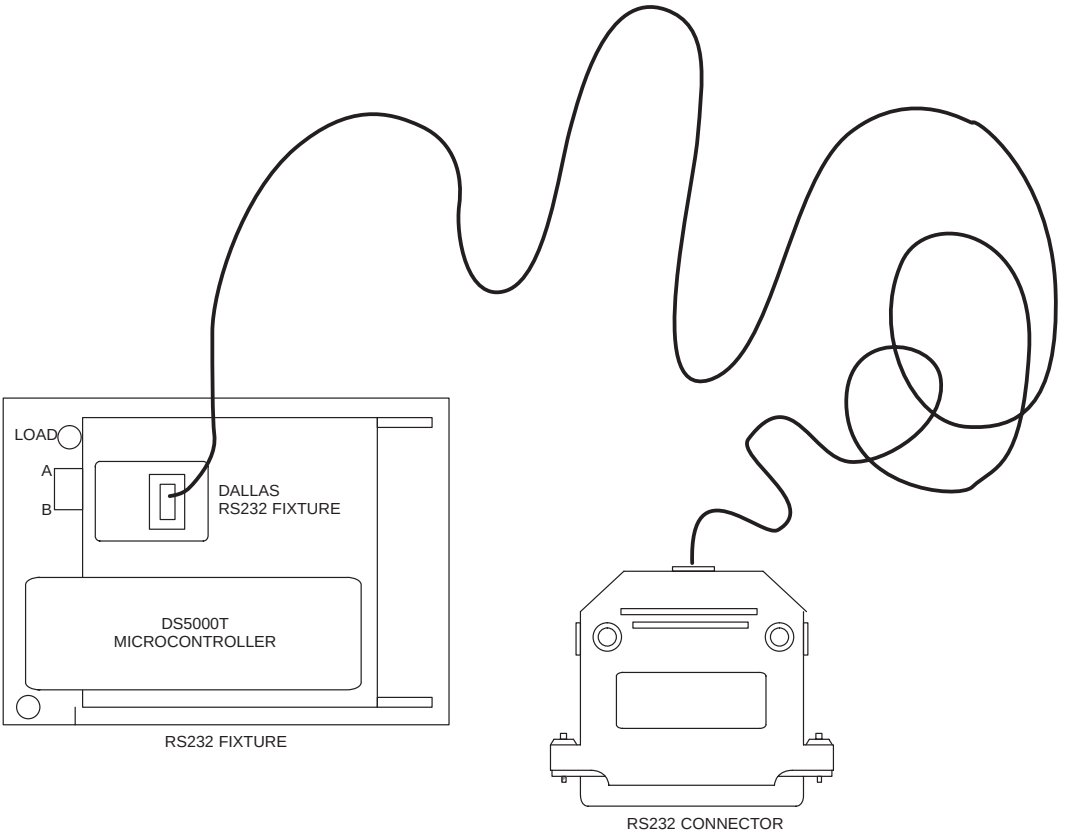
With the Evaluation Kit, the user can quickly configure the DS5000T for operation in the target system. This configuration can be performed without detailed knowledge of the DS5000's Serial Load mode. The DS5000T Evaluation Kit not only serves as a first–time evaluation system for the DS5000 or the DS5000T, but also performs the equivalent function of an EPROM programming system throughout the prototyping phase of the design cycle. If the user wishes to program a DS2250, or DS2252T using special software described later, then an adaptor is available from Dallas Semiconductor which allows the module to plug into the fixture. The adaptor part number is DS9075–40V. Note that the SDI pin (DIP pin 31) on the adaptor must be removed to program the DS2252T.

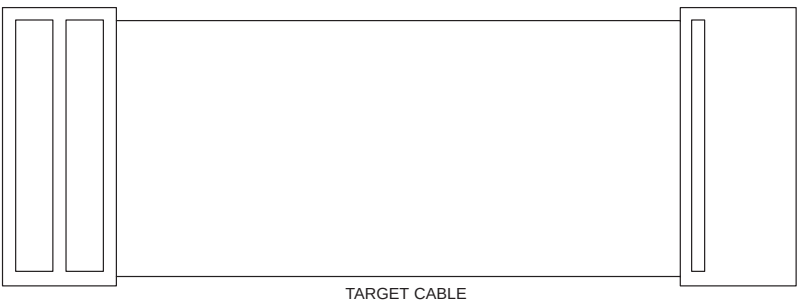
In–System Loader

The purpose of the In–System Loader hardware is to serially download the DS5000T on command from the KIT5K software in such a manner that it will be transparent to the hardware on the target system. The In–System Loader hardware illustrated in Figure 1 consists of an RS232 cable that connects to the RS232 Fixture which houses the appropriate interface circuitry and provides a 40–pin Zero–Insertion–Force socket for either the DS5000 or DS5000T. The Fixture in turn attaches to the 40–pin target cable which connects to the microcontroller socket in the target system. The hardware provides the mechanism for the KIT5K software to take control of the DS5000T via the RS232 cable, place the device in its Serial Program Load mode, and transmit new software to the device.

NAME	DESCRIPTION
RS232 Connector	Adaptor with cable. Adaptor provides DB25 female connector for connection to an RS232C IBM PC COM port on one side and RJ11 female on the other side. Cable carries RS232 signals required by the kit with two male RJ11 jacks on either end. (Note that although this cable resembles an ordinary telephone cable, it is not the same and a telephone cable will not work properly.
RS232 Fixture	RS232 serial interface for DS5000. Provides RJ11 female for RS232 signal connection, 40–pin DIP IC socket for DS5000 and 40–pin PC edge connector for connection to target cable.
Target Cable	40–pin adaptor cable which connects the 40–pin edge connector on the RS232 Fixture to the target system microcontroller socket.

DS5000T EVALUATION KIT: IN–SYSTEM LOADER HARDWARE Figure 1





TARGET CABLE

KIT5K OPERATION

KIT5K.EXE is the software environment supplied with the DS5000T Evaluation Kit. It provides a high–level interface for loading application software into the DS5000T or for setting its configuration parameters via the Program command. For more experienced users, KIT5K provides advanced features such as direct initialization of the MCON register, loading of the Encryption Key word, and setting and clearing of the Security Lock. In addition, individual memory location editing is provided to allow patches to be made to the application software. When the loading operation is completed, the device can be released on command from the PC to run the application software.

A dumb terminal emulator function is included for users interested in serial communication applications. This allows the user to run application software in the DS5000 which communicates with the user via a PC COM port. The serial communication uses the target system time base, allowing flexibility in baud rates. The terminal emulator simplifies applications which use the Dallas serial communication software module. Many of the KIT commands are available while in terminal emulation.

After KIT5K has been invoked and the prompt has been displayed, commands may be entered by the user. KIT5K operates either in interactive or batch mode. The user will not see any of the communication between KIT5K and the DS5000T (except when debug is on). The following is a summary of commands recognized by the KIT5K software.

Note that KIT5K.EXE was not designed for use with the DS5001FP, DS2251T, DS5002FP, or DS2252T devices. The software package K2.EXE, available from the Bulletin Board System or ftp site, is needed to communicate with these devices. Almost all of the KIT5K commands will work with K2.EXE. The differences are noted in the README file included with the software.

KIT MODE COMMAND SUMMARY

cd	Change to another directory or show the default directory.
cls	Clear screen.
com	Specify the COM port for the In–System Loader hardware.
dir	List the default directory or specified path.
display	List Embedded RAM contents in debug format.
do	Execute a list of KIT5K commands from a file.
dos	Enter DOS mode temporarily.
dtr	Toggles the DTR line to switch between run and load.
dump	Dump Embedded RAM in Intel Hex to a file.
edit	Individual examine/change Embedded RAM bytes in DS5000.
exit	Exit the KIT5K program; return to MS–DOS.
fill	Fill Embedded RAM with a constant value.
help	Describe the function and syntax of KIT5K commands.
key	Load the 40–bit Encryption Key word.
load	Load Embedded RAM from an Intel Hex object file.
lock	Set the Security Lock on the DS5000.
logoff	Disable logging of KIT5K commands.
logto	Log KIT5K commands to the specified file.
mcon	Set the MCON register with a specified value.
out1	Toggles a PC/AT bus signal for use by PC–based target systems.
partition	Set the Partition Address with a specified value.
pgmode	Place the in its Serial Load mode.
program	Program the DS5000 automatically with a configuration file.
quit	Same as exit; leave the KIT5K program; return to MS–DOS.
range	Set the Range Address to 8K or 32K.
reload	Sets the PC UART reload value for flexible baud rate selection.
run	Release DS5000 from program mode and run application program.
speed	Specify the serial baud rate to be used during loading.
status	Display status.

term	Switch to terminal mode; see below.
type	Type the requested filename to the screen.
unasm	Unassemble the program memory to view code.
unlock	Clear Security Lock.
verify	Verify Embedded RAM with the specified Intel Hex file.

TERMINAL MODE

capture	Capture RAM to memory and allow uploading to a file.
cd	Change directory.
cls	Clear screen.
com	Set the com port for communication.
dir	Read directory.
dos	Enter DOS mode temporarily.
dtr	Toggle the DTR line.
exit	Exit Kit.
help	Describe the functions and syntax of terminal emulator.
kit	Switch to kit mode.
logoff	Stop logging commands to a file.
logto	Log commands to a file.
nosnow	Enable snow checking for CGA screens.
out1	Toggles a PC/AT bus signal for use by PC–based target systems.
pgmode	Program the DS5000 automatically from a configuration file.
quit	Leave KIT5K.
reload	Sets the PC UART reload value for flexible baud rate selection.
run	Run a DS5000 program.
send	Send a file to the DS5000 via the serial bus.
snow	Disable snow checking for CGA monitors.
speed	Select the baud rate.
type	List a DOS file.

System Requirements

The Evaluation Kit requires an IBM PC or compatible with DOS 2.0 or later and at least 128K bytes of memory. In addition, an RS232 port must be available which is configured as COM1 (03F8H, IRQ4) or COM2 (02F8H, IRQ3). Displays which are supported include monochrome, color graphics (CGA), or enhanced graphics (EGA mode 3).

IMPORTANT APPLICATION NOTE

The KIT5K.EXE software was designed for the DOS environment and may operate erratically under the Windows 3.x or Windows 95 operating systems. If you experience communication problems with the target chip or DS5000TK hardware, a slower baud rate may be required. If problems persist, the software should be run under the DOS environment exclusively.

The DS5000TK hardware requires external power to operate. Power (+5V) must be supplied the V_{CC} and GND pins of the target cable of the RS232 fixture. Failure to do so will result in a “Cannot talk to Kit” or “Prompt not seen” message. A user selected crystal must be attached to the appropriate target cable pins if code is to be run by the DS5000TK hardware.

Electrical Specifications

Operating Temperature Range	0 to 50°C
System Power Supply Requirements from Target System	+5V @100 mA max

Interfacing to an IBM PC COM Port

The DS5000TK Evaluation Kit is provided with serial interface cables which are designed to be connected directly to a standard male DB25 connector from a COM port on an IBM PC. However, in some PC configurations, the DB25 connector may not be supplied from the PC and/or the pin assignments may be different. Consequently, problems may be experienced by users in trying to establish communication between the PC and these kit products.

To solve this problem, the following documentation defines the RS232 pin assignments between the PC and RJ11 on the DS5000TK hardware module. If necessary, the user can then build an adaptor to insure that the appropriate signals from the PC are routed to the correct pins on the RJ11 jack connector for the DS5000TK.

Configuration

The DS5000TK is configured as a DCE RS232 interface. A total of four signals are routed from the PC's COM port connector to the kit hardware as summarized below:

IBM PC SIGNAL	DB25 PIN #		KIT HARDWARE
TXD	Pin 2	→	RXD
RXD	Pin 3	←	TXD
GND	Pin 7	—	GND
DTR	Pin 20	→	DTR

The DB25 to RJ11 adaptor takes the above four signals from the IBM PC's COM port and routes them to its RJ11 jack.

RJ11 Cable

The kits are supplied with an interconnecting cable with two RJ11 plugs on either end. This cable is used to route the above RS232 signals from the DB25/RJ11 adaptor to the RJ11 jack located on the kit hardware. Although this cable appears to be a standard telephone cable commonly used in the United States, it is a special version which has pin assignments which are reversed from the U.S. standard cable. As a result, such a telephone cable will cause the kits to not operate.

Looking at the end of the RJ11 cable as a reference, the pin assignment for the cable from left to right can be given as follows:

PIN #	→	1	2	3	4
Wire Color	←	Black	Red	Green	Yellow
DCE Signal	→	RXD	GND	DTR	TXD

Kit Hardware RJ11 Jack

In the DS5000TK hardware fixture there is an RJ11 jack which accepts the cable described above. When the cable is installed in the jack, there are leads exposed on the jack which are electrically connected to signals from the cable. As a result, these lines may be probed if necessary to insure that the appropriate RS232 signals from the PC COM port are correctly routed to kit hardware.

DS5000TK Software Diskette

The software diskette supplied with the DS5000TK includes a set of programs which work together to allow you to read and set the date and time in a DS5000T and to compare it with the clock in your IBM or IBM–compatible PC. All of these programs are summarized in the file READ.ME included in the software diskette.

Installation Instructions

To install the In–System Loader hardware, the user should first turn power off to the target system. Next, the RS232 Cable with the 25–pin DB25 adaptor should be connected to either the COM1 or COM2 port of the IBM PC. Note that although this cable resembles an ordinary telephone cable, it is not the same and a telephone cable will not work properly. The RJ11 plug should then be inserted into the RJ11 jack on the RS232 Fixture. Finally, the 40–pin Target Cable should be connected between the edge connector of the RS232 Fixture and the 40–pin socket of the target system. The user should check to insure that the switch on the RS232 Fixture is in the "A" position for initial checkout.

As a precaution, a duplicate copy of the software diskette should be made before attempting to run the software on the PC.

Initial Checkout

KIT5K is supplied with a file called "TEST.HEX" that may be downloaded to the DS5000T to verify that the Evaluation Kit has been installed correctly. Below is a checkout procedure which downloads the "TEST.HEX" file to

the NILT and initializes the device's configuration parameters. This procedure also demonstrates the command sequence which is likely to be the one most often used to serially download new application software.

After performing the installation procedure described above, the initial checkout procedure can be started by typing KIT5K.EXE. The software will respond with the following:

Dallas Semiconductor NIL Evaluation Kit Software
Kit – Version x.x
Copyright (C) xxxxx, Dallas Semiconductor Corporation

At this point, KIT5K is ready to accept commands. First, specify the COM port to which the In–System Loader hardware is connected. Assuming that this is COM1, the user would enter the following:

kit>com 1 <CR>

KIT5K may now communicate with the NIL's on-chip serial loader. In order to download the file 'TEST.HEX' to the NIL, the user should type:

kit>program test.hex <CR>

The user will then be prompted with a series of questions regarding the configuration of the NIL. By entering a <CR> character for all of these, the displayed default values will be assigned as shown below:

Configuration: Press return for default value
Range (8000) = <CR>
Partition Address (1000) = <CR>
Encryption (No) <CR>
Locking (No) = <CR>
Begin (0000) = <CR>
End (7FFF) = <CR>
Verify (Yes) = <CR>

After this sequence has been completed, the software will echo back the selected configuration and program the NIL series device as follows:

Configuration Contents:
Range: 8000
Partition Address: 1000
Encryption: No
Locking: No
Begin: No
End: 7FFF
Verify: Yes

Unlocking...
Clearing MCON...
Setting Range...
Setting Partition
Loading...
Verifying...
kit5K>

The above response from KIT5K signifies that the configuration/loading operation was completed successfully. The user may verify this by executing the command "DISP 0 80" to show the test data in the NILT memory. This is shown below:

kit>disp 0 80 <CR>

0000	01	00	00	00	00	00	00	00	–	00	00	00	00	00	00	00	00	.....
0010	00	00	00	00	00	00	00	00	–	00	00	00	00	00	00	00	00	.....
0020	54	45	58	54	20	46	4F	52	–	20	44	49	53	50	4C	41	59	TEXT FOR DISPLAY
0030	20	50	55	52	50	4F	53	45	–	53	2E	20	41	42	43	44	45	PURPOSES.ABCDE
0040	46	47	48	49	4A	4B	4C	4D	–	4E	4F	50	51	52	53	54	55	FGHIJKLMNOPQRSTU
0050	56	57	58	59	5A	20	61	62	–	63	64	65	66	67	68	69	6A	VWXYZ abcdefghij
0060	6B	6C	6D	6E	6F	70	71	72	–	73	74	75	76	77	78	79	7A	klmnopqrstuvwxyz
0070	20	31	32	33	34	35	36	37	–	38	39	30	20	30	98	FD	C2	1234567890 0...
0080	98																	.....

Following the execution of the Program command shown above, KIT5K automatically created a configuration file with the same name as the specified .HEX file, but with an extension of .CFG. This file is used to save the NIL configuration parameters that the user specified during the first time that the Program command was executed for the specified .HEX file. During future Program command operations, the associated configuration file will be used to initialize the parameters automatically without any intervention by the user.

If modification of the previously selected parameters is desired, the user should select the/edit when invoking the Program command as shown below:

kit>program test.hex /edit<CR>

Command Line Syntax

Single–letter ASCII character strings are recognized as commands. Commands will not be processed until an entire command line is entered and terminated with a <CR>. Since a command line is not processed until a <CR> is entered, it may be edited with the delete key which will do a destructive delete to the screen.

Only legal characters will be echoed back to the screen. The legal characters are: 0123456789<:>, <space>, ABCDEFGHIJKLMNOPQRSTUVWXYZ, abcdefghijklmnopqrstuvwxyz, and <delete>. Backspace characters (<BS>) are converted to delete characters. The horizontal tab character is converted to space.

In most commands, arguments are represented by hexadecimal numbers. A hexadecimal number is any sequence of hexadecimal characters. A hexadecimal character may be a digit, 0 through 9, or one of the letters A through F. A byte will always be the right-most two digits of a hexadecimal number. For example, the following hexadecimal numbers will result in the following bytes:

A	→	0AH
AB	→	0ABH
ABC	→	0BCH
ABCD	→	0CDH

An address will always be the right–most four digits of a hexadecimal number. For example, the following hexadecimal numbers will result in the following addresses:

A	→	000AH
AB	→	00ABH
ABC	→	0ABCH
ABCD	→	0ABCDH
ABCDE	→	0BCDEH

In the other cases, arguments are represented by decimal numbers. In commands which normally accept hexadecimal numbers as their arguments, decimal operation may be invoked by typing a period (.) after the entered value.

KIT5K Detailed Command Summary (Kit Mode)

Cd directory_name

The default directory is set to the argument.

Example:

kit> cd \ws
C:\WS

Cls

Clear the monitor screen

Com (1) (2)

Selects which PC communication port to use. DOS puts the port base numbers into a vector area in memory. This program will attempt to use either of these two addresses (there may be zero or one value here) after the base has been checked against the hexadecimal base values of 3F8 and 2F8.

Example:

kit>com1

Dir (filename | wildcards)

A list of the file names in the directory are displayed.

Example:

```
kit> dir
RUNME.EXE READ.ME KIT5K.EXE TEST.HEX DEMO.BAT DEMODS5T.CMD DEMODS5T.EXE DEMODS5T.HEX
DEMOS5T.LST  DEMODS5T.PAS  DEMODS5T.SRC  SAMPLE.HEX  SAMPLE.LST SAMPLE.SRC
```

Display beg–addr, end–addr (>filename)
Data is displayed as in MS–DOS debug. The optional arguments are interpreted as hexadecimal numbers as a default. The beginning and ending are positional and will default to zero and the current range value, if not specified. The “greater than” sign signifies that output is to go to the specified file instead of to the screen.

```
kit>disp0 80 <CR>

0000 01 00 00 00 00 00 00 00 – 00 00 00 00 00 00 00 00 ................
0010 00 00 00 00 00 00 00 00 – 00 00 00 00 00 00 00 00 ................
0020 54 45 58 54 20 46 4F 52 – 20 44 49 53 50 4C 41 59  TEST FOR DISPLAY
0030 20 50 55 52 50 4F 53 45 – 53 2E 20 41 42 43 44 45  PURPOSES. ABCDE
0040 46 47 48 49 4A 4B 4C 4D – 4E 4F 50 51 52 53 54 55  FGHIJKLMNOPQRSTU
0050 56 57 58 59 5A 20 61 62 – 63 64 65 66 67 68 69 6A  VWXYZ abcedfghij
0060 6B 6C 6D 6E 6F 70 71 72 – 73 74 76 77 78 79 7A     klmnopqrstuvwxyz
0070 20 31 32 33 34 35 36 37 – 38 39 30 20 30 98 FD C2  1234567890 0.....
0080 98
```

Do filename
The commands in the filename are executed as a script until the end of file is encountered or until an error occurs.

Example:

```
kit>type script
fill ff 0 2f
display 0 2f

kit> do script

fill ff 0 2f

display 0 2f

0000 FF FF FF FF FF FF FF FF – FF FF FF FF FF FF FF FF ................
0010 FF FF FF FF FF FF FF FF – FF FF FF FF FF FF FF FF ................
0020 FF FF FF FF FF FF FF FF – FF FF FF FF FF FF FF FF ................
```

Dos
Takes the user to the DOS prompt to execute commands without actually leaving KIT5K. When DOS commands are complete, return to KIT by typing “exit”.

Example:

```
kit>dos
Type Exit to return to Kit5K

DOS Message

c:\kit>copy \test.hex \kit\prog.hex

c:\kit>exit
```

Welcome back to KIT.

Dtr
Toggles the status of the DTR line. This will toggle between run and program load.

Example:

kit>dtr
dtr dropped on COM 1

kit>dtr
dtr asserted on COM 1

Dump beg-addr, end-addr (> filename)
Data is displayed as Intel Hex data. The optional arguments are interpreted as hexadecimal numbers as a default. The beginning and ending addresses are positional and will default to zero and the current range value if not specified. The “greater than” sign signifies that output is to go to the specified file instead of to the screen.

Example:

The following command dumps the specified range of data to the screen in Intel Hex formal:

kit> du 0 2f
:2000000000010203FF05FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF0
:10002000FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFE0
:00000001FF

Alternatively, the command sequence shown below will dump the same data to a file called TEMP.HEX

kit> du 0 2f > temp.hex

Edit address
Data beginning with this address is available for examination and change. The argument is interpreted as a hexadecimal number as a default. In this example, user typed values are in italics.

Example:

kit> edit 0

X to exit edit; CR to leave unchanged; NUMBER to change.

0000	FF:*00*
0001	FF:*01*
0002	FF:*02*
0003	FF:*<or>*
0004	FF:*04*
0005	FF:*x*

kit> display 0 f
0000 00 01 02 FF 04 FF FF FF – FF FF FF FF FF FF FF FF ....

Exit
Buffers and files are closed, the communication ports are cleared and the program is exited.

Example:

kit>exit

A:\>

Fill value (beg–addr, end–addr)
The specified range of locations is filled with the specified constant value. The optional arguments are interpreted as hexadecimal numbers as a default.

Example:

kit>fill ff 0 2f

kit>display 0 2f

```
0000 FF FF FF FF FF FF FF FF  –  FF FF FF FF FF FF FF FF  ................
0010 FF FF FF FF FF FF FF FF  –  FF FF FF FF FF FF FF FF  ................
0020 FF FF FF FF FF FF FF FF  –  FF FF FF FF FF FF FF FF  ................
```

Help (command–name)
A list of available commands is listed or hep on the requested command is given.

Example:

kit>help load
name: load
function: Load the DS5000 memory from a file containing Intel Hex data.

Key (ASCII String | 5 pairs of hex digits | RANDOM)
This command sets the Encryption Key Word within the DS5000. The key may be set in three different ways. Five ASCII characters enclosed in single or double quotes may be used to specify the key. The user may request the computer to specify five random numbers or the user may enter five hexadecimal numbers; e.g., KEY ‘Stuff’, or KEY AABBCCDDEE, or KEY RANDOM.

Example:

kit>key 001223344

Load filename
The data from the filename is used to program the chip. Arguments are interpreted as hexadecimal numbers as a default. Several errors can be detected, such as multiple programming of the same memory location and attempts to program nonexistent memory. All error messages will be reported. No configuration data files are used with this load. See the description of the Program command.

Example:

kit>load test.hex

kit>display 0 7f

```
0000 01 00 00 00 00 00 00 00  –  00 00 00 00 00 00 00 00  ................
0010 00 00 00 00 00 00 00 00  –  00 00 00 00 00 00 00 00  ................
0020 54 45 58 54 20 46 4F 52  –  20 44 49 53 50 4C 41 59  TEST FOR DISPLAY
0030 20 50 55 52 50 4F 53 45  –  53 2E 20 41 42 43 44 45  PURPOSES. ABCDE
0040 46 47 48 49 4A 4B 4C 4D  –  4E 4F 50 51 52 53 54 55  FGHIJKLMNOPQRSTU
0050 56 57 58 59 5A 20 61 62  –  63 64 65 66 67 68 69 6A  VWXYZ abcedfghij
0060 6B 6C 6D 6E 6F 70 71 72  –  73 74 75 76 77 78 79 7A  klmnopqrstuvwxyz
0070 20 31 32 33 34 35 36 37  –  38 39 30 20 59 F6 41 11  1234567890 Y.A.
```

Lock
Set the Security Lock on the DS5000.

Example:

kit>lock

kit>status
Part is locked.

Logoff
The data logging buffers are flushed and the log file is closed.

Example:

(see the example given below for the Logto command)

Logto filename
Data logging is enabled to the specified file. Logging is turned off with the Logoff command or by exiting. All user input and data echoed to the screen is logged.

Example:

kit>logto script

kit>fill ff 0 2f

kit>display 0 2f

```
0000  FF  FF  FF  FF  FF  FF  FF  FF  –  FF  FF  FF  FF  FF  FF  FF  FF  ................
0010  FF  FF  FF  FF  FF  FF  FF  FF  –  FF  FF  FF  FF  FF  FF  FF  FF  ................
0020  FF  FF  FF  FF  FF  FF  FF  FF  –  FF  FF  FF  FF  FF  FF  FF  FF  ................
```

kit>logoff

MCON number
The MCON register is changed to the requested number. The argument is interpreted as a hexadecimal number as a default.

Example:

kit>mcon 28

kit>status
Partition: 1000 Range: 8000 (32K) Chip Enable 2: 0

Partition (0 | 800 | 1000 | 1800 | 2000 | 2800 | 3000 | 3800 | 4000 | 4800 | 5000 | 5800 | 6000 | 6800 | 7000 | 8000)
The Partition Address is set to the selected hexadecimal value and the display is updated. The argument is interpreted as a decimal number as a default.

Example:

kit>par 2000

kit>status
Partition: 2000 Range: 8000 (32K) Chip Enable 2: 0

Out1
Toggles the status of the out1 signal on the PC/AT bus. This is useful for PC-based target system. It may serve in a similar manner to DTR.

Partition
Directly sets the partition as above.

Pgmode
Signals the In–System Loader hardware to place the DS5000 in Program mode by raising the DTR line to its active level. Communication is then attempted to the DS5000 at the selected baud rate. The default value of the baud rate is 9600 bps if no other baud rate frequency has been selected.

Example:

kit>pgmode
DTR asserted on COM 1

Program filename [/edit]
The data from the filename (default extension = .HEX) and its associated configuration file (.CFG) is used to program the chip. If the configuration file dows not exist, the necessary information will be prompted for and a new configuration file will be created. If the file doesn't exist during batch operation, defaults will be used. The configuration file is displayed before the part is programmed. The/Edit switch allows the current configuration to be edited one line at a time.

Example:

(see Initial Checkout section)

Range (2000 | 8000)
The range bit is set and the display is updated.

Example:

kit> range 8000

kit>status
Partition: 2000 Range: 8000 (32K) Chip Enable 2: 0

Reload
Sets the reload value of the PC 8250 UART. This is available for more flexible selection of baud rates. The baud rate is selected by the formula 115200/n where n is the reload number.

Example:
kit>reload 6

baud rate 19200

Run
The DTR line is dropped to its inactive level. This action signals the In–System Loader hardware to release the DS5000 from its Program mode and allows it to run the application program. A crystal must be connected to the target system.

Example:

kit>run
DTR dropped from COM 1

Speed (150 | 300 | 600 | 1200 | 2400 | 4800 | 19200)
This command is used to select the baud rate for communication between the PC and the DS5000. Decimal numbers are used in entering the arguments.

Example:

kit> sp 1200

Status
Display the current status of the DS5000.

Example:

kit>status
Partition: 2000 Range: 8000 (32K) Chip Enable 2: 0

Term
Switch to terminal emulation mode. This allows testing of software which expects serial commands from a PC or similar station. Many of the kit commands are available from this mode. Online help is also available as with normal KIT mode.

Example:

kit> term

++++++++++ Dumb Terminal Press Escape for Commands ++++++++++

–
"press escape"
–
dt> kit

Type filename
Type the requested file to the screen.

Example:

kit> type script
fill ff 0 2f
display 0 2f

Unasm
Unassemble the program RAM of the DS5000. Optional specify start and stop addresses for disassembly.

Example:

kit> usasm 100 10C

0100	EB	MOV	A,R3
0101	F7	MOV	@R1,A
0102	5191	ACALL	00291H
0104	B40A07	CJNE	A,#00AH,0010EH
0107	311F	ACALL	0011BH
0109	20050F	JB	005H,0011BH
010C	01DB	AJMP	000DBH

KIT>

Unlock
Clear the Security Lock bit on the DS5000.

Example:

kit> unlock

Verify Filename (beg–addr, end–addr)
The data from the filename is used to verify data in the chip. The optional beginning and ending addresses will determine what parts of the input file will be used for verification. Data from the file is compared against the current contents of memory. Anytime they are different, the discrepancy will be reported. Arguments are entered as hexadecimal numbers. The beginning and ending addresses are positional and will default to zero and to the current range value if not specified. No configuration data files are used with this load.

Example:

kit>load test.hex

kit>verify test.hex
No Verification errors

Terminal Emulator Mode Commands

This section discusses the commands which are unique or different in the terminal mode. A complete list of commands for this mode is given above.

Capture
When toggled on, the capture command receives data from the DS5000 and holds the contents into memory. When toggled off, the program prompts for a filename to store to.

Example:

dt> capture
"an operation which sends data to the COM port"
"escape"

dt>capture
Enter filename to save capture buffer, CR to discard.
Filename:

Help
Displays the commands available in terminal mode

Example:

dt> help
Available commands:

CApture	CD	CLs	COm	DIR	DOS
DTr	EXit	Help	Kit	LOGOff	LOGTo
NosnowOut1	PGmode	Quit	REload	RUn	
SEnd	SNow	SPeed	TYpe		

Use "Help" "command-name" or HELP*" for more information.

Kit
Switch out of terminal emulator mode into KIT mode.

Nosnow
Enable snow checking for CGA monitors. Screen output is slower.

Send
Sends a file through a COM port to the DS5000. Useful for serial download to an application program.

Snow
Disable snow checking on CGA tubes. Output is faster.

In–System Loader Operational Details

The DTR signal on the COM port interface is activated by the KIT5K software to signal the hardware in the RS232 Fixture that serial downloading is in effect. In addition, RTS is activated for the duration of the time that KIT5K is in execution.

When DTR is activated, the hardware isolates signals on the DS5000 which are used to accomplish the serial download task from the target system circuitry. This includes RST, TXD(P3.1), RXD (P3.0), and XTAL1. RST is then driven high to initiate a reset within the DS5000. Following this action, XTAL1 is then driven with the RS232 Fixture's internal 11.0592 MHz clock oscillator circuit. Finally, $\overline{PSEN}$ is then driven low. This sequence of actions causes the DS5000 to begin operation in its Serial Program Load mode at a clock frequency from which standard baud rate frequencies may be derived. None of the activity on the RST, TXD, RXD, and XTAL1 pins is driven out to the target system lines while the DTR signal is active. DTR will remain active until either the "Run" or the "Exit" command is executed from KIT5K.

When DTR is released, the In–System Loader causes the DS5000 to be reset and begin execution of the application code. When this occurs and the In–System Loader's switch is in the "A" position, all communication performed on the TXD and RXD pins on the target system is isolated from the PC. If the switch is placed into the "B" position, then the TXD and RXD pins are connected to the PC and not to the target system during the execution of the application program. This capability is provided for applications which require that the target system have the ability to communicate to the PC through the COM port used by KIT5K. In general, however, the "Run" command cannot be used to initiate the execution of DS5000 application software which communicates to the IBM PC since KIT5K will still be in execution and will have control of the COM port.

When operating the serial loader, the user should insure that the port pins P2.7 and P2.6 are not externally pulled to a low state. If this condition were to occur, the Parallel Loader mode's verify cycle would be invoked. As a result, serial communications between the KIT5K program on the PC and the serial loader on the DS5000 would not function. This is due to the fact that since RST and $\overline{PSEN}$ are being pulled high and low respectively to invoke the DS5000's Serial Load mode operation, the addition of P2.7 and P2.6 being pulled low would satisfy the condition for a Verify cycle on the device. The easiest way to insure that this does not occur is to assign either P2.7 or P2.6 as an output in the target system. This will insure that at least one of these pins will be pulled high by its internal pullup while the Serial Load mode is in effect, as all port pins are set at a 1 (reset) state during this time.

KIT5K OPERATIONAL DETAILS

When KIT5K is invoked, communication is automatically established with the DS5000 via its on–chip Serial Loader. KIT5K always configures the COM port with eight data bits, one stop bit and no parity, and activates RTS. Communication with the DS5000 is then attempted by asserting DTR and sending a carriage return (CR>) at the currently selected baud rate (default value is 9600 bps). If no response is detected, then an error message to this effect is displayed to the user.

After the baud rate is determined, KIT5K holds both the DTR line and the RTS line at their active levels until either a "Run" or and "Exit" command is executed. When the "Run" command is executed, DTR is taken inactive. When the "Exit" command is issued, both DTR and RTS are de-asserted and control is returned to DOS.

DS5000T Demonstration Software

The DS5000TK diskette contains a set of programs which word together to allow you to read and set the date and time in a DS5000T and to compare it with the clock in your IBM or IBM–compatible PC. The program DEMODS5T.HEX runs in the DS5000T, and is used to pass date and time information back and forth between the DS5000T and the PC over the serial port.

The program DEMODS5T.EXE runs in the PC and allows you to read or set the time in the DS5000T and compare it with the PC clock.

Running DEMO.BAT

DEMO.BAT automatically loads the DS5000T with a program (DEMODS5T.HEX) to read the time and then runs a program in the PC (DEMODS5T.EXE) to set or display the time sent back by the DS5000. The following steps are required to run this demo:

a) Place your DS5000T in the socket of the RS232 Fixture and turn the socket lock screw to the “C” position.

b) Place the switch on the fixture in position B, then connect the fixture using the ribbon cable to a socket providing V_{CC} and Ground. The socket must also supply an 11.0592 MHz crystal across pins 18 and 19, with pins 18 and 19 also each connected through a 33 pF capacitor to pin 20 (V_{SS}). Finally, the socket should insure that pin 31 (EA) is tied to pin 40 (V_{CC}).

c) Connect the Fixture to the COM1 or COM2 serial port using the modular cable provided. (Note that although this cable resembles an ordinary telephone cable, it is not the same, and a telephone cable will not work properly.)

d) Type DEMO on the keyboard to execute the batch file. This batch file first uses the KIT5K utility program to load a program into the DS5000T which relays the date and time information back to the PC, then it runs a PC program which compares the time provided by the PC clock with the time provided by the DS5000T.

e) Within a few seconds, the program should report that it has found the DS5000T and it will ask you if you want to set the time. If you answer N, the program will read the date and time information from the DS5000T and compare it to the date and time from the PC clock. If you answer Y, the program will set the date and time in the DS5000T to agree with the PC clock, then it will begin comparing the two times. The program will continue running until any key is pressed.