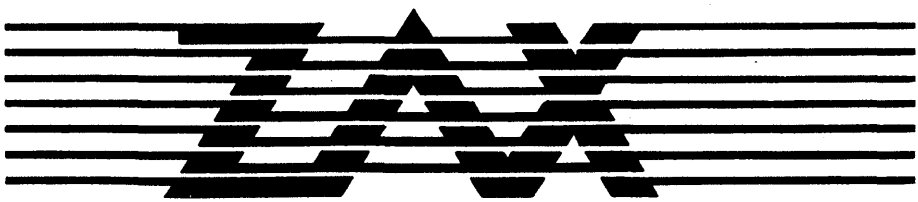
ZICE-II

REFERENCE MANUAL



ZICE-II

SYMBOLIC DEBUGGER
and
COMMUNICATIONS SYSTEM
for
ZAX ICD-SERIES EMULATORS

Version 2.0

REFERENCE MANUAL

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Introduction

ZICE-II is a symbolic debugger and communications system for interfacing ZAX In-Circuit Debugger (ICD) emulators to Unix-, VMS-, and MS-DOS-based host computers (the software is essentially hardware independent). ZICE-II facilitates symbolic debugging of microprocessor programs, as well as support for all the features of ZAX's ICD-series emulators. Once installed, ZICE-II may be used in one of two different operating modes: REMOTE and LOCAL. In the REMOTE mode, the computer (and ZICE-II) acts as the interface between the user and the ICD. In the LOCAL mode, the user accesses the ICD directly via a terminal. The computer's role, in the LOCAL Mode, allows the user to access ZICE-II commands, perform symbolic debug, and interface to multi-user workstations.

ZICE-II Features

- Support for MS-DOS (3.1), VMS and Unix 4.2BSD operating systems
- Enter multiple commands on a single line (up to 10)
- Repeat the last command executed with a single keystroke
- Execute batch files upon invocation of ZICE-II
- Abort ICD commands or batch file commands at any time
- Calculate Hex or decimal numeric or symbol values
- Access an on-line help facility for ZICE-II and ICD commands
- Execute a command or series of commands with a single keystroke
- Record on disk all or selected parts of a debug session
- Create an unlimited number of user-defined macros
- Perform automatic command sequencing following an ICD break
- Insert comments into a batch file
- Dictate full file specifications for all file operations
- Automatically install selected macros
- Powerful module/symbol table manager
- Default file typing employed for all file operations

- Nested batch files
- User-definable, variable length module and symbol names
- Execution of operating system commands from within ZICE-II
- LOCAL "host computer assisted" mode
- Maintains symbol table in the host computer

User's executable program allow the following formats:

- INTEL hex (plus extended hex and ISIS symbol tables), MOTOROLA S records, INTEL 8086 OMF

ZICE-II supports all the features of ZAX ICD-series emulators, including:

- Single step trace
- RS-232 communications
- Universal command structure
- External break and event triggers
- In-line assembler and disassembler
- Real-time emulation (no wait states)
- Hardware and software breakpoints
- Real-time trace buffer

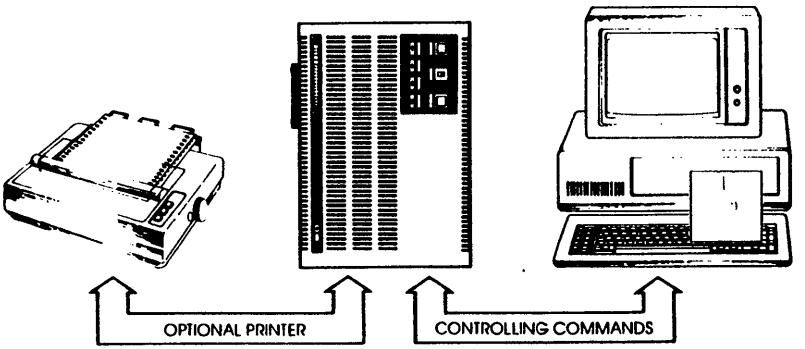
Command Overview

BATCH	The BATCH command executes a group of commands from a command line. BATCH files may be nested to a total of 10 levels. When a BATCH file is being executed, the ZICE-II prompt assumes the identity of the BATCH filename, thus indicating the current BATCH file being executed. The current BATCH file may be aborted by pressing control-X.
CALCULATE	The CALCULATE command allows hex or decimal calculation of numeric or symbol values.
DEFINE	The DEFINE command creates new module/symbol definitions, and alteration of existing module/symbol definitions.
DELETE	The DELETE command deletes single/multiple symbols.
DISPLAY	The DISPLAY command enables/disables display of symbols.
EXECUTE	The EXECUTE command allows execution of an operating system command from within ZICE-II environment.
FUNCTION KEY	The FUNCTION KEY command allows use of a previously defined function KEY macro to be used from within a BATCH file.
HELP	The HELP command provides an on-line summary for ZAX and ZICE-II commands, and provides on-line syntax and examples for ZAX and ZICE-II commands.
IF	The IF command allows for conditional execution of commands dependent upon specific register, memory or ports contents.
JOURNAL/ NOJOURNAL	The JOURNAL/NOJOURNAL command allows command sequences to be recorded to disk file for later re-execution as a BATCH file.
KEY	The KEY command allows a command or series of commands to be associated with a single function key (F1-F10).
LOG/NOLOG	The LOG/NOLOG command allows all or selected parts of a debug session to be recorded to disk file.
MACRO	The MACRO command allows unlimited user-defined macros which can be locally created, and loaded/saved from/to a disk file.

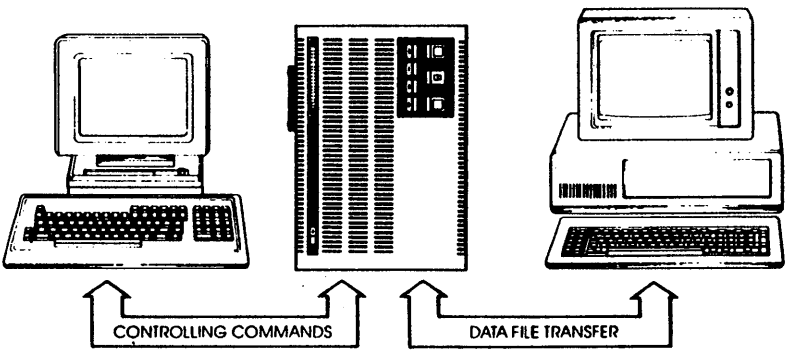
MODULE LENGTH	The MODULE LENGTH command allows variation of the number of module-name characters to be used for output (0-20).
ONBREAK	The ONBREAK command allows automatic command sequencing following an emulation break.
PAUSE	The PAUSE command temporarily suspends the execution of a BATCH file.
PROMPT	The PROMPT command alters the ZICE-II prompt.
QUIT	The QUIT command terminates ZICE-II and returns to the operating system.
REMARK	The REMARK command allows comments to be inserted in BATCH files.
SAVE SYMBOL	The SAVE SYMBOL command allows the entire module/symbol table to be stored on disk.
SHELL	The SHELL command allows another operating system command interpreter (shell) to be run while preserving all symbols and the ZICE-II environment.
SHOW	The SHOW command displays all modules and symbols, just modules, just symbols, symbols from a specific module, and symbols with a common name.
SYMBOL LENGTH	The SYMBOL LENGTH command allows variation of the number of symbol-name characters to be used for output (0-20).

User/ ICD Interface

Before invoking ZICE-II, you must determine the role of the computer in your system configuration, and how you intend to control the ICD. In the REMOTE mode, the computer controls the ICD directly; no other devices are required. In the LOCAL mode, a terminal controls the ICD directly, while the computer acts as a conduit to ZICE-II and permits interfacing to multi-user workstations. You must select and construct your particular system configuration before installing ZICE-II.



Operation Mode: REMOTE



Operation Mode: LOCAL

NOTE: To see how to configure your system for either REMOTE or LOCAL operation, read Section 1, "ICD Description and Operation," in your ICD User's Manual.

ZICE-II Operating Environments

ZICE-II may be invoked on any computer using MS-DOS, VMS or Unix 4.2BSD. Before invoking ZICE-II, it must be properly installed on your particular system. To install ZICE-II, determine which operating system your computer employs and then read the instructions under that heading (e.g., for Unix OS, read both "ZICE-II Specifics For Unix Environment," and "Invoking ZICE-II In Unix Environment").

ZICE-II Specifics For MS-DOS Environment

Before invoking ZICE-II in MS-DOS environment, make a directory where you intend the ZICE-II file to reside, and then copy ZICE-II to that directory.

Invoking ZICE-II In MS-DOS Environment

REMOTE Mode Invocation

In order to invoke ZICE-II in the REMOTE mode, enter the following command:

zice

LOCAL Mode Invocation

In order to invoke ZICE-II in the LOCAL mode, enter the following command:

hinstal.dat

and then follow the instructions on the computer's screen.

ZICE-II Specifics For VMS Environment

For VMS, ZICE-II uses a directory that the installation program creates. This directory is "sys$sysroot:[zax.zicexxx]," where 'xxx' represents the type of ICD used (e.g., "68k" for the 68000 family of ICDs). Within this directory reside the "zice.hlp" (help) and "zice.sys" (system) files. ZICE-II also maintains an environment variable ("ZAX_ZICE") which points to the "sys$root: [zax.-zicexxx]" directory.

Moving Distribution to Your Computer

Before placing ZICE-II on your computer, you must copy the distribution to any directory on your computer. The media that you are using is in "BACKUP" format, and can be copied using the VMS "BACKUP" command. The following is an example of the command used to transfer distribution to your computer:

```
MOUNT/FOREIGN msa0:
BACKUP/VERIFY/REWIND nsa0:zice.blk/save[]
```

This command copies the files on the media that is associated with the magnetic tape device "msa0:" into your current directory.

Installation

To install ZICE-II on your computer system, you must have sufficient privileges and your current directory must be where the executable files reside. The installation is automatically performed by invoking the ZAX installation utility. To invoke, use the following command:

@zinstal

This utility creates the "sys$sysroot: [zax.zicexxx]" directory and then moves the system and help files there. The executable files are then placed in the "sys$sysroot: [zax.zicexxx]" directory. These files are then removed from your current directory.

Invoking ZICE-II In VMS Environment

REMOTE Mode Invocation

In order to use ZICE-II in the REMOTE mode, you must specify which terminal port the ICD is attached to. For example, to invoke ZICE-II in the REMOTE mode with the ICD attached to "txal:" you would use the following command:

z68k -t txal:

If your ICD is configured in the REMOTE mode and you wish ZICE-II to execute a batch file, you must append the batch file name to the command. The following is an example using 68000 ZICE-II software:

z68k -t txal: batch_file.cmd

LOCAL Mode Invocation

The following is an example of invoking 68000 ZICE-II software in the LOCAL mode:

z68k

This command starts ZICE-II and then requires that you follow the instructions that will be issued to you. If you wish to execute a batch file when ZICE-II is invoked, then the batch file name must be appended to the command. The following is an example of invoking ZICE-II and executing a batch file while in the LOCAL mode.

z68k batch_file.cmd

ZICE-II Specifics For Unix Environment

For Unix, ZICE-II uses two directories on the host computer. The directory where executable files will reside is called "/usr/bin." These executable files are called "zice" and "zxxx" (where 'xxx' represents the type of ICD-e.g., "68k" for the 68000 family of ICDs). The other directory, "/user/zax/zicexxx," is the one that the installation program creates. Within this directory reside the "zice.hlp" (help) and "zice.sys" (system) files. ZICE-II also maintains an environment variable ("ZAX_ZICE") which points to the "/usr/zax/zicexxxx" directory.

If you have purchased a source distribution, you will need to create the ZICE-II executable files on your host computer. (This is not necessary if you have only purchased the executable distribution.)

Moving Distribution to Your Computer

Before placing ZICE-II on your computer, you must copy the distribution to any directory on your computer. The media that you are using is in "tar" format, and can be copied using the Unix "tar" command. The following is an example of the command used to transfer a distribution to your computer:

```
tar -xfv /dev/rmt8
```

This command copies the files on the media that is associated with the device "/dev/rmt8," into your current working directory.

Creating Executable ZICE-II

This is the next step if you have purchased a source distribution. To create the ZICE-II executable files, you must use the Unix "make" utility. Make sure that your current directory is where the ZICE-II source files reside and then use the following Unix command:

```
make
```

This command creates all the necessary executable files for ZICE-II to be used on your computer.

Installation

To install ZICE-II on your computer system, you must have sufficient privileges and your current directory must be where the executable files reside. The installation is automatically performed by invoking the ZAX installation utility. To invoke, use the following command:

```
zaxinstall
```

This utility creates the "/usr/zax/zicexxx" directory and then moves the system and help files there. The executable files are then placed in the "/usr/bin" directory. These files are then removed from your current directory.

Invoking ZICE-II In Unix Environment

REMOTE Mode Invocation

In order to use ZICE-II in the REMOTE mode, you must specify which terminal port the ICD is attached to. For example, to invoke ZICE-II in the REMOTE mode with the ICD attached to "ttyd1," you would use the following command:

```
z68k -t /dev/ttyd1
```

If your ICD is configured in the REMOTE mode and you wish ZICE-II to execute a batch file, you must append the batch file name to the command. The following is an example using 68000 ZICE-II software:

```
z68k -t /dev/ttyd1 batch_file.cmd
```

LOCAL Mode Invocation

The following is an example of invoking 68000 ZICE-II software in the LOCAL mode:

```
z68k
```

This command starts ZICE-II and then requires that you follow the instructions that will be issued to you. If you wish to execute a batch file when ZICE-II is invoked, then the batch file name must be appended to the command. The following is an example of invoking ZICE-II and executing a batch file while in the LOCAL mode,

```
z68k batch_file.cmd
```

ZICE-II Sequence of Events

The following shows the actions that transpire after control is passed to the ZICE-II program.

1. The command line is checked for the presence of a -t switch, followed by the computer's serial interface port name, to indicate a change from the default REMOTE or LOCAL mode of operation.

2. Access to files outside the current directory are searched through the host environment variable, "PATH."

3. The control-c interrupt vector is managed by ZICE-II.

4. The first line of the SIGN-ON text is displayed.

5. The ZICE.SYS file is read, and the PATH is searched if the file is not found in the current directory. If ZICE.SYS is not found, ZICE-II aborts.

6. If the host computer is an IBM PC or equivalent, the second line of the ZICE.SYS file is used to initialize the COM1 or COM2 port with the specified parameters.

NOTES: (a) max baud rate allowed is 19200bps.
(b) The original port parameters are saved, and re-established when ZICE-II exits.

7. The next two lines of the SIGN-ON message are displayed.

8. If the host computer is an IBM PC or equivalent, the specified port name and speed are displayed.

9. The macro file ZICE.MAC is searched for, if necessary using the PATH definition. If ZICE.MAC is found, the macros contained therein are loaded into ZICE-II's macro table.

10. If LOCAL operation is desired, the EXIT from USER mode is displayed.

11. The serial port(s) to be used are enabled.

NOTE: COM1/COM2 interrupts are enabled on the IBM PC.

12. ZICE-II now waits for communication from the ICD. When it is established, the ZICE-II prompt is displayed.

13. If the invocation command line included a filename parameter, the file is opened for immediate batch processing.

14. When ZICE-II receives the QUIT command, any open JOURNAL or LOG files are closed, and any interrupts which have been managed by ZICE-II are returned to their original values before returning control to the operating system.

Special Keys

The following keys are reserved for ZICE-II:

Keys	Function
Ctrl (control)-A	repeats last command
Ctrl-X	aborts current batch file
Ctrl-Y*	leaves ICD running and loads a new operating system shell while preserving ZICE-II environment
Ctrl-Z*	leaves ICD running and quits ZICE-II
space bar	controls flow of screen output
ESC (escape)	aborts current command

*Only available after a GO command has been issued.

BATCH

Abbreviation	BA
Action	Allows user to execute a series of commands by grouping the commands together in a command file. The BATCH command may be nested to a level of 10. Default file extension is CMD.
Syntax	BA filename[.cmd]
Example	BA setup BA test.1

CALCULATION

Abbreviation	CAL
Action	Allows hex or decimal calculation of numeric or symbol values.
Syntax	C data +|− data
Example	C 12345678 C 0fffh-44h

DEFINE

Abbreviation	DEF
Action	Allows creation of new module/symbol definitions or alters existing module/symbol definitions.
Syntax	DEF [module.]symbol = value DEF [module.]symbol = segment:offset
Example	DEF LAB1 = 1234 DEF INIT.START = 1000h

DELETE

Abbreviation	DEL
Action	The DELETE command deletes a symbol or group of symbols from the symbol table.
Syntax	DEL module.symbol DEL symbol DEL *.symbol DEL module
Example	DEL LAB1 DEL INIT.* (deletes all symbols from module INIT) DEL *.ABC (deletes all symbols called ABC)

DISPLAY

Abbreviation	DISP
Action	Enables/Disables display of symbols.
Syntax	DISP DISP ON/OFF
Example	DISP OFF DISP

EXECUTE

Abbreviation	EXEC
Action	Allows execution of a DOS command from within ZICE-II environment
Syntax	EXEC command_string
Example	EXEC DIR C: EXEC typo demo.lst

FUNCTION KEY

Abbreviation	FN
Action	Allows the use of a previously defined function key to be used from within a BATCH file.
Syntax	FN FN 1 | 2 | 3... | 10
Example	FN 5

HELP

Abbreviation	HE
Action	Provides an on-line summary and syntax listing for ICD and ZICE-II commands.
Syntax	HE [command]
Example	HE HE FILL HE A

IF

Abbreviation: none

Action: Allows conditional execution of commands dependent upon specific register, memory or port contents. The IF command may be nested to a maximum of 10 levels.

Syntax:

```
IF reg(n)|mem(n)|port(n)| eq|ne|lt|gt|le|ge value
                                    commands1
[else]

                                    commands2
endif
```

Example:

```
IF mem (.flag) gt 80
lo test4
g 100
ELSE
lo test5
g200
ENDIF
```

JOURNAL

Abbreviation: J

Action: Opens a file for storing all subsequent commands, until a NOJOURNAL command is issued. (This command is a convenient way of creating a BATCH file).

Syntax: J filename[.cmd]

Example:

```
J TEST
J TESTA.XYZ
```

KEY

Abbreviation: K

Action: Allows a command or series of commands to be associated with a single function key (F1-F10).

Syntax:

```
K
K 1 | 2 | 3... | 10=command_string
```

Example:

```
KEY 3=H D 100,50
KEY 7="R; DI 0 10:G MAIN.LOOP"
```

LOG

Abbreviation	none
Action	Opens a file which is used to store all subsequent user commands and ICD output for later processing or report generation, etc. NOLOG is used to terminate the logging process.
Syntax	LOG filename[.log]
Example	LOG TESTLOG LOG LOG.TXT

MACRO

Abbreviation	MAC
Action	Allows creation of unlimited user-defined commands. The MACRO command prompts for command lines until a blank line is read. The defined MACRO will accept up to 10 parameters (named: ..). Macros can be nested to a level of 10. Macro support commands are: MDelete (delete macro) e.g., MD reset MLoad (load macro files) e.g., ML macros MSave (save macros to file) e.g., MS newmacs MShow (show defined macros) e.g., MSH [macro_name]
Syntax	MAC macro_name
Example	MAC reset

MODULE LENGTH

Abbreviation	MOD
Action	Sets the length of module names to be used on screen output.
Syntax	MOD MOD length
Example	MOD 10 MOD

NOJOURNAL

Abbreviation	NOJ
Action	Stops command journaling.
Syntax	NOJ
Example	NOJ

NOLOG

Abbreviation	NOL
Action	Stops transaction Logging.
Syntax	NOL
Example	NOL

ONBREAK

Abbreviation	ON
Action	Allows automatic command sequencing following an emulation break. For any given break condition (breakpoint, bus timeout, memory timeout, etc.), the ICD can be programmed to perform any function on breakpoint.
Syntax	ON ON/A|/B|/C command_string ON/A|/B|/C ON|OFF|CLR ON/O|/1|/2 . . . |/7 command_string ON/O|/1|/2 . . . |/7 ON|OFF|CLR ON/E|/W|/M|/G|/X|/U|/F|/T command_string ON/E|/W|/M|/G|/X|/U|/F|/T ON|OFF|CLR
Example	ON/B H D 20 ON/G "LOG GUARD; H D 40;R:NOL:R RESET: GO" ON/W BA WRITEP.SET

PAUSE

Abbreviation	PA
Action	Temporarily suspends execution of a BATCH file until a key is pressed. If control-X is pressed, the BATCH file will be aborted.
Syntax	PA
Example	PA

PROMPT

Abbreviation	PRO
Action	Allows alteration of the ZICE-II prompt. When executing a BATCH file, the prompt automatically takes on the BATCH filename.
Syntax	PRO string
Example	PRO DEMO

QUIT

Abbreviation	Q
Action	Terminates ZICE-II and returns to DOS.

REMARK

Abbreviation	REM
Action	Allows comments to be inserted in BATCH files.
Syntax	REM text
Example	REM This is a comment

SAVE SYMBOL

Abbreviation	SAVES
Action	Allows the entire module/symbol table to be stored on disk.
Syntax	SAVES filename[.sym]
Example	SAVES iotest SAVES symbols_abs

SHELL

Abbreviation	SHE
Action	Allows another system command interpreter (shell) to be run while preserving all symbols, and the ZICE-II environment. Return to ZICE-II by pressing the "EXIT" key.
Syntax	SHE
Example	SHE

SHOW

Abbreviation	SH
Action	Displays various symbol formats.
Syntax	SH [ALL] SH SYM|MOD SH module_name.* SH *symbol_name SH module_name.c* SH c*
Example	SH SH *start SH MOD SH D*

SYMBOL LENGTH

Abbreviation	SYM
Action	Allows a variation of the number of symbol-name characters to be used for output.
Syntax	SYM SYM length
Example	SYM 10 SYM

COMMAND SUMMARY

BATCH	BA filename[.cmd]
CALCULATION	C data +|- data
DEFINE	DEF [module.]symbol=value
	DEF [module.]symbol=segment:offset
DELETE	DEL module.symbol
	DEL symbol
	DEL *symbol
	DEL module
DISPLAY	DISP
	DISP ON|OFF
EXECUTE	EXEC command_string
FUNCTION KEY	FN
	FN 1|2|3 ...|10
HELP	HE [command]
IF	IF reg (n)|mem(n)|port(n) eq|ne|lt|gt|le|ge value commands1
	[else] commands2
	endif
JOURNAL	J filename[.cmd]
KEY	K
	K 1 | 2 | 3... | 10=command_string
LOG	LOG filename[.log]
MACRO	MAC macro_name
MODULE LENGTH	MOD
	MOD length
NOJOURNAL	NOJ
NOLOG	NOL
ONBREAK	ON/A|/B|/C command_string
	ON/A|/B|/C ON|OFF|CLR
	ON/O|/1|/2 . . . |/7 command_string
	ON/O|/1|/2 . . . |/7 ON|OFF|CLR
	ON/E|/W|/M|/G|/X|/U|/F|/T command_string
	ON/E|/W|/M|/G|/X|/U|/F|/T ON|OFF|CLR
PAUSE	PA
PROMPT	PRO string
QUIT	Q
REMARK	REM text
SAVE SYMBOL	SAVES filename[.sym]
SHELL	SHE
SHOW	SH [ALL]
	SH SYM|MOD
	SH module_name.*
	SH *symbol_name
	SH module_name.c*
	SH c*
SYMBOL LENGTH	SYM
	SYM length

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