Z80DISA Disassembler

Z80DISA DISASSEMBLER

Instruction Sheet

NORTHWEST INSTRUMENT SYSTEMS, INC.
READ THIS FIRST

Northwest Instrument Systems’ Z80 Disassembler Package is a µAnalyst 2000 Series accessory for the Model 2100 Interactive State Analyzer (ISA). The disassembler software can be used only with the state analysis software listed below.

Table 1: Compatible Instrument Models and Software

<table>
<thead>
<tr>
<th>Instrument Models</th>
<th>Compatible Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 2100 Interactive State Analyzer, with:</td>
<td>SW2000 µAnalyst State/Timing Analysis Software (Version 1.0 or later)</td>
</tr>
<tr>
<td>32 Acquisition Channels</td>
<td></td>
</tr>
<tr>
<td>1 Clock Probe</td>
<td></td>
</tr>
<tr>
<td>2 Data Probes</td>
<td></td>
</tr>
<tr>
<td>1 Z80 Disassembler Probe; or PZ80 Microprocessor Probe</td>
<td></td>
</tr>
</tbody>
</table>

Insert this probe instruction sheet into the back of your Model 2100 Interactive State Analyzer Operator’s Manual.
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INTRODUCTION

Northwest Instrument Systems’ (NWIS) Z80 Disassembler Package is an accessory for the Model 2100 Interactive State Analyzer (ISA). The disassembler simplifies the data acquisition and disassembly process for analyzing real-time software flow.

A setup file, DISZ80, is supplied with the disassembler package. DISZ80 configures the state analyzer to acquire and disassemble data from a Z80 microprocessor. The disassembler display shows the microprocessor’s instruction set mnemonics, data, jump addresses, and system control signals.

This instruction sheet provides the information you need to connect and use the Z80 Disassembler Package, as well as complete specifications.

OPERATION DESCRIPTION

With the disassembler installed and the analyzer triggered, the system acquires processor instructions, immediate data, and jump addresses. The disassembler software package translates the acquired data into Z80 mnemonic and instruction text, which is then displayed as part of the Display Menu.

Immediate data and jump addresses are displayed as absolute numerical data rather than being interpreted as mnemonics. The numbers are displayed in hexadecimal, to the right of the mnemonics field. Figure 1 illustrates a screen display of acquired data.

Hexadecimal is the only radix available for displaying numerical data in a mnemonic group. Other display groups can be displayed in binary, octal, or hexadecimal by selecting the desired radix from the Format Menu. Figure 2 illustrates the Format Menu for the Z80 Disassembler.
Figure 1. Translated Data Display.
INSTALLATION

The following sections provide information necessary to install the Z80 Disassembler Package. Before installing the disassembler package, make sure that your state analyzer meets the configuration requirements defined in the following section, System Requirements.

System Requirements

To run the disassembler, the Model 2100 Interactive State Analyzer must meet the following minimum configuration requirements:

- 32 data acquisition channels
- 2 data probes
- 1 clock probe
- 1 Z80 Disassembler Probe; or PZ80 Microprocessor Probe
- SW2000 µAnalyst State/Timing Analysis Software (Version 1.0 and later)

The disassembler software includes the setup file, DISZ80.SAS, for software configuring the Model 2100 Interactive State Analyzer.
Connecting Data and Clock Probes to the ISA

The clock probe must be connected to the probe connector on the ISA controller board, and the two data probes must be connected to the two lowest-numbered probe connectors on the ISA memory boards.

Exact data probe connections vary depending on memory board type (16- or 32-channel) and board sequence in the µAnalyst mainframe. When 32-channel boards are used, the least-to-most significant sequence is from the lower to upper probe connectors on that board; 16-channel boards have only one connector.

For example, if your chassis is configured with an ISA controller in slot 2 and an ISA 32-channel board in slot 3, the probe connections are:

<table>
<thead>
<tr>
<th>Probe</th>
<th>Connector Slot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clock Probe</td>
<td>2</td>
</tr>
<tr>
<td>Data Probe 1</td>
<td>3L</td>
</tr>
<tr>
<td>Data Probe 2</td>
<td>3U</td>
</tr>
</tbody>
</table>

Connecting Data and Clock Probes to the Microprocessor Probe

The PZ80 probe is a viaduct between the test system microprocessor and the clock and data probes. Data and clock probes plug into the Z80 probe, which connects to the Z80 microprocessor.

The connectors on the Z80 probe are not keyed. Insert the data and clock probes into the Z80 probe so their labels face away from the cable attached to the test system. Check the orientation before continuing. Figure 3 illustrates the connections between the clock and data probes and the Z80 probe.
Figure 3. Z80 Probe.

Follow these steps to connect the data and clock probes to the Z80 probe:

1. Turn off power to the system to be tested and the µAnalyst.
2. Plug the clock probe into the Z80 probe's slot D.
3. Plug Data Probe 1 into the Z80 probe's slot A. The disassembler setup file DISZ80.SAS (DISZ80 in the I/O Menu) assumes that Data Probe 1 contains the 8 data bits and 4 status bits.
4. Plug Data Probe 2 into the Z80 probe's slot B. The disassembler setup file DISZ80.SAS (DISZ80 in the I/O Menu) assumes that Data Probe 2 contains 16 address bits.
Loading the Software

Follow these steps to load the disassembler software:

1. Insert a DOS boot diskette (version 2.00 or later) into drive A of your personal computer; close the drive door.
2. Turn on the µAnalyst mainframe and then the personal computer.
3. After DOS boots and you input the current date and time, replace the DOS diskette with the µAnalyst diskette labeled "HELP DISK".
4. Insert the disassembler diskette into drive B of your personal computer and close the drive door.
5. Enter
   B:
6. Enter
   ANALYZE
7. Invoke the state analyzer's I/O Menu and select the setup file DISZ80 for your test system. Figure 4 illustrates the Z80 Disassembler I/O Menu.

DISASSEMBLER OPERATION

When you installed the disassembler, the setup file configured the analyzer to display mnemonics. Look at the analyzer's Format Menu and you will see, in the lower right quadrant of the screen, that the entries "M" and "MNEMONIC" have been added to the GROUP and NAME table. When "M" is included in the DISPLAY ORDER list, the disassembler translates appropriate portions of acquired data and displays the translation in mnemonics.

To cancel the mnemonics, go to the Format Menu DISPLAY ORDER field and replace the "M" with an "X". Refer to the Interactive State Analyzer Operator's Manual for menu editing information.

If an undefined instruction is detected, the disassembler displays "?????" in the mnemonic field. (Some instructions take multiple data bytes.)
Operational Notes

1. The Z80 instruction set is the only data converted to mnemonics. Jump addresses and immediate data are displayed as absolute hexadecimal numbers only. Other parts of the instruction cycle are labeled accordingly, such as "OPCODE FETCH", "MEMORY READ", "MEMORY WRITE", "I/O READ", "I/O WRITE", etc.

2. The Z80 has two interrupt inputs: INT and NMI. When the Z80 acknowledges INT, the disassembler displays the message "INT acknowledge". For NMI, the disassembler displays "NMI acknowledge".

3. When using the disassembler, the basic clock setup must conform to the disassembler's requirements. However, you can still use additional data probes. Remember; you have several controls per probe (slot) in the Format Menu. Refer to the Menus section of the Interactive State Analyzer Operator's Manual.
TROUBLESHOOTING THE DISASSEMBLER

If problems with the disassembler occur, perform the troubleshooting tasks listed below:

- Verify that the test system is operational. You may also want to try the disassembler in a known-working system.
- Make sure the DIP clip is installed and seated correctly.
- Verify all probe connections. Be sure you have connected the data and clock probes as instructed in the section Connecting Data and Clock Probes to the ISA.
- If you made working copies of the supplied diskettes, verify their integrity by using a byte-compare program to compare the copies against the originals. If no compare program is available, make another set of working copies. You could also try loading the original diskettes, but if the problem is in the disk drive, you could damage the originals.
- Properly program the state analyzer triggers. To start out, set the triggering to "Any Value" and "Always Store". When you are satisfied that the disassembler is operating correctly, go back and program the desired triggering.

If you are still having problems after trying the above troubleshooting tips, contact Northwest Instrument Systems, Inc.

ACCESSORIES

NWIS provides you with the following accessories for the Z80 Disassembler:

1 01393 Instruction Sheet
APPENDIX A

This appendix summarizes the menu programming necessary to operate the Z80 Disassembler Package. Use this appendix as a guide for bypassing the Z80 probe and connecting flying leads directly to the system (necessary in buffered-bus systems to observe DMA cycles on the system bus).

The following basic setup is read in from the DISZ80.SAS file (DISZ80 in the I/O Menu):

<table>
<thead>
<tr>
<th>Z80 Control Line</th>
<th>Format Menu Clock Set Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>RD</td>
<td>Slot 2</td>
</tr>
<tr>
<td></td>
<td>Sample clock S1 (+)</td>
</tr>
<tr>
<td>WR</td>
<td>Slot 2</td>
</tr>
<tr>
<td></td>
<td>Sample clock S2 (+)</td>
</tr>
<tr>
<td>IORQ</td>
<td>Slot 2</td>
</tr>
<tr>
<td></td>
<td>Sample clock S3 (+)</td>
</tr>
<tr>
<td>CLK</td>
<td>Slot 2</td>
</tr>
<tr>
<td></td>
<td>Hold clock HI (HI = pass/LO = hold)</td>
</tr>
</tbody>
</table>

Sample clocks S4 and S5 are set to "Off": Hold Clock H2 is set to "Pass Always". S4, S5, and H2 should be disconnected.

Group Assignments

<table>
<thead>
<tr>
<th>Z80 Processor Hardware</th>
<th>µAnalyst Hardware</th>
<th>MUX</th>
<th>Hold CLK</th>
<th>Group</th>
<th>Name*</th>
<th>Radix*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address Bus (A0-A15)</td>
<td>Slot 3, channels 0-15</td>
<td>NO</td>
<td>X</td>
<td>A</td>
<td>Address</td>
<td>HEX</td>
</tr>
<tr>
<td>Data Bus (D0-D7)</td>
<td>Slot 4, channels 0-7</td>
<td>NO</td>
<td>H1</td>
<td>D</td>
<td>Data</td>
<td>HEX</td>
</tr>
<tr>
<td>Control Lines</td>
<td>Slot 4,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BUSAK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>WR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>IORQ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* These group names and radices are suggestions only and do not affect disassembler performance. Use any name or radix you wish.