

Z80DISA Disassembler

Z80DISA DISASSEMBLER

Instruction Sheet



NORTHWEST INSTRUMENT SYSTEMS, INC.

READ THIS FIRST

Northwest Instrument Systems' Z80 Disassembler Package is a μ Analyst 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

Instrument Models	Compatible Software
Model 2100 Interactive State Analyzer, with: 32 Acquisition Channels 1 Clock Probe 2 Data Probes 1 Z80 Disassembler Probe; or PZ80 Microprocessor Probe	SW2000 μ Analyst State/Timing Analysis Software (Version 1.0 or later)

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.

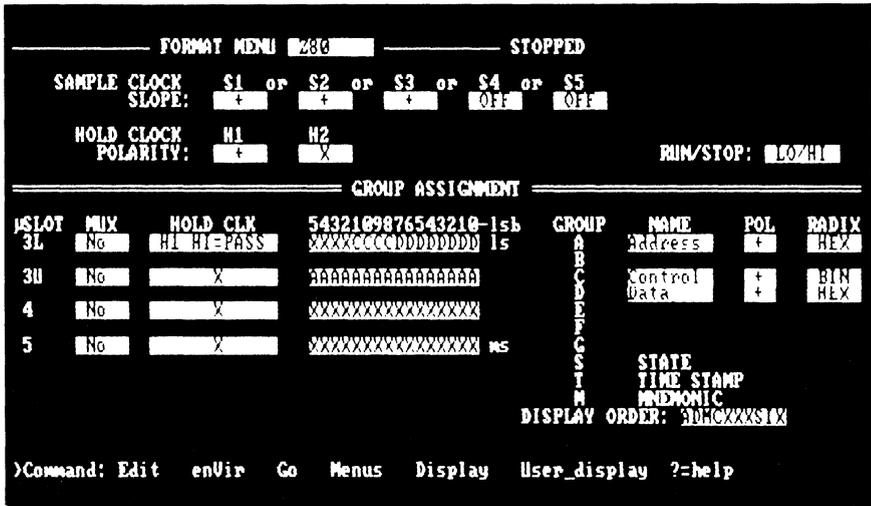
```

STATE DISPLAY  Z80  REF DATA  STOPPED
t to c:
LOC c:
+0063 CC42 2A LD HL,(CF43) Control STATE EXT
+0065 CC43 43 memory read 1111 (1) 1
+0067 CC44 CF memory read 1111 (1) 1
+0068 CF43 FF memory read 1111 (1) 1
+0069 CF44 FF memory read 1111 (1) 1
+0070 CF44 00 memory read 1111 (1) 1
+0071 CC45 EB EX DE,HL 0111 (1) 1
+0072 CC46 E9 JP (HL) 0111 (1) 1
+0073 CED4 79 LD A,C 0111 (1) 1
+0074 CED5 3C INC A 0111 (1) 1
+0075 CED6 04 JP Z,CED8 0111 (1) 1
+0076 CED7 D8 memory read 1111 (1) 1
+0077 CED8 CE memory read 1111 (1) 1
+0078 CED9 CD CALL D806 0111 (1) 1
+0079 CEE1 06 memory read 1111 (1) 1
+0080 CEE2 DA memory read 1111 (1) 1
+0081 CF3E CE memory write 1101 (1) 1
+0082 CF3D E3 memory write 1101 (1) 1
+0083 D806 C3 JP D8FE 0111 (1) 1

>Command: Edit Go Menus enVir Buffer Find Jump Page ?=help <SP>

```

■ Figure 1. Translated Data Display.



■ Figure 2. Z80 Disassembler Format Menu 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 μ Analyst 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 μ Analyst 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.

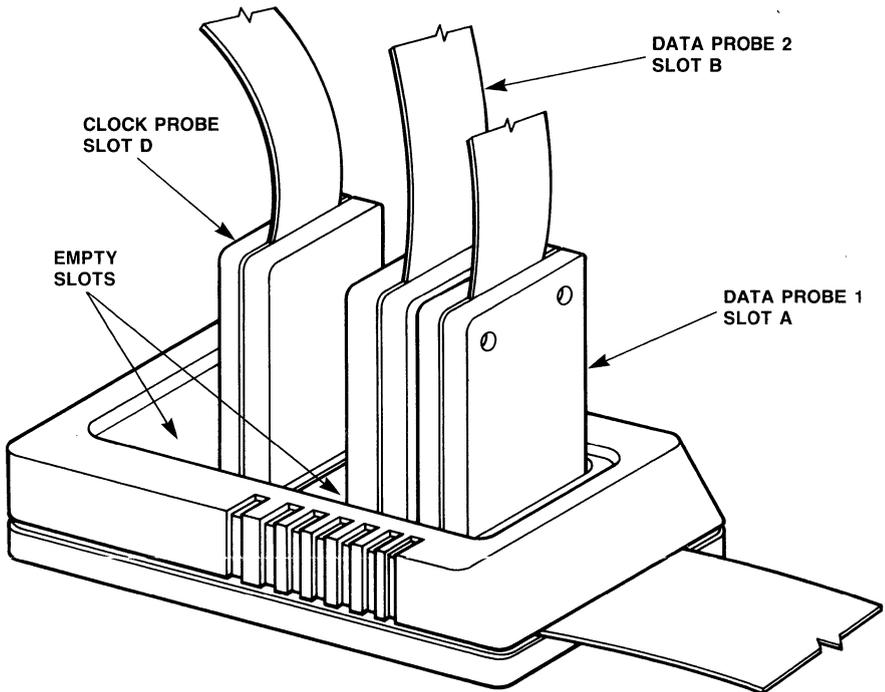
For example, if your chassis is configured with an ISA controller in slot 2 and an ISA 32-channel board in slot 3, the probe connections are:

<u>Probe</u>	<u>Connector Slot</u>
Clock Probe	2
Data Probe 1	3L
Data Probe 2	3U

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 μ Analyst.
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 μ Analyst mainframe and then the personal computer.
3. After DOS boots and you input the current date and time, replace the DOS diskette with the μ Analyst 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.)

```

—— I/O MENU —— Z80 ——                               STOPPED
Instrument: STATE ANALYZER
Device: DISK
Path:  B:\ANALYST\
File name: DISZ80
Function: LOAD  SETUP

Directory of B:
DISZ80      2560  SETUP
1 SETUP, 0 DATA files
18432 bytes available

Message: Press X to LOAD SETUP file DISZ80
)Command: Edit Go Menus Display eXecute ?=help enVir Page_directory <SP>

```

■ Figure 4. Z80 Disassembler I/O Menu.

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: $\overline{\text{INT}}$ and $\overline{\text{NMI}}$. When the Z80 acknowledges $\overline{\text{INT}}$, the disassembler displays the message "INT acknowledge". For $\overline{\text{NMI}}$, 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
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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):

Z80 Control Line	Format Menu Clock Set Up
\overline{RD}	Slot 2 Sample clock S1 (+)
\overline{WR}	Slot 2 Sample clock S2 (+)
\overline{IORQ}	Slot 2 Sample clock S3 (+)
CLK	Slot 2 Hold clock HI (HI = pass/LO = hold)

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

Z80 Processor Hardware	μ Analyst Hardware	MUX	Hold CLK	Group	Name*	Radix*
Address Bus (A0-A15)	Slot 3, channels 0-15	NO	X	A	Address	HEX
Data Bus (D0-D7)	Slot 4, channels 0-7	NO	H1	D	Data	HEX
Control Lines	Slot 4,					
$\overline{BUSA\overline{K}}$	channel 8			C	Control	BIN
\overline{WR}	channel 9			C	Control	BIN
IORQ	channel D10			C	Control	BIN
$\overline{M1}$	channel D11			C	Status	BIN

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