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CHAPTER 1
GENERAL INFORMATION

1.1 Introduction

The N9210 Analyzer System board is a powerful tool for the development, diagnosis and support of VME systems. It's many functions include the capture and storage of VME bus events, control of this storage using sophisticated trigger and trace conditions, external trigger in and trigger out interfaces, synchronous and asynchronous sampling, bus control, performance analysis and direct readout of power supply voltages and temperature . The combination of these functions provides a means of understanding complex VME bus interactions simply and accurately.

1.2 Features

The N9210 combines the features typically found in sophisticated logic analyzers with the plug-in ease of a VME board. The following list is a summary of these features.

- Captures up to 65,568 (64K) VME bus events in a high speed trace buffer.

- Stores 96 VME bus signals including address (32 bits), data (32 bits), arbitration, interrupt and handshaking.

- Stores Elapsed, Interval and Time/Date Time Tags.

- Sophisticated control of the type and amount of information captured in the trace buffer via:
  - Selective trace capture
  - Complex trigger conditions
  - Multiple trigger levels
  - Trigger positioning
  - Multiple address and data windows/values
  - Occurrence counting

- Synchronous sampling of VME transactions up to 25Mhz.

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- Asynchronous sampling up to 50 Mhz for timing analysis with selectable sampling rates.

- Direct readout of power supply voltages and temperature.

- Bus control for:
  - Performing bus transfers
  - Backplane testing
  - Special bus stimulus

- External trigger-in and trigger-out interface with selectable polarity.

- Tracing of external user signal.

- Histograms of address ranges and bus signals.

- Non-volatile storage of setups and screen displays.

- Terminal and Printer/Passthru ports with jumper selectable baud rates and hardware handshaking.

- Connection to standard ASCII terminal or modem.

1.3 Specifications

This section summarizes the features, environmental and power requirements of the N9210 Bus Analyzer.

Trace Size	4K X 112 (4K model) 16K x 112 (16K model) 64K x 112 (64K model)
Trace Speed (max)	25 Mhz Sync 50 Mhz Async

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Trace Data	A01-A31, AM0-AM4, AS D00- D31, DS0,DS1, WRITE, LWORD, 1RQ1-1RQ7,IACK, IACK1/0, BR0-BR3,BG0-BG3, BBSY,BCLR,BERR,DTACK, SYSRESET, TIME TAGS
Match Specifications	
Number	4 Independent Specifications
Fields	Address Value or Range (32 bit) Address Modifier, Data Value or Range (32 bit) Interrupt, Arbitration, Handshaking and External Signals
Manipulations	Logical Combination
Trigger Specifications	
Levels	4 Independent Levels
Fields	Event, Occurrences, True action, False Action, Trace Control, Clock
Manipulations	Programmable Level Jumps
External Interfaces	2 RS232 Ports with Programmable Baud Rate and Hardware Handshaking, 8 Bit Data, 1 Stop Bit, No Parity Trigger In/Out Jacks

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Accessories	2 Red, 2 Black Trigger Cables 2 Telephone Cables 2 RS-232, 25 Pin D sub connectors
Shipping Weight	1 pound approximately

Power Requirements (max)

+5V	2.5 Amps (operating) 1.0 Amp (idle)
+12V	10 mA
-12V	10 mA

Environmental

Operating Temperature	0 to 55 degrees C
Storage Temperature	-40 to 85 degrees C
Humidity	Up to 90%

Dimensions

(including front panel)

Height	10.31 in. (26 1.8 mm)
Width	7.40 in. (188.0 mm)
Depth	.83 in. (21.0 mm)

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1.4 Applications

During development, testing and support of a product, an engineer relies on general purpose test equipment such as oscilloscopes, logic analyzers and emulators to investigate problem areas. Although such equipment is useful in debugging board and component level problems, it can prove cumbersome in analyzing system bus activity. General purpose test equipment usually requires a significant amount of set up time to physically connect to the many bus signals. Once this is accomplished , meaningful information may be hard to extract when complex interactions occur.

For VME systems, the N9210 provides not only a simple means of viewing bus activity, but also provides a convenient means of testing other boards in the system. Checking the power supply and testing the backplane, for example the N9210, can assist you in analyzing your whole system. Because it is a standard N9210 board it can be used immediately without special setup. More important, it has been designed specifically to capture and display VME bus events with no complicated set-up or cabling.

In some cases, the N9210 can be effectively used in conjunction with other general purpose test equipment. The trigger - in and trigger - out interface has been provided to accomplish this. The N9210 may be set-up to trigger during a particular bus event and trigger an oscilloscope to look at high speed timing during that event.

The N9210 can be used in a wide range of applications throughout a products life. In new product development the N9210 is an invaluable tool to verify both hardware and software performance. The N9210's sophisticated tracing controls allows it to zero in on specific sections of software code as well as isolate hardware faults on particular boards. After the initial design of a VME product, the N9210 can be used for production testing. Several N9210's can be linked to a main computer which automatically initiates tests and analyzes results. After a system has been delivered to a customer, the N9210 can be used for field maintenance and troubleshooting. The N9210 can also be left in a system to remotely monitor system performance and diagnose problems via an external modem hookup.

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CHAPTER 2
PREPARATION FOR USE

2.1 Introduction

This section presents information on unpacking, installation and jumper options for the N9210.

2.2 Unpacking and Inspection

The N9210 has been shipped in a specially constructed box to prevent damage during transit. If there is any evidence of mishandling open the box in the presence of the carrier and inspect the product for any damage which may have occurred. Check for any loose or broken parts to the main board and accessories. If any damage is evident , contact the shipping agent or Nissho immediately for further instructions.

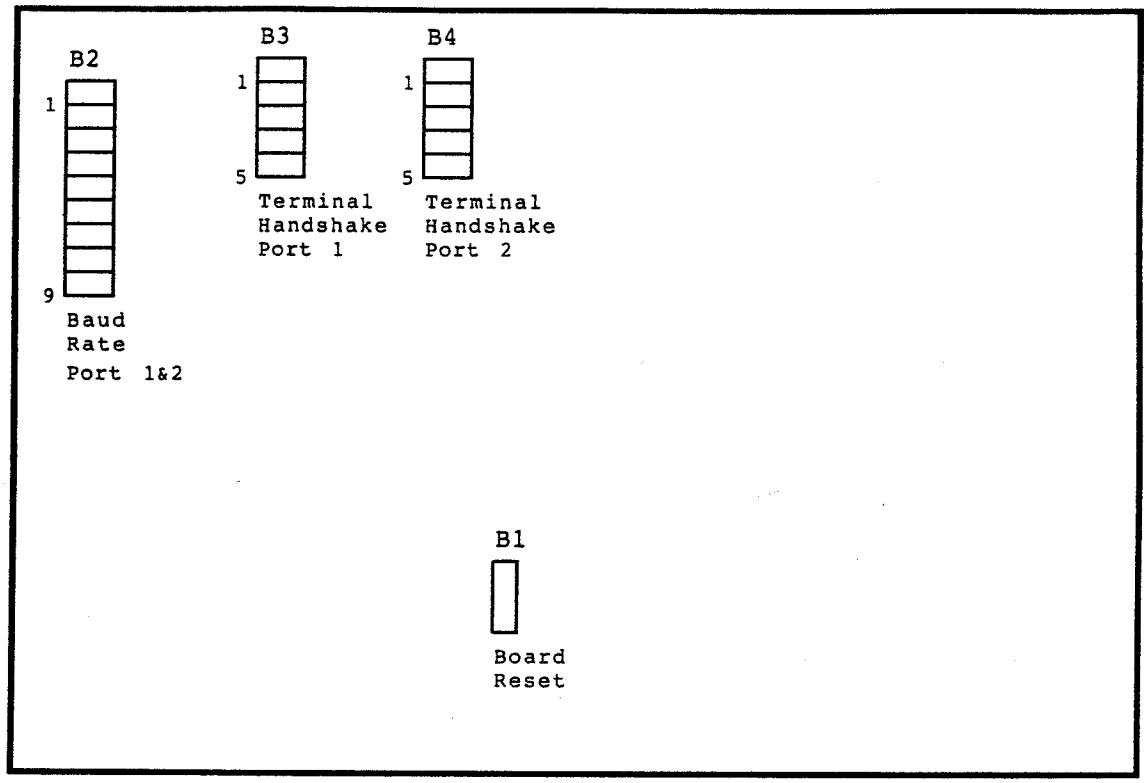
2.3 Installation

The N9210 can be installed in any VME compatible backplane (J1 or J1/J2). Care must be taken to insure that the power and cooling requirements outlined in the specifications are met. Any ASCII terminal can be connected to the N9210 via the enclosed terminal cable. Both hardware and software handshaking is provided. No special control character sequences are used, therefore you do not need to specify the specific terminal you are using. Jumper block B2 is provided to setup the terminal baud rate and jumper block B3 and B4 configures the hardware handshaking.

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2.4 Jumper Options

Several user jumper options are available to configure the N9210 for your specific application. Settings marked with a "*" indicate the default setting provided by the factory. Figure below shows each jumper location.



Board Jumper Locations

2.4.1 N9210 Reset - Jumper Block B1

The N9210 provides its own power-up reset, but may use the system reset by inserting jumper B1.

	B1
Use N9210 reset*	OUT
Use system reset	IN

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2.4.2 Baud Rate - Jumper Block B2

These jumpers configure the N9210 for your terminal speed.

----------PORT 1----------

BAUD	B2-3	B2-2	B2-1
19.2K	OUT	OUT	IN
9600*	IN	IN	IN
4800	IN	IN	OUT
2400	IN	OUT	IN
1200	IN	OUT	OUT
600	OUT	IN	IN
300	OUT	IN	OUT

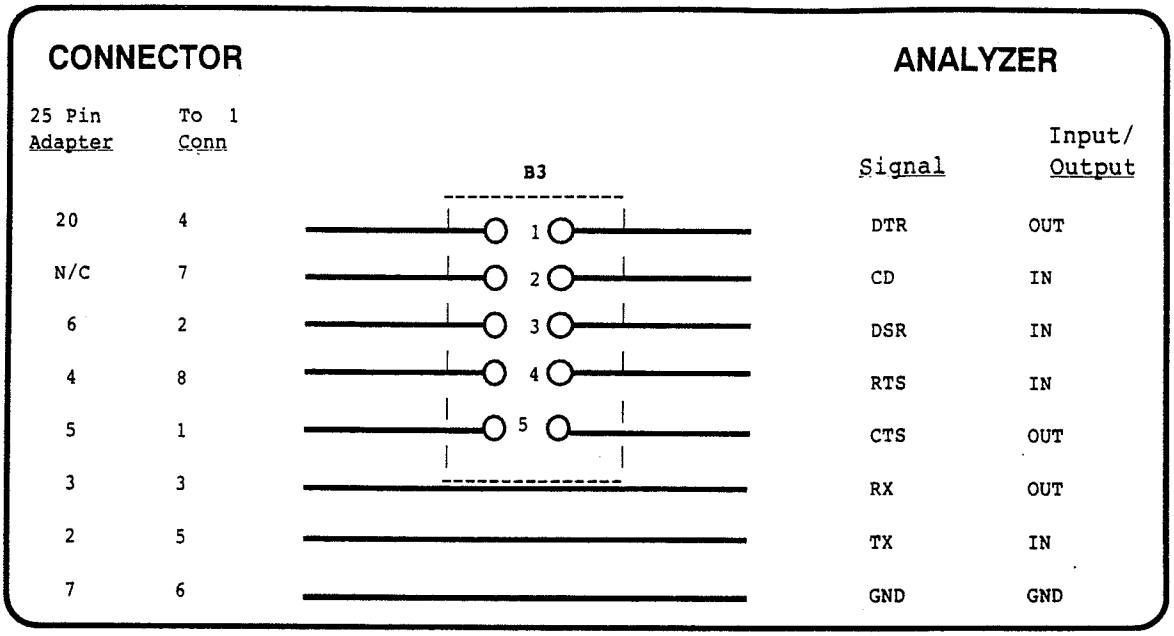
Jumpers B2-4,5,7,8,9 are unused.
Jumper B2-6 is used for factory use only.

The baud rate for the printer/passthru port is set with the CF command. See the commands section for more information on the CF command.

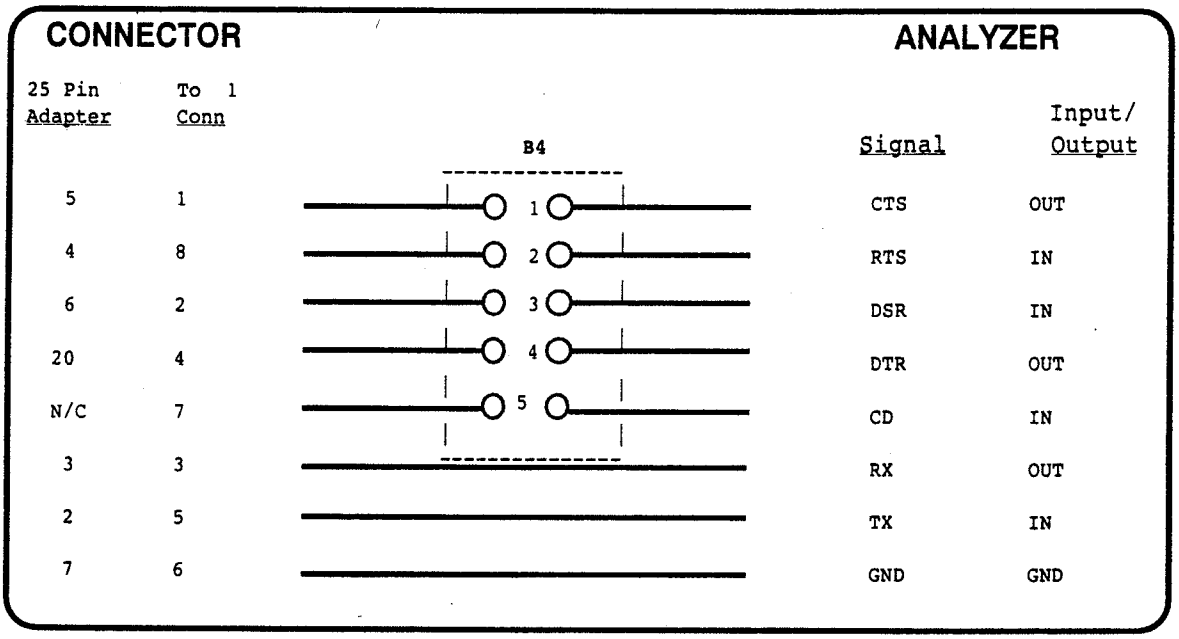
2.4.3 Terminal /Modem Handshaking - Jumper Block B3, B4

The terminal/modem interface consists of 2-8 wire telephone jacks located along the front panel providing a standard RS-232 interface. In addition to hardware handshaking signals a software XON/XOFF protocol is implemented. The following diagram shows the interface for jumper block B3 controlling Port 1 (terminal) and B4 for Port 2 (printer). The data format is 8 data bits, 1 stopbit, no parity.

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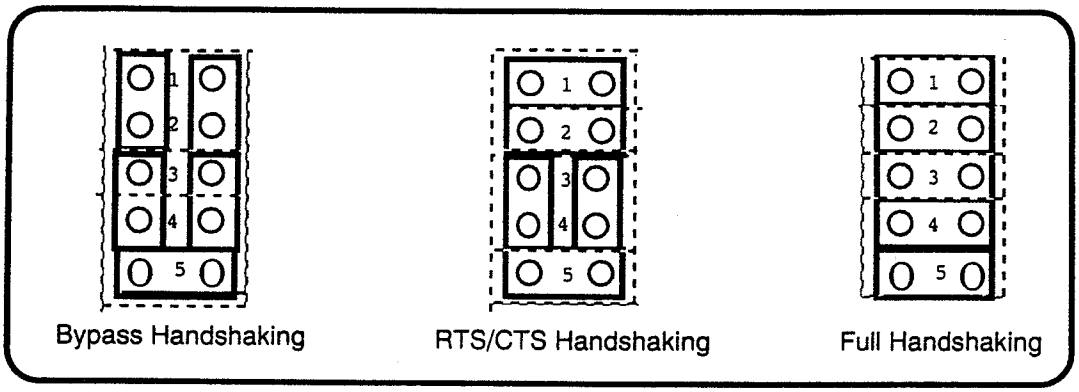


PORT 1 SIGNALS



PORT 2 SIGNALS

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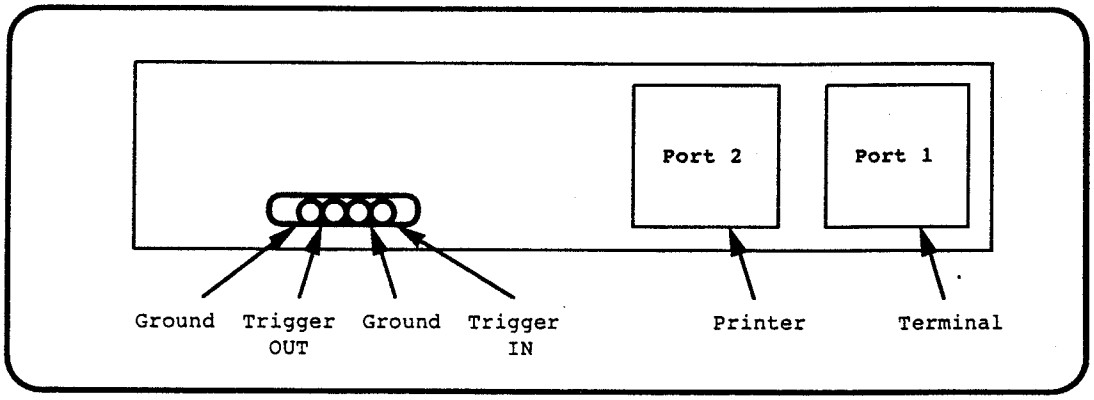


PORT 2 EXAMPLE

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2.5 Front Panel Interfaces

The front panel provides access to CRT, printer/passthru and trigger in/out interfaces. The CRT and printer/passthru ports consist of 2-8 wire telephone jacks. The trigger in/out interface consists of 4 tip jacks. The location of these interfaces are shown below:



The trigger-out interface is driven by a TTL output and stays active low (less then 0.8 volts at 20 mA) when a trigger is encountered. The trigger-in interface is a TTL input and is pulled up by a 1K resistor. This input is active low and can be used as a trigger and an external signal which is captured by the trace buffer. Both trigger-in and trigger-out interfaces are diode protected for over and under voltage conditions.

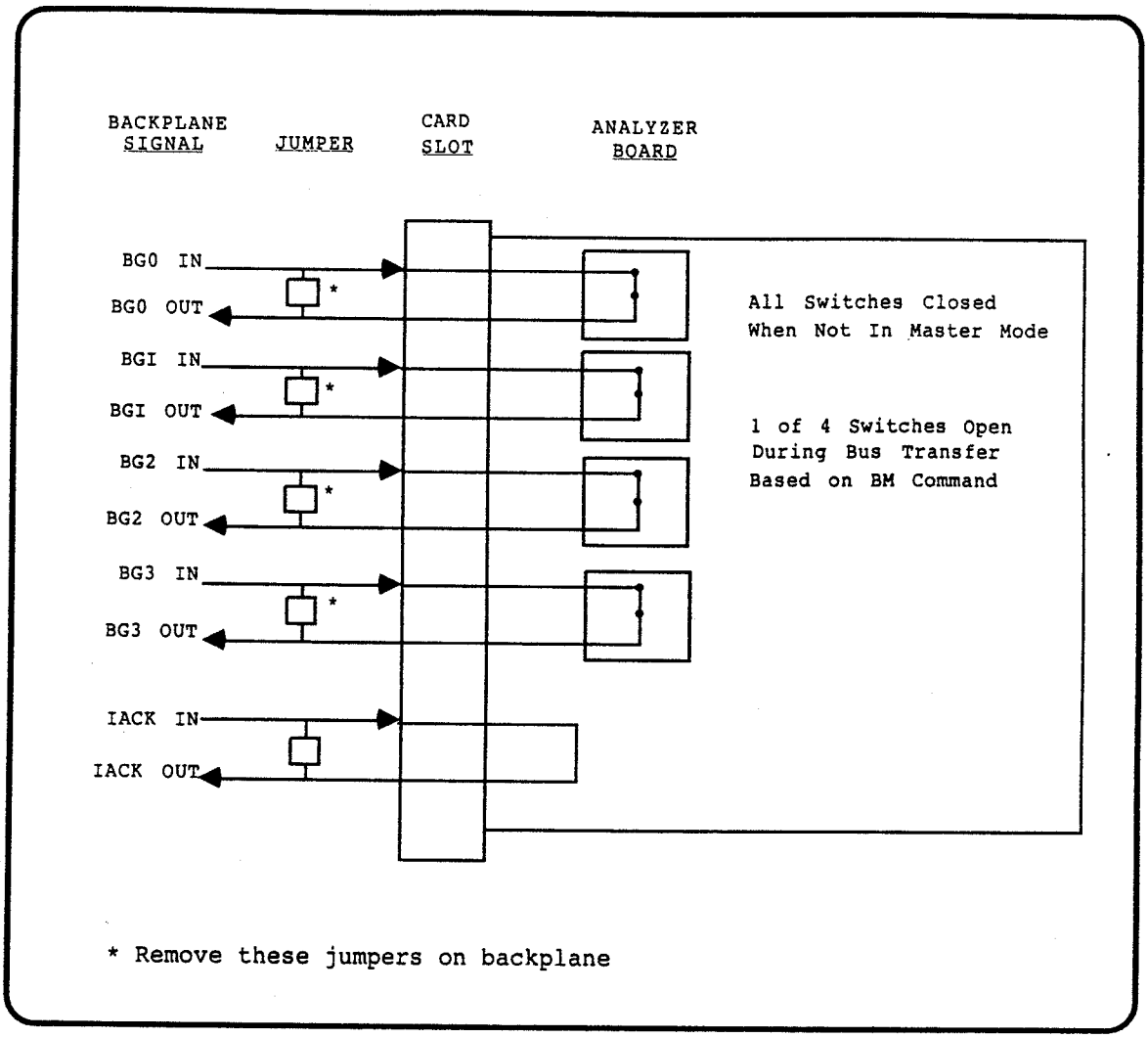
2.6 Backplane Jumpering

Since the N9210 can perform bus transfers, the backplane jumpers involved in arbitrating mastership must be set correctly.

A typical VME backplane has 5 jumpers for each card slot. Four of these are used for the Bus Grant In/Out daisy chained signals. These 4 jumpers should be removed in the slot occupied by the analyzer. When the N9210 is not a master, it passes Bus Grant In to their respective Bus Grant Out signals.

The fifth jumper is the Interrupt Acknowledge daisy chain. This may be left in or removed. The N9210 ties these signals together.

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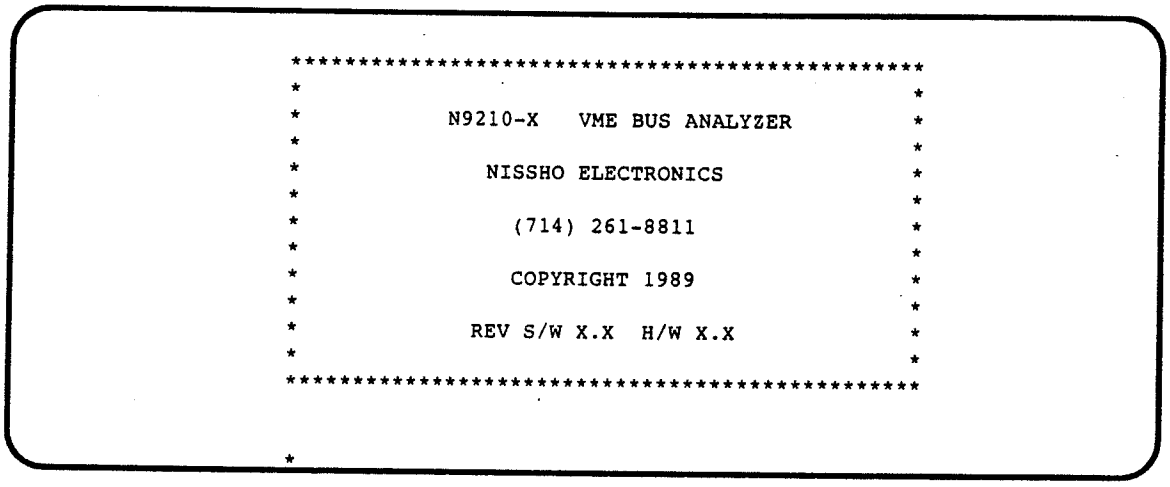
CHAPTER 3
BASIC OPERATION

3.1 Introduction

This chapter presents some of the basic features and commands to capture bus activity. Using the N9210 can be as simple as typing GO. The following sections describe the GO command and the display of trace information. Detailed command descriptions are found in the last section of the users guide.

3.2 Getting Started

When the N9210 is powered up the following banner message appears.



This indicates that your CRT interface is correct. If some characters are wrong or missing check your CRT baud rate and the N9210 baud rate using jumper block B2. If no message appears check jumper block B3 for the correct hardware handshaking signals. The asterisk character indicates that you can enter a command. Some editing features such as backspace to erase a character, control-X to erase a line and escape to exit may be useful when entering commands. In addition, all lower case characters are converted to upper case. Typing HELP provides a complete list of all the available commands.

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3.3 Basic Tracing

To start tracing bus activity only one command is required. The GO command starts the capture of bus events in the trace buffer. After typing GO the message "TRACE ACTIVE" appears followed by a Go Status display. This display is constantly updated and shows the number of cycles captured in the trace buffer as well as if a trigger was encountered and if the buffer is full. Since no specific event has been designated as a trigger, the first event encountered will be considered the trigger.

```
************************ TRACE ACTIVE ************************

 LEVEL      TRIGGER      CYCLES BEFORE      CYCLES AFTER      BUFFER
                           TRIGGER            TRIGGER          FULL
 ------------------------------------------------------------------

   1          YES             0000               0100           NO
```

The GO command remains in effect until the trace buffer is full or the RETURN key is typed. The GO F (Go Forever) command can be used when it is desirable to continue tracing after the buffer is full. When tracing has been halted, the last page of trace buffer information is displayed, with the trigger centered on the page. The initial set-up stores the trigger at the midpoint of the trace buffer.

To view other pages of the trace buffer use the P (Print Trace) command. Typing P-displays the previous page while typing P alone displays the next page. Typing P-(num), (num) will print a range of frame traces. These number ranges can be varied, depending upon how many frame occurrances you want to see. You can also jump to any trace location by specifying the frame number using P(num) or search for information using the PS (Print Search) command and specifying the match condition with the PM (Print Match) command.

3.4 Trace Displays

There are 3 basic trace displays. The first shows bus signals, the second type adds timing information to the signal information, the third type is a timing waveform representation of trace information, and the last type is in RAW format. (See Commands 8-33 for more information. The Print Display (PD) command selects between these 4 displays. Following are descriptions of these displays.

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3.4.1 Signal Display

The information in this display is divided into a frame number and 4 main categories: Transfer, Interrupt, Bus and External signals.

The frame number indicates the position in the trace buffer. Positive numbers indicate samples after the trigger, while negative numbers show samples before the trigger. The trigger itself is shown by the word "TRIG" in the frame column.

```
**********TRACE STARTED AT 10:23:02 ON 11/10/89**********
*       CYCLES BEFORE TRIGGER = 2048      CYCLES AFTER TRIGGER = 0000      *
*************************************************************************
      |                    TRANSFER              |   INTERRUPT   |        BUS          |X
FRAME|R   ADDRESS    DATA    AM AS LW DS ER AK|   REQ   ACK ACK|GRANT   REQ   BSY CLR |
     |W                                        |7654321     I/O| 3210   3210          |
-----|-----------------------------------------|---------------|---------------------|-
-0014|R 024E5782 E5E5E5E5 3F  0  1  0  1  0|--5---- 1     1 | 1011  1011    1    1  |1
-0013|R 00001000 00005678 3E  0  0  0  1  0|--5---- 1     1 | 0111  0111    1    1  |1
-0012|W 00001000 0000567A 3E  0  0  0  1  0|------- 1     1 | 0111  0111    1    1  |1
-0011|R 01055555 A5A5A5A5 2F  0  1  0  0  1|------- 1     1 | 1111  1111    1    1  |1
-0010|R 01000010 44444444 2E  0  1  0  1  1|-----2- 0     1 | 1101  1101    1    1  |1
-0009|R 01000012 3856F3A2 3F  0  1  0  1  1|-----2- 0     0 | 1101  0101    1    1  |1
-0008|R 01000014 5FEA3400 3F  0  1  0  1  1|------- 1     1 | 1101  0101    1    1  |1
-0007|R 00300000 00002300 3E  0  0  0  1  0|------- 1     1 | 0111  0111    1    1  |1
-0006|W 182000FE FE021109 1F  0  0  0  1  0|------- 1     1 | 0111  0111    1    1  |1
-0005|W 18200100 65D8A6C4 1F  0  0  0  1  0|------- 1     1 | 0111  0111    1    1  |1
-0004|R 004E2222 D4E66F53 2F  0  0  0  1  0|-6---2- 1     0 | 1110  1110    1    1  |1
-0003|R 004E2226 7D8FE456 2F  0  0  0  1  0|-6---2- 0     0 | 1110  1110    1    1  |1
-0002|R 004E222A 5E632F76 2F  0  0  0  1  0|-6---2- 0     0 | 1110  1110    1    1  |1
-0001|R 004E222E 354FD6DE 2F  0  0  0  1  0|-----2- 0     0 | 1110  1110    1    1  |1
 TRIG|R 00432232 C4A55267 2F  0  0  0  1  0|-----2- 0     0 | 1110  1110    1    1  |1
 **********TRACE STOPPED AT 10:24:05 ON 11/10/87**********
*
```

BASIC SIGNAL DISPLAY

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The Transfer column consists of information about the data transfer. An R or W indicates a read or write cycle. This is followed by the address, data and address modifier code displayed in hexadecimal. Other discrete signals involved in the data transfer are also shown including Address Strobe (AS), Long Word (LW), Data Strobe 0 and 1 (DS0, DS1), Bus Error (ERR) and Data Acknowledge (ACK).

The Interrupt column displays the 7 interrupt request lines (IRQ1-7) and the Interrupt Acknowledge (ACK) and Interrupt Acknowledge daisy chain (ACK I/O) signals.

The Bus column shows the bus arbitration signals. These include Bus Request (BR0-3), Bus Grant (BG0-3), Bus Busy (BSY) and Bus Clear (CLR).

The External column shows the level of the N9210 trigger input.

3.4.2 Time Display

The time display includes elapsed, interval and time of day tags in addition to all the information in the signal display. The elapsed time starts when the GO command is initiated. The interval time is calculated by subtracting the current and previous elapsed times. Time of day is presented every 64 events. The display on the next page shows 2 times below each traceline.

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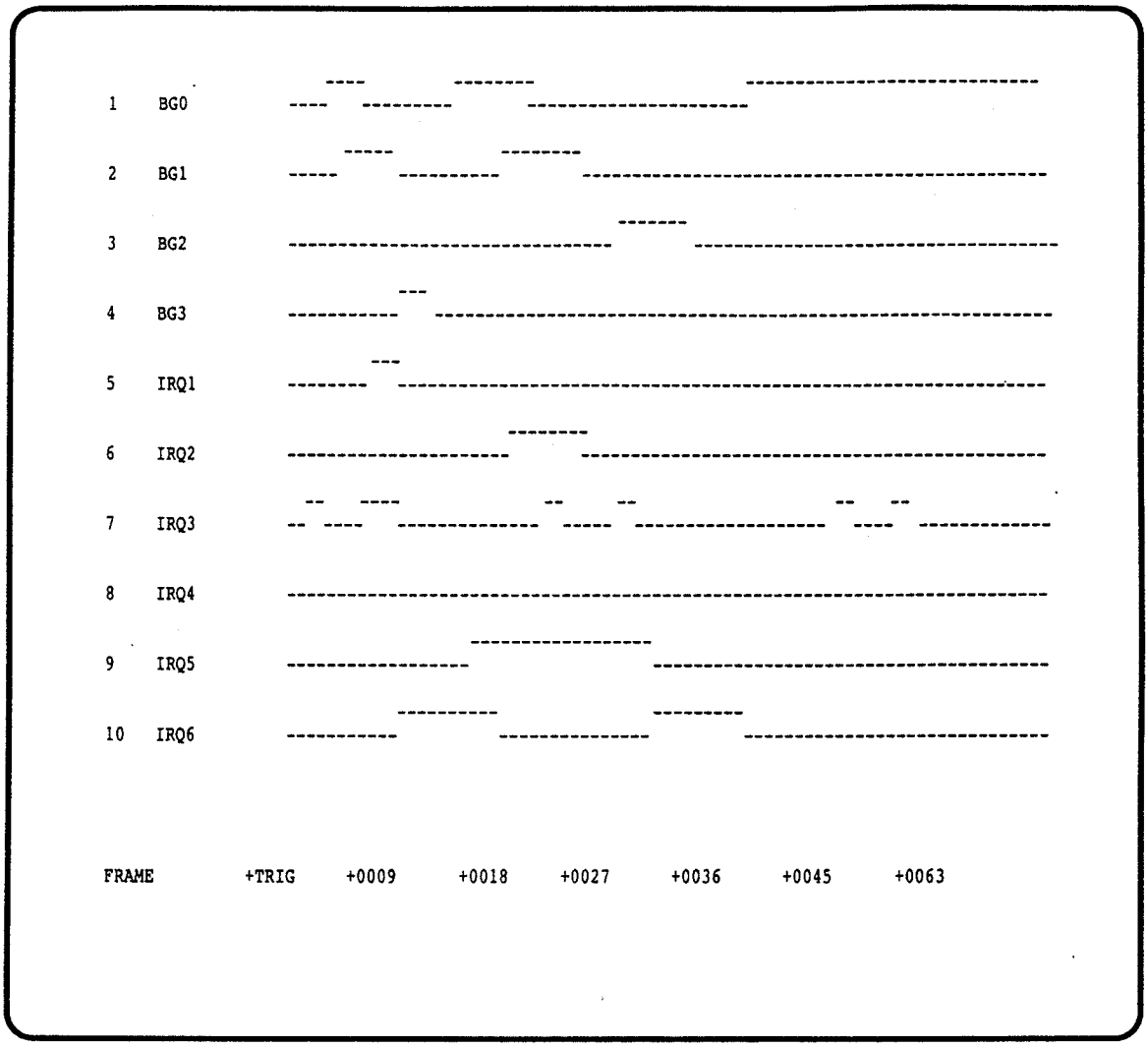
```
**********TRACE STARTED AT 10:23:02 ON 11/10/89**********
*    CYCLES BEFORE TRIGGER = 2048          CYCLES AFTER TRIGGER = 0000        *
*****************************************************************************
                          TRANSFER                INTERRUPT              BUS     X
FRAME|R  ADDRESS    DATA    AM AS LW DS ER AK|  REQ  ACK ACK| GRANT REQ BSY CLR|
     |W (INTERVAL) (SEC.MS.US.NS)             |7654321    I/O| 3210  3210       |
-----|---------------------------------------|-------------|-----------------|-
-0007|R 024E5782  E5E5E5E5  3F  0  1  0  1  0|------- 1   1 | 1011  1011 1   1 |1
     |  (35.2US)  (000.023.000.000)          |             |                  |
-0006|W 00001000  0000567A  3E  0  0  0  1  0|------- 1   1 | 0111  0111 1   1 |1
     |  (35.9US)  (000.023.035.200)          |             |                  |
-0005|R 01000010  44444444  2E  0  1  0  1  1|-----2- 0   1 | 1101  1101 1   1 |1
     |  (40.8US)  (000.023.071.100)          |             |                  |
-0004|R 01000014  5FEA3400  3F  0  1  0  1  1|------- 1   1 | 1101  0101 1   1 |1
     |  (41.1US)  (000.023.111.900)          |             |                  |
-0003|W 182000FE  FE021109  1F  0  0  0  1  0|------- 1   1 | 0111  0111 1   1 |1
     |  (43.2US)  (000.023.153.000)          |             |                  |
-0002|R 004E2222  D4E66F53  2F  0  0  0  1  0|-6---2- 1   0 | 1110  1110 1   1 |1
     |  (45.0US)  (000.023.196.200)          |             |                  |
-0001|R 0043222A  5E632F76  2F  0  0  0  1  0|-6---2- 0   0 | 1110  1110 1   1 |1
     |  (46.1US)  (000.023.241.200)          |             |                  |
 TRIG|R 00432232  C4A55267  2F  0  0  0  1  0|-----2- 0   0 | 1110  1110 1   1 |1
     |  (46.7US)  (000.023.287.300)          |             |                  |
**********TRACE STOPPED AT 10:24:05 ON 11/10/89**********
```

SIGNAL AND TIME TAG DISPLAY

3.4.3 Waveform Display

The waveform display represents trace information in a timing diagram. Using the W command, a maximum of 10 signals can be selected for this display. To display more information use the P command.

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WAVEFORM DISPLAY

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RAW DATA FORMAT

N9210

Bit Byte	7	6	5	4	3	2	1	0
0	A7	A6	A5	A4	A3	A2	A1	0
1	A15	A14	A13	A12	A11	A10	A9	A8
2	A23	A22	A21	A20	A19	A18	A17	A16
3	A31	A30	A29	A28	A27	A26	A25	A24
4	D7	D6	D5	D4	D3	D2	D1	D0
5	D15	D14	D13	D12	D11	D10	D9	D8
6	D23	D22	D21	D20	D19	D18	D17	D16
7	D31	D30	D29	D28	D27	D26	D25	D24
8	DTACK	BERR	BBSY	BR3	BR2	BR1	BR0	TRIG IN
9	IACK	IRQ7	IRQ6	IRQ5	IRQ4	IRQ3	IRQ2	IRQ1
10	IACKI	DS1	DS0	BCLR	BGO	BG1	BG2	BG3
11	0	0	AM5	AM4	AM3	AM2	AM1	AM0
12	---------- NOT USED ----------					LW	WR	AS
13	---------- NOT USED ----------							
14	---------- NOT USED ----------							
* 15	---------- NOT USED ----------						P1	P0
* 16	T7 (MSB)	T6	T5	T4	T3	T2	T1	T0 (LSB)

TABLE 1

* P0, P1 and T0 through T7 are interval time bits. P0 and P1 are counter prescaler bits which define a multiplier for time T0 through T7 as follows

P1	P0	Multiplier
0	0	40 ns
0	1	102 us
1	0	26 ms
1	1	67 sec

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3.5 Searching Trace Buffer

To locate specific information in the trace buffer, use the Print Search (PS1 thru PS8) and Print Match (PM1 thru PM8) commands.

The Print Match command allows you to specify what information to locate in the trace buffer. As many as 8 of these can be used independently or chained together to locate a sequence of events.

The Print Search command initiates a trace search starting at the last frame number displayed. If you want to start a search at the beginning of the trace buffer, use the P(num) command to display a position before the first valid trace location. Repeated use of this command will find the next trace match. The command PS1 uses Print Match specification PM1. If PM1 had a 2 in its "next" field, then PM2 would be searched for next. This continues until a zero is found in the next field of the last PM specification.

3.6 Sampling Methods

The user can select between synchronous and asynchronous sampling using the S command.

Synchronous sampling captures bus activity when the DTACK or BERR signals go active. This method is recommended to observe bus transfers.

Asynchronous sampling is useful for timing analysis. This method uses an internal clock to sample bus signals at a fixed rate. A number of sampling rates can be selected by the user with the S command. The sampling rates are:

Asynchronous Speed Selections

Frequency	Period
50 Mhz	20 ns
25 Mhz	40 ns
12.5 Mhz	80 ns
6.25 Mhz	160 ns
3.125 Mhz	320 ns
1.5625 Mhz	640 ns
.78125 Mhz	1280 ns

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CHAPTER 4
TRIGGER AND TRACE QUALIFICATION

4.1 Introduction

Triggers and trace qualifiers allow you to control when trace information is collected and what type of information is stored. The N9210 has many trigger and trace features which allow you to zero in on specific bus activity.

4.2 Match Specifications

There are 4 match specifications (A,B,C,D) which can be used in many of the trigger and trace commands. Each specifies a bus condition to look for. The following figure shows the parameters in a match specification. Notice that don't care values (X's) may be specified for any signal in the match specification. Instructions as to the type of character for each field, and how to modify the characters are listed below the match specifications. Remember, to go to the previous field, press <. To go to the next field, press return. ESC will exit the command.

```
*A
MATCH SPECIFICATION A
                                TRANSFER          INTERRUPT                BUS
R    ADDRESS     DATA       AM AS LW DS ER AK   REQ    ACK ACK   GRANT  REQ  BSY CLR  X
                                    10         7654321            3210  3210
-------------------------------------------------------------------------------
X  >XX126540E  <XX1234XX  XX  X  X XX  X  X  XXXXXXX X    X     XXXX  XXXX  X   X   X

FIELD TYPE FOR ABOVE MATCH SPECIFICATION
R  GNNNNNNNNN  GNNNNNNNN  NN  B  B  B  B  B  BBBBBBB B    B     BBBB  BBBB  B   B   B


FIELD TYPE    VALUES     TO CHANGE
---------------------------------

R             R,W,X      SPACE BAR
G             >,<,=      SPACE BAR
N             0-F,X      TYPE VALUE
B             0,1,X      SPACE BAR
```

A, B, C, D

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Match specifications can be logically combined (And'd, Or'd, Xor'd) to form more complex specifications, such as inside and outside windows and multiple match conditions. For example if A specifies an address greater then 1000 and B specifies an address less then 2000, then A.B (dot is the AND operator) specifies a window between these two values. To setup a match specification see A,B,C,D in the commands chapter.

4.3 Trace Qualifiers

It is often useful to be selective about the type of events captured in the trace buffer. This prevents the trace buffer from getting filled with unnecessary information. The TO (Trace Only) command selects specific events to be captured in the trace buffer.

After typing TO the message "TRACE ALL EVENTS" is displayed. The cursor will appear at the first letter in "ALL". The space occupied by "ALL" is actually a field which may be defined by the user. This field may contain the word "ALL", "NONE" or individual or logical combinations of match specifications (A,B,C and D). For example if Match A specifies an address range of greater than 1000, then TRACE A EVENTS will cause the N9210 to capture only those events whose address is greater than 1000. Another match specification can be logically AND'ed with A. If event B specifies an address range of less than 2000, then TRACE A.B EVENTS will cause the N9210 to capture only those events between addresses 1000 and 2000. "TRACE ALL EVENTS" will cause all events to be captured, while the TRACE NONE EVENTS turns off the trace buffer. The initial setting for the TO command is ALL.

4.4 Tracing with Triggers

It is often useful to look at bus activity around a defined point of interest called a trigger. The trigger is used to control when bus events are captured by the trace buffer.

A trigger condition is specified in the GO command. The 4 match specifications (A,B,C and D) can be used separately or logically combined to form a trigger expression. For example the command GO A will use A as the trigger condition.

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A "YES" will appear under "TRIGGERED" in the Go Status display when the trigger condition is met. Events continue to be captured until the trace buffer is full or the RETURN key is typed. When either case occurs the page of trace buffer events around the trigger is displayed.

A trigger may be positioned within the trace buffer to control the number of events stored before and after the trigger in the trace buffer. The TP (Trigger Position) command can place the trigger at the start, end or 1/4, 1/2, 3/4 of the way through the trace buffer. After typing TP press the space bar to increment through the possible choices and return key to enter that choice. The initial value of TP is in the middle of the trace buffer.

4.5 Programming Complex Triggers

A complex trigger specifies a sequence of events which must occur before a trigger condition is satisfied. This type of trigger is actually a small user defined program consisting of up to 4 program levels. One level is active at a time. The match conditions specified in the active level are compared with the actual bus event. Based on this comparison a jump to another level can be made or a trigger point reached. The following figure shows a simple program.

LEVEL	IF EVENT OCCURS	THEN -	TRIG?	ELSE -	TRIG?	TRACE	CLOCK
1	A	01	GO TO 2	NO	GO TO 1	NO	NONE	SYNC
2	B	01	GO TO 1	YES	GO TO 2	NO	ALL	SYNC

A complex trigger is specified using the GO command followed by a level number. In this example if the command "GO L1" was typed Level 1 would become active and the Go Status display would indicate the current active level. Level 1 waits for event A to occur. During this time no events are captured in the trace buffer. As soon as event A occurs level 2 becomes active. The trace buffer now captures all bus events until event B occurs. Level 1 then becomes active and the cycle repeats. A typical application for this example is capturing events in a software subroutine given the start and end addresses.

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Each level is setup using the Level commands (L1, L2, L3 and L4). A level consists of several fields the first being IF EVENT. This field can be any logical combination of the match specifications A,B,C and D or the word "ALL" or "NONE". The next parameter, OCCURS, is the number of times the event must occur. If the event occurs the specified number of times the THEN action is taken. If the event does not occur the ELSE action is taken. An action may be a jump to any of the 4 levels. The TRIG? field next to each action specifies if the trigger should occur during that action. Following the action fields is a TRACE field. This field specifies what type of information to capture in the trace buffer. The trace may be turned on or off, or set to capture bus activity using the match specifications. The last parameter specifies the sampling clock used to capture events. Synchronous or asynchronous sampling can be specified. See L1, L2, L3 and L4 in the command chapter for a detailed description of these commands.

4.6 Occurrence Counting

You may not want to trigger the trace buffer on the first occurrence of a trigger condition. Using the O (Occurrence) command you can specify the number of times the trigger condition must occur before actually triggering the trace buffer. After typing O the message "TRIGGER AFTER 01 TIMES" will appear. The value of "01" can be changed to any numerical value up to 64.

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CHAPTER 5
BUS CONTROL

5.1 Introduction

The N9210 monitors the bus when tracing, but can also control the bus with a number of master commands. Some commands perform normal bus transfers while others test and stimulate the bus according to user defined conditions.

Note: The N9210 can not trigger itself. In other words, if the N9210 does a read to a specific memory location, that read can not cause a trigger.

5.2 Performing Bus Transfers

Three commands perform normal bus transfers. The Bus Read (BR) command reads and displays a block of data given a starting and ending address. The Bus Write (BW) command writes data to a range of addresses. The last command Bus Substitute (BS) reads and displays one byte of data at a time and lets you alter the value at that address. The escape key exits this command.

When using the above commands the BM command can be used to specify the address modifier and bus request level used during bus transfers.

5.3 Backplane Testing

The Backplane Test (BT) command checks for signal shorts on a VME backplane. It is recommended that this test be performed with no other boards in the system. Signals tested include all VME defined bus signals on J1 and J2. This test is performed in several stages. The first stage of the test checks and displays any active signals. If a signal is active it is not tested.

The next stage activates one signal at a time and monitors all other signals for activity. If another signal is found active it is listed as a shorted signal. The signal

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which is activated is also monitored to determine if it can be driven and an error message displayed if it cannot be driven.

5.4 User Defined Bus Stimulus

In addition to performing normal data bus transfers the N9210 can send out user defined stimulus on the VME bus. The Bus condition (BC) and Bus Activate (BA) commands can send as many as 8 user defined stimuli on to the bus.

The Bus Condition (BC1 thru BC8) commands allow the user to define what signals to activate and their duration. These commands can be chained to form a stimulus sequence. The "Next" field can point to another Bus condition.

The Bus Activate (BA1 thru BA8) commands send out the respective bus condition on to the bus.

5.5 Inhibiting Bus Control

The BP command turns the bus control features off and on. This prevents a user from accidently sending out bus stimulus which could adversely affect normal system operation.

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CHAPTER 6
PERFORMANCE ANALYSIS

6.1 Introduction

A number of features are provided to indicate and measure system performance. These include histograms and timing measurements. Range histograms show activity in various address ranges, while signal histograms count the number of occurrences of user selected signals. Timing measurements show elapsed and interval times between events.

6.2 Range Histograms

The N9210 can accumulate a history of VME bus address usage. The GO HR command starts the capture of bus events for the histogram display. In this mode bus events are captured until the trace buffer is full. When this occurs the trace buffer is read to determine the percentage of events found in the user defined address ranges. The new percentages are averaged with the old percentages and shown in the histogram display. The capture of events is again initiated and the cycle continues. To stop the histogram press the RETURN key. The histogram display consists of 8 user defined address ranges specified in the R1 thru R8 commands.

6.3 Signal Histograms

Signal Histograms show bus activity of up to 8 user selected signals. Each selected signal is sampled asynchronously. If a signal is active a hardware counter is incremented for that signal. A separate counter counts the total number of samples. Before the total counter reaches its maximum count, all counters are read, reset and continue to accumulate samples. The percentage of occurrences of each selected signal is displayed and averaged with new sample counts.

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6.4 Timing Information

The timing information presented in the trace display can be useful in measuring system performance. During software analysis, measurements to determine interrupt latency or the time to execute a subroutine can be made with the elapsed timer.

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CHAPTER 7
OTHER FUNCTIONS

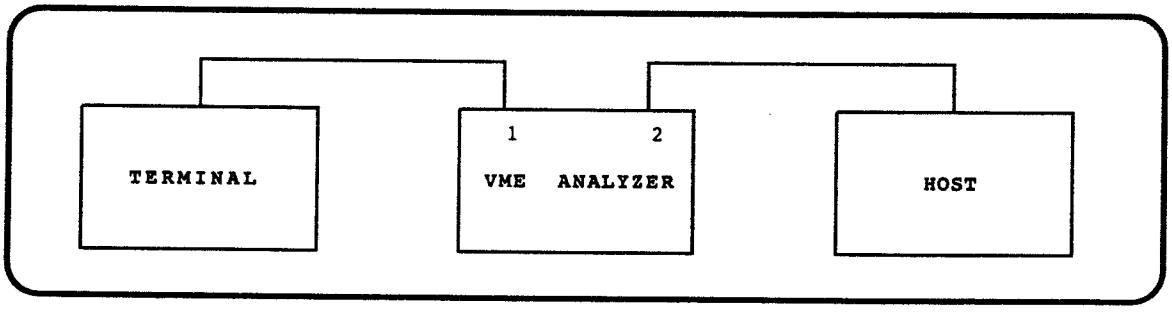
7.1 Storing Setups and Data

The N9210 provides non-volatile storage of up to 8 user setups and 8 screen displays. The current setup can be saved with the Store Setup (SS1 thru SS8) command. All user configurable parameters are saved. To recall a previously stored setup use the Recall Setup (RS1 thru RS8) command.

Screen displays can also be saved and recalled. The Store Page (SP1 thru SP8) command saves an exact copy of the current terminal display. The recall page (RP1 thru RP8) redisplays previously stored screens.

7.2 Printer / Passthru Port

The N9210 provides a secondary port which can be connected to a printer or host device. When connected to a host device the passthru command (CTRL-T) allows the user to switch terminal communication between the N9210 and the host device. This feature enables the user to have a single terminal for both the N9210 and a host device.



When connected to a printer, the Print Screen (CTRL-P) command sends the current terminal screen display to the printer. The print on/off (CTRL-O) command echos all terminal displays to the printer. Using print on/off again turns this feature off. The baud rate of this port is set with the CF command.

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7.3 Monitoring Power and Temperature

The N9210 measures and displays the 3 main power supply voltages on the backplane. The Voltage (V) command displays the current voltage level of the +5V, +12V and -12V supplies.

The Read Temperature (RT) command reads and displays the temperature measured by a sensor on the N9210. Although this measurement is very accurate it is at only one location in a system and may not be indicative of overall system temperature. It can, however, indicate rises and falls in temperature due to abnormal conditions.

7.4 Clock/Calendar

A battery backed up Clock/Calendar provides time stamping for trace displays. The Clock Set (CS) command lets the user set the current time and date. The Clock Read (CR) command reads and displays the output of the clock/calendar.

7.5 Self Test

A built-in self test is provided to insure board integrity. This test provides a complete end to end test of the N9210 from bus interface to internal processor. The Test (T) command initiates the self test. Each test name is displayed with a Pass or Fail indication.

7.6 Configurable Options

The Configuration (CF) command allows the user to control specific N9210 features. These functions are listed below:

1. A32/D32 or A24/D16 Setup
2. Hexadecimal or Binary Setup
3. Baud Rate - Port 1 (Primary)
4. Baud Rate - Port 2 (Printer/Passthru)
5. Trigger Out Polarity
6. Execute Command File at Startup

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Each option is explained below:

1. **A32/D32 or A24/D16 Setup** -

   This option allows the user to work in systems with 32 bit address/32 bit data buses or 24 bit address/16 bit data. All setup and trace displays are adjusted to show the correct number of signals for address and data fields.

2. **Hex or Binary Address/Data Setup**-

   Display and modification of address and data in setup commands can be in hexadecimal or binary.

3. **Baud Rate Port 1 (Primary)**-

   The baud rate of port 1 is determined at power up by jumper block B2. After power up the baud rate may be changed with this option. The selected baud rate is immediately effective after pressing the return key.

4. **Baud Rate Port 2 (Printer/Passthru)**

   The baud rate of port 2 is selected with **CF** option. See Command Section for more information on CF command.

   Passthru Control Key -

   The default command to use the secondary port in passthru mode is Control-T.

   NOTE: Check XMIT and REC connector pins on Host terminal for compatibility.

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5. **Trigger Out Polarity** -

   The user may select the polarity of the external trigger output. This may select the polarity of the external trigger output.

6. **Execute Command File at Startup-**

   This option selects and executes the command files (CA 1-8) upon power up, (if jumper B-1 is installed).

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CHAPTER 8
COMMANDS

8.1 Introduction

This chapter presents a detailed description of each N9210 command. The format consists of the command name in bold in the upper right hand corner of each page, followed by its syntax and command description.

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A
B
C
D

Match Specification Display and Setup

Syntax:

A
B
C
D

Description:

The A,B,C and D commands setup and display the 4 match specifications. After typing one of these commands several lines are displayed showing the current contents of the match specification. The cursor is positioned at the first character of the first valid field. To move between fields the following keys are available.

Key	Action
>	Go to next field
<	Go to previous field
RETURN	Enter field and Go to next field
ESC	Exit command

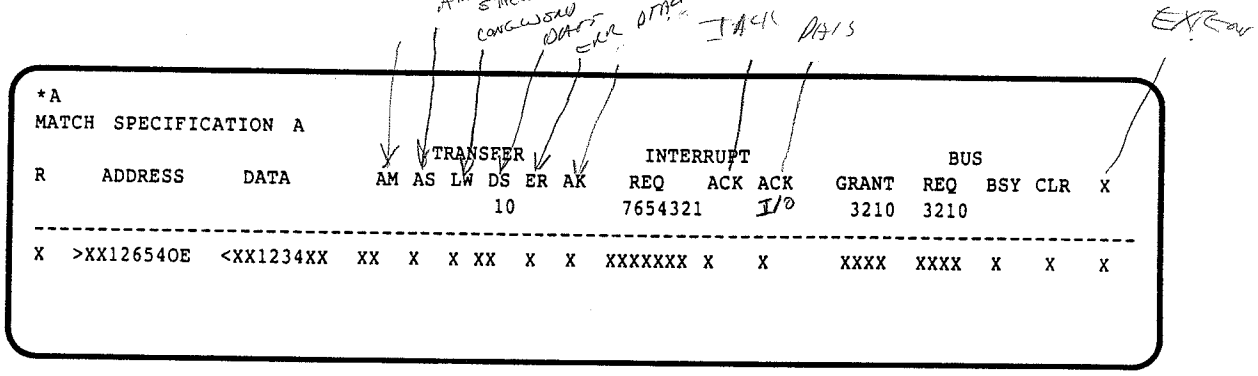
To change a value in a field several key options are available and described below.

Space Bar	Sequence through available field values
Numbers (0-F,X)	Enter value (for Address, Data use 0 through F) (X = don't care)

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It is important to remember that VME bus addresses expressed in bytes are always even. Always enter an even address in a match specification.

The following figure shows a match specification and explains each field.



A, B, C, D

The address, address modifier (AM), and data fields shown above may be entered in hexadecimal (0-9,A-F or X). These values may also be entered in binary by selecting binary mode with the CF command.

Before both address and data fields are range fields, which can be changed by pressing the space key. The range fields must be equal to (=), greater than (>) or less than (<) the specified value if a valid match is to occur.

All other fields may be changed by pressing the space key. An "X" specifies a don't care state, a "0" specifies the active state, while a "1" is the inactive state.

The last field, X, is the external trigger input, which may also be used in each match condition.

Any field marked with an X is ignored in the match condition.

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BA
Activate Bus Stimulus

Syntax: BA (1-8)

Description:

The BA command starts bus activation according to the stimulus condition specified in the BC command. To stop bus activation, type the Escape (ESC) key. This may be needed to stop chained stimulus conditions that loop indefinitely.

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BC
Set Stimulus Condition

Syntax: BC (1-8)

Description:

The BC commands set stimulus conditions which can be driven onto the VME bus, using the BA command. After typing BC, the user can specify a stimulus condition by positioning the cursor under a signal field and modifying its value. See the A,B,C,D commands for information on cursor movement and field modification.

The last field, NEXT, allows you to specify a sequence of stimulus conditions by chaining them. If this field contains a 0, then stimulus stops after that condition is driven onto the bus. A value in this field between 1 and 8 will cause another stimulus condition to be activated.

The time duration of activation and the time before activating the next condition can be specified with each condition. The activation time has a range of 1 to 99 microseconds in 1 microsecond increments. The wait time can be specified from 1 to 99 milliseconds in 1 millisecond increments.

```
* BC1

STIMULUS CONDITION1

                              TRANSFER          INTERRUPT              BUS          R
R    ADDRESS     DATA      AM AS LW DS ER AK    REQ    ACK ACK   GRANT   REQ  BSY CLR  E NEXT
W                                  10         7654321            3210  3210           S
-------------------------------------------------------------------------------------------
X   XX126540E   XX1234XX   XX  X  X XX  X  X  XXXXXXX X   X     XXXX  XXXX  X   X   X  2


ACTIVATION TIME (US) = 60
NEXT TIME (MS) = 20
```

BC1 SCREEN

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BM
Bus Master Conditions

Syntax: BM

Description:

The BM command sets the bus request level and address modifier output on the VME bus during the BR (Bus Read), BW (Bus Write) and BS (Bus Substitute) commands.

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BR
Bus Data Read

Syntax: BR

Description:

The BR command reads data from the VME bus. After typing BR, the starting and ending address values must be entered in hex. The N9210 then performs a Data Transfer Bus Cycle to obtain data from a slave device. This data is read in bytes and displayed in hexadecimal along with its ASCII equivalent. Any hex data byte which does not have a printable ASCII character is shown as a period (.) in the ASCII display.

```
*BR

START ADDRESS = 0000400

END ADDRESS = 000041F

00000400   51 48 30 34 47 45 29 27 21 58 41 44 01 10 11 12  QH0RGE)'!XAD....
...
00000410   00 01 02 41 4E 41 4C 59 5A 45 00 00 00 00 00 00  ...ANALYZE......
```

BR SCREEN

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BP
Bus Protection

Syntax: BP

Description:

The BP command allows the user to inhibit the bus control commands thus preventing them from accidentally affecting normal system operation. After BP is typed, press the space bar to select between turning on and off bus protection.

```
* BP

ENABLE BUS COMMANDS     = OFF
                          ON
```

BP SCREEN

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BS
Bus Data Substitute

Syntax: BS

Description:

The BS command reads and writes data across the VME bus one byte at a time. After typing BS, the starting address must be entered in hex. The first data byte at this address is displayed. The user may enter a new byte to replace the old value, press return to go to the next byte or press the ESC key to exit.

```
*BS

START ADDRESS = 00001000

00001000 55 41

00001001 20 .
```

BS SCREEN

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BT
Backplane Test

Syntax: BT

Description:

The BT command tests the VME bus for signal shorts. This command should normally be used with **no other boards** in a system since many signals are activated with no regard to bus timing. After typing BT the N9210 first looks at all bus signals to map out any signals in the active state and lists these. After this, each inactive bus signal is driven to it's active state, one at a time, while all other bus signals are monitored for activity. If activity is detected on another bus signal, it is listed as a short. The signal which is being driven by the N9210 is also monitored. If this line cannot be driven, then it is also listed. If any signals are found active, shorted or unable to be driven, a test FAIL is indicated, otherwise a test OK is displayed.

```
*BT

TESTING BUS SIGNALS FOR INACTIVITY

MAPPING OUT ACTIVE SIGNALS:   IRQ5
                              IRQ7

CHECKING FOR SHORTS:   ADR8 SHORTS ADR9
                        IRQ2 CANNOT DRIVE

TEST FAIL
```

BT SCREEN

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BW
Bus Data Write

Syntax: BW

Description:

The BW command writes data across the VME bus. After typing BW, the starting, ending address and data values must be entered in hexadecimal. The N9210 then performs a Data Transfer Bus Cycle to write the data value to the address range specified.

```
*BW

START ADDRESS = 00001000

END ADDRESS   = 000020FO

DATA          = 00AA
```

BW SCREEN

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CA (1-8)
Command Activation

Syntax: CA (1-8)

Description:

The Command Activation (CA) command allows the user to execute one or all of the executable command files, by pre-setting specific commands in the CL(1-8) Command Files.

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CF
Configure Analyzer

Syntax: CF

Description:

The Configuration (CF) command allows the user to control specific N9210 features. These functions are listed below:

1. A32/D32 or A24/D16 Setup
2. Hexadecimal or Binary Setup
3. Baud Rate - Port 1 (Primary)
4. Baud Rate - Port 2 (Printer/Passthru)
5. Trigger Out Polarity
6. Execute Command File at Startup

Each option is explained below:

1. **A32/D32 or A24/D16 Setup** -

   This option allows the user to work in systems with 32 bit address/32 bit data buses or 24 bit address/16 bit data. All setup and trace displays are adjusted to show the correct number of signals for address and data fields.

2. **Hex or Binary Address/Data Setup**-

   Display and modification of address and data in setup commands can be in hexadecimal or binary.

3. **Baud Rate Port 1 (Primary)**-

   The baud rate of port 1 is determined at power up by jumper block B2. After power up the baud rate may be changed with this option. The selected baud rate is immediately effective after pressing the return key.

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4. **Baud Rate Port 2 (Printer/Passthru)**

   The baud rate of port 2 is selected with this option.

   Passthru Control Key -

   The default command to use the secondary port in passthru mode is Control-T. This may be changed to another control character if it interferes with host operation.

5. **Trigger Out Polarity** -

   The user may select the polarity of the external trigger output. This may select the polarity of the external trigger output.

6. **Execute Command File at Startup**

   This option selects and executes the executable command files (CA1-CA8) upon power up, (if jumper B-1 is installed)

```
* CF

A32/D32 OR A24/D16 SETUP = A32/D32
HEXADECIMAL OR BINARY SETUP = HEXADECIMAL
BAUD RATE - PORT 1 (PRIMARY) = 9600
BAUD RATE - PORT 2 (PRINTER/PASSTHRU) = 9600
TRIGGER OUT POLARITY = ACTIVE HIGH
EXECUTE COMMAND FILE AT STARTUP
```

CF SCREEN

After typing CF, these options are selected by pressing the space key to change a setting and typing the RETURN key to enter your choice.

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CL (1-8)

Command File

Syntax: CL

Description:

Command files allow the user to store a sequence of executable commands, which when initiated, can perform various functions and can recall stored setups upon power up.

A double asterisk "**" will distinguish between the command file execution and the single prompt "*" terminal command entry. When a wait time is specified, the message "WAITING" is displayed and flashed for the duration of the wait time.

```
*CL1

COMMAND LINE 1
COMMAND   :  WAIT  : NEXT
          :   00   :  0
```

CL SCREEN

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CR

Clock Read

Syntax: CR

Description:

The CR command reads and displays the internal N9210 clock/calendar. The time and date are displayed. The clock/calendar is battery backed up and therefore continues timekeeping when power is removed from the N9210.

```
*CR

12:10:30   10/30/89
```

CR SCREEN

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CS

Clock Set

Syntax: CS

Description:

The CS command allows the user to set the internal N9210 clock/calendar. This clock is used as a time stamp for trace data or can be read directly with the CR command.

After CS is typed the user is prompted for the time and date.

```
*CS

 HOURS      MINUTES     SECONDS      MONTH       DATE        YEAR
(00-23)     (00-59)     (00-59)     (01-12)     (01-31)     (00-99)
-------------------------------------------------------------------
   12          10          30          10          30          89
```

CS SCREEN

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CTRL-O

Print On/Off

Syntax: CTRL-O

Description:

The Print On/Off command allows the user to send all screen displays to Port 2. When Ctrl-O is first typed everything displayed on Port 1 is also displayed on Port 2. If Port 2 is connected to a printer, this provides you with a complete hardcopy when using the N9210. Typing Ctrl-O again turns off Port 2.

The baud rate of Port 2 is selected with the CF command. The default is 9600 baud.

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CTRL-P

Print Screen

Syntax: CTRL-P

Description:

The Print Screen command sends a copy of the current screen display to Port 2. Typically a printer would be connected to this port for a hardcopy.

The baud rate of Port 2 is selected with the CF command. The default is 9600 baud.

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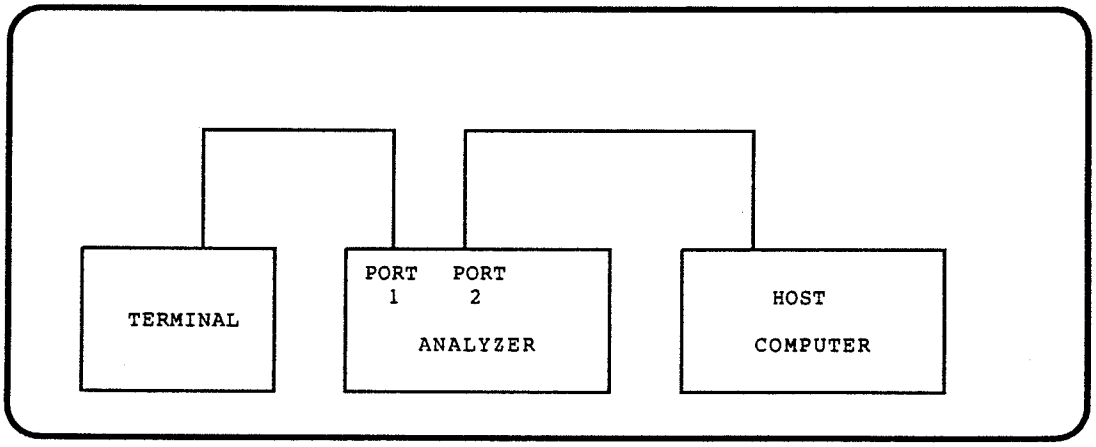
CTRL-T

Passthru Port

Syntax: CTRL-T

Description:

The passthru command allows the user to switch terminal communication between the N9210 and Port 2. This feature enables the user to have a single terminal for both the N9210 and a host computer. Once CTRL-T is typed the terminal sends and receives all characters on Port 2. The N9210 is still functioning, but sending its output to an internal buffer. A typical system configuration is shown below. See the "Preparation for Use" section in Chapter 2 for interface details.



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DS

Display Current Setup

Syntax: DS

Description:

The DS command summarizes and displays some of the current user setup parameters. These include:

4 Match Conditions
4 Program Levels
Trigger Position
Trace Qualifier
Occurrence Count
Sample Clock

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GO

Start Event Capture

Syntax:

GO
GO F
GO (Trigger Condition)
GO (Program Level)
GO HR
GO HS

Description:

The first form of the GO command starts the capture of bus events by the trace buffer. After typing GO the message "TRACE ACTIVE" appears followed by a Go Status display.

```
******************** TRACE ACTIVE *********************
LEVEL    TRIGGER    CYCLES BEFORE    CYCLES AFTER    BUFFER
                       TRIGGER          TRIGGER       FULL
---------------------------------------------------------
  1         NO          0100             0000         NO
```

Event capture continues until the trace buffer is full or the RETURN key is typed. When this occurs the page of trace information around the trigger is displayed.

The second form, GO F, is similar to the first except that event capture continues after the trace buffer is full by continuing to store events in a FIFO (first in/first out). The only way to stop this type of GO is by typing the RETURN key.

The third form of the GO command specifies a trigger condition. A trigger condition is a single event specification or logical combination of event specifications. The four event specifications A,B,C and D can be AND'ed, OR'ed or XOR'ed together. The AND operator is a dot (.), the OR operator is a (+) and the XOR operator is an "X". For example the command GO A.B specifies that both the A and B event specifications must be true to trigger the trace buffer. To setup an event specification see the A,B,C and D commands.

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The fourth form of the GO command starts event capture based on the information in the specified program level. There are 4 program levels (L1,L2, L3, L4) which are setup using the L(num) command. Typing GO L1 executes program level 1.

The last forms of the GO command, GO HR and GO HS start the range and signal histograms. Eight user defined address ranges can be specified with the R command for the range histogram. For the signal histogram the user can select any eight bus signals with the H command. To stop the histogram display press the RETURN key.

```
*GO HR

ADDRESS RANGE HISTOGRAM

SAMPLES   RANGE 1   RANGE 2   RANGE 3   RANGE 4   RANGE 5   RANGE 6   RANGE 7   RANGE 8
           XXXXXXX   XXXXXXX   XXXXXXX   XXXXXXX   XXXXXXX   XXXXXXX   XXXXXXX   XXXXXXX
                                                                                 1
           XXXXXXX   XXXXXXX   XXXXXXX   XXXXXXX   XXXXXXX   XXXXXXX   XXXXXXX   XXXXXXX
-------------------------------------------------------------------------------------------
01050       10%       15%       05%       61%       .09%      .00%      00%       00%
```

GO HR SCREEN

```
*GO HS

SIGNAL HISTOGRAM

SAMPLES   SIGNAL1   SIGNAL2   SIGNAL3   SIGNAL4   SIGNAL5   SIGNAL6   SIGNAL7   SIGNAL8
            A16       A15       IR7
-------------------------------------------------------------------------------------------
02318       06%       10%       05%
```

GO HS SCREEN

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H

Select Histogram Signals

Syntax: H

Description:

The H command lets the user select up to 8 signals for the signal histogram display. After typing H, a list of bus signals are displayed. Under each signal is an "X" indicating it is not to be used in the signal histogram display. To include a signal in this display, move the cursor to an "X" using the following cursor control keys:

Key	Action
>	Go to next field
<	Go to previous field
RETURN	Enter field and go to next field
ESC	Exit command

When the cursor is at the signal to be included, press the SPACE key. The "X" will change to an "A" and will be included in the histogram signal display. To deselect an included signal, press the SPACE key again and the "A" will change back to an "X". A maximum of 8 signals may be included.

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HELP

Help List

Syntax: HELP

Description:

This command displays a list of all the N9210 commands. The Help command also gives detailed information on each command. A description and example is provided for a command by typing HELP followed by the command name, for example "HELP GO".

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```
* HELP
****************************************** COMMAND SUMMARY*************************************************

-------------TRACE CAPTURE-------------

GO            - START EVENT CAPTURE

GO F          - START CAPTURE FOREVER

GO (TRIG)     - CAPTURE USING TRIGGER

GO (LEVEL)    - CAPTURE USING LEVEL


GO HR         - START RANGE HISTOGRAM

GO HS         - START SIGNAL HISTOGRAM

-------------TRACE BUFFER--------------

P             - DISPLAY NEXT PAGE

P-            - DISPLAY PREVIOUS PAGE

P (NUM)       - DISPLAY AT FRAME NUM

PS (1-8)      - SEARCH TRACE

PM (1-8)      - SET SEARCH CONDITION

PD            - SELECT TRACE DISPLAY

------------TRIGGER SETUP---------------

A B C D       - SET MATCH CONDITIONS

L1 L2 L3 L4   - SET LEVEL CONDITIONS

TP            - TRIGGER POSITION

O             - OCCURRENCE COUNT

TO            - TRACE QUALIFIER

--------------BUS CONTROL-------------

BR            - BUS DATA READ

BW            - BUS DATA WRITE

BS            - BUS DATA SUBSTITUTE

BM            - BUS MASTER CONDITION

BT            - BACKPLANE TEST

BC (1-8)      - SET BUS CONDITION

BA (1-8)      - SEND BUS CONDITION

BP            - BUS CONTROL ON/OFF

-------------CONFIGURATION------------

S             - SELECT SAMPLE CLOCK

H             - SELECT HISTOGRAM SIGNALS

R (1-8)       - SELECT HISTOGRAM RANGES

W             - SELECT WAVEFORM SIGNALS


SS (1-8)      - STORE SETUP

RS (1-8)      - RECALL SETUP

SP (1-8)      - STORE SCREEN PAGE

RP (1-8)      - RECALL SCREEN PAGE

DS            - DISPLAY SETUP

CF            - CONFIGURE OPTIONS

                    TYPE "HELP MORE" FOR ADDITIONAL COMMANDS



************************************** COMMAND SUMMARY CONTINUED*******************************************

---------PRINTER/PASSTHRU PORT---------

CTRL T        - PASSTHRU TOGGLE

CTRL P        - PRINT SCREEN

CTRL O        - PRINT ECHO TOGGLE


------------CLOCK CALENDAR-------------

CS            - CLOCK SET

CR            - CLOCK READ

------------MISCELLANEOUS------------

V             - READ BUS VOLTAGES

RT            - READ TEMPERATURE

T             - SELF TEST

CL (1-8)      - COMME LINE SETUP
CA (1-8)      - COMMAND LINE ACTIVATION

I             - CLEAR CURRENT SETUP

HELP (CMD)    - HELP SUMMARY (DETAIL)
```


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I

Initialize Setup

Syntax: I

Description:

The I command sets the current user setup to a predefined factory setting. All signal fields in the setup commands are set to "X" (Don't Care).

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L1
L2
L3
L4
Program Level Display and Setup

Syntax:

L1
L2
L3
L4

Description:

The L1,L2,L3 and L4 commands setup each of the 4 program levels. After typing the program level command several lines are displayed showing the current contents of the program level. The terminal cursor is positioned at the first character of the first valid field. To move between fields, the following keys are available.

Key	Action
>	Go to next field
<	Go to previous field
RETURN	Enter field
ESC	Exit command

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The following figure outlines each field in the level command.

```
*L1
LEVEL   IF EVENT   OCCURS   THEN - TRIG?   ELSE - TRIG?   TRACE   CLOCK
-------------------------------------------------------------------------
  1       ALL         01     GO TO 1   NO    GO TO 1   NO    ALL      SYNC

The following table describes how to change the level specification.

Field           Value                 Action
LEVEL           1 to 4                This value is set to the L command number

IF EVENT        ALL, NONE             Type in an expression using the 4 match
                 A,B,C,D               specifications. Dot (.) means AND, plus (+)
                A.B                   is OR and X is Xor.

OCCURS          1 to 64               Type in a decimal number

THEN            GO TO 1 thru 4        Press the space bar

TRIG            NO, YES               Press the  space bar

ELSE            same as THEN          same as THEN

TRIG            same as TRIG          same as TRIG

TRACE           same as IF EVENT      same as IF EVENT

CLOCK           SYNC, ASYNC           Press the space bar

Use the RETURN key to advance to the next field.
```


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O

Occurrence Counting

Syntax: O

Description:

The O command specifies the number of times a trigger event must occur before the trace buffer is actually triggered. After typing O the message "TRIGGER AFTER 01 TIMES" appears. The field containing "01" may be changed in the range 01 to 64.

```
*O
TRIGGER  AFTER   01  TIMES
The underlined field  may contain a decimal number from 01 to 64.
TRIGGER  AFTER  10  TIMES

Press the RETURN key to enter your
```


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P

Print Trace

Syntax:

P
P -
P (num)
P (num), (num)
PS (1-8)
PM (1-8)
PD

PE
PRINT ELAPSED

Description:

The Print command displays the contents of the trace buffer. Typing P alone displays the next 15 locations in the trace buffer. P followed by a "-" displays the previous 15 locations. Specifying a number after P positions you anywhere in the trace buffer. Using the P(num), (num) will allow you to see a range of locations within the trace buffer.

Searching for trace information is accomplished using the Print Search (PS) and the Set Print Match (PM) commands. The PM commands are used to specify conditions to search for. Searching starts at the last frame number displayed. If you want to start a search at the beginning of the trace buffer, use the P(num) command to display a position before the first valid trace location.

Multiple PM commands may be chained together to locate a sequence of events in the trace buffer. Once a search is initiated using the PS command, an attempt is made to find an event in the trace buffer that matches the corresponding PM condition. If no match is found a message is displayed indicating this and the search stops.

If a match is found, the next field of the PM condition is examined. If the next field contains a zero, the search is stopped and the trace buffer is displayed starting with the location of the matched event. If the next field contains a number between 1 and 8 a new PM condition is searched for starting at the location immediately following the previous match.

The last Print command, PD, selects between 4 types of trace displays. After typing PD use the space key to select your choice. The first type of display shows all bus signals, while the 2nd also includes time stamping. On this display, the elapsed and interval time is shown for each trace line.

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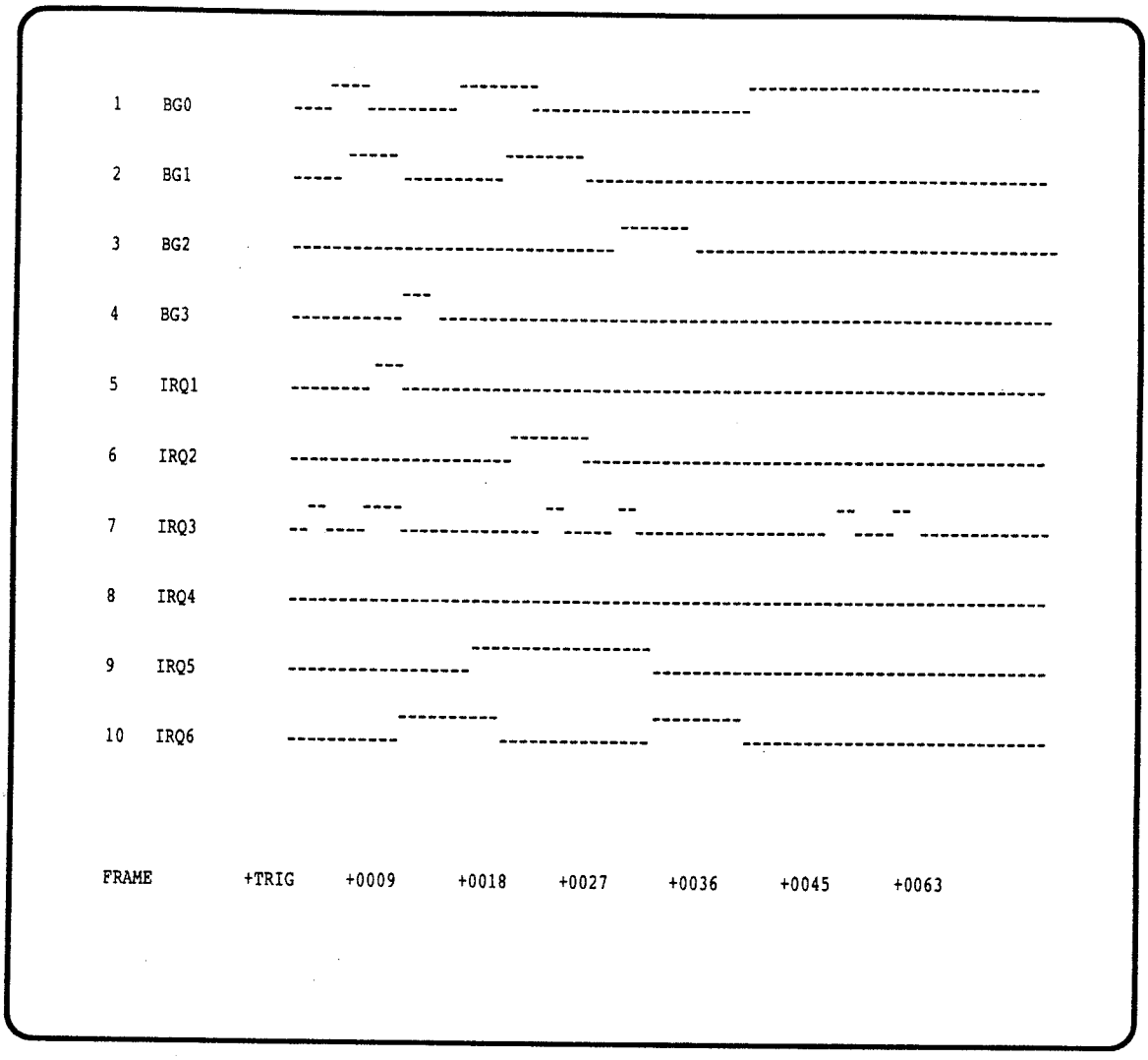
The third display shows a waveform representation of trace data. Signals used in this display are selected with the W command.

The fourth display is the "RAW" display. This option is intended for applications where a computer is capturing and sometimes analyzing trace data. As with the other trace displays, the P command selects what trace data to output.

```
**********************TRACE STARTED AT 10:23:02 ON 11/10/89**********************
*    CYCLES BEFORE TRIGGER = 2048          CYCLES AFTER TRIGGER = 0000          *
*****************************************************************************
                            TRANSFER                INTERRUPT              BUS     X
FRAME|R  ADDRESS    DATA    AM AS LW DS ER AK|  REQ  ACK ACK| GRANT REQ BSY CLR|
     |W (INTERVAL) (SEC.MS.US.NS)            |7654321    I/O| 3210  3210       |
-----|---------------------------------------|--------------|------------------|-
-0007|R 024E5782  E5E5E5E5  3F  0  1  0  1  0|------- 1   1 | 1011  1011 1   1 |1
     |  (35.2US)  (000.023.000.000)          |              |                  |
-0006|W 00001000  0000567A  3E  0  0  0  1  0|------- 1   1 | 0111  0111 1   1 |1
     |  (35.9US)  (000.023.035.200)          |              |                  |
-0005|R 01000010  44444444  2E  0  1  0  1  1|-----2- 0   1 | 1101  1101 1   1 |1
     |  (40.8US)  (000.023.071.100)          |              |                  |
-0004|R 01000014  5FEA3400  3F  0  1  0  1  1|------- 1   1 | 1101  0101 1   1 |1
     |  (41.1US)  (000.023.111.900)          |              |                  |
-0003|W 182000FE  FE021109  1F  0  0  0  1  0|------- 1   1 | 0111  0111 1   1 |1
     |  (43.2US)  (000.023.153.000)          |              |                  |
-0002|R 004E2222  D4E66F53  2F  0  0  0  1  0|-6---2- 1   0 | 1110  1110 1   1 |1
     |  (45.0US)  (000.023.196.200)          |              |                  |
-0001|R 0043222A  5E632F76  2F  0  0  0  1  0|-6---2- 0   0 | 1110  1110 1   1 |1
     |  (46.1US)  (000.023.241.200)          |              |                  |
 TRIG|R 00432232  C4A55267  2F  0  0  0  1  0|-----2- 0   0 | 1110  1110 1   1 |1
     |  (46.7US)  (000.023.287.300)          |              |                  |
 **********************TRACE STOPPED AT 10:24:05 ON 11/10/89**********************
```

SIGNAL AND TIME TAG DISPLAY

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Waveform Display

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RAW DATA FORMAT

N9210

Bit Byte	7	6	5	4	3	2	1	0
0	A7	A6	A5	A4	A3	A2	A1	0
1	A15	A14	A13	A12	A11	A10	A9	A8
2	A23	A22	A21	A20	A19	A18	A17	A16
3	A31	A30	A29	A28	A27	A26	A25	A24
4	D7	D6	D5	D4	D3	D2	D1	D0
5	D15	D14	D13	D12	D11	D10	D9	D8
6	D23	D22	D21	D20	D19	D18	D17	D16
7	D31	D30	D29	D28	D27	D26	D25	D24
8	DTACK	BERR	BBSY	BR3	BR2	BR1	BR0	TRIG IN
9	IACK	IRQ7	IRQ6	IRQ5	IRQ4	IRQ3	IRQ2	IRQ1
10	IACKI	DS1	DS0	BCLR	BGO	BG1	BG2	BG3
11	0	0	AM5	AM4	AM3	AM2	AM1	AM0
12	---------- NOT USED ----------					LW	WR	AS
13	---------- NOT USED ----------							
14	---------- NOT USED ----------							
* 15	---------- NOT USED ----------						P1	P0
* 16	T7 (MSB)	T6	T5	T4	T3	T2	T1	T0 (LSB)

TABLE 1

* P0, P1 and T0 through T7 are interval time bits. P0 and P1 are counter prescaler bits which define a multiplier for time T0 through T7 as follows

P1	P0	Multiplier
0	0	40 ns
0	1	102 us
1	0	26 ms
1	1	67 sec

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R

Set/display Range Values

Syntax: R (1-8)

Description:

The R commands set the 8 address range settings used in the address range histogram display. After typing R followed by a number, the low value and high value of that range may be entered. The address range histogram display is intitiated using the GO HR command.

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RT

Read Temperature

Syntax: RT

Description:

The RT command reads and displays the temperature on the N9210 via a temperature sensor located on the board. Although this reading is accurate, it is indicative of the temperature at only one location in the system. This temperature can be an indicator of abnormal conditions in the system.

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S

Sampling Clock

Syntax: S

Description:

The S command specifies the source for clocking the trace buffer. The clock may be synchronous using the VME DTACK signal or asynchronous using an internal oscillator. After typing S the space bar selects the clock type while the RETURN key enters the choice.

```
* S
SAMPLING CLOCK =   SYNC

The underlined field may contain SYNC or ASYNC.
Press the space bar to select your choice.

SAMPLING CLOCK = ASYNC

SAMPLING SPEED = 50 MHZ

If ASYNC is selected, press space bar to select speed.
Press the RETURN key to enter your choice.
```

After selecting asynchronous sampling the user is prompted to enter the sampling speed. The space bar selects from 7 available choices which range from 50 Mhz to 780 KHZ.

Asynchronous Speed Selections

Frequency	Period
50 Mhz	20 ns
25 Mhz	40 ns
12.5 Mhz	80 ns
6.25 Mhz	160 ns
3.125 Mhz	320 ns
1.5625 Mhz	640 ns
.78125 Mhz	1280 ns

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SP (1-8)
RP (1-8)

Store Page
Recall Page

Syntax: SP (1-8), RP (1-8)

Description:

The SP and RP commands store and recall up to 8 complete pages of information in non-volatile memory. One page is equivalent to a standard terminal screen which is 80 columns by 24 lines. The SP command stores the current screen, while the RP command displays a previously stored screen. Only information which is displayed on the terminal screen is stored.

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SS (1-8)
RS (1-8)
Store Setup
Recall Setup

Syntax: SS (1-8), RS (1-8)

Description:

The SS and RS commands allow the user to store and recall up to 8 setups in non-volatile memory. The SS command stores the current setup conditions. This includes all user programmable setup parameters. The RS command recalls a previously stored setup.

An invalid setup message may occur if a setup is recalled (using the RS commands) that was not previously stored (using the SS commands).

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T
Self Test

Syntax: T

Description:

A built-in self test has been provided to insure board integrity. The test is entered using the T command.

```
* T


BUS TRANSCEIVER TEST ..................... PASS
PROCESSOR TEST ........................... PASS
CONTROL LOGIC TEST ....................... PASS
TRACE BUFFER TEST ........................ PASS
SELF TEST SUMMARY ........................ PASS
```

T SCREEN

A pass or fail is indicated for each test. After all tests are performed, a summary indicates if any tests have failed.

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TO
Trace Only

Syntax: TO

Description:

The TO command specifies the types of events which are captured in the trace buffer. After typing TO the message "TRACE ALL EVENTS" appears. The field containing "ALL" may contain a combination of match specifications or the word ALL or NONE.

```
*TO
TRACE   ALL      EVENTS

The underlined field may contain any logical combination of the 4
event specifications (A,B,C,D) or the words ALL or NONE.

TRACE  A+B+C+D  EVENTS

Press the RETURN key to enter your choice.
```


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TP
Trigger Position

Syntax: TP

Description:

The TP command positions the trigger at different locations within the trace buffer. After typing TP, the current position value is displayed. Use the space bar to sequence through the possible values and the return key to exit this command. A value of 1/2 means that the trigger is located in the center of the trace buffer. For example, on the 4K version of the N9210, there would be up to 2048 events before the trigger and 2048 events after the trigger.

```
*TP
TRIGGER  POSITION  =  START

The underlined field may contain START, 1/4, 1/2, 3/4, END.
Press the space bar to select your choice.

TRIGGER  POSITION  =  1/2

Press the RETURN key to enter your
```


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