The
1240
Logic Analyzer

Tektronix 1240 LOGIC ANALYZER

START

MENU

CONFIG

TRIGGER

DATA

EDIT

UTILITY

Tektronix
COMMITTED TO EXCELLENCE
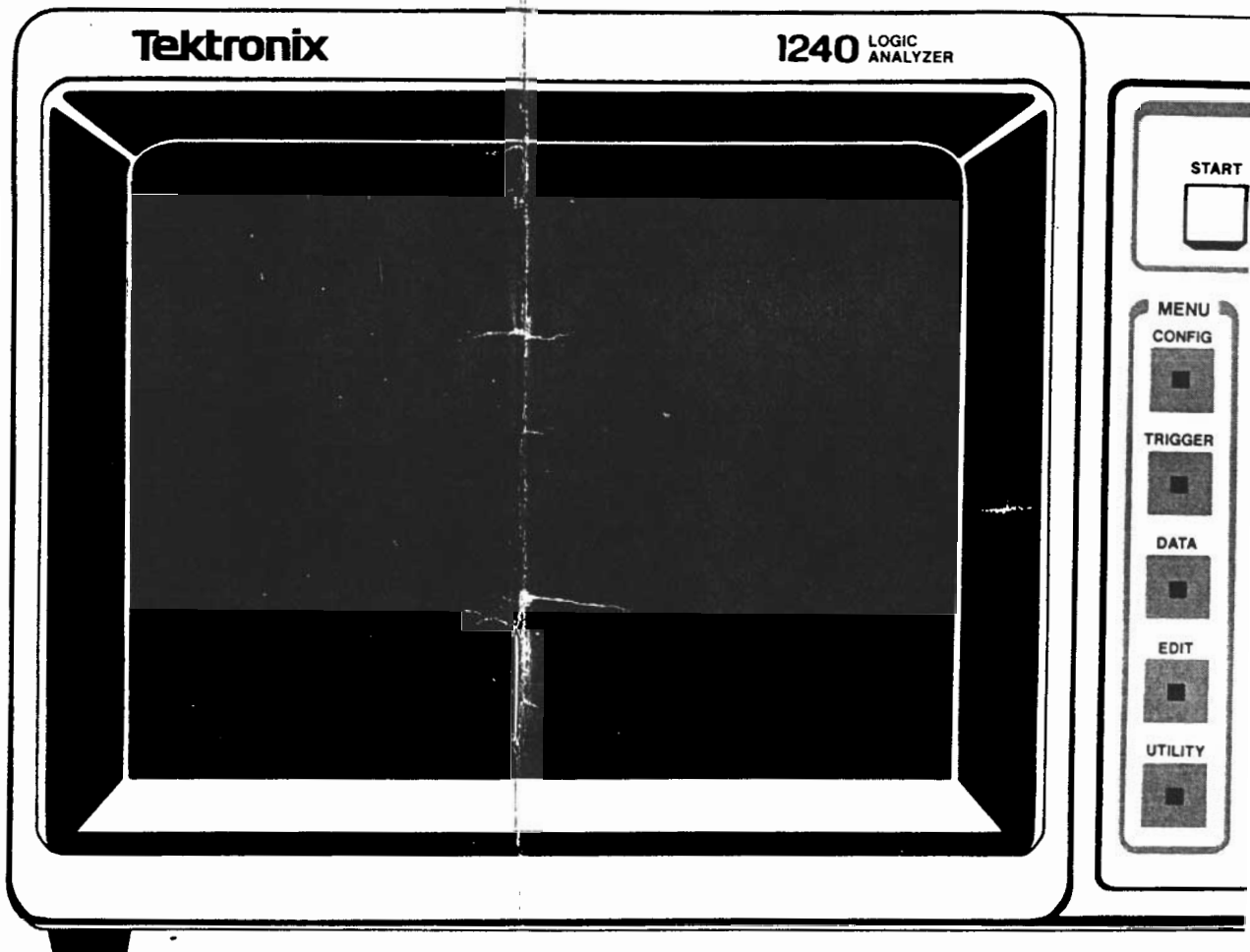
Introduction

This reference guide provides a summary of the 1240 menus. It assumes the reader is already familiar with the instrument's general operating characteristics and capabilities. For detailed operating information, refer to the *1240 Logic Analyzer Operator's Manual.*

Contents

Menu Overview

All 1240 operations are controlled by selections you enter into menus displayed on the screen. There are five groups of related menus; each group is accessed by a front panel MENU key. The following diagram shows which menus are accessed by each MENU key.
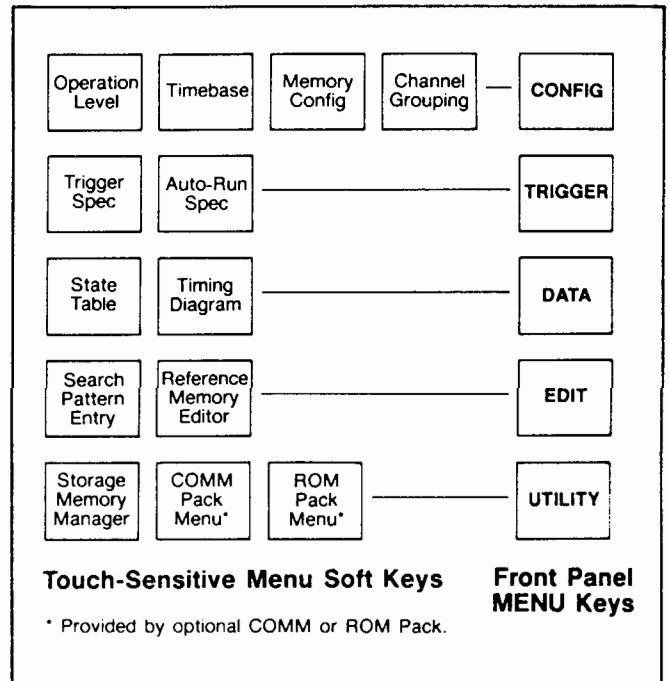
Menus accessed by each MENU key.

Soft Keys. At the top of the screen are touch-sensitive soft keys, one for each menu in the current menu group. The soft key in reverse video corresponds to the menu currently displayed. Change menus by touching another menu soft key. Some menus have soft keys at the bottom of the screen. These soft keys provide special functions which apply only to the menu being displayed.
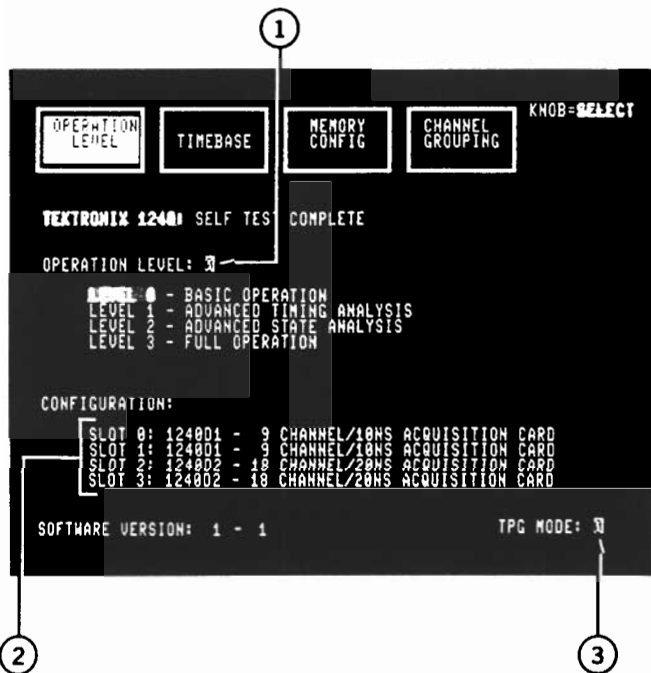
Display Conventions.

- Error and prompt messages are displayed on the top line of the screen.

- The blinking field cursor can only be positioned on reverse video fields. The cursor must be positioned in a field before changes can be made to that field. Move the cursor from one field to another with the CURSOR keys.

- The function of the SCROLL knob is displayed in the upper-right corner of the screen. The knob's main function is to scroll through acquired data, but it also is an alternative to the SELECT keys in certain menus.

Operation Level Menu

TEKTRONIX 1240 SELF TEST COMPLETE

OPERATION LEVEL: ▓

     LEVEL 0 - BASIC OPERATION
     LEVEL 1 - ADVANCED TIMING ANALYSIS
     LEVEL 2 - ADVANCED STATE ANALYSIS
     LEVEL 3 - FULL OPERATION

CONFIGURATION:

     SLOT 0: 1240D1 - 9 CHANNEL/10NS ACQUISITION CARD
     SLOT 1: 1240D1 - 9 CHANNEL/10NS ACQUISITION CARD
     SLOT 2: 1240D2 - 18 CHANNEL/20NS ACQUISITION CARD
     SLOT 3: 1240D2 - 18 CHANNEL/20NS ACQUISITION CARD

SOFTWARE VERSION: 1 - 1   TPG MODE: ▓
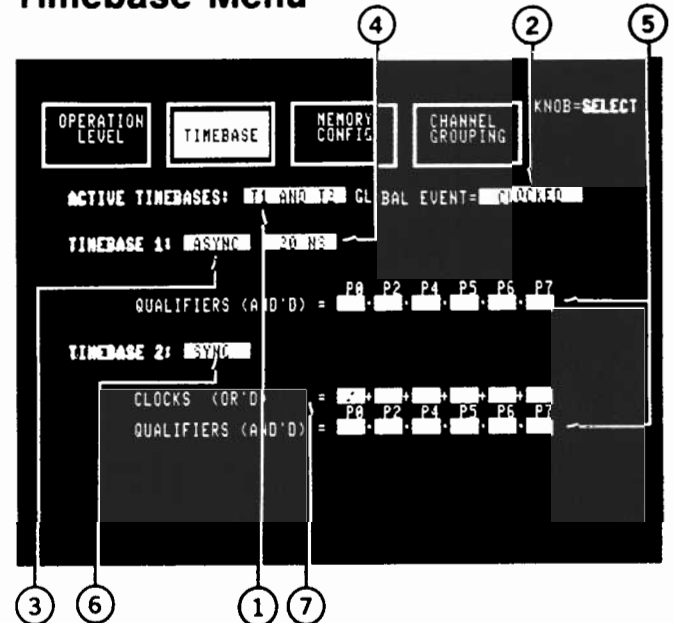
1 Selects the Operation Level, **0 - 3**. The Operation Level determines what features are available in other menus.

2 List of acquisition cards installed.

3 Determines what data pattern is output at the Test Pattern Generator (TPG) connectors on the right side panel. The TPG simulates a data source by sending out a data pattern of 63 unique values. A different pattern is available from both TPG outputs. Refer to *Test Pattern Generator Information* in the *1240 Operator's Manual* for a description of the modes and patterns.

The Operation Level menu is displayed at power-up. The Operation Level determines what features are available in other menus. Level 0 (Basic Operation) provides the most often used features for timing and state analyses. Levels 1 and 2 (Advanced Timing and State Analysis) provide additional specialized features. All features are available in Level 3 (Full Operation). Menu descriptions in this guide include information on features affected by the Operation Level.
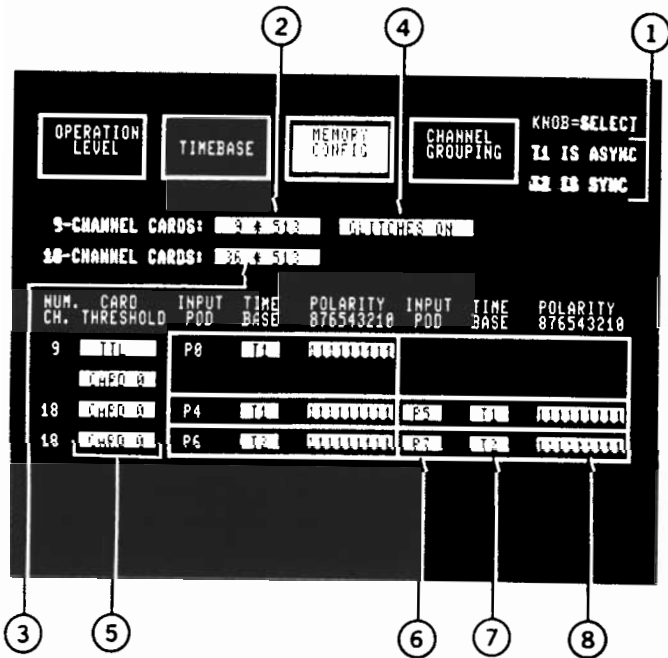
Timebase Menu

1 Selects which timebases can be used to control data acquisition. Selections: **T1 ONLY, T2 ONLY, T1 AND T2**. Displayed only in Operation Levels 2, 3. In Levels 0, 1 only T1 is available.

2 Displayed when Operation Level is 1 or 3. **CLOCKED**: events coinciding with sample points are compared to global event recognizer. **UNCLOCKED**: data continuously compared to global event recognizer; an event can be recognized if present for the time defined by the global event filter (see Trigger Spec menu).

3 Type of timebase for T1. Selections are **ASYNC, SYNC**.

4 Asynchronous clock period. Displayed only if **ASYNC** selected. Range is **10 NS** to **1 S** in a 1-2-5 sequence. **10 NS** selection not available if glitch storage enabled or 18-channel cards assigned T1 in Memory Config menu.

5 Clock qualification: AND of the C/Q line from each pod. Pod IDs are displayed over each field. Default is all blanks (no qualification). Other selections are **1** and **0**, for signals above or below the card threshold.

6 Type of timebase for T2. Selections are **SYNC, DEMUX**.

7 Synchronous clock is the OR of the C/Q line from each pod. Selections: ⌐ (rising edge), ⌐ (falling edge), ⌐ (rising or falling edges), or a blank (signal ignored).

The Timebase menu specifies the number and type of timebases that can be used to control data acquisition. Pod-timebase assignments in the Memory Config menu determine what timebases are actually used.

Memory Config Menu
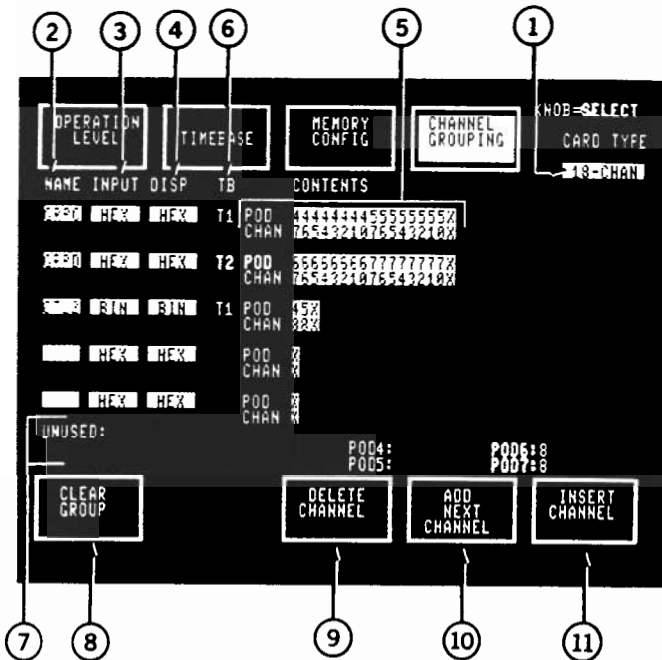

1 Reminder of timebases set up in Timebase menu.

2 Acquisition memory width vs. depth for 9-channel cards. First value is the number of channels to be stored (width); second value is the number of samples stored per channel (depth). If **GLITCHES ON** is selected, 9-channel memory depth is halved. Selections with larger depth values "chain" areas of memory together to store more samples per channel. Not a select field in Level 0 (no chaining).

3 Acquisition memory width vs. depth for 18-channel cards. Selections with larger depth values "chain" areas of memory together to store more samples per channel. Not a select field in Level 0 (no chaining).

4 Glitch storage (9-channel cards only). Selections are **GLITCHES ON** and **GLITCHES OFF**. If glitch storage is on, 9-channel memory depth is halved but each data sample includes glitch information.

5 Card Threshold Voltage. Selections: TTL, –ECL, TPG (used with the Test Pattern Generator), and a range of voltages between +6.35 V and -6.35 V in 50 mV increments. **CARD 0** matches threshold set for first card.

6 Data from the input pod is clocked into memory according to the timebase shown. Becomes a select field for odd-numbered pods of 18-channel cards when T1 and T2 are active or when T2 is DEMUX; selections are the IDs of either pod connected to the 18-channel card.

7 Timebase used to clock data from the pod into memory. **Timebases are specified in the Timebase menu, but this field determines how timebases are actually used.** Becomes a select field when T1 and T2 are active or when T2 is DEMUX; selections are any of the timebases defined in the Timebase menu.

8 Channel Polarity. Nine digits correspond to pod leads 8-0. A **1** indicates positive-true logic; **0** indicates negative-true logic.

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*Use the Memory Config menu to configure the width and depth of acquisition memory, set the card threshold voltages, enable/disable glitch storage, and make pod-timebase assignments. **Pod-timebase assignments made in this menu determine which of the timebases specified in the Timebase menu are actually used.***

The depth of the rectangles in the display changes as you change the width vs. depth fields; the size of each rectangle is a visual indicator of how many samples will be stored for each pod. This sample display shows memory from two 9-channel cards chained together to increase the number of samples stored per channel for pod P0.

Channel Grouping Menu

6 Group Timebase; timebase associated with each group. When the first pod number is entered in the POD field, the timebase associated with that pod in the Memory Config menu is displayed in the TB column. When T2 is displayed, it is shown in highlighted video.

7 UNUSED List. Channels not currently assigned to a group.

8 Deletes the group containing the blinking field cursor. Deleted channels appear in the UNUSED list. Must be confirmed.

9 Deletes the POD/CHAN pair at the location of the field cursor; the channel is added to the UNUSED list.

10 Adds a new POD/CHAN pair to the right of the pair where the field cursor is located. The new pair has the same POD value as the preceding pair, but the next lower CHAN value.

11 Inserts a blank POD/CHAN pair ($\frac{X}{X}$) to the left of the field cursor. The POD and CHAN characters can then be changed to other values.

1 Selects type of grouping. Selections are **9-CHAN** and **18-CHAN**. Displayed only if both types of acquisition cards are installed.

2 Group Name. Selections are letters A-Z, numbers 0-9, special characters . , / : ∧ $ and a blank space. Select each character individually using the SELECT keys or the SCROLL knob.

3 Input Radix; radix used to enter data values in other menus. Selections are **HEX**adecimal, **BIN**ary, **OCT**al.

4 Display Radix. Data acquired by a group is displayed according to this radix. Selections are **HEX**adecimal, **BIN**ary, **OCT**al, **ASCII**, **EBCDIC**, **OFF** (group not displayed).

5 POD/CHAN pairs. Each pair assigns a specific channel from a pod to the group. A specific pair can appear in only one group at a time. The first POD entry in a group determines the group's timebase; subsequent POD entries must use the same timebase. A blank POD/-CHAN pair ($\frac{X}{X}$) occupies the rightmost position in a group unless the group has 36 channels (maximum).

Use the Channel Grouping menu to organize channels from 9-channel and 18-channel acquisition cards into groups for data entry and display. You can specify a total of ten groups, five groups from 9-channel cards and five from 18-channel cards. The maximum group size is 36 channels.

Trigger Spec Menu
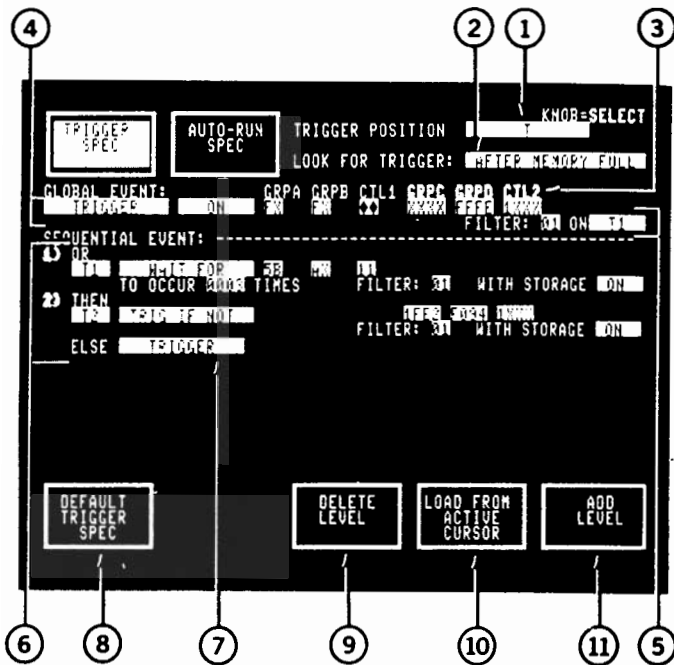
1 Trigger position in acquisition memory.

2 When trigger will be accepted. Selections: **AFTER MEMORY FULL** and **IMMEDIATELY**. Not displayed in Level 0.

3 Group names. Names of T2 groups are highlighted.

4 Global event recognizer. Action selections are **OFF, TRIGGER, RESET, STORE, START TIMER, TIME WHILE, INCR CNTR**. The action is performed when the global event is true. Invert the event value (except glitches) by selecting **ON NOT** in the next field. (Glitch requirements are *not* inverted when you select **ON NOT**.)

Enter event values in input radices (specified in the Channel Grouping menu). Glitches (♦) are valid only for 9-channel card groups assigned T1 ASYNC when glitch storage is enabled in the Memory Config menu, and when the global event is UNCLOCKED.

5 Global event filter (not displayed in Levels 0, 2). Rejects events present for less than minimum duration N x T, where N is value of FILTER field (selections 1-16) and T is value of ON field (selections **T1** (when T1 active), **T2** (when T2 active), **10NS**). Global event recognizer accepts only events lasting this amount of time, or longer.

6 Sequential event recognizer. Selections: **WAIT FOR, WAIT FOR NOT, TRIGGER IF, TRIG IF NOT, RESET IF, RESET IF NOT, JUMP IF, JUMP IF NOT, DELAY**.

Each level can be associated with only one timebase; the timebase-selection field is displayed to the left of action fields when both T1 and T2 are active. Selections are **T1** and **T2**.

The TO OCCUR field is displayed when the action is WAIT FOR or WAIT FOR NOT. The value **(1-9999)** specifies how many times the event must be true before the sequence level is satisfied and the 1240 advances to the next level.

In Operation Levels 1 and 3, a FILTER field is displayed for all actions except DELAY. The filter value **(1-16)** specifies the number of timebase periods an event must be true before it can be recognized.

In Operation Levels 2 and 3, a WITH STORAGE field is displayed for all sequence levels. Selections are **ON, OFF**. With **ON**, data is stored while the sequence level is in effect.

7 Final action of the sequential event recognizer. Selections are **TRIGGER, RESET, DO NOTHING**.

8 Resets both event recognizers to their default setups: global event recognizer OFF, sequential event recognizer WAIT FOR all don't care (X). Must be confirmed.

9 Deletes sequence level at location of field cursor.

10 Sets the event values at the location of the field cursor to the value of the active data cursor.

11 Adds a new sequence level below the location of the field cursor. New level is set to WAIT FOR all values X.

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*Use the Trigger Spec menu to specify the event or sequence of events that causes the 1240 to trigger. **Press the START key to begin the trigger search.***

The global event recognizer and the sequential event recognizer can operate simultaneously or either one can be disabled. When they are used together, the trigger setup is a logic OR condition: either event recognizer can generate the trigger. A RESET command in either event recognizer re-starts the trigger search in both.

The global event recognizer specifies a single event using all connected channels, regardless of the timebase they are associated with.

The sequential event recognizer is composed of up to 14 separate levels, numbered 1-E, where each level specifies an event. Each level can be associated with only one timebase (T1 or T2).

Auto-Run Spec Menu
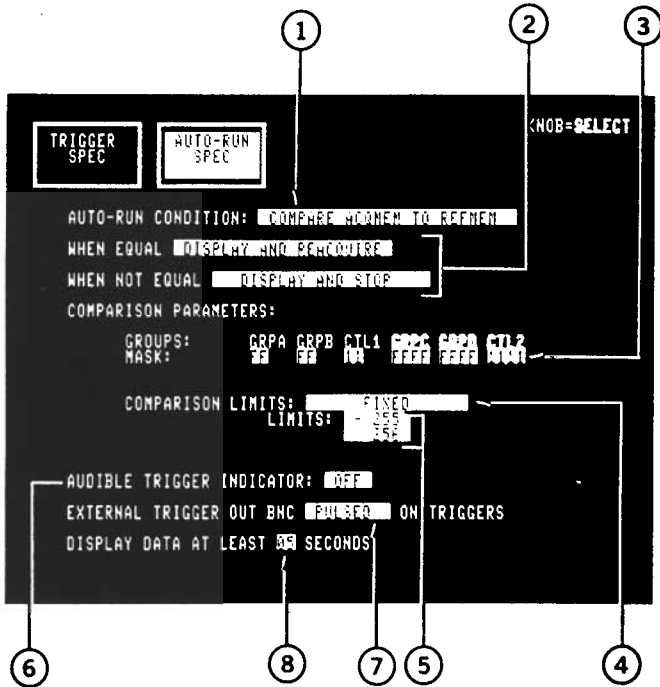
1 The four Auto-Run conditions are: **COMPARE ACQMEM TO REFMEM, CONTINUOUS TRIGGER OUT, TRIGGER IN, STORE AFTER TRIGGER.** This display shows the **COMPARE ACQMEM TO REFMEM** menu; refer to the *1240 Operator's Manual* for information about the other conditions.

When you select **COMPARE ACQMEM TO REFMEM,** the 1240 searches for the trigger specified in the Trigger Spec menu. When the trigger event is found, the 1240 compares ACQMEM to REFMEM then takes action depending on whether the memories are equal or unequal.

2 Actions to be taken when the memories are equal or unequal. Selections are **DISPLAY AND REACQUIRE, DISCARD AND REACQUIRE** (new acquisition discarded, previous acquisition unchanged), **DISPLAY AND STOP.**

3 Mask fields; specify which channels will be compared. Enter mask digits in the input radix for each group. Choose each digit so that binary 1's are in equivalent positions of channels you want to include in the comparison, and binary 0's are in positions of channels you want to exclude. Don't care (X) is the same as 0 (channel not compared).

4 Determines how much of acquisition memory is compared to reference memory. Selections are **FIXED** and **BETWEEN CURSORS. FIXED:** comparison is limited to acquisition memory locations between (and including) the values shown in the LIMITS fields. **BETWEEN CURSORS:** comparison is limited to memory locations between (and including) the current positions of data cursors 1 and 2.

5 If you select **FIXED** in the preceding field, these lines are select fields. Selections for each field range from **-4095** to **+4095.**

If you select **BETWEEN CURSORS** in the preceding field, these fields show the current locations of data cursors 1 and 2.

6 AUDIBLE TRIGGER **ON/OFF.** If you select **ON,** the 1240 generates a tone when the trigger specified in the Trigger Spec menu is found and memory has filled.

7 Duration of signal from EXT TRIG OUT BNC. Selections are **PULSED** (signal high for at least 80 ns) and **LATCHED** (signal stays high until trigger search restarted). 1240 supplies signal to EXT TRIG OUT BNC each time trigger event is found.

8 Used with DISPLAY AND REACQUIRE to determine minimum time between acquisitions. Values are **00** to **99** seconds.

The Auto-Run Spec menu lets you specify the conditions under which the 1240 makes repeated data acquisitions. The entries in this menu are used only if you start data acquisition with the AUTO key.

Auto-Run setups do not specify trigger conditions. They determine what action the 1240 takes when the trigger specified in the Trigger Spec menu occurs.
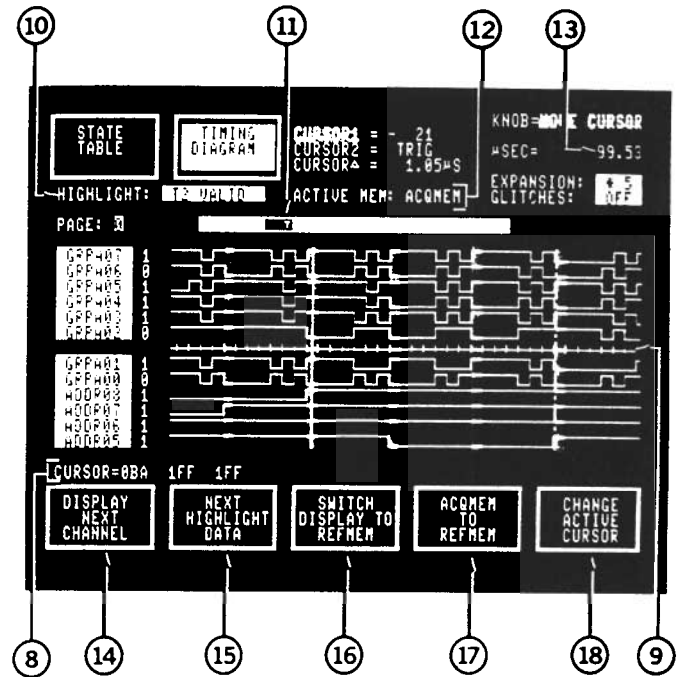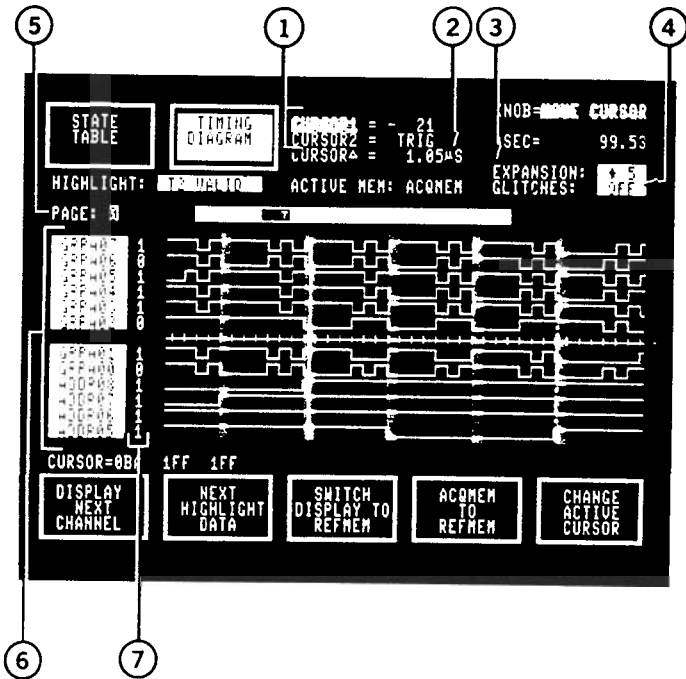
State Table Display
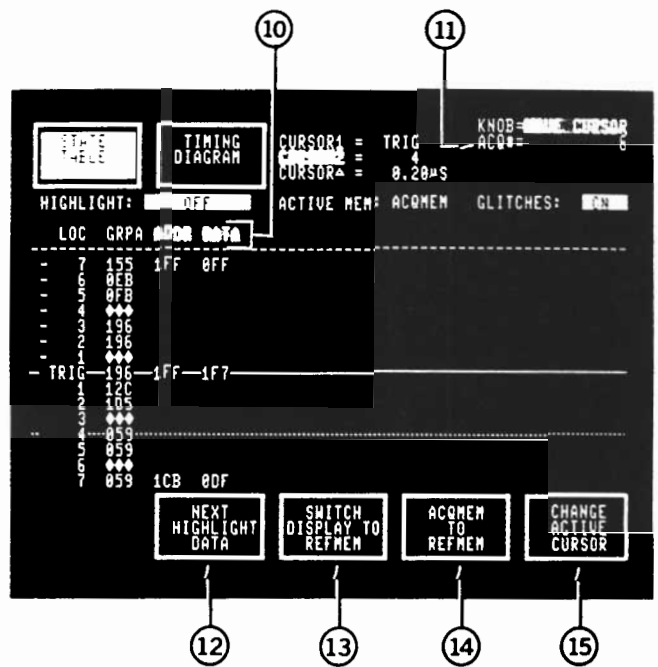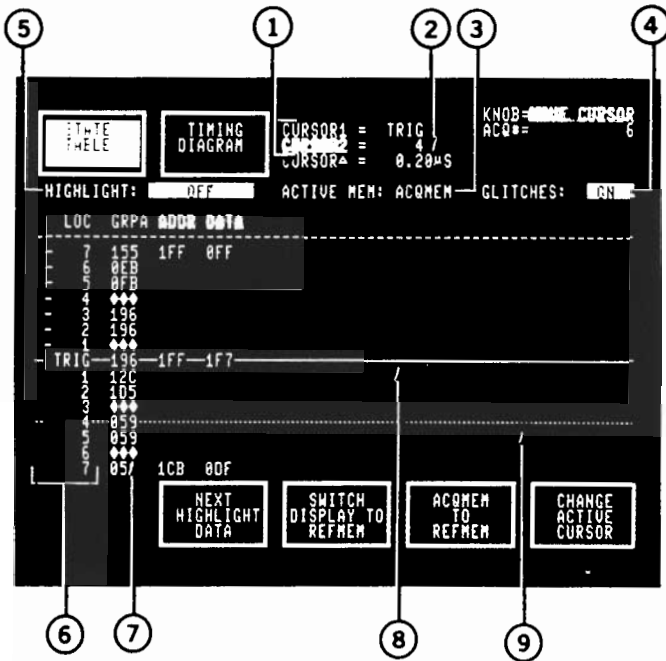
1 Location of cursors 1, 2. Active cursor highlighted.

2 Distance between cursors.

3 Memory currently displayed (ACQMEM or REFMEM).

4 Glitch display. This field is displayed only if glitch storage was enabled in the Memory Config menu when the data was acquired. With ON, ♦ is displayed for each digit of the display radix that contains a bit of glitch. With OFF, the data at the sample point is displayed.

5 Determines type of highlighted data. Selections: OFF, MEM DIFFS, PATTERNS, GLITCHES, T1 VALID, T2 VALID. Data that meets the requirements is marked with highlighted memory location (LOC) numbers.

6 Memory location number. Events preceding the trigger (TRIG) are assigned negative locations; events following TRIG have positive locations.

7 The ♦ symbol indicates that glitch information was stored for at least one bit of the digit. Only displayed if GLITCHES ON selected.

8 Cursor 1.

9 Cursor 2.

10 Group names. Names of groups associated with T1 are displayed in normal video. Names associated with T2 are highlighted.

11 Number of acquisitions. Displayed when the data was acquired using the COMPARE ACQMEM TO REFMEM Auto-Run condition.

12 Moves the active cursor to the first location of the next occurrence of highlighted data.

13 Displays the other memory (ACQMEM or REFMEM). When REFMEM is displayed, the label for this soft key changes to SWITCH DISPLAY TO ACQMEM. The cursor positions do not change.

14 Copies the contents of ACQMEM into REFMEM, overwriting the previous REFMEM contents. Must be confirmed.

15 Transfers the role of active cursor to the other cursor.

The location of the active cursor determines which data is displayed. Move the active cursor with the SCROLL knob. The label of the active cursor is highlighted at the top of the screen. Data is displayed in the radices selected in the Channel Grouping menu.
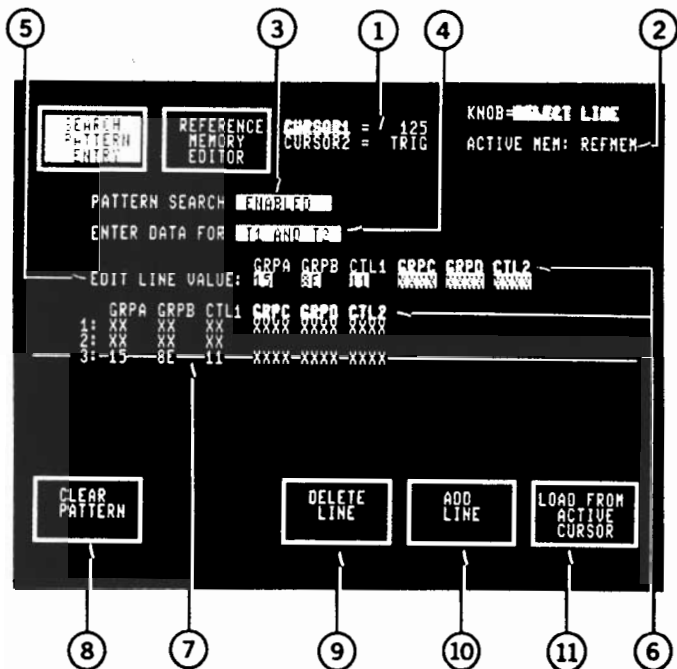
DATA

Timing Diagram Display

(5) (1) (2)(3) (4)

| STATE TABLE | TIMING DIAGRAM | CURSOR1 = - 21 CURSOR2 = TRIG CURSOR△ = 1.85µS | KNOB=MOVE CURSOR SEC= 99.53 |
| HIGHLIGHT: T2 VALID | | ACTIVE MEM: ACQMEM | EXPANSION: GLITCHES: OFF |

PAGE: 0

CURSOR=0B4   1FF 1FF

| DISPLAY NEXT CHANNEL | NEXT HIGHLIGHT DATA | SWITCH DISPLAY TO REFMEM | ACQMEM TO REFMEM | CHANGE ACTIVE CURSOR |

(6) (7)

(10) (11) (12) (13)

| STATE TABLE | TIMING DIAGRAM | CURSOR1 = - 21 CURSOR2 = TRIG CURSOR△ = 1.85µS | KNOB=MOVE CURSOR µSEC= 99.53 |
| HIGHLIGHT: T2 VALID | | ACTIVE MEM: ACQMEM | EXPANSION: GLITCHES: OFF |

PAGE: 0

CURSOR=0BA   1FF 1FF

| DISPLAY NEXT CHANNEL | NEXT HIGHLIGHT DATA | SWITCH DISPLAY TO REFMEM | ACQMEM TO REFMEM | CHANGE ACTIVE CURSOR |

(8) (14) (15) (16) (17) (18) (9)

1 Location of cursors 1, 2. Active cursor highlighted.

2 Distance between cursors.

3 Horizontal trace expansion. Selections are ∗1, ∗2, ∗5, ∗10, ∗20.

4 Glitch display. This field is displayed only if the data was acquired with glitch storage enabled in the Memory Config menu. With ON, each glitch is displayed as a wide, intensified rising edge. With OFF, the data value at the sample point is displayed.

5 Specifies which PAGE of 12 channels is displayed. Selections are 0 - 5. When the number is changed, the channels assigned to the new PAGE are displayed.

6 Trace names. Each name consists of a trace's group name and channel number. For each trace, select any channel defined in the Channel Grouping menu or OFF (no trace displayed).

7 Binary value of the displayed channels at the position of the active cursor. In two-timebase displays, a value shown in this readout may have been extrapolated from previously sampled data.

8 Active cursor value. Value of all channels at the position of the active cursor in State Table format.

9 Tick marks, one per memory location.

10 Determines type of highlighted data. Selections: OFF, MEM DIFFS, PATTERNS, GLITCHES, T1 VALID, T2 VALID. Locations with T2 data are highlighted in this display.

11 Memory window; shows area of memory displayed. "T" marks the trigger.

12 Memory currently displayed (ACQMEM or REFMEM).

13 Timer value. Displayed when START TIMER or TIME WHILE is the global event action.

14 Displays the next-lower channel name below the field cursor. Valid only when the field cursor is in a trace name field (callout 6).

15 Moves the active cursor to the first location of the next occurrence of highlighted data.

16 Displays the other memory (ACQMEM or REFMEM).

17 Copies ACQMEM into REFMEM, overwriting the previous REFMEM contents. Must be confirmed.

18 Transfers the role of active cursor to the other cursor.

14

15

Search Pattern Entry Menu

1 Location of data cursors. Active cursor highlighted.

2 Active Memory. Reminder of which memory (ACQMEM or REFMEM) was last displayed.

3 PATTERN SEARCH **ENABLED/DISABLED**. If you select **ENABLED**, the search pattern is compared to stored data. View the results of the comparison in the DATA menus with the HIGHLIGHT: **PATTERNS** selection. If you select **DISABLED**, the pattern feature does not operate.

4 Timebase(s) associated with the EDIT LINE VALUE. Displayed only if timebases T1 and T2 are active; selections are **T1 ONLY**, **T2 ONLY**, **T1 AND T2**.

5 Value (in input radices) at the location of the search data cursor. As you make changes, new values are displayed in the pattern line (in output radices).

6 Group names. Groups associated with timebase T2 are highlighted.

7 Search Data Cursor. Move this cursor with the SCROLL knob. The value of the pattern line at the location of the cursor is displayed in the EDIT LINE VALUE field.

8 Returns the search pattern to the default setup: one line with all values set to don't care (X). Must be confirmed.

9 Deletes the pattern line at the location of the search data cursor.

10 Adds a new line to the pattern below the position of the search data cursor. The new line has the same data as the preceding line.

11 Loads the EDIT LINE VALUE with the same data as the location in active memory where the active data cursor is positioned.

Use the Search Pattern Entry menu to set up a data pattern to be used with the pattern highlighting function in the State Table and Timing Diagram.

A search pattern consists of 1 to 8 lines of data in State Table format. The default pattern is one line with all values set to don't care (X); this setting matches any value, including no data.

*The pattern function operates only if PATTERN SEARCH **ENABLED** is selected in this menu. Whenever the 1240 applies the search pattern to stored data, the message APPLYING SEARCH PATTERN — PLEASE WAIT is displayed at the top of the screen.*

Reference Memory Editor Menu
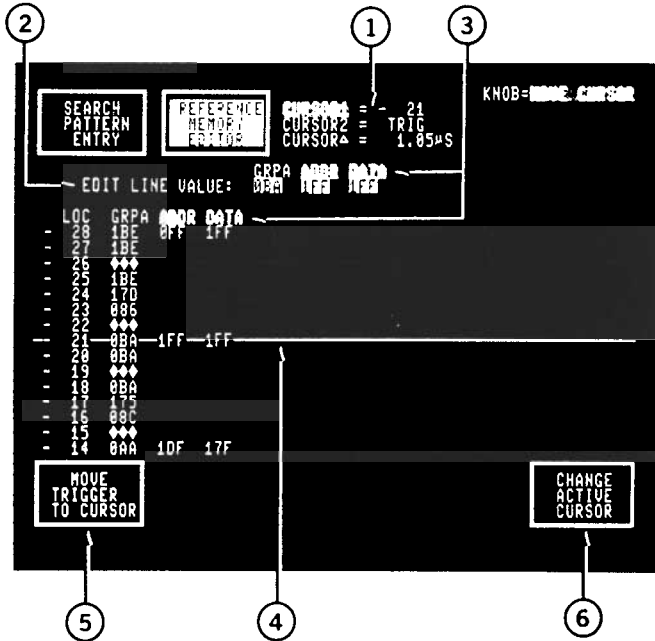
1 Location of data cursors. Active cursor highlighted.

2 Value (in input radices) of the location in reference memory where the active cursor is positioned. The value at the active cursor changes when you make changes in this field (X not a valid entry). Memory locations are displayed in output radices.

3 Group names. Groups associated with timebase T2 are highlighted.

4 Cursor 1. In this example, Cursor 1 is the active cursor. The value at the active cursor is displayed in the EDIT LINE VALUE field. The value at the active cursor changes when you alter the EDIT LINE VALUE.

5 Moves the TRIG (or STOP) label to the location of the active cursor. All locations are renumbered accordingly, with TRIG as the zero point.

6 Makes the other cursor active.

Use the Reference Memory Editor menu to change data values in reference memory or to move the trigger event to a different location. Only locations around the active data cursor are displayed. Move the active cursor with the SCROLL knob.

Storage Memory Manager Menu
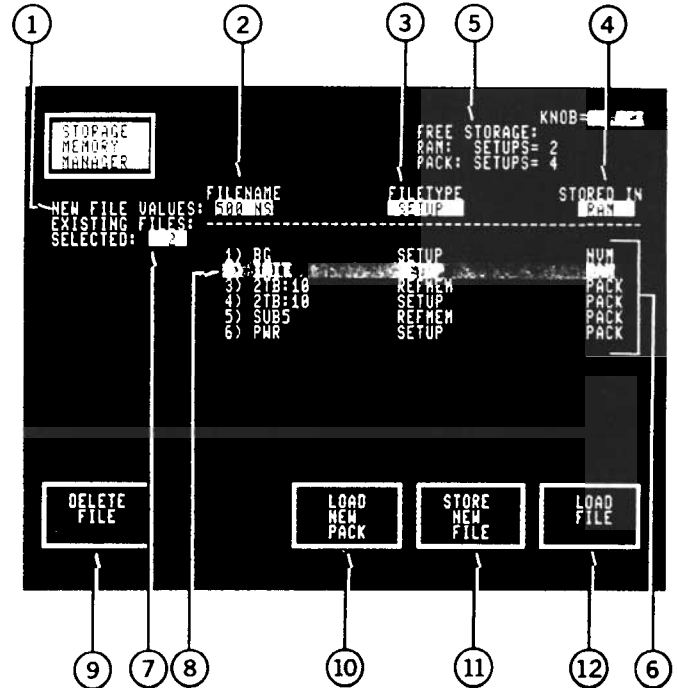
1 The three fields on this line describe the file stored when you press the STORE NEW FILE soft key.

2 Filename of new file to be stored. Enter each character of the filename individually using the SCROLL knob or SELECT keys. Choose from letters A - Z. numbers 0 - 9, special characters . , / : ∧ $ and a blank space.

3 Type of information to be stored. Without a RAM pack, only setups can be stored. With a RAM pack, selections are **SETUP, ACQMEM, REFMEM**.

4 Type of memory in which file will be stored. Selections: **NVM** (nonvolatile memory), **RAM** (internal RAM), **PACK** (only when a RAM pack is installed).

5 Free storage space for setups. Line labeled RAM lists number of setups that can be stored in internal RAM. Line labeled PACK lists number of setups that can be stored in the RAM pack (only displayed when a RAM pack is installed).

(cont.)

(cont.)

6 List of stored files. File in SELECTED field is highlighted. Files stored in a ROM/RAM pack are labeled PACK in the STORED IN column. All memory files are labeled REFMEM in the FILETYPE column; this label indicates that the file is loaded into reference memory when you press LOAD FILE.

7 Selects the file to be used by DELETE FILE and LOAD FILE soft keys. Selections are the numbers of the files displayed in the EXISTING FILES list.

8 INIT is the setup in effect the last time the 1240 was powered down.

9 Deletes the selected file from memory. Must be confirmed.

10 Runs initialization routines for a newly installed pack; also, resets the 1240 for normal operation after a pack is removed. **IMPORTANT:** When installing or removing a ROM or RAM pack while power is on, the Storage Memory Manager menu must be displayed on the screen. Touch this soft key **immediately** after installing or removing a pack.

11 Stores file described in NEW FILE VALUES.

12 Loads selected file into the 1240. Must be confirmed.

Use the Storage Memory Manager menu to control storage and retrieval of setups in nonvolatile memory and internal RAM, storage and retrieval of setups and memories in RAM packs, and retrieval of setups and memories from ROM packs.

When installing or removing a ROM or RAM pack while power is on, the Storage Memory Manager menu must be displayed on the screen. Press the LOAD NEW PACK soft key immediately after installing or removing the pack. *This soft key runs pack initialization routines and ensures that the 1240 uses the pack properly. It also resets the 1240 for normal operation after a pack is removed.*

Nonvolatile memory can store one setup; internal RAM can store three. The number of setups and memories that can be stored in a RAM pack depends on the size of the pack and of the files to be stored. New files cannot be stored in a ROM pack and existing files cannot be deleted.

Status Displays
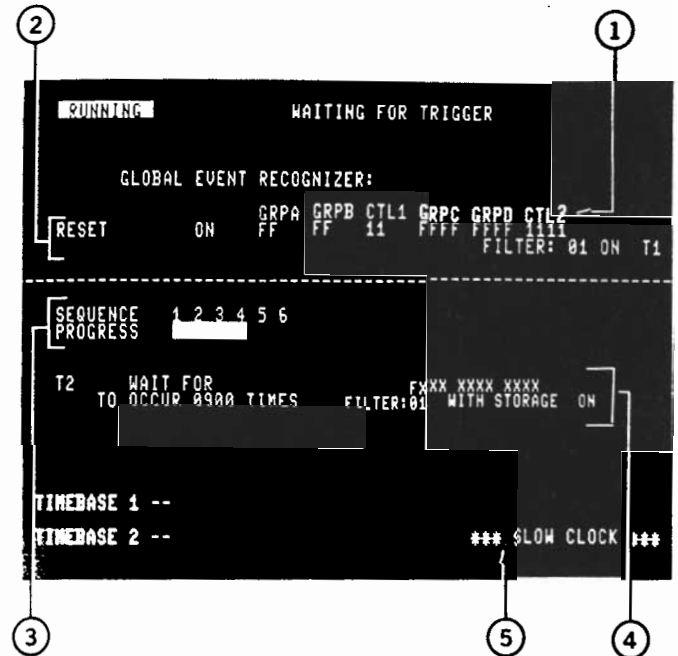
1 Group names. Names associated with T2 are highlighted.

2 Global event recognizer set up in the Trigger Spec menu.

3 Progress of the sequential event recognizer. The reverse video band moves across the screen to indicate the sequence level currently in effect.

4 Current sequence level. By looking at the progress display, you can see that this is the setup for level 4.

5 A clock period of more than 1 ms (approximately) is labeled "slow clock."

After you press START, the 1240 displays information on the status of the trigger search. This information is updated until a trigger is found or you press STOP. After the trigger is found and while memory is being filled, the top line of the display is TRIGGERED. When memory is filled, the top line changes to PROCESSING DATA. This display remains on the screen while acquired data is formatted for display. When processing is complete, the data is displayed in State Table or Timing Diagram format, whichever was last used.