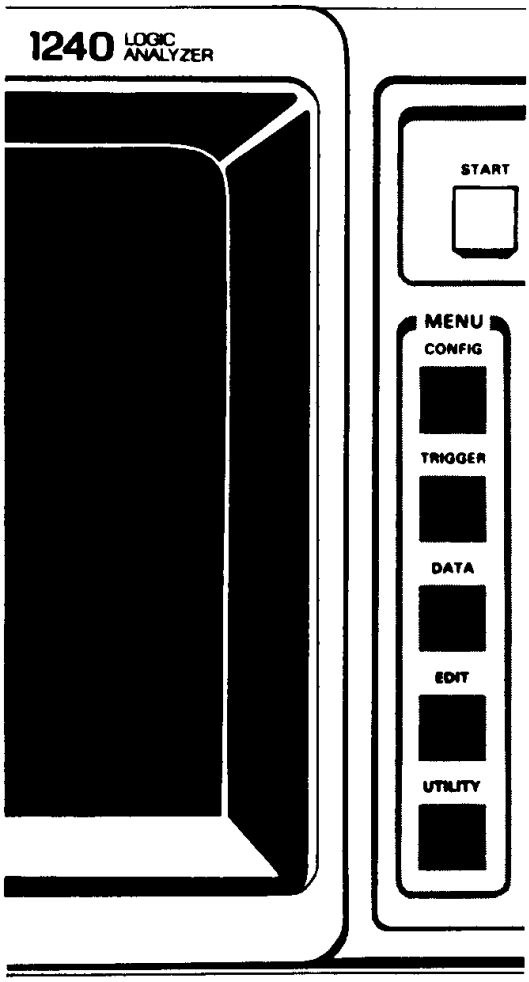
4


1240 LOGIC ANALYZER
START
MENU
CONFIG
TRIGGER
DATA
EDIT
UTILITY

TRIGGER

The TRIGGER key on the front panel allows you to access the Trigger Spec(ification) and the Auto-Run Spec(ification) menus. These menus allow you to define the triggering characteristics of the 1240.

TRIGGER SPEC

This menu allows you to specify the event or sequence of events that causes the 1240 to trigger. An "event" is the set of 1's and 0's received by the 1240 on a cycle of the timebase.[1] The 1240 compares each event to the specifications entered in this menu. When there is a match, the event is "recognized."

Two separate event recognizers are available in this menu: the global event recognizer and the sequential event recognizer. The event recognizers 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 sections.

The global event recognizer specifies a single event. It is called "global" because you can specify an event using all connected channels (regardless of the timebase they are associated with), and because this event is in effect during the entire acquisition. Refer to *Global Event Recognizer* later in this section for more information.

The sequential event recognizer is composed of up to 14 "sequence levels," where each level specifies an event. When the condition specified in a level is recognized, the 1240 either advances to the next level, jumps to a specified level, triggers, or resets. If the last level is reached and satisfied, the final action in the sequence (**TRIGGER, RESET, DO NOTHING**) is executed. Each level can be associated with only one timebase. Refer to *Sequential Event Recognizer* later in this section for more information.

NOTE

Only one trigger is executed, even if both event recognizers are in use and/or two timebases are active.

TRIGGER POSITION

The TRIGGER POSITION field allows you to position the trigger in acquisition memory (see Table 4-1 and callout 1 in Figure 4-1). Data stored before the trigger is called pre-trigger data; data after the trigger is post-trigger data.

Memory depth varies with the number of acquisition cards installed, the operation level in effect, the use of memory chaining, and glitch storage enabled or disabled. Table 4-1 lists the number of post-trigger acquisition cycles for all trigger positions and memory depths.

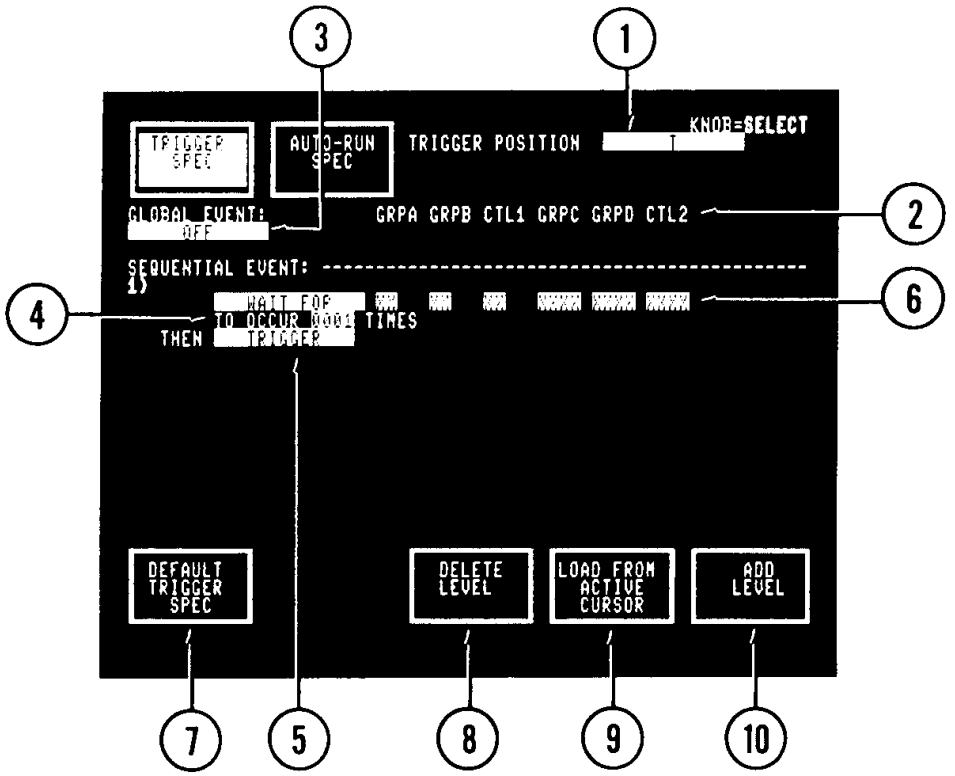
The LOOK FOR TRIGGER field (callout 2 in Figure 4-2) determines when the 1240 will accept a trigger. Selections are **AFTER MEMORY FULL** and **IMMEDIATELY**. If you choose **AFTER MEMORY FULL**, the 1240 accepts a trigger only after the required amount of pre-trigger data is acquired.

If the trigger event is found before the pre-trigger requirement is satisfied, the trigger search is reset. When enough pre-trigger data has been acquired, the 1240 accepts the next trigger event and marks it as the trigger in the data display.

---

[1] The timebase period is specified in the Timebase menu. The CARD THRESHOLD and POLARITY fields in the Memory Config menu determine if an incoming signal is a 1 or a 0.

If you select GLOBAL EVENT = **UNCLOCKED** in the Timebase menu, the global event recognizer can recognize any event that is present for the amount of time defined by the global event filter period. The event does not have to coincide with a sample point. See *Global Event Recognizer* later in this section for details.



1 Trigger position in acquisition memory. You can position the trigger so that 97%, 75%, 50%, 25%, or 3% of the acquisition cycles follow the trigger. Refer to *Trigger Position* for more details.

2 Group names.

3 Global event recognizer action. See Table 4-2 for selections.

4 Action at this level of the sequential event recognizer. See Tables 4-3 and 4-4 for descriptions of selections available in this field.

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

6 Event recognizer fields, one field per channel group. Number of entries in a field determined by the input radix selected for that group in the Channel Grouping menu. (♦ symbol valid only for 9-channel card groups assigned T1 ASYNC when glitch storage is enabled in Memory Config menu.)

7 Resets both event recognizers to their default setups. No change is made until you confirm the operation by pressing the X key.

8 Deletes the sequence level at the location of the field cursor.

9 Sets the event recognizer fields at the location of the field cursor to the value of the active data cursor. Refer to Section 5 for an explanation of the active data cursor.

10 Adds a new sequence level below the location of the field cursor. New level is set to **WAIT FOR** all values don't care (X).

4340–32

Figure 4-1. Power-up default Trigger Spec menu display. The global event recognizer is disabled, and the sequential event recognizer is set to trigger on the first event that occurs after the required amount of pre-trigger data is acquired (see *Trigger Position* for pre-trigger details).

When you select **IMMEDIATELY**, the trigger is enabled for the first event sampled; pre-trigger data acquisition is not required. (If you select **IMMEDIATELY** and the first event sampled meets the trigger conditions, the acquisition memory reserved for pre-trigger data will be empty.)

The LOOK FOR TRIGGER field is not displayed in Operation Level 0, but the **AFTER MEMORY FULL** selection is in effect.

Table 4-1
TRIGGER POSITIONS BASED ON MEMORY SIZE

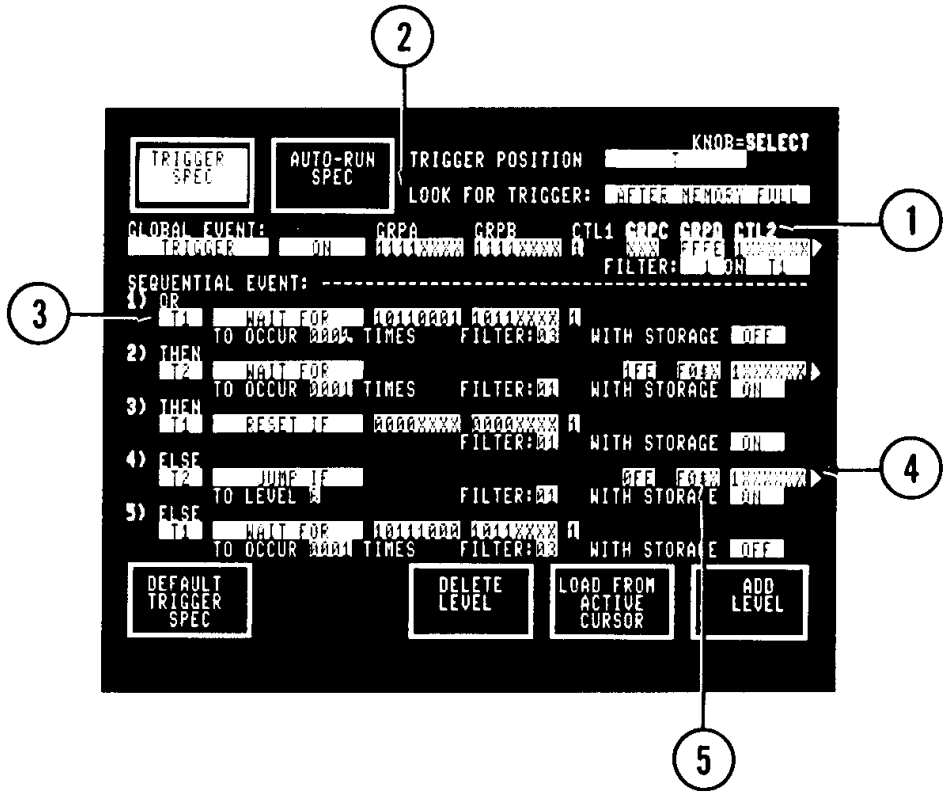
	Number of cycles stored from TRIG to end of memory for different memory depths					
	Memory Depths: [a]					
Menu Selections	**257**	**513**	**769**	**1025**	**1537**	**2049**
[T]	241	497	737	993	1489	1985
[T]	193	385	577	769	1153	1537
[T]	129	257	385	513	769	1025
[T]	65	129	193	257	385	513
[T]	17	17	33	33	49	65

[a] Memory depth is not selectable in Operation Level 0. The standard fixed depth is 513 cycles; 257 is the depth for 9-channel cards when glitch storage is enabled.

EXTERNAL TRIGGER OUT

The 1240 supplies a signal to the EXT TRIG OUT BNC on the back panel whenever the trigger event is found.

In most Auto-Run conditions, you can select the EXT TRIG OUT signal to be PULSED or LATCHED (see *Auto-Run Spec* later in this section). If you are not using Auto-Run and taking only single acquisitions, the signal is always pulsed (high for at least 80 ns).



1 Group names. Names associated with T2 are highlighted.

2 When trigger will be accepted. Selections are **AFTER MEMORY FULL** (trigger accepted only after required amount of pre-trigger data is acquired) and **IMMEDIATELY**.

3 Sequence level timebase assignment; selections **T1** and **T2**. A sequence level can be associated with only one timebase. When T1 and T2 are active, this field is displayed for each level. The selection determines which groups are displayed in the event value fields. For example: in level 1 in this display, only groups associated with T1 are displayed; in level 2, only groups associated with T2 are displayed.

4 Symbol for truncated data. Event recognizer fields are truncated to the left and/or right when all channels cannot be shown on the display. Use the left/right cursor keys to move truncated data onto the screen.

5 $ indicates that the input radix was changed and the original value of the digit was a mix of numbers, X's, or ♦'s that cannot be displayed cleanly in the new radix.

4340–33

Figure 4-2. Two-timebase Trigger Spec display. The global event recognizer can search for an event that combines data from both timebases. Each level in the sequential event recognizer is associated with one timebase (T1 or T2); therefore, only groups associated with the selected timebase are displayed in the event value fields. A sequence can be up to 14 levels deep but not all levels can be displayed on the screen at one time. Use the cursor keys to move to undisplayed levels.

GLOBAL EVENT RECOGNIZER

Overview. The global event recognizer specifies a single event. This event can specify channels from one or both timebases. Table 4-2 describes the action selections available in the global event recognizer, plus associated fields. Figures 4-1 and 4-2 show different global event setups.

Each global event can be inverted with an **ON NOT** selection (see Table 4-2). With **ON NOT**, the global event action is performed when any event other than the specified value is recognized. Glitch requirements are *not* inverted when you select **ON NOT**. For example: If the global event is **TRIGGER ON NOT F♦**, a trigger will occur when any value other than F is recognized for the first digit and a glitch occurred on at least one channel of the second digit.

NOTE

ON NOT XXXX (event value of all don't cares) specifies an event that will never occur.

Filter. The global event recognizer does not recognize an event unless the event is present for the amount of time defined by the global event filter. An event is accepted if it is present for an amount of time ≥ NxT, where N is the value in the FILTER field and T is the value in the ON field. Detailed filter specifications are included in Table 8-5 in Section 8.

Selections in the FILTER field are **1-16**; selections in the ON field are **T1** (when timebase T1 is active), **T2** (when timebase T2 is active), and **10NS**. The **10NS** selection is usually used with the GLOBAL EVENT = **UNCLOCKED** selection (see *Clocked/Unclocked*, next) to monitor input events independent of the sample clock.

Use the filter to reject events below a certain duration. For example: FILTER **9** ON **T1** (T1 set to 50 ns) rejects any event less than 450 ns in duration.

How the 1240 applies the filter to data depends on whether edge or level event recognition is in effect. See *Edge vs. Level Event Recognition* later in this section for details.

Clocked/Unclocked. The GLOBAL EVENT = **CLOCKED/UNCLOCKED** field in the Timebase menu (see Figure 3-2) determines when events are compared to the global event recognizer. The **CLOCKED** selection means that only events that coincide with sample points are compared to the global event recognizer. When you choose **UNCLOCKED**, data from the system under test is continuously compared to the global event recognizer. The global event can be satisfied by any event that meets the global event filter (see *Filter*, previous).

Counter/Timer. The counter/timer functions (INCR CNTR, START TIMER, and TIME WHILE) only count or time events that satisfy the global filter requirements and match the global event value (global event true). The final value is displayed in appropriate units in the top, right corner of the data display (see Figures 5-1 and 5-5 for examples).

INCR CNTR increments the counter by one every time the global event is true. The count stops when the 1240 triggers or you press STOP.

START TIMER starts the timer at the first occurrence of the global event. The timer runs until the 1240 triggers or you press STOP.

TIME WHILE times how long the global event was true from the start of the trigger search until the 1240 triggers or you press STOP. TIME WHILE starts the timer each time the global event is true and stops it when the event is false. The final value is the cumulative time the global event was true.

Table 4-2
GLOBAL EVENT RECOGNIZER ACTIONS AND ASSOCIATED FIELDS

Action Selections	Associated Fields
OFF — global event recognizer disabled	None.
TRIGGER — trigger when global event is true	**ON/ON NOT** — event is true when the sampled data equals/does not equal the event value Event Value [a]— entered by channel group in the input radix specified in the Channel Grouping menu. FILTER: — number of timebase periods the global event must be true before it can be recognized. Selections are **1-16**. Displayed only if Operation Level is 1 or 3. ON — timebase for FILTER field. Selections are **10NS**, **T1** (when timebase T1 active), **T2** (when timebase T2 active).
RESET — re-start trigger search in both event recognizers when global event is true.	**ON/ON NOT**, Event Value, FILTER: ON (described above)
STORE — allow data storage only while global event is true.	**ON/ON NOT**, Event Value (described above)
START TIMER [b]— timer starts when global event is true; stops when 1240 triggers, or you press STOP. Final timer value is displayed in appropriate units at the top of the data display. **TIME WHILE** [b]— timer starts when global event is true; stops when event is false. Timer continues if event comes true again. Final value is cumulative time the event was true before the 1240 triggered, or you pressed STOP.	**ON/ON NOT**, Event Value, FILTER: ON (described above) **TRIGGER**, **RESET** — final action taken when termination value for timer is reached (see IF TIMER description below). **DO NOTHING** — no action taken based on timer value. IF TIMER = — termination value for timer. Perform action (**TRIGGER**, **RESET**) if this value is reached. Numeric field; range is 10 ns to 999,999,999,990 ns (about 17 minutes).
INCR CNTR [b]— counter increments once every time global event is true. Counter runs until 1240 triggers, or you press STOP. Final counter value is shown as number of events at top of data display.	**ON/ON NOT**, Event Value, FILTER: ON (described above) **TRIGGER**, **RESET** — final action taken when termination value for event counter is reached (see IF COUNT description below). **DO NOTHING** — no action taken based on counter value. IF COUNT = — termination value for counter. Perform action (**TRIGGER**, **RESET**) if this value is reached. Numeric field; range is 1 to 99,999,999,999 events.

[a] The glitch symbol (◆) is a valid entry only for 9-channel card groups assigned T1 ASYNC when glitch storage is enabled in Memory Config menu and the global event recognizer is CLOCKED.

[b] When a reset occurs, the counter/timer functions return to 0 then continue. The accumulated count or time is lost.

Table 4-3
SEQUENTIAL EVENT RECOGNIZER ACTIONS AND ASSOCIATED FIELDS

Action Selections	Associated Fields
WAIT FOR **WAIT FOR NOT** — stay in current sequence level until the defined event is/is not true, then advance to the next level.	Timebase [a] — selections are **T1** and **T2**. Selection determines which groups are displayed in the event value fields. Event Value [b]— entered by channel group in the input radix specified in the Channel Grouping menu. TO OCCUR **nnnn** TIMES — value **nnnn** specifies how many times the event must be true before 1240 advances to next sequence level. Range is 1 - 9999 events. FILTER — number of timebase periods an event must be true before it can be recognized. Selections are **1-16**. Displayed only in Operation Levels 1 or 3. WITH STORAGE — storage qualification. Selections are **ON** and **OFF**. With ON, data is stored while the sequence level is in effect. Displayed only in Operation Levels 2 or 3. Not displayed if timebase is T1 ONLY, ASYNC 10NS.
TRIGGER IF **TRIG IF NOT** — trigger if data from current acquisition cycle satisfies/does not satisfy the defined event; otherwise, advance to the next level.	Timebase, Event Value, FILTER, WITH STORAGE (described above)
RESET IF **RESET IF NOT** — re-start both event recognizers (and set counter/timer to 0) if data from the current acquisition cycle satisfies/does not satisfy the defined event; otherwise, advance to the next level.	Timebase, Event Value, FILTER, WITH STORAGE (described above)
JUMP IF **JUMP IF NOT** — jump to level specified in TO LEVEL field if data from the current acquisition cycle satisfies/does not satisfy the defined event; otherwise, advance to the next level.	Timebase, Event Value, FILTER, WITH STORAGE (described above) TO LEVEL: — jump to this level when jump action is perfomed. Selections are **1-E**. A jump to an undefined level causes a trigger.
DELAY — delay specified number of timebase periods, then advance to the next level	Timebase, WITH STORAGE (described above) **nnnn** CLOCKS — number of timebase periods to delay. Range is **1-9999**.
TRIGGER **RESET** **DO NOTHING** — final action of the sequential event recognizer.	WITH STORAGE (described above) — displayed when DO NOTHING is the final action.

[a] Displayed for every level when T1 and T2 are active. Two-timebase operation is available only in Operation Levels 2 and 3.

[b] The glitch symbol (◆) is a valid entry only for 9-channel card groups assigned T1 ASYNC when glitch storage is enabled in Memory Config menu and the global event recognizer is CLOCKED.

The counter/timer returns to zero, then restarts, whenever a RESET command occurs in the sequential event recognizer. It is also reset if the trigger event is found but the pre-trigger requirement has not been met (refer to *Trigger Position*, previous).

Storage Qualification. The **STORE** selection provides storage qualification for the global event recognizer. Storage (data) qualification makes the most of available acquisition memory space by storing only the events you are interested in.

When you select **STORE ON**, an event is stored in memory only if it satisfies the global filter and matches the global event value. If you select **STORE ON NOT**, an event is stored only if it satisfies the global filter and is *different* from the global event value.

If timebase T1 is ASYNC 10 NS, STORE has no affect on storage of T1 data — all T1 data is stored. Even though there is no T1 storage qualification under these timebase conditions, you can use the T1 channel values to help determine storage qualification for T2 data.

NOTE

Remember that when the event recognizers are used together, they are OR'd. Data is stored if the STORE action is true in the global event recognizer, or if a level with storage ON is in effect in the sequential event recognizer.

SEQUENTIAL EVENT RECOGNIZER

Overview. The sequential event recognizer can have up to 14 levels, numbered 1 - E. The actions available at each level and their associated fields are summarized in Table 4-3.

Except for **WAIT FOR**, **WAIT FOR NOT**, and **DELAY**, all sequence actions are in effect for one acquisition cycle.[2] If the event specified on the level is satisfied during that cycle, the action is performed. If not, control advances to the next level. Table 4-4 summarizes the transfer of control from level to level of the sequential event recognizer.

Each level can be associated with only one timebase. When timebases T1 and T2 are active,[3] a select field is displayed at each level so you can specify which timebase applies. Only channel groups associated with the selected timebase are displayed in the event field. Refer to Figure 4-2; notice that at each level, the event value is composed only of groups that use the selected timebase, and the spaces for the other groups are blank.

NOTE

The entire event value will be blank if you select a timebase that has no pods assigned in the Memory Config menu. All blanks is the same as an event value of all don't cares. Since any data value will satisfy this event value, the sequence action is performed when a clock signal for that timebase is received during that level of the sequence. For example: if a sequence level is T1 WAIT FOR (all groups blank) THEN TRIGGER, the 1240 will trigger when the first T1 clock occurs after the sequence reaches this level.

---

[2] This assumes a FILTER value of 1. If the FILTER value is greater than 1, the sequence action could be in effect for more than one cycle.

[3] T2 can be specified only in Operation Levels 2 and 3.

Each sequential event action, except **DELAY**, can be inverted with a NOT action (**WAIT FOR NOT**, **JUMP IF NOT**, etc.; see Tables 4-3 and 4-4). With a NOT action, the sequence action is performed when any event other than the specified value is recognized. Glitch requirements are *not* inverted when you select a NOT action. For example: If the event is **RESET IF NOT 5♦**, the reset action will be performed when any value other than 5 is recognized for the first digit and a glitch occurred on at least one channel of the second digit.

NOTE

A NOT action with an event value of all don't cares (X) specifies an event that will never occur.

Filter. The sequential event recognizer does not recognize an event unless the event is present for the amount of time defined by the filter for that sequence level. An event is accepted if it is present for an amount of time ≥ NxT, where N is the value in the FILTER field and T is the value in the ON field. Detailed filter specifications are included in Table 8-5 in Section 8.

How the 1240 applies the filter to data depends on whether edge or level event recognition is in effect. See *Edge vs. Level Event Recognition*, following, for details.

Storage Qualification. In Operation Levels 2 and 3, the WITH STORAGE field is displayed in each level of the sequential event recognizer. (It is also displayed when DO NOTHING is the final sequence action.) Selections are **ON** and **OFF**. If you select ON, the 1240 stores data in memory while that level of the sequence is in effect. If you select OFF, data is *not stored* while that level is in effect.

For example: you want to store only the instructions in a specific subroutine. The subroutine starts with AAAA and ends with FFFF. The first sequence level is WAIT FOR AAAA, WITH STORAGE **OFF**. The next sequence level is WAIT FOR FFFF, WITH STORAGE **ON**, THEN TRIGGER. No data is stored while the 1240 waits for AAAA. When AAAA occurs, the sequential event recognizer moves to the next sequence level. Data is stored while the 1240 waits for FFFF; when FFFF occurs, the 1240 triggers. A reset is generated every time the 1240 finds an event that matches the trigger condition. Therefore, the sequential event recognizer restarts at level 1 when the 1240 triggers. Level 1 turns storage OFF; no other data besides the subroutine is stored.

The WITH STORAGE field is not displayed if the active timebase is T1 ONLY, ASYNC 10 NS.

NOTE

The trigger search is restarted in both event recognizers whenever: 1) a RESET command is executed in either event recognizer, or 2) the 1240 finds an event that matches the trigger condition.

Whenever a reset or trigger occurs, the sequential event recognizer restarts at level 1. Keep this in mind when you use storage qualification; restarting the trigger search could change your qualification scheme. For example: refer to the subroutine example above. Suppose a reset occurs in the global event recognizer while the 1240 is waiting for FFFF (storage is ON). The sequential event recognizer immediately restarts at level 1, and storage is turned OFF. The rest of the subroutine is not stored. Data storage will start again only if AAAA reoccurs.

NOTE

Remember that when the event recognizers are used together, they are OR'd. Data is stored if the STORE action is true in the global event recognizer, or if a level with storage ON is in effect in the sequential event recognizer.

Table 4-4
SUMMARY OF SEQUENTIAL EVENT RECOGNIZER ACTIONS

Action	Event Found this Acquisition Cycle	Event Not Found this Acquisition Cycle
WAIT FOR	advance to next level	do nothing
WAIT FOR NOT	do nothing	advance to next level
TRIGGER IF	trigger	advance to next level
TRIG IF NOT	advance to next level	trigger
RESET IF	reset	advance to next level
RESET IF NOT	advance to next level	reset
JUMP IF	jump	advance to next level
JUMP IF NOT	advance to next level	jump
DELAY (not event oriented)	n/a	n/a

EDGE vs. LEVEL EVENT RECOGNITION

Global and sequential event recognizer actions (except **STORE** and **DELAY**) are not performed unless the specified event satisfies the filter conditions. How the filter is applied depends on whether edge or level event recognition is in effect.

Figure 4-3 illustrates the difference between the two types of event recognition. Most Trigger Spec setup conditions support level event recognition. The setup conditions that determine edge event recognition are listed in Table 4-5.

Level. Level event recognition is based on the state of the inputs at the clock edge. When the valid event occurs, the filter counts the required number of successive cycles the event is present. If the filter is satisfied, the event is recognized and the filter resets and starts over. If the filter is not satisfied and the event becomes invalid, the filter resets and waits for the event to occur again.

Level event recognition is always in effect if the event value is all don't cares or if the timebase is synchronous.

Edge. In edge event recognition, the filter is applied after incoming data makes the transition to the state specified in the event value fields. In Figure 4-3, these transitions are marked with the word "edge." If the filter is satisfied, the specified event is recognized as having occurred once. If the trigger condition requires that the event be recognized more than once, the filter is reset but is not applied until another transition occurs from event invalid to event valid.

Refer to Table 4-5 for a list of the setup conditions that determine edge event recognition. Unless these conditions are met, level event recognition is in effect.

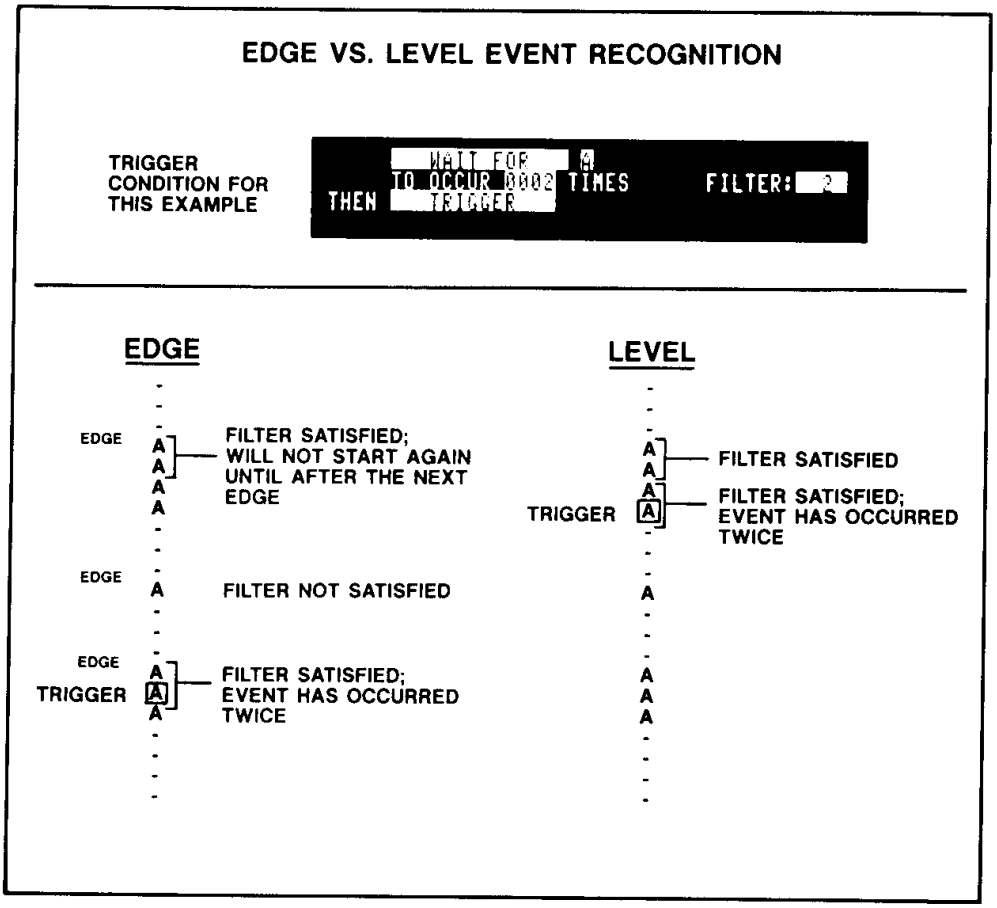


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Figure 4-3. Difference between edge and level event recognition. In edge event recognition, the filter is applied only after a transition occurs from event invalid to event valid. Level recognition is based on the state of the inputs at the sample point.

Table 4-5
CONDITIONS THAT DETERMINE EDGE EVENT RECOGNITION [a]

Event Recognizer	Conditions
GLOBAL	FILTER timebase is 10 NS and Event value is **not** all X
	FILTER timebase is T1 and T1 is ASYNC and Event value is **not** all X
SEQUENTIAL	Sequence level timebase is T1 and T1 is ASYNC and Sequence level event value is **not** all X

[a] Level event recognition is in effect if these conditions are not met.

BUILDING A SEQUENCE

The soft keys at the bottom of the menu allow you to build a sequence of levels in the sequential event recognizer, return to the default trigger setup, or quickly copy an event value from memory.

DEFAULT TRIGGER SPEC. Touch this soft key to return both event recognizers to their default setups. After you touch this key, the following confirmation message is displayed on the top line of the screen: PRESS "X" TO CONFIRM OPERATION (ANY OTHER HARD KEY CANCELS IT). Press the X key to confirm the return to default; press any other key on the front panel to cancel the operation.

DELETE LEVEL. Touch this soft key to delete the sequence level at the location of the blinking field cursor. If there is only one level, touching this soft key completely deletes the sequential event recognizer.

LOAD FROM ACTIVE CURSOR. This soft key is valid only if the field cursor is positioned in an event field. When you touch this soft key, the event at the location of the field cursor is loaded with the same data as the location in active memory where the active data cursor is positioned. Active memory is the type of memory (acquisition or reference memory) last displayed. Refer to Section 5 for a description of the active data cursor.

Recall from the *Channel Grouping* description in Section 3 that displayed data and event recognizer input data can have different radices. If the display radix is different from the input radix, the data at the active cursor is converted to the input radix. The radix is changed, not the value of the data.

ADD LEVEL. Touch this soft key to add a new sequence level below the location of the field cursor. The new sequence level is initialized to the default values (WAIT FOR, all don't cares).

STARTING THE TRIGGER SEARCH & EVALUATING STATUS DISPLAYS

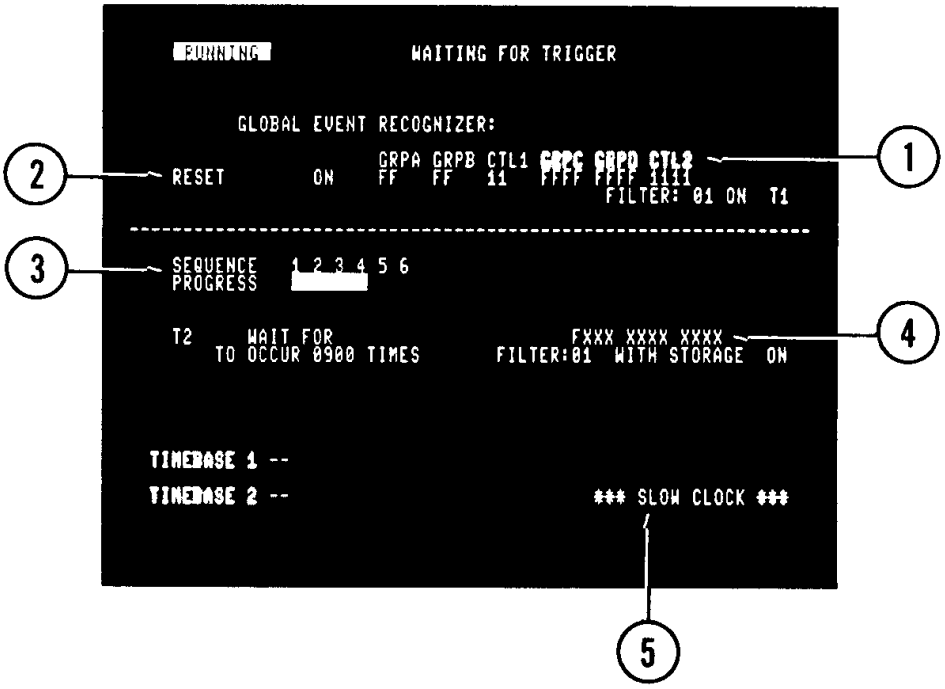
Press the START key on the front panel to begin the search for the trigger condition specified in the Trigger Spec menu.

After you press START, the 1240 displays information on the status of the trigger search (WAITING FOR TRIGGER status display, see Figure 4-4). This status information is updated until a trigger is found or you press the STOP key.

The TRIGGERED status display (see Figure 4-5) is shown after the trigger occurs or after you press STOP. This display stays on the screen until all remaining locations in acquisition memory are filled.

When memory is filled, the top line of the screen changes to PROCESSING DATA. This display remains on the screen while the 1240 formats the acquired data for display. When processing is complete, the acquired data is displayed in State Table or Timing Diagram format, whichever was last used.

The status displays have no changeable fields. They are informational fields only.



1 Group names.

2 Global event recognizer.

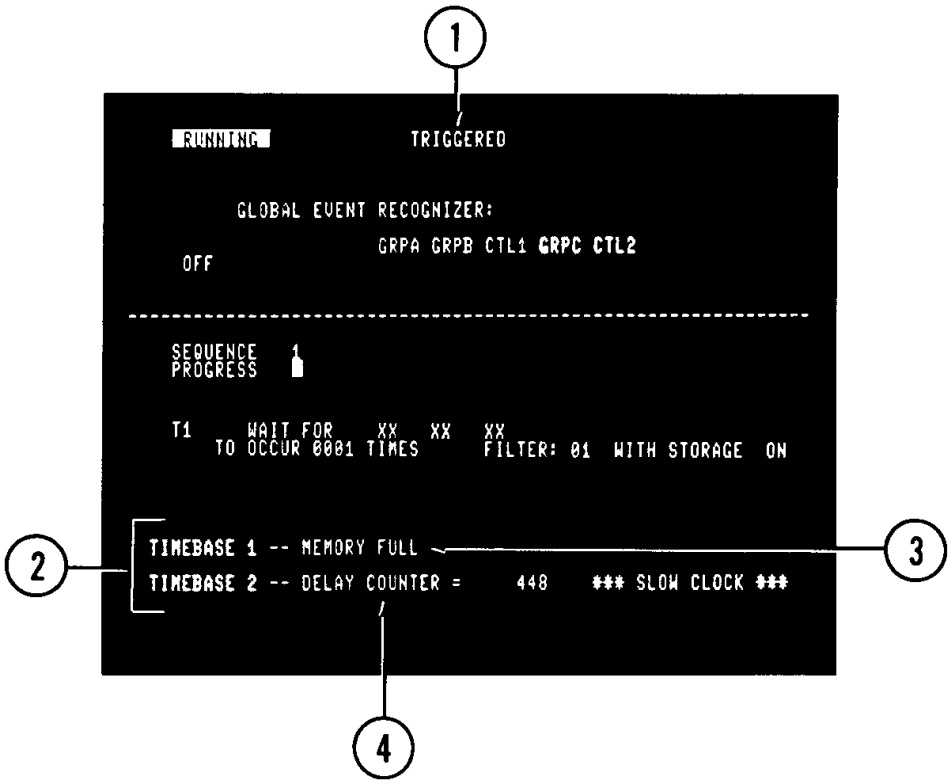
3 Progress of the sequential event recognizer. The reverse video band moves across the screen to indicate the sequence level currently in effect. In this display, the progress band shows that levels 1-3 have been satisfied and level 4 is currently in effect.

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 more than 1 ms (approximately) is labeled "slow clock."

4340–35

Figure 4-4. WAITING FOR TRIGGER status display. After you press the START key on the front panel, the 1240 displays information on the status of data acquisition.



1 Trigger has occurred and the 1240 is filling the remaining locations in acquisition memory.

2 Active timebases.

3 The memory assigned to timebase T1 pods is filled with acquired data.

4 The memory assigned to timebase T2 pods has not filled with data. The value of the delay counter shows how many locations remain to be filled. This information is displayed when a trigger has occurred but memory is not full because a timebase is not present or is slow, or if data qualification is disqualifying most samples from storage. A clock period more than 1 ms (approximately) is labeled "slow clock."

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Figure 4-5. TRIGGERED status display. This display is shown after the trigger has been found and while the 1240 is filling the remaining locations in acquisition memory. Without a slow clock, memory is filled too rapidly for this display to be read. When memory is filled, the top line of the screen changes to PROCESSING DATA.

AUTO-RUN SPEC

This menu lets you set up the 1240 to make repeated data acquisitions without manual starts. The specifications in this menu are used only if the data acquisition process is started with the AUTO key on the front panel.

The four Auto-Run conditions are: **COMPARE ACQMEM TO REFMEM**, **CONTINUOUS TRIGGER OUT**, **TRIGGER IN**, and **STORE AFTER TRIGGER**. Figure 4-6 illustrates the **COMPARE ACQMEM TO REFMEM** menu display; displays for the other three Auto-Run conditions are shown in Figure 4-7.

After you press AUTO, the 1240 displays status information on the progress of data acquisition. The status displays for **CONTINUOUS TRIGGER OUT**, **TRIGGER IN**, and **STORE AFTER TRIGGER** are similar to the display shown in Figure 4-4 except that the title of the Auto-Run condition is displayed on the second line of the screen. The **COMPARE ACQMEM TO REFMEM** status displays are special versions of the State Table and Timing Diagram data displays; see Figures 4-8 and 4-9.

NOTE

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.

COMPARE ACQMEM TO REFMEM

In this Auto-Run condition, the 1240 searches for the trigger specified in the Trigger Spec menu. When the trigger event is found, the 1240 fills acquisition memory, compares acquisition memory to reference memory, then takes action depending on whether the memories are equal or unequal. The three possible actions are: **DISPLAY AND REACQUIRE** (display acquisition memory and restart the trigger search), **DISCARD AND REACQUIRE** (discard the current acquisition, saving the previous one, and restart the trigger search), or **DISPLAY AND STOP** (stop and display acquisition memory).

The fields associated with **COMPARE ACQMEM TO REFMEM** are described in Figure 4-6.

The **COMPARE ACQMEM TO REFMEM** status displays are special versions of the State Table and Timing Diagram displays; see Figures 4-8 and 4-9.

The ACQ# field in the upper-right corner of the State Table or Timing Diagram display shows the number of acquisitions since you pressed AUTO. The number is incremented even if acquired data is not displayed.

When the trigger event specified in the Trigger Spec menu is found, the 1240 supplies a signal to the EXT TRIG OUT BNC. You can select this signal to be **PULSED** (high for at least 80 ns) or **LATCHED** (high until next acquisition starts).

NOTE

The selected data in acquisition memory must be identical to the corresponding data in reference memory, including time relationships between two-timebase data, for the memories to be considered equal.

If the data in REFMEM was acquired with different parameters than the current setup, ACQMEM and REFMEM are always unequal.

If glitch display is off, memory comparisons are based on the actual contents of memory and not on what may be displayed. See Glitch Display in Section 5 for more information.

CONTINUOUS TRIGGER OUT

In this Auto-Run condition, the 1240 continuously searches for the trigger specified in the Trigger Spec menu. When the trigger is found, the search restarts, and the 1240 supplies a signal to the EXT TRIG OUT BNC (on the back panel, see Figure 1-3) for at least 80 ns.

Press the STOP key on the front panel to stop this auto-acquisition method. The data that occurred immediately before the STOP keystroke is displayed.

The menu display for **CONTINUOUS TRIGGER OUT** is shown in Figure 4-7.

TRIGGER IN

In this Auto-Run condition, the 1240 continuously searches for the trigger specified in the Trigger Spec menu. It also continuously monitors the status of the EXT TRIG IN BNC (on the back panel). If the EXT TRIG IN signal is true 50 - 150 ns after the trigger event is true, the 1240 triggers, stops, and displays stored data. If the EXT TRIG IN signal is false, the trigger search continues. Table 4-6 summarizes the actions associated with the different combinations of the trigger event and the EXT TRIG IN signal.

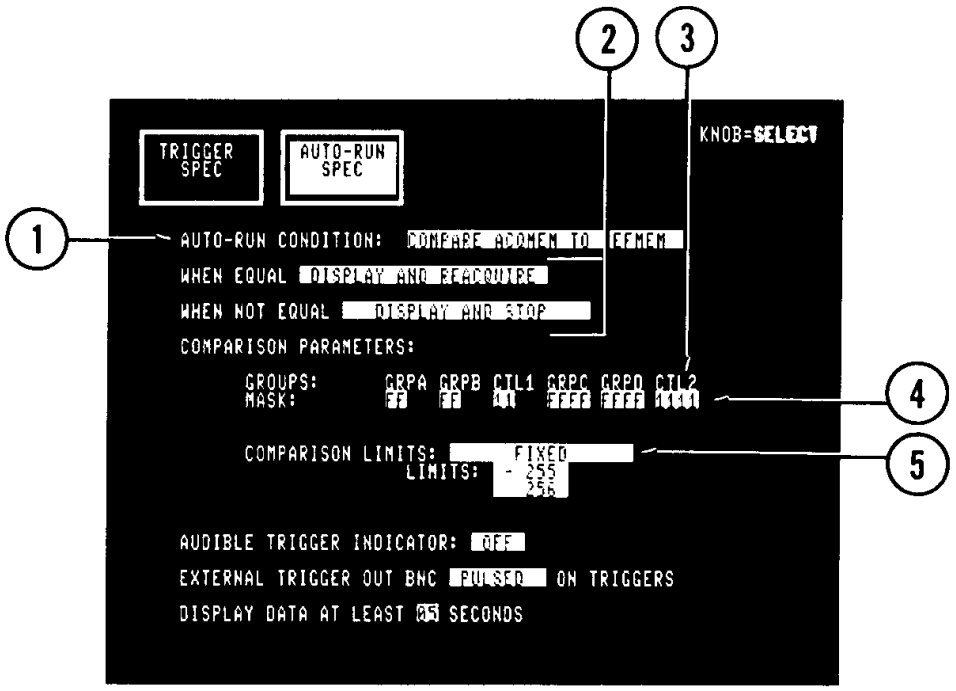
When the trigger event specified in the Trigger Spec menu is found, the 1240 supplies a signal to the EXT TRIG OUT BNC. You can select this signal to be **PULSED** (high for at least 80 ns) or **LATCHED** (high until next acquisition starts). See Table 8-5 for the specifications of the EXT TRIG OUT and IN signals.

The menu display for **TRIGGER IN** is shown in Figure 4-7. **TRIGGER IN** can be used to link two 1240s for triggering on very wide data words or on time-related sequences.

Table 4-6
TRIGGER IN: COMBINATIONS OF EXT TRIG IN/OUT BNCs

Trigger Event [a]	EXT TRIG IN	1240 Action
Not Found	False	Continue trigger search
Not Found	True	Continue trigger search
Found	False	Restart trigger search
Found	True	Trigger, stop, and display data

[a] Specified in the Trigger Spec menu. Signal to the EXT TRIG OUT BNC goes true when the trigger event is found.



1 1240 searches for the trigger specified in the Trigger Spec menu; when the trigger event is found, the 1240 compares acquisition memory to reference memory 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), and **DISPLAY AND STOP**.

3 Group names.

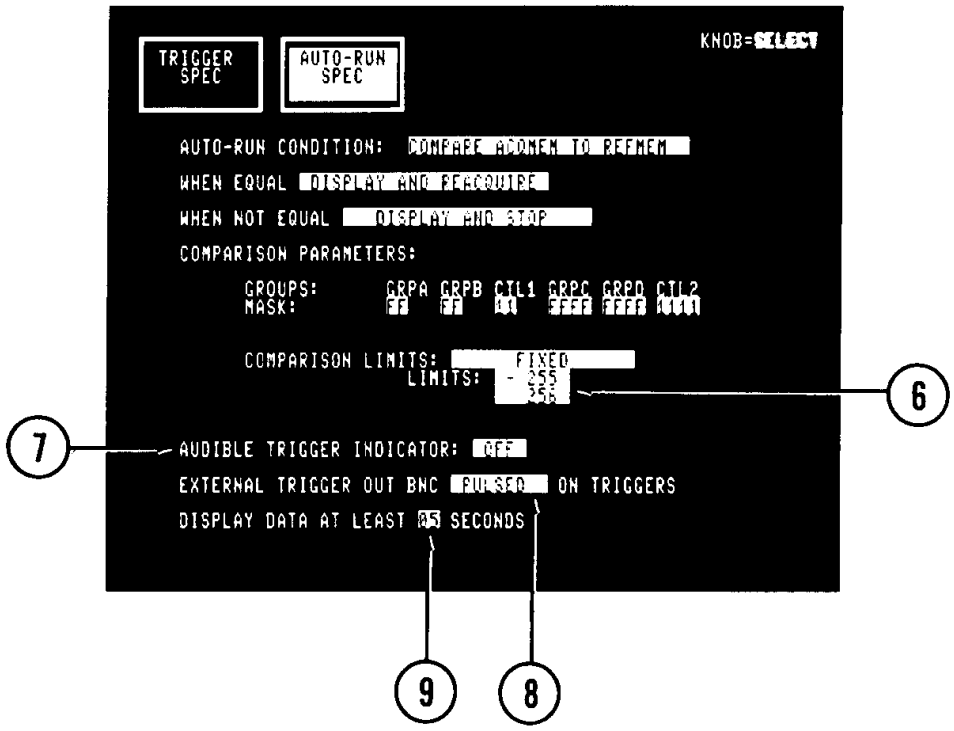
4 Mask fields, one per group; specify which channels will be compared. Enter mask digits in the input radix for each group. Choose each digit so that binary 1's are in equivalent positions of those channels you want to include in the comparison, and binary 0's are in positions of channels you want to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

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

(cont.)

Figure 4-6. Menu display for the COMPARE ACQMEM TO REFMEM Auto-Run condition. The selected data in acquisition memory must be identical to the corresponding data in reference memory, including time relationships between two-timebase data, for the memories to be considered equal.

(cont.)



6 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 lines display the current locations of data cursors 1 and 2. The cursor positions are the limits of the comparison. The cursor positions can be changed during auto-acquisition, but movement may be slow. Refer to Section 5 for a complete description of the data cursors.

It is possible that not all memory locations between the specified limits will contain data. Locations at which neither memory has data are always equal. Locations at which only one memory has data are never equal.

7 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.

8 Selects the duration of the signal supplied on the EXT TRIG OUT BNC. Selections are **PULSED** (signal high for at least 80 ns) and **LATCHED** (signal high until next acquisition starts).

9 Used with **DISPLAY AND REACQUIRE** (see callout 2) to determine the minimum time between acquisitions. Values are **00** to **99** seconds.

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Figure 4-6. Menu display for the COMPARE ACQMEM TO REFMEM Auto-Run condition (cont.).

STORE AFTER TRIGGER

In this Auto-Run condition, the 1240 continuously searches for the trigger specified in the Trigger Spec menu. When you press STOP, the data stored as a result of the last trigger is displayed.

If no trigger has occurred or if a trigger has occurred but acquisition memory is not full (timebase may be slow), the current contents of acquisition memory is displayed.

The menu display for **STORE AFTER TRIGGER** is shown in Figure 4-7.

STORE AFTER TRIGGER lets you continuously sample the system under test at the point defined by the Trigger Spec menu. For example: your prototype system suffers intermittent system crashes, and you determine that the error occurs after some point BB. Set the Trigger Spec menu to trigger on BB, then change to the Auto-Run Spec menu. Select **STORE AFTER TRIGGER**, then press AUTO. Every time the 1240 finds BB, it triggers and fills acquisition memory. Let the 1240 run until the next system crash, then press STOP. Acquisition memory from the last trigger will show data around the error.

When the trigger event specified in the Trigger Spec menu is found, the 1240 supplies a signal to the EXT TRIG OUT BNC. You can select this signal to be **PULSED** (high for at least 80 ns) or **LATCHED** (high until next acquisition starts).

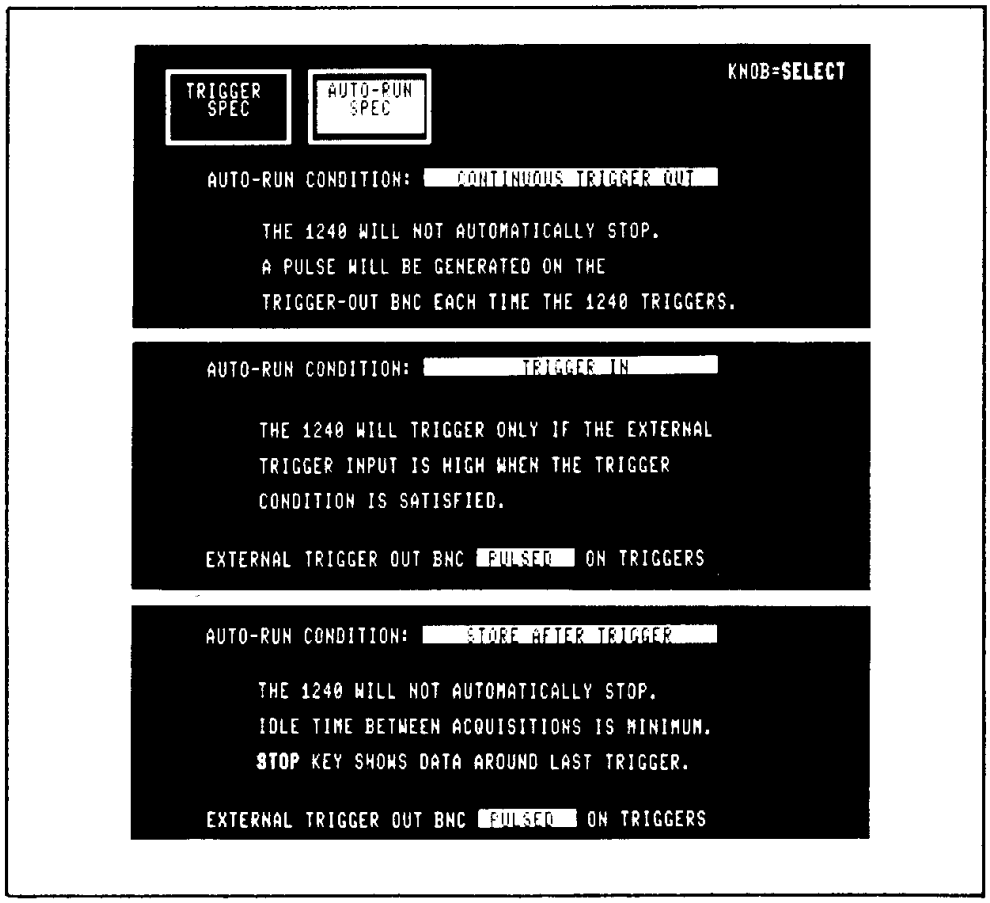

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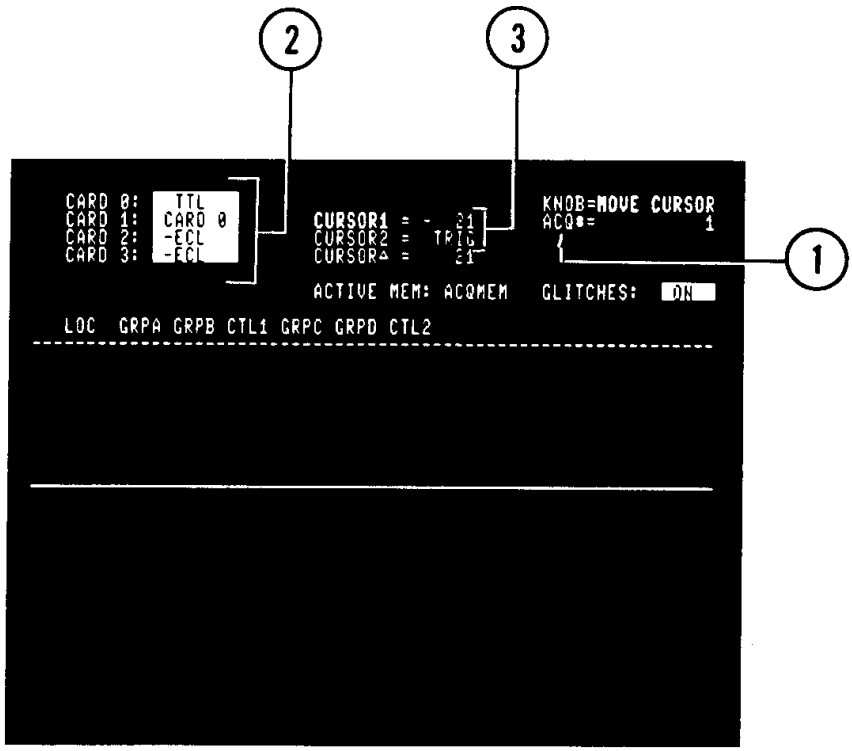
Figure 4-7. Menu displays for the CONTINOUS TRIGGER OUT, TRIGGER IN, and STORE AFTER TRIGGER Auto-Run conditions. At each trigger, the 1240 supplies a signal to the EXT TRIG OUT BNC on the back panel. The signal can be **PULSED** (signal high for at least 80 ns) or **LATCHED** (signal high until next acquisition starts).



1 Number of acquisitions since you pressed AUTO. Incremented even if the acquired data is not displayed.

2 Threshold select fields. Lets you change a card's threshold voltage while the acquisition operation is running. The available selections are the same as those listed in the description of the Memory Config menu. The new threshold is applied to the data currently at the probe tip. Higher-numbered fields do not appear if your 1240 is configured with less than four cards.

3 Locations of the data cursors. The location of the active cursor can be changed with the SCROLL knob during operation. Data movement may be slow.

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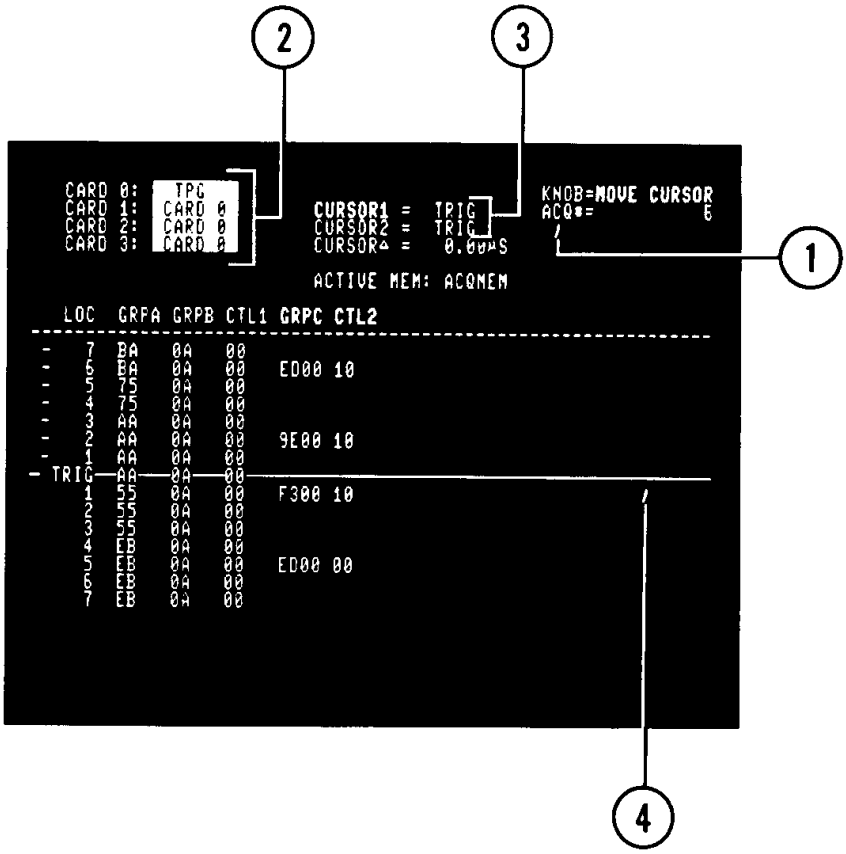
Figure 4-8. Status display for COMPARE ACQMEM TO REFMEM actions DISPLAY AND STOP, DISCARD AND REACQUIRE.



1 Number of acquisitions since you pressed AUTO.

2 Threshold select fields. Allow you to change a card's threshold voltage while the acquisition operation is running. The available selections are the same as those listed in the description of the Memory Config menu. The new threshold is applied to the data currently at the probe tip; displayed data is not affected by a threshold change.

3 Locations of the data cursors, active cursor highlighted.

4 Active cursor. In this type of display, the role of the active cursor cannot be switched to the other cursor. Which cursor is active is determined by the assignment in effect when AUTO is pressed. Move the active cursor with the SCROLL knob (movement may be slow).

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Figure 4-9. Status display for COMPARE ACQMEM TO REFMEM, DISPLAY AND REACQUIRE action. The bottom half of the display is shown in State Table or Timing Diagram format, depending on which data display format was last used. Moving the cursor affects the comparison limits if **BETWEEN CURSORS** is selected.