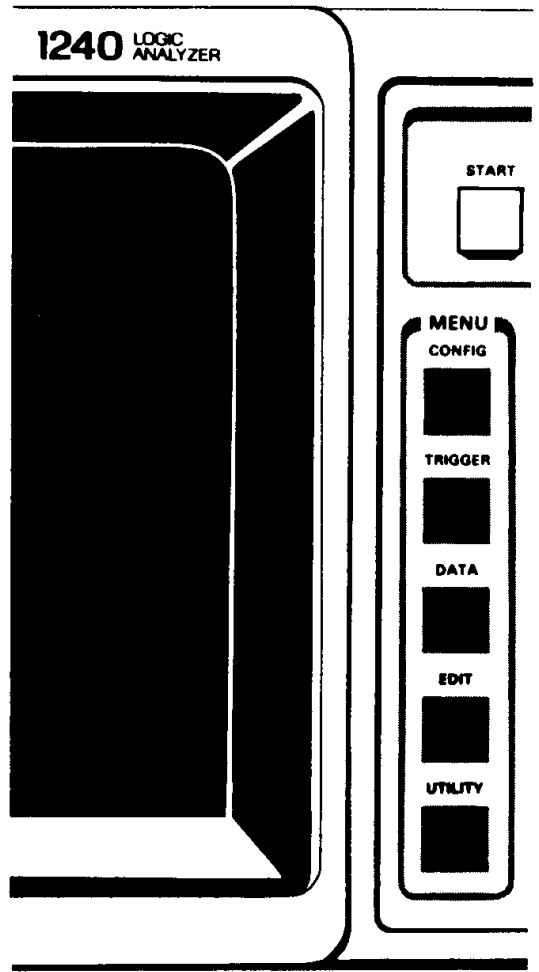




REFERENCE  
INFORMATION

# REFERENCE INFORMATION

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## EFFECTS OF MENU CHANGES

The 1240 does not allow illegal setup conditions to exist. As a result, changes you make in one menu may affect selections available in other menus. Tables 8-1 to 8-4 list the crucial changes and their effects.

The 1240 changes entries in other menus only when you **exit** the altered menu. If you make a change then reverse it before leaving the menu, no change is made to other menus.

**Table 8-1**  
**EFFECTS OF CHANGES TO THE OPERATION LEVEL MENU**

| If You Change:                             | EFFECTS ON OTHER MENUS ARE:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>To Level 0 from higher levels</b>       | <p><b>MEMORY CONFIG:</b> Memory width vs. depth select fields are changed to fixed values that indicate no memory chaining. These values depend on the number of 9-channel and 18-channel acquisition cards installed; refer to Tables 3-1 and 3-2.</p> <p><b>TRIGGER SPEC:</b> The LOOK FOR TRIGGER field is not displayed. The 1240 will accept a trigger only after the required amount of pre-trigger data (determined by the TRIGGER POSITION field) has been acquired.</p>                                                                                                                                                                                                                                                               |
| <b>To Levels 0 or 1 from higher levels</b> | <p><b>TIMEBASE:</b> The ACTIVE TIMEBASES field is not displayed, and the 1240 uses only timebase T1. Timebase T2 fields are not displayed.</p> <p><b>MEMORY CONFIG:</b> The INPUT POD and TIMEBASE fields are changed to fixed values; no selections are available. T1 is assigned to all pods.</p> <p><b>CHANNEL GROUPING:</b> All groups are assigned T1.</p> <p><b>TRIGGER SPEC:</b> T1 is assigned to all levels of the sequential event recognizer, and the timebase select field in each sequence level is no longer displayed. WITH STORAGE fields are not displayed in the sequential event recognizer.</p> <p><b>SEARCH PATTERN ENTRY:</b> All lines of the pattern are set to T1, and the ENTER DATA FOR field is not displayed.</p> |
| <b>To Levels 0 or 2 from 1 or 3</b>        | <p><b>TIMEBASE:</b> GLOBAL EVENT = CLOCKED/UNCLOCKED field is not displayed. Events are compared to the global event recognizer only if they coincide with a sample point (CLOCKED).</p> <p><b>TRIGGER SPEC:</b> The FILTER fields in both event recognizers are not displayed. To be recognized, an event must be present for at least one timebase period.</p>                                                                                                                                                                                                                                                                                                                                                                               |

**Table 8-2**  
**EFFECTS OF CHANGES TO THE TIMEBASE MENU**

| If You Change:                                     | EFFECTS ON OTHER MENUS ARE:                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Active Timebases</b>                            | MEMORY CONFIG: Each obsolete timebase assignment is changed to the legal value. For example: if you change ACTIVE TIMEBASE from <b>T1 AND T2</b> to <b>T2 ONLY</b> , all timebase assignments in Memory Config are changed to T2.                                                                                                                                                                                                                              |
| <b>Active Timebase to T1 ONLY</b>                  | MEMORY CONFIG: INPUT POD fields on the right side of the display are set to the odd-numbered pod.<br><br>CHANNEL GROUPING: All groups are assigned T1.<br><br>TRIGGER SPEC: T1 is assigned to all levels of the sequential event recognizer. The FILTER timebase in the global event recognizer is changed to T1.<br><br>SEARCH PATTERN ENTRY: All lines of the search pattern are set to T1.                                                                  |
| <b>Active Timebase to T2 ONLY</b>                  | MEMORY CONFIG: If T2 is SYNC, INPUT POD fields on the right side of the display are set to the odd-numbered pod.<br><br>CHANNEL GROUPING: All groups are assigned T2.<br><br>TRIGGER SPEC: T2 is assigned to all levels of the sequential event recognizer. All glitch entries are changed to don't care (X). The FILTER timebase in the global event recognizer is changed to T2.<br><br>SEARCH PATTERN ENTRY: All lines of the search pattern are set to T2. |
| <b>T1 to SYNC</b>                                  | TRIGGER SPEC: All glitch entries are set to don't care.                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>T2 to SYNC</b>                                  | MEMORY CONFIG: All T2 L and T2 F timebase assignments are changed to T2.                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>T2 to DEMUX</b>                                 | MEMORY CONFIG: All T2 timebase assignments are changed to T2 L.                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>T1 to ASYNC 10 NS when T1 and T2 are active</b> | TIMEBASE: T1 qualifier fields are not displayed. The 1240 does not support clock qualification for T1 when T1 and T2 are active and T1 is ASYNC 10 NS.                                                                                                                                                                                                                                                                                                         |
| <b>T1 to ASYNC 10 NS when T1 ONLY is selected</b>  | TRIGGER SPEC: WITH STORAGE fields in the sequential event recognizer are not displayed.                                                                                                                                                                                                                                                                                                                                                                        |
| <b>GLOBAL EVENT field to UNLOCKED</b>              | TRIGGER SPEC: All glitch entries in the global event recognizer are set to don't care (X).                                                                                                                                                                                                                                                                                                                                                                     |

**Table 8-3**  
**EFFECTS OF CHANGES TO THE MEMORY CONFIG MENU**

| If You Change:                                      | EFFECTS ON OTHER MENUS ARE:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Memory width to a smaller number of channels</b> | <p>CHANNEL GROUPING: Deleted channels are removed from all groups.</p> <p>TRIGGER SPEC: Deleted channels are removed from both event recognizers.</p> <p>AUTO-RUN SPEC: If you are using the COMPARE ACQ-MEM TO REFMEM condition, the deleted channels are removed from the mask field.</p> <p>SEARCH PATTERN ENTRY: The deleted channels are removed from the search pattern.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Pod-Timebase assignments</b>                     | <p>TIMEBASE: If T1 is ASYNC with a 10 ns period and you assign T1 to any pod connected to an 18-channel card, the clock period is changed to 20 ns.</p> <p>CHANNEL GROUPING: If the pod-timebase change affects all channels in a group, the group is assigned the new timebase; no channels are deleted. If the change affects only some of the channels in a group, those channels are deleted from groups and appear in the UNUSED list.</p> <p>TRIGGER SPEC: If a pod's timebase assignment changes from an ASYNC to a SYNC timebase, all glitch entries for channels from that pod are changed to don't care (X). If the pod-timebase change affects only some of the channels in a group, those channels are deleted from both event recognizers.</p> <p>AUTO-RUN SPEC: If the pod-timebase change affects only some of the channels in a group, those channels are deleted from the MASK fields in COMPARE ACQMEM TO REFMEM.</p> <p>SEARCH PATTERN ENTRY: If the pod-timebase change affects only some of the channels in a group, those channels are deleted from all lines of the search pattern.</p> |
| <b>GLITCHES to OFF</b>                              | TRIGGER SPEC: All glitch entries are set to don't care.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>GLITCHES to ON</b>                               | TIMEBASE: If T1 is ASYNC with a period of 10 ns, the period is changed to 20 ns.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

**Table 8-4**  
**EFFECTS OF CHANGES TO THE CHANNEL GROUPING MENU**

| If You Change:                                               | EFFECTS ON OTHER MENUS ARE:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Group definition by deleting or re-arranging channels</b> | <p>TRIGGER SPEC: Event recognizer values for the affected channels are removed or rearranged to correspond to the new group definitions.</p> <p>AUTO-RUN SPEC: If you are using the COMPARE ACQ-MEM TO REFMEM condition, MASK field values for the affected channels are removed or rearranged.</p> <p>TIMING DIAGRAM: Channels that are deleted or moved in Channel Grouping are turned <b>OFF</b> in the Timing Diagram PAGE displays.</p> <p>SEARCH PATTERN ENTRY: Values for the affected channels are removed from, or rearranged in, all search pattern lines.</p> |

**Table 8-5**  
**1240 ELECTRICAL SPECIFICATIONS**

| Characteristic                                   | Performance Requirements                                                                                                                 | Supplemental Information                                                                                                                                                                                                                                                                                         |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SAFETY                                           |                                                                                                                                          |                                                                                                                                                                                                                                                                                                                  |
| General                                          |                                                                                                                                          | Complies with the requirements of UL 1244, IEC 348, and CSA 556B.                                                                                                                                                                                                                                                |
| CRT                                              |                                                                                                                                          | UL, VDE (German X-radiation law).                                                                                                                                                                                                                                                                                |
| PRIMARY POWER INPUT                              |                                                                                                                                          |                                                                                                                                                                                                                                                                                                                  |
| High Line                                        |                                                                                                                                          | 132 V or 250 V                                                                                                                                                                                                                                                                                                   |
| Low Line                                         |                                                                                                                                          | 90 V or 180 V                                                                                                                                                                                                                                                                                                    |
| Frequency                                        |                                                                                                                                          | 48 to 440 Hz                                                                                                                                                                                                                                                                                                     |
| Power                                            |                                                                                                                                          | 500 VA max., 5 A max.                                                                                                                                                                                                                                                                                            |
| VIDEO OUT                                        |                                                                                                                                          | Conforms to RS170                                                                                                                                                                                                                                                                                                |
| GLOBAL EVENT                                     |                                                                                                                                          |                                                                                                                                                                                                                                                                                                                  |
| Filter, global event UNLOCKED                    |                                                                                                                                          | Event consists of inputs from all groups.<br>An event is not recognized unless it is accepted by the global filter. These specifications are based on a 1240 equipped with P6460 Data Acquisition Probes.                                                                                                        |
| Separate 1240D1 and 1240D2 events                |                                                                                                                                          | N is value of FILTER field; selections are 1-16. T is value of ON field (filter timebase); selections are T1 (when T1 active), T2 (when T2 active), and 10NS.                                                                                                                                                    |
| When N = 1:<br>min. guaranteed event accepted    | Timebase period + 6 ns                                                                                                                   |                                                                                                                                                                                                                                                                                                                  |
| When N = 2-16:<br>max. guaranteed event rejected | $(N-1) \times T - 8 \text{ ns}$                                                                                                          |                                                                                                                                                                                                                                                                                                                  |
| min. guaranteed event accepted                   | $(N \times T) + 2 \text{ ns}$                                                                                                            |                                                                                                                                                                                                                                                                                                                  |
| Mixed 1240D1 and 1240D2 events                   |                                                                                                                                          |                                                                                                                                                                                                                                                                                                                  |
| max. guaranteed event rejected                   | $(N-1) \times T - 8 \text{ ns}$                                                                                                          | N = 2-16                                                                                                                                                                                                                                                                                                         |
| min. guaranteed event accepted                   | $(N \times T) + 20 \text{ ns}$                                                                                                           | N = 1-16                                                                                                                                                                                                                                                                                                         |
| Filter, global event Clocked                     |                                                                                                                                          |                                                                                                                                                                                                                                                                                                                  |
| Accept 1240D1 &/or 1240D2 events                 | $N \times T$                                                                                                                             | N is value of FILTER field; selections are 1-16. T is value of ON field (filter timebase) and selection (T1, T2, 10NS) is same as sample clock. Filtered event becomes valid on Nth contiguous valid acquisition event.<br><br>Combined 1240D1 and 1240D2 ASYNC acquisition requires additional 2 ns word width. |
| STORE ON action                                  |                                                                                                                                          |                                                                                                                                                                                                                                                                                                                  |
| T1 event or T2 event                             | clocked:<br>Store data if event true for 20 ns or more.                                                                                  | unclocked:<br>Data valid $\pm 12 \text{ ns} - 20 \text{ ns}$ with respect to data clock                                                                                                                                                                                                                          |
| T1 event and T2 event                            | Store data for a timebase if both events meet indiv. timebase spec. and the other timebase event is valid for 10 ns after storage clock. | Data valid $\pm 12 \text{ ns} - 20 \text{ ns}$ with respect to data clock                                                                                                                                                                                                                                        |

**Table 8-5 (cont.)**  
**1240 ELECTRICAL SPECIFICATIONS**

| Characteristic                                                                             | Performance Requirements                | Supplemental Information                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------------------------------------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RESET                                                                                      | 40 ns                                   | Counter/timer reset takes 100 ns prior to restart.                                                                                                                                                                                                                                                                                                                                                               |
| TRIGGER                                                                                    |                                         | <p>Trigger position is within one stored clock of event causing trigger. If reset and trigger occur together, a trigger occurs.</p> <p>When AFTER MEMORY FULL is the trigger position, a trigger before memory is full causes a reset.</p> <p>If the counter/timer causes a trigger at the same time that the sequential event causes a reset, the 1240 will trigger and the counter/timer will be set to 0.</p> |
| COUNTER/TIMER<br>COUNT mode<br>INCR CNTR                                                   | One count per valid evt.                | Range is 1 to 99,999,999,999 events                                                                                                                                                                                                                                                                                                                                                                              |
| TIME mode<br>TIME WHILE                                                                    | Accuracy, start to stop:<br>$\pm 20$ ns | Timer value truncated to 4 digits. Filter clk. must equal sample clk.                                                                                                                                                                                                                                                                                                                                            |
| SEQUENTIAL EVENT                                                                           |                                         | Event may consist only of groups assigned the same timebase.                                                                                                                                                                                                                                                                                                                                                     |
| Filter, accept event                                                                       | $N \times T$                            | N is value of the FILTER field; selections are 1-16. T is the period of the active timebase for that level.                                                                                                                                                                                                                                                                                                      |
| Sequence level execution rate                                                              | 30 ns                                   | Time after sequential event occurs before next level is allowed.                                                                                                                                                                                                                                                                                                                                                 |
| RESET action                                                                               | 40 ns                                   | <p>Reset from sequential event to timer not guaranteed if sequential event has SYNC timebase.</p> <p>Reset from sequential event to counter only guaranteed if both seq. and global events use same filter clock.</p>                                                                                                                                                                                            |
| Storage qualification                                                                      | 30 ns                                   | WITH STORAGE field; selections are ON and OFF.                                                                                                                                                                                                                                                                                                                                                                   |
| TO OCCUR nnnn TIMES                                                                        | One count per valid event               | Count of valid evts. before seq. evt. is satisfied; range is 1 - 9,999.                                                                                                                                                                                                                                                                                                                                          |
| Delay (nnnn CLOCKS)                                                                        | Delays up to 9,999 system clocks        | Count of clocks before sequential event is satisfied.                                                                                                                                                                                                                                                                                                                                                            |
| EXT TRIG OUT<br>Vout high (open)<br>Vout high (50 $\Omega$ )<br>Vout low (either)          |                                         | <p>50 <math>\Omega</math> source Z</p> <p>3.8 V min.</p> <p>1.9 V min.</p> <p>0.6 V max., at 7 mA</p>                                                                                                                                                                                                                                                                                                            |
| Pulse width                                                                                |                                         | 70 ns min., 120 ns max.                                                                                                                                                                                                                                                                                                                                                                                          |
| Delay; probe tip clock to trigger out                                                      |                                         | <p>65 ns min.</p> <p>90 ns max.</p>                                                                                                                                                                                                                                                                                                                                                                              |
| EXT TRIG IN<br>Input resistance<br>Input capacitance<br>V-input, max.<br>Acceptance window |                                         | <p>1 M<math>\Omega</math> <math>\pm</math> 1%</p> <p>37 pF <math>\pm</math> 5 pF</p> <p><math>\pm 20</math> V</p> <p>Window length = 100 ns; window starts 50 ns after clock that causes trigger.</p>                                                                                                                                                                                                            |



**Table 8-5 (cont.)**  
**1240 ELECTRICAL SPECIFICATIONS**

| Characteristic                                                                                              | Performance Requirements | Supplemental Information                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| x1 Probes and 50 $\Omega$ terminated coax.<br>Input threshold<br>Minimum pulse ampl.<br>Minimum pulse width |                          | 1.4 V $\pm$ 100 mV<br>1.8 V high, 1.0 V low<br>20 ns                                                                                                                                                                                         |
| x10 Probes<br>Input threshold<br>Minimum pulse ampl.<br>Minimum pulse width<br>Minimum slew rate            |                          | 1.4 V $\pm$ 500 mV<br>2.4 V high, 0.6 V low<br>30 ns<br>5 V/ $\mu$ s                                                                                                                                                                         |
| Time between triggers for linked 1240s                                                                      |                          | Slave trigger within 60 ns of master trigger                                                                                                                                                                                                 |
| T2 DEMUX CONTROL<br>Phase Delay between first phase (T2 F) and last phase (T2 L)                            | 10 ns min.               | Only first occurrence of next phase is valid. Successive clocks without an intervening alternate phase are ignored.                                                                                                                          |
| Phase delay between last phase (T2 L) and first phase (T2 F)                                                | 20 ns min.               |                                                                                                                                                                                                                                              |
| ASync TIMEBASE                                                                                              |                          | 10 ns to 1 s in 1-2-5 increments (0.01% average accuracy)                                                                                                                                                                                    |
| TWO TIMEBASE CORRELATION<br>Resolution of precedence between timebases.                                     | 10 ns                    | The 1240 can resolve the difference between a T1 and a T2 event if they occur 10 ns or more apart. If they occur < 10 ns from each other, the timebase that was previously indicated as occurring first will be indicated as occurring last. |

**Table 8-6**  
**1240 ENVIRONMENTAL SPECIFICATIONS**

| Characteristic                                                         | Description                                                                                                                                                         |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature<br>Maximum operating<br>Minimum operating<br>Non-operating | +55°C<br>-10°C<br>-62°C to +85°C                                                                                                                                    |
| Humidity                                                               | 95% to 97% relative humidity (Five 24 hr. cycles at 30°C to 60°C, instrument must reside in $\leq$ 70% relative humidity for two hours before and during operation) |
| Altitude<br>Operating<br>Non-operating                                 | 4.5 km (15,000 ft.)<br>15 km (50,000 ft.)                                                                                                                           |
| Vibration, operating<br>Displacement<br>Frequency range                | 0.025 inch (0.64 mm)<br>10 to 55 Hz                                                                                                                                 |
| Shock                                                                  | 30 G's, halfsine, 11 ms duration, 18 shocks total, 3 on each face                                                                                                   |
| Electromagnetic interference                                           | Meets FCC part 15, sub-part J, class A, without probes. Meets VDE 0871, class B, without probes.                                                                    |

**Table 8-7**  
**1240 PHYSICAL SPECIFICATIONS**

| Characteristic                            | Description           |
|-------------------------------------------|-----------------------|
| Weight                                    | 12.0 kg (26.5 lbs.)   |
| Overall Dimensions                        |                       |
| Height (handle folded back)               | 19.7 cm (7.8 inches)  |
| Width (including handle)                  | 36.8 cm (14.5 inches) |
| Length (including protective front cover) | 49.8 cm (19.6 inches) |

**Table 8-8**  
**1240D1 ELECTRICAL SPECIFICATIONS**

| Characteristic        | Performance Requirements                               | Supplemental Information                                                                                                                                                                               |
|-----------------------|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MEMORY CONFIGURATION  |                                                        |                                                                                                                                                                                                        |
| Width                 |                                                        | 9 stored data channels; 1 non-stored clock/qualifier chan.                                                                                                                                             |
| Depth                 |                                                        | Glitches On / Glitches Off                                                                                                                                                                             |
| no chaining           |                                                        | 257      513                                                                                                                                                                                           |
| 2 1240D1s chained     |                                                        | 513      1025                                                                                                                                                                                          |
| 3 1240D1s chained     |                                                        | 769      1537                                                                                                                                                                                          |
| 4 1240D1s chained     |                                                        | 1025      2049                                                                                                                                                                                         |
| TIMEBASE GENERATION   |                                                        |                                                                                                                                                                                                        |
| Clock Input           |                                                        |                                                                                                                                                                                                        |
| Pulse Width           | 8 ns min.                                              |                                                                                                                                                                                                        |
| Period                | 20 ns min.                                             |                                                                                                                                                                                                        |
| Amplitude             | $\pm 350$ mV min. above and below programmed threshold | Min. time between OR'd clks is 25 ns                                                                                                                                                                   |
| Qualifier Input       |                                                        |                                                                                                                                                                                                        |
| Setup time            | 11 ns max.                                             |                                                                                                                                                                                                        |
| Hold time             | 0 ns max.                                              | Values based on 1240D1 equipped with P6460 Data Acquisition Probe. Single selected qualifier driven.                                                                                                   |
| SYNCHRONOUS OPERATION |                                                        |                                                                                                                                                                                                        |
| Data, all channels    |                                                        | Uses signals specified by operator in Timebase menu. Can be used with all timebases.<br>Data word width = 14 ns min. Setup and hold values based on 1240D1 equipped with P6460 Data Acquisition Probe. |
| Setup time            | 7 ns                                                   | 4 ns setup time for single channel driven                                                                                                                                                              |
| Hold time             | 0.5 ns (T1 sourced from 1240D1)                        | 2 ns hold time if data acquired on one type of acq. card and clk. source on other type.                                                                                                                |
| Amplitude             | $\pm 350$ mV min. above and below programmed threshold |                                                                                                                                                                                                        |

**Table 8-8 (cont.)**  
**1240D1 ELECTRICAL SPECIFICATIONS**

| Characteristic                                                                                                                                  | Performance Requirements                                      | Supplemental Information                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SYNC Events<br>Global event for all channels<br><br>Sequential event for all channels                                                           |                                                               | At max. SYNC rate, any input event meeting setup and hold times and min. word width.<br><br>At max. SYNC rate, recognize any input event meeting setup and hold times and min. word width. Up to 14 different events, one per sequence level. |
| ASYNCHRONOUS OPERATION<br>Data min. word width guar. to be sampled                                                                              | Timebase period + 6 ns                                        | Timebase period + 8 ns with 1240D2; N samples of word requires $(N \times T) + 6$ ns min. word width $((N \times T) + 8$ ns with 1240D2)                                                                                                      |
| Glitch Capture<br>Glitch width<br><br><br>Glitch amplitude                                                                                      | <br><br><br>$\pm 350$ mV above and below programmed threshold | 6 ns at threshold (single chan.) at max. glitch/data transition rate of 30 ns<br><br>Glitch may be detected as both glitch & data if transition occurs within 2 ns of sample clk.                                                             |
| ASYNC Events<br>Global event, all chans. min. data word width guar. to be sampled<br>Clocked (1, 0, X, $\blacklozenge$ )<br>Unclocked (1, 0, X) | Timebase period + 6 ns<br><br>16 ns min.                      | N samples of word requires $(N \times T) + 6$ ns min. word width $((N \times T) + 8$ ns with 1240D2)<br><br>Timebase period + 8 ns with 1240D2<br>Min. width of valid event when global filter = 1 at 10NS and no 1240D2 channels specified   |
| Sequential Event (1, 0, X)                                                                                                                      | Timebase period + 6 ns                                        | Timebase period + 8 ns with 1240D2                                                                                                                                                                                                            |
| PROBE THRESHOLD<br>Threshold range<br><br>Accuracy                                                                                              | <br><br>$\pm 0.5\% \pm 65$ mV                                 | Selectable from +6.35 to -6.35 V in 50 mV increments; also includes preset values for TTL (+1.4 V), TPG (+3.70 V), -ECL (-1.30 V)                                                                                                             |

**Table 8-9**  
**1240D2 ELECTRICAL SPECIFICATIONS**

| Characteristic                                                                      | Performance Requirements | Supplemental Information                                     |
|-------------------------------------------------------------------------------------|--------------------------|--------------------------------------------------------------|
| MEMORY CONFIGURATION<br>Width                                                       |                          | 18 stored data channels; 2 non-stored clock/qualifier chans. |
| Depth<br>no chaining<br>2 1240D2s chained<br>3 1240D2s chained<br>4 1240D2s chained |                          | 513<br>1025<br>1537<br>2049                                  |

**Table 8-9 (cont.)**  
**1240D2 ELECTRICAL SPECIFICATIONS**

| Characteristic                                                                                                                                 | Performance Requirements                                                                | Supplemental Information                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>TIMEBASE GENERATION</b><br>Clock Input<br>Pulse Width<br>Period<br>Amplitude                                                                | 8 ns min.<br>20 ns min.<br>$\pm 350$ mV min. above<br>and below programmed<br>threshold | Min. time between OR'd clocks is 25 ns                                                                                                                                                                                                                                                                                |
| Qualifier Input<br>Setup time<br>Hold time                                                                                                     | 11 ns max.<br>0 ns max.                                                                 | Single, selected qualifier driven. Values based on 1240D2 equipped with P6460 Data Acq. Probes.                                                                                                                                                                                                                       |
| <b>SYNCHRONOUS OPERATION</b><br>Data, all channels<br>Setup time<br>Hold time<br>Amplitude                                                     | 12 ns<br>0 ns<br>$\pm 350$ mV min. above<br>and below programmed<br>threshold           | Uses signals specified by operator in Timebase menu. Can be used with all timebases. Setup and hold values based on a 1240D2 equipped with P6460 Data Acquisition Probes.                                                                                                                                             |
| <b>SYNC Events</b><br>Global event for all channels<br>Sequential event for all channels                                                       |                                                                                         | At max. SYNC rate, any input event meeting setup and hold times.<br>At max. SYNC rate, recognize any input event meeting setup and hold times. Up to 14 different events, one per sequence level.                                                                                                                     |
| <b>ASYNCHRONOUS OPERATION</b><br>Data min. word width guaranteed to be sampled                                                                 | Timebase period + 6 ns                                                                  | Timebase period + 8 ns with 1240D1; N samples of word requires $(N \times T) + 6$ ns min. word width $((N \times T) + 8$ ns with 1240D1)                                                                                                                                                                              |
| <b>ASYNCH Events</b><br>Global evt., all chans. min. data word width guar. to be sampled<br>Clocked<br>(1, 0, X)<br><br>Unclocked<br>(1, 0, X) | Timebase period + 6 ns<br><br>16 ns min.                                                | N samples of word requires $(N \times T) + 6$ ns min. word width $((N \times T) + 8$ ns with 1240D2)<br><br>Data stored may be different than that recognized by event recognizer; Timebase period + 8 ns with 1240D1<br>Minimum width of valid event when global filter = 1 at 10NS and no 1240D1 channels specified |
| Sequential Event<br>(1, 0, X)                                                                                                                  | Timebase period + 6 ns                                                                  | Timebase period + 8 ns with 1240D1                                                                                                                                                                                                                                                                                    |
| <b>PROBE THRESHOLD</b><br>Threshold range<br><br>Accuracy                                                                                      | <br><br>$\pm 0.5\% \pm 65$ mV                                                           | Selectable from +6.35 to -6.35 V in 50 mV increments; also includes preset values for TTL (+1.4 V), TPG (+3.70 V), -ECL (-1.30 V)                                                                                                                                                                                     |

## ERROR AND PROMPT MESSAGES

|                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ALL AVAILABLE LEVELS<br>ARE DEFINED: CHANGE<br>AN EXISTING LEVEL                 | You tried to use the ADD LEVEL soft key when all 14 sequence levels are defined.                                                                                                                                                                                                                                                                                                                                                                                 |
| ALL AVAILABLE LOCATIONS<br>DEFINED: CHANGE AN<br>EXISTING LOCATION               | You tried to add a new line to the search pattern when all eight lines (maximum) are already defined.                                                                                                                                                                                                                                                                                                                                                            |
| APPLYING SEARCH PATTERN —<br>PLEASE WAIT                                         | This message is displayed whenever the search pattern is applied to memory. The function can take several seconds to complete.                                                                                                                                                                                                                                                                                                                                   |
| CANNOT EDIT AN<br>EMPTY REFMEM                                                   | This message is displayed when you try to access the Reference Memory Editor menu when the current REFMEM contains no data.                                                                                                                                                                                                                                                                                                                                      |
|                                                                                  | The following five error messages can occur whenever you display ACQMEM or REFMEM, use the COMPARE ACQMEM TO REFMEM Auto-Run condition, or press the LOAD FROM ACTIVE CURSOR soft key.                                                                                                                                                                                                                                                                           |
| CONFIG ERROR:<br>(ACQMEM/REFMEM)<br>ABSENT MEMORIES ARE<br>(list of pod numbers) | Memory to be displayed was downloaded from a ROM or RAM pack or from a remote controller, and was acquired on a 1240 with a different configuration than the current instrument setup. The pod numbers listed correspond to the unused memory segments in the downloaded memory. (Refer to <i>Memory Width vs. Depth</i> in Section 3 for a definition of memory segment.) The downloaded memory cannot be displayed unless the 1240's configuration is changed. |
| CONFIG ERROR:<br>(ACQMEM/REFMEM)<br>9 CHANNEL CARDS<br>ARE (width) BY (depth)    | Memory to be displayed was stored with different 9-channel width vs. depth parameters than the current instrument setup.                                                                                                                                                                                                                                                                                                                                         |
| CONFIG ERROR:<br>(ACQMEM/REFMEM)<br>18 CHANNEL CARDS<br>ARE (width) BY (depth)   | Memory to be displayed was stored with different 18-channel width vs. depth parameters than the current instrument setup.                                                                                                                                                                                                                                                                                                                                        |
| CONFIG ERROR:<br>(ACQMEM/REFMEM) T1<br>MEMORIES ARE:<br>(list of pod numbers)    | Memory to be displayed was stored with different T1-pod assignments than the current instrument setup.                                                                                                                                                                                                                                                                                                                                                           |
| CONFIG ERROR:<br>(ACQMEM/REFMEM) T2<br>MEMORIES ARE:<br>(list of pod numbers)    | Memory to be displayed was stored with different T2-pod assignments than the current instrument setup.                                                                                                                                                                                                                                                                                                                                                           |
| DIRECTORY FULL: DELETE<br>AN EXISTING FILE FROM<br>THE RAM PACK                  | This message is displayed when the area of the RAM pack reserved for storing file names is full, and you tried to store another file.                                                                                                                                                                                                                                                                                                                            |

(cont.)

|                                                                 |                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DON'T CARE INVALID IN THE REFMEM                                | Don't care (X) is not a valid character in the Reference Memory Editor menu.                                                                                                                                                                                                                                                                         |
| GLITCH CAPTURE NOT ENABLED                                      | You cannot enter a glitch symbol in the Trigger Spec or Search Pattern Entry menus when <b>GLITCHES OFF</b> is selected in the Memory Config menu. You cannot edit a glitch into reference memory if <b>GLITCHES OFF</b> was selected when the REFMEM data was acquired.                                                                             |
| GLITCH INVALID IN A MASK FIELD                                  | The glitch symbol is not a valid entry for the MASK fields in the COMPARE ACQMEM TO REFMEM Auto-Run condition.                                                                                                                                                                                                                                       |
| GLITCH INVALID ON 18-CHANNEL CARD                               | You tried to enter the glitch symbol for a channel acquired by an 18-channel card. An 18-channel card cannot acquire glitches.                                                                                                                                                                                                                       |
| GLITCH INVALID WITH SYNCHRONOUS TIMEBASE                        | You tried to enter the glitch symbol for a group that is assigned a synchronous timebase.                                                                                                                                                                                                                                                            |
| GLITCH INVALID WITH UNCLOCKED GLOBAL EVENT RECOGNIZER           | You tried to enter the glitch symbol in the global event recognizer when GLOBAL EVENT = <b>UNCLOCKED</b> is selected in the Timebase menu.                                                                                                                                                                                                           |
| GROUP FULL: CANNOT INSERT CHANNEL                               | You touched INSERT CHANNEL for a group that already has the maximum of 36 channels.                                                                                                                                                                                                                                                                  |
| HIGHLIGHTING OFF                                                | You touched NEXT HIGHLIGHT DATA but the HIGHLIGHT field is set to <b>OFF</b> .                                                                                                                                                                                                                                                                       |
| INVALID CHANNEL NUMBER                                          | You tried to enter a value other than 0-8 or X in a CHAN field.                                                                                                                                                                                                                                                                                      |
| INVALID CHECKSUM: PACK IGNORED                                  | The verification routine that runs when you press the LOAD NEW PACK soft key found a checksum error in the newly installed ROM pack.                                                                                                                                                                                                                 |
| INVALID CHECKSUM: "X" INITS PACK, ANY OTHER HARD KEY IGNORES IT | When you install a RAM pack and touch the LOAD NEW PACK soft key, this message is displayed if the pack verification routine detects a checksum error. Press X to clear and format the pack for use. This message is normal when a new, unused RAM pack is installed.                                                                                |
| INVALID INPUT FOR BINARY RADIX<br>INVALID INPUT FOR OCTAL RADIX | You tried to enter a digit too large for the selected radix. Valid binary values are 0 and 1; valid octal values are 0-7.                                                                                                                                                                                                                            |
| INVALID INPUT FOR PARTIAL DIGIT                                 | You entered a number too large to fit in the number of bits remaining in the digit. For example: if a group is made up of 10 channels and the input radix is HEX, the input fields for this group will have three digits. The largest value you can enter is 3FF. If you try to enter 4-F for the high-order digit, this error message is displayed. |

(cont.)

|                                                                 |                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| INVALID OPERATION: FILE TYPE NOT RECOGNIZED                     | You can store special file types (created by ROM packs) into a RAM pack. This message is displayed when you try to load a special file from a RAM pack and the 1240 no longer contains the internal parameters set up by the ROM pack to use the special file. Refer to the ROM pack manual for complete details. |
| INVALID OPERATION: FILES CANNOT BE DELETED FROM A ROM PACK      | You tried to delete a file stored in a ROM pack. New files cannot be added to ROM packs, and existing files cannot be deleted.                                                                                                                                                                                    |
| INVALID OPERATION: NO FILES TO (DELETE/LOAD)                    | You touched LOAD FILE or DELETE FILE in the Storage Memory Manager menu when there were no files in the EXISTING FILES list.                                                                                                                                                                                      |
| INVALID POD NUMBER                                              | The number you tried to enter in the POD field corresponds to a pod that either does not exist, is not assigned to the type of card you are building groups for, or has a different timebase than that already defined for the group.                                                                             |
| INVALID SETUP:<br>INCONSISTENT DATA<br>OR HARDWARE REQUIREMENTS | Before a setup is loaded into the 1240 from a ROM or RAM pack, it is tested for certain conditions. This message is displayed when you press LOAD FILE and the setup does not pass the verification tests. This might happen if the setup is based on a different 1240 configuration or if the file is corrupt.   |
| MEMORY FULL: DELETE AN EXISTING FILE FROM ....                  | You pressed the STORE NEW FILE soft key and there is not enough storage space remaining in the selected storage area.                                                                                                                                                                                             |
| MEMORIES CAN ONLY BE STORED INTO A RAM PACK                     | You pressed STORE NEW FILE in the Storage Memory Manager menu with a FILETYPE of ACQ-MEM or REFMEM, but the selection in the STORED IN field was not PACK.                                                                                                                                                        |
| MOVE FIELD CURSOR TO A CHANNEL SELECTION FIELD                  | You touched DISPLAY NEXT CHANNEL in the Timing Diagram when the field cursor was not in a channel selection (trace name) field.                                                                                                                                                                                   |
| MOVE FIELD CURSOR TO A GROUP DEFINITION FIELD                   | You pressed CLEAR GROUP with the field cursor positioned on the CARD TYPE field.                                                                                                                                                                                                                                  |
| MOVE FIELD CURSOR TO A POD OR CHAN FIELD                        | You tried to use DELETE CHANNEL, ADD NEXT CHANNEL, or INSERT CHANNEL when the field cursor was not on a POD or CHAN field.                                                                                                                                                                                        |
| MOVE FIELD CURSOR TO A SEQUENCE LEVEL                           | You tried to delete a level of the sequential event recognizer when the field cursor was not positioned in a level.                                                                                                                                                                                               |
| MOVE FIELD CURSOR TO AN ASSIGNED CHANNEL                        | You touched the ADD NEXT CHANNEL soft key when the field cursor was positioned on an undefined channel (POD and/or CHAN value of X).                                                                                                                                                                              |

(cont.)

|                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MOVE FIELD CURSOR TO AN EVENT RECOGNIZER GROUP FIELD | You touched LOAD FROM ACTIVE CURSOR in the Trigger Spec menu when the field cursor was not positioned in an event recognizer value field.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| NO DATA TO EDIT IN CURRENT GROUPING                  | This message is displayed in the Reference Memory Editor menu when the 1240 has acquired data but has no grouping information for those channels and, therefore, cannot display the data.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| NO GROUPS DEFINED: CANNOT EXIT MENU                  | You cannot exit the Channel Grouping menu if all groups are unspecified (all channels in the UN-USED list).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| NO HIGHLIGHTED LOCATIONS OCCUR                       | You touched NEXT HIGHLIGHT DATA and no data meeting the highlight requirements was found.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| NO SUCCESSOR TO CHANNEL 0                            | You tried to add another channel to a group with the ADD NEXT CHANNEL soft key when the field cursor was positioned on a CHAN value of 0.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| NO VALID DATA ACQUIRED                               | <p>This error message can be displayed for either of the following two reasons:</p> <ol style="list-style-type: none"> <li>1. No data was acquired; acquisition memory is empty. This can occur if the sampling clock is SYNC and no clocks occur. It can also occur if you use clock and/or storage qualification to reject all clocks and/or data.</li> <li>2. The current clock setup violates the 1240's clock specifications. (Data is acquired, but it is not valid.) For example: The clock specifications are violated if you try to clock the 1240 faster than 20 ns SYNC. The clock specifications can also be violated if you change the card threshold during the COMPARE ACQMEM TO REFEMEM Auto-Run mode, and the clock line is noisy.</li> </ol> |
| OPERATION IN PROGRESS — PLEASE WAIT                  | This message is displayed when you store or load a memory file in the Storage Memory Manager menu. Storing and loading operations can take several seconds to complete.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| PATTERN SEARCH DISABLED                              | You selected pattern highlighting in the State Table or Timing Diagram but the PATTERN SEARCH <b>DISABLED</b> selection is currently in effect in the Search Pattern Entry menu.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| PRESS "STOP" TO TERMINATE ACQUISITION                | The five MENU keys and STOP are the only valid key inputs while the 1240 is acquiring data. When you press one of the MENU keys, acquisition stops, and the 1240 displays the last menu accessed in that menu group. When you press STOP, acquisition stops, and the 1240 displays data in state table or timing diagram format. During COMPARE ACQMEM TO REFEMEM status display operations, only STOP is valid.                                                                                                                                                                                                                                                                                                                                               |



(cont.)

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|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PRESS "X" TO CONFIRM OPERATION (ANY OTHER HARD KEY CANCELS IT)         | This is not an error message. It is displayed when you touch a soft key that requires verification before the action is taken.                                                                                                                                                                                                         |
| SELECTED FILETYPE CAN ONLY BE STORED INTO A RAM PACK                   | The file to be stored is an ACQMEM, REFMEM, or special file type (from a previously-installed ROM pack) but the selected storage area is not <b>PACK</b> . Nonvolatile memory and internal RAM can store only instrument setups; memories and other special file types can only be stored in a RAM pack.                               |
| UNKNOWN PACK TYPE: PACK IGNORED                                        | The verification routine that runs when you touch the LOAD NEW PACK soft key did not recognize the newly installed ROM pack as a valid 1240 pack. This occurs when the ROM pack is not a 1240 pack, or if it is defective.                                                                                                             |
| UNKNOWN RAM PACK: "X" INITIS PACK, ANY OTHER HARD KEY IGNORES IT       | When you install a RAM pack and touch the LOAD NEW PACK soft key, this message is displayed if the pack verification routine cannot identify the pack. Press the X key on the front panel to clear and format the pack for use. This message is normal when a new, unused RAM pack is installed.                                       |
| USE 0-9                                                                | You tried to enter a non-decimal value into a decimal field.                                                                                                                                                                                                                                                                           |
| USE 0 OR 1                                                             | You tried to enter a number other than 0 or 1 in a POLARITY field.                                                                                                                                                                                                                                                                     |
| USE 1-E                                                                | You tried to enter something besides 1-E in the TO LEVEL field (displayed when JUMP IF/JUMP IF NOT is selected in the sequential event recognizer).                                                                                                                                                                                    |
| USE SELECT KEYS                                                        | You tried to use the data entry keys to enter a value into a field controlled by the SELECT keys.                                                                                                                                                                                                                                      |
| WARNING: 10 NS INVALID - GLITCH ENABLED and/or 18 CHANNEL CARD USES T1 | The 10 NS selection for T1 ASYNC is not available because glitch storage is enabled in the Memory Config menu, and/or an 18-channel card is assigned to T1. For 10 ns acquisition, glitch storage must be disabled, and all 18-channel cards must be assigned T2. Refer to <i>10 ns Acquisition</i> in Section 3 for more information. |
| WARNING: JUMP TO UNDEFINED LEVEL CAUSES TRIGGER                        | You entered the number of a level not currently defined in the sequential event recognizer into the TO LEVEL field (displayed when JUMP IF/-JUMP IF NOT is selected).                                                                                                                                                                  |
| WARNING: MAXIMUM VALUE USED                                            | This message is displayed if you try to enter too large a numeric value into certain fields. The 1240 sets the field to its maximum value.                                                                                                                                                                                             |

(cont.)

|                                                           |                                                                                                                                                                                                                                            |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WARNING: MINIMUM<br>VALUE USED                            | You tried to enter a numeric value lower than the acceptable minimum for a field. The 1240 sets the field to its minimum value.                                                                                                            |
| WARNING: SETUP INFORMATION IN OTHER MENUS WILL<br>BE LOST | This message is displayed when you change the Operation Level to a lower number and the existing setup was specified under a higher number. Refer to Table 8-1 for a description of the possible changes.                                  |
| WARNING: T1 STORAGE<br>QUALIFICATION DISABLED<br>AT 10 NS | This message is displayed in the Trigger Spec menu when T1 is ASYNC 10 NS, and you select STORE in the global event recognizer. The 1240 does not support storage qualification for T1 channels at 10 ns. At 10 ns, all T1 data is stored. |

## DIFFERENCES BETWEEN OPERATION LEVELS

**Table 8-10**  
**DIFFERENCES BETWEEN THE OPERATION LEVELS**

| Level | Timebase Menu                                     | Memory Config Menu | Trigger Spec Menu                                                                                                                             |
|-------|---------------------------------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| 0     | Only T1<br><br>CLOCKED/UNCLOCKED<br>not displayed | No Chaining        | LOOK FOR TRIGGER<br>and FILTER fields not<br>displayed.<br><br>WITH STORAGE fields<br>not displayed in se-<br>quential event recog-<br>nizer. |
| 1     | Only T1                                           | Full Operation     | WITH STORAGE fields<br>not displayed in se-<br>quential event recog-<br>nizer.                                                                |
| 2     | T1 , T2<br>CLOCKED/UNCLOCKED<br>not displayed     | Full Operation     | FILTER fields not<br>displayed.                                                                                                               |
| 3     | Full Operation                                    | Full Operation     | Full Operation                                                                                                                                |

## TEST PATTERN GENERATOR INFORMATION

The test pattern generator (TPG) simulates a data source by sending a data pattern of 63 unique values to the two sets of pins located directly above the probe connections on the right side panel of the 1240. A different pattern is available from both TPG outputs; these patterns are listed below in Tables 8-11 and 8-12.

The TPG MODE field in the Operation Level menu (see Section 3) lets you select how the patterns will be clocked and whether the patterns will contain glitches. Table 8-13 describes the characteristics of the different TPG modes. Mode 0 is the power-up default. Figures 8-1 and 8-2 explain the clock and data outputs for the different modes.

When you acquire data from the TPG, you must set the THRESHOLD fields for the cards connected to the TPG outputs to TPG. This selection sets the card input threshold to +3.70 V, to correspond to the TPG output levels.

### NOTE

*The TPG can only be used with the P6460 Data Acquisition Probe.*

*The TPG is only guaranteed to operate properly within the temperature range +20°C to +30°C.*

**Table 8-11**  
TPG PATTERN FROM LEFT CONNECTOR

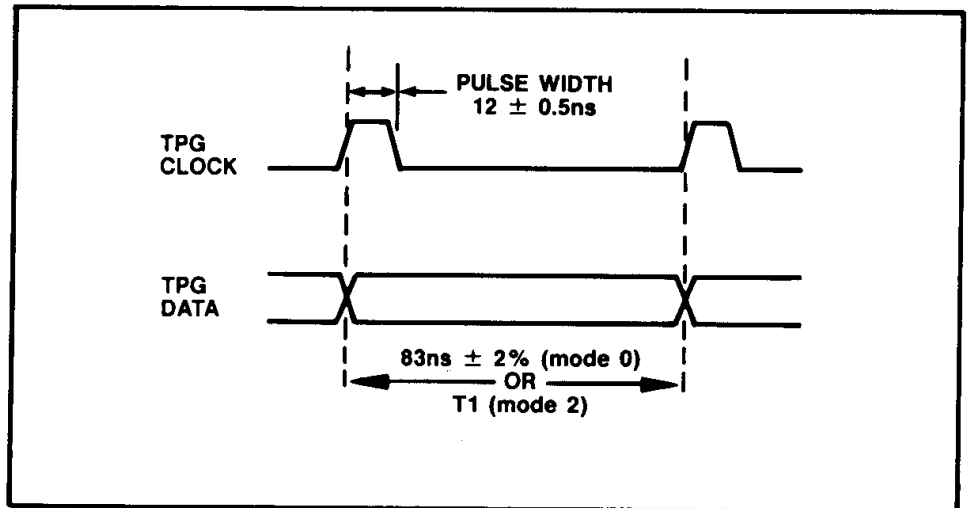
|     |     |     |     |
|-----|-----|-----|-----|
| 1FF | 1AE | 071 | 186 |
| 1BE | 15D | 0A2 | 10C |
| 17D | 0FB | 145 | 018 |
| 0BA | 1B6 | 0CB | 030 |
| 175 | 16D | 1D7 | 061 |
| 0AA | 09A | 1EF | 082 |
| 155 | 134 | 19E | 104 |
| 0EB | 069 | 13C | 008 |
| 196 | 092 | 079 | 010 |
| 12C | 124 | 0B2 | 020 |
| 059 | 049 | 165 | 041 |
| 0F3 | 0D3 | 08A | 0C3 |
| 1A6 | 1E7 | 114 | 1C7 |
| 14D | 18E | 028 | 1CF |
| 0DB | 11C | 051 | 1DF |
| 1F7 | 038 | 0E3 |     |

**Table 8-12**  
TPG PATTERN FROM RIGHT CONNECTOR

|     |     |     |     |
|-----|-----|-----|-----|
| 1FF | 175 | 18E | 030 |
| 1F7 | 0EB | 114 | 061 |
| 1EF | 1DF | 028 | 0C3 |
| 1D7 | 1B6 | 059 | 186 |
| 1AE | 16D | 0BA | 10C |
| 155 | 0D3 | 17D | 010 |
| 0AA | 1A6 | 0F3 | 020 |
| 15D | 14D | 1E7 | 041 |
| 0B2 | 092 | 1CF | 082 |
| 165 | 124 | 196 | 104 |
| 0CB | 049 | 12C | 008 |
| 19E | 09A | 051 | 018 |
| 134 | 13C | 0A2 | 038 |
| 069 | 071 | 145 | 079 |
| 0DB | 0E3 | 08A | 0FB |
| 1BE | 1C7 | 11C |     |

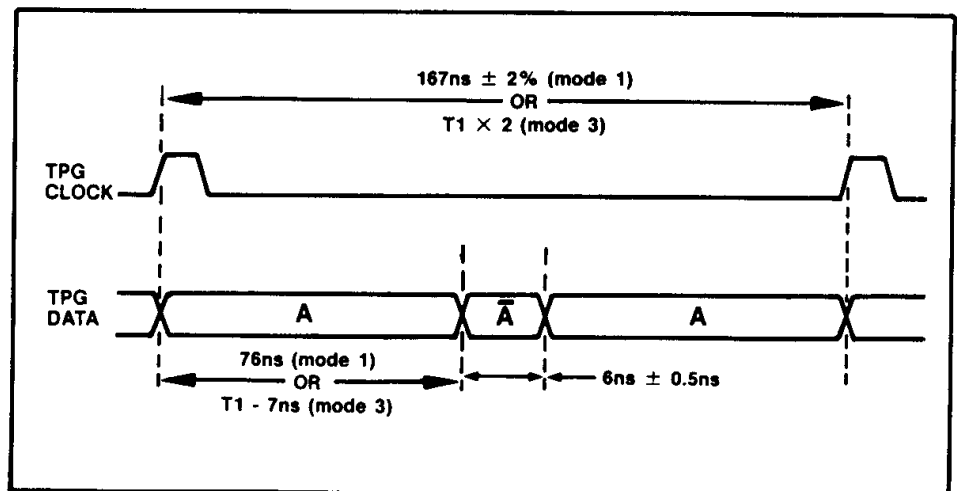
**Table 8-13**  
TPG MODES

| Mode | With Glitches | Clocked At |
|------|---------------|------------|
| 0    | No            | 12 MHz     |
| 1    | Yes           | 6 MHz      |
| 2    | No            | T1         |
| 3    | Yes           | T1 ÷ 2     |



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**Figure 8-1. Mode 0 and mode 2 TPG outputs.** In mode 0, the clock is derived from a 12 MHz oscillator which is internal to the TPG. In mode 2, the clock source is timebase T1 (specified in the Timebase menu); the TPG output is only valid when T1 is less than or equal to 50 MHz.



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**Figure 8-2. Mode 1 and mode 3 TPG outputs.** In mode 1, the clock is derived from a 12 MHz oscillator which is internal to the TPG. Alternate clock cycles are used to produce glitches, so the actual frequency of the output is 6 MHz. In mode 3, the clock source is timebase T1 (specified in the timebase menu) and the output period is  $T1 \times 2$ . The TPG output is only valid when T1 is less than or equal to 50 MHz.

**OCTAL-HEX-ASCII CONVERSION CHART**

| OCT | HEX | ASC | OCT | HEX | ASC | OCT | HEX | ASC | OCT | HEX | ASC |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 000 | 00  | NUL | 040 | 20  | SP  | 100 | 40  | @   | 140 | 60  | `   |
| 001 | 01  | SOH | 041 | 21  | !   | 101 | 41  | A   | 141 | 61  | a   |
| 002 | 02  | STX | 042 | 22  | "   | 102 | 42  | B   | 142 | 62  | b   |
| 003 | 03  | ETX | 043 | 23  | #   | 103 | 43  | C   | 143 | 63  | c   |
| 004 | 04  | EOT | 044 | 24  | \$  | 104 | 44  | D   | 144 | 64  | d   |
| 005 | 05  | ENQ | 045 | 25  | %   | 105 | 45  | E   | 145 | 65  | e   |
| 006 | 06  | ACK | 046 | 26  | &   | 106 | 46  | F   | 146 | 66  | f   |
| 007 | 07  | BEL | 047 | 27  | '   | 107 | 47  | G   | 147 | 67  | g   |
| 010 | 08  | BS  | 050 | 28  | (   | 110 | 48  | H   | 150 | 68  | h   |
| 011 | 09  | HT  | 051 | 29  | )   | 111 | 49  | I   | 151 | 69  | i   |
| 012 | 0A  | LF  | 052 | 2A  | *   | 112 | 4A  | J   | 152 | 6A  | j   |
| 013 | 0B  | VT  | 053 | 2B  | +   | 113 | 4B  | K   | 153 | 6B  | k   |
| 014 | 0C  | FF  | 054 | 2C  | ,   | 114 | 4C  | L   | 154 | 6C  | l   |
| 015 | 0D  | CR  | 055 | 2D  | -   | 115 | 4D  | M   | 155 | 6D  | m   |
| 016 | 0E  | SO  | 056 | 2E  | .   | 116 | 4E  | N   | 156 | 6E  | n   |
| 017 | 0F  | SI  | 057 | 2F  | /   | 117 | 4F  | O   | 157 | 6F  | o   |
| 020 | 10  | DLE | 060 | 30  | 0   | 120 | 50  | P   | 160 | 70  | p   |
| 021 | 11  | DC1 | 061 | 31  | 1   | 121 | 51  | Q   | 161 | 71  | q   |
| 022 | 12  | DC2 | 062 | 32  | 2   | 122 | 52  | R   | 162 | 72  | r   |
| 023 | 13  | DC3 | 063 | 33  | 3   | 123 | 53  | S   | 163 | 73  | s   |
| 024 | 14  | DC4 | 064 | 34  | 4   | 124 | 54  | T   | 164 | 74  | t   |
| 025 | 15  | NAK | 065 | 35  | 5   | 125 | 55  | U   | 165 | 75  | u   |
| 026 | 16  | SYN | 066 | 36  | 6   | 126 | 56  | V   | 166 | 76  | v   |
| 027 | 17  | ETB | 067 | 37  | 7   | 127 | 57  | W   | 167 | 77  | w   |
| 030 | 18  | CAN | 070 | 38  | 8   | 130 | 58  | X   | 170 | 78  | x   |
| 031 | 19  | EM  | 071 | 39  | 9   | 131 | 59  | Y   | 171 | 79  | y   |
| 032 | 1A  | SUB | 072 | 3A  | :   | 132 | 5A  | Z   | 172 | 7A  | z   |
| 033 | 1B  | ESC | 073 | 3B  | ;   | 133 | 5B  | [   | 173 | 7B  | {   |
| 034 | 1C  | FS  | 074 | 3C  | <   | 134 | 5C  | \   | 174 | 7C  |     |
| 035 | 1D  | GS  | 075 | 3D  | =   | 135 | 5D  | ]   | 175 | 7D  | }   |
| 036 | 1E  | RS  | 076 | 3E  | >   | 136 | 5E  | ^   | 176 | 7E  | ~   |
| 037 | 1F  | US  | 077 | 3F  | ?   | 137 | 5F  | _   | 177 | 7F  | DEL |

## OCTAL-HEX-EBCDIC CONVERSION CHART

| OCT | HEX | EBC | OCT | HEX | EBC | OCT | HEX | EBC | OCT | HEX | EBC |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 000 | 00  | NUL | 100 | 40  | SP  | 200 | 80  |     | 300 | C0  | {   |
| 001 | 01  | SOH | 101 | 41  |     | 201 | 81  | a   | 301 | C1  | A   |
| 002 | 02  | STX | 102 | 42  |     | 202 | 82  | b   | 302 | C2  | B   |
| 003 | 03  | ETX | 103 | 43  |     | 203 | 83  | c   | 303 | C3  | C   |
| 004 | 04  | PF  | 104 | 44  |     | 204 | 84  | d   | 304 | C4  | D   |
| 005 | 05  | HT  | 105 | 45  |     | 205 | 85  | e   | 305 | C5  | E   |
| 006 | 06  | LC  | 106 | 46  |     | 206 | 86  | f   | 306 | C6  | F   |
| 007 | 07  | DEL | 107 | 47  |     | 207 | 87  | g   | 307 | C7  | G   |
| 010 | 08  | GE  | 110 | 48  |     | 210 | 88  | h   | 310 | C8  | H   |
| 011 | 09  | RLF | 111 | 49  |     | 211 | 89  | i   | 311 | C9  | I   |
| 012 | 0A  | SMM | 112 | 4A  | ¢   | 212 | 8A  |     | 312 | CA  |     |
| 013 | 0B  | VT  | 113 | 4B  | .   | 213 | 8B  |     | 313 | CB  |     |
| 014 | 0C  | FF  | 114 | 4C  | <   | 214 | 8C  |     | 314 | CC  |     |
| 015 | 0D  | CR  | 115 | 4D  | (   | 215 | 8D  |     | 315 | CD  |     |
| 016 | 0E  | SO  | 116 | 4E  | +   | 216 | 8E  |     | 316 | CE  |     |
| 017 | 0F  | SI  | 117 | 4F  |     | 217 | 8F  |     | 317 | CF  |     |
| 020 | 10  | DLE | 120 | 50  | &   | 220 | 90  |     | 320 | D0  | }   |
| 021 | 11  | DC1 | 121 | 51  |     | 221 | 91  | j   | 321 | D1  | J   |
| 022 | 12  | DC2 | 122 | 52  |     | 222 | 92  | k   | 322 | D2  | K   |
| 023 | 13  | TM  | 123 | 53  |     | 223 | 93  | l   | 323 | D3  | L   |
| 024 | 14  | RES | 124 | 54  |     | 224 | 94  | m   | 324 | D4  | M   |
| 025 | 15  | NL  | 125 | 55  |     | 225 | 95  | n   | 325 | D5  | N   |
| 026 | 16  | BS  | 126 | 56  |     | 226 | 96  | o   | 326 | D6  | O   |
| 027 | 17  | IL  | 127 | 57  |     | 227 | 97  | p   | 327 | D7  | P   |
| 030 | 18  | CAN | 130 | 58  |     | 230 | 98  | q   | 330 | D8  | Q   |
| 031 | 19  | EM  | 131 | 59  | !   | 231 | 99  | r   | 331 | D9  | R   |
| 032 | 1A  | CC  | 132 | 5A  |     | 232 | 9A  |     | 332 | DA  |     |
| 033 | 1B  | CU1 | 133 | 5B  | \$  | 233 | 9B  |     | 333 | DB  |     |
| 034 | 1C  | IFS | 134 | 5C  | *   | 234 | 9C  |     | 334 | DC  |     |
| 035 | 1D  | IGS | 135 | 5D  | )   | 235 | 9D  |     | 335 | DD  |     |
| 036 | 1E  | IRS | 136 | 5E  | .   | 236 | 9E  |     | 336 | DE  |     |
| 037 | 1F  | IUS | 137 | 5F  | :   | 237 | 9F  |     | 337 | DF  |     |
| 040 | 20  | DS  | 140 | 60  | -   | 240 | A0  |     | 340 | E0  | \   |
| 041 | 21  | SOS | 141 | 61  | /   | 241 | A1  | ~   | 341 | E1  |     |
| 042 | 22  | FS  | 142 | 62  |     | 242 | A2  | s   | 342 | E2  | S   |
| 043 | 23  |     | 143 | 63  |     | 243 | A3  | t   | 343 | E3  | T   |
| 044 | 24  | BYP | 144 | 64  |     | 244 | A4  | u   | 344 | E4  | U   |
| 045 | 25  | LF  | 145 | 65  |     | 245 | A5  | v   | 345 | E5  | V   |
| 046 | 26  | ETB | 146 | 66  |     | 246 | A6  | w   | 346 | E6  | W   |
| 047 | 27  | ESC | 147 | 67  |     | 247 | A7  | x   | 347 | E7  | X   |
| 050 | 28  |     | 150 | 68  |     | 250 | A8  | y   | 350 | E8  | Y   |
| 051 | 29  |     | 151 | 69  |     | 251 | A9  | z   | 351 | E9  | Z   |
| 052 | 2A  | SM  | 152 | 6A  | :   | 252 | AA  |     | 352 | EA  |     |
| 053 | 2B  | CU2 | 153 | 6B  |     | 253 | AB  |     | 353 | EB  |     |
| 054 | 2C  |     | 154 | 6C  | %   | 254 | AC  |     | 354 | EC  |     |
| 055 | 2D  | ENQ | 155 | 6D  |     | 255 | AD  |     | 355 | ED  |     |
| 056 | 2E  | ACK | 156 | 6E  |     | 256 | AE  |     | 356 | EE  |     |
| 057 | 2F  | BEL | 157 | 6F  | ?   | 257 | AF  |     | 357 | EF  |     |
| 060 | 30  |     | 160 | 70  |     | 260 | B0  |     | 360 | F0  | 0   |
| 061 | 31  |     | 161 | 71  |     | 261 | B1  |     | 361 | F1  | 1   |
| 062 | 32  | SYN | 162 | 72  |     | 262 | B2  |     | 362 | F2  | 2   |
| 063 | 33  |     | 163 | 73  |     | 263 | B3  |     | 363 | F3  | 3   |
| 064 | 34  | PN  | 164 | 74  |     | 264 | B4  |     | 364 | F4  | 4   |
| 065 | 35  | RS  | 165 | 75  |     | 265 | B5  |     | 365 | F5  | 5   |
| 066 | 36  | UC  | 166 | 76  |     | 266 | B6  |     | 366 | F6  | 6   |
| 067 | 37  | EOT | 167 | 77  |     | 267 | B7  |     | 367 | F7  | 7   |
| 070 | 38  |     | 170 | 78  |     | 270 | B8  |     | 370 | F8  | 8   |
| 071 | 39  |     | 171 | 79  | ,   | 271 | B9  |     | 371 | F9  | 9   |
| 072 | 3A  |     | 172 | 7A  | :   | 272 | BA  |     | 372 | FA  |     |
| 073 | 3B  | CU3 | 173 | 7B  | #   | 273 | BB  |     | 373 | FB  |     |
| 074 | 3C  | DC4 | 174 | 7C  | @   | 274 | BC  |     | 374 | FC  |     |
| 075 | 3D  | NAK | 175 | 7D  | .   | 275 | BD  |     | 375 | FD  |     |
| 076 | 3E  |     | 176 | 7E  | =   | 276 | BE  |     | 376 | FE  |     |
| 077 | 3F  | SUB | 177 | 7F  | ~   | 277 | BF  |     | 377 | FF  | EO  |

## OPTIONS AND ACCESSORIES

### Options

Option A1, Universal Euro Plug, 250V/6A  
Option A2, United Kingdom Plug, 240V/6A  
Option A3, Australian Plug, 250V/6A  
Option A4, North American Plug, 240V/10A  
Option A5, Switzerland Plug, 240V/6A

### Standard Accessories

1 Accessory Pouch, 016-0707-00  
1 Operator's Manual, 070-4340-00  
5 Reference Guides, 070-4641-00  
1240 Seminar Workbook, 062-6926-00  
1 Power Cord, 161-0104-00  
1 Front Panel Cover, 200-2780-00  
2 Diagnostic Lead Sets, 012-0556-00

### Optional Accessories

#### Acquisition Cards:

1240D1, 9-channel Acquisition Card  
1240D2, 18-channel Acquisition Card

#### Data Acquisition Probes:

P6460 Data Acquisition Probe  
P6462 Fixed Threshold TTL Acquisition Probe

#### Scope Probes:

P6120 x1 Scope Probe, 010-6120-00  
P6105 x10 Encoded Scope Probe, 010-6105-00

#### COMMunication Packs:

1200C01, RS232C COMM Pack  
1200C02, GPIB COMM Pack  
1200C11, Parallel Printer COMM Pack

#### Memory Packs:

12RS01, Nonvolatile 8K RAM Pack  
12RS11, 32K EPROM Pack (empty)  
12RS12, 32K EPROM Pack (blank)

#### Documentation:

Empty half-size binder for optional accessory documentation, 062-6927-00

#### Service Accessories:

Service Maintenance Kit, 067-1103-01  
    includes: 12RD01, 1240 Diagnostic ROM Pack  
                Service Manual  
                Extender Card  
                Diagnostic Lead Set  
Service Manual, 062-7124-00  
12RD01, 1240 Diagnostic ROM Pack  
Diagnostic Lead Set, 012-0556-00  
1240 Extender Card, 670-7539-01



**ROM Packs:**

12R01, Performance Analysis ROM Pack  
12RC01, Printer Support ROM Pack  
12RC02, Master/Slave Support ROM Pack  
12RM01, 8080 Mnemonics ROM Pack  
12RM02, 8085 Mnemonics ROM Pack  
12RM03, 8086 Mnemonics ROM Pack  
12RM04, 8088 Mnemonics ROM Pack  
12RM05, 80186 Mnemonics ROM Pack  
12RM06, 80188 Mnemonics ROM Pack  
12RM21, 6800 Mnemonics ROM Pack  
12RM22, 6802 Mnemonics ROM Pack  
12RM23, 6808 Mnemonics ROM Pack  
12RM24, 6809 Mnemonics ROM Pack  
12RM25, 68000 Mnemonics ROM Pack  
12RM26, 68008 Mnemonics ROM Pack  
12RM41, Z80 Mnemonics ROM Pack  
12RM42, Z8001/3 Mnemonics ROM Pack  
12RM43, Z8002/4 Mnemonics ROM Pack  
12RM62A, F9450 (1750A MIL STD) Mnemonics ROM Pack  
12RM63, 6502 Mnemonics ROM Pack  
12RM71, NSC800 Mnemonics ROM Pack