

HP 166X Logic Analyzers

These notes give a very brief overview of using the HP1660 and HP1661 logic analyzers for timing analysis. For more information, see the full manual available in the EE 459 lab.

The logic analyzers are capable of acquiring data on either 96 or 128 channels depending on the model. Each set of 16 input channels is called a “pod”. Each pod has a separate ground connection which should be connected to the circuit ground if that pod will be used to collect data.

1.0 Menu Selection

The six keys in the “Menu” section of the front panel are used to select which display to show.

System - Used for loading/storing files on the floppy, setting clock, etc.

Config - Sets various configuration parameters

Format - Used for assigning input channels to labels and grouping input channels together into buses.

Trigger - For selecting trigger parameters

List - Shows data captured in list format

Waveform - Shows the waveforms of the input data. Also used to select which channels are displayed.

2.0 Moving the Cursor

The arrow keys below the Menu keys are used to move the cursor. In some fields the dial can be used to move the cursor. If the dial is being used a small icon that looks like a side view of the dial is shown by the field.

3.0 Timing Waveform Display

1. Set up the Configuration menu:

The analyzers may start up with the settings made below already set that way, but in case they don't, follow these instructions.

1. Press the <Config> key to go to the Configuration screen.

2. Assign Pod 1 to Machine 1 by moving the high-lighted area to the [A1-A2] box, then press <Select>. In the pop-up menu, select “Machine 1” and press <Done>.
3. In the Analyzer 1 box, select the “Type” field, and then select “Timing”.

2. Setting up the input channel labels:

The Format menu is used to enter labels for individual channels or groups of input channels. It also is used to determine which input channels are associated with a label. Labels can be associated with individual channels or with a group of channels (a bus.)

1. Press the <Format> Key
2. Move to the label list along the left side, and use the up/down arrows or the dial to select a label to change.
3. Type in a name for the label end press <Done> when finished.
4. Press <Select> and select “Turn Label On” and then <Done>.
5. Move to the pod field on the line and press <Select> to bring up a the bits for that pod.
6. Use the left/right arrow keys to move across the bits, and the up/down arrows to enable or disable the channels that should be associated with the label. When finished, press <Done>
7. Repeat the process for all pods and labels required.

3. Setting up the trigger conditions:

The “Trigger” menu is used to select the triggering conditions that will cause the analyzer to acquire data. When the analyzer starts up it triggers when the trigger variable is a “Don’t Care” so it will acquire data as soon as the <Run> button is pressed.

The initial trigger variable is called “a”. To change the trigger conditions, move the cursor to the “a” line at the bottom left. Move right to the field under the label and enter with the numeric keypad the value that label should be for triggering. Press <Done> when finished with each entry.

4. Setting up the display:

To determine which channels are displayed and the sampling rate, press “Waveform” in the Menu section. The initial list of channels show will be all the channels from the first label in Format list. Any others must be added manually.

1. Go to the display field along the lower left, then use the dial to select one of the channels and press <Select>. If you wish to insert a channel in the list, select the channel above where you want the new channel to appear.

2. From the pop-up menu use the arrow keys to select the action to be taken and press <Select>.
3. If inserting channels, the next pop-up menu will allow you to select which label to select a channel from.
4. Select either the individual channel or bus of channels to be inserted and press <Done>

To change the sampling rate, go to the “sec/Div” field. The dial can be used to select different sampling rates. Alternatively, press <Select> and use keypad to enter a sampling rate. In this mode the left/right arrow keys or dial is used to select between ns, μ s, ms, and sec.

5. Acquiring Data

To acquire data under the trigger conditions that are in effect, press the <Run> key. The analyzer will wait for the trigger conditions to be met and then record and display the data in the Waveform display window. Once data has been acquired, it can be examined using the controls in the Waveform window.

The time base for the display of the data can be adjusted by moving the cursor to the “sec/Div” field and using the dial to change it up or down.

The values of the individual channels can be examined using the two cursors, “X” and “O”. These can be moved horizontally (forward and back in time) relative to the trigger point. The trigger point is marked with a “t” at the bottom of the screen. To move the cursors, use the arrow keys to move the “X to O”, “Trig to X” or “Trig to O” fields and press the <Select> key. The dial controls the position of the X or O cursor when “Trig to X” or “Trig to O” are selected. In the “X to O” mode, both cursors move together. The value of the channels associated with each label at the X and O positions are show in the upper center part of the screen. To change the label being displayed, select the label and the pop-up menu will list the available labels that can be displayed.