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Know Your Digital Storage Oscilloscope

1. INTRODUCTION

The first **Digital Storage Oscilloscope** (DSO) was invented by **Nicolet Test Instrument** of Madison, Wisconsin. It was a low speed ADC (1 MHz, 12 bit) used primarily for vibration and medical analysis. The first high speed DSO (100 MHz, 8 bit) was invented by **Walter LeCroy** (who founded the **LeCroy Corporation**, based in New York, USA) after producing high-speed digitizers for the research center CERN in Switzerland. **LeCroy** (since 2012 Teledyne LeCroy) remains one of the three largest manufacturers of oscilloscopes in the world.

A **Digital Storage Oscilloscope** (often abbreviated **DSO**) is an instrument which stores and analyses the signal digitally rather than using analogue techniques. It is now the most common type of oscilloscope in use because of the advanced trigger, storage, display and measurement features which it typically provides.

The input analogue signal is sampled and then converted into a digital record of the amplitude of the signal at each sample time. The sampling frequency should be not less than the **Nyquist rate** to avoid aliasing. These digital values are then turned back into an analogue signal for display on the screen.

1.1 DSO's Main blocks:

- Block Diagram
- Front panel

BLOCK DIAGRAM
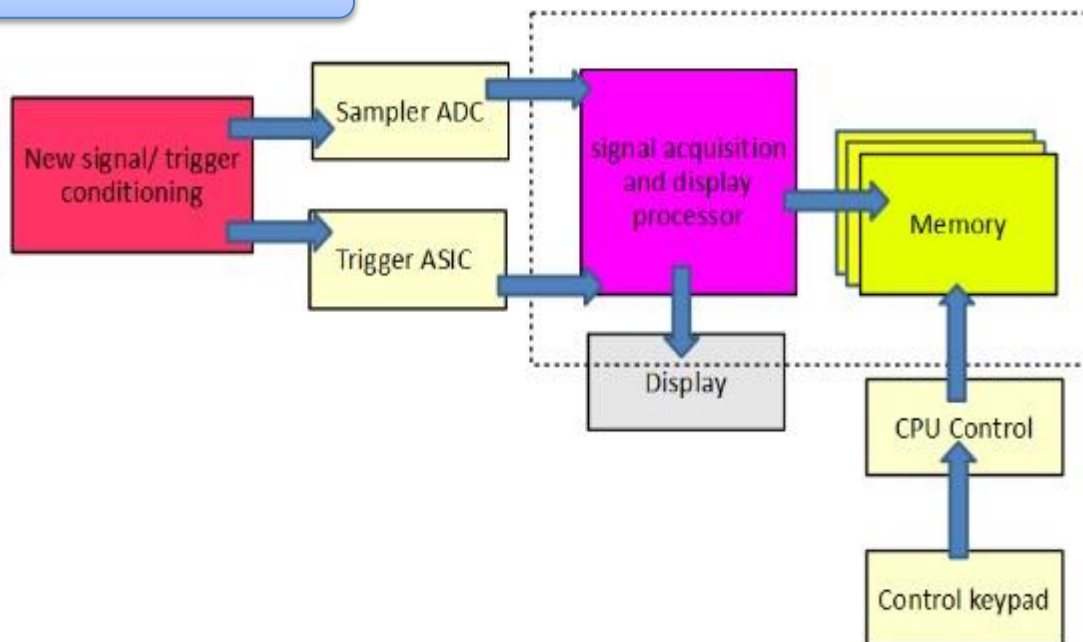
FRONT PANEL
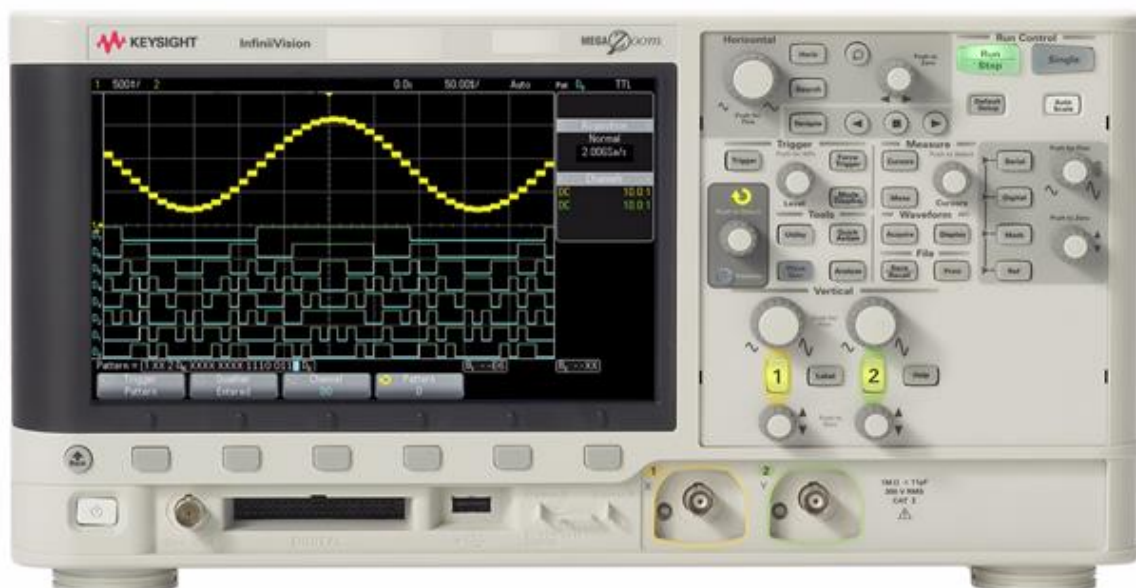
2. SPECIFICATIONS

Bandwidth	70 MHz
Bandwidth Upgrades Available	Yes
Channels	2
Max Sample Rate	2 GSa/s
Max Memory Depth	1 Mpts
Display size	8.5-inch WVGA (800 X 480)
Waveform Update Rate	50,000 wfms/s
ADC Bits	8 bits
Built-In Instruments (Optional)	• Digital Channels • 20 MHz Function Gen • 5-digit Counter • 3-digit DVM
Operating System	Embedded
Real-Time	Yes
Connectivity	Connectivity USB host (one front, one back), USB device, LAN (optional), GPIB (optional))
Waveform update rate	> 50,000 waveforms per second

Table No.1: Specifications of DSOX2002A

3. DEFAULT SETTING OF DSO

To recall the default oscilloscope setup:

Press [Default Setup] key

The default setup restores the oscilloscope's default settings. This places the oscilloscope in a known operating condition.

The major default settings are:

Horizontal	Normal node, 100μs/div scale, 0 s delay, center time reference.
Vertical(Analog)	Channel 1 ON , 5V/div scale, DC coupling, 0 V position
Trigger	Edge trigger, Auto trigger mode, 0 V level, Channel 1 source, DC coupling, rising edge slope. 40ns hold-off time.
Display	Persistence off,20% grid intensity
Other	Acquire mode normal. [Run/Stop] to Run, cursors and measurement off.
Labels	All custom labels that you have created in the Label Library are preserved(not erased), but all channel labels will be set to the original names

Table 2: Default settings of the DSO

4. Some Basic Front Panel Controls:

1. **Power Switch** – Press once to switch power on; press again to switch power off (as shown in Figure – 2).
2. **Soft keys** – The functions of these keys (in Figure – 2) change based upon the menus shown on the display directly above the keys. These are present just below the DSO screen. The Back/Up key turns the menus off, and DSO information is shown instead.
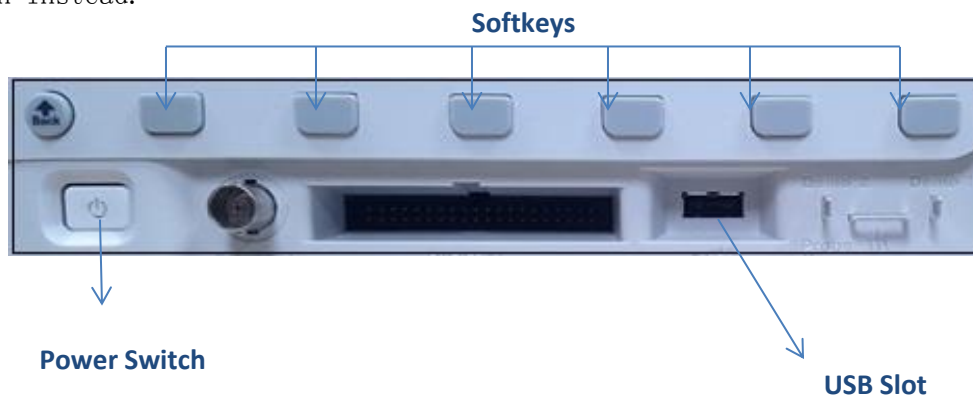
Softkeys

Power Switch

USB Slot

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Figure 1: Some keys below the DSO screen

3. `Intensity key` – Press the key (Figure-2) to illuminate it. When illuminated, turn the Entry knob to adjust waveform intensity.
You can vary the intensity control to bring out signal detail, much like an analog oscilloscope. Digital channel waveform intensity is not adjustable.

4. `Entry knob` – The Entry knob (Figure-2) is used to select items from menus and to change values. The function of the Entry knob changes based upon the current menu and soft key selections.

☞ The curved arrow symbol (Fig-2) above the Entry knob illuminates whenever the entry knob is being used to select a value/option

5. `Help key` – Opens the Help Menu (Figure-2) where you can display overview help topics and select the Language.

6. `[Default Setup] Key` – Press this key (Figure-2) to restore the oscilloscope's default settings.

7. `[Auto Scale] Key` – When you press the [AutoScale] key (Figure-2), the oscilloscope will quickly determine which channels have activity, and it will turn these channels on and scale them to display the input signals.

8. `Demo 2, Ground, and Demo 1 terminals` –
   o `Demo 2 terminal` — This terminal outputs the Probe Comp signal which helps you match a probe's input capacitance to the oscilloscope channel to which it is connected

   o `Ground terminal` — Use the ground terminal for oscilloscope probes connected to the Demo 1 or Demo 2 terminals.

   o `Demo 1 terminal` — With certain licensed features, the oscilloscope can output demo or training signals on this terminal.

9. `USB Host port` – This port is for connecting USB mass storage devices or printers to the oscilloscope.

10. `Digital channel inputs` – Connect the digital probe cable to this Connector

👉 The Digital channel input is inactive in this model of DSO. For accessing the same a separate license need to purchased

11. Analog Channel Inputs –
Attach oscilloscope probes or BNC cables to these BNC connectors. In the InfiniiVision 2000 X–Series oscilloscopes, the analog channel inputs have 1 MΩ impedance. Also there is no automatic probe detection, so you must properly set the probe attenuation for accurate measurement results.

5. Various Front panel sections:

1. Horizontal control section
2. Run Control Section
3. Vertical control section
4. Measure Section
5. Tool section
6. File section
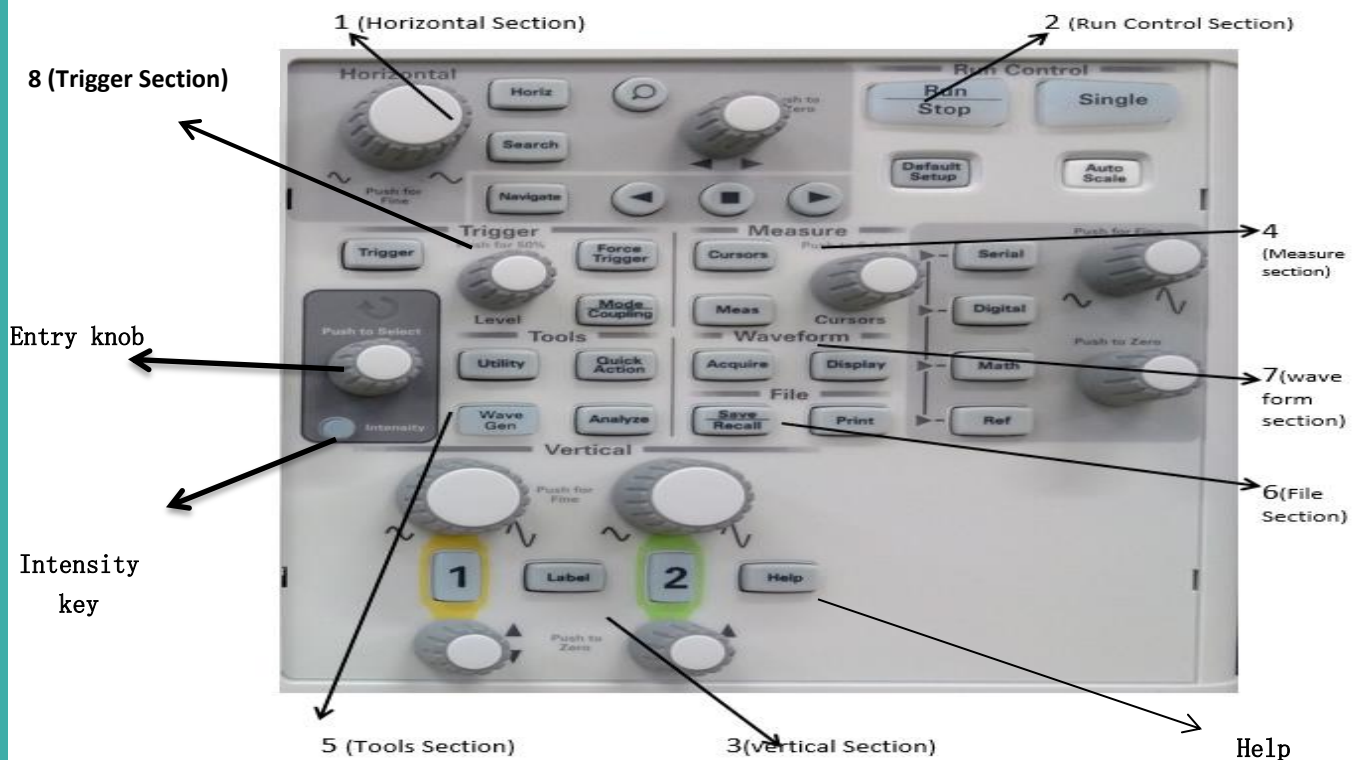7. Waveform section
8. Trigger control section

Figure 2: The front panel controls of the DSO.
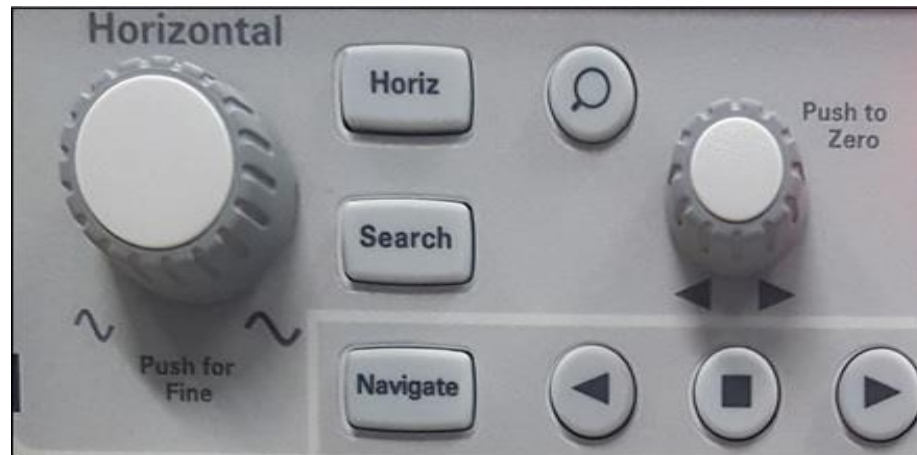
5.1 Horizontal Control Section

Figure 3: A magnified view of the Horizontal section

The Horizontal controls (Figure-3) consist of:

o **Horizontal scale knob** — Turn the knob in the Horizontal section that is marked to adjust the time/div (sweep speed) setting. The symbols under the knob indicate that this control has the effect of spreading out or zooming in on the waveform using the horizontal scale.

o **Horizontal position knob** — Turn the knob marked to pan through the waveform data horizontally. You can see the captured waveform before the trigger (turn the knob clockwise) or after the trigger (turn the knob counterclockwise). If you pan through the waveform when the oscilloscope is stopped (not in Run mode) then you are looking at the waveform data from the last acquisition taken.

o **[Horiz] key** — Press this key to open the Horizontal Menu where you can select XY and Roll modes, enable or disable Zoom, enable or disable horizontal time/division fine adjustment, and select the trigger time reference point.

o **Zoom key** — Press the zoom key to split the oscilloscope display into Normal and Zoom sections without opening the Horizontal Menu.

o **[Search] key** — Lets you search for events in the acquired data.

o **[Navigate] keys** — Press this key to navigate through captured data (Time), search events, or segmented memory acquisitions.

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5.2 Run Control Section

Figure 4: A magnified view of the Run Control Section

o   When the [Run/Stop] key is green (Figure-4), the oscilloscope is running, that is, acquiring data when trigger conditions are met. To stop acquiring data, press [Run/Stop]. When the [Run/Stop] key is red, data acquisition is stopped. To start acquiring data again, press [Run/Stop].

o   [Single] key -To capture and display a single acquisition (whether the oscilloscope is running or stopped), press [Single].

o   The [Single] run control lets you view single- shot events without subsequent waveform data overwriting the display.

o   When you press [Single], the display is cleared, the trigger mode is temporarily set to Normal (to keep the oscilloscope from auto- triggering immediately), the trigger circuitry is armed, the [Single] key is illuminated, and the oscilloscope waits until a trigger condition occurs before it displays a waveform.

o   When the oscilloscope triggers, the single acquisition is displayed and the oscilloscope is stopped (the [Run/Stop] key is illuminated in red). Press [Single] again to acquire another waveform.

o   If the oscilloscope doesn't trigger, you can press the [Force Trigger] key to trigger on anything and make a single acquisition.

o [Default Setup] Key – Press this key (Figure-4) to restore the oscilloscope's default settings.
o [Auto Scale] Key – When you press the [Auto Scale] key (Figure-4), the oscilloscope will quickly determine which channels have activity, and it will turn these channels on and scale them to display the input signals.

5.3 Vertical Control Section –

The Vertical controls (Figure-5) consist of:

- Analog channel on/off keys — Use these keys to switch a channel On or Off, or to access a channel's menu in the soft keys. There is one channel On/Off key for each analog channel. These have been marked as 1 and 2 respectively.
- Vertical scale knob — There are knobs marked for each channel. Use these knobs to change the vertical sensitivity (gain) of each analog channel.
- Vertical position knobs — Use these knobs to change a channel's vertical position on the display. There is one Vertical Position control for each analog channel.
- [Label] key — Press this key to access the Label Menu, which lets you enter labels to identify each trace on the oscilloscope display.

Figure 5: A magnified view of the Vertical Section

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5.4 Measure Control Section

Figure 6: A magnified view of the Measure Control Section

The Measure controls (Figure-6) consist of:

5.4.1 Cursors knob – Press this knob select cursors from a popup menu. Then, after the popup menu closes (either by timeout or by Pressing the knob again), rotate the knob to adjust the selected cursor position.

5.4.2 Measurement Key –

1. Press the Source softkey to select the channel, running math function, or reference waveform to be measured.
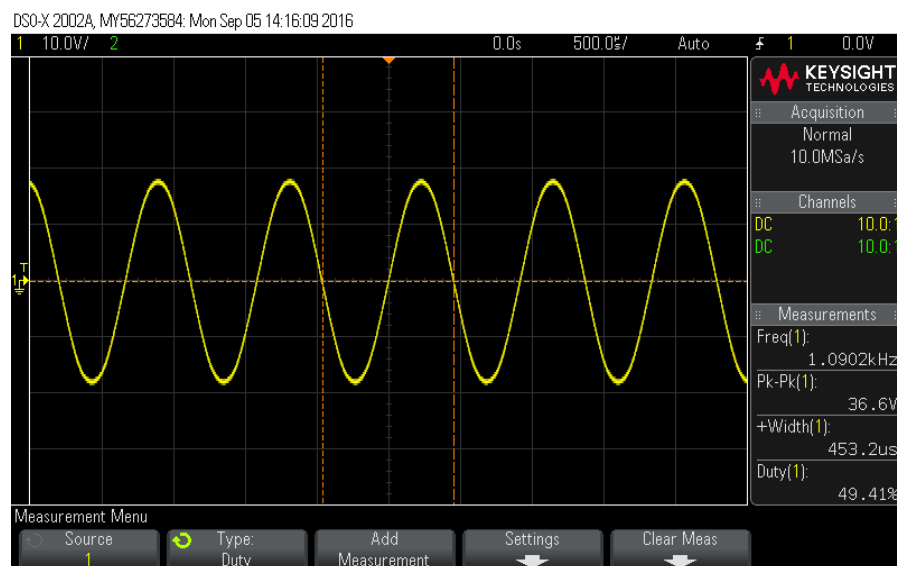

Figure 7: To show various measurements

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2. Press the Type softkey then rotate the Entry knob to select a measurement to be made.

The type of voltage measurements are : –

Peak-Peak, Max, Min, Amplitude, Top, Base, Avg-Cycle, Dc Rms and Ac rms

The various types of available Time measurements are: –

Period, frequency, +Width, -width, Burst width, +Duty, -Duty, Rise, Fall

- ▪ To Display any of the measurement on the main screen select that measurement and then press Add measurement soft key.
- ▪ To Display all the measurement, select the Snapshot All then press Add measurement which will display all the measurement

3. Press the Add Measurement softkey or Press the Entry knob to display the measurement.
4. The Settings softkey will be available to make additional measurement settings on some measurements. Here you will find the Threshold settings.

5.4.2.1 Threshold :–

Setting measurement thresholds defines the vertical levels where measurements will be taken on an analog channel or math waveform.
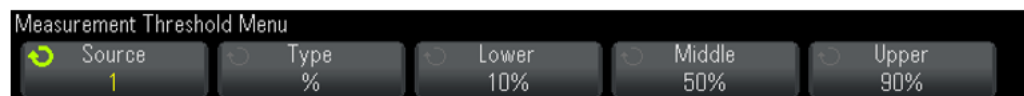
Measurement Threshold Menu

Source	Type	Lower	Middle	Upper
1	%	10%	50%	90%

Figure 8: Threshold Menu

1. Press the Type softkey to set the measurement threshold to % (percentage of Top and Base value) or to Absolute (absolute value).
2. Press the Lower softkey; then, turn the Entry knob to set the lower measurement threshold value.
3. Press the Middle softkey; then, turn the Entry knob to set the middle measurement threshold value.
4. Press the Upper softkey; then, turn the Entry knob to set the upper measurement threshold value.
5. To stop making one or more measurements, press the Clear Meas softkey and choose the measurement to clear, or press Clear All.

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Note: Here you can display any of the FOUR measurements. By default, you will see the two measurement i.e. freq and Pk-Pk (peak to peak) of the signal For any channel you can measure.

5.4.3 [Cursors] key — Press this key to open a menu that lets you select the cursors mode and source.

5.5 Tools Section: -

Figure 9: A magnified view of the Tools section

5.5.1 [Wave Gen] key:-

One of the advantages of this DSO is the In-built waveform generator.
1. To access the Waveform Generator Menu or to enable/disable the waveform generator output on the front panel Gen Out BNC, press the [Wave Gen] key.
2. When waveform generator output is enabled, the [Wave Gen] key is illuminated. When waveform generator output is disabled, the [Wave Gen] key is OFF.

☞ The waveform generator is always in OFF state when the instrument is first turned ON.

3. On the DSO screen in the Waveform Generator Menu, press the `Waveform` softkey and turn the `Entry` knob to select the waveform type.
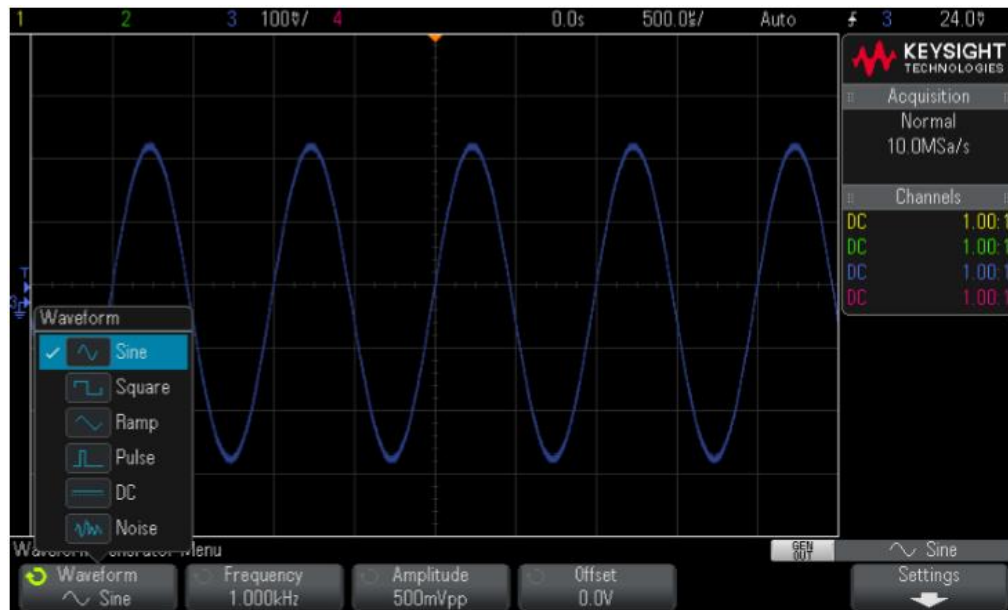

Figure 10: To display waveform options

4. Depending on the selected waveform type, use the remaining softkeys and the `Entry` knob to set the waveform's characteristics.

5.5.1.1 Waveform Generator Setting

The `Settings` softkey opens the Waveform Generator Settings menu which lets you make other settings related to the waveform generator.

Figure 11: Waveform Generator Settings Menu

1. In the Waveform Generator Settings Menu, press the `Trig Out` softkey and turn the `Entry` knob to select Waveform Generator Sync Pulse.

2. In the Waveform Generator Settings Menu, press the `Output Load` softkey and turn the Entry knob to select:
   - 50 Ω
   - High-Z

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☞ The output impedance of the "Gen Out BNC" is fixed at 50 ohms. If the actual load impedance is different than the selected value, the displayed amplitude and offset levels will be incorrect.

3. To use waveform generator logic presets:-

    With logic level preset, you can easily set the output voltage to TTL,

    CMOS 5.0V), CMOS (3.3V), CMOS (2.5V) or ECL compatible Low and High levels.

Softkey (logic levels)	Low level	High level, 50 ohm expected output load	High level, high-Z expected output load
TTL	0 V	+2.5 V (TTL compatible)	+5 V
CMOS (5.0V)	0 V	Not Available	+5 V
CMOS (3.3V)	0 V	+2.5 V (CMOS compatible)	+3.3 V
CMOS (2.5V)	0 V	+2.5 V	+2.5 V
ECL	-1.7 V	-0.8 V (ECL compatible)	-0.9 V

Table 3: Logic level's voltage variation with impedance

3. In the Waveform Generator Settings Menu, press the Add Noise softkey and turn the Entry knob to select the amount of white noise to add to the waveform generator output.

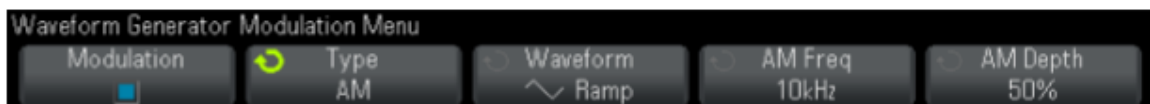4. In the Waveform Generator Settings Menu, press the Modulation softkey.

Figure 12: Waveform Generator Settings Menu

• Press the Modulation softkey to enable or disable modulated waveform generator output.
• Press the Type softkey and turn the Entry knob to select the modulation type. Here we have selected type as" A.M ".
•Press the Waveform softkey and turn the Entry knob to select the shape of the modulating signal:
Sine, Square, Ramp, Sine Cardinal, Exponential Rise, Exponential Fall

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•Press the AM Freq softkey and turn the Entry knob to specify the frequency of the modulating signal.
•Press the AM Depth softkey and turn the Entry knob to specify the amount of amplitude modulation.

5.5.2 Quick Action

Quick Action is a button that you can configure and assign a task that you want to perform and whenever you press it the then it will perform that task like Quick measure all, Quick Save, Quick Recall etc.

5.5.3 Utility

Utility button is used to check the device is properly working .For further Details please contact the respective Lab In-charge.

1. I/O

The oscilloscope can be accessed and/or controlled remotely via these I/O interfaces:
• USB device port on the rear panel (square shaped USB port).
• LAN interface when a LAN/VGA module is installed in the rear panel module slot.

2. File Explorer

In the File Explorer Menu, press the softkey in the first position and use the Entry knob to navigate.

The softkey in the first position can have these labels:
• Press to go — when you can Press the Entry knob to navigate to a new folder or storage location.
• Location — when pointing to a directory that is currently selected.
 • Selected — when pointing to a file that can be loaded or deleted.
When this label appears, you can press the Load File or Delete File softkeys to take the action. Pressing the Entry knob is the same as pressing the Load File softkey.

3. Options
   ▪ Preferences:-
      o "Expand about" center or ground :-When you change a channel's volts/division setting, the waveform display can be set to expand (or compress) about the signal ground level or the center of the display.

- o Transparent to toggle between transparent and solid text display backgrounds.
- o Default Library To load the default label library
  - ▪ Clock:-
    Press the Year, Month, Day, Hour or Minute softkey; then, rotate the entry knob to set to the desired number.
  - ▪ Rear panel

4. Service

The Service Menu (under [Utility] > Service) lets you perform service-related tasks:
- "To perform user calibration"
- "To perform hardware self-test"
- "To perform front panel self-test"
- "To display oscilloscope information"
- "To display the user calibration status"

5. Annotation:

You can add an annotation to the upper left corner of the oscilloscope's display. The annotation is useful for documentation purposes, to add notes before capturing screens.
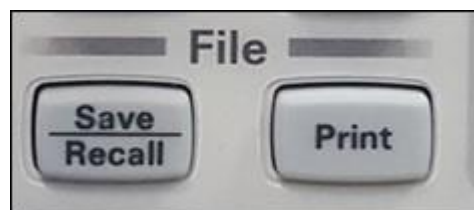
5.6 File Section

Figure 13: File Section in DSO

This Section is of great importance for those who want to save their measured data for further analysis or want to take print out of the waveform with all other measurements.
- Press the [Save/Recall] key to save or recall a waveform or setup.

- The [Print] key opens the Print Configureuration Menu so you can print the displayed waveforms.

☞ **"This Section has been explained in detail in the Demo experiment at the last of this User guide".**

5.7 Waveform Section

Figure 14: A magnified view of the Waveform section

o The [Acquire] key lets you select Normal, Peak Detect, Averaging, or High Resolution acquisition modes and use segmented memory.
o The [Display] key lets you access the menu where you can enable persistence, clear the display, and adjust the display grid (graticule) intensity.

☞ **"Kindly contact the Lab-In charge for further details**

5.8 Trigger Control Section

- It establishes the time reference for waveform display and measurement.

- A trigger setup tells the oscilloscope when to acquire and display data. **For example**, you can set up to trigger on the rising edge of the analog channel 1 input signal.

- You can adjust the vertical level used for analog channel edge detection by turning the **Trigger Level knob.** You can push the Trigger Level knob to set the level to the waveform's 50% value. If AC coupling is used, pushing the Trigger Level knob sets the trigger level to about 0 V.

- The position of the trigger level for the analog channel is indicated by the trigger level icon ᴛ▶(if the analog channel is ON) at the far left side of the display. The value of the analog channel trigger level is displayed in the upper- right corner of the display In addition to the edge trigger type, you can also set up triggers on pulse widths, patterns, and video signals.

- If the oscilloscope is stopped when you change a trigger setup, the oscilloscope uses the new specification when you press **[Run/Stop]** or **[Single]**. If the oscilloscope is running when you change a trigger setup, it uses the new trigger definition when it starts the next acquisition.

- You can use the **[Force Trigger]** key to acquire and display data when triggers are not occurring. This key causes a trigger (on anything) and displays the acquisition. This key is useful in the **Normal trigger mode** where acquisitions are made only when the trigger condition is met. In this mode, if no triggers are occurring (that is, the "Trig'd?" indicator is displayed), you can press **[Force Trigger]** to force a trigger and see what the input signals look like. In the **Auto trigger mode**, when the trigger condition is not met, triggers are forced and the "Auto?" indicator is displayed.

Figure 15: A magnified view of the Trigger Section (Upper section)

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In the Trigger Mode and Coupling you can select the type of coupling i.e.

- **DC coupling** — Allows DC and AC signals into the trigger path.
- **AC coupling** — Places a 10 Hz high-pass filter in the trigger path removing any DC offset voltage from the trigger waveform. The high-pass filter in the External Trigger input path is 50 Hz for all models. Use AC coupling to get a stable edge trigger when your waveform has a large DC offset.
- **LF (low frequency) Reject coupling** — Adds a high-pass filter with the 3-dB point at 50 kHz in series with the trigger waveform. Low frequency reject removes any unwanted low frequency components from a trigger waveform, such as power line frequencies, etc., that can interfere with proper triggering. Use LF Reject coupling to get a stable edge trigger when your waveform has low frequency noise.
- **TV coupling** — is normally grayed-out, but is automatically selected when TV trigger is enabled in the Trigger Menu

5.9 Additional Waveform Controls –

The additional waveform controls **(Figure-16)** consist of:

5.9.1 [Math] key — provides access to math (add, subtract, etc.) functions. By this you can do mathematical operations on the waveform applied at the channels and can check the respective output.

5.9.2 [Ref] key — provides access to reference waveform functions. Reference waveforms are saved waveforms that can be displayed and compared against other analog channel or math waveforms.

5.9.3 [Digital] key — Press this key to turn the digital channels on or off (the arrow to the left will illuminate).

NOTE: — DIGITAL key have not been enabled in this DSO.

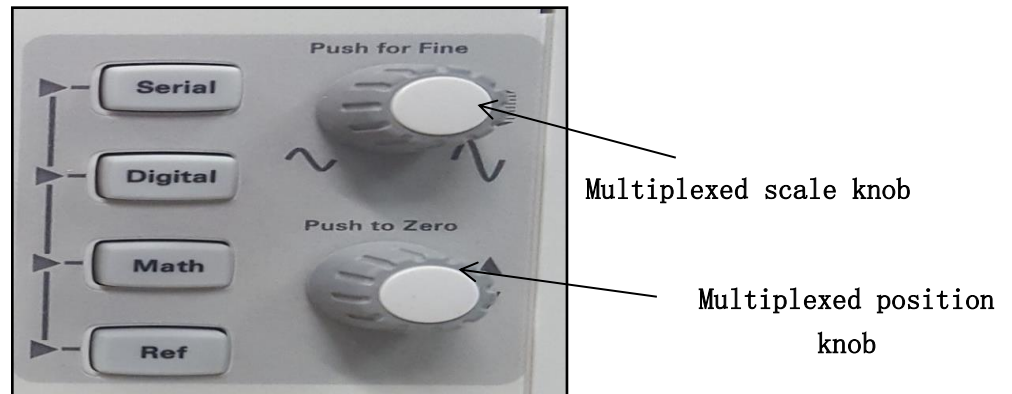**Kindly contact the respective lab –Incharge for more details.**

Figure 16: A magnified view of the Additional waveform controls

5.9.4 [Serial] key —The Digital channels and serial decode cannot be ON at the same time. The [Serial] key takes precedence over the [Digital] key. Serial triggers can be used when digital channels are ON. This DSO have been installed with the DSOX2EMBD license by this you can decode I2C (Inter-IC) and SPI (Serial Peripheral Interface) serial buses only.

5.9.5 Multiplexed scale knob — This scale knob is used with Math, Ref, or Digital waveforms, whichever has the illuminated arrow to the left. For math and reference waveforms, the scale knob acts like an analog channel vertical scale knob.

5.9.6 Multiplexed position knob — This position knob is used with Math, Ref, or Digital waveforms, whichever has the illuminated arrow to the left. For math and reference waveforms, the position knob acts like an analog channel vertical position knob.

6. Generating a 2Vpp, 50 KHz sinusoidal signal using wave generator of DSOX2002A and then verifying the same on the oscilloscope.

- The DSO is provided with two 10:1 passive probes(10:1 attenuation,150MHz,10MHz‖ 15Ppf)
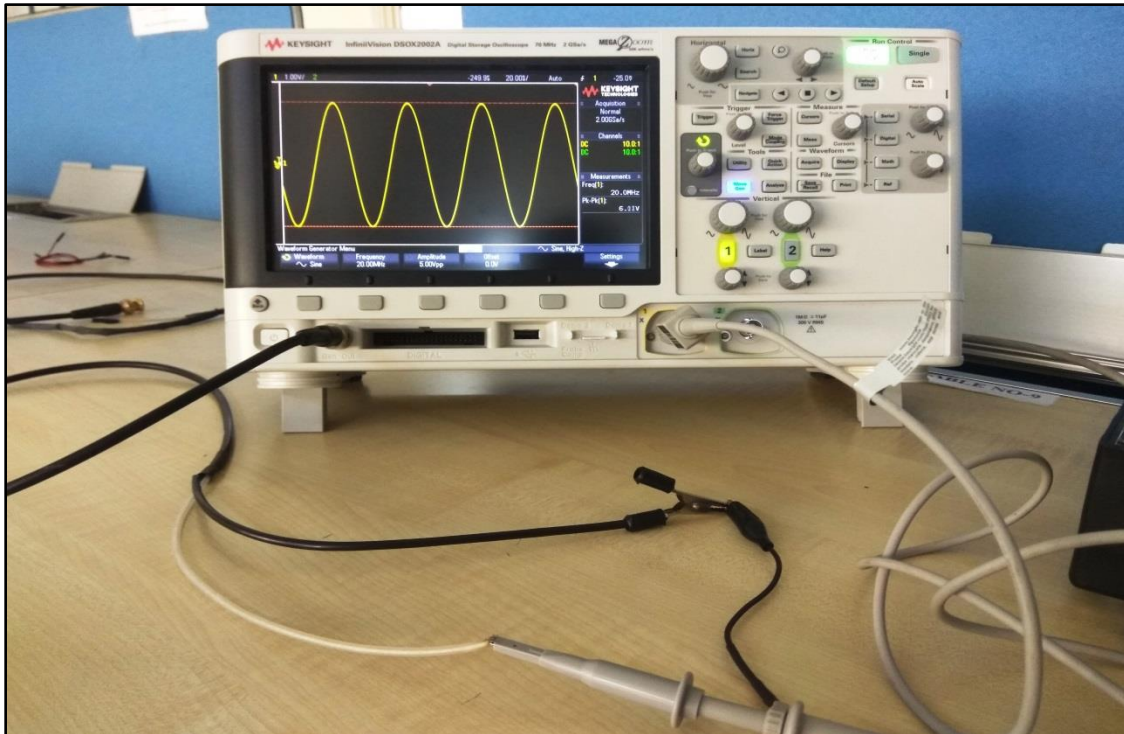

Figure 17: Probes connection set up between wave generator and DSO.

- Note: We cannot connect any of these two probe's connector (1Mohm) at **GEN OUT BNC** of waveform generator as it is fixed at 50 ohms and there will be impedance mismatching which may result in erroneous results. In that case we have to use a **50 ohm** BNC cable.
- Connect the pin of one probe end into the hook of the other probe end as shown in Figure 17.
- Clip the black ground cable of both the probes to each other as shown in Figure 16.

- Press the "**Wave Gen**" button, the "Wave Gen" button will be illuminated in blue and the "Run/Stop" will be illuminated in green (Figure-18).By Default a Sine waveform will appear on the display (Figure-18).
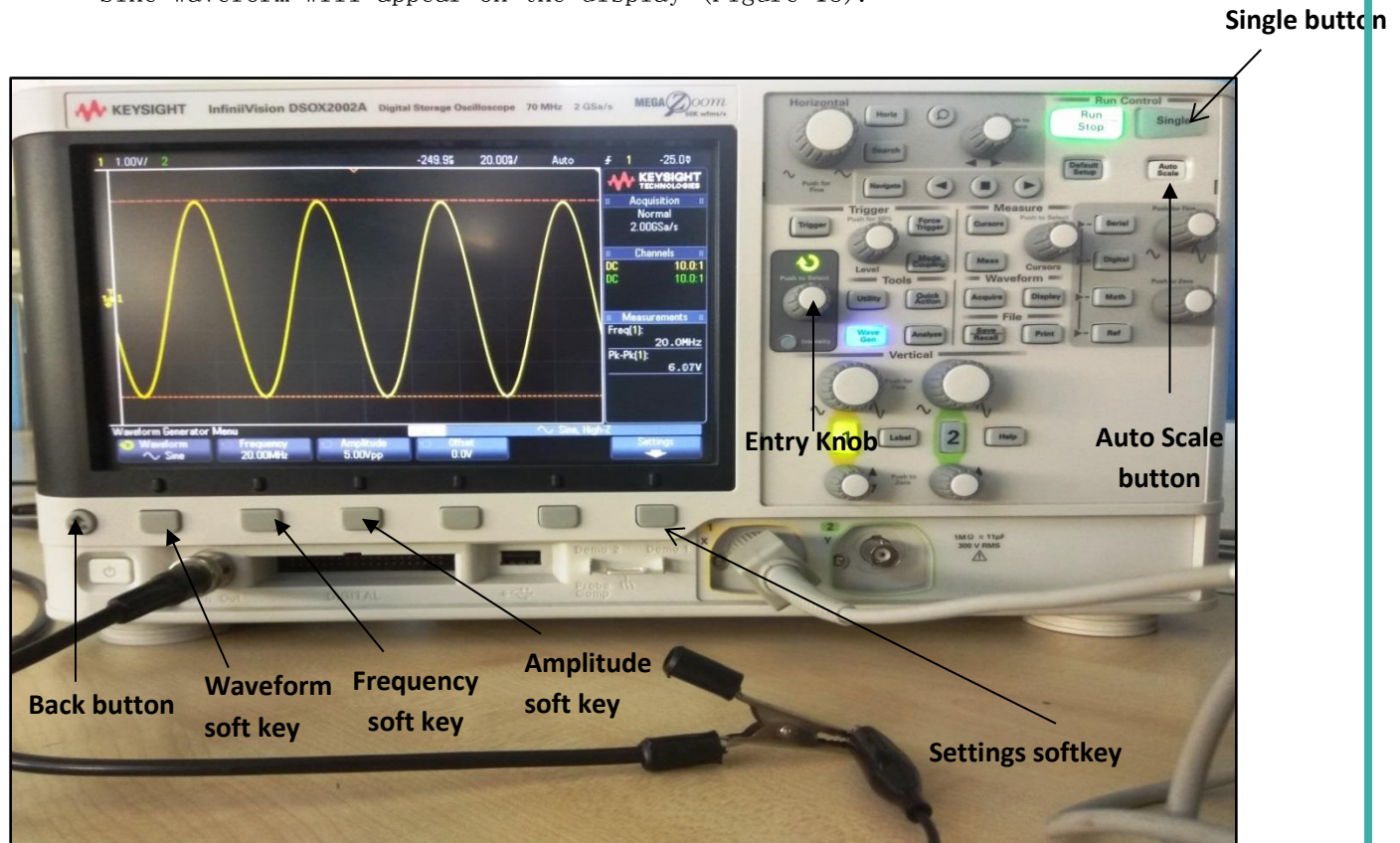
Figure 18: The wave generator menu and its respective front panel controls

6.1 To Adjust the Output Load Impedance:

- Press the "Settings" soft key as shown in figure 18.
- Press the soft key below the text "Output Load", here you will see two options i.e. 50 ohm and High-Z (impedance) as shown in figure 19.
- Select 50 ohm if you are using a 50 ohm BNC cable at the DSO's channel input otherwise select High-Z in case you are using the provided DSO cables.
- Now, Press the "Back" key to return back to the Waveform Generator Settings menu.

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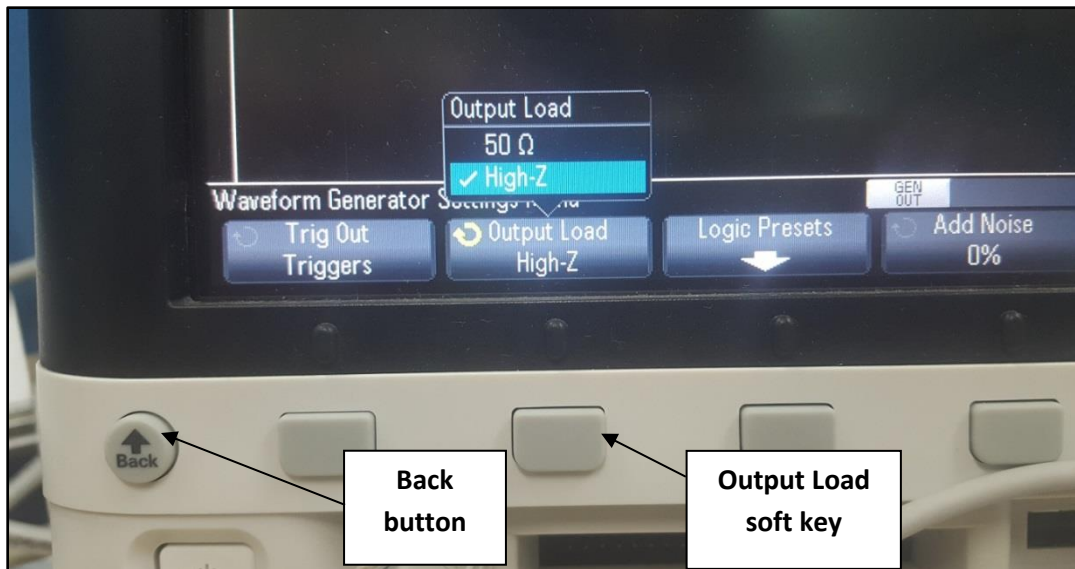
Figure 19: Impedance selection according the probe used.

6.2 Using Wave Generator

- The Waveform Generator Menu will appear at the bottom of the screen. Now in the waveform generator menu, the menu consisting of Waveform, Frequency, Amplitude, Offset and settings options will appear (figure-18).

- Press the "Waveform" softkey as shown in Figure-18 and rotate the Entry Knob to select the desired wave function.

> **Another method** to select any parameter on the screen; tap the dedicated soft key again and again in order to switch to next parameter within the same softkey .After selecting the desired parameter, Press "Back" soft key .

- Select the desired "Frequency" by Pressing the Frequency soft key (Figure-18); you can select the desired frequency by rotating the Entry Knob.

- Now rotate the Entry Knob to change the frequency of the wave; set the frequency of the waveform to 50 KHz (Figure-20).

☞ • The minimum and maximum value of frequency generated by the waveform generator is 100 mHz and 20 MHz respectively.
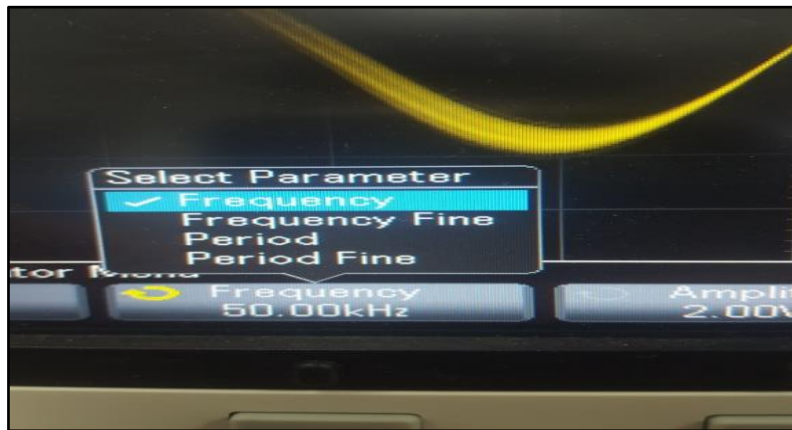

Figure 20: Selection of particular frequency

• Press the third soft key i.e. Amplitude as shown in Figure-18; rotate the Entry Knob to select the desired Amplitude (Figure-21).Here set the amplitude to 2Vpp .

☞ • The minimum and maximum value of amplitude generated by the waveform generator is 20 mVpp and 5 Vpp respectively(**at High impedance state**)

Figure 21: Selection of particular amplitude

- Adjust the waveform by turning the Horizontal Scale knob.

6.3 Measurement of Signal:

- Under the "Measure" section in the oscilloscope, Press the "Meas" key
- The Measurement menu will appear at the bottom of the screen (figure-22).
- Check the value of the default measurements at the right hand corner of the display (figure-22).
- The frequency and the Pk-Pk value will vary slightly from that of the set amplitude (2Vpp) and frequency (50Khz).
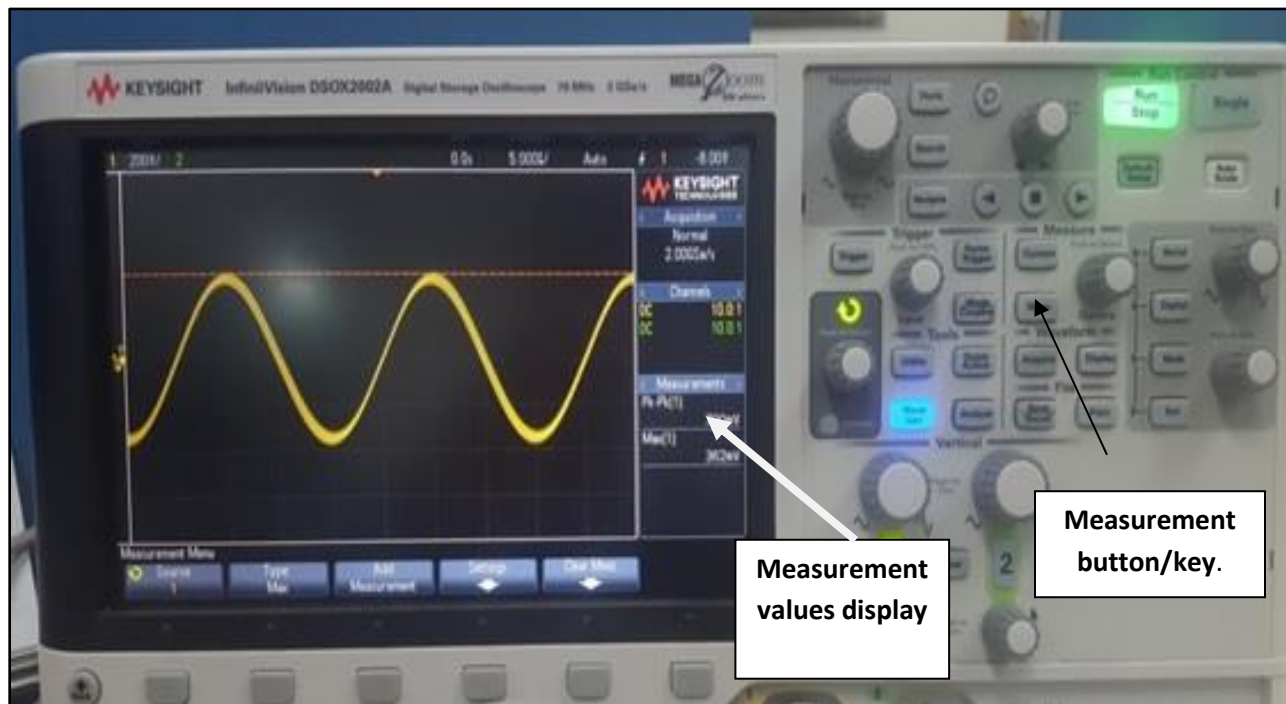
Figure 22: Measurement menu

- In the measurement menu, Press the soft key under the "Type" option (Figure 23)
- Rotate the Entry knob to search for the different measurement types and press the knob to select the type needed; such as "Maximum", "minimum" etc...
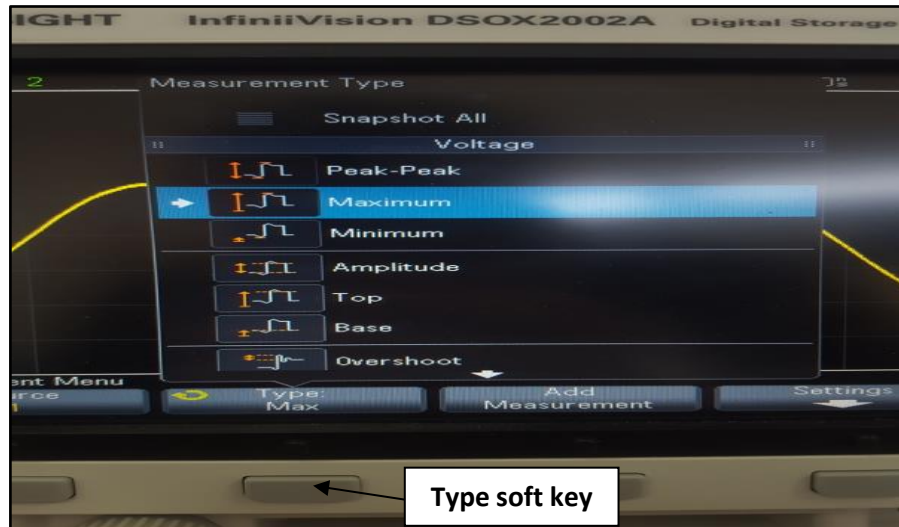
Figure 23: 'Type' softkey showing different measurement types

- The selected measurement **type** ("Maximum") will appear in the right hand corner in the measurement section of the display(Figure-23).

NOTE: Maximum number of Measurements Type which can be selected and displayed in the measurement section (i.e. Measurement value section in the diagram) is **four**

- Now, Suppose if you are using both the channels and want to measure some parameters of each channel then,
  In the measurement menu, Press the soft key under the "Source" option
- Select Source '1' and the parameter type you want to measure by rotating the entry knob as shown in figure 24.
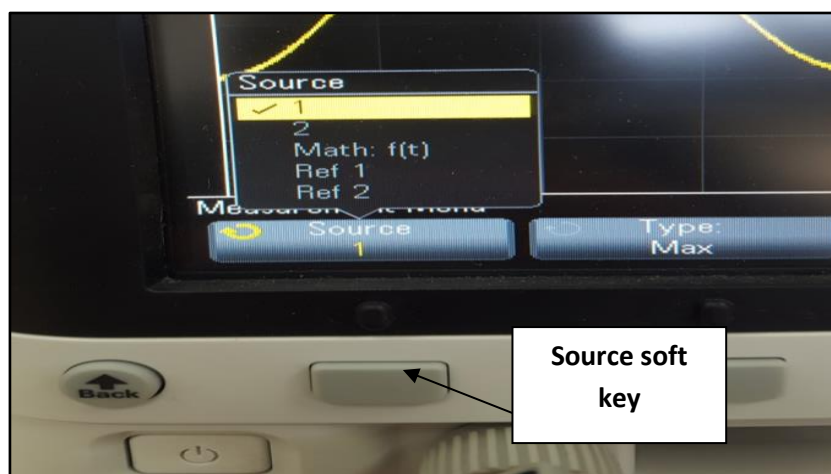
Figure 24: Source softkey description

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- Then press the soft key under the "Add measurement" option (Figure – 25).
- The measurement type selected will be added to the Measurement section and will show its respective value.

Add measurement
soft key

Figure 25: "Add measurement" softkey

6.4 Trigger Section :(Refer to Figure – 15)

- Press the Trigger button.
- Trigger menu will appear on the display.
- Press the soft key under the "Trigger type" option (Figure-26).
- Rotate the Entry knob to search the trigger type as "Edge".
- Press the knob to select the trigger type "Edge".
- The Edge trigger type identifies a trigger by looking for a specified edge (slope) and voltage level on a waveform. You can define the trigger source and slope in this menu. The trigger type, source, and level (if applicable) are displayed in the upper-right corner of the display.
- In the trigger menu, Press the soft key under the "Source" option.

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- Now, Rotate the knob to select the triggering source i.e. if your probe is connected to channel 1 then Source 1 should be selected and same case is for channel 2.
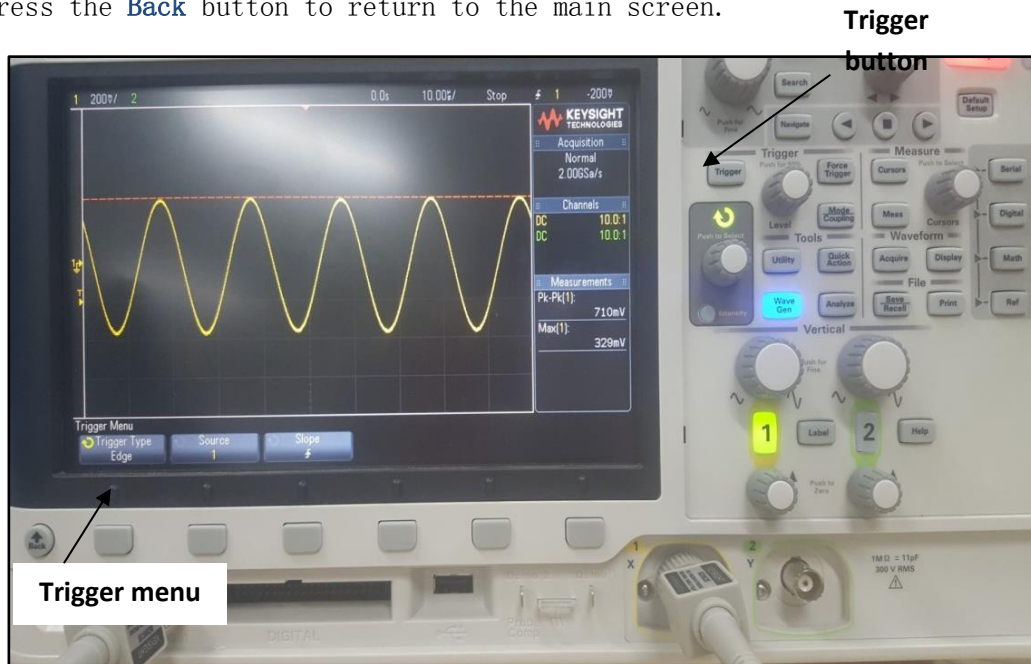- Press the Back button to return to the main screen.

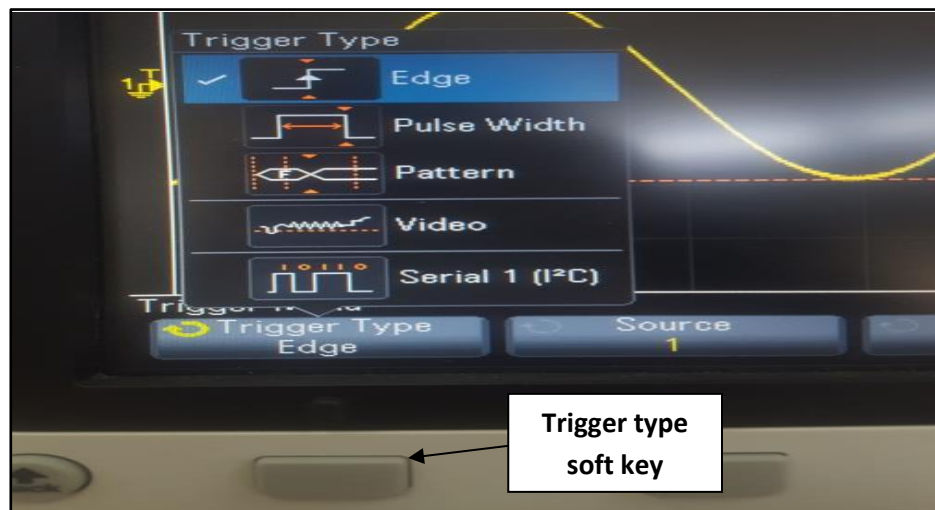
Figure 26: Trigger menu

Figure 27: Trigger type and source selection

6.5 Probe Attenuation Set: (Refer to Figure – 27 and 28)

- Press the Channel 1 button, softkey's function will change from the previous one.
- Press the soft key under the "Probe" option in the Channel 1 menu. "Channel 1 Probe Menu" will appear.
- Now Press the soft key under the "Probe" option in the menu (Figure-28).
- By tapping the soft key repeatedly under the probe option, select the Attenuation as "Ratio" as shown in Figure-29.
- Now, rotate the Entry knob to set the attenuation ratio as 10.0: 1
- Press the Back button to return to main screen.
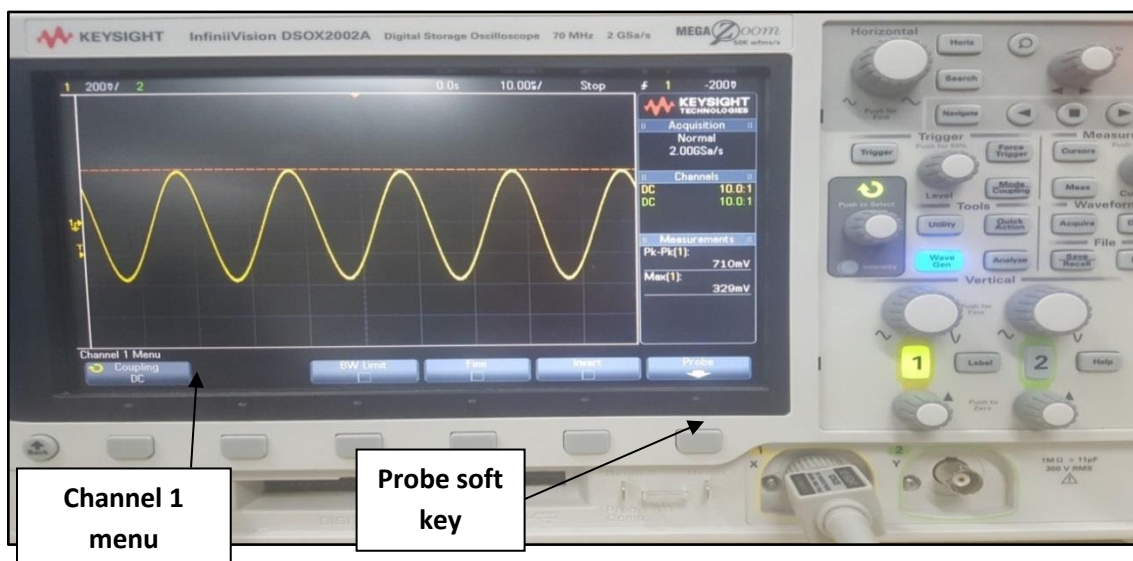
Figure 28: Channel's Probe settings
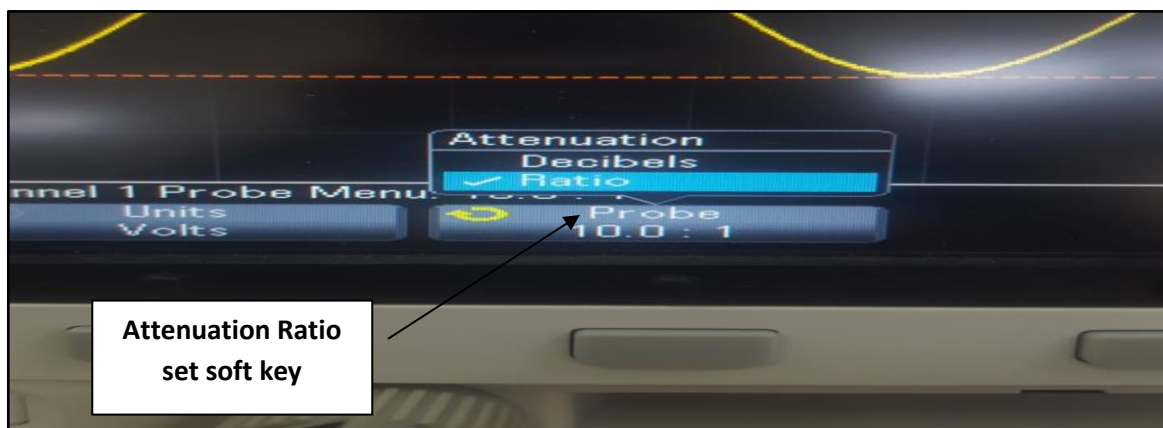
Figure 29: Probe attenuation adjustment

6.6 Save/Recall the Result of Experiment:

- Press the Save/Recall button (Figure-30); "Save to file" menu will appear.
- Press the soft key under the "Save" option (Figure-30).
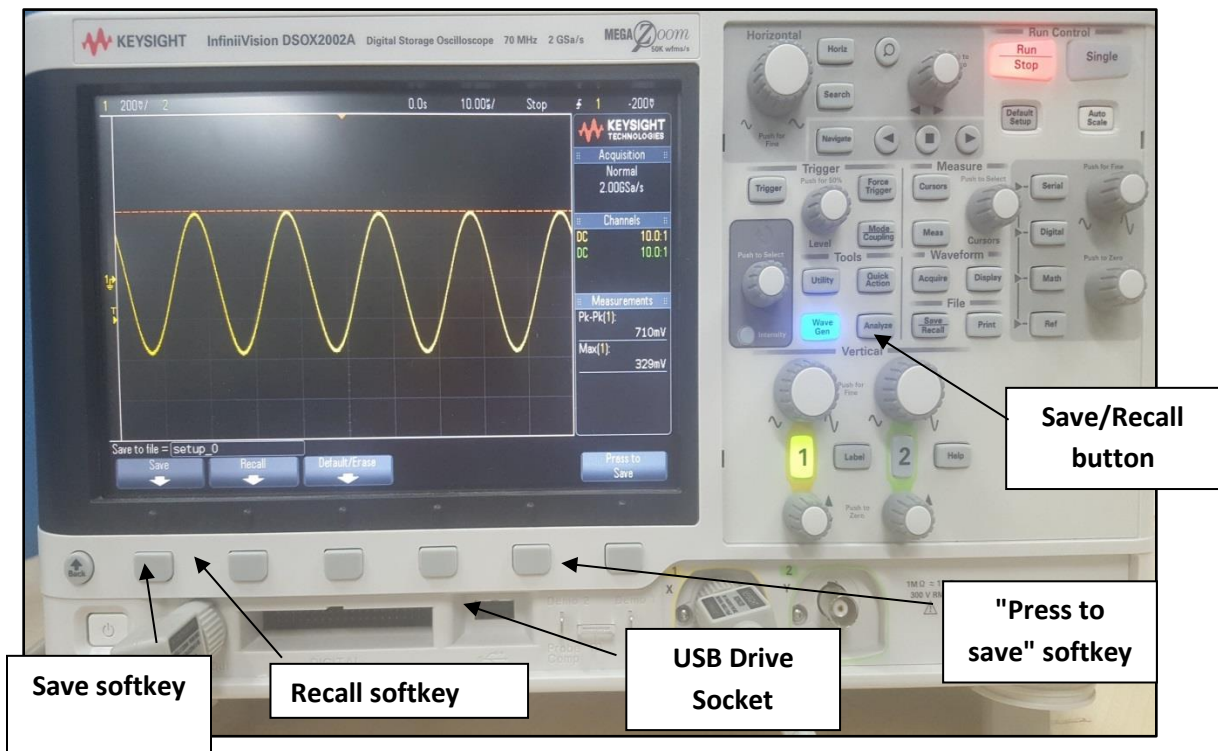

Figure 30: Save/Recall Menu

Figure 31: Format selection before saving the waveform

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- Press the soft key under the "Format Setup" option (Figure – 31).
- Select the default setup format (.scp) as shown in Figure – 31.

☞ In order to store the result of the experiment into the oscilloscope, select the format as Setup (.scp) only. Otherwise, if the result is to be stored in the pen drive, all other formats except the Setup format can be selected by rotating the Entry knob. Further, Press the knob for the particular format to be selected.

- Now, select the location of the memory (out of 10) where the result needs to be saved (Figure-32).
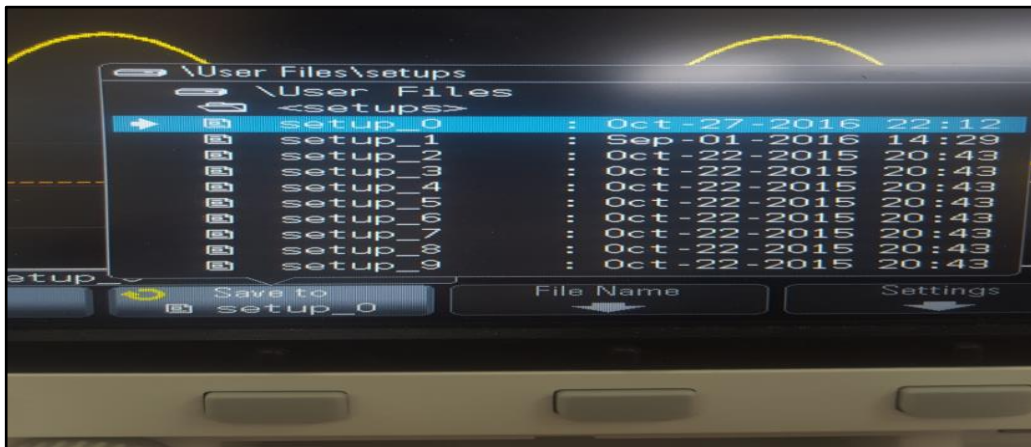- Press the knob for the desired location in the memory (Figure-32).

Figure 32: Saving the waveform in the DSO memory space

- Now, Press the soft key under the "Press to save" option in the "Save to file" menu as shown in figure-31.
- A notification will appear as "file saved successfully".
- Press back button to return to the main screen.

Steps for Recall:

- Press the Save/Recall button (Figure-33).
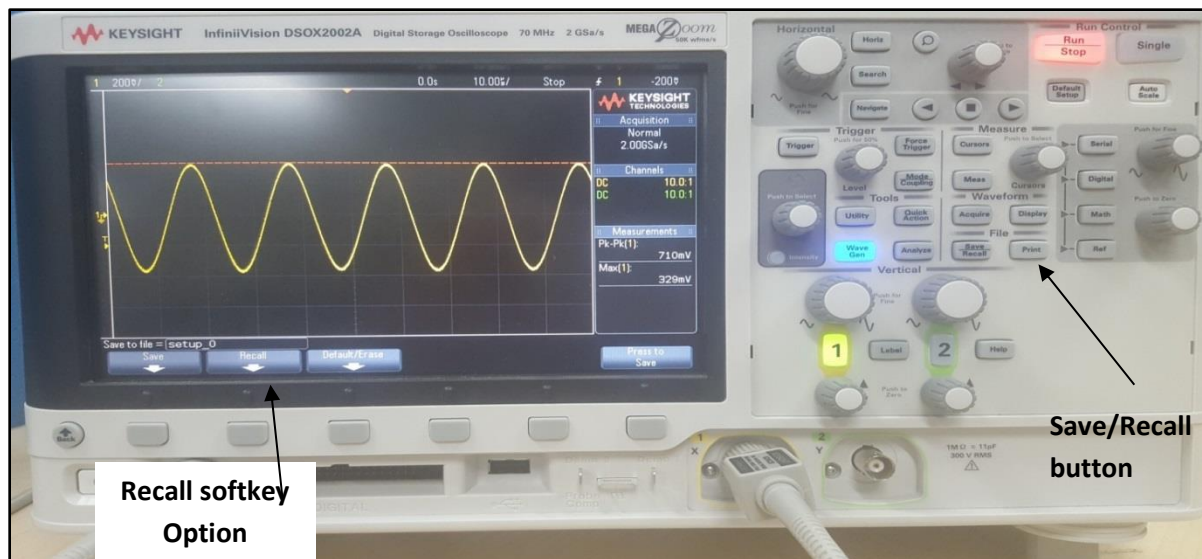- Press the soft key under the "Recall" option (Figure-33).

Figure 33: Recalling the saved waveform from its location

- Recall menu will appear (Figure-33).
- Press the soft key under the "Recall: Setup" option (Figure-33)
- Select the default file format to be recalled as Setup(.scp) as shown in Figure-33 using the Entry knob.
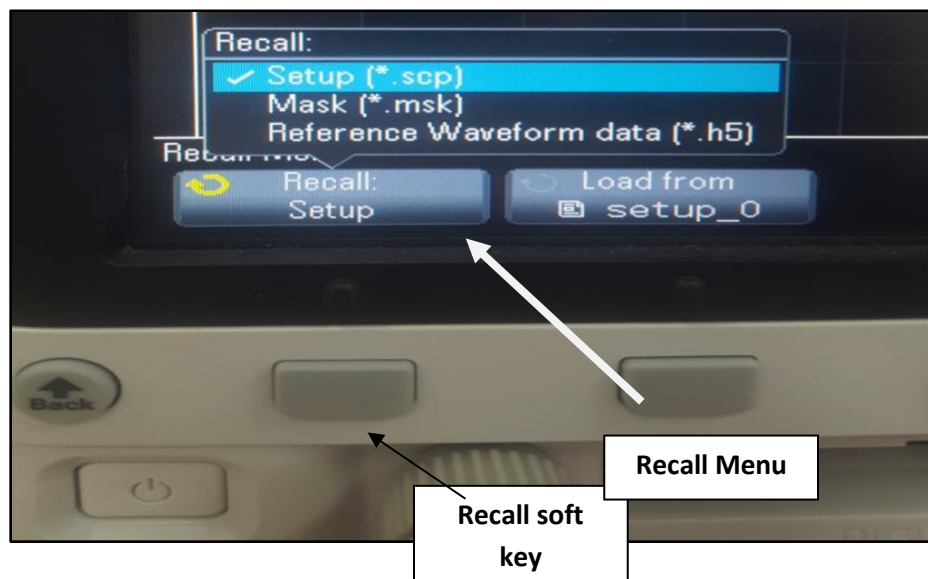

Figure 34: File format selection to be recalled

- Press the soft key under the "Location" option in the recall menu (Figure-35).
- Select the saved file in which the result was stored previously by rotating the Entry knob to the desired location and select the location by pressing the knob (Figure – 35).
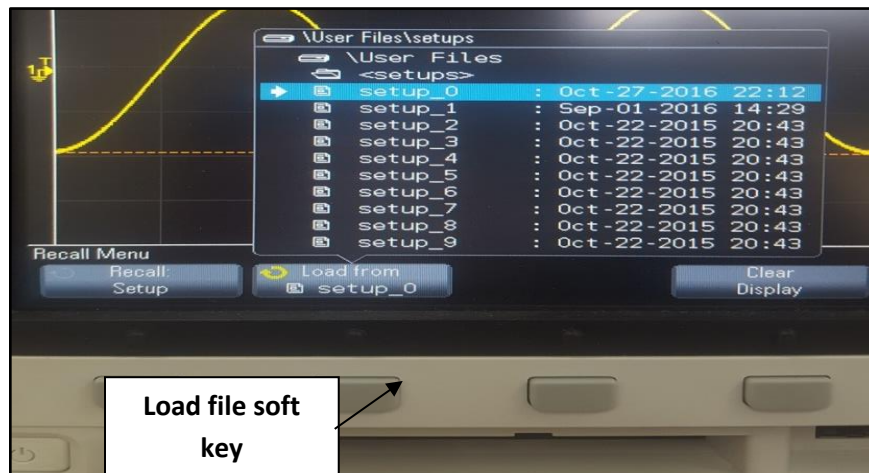

Figure 35: Selection of the saved waveform to be recalled

- Now, Press the soft key under the "Press to Recall" option in the recall menu (Figure – 36).
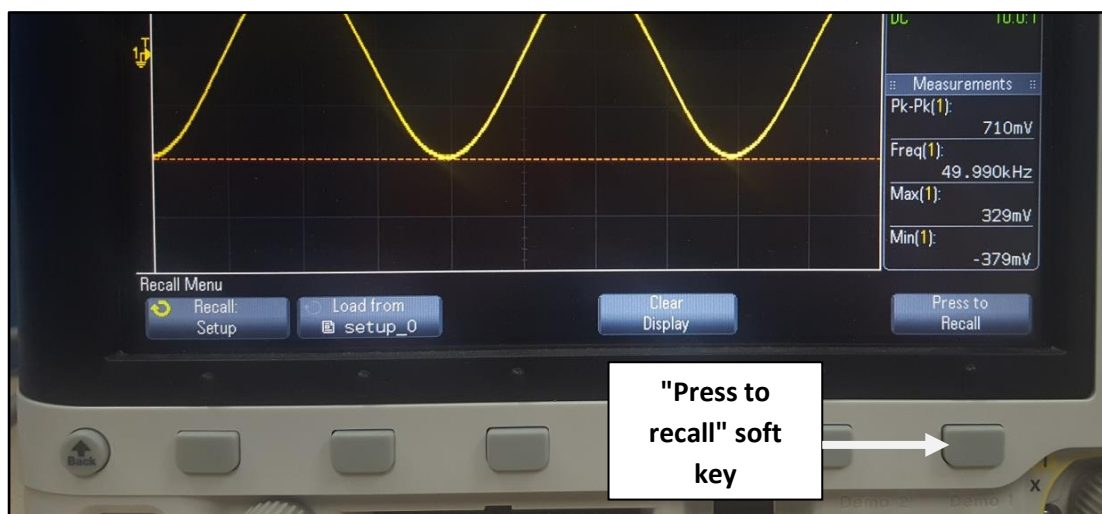

Figure 36: Final step of recalling the saved waveform

- Therefore, the previously saved result will be recalled successfully.

We hope now you can test/analyze any circuit on DSO using this manual.

For any further query regarding its operation .Kindly contact the respective Lab-Incharge.

Please contact ecelab@iiitd.ac.in for any update on this document".