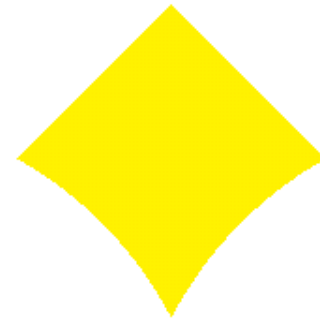




Student Workbook

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Self-Paced Exercises

Exercise 1 – Save a .SET file

The SL1400 has a number of different file types:

- .WVF – binary waveform data (always has a .HDR header associated file with it – keep these together as pairs when transferring files)
- .WDF – Waveform Data File - this is a REALTIME file for SL1400 (it has no .HDR file associated with it)
- .FLD – Floating point
- .HDR – Header File – this file must accompany the .WVF as mentioned above
- .ASCII – Opens as a .CSV within Excel – choose ASCII on SL1400; Used for MEASURE file.
- .SET – Settings File for SL1400** ←
- .JPG, .BMP, .SNP, .PDF, and .PNG – Graphics / Rasterized - image file types

Of these types, a .SET settings file is one of the most convenient files – it allows you to save your settings and later set-up your Recorder with just several key-strokes.

Follow these keystrokes to practice saving your setup into a .SET file:

There are several extraneous steps to ensure your success.

Select the Path

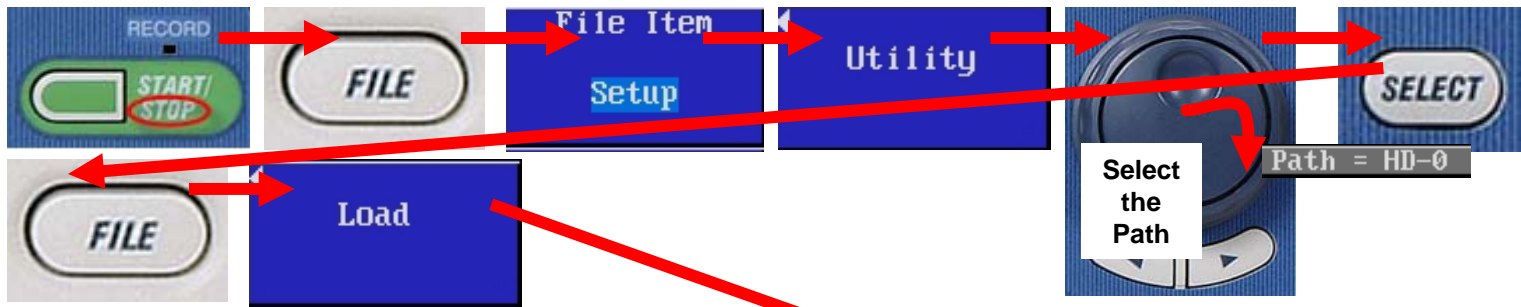
Select the Path

File List				
Path = HD-0				
Space	20004487168	byte	FileObjects:	1
File Name	Size	Date	Attr	
IPC_Card	1			
IHD-0	1			
INetwork	1			
0000	.SET	122196	2008/05/21 12:47	R/W

Success!

Exercise 2 – Load a .SET file

Follow these keystrokes to practice loading the .SET file which you created in Exercise 1 Loading a .SET file restores your settings.



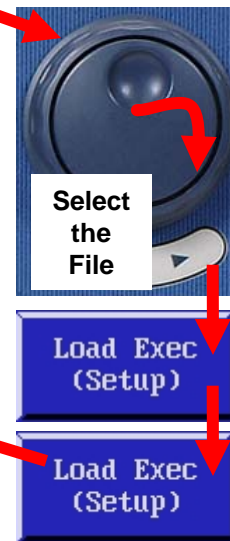
File List
Path = HD-0
Space 20004257292 byte File Objects: 1
File Name Size date Attr
IPC_Card]
LHD-0]
LNetwork]
0000 .SET 122196 2008/05/21 13:11 R/W

Highlight the .SET file you want, and load it.
You may wish to set the Filter to *.*

Load
Property
Filter
*.SET *.*
Load Exec (Setup)

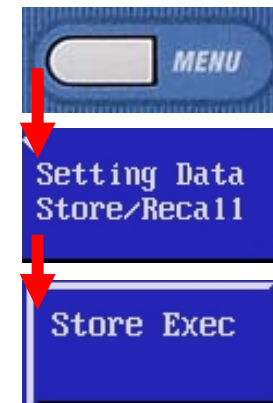
CH3 2500.0mV
[Sample : 100kS/s] Normal
[Rec.time 10s]

Stopped Trigger mode Auto
500.0mV



Need a quick & easy settings file?

You may alternately choose to backup your settings with these three keystrokes:



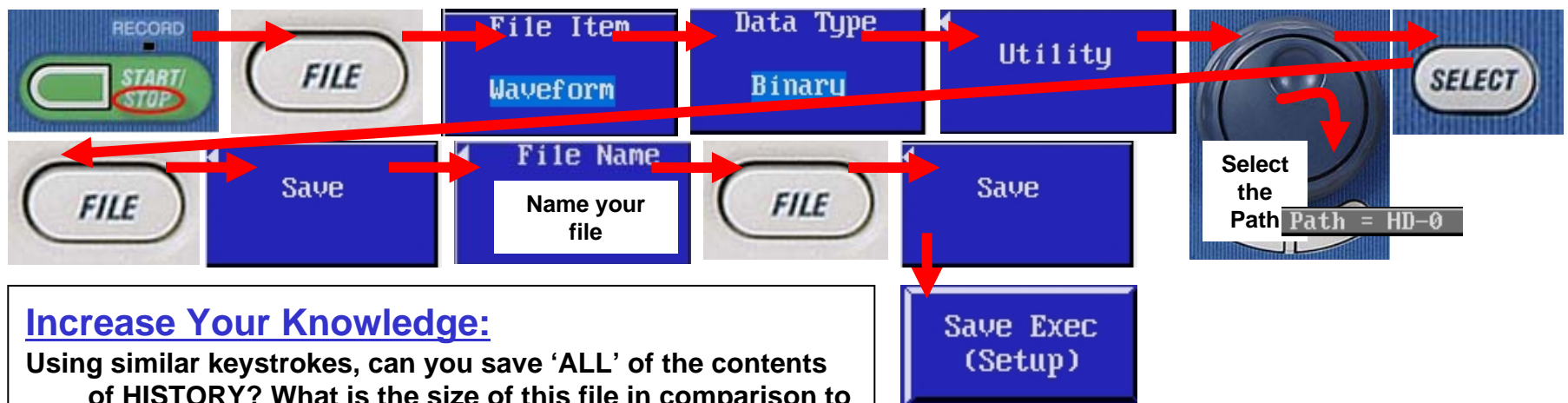
Exercise 3a – Save a .WVF file

The SL1400 has a number of different file types:

- .WVF** – **binary waveform data** (always has a .HDR header associated file with it – keep these together as pairs when transferring files – on your PC) ←
- .WDF** – Waveform Data File - this is a REALTIME file for SL1400 (it has no .HDR file associated with it)
- .FLD** – Floating point
- .HDR** – (must accompany the .WVF as mentioned above)
- .ASCII** – Opens as a .CSV within Excel – choose ASCII on SL1400. Used for MEASURE file.
- .SET** – Settings File for SL1400
- .JPG, .BMP, .SNP, .PDF, and .PNG** – Graphics / Rasterized - image file types

Of these types, a .WVF binary file is one of the most important files – it allows you to save your data as efficient binary data and later view or post-process your data. The Yokogawa Xviewer application can open & save .WVF;

Follow these keystrokes to practice saving data as a .WVF file:



Increase Your Knowledge:

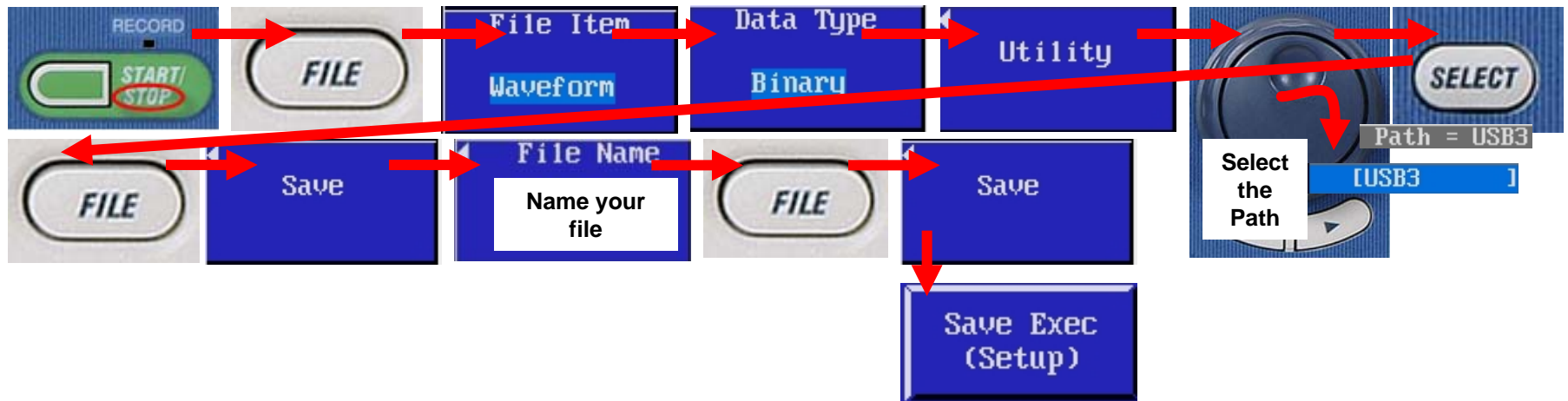
Using similar keystrokes, can you save 'ALL' of the contents of HISTORY? What is the size of this file in comparison to the .WVF which you saved in the above exercise?



Exercise 3b – Save a .WVF file to a USB Thumb Drive

Save a .WVF file to a USB Thumb Drive

You may skip over this exercise, if you already have an understanding of the PATH selection procedure.



Further your Understanding with this tip:

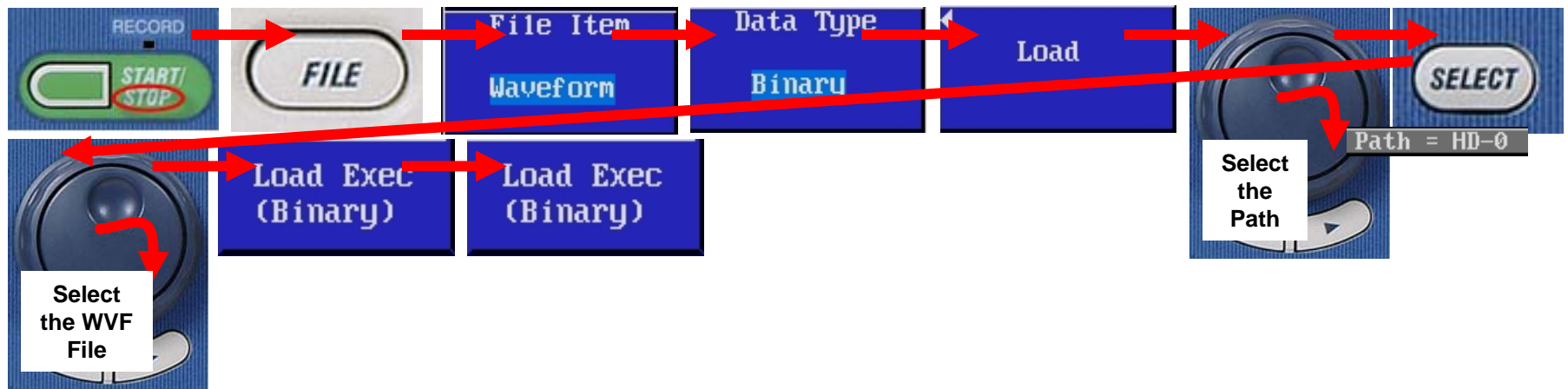
If you have already performed the above steps once, follow this shortcut:



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Exercise 4 – Load & View a .WVF file

Follow these keystrokes to practice loading and viewing the .WVF file which you created in Exercise 3



Did you know?

One of the greatest features of the .WVF is that you can load it and view it on the screen of the SL1400.

Another convenient feature of .WVF files is that they are compact and readily viewable on Yokogawa's Xviewer software.

ScopeCorder Tip:

Remember to always keep the .WVF and .HDR files together as a pair once you have transferred them to a computer.



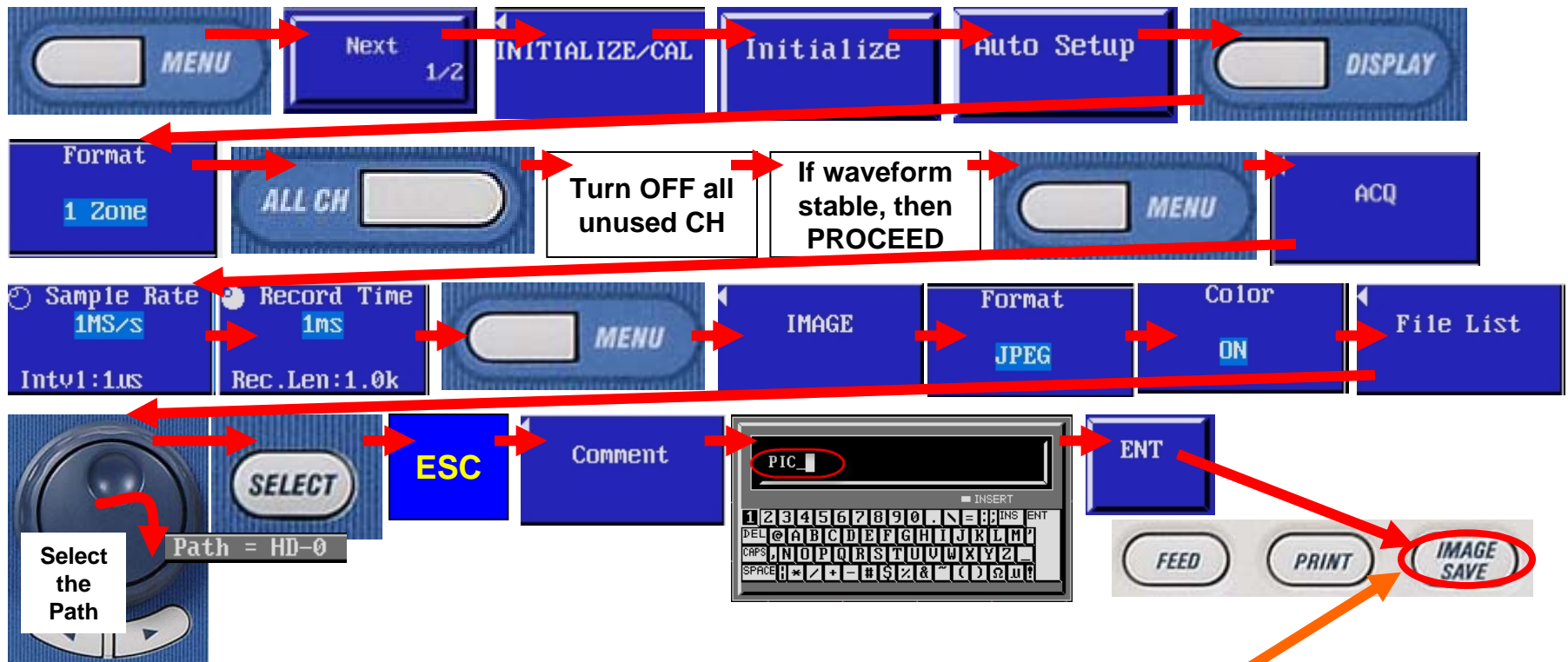
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Exercise 5 – Saving a screen IMAGE

The SL1400 is capable of saving four types of images: .PNG, .JPG, .BMP, & Post Script.

In this exercise, you will save an image as a color JPEG.

Connect a Probe to CH1 and connect the tip to the PROBE COMP terminals.



From this point forward, you press ONE BUTTON

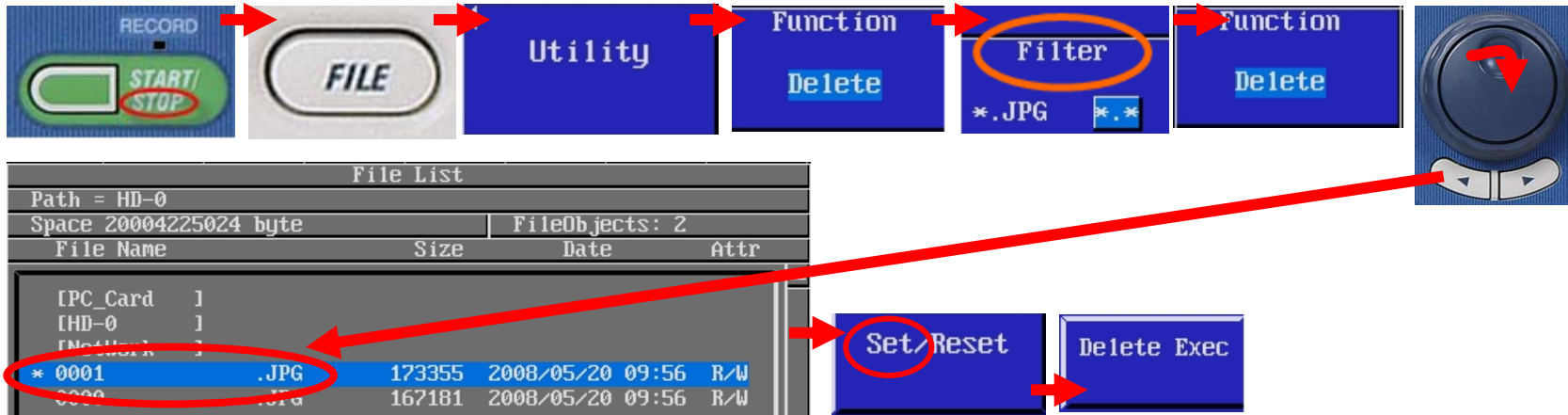
The steps listed above do not need to be completed each time you wish to capture an image to storage media. Simply press the one button "IMAGE SAVE" for each image desired.

Exercise 6 – File Utilities

The SL1400 has a number of different file utilities:

Delete, Copy, Rename, Make Dir, and Format

The Exercise below demonstrates how to Delete a file, as an example.



Increase Your Knowledge:

The keystrokes used to DELETE a file in the above exercise above was a virtual tour of: *Delete, Copy, Rename, Make Dir, and Format functions.*

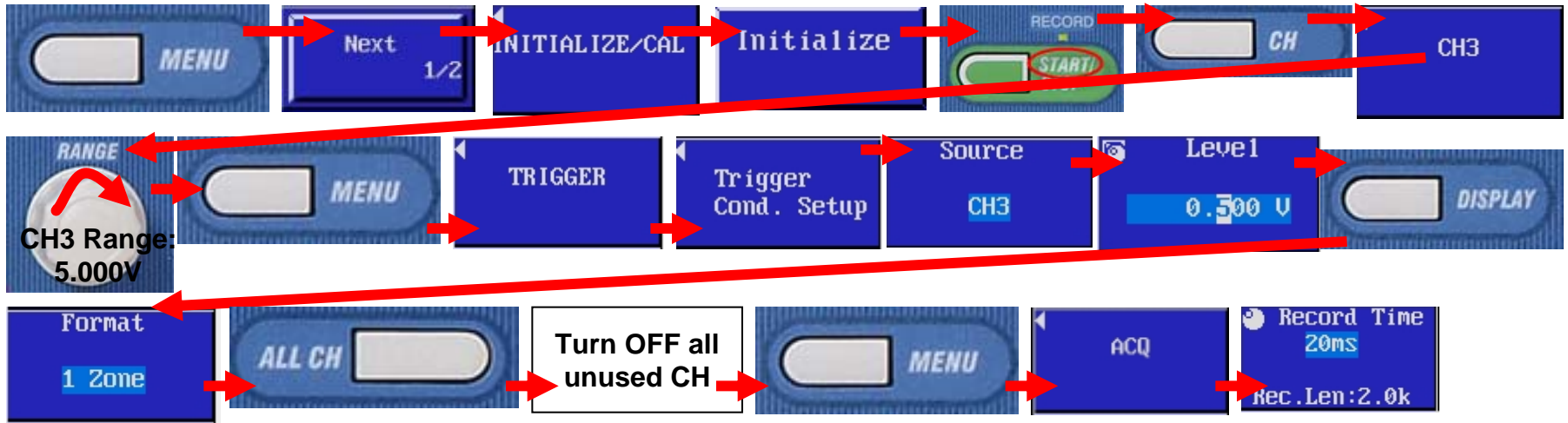
Using similar keystrokes, can you perform the Make Dir function, creating a directory named "Data"?



Exercise 7a – Simple Trigger Exercises

This is a good start to viewing just about any signal:

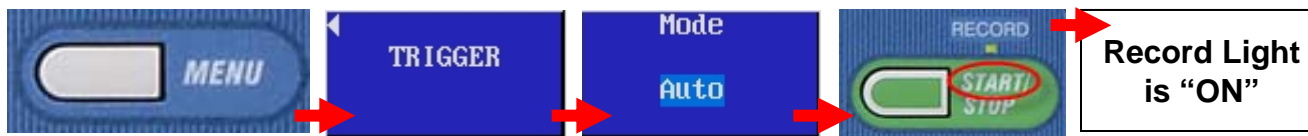
In this example, please connect a probe to any voltage input module except for CH1 and then to PROBE COMP on the front panel. Assuming CH3 is your input channel, let's get started:



Increase your skills - SINGLE Mode: What happens when you press START?



Prepare for Exercise 5a: Return to Auto Mode:

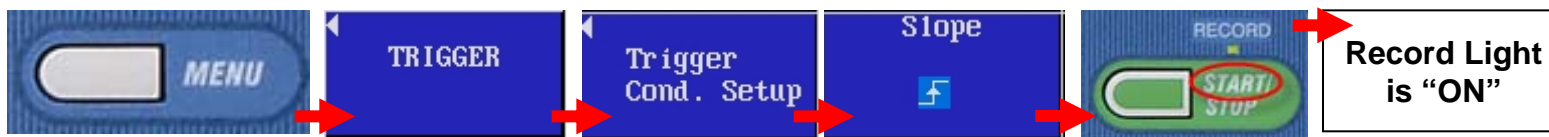


Exercise 7b – Simple Trigger Exercises

Getting the hang of SLOPE: What happens when you press SLOPE?

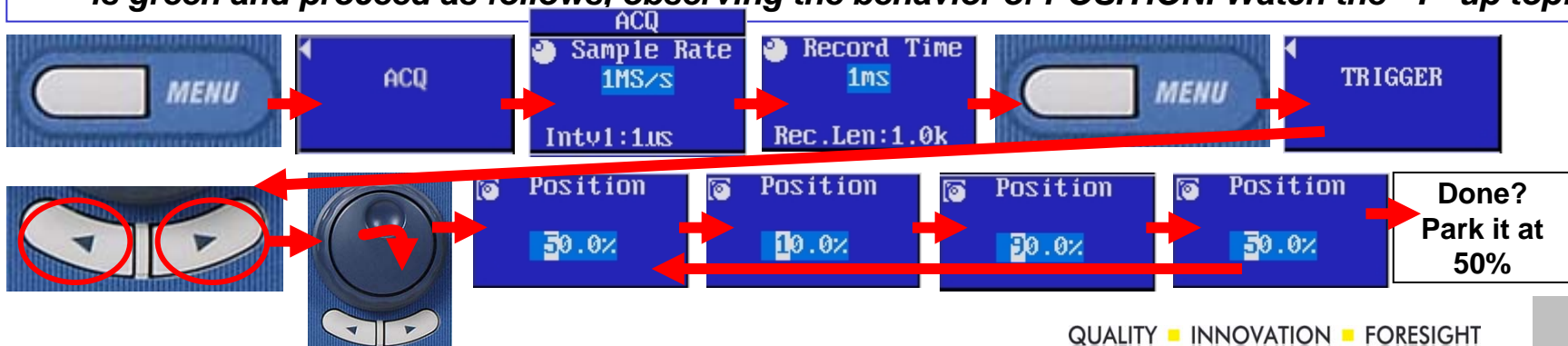


When have completed the SLOPE exercise: Park it as follows:



Getting POSITION'd:

When you are interested in either mostly pre-trigger data (or, perhaps, you are interested in mostly post-trigger data) – you will find POSITION adjustment very handy. Make sure your PROBE COMP signal is stable, the TRIG'D light is green, and the RECORD light is green and proceed as follows, observing the behavior of POSITION. Watch the “T” up top!



Exercise 7c – Simple Trigger Exercises

Understanding the NORMAL Trigger Mode: Using the previous set-up, perform the following steps you will adjust trigger level so that the trigger condition is “met” and alternately “not met”.

You will gain an understanding of NORMAL mode and TRIGGER LEVEL.



What happens and why?

1. Your waveform was acquired repeatedly with LEVEL at 0.500V, and then froze at 1.500V. The trigger condition was “met” / true and alternately not “met” / false.
2. You observed that the TRIG'D indicator LED was dark (no trigger) at 1.500V.
3. You observed the “T” on the left-hand side of the screen move with the trigger-level adjustment as a visual confirmation of your trigger-level.
4. This is NORMAL trigger mode – one of the most powerful modes of the SL1400.

Before you move on to the next exercise:

With the Level set to 1.500 Volts, find and press the ‘Manual Trig’ button on the front-panel of the SL1400.

What happens and why?

Is a trigger condition being met? Or is a trigger being forced?

Is this manual trigger in-sync with the PROBE COMP waveform?

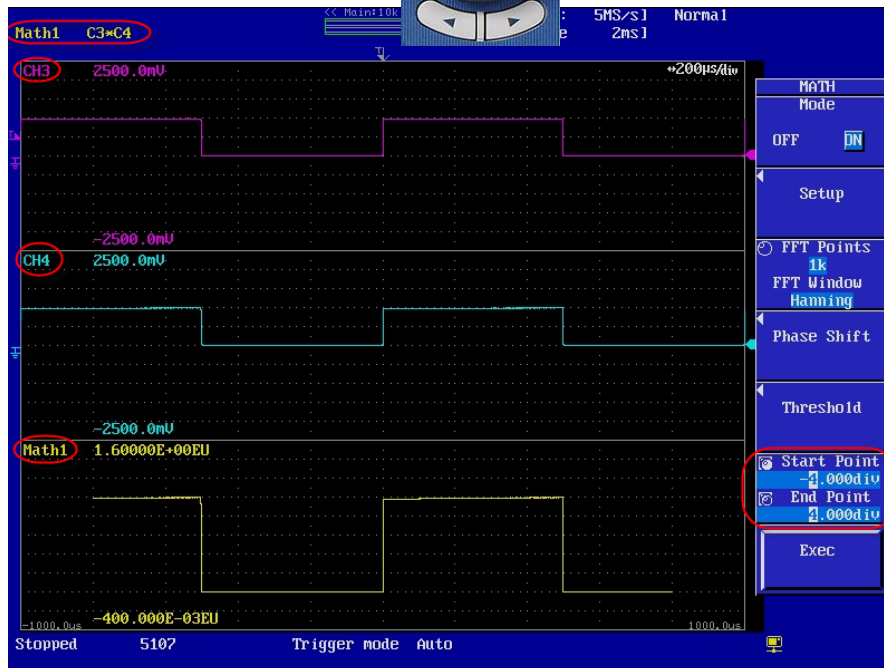
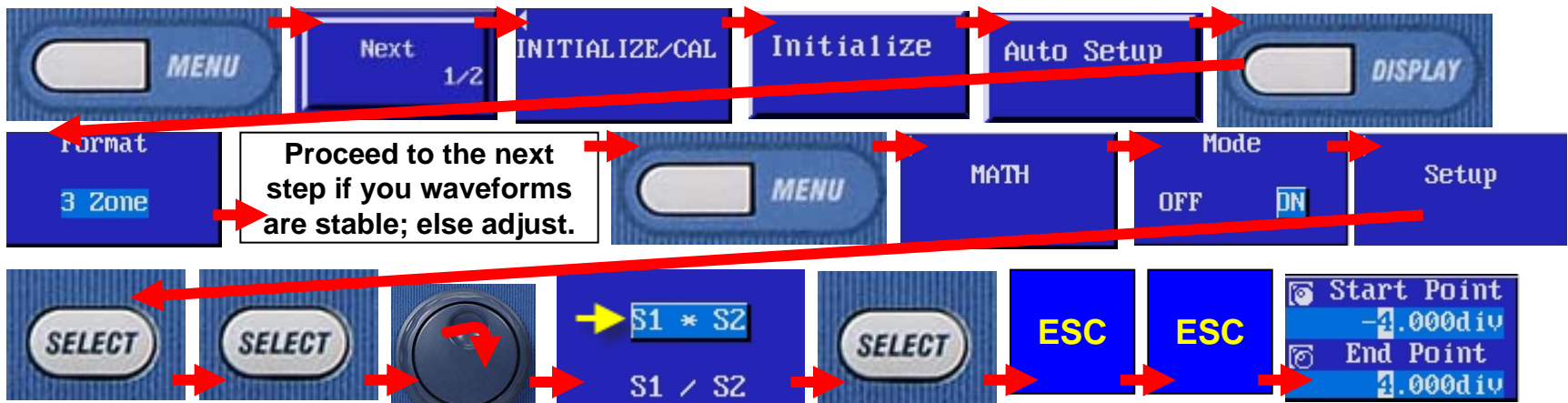


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Exercise 8 – MATH on the SL1400

The SL1400 can do ADD SUBT MULT DIV and more:

Connect a pair of waveforms to CH1 and CH2. These waveforms can be anything. We will use the PROBE COMP signal in this example.



Review:

- You used AUTO SETUP to acquire a pair of waveforms.
- You multiplied this pair of waveforms using SL1400 MATH.
- You de-limited that MATH with Start/End Point cursors.

Practice your knowledge:

- Using what you have learned thus far, save these settings to a .SET file with a comment called "Multiply".
- Hint: MENU, SETTING DATA, etc.



Exercise 9a – Getting Started with RealTime

The SL1400 is capable of streaming data to the HDD:

The Exercises on the following pages demonstrates how to get started with RealTime Mode. Please input a signal of PROBE COMP into CH1, and then follow the steps detailed below:

File List

File Name	Size	Date	Attr
[PC_Card]		
[RealTime]		
[HD-0]		
[NetWork]		
RT_0001	.WDF	3145728	2008/05/21 11:09 R/W
RT_0000	.WDF	3145728	2008/05/21 10:53 R/W
MY_R0000	.WDF	3145728	2008/05/21 10:11 R/W

Success!

Setting Data Store/Recall

Store Exec

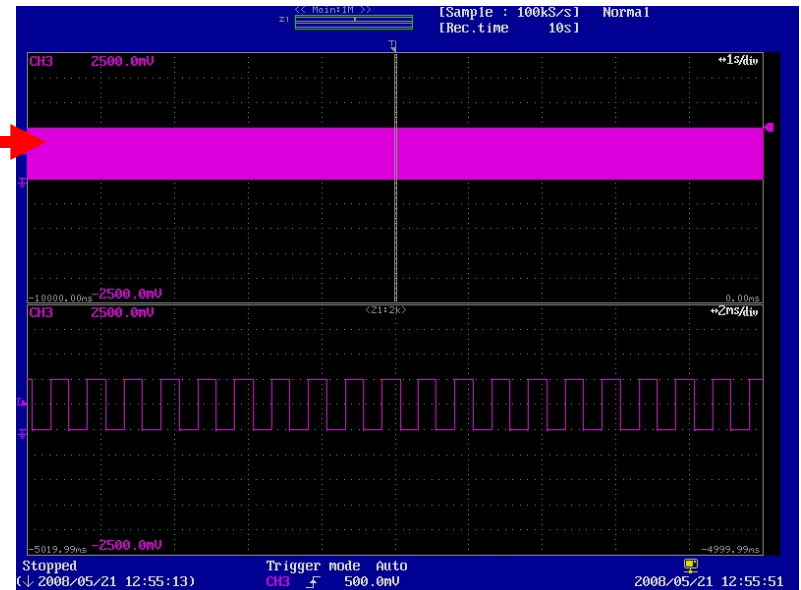
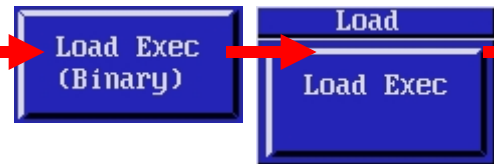
Practice what you have learned:

At this point, you have a number of keystrokes invested in this exercise. You may wish to backup your settings with these three keystrokes:

Exercise 9b – Viewing a RealTime File

The SL1400 is versatile – permitting you to archive and view your RealTime data in the field:

Follow the simple steps below to view the .WDF file which you just created in Exercise 8a. There are several extraneous steps to ensure your success.



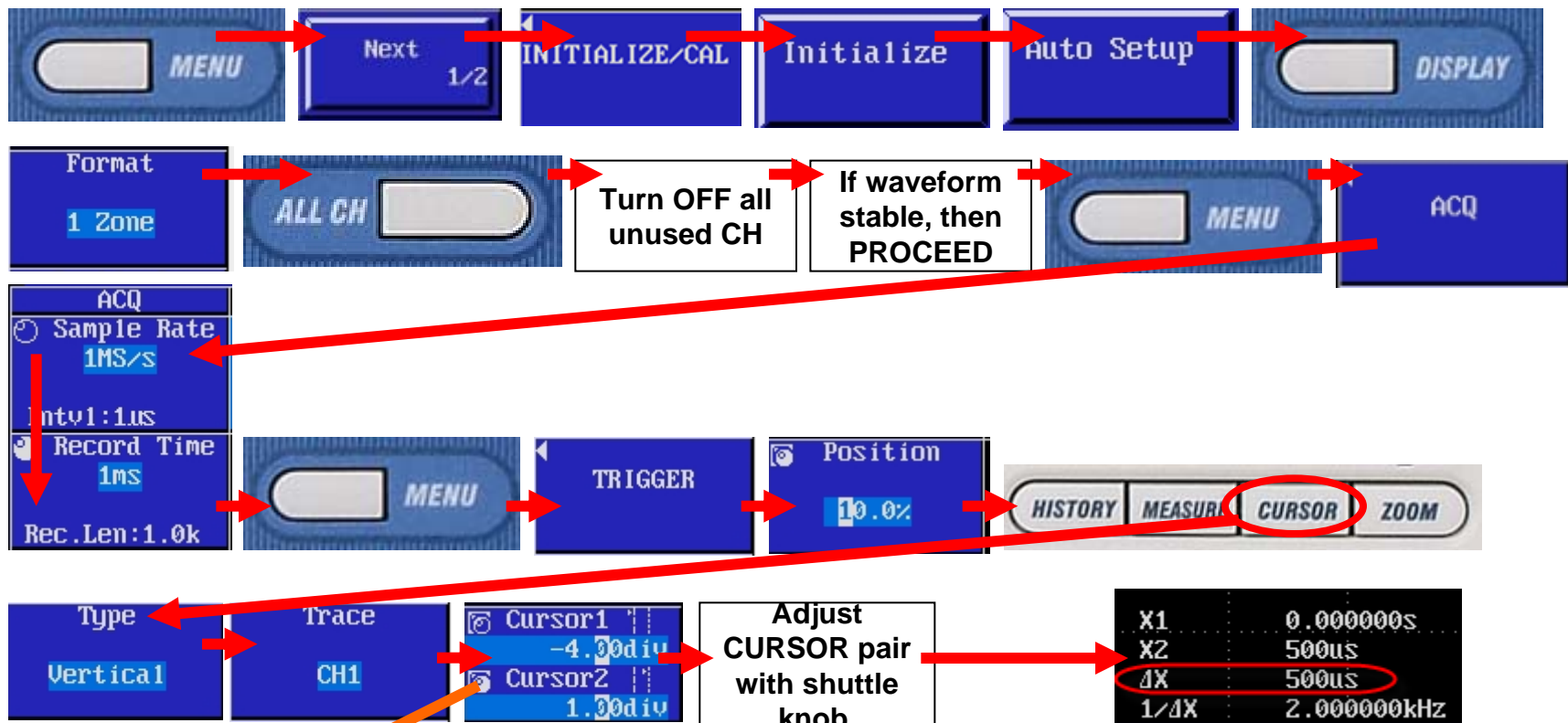
Exercise 10 – Let's use Cursors

The SL1400 features five types of cursors:

In this exercise, you will manually measure the pulse width of the PROBE COMP signal so that you become acquainted with CURSORS.

Connect a voltage probe from CH1 to PROBE COMP and acquire a waveform practicing the skills that you have acquired in the last few exercises.

There are several extraneous steps to ensure your success.



Challenge yourself! Take a moment to discover how to move both cursors simultaneously.

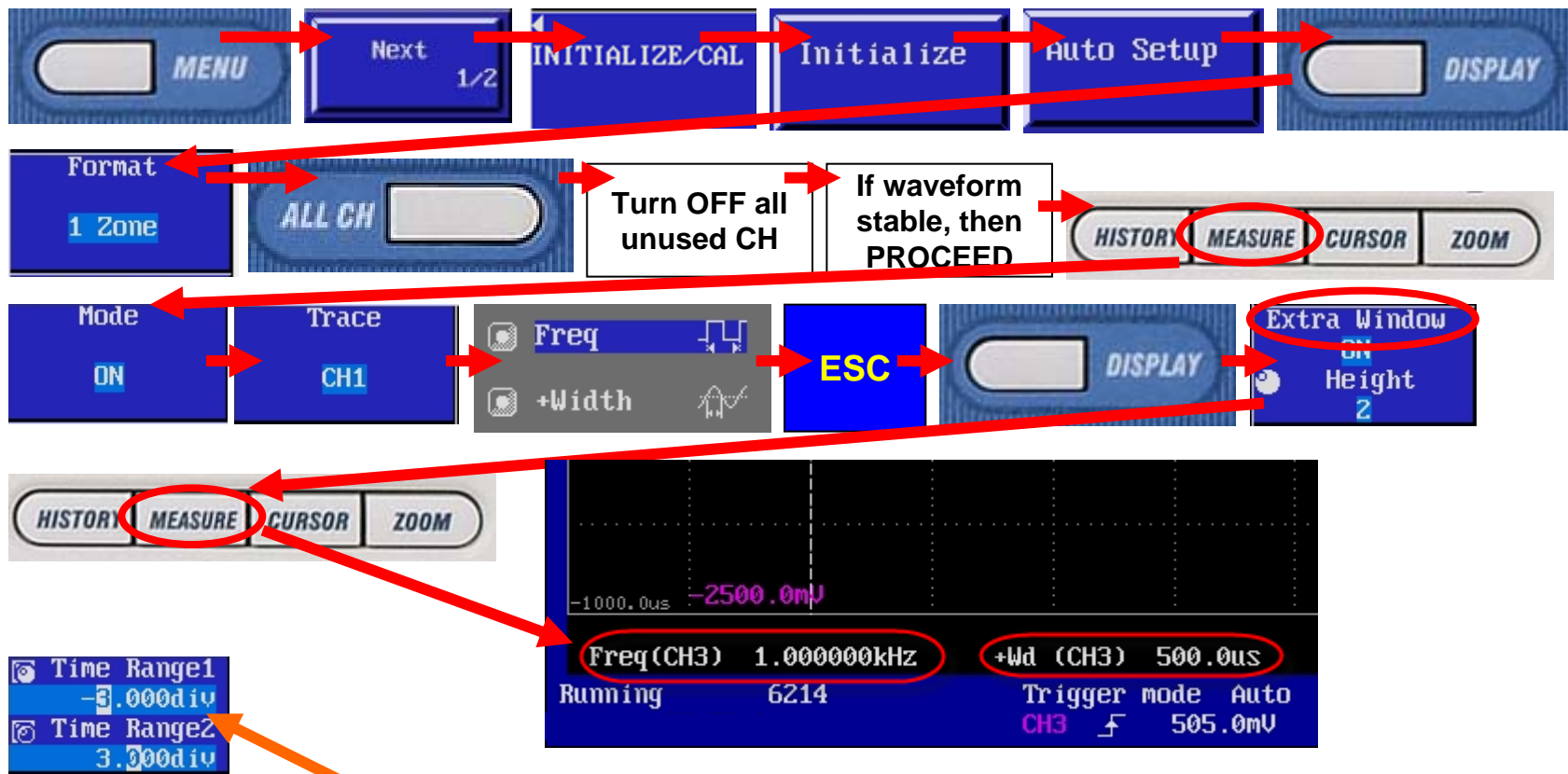
Exercise 11 – Explore the MEASURE Menu

The SL1400 features over 28 MEASURE Items:

In this exercise, you will measure the pulse width of the PROBE COMP signal so that you become acquainted with the MEASURE Items.

Connect a voltage probe from CH1 to PROBE COMP and acquire a waveform practicing the skills that you have acquired in the last few exercises.

There are several extraneous steps to ensure your success.



Challenge yourself! Take a moment to discover the TIME RANGE cursor-pair in the MEASURE menu. What effect does this pair of cursors have on the measurement?

Exercise 12 – Fine Tune your Waveform

The SL1400 is capable fine adjustment of both RANGE and POSITION:

Often you will want your waveform to fill the screen.

This assures you of easier and more accurate measurements.

In this exercise, you will fine tune your waveform to utilize maximum screen area.

Connect a Probe to CH1 and connect the tip to the PROBE COMP terminals.

Proceed as follows:

MENU → Next 1/2 → INITIALIZE/CAL → Initialize → Auto Setup → DISPLAY

Format 1 Zone → ALL CH → Turn OFF all unused CH as necessary → CH → CH1

Span : 1200.0mV
CH3 Range : 2.000V
[Sample : 5MS/A] Norma1
[Rec.time : 2ns]
CH3 1104.0mV
+200µs/div
-96.0mV
1000.0µs
Running 19198 Trigger mode Auto
(2008/05/22 13:56:03) CH3 F 505.0mV 2008/05/22 13:56:04

RANGE FINE POSITION FINE
RANGE POSITION

Alternately adjust these four controls to utilize most of the waveform display area.

Exercise 13a – Phase Msm't between two Channels

The SL1400 has a built-in Delay Measurement:

This function makes phase measurements possible without cursors, enabling you to automate your phase measurements for easier, faster, and accurate measurements. *You can measure up to 24 phase angles simultaneously!*

In this exercise, you will measure the degrees of delay between a pair of signals. You will need a pair of signals for this measurement, out of phase with one another.

Input and acquire a pair of waveforms

In this example, CH3 is the Reference Signal.

In this example, CH4 is the channel we will measure.

Check Your Results on the Next Page

Edge Count
Edge Count is the reference point formed by the nth falling/rising edge from the left-hand side of the display.
In this exercise, you will measure the delay between the 1st rising edge on CH3 to the 1st rising edge on CH4.

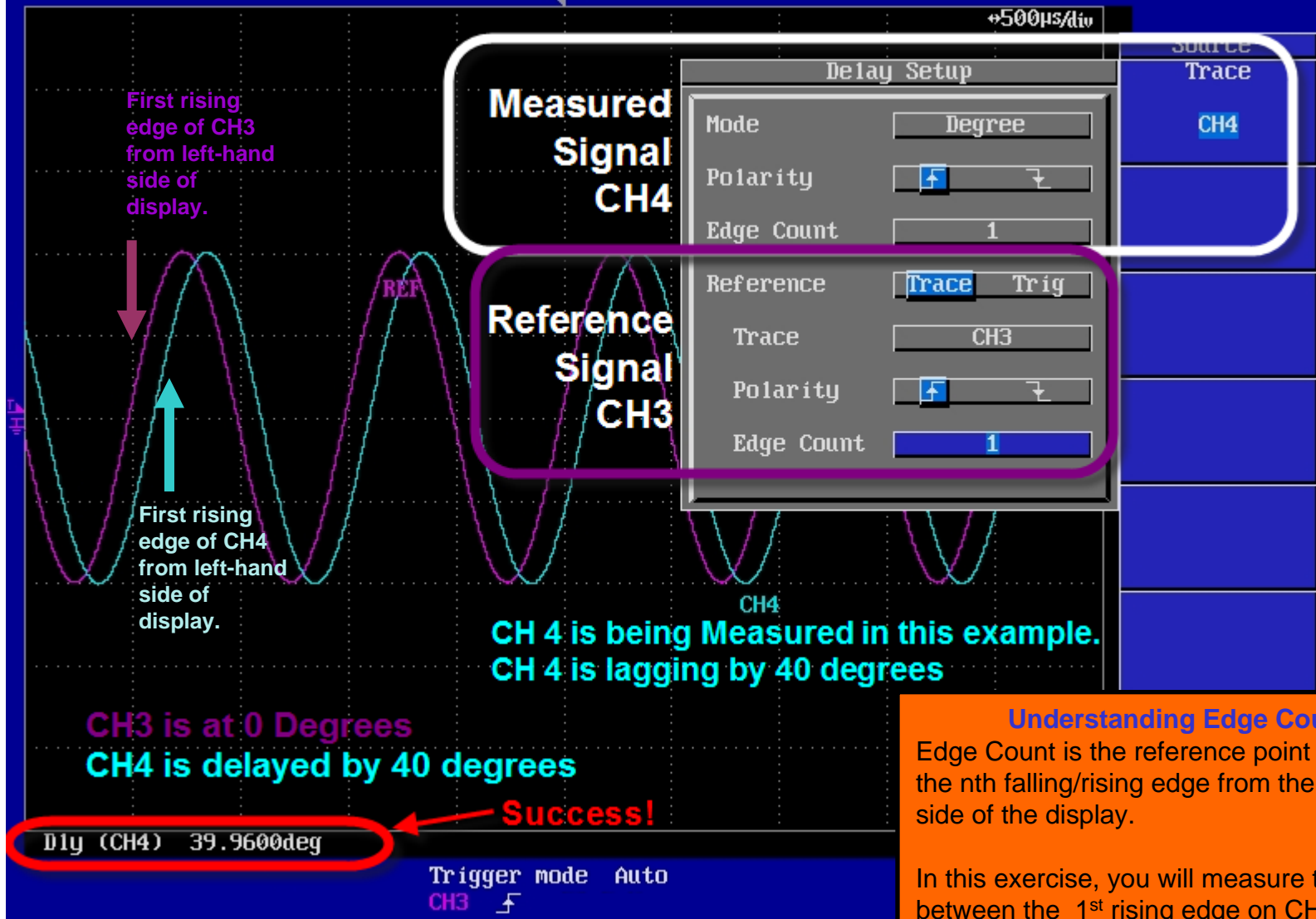
Increase Your Knowledge:

Using similar keystrokes, please add a 2nd simultaneous Phase measurement → Measure the delay of CH3 with respect to CH4. The correct result is - xx degrees.



Exercise 13b – Phase Msm't between two Channels

Delay Measurement between a pair of 1 kHz Sine Waves



Understanding Edge Count

Edge Count is the reference point formed by the nth falling/rising edge from the left-hand side of the display.

In this exercise, you will measure the delay between the 1st rising edge on CH3 to the 1st rising edge on CH4.

