



Using the GETDATA program with the Casio EA-100/EA-200 Data Analyzers

General

When loaded into any of the Casio CFX series of graphics calculator, the program 'GET DATA' controls data collection by the Data Analyzer for any activity using any combination of the three supplied probes:

1. Light
2. Temperature
3. Voltage.

These probes are always connected to the Data Analyzer unit through any of CH1, CH2 or CH3 sockets.

In a typical laboratory or classroom, all students will load a copy of the program from a central source. Within each sub-group of 4 or so students, one calculator will then be used to initiate data collection from an investigation (option 1. New Experiment). This calculator can then be disconnected from the Data Analyzer unit until data collection is complete. Then all students connect to the Data Analyzer unit in turn to download data for individual analysis (using option 2. Download Data).

1. New Experiment

This screen is the initial welcome from the program. Choose option 1 or 2 and press EXE.

Here *1. New Experiment* has been chosen.

A reminder to turn on the Data Analyzer unit is shown.

Press **EXE** to continue after the "- Disp -" prompt appears.

It is good practice to start in this order:

1. connect probe(s) to Data Analyzer unit
2. connect Data Analyzer unit to calculator
3. turn on Data Analyzer unit
4. start the GET DATA program

Enter the number of samples required and press **EXE**.

This can be any integer from 2 to 250.

Values outside this range are ignored and either 2 or 250 substituted.

```
EA-100 Data Program
Choose:
1. New Experiment
2. Download Data
?
1
```

```
Turn EA-100 unit on
connect probe(s)
and then press EXE
- Disp -
```

```
Number of samples
(2 - 250)
?
100
```



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Enter the time interval in seconds between samples and press **EXE**.
The range allowed is 0.001 (1 millisecond) to 16000 (just over 4 hours).
Note this is not the total sampling time.

```
(2 - 250)
?
100
Time between samples
(.001s - 16000s)
?
0.1
```

The total sampling time is displayed.
Abort the program at any stage "- Disp -" is showing by pressing **AC/ON** followed immediately by **EXE** to restart from the beginning.

```
Time between samples
(.001s - 16000s)
?
0.1
Total time (s)... 9.9
- Disp -
```

A memory check is carried out. If the calculator in use does not have enough memory to download all data after the experiment is over a "Mem ERROR" will be displayed.
If this happens, press **AC/ON**, free up some calculator memory and re-start the program.
(Hint: Enter MEM mode and examine usage).

```
Checking memory...
Memory OK

Press EXE to start
data sampling
- Disp -
```

When you want data sampling to begin, press **EXE** and the Data Analyzer unit will flash 'SAMPLING' on its display.
Do not press **EXE** on the calculator to continue until 'DONE' appears on the Data Analyzer unit screen.

```
Sampling in progress
Wait until DONE
appears on EA-100.
Then press EXE...
- Disp -
```

If data collection will take a long time, the CFX calculator may be turned off and disconnected from the Data Analyzer unit at this point

On completion of data collection (DONE appears on the Data Analyzer unit) press **EXE**.
Data is now transferred from the Data Analyzer unit to the calculator. This stage may take up to 1 minute if the maximum number of samples were taken and three probes were used.

```
Receiving Data
Time....
Data 1...
Data 2...
Data 3...
```

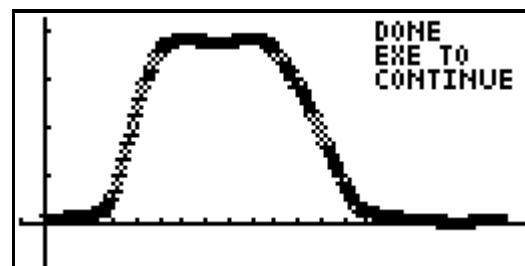


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Once all data has been transferred to the calculator turn off the Data Analyzer unit to conserve battery life. Press **EXE** for an automatically scaled scatterplot of time v data.

```
All data in
EXE to graph...
- Disp -
```

This graph was from an investigation with a light probe. Proceed to the end of the program by pressing **EXE**.



Press **MENU** followed by the **2** key to enter STAT mode.

```
Finished
Again..... EXE
See Data... MENU,2
End..... AC/ON
```

Once in Statistics mode you can

1. manually edit sampled data to remove any outliers or erroneous data
2. choose different types of graph to display data
3. perform statistical analysis of data

	List 1	List 2	List 3	List 4
1	0	10.953		
2	0.03	11.067		
3	0.06	11.297		
4	0.09	11.529		
5	0.12	11.881		

0

GRAPH CALC TEST INTR DIST

2. Download Data

If option 2 was chosen at the start because data collection by the Data Analyzer unit was complete, the reminder to the right will be shown. Data is not lost if the Data Analyzer unit is turned off, but do not unplug the probes.

```
Check EA-100 is on
with probes still
connected
Then press EXE...
- Disp -
```



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After pressing **EXE** to continue, all data is downloaded from Data Analyzer to CFX calculator.

This screen indicates 3 probes were used in the experiment.

```
Receiving Data
Time.....
Data 1...
Data 2...
Data 3...
```

Probes

The probes can sample data in the following ranges:

1. Temperature -20°C to 130°C with an accuracy to 0.1°C
2. Light 100 to 999 (measure of relative brightness only)
3. Voltage -10V to $+10\text{V}$ with an accuracy to 10mV .

Data Analyzer Unit

Depending on the probes used, the Data Analyzer unit can drain its four 1.5V batteries fairly quickly. For longer experiments use an external 6V power source.

Lists

The Lists in the graphics calculator are used to store sampled data as follows:

1. List 1 - time (seconds)
2. List 2 - data from lowest channel used
3. List 3 - data from next lowest channel (if used)
4. List 4 - data from remaining channel (if used)

Eg. If the voltage probe was in CH1 and the temperature probe in CH3 then List 2 would contain voltages and List 3 would contain temperatures.

The following symbols are used to plot each List:

- List 2 : a cross
- List 3 : a square
- List 4 : a dot



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Error messages

To clear an error message on the Data Analyzer unit press **HALT**.

To clear an error message on the graphics calculator press **AC/ON**.

Typical causes of the following error messages are:

- | | |
|-----------|--|
| Com ERROR | Cable missing or not properly inserted between calculator and Data Analyzer. Make sure cable is inserted at both ends with a 'click'. |
| Mem ERROR | Not enough memory free on calculator - you need to free up memory or take fewer samples. Each data point sampled will need 10 bytes.
Eg 250 samples ? 10 bytes ? 4 (3 probes + time) = 10000 bytes free needed for data. Graph will need another 4300 or so bytes, so if you check you have 15000 bytes free before starting you should experience no memory problems.
Check memory usage in MEM from the MAIN MENU. |
| Syn ERROR | The GET DATA program has become corrupted. Delete and load in a fresh version. |
| Ma ERROR | Usually caused by the calculator trying to divide by zero - for instance when trying to auto-scale a graph but all data points have the same value. Try manually plotting graph (change in STAT Setup). |