

Data Collection: Start to Finish
“SOUND” using TI -89, CBL2, microphone, and physics()
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T³ • Teachers Teaching with Technology

PREPARE THE EQUIPMENT

Microphone sensor → CBL-2 → TI-89



PREPARE THE CALCULATOR

1. Make a PHYSICS folder on the calculator
 - a. Press VAR-LINK
 - b. Press **[F1]** and choose 5: Create Folder
 - c. Type the folder name CBL2
 - d. Press **[ENTER]** *twice* to create the folder

2. Switch to your PHYSICS folder on the calculator
 - a. Press **[MODE]**
 - b. Press **[↓]** to get to “Current Folder”
 - c. Press **[↓]** to see the list of folders available
 - d. Press **[↓]** or **[↑]** to locate the CBL2 folder
 - e. Press **[ENTER]** *twice* to save the mode setting

3. Download the physics programs from another calculator or from a computer to the calculator
 - a. Receiving calc: **[2nd][=]** (VAR-LINK) **[F3]** 2: Receive
 - b. “Waiting...”
 - c. Sending calc: **[2nd][=]** (VAR_LINK); mark files (**[F4]**); **[F3]** 1: Send
 - d. Watch transmission process.

4. Run the physics() program on the TI-89
 - a. Either TYPE the command **physics()**
or
 - b. Press VAR-LINK (**[2nd][=]**) and choose **physics** from the menu and remember to *type the closing parenthesis* at the end of the command
 - c. Press **[ENTER]** to execute the command.

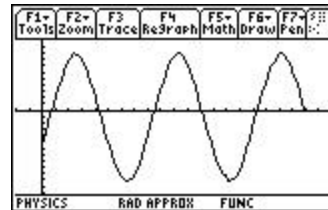
Using PHYSICS()



physics() MAIN MENU

1. SET UP PROBES (press 1 on the MAIN MENU)
 - a. Choose NUMBER OF PROBES of probes (1)
 - b. Choose MICROPHONE (4)
 - c. Connect microphone sensor to channel 1 on the CBL2
 - d. Choose CBL as the type of microphone (1)
 - e. RETURN TO MAIN (4)

2. COLLECT DATA (press 2 on the MAIN MENU)
 - a. Choose WAVEFORM (2)
 - b. ** time settings are automatically set for collecting sound data!*
 - c. Read screen instructions and proceed...
 - d. At the end of data collection (100 data points in 0.001 second), the data is analyzed and a graph is displayed.
 - e. After examining the graph (tracing), press **ENTER**.
 - f. Repeat? Answer YES OR NO...
 - g. NO... then RETURN TO MAIN



There is no SINREG model in the ANALYZE tool in the physics() program. We'll have to do this 'by hand'...

(You can use the datafile cbldata and the Data/Matrix Editor or the lists l1, l2, etc. and the Stats/List Editor if it is installed). The following instructions are for using the Data/Matrix editor...

“BY-HAND” GRAPHING

Quit the physics() program (7: QUIT on the MAIN MENU). The data is in the current Data/Matrix editor file, called **cbldata**, in the PHYSICS folder you created.

To set up a stat plot of distance vs. time by hand, press **Y=** (**2nd** **F1**). Press **⏪** to go up to the Plots. One of them is the plot created by the physics program. Press **ENTER** to edit that one.

For the X-list (time), **c1** is used; for the y-list (distance), **c2**.

Press **ENTER** to save the plot setup.

Press **F2** (Zoom) **9** (ZoomData) to see the graph of the data.

“BY-HAND” REGRESSION

Stat Calc tools (regressions) are built into the Data/Matrix Editor. Press $\boxed{\text{APPS}}$ and choose the Data/Matrix Editor. Once in the editor, press $\boxed{\text{F5}}$ (Calc).

On Calculation Type:, press \blacktriangleright to select the type of analysis. For this problem, choose **B: SinReg**.

Press \blacktriangleleft to move to the x..... field and enter **c1**. Press $\boxed{\text{ENTER}}$

Press \blacktriangleleft to move to the y..... field and enter **c2**. Press $\boxed{\text{ENTER}}$.

Press \blacktriangleleft to move to the Store RegEq to... list. Press \blacktriangleright and choose a y-function to hold the equation ($y_1(x)$).

Press $\boxed{\text{ENTER}}$ to perform the regression.

At the end of the regression routine, the values of a , b , and c are displayed. Press Enter.

Finally, press GRAPH ($\boxed{2\text{nd}}\boxed{\text{F3}}$) to see the graph of the data and the graph of the regression equation or press $Y=$ ($\boxed{2\text{nd}}\boxed{\text{F1}}$) to see the equation.

SHARE THE DATA

To transfer the collected data to other TI-89's in the room, use the calculator-to-calculator link cable. Transfer the file **cbldata** that is in the PHYSICS folder.:

1. Connect calculators.
2. Be sure that the receiving calculator has the correct 'Current Folder':
PHYSICS
(check $\boxed{\text{MODE}}$)
3. Press VAR-LINK ($\boxed{2\text{nd}}\boxed{-}$) on both calculators
4. On the receiving calculator, press $\boxed{\text{F3}}$ 2: Receive
5. On the sending calculator:
 - a. Select the file(s) you want to send by scrolling (\blacktriangleleft and \blacktriangleright) and pressing $\boxed{\text{F4}}$ on each file so that a check mark appears in the left edge of the screen next to the filename.
 - b. Press $\boxed{\text{F3}}$ 1: Send to TI-89/TI-92 Plus
6. Wait.

PRESERVE THE DATA

To save the data for a long time (physics()) always overwrites the file **cbldata**), there are two methods:

I. Use the Data/Matrix Editor:

Press [APPS] 6: Data/Matrix Editor and choose 1: Current

If the **cbldata** file is not the current file, then press [F1] and choose 1: Open and use the Open dialog box to open the PHYSICS **cbldata** file.

Press [F1] 2: Save copy as... and enter a foldername and a **different** filename.

II. Use VAR-LINK to copy the file to another folder:

Press VAR-LINK ([2nd][=]).

Locate the file **cbldata** in the PHYSICS folder (use [↑] and [↓]).

Press [F1] 2: Copy

Select another folder.

Press [ENTER]

or...

Use VAR-LINK to rename the **cbldata** file:

Press VAR-LINK ([2nd][=]).

Locate the file **cbldata** in the PHYSICS folder (use [↑] and [↓]).

Press [F1] 3: Rename

Enter a new name for the file and press [ENTER]

VIEW THE DATA

Use [APPS] **Data/Matrix Editor** to see the file **cbldata**.

Use [♦][APPS] **Stats/List Editor** (if installed) to see the lists **L1**, **L6**, **L7**, and **L8**.