Solartron 7151 Test and Calibration software for AR488

User Manual

Version: 0.51

Date: 9th January 2025

What is the purpose of this software?

The Solartron 7151 and similar multimeters are highly capable devices with very solid accuracy and longevity, one way they differ from similar multimeters is that calibration can only be completed over the bus.

This means that the simple act of calibrating a 7151 can be expensive and confusing as you not only have to buy a GPIB controller but also need to learn the specific commands and process to calibrate the multimeter. This is why I decided to develop this software for the AR488 as its a very low cost (as little as £10) GPIB controller that works extremely easily with very little set-up required. More info on the AR488 can be found here AR488 Github

The second feature of the software aside from the calibration routine is the long and short term logging. This allows the user to log data for any amount of time they desire with any amount of interval they desire (as long as it isn't shorter than the measurement time) It will then be saved as a CSV file in the location of your choice for easy analysis in external software like excel.

Lastly I would like this software to be useful to you so if you have any changes you'd like to make please send a pull request or fork it on Github. Also the logging section in particular should be quite universal so if you would like me to adapt it for a certain multimeter (especially if its another Solartron) this shouldn't be too hard. If you have any questions or suggestions please E-mail me at pascal@pascalne.com.

How to navigate the program.

- When a menu is presented you can select an option using the up and down arrow keys.

- If you are asked to enter a value, type out the value and then press enter to confirm.

- In the measurement menu press a key once based on the information at the bottom.

Disclaimer : I am **not** a software engineer this is just a piece of software I have created and thought others might find useful. I take **no** responsibility if you damage your multimeter while using this software (although this is extremely unlikely and would likely be due to external factors since the 7151 handles erroneous data very well) I also cannot guarantee all the calibration modes as I do not have access to current or AC calibration sources but hopefully as people begin to use the software we can confirm these as working without issue.

Calibration Procedure

Step 1 – Starting a calibration

First insert the calibration shorting plug into the back of the unit.

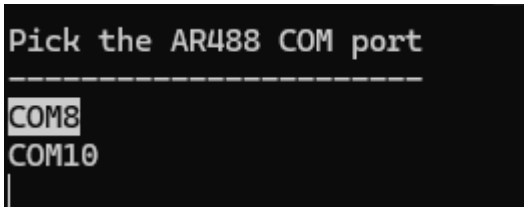
Don’t have a calibration plug? Simply get a 2.5mm audio cable cut it and solder all the wires together shorting them. Once the plug is inserted there should be a flashing CAL symbol on the display.

Start up the program. Once on the main menu select Calibration using the arrow keys and press enter to confirm

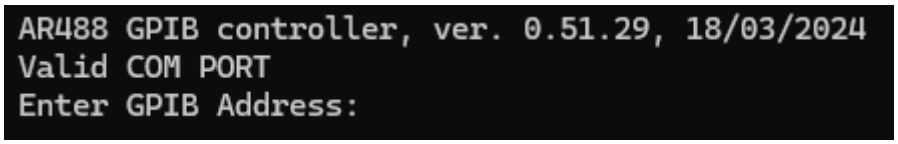
Step 2 – Selecting the COM port

Before entering the program its best to know which COM port is your AD488 controller but if you do not this can be found in device manager under ports or in Arduino IDE (where you likely uploaded the AR488 code)

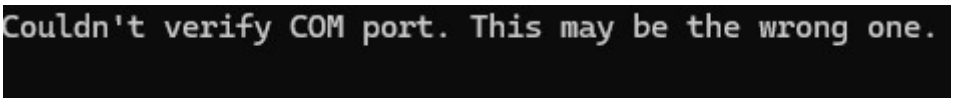
The next step is to select the COM port from the list again select it using the arrow keys and press enter to confirm.



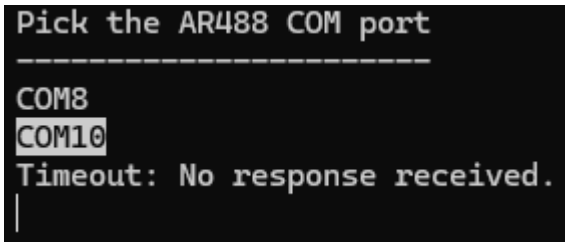
If the COM port was the correct one this message should be displayed (the version number and date is irrelevant)



If the COM port did not respond with the expected response this message will be displayed. Or a timeout message will be displayed in either you can press enter and you will be sent to the main menu.



Then double check the COM port and try again.



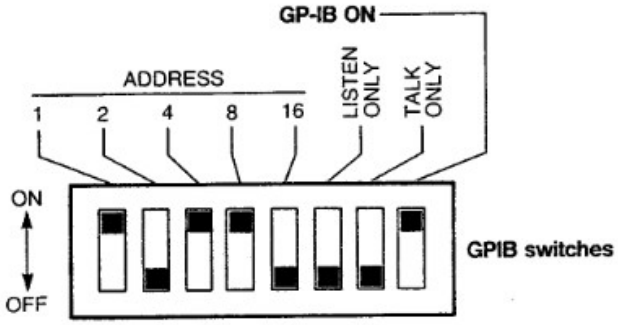
Step 3 – Enter GPIB address

After you select a valid COM port it should prompt you to enter a GPIB address this should be in the range between 0-31 and is set by the DIP switches on the back of the multimeter (GPIB should be on and Talk and listen only should be off)

2 PREPARATION OF INSTRUMENT FOR GPIB USE

Address and Talk/Listen selection.

When 7151 is to be used in conjunction with a controller, set the rear panel selector switches as indicated below:



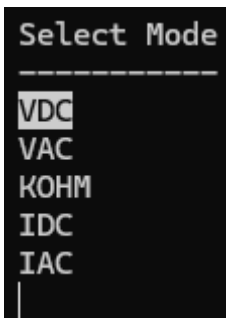
GPIB : ON
TALK ONLY : OFF
LISTEN ONLY : OFF
ADDRESS : 1,2,4,8 & 16. – Select as required. For example, to set 7151's address to 21, put switches 16,4 and 1 to the ON position.
The permissible address range is normally 0 →30.
Remember, each GPIB instrument must process a unique address.

For operation without a controller: e.g. if a printer only is connected to 7151, the TALK ONLY mode should be selected, in addition to GPIB ON.

Note: Any alteration to the switch settings is only actioned if the *PWR ON* facility is set to *RESET*, and the instrument switched OFF, and ON again.

Step 4 – Selecting the Mode

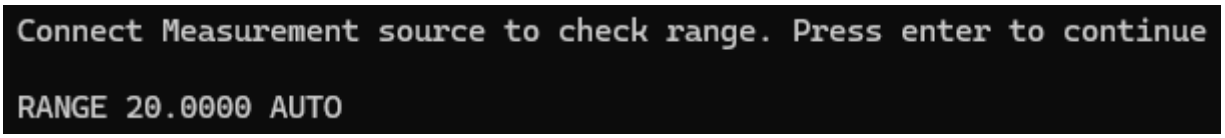
Once you have entered a valid address a menu should appear to select a Mode select using the arrow keys and confirm using the enter key.



Step 5 – Confirm range

Due to mysterious zeroing errors when calibrating with Manual range setting the range has to be set automatically.

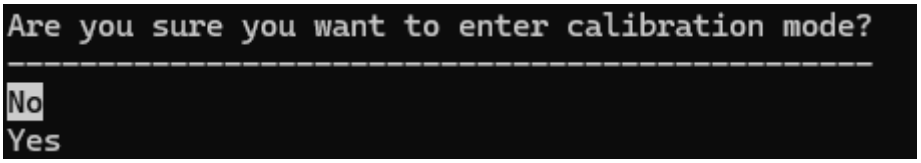
Connect the measurement source you intend to use to calibrate this range (the resistor or voltage source) Then press enter.



It will then display the range it has selected if you are using an appropriate measurement source this should always be correct. Press enter to continue

Step 6 – Enter calibration Mode

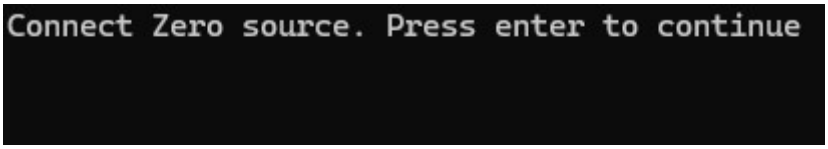
You will then be shown a menu like this



If the range that was selected was wrong or you would not like to calibrate select No otherwise select yes. If yes is selected it should display CAL on the instrument display.

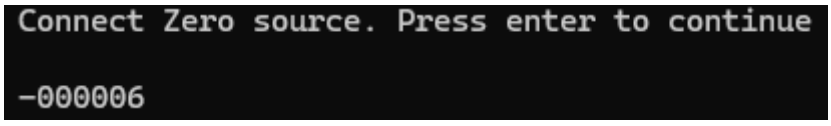
Step 7 – Connect zero source

This is for the low point in the calibration.



It should now say this connect your zero source (4 wire zero source or shorting plug or whatever is appropriate for the mode)

Once it is connected press enter and after about five seconds a number will be displayed this number is generally not important but should be around close to 0.

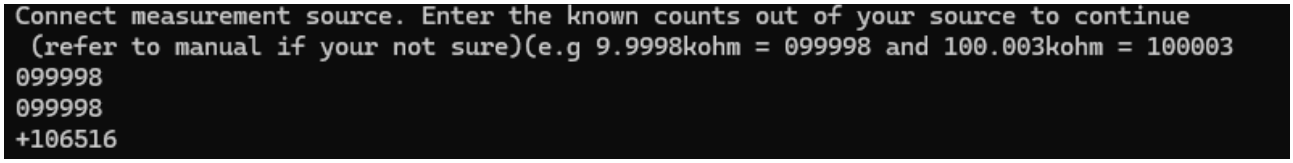


Step 8 – Connect Measurement source

This step is to complete the high calibration. The number that needs to be entered is the number of counts.

For example if you have a calibration source that is 9.9998KΩ in the 20KΩ range this would be 099998 counts. It always need to be a 5.5 digit (5x9) value. The largest value of counts is (I believe although it is never specified) 235000. So for a 20.0001KΩ in the 20KΩ range it would be 200001 counts.

So connect your measurement source and enter the number of counts then press enter to continue.

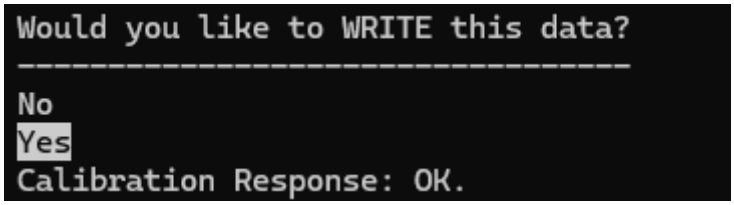


After a few seconds it should respond with a number this again is not relevant at all. Press enter to continue.

Step 9 – Write data and finish calibration.

Now we are shown a menu to write the data press yes unless you think something is wrong.

It should hopefully say OK which means your new calibration data has been written if it says error 10 CAL is outside limits usually a connection error.



Then press y or n if you'd like to calibrate another range.

Step 10 – Check calibration

Use the measurement section to check your newly calibrated value.

And you are done.

Measurement and logging

Step 1- Select Measure

Start up the program once your AR488 is connected and then select measure using the arrow keys and press enter to confirm

Step 2 – Selecting the COM port

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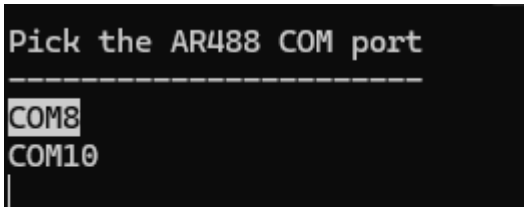

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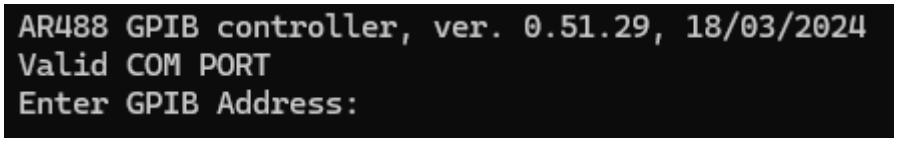

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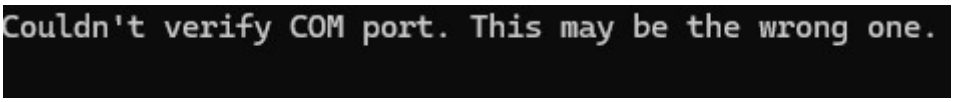

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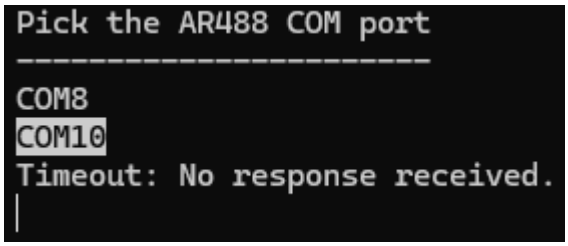

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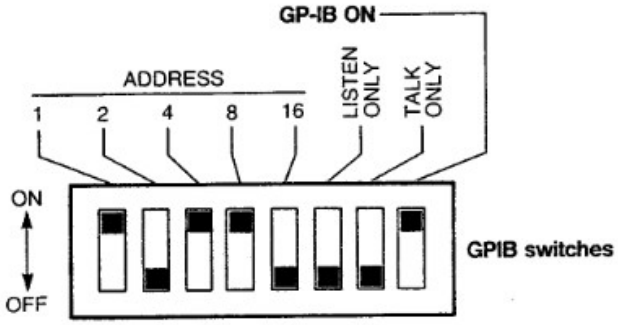

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Step 4 – Selecting the Mode

Once you have entered a valid address a menu should appear to select a Mode select using the arrow keys and confirm using the enter key.

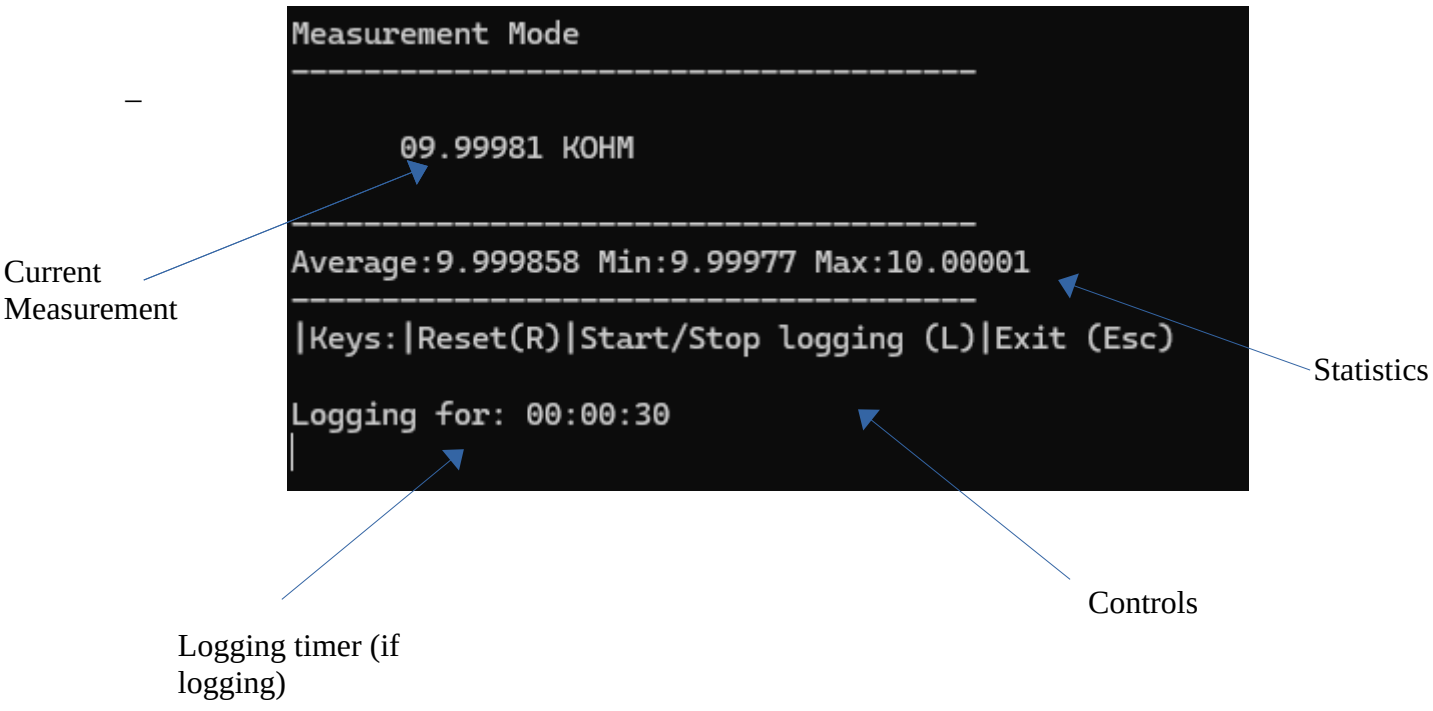
Step 5 – Select the number of digits

Changing the number of digits effectively just changes measurement time the less digits the faster the measurement.

Number of digits	~Measurement time
6.5 Digit (6x9)	8s
5.5 Digit filter ON	1.6s
5.5 Digit (filer OFF)	400ms (0.4s)
4.5 Digit	50ms (0.05s)
3.5 Digit	6.66ms (0.00666s)

Select the desired number of digits using the arrow keys and press enter to confirm

Step 6 – Navigating measurement mode



Press R to reset the statistics

Press L to start/stop logging

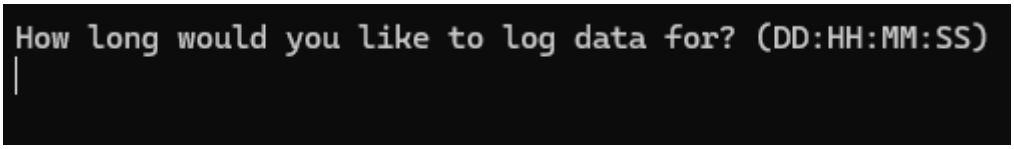
Press Escape to exit

These may take time to register be patient.

In logging mode stop logging and then press escape to exit

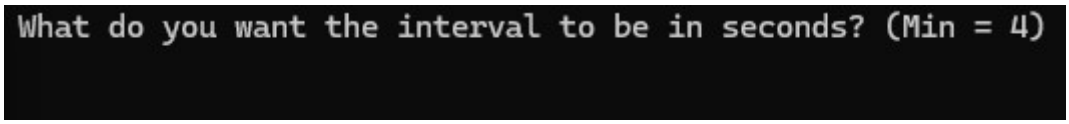
Step 7 – Starting Logging

If you want to start logging press L once. This prompt should appear



Enter a time period in the format DD:HH:MM:SS to continue (you must include all the values e.g 00:00:01:00 = 1min) Then press enter to confirm.

It should then show you this prompt



The minimum is based on how long it takes to measure in the mode your in your number must be greater than this enter your interval (in seconds and not minutes or hours) and press enter to confirm

Step 8 – During logging

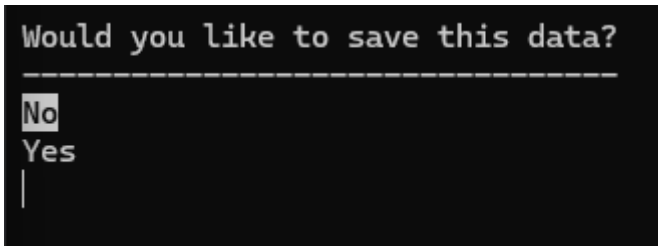
During logging a new value should be displayed every interval you entered.

Press L again or wait till the time is completed to end the logging session.

During logging it may take a maximum of 10 seconds to end logging so be patient and only press L once. (this is to reduce errors In timing)

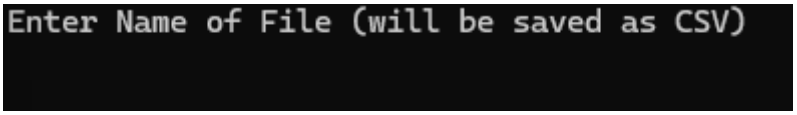
Step 9 - After logging

Once the time is up or you have pressed L to end logging this menu should appear:



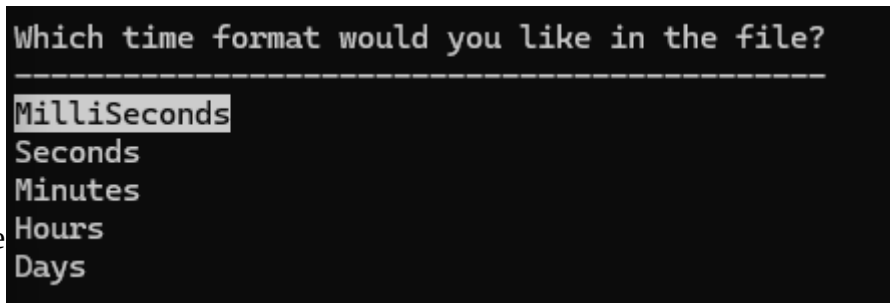
If you would like to save the data select yes and press enter.

You will then be asked to enter the name of the file you want this will be saved within the program files as a CSV with standard syntax (Do not add a file ending like .CSV or .txt this is done automatically.)

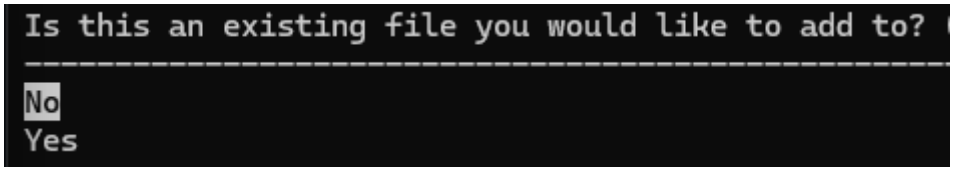


You can enter a file-path to a folder you want it to be saved too along with the name. If you just enter a name it will be saved to the program folder.

You will now be asked to select a time format this is the format that the time will be in in the CSV file



You will then be shown this menu



This basically just decides if you want a heading at the top or just data usually you would want a heading so select No (selecting no will add headers)

The file will now be saved to where the exe and other files are unless you specify a different path.