Transform your TI-Nspire

# into TI-Nspire CAS

# Summary

## I.    Introduction

The TI-Nspire CAS includes a Computer Algebra Systme which is not included with the non-CAS TI-Nspire.

You may have already tried to install a CAS OS on your non-CAS TI-Nspire. In theory, it could work because the hardware is the same one.

But this is impossible, because sending the .tnc OS file is refused by TI-Nspire CAS Computer Link.


The non-CAS and CAS OS share the same signature key and the boot2 code which installs/loads the OS on the calculator ($2^{nd}$ half of the loading bar) which is also common to non-CAS and CAS handhelds.


What happens? Well, the boot2 simply compares the type of handheld you own and the OS kind (CAS or non-CAS)


About the calculator kind, it is written in a component which cannot be programmed, for today.


About the OS type, if we edit it, we should resign it. But we would need private keys which we don't own. As the signature is not valid, the boot2 refuses to run an edited OS.


We would actually need a program which act as the boot2 (to run an OS) but without checking its signature…

This could open the doors to running CAS OS on TI-Nspire non-CAS, non-CAS OS on TI-NspireCAS, or even running other OS!

*Stop dreaming! That's what we're gonna do!*
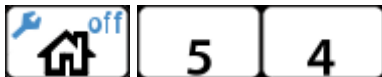
## II.	Preparing your TI-Nspire non-CAS

•	In order to run a CAS OS, we need a program called OSLauncher

•	This program has been coded in ASM. Running ASM code on TI-Nspire involves installing another program: Ndless 2.0 or later.

•	In its latest version, Ndless is only compatible with 3 TI-Nspire OS: 1.7.2741, 2.0.1.60, or 2.1.0.631.

### II.1	Checking / Installing OS

You need one of the followings OS on your TI-Nspire:

•	1.7.2741

•	2.0.1.60

•	2.1.0.630

First, check which OS is installed on your calculator. Type in these keys to know about it:
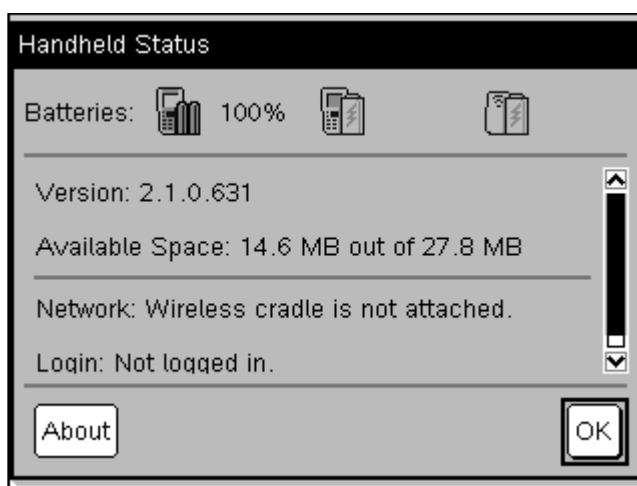
⭕	On OS 2.0 or later:

⭕	On OS 1.4 to 1.7:

⭕	On OS 1.3 or previous:

***Nota bene:*** *If you don't know which OS your calculator is running, you just need to try each keys one by one.*

You will get a screen similar to these ones:

*OS 1.7 or previous:*                    *OS 2.0 or later:*

**About**

Handheld Type: TI-Nspire™
Math and Science Learning Technology
Version: 1.7.2741 2009-05-19
Copyright © 2006-2009 Texas Instruments
All rights reserved.
Product ID:

OK

**Handheld Status**

Batteries: 100%

Version: 2.1.0.631

Available Space: 14.6 MB out of 27.8 MB

Network: Wireless cradle is not attached.

Login: Not logged in.

About    OK
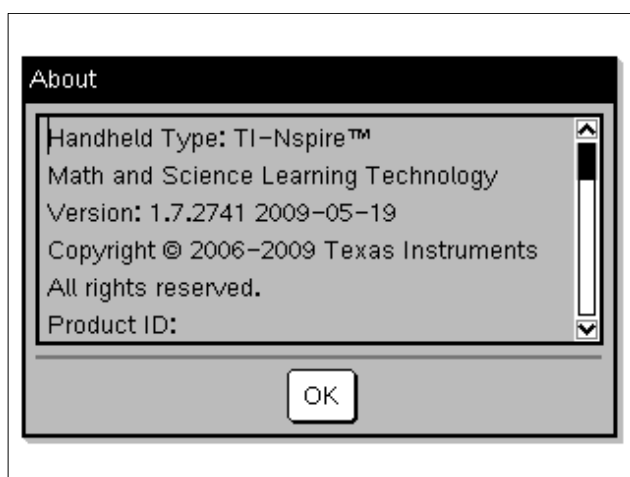
If you have one of those OS, go to the next step.

Otherwise, you need to download one *(a non-CAS one for the moment)* and to install it. You can download them on this link:

http://ti.bank.free.fr/index.php?mod=archives&ac=cat&id=OS+Nspire


To install the OS, you need TI-Nspire Computer Link Software:

http://ti.bank.free.fr/index.php?mod=archives&ac=voir&id=1711


After running TI-Nspire Computer Link, it might ask you to install the latest OS. Refuse! In the toolbar, go to *« Tools »* and choose *« Install OS »*. You just need to select the OS you just downloaded and to run setup.


***Nota bene:*** *if your TI-Nspire has a boot2 code version 3.0, it includes a powerful « anti-downgrade protextion » which avoids running any OS previous to 2.1. You will get an error message about a non-valid OS at the end of the sending operation. In case of this problem, you can take a look at the tutorial in order to determine if you are concerned and to try to get rid of it:*
*http://ti.bank.free.fr/index.php?mod=archives&ac=voir&id=3503*
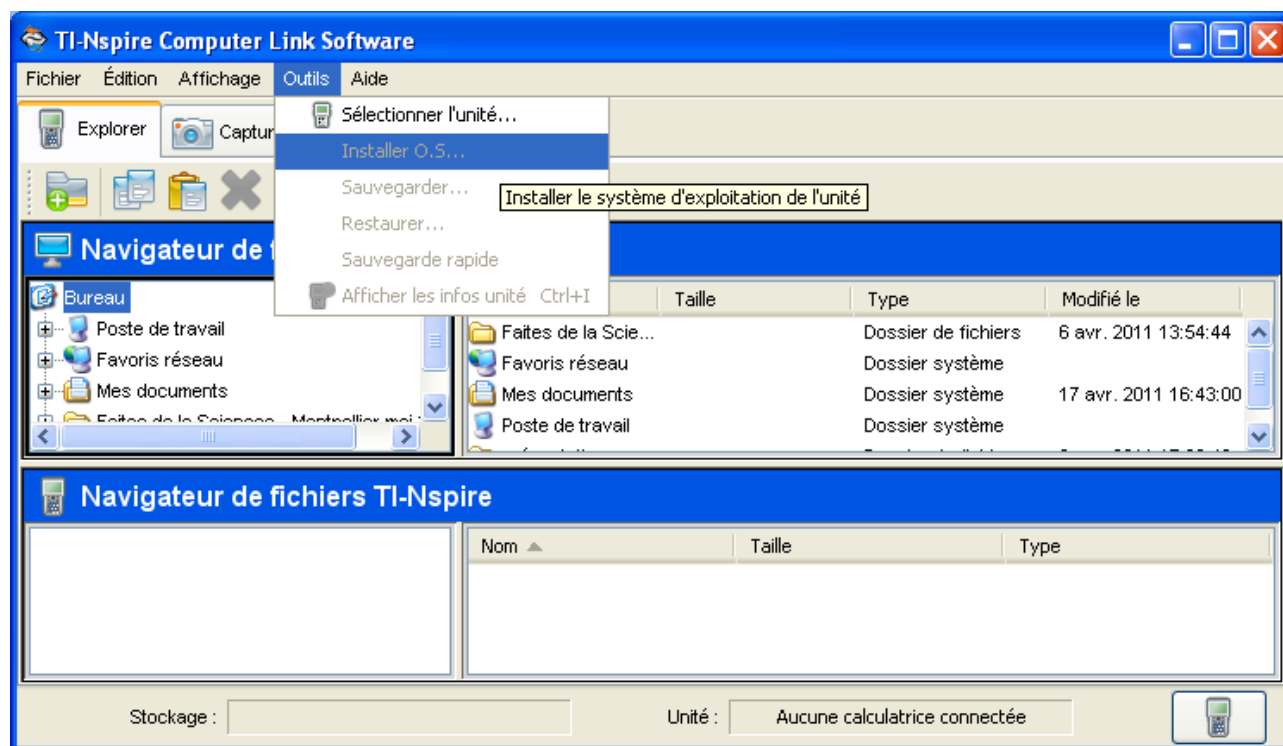


*We now have an OS which is compatible with Ndless!*

## II.2   Installating Ndless

Ndless is compatible with OSlauncher only from the r387 version. But as the official link isn't updated and points to an incompatible version, here is a special link leading to the r392 release, compatible with OSlauncher:

http://ti.bank.free.fr/index.php?mod=archives&ac=voir&id=3514

To keep in mind it would be updated, here is the official link to download the incompatible r382:

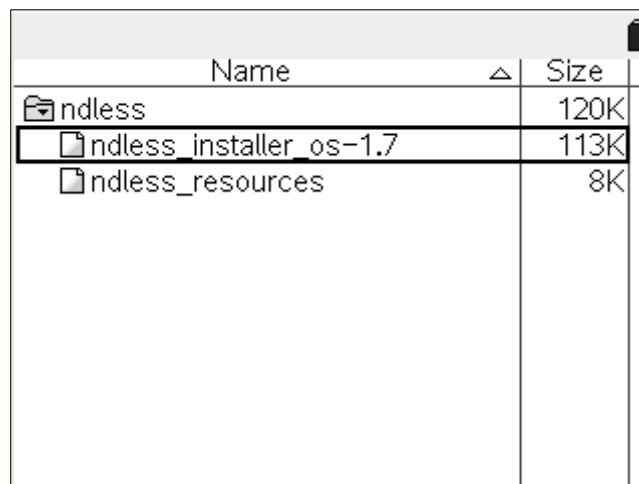http://ti.bank.free.fr/index.php?mod=archives&ac=voir&id=2180

You will need to send 2 files to your calculator. In the oficial archive, these files are saved in the folder called *« calcbin »*.

❾        The *« ndless_resource.tns »* file

❾        The setup file corresponding to your OS version:

     ⭕ *« ndless_installer_os-1.7.tns »* for the OS 1.7.2741

     ⭕ *« ndless_installer_os-2.0.1.tns »* for the OS 2.0.1.60

     ⭕ *« ndless_installer_os-2.1.0.tns »* for the OS 2.1.0.631

You will need a software compatible with TI-Nspire, as the TI-Nspire Computer Link:
     http://ti.bank.free.fr/index.php?mod=archives&ac=voir&id=1711

These files should be saved on the calculator in the same folder. The name of this folder doesn't have to contain any special character (space, dot,...)



We are now going to install Ndless

**Disconnect** the calculator. *(if the calculator stays connected to the computer, installation can freeze)*

Then open the setup file corresponding to your OS.

*Nota bene: Please just click **once** (click ou ENTER key). A second execution caused by a double click uninstalls Ndless by restarting the calculator.*

A few seconds later, you should get this screen, telling you Ndless has been successfully installed.
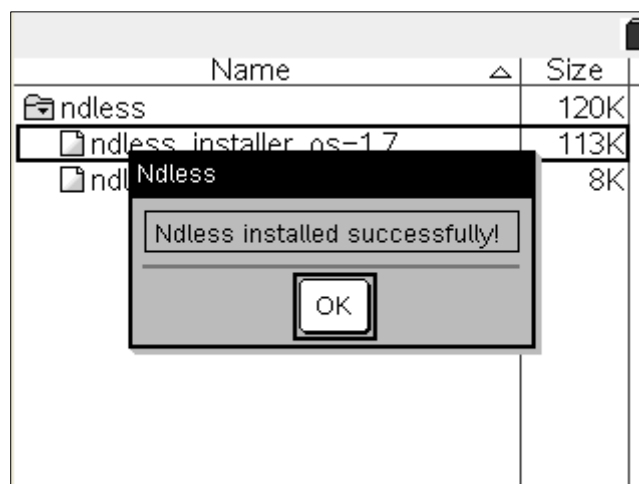
It is possible that the installation fails and that your calculator freezes. In this case, take out one of the batteries *(and eventually the battery)* or use the *« reset »* button situated at the back to restart your calculator. Also check that you didn't forget to disconnect the TI-Nspire from the computer and start the operation once more.

If your calculator reboots during the installation, check that you didn't double click on the installation file *(no double-click or pressing ENTER twice).* If this is not the cause, the reboot indicates you didn't install the correct OS. Check if it is the correct one, if not, install the correct one.

*We now have Ndless on the TI-Nspire!*

## II.3   Transferring OSlauncher

Download OSlauncher's archive here:

http://ti.bank.free.fr/index.php?mod=archives&ac=voir&id=3223

Open it, then extract the file named *« oslauncher.tns »* and send it on your calculator.

*It is now time to prepare the CAS OS which will be running*

## III.    Preparing the CAS OS which will be running

### III.1   Preparing your workspace

The TI-Nspire OS are delivered in the updating files TNC or TNO in which they are compressed and crypted. Decompression is done byOSlauncher, but it cannot decipher it. We will need to decipher the OS on the computer, before sending it on the calculator. Don't be afraid, everything has been done to make the task the easiest possible, and a simple double-click will be necessary. Download the OS discrambler unSpire:

http://ti.bank.free.fr/index.php?mod=archives&ac=voir&id=3515

Extraxt the files contained in this archive to a folder on your computer. The files *« imdump.exe »* and *« unSpire.bat »* are the ones we're going to use.
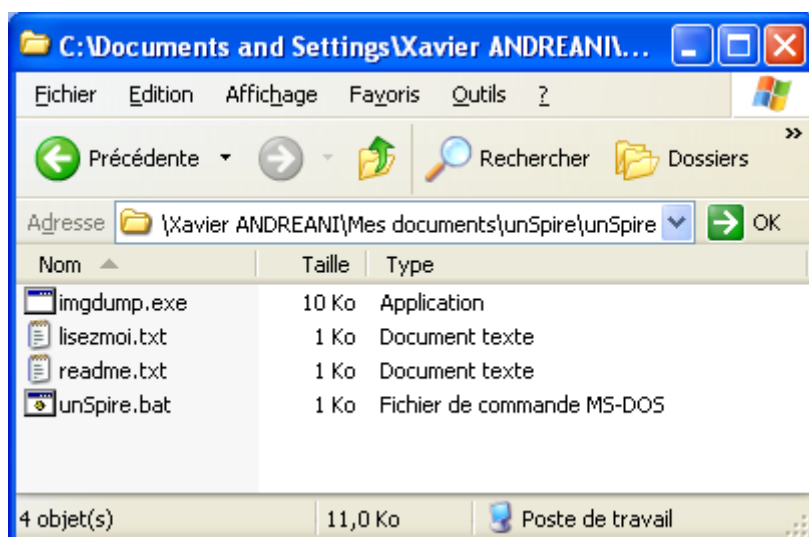
## III.2  Choosing your CAS OS

You now have to download a CAS OS to load on your TI-Nspire. The TI-Nspire OS installs different resource files directly into the filesystem. The CAS OS which we are going to run won't be installed *( otherwise the boot2 code will refuse it and will ask for another OS in the next reboot)*, but simply loaded in RAM where it'll stay until the next reboot (exactly as Ndless). We need the CAS OS to be compatible with the resources files. This means the versions must be the same, or similar.

Here is the list of all the OS you can run, depending on the OS installed on your TI-Nspire:

| Installed OS | OS CAS to run | Space used by CAS OS in the filesystem | Possibility to use Ndless on CAS OS |
|---|---|---|---|
| 1.7.2741 | 1.7.2733 | 3,18Mb | Yes |
| | 1.7.2741 | 3,18Mb | Yes |
| 2.0.1.60 | 2.0.0.1188 | 3,42Mb | No |
| | 2.0.1.60 | 3,43Mb | Yes |
| 2.1.0.630 | 2.1.0.631 | 4,08Mb | Yes |

If you are used to the OS 2.X's interface, the best configuration is running the CAS OS v2.0.1.60 on the non-CAS OS v2.0.1.60, which will allow using Ndless in the CAS OS and *only* using 3.43Mb in the filesystem.

If you don't want this interface, the other good one is to run CAS OS v1.7.2741 on non-CAS OS 1.7.2741, which also allow using Ndless in the CAS OS while using only 3.18Mb.

Choice is yours. Download here the CAS OS you have chosen:

http://ti.bank.free.fr/index.php?mod=archives&ac=cat&id=OS+Nspire

## III.3  Deciphering the CAS OS

Now, you have to use a software such as Winrar *( WinRAR: http://www.rarsoft.com/download.htm )* in order to open the TNC file you just downloaded. We now see that this file contains other files:

The only interesting one is the file called *« TI-Nspire.img »*. Extract it into the folder unSpire which contains the files *« unSpire.bat »* and *« imgdump.exe »*.
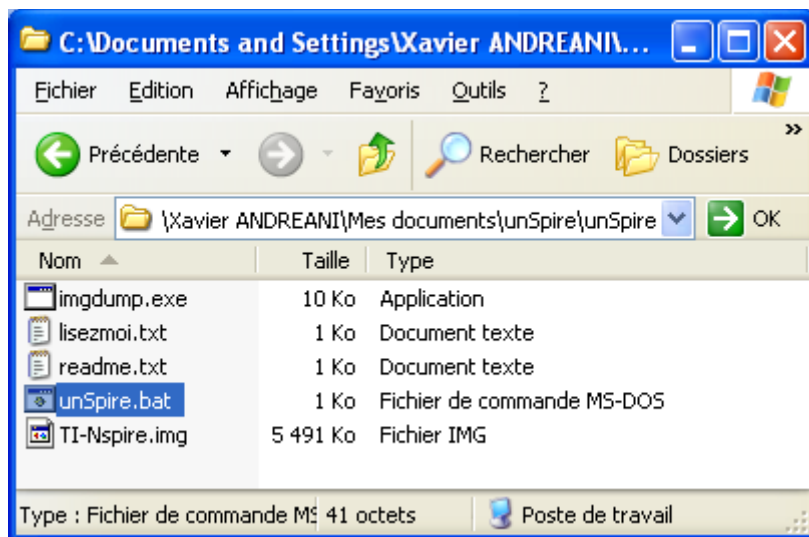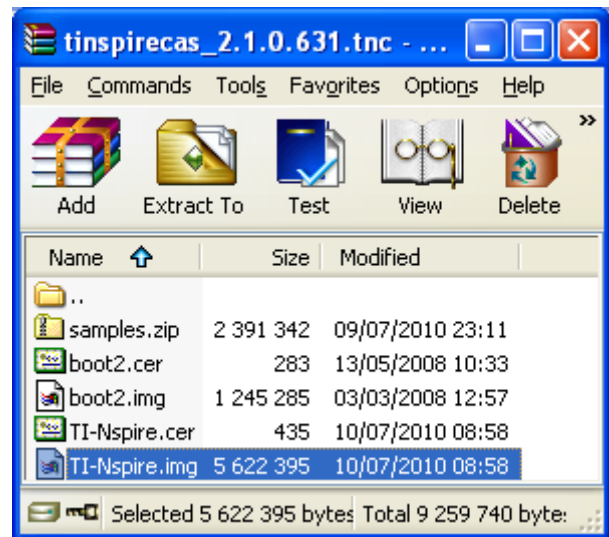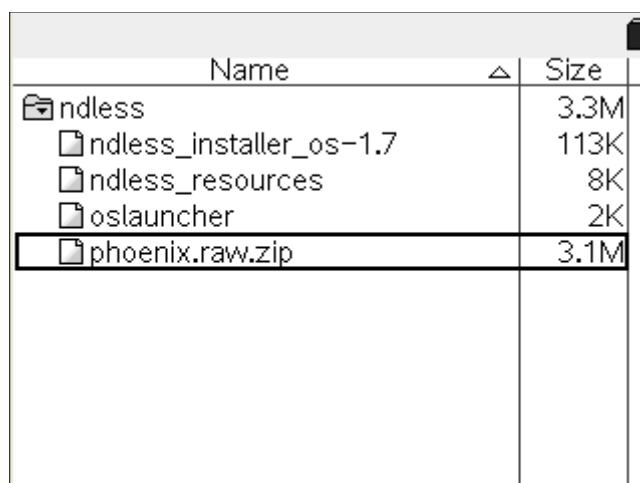
All you need to do is a simple double-click on the file *« unSpire.bat »*. A new file called *« phoenix.raw.zip.tns »* will be created.
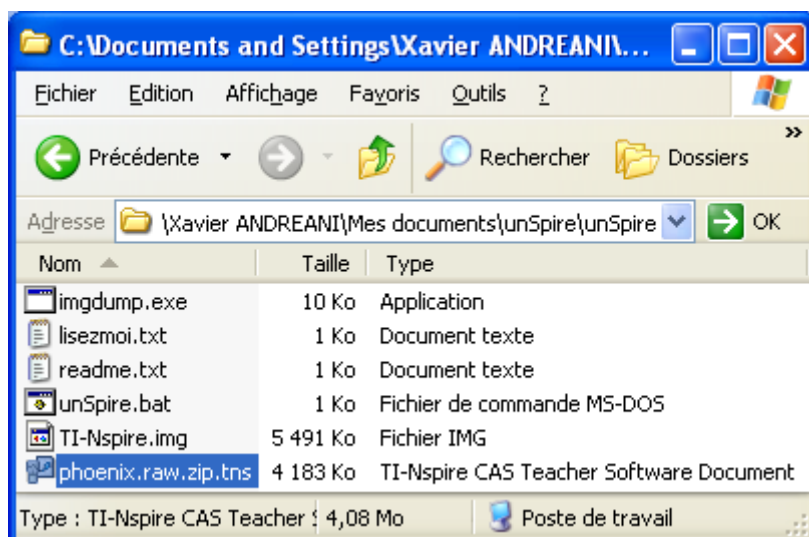
### III.4   Transferring the CAS OS

Using TI-Nspire Computer Link, send the last file *« phoenix.raw.zip.tns »* on your calculator. You **have to** send it to the folder  *« ndless »*, which you need to create if not already done. *(translator note: use a small n, not a capital N)*
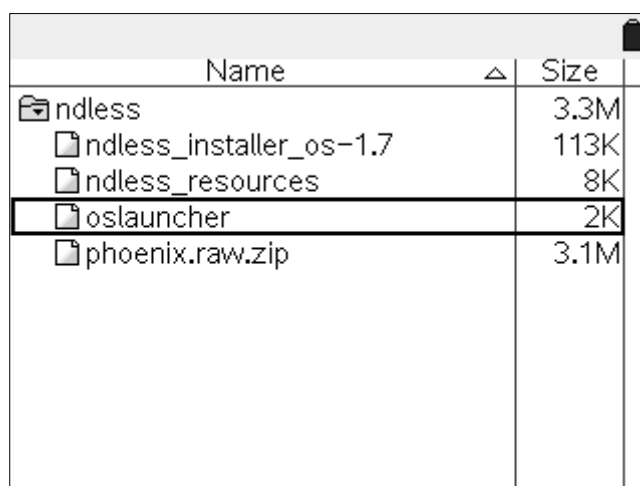
| Name | △ | Size |
|---|---|---|
| 🗁 ndless | | 3.3M |
| 🗋 ndless_installer_os−1.7 | | 113K |
| 🗋 ndless_resources | | 8K |
| 🗋 oslauncher | | 2K |
| 🗋 phoenix.raw.zip | | 3.1M |

*We are now ready to run a CAS OS on a non-CAS TI-Nspire! Let's go…*

## IV.   Running CAS OS on a non-CAS TI-Nspire

On your calculator, open the file *« oslauncher »*.

| Name | △ | Size |
|---|---|---|
| 🗁 ndless | | 3.3M |
| 🗋 ndless_installer_os−1.7 | | 113K |
| 🗋 ndless_resources | | 8K |
| 🗋 oslauncher | | 2K |
| 🗋 phoenix.raw.zip | | 3.1M |

The calculator will seem to freeze, but this is normal, due to the size of the file to run. Wait during 10 seconds. You should get those 2 screens:
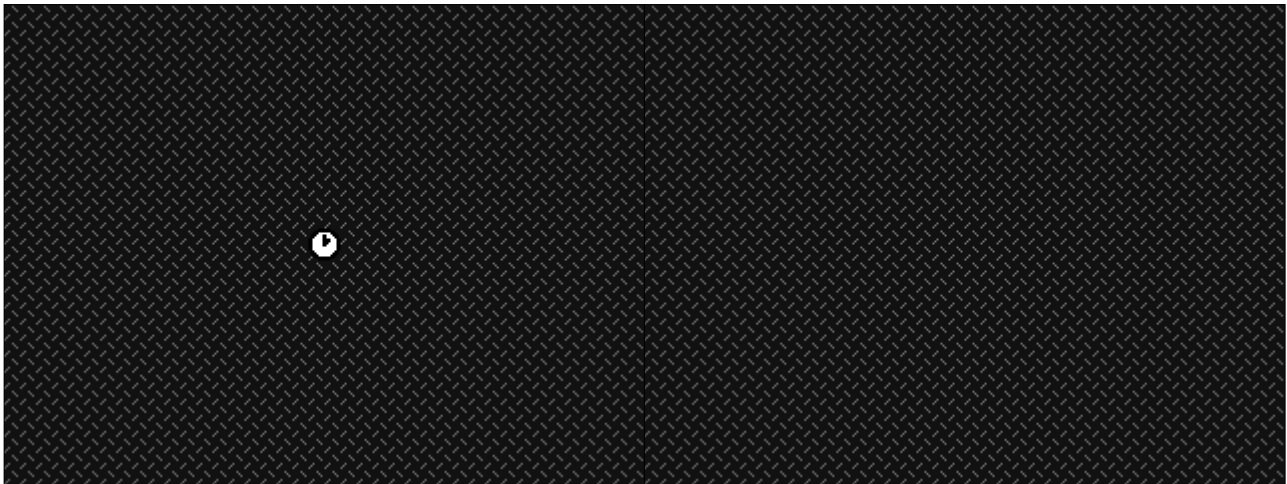
*Nota bene:* It is possible that the calculator really freezes. The person who told the author this problem had to remove the keyboard and put it again in order to run the CAS OS.

*Nota bene:* It is possible that running a CAS OS fails and that the calculator freezes on strange screens, which are different from the two above (dark, with a pattern which is repeated). It is a curious problem because it depends of the calculator, not of the OS. There are some calculators, new (TouchPad) or old (ClickPad), where OSLauncher always runs successfully. There are also calculators where OSLauncher always fails (for example, once out of 20. There would be a difference in the hardware which is not taken in account by OSLauncher. Strangely, this difference is independant of the manufacturing date. The few statistics we have show that we encounter easily both types of calculators. You would have a chance out of two to be on a « good serial number ». We wish that this process works for you. If not, you could try on other TI-Nspires and try to exchange yours with somebody who doesn't need this feature.

*You can help us to determine/correct the problem by giving us the end of your serial number on this topic, by telling us if it works or not.*

*http://tibank.forumactif.com/t7018-transforme-ta-ti-nspire-basique-en-ti-nspire-cas*

Just after these screen, the CAS OS boots.

If the process failed, put out a battery *(or eventually the battery pack)* or press the *« RESET »* button situated at the back of the TI-Nspire. Install Ndless and run OSLauncher.

*Nota bene: Ndless is now uninstalled. If you want to use Ndless programs, you need to install it.*

*Nota bene: Each reboot (when the loading bar appears) will run the non-CAS OS, installed in your calculator. You wil have to install Ndless and run OSLauncher. Just to give you some information, a reboot can be caused by removing batteries, changing the keyboard, pushing the « RESET » button, or simply by an error in Ndless or in the OS.*
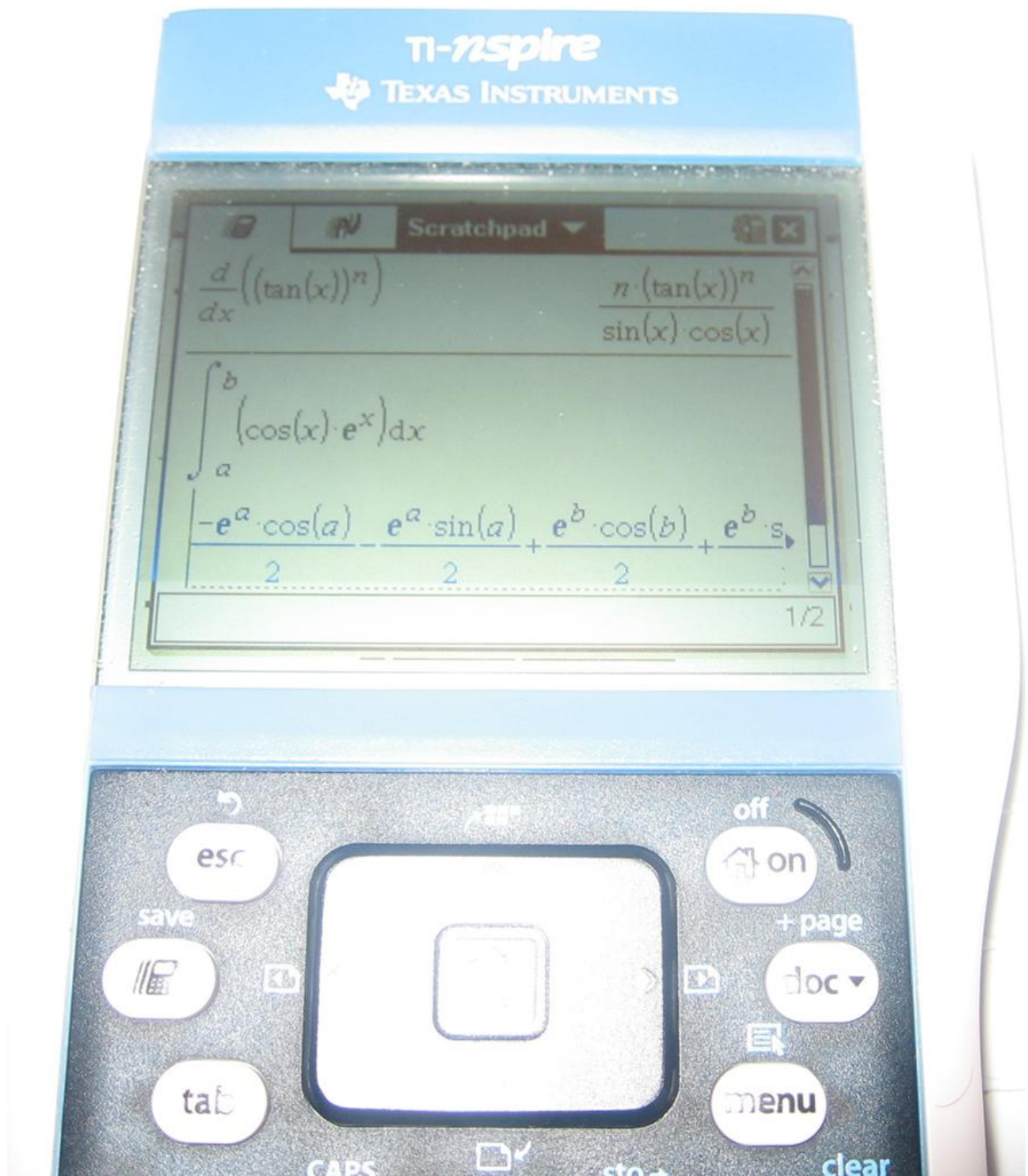
*At last, the CAS OS is running on your non-CAS TI-Nspire: have fun!*
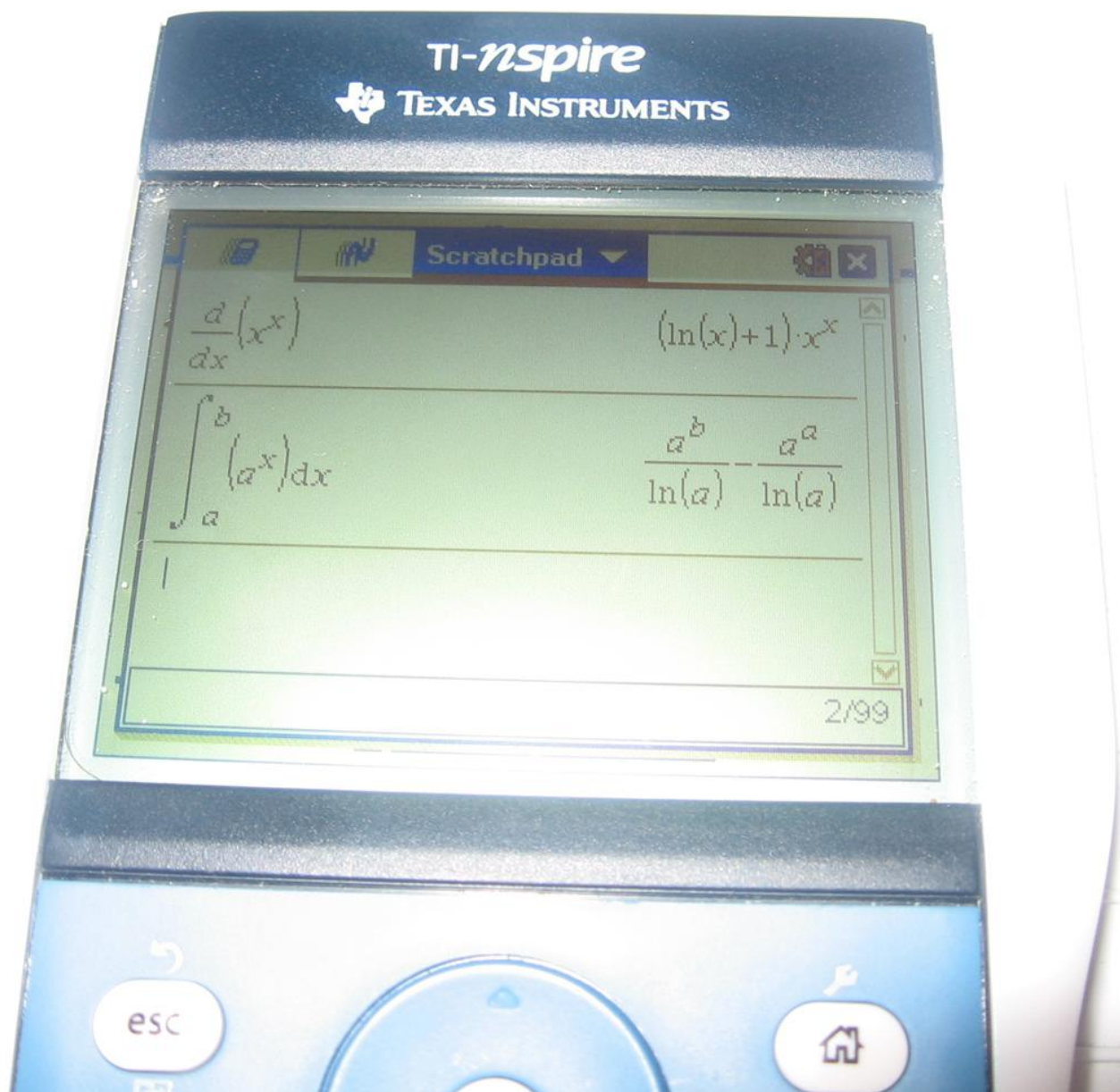
## V. Pictures:

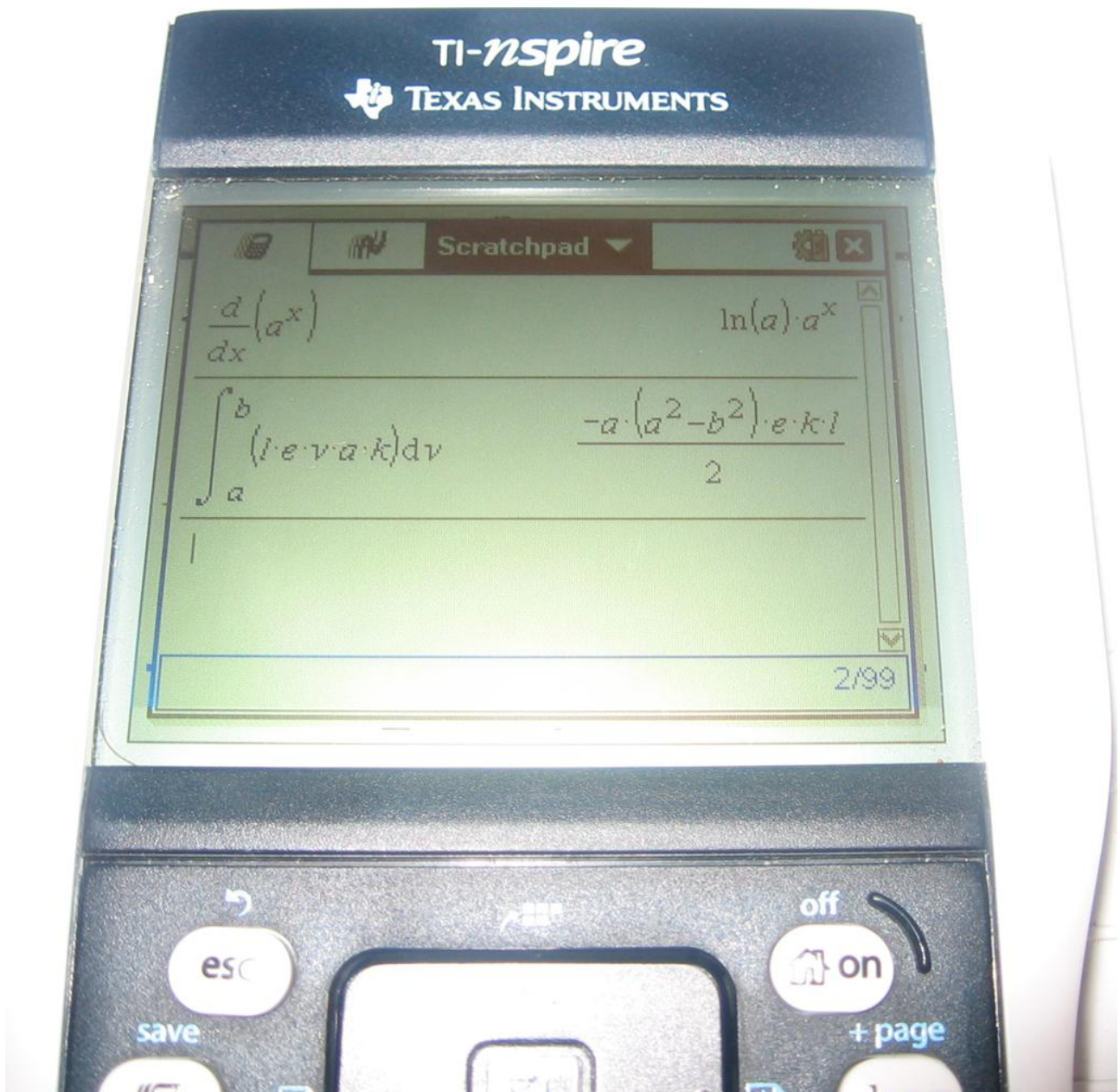### V.1 TI-Nspire ClickPad non-CAS + ClickPad keyboard
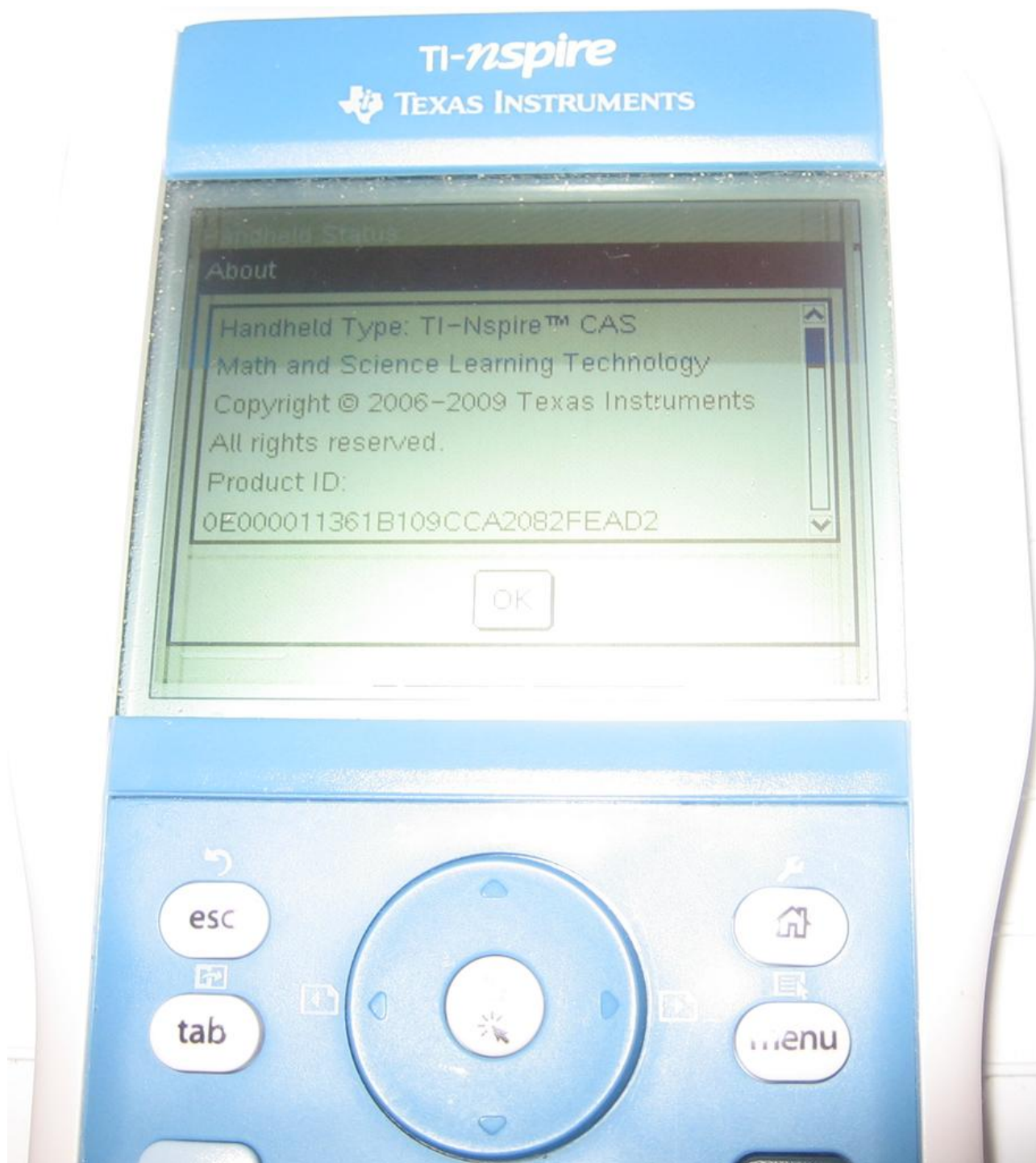


### V.2 TI-Nspire ClickPad non-CAS + TouchPad keypad

**V.3  TI-Nspire TouchPad non-CAS + ClickPad keyboard**

***V.4    TI-Nspire TouchPad non-CAS + TouchPad keyboard***

## VI.    Conclusion

You now have freely transformed your TI-Nspire non-CAS into a TI-Nspire CAS, while saving 50€. You know have the power of the Computer Algebra System, in order to solve all your problems. This includes:

•       Transforming literal expressions: factors, developing, putting into the same divisor, simplification...;

•       Function derivates;

•       Primitive functions

•       Limits of a function

•       And many other things...

Do not hesitate to refer to the TI-Nspire CAS User Guide.

***Nota bene:*** *We can similarly run a non-CAS OS on a TI-Nspire CAS, which won't have any CAS feature. But you would be able to use the TI-84+ emulator, which is included in the non-CAS OSes. But this emulator only runs if you remove the keyboard and replace it by the TI-84+ Keypad, which is impossible to do on the TI-Nspire CAS Clickpad. Although it is still difficult to insert it in a TI-Nspire CAS Touchpad, some tests are running…*

Before going to do something else, we would like to thank:

 O      Olivier Armand alias ExtendeD, who created Ndless;

 O      Geoffrey Anneheim alias Geogeo for the first program able to run a CAS OS on a non-CAS TI-Nspire, RunOS, showing it was possible, but sadly never published;

 O      Bsl, for the twins Boot2launcher et Diagslauncher, showing some similar capacities;

 O      ???????? who created the deciphering program *(the author doesn't want to be quoted anymore)*

 O      Levak for his very convincing video of OSlauncher;

 O      Lionel Debroux, for the development and testing of OSlauncher.