How-To Program the ATMega128

By: do999 – September 17th, 2002 version 1.00

Note: This document will outline the steps to program the current testing solutions. These will obviously change on a regular basis as new software is produced. However the programming instruction themselves should be valid for a while. These instructions are valid for ExpressVu and may not apply to DishNetwork.

To make updating the document easier, the actual program names will be listed here and referenced within the rest of the document.

The data file (pfg) to use with the Atmega128 as of September 17th, 2002 is:
NawapoM0.1

In addition Cutie-Patootie and Argofanatic should also work. If one does not work, try the other. Different IRD's work better with one or the other.

The current or appropriate data file to use may differ and you should check on the web site to see what is working.

This is not a newbies guide, although it will be simple to follow the instructions. It is assumed that you are familiar with many terms used in satellite TV testing. If you do not understand the terms, read one of the various newbie guides first.

An ATMEGA128 is the one with the Atmel Atmega128 chip on it. Many require a separate programmer with a DB25 connector for connecting to your PC. (If yours has an AT90S8515 chip it is an AVR3 and is covered by a different document).

Assumptions:

- It is assumed that the hardware is configured properly. An ATMEGA128 is connected to your computer using the parallel port. Since the ATMEGA128 and the parallel port are typically both female DB25 connectors (25 holes), you will need either a 25-wire male DB25-to-male DB25 cable or a male-to-male DB25 gender changer. If you go with a cable, keep it as short as possible (under 6') to reduce the impedance of the cable. A gender changer is the preferred option but you may not be able to easily get behind your computer for regular programming.

- Sufficient parallel port power to program the card. The ATMEGA128 uses power from the parallel port to power the onboard chip. Many computers [laptops, Dell, Compaq and a few others in particular] do not provide enough power (5V) to program the chips. In these cases you may have to investigate alternatives such as adding another (or replacing) the parallel port with one that is known to work. You may also be able to build an external power supply remembering of course to

cut the current power trace to the PC connection. These advances options are beyond the scope of this document.

- It is also assumed that your ATMEGA128 is jumpered or otherwise configured appropriately for use with the satellite system that you will be testing. This includes assuring that a crystal with the appropriate frequency is installed. The original Atmega128's required a jumper to be in place for programming and removed for viewing TV. There are now too many variations (multiple jumpers, jumperless, switches, etc.) to get into in this document.

- General PC knowledge is also required. The use of folders / directories and other utilities such as WinZip are typically required. It is assumed that all the necessary software is already loaded on your system.

- A smartcard (CAM) is not required to be used with the ATMEGA128 as it runs camless.

These instructions provide specific information regarding the use of the Jeepers program (thanks to Dave2 for this great utility). Please see the documentation distributed with the original archives of that program for details on the other options available.

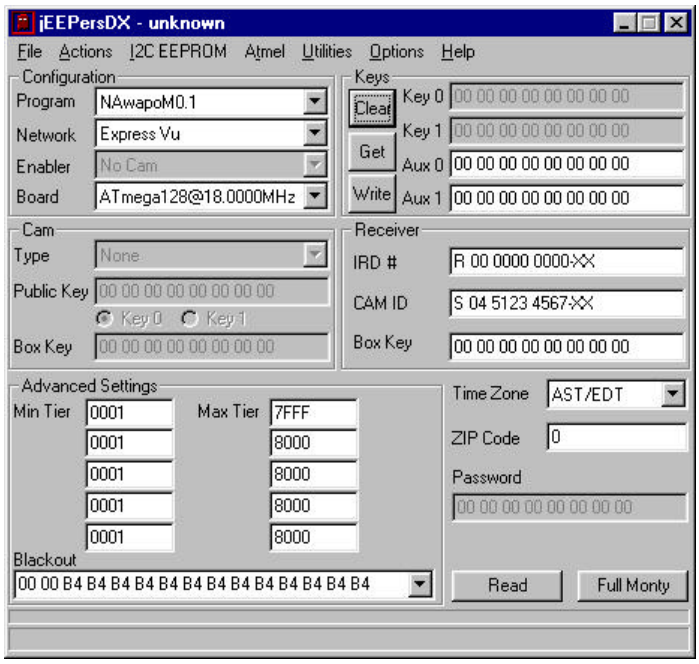
Jeepers is a Windows based utility that uses data files (*.pfg) to load program instructions onto the ATMEGA128. The version that is current as of this writing is version 2.1.0. You should always run the most current version appropriate for your hardware.

When you run Jeepers, it reads the data files from the same directory that the jeepers.exe program file is itself located in. Any updated data files should be copied to this directory so that Jeepers can make use of them.

Suggestion:
It is strongly recommended (particularly for the Newbie), that all data files (pfg files) that you are **NOT** using be placed in a different directory. This effectively removes them from the list of available programs and reduces the potential for making a mistake or getting an improper "read" from the card. Simply create a new directory, called "backups' or some other appropriate name, and move the unused pfg files to that directory. It is a good idea to keep them around in case you want to make use of them in the future.

Ok, here we go. Connect the ATMEGA128 to your computer and run the Jeepers program.

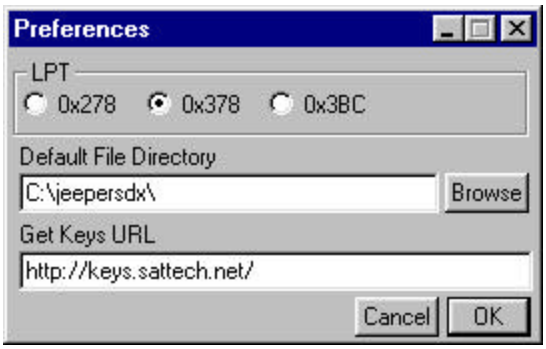
The first time you load jeepers, the screen should look similar to the image below. The image below shows NawapoM0.1



Note: If you have more than 1 data file (pfg) in the jeepers directory, then the initial values may be different. See Step 1 below on how to change the program.

In order for Jeepers to communicate with your ATMEGA128, it is necessary to configure the parallel port that the ATMEGA128 is connected to. Select the “File” menu option at the top left hand side of the menu then select “Preferences” from the drop down.

A window similar to the following should appear:



Select the appropriate value for the parallel port. Typically, if your system has only one parallel port (LPT1) then select “0x378”. If it has two and you are using the second one

(LPT2), then select “0x278”. You can also try the third option “0x3BC” is you have additional or add on parallel port cards.

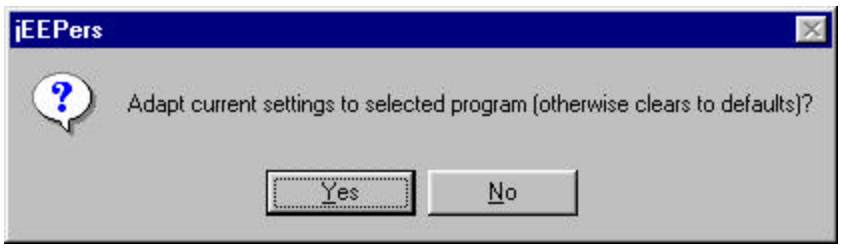
The “Default File Directory” should be configured to point to the directory / folder where your data files (pfg files) are stored. The default is the same locations as your Jeepers.exe program file and it will be assumed throughout this document that the default is used. You can use the browse button to change the default value or type in a directory path.

The “Get Keys URL” is the location on the internet that Jeepers will use when the “Get” button within the Keys frame is pressed. Use whichever site supplies you with the most current keys.

If you change any values on this screen, press the “OK” button to save them or press “Cancel” to exit without saving.

Step 1a: Configuration – Program
Select the appropriate “Program” from the drop down box if the correct one is not displayed. Remember, if the one you want is NOT in the available list, it needs to be copied to the same folder / directory as the Jeepers.exe program.

When you change the selection, you may get a message as indicated below:



What this does is read the defaults from the data file and it may change some of the values already entered into Jeepers. Select “Yes” and proceed to the next step.

Step 1b: Configuration – Network
Select the appropriate system type that you will be testing. Selecting “Both” will enable the card to be used on either system.

Step 1c: Configuration – Enabler
Since the ATMEGA128 runs camless, the enabler should be grayed out. Perhaps some future version will support other configurations, but do not worry about this for the moment.

Step 1d: Configuration – Board
Select the board configuration that matches the hardware that you have. For example, at ATMEGA128 card that has an 18MHz crystal should be set to “ATmega128@18.0000MHz”. Selecting the appropriate crystal frequency is important as

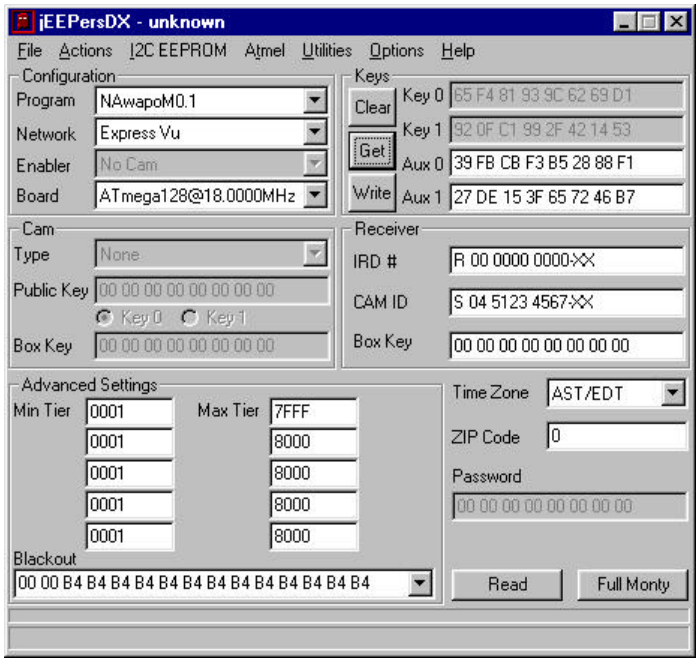
programming at the incorrect frequency can lock the ATmega and prevent further programming.

Step 2: Keys - Get

Encryption keys are used to decrypt the satellite signal. A number of web sites provide the current keys and Jeepers will "get" the keys from these sites. The first time you program with Jeepers or if you are having trouble "get"ting the keys, verify the site URL that is used to retrieve them within the "File – Preferences" menu selection as described above.

Note: This step is optional since the ATMEGA128 should automatically pick up the current keys from the stream once properly configured.

Press the "Get" button in the keys section. Within a minute or so, the values should automatically change from "00 00 00 00 00 00 00 00" to whatever the current keys are. The Key 0 / Key 1 pair are used for DishNet and the Aux 0 / Aux 1 pair are used for ExpressVu.



Step 3a: Advanced Settings - Min Tier & Max Tier

The default values under the advanced settings should not need to be altered. A Min Tier value of "0000" or "0001" and a Max Tier value of "7FFF" or "8000" should open the full range of available channels. Advanced users can modify the tier ranges to remove channels that are not required. Newbies should leave the default and open the entire range.

Step 3b: Advanced Settings - Blackout
Similarly, the blackout value need not be changed. This is used for sporting events and other special programming. If you get a message indicating that a particular program has been blacked out in your area, you can change this value and try one of the other options in the dropdown box. Otherwise, leave it alone.

Step 3c: Advanced Settings - Time Zone
Select the appropriate time zone for the area in which you live keeping in mind daylight savings time is in effect in the summer for most areas. This affects the time as it is displayed in the guide and will need to be changed twice a year as you switch between standard time and daylight savings time.

Step 3d: Advanced Settings – Zip Code
The Zip Code is not used by ExpressVu at this time and the default of "0" can be used. However, depending on the program (data file) used if you find the time in the guide changes after a few minutes to a different time zone, then try entering a zip code for a US city that is in the same time zone as the city you live in.

Step 3e: Advanced Settings - Password
The password entry box should be grayed out as it is not currently a user changeable field.

Step 4a: Receiver – IRD#
The Receiver Identification number can be found on the label on the back of the IRD. It can also be found on the Important System Information screen accessible by pressing <menu> <6> <1> <3> on the remote or the <SysInfo> button. Note that reading it from the TV is preferable than reading it from the label as the label may be incorrect. This number is entered in the same format as it is printed or displayed (does not need to be converted to a hex value). The last two digits, if entered, will be changed to "XX" as they are checksum digits and are calculated internally or not used.

Step 4b: Receiver – CAM ID
The actual CAM ID that matches the one that came with your IRD is not required. However, if you use it, then the correct information will be easily available to you. Enter the value printed on the CAM (smartcard) or the info displayed on the Important System Information screen indicated above. It is easier to enter the information as printed on the CAM. If you use the Important System Information screen, make sure to insert the CAM into the IRD by itself so that the information can be read directly from the card. The last two digits, if entered, will be changed to "XX" as they are checksum digits and are calculated internally or not used.

You can "make up" a value as long as you keep the correct format or you can simply use the default value already in this field.

Step 4c: Receiver – Box Key
The actual Box Key that matches the one stored in the TSOP of your IRD is required. You must extract the Box Key using a JTAG cable, reading the CAM or some other method. All values must be correct in order for the ATMEGA128 to work.

Step 5a: Full Monty
A "Full Monty" writes all remaining steps to the ATMEGA128. It is the same action that can be accomplished using the "Actions – Full Write" menu option.

It is ONLY necessary to perform this step if you are changing the data file used to program the ATMEGA128 or if you have erased the ATMEGA128.

Click "Full Monty" to write the program (Turnip, Quincy, etc) to the Atmel. The progress will be indicated via the progress bar. If you run into an error, then try erasing the Atmel and try programming again. It may take a few minutes to write the code to the chip.

Step 5b: Write EEPROM (Not required if you did a Full Monty)
If you are only updating some of the information found on the jeepers screen such as the IRD # or time zone, then a full write to the chip is not required. Simply make whatever changes are necessary and use the "Actions – Write EEPROM" menu option to write the information to the ATMEGA128. This action takes significantly less time to perform.

Step 5c: Write Keys (Not required if you Full Monty or Write EEPROM)
If you are simply updating the key and no other changes are required, you can either click the "Write" button in the Keys section after getting the new keys or go to the "Actions – Write Keys" menu option. This action will take the shortest amount of time compared to the other write actions. For Quincy users in particular, this is the faster action to get you back to watching TV.

Using the ATMEGA128
Once successfully programmed, disconnect the ATMEGA128 from the computer, remove the jumper if appropriate and insert into the IRD. Watch TV.

Basic Troubleshooting

- A "Failed to enter program mode" error means that Jeepers was unable to communicate with the AMEGA128. Check all your connections, parallel port voltage, preference settings, BIOS setup for your LPT port and look for advance trouble shooting techniques on the web. **Note:** After a failure you may get a "Full Write Completed" message. This does NOT mean the write was successful.

- A "Guide" that shows all the channels unlocked (not in red) but a black screen when a channel is selected typically indicates that the Box Key was entered incorrectly. Go back and read the Box Key again.

It may not work on the first try. If you experience problems, try erasing and starting all over from scratch. Take a read through the forums on the web sites and use the search button to look for similar error messages or other problems. Chances are that you are not the first to encounter a problem and the answer is almost always already there.