

ANES

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COLLABORATORS

	<i>TITLE :</i> ANES		
<i>ACTION</i>	<i>NAME</i>	<i>DATE</i>	<i>SIGNATURE</i>
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REVISION HISTORY

NUMBER	DATE	DESCRIPTION	NAME

Contents

1	ANES	1
1.1	A/NES - 8-bit Nintendo emulator for Amiga	1
1.2	A/NES CGFX	1
1.3	A/NES CGFX Introduction	2
1.4	A/NES	3
1.5	A/NES - GUI & Preferences	3
1.6	A/NES	4
1.7	A/NES	5
1.8	A/NES	7
1.9	A/NES	8
1.10	A/NES - Registered Users	9
1.11	A/NES What's new?	9
1.12	A/NES File formats	10
1.13	.pal format	11
1.14	A/NES Controls	11
1.15	A/NES Bugs	12
1.16	A/NES CGFX Requires	12
1.17	Register A/NES Today!	13
1.18	A/NES	13
1.19	How 2 A/NES	14
1.20	The future of A/NES CGFX	14
1.21	A/NES CGFX History	14
1.22	A/NES	16
1.23	Frequently Asked Questions	17
1.24	A/NES Greetings to:	18

Chapter 1

ANES

1.1 -÷×÷- A/NES - 8-bit Nintendo emulator for Amiga-÷×÷-

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     /  \    /  \    /  \    /  \    /  \    /  \    /  \    /  \
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      :.....:.....:.....:.....:.....:.....:.....:.....:.....:
C Y B E R G R A P H X

```

Version 1.27

<<< F R E E W A R E >>>

<http://hem.passagen.se/anescgfx/>

Development started:

8:th of May 1997

Created by:

Morgan Johansson

Fredrik Schultz

Documentation

The authors cannot be held responsible for any possible damage caused by this program. You are using it at your own risk!

1.2 -÷×÷- A/NES CGFX -÷×÷-

Welcome to A/NES CGFX - Amiga Nintendo 8-bit emulator for CGFX- ↔ systems.

Introduction
A short introduction to A/NES CGFX...

Requirements
What do you need to run this..?

Installation
Shouldn't be a problem...

Registered User?
Read this if you're a registered user.

Features

Preferences

Controls
If you don't already know them...

Sending gifts

Authors
How you can contact us...

Technical info

Future
What will the future be?

History
Link to the past ;)

Bugs
Still some to fix...

FAQ
Frequently Asked Questions

Is this legal?
A legal notice found on the Net...

Greetings to

1.3 -÷×÷- A/NES CGFX Introduction-÷×÷-

Introduction

It all started a day in may in the year of 1997. I was

watching Nesticle on a PC machine and started to wonder why there wasn't any decent NES emulator for Amiga... So I (Morgan) and my friend Fredrik started this little project. We had never done anything like this before so it was a challenge. The CPU emulation (it's incredible fast) was written from scratch in 68020 assembly language and everything else concerning the emulation is also written in assembly.

Enjoy it, and remember, if you like it and use it, don't forget to support us.

1.4 -÷×÷- A/NES -÷×÷-

TECHNICAL INFORMATION

The following utilities was used during the development of A/NES.

- * ASM-ONE / ASM-PRO
- * GADTOOLSBOX

A/NES consists of more than 19.000 lines of pure assembly code. The source code (including gui) is about 300 Kbyte in size.

The 6502 cpu emulation is NOT based on any existing source and is written from scratch in assembly, making special use of the 68020 processor or better.

The A/NES CGFX archive comes with two executables, ANESCGFX.020 & ANESCGFX.060. The 060 version is compiled for the 68060 processor, however it will run on 020/030/040 systems aswell, but a little bit slower. So, if you haven't got a 060, don't use that version.

Also, if you don't have CGFX and a graphicscard, don't use this version. OCS/ECS/AGA users should use the "normal" version found Aminet (misc/emu/anes.lha).

1.5 -÷×÷- A/NES - GUI & Preferences -÷×÷-

GUI

Explaining about Load / Start ROM is not needed I guess. :) The "continue" button will let you continue your game when you have aborted it (by for example pressing the escape-key). However this button is not entirely reliable yet so use it with care.

PREFERENCES

Features enabled at this time are:

GENERAL

EMULATION

MISC

CHEAT

1.6 -:-× :- A/NES -:-× :-

NESA

NESA (which means "NES AUDIO") and is the new audio-format that is supported by A/NES.

A/NES now allows the user to rip the audio played by the ROM and save it to a standard NESA-file.

- | | |
|---------|--|
| Title | - Enter the title of the song in this field (not required). |
| Comment | - Additional comments here (not required) |
| Buffer | - This cycle button allows you to change the buffer that are used for ripping audio. Choose between 64K, 128K & 256K. Note! This setting is not activated until A/NES is restarted.
When the buffer is filled the audio-ripping will simply stop.
Some tunes requires a larger buffer than others (depending on how complex the song is!). |
| Grab | - Select "Never" if you don't want to rip any audio. Or "Always" and A/NES will rip audio all the time.
The F1/F2-mode allows you to press F1 for start ripping and F2 to stop. |
| Grab as | - Select grab-format. NESA2 only grabs the three "main" soundchannels. NESA3 grabs ALL channels (Noise+PCM) and the fileformat is also |
-

a little bit smaller than NES2.
Notice that NES2 only grabs the channels
that you've enabled in the A/NES GUI.

The Save-button will save your audio to disk.

Vs.UNISYSTEM

Here you can change the dip-settings used for the VS-roms.
Try experimenting with these to modify starting number of lives,
free play etc. Quite fun. :)

MATRIX MODE

When Matrix-mode is active you'll be able to discover the inner
secrets of the NES (well, almost anyway :).
Setting the mode to "primitive" allows you to view the
FPS counter, sprite counter and the mirroring in realtime.
That's not all, activating the "High-tech" mode allows you to
browse the NES-memory (use F3/F4 to scroll up/down). This
works like a simple hex-viewer and is perfect for ROM-hacking
(easy to spot number of lives, counters etc.).
This memory-browser is placed on top of the gameplay area (transparent)
and allows you to see the contents of the NES-memory in REALTIME!

Adjusting the "Matrix Level" allows you to decide how many
bytes that should be drawn on the screen at once (try adjusting this
if you've got a slower computer since re-drawing parts of the memory
on top of the in-game graphics is quite CPU-intensive).

Bug: The memory-browser doesn't update correctly when scrolling
wraps around at \$07FF-\$0000.

1.7 -:-X:- A/NES -:-X:-

GENERAL WINDOW

LIMIT SPEED

This function disables all speed-limitation code. So,
if your favourite game always run at 50fps, it should
now run even faster.

Default = checked

AUTOSAVE BATTERY

Turn this function off if you don't want to save the
battery.

Default = checked

USE BATTERY PATH

As default, all battery files (.sav) will be saved in the same directory as the .NES file. But when this box is checked you can have your battery files in a different directory. Remember to set your default battery-path by pressing the Battery-button.

AUTOSAVE PREFS

When this function is on, preferences-settings will be saved when you quit A/NES. If turned off, no settings will be automatically saved.

IGNORE LED

Here is a real usefull option! :D
When this button is cleared, A/NES automatically takes care of switching on/off the hardware sound-filter to improve sound quality.
Check this if you don't want A/NES to do that.
Default = cleared

USE COMMENT AS TITLE

When this function is active, the game title will be grabbed from the file-comment instead of the game itself. Could be usefull for XPK-packed ROMs.

JOYPAD 1

Selects if you want to use keyboard/CD32 pad for emulating joypad 1. Support for more pads will be added later.

JOYPAD 2

Selects between "Disable" or "CD32". You should choose "disable" if you don't want to use joypad2 (will save a few cycles) or if you haven't got a CD32 compatible joypad. :)

Screenmode

Here you can pick a suitable 8-bit screenmode for A/NES. A 256x240x8 screenmode is perfect, however other sizes will probably work too, but if your screen is taller than 240 pixels, you'll probably see some garbage. So, go ahead and create a 256x240x8 screenmode instead.

Sprite priority?

Checking this box enables sprite-to-background priority. This means that sprites could be drawn behind the background (for example when Mario enters a pipe in SuperMarioBros.). If you disable this feature some games may look a little weird, but the emulation will run just a little bit faster.

1.8 -÷×÷- A/NES -÷×÷-

EMULATION WINDOW

V LINES CURRENTLY DISABLED

This is the setting how many lines the NES screen consists of. Default value is 240 on PAL screens. Lowering this value can result in weird looking screens.

VBL-time CURRENTLY DISABLED

NTSC-roms works okay with a value of 25, PAL games often require higher values (Asterix PAL works with 40). To improve emulation-speed you can try and decrease this value <25, some games works, some does not. Some games require MUCH VBL-time, for example "Elite" requires about 70(!) VBL-lines. Correct emulation for NTSC/PAL should be 38/72 VBL-lines however such high values are often not required and they will slow down emulation. This setting is for advanced users only.

HBLANK CURRENTLY DISABLED

Number of cycles / row. Only for advanced users. Default value is 114.

DEFAULT NTSC/PAL CURRENTLY DISABLED

These button changes the timings to the appropriate system. Please notice that these values are not 100% accurate.

Today there is nothing in the NES-header telling if the game is PAL/NTSC (Tell Marat that he should implement such a bit!), but most dumped ROMS are for NTSC. However playing certain PAL roms on NTSC may look weird or may does not work at all. If so try use the DEFAULT PAL button if you suspect that your ROM is for a PAL system.

Ignore bad opcodes?

Some ROMs floating around contain flaws (Adventure of Lolo 1). Check this option if you don't want A/NES to quit emulation when executing a bad opcode.

ROM Patch?

When this option is checked, the entire ROM is scanned before execution and certain code-sequences is replaced with faster ones. Some instructions are executed almost 25% faster! Notice that some games may not work when this option is turned on (haven't found a single one yet though...).

EMULATE SOUND

Turn sound emulation on / off. Saves a few cycles but shouldn't be noticeable.

FREQUENCY SWEEPS?

Enable this checkbox if you want to hear the sound with frequency sweeps.

CHANNELS

All NES sound channels are emulated by A/NES. If you don't want to listen to any of them, you can de-select the channel here.

The different channels are squarewave 1, square wave 2, triangle wave, noise and PCM.

Notice that the PCM and noise channel are using the same Amiga-soundchannel so you still may miss some sound effects sometimes (the PCM sound has higher priority than the noise-sound).

If you want to experiment with NES-sound and if you have experience using hex-editors, try modifying the ANES_xx.chn files in your S: directory (do not modify the first 8-bytes since that is a header). Do not forget to make backups on your old ANES_xx.chn files if you screwup. :)

1.9 -:-X:- A/NES -:-X:-

CHEAT WINDOW

ACTION REPLAY INFORMATION

If you look on the left side of this window, you will discover several "string gadgets", they look something like this:

action replay

```

.----- .----- .----- .-----
|         | |         | |         | |         |
'-----' '-----' '-----' '-----'

```

game genie

```

.----- .----- .----- .-----
|         | |         | |         | |         |
'-----' '-----' '-----' '-----'

```

In the Action Replay gadgets you can input Action Replay codes (really!) :)

You can have four different codes activated at once.

Game Genie codes works just like the ActionReplay codes. These codes will also be saved along with your saved patch files.

Note that all values you type are default as HEX code, which means you don't have to type \$-signs or similar. Valid characters are 0-F, any other characters will be ignored.

Also, be sure to "fill" the entire "string-fields", for example if you want to "poke" at adress 10, be sure to write 010!

Cheat description - here you type a 64 character long description of your cheat. This is only usefull if you want to save your cheat into a special patch (.pat) file, so you don't have to type your cheatcodes more than once.

Activate - Be sure this button is activated if you want to use the current cheat codes.

Save - Press this and your current cheat will be saved as a file.

Load - Loads a cheatfile.

Get filepath - Press this button to select a suitable path for storing your cheatfiles. There seems to be some kind of bug left in this code since the ROM path & cheat files path are mixed sometimes. Nothing serious though...

1.10 -÷×÷- A/NES - Registered Users -÷×÷-

Information for registered users

A/NES is freeware. Thanks to everyone who had supported us in the past!

If you still want to support our project by donating money (or anything else), feel free to contact us.

1.11 -÷×÷- A/NES What's new? -÷×÷-

Features

- Full 6502 emulation
 - Battery backup
 - Nice looking gui! :)
 - Action Replay/Game Genie code support!
 - Good sound support
 - Perfect sprites with priority
 - Splitscreen scrolling
 - Two player support
 - Vs.Unisystem support
-

- CD32 joypad support
- XPK support
- Supports the most common mappers (more or less).
- Written in 100% 680x0 assembler code
- 060-optimized version included!
- It's fast!

Note! A/NES only supports loading of XPK compressed ROM files, not XPK compressed battery save files (*.sav).

Screen dumps

=====

By pressing F5 during emulation, a screengrab will be made. The image will be saved in RAM: when emulation quits as "ANESCGFXScreendump_256x240.rgb". This is a 24-bit RAW-image file. You have to convert it into a more suitable format before viewing. Try "ArtPRO" found on Aminet.
A more suitable image format will be added soon. :-)

Supported fileformats/types

1.12 -÷×÷- A/NES File formats -÷×÷-

Fileformats supported:

A/NES CGFX supports (more or less) two different fileformats:

iNES:

The most common fileformat, developed by Marat Fayzullin. This format can contain a dump of a NES/FAMICOM/PLAYCHOICE or a VS UNISYSTEM ROM.

FDS:

FDS means "Famicom Disk System" which was a floppy based system for the old Famicom. .FDS images floating around are dumps of these disks. A/NES CGFX supports the fileformat, however FDS-emulation is not yet reliable.

Note! To use .fds-files you MUST have the FDS-Bios in your S: path (called S:Disksys.ROM).

Vs.Unisystem palette-files

A/NES CGFX supports VS.Unisystem ROMs. If you have correctly installed A/NES CGFX, you can discover a new drawer in your S: path entitled S:ANESData/Palette/.

A/NES CGFX requires these files in this drawer to correctly emulate the colours of each VS-ROM since VS-ROMs doesn't use the same palette as the standard NES/FAMICOM.

Note that the ROM-name and the palette-filename must be the same for the palette to be loaded. (ex. SuperMarioBros.nes/SuperMarioBros.pal)

Technical information about .pal format

1.13 -÷×÷- .pal format -÷×÷-

.pal fileformat

The first 4 bytes says "PAL1" which is an identification of the file. The following byte is a file-type id, which should be set to 1. Then we have 11 empty bytes (this makes a 16 byte header). These should be set to 0 for future compatibility.

File-type id 1

Palettes with filetype id 1 is 80 bytes large (incl. 16 byte header). After the header there is a 64-byte large look-up table which tells A/NES which colour to use at that location. Simple!

File-type id 2

Not yet available.

1.14 -÷×÷- A/NES Controls -÷×÷-

JOYSTICK 1

When selecting "keyboard" in the preferences window, the following keys will work:

ENTER	- Start
RIGHT SHIFT	- Select
LEFT AMIGA	- A
LEFT ALT	- B
ARROWKEYS	- Guess what? :)
BACKSPACE	- Insert Coin (VS.Unisystem ROMS only!)
F10	- Emulates a NES-reset.
ESCAPE	- Abort emulation

... or if you decide to use a CD32 compatible joypad:

CD32

YELLOW	- Start
GREEN	- Select
RED	- A
BLUE	- B
PAUSE	- Abort emulation

JOYSTICK 2

Choose between "disabled" or "CD32", that suites you the best.
The keyboard is always locked to joystick 1 and may not be used by player 2.
Always set this to "disable" when not using joystick 2.

1.15 -÷×÷- A/NES Bugs -÷×÷-

Reporting bugs

Please report bugs to us that causes your computer to behave strangely. (See our addresses elsewhere in this guide file).
BUT! Don't report about non-working ROMs as many mappers are not emulated yet correctly.

When reporting bugs to us, don't forget to mention:
* Your complete machine setup! (CPU, RAM, PAL/NTSC?, GRAPHICSCARD etc) and anything else that may be usefull for us to know..

Known bugs/problems

- * Games crash when pressing "continue"-button.
- * Scrolling wrong / flickers.
- * Graphics bugs.
- * CPU emulation bugs.
- * PCM sounds weird.

1.16 -÷×÷- A/NES CGFX Requires -÷×÷-

Requirements

- CyberGraphx (v3 will probably do)
- A graphicscard
- A suitable screenmode (preferable 256x240x8)
 - 68020+
 - ~2Mb of Memory
 - reqtools.library
 - lowlevel.library (if you want CD32 joypad support!)
 - xpkmaster.library (for loading XPK files!)

Notice that YOU MUST select a screenmode in the preferences

section before trying to run any ROMs!

1.17 -÷×÷- Register A/NES Today! -÷×÷-

A/NES CGFX is freeware. However if you like you can donate money to us to support this project.

If that's the case, please contact us first:

+ fredrik.schultz@swipnet.se
+ morjoh@telia.com

1.18 -÷×÷- A/NES -÷×÷-

The Legalities of Console Copying and Emulation
3-11-97, Copyright Anthony DiPasquale
<http://www.pce.net/anthony>, anthony@pce.net

1. Is it legal to create an emulator?

There has been some discussion on this. To create an emulator one must have a high level of knowledge of the source platform to be emulated, and the target platform the emulator runs on. To find out info about the source, usually takes reverse engineering, of the original console, which may be considered illegal.

2. Is it illegal to run/use an emulator?

This goes along with the above question. There is debate around this as well. The general rule to follow is: You are allowed to own/run an emulator, as long as you actually own a corresponding hardware device. Example, you own a game boy, so you are allowed to run a game boy emulator on your computer.

3. Is downloading ROM images illegal?

No, it is not, as long as you own a hardware copy of each rom image you download. If you download images you do not own a copy of, you are committing piracy. By now, I'm sure Nintendo has realized that all the game boy game roms have been being illegally copied, that being one of the most popular emulators, and they do not seem to care. Chances are if you copy a Coleco, Atari, Sega Master System, etc, it wouldn't matter too much. The general rule is: If the company is no longer collecting royalties, they probably won't mind. Who would pay \$30 for a Coleco Vision ROM nowadays when you can go out and get the latest CD Rom game for about the same? Most people don't pirate roms because they are too cheap, they do it because they may miss an old game that you could no longer purchase even if you wanted to.

4. Is storing/distributing ROM images illegal?

It may not necessarily be illegal, it is more up to the person who

downloads the image then the person who provides it. It is a questionable practice, and I wouldn't recommend it. Even though you may see various web pages and FTP sites doing it, that doesn't make it legal.

1.19 -÷×÷- How 2 A/NES -÷×÷-

Installation

Use the installer script that is included in this archive to install A/NES.

Thanks for the script, Lennart Johannesson!

1.20 -÷×÷- The future of A/NES CGFX-÷×÷-

The future

?

1.21 -÷×÷- A/NES CGFX History-÷×÷-

A/NES CGFX History

Version:

1.27 1/9-2002

- Optimized the graphics-engine. Games that perform alot of CHR-ROM bankswapping gained quite a performance boost (4-5fps faster compared to v1.26 on my 040/25!!)
- Small Spritebug fixed (for example, doors in "Metroid" now looks correct)
- Minor palette-handling optimization.

1.26 20/5-2002

- A major CPU-bug was fixed (Thanks FluBBa!)

1.25 22/12-2001

- Freeware!
- Minor code-cleanup.

1.24 27/7-2001

- New palette! (More accurate)
 - More accurate frame-timing, now uses 262 scanlines per frame
-

- (which is accurate for NTSC) instead of 265 scanlines used earlier.
- Minor GUI modifications.

1.23 21/3-2001

- Looping PCM sounds supported.
- Minor PCM fixes.
- Major mapper-code cleanup (reduced the exe-file size)
- MMC3 IRQ's implemented. Works pretty okay. Huge compatibility boost!
- If no screenmode has been selected when the user tries to start a ROM, a screenmode requester now pops up (no more crashes!).
- New cool 24-bit logo added to GUI. :)

1.22 30/12-2000

- Some palette problems during startup fixed.
- Major mapper9 fixes. "Punch Out!!" looks close to perfect!
- Added screendump function.
- External audiofiles removed.

1.21 30/10-2000

- "Matrix Mode" implemented.
- System-crashes related to FDS-emulation fixed.
- Keyboard handler code is now a little faster.
- Massive code-cleanup.

1.20r 1/8-2000

- Improved Vs.Unisystem CHR-ROM swapping.
- External palettefiles (Vs.Unisystem) support added.

1.19 2/7-2000

- Sprite DMA emulation timing improved (~90% accurate).
- Fixed some Mapper4 CHR-ROM problems (MegaMan 4 looks better).
- VS Unisystem dipswitches are now actually functional. :)
- Soundchannel data are now moved to external datafiles.
- Misc mappercode cleanup.
- Misc code cleanup.

1.18 26/3-2000

- Fixed bug that caused the filerequester to behave strange when using an "ASL to Regtools" patch program.
- Powerful ROM-Patch function implemented which speed-up certain code in the ROM.
- PPU emulation is now a little bit more accurate.
- New scanline counter system, should be a little bit faster.
- Added partial mapper 40 support.
- Partial FDS-emulation.

1.17 23/12-1999

- Bugfixed the ASL-filerequester code (Sorry for that one).
- Minor fixes as usual.

1.16 10/12-1999

- Graphics bug fixed, all visible scanlines are now drawn.
 - Added a sprite-priority switch.
 - Doublebuffering implemented. This saves a fullscreen blit for each frame so emulation is now a little faster.
 - New, improved & faster installer script!
-

- Minor bugfixes.

1.15 21/11-1999

- A/NES CGFX now works on other 8bit screenmodes than 256x240.
- Minor noisechannel fixes.
- Minor CPU-emulation speedup.
- Somce nice A/NES icons included.

1.10 10/11-1999

- Some scrolling-bugs fixed. (Golf works again).
- VS-dip switches implemented.
- Now uses Asl.library instead of reqtools in most cases.
- A silly but fatal screenmode bug removed. (thanks Johey!)

1.00 29/10-1999

- Splitscreen sprites supported.
- Improved errorhandling.
- Some mapper-fixes.
- Minor GUI changes
- Misc fixes and minor speedups.
- 060-optimized version included.

1.22 -÷×÷- A/NES -÷×÷-

Authors of A/NES:

MORGAN JOHANSSON

computer : A1200T, Blizzard PPC 603e/200 & 040/25,
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UIN : #17683254

guilty of: 6502 CPU emulation
 Sound
 Mapper support
 ROM-handler
 Gfx in general
 Bugtesting (and finding most of them)

FREDRIK SCHULTZ

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guilty of: 6502 CPU emulation
 GUI
 Gfx in general

Sprite & Scrolling
Some bugfixing

Also big thanks to
Dew / Limited Edition - for fixing the keyboard handler!

1.23 -÷×÷- Frequently Asked Questions -÷×÷-

Frequently Asked Questions

Q: How do I make A/NES CGFX run faster?

A: For maximum performance, check these settings:

- 1) Sprite priority OFF
- 2) Emulate Sound OFF
- 3) No cheats activated
- 4) Limit speed option should be deactivated

You can also try to enable the ROM-patch option, however this one is not entirely safe. It may cause problems in some games. But try it.

Q: A/NES CGFX crashes when I try to start a ROM, why?

A: Be sure you've got all necessary files installed. Also make sure you've selected a suitable screenmode in the preferences section before starting a ROM.

Q: How do I dump my own NES cartridges?

A: You need some external hardware. There are actual backup-devices for Famicom (Jap.) however they are quite hard to find. More common hardware could be for example the IO-48/IO-56 card which you connects to your computer.

Q: Why is not Mapper5 supported?

A: Mapper 5 (or MMC5) is an incredible device that almost turns your NES into a new machine. It's VERY complex and the question is if it's ever going to be emulated properly.

Q: Tell me more about mapper 9!

A: Mapper 9 (MMC2) is 98% supported. It's a very CPU-intensive device to emulate because the chip is able to bankswitch when certain tiles appear on the screen (other MMC's usually bankswitch at certain scanlines). Anyway, nothing slower than a 040/25 is recommended when emulating the MMC2.

Q: My action replay codes doesn't work. Why?

A: Could be due to several reasons:

- 1) Check your spelling. Is it 8 characters long?
- 2) The code may be ROM based, and this does not work yet in A/NES
- 3) The action replay code may be for a different version of the game and may not work with yours.
- 4) Is the "activate" switch on? :)
- 5) Bugs in our code? :) :)

Q: A/NES CGFX just quits when I try to start it. Why?

A: Check that you have installed the included font in your FONTS: directory properly.
Do you have CGFX & a graphicscard installed?
Do you have enough memory available?
Also, do you have the required 68020 processor?

Q: Why do I get an 'XPK ERROR' message?

A: You are trying to load an XPK packed file, that is either corrupt or simply, you don't have the xpkmaster.library and it sub-libraries installed in your LIBS: drawer.

Q: Why is A/NES written in assembler and not C?

A: There is enough slow c-ports out there, don't you think?

Q: In some games, the graphics looks very strange.

A: This could be caused by two reasons:

- 1) Graphic-emulation bugs/problems. Some games uses some very critical timing to perform certain effects which are hard to emulate.
- 2) A non-entirely or non-correctly emulated MMC-chip.

1.24 -÷×÷- A/NES Greetings to: -÷×÷-

Thanks to:

Bloodlust Software, D, Dew/LED, FanWen, Firebug, Fredrik Olsson, FX3, Matthew Conte, Lennart Johannesson, Leo Flavum, Marat Fayzullin, Nate_DAC, Nintendo, Paul Robson, Ville Helin, Y0shi, #amycoders

+ everyone that has supported us this far in our project.
Especially thanks to those which have registered / sent us gifts! Thanks guys! We won't forget you!
