

How to Backup and Restore IGT Software

Version 1 – June 2014

Disclaimer

This document describes how to backup and restore IGT software on EPROMs and SIMMs for various IGT gaming machines. Although the Willem GQ-4X True USB EPROM Programmer and SIMM Burner v2 with QCP Software are capable of backing up other software for other types of gaming machines, this document specifically addresses IGT software. There are no guarantees or implied warranties with this information and users should proceed at their own risk.

All About EPROMS (Willem GQ-4X True USB EPROM Programmer)

How to Identify EPROMs

EPROM stands for “Erasable Programmable Read Only Memory”. The “E” prefix specifically designates the PROM as erasable. The EPROM is erasable by exposing the chip to Ultra Violet (UV) light through a special quartz window built into the ceramic chip.

EPROMs are named by the manufacturer, memory size and access speed. The name of the device is written on the EPROM in very small writing (may need a magnifying glass). For example, the most common EPROM used in IGT slot machines is 27C801-10f. The “27” identifies the chip as an EPROM. The “C” indicates the EPROM is a CMOS-based EPROM, which is used in IGT machines. The next three numbers of “801” indicate the size, which in this example is an 8 mega-bit EPROM. The last numbers after the hyphen refer to the speed, which in this example is 100 nano-seconds. To add to the confusion, the EPROM may have a prefix, such as “M” or “AT”, the size may differ, such as “801” or “080”, and the speed can be represented in different ways, such as “10f” and “100”. So, continuing the example, all of the following EPROMs are the same: 27C801-100, 27C080-10f, AT27C080-10, M27C800-1 and M27C801-100.

According to the various IGT manuals, the optimal speed for IGT EPROMs is 120ns or faster. Here are some examples of speeds:

EPROM Designation	Actual Speed	Recommended?
10f	100ns	Yes
100	100ns	Yes
120	120ns	Yes (slower)
15	150ns	No (may work)
90	90ns	Yes (faster)

How to Erase EPROMs

To erase an EPROM, simply remove any sticker that is covering the quartz window and place the EPROM window-up in the tray of the eraser. Turn on the eraser and set the timer. **CAUTION: Do not look directly at the UV light.**

The length of time to expose the EPROM to UV light can vary. Too much exposure can permanently erase the EPROM and not allow any more data to be written to the chip. The best way to determine how long to expose the EPROM is to expose the chip to the UV light for one (1) minute and test the chip for erasure. To verify if the chip is blank, follow steps 1 – 10 under the section, “How to Write to EPROMs (restore).” Continue the process until the EPROM reads as erased in the GQ-4X software. Then, multiple the numbers of minutes it took to erase the EPROM by 1.5 to determine a safe erasure time.

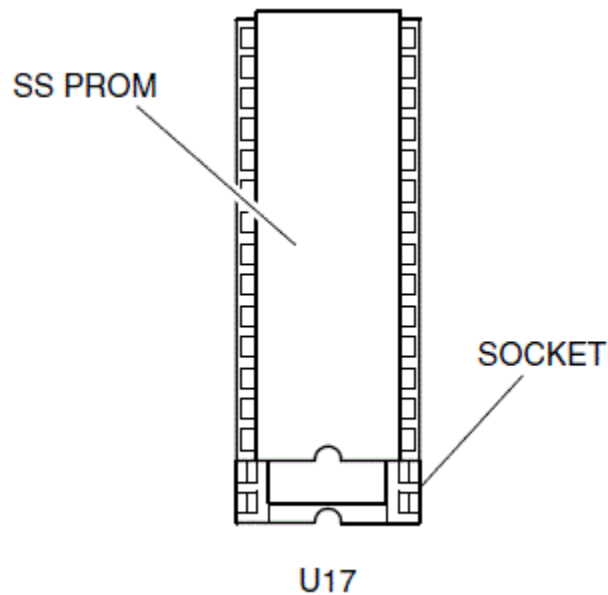
Recommended EPROMs for Backup

IGT Reel Slot Machines

Recommended Replacement EPROMS for IGT Reel Slot Machines				
MPU Board	Stepper Base (SB)	Stepper Game (SP or SG)	Stepper Reel Data (SS or ST)	Stepper Version (VS)
S and S-Plus 755-057-xx		10MHz: U35 16MHz: U57 27128-250*	10MHz: U36 16MHz: U58 27C64-100	
S-2000 and Vision 755-105-0x	U21 27C4002-100	U19 & U46 27C801-100	U17** 27C64-100	U44 27C801-100

* The 27128-250 EPROM is specified in the S and S-Plus manual; however, I recommend a faster EPROM for backup of a speed of 100ns or faster. Further, your current EPROM may actually be a smaller 27C64 size or have a faster rating or 120ns or 100ns. Refer to the section, "Backing up Programs on Larger EPROMs", to learn how to back-up a 27C64 onto a 27128 or 27C128 or larger and faster EPROM. This is often needed to convert an S or S-Plus game to an S-2000 or Vision platform.

** As specified in the IGT Service Manual 821-354-00, the U17 socket accepts a 27C801 8MB EPROM of 100ns or faster. However, this socket is suited for a Stepper Reel SS-PROM. The SS-PROM chip is a smaller 27C64 EPROM with 28 pins, but the U17 socket has 32 pins. Refer to the diagram below on how to install an SS-PROM EPROM into the U17 socket by inserting the un-notched end of the EPROM closest to the un-marked end of the socket as shown.



IGT Video Slot Machines

Recommended Replacement EPROMS for IGT Video Slot Machines					
MPU Board	Data/Base	Game Program	MO/PXL	CAP/CG	Sound
Player's Edge (PE) 757-032-0x		U68 27C512*	U72-U75 27C128	U150 82S147**	
Player's Edge Plus (PE+) 757-034-0x	U66 27C128	U67 27C512*	U77-U80 27C128	U43 82S147**	
Game King & iGame 757-035-0x 757-038-0x (aka 3802)	U8 27C4002-100	U21 & U5 27C801-120	U20 & U4 27C801-120	U48 & U47 27C401-100	U5 & U6 27C801-120
Game King & iGame Plus 757-039-0x (aka 3902)	U39 27C4002-100	U13 & U36 27C801-120	U14 & U37 27C801-120	U30 & U53 27C401-100	U5 & U6 27C801-120

* The PE and PE+ boards support both 256k and 512k game sizes. A jumper at U68 (PE) and U67 (PE+) set the game size accordingly (refer to the user manuals for more information). Therefore, it is recommended to backup software using 27C512 EPROMs to ensure both sizes are covered.

** Color Attribute PROMs (CAP) are not compatible with Willem GQ-4X True USB EPROM Programmer. This special type of PROM can only be programmed once by blowing internal fuses using current (instead of voltage). An alternative to using CAPROMs is to build an adapter to convert to a 27C128 EPROM. I recommend searching the WWW for "Adapter to Replace Color CAP PROM with EPROM". Then, you can use the GQ-4X to back-up the CAPROM.


How to Read from EPROMs (backup)

1. Plug one end of the USB cable into the Willem GQ-4X True USB EPROM Programmer and the other end of the USB cable into your computer.
2. Launch the GQ-4X software and wait for the software to recognize the programmer.
3. Click the **Device** button on the left to display the “Device Selection/Search” dialog box.
4. In the “Search Device For” box, type in the name of the EPROM you are using (refer to the section, “Recommended EPROMs for Backup”).
5. From the Device box, click on the device you typed above. You can save the device as a favorite by clicking on the >> button so you can easily choose that same device in the future without retyping or searching.
6. Click **Select** to return to the main program window.
7. With the socket handle in the upright position, place the EPROM in the GQ-4X device with the un-notched end of the EPROM against the bottom of the un-marked socket as shown in the image in the software.

NOTE: Base chips of 27C4002 require the ADP-054 Adapter. Insert the adapter into the GQ-4X with all of the writing face-up. The adapter will actually hang over the side of the GQ-4X. Then, insert the 27C4002 EPROM as described above.

8. Push the socket handle down to secure the EPROM in the socket.
9. Click the **ID** button in the GQ-4X software to identify the EPROM. If the EPROM is recognized differently than the device selected in steps 3-6, then check the EPROM label and choose the proper device.

NOTE: The ID button will not work for Base chips of 27C4002.

10. Click the **Read** button to start reading the EPROM. The Code tab and progress bar will display.
11. Click the **Save**  icon on the toolbar (or choose File→Save or CTRL+S) to save the file with a .bin extension. You can name the file anything you want. My file naming recommendation is below.
12. *Optional:* With the file still open in the GQ-4X software, click the **Verify** button to verify what is saved on disk matches what is on the EPROM.

How to Backup and Restore IGT Software










Backup File Name Recommendation

I recommend naming your .bin file as follows so you can easily organize the backups on a PC:

Game, IGT Type, IGT Number, -Jurisdiction, EPROM Name

This naming convention will sort the bin files related to the same game together and will allow you to recall what type of EPROM is needed to restore the game later. Plus, if the file gets separated from a sub-folder, you will know exactly where it belongs without having to try and lookup or cross-reference other resources.

Sample file names for Game King 4.3 backup:

Name	Size
 GK4.3 Base M0000888-NV M27C4002.bin	512 KB
 GK4.3 CG1 C0000793-NV M27C401.bin	512 KB
 GK4.3 CG2 C0000793-NV M27C401.bin	512 KB
 GK4.3 GME1 G0002142-NV M27C801.bin	1,024 KB
 GK4.3 GME2 G0002142-NV M27C801.bin	1,024 KB
 GK4.3 PXL1 C0000793-NV M27C801.bin	1,024 KB
 GK4.3 PXL2 C0000793-NV M27C801.bin	1,024 KB
 GK4.3 SND1 SWC00046-NV M27C801.bin	1,024 KB
 GK4.3 SND2 SWC00046-NV M27C801.bin	1,024 KB

How to Write to EPROMs (restore)


IMPORTANT: Make every attempt to use the same EPROM type and speed for the same game restoration. In other words, don't restore GME1 on a ST27C801-90 and GME2 on M27C080-10f for the same game. Restore both GME1 and GME2 to the same type of EPROM with the same access speed to ensure full compatibility.

1. Plug one end of the USB cable into the Willem GQ-4X True USB EPROM Programmer and the other end of the USB cable into your computer.
2. Launch the GQ-4X software and wait for the software to recognize the programmer.
3. Click the **Device** button on the left to display the "Device Selection/Search" dialog box.
4. In the "Search Device For" box, type in the name of the EPROM you are using (refer to the section, "Recommended EPROMs for Backup").
5. From the Device box, click on the device you typed above. You can save the device as a favorite by clicking on the >> button so you can easily choose that same device in the future without retyping or searching.
6. Click **Select** to return to the main program window.
7. With the socket handle in the upright position, place the EPROM in the GQ-4X device with the un-notched end of the EPROM against the bottom of the un-marked socket as shown in the image in the software.

NOTE: Base chips of 27C4002 require the ADP-054 Adapter. Insert the adapter into the GQ-4X with all of the writing face-up. The adapter will actually hang over the side of the GQ-4X. Then, insert the 27C4002 EPROM as described above.

8. Push the socket handle down to secure the EPROM in the socket.
9. Click the **ID** button in the GQ-4X software to identify the EPROM. If the EPROM is recognized differently than the device selected in steps 3-6, then check the EPROM label and choose the proper device.

NOTE: The ID button will not work for Base chips of 27C4002.

10. Click the **Blank Check** button to verify the EPROM is fully erased and blank.
11. Click the **Open** icon  on the toolbar (or choose File→Open or CTRL+O) to open the file you're restoring.
12. In the Auto Mode section of the software on the right-hand side, make sure "Write" and "Verify" are both checked. Then, click the **Auto Mode** button on the left.

Backing up Smaller Programs on Larger EPROMs

You can backup software onto an EPROM that is actually larger in size than the software file. For example, you can restore a 4 Mega-bit (512 KB) file onto an 8 Mega-bit EPROM (1,024 KB). Essentially, you're copying the code back-to-back on the EPROM to completely fill the EPROM with two copies of the same code. This is sometimes done on IGT Color Graphic EPROMS placed on 27C801 chips.

1. Choose the larger device in the GQ-4X software. It should be no more than twice as large.
2. Open the smaller file in the GQ-4X software from disk.
3. On the Code tab, if you scroll down, you will see the file ends at the hexadecimal location that matches the size of the file on disk.
4. After that location, each row contains pairs of "ff" indicating the remainder of the EPROM is blank.
5. Use the table below to determine the hexadecimal location that corresponds to the end of the file based on the file size on disk.

Device	File Size on Disk	Copy from 0 to OFFSET	Paste starting at OFFSET
27C16	8 KB	0000003F0	000000400
27C32	16 KB	0000007F0	000000800
27C64	32 KB	000000FF0	000001000
27C128	64 KB	000001FF0	000002000
27C256	128 KB	000003FF0	000004000
27C512	256 KB	000007FF0	000008000
27C801	512 KB	00007FFF0	000080000

6. Select the all of the code in the Code tab starting with the first position (000000000) all the way through to the location identified in step 5.
7. Paste the code starting in the starting position located in step 5. Essentially, you're copying the code back-to-back on the EPROM.

More about EPROMs

A great resource for understanding more about EPROMs can be found here:

http://wiki.xtronics.com/index.php/How_EPROMS_Work

Where to buy UV EPROMs

You can find UV EPROMs all over the Web. Some resources include:

Jameco.com

Mouser.com

Alibaba.com

Ebay.com

All About SIMMs (Quad Clone Programmer SIMM Burner v2)

IGT introduced SIMM modules with the 80960 processor making SIMM games available in the S-2000, Vision and iGame Plus software. The SIMM memory modules allowed IGT to expand the sound capability and pixel graphics of their games to offer recorded music, 256 colors simultaneously, and to display block graphics onto the monitor faster.

Type of SIMMs

There are basically two (2) types of SIMMs used in all IGT games:

1. **CGF** – these modules are physically wider than the other SIMMs and are only used in iGame Plus software in the Color Graphic **J3** socket. These SIMM modules have no dip switches.
2. **PXLF/SNDF** – these modules are physically narrower than the CG SIMM modules and are interchangeably used as either sound or pixel modules depending on the dip switch settings (refer to “SIMM Dip Switch Settings”):
 - a. **Sound (SNDF)** modules are used in S-2000, Vision and iGame Plus in the **J2** SNDF socket of the Multimedia Lite SIMM sound board assembly # 769-244-0x (aka MMII).
 - b. **Pixels (PXLF)** modules are used in iGame Plus in the **J6, J7, and J8** sockets (PXLF3, PXLF4 and PXLF5 respectively) of the MPU board assembly # 757-039-0x (aka 3902).

Board	SIMM Type / Prefix	SIMM Size
iGame Plus Color Graphics (CG) Assembly # 757-039-0x (aka 3902)	CGF / C	4 or 8 Megabyte
iGame Plus Pixel (PXL) Assembly # 757-039-0x (aka 3902)	PXLF / C	8 or 16 Megabyte
iGame Plus SIMM Sound Board Assembly # 769-244-0x (aka MMII)	SNDF / DSS	16 Megabyte
S-2000 and Vision SIMM Sound Board Assembly # 769-244-0x (aka MMII)	SNDF / DSV	16 Megabyte

Prefix Examples:

A SIMM labeled **DSV00042** indicates a SNDF SIMM for an S-2000 or Vision machine.

A SIMM labeled **DSS00334** indicates a SNDF SIMM for an iGame Plus machine.

A SIMM labeled **C0000787** in the narrow module with dip switches indicates a PXLF SIMM for an iGame Plus machine.

A SIMM labeled **C0000787** in the wider module without dip switches indicates a CGF SIMM for an iGame Plus machine.

Where to buy SIMMs


SIMM modules were made specifically for IGT and are therefore, harder to locate. Some resources include:

Ebay.com


RudysDeals.com

Resellers on NewLifeGames.com

How to Read from SIMMs (backup)

1. Plug one end of the USB cable into the SIMM Burner v2 device and the other end of the USB cable into your computer.
2. Launch the Quad Clone Programmer (QCP) software and wait for the software to recognize the device (if “Auto detect on connect” is enabled, which it is by default).
3. Insert the SIMM module into the SIMM Burner device.
4. Click the **Detect** button on the toolbar. QCP will attempt to identify the SIMM.
 - Verify QCP correctly identified the SIMM. If it did not, then click the **Stop** button, wait, and then click the **Connect** button to try again.
5. In the file box, type the name of the file you’re saving. You can name the file anything you want. Refer to the “Backup File Name Recommendation” section for my recommendation for naming files.
6. Click the **Read** button to start reading the SIMM. By default, after QCP reads the SIMM, QCP will prompt you for a location to save the file. If you are not prompted after QCP reads the SIMM, then click the **Save**  icon.
7. *Optional:* With the file still open in the QCP software, click the **Verify** button to verify what is saved on disk matches what is on the SIMM. By default, QCP verifies after reading anyway.

How to Write to SIMMs (restore)

1. Plug one end of the USB cable into the SIMM Burner v2 device and the other end of the USB cable into your computer.
2. Launch the Quad Clone Programmer (QCP) software and wait for the software to recognize the device (if “Auto detect on connect” is enabled, which it is by default).
3. Insert the SIMM module into the SIMM Burner device and set the dip switch accordingly (refer to “SIMM Dip Switch Settings”).
4. Insert the write-enable clip onto the SIMM (use the unmarked clip unless the SIMM is a Toshiba).
5. Click the **Detect** button on the toolbar. QCP will attempt to identify the SIMM.
 - Verify QCP correctly identified the SIMM for the file size you’re restoring. If it did not, then click the **Stop** button, wait, and then click the **Connect** button to try again or replace the SIMM.
6. **WARNING: Make sure you have backed up the contents of the SIMM before erasing it!** Click the **Erase** button on the toolbar to erase the SIMM.
7. Click the **Open**  button on the toolbar and open the file you’re restoring.
8. Click the **Write** button to start writing to the SIMM.
9. *Optional:* With the file still open in the QCP software, click the **Verify** button to verify what is saved on disk matches what is on the SIMM. By default, QCP verifies after writing anyway.

SIMM Dip Switch Settings

8MB SIMMS

When **burning** 8MB SIMMs, the dip switches must be set as follows:

SIMM	1	2	3	4
CGF (1 of 4)	CFGs have no dip switches.			
PXLF	ON	ON	ON	OFF
SNDF	OFF	OFF	OFF	OFF

In rare cases where this does not work while **burning**, then use:

SIMM	1	2	3	4
CGF (1 of 4)	CFGs have no dip switches.			
PXLF	OFF	ON	OFF	ON
SNDF	OFF	OFF	OFF	OFF

When **installing** a game with only one 8MB PXL SIMM, the dip switches should be set as follows:

SIMM	1	2	3	4
CGF (1 of 4)	CFGs have no dip switches.			
PXLF3 (2 of 4)	ON	ON	ON	OFF
SNDF	OFF	OFF	OFF	OFF

16MB SIMMS Burning and Installing

When **burning** 16MB SIMMs, the dip switches can be in any sequence.

When **installing** 16MB SIMMs, the dip switches must be set as follows:

SIMM	1	2	3	4
CGF (1 of 4)	CFGs have no dip switches.			
PXLF3 (2 of 4)	ON	ON	ON	OFF
PXLF4 (3 of 4)	OFF	ON	ON	OFF
PXLF5 (4 of 4)	ON	OFF	ON	OFF
SNDF	OFF	OFF	OFF	OFF

NOTE: Some dip switches may be installed upside-down. Look for the labels, "1" and "ON".

8MB and 16MB SIMMS combined in a game

When **installing** a game with both 8MB and 16MB PXL SIMMs, then install the 16MB SIMM in the first slot (PXLF3) and the 8MB SIMM in the second slot (PXLF4) and set the dip switches as follows:

SIMM	1	2	3	4
CGF (1 of 4)	CFGs have no dip switches.			
16MB PXLF3 (2 of 4)	ON	ON	ON	OFF
8MB PXLF4 (3 of 4)	OFF	OFF	OFF	ON
SNDF	OFF	OFF	OFF	OFF