

1996's BEST KNOWN A-BUGS

DTS COMPILES A LIST OF THE MOST COMMON BUGS
IN SATURN GAME DEVELOPMENT - PART 1



With the advent of new games and peripherals enhancing the gaming environment, a set of standards was established so your games would sail through development with flying colors and not tank in test. In the past few months of intensive game development, Sega Developer Technical Support sought out information from both First and Third Party Test and Strategic Support and Engineering to compile a listing of the most encountered **A-Bugs**. This article is the first of two parts in which we will examine peripheral A-Bugs. Sega has always based a great deal of importance on the peripheral end of the market, as well as believed that ease of use and logical interface design will without a doubt have considerable impact on the commercial value of a product.

continued on page 4

WE'VE MOVED

DTS MOVES DOWN THE STREET SO
 GAME DEVELOPMENT SUPPORT
 IS HOUSED IN ONE PLACE

NEW ADDRESS

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NEW EXTENSIONS (same email)

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(415) 802 -

Sharon.Bone@sega.com	3213
database administrator	
Paul.Chamberlain@sega.com	3223
webmaster/graphic designer	
Renee.Greenwood@sega.com	3210
dts manager	
Judy.Jette@sega.com	3260
dts dispatcher	
Grace.Maramba@sega.com	3220
training coordinator	
Evelyn.Merritt@sega.com	3275
associate director	
Steve.Mitchell@sega.com	3236
dts administrative assistant	
Mike.Tucker@sega.com	3221
distribution coordinator	

SAME FAX

415.802.1717

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 DTS CD
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Q SOUND PART 2

A PROGRAMMER'S PERSPECTIVE



Since the routing of a sound through the QSound algorithm is set using the Tone Editor, a particular layer can only be routed to one QSound input. As a result, the sound can be placed in only 1 location at a time. Therefore, it is often useful to create different versions of the same sound and route them to differing QSound inputs. By doing this, a programmer can, for example, play the same sound at the same time with different locations. Create some MIDI sequences with the QSound trajectory information already in the MIDI score. For example, a missile flying from left to right and fading away.

Pass the output from another DSP effect such as reverb into two of the QSound inputs; then set the QSound positions of the inputs to 0 and 30. This will create a 3D-type effect on your effect outputs.

Controlling QSound via CPU

From a game programmer's point of view, many times the position of a sound must be tracked and updated as the game is playing. In order to permit the real-time updating of sounds using QSound, Sega has provided 2 "hooks" that can modify the position parameters of the QSound modules.

One "hook" is done by sending MIDI data directly to the sound driver using `slSoundRequest` with `Command Data = 0x09`. The MIDI message should be a MIDI Control Change request on MIDI channel 0-7 (to select the QSound input to change) with MIDI data in the range 0-30. The other "hook" is to send a request directly to the sound driver using `slSoundRequest` with `Command Data = 0x12`. Parameter 1 (0-7) should contain the QSound input to change and parameter 2 (0-30) should contain the desired QSound position.

As discussed above, care must be used when playing sounds and updating their positions. The programmer must know what sounds are assigned to what QSound inputs in order to properly update their positions. Therefore, good coordination between sound designer and programmer is essential. When used properly, QSound can add a great deal to a game. Sounds can be heard off-screen prior to the player seeing the objects they refer to, or the player can be placed in huge audio environments such as a jungle or stadium. QSound has been successfully implemented on Saturn games such as *Sega Nights* and *Sega Rally Championship*.

Look for our example on the Nov96 DTS CD, in "Other:QSound" directory that contains a full sound tool-based demonstration of QSound along with the MIDI score that plays the demo. It contains:

A QSound DSP program created with eLinker

A Tone bank set properly to use QSound

A MIDI sequence that shows how to control the positions of sounds using MIDI

A Map file to play the demonstration using the SoundSimulator

**For further information contact: QSound Labs, Inc.
403-291-2492 or www.qsound.ca**



SBL Programming

- Q. I'm using color RAM in 2048-color mode, but I cannot use the color code for the 2047th color.
- A. *The 2047th color in the color RAM is used in the normal shadow function of the VDP2 and, therefore, cannot be used by sprite. You must use another palette number.*

SGL Programming

- Q. Should I calculate the light source when there is texture data?
- A. *There are assignments for calculating the light source in SGL using an option of the Attribute Macro. With polygons (non-textured), it is possible to assign light source calculations by `UseLight` for RGB and palette modes (must assign `UsePalette` for palette mode). When using textured data, calculate the light source using the Gouraud shading function of VDP1. According to VDP specifications, light source calculations can only be done in RGB mode (32 K colors). You cannot calculate the light source for textures in palette mode.*

- Q. With the `slInitSystem` function, what are the contents set to by the arguments of the function?
- A. *When settings are not indicated by arguments, the following shows the settings made with the `slInitSystem` function. When*

**See "FAQ" continued
on page 5**

1996's BEST KNOWN A-BUGS

NOTE: DOCUMENT **ST-151-R3** IS CURRENTLY BEING UPDATED AND WILL INCLUDE STANDARDS FOR NETLINK AND MULTIPLE DISK GAMES - LOOK FOR IT ON THE DTS WWW IN LATE OCTOBER.

GENERAL

A-Bug This game is not using Sega SMPC control mode for peripherals.

Solution Per Sega Standards, all games must read the peripheral ports using SMPC control mode, **not** SH2 direct mode.

A-Bug Gameplay does not resume after a peripheral has been reconnected.

Solution If the peripheral is reconnected, the user must be able to resume a normal game session. If the game is placed in pause mode after disconnection of the peripheral, the game should ideally resume when button input is detected after re-connection of the peripheral.

A-Bug After executing a software reset during the main game state, the game does not revert to the title screen.

Solution A software reset must be executable from any screen by pressing a peripheral's A+B+C+START Buttons; except during backup memory device operations (i.e., clear, save, remove). The action to be taken upon execution depends on the status of the display:

- During the main game state, the game should revert to the title screen.

- During the title loop sequence & options display, the game should revert to the Audio CD Control Panel (Saturn Software Development Standards; p. 16, Sec 8.4.2).

A-Bug Game does not revert back to CD Audio Control Panel after the CD door has been opened.

Solution If the Sega Saturn's CD Door OPEN button is pressed during a game and the door opens, then the boot ROM's Audio CD Control Panel must be displayed in the same manner as a reset is handled during the Title Loop sequence (Saturn Software Development Standards; p. 18, Sec 9.1).

A-Bug The game functions solely through Saturn control port 2.

Solution A control pad must always be connected to control port 1 in order for the player to start the game (Saturn Software Development Standards; p. A5-4, Sec 2.1).

A-Bug The game allows player 2 controls to start the game.

Solution Always use player 1 controls (the compatible connected to Control Port 1) to start a game (Saturn Software Development Standards; p. A5-5, Sec 2.2.2).

A-Bug Peripheral Sampling.

Solution Per Sega standards, all supported peripherals should be sampled at every VBI, or 16.5ms.

6-PLAYER TAP

A-Bug When using the 6-Player Tap, player 1 is not given proper assignment priority if connected to any ports other than port 1 of the 6-Player Tap.

Solution Player numbers must be assigned so that the lower-numbered ports (left-side ports) are always given assignment priority according to the 6-Player's state. Make sure that player numbers are not assigned out of order (Saturn Software Development Standards; p. A5-8, Sec 3.2).

A-Bug The game works only in port 1 of the 6-Player Tap player, it is required that the game support operation from any of the 6 peripheral ports when the 6-Player Tap is con-

nected to Peripheral Port 1 (left port when looking at the front of the Sega Saturn).

A-Bug Saturn Port 2 does not function when 6-Player Tap is connected in Port 1.

Solution Per Sega Standards, Port 2 should be active for 2 player game.

A-Bug The game cannot play 2 players when using 6-Player Tap.

Solution When a 6-Player Tap is used, the first port must always be assigned to player 1. The next port to the right is assigned to player 2.

B-Bug The control pad does not work with other active ports on the 6-Player Tap after it has been disconnected from its original port on the 6-Player Tap.

Solution If a 6-Player Tap with an active peripheral is disconnected and a different 6-Player Tap setup with active peripherals is reconnected, re-enable input to only compatible peripherals that are connected to the unused active ports (Saturn Software Development Standards; p.A5-13, Sec 3.3.3)



ARCADE RACER

A-Bug The driving game does not support the Arcade Racer.

Solution All driving games must support the Arcade Racer (Saturn Software Development Standards; p. 5, Sec. 2.3.4).

A-Bug The Arcade Racer, an unsupported peripheral, can start and play the game through.

Solution Sega requires that all games ignore unsupported peripherals (Sega Saturn Development Standards; p. 3, Sec 2.3).

MOUSE

A-Bug The Mouse, an unsupported peripheral, can start and play the game through.

Solution Sega requires that all games ignore unsupported peripherals (Sega Saturn Development Standards; p. 3, Sec 2.3).

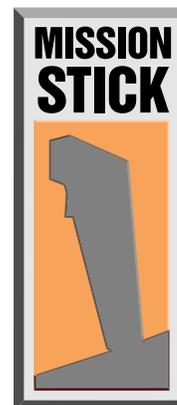
A-Bug Button C on the mouse does not work.

Solution Input from buttons A, B, and C must all be supported by the application (Saturn Software Development Standards; p. A5-18, Sec 4.2.1).

MISSION STICK

A-Bug This game does not work with the Mission Stick.

Solution All games **must** support the 8-Button Control Pad, Virtua Stick, 6-Player Tap, and Mission Stick (in digital mode only) peripherals (Saturn Software Development Standards; p. 3, Sec 2.3). This standard has been established for those consumers wishing to purchase a Mission Stick as their second peripheral. It also ensures that consumers will be able to play a two player game regardless of their choice of peripherals.



making settings other than those indicated here, you must use the respective functions for those settings.

(1) Window size and position of vanishing point for sprites and polygons [The list is OK as is.]

Note: The values for ScreenXSize and ScreenYSize can be changed by calling the function with the new values as the first two arguments.

(2) Initial settings for the Scroll

Displayed scroll planes: NBG0, NBG1, RBG0

Scroll planes: NBG0, NBG1, NBG2, NBG3, RBG0

Priority: 73214

Sprite0 (polygon): SPR0

Priority: 6

Other sprites: SPR1-SPR7

Priority?: 5

Scroll color mode: 256-color mode for each scroll

Color RAM mode: 1 (2,048 colors chosen from 32,768 colors)

VRAM split: split both banks A and B

Character data: NBG0, NBG1 from 25E60000; RBG0 from 25E00000

Character size: 8x8 pixels for each cell

Pattern name data: NBG0 from 25E76000; NBG1 from 25E78000; RBG0

PA from 25E40000; RBG0 PB from 25E50000

Pattern name size: NBG0 (1 word) with 10-bit reflected pattern name for each cell; NBG1 and RBG0 (1 word) with 12-bit nonreflected pattern name

Plane size: 64x64 cells for each plane

Background color: Black (R=0; G=0; B=0) in 25E3FFFE

Rotation parameter: from 25E3FF00

Sprite data: mixture of palette and RGB modes

Special effect functions: no mosaic, color offset, etc.

Cinepak

Q. Is there anything I should be careful about when using the SCU-DMA to transfer a block of data from the CD to the ring buffer?

A. Occasionally the correct peripheral data is not received when transferring a block of data from the CD to the ring buffer. The accuracy of data transfers can be improved by setting the maximum transfer sector (default is 20) to a smaller number. In doing this, however, you must then call the task function at a fast enough frequency to offset the smaller number. See the example below.

[Example process]

```
CPK_SetTrModeCd (cpk, CPK_TRMODE_SCU);
```

```
/* Transfer using SCU-DMA */
```

```
CPK_SetLoadNum (cpk, 10);
```

```
/* Maximum amount [sector] for one transfer */
```

Also, the bus used by the SCU-DMA for transferring data will be occupied at that time. Therefore, the SH2 will be in a waiting state from the time it tries to access the CPU bus. Do not overuse the SCU-DMA.

TUCKER

THE MYTH



Name anything about Saturn game development and one man will find the documentation and related materials for you fast. Distribution Coordinator, Mike Tucker.

Mostly known as Tucker, he is widely recognized throughout Sega for his powers of recall, Quake supremacy, and a biting wit that leaves few straight-faced. He also spares no expense on a good Dominican cigar, although lunch provided by the local AM/PM is another matter.

A Cal man all the way, Tucker graduated from Berkeley in 1992 with a bachelor's degree in statistics. Tucker eventually found his way to Sega in 1994 as a temp in DTS and was soon recognized as the person to be in charge of the volumes of information being released for Saturn.

The distribution of key discs and peripheral information also falls in his domain as well as the PDF migration and web implementation. Tucker has seen this area of DTS change the most dramatically in means of technology. "When I started, docs were just duplicated on an old blown-out copier, today we have three modes of distribution; paper, CD-ROM and the Web."

On his off hours, Tucker can be found on the links or basketball or tennis courts. Being a stats major makes him a rabid sports fan and a killer adversary in any sports trivia contest.

Tucker prior to jumping out of a plane - he survived. This is not an obituary.





THE LATEST IN SEGA SATURN DEVELOPMENT

SOFTWARE AND TOOLS



CD - SEGA DTS NOV. '96 CD

W - SEGA DTS WEBSITE

dts - Contact SEGA DTS - e-mail dts@sega.com

V - Contact vendor directly for information about product. Details on where to call are listed.

SOFTWARE

W/CD SS-SDK 1.00
Sega Saturn Software Development Kit—Final Japanese Version for Win '95: includes SGL CD.0 Library & Sample Programs that are updates to SGL 2.10A, Windows95 Graphic Tools, and Windows95 Graphic Tool Converter for SGI.

W/CD SGL 2.10A
Sega 3D Game Library, a high-level GNU C-based library targeted for 3D game application development.

W/CD SBL 6.0 & Updates
Saturn Basic Library, a low-level library which can be applied to many uses—updates are for the Scroll and Sound Libraries.

W/CD PROGRAMMING EXAMPLES
Demonstration code includes new SGL flying saucer demo, DevCon '96 examples, Backup RAM, Dual CPU, GFS (General File System), and Peripheral sample code.

W/CD SOUND SPECIFIC CODE DEMOS
A collection of examples for the programming box, tool demos for the sound box, and soon the MIDI compatible CartDev.

TOOLS

W/CD GNUTOOLS - SOA960904
Sega provides a standard GNU C compiler that has been modified from the Cygnus release to work with the Saturn's SH-2 CPUs— read the GCC.LOG & FAQ.LOG which include details on known bugs, problems that have been fixed, and lists changes made in the current and previous SOA GCC releases. Also includes the source and IRIX5 executables.

dts/V SNASM2 Ver. 2.1D
Development software by Cross Products; assembler/linker and debugger. Contact Cross Products at +44 113-242-6163 or e-mail sales@crossprod.co.uk, <http://www.crossprod.co.uk>.

V PSY-Q
Development software by Psy-Q Dev. Systems. Contact Psy-Q Sales at +44 (0)151-282-3000 or e-mail psyq@psygnosis.co.uk.

dts Hitachi Development software; C compiler, assembler and debugger.

V TrueMotion 3.5
A set of compression tools, run-time decompression libraries and sample playback applications for video, graphics & audio. TrueMotion files can be compressed for 16 or 24bit playback as well as 16bit with alpha channel (sprites w/transparency).
Contact The Duck Corp. at 212-941-DUCK

dts Cinepak Library 1.21 and Tools
An asymmetrical intraframe codec supporting up to 16bit video.

W/CD VCD
Virtual CD tools & demos used in conjunction with a Virtual CD Emulation Board or Mirage to emulate a Saturn CD-ROM without actually placing one in the CD drive. Included are tips about basic VCD usage, demos for using VCD with CartDev, and examples for Third Party & Sega Brand developers.

W/CD BGCON 1.6
2D Background Converter that can read picture files created by common graphics programs, manipulate and write them in a number of Saturn-specific formats.

W/CD CF.EXE & ROF2BIN.EXE
Converters for binary data to s28 files and Hitachi Sysrof files to binary, respectively.

W/CD DSPASM & DSPSIM Ver. 2.00 & 2.11 respectively. SCU DSP assembler & simulator.

W/CD HSI_TL
For development of CartDev Tools.

PC ART TOOLS

dts GAMUT-SG 1.21 (Downloader/Converter by Animetix for Autodesk 3D Studio ver. 4.0. - Contact Adam Walters at 604-608-1941 or e-mail adamw@animetix.com, <http://www.animetix.com>)

V InterChange 4.0 (3D conversion tool by Syndesis available for Windows and now the SGI IRIX. Contact Kim Shuppe at 414-674-5200 or e-mail kshuppe@threedee.com, <http://www.threedee.com>)

SGI ART TOOLS

V Softimage 3D Design Toolkit: includes Softimage 3D (SGI 3.5 or available now for NT 3.51) & Saturn Export & Viewer (The just released Softimage 3D for NT has the same features as the SGI version. Updated Saturn Tools are available for both. Contact Gary Horstkorta at 510-803-2300 or e-mail garyho@microsoft.com, <http://www.softimage.com>)

V Saturn Express 3.0 (Downloader/Converter by Nichimen Graphics for N World ver. 3.0. Contact Bill Clark at 303-693-8999 or e-mail bclark@nichimen.com, <http://www.nichimen.com>)

V Wire to Sega GL Converter (Created by Alias|Wavefront for PowerAnimator V7.5. Contact Alias|Wavefront at 800-447-2542 or e-mail info@aw.sgi.com, <http://www.aw.sgi.com>)

V General Games Tools (Plug-ins created by Alias|Wavefront for PowerAnimator V7.5. Contact Alias|Wavefront at 800-447-2542 or e-mail info@aw.sgi.com, <http://www.aw.sgi.com>)

OTHER TOOLS

W/CD Sega Macintosh Art Tools
These tools consist of downloaders, converters, editors, and PhotoShop plug-ins.
3DEditor 1.72US
MapEditor 1.81E
ScreenEditor 1.07E
QuickViewer 3.17US
Sega2DViewer 1.0US
SegaConverter 4.83E
SegaPainter 1.11US
SpriteEditor1.36US
PhotoShop Plug-Ins (6 plug-ins)

W/CD Sega Sound Tools & Converters
The four main development tools used for Sound Design on the Saturn.
Sound Simulator 3.01
Tone Editor 2.07
Wave Editor 1.13
DSP Linker 2.0
AIFF to RedBook 1.00

W/CD ADPCM Encoder 1.00
A tool for producing ADPCM data that is compatible with the Sega Basic Library's (SBL 6.0) ADPCM Playback Library.

dts/V QSound
Interactive Real Time Virtual Audio—QSound Labs has a family of tools all designed to implement QSound's patented algorithms into your application. Contact QSound Labs at 403-291-2492, <http://www.qsound.ca>.

dts Ysound
3D Sound DSP tools.
eLinker

W/CD Sega General MIDI and FM Sound Tone Libraries

W/dts InVision Tone Library

DOCUMENTATION

Listed below is the complete set of Saturn documentation as of October 11, 1996. If you wish to order a complete set of Saturn documentation, contact us by e-mail or fax us your request. **DTS e-mail: dts@sega.com / Fax: (415) 802-1717**

The documents listed below are available on both the DTS WWW Environment and the November DTS CD.

Document Name	Document #
SATURN PROGRAMMING MANUAL VOL. 1	
Saturn Introduction Manual	ST-155-062094
Sega of America-Introduction to Saturn Game Development	13-Apr-94
Saturn Overview Manual(temporary version 1)	ST-103-R1-040194
SCU User's Manual	ST-097-R5-072694
SCU Final Specifications: Precautions	ST-210-110194
SMPC User's Manual.....	ST-169-R1-072694
SMPC Sample Program User's Manual.....	ST-214-111594
Saturn SCSP User's Manual	ST-077-R2-052594
SEGA Saturn Dual CPU User's Guide	ST-202-R1-120994
SATURN PROGRAMMING MANUAL VOL. 2	
VDP1 User's Manual.....	ST-013-R3-061694
VDP1 User's Manual Supplement	ST-013-SP1-052794
VDP2 User's Manual.....	ST-058-R2-060194
SATURN DEVELOPMENT TOOLS MANUAL	
Sega Saturn Software Development Standards	ST-151-R3-082295
Boot ROM User's Manual	ST-079B-R3-011895
Disc Format Standard Specifications Ver.1.0.....	ST-040-R4-051795
Backup System Production Standard	ST-203-100494
SATURN Demo - Demo File Loader Specifications Ver. 1.20	ST-250-R1-031296
SCU DSP Assembler User's Manual	ST-240-A-042795
SCU DSP Assembler User's Manual Addendum	ST-240-A-SP1-052295
SCU DSP Simulator User's Manual	ST-240-B-042795
SCU DSP Simulator User's Manual Addendum	ST-240-B-SP1-052295
CD Development Tool Description File	ST-211-110494
Virtual CD System User's Manual.....	ST-129-R2-093094
Virtual CD Supplementary Manual	ST-129-R2-SP1-061995
Virtual CD System (Release 3) Limitations	ST-182-081294
Write Once CD-R System User's Manual	ST-201-B-092994
SEGA BASIC LIBRARY (SBL)	
Saturn System Library User's Guide ver.1.0	ST-162-R1-092994
System Library User's Manual	ST-162-062094
Program Library User's Guide 1	ST-136-R2-093094
Branching Playback Library User's Manual	ST-136-D-R2-082495
Program Library User's Guide 2	ST-157-R1-092994
Program Library User's Guide 3	ST-135-R4-092295
DLL Library User's Manual	ST-200-092994
External Specification Doc. Saturn Stream System	ST-098-031194
SATURN GRAPHIC LIBRARY (SGL)	
SGL Developer's Manual Tutorial	ST-237-R1-051795
SGL Developer's Manual Reference	ST-238-R1-051795
SATURN GRAPHICS TOOLS MANUAL	
3D Editor1.72US (ReadMe, Release Notes)	SGT-DISK-102795
MapEditor1.81E (ReadMe, Release Notes, Basics)	SGT-DISK-102795
ScreenEditor 1.07E (ReadMe, Release Notes, Basics)	SGT-DISK-102795
QuickViewer 3.17US (ReadMe, Release Notes)	SGT-DISK-102795
Sega2DViewer 1.0US (ReadMe)	SGT-DISK-102795
SegaConverter 4.83E (ReadMe, Release Notes)	SGT-DISK-102795
SegaPainter 1.11US (ReadMe, Animation, Menu, Palette/Color, Tool Palette)	SGT-DISK-102795
SpriteEditor 1.36US (ReadMe, Release Notes, Basics)	SGT-DISK-102795
Saturn/32X Graphics References ver. 2.0	ST-124-R1-091394
SATURN SOUND TOOLS MANUAL	
Sound Development Manual ver, 1.1	ST-081-R5-062894
Saturn Sound Simulator Manual	ST-168-R3-011895
Wave Editor User's Manual	ST-099-R1-042594
SCSP Waveform Editor Technical Specifications	ST-067-121593
Tone Editor User's Manual	ST-068-R1-042594
Tone Editor User's Manual Addendum: File Format	ST-235-030795
SCSP/DSP Effect Module Specifications	ST-069-121693
DSP Linker User's Manual	ST-070-R1-031094
dAsms User's Manual	ST-228-R1-030595
Parameter Editor User's Manual	ST-227-R1-030595
Saturn Sound Tools Manual Supplement	ST-198-R1-121594
NEW Saturn Sound Driver Implementation Manual	ST-241-042795
Saturn Sound Driver System Interface Version 3.03	ST-166-R4-012395
Standard MIDI File: Converter Specifications	ST-066-121593
Sound Programming Debugger User's Manual	ST-065-R1-031494
Microcomputing Developing Int. Environment for Macintosh	ST-080-R2-050994
PRELIMINARY SATURN DOCUMENTS	
NEW CD Communication Interface (PAPER ONLY)	ST-162-B-R1-042795
NEW Stream System Library User's Manual (PAPER ONLY)	ST-136-B-R3-052395
NEW Analog Joypad User's Manual version 0.60	ST-277-040596
PRELIMINARY TECHNICAL BULLETINS	
NEW #42 - Cautions on using SMPC	ST-TECH-42
NEW #44 - Shuttle Mouse Data Format version 1.00	ST-TECH-44
NEW #45 - Saturn Keyboard Data Format version 1.00	ST-TECH-45
NEW #46 - Saturn Date Cartridge Manual version 1.00	ST-TECH-46

Saturn Cinepak and Saturn Netlink documentation are also available upon request. Please contact DTS for more information.

Status Check

In order to serve you better and refine our existing databases, we need to stay informed of any changes with our developers that may affect the distribution of material from DTS. Please take a moment to fill out the information below and mail or fax it to Sega @ (415) 802-1717, or e-mail us at <dts@sega.com>.

Company _____

E-mail address _____

URL _____

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Title changes of personnel who receive the newsletter.



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