

Host machine for development (NEWS/DOS): DEC-LPx466d2  
Hardware tool model No.: DTL-H200  
Software tool model NO.: DTL-S220

Subject: About Use of Polygons and Material Editor

I am checking object data, which were prepared for testing, to make preparations for full-fledged program development. In doing so, I encountered many problems. So, please give me your kind advice.

#### 1. About Use of Polygons

I am trying to find the most efficient way of using polygons to prepare objects. I am worried because the front and rear relations of polygons go wrong when displayed using the Z Sort. I want to put an object of a character on the ground surface made of polygons. If the ground surface is made from relatively large polygons, the ground surface, which should be located under the foot of the character, is seen to the front depending on the view angle. (The foot are buried under the ground.) Perhaps, this is a phenomenon which takes place because the front and rear relations of polygons as seen from the view point are judged from the center of three vortexes when data are Z-sorted. The problem may be solved if the ground surface is divided into smaller polygons, or if the character is floated above the ground. Is not there any good method to make the character stand aloof on the ground made of large polygons?

#### 2. About Material Editor

When I try to paste a texture to a polygon using Material Editor, it will not stick if the texture has the same size as the polygon. I can paste a texture properly if it is a little larger than a polygon. In my job, I will have to paste many textures to box-shaped objects so that they may be just fit to the objects. I request you to supply a function which will allow pasting of a texture to a polygon of the same size. I pasted a grid texture to a plane consisting of two triangular polygons, the grid is seen to be distorted depending on the view angle. I pasted two polygons just from above, selecting them at one time. It sometimes happens that the diagonal line (which divides the plane into two triangular polygons) of the plane clearly shows that the texture is a little put aside. Each time I paste a similar texture to a plural number of planes using Material Editor, I have to read TIM data into VRAM. For instance, I will have to read the same TIME data into VRAM six times if I try to paste the same texture to a plural number of planes. I am much obliged if I have a function which allows repetitive use of data read into VRAM. When the format of modeling data is changed from DXF format to RSD format, all the quadrangular polygons are divided into triangular polygons. Then, I cannot use quadrangular polygons. Will you please add a function which converts triangular polygons into quadrangular polygons to the converter, material editor, or modeler?

#### Answer to Question 1:

It is difficult to solve this problem because it is intrinsic to Z Sort. As you pointed out, it is effective to use polygons of the same size, or float the character above the ground surface. Another method is to perform Z-sorting of two OTs separately, and combine them into one before drawing.

1	Character	->	OT1
2	Ground	->	OT2

3 OT2 -> OT 1 (At this time, designate the Z value of OT in OT1.)

Thus, you can draw a character after drawing the entire ground surface.

Answer to Question 2:

A: The function which will just fit a texture to an object seems to be very effective. We will add such a function to a new version.

B: PS-X allows only primary conversion (parallel quadrangle). So, an object looks distorted when it is seen diagonally with respect to a plane.

C: Like A, we will add this function to a new version.

D: The library of the current version does not support quadrangular polygons. We will offer a function for conversion into quadrangular polygons when the library becomes ready for it.

Keywords: Polygon, Z Sort, Material Editor

Host machine for development (NEWS/DOS): DOS

Subject: About Sprites

Question: To display a sprite, I used the function GsSortSprite, and the following message was given by the target:

"ps\_sort\_sprite,bg: z resolution overflow"

In which case does this message appear? The contents of the program are almost similar to the sample program "SPRITE". If I use GsSortFastSprite() instead of GsSortSprite(), a sprite is displayed properly and no message appears.

Answer: This error appears if the value of "pri", which indicates the display preference given as an argument for the GsSortSprite() function, is out of the allowable OT range. If the value of resolution specified by the "length", which is a member of the GsOT structure, is designated as "r", "pri" must be any value between "0" and  $2^r-1$ . No error message is displayed for the GsSortFastSprite() function to assure high speed. (At this time, it is possible that memory near OT is destroyed.)

Keywords: Sprite, GsSortSprite(), GsSortFastSprite()

Host machine for development (NEWS/DOS): PAC/AT compatible (DOS6/V)

Hardware tool model No.: NTL-H500/H500C

Software tool model No.: DTL-S560/S510B

Subject: About Quadrangular Polygons

Question 1: It is impossible to display data for quadrangular polygons. Why are they displayed if each quadrangle is divided into two triangles? If there is any method which enables quadrangular polygons, please teach it to me.

Question 2: I cannot display polygons for two or more object. Something seems to be wrong with the data output by RSDLINK. Is it necessary to do something special?

Question 3: I want to use trigonometric functions. No document describes them in detail. Please teach me how to use them.

Answer 1: About Quadrangular Polygons You will find a sample in \PSX\sample\tuto\tut2.c. The essence is condensed in this portion.

```
draw_poly_F4(ot, x0, x1, x2, x3)
u_long *ot;
SVECTOR *x0, *x1, *x2, *x3 /* Four vertexes of a quadrangle */
{
    POLY_F4 WALL;
    /* Initialization of primitives */
    SetPolyG4(&wall);
    /* Setting of brightness value */
    SetRGB0(&wall, 0xff, 0xff, 0x00);
    /* Designation of coordinates of four points */
    setXY4(&wall, x0->vx, x0->vy, x1->vx, x1->vy,
           x2->vx, x2->vy, x3->vx, x3->vy);
    /* Saving in OT */
    AddPrim(ot, &wall);
    /* Drawing */
    DrawOTag(ot);
}
```

Answer 2: About Polygons in Multiple Objects If you pick multiple files using rsdlink, you can create a TMD format file containing a plural number of objects. To produce a plural number of objects in a program, you have to execute GsSortObject2 for each object. In SPACESHUTTLE, the number of objects is put in a variable "Objnum". Looping is done as many times as the number of objects to display multiple objects. You can download the sample program "SPACESHUTTLE" from BBS.

Answer 3: Reference to Trigonometric Functions

**\*\*8.29 Name rcos**

Syntax rcos(a)

int a;

Explanation

To find cos of the angle (4096-2pai) of PSX format in fixed point notation (4096=1.0)

<Format> a: PSX format (4096=2pai radian)

Return value: (1, 19, 12)

Return value cos(a)

**\*\*8.30 Name rsin**

Syntax rsin(a)

int a;

Explanation

To find sin of the angle (4096-2pai) of PSX format in fixed point notation (4096=1.0)

<Format> a: PSX format (4096=2pai radian)

Return value: (1, 19, 12)

Return value sin(a)

**\*\*8.31** Name ccos

Syntax ccos(a)

int a;

Explanation

To find cos of the angle (4096-2pai) of PSX format in fixed point notation  
(4096=1.0)

<Format> a: PSX format (4096=2pai radian)

Return value: (1, 19, 12)

Return value cos(a)

**\*\*8.32** Name csin

Syntax csin(a)

int a;

Explanation

To find sin of the angle (4096-2pai) of PSX format in fixed point notation  
(4096=1.0)

<Format> a: PSX format (4096=2pai radian)

Return value: (1, 19, 12)

Return value sin(a)

**\*\*8.33** Name cln

Syntax cln(a)

int a;

Explanation

To find cos of the angle (4096-2pai) of PSX format in fixed point notation  
(4096=1.0)

<Format> a: a:(1, 19, 12)

Return value: (1, 19, 12)

Return value ln(a)

**\*\*8.34** Name csqrt

Syntax csqrt(a)

int a;

Explanation

To find the square root of the fixed point (4096=1.0) in fixed point notation  
(4096=1.0)

<Format> a: (1, 19, 12)

Return value: (1, 19, 12)

Return value sqrt(a)

**\*\*8.35** Name catan

Syntax catan(a)

int a;

Explanation

To find the main values ( $-\pi/2 \dots \pi/2$ ) of arctan of the fixed point (4096=1.0) in PSX format (4096=2 $\pi$ )

<Format> a: (1, 19, 12)

Return value: (1, 19, 12)

Return value atan(a)

Keywords: Polygon, quadrangular polygon, rsdlink, multiple objects, trigonometric functions

Host machine for development (NEWS/DOS): DOS/V(DEC 466LPx)

Hardware tool model NO.: DTL-H500

Hardware tool model No.: DTL-S510B

Subject: About Functions of PS-X

Questions:

1. I hear it is possible to perform fade-in and fade-out using PS-X in 2D mode by changing the color of Ambient. However, I failed to do so. Is there any possible cause? Does use of SetAmibent require setting for the 3D system?

2. Can I use a mosaic function like SFX produced by the company N?

3. I hear there is a library function that allows generation of animation data, which were prepared using Sprite Editor or 3D modeler, in a program. I do not know which function I should use. Please teach me.

4. It is very difficult to download using dbugpsx if there are too many tim files. I request you to allow loading using a batch file. In the previous training course (April 7 and 8), I heard that there were a function that loaded tim files in the program. Which function should I use?

5. Will a function that regenerates animation data for Quick Time Movie be added? Will a similar function for other animation data be provided? Is it the only method for animation to consecutively regenerate still pictures (one still picture was pasted to one polygon) as you did in a demonstration in the previous training course?

6. Is there any problem if the 2D system and 3D system coexist in the same screen as when a plane sprite for POLY\_FT4, BG (with MAP data used), and a polygon cube coexist in a screen at one time. As for allocation of ot, is there no problem if SortObject and AddPrim coexists within one routine?

Answers

(1) If you enter:

```
SPRT P;  
SetShadeTex(&p, 0);
```

Each pixel inside a polygon is calculated from the pixel value "T" of the correspondent texture pattern, and luminance "L" as follows:

$$P = (T * L) / 128$$

That is the luminance value of the texture pattern is drawn when  $L = 128$ .

Namely,

r0, g0, b0	Texture pattern	Actual luminance values
00,00,00	aa,bb,cc	00,00,00 (black)
80,80,80	aa,bb,cc	aa,bb,cc (Original color)
ff,ff,ff	aa,bb,cc	aa*2,bb*2,cc*2 (Luminance is increased by two times.)

(2) A mosaic effect cannot be realized by hitting the register as is done in SFX. However, it is relatively easy to create a pseudo-mosaic by changing (u, v) of a primitive.

(3) See the sample program "\psx\sample\playtod".

(4) As we announced in BBS, you will find a sample program which utilizes "PCopen" in LIBSN.LIB. Referring to this, please write a program suited to your purpose.

(5) In PSX, animation is realized using a high speed animation decoder. This animation decoder does not support the format of Quick Time Movie. Therefore, there is no such function, which develops and displays data from Quick Time Movie, in the function group available as standard. You may use either of the following two methods to display Quick Time Movie data:

- 1) To create a function which allows a program to decode Quick Time data code using the CPU power in the computer
- 2) To use Quick Time data after converting them to the format of PS-X In reality, the converter for the method 2) is likely to support this. So, it is advisable to use it.

(6) There is no problem. We are developing a sample program.

Keywords: Fade-in, fade-out, mosaic, PCopen(), animation, SortObject()

Host machine for development (NEWS/DOS): DOS

Hardware tool model No.: DTL-H500

Software tool model No.: DTL-S560

Subject: About Use of LibGS

Questions: When I asked a question on April 21, I did not know I can use a question form like this. Very sorry for your trouble. Now, I will ask you a question using the specified form. LibGS contains two types of similar functions and structures like GsDOBJ and GsDOBJ2. How should I use them? (Apart from the question, I found the following misprinting in a text explaining

GsDOB:

MATRIX lsmatrix --> MATRIX lwmatrix

MATRIX lighthm --> MATRIX lightm

Answers

Thank you for correcting misprinting. There are two major differences between GsDOBJ and GsDOBJ2: difference in parameter interface, and whether or not a matrix can be seen by the programmer. In GsDOBJ, the parameters "rotation", "scale", and "translation", which are called RST type parameters are given to an object. These parameters are converted into matrix by LIBGS for calculation. The advantage of this method is that "it can be known by intuition, and is more easier than to give matrices". There is drawback that the method is inflexible because the process of conversion into matrices is not unique. In LIBGS, the order of rotation is only YXZ, but there exist some other combinations such as xyz and zxy. GsDOBJ2 is intended for a programmer who wants to manipulate matrices directly. GsDOBJ2 runs high speed because matrices are directly entered, and it has no ambiguity mentioned above. However, matrices are used for interface. So, it has the drawback that it is difficult to know it by intuition. The sample SPACESHUTTLE uses GsDOBJ2. You can use it for reference.

Keywords: LibGS, GsDOBJ, GsDOBJ

Host machine for development (NEWS/DOS): PC/AT compatible (PC-DOS Ver6.1/V)

Hardware tool model No.: DTL-H500/H500C Software tool model No.: DTL-S560/S510B

Subject: About Display of Polygons and Quadrangular Polygons

Questions:

Q1 Sprite data (TIM format) for 8-bit CLUT are not displayed normally. I cannot display pat8.tim using the sample program. I do not know what to do. There may be something wrong with compiling or linking on my part. If you will kindly supply main.cpe and main.sym, I will make researches by myself.

Q2 I cannot display a model using quadrangular polygons in a file of TMD format. I use the GsSortObject function, referring to the sample program for scube.

Answers:

Q1 GsSortSprite() is likely to have a bug. A corrected version will be distributed in May. Please use GsSortFastSprite() for the time being. I understand you were a little worried about the SCSI I/F board. Is it operating normally?

Q2 In TMD PRIMITIVE, drawing is executed after processing by GsSortObj/GssortSprite, etc., which are the functions in libgs, and conversion into libgpu primitives.

TMD PRIMITIVE -> GsSortObj -> libgpu primitive -> Drawing device

The currently available GsSortObj cannot convert TMD primitives in which quadrangular polygons coexist. A new function will be added in minor version upgrading. Please wait for some time.

Keywords: Sprite, polygon, TIM, GsSortObject()

Host machine for development (NEWS/DOS): NWS-3720/DECpc\_LPx 466d2  
Hardware tool model No.: DTL-H200  
Software tool model No.: DTL-S560update2

Subject: About LIBGTE Library

Questions: Concerning the use of flags attached to the Rot type library, "\DOC\LIBgteABSTRUCT.TXT attached to DTL-S560 update 2 tells me, "For the meanings and usage of flags, refer to Clipping Guide." In cannot see the meaning because I can find "Clipping Guide" nowhere. I am preparing a routine which performs 3D processing using RotTranPers. Unless I have a system that checks points out of the view area before transparent conversion and reports such points as requiring clipping, I cannot construct a normal screen. Currently, I am performing rotation conversion using RotTrans for a substitute.

Answers: Information on whether or not vertexes have exceeded a certain area containing the view area is returned to the flag. This enables deletion on a polygon basis, but it does not allow precise clipping to enable drawing of a polygon display area only. We are currently developing a library and clipping guide for precise clipping. Please wait for some time. The meanings of flag bits that can be used for coarse clipping are as follows:

MSB	LSB
31-----17---14-13-----0	

Y-coordinate after transparent conversion has exceeded  $-2^{10}, 2^{10}$ .

X-coordinate after transparent conversion has exceeded  $-2^{10}, 2^{10}$ .

Z coordinate after transparent conversion has become small than  $h/2$ .

Where, h is the distance from the view point to the screen.

Keywords: LibGTE, RotTranPers()

Host machine for development (NEWS/DOS): IBM PS/V2410 NWC  
Hardware tool model No.: DTL-H500Software tool model No.: DTL-S560

Subject: About Number of Colors in 15-Bit BG Display

Questions: When I load 15-bit TIM data to VRAM, and display them as BG, the number of colors seems to be reduced. BG looks as if 8-bit RGN were displayed as 3-bit, 3-bit, 2bit. Is this ascribable to the specification, or is it a problem that can be solved by updating of the library?

Answers: In the current target, R, G, B are reduced to 3 bits, 3 bits, 2 bits. Only when the ambient color is designated as 0x80, 0x80, 0x80, the data are displayed in 16 bits. This problem will be solved in updating of the 7/M hardware.



Keywords: TIM, 15 bits, BG

Host machine for development (NEWS/DOS): IBM PS/V410 NWC

Hardware tool model No.: DTL-h500 Software tool model No.: DTL-S560

Subject: About Detailed Specification of Sound Data

Questions: Please explain the specification of sound data sampling rate and number of quantization bits handled by PS-X. According to the document, the sampling rate is 4-bit ADPCM. Is it variable?

I hear the an AIFF converter is attached to Sound Tool. To what degree, is the AIFF specification, including loop setting for individual tones, supported?

I hear that ATRAC compression for MD is used. If 44.1KHz linear 16-bit for CD is compressed to about 1/5, the length of about 0.5 second can be assigned to one tone if it is loaded to 2Mbyte main memory to make the best use of the specification which assures 256 tones per file. Even if loops are successfully built into each tone, it will be difficult to create a decent music piece. It is a great pity because sound quality is fairly high because it is MD level. If main memory has only 2 M-bytes, is it not possible to enable selection of 22KHz and 11KHz as sampling rate, and reduce the number of bits?

Answers: (Please explain the specification of sound data sampling rate and number of quantization bits handled by PS-X.)

In PS-X, 16-bit sound data with the sampling rate of 44.1kHz are compressed to 4-bit ADPCM are stored in local memory. Regeneration is performed as 4-bit ADPCM is expanded to 16-bit data real time. Twenty-four tones can be regenerated at one time, and pitch conversion (pitch change) and envelope modification of each waveform can be performed freely.

(According to the document, the sampling rate is 4-bit ADPCM. Is it variable?)  
Using the function of pitch conversion, sound sampled at any other frequency (5, 11, 22, 32, 48kHz, etc.) than 44.1kHz can be reproduced for the original pitches. (Naturally, sound sampled at 22kHz is reproduced at 44.1kHz, the sound quality will be 22kHz.)

(I hear the an AIFF converter is attached to Sound Tool. To what degree, is the AIFF specification, including loop setting for individual tones, supported?)  
It supports the setting of loops utilizing sampling frequency and marker. Fundamentally, wave editing is performed using any existing tool (Sound Designer II, Alchemy, etc.), you will have to convert the results edited using the sampling tool.

(I hear that ATRAC compression.....and reduce the number of bits?)  
We do not have a plan to employ ATRAC compression for PS-X. As mentioned above, it is possible to change the sampling rate. You can save the memory area by changing the rate depending on the sound to be sampled. However, the memory area cannot be saved by 8-bit data sampling (in which data are handled as 16-bit data) because the number of bits is fixed at 16 bits (4 bits after conversion) because of the restrictions ADPCM has. Surely, 512kB (equivalent to 16bit approximately 1.8 M-bytes) of data may need only 20

seconds even in monaural. Considering the fact that the waveform memory size for the commonly used MIDI sound source is several M-bytes, a fairly rich sound source can be constructed compared with the existing game software.

Keywords: Sound data, sampling, ADPCM

Host machine for development (NEWS/DOS): DOS

Hardware tool model No.: DTL-H500 Software tool model No.: DTL-S560

Subject: About Clipping

Questions: I want some explanation about NearClip. When I set relations of the view point, I determine the view point position first, then determines the distance to the screen, and the position of NearClip. I think it is meaningless unless the position of NearClip is farther than the position of the screen. The sample program for SPACESHUTTLE designates:

Position of view point	-2000
Position of screen	1000 from view point
NearClip	100 from view point

I understand that NearClip cuts things in front of the screen. Am I wrong? When I try to display a large polygon, it is clipped for items other than Near and Far. It seems to me that the top, bottom, right, and left are clipped. Can I see on which position clipping is done?

Answers: In three dimensions, the screen is placed at a relatively remote place. If all the things existing at the front of the screen are cut, most of the things at a short distance are cut. Near Clip is set in terms of the distance from the view point, and it is not a distance from the screen. Generally, a value equivalent to one half of the projection is set. If the X and Y coordinates of, at least, one of the vertexes of a polygons goes out of the range between -1024 and 1024 on the screen coordinate system, the polygon will be clipped.

Keywords: Clipping, NearClip

Host machine for development (NEWS/DOS): IBM PS/V2420 NWC

Hardware tool model No.: DTL-H500 Software tool model No.: DTL-S560

Subject: About Sound Functions

Questions: Thank you very much for your answers. I read the document concerning the VAB data format and SEQ, and there arose the following questions. Please answer them.

1. I understand that VAB data allows multi-sampling. Does it mean that splitting of 16 VAG data per program is done using min and max (minimum and maximum note limits) on the VAG Attribute Table to realize a drum set? Then, what meaning does Bank Change in program change and control change in SEQ have? What in VAG data is changed by these MIDI status data?

2. The VAB data format does not include any item used to set a MIDI channel. Are sixteen programs correspondent to sixteen channels of MIDI?

3. I understand that SEQ supports resolution of SMF. Is there no limit? If resolution is increased, is not the performance of the entire machine adversely affected by frequent interruption?

Answers:

1. Multi-sampling becomes possible upon setting of note limits as you say. Program change in SMF means which program should be assigned to a logical track in MIDI. In a sound system, the program is switched over as it is. Bank change in control change switches the bank (VAB). The PS-X sound system allows simultaneous use of multiple banks (VAB). Definition (open) of multiple banks before playing a musical piece will enable simultaneous use.

2. VAB is a sound set having attributes. It is possible to utilize the same bank (VAB) from multiple SEQs (sequences). So, MIDI channels should be set in SMF (SEQ). The channels 1 through 16 of MIDI are set to VAB 0 through 15 by default. However, it is recommended to set them explicitly using program change at the start of SMF.

3. It is possible to operate the S-X sound system in cycles of 1/60 second and 1/240 cycle. This allows switching of the sound system upon starting. For instance, even if data with the resolution of 480 are created using Performer, it must be quantized to 1/240 seconds on replying. So, this does not affect the performance of the entire machine.

Keywords: Sound, VAB, SEQ

Host machine for development (NEWS/DOS): DECpc LPx 486d2 (DOS)

Hardware tool model No.: DTL-H500

Software tool model No.: DTL-S510

Subject: About Order of Drawing of Ordering Tables Using LIBGS

Questions: I have a question about the order of drawing of ordering tables (OTs) on the LIBS library for the PSX system. The manual for the LIBGPU library describes that OTs are drawn in the due order starting with the index No. 0. However, GsDraw0t() in LIBGS draws the index No. 0 lastly. I can find no comments on this anywhere. Is it due to the specification? Considering the imaginary Z value transferred to a GsSort function, the order of drawing is not likely to be changed in future. Please make correct information open to the public.

Answers:

0 index start	0 index end
LIBGS	LIBGPU

As seen from the above table, LIBGS does not support OT in the 0 index start. If OT is to be used by LIBGS and LIBGPU in common, OT must be initialized using the reverse direction OT described on page 53 of Library Reference Manual VOL 1.

Keywords: LIBGS, ordering table

Host machine for development (NEWS/DOS): DOS/V  
Hardware tool model No.: DTL-H200Software tool model No.: DTL-S510B

Subject: About Abnormal Operation of Program

Questions: If the program described below is executed, linking with the target box is restored even if I do nothing. If I run another program after that, a bus error occurs whenever PadInit(0); is encountered. (An example is Sprite provided in a sample.) The following program was originally much longer. In this program, a bus error occurred when PadInit(); was encountered. I suspected the coding, and made the program short. I made researches, but operation went wrong. Will you please teach me a cause?

Answers: If PadInit() was executed, it is necessary to execute PadStop(); before terminating the program. Enter "PadStop()" before "exit(0);". The following is the sample of change:\*\*\*

Host machine for development (NEWS/DOS): IBM PS/V2410 NWC  
Hardware tool model No.: DTL-H500Software tool model No.: DTL-S560

Subject: About Animation Replay Time in PS-X

Questions: When I asked you questions about the specification of animation in PS-X, your answer was as follows: CD-ROM can read data at a speed of 300 kB/sec. Therefore, the data size per frame is:  
10kB/frame in replay at 30 frames per second  
20kB/frame in replay at 16 frames per second

If data are compressed to 150 kB/sec., sacrificing the picture quality, I suppose that reading from the double-speed CD-ROM drive will be complicated. To what degree, can the CD-ROM drive in PS-X follow up with low speed reading? A software program we are currently developing will use many animations. Therefore, the short replay time will be fatal to animations at 300Kb/sec. If I give preference to replay time rather than picture quality, will you please teach me how long replay can be performed?

Answers: The PS-X CDROM data can select either of the following two transfer speeds:

Mode	Transfer speed	Total replay time
Fixed speed	150 kB/sec.	74 sec.
Double speed	300 kB/sec.	37 sec.

In fixed speed mode, data can be read at a speed of 150 kB/sec. Therefore, data size per frame is:

5 kB/frame when animation is replayed at 30 frames per second  
10 kB/frame when animation is replayed at 16 frames per second

Keywords: CD-ROM, animation replay

Host machine for development (NEWS/DOS): DOS  
Hardware tool model No.: DTL-J500Software tool model No.: DTL-S560

Subject: Display of Inverted Sprites

Questions: Using the function of LIBGPU level, I want to display sprites inverted in the horizontal and vertical directions, but I cannot to so using primitive SPRT. If I use POLY\_FT4, I can do so. However, it requires too great overhead in designation of parameters and execution. I think it will be hardly possible to store inverted data in memory because of the limited memory size. It will be easy to display inverted sprites at a high speed considering the function of PS-X. What should I do?

Answers: To our regret, only POLY\_FT4 allows vertical and horizontal inversion of sprites. Even if GPU is equipped with such a function, it will be meaningless because execution time will be doubled due to the architecture of GPU. To conclude, GPU has no command packet which designates horizontal inversion. It is unavoidable that overhead will be great. If possible you may consider storing of inverted data in the texture area. We think there is a sufficient area in comparison with the conventional products.

Keywords: Sprite, inverted display, libGPU

Host machine for development (NEWS/DOS): DOS

Hardware tool model No.: DTL-H500

Software tool model No.: DTL-S560

Subject: About Matrix Operation

Questions: If the following is designated to RotMatrix in the gte library:

```
SVECTOR R ;  
MATRIX M ;  
InitGeom () ;  
...  
r.vx = v.vy = r.vz = 0  
RotMatrix (&r, &m) ;
```

Then, the following is returned as elements of m"

```
[4094][0][0]  
[0][4094][0]  
[0][0][4094]  
Should not this be corrected as follows?  
[4096][0][0]  
[0][4096][0]  
[0][0][4096]
```

If "4094" is correct, why? GsWSMATRIX, which seems to be a conversion MATRIX from WORLD to SCREEN, also contains 4094. An error with respect to the value designated by RVIEW is found in "trans".

Answers: Because PSX is a machine with the finite word length, all the numerical functions have errors. RotMatrix has error in all the angles. 0 degree and 90 degrees are not exceptions. It seems to me that what you are emphasizing is "There is an error in 0 degree, which should has no fractions,

and you cannot stand it." We treat all the angles evenly. So, 0 degree also includes an error to the same degree. I will explain the process which produces errors. However, it is not the sole cause for errors. The fundamental reason for error lies in finite word length. RotMatrix is calculated using sin and cos functions. The sin cos functions for PSX are calculated from the sin table for a range between 0 degree and a value (1023) immediately before 90 degrees. To find sin and cos functions for any angle out of the range between 0 degree and 90 degrees, a complementary angle, supplementary angle, etc. are used as in:  $\sin(\text{just } 90 \text{ degrees}) = \sin(\text{a value immediately before } 90 \text{ degrees})$  That is,  $\sin(1024) = \sin(1023) = 4095$ . Similarly, cos has an error. When calculations are made from the finite table, an error is produced like other angles unless special processing is performed for the connection. PSX does not perform special processing for the following reasons:

- 1) Any angle has an error because fixed point notation is used. (It is unnecessary that errors for only 0 degree and 90 degrees are zero.)
- 2) Special processing for 0 degree and 90 degrees will impair the entire continuity.
- 3) Processing speed will be reduced. The best way will be to perform programming in such a manner that the program may not be affected by errors.

Keywords: Matrix operation, IIBGTE, RotMatrix()

Host machine for development (NEWS/DOS): NEWS, DOS

Hardware tool model No.: DTL-H500 Software tool model No.: DTL-S560

Subject: About Function VectorNormal and OuterProduct12

Questions: I used VectorNormal and OuterProduct12 provided as library functions for libgte. Depending on values set as arguments, correct values fail to be returned. (Zero vector or folded values are returned.) Mostly, this occurs when the values of vector components are remote from 0. The following is an example:

```
v0.vy = 0x0000;  
v0.vz = 0x0000;
```

```
VectorNormal(&v0, &v1);
```

If v0.vx is changed, the following values are returned:

```
v0.vx = 0xb000 ----> v1.vx = 0x0ffe (Almost normal up to this point)  
v0.vx = 0xc000 ----> v1.vx = 0x1ad4  
v0.vx = 0xd000 ----> v1.vx = 0x214c  
v0.vx = 0xe000 ----> v1.vx = 0x0000  
v0.vx = 0xf000 ----> v1.vx = 0x3dd8
```

There seems to be a bug because the arguments are of VECTOR type. If this is due to the specification, please let me know the range of values that can be entered as arguments. I am performing similar processing. It will be helpful if you kindly let me know functions which can cause a similar phenomenon.

Answers: Very sorry. It is ascribable to the incomplete document.

VectorNormal calculates the sum of the squares of individual components, and divides each component by the square root. When calculating the sum of the squares, overflow can be caused in signed 32-bit integer operation. Therefore, the range of allowable arguments should be as follows:

"Sum of squares of individual components should not exceed  $2^{31}-1$ ."

In a strict sense of the word, it is difficult to check such values. You are requested to divide by a constant if vectors are likely to be large. Arguments in OuterProduct12 are of VECTOR type, but calculations are performed in 16 bits. Therefore, the range of arguments is:

" $-2^{15}$  to  $2^{15}-1$ "

The same applies to OuterProduct0.

Keywords: VectorNormal(), OuterProduct12()

Host machine for development (NEWS/DOS): DOS

Hardware tool model No.: DTL-H500SoftWare tool model No.: DTL-S560

Subject: About Errors in Matrix Operation

Questions: From the document I received from you, I understand why errors are caused even for definite values such as 0 and 4096. The following questions may be related to the above fact. If the view point is extremely brought near to an object, the latter looks as it were moved away temporarily. (It swells and shrinks.) It is imagined that this is due to the result of accumulation of errors in matrix operation, and I understand it cannot be helped. Is not it possible to reduce errors to a certain degree by improving the precision of the sin table? I think the table "rsin\_tbl" is this sin table. Seemingly, the high order two bytes are not used (filled with zeroes). If 12-bit shift is not always necessary for the operation part before transfer to GTE, is not it possible to improve the precision of operation without reducing the processing speed by improving the precision of this table and using the library functions based on it? rsin\_tbl seems to concern data for the range between sin 0 to sin of a value immediately before 90. According to your answer, PSX does not perform special processing for the following reasons:

- 1) Any angle has an error because fixed point notation is used. (It is unnecessary that errors for only 0 degree and 90 degrees are zero.)
- 2) Special processing for 0 degree and 90 degrees will impair the entire continuity.
- 3) Processing speed will be reduced.

If emphasis is placed on 3), is not it all right to have the table contain data for a range between 0 degree and a value immediately before 180 degrees, and increase the table size to 2 K-bytes? Thus, one condition will be eliminated in search of appropriate data, and continuity will be secured for the range between 0 degree and a value immediately before 180 degrees. From a viewpoint of the user, it is not desirable because the memory area used by OS will be increased. However, I am expecting that the user will be able to select a library in future to give preference to speed or capacity. To be brief, the problem lies in that an object looks as if it were swollen and shrunk. What

should be born in mind to "perform programming in such a manner that the program may not be affected by errors"? I am very much obliged if you kindly show an example.

Answers: The sin bit table uses 16 bits only. If its precision were improved, the precision would be kept high up to the middle point of RotMatrix operation. In a matrix output from RotMatrix, the digits that follow the decimal point are 12 bits. So, all that we could do would be to eliminate the error for the last bit. Swelling and shrinkage would not be corrected even if the precision were improved. The cause for swelling is unknown, but a cause may lie in another function even if it is ascribable to the library. RotMatrix, rsin, and rcos are included with libgte, but they do not use GTE. Therefore, the user can generate a function of the same level. For your reference, we are attaching the source for RotMatrix, sin, and cos. Please perform coding if you are going to place emphasis on computation speed. You should bear in mind the following: "A unit matrix is not a unit matrix."

If you want to know whether two vectors are of one-dimension independence, it is not always substantially independent if the small matrix expression is near 0.

Keywords: Matrix operation

Host machine for development (NEWS/DOS): DOS (QuarterL)

Hardware tool model No.: DTL-H500 Software tool model No.: DTL-S560

Subject: Arguments Having Variable Length and Functions

Question: What should I do to write a function whose array of arguments has a variable length, such as printf()? I cannot reference va\_start() or va\_end() because stdarg.h is not included with the standard library.

Answers: Fundamentally, the method will be to have the first argument bring the number of arrays, and loops will be used to get the arguments. Which address an argument is stored can be known from the result of de-assembly. GNU does this seriously and cleanly. So, there seems to be no problem. If you are pressed in time, you may study the applicable portions of the source code of freeware BSD to get knowledge.

Keywords: Function, arguments with variable length

Host machine for development (NEWS/DOS): DOS

Hardware tool model No.: DTL-H500 Software tool model No.: DTL-S560

Subject: About Heap

Questions: 1. The description of InitHeap() tells that the start of heap can be designated using "head". The description of malloc() tells that heap memory is set to the highest position + 4 in the module. Does this mean that a heap can be set by myself if InitHeap() is used, and heap memory is set to the highest position + 4 in the module by default?

What is the default for SetGraphDebug()? I do not call it because I presume



that the default is 0.

This is not a question, but a report on a bug. If a DXF file contains Japanese code in DXF2RSD, no conversion is performed because the file is construed as binary. When I use Strata Vision, Japanese code is often put into a file. I will be glad if you will make corrections in release of a new version.

Answers:

(1) About Heap Memory

InitHeap() is a function which initializes internal data structure used by malloc(). Therefore, the start of the heap area and its size must be specified before execution. The current version performs automatic execution so that the highest address of the module to the end of the 8Mbyte main memory may be designated as heap although this is not described in the document. There is a possibility that it will be overlaid on a stack, but it was selected as the maximum setting. To override this setting, execute InitHeap(), and define the heap area by yourself.

(2)About SetGraphDebug() The default setting is 0.

Keywords: Heap, InitHeap(), malloc(), SetGraphDebug()

Host machine for development (NEWS/DOS): DOS

Hardware tool model No.: DTL-H200Software tool model NO.: DTL-S

Subject: About Texture

Questions: I want to put textures in VRAM. I cannot put them in a rectangular area (640, 0) - (1023, 511). For instance, I want place a texture in an area (640, 0) - (1023, 1023). Can I paste a texture greater than 256x256?

Answers: The frame buffer controlled and referenced by GPU is a rectangular area (0, 0) - (1023, 511). Therefore, the coordinates (640, 512) - (1023, 1023) do not exist on the frame buffer. Therefore, you cannot specify nothing there. (See page 40 of Reference Manual.) You cannot paste a texture greater than 256x256 because two or more texture pages cannot designated. Not only the area (640, 0) - (1023, 511), but a larger area can be secured if the display area is made smaller. We conjecture that you are using a display/drawing area having the size of 640x640. If so, textures and CLUTs can be put on the area (0, 480) - (639, 511). Thus, you can put 80 16-bit sprites having the size of 16x16, or 320 4-bit sprites of the same size.

Keywords: Texture, VRAM

Host machine for development (NEWS/DOS): DOS

Hardware tool model No.: DTL-H500Software tool model No.: DTL-S560

Subject: About RotAverageNclip4

Questions: I used RotAverageNclip4, but otz does not return a correct value.

"0" is always returned. Please teach me if a correct value is returned, or it is impossible to return a correct value under the circumstances. Recently, it often occurs to me that I am using precious time finding whether a queer phenomenon which takes place is due to a bug created by myself or ascribable to the library. I will be able to save much time if you reveal us bugs, and things which cannot be done although they are described in the manual. (WE have a place for BUG information in BBS.)

Answers: The function of Rot...Nclip type has arguments as in:  
opz=Rot...Nclip(....p,otz,flag)

Due to a bug, the following is used for RotAverageNclip4:

opz=RotAverageNclip4(v0,v1,v2,v3,sxy0,sxy2,sxy2,xsy3,p,dummy,otz,flag)

Please use it as described above.

Keywords: RotAverageNclip4

Host machine for development (NEWS/DOS): DOS

Host machine for development (NEWS/DOS): DOS

Hardware tool model No.: DTL-H500Software tool model No.: DTL-S510

Subject: About Display in Interlace Mode

Questions: Concerning the luster output in 640x640 interlace mode, the odd and even numbers are switched by turns in an interval of 1/60 second. Is it possible to control this from a program. If processing is not finished within 1/60 second, the screen display will flicker. I want to avoid this.

Answers: You cannot control it, or rather, the specification of the NTSC signals does not allow it. If you want prevent the screen display from flickering, you may use 640x240 double buffers in interlace mode.

Keywords: Interlace mode

Host machine for development (NEWS/DOS): DOS

Hardware tool model No.: DTL-H500Software tool model NO.: DTL-S510

Subject: About Root Counter Control Service and Event Control Service

Questions: Can I use root counter control service and event control service in the kernel library (libapi)? I made a try, and found that the value of the root counter was always 0, and that a program, which was developed referring to "Hints on Programming Using Vertical Return Line Triggering" described on page 18 of Library Reference Version 1.0 Vol. 1, stops at WaitEvent().

Answers: As for vertical return lines, the target value is fixed at 1. Because the root counter takes on a value between 0 and target value minus 1, it is a normal behavior that the root counter takes on 0. In connection with stopping

of your sample program, we prepared the following code, and it proved to run normally:       \*\*\*

Keywords: LibAPI, root counter control, event control

Host machine for development (maker/model No.): GATEWAY2000/P5-60  
Hardware tool model No.: DTL-H500Software tool model No.: DTL-S510B

Subject: Questions about Movie

Questions:

1. Is it possible to select resolution? If so, what kinds of resolution can be selected?
2. Is it possible to select the number of colors? If so, how many kinds can I select?
3. What is the number of frames in a second?
4. Is it possible to perform image compression? If so, what method should I use? To what degree is picture quality deteriorated by compression. Is a tool for compression available?
5. When will the movie tool be released?
6. When will the library be supplied?

Answers:

1. A decoded picture is expressed by a set of 16x16 rectangular areas instead of a large board. Combination of such areas assures expression of any shape.
2. You can select the number of colors from 24-bit RGB/16-bit RGB during decoding.
3. The de-freezing rate is 9000 MB/sec. (MB = Macro Block = 16x16 sprite). Therefore, you can select, for instance, the following:  
320x240 (= 300 MB) x 30 frames/sec.  
640x240 (= 600 MB) x 15 frames/sec.

4.5.6 All of them will be distributed soon. (6/M: PC version)

Keywords: Movie

Host machine for development (NEWS/DOS): DOS  
Hardware tool model No.: DTL-H500Software tool model No.: DTL-S510

Subject: About Error in qsort()?

Questions: I made questions about qsort the other day. Thank you for your answers. I verified what you answered. I made tries thereafter. If found an abnormal result is produced if qsort() is executed after dynamically securing a memory area using malloc(). If USE\_HEAP is not commented out, the following will result.

Initial table:

value: 25, ID: 0  
value: 33, ID: 1  
value: 27, ID: 1

Final table:

value: -2, ID: 8

value: 25, ID: 0

value: 27, ID: 2

I heard that setting for heap was needed, but it was out of my mind. The cause for the abnormal result may not lie in qsort(). If you find something, please tell me.

Answers: The currently available qsort() requires "the number of elements of the sorted item - 1" as the second argument. Correctly, it should read as "the number of elements of the sorted item". Correction will be made when the PC/AT board is released around the end of July.

Keywords: qsort

Host machine for development (NEWS/DOS): DOS/V

Hardware tool model No.: DTL-H \_\_\_\_ Software tool model No.: DTL-S \_\_\_\_

Subject: Movement of Rotation Axes by Rot-Related Functions

Question: Problems arose when I was using Rot-related functions, such as RotTransPers and RotAverage4 in libgte. I will explain them using the sample tuto2 ("rotation" and "scale" using the libgte functions). Using this sample, a smooth-gradation polygon displayed on the screen can be rotated and enlarged. If I follow these steps:

(1) To perform Y-axis rotation using the G, and P buttons

(2) To perform X-axis rotation using the E and F buttons.

In the above procedure, the "X-axis" is not affected at all even when Y-axis rotation is performed in (1). Normal X-axis rotation is accomplished by (2). If I follow these steps:

(1) To perform X-axis rotation using the E and F buttons

(2) To perform Y-axis rotation using the G and P buttons

In the above procedure, If I perform X-axis rotation in (1), the "Y-axis" also performs X-axis rotation, and normal Y-axis rotation fails in (2). Why does this occur? Further researches seem that there is axis destroying relations like "X-axis > Y-Axis > Z-axis". That is, - If X-axis rotation is performed, the Y- and X- axes rotate - If Y-axis rotation is performed, the Z-axis rotates but X-axis does not move. - Even if Z-axis rotation is performed, neither X- nor Y-axis rotates. I think that a rotation matrix varies according to the order of rotation of X-, Y-, and Z-axes.

Is the problem ascribable to this? If so, please teach me a method for normal axis rotation. I also ask you to let me know the order of rotation actually employed.

Answers: The rotation matrix generating function RotMatrix in libgte calculates a rotation matrix in the order of:

[X-axis rotation matrix]\*[Y-axis rotation matrix]\*[Z-axis rotation matrix]

If this result is set in GTE and a Rot-related function is executed, the entered coordinate vectors are applied beginning with the right.

[X-axis rotation matrix]\*[Y-axis rotation matrix]\*[Z-axis rotation matrix]\*[Coordinates]

Therefore, the order for RotMatrix is Z, X, and Y from the right. X-axis rotation is not affected by any other rotation because X-axis rotation is performed lastly. However, Y and Z are affected by others. Does "normal rotation" mean that an object rotates around the rotation axes fixed to the screen coordinate system? As far as you employ a method in which the posture of an object (local coordinate system) is held by the rotation angle and rotation is accomplished by the change of the rotation angle, you have to use the rotation matrix mentioned above. Whatever order may be employed, two rotation axes are always affected by the other rotation axis. If the posture of an object is held by the rotation matrix itself, and rotation is accomplished by applying a rotation matrix correspondent to each axis, the object can be rotated around a rotation axis fixed to the screen coordinate system. However, errors will be accumulated in the rotation matrix in an moment, and it will not be a "rotation matrix" any more. Therefore, "normal rotation" is impossible.

Keywords: RotTransPers, RotAverage

Host machine for development (NEWS/DOS): DOS

Hardware tool model No.: DTL-H500 Software tool model No.: DTL-S560S

Subject: About Screen Mode

Questions: I have a question about screen mode for PlayStation. If I set screen mode for PlayStation as follows:

Setting of DispEnv: 512\*240 dots

Setting of DrawEnv: 320\*240 dots

Dust is displayed outside because only 320 dots are drawn. Can I use a method which masks the range outside 320 dots? We are transplanting a function for vertical scroll shooting. So, we want to employ the above settings as a means of reproducing vertically long screen. I understand that such use requires a special technique. However, it greatly concerns the appearance of a game. Please study this problem, and answer my question.

Answers: Sorry for waiting so long. Two methods are conceivable. In the following examples, 128x128 is displayed on a 320x240 screen. These methods have advantages and drawbacks.

1) In the next library, a window can be put within the display area, and limit it to a rectangular area.

320	Black	128
-----	-------	-----

240	Display	128
-----	---------	-----

In this case, the drawing buffer may cover the 128x128 area. However, the non-display portion is displayed in black.

2) You should secure a drawing buffer for 320x240, but the drawing area is limited so that it may be put within 128x128 in actual drawing. The remaining area must be cleared first, or a certain image pattern must be loaded there. At this time, the two buffers must be loaded with the same pattern. In this case, the drawing buffer must have an area for 320x240. However, it is possible to apply a color or paste a still image to the area outside the window.

Keywords: Screen mode, DispEnv, DrawEnv

Host machine for development (maker/model No.): DOS/V (with AIR 486MI Mother Board used)

Subject: (1) About Stack (2) About LIBGTE (3) About Polygons with Textures  
Questions:

(1) About Stack

I think the following question concerns the specification of the compiler.  
Please teach me for which parts the stack is used, and what size does it have.  
If you have any document which shows this, please tell me the name of the document. I think that the stack is set using SYSTEM.CNF upon booting. How should I set it currently? Is it possible to set the stack from an application?

(2) About LIBGTE

May I understand as follows? Of the functions in LIBGTE, only RotTrans uses hardware actually. Others are functions related to coordinate change. All the other calculations are performed by software. I want to know the clear borderline between the parts calculated by hardware and by software.

(3) About Texture with Polygons

When pasting a small texture to a large polygon, it is conceivable to paste two or more textures to the polygon instead of pasting an enlarged texture. Can I do this (without dividing the polygon)?

Answers:

(1) A stack pointer can be set by designating SetSp in a program as described in the manual. The size will be extended upward until it comes to a stop. Normally, a stack pointer is set at the end of main memory. Currently, RUN.EXE sees the contents of DIP switches, and assigns a stack pointer to the end of main memory.

(2) Most of the functions included in libgte use hardware "GTE coprocessor". Exceptions are as follows: rsin, rcos, csin, ccos, cln, csqrt, catan, RotMatrix, RotMatrixC, TransMatrix, ScaleMatrix, Subpol4, Subpol3

(3) Possible if textures of the same patterns are used. This is designated by cutting the texture window. Setting for the texture window is done using PutDrawEnv() or DR\_MODE primitive. If the texture window is designated as (0, 0) - (16, 16), mapping is done as if the (0, 0) - (16, 16) portion (portion T) is repeated.

Keywords: Stack, LibGTE, texture

Host machine for development (NEWS/DOS): DOS/V(DEC 466LPx)  
Hardware tool model No.: DTL-h500 Software tool model No.: DTL-S510B

Subject: About Functions of PS-X

Questions: Please answer the following questions:

### 1. About libgs

In libgpu, it is possible to draw in an area other than the double buffers if a drawing area is changed using PutDrawEnv. What should I do to draw in an area other than the double buffers using libgs? (I want to draw BG using primitives and maps defined using DOBJ.)

2. I calculated the counts from VSync to next VSync using a function related to Vcount. The counts were about 250 counts. I executed SortBG for 320x240 BG using 8x8 cells for 4bitCLUT, the execution of this function (SortBG) needed 128 counts. That means that two BGs of this size are output within 1/60, it will fall out of processing. Similarly, 16x16 cells required about 55 counts. From the results of above experiments, processing cannot be performed if two BGs for 8x8 cells and five BGs for 16x16 cells are rewritten using PSX. I do not think the drawing ability of PSX is so poor. I would like to confirm the correctness of this results by performing approximate collocations. Please provide me with data, if any, on how many PGs can be rewritten in 1/60 second for 8bitCLUT and 16bitDIRECT. (Does it change with the size of cells?) May I understand that BG is a congregation of POLY\_FT4 in libpu? If so, BG (11CEL=8X8, 320X240) will cover  $32 \times 30 = 960$  polygons, and it seems to me that about 2000 polygons per two BGs are likely to match considering the performance. I am sorry that my comments are too lengthy. To be brief, I want to know whether the above is correct or not.

\* I have not received answers to my questions on May 24 and 25. Please take the trouble to answer my questions soon.

Answers:

1. Define using GsDefDispBuff(), draw, and restore.

2. To fill 320x240 with BG using 4bitCLUT, we made changes to the following sample which was used in the previous seminar:

\psx\sample\graphics\intro\tuto3.c The results were four BGs for 8x8 cells, and about 6 BGs for 16x16 cells. As the cell size is reduced, a greater load is applied to processing because a larger primitive list is needed. Speed for textures is higher in the order of 4-bit>8-bit>16-bit. The approximate speed ratio is as follows:

4-bit:8-bit:16-bit = 1:1.5:2

Keywords: BG, LibGS

Host machine for development (maker/model No.): Apple/Centronics 650

Hardware tool model No.: DTL-H700 Software tool model No.: DTL-S710

Subject: About Processing around SPU

Questions:

(1) About Interrupt and Effective Value of Timing in Performance of SEQ Data  
Currently, I understand that interrupts for data interpretation at timing of 1/60 or 1/240 occur. Is processing for "data analysis/sound production" performed at this interruption timing? If these interrupts are used for sound production, sound can only be produced by adjustment at 1/60 (240), and the specification will fail to follow up with the resolution and tempo which are the bases for timing of sound production. If you advise me not to mind it. I judge that the

sound production timer is controlled inside SPU. Is it possible to make resolution and tempo effective freely?

(2) About Data Structure for SEQ

Currently, I am preparing data using DTL-H700 and DTL-S710. A fault in tempo occurs very frequently. (It is not a fault due to inhibition of interrupts or hook, which is dependent on Macintosh.) I do not perform execution on a development target. I cannot trace the reason because data attached as a sample does not include a fault. I think a solution can be given by referring to information utilized for .SEQ. If possible, will you reveal the head information for the first 8 bits in .SEQ data? Please give advice if you happen to know a possible cause that brings about tempo instability.

Answers:

(1) As you conjectured, data analysis and sound production are performed at timing of 1/60 or 1/240. As you know, resolution can be increased to 1/480 for the existing sequencer, but such design has been employed considering that control at 1/60 or 1/240 seemed to be sufficient for PlayStation. More precise interruption control is possible, but the figure 1/60 or 1/240 seems to be appropriate when the balance with graphic processing is considered. The sound production timer is not controlled inside SPU but by CPU (R3000). Waveform processing (DSP functions such as ADSR and reverberation) is performed by SPU only.

(2) The current Sound Artist board driver for Macintosh has trouble in time control, and tempo is instable because of the swaying of interrupts in 1/60 second. SEQ data are preserved using resolution designated by the sequencer. So, there is no problem in replay using a target or machine. Currently, improvements are being made to enable a driver on Macintosh to perform correct replay. Please wait for some time. We registered a bank editor and converter, from which minor bugs have been eliminated, in BBS. Please try it. (In this version, no correction is made to the variation of tempo.)

Keywords: SPU, Sound Artist Tool

Host machine for development (DOS/V): DECpc XL 466d2

Hardware tool model No.: DTL-H500 Software tool model No.: DTL-D5?0

Subject: About Change of Direction of Light Source

Questions: I am creating a polygon display system using LibGte. I do not know how to change the direction vectors for three light sources which are set using SetColorMatrix. If I execute RotMatrix, and SetLightMatrix, the directions of all the three light sources are changed. Please tell me how to control individual light sources.

Answers: SetColorMatrix determines colors of light sources. RotMatrix determines the rotation matrix from the rotation angle. Let us designate the colors of the three light sources as follows:

(LR1, LG1, LB1) (4096 = full color)

(LR2, LG2, LB2)

(LR3, LR3, LR3)

Let us designate the direction vectors for the light sources as follows:



(L11, L12, L13)  
(L21, L22, L23)  
(L31, L32, L33)

For simplicity, let us suppose that all the polygons are fixed to the world coordinate system. If you do not want to change the directions of the light sources, enter the following. Then, the colors and directions of the light sources are set.

```
MATRIX LC;  
MATRIX LL;
```

If you want to change the directions of the three light sources in the similar manner, enter as follows:

```
MATRIX m;  
SVECTOR ang;  
RotMatrix(&ang,&m);  
MulMatrix2(&m,&11);  
SetLightMatrix(&11);
```

If you want to change the direction of only one light source, enter:

```
MATRIXm;
```

If polygons are located on the local coordinate system, multiply 11 matrices described above by the local/world conversion matrix, and execute SetLightMatrix.

```
MulMatrix0(&11,&lw,&11_new);  
SetLightMatrix(&11_new);
```

Be careful because ApplyMatrix and MulMatrix destroy the constant rotation matrix in GTE.

Keywords: Light source, LibGTE, SetColorMatrix, RotMatrix, SetLightMatrix

Host machine for development (NEWS/DOS): DOS (QuarterL)

Hardware tool model No.: DTL-H500 Software tool model No.: DTL-S590

Subject: movie

Questions: I have some questions and requests about Movie newly added to S-590.

1) Will you please distribute a program which reproduces streaming data, which are output from the movie generating tool Movconv, on the target box? I did not find any in CD-ROM. Referring to the sample program, I have created a program which reads all the streaming data on DOS, and transfers a bit stream for each frame to the decode library. If frames are reproduced consecutively, timeout sometimes occurs in DecDCToutSyn(). (MDEC\_OUT\_SYNC TIMEOUT is printed.) I think Development is likely to have such a tool. Please supply it as a sample program.

- 2) MDEC command and VLC header value are set in the MDEC animation sector in the streaming data for "mov.str" included in CD-ROM. What are these data? Is it all right to ignore them in a replay program.
- 3) The sample programs tuto4 and toto7 replay animations. Does the picture quality of a movie for PlayStation have such a level? Block noise is very often generated at the edge. Data encoded using Movconv also contains blocks apparently different in color. Can libpress replay data of GPEG format created by other tool? Do you have any intention to publicize the bit stream format?
- 4) Resolution for the sample movie is 256x167 or 256x160. Is this size recommended to replay fairly clean full motion movie using double-speed CD-ROM? Which level ADPCM should I use for sound? Please let me know the recommended values for setting parameters used for encoding.

Answers:

- 1) An on-memory viewer for STR format is available. Timing from CD-ROM cannot be completely reproduced using the current MSW.\* because it has no CD-ROM, but it is possible to evaluate picture quality.
- 2) The data may be ignored because the original data include the MDEC command for the header, and VLC header.
- 3) To secure portability, animation data of text format are put in the header file in tuto4 and tuto7. there is a problem about picture quality because the compression rate is increased to four to eight times due o the time required for compiling. We are studying to provide a function for replay of data of JPEG format, etc. Each version is controlled using ID in VLC. There is a possibility that changes will be made to the current version because it involves problems about the compression rate and decoding speed. Bit stream data will be made open to the public after such changes.
- 4) The relations between the number of replayed frames and size are as follows: PlayStation uses 16x16 24-bit direct color pictures as bases for processing. This cell is called a macro block. All the pictures are divided into 16x16 macro blocks, compressed into a form called bit stream, and the results of decoding are also output as macro blocks. Animation decoding speed is 9000 macro blocks per second. This is equivalent to decoding of thirty 320x320 pictures per second. That is, 30 frames per second for 320x320 pictures, and 15 frames per second for 540x640 pictures are generated.

Resolution	320x240	640x240	640x480...
Frame/sec.	30	15	7.5...

Either 150 KB/sec. (standard speed) or 300 KB/sec. (double speed) can be selected as transfer rate for CD-ROM. In double speed replay, data equivalent to 30 frames per second can be read from CD-ROM if a bit stream constituting one frame is compressed to 10KB (=300 KB/30) or less, and they are stored in CD-ROM.

Data size	10 KB	20 KB	30 KB
-----------	-------	-------	-------

Frame/sec.      30      15      7.5

The animation replay rate is determined by these two conditions. In double speed replay, you may compress a bit stream constituting one frame (320x240) to 10 KB (= 300 KB/30), and store it in CD-ROM. As far as these conditions are satisfied, you can freely select the number of frames, picture resolution, and compression rate.

Keywords: Movie

Host machine for development (maker/model No.): EPSON/DECpc  
Hardware tool model No.: DTL-H500Software tool model No.: DTL-S560

Subject: About Library

Questions: When will the VsyncCallBack() function be supported? If it is not currently supported, what should I do? I placed the above questions fairly long time ago. Would you please answer them?

Answers: Sorry for having kept you waiting. It has been decided that VsyncCallBack() will not be supported in future. Very sorry that we described it in the manual. No. 3 of the root counter is used for detection of Vsync. So, please use it.

Keywords: VsyncCallBack

Host machine for development (NEWS/DOS): DOS/V  
Hardware tool model No.: DTL-H500Software tool model No.:

Subject: About Gradation Polygons

Questions: I created smooth a shading polygon with colors assigned to individual vertexes (the manual describes gradation polygons without textures) by editing a MAT file in the RSD file using the editor, etc. although it is impossible to do so using Material Editor. I successfully loaded the created RSD file into Material Editor, and displayed correctly. However, if such data are used on a program, they are not displayed correctly. Polygons are displayed as colored polygons (in the same color as that assigned to the first vortex). Is not a gradation polygon on the LIBGS level (using tmd data) supported currently?

Answers: A colored polygon on the TMD level is not supported currently. It will be supported by the version to be released around the end of July. Currently, such a polygon can be displayed if colors are directly designated using GsSortPoly().

Keywords: Gradation polygon, colored polygon

Host machine for development (NEWS/DOS): DOS/V (DELL 466/MVX)  
Hardware tool model No.: DTL-H500Software tool model No.: DTL-S510A

Subject: About GTE Coordinate Conversion

Questions: I am creating a "SUTO" 2 type fighting action game for 2D. Using 320\*240 mode, two characters (64\*120) are displayed on the double-scroll BG2 screen. If the two characters are rotated in the following source using animation data, processing sometimes exceeds 1sync.(This does not occur in double enlargement, but it does occur in rotation only.) Is this caused by the performance of hardware, or will the speed increased by addition to the library? (Is anything wrong with GPU/GTE or library?) This problem is very important to us in determining future specification for program development. Please let us know the details, including the drawing ability of 1sync in PlayStation.

(If you have any means of improvement, please teach us.)

#1      Rotation angle data in animation data  
Scale factor data in animation data  
VECTOR p0,p1,p2,p3 --> Display coordinates

#2      Local vortex coordinates  
Matrix              Rotation angle              (S, Y, Z)  
Parallel translation vector (S, Y, Z)              Scale vector (X, Y, Z)

#3      Matrix setting    #4  
Coordinate conversion by matrix

P.S. The description of TransMatrix (p.180) and ScaleMatrix (p.181) in Library Reference Ver. 1.0 Vol.2 reads that a variable whose input is declared as follows should be used:

VECTOR vec;

In reality, hung-up takes place during execution unless an array-declared variable described below is used:

long vec[3];

Is not it advisable to correct the description (including the description of RotMatrix) of the manual to prevent misunderstanding (if the current method is to be used)?

Answers: We changed vec and sca into VECTOR, but no hung-up took place. In other programs, there arose no problem in the description of VECTOR. In the old library, however, a correct result may not be obtained due to a bug in ScaleMatrix. In case of VECTOR, SVECTOR is no the same as short vec[3] as in long vec[3]. To make the description consistent, we would like to use the term "VECTOR". There may be various causes for a program which is "slow" or "whose performance is lower than expected". One bottleneck is CPU, and another is GPU. In operations of the data you sent to us, we do not think processing will fail in processing because of a problem of GTE. The cause may be a great burden on GPU or CPU, or optimization is not performed using the compiler option. Here are some solutions to the problems related to GPU.

1. To reference a texture area which can improve the cache hitting rate to

some extent because GPU has a cache

2. To shrink a large texture area into a small sprite, or not to perform processing in which 128x128 texture is pasted to fifteen 32x32 sprites. To reference texture areas suitable for the size of displayed sprite/polygon

3. To use 4-bit or 8-bit CLUT mode as much as possible because they assures quicker processing than 16-bit direct transfer. Because CPU has a cache, a program which utilizes many small loops is advantageous.

Keywords: GTE, failure in processing

Host machine for development (maker/model No.): DEC/DECpc466

Hardware tool model No.: DTL-H500 Software tool model No.: DTL-S560

Subject: About DecDCTxxx

Questions:

```
/* tuto7 simplest sample */
/* Replay of background animation (with frame double buffers)*/
/* VLC shall be decoded using the table.*/
/* Copyright (C) by Sony Corporation*/
/* All Rights Reserved */
/* Decode the first VLC. */
DecDCTvlc(StrNext(), dec.vlcbuf[dec.vlcid]);
```

Although the above function is used, I can find no explanation of this function. Please teach me where it is described. The manual reads as DecDCTin(bs,buf,nbs);, but the sample program uses two parameters. Is not the size of the bit stream needed?

Answers: We are very sorry. The version of the manual in hard copy was incorrect. We are attaching a revised version.

DecDCTReset

Purpose: Initialization of image processing subsystem

Syntax: void DecDCTReset(mode)  
int mode;

Argument(s):

mode            Reset mode  
                 0: Total initialization  
                 1: Only processing currently being executed is stopped.

Comments:        This function resets the image subsystem.

Return value:    None

DecDCTvlc

Purpose: To de-freeze VLC  
 Syntax: void DecDCTvlc(bs, runlevel)  
 unsigned long \*bs;  
 unsigned long \*runlevel;

Argument(s): bs Input bit stream  
 runlevel Output run level

Comments: This function decodes the bit stream bs, and generates the run level, which is of the intermediate format, to a level below runlevel. The size of the run level after d-freezing can be obtained using DecDCTBuSize().

Remarks: A block function. Before executing DecDCTin(), the bit stream has to be converted to the run level using DecDCTvlc().

Return value: None

## DecDCTin

Purpose: To transmit the run level to the image processing system  
 Syntax: void DecTin(runlevel, mode)  
 unsigned long \*runlevel  
 int mode;

Argument(s): runlevel Input run level  
 mode Decode mode  
 bit 0 output mode

0	16-bit direct color
1	24-bit direct color
	bit 1 STP
0	STP=0
1	STP=1

Comments: This function d-freezes level below the run level to direct color images. The results are taken out using DecDCTout().  
 24 or 16 bits can be selected as the depth of output pixels. In 16-bit mode, the fifteenth bit in the pixel after d-freezing can be set using bit1 in mode.

Return value: None

Remarks: Information on the width and height of a picture generated by decoding by DecDCTin() is not held in run level or bit stream. These parameters are defined using data format (such as STR format) for the higher hierarchy. To prevent deadlock in transmission and reception, data having the size suitable for the transmitted run level must be always received using DecDCTout(). In this case, data transmitted by one DecDCTin() function may be read using two or more DecDCTout() functions, and vice versa. Because DecDCTin() is a non-block function, completion of actual transmission must be detected by DecDCTinSync() transmission. If the next DecDCTin() function is

executed before completion of execution of DecDCTin(), the next transmission is blocked until the first transmission is completed.

#### DecDCTout

Purpose: To receive decode data from the image processing subsystem

Syntax void DecDCTout(cell, size)

unsigned long \*cell;

int size;

Argument(s): cell Image data after decoding  
size Data size (long word) to be received)

Comments: This function decodes run level, and stores the results for the number of size specified by "size" in area after "cell". The format of decoded data is 24-bit or 16-bit depending on the arguments in DecDCTin().

A value equivalent to or smaller than the size of the total the decoded data must be designated as "size". If a value smaller than the size of the total decoded data is specified, all the remaining data must be read using the next DecDCTout to prevent a deadlock.

Decoded images are output in macro blocks (16x16 rectangular areas). Data size must be designated in terms of macro block size (16x16x2 = 512 bytes = 128 words in 16-bit mode, and 16x16x3 = 378 bytes - 192 words for 24-bit mode).

Return value: None

Remarks: Because DecDTCout() is a non-block function, completion of actual transmission must be detected by DecDCToutSync() transmission. If the next DecDCTout() function is executed before completion of execution of DecDCTout(), the next transmission is blocked until the first transmission is completed.

#### DecDCTinSync

Purpose: To wait for completion of transmission to the image processing system

Syntax: int DecDCTinSync(mode)

int mode;

Argument(s): mode Mode  
0 Blocked until completion  
1 Only the status is reported.

Comments: This function detects the end of the DecDCTin() function.

Return value: Status of image processing system

0: Transmission suspended  
1: Transmission in progress

#### DecDCToutSync

Purpose: To wait for the end of reception by the image processing subsystem

Syntax: int DecDCToutSync(mode)  
int mode;

Argument(s): mode                      Mode  
0    Blocked until completion  
1    Only status is reported.

Comments: This function detects the end of the DecDCTout() function.

Return value: Status of image processing subsystem

0: Reception suspended

1: Reception in progress

#### DecDCTinCallback

Purpose: To set callback which is called on completion of transmission

Syntax: int DedDCTinCallback(func)  
void                      (\*func)()

Argument(s): func                      Address of the callback function

Comments: This function sets the callback func which is called upon completion of transmission. If callback is set, the function func is called on completion of transmission. If 0 is set in func, no callback takes place.

Return value: None

Remarks: Within func, the subsequent transmission end interrupt is masked. Therefore, func should be returned immediately when necessary processing has been done.

#### DecDCToutCallback

Purpose: To set callback which is called upon end of reception

Syntax: int DedDCToutCallback(func)  
void                      (\*func)();

Argument(s): func                      Address of the callback function

Comments: This function sets the callback func which is called upon completion of reception. If callback is set, the function func is called on completion of reception. If 0 is set in func, no callback takes place.

Return value: None

Remarks: Within func, the subsequent reception end interrupt is masked. Therefore, func should be returned immediately when necessary processing



has been done.

#### DecDCTBufSize

Purpose: To acquire the size of run level

Syntax: int DecDCTBufSize(bs)

u\_long \*bs

Argument(s): bs Bit stream

Comments: This function acquires the size of the run level which is generated as intermediate format by decoding the input bit stream bs. It does not perform actual decoding.

Return value Size of run level (long word)

Keywords: DecDCT

Development host machine (NEWS/DOS) : DOS

Tool model used (Hardware) : DTL-H500

Tool model used (Software) : DTL-S560

Question : GsCELL flag

Contents of questionIn new library's GsBG, CELL indication can be inverted. Previously, we have asked you about information (parameter) for setting GsCELL structure's member flag (not covered in the manual). But we have not been answered.

Answer

Shown below is the bit assignment of GsCELL's flag member. This is the same as the CEL file's FLAG field.

HLP : Horizontal inversion

0: Not inverted

1: Inverted

VLP : Vertical inversion

0: Not inverted

1: Inverted

Key words : GsCELL

Development host machine (Manufacturer/model) : DOS/V / PS/V

Tool model used (Hardware) : DTL-H500

Tool model used (Software) : DTL-S510B

Question : Library

Contents of questionFor libgte rot, the return value of flag (for clip) cannot be understood fully. Please send detailed data materials as soon as possible.

Answer

Presented below is the meaning of a flag returned by a rot function. A function for simultaneously calculating vertices provides ORing of the corresponding flags.

MSB31-(30) (29) (28) (27) (26) (25) (24) (23) (18) (17) (16) (15) (14) (13) (11)LSB

- 30- Overflow during calculation ( $\geq 2^{43}$ )
- 29- Overflow during calculation ( $\geq 2^{43}$ )
- 28- Overflow during calculation ( $\geq 2^{43}$ )
- 27- Overflow during calculation ( $\leq -2^{43}$ )
- 26- Overflow during calculation ( $\leq -2^{43}$ )
- 25- Overflow during calculation ( $\leq -2^{43}$ )
- 24- The output value exceeds  $[-2^{15}, 2^{15})$
- 23- The output value exceeds  $[-2^{15}, 2^{15})$
- 22- The output value exceeds  $[-2^{15}, 2^{15})$
- 21- The output value exceeds  $[0, 2^8)$
- 20- The output value exceeds  $[0, 2^8)$
- 19- The output value exceeds  $[0, 2^8)$
- 18- The Z value in the screen coordinate system exceeds  $[0, 2^{16})$
- 17- The Z coordinate value after perspective transformation is smaller than  $h/2$ .
- 16- Overflow during calculation ( $\geq 2^{32}$ )
- 15- Overflow during calculation ( $\leq -2^{32}$ )
- 14- The X coordinate value after perspective transformation exceeds  $[-2^{10}, 2^{10})$
- 13- The Y coordinate value after perspective transformation exceeds  $[-2^{10}, 2^{10})$
- 12- The p value exceeds  $[0, 2^{12})$
- 11-0 Not used

h refers to the range from the visual point to the screen.

Key words : LibGTE, RotTrans

Development host machine (Manufacturer/model) : DEC / DECpc LPx 466d2

Tool model used (Hardware) : DTL-H500

Tool model used (Software) : DTL-S510A

Question : Improper libgte library NormalColorCol

Contents of question

As pointed out in your sample tuto[4-5], the use of NormalColorCol as a library function for light source calculation results in the destruction of part of primitive structure. (The lower code portion is destroyed.)

Primitive{PRIM \*tag ; u char r0, g0 b0, code ;}

For example, if the structure is destroyed for the collective transfer of four bytes by sw, swc2, etc., rebuild all libraries so that the destroyed portions are saved in an empty register. The destruction of a work not covered in the

manual makes it impossible to use the library. Because of the library, a bug whose cause cannot be identified cannot be eliminated. Before rebuilding the library, inform us of the names of all the libraries destroying works, and of the works destroyed, as soon as possible.

Answer

We are sorry that documents are not prepared completely. GTE is provided with a register for holding the GPU packet code. The function for light source calculation and RGB value output provides the top of an RGB value with its GPU packet code. The GPU packet is such that RGB and a code form one word. Thus, the packet's RGBcd portion can be created by programming the memory once. The trouble pointed out is due to the improperly set GPU packet code register in GTE. Set the GPU packet code register properly. For this purpose, set the GPU packet code at the upper eight bits of the elementary color vector for the light source calculation function. The set packet code is copied automatically. If the function has no elementary color vector, use function SetRGBcd().

Name SetRGBcd

Sets the elementary color vector and the GPU code.

Syntax void SetRGBcd(v);  
CVECTOR \*v; /\* input: Color vector GPU code \*/

Explanation

Set the elementary color vector and GPU code v.

<Argument format>v->r, g, b, cd : (0, 8, 0)

Return value None

The following are the functions for copying the GPU packet code:

DpqColorLight	DpqColor	DpqColor3	Intpl
NormalColor	NormalColor3	NormalColorDpq	
NormalColorDpq3	NormalColorCol	NormalColorCol3	
ColorDpq	ColorCol	RotColorDpq	
RotColorDpq3	RotAverageNclipColorDpq3		
RotAverageNclipColorCol3		RotColorMatDpq	
ColorMatDpq	ColorMatCol		

Key words : LibGTE, NormalColorCol

Development host machine (Manufacturer/model) : DEC / DCEpc LPx 466d2

Tool model used (Hardware) : DTL-H500

Tool model used (Software) : DTL-S560

Question : Specification of duplex polygon

Contents of questionA duplex polygon cannot be set properly using the Gs library. The .mat file sets polygon material as follows:

0 2 F T 0 0 0 47 0 47 46 134 -33

Answer

The support of a duplex polygon using the Gs library will be started at the beginning of September.

Key words : LibGS, duplex polygon

Development host machine (Manufacturer/model) : DEC/DECpc Lpx 466d2

Tool model used (Hardware) : DTL-H500

Tool model used (Software) : DTL-S560

Question : Programming

Contents of questionOpenTh() cannot be used, as the method of getting the current global pointer cannot be understood. What should be done to get the global pointer?

Answer

The global pointer can be implemented by getting R3000's gp register values.

Key words : global pointer, OpenTh

Development machine (Manufacturer/model) : Maha posya

Tool model used (Hardware) : DTL-H500

Tool model used (Software) : DTL-S510A

Question : Document of STR format data specifications Contents of question

This question is related to the streaming library document contained in CDROM (Runtime Library Version 1.2) distributed lately. The document of interest is psx\doc\lib\stream\struct.txt resulting from defrosting LHA. The description of the sector header begins on the 97th line. Figure 3 is used to set out the fields. But many of them are not covered in Figure 3. Some fields can be forecasted from the contents. We would like to generate a program on the basis of the information and, thus, need correct data. Please tell us what locations of 32 bytes of the sector header are covered by field names. Field names not covered in Figure 3-

id- type -> StType?- secCount- nSectors- frameCount

Answer

STR format data specifications[Overview]In the PS-X, the processing mode of reading data sequentially from the CD-ROM is referred to as streaming. The STR format on the CD-ROM is defined to implement streaming in the PS-X.

Note: The PSX CD-ROM is based on the CD-ROM XA standard. The STR format is for the user data area in the CD-ROM XA standard. The streaming is used typically for sequentially reproducing animation and voice data. It is not limited to such application. The streaming can be used for all consecutively changed time series data.

[Streaming data]

In the STR format, streaming data is given as a sequential array of FRAME data, as shown in Figure 1. FRAME data is used to express a frame of streaming. The format of FRAME data can be defined by the user at his disposal. For animations, FRAME data corresponds to each picture. For 3D modeling data animations, such data corresponds to a frame of data. FRAME data has its particular type and size, each of which can be set independently. A piece of streaming data has a mixture of FRAME data with various types and sizes. The type and size of FRAME data are covered in type and size fields in FRAME data, respectively.

FRAME data                      FRAME data                      FRAME data                      FRAME data

Figure 1 Streaming data

[FRAME data]

FRAME data is divided further into sectors as units of reading from the CD-ROM (see Figure 2). A sector is composed of 2,048 bytes. The sector has at its top 32 bytes of a sector header for indicating the kind of its data. Thus, the effective data area of a sector is comprised of 2,116 bytes (2,048 - 32). A proper volume of dummy data is added to the end of FRAME data so that its start corresponds to a sector boundary.

Sector header (32 bytes)	Data (2,016 bytes)	
Sector boundary	Sector header (32 bytes)	Data (2,016 bytes)
Sector boundary	Sector header (32 bytes)	Data (2,016 bytes)
Dummy data		

Figure 2 FRAME data[Sector header]

The sector header located at the top of a sector is divided into such fields as are shown in Figure 3. StSTATUS provides an STR format identifier and version information. StTYPE indicates the data type of frame data, referring to the system defined format, when the most significant bit is 1, and to the user defined format, when such bit is 0. The user can incorporate a particular FRAME format into the STR format by setting 0 at the most significant bit and the subsequent 15 bits at his disposal. StSECTOR OFFSET stands for a sector number in the frame, StSECTOR SIZE for the number of sectors forming FRAME, and StFRAME NO for a FRAME number in streaming data. These parameters are used by the streaming library to read FRAME data without damaging a sector. StUSER can be used freely in a user defined field by data type.

32 bytes a b c d e f g

- a) StSTATUS: Sector status (Reserved) -- 2 bytes
- b) StTYPE: Data type                      -- 2 bytes      sSystem defined format, when most significant bit s is 1. User defined format, when most significant bit s is 0.

- c) StSECTOR OFFSET: Sector number of FRAME -- 2 bytes
- d) StSECTOR SIZE: Number of sectors forming FRAME -- 2 bytes
- e) StFRAME NO: FRAME number in streaming data (1 - ) -- 4 bytes
- f) StFRAME SIZE: FRAME size (by long word) -- 4 bytes
- g) StUSER: User defined area -- 16 bytes\* Little endian

Figure 3 Sector header[User defined FRAME data]

The user can stream data by the StTYPE field in the sector header. Some types of data call for grouping attributes common to FRAME as a header. The STR format is expressed as an array of sequential FRAME data shown in Figure 1. Assigning StTYPE parameters to a data array allows header data to be dealt with.

```
StTYPE: 0x0003    header
StTYPE: 0x0002    FRAME 0
StTYPE: 0x0002    FRAME 1
StTYPE: 0x0002    FRAME 3
```

Figure 4 Streaming data]

The example covered in Figure 4 separates the header from other frame data using StTYPE's least significant bit. When reproducing data from the CD-ROM, the application program can access the StTYPE field of read FRAME data freely. This allows free data interpretation selection. The possible data stored in the header is CLUT data (animations) independent of FRAME and a table of jump to FRAME. [System defined FRAME data] Shown below is the currently available format of system defined FRAME data. <MDEC animation (StTYPE: 0x8001)> Figure 4 shows a sector header for an MDEC animation.

32 bytes a b c d e f

Items a) thru f) are explained above.

```
StMOVIE WIDTH: Width      -- 2 bytes
StMOVIE HIGHT: Height     -- 2 bytes
StMOVIE HEADM: MDEC command -- 4 bytes
StMOVIE HEADV: VLC header  -- 4 bytes
```

Figure 4 MDEC animation sector header [Voice]

The voice processed generally by the PS-X has a frequency of 44.1 kHz. Unlike such voice, the voice used during animation reproduction is output from the CD-ROM AD-PCM decoder, as it is. The format of storing such voice is based on the CD-ROM /XA standard. The following are the voice frequencies that can be streamed by the PS-X from the CD-ROM drive:

1. 37.8 kHz: Stereophonic
2. 37.8 kHz: Monophonic
3. 18.9 kHz: Stereophonic
4. 18.9 kHz: Monophonic

The above voice is output via the SPU after it has been decoded by the CD-ROM decoder. For stereophonic 37.8 kHz output as the richest application, the CD-ROM XA always uses one of the four sectors by the standard rate

drive.

Audio Video Video Video

[Sector allocation in CD-ROM XA during video reproduction]

The PS-X uses a double speed drive, covering eight sectors.

Audio Video Video Video Video Video Video Video

[Sector allocation in CD-ROM XA during double speed videoreproduction]

Monophonic reproduction or stereophonic reproduction at a lower frequency uses one of the 16 sectors. Monophonic reproduction at a frequency of 18.9 kHz uses one of the 32 sectors. The rate of the voice sector is not changed even for animation reproduction at 15, 25 and other frames per second. Such rate depends only on the monophonic or stereophonic mode. The library passes read data immediately to the CD-ROM decoder. This means that such effects as velocity cannot be used at a time on the voice. The use at a time calls for reading such effects into the main memory for transfer to the SPU. This does not apply to voice volume setting.

Key word : STR

Development host machine (Manufacturer/model) : Maha posya

Tool model used (Hardware) : DTL-H500

Tool model used (Software) : DTL-S510A

Question : Combination of movie performance and voice data

Contents of question

This question is related to movies. Currently, we investigate into game software using movies. We would like to understand the performance of PlayStation and a method of combining movies with voice data.

1. How many frames can be displayed in a second? This capacity depends on the frame size. Assuming that movie data of 640 x 480 is created, what performance will be available? The transfer rate of the double speed CD drive is 300 k-bytes per second. Thus, 15 sectors of 300 bytes can be transferred in a second. One frame contains 600 k-bytes (640 x 480 x 2) of data. Suppression by JPEG by a factor of 10 leads to 60 k-bytes. Five (300/60=5) frames can be transferred from the CD. This makes it impossible to create smooth movies. Is it impossible to create movies of 640 x 480? Movies of 320 x 240 result in 20 frames per second with one frame containing 15 k-bytes. Is it possible to obtain such performance? Please point out errors of the calculation, if any. While we assume that the rate of suppression is 1/10, please inform us of standard values, if any.

2. How should image and voice data be mixed in streaming data? Currently available movie converter MovConv1.2 converts image data to the corresponding MDEC streaming data. What steps and actions should be taken to add voice data to such streaming data? We shall be much obliged, if

you would kindly answer the above two abstract questions.

Answer

1. Requirements of the number of frames reproduced and sizes can be accommodated flexibly. Streaming of 640 x 480 is not impossible. PlayStation processes 16 x 16 24-bit direct color images as basic units. This cell is referred to as a macro-block. All images are dissolved into 16 x 16 macro-blocks, followed by compression to bit streams. The defrosted results are output as macro-blocks. The highest rate of defrosting animations is 9,000 macro-blocks per second. This means that 30 320 x 240 images are defrosted per second. The rate of defrosting animations is not related to the rate of compression. Naturally, the image resolution is inversely proportional to the number of frames reproduced. 320 x 240 images lead to the reproduction of 30 frames per second and 640 x 240 images to the reproduction of 15 frames of animations per second.

Defrosting speed

Resolution	320 x 240	640 x 240	640 x 480
Frames per second	30	25	7.5

The CD-ROM can select 150 KB/sec. (standard speed) or 300 KB/sec. (double speed) as the transfer rate. During double speed reproduction, 30 frames per second can be read from the CD-ROM by suppressing the bit stream forming a frame under 10 KB (= 300 KB/30) to be recorded into the CD-ROM. Transfer speed

Data size	10 KB	20 KB	30 KB
Frames per second	30	15	7.5

The rate of reproducing animations is determined by these two conditions. For example, during double speed reproduction, the bit streams forming one frame (320 x 240) is suppressed to 10 KB (=300 KB/30) to be recorded into the CD-ROM. If the conditions are fulfilled, the number of frames, the image resolution and the rate of compression can be selected at your disposal.

2. Shown below is the flow of conversion on the PC.

<Encoding only sound>

\*.wav

(Windows voice format --- PCM)

MovConv

\*.xad

(ADPCM format for XA)

<Encoding only pictures>

\*.avi

(Windows movie format)

MovConv

\*.str

(PlayStation movie format)

<Encoding pictures and sound>

\*.avi



(with sound)

MovConv

\*.str

(with sound)

<Mixture of encoded sound and pictures>

\*.xad & \*.str

MovConv

\*.str

(with sound)

Simultaneously handling sound and pictures encounters a problem with synchronization of both. Sound and pictures are to be converted into avi, followed by the application of existing animation editing tools (for example, adobe Premiere). The above description recommends that MovConv be used for all conversion. Other tools may be applied.

Key words : movie, streaming

Development host machine (DOS/V) : DECpc XL 466d2

Tool model used (Hardware) : DTL-H500

Tool model used (Software) : DTL-D5?0

Question : LibGpu function

Contents of questionCurrently, OpenTMD can handle only the first polygon. When can the subsequent polygons be used? If some time is taken, please disclose sources.This is all.

Answer

OpenTMD cannot handle more than one object because of a bug. We are sorry to say that the subsequent version (introduced along with PlayStation Board) cannot cover this requirement. In the near future, the requirement will be accommodated.

Key words : LibGPU, OpenTMD

Development host machine (Manufacturer/model) : GATEWAY2000 /P5-60

Tool model used (Hardware) : DTL-H500

Tool model used (Software) : DTL-S510

Question : GTE's accuracy

Contents of question

SVECTOR (0, 0, 0) as RotMatrix results in:

4094, 0, 0,  
0, 4094, 0,  
0, 0, 4094

Does this problem stem from the hardware? Does PlayStationBoard also entail the problem?

Answer

RotMatrix uses no GTE hardware. The problem does not result from the hardware, but from the software. The rsin and rcos functions used in RotMatrix are fixed by the sin table 90 degrees (1023) before 0 degrees (0). Complementary and supplementary angles are used to fix the values of sin and cos functions other than 0 to 90 degrees. Now, it can be assumed that sin (just 90 degrees) = sin (right before 90 degrees). Thus, sin (1024) = sin (1023) = 4095. The cos function is also accompanied by errors. Boundaries between values determined by finite tables require special processing. Without the processing, errors are produced. The rsin and rcos functions are not subjected to special processing, because:

- 1) Any fixed point angles are accompanied by errors (Only angles of zero and 90 degrees free from errors have no meaning.);
- 2) special processing only at 0 and 90 degrees damages the whole continuity; and
- 3) the processing speed is lowered.

As described above, RotMatrix, rsin and rcos contained in libgte do not use GTE. Thus, the user can create functions of the same level. Attached RotMatrix, rsin and rcos sources can be resorted to in coding for putting emphasis on the speed or accuracy.

```
short *RotMatrix(rot,mtx)
short int rot[3];
short int mtx[3][3];
{ int c0,c1,c2;int s0,s1,s2; }
```

Key word : RotMatrix

Development host machine (Manufacturer/model) : Maha posya/  
Tool model used (Hardware) : DTL-H500  
Tool model used (Software) : DTL-S510A

Question : Kinds of images applicable to movies

Contents of question

We asked you about the method of combining movie performance with voice data and have been answered. The question is related to the method. You said that PlayStation processes 16 x 16 24-bit direct color images as basic units. Can only 16 x 16 24-bit direct colors be used for movies? Hardware Guide/OS Handbook Version 1.0 tells at page 20 that the 24-bit mode makes it impossible to use the GPU's drawing function. Does this mean that the 16 x 16 24-bit direct color (movie) is incompatible with libraries libgpu and libgs? We are investigating into game software based on combinations of movies and polygon 3D.

Answer

Currently, MDEC can select 16 x 16 16-bit or 16 x 16 24-bit direct color during reproduction. (The encoding data is common.)The 24-bit mode cannot draw polygons but reproduce high-quality animations. The 16 bit mode can also use the GPU's drawing function, though the color resolution is lowered. Thus, for ibgpu/libgs, the 16-bit mode should be used.

Key word : movie

Development host machine (DOS/V) : DECpc XL 466d2

Tool model used (Hardware) : DTL-H500

Tool model used (Software) : DTL-D5?0

Question : Difference file format for MIMe

Contents of question

The difference file format for MIMe includes an object number. A created difference file contains only data with an object number of zero. What meaning does the object number have? How can data of other than zero be created?This is our question.

Answer

The typical TMD is made up of more than one object. For example, for robot data, hands and feet are created as independent data for individual control. This creation calls for making each object as an RSD and linking RSDs via rsdlink. Thus, specifying only one RSD by rsdlink results in one object in the TMD file, with the object number being zero. Dividing objects suitably to generate data will lead to high-speed MIMe calculation.

Key word : MIMe

Development host machine (NEWS/DOS) : DEC FR-775JA-37

Tool model used (Hardware) : DTL-H500

Tool model used (Software) : DTL-S220

Question : 2D clipping

Contents of question

We would like to know differences among Gs library, GsSetDrawBuffClip and GsSetClip2D functions.

Answer

GsSetClip2D() is used to only assign values to variables. GsSetDrawBuffClip() references set variables for actual clipping.

Key words : clipping, GsSetDrawBuffClip, GsSetClip2D

Development host machine (NEWS/DOS) : DECpc LPx 466d2

Tool model used (Hardware) : DTL-H500

Tool model used (Software) : DTL-S510B

Question : Screen division by libgs

Contents of question :

We would like to divide the screen to two upper and lower parts to get the screen with respect to visual points 1P and 2P. We cannot understand the method of using the libgs library. Please tell us the method.

Answer

We provide you with sample program. The program, which is for new LIBGS, calls for updating LIBGS. In the near future, we will send you new LIBGS.

\*\*\*

Key word : LIBGS, screen

Development host machine (NEWS/DOS) : DOS

Tool model used (Hardware) : DTL-H200

Tool model used (Software) : DTL-S210

Question : Functions of duplex polygon

Contents of question

Reportedly, both the library and the material editor cannot use duplex polygon functions. When will a new version that can apply such functions be released? Is it possible to release such version? We need a test version as soon as possible.

Answer

The subsequent version will support a duplex polygon on the material editor. The present possible actions are such that two obverse and reverse polygons are created on the modeler. The dxf2rsd converter as well can create such polygons for each object. The judgment of the duplex polygons takes much time. The potential candidate is to introduce a back clip function. (With a back clip not applied, a reversed polygon becomes a duplex polygon that inverts the normal for indication.) Such a product will be released at the beginning of September. A test version will be delivered in the middle of August. The use of a duplex polygon for higher speed will be implemented

easier by the application of obverse and reverse polygons.

Key word : duplex polygon

Development host machine (Manufacturer/model) : DEC/LPx466d2

Tool model used (Hardware) : DTL-H500

Tool model used (Software) : DTL-S560

Question : PadRead()

Contents of question PadRead() is called right before VSync(). Heavier processing (reduced period until VSync) may result in incorrect reading of pads. Operation in 1/30 seconds often hinders the input of pads with processing increased. We guess that pads cannot be read in correctly with PadRead and VSync colliding with each other. Please inform us of information and actions to be taken.

Answer

This is due to a bug of microcomputer software in the control pad. The controller of final specifications does not suffer from such bug.

Key words : control pad, PadRead

Development host machine (Manufacturer/model) : DEC/DECpc466

Tool model used (Hardware) : DTL-H500

Tool model used (Software) : DTL-S560

Question : MDEC

Contents of question

Currently, we encounter a problem with static images obtained by MDEC. Values obtained by `i = DecDCTBufSize(mdec bs);` exceeding 32000 (perhaps 32767) cannot be converted well because of:

MDEC in sync timeout: mdec=6E01829Fd0:chcr=01000201 mdr=007DB09C bcr=04150020d1:chcr=00000200 mdr=001241DC bcr=00000020.

Please inform us of actions. Should data be smaller? Smaller data may cause a problem with picture quality. Do you have other measures? The bs size is 50 k-bytes. The buffer is tested by:

```
u long mdec bs[20000];
u long mdec rl[51000];
```

PS. DecDCToutCallback(out callback); Items related to the above will be retested on an 8/1 version. We will report the results of the retesting.

Answer

Currently, the data exceeding 32767 words = 128 KB per frame cannot be decoded. Possible actions are such that images per frame are divided into sub-images to be encoded. Sub-frames provide a smaller buffer size of mdec rl[]. A buffer size of mdec rl[] is not small. We are investigating into an encoding method for division into sub-frames.

Key words : MDEC, DecDCTBufSize

Development host machine (Manufacturer/model) : Apple  
Macintosh/Centris650  
Tool model used (Hardware) : DTL-H700  
Tool model used (Software) : DTL-S

Question : VAB

Contents of question

We would like to know a method of assigning MIDI (track) used by VAB for tones in the standard MIDI file. Do you issue a manual for DTL-S710? For SoundDelicatessen, can STUDIO4 manufactured by Opcode Inc. be used?

Answer

- MIDI assignment

Use MIDI in the same manner as the typical MIDI sound source. For SMF, specify programs (1 thru 128) to be used by means of the program change.

- Manual

Currently, the manual is planned and designed. In the near future (until 8/16 when the sound tool version is updated), the manual will be released by BBS. The document will be distributed using a file of Dynaware's MacWord (2.0 or subsequent version) format. Documents of other file formats will be delivered.

- Opcode's STUDIO4

We have no STUDIO4. Thus, we cannot test its connection. But STUDIO4 is considered to be applicable, as it corresponds to MIDI Manager. When using FreeMIDI for patching, install "FreeMIDI MIDI Manager Driver" along with FreeMIDI. Then, patch SoundDelicatessen and FreeMIDI with PathBay for Apple MIDI Manager. This allows selective connection to external MIDI equipment. When using OMS, install Apple MIDI Manager and patch OMS and SoundDelicatessen with PatchBay. This installation allows connection to external MIDI equipment. Double-clicking the OMS icon on PathBay enables the OMS port to be set. Until this autumn, requirements of FreeMIDI and OMS will be fulfilled.

Key words : VAB, SoundDelicatessen

Development host machine (Manufacturer/model) : IBM compatible machine

Tool model used (Hardware) : DTL-H500

Tool model used (Software) : DTL-S510

Question : Handling sprites and polygons

Contents of question

Attempting to display polygons and sprites at a time results in very slow processing possibly because of delayed drawing. (After detecting the end of drawing by the DrawSync function VSync is waited for and the displayed screen is swapped, followed by the subsequent OT drawing by the DrawOTag function.) Replacing sprites with polygons (with texture) did not result in lowered processing speed. The simultaneous use of sprites and polygons makes the processing heavier? Or is this due to a bug related to sprites?

Answer

The simultaneous use of sprites and polygons never results in heavy processing. Given below is a general description of such use for your reference. The drawing is delayed possibly because of the reasons below.

- Drawing neck

The GPU's capacity of operation and drawing is curbed.

- Operating neck

This neck is caused, when the number of vertices is calculated beyond GTE's capacity of operation.

- CPU neck

This neck is caused, when one frame cannot cover the memory's or the CPU's capacity of operation.

The following are actions to be taken.

- Drawing neck--

Excessive primitives are not created nor transferred. Obverse and too far polygons like points are clipped as needed.

- Texture should be included in the cache. The texture cache is of about 64 x 64 dots in the 4-bit mode. (DTL-H500 has a texture cache of 1/4 of 64 x 64 dots.) Incorrect hit lowers the drawing capability gradually. Be sure to create codes in the light of the texture cache.

Note that the CPU as well is engaged in operation. The GPU is a chip having the operating capability of about 300 MIPS (nominal). The capability is

resorted to when the variation and rotation of a polygon are calculated. Applying 256 x 256 texture onto several hundreds of 10 x 10 polygons (unreasonable) results in lowered processing owing to the limit of the operating capability. Select texture of an appropriate size.

- The 4-bit mode is faster than the 16-bit mode.
- A sprite is faster than a polygon.

- CPU neck--

libgs provides high generality, but entails a problem with speed. libgs is a prototype and can also be used easily by the programming beginner for three-dimensional matter. Some staff members of the developing department consider that it cannot fully cover a real-time system (game). According to principles of computer programs, a dedicated routine provides higher speed than a general routine. Thus, the customer should utilize his own know-how to combine libgpu and libgte with each other to generate the routine optimum to a game. This generation will be dealt with by seminars held by us.

-- Do not resort to the compiler's processing of optimization. PlayStation is provided with an instruction cache of about 4 KB. Further, it is equipped with one KB of a data cache called a scratch pad. A loop instruction should be covered by the instruction cache or the data structure should be designed properly to reduce overheads. (For the CISC processor, several hundreds of loops can be coped with effectively by the assembler. For RISC plus cache, the cache should be used more efficiently.) Our team of development currently investigates into functions for overhead reduction as in-line macros. A higher-speed function will be available in the near future. For R3000, the number of arguments passed by C language should be limited up to four for high-speed implementation.

-- The assembler as well may be used. Many manufacturers have embarked on description using the assembler. This strategy has been introduced by programmers who cannot withstand C's overheads.

- Operating neck

You do not suffer from this neck, if GTE is operating by a correct procedure.

Key words : sprite, polygon, delayed processing

Development host machine (Manufacturer/model) : Kit/PC or AT compatible machine

Tool model used (Hardware) : DTL-H500

Tool model used (Software) : DTL-S590

Question : Object/polygon division

Contents of question Each of GsDOBJ and GsDOBJ2 is not affected by an object division bit. The bit can be placed after GsInitCoordinate()? Please tell us how to use it. Reportedly, in the future, the strategy of appropriate division will be introduced which is aimed at dividing only the polygons meeting conditions. Is it available in the near future?



Answer

Currently, no object division bit is supported. The subsequent release will support such bit along with a higher-speed version. The method of appropriately dividing only the polygons meeting Z and other conditions can be applied effectively to removing texture distortion and near clipping. But the method brings about a problem with a gap between polygons divided and not divided.

\* It is impossible to identify a gap resulting from automatic division by the library, leading to difficult control. Currently, we come up with the strategy of appropriate division by object to remove texture distortion.1

- . Polygon division (modeling level) along center-line texture
2. Automatic division by object (The run time is controlled by the user.)
3. Object-to-object gap control (The run time is controlled by the user

.) Thus, the appropriate division by polygon will not be introduced into the library in the near future.

Key words : GsDOBJ, GsDOBJ2, object division, appropriate division

Development host machine (NEWS/DOS) : DOS

Tool model used (Hardware) : DTL-H500

Tool model used (Software) : DTL-S560 (DOS) DTL-S710 (Mac)

Question : Sound library

Contents of question

Q1: The sound library cannot open VAB beyond 400 KB, if it is not an online memory? If not, is it possible to locate only the VAB header in an online memory, followed by ID acquisition and transfer to a local memory to read data sequentially from the CD? It is not desirable to consume several hundreds of KB of main memory for sound. Memory consumption can be curbed by:

- reading the VAB header from the CD;
- acquiring VABID;
- reading VAB data 1 from the CD;
- transferring VAB data 1 to a local memory;
- reading VAB data n from the CD; and
- transferring VAB data n to the local memory.

Q2: Is SEQ opening not terminated normally, if all SEQ data is not correctly structured? Sound LIB cannot accommodate requirements of compression. Thus, we will take actions.

Performance will be accompanied by extension by about 256 bytes by VSYNC.

Request of BGM from the main program

Extension of part of the corresponding BGM top

SEQ opening

Start of performance.

Subsequent extension by VSYNC

Q3: A previous separate letter deals with voice effluence during reading at CD intervals. Concretely, for example, data recording whole music over 180 seconds is converted into the corresponding VAB data for storage in the CD. Read VAB data over about three seconds (stereophonic) from the CD to start reproduction by a certain method. A period of three seconds precedes the completion of the reproduction. Reading in three seconds the subsequent three seconds of VAB main program data allows uninterrupted VAB reproduction. Naturally, the end of the previously reproduced VAB data must be identified. XA may make some designed actions possible. Since this strategy hinders free data handling, however, it is inapplicable to RPG.

Answer

Q1: Divided VAB transfer mode

Currently, the divided mode of transfer is supported. (In the future, the strategy of the divided transfer will be introduced as the default.) The present design calls for several KB to several tens of KB of a buffer on the main memory for transfer.

Q2: SEQ compression/extension Present

SsSeqOpen is terminated normally, if the header information of SEQ data (sequence data resolution, tempo information and start sequence pointer) can be analyzed. Part of SEQ data cannot be used, as the header information cannot be analyzed.

Q3: Sound streaming

Large data not covered by the sound buffer (512 KB) should be handled basically by XA or DA. XA and DA sound as well can be reverbed and panned in the same manner as for voice. Subjecting such large data to real-time ADSR and vibration will require the method pointed out. The CD library designer is examining the sound streaming function. Please inform us of functions needed for sound streaming, if any.

Key words : LibSnd, VAB, SEQ, streaming

Development host machine (NEWS/DOS) : DEC/DECpcXL466d2

Tool model used (Hardware) : DTL-H500

Tool model used (Software) : DTL-S590

Question : libgs and GTE

Contents of question

Question 1

We cannot understand the method of transformation to the screen coordinate system and of perspective transformation using structure GsDOBJ for TMD obj. Currently, for this implementation, the following are called:

```
GsSetRefView(&View);
GsSetProjection(PROJECTION);
GsSetObjLw(&obj);
GsGetObjMatrix(&obj);
andGsGetObjLight(&obj);
```

Then, GsSetLsMatrix(&obj, lwmatrix) is called to identify the screen location by RotTransPers. But no desirable results are not obtained. Thus, obj.tmd is linked with NULL to set up a non-display bit. The application of GsSortObject(&obj, ...); leads to the setting of the GTE matrix. But this process is not applicable to RotTransPers. The application of RotTrans is followed by perspective transformation. This assumes that the GTE is set in GsSortObject. Optimized Lib may result in changed contents, making operation impossible. Please tell us details of the method.

## Question 2

Assigning a too large value to VectorNormal in the GTE library results in a malfunction. What is its cause?

## Question 3

Please inform us of the optimum method for processing a large number of GTE vectors waiting for matrix transformation en bloc.

## Answer

1. We can understand your difficulties. It is recommended that GsCOORDINATE2 be used in place of GsCOORDINATE, because the matrix can be obtained directly by GsGetLs(). In addition, function GsSetLsMatrix() can be applied which is set explicitly in GTE. This application provides higher speed. With GsCOORDINATE2 used, one of GsDOBJ2, GsDOBJ3 and GsDOBJ5 may be selected. GsDOBJ2 is equivalent to GsDOBJ, corresponding to the GsCOORDINATE2 coordinate system instead of GsCOORDINATE. GsDOBJ3 is an object handler for reproducing the PMD format. GsDOBJ5 prepares a packet for higher-speed implementation. The sample below covers GsDOBJ5.

\*\*\*

2. VectorNormal calculates the sum of squares of vector components. Exceeding 2<sup>31</sup>-1 results in incorrect calculation.

3. "Matrix conversion" includes perspective transformation? If it is included, calling the PMD function with the PMD vector data format provides the highest efficiency. The PMD format is released along with a new library version. If no perspective transformation is included, the only possible method is to use RotTrans.

Key words : LibGs, LibGTE

Development host machine (NEWS/DOS) : DOS  
Tool model used (Hardware) : DTL-H500

Question : CD's waveform data

Contents of question

CD reproduction entails data storage in the main memory. Can the data be applied to music? (Is the data applicable as VAG?)

Answer

The reproduction of CDROM-XA (ADPCM compressed voice data interleaved with streaming and other data) or of CD-DA (typical music CD data) stored in the CD-ROM tracks from the second on is not accompanied by data storage in the main memory. CD data is transferred directly to the D/A converter for output as sound. 16 bits of data from CD to the D/A converter can be transferred via the sound buffer to the main memory by means of the sound library. This function will be supported in the future. Thus, the transfer of data from CD can be analyzed. But using the data as VAG calls for conversion into ADPCM for storage in the sound buffer. (SPU can produce only ADPCM's waveform data.) This means that ADPCM must be encoded in real time in PlayStation. The support of the encoding function is being examined. Hence, it is recommended that the data encoded by ADPCM in advance be taken out via streaming for utilization.

Key words : CD, VAG

Development host machine (Manufacturer/model) : EPSON / DECpc  
Tool model used (Hardware) : DTL-H500  
Tool model used (Software) : DTL-S560

Question : Sound

Contents of question

1. How should waveform data of the VAG format be sampled?
2. How should data for the CDROM subsystem's RT (Real Time) ADPCM reproduction and for data transfer be created?
3. Does voice reproduction for streaming use the CDROM subsystem's RT (Real Time) ADPCM reproduction and data transfer?

Answer

1. Applicable is the sound sampled by Digidesign's Sound DesignerII and

AudiomediaII, AKAI's CD-3000 and Macintosh's standard voice input device. However, the converter supports only AIFF monophonic 16-bit sound. The AIFF format file is output with your sampling tool before conversion. Any sampled data that can be updated by a typical sampling tool can be transferred to PlayStation. The waveform data contained in the VAG format is subjected to PlayStation's original compression.

2. Data created by Sound Designer II is to be converted by sound tool RAW2XA or movie tool MovConv. RAW2XA encodes 16-bit stereophonic fs 37.8 kHz straight data such as Sound DesignerII's format data for application to XA.
3. That's right. Movie data of the video for Windows AVI format on Windows can be encoded as streaming data on pictures and sound by our movie tool MovConv. MovConv is included in run time libraries DTL-S590 and DTL-S2100.

Key words : sound, VAG, ADPCM

Development host machine (Manufacturer/model) : EPSON / DECpc  
Tool model used (Hardware) : DTL-H500  
Tool model used (Software) : DTL-S560

Question : Sound  
Contents of question

As the data used for animations (with voice) by streaming, can only movie data of the video for Windows AVI format be utilized? Or, can separately created picture data (TIM) and sound data be linked with each other?

Answer

Possible. MovConv is provided with a function for mixing str of only pictures with voice data encoded by ADPCM. str of only pictures can be encoded with MovConv. ADPCM can be encoded by MovConv or sound tool RAW2XA on Mac. However, this calls for synchronizing pictures and sound. If not synchronized, pictures and sound are converted into avi and way, followed by synchronization by editing software covering avi. Then, convert avi into str. The avi compression format does not deteriorate picture quality, if not compressed at 24 bits. The avi based editing software includes adobe's Premier.

Key words : streaming, AVI, TIM

Development host machine (NEWS/DOS) : DOS  
Tool model used (Hardware) : DTL-H500

Question : Development hardware

#### Contents of question

Please inform us of the schedule for releasing new development hardware.

#### Answer

The present plan covers the release of the hardware below.

(Programmer tool)

- (1) PlayStation Board (DTL-H2000): Delivered (substituted) sequentially from the middle of August.
- (2) CD-ROM Drive: Ready for delivery. Delivered along with above (1).
- (3) CD-ROM Emulator: Released in August.
- (4) CD-ROM Generator: Delivered sequentially (Small number of products)
- (5) Debugging Station: Released at the end of August.
- (6) Memory Box: Released at the end of August. External SCSI HDD for the CD-ROM emulator is applicable to limited drives. Please purchase drives, after we have posted the applicable drives.

Key word : release

Development host machine (NEWS/DOS) : DOS

Tool model used (hardware) : DTL-H200

Tool model used (Software) : DTL-S

#### Question : Emulator

#### Contents of question

The emulator currently used utilizes 100 percent of the performance of PlayStation? The emulation of such parts as the geometry engine depending on the co-processor by the library lowers the performance? When will we get an emulator providing 100 percent of performance? If the present emulator provides 100 % of performance, the processing is too slow. Please tell us the technique for higher-speed implementation. Please give us a more practical sample program (covering many objects).

#### Answer

DTL-H500 provides the same hardware specifications as actual PlayStation. Such software as the drive library must be enhanced in the future. But it can provide somewhat higher speed. The hardware as well can offer higher speed. However, we cannot bring about drastic changes in the present stage. If the basic routine has been well arranged or the data structure has been optimized in addition to tuning up the library, the software may provide capability beyond hardware functions. (Actually, our development department has implemented a program based on the C language displaying

320 thousand polygons per second.)

Routines occupying 10 percent of a program are run over 90 percent of the period of execution. We should investigate into whether or not the basic main loop contains unnecessary functions and expressions and into the implementation of lighter loops contained in the cache. The running speed of a program depends significantly on the bit rate of the instruction cache. We should develop more efficient algorithm. Programs based on the C language can be optimized variously. The more important point is to optimize a whole program rather than compiler options. Further, such optimization is affected by a CPU. For example, in a CPU using R3000 as the core, four arguments for C functions provides the highest efficiency. This is important know-how.

Key words : target box, performance

Development host machine (NEWS/DOS) : DOS

Tool model used (hardware) : DTL-H200

Tool model used (Software) : DTL-S

Question : Battery backup

Contents of question

Please inform us of detailed specifications of the card for battery backup (capacity, price, time of introduction, product position and other information).

Answer

Capacity: 1 M-bits (128 k-bytes)

Price: Convenient price

Time of introduction: Along with the main body

Form of delivery: Separate delivery

Key word : Backup card

Development host machine (NEWS/DOS) : GATEWAY2000

Tool model used (hardware) : DTL-H500

Tool model used (Software) : DTL-S510A

Question : Development by Pentium machine

Contents of question

This is my first letter. I am Kondoh belonging to BPS Inc., R & D department. I hope that you will help us in the future. We plan to introduce a Pentium machine as the development host. Please give us data for this application.

Answer

Thank you very much for your kind letter. Our development department has

introduced a Pentium machine of GATEWAY2000 P5-66. The current stage is installation. No trouble of such application has been reported. The AT machine requires troublesome selection. It entails the drawback that it is triggered by some errors of Windows installation. It is recommended that a typical chip based extension board be selected.

Key word : Pentium

Development host machine (NEWS/DOS) : DOS

Tool model used (hardware) : DTL-H200

Tool model used (Software) : DTL-S220

Question : Light source calculation

Contents of question

Subjecting light source calculation to texture results in smaller bit width of display colors. The calculation is based on hardware (artist board) specifications.

Is this application possible only on the basis of the artist board?

Answer

This trouble is due to a bug of the GPU. The target box also suffers from the same symptom. Hardware DHL-H200 released subsequently and a machine equipped with the hardware are free of this trouble.

Key word : light source calculation

Development host machine (NEWS/DOS) : DOS

Tool model used (hardware) : DTL-H500

Tool model used (Software) : DTL-S510B

Question : Monitor characteristics

Contents of question

For a super family computer, eight side dots disappear depending on the monitor. How about PlayStation? If they disappear, should the upper and lower dots be considered?

Answer

For the PS-X, the location of the screen on the display can be varied by controlling the CRT controller, though this control requires a very complicated procedure. To show the right eight dots, offset the top left point of screen indication to the left for setting. The display of horizontal pixels depends on the monitor. An inexpensive TV set cannot cover the left and right edges, if it is set improperly. We cannot know what type of monitor will be connected and what characteristics the monitor has. The display location must be set so



that the mean-level monitor meets conditions. Currently, the CRT controller is set at seemingly appropriate values. The next-generation library provides an interface for the CRT controller. Thus, the display location can be controlled. Key word : monitor characteristics

Development host machine (Manufacturer/model) : DOS/V / PS/V  
Tool model used (hardware) : DTL-H500  
Tool model used (Software) : DTL-S510B

Question : Speed Contents of question

Q1: Are semi-transparent sprites and typical sprites displayed in the same period?

Q2: Which is faster, drawing by multiplying a texture pattern by a certain brightness value or drawing by only texture patterns?

Answer

A1: Semi-transparent indication is slower.

A2: Same

Key word : sprite

Development host machine (Manufacturer/model) : DOS/V (AIR 486MI Mother Board used)  
Tool model used (hardware) : DTL-H500  
Tool model used (Software) : DTL-S510  
Questions : (1) GTE and GPU (2) Artistic board Contents of question

(1) GTE and GPU

Is GTE implemented actually only by the hardware? What kinds of calculation are accessible? We would like to know the speed of GTE and GPU instruction execution (in one second).

(2) Artistic board

Could you disclose specifications of boards appended to the artistic tool, and information for preparing appropriate tools?

Answer

1) Nearly all of the functions contained in libgte use hardware "GTE co-processor". The functions not used include: rsin, rcos, csin, ccos, cln, csqrt, catanRotMatrix, RotMatrixC, TransMatrix, ScaleMatrix, SubPol14, SubPol13. The run speed of each function has not been calculated. Measuring all functions takes much time. Further, the result depends on the measuring program. The speed should be measured by the user.

2)These libraries are not handled by our firm as products largely because of political elements. Please contact our business staff members.The delivery calls for certain reasons.

Key words : GTE, GPU, Graphics Artist Board

Development host machine (NEWS/DOS) : PC/AT DOS/V

Tool model used (hardware) : DTL-H500

Tool model used (Software) : DTL-S510B

Question : Screen mode of PlayStation

Contents of question

Currently, the GPU supports eight screen modes. Will new modes be supported in the future? (Reportedly, 384(H)x224(V) will be supported.)

Answer

This information has been posted by SCE-NET. 384(H) does not cover all of the 384 dot mode pixels.

(The information below has been posted.)

Addition of graphic system specifications

June 10, 1994

The display modes below will be added to the next programmer development tool (DEX-2000) and the final version actual machine for the PlayStation graphic system.

Old version

16 bits

256x240 320x240 512x240 640x240 256x480 320x480 512x480 640x480

24 bits

256x240 320x240 512x240 640x240 256x480 320x480 512x480 640x480

New version

16 bits

256x240 320x240 365x240 512x240 640x240 256x480 320x480 365x480  
512x480 640x480

24 bits

256x240 320x240 365x240 512x240 640x240 256x480 320x480 365x480  
512x480 640x480

Key word : screen mode

Development host machine (NEWS/DOS) : DOS

Tool model used (hardware) : DTL-H500

Question : Target box and artist board

Contents of question

Can the target box and the artist board be applied simultaneously? Please inform us of any problems with such application.

Answer

The simultaneous application is possible. In the light of complicated installation and work, the box and the artist board should be separated. A potential problem is batting due to changes in board addresses. But any problem will be caused, if the factory settings are followed and the manual is read carefully for installation. A high-capacity memory is required. Note that DOS prompt in Windows is not guaranteed.

Key words : target box, graphic artist board

Development host machine (Manufacturer/model) : DOS/V (AIR 486MI Mother Board Used)

Tool model used (hardware) : DTL-H500

Tool model used (Software) : DTL-S510

Question : (1) Stack          (2) GTE          (3) Host machine

Contents of question

(1) Stack

Like typical C, can the stack be applied to automatic variable and sub-routine calling?

(2) GTE

The "GTE co-processor" is focused on the higher-speed calculation of the RotTrans function being:

$V2 = M * V0 + V1M$  : Matrix of (1, 3, 12)

V0 : Matrix of (1, 15, 0)

V1 : Matrix of (1, 31, 0)

V2 : Matrix of (1, 31, 0)

Does the software cover other calculation including RotTransPers? Is RotTransPers3 equivalent to calling the function three times? What speed is defined by GTE specifications for theoretical calculation (clocks) by only HDD?

(3) Host machine

We plan to purchase IBM's PS/V Vision as the host machine for the programmer and the artistic tool. Can it be used? (The problems are the board size and PS/V Vision's functions as the TV set.)

Can other video capture cards be used for operations as displaying PlayStation's output by Windows?

Answer

(1) C's method of using the stack is followed. The typical stack is set at the location specified by SN ENTRY POINT. In addition, there is a stack for an interruption routine. Please inform us of any errors of the stacks.

(2) Does HDD mean the hardware? The hardware is not disclosed. You cannot be informed of any hardware functions and the hardware speed. The speed of the libgte function can be measured. But the result is different depending on the measuring program. You should measure the speed. PlayStation is a real time OS. The measured speed is always constant.

Measured speed = Hardware speed + libgte's overhead + measuring program's overhead

(3) The configuration should not be introduced, though it seems to be convenient. PS/V Vision entails a problem with the number of slots. The next-generation DTL-H2000 uses two slots. The addition of the artist board allows no further extension. Some types of configuration uses a number of slots, resulting in severe development. If IBM abides by the architecture of an AT compatible machine, the software itself is applicable.

Key words : stack, GTE, host machine

Development host machine (Manufacturer/model) : DOS/V / PS/V

Tool model used (hardware) : DTL-H500

Tool model used (Software) : DTL-S510B

Question : psx's communications functions

Contents of question

Psx's communications functions are covered by recent game magazines for metal jackets. The user is willing to accept the functions to enjoy games with two or more psx functions connected. During the initial stage of psx development, Sony's engineer said that up to 32 units can be connected (including units connected to game centers). But a recent document tells that only two units can be connected. Please tell us the cable capability on fan-out.

Answer

Currently, products are hatched which cover only two units. A product covering more units will be disclosed prior to introduction.

Key word : communication

Development host machine (NEWS/DOS) : DOS

Tool model used (hardware) : DTL-H500

Question : PlayStation's external terminal

## Contents of question

A family computer magazine says that PlayStation is provided with an RS-232C terminal. Is it true?

## Answer

A serial port is installed. (But the signal level is different from 232C.)

Key word : external terminal

Development host machine (Manufacturer/model) :

Tool model used (hardware) : DTL-H200

Tool model used (Software) : DTL-S

Question : Multi-tap, backup cartridge and morphing

## Contents of question1.

Out tennis game covers four men for doubles on the basis of specifications.

- 1.1 Will a multi-tap covering four men be introduced?
- 1.2 If introduced, when does such tap become commercially available?
- 1.3 Will other firms be intended to embark on this introduction?
2. An editing player is backed up to prepare special specifications.
  - 2.1 Is the capacity of each of two slots 1 M-bits? (Final product)
  - 2.2 Does the backup cartridge store data for more than one game?
  - 2.3 Can game data from other firms be erased, if the capacity has been exceeded?
  - 2.4 Are specifications incorporated which allow deletion by a common hardware menu, like a PC engine and mega-drum?
  - 2.5 Is a common format for indexing needed (for collective indication)?
  - 2.6 Does cartridge removal or insertion call for turning off the machine?
- 3.3.1 Reportedly, morphing is to transform a character to another one. Can this function be covered by hardware. Is dedicated software needed? For example, is it possible to transform a polygon plate character to a human polygon?
  - 3.2 Apart from complicated forms, can "A" be transformed to "B"? We would like to know changes in colors. Is a middle pattern needed?
  - 3.3 Is it possible to enlarge part of the plate for transformation to a human polygon?
  - 3.4 Can a plate be enlarged like waves (from the center)?
  - 3.5 Can two waves be propagated?

## Answer

- 1.1 A multi-tap is hatched, but no port is designed.
- 1.2 Not planned.
- 1.3 Not planned. (Investigation into licenses on peripherals has been just embarked on.) This is a future issue.
- 2.1 1 M-bits per unit
- 2.2 Covered.

- 2.3 Can be erased.
- 2.4 Supported.
- 2.5 A label (heading picture) will be transplanted from the application (game) to the backup cartridge.
- 2.6 Can be inserted and removed during current application.

3.1 Morphing provides high performance effects. As they depend greatly on the application, however, dedicated morphing may be needed. Only transformation can be covered relatively easily by same primitive configuration. MIME is operated under the same tactics.

3.2 Interpolation can cover forms relatively easily. It is fairly difficult to accommodate texture information. Color information may be supplemented linearly. A means is to load the texture area with streaming images to be referenced.

3.3 Possible. A program for transforming a ball to a human character has been generated.

3.4, 3.5 Possible, unless loaded mathematically heavily. The above answers on item 3 may be insufficient. The important point consists in your technological capability. The identity of a software designer is to digest software's particular essence ahead of the other designers.

Key words : multi-tap, backup, morphing

Development host machine (Manufacture/model) : DOS/V / PS/V

Tool model used (hardware) : DTL-H500

Tool model used (Software) : DTL-S510B

Question : Usable area on screen

Contents of question

This question is related to edges of the game screen not covered by a TV set. You have provided the same answer as for SFC and MD. How many dots do SFC and MD open? Please give us the actual recommended value.

Answer

Firms N and S specify 224 dot height as the safety area. We cannot give you any recommended value. You should decide about a usable value.

Key word : screen

Development host machine (Manufacturer/model) :

Tool model used (hardware) : DTL-H200

Tool model used (Software) : DTL-S

Question : Joint pad

Contents of question

The previous answer says that a multi-tap is hatched but a port is not designed. Is it possible to detect a connected pad for 1P or 2P? With a multi-

tap connected, can a connected pad for 3P or 4P be detected?

Question : Backup cartridge

Contents of question

The previous answer tells that a backup cartridge can be inserted and removed even with current applied. For example, five persons provide cartridges saving original characters for repeated loading and removal on PS-X. In that case, can five original characters be introduced in the same game?

Answer

[Connected joint pad detection]

A connected pad can be detected by a group of libraries under development. It may be released along with DTL-H2000. The examination of details may take more time. Our development department has designed stable operation even with a pad pointed to. For a multi-tap, such function can be implemented, though the time when it is supported is not determined. Perhaps, it will be supported in the near future.

[Backup cartridge]

Technologically possible. The problem consists in software generation.

Key words : joint pad, backup cartridge

Development host machine (NEWS/DOS) : COMPAQ ProSignia 486/66-1050

Tool model used (hardware) : DTL-H500

Tool model used (Software) : DTL-S510B

Question : Mode on number of colors displayed by GPU

Contents of question

The PSX's color display is based on the 15- and 24-bit modes. For the GPU's drawing function, the 24-bit mode is not covered. Why not?

Answer

This is explained in the chapter for the graphic system in Hardware Guide/OS Handbook for Programmer Tool. The 24-bit mode is such that only the image data transferred into VRAM can be displayed. The GPU's drawing function cannot be executed. For your planning and development, this fact should be taken into account.

Key words : GPU, displayed color count

Development host machine (Manufacturer/model) :

Tool model used (hardware) : DTL-H

Tool model used (Software) : DTL-S

Question : RT reproduction

### Contents of question

This question is related to RT reproduction set out in the library reference. During the RT reproduction, is R3000's main memory not used for transmission from the CD-ROM decoder to SPU?

### Answer

RT reproduction in the sense of voice streaming (SD D/A reproduction) is such that data is sent directly to SPU. Such special processing as reverberation and echo production calls for SPU. Thus, data must be read into the main memory. Changes in volume and pan pot do not require reading into the main memory.

Key words : RT reproduction, CD-ROM, SPU

Development host machine (NEWS/DOS) : Macintosh

Tool model used (hardware) : DTL-H700

Tool model used (Software) : DTL-S710

Question : RT reproduction

### Contents of question

The library reference describes the three modes below.

- (a) DA (Digital Audio) reproduction
- (b) RT (Real Time) ADPCM reproduction plus data transfer
- (c) SM (Sound Map) reproduction

For RT reproduction plus data transfer, ADPCM reproduction is covered by the decoder in the CD-ROM. This function can be used independent of the sound function offered by the sound library. This description means that data is reproduced without the main memory. It is possible for the present library to reproduce data without using the CD-ROM decoder?

### Answer

RT (Real Time) ADPCM reproduction refers to an audio track for CDROM-XA. XA reproduction never resorts to the main memory. The ADPCM data stored in CDROM-XA's audio track can be decoded only by the CD-ROM decoder. (The interpretable format is different between SPU and the CD-ROM decoder.) Thus, XA sound cannot be reproduced without using the CD-ROM decoder. The data decoded by the CD-ROM decoder can be sent to SPU for volume setting and reverberation effect application, if needed.

Key words : RT reproduction



Development host machine (Manufacturer/model) : COMPAQ/PROLINEA MT  
CDS

Tool model used (hardware) : DTL-H500

Tool model used (Software) : DTL-S590

Question : Texture

Contents of question

With a polygon displayed under the same conditions, the display speed is changed considerably by the area of texture applied onto the polygon. Is this due to hardware characteristics? Very fine texture (= large-area texture space) results in the display of a much smaller number of polygons.

Answer

The drawing speed depends on the size of original texture to be applied onto a polygon. This dependence is due to the amount of operation related to transformation. "Considerable" changes result possibly from the GPU's texture cache capacity. The GPU's texture cache is covered by:

- 4 bits : 64 x 64
- 8 bits : 32 x 64
- 16 bits : 16 x 64

Thus, the 16-bit texture provides no significant benefit. You should create a program on the basis of the above description.

Key words : texture, polygon

Development host machine (NEWS/DOS) : DOS/V / PS/V

Tool model used (hardware) : DTL-H500

Tool model used (Software) : DTL-S510B

Question : Texture

Contents of question

TIM data with CLUT brightness values of about 19 thru 23 is displayed as sprites, with gradation applied. But application as texture results in display as the same color. This problem originates in the hardware. The actual product eliminates the problem? If not corrected, we would like to know actions to be taken.

Answer

The phenomena is particular to MW3. Simultaneous texture mapping and shading bring about this problem. The actual product and the next-generation tool will eliminate the problem. For display with no shading applied to TIM, even MW3 is operated normally by prohibiting shading by the SetShadeTex() function. With the brightness value (r, g, b) set at (0x80, 0x80, 0x80), shading is prohibited automatically in the GS level.

Key words : texture, shading

Development host machine (Manufacturer/model) : GATEWAY2000 /P5-60

Tool model used (hardware) : DTL-H500

Tool model used (Software) : DTL-S510

Question : Migration from TargetBox to PlayStationBoard

Contents of question

Today, we have received the document on the release schedule of the PSX tool. We have some questions on the schedule. Are the functions usable in current TargetBox applicable to PlayStationBoard as well?

1. printf debugging using RS232C
2. PC host function and reading to/writing from PC local disk. If the PC host function is not supported, can other functions be used to program the disk with data? (Such functions are needed for our data creation.)
3. We would like to know the memory installed. Same as the actual product?
4. I have not been informed of the fact that the change from the target box to boards requires three boards. Has this been announced in advance? I would like to know a board size. Please advise us of the sizes of two PlayStation boards and a CD-ROM emulator card? (Full size?) The CD-ROM emulator card is connected to an external hard disk according to the attached drawing. Can it be connected to the built-in hard disk as well?

Answer

1. Impossible. You should resort to an alternative means.
2. PCwrite, PCread and PCcreate will be supported.
3. The memory capacity is 8 M.
4. Though being too late, the document issued by our business department says so. Both DHL-2000 boards are of full size. We cannot provide you with data on the CD-ROM emulator card. The emulator card is provided with an interface for incorporation. Thus, a disk can be built in.

Key words : PlayStation board

Development host machine (Manufacturer/model) : COMTRADE/PCI GigaByte  
Tornado P90

Tool model used (hardware) : DTL-H500

Tool model used (Software) : DTL-S590

Question : I and D caches

Contents of question

- 1) Currently, the I cache stores only instructions and does not store data. Is the actual product as well so designed?

2) Currently, the D cache can read in data in high speed, but can be programmed only in the same manner as the other RAM areas (0x80000000-0x8-1fffff). Is it unchanged in the actual product?

Answer

- 1) The actual product as well is so designed.
- 2) No. Programming is also made more rapidly than the other RAM areas.

Key words : I cache, D cache

Development host machine (Manufacturer/model) : DEC / DECpc LPx 466d2  
Tool model used (hardware) : DTL-H500  
Tool model used (Software) : DTL-S510A

Question : PlayStation target box' memory wait

Contents of question

Lately, a run time measurement program has been created to measure a program's run speed. Results of this measurement tell that the memory wait value is six waits. Previously, Mr. Okamoto of your firm said that the value was three waits. Does this difference stem from the actual product and the target box. Such difference will affect how to create a program. Please inform us of correct data.

Answer

[Memory wait]

PlayStation's RAM may be somewhat different from a RAM your engineer assumes. It is different from the past and personal computer's RAMs in waits. You should believe a value of six waits. But the value is different depending on the program.

Key words : memory wait, TargetBox

Development host machine (NEWS/DOS) : DOS  
Tool model used (hardware) : DTL-H200  
Tool model used (Software) : DTL-S210

Question : Font ROM

Contents of question

Reportedly, PlayStation will be equipped with a display ROM for a 15x15 dot font in the first class. Further, some people say that fonts of 13x13 and 11x11 will also be supplied. Will these fonts be installed in the ROM or used for reading from the CD?

Answer

Our tentative specifications define kanji data as follows: Three gothic fonts of 15x15, 13x13 and 11x11 will be distributed as the library (or data file) for development tools, covering a set of non-kanji characters, the first and second classes, and other forms (half size characters and vertical writing). The standard access function for kanji data will also be distributed. Thus, the typical method of application will be to link needed data with functions as the library. Among three fonts, a font of 15x15 covering the first class and part of non-kanji characters (alphanumerics and kana characters, etc.) will be installed in a game machine's ROM. The distribution of kanji data and its installation in the ROM will be posted after the determination of specifications in early September.

Key word : font

Development host machine (NEWS/DOS) : DOS

Tool model used (hardware) : DTL-H500

Tool model used (Software) : DTL-S590

Question : RAM

Contents of question

Thank you very much for your cooperation. PlayStation's RAM is protected against resetting? The RAM is now used assuming that it is protected against resetting. The manual only says that such operations as adversely affect the memory right after resetting are curbed wherever possible. Does this mean that part of the memory contents are destroyed intentionally? Or, does it mean that memory contents are kept in almost all cases but may be damaged occasionally? Thus, RAM contents after resetting are unstable? Please answer this question on the basis of the actual product.

Answer

Naturally, the system area (top 64 K) is cleared completely. Taking into account the process of maintenance service, the degree of a memory test on destruction is being investigated into. Please wait until the end of August.

Key words : PlayStation, RAM

Host machine for development: PSV-2410

Hardware tool model No.: DTL-H500

Software tool model No.: DTS-S230

Subject: About Mac Tools

Question:

I have some questions about Mac software. The power PC version of 3D modeler software "Form Z", which you recommended, will be released in May. Can data created with this software program be converted into PSX data? We are going to purchase Mac as a development tool, and we would like to consider this point in selecting it. Would you kindly tell us which machine model you recommend?

Answer:

We asked the "Form Z" maker about your question. They assured compatibility of created data.

Keywords: Form Z, modeler, convert

Host machine for development (NEWS/DOS): DECpc LPx 486d2

Hardware tool model No.: DTL-H500

Software tool model No.:DTL-S510

Subject: About Trouble in Creation of Modeling Data

Questions:

The following phenomena take place during creation of modeling data. We want to know the way of preventing such trouble. Would you please give us advice?

- (1) A DXF file created using Strata Studio of Mac cannot be sometimes converted by DXF2RSD. I transferred modeling data, which failed to be converted, to Strata Vision, and created a DXF file for Strata Vision. I successfully converted this DXF file with DXF2RSD.
- (2) An RSD file sometimes fails to be converted into TMD data with RSDLINK. Polygons in the data, which happened to be successfully converted, are all inverted.
- (3) If a file created with Meditor is loaded, and saved under a new name, no \*.GRP file will be created.

Answers:

- (1) I will answer your question presuming the case in which the result of conversion cannot be obtained because of abnormal end or hanging during conversion with dxf2rsd. Fundamentally, dxf2rsd handles 3D data of DXF 3DACE format. Some modelers generate DXF files in any other format, such as POLYLINE. dxf2rsd tries to rectangulate POLYLINE, but sometimes fails. Rectangulation takes a long time. So, you may mistake long-time rectangulation for hanging. Open the generated DXF file using a text editor, and check to see if there is an entry "POLYLINE". The -nopl option allows you to ignore POLYLINE, but most of data may be lost. We have not verified yet in which case Strata Studio fails in format conversion. Conversion is sometimes enabled if you execute FACET on the Modeling menu before saving.

(2) It is known that conversion fails if colors are allocated to individual polygons in a MAT file, or if RSD has two or more textures. We will soon distribute improved program through BBS. As for inversion of polygons, make sure that the RSD version (a program related to polygon inversion is the PLY file) is 940102. The earlier versions handle inverted polygons as compared with those handled by 940102. Also, use the tools of the latest version. As of April 21st, the dxf2rsd version 2.0, meditor version 1.0, and rsdlink version 2.0 are the latest ones. We will be able to give you more satisfactory answer if you will tell us arguments and phenomena (such as the output obtained when the -v option is used) during execution of commands, and input data (creating procedure, shapes, etc.) in conjunction with (1).

(3) We will release improved version. We apologize to you for this error.

Keywords: Modeling, DXF, DXF2RSD, RSD, RSDLINK, TMD, MEDITOR

Host machine for development (NEWS/DOS): DOS/V

Hardware tool model No.: DTL-H500

Software tool model No.:DTL-S210

Subject: About Sprite Editor and Artist Board

Question:

During use of Sprite editor on DECpcLPx, Windows sometimes hangs, and Sprite Editor is closed due to an error. We are reported that this phenomenon is likely to take place during animation work. DECpcLPv hardly causes such an phenomenon. How the version of the library for Artist Board upgraded? Can I be supplied with the latest version?

Answer:

- About Abnormal End of Sprite Editor If you use 256 colors for DECpcLPx, SYSTEM.INI saved in the directory where Windows is installed must include the following two lines:

[DeviceCaps]  
display-bitblt

If this entry is missing, the behavior of an application on Windows may become unstable. Be sure that your program include the above entry. -  
About Upgrading of Artist Board Library Version The one distributed on April 21st is the latest version. We have no plan to upgrade the version for the time being.

Keywords: Sprite editor

Host machine for development (NEWS/DOS): DEC FR-775JA-37

Hardware tool model No.:DTL-H500

Software tool model No.: DTL-S220

Subject: About Linkage of Multiple Objects with rsdlink

Question:

A plural number of objects were linked using rsdlink to generate a tmd file. However, all the objects, excepting the first one, failed to be displayed. It was possible to display each object independently. I entered the following for rsdlink:

```
rsdlink -o obj.tmd obj0.rsd obj1.rst obj2.rsd
```

In dumping of rcube.tmd, which is provided as a sample, pointers to vertexes, normal vectors, and primitive data seems to point at individual objects. However, dumping of a generated tmd file shows that pointers to the vertexes, normal vectors, and primitive data point at the same location as the first object. Please tell me how to link multiple objects.

Answer:

```
rsdlink -o obj.tmd
```

In RSDLINK, you may enter the following:

```
file obj0.rsd    pick 0   file obj1.rsd    pick 0   file obj2.rsd    pick 0   exit
```

Otherwise, create an RSD file containing multiple objects by entering:

```
rsdcat -o obj.rsd obj1.rsd obj2.rsd obj3.rsd...
```

Then, enter the following:

```
rsdlink -o obj.tmd file obj.rsd all exit
```

Keywords: rsdlink, tmd

Host machine for development (NEWS/DOS):NWS-3720/DECpc-LPx 466d2

Hardware tool model No.: DTL-H200

Software tool model No.: DTL2560update2

Subject: About Generation of Objects in Linkage of Multiple Files

Question:

I am performing split compiling by generating \*.OBJ files one by one using ccpsx, and joining them. However, the number of characters in a line exceeded 128 because of too many files. (See NOTE.) I think that linkage should be performed by specifying a link file in psylink, but I do not see what to do to perform the same linking job as I did with ccpsx. (I made a try, but I do not know if the result is the same as that obtained from ccpsx.)

Teach me how to perform ordinary split compiling using ccpsx, and how I should do the equivalent job using psylink.

NOTE: An example is given below. Actually, makefile.mak was used.

```
ccpsx -g -c file1.c
```

```
ccpsx -g -c file2.c      ...
ccpsx -g -xo$80080000 file1.OBJ file2.OBJ...-omain.CPE, main.SYM
```

The program did not accept the last line because it was too long.

Answer:

We are now preparing an answer to the question as to the method in which a command file is used for psylink. Please wait for some time. An example of use of ccpsx is given below. ccpsx allows designation of a command line character string by designating a command file using @filename. Enter the following in makefile.mak:

```
#### makefile.mak ####
CC                = ccpsx
CC_OPTION         = -O -C
main.cpe: file01.obj file02.obj file03.obj file04.obj file05.obj file06.obj file07.obj
file08.obj file09.obj file10.obj
ccpsx @main.cmd
file01.obj:       file01.c
$(CC) $(CC_OPTION) file01.c

file02.obj:       file02.c
$(CC) $(CC_OPTION) file02.c
... (omitted)

file10.obj:       file10.c
$(CC) $(CC_OPTION) file10.c
```

Then, prepare the following file as main.cmd. (Describe what is entered on the command line of ccpsx as it is.)

```
#### main.cmd ####
-Xo$80080000 file01.obj file02.obj file03.obj file04.obj file05.obj file06.obj
file07.obj file08.obj file09.obj file10.obj -omain.cpe, main.sym, main.map
###
```

Split compiling can be done in the manner described above even if too many files are involved. If you have any more question, please ask us.

Keywords:      Link, ccpsx, psylink

Host machine for development (NEWS/DOS): DOS/V  
Hardware tool model No.: DTL-H200  
Software tool model No.: DTL-S220

Subject: About 3D Modeler

Question:

I want to know the detailed specification of 3D modeler produced by Signos. Will you please send me reference material if any?



Answer:

We are very sorry that we do not have any material. Currently, we know that 3D modeler in question will have the following features:

- Spline-based modeler
- Texture editing
- Animation
- Polygon editing
- Data preview on PS-X board

The time of release is not yet fixed.

Keyword: 3D modeler

Host machine for development (NEWS/DOS): DOS

Hardware tool model No.: DTL-H200

Software tool model No.: DTL-S

Subject: About 3D Tool for Designer

Question:

Currently, I am using 3DCAD on MAC. I am thinking of replacing it with SGI for higher efficiency in work. I am planning to use any of the following software programs:

- SoftImage
- Prism
- Alias
- Explorer

Please teach me about compatibility of these programs with PSX (especially, concerning materials such as texture, and affinity of data).

Answer:

Currently, SoftImage is available as 3D tool on SGI. A convertor, which converts modeling data and material data to PS-X data format, is sold as an option. A converter for Alias is currently being developed. Development of convertors for other tools are now under review.

Keywords: 3D tool, 3D modeler

Host machine for development (NEWS/DOS): DOS

Hardware tool model No.: DTL-H200

Software tool model No.: DTL-S220

Subject: About Material Editor

Question:

If objects are displayed after light source calculations, a 256-color texture is displayed in 16 colors. Is this ascribable to the specification?

Answer:

If you perform light source calculations for a texture, the bit width for displayed colors is reduced. This is due to the specification of the hardware (Artist Board). Keyword: Material editor, light source calculation, texture

Host machine for development (NEWS/DOS): DOS/V(DEC 466LPx)

Hardware tool model No.:DTL-H500

Software tool model No.: DTL-S510B

Subject: Question about Functions of PS-X

Question:

Would you please answer the following questions?

1. Will it become possible with Sprite Editor to perform "all clear" on TIM or cell window? Will a menu, which will save a file without changing its name, be added? MAP allows editing of four banks at one time. Is it possible with the current version to overlay these four kinds of MAP data on the screen? I used the bank transfer MAP to turn on the four types of data, but the result was a failure. Is it because there is no setting for CELL data?

2. Would you please to publicize the contents (source) of the function "SortBG", which saves a BG structure for LIBGS to OT? BG created using MAP and CELL can be enlarged and shrunk both vertically and horizontally. I am trying to change the scale factor from the top to the bottom of the BG screen. With the current version, however, it can be only done by pasting a rectangular area to a trapezoid using POLY\_FT4 after development in VRAM. For this purpose, I will make changes to the source if you publicize it.

Answers:

1. - "All clear" on TIM and cell window is possible with the current version. All clear will be done if you click the tool (the forth tool from the right end in horizontal layout, and forth tool from the bottom in vertical layout) to the left of the cell tool on the tool palette, and then left-click on any desired window. - For the time being, we have not plan to add a menu which will save a file without changing its name. - The current version of MAP allows overlay of four banks on the NTSC television screen. I cannot give a definite answer because detailed conditions are unknown. The following are possible causes for your trouble:

- Incorrect setting of transparent colors

On Sprite Editor, a transparent color is given if RGB values are all zeroes, and translucent flag is off. If the upper bank (having the smaller MAP bank No.) is opaque when the banks are overlaid, only the data on the top bank will be displayed. If RGB values are all zeroes when the translucent flag is turned on, opaque black will be displayed, and only the data on the top bank will be displayed.

- TIM data failed to be sent to the board correctly.

Necessary TIM data sometimes may fail to be correctly displayed in MAP display unless they are displayed on the NTSC screen invoked from the "Item of transfer" menu beforehand. Especially, if you directly select "Map" after selecting "None" on the "Item of transfer" menu, only TIM data for the currently active TIM bank will be displayed.

2. Very sorry, but we cannot publicize the source.

Keywords: Sprite Editor, LibGS

Host machine for development (NEWS/DOS): DOS

Hardware tool model No.: DTL-H200

Software tool model No.: DTL-S220

Subject: About RSDFORM

Question:

If RSDFORM is executed, a syntax error or "Sector not found" error is displayed, and the original data are aborted. What should I do to change the size of the model?

Answer:

The cause may be that the same name is given to both input and output files by entering, for example, "rsdform -o foo -s 10 10 10 foo.rsd". rsdform repeatedly reads the input file and writes the output file by turns. Naturally, the files will be destroyed if the input and output files have the same name. Even if an extension is designated as in "foo.tmd", it is ignored. (It is construed as ".rsd".) Inputs/outputs for rsdform are four files (.rsd, .ply, .mat, .grp), and their extensions are fixed. Therefore, use different names for the input and output files as in the following example: rsdform -o boo -s 10 10 10 foo If it is absolutely necessary to overwrite a file, you may create the following batch file:

```
> type form.bat
@ECHO OFF
REM Conversion using a name "tmp"
rsdform -o tmp %1 %2 %3 %4 %5 %6 %7 %8 %9
REM Finding the last argument ( = input filename)
:LOOP
IF "%1"=="GOTO END
SHIFT
GOTO LOOP
:END
REM Overwriting to the input file (%0)
rsdform -o %0 tmp
REM Deletion of tmp.* for finish
DEL tmp.*
```

In future, improvements will be made so as to allow overwriting.

Keywords: rsdform

Host machine for development: IBM compatible

Hardware tool model No.: DTL-H500

Software tool model No.: DTL-S510

Subject: About Debugger

Question:

Questions about PSYQ source level debugger

1. If a sample is executed on the debugger, it operates on the target, but the debugger displays the following message:

"Target did not respond."

Why is the target not recognized. (If the target is reset, the operation of the debugger can be resumed.)

I start the debugger by entering:

```
>dbugpsx /e main main.sym
```

2. Have you any plan to make the source level debugger handle ANSI (C language specification)? If you have a plan, teach me the time of release, etc.

Answer:

This phenomenon seems to take place because "pollhost();" is not inserted to the source code. Unless the status of the interior of CPU is not transferred from the target to the debugger periodically, the above message will be displayed. Even in this case, the program runs normally. If you insert "pollhost()" immediately before V blank, time loss can be minimized. Currently, we have no plan to make the debugger compatible with ANSI.

Keywords: Debugger, dbugpsx

Host machine for development (NEWS/DOS): DOS/V(DEC 466LPx)

Hardware tool model No.: DTL-H500

Software tool model No.: DTL-S510B

Subject: Question about Functions of PS-X

Question:

Please answer the following questions:

1. I created CELL data by laterally inverting the part of TIM using Sprite Editor. When I saw the CELL file later, the portions where the FLAG for the CELL part is laterally inverted were found to be all 01H. The manual (p.65 in Hard OS Manual) describes that they should become all 02H. Vertical inversion produces the contrary result. Is it an error in the manual? If MAP is created using such CEL data, and SortBG is executed, the CELL is displayed without inversion. Does not the current version allow such use?

2. I converted DXF data for which modeling was performed using the Mac modeler "Strata Studio Pro", and I loaded that file with the material editor. There were transparent surfaces because of the inversion of the face and rear of polygons. I saved two OBJs (e.g. an apple and leaves) as one, and converted it. When it was rotated using Material Editor, the two were

separated and turned independently. However, this never took place when I experimented using DXF created with FormZ. Is there any difference in DXF data created by these two tools? I suppose both these tools are for DXF for 3DFace.

Will not Material Editor provide a function which will inverse the face and rear of polygons?

Answer:

1. Sprite Editor of new version has fixed such a bug. A correction has been also made to a new library which will be delivered to you soon. So, make a try.

We receive many questions "Is not the current version capable of ..."

You should think that the current version cannot do it if you have failed.

2. If a lathe (a body of rotation) is handled using Strata Studio Pro, polygons will be inverted. If all the polygons are inverted, you may use the -back option in dxf2rsd. If only a certain number of polygons are inverted, you have to select inverted polygons and correct them using Studio Pro. To do so, select inverted polygons, and click the Flip mesh faces check box for the Edit Primitive command.

Originally, DXF has no special information on the face and rear. dxf2rsd judges the face and rear from the order of vertexes constituting each polygon. (Counterclockwise turn indicates the face.) Both Strata and FormZ provides correct DXF. In many cases, however, FormZ seems to output data more satisfactory to us.

The phenomenon that "the two objects are seen to be rotated independently" is often seen when the face and rear of polygons are inverted. Perhaps, the leaf portion may be correctly displayed, and the apple may be inverted.

Material Editor will have a function to invert the face and rear of polygons when it is upgraded in July or later.

Keywords: Sprite Editor, Material Editor

Host machine for development (Manufacturer/Model No.): EPSON/DECpc

Hardware tool model No.: DTL-H500

Software tool model No.: DTL-S560

Subject: About Sound Development

Question:

Will a sound monitor, which gives off sound, be produced by individual companies? May I have samples if any?

Answer:

Sound Artist Tool (DTL-H700/DTL-S710) has a function to play back waveform data and sequence data. Playback can be performed using DTL-H200. A library attached to the development environment includes sound playback function. You may use it for playback. Please use sample programs which will be attached to the library. DTL-H2000 is a board for AT compatibles,

which will be distributed to licensees in July. A library will be included with the kit which will be delivered to you around June 10th. However, DTL-H500 cannot execute these sample programs.

Keywords: Sound, sound monitor

Host machine for development (NEWS/DOS): DOS/V

Hardware tool model No.: DTL-H500

Software tool model No.:

Subject: About Malfunction of Sprite Editor

Question:

A document tells that the right end of the entire TIM, or a cell or animation containing the lowest one pixel is not correctly displayed, and that improvements have been made on the latest version.

Seemingly, screen display is normal, and not disturbed. Nevertheless, is not screen display incorrect? I checked up using animation display, and found that the sixteenth line from the right end of TIM display is doubled.

Would you please check by yourself, and give me an answer?

Answer:

Sprite Editor performs texture mapping for quadrangle polygons so that rotation, expansion, and contraction may be performed in drawing on NTSC. At this time, the specified area is not displayed correctly unless an additional pixel is vertically and horizontally added to the texture of the specified area. However, it is impossible to designate marginal texture which includes the right end and lower end of the texture page. In reality, a texture smaller by one pixel is expanded and displayed as such. For this reason, one pixel at the center of the designated texture is overlaid, and displayed as two pixels.

In case a sprite animation or BG is displayed using the GsSortSprite() and GsSortBG() function on the target box, such a malfunction is not caused because cells which need not be rotated, expanded, or contracted are displayed using a sprite draw command.

Keywords: Sprite Editor

Host machine for development (NEW/DOS): DOS/V

Hardware tool model No.: DTL-H200

Software tool model No.: DTL-S210

Software tool model No.: DTL-S220

Subject: About Material Editor

Question:

- 1) I tried to display black pixels (transparent and opaque) within a texture properly. Black pixels were displayed as transparent in translucent processing, but they failed to be displayed in other cases.
- 2) Will it be possible to bend a texture before pasting it?
- 3) Why do colors of textures pasted to an object differ from ordinary dyed colors (e.g. white of the same tint)?
- 4) Is not it possible to perform parallel translation of textures using keys?
- 5) Is it possible to designate colors (in RGB32 gradations) in preparation of ordinary dyed colors as is possible with Sprite Editor?

Answers:

- 1) If the STP bit in a TIM file is 0, black ( $R = G = B = 0$ ) is treated as transparent. If you do not want it to be transparent, you should set "1" in the STOP bit.
- 2) Under review currently. It will be July or later if it ever becomes possible.
- 3) In light source calculations, there are differences between texture colors and characteristic colors. This is due to hardware specification. Improvements have been made on development tools to some extent, but there remain differences in colors. As a practical means, you may do as follows. Make a polygon, where you want to mix texture colors and characteristic color, into two layers. Paste a texture having transparent portions to the upper layer, and set the characteristic color to the lower layer. Then, the characteristic color of the polygon will be displayed under the transparent portions. We are planning to add a function which will enable this easily to Material Editor.
- 4) Use of keys for this purpose will not be supported because of consistency with keys used to translate objects.
- 5) We will review this problem. To enable color setting, a function, which allows selection of a color of a polygon through selection of the polygon, will be added.

Keywords: Material Editor

Host machine for development (NEW/DOS):        DOS  
Hardware tool model No.: DTL-H200  
Software tool model No.: DTL-S220

Subject: About Material Editor

Questions:

Is not the setting button for the background within the light source setting window functioning properly? The setting button sticks if the azimuth/elevation scroll bar is moved to the right end within the light source setting window. If an object is rotated using the visual point move button, polygons, which were originally unseen because they were on the rear, will be displayed in black. (This can be corrected if the object is moved from the

keyboard or by pressing the F1 key. However, this almost always happens whenever data are newly loaded.)A value for zooming can be entered, but the zooming function does not work properly.Even if smooth shading is selected, flat shading ensues if the F3 key is pressed.A warning message "Model is too large; file..." sometimes appears and sometimes does not even when the same file is tried to be loaded. Once this warning message is displayed, other RSD files fail to be loaded by and by unless Editor is reset and re-started.If the address X = 640 or less is used to load a texture, it cannot be loaded, nor operation is possible.Requests for improvement and addition of functions>Loading have to be done each time mapping is performed even when the same texture file containing the same PIXEL and CLUT addresses is used. This is very inconvenient. (I request you to add a dialogue window which allows saving of loaded textures as in polygon group control.)If saving is done after moving vertexes in "Vertex editing", that status is written to the data. Is not it unreasonable? (Is not the purpose of this function lie in movement of vortexes within Material Editor for efficient mapping?)It is absolutely necessary to display material data, such as object position coordinates, rotation angle, and scale factor, and it should be possible to enter those numerical values. (Precision is low on the NTSC screen, and editing on a pixel basis is impossible.)I want a function, which allows setting of designated polygons vertically with respect to the Z-axis.Currently, a 15-bit 640\*480 pixel TIM file is generated if "Snapshot" is used. Will not it become possible to generate a 8-bit 256\*256 pixel TIM file? (Cut images cannot loaded using Sprite Editor for editing. It is very inconvenient.)When Material Editor and Sprite Editor are used by turns, I want screen output to NTSC to be switched by turns. (As with the previous item, Editors should be cooperative with each other.)I want it possible to save the window opened within the editor and its position.A "project" between editors controlled through a path can only be edited using a particular directory composition. (As a larger amount of data are used, file management becomes more complicated.)

Question:

When will it be possible to use switches to edit two-sided polygons?

Answer:

Proper loading is impossible, and operation cannot be performed if addresses X = 640 or less are specified for loading of a texture.

Answer:

Material Editor uses 640 pixels from the left corner of VRAM in the X-direction, and 480 pixels in the Y-direction as display area. So, no texture can be located there.

Answer:

The display area and screen resolution will be expanded in future so that the user can specify them.Requests for improvement and addition of functions>Loading have to be done each time mapping is performed even when the same texture file containing the same PIXEL and CLUT addresses is used. This is very inconvenient. (I request you to add a dialogue window which allows saving of loaded textures as in polygon group control.)



Answer:

We are reviewing this problem. Now continuous texture mapping will be added, and a file will need not be re-loaded.

Question:

If saving is done after moving vortex

Question:

If saving is done after moving vertexes in "Vertex editing", that status is written to the data. Is not it unreasonable? (Is not the purpose of this function lie in movement of vortexes within Material Editor for efficient mapping?) Comments: Originally, this function was prepared to modify the shape of a model. According to our plan, a function for editing of UV should have been prepared separately.

Answer:

As you pointed out, this function can be used for editing of UV. So, we will add a function that does not change the coordinate values.

A "project" between editors controlled through a path can only be edited using a particular directory composition. (As a larger amount of data are used, file management becomes more complicated.) Following: A directory may be created anywhere as in the following:  
foo1\timfoo2\rsd foo2\tim

Question:

When will it be possible to use switches to edit two-sided polygons?

Answer:

Material Editor will support two-sided polygons when the library begins to support two-sided polygons. We will make a report according to the development of the library.

Keywords: Material Editor

Host machine for development (maker/model No.): AT compatible  
Hardware tool model No.: DTL-H200  
Software tool model No.: DTL-S220

Subject: About Conversion of Data Created by Strata Studio Pro

Question:

I am trying to convert data for which modeling is done using Strata Studio Pro, but i cannot convert them properly for dxf2rsd +Z+Y. Problems are as follows. No polygon exists where it should, a polygon is generated where it

should not, and the face and rear of a polygon cannot be fixed properly. I attach simple data converted using lha and ish. It is a thick star extruded from a plane. (Data omitted) Please teach me what to do.

Answer:

I checked the data. There are the following two problems:

- (1) Failure in rectangulation of the graphic consisting of POLYLINE
- (2) The rear and face (part) of polygons are inverted.

About (1)

POLYLINE is a format for continuous straight lines for DXF. In RSD format, it is regarded as polygons, and divided into rectangles. However, such conversion sometimes fails. Therefore, I ask you to create DXF, in which the polygon is divided into rectangles (or quadrangles) called 3DFACE, at the modeler side beforehand. Before saving DXF, perform conversion into 3DFACE in the following manner: Using Triangle Mesh Options in 3D Sculptor, perform rectangulation. If Triangle Mesh Options cannot be selected, use "Facet" and "Smooth" on the Modeling menu. If you enter 3D Sculptor, a graphic which seems to have been rectangulated appears on the screen. Rectangulation is not performed unless these options are executed. By this, you can avoid POLYLINE.

About (2)

If "lathe" is executed on Strata STUDIO, the face and rear seem to be inverted. I saved hoshi0.dxf as DXF after performing the processing (1), all the polygons were inverted. If all the polygons are inverted, you can invert all the faces using "dxf2rsd +Z+Y -back". If only particular polygons are inverted, the direction of the face of each of inverted polygons must be corrected. In this case, execute "Flip mesh faces" and "Flip polygons" in "Edit Primitive" on the Modeling menu of Strata STUDIO for such polygons. Because DXF includes no data on the face and rear, many modelers express the face and rear using the order of vortexes that appear on a DXF file. ("Flip..." reverses this order.) Therefore, designation of two-sided polygons is not effective in DXF.

Keywords: Strata Studio PRO, dxf2rsd

Host machine for development (NEWS/DOS): DOS

Hardware tool model No.: DTL-H500

Software tool model No.: DTL-S560

Subject: About ASMP5X

Questions:

1. If the source (A) is assembled, the code (A') is generated. Is this due to the specification, or is it corrected in future?

(A)	db	1, 2, 3, 4, 5
	db	1, 2, 3, 4, 5

(A')

00000000 04030201 05

If the source (B) is assembled, an error (B') occurs. Is this due to the specification, or is it corrected in future?

(B)

db (1<<7)

(B')

TEST.S(2): Error: Syntax error in expression

db (1<<7)

Answers:

ASPSX uses strict syntax. If an unnecessary blank is put, what follows that blank is regarded as a comment.

e.g. db 1 this is a comment

As an exception, a blank after "," is regarded as a blank.e.g.

db 1, 2, 3

(i) To have the blanks ignored, enter the following in the file:

opt ws+

(ii) Otherwise, designate /ows+ option in asmpsx before assembly. In either case, a comment will have to be demarcated with ";".

Keywords: asmpsx

Host machine for development (NEWS/DOS): DOS/V

Hardware tool model No.: DTL-H500

Hardware tool model No.: DTL-H500C

Hardware tool model No.: DTL-H500C

Software tool model No.: DTL-S560

Software tool model No.: DTL-S510

Software tool model No.: DTL-S510A

Subject: About Sprite Editor

Questions:

Will controllability of Sprite Editor be improved?

- 1) Will the functions for color masking and selection of thickness of lines in dot drawing, and tools necessary for sprite drawing (dot illustration) such as spray and tiles added in future?
- 2) Currently, it is possible to copy a palette. Will it become possible to move the palette (exchange of selective palettes and overwriting without destroying position data in dot drawing)?
- 3) Is it possible to form a plural number of TIM data drawn in 16-color mode into one 256-color TIM data?
- 4) If a cell is placed at the left top corner in mapping on the map display

screen, the display data for the portion where the cell is placed is displayed all over the TV screen, and no other cell data are displayed.

Answers:

- 1) We are planning to enable change of thickness of lines. However, we have no plan to add the mask function, spray and tiles, etc.
- 2) We are planning to add the function for movement of a palette.
- 3) It is impossible because conversion from 16-color mode to 256-color mode is not supported.
- 4) I suppose you placed a cell on the left top corner of the cell display window. Because map data are zero (the value indicating the cell on the left top corner of the cell display window) in the initial status, if a cell is put on the left top corner of the cell window, the data for that corner are displayed on the entire map window. Therefore, if a cell is registered on the left top corner of the cell display window after editing is done for the map bank 1 and subsequent map banks and nothing is edited in the map bank 0, the TV screen will be filled with such cells. If you perform editing in the map bank 0, or turn off 0 for the transfer map bank, the map under editing will be displayed.

Keywords: Sprite Editor

Host machine for development (NEWS/DOS): DECpcLpx466d2

Hardware tool model No.:

Software tool model No.: DTL-S210

Subject: About Graphics Artist Tool

Questions:

The "-quad" option in "dxf24sd.exe ver2.3" seems to be invalid. Even if this option is selected, a quadrangle is divided into two triangles. I am using "Form-Z" as modeling tool. Sometimes, a warning message "Fail to triangulate!" appears, and some polygons in the generated RSD file are missing. What does this message mean, and what should I do in such a case?

Answers:

Concerning the failure in correct output of quadrangles, count the number of polygons in the converted RSD by entering "dxf2rsd -v..." in each case in which "-quad" is selected, and not selected. Even if quadrangles are correctly generated, they are displayed as triangles on Material Editor. (Improvements will be made on Material Editor in upgrading of the version in July.) "Fail to..." appears when shape expression for DXF called POLYLINE is converted. In POLYLINE, continuous straight lines constitute a polygon. In RSD format, it must be divided into rectangles (or quadrangles). In some cases, rectangulation fails. So, designate another expression (triangles or quadrangles) called 3DFACE when you are going to output DXF using Form Z. In the dialogue displayed when you select DXF in "Save as", click the "Export All Faces As 3D Faces" button. (If you further check "Triangulate Faces", all the faces will be divided into triangles.) In case of POLYLINE, a quadrangle is divided into triangles even if you select "-quad" as you pointed out in the first

question. In this case, create DXF using 3DFACE rectangles.

Keywords: dxf2rsd

Host machine for development (maker/model No.): DEC/LPx 466d2

Hardware tool model No.: DTL-H200

Software tool model No.: DTL-S210

Subject: About Objects for MIME

Questions:

I tried to test MIME, but I am at a loss because the number of normals varies in each pause. I created data in the following manner. First, I created each pause using commercially available modeler, converted it into a DXF file, and then converted it into an rsd file. Up to this point, the vortexes of each pause have complete correspondence. These rsd files were loaded into Material Editor, and specified smooth shading for all the polygons, and then specified flat shading for some particular polygons. (I wanted to express part of the object as flat.) Those steps were followed for all the pauses.

However, it is impossible to create a data file for MIME from those pause data because the number of normals varies in each pause. I used the group control function of Material Editor to select polygons which should undergo flat shading, and created similar group files for all the pauses. Therefore, designation (flat or smooth) of shading for each polygon should have the same structure in each pause. The above procedure may be wrong, but what should I do? Please reveal a good idea (or tool) to me.

Answers:

I verified a phenomenon that normals lose correspondence when data are loaded into Material Data. (It seems that processing for smooth shading is executed.) We are now reviewing this problem so as to assure correspondence. In principle, MIME processing is impossible unless correspondence is secured because MEME processing is simple interpolation. However, fimefilt, which were delivered to you, generates a correct vortex differential file even if correspondence of normals are incorrect so far as the vortexes have correct correspondent relations. Use the \*/vdf file only without using the wrong \*.ndf file, and use the following function as comment-out:

```
main ()
{
    ...
    set_nromal_mime_data ();
    ...
    normal_mime ();
    ...
}
```

Keywords: MIMe

Host machine for development (maker/model No.): DEC/DECpc466

Hardware tool model No.: DTL-H500

Software tool model No.: DTL-S560

Subject: About MOVCONV.EXE

Questions:

I have the following questions about MOVCONV.EXE in CDROM, which was delivered to me the other day.

(1) When I tried to convert a non-compressed AVI file using MOVCONV, a message "Bad image size in RGB mode (160 x 120)" appears, and conversion failed.

(Then, a system error occurred, and I was asked to close the application.)

(For conversion, I used data attached to Tech LOGIN CDROM#2.  
\\TECH2\2\_VFW\CH2\COMPRESS\8\_FULL.AVI 1, 087, 702 94-02-07 6: 06)

What restrictions do the image size have in conversion?

(2) Is there any plan that this tool will handle QT format of Mac? Is there any existing tool which converts Mac QT into non-compressed AVI?

(3) I want to compress a still picture, and hold it on CDROM or RAM. What tool or library can I use for this purpose? (The original format of the still picture is MacPICT or BMP.)

Answers:

1) Help fails to give full explanations, but encode for MDEC must be a multiple of 16 both vertically and horizontally.

2) For the time being, there is no plan to have NovConv directly support QT format. Format conversion between QT and AVI can be performed on Mac using the converter attached to Video For Windows as a standard device. Using the Windows version of adobe Premiere, a QT file can be directly loaded. Currently, it is impossible to convert only one still picture. We are thinking of adopting such a function in the next upgrading of the version (7/1, or 8/1).

Keywords: MovConv

Host machine for development (NEWS/DOS): DECpcLPx

Hardware tool model No.: DTL-H200

Software tool model No.: DTL-S220

Subject: About Tools

Question:

Can I use data, whose form has been changed after vortex editing with ORM-Z, for MIMe without any trouble? Do DXF format data generated using Kouei-produced Cyclone have interchangeability with DXF data generated using FORM-Z? I am thinking of purchasing FORM-Z. Please answer my questions as soon as possible.

Answers:

If only the vortexes are to be moved, any modeler will enable use of MIMe. However, a modeler, which has only such a high function that it automatically insert vortexes for smoothness as the form is being changed, cannot perform MIMe. Form-Z seems to be suitable for MIMe because it has a function which can change the form without changing the number of vortexes. However, you must take care in operation not to allow one vortex put on another as if they were one vortex. I am not sure because I have only a test version of Cyclone Solid at hand. However, Cyclone seems to have high interchangeability because the on-line manual tells that data can be converted into 3DFACE format DXF by the converter. (Form-Z sometimes fails to read DXF of POLYLINE format correctly.) However, a problem that the face and rear are inverted may arise. (You will have to invert polygon faces.)

Keywords: MIMe, Form-Z, Cyclone, DXF

Host machine for development (maker/model No.): DEC/DECpc466

Hardware tool model No.: DTL-H500

Software tool model No.: DTL-S560

Subject: About LibPress

Questions:

I want create data (compressed image data) which can be used with LibPress. I am at a loss because no compressed library function is supported. I would like to ask the following questions:

- (1) When an image data (still picture) compression tool will be released? -  
I have 2000 to 3000 still pictures of 544x400 dots. It is a hard job for me to manually process each still picture using Movconv. I would be much obliged if I could use a tool which can be entered from a DOS command line.
- (2) If such a tool is to be distributed much later, is it possible to write a compression tool by myself? (Naturally, I will not be able to write such a tool unless I can have a document because the details of compression format are unknown.)
- (3) In connection with the above questions, Movconv seems to be able to

convert images in a QT movie only. How should I convert voice attached to the movie?

I will be much obliged if I can have a tool which can convert images and voice at one time.

Answers:

(1) The function for conversion of one still picture at one time will be available in the new version of MovConv released in August 1st. (It may be released earlier than scheduled because we have many such requests.) We have no plan to release a conversion tool that runs on DOS. You can convert two or more files using MovConv if you enter the following so that Movconv can recognize filenames as a row of still pictures:

```
...
xx0045.tim
xx0046.tim
xx0047.tim
...
```

(2) You will not be able to do so because the details of compression format are not publicized.

(3) Conversion of voice will become possible in the new version to be released on July 1st. Then, you will be able to convert an avi motion picture with voice into PlayStation Movie. For this purpose, ADPCM encoding will be performed for voice. (MovConv is not intended for use with QT. For conversion from QT, you have to use a converter attached to "Video For Windows", or any other converter.)

Keywords: LibPress

Host machine for development (maker/model No.): DOS/V, PS/V

Hardware tool model No.: DTL-H500

Software tool model No.: DTL-S510B

Subject: About TMD Format

Questions:

I suppose the following steps are followed when creating a polygon object using 4-bit (8-bit) texture:

- (1) To generate a modeling data using Home G, etc.
- (2) To convert dxf data into rsd data.
- (3) To generate texture data using Sprite Editor (produced by Sony)
- (4) Paste the texture using Material Data (produced by Sony)
- (5) To generate tmd data using rsdlinkOn which stage are CPA (VRAM coordinates of CLUT), TSB (texture page), and other numerical values for composition of packet data in the primitive part of the tmd data determined? In Sprite Editor, there is no setting item for determination of the CLUT position. In Material Editor, texture cannot be read into the area from 0



to 40 on the x-axis and from 0 to 480 on the y-axis. I am at a loss what to do.

Answers:

These values are set in the header of a TIM file. They are specified when data are converted using an option such as rgb2tim, or changed using timpos. You can enter these values on Material Editor when a texture is loaded, but the TIM file is not preserved. You have to make changes using timpos later. Generally, appropriate RAM assignment must be performed because TMD uses two or more textures. You should think that this can be performed when all the textures have been confirmed, or immediately before rsdlink. Determine VRAM assignment using timpos immediately before rsdlink. (Ordinarily, texture data are placed in  $x \geq 640$ , and CLUT is placed in  $y \geq 480$ .) These values need not be the same values set in Material Editor. rsdlink searches the RSD file to find a texture file, and sets CBA and TSB for TMD.

Keywords: TMD

Host machine for development (NEWS/DOS): DOS

Hardware tool model No.: DTL-H200

Software tool model No.: DTL-S210

Subject: About Video Output of Sprite Editor

Question:

Using Sprite Editor, I generate 320 x 240 graphics. When the data are output to the video from Artist Board, about one fourth at the right end is cut off. What should I do to output the entire screen?

Answer:

You can create only a 256 x 256 (or smaller) image using Sprite Editor. If an image of the greater size is loaded, it is divided into two or more banks. Artist Board only outputs image data in the currently active bank. If you load 320 x 240 data, about one fourth at the right end is cut off because an image having the size of 256x256 or smaller can be displayed at one time. Output of image data having the size of 256x256 or more is not supported. By saving data read into multiple banks to the cell map, data having the size of 320x240 can be virtually displayed, but response speed in image editing will be extremely reduced.

Keywords: Sprite Editor

Host machine for development:

Hardware tool model No.: DTL-H

Software tool model No.: DTL-

Subject: About 3D Tool

Questions:

Please answer the following questions:

1. We are trying to find a tool suitable for 3D modeling/animation. Would you please teach us addresses which we can contact to purchase a tool you may kindly recommend for DOS/V? 2.

In conjunction with 1 above, we are collecting information on "3D Studio" produced by Autodesk. We converted a DXF file, which Autodesk sent us, using "3D STUDIO", the following error message appeared:

```
dx2f2rsd -info b1_r12.dxf
```

(C) 1994 Sony Computer Entertainment Inc. All Rights Reserved.

Input DXF file: b1\_r12.dxf

WARNING: LAYER is ignored (line= 84)

WARNING: Unknown DXF code: 134("134") line=231

WARNING: Unknown DXF code: -8("-8.880890") line=239

Unexpected EOF:

TABLES "30" line=240

I cannot find whether the tool has a defect, or the file has dust.

3. I executed "Layout.exe" from File Manger, and started a demonstration program for "Hand" as described in LAYOUT.TXT dated July 1st. However, "Key Recorder" dialogue failed to appear. Did I made a mistake in installation? Once again, please teach me how to install Layout Tool.

Answers:

1) There are few 3D modelers that run on DOS/V. It is possible to convert DXF files which are output from any of the following modelers:

Sculptura Rober McNeel & Association

Phone: (206) 547-7000, US

Fax: (206)547-7321, US

Alias UpFront

Focal Point Computer Co., Ltd.

Phone: 03-5484-0147

Cyclone Solid

Kouei Co., Ltd.

Phone: 045-561-6861

To our disappointment, these are not intended for games. So, we cannot recommend any. Recently, Caligari, of Canada, released a 3D integral environment called "trueSpace. It has some problems when used for games. However, the version will be upgraded within the year.

2) We tried a sample for 3D Studio. A similar error occurs due to an empty line in the DXF file. We do not know why there is such an empty line. We think conversion will be possible if you write something (anything) on that line. Also, see if DXF contains a "POLYLINE" line. Currently, dx2f2rsd can convert DXF containing POLYLINE, but the face and rear of polygons are sometimes inverted. You can convert DXF correctly if it contains a "3DFACE" line instead of a "POLYLINE" line. We think that 3D Studio allows designation to output 3DFACE, but we are not sure. I recommend you to contact Autodesk for confirmation. If it is impossible to output 3DFACE, then the current version of

dx2rsd cannot perform conversion to our disappointment.

3) The currently available Layout Tool has the layout function only, and it has no animation function. Therefore, you cannot use the "Key Frame Recorder" dialogue as yet. Keywords: Modelers, dx2rsd

Host machine for development (maker/model No.): DEC Japan/DECpc XL  
466d2

Hardware tool model No.: DTL-H500

Hardware tool model No.: DTL-S510B

Subject: About Conversion of SOFTIAMGE File into RSD File

Questions:

When a file generated using SOFTIMAGE is converted by entering a soft2Sony (DTL-S260) command, the following inconveniences are encountered because the version is @RSD940101:- If there is no material designation, conversion is suspended halfway when RSDFORM.EXE is executed.

Contents of imo4.mat

@MAT940101

#

# Number of Materialberof ate

# Material list

# M

Output message

(C) 1994 Sony Computer Entertainment Inc. All Rights Reserved.

WARNING: "imo4.rsd" is old.

Converting to new version.

WARNING: "imo4.ply" is old.

Converting to new version.

WARNING: "imo4.mat" is old. Converting to new version.

- Only .RSD and .PLY files are created.

- To convert a file into a TMD file using RSDLINK.EXE, I have to load and save it using Material Editor with the version designated as @RSD940102.

- When RSDLINK.EXE is used the contents of a generated TMD file differ from @RSD940101 and @RSD940102.

@RSD940101 72256 (converted using soft2Sony)

@RSD940102 49368 (The file was loaded and saved using Material Editor.)

I do not specify any option for conversion using soft2Sony. Can I use an option for RSDFORM RSDLINK? Do you have any plan to solve the above problem in any future version of soft2Sony?

Answers:

We will give a solution to the above problem in the next versions (to be released on August 1st) of RSDORM and RSDLINK. For the time being, please

use Material Editor in combination. We have no plan to upgrade the version of soft2Sony currently.

Keywords: soft2Sony

Host machine for development (maker/model No.): apple/Centris650

Hardware tool model No.: DTL-H700

Software tool model No.: DTL-S710

Subject: About Operation of DHL-S710

#### Question 1

A problem arose in SEQ playing using DHL-S710. A malfunction was confirmed in SoundDelicatessen Ver 1.0.0 through 1.0.2. When a particular sequence was played using SoundDelicatessen, I found a malfunction that reproductivity was extremely high.

(1) VAB tone set was set as follows:

Prog	#tone	name
14	FatSAW	15

FastSAWIn either case, the setting of "Tone" was the same, and the same VAG was used.

(2) I used multiple channels (two tracks for verification) utilizing the above program (tone) on the MIDI sequencer, and described total four bars of a troll consisting of dotted eighth notes in quarter measure. Suppose "-" stands for a sixteenth note, and voice is given off. (In this example, the music piece was played legato.) The music piece was played from left to right. "=" stands for no tone.

(MIDI Channel 2: Program 14)

G-4		----	F4	E4
E-4	F4	D-4		

(MIDI Channel 3: Program 15)

G-4		----	G	E4
E-4	D4	D-4		

(3) When the above sequence is played, the following malfunction occurs:

When E4 in Channel 2 is noted off, E4 in Channel 3 is also noted off through it should not. If the same condition takes place, what follows E4 are also noted off.

It seems that sound is muted regardless of the MIDI Channel (Track) when SoundDelicatessen tries to note off a scale which is being played by the same VAG. Such trouble does not arise when another VAG is assigned. I suppose channels and synthesizer ordinarily control in concert. It can be a mistake on my part. For your reference, I am attaching a dump list of SEQ. The results of

my analysis show no malfunction. Please give me advice.

```

00000000      01      80      07      A1      20      04      02      00-C1
      0E      00      C2      0F      00      91      4C      *division,
tempo..000000105B      82      20      92      4C      5B      86
      60-91  4C      00      00      4A      5B      81      40      *offset 8
-> Seq. ?00000020      4A      00      00      4C      6E      60      92
      4C-00  00      4A      5B      60      91      4C      0000000030
      00      4D      49      60      92      4A      00      00-4C  6E
      81      40      4C      00      00      4D00000040      49      82
      20      91      4D      00      00      4D-49  82      20      92
      4D      00      00      4D00000050      49      82      20      91
      4D      00      00      4F-49  82      20      92      4D      00
      00      4F00000060      49      60      91      4F      00      00
      4C      5B-82  20      92      4F      00      00      4C
      5B00000070      89      60      91      4C      00      00      92
      4C-00  00      FF      2F      00

```

I also found a phenomenon in which NoteOn was not performed. This seems to have occurred under the similar conditions.

Question 2 title: about development support materials DHL-S710/S700

I found many parameters whose meanings I cannot understand. I also found many numerical values whose upper and lower limits and notation (Dec or HEX) are not specified. If possible, would you please furnish me with a detailed development materials?

Answer to Question 1:

We conducted a similar test, and we also found trouble as you pointed out. It seems to be a bug in the sound library. We will fix it as soon as possible. In the next version (July 18) of Sound Tool, the bug will be removed. The problem is solved in DTL-S21xx attached to DTL-H2000.

Answer to Question 2:

We must apologize to you for supply of the incomplete tool manual. We are preparing tool documents. Please wait for some time. In upgrading of the version in August 16, an on-line document will be uploaded.

Keywords: DTL-S710, SoundDelicatessen

Host machine for development (maker/model No.): PS/V Model 2410

Hardware tool model No.: DTL-H700

Software tool model No.: DTL-S710

Subject: Failure in Conversion of 8-bit AIFF Data

Questions:

(1) Is it possible to convert 8-bit (sampling frequency: 11kHz) AIFF data?  
(When will it become possible?)I tried to convert 8-bit (sampling frequency: 11kHz) AIFF data using AIFF2VAG, a message "Only 8-bit/16-bit sample can be converted." appeared, and conversion failed.

(2) I want to convert a large quantity (about 1000) of 8-bit audio into VAG format using AIFF2VAG. I want to have a function which allows batch processing or conversion of the entire folder. Can I have such a function?(I do not mind if such function is provided using a combination of existing tools.)

Answers:

(1) We are very sorry. It is a bug in the error message.As described in the document source data for the converter are fixed at 16 bits. This is due to the specification of the sound chip SPU installed in PlayStation. Resolution for other than 16 bits is not supported.Please generate all data in 16-bit length.If necessary, you can create a tool which converts 8-bit data into 16-bit data inside the converter, and then converts them into VAG. (The rate of compression is adversely affected because data are equivalent to 16-bit data.)

(2) You can use the drag & drop function for the current converter, but you are asked a filename.We will review this problem further because we can employ a method in which conversion will be performed with an extension ".vag" attached automatically.If such changes are made to the specification, you will be able to select multiple files, and convert them at one time.

Keywords: AIFF, AIFF2VAG

Host machine for development (maker/model No.): DEC/Lpx 466d2

Hardware tool model name: DTL-H200

Software tool model name: DTL-S210

Subject: About Shading of Polygons

I have a question about shading of polygons. If the case in which light source calculations are not performed (set to fixed colors) is compared with the case in which flat or smooth shading is performed, to what degree the former is favorable (how much processing is lightened)?I will use objects, such as mountains and buildings, whose faces do not move with respect to the light source.If bright fixed colors are given to the faces exposed to the light, and dark fixed colors are given to the faces not exposed to the light, the same effect as light source calculations can be obtained.However, it is almost impossible to set colors shaded manually.I request you to provide a function which sets fixed colors to polygons according to the direction of the light set using the light source menu of Material Editor as if shading were performed. It would be wonderful if I had a function which sets colors of polygons (to gradation colored polygons if smooth shading has been performed) to shaded colors (colors as they are displayed on the monitor) by pressing a button after colors of an object have been set using Material Editor.This may be a request rather than a question, but please give a due consideration to it.

Answers:

If light source calculations are to be performed for each frame, the following disadvantages will be involved:

- Frequency of memory access increases (because you have to rewrite the r, g, and b fields of primitives for each frame).
- A load on GTE increases. The influence will be especially great in case of smooth shading polygons. In some cases, the speed will be about 30% slower if light source calculations are performed. We will make changes to the specification of Material Editor, and we will be able to meet your request in the new version to be released on August 1st.

Keywords: Polygon, shading, Material Editor

Host machine for development (maker/model No.): DEC/DECpc LPx 466d2

Hardware tool model No.: DTL-H500

Software tool model No.: DTL-S560

Subject: About Material Editor Ver 1.5

Question:

I cannot do settings for two-sided polygons. I checked an outfile ".mat", and found that the flag remained to be 0. Example:

```
0      2 F T 0 0 0 47 46 134 -33
```

I expected this.

```
0    0 f T 0 0 0 47 46 134 -33
```

However, the result was this.

Material Editor did not seem to display two-sided polygons.

Answer:

A library for drawing of two-sided polygons will be released in early September. We will enable Material Editor to generate two-sided polygons as the library is released.

Keywords: Material Editor

Host machine for development (NEWS/DOS): DOS/V, MAC QUADRA840AV

Hardware tool model No.: DTL-H200, DTL-H500, DTL-H500C, DTLH-700

Software tool model No.: DTL-S210, DTL-S510A, DTL-S510B, DTL-S560

Subject: About Software for Sound Development

Question:

I have a question about waveform editing software. I am thinking of purchasing "Alchemy" because I happened to find it in a certain store. Can this software program read and process PCM data loaded into a Mac model? (I asked a clerk of the shop, but he answered he did not know.) I am using 840AV, but has no any other special sampler, etc. So, I want to use Mac for sampling and processing. If "Alchemy" does not allow this, will I have to have "AudioMaterial" or any other hardware set? Please answer my question.

Answer:

It is possible to perform waveform editing using Alchemy and the voice input device in Quadra 840AV. Because Alchemy has no recording function, voice has to be entered using the standard voice input function (by using "Add..." in "Sound" on the control panel) of Macintosh. Then, you have to follow complicated steps. That is, you double-click the "System" file in the system folder, and drag the sound resource file out of the folder, and open the file using Alchemy. The A/D converter attached to the machine is not of high quality. We recommend a sampling tool "AudiomediaII". Alchemy is used by many customers because it has excellent re-sampling and looping functions. You can get the most out of Alchemy by using a sampling tool such as "AudiomediaII" in combination.

Keywords: Sound, Alchemy, AudioMediaII

Host machine for development (NEWS/DOS): DOS/V (DEC 466LPx)  
Hardware tool model No.: DTL-H500  
Software tool model No.: DTL-S510B

Subject: About PlayStation Tools

Question:

Please answer the following questions:

1. About PlayStation Controller

I am trying to devise a command input method in a fighting game. The "+" button on the controller released in the past is divided into four parts. In an answer to a certain question, you said, "A cover will be put on the "+" button, and the four parts of this "+" button will be connected. I touched a mock-up in a seminar opened previously, the "+" button was linked inside the controller. Will not a cover be applied at all, or will it be an option?

2. About development devices

In connection with the question I placed on May 24th, please teach me a recommended hard disk model to be connected to the CDROM emulator.

3. Will you please reveal the date of release of the PSX board of the programming tool if it is fixed?

Answers:

1. Changes have been made to the specifications because of license and design. We apologize to you for furnishing incorrect information.



2. CD-ROM Emulator is developed to meet particular SCSI HD models produced by particular makers. We cannot let you know the usable HD models as yet. We will announce them when arrangements have been made. I recommend you to refrain from purchasing HD for CD-ROM Emulator until then.

3. It will be relapsed around the end of July.

Keywords: Controller pad, CD-ROM Emulator, PlayStation Board

Host machine for development (maker/model No.): DEC/DECpc466

Hardware tool model No.: DTL-H500

Software tool model No.: DTL-S560

Subject: About Malfunction of MOVCONV

Question:

I reported you that the file I sent to you the other day caused noise. Particular noise seems to be put into certain vertical and horizontal portions. Noise is inserted if the size is great. So, you may have verified it. The problem is that colors of images displayed on the screen are different from those of the original images when I regenerated a file converted using MOVCONV utilizing the sample program. I found that dark yellow to brownish images are regenerated as purple images. I am not certain what is wrong because I cannot know the data structure. I want to send a file by mail, but I cannot save it to a floppy disk because the original data are too great in quantity. Data for Q-Time are small in quantity...

Requests: I am experimenting on conversion of various data. However, the size of most data are not a multiple of 16. So, as you requested earlier, please perform conversion according to a multiple of 1. Most of data currently not supported are the following data related to sound:

CHANNELS	MONO	SAMPLE SIZE	8BIT	FREQUENCY
11.025kHz				

I would be glad if those data were supported first if you do not mind. If data whose quantity is 10 M-bytes in Q-Time are expanded to 100 M-bytes if they are converted into 24-bit AVI file using VFW. I want to convert them at one time, but it is practicably impossible. Please take some means. It takes one minute per M-byte for MOVCONV to convert a file. If the file size is 100 M-bytes, I will have to wait for 100 minutes. I hope you will consider increase of speed.

Answers:

We are testing the test you sent to us. Please wait for some time. Concerning failure in color conversion, will you please send us Q-Time data? If you did not do something special in conversion from Q-Time, we will be able to convert them. Our comments we can currently make on your requests are as follows:

- We are planning to install a function you advised on data whose length is

not a multiple of 16. (Time of installation: August or later)

- Concerning sound, a function for conversion from AVI with voice will be added to the version to be released July 18th or August 1st. An AVI file having a 44.1-kHz and 16-bit will be supported first. It will be converted into 37.8-kHz pitch, and mixed with image track compressed to meet MDEC after ADPCM encoding. No sound will be given off unless the function is loaded into CD-ROM. Reproduction is impossible with DTL-H2000 and earlier.
- Currently, we have no plan concerning the quantity of data. We will review this problem further.
- We are planning to increase conversion speed by and by.

Keywords: MovConv

Host machine for development (maker/model No.): TSUKUMO/TS-9900

Hardware tool model No.: DTL-H500

Software tool model No.: DTL-S590

Subject: About MIMEFILT.EXE

Question:

Is it possible to use MIMEFILT.EXE for data created using the "-quad" option in DXF2RSD? I tried to create a finite difference file using those data, but finite differences of normals were not produced.

Answer:

You can use it for quadrangular polygons. I no ".nd" file was generated, make sure that you selected "-n" option. No finite difference file for normals are generated by default. If a .ndf file is generated, but it has no content (only 4-byte header), there may be no difference in normal data. Check the number of finite difference normals using "-v" option. The latest version of mimefilt.exe is version 1.2. Please use it.

Keywords: mimefilt, dxf2rsd

Host machine for development (NEWS/DOS): COMPAQ ProSignia 486/66-1050

Hardware tool model No.: DTL-H500

Software tool model No.: DTL-S510B

Subject: About Sprite Editor, etc.

Questions:

1. Is there any method which I can employ to display and synthesize multiple TIM files for editing? If not, is there any alternative means?
2. Is there any method which I can employ to convert a TIM file into a PICT

file? If not, is there any alternative means?

Answers:

1. Currently, there is no method which allows you to synthesize multiple TIM files for editing. An alternative means will be to convert multiple TIM files into BMP format, and synthesize and edit them using any other appropriate paint tool.
2. The file converter for WINDOWS to be released on August 1st will support conversion from TIM to PICT.

Keywords: TIM, PICT

Host machine for development (maker/model No.): Maha posya

Hardware tool model No.: DTL-H500

Software tool model No.: DTL-S510A

Subject: Output Data of Layout Tool

Questions:

I understand that Layout Tool acquires model data, arranges them visually, and converts them to data format that can be handled by a program. However, the document attached to Layout Tool (released on July 1st, 1994) does not describe how data generated by Layout Tool are handled by a program. When I lay out an object using Layout Tool, the following file group is generated:

Hierarchy file (HRC)      Sequence file (ACT)  
Light file (LHT) Camera file (CAM)      Model file (RSD)

They seem to be text files. Are they made into binary files by conversion to allow a program to handle them? What data format is used then? All that I know now is to use an RSD file. Please teach me the format of those output data, and how to use them. I would be glad if you would kindly show me a sample program using those data.

Answers:

As the on-line manual describes, access in a program is enabled if you convert layout and animation data into TOD format. The TOD format is a binary format which enables access to layout and animation data from a program. TOD data can be generated by "export" on file menu of Layout Tool. Otherwise, you can convert an HRC file into a TOD file using the converter "mktod" which was released in BBS earlier. The details of format and library for access are described in the manual for the programming tool. The manual for the format is as follows:

Animation File Format      (TOD Format)

Sony Computer Entertainment

March 6, 1994.

What Is an Animation File (TOD Format)

An animation file (TOD format) is used to set information on 3D objects according to the elapse of time. It meets the expanded graphics library

"libs". This file contains necessary data on 3D objects which are generated, changed, and extinguished in each frame of a 3D animation (supposed to consist of consecutive frames). In this file, data on each frame are arranged according to the elapse of time. The details of the animation file (TOD format) are discussed in the following:

2. Overview of Animation File There are 2-word (64-bit) file header at the start of the animation file. The file header includes the following information:

- file ID (8 bits) 0x50 An ID which indicates an animation file
  - version (8 bits): 0x00, originally Version of animation
  - resolution (16 bits) Time during which one frame is displayed (Unit: Tick = 1/60 sec.)
  - number of frames (32 bits) Number of frames described on a file
- Frame data follow the file header. As described above, these frame data are arranged according to the time series.

(See Fig. 1.)

MSB  
LSB  
32 bit  
resolution  
version  
file ID  
number of frames  
Frame 1  
Frame 2  
Frame 3  
Frame 4  
Frame 5  
file header

Figure 1. Animation File Format

3. Frame Figure 2 shows the composition of data arranged according to the time series in each frame. There is a 2-word frame header at the start of each frame. It contains the following information:

- frame size (16 bits) Size of frame data (including header) in words (4 bytes)
- number of packets (16 bits) Number of packets
- frame number (32 bits) Frame No.

Packets follow the frame header. Each packet consists of one-word packet header followed by packet data. (See Figure 3.) There are various types of packets. The size of data in each packet is not always the same whether or not the type of the packet differs.

MSB    LSB  
32 bit

number of packets  
frame size  
frame number  
packet header  
packet data  
packet header  
packet data  
frame header  
packet

frame

Figure 2. Frame Format

Let us see the details of the data format for packets.

4. Packets Each packet is composed as shown in Figure 3. The header of the packet includes the following information:

- packet type (4 bits)      Type of packet data
- flag (4 bits)              Meaning differs from one packet to another.
- packet length (8 bits)    Packet length (including the header) in words (4 bytes)
  
- object ID (16 bits)        ID of the object in question

MSB    LSB31   0  
32 bit  
packet length  
packet type  
object ID  
packet data  
packet header

Figure 3. Packet Format

An object means a 3D object (GsDOBJ structure) handled by libgs, in which packet data are reflected. Packet length is described in words (4 bytes). Various types of data, such as the RST value of a GsCOORDINATE structure, and TMD data ID, are described as packet data. "Packet type" described in the packet header indicates the type of the packet. The meaning of the flag described in the header differs with the packet type. The composition of packet type differs with the packet type and flag. The packet type is designated as follows:

- 0000    Attribute
- 0001    Coordinate (RST)
- 0010    TMD data ID
- 0011    Parent object ID
- 0100    Matrix value
- 0101    TMD data body
- 010     Light source
- 0111    Camera
- 1000    Object control
- 1000 - 1101: User defined
- 1110    Reserved
- 1111    Special command

The details of each packet type are described below:

#### 4.1 Packet type: Attribute (0000)

If packet type is "Attribute", attribute for the GsDOBJ structure is set. In this case, the flag is not used at all.

Composition of Packet Data for "Attribute" In case packet type is "Attribute", packet data consist of two words. (See Figure 4.) The first word is a mask that indicates the portions where values should and should not be changed.

"0" is set in the bit correspondent to the item to be changed, and "1" is set in the bit correspondent to the item not to be changed. In the second word, new data are put in bits correspondent to the items to be changed, and "0" is set in all the other bits. Notice that the default value to be set in the bits which should not be changed is "1" for the first word, and "0" for the second word. Each bit in the packet data in the second word shown in Figure 4 has the following meanings:

Bit (0) - bit (2)	Material attenuation (0 - 3)	- 00	Material attenuation 0
		- 01	Material attenuation 1
		- 10	Material attenuation 2
		- 11	Material attenuation 3
Bit (3)	Lighting mode 1	- 0	Flag off
		- 1	Flag on
Bit (4)	Lighting mode 2	- 0	Material on
		- 1	Material off
Bit (5)	Lighting mode 3	- 0	Use lightning mode
		- 1	Use default lightning mode
Bit (6)	Light source	- 0	Light source calculation off
		- 1	Light source calculation forcibly
Bit (7)	Operation upon overflow	- 0	Z overflow clip
		- 1	Z overflow not clip
Bit (8)	Back clip on/off	- 0	Back clip on
		- 1	Back clip off
Bit (9) through bit (27)		Reserved (0: Initialized)	
Bit (28) through bit (29)		Translucency rate	
		- 00	50%
		- 01	100% added
		- 10	50% added
		- 01	25% added
Bit (30)	Translucency	- 0	Off
		- 1	On
Bit (31)	Display	- 0	Displayed
		- 1	Not displayed

For instance, light source calculation is forcibly turned on, packet data will be as shown in Figure 5. "0" is put in the bit (6) in the first word to indicate that changes are made concerning the light source, and "1" should be put in the other bits to indicate that no changes should be made concerning the light source. Therefore, the first word will be 0xffbf. "1" should be put in the bit (6) in the second word to indicate that light source calculation should be forcibly turned on, and the default value "0" should be put in the other bits to indicate that the value should not be changed. Therefore, the second word will be 0x0040.

Packet Data with Light Source Calculation Forcibly On

## 4.2 Packet Type: Coordinate (RST)

(0001) In case packet type is "Coordinate (RST)", coordinates for the Gs DOBJ structure are set. In this case, the flag has the following meaning:  
(See Figure 6.

translation      scaling   rotation   matrix type

Figure 6. Flag for Coordinate (RST)

- matrix type	Type of RST matrix
- 0	Absolute value
- 1	Finite difference matrix from the previous
frame	
- rotation	Rotation (R) flag
- 0	Not set
- 1	Set
- scaling	Scaling (S) flag
- 0	Not set
- 1	Set
- translation	Parallel translation (T) Flag
- 0	Not set
- 1	Set

The composition of packet data varies with the values in the rotation, scaling, and translation bits in the flag as shown in Figure 7. In the figure, Rx, Ry, and Rz stand for the X-axis, Y-axis, and Z-axis components of the rotation angle, respectively. Similarly, Sx, Sy, and Sz stand for the X-axis, Y-axis, and Z-axis components of scaling, and Tx, Ty, and Tz stand for the x-axis, y-axis, and z-axis components of parallel translation.

(a)	Flag: 1110 or 1111	Rz	Sy	Rx	Sx	Ty	Ry
		Sz	Tx			***	
		Tz					
(b)	Flag: 0110 or 0111	Rz	Sy	Rx	Sx	***	Ry
		Sz					
(c)	Flag: 1010 or 1011	Rz		Rx		Ty	Ry
		Tz	Tx				
(d)	Flag: 1100 or 1101		Sy		Sx		***
		Sz	Tx		Ty		
		Tz					
(e)	Flag: 0010 or 0011			Rx			Ry
		Rz					
(f)	Flag: 0100 or 0101		Sy		Sx		***



Figure 7. Composition of Packet Data for Coordinate (RST)

#### Type 4.3 Packet Type: TMD Data ID (0010)

In case packet type is TMD data ID, the modeling data (TMD data) which substantiate the object concerned are set. In this case, no flag is used. Packet data should be two-byte TMD data ID. (See Figure 8.)



Figure 8. Composition of Packet Data for TMD Data ID

#### 4.4 Packet Type: Parent Object ID (0011)

In case packet type is parent object ID, the parent object for the designated object is set. In this case, no flag is used. Packet data should be two-byte parent object ID. (See Figure 9.)

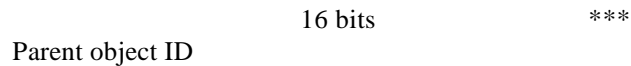


Figure 9. Composition of Packet data for Parent Object

#### 4.5 Packet Type: Matrix Value (0100)

In case packet type is a matrix value, lsmatrix of the Gs DOBJ structure is set. In this case, no flag is used. Packet data have the composition shown in Figure 10.



Figure 10. Composition of Packet Data for Matrix Value

#### 4.6 Packet Type: TMD Data Body (0101)

#### Yet to be developed4.7 Packet Type: Light Source (0110)

In case packet type is light source, the light source is set. In this case, object ID should be ID of the light source different from ID of an ordinary object. The flag has the following meanings: (See Figure 11.)



Figure 11. Flag for Light Source



- data type	Type of data	
	- 0	Absolute value
	- 1	Finite difference from
previous frame		
- direction	Direction flag	
	- 0	Off
	- 1	On
- color	Color flag	
	- 0	Off
	- 1	On

The composition of packet data varies with the direction and color bits in the flag as shown in Figure 12.

(a)	Flag: 0110 or 0111		X110 r 01	B	G	R
(b)	Flag: 0100 or 0101		X100		Z	
(c)	Flag: 0010 or 0011	**	B	G	R	

Figure 12. Composition of Packet Data for Light Source

#### 4.8 Packet Type: Camera (0111)

In case packet type is camera, data on visual point position are set. In this case, object ID is camera ID different from an ordinary object ID. The flag has the following meaning. (See Figure 13.)

Notice that meanings of other bits vary depending on the type bit.

- (a) Camera type: 0Z angle Position & reference data type camera type = 0
- (b) Camera type: 1 translation rotation data type camera type = 1
- Figure 13. Flag for Camera 1. Camera type bit: 0 -

data type	Type of data	
	- 0	Absolute value
	- 1	Finite difference from the previous
frame		
- position & reference	Visual point and interest point position flag	
- z angle	Interest point angle flag from horizontal plane	
	- 0	Off
	- 1	On
2. Camera type bit: 1	- data type	Type of data
	- 0	Absolute value - 1
	Finite difference from the previous frame	- rotation
	Rotation (R) flag	
	- 0	Off
	- 1	On
	- translation	Parallel translation (T) flag
	- 0	Off
	- 1	On

The composition of packet data varies with the flag as shown in Figures 14 and 15.

- (a) Flag: 1100 or 1110  
 Py Pz Px Rx  
 Ry Rz  
 Z
- (b) Flag: 0100 or 0110  
 Py Pz Px Rx  
 Ry Rz
- (c) Flag: 1000 or 1010

Figure 14. Composition of Packet Data for Camera (1)

- (a) Flag: 0111  
 Ry Rz Rx Tx  
 Ty Tz
- (b) Flag: 0011  
 Ry Rz
- (c) Flag: 0101  
 Ty Tz Tx

Figure 15. Composition of Packet Data for Camera (2)

#### 4.9 Packet Type: Object Control (1000)

In case packet type is object control, setting for control of object is performed. In this case, there are no packet data. The flag has the following meaning:

0000 Create  
 0001 Kill  
 0010 - 1111 Reserved

#### 4.11 Packet Type: Special Command (1111)

In case packet type is special command, animation data are controlled. Details are not yet determined.

Keywords: Layout Tool

Host machine for development (maker/model No.):

Hardware tool model No.: DTL-H

Software tool model NO.: DTL-S

Subject: About Sound Development

Question 1:

Concerning AIFF2VAG, quality for particular sound (voice, flute, etc.) extremely varies from a sampling frequency of 24K to a sampling frequency of 22K. Do you have any plan for improvement?

Question 2:

Will all the MIDI codes intended for SoundDelicatessen be supported in the next version?

Question 3:

Is it become possible to confirm sound quality of CD-XA for MAC in future?

Question 4:

For CD emulation, use of hard disk produced by Sony is specified. We have to make preparations for purchase about one month earlier because of documents required for proceedings. We are planning to purchase DEC's DSP3107LS as hard disk for CD emulation. Is there any problem?

Answer to Question 1:

We are improving the encoder engine currently. The conventional encoder is weak in metallic sound. An improved encoder will be released. According to our plan, it will be added to the next version to be released on August 16. Thereafter, we will offer a plural number of encoder models.

Answer to Question 2:

NRPN (rewrite a table of VAB according to a MIDI message, etc) will be added to the next "beta" version. All the others will be incorporated into the next version.

Answer to Question 3:

It will not be possible for the time being.

Answer to Question 4:

CD-ROM emulation requires special specification. It will take time for us to check and select models. Please wait for some time until we will announce the models usable. Keywords: AIFF2VAG, SoundDelicatessen, CD-ROM Emulator

Host machine for development (NEWS/DOS): DOS

Hardware tool model No.: DTL-H500

Software tool model No.: DTL-S560

Subject: About CD ROM Emulator

Question 1:

Is it possible to connect two or more hard disks to the CD emulator (DTL-

S2020), and select one for emulation? Are HDs seen from DOS in this case?

Please see the following example:

AT-----DTL-S2020-----1GHD-----1GHD-----1GHD

Question 2:

Generally, CD-ROM Drive (DTL-H2010) is connected to DTL-H2000. Is it possible to reference it from DOS if it is connected to the SCSI board?

Answer to Question 1:

HD for CD-ROM Emulator is accessed from DOS using the function for CD-ROM Emulator. That is, it is not seen as a drive for DOS. The daisy chain of the drive will be supported. Also, we will provide a function which will allow you to divide one drive into partitions, and handle them as a plural number of CD-ROMs.

Answer to Question 2:

Our answer is that it cannot be referenced because DTL-H2010 is not equipped with SCSI interface. Keywords: CD-ROM Emulator

Host machine for development (NEWS/DOS): DOS/V (DELL 466/MXV)

Hardware tool model No.: DTL-H200

Software tool model N.: DTL-S210

Subject: Requests concerning Sprite Editor

Questions:

Currently, I am developing a map for a fighting game using 32-dot cells, but triple scroll is too much for synchronization. If you will improve Sprite Editor, I will be able to increase processing speed using a method I am thinking of. My request is to expand the area where patterns can be placed in animation mode of Sprite Editor from 192\*192 to 1024\*1024 or more. (It will be better if the area can be set freely.) (In this case, offset coordinate values for ANM data to be output will be expressed in words. It will be better to output a file discriminated from the current output data.) Then, I will be able to constitute a map in any desired unit without preparing a map using cells. This will remove transparent cells generated when a multiplex scroll map is prepared using cell maps, and I may only save a smaller number of primitives to OT. (Currently, I use about 500 primitives, but several tens of primitives will suffice for expression.) Thus, I will be able to reduce drawing speed. I ask you to provide Sprite Editor with a function which allows designation of palettes to cell and animation patterns in 16-color mode, although I do not do so currently. Unless such a function is provided, there will be restrictions to generation of a game in 16-color mode. (If possible, I would be able to draw a map using 16 colors/cell. I am using 256-mode currently.)

Answers:

If you save cell and animation patterns for 16-color data while switching the palettes, you will be able to designate different palettes to each cell and sprite. In Ver. 1.4 to be released in August 2nd, you can switch palettes even after saving of cells and sprites. (As you know, 16-color data assures higher drawing speed than 256-color data.) Concerning transparent cells, you seem to save them as primitives. You do not have to save transparent cells as primitives. Because Map data are initialized using cell No. 0. Cell numbers in portions where nothing is saved (transparent cells) are all 0. Drawing will be much easier if you do not save primitives if cell numbers are zeroes. Concerning your request to use 1024 or more as offset coordinates of sprite patterns for animation, we will review your request but it will be difficult to provide such a function soon because many changes are involved.

Keywords: Sprite Editor

Host machine for development (maker/model No.): Apple/Macintosh Quadra 840 AV

Hardware tool model No.: DTL-H700

Software tool model No.: DTL-S710

Subject: About Compatibility of SoundDelicatessen/MIDI Driver

Question:

Now, Sound Delicatessen can be used with Apple MIDI Manager. Is it possible to use it with OMS of OPCODE SYSTEMS. If possible, I want you to provide such a function by all means.

Question:

We are now trying to develop a function which will assure use of SoundDelicatessen with OMS of OPCODE Systems and FreeMIDI of Mark of the Unicorn. The time of release is not yet fixed.

Keywords: SoundDelicatessen

Host machine for development (maker/model No.): DEC/LPx 466d2

Hardware tool model No.: DTL-H200

Software tool model No.: DTL-S210

Subject: About Shading of Polygons with Textures

Question:

When I paste textures to some polygons constituting part of an object, polygons to which textures are pasted look as if they were floated from other portions. Suppose an eye is mapped on a red sphere. In this case, a TIM file

in which a black eye is drawn at the center of the same red color as is set on the sphere is used. I select polygons where I want to put the eye using Material Editor, maps textures, and performs smooth shading of the entirety. Then, the portion where the textures are placed (which should be the same color) is shaded in a manner different from other portions, and looks as if it were floated. Does this difference in shading occur when the colors of polygons are directly designated, and when the case colors are assigned using textures? If so, can I use some suitable method to avoid this?

Answer:

In the programming tool DEX-2000 to be released around the end of August, improvements will be made to reduce difference between texture and polygon colors, but the difference will not be eliminated completely. There are the following solutions to this problem:

1) Use double polygons where a texture is pasted (the portion of the black eye), and paint the lower polygon in the same red like the surroundings. When you paste a texture for a black eye to the upper polygon, make the circumference (which you want to paint in red) of the black eye texture transparent in black. Then, the red of the lower polygon will appear. For easy operation, this function will be added to Material Editor. Currently, you can do the same thing by creating double polygons having the same vertexes.

2) Turning off light source calculations for the entirety

If you turn off light source calculations, colors on textures will not be lost. An object which rotates with respect to the light source may look unnatural because the colors of polygons do not vary. In all the other cases, objects will look natural even if light source calculations are turned off, and execution speed will increase. In this case, however, it is necessary to set polygon colors utilizing the results of light source calculations for polygons without texture so that the object may be look solid. This can be done using "Drawing color writing" function of Material Editor.

3) Pasting texture to the entire area

If you paste a red texture to the white eye portion, to which no texture is usually pasted, the boundary between textures will disappear. Because the texture for the white eye is mono-color (red), a small texture (e.g. 4x4) may be greatly expanded. In this case, execution speed will be reduced because the area for texture mapping will increase.

Of those methods, (1) will be more practicable.

Keywords: Texture, polygon, shading

Host machine for development (maker/model No.): DEC/LP-486

Hardware tool model No.: DTL-H200

Software tool model No.: DTL-S220

Subject: About Polygons and Textures

Questions:

1) How to prepare a two-sided polygon

I hear that two-sided polygons can be used. What should I do to prepare such things using the tool? Currently, I am preparing a similar thing using two polygons, but I need too many polygons. I would like to use two-sided polygons, please teach me what to do.

2) Change in texture pasting angle

Is it possible to change the texture pasting angle by 90 degrees with the position and angle of the polygon itself unchanged? I want to rotate the same picture without using different pictures.

Answers:

Because two-sided polygons are not supported by the library. So, you cannot create data using the tool. If two-sided polygons are supported by the library:

1) The entire performance will be delayed because the number of decision routines will increase.

2) Performance which reverses normal will be needed when two-sided polygons are inverted. For these reasons, it is said that it is more efficient in speed to have two polygons at the data side than to support them in the library. Currently, you have to use a modeler to create two polygons. In future, we will provide a function which will allow you to create two polygons using Material Editor.

Keywords: Polygon, texture

Host machine for development (maker/model No.): Maha posya

Hardware tool model No.: DTL-H500

Software tool model No.: DTL-S510A

Subject: About Compression of Image Data

Questions:

I want to generate a large quantity of movie data. It is expected to take considerable time to compress image data using Movie Converter, which utilizes software for compression. It takes about thirty minutes to generate 100 frames of data using the currently available movie converter. I want to compress data using any other system. According to newspapers and documents distributed in briefings last year, the compression method is designated as JPEG. Does it comply with JPEG Standard? I am not familiar with the details of algorithm. In magazines featuring articles on JPEG, I have never seen the coding method VLC in the algorithm DCT+IQ+two-dimension VLC described in the manual. Is the compression method for PlayStation closed within PlayStation?

Answers:

Fundamentally, only "MPEG macro-block layer" level compression is

performed in PlayStation. The encode/decode in a MPEG macro-block consists of:

DCT+IQ+Two-dimension VLC

It has the same composition as the one used with PlayStation. It differs from the MPEG macro-block in the following points:

- 1) A MPEG macro-block performs VLC in the order of Y, Cb, and Cr. PlayStation do so in the order of Cb, Cr, and Y.
- 2) A MPEG macro-block outputs the values of Y, Cb, and Cr. PlayStation outputs them in RGB. The specification of the IQ table and VLC code book are the same as MPEG. If you are going to use a commercially available encoder, we recommend MPEG because it seems more suitable than JPEG. The compression speed of MovConv version 1.5 has been almost doubled.

Although dependent on the contents, 320x320 data can be compressed at a rate of less than six seconds per frame.

Keywords: Movie, MovConv

Host machine for development (NEWS/DOS): DECpc LPx 466d2

Hardware tool model No.: DTL-H500

Software tool model No.: DTL-S510B

Subject: About Sprite Editor

Question:

I have a request and question about Sprite Editor. Request: I want to hold information on "Entire TIM display x 2" in display scale factor setting.

Question: Why delicate dislocation (about 1 dot) is caused during animation. (A phenomenon that the image is expanded horizontally by one or two dots when a 64 x 64 dot animation is displayed)

Answer:

To enable, rotation, enlargement, and contraction, sprites are displayed by mapping textures to quadrangular polygons for animation in Sprite Editor. In PlayStation, one pixel at the right end and one pixel at the bottom end are not displayed in quadrangular polygon drawing. For this reason, an additional pixel is added to the texture for drawing with Sprite Editor. However, it is impossible to designate an additional pixel to a texture that includes the right end and bottom end of the texture page (TIM bank). Therefore, data which include the right end and bottom end are expanded (the one line at the center is expanded to two lines) by one pixel when they are displayed. Delicate dislocation will be eliminated if you reduce the size by one pixel (reduce the XY size of the animation window by one pixel) if the data includes one pixel at



the right end and one pixel at the bottom end.

Keywords: Sprite Editor

Host machine for development (maker/model No.):

Hardware tool model No.: DTL-H200

Software tool model No.: DTL-S210

Software tool model No.: DTL-S220

Subject: About Layout Tool

Question:

How should I use "Key Frame Recorder" described in the manual? In the beta version, I did not find any operation panel. If such function cannot be used with the beta version, when it will be possible to use it?

Answer:

On August 16th, we will release a new version including the function of linear interpolation key frame animation.

Keywords: Layout Tool