

General Notice

When using this document, keep the following in mind:

1. This document is confidential. By accepting this document you acknowledge that you are bound by the terms set forth in the non-disclosure and confidentiality agreement signed separately and /in the possession of SEGA. If you have not signed such a non-disclosure agreement, please contact SEGA immediately and return this document to SEGA.
2. This document may include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new versions of the document. SEGA may make improvements and/or changes in the product(s) and/or the program(s) described in this document at any time.
3. No one is permitted to reproduce or duplicate, in any form, the whole or part of this document without SEGA'S written permission. Request for copies of this document and for technical information about SEGA products must be made to your authorized SEGA Technical Services representative.
4. No license is granted by implication or otherwise under any patents, copyrights, trademarks, or other intellectual property rights of SEGA Enterprises, Ltd., SEGA of America, Inc., or any third party.
5. Software, circuitry, and other examples described herein are meant merely to indicate the characteristics and performance of SEGA's products. SEGA assumes no responsibility for any intellectual property claims or other problems that may result from applications based on the examples describe herein.
6. It is possible that this document may contain reference to, or information about, SEGA products (development hardware/software) or services that are not provided in countries other than Japan. Such references/information must not be construed to mean that SEGA intends to provide such SEGA products or services in countries other than Japan. Any reference of a SEGA licensed product/program in this document is not intended to state or simply that you can use only SEGA's licensed products/programs. Any functionally equivalent hardware/software can be used instead.
7. SEGA will not be held responsible for any damage to the user that may result from accidents or any other reasons during operation of the user's equipment, or programs according to this document.

NOTE: A reader's comment/correction form is provided with this document. Please address comments to :

SEGA of America, Inc., Developer Technical Support (att. Evelyn Merritt)
150 Shoreline Drive, Redwood City, CA 94065

SEGA may use or distribute whatever information you supply in any way it believes appropriate without incurring any obligation to you.



SEGA OF AMERICA, INC.
Consumer Products Division

SCSP/DSP Effect Module Specifications (Tentative)

Doc. # ST-69-121693

9/3/93, Ver. 1.00

YAMAHA CORPORATION

1.0 Introduction	2
2.0 Effect Modules Scheduled to Be Developed	2
Reverb(s)	3
Early Reflection(s)	3
Echo (Delay) (s)	4
Pitch Shifter(s)	5
Chorus	6
Flanger	6
Symphonic	7
Surround	7
Voice Cancel	7
Auto Pan	8
Phaser	8
Distortion	8
Filter	9
Parametric EQ	9

READER CORRECTION/COMMENT SHEET

Keep us updated!

If you should come across any incorrect or outdated information while reading through the attached document, or come up with any questions or comments, please let us know so that we can make the required changes in subsequent revisions. Simply fill out all information below and return this form to the Developer Technical Support Manager at the address below. Please make more copies of this form if more space is needed. Thank you.

General Information:

Your Name _____ Phone _____

Document number ST-69-121693 Date _____

Document name SCSP / DSP Effect Module Specifications

Corrections:

Chpt.	pg. #	Correction

Questions/comments: _____

Where to send your corrections:

Fax: (415) 802-1717
Attn: Evelyn Merritt,
Developer Technical Support

Mail: SEGA OF AMERICA
Attn: Evelyn Merritt,
Developer Technical Support
150 Shoreline Dr.
Redwood City, CA 94065

1.0 Introduction

The SCSP/DSP Effect modules are function-specific software modules that users can link together with the SCSP/DSP Linker software to create their own DSP microprograms.

2.0 Effect Modules Scheduled to Be Developed

1. Reverb(s)
2. Early Reflection(s)
3. Echo (Delay) (s)
4. Pitch Shifter(s)
5. Chorus
6. Flanger
7. Symphonic
8. Surround
9. Voice Cancel
10. Auto Pan
11. Phaser
12. Distortion
13. Filter
14. Parametric EQ

Notes:

1. The modules with (s) at the end of their names are scheduled to be released with subsets of the effect family. For the modulation type modules (5, 6, 7, and 11), prototype effect subsets are scheduled to be created and tested. Whether or not the subsets will be released has not been determined.
2. The values indicated in the following specifications for number of steps and Delay buffer RAM size are tentative and may be changed during the module development and evaluation stages. The values enclosed in parentheses are the subset edition values for each effect subset module.
3. The parameters type and the value ranges may be changed during the module development and evaluation stages.



Reverb(s)

Effect	Generates reverb.
Number of steps	34 (28)
Delay buffer RAM size	15 [kwords]

Parameter	Value	Remarks
Type	Hall/Room/Vocal/Plate/others	
Initial Delay	0.1 to several 10's [ms]	
Diffusion	0 to 10	
Reverb Time	0.3 to several 10's [s]	
Effect Level	0 to 100%	
Direct Level	0 to 100%	

Comments: It is possible to partially compensate for the decreases in the number of steps and Delay buffer RAM size by adjusting the quality and reverb time of the effect.

Early Reflection(s)

Effect	Generates Reverb-type effects using early reflection.
Number of steps	100 (60)
RAM size used for delay	13 [kwords]

Parameter	Value	Remarks
Type	Hall/Random/Reverse/Spring/others	
Initial Delay	0.1 to 100[ms]	
Liveness	0 to 10	
Diffusion	0 to 10	Unavailable in the subset version.
Room Size	0.1 to 10	
Effect Level	0 to 100%	
Direct Level	0 to 100%	

Comments: The full version is stereo, and the subset version is mono. It is possible to partially compensate for decreases in number of steps and Delay buffer RAM size by adjusting the quality of the Early Reflection sound.

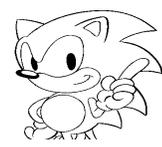
Echo (Delay) (s)

Effect	Generates echo sounds.
Number of steps	20 (10)
RAM size used for delay	26 (13) [kwords]

Parameter	Value	Remarks
Delay Time Left	0.1 to 300 [ms]	
Feed Back Left	-99 to +99%	
Delay Time Right	0.1 to 300 [ms]	
Feed Back Right	-99 to +99 [%]	
Effect Level	0 to 100%	
Direct Level	0 to 100%	

Comments: The full version is stereo. The subset version is mono (simulated stereo) and features simplified preprocessing.

SEGA Confidential



Pitch Shifter (s)

Effect	Generates three independently pitch-shifted sounds in addition to the direct sound.
Number of steps	64 (32)
RAM size used for delay	15 (2) [kwords]

Parameter	Value	Remarks
Pitch1	-12 to +12	Related to SCSP synthesizer settings.
Fine1	-99 to +99	Related to SCSP synthesizer settings.
Delay1	0.1 to 300 [ms]	Unavailable in the subset version.
Pitch2	-12 to +12	Related to SCSP synthesizer settings. Unavailable in the subset version.
Fine2	-99 to +99	Related to SCSP synthesizer settings. Unavailable in the subset version.
Delay2	0.1 to 300 [ms]	Unavailable in the subset version.
Pitch3	-12 to +12	Related to SCSP synthesizer settings. Unavailable in the subset version.
Fine3	-99 to +99	Related to SCSP synthesizer settings. Unavailable in the subset version.
Delay3	0.1 to 300 [ms]	Unavailable in the subset version.
Feedback	-99 to 99 [%]	
Pitch1 Level	0 to 100%	
Pitch2 Level	0 to 100%	Unavailable in the subset version.
Pitch3 Level	0 to 100%	Unavailable in the subset version.
Direct Level	0 to 100%	

Comments: The subset version generates only one pitch-shifted sound, and does not support control over delay.

Chorus

Effect	Generates a chorus effect.
Number of steps	22
RAM size used for delay	1 [kword]

Parameter	Value	Remarks
Rate	Arbitrary	Related to SCSP synthesizer settings.
Amp Depth	0 to 100 [%]	
Pitch Depth	0 to 100 [%]	
Effect Level	0 to 100%	
Direct Level	0 to 100%	

Flanger

Effect	Generates a flanging effect.
Number of steps	20
RAM size used for delay	2 [kwords]

Parameter	Value	Remarks
Rate	Arbitrary	Related to SCSP synthesizer settings.
Mod Delay	0.1 to 20 [ms]	
Feedback	-99 to 99 [%]	
Depth	0 to 100 [%]	
Effect Level	0 to 100%	
Direct Level	0 to 100%	



Symphonic

Effect	Generates complex chorus-type pitch changes.
Number of steps	21
RAM size used for delay	1 [kword]

Parameter	Value	Remarks
Rate	Arbitrary	Related to SCSP synthesizer settings.
Depth	0 to 100 [%]	
Effect Level	0 to 100%	
Direct Level	0 to 100%	

Surround

Effect	Generates reverb.
Number of steps	23
RAM size used for delay	15 [kwords]

Parameter	Value	Remarks
Liveness	0 to 10	
Effect Level	0 to 100%	
Direct Level	0 to 100%	

Voice Cancel

Effect	Reduces the volume level of the vocal band that is normally positioned in the center pan position.
Number of steps	36
RAM size used for delay	0 [kword]

Parameter	Value	Remarks
Effect	ON/OFF	

Auto Pan

Effect	Moves sound image to the left/right.	
Number of steps	4	
RAM size used for delay	0 [kword]	

Parameter	Value	Remarks
Rate	Arbitrary	Can be set to any value by the sound CPU program.
Depth	Arbitrary	Can be set to any value by the sound CPU program.

Phaser

Effect	Generates rotary speaker-type effect.	
Number of steps	22	
RAM size used for delay	2 [kwords]	

Parameter	Value	Remarks
Rate	Arbitrary	Related to SCSP synthesizer settings.
Depth	0 to 100 [%]	
Mod Delay	0.1 to 20 [ms]	
Effect Level	0 to 100%	
Direct Level	0 to 100%	

Distortion

Effect	Distorts the original sound.	
Number of steps	20	
RAM size used for delay	0 [kwords]	

Parameter	Value	Remarks
Distortion	0 to 100 [%]	
Output Level	0 to 100 [%]	



Filter

Effect	Cuts the specified frequency band.
Number of steps	5
RAM size used for delay	0 [kword]

Parameter	Value	Remarks
Type	Low Pass/High Pass/Band Pass	
Frequency	About 30 [Hz] to 15 [KHz]	

Comments: This module can be used as a dynamic filter by dynamically rewriting the filter coefficients with the sound CPU.

Parametric EQ

Effect	Boosts or cuts frequencies around the specified frequency.
Number of steps	5
RAM size used for delay	0 [kword]

Parameter	Value	Remarks
Frequency	About 30 [Hz] to 15 [KHz]	
Gain	-12 to +12 [dB]	
Q	Low/High	

Comments: This module can be used to produce wow wow effects by dynamically rewriting the filter coefficients with the sound CPU.