KORG DSS-1 UPGRADE 2009
NEW FEATURES LIST

Introduction

Thank you for purchasing the Korg DSS-1 upgrade. With this upgrade, your DSS-1 has access to 64 times the sample memory of the original unit. Systems, multisounds, and samples can now be stored on SCSI (optional) or on a USB-based storage medium such as Compact Flash or thumb drive.

This upgrade is based on the original DSS-MSRK that was developed by Sound Logic in 1987 for Korg. The DSS-MSRK added 7 additional banks of memory, a SCSI interface, a 16-bit NEC V40 CPU, and support for high-density (1.44MB) floppy drives. In addition to these features, this new modification adds USB support, and expands the memory to 64 banks (16 Megawords of 12-bit memory).

Additional feature list

DSS-MSRK additions (1987)

- 7 additional banks of memory
- SCSI interface
- 1.44MB floppy drive support
- 16MHz NEC V40 CPU
- DMA data transfer for floppy and SCSI
- Normal and Turbo floppy format

New features (2009)

- 64 banks of memory with new memory board
- USB drive support via Vinculum VNC1L module, supports FAT and FAT32 with subdirectories
- DMA transfer for USB
- All systems from floppy in memory at once (banks A-D)
- 128 programs in memory at once
- 64 Multisounds in memory (instead of 16)
- Portamento mode
- expanded and enhanced diagnostics
- reduced power consumption using HCMOS technology (50% of original CPU)
- assign TUNE, DATA A and DATA B sliders to program parameters
- OS updating from USB drive

The system software will be updated from time to time to add new features and fix bugs. Check the website for new versions.

Part 1

DSS-1 Upgrade Summary

1. A standard DSS-1 has 256K words of memory. This has been increased via a new plug-in memory board to 32 Megabyte (16 Megaword) of memory. The memory is divided up into banks of 256k each. You can check to see how much memory has been used in each bank by going to the SYSTEM F7 menu.

2. The optional SCSI port adds support for a variety of storage devices. A flat file system (no subdirectories) is implemented, allowing for 99 Systems, 512 Multisounds, as well as sample and MIDI parameter storage. Originally, the upgrade supported up to 120 Meg hard drives. This has been increased to 1 Gig. Hard drives can be formatted to optimize either speed or density. Because the USB functionality exceeds the SCSI in every way, the SCSI port is now an optional add-on.

3. The floppy drive now has two options for format: Normal and Turbo. The Turbo mode increases the amount of information that can be stored on a floppy disk by up to 50%, using a data compression algorithm that compresses a sound based on high frequency content of the sounds.

4. The USB port is the addition which has the largest impact on the operation of the DSS-1. The firmware on the USB module supports storage devices formatted FAT or FAT32. Subdirectories are supported, and you can create, rename, or delete directories from the DISK UTILITY F8 menu. Formatting of USB devices is not supported from the DSS-1, however it is easy to plug the removable storage device into a computer and format it.

5. Up to 64 multisounds can be in memory at once. Each sound that makes up part of a multisound can be up to about 256K in length (261,886 words). Multisounds can include sounds from any of the 64 banks. A single multisound can be up to 16 Meg in size.

6. Sounds (individual components of a multisound), when stored to USB, are saved in .WAV format. This allows easy editing in a computer, as well as bringing in samples from other sources into the DSS-1. When importing sounds, the total length must be 256k or less, and one of the four sample rates that the DSS-1 supports (16kHz, 24kHz, 32kHz, or 48kHz).

7. Portamento has been added via the Sound Parameter menu F18.

8. You can assign the Tune, Data A and Data B sliders to sound parameters. This is accessed under the MIDI F6 through F8 parameters.

Part 2

Working with the enhanced storage options

Floppy drive

Floppy drive operations in the DSS-1 upgrade have been enhanced. There are three main improvements:

- Turbo mode format - uses data compression to increase effective disk capacity and a 1:1 interleave to speed up loading times
- 1.44 MB drive support - connect a standard 1.44MB PC floppy drive to the DSS-1
- DMA transfer - allows for data transfer directly to and from sample memory with minimal CPU intervention

Formatting floppy disks

- Insert a 720k DSDD or a 1.44MB DSHD disk into the floppy drive.
- Go to DISK UTILITY, then 0 (FORMAT DISK)
- The display will read FORMAT DISK, Original or Turbo. Use the < and > keys to place the cursor under the option you want and hit ENTER
- The disk will be formatted and verified. If there is an error the display will read DATA ERROR!

Loading from Floppy Disk

The 'Get System' function (SYSTEM F1) has been enhanced. In addition to selecting system A through D, you can now select ALL The four systems A through D are loaded as programs 1 through 128.

- System A uses programs 1-32
- System B uses programs 33-64
- System C uses programs 65-96
- System D uses programs 97-128

SCSI interface

The SCSI interface on the DSS-1 modification is a 25-pin D-SUB connector. It conforms to the SCSI-1 specification. The SCSI bus requires each device on the bus to have a separate ID number, usually selectable as a switch or jumper on the SCSI device. The SCSI interface supports ID numbers from 0 to 7.

Termination

SCSI requires both ends of the bus to be terminated to avoid signal reflections. One end of the bus, on the CPU board, has active termination installed. A second terminator must be connected to the other end of the SCSI chain, which is the last physical drive on the chain.

Formatting SCSI devices

The DSS-1 uses a custom format for SCSI drives. Any drive that has been used with another type of computer or sampler must be reformatted to be used with the DSS-1.

To format a drive:

- First, power up the SCSI device(s), then the DSS-1
- Select DISK UTILITY F7. The display will read Format SCSI x, where x is a number between 0 and 7. To change the ID to be formatted, use the < and > keys to place the cursor under the drive ID number and use the data entry up/down keys to select the desired ID.
- Hit ENTER, and the display will read "Select Interleave". The two options are Speed and Density. Speed will store all 12-bit data as 16 bits, and Density will 'pack' 2 12-bit words into 3 bytes. This will save disk space at the expense of speed.
- Hit ENTER, and the display will reed "Keep Bad Block list". Select Y by hitting the YES key
- The drive will proceed to format and verify. If bad blocks are encountered, the display will read "SCSI ERROR", otherwise it will read "SCSI x FORMATTED"

The DSS-1's SCSI filesystem is flat, meaning it does not support subdirectories (folders). You can store up to 99 Systems, 512 Multisounds, x Sounds, and MIDI parameters.

Loading and Saving to SCSI Devices

Saving and loading systems is performed in much the same manner as the floppy disk. The SCSI disk can be viewed as a large floppy drive with 99 Systems available instead of 4. Each system can have a user-selectable name, whereas the floppy systems are always called A through D.

Loading from SCSI

- Press SYSTEM F1, and use the < > keys to place the cursor under SCSI x, and use the DATA A or DATA B keys to select the SCSI ID to access.
- Press ENTER, and you will be presented with a numbered list of Systems available on the hard disk. Use the DATA A or DATA B to scroll through the list.
- Once the desired system is shown on the LCD, hit ENTER. The System is loaded and you are returned to Play mode.

Saving to SCSI

- Press SYSTEM F2, and use the < < keys to place the cursor under SCSI x, and use the DATA A or DATA B keys to select the SCSI ID to access.
- Press ENTER, and you will be presented with a numbered list of Systems on the hard disk. Use the DATA A or DATA B to scroll through the list.
- Once the desired system is shown on the LCD, press ENTER.
- The prompt SYS NAME will be shown. Use the < > keys to place the cursor under the letter to be modifed, then use the DATA / Slider A or DATA / Slider B to change it.
- Once the desired System name has been entered, press ENTER and the system will be saved to disk.

Multisounds, Sounds, and MIDI parameters are saved and loaded similarly to Systems. There are specific limits for these file types:

- 512 Multisounds
- 512 Sounds
- 1 MIDI Parameter file

USB Interface

The addition of the USB interface adds a substantial amount of functionality to the DSS-1.

- Massively expanded storage capacity. The amount of storage available is only limited to the filesystem used (FAT or FAT32), and the type of media.
- Many types of media supported: Compact Flash, SD, MMC, USB drive. Virtually all types of media supported by a USB card reader will work.
- DMA-accelerated save and load operations.
- The use of the FAT filesystem allows the use of subfolders, allowing much more freedom in organizing your Systems, Multisounds, and Sounds.

A few things to note about the implementation of USB in the DSS-1:

- The USB interface is implemented as a host-only interface; it will only connect to storage media. You cannot connect the USB on the DSS-1 directly to a computer or other device.
- File naming is limited to the 8.3 standard (8 characters plus 3 for the file extension). All filenames are UPPER CASE, and illegal characters are not allowed (/ ? , .)
- You cannot hot-swap storage media (as of the current 4.0 software release). To change the storage media, you must power down the DSS-1, swap the media, and power back up again.
- You must have the media inserted while powering up the DSS-1 for it to be recognized.
- The DSS-1 will NOT format the storage media, it has to be pre-formatted in a computer.

The DSS-1 uses the following file extensions for USB:

- .DS1 for the SYSTEM file
- .DMS for a MULTISOUND
- .WAV for a SOUND (individual sample)

MIDI parameters are stored as part of the .DS1 file. The additional new slider assign parameters (MIDI F6 through F8) are ONLY stored to the .DS1 file on as USB drive.

As of version 4.0, the DSS-1 upgrade supports 2 USB ports. However, depending on the installation, only one of the ports may be connected. Port B refers to the primary port , which will be the most commonly used. Port A is the secondary port. Port B must be used for firmware updates.

The DSS-1 firmware must be at version 4.x, and the USB module must have the VDFC V3.69 firmware (or later) to use this feature.

Loading and Saving to USB

Loading and saving with USB are similar to Floppy and SCSI, with the following additions and enhancements:

- The current file path is shown on the first line of the LCD when doing a file operation. The drive letter D: (for software versions below 4.x) or A: or B: (for versions 4.x and above) will be shown with the path separated by a backslash. For example the root directory will be shown as D:\ (or A:\ or B:\), and a directory called DISK1 will be shown as D:\DISK1\.
- The current selected file in the directory will be shown on the second line of the display. Only the files valid for the current operation will be shown. For example, when loading a system, only files with a .DS1 extension will be visible. Similarly, when loading a Multisound, only files with a .DMS extension will be shown.
- Directories are displayed as a name with <DIR> -> after it. The arrow to the right indicates that you press the right arrow key to navigate to the selected directory.
- Directory navigation is performed using the left and right arrow keys. To go down a level into a directory, select it and press the right arrow key. To go up a level, press the left arrow key.

Loading from USB

- Select the desired type of file to load (System, Multisound, or Sound)
- Place the cursor under USB using the < > keys and optionally select the port (A or B) using the DATA A or DATA B arrows.
- Press Enter, and you will be given a list of files and / or directories. Navigate to the desired directory and select the desired file, then press ENTER.

Saving to USB

- Select the desired type of file to save (System, Multisound, Program, or Sound)
- Place the cursor under USB using the < > keys and optionally select the port (A or B) using the DATA A or DATA B arrows.
- Press Enter, and you will be given a list of files and / or directories. Navigate to the desired directory. The second line of the display with either say NO FILES or will show the first file found in that directory. The first line will show the path.
- Press ENTER, and you will be asked to choose the file name. Uppercase A through Z, 0 through 9, and the characters $ % ' - @ ~ ` ! ( ) { } ^ # & are valid.
- Press ENTER, and the file will be saved. Note that if a file with the same name exists, it will ask you if you want to overwrite it.
- Note that Programs can only be saved as part of a System.

Other USB Functions

Directory operations

You can create, rename, and delete directories on USB media by using the DISK UTILITY F8 function.

- Press Disk Utility, then 8, and use the < > keys to select the type of operation to perform.
- To create a directory, first use the < > keys to navigate to the directory where you want the new directory to exist, and press ENTER. You will be prompted for the name of the new directory. Uppercase A through Z, 0 through 9, and the characters $ % ' - @ ~ ` ! ( ) { } ^ # & are valid. Press Enter and the directory will be created.
- To rename a directory, first use the < > keys to navigate to the directory you want renamed and press ENTER. You will be prompted for the new name of the directory. Uppercase A through Z, 0 through 9, and the characters $ % ' - @ ~ ` ! ( ) { } ^ # & are valid. Press ENTER and the directory will be renamed.
- To delete a directory, use the < > keys to navigate to the selected directory and press ENTER. You will be asked to confirm. Press YES or NO.

Swapping USB Media

Currently only media with an actual USB port (ie thumb drive) can be swapped while the DSS-1 is powered on.

- Make sure there is no file operation in progress (save or load) Also make sure that any edits or changes have been saved.
- Make sure the DSS-1 is in Play mode (current program shown, no Function keys lit)
- Remove the USB drive, wait a couple of seconds, then insert the new one
- Press COMPARE, and the DSS-1 will scan the new drive.

PART 3

Additional Features and Functions

Program Parameters

Portamento

Portamento has been added as a sub-function of Parameter 18, Auto Bend. It can be applied to OSC1, OSC2, or BOTH. Portamento time is controlled by parameter 19, Auto Bend Time.

MONO key assign mode

MONO has been added as another key assign mode (Program Parameter 63)

System Parameters

System F7 shows the usage of sample memory in each bank. Use the sliders and up/down arrows to scroll through the banks.

MIDI Parameters

You can now assign either slider A, B, or the TUNE slider to control various program parameters in PLAY mode.

- MIDI F6 selects the parameter for Slider A. Use the arrow keys or the slider to select the function to control.
- MIDI F7 selects the parameter for Slider B. Use the arrow keys or the slider to select the function to control.
- MIDI F8 selects the parameter for the TUNE slider. Use the arrow keys or data sliders to select the function to control. When the function is set to TUNE, the actual TUNE value is displayed. A display of 00 corresponds to A-440. You can disable the TUNE slider from accidental adjustment by setting it to NONE.

MIDI parameters (excluding the slider assignment parameters) can be saved as a separate file to Floppy and SCSI. For USB, the midi parameters, including the slider assignments, are saved with the System (.DS1) file. This allows each system to have its own MIDI parameters and slider assignments.

TEST MODE FUNCTIONS

To activate Test mode, hold down the DATA A up/down arrow keys while booting up. Keep holding the keys until the LCD reads TEST MODE.

Floppy test

The first test is the floppy drive test. The screen will read TEST FDD? Press YES to test or NO to skip to the next test. Insert a low or high density DSS-1 formatted floppy disk and press ENTER. The disk will be scanned and checked for errors. When it is completed any errors will be reported.

WRAM (Wave RAM) test

The second test is the WRAM test. This test checks all the banks of memory, writing values of 00 and FF and reading them back. It will also report how many banks of memory have been found. Normally this should be 64. This test takes several minutes.

Switch test

The last test is the switch/slider test. Pressing a switch will display the name of the switch on the LCD. Moving a slider will display the name of the slider and its value on the LCD. Pressing COMPARE then ENTER will exit the test.

Once the tests have been completed, the DSS-1 will be in Play mode. However if test mode has been used, there will be two differences from normal (non-tested) operation.

• The tuning slider will be disabled, as will pitch bend.
• The current voice playing will be displayed on the second line of the LCD.

To return to normal operation, reboot the DSS-1 without going into test mode.

OS Update

The DSS-1's OS is stored in Flash memory. To update to newer software, enter test mode by holding the DATA A up/down keys until the display reads TEST MODE. The USB media with the update file and flash loader file (DSS1LODR.BIN) in the root directory should be inserted before power-up. The DSS-1 will indicate that an update is present and ask if you want to update. Select YES to update and NO to cancel.

   DO NOT POWER OFF THE DSS-1 DURING THE FLASH PROCEDURE!!!!*

Updating the USB firmware

The USB module used in the DSS-1 upgrade is a self-contained, specialized processor with its own firmware. Periodically it may be necessary to upgrade this firmware. This is a separate operation to the OS upgrade described previously.

- Put the update file on the root of a formatted USB drive and insert it into the DSS-1. This file is named 'FTRFB.FTD'
- Power up the DSS-1 with the DATA A up / down buttons held together until the LCD reads TEST MODE.
- Press NO < three times to skip the tests.
- At this point the display will read CHANGE MAIN. The USB module is indicating that the firmware file has been found and it is updating itself.
- Wait 5 minutes, power down the DSS-1.
- Remove the drive, and delete the FTRFB.FTD file.
- Reboot the DSS-1. When the USB module is identified during the boot process, the new version number will be displayed.

Addendum to MIDI Sysex specification

The sysex implementation of the DSS-1 retrofit is unchanged except for the MULTISOUND PARAMETER DUMP (FUNCTION ID = 44H). Please refer to the MIDI implementation chart in the back of the DSS-1 owner's manual. After the Last Sound Parameter and before the check sum we send (and receive) a 6 byte Absolute Address for each sound in the Multisound. The Sound Start Address and Loop Start Address (these are part of the 36 byte Sound Parameters) are now relative to the Absolute Address of that particular sound NOT the start of the Multisound. Here is the new command:

F0 42 3n 0B 44		Multisound Parameter Dump Header
aa	(1 byte)	Multisound NO. -1
bb....bb	(8 bytes)	Multisound Name
cc....cc	(6 bytes)	Multisound Length
dd	(1 byte)	Loop Flag & No. of Sounds
ee	(1 byte)	Max Interval
ff....ff	(36 bytes)	Sound 1 Parameters
:		
:		
gg....gg	(36 bytes)	Last Sound Parameters
uu....uu	(6 bytes)	Sound 1 Absolute Address
:		
:		
vv....vv	(6 bytes)	Last Sound Absolute Address
ss	(1 byte)	Check Sum
F7		EOX

The format for the 6 byte Absolute Address values is:

	MSB						LSB
1st byte	0	b7	b6	b5	b4	b3	b2	b1
2nd byte	0	b0	0	0	0	0	0	0
3rd byte	0	b15	b14	b13	b12	b11	b10	b9
4th byte	0	b8	0	0	0	0	0	0
5th byte	0	b23	b22	b21	b20	b19	b18	b17
6th byte	0	b16	0	0	0	0	0	0

Bits 23-18 of the Absolute Address form the page number (0-63) where that Sound is allocated.
Remember that the Sound Start and Loop Start are relative to the Absolute Address for that particular Sound.