Service Manual

SD▾1

▾FX^{SD}

▾FX

Service Manual

SD▾1

▾FX^SD

▾FX

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THE TECHNOLOGY THAT PERFORMS

ENSONIQ Customer Service

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NOTES:

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IMPORTANT THINGS TO KNOW ABOUT THE SD-1, VFX^SD AND VFX

As with every ENSONIQ product, all SD-1, VFX^SD and VFX service will be handled through the ENSONIQ Module Exchange Program. Rather than diagnose and exchange individual components, you will replace complete modules. We feel that this is the most time and cost effective method of repair, both for you and your customers. IF YOU DON'T READ ANY OTHER PART OF THIS MANUAL, READ THIS SECTION.

When troubleshooting an SD-1, VFX^SD or VFX, remove any cartridge that might be present. This will prevent a faulty cartridge from complicating your troubleshooting.

1. SD-1, VFX^SD AND VFX SIMILARITIES

The SD-1, VFX^SD and VFX use the same keyboard and power supply, while the main board and display board are different. In addition, the SD-1 and VFX^SD have a disk drive and a built-in sequencer that the VFX does not (see Figure 1). Despite these differences, the techniques used in debugging the modules are similar.

When troubleshooting a VFX, check the software version number (see the following page). In VFX version 2.0 or higher, a system reset sequence (see the following page) was added. This system reset sequence is also available in the SD-1 and VFX^SD.
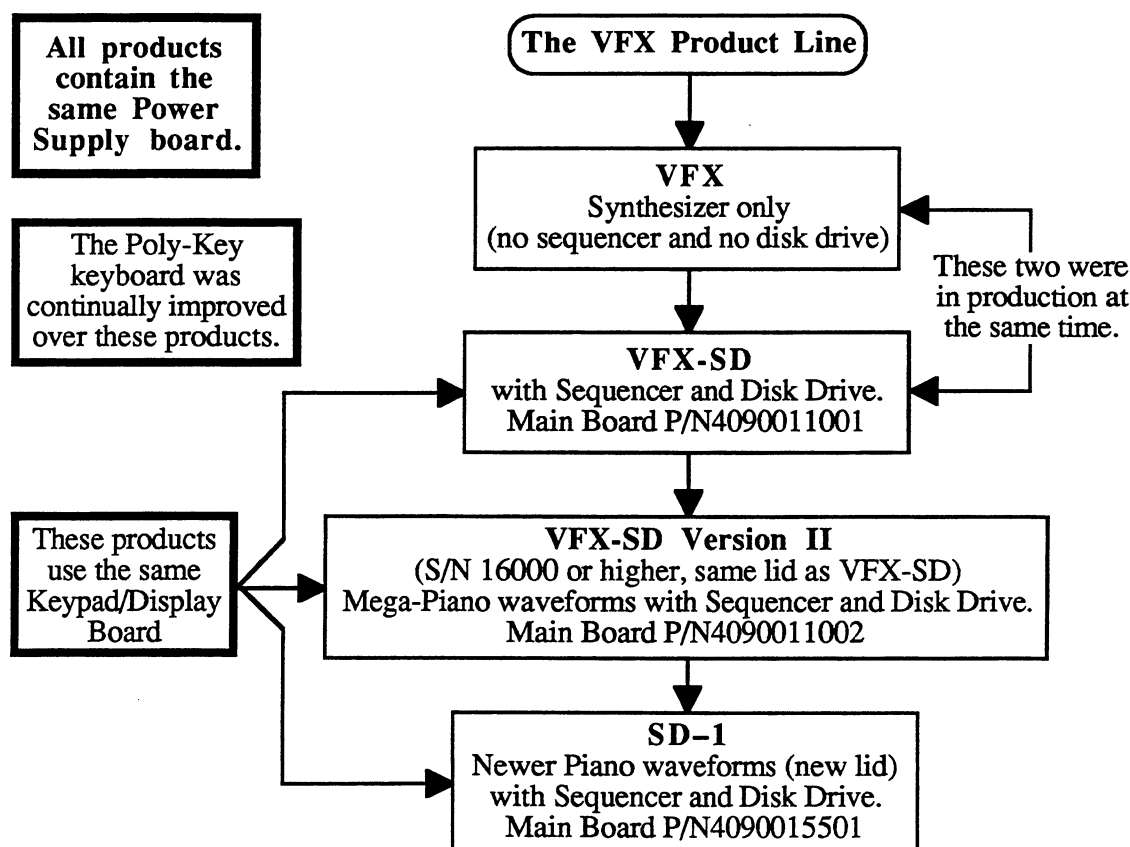

Figure 1 — VFX Product Line

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2. REINITIALIZATION
These units are essentially computers with over 64K and 196K of RAM respectively. It is possible for these units to become confused if bad data is loaded into this memory. This can result from loading data off a bad cartridge/disk or a bad MIDI Sys-Ex transfer. If the memory does get scrambled, it will be necessary to reinitialize the system. So, periodic backing up of all data is recommended.

The SD–1/VFX^{SD} and VFX are heavily software dependent and, as with all computers, certain events can cause a unit to glitch and contract a severe case of amnesia. Sometimes these units merely require reinitialization. Since scrambled software can cause problems that at first glance appear to be hardware-related, reinitialization is recommended as a first step in troubleshooting. For more information on reinitializing, see Section 1 of the *Musician's Manual*.

A given unit is likely to have data in its internal memory that is near and dear to the owner of that unit. When reinitializing, all the current data will be lost. However, the ROM sounds and presets are automatically loaded back into the internal memory after reinitializing. It is highly recommended that the internal memory be saved by the end user before servicing. See the Storage Section of this manual or Section 11 of the *Musician's Manual* for full instructions on saving data.

IMPORTANT! Unplug all audio cables before reinitializing. The audio outputs of the unit may make a pop when reinitializing.

TO REINITIALIZE THE SD–1, VFX^{SD} OR VFX FROM THE FRONT PANEL
- Save all Sound, Preset and Sequence data (see the Storage Section).
- While holding down *Presets*, press the upper left soft button.
- Select YES to ERASE MEMORY AND REINITIALIZE. After selecting YES, the unit erases its internal memory and then starts up just as it does when you turn the power on, and reinitialization is complete. The ROM Sounds and Presets are automatically placed in the internal memory.

SD–1/VFX^{SD} ONLY — Load in the Sequencer O.S.:
- Insert Sequencer O.S. disk into the drive.
- Press *Storage*, select DISK, move the data entry slider to the maximum to select FILE–TYPE=SEQUENCER–OS.
- Select YES. After the drive stops loading, select NO to exit this page.

If the system is so scrambled that the front panel isn't working, try the following Reset Sequence:

SYSTEM RESET SEQUENCE for SD–1/VFX^{SD} and VFX with O.S. 2.0 or higher
- Turn the unit off and then on slowly (at approximately 2 second intervals) seven times.
- The eighth time you turn it on, the unit should automatically reinitialize itself and show the wake-up screen. If it doesn't then there is another problem.

If the unit is open, you can try the following Hard Reset.

3. HARD RESET (this is the only way to reinitialize VFX's with O.S. 1.72 or lower):
- **Make sure the power is off!**
- VFX ONLY — Short the left lead of C1 (upper left corner of the Main Board) to the bottom left pin (pin 28) of U9 for a few seconds.
- SD–1/VFX^{SD} ONLY — Short the minus side (left) of the battery to the bottom left pin (pin 28 or pin 32 if memory expansion is installed) of U1 for a few seconds.

If the above methods do not return the system to normal operation then there is a problem in one of the modules.

4. THE KEYBOARD

The Poly-Key™ Pressure Keyboard is a complex module that contains its own computer and software. So, when necessary, you will be swapping it out as a whole unit. Display information to the main board is processed through the keyboard so what might appear to be a frozen display could instead be a bad keyboard. What might appear to be a bad keyboard (display stuck on calibration page) might instead be caused by scrambled RAM (in which case the unit needs to be reinitialized). For more troubleshooting hints, see flow charts on pp. 11-12.

<u>Checking the Software Version</u> (Keyboard Assembly EPROM Version)
Each version of the keyboard assembly EPROM is optimized for the hardware that is within the keyboard assembly When you hold down the *Presets* button and press the *Master* button, the display will show:

<div align="center">
ENSONIQ ____
SOFTWARE- ROM V X.XX KPC V YYY
</div>

X.XX indicates the main operating system version; YYY indicates the keyboard operating system version. For more information see Service Bulletin #12.

<u>20-pin Ribbon Cable</u>
When reconnecting the keyboard cable to the main board, make sure that the striped side is aligned with pin 1 and that the cable is not mispinned. If the cable **IS** mispinned or backward, fuses F3 and F4 on the power supply will blow. **NOTE:** If one fuse blows, the other will also blow; you must replace both.

When installing the keyboard assembly back into the unit, be sure that the keyboard assembly cable is flat under the keyboard assembly and that the ferrite bead is not trapped on top of the main board.

For more information on the Poly-Key keyboard, see Service Bulletin #12.

5. PLASTIC CASE

<u>Avoid Stripping Screws</u>
Because the structural components (base, control panel, and wheel cover) are made of plastic, *great care* should be exercised when assembling or disassembling any part of the unit. **Avoid over-tightening screws in the plastic case when executing any repair procedure! You should use no more than 8 inch/lbs of torque**

When replacing any of the self-tapping screws, it is possible to over-tighten the screws and strip a hole in the case, making it necessary to replace the case or control panel. To keep this from happening, follow these procedures:

a. Before replacing a self-tapping screw (or screws) into a stripped hole, put a drop or two of LOCKTITE, Super Glue Gel, or RTV into the hole.
b. Install the screw, and tighten it only until the sub-assembly being attached is snug against the case. **Do not tighten the screw any further.** When the glue sets, the screws will hold the sub-assembly in place.

It is important to make sure that there are no loose screws inside the unit, as they may come loose and short out something.

<u>Brass Inserts</u>
To prevent stripping, there are brass inserts in the main board ground boss and in the four control panel holes. Be sure to use machine screws in these locations. **Do not use a self-tapping screw in a brass insert as this will ruin the insert.**

6. THE DISK DRIVE (SD–1 and VFX^{SD} ONLY)
PLEASE DO NOT SHIP A UNIT OR REPLACEMENT DISK DRIVE IN A BOX PACKED WITH PEANUTS. If you must, wrap the entire unit in plastic first. These peanuts may cause severe damage to the disk drive, keyboard, or cartridge port.

Transporting a unit
There is a printed label near the disk drive on every new unit shipped. This label contains important information concerning the care of the disk drive and lists recommendations regarding the treatment of the drive during transport. **We do not, under ANY circumstances, recommend the insertion of an actual disk during transport.** Transport the unit with nothing in the drive. You may transport it with a plastic sheet in the drive ONLY if the unit came with it.

What disks to use
It is very important to use double-sided, double-density 3.5" micro-floppy disks. The SD–1 and VFX^{SD} write information to every track on a disk, so it is imperative that the disk be of superior quality and certified for double-sided use.

Testing the disk drive
The best way to test the disk drive is by formatting a disk (see the Storage Section). When a disk is formatted, the SD–1 and VFX^{SD} reads and writes every track on that disk. If the formatting attempt fails, it is likely that the disk itself is faulty. Always try formatting another blank disk before determining that the disk drive is faulty. Unlike many computer systems, the SD–1 and VFX^{SD} do not automatically discard bad sectors. The entire disk must be good for successful formatting.

The disk drive shield
You will find that there is a metal plate located on the bottom of the disk drive (see Figure 11). The function of this plate is to keep the 34-pin ribbon cable from interfering with the disk drive motor. When replacing the disk drive, it is important to transfer this metal plate to the new drive. The plate is attached with two screws and star washers. This plate must be installed to ensure proper operation of the drive.

7. SD–1 HIGH-RETENTION FORCE CONNECTORS (Repair Technicians Label)
SD–1's have a warning/information label just for you. We just wanted to let you know that we have switched to a higher retention force connector on our transformers. This means it will be very difficult to remove this connector by just pulling. We recommend the use of a scribe, screwdriver or similar object to remove this connector. Due to the benefits of a high-retention force connector, we will be adding them in other places on the harness as well. Watch out for them, and please don't pull on the wires!

We have found that some units have developed further problems once a module has been changed. This may be a result of improper handling of cables. We suggest removing all cable connectors using the angled end of a scribe (see below).

Figure 2 – Scribe

This scribe can be found in the following catalogs:
* Techno-Tool catalog 38, page 204, part number 400PR144
* Newark catalog 110, page 1024, part number 76-1510

Be careful not to damage any traces on the circuit board when prying the cable loose.

COMMUNICATIONS PATH

It is important that you completely understand the communications path of these units. Please read this carefully.

The main board, keypad/display board and keyboard assembly are complete computer systems in themselves, each with its own microprocessor and operating software. The modules communicate with each other using serial communication ports. Whenever a key is played on the keyboard, for example, the keyboard assembly microprocessor transmits this information to the microprocessor on the main board.

The keypad/display board communicates with the main board through the keyboard. Whenever the main board wants to put a message on the display, it sends the message directly to the display. Whenever a button is pressed on the control panel, the keypad/display board sends the message to the keyboard which, in turn, passes it on to the main board.
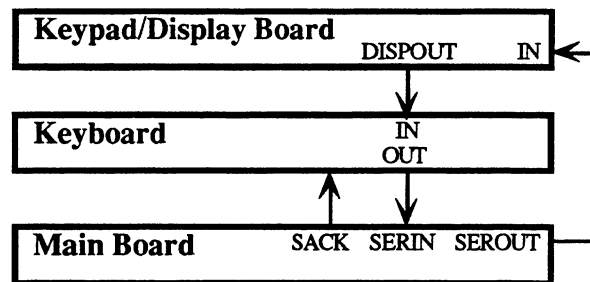
The communications path is shown in Figure 3. The main board communicates with the keyboard assembly over a two-line asynchronous interface carried by the 20-pin keyboard assembly ribbon cable. The keypad/display board communicates with the main board via the 4-pin cable.

Due to the complexity of the modules involved, it is often difficult to determine which module is at fault when a communications problem occurs. To aid in troubleshooting, a Communication Test Board is available.
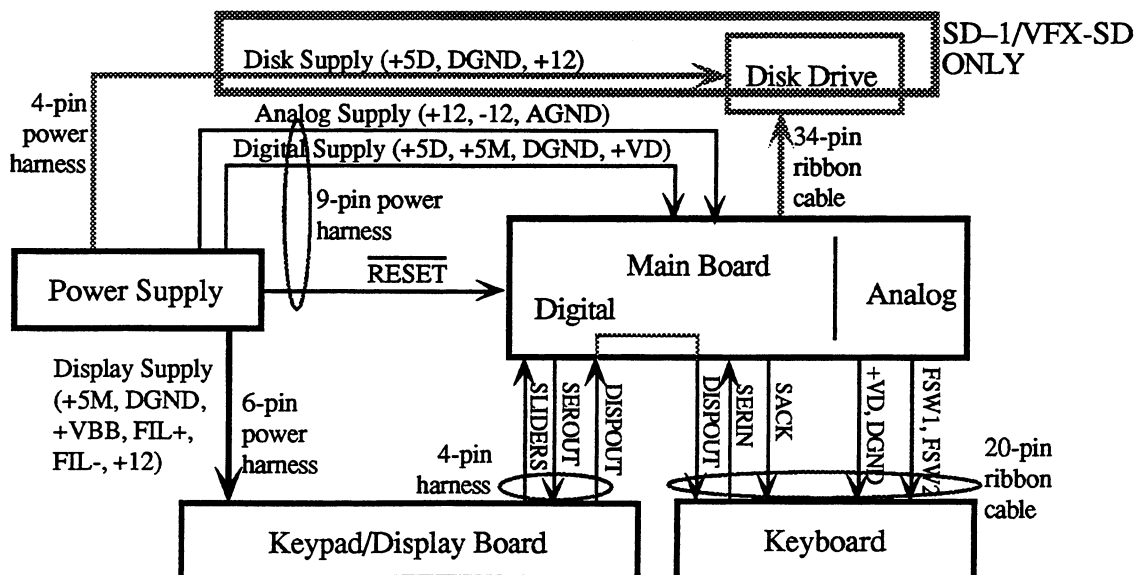
Figure 3 –Block Diagram

If a communication problem occurs (i.e., no display or no response to button presses or keys), it could be something as simple as a bad ribbon cable or display cable, or it could be a problem in one of the modules. To help you identify a faulty module, a special Communication Test Board is available from ENSONIQ Customer Service. The Communication Test Board simulates the operation of the keyboard assembly and can be used as a "known good" module in place of the keyboard assembly for troubleshooting.

IMPORTANT!
When using the Communication Test Board, keep in mind that it is sensitive to static discharge. Handle the board by the edges and store it in the anti-static shipping bag when not in use. Do not let the board short out when testing, place an insulator (cardboard, paper, etc.) underneath it.

Attaching the Communications Test Board
If the unit has a communications problem, turn the unit off and unplug the keyboard assembly 20-pin ribbon cable from the main board. Plug the 20-pin ribbon cable from the Communication Test Board onto the main board in its place. This will eliminate the keyboard assembly as a variable. Turn the system on. If the communications problem persists, you know the keyboard assembly is not at fault. If communication is restarted, however, the keyboard assembly is at fault. See the flow charts on pp. 9-16 for troubleshooting procedures.

There is one further complication. Since the communications path between the keypad/display board and keyboard is routed through the main board, there is a remote possibility that the printed circuit connections between the two connectors are defective. If you have a unit that has a problem communicating with its keypad/display board, you may want to verify continuity between the connectors on the main board. Turn off the power and unplug the 20-pin ribbon cable and the 4-pin display cable from the main board. Using an ohmmeter, verify continuity between the following points on the main board:

20-pin keyboard connector	4-pin display connector
Pin 1	to Pin 1
Pin 3	to Pin 2
Pin 5	to Pin 3

CHECKING THE POWER SUPPLY

Many problems may be related to a faulty power supply, transformer or line filter. You should always check these before troubleshooting the rest of the unit.

Check to make sure that all the cable connections are secure and correct. Plug in the unit and turn it on. After it has warmed up for five minutes, begin to test the voltages at the points shown in Figures 4 and 5. It is normal for line voltage to vary +/- 10%. If the voltages vary outside the allowable limits, see Figure 6 - Troubleshooting an SD–1/VFX^{SD}/VFX with Incorrect Power Supply Voltages.
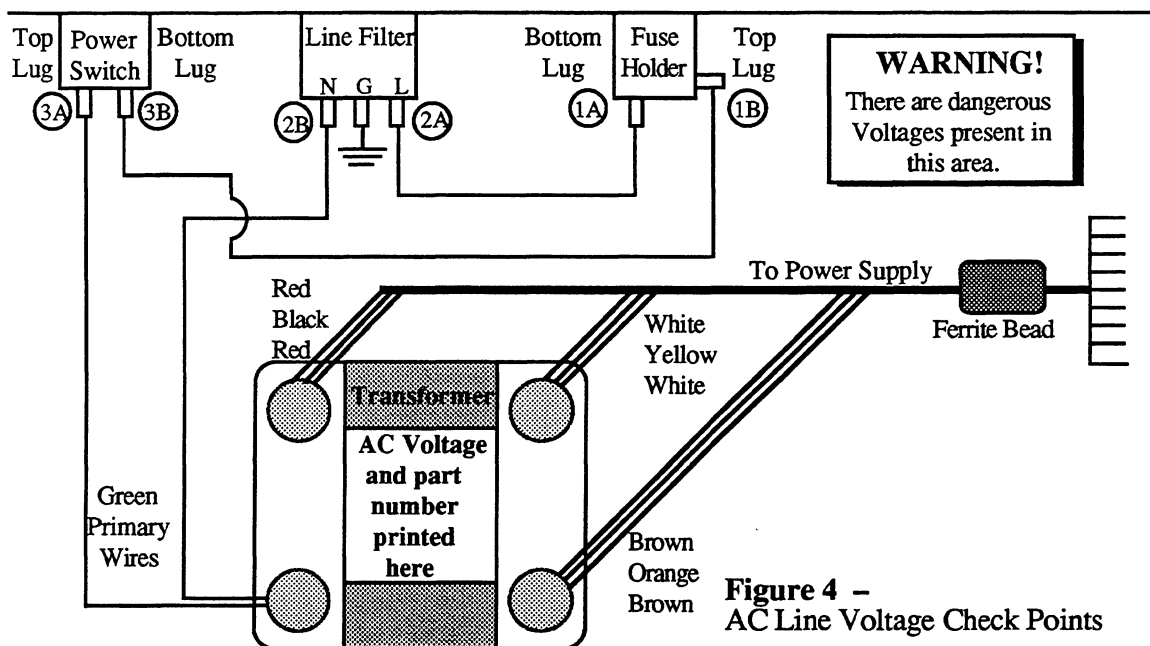
Figure 4 –
AC Line Voltage Check Points

AC LINE VOLTAGE MEASUREMENTS (see Figure 4 above)	
With the power switch OFF, the proper AC Line Voltage should read from: 2B-1A, 2B-2A, 2B-3B	With the power switch ON, the proper AC Line Voltage should read from: 2B-1A, 2B-1B, 2B-3B, 2B-3A There should be no voltage across the power switch.

TRANSFORMER AND POWER SUPPLY PART NUMBERS

The SD–1, VFX^{SD} and VFX all use the same power supply (assembly number 4090008101 silk-screened on the lower left of the power supply PC board). The transformer voltage and part number is labeled where shown in Figure 4. If you suspect a problem with the power supply and the labels on the transformer and power supply do not correspond to the configuration below, contact ENSONIQ Customer Service for instructions.

Voltage	Transformer
100V	1450000322
115V	1450000502
220V	1450000512
240V	1450000532

SAME POWER SUPPLY FOR SD–1, VFX^{SD} AND VFX

Figure 5 – Power Supply Voltage Check Points
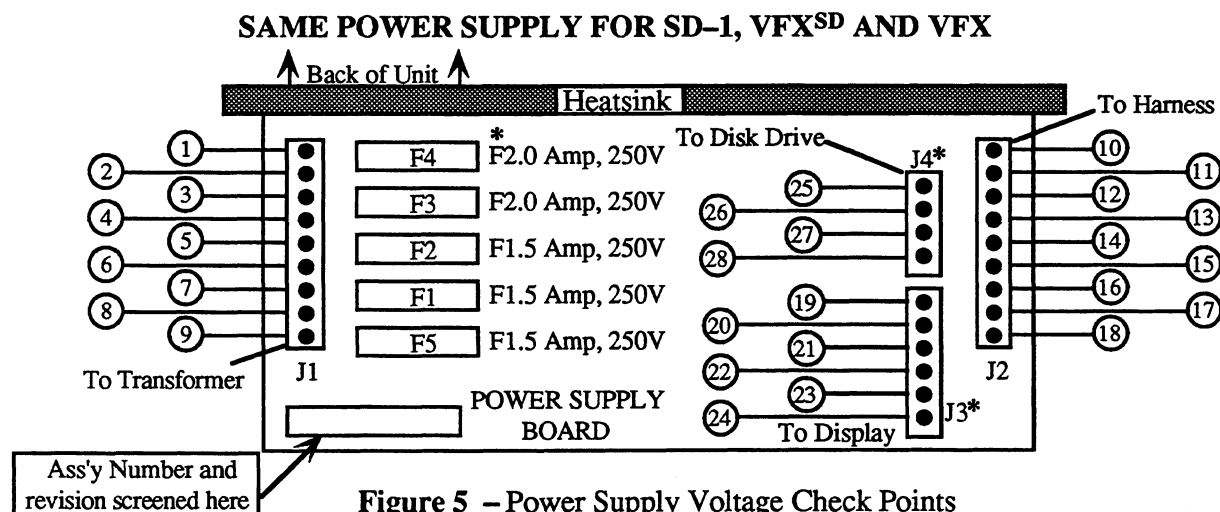
* Rev D and higher power supply boards only (SD–1 S/N 19340 and higher):
  * J3 and J4 are in different locations, and
  * the "F" before the fuse rating denotes a fast blow fuse.

POWER SUPPLY VOLTAGE CHART

The proper AC line voltage for each unit should be printed on the top of the transformer. Figure 4 shows the check points for reading the AC line voltage. Figure 5 shows the connector terminal numbers for the power supply and transformer. It is normal for line voltage to vary +/-10%.

The following chart lists the voltage ranges for proper operation of each supply (fully loaded) and the appropriate terminals to read across with the voltmeter (refer to Figure 5 for terminal locations):

Designation	Terminals +	−	Connector	Allowable range			Units
Digital Supply	1	3	J1	15.00	to	19.00	VACrms
Analog Supply	4	6	J1	23.00	to	29.50	VACrms
Display Filament	7	9	J1	8.50	to	11.00	VACrms
+5 Display	11	10	J2	+4.75	to	+5.25	VDC
+5 Digital	13	12	J2	+ 4.75	to	+5.25	VDC
VRES	14	12	J2	+2.70	to	+5.25	VDC
+12 Analog	15	18	J2	+11.40	to	+12.60	VDC
+VU	16	10	J2	+8.00	to	+11.00	VDC
-12 Analog	17	18	J2	-11.40	to	-12.60	VDC
+5 Display	20	19	J3	+ 4.75	to	+5.25	VDC
Vbb	21	19	J3	+45.00	to	+55.00	VDC
+12 Analog	22	19	J3	+11.40	to	+12.60	VDC
Filament	23	24	J3	8.50	to	11.00	VACrms
Display Offset	23	19	J3	+8.00	to	+11.00	VDC

SD–1/VFX^{SD} ONLY (this connector is not used on the VFX)

+5 Display	25	26	J4	+ 4.75	to	+5.25	VDC
+12 Analog	28	27	J4	+11.40	to	+12.60	VDC

TESTING THE POWER SUPPLY UNLOADED

If the power supply readings exceed the indicated tolerance (particularly the +5 digital line between terminals 12 and 13) it is possible that a defective component on the main board is drawing the power supply down. You should test the power supply unloaded before proceeding (see the following flow chart).

TROUBLESHOOTING AN SD–1/VFX-SD/VFX WITH INCORRECT POWER SUPPLY VOLTAGES

```
   WRONG VOLTAGE
    MEASUREMENT
         │
         ▼
  Disconnect 6-pin display
  cable at power supply J3.
         │
         ▼
    Are the voltages ───── YES ────▶  Replace the
    correct now?                      keypad/display board
         │                            (see Section B).
         NO
         ▼
  Disconnect 20-pin keyboard cable
  from the main board (VFX-SD/SD-1
     at J11, VFX at J6).
         │
         ▼
    Are the voltages ───── YES ────▶  Replace the keyboard
    correct now?                      (see Section C).
         │
         NO
         ▼
  Disconnect 9-pin main board
  cable at power supply J2.
         │
         ▼
    Are the voltages ───── YES ────▶  Replace the main board
    correct now?                      (see Section A).
         │
         NO
         ▼
  Replace the power supply
     (see Section D).
```

Figure 6 –
Incorrect Voltages

DISPLAY SELF-TEST MODE

When the keypad/display is receiving power from the power supply but is not in proper communication with the main board, the unit enters **self-test mode**. In self-test mode, the display remains blank until you press the buttons on the front panel. Pressing various front panel buttons will cause the display to print characters, clear the screen, etc.

USING SELF-TEST MODE TO DIAGNOSE KEYPAD/DISPLAY

1. If the sign-on message appears but the unit doesn't respond to button presses:
- **.** VFX's with O.S. 1.72 or lower, try a hard reset as described on p. 2.
- VFX's with O.S. 2.00 or higher, perform the system reset sequence as described on p. 2.
- SD–1's and VFX^{SD}s, perform the system reset sequence as described on p. 2.

2. If the unit is in self-test mode but the display does not respond according to the following chart, the problem is most likely in the keypad/display board. If certain buttons do not function properly during normal operation, test them while the unit is in self-test mode. If the same buttons do function properly in self-test mode, then the problem is most likely scrambled software (the unit will need to be reinitialized as outlined on p. 2).

DISPLAY SELF-TEST CHART

With the display cable disconnected from the main board, the front panel buttons respond as follows:

Press:	Display Reads:	Press:	Display Reads:
Up arrow/inc	space	Release	(erase underscore 8 characters)
Down arrow/dec	space	Patch Select	(backup cursor)
Cart	space	MIDI	(clear screen)
Sounds	space	Effects (Perf)	(clear line 1)
Presets	space	Replace Program	(clear line 2)
0	space	Multi A	(underscore at cursor)
1	space	Multi B	(underscore at cursor + adv. cursor)
2	space	Master	9
3	+	Storage	(enter flashing mode)
4	space	MIDI Control	(enter underscore mode)
5	space	LFO	7.
6	space	Env1	1
7	(underscore 6 characters)	Env2	3
8	(underscore 5 characters)	Env3	5
9	(advance cursor)	Pitch	0
Soft button #1	space	Pitch/Mod	2
Soft button #2	$	Filters	4
Soft button #3	'	Output	6
Soft button #4	space	Wave	space
Soft button #5	=	Mod/Mixer	?
Soft button #6	8.	Program Control	9.
Volume	(underscore 7 characters)	Effects (Prog)	<
Pan	(underscore 8 characters)	Select Voice	*
Timbre	(erase underscore 5 characters)	Copy	up arrow
Key Zone	(erase underscore 6 characters)	Write	down arrow
Transpose	(erase underscore 7 characters)	Compare	>

SD–1/VFX^{SD} buttons only:

Seq	space	Seq Control	7
(Edit) Song	space	Locate	(erase underscore at cursor + adv.)
(Edit) Seq	space	Record	8
(Edit) Track	space	Stop/Cont	(enter normal mode)
Click	(erase underscore at cursor)	Play	(enter flashing underscore mode)

BLANK OR FROZEN DISPLAY

**TROUBLESHOOTING A VFX
WITH A BLANK OR FROZEN DISPLAY
(ONLY FOR VFX's WITH O.S. 1.72 OR LOWER)**

Are all wire harness connections making good contact? — NO → Repair and retest

YES

NO

Any fuses blown? — YES → Are F3 and F4 blown? — YES → Check keyboard ribbon cable for improper connection.

NO

Turn VFX OFF. Disconnect 4-pin display cable from the main board (J5). Turn VFX ON.

Is the display in self-test mode? (p. 10) — NO → Are the display voltages correct? (J3 on the power supply - p. 8) — YES → Replace the keypad/display board (see Section B).

YES

NO

Turn VFX OFF. Reconnect 4-pin display cable to the main board at J5. Hard reset VFX as described on p. 2. Turn VFX ON.

Test the power supply unloaded. Go to Incorrect Power Supply Voltages flow chart, p. 9.

Does the sign-on message appear? — YES → All better now!

Replace the main board (see Section A).

NO

NO

Turn VFX OFF. Disconnect the keyboard cable from the VFX main board at J6.

Connect pins 19 and 17 of J6 together (the lowermost two of the left row of pins on J6). Turn VFX ON.

Does the sign-on message appear? — YES → Replace the keyboard (see Section C).

Figure 7 –
VFX's (ONLY with O.S. 1.72 or lower)
with a Blank or Frozen Display

TROUBLESHOOTING AN SD–1/VFX^SD/VFX (O.S. 2.X) WITH A BLANK OR FROZEN DISPLAY

Troubleshooting a VFX with a blank or frozen display is slightly different depending on the O.S. installed in the unit. The power-up sequence for the VFX was changed as of O.S. 2.0 so that the wake-up screen will always come on and a keyboard calibration will be done even if there is no keyboard attached.

(BLANK OR FROZEN DISPLAY)

TROUBLESHOOTING AN SD-1/VFX-SD OR VFX WITH O.S. 2.X, WITH A BLANK OR FROZEN DISPLAY

Peform the reset sequence or hard reset, see p. 2.

OK? — YES → (All better now!)

NO

Are all wire harness connections making good contact? — NO → Repair and retest ←

YES

NO

Any fuses blown? — YES → Are F3 and F4 blown? — YES → Check keyboard ribbon cable for improper connection.

NO

Turn unit OFF. Disconnect 4-pin display cable from the main board (see cable list on p. 32). Turn unit ON.

Is the display in self-test mode? (p. 10) — NO → Are the display voltages correct? (J3 on the power supply - p. 8) — YES → Replace the keypad/display board (see Section B).

YES

NO

Replace the main board (see Section A).

Test the power supply unloaded. Go to the Incorrect Power Supply Voltages flow chart, p. 9.

Figure 8 –
SD-1/VFX-SD or VFX (with O.S. 2.X) with a Blank or Frozen Display

Troubleshooting a unit with a Footswitch Problem (see Figure 9)
If one or both of the footswitches do not operate properly, make sure that the footswitches are set to the proper mode (on the Master page). See Section 6 of the *Musician's Manual* for more information.

The FS2 parameter corresponds to the right pedal of SW-5 or single pedal SW-1. The FS1 parameter corresponds to the left pedal of SW-5 only. The SW-5 is the Dual Footswitch (piano-type) available from ENSONIQ.

On the Master page:

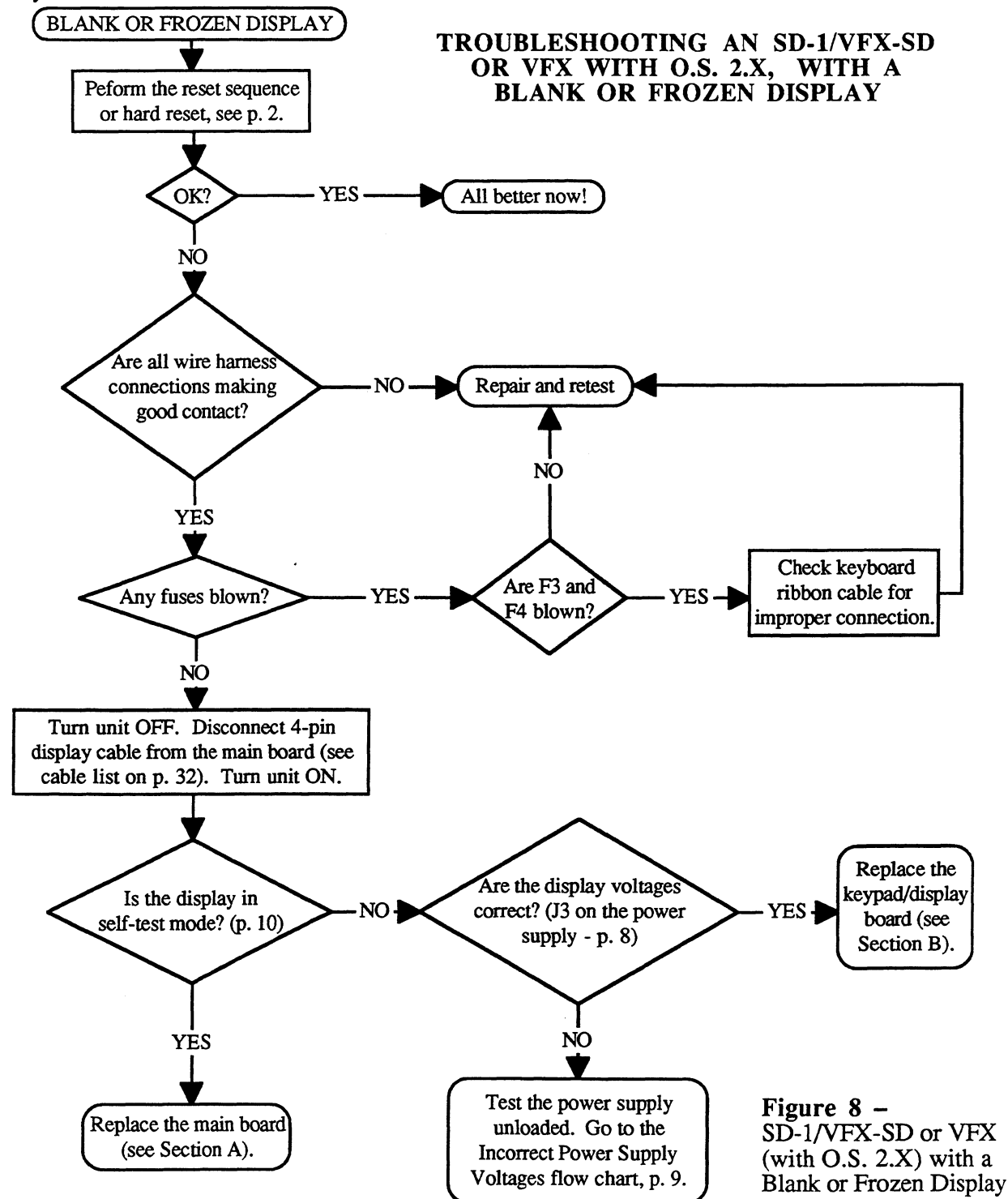|	**FS1**	**FS2**
Footswitch	SW-5 left pedal	SW-1 single footswitch, or SW-5 right pedal
Default	UNUSED	SUSTAIN
Option	SOSTENU	right PATCH R button
Option	left PATCH L button	—
Option	ADVANCE	—
Option*	STOP/GO	—
Option*	*STEP*	—

*SD-1 and VFX-SD only

If the footswitch mode is correct and the footswitch still doesn't function properly, there is either a problem with the main board, the keyboard or the 20-pin ribbon cable connecting the two. Although the footswitch jack is mounted on the main board, the footswitch signals are carried over to the keyboard by the 20-pin ribbon cable, where they are sensed by the keyboard microprocessor.

Use the following flow chart to troubleshoot the footswitches.

Footswitch problem

**TROUBLESHOOTING A
SD–1/VFX-SD/VFX WITH A
FOOTSWITCH PROBLEM**

Are they set to the proper mode on the Master page?

NO → Set the footswitches to the desired mode. → All better now!

YES

Set both footswitches to act as Patch Select Buttons. Press *Master*. Set FS1 to PATCH L. Set FS2 to PATCH R.

Press *Select Voice*. Pressing either footswitch should cause the appropriate patch indicator to change in the leftmost two characters of the display.

Is it working properly? — YES

NO

Turn the unit OFF. Attach the communications test board. Turn the unit ON. The display will show KEYBOARD CALIBRATION FAILED. Select IGNORE.

Press *Select Voice*. Pressing either footswitch should cause the appropriate patch indicator to change in the leftmost two characters of the display.

Is it working properly? — NO → Replace the main board (see Section A).

YES

Set the footswitches to the desired mode.

Replace the keyboard (see Section C).

Figure 9 –
Footswitch Problem

ERROR MESSAGES

Occasional system errors are not unusual, and unless they become chronic, they are not a cause for concern. It is important to realize that these messages are diagnostics and do not necessarily indicate a problem. These messages were designed to help our software engineers in the development of the software, not as hardware diagnostics.

It is possible that chronic error messages could result from scrambled memory. Be sure to reinitialize the system (see p. 2) before troubleshooting any further.

Software Error Messages
The following error messages could be caused by software:

Number	Description	Number	Description
16	poly or mono pressure events sent to VC	131	illegal instruction
20	unknown button event	132	chk instruction
48	parameter error	133	trapv instruction
49	layer error	134	privilege violation
80	bad buffer to MIDI	135	trace
128	bus error	137	line 1111 emulator
129	odd address error	138	spurious interrupt
130	divide by zero	139	unused vector

SD-1/VFX^{SD} only
60	unknown DOS status error
192	sequence bank load error
193	sequencer key up playback error
194	sequencer out of SDB's error
195	bad sequencer data created (VFX^{SD}s with O.S. 2.0 and higher)

Main Board Error Messages
The following error messages could be caused by a bad main board:

32	bad download	40	bad ESP error
33	bad ESP chip	145	unknown DUART interrupt error
34	bad DRAM	160	ESP refresh failed

MIDI or Keyboard Error Message
The following error message is usually caused by too much incoming data. It could also be caused by a MIDI or keyboard problem:

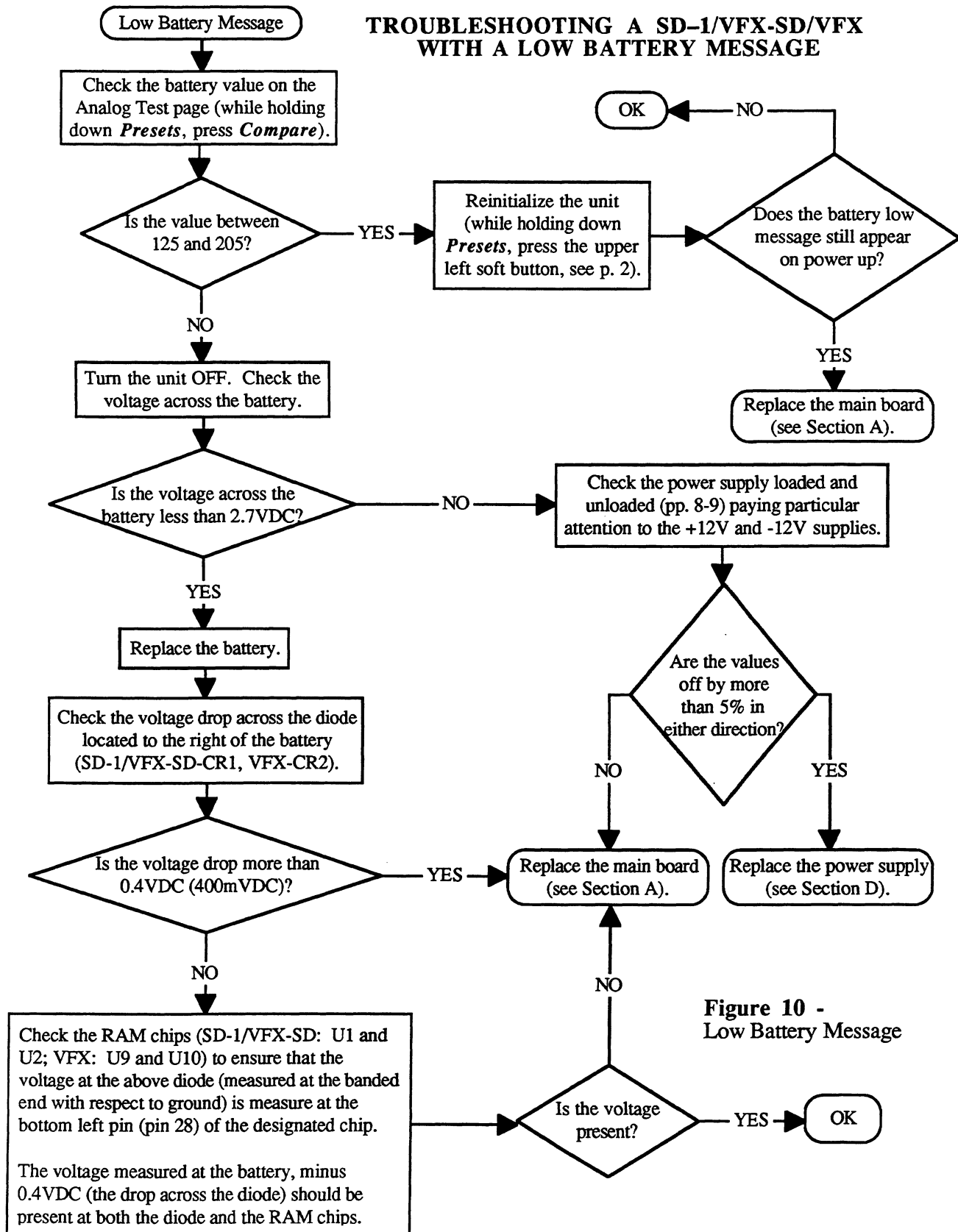|	
144	out of buffers

LOW BATTERY MESSAGES
A number of things could cause this message to appear when the unit is powered up:

WARNING - - LOW BATTERY VOLTAGE
SAVE DATA - SEE USER MANUAL *CONTINUE*

Sometimes the unit in question can wake up in a state of mild confusion and this message might appear. Go to the Analog Test Page (while holding *Presets*, press *Compare*). The value next to BAT should read between 125 and 205. If this is the case, it usually indicates that the system is confused and you should reinitialize (see p. 2), and check it again. See the following flowchart (Figure 10 - Low Battery Message).

**TROUBLESHOOTING A SD-1/VFX-SD/VFX
WITH A LOW BATTERY MESSAGE**

Low Battery Message

Check the battery value on the Analog Test page (while holding down *Presets*, press *Compare*).

Is the value between 125 and 205?

— YES → Reinitialize the unit (while holding down *Presets*, press the upper left soft button, see p. 2). → Does the battery low message still appear on power up?

Does the battery low message still appear on power up? — NO → OK

Does the battery low message still appear on power up? — YES → Replace the main board (see Section A).

Is the value between 125 and 205? — NO → Turn the unit OFF. Check the voltage across the battery.

Is the voltage across the battery less than 2.7VDC? — NO → Check the power supply loaded and unloaded (pp. 8-9) paying particular attention to the +12V and -12V supplies.

Is the voltage across the battery less than 2.7VDC? — YES → Replace the battery.

Check the voltage drop across the diode located to the right of the battery (SD-1/VFX-SD-CR1, VFX-CR2).

Is the voltage drop more than 0.4VDC (400mVDC)? — YES → Replace the main board (see Section A).

Is the voltage drop more than 0.4VDC (400mVDC)? — NO → Check the RAM chips (SD-1/VFX-SD: U1 and U2; VFX: U9 and U10) to ensure that the voltage at the above diode (measured at the banded end with respect to ground) is measure at the bottom left pin (pin 28) of the designated chip.

The voltage measured at the battery, minus 0.4VDC (the drop across the diode) should be present at both the diode and the RAM chips.

Are the values off by more than 5% in either direction? — NO → Replace the main board (see Section A).

Are the values off by more than 5% in either direction? — YES → Replace the power supply (see Section D).

Is the voltage present? — NO → Replace the main board (see Section A).

Is the voltage present? — YES → OK

**Figure 10 -
Low Battery Message**

TEST PROCEDURE

The following procedure will ensure the thorough testing of a SD–1, VFX^{SD} or VFX and will also aid in troubleshooting the unit. The unit should be connected in stereo to a sound system. To perform the following tests you will need:
- a short MIDI cable,
- a CV pedal,
- a dual pedal footswitch, and
- an STC-32 storage cartridge

The SD–1, VFX^{SD} and VFX are heavily software dependent, and like all computers, certain events can cause the unit to glitch and contract a severe case of amnesia. Sometimes these units merely require reinitialization (see p. 2).

1. **Power Supply Continuity**
   a. Set meter on 2KΩ scale.
   b. Meter should read 190Ω to 230Ω between power supply heat sink and metal tab of regulator Q-4. Regulator Q-1 will read "open" after about 15 seconds.
   * **Failure indicates a power supply problem.**

2. **MIDI Test**
   a. Plug in audio cables on the rear panel and connect MIDI In to MIDI Out with a MIDI cable.
   b. Hold down a few keys.
   c. Disconnect one end of the MIDI cable.
   d. When you release the keys, the notes should sustain.
   e. Play twenty or more keys simultaneously to reinitialize the voices.
   * **Failure indicates a main board problem.**

3. **Memory Backup Test (VFX ONLY)**
   a. Transfer the contents of a cartridge into the internal memory (press *Storage*, then select CARTRIDGE, BOTH, CART-TO-INT, then answer YES to both questions).
   b. Toggle the power switch off and on 5 times, then leave the unit off for 10 seconds.
   c. Power the unit on and verify that the sounds in internal memory have not reverted to the default sounds.
   * **Failure usually indicates a main board problem although a power supply problem is also possible.**

4. **Audio Quality Test**
   a. Select and individually test the following sounds in each ROM bank for sound quality, pops, glitches, clicks, etc. On the SD–1, press *BankSet* until RM0 shows in the upper left corner of the display. On the VFX^{SD} and VFX, double-click on the *Cart* button until ROM shows in the upper left corner of the display.

Bank	SD–1/VFX^{SD}	VFX
0	STAR-DRIVE	TRANS-TINE
1	METAL-TINES	STARBRASS
2	SYN-PIANO	PIANO-HI
3	CHIFFLUTE	NASTY-ORGAN
4	BRASSY	SOLOTRUMPET
6	NASTY-ORGAN	PIANO-LO
6	TIMBRE-ORG	—
7	ORCH+SOLO	BETTERBELLS
8	FLANG-CLEAN	HOLD-ON
9	FUSION-KIT	12-STRING
9	ROCKIN-KIT	—

5. Audio Output and Panning Tests

a. Select DOUBLE-REED. This sound is located in the ROM sound banks: SD–1 RM03 (press *BankSet* until RM0X appears in the left corner of the display, then bank *3*); VFX^SD bank 3, VFX ROM bank 8 (double-click on the *Cart* button).

b. Press *Output* twice.

c. Select the PAN= (soft button 4).

d. Move the data entry slider and play to verify that the sound pans as you play the keyboard.

e. Unplug the left output. Verify that you have mono coming out of the right channel (you should hear equal volume levels regardless of the pan setting).

f. Unplug the right output and plug in the left output. Verify that you have mono coming out of the left channel.

g. Plug your headphones directly into the headphone jack and verify that the sound pans as you move the data entry slider and play the keyboard.

* **Failure indicates a main board problem.**

6. Aux Output Test (SD–1/VFX^SD ONLY)

a. Plug the audio cables into the aux output jacks.

b. Select DOUBLE-REED. This sound is located in the ROM sound banks: SD–1 RM03 (press *BankSet* until RM0X appears in the left corner of the display, then bank *3*); VFX^SD bank 3 (double-click on the *Cart* button).

c. Double-click on *Select Voice*.

d. Press *Output* twice until the top line of the display shows DESTINATION BUS.

e. Set DESTINATION BUS=AUX (move the data entry slider all the way up).

f. Play briefly to verify that there is no distortion in the sound (see SD–1 ONLY section).

g. Press Output until the display shows PAN=. Press soft button 4 to select it.

d. Move the data entry slider and play to verify that the sound pans as you play the keyboard.

h. Unplug the left aux output. Verify that you have mono coming out of the right channel (you should hear equal volume levels regardless of the pan setting).

j. Unplug the right aux output and plug in the left aux output. Verify that you have mono coming out of the left channel.

k. Plug your headphones directly into the headphone jack and verify that the sound pans as you move the data entry slider and play the keyboard.

* **Failure indicates a main board problem.**

7. Footswitch Test

a. Plug in the SW-5 piano-type dual footswitch.

b. Verify that notes sustain while the right footswitch is pressed.

c. Press *Master*, then select FS1= and set it to SOSTENU.

d. Play a note, then press the left footswitch. Release the note and the note should sustain while the left footswitch is pressed.

e. Unplug the footswitch.

* **If the footswitches do not operate correctly, see the flowchart on p. 14.**

8. Keyboard Test

a. Select DOUBLE-REED. This sound is located in the ROM sound banks: SD–1 RM03 (press *BankSet* until RM0X appears in the left corner of the display, then bank *3*); VFX^SD bank 3, VFX ROM bank 8 (double-click on the *Cart* button).

b. Verify that the sound gets louder with higher key velocity.

c. Press each key only until normal travel ends. Do not enter the pressure zone. Verify that no pressure effect occurs. Continue to press the key into the pressure zone and verify that pressure causes vibrato.

* **Failure indicates a keyboard problem.**

9. Analog Tests
   a. Plug a CV Pedal into the Pedal•CV jack.
   b. Select Analog Test Page (while holding down *Presets*, press *Compare*).
   c. Move the appropriate controller throughout its range and check the following:

1) Pitch Wheel (PTCH)	0	-	127	center =64		
2) Mod Wheel (MOD)	0	-	127			
3) Pedal•CV (PED)	0	-	127	unplugged =127		
4) Volume (VOL)	0	-	127			
5) Data Entry (KNOB)	0	-	255			
6) Patch Selects (PSL)	neither =0		left = 64	right = 32	both = 127	
7) Battery (BAT)	between 125 and 205					

   * **Failure indicates a main board problem or a problem with the associated controller.**

10. Cartridge Write Test
   a. Press *Copy*, select MAKE COPY, then select RECALL.
   b. With the data entry slider, change the name of the patch (one character will do).
   c. Press the *Cart* button (*BankSet* on the SD–1, until CRT is displayed).
   d. Press a Sound Bank button and while holding that button, select a program to overwrite using the soft buttons.
   e. Verify that the name has changed.
   f. Select the sound you have written to the cartridge and play a few notes to check for scrambled sound data.
   * **Failure indicates a main board problem or a problem with the cartridge cable assembly.**

11. Disk Change Test/Battery Backup Test (SD–1/VFX^SD ONLY)
   a. Load in Sequencer O.S. Press *Storage*, then select DISK, LOAD, move data entry slider to the top to select TYPE=SEQUENCER-OS, eject the disk from the drive and then reinsert it. Select YES.
   b. Verify that the display shows DISK HAS BEEN CHANGED briefly. Press YES. The display should show DISK COMMAND COMPLETED.
   c. Eject the disk from the disk drive.
   d. Toggle the power switch off and on 5 times, then leave the unit off for 10 seconds.
   e. Power the unit on. Verify that the sounds in internal memory have not reverted to the default sounds and none of the names are scrambled.
   f. Press the *Click* button. The display should not show SEQUENCER MUST BE LOADED.
   * **Failure indicates a main board problem or a power supply problem.**

12. Reinitialize and Load Sounds
   a. Reinitialize the unit (while holding down *Presets*, press soft button 1, then answer YES).
   b. Load in the customer's sounds (see the Storage Section).
   c. Load in the Sequencer O.S. for SD–1 and VFX^SD.
      1) Insert Sequencer O.S. disk into the drive.
      2) Press *Storage*, select DISK, move the data entry slider to the top to select FILE–TYPE=SEQUENCER–OS.
      3) Select YES. After the drive stops loading, select NO to exit this page.

SD-1 ONLY SECTION

Distortion in both the Main and Auxiliary Outputs
If both the main *and* auxiliary outputs sound distorted (i.e., everything sounds like it is being played through the distortion algorithm) the problem may be caused by the charge pump circuit on the main board. This distortion may be intermittent. Call ENSONIQ Customer Service for a replacement main board.

Ground Wire vs. Foil Shield
On all SD–1s and later VFX^{SD}s (serial number 22500 and higher) there is a ground wire that connects to three places in the unit: 1) the ground of the line filter, 2) the power supply heatsink and 3) the grounding pad of the main board. On VFXs and VFX^{SD}s below 22500, the ground from the line filter was connected to the main board grounding pad by a foil shield under the main board (shown in Figure 11). It was found that a single ground wire makes a more reliable connection to these three points than the foil shield.

On some units, this ground wire is part of the main harness and on others it is a separate wire. Make sure this wire is making good contact after any repair. The ring lug should go onto the screw first, then the star washer. This makes sure that the wire cannot rotate and come loose.

SD-1 SOFTWARE NOTES
The following changes were included in ROM Version 1.00C:
• Modified data slider software to allow for production tolerances.
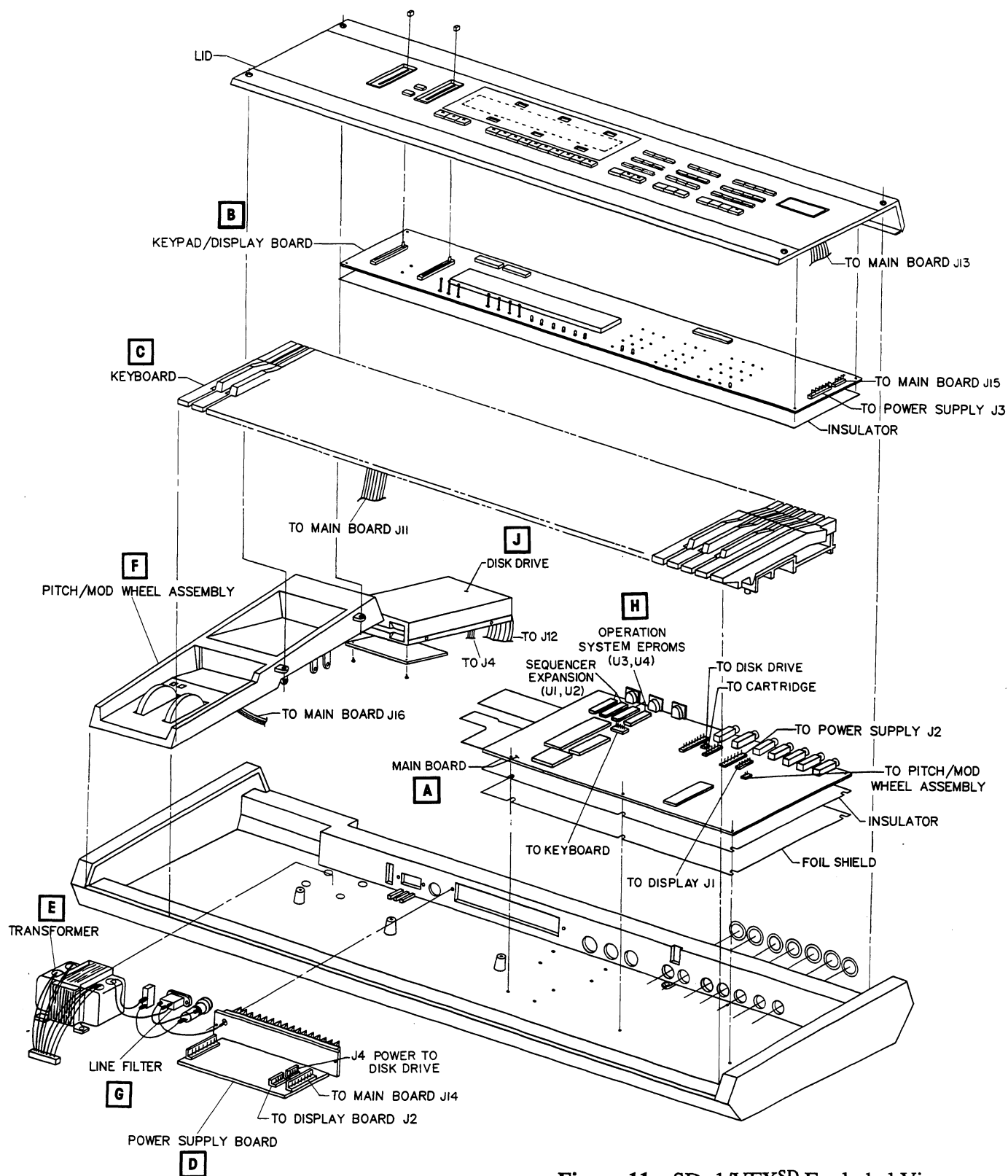• Incorporated some minor changes to ROM sound programs.

LID

B

KEYPAD/DISPLAY BOARD

TO MAIN BOARD JI3

C

KEYBOARD

TO MAIN BOARD JI5

TO POWER SUPPLY J3

INSULATOR

TO MAIN BOARD JII

J

DISK DRIVE

F

PITCH/MOD WHEEL ASSEMBLY

H

OPERATION SYSTEM EPROMS (U3,U4)

SEQUENCER EXPANSION (UI,U2)

TO J12

TO J4

TO DISK DRIVE

TO CARTRIDGE

TO POWER SUPPLY J2

TO MAIN BOARD JI6

MAIN BOARD

A

TO KEYBOARD

TO DISPLAY JI

TO PITCH/MOD WHEEL ASSEMBLY

INSULATOR

FOIL SHIELD

E

TRANSFORMER

J4 POWER TO DISK DRIVE

LINE FILTER

TO MAIN BOARD JI4

G

TO DISPLAY BOARD J2

POWER SUPPLY BOARD

D

Figure 11 – SD–1/VFX^{SD} Exploded View

VFX<small>SD</small> ONLY SECTION

Ground Wire vs. Foil Shield — see p. 20.

SOFTWARE NOTES

All VFX^{SD}s should have at least O.S. version 1.37. Any unit that doesn't should be updated to the latest O.S.

To check the software version, hold down *Presets* and press *Master*.

VFX^{SD} Version 1.37 contains fixes for problems that have been discovered since the version 1.32 disk and version 1.33 ROM release.
Compatibility: **(R)** ROM: requires at least version 1.30 disk
(D) Disk: requires at least version 1.30 ROM
Note: **(D!)** and **(R!)** indicate new features added in this release

MIDI

(R) DEVICE ID INQUIRY MESSAGE- In previous versions, receiving the device inquiry message could cause a system error. In addition the version number information which was transmitted in response to the inquiry was not correct. These problems have been eliminated.

(R) MIDI SUSTAIN PEDAL FROM SONG TRACKS- In previous versions, sustain pedal events were not always sent out via MIDI when playing on SONG tracks.

Disk Operating System (DOS)

(R) PROBLEMS SAVING SEQ FILES- In previous versions, if the following procedure was used, problems could result.
- Select either the 30 or 60-SEQ-FILE type;
- press *YES* from the SAVE FILE page;
- indicate that you want to save 30 or 60 programs along with the sequence data;
- eject and reinsert the disk while on the file naming page;
- press *YES* again to indicate that you want to save the file.

This could cause the disk to become completely filled and possibly corrupted and disk error 43 to be displayed. The actual error code should have been 143. The software has been modified to now display 3-digit disk error codes. Error codes above 128 indicate *serious* disk operation problems which may have corrupted the file or even the entire disk.

Another condition was corrected which could have caused similar problems with files of the 30–SEQ–FILE type which were saved from the upper bank (5-9) without programs.

(R) PROBLEMS LOADING SEQUENCER-OS or SYS-EX FILES- In previous versions, if the disk was ejected while on the page which asks for confirmation before erasing all sequence data, a file operation error 5 would result. This was harmless but not friendly or informative. The system now indicates that the disk has been changed and returns to the LOAD FILE page automatically so the user can select a file to load from the newly inserted disk.

General System

(R!) SHORTCUT TO FIND CURRENT SOUND- Double-clicking the *Sounds* button will display the program bank page which contains the current primary sound. This feature was added to make it easy to find the current program.

(R) SUSTAIN PEDAL ON TRACKS 9-12- In previous versions, notes were not released when the sustain pedal was let up on tracks 9-12. Fixed in 1.37

(R) CONTROLLING EFFECTS FROM SONG TRACKS- In previous versions, it was not possible to control the modulation of effects from SONG tracks.

(R) LED CHANGES- Some minor changes were made to control when certain LEDs are active. These changes do not affect the functionality of the system, and were made only to reduce potential confusion.

Sequencer

(R) MIDI NOTES LEFT HANGING BY SONG STEPS- In previous versions, if a MIDI key event lasted past the end of a sequence, *in Song mode* that note could be left "hanging" if the next sequence in the song had either a different MIDI status or a different MIDI channel assigned to the track. Versions 1.37 and higher will always send a Note Off event *before* the track MIDI status or channel changes.

(R) SELECTING "UNDEFINED" TRACKS- Selecting an UNDEFINED track will now copy *all* track values from the previously selected track. Previous versions copied only the sound from the selected track while inserting default values for the rest of the track parameters.

(R) SEQUENCER FREE MEMORY DISPLAY- In previous versions, the sequencer free events field on the Sequencer Control page did not display the correct number of free events when the number of events exceeded 65535 (only possible with the memory expander installed). This has been fixed in version 1.37.

(D) RECORDING FIRST TRACK- In previous versions, the first note played on the first track of a sequence was always recorded on the first clock, regardless of where the note occurred relative to the audible click. In versions 1.37 and higher, the first note will be recorded at its correct position in the first measure when the CLICK parameter is set to ON or REC. If CLICK=OFF, the first note will always be recorded at the first clock.

VFX^SD Version 2.00 contains fixes for problems that were discovered since the version 1.37 disk and version 1.37 ROM release.
Compatibility: (R) ROM: requires at least version 2.00 disk
              (D) Disk: requires at least version 2.00 ROM
Note: (D!) and (R!) indicate new features added in this release

Interim version numbers referred to in these notes pertain only to beta test releases. All changes described are included in version 2.00. The descriptions of some changes, particularly new features, refer the reader to the VFX^SD Software Version 2.0 Update document for more detailed information.

General System
(R!) TRANSPOSE CONTROL PARAMETER- The MIDI Transpose Enable (XPOS) parameter on the MIDI Control page has new settings which allow more control over how track transpose is handled (refer to VFX^SD 2.0 Update).

(R!) MAXIMUM VELOCITY PARAMETER- A new parameter has been added to the second Master sub-page which sets the maximum velocity value which will be recognized from the keyboard (refer to VFX^SD 2.0 Update).

(R!) PITCH TABLE CARTRIDGES- When SYSTEM PITCH-TABLE=CUSTOM, the user now has a new way of transferring pitch tables from special cartridge programs into the system pitch table without affecting the currently selected sound (refer to VFX^SD 2.0 Update).

(R!) PITCH BEND HELD MODE- The pitch bend parameter has new settings which provide the option of bending only notes that are being held on the keyboard (refer to VFX^SD 2.0 Update).

(R!) INTERNAL PRESET INITIALIZATION- The ROM presets will be copied into the internal presets whenever the system is reinitialized. This will put valid, working presets into the internals, instead of their previous value of all zeroes.

(R!) UPDATE TRACK NAMES- When changing Track Status or MIDI Channel values on preset tracks, the names of the programs will now be updated to reflect the new settings.

(R) PATCH SELECT HOLD ON MULTIPLE TRACKS- In previous versions, the Patch Select HOLD function would only affect the track whose parameter was underlined, even if multiple layered tracks were set to HOLD. The HOLD function will now work correctly on all active tracks which are set to HOLD status.

(R) SUSTAIN PEDAL ON TRACKS 9-12- In previous versions, sometimes voices would hang (continue to sound) when the sustain pedal was let up on tracks 9-12, particularly if the program on the track(s) contained delayed voices.

(R) REPLACE PROGRAM WITH EFFECT ON PRESET TRACKS- The technique for importing an effect into a sequence/song along with a program when using Replace Program will now also work on Preset tracks (as documented on p. 2-10 of *Musician's Manual*).

(R) LOW BATTERY THRESHOLD- The cutoff value was changed to be a slightly more tolerant in order to solve production problems with spurious and premature battery warnings.

(R) PRESET TRACK PARAMETER ERRORS- In previous versions, when a layered preset track was deselected, its track parameter would be underlined and an incorrect value would be displayed. Unlayering a track will no longer underline the deselected track's performance parameter.

(R) MOD MIXER PROBLEM- A change was made to make sure that the Mod Mixer can correctly handle extreme negative values from mod sources which can generate negative values (i.e. LFO and KEYBD).

(R) COPY PAGE PROBLEMS- A change was made to make sure that the Copy function will work correctly when copying pages of program data from ROM or cartridge locations.

(R!) PITCH BEND RANGE- In previous versions, when the pitch bend parameter was set to 12, the pitch would not bend quite a full octave at the limits of travel of the pitch bend wheel. This has been corrected.

Disk Operating System (DOS)
(R) FILE LOADING PROBLEMS- A problem was corrected which could sometimes cause problems when users attempted to load non-contiguous files (file broken into several sections on the disk). Files can become non-contiguous when saved onto a disk which has had files erased, or when the size of the file is increased and it is resaved under the same name. This problem is most likely with sequence data files, but it can happen with almost any file type. The data in the file is not affected, and if the file was originally saved correctly, it may be loaded successfully with the new OS. A good example is a 60-SEQUENCE file which would load correctly before the last time it was saved, but which now results in a system error 192.

(R) SYS-EX RECORDER CHANGES- Some changes were made to the Sys-Ex Recorder to increase its reliability. You must now use the *SAVE* or *EXIT* soft buttons to leave the page. Sys-Ex data remains in memory until it is successfully saved onto a disk, or until sequencer data is changed.

(R) SAVING AND LOADING SINGLE PRESETS- The actual contents of the Edited Preset will now be saved if it is selected when a single preset file is written, and loading single preset files will work as documented. In previous versions, the last selected preset would be saved even if the edited version was selected, and reloading did not work correctly.

(R) LOADING SYS-EX FILES- A minor change was made to prevent possible but unlikely errors which could have occurred if Sys-Ex files were loaded without the Sequencer OS in memory.

(R) SEQUENCE FILE LOADING PROBLEMS- In previous versions, if sequence files were loaded when changes made to the currently selected sequence were still outstanding (i.e. the changes had not been saved), it was possible for the old track setup information (program assignments, etc.) to be combined with the newly loaded sequence data for that particular sequence location. This could confuse the sequencer and/or the user in a number of ways. This problem could also have occurred when receiving sequencer data Sys-Ex dumps. This problem has been corrected.

MIDI

(R) MIDI VOLUME WITH A MIDI LOOP- In earlier versions, if a MIDI loop was present and the user decreased the track mix on the Volume page, the volume would often rapidly decrease to zero and could never be increased, usually resulting in totally silent tracks which often showed high mix values. To fix this problem, a new switch has been added to the MIDI Control page which changes the way volume is transmitted when track status is set to MIDI. With this new MIDI LOOP switch set to ON, track Volume page (mix) changes are not transmitted, and volume pedal changes are sent directly, unaffected by the mix setting. This prevents the negative volume spiral (dreaded vortex) problem that some users encountered when working in a MIDI loop configuration – typically with an external computer sequencer (refer to VFX^{SD} 2.0 Update). The CONTROLLERS=ON or OFF switch has been abbreviated to CNTRLS=ON or OFF to make room for the new switch.

(R) SENDING SUSTAIN PEDAL EVEN IF OFF- In previous versions, sustain pedal events were always transmitted via MIDI (except if track status was LOCAL) even if the Sustain Pedal Enable switch on the track was set to OFF. This has been corrected, and MIDI transmission of sustain pedal events is now also controlled by the switch.

(R) SENDING PROGRAM CHANGES FROM THE SEQ/SONG TRACKS- In earlier versions, if a program change was ever received on a track, then no further program changes would be transmitted from the seq/song tracks unless the user manually changed the program number on the track MIDI Channel page; that is, they would not be sent when the track was selected. In version 1.40 and higher, a program change will always be sent when the track is selected, regardless of what has been previously received.

(R) REPLACE PROGRAM ON PRESET TRACKS- When using Replace Program on Preset tracks, MIDI program changes will *not* be sent when a program is selected.

(R) TIMBRE AND RELEASE NOT RECEIVED IN MULTI MODE- In previous versions, the Timbre and Release controllers were not correctly received in MULTI mode. This has been corrected.

(R) SOSTENUTO CONTROLLER NOT RECEIVED- In previous versions, the Sostenuto controller (#66) was transmitted but not correctly received from MIDI by the VFX^{SD}. This has been corrected.

MIDI System Exclusive

(R) DEVICE ID INQUIRY- The VFX^{SD} is now able to correctly respond to Universal Device Inquiry messages. In previous versions, incorrect software version number information could be sent, and the inquiry could cause a system error. This has been corrected.

(R) SENDING SINGLE PRESETS- The actual contents of the Edited Preset will now be transmitted when the current preset is sent or requested, as specified in the *Musician's Manual*. In previous versions, the last selected preset would be sent even if the edited version was selected.

(R) RECEIVING MULTI DUMPS- A minor change was made to make sure that the Track Select page (TRAX) for Tracks 1-6 is always displayed after a Track Parameters Dump is received. In previous releases, the display would alternate with the last used track parameter page when consecutive dumps were received.

(R) SYS-EX RECEIVE ERRORS- Sys-Ex messages will now be processed even if they are received while the system is waiting for a YES or NO response to a prompt on the screen. In previous versions, Sys-Ex messages received in this state would be ignored, and could cause later Sys-Ex Receive Errors. Additionally, Sys-Ex messages will now be processed when a timed message is on the screen, but some commands may be ignored. It is suggested that users avoid sending Sys-Ex messages while such temporary messages are being displayed.

(R) VIRTUAL BUTTON CHANGES- The Virtual Button command has been modified to separate button up and down commands, allowing more complete simulation of front panel actions.

(R) SYS-EX DOCUMENTATION CHANGES- Numerous changes and corrections were made to the VFX^{SD} Sys-Ex documentation (Appendix A of the *VFX^{SD} Musician's Manual*). A complete revised version of Appendix A is available.

Sequencer

(D!) STEP ENTRY RECORDING FEATURES- A new way of recording tracks in non–real time has been added. There is a new switch on the Seq Control third sub-page called STEP-ENTRY which controls whether the sequencer will record normally or in Step Entry mode. In Step Entry mode, a new page will be displayed. A new setting for FS1 has been added to allow the left footswitch to advance the track location while using Step Entry (refer to VFX^{SD} 2.0 Update).

(D!) MULTI–TRACK RECORD- A new record mode has been added which makes it possible to record data from MIDI on multiple tracks simultaneously. A new setting was added to the REC-SOURCE parameter on the Seq Control page (refer to VFX^{SD} 2.0 Update).

(D!) SEQUENCE BANK FEATURES- A way to select sequences has been added to certain sequencer edit pages. When a sequence name parameter is selected on the Song Edit, Append Sequence, Copy Track or Merge Track pages the LED in the bank buttons will flash to show which bank the indicated sequence is located in. Pressing a bank button will temporarily show the corresponding sequence bank page, and sequences may be selected using soft buttons. The page will then revert to the previous edit page with the new sequence installed. Sequence locations for the Copy Song and Copy Sequence commands may also be selected from these "momentary" banks (refer to VFX^{SD} 2.0 Update).

(D!) PLAYING TRACKS IN AUDITION- It is now possible to alternate between playing the Old and New track in Audition mode *without* having the track restart from the beginning. In previous versions, each time Play New or Play Old was selected, the track would be played from the beginning, which could make comparisons inconvenient.

(R) COPYING PRESETS INTO SONG TRACKS- In previous versions, presets could only be copied into sequence tracks, even if song tracks were most recently selected. This feature will now work correctly.

(R) CHAINING SEQUENCES IN REAL TIME- In previous versions, if a sequence was selected while another sequencer was playing, it would not have the correct effect installed when it started playing; instead, the effect would always be Large Hall Reverb. This has been fixed.

(R) HANGING MIDI NOTES IN SONG MODE- In previous versions, when a track with STATUS=MIDI or BOTH contained notes whose duration extended past the end of a sequence, these notes could hang when the sequence was played as a song step. This has been fixed.

(D) ENTERING PROGRAM NUMBERS ON SEQ TRACKS- If MIDI program numbers are entered on Sequencer tracks 1-12 using the bank button method (described on page 3–12 of the *VFX^{SD} Musician's Manual*), the change will now trigger the Save Changes prompt. In previous versions, this was not the case.

(D) RECEIVING MIDI SONG SELECTS- In previous versions, the VFX^{SD} did not respond to MIDI song select messages. This was fixed.

(D) LOCATING IN SEQUENCES WITH SUSTAIN PEDAL INFORMATION- In previous versions, if a sequence had sustain pedal information recorded on one or more tracks, the LOCATE function could cause a SYSTEM ERROR 144. This was fixed.

(D) LOCATING IN AUDITION MODE- In previous versions, if the Locate function was used while in Audition mode, pressing Stop would no longer return the user to the Audition page. This left the user unable to decide to Keep New or Old, and therefore trapped in Audition forever. The unit could be turned off, but the new track would be lost. This problem has been fixed.

(D) LOCATING IN SONGS- In previous versions, it was possible for the Locate function to leave the tracks in partially incorrect states after locating ahead into a song. Sometimes the programs assigned to the tracks would be incorrect, or controller settings were wrong. The Locate mechanism was modified to be more foolproof, and while locating in a long sequence or song may sometimes take longer than in earlier versions, the tracks will always be completely correct. The system now displays "LOCATING..." while it is processing the GOTO command. The above comments also apply to the handling of MIDI Song Position Pointer messages, which are essentially the same as internal GOTO commands.

(D) CHANGING EVENT DURATION- In previous versions, it was impossible to decrement the BAR field of the event duration to a value of zero. This was fixed.

(D) EXITING EVENT EDITOR- In previous versions, selecting *EXIT* from the top level of the event editor did not always display the audition screen (Keep/Play); it was sometimes necessary to press *Play* or *Stop* to enter Audition mode. In version 1.41 and higher, if any actual edits have occurred, pressing *EXIT* from the top level of the event editor will always display the audition screen.

(D) INSERT "ALL"-TYPE EVENT PROBLEM- In previous versions, it was possible to corrupt the data on a track by using the INSERT command when TYPE=ALL. The sequencer would insert random information, which could corrupt the track in some cases. The Insert command is now ignored when TYPE=ALL (or CNT which stands for All Controllers and was always ignored).

(R) OVERDUBBING BY PRESSING PLAY/RECORD- When punching in on a track by pressing RECORD while in PLAY mode, it was possible to encounter SYSTEM ERROR #193. This was fixed.

(R) RECORDING CONTROLLERS- When a track was selected with the volume/mod pedal or the modwheel already set to a non-zero value, the initial values of these controllers would not be recorded.

(D) EVENT EDITOR CORRUPTING AUTO-PUNCH TIMES- In previous versions, using the EVENT EDITOR could change EDIT-IN and/or EDIT-OUT times without explicit change having been made by the user.

(D) RECORDING SUSTAIN PEDAL- In previous versions, each time the sustain pedal was depressed, TWO (2) sustain pedal events were recorded in the track. This was harmless, except for the unnecessary waste of sequencer RAM. Fixed.

(D) OUT OF SEQUENCER SPACE- When the remaining sequencer space is not enough to complete an operation, a message is displayed to indicate this condition if it occurs during any SEQUENCE or TRACK edit function. In earlier versions, some functions had simply aborted without displaying any message to the user.

(D) DELETING BARS IN A SEQUENCE- Using the LENGTH command to delete bars from the middle of a sequence could shift the timing of the events after the deleted section.

(D) PLAYING SONGS WITH LOOP OFF- In earlier versions, when a song was played with LOOP=OFF the sequencer status display would remain SNGP when the song stopped. This has been corrected. It will go to SNGS when the song stops.

(D) CHAINING SEQUENCES WITH LOOP OFF- In earlier versions, it was not possible to manually chain together sequences if the sequence that was currently playing had LOOP=OFF. This has been changed, and sequence chaining will work even if LOOP=OFF.

(D) RECORDING MIXDOWN TRACKS– In previous versions, when recording Mixdown volume into a sequence track pitch bends, and possibly other controllers from the sequence track were erroneously recorded into the mixdown track. In addition, the track selected on the Volume page would keep switching to the track selected in the sequence (for each song step). These problems have been corrected.

(D) RECORD SOURCE PROBLEM– In previous versions, the REC-SOURCE parameter did not work correctly unless it was left in its default setting of BOTH. This has been corrected.

VFX^{SD} **Version 2.10 contains fixes for problems that have been discovered since the version 2.00 release. This is a disk only release.** The ROM changes are very minor, and new ROMs are available on an as needed basis only.

Compatibility: (R) ROM: requires at least version 2.00 disk
(D) Disk: requires at least version 2.00 ROM
Note: (D!) and (R!) indicate new features added in this release

General System
(R) MIXER "SMOOTHER" MODULATION– A change was made to make sure that the Smoother function is correctly initialized when a voice is started. In previous versions the Smoother could generate seemingly random initial output values.

MIDI
(R) GLOBAL CONTROLLERS IN MONO MODE– In previous versions, if the base channel was set to 01, global controller messages received on channel 16 were not handled correctly. In addition, global sostenuto controllers are now recognized.

Disk Operating System
(R) SAVING AND LOADING STORED SINGLE PRESETS– The actual contents of the *stored* Preset will now be saved if it is selected when a single preset file is written. In version 2.00, the last edited preset would be always saved even if the stored version was selected.

Sequencer
(D) LOCATING WITH MIDI SONG POSITION POINTERS– In version 2.00, the sequencer could respond incorrectly to MIDI Song Position Pointer (SPP) messages if the locating process took longer than the time delay between receiving the SPP message and receiving the subsequent MIDI Continue and clocks. This problem could be corrected in some cases by increasing the delay time (using the "Slow" setting on the device sending the messages), but in other cases there was no work-around. The amount of time required to locate to a particular location in a song depends on how many events exist in the song *before* that point. Dense songs or sequences with many events take longer to locate through, and song steps with multiple repetitions also take longer because they effectively multiply the number of events. The sequencer now takes into account all clocks received while it is locating, and will now be in the right place when it begins to play, even if the locating process takes several minutes!

(D) RESPONDING TO SONG POSITION POINTER- The sequencer will now respond to Song Position Pointer messages only when it is set to sync to external MIDI clocks (CLOCK=MIDI). Previously, the system *always* responded to these messages, which caused problems if the selected sequence or song did not have any track data recorded. This occurred when using a VFX^{SD} sequence as a template for playing tracks from an external sequencer which always sends song position pointers when it starts playing.

(D) MULTI-TRACK RECORD PROBLEMS- In previous versions, and under certain conditions, key events lasting longer than approximately 10 beats could cause timing errors and/or loss of events. This problem has been corrected.

(D) SONG AND SEQUENCE TIME DISPLAY- In previous versions, the TIME displayed on the INFO page was not correct for times longer than 9 minutes. The minute value was always shown as a single digit 0..9 even if the actual time was longer. This problem has been corrected, and values up to 99 minutes can be displayed correctly.

(D) LOSING ALL FREE SEQUENCER MEMORY- In previous versions, pressing the *Play* button while in Punch-In Standby mode (flashing ODUB) could cause the sequencer to lose track of all of its free memory, rendering further recording or editing operations impossible.

(D) PROBLEMS USING 23rd AND 24th TRACKS- In previous versions, it was not possible to successfully record on more than 22 tracks total, though it did not matter which 22 were used. This problem has been corrected.

(D) RESPONDING TO SONG SELECTS- The sequencer will now respond to MIDI Song Select messages as described on p. 13-2 of the *Musician's Manual.* The sequencer must be stopped, and the selected sequence must be defined. In all previous versions, this message type was ignored.

(D) CLICK DISAPPEARANCES IN SONG MODE- A change was made to make sure that the Click status is correctly set whenever a new song step is reached. The Click status is saved in each sequence. The only other cause for clicks not being heard is voice stealing when maximum polyphony is exceeded (the click requires a voice from the pool of 21 just like any other sound).

(D) LAST REPEAT OF SONG STEP NOT NORMALIZED- In previous versions, when the song step repeat count was set to 2 or higher, the last repeat of the sequence would not be normalized as it started to play. Any program changes that had occurred during the previous step would not get reset for the last repeat. Also, any "overhanging" controllers that had not returned to zero by the end of the step would not be reset (the last repeat could sound out-of-tune if pitch bends were not normalized). This same problem would occur on ALL repeats of a step when the repeat count was set to "FS" (footswitch). This problem has been fixed.

(D) PROG CHANGE OF 0 NOT CHANGING SOUND LOCALLY- Previous versions contained a bug which prevented a sequenced program change from changing the local keyboard sound when the track status was set to BOTH and the program change number was 0.

DISK ROM	1.10	1.15	1.16	1.20	1.21	1.30	1.31	1.32	1.37	2.00	2.10	
1.11	X	X	X									
1.15		X	X									
1.16			X									
1.20				X	X							
1.21					X							
1.30						X	X	X	X			
1.31						X	X	X	X			
1.32						X	X	X	X			
1.33						X	X	X	X			
1.37						X	X	X	X			
2.00										X	X	

Figure 12 – VFX-SD Software Compatibility

VFX ONLY SECTION

INTERMITTENT START-UP
(REV A power supply boards ONLY — 100/120V S/N 11115 or lower, 220/240V S/N 500196 or lower)

In some cases, a noisy reset output from the LM2925 regulator on the power supply board (**REV A ONLY**) can lead to intermittent start-up (sometimes the unit won't always come up the first time it is switched on). A capacitor was added to the power supply board to correct this. If you have a unit which exhibits an intermittent start-up problem and the capacitor is NOT present on the power supply board (see Figure 5), a 470pF capacitor should be added as shown, tack soldered from the indicated feedthrough to the left leg of C21.
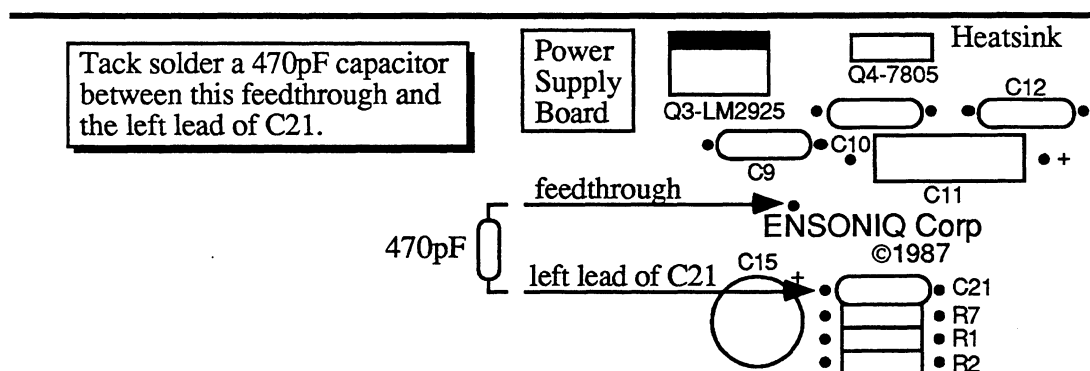

Figure 13 – Intermittent Start-up fix for REV A boards **ONLY**

Any power supply boards marked Rev B or higher incorporate this fix and do not need the capacitor. See Figure 5 for the location of the power supply part number and revision level.

VFX SOFTWARE NOTES
All VFX's should have at least O.S. version 2.00. Any unit that doesn't should be updated to the latest O.S.

To check the software version, hold down *Presets* and press *Master*.

The following changes were included in VFX Software Version 2.00:
Note: ! indicates new features added in this release.

General System
!   COPYING PRESETS WITH EFFECTS INTO MULTI TRACKS- It is now possible to copy a preset into three Multi tracks *and* replace the Multi effect with the effect from the preset.
!   EXTERNAL TRACK STATUS- The track status *OFF* has been replaced by *EXT*, indicating External status. Events played on a track set to External status will now be transmitted on the specified MIDI channel, but the track will still ignore incoming MIDI events.
!   NEW VOICING SOFTWARE- Improvements which take advantage of the improved voice chip design were made to reduce or eliminate noises (ticks, clicks and pops) from the voices.

!   **SYSTEM RESET FAIL-SAFE- The system reset process was modified so that if the system fails to successfully start up after 6 tries, on the seventh it will automatically reinitialize the system. This is a precaution which should prevent scrambled RAM from causing a unit to be unable to boot-up. Previously, the only solution in such cases was to short out the RAM. With this change, it should only be necessary to turn on and off the power switch slowly 6 or 7 times to be sure that it will come up.**

! SELECTING EDITED PRESET– The soft button below the *EDITED* field on the preset select page can now be used to select or deselect the Edited version of the preset.

• RECALLING EFFECTS USING THE COPY BUTTON- If an effect was "recalled" from the Copy buffer and the Compare LED was not lit, the effect was not recalled properly until either the sound was written to a location or the *Compare* button was toggled to deselect and then reselect the Compare buffer.

• CHANNEL PRESSURE IN SOUNDS MODE- Sounds which used channel pressure didn't work correctly in SOUNDS or PRESET mode unless they wound up on the two right-most tracks of the PRESET.

New Master Page parameters

! VOICE MUTING SWITCH- Controls whether voices will be shut off when the effect is loaded. The default state is ON, which *will* mute all sounding voices when a new program is selected.

! KEYBOARD NAMING SWITCH- Controls whether the keyboard can be used as an input device for entering name data (e.g. on the Write page).

! MIDI TRACK NAMES SWITCH- Controls whether a track set to MIDI or *EXT* status will display the name of the VFX program assigned to that track or *MIDI–CH## indicating the MIDI channel assigned to the track.

Effects

! NEW EFFECTS- Several new effects and effect presets have been added to the VFX. Some of the new effects include Gated Reverb, Concert Hall, and Roto-Speaker with Distortion.

• FLANGER SWEEP PROBLEM- A modification was made to the flanger algorithm to correct for a condition which could cause the flanger sweep to get stuck at the highest notch frequency and stop sweeping. The problem only occurred when the MAX sweep limit was modulated to its maximum.

MIDI

• MIDI INPUT PROBLEM- In previous versions, it was possible for certain MIDI error conditions to cause the VFX to be unable to receive MIDI input correctly, while still functioning normally in all other respects. The problem was related to a serial input break error caused by turning on or off an external system connected to the MIDI In of the VFX while it was running The symptom was that *any* MIDI event received by the VFX would cause all sounding notes to be stopped.

• MAXIMUM MIDI VOLUME VALUE- The maximum value transmitted for MIDI Volume (controller 7) was previously sent as 126 instead of 127. This has been corrected in this version.

System Exclusives

! The new version will recognize and receive older VFX "Multi-Set" messages, but will only send the new format "Tracks" message.

• All program, preset and track data dump messages are compatible with the VFX^{SD}.

• The parameter select mechanism was modified to accommodate the new parameters added to the Master page and the new effects.

• Corrections were made in the handling of parameter change messages to eliminate the sending of spurious messages.

• The correct Release, Timbre and Pressure Mode values will now be installed into the track when a single program dump is received into the Compare buffer.

The following changes were included in VFX Software Version 2.10:
Note: ! indicates new features added in this release.

General System

! TRANSPOSE CONTROL PARAMETER- the MIDI Transpose Enable (XPOS) parameter on the MIDI Control page has had new values added which allow more control over how track transpose is handled (refer to VFX 2.10 Addendum).

! MAXIMUM VELOCITY PARAMETER- a new parameter has been added to the second Master sub-page which sets the maximum velocity value which will be recognized from the keyboard (refer to VFX 2.10 Addendum).

! INTERNAL PRESET INITIALIZATION- the ROM presets will be copied into the internal presets whenever the system is reinitialized. This will put valid, working presets into the internals, instead of their previous value of all zeroes.

! SHORTCUT TO FIND CURRENT SOUND- Double-clicking the *Sounds* button will display the program bank page which contains the current primary sound. This feature was added to make it easy to find the current program.

! REPLACE PROGRAM WITH EFFECT ON PRESET TRACKS- the feature added in version 2.00 for importing an effect into the Multi along with a program when using Replace Program will now also work on Preset tracks (refer to VFX 2.10 Addendum).

! UPDATE TRACK NAMES- when changing track Status or MIDI Channel values on preset tracks, the names of the programs will now be updated to reflect the new settings.

• SUSTAIN PEDAL ON TRACKS 9-12- In previous versions, sometimes voices would hang (continue to sound) when the sustain pedal was let up on tracks 9-12, particularly if the program on the track(s) contained delayed voices.

• LED CHANGES- Some minor changes were made to control when certain LEDs are active. These changes do not affect the functionality of the system, and were made only to reduce potential confusion.

• LOW BATTERY THRESHOLD- the cutoff value was changed to be a slightly more tolerant in order to solve production problems with spurious battery warnings.

- PRESET TRACK PARAMETER ERRORS- in previous versions, when a layered preset track was deselected, its track parameter would be underlined and an incorrect value would be displayed. Unlayering a track will no longer select the deselected track's performance parameter.
- MOD MIXER PROBLEM- a change was made to make sure that the Mod Mixer can correctly handle extreme negative values from mod sources which can generate negative values (i.e. LFO and KEYBD).

MIDI

- MIDI VOLUME WITH A MIDI LOOP- In version 2.00, if a MIDI loop was present and the user decreased the track mix on the VOLUME page, the volume would often rapidly decrease to zero and could never be increased, usually resulting in totally silent tracks which often showed high mix value. To fix this problem, a new switch has been added to the MIDI Control page which changes the way volume is transmitted when track status is set to MIDI. With this new MIDI LOOP switch set to ON, track Volume page (mix) changes are not transmitted, and volume pedal changes are sent directly, unaffected by the mix setting. This prevents the negative volume spiral (dreaded vortex) problem that some users encountered when working in a MIDI loop configuration – typically with an external computer sequencer (refer to VFX 2.10 Addendum).
- SENDING SUSTAIN PEDAL EVEN IF OFF- In previous versions, sustain pedal events were always transmitted via MIDI (except if track status was LOCAL) even if the Sustain Pedal Enable switch on the track was set to OFF. This has been corrected, and now MIDI transmission of sustain pedal events is controlled by the switch.
- SENDING PROGRAM CHANGES FROM THE MULTI- In earlier versions, if a program change was ever received on a track, then no further program changes would be transmitted from the MULTI unless the user manually changed the program number on the track MIDI Channel page; that is, they would not be sent when the track was selected. This has been fixed in version 2.01 and higher so that a program change will always be sent when the track is selected, regardless of what has been previously received.
- REPLACE PROGRAM ON PRESET TRACKS- When using Replace Program on Preset tracks, MIDI program changes will *not* be sent when a program is selected (refer to VFX 2.10 Addendum).

MIDI System Exclusive

- DEVICE ID INQUIRY- the VFX is now able to correctly respond to Universal Device Inquiry messages. In previous versions, incorrect software version number information could be sent, and the inquiry could cause a system error. This has been corrected.
- SENDING SINGLE PRESETS- the actual contents of the Edited Preset will now be transmitted when the current preset is sent or requested, as specified in the documentation. In previous versions, the last selected preset would be sent even if the edited version was selected.
- VIRTUAL BUTTON CHANGES- the Virtual Button command has been modified to separate button up and down commands, allowing more complete simulation of front panel actions.
- SYS-EX RECEIVE ERRORS- Sys-Ex messages will now be processed even if they are received while the system is waiting for a YES or NO response to a prompt on the screen. In previous versions, Sys-Ex messages received in this state would be ignored, and could cause later Sys-Ex Receive Errors. Additionally, Sys-Ex messages will now be processed when a timed message is on the screen, but some commands may be ignored. It is preferred practice to avoid sending while such temporary messages are being displayed.
- SYS-EX DOCUMENTATION CHANGES- many changes and corrections were made to the VFX Sys-Ex documentation (Appendix A of the *VFX Musician's Manual*). A complete revised version of Appendix A is available.
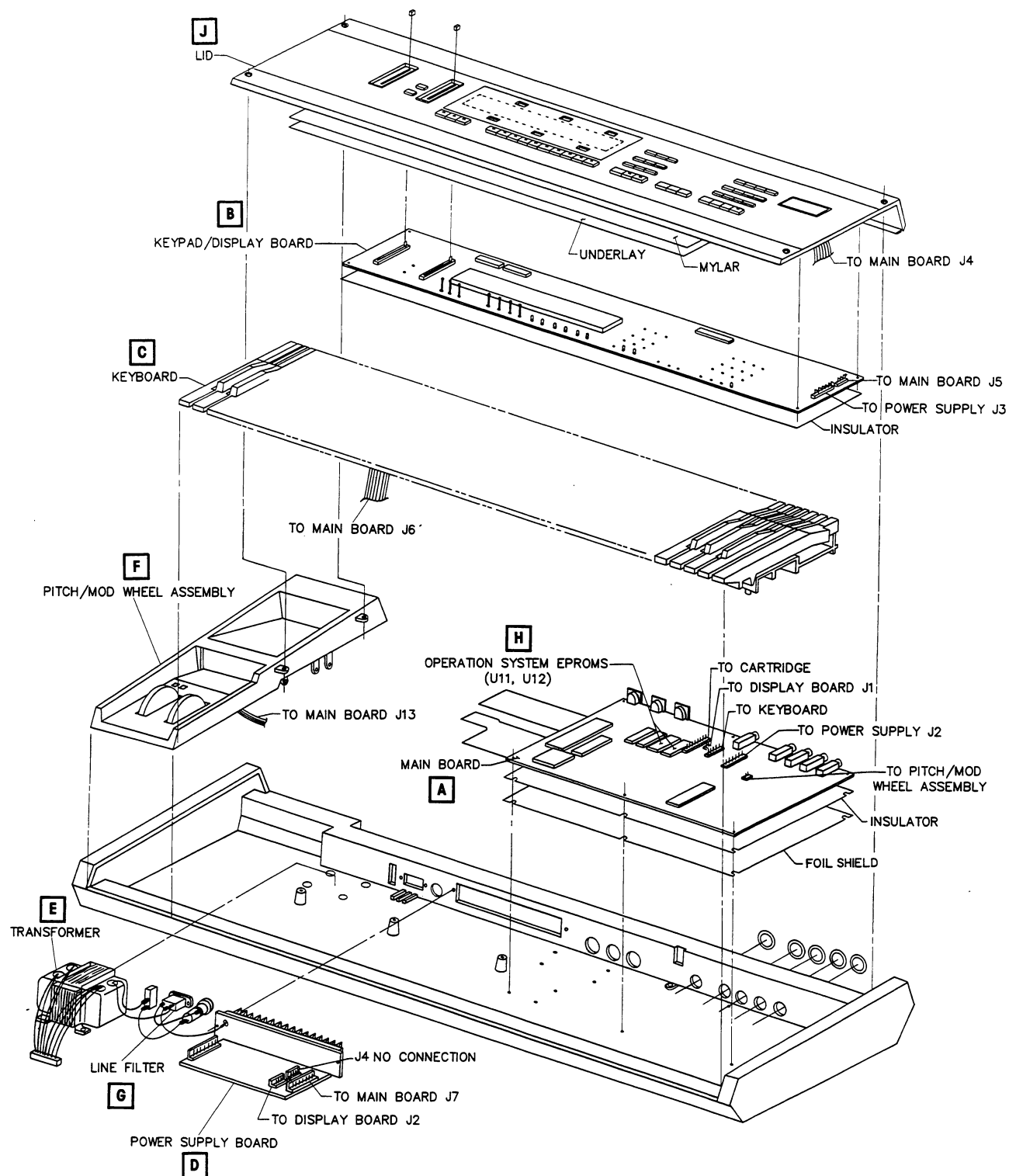
J
LID

B
KEYPAD/DISPLAY BOARD

UNDERLAY
MYLAR
TO MAIN BOARD J4

C
KEYBOARD

TO MAIN BOARD J5
TO POWER SUPPLY J3
INSULATOR

TO MAIN BOARD J6

F
PITCH/MOD WHEEL ASSEMBLY

H
OPERATION SYSTEM EPROMS
(U11, U12)

TO CARTRIDGE
TO DISPLAY BOARD J1
TO KEYBOARD
TO POWER SUPPLY J2

TO MAIN BOARD J13

MAIN BOARD

A

TO PITCH/MOD
WHEEL ASSEMBLY

INSULATOR

FOIL SHIELD

E
TRANSFORMER

LINE FILTER

G

J4 NO CONNECTION

TO MAIN BOARD J7

TO DISPLAY BOARD J2

POWER SUPPLY BOARD

D

Figure 14 – VFX Exploded View

SECTION
A

Replacing the Main Board

1. Remove all cables connected to the unit including the power cord.
2. Using a 2.5mm hex wrench, remove the four (4) screws that fasten the control panel and raise the panel. NOTE: These are machine screws. See "Brass Inserts" p. 3.
3. Remove the keyboard (see Section C). Note that you should remove the 20-pin ribbon cable from the main board instead of from the keyboard.
4. Remove the five (5) nuts from the rear panel jacks marked Ft. Sw., Pedal/CV, Left/Mono, Right/Mono, and Headphones.

SD–1/VFX^{SD} 5. Remove two (2) more nuts from the rear panel jacks marked Left Aux Out and Right Aux Out.

6. Disconnect all cables from the main board (see list below).

SD–1/VFX^{SD} 7. Remove the seven (7) self tapping screws from the main board and the one ground screw with star washer.

VFX   7. Remove the three (3) self tapping screws from the main board and the one ground screw with star washer.

VFX   8. Release the main board from the three white standoffs by squeezing the standoffs and lifting the board.

VFX^{SD}/VFX   9. Before installing the new board, make sure the cardboard insulator is in place.

10. With the board tilted on a slight angle, insert the jacks into the holes in the rear panel. Press the board down into place.
11. Replace the main board screws and secure the jacks with the nuts. Reconnect all the cables.
12. Reinstall the keyboard (see Section C).
13. Power up, test the unit, and close the control panel.

Main Board Cable Connector Designators

	SD–1/VFX^{SD}	VFX
Wheels	J16	J13
Keypad/Display	J15	J5
Cartridge	J13	J4
Keyboard	J11	J6
Power	J14	J7
Disk Drive	J12	none
Lower O.S. EPROM	U3	U11
Upper O.S. EPROM	U4	U12

SECTION B

Replacing the Keypad/Display Board

1. Remove all cables connected to the unit including the power cord.
2. Using a 2.5mm hex wrench, remove the four (4) screws that fasten the control panel and raise the panel. NOTE: These are machine screws. See "Brass Inserts" p. 3.
3. Remove the volume and the data entry knobs.
4. Remove the six-wire and four-wire cable harnesses located on the right side of the keypad/display board. Note that they are keyed.
5. Remove the sixteen (16) screws that hold the keypad/display in place and carefully remove the keypad/display. Remove the cardboard insulator that covers the bottom of the keypad/display board.
6. To reassemble, first make sure that the lens is clean. Reconnect the wire harnesses to the new keypad/display board paying attention to polarity.
7. Align the two left screw holes in the keypad/display board with the two screw holes on the lid and then align the two right screw holes. This will ensure that the LEDs go into the correct locations. Make sure the sixteen LEDs are properly aligned with the window inside of the buttons.

IMPORTANT! Use a hand screwdriver when installing the following screws to avoid stripping the holes in the lid (no more than 8 inch/lbs, see p. 3).

8. Place the cardboard insulator over the keypad/display board and install the sixteen (16) screws. Reinstall the knobs on the data entry and volume sliders.
9. Power up, test the unit, and close the control panel.

SECTION
C

Replacing the Keyboard

1. Remove all cables connected to the unit including the power cord.
2. Using a 2.5mm hex wrench, remove the four (4) screws that fasten the control panel and raise the panel. NOTE: These are machine screws. See "Brass Inserts" p. 3.
3. Place the unit upside down on a soft surface and remove the ten (10) screws that attach the keyboard to the case. See Figure 15 for location of screws.
4. Carefully turn the unit right side up. Raise the control panel and disconnect the keyboard ribbon cable from the main board, paying particular attention to the polarity.
5. Remove the keyboard from the case by gently lifting up the front of it while pulling it toward the front of the unit. Once the rear of the keyboard has cleared the control panel mounting tabs, the keyboard can be removed from the keyboard cavity. See "The Keyboard" p. 3.
6. Making note of the proper polarity, remove the keyboard ribbon cable from the old keyboard and install it on the new keyboard.
7. Connect the keyboard ribbon cable to the main board.

IMPORTANT! **If the ribbon cable is mispinned, fuses F3 and F4 on the power supply will blow.**

8. Insert the new keyboard rear first into the unit at the front of the keyboard cavity. Gently slide the keyboard toward the rear of the unit, lowering the front of the keyboard as needed to clear the control panel mounting tabs. Be sure that the keyboard cable lies flat beneath the keyboard and is not pinched under the keyboard frame.

SD-1/VFX^{SD} 9. Be sure that the disk drive cable lies flat beneath the keyboard and is not pinched under the keyboard standoffs.

IMPORTANT! Use a hand screwdriver when installing the following screws to avoid stripping the holes in the plastic base or keyboard (no more than 8 inch/lbs, see p. 3).

10. Turn the unit upside down on a soft surface and replace the ten (10) screws that secure the keyboard to the case.
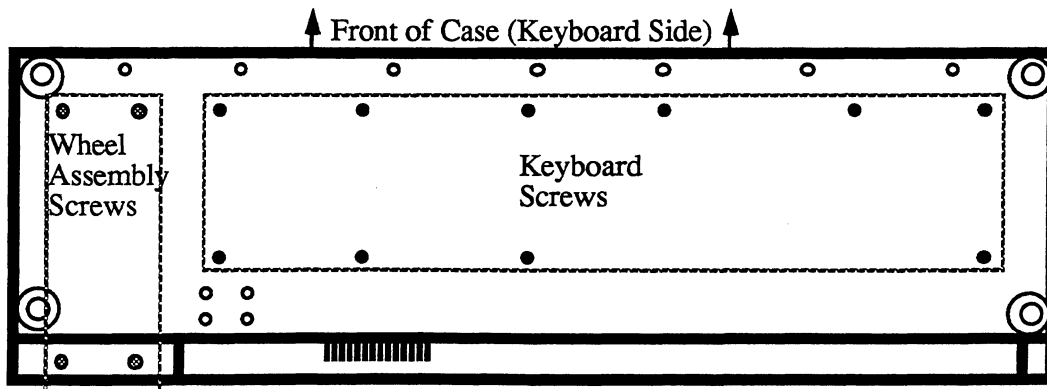11. Power up, test the unit, and close the control panel.

Figure 15 – Bottom of Case

SECTION
D

Replacing the Power Supply Board

1. Remove all cables connected to the unit including the power cord.
2. Using a 2.5mm hex wrench, remove the four (4) screws that fasten the control panel and raise the panel. NOTE: These are machine screws. See "Brass Inserts" p. 3.
3. Disconnect the 9-pin connectors (J1, J2), and the 6-pin connector (J3) from the power supply board. Disconnect the 4-pin (J4) connector on the SD–1 and VFX^{SD}. Note that these connectors are keyed and that **on the VFX there is no cable connection to J4.**
4. Remove the screw and star washer that connect the green ground wire to the heat sink.
5. Remove the two (2) screws, star washers and nuts that secure the power supply to the case.
6. Remove the power supply board by pulling the front of the board toward the keyboard and then lifting up the front of the board so that the heatsink clears the case.

VFX/VFX^{SD} 7. Before replacing the power supply board, first make sure that the insulator pad is in place. On later VFX^{SD}s, this insulator (and foil shield) is left out (**see Ground Wire vs. Foil Shield, p. 20**).
8. Insert the replacement power supply board from the inside of the case, heatsink first. Lift the heat sink from the outside of the case so that it is centered in the opening. The standoffs on the power supply are intended only for support and should not be stuck down to the case.
9. Reinstall the power supply screws and star washers.
10. To attach ground wire: place the ring lug onto the screw first, then the star washer and screw it into the heatsink.
11. Carefully reconnect the cables paying particular attention to the alignment of pins and connectors.
12. Power up, test the unit, and close the control panel.

SECTION
E

Replacing the Transformer

Due to problems that may occur with the plastic case, all units that need the transformer replaced should be sent back to the factory. Contact your distributor if you are outside the U.S.

SECTION F

Replacing the Pitch/Mod Wheel Assembly

The pitch and mod wheels are replaced as an assembly along with the cable harness.

1. Remove all cables connected to the unit including the power cord.
2. Using a 2.5mm hex wrench, remove the four (4) screws that fasten the control panel and raise the panel. NOTE: These are machine screws. See "Brass Inserts" p. 3.
3. Place the unit upside down on a soft surface and remove the four (4) screws that attach the wheel assembly to the case. See Figure 15 for location of screws.
4. Return the unit to an upright position. Cut the wire ties that hold the wire harness to the chassis. Disconnect the harness from the main board, from the keypad/display board and from the power supply. Note that these connectors are keyed and have connector locks. Carefully lift the wheel assembly out of the case.

SD–1/VFX^{SD} 5. Disconnect the cables from the disk drive, paying particular attention to the polarity.

SD–1/VFX^{SD} 6. Disconnect the grounding wire (**see Ground Wire vs. Foil Shield, p. 20**).

SD–1/VFX^{SD} 7. Remove the disk drive and place it into the new assembly as described in Section J. Reattach the disk drive cables.

8. Connect the new wire harness to the main board, to the keypad/display board (4-pin and 6-pin), and to the power supply, paying particular attention to the alignment of pins and connectors. Reconnect the wire harness to the case using wire ties.
9. Reattach the wheel assembly to the case using the four screws.
10. Power up, test the unit, and close the control panel.

SECTION G

Replacing the Line Filter

1. Remove all cables connected to the unit including the power cord.
2. Using a 2.5mm hex wrench, remove the four (4) screws that fasten the control panel and raise the panel. NOTE: These are machine screws. See "Brass Inserts" p. 3.
3. Remove the three (3) wire tabs connected to the back of the filter, paying particular attention to polarity.
4. Remove the two (2) screws and nuts that secure the filter to the case. Note that there are star washers on the inside only.

VFX/VFX^{SD} 5. To replace the line filter, first make sure that the foil shield is in place. Install the new line filter from the outside of the case. The foil shield should make contact with the bottom of the new line filter (**see Ground Wire vs. Foil Shield, p. 20**).

6. Reconnect the three wires to the filter, again noting the proper polarity.

IMPORTANT! Failure to connect the wires to their proper posts can lead to a potential shock hazard (see Figure 4).

7. Power up, test the unit, and close the control panel.

SECTION
H

Replacing the O.S. EPROMs

The operating system can be updated by replacing the O.S. EPROMs. Each unit has two operating system EPROMs located on the main board just above the keyboard. After replacing these EPROMs, the unit must be reinitialized (see p. 2). The internal sounds are automatically replaced by the ROM sounds after reinitialization.

All sounds, presets, and sequences must be saved before starting this procedure! For more information on saving sounds and presets, see the Storage Section or Section 11 of the *Musician's Manual*.

1. Remove all cables connected to the unit including the power cord.
2. Using a 2.5mm hex wrench, remove the four (4) screws that fasten the control panel and raise the panel. NOTE: These are machine screws. See "Brass Inserts" p. 3.
3. The two operating system EPROMs (SD–1/VFX^{SD} — U3 LOWER and U4 UPPER, VFX — U11 LOWER and U12 UPPER), are located in the center of the main board. Carefully remove the two EPROMs and insert the replacement EPROMs into their respective sockets (UPPER and LOWER). Be sure the notch in both EPROMs is facing the keyboard.

IMPORTANT! **Make sure all audio cables are unplugged BEFORE turning the unit on. The first time you turn it on after updating the software, the audio outputs may make a pop.**

4. Power up, reinitialize by holding down *Presets* and pressing the upper left soft button.
5. Check the software version by holding down *Presets* and pressing *Master*.
6. Test the unit and then close the control panel.
7. Reload the sounds and presets that were saved prior to replacing the EPROMs.

SECTION
J

Replacing the Disk Drive
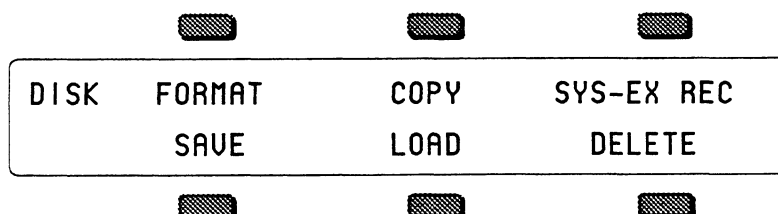
SD-1 and VFX^{SD} Only

1. Remove all cables connected to the VFX^{SD}, including the power cord.
2. Using a 2.5mm hex wrench, remove the four (4) screws that fasten the control panel and raise the panel. NOTE: These are machine screws. See "Brass Inserts" p. 3.
3. Turn the unit over, top down, and remove the four (4) screws that attach the wheel assembly to the case. See Figure 15 for location of screws. Return the unit to an upright position and raise the control panel. Carefully lift the wheel assembly out of the case.
4. Disconnect the two cables from the disk drive, paying particular attention to the polarity. See "The Disk Drive" p. 4.
5. Remove the four (4) screws and star washers that attach the disk drive to the wheel assembly.
6. Carefully slide the disk drive out of the wheel assembly. Remove the two (2) screws and star washers that attach the metal plate to the bottom of the disk drive.
7. Immediately place defective drive in the anti-static bag that the new drive came in. Attach the metal plate to the new disk drive using the two screws and star washers. See "The Disk Drive" p. 4.
8. Slide the new disk drive into place and mount it using the four screws and star washers. Reconnect the two cables, paying particular attention to the alignment of pins and connectors.
9. Reattach the wheel assembly to the case using the four screws.
10. Power up, test the unit, and close the control panel.

How to Save and Load Sound, Preset, and Sequence Data

We have heard from Repair Stations that many technicians do not have access to a Musician's Manual for every product. Therefore, we have included this section on how to save and load data. The most efficient way to save data on as SD–1 and VFX^{SD} is to a disk. For the VFX, you can save data to either a Sys-Ex Recorder or an STC-32 RAM Cartridge. Instructions for all of these are included.

To Format a blank disk:
- Insert a blank, Double-Sided Double-Density 3.5" micro-floppy disk into the disk drive, with the label-side facing up, and the metal shutter facing away from you. Make sure the plastic write-protect tab is in the closed position (no light showing through the window).
- Press *Storage*.
- Select DISK. The Disk Storage menu appears:

```
       ▨            ▨            ▨

  ┌─────────────────────────────────────────┐
  │ DISK   FORMAT      COPY      SYS-EX REC  │
  │                                          │
  │        SAVE        LOAD      DELETE       │
  └─────────────────────────────────────────┘

       ▨            ▨            ▨
```

- Select FORMAT.
- The display shows: FORMAT DISK ALL DISK FILES WILL BE ERASED.
- Select *YES* to proceed. (Selecting *NO* will return you to the Disk Storage page with no harm done.)
- While the SD–1/VFX^{SD} is formatting the disk the display reads FORMATTING DISK... The formatting process takes about 80 seconds.
- When the formatting is done, the display reads DISK FORMATTED SUCCESSFULLY, and then you are returned to the Storage page. The disk is ready to accept program, preset, sequencer or system data.
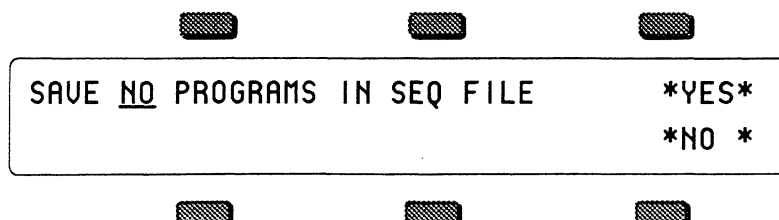
FORMAT DISK Error Messages:
There are a few messages you might encounter while formatting a disk:
- DISK DRIVE NOT READY — No disk in the drive.
- DISK FORMAT FAILURE -- DISK IS UNUSABLE. This indicates a defective disk. If you get this message we advise that you throw out the disk in question. Try again with another disk.
- DISK WRITE-PROTECTED — The plastic write-protect tab in the lower-left corner of the disk must be closed (so you can't see through the hole) before anything can be written to the disk. Close the write-protect tab and try again.

To Save data to disk:
- Insert a formatted SD–1/VFX^{SD} disk into the disk drive.
- Press *Storage* to go to the Storage page.
- Select DISK. The Disk Storage menu appears.
- Select SAVE. The Save File display appears as shown above. The file type is underlined.
- Use the data entry controls to select 60-SEQ/SONGS: Select YES. The display shows:

```
       ▨            ▨            ▨

  ┌─────────────────────────────────────────┐
  │ SAVE NO PROGRAMS IN SEQ FILE    *YES*    │
  │         ‾‾                               │
  │                                 *NO *    │
  └─────────────────────────────────────────┘

       ▨            ▨            ▨
```

Use the data entry controls to change NO to 60 programs. All sixty internal programs will be saved into the file with the sequence data. The programs will be reloaded into the internal memory when the SEQ/SONG file is loaded, replacing the programs that are there.

- After choosing the number of programs to be saved, select *YES* to proceed.

```
  ▨              ▨              ▨

┌─────────────────────────────────────────────┐
│  SAVE FILE        NAME=60-SEQ/SONG   *YES*   │
│         LEFT   -CURSOR-  RIGHT       *NO *    │
└─────────────────────────────────────────────┘

  ▨              ▨              ▨
```

- Name the file with a name of your choice using the data entry controls and the two cursor soft buttons, labeled LEFT and RIGHT.
- Select *YES*. The display reads SAVING <FILENAME> while the data is being saved to disk. Or select *NO* to cancel the procedure for any reason.
- If there is a file of that type with the same name already on the disk, the SD–1/VFX^{SD} will ask DELETE OLD VERSION? Select *YES* to save the file, replacing the one on the disk. This is for updating files to which you have made changes. Or select *NO* to abort the procedure.
- After the file is saved, the SD–1/VFX^{SD} returns to the Save File page so that you can save any other files you may want to save at that time.

To Load data from disk:

When you select LOAD from the Disk Storage menu, you will see the following display:

```
            ┌──────────┐   ┌──────────┐
            │ File Name │  │ File Size │
            └──────────┘   │ in blocks │
                           └──────────┘
    ▨              ▨              ▨
   ┌──────────────────────────────────────────────┐
   │  LOAD FILE=BASS-SOUNDS      SIZE=7    *YES*   │
   │     TYPE=6-PROGRAMS    BANK 0         *NO *   │
   └──────────────────────────────────────────────┘
    ▨              ▨              ▨
   ┌──────────┐     ┌──────────────────┐
   │ File Type │     │ Destination Bank │
   └──────────┘     │ (some file types)│
                    └──────────────────┘
```

The display shows the *File Name* which identifies the file that will be loaded if you press *YES*; the *Size* of the file in Blocks; the *File Type* and (for some file types) the *Destination Bank*, i.e., which bank(s) to load the data into. Only files of the type selected will be shown in the Name field, or in file banks.

To Load a file from disk:
- Insert the disk containing the file data into the disk drive.
- Press *Storage* to go to the Storage page.
- Select DISK. The Disk Storage menu appears.
- Select LOAD. The Load File display appears as shown above. The file type is underlined.
- Use the data entry controls to select 60-SEQ/SONGS.
- Press the soft button above the file name and use the data entry controls to find the file you want.

- Select *YES*. The display reads LOADING FILE... while the data is being loaded. Or select *NO* to cancel the procedure for any reason.
- If 60 programs were saved in a 60-SEQ/SONGS file with the sequencer data, a **P** will flash on the upper line of the display when the file is displayed on the DISK LOAD page. When you answer *YES* to load the data, the SD–1/VFX^{SD} will load the programs automatically with the sequencer data, replacing the programs currently in memory.
- After the file is loaded, the SD–1/VFX^{SD} returns to the Load File page so that you can load any other files you may want.

Saving ALL Programs and Presets to a MIDI SYS-EX Storage Device
- Press *Storage*.
- Press the soft button for MIDI SYS-EX. The display reads:

```
MIDI SYS-EX      -SELECT TYPE-       ALL

       PROGRAMS        PRESETS     MULTI-A+B
```
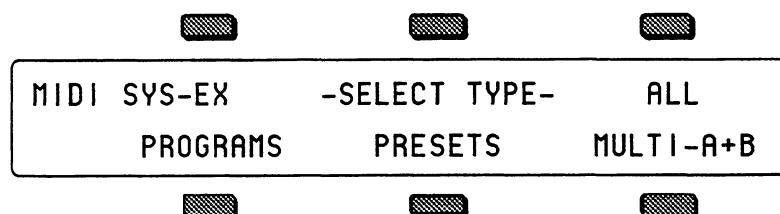
- Press the soft button to select ALL. The VFX will transmit three consecutive dump messages containing the internal program banks, the internal preset banks, and the Multi A&B tracks. Using this command is equivalent to sending the three messages individually, and is convenient when you wish to save everything with one command.
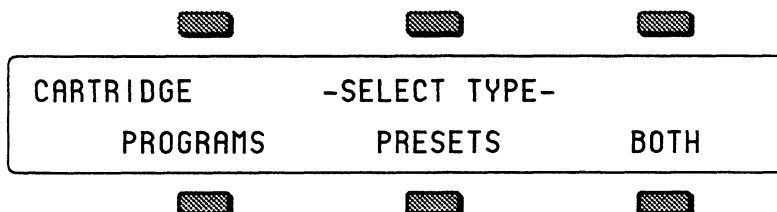
Receiving MIDI Sys-Ex Messages
The receiving of data dumps is initiated automatically by system exclusive messages sent from the transmitting unit. No front panel commands are necessary to receive dumps if the receiving of system exclusive messages is enabled on the MIDI Control page (SYS-EX=ON).

To Copy Both Programs & Presets from Internal Memory to a Cartridge

NOTE: You cannot store sequencer information to an STC-32 Storage Cartridge.

• Press *Storage*.
• Press the soft button for CARTRIDGE. The display reads:

```
    ▧             ▧             ▧
 ┌─────────────────────────────────────────────┐
 │  CARTRIDGE       -SELECT TYPE-               │
 │                                             │
 │      PROGRAMS      PRESETS        BOTH       │
 └─────────────────────────────────────────────┘
    ▧             ▧             ▧
```

• Press the soft button for BOTH. The display reads: COPY PROGRAMS AND PRESETS.
• Press the soft button for INT-TO-CART. The display reads: COPY PROGRAMS AND PRESETS FROM INTERNAL TO CARTRIDGE.
• Respond *YES* if you wish to copy presets and programs from internal memory to the cartridge. The display reads: CONVERT PRESET PROGRAMS.
• Select YES. This conversion makes the presets that previously used internal programs now use the same programs from the cartridge. ROM programs are not affected. The unit will automatically modify the presets that used internal programs to use the corresponding programs on the cartridge.
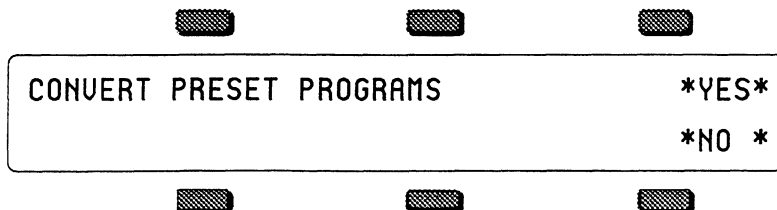
To Copy Both Programs & Presets from a Cartridge to Internal Memory

NOTE: You cannot store sequencer information to an STC-32 Storage Cartridge.

From the CARTRIDGE COPY PROGRAMS AND PRESETS page—
• Press the soft button for CART-TO-INT. The display reads: COPY PROGRAMS AND PRESETS FROM CARTRIDGE TO INTERNAL.
• Select YES.

As with the case of copying both programs and presets from internal to cartridge, if you select *YES*, you will be prompted to decide about converting the programs in the presets.

```
    ▧             ▧             ▧
 ┌─────────────────────────────────────────────┐
 │  CONVERT PRESET PROGRAMS            *YES*    │
 │                                             │
 │                                    *NO *     │
 └─────────────────────────────────────────────┘
    ▧             ▧             ▧
```

When you are copying both presets and programs from CART to INT and you respond *YES* to CONVERT PRESET PROGRAMS the VFX will change the presets to use the INT programs (which will be the same as those in the cartridge, since you are copying them at the same time).

NOTES