Service Manual

KS-32

Weighted Action MIDI Studio

ENSONIQ ™

LEADING THE WORLD IN SOUND INNOVATION

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* Added to Rev B of this manual.

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IMPORTANT THINGS TO KNOW ABOUT THE KS–32

As with all ENSONIQ products, KS–32 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.

1. SQ–2 32 Voice Similarities
Though the KS–32 has a different main board, keypad/display board, and keyboard from the SQ–2 32 Voice, all the debugging processes are the same. They use the same transformer, transformer adapter board, and mono pressure board.

2. Reinitialization
The KS–32 is essentially a computer with 64K of RAM. It is possible for the KS–32 to become confused if bad data is loaded into this memory. This can result from loading bad data from a card, a bad MIDI Sys-Ex transfer, or a power glitch. If the memory does get scrambled, it will be necessary to reinitialize the system. Scrambled software can cause problems that at first glance appear to be hardware-related, reinitialization is recommended as a first step in troubleshooting.

When reinitializing a KS–32, all the current data in RAM (internal sounds, presets, and sequences) will be lost. The internal sounds are automatically replaced by sounds in the ROM during reinitialization. **It is highly recommended that the internal memory be saved by the customer before servicing.** See p. 25 for instructions on saving data.

IMPORTANT! Unplug all audio cables before reinitializing. The audio outputs of the KS–32 may make a pop when reinitializing.
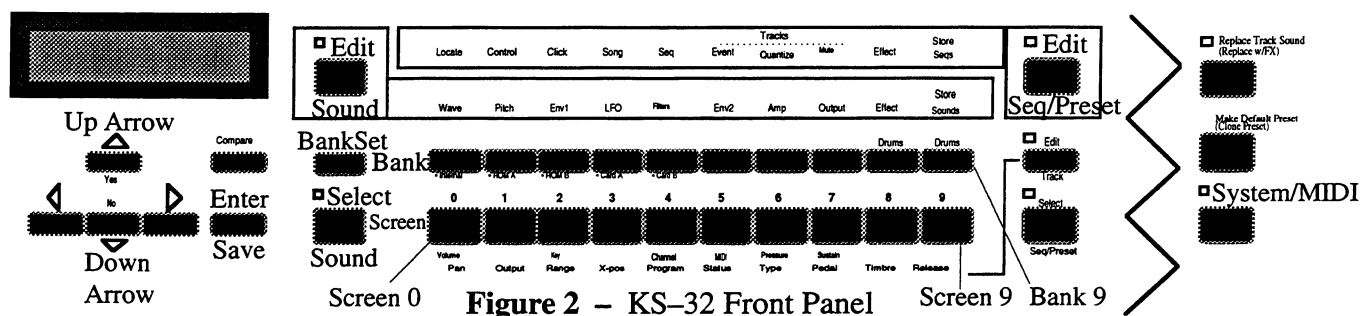
Figure 2 – KS–32 Front Panel

TO REINITIALIZE THE KS–32 FROM THE FRONT PANEL
*   Save all Sound, Sequence and Preset data (see p. 25).
*   Press the *Edit Seq/Preset* button (see Figure 2 for button location).
*   While holding down *Bank 9* press *Screen 9*.
*   The display should read, "Reinitialize sound & seq RAM?" Press *Up•Yes Arrow* button. The KS–32 erases its internal memory and then starts up just as it does when you turn the power on, and reinitialization is complete. The internal sounds are automatically replaced by sounds in the ROM during reinitialization.

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

SYSTEM RESET SEQUENCE
- Turn the unit off and then on slowly (at 2 second intervals) seven times.
- The eighth time you turn it on, the unit will automatically reinitialize itself and should 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:

HARD RESET
- **Make sure the power is off!**
- Short the <u>minus</u> side of the battery (center of the main board) to pin 28 (or 32, if there is one) of U28 for a few seconds (see Figure 5 for location).

3. Checking The Software Version
As of February 1993, the only software version is 3.00.
- Press *Edit Seq/Preset* (see Figure 2).
- While holding down *Bank 9*, press *Screen 1*.
- The display should read "ENSONIQ KS-32 OS Version X.XX"

4. 76 Note Keyboard
a) Cables to the Main Board
The two cables that connect the keyboard to the main board were lengthened an inch in units built after March 1993. You may call Customer Service for new longer cables if you need them. The long run of the 16-pin cable is now 20.7". The long run of the 20-pin cable is now 13.2". These longer cables may make is easier for you to remove and install the 76 note keyboard.

b) Cables to the Mono Pressure Board
Be careful when handling the two small cables (with the four pin connectors) that connect the keyboard to the mono pressure board (under the wheel cover); these cables may break.

c) Mounting Holes
On some early units, some mounting holes in the keyboard may not line up on the base; just leave those screws out. With the keyboard springs away from you, the holes that may not line up are on the left rear corner of the keyboard assembly.

The first 200 keyboards were like this.

A few were like this.

The majority of keyboards are like this.

Left Rear Corner of Keyboard

◯ = hole

● = mounting standoff
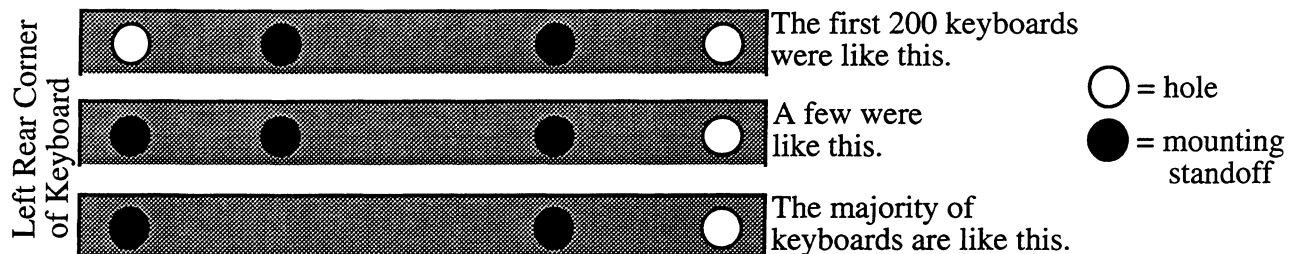
d) Shipping a 76 Note Keyboard
The KS–32 keyboard is susceptible to damage during shipping. When sending back a 76 note keyboard, use the plastic packing end pieces that were sent with the replacement keyboard. Please pack the keyboard carefully.

5. Keypad/Display Boards

Early units had flat washers on the screws that hold the keypad/display board in place. Due to changes in the locations of some PEMs (threaded mounting standoffs), make sure that you have your serial number ready when ordering a replacement keypad/display board; that way you will get one that mounts properly.

6. Hum or LED Scanning Noise in the Outputs

We found a problem in the internal grounding of the unit that may cause the unit to hum or to have LED scanning noise in the outputs. To enhance the grounding of units built before 15 January 1993, an extra ground wire was added to connect the main board heat sink to the main board, and star washers were added to the screws that attach the main board heat sink to the chassis. You may order a grounding wire from Customer Service, part number 2020015501.

On later units, we changed the rivets that attach the main board heat sink to the main board. These new rivets hold the heat sink tightly down on the main board and give the unit a better ground. The star washers were also added to later units.

To enhance the grounding of units built before 15 January 1993:
a) Add the ground wire, part number 2020015501.
   • Scrape away the solder mask on the top side of the main board near C11, R8, R10 and R11.
   • Solder the solder the stripped end of the wire to the place you just scraped away.
   • Attach the ring lug end of the wire to the main board heat sink screw near Q18.
b) Remove the screws from the rear panel of the unit that fasten the main board heat sink to the chassis. Add star washers to the screws and replace them.

7. Lid Alignment Tabs

There is a black plastic alignment tab, approximately 3" in length, glued to the inside of each end of the lid. These alignment tabs are used to help align the lid during manufacturing over the endcaps so that the lid screws may be inserted. Some of these tabs may fall off; you may either glue the tab back on to the lid or discard it.

8. Brass Insert for Lid Screws

On some units the brass inserts in the endcaps that are used for the lid screws may pull out. You may glue the insert back into place, or call Customer Service for a replacement endcap.

9. Power Supply

The KS–32 is similar to the SQ products in that the power supply is integrated onto the main board. Therefore, all the power supply voltages are measured at test points on the main board. The transformer is on a separate board (see p. 4).

10. Shipping

Please do not ship a KS–32 in a box packed with peanuts. If you must, wrap the entire unit in plastic first. These peanuts may cause damage to the keyboard, or card port. When possible, use the original shipping box and packing materials. When sending back a 76 note keyboard, use the plastic packing end pieces that were sent with the replacement keyboard. Please pack the keyboard carefully.

CHECKING THE POWER SUPPLY CIRCUITRY

When troubleshooting a KS–32, remove any memory card that might be present. This will prevent a faulty card from complicating your troubleshooting. Some KS–32 problems may be related to a fault in the power supply circuitry. You should check this before troubleshooting the rest of the unit.

Plug the KS–32 in and turn it on. After it has warmed up for five minutes, begin to test the voltages. It is normal for Line Voltage to vary +/- 10%. **Check all the fuses to make sure they are not blown.**

AC LINE VOLTAGE CONNECTIONS

Transformer Adapter
Board 4090018301

Figure 3 –
AC Line Voltage Connections
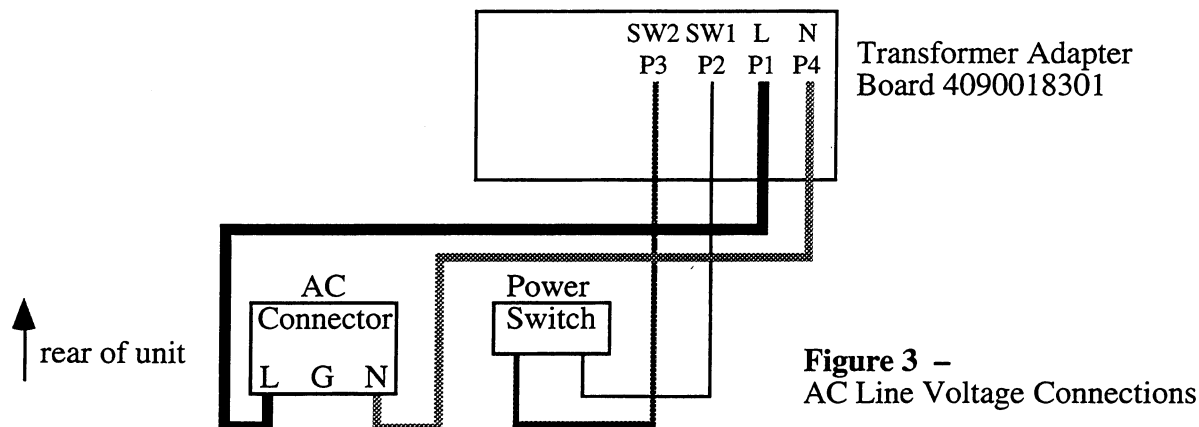
TRANSFORMER CONFIGURATIONS

The KS–32 has a transformer with a separate transformer adapter board. There is a different transformer for each line voltage:

AC Voltage	Transformer Part Number
100V	1450000822
115V	1450000502
220/230V	1450000512
240V	1450000532

Figure 4 –
KS–32 Transformer
and Transformer
Adapter Board
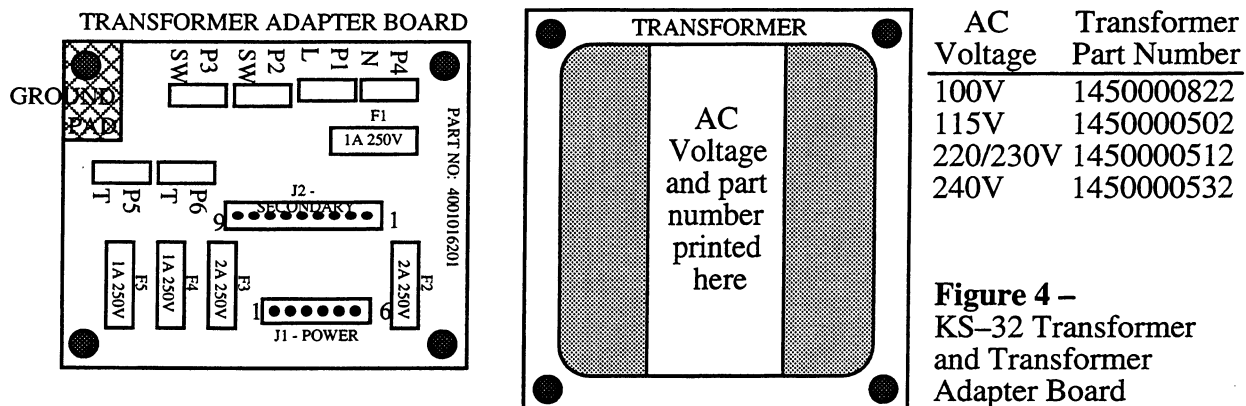
POWER SUPPLY VOLTAGE CHART

The following chart lists the voltage ranges for proper operation of each supply (fully loaded) and the appropriate points to read across with the voltmeter:

Designation	Terminals		Allowable range			Units

Transformer Adapter Board, J1 connector (see Figure 4)

Digital Supply	4	6	15	to	23	VACrms
Analog Supply	1	3	23	to	37	VACrms

Keypad/Display Board, J1 connector

	+	-				
+VD	1	mounting screw	+8.00	to	+11.00	VDC

Main Board (see Figure 5)

	+	-				
+VD	TP9	main board heat sink	+8.00	to	+11.00	VDC
+5D	TP11	main board heat sink	+4.75	to	+5.25	VDC
+5M	TP12	main board heat sink	+4.75	to	+5.25	VDC
+VA	TP7	main board heat sink	+17.00	to	+23.00	VDC
-VA	TP6	main board heat sink	-17.00	to	-23.00	VDC
+12A	TP5	main board heat sink	+11.40	to	+12.60	VDC
-12A	TP2	main board heat sink	-11.40	to	-12.60	VDC
+5A	TP4	main board heat sink	+4.75	to	+5.25	VDC
-5A	TP3	main board heat sink	-4.75	to	-5.25	VDC
-15A	TP13	main board heat sink	-14.25	to	-15.75	VDC

(TP=test point, main board heat sink=ground)

Main Board Test Point Locations

(The test points are labelled on the main board silk screen.)
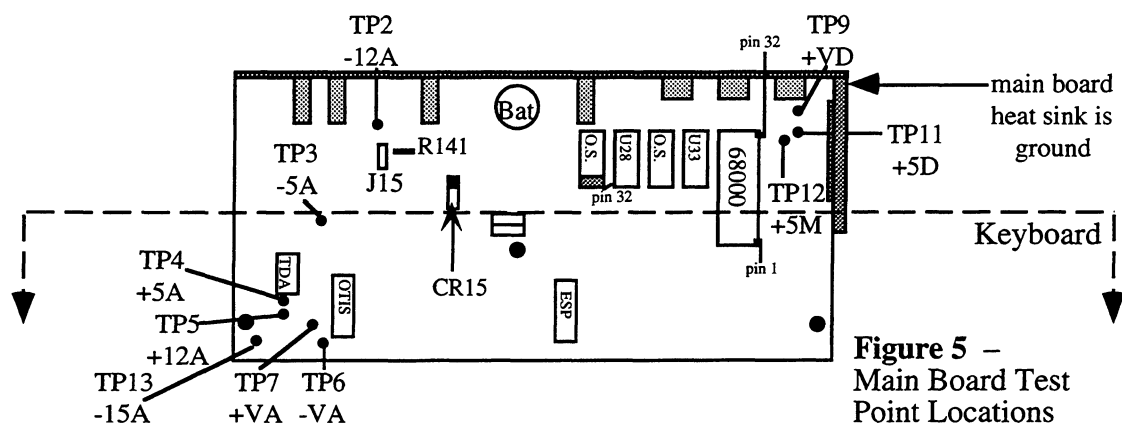
Figure 5 –
Main Board Test
Point Locations

TESTING THE TRANSFORMER ADAPTER BOARD UNLOADED

If a fuse blows, is replaced and then blows again:

**TESTING A
TRANSFORMER ADAPTER
BOARD UNLOADED**

A fuse(s) has blown.

Turn the unit off. Replace the fuse(s). Turn the unit on.

Did the fuse(s) blow again? —No→ All better now!

Yes

Turn the unit OFF. Replace the fuse(s). Disconnect the cable between the main board and the keypad/display board. Turn the unit ON.

Did the fuse(s) blow again? —No→ Replace the Keypad/Display Board

Yes

Turn the unit OFF. Replace the fuse. Disconnect the cable between the transformer adapter board and the main board. Turn the unit ON.

Did the fuse(s) blow again? —No→ Replace the Main Board

Yes

Replace the Transformer Adapter Board

Figure 6 –
Testing a Transformer
Adapter Board Unloaded

The above method also can be used to find the defective module if the voltages are incorrect when fully loaded.

DISPLAY SELF-TEST MODE

When the keypad/display is receiving power from the main board but is not in proper communication with the main board, the KS–32 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 show "BUTTON," then a number.

TROUBLESHOOTING A KS–32 WITH NO DISPLAY OR DISPLAY IS IN SELF-TEST

NO DISPLAY or SELF-TEST

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

Yes

Any fuses blown? — Yes → See Figure 6, Testing a Transformer Adapter Board Unloaded.

No

Turn unit OFF. Jumper pin 17 of the 68000 to the main board heat sink (GND, see Figure 5). Turn the unit ON.

Is the display in self-test? — No → Is the voltage correct on the display board (p. 5)? — Yes → Replace the Keypad/Display Board

Yes

Turn unit OFF. Disconnect the jumper. Hard reset the unit (p. 2). Turn the unit ON.

No → Turn the unit OFF. Disconnect the cable to the keypad/display board. Turn the unit ON. → Is the display voltage correct on the main board (+VD, p. 5)? — Yes

No

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

No

Are all the transformer voltages OK (p. 4)? — No → Replace the Transformer Adapter Board

Replace the Main Board ← Yes

Figure 7 –
KS–32 with No Display
or Display is in Self-Test

UNEXPECTED EVENT MESSAGES

Occasional unexpected event messages 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 unexpected event messages could result from scrambled memory. Be sure to reinitialize the system (see p. 1) before troubleshooting any further.

Software Messages

The following unexpected event messages could be caused by software:

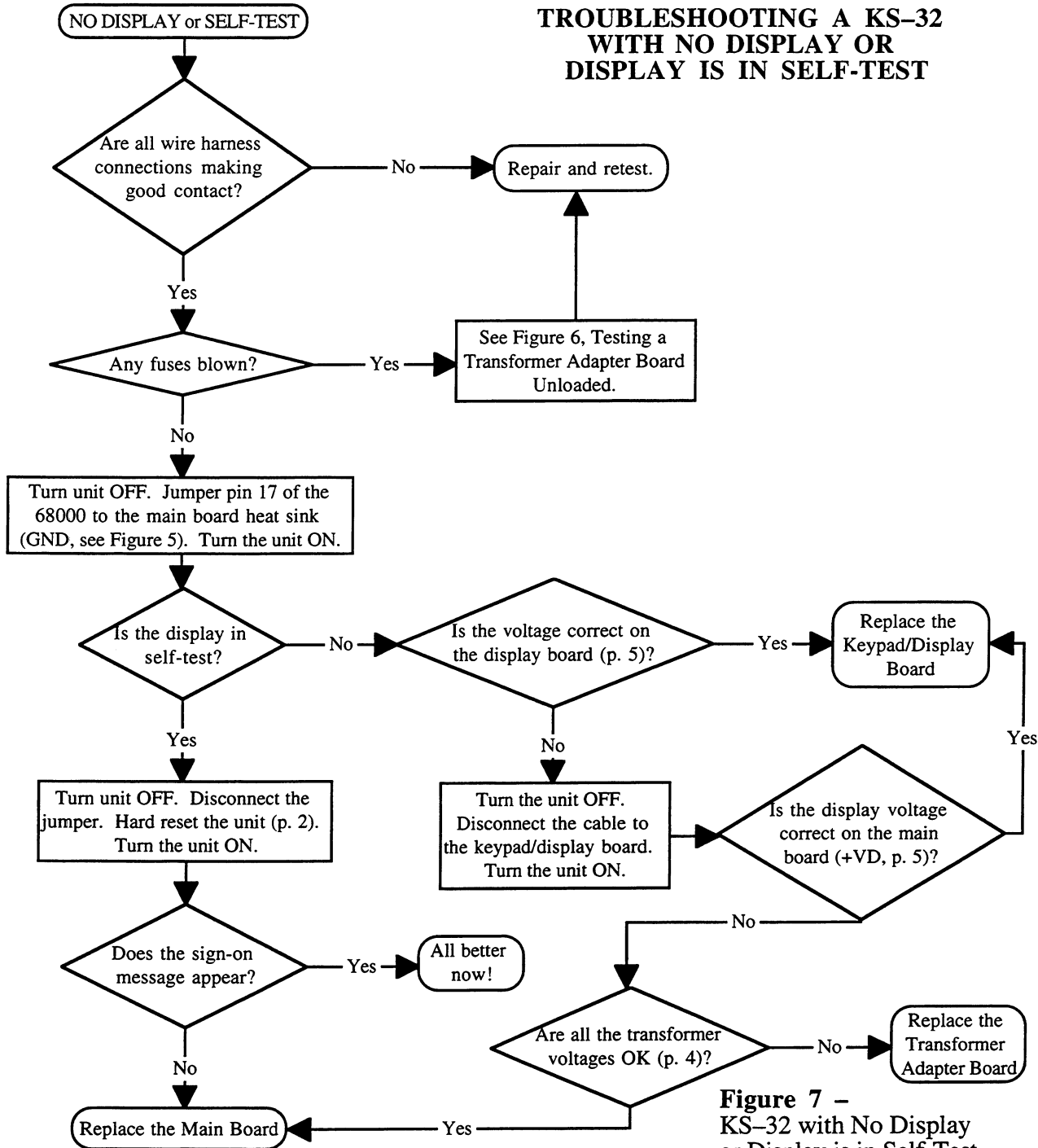| ID #	Description	ID #	Description
16	poly or mono pressure events sent to VC	133	trapv instruction overflow error
20	unknown button event	134	privilege violation
48	parameter error	135	trace
49	layer error	137	line 1111 emulator
80	bad buffer to MIDI	138	spurious interrupt
128	bus error	139	unused vector
129	odd address error	192	load all data error (from MIDI or card)
130	divide by zero	193	keyup playback error
131	illegal instruction	194	out of SDB's error
132	chk instruction register out of bounds		

Main Board Problems

The following unexpected event messages could be caused by a problem on the main board:

ID	Description	ID	Description
32	bad download	40	bad ESP error
33	bad ESP chip	138	spurious interrupt
34	bad ESP RAM	145	unknown DUART interrupt error

MIDI or Main Board Problems

The following unexpected event message is usually caused by too much incoming MIDI data. It also could be caused by a problem on the main board:

144	out of buffers

SOFTWARE NOTES:

Version 3.01 (released 18 OCT 93)
This software change was made to reduce or eliminate front panel button lockout problem (unit powers up but pressing front panel buttons have no effect).

LOW BATTERY MESSAGE

Several things could cause this message to appear when the *unit is turned on*: "WARNING! Battery low. See manual." Press any button to continue. Sometimes the unit in question can wake up in a state of mild confusion and this message might appear. If you get this message after a RAM card (MC-32) is inserted, this message is referring to the battery in the card, not the one in the unit (see p. 26).

☞ IMPORTANT!

A Low Battery Message does not necessarily mean that you have a low battery! Follow the flow chart in Figure 8!

Battery Cautions

In order to comply with safety agency requirements, translations of the warning on the battery label inside the KS–32 are listed here.

English   CAUTION!
Danger of explosion if battery is
incorrectly replaced. Replace only with
the same or equivalent type recommended
by the equipment manufacturer. Discard
used batteries according to
manufacturer's instructions.

Denmark   ADVARSEL!
Litiumbatteri - Eksplosionsfare ved
fejlagtig handtering. Udskiftning ma kun
ske med batteri af samme farbrikar og
type. Lever det brugte batteri tilbage til
leverandøren.

Finland   VAROITUS!
Paristo voi räjähtää, jos se on
virheellisesu asennettu. Vaihda paristo
ainoastaan laitevalmistajan suosittelemaan
tyyppin. Hävitä käytetty paristo
valmistajan ohjeiden mukaisesti.

Sweden   VARNING!
Explosionsfara vid felaktig batteribyte.
Använd samma batterityp eller en
ekvivalent typ som rekommenderas av
apparattillverkaren. Kassera använt
batteri enligt fabrikantens instruksjon.

To check the battery, go to the Analog Test Page:

Press *Edit Seq/Preset* then while holding down *Bank 9*, press *Screen 0*.

The display shows ANALOG TESTS, then press *Screen 2* (see Figure 2).

The value next to BAT= should read between 125 and 205. If the number is outside this range, it usually means that the system is confused and you should reinitialize (see p. 1), and check it again.

TROUBLESHOOTING KS–32 WITH A LOW BATTERY MESSAGE WHEN YOU TURN IT ON

Low Battery Message

Check the battery value on the Analog Test page (see above).

Is the value between 125 and 205? — Yes → Reinitialize the unit (see p. 1). → Does the battery low message still appear on power up?

No (from "Is the value between 125 and 205?")

Turn the unit OFF. Check the voltage across the battery.

Is the voltage across the battery less than 2.7VDC? — No → Replace the Main Board

Does the battery low message still appear on power up? — No → All better now! / Yes → Replace the Main Board

Yes (from "Is the voltage across the battery less than 2.7VDC?")

Replace the battery.

Check the voltage drop across diode CR15 (see Figure 5 for location).

Is the voltage drop more than 0.4VDC (400mVDC)? — Yes → Replace the Main Board

No (from "Is the voltage drop more than 0.4VDC?")

Check the RAM chips (U28 and U33, see Figure 5 for location) to ensure that the voltage at the above diode measured at the banded end with respect to ground (TP10, see Figure 5) is present at pin 28 (or 32) of the designated chip.

The voltage measured at the battery, minus the drop across diode CR15 should be present at both the diode and the RAM chips.

Is the voltage present? — No → Replace the Main Board / Yes → All better now!

NOTE:
If you get a Battery Low message after a RAM card is inserted, this message is referring to the battery in the card, not the one in the unit (see p. 26).

Figure 8 –
KS–32 with a Low Battery Message when you turn it on

KEYBOARD

The KS–32 keyboard uses what we call "bubble" switches. Instead of mechanical switches, the KS–32 keyboard, like the SQ–2, has a molded rubber bubble under each key. The keyboard circuit board has conductive carbon contacts printed on it (which appear as small black strips under each key). Each rubber bubble also has small conductive carbon dots printed on the inside. The bubbles are made in strips which attach to the circuit board using small nubs. The nubs on a strip are pushed through holes in the circuit board, in order to hold the strip in place.

As a key is pressed, it forces the bubble down until the carbon dots on the bubble hit the carbon contacts on the circuit board. This completes the circuit. The circuit has two contacts per key, a back contact and a front contact. The back contact closes first when a key is pressed, then the front contact closes. We measure the amount of time between when the back contact closes and when the front contact closes. This tells us how fast the key was hit, making the keyboard "velocity-sensitive." In other words, we can tell how hard the musician is playing and can adjust the volume and brightness of the sound in response to the playing style. Each bubble switch also has a diode in series with it for proper circuit operation.

Although bubble switches are more reliable than mechanical switches, there are many things that can go wrong with this keyboard. If the bubble switches don't switch in the proper order (first the back contact, then the front contact) or if the switches don't make clean contact, several problems can occur. These include:

- Keys that don't sound at all
- Erratic keys that "chatter" as they are played, held or released
- Keys that sound much louder than other keys
- Keys that sound much quieter that other keys

These problems can be caused by several things, including:
- Open or shorted traces on the circuit boards
- Bad or dirty carbon contacts on the circuit boards
- Bad or dirty carbon contacts on the bubbles
- Torn or otherwise damaged bubbles
- Bubble strips that are installed backward
- Interference between the key and the bubble (such as foreign material trapped between the key and the bubble)
- Improper alignment between the key and the bubble
- Bad diodes

Usually failures will fall into two categories; either one key is bad, or a group of keys is bad. If a group of keys is bad, all the keys may be grouped together (usually a group of eight) or they may be spread across the keyboard (usually every eighth key).

If keys fail in a group of eight or every eighth key fails, the problem is most likely an open or shorted trace on the circuit board. Check this first and repair as shown on the following two pages.

If only one key is bad (or if groups of keys is bad but not in groups of eight or every eighth key), the problem could be any of the above. The first thing to do is remove the key and see if there is anything obviously wrong with the bubble:

- **Look for damage to the bubble itself.**
  If the bubble is damaged, the circuit board must be removed so the strip can be replaced.
- **Check that the bubble strip is seated flat against the circuit board.**
  If the strip is improperly seated, use an appropriate tool (a straightened paper clip works well; don't use a sharp tool as it can puncture the rubber strip) to force the nubs on the strip into the holes on the circuit board. The strip should lay flat against the circuit board.
- **Check that the bubble isn't backward. If installed correctly, the deeper of the two bubble contacts should be at the rear of the keyboard.**
  If the strip is in backward, remove the circuit board, pull the strip off the circuit board, turn it around and reinstall it.
- **Remove any foreign material caught between the bubble and the key.**
- **See if the plunger on the key makes proper contact with the top of the bubble.**
  If the plunger on the key forces the bubble down unevenly (with one side of the bubble being much higher than the other side), loosen the screws that hold the circuit board in place and slide the circuit board over slightly to better align the key and the bubble, then retighten the screws.
- **Check that both diodes for that key are inserted properly (the banded end of all diodes should face the same way).**
  If a diode is in backward, the circuit board must be removed and the diode must be unsoldered, reversed and resoldered.
- **Check that both diodes for that key are working properly.**
  Select the "diode check" setting on an ohmmeter and test the diodes. The diode should conduct when the negative (black) lead of the ohmmeter is on the cathode (banded) end of the diode and the positive (red) lead of the ohmmeter is on the anode (unbanded) end of the diode. The diode should not conduct when the negative (black) lead of the ohmmeter is on the anode (unbanded) end of the diode and the positive (red) lead of the ohmmeter is on the cathode (banded) end of the diode. If a diode is bad, replace it with a 1N914B diode.

If there is no obvious problem, remove the circuit board:
- **Examine the circuit board for short circuits.**
  These are usually caused by solder bridging. Touch up any shorts with a soldering iron and/or razor knife.
- **Look for open traces.**
  These usually occur at the break-away points along the edge of the board and near the connectors. Solder a wire jumper in place to fix any broken connections.
- **Remove the bubble strip and clean both the circuit board contacts and the bubble contacts with alcohol and a cotton swab.**
  Allow them to air dry before putting the bubbles back on the circuit board.

If after all this the keyboard still doesn't work properly, replace the circuit board and bubbles with a new board assembly.
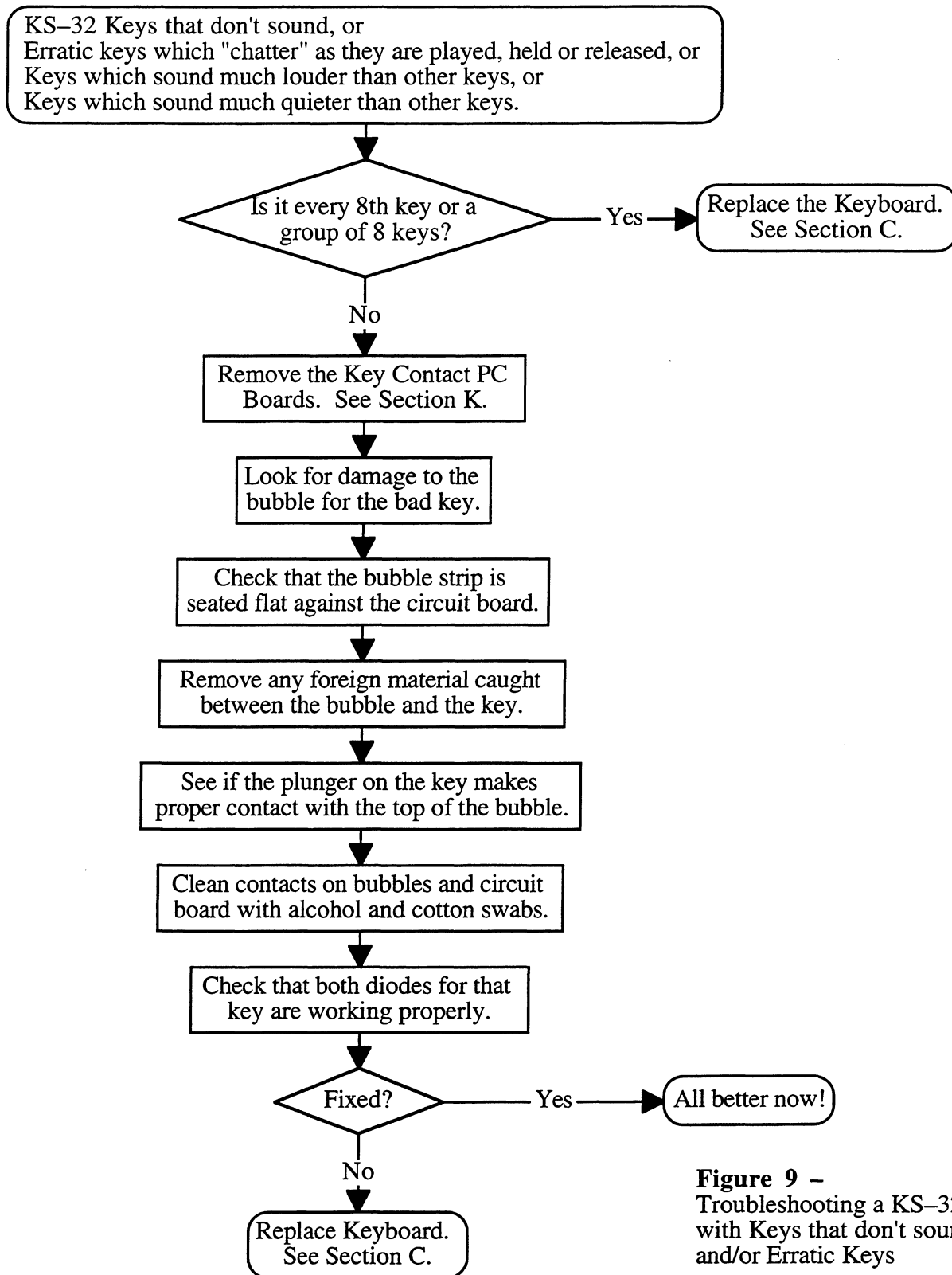
KS–32 Keys that don't sound, or
Erratic keys which "chatter" as they are played, held or released, or
Keys which sound much louder than other keys, or
Keys which sound much quieter than other keys.

Is it every 8th key or a group of 8 keys? —Yes→ Replace the Keyboard. See Section C.

No

Remove the Key Contact PC Boards. See Section K.

Look for damage to the bubble for the bad key.

Check that the bubble strip is seated flat against the circuit board.

Remove any foreign material caught between the bubble and the key.

See if the plunger on the key makes proper contact with the top of the bubble.

Clean contacts on bubbles and circuit board with alcohol and cotton swabs.

Check that both diodes for that key are working properly.

Fixed? —Yes→ All better now!

No

Replace Keyboard. See Section C.

Figure 9 –
Troubleshooting a KS–32 with Keys that don't sound and/or Erratic Keys

The KS–32 keyboard, like the SQ–2, has mono pressure response. This allows a modulation effect to increase as you press harder on a key. Pressing harder on any key will affect all other keys. To produce mono pressure, two pressure sensitive strips are inside the keyboard assembly. Pressing on a key exerts a downward pressure on the strips. Two strips are used because of the large 76-note span. The signals from the two strips are combined by a small circuit board (the mono pressure board) that is mounted to the base. A 4-pin cable carries the combined signal over to the main board. Note that it is normal for pressure response to vary depending on the number of keys being pressed.
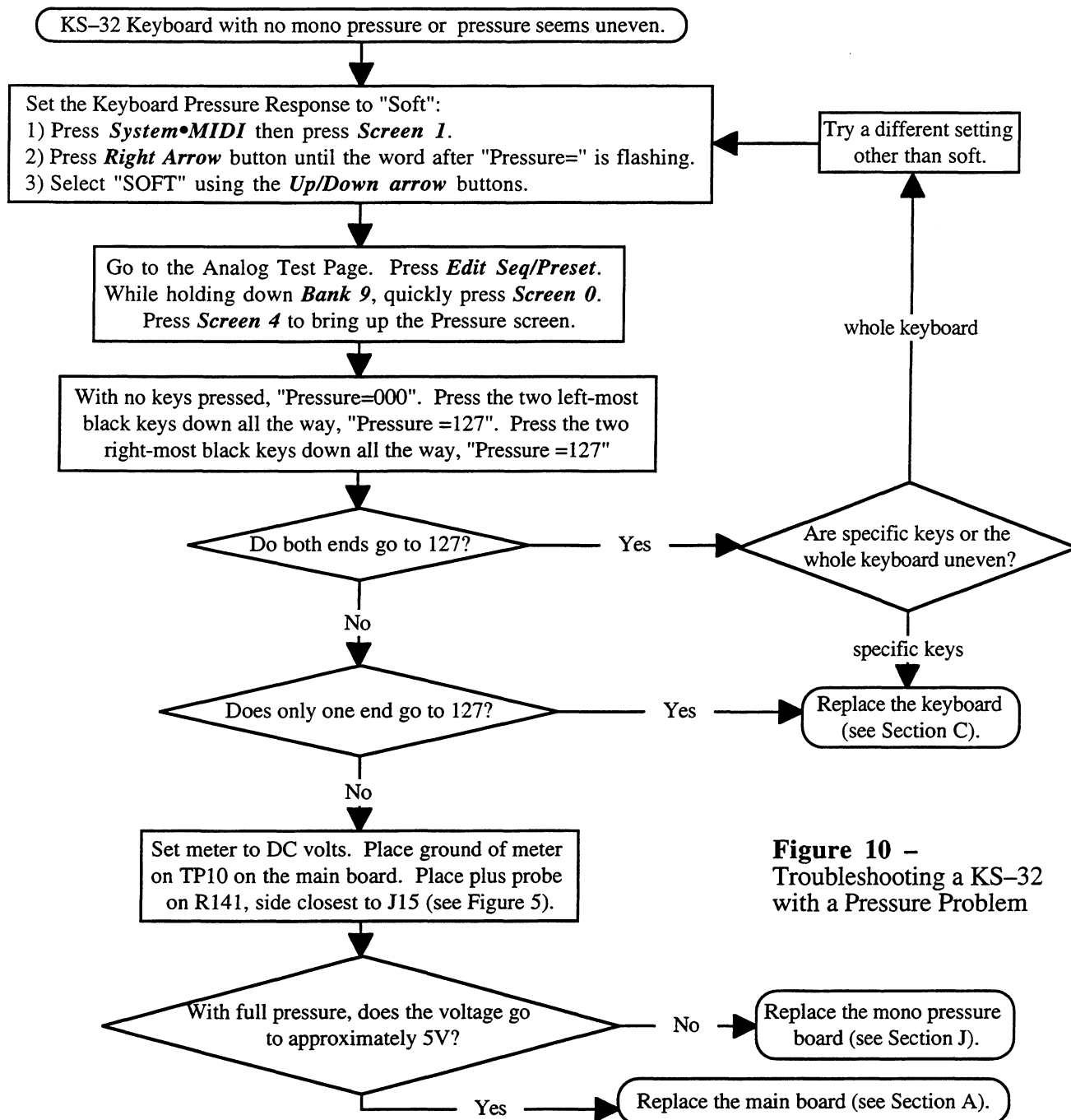
KS–32 Keyboard with no mono pressure or pressure seems uneven.

Set the Keyboard Pressure Response to "Soft":
1) Press *System•MIDI* then press *Screen 1*.
2) Press *Right Arrow* button until the word after "Pressure=" is flashing.
3) Select "SOFT" using the *Up/Down arrow* buttons.

Try a different setting other than soft.

Go to the Analog Test Page. Press *Edit Seq/Preset*. While holding down *Bank 9*, quickly press *Screen 0*. Press *Screen 4* to bring up the Pressure screen.

whole keyboard

With no keys pressed, "Pressure=000". Press the two left-most black keys down all the way, "Pressure =127". Press the two right-most black keys down all the way, "Pressure =127"

Do both ends go to 127? — Yes → Are specific keys or the whole keyboard uneven?

No

Does only one end go to 127? — Yes →

specific keys

Replace the keyboard (see Section C).

No

Set meter to DC volts. Place ground of meter on TP10 on the main board. Place plus probe on R141, side closest to J15 (see Figure 5).

Figure 10 –
Troubleshooting a KS–32 with a Pressure Problem

With full pressure, does the voltage go to approximately 5V? — No → Replace the mono pressure board (see Section J).

Yes → Replace the main board (see Section A).
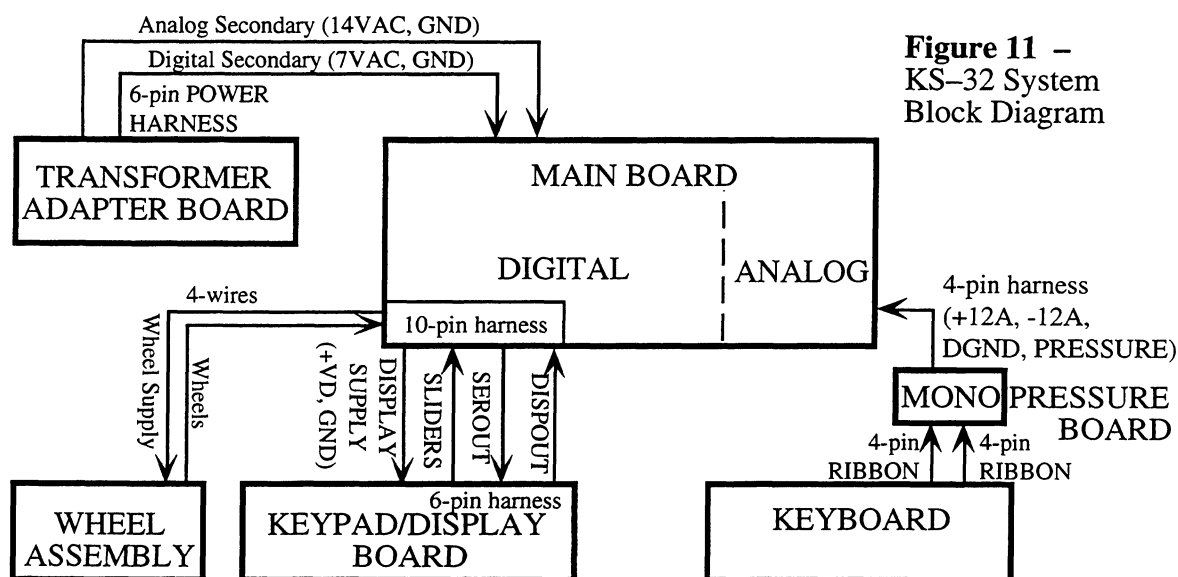
KS–32 SYSTEM BLOCK DIAGRAM

Figure 11 –
KS–32 System
Block Diagram

TEST PROCEDURES

The following test procedure will ensure the thorough testing of a KS–32 and will help qualify customer complaints about: MIDI malfunctions, audio quality, wheel problems, foot switch or pedal problems, keyboard problems, and memory problems.

The KS–32 should be connected in stereo to a sound system. To do the following tests you need:
- a short MIDI cable
- a CV Pedal (model CVP-1)
- a dual pedal Foot switch (model SW-5/10)

The KS–32 IS heavily software dependent, and like all computers, certain events can cause the unit to glitch and contract a severe case of amnesia. Sometimes the unit merely requires reinitialization (see p. 1). Be sure to save the customer's sounds and sequences before reinitializing (see p. 25).

1. 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.**

2. Audio Quality Test

a. Press *BankSet* until the display shows "ROM" in the upper left corner.

b. Select and individually test the following sounds for sound quality, pops, glitches, clicks, reverb, etc. Play each of the following sounds for at least 5 seconds.

c. Verify that there is sound coming from both outputs.

Bank	Sound#	Sound Name	Effect
0	9	Pno/Str & Bass	Chorus + Reverb
3	2	New E. Piano	Phaser + Reverb
4	9	Be Three	Rotary Speaker + Reverb
5	1	Medieval Pipes	Flanger + Reverb 1
7	3	Pro Lead	Cmprss+Dist+Verb
8	3	Ballad Kit	Hall Reverb
9	0	Vocal Kit	Flanger + Reverb 2

d. Press *Bank 1* to exit the DRUM banks.

e. Press *BankSet* until the display shows "INT" in the upper left corner.

Bank	Sound#	Sound Name	Effect
1	9	Nineties Bass	8-Voice Chorus
2	0	Orch Strings	Chorus + Reverb
8	7	House Kit	Room Reverb

f. Plug headphones directly into the headphone jack and verify that there is sound in both sides.

* **Failure indicates a Main Board problem.**

3. Foot Switch Test

a. Press *Bank 1* to exit the DRUM banks.

b. Press *BankSet* until the display shows "ROM" in the upper left corner.

c. Hold down the *Down* arrow button until the display shows "ROM 00" in the upper left corner to select the sound in location 00.

d. Plug the dual foot switch into the Ft. Sw. jack.

e. Press the right (Sustain) foot switch and verify that notes continue to sound after the key is released but stop when the foot switch is released.

f. Select the Sostenuto function:
   1) Press *System•MIDI*.
   2) Press *Screen 2*. The display should read "FtswL=..."
   3) Select "FtswL=SOSTENUTO" using the *Up/Down* arrow buttons.

g. Press *Select Sound*.

h. Play and hold a note, then press the left foot switch. Release the note and verify that the note continues to sound after the key is released but stops when the foot switch is released.

* **Failure indicates a Main Board problem.**

4. Keyboard Test
a. Press *BankSet* until the display shows "ROM" in the upper left corner.
b. Hold down the *Down* arrow button until the display shows "ROM 00" in the upper left corner to select the sound in location 00.
c. Play briefly to verify sound quality.
d. Verify that the sound gets louder with higher key velocity.
e. Verify that all keys function and that velocity response is uniform across the keyboard.
* **Failure indicates a Keyboard cable, Keyboard, or Main Board problem.**

5. Mono Pressure Test
a. Set the Keyboard Pressure Response to "Soft":
   1) Press *System•MIDI*.
   2) Press *Screen 1*.
   3) Press the *Right arrow* button until the word after "Pressure=" is flashing.
   4) Select "SOFT" using the *Up/Down* arrow buttons.
b. Press *Select Sound*.
c. Select "Slam Keys" (INT Bank 3, sound 5).
d. Play each key and verify that pressing harder on each key causes a vibrato effect to occur.
* **In case of failure, see pp. 9-13.**
   Be on the lookout for erratic keys, which cause multiple key triggers when the key is pressed or released, and keys with dramatically different velocity response (such as keys that always play with full velocity or low velocity no matter how the key is played).

6. Analog Tests
a. Plug the CV pedal into the Pedal•CV jack.
b. Select the Analog Test Page:
   1) Press *Edit Seq/Preset*.
   2) While holding down *Bank 9*, quickly press *Screen 0*.

c. Move the appropriate controller throughout its range and check the following readings:

Controller	Display	Down	Up	Center
1) Pitch Wheel	PW=	0	127	64
2) Mod Wheel	Mod=	0	127	-

d. Press *Screen 1* and check the following:

	Display	Down	Up	Center
1) CV Pedal	CV=	0	127	-
2) Volume Slider	Vol=	0	127	-

Unplug the CV pedal and verify that CV=127.

e. Press *Screen 2* and check the following:

	Display	Down	Up	Center
1) Data Entry Slider	Knob=	0	255	-
2) Battery	Bat=	between 125 and 205		

f. Press *Screen 4* and check the following:
   Keyboard Mono-Pressure

With no keys pressed:	Pressure=000
With the two left-most black keys fully pressed:	Pressure=127
With the two right-most black keys fully pressed:	Pressure=127

g. Press *Screen 5*, then press *Select Sound* to exit the Analog Test Page.

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

7. Write Test

a. Press *BankSet* until the display shows "ROM" in the upper left corner.

b. Hold down the *Down* arrow button until the display shows "ROM 00" in the upper left corner to select the sound in location 00.

c. Press *Enter•Save*. The display should read "Replace edit sound?"

d. Press *Enter•Save*. The display should read "Save SOUND" followed by the name of the current sound.

e. Using the *Up/Down* arrow buttons, change the name of the sound (one character will do).

f. Press *Enter•Save*. The display should read "Save to INT XX."

g. Select a sound to overwrite using the *Up* arrow button. The location number is on the upper line of the display and the name of the sound at that location is on the bottom of the display.

h. Press *Enter•Save*. The display should briefly read "Saved" then display the sound and location.

i. Verify that the name has changed.

j. Play a few notes to verify that there is no scrambled sound data.

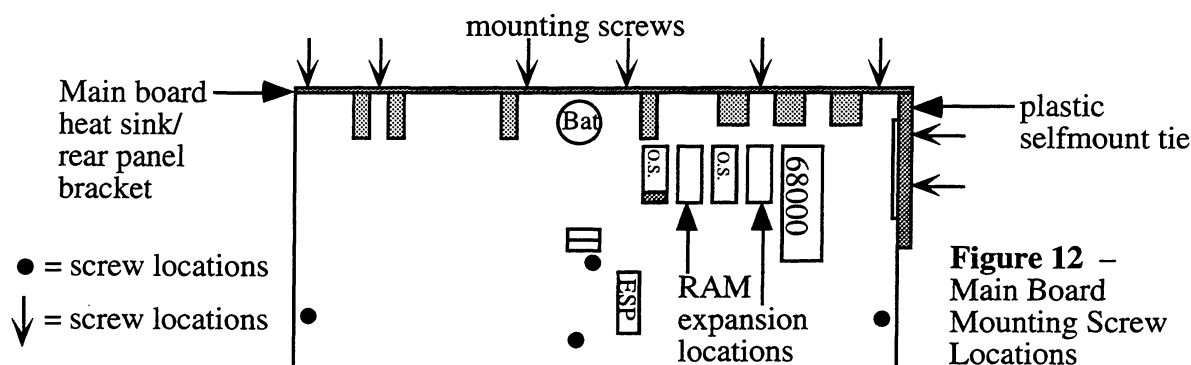* **Failure usually indicates a Main Board problem.**

8. Battery Backup Test

a. Turn the unit off and verify that there is no squeal at the main outputs on power-down.

b. Toggle the power switch on and off rapidly 5 times ONLY. Then, leave the unit off for 10 seconds.
   NOTE: Remember, if you turn it on and off 7 times, it will reinitialize itself (see p. 1).

c. Power the unit on and verify that there are no loud pops at the main outputs on power-up.
   NOTE: The headphone outputs will produce a pop at power-up and power-down as there is no muting on the headphone outputs.

d. Press *BankSet* until INT sounds are selected and verify that the sound you wrote in step 7 has not been replaced by the ROM sound.

* **Failure usually indicates a main board problem although a power supply problem is also possible.**

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│ SECTION     │
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Replacing the Main Board

Removing
1. Remove all cables connected to the KS–32, including the power cord.
2. Remove the six (6) screws and washers from the lid (four on top, two in back).
3. Remove the keyboard, see Section C.
4. Disconnect the remaining cables from the main board (NOTE that they are keyed):
   a) the 10-pin display/wheels cable (J5),
   b) the 6-pin power cable (J12),
   c) the headphone cable (J1), and
   d) the mono pressure cable (J15).
5. Remove the four (4) nuts from the rear panel jacks marked Ft. Sw., Pedal•CV, Left Mono, and Right Mono.
6. Remove the six (6) screws from the PCB bracket to rear of base.
7. Remove the main board mounting screws (see Figure 12 for locations):
   a) Remove three (3) screws from the main board to the base.
   b) Remove the two screws that go from the side main board heat sink to heat sink bracket.
   c) Remove plastic self mount tie holding transformer cable and power cable to side heat sink of main board.

Main board → heat sink/ rear panel bracket

mounting screws

plastic selfmount tie

● = screw locations
↓ = screw locations

RAM expansion locations

Figure 12 – Main Board Mounting Screw Locations

8. Slide the board out of the rear jack panel, and remove the board.
Installing
9. Insert the board jacks first into the holes in the rear jack panel.
10. Install the main board screws: three (3) to base, two (2) to side heat sink bracket, and six (6) to rear PCB bracket.
11. Secure the jacks with the nuts (if you haven't already). Connect all cables to the main board.
12. Install the keyboard and connect all cables to the unit.
13. Power up, test the unit.
14. Install the six (6) lid screws and washers.

SECTION B

Replacing the Keypad/Display Board

Removing

1. Remove all cables connected to the KS–32, including the power cord.
2. Remove the volume and the data entry knobs.
3. Remove the six (6) screws and washers from the lid (four on top, two in back).
4. Remove the two (2) screws from the back of the lid that hold the memory card brackets to the lid.
5. Open the lid. Disconnect the 6-pin cable from the keypad/display board.
6. Remove the fourteen (14) screws (Phillips head) that hold the keypad/display board in place. Make sure that the spacers stay in place. **See important information about the keypad/display board, p. 2.**

Installing

7. Before reassembling, make sure that both the lens and LCD display are clean and that all the spacers are in place.
8. Install the fourteen (14) screws (**use no more than 8 in/lbs of torque**).
9. Connect the 6-pin cable to the keypad/display board paying attention to polarity.
10. Install the memory card board using the two screws.
11. Install the data entry and volume knobs. Power up, test the unit.
12. Install the six (6) lid screws and washers.

SECTION C

Replacing the Keyboard

Removing

1. Remove all cables connected to the KS–32, including the power cord.
2. Turn the unit upside-down on a soft surface. Place something under the wheels to support them and to keep them from bending.
3. Remove ten (10) screws in the recessed holes from the base pan.
4. Turn the unit right-side-up and remove the six (6) screws and washers from the lid (four on top, two in back).
5. Lift the left end of the keyboard and disconnect the two (2) flat cables from the mono pressure board (under wheels).
6. Lift the front of the keyboard and remove the two (2) ribbon cables from it.
7. Remove keyboard by lifting up on the front of the keys.

IMPORTANT! On some early units, some mounting holes in the keyboard may not line up on the base; just leave those screws out. With the keyboard springs away from you, the holes that may not line up are on the left rear part of the keyboard assembly (see 76 Note Keyboard, p 3).

Installing

8. Insert the new keyboard springs first.
9. Connect the flat cables to the mono pressure board.

10. Connect the two ribbon cables to the keyboard. Notice they are different sizes and that they are keyed.
11. Install the six (6) lid screws and washers. This will help hold the keyboard in when you turn the unit upside-down to install the screws.
12. Carefully turn the unit upside-down. Replace the ten (10) screws that secure the keyboard to the base. **Use no more than 8 in/lbs of torque.**
13. Power up, test the unit.

IMPORTANT! The KS–32 76 note keyboard is susceptible to damage during shipping. When sending back a 76 note keyboard, use the plastic packing end pieces that were sent with the replacement keyboard. Please pack the keyboard carefully.

SECTION
D

Replacing the Transformer

All units that need the transformer replaced should be returned to the factory. If you are outside the U.S., contact your distributor.

SECTION
E

Replacing the Transformer Adapter Board

Removing
1. Remove all cables connected to the KS–32, including the power cord.
2. Remove the six (6) screws and washers from the lid (four on top, two in back).
3. Disconnect the following cables and wires from the Transformer Adapter board (see Figure 3):
   a) the six (6) pin connector (J1) (note that this connector is keyed),
   b) the nine (9) pin connector (J2) (note that this connector is keyed),
   c) P1 (L) wire from the line cord connector
   d) P2 (SW1) wire from the power switch
   e) P3 (SW2) wire from the power switch
   f) P4 (N) wire from the line cord connector
   g) P5 (T) wire from the transformer
   h) P6 (T) wire from the transformer
4. Remove the four (4) screws and one star washer that secure the Transformer Adapter board (see Figure 4) to the lid.

Installing
5. Make sure that the mylar insulator is in place.
6. Install the new transformer adapter board using the four screws and 1 star washer (star washer on the ground pad) with the four orange capacitors closest to the keyboard.
7. Attach the wires and cables, see Figure 3.
8. Power up and test the unit.
9. Install the six (6) lid screws and washers.

SECTION F

Replacing the Wheel Assembly

The Pitch and Mod Wheels are replaced as an assembly with the cable harness.

Removing
1. Remove all cables connected to the KS–32, including the power cord.
2. Remove the four (4) screws that attach the wheel assembly to the base.
3. Remove the six (6) screws and washers from the lid (four on top, two in back).
4. Disconnect the cable from J3 on the mono pressure board.
5. Remove the two screws that hold the headphone bracket to the base.
6. Cut the wire ties that hold the wire harness to the base. Disconnect the harness from the main board, and from the keypad/display board. Note that these connectors are keyed and have connector locks.
7. Carefully lift the wheel assembly out of the case.

Installing
8. Install the headphone bracket with the two screws.
9. Plug J3 into the mono pressure board.
10. Insert wheel cover assembly. Be careful not to pinch wires under wheel cover legs.
11. Attach the wheel assembly to the case using the four screws (**use no more than 8 in/lbs of torque**).
12. Connect the new wire harness to the main board (J1, J5, J15), and to the keypad/display board (6-pin), paying particular attention to the alignment of pins and connectors.
13. Connect the wire harness to the case using wire ties.
14. Power up, test the unit.
15. Install the six (6) lid screws and washers.

SECTION G

Replacing the O.S. EPROMs

The KS–32 operating system can be updated by replacing the O.S. EPROMs. Each KS–32 has two Operating System EPROMs located on the main board near the MIDI jacks. After replacing these EPROMs, the KS–32 must be reinitialized (see p. 1). The internal sounds are automatically replaced by sounds in the ROM during reinitialization. **All Sounds and Presets must be saved before starting this procedure!** (see p. 25).

Removing
1. Remove all cables connected to the KS–32, including the power cord.
2. Remove the six (6) screws and washers from the lid (four on top, two in back).
3. The two Operating System EPROMs, LOWER (U27) and UPPER (U32), are located on the right side of the Main Board next to the Ft Sw. and MIDI In jacks respectively (see Figure 12). Carefully remove the two EPROMs.

Installing 4. Insert the replacement EPROMs into their respective sockets. Be sure the notch in each EPROM is facing away from the jacks. Make sure Lower (U27) is all the way to the top of the socket (four front pins are empty, see Figure 12).

IMPORTANT! Make sure all audio cables are unplugged BEFORE turning the unit on. The first time you turn on the KS–32 after updating the software, the unit may make a pop.

5. Power up, reinitialize by pressing the *Edit Seq/Preset* button, then while holding down *Bank 9*, quickly press *Screen 9* (see Figure 2). The display should read "Reinitialize Sound and Seq RAM?" Then press *Yes*.
6. Check the software version by pressing the *Edit Seq/Preset* button, then while holding down *Bank 9*, quickly press *Screen 1*. The version number should be the same as that printed on the label of the newly installed EPROMs.
7. Test the unit (see p. 14).
8. Install the six (6) lid screws and washers.
9. Reload the sounds and sequences that were saved before replacing the EPROMs (see p. 25).

SECTION H

Replacing Memory Card Connector Board

Removing 1. Remove all cables connected to the KS–32, including the power cord.
2. Remove the six (6) screws and washers from the lid (four on top, two in back).
3. Disconnect the 40-pin ribbon cable from the main board (J6) using a scribe.
4. Remove the two (2) screws that hold the memory card connector board brackets to the lid (located on the back of the lid).
Installing 5. Attach the memory card connector board brackets to the lid using the two screws.
6. Connect the 40-pin ribbon cable to the main board (J6).
7. Power up, test the unit.
8. Install the six (6) lid screws and washers.

SECTION J

Replacing the Mono Pressure Board

Removing 1. Remove all cables connected to the KS–32, including the power cord.
2. Remove the six (6) screws and washers from the lid (four on top, two in back).
3. Unscrew the wheel cover assembly and move it out of the way.
4. Disconnect the 5-pin cable from the mono pressure board.
5 Disconnect the two (2) flat cables (J1, J2) from the mono pressure board.
6. Remove the three (3) screws that hold the mono pressure board to the base.
Installing 7. Install the three (3) screws that hold the mono pressure board to the base.
8. Connect the 5-pin cable to J3 and the two flat cables to J1 and J2.

9. Install the wheel cover assembly.
10. Power up, test the unit.
11. Install the six (6) lid screws and washers.

SECTION K

# Replacing Key Contact PCBs & Bubble Strips

Removing
1. Remove all cables connected to the KS–32, including the power cord.
2. Remove the keyboard from the unit (see Section C).
3. Place the keyboard keys down on a soft surface that will not scratch the keys.
4. Remove the forty-one (41) screws that secure the two (2) key contact PC boards to the keyboard (a #1 Phillips screwdriver works best).
5. Lift the key contact PC boards from the keyboard and note the orientation of the key contact bubble strips.

IMPORTANT: You must replace the bubble strips in the same orientation they were removed from for velocity sensing to work!

6. Gently peel each key contact bubble strip from the two key contact PC boards. They should peel off with very little force. There are five strips of twelve bubble contacts, two strips of eight bubble contacts (see Figure 13).
7. Perform any necessary maintenance as described on pp. 9-13.

Installing
8. Place each key contact bubble strip in its proper location and orientation. It is VERY IMPORTANT to orient the stops properly for velocity sensing to work.

Deeper hole closest to the spring end of the
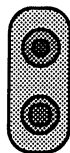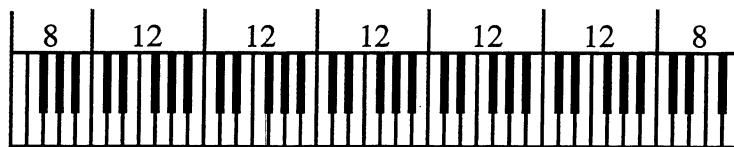
Bubble

Figure 13 – Bubble strip lengths

9. Align the rubber posts on the contact strip with the appropriate holes on the key contact PC board.
10. Using a thin blunt instrument (a solder tinned end of a straightened paper clip or a miniature screwdriver such as Xcelite MN-01 works well), gently push each rubber post through the appropriate hole on the key contact PC board. It **does not** take much force to push the post through, if you use too much force, you can tear the contact strip or cause damage to the PC board.
11. After all bubble strips are replaced, install the key contact PC boards onto the keyboard using the 41 screws. The shorter board goes on the lower half of the keyboard. The connectors should be near the center of the keyboard.
12. Reinstall the keyboard (see Section C).

Saving KS–32 Data to a MIDI Sys-Ex Recorder

Sounds:
1) Connect a MIDI cable from the KS–32 MIDI Out jack to the MIDI In jack of the Sys-Ex Recorder.
2) Press the *Edit Sound* button.
3) Select the Store Sounds bank by pressing the *Bank 9* button (see Figure 2).
4) The display reads, "Press ENTER to Store Sounds."
5) Press *Enter•Save*. The display now lets you choose which type of storage to use.
6) Use the *Up/Down Arrow* buttons to select "Storage Type=MIDI SYS-EX."
7) Press *Enter•Save*.
8) Use the *Up/Down Arrow* buttons to select "Operation=SAVE INT TO MIDI." This command transmits the entire contents of the eight Internal Sound Banks (0-7) as a system exclusive message. The dump contains data for the complete set of 80 sounds.
9) Press *Enter•Save*. The display will read "Please wait ... sending data" while the sounds are being transmitted.

Sequences/Presets:
1) Connect a MIDI cable from the KS–32 MIDI Out jack to the MIDI In jack of the Sys-Ex Recorder.
2) Press the *Edit Seq/Preset* button.
3) Select the Store Seqs bank by pressing the *Bank 9* button (see Figure 2).
2) The display reads, "Press ENTER to Store Sequences."
3) Press *Enter•Save*. The display now lets you choose which type of storage to use.
4) Use the *Up/Down Arrow* buttons to select "Storage Type=MIDI SYS-EX."
5) Press *Enter•Save*.
6) Use the *Up/Down Arrow* buttons to select "Operation=SAVE ALL SEQUENCES." This command transmits the entire contents of the sequencer memory as a system exclusive message. The dump contains data for the complete set of 70 sequence locations and 30 song locations.
7) Press *Enter•Save*. The display will read "Please wait ... sending data" while the sounds are being transmitted.

Receiving MIDI Sys-EX Data on the KS–32

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 (*System•MIDI, Screen 8*, System Excl=ON).

Memory Card Storage

The KS–32 and SQ family use credit card-type memory cards for sound and sequence storage. Only ENSONIQ SC series memory cards, or cards approved by ENSONIQ, can be used with the KS–32. Similar memory cards sold for use with other manufacturer's products may be incompatible with the KS–32, and may cause damage to the card or to the KS–32 itself.

"WARNING! Battery low. See manual."
If this message appears when a RAM card is inserted into the card slot, it means that the battery in the card is getting low and should be replaced as soon as possible. To replace the battery, see below. Also, if you replace the battery *while the card is plugged into the KS–32, with the KS–32 power on*, you will not lose the data stored on the card. This will not harm the card or the KS–32. (Make sure, though, that you do not turn off the KS–32's power while the card is installed with the battery removed, or any data on the card *will* be lost.)

Installing the Battery in a RAM Card
To maximize battery life, MC-32 RAM Cards are shipped with the battery not installed. Before using these cards, you must first install the battery, following the instructions below.

1. Using the supplied screwdriver, loosen the battery-drawer screw. Do not try to remove the screw; it remains attached to the battery drawer.

2. Pull gently on the plastic tab at the top of the card to open the battery drawer to the position shown at the far right. (Do not try to pull it out any further.)

2. Insert the Battery in the Battery Drawer with the flat (+) side of the battery facing up.

3. Slide the the battery drawer closed.

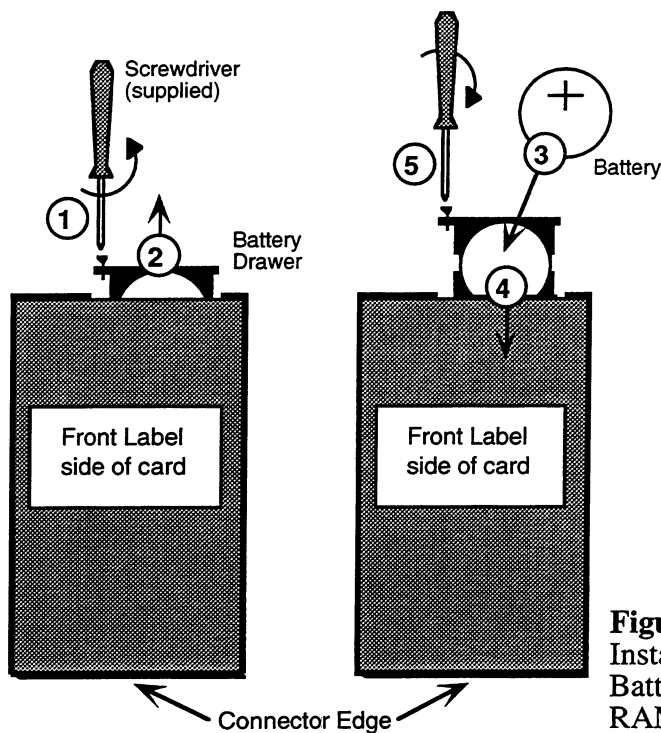4. Retighten the battery drawer screw to lock the battery drawer closed.

Figure 14 – Installing the Battery in a RAM Card