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# Music Technologies Group

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## Yamaha DX7 SuperMAX+ Installation Guide

Installation Guide Version 2.20  
November 2018

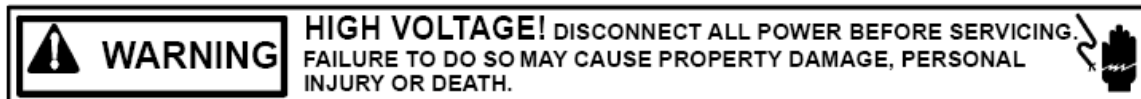
### 1: Introduction

The SuperMAX+ is a very powerful do-it-yourself option that provides increased memory and greater control of the DX7.

While the installation is fairly simple, it still requires patience and general electronics knowledge. We accept no responsibility for the work you perform on your DX7. Read over the following installation description and if you feel you are not capable of the work required, turn the project over to a qualified technician.

**All Lithium battery repairs must be done by a qualified technician due to the explosive nature of the CR2032 battery.**

### Precautions!



#### **High Voltage Safety Warning**

Turn the DX7 power switch OFF and disconnect the AC power cable before opening the DX7.

#### **ESD Precautions and Proper Handling Procedures**

You should observe standard static-safe handling behavior when working with sensitive electronic equipment such as synthesizers:

- Avoid carpets in cool, dry areas.
- Dissipate static electricity before handling any system components by touching a grounded metal object.
- If possible, use anti-static devices, such as wrist straps and floor mats.
- Take care when installing the board. A damaged pin can render the board unusable.
- Prevent damage to the connectors by aligning connector pins before you apply pressure. A damaged pin can render the board unusable and can cause damage to system components at power-on.
- If disconnecting a cable, always pull on the cable connector, not on the cable itself.

## Tools Required (SuperMAX installation NOT including battery holder)

- Standard flat-head screwdriver (small).
- Standard Philips screwdriver.

## Condition of DX7

While the SuperMAX+ will replace the functionality of damaged or missing EPROM and/or SRAM chips, it will not correct other problems your vintage synthesizer may have. It is recommended that the synth be in otherwise good condition before beginning the installation. For instance, the battery voltage should be checked and the battery replaced/repaired by a tech if necessary. Sockets for the EPROM and SRAM chips should be in good working order and not be dirty, oxidized, rusted or otherwise compromised. If repair is required, do it before installing SuperMAX+.

## 2: Installation

🔒 **Back up your patches if they are important to you!**

### Open the DX7

Using a Philips head screwdriver, **remove the 5 screws from the front panel**. Two are located on the left front. Two are located on the right front. A final one is located on the right rear. Set the screws aside, noting that the rear panel one is the shortest.



## (Re)Move the Keybed & Remove the Keyboard Rail

It can be difficult to see the delicate pins when installing the SuperMAX+ board. By moving the keybed (the chassis with the keys) and removing the silver keyboard rail, you will have better sight lines and freedom of movement when installing the SuperMAX+ board.

**Remove the 4 large external screws from the underside of the keyboard** along the front edge. The photo below shows the inside front edge of the empty case bottom. The photo illustrates the location of the 4 screws. You will, of course, be unscrewing from the underside.

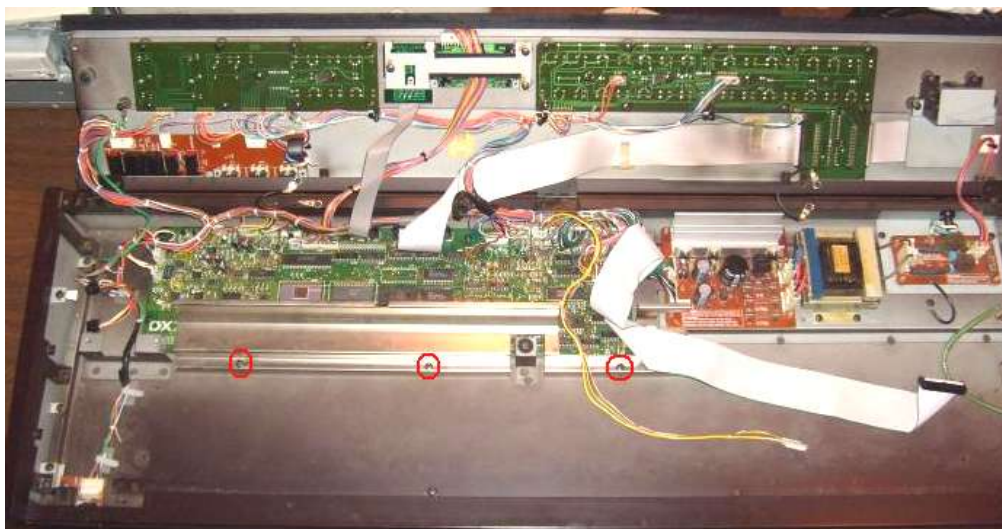


**Loosen the 3 internal screws at the extreme right and left ends that hold the keybed in place.** It is not necessary to extract them from the holes they reside in.

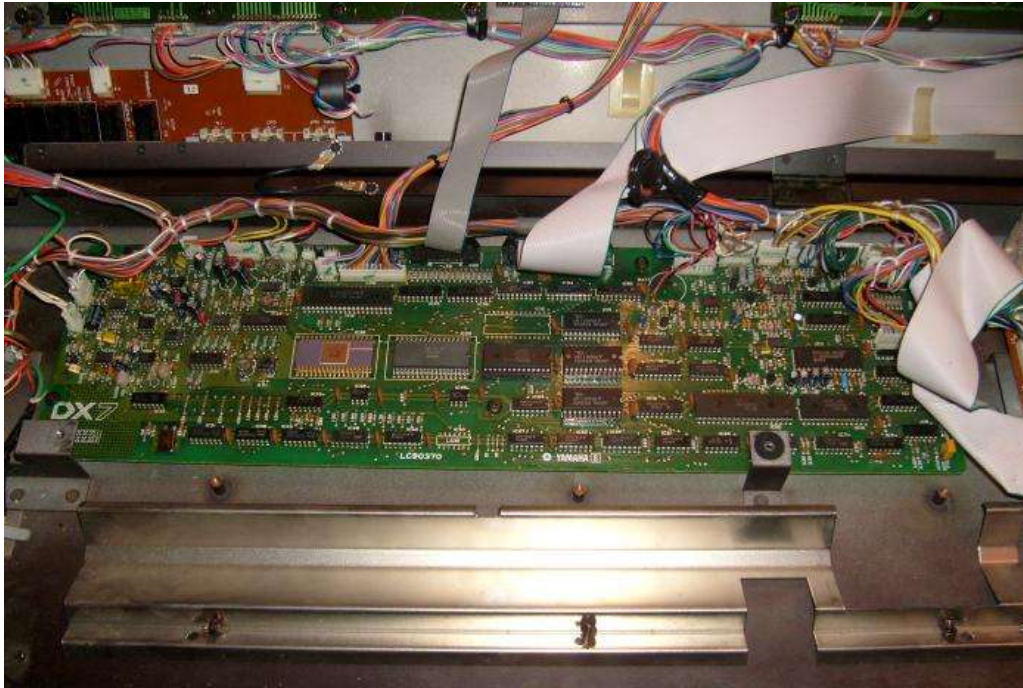


**Carefully lift the keybed slightly up and out (toward yourself) an inch or so.** You don't need to move it much. You will probably need to free up one or more cables to accomplish it. Or if you prefer, disconnect the cables and completely remove the keybed.

This will give you access to the 3 screws holding the silver keyboard rail in place. **Remove those three screws and set aside the silver keyboard rail.** (Shown below with keybed removed).



You now have excellent access to the DX7 main board. If you do remove the keybed you may find it easier to remove the small yellow cable and large flat grayish cable at the main-board-end rather than from the keybed. You will also need to unclip two small cables on the left end. There may also be wire ties and/or cable fasteners to deal with.

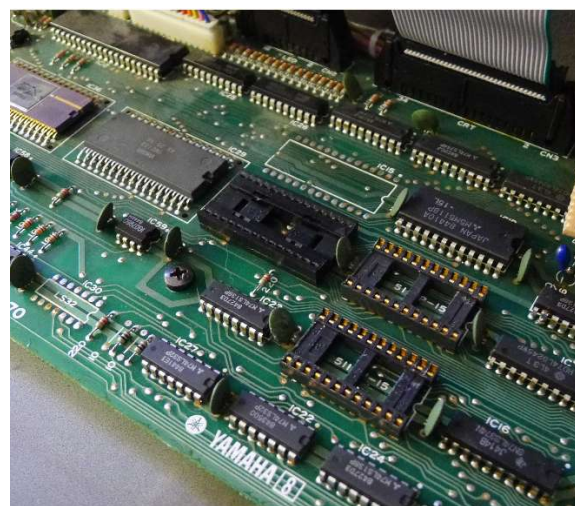


### Remove the EPROM and SRAM ICs

The next step is to **remove the EPROM and two SRAM ICs**. Follow the instructions on the next page.



Memory chips in place



Memory chips removed

The EPROM is found in location IC14 and the two M5M5118P SRAM chips are located at IC21<sup>1</sup> and IC20.

Remove them by prying slowly at each end of the chip back-and-forth with a small flat-head screwdriver. Avoid touching any of the metal pins with the screwdriver. Also be careful of the capacitors nearby (these are the flat green discs in the photos).

Place the chips safely aside on anti-static foam. You can use the reverse side of the foam shipped with the SuperMAX+.

After removing the chips, also **remove the screw shown at the center of this photos near IC23.**



## Install the SuperMAX+ Board

Hand-tighten the supplied nylon standoff into the screw position near IC23. Tighten it well by hand, but there is generally no need to use a tool. Do not over tighten or strip the threads.

Next, CAREFULLY remove the SuperMAX+ board from its anti-static packaging. Inspect the bottom of the board to make sure none of the pins have been damaged or have any debris on them.

☞ Identify your SuperMAX+ board version.

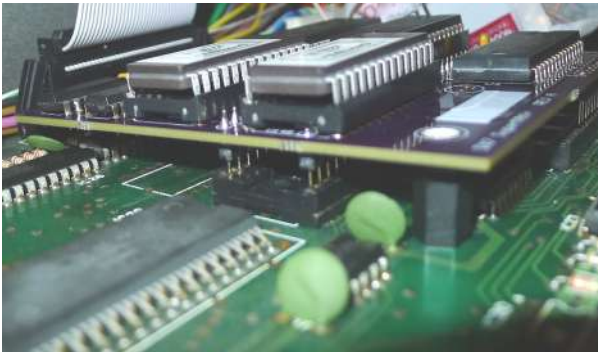
**Rev A:** You should see one collection of 28 pins (2 parallel strips of 14 pins), one collection of 24 pins (2 parallel strips of 12 pins) and a strip of 8 pins. The photos on the next page show the Rev A boards

**Rev B:** You should see one collection of 28 pins (2 parallel strips of 14 pins), and two strips of 8 pins.

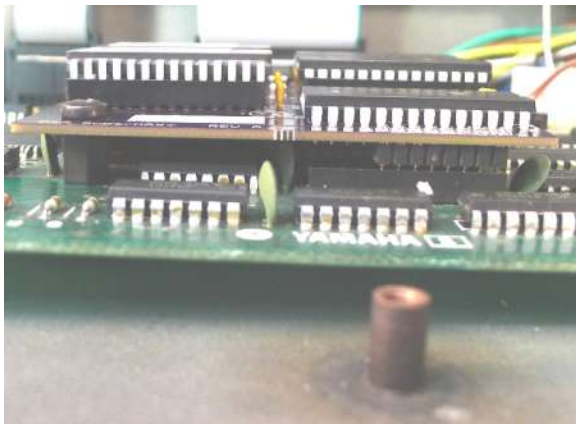


<sup>1</sup> Some models of DX7 utilize a second EPROM at position IC15. You will need to perform a factory modification before proceeding. These are very rare.

Place the SuperMAX+ board gently on the DX7 main board so that the 28 pins that form a DIP package align with the vacated IC14 spot. The 8 pins along the edge should align with IC20. Do not press the board in place yet. You can use a small mirror to check the pin alignment.



Once you are happy that all the pins are aligning with the desired locations, firmly and evenly press the SuperMAX+ board in place. Make a visual check to see that the board is flush with the sockets. **For Rev B it is recommended to press on the two white rectangles.**



Using a screwdriver, carefully tighten the original main board screw through the SuperMAX+ board into the nylon standoff. **Do NOT force it or over tighten as this can not only strip the standoff, but it can cause the SuperMAX+ board to torque and change position. It should be tight enough so that it cannot work loose.** Double check the pins.

## Reassembly

Carefully reassemble the DX7 in the reverse order, taking care to replace the correct screws in the various locations. If you disconnected the green keyed ground strap wire don't forget to screw it back in.

**When you reinstall the silver metal keyboard rail, make sure it does not contact any SuperMAX+ components or pins.** The silver metal rail should just clear the SuperMAX+ when the rail is tightened in place. The silicon or hot glue seen on the SuperMAX+ board helps keep the board and rail apart somewhat, but check with a mirror and flashlight to be sure.

## Test

The first time you power the DX7 on (and any time you change the battery) you will notice about a 5 second delay before the LCD shows it's initial message. Tense moments indeed.

The LED should display characters such as "--", "C4" and "Su". Eventually you should get the message like:

```
* Welcome to *
* SuperMAX+! *
```

The 2 banks of "factory" patches sounds have been copied to all 16 patch memory banks. Please read the owners manual before reloading your own patches. You can do a quick version check of the board by pressing and holding the front Function button and also pressing and holding buttons 16 and 32. You should see something like the following:

```
MAXsystems v2.20
```

**NOTE:** Rev B also shows the setting of the board mounted **velocity switch** on this screen. It will say "Vel=+0" (normal) or "Vel=+3" (offset applied). The units 0 and 3 are DX7 internal values and have no particular weighting such as MIDI units or dB or anything else. It was chosen so that a typical player can achieve a MIDI Out note-on velocity of 127 using reasonable force.

Consult the online "Yamaha DX7 SuperMAX+ User Guide" for more information on using your upgraded DX7.

**Problems?!** Almost all installation problems are due to poor board seating or connections. Remove the board; check all the pins for debris, contamination, bending, etc. Then reinstall.

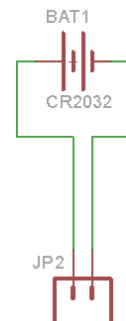
## Battery Holder Option

The information here is deliberately minimal. It is intended that a professional perform the work for the battery modification.

A CR2032 battery holder is supplied in case you would like to have your soldered-in battery **removed** and replaced with a CR2032 coin cell.

*If you prefer to install a pair of AA or AAA batteries, such a holder is available by special request at SuperMAX+ order time.*

**CR2032 lithium batteries are extremely sensitive to heat and shorting and can explode! This operation should be left in the hands of a qualified technician.**



The tech will remove the old battery and run wires from the old battery location to the new one, **making careful note of correct polarity**. It is not unusual, however, to encounter defective diodes and/or open traces. **This work will require the use of a multimeter and soldering iron!**