

How to put ZIF Drives in the Rio Karma

A guide by M0tah

This mod was conceived of because of my want of a DAP with the features of a Karma but with larger storage space. Because of the shortage of Hitachi 1.8" 44-pin drives, I decided to do some research on whether it was possible to use a different type of HDD in the Karma.

I pondered putting Toshiba HDDs with 50-pin connectors (which I think are the same as those used on CF cards) in the Karma, but they were too long. I realized that the only HDDs that had a chance of fitting in the Karma were the newer ZIF drives. But there were no adapters suitable for use in the Karma.

I finally found some [adapters on eBay](#) that fit the bill – they had the right kind of connector to fit directly into the Karma's HDD connector and came with a ZIF cable that was long enough to allow the drive to be put in a different direction than that of the adapter. And the HDDs that could be used with it were in no danger of disappearing any time soon – they were used in the amazingly popular other DAP that we won't mention here.

There are a few modifications you need to do to the Karma in order for it to work in it, but I think that it's worth it if you want a larger Karma. You'll need to modify the ZIF adapter, replace the battery, and dremel the back of the case in order for it to all work.

Parts needed: A ZIF to 44-pin adapter, listed on eBay as a "1.8 toshiba ZIF Hard drive to 2.5 IDE Adapter", and a compatible ZIF HDD, which should be all 1.8 inch, 40-pin ZIF drives. Seagate, Hitachi, Samsung, and Toshiba make what seem to be compatible drives, but I have only tested it with a Toshiba ZIF drive.

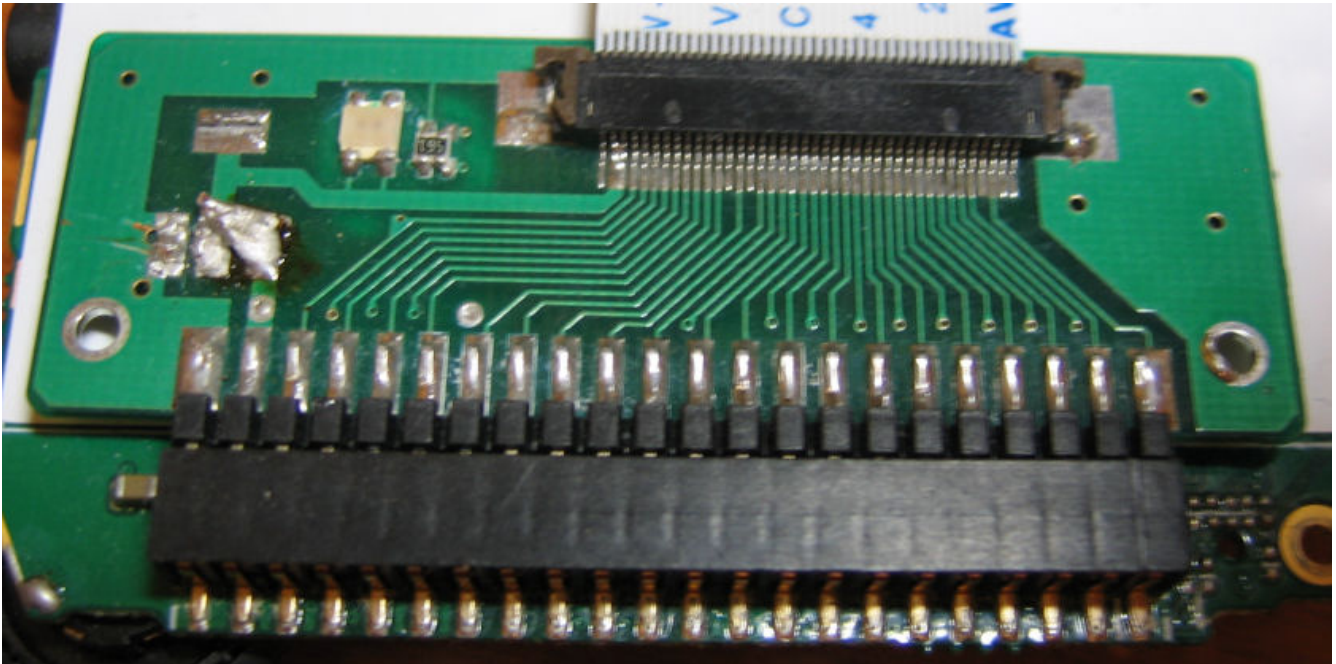
Equipment needed: soldering iron, cutting implement, dremeling tool, and screwdriver(s).

Modifying the ZIF adapter

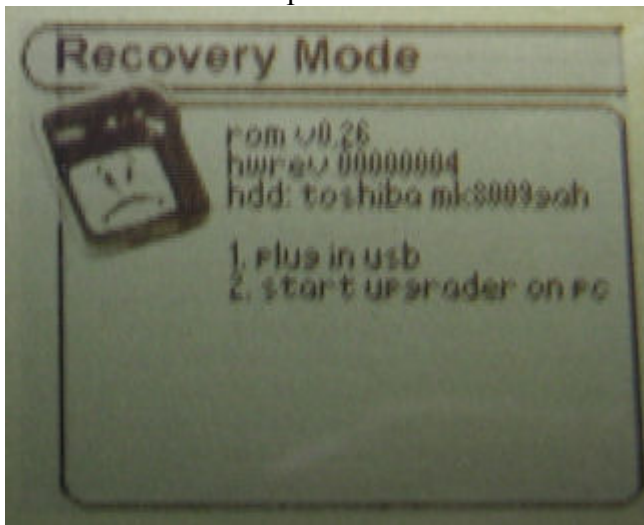
Because the ZIF adapter has a [3.3v regulator](#) to step down the 5v it expects to receive to 3.3v, you will need to bypass it. Otherwise the voltage delivered to the ZIF drive will be less than 3.3v and the drive will not work. The regulator is located on the left of the adapter and has "AMS1117" printed on it.

1. Remove the regulator by desoldering it or by simply cutting the leads.
2. Bridge the two pads on the bottom middle/right of where the regulator used to be (looking at the board in the same direction as the writing on the regulator). This will directly connect the output from the Karma to the HDD.
3. Make sure that the third pad on the left is not bridged; this is negative and the other two are positive.
4. Hook the ZIF drive up to the adapter, plug it into the mainboard, and boot up your Karma in recovery mode (hold the menu button and then press the power button). You should see a screen like that below, with the model of the HDD you are using in place of "toshiba mk8009gah."

- (optional) Also desolder the LED (located diagonally up and right of the regulator), which lights up when it receives power. Doing this will increase the battery life of the Karma, but probably not by much. (Note: I have not tested doing this.)



The modified ZIF adapter.



The recovery mode screen.

The battery

The replacement battery will need to have dimensions of 66x35x5 mm (LxWxH), although the length of the battery can change a bit. I used a Tenery brand battery purchased from www.all-battery.com with a capacity of 1300 mAh, however, I recommend using a battery that already has a protection circuit board attached to it, such as a battery for a Sony Clie NX70VL, which has the same dimensions (found thanks to [this post](#) on the old Rionvolution). If you decide to use a battery that already has a protection board, you can simply solder it to the power daughterboard in place of the old battery.

However, if the battery you get does not have a protection board, you'll have to use the board off of the old battery pack. To do so,

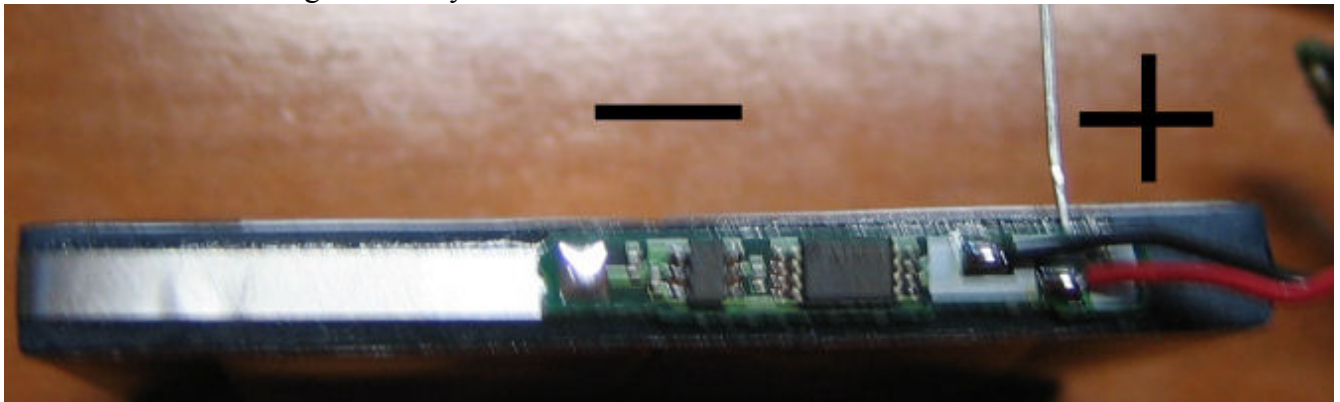
1. Remove the plastic covering of the battery pack.
2. You should see a PCB glued to the side of the battery cells. Start pulling it off, and when there is enough clearance, cut the plastic holding it in place. The plastic should also contain leads to the two li-ion cells.
3. Once you have cut the PCB free, it is a matter of removing the remainder of the leads to the PCB. You should be able to remove most of the leads around where they are connected to the PCB, however, you don't need to completely remove them.
4. Desolder the small metal plates from the pads. Each plate is soldered to two pads on the PCB. Luckily, the battery cells only need to be soldered to one of each pair of pads, as they are connected internally. The negative and positive pads are in the same order as the output to the power daughterboard from the PCB.
5. Make sure not to touch the leads of the battery together, shorting the battery. This can be dangerous.



A view of the original battery without its cover.



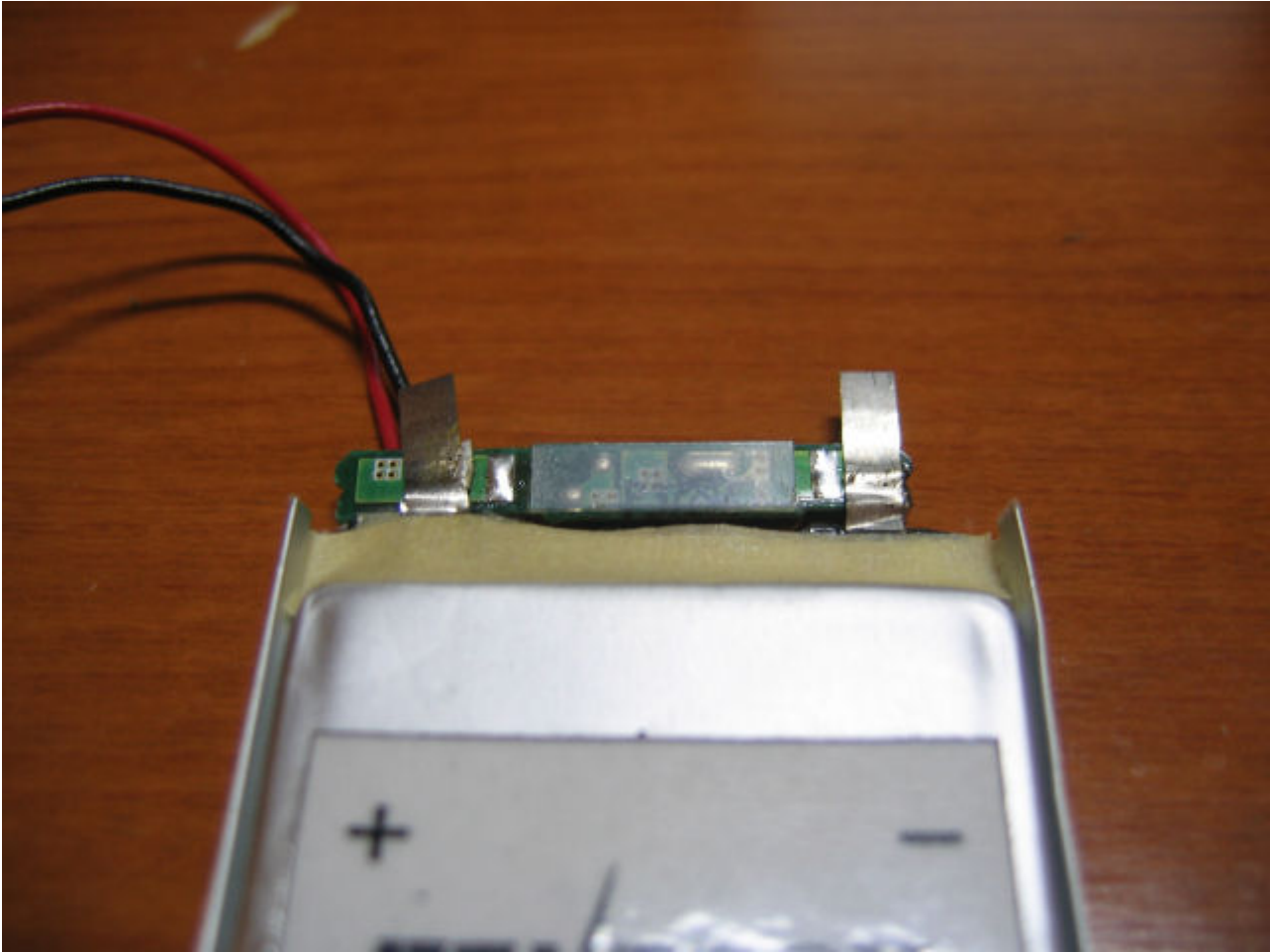
Another view of the original battery.



The polarity of the battery protection board.



The metal plates soldered to the input pads on the protection board.



A close up of the attached battery protection board.

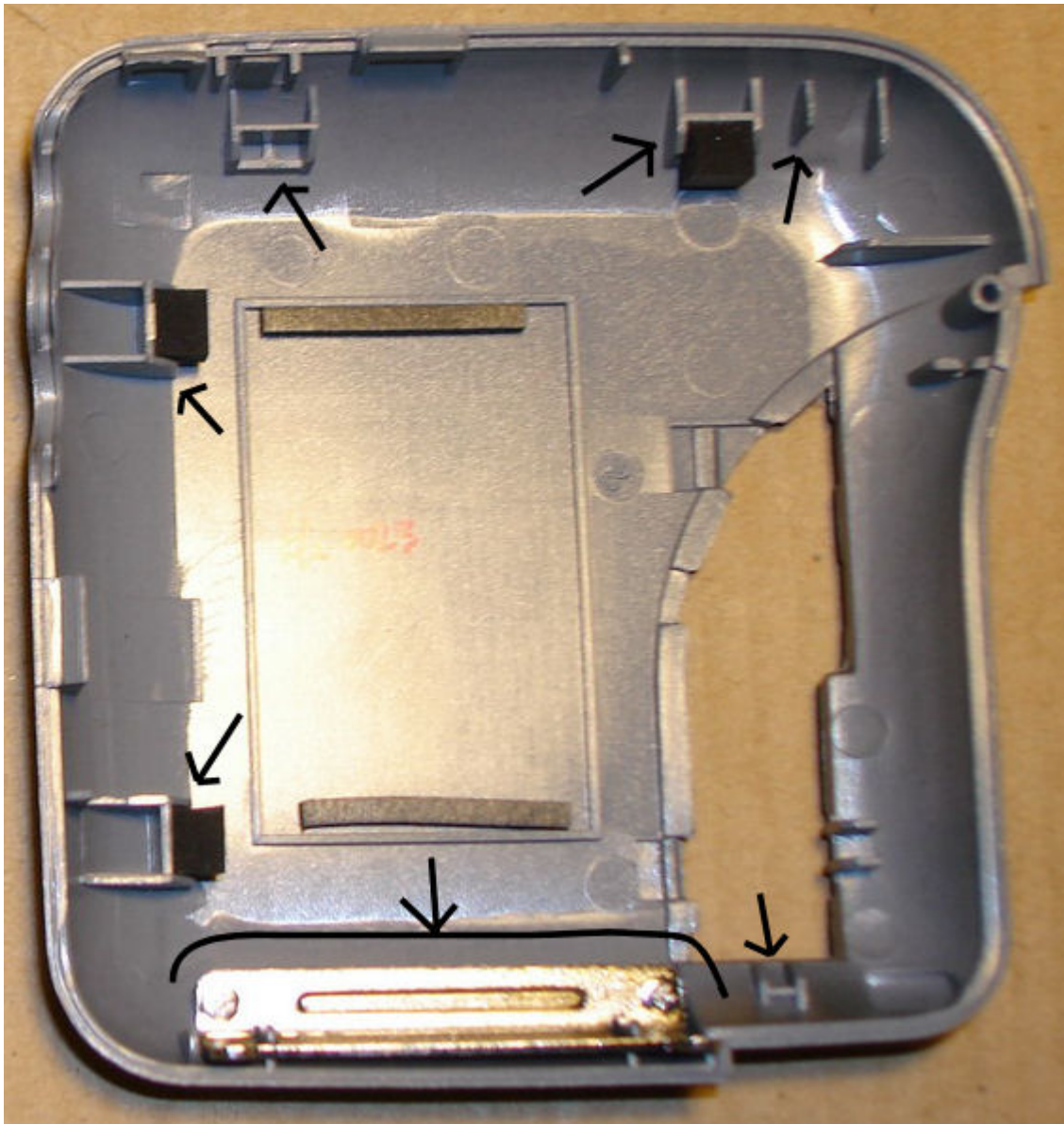


The finished battery/power module.

The case

Since the HDD will be residing in the back of the case instead of against the mainboard as it typically is, you will need to dremel the back of the case a bit in order to make it fit.

Get rid of all of the nubs that held the battery in place and also get rid of the plastic that held the metal piece. Finally, dremel the plastic sticking up in the bottom right of the back and the small bit sticking up next to the upper right nub. The HDD should go in the back so that the curved part of the HDD case below the disks is at the bottom.



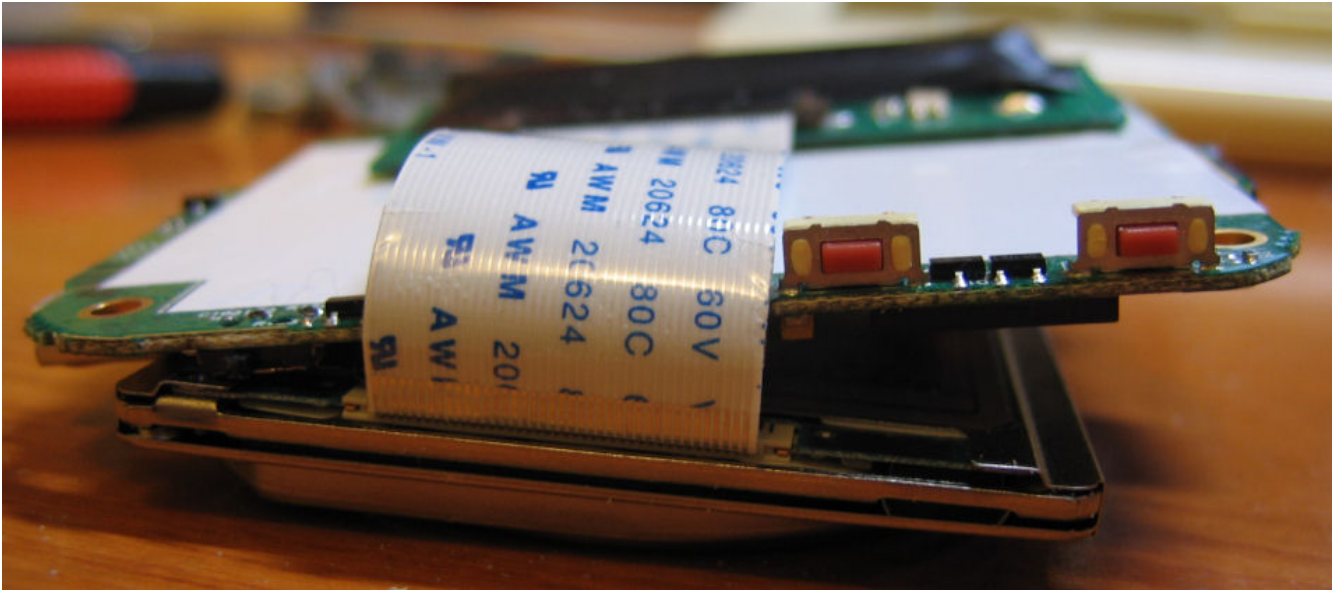
What you need to get rid of on the back of the case. (Picture courtesy of [Karma Limbo](#))

Putting it all together

It's probably easiest to connect everything up and then position it in the Karma. You should also put electrical tape over the adapter board and the battery protection board so the pins don't have a chance to be shorted. I connected everything up, put the mainboard in the front of the case, and then taped the temperature sensor to the side of the battery, which should be positioned next to the adapter – there's just enough room for it. In order for the ZIF drive to fit in the case, the ZIF cable needs to be bent where it connects to the HDD. This will allow the drive to sink down into the back of the case and give the cable enough slack to fold.

Because of the absence of the HDD in the back of the mainboard, you'll need to figure out a way to secure the LCD in place. I used one screw near the back of the battery (bottom right screw hole,

looking at the LCD so you could read it if it was turned on), which was enough to hold it. Once you have assembled the front of the Karma, put it together by hooking the left side of the Karma together and hinging the case shut. You may need to reposition the HDD while doing this to ensure a good fit. It should be pretty tight, and you'll probably need to apply some pressure to get it to close, assuming you're using a Toshiba 7mm high ZIF drive. Assemble it the rest of the way, following the [excellent instructions](#) over at Karma Limbo.



The bent ZIF cable.



The arrangement of components in the case.

The result

So far my Karma hasn't had any problems, but I've only used it like this for about a week. The battery life is over six hours when playing FLAC files, which is fine for my needs. One annoying thing this has caused is the external buttons on the upper left of the case not contacting the internal buttons. I need to press down on the case there for them to work, but I think this is because of the stripped screw holes that hold the mainboard in place, so there shouldn't be any problems if the case you use isn't messed up.

One other good thing that has happened as a result of this mod is the absence of HDD noise in the headphone output.



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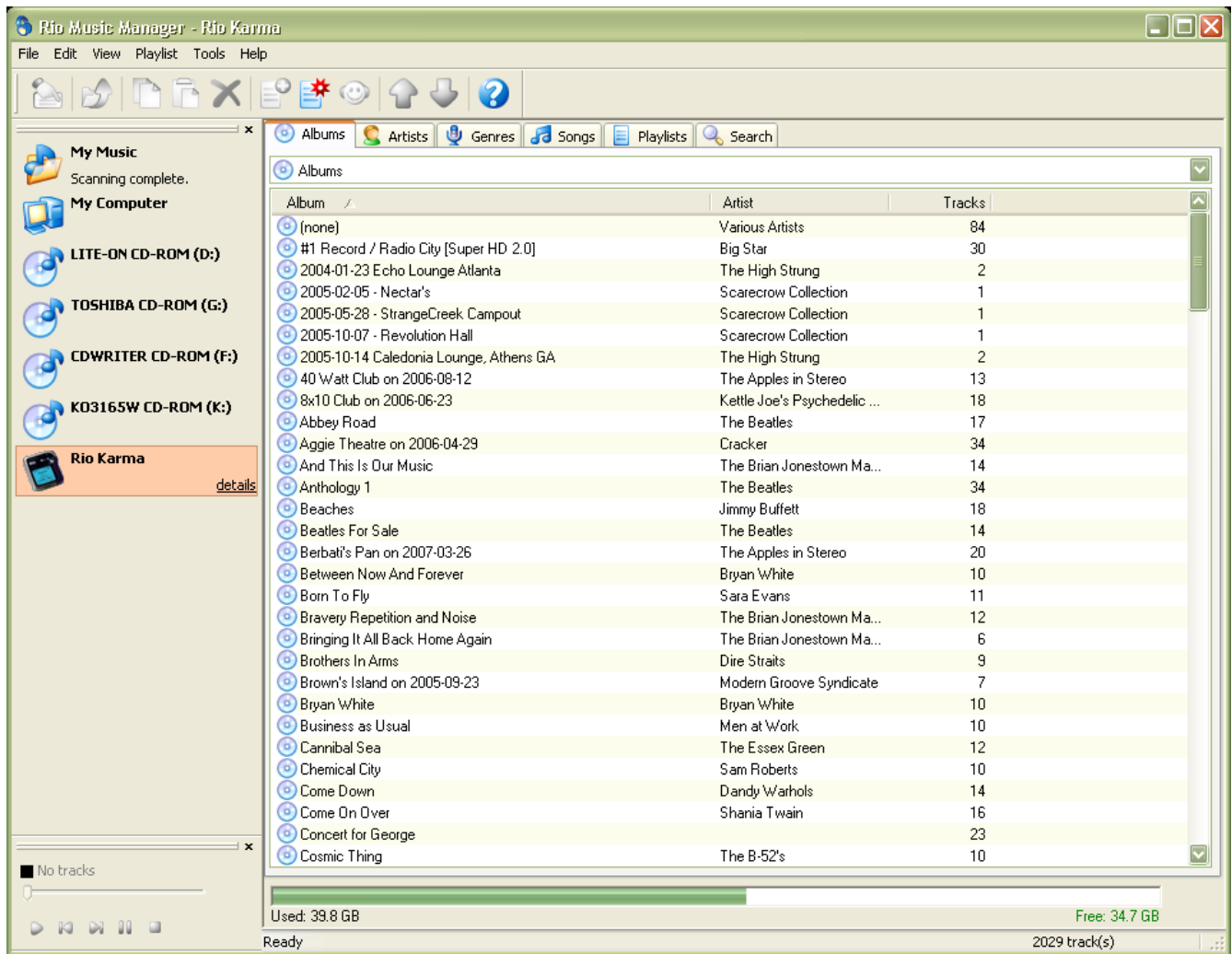
Riō Karma

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11 Tracks on player
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Well, that's it. I hope that you've found this guide to be helpful. Happy modding! 😊