

Greening the CD63

by Bob Noriega February 1995

The Marantz CD63 CD player is a good buy right out of the box, but with just a little work it can and will be a world-beater. All it takes is a handful of parts, and a willingness to void warranties. My CD63 is happily the center of my sound system. What these changes will gain you is the cleanest most dynamic sound , with the most palpable image and the best balance top to bottom you are likely to hear anywhere. Most people who hear my system comment on how clean the sound is.

The changes are to power supply filtering, opamps, some resistor changes or removal, power and ground jumpering, and added coax cables where needed. To make things easy, I've made up a swap list. This shows each part number and it's new value. I've also divided the list into several sections for those who may want to use their 63 only as a transport, for those who would use it as a player and for those who only want to do the easy changes (although nothing is really very hard to do, skill-wise). Some of you are sure to ask what is the most for least. I would encourage you to do all, or as much as you can (see number 9 below). I'll try to explain how each change affects the sound of the CD63.

The sound of the changes goes something like this:

1. Jumpering out all the safety resistors (fusible resistors) located in the power supply lines. In some cases replacing them with chokes will have a large effect on transient response. The whole spectrum top to bottom will improve. Veils will fall from between you and the image.
 2. Increased filtering in the power supply will lower the noise floor, and improve dynamics and imaging. Images will appear and not wander.
 3. Replacing the decoupling capacitors at all the ICs with larger values (1000uF typ.), and then adding small .1uF bypass capacitors will greatly improve detail.
 4. Replacing bypass capacitors in the analog section will improve dynamics, and that section's artifacts just about disappear. The interesting note here is that at one point I put in large value capacitors of about 2200uf. Instead of getting better it got dull and lifeless. The magic was gone! I put back the 1000uF capacitors and the magic returned. Too high an ESR, I suppose.
 - 5.Removing the unnecessary 100pF capacitor and 10K resistor at the analog output and lowering the output impedance to 50 ohms total will bring up the high end, make it easier to drive cables, and will increase stage width.
 6. Changing the I/V opamp to an AD827 will get you into the high end.
- Note: I have used the AD827JN since it first came out and I think highly of it, but this project has given me much greater respect for it. If used with a good buffer like the HDAM circuit that's in this player or maybe the Burr-Brown OPA633, it will never be a bottleneck in your system.
7. Changing the capacitors around the DAC will keep sibilances from ever being a problem, as well as making sure that we get all the dynamics the DAC is capable of giving.
 - 8.Removing the 100 ohm resistor and 47pF capacitor from the decoder digital output, and adding a coax to take the signal to the coupling capacitor of the digital output will bring up the rise time and improve imaging. Making a stacked coupling capacitor for the digital output will make sure that fast rise time gets to the output jack. Also, jumpering out the capacitors at the output transformer (making it a DC ground instead of AC) will get the waveform to look a lot better. I used a Tektronics 485 and test CD to check this out.
 9. Replacing the ribbon cable with coax from the RF Amp PC board to the main PCB is one of the biggest changes you can make. (15 separate coaxes) This player will never reach its full potential without this step. Also, the four data lines between the DECODER and the DAC should be replaced by coax. These four lines are easy to find because resistors RD11-14 are in series with them: these resistors are removed. There is one other set of coaxes to go in. They are between the DAC, DECODER, CPU, and SERVO IC. They carry the data and clock signals. If I were forced to make only one change to this player , it would be to put all the coax into it.
 10. Right along with the coax is the replacement of two resistors that supply power to the RF amp and the equalization circuits. The first is a 330 ohm that supplies the RF amp PCB: it is replaced with a choke and capacitor. This is a new capacitor that we add in. The second is a 100 ohm that supplies the equalization circuit, also replaced with a choke and a larger value of C504. These two changes will drop a big veil.

I want to say at this point that this player has the least color of any (stock) machine I've ever modified. What it does have are many veils. We will be removing those veils as we make the changes. A camera lens coming into focus would be the best way to describe the process we'll be going through. You are going to love the picture you'll see when its done!

Whether using the CD63 as a player or transport, the big concern will be to clean up the unregulated ±12V supply to the opamps in the servo circuits. I used large value capacitors and chokes to do this. This will keep noise in as well as keep noise out.

Something to keep in mind throughout this project is that the HF signal (eye-pattern) from the RF amp is ANALOG! It doesn't become digital 'til it gets to the decoder IC. Even the servo loops act more like analog than digital, even though they operate at TTL levels. So by cleaning up the grounds, improving the power supply and using coax, you might see why there are such big gains in sound quality.

To start off, we'll make the changes to the front end of the CD63 that will help it to be a better transport.

PLEASE NOTE: That wherever a choke is used, that choke should have a DC resistance of NOT MORE THAN 2 OR 3 OHMS. If chokes are not available then a jumper may be used instead. In my machine, I started with jumpers and then went to chokes. Chokes bring out more detail from the background and achieve a lower noise floor more than jumpers alone.

RESISTOR FOR RF AMP PCB POWER:

R107 CHOKE, ALSO A 1000uF/16 CAP IS ADDED TO THE OUTPUT SIDE OF THIS RESISTOR. THAT'S THE RF AMP SIDE.

RESISTORS IN THE SERVO CIRCUITS:

Note: These may all be replaced with jumpers.

R122, R123, R127, R128, R149, R150, R164, R165: CHOKE

RESISTOR FOR LASER ON:

R136 JUMPER

RESISTORS FOR DECODER:

R508, R511: CHOKE

RESISTOR FOR EQ. CIRCUIT:

R505: CHOKE

RESISTOR FOR THE CPU:

RF01, this resistor should not be replaced unless it is with a choke: the CPU is really noisy.

CAPACITORS FOR THE MAIN POWER SUPPLY:

C803, C804, C805: 4700/35

C806: 4700/16

CAPACITORS FOR THE SERVO CIRCUITS:

C120, C121, C135, C138, C146, C148, C153, C154: 1000/16

CAPACITOR FOR THE VREF.:

C124 1000/16

CAPACITORS FOR THE DECODER:

C510, C511: 1000/16

CAPACITOR ON THE RF AMP PCB:

C106: replace by a TANTALUM cap.

CAPACITORS IN THE EQ. CIRCUITS:

C504: 1000/16

C505: replace by a FILM cap.

DECODER DIGITAL OUTPUT:

C514: REMOVED

R514: REPLACED WITH COAX TO DIGITAL OUTPUT COUPLING CAP.

CT01 Becomes a stacked capacitor made up of a 10uF tantalum, 1uF film, .1uF film and a .01uF film. One side of this capacitor receives the end of the coax coming from R514 (or pin-2 of the decoder).

CT02 JUMPER

CT03 JUMPER

CT04 JUMPER

RESISTORS FOR THE DAC:

RD01, RD04: JUMPER

RESISTORS FOR THE OP AMPS:

R613, R614, R615, R616: JUMPER

RESISTORS FOR THE HDAM CIRCUITS:

R651, R652, R653, R654: JUMPER

RESISTORS IN THE OUTPUT:

R655, R656: REMOVED

R657, R658, R659, R660: REDUCED TO 20 OHMS

CAPACITORS FOR THE DAC:

CD04, CD07, CD15, CD16 1000uF/16

CAPACITORS FOR THE OPAMPS:

C611, C612, C613, C614: 1000uF/16

CAPACITORS FOR THE HDAM:

C651, C652, C653, C654: 1000uF/16

OUTPUT SECTION:

C659, C660: REMOVED

OUTPUT COUPLING CAPACITORS:

C656-C658 and C655-C657 should be PARALLELED with a 1uF, 47nF pair.

POWER AND GROUND :

By jumpering, I mean that we put a piece of wire in parallel across each place where there is a power or ground jumper on the top side of the PCB. They all go in on the bottom side of the board. These are identified on the PC board with "U" numbers. I was going to make a list as I've done for the resistors and capacitors, but I found myself listing every one of them. So just go ahead and do as many as you can in all the areas that you'll be using in your CD63. 18 or 20ga wire will work. Larger gage wire is hard to work with in short lengths. By doing this you will lower the impedance of the power supply, and again the noise floor will go down. The lower the noise floor the more detail you will hear.

Take your time and study the bottom of the PC board, and you'll begin to see the patterns for each of the different circuits.

COAXES.

NOTE: FOR ALL COAX CABLES I USED RG196. ITS SMALL IN DIA., ONLY ABOUT .080, AND IT WILL NOT MELT.

I used a DMM (digital multi-meter) to trace out each net before and after I did the work. Check, to make sure the net is reconnected properly. Work slowly, work carefully.

In all cases I made up all my cables beforehand. Lay your cables down on the board so you can see how it will look, and choose your ground points.

I think one of the reasons coax works so well in this player (or any player) is because grounds between IC's are moved closer together. As you go through and add the coaxes in you will have a lot of unused traces. It would be a good idea to ground as many of these as possible.

This will help to hold down crosstalk.

Digital output:

The first coax to do is the digital output (if you haven't done it already).

This is easy to do if you remove R514 and use the hole that goes to pin 2 of the decoder to solder one end down. Scrape the solder mask from the ground plane near the hole to solder the coax ground to. The other end goes to one end of the stacked capacitor CT01. Again, scrape the solder mask near the capacitor. Solder one lead of the capacitor to the board (in its normal place) and leave the other in the air, cut its lead short and solder the coax to it. Solder the ground to the ground plane.

Decoder to DAC:

These four are probably the most significant changes to be made on the main board. They call for the cutting of three traces at both Decoder and DAC. Resistors RD11-RD14 are on these lines, and they are removed. Also jumper U193 must be removed. The connections to make are:

Decoder to DAC

Q503 pin 13 to QD01 pin 4.

Q503 pin 19 to QD01 pin 10.

Q503 pin 20 to QD01 pin 8.

Q503 pin 21 to QD01 pin 9.

The first of these is easy because RD14 and U193 leave us perfect places to connect to. The next three must be done with care so as not to mix up the signals. Soldering to surface mount ICs can be scary, but if you strip the center conductor back only about 1/16" and tin it, then set it on top of the pin and heat it with your iron, the solder will flow and you won't make a short. Bring out a ground wire to the nearest ground.

DECODER MOTOR OUTPUT:

This is one change I didn't think to do at first but since it's right next to Q503 pin 21(SCLK signal), I thought it wouldn't hurt. I just don't like the idea of the motor signal and clock signal right next to each other. Both are TTL level signals.

The connection is from Q503 pin 22 to the node of R153,154,155.

This is easier then it may sound because one end of jumper U180 is at the resistor node. Remove jumper U180 and connect one end of the coax to the resistor node, and at the other end you cut the trace from Q503 pin 22 and solder the coax to it. This connection is easy because its a corner pin.

CLOCK and DATA SIGNALS:

These were the first coaxes I put in my CD63. I hoped they would help. What I got about knocked my socks off. The sound improved so much it gave me a better idea of where this machine could go with just a little more work. Large veils dropped along with a lot of fuzz around images.

The nets for these changes are:

Q104 pin27- Q503 pin 30- QF01 pin 9 - QD01 pin 11.

The second net is:

Q104 pin 26 - Q503 pin 31 - QF01 pin 10 - QD01 pin 12.

Since we're going to daisy-chain four places together we'll need three coaxes (four ends). The two center points will have two center conductors twisted together. If you solder their braids together and their center conductors together also, it makes it easy to get it into the hole in the PC board.

If you look at the PC board you will see how the job of putting these coaxes in is made easier by the fact that there are jumpers to help us just where we need them. For the first net we have jumpers U171, U188, U132. For the second net they are U172, U189, U131.

We still have to cut traces but this is easy. Cut the two traces where they go by U187, and where they come to U131,U132. Do not cut the on the side that goes to QF01! Then cut the traces at pins 26,27 of Q104. Solder in your coax and its done. Grounds are located near each of these places.

REPLACING THE RIBBON CABLE:

The next modification to do is to replace the ribbon cable from the RF AMP board to the main PCB. Remove J102 and J103.

There are fifteen cables in all, but we will treat one of these as special. This one is the HF signal or EYE-PATTERN. Looking at the RF board, you'll see that there is jumper (U100) to help us out. If we remove the jumper we can solder the coax right to where the signal originates.

The other end of the coax will go to the main board HF equalizer circuit (top side of PCB). Unsolder the input end of R501 and pull it out of the PC board. Solder the center conductor of the coax to the resistor and the braid to the ground plane.

The rest (fourteen in all) of the cables go in place, right in order. Two of these are ground so you may even choose to make them a piece of wire instead. Make these cables about a four inch loop. We want to be able to move the transport around if we have to. I grounded the coax at both ends to have a good ground connection between the two boards.

CLOSING NOTES:

I did all these changes in small groups or one component at a time. The nice thing about that is that you get to hear what little changes can do for the sound and also what a change to a particular section or circuit will do for the sound. It won't be long before you'll be reading reviews in a stereo rag and you'll say to yourself, "I know just what that sounds like". Or better still "I know just how to fix that!"

Some of you may still be wondering just how good this CD player will become. The player I retired in favor of the CD63 was the sixth player that I've modified (used as transport only) and I also retired a DAC that up to now I had been in love with. I never thought I ever would have canned that combination. The player went after only a few mods were in the 63. The CD63 just leap-frogged right over it in sound quality.

The DAC lasted a little longer, only because I had no intention of using the CD63 as a player. The DAC was a player when I bought it. It was only after a friend asked me to see how good the analog section was that I even listened to it. He wanted to use it as a player.

Our first listening session told us that the sound of the stock CD63 was good, but not great. Then I changed the opamps and it got better. Next I took out the resistors in the power supply lines and put in jumpers. It got better! Then the capacitors went in for the opamps. After a couple of days I began to notice that there was an excess of sibilance. I had a hunch that it was the DAC this time, so I changed the capacitors at the DAC, and the problem went away. Dynamics soared and at this point it was as good as the outboard DAC . Next I lowered the output impedance, and stage-width increased. (Note: at one point I took the output impedance too low and it began to oscillate) Now it was better then the outboard DAC (BOO-HOO) and I still had more to do.

Removing the unnecessary resistor and capacitor at the output made me put the DAC away in the spare room and not look back. At this time I had not even put in the power and ground jumpers! How the DAC in this machine can do so much I have no idea, but I hope it never goes away.

Don't be surprised if you find out you need to upgrade the rest of your system or at least part of it. I put a second Classe' 10 power amp into my system. My Maggies are already modified (impedance compensation) but I did retune my sub-woofers. Somehow I had more bass then I needed. Hmm. Someone is going to ask," What if I buy or have bought a CD63SE?" Well, I listened to the SE before I bought my 63. All I can tell you is that all this still applies. You won't be sorry if you modify your SE. Good luck and good listening!