

SHIGA CD TRANSPORT 2012

User manual

Revision_1.6 2013-24-02

Recent updates:

24/02/2013 add a short [note](#) regarding mods from 05/11/2012 and [instructions](#) about removing the LCD and backlight foil protection

14/02/2013: add [description](#) for V1, V2, V3 & V4

05/11/2012: add some mods to [adjust the contrast](#) of the LCD display.

18/11/2012: add some [comments & photos](#) about optional components or configurations; also add few instructions about connecting [shield wire](#) of the power transformer and replaced the footnotes links with hyperlinks.

19/11/2012: add [instructions](#) about removing the laser protection and information about optimal digital cable length.

12/12/2012: add detailed [picture & information](#) about oscillators implementation.

Summary

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Introduction

Shiga CD Transport is a project developed by [diyAudio](#) community and designed as DIY kit by **vicolaudio**. The kit contains 3 boards ("main", "+8v power supply" and "LCD & command"), the Sanyo CD mechanic and a custom 25VA transformer.

The **Shiga CD Transport** kit is available on [vicolaudio](#) and is shipped mounted and tested. A limited special offer for **diyAudio** members includes two options: "DIY kit" or "Full kit" and a detailed [bill of materials](#) is available.

This user manual apply to **Shiga CD Transport** 2012 version.

For additional technical documentation please visit our website at www.vicol-audio.ro/shiga.php. Alternatively, you can email us at office@vicol-audio.ro or keep close to **diyAudio** forum discussions.

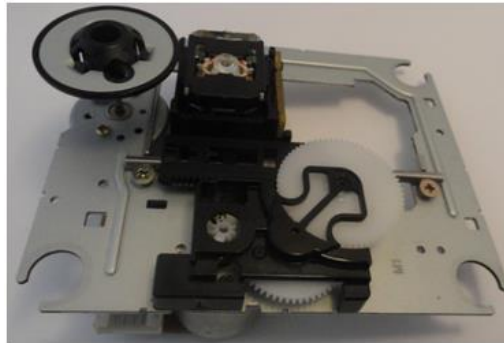
Application

Any stand alone CD player comprises a transport (that read data off CD and transmits data to external source) and a digital to analog converter or DAC (that convert data into analog signal). Using these parts separately involve several advantages:

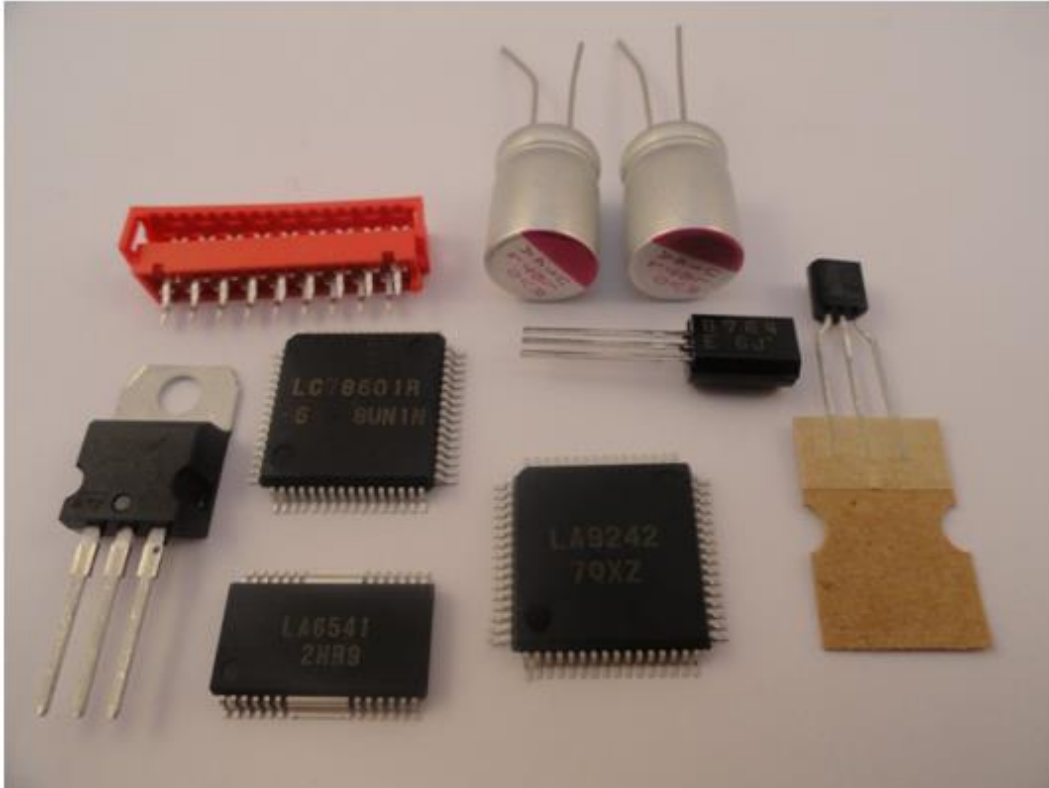
- considering that each transport or DAC has its own specific sound, use separate offers more freedom in choosing your system components;
- keeping power supplies separately help preventing interference, and thus a better sound;
- isolation of the mechanical parts from the electronics also contributes to the sound quality.

Components that we use

The **Shiga CD Transport** is built around the very robust SFP101N16P Sanyo cd mechanism, used by already familiar Shigaraki Transport.



The chipset family - LA9242, LC78601 and LA6541 - is also Sanyo based...



... and a shielded ultra low noise custom transformer, special designed for this project.



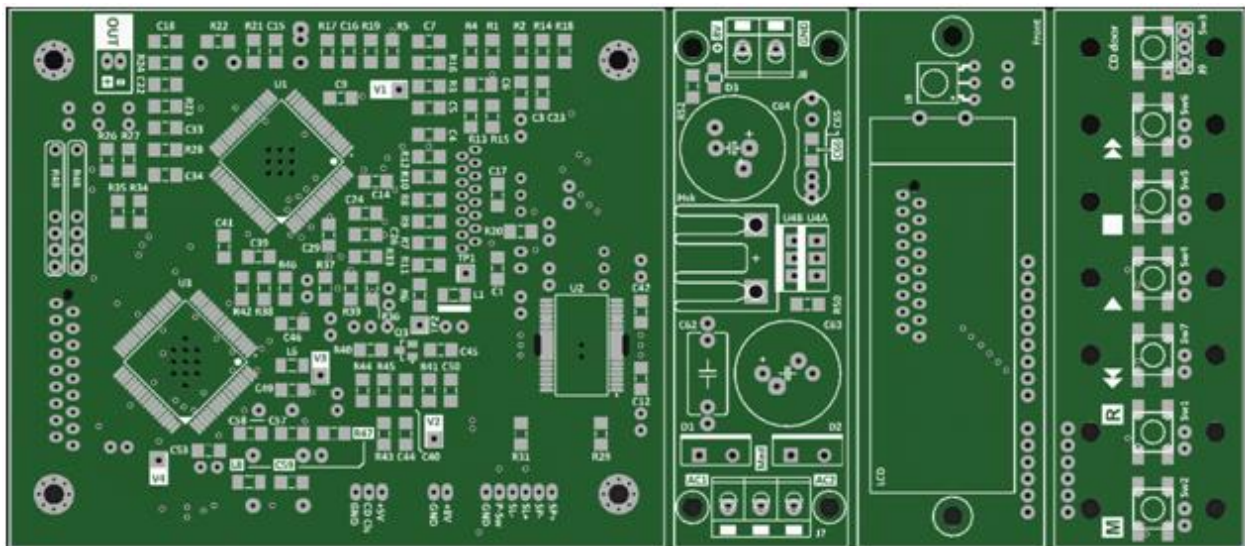
Assembly instructions

The **Shiga CD Transport** has been designed according to a modular structure which includes 3

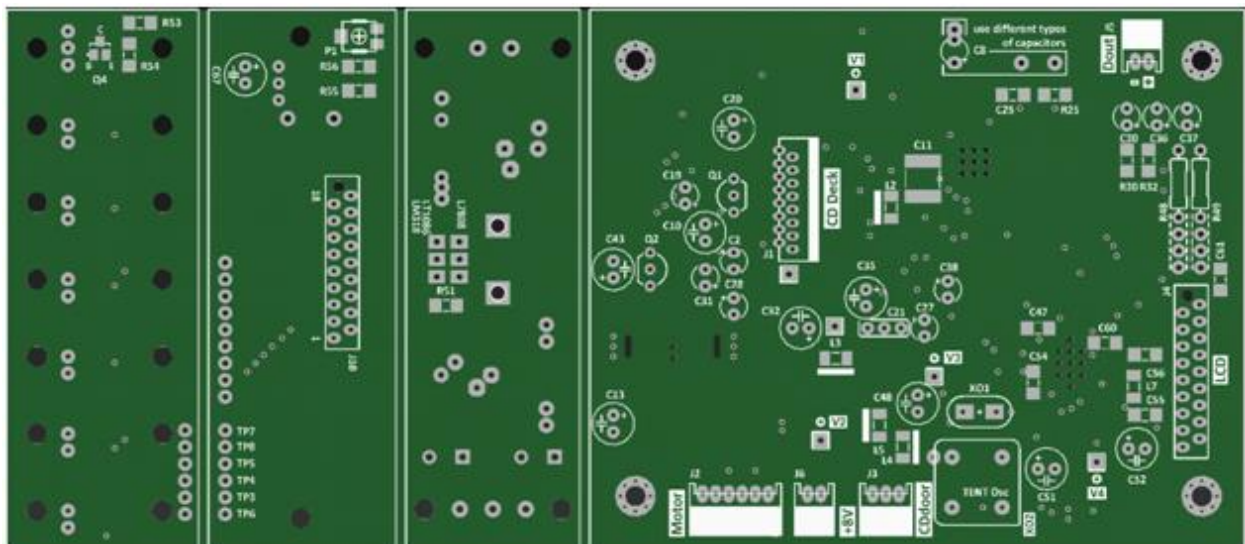
boards made of high quality FR-4 glass epoxy. “LCD & command” is provided as one board, but according to the specific CD transport chassis or layout this board can be split and used as two separated boards without affecting functionality.

Here is the panel board

... on top side



... and bottom side.



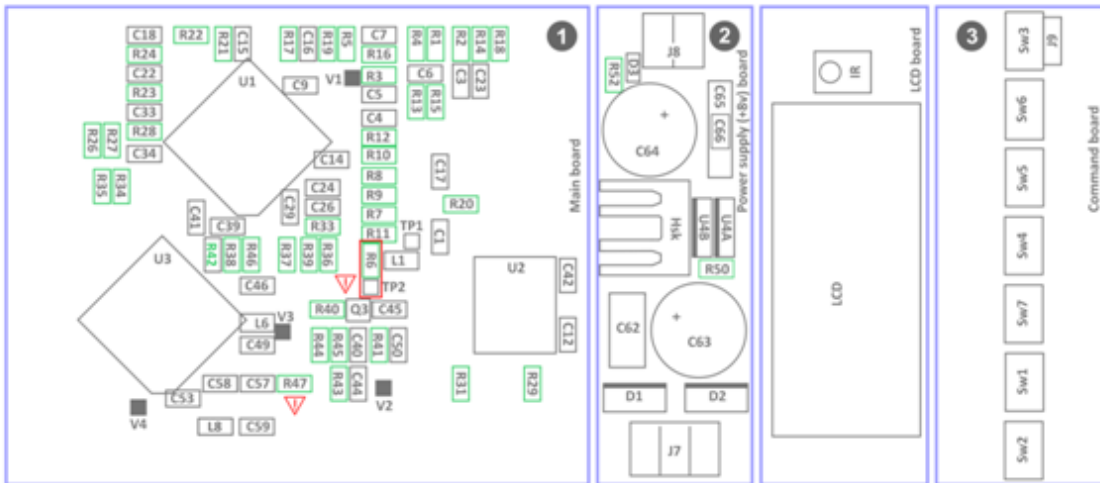
As mentioned, **Shiga CD Transport** is delivered mounted and tested. So instructions below are for owners of “DIY kit” or “Full kit”.

Special soldering techniques are not necessary, but if this is your first kit you may check the

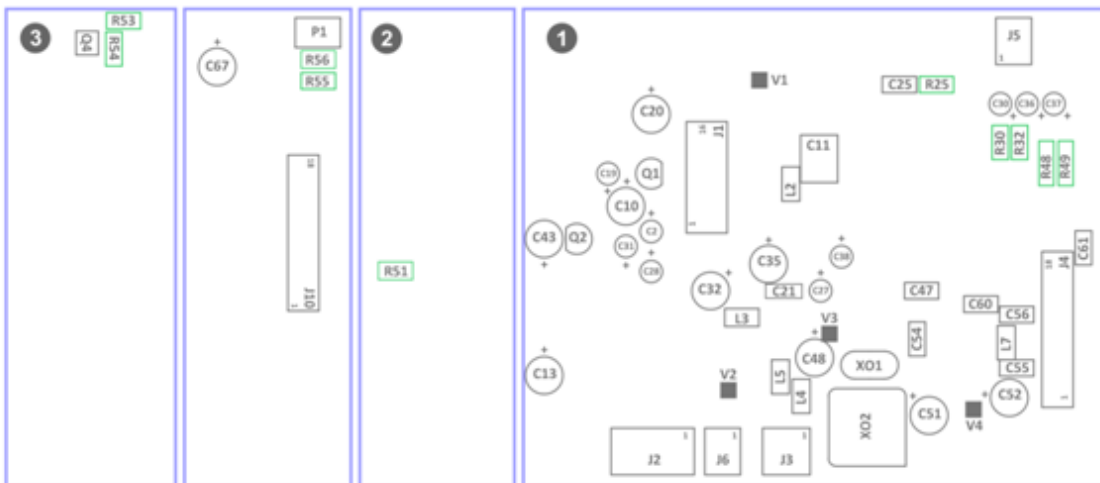
document „[Tools and rules for soldering smd components](#)” provided by vicolaudio. Also, we recommend you to follow the instructions presented here.

Mount the smallest part first beginning with **resistors** (marked in green color - colors are the same with those used in the bill of materials to mark the differences between types of components)!

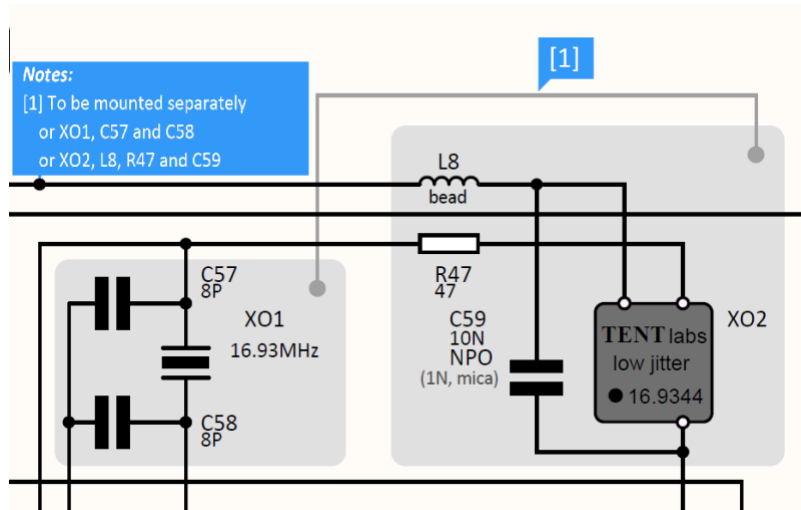
Assembly drawing TOP



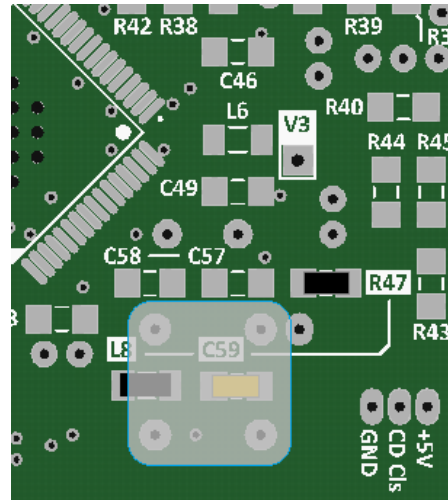
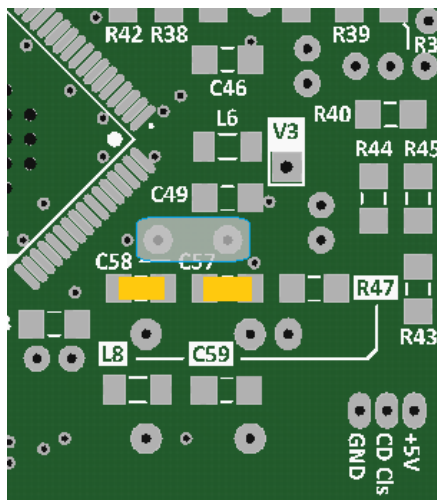
Assembly drawing BOTTOM



Because R42 is to close to the chip is recommended to solder it after putting U3 in place. Remember note #1 from the Shiga CD schematic: R47 should be solder only if you use TentLabs oscillator (XO2).



The images below show the practical implementation of the two options referred in the diagram: on the left you see the XO1, C57 and the C58 group, and on the right the [TentLabs oscillator](#), R47, L8 and the C59 group.

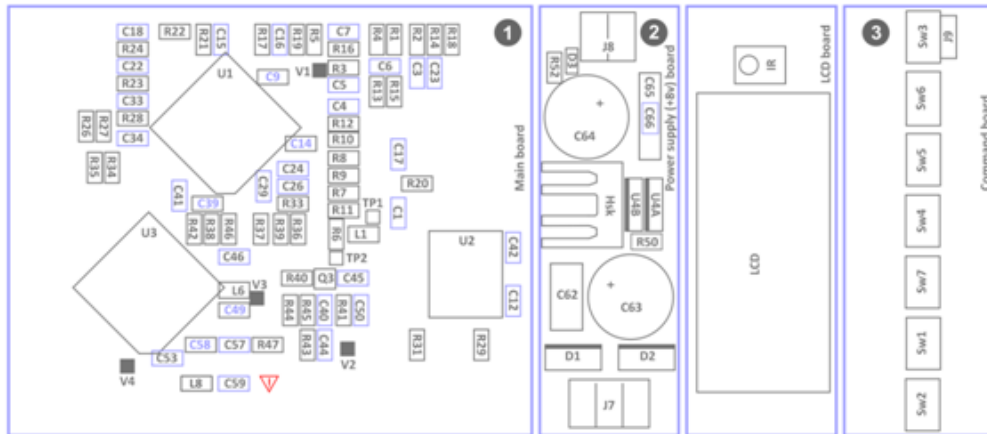


In case you want to power Tentlabs oscillator from a separate power supply, remove L8 and use L8 pad to inject power.

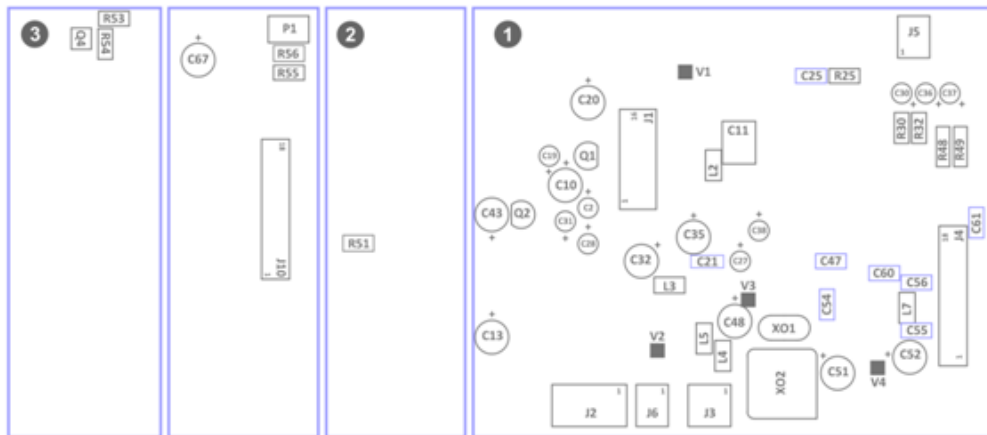
Also, R50 and R51 are installed only if the LT1086 or LM317 is used (see explanations for U4).

Continue to solder **chip capacitors** (marked in violet color). Remember that C59 should be solder only if you use TentLabs oscillator (XO2).

Assembly drawing TOP



Assembly drawing BOTTOM



When solder **chip inductors** (marked in orange color), you should know that L2, L3 & L5 are not necessary if you use separate regulators for V1, V2, V3 & V4.

Using separate power supply sections V1, V2, V3 & V4

V1 **ATTENTION** remove L2 ferrite bead before using separate power supply for this section.

Trough V1 following sections will be powered:

- LA9242M Vcc1 pin 64 for ASP radio frequency section
- Vcc for laser CCS (constant current source)
- Vcc for PIN photo detector (mechanic optical)

V2 **ATTENTION** remove L3 ferrite bead before using separate power supply for this section.

In case of V2 use, V1 must be also provided from a separate power source.

Trough V2 following sections will be powered:

- LA9242M Vcc2 pin 56 for servo system and digital system

V3 **ATTENTION** remove L5 ferrite bead before using separate power supply for this section.

In case of V3 use, V1 and V2 must be also provided from a separate power source.

Trough V3 following sections will be powered:

- LC78601 VVdd pin 6 for internal VCO power supply
- LC78601 Xvdd pin 62 for internal crystal oscillator circuit power supply

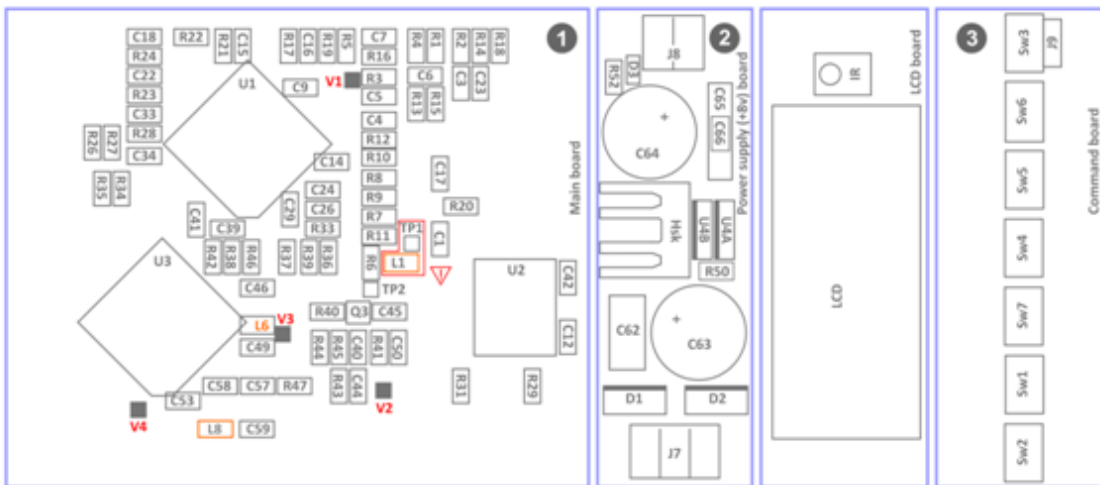
V4 **ATTENTION** remove L4 and L5 ferrite bead before using separate power supply for this section.

In case of V3 use, V1, V2 and V3 must be also provided from a separate power source.

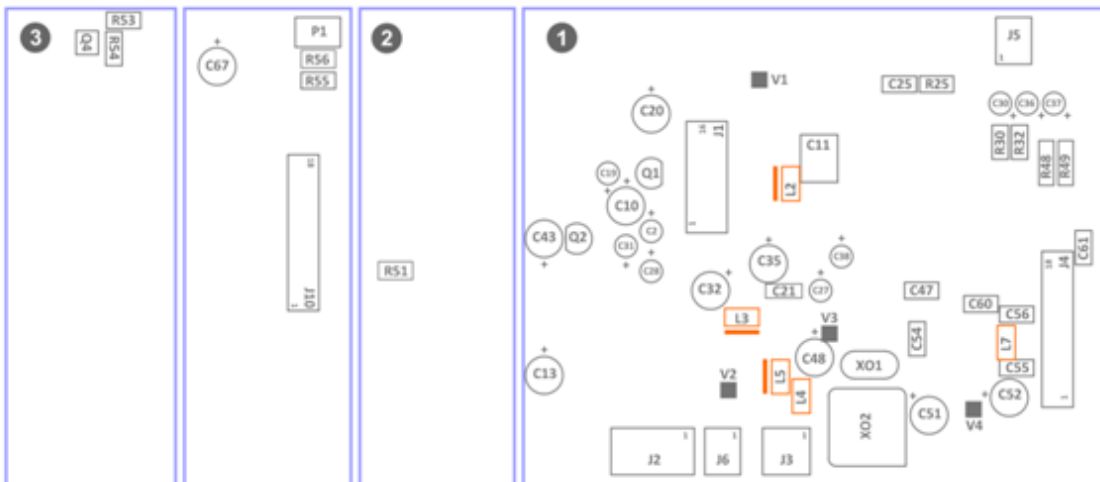
Trough V4 following sections will be powered:

- LC78601 Vdd pin 22 for digital system power supply
- LC78601 VLCD1 pin 40 for LCD drive bias 1/2 VDD monitor

Assembly drawing TOP

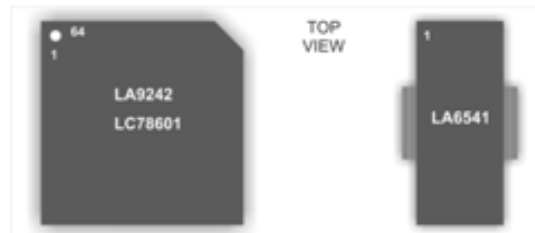


Assembly drawing BOTTOM

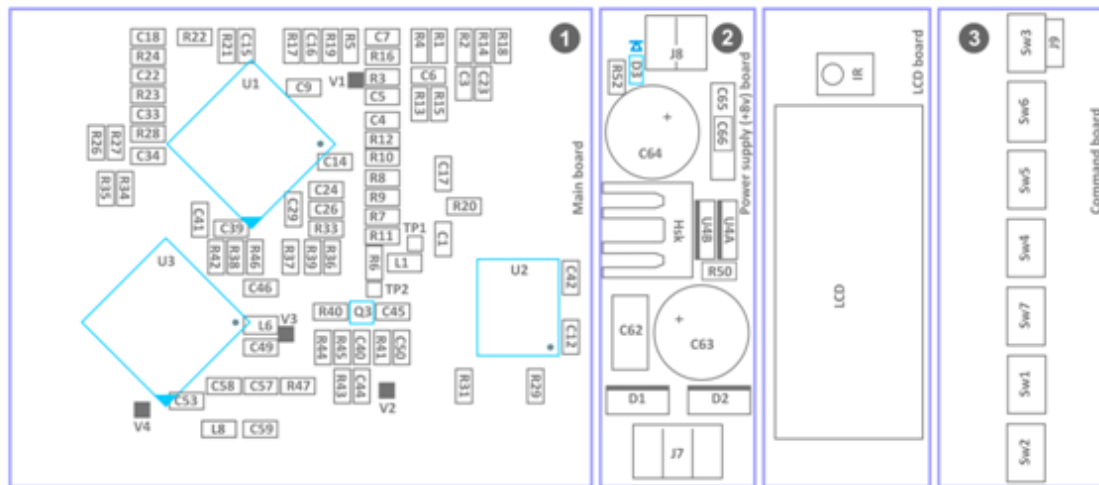


Apply the same procedure (as for R42) to C9, C14, C39, C49, C58, C53 and L6.

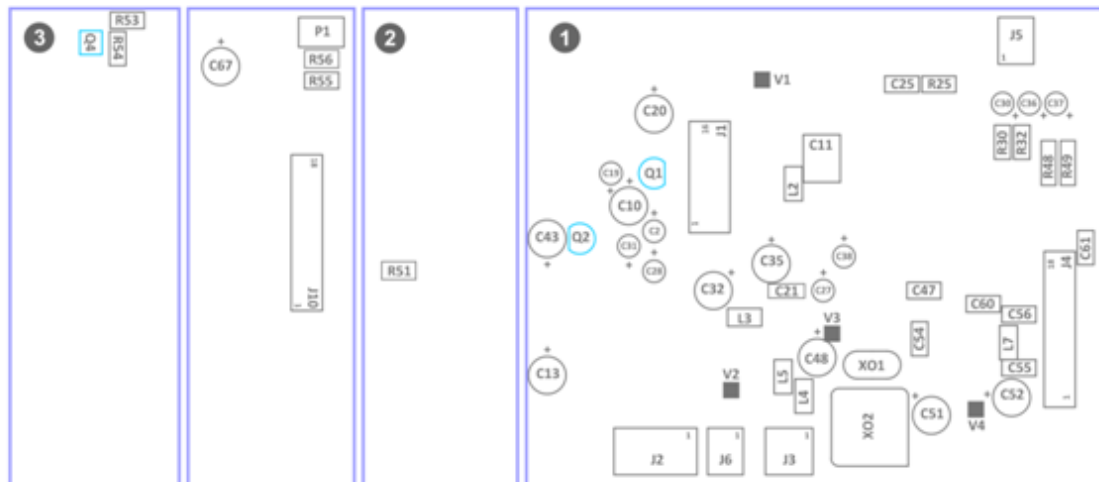
Now you can solder the transistors (Q1 – Q4), the integrated circuits (U1 – U4) and led (D3). Pay attention to the package marking format of the integrated circuits in order to correctly identify pin 1.



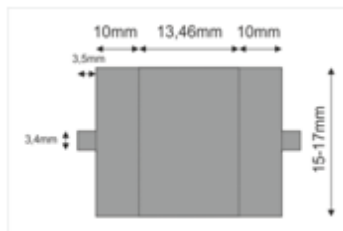
Assembly drawing TOP



Assembly drawing BOTTOM



As you can see, U2 needs a heatsink. This can be prepared using aluminium or copper, or just buy it (not included in kit).

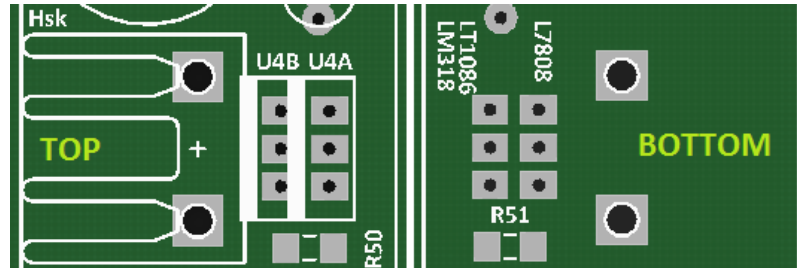
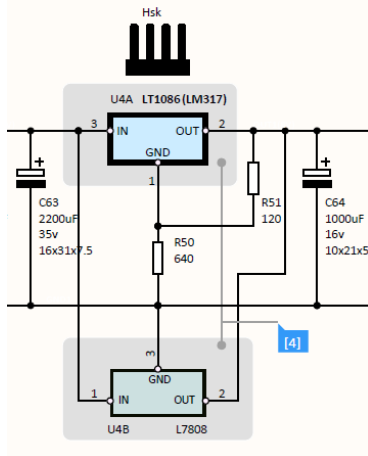


[4302199](#) or

[4302357](#) on

Farnell

The pcb accommodates 2 types of voltage regulators for U4, which can be seen in the image below. Follow the diagram and the text written on pcb to mount LT1086 or LM317 or L7808 and remember that R50 and R51 are used only in conjunction with U4A.



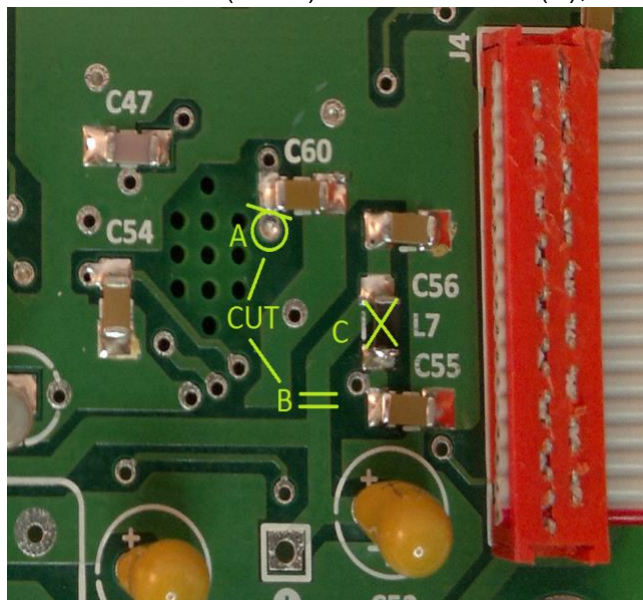
Also U4 is mounted on the pcb with a small heatsink for cooling. The pcb was designed for [1710603](#) but also can be used successfully [1700005](#).

Finally put in place electrolytic capacitors, the oscillator & connectors.

LCD backlight or contrast improvements

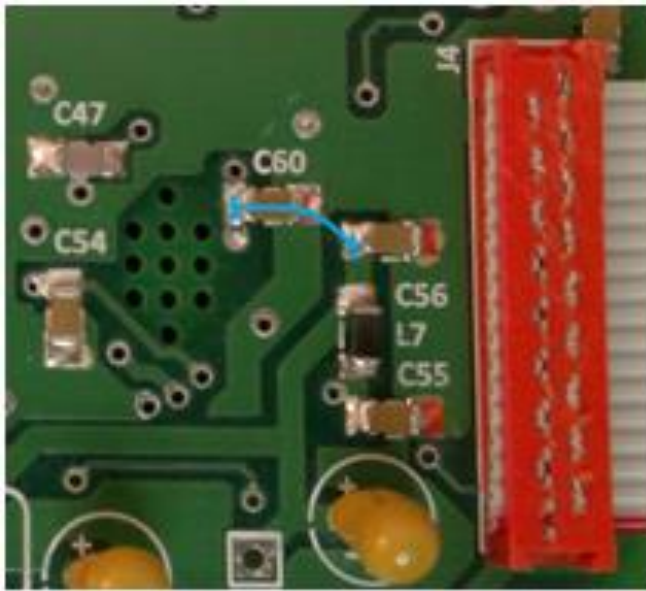
The P1 potentiometer (500R) will change the backlight intensity. In order to adjust the contrast of the LCD display make this mod on your main board (top side):

1. cut the traces (A & B) and remove L7 (C);

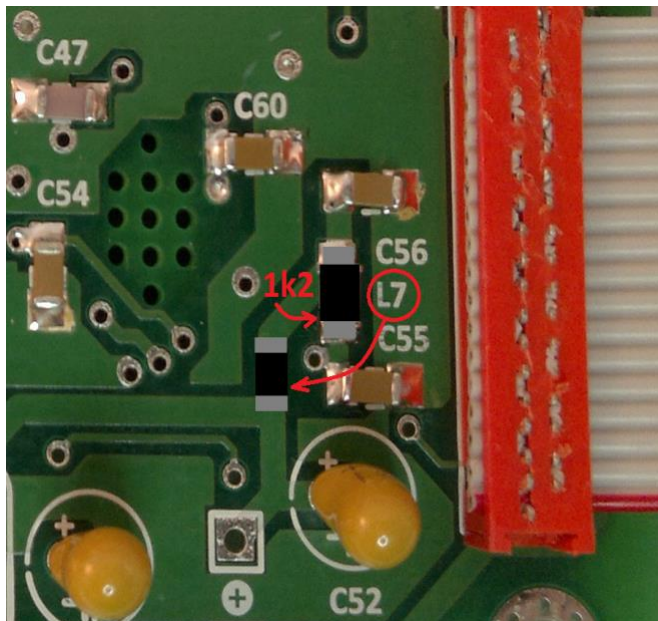


NB: Instead of cutting the trace (A), you may use a 1-2mm drill to expand the vias hole!

2. make a strap between C60 and C56 pads;



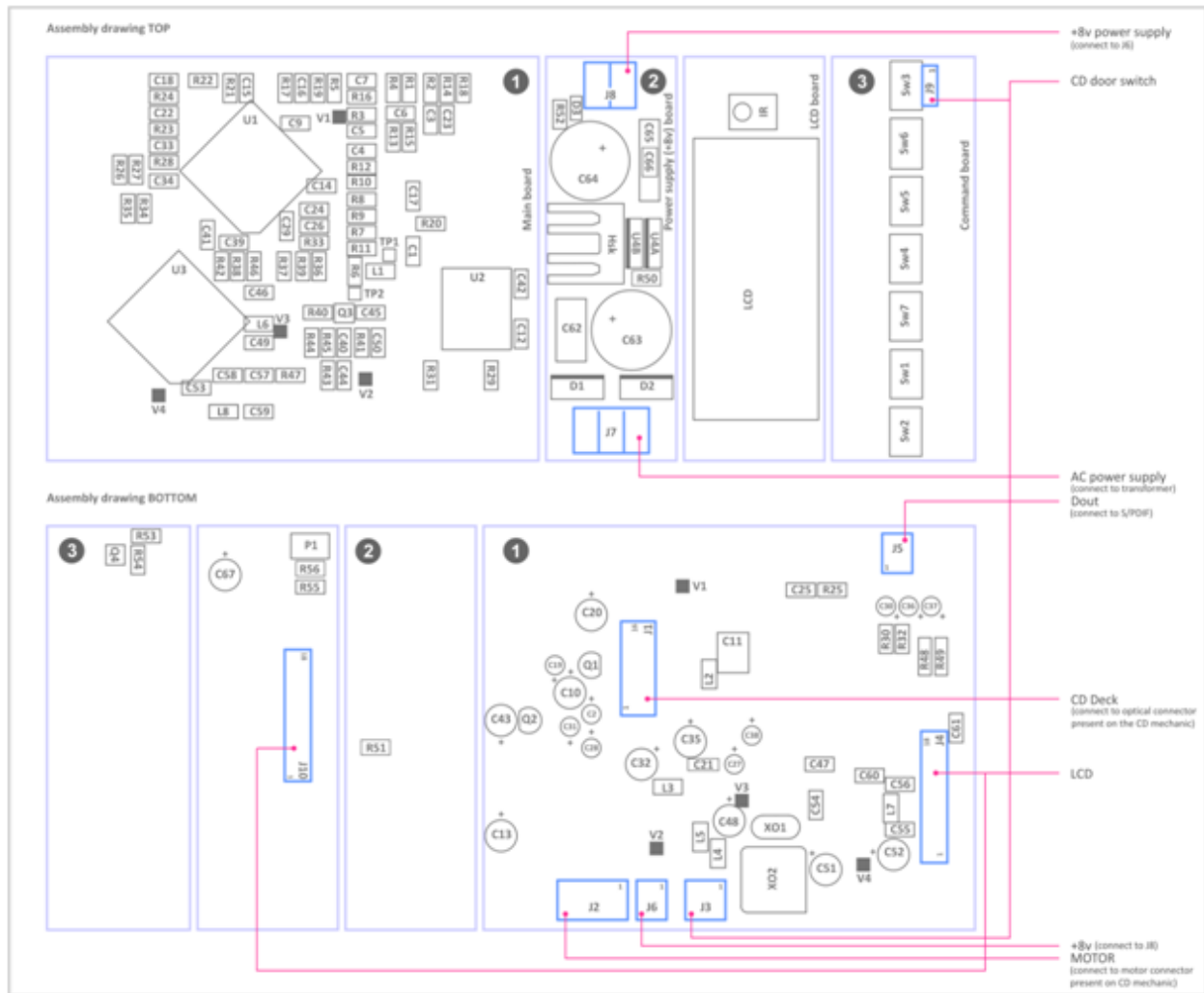
3. replace L7 with a 1k2 resistor, and solder L7 in the new location.



Connecting modules

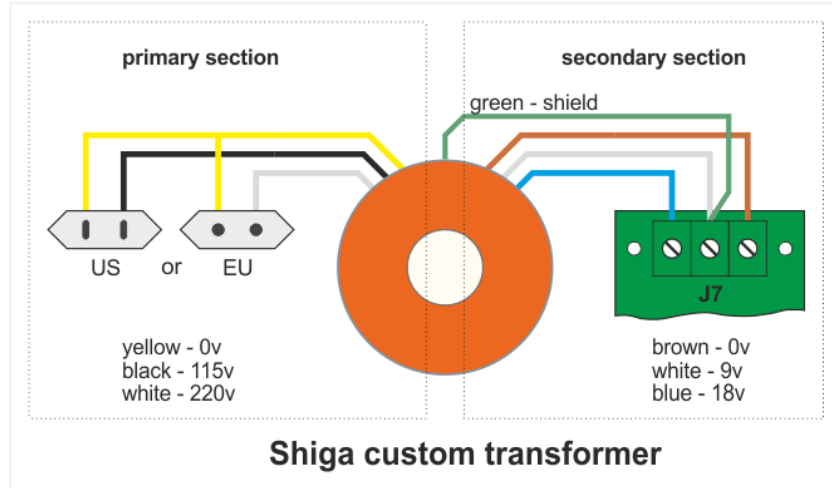
After you have completed assembling all parts on the boards, it is time to wire up the modules. So follow the step-by-step procedure below.

First, it is necessary to correctly identify the meaning of connectors used by **Shiga CD Transport**.



Bind J7 connector present on power board (+8v) to the transformer, as shown in the picture below. Kit includes a toroidal transformer specially designed for Shiga CD transport, which can be used both on european and US network.

Note that shield wire was connected to the ground of the power supply!



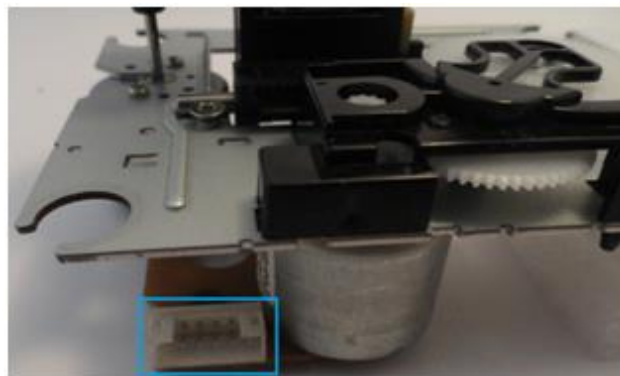
After connecting to the mains, as shown, the LED on power supply board (D3) should be lit, and if the output voltage is measured the multimeter should indicate approx. 8-9v.

Then connect J4 to J10 using a ribbon cable.



Also link J3 to J9 to run the “CD door” function.

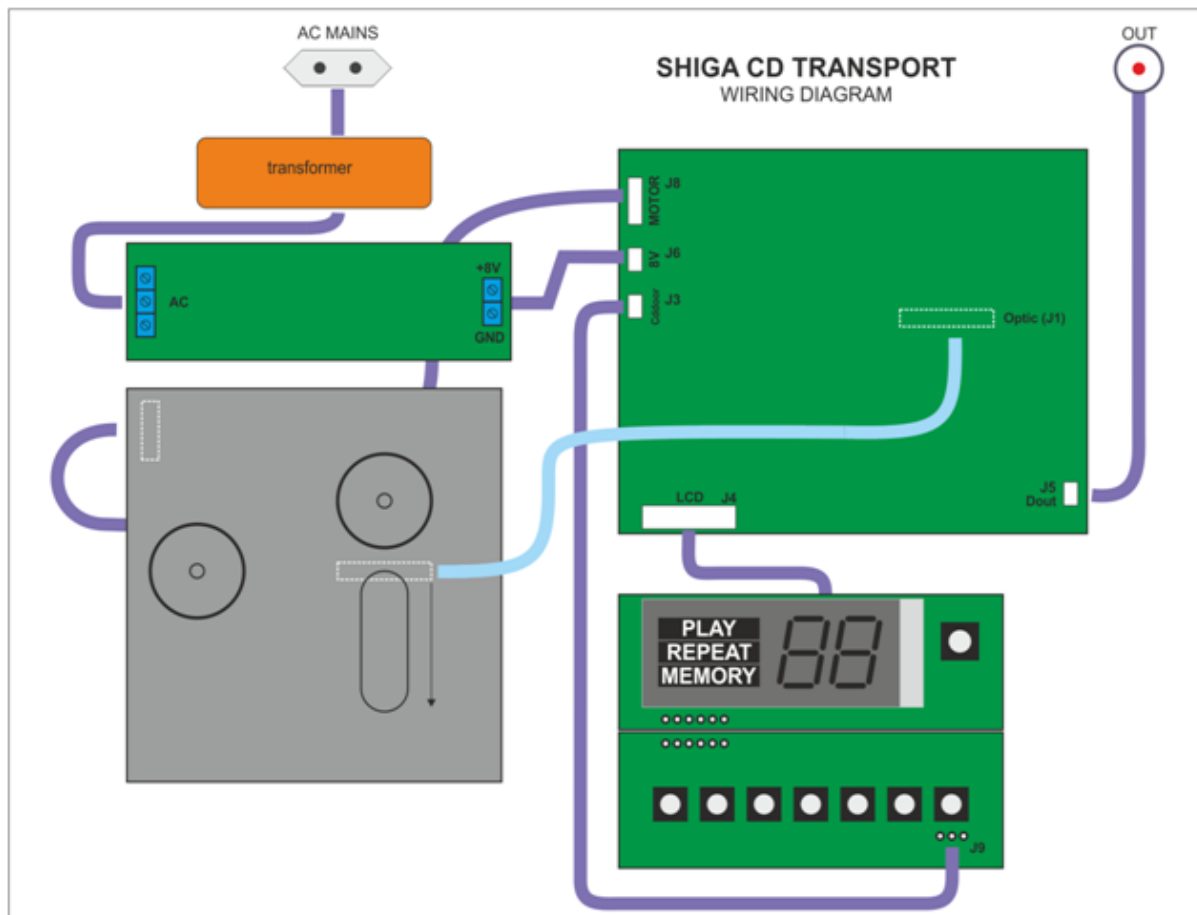
Then connect the J2 connector to the specific connector present on Sanyo CD mechanism (see picture), in order to provide motors control.



Use a FFC cable to connect J1 to the optical connector present on Sanyo CD mechanism (see picture).



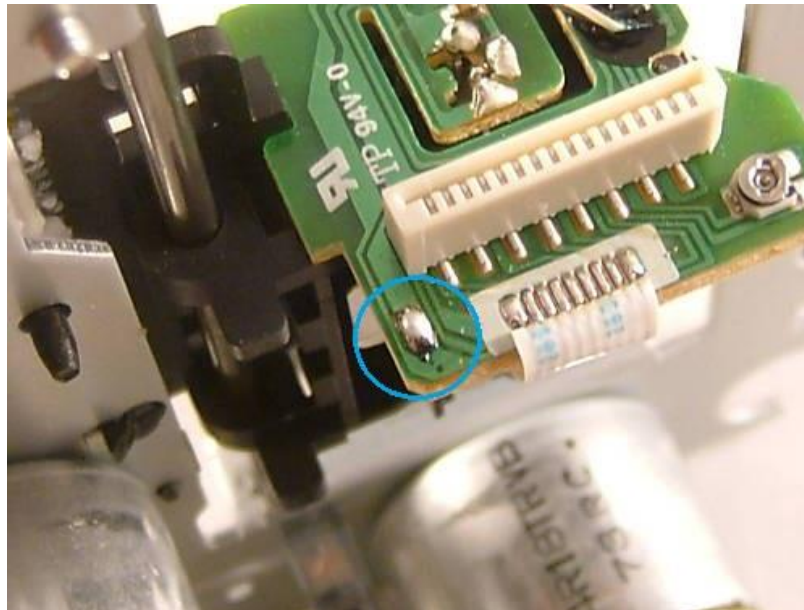
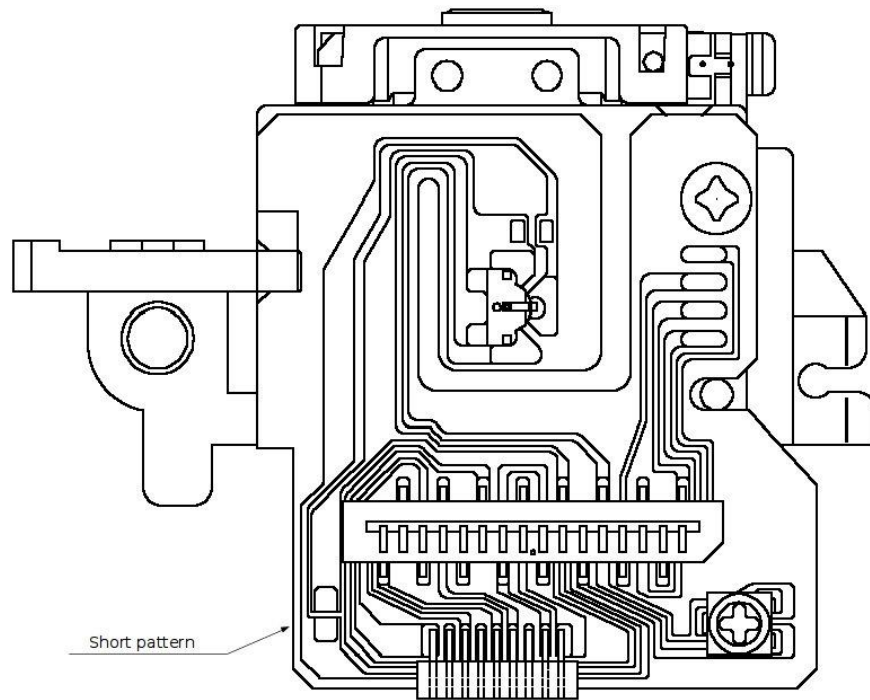
Now you can connect and power the main board. This means that J8 is connected to J2. Modules wiring diagram is shown below.



Removing short pattern

One important point to note before you start using the Shiga CD transport!

The new laser has a solder link in place to protect it from static electricity damage. You need to remove this small link with a soldering iron with grounded tip. The link is shown in the drawing and picture below.



The laser is also fitted with a protective plastic cover which must be removed.

Removing protection foil

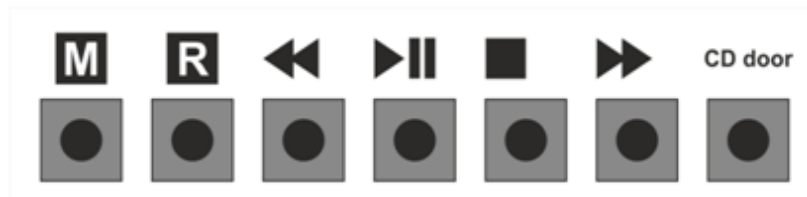
LCD backlight have a top protection foil. This was not removed.

Also, glass LCD have a top and bottom protection foil. These have not been removed either.

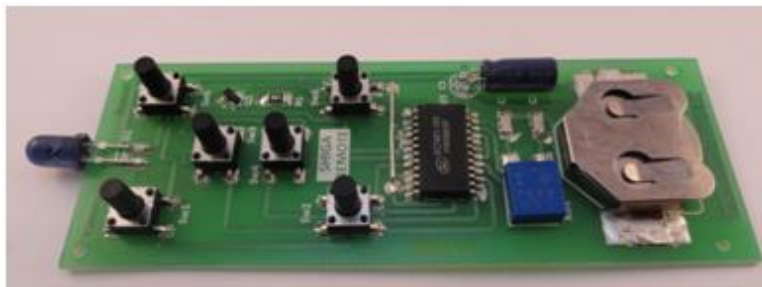
All these protection foils can be removed very easy with free hand or with a small tweezers.

Operating instruction

Shiga CD Transport is ready for operation. Its functions are performed either by the 7 push-buttons...

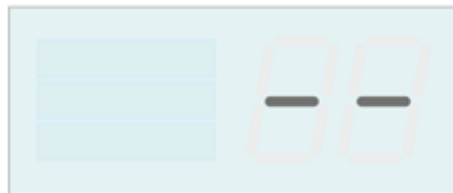


... or the remote control. A ready mounted and tested infrared remote is available on **vicolaudio** webshop, but it can be built based on the guidelines that are also on site.



Whether you use push-buttons or remote control operation algorithm is as follows:

1. At startup, the display shows “- -” flashing

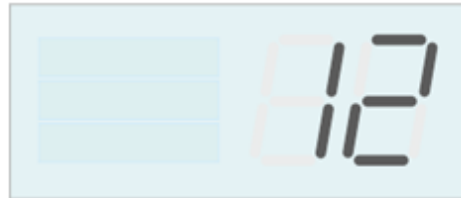




and then “00” appears if no disc is loaded.

vicolaudio

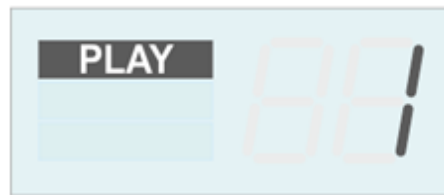




2. Place a disc with the label side facing up, place the puck, and push “CD door” button. The total number of tracks on the disc appears in the display.





3. Press (PLAY)  button. Playback starts from track 1. The current track number appears in the display. To pause playback, press  button.




Text **PLAY** flashes in the display.






Press  button again to resume playback. To stop playback, press (STOP)  button. Wait a few seconds for the disc to stop turning completely, and then remove the puck and the disc.



4. In order to quickly locate the beginning of any track on the disc, including the track currently being played use  or  button.

During playback:

- Press  once to return to the beginning of the current track
- Press  twice in rapid succession to return to the beginning of the previous track
- Press  to skip to the beginning of the next track

In stop mode, press  or  button repeatedly until the display shows the desired track number, and then press  button. Playback starts from the selected track.

5. During playback, press and hold  or  button in order to move forward/back through a disc at high speed.

6. The (REPEAT)  button allows you to play the current track, all the tracks on the disc or the entire program repeatedly. Each time you press  button, check the display to see which choice you have selected. When **REPEAT** flashes in the display, the current track is played repeatedly.







When **REPEAT** lights up continuously in the display, all the tracks on the disc or the entire program are played repeatedly.


7. In stop mode, press (MEMORY)  button to enter program create mode.

MEMORY and "01" start flashing in the display.



Press  or  button to select a track number, and then press  button to store the selected track number in the program. You can repeat this procedure and store up to 20 tracks in the program. If you select more than 20 tracks, programmed tracks are overwritten from the first track.

Press  button to start program play.

To confirm the order of programmed tracks, press  button in stop mode. To clear the

program, press  button in stop mode.

MEMORY disappears from the display.

S/PDIF connection

Shiga CD Transport use a [S/PDIF](#) (Sony/Phillips Digital Interconnect Format) connection, via a coaxial cable (75 ohm) with [RCA connector](#). Should be noted that the optimal cable length of the S/PDIF cable is 1.5m, due to reflection issues.

Digital cable length (from [UHF Magazine](#)):

"When a transition is launched into the transmission line, it takes a period of time to propagate or transit to the other end. This propagation time is somewhat slower than the speed of light, usually around 2 nanoseconds per foot, but can be longer... When the transition reaches the end of the transmission line (in the DAC), a reflection can occur that propagates back to the driver in the transport. Small reflections can occur in even well matched systems. When the reflection reaches the driver, it can again be reflected back towards the DAC. This ping-pong effect can sustain itself for several bounces depending on the losses in the cable. It is not unusual to see 3 to 5 of these reflections before they finally decay away. So, how does this affect the jitter? When the first reflection comes back to the DAC, if the transition already in process at the receiver has not completed, the reflection voltage will superimpose itself on the transition voltage, causing the transition to shift in time. The DAC will sample the transition in this time-shifted state and there you have jitter. If the rise-time is 25 nanoseconds and the cable length is 3 feet, then the propagation time is about 6 nanoseconds. Once the transition has arrived at the receiver, the reflection propagates back to the driver (6 nanoseconds) and then the driver reflects this back to the receiver (6 nanoseconds) = 12 nanoseconds. So, as seen at the receiver, 12 nanoseconds after the 25 nanosecond transition started, we have a reflection superimposing on the transition. This is right about the time that the receiver will try to sample the transition, right around 0 volts DC. Not good. Now if the cable had been 1.5 metres, the reflection would have arrived 18 nanoseconds after the 25 nanosecond transition started at the receiver. This is much better because the receiver has likely already sampled the transition by this time."