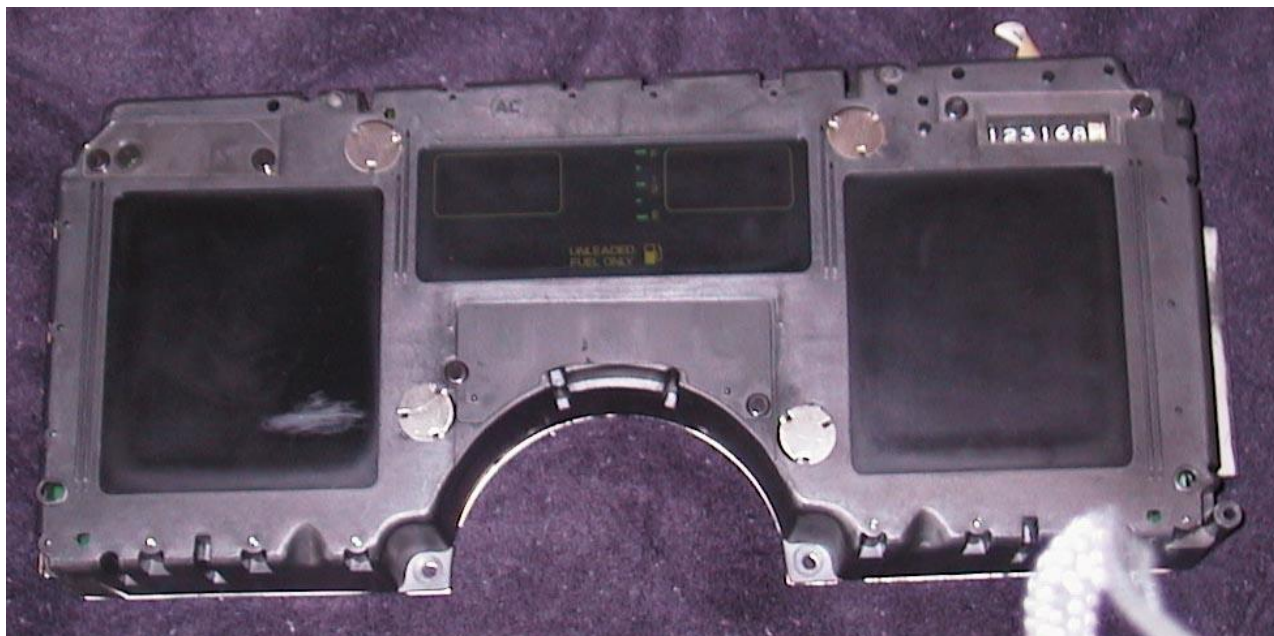


# Repairing the 1984 - 1989 C4 Corvette Digital Instrument Panel Cluster Dash

by Bryan A. Thompson

Revision 1.5, Last Updated 06/20/2010



## Symptoms That You Should Perform This Procedure

If you're considering doing this, you have an old Corvette. Potentially 26 years old. Vibrations, current flow and time conspire to cause the solder joints to become "cold" or broken. This manifests itself in the following ways:

1. If you have a cruise control, the cruise control computer is built into the Digital Cluster. In my case, the cruise would never set.
2. The dash lights flicker or go out altogether for extended periods of time. Hitting the dash (not recommended) sometimes brings the lights back.
3. Dash lights go out and turn indicator lights and high beam indicator light go to full intensity. This happens because the Digital Cluster has lost its factory ground and grounds itself through these lights.

4. One or more LCD segments are continuously on or off. There are small rubber conductive blocks that connect the glass LCD display panels to the bottom circuit board. Sometimes these become dislodged or dirty. This causes specific segments or groups of segments on the LCD to function improperly.

### **The Repair Procedure**

The likely culprit of your display troubles are the inter-board connectors that connect the two circuit boards. Sometimes the trouble is the connector itself, and can be repaired by cleaning the connector with an electrical contact cleaner. But most often, it's a "cold" broken solder joint between the bottom circuit board and the board connector. To resolder this connector requires complete (not just partial) disassembly of the instrument panel, but the procedure is super-easy, and completely documented below.

*Please note:* Please read through these procedures before attempting any repairs. If you don't have the skills to perform these procedures, take the Digital Cluster to your local electronics repair shop along with a copy of these instructions. The bill will still be cheaper than the \$350 - \$500 advertised by many corvette parts sellers or GM.

I won't be responsible for any damage resulting from your attempt at this repair. I offer this information solely as an account of how I fixed my Digital Cluster.

Thank you,

Bryan A. Thompson

### **Tools you'll need for this project**

To remove the Digital Cluster:

- 9/32" 1/4" drive socket
- 1/4" drive ratchet
- 1/4" drive 6" length extension
- #2 Phillips Screwdrivers, stubby and regular length

- 1/4" Straight Blade Screwdriver

### **To service the Digital Cluster:**

- 7/32" Nut Driver
- 25-40W Pencil Soldering Iron with pointed cone tip (\$5.99 at Radio Shack - don't use soldering guns or higher heat soldering irons! If tip of the iron isn't clean, smooth and tinned, don't use it - you'll damage the circuit boards)
- .032" Rosin Core (Electrical) 60/40 Solder
- Solder wick/braid (just in case you make a mistake soldering)
- Windex / Cloth paper towels (While it's apart, you might as well clean it)
- Canned / Compressed air (Dust, bugs collect inside the panel)
- Static control wrist strap (radio shack again)
- Electrical contact (tuner) cleaner (not brake cleaner, which leaves behind a non-conductive lubricant)
- Replacement bulbs for any illumination lights that are burned out. They're available at GM dealership parts counters. The part number is #882 or #891.

### **Removing the Digital Cluster**

1. Using a #2 screwdriver, remove all the screws holding the Digital Cluster Bezel to the dash. There's one behind the vent that you'll need a stubby screwdriver to remove.
2. Place the tilt steering wheel in its lowest position, then remove the steering wheel tilt lever by unscrewing it. Use a wrench if necessary, but be careful not to mar the surface.
3. Remove the four 9/32" Hex head screws that hold the instrument panel to the dash. There's one at the top left and top right corners, and two above the steering column.
4. Tilt the top of the Digital Cluster out away from the dash. There's a sharp metal cover on the back of the instrument panel. Be careful not to scrape this on the column, the dash, and be

careful not to scratch the Digital Cluster LCD display panels on the column.

5. Using the flat blade screwdriver, remove the clips securing the two electrical connectors on the right side of the Digital Cluster, and remove the electrical connectors.

### **While the Digital Cluster is out**

1. If you have further troubleshooting to do, now is the time to do it. Many test procedures outlined in the Chevrolet factory shop manual for Corvettes require that the Digital Cluster be removed, so if something else isn't working, now's the time to fix it.
2. Clean the lower dash area and bezels. You can never get into all the cracks and crevices with the bezels in place, so clean them while they're out. You'll be glad you did.

### **Disassembling the Digital Cluster**

**IMPORTANT:** Wear the properly grounded static wrist strap the entire time the Digital Cluster is apart! These were built in the mid-80's, and as a result, contain CMOS semiconductor components that are extremely sensitive to static electricity.



Figure 1 - Back of Digital Cluster

1. Place the Digital Cluster face down on a soft surface and remove the five 7/32" hex screws holding the metal panel to the rear of the panel. Remove the metal cover. See Fig 1.

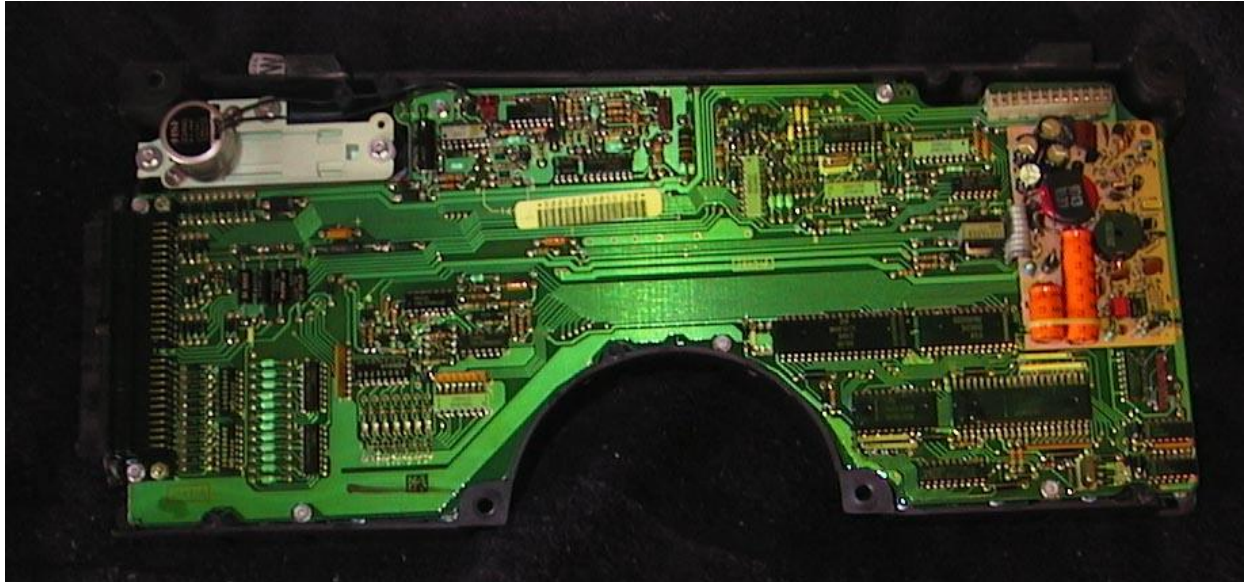


Figure 2 - Back Cover Removed

2. Remove the seven 7/32" screws holding the top circuit board to the Digital Cluster case. Two of these are found on the back side of the long black electrical connectors leading to the wiring harness. See Fig 2.
3. Disconnect the odometer wire and carefully remove the top circuit board.
4. Remove the three 7/32" screws holding the odometer to the instrument panel case and remove the odometer. Please try to resist the temptation to tamper with your odometer at this point. I'm sure there's a law somewhere against it.
5. Remove the 22 screws holding the bottom circuit board to the Digital Cluster case.

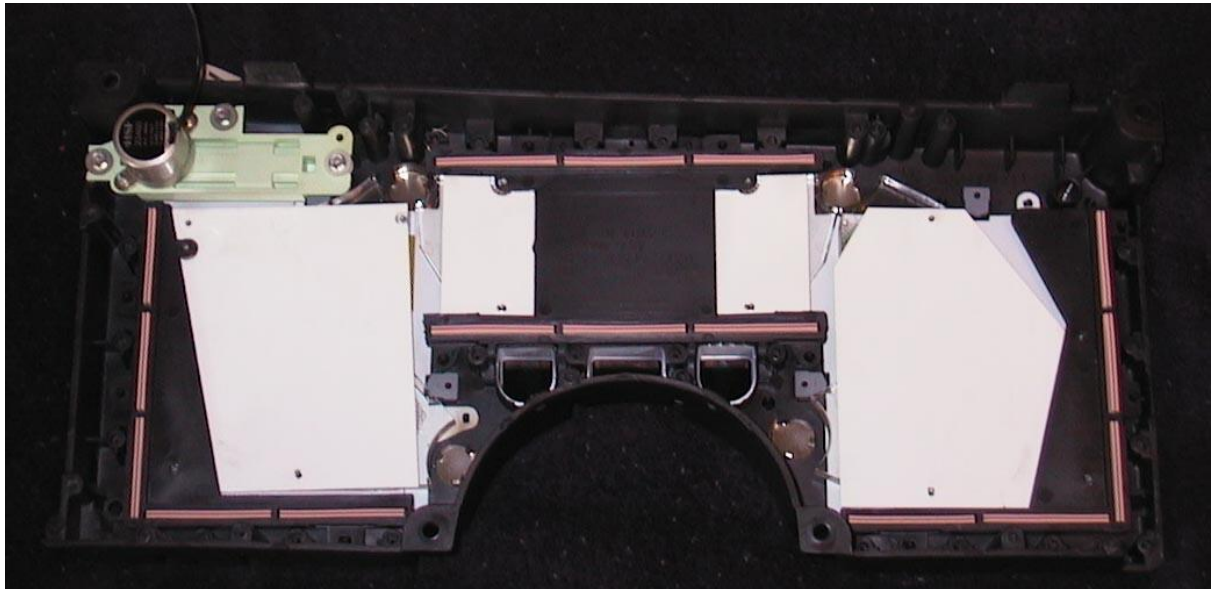


Figure 3 - Housing with both circuit boards removed. I had to remove the odometer in order to reassemble the Digital Cluster

6. Be very careful at this point! There's no physical connection between the glass lcd displays and the bottom circuit board, but when you lift the bottom circuit board, the LCDs might come with it. Also be careful not to touch any of the lamps. Residual oil on your hands can dramatically shorten the life of these already extremely hot lights.
7. The pink and grey rubber blocks between the glass LCD displays and the bottom circuit board are conductive, and are the "wires" connecting the glass to the circuit board. There's no glue on either end, they just kinda tend to stick to the glass and the copper traces on the circuit board. See Figure 3.
8. If it hasn't happened already, separate the LCD displays (3) from the bottom circuit board. If you have a segment out, go ahead and remove the pink/grey rubber blocks from both the glass and the circuit board. If not, try to let them remain stuck to the glass. Try to keep the panels, thick clear plastic light diffusers and thin plastic color sheet together. Don't worry about maintaining their alignment at this point - there are index pins to line everything back up when you reassemble it. See Figure 3.

## **Repairing the Digital Cluster**

1. Carefully clean the faces of the glass LCD panels with Windex and paper towels. Mine had a ring of silicon around them, courtesy of the former owner.
2. If you have a segment missing, remove the pink/grey rubber blocks from the LCD panels and thoroughly clean the edges of the blocks and glass with windex. Be careful - the edges of cut glass are sharp. See Fig 3.
3. Clean all parts with compressed air to remove residual dust, bugs, etc. All this crap IS conductive to a certain degree and can potentially cause a short circuit.
4. On the bottom circuit board (the one you took out last) resolder the joints on the connector that connects the two circuit boards. See Figure 4 and 5.
5. Resolder the joints on the other large components that appear in Figure 4 - The capacitor (big yellow thing), the brown resistor, and the voltage regulator (black thing with three leads) are all susceptible to broken solder joints due to the fact that they support large components or high current carrying ones.

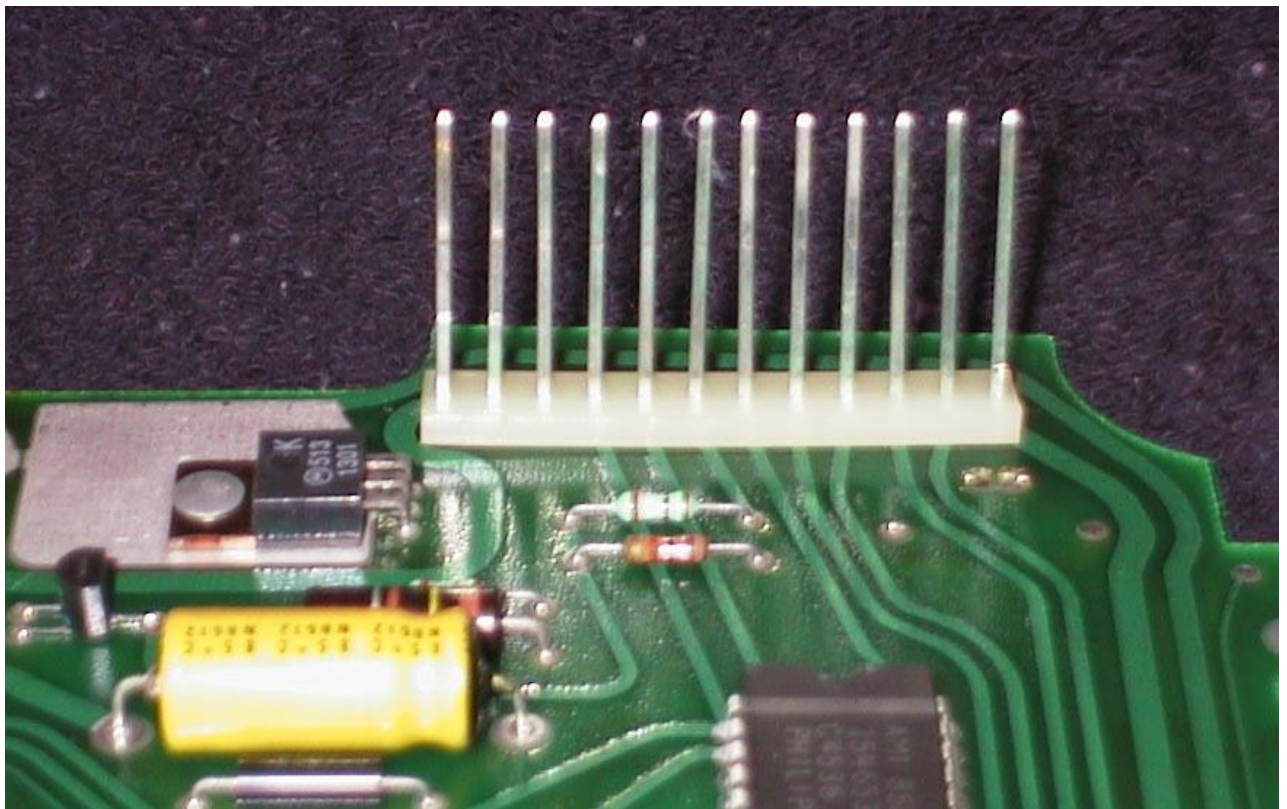


Figure 4 - Board Interconnector (front view)

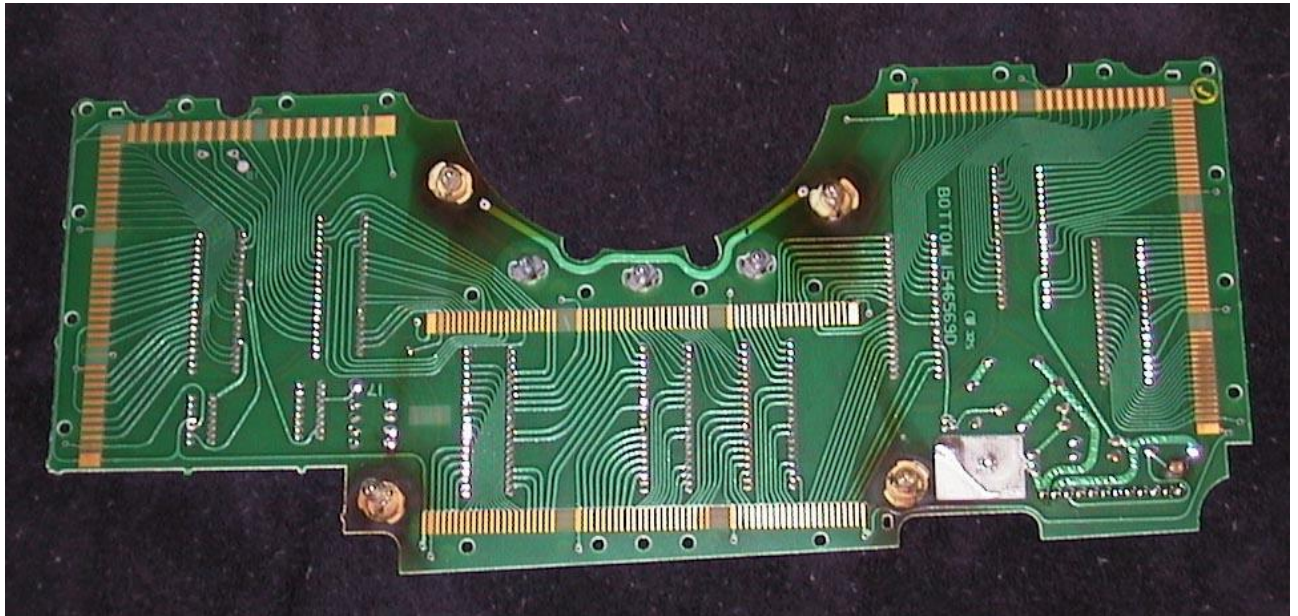


Figure 5 - Back of Bottom Circuit Board - Board Interconnect is in the lower right corner

### Some notes on soldering

- When soldering, heat the connector lead and the solder pad on the circuit board, not the solder. Once these two locations are sufficiently heated, solder will flow into the joint. Don't just heat the existing solder, add a small amount of new solder to each joint. The rosin it contains will help to clean the solder joint and help the solder stick.
- Cold solder joints take on the following forms in this case:
  - Dull grey / crystalline appearance: Reheat the joint and add a small amount of solder until the joint is a bright shiny concave pool around the connector lead.
  - Rectangular outline around the connector lead: Reheat the joint and add a small amount of solder until the joint is a bright shiny concave pool around the connector lead.
  - A convex (water drop look) bead of solder around the joint: Use the solder wick to remove the old solder (there's too much). Place the wick over the solder to be removed and heat the top side of the wick. When it's hot enough, the solder will flow from the connection to the wick. Then resolder the joint.
- Solder bridge: This is when a drop of solder spans two or more connections. This needs to be removed. Use the



solder wick to remove the old solder (there's too much). Place the wick over the solder to be removed and heat the top side of the wick. When it's hot enough, the solder will flow from the connection to the wick. Then resolder the joint(s).

6. I didn't find any cold solder joints on the top circuit board connector, but while it's apart, you might as well resolder them too. See Figures 6 and 7.
7. User tip from John Derner (jderner@nordson.com): My display would go dead any old time. I ran a new ground wire and even hot wire to the incoming harness, but it eventually went dead again. I examined all the connectors and solder joints under a microscope and still didn't see a problem. Finally, with the guts under power, sitting on top of my dash board, I was able to make it die on me. As it turned out, one of the large capacitors on the power supply board had a cold joint (or probably had been shaken loose) and was causing the whole problem. I hit all the solder joints with the iron and haven't had a problem in about a year. How could they expect large components to stay attached under such conditions?

Authors notes: The power supply board is pictured in Figure 6 (the one with the cylindrical orange things). Be careful of that ribbon cable - if yours doesn't have a connector (mine didn't), be careful not to pull it loose from the larger circuit board - it's a really short cable! Remove the board and resolder everything. It's quite a few connections to solder, but it'll be worth it in the long run. You don't want to have to do this again, do you?

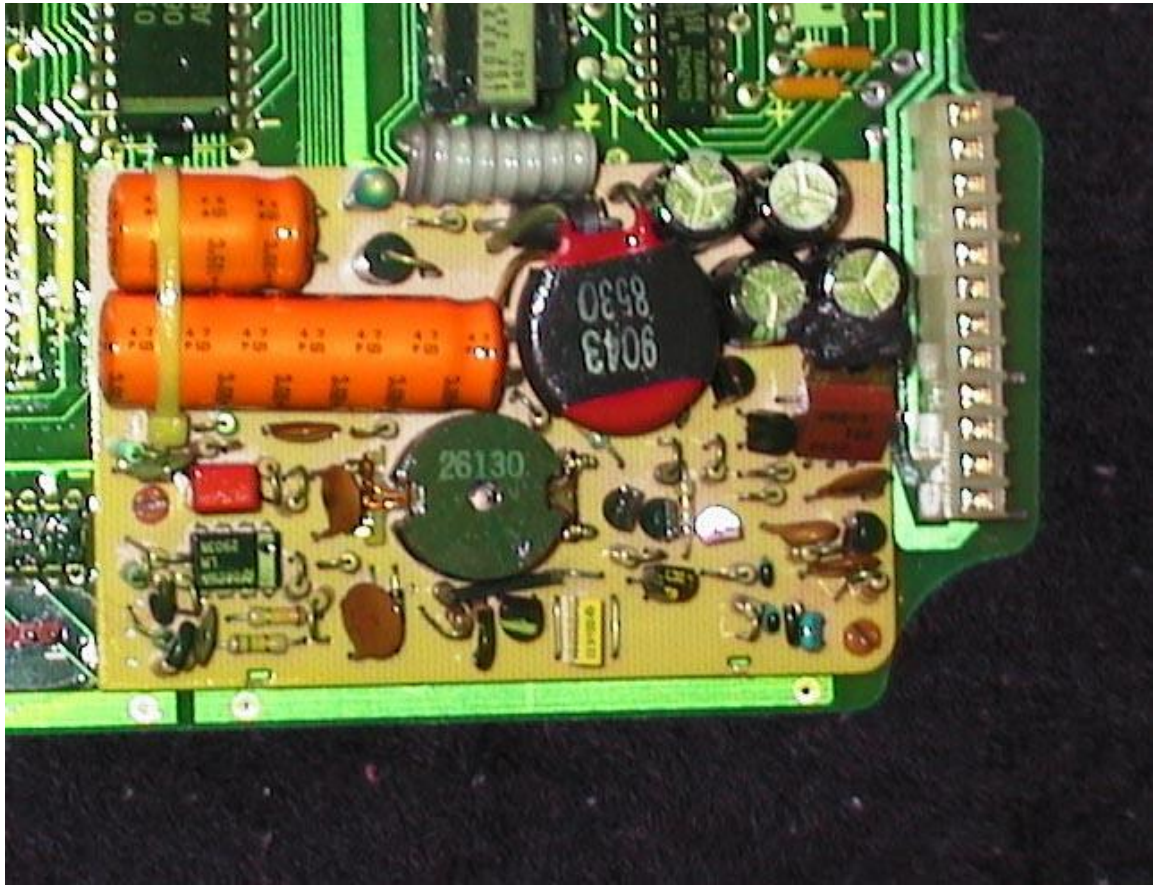


Figure 6 - Top Circuit board interconnector with power supply piggybacked (Front View)

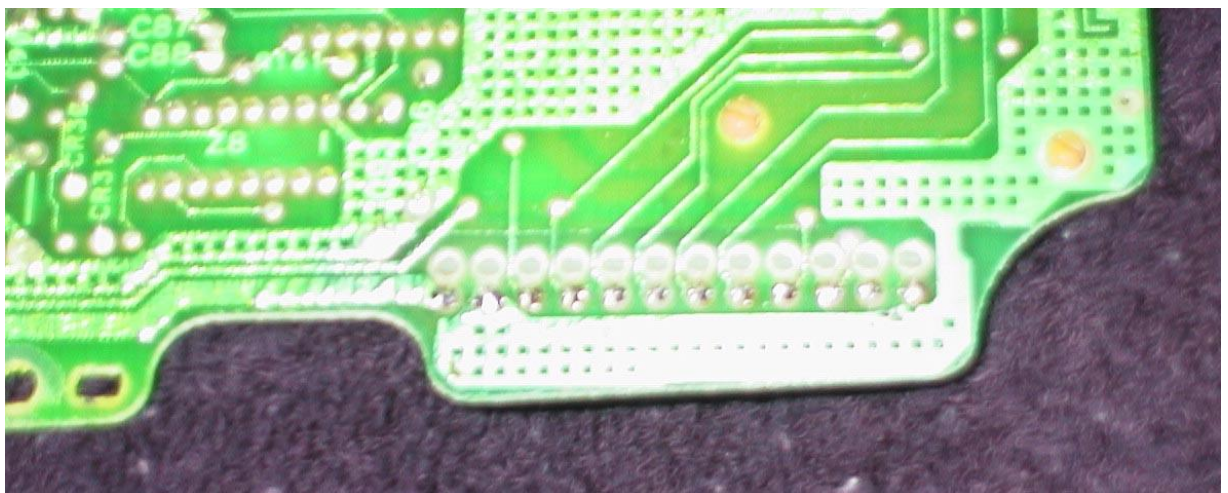


Figure 7 - Top Circuit Board Interconnector (Back View)

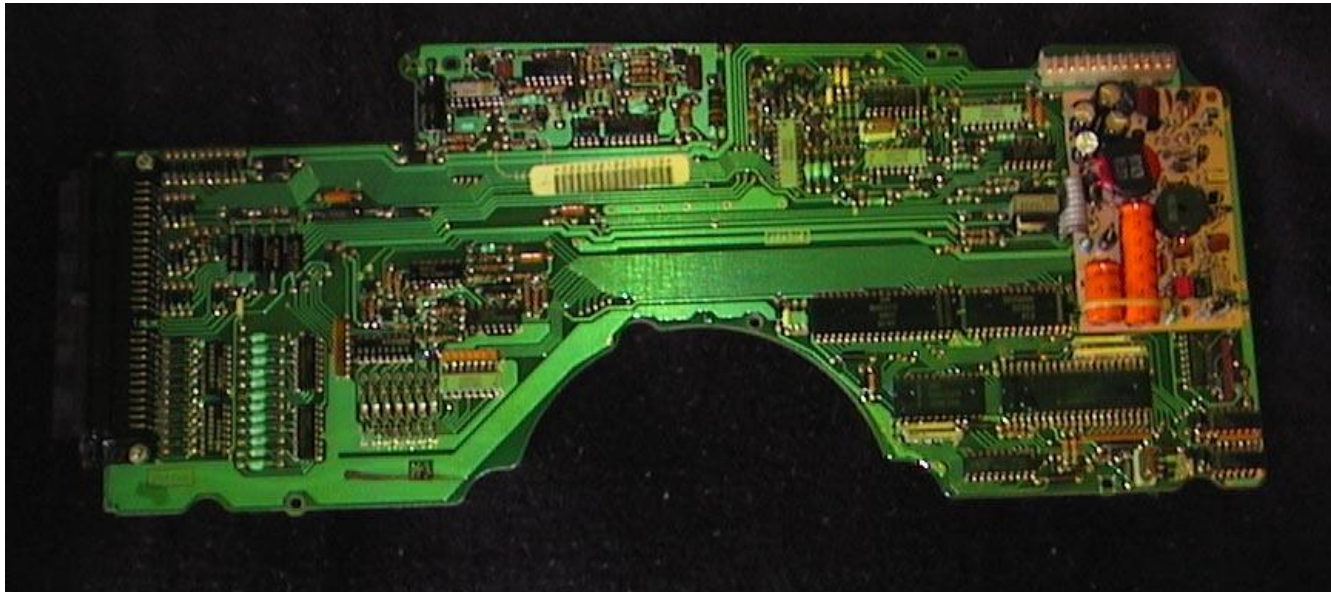


Figure 8 - Top Circuit Board Full View (Front View) - Power supply board is the board in the top right corner.

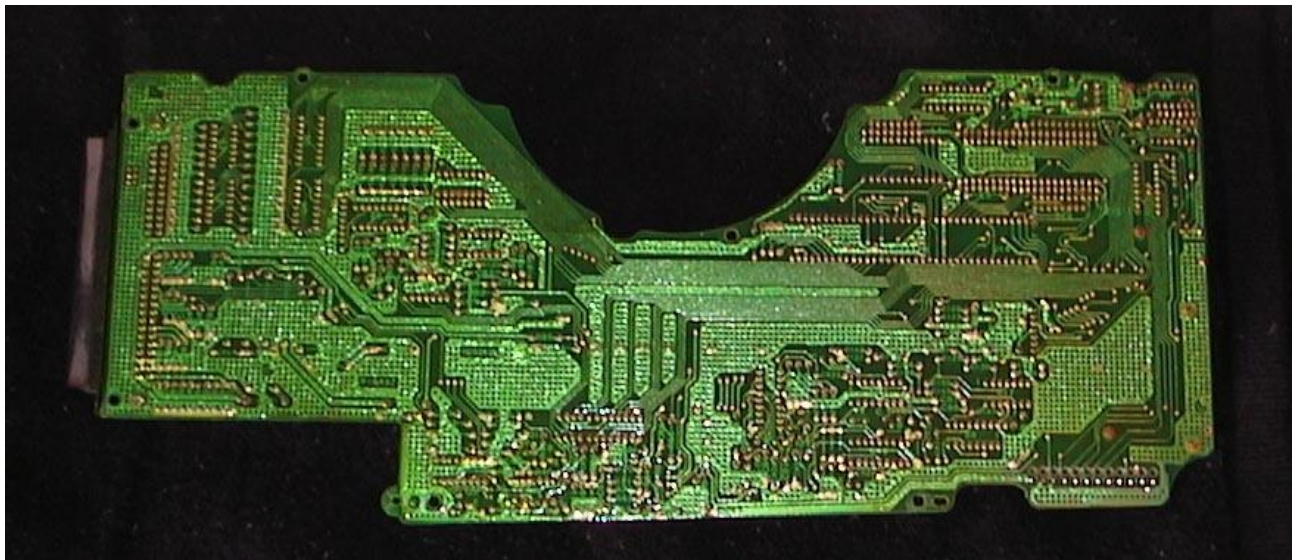
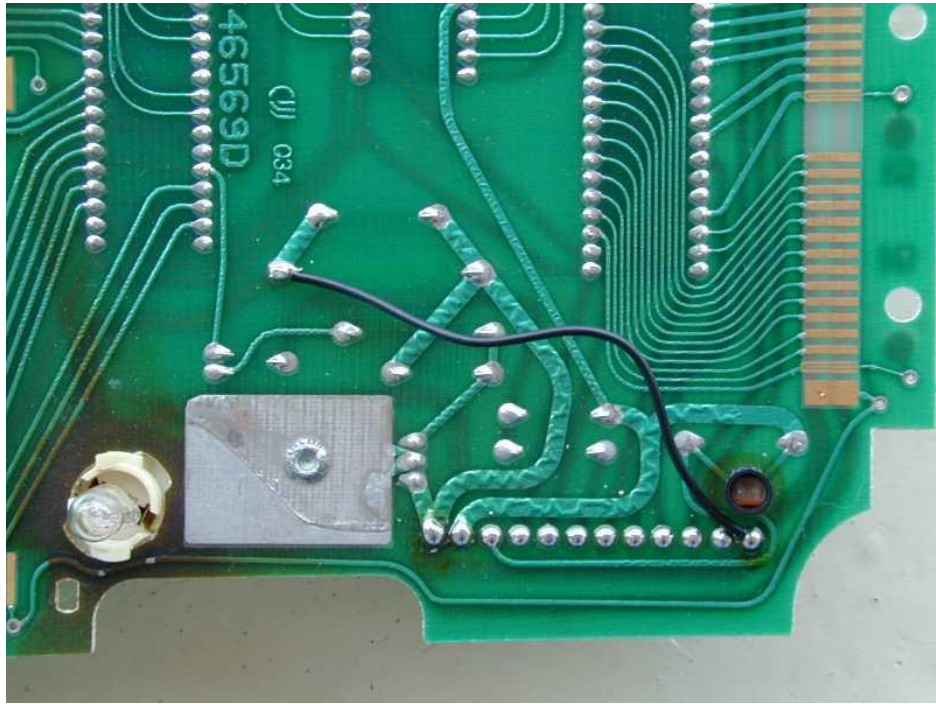


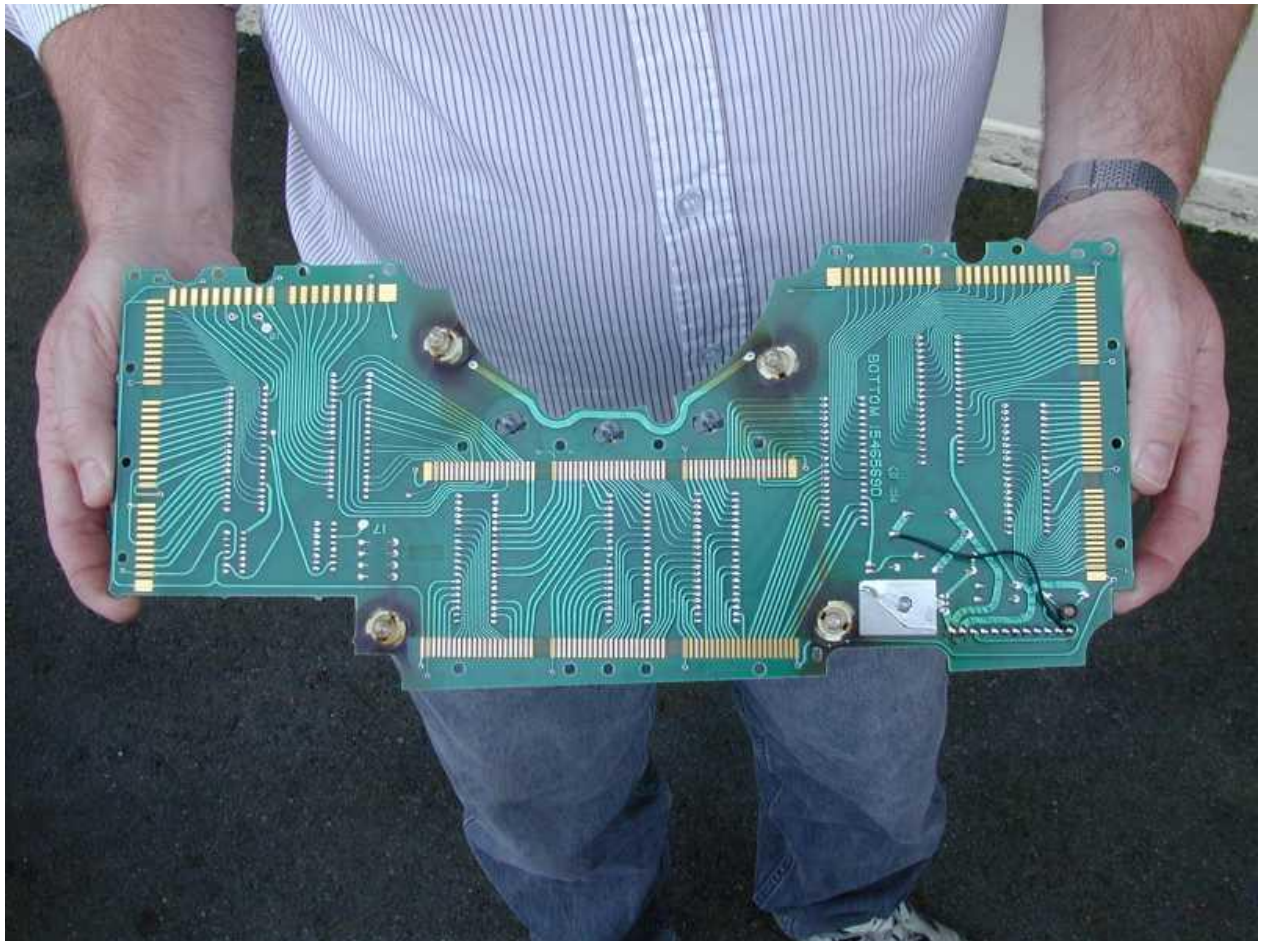
Figure 9 - Top Circuit Board Full View (Back View)

8. User tip from Bill Blake (bblake@idmail.com): Add a wire from the tip of the ground pin for the halogen lamps circuit to the nearest solder point along the same trace. This acts as insurance against a bad solder (cold) joint in the future.

Following photos provided by Bill Blake:



The part Bill added was the black wire



9. Clean the circuit board connectors on the top and bottom circuit boards with electrical contact cleaner.
10. Thoroughly clean the instrument panel housing inside and out.

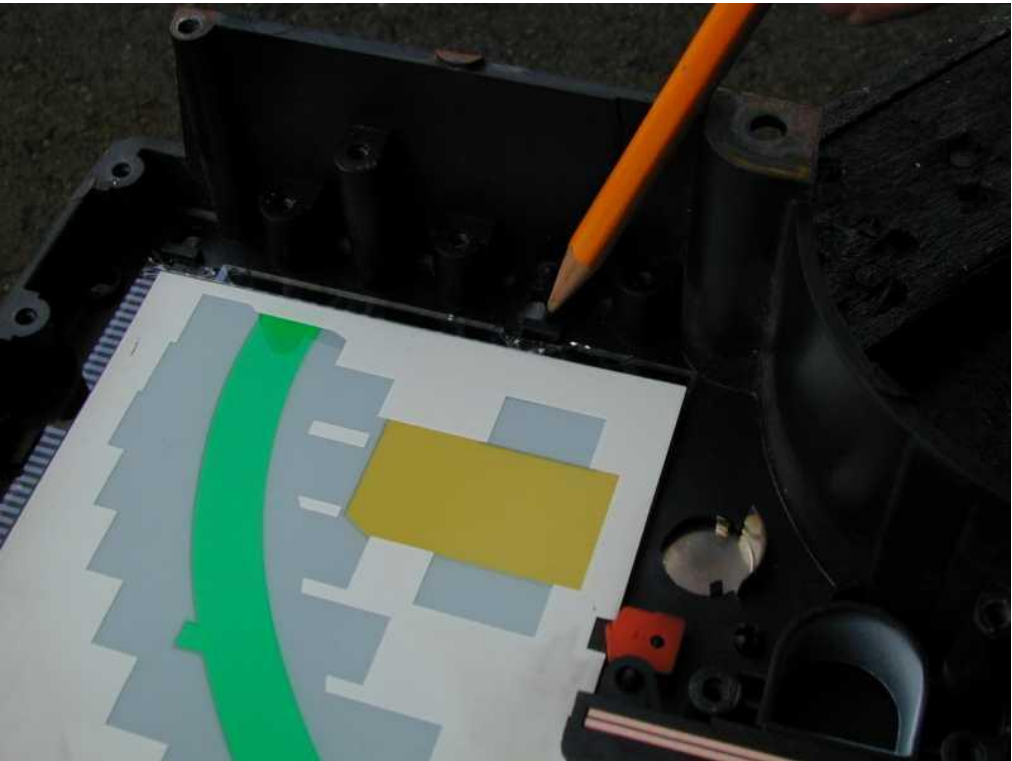
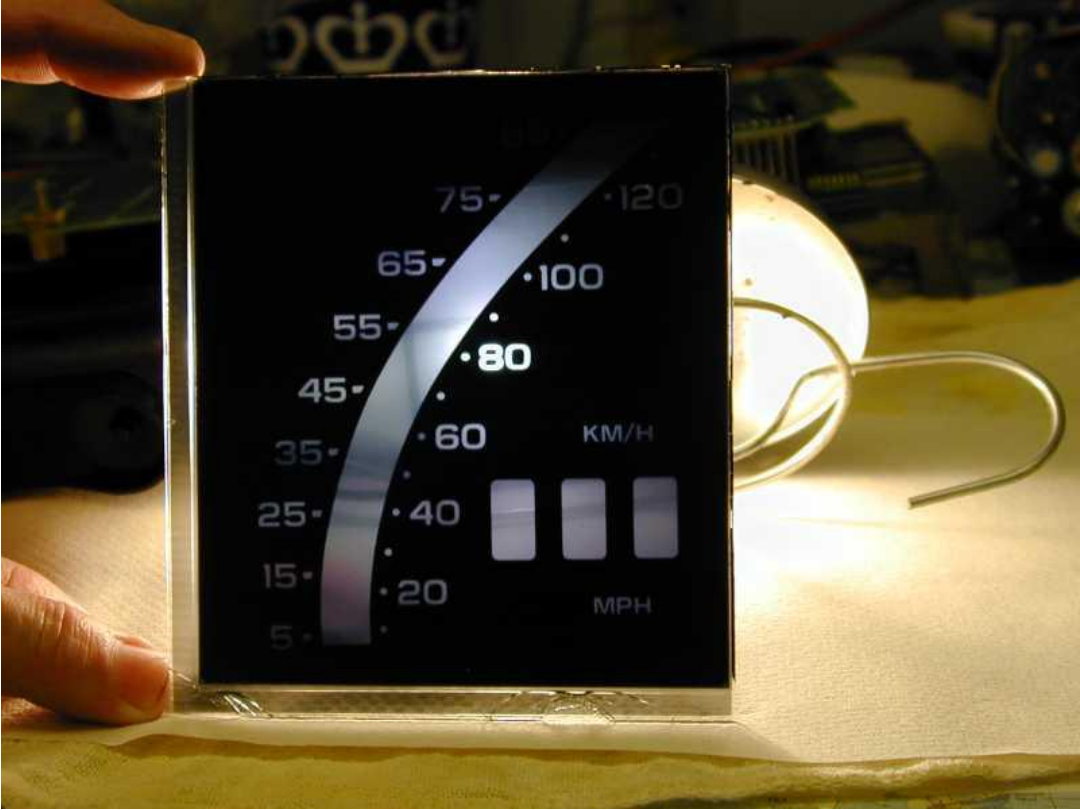
### **Reassembling the Digital Cluster**

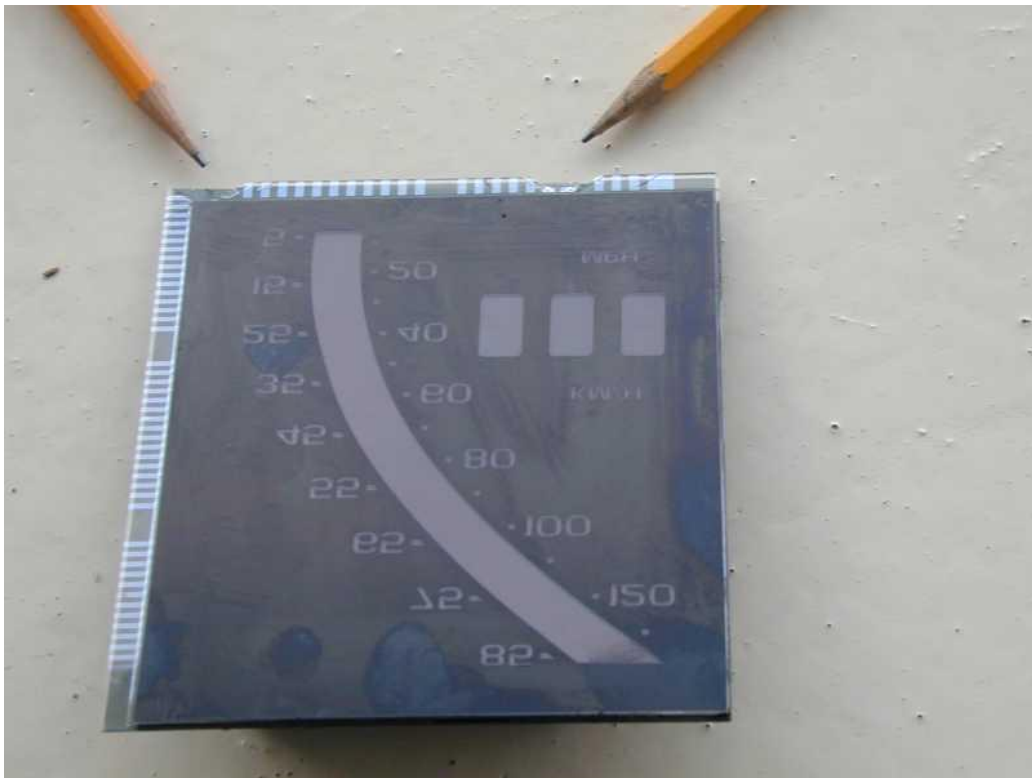
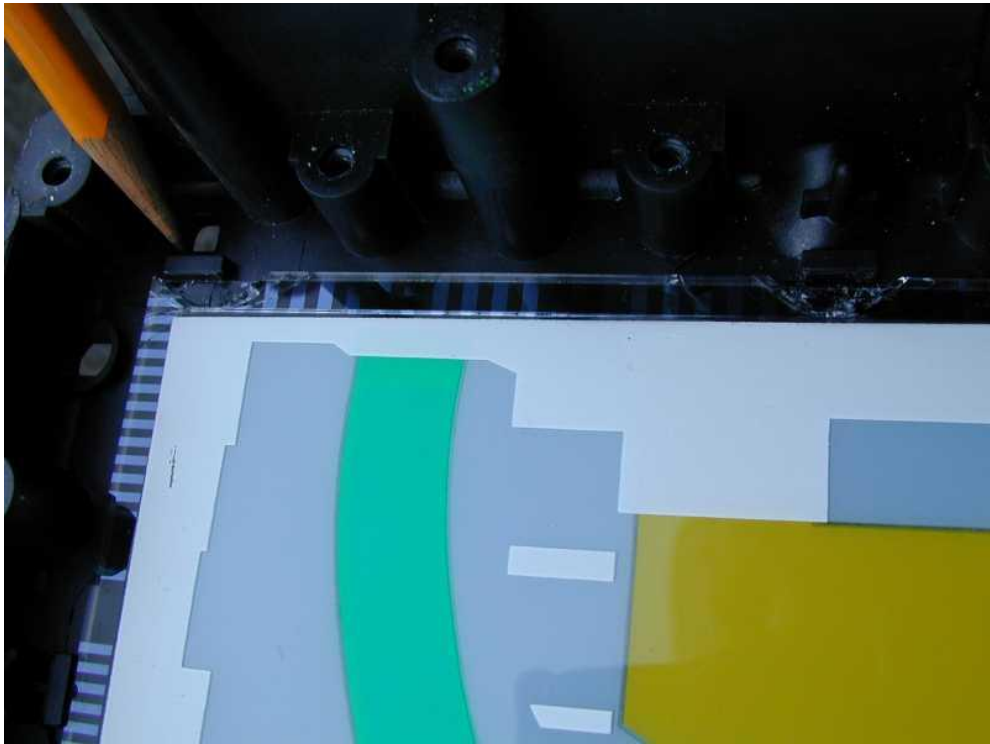
Caution: When assembling the LCD displays verify that it is inserted and down flat between those alignment tabs. It could be missed if the unit is sitting on a pad or towel that could leave it raised up a bit. Seriously - there have been two reports of problems concerning LCD panel damage during reassembly, so be careful!

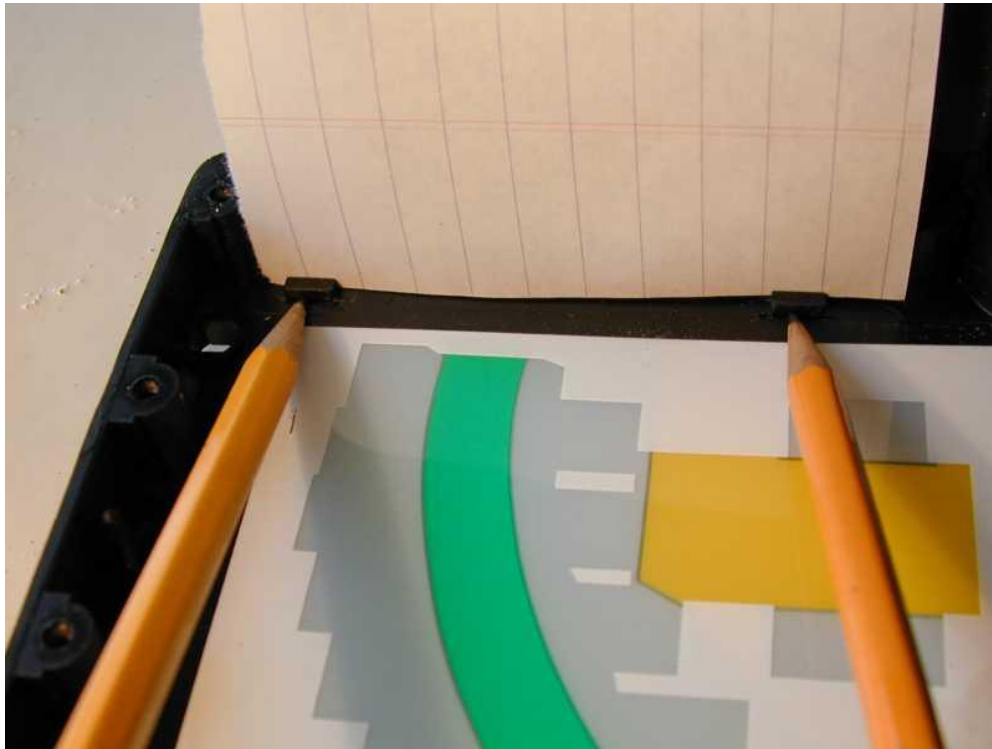
User Re-assembly Warning from Bill Blake (bblake@idmail.com): The person before me must have had it all apart. He then assembled it by not noticing that the glass LCD module needs to sit down in the correct location as determined by the positioning tabs around the edges of the glass. You mentioned that it all goes together easily with proper alignment tabs etc. It certainly does but this guy must have been in a hurry. He left one side cocked up on two of the square shaped tabs alongside the edge connector. When the remainder of the assembly was screwed down it crushed the LCD display. This left two half moon shaped shattered glass spots on the edge connector of the LCD display. This of course wiped out the connections embossed on the glass at that spot. I figure there are at least a dozen connections all told that are destroyed.

User Reassembly tip by CorvetteForum reader Jan-Erik: A very good advice. Do not touch the rubber that makes the contact between the display glasses and the lower pc board. Then you can lose some of you segments in the display. If you do you have to take the rubber and the plastic foils above the glasses up and clean it with pure ethanol or alike. Clean the rubber also. Then install it again and everything will be ok. I would recommend to change the bulbs when you have everything out. It is extremely easy to do it when you have the cluster out and you have removed the upper pc board.

The following series of pictures were provided by Bill Blake:  
Speedometer LCD panel showing damage that can occur if not properly aligned







### **Before reassembling the cluster**

- Clean all surfaces of the LCD panel and bottom circuit board with Ethanol or high-grade isopropyl alcohol. This includes the conductive part where the pink rubber blocks rest. Also clean all surfaces of the rubber blocks and don't touch the surfaces where the rubber and glass meet. The oil residue can cause segments not to work.
- If you're missing segments in your display, remove all rubber blocks from the glass and PC Board and clean all mating surfaces of the rubber blocks and the glass with alcohol.
- Heed the warnings above! Be careful - the images show how wrong things can go if you don't. You have been warned.

### **Reassembling the Cluster**

1. Place the glass LCD displays into the Digital Cluster housing. There are numerous rubber and metal clips used to precisely position these panels. Make sure you don't pinch them between the glass and the panel housing. Be sure the LCDs are positioned correctly and right-side-up.



2. Place the plastic trays that position the pink rubber blocks onto the backs of the LCD panels.
3. If you removed the pink rubber blocks, place them back in the plastic trays after cleaning the mating surfaces of the rubber, glass and bottom circuit board with alcohol.
4. Replace thin plastic colored sheet.
5. Replace the three thick clear plastic pieces (see Fig 9).
6. Replace the bottom circuit board. Start all 22 screws before tightening, then be sure to tighten them evenly.
7. Replace the odometer.
8. Replace the top circuit board. Be sure the pins from the bottom circuit board are aligned with the holes in the bottom of the top circuit board.

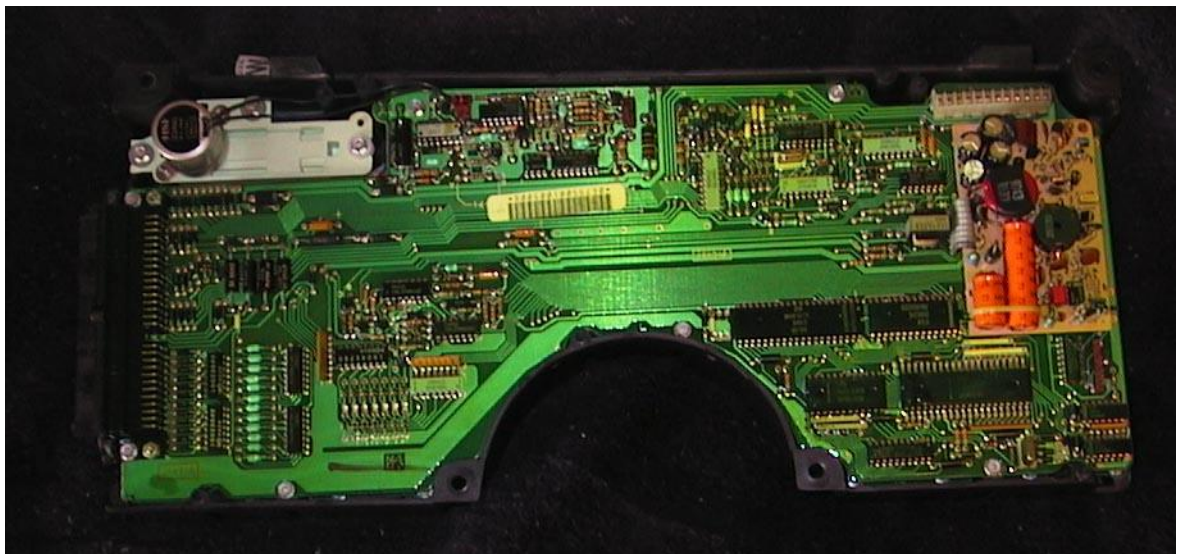


Figure 10 - Housing with both boards and odometer reinstalled

9. Reconnect the odometer lead to the top circuit board.
10. Replace the metal back cover onto the instrument panel housing.

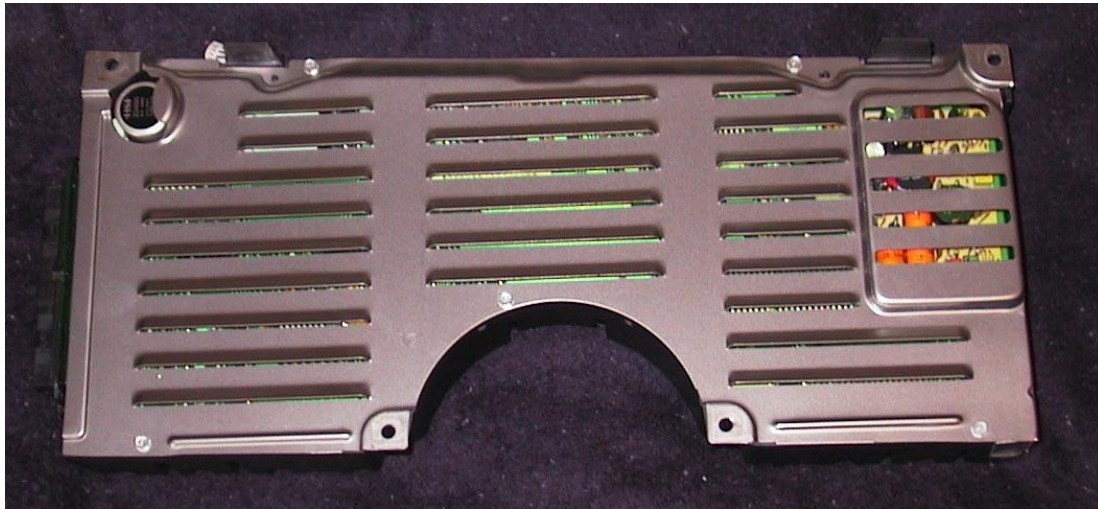


Figure 11 - Back Cover replaced.

### **Reinstalling the Digital Cluster**

1. Reconnect the instrument panel to the two electrical connectors. Test functionality before reinstalling.
2. Just reverse the steps above when you removed the panel to reinstall it.

Congratulations! You're done!

### **A Note From Bryan**

I've spent a good part of the last nine years creating, compiling, and producing the information above, and I hope that it helped you to resolve a problem. If so, it probably saved you between \$300 and \$500. Consider [clicking here](#) and donating a \$20 to keep the information free.

Thanks,

Bryan A. Thompson