Basic Car Audio Electronics Repair Tutorial

Email: babin_perry@yahoo.com – Repair Intro Page

Introduction to Car Audio Amplifier Repair

Gulim Font Confirmation:

All modern versions of Windows are supposed to ship with the Gulim font but it seems that some computers are missing the file. The font is the best I've found for this tutorial it's clean and extremely easy on the eyes. If the text in this paragraph doesn't look like the 20px example below, I'd recommend installing Gulim. Click on the image below to go to the instructions and file link. ∨∨∨ This is an image, not a block of text. ∨∨∨

Recommended Fonts:

- Gulim (generally thin) <<< I'm really liking this one at the 20px size (below).

As a side note, if you had a 2 volt (max) deck that produced 1 volt (at full volume) with the 0dBfs track (no boost) and you wanted to be able to use the full range of the bass and treble controls, you could fade away from the RCA output you were using (the front in this case)...

If you don't have the Gulim font as an option, the file is HERE. If you're using Safari (makes this easier) right-click the Gulim.ttc file and choose install from the menu. If you're using Chromium (not good for dealing with files and folders), you will click the font file. It will be downloaded and you'll have to view the file in the download folder to install it.

Gulim at 16px:

As a side note, if you had a 2 volt (max) deck that produced 1 volt (at full volume) with the 0dBfs track (no boost) and you wanted to be able to use the full range of the bass and treble controls, you could fade away from the RCA output you were using (the front in this case)...

Gulim at 24px:

As a side note, if you had a 2 volt (max) deck that produced 1 volt (at full volume) with the 0dBfs track (no boost) and you wanted to be able to use the full range of the bass and treble controls, you could fade away from the RCA output you were using (the front in this case)...

Background	Fonts

We both know that you're not going to read this section (that has no technical information) the first time you see it but I ask you to come back and read it soon. It really is important information that will help you navigate through the thousands of files included in this tutorial.

A

Working Through the Content

The Quick Links menu at the top of the directory is for use after you've become familiar with the information on the various pages. To most effectively work through the tutorial, start with the Safety page, just below the - Directory - Repair header. Work down from that point. This will make the information easier to understand than skipping around.

Resizing Content

I don't think this is news to anyone but I'll post it anyway. For those who are unaware, you can change the size of the text and images easily by holding the ctrl key down and rolling the mouse scroll wheel (or using + or - buttons on the keyboard). The shortcut ctrl-0 resets all. Try it now if this is new to you. If you'd like, you can make the content of the left pane completely fill that pane in this way.

In some instances, you'll want to search a long page. If you go to full-screen (F11) and resize, smaller, you can scroll a lot more quickly. When you find what you're looking for, find the number it corresponds to in the list. Click one of the 'Back to the Top' links and reset the size. Then click the number in the list to go back to where you need to be.

If there are no list numbers, highlight and copy a short segment of text. Resize and then perform a ctrl-f search for that text.

The reason that the two options are needed is because the zoom can travel quite a ways from the point where you are when zoomed out.

Other Navigation:

For these to work as expected, you may need to click in the frame you want them to work in (main or directory) to have them work as expected.

- Home Key:
  The Back to the Top links are generally best, where available, but the home key will get you to the top of the page (maybe higher on the page than you wanted to go, if you're looking for the menu). The BttT links are especially helpful for those who are working away from a computer desk (i.e. on the shop workbench) and may not have a keyboard immediately available.

- End Key:
  Same basic function as the home key but it brings you to the bottom of the page (where there is often a Back to the Top link).

- Page Up/Page Down Key:
  These step approximately one full page height per click and will repeat if held down.

- Insert Key:
  This one can cause confusion because there is no indication which mode it's in. Try not to click it. If you accidentally do and you try to edit text, what you type will overwrite whatever was to the right of it. To make things worse, it's not recognized by all software so where it interferes with one program, it won't with others.

- PrtScn Key:
  This one copies what's on the monitor. Alt-PrtScn captures only the active window. These copy to the Windows Clipboard. Then you paste them into something like Irfanview, edit as desired then save as the file type of your choice, in the location of your choice. Type .PNG is often best for captures with sharp text, .JPG is better for captures that are

more photographic in nature.

- Scrolling Long Pages:
  Some of the pages are long and using the scroll bar handle at the right of the frame may not work very smoothly. If you click your center/mouse wheel button, the cursor on the screen will <u>change</u> and moving your mouse up or down slightly will scroll smoothly. The distance you move your mouse from the point where you clicked will determine the scroll speed. After scrolling, clicking the mouse wheel again will clear this mode of scrolling.

Background Color and Font Options:

For those who are really interested in this type of work, you will spend significant time with the tutorial. To help make it better for you (visually), there are now options for font and background colors.

Earlier versions of the tutorial had strict font control but in recent re-writes, the control over the fonts was largely left to your discretion and will be whatever you choose. Arial or Verdana are web-standard fonts. Those two are OK for short periods but not for extended reading. If you have it, Gulim is a very fine/thin font that sometimes works better than the two previous suggestions. The likely default is 'Times' which is hard for me to read for long periods. Depending on the monitor, fonts from 14 to 24 pixels may be options for various readers. My preference is Gulim at 20px and that's what's set in the .css file (it can be changed). If you find yourself using the zoom feature (ctrl-mouse scroll wheel) often, you can change the default font in your browser. <u>THIS</u> page (more important than you might think) has several examples if you're not familiar with fonts.

If you're using one of the browsers (other than the recommended Safari or Chromium portable) that doesn't allow you to set a suitable font or adjust the font size (Maxthon browsers or the older Opera 12.14), you can set the font face and size in the .css file. Email me at the following address if you need help doing this.
babin_perry@yahoo.com

New options for the <u>background</u> have also been added. These options are not quite as simple as clicking a button but they only require that you:

1. Open a .css file in Windows Notepad (nothing else).
2. Copy and paste a number or name into a specified location (simple).
3. Save the .css file and reload the tutorial page to see the results. Change until you find what you like the best.

Remember that links for both the background and font instruction pages are at the top of this yellow table and that this page is the second one down from the top, in the directory.

Flash Content in this Tutorial
This should have been resolved before you purchased the tutorial but if it wasn't...

This tutorial uses Flash graphics extensively. If you're using a mobile device like the iPhone or iPad, it's likely that you won't be able to view most of the interactive content because many of those devices can't display Flash graphics.

Using the right hardware and software:
To get the most from this tutorial, use it with a standard desktop or laptop computer with a

full-sized monitor and a mouse/trackball. Use a Flash-capable browser. If you contacted me before purchasing the tutorial, it's likely that we've already confirmed that you have a suitable browser. If you want to find a different Flash-capable browser, go to **THIS** page or email me at:
babin_perry@yahoo.com

There may be instances (in some browsers) where you may not be able to enter values into the Flash graphic text fields if you try to enter them where the graphic resides on the page. If that happens, click the link below the graphic to open it in its own tab. This should resolve the problem. If not, email me.

Possible Monitor Options:
Today's monitors are typically in a wide-screen format and generally best suited for watching movies. They are not really formatted for viewing long pages. To see more, at one time on your monitor, you can go to full-screen mode. To toggle full-screen mode, use the F11 button/key. This will increase the effective height of your monitor.

If you're familiar with the operation of computers and hardware and are using the tutorial on a high-resolution, wide-screen monitor (which the tutorial doesn't need), you may want to rotate the monitor 90° and use the monitor in portrait mode. This is done by some who code or produce large vertical text documents. Do this only if the computer is exclusively used for the tutorial. It may not be suitable for daily use for other content.

If the monitor in portrait mode isn't quite wide enough to fit the two frames, there are a couple of simple options. One is to grab the frame between the main and directory and slide it over toward the directory. The other option is to right-click the link in the directory that you want to open and select open link in new tab. There is an Easter egg in the directory cells. If you click the upper corner of the cell, that will open that cell's link in a new tab.

Above, it was stated that you don't need a wide-screen monitor for the tutorial. An older 19" 4:3 monitor with a 1280 x 1024 resolution will work well. Larger than 19" is a bit better but not necessary. I used an old Dell computer with a monitor on an articulated wall mount, for the monitor. The keyboard and mouse were wireless but I so rarely used the keyboard, it was only important that the mouse be wireless. If you have a neat workbench, neither needs to be wireless. What made it work so well was the articulated wall mount (monitor had a VESA mount) for the monitor.

One last note... The most basic, 10 year old Dell or HP computer running Win7 will do all you need, to use the tutorial. Ask around and you'll likely find people willing to give you computers that are just taking up space.

Pre-Loading:
This pre-loading will work anywhere in the tutorial (except the Quick Links) and will prevent waiting for pages to load. If you want to open any/all of the tutorial links in background tabs so they will load and be ready when you switch to them, right-click >> open link in new tab.

Flash:
The embedded Flash files have advantages that make them useful. The vector aspect of the graphics means that they are essentially infinitely scalable. They will remain sharp, regardless of the magnification. They will, in some cases, contain large raster (photo) files. These take

significant resources when used at high resolution. Many of the pages with these large files will cause slower computers to hesitate when you scroll over the large files. If this becomes a problem, grab the scroll handle and scroll the full length of the page several times quickly, the browser will store the files in RAM and from then on (until you leave the page), the page should scroll smoothly.

For all Flash files, you can zoom in (right-click and select from menu). To navigate when zoomed in, use the left mouse button (click, hold and drag). When opening a Flash file in a new tab, go to full-screen mode (F11) or at least maximize the window.

The various Flash diagrams can be printed at high quality if you open them in the stand-alone Flash player (if you installed all four Flash Player files). For many Flash diagrams, there is a link to open them in the new tab. If you copy the file name from the address field, find it in the tutorial files, in the Windows file manager and open it by double-clicking it there, it should open in the stand-alone Flash Player. From there, you can print it.

Remember that you're not limited to printing to paper. You can print to PDF and other formats. The options are likely in the printer options dialog box.

When you open a Flash file (extension .swf) in the stand-alone Flash player, it allows printing but there is another option for a small number of .swf files. There will be a .exe file with the same base file name as the .swf file. Many people will panic (for good reason) when they see a Flash-related .exe file. These files are harmless. They allow printing if you don't have the stand-alone flash player installed. Your anti-virus will likely warn you and scan it when you click on one but all will come back clean.

Mains Voltage and Damage to the Scope Ground

The Term 'MAINS':

You will see the term 'mains' in the body of this tutorial. The term refers to the AC voltage supplied by the electric utility company. In the US, it's 120v, 60Hz at common wall outlets. Another common mains voltage is 230v, 50Hz. There are many others.

Connecting a mains-powered scope's chassis ground clip (generally connected via a banana connector on the front panel of the scope) or scope probe's ground clip to anything other than a 0v ground can damage the scope because the scope's chassis ground is typically connected directly to the mains ground. The GND on the scope in THIS image is obvious, as is the probe's ground clip lead.

For many 12v power supplies with 3-prong power plugs, the front panel output 'ground' terminal is also connected to that mains ground.

If you connect either of those scope grounds to power source (±voltage) inside an amplifier, the scope and/or the amplifier could be badly damaged because that voltage will try to pass through to the mains ground via the 3-prong mains power plugs. You'll essentially be shorting that supply voltage to ground. This can lead to excessive/damaging current passing through the scope's ground circuit because the large bank of capacitors, charged to high voltage stores considerable energy and that energy will be discharged into your scope.

THIS page has information that will help prevent you from using a damaging ground point

for your scope.

My Shorthand

†:
You will find an unending number of dagger (AKA obelisk, or obelus) symbols of various colors. These allow explanations of various pieces of information without having a comma-enclosed comment several sentences long inside a paragraph.

There may be 10 yellow daggers per page but the small dagger (with paragraph text) and large dagger (below, on its own) open/close that colored pair. If you see another small dagger of the same color later on the same page, look for it's larger mate shortly below it (could be several paragraphs or images below).

~:
If you see the character '~', it means approximately. For example, ~15v means approximately 15v.

±:
If you see the character '±', it means positive and negative. For example, ±15v means positive AND negative 15v. This is commonly used when stating the output voltage of the various power supply circuits (±15v, ±rail voltage, etc.).

B+:
B+ is the positive battery terminal connection on the amp or the positive 12v source (depending on the context).

TNFG:
TNFG means Take Nothing For Granted. Confirm everything that could make a difference for the circuit you're troubleshooting. Make no assumptions.

xxx:
If you see a part number that has a lower case 'x' as part of the part number but the other letters of the part number are upper case, it means that there are several versions of the same basic part. For example the TLx94 could be a TL494 or a TL594 but, for the context, they are similar enough so that the TLx94 would cover both parts. The same goes for the L7815, L7805, L7809.... If the context was for the L78.. regulators in general, they would be referred to as the L78xx regulators.

Weeds:
You'll see 'a trip into the weeds' (or something similar) throughout the tutorial. These are (generally) short tangents with something that may be of interest. It's not generally completely useless information but may not be perfectly in line with the more relevant content on the page. For long paths through weedy areas, you'll generally have an option to skip over it.

Part Number Clarification:
If you see a lower case 's' at the end of a part number (particularly one that has other letters in upper case), that's the pluralization of the part number and is not part of the part number. For example, If you're instructed to replace the 'IRF3205s' in the circuit, the part number is

IRF3205, not IRF3205S. There may be instances where you will see something like IRS21844S. The capitalized S suffix is part of the part number. IRS21844Ss would be plural.

There will be instances where multiple pins of an IC will be referenced. Let's say it's a TL494. If the pin referenced is pin 14 (which is the 5v regulator output pin, by the way), it may be referred to as 494-14. If there are multiple TL494s and they are designated as IC601 and IC602, that same pin of IC602 may be referenced as IC602-14.

PDF Page Number:

You will have to use PDF files with the tutorial. If you see it written that you need to go to 'PDF' page xyz, that means the number in the page indicator on the toolbar of the PDF reader. There are instances where the numbers on the original printed document don't match those of the PDF file. This should make it clear on what point of the document you should be looking, for the information.

Map Reference (MR):

In some documents like PDF diagrams (and maps), there are numbers across the top/bottom of the page and letters down both sides of the page. These are used to give a reference location on the page. This helps you to give the location of a part that may be difficult to find. For THIS diagram, if you were told to check Q126, you may be able to find it quickly (maybe) but if you were given the page number and the location/reference of page 1, F6, you could go directly to it. If you're using PDF Xchange Viewer, zoom out, align the horizontal and vertical markers (they show mouse x-y positions) to F and 6, then use ctrl-roll mouse scroll wheel to zoom in on that point.

PDF File Links:

There will be instances where you will click a PDF file link and it will open in a browser window. The application used by that browser may not be ideal. The file location will be shown in the browser's address field at the top of the browser window. You can:

- Navigate to that folder and double-click the file to open it in the default PDF viewer

- Or, copy the entire address, open your PDF viewer, choose the 'open file' option and paste the entire address into the file field at the bottom of the window.

- Or, copy the entire address, open the Windows file manager (Windows Explorer, File Explorer) and paste the entire address into the address field at the top of the window and click enter. This will work for any files that have a default application associated with the file type.

- Recommendation: PDF Xchange Viewer. It's fast, free and works very well.

- You should have installed Safari for times like this. Safari is FAR superior to other browsers when you will encounter files/folders and PDF files. Other browsers open the PDF files in a generic PDF browser. Safari opens it in a Safari window but it opens it in your default PDF application. This retains all of the features you expect (including being to navigate with the hand tool). Safari !! If you see a horizontal rule at the top of a page that is colored like the one below, instead of the normal gray, the page will be nearly impossible to use, as intended, with anything other than Safari.

[▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬]

PDF Viewer Access:

If you want a quicker way to access your PDF viewer, there are several things you can do. The easiest are to pin it to either the Windows Start Menu or the Windows Taskbar. In Win7, all you have to do is right-click on the PDF viewer in the list of software/applications (instead of left-clicking, to open it) and select pin to either the Taskbar or the Start Menu. You can also send a shortcut to the desktop. Same process as before but you select Send To >> Desktop (Create Shortcut).

Use the Suggestions as Starting Points

There are many tips in the tutorial. Most work well for me and probably will for most people. Use them as a starting point. You may (will) find a way to do some things that will work better for you... but, when first getting started, don't spend time TRYing to reinvent the wheel. Instead, spend time learning the material.

Although many tips will be in sections for a specific type of amplifier, don't let that give you tunnel-vision. Many of the tips can work for other amps, as well.

Markers

For sections that contain checklists, important information or graphics, I've added markers. For text... copy the text between the markers and paste it into a text editor (Word, Notepad, Wordpad...). For items that cannot be copied and pasted, there will be specific instructions. Print the items and keep them handy for the first few repairs. If you see a '•' next to a link in the index of a page, that indicates it's a section where you'll find the markers.

What You Need to Know About the Links

There are many links to other pages. Many times, the link is to a point in the middle of another page. If your computer's hard drive isn't fast enough, the place where you land may not be precisely where you want to be. This means that you won't see the information that you're expecting to see. If the page loads in the same pane of the browser (to the left of the directory), let the page load completely (will take 3-4 seconds) then go BACK and click the link again. Generally, the second time you go to the page, you'll land in the correct location. For pages that open in a new tab, let the page load, close the page then click the link again.

For those who cannot get the page to load properly, I generally have the name of the page and the item number on the page. It will look something like this:
flameproof and fusible resistors (Resistors and Capacitors page, Item #6)

For links (both images and entire pages) that pop-up new tabs, close the new tab (ctrl-w is often quicker/easier than using the mouse to click the x) after your done with it. If you click another link and the pop-up window is in the background, the linked page will open in the background window and you may not realize it (leading you to think it's a dead link).

'Ghosted' Text:

There will be some text that will be barely visible (like the 'Back to the Top' buttons/links that

you'll find on many pages). The text is generally non-critical and could be insignificant comments, options/links... If you left-click and drag to highlight the text, it will become clearly visible.

'Ghosted' <I:
If you see <I where you would expect to see a blank space, it's a snippet of information that will show up in a balloon if you place your mouse cursor over it.

Highlighted Links in the Directory:
There are some links in the directory that have a rectangle around them. These links are for pages with a heavy load (multiple Flash files and/or a large amount of content). These will take longer to load in Safari. The left-hand pane may turn white or seem to freeze until the page loads. For Safari, the wait can be up to 10 seconds for loading (but will depend on your computer), the first time you visit the page. After that, Safari should cache the page so subsequent visits will load more quickly.

Types of Links:
The following applies to the pages where all links are color-coded. There will be some links that open in new tabs. You can close the new tab after reading the pertinent information. There will be no 'back' option on these tabs/pages. When you click a link that doesn't open a new tab, it's likely that you're being redirected to a point on the same page that you are on. In those instances, selecting the 'back' option will get you to where you previously were.

- A link with this color underline is an **ex**ternal link and best used with Chromium portable. Expect Safari to fail for any external (pink) links. These are typically the only links outside the tutorial files.
- A link with this color underline is a link to a pop-up image. In Safari, it will open a new tab. To clear it, close the tab. In Chromium, it will open a pop-up window which needs to be closed.
- A link with this color underline is an internal link. It will open a new tab. To clear it, close the tab.
- A link with this style (gray) underline is an internal link but the content is on the same page that you're currently viewing. Clicking that link will bring you to the relevant point on your page. This is the only type of link, for most of the pages of the tutorial, where the 'back' button will be used to bring you back to the previous point you were viewing.

External Links:
The two most common browsers for the tutorial are Safari 5.1.7 and the portable version of Chromium. I like Safari but some of the external links won't work with it. Using Chromium portable will eliminate the external link problem and still give you the ability to view all of the Flash graphics.

With the ever-changing internet, some links will go dead. If a link no longer works, you can generally use a search engine to find the information you need.

Internal File Manager Links:
One advantage of Safari is that, when you click on a link to a Windows folder/directory, it opens the Windows file manager. This means, if you have an image viewer that allows you to

scroll through images with a click or roll of the mouse scroll wheel, you can do so (IrfanView, highly recommended). Safari will also generally open files in their native/default application (important for .PDF files), instead of opening them in the browser's internal PDF reader, as Chromium portable does.

As far as I can tell, no version of Chrome will use the native applications. For graphics, every image is a separate link that you have to click. If you open the Windows file manager (Windows Explorer, File Explorer) directly and copy/paste the link into the address field at the top of the file manager and hit return/enter. This will bring up the folder and allow normal file interactions. More on this, below.

Navigating directly to file locations is much quicker if you have the Everything Search Engine installed. Drop a folder or file name (not the complete file link) into its address field and it immediately comes up. It works especially well if you can only remember part of the file name. Start typing and the possible file names start to come up. The more you type, the shorter the list becomes. When you see the file that you want, you have a couple of options. Either double-click to open the file or right-click it and select 'open path' to open the folder with the file you searched for. To test this, open Everything and start typing *500a2* or *200ix* in the Everything address field. The most efficient way to search is to type two asterisks and then start typing between them. You will see that it makes it very easy to find files, by name. Bear in mind that it doesn't search contents of files which will generally make it much quicker than the native Windows search.

The Windows Key:
By using the 'Windows' key + e, you will be able to open the file manager, directly.

You will see the following block of instructions (or a 'navigate' link back to here) in various parts of the tutorial. This helps you navigate much more efficiently.

> This is the link to the MiscellaneousStuff folder.
>
> Click the link above if you're using Safari (preferred browser for opening files and folders).
>
> If you're using Chromium Portable, copy the link address (right-click link and select copy link address) and drop into the address field of Windows Explorer. Using the Windows key + E will open the Windows Explorer file manager.

^^^ Try this now ^^^
with both the Safari AND Chromium Portable browsers

Notes/Review:
- There may be instances (in some browsers) where you may not be able to enter values into the Flash graphic text fields if you try to enter them where the graphic resides on the page. If that happens, click the link below the graphic to open it in its own tab. This should resolve the problem. If not, email me.
- THIS is what you will see if browsing files/folders with Chromium. THIS is what you'll get when browsing the same files/folders with Safari.
- Safari won't work for most external links. Use Chromium or copy and paste the link into your preferred browser. You won't miss much, externally. Most are links to McMaster. For most links in the tutorial, Safari is far better than anything else.
- When you go to paste the copied address into the address field of Windows Explorer, the

word 'computer' will be there. Click on a vacant part of the address field and the background for 'computer' will switch from white to the default system color (generally blue). At that point, you can right-click in that field and paste the address. Then hit the 'enter' key to go to the folder with the files for that link.

^^ Will work for copied/pasted addresses that have the full file link (like the one below, small text so it would fit on one line) and will open folders in Windows Explorer. It will generally open files in their native viewers (good for PDF files). You can copy the text below and try it in Windows Explorer. Use the Windows key + E to open it as suggested above.

file:///C:/power%20supply%20tutorial/power%20supply%20tutorial/repair_tutorial/miscellaneousstuff/jbl/bp1200p1_sm.pdf

For partial names, use the Everything search engine (if you have it installed) and the asterisks (for more thorough searching) from inside the repair tutorial folder. When you right-click, THIS is what you'll see. Choose the Search Everything option and search as suggested.

- The various links in the tutorial are generally set up to open in a new tab. If you click the links (as you should), you can have too many open tabs if you don't immediately close them. If you find one that you want to keep open but want to close the rest, right-click that tab and select 'close other tabs'. That will leave you with only the selected tab open.

  To keep more than one open, slide all the tabs you want to keep open to the left. Then use the option to 'close tabs to the right' (not an option in Safari).

CTRL-F:

Many keyboard shortcuts perform the tasks immediately but some like control-f require input. Control-f is 'find'. It brings up a dialog box or text input field and allows you to enter a word or string of text when you hold down the control key and while it's down, you press the F key. This works universally on virtually every Windows application. The Windows 'find' function is very thorough and therefore can take a relatively long time to complete a search. The wider the search field (the entire computer), the longer the search time. Searches of relatively small volumes, like the tutorial, don't take long... AFTER Windows has indexed the files. It does this, generally, when your computer is otherwise inactive.

The 'Everything' search engine recommended on the TT10 page (and above – it's wonderful software), item #22. The Everything search engine only searches file names but if you know the file name or any part of it, the returned file list is almost instantaneous.

As an example, I searched the tutorial for 500m (an amp model) with both the Windows SE and the Everything SE. Windows returned 85 items. Everything, only one (which happened to be the one I needed). Try it for yourself if you installed Everything.

Component Part Numbers

Throughout the tutorial, you will see various part numbers for various components. The semiconductors that are available from the various manufacturers are not available forever. Some are available for only about a year. Some for 20 years or more. There is no way to avoid using part numbers and there is no way to suggest replacements that will be available forever. Although the semiconductors are the biggest problem, this applies to various other

components as well. Keep this in mind when you come across obsolete part numbers. The part numbers used as examples were the ones available at the time that that part of the tutorial was written.

In some instances (the output transistors in class D amplifiers, especially) replacement semiconductors that are compatible with the circuit may be difficult to find. To find working/suitable replacements, it may take a bit of comparison of specifications and then extensive testing, trial and error. Some class D circuits may require a bit of re-design to get them reliably repaired. Keep this in mind when you find that an amp uses obsolete transistors when you give a quote to repair the amp.

Radio Shack References

There are quite a few references to Radio Shack items. At this time, RS is still in business and still has some stores open. Even if Radio Shack disappears, some of the items mentioned in this tutorial will be available on eBay. As a side note (and possibly only of interest to those who grew up with Radio Shack catalogs) there is a great site that has old Radio Shack catalogs that you can browse. When you need a break from the tutorial, visit the **SITE**. if you're using a browser that won't work with the link: http://www.radioshackcatalogs.com/catalog_directory.html

Another of the Easter Eggs

For those who read the information in the yellow table above (again, that information is VERY important)... If/when you visit this page again, you can skip the content in the yellow table by clicking the 'Introduction to Car Audio Amplifier Repair' line of text above the yellow table.

If you used ctrl-mouse scroll wheel to resize this page, remember that you reset the zoom with ctrl-0.

Now onto Amplifier-Related Content

This can Make Repairing Car Amplifiers Relatively Difficult:
Getting the bad news out of the way, first... One thing that makes doing this work more difficult is a lack of technical documents and schematic diagrams. Do not expect any support from the manufacturer. It's rare. Some go as far as to deface parts to make it more difficult to repair the amp. This is especially true for the Brazilian types of amps (some are from Brazilian manufacturers and some are Chinese knock-offs).

If you're in this for profit (<< not a dirty word) and won't see many of the amps for which you have no support from the manufacturer and that have defaced components (especially the output transistors), PUNT. Let the owner send it to the manufacturer for repair. Don't let them make their problem your problem.

If you want to experiment with repairing an amp using parts that you believe will be reliable replacements (not good if you don't know the owner VERY well), do so. Be aware that, just because the amp works for a short while in your shop, that doesn't mean it will be reliable long term. If it fails, prepare to be married to it. One more thing. If you're struggling to survive