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How to Swap the Old Roundie Relays with Standard Bosch Relays

By Loyale 2.7 Turbo, July 14, 2008 in Interior / Body Electrical

Fix · Electricity · Loyale 2.7 Turbo · Swap · Relays · Halogens · Horn · Wiring · JesZeK · Relay

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Loyale 2.7 Turbo

The Mighty "BumbleBeast"

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Roatán, Honduras.

Posted July 14, 2008 (edited)

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In This Writeup:

► Understanding **How** a Relay Works.

► Knowing **which** Wire is for, at the Round Relays.

► How to **Swap** the Old Worn Relays with Newer, more Capable ones.

► Finding the **Location** of the Relays on a Subaru EA82 (Third Gen **Leone** / **Loyale**)

► Learning to **Wire** New Relays if Desired... in case you wanna Run Halogens, Bigger Horns, etc...

First of All: I Hope this Write Up will Help anyone with Electrical Problems due to bad Relays, Such as Power Windows, Air Conditioneer, HeadLamps, Halogens ...etc... also you'll learn how a Relay Works and How to Easily Wire New Relays.

You Know that when you Switch Almost Anything Electric in your any car There is a Relay Takin' the Main Job of Sending the Power to the Accesory you Switched On; the Switch that you Touch or Handle, is just a "Remote Control Signal Sender" to those Relays.

Very Long Long Time Ago, I had Problems with my Subarus' Electric Powered Windows, and then Long time ago with the Air Conditioneer too, I Found that the Fault of Slow Workin' / Non Workin' Power Windows was due to a Bad Relay; Also The good ol' subies had A/C Engaging & keep workin' Compressor Problems.

An Easy Fix Would be to Just Change the Round Original **22** Amps Relay, But Those Relays aren't Easy to Find, They Need the Whole 12V Power to engage Properly, they are Expensive, and they are only 22 Amps Rated ... 😬 ... Beside that at this point of the wirings' life, their Sockets (Plugs) Could be burnt too...

In my Own humble opinion, the **Best** Solution of All is to Swap There Bosch Standard Relays. I've Done it to the Main A/C Relay, the Two Auxiliary A/C Relays, the Power Windows' Relay, and the two HeadLamps Relays.

I'll Explain How To do that swap Here, with Photos. 😁

Bosch Standard Relays comes in Many Quality Brands, Not Only **Bosch** (By the way, I Saw Bosch's Made in Portugal, Germany and Brazil, rated at different Amps) There are many Other Brands that Make the Bosch Standard relays, like **Hella**, **Wagner**, **Flösser**, **Osram**, **Sylvania**, **Potter & Brumfield** ... etc ... so They are **Easy** to Find, They are **Cheaper** than stock round relays, and Give **Better** / **Faster** Response; they just need as Little as **8** Volts to Engage, also Bosch Standards are more Reliable, and are Rated from **30** Amps to **40** Amps, so They'll Last Longer too ... 😠 ...

Warning*!* - Please Forget about *Cheapo* bad quality relays.

In Example, This is a photo of a "**Potter & Blumfield**" **40** Amps Relay, Made in USA,

The one that I've Swaped in, instead the Main **A/C** Relay Under the DashBoard:

But to Swap a Bosch Standard Relay in your Subie, You'll Need to Cut off the Subie's Plug and Weld there a Bosch Standard Plug ... Or use an Adaptor. I'll Explain How to do That Too, is Easier than you Could Imagine, but keep Readin' Carefully, and Do Not Forget to Remove one of the Battery Terminals prior to Start Cutting / Welding ***any*** Wire.

Please: Be Careful While doing this, follow this instructions at your own Risk.

The Plugs' Swap is needed to be Done just once for each Relay Unit; then in the Future if you Need to Change any Bosch Standard Relay, the Plug Stays, you only Need to Pull the old Relay from it, and put there a Fresh New Relay; and That's it*!* :)

Edited November 8, 2013 by Loyale 2.7 Turbo

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The Mighty "BumbleBeast"

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► **Power Windows' Relay:** (**Only One**)

It is Located Under the Front Passenger's Seat, Under the Carpet, Near to the Door's Opening. To Work Properly you'll need to Remove the Plastic Carpet Retainers near the Door Opening, and move Up the Carpet.

I Suggest to Remove the Whole Seat to have Enough Working Space to make it easier to cut the Old Plug and Weld the New Plug's Wires to the Subie's Wires, then Putting on the New Bosch Relay.

Do Not Forget to cover Properly and Separately Each Welded Wire with Good Electrical insulator Tape, Then Cover all Wires with said Tape too.

Changin' the Round Original **22** Amps Relay, with a **40** Amps Bosch Standard one there, Gave me a Better \ Powerfully / Faster Responding *"Happier"* Power Windows*!* 😉

► **The A/C Relays:** (**Those are Three**)

- The **Main Relay** is Located Behind the instrument Cluster, under the Dashboard, above the Fusible Box, so you must remove said Fusible Box and the lower part of the dashboard (under the Steering Column) to reach it. (it is Placed Next to other **three identical** relays which I'll describe soon, in other parts of this writeup, So **continue Reading**)

The A/C **Main** Relay receives the **signal** from the A/C Switch and sends Power output to the Blower in the Dashboard and also sends power "on" **signal** to the Other Two Auxiliary Relays, outside, in the Engine Bay.

- The Two **Auxiliary** Relays are Located in the Engine Bay, Behind the Passenger's Side Strut Tower, under the Windshield's Base; They Receive the Power **signal** from the A/C Main Relay as described above, and one of them sends the Power to the A/C Condenser's Fan (Next to the Radiator's Fan) while the other one, sends the Power to the Compressor's Electromagnetic Clutch, in order to Keep it Engaged.

I Changed the Position of the two A/C relays on the engine bay, from "Exposed to Humidity and Heat" on behind the passengers' side strut tower, to "Hiding and Safe" inside a black Box, in front of said strut tower, see:

The Air Conditioneer is Very Needed Here, in my Country (**Honduras**); but Not due to the High Temps at Summer, it is Needed due to the Very long Stormy Wheather Season, to keep the Windshield Glass Clean while Downpour outside; so it is Needed for **Safety** while Driving During RainStorms.

Before I changed those A/C Relay, it was Acting like This: When you Switched it "ON", the Outside Fan and the Main Compressor Worked along the Inside Blower, then after some Seconds, the Outside things Stopped to Work, keeping "ON" the Inside Blower only, or sometimes Everything quit to Work, and if you Switched it Off, it will Never turn "ON" Again, untill many Minutes Passed away, or even Untill the Next Day ...

So I Swapped the Main A/C Relay, and the two Auxiliary Relays for the A/C with 40 Amps Bosch Standard Units, (Along with the Plugs as I Said Before) and since I did That, the A/C is Working Fantastic *!* ... ... Flawlessly, it Engages Faster and Holds On Stronger*!*

As I wrote above, there are Four (**4**) Relays Behind the instrument Cluster, under the Dashboard, above the Fusible Box, to Find the Under Dash's Relays, First you Need to Remove the Plastic Covers (Above the Pedals) and Then Remove the Whole Fuses Box, Looking Straight Above the Fuses Box, Behind the SunGlasses Tray, You'll See the Relays Hanging there, each one held in place by a Metallic Holder, just in the same way that the Fuel Filter is Held Near the Gas Tank.

Here you can see the Removed Plastic Base for the Stock Round Relays from my Subaru " **BumbleBeast**", along one of those Round Relays, the one which is the A/C Main Relay, also notice that I cutted the wires, so it came along its Socket:

this is How the Main **A/C** Relay Looks Like Already Swapped with that 40 Amps Bosch

Standard Relay, Next to the Remaining three Original Subie's Round Relays:

Yes, That's my Hand Holding 'em! 😁

► **The HeadLamps Relays:** (**Those are Two**)

They have Identical Wires and they Work Interconnected. Please note that EACH ONE HAS TWO FUNCTIONS:

- The **Left** Relay is for the **Driver's side** (**Left**) **HeadLamp** AND the **instrument cluster**'s background Lights (its power out line have a **black** wire with **Red** stripe)

- The **Right** Relay is for the **Passenger's Side** (**Right**) **HeadLamp** AND the Blue Lights Indicator of the **High Beam** at the instrument cluster (its power out line have a **black** wire with **Yellow** stripe)

Remember: Both Headlamps' Relays Work Together!

So if the **Left** Relay Fails, the instrument cluster Background Lights will go Off or Dim, along the Driver's Side HeadLamp going -Almost- Off (too Dim), while if the **Right** Relay Fails, the High Beams blue lights Indicator at the instrument cluster will go off or Dim, along the Passenger's Side HeadLamp going -Almost- Off (too Dim).

Before Startin' to Cut Wires like Crazy ... 😉... I Kindly Suggest

You to Obtain a Voltage Tester, like this one that I Have:

Now You Need to Understand First, How a Relay Works;

Then you Need to Find the Right Wires for Each Relay Pin, and Everything will be Just Fine *!*

Edited June 28, 2016 by Loyale 2.7 Turbo

Loyale 2.7 Turbo
The Mighty "BumbleBeast"

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Roatán, Honduras.

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Understanding Relays:

A Relay is a ByPass of Power, to Remotely Switch On / Off an Accessory. A Standard Bosch Relay have Four Pins (There are Five Pins Versions Too, but That will be Explained soon) the Pins are Named:

Nº **30** = Fused Permanent Hot Line (**+**) input, Always On.

Nº **87** = Line Out (**+**) to Power the Accesory.

Nº **86** = Ground (**-**) (Could be Used as Signal to Power on or off the Accesory in**Negative** Switching install, when the Nº 85 has permanent Power)

Nº **85** = Possitive (**+**) (Could be Used as Signal to Power on or off the Accesory in**Positive** Switching install, when the Nº 86 has Permanent Ground)

So Pin **30** (**+**) Pass the Power to Pin **87** (**+**), when Power is Applied to Pins **85** (**+**) and **86** (**-**)

Is Important to Know that Since Pins **85** and **86** are the Remote Switch Signal, you can Remove the Permanent Ground (-) at Pin **86** and connect it to a Switching Ground; Leaving the Pin **85** (**+**) Permanent, Always On (you can Connect it Directly to the Same Wire that comes to the Nº 30 Pin that is Always On Too, That's how a Three Wires' Relays Works) so you can Control the Relay sending Just a Ground (-) Signal, instead a Possitive (**+**) Signal.

Pin connections are as follows:

► **Pin 85** : and

► **Pin 86** :

Those are your Switching control inputs: Applying 12 volts (**+**) **to one** side and ground (**-**) to the **other** will cause the relay to activate or "Turn On" (actually, these relays will activate with as little as 8 volts, but that's another story for a much more detailed discussion)

Polarity is not important here and you can put your switching signal either in the power side or the ground side, depending on what you're doing; generally though, you usually apply power (**+**) to pin **85** and ground (**-**) to pin **86**, but

this is not really important.

One technical thing you need to do here though, if you install a relay through the power of electronic sensitive devices, get yourself a **1N4001** diode (or any 1N4000 series diode), install it across pins **85** and **86** with the band side toward the positive connection. It will act as a **surge protector** in a way (the coil creates a magnetic field which turns back on itself when power is removed, creating a power surge of little current but high voltage which can damage devices in the circuit if left alone).

► Pin **30**:

Is the **high current 12V** (**+**) **input**, either directly from the battery (fused, of course) or from an ignition or accessory circuit output from your ignition switch (also fused). In some cases, pin **30** is used for output instead of input, but we won't discuss that here since it doesn't apply to basic wiring.

► Pin **87**:

Is the **12V** (**+**) **power output to the device** that you want to power up when the relay is activated (when you press the horn button, for example).

Important Note: in the Five Pins Relays, You'll Find an "**87A**" Pin:

That Pin **87A:** (the **A** is for Alternative) is only used if you need power to flow through the contacts when the relay is **NOT** powered up, which means the switching signal is in "off" (such as a starter kill in an alarm harness) or if you are diverting power from one place to another by activating the Relay (for example, if you are using the relay as a headlight Low / High beams switch).

So When Relay is Off, the Permanent Power from Pin Nº **30**, will Flow to the Pin Nº **87A**; and when Relay is On, the Power from Pin Nº 30 will Flow to the Pin Nº **87** as Usual in Four Pin Relays.

Warning! - Please Note that Four and Five Pins Relays Looks like the Same, they got the Same Pin Numbers too, but their Pins are Located **at Different Places**, so if you Pull a Four Pin Relay from its Plug, you can put a Five Pins Relay There, but the Five Pins one Will Not Work there at All or do a Short Circuit: Be Careful!

Edited November 8, 2013 by Loyale 2.7 Turbo

Loyale 2.7 Turbo
The Mighty "BumbleBeast"

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7629 posts
Roatán, Honduras.

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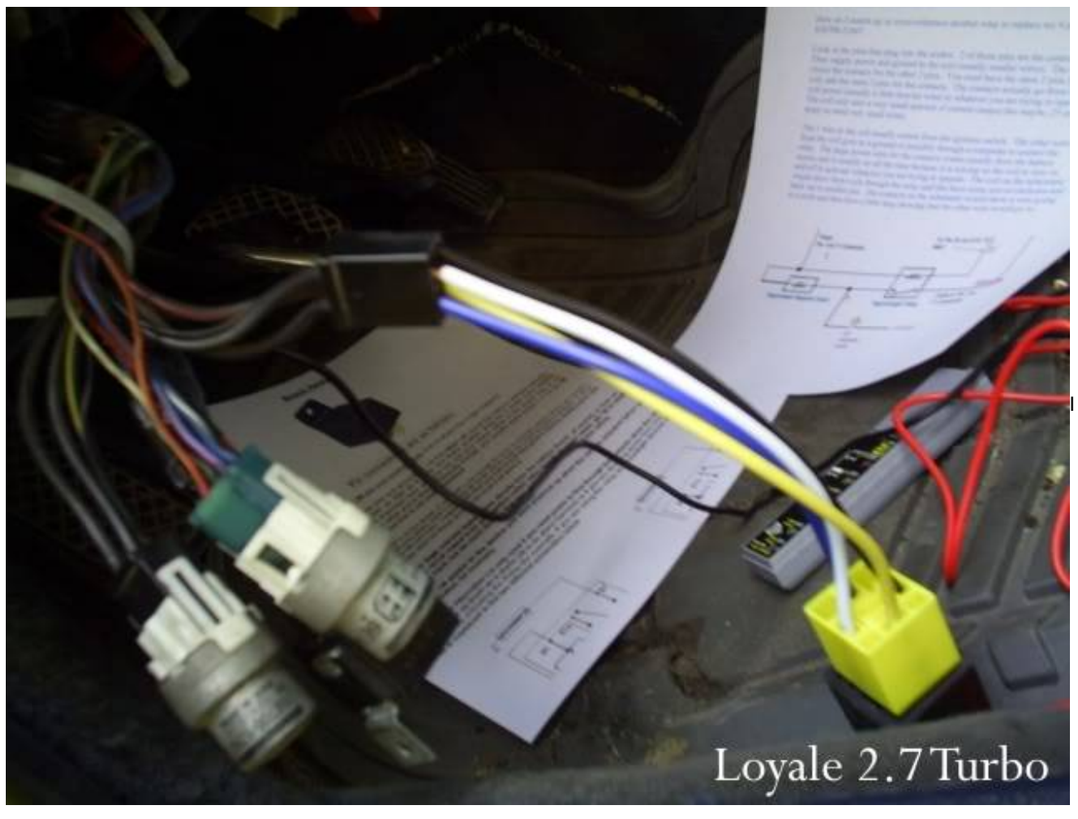
To Change the Subie's Plugs, Cutting off the Old one, Welding the New One:

First: Do a Simple "Test" with the Voltage Tester, to Find the permanent Live Plug, it Shall Goes to the Pin Nº **30**, then Test each Wire turnin' On and Off the HeadLamps Switch to Find the Other Wires and their Locations; then Simply put the New Relay in the New Plug, and simply slide its Wires into the Subie's Old Plug, so you can Test if it Works Properly Before Cutting the Wires.

See How I Tested my New Relay Before Cutting the Wires:



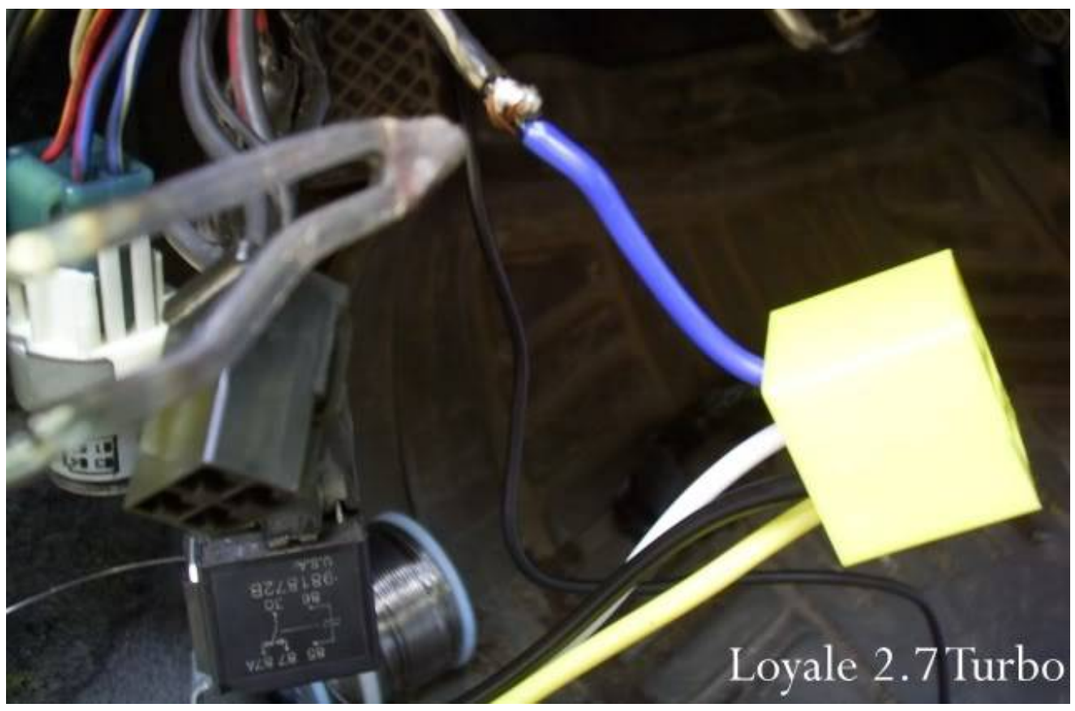
I Did Found Correctly Each Wire's Pin, so it Worked Great!

I Marked Each Wire function with Written Masking Tape.

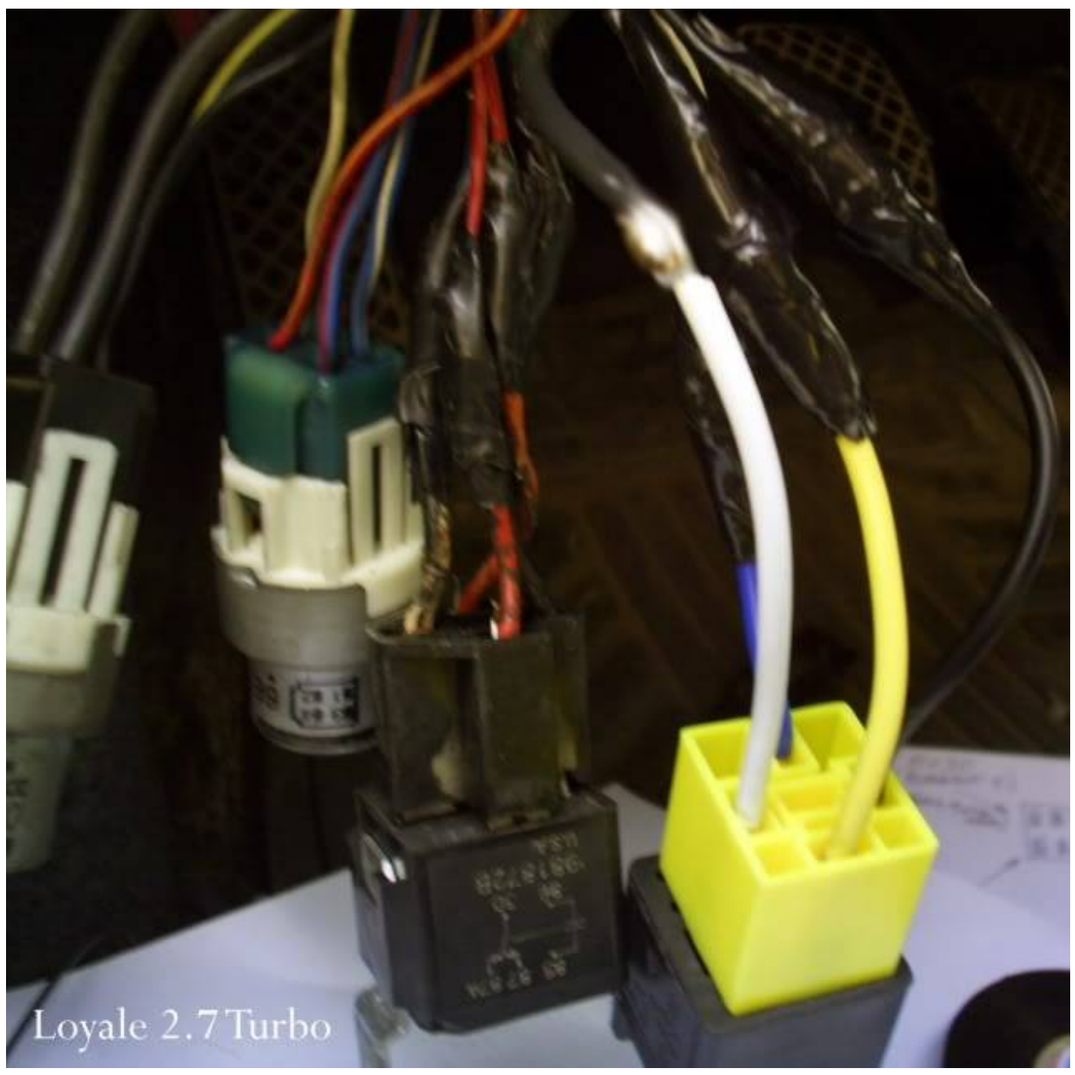
Then Cutting and Welding with a Soldering Gun

Using Rosin Core, Non-Ferrous **tin**, Each Wire,

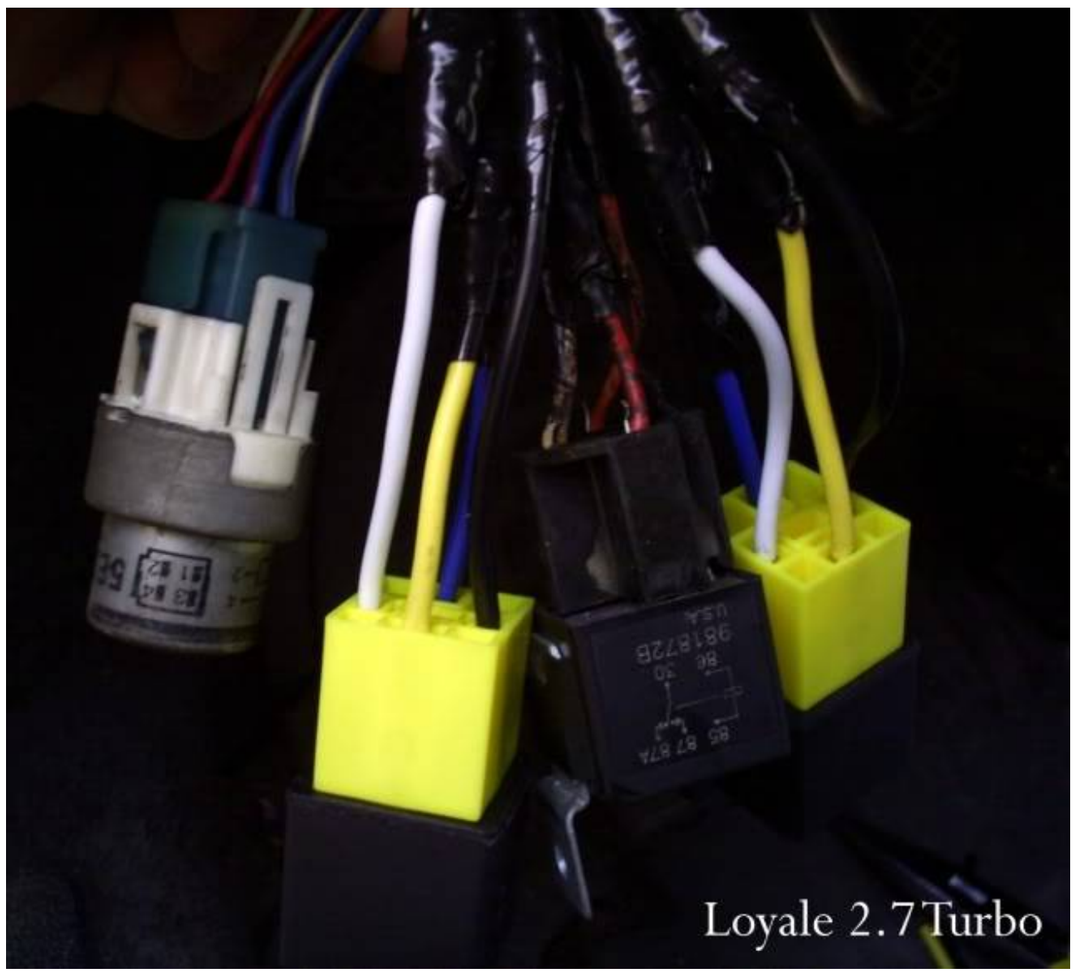
...One by One...



... Cuttin', Weldin' and **Isolatin'**...



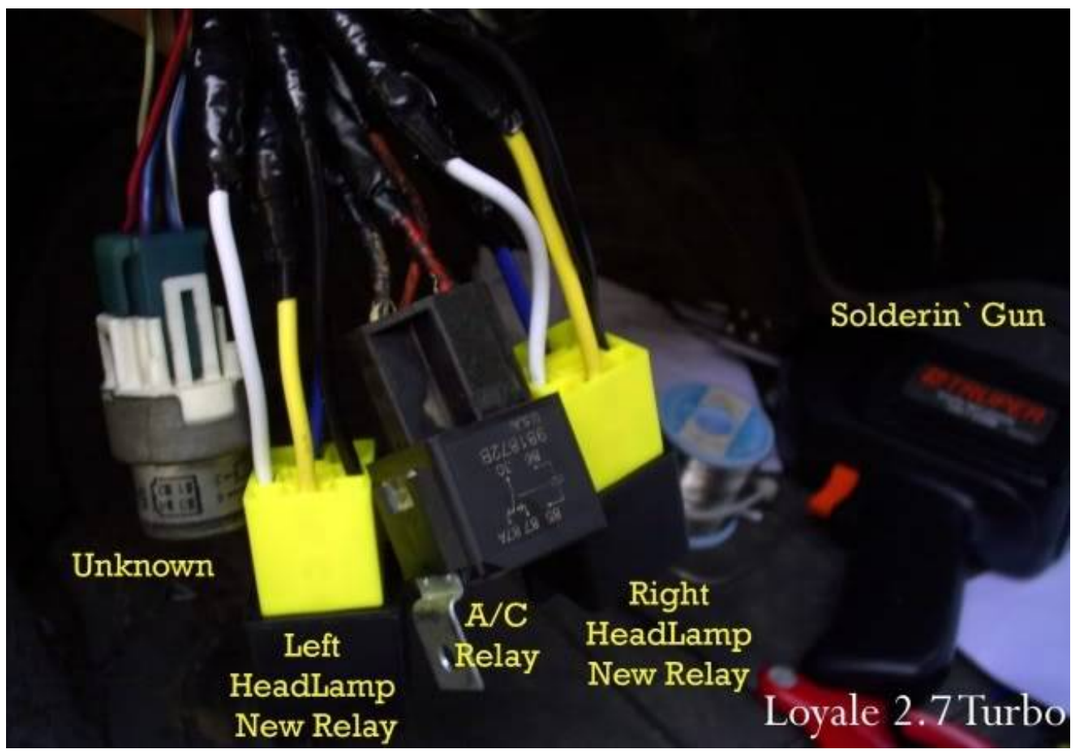
...**One** by **One**...



That is How it Looks Like Now:

The Two Yellow Plugs has the New Bosch Standards,

Holding Bosch Relays for the **HeadLamps**; They Works Great*!*



...Now my Subie's HeadLights are Brighter than Ever

(Just like a New Car)

also the instrument cluster lit brighter too *!*

During Those Relays Swap, I Discovered many Things on my Subie, one is that the Two MainHeadLamps' Relays Always turns **On** when you Turn the Key to the **On** Position (When the Car's Engine is Running Too) Even if you have the HeadLights Switch Off ... 😵 ... So They're Hot whenever the Car is On.

That is Because Subaru Designed the Outside Wires (the Lamps` Wires) to Have the Possitive (+) Wire -the Middle One on Each Bulb's Plug- Always On; the Main HeadLights Switch just Turns **On** or **Off** the **Ground** for the HeadLights; so the Main Key Controls their power ... That's Why the HeadLights goes Off if you turn your Subie's Engine Off, even with the HeadLights' Switch in "**ON**" Position.

Another Thing that I Discovered is How the Subaru's Relays are Wired, I made a Drawing of the Base of a Factory Round relay, so You can Easily understand the Wirings and Swap those Old Roundie Relays with Standard Bosch Relays, it will Improve Electrical Things' Performance.

This Drawing I Made, shows you the **Round Relay's** Base:

The Round Nippon-Denso (ND) Relay N° 056700-5260 and its Many Variations, Comes in many Japanese Cars like Subaru, Toyota, etc, also in Motorcycles like Kawasaki... is Rated only as 22 Amps, and somehow is not easy to find the exact Replacement, also It Needs Accurate 12 Volts Signal to Switch On.

The Bosch Standard Four Pin Relays, can be Started with as Little as 8 Volts, and are Reliable, Last Longer, capable of 30 or even 40 Amps, and are Very easy to Find the Replacement.

Now I Can Enjoy my **9104** Rally Bulbs at Fully Power*!*

Warnings!

Remember: Use this Ideas at your Own Risk, Please be Sure that You've understood Well All the Instructions **Before** Proceed; Also if you Haven't Used a Soldering Gun / Iron Before, Call a Friend or Someone with Enough **Experience**; 'cos Bad Use of it may cause Serious Burning on the Skin and the Car's Plastics... etc.

If you Don't Want to Weld the Wires, I Don't Suggest to Cut Any Wire; Because an Unwelded Wire can Cause Serious Problems, due to Bad Contact (Corrosion, Dew, etc) Short Circuits, etc... Sooner or Later, in such case you can obtain Adaptors that has in one end a fitting socket for the Subaru's Round Relay terminal, and in the Other side, a fitting Socket for the Bosch Standard Relay.

Edited November 10, 2013 by Loyale 2.7 Turbo
Just to Center Images ;)

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Loyale 2.7 Turbo
The Mighty "BumbleBeast"

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7629 posts
Roatán, Honduras.

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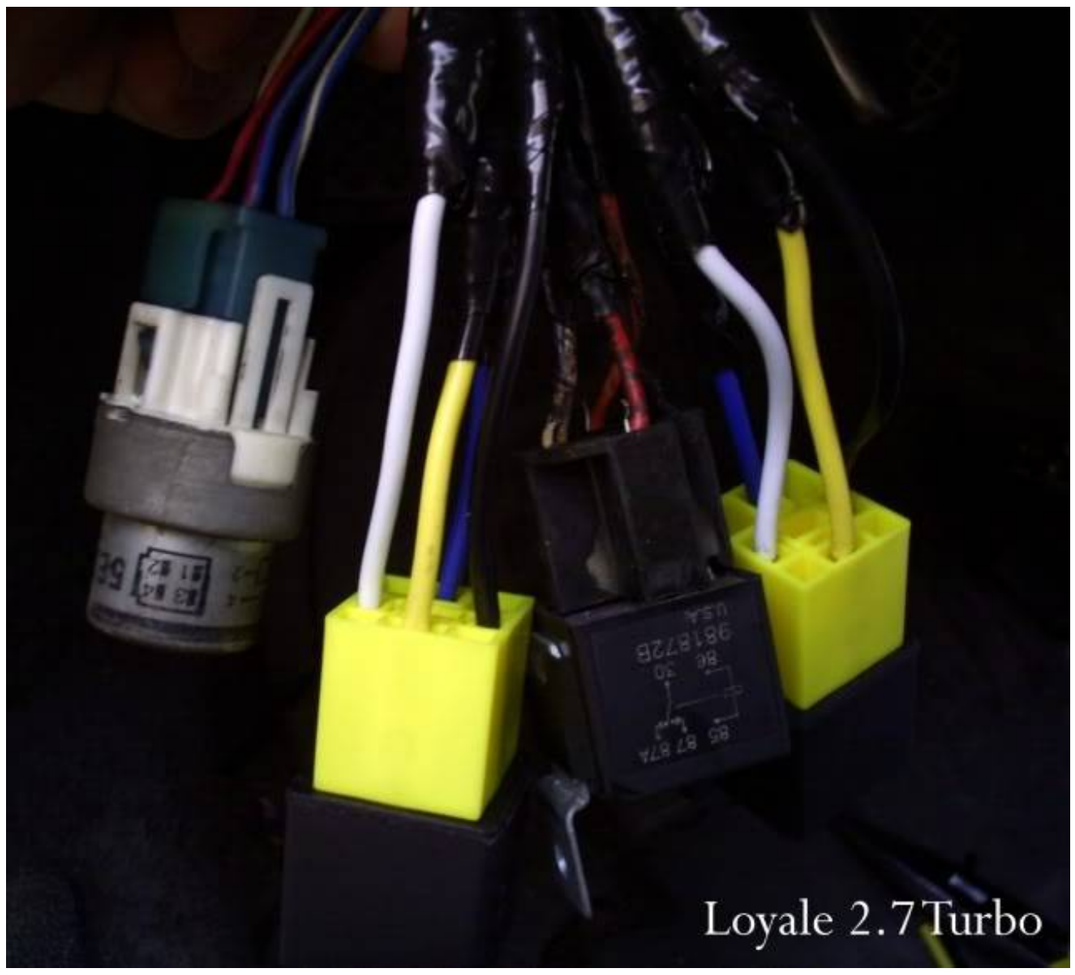
The Last Step is to Fix Each Relay one Next to Another, leaving enough Space Between 'em to keep cool Air Flowin' Thru ... They get very Warm when the Car is Runnin' (or Key is in "**ON**" Position) Because they go On with ignition.

I believe that it is Good Idea to Keep the Subaru's positioning idea, letting the *"Unknown"* Relay and the A/C Main Relay between the Left & Right HeaLamp's Relays, 'cos those trend to be Cool while not in use; so the Headlamp's Relays Won't "Share" their Heat with Each Other, increasing it.

I'll get some long enough Piece of Metal and Drill in it the Four Holes to Hold to it Each Relay, Separately with a Screw.

For Now I'll Leave 'em hangin' Like This:



For One Week, Untill Next Weekend, to Test 'em and Watch their Behavior.

For now, They're Workin' **Very Good!**

Edited November 10, 2013 by Loyale 2.7 Turbo
To Add Some More Info...

Loyale 2.7 Turbo
The Mighty "BumbleBeast"

Posted March 14, 2009 (edited)

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Well... I Drove my Subie with those Relays Hangin' around there for much more time than a Week, which was more than Enough Test, They Work Awesome! ... ... So, it is time to Put 'em Back to their Place.

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I Obtained a Solid Metal Angle, I Drilled Four Holes in one Angle's Side for the Relay's Screws and Two Holes in the Other Angle's Side to Hold it Up.

After Sandpaper & Covered it with AntiRust Paint, I Put the Two HeadLamps' Relays in the Corners, Away from each Other to Prevent Heat interchange.

Those are the Yellow ones:

Then, in order to Prevent a Loosen Contact, I Attached a Plastc Zip Tie to Each Relay,

it Wraps Around the Relay and it's Base, Between the Wires, Holding both Together:

Then I Cutted the Remaining end of the Zip Ties,

The setup Finally ended Lookin like This:

Then I Closed everything and That's it! 😁

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Loyale 2.7 Turbo
The Mighty "BumbleBeast"

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7629 posts
Roatán, Honduras.

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Wiring New Relays

Basically talkin', you only need **three** (3) wires in order to get a Relay properly working, to Power a Device (Such like Horn, Halogens, etc...)

1► the Positive input shall be placed in two Spades, the Nº **30** (which is the High Power positive imput, directly from battery - To be Transferred to the Device once the Relay is On) and to the Spade Nº **86** (Positive switchin' signal) and those could have power permanently.

2► The Switching (On / Off) Signal, comes in from the Ground, sent by a Grounded Switch on the Dashboard (or wherever you might want to put the Ground source, such like a High / Low Beams' stick, Horn button, etc...) It goes to Spade Nº **85**

3► The Positive Power Output to Power the Device, (Halogens, Horn, etc...) goes out from Spade Nº **87**

Of course you could use a **Positive signal** (+) to switch the Relay on /off instead the Ground, But that's a **Four** (4) wiring install. 😉

In such case, the Relay's ground shall be Permanently connected to Spade Nº **85**, and the Direct Positive imput shall goes to Spade Nº **30** ONLY, then you use a Low power positive as Switching signal on Spade Nº **86**. Remember: Nº **87** is **always** the Power Output for the Device.

I have a couple of Pictorial Diagrams to Help you in How to Wire New Relays;

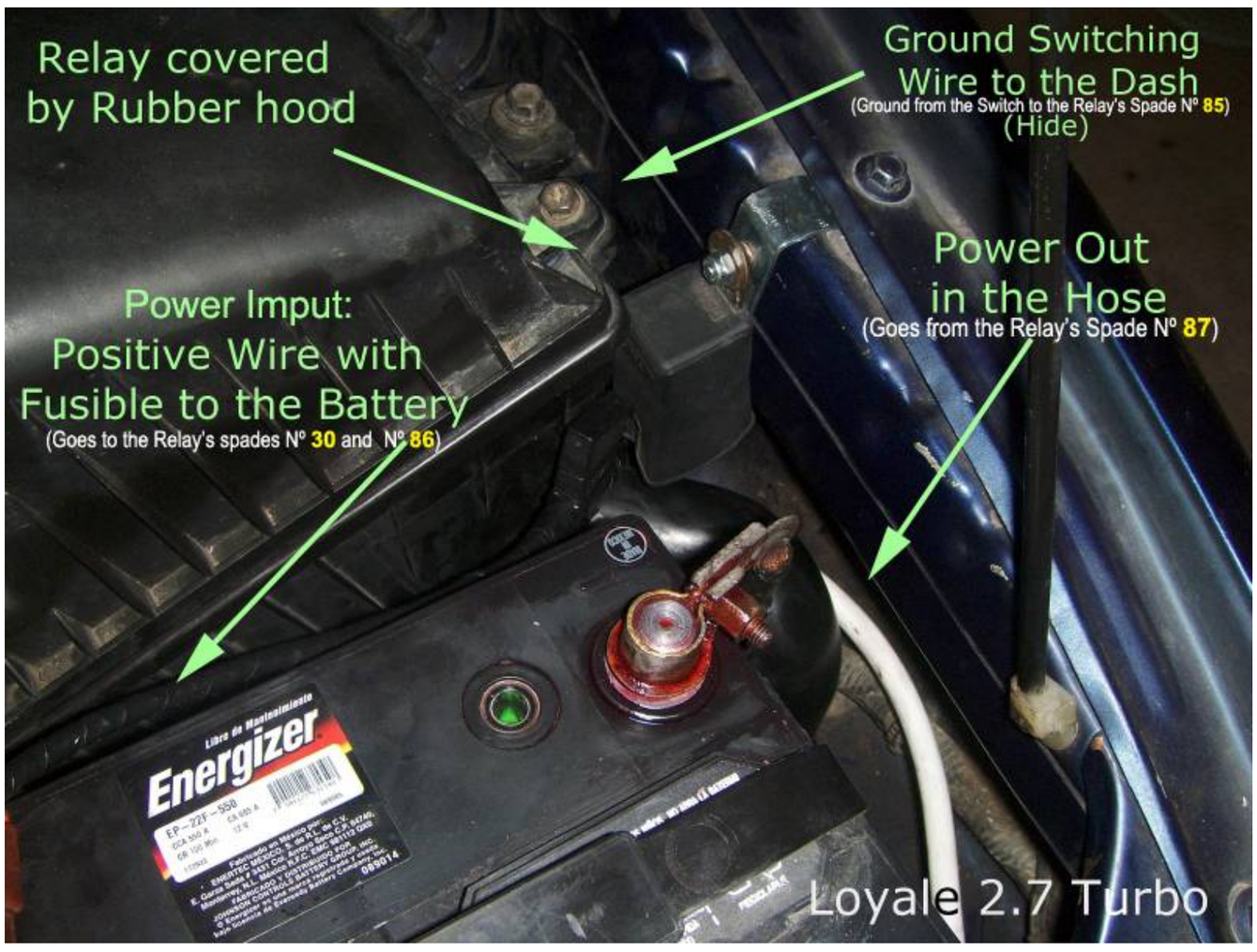
you can find one of those in my other writeup, named:

~► "**How to Wire Dual Electric Fans on a Subaru EA82**"

This is the Picture:

Also I posted another Pictorial Diagram, in my Wife's car Thread: ~► "**The KiaStein**"

This is the Picture:



If you find this writeup, Useful, please let me know by hitting the "**Like**" Button below.

I only ask this as a **Motivation** to continue Sharing my work with you. Kind Regards.

Edited June 28, 2016 by Loyale 2.7 Turbo

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