818 Subaru parts disassembly



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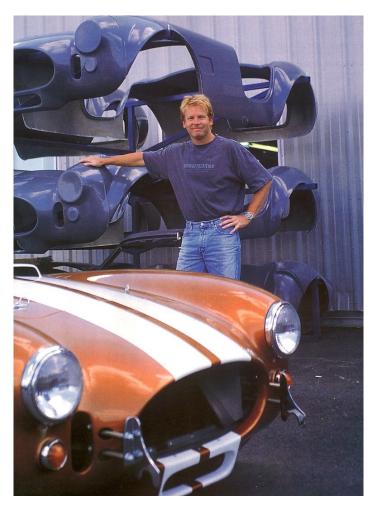
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Chapter

General Information

Foreword

f you are reading this, you are embarking on a mission to build your own car, or at least considering doing so. I wanted to share with you some of my experiences and lessons learned while working with literally thousands of people who have completed this undertaking with us. The lessons learned here are important and will hopefully help with your decisions as well as with the project and the completed car. First of all, the idea of building your own car is NOT for everyone. It is a serious endeavor that should be undertaken with care and consideration. The desire



to build your own custom car goes way back. It is part of our uniquely American car-centric culture, and those who build their own cars are at the very center of this. Since the earliest days of Hot Rodding, literally tens of thousands of people have built their own cars. Even more have done restorations and major customizations to existing cars. As fun as this project is, a person should be candid about their abilities turning a wrench. This is not a place for novices. That is even truer in racing, where danger and risk are part of the very definition of always trying to go faster. The late Carroll Smith wrote something I really loved that speaks to this point. "There is no magic! The one basic truth of successful racecar preparation bears repeating. There is no magic. There is only logic, common sense, forethought, vast amounts of hard work, and a fanatic dedication to the task at hand".

Carroll Smith "Prepare to Win"

I can't think of anything more appropriate to say about the right way to approach the serious work of building your own car. Carroll passed away not too long ago, but his accomplishments behind the Ford Lemans victories and his contributions to the motorsports community continues in his writings that are all at the top of my list of recommended readings for the car builder or racer.

After being honest about the skills, responsibility, and dedication required to build a car, I feel the need to talk about the PROCESS of building a car in an equally candid manner.

The process of building a car is a lot like the process of having kids. As a matter of fact, it's absolutely the best analogy I can find (apologies in advance to all of you without kids, try and bear with me). Both things are easy to get started. With a car project you order a manual, talk to car guys, get all excited over glossy photos and perhaps order a kit from us. With the whole pregnancy thing, well for most folks that's even easier to get started... When my wife was pregnant with our first daughter I was sure we would never have any more children. From the swollen ankles to the morning sickness, to the delivery room scene from the movie "Alien", the whole process was difficult, and while she didn't complain too much thru the nine months, it was obviously hard work. Another thing, she wouldn't have been the best salesman for others considering getting started on the baby thing. When it comes to the car project, once the kit arrives and the process begins it is much the same as pregnancy. Frankly the degree to which a person breezes thru the project or languishes is commonly a factor of skill, but still, building a car for anyone is a tough job and there are inevitably issues. How many times have you gotten the wrong part at NAPA, gotten home to realize the alternator has a six ribbed pulley not five...? You will meet challenges building this car and you will be frustrated at times. Thankfully there are internet discussion forums where you can vent your frustrations and complain about the idiots who designed this kit. We smile when reading these posts because we know that while the pregnant woman complains, the mother loves her children in an unreasonable and perhaps even undeserved way! All the way thru the process, as you build your car, the seasoned guys at Factory Five in tech support will help you. The larger community of Factory Five customers will also be there for you, as the one thing that really sets us above the crowd of other companies is the size, competence and enthusiasm of our customer community.

When the baby arrives and when your car is done, there will still be more work. With babies, it's up all night, diapers, and strange maternity contraptions that men don't speak of in the light of day... With the car it will be other challenges. Registration and licensing can be frustrating and laws vary from state to state. A wrench dropped from 25 feet away will inexplicably shoot sideways into any freshly painted surface and my favorite was my own engineers who felt the need to test out how long a rear differential can run on a track without gear oil (answer, about three laps before deciding to stop moving).

There will be highs and there will be lows, but in the end, there are few parents who don't treasure their children more than life itself, and there are few Factory Five owners whose lives remain unchanged by the experience and the artwork they have crafted.

It's one of the greatest experiences in the world to raise children. It's also one of the most rewarding things I know to build your own car. Even today at car shows, open houses, and events wherever Factory Five cars are found, I smile to hear the inevitable first words every guy says to me... "Let me show you what I've done".

The cars that we build are more than cars. They are a reflection of us. The badge of honor that comes with having built your own car is a special one indeed. You will join a community of others who have earned their own... and THAT is the story of Factory Five Racing and that is what awaits you in this process.

David Smith President

Safety Notice

While there are many things to love and be proud of in our country today there are a few things that we wish were different. With regret and a small amount of resentment we include the following warning and statement of non-liability at the advice of men with soft hands and necks the size of pencils.

Motorsports involves the operation of machines and materials near the limits of performance. Racing involves an inherent amount of risk. Any decision to proceed in the project of building one's own racecar must be made with the acceptance of personal responsibility. If, while building, driving or racing this Factory Five Racing kit, should you become injured or die, it will be the result of your own conscious decision and we at Factory Five Racing, Inc., disclaim any responsibility of any kind.

The procedures and recommendations contained in this book are to be used as a guide with the ultimate determination of safe construction and race-worthiness to be made by you. If you feel uneasy about whether you have the skills to build your own vehicle, DO NOT PROCEED. This project involves building a car from the bare frame all the way up to a finished vehicle. It is intended for individuals who have the skills and abilities commensurate with the scope of a project of this magnitude.

This kit is only a collection of parts designed for use primarily as a race car. Factory Five Racing does not build completed or partially completed vehicles. You are responsible for ensuring that the vehicle you build complies with all Federal, State and local laws regarding its use. Except as may be specified in writing, Factory Five makes no warranties, expressed or implied, on the products (parts, or kits) offered for sale. All implied warranties of merchantability and fitness for a particular purpose are expressly disclaimed by Factory Five.

While Factory Five products are thoroughly tested under actual race conditions, Factory Five cannot control the quality of the installation or application of these products. The products offered for sale are true race car components, the installment of which often requires considerable time and fabrication skill. Before attempting any installation or assembly, the purchaser should determine the suitability of the product for the intended use, the time, and level of skill necessary for correct installation or assembly.

Factory Five does not make any warranty, expressed or implied. Purchaser expressly ASSUMES THE RISK of all personal, property and economic injury, damage or loss, either direct or indirect, arising from the use, misuse, or failure to determine the appropriate use of any Factory Five product.

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Safety Tips

- Read the manual. It is at least a good guide and place to start.
- Don't take short cuts.
- Before starting work, make sure you have the proper tools, the required parts, and sufficient space for the job. If you damage any parts, it will probably be because they were either not stored properly or, the wrong tool was used to install them.
- Don't work when you're too tired or upset. The car you will be building is capable of supercar levels of performance, and your life depends on the quality of your workmanship.
- Never work under a raised car unless it is well supported by stands intended for that purpose. Never work under a car supported by a jack.
- Always observe good safety practices such as the use of eye protection, protective clothing, and gloves.
- Keep the battery disconnected whenever you work on fuel or electrical systems and always keep a fire extinguisher handy.
- Don't allow children in the work area.
- Partially assembled cars attract a crowd. Keep garage doors closed or mark off work areas.
- Make sure that all electrical equipment is grounded. If working alone, have someone check on you periodically.
- When using an engine hoist, make sure that the working load rating is correct for the weight.
- Work in a well-ventilated and well-lighted area.
- Use portable safety lights for under-carriage work. Never use an exposed bulb type light.
- Be mindful of the environment. Avoid spills of solvents or engine fluids. If a spill occurs, clean up immediately and dispose of it in hazardous waste containers
- Never let a friend or someone else drive your car.
- Always wear your harnesses.
- Clean your build area after each assembly is completed. This will speed your build process as it ensures that you know where your tools are and prevents tripping injuries.
- It is impossible to anticipate all of the possible hazards. Care and Common Sense will prevent most accidents.

How to use This Book

This Assembly manual is intended to help you build your Factory Five Kit. This book will not explain such things as engine or transmission building. A secondary purpose of this book is to use it as reference for owners that want to do maintenance work on their cars or for those that purchase finished cars, to understand their cars better.

This manual was written with the average weekend mechanic in mind. It is best to follow the manual step by step but if there is a part missing from the kit move to the next section and come back to it late when the part is available. If the instructions are followed then the resulting car should be a great handling sports car.

	ICON KEY	
≫ %	Valuable information Tools needed	
	Parts Needed	

We have included an Icon key as the beginning of each section that contains useful information for each assembly that details the tools needed for that assembly, what assembly in the kit parts are packaged in that are needed for that step and any useful information or warnings.

What You Get

- **Frame:** Complete jig-welded tube frame. Includes mounts ready to accept Subaru EJ 2.0L and EJ 2.5L engines.
- **Body:** Hand laid $\frac{3}{16}$ " laminate composite body panels made with vinyl ester resin.
- **Chassis Aluminum Panels:** Over 55 Laser cut, pre-formed aluminum panels for cockpit, wheel wells, and engine bay. 600 pre-packaged rivets.
- **Front Suspension:** Tubular upper control arms, Upper Ball joints, Koni[™] brand high performance shock absorbers, springs, custom Spindle Adapter brackets.
- **Rear Suspension:** Custom Spindle Adapter brackets, KoniTM brand high performance shock absorbers, springs and fasteners.
- **Brake/Fuel lines:** Pre-flared $\frac{3}{16}$, $\frac{1}{4}$ and $\frac{5}{16}$ brake and fuel lines.
- Cooling System parts: Stainless steel radiator hose kit.
- **Engine/Exhaust parts:** The 818 kit is configured to accommodate the EJ 2.0L or 2.5L engines. The kit comes polished stainless steel exhaust parts to adapt to either the turbocharged WRX or naturally aspirated Subaru Impreza engines.
- Gauges and Dash and Electrical Assembly: Parts are included to adapt the Subaru Impreza wiring harness and comes with a molded dash designed to allow the Subaru gauge pod to bolt-in.
- **Interior Accessories:** Parts are included to bolt-in the Subaru Impreza seats and seat belts. Footbox carpet, cable shifter assembly and shifter boot.
- **Exterior Accessories and Lighting:** DOT approved windshield, License plate light and bracket, Ceramic Factory Five nose and tail badges, DOT approved headlights, turn signals, and tail-lights, hood pin kit, hood, trunk and side mesh louvers.
- Assembly Manual: Bound assembly manual full of pictures and diagrams.

Fasteners: Over 400 top quality zinc plated and stainless steel fasteners.

Major parts Needed

Engine Transaxle Front and rear suspension Wheels and tires Radiator Steering rack Steering column Seats

Fuel pump

 \mathfrak{B} See the complete list in the appendix.

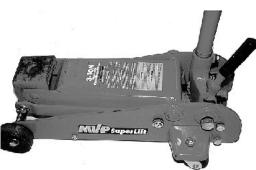
Tools and Supplies List

The following lists detail the tools and supplies that are needed to build your kit. The "helpful" items are not crucial to the assembly but make life easier. Home Depot HUSKY[®], Sears CRAFTSMAN[®], and Snap-On[®] tools are all guaranteed for life and we've found them to be reliable tools.

- Storage Shelves for kit and running gear parts
- Body storage area (can be outside)
- _____ SAE and metric socket set, a 52-piece set is a good choice
- Deep sockets for some common sizes are helpful.
- **SAE** Combination wrench set $(\frac{3}{8}"-\frac{15}{16}")$
- Metric combination wrench set (7mm 24mm)
- A set of standard and Phillips head screwdrivers
- Standard and Metric Hex key sets
- Long nose pliers, 4.5"
- Snap ring pliers
- Tin Snips
- Drill
- Drill bits (#30, #11, $\frac{3}{32}$ "- $\frac{1}{2}$ " standard drill bits)
- Caulk gun
- Dead Blow hammer
- Razor knife
- _____ Wire stripper/crimping tool
- Bench top vise
- 6" C-Clamps
- Tape measure or straight edge ruler/T-square
- Hydraulic floor jack
- _____ Engine hoist
 - 6' $\frac{5}{16}$ chain (to lift engine)
- _____ 4 Jack stands
- $3/_{16}$, 1/4", $5/_{16}$ " Fuel/brake line bender (hand held)
- _____ Jig saw (Body cut outs)
- _____ Torque wrench (Click style, ³/₈" or ¹/₂"drive)
- Eye protection
- Bucket

Hel pful

- Cordless drill (w/clutch helpful, 14-18 volt units are best)
- #6 hex driver attachment for cordless drill
- Adapter for cordless to use ¹/4" socket driver
- Flare nut wrenches $(\frac{3}{8}" \& \frac{7}{16}")$





Flat file and round file

Ratchet wrenches

Required Supplies

- Engine degreaser (for used engine if using)
- Silicone Door and window sealant, GE Silicone II or equivalent 4 tubes
- Coolant
- Engine oil
- ____ Gear oil
- Transmission Fluid
- Brake fluid, DOT 3
- _____ Chassis grease with grease gun and grease fitting coupler
- Oil filter
- _____ Battery
- _____ Spark plugs
- _____ Black permanent marker
- ____ Duct tape
- _____ Masking tape
- Electrical tape
- _____ Bodywork supplies
- _____ Rags
- Gojo[®] pumice hand cleaner
- Acetone
- Aluminum polish/cleaner
- 3M Super 77 spray adhesive 1 large can
- 3M General Trim Adhesive (for headliner) 1 large can
- Stick with name brand products like Eastwood®, 3M®, and Duplicolor®. The Eastwood brand coatings are great. Sherwin Williams, PPG and Dupont brand paints are excellent.

Chapter 2 – Donor Car Disassembly



Removing the Donor Parts



 $^{\circ}$ For each of the parts removed that will get used in the build, keep all fasteners.

Disconnect the battery, ground terminal first, and remove from the car.

* If the battery is in good shape save it for the build or otherwise note that you will need a new one.

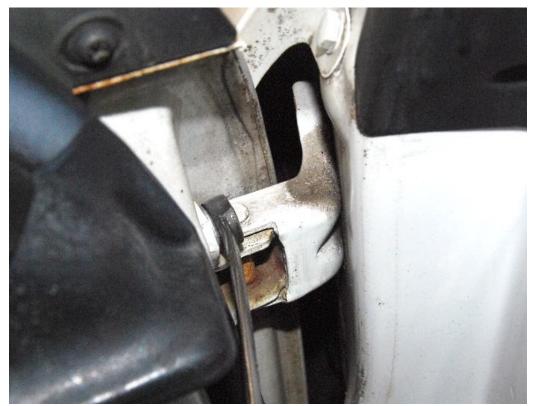


Remove the hood. Save the hinges, they will be used in the build.

Doors



Remove the doors, hood and trunk first, this will help access to the rest of the parts on the car. Save the hardware from the front doors.



Remove the hinges, latches, strikers, and interior door handles from the **REAR** doors for use in the build.

Seat Belts



Begin removing the interior parts by removing the rear seat belts. Undo the upper side mount



Remove the trim to access the seat belt reel bolts. This trim will not be re-used so it can be cut off to ease removal.



As you are uncovering the various mounting bolts, remove any trim and carpet for easy access to the wiring harness later.



Remove the **REAR** seat belt reels and the center receptacles, these will be the belts used in the 818. Leaving the two pieces connected is a good way to not lose the smaller part.

Seats

The front seats will be re-used so be careful removing them. Some models have electrical plugs that must be undone before seats can be pulled clear of the car.



Pull the plastic covers off the back of the seat tracks to access the bolts holding in the seats.

Remove the bolts.



Slide the front seat all the way back in the tracks to expose the front mounting bolts.

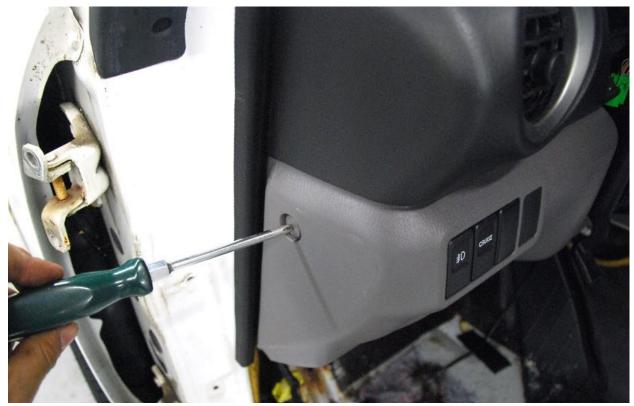
Remove the bolts.

If necessary unplug any seat electrical connections and remove the seats.



Remove rear seat for access to the fuel tank and wiring.

Dash



Begin Removing the dash for access to the wiring and instrument cluster. Start at bottom left side.



Remove the fuse panel cover and set it aside so you will have the diagram on the back.



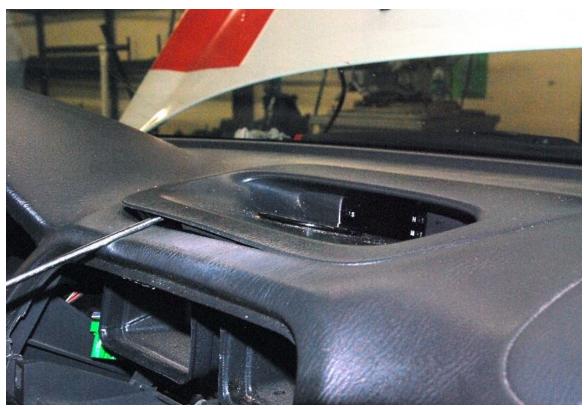
With all the screws removed pull off the driver's side lower dash panel.



Pull off the radio cover plate to uncover the radio and climate control mounting hardware.



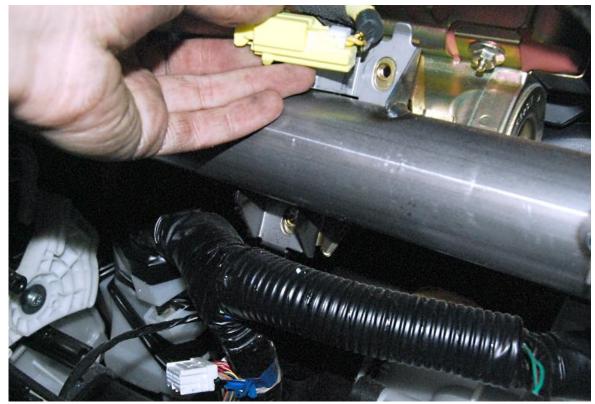
Remove and unplug the radio and HVAC controls. Mark these plug with a masking tape or label now before the rest of the harness is unplugged so you know what the plugs go to later.



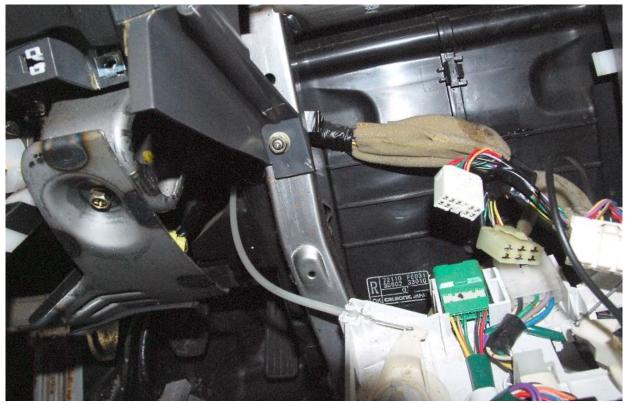
Using a screwdriver pry up the cover to the clock so it can be removed and the top dash screws are uncovered. Label this plug with a piece of tape or label maker.

- ¹ Double check that your battery is disconnected. You do not want to work around live air-bags.

Gently lift off the cover to the passenger side air-bag.



Unplug the airbag and remove it. It will not be used and can be scrapped or sold if it still in good condition.



Unplug all of the accessible connections under the dash labeling each as you go. If you do not recognize the component you are unplugging, label it as well so that it can be matched back up to the plug later.

Gauges



Remove the instrument cluster being very careful not to damage it. It has one screw up high as well as two along the bottom.



There are three separate electrical plugs along the top that can be unplugged once the cluster has been pulled away from the dash a little ways.



Remove the center vent from the dash then remove the hazard switch from the center vents, only the switch itself will be used and not the vents themselves.



Set aside the center console section with the shift boot and knob.

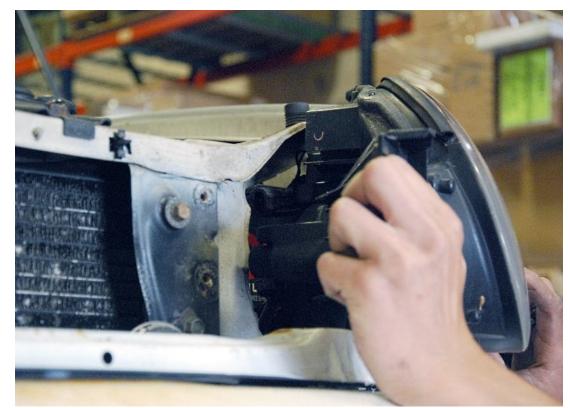


Place the car on jack stands and remove the wheels. Even if you are not planning on using them on the finished car they are handy for rolling the chassis around during construction.

Engine/Radiator/front suspension/exhaust



Begin Engine bay disassembly by removing the front fenders to provide access.



Remove front grill and headlights, mark the headlight plugs with labels for later.



Remove front bumper cover and support.



Remove the Air box and set aside for use in the build.



Drain the radiator and remove cooling lines to engine and radiator, save all of the radiator hoses as sections of them will be used later.



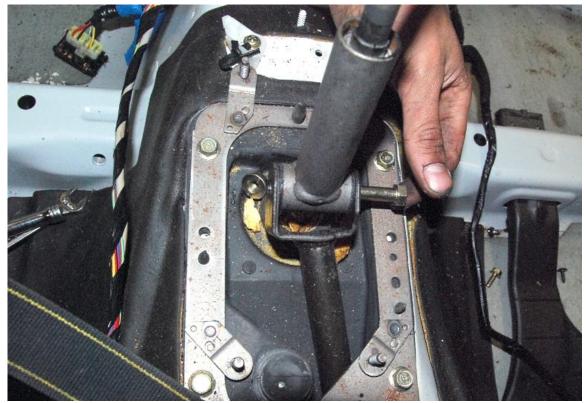
Remove the radiator and fans making sure to keep all of the mounting brackets fasteners and rubber isolators.



Remove all electrical, fuel, and mechanical connections to the engine and droop them out over the wheel wells to give space for the engine removal.



Remove the suspension brace from underneath the car, you may need to move your jack stands to access this piece, make sure they are in a secure location before crawling underneath.



Disconnect the shift linkage from the shift lever and remove the rubber boot. Make sure the linkage is free to drop out of the car with the transmission.



Remove the exhaust system from after the turbo (WRX only). Keep the down-pipe with the catalytic converter, or the cat itself in normally aspirated models as it will be re-used. Save the oxygen sensors.

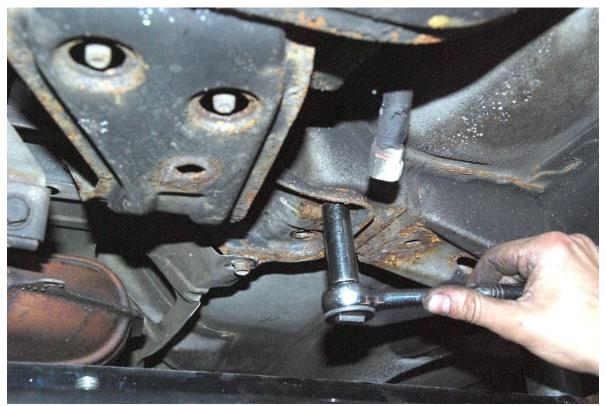


Using an engine hoist, secure the engine and take up any slack in the chain.

Loosen the transmission and engine mounts. While under the car, double check that everything has been disconnected from the engine and transmission.

Disconnect the steering column from the shaft.

Disconnect flexible brake lines and leave them attached to the calipers.



With the engine and chassis safely supported, disconnect the subframe hardware including the bolts that hold the front control arms.



Slowly loosen the upper strut mounts, you may need to adjust the engine hoist height during this process to keep the sub-frame from dropping too quickly.



Lower the engine and sub-frame down and out of the car. and set aside for further disassembly.

E-brake handle/cables

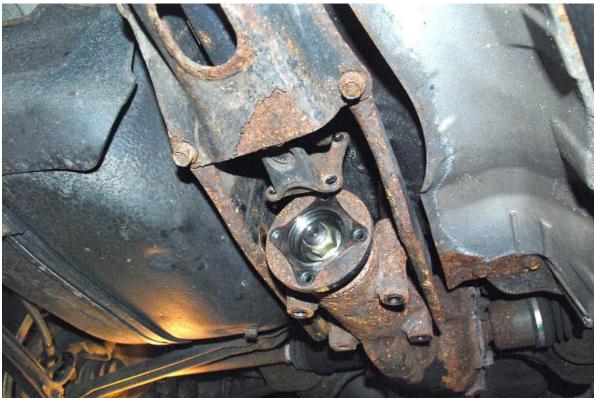


Remove the emergency brake cable bracket and handle, save both of these parts.

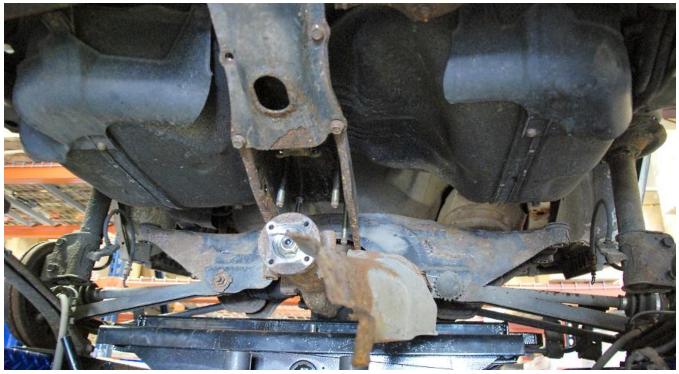


Push the emergency brake cables down through the floor to allow them to be removed with the rear subframe.





Disconnect the driveshaft and unbolt the rear differential housing from chassis.



Undo the flexible brake lines from the chassis leaving them attached to calipers.



Disconnect the trailing arms and rear struts then lower the rear sub-frame out of the chassis using a floor jack. Set the rear sub-frame aside for later disassembly. Save the rear sway bar, bushings and mounting brackets.

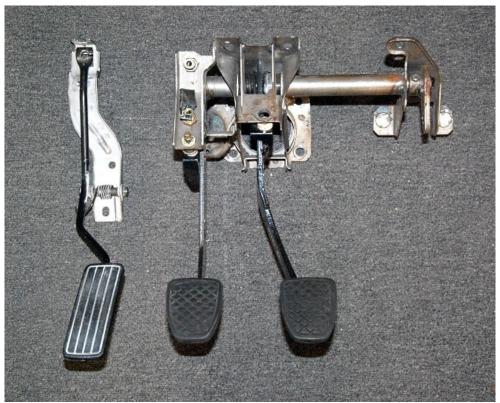
Power booster/pedals/Steering column



Remove the clutch and brake master cylinders along with the brake booster.



Set aside the brake booster even if you are not planning on using it. The pushrod will be used even with the manual brake set-up.



Remove and save the steering column, pedal assembly, and throttle pedal being careful to not damage the brake light switch which will be re-used. Either cable or drive-by-wire pedal can be used.

Fuel tank



Unplug all of the fuel lines and electrical plugs from the fuel tank. and lower it down from the car.

The stock tank will not be used but the internal fuel pump will need to be removed for use in the new tank.



Remove the various firewall plugs and connectors to allow the main wiring harness to be removed.



Remove and save the horns.



Remove the rearview mirror from the windshield along with the pedestal that the mirror mounts to. Use a heat gun or hair drier to heat up the glue on the mirror from the outside and then pull the mirror off when it gets soft.



Pull all of the remaining harness and electrical boxes from the chassis, if there is any question about something being used always save it until the build is over to be sure.

^{*} The interior of the car should now be empty except for sound deadener and welded on brackets.



Once you are sure there is nothing useful remaining of the shell you can cut it up or have it hauled away.

Preparing the Donor Parts

Front lower control arms



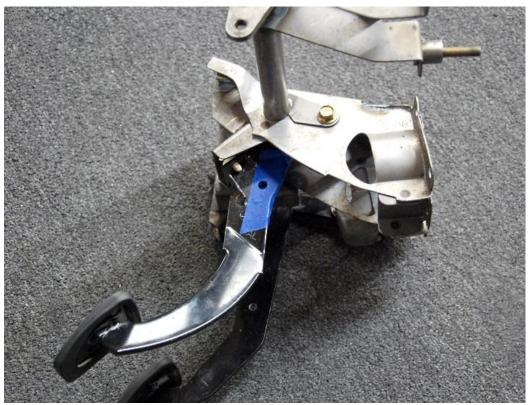
Remove the rear bushing and mount from both front control arms keeping track of which one was on which side and the locations of the end bushings and caps.



Re-install the mounts on the opposite side arms you removed them from using all the original hardware and pieces.

Pedalbox modification for manual brakes

The 818 is 1000 lbs. lighter than the Subaru Impreza. Because of this, the power brakes are not needed. They are very touchy if they are used. We recommend using manual brakes in the 818.



Place some blue painters tape on the brake pedal over the hole used to attach it to the power booster and poke a hole through the booster push-rod mount hole

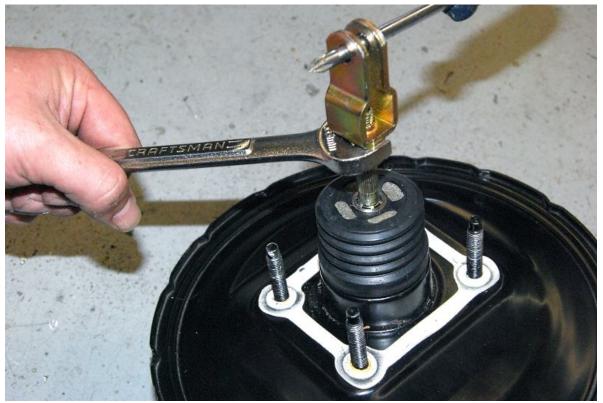


Use a ruler and marker to mark $\frac{1}{2}$ " up from the stock booster push-rod mount hole.



Drill a new booster push-rod mounting hole using a $\frac{5}{16}$ " drill bit. After drilling, test fit the stock push-rod connecting pin.

Power Booster parts



Remove the clevis and nut from the back of the power booster using a screwdriver in the hole to hold it while loosening with a wrench.



Put the clevis and nut aside for use later.

Swaybar



The rear sway bar can be used on the front of the 818 with some additional linkages provided in the kit. Remove it from the rear sub-frame and set it aside with the bushings and mounting brackets. The end links will not be re-used.

Appendix A: Donor Parts

2002-2007 Subaru Impreza and Impreza WRX

M.	retain mounti	ng hardware	from items	on this	list unless	otherwise noted

	Part Name	Check
Front Suspension	Front Lower Control Arms	Chierk
i ione suspension	Front Spindles	
	Front brakes (complete)	
	Front Flexible Brake lines	
	Front CV joints complete with axle nuts	
	Strut to Spindle mounting hardware	
Steering	Steering rack with outer tie rods	
Steering	Steering shaft complete	
	Steering Column with switchgear	
	Steering Wheel	
Rear Suspension	Rear Spindles	
	Rear Brakes Complete	
	Rear Flexible brake lines	
	Emergency Brake Cables	
	Lower Trailing Arms	
	Lower forward Control Arms	
	Rear Toe Links	
	Rear Outer CV joint	
	Rear Swaybar with chassis mount bushings	
	and brackets	
	Strut to Spindle mounting hardware	
Drivetrain	Complete Engine with Alternator and Airbox	
	Transmission with Flywheel and Clutch	
	Shift Linkage mount to Transmission	
	Engine and Transmission mounts	
	Wheels and Tires	
	Starter	
Exhaust	Exhaust manifold and Y pipe	
	Up-pipe (if turbo)	
	Down-pipe with cat (if turbo)	
	Catalytic converter (naturally aspirated)	
	Oxygen sensors	
Interior	Instrument Cluster	
	Seats	
	Emergency Brake Handle	
	Rear seat belts with receptacles	
	Interior Door Latches	
	Shift Knob and Boot	
	Rear View Mirror	
	Complete pedal assembly	
	Throttle pedal	
	Brake Master Cylinder	

	Clutch Master Cylinder		
	Hazard flasher switch		
	E-brake cable mount bracket		
Cooling	Radiator		
	Fans with mounting bracket		
	Upper and Lower Radiator hoses		
	Fill/Burp Tank		
	Overflow Tank		
Electrical	Fuel Pump with Sock		
	Complete Vehicle Wiring Harness		
	Battery Cables		
	Battery		
	Brake light Switch		
Body	Rear Door Hinges		
	Rear Door latches with catch		
	Hood Hinges		
	Side Mirrors		
	Horn		
	Charcoal Canister		
Optional	Windshield Wiper Assembly		
	Brake Booster		

Appendix E: Technical Support



Our success depends on you being able to build your kit without problems or frustration. We are counting on you to build and drive this car and in so doing, provide us with the most important advertising of all.

If you have purchased a kit, we want to make sure that you know that you are not alone. Although we know our kit is the most straight forward assembly around, there may be a time when you need to speak to us. We will be there for you to make sure you are successful. No question is too simple. We are easily reached in a number of ways.

The Web:	www.factoryfive.com
	www.thefactoryfiveforum.com
Phone:	508-291-3443
Fax:	508-291-3883
E-mail:	Tech@factoryfive.com
Mail:	9 Tow Rd, Wareham, MA 02571

Appendix G: Subaru Specifications

Subaru's by year

Year & Model	Engine	HP*	Torque*	Transmission	Wheels
02-05 Impreza	2.5L, 4-cyl	165@5600	166@4000		16"x6.5"
04-05 Impreza Outback	2.5L, 4-cyl	165@5600	166@4000		16"x6.5"
02-05 WRX	2.0L, 4-cyl turbo	227@6000	217@4000		16"x6.5"
06-07 Impreza	2.5L, 4-cyl	173@6000	166@4400		16"x6.5"
06-07 Impreza Outback	2.5L, 4-cyl	173@6000	166@4400		16"x6.5"
06 WRX	2.5L, 4-cyl turbo	230@5600	235@3600		17"x7"
07 WRX	2.5L, 4-cyl turbo	224@5600	226@3600		17"x7"