

HOW TO: BUILD YOUR OWN SHORT STROKE COILOVER

PROJECT CAR

PROJECT WRX FIN

p.98

No.15

REAL TECH / REAL CARS / REAL BUDGETS

SPRING 2010 ISSUE • projectcarmag.com

**GUEST
STARRING
PRO DRIFTER
TAKA AONO**



REVIVE p.74
YOUR 4AGE

**BACKYARD
BUILT AE86
DO-IT-YOURSELF
SR5 TO GT-S CONVER**

A SOURCE INTERLINK MEDIA PUBLICATION
DISPLAY UNTIL 7/13/2010 • USA \$5.99 CANADA \$7.99



SIM INTERNATIONAL TUNER SERIES

REAL TECH / REAL CARS / REAL BUDGET

No. 1



ON THE COVER:

Scott Dukes stepped in to photograph this amazing cover for issue #15. We were stuck without a photographer and Scott drove clear across town to bail us out. This time around we chose a classic driveway scene with professional drifter Taka Aono in the foreground. In the background, we have our very own Robbie Perez acting like he knows how to drop in an engine. Robbie's motto is "ya gotta fake it 'till ya make it".

SPRING ISSUE 15 • www.projectcarmag.com

PROJECT HACHI ROKU



GET INJECTED



UPGRADE YOUR REAR END



DIY COILOVERS



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A full-page photograph showing two men working on a car chassis. One man with long blonde hair is perched on a red hoist, guiding a large engine into the car. The other man, wearing glasses and a purple shirt, is on the ground, assisting with the engine's placement. The engine is suspended by a red hoist with chains. The background features a large, dense green hedge and a blue sky with light clouds. The car's front end is open, revealing the engine bay and chassis components.

**'IN ENGLISH
HOIST SOUNDS
LIKE HORSE'**

BACKYARD WRENCHERS ALL WE NEED IS A DRIVEWAY



I can clearly remember when I started with *Project Car* two years ago. Ricky Chu had left, leaving the magazine in the hands of Justin Fivella, who had been training under his wings for less than three months. Here I was, a backyard wrencher with no editorial experience, trying to learn the ropes from a kid that only knew bits and pieces himself. We struggled through it together and eventually found our way. In time, Justin transferred to one of the motorcycle magazines and remains with the company. Needless to say, I'm still here. Interestingly, things have a way of working themselves out. With the help

of many friends, the job has gotten a little easier. Although the hours are long, we make it enjoyable much like the days of wrenching in the backyard.

This issue brought back some good memories, partly because we were working in a private driveway with only a jack and a set of jackstands. Although I've never owned an AE86, I've wrenched on a few that belonged to friends. Additionally, I've owned a few AW11 MR2s which share the same 4AGE engine and some similar 80's technology.

Beyond the nostalgia, this issue was special because I had the honor of working with someone I look up to, Taka Aono. I could venture to say that

he is the greatest AE86 driver in the United States. But what makes him truly amazing is his personality. He is perhaps the most helpful person I have ever met. At Drift Days, he has a reputation of being the first one at the track and the last one to leave. And if you're that last guy stranded at the track with a broken car, Taka can probably be found wrenching with you through the night.

When we asked Taka if he could help out on this build, he put his own car aside to give us a hand. By the time you read this the 2010 Formula Drift season will have already started; but right now, Taka's car sits without an engine. It

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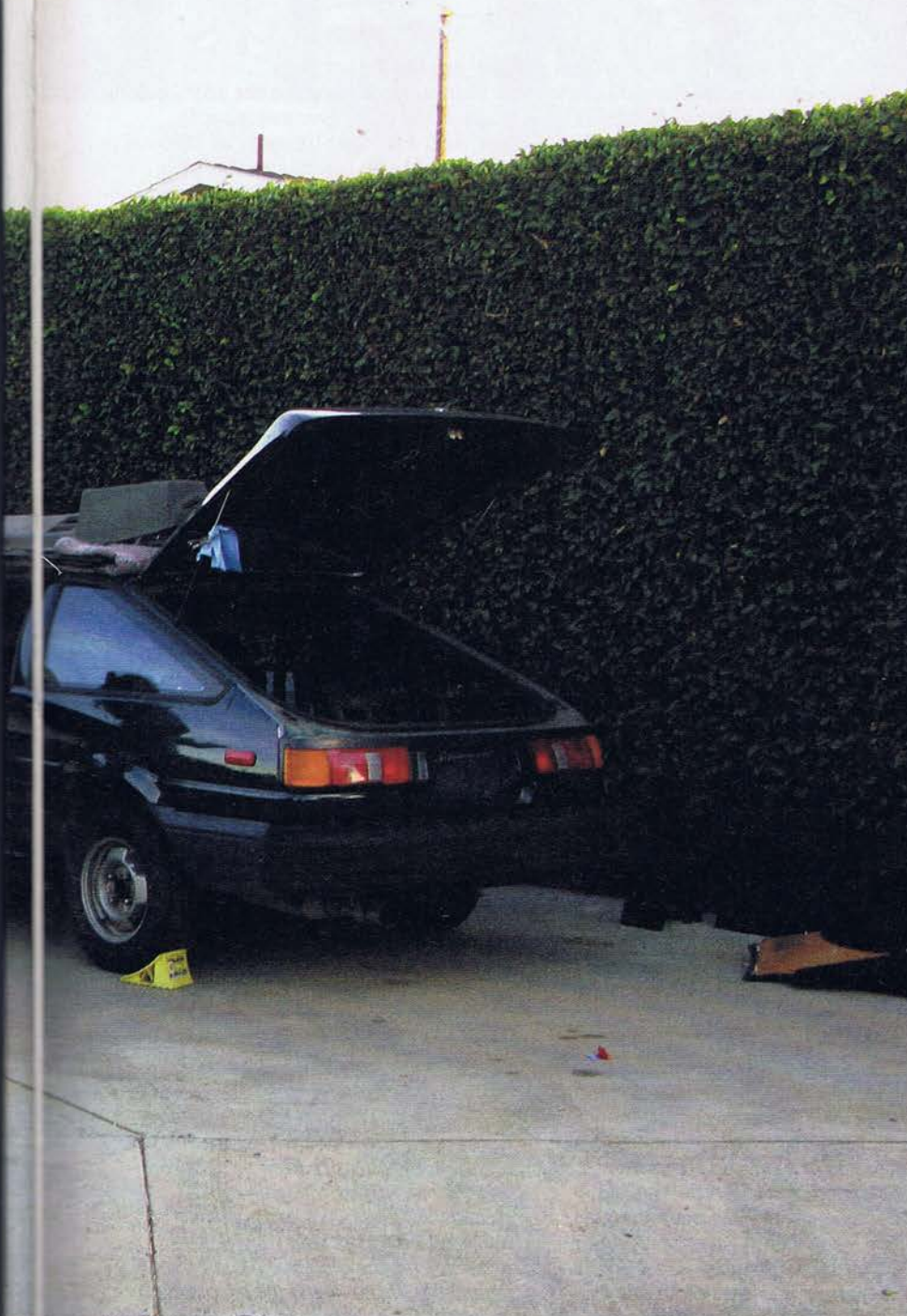
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blew up last season and he is struggling to raise enough money to get it back together in time. As a privateer, it is not easy to fund a competition drift car, especially when the schedule doesn't allow you to work a regular job. While most would walk away, Taka is passionate about what he does and somehow makes it happen. The life of a famous drifter is rarely glamorous. He makes sacrifices on things we consider bare necessities just to get the car to the next event. I have nothing but the utmost respect for what he does both behind the wheel and in his daily life. I hope that you as a reader can appreciate the time and effort Taka spent to help

us document this build.

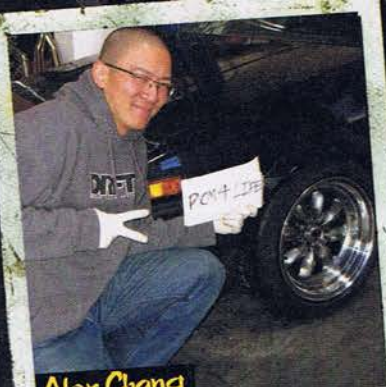
Understanding the needs and limitations of the average Corolla owner, Taka didn't think we were crazy when we told him that we planned to leave the engine stock-well for now at least. If things go well, we'll lure Taka back into the garage and add some tire smoking upgrades to the Hachi Roku. We already know his weakness, some Redbull and a corn dog.

Peace Out,

OLD MAN GARY
inbox@projectcarmag.com



THE ENTOURAGE>> CONTRIBUTORS WHO WORK FOR FOOD



Alex Chang

We told Alex to go get a life and he did: Congrats on the new job.



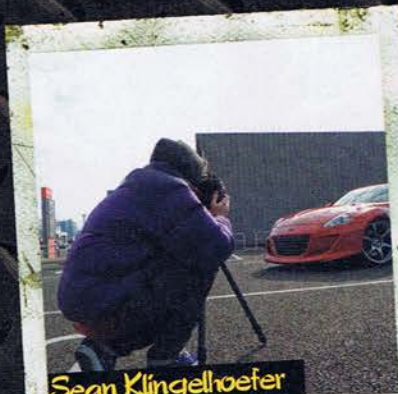
Will "CFO" Law

The king of lunch disappeared during Chinese New Year. Rumor has it that he sells chicken feet to Chinese restaurants this time of year.



Andy Tran

The soon-to-be legend is going after CFO's record of the most Hondas in one lifetime. He told his girlfriend that he needed a daily driver and then trekked to Reno to bring one back. Yes, they all start out as daily drivers...



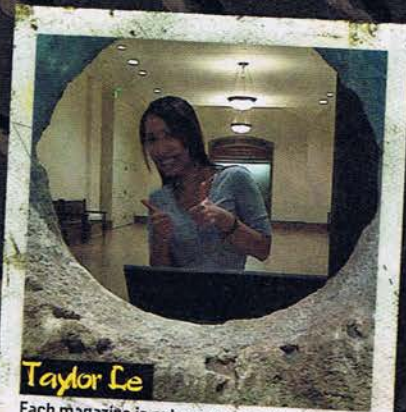
Sean Klingelhofer

After retuning from Japan he's been screaming. "I think I'm turning Japanese. I think I'm turning Japanese I really think so!!!! Glad to have him back catchin' some hot flicks for the mag."



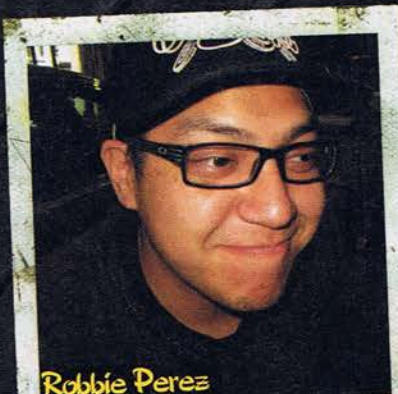
Jesse "Pinky" Wong

This B-series-lover changes blocks and heads more often than the CFO changes his oil. Last we heard he finally tracked down that pesky oil leak.



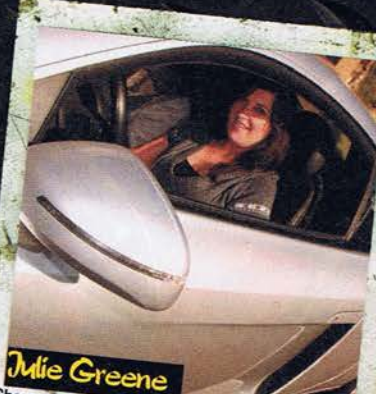
Taylor Le

Each magazine is only as good as its art director. Our magazine is the bomb!



Robbie Perez

Taka has been rubbing off on the kid. He now drives around with a safety cone which he uses to practice right-hand drifts. Stay clear of any white Chevy Dualies in the LA area.



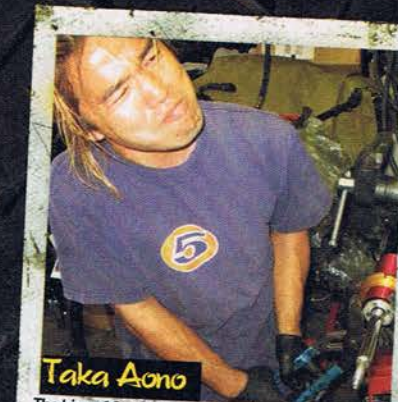
Julie Greene

She saves our butts on a daily basis. As our way to say thanks, we tried to meet our deadlines this time around. She returned the favor by saying "try harder". BTW has anyone seen her yellow Lambo?



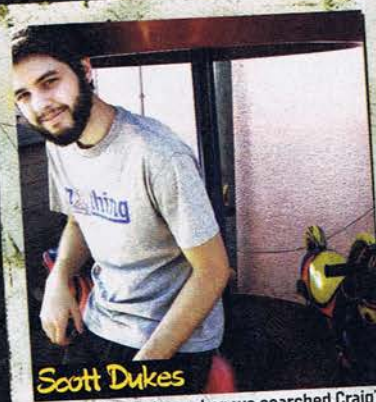
Koji Mori

Coming through with his quick zingers he's made a great addition to our team. Did we mention his garage is a mini Harbor Freight; he's got one of everything they make.



Taka Aono

The king of Corollas has us in awe with his every move. This multi-talented superstar does everything with expert precision. He's like a well-oiled machine that runs on cigarettes and Redbull.



Scott Dukes

In need of a photographer, we searched Craig's List for a Sean look-a-like. After seeing Scott's amazing photography, we got really confused. Is he Sean or an imposter?

attitude to attract chicks on its mediocre looks. Most importantly, it had to be fun to drive, reliable, affordable to drift/race and easy to build.

For the first phase of the build, we'll be focusing on the GT-S conversion process and replacing normal maintenance and safety items, such as brakes, belts, oil seals and fluids, as well as doing some basic performance upgrades like wheels and suspension. Since we have a pro drifter onboard brave enough to test pilot our build at the next Drift Day event, we're digging even deeper to set the car up with a proper limited-slip differential. When we say digging deep, we're not referring to fruitlessly digging into our empty wallets. This one will be coming out of my private stash, one of the parts I've been collecting for my dream car.

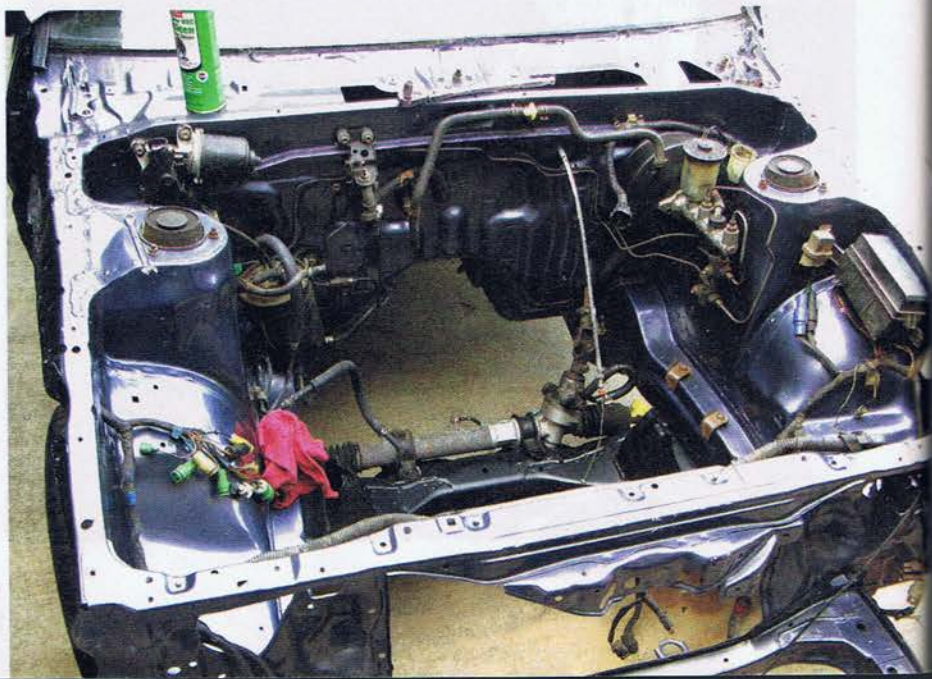
Of course, like any self-respecting gearhead, we don't expect to be able to leave good enough alone. If things go well, we hope to bring our Hachi Roku back for a couple more issues giving us a chance to build it to the next level. The staff is already arguing between a 20-valve black top swap and a built all-motor 16-valve. For now, we hope you enjoy our *Project Car* rendition of the classic AE86! 🍀

REFERENCES:

Moto Miwa
www.club4ag.com

Naoki Kobayashi
www.driftday.com

Taka Aono
www.driftpro.com





'86 TOYOTA COROLLA

WORDS & SNAPS / GARY NARUSAWA



Tools Needed: Jack, jackstands, ratchet, metric sockets and combination wrenches, Phillips and a flat-head screwdriver, pliers, fire extinguisher (for just-in-case)

Difficulty: 2.5 out of 5

Install Time: 2 hours

Parts List

	MSRP	STREET PRICE
Used GT-S Fuel Tank.....	\$150	\$150
Used GT-S Fuel Lines.....	\$50	\$50
Used GT-S Fuel Charcoal Canister.....	\$15	\$15
New Genuine Toyota Fuel Filter (Cabe Toyota).....	\$36	\$28
New OEM Fuel Pump (Cabe Toyota).....	\$417	\$160
TOTAL	\$668	\$403

GET INJECTED

SR5 TO GT-S FUEL SYSTEM CONVERSION

Back in my day, carburetors were being used on a lot of cars. Electronic fuel injection was becoming popular, but was often limited to high-performance or luxury vehicles. For this reason, the SR5 Corolla came with the paltry carbureted SOHC 4A-C engine, while the GT-S sported the high-performance, fuel-injected DOHC 4A-GE.

Unfortunately, the difference in fuel management systems between the two models is what makes the SR5

to GT-S engine conversion such a pain. At first glance, it all seems simple, but when you start doing some research, you soon realize that there are differences throughout the entire fuel delivery system as well as in the wiring. To get started, we convinced our pro drifter/AE86 expert, Taka Aono to show us the ins and outs of this conversion. Times are tough and it's amazing what a free lunch can get you, especially when dealing with an off-season drifter.



01 Start by raising the car and properly supporting it on jackstands. Next, drain the fuel, remove the gas cap and disconnect the SR5 fuel lines. Underneath the car you should find the two straps that secure the gas tank. After supporting the weight of the gas tank with a floor jack, unbolt the straps as shown.



02 With both straps loose, the tank can now be lowered to the ground.

03 Taka recommends that you check the area where the mounting strap attaches to the chassis. It's common for this area to rust out. Ours was fine but we live in sunny Southern California.



04 It was Koji's turn to get dirty. We sent him under the car to swap out the lines. It's highly-recommended to use the GT-S lines as it has a larger diameter feed line. It also has the correct fittings, simplifying the connection to the tank.



05 Underneath the car, you will find several small brackets that hold the SR5 fuel lines. The GT-S lines will bolt right in.



06 Here's how the GT-S lines should route in the engine bay.

07 To keep things legit and looking original, we recommend using the GT-S charcoal canister. It's the larger one on the left.



08 We went with a new fuel filter sourced from Cabe Toyota. Getting a genuine Toyota filter is the best way to get the mounting bracket. It's also nice to know that you're getting a high-quality filter.



09 When you consider that the new Toyota filter comes with the bracket and mounting hardware, it's a pretty good deal—Cabe Toyota sells these for only \$28.



10 The GT-S fuel line threads directly into the bottom of the filter. Be sure to start the nut nice and straight to avoid damaging the threads. You'll need a 19mm wrench to hold the body of the filter and a 14mm wrench to tighten the nut.



11 Getting back to the fuel tank, here's a side-by-side comparison of the SR5 (left) and GT-S (right) tanks.



'86 TOYOTA COROLLA

WORDS AND SNAPS / GARY NARUSAWA

PART 1

TOTALLY WIRED

SR5 TO GT-S ENGINE BAY WIRING CONVERSION

Tools Needed: Ratchet, metric sockets and combination wrenches, flat-head screwdriver, needle-nose pliers

Difficulty: 2.5 out of 5

Install Time: 1.5 hours

Parts List

Used GT-S Engine Room Harness.....

MSRP

\$N/A

STREET PRICE

\$75

TOTAL

\$N/A

\$75



There's more than one way to skin a cat and the same can be said about doing this conversion. There are some creative folks that have modified the SR5 wiring to make it work with the GT-S powerplant, but the generally preferred method is to swap out the SR5 wiring for full GT-S electrical. Sure it can be argued that it has gotten quite difficult to find GT-S parts lately, but we'd much rather spend our time searching the forums for parts than slaving through electrical diagrams and rigging things to work. Please follow along as we start in the engine bay to show you the ins and outs of this procedure.

SR5 HARNESS REMOVAL

01

Located behind the passenger's side kick-panel is this "ECU". Don't try to run your 4AGE on it; it's an Emissions Control Unit. Remove it and file it in the round bin.



02

After removing the "ECU", you will see this junction box. Unplug all the connectors from it as shown. This will free the passenger's side of the engine bay harness from the underdash harness.



03

You should now be able to pull the harness out through the fenderwell. Our car doesn't have fenders or fenderwell covers so we have clear access. If your car is complete, you'll need to remove the wheels and the fenderwell covers to gain access to the harness.



04

The goal is to completely remove the engine bay harness, so work your way around the bay disconnecting any connectors and clips you come across. We found that a pair of needle-nose pliers works well.

**05**

Here's the headlight retractor relay located at the left front corner of the car. Note: In its current state, our car doesn't have headlights, so you'll have to figure out how to disconnect the lighting connectors on your own. Don't worry; all it takes is a little common sense.

**06**

Around on the driver's side strut tower you'll find the emissions relay. This won't be needed for the GT-S swap and can be removed.

**07**

Just next to the relay is the fuse box. Remove that as well.

**08**

With the harness free in the engine bay, we move back into the passenger's compartment to free the wiring from the interior fuse box on the driver's side of the car. The first connector to disconnect is this black plug.

09

Disconnecting these two clear connectors from the fuse box will free the engine room harness from the underdash harness.

**10**

The rear interior harness also connects at the fuse box. Since we'll be changing it out as well for the conversion, we'll go ahead and unplug the yellow and the white connectors as shown here.

**11**

There's a third connector for the rear harness that needs to be removed. It's this clear connector found at the bottom of the fuse box.

GT-S HARNESS INSTALLATION

12

With the plugs inside disconnected, the SR5 harness can be pulled out through the driver's side fenderwell and removed from the car.

**13**

Here's Taka putting the GT-S harness into place.





'86 TOYOTA COROLLA

TOTALLY WIRED: PART 1

14

One of the key points when installing the harness is to ensure a good ground. Here you can see where Taka sanded the area for the ground wire down to bare metal. This is a critical point since it provides the ground for the EFI system.



15

The connectors shown here plug into the back of the fuse box. Once they're connected, bolt the fuse box to the inner fender.



16

As you work your way back around the front, bolt down the headlight retractor relay and secure the harness to the upper radiator support using the factory clips.



17

The last section to wire in the engine bay is the passenger's side. Here's what it should look like when you're done.

SOURCE:

Club4AG
www.club4ag.com

18

Lastly, you'll need to route the harness through the fenderwell and into the passenger's compartment. Next, we'll be going into the car to swap out the underdash and rear harness.





'86 TOYOTA COROLLA

WORDS & SNAPS / GARY NARUSAWA

Tools Needed: Ratchet, metric sockets and combination wrenches, flat-head and Phillips screwdriver, needle-nose pliers, panel popper, electrical tape.

Difficulty: 2.5 out of 5

Install Time: 2 hours

Parts List

Used GT-S Engine Room Harness.....

MSRP

\$N/A

STREET PRICE

\$75

TOTAL

\$N/A

\$75



PART 2

TOTALLY WIRED SR5 TO GT-S REAR HARNESS CONVERSION

The next harness to replace is the rear harness. This one starts at the driver's side kick-panel and runs all the way back to the rear hatch. Like with the engine room harness, replacing the SR5 with the GT-S harness is not your only alternative, but in our opinion, it's the easiest and most reliable method when converting to fuel injection. The rear harness is not difficult to change out, just time consuming because it requires a good portion of the interior to be removed. When purchasing a harness, it's best to source everything from the same car. When that's not possible, Taka

recommends that you avoid mixing "Zenki" and "Kouki" sections of the harness. In Japan, they refer to "Zenki" as the early model and "Kouki" as the later model. This refers to minor changes within the model cycle. For instance, with the Corolla GTS, there were some minor changes between the '85 and '86 year models. Accordingly, our '86 car would be a Kouki model while the '85 donor car that our harness came from would be a Zenki model. Using a complete Zenki harness in a Kouki car or vice versa is not a problem. Where you could run into issues is when you start mixing Zenki and Kouki parts.

SR5 REAR HARNESS REMOVAL



01 Start by removing the driver's seat. Pry off the covers to reveal the four seat bolts.



04 There's a screw at the back of the panel that also needs to be removed.



02 We told Robbie that we'd take him drifting if he helped out. He immediately picked up the vacuum and went to work.



03 With the seat out, you can easily access the middle screws for the door sill panel.



05 You should now be able to remove the panel.



06 Underneath, you will find the front section of the harness.



07 The harness is attached via several clips. If you're careful, you can pry the clips out and reuse them.



08 This is why the seat needs to be removed. The small branch of wires pictured here routes to the e-brake handle and the seatbelt sensor.

09

Here's the plug for the seatbelt sensor. This circuit triggers the little red light on your dash to remind you that you're an idiot for not wearing your seatbelt. Go ahead and disconnect it.



10 Also disconnect the wire for the e-brake switch.

11

You should now have the front section loose.



12

To remove the rear side panel, start by taking out this screw located just under the "B" pillar.

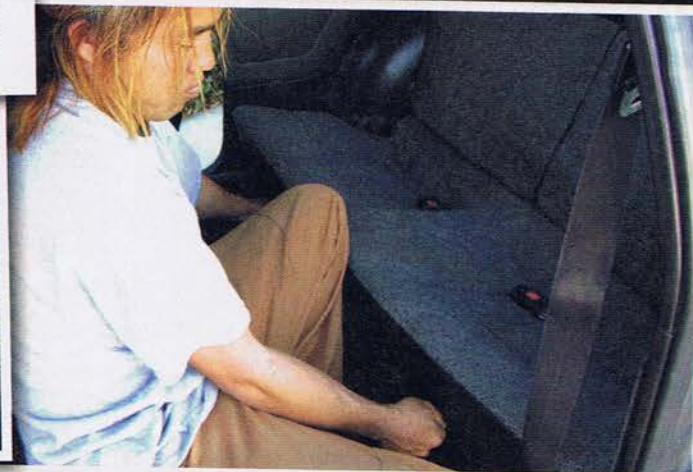


13

Using a "panel-popper" or suitable tool, pry the front of the panel out. It's held in by these two clips.

14

To get the rear seat out of the way, pull on the tabs located on each side of the seat bottom.



15

Our pro drifter found all this treasure under the seat. We called dibs on it before he could lay claim. Hey, we've been buying him lunch all week.



16

In front of the wheel well (behind the side panel), you should find these two connectors. Disconnect them as shown. One is for the courtesy light switch and the other is for the rear speaker.



17

As you work your way across the back seat area, you'll come across a few more mounting clips. Again, a pair of needle nose pliers and a lot of patience will do the trick.



18

As you work your way toward the rear of the car, you'll need access to the hatch area. If your "shocks" are blown like ours, protect your head by locking the hatch in place with a small vice grip.





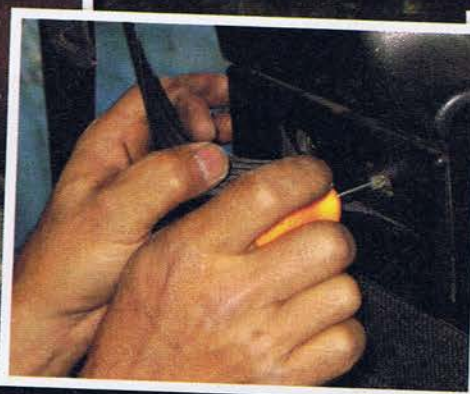
19 To remove the seat back, remove the two bolts on each side and the four bolts in the center.



20 The rear carpet is connected to the seat back. Bundle it up and remove it.



21 Now remove the panel on the right side.



24 Unscrew the hook above the rear quarter window.



22 Move up to the B-pillar and remove this seatbelt bolt.



23 Note the order of the spacer and the lock washer. During reassembly, you'll want to put things back the same way they came out.



25 Also unscrew the Oh-S#!T handle.



26 After you're sure you removed all the screws, grab the upper trim piece and pry it out with your fingers.





'86 TOYOTA COROLLA

TOTALLY WIRED: PART 2



27

The trim piece is held on by clips. If any got stuck on the car side, re-set them into the backside of the panel as shown.



28

Unscrew the top of the B-pillar panel and remove it.



29

There is one more panel above the quarter glass that needs to be removed. Unscrew it and drop it down.



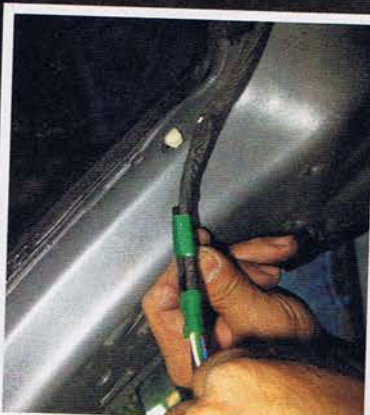
30

Now unplug the two connectors leading to the hatch.



31

The upper section of your harness should now be free.



32

As you work your way around to remove the harness, you'll run across these mounting clips. Taka's recommendation is to cut or un-wind the tape to separate the harness from the clips. Trying to pull the clips out of the body will only break them.



33

Leaving the clips in place will provide a mounting system for the new harness. Ignoring this step will result in an annoying sound from behind the panels: rattle, rattle...

34

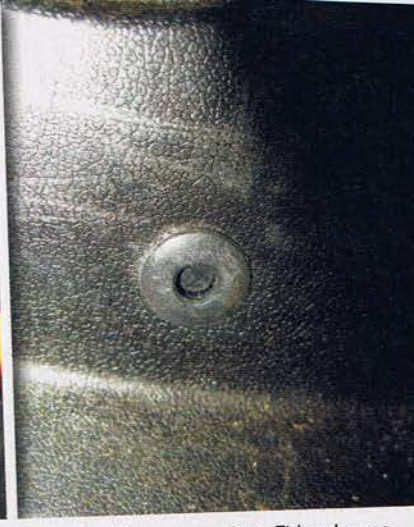
We now move on to the hatch area. Again, the idea is to remove the paneling and get to the harness. Most of the rear panels are held in by clips. If you're car is anything like ours, half the clips will be missing or broken.





35

To remove the clips, simply push the center pin in with a screwdriver. This releases the clip, allowing it to be removed.



38

The third bolt is directly behind the speaker and the fourth is by the rear hatch.



36

Next, you'll need to remove the rear speaker panel on the right side of the car. The first bolt is next to the seat-back latch as shown.



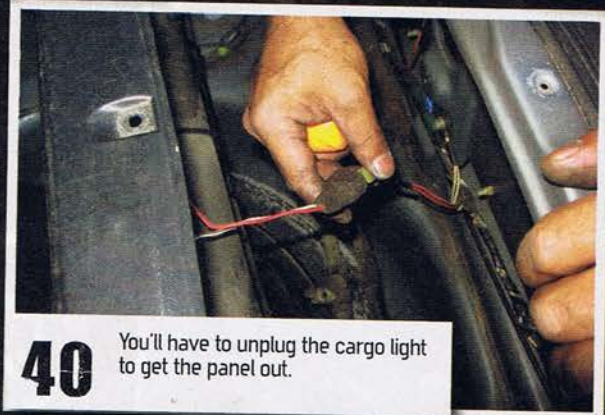
37

You'll find the second bolt just to the front of the speaker.



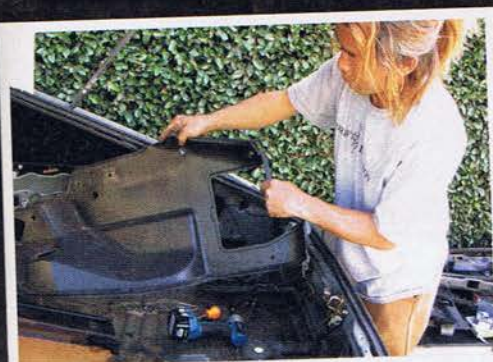
39

At the back of the car, remove the rear panel to gain access to the tail light area.



40

You'll have to unplug the cargo light to get the panel out.



41

Now remove the passenger's side rear panel.



42

Here you can see how the wiring routes around the side and across the back.



'86 TOYOTA COROLLA

TOTALLY WIRED: PART 2



43

Now unplug the lighting at the back of the car.



44

And finally, unbolt the ground terminal.

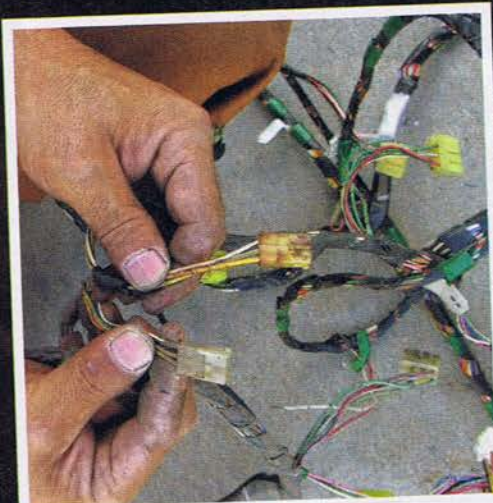
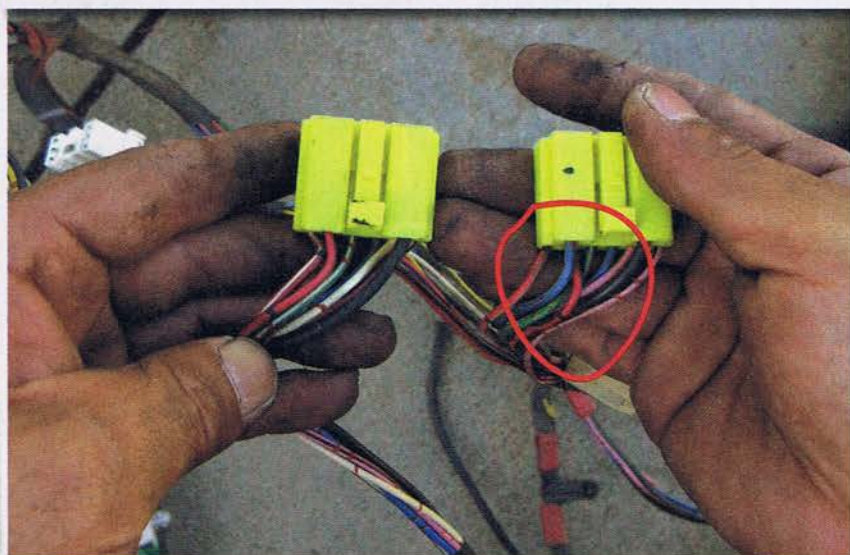


45

You should now be able to remove the rear harness.

46

Here's a comparison of the SR5 and GT-S rear harness. The connector on the left is SR5 and the one on the right is GT-S. This is the end that plugs into the fuse box at the driver's side kick panel. The critical difference is the blue wire on the GT-S harness that feed power to the electric fuel pump.

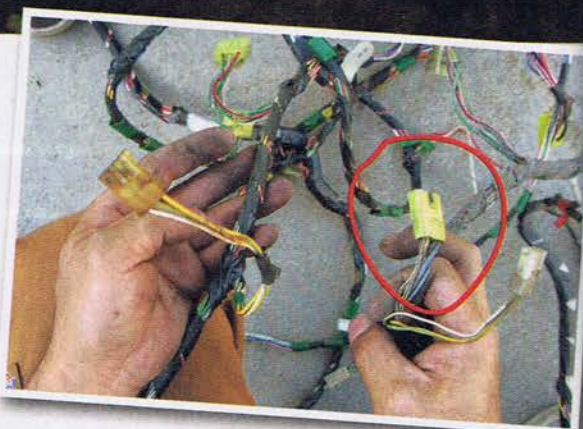


47

At the other end of the harness, two of the connectors match. These are for the fuel sending unit (gas gauge).

48

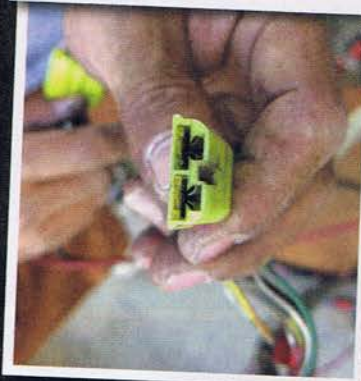
The difference is in the second plug. On the right, you can see the yellow connector that plugs into the GT-S fuel pump. On the left, the yellow connector is non-existent as the SR5 uses a mechanical fuel pump. While a basic fuel pump circuit can easily be added in to an SR5 harness (using an external relay), the factory GT-S system is much safer as it incorporates a circuit opening relay. This system reads a signal from the air flow meter and only allows the fuel pump to operate when the engine is running. So in the event of an accident, the fuel pump shuts down any time the engine dies. This could keep you from becoming a burn victim. While a circuit like this could be added in externally, it involves some advanced electrical knowledge and goes beyond the scope of this article. So if you don't want to take the recommended route and swap out to GT-S wiring, we recommend that you brush up on your electrical skills and bust out the factory wiring diagrams.



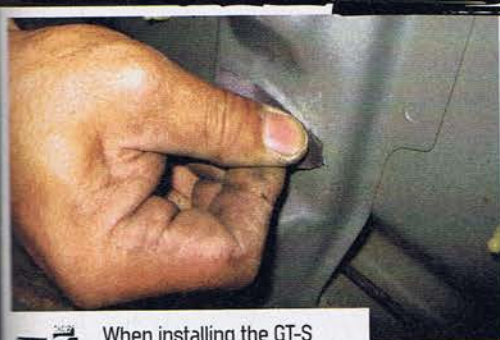
49 What Taka is doing here is resistance checking the main lead to the fuel pump. He's touching the first lead from his meter to the blue wire on the fuel pump connector. Although not visible in this picture, he is simultaneously holding the second lead to the opposite end of the blue wire located in the larger yellow connector. In the second picture you can see how he's got the dial set to the 200 ohm position and the reading shows 00.4 ohms. To avoid getting technical as there are many factors affecting resistance in a wire (such as length wire material and corrosion) let's just say that the closer to zero your number is, the less resistance there is in your wire. So by this standard, our reading of 00.4 ohms is pretty good. If you think of electricity as water flowing through a pipe, resistance would be the equivalent of trying to flow excessive amounts of water through a tiny pipe or having crud built up around the inside walls, both of which would restrict flow. So like with crud restricting the flow of water, high electrical resistance is bad since it reduces the voltage reaching the pump.



50 If the resistance on your wire reads high, try cleaning the terminals with a small wire brush. Here's a close up of the terminals on the fuel pump connector. These don't look bad but a quick scrub couldn't hurt either.



GT-S REAR HARNESS INSTALLATION



51 When installing the GT-S harness, Taka recommends cleaning the area around the ground terminal. A small piece of emery cloth works well for the job.



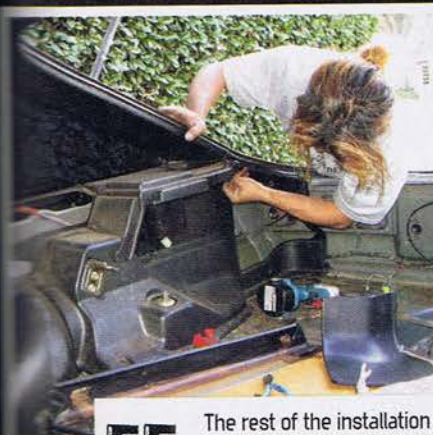
52 You should also sand down the ground terminal to remove any oxidation. A dirty ground connection can create high resistance, reducing voltage through the ground side of the fuel pump. This can also cause your taillights to look dim.



53 Remember the mounting tabs around the B-pillar? Simply attach the new harness using electrical tape.



54 We ran into a slight compatibility issue with the rear hatch connectors. Our wiring came out of a Zenki (early model) GT-S donor car and we are trying to install it into a Kouki (later model) SR5. Since the wires are for the rear wiper (which our GT-S harness is not wired for) and the rear defroster (which we don't need in Southern California) we simply tucked the connectors away and moved on.



55 The rest of the installation is the reverse of the removal. It's a no-brainer.



56 Geez, Robbie must really want to go drifting; we've never seen him work so hard. Maybe I should pull my truck around....



'86 TOYOTA COROLLA

WORDS & SNAPS / GARY NARUSAWA

Tools Needed: Ratchet, metric sockets and combination wrenches, flat-blade and Phillips screwdriver, needle-nose pliers

Difficulty: 2.5 out of 5

Install Time: 2 hours

Parts List

Used GT-S Underdash Harness

MSRP

\$N/A

STREET PRICE

\$75

TOTAL

\$N/A

\$75



To finish up the wiring, we must also replace the underdash harness. This is a key harness for the swap as it contains the circuit opening relay (for the fuel pump) and the wiring to the instrument cluster. Keep in mind that the GT-S cluster uses a check engine light as well as an additional circuit from the speedometer head to send an electrical vehicle speed signal to the ECU. Pulling the dash sounds a little crazy, but since we're dealing with an older car, it's actually quite simple. The key is to take your time since you'll be dealing with some old and brittle plastic parts. Look at the bright side; this is the perfect time to replace that old dash with the nasty cracks in it—assuming you can find a cleaner one.

PART 3

TOTALLY WIRED

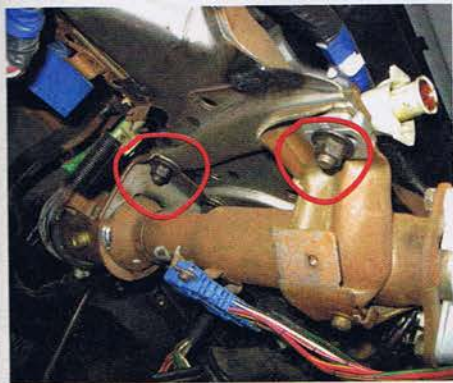
SR5 TO GT-S UNDERDASH HARNESS CONVERSION



01

OK, you caught us cheating; this car doesn't have a dash to remove. Hey, these are the real-life situations that we deal with. Project vehicles come in all shapes and forms. We'll grab a cup of coffee while you figure out how to remove yours. Seriously, if you reverse our installation steps, you should be able to figure it out. You can also grab an FSM (Factory Service Manual) which shows the detailed steps for removing the dash. We're starting with the dash support. It mounts with four bolts on the driver's side corner.





02

To the right of where you're working, you should see the four bolts for the steering column. Remove them as well.
Note: If you've just removed your dashboard, you probably already completed this step.



03

Next to the speedometer cable, you should find two more bolts needing to be removed (12mm).



04

Next, you'll need to remove the frame behind the radio console. I think ours is missing a few bolts down here.

05

Up top, we had one bolt on each side.



06

On the passenger's side, remove the single bolt by the cowl and the two in the corner.



07

Before removing the dash support, disconnect any wires or modules that may be attached to it.



08

Once everything is clear, pull the dash support out of the car. Work carefully; it has some sharp edges.

09

You can now start disconnecting the harness. The spring shown here is for the clutch pedal. We temporarily disconnected it to slip the harness around it.



10

Now remove the center defroster vent. It's held in by 5 screws.





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TOTALLY WIRED: PART 3



11 Hidden behind the defroster vent is the section of harness that routes around to the passenger's side.



12 At the right kick panel, you should find this junction box. It's held in by a bolt up top and a clip below.



13 Closer to the A-pillar, you should have a grey relay and a black module like ours. Unhook these from their mounting tabs.



14 There should be some connectors for the heating/AC system. Unplug anything that is connected to the harness.



15 The harness is attached through several of these clips. Pry the tab down with a screwdriver as shown to release it.

16 We're making some progress!



17 Back on the driver's side, you'll have this large connector over by the brake pedal. Remove the bolt and unclip it.



18 If you haven't done so already, unplug the clutch safety and the stop light switch.

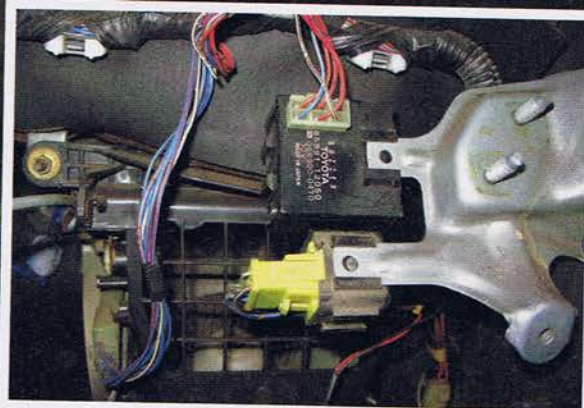


19 As you work your way left, you should stumble across the interior fuse box. Unbolt it and remove it with the harness.



20 As you pull the harness out of the car, remind yourself that you're halfway done. It's downhill from here (or uphill if you're a pessimist).

21 The GT-S harness installs just like the old one. Route it around and start plugging things in.



22 Similar to the SR5 harness, the GT-S harness has a relay and a module that clip in to this bracket.

23 Here's the junction box bolted to the right kick panel. Even the bottom clip snaps right in.



24 Hey look: we're back to where we started—but with the GT-S harness.

25 Aside from the small mark above the cluster area, this dash is nearly perfect. This was snagged from a junk yard several years ago. Nowadays, a perfect dash is almost impossible to find, especially when you're on a budget.



26 As we were mounting the dashboard, Taka pointed out the two mounting studs in the instrument cluster cavity. When I asked for any tips to avoid damaging the classic dash during installation, Taka responded "don't break it". One thing's for sure with Taka: you ask him a stupid question and you'll get a stupid answer. At least I got a smile with my answer to help me feel less dumb. Working with Taka is super-cool!



27 The speedo cable has its own little VIP spot at the back of the dash. Go ahead and pop it in place.

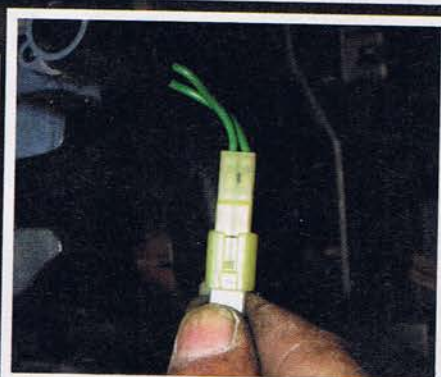
28 This hole is for the clock. Make sure the electrical connector is accessible before continuing.



29 There's a hidden bolt in the clock hole. Keep that in mind for the next time you're pulling a pristine dash at the junkyard. There is also a second one hidden in the small defroster vent on the passenger's side of the dash, located above the right A/C vent (not shown in picture).



30 Finding a super-clean climate control unit these days is tough. This one will have to do. It mounts with four Phillips head screws.



31 We just plugged in two of these little light things. They screw in on the sides of the instrument cluster. Taka calls them "fancy" and unnecessary. Their job is to tell you if your lights or wipers are on. Whoa, like it's easier to see this little light than wipers sweeping across the windshield.

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TOTALLY WIRED: PART 3

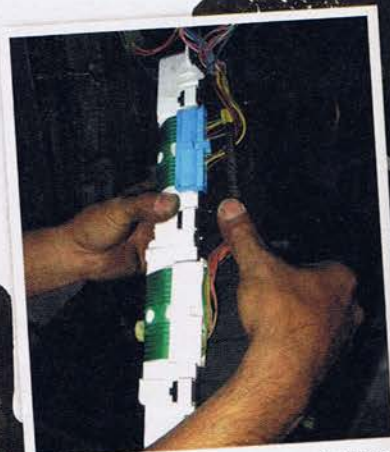
32

Here's a better look at the two useless lights. The important step here is to mount the headlight and wiper switches.



33

Now install the instrument cluster. Plug in the electrical connectors and pop the cluster into place. It's held in by four Phillips head screws. Be sure to return next issue to see how Taka updated our cluster with LED lighting. It makes you feel like you're driving a Lexus.



34

You can now install the trim plate/bezel for the cluster.



35

After securing the light and wiper switches, finish them off with the knobs.

36

If you haven't done so already, plug in the engine room and rear harness into the new fuse box. We'll come back to install the glove box and miscellaneous parts on the passenger's side of the car after installing the fuel injection harness and the ECU.



SOURCE:

Club4AG

www.club4ag.com



'86 TOYOTA COROLLA

WORDS & SNAPS / GARY NARUSAWA

Tools Needed: Ratchet, metric sockets and combination wrenches, flat-blade and Phillips screwdriver, needle-nose pliers

Difficulty: 2.5 out of 5

Install Time: 1.5 hours

Parts List

	MSRP	STREET PRICE
Used GT-S Throttle Cable.....	N/A	\$18
Used GT-S Clutch and Brake Pedals.....	N/A	\$40
Used GT-S Clutch Line.....	N/A	\$10
New Clutch Master Cylinder (aftermarket).....	N/A	\$28

TOTAL

\$N/A

\$96



Since the dash was out (a few steps ago), we took advantage of the clear access we had to the pedals. Our original plan was to only change out the throttle cable (the GT-S cable is longer) but we ran into a minor compatibility issue with the pedal wiring. While we probably could have remedied the situation by changing switches or swapping connectors, we already had the parts from the donor car so we decided to swap the pedals out completely. We'll cover further details on this throughout this section.

FOOT ACTION

PEDAL ISSUES



01 Lets start off with the throttle cable. The GT-S cable is the longer one pictured on the left. Don't forget to grab yours from the donor vehicle.



02 There are two bolts to the firewall (one is hidden in this picture) and the white nylon clip (going through the hole in the pedal) that need to be removed.



03 Here's a close-up of the clip. To remove it, simply pinch the tabs from the backside as you pop it out of the pedal. The cable can then slip out of the slot in the pedal.



04 Pull it through the inside of the car to remove it.

05 Install the GT-S cable using the reverse procedure of removal.



06 If you look closely at these pedals you can see some minor differences. The '85 GT-S pedals are on the bottom, and the '86 SR5 pedals are on top. The clutch pedals are on the left, the brake pedals are on the right. As far as wiring goes, either clutch pedal is compatible. The switches look different, but either connector plugs in. Where we noticed a difference was with the brake switch connectors. Taka thinks this was because one car had cruise control and the other didn't. We probably could have gotten away with just changing out the switches but we had the full pedal and swapped the whole thing.



07 Here's a close-up of the clutch pedals. They both have the same three-bolt mounting pattern which makes them interchangeable but note the difference in how they mount to the firewall. The SR5 pedal has two holes while the GT-S pedal is upgraded to a hole and a stud.



08 According to Taka, having the stud makes a huge difference when working alone. You can hang the pedal from the top bolt and align it with the stud as shown here.

09 You can then come around to the engine bay and pop the clutch master cylinder into place. Doing this without the stud is nearly impossible unless you have the help of a second person. Note how the design requires the removal of the brake booster in order to slip the clutch master cylinder into place; let's add that to our list of brilliant designs.



10 Here's the nut that secures the assembly from the engine bay side.

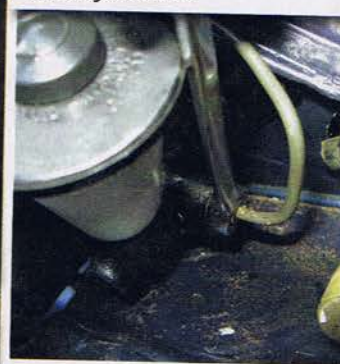


11 You'll have to go inside the car to install the second nut. This one threads onto the stud from the clutch master cylinder.



12 Because the GT-S hydraulic system requires the slave cylinder be mounted on the passenger's side, you'll need to either source a used line from a GT-S or bend a universal line to fit. A third option is to take a trip down to Earl's and build one out of steel braided hose and AN adapters. Check out how nicely our factory GT-S line fits up with the slave cylinder hose. It looks perfectly stock when you use all the GT-S hardware. We'll return to this area after the engine is mounted to finish the connection to the slave cylinder.

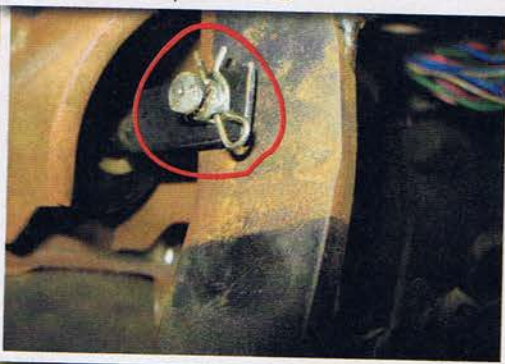
13 Back up top, you can see how the opposite end of the line connects to the master cylinder. When tightening, we recommend using a line/flare wrench on the tube nuts to prevent rounding them out.



14 With the clutch master in place we can re-install the brake booster. It mounts to the firewall from the inside by the four nuts at the base of the brake pedal bracket (two studs are not visible).



15 Whatever you do, don't forget to install the pin which connects the brake master cylinder to the pedal. The clutch pedal uses a similar set-up. Install that pin as well.



SOURCES:

Club4AG
www.club4ag.com

Local Parts House



'86 TOYOTA COROLLA

WORDS & SNAPS / GARY NARUSAWA

Tools Needed: Jack, jackstands, ratchet, metric sockets and combination wrenches, flat-blade screwdriver, pliers

Difficulty: 2.5 out of 5

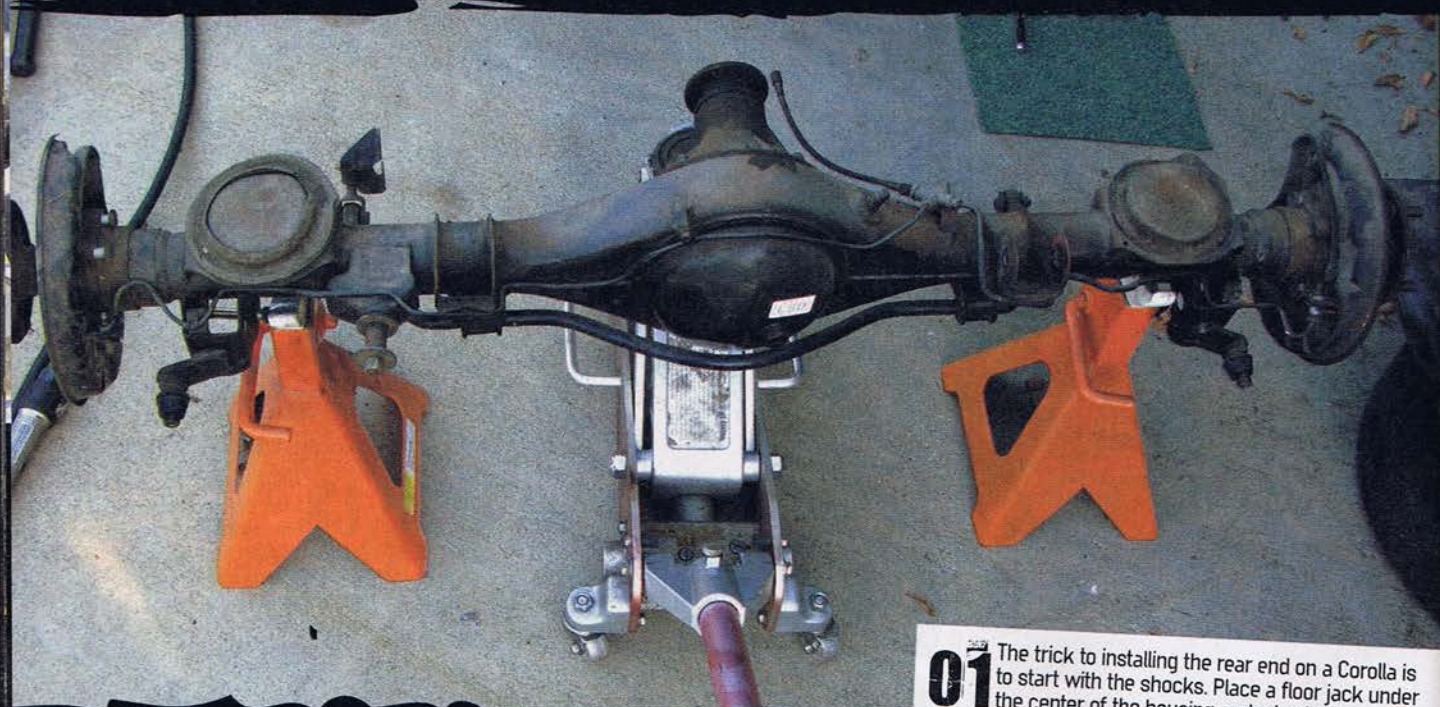
Install Time: 1.5 hours

Parts List

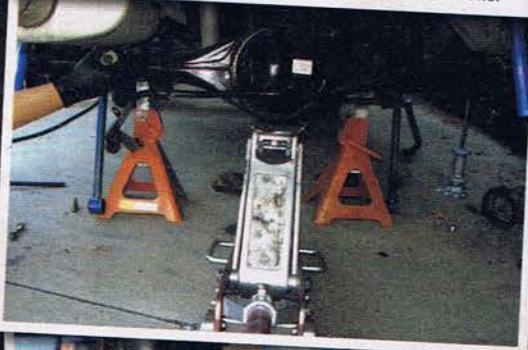
	MSRP	STREET PRICE
Used GT-S Rear End (Complete Disk to Disk)	\$350	\$350
New Left and Right E-brake Cables (Toyota)	\$140	\$112
TOTAL	\$490	\$462

UPGRADE YOUR REAR END

SR5 TO GT-S REAR AXLE HOUSING CONVERSION



01 The trick to installing the rear end on a Corolla is to start with the shocks. Place a floor jack under the center of the housing and raise it into position. Slip the shocks into place and loosely tighten the bolts.



We have already covered several of the differences between the SR5 and GT-S models. Let's go ahead and add one more to the list: the rear end (axle housing) assembly. While the SR5 model only came with a 6.38" open differential with drum brakes, the sporty GT-S came equipped with the larger 6.7" differential and rear disk brakes. Even better, a two-pinion clutch style limited-slip differential was also available as a factory GT-S option. Although we were lucky enough to find a GT-S rear end with a factory LSD, our plan is to upgrade to an aftermarket 2-way differential. According to Taka, the factory LSD works decent for everyday street duties but is not strong enough for drifting or grip driving. This weakness is due to its inferior two-pinion design (aftermarket units use a stronger 4-pinion system). Be sure to check back next issue for a step-by-step write-up on how to set-up an aftermarket limited-slip differential unit. For now, please follow along as we show you how to upgrade to a GT-S rear end.



02

Having the shocks in place will help to align the rear axle housing, making it much easier to install the four links. Start with the upper links. Once you get the parts into position, start the bolt.



03

Install the lower links in a similar manner.



04

With all four links in place, disconnect the shocks and lower the jack to swing the axle housing down. This will give you the necessary clearance to install the springs. We're temporarily installing the stock springs. We'll come back to upgrade the suspension as soon as the new parts arrive.



05

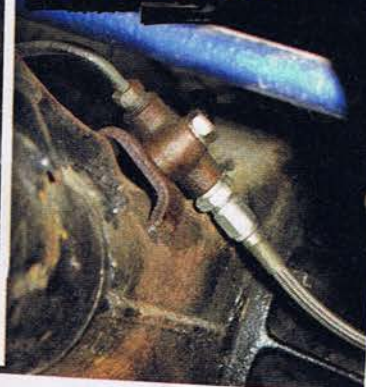
Raise the jack back up and re-install the shocks.



HYDRAULIC BRAKE LINE

06

We can now move on to hooking up the brake lines. There's one hydraulic line that connects to the axle housing. Our car came with an aftermarket steel braided line, the stock system uses a rubber hose.



E-BRAKE CABLES

07

When converting to the GT-S axle housing, you'll also need to swap out the e-brake cables. Start by removing the old e-brake handle assembly. It's held on by two bolts up front and two in the rear.



08

Next, disconnect the connector for the switch.



09

Assuming your SR5 cables have already been removed with the old rear end, the brake handle assembly should pull right out.



10

Many people don't realize that the SR5 and GT-S e-brake handles are different. Take a look at the two sitting side by side. If you look carefully at the pulley/cam where the cable pivots, you can see that the one on the GT-S handle (on the right) is larger.

11

If you compare the front section of the cables (the portion that rides inside the pulley), you can see that one is longer than the other. The longer one is from the GT-S.





'86 TOYOTA COROLLA

UPGRADE YOUR REAR END



12 So to do the job correctly, we're installing the brake handle and the front section of the cable, all sourced from a GT-S.

13 Under the car, the front section of the cable attaches to a bar where the two main cables attach. Unfortunately, our used cables were in poor condition. Since having a functioning e-brake is important for a drift car, we ordered a new pair from Cabe Toyota. In doing so, we learned that the left and right cables have different part numbers and are not interchangeable. The one pictured here is for the left side.



14 A distinguishing mark that we found on both our new and old cables is this yellow marker. Both sets only have the marker on the right cable.

15 Starting on the right side, connect the cable to the brake caliper. The outer housing is retained by a clip as shown. When purchasing a used GT-S rear end, we recommend trying to find one complete with the brake calipers and e-brake cables attached. Trying to piece everything together can be a hassle and adds hidden costs.



16 The end of the cable attaches to the parking brake crank as shown. Since we're missing the factory clip that locks the pin in place, we're replacing it with a cotter pin.



17 The center of the cable housing bolts to the chassis as shown.

18 The front of the cable housing mounts to the chassis through this clamp. Tightening the bolt on the side locks the cable in place.



19 Forward of the clamp, there's a bracket to hold the little nylon bushing in place. When done, install the left cable using the same procedure.



20 Here's the bar that connects the short cable from the e-brake handle to the two main cables leading to the calipers. Slide the cables into place as shown.



21 If your rear calipers are not yet mounted (like ours), go ahead and bolt them down.



22 The final step is to adjust the e-brake cable. Follow the recommended setting of 6-9 clicks of travel.

SOURCES:

Club4AG
www.club4ag.com

Cabe Toyota
562.595.7411
www.cabetoyota.com

DriftPRO
www.driftpro.com



'86 TOYOTA COROLLA

WORDS & SNAPS / GARY NARUSAWA

Tools Needed: Ratchet, metric sockets and combination wrenches, caliper piston compressing tool, adjustable wrench, prybar, jack, jackstands.

Difficulty: 2.5 out of 5

Install Time: 2 hours

Parts List

	MSRP	STREET PRICE
Tokico HTS 102 Dampers (Set of Four)	\$800	\$655
Swift 6.5 Kg/mm Rear Springs	\$175	\$175
Techno Toy Tuning Lateral Rod	\$135	\$135
Hawk Performance HPS Rear Brake Pads	\$60.29	\$60.29
TOTAL	\$1170.29	\$1025.29

The AE86 Corolla uses a live axle, four link rear suspension. While some may consider this a bit primitive when compared to newer IRS systems, Taka and many other racers and tuners have found ways to make the system work. For Project Hachi Roku, our criteria for selecting suspension components was based on price (value), quality and the effectiveness of each part. For a low and aggressive

stance, we started with a set of Swift rear lowering springs and Tokico HTS short stroke shocks. To gain lateral adjustability of the rear axle, we then added a Techno Toy Tuning adjustable lateral rod. Since it's equally important to stop as it is to go fast, we finished the list with a set of Hawk HPS brake pads. Please follow along as Taka shows us the basics on setting up the AE86 rear suspension.

THE LOW DOWN

UPGRADING THE REAR SUSPENSION AND BRAKES



01 We selected a pair of 6.5 Kg/mm Swift springs for the rear of the car. They feature a progressive rate design, making them ideal for a daily driver/weekend warrior like ours. We sourced them from PASS Racing in City of Industry, CA.

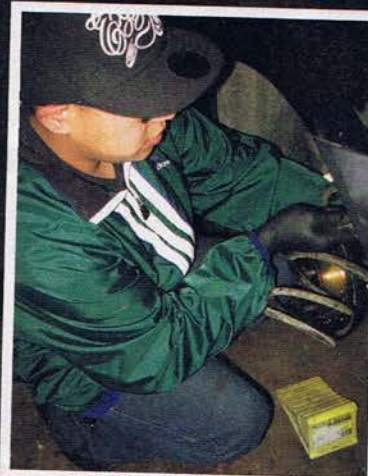
02 To match our springs, we ordered a set of Tokico D-spec/HTS short stroke shocks. Being a short stroke design, they will maintain proper suspension travel with our lowered height. Attempting to significantly lower an AE86 using full length shocks is a bad idea as it will result in the shock piston bottoming out. Not only will this upset the handling of the car, but it will cause damage to the shock absorber.



03 The third component needed when lowering your AE86 is an adjustable lateral/Panhard rod. As the suspension compresses, the lateral rod will push the rear axle housing toward the driver's side of the car. This is due to the mounting angle of the rod and the arc that it swings on. Having an adjustable length rod allows you to re-center the rear axle housing after the lowered ride height is established. We sourced this trick looking adjustable lateral rod from Techno Toy Tuning (T3).



04 Let's start the installation by lifting the rear of the car and supporting the chassis on jackstands. Then, while supporting the axle housing with a floor jack, unbolt the rear shocks and slowly lower the jack.



05 You should now be able to remove the springs as Robbie is doing here.

BUMPSTOP MODIFICATION

06 Bolted to the center of the upper spring perch is the bumpstop. Unbolt it and remove it from the car.



07 Using a hacksaw, we are cutting off roughly two thirds of the bumpstop. If we don't shorten the bumpstop when lowering the car, the suspension can bottom out against it too early, resulting in some unpredictable handling issues.



08 Here's our shortened bump stop being reinstalled in the car.

REAR BRAKE PADS AND ROTORS

09 The guys at DriftPRO had these slotted and cross-drilled rotors sitting around the shop. They donated them for the project. Thanks DriftPRO!



10 We selected a set of Hawk HPS performance brake pads. These are Hawk's street pads designed for low noise, low dust, long life and great performance. Hawk has special compounds for virtually every type of racing. We could have gone with a more aggressive compound but we selected the HPS pads because they best matched our goal for a well-mannered street machine.





'86 TOYOTA COROLLA

THE LOW DOWN

- 11** Working from the backside of the caliper, loosen the two mounting bolts and free the caliper.



- 12** Once the caliper is out of the way, you can remove the old rotor and replace it with a new one. If you're low on funds, check to see if your stock rotors can be resurfaced or just buy a set of stock replacements. Aftermarket rotors like these are nice, but stock will do the job.



- 13** Reinstall the caliper assembly over the new rotor. Remove the cylinder installation bolt, swing the cylinder upward and remove the old brake pads.



- 14** Compress the piston to allow clearance for the new pads. You can purchase an appropriate tool at most local parts stores or sometimes get away with a pair of needle nose pliers. The procedure is to push inward as you twist in a clockwise direction. When you're done, align the grooves in a vertical position. There's a pin on the back of the brake pad that must align with the lower groove.



- 15** Load the new Hawk pads into the caliper bracket. Be sure to align the pin with the groove as explained in the previous step.



- 16** Lower the cylinder into position and secure it with the mounting bolt.

SHOCK REMOVAL

- 17** Our car came with a pair of Tokico HP "Blues" in the rear. While it's a good shock for the average street car, it will not cut it for the low stance and weekend track demands we have planned for this Hachi Roku. We've already disconnected the bottom mounting bolt and are looking at how the shock is attached up top. We have the main nut at the bottom followed by a skinny lock nut. At the tip of the strut, you can also see two flattened edges, allowing the shaft to be held with a wrench.



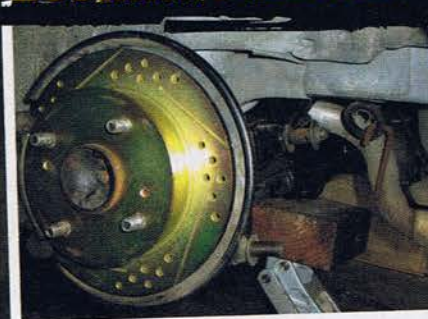
- 18** Hold the lower nut with a 14mm wrench and loosen the lock nut with a second 14mm wrench.



- 19** Once the lock nut is removed, secure the shaft by holding it with a wrench on the two flat edges and loosen the main nut. Have a buddy hang on to the shock as you remove the nut or you'll hear a big clunk when it hits the floor.



BUSHING PRELOAD



- 20** While the shocks and springs are out, Taka recommends setting the preload position of the bushings. Although this may sound like an unusual step, it actually makes a big difference in the ride height as well as the handling of the car. We'll explain this further as we walk you through the steps.

21 Start by loosening the bushings on all four links. If you're using a factory lateral rod, loosen those bushings as well.



22 Although the factory manual recommends tightening the bushings at the static ride height of the car (JDM tuners call this the IG position), Taka's method is to do this under full compression. Right about now, some of you might be asking "what difference does it make since the bushings are designed to rotate freely with the suspension?" Wrong, as you'll soon see: the bushings work under tension and will spring back to their original position. Start by raising the jack until the rear suspension is fully compressed. This picture shows the lower spring perch sitting against our shortened bump stop.



23 Now go ahead and tighten all the bushings as Taka is doing here.

24 When you lower the jack, you'll see that the axle housing does not drop very far. When measured, ours only dropped about 2.5 inches. Keep in mind that ours is currently only supported by the four links/control arms.



25 Doubting Robbie tried pulling down with all his might. The axle housing moved down slightly and bounced right back into position.

REAR SPRING INSTALLATION



26 The bushings created so much resistance that we had to use a prybar to install the springs

27 Here's our rear suspension sitting at full droop. The slight tension from the bushings hold the Swift springs in place without preloading the spring. Had we locked down the bushings at full droop instead of full compression, our springs would be flopping around right now. According to Taka, locking the bushings down at full droop raises the ride height of the rear as well.



REAR SHOCK INSTALLATION

28 We can now mount the rear Tokico HTS shocks. Install the lower washer and bushing as shown: they'll both sit below the chassis.



29 Now place the shock through the chassis. Mount the upper bushing and washer followed by the mounting nut. If you've done things properly, the chassis should be sandwiched between the two rubber shock bushings. Take a look at the tip of the shock. It has two flat spots machined across the threads to fit a wrench.

30 Hold the tip with a wrench and tighten the mounting bolt. Work carefully to avoid damaging the threads with the top wrench.





'86 TOYOTA COROLLA

THE LOW DOWN

LATERAL ROD

31 Insert the bushings and bolt the bottom of the shock to the axle housing.



32 We can now install the Techno Toy Tuning (T3) lateral rod. The purpose of the lateral rod is to limit the side-to-side movement of the axle housing. This aftermarket unit offers adjustability in length through its threaded Heim joint ends. Unbolt your stock lateral rod and use it as a reference to set the length for the T3 rod. Leave the locking nuts loose as further adjustments still have to be made.

34 The opposite end of the lateral rod mounts to this stud on the axle housing.



33 The T3 bar comes with all the necessary hardware for a hassle free installation. Assemble the spacers to the side of the rod end and bolt the bar to the chassis as shown.



36 The length of the lateral rod should be set at the static ride height (IG). To simulate this IG state, raise the car and move the jack stands underneath the axle housing. This will place the weight of the body over the suspension, as if the car were resting on the ground.



37 To center the axle housing, Taka is measuring between the inner lip of the rim and the edge of the of the frame rail on each side.



38 Spinning the center section of the rod will change its length, shifting the axle housing from one side to the other. Once the center point is achieved, tighten the two lock nuts on the lateral rod.



39 For break-in purposes, Taka recommends setting the damping on the shocks to a soft position. Turn the dial in all the way in until it stops and then back the adjuster out 7 turns. We'll drive around like this for a bit and then re-adjust it before hitting the track.



SOURCES:

Tokico USA

800.548.2549

www.tokicogasshocks.com

Techno Toy Tuning

530.626.7334

www.technotoytuning.com

Hawk Performance

800.542.0972

www.hawkperformance.com



'86 TOYOTA COROLLA

WORDS & SNAPS / GARY NARUSAWA

Tools Needed: Jack, jackstands, ratchet, metric sockets and combination wrenches, needle-nose pliers, channel locks, flat-blade screwdriver, spring compressor, angle grinder, chop saw or equivalent, welder (or a local muffler shop)

Difficulty: 2.5 out of 5

Install Time: 6 hours

Parts List

	MSRP	STREET PRICE
Tokico HTS 102 Dampers (set of four)	\$800	\$455
Techno Toy Tuning Strut Tube Spacers (pair)	\$25	\$25
Techno Toy Tuning Ground Control Weld-on Coilover Kit	\$199	\$199
Techno Toy Tuning Camber Plate Upper Hat System	\$50	\$50
Techno Toy Tuning Camber Plates	\$180	\$180
TOTAL	\$1,254	\$1,109



DIY COILOVERS

DIY SHORT STROKE FRONT COILOVERS

Due to the design of the AE86 front struts (spindle incorporated on the strut); there aren't a lot of off the shelf front coilover kits available. For this reason, many Toyota tuners have resorted to modifying their own struts, shortening and converting them into coilovers. While there are other alternatives available, we thought we'd show you this tried and true backyard method as it fits best with the

DIY nature of our magazine. When coupled with a quality insert style damper such as the Tokico HTS, the results can be very impressive. Best of all, you get the reward of knowing that you did it all yourself. And for those of you who still have not learned how to weld, just measure things out and take the parts to a local welder or muffler shop. After that, go to your local community college and enroll in a welding class.

01 Let's start by removing the front struts. Because we're dealing with an incomplete car, our front brakes did not come on the car. Remove yours by disconnecting the brake line and unbolting the calipers.



HUB REMOVAL

02 To remove the hub and rotor assembly, pry the dust cap off and remove the cotter pin.



03 Loosen the spindle nut with a wrench and spin it off with your fingers.



04 Remove the washer and bearing from the outboard side of the hub.



05 Pull the rotor and hub assembly off the spindle. There should be an inner bearing as well. Just leave it inside the hub for now. We'll show you how to overhaul the hub during reassembly. Wipe the grease off the spindle to avoid walking back in the house looking like a pigpen.



TIE ROD REMOVAL

06 The next step is to disconnect the tie rods. You should have a cotter pin securing the nut. After removing the cotter pin, use a wrench to loosen the nut.



STRUT REMOVAL

07 Use a small ball joint puller to break the joint loose. An alternate method is to bang the edge of the steering knuckle with a small sledge hammer. The shock will usually free the ball joint.



08 The bottom of the strut tube connects to the steering knuckle through two bolts. Remove these bolts to free the bottom of the strut.



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DIY SHORT STROKE FRONT COILOVERS



03 Unbolt the three nuts from the upper mount and remove the strut.



11 We purchased this spring compressor from Harbor Freight Tools for about \$15. Harbor Freight has recently started running ads in *Project Car* with a 20% off coupon. Be sure to take advantage of the savings while you support this advertiser.



13 You can now remove the upper mount, spring perch and the spring.



15 Secure the strut in a vise and loosen the gland nut. We used a large pair of channel locks but a pipe wrench works as well. Don't remove the nut all the way as there is oil inside the tube which will make a mess.



STRUT DISASSEMBLY

10 Hidden under the dust cap, you should find the nut that holds the assembly together. Make sure you take the tension out of the spring with a spring compressor before removing the nut.



12 Mount the spring compressor and tighten the two long bolts. This will release the tension on the spring.



14 Unbolt the dust shield from the spindle. It's held on by four bolts.

16 Remove the strut from the vise, stand it upright, remove the gland nut and gut the internals.



17 Drain the oil into a drain pan and wipe down the parts.

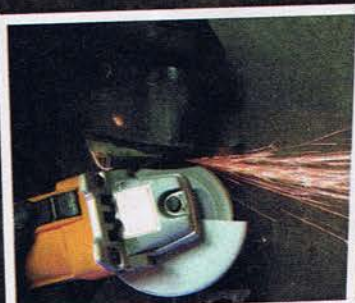


18 Here are all the parts we ended up with but all we'll need is the strut housing.



19 Another of Taka's tips is to inspect the base of the strut tube. What you're looking for is an uneven gap where the tube connects to the spindle. An uneven gap is a good indicator that your strut is bent. If it looks bad, find a suitable replacement.

STRUT HOUSING MODIFICATIONS



20 We are now cutting off the lower spring perch. Taka's using an angle grinder equipped with a thin metal cut-off disk. By using straight cuts, he created a hexagonal shape around the base of the perch.



21 The remnants of the perch can be grinded off with a flap disk. You can get these disks cheap down at Harbor Freight. While you're there, don't forget to pick up a pair of safety goggles.



22 We've finally gotten to the fun part: shortening the housing. The idea is to section it out so we keep the lower part with the spindle and the upper part that's threaded for the gland nut. We'll start by taking a measurement from the base of the strut tube. Since we're dealing with Japanese shocks and a Japanese drifter/mechanic, we're using a metric ruler. The metric system is actually easier to use than our fractional standard system. If you can count up to 60 and do some basic subtraction, you should be able to follow along.



23 The HTS short stroke strut insert is 60mm shorter than the factory length. If we want to slam the car into the weeds, we could shorten the housing by a full 60mm. Taking our wheel and tire choice into consideration, Taka suggested that we only cut 40 mm off the housing. As you'll see later, we'll need to fill the extra 20mm difference with a spacer. Luckily for us, T3 makes just the part. Looking at the ruler, you can see how Taka put a marker at 24 and 28 cm. The difference between the two is 4 cm (4 cm is equal to 40 mm). This is the area we need to section out.



24 To better define our markers, we put two strips of painter's tape around the line we want to cut. We also grinded a portion of the weld so the housing will sit flat against the floor of the chop saw. This is an important step to ensure a straight cut.



25 Using a chop saw, we cut out the center section. Cut slowly and use the painter's tape as your guide. It's important to get a straight cut.





'86 TOYOTA COROLLA

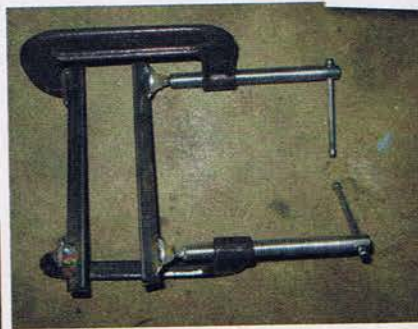
DIY SHORT STROKE FRONT COILOVERS

27

Check out this fixture we created out of two C-clamps and two strips of angle iron. It's designed to hold the two sections of tubing together while we weld them.

26

After the cut is made, clean the edges with a belt sander. If you don't have one, use a file or whatever you have handy. Also try to bevel the edge around the tube. Creating a "V" groove where the two tubes meet will result in a stronger weld.



28

We used a MIG welder to weld the strut housing back together. When doing so, be sure not to use excessive heat because you don't want to create a ridge of molten metal inside the tube. Keep in mind that the HTS insert must be able to slide into the tube without any obstructions.



29

The bead of weld that you just threw down must now be grinded smooth. That's because the threaded collar needs to fit over this section of the tubing.



30

To create a new perch for the threaded collar, we cut a pair of metal rings from a piece of 2" ID tubing. The T3 kit actually comes with weld-on rings but ours got lost somewhere in the shop.



31

Set the ring just above the bracket for the brake hose and weld it nice and straight.



32

Here are our new Tokico short stroke HTS dampers. The front inserts (on the right) are what will slip into our modified strut housings.



33

Check out the difference in length between the stock length Tokico "blue" and the short stroke Tokico HTS inserts.



34

Remember how we mentioned the need for 20mm spacers? Let's review our math. The HTS short strokes are 60mm shorter than stock. We cut 40mm off the strut housing, so we need a 20mm spacer for our HTS shocks to fit properly in our shortened housings. Once again, T3 has just what the doctor ordered. They sell these beautifully machined spacers in various sizes to custom meet your needs.





'86 TOYOTA COROLLA

DIY SHORT STROKE FRONT COILOVERS

35 Flip the strut insert upside down, position the strut spacer, and slip the shortened housing over the HTS insert. Once the housing bottoms out, just flip the assembly back over and you should be ready for reassembly.



38 Now insert the washer for the Tokico HTS inserts.



41 The top hat sits right over the spring. The bearing at the top is to keep the top hat from binding every time you turn the steering wheel.



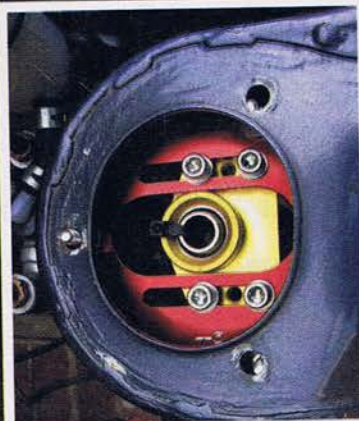
43 Here's Taka displaying his handiwork. If you don't feel comfortable attempting these modifications yourself, just give Techno Toy Tuning a call. For a reasonable price, they can do the job for you.



36 These are Ground Control coil over sleeves. More specifically, these custom Ground Controls are made to T3's specifications, featuring longer sleeves and custom spring rates to work perfectly with whatever shock you're running.



39 Once all the parts are in place, lock the HTS insert in place with the gland nut. Note: In the event that your calculations were off and the HTS insert sits too high the T3 spacers can be ground down for a custom fit.



42 Here's something we just learned: the bolt pattern is different between the left and right strut towers. Be sure to determine which camber plate is right and which is left so you can mount each one on its corresponding strut.



37 The T3 Ground Control sleeves come with o-rings to insulate between the sleeves and the struts. Insert the o-ring, followed by the threaded sleeve.



40 Techno Toy Tuning (T3) also makes these aluminum camber plates and needle bearing equipped top hats to go with your custom coilovers.



SOURCES:

Tokico USA
800.548.2549
www.tokicogasshocks.com

Techno Toy Tuning
530.626.7334
www.technotoytuning.com



'86 TOYOTA COROLLA

WORDS & SNAPS / GARY NARUSAWA

Tools Needed: Jack, jackstands, ratchet, metric sockets and combination wrenches, Loctite

Difficulty: 2 out of 5

Install Time: 1 hour

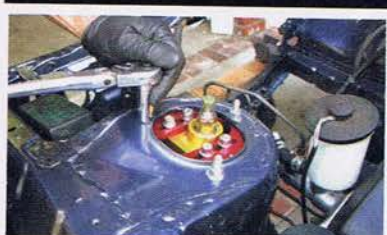
Parts List

	MSRP	STREET PRICE
T3 Negative Camber Roll Center Adjusters.....	N/A	\$130
T3 Tension Control Rods.....	N/A	\$200
TOTAL	\$N/A	\$330



With our custom coilovers in hand, it was time to assemble the front suspension. Once again, we turned to T3 for our suspension goodies. The first thing we ordered was a pair of negative camber roll center adjusters (NCRCA's). When you lower a car, you change the geometry of the suspension. The NCRCA's are blocks engineered to bring the suspension geometry back closer to its original design. By doing this, you restore the roll center of the lower control arms and reduce bumpsteer. As an added bonus, the blocks are also engineered to widen the front track and add negative camber. While on the Techno Toy website, we also ordered a set of T3 tension control rods (TC rods). These feature adjustable rod ends to give the front suspension a bit of caster adjustment. We'll discuss these parts a bit further as we install them.

ADVANCED GEOMETRY INSTALLING THE FRONT SUSPENSION



01 Begin by hanging the front struts by the three nuts at the top of the strut tower.



03 Start by applying a little Loctite to all the bolts.

04 Thread the black Allen bolts through the T3 block and into the bottom of the strut/spindle.



02 Here are the T3 NCRCA's. These are CNC machined out of 6061 aluminum and then anodized to protect the metal. Don't you just love anything billet aluminum and anodized? It looks so cool!



05 Then thread the zinc coated bolts (with lock washers) through the steering knuckle and into the NCRCA block. Torque everything down properly as you don't want anything coming loose in this area. Note how the NCRCA block spaces the lower control arm down. This restores the proper angle so it doesn't point in an upward direction. Also note how the spacer moves the spindle outward. This increases negative camber and widens the front track.

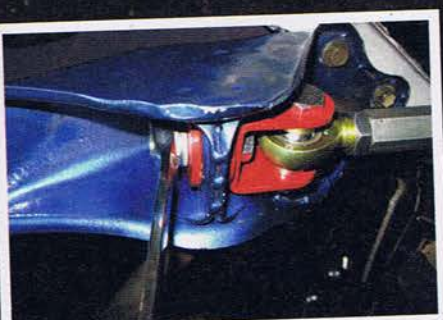




06 Before we can install the T3 tension control rods, we have to put a few parts back on our car. Here's Taka installing the front sway bar together with the brackets for the TC rods.



07 Installing the swaybar on an AE86 is like solving a puzzle. Whatever you do, make sure you end up with the sway bar sitting above the lower control arm.



08 Bolt the front of the Techno Toy Tuning TC rod to the factory bracket as shown.



09 Using the supplied hardware, bolt the back of the TC rod to the lower control arm.

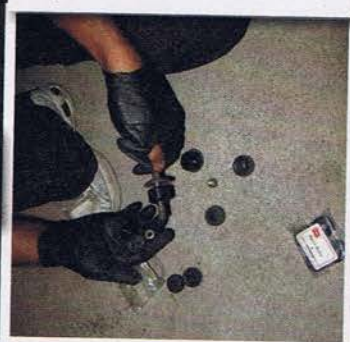


10 You'll kind of have to guesstimate the length of the TC rod for now. Snug the lock nuts down and let the alignment shop figure it out when they set the caster.




11 Don't all these T3 parts look cool? Ok, let's stop staring at them and get back to work.

12 We were lucky enough to get these TRD sway bar bushings. They are normally sold in the complete TRD bushing kit but DriftPRO had a set lying around. While we considered upgrading to aftermarket swaybars, Taka suggested that we save the cash. In general, using the proper spring rates can control most of the body roll.



13 Here's our TRD end link bushings and stock swaybar combo sitting on the lower control arm.



14 OK, let's get back to staring at the shiny red parts. My dog enjoys doing this, too. 



SOURCES:

Techno Toy Tuning
530.626.7334
www.technotoytuning.com

DriftPRO
www.driftpro.com



'86 TOYOTA COROLLA

WORDS & SNAPS / GARY NARUSAWA

Tools Needed: Jack, jackstands, ratchet, metric sockets and combination wrenches, needle-nose pliers, pry bar, adjustable wrench, flat-blade screwdriver, hammer, punch, c-clamp, torque wrench, wheel bearing grease.

Difficulty: 2.5 out of 5

Install Time: 1 hour

Parts List

	MSRP	STREET PRICE
Front Wheel Bearings and Races (Toyota)	\$128	\$92
Grease Seals (aftermarket) (2x\$5)	\$10	\$10
Hawk Performance HPS Front Brake Pads	\$68.54	\$68.54

TOTAL

\$206.54

\$170.54



OVERHAULIN' HUBS

HOW TO REPLACE AND PACK YOUR BEARINGS

If you're old school like me, you probably have a little experience adjusting, re-packing and replacing wheel bearings. Back in the day, most cars, like our AE86, used serviceable wheel bearings. Today, most automotive hubs have

switched to maintenance-free sealed bearings. With a rising trend of people restoring and customizing classic imports, we thought it would be nice to show you the steps of what could soon become the lost art of overhauling a hub.

FRONT HUB OVERHAUL



01 Start by separating the rotor from the hub. Do this by removing the four bolts from the back of the rotor.



02 Now pry the rotor away from the hub.



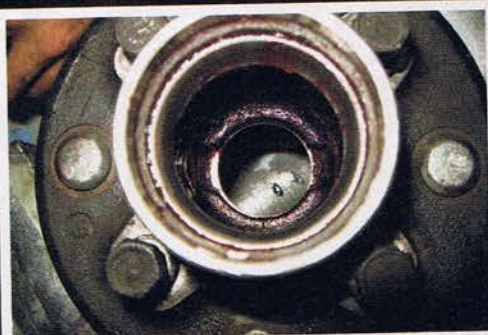
03 There's a grease seal at the back of the hub. Pry that off as well.



04 Behind the grease seal you'll find the inner bearing. Pull it out and put it aside. In many cases, the bearings can be cleaned and inspected. What you're looking for is any pitting or heat marks on the rollers. In our case, we're dealing with an older car that eventually should find its way to the track, so to gain peace of mind we're replacing the bearings.



05 There should be a lot of nasty grease inside the hub. Use paper towels or rags to clean it out.



06 The next step is to remove the bearing races. If you look inside the back of the hub you can see outer bearing race (shiny metal ring). Note how there are two notches in the hub. In the next step, we'll place a punch in the notched area and hammer the race out.

07 We're actually using a cold chisel rather than a large punch. Whatever you use, place it inside the notch and in direct contact with the bearing race. Support the hub in a vice and hammer away at the punch. Be sure to occasionally move the punch across to the second notch to drive the race out evenly.



08 After knocking the outer race out, flip the hub and repeat the steps to remove the inner race.

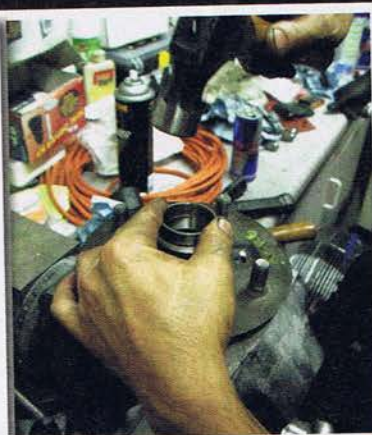


09 We ordered a new set of inner and outer bearings from Cabe Toyota. Any time you replace a bearing, be sure to get a new race to go with it.

10 Taka is now installing the new outer race.



11 Although it might look like he's hitting the new race with a hammer, he's not. The new race is already 90% of the way inside the hub. In this picture, Taka is using the old race as a driver. He's hammering on the old race which is driving the new one into place. Never hammer directly on a new bearing or race—unless you're like Yamz who enjoys practicing each job 2-3 times.



12 Here's another trick that Taka showed us. Place the old bearing into the old race and use the entire assembly as a driver. In case you were sleeping during the last step, he is only hammering on the old parts, using them to drive the new race into the hub.





'86 TOYOTA COROLLA

OVERHAULIN' HUBS

13 After installing both the inner and outer races, the next step is to pack the bearings.

We asked Taka to use the old-fashioned method. Place a dab of high temperature wheel bearing grease in the palm of your hand. Tap the bearing in the grease using your other hand. Slowly rotate the bearing as you work to fill all the cavities with grease. Taka recommends doing this without gloves. Your bare hands can feel any dirt or contamination. The last thing you want to do is pack a bearing with contaminated grease.



14 You'll know when to stop once the grease starts to seep out of the opposite end of the bearing.



15 Place the packed bearing into the hub. It should ride directly on your newly-installed bearing race.



16 Install a new grease seal behind the inner bearing. Wow, this is the first time we've seen Taka use an actual seal driver. He must have not had a large enough socket.



17 For added insurance, Taka adds a coat of grease around the inner lip of the seal.



18 If you haven't done so already, pack the outer bearing as well.



19 The modern method of packing bearings is to use a bearing packer. Powered by a grease gun, this tool force feeds grease into the bearing.



20 Before moving on with the installation, spread a coat of grease inside the center of the hub.

21 We can now install the front rotors. These slotted and cross-drilled rotors were a freebee from DriftPRO.



22 Now place the hub over the spindle.



23 Install the outer bearing and the washer.



24 The trickiest part is adjusting the preload on the bearings—or worse, explaining how to do this. Torque the nut down to 21 ft-lb. Spin the hub several times to seat the bearings and re-torque it to the same 21 ft-lb.

25 This is where it gets a little tricky. The idea is to rotate the hub and feel the drag as you back off on the adjustment nut. Once you stop feeling it drag, snug the nut back a hair and set the nut lock followed by the cotter pin. Essentially, you want to catch it right before the hub starts to drag from excessive tension on the bearings. If you're not comfortable with our explanation, we recommend that you follow the exact steps in the factory service manual.



26 Don't forget to install the dust cap. It's an important component in the system because it keeps the grease in and the contaminants out.



FRONT BRAKES



27 Install the brake caliper bracket. It attaches with two bolts from the back.

28 Now mount the brake cylinder to the bracket. Be sure to clean and lube the pin before sliding the cylinder into place. Note: Avoid using brake cleaner around the rubber parts of the cylinder mounting pin and sliding bushing. It will swell the rubber and cause the cylinder to bind. If you haven't done so already, connect the hydraulic hose to the caliper.



29 We ordered a set of Hawk HPS pads. Although performance brake pads might cost a bit more than stock, they are worth every penny.



30 The next step is to compress the piston. If you don't have a special tool for this, use a large C-clamp and an old brake pad. As the pads wear, the piston slowly moves inward. Since the new pads are much thicker than the used ones, this piston must be compressed back into the cylinder to fit the new pads (removing the brake master cylinder cap will relieve a little pressure).

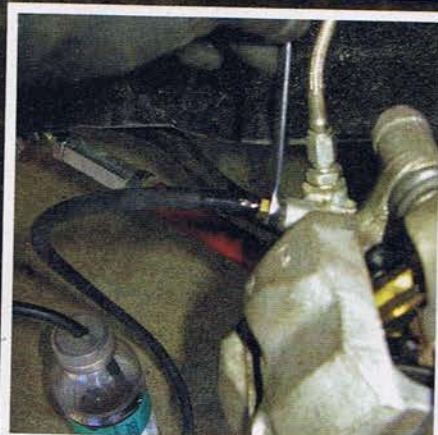


31 As you can see in this picture, the inner and outer pads are different. Look at the marks on the old pads to figure out which is the inner and which is the outer. The circle was created by the piston and the 'U' shape was created by the outer portion of the cylinder housing.



32 Load the pads into the caliper.

33 Swing the cylinder into place and secure it with the mounting bolt.



34 Bleed the brakes at all four corners. The recommended bleeding order is to start with the caliper furthest from the master cylinder and work your way in.

SOURCES:

Cabe Toyota

562.595.7411

www.cabetoyota.com

Hawk Performance

800.542.0972

www.hawkperformance.com

Tools Needed: Jack, jackstands, ratchet, metric sockets and combination wrenches, needle-nose pliers, adjustable wrench, Phillips and flat-blade screwdriver, ball joint puller, penetrating oil, Loctite

Difficulty: 2.5 out of 5
Install Time: 2.5 hours

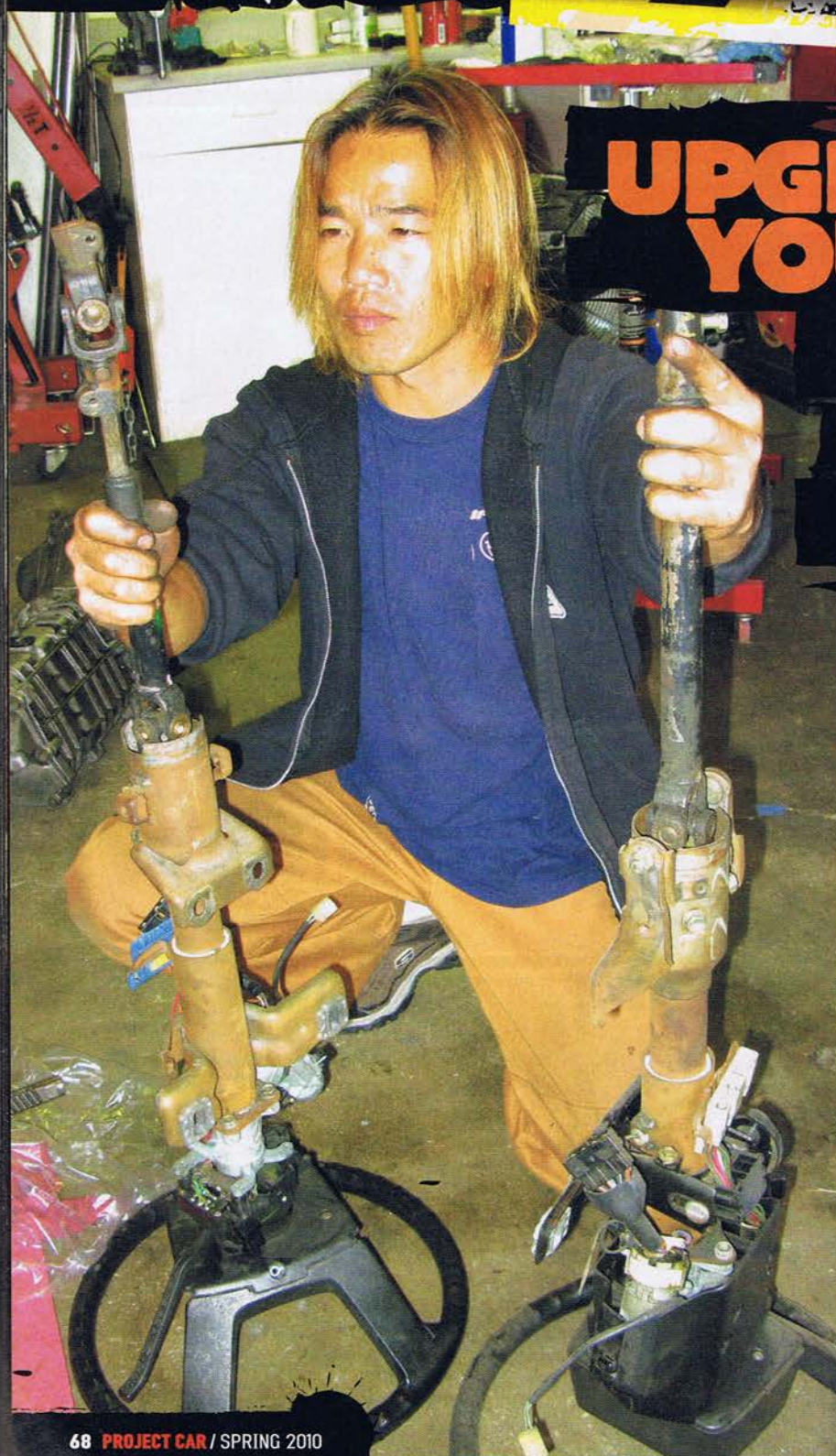
Parts List

	MSRP	STREET PRICE
Techno Toy Tuning Manual Rack Conversion Bushing.....	\$32	\$32
Tie Rod Boots	\$76	\$61
TOTAL	\$108	\$93

UPGRADE YOUR RACK

INCREASE STEERING ANGLE WHILE CONVERTING FROM POWER TO MANUAL STEERING

A popular modification for the AE86 is to convert from power to manual steering. The primary reason for dumping the power steering rack is to increase steering angle. Unfortunately, the position of the fluid feed line limits the travel on the power steering rack. Since the manual rack does not have any fluid lines, it doesn't suffer from this limitation. Other performance benefits from this conversion are improved steering feedback and eliminating parasitic drain on the engine caused by the power steering pump. Additionally, if you're like Taka who's always pulling an engine for one reason or another, no longer having to deal with power steering hoses and spilling fluid is a total bonus. For Project Hachi Roku, Driftpro helped us source a manual steering rack and column from a factory non-power steering equipped AE86. These parts are getting quite rare, so keep an eye out for them the next time you're at the boneyard. If you're having problems sourcing the conversion parts, check out www.club4ag.com. Some creative members have successfully managed to adapt steering components from the AW11 MR2 to work on the AE86.



STEERING COLUMN REMOVAL!



01 Here's the power steering column and rack and pinion unit that we'll be removing. Our hoses have been looped to prevent spilling fluid all over the driveway. Start by disconnecting the steering u-joint. Remove the two bolts as shown.



02 of the shaft. This will make it easier to slip the u-joint off.



03 Slide the u-joint upward toward the column to disconnect it from the steering rack.



04 Then slide the u-joint down and remove it.



05 To remove the column, remove the four bolts that attach the column to the dash support.



06 Here's a comparison of the manual and power steering column. Note how the manual rack is longer.



07 There are also differences in the u-joints. Along with a difference in length, there is a difference in the diameter of the splines where it attaches to the steering rack.

TRANSFERRING THE LOCK CYLINDER



08 Our next step is to switch out the lock cylinders. We're doing this to keep our keys matching. If you don't care about having a separate key for the ignition lock, you can skip these steps. Start by removing the column cover. This will give you access to the lock cylinder. Note: To do this at home, you will need the key for both locks. If you don't have the key from the donor car, we recommend that you consult a locksmith.



09 To remove the lock cylinder, turn the key to the ACC (accessory) position. Use a very small screwdriver or equivalent to press in the release pin. Pull the lock outward and remove the cylinder. Keep in mind that you will not be able to depress the pin unless the key is in the ACC position. This is a safety feature designed to make it harder to steal the car.



10 Repeat the same steps to remove the lock from the second column. Insert the old lock into the new column and install the assembly into the car.



11 Disconnect the tie rod end from the steering knuckle.



12 Unbolt the driver's side steering rack bracket. One of the bolts can be accessed from the top. The second bolt must be removed from the bottom side of the crossmember.



13 Remove the passenger's side bracket as well. Both bolts for this one are on top.



14 Now remove the power steering rack.



15 Here's a cool specialty part from Techno Toy Tuning. The right side of the manual rack is smaller in diameter than the diameter around the power steering rack. For this reason, the power steering bushing fits too loosely around a manual rack. When people purchase a used manual rack, they often fail to get the bushings and brackets. This T3 bushing is designed with a smaller inner diameter to fit properly around the manual rack yet has the correct outer diameter to work with a power steering bracket.



16 In this picture we have the right side power steering rack bracket (left), the factory power steering bushing (center), and the T3 bushing (right). Comparing the two bushings, you can clearly see how the T3 bushing has a much smaller inner diameter.



17 The stiffer Delrin T3 bushing comes in two halves. Insert half of the bushing under the rack and the second half above it. Note how there's a small recess around the inner diameter of the bushing. Be sure to match this up with the lip on the rack as shown in these pictures.





'86 TOYOTA COROLLA

UPGRADE YOUR RACK

18

Bolt the manual rack to the crossmember. With the help of the T3 bushing, everything bolts in like stock.



19

Bolt the inner tie rods to the steering rack. Lock it in place with the factory claw washer. If your claw washers are damaged or missing (like ours) a little Loctite will do the trick.



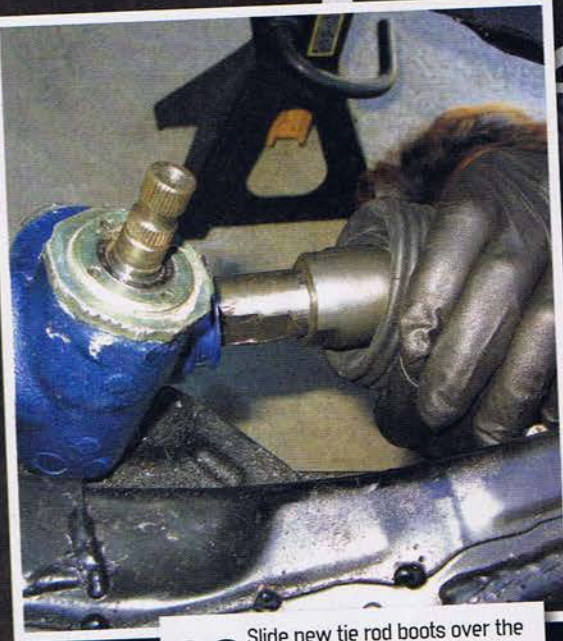
21

The simplest way to effectively increase steering angle is to pair a manual steering rack with power steering knuckles. The steering knuckles from the PS setup are shorter, as can be seen in this comparison shot. Using the shorter knuckles changes the overall ratio of the steering, resulting in quicker steering response and increased steering angle. The drawback is that the shorter knuckles require more effort from the driver to turn the steering wheel.




20

Slide new tie rod boots over the tie rods to protect your steering rack from dirt and debris.



23

Install the steering u-joint and the two bolts that lock it in place. When connecting the steering u-joint, be sure to center the tie rods, the wheels and the steering wheel. When you're done, the system should turn equally to the right and to the left. 



22

Bolt the tie rods to the knuckles and lock everything in place with a cotter pin.



SOURCES:

Techno Toy Tuning
530.626.7334
www.technotoytuning.com

Club 4AG
www.club4ag.com

DriftPRO
www.driftpro.com



ENGINE REVITALI



Parts List

	MSRP	STREET PRICE
Timing Belt Tensioner and Spring.....	\$125	\$87
Water Pump (OEM).....	\$94	\$55
Rear Main Seal.....	\$24	\$24
Crank Seal (Front Seal).....	\$6	\$6
12 Injector O Rings (3 Per Injector).....	\$30	\$30
Dizzy O-Ring.....	\$3	\$3
Cam Seals (Pair).....	\$14	\$14
Valve Cover Gaskets.....	\$13	\$13
Valve Cover Grommets/Washers (Set of 8).....	\$6	\$6
Oil Filter.....	\$6	\$4.95
NGK Spark Plugs (Set of 4).....	\$8	\$8
TOTAL	\$329	\$250.95

Tools Needed: Ratchet, metric sockets and combination wrenches, flat-head and Phillips screwdriver, needle-nose pliers, pry bar, suitable puller for crank pulley, hammer, seal driver kit (or suitable large sockets), torque wrench

Difficulty: 2.5 out of 5

Install Time: 4 hours

Our victim for this issue is a high mileage 4AGE. We don't know much about its history, but it appears to have some life left in it. All we know is that it came from a running car and that the car was able to pass smog with the engine. That's a good sign, but when you're dealing with a 25 year-old engine, anything can happen. While it would be great to tear it apart and fully build this engine, we realize that not everyone can do this, whether due to budget, time or skill level. Being the first Toyota to be featured in *Project Car*, we decided to set some realistic goals. For obvious reasons, we didn't want to fill the pages showing you how to install an air filter on your 4AC; we figured you could do that on your own. Our focus for this project was to show you the ins and outs of an SR5 to GT-S spec conversion. While this conversion won't win you many races, it'll put you miles ahead of what you had with your 4AC and transform your AE86 into an exciting daily driver and a capable weekend warrior. While this swap may not be the stuff dreams are made of, it's a great stepping stone to your final goal.

The following pages have been dedicated to showing you how to properly prep the engine prior to installation. If you're wondering why we're investing our precious time and money into this old engine, it's because we have faith in it - after all it is a Toyota. When not pushed over its limits, even an old 4AGE can prove to be very reliable when properly maintained. According to Taka, a well-maintained stock Corolla can drift all day, long after many high-powered cars have been forced to quit due to worn out tires, broken parts or running out of fuel. For our maintenance parts, we took a trip down to Cabe Toyota in Long Beach CA. Our connection over there is Herb Policarpio, aka Herb Rock One. He's got about 16 years experience dealing with Toyota parts and has owned, built and autocrossed his share of Corollas. Being an enthusiast, he understands the needs and demands for both USDM and JDM engines. Whether you own a blue, red, silver or black top 4AGE engine, Herb can probably help you find the parts you need.

LIZATION

PREPPING THE 4AGE



'86 TOYOTA COROLLA

ENGINE REVITALIZATION

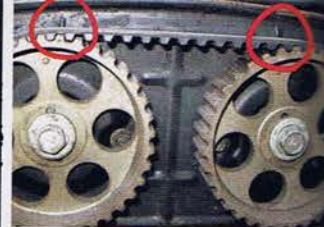
FINDING TOP DEAD CENTER



01 Our USDM 4AGE is commonly referred to as a "blue top". This is due to the blue lettering on the top of valve cover.



02 Our first goal is to replace the timing belt. Let's start by getting everything aligned to TDC (Top Dead Center) and on the compression stroke. Keep in mind that the crank rotates twice to every one rotation of the camshafts. This means that we cannot assume the engine is on the compression stroke by looking at the marks on the crank pulley alone.



03 The second set of markers to look at can be found behind the upper timing cover. Unbolt the cover (ours came missing) and make sure the small dots on each gear are aligned with the lines on the backing plate. If these marks are not visible on your cam gears, rotate the crank another turn to bring the engine to the compression stroke.



04 To help demonstrate, Taka marked everything in yellow and noted the rotation with an arrow.



05 The 4AG has a third marker to indicate TDC (compression stroke). If you pull the oil cap, you can see a small dimple in the camshaft indicating a proper alignment. This marker is extremely useful when you are trying to install the distributor with the timing belt cover installed.

REMOVING THE TIMING BELT



06 Remove the crank pulley bolt next. We gunned ours off.



07 Although the pulley has threaded holes to mount a proper puller, all we had was this large jaw-style puller. It did the job.



08 With the pulley out, the lower timing cover can be removed.



09 To remove the timing belt, remove the idler pulley bolt and slide the timing belt off.



10 Here's a close-up of how the idler pulley and tension spring are mounted. Make a mental note of the order of the parts to guide you during the reassembly.



11 The crankshaft timing gear can sometimes get stuck to the crank. Taka recommends soaking it with penetrating oil. We'll let the oil set in and return later to remove the gear. Removing the gear is not necessary when only changing the belt. Our goal is to replace the front seal (oil pump seal) so we'll need it out.



CAM SEALS



12 While we're waiting, let's reseal the top end. Start by unbolting the spark plug cover.



13 Unbolt the valve covers next. Pry the grommets out and lift the valve covers off.



15 Remove the bolt and slide the cam gear off. Repeat the same steps for the exhaust cam.



14 The cam gears come off next. Be sure to hold the cam with a wrench as you loosen the front bolt. The second image shows where to install the wrench on the camshaft.



16 Now unbolt the backing plate (rear timing cover). It's held on by seven bolts.



17 To get to the seals, we'll need to remove the first bearing cap on each camshaft.



18 Use a bucket, a rag and a can of parts cleaner to clean the bearing caps.



19 We sourced the cam seals from Cabe Toyota. It's amazing how much inventory they keep in stock.

20 Spread a light coat of liquid gasket (silicone sealant) around the seal and slip it over the nose of the camshaft.



21 Place a couple drops of motor oil on the bearing surface of the cap. The idea is to only get oil on the frictional surface of the cap while keeping the part that sits over the seal clean and dry. Wet silicone and oil don't mix well when you're trying to seal an area.

22 Reinstall the front cap and torque it down in multiple steps. The final torque setting is only 9 ft-lb so keep a close eye on your torque wrench. The torque wrench we're using is way too big. Unfortunately, it was the only one we had available. Once again, do as we say, not as we do. Repeat the same steps for the second cam seal.



23 After soaking for about 20 minutes, our crankshaft timing gear popped right off. Typically, you have to pry at it carefully with a couple large screwdrivers, but this one came out by hand.



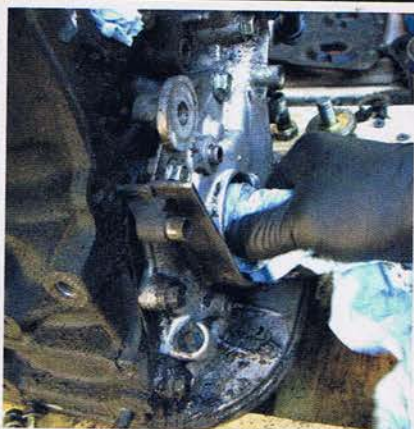
24 The blurry white thing is a cleaning brush. We had a lot of oily grime around the front seal, it's a good thing we're resealing the engine.



25 Being a licensed chiropractor, Taka has a certain way with things. He simply pushed in on the right side of the seal causing the left side to pop out. That would have never happened for us. Whatever you do, don't scratch the crank when you pry out the seal.



26 Once again, be patient and clean thoroughly.



27 Here's our new front oil seal. This also came from Cabe Toyota.



28 Due to the long snout on the crank, Taka had to get creative when it came time to drive in the seal. He found a steel collar that fit around the seal and then added a large socket to make it long enough to clear the snout of the crank.



29 Don't drive the seal in too deep. It should sit flush with the surface as shown in this picture.

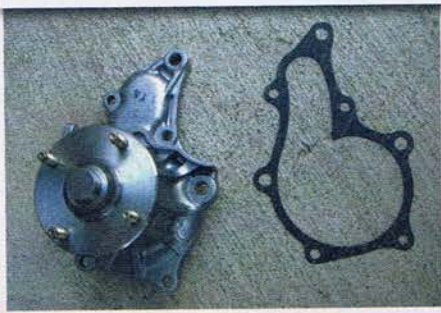


30 Next, reinstall the rear timing cover/backing plate.



WATER PUMP

31 This is the best time to change the water pump. It's a basic maintenance part that we highly recommend changing before doing a swap. Cabe Toyota sells these for only \$54.



32 The 4AGE uses a two-piece water pump. While the complete unit is available from Toyota, it's cheaper to only replace the front half. That's the part with the wear and tear components. Here's what the rear section looks like: it's just a housing with no moving parts. We threw it in the bead blaster to give it a new look.



34 Secure the two halves together with four of the smaller water pump bolts.



33 For the installation, start by putting the two halves together. Apply a thin coat of silicone followed by the gasket.



35 You'll need the o-ring on top and the small 2-bolt gasket (shown at the bottom) to install the water pump assembly. The gasket in the center will be used later when we install the water outlet housing.



36 The o-ring goes on the front of the block. Use a little silicone to ensure a proper seal.



37 On the side of the block, you'll find where the small 2-bolt gasket is used. It mounts to this flange on the heater outlet pipe. Prep the surface with a gasket scraper or a razor.

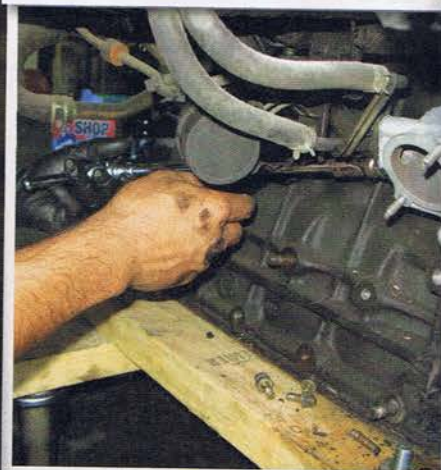




38 Set the water pump into position and start the bolts. Next to Taka's left thumb, you can see that one of the mounting holes is countersunk. This hole requires a special bolt. The bolt stands out because it has an 8mm diameter shank yet requires a 10mm socket to tighten.



39 Remember that flange we just cleaned for the small 2-bolt gasket? This is how it attaches to the water pump assembly.

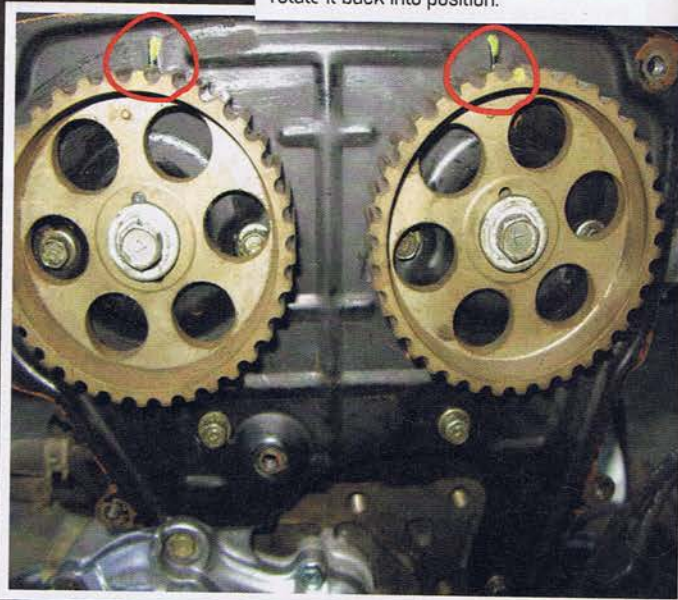


42 Be sure to check the alignment of the cam gears with the lines on the rear timing cover. Everything should be close, but if anything has moved, carefully rotate it back into position.

INSTALLING THE TIMING BELT



41 We can now finish up the timing belt. Install the cam gears and torque each bolt to the factory spec of 34 ft-lb. Don't forget to hold the camshaft in place while you do this.



43 We got our new timing belt, idler pulley and tension spring from Cabe Toyota. Tell Herb that you that you read this article in *Project Car* and ask for the good guy pricing. Don't worry if you're not local, they ship to most places.



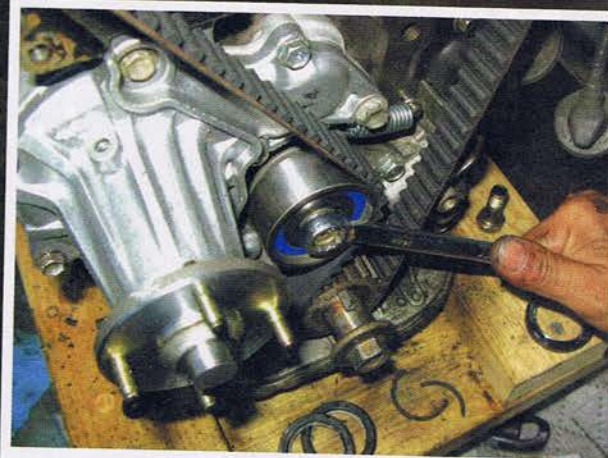


44 If you look carefully at this picture, you can see how Taka is prying the idler pulley toward the water pump as he tightens the center bolt. This will temporarily lock the pulley into a position where it won't put tension on the belt.



45 If you haven't done so already, slide the timing belt drive gear back over the snout of the crank. With the idler pulley locked to the side, you should have no problem installing the belt. Now slowly loosen the center bolt on the idler pulley to create tension on the belt.

46 After triple checking to make sure all the timing marks are aligned, temporarily install the crankshaft pulley bolt. Now rotate the crankshaft two revolutions in a clockwise direction. Note: The center bolt on the idler pulley should be loose while you're doing this, allowing the spring to set the proper tension on the belt.



47 Tighten the center bolt on the idler pulley. The proper torque spec for this bolt is 27 ft-lb.



48 You can now remove the crank pulley bolt. Don't forget to install the timing belt guide.



49 Reinstall the three sections of the timing cover. Since we were missing the upper covers, Taka grabbed a set from his private collection.



50 Here's another old school tip from Taka: highlight the timing marks with yellow paint to make them easier to see with your timing light.



RESEALING THE VALVE COVERS



51 The last step for the timing belt replacement is to reinstall the crank pulley. We used the 1/2" impact gun to tighten ours. If you want to be anal about it, the proper torque spec is 87 ft-lb.



52 To reseal the valve covers, you'll need a new set of valve cover gaskets and grommets. The grommets are designed as a non-reusable item; to prevent any leaks we recommend that you replace them.



53 Clean all the nasty dirt and oil from the mounting surface on the head. Clean the valve cover side as well.



54 Press the gasket into each valve cover as shown.



55 Apply a light coat of silicone around the sides of the front bearing caps.



56 Press the valve covers down and insert the grommets.



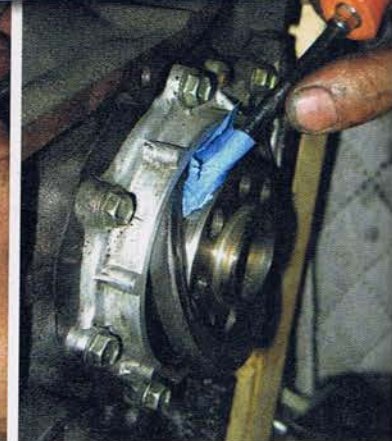
57 Install the valve cover nuts and tighten in an even fashion.

REAR MAIN SEAL

58 Next, we're installing the rear main seal. If you look carefully at ours, you might notice that it sits a bit crooked. It's a good thing we're changing it out.



59 Remove the old seal by prying it out with a screwdriver. Taka impressed us with yet another trick. He placed a piece of tape around the screwdriver to protect the surface of the crankshaft. He later admitted that this step is in the FSM (Factory Service Manual).



60

Here's the new rear main seal. Guess where we got it from? The dealer's initials are CT. Please don't write in asking for another hint... seriously.



61

Lube the inner lip with a bit of grease and slide it over the butt end of the crankshaft. That sounds so wrong! (You mean, "that's what she said"? - SK)

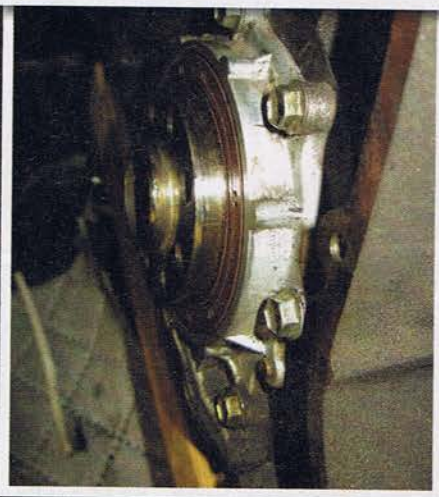


62

Not having a proper seal driver, Taka is using the alternative method of tapping the seal in with a socket. To do this, carefully tap around the seal to drive it in evenly. This is not the recommended method, but when you don't have the right tools, it gets the job done.

63

Here's what the seal should look like when properly installed. It's nice and straight and flush with the surface.



64

Don't forget to install the backing plate. It's this thin black sheet metal plate that gets sandwiched between the engine and the transmission bellhousing.



INJECTOR O-RINGS

65

Our next task is to reseal the fuel injectors. Towing your pride and joy back from the track after an engine fire is not a good experience. Just ask Scott from Import Tuner. Let's start by cleaning things up.



67

Now unbolt the fuel rail.



66

Remove the cold start injector feed line and any other hoses standing between you and the fuel rail.



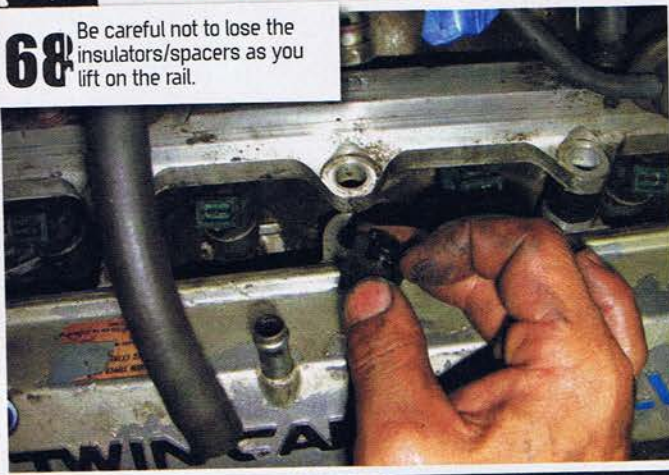


'86 TOYOTA COROLLA

ENGINE REVITALIZATION

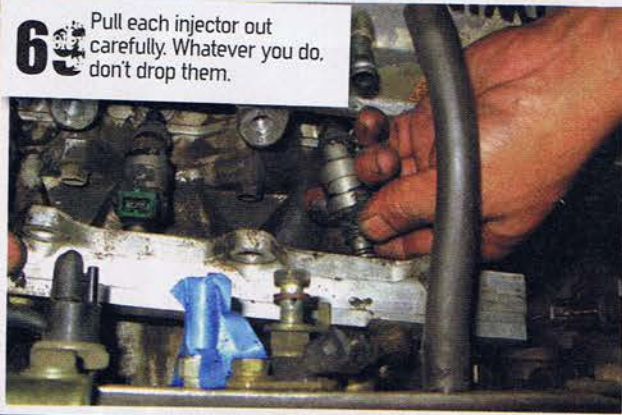
68

Be careful not to lose the insulators/spacers as you lift on the rail.



69

Pull each injector out carefully. Whatever you do, don't drop them.



70

This is why you want to replace the injector o-rings and grommets. They get crusty with age.



71

If you learn one thing from Taka, it should be the importance of cleaning your parts. In professional racing/drift, there are no do-overs. The job must be done right the first time around.



72

Check out the next mess we have to clean. When doing so, plug the injector holes to keep the crud out of the engine.



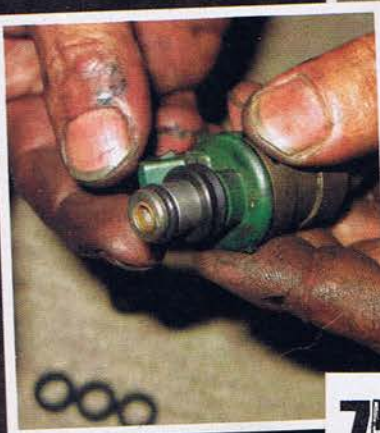
73

Here are our new o-rings and grommets. These parts are still available through the dealer.



74

A pick works well for removing the old o-rings.



75

Our injectors look much safer with all new rubber. This should help us sleep at night.



76

Lube the injector o-rings before slipping them into the rail. The recommended lube is gasoline; we didn't have any handy and used a light coat of grease. Again, do as we say, not as we do.



WATER OUTLET HOUSING AND BY-PASS PIPE



77 Place the fuel rail into position and bolt it down. We'll re-connect the hoses and related parts after installing the harness.

78 This little piece is the water by-pass pipe. Install two new o-rings to ensure a proper seal.

79 The by-pass pipe connects between the water outlet housing and the water pump. To install it, pop it into the water outlet housing and then install the assembly onto the engine.



80 When we zoom out on the water outlet housing you can see how it mounts to the head. Remember the extra gasket from step #35? This is where it goes.



81 With the gasket in place, bolt the housing down.

EFI HARNESS

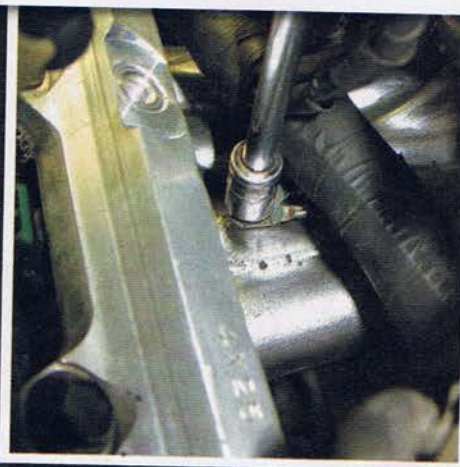


82 Now we're installing the engine/EFI harness. Start by laying it out across the engine.



83 Starting at the back of the engine, route the harness across the intake manifold. Bolt it into place with the clamp.

84 As you move toward the front of the engine, you should find the threaded hole for the ground wires. Bolt them down as shown.



85 Plug in the electrical connectors for the injectors next.



86 Connect the fuel feed line. It uses a crush washer on each side of the banjo fitting. Make sure these are in place. Just above Taka's hands you should see the TPS (Throttle Position Sensor). Plug its connector in.



87 The fifth injector is for the cold start system. Plug its connector in as well.



'86 TOYOTA COROLLA

ENGINE REVITALIZATION



88 Connect the vacuum sensing hose between the intake manifold and the fuel pressure regulator.



89 Plug in the three coolant related sensors. The brown connector is for the start injector time switch (for cold start injector), the grey connector is for the temperature gauge and the green connector is for the water temperature sensor (for ECU).



90 Plug in the blue connector for the VSV (Vacuum Switching Valve). It's used to control the variable induction system. The unit is located under the intake manifold.

DISTRIBUTOR O-RING



91 It's quite common to get a leak from the distributor o-ring. Look how flattened out and brittle ours looks.

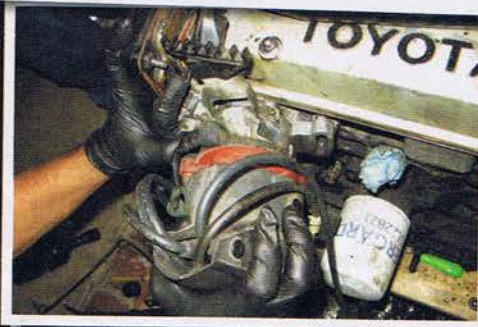
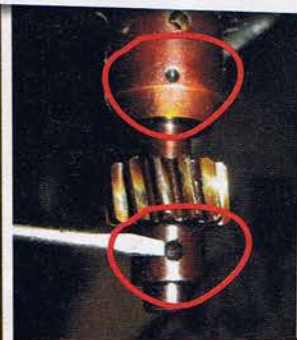


92 Cabe Toyota sells the o-ring for a mere three bucks. For that price, there's no reason to drive around with a leaky distributor.



93 Installing the new o-ring is a snap. Just roll it into place.

94 To install the distributor, make sure the engine is still set to TDC (compression stroke). To do this, remove the oil filler cap and check for the alignment of the dimple as shown in step #5. Next, align the two dimples on the distributor and carefully place it into the head as Taka is doing in the second picture. Only hand-tighten the bolts for now. We'll snug them down after setting the ignition timing.



OIL FILTER



95 With the good-guy pricing from Cabe Toyota, it's cost effective to purchase original Toyota oil filters. I even bought a few for my Tundra.



96 Before installing the new filter, clean the surface area to ensure a good seal.



97 The filter seal actually comes pre-lubed. Don't you just love how the Japanese pay so much attention to detail?

98 Spin the filter on hand tight. You should not need any tools to install it.



EXHAUST MANIFOLD

99 Because somebody had previously removed our exhaust manifold, Taka had to put it back on. It's important to prep the gasket surface on the head. Use caution when cleaning with a razor. Keep in mind that a razor is made out of a much harder metal (stainless steel) than the surface you are cleaning (aluminum).



100 OK, you caught us being cheap! We actually forgot to order a new exhaust manifold gasket and decided to make do with the old one. The factory gasket has metal rings around the exhaust ports. As long as this portion of the gasket is not damaged, you can usually get by on the recycled route.

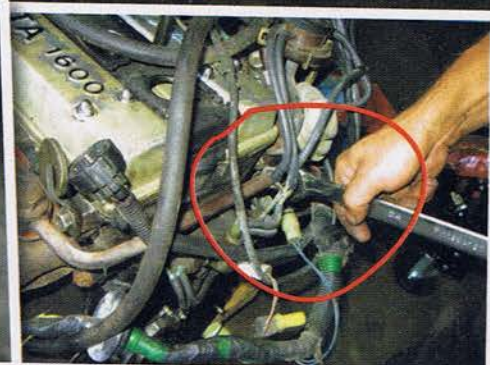
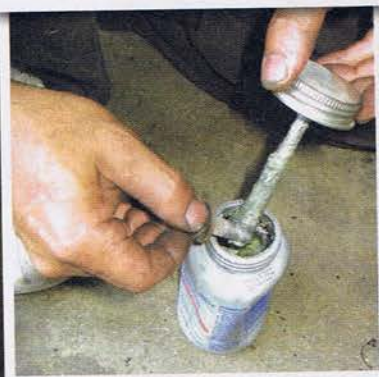


101 Alright, now we're really being cheap. For some added insurance, Taka suggested that we add a coat of high temp Ultra Copper gasket maker. As you can see, the top of our tube was dried out. Being the resourceful people that we are, we made a new opening to access the semi-fresh silicone at the bottom. Hey, times are tough.

102 After adding a light coat of Ultra Copper to both the head and the gasket, we put the parts together.



103 It's a good practice to coat any exhaust hardware with anti-seize. A bottle like this will last you a long time.



104 This gigantic banjo bolt is for the EGR tube. Starting the threads on this bolt is rarely easy. Taka recommends that you loosen the opposite end of the tube (over by the EGR valve) to get the needed play to start the threads. Don't forget to tighten both ends when you're done.

105

Take the time to install the heat shield. It actually does a great job shielding the distributor from the high temperatures of exhaust manifold. We prettied ours up with a Scotch Brite pad.



106

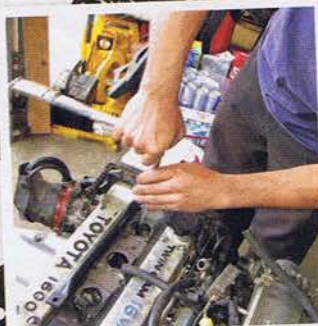
Here's how it mounts to the exhaust manifold.



SPARK PLUGS



107 We ordered a stock set of NGK resistor plugs for our stock engine.



108 Here's Taka removing the old plugs.



109 Although they look old and crusty, there's no sign of a major engine problem.

110 If you order the correct plugs, they should come pre-gapped. Accounting for human error, we make it a habit to check the gap on each plug. The factory recommended gap is 1.1mm (0.043"). The closest size we had on our gapper was 1.14mm. It was close enough.



111 Install the new plugs. The recommended torque spec is 13 ft-lb. Note: After visually inspecting our cap, rotor and plug wires, we opted not to change them to save a little on our budget. In most cases, we recommend changing these items.



MISC BRACKETS AND PARTS



112 If you haven't done so already, install the oil dipstick tube. It attaches to one of the water pump bolts as shown.

113 Install the engine mounts (insulators) and brackets next.



114 Mount the alternator bracket to the block.

115 Now mount the alternator. Connect the two electrical connectors from the back. Just above and behind the alternator you can see the thermostat housing. Insert the thermostat, seal the housing with liquid gasket and bolt the housing down.



116 Although the starter cannot be mounted until the transmission is attached, go ahead and connect it to the harness. The large wire with the ring terminal is the main power lead and the smaller wire for the solenoid.

SOURCE:

Cabe Toyota
562.595.7411
www.cabetoyota.com



Tools Needed: Ratchet, metric sockets and combination wrenches, hammer, seal driver (or large sockets), torque wrench, flat-blade screwdriver, multi-purpose grease

Difficulty: 2.5 out of 5 **Install Time:** 2 hours

Parts List

	MSRP	STREET PRICE
Used GT-S 5-Speed Transmission	\$250	\$250
SPEC Clutch	\$319	\$288
Transmission Rear Seal (Cabe Toyota).....	\$11	\$7.50
Transmission Front Seal (Cabe Toyota).....	\$9	\$6

TOTAL

\$589

\$551.50

UPGRADING THE CLUTCH AND RE-SEALING THE TRANSMISSION

KICKIN' CLUTCH

When converting from SR5 to GT-S, you will need to source a GT-S 5-speed transmission or at least the bellhousing from one. Based on information gathered from both Taka and Club4AG, the SR5 and GT-S Corollas share the same T50 gearbox down to identical gear ratios. Unfortunately, there is a critical difference in the bellhousings. Since the SOHC 4AC head uses a turn-flow design (intake and exhaust ports are on the passenger's side) there are no clearance issues with the driver's side mounted clutch fork. In contrast, the performance based 4AGE sports a crossflow design, relocating the exhaust components to the driver's side. So, if you try using an SR5 bellhousing with a 4AGE engine

you'll run into a clearance issue between the clutch fork and the exhaust.

To match our new engine, we're also using a GT-S clutch and flywheel combination (200mm). Although the SR5 shares the same diameter clutch/flywheel, the flywheel has fewer bolts where it attaches to the crank. As an option, we could use the larger diameter 212mm setup from an AE92 Corolla, but we don't feel that our bone-stock 4AGE should warrant the upgrade. Along with the new clutch, we're opting to do a bit of maintenance, replacing the front and rear transmission seals. We often overlook these seals on newer cars but since we're dealing with a 25 year old car, it'd be foolish not to change them while the transmission is on the ground.

01

With Taka onboard, drifting our AE86 is bound to happen. Also knowing that our underpowered 4AG will require some clutch kicking, we thought it would be smart to order a heavy duty clutch for the project. Throughout the history of *Project Car*, we've used a lot of SPEC Clutch products and have never had a premature failure. So again, we went with the tried and true—SPEC blue.

**02**

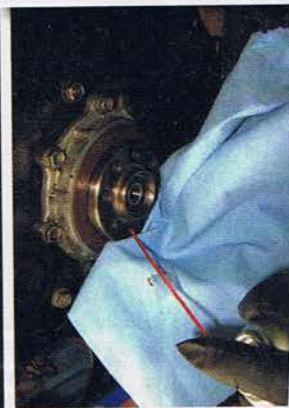
To do any clutch job right, you must start out with a resurfaced flywheel. We sent ours out to T.G.'s Performance in Lawndale, CA and got it back looking like new.

**03**

After prying out the old pilot bearing, find a suitable socket to drive the new one into place. Drive the bearing in until it's fully seated. It's a good habit to replace the pilot bearing every time you do a clutch. The last thing you want to do is pull the transmission back out simply because you were too cheap or lazy to replace the bearing the first time around.

**04**

Since we'll be using threadlock on the crank bolts, it's important to clean the threads on both the crank and the bolts.

**05**

Cleanliness is next to godliness. Taka was trained by the masters at TECHNOSQUARE. One thing he's learned is that parts can never be too clean. Even a little bit of oil left on the flywheel can reduce performance and shorten the life of the clutch.

**06**

The flywheel can now be installed onto the engine. Just be sure that your backing plate is in place between the flywheel and the engine. Occasionally, we forget to put that sucker in and have to take the clutch and flywheel back out to install it. Yarnz calls it a "rookie move" but we've seen it happen to veterans.

**07**

Taka recommends using a bit of threadlock on the flywheel bolts. It's just a little insurance to make sure the bolts don't back out, especially when put through the rigors of drifting.

**08**

Tighten the bolts in multiple steps and in a cross-pattern. The factory spec is 58 ft-lb. Check out Taka's method of locking the flywheel. We love working with this guy!

**09**

Don't forget to remove the "locker". Otherwise, you'll have a difficult time installing the transmission.





'86 TOYOTA COROLLA

KICKIN' CLUTCH

10 With the flywheel in place, it's time to install the clutch. SPEC includes the clutch alignment tool to make the job easy.



12 When you're done, be sure to remove the alignment tool and locking socket before proceeding.

15 Here's the release bearing hub that we are referring to.



17 To install the new release bearing, Taka uses a wood block, a large socket and a hammer. The socket should fit around the inner lip of the bearing as shown. Avoid tapping on the face of the bearing as it can cause damage.



13 Next, we have to replace the release bearing. Here's Taka's trackside method using the upper section of his jackstands. The idea is to support the bearing on the edge of the metal plates while leaving the hub free to drop down.



16 Inside the hub should be some grease. Be sure to clean out all the old grease. We'll be re-greasing it in just a few steps.

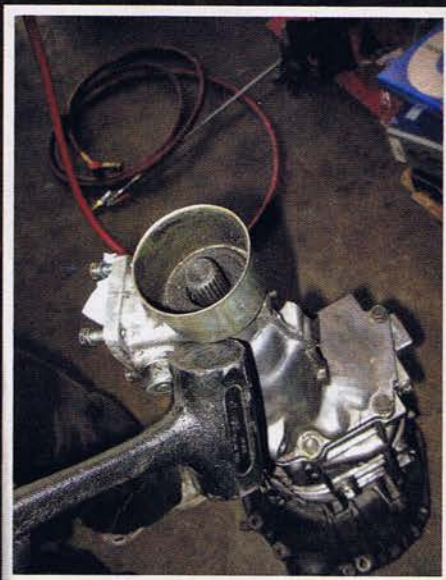
18 Here's what the bearing should look like when mounted on the hub. Starting at the center of the assembly, you should see the lip of the hub, the lip of the bearing, and lastly, the face of the bearing.



11 Slide the pressure plate over the disk and torque it down. This should be done in a gradual and even pattern. The proper sequence is to work in a clockwise direction, skipping a bolt as you work your way around. Tighten in multiple steps to prevent any warpage. The final torque spec is 14 ft-lb. Note how the socket was used once again to keep the flywheel from turning.



14 Using a hammer and a socket that fits over the lip of the hub, tap the collar down and out of the bearing.



19 Since we're dealing with an older car, we're going to change out the front and rear transmission seals. To get to the rear seal, tap the dust shield off with a soft mallet.

20

You should now have access to the rear seal. To remove it, carefully pry it out with screwdriver.

**21**

Again, taking the time to clean things will result in a better job. Wipe away any oil around the mounting surface of the seal.

22

It's a good idea to lube the inner lip of the seal. This will protect the seal when the driveshaft is installed.

**23**

Not having a proper seal driver kit handy. Taka used our old clutch release bearing to drive in the seal.

24

Don't forget to reinstall the dust shield. This will protect the seal from dirt and other crap.

**25**

There's a seal at the front of the transmission as well. A leak from this one can cause a premature failure of the clutch if oil gets onto the frictional material. It could also lead to a damaged transmission if enough fluid were to leak out. To access the seal, remove the four bolts for the front bearing retainer.

**26**

From the back side of the bearing retainer, you should be able to access the seal. Again, carefully pry it out with a screwdriver.

27

Don't forget to lube the seal as Taka demonstrates here.

**28**

Since this is the back side of the retainer, the seal must be installed backwards as shown. Once the retainer is installed, the front side of the seal should face the engine.

**29**

Again, find a suitable socket or seal driver to install the seal.

**30**

Since we didn't have a new gasket, we used a little gray silicone to seal the deal.

**31**

Reinstall the front bearing retainer and secure it with the four bolts.





Also grease the contact points of the fork as well as the two ears and the center of the hub. A little grease is good, too much can be bad.



32

We now move on to the clutch fork. On the backside of the unit, you should find the socket where the pivot ball sits in. Be sure to grease this area with MP (multi-purpose) grease.



34

Install the fork onto the pivot ball followed by the release bearing assembly. Note how all the points we greased are the contact points on these parts.



35

To secure the release bearing hub to the fork, install the two clips as shown.



36

Aside from the bellhousing, the only other critical difference between an SR5 and GT-S transmission are the speedometer gears. While there could be differences between years, our '85 GT-S transmission has a 5/19 ratio (5 teeth on the drive gear and 19 on the driven gear) while our '86 SR5 unit came with a 6/20 ratio. Don't try changing to a new ratio by only swapping out the driven gear. You must change both gears together or you'll destroy the nylon teeth of the driven gear. Hopefully we'll get a chance to discuss this further and show you how to change out the speedometer drive gear in the next issue.

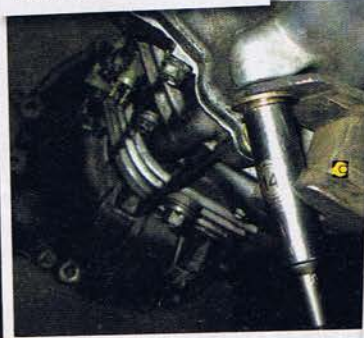
37

If your speedometer driven gear is not already installed in the transmission, grease the assembly and slide it into the case. It's held in by the small bracket and bolt seen in the second picture.



38

Next, we're installing the transmission mount and bracket/crossmember. Bolt them on as shown.



39

The final step is to attach the transmission to the engine. We used a jack to get things aligned and then muscled the transmission into place. Actually, Taka used every muscle in his body to do this while I used every muscle in my right index finger to snap the picture. 📸



SOURCES:

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www.club4ag.com

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www.cabetoyota.com

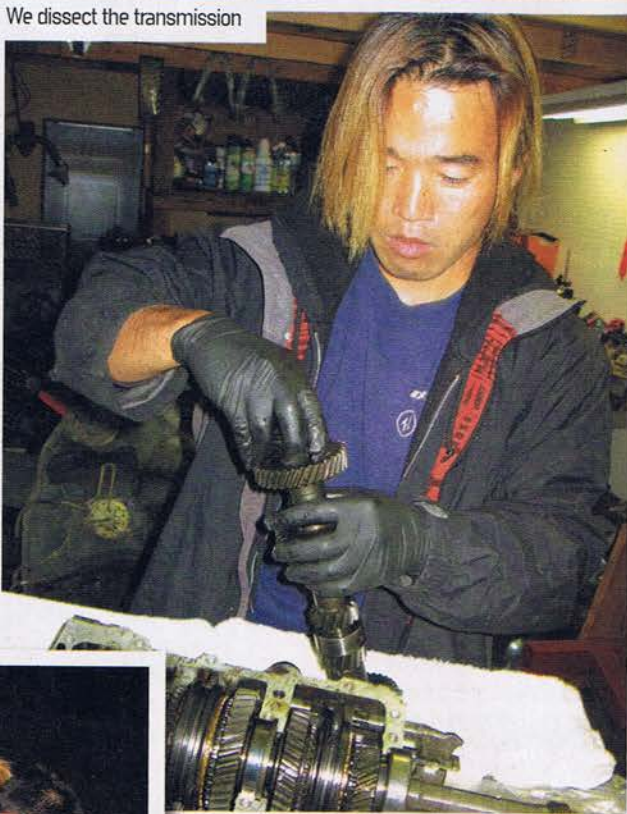
THIS A COMETH

STAY TUNED FOR **ISSUE 16**

We drop in the engine



We dissect the transmission



We show you how to set up a limited-slip differential



We pull fenders

We convert to LED instrumentation



We install JDM goodies



WE ROAST TIRES!





Tools Needed: Jack, jackstands, metric sockets and combination wrenches, 10mm line wrench, metal cutting tool.

TRICKS OF THE TRADE

A SIMPLE SOLUTION FOR A STUPID DESIGN

WORDS AND SNAPS / GARY NARUSAWA

Here's a little tip for the old school Toyota crowd. Having owned several older Toyotas, I sympathize with anyone who has ever had to disconnect a brake hose in order to remove a strut. The guy who designed the bracket must have been as

sharp as a spoon and as bright as the midnight sky. So when Taka suggested that we modify the brake hose bracket on our AE86, I couldn't agree more. It's a simple trick that people have been doing for as long as this idiotic bracket design has been around.



01

This little trick that Taka is showing you will make your life easier for as long as you own the car. Here's the deal. As you can see in these pictures, the engineer designed this bracket to completely surround the brake hose. Even after pulling the retaining clip out, there is no way to remove the hose without disconnecting an end and threading it through the hole. Considering that you have to bleed the brakes every time you do this... stupid!



02

The simple solution is to cut a slot in the bracket just wide enough for the brake hose to slip through. You can use a grinder, a Dremel tool or even a hacksaw to make the cut.



03

Here's what it should look like when you're done. Don't forget to file any sharp edges down to avoid cutting the hose or your fingers.



04

Now why couldn't the engineer design it this way to begin with? I just got a recall notice on the Tundra: something about the gas pedal sticking. Hasn't anyone fired this guy yet?

ONE LAST TWEAK >>

IT'S ALIVE!
FREE FOR NOW...
BUT IT WILL
BE BACK



WIDE FENDER MODS CUT, SMASH AND ROLL

PROJECT CAR

No.16

'07 CIVIC Si
TRACK ATTITUDE,
STREET MANNERS

p.12

REAL TECH / REAL CARS / REAL BUDGETS

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CHEAP SKATE

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DETAILED
SR5 TO GT-S
CONVERSION

REAR END
EXPLORATION
SET UP
YOUR LSD

GET SCHOOLED
DRIFT 101-TIPS
FROM A PRO



**PUT YOUR JUNK
IN THE TRUNK**
BABY GOT BATTS

p.92

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THE QUIET BEFORE THE STORM

A GLIMPSE AT WHAT LIES AHEAD



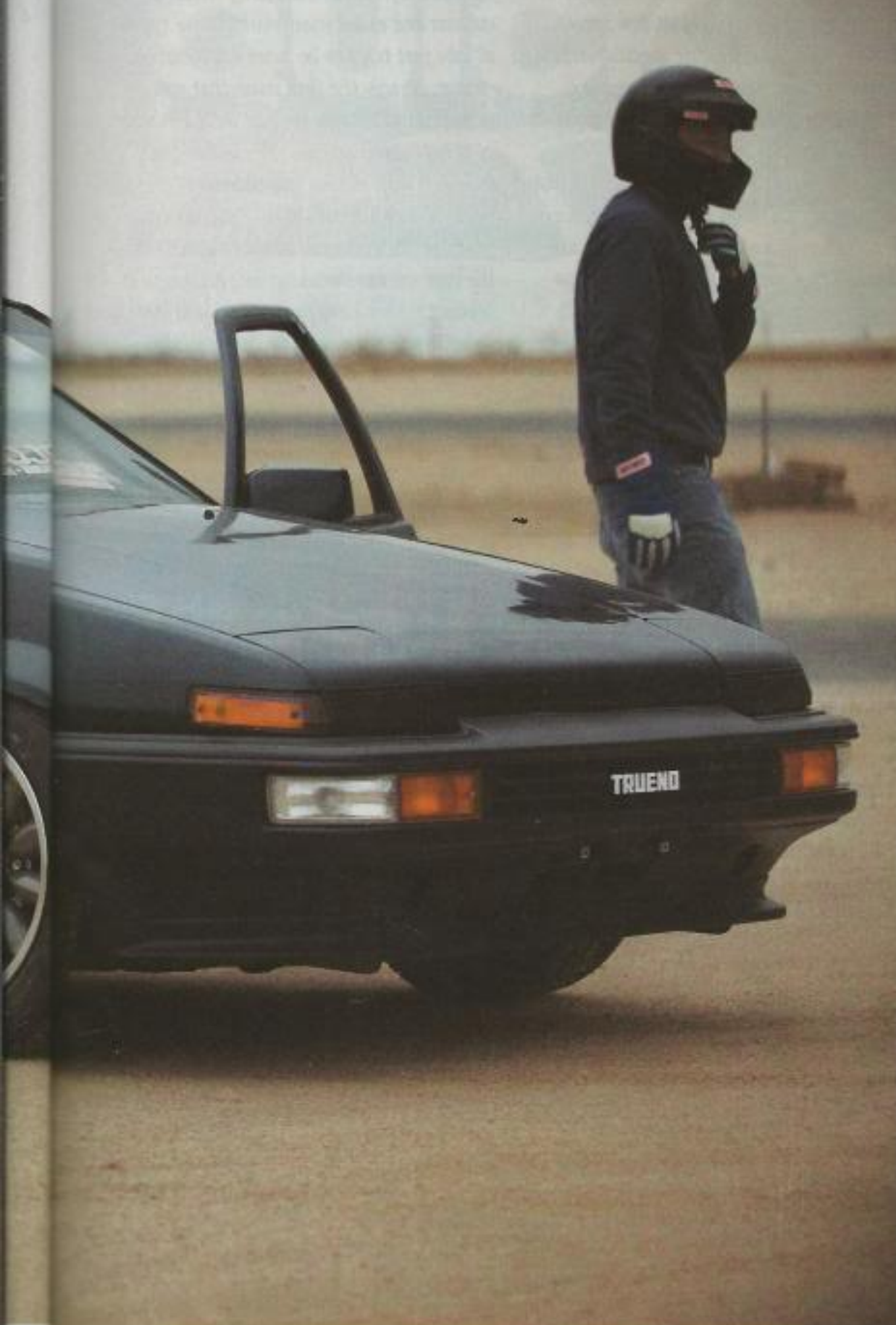
Photo: Sean Klingelhofer

I guess the best way for me to describe this issue would be the quiet before the storm. Due to the comprehensive nature of our AE86 build, a large percentage of its content overflowed into this issue leaving us with roughly only one third of the book open for a new project. With something special brewing in the *Project Car* garage (for next issue), we needed a car that could be wrapped up quickly and in the few pages that remained. So in our usual fashion, we found ourselves

scrambling to find that special car. In an effort to take care of our many readers who drive newer cars, we made the decision to borrow a '07 Civic Si from a friend. It made perfect sense; it's a car that responds well to bolt-ons, it has a strong following and best of all it is K20-powered, which we've been dying to play with for several years. In time, we'll get around to swapping one into a lighter chassis, but don't expect to see that happen right away. We still want to play with a few B-series options as we wait

for the right K-series deal to come along. The engines are getting cheaper and eventually we should be able to swoop one up.

To conclude this segment of our AE86 build, we jumped at the opportunity to go drifting, or in Robbie's case—murder cones. After all, we were working with Taka Aono, who's not only a professional drifter, but also a drift school instructor. All it took was a few simple arrangements with Naoki Kobayashi from Drift Association and we



were enrolled in DRIFT 101. Although Taka normally sticks to teaching DRIFT 102, he made an exception and signed up as our private instructor. All I can say about the class is "damn, it was the most fun I've had in years"! Be sure to catch the summary of our DRIFT 101 class featured toward the back of this issue.

So how does going drifting and having a blast qualify as the quiet before the storm? You obviously haven't seen our storm! Like Noah preparing his ark, we've been slowly

getting things into place for what we expect to be the wildest issue of *Project Car* to date. I can't give away details so you'll have to keep an eye on the newsstand throughout mid-October to see what we're up to. All I can say is that you'll know just how special this issue is the second you see the cover.

Peace Out,

OLD MAN GARY
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PROJECT HACHI-ROKU PART II

WRAPPING UP
THE **AE86**

TRUEND

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'86 TOYOTA COROLLA

WORDS / GARY NARUSAWA

SNAPS / ROBBIE PEREZ

GT-S POWER

INSTALLING THE 4AGE



Tools Needed: Ratchet, metric sockets and combination wrenches, flat-head and Phillips screwdriver, pliers, channel locks, prybar, engine hoist, floor jack, jackstands, timing light

Difficulty: 2.5 out of 5

Install Time: 4 hours

Parts List

T3 Short Shift Kit

MSRP

\$N/A

STREET PRICE

\$170

TOTAL

\$N/A

\$170

While planning this build last issue, our immediate reflex was to swap in a black top 20V engine. The thought of terrorizing the streets with the sexy sound of open velocity stacks and a set of individual throttle-bodies (ITB's) lingered from our late night dreams and into our daily lives. Unfortunately, reality set in as the rational side of our tiny brains reminded us that we work for

Project Car and must stick to a budget. Yes, our average readers are just like us, broke and full of dreams. So this one is for all the fools out there that roll like we do and are proud to rock whatever they got. We'll keep eating junk food and saving our extra pennies toward the purchase of the vaunted 20V but for now, we're going to show you how to drop a 16-valver into the bay so you'll have just enough power to get your drift on.

03

05

inside, so do

01 After dropping the engine into place, secure it by tightening the left and right motor mounts. Note: Using a swivel head ratchet makes this job a whole lot easier.



02 Use a floor jack to align the transmission and bolt the bracket into place.



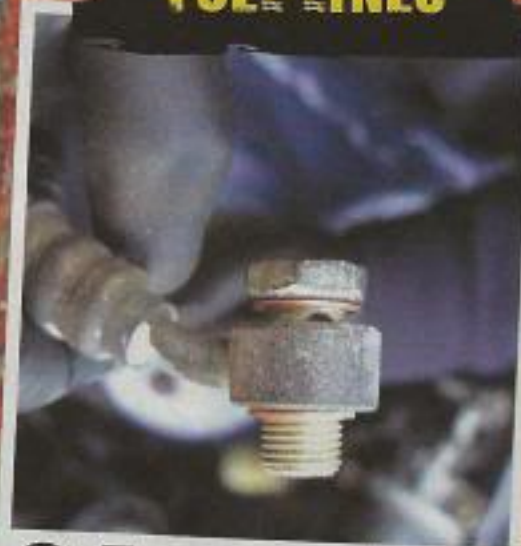
03 Thread the engine harness through the firewall and pull the connectors into the passenger's compartment. We'll hook up the ECU a little later.



05 You can now connect the feed line to the fuel filter. Keep in mind that banjo fittings are hollow on the inside, so do not over-tighten them.



FUEL LINES



04 When hooking up the fuel feed line, make sure you position one crush washer above and one below the banjo fitting.



06 The opposite end of the feed line attaches to the fuel rail as shown.



'86 TOYOTA COROLLA

GT-S POWER

- 07** The fuel return line connects to the fitting on the bottom of the fuel pressure regulator.



- 10** There is an idle-up solenoid bolted to the side of the MAF sensor. Its purpose is to raise the engine idle to compensate for any large draws in the electrical system. The small vacuum hose attaches to the port on the throttle-body as shown in this picture.



- 13** Now plug in the MAF connector.



- 15** There's a spot in front of the fuel filter for the resistor pack. Bolt it down and plug it into the engine harness. Since it feeds power to the injectors, it's needed for the engine to run. If for some reason you forget to get one with your engine, take a trip to the junkyard to find one. Many of the mid to late '80s fuel injected Toyotas use this same resistor pack.

MAF AND INTAKE

- 08** The intake system can be installed next. Ours is complete from the factory GT-S air box all the way to the throttle-body.



- 11** There is also this green electrical connector that needs to be plugged in.



MISCELLANEOUS ELECTRICAL CONNECTIONS

- 14** At the corner of the firewall, you should find the wiper motor. Plug it in before the next storm.



- 16** You can now connect the wiring for the alternator. There's a round plug (as seen in the first image) and a round terminal that slips over the post (as seen in the second image).

- 09** Start by bolting the GT-S air box down. It should bolt right into the SR5 chassis. Note: The SR5 has a bracket to hold the washer fluid and coolant reservoir tanks mounted underneath the inner fender which needs to be removed prior to installing the GT-S air box.



- 12** Because our 4AG came with A/C, it has a second idle-up solenoid. We won't be using this one since we do not plan to connect the A/C. According to Taka, this unit can be used for an idle-up circuit when using individual throttle-bodies. We'll be sure to keep it in a safe spot in case we ever do an ITB setup.



- 17** Also, check the key to make sure it's matching the correct terminal to the unit.

- 20** Toward the end of the unit, the terminal to the unit.

- 23** The correct terminal to the ignition power.

- 26** Now, the bracket is slack.

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17 Along the firewall you should find this black electrical connector. It contains many of the key power wires for the ECU. Plug it in to the matching connector on the engine harness.



18 Moving across to the driver's side there are a few more items that need to be connected. We'll start by mounting the coil and the ignitor assembly. We found a threaded hole along the base of the inner fender that was close enough to the distributor for the wires to reach.

19 Here are the two green connectors for the ignition system. Plug them in as shown.



20 Toward the front of the block, you can find the oil pressure sending unit. Slide the rectangular plug over the terminal to connect it.



21 The yellow connector is for the O2 sensor.



22 The rectangular black connector with the black/white wire is for the starter solenoid.



23 The round black connector with the black/red wire feeds ignition power to the coil.

24 The blue and white connectors are A/C related so we'll just tuck them away.



26 Now mount the cable to the bracket and adjust it to take the slack out of the inner cable.



THROTTLE CABLE



25 As mentioned in the first part of this build, you'll need to use the GT-S throttle cable for the conversion. To mount it, slide the barrel into the hole on the throttle arm as shown and route the cable through the groove.

FAN AND BELTS

27 Slip the fan over the water pump pulley and bolt it down. Taka uses a large screwdriver to keep the pulley from spinning as he tightens each of the mounting nuts.





'86 TOYOTA COROLLA

GT-S POWER



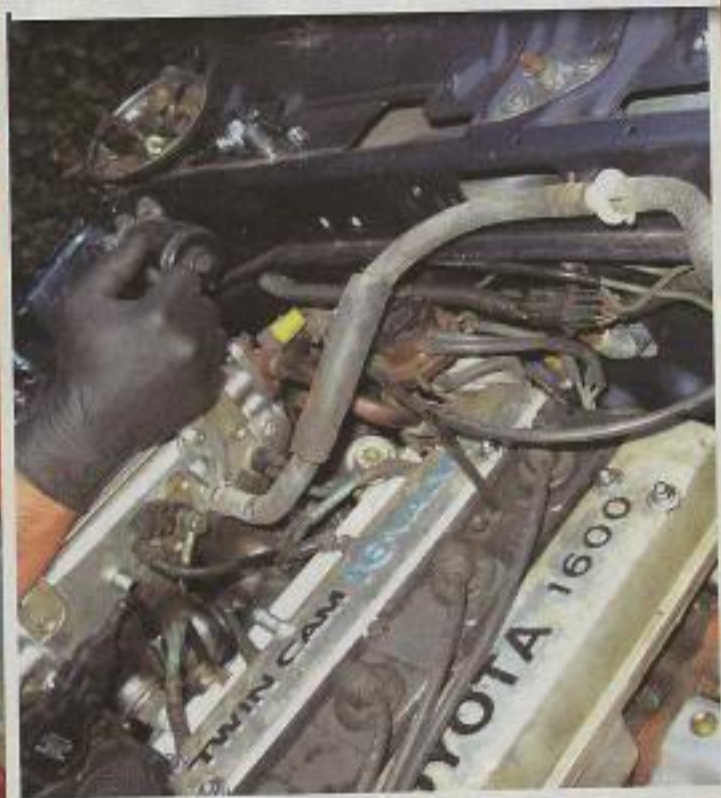
28 After slipping the alternator belt into place, adjust its tension through the alternator. In this picture, Taka is prying against the alternator as he tightens the adjustment bolt.

BRAKE BOOSTER VACUUM HOSE



29 Here's a comparison of the GT-S (top) and the SR5 (bottom) brake booster hoses.

30 We're using the GT-S hose for the conversion as it's a little longer and has the correct bends.



TRANSMISSION RELATED ITEMS

31 Moving under the car, our next step is to install the clutch slave cylinder. To do this, thread the slave cylinder onto the hose and get it snug.



32 Now mount the slave cylinder to the transmission and properly tighten the hose.



33 Since you're already under the car, go ahead and install the speedometer cable. A pair of channel locks will help you get it snug.



34 Don't forget to connect the wire for the reverse switch as well.

35 Next we'll install the driveshaft. According to Taka, there are three variations of the USDM Corolla driveshafts. The GT-S and SR5 with manual transmission have the same size front transmission yoke but different rear flanges for the differential. So, if you're using a GT-S rear end like we are, you'll need a GT-S driveshaft. Conversely, if you're using an SR5 rear end, you'll need an SR5 driveshaft. The third variation is for the SR5 automatic. (Which is for sissys - SK).



36 Wipe the transmission yoke down with a clean rag and some parts cleaner before installing it.



37 Slide the front of the driveshaft into the transmission.



38 Now align the center support and bolt it in.



39 Mate the rear flange of the driveshaft to the pinion flange of the differential and bolt them together.



40 Use a prybar to hold the driveshaft from spinning and tighten the four bolts.



T3 SHORT SHIFTER KIT

41 To improve the feel of our transmission, we're installing a T3 short shifter. This unit reduces the throw by an impressive 55%.



42 Before getting started, we're going to cheat a little and dump the gear oil in through the shifter hole. The factory recommends 1.8 quarts of 75W-90 or 80W-90 GL-4 or GL-5 gear oil.



43 The first step for installing the T3 short shifter is to salvage the rubber boots from the old shifter. We set CFO Will loose with a torch and he quickly tore things apart. The idea is to heat the stock shifter with a torch in order to separate the outer sleeve from the main shifter rod.



44 You can now remove the boots from the old shifter and transfer them to the T3 short shifter.





'86 TOYOTA COROLLA

GT-S POWER

45

To seal the shifter to the case, we used a light coat of grey silicone.



46

The shifter can now be bolted to the transmission.

47

To keep the heat and the nasty fumes out of the passenger's compartment, bolt the outer shifter boot to the transmission tunnel as shown.



EXHAUST

48

The last thing to do under the car is to reconnect the exhaust. Here's Taka sliding the secondary pipe into place. There are three nuts connecting the secondary pipe to the exhaust manifold and two connecting the back of the pipe to the cat.



COOLING SYSTEM

49

The GT-S comes with an external oil cooler from the factory. Just transfer it over to your SR5 chassis and reconnect the lines. Note: Taka highly recommends that you upgrade the oil cooler and the lines for any high-performance applications. Keeping the oil temps under control will greatly improve the life expectancy of your 4AG.



50

We can now move on to installing the radiator. This is another area that Taka recommends upgrading if your car will be seeing some track time. Since we're still dealing with a stock engine, we'll save the upgrade for when we get into some further engine mods. As far as the conversion goes, you can use either the SR5 or the GT-S radiator.

51

After positioning the radiator, go ahead and install the upper and lower radiator hoses.

53

Hoping that our stock 4AGE won't be staying in this bay for long, we decided to loop the two heater hoses. This will make the removal process much easier the next time around.

**52**

In most cases, you'd hook up the heater hoses to these two fittings at the firewall.



PLUGGING VACUUM PORTS

**54**

If you have any open vacuum ports, get some rubber caps from your local parts house and cap them off.

FLUIDS

**55**

The last thing you want to do is forget to fill the oil. We're doing it early to make sure it gets done.

57

While it's best to mix 50% coolant with 50% distilled water, our boys are using water straight from the tap. The reason distilled water is recommended is because it doesn't have any minerals that can cause build up in your cooling systems. Tap water won't kill anything too quickly so we're not really worried about it. If things go well, this engine won't be in here for more than a year.

56

Go ahead and fill the coolant as well. Koji had this cool pitcher that he uses to premix his coolant. Andy and Khai couldn't wait to try it out.

**58**

Here's where we got ghetto. We wrapped the spout with electrical tape to enlarge it enough to fit snugly into the radiator.

**58**

Bleeding the air out of the cooling system is very important. Here's a little ghetto trick to help get the job done. The idea is to raise the level of the coolant well above the highest point of the engine. To do this, we cut the bottom off of a water bottle.

**60**

Next, we filled the radiator with coolant.





'86 TOYOTA COROLLA

GT-S POWER

61 Then we squeezed out all the air from the hoses. In this picture, you can see the air bubbles coming up. As the air comes up, the coolant level will drop as the system is displacing the air with coolant. Although we got a lot of air out, we'll repeat this procedure once the engine is started. At that time, we'll be able to bring the engine up to operating temperature to open the thermostat. This should bring more air bubbles up to the top.



62 Knowing that our fuel tank was bone-dry, our next step was to fill it with gas. When doing this, keep your smoker friends far away.



FAN SHROUD



63 One of the keys to keeping your engine cool is by using a fan shroud. Slide the bottom half in first, followed by the top half.

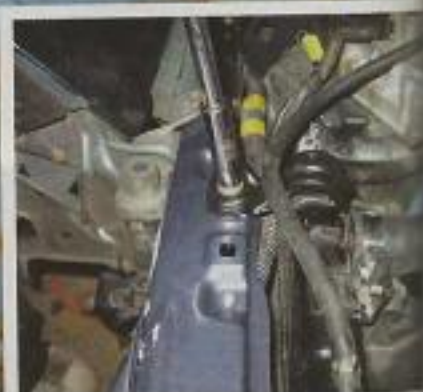


64 Now bolt the two halves together.



65 Here's how the fan shroud attaches to the radiator on the passenger's side of the vehicle.

66 Unfortunately, the mounting tab for the driver's side was broken. Lucky for us, Taka was around and secured it with a zip tie.



67 With everything in place, go ahead and secure the radiator using the factory mounting brackets.

ECU

68 Moving into the passenger's compartment, you can now install the ECU. It's all plug-and-play.



69 After connecting the ECU, Taka could finally reassemble the passenger's side of the interior.





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GT-S POWER

POWER AND GROUND

70 Always make sure that you have a proper ground wire between the engine and the chassis. The starter draws a lot of electrical current and requires a heavy gauge ground wire.



71 Since we relocated our battery to the rear of the car, our main power wire was now coming in from one of the holes in the inner fender. Be sure to check out the Project Car Garage section at the back of this issue for a full write up on how to relocate your battery.



PRIMING THE OIL AND THE FUEL SYSTEMS



72 After completing our battery relocation, our final steps were to prime the fuel pump and the oil system, fire the engine and set the ignition timing. To prime the fuel system, we connected a jumper wire to the connector located next to the MAF sensor as shown. This forces the fuel pump to run continuously anytime the ignition key is turned on and primes the fuel system.



73 In order to prime the oil system, you'll want to keep the engine from firing. To do so, disconnect the two green plugs by the distributor. Now go ahead and crank the engine over several times, spinning the engine on the starter alone. This procedure will clear the air out of the oil passages and fill them with oil. Once the priming procedure is completed, reconnect the green plugs at the distributor and remove the fuel pump jumper. Since turning the key on also primes the fuel system, check for any leaks around the fittings and the injectors.



74 You can now start the engine. When doing so, keep an eye on the oil pressure gauge as the system should build pressure quickly. Be sure to check for any leaks before moving on.



SETTING THE IGNITION TIMING

76 Connect the pick-up lead from your timing light to the #1 spark plug wire followed by the power and ground.



77 Loosen the mounting bolts on the distributor, start the engine, and align the timing mark to the factory recommended 10° BTDC mark. To adjust the timing, simply rotate the distributor until the mark on the crank pulley aligns with the appropriate mark on the timing belt cover. (Note: timing should be set with the engine idling at 800 RPM). Tighten the distributor mounting bolts and you're done. ☑



75 Our final step is to set the ignition timing. To do this, install a jumper wire at the "Check Engine" connector located along the harness near the wiper motor.

SOURCES:

Techno Toy Tuning
530.626.733
technotoytuning.com

Cabe Toyota
562.595.7411
cabetoyota.com



'86 TOYOTA COROLLA

WORDS AND SNAPS / GARY NARUSAWA

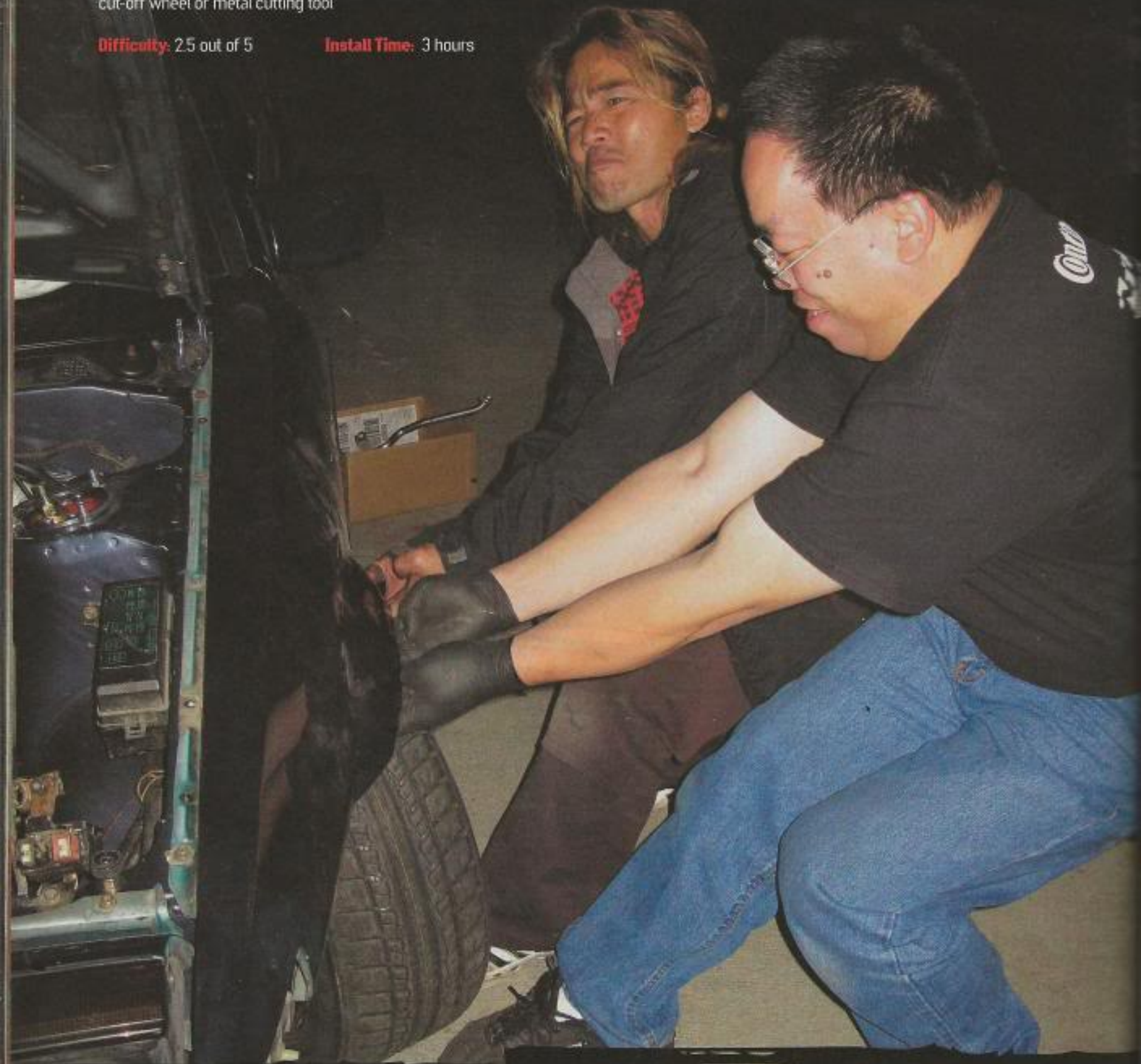
HOW WE ROLL

ROLLING THE FENDERS ON PROJECT HACHI-ROKU

Tools Needed: Jack, jackstands, ratchet, metric sockets, fender roller, hammer, heat gun, infrared thermometer, cut-off wheel or metal cutting tool

Difficulty: 2.5 out of 5

Install Time: 3 hours



Fitting wide, low offset wheels on a slammed AE86 Corolla is common but many don't realize that it requires some pretty extensive modifications to the fenders and fenderwells. For Project Hachi-Roku, we ordered a set of 15x8" XXR 521 wheels in a zero offset. While waiting

for our wheels to arrive, we went ahead and started modifying the car to clear our wheels. Normally you would need the wheels and tires to figure out exactly how much clearance will be needed, but we were lucky enough to be able to borrow one from Taka. The job took a few hours but the results made it well-worth it.

On our initial test-fit, we could immediately see a clearance issue between the tire and the fender in the fenderwell.

05 Hammering out the fenderwell requires going beyond just the pinch weld. We actually had to hammer in a bit of the fenderwell itself to gain clearance for the wheel/tire.

02 To make it easier to hammer the pinch weld flat, we marked a few spots for relief cuts.

03 There was also this bracket for the fender liner in the way. We simply bent it back and forth a few times until it snapped off.

04 For the relief cuts, we cut across the pinch weld in several spots using a cut-off wheel. Had we not made the relief cuts the pinch weld would have a tendency to split apart as we hammer it down (due to the curvature of the fenderwell).

06 Before rolling the fenders, we cut off the tabs where the fender liner previously attached.

07 After mounting the fenders, we attached the fender roller.

08 To keep the paint from cracking and peeling, CFD Will softened the paint with a heat gun. The trick is to keep the heat gun moving to avoid burning or overheating the paint.

09 The key is to keep the paint between the recommended temperatures of 125-140°F.

10 After a thorough inspection, CFD Will gave us his seal of approval.

11 The same steps were repeated on the passenger's side front fender.

12 Rolling the back fenders was a little easier. At least the job did not include the use of a sledgehammer.

13 After a final fitment, it was determined that we needed a little more of a pull. The poor little fender was no match for Taka and CFD Will.



'86 TOYOTA COROLLA

WORDS / GARY NARUSAWA

SNAPS / ROBBIE PEREZ

JDM BUMPS

CONVERTING TO JDM BUMPERS



Tools Needed: Jack, jackstands, ratchet, metric sockets, and combination wrenches, needle-nose pliers, Phillips and a flat-blade screwdriver, wire cutters, wire crimpers

Difficulty: 2 out of 5 **Install Time:** 1.5 hours

One of the things that we like to focus on here at *Project Car* is bang for your buck performance. So how does a set of rare and expensive JDM bumpers fit that bill? Well, it doesn't. Sure, we could try to justify it based on weight savings (which is significant) but to be perfectly honest; this is one mod that we added just to make the car look good. One look at a car with JDM bumpers and your busted USDM bumpers never look the same. Sure, we thought about upgrading to a set of GT-S bumpers and covering things up with a little paint but in the end there was only

one thing that could make us happy, JDM bumpers. No offense to the guys rockin' USDM bumpers and please don't write in to tell us that we're idiots for blowing our money (we already know that). Bottom line, building a car is subjective and each person should choose to spend their money in a manner that works best for them. We're not here to tell you what parts are cool and what to buy and we don't want your car to look just like ours. Our goal is to get the little hamster wheel turning in your head by giving you ideas that you can build off of. Here are the how-to steps for installing JDM bumpers.

01

03

05

When you're mounting... well. Since bumpers don't have hardware, you'll have to scrounge around for bolts to attach the brackets to the bumpers.



01 Starting at the back of the car, remove the center section of the rear bumper. It's held in by two bolts on each side (bolts are accessible from inside the rear hatch).



02 Next remove the side panels. From the outside, there is one bolt in the fender well and two along the lower sides. A fourth bolt must be removed from inside the car; it's located in the rear corner of the quarter panel (not shown).

03 Here's what backside of the panel looks like. Note the position of the four mounting points.



04 Robbie couldn't wait to unwrap the brand-new JDM Kouki bumpers. These have gotten very expensive and difficult to find over the past few years. We've seen used sets (with lights, brackets and grille) selling for close to \$1500. Pass Racing can special order the bumpers but getting the small parts to go with it can be a challenge. We were lucky as DriftPro had an extra set for us to use on the project.



05 When sourcing JDM bumpers, be sure to get the mounting brackets as well. Since new JDM bumpers don't come with hardware, we had to scrounge around for bolts to attach the brackets to the bumpers.





'86 TOYOTA COROLLA

JDM BUMPERS

06

You'll have to find a couple new mounting bolts as the threaded hole on the JDM rear bumper is a smaller in diameter than the USDM mounting bolts that came out of the car. Also, as you'll see in the following steps, the spacing on the holes is a little different.



07

Robbie gave Taka a hand to get the new bumper into position.



08

When mounting the bumper, note the clip at the top of the bumper bracket; it should slide into the slot on the chassis, circled in the second picture.



09

After a few tweaks, the dynamic duo got the bumper in place.



10

You should be able to get the front hole aligned on each side and start the bolts.



11

Here's the hole spacing issue that we were talking about. The rear hole does not quite line up. The first solution that we thought of was to elongate the hole on the body. This is the preferred method to solve the problem.

12

The shortcut method is to do what we did. Find a smaller diameter bolt, some large washers with a matching nut. Now hope you never get rear-ended.



13

Remember the side bolts on the old bumper? The good news is that two of them can be used to secure the JDM bumper.



21

we could



14 Here's Robbie finishing up the right side. The new rear bumper looks so much cleaner!



15 Now on to the front. Taka did the honors unveiling the front bumper.



16 He also unpacked the front corner lights.



17 Don't forget to install the lights before the brackets, you'll need clear access to the mounting nuts.



18 Thread the electrical connector for the light through the hole in the bumper and bolt the bracket into place. Again, you will need to scrounge around for some bolts.



19 Now pop the "TRUENO" badge into place.

20 Robbie couldn't wait to see what the car would look like with both bumpers, so we did a quick test-fit. After satisfying Robbie's curiosity, the bumper came back off for a few modifications.



22 Using a long M6 x 40mm Allen bolt which we found at a local hardware store, we rigged a custom mounting system. First we threaded the bolt from the back of the bracket to create a stud on the front side.



21 On the inner side of the bumper you will find these two holes. They are used to secure the bumper to the fender. Lucky for us, our USDM bumper also utilized a similar mounting system, from which we could steal the brackets.





'86 TOYOTA COROLLA

JDM BUMPERS

23 To clear our low offset 15x8" wheels, we added a spacer to help stretch the bumper outward.



24 Next we coated the threads with Loctite and threaded on a flange nut. We did this with the flange side facing out.



25 Next, we screwed the bracket to the side of the bumper as shown. The idea was to create a stud that would slip into the hole in the fender for mounting.



26 We did the same for the other side of the bumper. As you can see in this picture only one screw hole aligned properly. We had to pinch the other side with the head of the screw.

27 As we mount the bumper, you can see how our system works. The newly-created stud goes through the pre-existing mounting hole in the fender. Once the stud is through, we thread a nut and bolt it down. Had we used a bolt from the opposite direction, we'd be crawling under the car and fighting with the spacer any time we had to remove the bumper. The alternative "drifter's" method is to secure the bumper with zip ties. Unfortunately, this requires drilling holes in the brand-new bumper which would lower the resale value of the part (if we were to ever sell it).



28 There are other issues when mounting JDM bumpers. The system used two main mounting bolts on each side. One comes in from the top and the second one comes in from the front. Unfortunately, neither one aligns properly with the USDM chassis. The first picture shows the misalignment of the top hole. The second picture shows the gap between the bumper and the frame rail (for the bolt coming in from the front).



29
stands for
of the hole

32

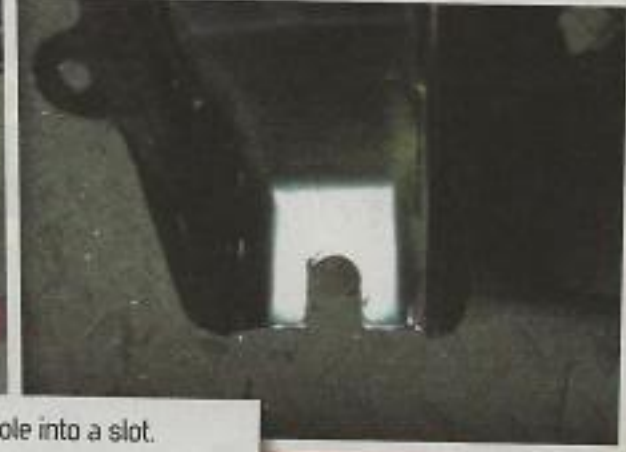
34
plugs direct



29 Our solution was to run down to the hardware store and pick up an M16 nut and an M14 washer. For those unfamiliar with metric hardware, the "M" stands for "metric" and the "16" or "14" refers to the diameter of the hole in millimeters.



30 For the bolt entering from the front of the bumper, we used the M16 nut to fill the gap between the bumper and the frame rail.



31 For the top bolt, we modified the bumper bracket by cutting the hole into a slot.



32 We then slid one of the M14 washers onto the bolt to give the bolt head a larger surface diameter. Once everything was in place, we tightened the nut from the bottom.



33 The JDM lights sure look good. Now all we have to do is get them to work.



34 Start by salvaging the connector from the old USDM light. This one is useful as it plugs directly into the harness.

35 For the green wire (parking lights), we are adding a small jumper wire and then crimping on a female blade connector. The reason we are adding a jumper is to be able to power up the clear lens anytime the parking lights are on.



36 Next, we crimp a second connector onto the red wire we just added.





'86 TOYOTA COROLLA

JDM BUMPERS

37 That completes the modifications for the parking light circuit.



38 The next wire we are dealing with is the green/yellow wire (turn signal). Simply crimp a connector on this one.



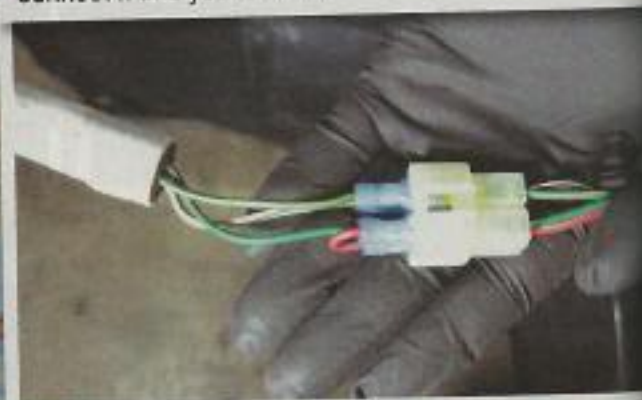
39 The same thing goes for the white/black wire (ground).



40 It's now time to mate the wires with the connector for the JDM light. It's just a matter of plugging things in.



41 Here's the order: The green wire mates with the JDM green wire, the green/yellow mates with the JDM green/yellow wire and the white/black mates with the other white/black. The only remaining wire is the jumper wire that we added. Yes, there's a reason why Taka selected a red wire. Connect it and you're done.



42 Now plug the connector into the harness and your JDM lights should work.



43 The last thing to install is the grille. Yes, you will need a JDM grille to match your JDM bumper.



44 This thing snaps right into place.



45 It's funny how the grungy the old parts look when everything else around it is new. To finish off the looks of the front end, we sourced a new set of lower headlight panels from Cabe Toyota. Too bad you'll have to wait till our final feature to see how nice the front end looks.



SOURCES:

Cabe Toyota
562.595.7411
cabetoyota.com

PASS Racing
626.961.7711
passracing.com

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'86 TOYOTA COROLLA

WORDS AND SNAPS / GARY NARUSAWA

DIVERSION TACTICS

DIVERTING AIR FOR IMPROVED COOLING



While adding a diversion panel cleans up the look of the engine bay, the concept behind it is purely functional. As air enters through the front of the car, it searches for the path of least resistance.

In an ideal situation, this air should flow through the radiator, cooling the water/coolant as it moves through the cooling fins. Unfortunately, in our not-so-perfect world, much of the air escapes around the radiator missing its intended target. The end result can be an engine that runs hot. Not getting enough airflow through the radiator on a drift car is also a common problem. This is because only a limited amount of air enters the opening of the bumper when the car is moving sideways. So here's where a diversion panel can help. By closing off the large opening around the hood latch area, air can be diverted back down toward the radiator where it can do its intended job. So for Project Hachi-Roku, we installed a Techno Toy Tuning diversion panel in an effort to raise the efficiency of the cooling system. The installation was a snap; it only required removing one bolt and the entire process took less than ten minutes.

Tools Needed: Ratchet, 10mm socket, metric Allen wrench set.

Difficulty: 1 out of 5 **Install Time:** 10 minutes

Parts List

T3 Diversion Panel/Radiator Shroud **MSRP** N/A **STREET PRICE** \$64

TOTAL

\$N/A

\$64



01 We sourced this diversion panel/radiator shroud from Techno Toy Tuning.



02 We'll start by removing our recently installed JDM Trueno grille.



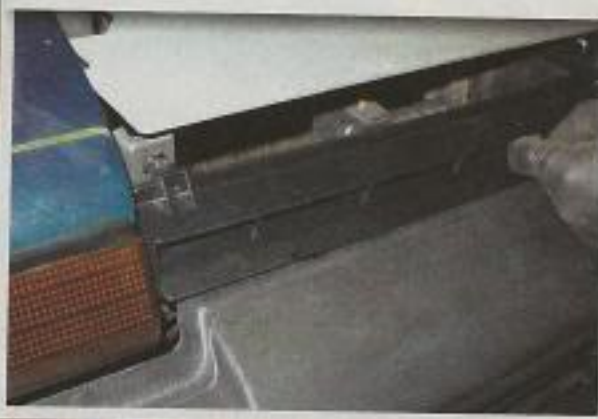
03 Remove the bolt for the engine oil cooler bracket (10mm). T3 provides a new bolt and some washers to shim the panel up. Position the washers under the panel as shown.



04 The tricky part is sliding the lever for the hood latch through the hole in the diversion panel. The panel will flex enough to allow you to slide it into position. Once it's in place, secure it with the button head Allen bolt.



05 Reinstall the grille and you're done. 🏁



SOURCE:

Techno Toy Tuning
530.626.7334
technotoytuning.com

DRIFF



T

101

GET SCHOOLED IN DRIFTING

WORDS / ROBBIE PEREZ & GARY NARUSAWA
SNAPS / SEAN KLINGELHOEFER & STAFF

Part of growing up around fixed up cars means learning how to do burn-outs, donuts and J-turns. Having this background should qualify you as a drifter, right? Just mash on the gas, turn the steering wheel, add some panic-inspired countersteer and then hope you don't crash. Sorry to inform you, but drifting is a bit more involved than that. There are various drift techniques that must be learned and precision car control that must be mastered. So how does the average person learn how to drift? Unfortunately, drifting in public areas is frowned upon in most societies, making it a difficult sport to practice. The answer is simple; do like we did and go to drift school.

Signing up for drift school is as simple as contacting Drift Association. For a fee, they'll provide the location, a qualified instructor and even offer to rent you a properly prepared drift car to learn on. While you can bring your own car, in most cases we recommend that you opt for the rental. The company's cars come properly equipped with a limited-slip differential, heavy-duty clutch, drift tuned suspension and plenty of tire to burn. Our case was a little different since we had a purpose-built wannabe mean green drift machine begging to be tested.

With excitement looming through the air, we packed the car with our two spare wheels and then loaded it on the trailer. It was just two of us (Robbie and Gary), the Tundra, Project 86 and the open road. On the ride over, we talked about how much fun this was going to be, and asked each other useless questions like, "Do we have enough tires?" or "Do you think the engine will blow?" We even worried about things like sliding off into the dirt and the possibility of damaging the car.

rest of the crew. There was no backing out now; we were at the track with Taka, a drift car, helmets and our photographer, Sean, ready to capture every embarrassing moment. After a short safety lesson we did a quick safety check of the car. Next, we proceeded to check the tire pressures. This is where the first lesson of the day was learned. Robbie asked Taka what to put the tires to. His response was "set them to about eighty PSI." Robbie laughed and said "no really, what do you want the tires at?" Taka chuckled and said "I just told you, 80PSI." Taka then explained that since the car was underpowered, over-filling the tires would reduce traction and help us slide.

With our helmets in hand and each of us pointing at the other to go first, we began our private DRIFT 101 class. Taka went over a few more safety tips along with some pointers to help us get started. Each of us jumped in the car for a few quick laps, mostly to familiarize ourselves with the car. Although not part of the training, we pushed it a little in an attempt to see if we could get the car to go sideways. (In all honesty, all that OMG & JR managed to do was some uncontrollable spin-outs - SK). Although this was fun and we could do it all day, it was not part of the schedule. To our surprise, the car handled well and our freshly swapped blue top was running like a champ. This eased our anxieties as we slowly gained confidence in the car. Keep in mind that this was the first time we got to push the car to its limits — Robbie sitting in the driver's seat with Andy screaming engine noises doesn't really count. Next, it was Taka's turn. Watching Taka pull some medium speed sideways maneuvers and precision donuts not only amazed us but it helped us realize the true potential of the car. Although grossly underpowered for more than a second gear drift, Project Hachi-Roku proved worthy as a great entry level drift car.

With the testing session out of the way, we were ready to get started with our lesson. Since Drift 101 is an introductory course, its primary focus is geared towards car control. Our first task was to spin donuts in an open area. Displaying overconfidence for this remedial task, we stepped up to the challenge. It was at this point that we began to realize the difference between simply spinning a donut and spinning a donut in a controlled manner.

Throughout this exercise Taka showed us detailed techniques to slowly help us gain control of the spin. At the request of Drift Association, we will not cover these techniques in this article for one simple reason; these techniques should be learned and practiced under the



To help reduce traction in the rear, the tires were inflated to 80 PSI. Here's Taka's ultra-cool air compressor. It's designed primarily for off-road trucks and is capable of reaching high pressures in a short period of time.



Our first challenge was to master the left-hand donut.



The right-hand donut proved to be quite challenging.

supervision of a qualified instructor and in a controlled environment—your local church parking lot doesn't count.

Our next task was to spin donuts tightly around a cone. Boy did that little orange marker change the equation. While this exercise sounds simple, reaching a level of mastery requires a lot of practice and the precise implementation of the various skills taught in this school. We started out spinning to the left. For most people spinning to the left comes more naturally than spinning to the right. We figure this has a lot to do with the fact that we were in a left-hand drive car. Spinning to the right is a completely different ball game. It's like learning to play golf—fun but extremely frustrating. Lucky for us, we had a great instructor. Taka's strategy was

simple; give us instructions, set us loose in the car and then reel us back in when we were in need of correction. Beyond that, Taka did an amazing job boosting our confidence and making us feel comfortable. He also used techniques such as switching drivers if he noticed us reaching a level of frustration or fatigue. In time, we caught on and eventually stopped murdering the cone.

After several hours of continuous donuts, our tires began to come apart. At this point chunks of the tire were slapping against the fenderwell, making a thumping noise with every revolution. Concerned about the problem, Gary jumped out the car and asked the question of the day; "what happens when the tire pops?" In a calm and collected voice, Taka replied "it goes pop," we all



Although Project 86 was underpowered for high-speed drifts, Taka didn't hesitate to try. The lack of smoke from the tires is a good indicator that the car could use more power.





Here's Old Man Gary getting schooled.



It started to rain in the afternoon; we just smiled and kept on going.



Even though he got soaked, Taka continued to teach our lesson.


laughed as the old man realized that we had just walked right into that one. After reassurance from our sensei, Gary jumped back in the car and waited to hear a "pop". Unfortunately, the thumping got worse and we had to make the decision to swap out the tires instead of risking damage to the car—or our über-expensive bumpers.

We figured this would be a good time for a lunch break. After chowing down a quick and greasy lunch, the weather turned south on us. It started as a few showers and quickly turned to rain. When we asked Taka if we should pack it up and go home, he quickly replied "free horsepower!" We laughed and said

"what?" He said, "Wet track equals more horsepower." So despite the rain our training session continued. The rain changed things a bit. It took a lot less power to get the tires spinning but it also forced us to implement more precise throttle control.

Our final challenge was the figure-eight. This required combining a left and a right donut to form a figure-eight around two cones. Our first reaction was to run and hide. What made this difficult was figuring out how to transition from one direction to the other. Transition too early or too late and you'll miss the line for the next cone. The wet track and reduced visibility didn't help the

situation. But like with most skills, mastery can be obtained through time and practice. By the end of the day we almost had it down. We'll keep practicing our figure-eights and then return for Drift 102.

Every technique we learned came with twice as many laughs and smiles. Every frustrating moment was replaced with a sense of accomplishment. After experiencing Drift Association's Drift 101 class first-hand, we highly recommend it to all of our readers. Whether you simply want to learn the basics of drifting and car control or want to pursue a professional career in Formula D, DRIFT 101 is the place to start. 

SOURCE:

Technosquare
310.787.0847
technosquareinc.com

OS Giken
310.243.1349
osgiken.net

KAAZ
714.554.4333
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Tomei
949.855.6577
tomeiusa.com

Royal Purple
281.354.8600
royalpurple.com

RPM Auto Parts
714.957.2741
rpmautoparts.com



Difficulty: 4.5 out of 5

Install Time: 3 hours

Tools Needed: Jack, jackstands, ratchet, metric sockets and combination wrenches, slide hammer, dial indicator, torque wrench

THE ART OF SETTING UP AN LSD

INSTALLING A LIMITED-SLIP DIFFERENTIAL

WORDS / GARY NARUSAWA
SNAPS / ROBBIE PEREZ

We've all been told not to do something because the job is too difficult. Fear of the unknown is a bad thing, so why not educate yourself and make your own decision on what jobs you can or cannot handle. Education is exactly what this article is about. We are not saying that everyone is qualified to do internal work on a differential; some of you are and many of you might not be. The last thing we want to see is a bunch of our readers running off half-cocked trying to figure things out on their own and messing things up along the way. Instead, we want you to know what is involved with this type of work, so if you were to attempt this procedure on your own, you'd have the needed information to be successful. Please be aware that this is an advanced level modification that should only be attempt it if you are an experienced mechanic and are willing to take the chance on ruining a perfectly good set of gears and possibly even your

new limited-slip differential. For the rest of you, we strongly recommend that you leave this job to a qualified professional such as the crew at Technosquare. Even though Taka has done this job before, even he felt that it would best if we worked with the proper tools and under the supervision of Technosquare. Don't get us wrong, we are all about the DIY, and do not want to scare any of you from trying anything new but we want to make sure you gain a respect for the precision work that is required to accomplish this job successfully. There is a learning curve to everything and it's inevitable that some costly mistakes will be made along the way. But hopefully, if you work carefully, have the proper tools, and prepare yourself with the proper knowledge, you can eventually master any technique. Note: The following steps are only for the installation of an aftermarket limited-slip differential unit. Replacing the ring and pinion is a different job and will not be covered in this article.



01 The first step is to remove the differential unit from the axle housing/rear end. Our housing happens to be out of the car and with the brake calipers already removed. Unless you're swapping out to a GT-S rear end like we did, yours would probably be mounted in the car. Either way, the steps are the same.



02 Behind the brake rotors you should find the four nuts that hold each axle into place. Go ahead and remove them.



03 Your axles are probably going to be stuck in the housing. The best tool for removing them is a slide hammer.



04 Once you've mounted the slide hammer, give it a few bangs and the axle should begin to come out.



05 Once the axle is free, pull it out keeping it straight and centered to avoid damaging the axle seal.



06 Here's a close up of the axle seal that you are trying to preserve. If the rubber lip on the seal is hard or damaged, the seal should be replaced.



07 There are two different axle diameters on the GT-S. The early (Zenki) model is smaller measuring 24mm in diameter while the later (Kouki) model is larger and stronger, measuring 25mm. There are also differences in length between open and factory LSD axles, so be sure to verify what you have before ordering your LSD. We were good to go as our Zenki axles matched Koji's LSD.



08 While the axle is out, you should inspect the axle splines for damage. They should be straight (not twisted) and should not show any significant wear.



09 Also inspect the axle bearings. You should feel a light resistance as you spin them and they should spin quietly.



10 If your rear axle housing is out of the car like ours, you'll want to raise the pinion to roughly its mounted angle and support it with a jackstand.



11 Now unbolt the drain plug and drain the gear oil out of the housing. Removing the fill plug as well should help the oil drain out faster.



12

You can now unbolt the "pumpkin".



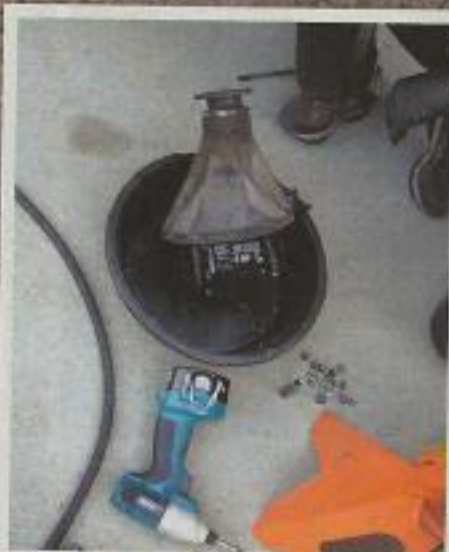
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Here's Taka using a plastic dead-blow hammer to break the seal.



14

After cracking the differential unit free from the axle housing, slip a prybar into place and pry the differential unit away from the housing.



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Gear oil is stinky and messy, so let the unit drain down in a clean drain pan.

TECHNOSQUARE



16

To show you how to do the job the right way, we took our differential to Technosquare in Torrance, CA. This legendary shop has been setting up differentials for countless race/drift teams over the years. Since Technosquare is one of Taka Aono's sponsors, they were nice enough to let us use their facility. This picture shows Howard Watanabe and Taka attaching our differential to a special mounting fixture designed to hold the unit securely while it's being worked on. Howard is somewhat of a mentor for Taka. He's old school but super cool and knows everything about building race cars. He's kind of like Taka's own Mr. Miyagi.



17

Once our differential was mounted to the fixture, the complete unit was secured in a vice.



18

Before unbolting anything, a dial indicator is mounted to check the backlash on the ring gear. When doing this, be sure to mount the dial indicator straight up and down in a vertical position. If you hold the pinion and rotate the ring gear back and forth, there is a small amount of play before the gears engage with each other. This small amount of play is the backlash to be measured.

19


Taka holds the pinion as he slowly moves the ring gear back and forth. As he does this, the dial indicator measures the play between the two gears. If the space between the gears is too small, the gears will be tightly jammed into each other causing excessive friction and excessive heat, which can eventually destroy the gears. If the backlash is set too loose, you will not have proper contact between the gears often resulting in broken or sheared teeth. Taking this initial backlash measurement is critical because this same backlash measurement should be used upon reassembly. Ours measured 0.20mm. Note: the backlash should be checked in three to four spots around the gear to ensure an accurate reading.




20

Taka starts the disassembly by removing the locking tabs on each side.






21 As the parts are removed, he places them in an orderly fashion on the bench as to not mixing up the parts from the left and right sides. This ensures that each part will go back into its original spot during reassembly.




22 To make sure that the bearing caps go back together exactly as they came out, Taka stamps an "x" into the side of the components.



23 The bearing caps can now be unbolted.




24 Using a special service tool, Taka grips the holes of the adjusting nuts and spins them loose.




25 The bearing caps can now be removed.




26 The adjusting nuts are removed as well and placed in an orderly fashion on the bench.




27 The differential can now be lifted out and placed on a work bench.




28 All that should be left is the pinion gear. Be sure to visually inspect it for damage or pitting.



29 Note how Taka keeps each part clean and in order. This is an important step to doing the job correctly.




30 The next step is to remove the ring gear and transfer it over to the aftermarket LSD unit. To do this, the tabs on the lock plates must be bent back.



31 Once the tabs on the lock plates are out of the way, the ring gear bolts can be removed.



32 Taka lightly taps the side of the ring gear with a hammer to get it loose. Do not hit it hard as you do not want to damage the gear.



33 After getting a gap under the gear, Taka was able to pry it off.

34

It was now time to clean things up. Howard is a stickler for cleanliness so we didn't dare cut corners in this department.



35

Here's the Tomei 2-way LSD that we "borrowed" from Koji's private stash. From what we've heard, Tomei recently discontinued this product. We've also heard that the Tomei LSD was actually a remarketed Kaaz unit (which is currently available). Another great option for the AE86 is the OS Giken LSD, which is what Taka uses in his competition car.



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When doing this job, you will need a new set of differential side bearings. We got ours from RPM Auto Parts in Costa Mesa, CA.



37

Our sensei, Howard, kept a close eye on us from a distance but was happy to step in whenever we needed a hand. We think he secretly likes getting his picture taken for the magazine.

38

Here's Taka checking the fitment of the ring gear.



39

Next, he warmed up the ring gear in hot water. The heat expands the gear making it easier to install over the differential case.



40

After aligning the gear, Taka loosely started a couple of the bolts to hold the gear in place.



42

The next step was to properly torque down the bolts. To do so, the unit was clamped in a bench vise. Note how Technosquare's vice has two 90 aluminum inserts to protect the part from the metal jaws.



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The threads were then coated with Loctite and tightened by hand.

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The factory torque spec for the ring gear bolts is 71 ft-lb. Tighten the bolts in an even fashion and in multiple steps. Again, we caught Howard keeping a close eye on us to make sure the job was being done correctly.

44

Oops, looks like we missed a spot around the bearing. This job requires precision, having a perfectionist like Howard overseeing us is a great thing. His attention to detail is why Technosquare has built such a great reputation.

45

The new differential unit can now be installed into the carrier.



46

The adjuster nuts were then loosely positioned into place.



47

The bearing caps are then installed.



48

Remember the "x" marks that Taka stamped earlier? Once the marks are lined up, we can rest assured that the caps are reinstalled exactly as they were removed.



49

The cap bolts were only snugged down at this time to allow the side adjustment nuts to rotate freely.



50

Before setting the backlash, the side adjusters should be set to a zero preload position. From there, setting the backlash is a matter of moving the differential case side-to-side by moving the left and right adjusting nuts by equal amounts. For instance, if you loosen the right adjuster by one notch, you will need to tighten the left adjuster by one notch. Doing so will maintain the previously set zero preload status. Moving the ring gear inward toward the pinion gear will tighten the backlash. Backing it away from the pinion gear loosens it.



51

Since this is a critical step, we left it in the hands of the master. It's basically a matter of adjusting the backlash until the dial indicator shows a difference of your targeted backlash setting. (Use the same backlash as measured prior to disassembly).



52

Once the backlash is set, the bearing caps should be torqued down in multiple steps. The factory torque setting is 58 ft-lb.



54 As you can see in the first picture, when the ring gear is moved in one direction, we get a measurement of 0.95mm. In the second picture, you can see that the dial indicator shows 0.76mm when the ring gear is moved in the opposite direction. The difference between the two is 0.19mm. This is close enough to our initial setting that we measured at 0.20mm.



53 To make sure that nothing has changed, the backlash setting is double-checked.



55 Our final step on the bench was to install the locking tabs. Their job is to ensure that the adjusting nuts do not move.

REINSTALLATION



56 Those paying close attention may have noticed that our rear axle housing has magically installed itself into the car. In real life, several weeks have passed since we first took things apart and the build has progressed.



57 To ensure a proper seal we installed a new gasket.

58 Next Taka He-Manned the differential carrier into position and started all the nuts.



59 Everything was then tightened using a ratchet, an extension and a socket.



60 Here's another one of Taka's little track-side tricks. Using a funnel and an old radiator hose, he tilts one side of the differential up and fills the differential with gear oil. Not only is this method faster, but it allows you to slightly overfill the rear end. When drifting, the oil sloshes from side to side so a little extra capacity helps to protect the internal components. Taka recommends filling about 2 quarts of gear oil on a drift car.



61

Our axles were installed next. When doing this, be sure to support the axle during installation to avoid damaging the seal.



62

Also make sure that the axle is fully seated before you tighten the retaining nuts.



BREAK-IN PROCEDURE

63

Install the brake calipers and rotors, reconnect the driveshaft and double check the drain and the fill plugs. Lower the car and get ready for some figure eights.



64

When Taka asked for a volunteer to do figure eights, Robbie volunteered with haste. While Robbie thought he'd be drifting in figure eights, Taka meant driving the car in figure eights at a low speed for 20 minutes. So we sent Junior off to break the LSD in. This is not exactly fun as you start getting dizzy after about 10 minutes. By the 15 minute mark, you will want to puke. If you make it past that, you're probably home free.



65

Junior is more of a wise-ass than he is wise. At least he's a good sport.



66

After the break-in procedure, it was already time to change out the fluid. We grabbed some 75W-90 Royal Purple gear oil for the job: this is good stuff and compatible with our clutch type 2-way LSD. Happy Drifting!





WORDS / GARY NARUSAWA

SNAPS / ROBBIE PEREZ

Difficulty: 2.5 out of 5

Install Time: 3 hours

Tools Needed: Ratchet, metric sockets and combination wrenches, flat-head and Phillips screwdriver, pliers, drill, drill bits, MAP or propane torch, hacksaw or suitable metal cutting tool, welder (or a visit to your local muffler shop).

Parts List

	MSRP	STREET PRICE
Universal Battery Tray	N/A	\$5
Universal Battery Box	N/A	\$12
Universal Battery "J" Bolt Kit	N/A	\$2
Universal Battery Terminal (positive side)	N/A	\$4
Universal Ground Cable (w/terminal)	N/A	\$7
Used 2 gauge battery cable (for positive side)	Freebie	Freebie
TOTAL	N/A	\$30

BATTERY RELOCATION

MOVING THE BATTERY TO THE REAR

Relocating your battery to the rear of the car is a simple modification that offers several benefits such as improved front-to-rear weight distribution, a cleaner look in the engine bay and extra room to run intercooler piping on a turbocharged application. From a handling perspective, relocating the battery can actually change the front-to-rear weight distribution by approximately 1-2 percent. This is because you are not only removing weight from the front of the car, but you are adding weight to the rear. This modification does however come at the cost of added weight from a longer battery cable as well as a loss of space in the cargo area. If you've got extra money, these drawbacks can be countered

through the use of a smaller racing battery offered by companies such as Odyssey, Braille and the like.

By the time we got around to relocating the battery on our AE86, we were pretty much out of funds. While there are nice relocation kits, fancy terminal/distribution blocks and lightweight batteries available, we didn't have a choice but to do things on the cheap. Giving our old battery a bath was our idea of a "new battery". An old cable in DriftPro's garage and a couple trips to Pep Boys made up for a fancy relocation kit. And a bolt, a nut and some good old electrical tape made up for our lack of a decent terminal/distribution block. We're not saying this is the "correct" way to do things...but it got the job done.



01 The first step to relocating your battery is finding a suitable location to relocate it to. We chose the right rear corner of the car. In many cases, you can simply drill a few holes to mount the battery box/tray down, but our Corolla had part of the frame rail and the gas tank in the way. Whatever you do, be sure to peek under the car before poking any holes. Our solution was to weld a couple mounting brackets to the floorboard. Before we could do so, we had to remove the sound deadening material from the area to be welded. It was a cold night, so a few taps with an air chisel did the job. On a hot day, we recommend starting with a layer of dry ice over the top to make the sound deadening material nice and brittle.



02 Once we got down to the sheet metal, we cut a couple rectangular blocks out of T-square steel tubing.



03 Using our battery tray as a template, we drilled a couple holes in each piece of tubing, each large enough to fit a nut.



04 Once welded into place, the nuts gave us threaded holes for bolting down the battery tray.



05 Next, we prepped the area on the floorboard to be welded. It's important to get down to the bare metal before doing any welding.



06 Using a MIG welder, we secured the brackets with a few beads.



07 To prevent rust, we sprayed a little paint out of a rattle can.



08 We then test-fitted the battery tray. Although it's tempting to bolt down a battery box without a tray, most boxes are constructed out of very thin plastic which will break during hard cornering or an accident. The last thing you want to see during a roll-over is your battery flying across the cabin.



09 To keep things looking orderly, we trimmed the carpet to fit around the mounting brackets.



10 Don't be lazy by not cutting out the backing material.

11

Look how nicely our carpet fit around the brackets.



12

Again, we mounted the battery tray. Note how we used large "fender" washers to make sure the bolts won't slip through the mounting holes.



13

Next we mounted the battery box. Figuring out a proper design took a little time. Our first thought was to mount the "J" bolts on the outside of the box. After realizing that this would require a lot of trimming and possibly cause issues with the lid closing properly, Robbie came up with the idea to mount them from inside the box. Wow, Junior is actually capable of thinking outside the box! He even impressed Taka with his idea. To see if the plan would work, we drilled a hole at the bottom of each side of the box and positioned the "J" bolts.



14

Next we dropped the battery box inside the tray and slid the "J" bolts into place. Wow, Junior's plan was coming together!!



15

All we had to do now was trim down the length of the "J" bolts.

16

To get a clean cut on the threads, we stuck the sucker into a vise, double-nutted it and hacked away with a hacksaw.



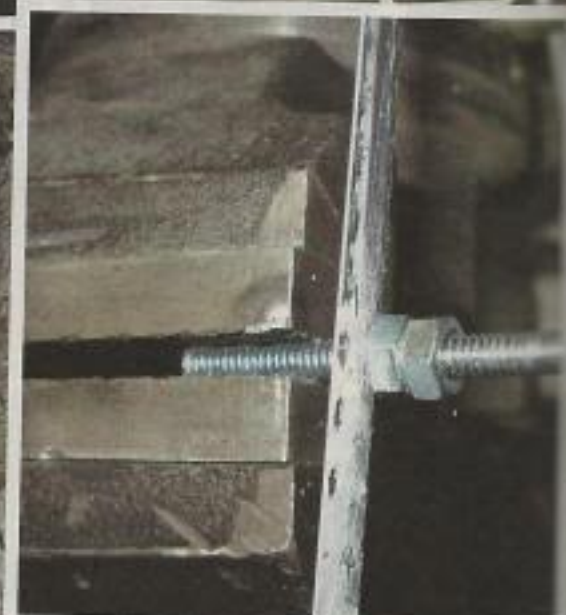
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Robbie was quite proud of his design as he made sure to wash the battery before presenting it to the world.



18

All that was left was to make a bracket to go across the top of the battery. We found a small piece of square tubing which was up for the task. After measuring things out, we marked the holes with a center punch.



19

Two holes were then drilled through the tubing.

20

A fresh coat of paint and voila!



21

To make sure the battery doesn't come loose, we used nylock nuts to hold everything in place.





22 Now all that remained was our battery connections. We found a long piece of 2 gauge wire which we could use for the positive cable.



23 Starting at the front of the car, we connected our positive leads.



24 Not having a large enough piece of heat shrink tubing, we wrapped the exposed terminal with electrical tape. It should work for now, but we'll redo this connection later when we have more time.



25 The cable was then routed through the interior of the car. When doing so, make sure that the wire is not rubbing against any sharp edges. In time, a sharp edge can wear through the insulation on the wire and cause very bad things to happen.



26 Here's Taka's method of securely installing a ring terminal onto a 2 gauge wire. Start by stripping back the insulation and make sure the ring terminal slides smoothly over the end of the wire.



27 Now heat the terminal and the wire with a torch. Although not pictured, Taka's next step is to melt solder inside the terminal and quickly join the two parts together. Keep in mind that the parts will be extremely hot, so don't touch any of the parts with your bare hands.



28 When done properly, the solder will fuse the terminal to the wire for an ultra reliable connection. After the parts had cooled, Taka did his patented pull test on the connection.



29 Using a generic battery terminal sourced from a local parts house, we completed the connection to the battery.

30 The ground side was much simpler. After locating a decent bolt hole, we sanded the area down to bare metal.



31 We then bolted a ground cable to the threaded hole.



32 Our final step was to attach the ground cable to the negative post on the battery. This step was a no-brainer. Double-check all your connections and you should be good to go.



WORDS / GARY NARUSAWA
SNAPS / ROBBIE PEREZ

Tools Needed: Ratchet, metric sockets, combination wrenches and Phillips screwdriver.

Difficulty: 2 out of 5
Install Time: 20 minutes

BEFORE



AFTER



LED INSTRUMENTATION

UPDATING YOUR INSTRUMENT CLUSTER WITH LED TECHNOLOGY

Taka always has a few tricks up his sleeve. We've done LED upgrades before but never thought to use them in an instrument cluster.

So when Taka suggested this tech article, we were all ears. The great thing about this mod is that it crosses over to many other older cars making it a great universal tech article for our *Project Car Garage* section. Follow along as Taka shows us how to bring an 80's style instrument cluster into the new millennium.

01 These are the little LED suckers that will be replacing your nasty 20 year-old incandescent bulbs. Taka picked them up at a truck stop on the way to one of his long distance drift events. Truckers love upgrading lights, so any truck accessory store should carry them. Ours replace most standard 168/194 bulbs. Check to see what bulb your car uses before dropping any cash.



02 Start by removing your instrument cluster. Check your factory service manual if you need instructions on how to do this. Our cluster was already out of the car from when we were upgrading the wiring to GT-S spec. On the backside of the cluster, locate the bulbs that light up with the parking lights and remove them.

03 Pop the new LED bulbs into the holder and install them into the cluster. Be aware that polarity matters on LED bulbs. You can either trace the circuit board on the back of the cluster to figure things out or use the trial and error method. If you get it backwards, the bulb won't light up. Simply flip it to reverse polarity and retry.



04 If the lens on your cluster looks scratched up like ours, now is a good chance to clean it up.



05 Start by removing the lens. Most will unclip from the cluster housing like ours.



06 The proper stuff to use is a plastic polish compound. They sell this stuff for motorcycle windscreens and Lexan windows. We didn't have any and were too cheap to buy some. Instead, we substituted some ultra fine 3M polishing compound. If you're taking our route, be sure to test on an inconspicuous corner to make sure your compound is safe to use across the front of the lens. Once you're done, plug the cluster back in, double check the lights and reinstall the cluster.

ONE LAST TWEAK >>

FOR SALE:
50% TREAD LEFT