Rush SR Service Manual

Track-side reference (PDF edition)

Rush Auto Works

2026-06-16

Contents

This PDF is generated from the online Rush SR Service Manual at https://manual.rush.sr. It is intended for offline / track-side use; the online manual is the source of truth and is updated more frequently than this PDF.

manual

Generated: 2026-06-16

Getting Started

Welcome to the Rush SR Online Service Manual.

If you own a Rush SR: we hope our car will bring you years of enjoyment, help you develop your on-track skills, and bring you many wins in wheel-to-wheel competition. This manual has been written to help you get from the trailer to the track as quickly as possible.

If you're just looking, feel free, and check out the online specs and configurator for more information.


RAW

The RUSH SR is a purpose-built race car that you will run hard on track. To ensure you get reliable on track performance, it is necessary that the car be maintained.


RAW

The maintenance requirements are not excessive: a couple of hours prepping the car before each event is all that's required. If you are handy with a wrench, then the maintenance requirements are well within the capabilities of most track day and racing enthusiasts. If you consider yourself mechanically challenged, or just prefer not to do the work yourself, we encourage you to get with a mechanic with race experience that can help get you going, and assist with your maintenance between events.

> **Note: Want a copy track-side?** Download the latest PDF edition — the full manual in a single file, rebuilt automatically whenever this site changes. The online manual is still the source of truth; the PDF is for offline use in the paddock.


rush.sr

Where to start

- **At the track and need something fast?** Go to the Paddock Quick Reference[p16] — torque specs, fluids, dash alarms, shift debugging, and the latest service bulletins, all one click away.
- **New owner, just took delivery?** Read Warnings Before First Drive[p11], then Break-in and Initial Setup[p12] before turning a wheel.
- **Prepping for an event?** Walk the Each Weekend[p35] checklist, confirm Fluids[p50] and Torque Specs[p52], and skim the latest Service Bulletins[p97] for anything that affects your car.
- **Chasing lap time or fixing a handling issue?** Start with the Factory Baseline Setup Guide[p76], then dial in Shock Adjustments[p78], Alignment and Ride Height[p80], and Gear Ratios[p79].
- **Diagnosing an electrical or shift problem?** Begin at Shift Debugging — Where to Start[p62], then cross-reference the Main Harness[p54] and Shift Harness[p54] pinouts.
- **Considering buying a Rush SR?** See Running and Consumables Costs[p91], Parts and Repair Costs[p94], and the Comparison to Other Cars[p92].

Rush SR Specs

ENGINE:

- Sealed RUSH S-1000 1000cc inline four
- 149 WHP with 11,800 rpm rev limit
- RAW ECU with FT RAW flash
- SS Headers with x-over and dual silencers

TRANSMISSION:

- 6-speed pneumatic shift system with no-lift shifts & auto-blip – no clutch needed while driving
- RUSH final drive with adjustable LSD
- Adjustable final drive ratios to suit track configuration

SUSPENSION:

- Fully adjustable RAW suspension system with front and rear unequal length A-arms
- Billet aluminum uprights with adjustable camber and toe
- Adjustable sway bars front and rear
- Two-way adjustable RUSH Shock with adjustable spring rates

WHEELS:

- RAW 13″ x 7″ Front & 13″ x 8.5″ Rear Aluminum Race Wheels, Black Finished
- Fitted w/ Nankang AR-1 tires, 185/60R13 Front and 205/60R13 Rear

DIMENSIONS AND WEIGHT:

- Length: 3325mm / 130.9″
- Wheelbase: 1900mm / 75”
- Width: 1500mm / 59″
- Height: 990mm / 38.9″
- Weight: 508kg / 1120lbs

CHASSIS:

- TIG Welded primary space frame structure. 1½” SQR Section 4130 primary tubing with Ducol R8 1¼” Round Cross Bracing
- Dual 1¾” Ducol R8 primary rollbar system
- Composite Tegris anti-intrusion panels
- Front Aluminum crash box and rear crash structure
- 6-Gallon Belasolution kevlar fuel cell inside a cockpit-mounted aluminum enclosure

BODY:

- FRP Body panels, underfloor and rear diffuser
- Front and rear quick connect multi-piece clam shells with aerocatch primary attachment

BRAKES:

- RUSH 4-piston Billet calipers front and rear, clamping 274 x 25mm floating 26-vane disk brakes
- Dash-mounted brake bias adjustment

Interested in the Rush SR? View full pricing, build options, and available configurations or build and price your Rush SR.

RAW

RAW

Why the GSXS-1000?

The Rush SR uses a drive-by-wire 1.0 liter motor from the 2022+ GSXS-1000, which produces just over 150whp. There are several reasons that we selected this engine for use in the RUSH SR over other engines that have typically been used for bike-engine cars (BECs).

Long-Term Engine Parity

In any spec series, parity between engines are a critical issue. Keeping the power output of all engines within a few horsepower of each other is **essential** if a series is to be widely accepted as a true spec series.

While the GSXR engines (and select others on the market) produce more power, these engines are used in motorcycle race applications and go through a redesign every 3-4 years. This would make long-term parity difficult to maintain.

The GSXS engine was developed in 2017 for the street bike. Suzuki have stated that this engine will be used for at least 10 years. The GSXS is a refresh of one of their best engines ever built: the K-5 / K-6, which was used in the 2005 and 2006 GSXR motorcycles.

Engine Reliability

Many people have asked why we did not go with the GSXR. After all, in stock form, it makes 204hp at the wheel.

There are many reasons! We think that 200hp in the very light Rush SR would require a very different skill-level of driver than the mass market it is trying to reach. Significantly more aero and wider tires would be required to make it drivable. The GSXR engine also hits the rev limiter at 15,400rpm instead of the 11,400 of the GSXS, so engine wear is greatly increased when used in the powerband constantly.

This translates directly to rebuild costs. GSXR-powered cars need rebuilds every 40-80 hours, and cost $10,000-$15,000 to rebuild. Conversely, the GSXS-1000 as used in the Rush SR requires a rebuild every 160+ hours, and costs approximately $3,500 to rebuild.

Engine Oil System & Cost Considerations

The GSXR and most engines people fit to BECs are motorcycle race engines! They are designed to be ridden at high angles of inclination. To keep the bike fast, they want the CG as low as possible. When the bike is at an angle, the forces on the bike are pushing the oil into the sump. This means manufacturers can use a small and shallow sump, which allows them to get the engine as low as possible in the frame. The GSXS, however, is a street bike. Although it banks in the corners, it is driven at a far milder angle than the race bikes.

Subsequently, the manufacturers raise the engine and use a larger, deeper oil sump. This is very beneficial to us, as most people who are familiar with BEC's know that oil starvation can be an issue. Indeed, if we used a GSXR engine, it would be necessary to add a dry sump system, which would add nearly $10,000 to the build cost. This is why most GSXR-powered cars are at least $90,000!

The sump on the GSXS engine is almost 3 times deeper, 3 times the length, and has a steep sidewall. This prevents the oil from moving out of the sump when the engine is in a constant horizontal position and is subject to high lateral loads. Our testing has confirmed this, and we have had no oil starvation scenarios observed during skidpad testing or in series racing.

Pictured are the sump diagrams of the GSXR (left) and GSXS (right) engines, and the difference in the size and shape of the sump can be clearly seen.

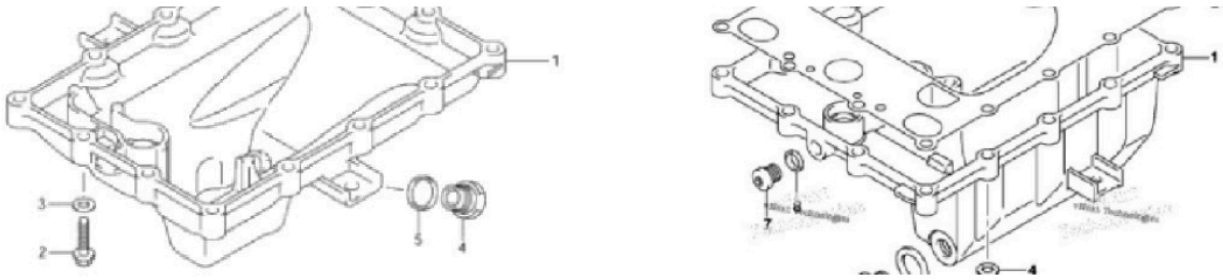
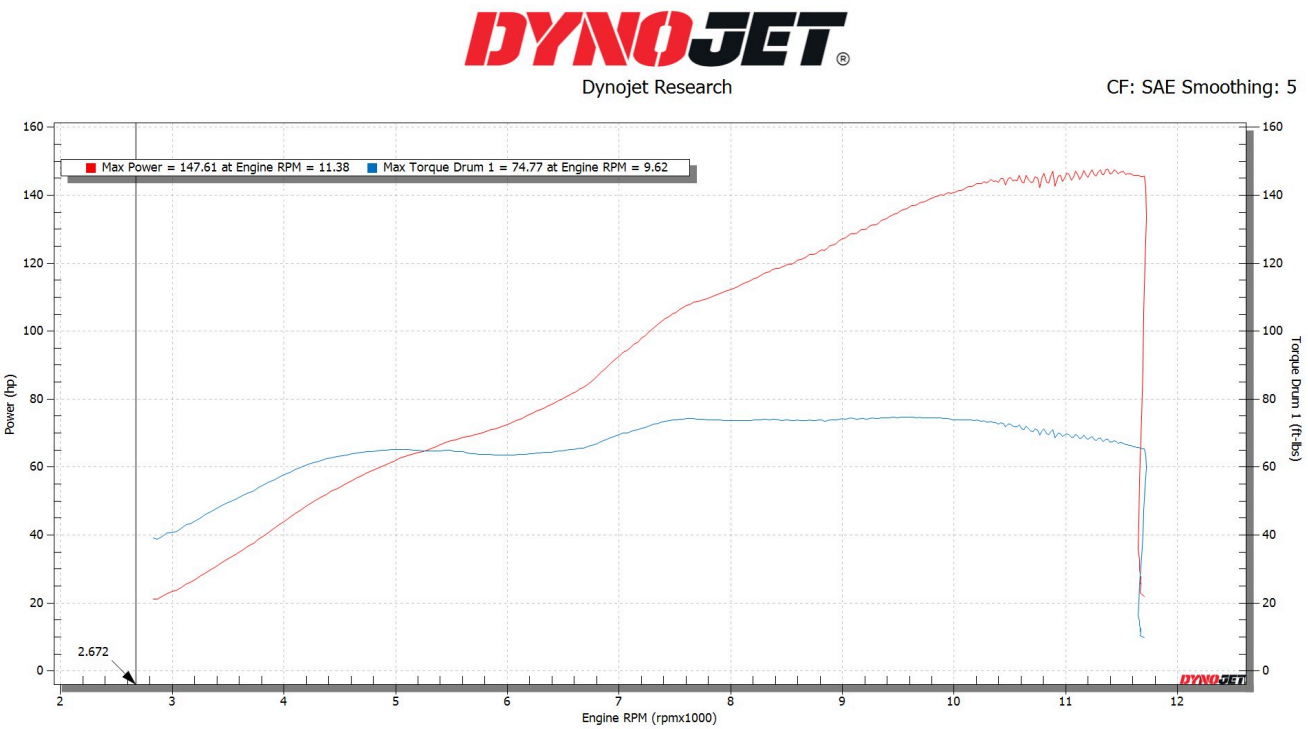


Figure 1: Oil Pans: GSXR (left), GSXS (right)

Dyno Sheet

The following is a dyno sheet showing **wheel horsepower** from a customer-owned Rush SR.



Warnings Before First Drive

The RUSH SR race car is a high-performance vehicle designed for track use only. Its proper maintenance and operation are critical for your safety. Improper maintenance, use, high performance events or competitive racing in general, can result in major injury or even death. Never drive the RUSH SR beyond your ability, and beware of other vehicles on track at all times.

During the winter, the SR may be shipped to you without any coolant. We do not use Glycol-based coolants, as they present a major safety issue if spilled on track. Only use water with water wetter. Fluids should be checked[p50] before each startup of the car. Never remove the radiator cap while the system is hot!

water

It is NOT recommended to ever engage gear on the car with the body work removed as there are unprotected moving components such as the chain and driveline that could cause severe harm or injury.

Never operate the RUSH SR without the seatbelts securely fastened and with the driver wearing appropriate safety gear. Full FIA / SFI fire rated safety gear is recommended at all times, together with a full-face race-approved helmet.

Safety System Requirements

Fire Suppression System: Inspect the fire suppression gauge before every event. The gauge must be in the GREEN zone before going on track. Ensure all nozzles are aimed properly and the fire pin is installed. The system must be professionally certified every 2 years.

Driver Harness: The driver harness must be replaced every 5 years regardless of apparent condition. Inspect before every session for frays, cuts, or damage. Never use a harness with broken or missing buckle pins.

Fuel Cell: The fuel cell must be replaced every 5 years. Inspect foam baffling regularly for deterioration. Dual fuel tank cars must have only ONE check valve installed — never both.

Danger: Mandatory Before Every Session: ALL tools, rags, and trays must be removed from the car before going on track. A single forgotten rag can cause a fire.

Break-in and Initial Setup

The following pages document the setup and break-in of your car. If you haven't already taken off the front and rear clip, see Removing Bodywork[p32].

The setup is as follows:

1. Seat Mounting[p12]
2. Pedal Box Placement[p12]
3. Engine Break-in[p13] and Brake Pad Bedding[p12]

Seat Mounting

We prefer that customers visit our factory at time of completion of their car. This allows us to ensure that the seat is mounted where the driver is comfortable and that the seat and pedals are positioned where they will best suit the owner.

Where a customer cannot visit our factory for seat fitment, we do not mount the seat. Our reason for this is we simply cannot guess where you will want it and will end up drilling holes where you didn't want them.

The car is shipped with the pedals mounted full forward. Don't worry about them until you have the seat mounted. It's important to get your seat placed where you are in a comfortable driving position first, and then adjust the pedals where you want them.

Click for a video on mounting the seat:

Download: Rush SR Seat Mount 720.mp4

MP4

Please ensure that once you have the lower mounts in place, that you install the seat back mounts to support the seat back. A subsequent video shows this process:

Download: Rush SR Seat Back Mount.mp4

MP4

Pedal Box Placement

The pedal box is mounted to the floor with four bolts. Removing the nuts from under the car will allow placement of the pedal box where you want it. The gold-colored foot plate will have to be removed to get access from the top. If it's necessary to move the pedal box further back than the mounting holes provide, then additional holes can be drilled in the mounting rails.

If moving the pedal box forward significantly for shorter drivers, it is required to cut slots in the foot plate to clear the steering rack mounting pedestals.

Bedding Brakes

It is very important to bed your brakes properly. The Rush SR is a very light car, but improper transfer of pad material to the rotors will lead to a very "wooden" brake feel and an inability to lock the tires under any pressure.

Note that the Rush SR does not have power brakes or ABS (like a Formula car!), so you will need to apply much more pressure than you are used to from a GT car. Don't worry, you'll get used to it, and start to appreciate the fine control your foot can do with manual braking.

With a new car, or new pads/rotors, the following procedure should be followed, and can be followed simultaneously with an engine break-in[p13]. It is useful to have a mostly empty track - do not slam on the brakes with people behind you!

1. Take the car out for an approx. 25 minute session.
2. During this session, go slow, and use the brakes as little as possible in the corners. Slowly build temperature in the brakes by using them in the straights, then let them cool.
3. Continue to increase brake pressure until you're at about 90% pressure. At this point, you should be about 15-20 minutes in. If you start to feel the brakes "going off", you're done with this step.
4. Now cool off your brakes. Do 1-2 laps with minimal braking, then head into the pits.
5. Once in the pits, DO NOT use the brakes to the extent possible, and let them cool completely (~45min). Do not press them when the car is stationary as you risk depositing extraneous pad material.

Owners have also found this Section 111 article handy.

Section

Engine Break-in

Before you set a new track record... think about that brand new engine. Be kind to it, and it will be kind to you and your wallet!

The engine should be given three break-in sessions of approximately 15-20 minutes:

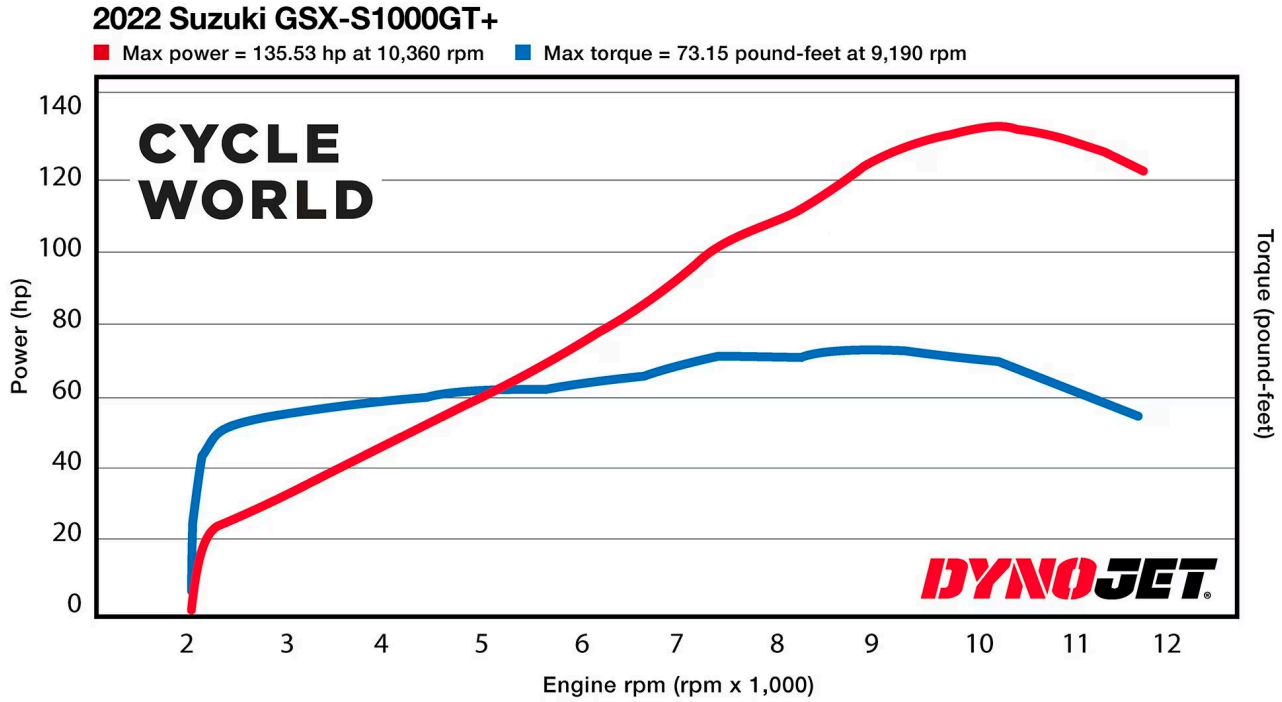
1. Keeping RPM below 7,500 and moderate throttle.
    1. You should use this opportunity to also bed your brakes[p12].
2. Keeping RPM below 10,500 and full throttle.
3. First half session (~10min) below 10,500rpm, then allowing full rev out all the way to the limiter.

The engine should be allowed to cool after each session.

This also give you a chance to get broken into the car. Fluids should be checked after each session, and **you must torque-check the wheels**[p34] **before every session!**

Following these three sessions, you are good to go. The car is very balanced but will bite back if you horse it around. Find your limits slowly and work into the car. It likes to be balanced in the corners: deep trail braking and yanking your foot off the brake at mid corner, will not give you the results you want. Apply brake pressure quickly, but roll it off smoothly.

Learning to use the shift lights will take some time too. <ost people are tuned into changing gear by 7,000 rpm. If you short-shift, you are not even in the powerband.



Understanding Your Dash

The dash panel is equipped with the following controls, from left to right:

- Master switch with red safety cover
- Starter button
- Run switch
- Fuel pump switch
- Steering wheel controls:
  - Paddle shift controls
  - Black N-Sel button
  - Red PTT Button
- AiM dash / data logger
- Auxiliary switch
- Rain light strobe switch
- DRL strobe / running lights 3 position switch
- Mechanical brake bias control

Controls in Depth

Master Switch - With the cover pushed down all power to the car is disconnected. Lift the cover and raise the master switch to power the car up. The shift system air compressor will be heard running, and it is common to hear the secondary throttle plates perform their power on calibration. The Aim dash will also power on and will show gear position.

Starter Button – With the master switch on, and the run and fuel switches on (all in the upward position) the engine can be started when in Neutral. The engine must be in Neutral to be started. It will not start if in gear, even with the clutch pedal depressed. Start the engine by momentarily pressing the starter button. It is not necessary to hold the button, as the ECU will run the starter for 5 seconds or until the engine starts.

Run Switch – The run switch must be moved to the upward position to start the car. Moving the run switch downward will kill the engine, but the electronics will remain on.

Fuel Pump Switch – The fuel pump switch must be in the upward position to start the car. The fuel pump switch allows the fuel pump to be switched off in the event of a fuel leak. Moving the fuel pump switch downward will kill the engine.

Paddle Shift Controls – The paddle shift controls are positioned behind the steering wheel rim. They are operated by lightly pulling the paddle rearward toward the wheel. The left-hand paddle is used to effect a down shift. The right-hand paddle is used to effect an upshift.

Black N-sel Button – The black neutral select button is provided to allow selection of Neural while operating the gearbox via the paddle shift controls. The gearbox is a sequential six speed gearbox, with Neutral positioned between first and second gears. The black Nsel button tells the GCU you are trying to select Neutral. When pressed, the shift paddle commands the GCU to make only a half shift, up or down respectfully.

> **Note:** To shift into Neutral, half-shift up from 1st (N-sel + right paddle), or half-shift down from 2nd (N-sel + left paddle).

Red PTT Button – The red Push to Talk button is provided should you wish to use a communication radio. The wires are connected through the wheel jumper cable to the wiring harness. A black and white wire can be found in the left-hand wiring harness and are not connected to anything. These wires can be connected to your radio harness to allow control of the PTT function.

AiM Dash Logger – Your dash logger has been set up at the factory with our basic setup. Alarms have been set for Water Temperature and Oil Pressure. If you see warning lights coming on while on track, assess the situation and either pull off and shut down, or slow down and exist that track immediately, then shut down.

The primary page of your dash logger will display your basic engine data and lap time. The Top LEDS have been set up as shift lights. Page 2 of your Aim Dash setup will show front and rear brake pressures. ALWAYS check your brake pressures and balance before entering the racetrack.

Auxiliary Switch – The auxiliary switch is not connected, it is provided as a spare for owner-installed options.

Rain Light Strobe Switch – The rain light strobe switch controls the rear center positioned red led strobe to provide better visibility for approaching vehicles in wet conditions.

DRL Strobe / Running Lights 3 position switch – The DRL strobe / running lights 3 position switch is off when in the center position.

In the upward position, the front DRL's are switched on in the strobe manner to provide additional visibility to cars ahead of you, so that they have a better chance of seeing you approaching from behind.

When moved to the lower position, this switch turns on the front DRL's continuously, and also activates the outward rear red led lights at half brightness. This can be useful in darker overcast conditions. These are NOT night driving lights. In this position, the rear brake lights are still active at full brightness under braking.

Mechanical Brake Bias Control – The mechanical brake bias control allows you to adjust the brake Bias balance front to rear. CAUTION It can also set you perfectly to spin the car when you mess with it and get it wrong!

Page 2 of your AIM dash / logger will show you the pressure you generate when pressing the brake pedal for both the front and rear brakes. Typically, you want this set 60-55% to the front, 40-45% to the rear. Do not turn the bias adjuster while pressing the brake pedal.

Turn the bias adjuster to the left formore front brake. Turn it to the right (clockwise) for more rear brake. "Right = Rear Brake"!

> **Note:** ALWAYS Check your brake balance before entering the track, kids love to turn knobs!

Paddock Quick Reference

The pages a tech or driver hits most when the car is at the track. Links land on specific sections where possible.

> **Note: Offline / no signal in the paddock?** Download the latest PDF edition of the manual before you head to the track.

rush.sr

By page

- Dash Alarms[p24] — what each alarm means and what to do
- Shift Debugging — Where to Start[p62] — GCU + shift system triage index
- Shift Debugging — Can’t Find Neutral[p66]
- Shift Debugging — Compressor runs continuously[p69]
- Torque Specs[p52] — fasteners, by component
- Fluids[p50] — types, capacities, intervals
- Service Bulletins[p97] — latest TSBs, newest first
- Main Harness Pinout[p54]
- Shift Harness Pinout[p54]
- Driving and Shifting[p19] — operation and shift protocol
- Driving and Shifting — 2→1 False Neutral[p20]
- Check Driver[p20] — before blaming the car

By symptom

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Actuator rod	Actuator Rod Length and Cylinder Alignment[p69]
Air leak	Finding an air leak[p71]
Asymmetric shifts	Asymmetric Shifts: One Direction Weaker[p68] · Shifter Cylinder Alignment[p58]
Bench test	Manual Pneumatic Shift Test[p64]
Bisect fault	Manual Pneumatic Shift Test[p64]
Blaming the car	Check Driver[p20]
Blip cylinder	Blip Cylinder Air Supply (Gen1 cable throttle)[p72]
Bogged corner exit	1st Gear and the 2→1 False Neutral[p20]
Brake light failure	Brake-light pressure sensor[p43]
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Cable throttle	Blip Cylinder Air Supply (Gen1 cable throttle)[p72]
Can’t find neutral	Can’t Find Neutral with the Engine Running[p66]
Check clutch switch	Clutch Switch[p26]
Check oil fill	Oil System Health (RPM-Based)[p25]
Check oil pump	Oil System Health (RPM-Based)[p25]
Clutch switch	Clutch Switch (Gen2 DBW)[p71]

Symptom	See
Compressor running constantly	Compressor Issues[p69]
Compressor short cycling	Compressor Issues[p69]
Compressor won’t run	Compressor Issues[p69]
Cylinder alignment	Actuator Rod Length and Cylinder Alignment[p69]
Cylinder misaligned	Shifter Cylinder Alignment[p58]
Dead paddles	Nothing Works: No Shifts, No Compressor[p65]
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Erratic shifts	GCU Water Intrusion[p65]
GCU dead	Nothing Works: No Shifts, No Compressor[p65]
GCU water	GCU Water Intrusion[p65]
Gearshift sensor mimic	Gearshift Sensor Mimic (Gen2 DBW)[p71]
Gen1	Blip Cylinder Air Supply (Gen1 cable throttle)[p72]
Gen2	Clutch Switch (Gen2 DBW)[p71] · Gearshift Sensor Mimic (Gen2 DBW)[p71] · Speed Emulator (Gen2 DBW)[p71]
Gss mimic	Gearshift Sensor Mimic (Gen2 DBW)[p71]
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Hiss after shift	Asymmetric Shifts: One Direction Weaker[p68]
Hissing tank	Finding an air leak[p71]
Intermittent shifts	Missed or Incomplete Shifts (Both Directions)[p69]
Limp mode	Clutch Switch (Gen2 DBW)[p71] · Speed Emulator (Gen2 DBW)[p71]
Low OilP ratio	Oil System Health (RPM-Based)[p25]
Low oil pressure	Oil Pressure[p25]
Manual shift	Manual Pneumatic Shift Test[p64]
Mechanical binding	Shift Arm[p68]
Missed shifts	Missed or Incomplete Shifts (Both Directions)[p69]
Muffled shift	Asymmetric Shifts: One Direction Weaker[p68]
Neutral but no crank	Car Won’t Start — Dash Shows N but Engine Won’t Crank[p66]
Neutral with engine on	Can’t Find Neutral with the Engine Running[p66]
No blip	Blip Cylinder Air Supply (Gen1 cable throttle)[p72] · Clutch Switch (Gen2 DBW)[p71] · Gearshift Sensor Mimic (Gen2 DBW)[p71]
No compressor	Nothing Works: No Shifts, No Compressor[p65]
No crank	Car Won’t Start — Dash Shows N but Engine Won’t Crank[p66]
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No shifts	Nothing Works: No Shifts, No Compressor[p65]
Not fast enough	Check Driver[p20]
OilP sender failed	Oil System Health (RPM-Based)[p25]
One direction dead	One Paddle Direction Doesn’t Respond[p66]
Overheating	Water Temperature[p25]
Paddle dead	One Paddle Direction Doesn’t Respond[p66]
Pneumatic test	Manual Pneumatic Shift Test[p64]
Rev limited in neutral	1st Gear and the 2→1 False Neutral[p20]
Shift arm	Shift Arm[p68]
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Stuck clutch switch	Clutch Switch[p26]
Stuck in neutral on downshift	1st Gear and the 2→1 False Neutral[p20]
Throttle capped	Speed Emulator (Gen2 DBW)[p71]
Very high oil pressure	Oil Pressure[p25]

Symptom	See
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Water intrusion	GCU Water Intrusion[p65]
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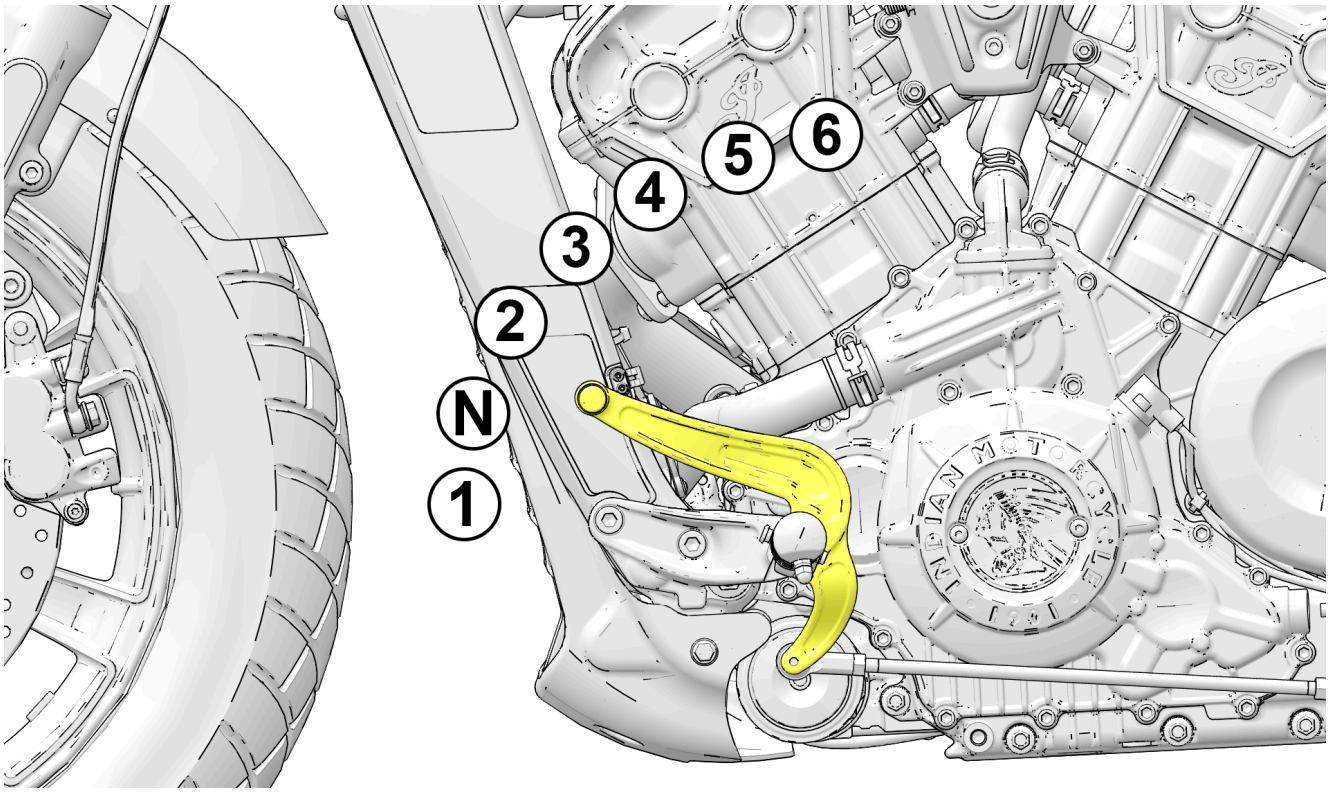
Won’t start	Car Won’t Start — Dash Shows N but Engine Won’t Crank[p66]

At the Track

Driving and Shifting

Driving the RUSH SR is very simple. It's doing it fast that's going to take you a bit of practice! The clutch is only used to engage 1st gear to get going, and again when you come to a stop. You will be starting in Neutral so depress the clutch and use the left-hand paddle to shift down to first.

Remember, **neutral is between first and second** on a motorcycle transmission! Your selected gear is always visible on the dash.



> **Note:** The clutch is pretty fierce so you're going to stall unless you give it considerable revs. Go to 3,000-3,500 then gently find the bite point to get the car rolling.

During demos we get someone to give the car a push, since most people will just stall the car. If you stall, press the clutch, press the NSel button, and upshift to neutral to allow the car to be restarted.

The car does not have a reverse gear. Plan accordingly.

Shifting

The Rush Auto Works GCU takes care of shifting for you, complete with blipping the throttle on downshifts, and cutting it on upshifts, so you don't need the clutch during normal driving.

The GCU takes care of determining the correct pressure to place on the shift lever and the amount of time to cut or blip throttle. You don't need to hold the paddle for a specific amount of time, just depress it fully and it will shift. The car will only shift once each time a paddle is pressed.

Upshifts (increasing gear) can be made with the right-hand paddle. Upshifts must be made under power, and if you lift off, it typically won't work. The GCU will automatically cut throttle for you to unload the transmission and ensure a smooth clutchless shift.

Downshifts should be made with the left-hand paddle while **off** the gas. If you're on the gas it won't work. The GCU will automatically blip the throttle for you, so you can downshift while on the brakes, without the clutch!

> **Note:** DO NOT try operating the gear box through the range of gears (other than to find N and 1st) while stationary, as this can result in damage to the gearbox's shift forks.

1st Gear and the 2→1 False Neutral

Because the Rush SR uses a motorcycle (Suzuki GSX-S1000) transmission, neutral lives **between 1st and 2nd**. Roughly **1% of 2→1 downshifts** will settle in neutral instead of 1st — the dogs slide partway and stop in the half-position. The GCU includes a post-shift retry that catches most of these (see Shift Debugging[p62]), but the underlying mechanical risk doesn't go away.

The problem is compounded by the ECU: the Suzuki donor ECU enforces a **soft rev limit of 6,000 RPM whenever it reads gear = N**. That's stock anti-burnout behavior on the bike side and isn't configurable. So a 2→1 false-neutral is doubly painful — you're in the wrong gear *and* you can't rev out of it. Corner exit gets bogged until the dogs engage.

To get out of a false neutral once you're in one:

1. **Slow down significantly**, or
2. **Pull the clutch** to unload the gearbox so the dogs can engage cleanly into 1st.

> **Warning: Our recommendation:** don't use 1st gear in a race. Gear the car so you never need it. The ~1% failure rate is small, but a bogged corner exit costs more time than the marginal advantage of a lower gear, and competitors behind you don't appreciate the surprise.
>
> If you do downshift to 1st, **brake hard** to scrub speed first and **use the clutch** on the 2→1 shift. Both reduce the load on the gearbox and dramatically lower the false-neutral rate.

Pedals

While in the paddock, perform a few brake checks to make sure you are finding the brake pedal. Wear proper shoes! We had one demo driver with large shoes manage to depress the wrong pedal!

Check Driver

Before you tear the car apart looking for the missing tenths, work the cheaper checks first:

- **Seat time.** Most "the car is slow" problems are solved by more laps. The Rush rewards consistency over heroics.
- **Tire pressures.** Hot pressures off the recommended window cost real time. See Tires[p88].
- **Line and brake points.** Overlay your SmartyCam clip with a quicker driver in the same car at the same track and watch where the deltas accumulate. It is almost never the straights.
- **Send it.** The car has more grip than you think. If your trail-brake is timid and your throttle pickup is early-and-soft, you're leaving most of the lap on the table.
- **Sack up.** That fast corner you've been short-shifting through and lifting for? It's flat. Probably has been all weekend.
- **Honesty.** If you're consistently 2+ seconds off the pace of another driver in an identical car, the car is probably fine.

Once you've ruled the driver out, check dash data and Service Bulletins[p97] before pulling parts.

For shift-system troubleshooting (won't start in neutral, compressor running constantly, manual shift attempts, shifter cylinder alignment), see Shift Debugging[p62] and Shift Harness and GCU[p54].

AiM Dashes and SmartyCams

The best content is on the forums for the AiM dash, data downloads, and using your SmartyCam.

rush.sr

These fantastic products work together as one unit. If ordered with your car, no customization is necessary for good results. However, if you want to start adding more data overlays or learning from your data, you might benefit from the following:

- How-To: Configure Your Smartycam - Throttle, Brake, Overlays and More!
- How-To: Create Custom AiM Dash Layouts
- How-To: Export a lap video from RaceStudio 3
- How-To: Render Video Without a SmartyCam

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See also the section on Dash Alarms[p24], which are managed in RaceStudio 3.

> **Note: Running RaceStudio 3 on a Mac?** The official RS3 software is Windows-only, but the community has built a free one-click macOS installer (Apple Silicon, Wine-backed, no Parallels needed). Download the notarized DMG from github.com/Rush-Auto-Works/aim-racestudio3-mac/releases — drag the `AiM` folder to `/Applications` and launch. First run auto-downloads and configures everything in about 10 minutes.

AiM Config Downloads

Rush Auto Works publishes versioned config releases on GitHub. Download the `.zconf2` file that matches your dash and car type, then import it in RaceStudio 3 under **Configurations → Import**.

GitHub

GitHub

Custom Sensors

If your car has aftermarket sensors (fuel level sender, brake pressure transducers, etc.), you'll need to install the matching sensor definition in RS3 before it can read the channel correctly. Sensor files (`.snsr`) are available in the latest release alongside the config files.

GitHub

Installing a Fuel Level Sender

Rush SRs with the optional fuel level sender use a custom calibration curve.

> **Tip: Already have a 6-gallon tank?** The default Rush configs from the releases page come with the 6-gallon fuel sender already configured on Ch04. If you have your own custom config, use the AiM Config Merge Tool to pull in the sensor definitions without losing your personal settings.

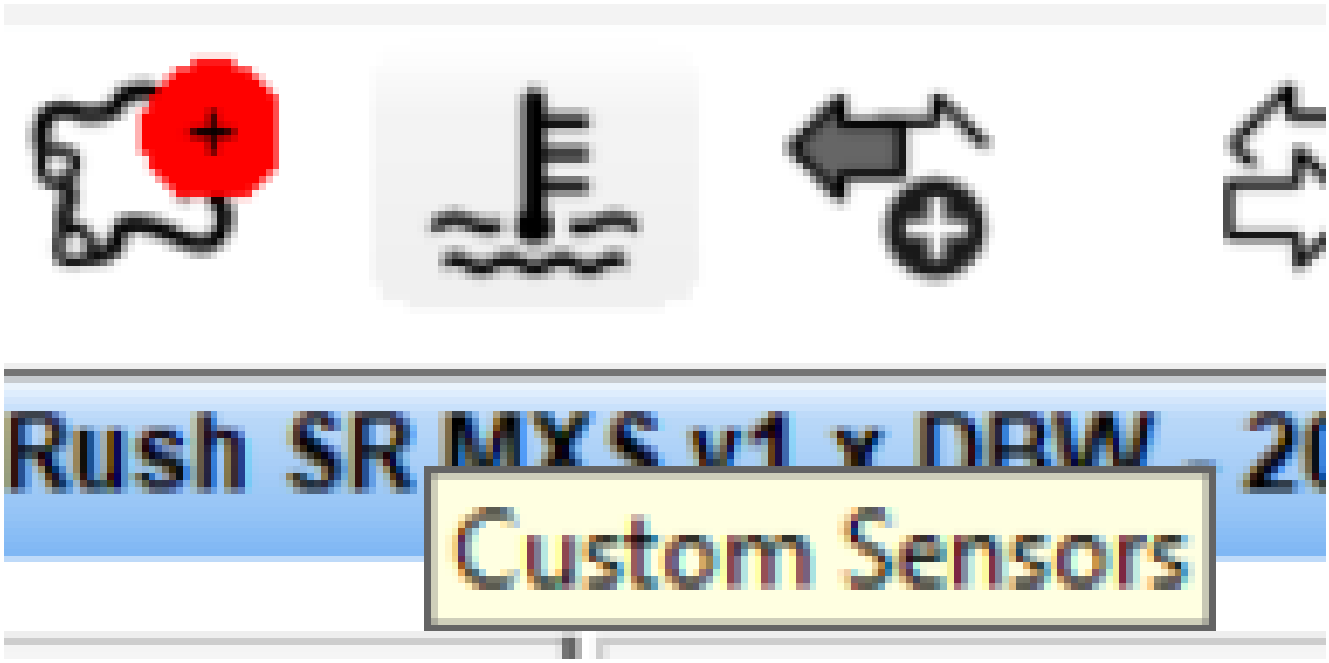
GitHub

If you need to set up a fuel sender manually (e.g., switching to the 12-gallon endurance tank, or starting from a non-Rush config):

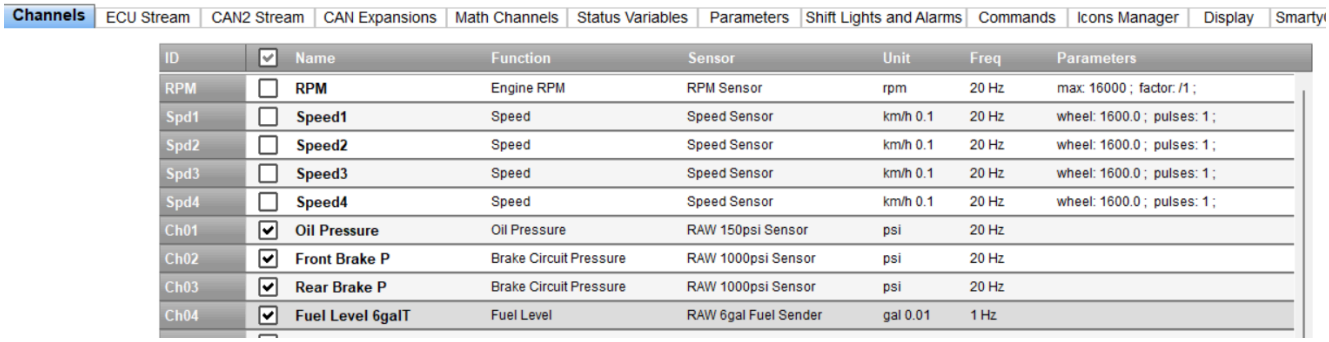
RAW

GitHub

1. Download the appropriate sensor file from the releases page:
   - **6gal fuel level sender.snsr** — for the standard 6-gallon Rush SR tank
   - **12gal fuel level sender.snsr** — for the 12-gallon endurance tank
2. In RaceStudio 3, click the **Custom Sensors** button in the toolbar (the fluid temperature icon shown below), then click **Import** and select the `.snsr` file.



3. Open your configuration and go to the **Channels** tab. Click on **Ch04** (Fuel Level).



ID	Name	Function	Sensor	Unit	Freq	Parameters
RPM	RPM	Engine RPM	RPM Sensor	rpm	20 Hz	max: 16000 ; factor: /1 ;
Spd1	Speed1	Speed	Speed Sensor	km/h 0.1	20 Hz	wheel: 1600.0 ; pulses: 1 ;
Spd2	Speed2	Speed	Speed Sensor	km/h 0.1	20 Hz	wheel: 1600.0 ; pulses: 1 ;
Spd3	Speed3	Speed	Speed Sensor	km/h 0.1	20 Hz	wheel: 1600.0 ; pulses: 1 ;
Spd4	Speed4	Speed	Speed Sensor	km/h 0.1	20 Hz	wheel: 1600.0 ; pulses: 1 ;
Ch01	Oil Pressure	Oil Pressure	RAW 150psi Sensor	psi	20 Hz	
Ch02	Front Brake P	Brake Circuit Pressure	RAW 1000psi Sensor	psi	20 Hz	
Ch03	Rear Brake P	Brake Circuit Pressure	RAW 1000psi Sensor	psi	20 Hz	
Ch04	Fuel Level 6galT	Fuel Level	RAW 6gal Fuel Sender	gal 0.01	1 Hz	

Figure 2: Channels tab showing sensor assignments. Ch04 is the fuel level channel.

4. In the Channel Settings dialog, set **Function** to “Fuel Level” and click the **Sensor** dropdown. Select **Custom**, then choose the Rush fuel sender you imported (e.g., “RAW 6gal Fuel Sender”).

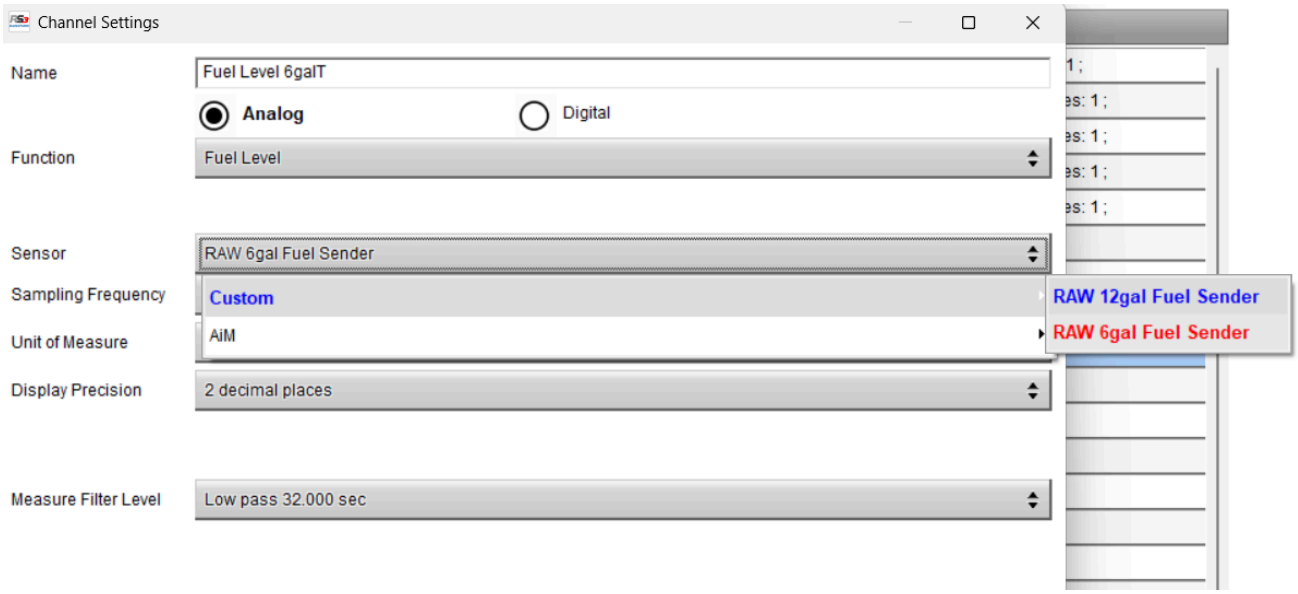


Figure 3: Selecting the custom fuel sender sensor under Custom sensors.

5. Click **Save**, then **Transmit** the configuration to your dash.

Adding Fuel Level to Your Dash Display

Once the fuel sender is configured, you can add it to any dash page:

1. Go to the **Display** tab and click on the dash page you want to edit.
2. Click on a display location where you want the fuel level to appear.
3. In the channel selector, choose **A/D Channels → Fuel Level 6galT**.
4. Click **Save**, then **Transmit**.

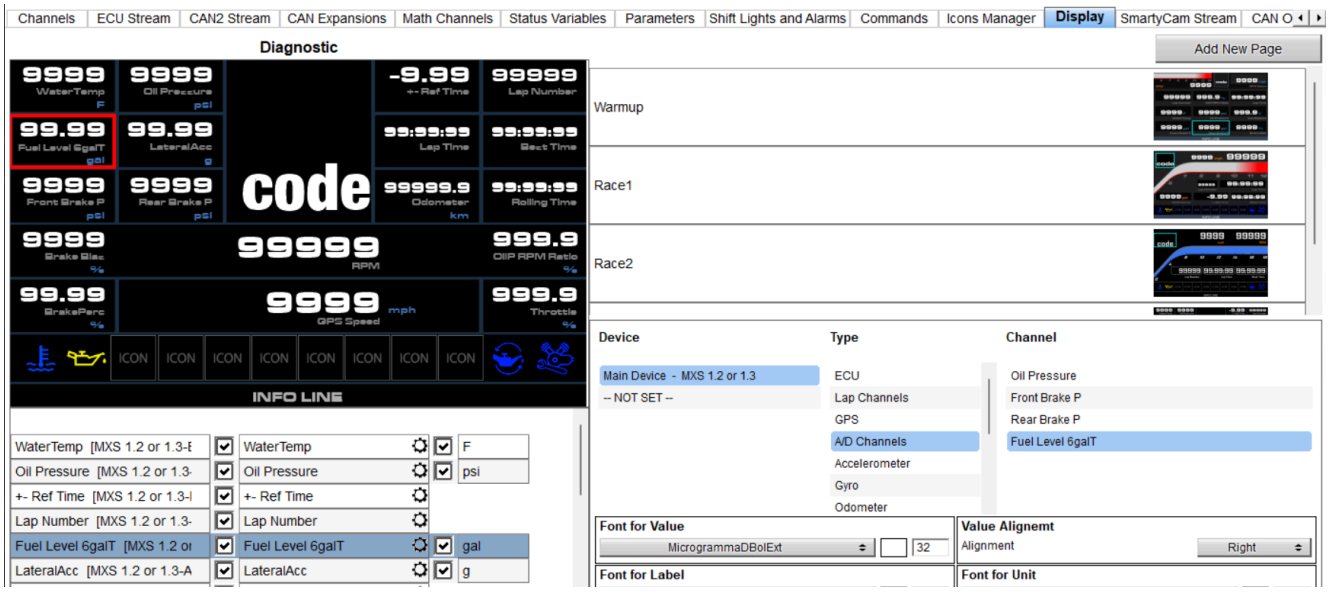


Figure 4: Adding Fuel Level to a dash page. Select the location, then pick Fuel Level 6galT under A/D Channels.

Upgrading MXm to MXS

The MXm and every version of the MXS (1.x and 2) are drop-in interchangeable on the Rush SR. To swap:

1. Disconnect the motorsport connector from the back of the existing dash logger.
2. Unbolt the dash from the panel.
3. Bolt on the new dash logger.
4. Reconnect the motorsport connector.

Warning: The MXS 1.x and MXS 2 use different RaceStudio configurations — make sure you flash the matching `.zconf2` from the AiM Config Downloads[p21] section before driving. Files for both generations are published on the aim-config-releases GitHub releases page.

Note: The connector labels on the MXm and MXS harnesses differ slightly (for example, the SmartyCam input is labeled **CAN EXT** on the MXS harness and **CAN EXT 2** on the MXm harness). Every AiM logger ships with its own harness, so if you're upgrading you'll have a spare — it's worth swapping to the matching harness so future troubleshooting matches what's printed on the connectors. If you bought a replacement MXS without a harness, you don't need to swap.

Warning: The square 4-pin connector on the back of the MXm is **not** cross-compatible with the MXS. The Rush SR stock setup doesn't use this connector, so it's only a concern if you've wired something custom into it.

SmartyCam Compatibility

Both the SmartyCam single (HD) and SmartyCam dual work with either the MXm or any version of the MXS.

The SmartyCam box connects to the dash logger harness with a CAN cable plugged into the **CAN EXT** connector (labeled **CAN EXT 2** on MXm harnesses).

The **dual** SmartyCam additionally needs 12V and ground. Rush's factory install uses a short pigtail that taps 12V from the back of the dash switches and grounds via a ring terminal on one of the bodywork pin plates.

Dash Alarms

Your Rush SR's AiM dash comes pre-configured with the alarms and icons listed below. To update to the latest configuration, download the appropriate file from the AiM Config Releases page and import it into RaceStudio 3.

Text & LED Alarms

These alarms display a text message on screen and/or blink the dash LEDs when triggered.

Oil Pressure

- **Low Oil Pressure** (Oil Pressure < 5 psi): LED 4 blinks orange and message “Low Oil Pressure” is displayed. Come in immediately.
- **High Oil Pressure** (Oil Pressure > 90 psi): LED 6 blinks blue and message “High Oil Pressure” is displayed. This may just indicate cold oil — monitor the situation.
- **Very High Oil Pressure** (Oil Pressure > 120 psi): LED 6 blinks fast red and message “Very High Oil Press” is displayed. This message will not be dismissed until the car is turned off. Come in and check the pressure relief valve.

Water Temperature

- **High Water Temp** (Water Temp > 230°F): LED 5 blinks orange and message “High Water Temp” is displayed. Reduce pace and come in soon.
- **Very High Water Temp** (Water Temp > 238°F): LED 5 blinks fast red and message “Very High Water Temp” is displayed. This message will not be dismissed until the car is turned off. Come in immediately.

Oil System Health (RPM-Based)

These alarms use the **RPM OilP Ratio** channel, which compares oil pressure against what’s expected for the current engine RPM. Since oil pressure naturally scales with RPM, a raw PSI reading alone doesn’t tell the full story — 20 psi at idle is normal, but 20 psi at 8000 RPM would be dangerously low. The ratio channel normalizes this so values above 100% are healthy and values below trigger alarms.

Typical values: 500–700% on a cold start, ~200% heading out for an outlap, 100–150% at operating temperature under load.

- **Check Oil Fill** (RPM OilP Ratio drops during hard cornering): LED 6 lights solid yellow. Oil level is low enough that lateral g-forces are starving the oil pickup. Adding approximately 0.25L of oil generally fixes this. The alarm requires sustained lateral acceleration above 1g combined with low oil pressure ratio, so brief dips during transitions won’t trigger it.

- **Check Oil Pump** (RPM OilP Ratio continuously below 80%): LED 6 lights solid yellow. Oil pressure is consistently low relative to RPM, suggesting a possible oil pump issue. Come in and inspect the oil system.
- **Low OilP** (RPM OilP Ratio below 45%): LED 6 blinks fast red. Oil pressure is critically low for the current RPM. Come in immediately.
- **OilP Sender Failed** (Oil Pressure reading out of range): LED 6 lights solid magenta. The oil pressure sensor appears to be producing bad data (e.g., reading negative pressure). Check the sensor wiring and connections. While this alarm is active, the oil system health alarms above are suppressed to avoid false alerts.

Clutch Switch

- **Check Clutch Switch** (Clutch switch stuck on above 10 mph): LED 1 lights solid magenta and message “Check Clutch Switch” is displayed. The clutch position switch may be stuck or disconnected.

Icons

Oil

- An oil pressure warning icon is shown at low pressures (<10 psi) and high pressures (above 90 psi; dismisses below 60 psi).
- A blue oil pressure icon is shown between 45–60 psi, indicating that the engine is cold.

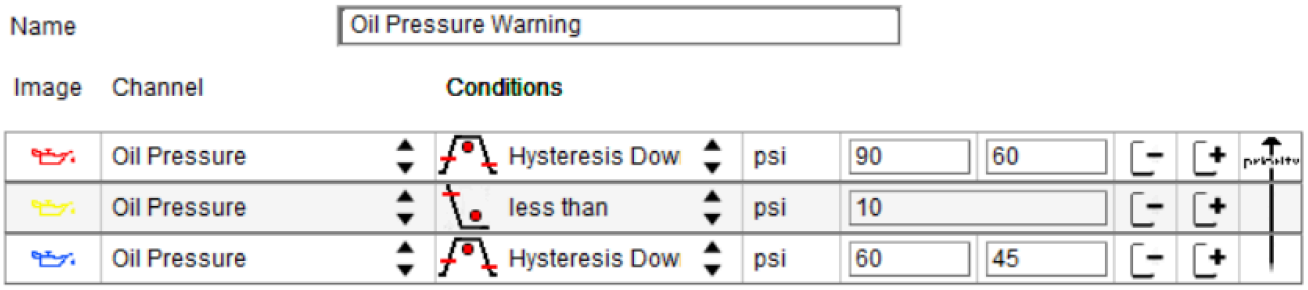


Figure 5: Oil Pressure Warning icon configuration in RS3

Water

- A red water temp icon is shown above 230°F, indicating that there may be a problem with the thermostat or air in the lines. Consider shutting off the engine ASAP.
- A blue water temp icon is shown below 160°F, indicating that the engine is cold.

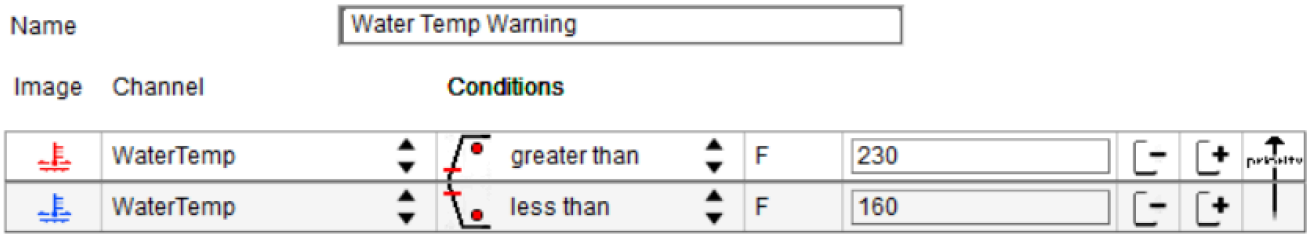


Figure 6: Water Temperature Warning icon configuration in RS3

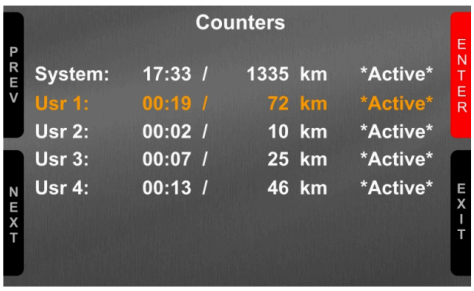
Maintenance Intervals

- A blue oil change icon will be shown at the bottom right of the dash every 640 mi (approx 8 hours). After changing the oil, reset Usr 3.
- A blue motor refresh icon will be shown at the bottom right of the dash every 12,000 mi (approx 150 hours). After refreshing the motor and gearbox, reset Usr 4.
- The process for viewing and resetting User Counters is below:

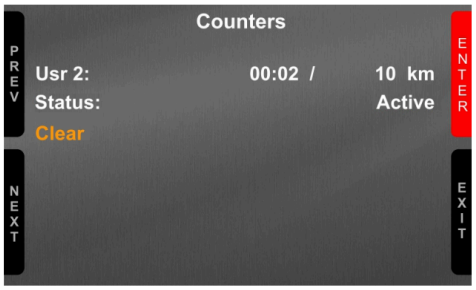
Question:
How can I manage my MXG 1.2/MXS 1.2/MXP/MXG 1.2 Strada/MXS 1.2 Strada/MXP Strada odometers?

Answer:

- Press "MENU", scroll to "Counters" icon using "next" and "prev" buttons: press "ENTER"
- five odometers shows up all set "Active" by default: one labelled "System" and four labelled "Usr" from 1 to 4
- "System" odometer can only be activated/stopped, while the four "Usr" ones can be: activated/stopped and reset.



- To reset the odometer scroll to "Clear" option and press "ENTER", the odometer resets as shown for "Usr 2" here below on the right.



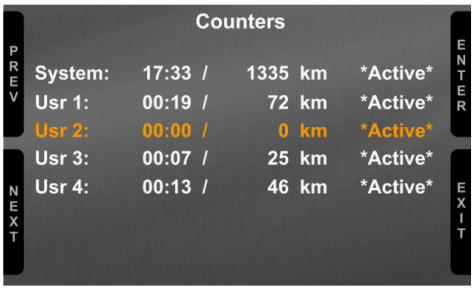


Figure 7: AiM Documentation for User Counters / Odometers. Note they are specified in km.

Left Foot Braking

Some of our owners like to run a double-wide brake pedal to accomodate left-foot braking.

Parts Required:

1. Order an extra brake/clutch pedal from your dealer or RAW.
2. 10.9-M10-1.50 x 110mm bolts. IMPORTANT: Do not order stainless bolts or nuts as they are weak and may gall.
3. M10x1.50mm nylon nuts.

Installation:

1. (Optional) Move your clutch pedal all the way left by unbolting the buttonheads in the pedal.
2. (Optional) Move your brake pedal all the way left.
3. Slide the bolts through the top and bottom of the pedal, attach the second pedal, and fasten.

The finished product looks like this. Adjust to your taste.

Competing in Events

See the linked page for Technical Regulations[p28]. Previous regulations are available on the forum.

A list of available events is available on the main website.

The Rush SR is perfectly capable at any HPDE event, and is often raced alongside other prototype cars.

Technical Regulations

See below for technical regulations for the latest series. Previous regulations are available on the forum.

Download: 2026 RAW Race Series Technical Regulations.pdf

Download: 2025-2026 RAW Race Series Technical Regulations diff.pdf

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RAW

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PDF

PDF

What Changed for 2026

Brake System

- **Section 7.1:** Brake pads changed from open (any brand/compound, Lotus Elise fitment) to RAW OEM only. All brake components including pads, rotors, and calipers must be as originally manufactured and purchased from RAW.
- **Section 7.3 (NEW):** Brake fluid is open spec but must meet minimum DOT 4.

Minimum Weight

- **Section 3.2.1:** SR minimum weight increased from 1,325 lbs to 1,350 lbs (dry tires).
- **Section 3.2.1:** SR wet tire minimum increased from 1,305 lbs to 1,325 lbs.

Setup Restrictions (NEW)

- **Section 3.5.1:** Maximum camber limit added: −3.0° front and rear. No camber limit existed in 2025.
- **Section 3.5.1:** Minimum ride height added: 17.25 inches measured from ground to top of front chassis bar at tag location. No ride height rule existed in 2025.

Fuel

- **Section 13.1:** 2026 allows only 91–94 octane pump gas. Sunoco 94 and Sunoco 95 Optima are no longer named options.
- **Section 13.4 (NEW):** Cooling of fuel is prohibited in any form.
- **Section 13.5 (NEW):** Fuel must be used exactly as supplied — no additives or modifications.

Gear Ratios

- **Section 11.4.1:** Front sprocket options reduced from 14/15/16 tooth to 14/15 tooth only. The 16-tooth option is eliminated.

Springs

- **Section 6.4.1:** Only springs supplied by RAW are permitted. Specific color/rate designations from 2025 (700 lb Red, 800 lb Blue) no longer apply.

Data, Electrical & Sensors

- **Section 16.2:** Sensor additions restricted to data sensor packs sold by RAW Aftersales only. 2025 allowed adding specific individual sensors (steering angle, fuel pressure, coolant pressure, oil temp).
- **Section 10.2:** No unauthorized device may be connected to any electronic control system (CANBus).
- **Section 10.3.2:** Permitted to hardwire clocks, USB chargers, cameras, SmartyCams, GoPros, Garmin Catalyst, rear-view cameras, and Garmin Zumo R1 Radar System.
- **Section 16.6:** Resetting the data acquisition system after official sessions is not permitted.

Tires

- **Section 12.4.2:** All drivers must use the same tire type (slick or rain) in all races and qualifying sessions.
- **Section 12.5.1:** Tire warmers and any means of artificially varying tire temperature are prohibited.

- **Section 12.5.3–12.5.4:** Cleaning tires after sessions is permitted; chemical or thermal treatment beyond normal cleaning is prohibited.

Safety Equipment

- **Section 15.1:** Arm restraints now mandatory (were optional in 2025).
- **Section 15.1:** Camber plate upgrade now mandatory (was optional in 2025).
- **Section 15.1:** Case saver now mandatory (was optional in 2025).
- **Section 15.1:** Clutch switch (or equivalent per 10.3.1) now mandatory (was optional in 2025).
- **Section 15.5.1–15.5.2:** FHR and helmet requirements clarified with specific standards.
- **2027 mandates announced:** Trident rollbar, behind-seat fuel tank, and FIA 8860/8059 ABP helmet.

New Procedural Requirements

- **Section 2.1.1:** Annual technical inspection required before competition each calendar year.
- **Section 2.2.3:** Top 5 finishers must drive directly to Parc Fermé after qualifying and races.
- **Section 12.3.3:** Formal Tire Replacement Request form required for damaged tire replacement.
- **Section 22.2:** Formal Vehicle Replacement Request form required for spare (X) car usage.
- **Section 1.6:** Non-RAW parts must be reported to technical inspectors before competition via a Tech Variance Form.
- **Section 25.4:** Protest fee of $250 added for technical and administrative protests.

Video & Communications

- **Section 17.0.2:** Livestreaming without telemetry is now explicitly permitted.
- **Section 17.0.4:** Video cameras mounted outside the vehicle are prohibited unless authorized by RAW.
- **Section 19.2:** Wind deflector source opened from RAW-manufactured only (2025) to OEM or aftermarket.

Permitted Modifications Now Requiring Declaration

- See sections 19.3–19.5 for specific information.

Maintenance

The Rush SR is designed to be easy to maintain — most owners are their own mechanics. Use the sections below to find interval-specific maintenance tasks, torque specs, fluid requirements, and wiring diagrams.

Service Intervals

The Rush SR, like any race car, will treat you right if you treat it right. Staying on top of maintenance intervals is the key to years of problem-free, safe operation. See the per-interval pages — Each Session, Each Weekend, Each Month/Quarter, Each Year, Long-Term — for the specific tasks at each cadence.

Rush SR Recommended Service Intervals

	Version 2025-07-22	1hr	2hrs	4hrs	8hrs	10hrs	20hrs	50hrs	150hrs
1	Lube Chain & Torque Wheels								*Every session*
2	Check Oil Level								*Every day*
3	Inspect Chain (Track Variable)								
4	Check Shock Pressure								
5	Charge Battery								
6	Inspect Spherical Mount Pin								
7	Inspect Rear Toe Link Pin								
8	Inspect Safety Harness								
9	Inspect and Test Fire System								
10	Adjust Throttle Cable (if equipped)							*Every 4 hrs or weekend*	
11	Adjust Clutch Cable								
12	Check Fuel Pressure								
13	Clean Chain								
14	Nut and Bolt Entire Car								
15	Change Engine Oil & Filter							*Every 6-8 hrs*	
16	Change Differential Oil								
17	Bleed Brakes								
18	Adjust Chain Tension								
19	Inspect Brake Pads and Rotors								
20	Grease Heim Joints								
21	Grease Spherical Bearings								
22	Change Coolant Water							*Every 10 hrs*	
23	Clean Fuel Filter								
24	Drain Air Tank								
25	Replace Chain (Track Variable)							*Every 20 hrs*	
26	Rebuild Shocks (Track Variable)								
27	Clean Radiator								
28	Inspect Wheel Bearings								
29	Rebuild CV Joints								
30	Change Air Filter	*Every 50 hrs*							
31	Clean Fuel Tank and Inspect Fuel Lines								
32	Change Brake Fluid								
33	Grease A-Arm Bushings								
34	Rebuild Steering Rack								
35	Rebuild Differential								
36	Replace Wheel Nuts								
37	Service Injectors								
38	Service Compressor								
39	Rebuild Brake Caliper	*Every 150 hrs*							
40	Rebuild Brake Master Cylinders								
41	Rebuild Engine & Transmission								
42	Replace Battery								

For handy reference, the GSXS1000 maintenance and owners' manuals are also attached below.

Download: RUSH_SR_Recommended_Service_Intervals 2025-07-22.pdf

Download: gsxs1000 owners manual.pdf

Download: gsxs1000-maintenance.pdf

PDF

PDF

PDF

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RAW

Support

Have questions? Visit the Rush SR Owners' Forum for owner support, or contact Rush Auto Works directly.

Removing Bodywork

Overview

Removal of the front and rear clips is best done by 2 people, but with practice can be done single handedly.

Removal of either the front or rear clip requires that all AeroCatch fasteners are unlatched. This is done by pressing the moon shaped segment at the wide end of the fastener, which will release

the handle. GENTLY lift the handle until the pin can be seen to have released from the hole in the mounting rod. If it's sticking its best not to force the handle but slightly jiggle the body work to release any load. A flat ended screwdriver can also be used to move the mounting rod sideways if necessary.

With the AeroCatchs unlatched there are a total of 14 Quick Latch fasteners that hold the front and rear clip to the car. These are released by pressing the button in the center. These work well when there is NO load on them. Oftentimes they are under load, and the body panel will have to be pushed or lifted to release the load on them before the button can be pressed and the latch released.

Front Clip

The car is shipped with the front strobe lights disconnected, as most people will unknowingly remove the front clip and immediately pull the wiring from its connector. Before removing the front clip, look through the right-hand air inlet in the front bumper and ensure the cable is unplugged from the socket, in the right-hand chassis side plate.

Front clip removal is easiest with a person either side holding the wheel arch and the front light relief.

1. Release the four AeroCatches.
2. Release the quick latch fasteners. It can help to pull up on the bodywork while you do this with your other hand.
3. Lift the rear of the clip upwards, tiling the clip forward like opening the hood on an old Jag E-type! Once the AeroCatches are clear of their mounting rods, hold the clip at that angle, and slide the whole clip forward to release the splitter supports.
4. The whole clip can be placed on the ground on the splitter, but something should be placed under the rear edge of the hood to support the weight at the rear, or you will cause damage to the fenders around the wheel arch.

   Note: If you are alone, a very low-profile dolly can be placed under the front splitter. Once all fasteners are released, simply push the front clip forward after lifting it up to clear the AeroCatches.

Amazon

Rear Clip

Rear clip removal is easiest and can be done single-handedly or with a helper.

1. Remove the two AeroCatches by the wing.
2. Remove the quick latches. It is helpful to start with the two at the rear diffuser (as these are easy to miss!), then work your way to each side. On the sides, the middle catch may be easiest to release, then release the bottom catch by the floor and the top catch by the airbox.
3. Get ready to lift the rear clip. This can be done with one person on either side holding the clip by the side of the ducktail and the edge of the fender that mates with the sidepod, or with a single person holding the wing.
4. Lift the rear clip straight upwards to clear the cooling duct mount and radiator. The straight upward movement will also allow the rear fenders to clear the roll hoop front edge. The rear clip can be stored in the vertical position standing on the back edge of the ducktail and the rear wing. If doing this, put something down on the ground to prevent scratching. Also be aware that wind can easily blow this over!

   Note: It is best not to store the rear clip on the ground horizontally (i.e., as it sits on the car). This can cause the edges to bow out over time and may make it harder to attach.

Suggestions

When not mounted to the car, we prefer to sit the front and rear clips on bodywork stands to prevent bending. You don't have to spend much! We find that the Harbor Freight Portable Work Stands (approx $23 each) work perfectly.

Harbor

Each Session

See the below items to keep your car safe and running right every session. You can also use this printable session log to keep yourself organized.

Download: session_log.pdf

PDF

Torquing Wheels

The Rush SR shipped with two types of wheels:

1. Braid Wheels (silver): used until approximately Fall 2022
2. RAW Wheels (black): used after Fall 2022

These wheels are functionally equivalent, but the black wheels have slightly more caliper clearance, which can help in case a small pebble or other obstruction enters the wheel.

However, torque specs on these wheels are different, and are as follows:

1. Braid Wheels (silver): 120 ft-lb
2. RAW Wheels (black): 80 ft-lb

> **Note:** It is extremely important to torque your wheels after every session!

With the black wheels, it is normal to lose some torque in your first few sessions, as the steel ring washer under the lug nuts compresses against the aluminum wheel. Therefore, these wheels MUST be torqued every session, especially when new.

See also: 2025-10-07 Brake System Upgrade Kit[p98] — addresses known brake hardware failure points.

Lubing Chain

Maintenance

- The chain needs to be lubricated. We recommend a high-performance chain wax as it will cause less fling than oil. The chain should be lubricated once per hour at minimum. Failure to lubricate the chain will result in accelerated chain wear.
- The chain should be cleaned with a non-solvent chain cleaner every 4 hours at minimum. Clean more often if you are in a dirty environment, such as a gravel paddock. Clean your sprockets too!
- The chain needs to be adjusted correctly. The chain should be adjusted to have one half to one inch vertical play at the midpoint between sprockets. This should be checked through the whole rotation of the rear sprocket and chain. A tight spot is a sign of a problem and should NOT be ignored.
- A new chain will stretch, it will need to be adjusted a couple of times before it sets.

Amazon

Amazon

Inspection

- This should be a deliberate step and should be part of the chain lube process! The chain should be inspected visually for any links that are going tight or for discoloration of a link barrel due to heat. The chain is a sealed chain meaning that grease is sealed in at the factory. If the seals are damaged that grease will escape and that link will seize and fail. If you see this, replace the chain early.
- The sprockets should be inspected for damage. This is best done by feel. Touch each tooth between your thumb and forefinger, if there is any damage you will feel it. Please don't turn the wheels while doing this, lest your own fingers will need maintenance!
  - This step is important, all it takes is a stone from the track to get thrown into the chain and it can cause damage to a sprocket. A damaged sprocket will break a chain.

Replacement

- While chain and sprocket life will be dependent on your usage, you should expect 25-50 hrs from a chain and sprocket set. Some will get significantly more.
  - **Use Only a Rush 530 or RK 530 ZXW chain!**

Each Weekend

Checking Fuel Pressure

Fuel pressure should be verified periodically to catch a failing pump, clogged filter, or regulator issue before it affects performance or strands you on track.

Spec: 45 PSI at idle (42 PSI if your gauge has been individually calibrated)

Checking Pressure — Cockpit Tank Cars (6-Gallon Behind-the-Seat System)

The 6-gallon cockpit fuel cell system includes a fuel pressure sensor that feeds the AiM dash. Fuel pressure is visible as a live channel on the AiM display without any additional tools. Check it at idle after the car has warmed up.

Checking Pressure — Older 5-Gallon Tank Cars

Older cars with the 5-gallon tank system include an inline fuel pressure gauge mounted visibly in the engine bay. Read it directly at idle.

Manual Check (Any Configuration)

If the gauge or AiM reading is unavailable, you can verify pressure at the Schrader valve on the fuel rail:

1. Ensure the car is cooled down and engine is off.
2. Attach a fuel pressure gauge with a Schrader valve adapter to the valve on the injector rail.
3. Start the engine and read at idle — spec is **45 PSI**.
4. If pressure is low, inspect the fuel filter before assuming a failing pump. See Cleaning Fuel Filter[p46].
5. Detach the gauge — the Schrader valve is self-sealing.

   Warning: Have a rag handy when attaching or detaching the gauge — a small amount of fuel will escape from the Schrader valve.

Clean and Adjust Chain

The chain is a safety-critical component. A broken chain at speed can cause catastrophic mechanical damage to the engine and drivetrain. See Chain Guards and Replacement[p85] for background on why this matters.

For per-session lubing and detailed inspection, see Lubing Chain[p34]. This page covers the deeper cleaning and adjustment done on a weekend cadence.

Cleaning

1. Elevate and support the rear of the car so the wheels can spin freely.
2. Apply a naphtha-based chain cleaner (Maxima CS75920 or similar) while slowly rotating the wheels.
3. Scrub with a chain brush to remove dirt and old wax buildup. Clean the sprockets too.
4. Let the cleaner evaporate completely — do **not** re-lube a wet chain.
5. Apply Maxima Chain Wax evenly while rotating the wheels.

   Danger: Never use a general-purpose solvent or WD-40 as a chain lubricant. Use dedicated chain wax only.

Adjusting

Spec: ½" to 1" (12–25 mm) of vertical play at the midpoint between the engine sprocket and the differential sprocket, measured on the slack (bottom) side with the car on the ground.

The Rush SR adjusts chain tension by repositioning the **differential**, not a wheel. The chain tensioner is a pair of double-female threaded adapters — one on each side of the differential mounting — that screw inward or outward to move the differential forward or rearward.

1. Check chain slack at several points through the chain's rotation by spinning the wheels. The tightest point in the rotation is what matters — **a tight spot anywhere is a problem**, not something to adjust around.
2. If adjustment is needed, turn both chain tensioner adapters equally — inward to increase tension, outward to reduce it. Keep both sides matched to maintain differential alignment.
3. Re-check slack after adjustment and verify it is within spec at the tightest point.

   Note: A new chain will stretch and need adjustment several times during its first few hours of use.

   Danger: Use only **RK GXW 530** chain with a rivet link. No substitutes. Approximately 64 links.

Inspecting Nuts and Bolts

Nuts and bolts should be checked before every event. After all, it's that old 5 P's saying...

A routine nut & bolt check should be done every time the body clips are off. Inspect the paint marks on all major components. If one doesn't exist, torque to spec[p52], and mark the bolt with a paint pen.

All major fasteners should be checked for correct seating while doing so. Not only will this help ensure the car is ready for the track but helps ensure your safety.

Checking Shock Pressure

Shock pressure should be 300psi, air or nitrogen. Nitrogen is preferred due to lower water content, but regular air can and will work in a pinch. It is important to measure with the wheels on the ground.

Keep on top of this! Low shock pressure can lead to inversion of the shock boots during use which will accelerate the failure of the shock.

If you want to use air, you can use any shock pump that is rated for at least 300 psi. The cheapest reliable one we have found is this one on Amazon. Typically, a larger pump is better, and a larger handle is better too, to save your hands. The chuck on the linked pump works fine. With other pumps, we recommend this no-loss chuck.

Amazon

no-loss

When you check shock pressure with your pump, it will typically lose approximately 100psi just from filling the hose and pressure gauge, as the shocks have very low air volume. Refill back to 300psi

after checking. A future factory upgrade will include enlarged air reservoirs, which will reduce this effect and reduce maintenance intervals for the shock.

Figure 8: Checking pressure with no-loss chuck.

Figure 9: Checking shocks at 300psi with Amazon pump. The no-loss chuck is not necessary with this pump and was later removed.

Adjusting Throttle and Clutch Cable

Cable condition and adjustment affect both feel and safety. Inspect both cables and adjust as needed before each event.

> **Danger:** Use **only** a dedicated cable lubricant (e.g., PJ1 Cable Lube) when lubricating cables. General-purpose lubricants can swell or damage the inner cable liner and cause sticking or failure.

Throttle Cable (Throttle-by-Cable Cars Only)

Drive-by-wire cars (2023 and newer) do not have a mechanical throttle cable at the pedal — skip this section if your car is DBW.

On throttle-by-cable cars, the throttle pedal connects via cable to the throttle body. Check for smooth, free movement through the full pedal range with no binding or sticking.

1. With the engine off, press the throttle pedal through its full travel — it should move freely and return crisply.

2. Inspect the cable routing for any sharp bends, kinks, or chafing.
3. Adjust freeplay at the barrel adjuster near the throttle body:
    - Turn adjuster **out** to increase freeplay.
    - Turn adjuster **in** to reduce freeplay.
4. Lock the adjuster locknut after setting.

Clutch Cable

The clutch is cable-operated on all Rush SR models. The cable runs from the clutch pedal through the chassis to the engine.

1. Check that the pedal moves freely through its full range with no binding.
2. The cable should have a small amount of slack at the pedal end before resistance is felt — enough that the clutch is fully released at rest, but engagement happens cleanly through pedal travel.
3. Adjust at the barrel adjuster (at the pedal end or the engine end):
    - Turn **out** to add slack.
    - Turn **in** to remove slack.
4. Lock the adjuster locknut after setting.

Cable Inspection

Inspect the full length of both cables for:

- Fraying or kinking of the inner wire
- Cracking or splitting of the outer sheath
- Binding at any routing point or bend

Replace cables showing any of these signs. The throttle and clutch cables use different diameter wire and conduit — they are **not interchangeable**. Carry a spare clutch cable as trackside insurance.

Each Month/Quarter

Greasing Joints and Bearings

Heim joints and ball joints need frequent inspection and re-greasing to ensure proper operation.

Do not ignore this! Failure to clean and lubricate joints can result in critical failures, as the seizing of a joint or bearing will result in unintended load on other components, which can cause failures on track.

The most common instance of upright failure comes from not cleaning your ball joints. Dirt and grime gets into them and makes them tight. When the top ball joint gets tight, it puts the upper upright bolts in bending every time the suspension moves. **Clean your ball joints regularly with WD40 and apply lithium grease or dry lube to them.**

In the picture below, both ball joints needed cleaning and re-greasing.

> **Note:** If you have spun your car or had an on- or off-track incident that would put additional stress on the uprights, we recommend replacing all upper upright bolts, especially the rears. They are G12.9 M10x55mm 1.5mm thread pitch from the factory.
>
> An even stronger bolt is available here in bulk. Keep in mind that if the bolt does not break, the shock may instead go to the upper control arm, bearing pin, or carrier, all of which are more expensive to replace!

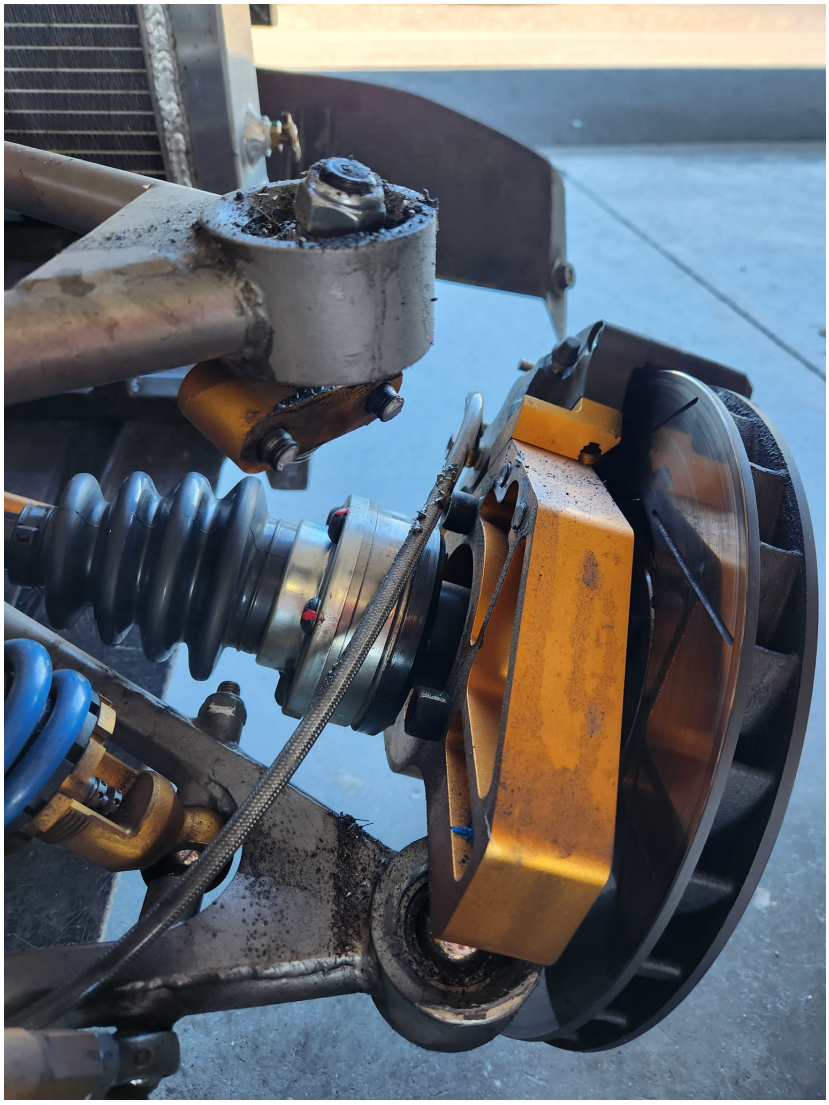


Figure 10: Pictured: broken upright bolts on rear left wheel hub.

Also pay attention to the rod end on the rear toe link. When it goes tight, it wants to unscrew the rear upright shoulder bolt. As part of your normal nut and bolt inspection[p36], if you notice this, it could indicate that a cleaning and lubrication is due.

If you notice that your ball joints are very dirty, or if you spin or have an off with the car, you should remove the upright bolts, inspect, and replace if necessary. Use the torque spec diagram[p52] when re-tightening.

Changing Diff and Engine Oil

Engine Oil

The engine oil levels should be checked regularly through the sightglass. The level should be between the “L” (low) and “F” (full) levels etched on the left.

Only use recommended synthetic oils and filters[p50].

Taking off the rear left wheel can make removing the oil filter easier, especially on dual-tank cars. Consider using a flexible funnel or other apparatus to avoid oil spilling onto the header wrap. If oil does spill onto the header wrap (a small amount is inevitable), run the engine outside for some time before taking it on track, to allow the oil to burn off the wrap. Don't skip this, or you risk being black flagged when the flaggers see smoke on the track!

An oil change is absolutely the cheapest thing you can do to extend engine life. Remember that the gearbox and engine use the same oil system. While we recommend every 10hrs of operation, we personally do it after every weekend event! Be kind to your engine and you should expect around 150hrs of track use before a rebuild is necessary.

A warning light is shown on the dash every 640 mi (approx. 8 hours) to indicate that the oil should be changed. See Dash Alarms[p24].

Diff Oil

Changing diff oil is very easy on the Rush SR.

Lift the back of the car and spin the rear wheels, noticing the two drain holes in the middle of the diff. Spin the diff so that both holes are at approximately the 10.5 and 1.5 o'clock position, and remove the plugs. Then spin the diff downward so the oil drains.

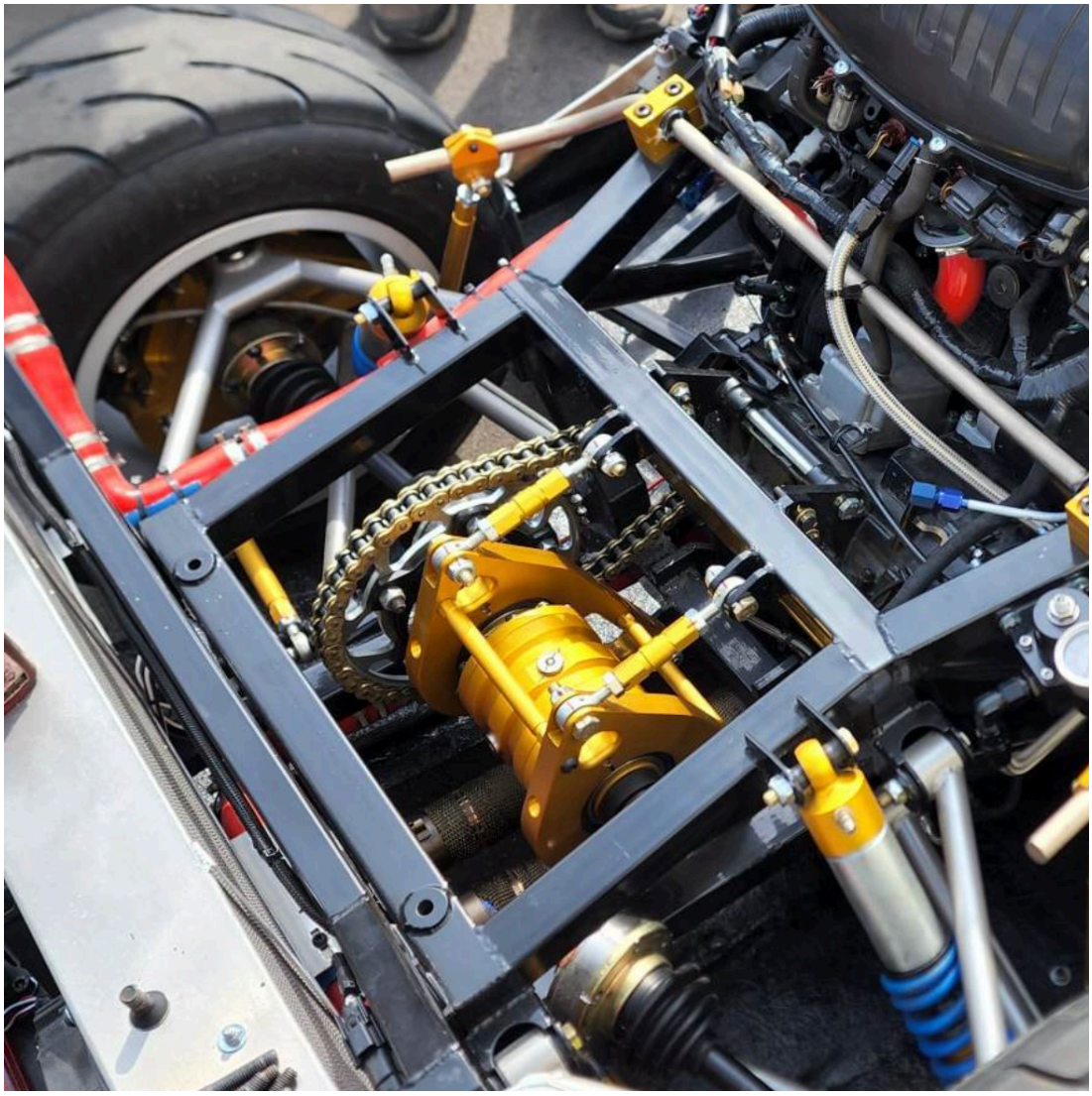


Figure 11: Diff location and both plugs visible (at 9 o’clock and 12 o’clock positions)

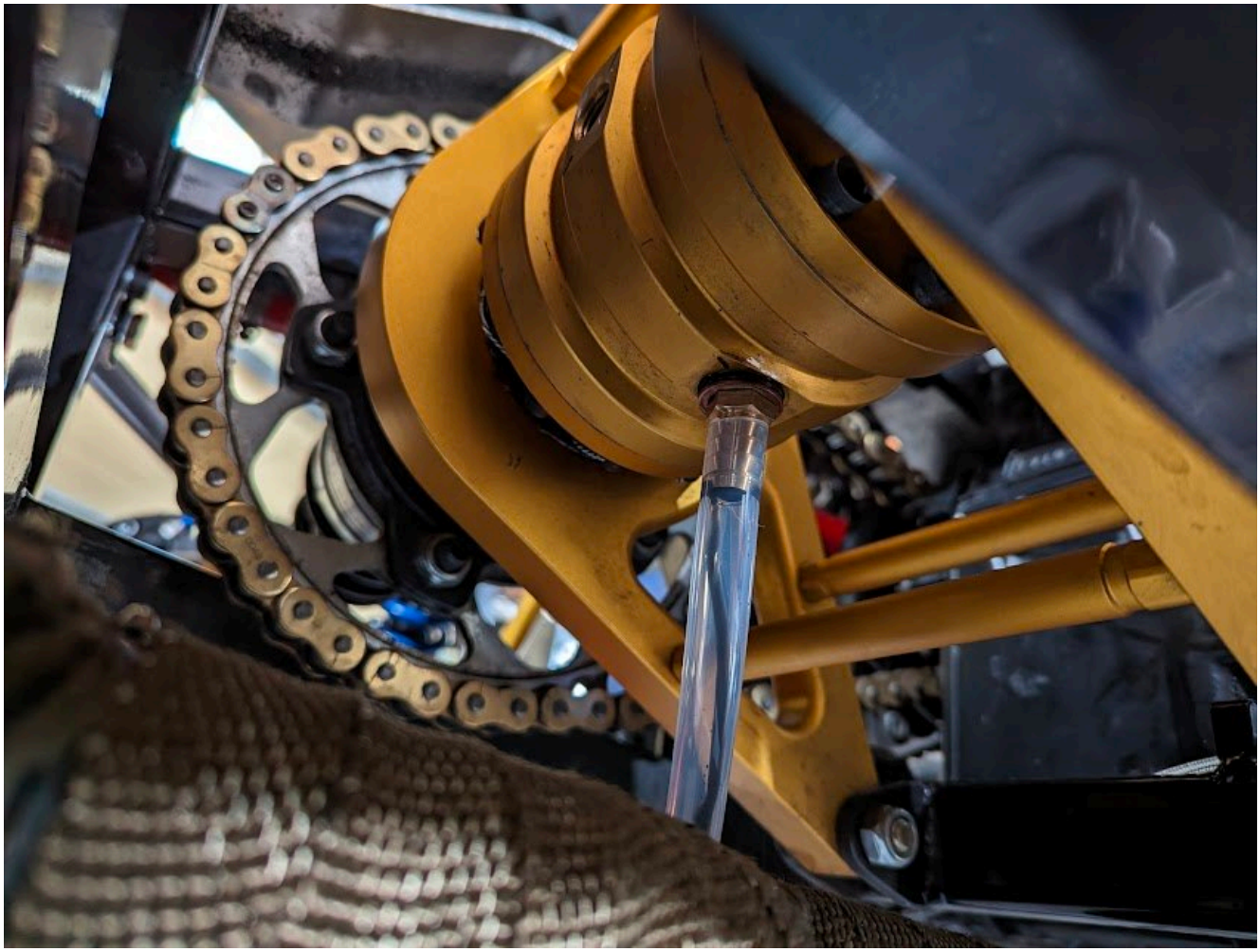


Figure 12: Draining with a M14x1.5 barbed fitting

In this photo, the owner used an M14x1.5 barbed fitting to make draining the oil cleaner. This isn't necessary if you have the right pan, but it can be helpful!

Once the oil is drained, prepare your new oil[p50] and rotate the diff so the holes are at the 12 and 9 o'clock positions, like the top photo. Fill with oil slowly until oil starts to come out of the 9 o'clock hole. We recommend you replace the copper washer on the drain plugs, and torque to 16 ft-lbs with blue thread locker.

Inspecting and Bleeding Brakes

The pads should be removed at regular intervals and checked for wear or glazing. If they need replacement, see our page on brake pads and rotors[p86].

Brake-light pressure sensor

The small pressure switch that triggers the brake lights threads into the rear brake line. It is a known wear item — the switch body can crack at the threaded fitting under repeated load, and **when it lets go it lets go as a brake-line failure**, not a brake-light failure. We have seen this take cars out on Lap 1 of Race 1.

Inspect at every brake-pad change:

- Look for any weep, residue, or staining around the sensor body and its line connection.

- Wiggle the sensor by hand. Any movement at the fitting means it’s done.
- If you can’t remember the last time it was replaced, replace it.

Switches are inexpensive and stocked by your dealer or RAW. Order a spare to keep in the trailer.

Each Year

The following tasks should be performed each season (approximately every 32 hours of track use).

Task	Notes
Replace inner CV joints	—
Replace spark plugs	Gap: 0.8–0.9mm (0.032”–0.035”)
Clean out fuel tanks	—
Compression and leak down test	—
Replace all heim joints	—
Flow test injectors	—
Replace batteries	—
Replace clutch cable	—
Full differential rebuild	—
Grease steering rack	—
Dyno test engine	—

See also rebuilding-axles.md[p48], rebuilding-shocks-track-variable.md[p47], and replacing-chain-track-variable.md[p48] for track-variable items that may need attention sooner.

Change Air Filter

Changing the air filter is simple - simply take off the rear bodywork, remove the airbox cover, and replace the filter.

2022-2024 Drive by Wire:

Suzuki 13780-48K00 or DNA P-S10GT22-01

Figure 13: DNA P-S10GT22-01

2019-2021 Throttle by Cable:

Suzuki 13780-47H10 or K&N SU-9915

Figure 14: K&N SU-9915

Changing Coolant

The coolant system should be filled completely with water and Water Wetter before each session. If temperature reach 250F, get off the throttle and get into the pits. If coming in hot, let the car idle to cool down before shutting the car down. Do not use antifreeze, as a spill on track would be a bad thing! Distilled water is preferred, but the system should be drained and replenished once a month to stop calcium build up and prevent bacterial growth. Drain the system any time freezing conditions are possible.

(view online resource)

YouTube

Cleaning Fuel Filter

The fuel filter catches particulates before they reach the injectors. A clogged filter will cause low fuel pressure and can cause lean running or injector damage.

> **Note:** If a fuel pressure check shows low pressure (below 45 PSI at idle), inspect the fuel filter before assuming a failing pump. See Checking Fuel Pressure[p35].

Location

Cockpit tank cars (6-gallon behind-the-seat system): The fuel filter is located **inside the tank enclosure**. Access it by opening or removing the tank enclosure cover.

Older 5-gallon tank cars: The filter is an inline unit in the fuel feed line between the tank and the fuel rail.

Procedure

1. Relieve fuel system pressure: remove the fuel pump fuse or use the dash fuel pump switch to shut off the pump, then crank the engine briefly until it stalls or cycle the key without starting to allow pressure to drop.
2. Place rags under the filter connections to catch residual fuel.
3. Disconnect the filter from its fittings. Note the flow direction arrow on the filter body before removal.
4. If the filter uses a cleanable mesh element: flush backward with compressed air or clean fuel to dislodge debris.
5. If the filter uses a paper element: **replace it** — paper filters cannot be cleaned.
6. Reinstall with the flow arrow pointing toward the engine. Verify all connections are secure.
7. Restore power to the fuel pump, cycle the key several times to prime the system, and inspect for leaks before starting the engine.

   Warning: Work away from ignition sources and have a fire extinguisher within reach when working on the fuel system.

Inspecting Wheel Bearings

Wheel bearing failure on track is dangerous. Inspect bearings annually (or any time you notice vague handling, grinding, or play in a wheel). The Rush SR uses **sealed wheel bearing hub assemblies** — the same unit at all four corners, bolting directly to the upright. These require no preload adjustment or re-greasing; when they wear out, the entire hub assembly is replaced.

The factory maintenance schedule calls for bearing replacement at **every 4 years / ~160 hours**.

Inspection — Lift Test

1. Safely lift and support the car with the wheel off the ground.
2. Grip the tire at 12 and 6 o'clock and try to rock it — there should be **zero** play.
3. Grip at 9 and 3 o'clock and repeat.
4. Any detectable play indicates a worn bearing assembly that must be replaced before the car goes back on track.

Inspection — Rotation Test

1. With the wheel off the ground, spin it by hand.
2. It should spin smoothly with no roughness, grinding, or uneven drag.
3. Any roughness or notchiness indicates a worn hub assembly.

Replacement

The sealed hub assembly bolts directly to the upright — remove the wheel, unbolt the hub from the upright, and fit the replacement. Replace the hub assembly (not just the bearing) — they are not user-serviceable internally.

Refer to torque specs[p52] for hub bolt torque values.

Rebuilding Shocks (Track Variable)

This is track-variable - on most tracks, so long as you are keeping up with shock pressure such that the gaskets do not flip and wear, this is not necessary.

The suspension uses ball end bearings and solid Delrin bushings. Expect to replace them every 100hrs. They will last for less time if you don't lubricate them.

Cleaning Radiator

The radiator fins clog over time with bugs, dust, and track debris. Since the radiator is **rear-mounted**, it sees significant debris thrown up by the rear tires. Clean it at the start of each season or whenever you notice elevated coolant temperatures.

Accessing the Radiator

Remove the rear bodywork (rear clamshell) to expose the radiator. The rear clam is held by 2 Aerocatches — no tools required.

Procedure

Airflow through the radiator travels front-to-back: air enters from the sidepod inlets at the front face of the radiator core and exits toward the engine. Debris builds up on the front face (air inlet side).

1. With the rear clamshell removed, inspect the radiator core for debris and fin damage.
2. Using compressed air, blow through the radiator from the **front (inlet) side toward the engine** — this pushes debris in the direction it entered, clearing it out through the engine side.
3. For stubborn buildup, use a gentle stream of water from a garden hose (not a pressure washer), directed the same way — front face toward engine.
4. Inspect the fins for bending. Carefully straighten any bent fins with a small flathead screwdriver or fin comb — bent fins restrict airflow and reduce cooling capacity.
5. Allow to dry completely before reinstalling bodywork.

   Warning: Do not use a pressure washer — the force will bend the aluminum fins and permanently reduce cooling efficiency.

Coolant Check

While the rear is open, it is a good time to inspect coolant condition. The Rush SR uses **distilled water + Red Line Water Wetter only**. Do not use antifreeze — glycol is a track safety hazard and not permitted. See Changing Coolant[p46] and Fluids[p50].

Replacing Chain (Track Variable)

This is track-variable - on most tracks, so long as you are keeping up with cleaning and lubing your chain, a full replacement is not necessary every year. If you feel a seized link that is not moving as it should, replace your chain IMMEDIATELY, as a dry link will quickly seize, heat up, and fail. When a car throws a chain at speed, damage to the engine can be serious.

Rebuilding Axles

See the below community video on axle rebuilds (thank you to Michael Schneider).

PLEASE NOTE, only Redline CV-2 CV grease should be used when rebuilding your CV's. This grease is designed to take the temperature associated with racing. Most other graphite / molly loaded CV greases are not suitable.

(view online resource)

YouTube

CV Joint Clocking

Correct clocking of the inner race is the most common mistake when rebuilding axles.

The rule: The inner race has one flat side and one indented side. The **indented side faces inboard** (toward the center of the axle).

Getting this wrong will cause premature CV failure. If in doubt, disassemble and recheck before sealing.

Seal the mating surfaces with high-temp RTV. Do not over-apply — a thin bead is sufficient.

See also: 2025-07-09 Upgraded Outboard CV Joint Hardware TSB[p99]

Long-Term Maintenance (150hr+)

The Rush SR is designed for longevity, but extended operation requires scheduled replacement of safety-critical and wear components. A warning light is shown every 12,000 mi (approx. 150 hours) to indicate the engine and gearbox should be rebuilt. See dash-alarms.md[p24].

The intervals below assume approximately 8 hours per event.

Every 2 Years (~64 hrs)

Task	Notes
Replace sprockets	—
Replace master cylinders	—
Rebuild brake calipers	—
Replace wheel studs	—
Replace ignition coils	—
Replace fuel pumps	—
Replace fuel cell foam	—
Replace Gen 1 seat	—
Certify fire suppression system	**REQUIRED** — gauge must be in GREEN before every event

Every 3 Years (~96 hrs)

Task	Notes
Replace pedal box	—
Replace Gen 2 seat	—

Every 4 Years (~160 hrs)

Task	Notes
Rebuild engine	~$3,500
Rebuild steering rack	—
Replace steering quick release	—
Replace wheel bearings	—

Every 5 Years — MANDATORY

Danger: The following items **must** be replaced every 5 years regardless of apparent condition. These are safety-critical components with defined service lives.

Task	Notes
Replace driver harness	Inspect before every session for frays, cuts, or damage. Never use a harness with broken or missing buckle pins.
Replace fuel cell	Inspect foam baffling regularly for deterioration. Dual fuel tank cars must have only ONE check valve installed.

Fluids

Warning: Pro Tip — Oil Analysis

It is highly recommended to take oil samples for analysis AND cut open oil filters at every oil change. This catches internal engine wear early and can prevent catastrophic failures.

Engine Oil

The Rush SR uses a **shared oil system** for the engine, gearbox, and clutch.

Recommended: Mobil 1 Racing 4T 10W-40

Capacity: 3 qt without filter change | 3.5 qt with filter change

Change interval: Every 8 hours

Oil Filter: K&N Performance KN-138

Note: Other oils may be used. If substituting, use a JASO MA certified oil (PAO/Ester Group IV+, Viscosity Index 170+). Summer alternatives: Klotz KV-1560R 15w-60, Motul 300V 15w-60. Check with your dealer if unsure.

Air Filter

Generation	OEM Part	Alternative
Gen I (Throttle by Cable)	Suzuki 13780-47H10	K&N SU-9915
Gen II (Drive-by-Wire)	Suzuki 13780-48K00	DNA Filter P-S10GT22-01

Differential

Recommended: Royal Purple SAE 75W-140

Capacity: 8–10 oz drain and replace (partial) | 16 oz full flush and fill

Note: Pro Tip — Differential Fill

Clock the diff so drain plugs are at 12 and 3 o’clock. Fill until fluid runs out the side (9 o’clock hole).

Brake Fluid

Recommended: AP Racing 600 Racing Brake Fluid

Or use an equivalent **non-synthetic DOT 4** with a dry boiling point in excess of 570°F.

> **Note:** Raise the rear of the car as high as possible when bleeding brakes to migrate air out of the master cylinders.

Fuel

Any **91 or 93 octane premium** fuel.

E10/ethanol blends are acceptable for normal use. When storing the car for 2 months or more — especially with an ethanol blend — drain the fuel as completely as possible and refill on the day you will run.

Coolant

Recommended: Distilled water with Red Line Water Wetter

DO NOT use antifreeze or glycol-based coolants for track use. Glycol is a safety hazard if spilled on track and is not permitted.

Capacity: ~3 gallons when empty

Cold-weather storage/transport only: G40 Pink coolant at 20% mix — drain completely and refill with distilled water + Water Wetter before returning to track use.

Chain Lube

Recommended: Maxima Chain Wax

Clean chain before lubing. Use a naphtha-based chain cleaner (Maxima CS75920 or similar) — rinse thoroughly and do **not** let dry on chain before re-lubing.

Greases & Specialty Lubricants

Application	Specification	Recommended Product
Heim / Rod End Joints	Synthetic Lithium Complex Grease NLGI GC-LB	Lucas Red N Tacky
Ball Joints	White Lithium — Low Viscosity	Dupont Teflon White Lithium PT# D10106601
Body Pins	White Lithium — High Viscosity	WD-40 Specialist White Lithium PT# 300240
Control Cables	Dedicated cable lubricant only	PJ1 Cable Lube

> **Danger:** Use **only** a dedicated cable lubricant on throttle and clutch cables. General-purpose lubricants can damage cable liners.

Download: RAW Fluid List 2023-12-09.pdf

PDF

Shock Diagrams

Download: Rush SR Shock Diagram.pdf

PDF

See above a detailed assembly drawing of the RAW Shock.

20155 (labeled 24) is the compression adjuster and 20156 (labeled 25) is the Rebound Adjuster.

See the Shock Adjustments[p78] page for more details.

Torque Specs

When tightening non-locking nuts and bolts without a locknut, use blue (Loctite 243) thread locker unless otherwise specified.

If a nut or bolt is found loose during a check, replace the locknut, or reapply thread locker before tightening again.

> **Note:** Use a paint pen to mark bolts once they are torqued. This allows for quicker visual inspection. Most bolts are marked from the factory.

If a bolt or nut without a locknut is moved during a check, the thread locker has been broken loose and needs to be reapplied before tightening again.

Locknuts are a single-use item and should be replaced if removed. Replace Nyloc nuts after every use.

Wheels should be torqued[p34] before every session.

> **Warning: Thread Locker Rules — Follow Exactly**
>
> 1. Non-locking fasteners WITHOUT a locknut: always use blue thread locker unless otherwise specified.
> 2. Loose bolt found during inspection: replace locknut OR reapply thread locker before retightening.
> 3. Bolt moved during inspection (no locknut present): thread locker is broken — reapply before retightening.
> 4. Locknuts are SINGLE-USE — always replace if removed.
> 5. Replace Nyloc nuts after every use. Use Top Lock Nuts in all critical suspension and drivetrain areas.

Suspension & Uprights

Component	Torque	Notes
Wheel Hub Bolts	40 ft-lb (54 N-m)	—
Lug Nuts	80 ft-lb	**NO** grease, anti-seize, or thread locker
Camber Bolts (Front and Rear)	40 ft-lb	Loctite 243 Blue — see length table below
Bearing Nuts	48 ft-lb	—
Rotor Bobbins	15 ft-lb (20 N-m)	Distorted thread lock nut
A-Arm and Shock Bolts	26 ft-lb (35 N-m)	—
ARB Block Bolts	18 ft-lb (24 N-m)	—

> **Note: Camber Bolt Length Selection**
>
> Front: Use 60mm bolt with more than 4mm shim | Use 55mm bolt with less than 4mm shim

Rear: Use 55mm bolt with 6mm or more shim | Use 50mm bolt with less than 6mm shim

Always apply Loctite 243 (Blue) liberally to bolt threads before torquing.

Differential & Half Shafts

Component	Torque	Notes
Diff Housing Bolts (Long Side)	96 in-lb (11 N-m)	Blue thread locker + safety wire. Max 120 in-lb
Diff Housing Bolts (Short Side)	96 in-lb (10.8 N-m)	Blue thread locker. Max 120 in-lb
Diff Drain/Fill Plugs	16 ft-lb (21.7 N-m)	Replace copper washer after each removal. Blue thread locker.
Axle Nut	130 ft-lb	—
Outside CV Joint Bolts	35 ft-lb (48 N-m)	Blue thread locker + Belleville washer (cone toward bolt head)
CV Housing Bolts (Short Side)	35 ft-lb (48 N-m)	Blue thread locker + Belleville washer
CV Flange Bolt	45 ft-lb (61 N-m)	**RED** thread locker

Engine & Drivetrain

Component	Torque	Notes
Engine Sprocket Nut	90 ft-lb	Original Suzuki spec was 85 ft-lb.
Engine Mount Chassis Bolts	20 ft-lb (27 N-m)	—
Engine Mount Block Bolts	40 ft-lb (54 N-m)	—
M6 Engine Cover Bolts	7.5 ft-lb	Suzuki spec
Clutch Basket Nut	111 ft-lb	Suzuki spec
Oil Drain Plug	17 ft-lb	Suzuki spec
Engine Oil Filter	15 ft-lb	Suzuki spec
Spark Plugs	8.5 ft-lb	Gap: 0.8–0.9mm (0.032”–0.035”)

AN Fitting Torque Reference

Always use oil lubricant when assembling AN fittings.

AN Size	Aluminum (in-lb)	Steel (in-lb)
3AN	70–105	95–105
4AN	100–140	135–150
6AN	150–195	270–300
8AN	270–350	450–500
10AN	360–430	650–700
12AN	460–550	900–1000
16AN	700–840	1200–1400

Download: RAW Rush SR Torque Specifications.pdf

Suzuki Service Manuals

The below manual is only for cars produced before Spring 2023. Newer drive-by-wire cars use the 2022+ motors, we are working on a manual for this.

Download: Suzuki 2019-2020 GSXS-1000S Service Manual.pdf

PDF

Electronics and Wiring

Main Harness

The interactive diagram below shows all active wiring in the Rush SR main harness (Gen2 drive-by-wire). Click any wire for details, or use the circuit toggles to isolate individual systems. Click “Wire Reference Table” on the dash panel for a complete wire list.

(view online resource)

RAW

Power Distribution

Wire colors use the Suzuki convention: first letter is the base color, after the slash is the stripe. For example, R/W means a red wire with white stripes.

The main 30A fuse supplies power via a red (R) wire to the dash panel On/Off switch. From there, power is distributed through two main circuits:

- **W/Y (Ignition circuit)** — powers the ECU and feeds the Run switch. The Run switch outputs W/R wires to ignition coils, starter button, and fuel switch.
- **W/G (Signal circuit)** — powers the shift harness, AiM data logger, brake light relay, and other auxiliary systems.

The fuel switch controls the fuel pump relay. When energized, the relay outputs R/W power to the fuel pump and all four injectors. The ECU controls each injector and coil individually via ground-side switching.

Reference Diagrams

- Shift Harness Wiring Diagram[p54]
- GCU Wiring Diagram[p55]

Download: main harness wiring diagram.png Original annotated Suzuki schematic showing removed OEM components (crossed out) and Rush SR modifications.

PNG

Shift Harness and GCU

The shift harness collects signals from the steering wheel and operates the pneumatic sytem to shift the car.

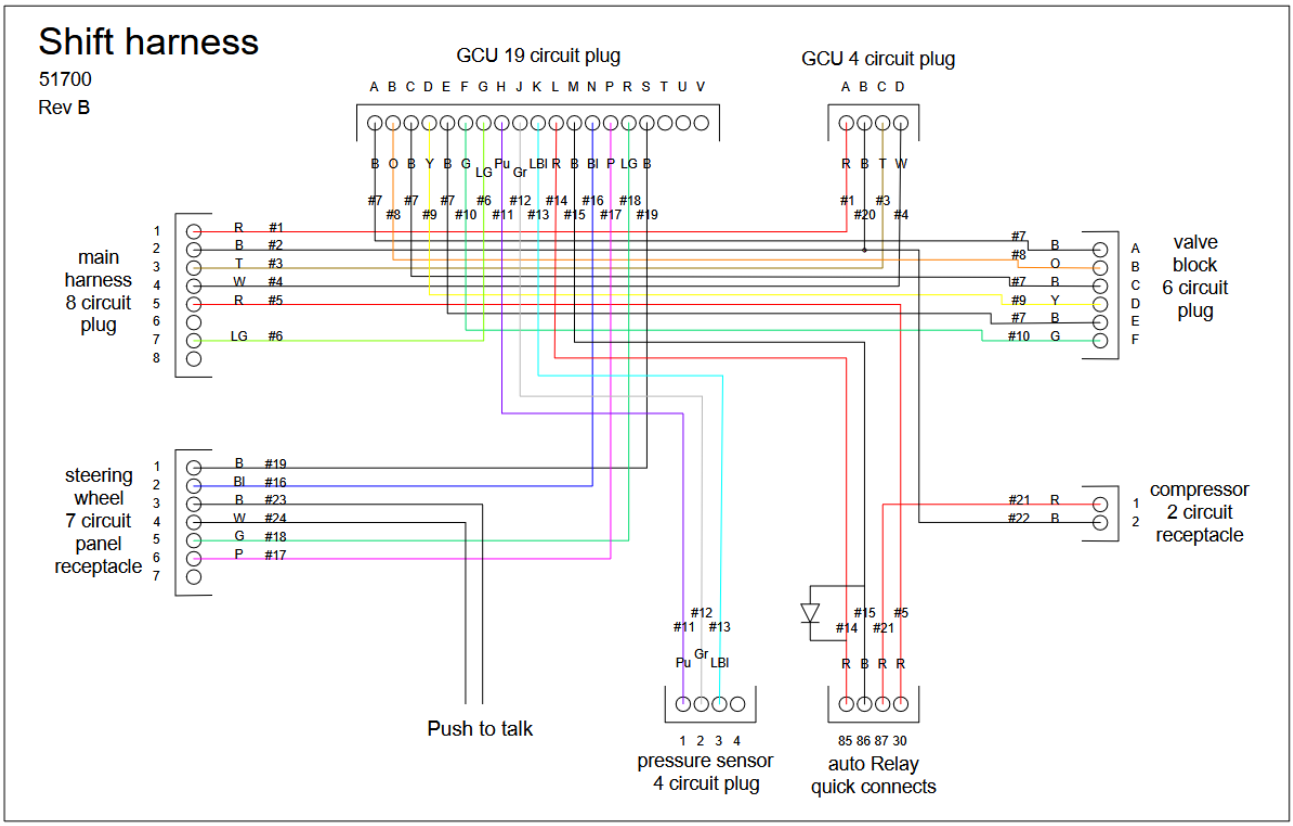


Figure 15: Shift harness diagram for mechanical throttle car

Please click to open the interactive diagram.

(view online resource)

The shift system is powered by two fused circuits from the main harness: the signal fuse circuit (ignition-switched, powers the GCU) and the compressor fuse circuit (always hot via the ABS fuse, powers the compressor). The interactive diagram above shows all wire routing, pin assignments, and Gen1/Gen2 differences. The easiest way to tell which generation engine is in a car is to check the pedal box for a throttle cable (Gen1, mechanical throttle) or accelerator pedal sensor (Gen2, drive-by-wire).

Download: 51700 RevB.pdf

GCU Pinout

Wiring Diagram

The following is a wiring diagram for the GCU on the Gen1 (throttle cable) cars. For Gen2, blip and throttle cut are handled by QuickShift on the ECU, which means that mosfets 3 and 4 are not used, and an additional wire is sent to pin 12 on the board for the gearshift sensor mimic. More details are below.

Please click to open the interactive diagram.

(view online resource)

Detailed Pin Table

For debugging purposes, we provide the following pin table for the GCU:

Input Pins

Pin Name	Number	Notes
Upshift paddle switch	18	Filtered through pin 10.
Downshift paddle switch	19	Filtered through pin 9.
Neutral paddle switch	3 or 20*	Pin 20 on KLine cars, 3 on DBW. Filtered through pin 8.
Tank air pressure sensor (analog)	A6	Default 70-90psi hysteresis.

Explanation and Debugging

For symptom-first troubleshooting (paddle direction dead, asymmetric shifts, compressor issues, reading the serial console, etc.), see GCU Debugging[p62]. The rest of this section covers pin-level electrical reference.

Paddle Switches (Upshift, Downshift, Neutral)

The paddle switches are all configured as INPUT_PULLUP, meaning the GCU holds each pin HIGH (~5V) through an internal pull-up resistor. When you press a paddle, the switch connects the pin to ground, pulling it LOW (0V). The GCU reads this LOW signal as a shift command.

To debug paddle inputs with a multimeter:

1. Set your multimeter to DC voltage.
2. Probe the relevant pin on the GCU connector (pin 18 for upshift, pin 19 for downshift, pin 3 or 20 for neutral) against ground (pin 2 of the main harness connector).
3. With the paddle **not pressed**, you should read approximately **5V** (the pull-up holding the line high).
4. With the paddle **pressed**, you should read approximately **0V** (the switch connecting to ground).

If you read 0V at all times, the switch may be stuck closed, or there is a short to ground in the wiring. If you read 5V at all times even when pressing the paddle, the switch is not making contact, there is an open circuit in the wiring, or the coil cable connection has a bad pin.

The upshift and downshift paddle signals pass through a capacitor filter on the intermediate board (pins 10 and 9, respectively) before reaching the logic board (pins 18 and 19). If you suspect the filter capacitor is the problem, you can bypass it by jumping pin 10 to pin 18 (upshift) or pin 9 to pin 19 (downshift) to test.

Air Pressure Sensor

The tank air pressure sensor is an analog input on pin A6, also configured with INPUT_PULLUP. It is a 10-bit sensor (range 0–1023) that reads **0.1633 psi per unit**. The GCU uses a hysteresis window of 70–90 psi: it turns the compressor on when tank pressure drops below 70 psi and off when it reaches 90 psi.

The INPUT_PULLUP configuration means the GCU's internal pull-up resistor holds pin A6 at ~5V. The pressure sensor acts as a variable resistance to ground, forming a voltage divider — as pressure changes, the voltage at A6 changes proportionally. This also provides a **fail-safe**: if the sensor wire is disconnected or broken, the pull-up pulls A6 to 5V, which the GCU reads as high pressure. The compressor stays **off**, which is the safe failure mode. A disconnected sensor reading low would run the compressor continuously against a potentially leaky or overpressured system.

To debug the pressure sensor:

1. Set your multimeter to DC voltage and measure pin A6 against ground.
2. The voltage should vary proportionally with tank pressure. At a full tank (~90 psi), expect a higher voltage reading; at an empty tank, expect a lower reading.
3. If the reading is stuck at 0V or 5V regardless of tank pressure, the sensor may be faulty or disconnected.

If the compressor runs continuously, the pressure sensor may be reading low (bad sensor, air leak, or wiring issue). If the compressor never turns on, the sensor may be reading artificially high (or disconnected — see fail-safe above), or the issue may be on the output side (relay or compressor fuse circuit).

The pressure sensor connects to the shift harness via the 4-circuit pressure sensor plug. The sensor signal wire (#12) runs from this plug to the GCU 19-pin connector. Check for continuity along this path if sensor readings are suspect.

Compressor

The compressor is controlled by the GCU via a standard automotive relay in the shift harness. The GCU's pin D11 drives an internal MOSFET (labeled "5 — compressor control" on the GCU board), which switches the ground side of the relay coil. When the GCU energizes the MOSFET, it completes the ground path through relay pin 86, energizing the coil (pin 85), and closing the relay contacts — connecting 12V from pin 30 to pin 87, which powers the compressor.

The compressor fuse circuit is always hot (directly connected to the battery via the ABS fuse), so the compressor should run whenever the relay is energized — regardless of ignition switch position. The GCU does need ignition power to read the pressure sensor and command the relay.

The signal path is:

1. GCU reads low pressure on A6 → GCU sets D11 HIGH → MOSFET 5 switches on
2. Relay coil energized (pin 85 to pin 86 through MOSFET ground) → relay clicks closed
3. 12V from main harness pin 5 (ABS fuse) → relay pin 30 → relay pin 87 → compressor pin 1 (red wire, #21)
4. Compressor pin 2 (black wire, #22) → ground

To debug the compressor:

1. **Check the fuse.** Verify the ABS fuse in the fuse box is intact. This supplies 12V to the compressor circuit via pin 5 of the main harness connector, which reaches relay pin 30.
2. **Listen for the relay.** With the ignition on and tank pressure below 70 psi, listen for the relay clicking. If you don't hear a click, either the GCU is not sending the signal or the relay coil circuit is open.
3. **Test the compressor directly.** Disconnect the compressor 2-circuit receptacle and apply 12V directly to pin 1 (red) and ground to pin 2 (black). The compressor should run. If it doesn't, the compressor itself is faulty.
4. **Test the relay directly.** The relay uses standard automotive quick-connect terminals (85, 86, 87, 30). Disconnect it from the harness and apply 12V to pin 85 and ground to pin 86. You should hear a click, and you should have continuity between pins 30 and 87. If not, replace the relay.
5. **Test the GCU relay output.** With the relay connected and tank pressure below 70 psi, check for voltage at relay pin 85 against ground. If the GCU is commanding the compressor on, the MOSFET should be pulling pin 86 to ground, completing the coil circuit. If no click occurs and the relay tested good in step 4, the GCU or its MOSFET may be faulty.
6. **Check for air leaks.** If the compressor runs but the tank does not pressurize, or the compressor cycles on excessively, check for air leaks in the pneumatic lines and fittings. Spray soapy water on connections and look for bubbles.

Output Pins

Pin Name	Number	Notes
Air valve 1: upshift	4	Triggers air shifter
Air valve 2: downshift	5	Triggers air shifter
Air valve 3: blip	6	KLine only; pulls throttle cable
Solid-state ignition coil interrupt	7	KLine only; interrupts ignition coils

Pin Name	Number	Notes
Compressor relay	11	Turns on air compressor
Gearshift sensor mimic (PWM)	12	DBW only; emulates bike gear lever sensor to initiate blip/throttle cut
Debug LED (red, blip)	53	Debug LED
Debug LED (yellow, downshift)	47	Debug LED
Debug LED (green, upshift)	41	Debug LED

Download: GCU KLine Wiring Diagram.pdf

PDF

Debugging

To pull data from the GCU, use a USB-B cable (like you see on a printer). We like these adapters.

Amazon

You can read the internal logs using the attached zip.

Reading the LEDs goes as follows:

- Green is upshift
- Red is downshift
- Green + yellow is neutral upshift; red + yellow is neutral downshift.
- When the compressor is running, the yellow LED will flash on versions ≥ 3.0.6.

Download: read_serial.zip

ZIP

Manual Pneumatic Shift Test

If the GCU is suspect or you want to bench the pneumatic system independent of the electronics, you can shift the gearbox manually by moving the pneumatic shift arm forward and backward at the valve block. This bypasses the GCU and exercises the air path + cylinder + linkage end-to-end. A symmetric movement that produces a clean shift in both directions means the pneumatic side is healthy and the fault sits in the GCU, paddle, or wiring.

Shifter Cylinder Alignment

If shifts in one direction (up or down) miss more often than the other, the connection between the pneumatic shift cylinder and the shift lever may be misaligned. The cylinder needs equal range of motion in both directions; if it doesn't, the weak direction stalls before the dogs engage.

To realign: loosen the red-circled bolt below and adjust until the cylinder swings the same distance fore and aft. The shifter bolt (at the 2" mark) to the case bolt on the left with the red mark should measure **1.25"**.

Figure 16: Distance between the shifter bolt (at the 2” mark) to the case bolt on the left with a red mark should be 1.25”.

Updating GCU Firmware

The GCU (Gear Control Unit) firmware controls the pneumatic sequential gearbox shifter. Firmware updates improve shift speed, reliability, and diagnostics.

Updating Your GCU

You will need a USB-B cable (printer-style) to connect the GCU to a laptop. We like these cables. IMPORTANT: some GCUs were manufactured with slim clearance to the USB port. You need a right-angle USB-B plug that is as slim as you can buy, for maximum compatbility. The linked cable is one of the best we’ve found.

Amazon

1. Download the release zip for your version below.
2. Unzip it to a folder on your computer.
3. Connect the GCU to your computer via USB-B.
4. Open the GCU Flasher app:
    - **macOS**: Double-click `GCU Flasher.app`
    - **Windows**: Double-click `GCU Flasher.bat`

5. Select the correct firmware for your car:
   - **Gen2 (CAN / drive-by-wire)**: `release_CAN-X.X.X.hex`
   - **Gen1 (KLine / throttle cable)**: `release_KLine-X.X.X.hex`
6. Select your serial port from the dropdown (click **Refresh** if it doesn't appear).
7. Click **Flash Firmware** and wait for the "Flash complete!" message.

   Note: Not sure which version you have? Gen1 cars have a throttle cable at the pedal box; Gen2 cars have an accelerator pedal sensor (no cable).

Viewing the Serial Console

The GCU Flasher includes a built-in serial console for diagnostics. Click **View Console** to connect to the GCU's serial output at 115200 baud. Click **Disconnect** to close the connection. The console is useful for verifying the GCU is running correctly after a flash or for troubleshooting shift issues — see GCU Debugging[p62] for the output strings to look for and what they mean.

Releases

3.1.0 — March 2026

Much faster sequential shifting. Each shift now completes in about 180ms (previously 325ms), allowing approximately 5.5 shifts per second instead of 3. You'll notice the difference on fast downshift sequences.

- **Faster shifts**: Reduced the wait time between shifts by over 70%. The air cylinder returns fast enough that the old delays were unnecessary.

Download: rush_GCU_3.1.0 (1).zip

3.0.6

Shifts adapt to tank pressure. The GCU now automatically adjusts shift timing based on how much air is in the tank.

- At low tank pressure, shifts take a bit longer to make sure they complete reliably.
- At normal pressure (70–90 PSI), shifts behave as before.
- At high pressure, shifts are quicker since there's more force available.

You don't need to do anything — this happens automatically. The result is more consistent shifts regardless of tank pressure.

Download: rush_GCU_3.0.6.zip

3.0.5

Diagnostic LED improvements.

- **Startup self-test**: When the GCU powers on, the red, yellow, and green LEDs light up in sequence. This confirms all three LEDs are working.
- **Compressor indicator**: The yellow LED now flashes while the air compressor is running. Useful for confirming the compressor is cycling on and off correctly — if you suspect a compressor issue, watch the yellow LED.

Download: rush_GCU_3.0.5.zip

3.0.4

First stable release with countershift. Countershift sends a brief reverse air pulse after each shift to help the gear fully seat, reducing the chance of a missed or incomplete shift.

- Separate shift timing for upshifts and downshifts
- Improved shift light behavior

Download: rush_GCU_3.0.4.zip

3.0.3 and earlier

Contact Rush Auto Works for firmware files for older versions.

Shift Debugging

Troubleshooting steps for techs and crew diagnosing shift-system issues. For pin-level electrical reference (voltages, pull-ups, fail-safes), see Shift Harness and GCU[p54]. For firmware updates and the serial console, see Updating GCU Firmware[p60].

The page is organized by symptom. Pick the closest match from the index below and jump in — each branch ends at either a fix or a deeper sub-test.

Where to Start

Shifts

- Both paddles dead *and* compressor won't run → Nothing Works: No Shifts, No Compressor[p65]
- One paddle direction dead, the other works → One Paddle Direction Doesn't Respond[p66]
- Both directions miss intermittently → Missed or Incomplete Shifts (Both Directions)[p69]
- One direction noticeably weaker (different sound, larger pressure drop) → Asymmetric Shifts: One Direction Weaker[p68]
- Missed upshifts *or* downshifts but not both, fails to fully engage one direction → Shift Linkage Mechanical Checks[p68]
- Audible binding during shift, weak/missed shifts that bench-test fine pneumatically → Shift Arm[p68]
- Can't find neutral with the engine running → Can't Find Neutral with the Engine Running[p66]
- Erratic shifting with no clear electrical or pneumatic pattern → GCU Water Intrusion[p65]

Compressor

- Runs continuously, can't reach 90 psi → Compressor runs continuously[p69]
- Never runs at all → Compressor never runs[p70]
- Short-cycles rapidly → Compressor short-cycles[p70]
- Compressor fuse blows immediately or after a short run → Compressor never runs[p70] (relay diode, water in compressor head)

Gen2 DBW (limp mode, no blip / no cut)

- Throttle capped at ~50% with no fault codes → Speed Emulator[p71]
- No blip on downshift, limp mode active → Clutch Switch[p71]
- Paddles register on LEDs but no throttle blip or cut → Gearshift Sensor Mimic[p71]

Gen1 cable throttle

- No blip on downshift, cable car → Blip Cylinder Air Supply[p72]

Intermittent / power

- GCU shifts fine for a while, then dies; full car restart recovers it → Nothing Works step 3[p65] (power-supply cap solder joints)
- No LEDs at all, Flasher can't open the USB serial port → Nothing Works step 5[p65] (Mega 2560 swap)
- `FALLBACK: Using safe default timing` in the serial log → Pressure Sensor Fail-safe[p72]

Triage / bench tests

- Bisect “GCU/paddle/wiring vs. pneumatic/mechanical” in one test → Manual Pneumatic Shift Test[p64]

Reference

- LED Reference[p63] · GCU Board Reference[p64] · Reading the Serial Console[p73]
- Shift Harness and GCU[p54] (pin-level electrical) · GCU Firmware[p60] (flashing, console access)

LED Reference

The GCU has three diagnostic LEDs on the board plus the onboard heartbeat LED. Their meaning depends on state:

LED	Idle (no shift in progress)	During a shift
Red	Off	Solid during downshift attempt
Yellow	Flashes ~2 Hz while compressor running	Solid during neutral attempt
Green	Off	Solid during upshift attempt
Heartbeat (D13)	Pulses continuously	Pulses continuously

On firmware 3.0.5 and later, red → yellow → green flash in sequence at boot (~100 ms each) as a power-on self-test.

During a neutral attempt, the yellow LED lights solid **together with** the direction LED (green for NT+up, red for NT+down), so yellow-plus-green means “neutral upshift attempt.”

If the heartbeat LED is frozen, the firmware has hung. A cold power cycle is always the first step before chasing electrical faults.

In the rest of this page, **Gen1** means KLine / throttle-cable cars and **Gen2** means CAN / drive-by-wire cars (see GCU Firmware[p60]). A Gen2 GCU will run in a Gen1 car well enough to debug paddles and compressor behavior, but it won’t drive the Gen1 throttle cut or blip — treat any cross-generation substitution as a paddock-only diagnostic, not a track-ready swap.

GCU Board Reference

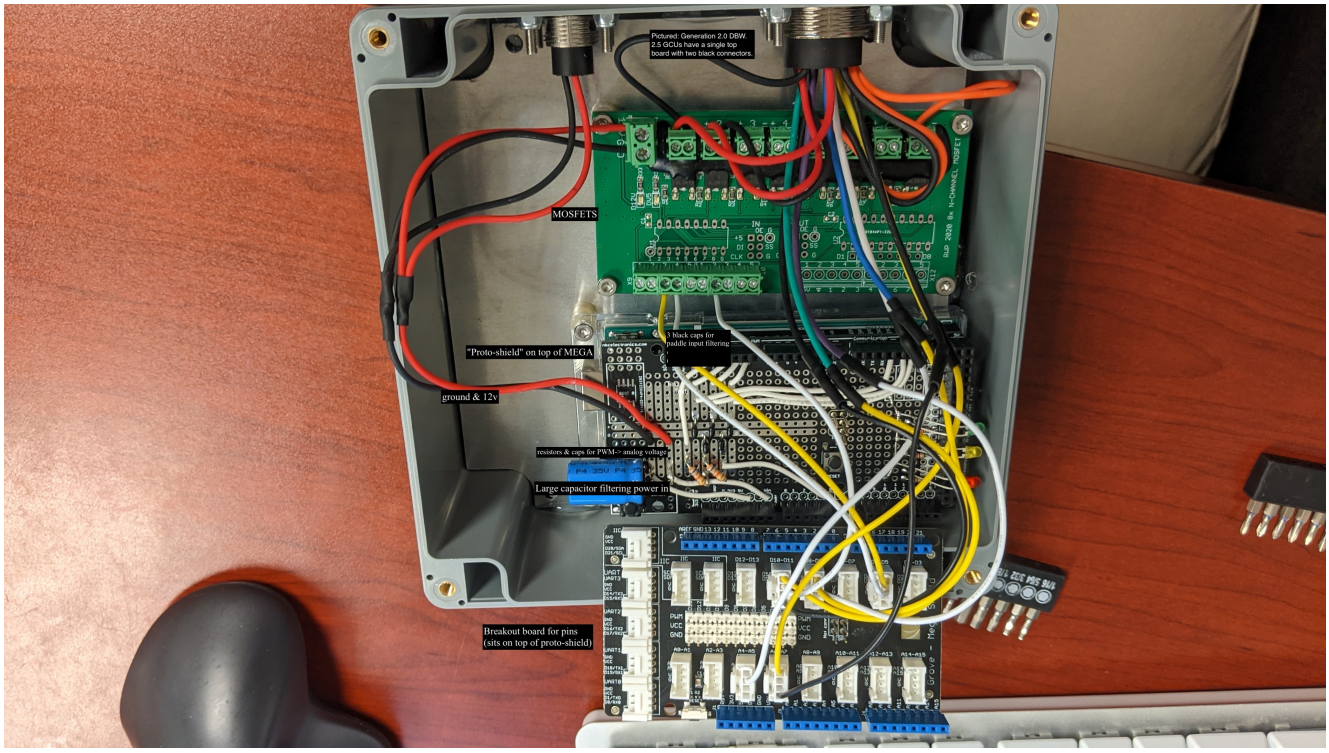


Figure 17: GCU 2.0 DBW board, annotated. GCU 2.5 units have a single top board with two black connectors; component positions otherwise match.

Quick map of what lives where on a GCU 2.0 DBW unit (Gen2, pictured):

- **Top green board — MOSFETs.** Actuator drivers; the terminals along the bottom of this board carry valve and compressor relay signals.
- **Middle board — Arduino Mega 2560 with the intermediate board (also called the proto-shield) mounted on top.** The intermediate board carries:
  - **Three black paddle-input filter capacitors** (up, down, neutral) between pins 9/10/8 on the input side and pins 19/18/20-or-3 on the logic side.
  - **A large blue electrolytic capacitor** (labeled *P4 35V*) filtering the 12 V power input. This is the “power-supply cap” referenced throughout the troubleshooting sections below.
  - Resistors and smaller caps forming the PWM → analog voltage network for the gearshift-sensor mimic (Gen2 only; unused on Gen1).
- **Bottom board — pin breakout** that sits on top of the proto-shield and brings the Mega’s digital and analog pins out to labeled connectors.

Manual Pneumatic Shift Test

Bench-bypass procedure to bisect “GCU / paddle / wiring” vs. “pneumatic / mechanical” in a single test. Bypasses the GCU entirely and exercises the air path, cylinder, and linkage end-to-end.

1. Confirm the air system is at full operating pressure.
2. Position yourself clear of the driveline. Car on stands or wheels chocked.
3. At the valve block, manually move the pneumatic shift arm forward and observe the upshift action.
4. Return the arm and move it backward to observe the downshift action.
5. Compare the two directions for symmetry.

Outcomes:

- **Clean shift in both directions** → pneumatic side is healthy. Fault sits in GCU, paddle, or wiring — proceed to the electrical sections.
- **Asymmetric movement** → shifter cylinder alignment or actuator rod length. See Shift Linkage Mechanical Checks[p68].
- **One or both directions fail manually** → pneumatic side (valve block, air supply, leaks). See Asymmetric Shifts[p68] or Compressor Issues[p69].

Nothing Works: No Shifts, No Compressor

Both paddles dead and the compressor won't kick on even with air demand. The fault is upstream of the per-direction hardware. Bisect in this order:

1. **Drain the air tank** and watch the compressor. The GCU commands the compressor on below 70 psi via the relay on pin 11. An empty tank should trigger the compressor within a second or two. If it doesn't, the GCU isn't making the relay call.
2. **Check the heartbeat LED.** No pulse = firmware not running. Signal fuse, brownout, or a board-level failure — check the signal-fuse feed first (see Shift Harness and GCU[p54]).
3. **Suspect the GCU power-supply electrolytic capacitor** (the large blue cap labeled *P4 35V* on the intermediate board; see the board reference[p64]). A failed power-supply cap produces exactly this pattern: no shifts, compressor won't run even with an empty tank. The rails sag under any load, so every subsystem misbehaves simultaneously. Visual check for bulging, leaking, or discolored electrolytic caps; replace if suspect. This is the most common cause once the fuse and heartbeat LED are ruled out. A related failure on the three-board Gen1 / Gen2.0 stack is a loose solder joint at the same cap — that presents as a GCU that shifts cleanly for a while, then drops out completely and requires a full car power cycle to recover. Reflow the joints if you see that intermittent pattern.
4. **Pressure sensor stuck-high fail-safe.** If the sensor wire is open or shorted to 5 V, the GCU reads pressure as high and keeps the compressor off on purpose (safe failure mode). See Pressure Sensor Fail-safe[p72] below — the drain-tank test already rules this in or out, because a stuck-high sensor means the compressor won't come on even with the tank drained.
5. **No LEDs at all and the Flasher can't open the USB serial port.** The Mega 2560 itself is dead; the surrounding boards can't be the cause if the Mega doesn't enumerate over USB. The Mega is interchangeable between Gen1 and Gen2 GCUs, and a stock Arduino or Elegoo Mega 2560 clone (cheaper, fully compatible, easy to source on Amazon) drops in directly. Lift the top boards off, unscrew the Mega from the chassis, fit the new board, and reinstall the top boards.

GCU Water Intrusion

Erratic shifting with no clear electrical or pneumatic pattern often turns out to be water in the GCU housing. Corrosion across the boards produces intermittent failures that mimic every other symptom on this page.

The daily checklist calls for inspecting the GCU and compressor for water at every event and draining if needed. Cars that miss the daily check accumulate moisture over a weekend.

1. Confirm the daily water check was performed for the affected session. If it wasn't, that's the first thing to fix going forward.
2. Remove the GCU from the car following ESD precautions.
3. Open the housing and inspect for visible moisture, corrosion, mineral residue, or water staining on the boards.
4. Inspect sealing surfaces, gaskets, and any vent provisions for blockage or damage.
5. **Document any contamination *before* drying or cleaning** — warranty and repair vendors need to see the original state.

Dry the unit thoroughly, replace damaged components, restore sealing integrity, and address the source of water entry. If corrosion is widespread, send out for repair or replace.

Can’t Find Neutral with the Engine Running

If you can get into neutral with the engine off but not while the engine is running, the issue is almost always clutch-related rather than a GCU fault. A neutral shift fires a short half-length pulse to the gearbox (25 ms up-to-neutral, 28 ms down-to-neutral) and, unlike a regular shift, applies **no throttle cut and no blip**. If the clutch isn’t fully disengaged, the dogs stay loaded and can’t slide through the half-position.

Two things to check:

1. **Push the clutch pedal all the way to the floor** when attempting to reach neutral. Any partial release keeps enough drive on the gearbox to prevent neutral engagement.
2. **Adjust your clutch cable to pull the clutch higher.** If the cable is too loose, even a fully-depressed pedal won’t fully disengage the clutch. See Adjusting Throttle & Clutch Cable[p38].

Also confirm input technique: the GCU fires a neutral shift only when the neutral paddle is **held** while you pull the upshift or downshift paddle. Tapping neutral by itself does nothing. The neutral input is polled (not interrupt-driven), so a momentary tap that’s simultaneous with a direction paddle can also miss — press and hold neutral first, then pull the direction paddle.

Car Won’t Start — Dash Shows N but Engine Won’t Crank

A common variant: the dash reads N but the starter refuses to engage. The gear-position sensor is reporting neutral while the gearbox is still partially in 1st or 2nd (dogs not fully cleared). The starter interlock sees “not neutral” and inhibits cranking.

To free it:

1. **Wiggle the car** to unload the gearbox. Even an inch of roll usually lets the dogs settle into the neutral detent. Easier with a friend pushing while you watch the dash.
2. **Push the clutch and tap the upshift or downshift paddle** to settle the position, then back to neutral.
3. **Check the gear-position sensor wiring** if the dash never updates regardless of car motion — see Shift Harness and GCU[p54].

One Paddle Direction Doesn’t Respond

When only one direction is dead and the other works normally, the firmware is fine (both sides share the same code path) and the fault is somewhere in the paddle → wheel → coil cable → harness → GCU chain. Work from the outside in with swaps; each swap isolates a different layer:

1. **Swap the up and down signal wires** at the coil cable or the GCU-side connector. If the fault follows the wire to the other direction, the problem is in that wire / pin. If the fault stays on the original direction, the problem is upstream (switch, wheel-side wiring) or downstream (GCU itself).
2. **Ground the paddle pin directly** at the GCU connector. Jumpering pin 18 (up) or 19 (down) to ground simulates a paddle press. If this produces a shift, everything from the GCU inward is fine — the fault is in the switch, wheel, or coil cable.
3. **Bypass the filter capacitor** (up/down only). Up and down paddle signals pass through filter caps on the intermediate board — pin 10 into 18 (up), pin 9 into 19 (down). Jumpering the input pin directly to the logic pin (10→18 or 9→19) bypasses the cap. If the direction comes back, the cap is the culprit. This test is not documented for the neutral line; see Shift Harness and GCU[p56] for the reference procedure.

4. **Swap the entire wheel and coil cable.** If a spare known-good wheel is on hand, this isolates everything from the paddle down to the GCU's harness-side connector in a single test. Often the fastest way to confirm a wheel-side fault.

Filter Capacitor Failure Modes

The three black caps on the intermediate board (see the board reference[p64]) sit between paddle input (pins 8, 9, 10) and logic input (pins 3-or-20, 19, 18) and reject transient noise. The up/down bypass procedure above is the fastest test; failure signatures are:

- **Open cap:** logic pin sees unfiltered noise. Spurious shifts or missed presses, often worse on rough tracks where vibration-induced chatter gets through.
- **Shorted cap:** logic pin stuck near 0 V. GCU sees a continuous paddle press; the first shift fires, then further presses are suppressed until the internal state resets. Feels like "one shift then nothing."
- **Leaky / degraded cap:** slow charge/discharge. Presses register with variable delay or get dropped.

The bypass test (step 3 above) is the fastest confirmation.

Paddle Switch Voltage Test

Where the ground-the-pin test (step 2 above) confirms the GCU side, the voltage test confirms what the GCU is actually *seeing* from the switch. Useful when you suspect a stuck-closed switch or a short to ground in the wheel-side wiring.

The paddle switches are configured `INPUT_PULLUP`: the GCU holds each pin HIGH at ~5 V, and the switch pulls the pin LOW to 0 V when pressed.

Probe at the GCU connector with the ignition on:

- Pin 18 = upshift
- Pin 19 = downshift
- Pin 3 (DBW / Gen2) or pin 20 (KLine / Gen1) = neutral
- Pin 2 of the main harness connector = ground reference

Expected: ~5 V unpressed, ~0 V pressed. Reading interpretations:

- **0 V at all times** — switch stuck closed, or short to ground in the wiring. Disconnect the wheel-side coil cable and re-probe to bisect.
- **5 V at all times even when pressed** — switch isn't making contact (open circuit) or a bad pin in the coil cable connection.

Paddle Magnets

If the symptom is on one paddle only and the wheel / switch / coil cable tests good, check the magnets. Ferrous debris on the magnet face can prevent full travel of the paddle, and magnets can crack or work loose from their seats.

1. Confirm the symptom is on one paddle only. Symptoms on both paddles point to the steering wheel cable or upstream, not the magnets.
2. Inspect magnet faces for ferrous debris, contamination, cracks, or chips.
3. Verify the momentary switches are being depressed when the paddle moves through full travel.

Clean debris off the face. Replace any magnet that's cracked, weakened, or no longer seated correctly.

Asymmetric Shifts: One Direction Weaker

One direction misses shifts noticeably more often than the other — and, importantly, sounds different from the cockpit. The fault is in the valve block or the air path feeding one valve, not in the electronics. Firmware runs both directions through identical code.

Diagnostic steps:

1. **Listen.** A healthy shift is a sharp crack from the valve block; a weak one sounds muffled or extended. A persistent hiss after the shift indicates that valve is venting past its seat.
2. **Compare the pressure drop per shift.** A normal 125 ms shift at ~80 psi consumes roughly 4 psi of tank air (about 3 psi at high-pressure / 90 ms shifts on firmware 3.0.6+). Read the drop off the AiM dash or analog gauge. Much larger drop on one direction = that valve is venting too much; much smaller drop = that valve isn't fully opening.
3. **Inspect the valve block Amphenol connector** before pulling the block — see the next section.
4. **Replace the valve block** if the Amphenol is clean and the asymmetry persists. The valve block is a single unit with three solenoid valves (upshift, downshift, throttle blip — the blip valve is unused on drive-by-wire cars), air in, two or three outputs, and shared electronics.

Inspecting the Valve Block Amphenol Connector

Before pulling a valve block, check the small Amphenol connector on the block itself. We've seen a pin sit unseated inside the connector housing — the shift was intermittent, but nothing on the wiring side looked wrong. Procedure:

1. Disconnect the Amphenol connector from the side of the valve block.
2. Visually inspect the pins on the block-side half of the connector. An unseated pin sits proud of its housing instead of flush with its neighbors.
3. If a pin is proud, push it fully home with a small blunt tool until it seats flush with the others.
4. Reconnect and test. If shifts return, done.

If all pins are seated correctly and the block still misbehaves per the asymmetric-shifts symptoms, the valve itself is the likely cause. The shift valve is on a four-event service interval — an overdue valve service can masquerade as a mechanical fault.

Shift Linkage Mechanical Checks

When electrical and pneumatic checks come back clean — or the Manual Pneumatic Shift Test[p64] flagged an asymmetry — the mechanical linkage is the next stop.

Shift Arm

Symptoms: audible binding during shift, missed shifts in either direction, weak shifts that bench-test fine pneumatically.

Probable causes: shift arm contacting the case saver, mounting hardware loose, worn splines.

1. Visually inspect shift arm position and clearance to the case saver through the arm's full range of motion.
2. Confirm all mounting hardware is tight and the arm pivots freely with no detectable play.
3. With the air system pressurized and the car safe to actuate, manually trigger a shift and watch the arm sweep for hesitation or contact.
4. Inspect for galling, burrs, or witness marks on the arm and case saver.

Adjust clearance / shim to restore clearance, torque hardware to spec, replace worn arm or pivot components as needed.

Actuator Rod Length and Cylinder Alignment

Symptoms: missed upshifts *or* missed downshifts but not both; fails to fully engage one direction.

The pneumatic shift cylinder needs equal range of motion in both directions. If the rod length is off or the cylinder is misaligned with the shift lever, the weak direction runs out of travel and the dogs don't engage.

Rush spec: distance from the shifter bolt at the 2″ mark to the case bolt on the left (red mark) = **1.25″**.

1. Verify the actuator rod is at the documented length specification.
2. Measure shifter bolt → case bolt distance and confirm 1.25″.
3. Cycle the shift mechanism manually and compare fore/aft travel for symmetry.
4. Compare engagement against a known-good reference car if available.
5. Check rod end joints for wear or play that could be absorbing stroke.

Loosen the cylinder alignment bolt and adjust so the cylinder swings the same distance fore and aft. The shifter bolt → case bolt distance should be 1.25″ after adjustment. Replace the rod if threads are damaged or rod ends are worn.

Missed or Incomplete Shifts (Both Directions)

Both directions occasionally misfire, typically under load or at low pressure. If the misfires are clearly biased to one direction, skip to the asymmetric-shifts section above instead. Likely causes in rough order:

1. **Low tank pressure.** Firmware 3.0.6 adapts shift timing to tank pressure (90 ms above 150 psi, 125 ms in the normal 70–90 band, up to 175 ms below 30 psi). But a tank stuck well below 70 psi still produces weak shifts. Watch the yellow LED after a shift burst — if the compressor can't catch up, you're shifting faster than the tank can refill (~1 psi/sec in the 70–90 band). Points back to compressor sizing, an air leak, or an asymmetric valve.
2. **Countershift disabled or mistuned.** Countershift (a brief reverse pulse after each shift to seat the dog ring) is on by default in both directions as of 3.0.4, and configurable per direction in 3.1.0. If countershift was turned off experimentally, turn it back on before chasing other causes. Contact Rush Auto Works before changing countershift settings.
3. **Shift cylinder / gearbox.** If air is healthy, countershift is on, and asymmetric-shift checks come back clean, the mechanical side is next — worn cylinder seals, stuck piston, or a shift fork issue. Inspection requires pulling the shifter.

Compressor Issues

The yellow LED flashes ~2 Hz while the compressor is running (firmware 3.0.5+). Hysteresis is hard-coded: compressor on below **70 psi**, off above **90 psi**.

Compressor runs continuously

The tank can't reach 90 psi. Quick math for context: the Kleinn 6270C compressor fills at about 1 psi/sec in the 70–90 band, and a single 125 ms shift at 80 psi consumes roughly 4 psi, so recovery after one shift takes about 4 seconds. If the compressor runs indefinitely with no shifts happening, look for leaks first — spray soapy water on fittings, the valve block seams, hose crimps, and cylinder seals under pressure and watch for bubbles.

If the air system is tight and the compressor still won't cycle off, a **MOSFET stuck open on the GCU** can hold the compressor relay closed regardless of pressure or GCU command. Track-side workaround: redirect compressor control from MOSFET 5 to MOSFET 6 — move pin 11 off the board to MOSFET 6 control, and move the orange and black wires on MOSFET 5 output across to MOSFET 6 output. The rest of the GCU stays functional until the board can be repaired.

Compressor never runs

Yellow LED never flashes: either the GCU thinks pressure is already above 90 psi (stuck-high sensor, see Pressure Sensor Fail-safe[p72]), the compressor circuit is dead, or the GCU itself isn't running (see Nothing Works: No Shifts, No Compressor[p65] above). Drain the tank to force the compressor demand — that one test separates sensor vs. board vs. compressor. If the yellow LED *is* flashing but the compressor stays silent the GCU is making the call, and the fault sits on the power side. Work cheapest to most involved:

- **Fuses.** Check the compressor / ABS fuse before assuming a board fault.
- **Compressor supply harness.** The harness feeding power to the compressor can work loose or go intermittent — reseat the connector and check for vibration damage at the crimps.
- **Black 4-wire relay.** We've seen this relay fail. The four terminals sit at N, S, E, W: **N = red**, **E = red/black**, **S = red**, **W = black/black**. N and S are interchangeable. See the shift harness wiring diagram for the full circuit.

Pin-level test procedure

The compressor circuit is **always hot via the ABS fuse**, regardless of ignition switch position — so the compressor will run any time the relay closes (you can't kill a stuck compressor by turning off the dash; pull the fuse). Power path: ABS fuse → 12 V → main-harness pin 5 → relay pin 30.

Auto relay pinout: pins **85/86 = coil**, pins **30/87 = contacts**.

Compressor 2-circuit receptacle: pin 1 (red #21) = 12 V hot, pin 2 (black #22) = ground.

Direct tests (work outward from the compressor):

1. **Compressor direct:** Disconnect the 2-circuit receptacle and apply 12 V to pin 1, ground to pin 2. If it doesn't run, replace the compressor.
2. **Relay direct:** Disconnect from the harness, apply 12 V to pin 85 and ground to pin 86. Listen for the click and confirm continuity 30→87. If not, replace the relay.
3. **Relay diode:** Bench test for proper directional conduction. A failed diode produces the "compressor fuse blows immediately or after a short run" pattern.
4. **GCU relay output:** With the relay connected and tank below 70 psi, check for voltage at relay pin 85 against ground. The GCU's MOSFET should pull pin 86 to ground when commanding the compressor on. No click with a known-good relay = suspect the GCU output stage.

The compressor is on a **four-event replacement interval**. Compressor fuse blowing is also produced by **water intrusion in the compressor head** itself — inspect the head if the fuse blows on a relay that bench-tests clean.

Compressor short-cycles

Rapid on/off typically means a slow leak drops pressure below 70 psi shortly after each fill, or the pressure sensor is noisy near the thresholds.

Quantifying a leak: pressure decay test

If the compressor cycles more frequently than baseline but no audible or soapy leak shows up, time the pressure decay against a known-good baseline car:

1. Confirm the air tank has been drained per the weekend interval.
2. With the car powered off, pull the purge valve to drain the tank completely. Then refill.
3. Pressurize to ~90 psi and turn the car off.
4. Time how long it takes to drop a fixed amount (e.g. 90 → 80 psi). Compare against a baseline car.
5. Soap-test every fitting, line, solenoid, and tank connection while pressurized — including under flow (during a manual shift trigger) to catch leaks that only open up during a shift event.
6. Inspect air lines for cracks, chafing, or kinks that indicate partial leaks or impending failures.

Finding an air leak

If the compressor is working often even when you're not shifting, the system is leaking somewhere. Standard approach:

1. **Pressurize the system**, then turn the car off and listen — a loud leak is audible.
2. **Spray soapy water** on every fitting, valve block seam, hose crimp, cylinder seal, and Schrader valve. Bubbles betray the leak.
3. **Purge the air tank a few times** (car off!) by pulling the purge valve — it has a small pull that looks like a key ring. Purging clears moisture or contamination that can hold valve seats open.

Limp Mode and No Blip / No Cut (Gen2 DBW)

Three independent subsystems on Gen2 drive-by-wire cars produce overlapping symptoms — limp mode, no throttle blip on downshift, no ignition cut on upshift. Diagnose in this order: Speed Emulator → Clutch Switch → Gearshift Sensor Mimic. The LED triage tells you whether the GCU is even commanding the shift; if LEDs are clean, the fault is downstream in the ECU signal path.

OBD connector convention: **Red OBD connector = Gen2 DBW**, **White OBD connector = Gen1 cable throttle**. Use the red connector for everything in this section.

Speed Emulator (Gen2 DBW)

The ECU expects a constant speed signal to keep throttle authority above limp mode. A failed Speed Emulator caps throttle at **~50 % with no fault codes** — the classic limp-mode signature without OBD evidence.

1. Connect OBD-II via the Red connector. If throttle is capped near 50 %, suspect the emulator first. (Codes take time to trigger; shift issues may appear before codes are set.)
2. Verify a speed value of approximately 25 mph is being reported through OBD.
3. With the car stationary in neutral, rev the engine. A rev limiter at **~6000 RPM in neutral** confirms the emulator is sending a stationary speed signal.
4. If the engine revs past 6000 RPM in neutral, the emulator isn't communicating.

Resolution: replace the speed emulator.

Clutch Switch (Gen2 DBW)

A failed or misadjusted clutch switch on a Gen2 DBW car produces limp mode with no blip on downshift.

1. Check the AiM dash or data log to confirm the clutch switch state through a session. The AiM channel should toggle cleanly between pressed and released.
2. Cross-check via OBD scanner.
3. Manually actuate the clutch pedal while watching the state change on the dash or scanner.
4. Verify the neutral switch hasn't been broken off — it presents similar symptoms.

Resolution: adjust the activation point; replace the switch if it won't actuate cleanly.

Gearshift Sensor Mimic (Gen2 DBW)

On Gen2 DBW cars the throttle blip and ignition cut are handled by the Suzuki QuickShift logic inside the ECU, not by the GCU directly. The GCU sends a PWM signal on pin 12 that emulates the bike's gear-lever sensor — that signal is what tells the ECU to blip on downshift and cut on upshift. If the mimic path fails, you get no blip and no cut despite paddles, Speed Emulator, and shifts themselves all testing good.

This is a **separate component from the Speed Emulator** — don't conflate the two.

1. Confirm Gen2 DBW car. (Gen1 cable cars use direct GCU outputs on pins 6 (blip) and 7 (ignition coil interrupt) instead.)
2. Use the LED Reference[p63] to confirm the GCU is registering paddle input.
3. Run the Speed Emulator[p71] check above and confirm it tests good.
4. With the engine running and the car on stands or wheels chocked, command an upshift and listen for throttle cut. Command a downshift and listen for the blip. If neither response occurs, the mimic path is suspect.
5. Watch the serial console for `Writing X.XXV to DAC pin` (or `Writing X.XXV to GSS pin`) during shift commands. Absence of this line during a shift = GCU isn't driving the mimic.
6. At the GCU 19-circuit plug, verify continuity from pin 12 to the ECU input.

If continuity is good but the GCU isn't driving the output, the fault is internal to the GCU output stage — send out for repair or replace.

Blip Cylinder Air Supply (Gen1 cable throttle)

On Gen1 cable-throttle cars, the downshift blip is produced by an air cylinder that pulls the throttle cable open through a dedicated valve. No blip on a cable car can mean a loose or stretched throttle cable, an over-extending throttle that trips the ECM limp-mode threshold, or a leak in the blip air supply.

OBD throttle check (use the **White OBD connector** for Gen1 cable cars): peak throttle position must **not exceed 95 %** under any condition; AiM dash setup target is **92 %**. Above 95 % triggers limp mode at full throttle.

1. Verify throttle cable tension and free play. Adjust as needed — see Adjusting Throttle & Clutch Cable[p38].
2. Inspect the throttle cable for fraying along its full length.
3. Read peak throttle on OBD. Target 92 %, hard limit 95 %.
4. Confirm the air system is at full operating pressure.
5. Inspect the blip-cylinder air supply line for kinks, chafing, or visible damage. Apply soap solution to the cylinder fittings and supply line during a manual blip event to find leaks.
6. Manually trigger a blip and observe the cylinder stroke through its full range of motion.

Resolution: adjust throttle cable so OBD doesn't exceed the 92 % target. Repair or replace the air supply line. Reseal or replace the blip cylinder if internal seals are compromised.

Pressure Sensor Fail-safe

The GCU validates every pressure reading before using it for timing. Readings rejected: NaN, infinite, negative, or outside roughly −10 to 250 psi. Invalid readings cause dynamic timing to be bypassed; the GCU falls back to the fixed 125 ms shift delay used before 3.0.6. Shifts still work; they just don't adapt to pressure. Repeated `FALLBACK: Using safe default timing due to pressure sensor failure` lines in the serial log point at the A6 sensor wiring.

A sensor that reads stuck-high pulls the compressor off (safe failure — you can't overpressure the system). A sensor stuck low would drive the compressor continuously; the pull-up on A6 prevents this on a clean disconnect, but a pinched wire that shorts to ground can still produce that symptom.

Pressure sender details and voltage test

The sender is a **10-bit analog input** on GCU pin A6, calibrated at **0.1633 psi per unit** (range 0 – 1023). It lives on the pressure-sensor 4-circuit plug (Pu / Gr / LBl wires per the 51700 Rev B shift harness). A6 is configured `INPUT_PULLUP`, which produces the safe-failure behavior above: a disconnected sensor reads ~5 V → GCU interprets as high pressure → compressor stays off.

To test:

1. Compare the GCU's reported pressure (via the serial console `tank_psi = N` line or the GCU utility) against a mechanical reference gauge on the tank. Disagreement = sender has failed.
2. Voltage test at GCU pin A6 against ground. Voltage should vary proportionally with tank pressure — a full tank (~90 psi) reads higher voltage; an empty tank reads lower. A reading stuck at 0 V or 5 V regardless of pressure indicates a faulty or disconnected sensor.
3. Before condemning the sender, verify the 4-circuit plug is fully seated and the Pu / Gr / LBl conductors show continuity back to GCU pin A6.

Reading the Serial Console

Connect at **115200 baud** via the GCU Flasher's console (see GCU Firmware[p61]). At boot you'll see:

```
Processor is working in main loop.
Firmware 3.1.0
Running in CAN mode.
```

(`KLine mode` on Gen1 cars.) During normal operation the GCU prints a line for every paddle press and every completed shift. Useful patterns:

- **`upshift attempt`** / **`downshift attempt`** / **`NT upshift attempt`** / **`NT downshift attempt`** — the GCU detected the paddle input. If you pull a paddle and see nothing, the switch, wheel wiring, coil cable, or filter cap is at fault, not the valve block.
- **`Shift completed in X ms. Pressure: Y PSI. Shift Delay: Z ms...`** — a full shift ran to completion. If you see this line but no gear change, the mechanical side (valve block, cylinder, shift fork) didn't follow through.
- **Periodic `tank_psi = N`** — sanity check on the pressure reading. Values stuck at 0 or near the sensor max (~150) indicate a wiring fault; compare to the analog gauge or AiM dash.
- **`Writing X.XXV to DAC pin`** (CAN cars) or **`Writing X.XXV to GSS pin`** — the GCU is driving the gearshift-sensor mimic to request blip/cut from the ECU. Absence of this line during shifts on a Gen2 car means the QuickShift request isn't reaching the ECU.
- **`FALLBACK: Using safe default timing...`** — pressure sensor reading rejected as invalid; see the section above.
- **`reset state`** — normal housekeeping at the end of each shift.

Leave the console connected during a test drive around the paddock to capture intermittent issues in context.

Dash Harness

The dash harness collects all the connections to the dashboard controls, as well as passes signal and power to the AiM.

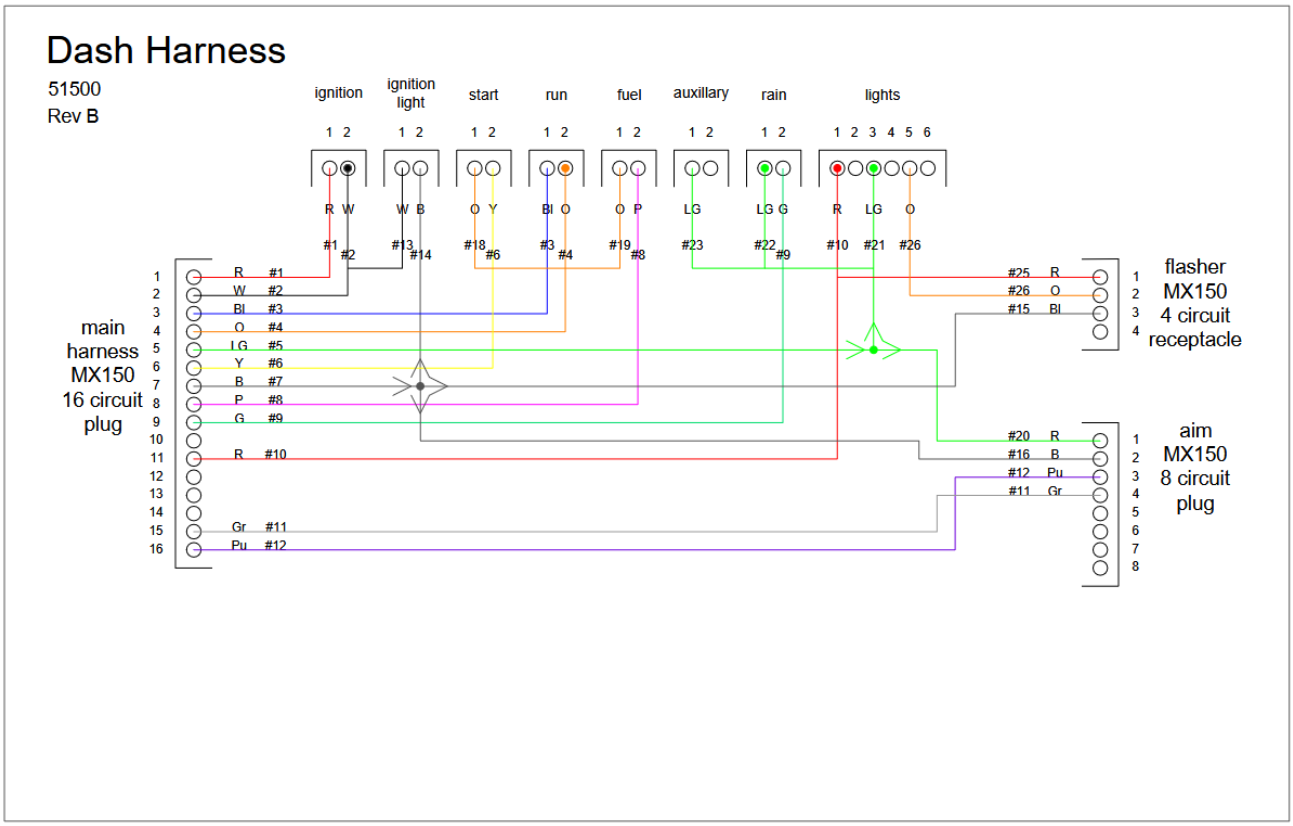


Figure 18: Dash Harness Diagram

There are 3 fused circuits here: the main fuse, the ignition fuse and the signal fuse. The main fuse circuit provides power to the ignition switch, which in turn provides power to most other circuits in the car. Most importantly it switches power to ignition and signal. The ignition fuse circuit provides power to the run switch, which in turn provides power to the starter button, fuel relay controls and ignition circuit components. The signal fuse circuit provides power for secondary components, such as the shift system, AiM display and lights. The signal fuse circuit powers the light green wires shown above.

Download: 51500 RevB.pdf

PDF

Winterizing

(view online resource)

YouTube

Engine and Gearbox

See the Maintenance overview[p31] for more information on when rebuilds are required.

We will collect various techniques and anecdotes for rebuilds in this section as we gather it from dealers.

For information on the GCU, see the Shift Harness and GCU[p54] page.

Limp Mode Diagnostics

Throttle Type	Diagnostic Steps
Gen II — Drive-by-Wire	Connect the **Red** OBD connector to run diagnostics. If no fault codes exist but throttle is limited to 40%, check the Speed Emulator first. Quick check: in Neutral, rev the engine — if it does not rev beyond 6,000 RPM, the Speed Emulator is NOT working.
Gen I — Throttle by Cable	Connect the **White** OBD connector to run diagnostics. Limp mode at full throttle only = throttle is over-extending past ECM limit. Peak throttle percentage should not exceed 95% when viewed through OBD. Dash setup: 92% max.

> **Note: Ignition Fuse:** The 10A ignition fuse controls the ECM, Ignition Coils, O2 Sensor (not used in race configuration), and Pair Valve.

Recommended Engine Oil

Rush Auto Works currently recommends **Klotz KV1560R** (15W/60 racing oil). This replaced the previous recommendation following testing that showed meaningful improvements in wear protection.

> **Warning: Warm-up requirement:** When using Klotz KV1560R, the engine must be fully warmed up before entering the track. This oil is thicker at cold temperatures. Skipping warm-up accelerates wear.

Amsoil Dominator 15W/50 is a well-regarded alternative used by a number of owners.

Oil change interval: Change at each event weekend, or per the service interval schedule.

See Fluids[p50] for the complete fluid specification list.

Clutch Replacement

An important note; when tightening and using **blue** loctite on the clutch, do not fill the motor with oil right away as it will cause the loctite to have trouble bonding. Leave the bolt torqued and the motor dry for some time (at least 24 hours) to allow the loctite to bond properly.

Failure to do this can cause the bolt to come loose, and will cause shift issues and failure of the clutch to fully engage.

Tunables

The Rush SR is fully adjustable for competitive racing. Use the sections below to dial in your setup for any track configuration.

Questions about setup? The Rush SR Owners' Forum is an active community of owners who share setup data and tips. Or contact Rush Auto Works for support.

rush.sr

Factory Baseline Setup Guide

Use the handy PDF below to set up your camber, toe, shocks, anti-roll bars, corner weights, tires pressures, and brake bias.

RAW

Download: Rush SR Baseline Setup.xlsx

XLSX

Download: Rush SR Baseline Setup.pdf

PDF

Use the below PDF to create your own.

Download: Blank Setup.pdf

PDF

Anti-Roll Bars

The factory position of the Anti-Roll Bars (ARB) is 25mm, as measured below:

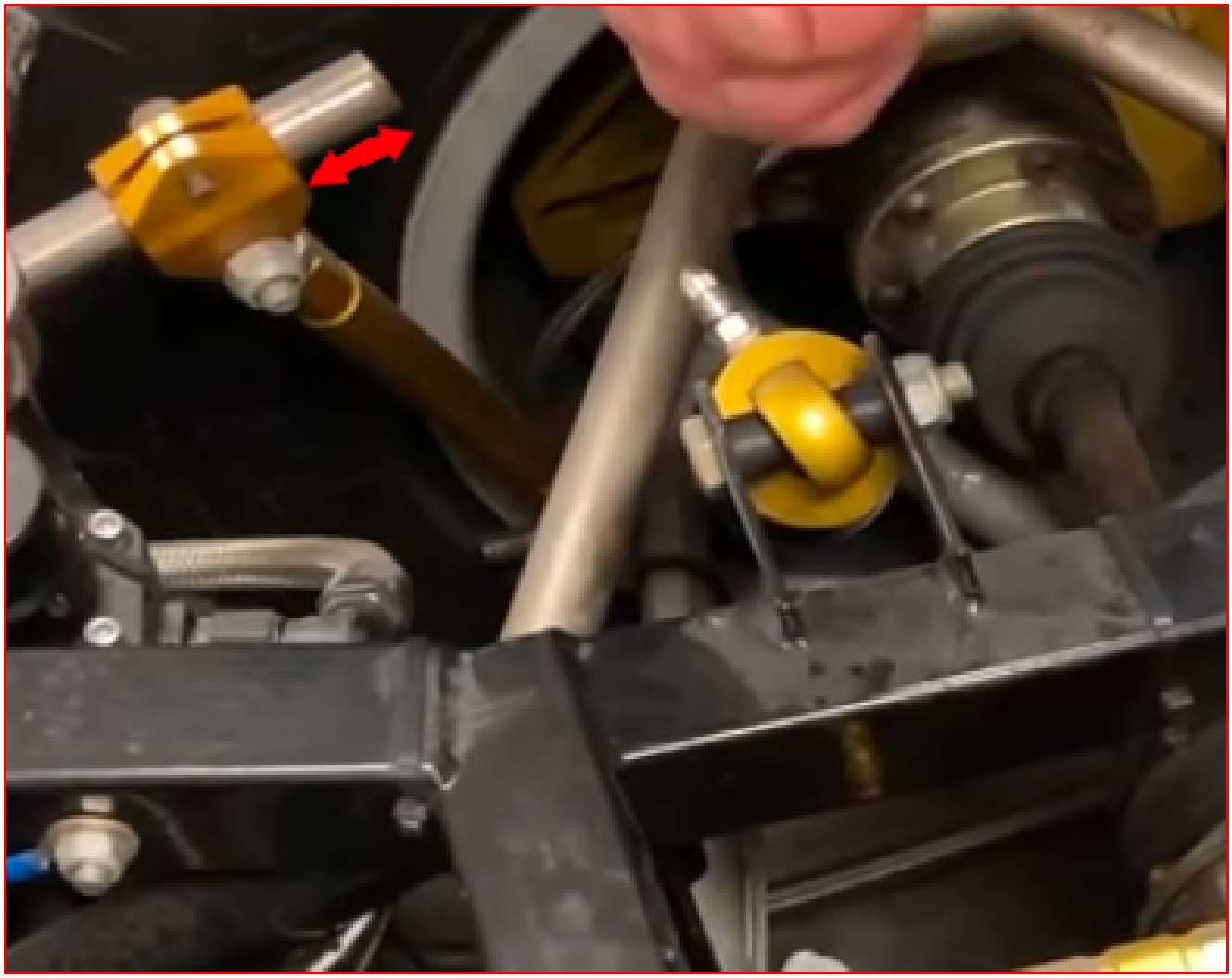


Figure 19: The red arrow is 25mm from the factory

There are three “positions” for the ARB:

1. Soft - The gold fitting is flush with the end of the sway bar
2. Medium (default) - The gold fitting is 25mm away from the end of the sway bar
3. Hard - The gold fitting is 50mm away from the end of the sway bar

On the factory setup guide it has us setting up with the car in the medium position for both the front and rear.

Setting up sway bars is the last step in setting up your car: your ride height and corner balancing[p80]should be already done.

To set the preload to neutral or taking off preload on the sway bars, you are trying to eliminate any torque put on the sway bars placed on them by the natural lean/weight of the car. This puts torque on your sway bars when they should be neutral and waiting for a bump or turn.

Adjusting Sway Bars

> **Note:** Consider sitting in the car, then have a friend do the work. The rest of the car should be in race condition (same amount of gas, air pressure in tires, etc.)

1. Park the car on a level surface.

2. Remove both front sway bar end links.
3. Set ends of the sway bar so they are close to parallel with the ground.
4. Adjust both end links to the same length.
5. Put one of the ends on and adjust the other so that there is no tension on the sway bar.
6. Tighten up the jam nuts and the sway bar end link bolt. You'll also want the heim joints parallel so they can move freely.

Then do the same procedure on the rear and you are set.

Thanks to Doug Larsen for this content.

Shock Adjustments

First of all, shocks should always be kept at 300psi[p36]. Check them before each track day and each race session.

When adjusting preload and ride height, two APU13 wrenches are needed.

See the Shock Diagram[p52] for a full exploded diagram of the shock.

Adjusting Compression and Rebound

Adjustment is best made using a small Allen key in the adjuster holes.

From closed, the compression adjuster (bottom, see picture) has 3.5 turns to fully open.

The rebound adjuster (top) has 4.5 from its fully closed position.

> **Note:** To close, turn to the right. To open, turn to the left. Closed is up, open is down.

The thread pitches are different. If you start with both the compression and rebound closed and open them together by opening the compression adjuster (turn them left), both will be fully open at 3.5 turns of the compression adjuster.

When closing both to the fully closed position, it is best to start by closing both together until you feel a valve bottom out. **DO NOT force the adjusters** at this point as excessive force can dislodge the press-fit valve retainers. Once you feel one of the valves closing, open the rebound valve slightly and see if the compression valve can be further closed. Repeat until you are certain the compression valve has shouldered out and then close the rebound adjuster.

See below for a picture of the adjuster holes. The top is rebound, the bottom is compression. See the Baseline Setup[p76] for stock settings. In short, close both, turn the bottom (compression) adjuster 2 full turns to the left, then turn the top (rebound) left one more turn.

Figure 20: An opened shock. The top adjuster is rebound, the bottom is compression. Turn right to close, left to open.

Gear Ratios / Sprocket Changes

From the factory, the Rush SR ships with a 14T front sprocket and a 44T rear sprocket. The front sprocket is easy to change with a 32mm socket, and you can buy extra sprockets directly from RAW.

See the attached gear calculator for ratios. In short, if you are redlining in 6th, you should run a longer (higher-tooth) front sprocket. If you are not even making it into 6th, you should consider a shorter sprocket.

Our owners have also enjoyed changing sprockets to avoid “awkward” shift points. Sometimes it is better to redline 6th for a moment and enjoy shorter ratios on the rest of the track!

Download: RUSH SR Gear Calculator.xlsx

XLSX

Recommended Sprockets by Track (2026 Season)

These are community-tested starting recommendations. When in doubt, 14T is the safer choice — you’ll occasionally rev-limit in 6th, but the tighter ratios are faster overall at most tracks.

Track	Recommended	Notes
Carolina Motorsports Park	14T	Technical track, short straights
Road Atlanta	15T	Long back straight
Gingerman Raceway	14T	Mix of low and medium speed
Watkins Glen	15T	Frontstretch and bus stop straight
Lime Rock Park	14T	Very technical, no long straights
Laguna Seca	14T	Corkscrew section punishes tall gearing

Rule of thumb: If you're hitting the rev limiter in 6th for more than a few seconds, go up one tooth. If you never make it into 6th, go down one tooth.

Alignment and Ride Height

(view online resource)

See also the Factory Setup Guide[p76] for a printable version of the factory alignment, tire pressures, ride height, and more.

Baseline Setup

The factory RAW baseline PDF is linked in the Factory Setup Guide[p76].

Parameter	Front	Rear	Notes
Camber	-1.2° (in)	-0.8° (in)	—
Toe	0.5mm out	0.25mm in	—
Spring Rate	700 lbs/in (Red)	800 lbs/in (Blue)	—
ARB	Soft	Medium	Soft: Flush w/ End, Med: 25mm, Hard: 50mm
Shock Compression	2 sweeps from closed	2 sweeps from closed	—
Shock Rebound	3 sweeps from closed	3 sweeps from closed	—
Shock Preload	1 turn	2 turns	25mm per turn
Shock Nitrogen Pressure	300 PSI	300 PSI	Check each session
Ride Height (frame-to-floor)	476mm	454mm	22mm rake baseline
Splitter AOA	1° angle of attack	—	—
Wing Setting	—	1 of 6	Lower number = smaller AOA
Tire Pressure	19 PSI cold / 22 PSI hot	19 PSI cold / 22 PSI hot	—
Corner Weights (w/ driver)	-	—	varies: 44–48% front
Brake Bias	58%	42%	Tune forward as needed

Fuel Pressure (at idle): 45 PSI

Ride Height Reference

Baseline is Front 476mm frame-to-floor / Rear 454mm frame-to-floor / 22mm rake.

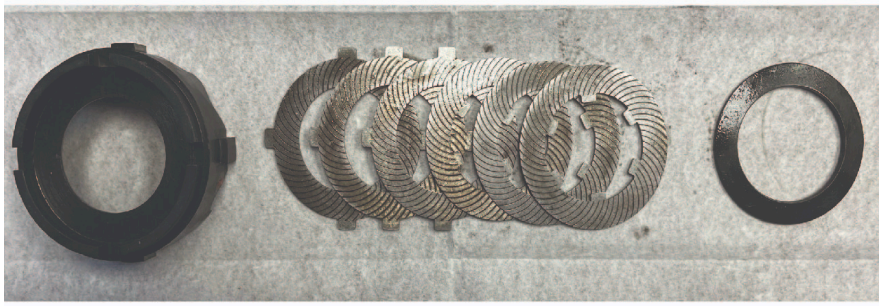
Each 1mm of rake difference equals approximately 0.17° of pitch angle. The 22mm baseline rake equals approximately 3.7° total pitch.

Diff Plate Stacks

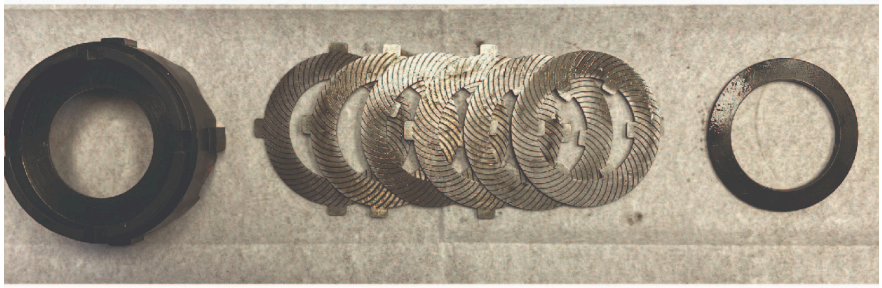
From the factory, we set the differential to the medium friction / medium lock-up configuration in the factory. Most owners leave it there and never touch it.

If you find that you are spinning the inside wheel coming off a corner, you can increase the differential lock up by adjusting the clutch plates to the high friction/ high lock-up configuration. Similarly if you find that power on exit is causing an exit understeer you can reduce the lock-up by going to the low friction configuration.

Low Friction, Low Lock Up, 1 contact face



Medium Friction, Med Lock Up, 3 contact face
Factory Setting



HighFriction, High Lock Up, 5 contact face

The picture above shows the clutch plate configuration for the 3 options. Please also note it takes a long time for the diff plates to seat in as there is really not a lot of movement during use.

Don't confuse a broken in diff with a worn out diff if you are able to spin a wheel by hand easily when you have the wheels off the ground. The diff is doing nothing unless being loaded through the drive gears.

Please note this is mainly driver preference and is NOT a typical tuning technique. The diff is adjustable by virtue of its design. Most will find the factory setting most preferential and will never adjust it!

Ballast

Some competition will require that you meet a minimum weight, such as the Rush SR Spec Series[p28].

In this case, you may need to add ballast to your car. Ballast plates are widely available, we recommend the stackable “brick” type, pre-drilled so you can bolt it into the car.

The best mounting point is behind the seat, in the seat rails. This avoids upsetting the car’s weight distribution and can be solidly bolted to the frame using M10 bolts.

Thanks to owner Andor Tobelem for the below photos and video.

(view online resource)

YouTube

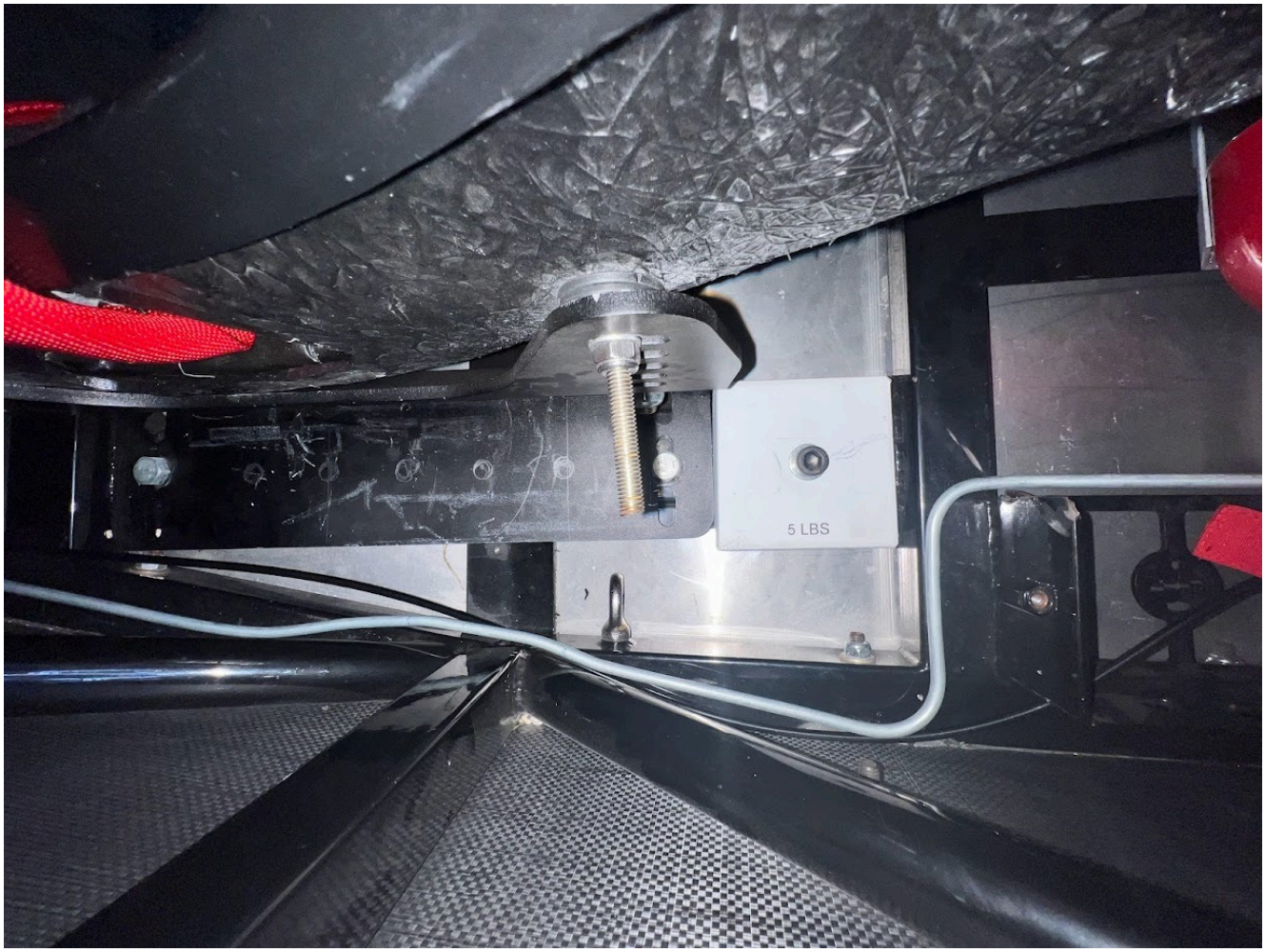


Figure 21: Small blocks from above

Figure 22: Large block bolted tightly into one rail

Figure 23: 5lb blocks on seat rails

Figure 24: Blocks outside of car

Chain Guards and Replacement

The SR comes from the factory with no chain guard. Why?

You might think: Design Engineer = Scottish = Cheap = No chain guard. Good guess, but no.

I have over 50 years' experience with chain driven vehicles, karts and cars. Almost all had chain guards. Yet, I made a different choice with the Rush. I will try and give you some of my reasoning here so that you can make your own decisions inclusive of that knowledge. At the end of the day, it's a personal preference and since we have now seen 4 different customer designs, it is obviously one that several prefer.

Chains are part of our life with a Bike Engine Car (BEC). Nobody loves them, if you do, you're likely a member of an alternate community page. However, they are really a tremendous device. They are relatively simple, low cost and one of the most efficient power transmission devices available.

The trade off is they need maintenance, inspection and replacement to be reliable. Lack of this will result in failure.

Chain failure is something you want to avoid at all costs. It will likely happen when on track under heavy load. That could have severe consequences: you now have a heavy chain coming loose in the engine bay at very high speeds, which can cause mechanical damage to other components in

the engine bay, including the most expensive part of the car: the engine itself.

See our article on lubing chains[p34] for more info.

Use only RK GXW 530 chain with a rivet link. The car takes approximately 64 links, and you can buy them direct from RAW. The RK GXW 530 is the only chain we recommend, there are many available with no where near the strength.

RK

Brake Pads and Rotors

The Rush SR uses 274mm custom rotors with billet 4-pot calipers.

The car is equipped calipers and rotors on all four corners that are the same size as the front pads on the Elise 05+, S2 Exige S, and 211. This is known as the 2593 shape, which is shown below:

2593

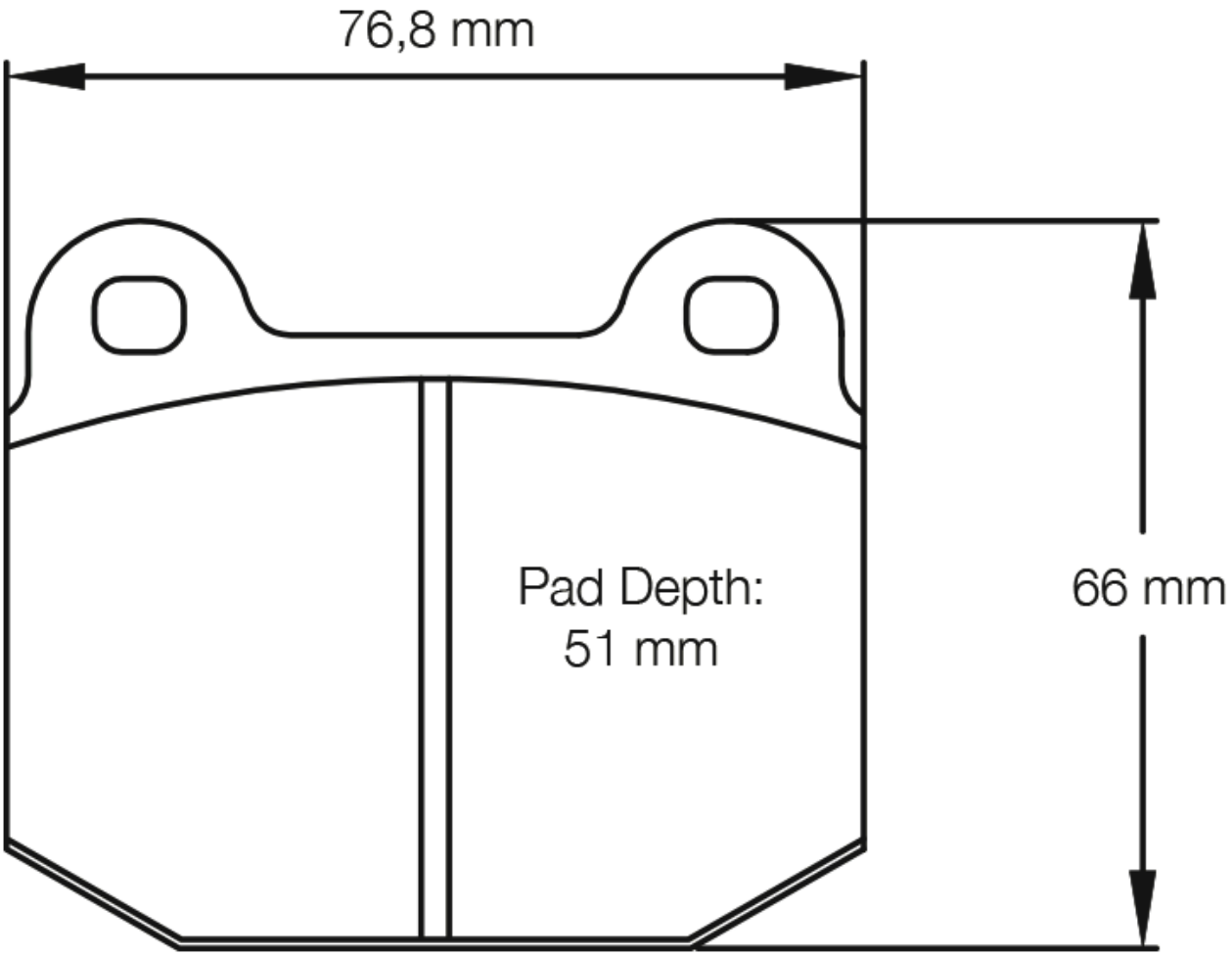


Figure 25: 2593 (Elise Front) Pad Shape

Note there are 14.6mm thicknesses and 15mm thicknesses (also notated as 1587). **15mm will not fit**, so make sure you get the 2593 shape.

The stock pads are a R1 Concepts competition pad. Initial bite is not very aggressive, but they are relatively inexpensive ($74.26/axle on the Spare Parts List) and will last a long time (50+hrs).

rush.sr

Rotating them front to back will increase life as the fronts will show more wear. The rotors will last 100+ hours.

There are a large selection of competition pads available that will allow you to get the pedal feel you want. Due to the overdesign in the brake system, pad selection will not yield higher performance but will change initial bite and progression.

The following pads have been tried with success:

- Hawk HB180 S.560 (these are easy to find, see compounds list and attached photo with compound temperatures)
- Performance Friction PFC-11 and PFC-13
- G-Loc R12 (buy at InoKinetic)
- Carbotech XP8 (buy at Monkey Wrench Racing)

As for compound, keep in mind that this is a light car. Your pads (and tires!) aren't going to get as hot as heavier cars will. This thread on rotor temperatures is a good illustration of that. In general, most amateur drivers should see around 800F, assume pads are roughly 200F more. John from the thread is a hot shoe and saw 1300F. Adjust according to your desired track and driving style.

Changing them out is not much different than doing so on an Elise.

If you have the older Braid silver wheels on your car, some modification may be needed. See this helpful photo below from an owner who is running PFC-11s. The wheels do not provide enough clearance and so a slight shaving of about 1mm is necessary (see the top right corner).

The newer black RAW wheels do not have this problem as they were designed with more clearance.

As always, if you change your pads, be sure to bed them properly[p12]. And if you have questions or need a new set of pads, call your dealer or RAW!

hawkperf

inokinet

Monkey

rush.sr

on

Figure 26: Shaved brake pads to clear Braid wheels (see top right of bracket)

Tires

The spec tire is the Nankang AR-1 Semi Slick. Depending on track surface you should get 4-6 competitive days from a set. Owners have seen as many as 35 heat cycles from this tire before serious degradation, depending on alignment. Many compare it to a Hoosier on its 3rd heat cycle, which is incredible performance and longevity for the cost!

Tires can be ordered directly from RAW or from your dealer. The sizes are:

- 185/60R13 Front
- 205/60R13 Rear

RAW

RAW

Tire Pressures

Starting pressures vary by ambient temperature and driving style. These are community-tested starting points:

Nankang AR-1 (spec tire): - Cold: 18–20 psi front, 18–20 psi rear - Target hot: 26–28 psi front and rear - Adjust cold pressure to hit target hot pressure at your track

Hoosier R7 (alternate): - Maximum hot pressure: 24 psi - Cold starting point: 17 psi has worked well for many drivers

Hankook slicks: - Treat similarly to Hoosier. A growing number of owners prefer these over Hoosiers at lower cost.

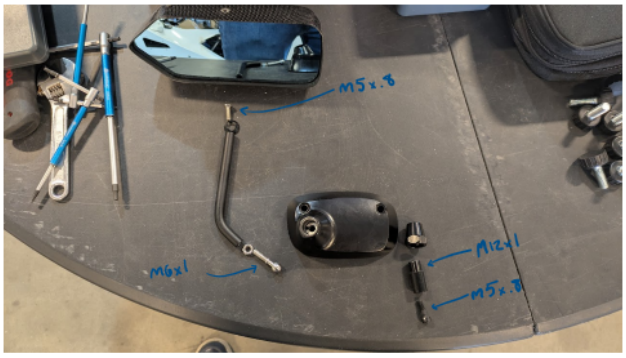
Monitor tire temps across the surface (inside / middle / outside) to diagnose alignment and pressure issues.

Mirrors

As per 4.8.5 of the Technical Regulations[p28], alternative mirrors may be used.

Details of the existing mirrors are below. There are many mirrors available on Amazon and similar sites that are universal and will fit the car well, and can be mounted in the original mounting location or to the roll bars.

Amazon



Recommended replacements

Amazon

Amazon

- Ball mounts
- Motorcycle mirrors

Some people prefer mounting these to the roll bar for a more secure, vibration-free fit. They may also stick on small convex mirrors for a wider field of view, which helps cover the blind spots created by the car’s wide rear bodywork.

Amazon

Owner Resources

Running and Consumables Costs

We have had a number of people ask about consumables and how this will affect the operating costs. While this will obviously be largely impacted by the tracks where the car is being used, we have prepared this as a basic guide for our customers to get a understanding of what to expect.

Routine Maintenance

Longevity of the car and your on-track experience obviously will be impacted by performing routine maintenance of the car. The key areas here are the chain driveline, coolant system and engine lubricants.

The Rush SR is easy to work on. A large number of our owners are their own mechanics. For this reason, parts are inexpensive and access to critical components is generally easy and unobstructed. Before going out for a day, it is proper practice to take the front and rear bodywork off and inspect the car. Thankfully, this only takes minutes and can be done solo!

See our Maintenance Section[p31] for complete details.

Combined Cost per Hour

The Rush SR is designed to be very inexpensive to run and maintain.

The Rush SR runs long-life tires[p88], over-specced brakes[p86], pump gas, a wet-sumped motor[p9], an unmodified sequential gearbox, a 14-piece body (no piece is too big to ship via UPS!), and has very light weight. This means it is very easy on consumables, and thus the Rush SR has a very competitive cost per hour, especially compared to other cars[p92].

> **Note:** *Rush SR runtime costs are estimated. They are dependent on driving style, track surface, tire wear, and owner preferences.*
>
> *All costs projected for competing cars are also estimations. Many competing costs have not been updated since 2021, and real costs are higher than projected.*
>
> ***At $150/hour to run, the Rush SR is in a league of its own.***

This cost is far lower than the estimated cost of running a Radical SR3 ($671/hr), Formula Mazda ($512/hr), and Formula 4 ($590/hr). Despite this, laptimes are a few seconds slower at popular tracks (approximately 3 seconds at Sonoma).

Popular inexpensive spec series like Formula Vee ($219/hr), Spec Miata ($435/hr), Spec 911 ($323/hr), and Spec E46 ($330/hr) deliver inferior performance, overwhelmingly rely on used and out-of-production parts, cost double or more to run, **and** often lack the safety features and conveniences (like no-lift paddle shifting) that are standard in the Rush SR.

Details below and in our complete spreadsheet[p92]:

Item	Frequency	Cost	Cost per Hour
Oil Change	6-8 hours	$40	$5.00
Chain Wax	20 hours (per can)	$14	$0.70
Tires	15 hours	$896	$59.73
Brake Pads	10-40 hours	$500	$12.50-$50
Brake Rotors	100 hours	$540	$5.40
Chain and Sprockets	50 hours	$250	$5.00
Suspension Bushing & Bearings	100 hours	$400	$4.00
Fuel (**93 pump gas**)	8 gal/hr (roughly)	$3/gal	$24.00
Engine Rebuild	160 hours	$3,500	$21.88
Gearbox Rebuild	160 hours	$750	$4.69
Total			~$150/hr

Ready to own a Rush SR? View full pricing, build options, and available configurations or build and price your Rush SR.

RAW

RAW

Comparison to Other Cars

> **Note:** *All runtime costs are estimates based on publicly available data, dependent on driving style, track surface, tire wear, and owner preferences. RAW does not guarantee the accuracy of competitor pricing.*

Cost Per Hour Summary

Car	Runtime $/hr	Key Cost Drivers
Rush SR	**~$150/hr**	$896/set Nankang AR-1 (15hr life), $4,000 engine rebuild every 160hr
Spec Miata	~$295/hr	$924/set Toyo RR (8 cycles), $4,000 engine rebuild every 53hr
SRF3	~$365/hr	$1,270/set Hoosier SRF (12 cycles), $620 rotors every 10hr, $6.3k engine/200hr
GT4 Clubsport	~$595/hr	$2,800/set Pirelli slicks (10hr life), 15 gal/hr fuel burn at $6/gal

Detailed Breakdown

Rush SR — $150/hr

Item	Cost	Life	$/hr
Fuel (91-93 octane)	$4.19/gal × 6 gal/hr	—	$25
Tires (Nankang AR-1)	$896/set	15 hr	$60
Brake pads	$500/set	25 hr	$20
Brake rotors	$540/set	100 hr	$5
Oil changes	$40/change	7 hr	$6
Chain, sprockets & lube	$264 kit + lube	50 hr	$6
Suspension bushings	$400 kit	100 hr	$4
Engine rebuild reserve	$3,500	160 hr	$22

Item	Cost	Life	$/hr
Gearbox rebuild reserve	$750	160 hr	$5

SRF3 — $365/hr

Item	Cost	Life	$/hr
Fuel (91-93 octane)	$4.19/gal × 6 gal/hr	—	$25
Tires (Hoosier SRF slick)	$1,270/set ($264/tire +20%)	12 cycles	$106
Brake pads (Hawk Blue)	$408/set (+20% from $340)	8 hr	$52
Brake rotors (Wilwood)	$620/set (+20% from $516)	10 hr	$62
Oil changes	$66/change (+20%)	9 hr	$7
Suspension (bearings, ball joints, shocks)	$118/weekend (+20%)	3 hr	$40
Engine rebuild reserve	$6,300 (+20% from $5,250)	200 hr	$31
Gearbox rebuild reserve	$4,200 (+20% from $3,500)	100 hr	$42

Spec Miata — $295/hr

Item	Cost	Life	$/hr
Fuel (91-93 octane)	$4.19/gal × 8 gal/hr	—	$34
Tires (Toyo RR)	$924/set	8 cycles	$116
Brake pads (Hawk DTC-60)	$275/set	10 hr	$28
Brake rotors (blank)	$320/set	80 hr	$4
Oil changes (Rotella T6)	$32/change	6 hr	$5
Suspension (hubs & bearings)	$180/yr	18 hr/yr	$10
Engine rebuild reserve	$4,000	53 hr	$75
Gearbox rebuild reserve	$1,200	53 hr	$23

GT4 Clubsport — $595/hr

Item	Cost	Life	$/hr
Fuel (98 octane race fuel)	$6/gal × 15 gal/hr	—	$90
Tires (Pirelli slick)	$2,800/set	10 hr	$280
Brake pads (PFC)	$1,100/set	15 hr	$73
Brake rotors (Girodisc 2-piece)	$3,100/set	60 hr	$52
Oil changes (Mobil 1 0W-40)	$120/change	6 hr	$20
Suspension (KW damper rebuild)	$1,120	50 hr	$22
Engine rebuild reserve	$20,000 (zero-hours schedule)	500+ hr	$10
PDK service + replacement reserve	$1,000/25hr + $22k reserve	25 hr svc	$48

Full Spreadsheet

The original cost comparison spreadsheet (Holmberg, 2021) covers 28 racing classes:

(view online resource)

> **Warning:** *Spreadsheet prices are from 2021 and have not been adjusted for inflation. The tables above use current (2026) pricing from manufacturer price lists and community sources.*

Try the interactive Season Cost Calculator to build your own estimate.

Interested in owning a Rush SR? See full pricing and configuration options on our site.

Parts and Repair Costs

The Rush SR features very inexpensive parts compared to the competition. The secret ingredient: lightness and relatively low horsepower.

Tires are under $900/set and can last an entire season. Brake pads are $82/axle. A full set of bodywork is just over $3,000.

You'll find that these prices blow away the competition, and keep the Rush SR the best value for the money in all of motorsports!

See the latest pricing and order today at our parts website.

Transporting Your Rush SR

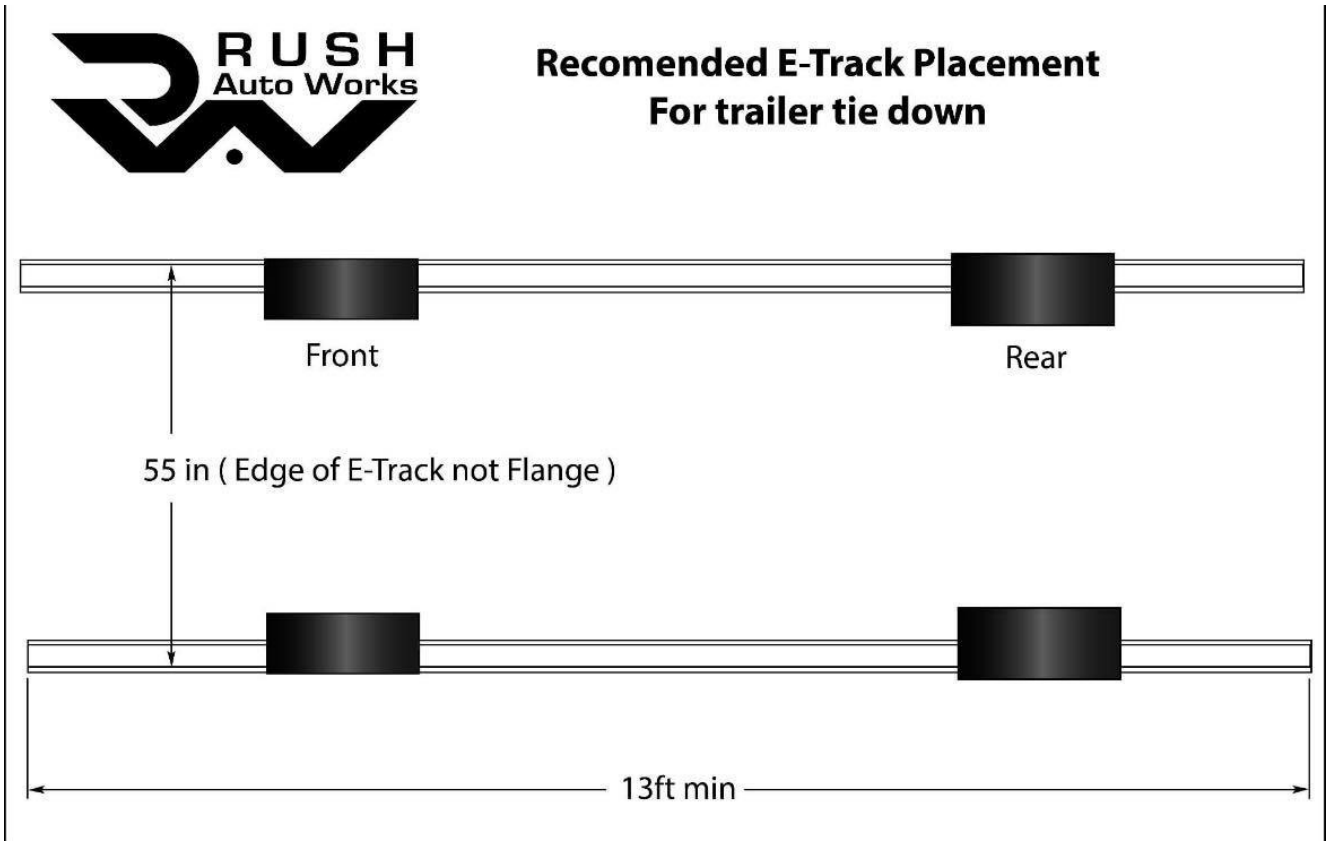


Figure 27: RAW-recommended E-Track Placement

See also the below PDF, prepared by owner Tim Gorham. The below is not prepared by RAW and is not endorsed by us, but is considered useful by our owners.

Download: Gorham 2023 E-track Guide.pdf

PDF

Wrapping Your Rush SR

Many of our owners have enjoyed wrapping their SRs. Commonly, cost is in the approx $3,000 range to do this, with some shops being cheaper than others.

Your wrap shop can use this handy template below to help you come up with the perfect wrap.

Once applied, we recommend applying additional clear PPF to the front bumper and to the areas of the side pods where the front and rear clip contact the pods.

Download: RAW wrap template 000 (SR).ai

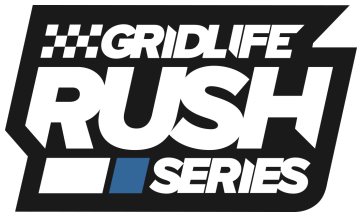
AI

Media and Logos

Brand Colors

Dark Blue 282 C	Blue 2995C	Orange 1665C	White
PANTONE® PMS 282 C #041E42	PANTONE® 2995 C	PANTONE® 1655 C	PANTONE® 000C White
#041E42	#00A9DF	#FC4C01	#FFFFFF

Brand Logos

RAW Master Logo	Rush Logo	Series Logo	GridLife Rush Logo
			

Illustrator Logo	Black PNG	White PNG
RAW LOGO.ai		

Spec Series Decals

The RUSH Spec Series[p28] requires specific decals on the car. You can contact RAW directly for the decals, which will be available at all events. See the GridLife Decal Guide for placement details.

GridLife

Profile	3/4 View
	

Front	Rear
	

Download: 2025_RUSH-DECALS.ai

AI

Service Bulletins

Technical Service Bulletins (TSBs) issued by Rush Auto Works. Review all bulletins applicable to your car.

Safety-critical bulletins are marked with a warning callout. These should be reviewed immediately and addressed before your next track event.

All bulletin PDFs are hosted on the Rush SR Community forum.

rush.sr

Current Bulletins

Date	Title	Severity
2026-01-16	Misalignment Spacer[p98]	Info
2025-11-04	Upgraded Spherical Bearing and Bearing Install Tools[p98]	Info
2025-11-03	Control-Arm Retaining Compound[p98]	Info
2025-10-07	Brake System Upgrade Kit[p98]	**Warning**
2025-10-07	Differential Rebuild Upgrade Kit[p98]	Info
2025-09-22	6 Gallon Fuel Cell Installation Procedures[p98]	Info
2025-09-17	Lifeline Fire Suppression System[p99]	**Warning**
2025-09-12	Compressor Technical Service Bulletin[p99]	**Warning**
2025-07-29	Lowered Differential[p99]	Info
2025-07-23	Wide Rear Camber Plates and Shims[p99]	Info
2025-07-21	Sealing Washers for 12 Gal Fuel Cell[p99]	**Warning**
2025-07-09	Upgraded Outboard CV Joint Hardware[p99]	**Warning**
2025-07-02	Fuel and Fire System TSB[p100]	**Warning**
2025-06-23	12 Gal Vent Line Relocation Bulletin[p100]	Info
2025-06-23	Battery (+) Wire Relocation Bulletin[p100]	Info
2023-05-19	Pedal Box Safety Notice[p100]	**Warning**

2026-01-16 Misalignment Spacer

> **Note:** New misalignment spacer for steering connection improves reliability and reduces wear.

Full bulletin and PDF downloads on the owner's forum.

Attached files: - 00024 - Misalignment Spacer for Steering Connection.pdf

2025-11-04 Upgraded Spherical Bearing and Bearing Install Tools

> **Note:** Improved spherical bearing with PTFE liner — no additional lubrication required, direct replacement with no control-arm modifications.

Full bulletin and PDF downloads on the owner's forum.

2025-11-03 Control-Arm Retaining Compound

> **Note:** Retaining compound procedure for control arm hardware. Apply during next scheduled service.

Full bulletin and PDF downloads on the owner's forum.

Attached files: - 00021-Control Arm Retaining Compound.pdf

2025-10-07 Brake System Upgrade Kit

> **Warning:** Brake system upgrade kit addresses known brake failure points. Strongly recommended for all cars prior to competition.

Full bulletin and PDF downloads on the owner's forum.

Attached files: - 00020 - Brake Upgrade Kit V3.pdf

2025-10-07 Differential Rebuild Upgrade Kit

> **Note:** Upgraded differential rebuild kit improves longevity and performance. Recommended when performing differential service.

Full bulletin and PDF downloads on the owner's forum.

Attached files: - Differential Rebuild Kit Upgrade.pdf

2025-09-22 6 Gallon Fuel Cell Installation Procedures

> **Note:** Installation procedures for the Gen3 6-gallon fuel cell. Required for NASA, SCCA, and SVRA competition in 2026.

Full bulletin and PDF downloads on the owner's forum.

Attached files: - 6 Gallon Fuel System Installation Procedures V2.pdf

2025-09-17 Lifeline Fire Suppression System

> **Warning:** New Lifeline fire suppression system replaces previous system. Safety-critical: review installation procedures.

Full bulletin and PDF downloads on the owner's forum.

Attached files: - New Fire Suppression Install Procedures V2.pdf - New Fire Suppression System.pdf

2025-09-12 Compressor Technical Service Bulletin

> **Warning:** Covers brake master cylinder banjo bolt replacement, compressor upgrade, and Kleinn compressor fuse. Review before next event.

Full bulletin and PDF downloads on the owner's forum.

Attached files: - BMC Banjo Bolt.pdf - Upgraded Compressor.pdf - Kleinn Compressor Fuse Replacement.pdf

2025-07-29 Lowered Differential

> **Note:** Lowered differential position improves handling balance. Includes drill template for installation.

Full bulletin and PDF downloads on the owner's forum.

Attached files: - diff drill template v2.pdf - Lowered Differential.pdf

2025-07-23 Wide Rear Camber Plates and Shims

> **Note:** New wider rear camber plates and shim kit provide increased camber adjustment range.

Full bulletin and PDF downloads on the owner's forum.

Attached files: - Camber Plates and Shims Bulletin.pdf - Camber Shim Kit.pdf

2025-07-21 Sealing Washers for 12 Gal Fuel Cell

> **Warning:** Covers sealing washer installation for the 12-gallon fuel cell. Fuel leak risk if not addressed.

Full bulletin and PDF downloads on the owner's forum.

Attached files: - Sealing Washers For Fuel Cell.pdf

2025-07-09 Upgraded Outboard CV Joint Hardware

> **Warning:** Upgraded outboard CV joint hardware addresses known failure points and improves longevity. **Strongly recommended for all cars prior to competition.** Cars without the kit have suffered outer CV boot failures during races, particularly on circuits with aggressive curbing.

Full bulletin and PDF downloads on the owner's forum.

Attached files: - Upgraded Outer CV Hardware.pdf

2025-07-02 Fuel and Fire System TSB

> **Warning:** Safety bulletin covering fire suppression cable inspection and fuel line age-out. Review immediately.

Full bulletin and PDF downloads on the owner's forum.

Attached files: - Fire Suppression Cable Check Bulletin External.pdf - Fire Suppression Cable Check Procedures.pdf - Fuel Lines Age Out.pdf

2025-06-23 12 Gal Vent Line Relocation Bulletin

> **Note:** Covers vent line relocation for the 12-gallon fuel cell. Applies to cars with the 12-gallon cell only.

Full bulletin and PDF downloads on the owner's forum.

Attached files: - Vent line relocation.pdf - Vent line relocation procedure.pdf

2025-06-23 Battery (+) Wire Relocation Bulletin

> **Note:** Covers relocation of the battery positive wire. Follow procedures to avoid electrical shorts.

Full bulletin and PDF downloads on the owner's forum.

Attached files: - Battery (+) Wire Relocation Bulletin External.pdf - Battery (+) Wire Relocation Procedures External Instructions.pdf

2023-05-19 Pedal Box Safety Notice

Download: 2023-05-19 Rush SR Pedal Box Safety Notice.pdf

These pictures show the completed repair.

The repair can be performed in a few different ways.

1) Least amount of work, The weld repair can actually be done in the car without completely removing it or dismantling it. The 4 bolts that mount it to the chassis must be removed. The break, clutch and throttle cables can be left in place. The paint is then ground off along the side and back seam. The side seams should be completely welded the back seam should be welded from the ends to the inner supports. The welds should be TIG welded as the frame is aluminum. This welding procedure is the same weather removing the box or not. Obviously this requires the car to be taken to a facility where the weld can be performed. This is less than 1hrs total for the repair.

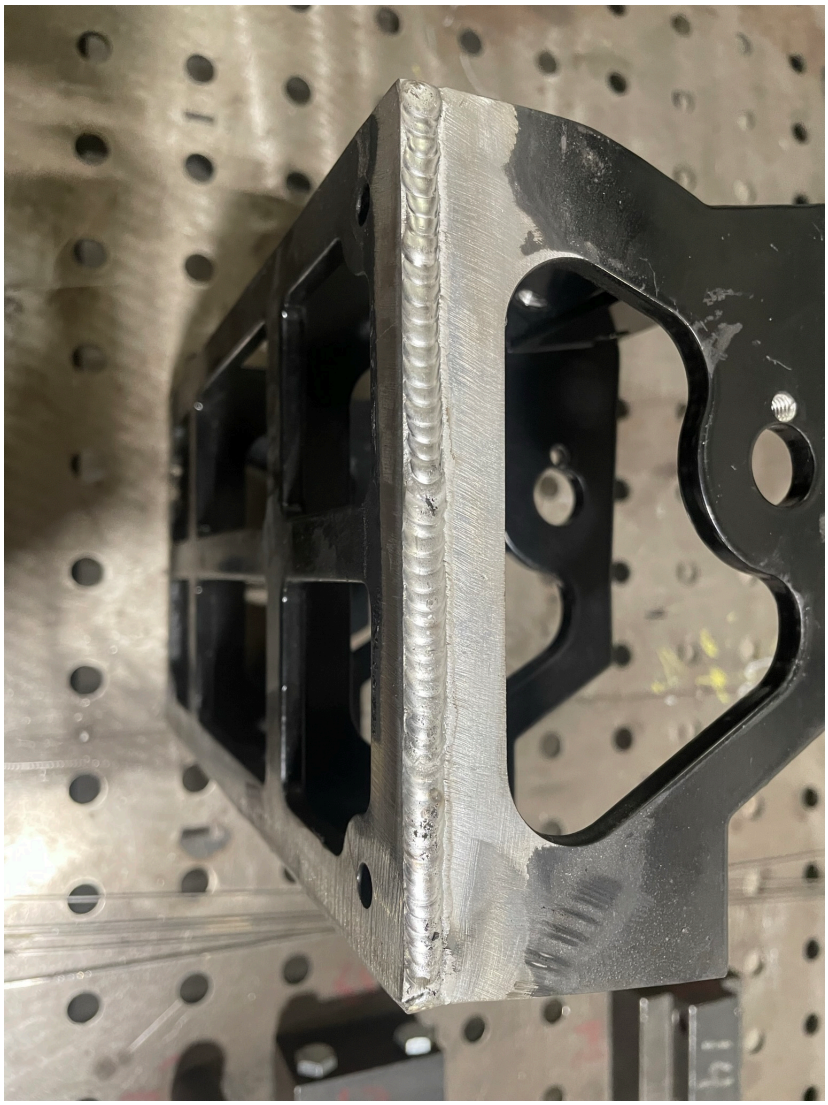
2) Pedal box removal. Remove the pedal box as above, remove the barrel from the end of the throttle cable and clutch cable. Remove the master cylinders, leaving the brake lines connected which will eliminate the need to bleed the brakes afterward.

With the pedal box removed it can be taken to a qualified welder where the welding should be performed as in 1 above.

3) Follow the instructions in 2 above, once the pedal box is removed from the car, box it up and send it to us. We will do the weld repair and send it back.

4) Lastly we are happy to send out a new pedal box frame to anyone who wishes it rather than the above options. This is however the most work as the pedal box will have to be completely

disassembled and rebuilt.



This bulletin can also be found on the owner’s forum and on the Facebook group.

rush.sr

Facebook

Getting Help

The best way to get help with your car is to call or email us directly.

(713) 937-0000
info@rushautoworks.com

However, if you are looking for tips, tricks, and community, the below resources may be useful:

- Rush SR Owners' Forum
- Rush SR Facebook Community

rush.sr

Facebook