SUSPENSION & ENGINES (/)

PRODUCT SEARCH (/product-search)

DVS VALVING SEARCH (/dvs/)

SPRING RATE SEARCH (/product-search)

ENGINE SEARCH (/engine-search)

FORK GOLD VALVE CARTRIDGE EMULATOR INSTALLATION
FEGV Series Standard

Welcome to the wonderful world of Gold Valving. To obtain your personal Custom Suspension Settings go to DVS Valving Search, insert your Access Code and rider data and print your DVS Setup Sheet. (/dvs)

To find instructions for your bike go to **Product Search** (/product-search) and look up your model. There may be more than one set of instructions required for the complete installation.

- These instructions outline typical Emulator installation. Look in **Product Search** (/product-search) and see if there are **"Special Valving Instructions for this Kit"** listed. Follow those too.
- Your Emulator Valving Setup may be different than the standard pre-installed valving.
- Most models **require** different fork springs. Consult the **Product Search.** (/product-search)
- Before installation check for proper fit (steps 4 and 5)

Click to enlarge

(/wp-content/uploads/TFDH-01-Group-PRINT.jpg)

TFDH 01 Damping Rod Holding Tool

$84.99 ADD TO CART

1 - TOOLS AND SUPPLIES

- Allen Socket (6, 8, 10, 12 or 14mm) depending on model
- Impact
- 8mm (5/16") or 6mm (¼") drill and drill motor
- Tape measure (metric)
- TFOL 02 Oil Level Tool - not required but definitely cool **TFOL 02** – $144.99 ADD TO CART
- Tubing cutter for spring preload spacer
- Seal Driver - TFSD Series size depending on model - **Tools Page** (/tools/)
- Fork Seals and Bushings - this might be a good time to replace them
- Fork Fluid (see **DVS Setup Sheet** (/dvs) or **Product Search** (/product-search) for viscosity recommendation)
- Damping Rod Holding Tool - may not be needed. Grabs the hole in the center of the rod with its taper. Fits most damping rods.**TFDH 01 Damping Rod Holding Tool** $84.99 ADD TO CART

Round

6 Point

(/wp-content/uploads/DampingRod_A-101.jpg)

12 Point

2 - STANDARD CUPPED-TOP DAMPING ROD - This is the most common type of damping rod on Japanese KYB and Showa forks from the early 70s to present.
The top of this damping rod is cupped. The inside of the head may be round (top), 6 point hex (middle) or 12 point (bottom). The hex is for an OEM holding tool.

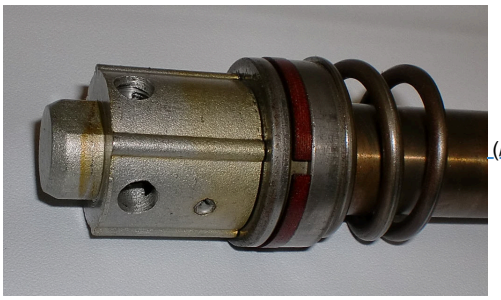
Piston rings are standard on modern damping rods. If there is no stock piston ring the Emulator Adapter will have one built in.

Emulators are designed to sit in the cup on top of these damping rods. The fit does not have to be exact. The requirement is that the Emulator must cover the top opening completely. Move it over to the side to check for gaps.

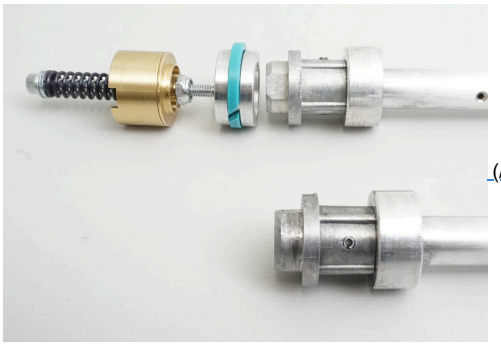
The main fork spring holds the Emulator in place.


(/wp-content/uploads/SUZ_DR350_STK01.jpg)

Flat-Top Suzuki DR350
Emulator Adapter Built into Emulator FEGV 4321


(/wp-content/uploads/KAW_KX250_1974_STK01.jpg)

Protruding-Top, Wimpy Piston Ring 1974 KX250
Machining Required
Adapter with Piston Ring (because the stock one is junk)


(/wp-content/uploads/FK-KYB-1974-EMU-DSC01790.jpg)

Protruding-Top, No Piston Ring 1974 Kawasaki F9 Bighorn
Adapter with Piston Ring
No head machining required

2A - NON-CUPPED AND NON-STANDARD DAMPING RODS -

These come in two basic styles; Flat-Top and Protruding-Top. ***More Details... (/damping-rod-gallery#type_2_-_non-cupped_top)***

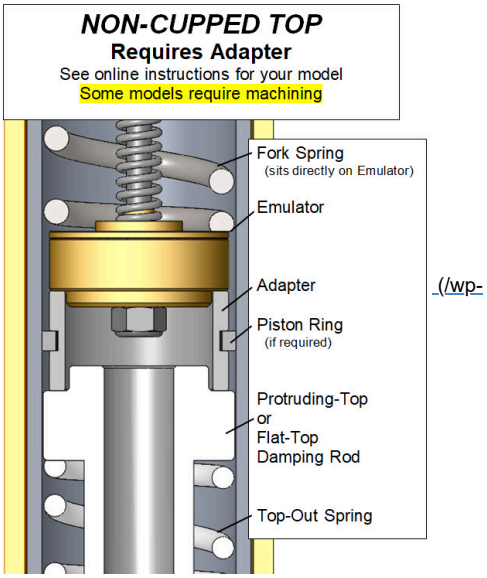
See **"Special Valving Instructions for this Kit"** in **Product Search** (/product-search).

EMULATOR ADAPTERS

- **Most non-standard rods require Emulator Adapters. The adapter is placed between the damping rod and the Emulator.**
- Sometimes the Adapter has a right side up - so pay particular attention to how it fits together.
- Piston Rings - Some adapters have piston rings. This is because they do not come with them or because the stock ones seal poorly.
- FEGV 4121and FEGV 4321 are for flat-top damping rods and have the adapter built into the Emulator.

OTHER

- **Machining** - Some rods require machining on a lathe
- **Rebound Adjusters** - Most rebound adjusters will be disabled. ***More Details... (/damping-rod-gallery#type_6_-_adjustable_rebound_damping)***
- **Brazing** - Some forks require holes to be filled. We recommend sending them to a competent suspension tuner familiar with the installation or to Race Tech.
- **Stock Valves** - some models have valves in their original design. Linear Valves, TCV Travel Control Valves, Compression Adjusters, etc. These will be removed or disabled. ***More Details... (/drod-4-linear-valve)***
- **Anti-Dive** - street bikes with Anti-Dive will be disabled. ***More Details... (/damping-rod-gallery#type_5_-_anti-dive_brakes)***



(/wp-content/uploads/FK_EMU_CA_W_ADAPT.jpg)

(/wp-content/uploads/TFDH-01-Group-PRINT.jpg)***TFDH 01***

3 - Remove the damping rods. Take the forks off the bike and disassemble them. An impact and a long Allen socket helps a lot.
For stubborn Damping Rod Allen bolts use a drift and beat on the head of the damping rod bolt to jar the threads loose.
Most forks can be disassembled without a holding tool by leaving the spring in and compressing the fork to provide resistance to turning while using an impact.
For really stubborn bolts use a TFDH 01 Damping Rod Holding Tool. **TFDH 01** –

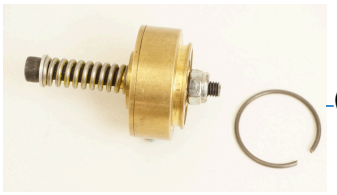
$84.99 ADD TO CART

Unless you are doing a complete overhaul you may not have to remove the seals. Simply take the fork spring and the damping rod bolt out, turn the fork upside down and the damping rod will fall out. The only tricky part is making sure the bottoming cone gets installed correctly.

(/wp-content/uploads/FK_PRELOAD_DROD_DSC03036.jpg)

(/wp-content/uploads/FK_PRELOAD_DROD_DSC03038.jpg)

Pushed Sideways - Gaps Open



(/wp-content/uploads/FK_PRELOAD_DROD_DSC03102.jpg)

Sizing Circlip Off

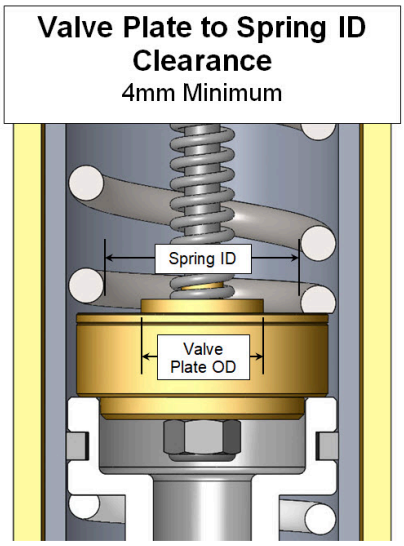
(/wp-content/uploads/FK_PRELOAD_DROD_DSC03106.jpg)

Sizing Clip Installed

4 - Check the fit of the Emulator by placing it on top of the damping rod. The step on the Emulator must sit into the top of the damping rod. The Emulator must completely cover the hole in the top.
If your application calls for an Emulator Adapter it goes onto the Damping Rod first. The Adapter may be directional (there is an up side and a down side).
Some Emulators (FEGV 4301 and 4101) come with Sizing Circlips (pictured). This allows proper fit for more than one ID damping rod. Check to determine if you need the Sizing Circlips by installing the Circlip and checking if it will fit into the top of the damping rod. The Circlip is for location only.

(/wp-content/uploads/FK_PRELOAD_DROD_DSC03039.jpg)

Pushed Sideways - Still Covered



(/wp-content/uploads/FK_EMU_CA_VALVE_PLATE_FIT.jpg)
(/wp-content/uploads/SUZ_RM250_1984_MOD02.jpg)

5 - Check the Fork Spring to Valve Plate clearance. The inner diameter of the fork spring must be at least 4mm (0.160”) larger than the Emulator Valve Plate itself for proper flow. This may be a problem if you are not using a RT Spring.

NOTE: The spring rests directly on the Emulator. There is no washer under the spring.

(/wp-content/uploads/DRod_6-1_KAW_ZX11_DSC01342.jpg)

Top Compression Holes Stock - Bottom Modified

6 - Enlarge the Compression Feed Holes

Based on Damping Rod Diameter:

- **17mm or larger - drill 8mm (5/16") holes**
- **smaller than 17mm - drill 6mm (¼") holes**

Enlarge existing compression holes and add holes if necessary so you end up with six holes (3 sets of 2 holes).

New holes should be spaced lengthwise above the existing holes at 10 mm (7/16") increments. Place each set of two holes 90 degrees from the last set so the strength of the rod is maintained.

There are exceptions to this as some models keep the holes in the same line. See notes on the DVS Setup Sheet.

After drilling, chamfer and deburr the compression holes, inside and out.

The exact size of the holes is not critical. There needs to be enough flow area. **This step transfers control of the damping from the compression holes to the Emulator.**

Anti-Dive - Models with Anti-Dive are particularly sensitive to correct hole location. On rods with bottoming cones the additional compresson feed holes should start just above the cone. See **"Special Valving Instructions for this Kit"** in **Product Search** (/product-search) or the Anti-Dive section of the Damping Rod Gallery (/damping-rod-gallery#type_5_-_anti-dive_brakes).

(/wp-content/uploads/FK_DROD_REB_HOLE_DSC_0063.jpg)

Rebound Hole

7 - Rebound Holes - Unless directed, do not add or enlarge the rebound holes (near the top of the damping rod) and leave their edges sharp. Adjustable Rebound models that require brazing may need work in this area. See **"Special Valving Instructions for this Kit"** in **Product Search** (/product-search).

(/wp-content/uploads/KAW_KX250_1974_MOD04.jpg)

Linear Valve Stock and Disabled

8 - Stock Valves - If there is any type of compression valve or adjuster, it must be removed or disabled.

Variations:

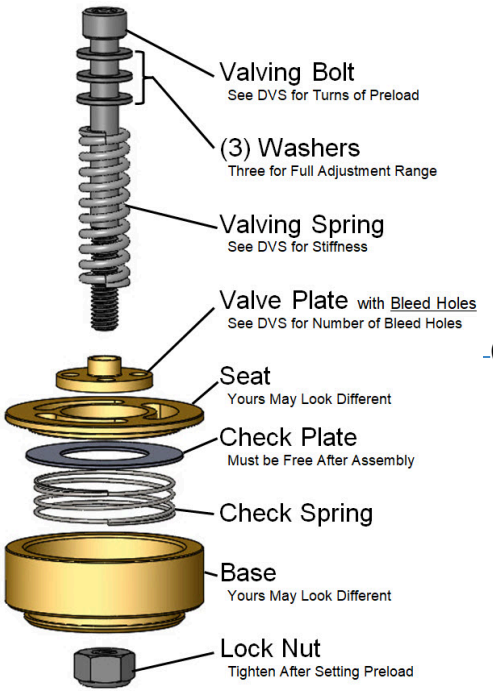
Linear Valves - The valve shown at the left is called a Linear Valve. Very common on dirt bikes in the 80s. It is part of the bottom bolt. It is modified by cutting it off where it goes into the bolt. You will no longer have external adjustment, however you won't care so much once you've ridden. ***More Details... (/drod-4-linear-valve)***

Damping Rod Top Valves - A few models have an existing valve that sits on top of the damping rod. One version is called a TCV found on KYB dirt forks in the mid 1980s. They have a valving rod attached to a spring sitting on top of the damping rod. Remove these stock valves.

Anti-Dive - Found exclusively on street bikes, Anti-Dive is disabled and not needed with Emulators. The addition of correctly located Compression Feed Holes takes care of this. ***More Details... (/damping-rod-gallery#type_5_-_anti-dive_brakes)***

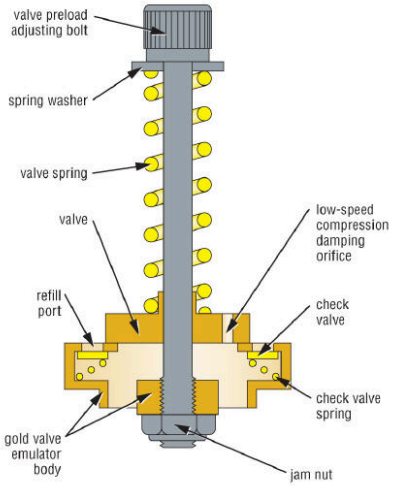
Adjustable Rebound - External adjusters are found on some street bikes. Often these are disabled. ***More Details... (/damping-rod-gallery#type_6_-_adjustable_rebound_damping)***

See **"Special Valving Instructions for this Kit"** in **Product Search** (/product-search).



(/wp-content/uploads/FEGV_EXP_TXT.jpg)

Exploded View



(/wp-content/uploads/3-18-500.jpg)

Emulator Cutaway

9 - Setup the Emulator Valving

Consult your **DVS Setup Sheet** (/DVS).

VALVE SPRING RATE

Determine which Valve Spring is installed by its color and change it if necessary.

- 26 lb Silver
- 40 lb Blue
- 64 lb Yellow
- 101 lb Red

VALVE SPRING PRELOAD

- Valving Spring Preload is counted in turns of Valving Bolt thread from no preload.
- The Adjusting Bolt is threaded into the Emulator Body. There is a jam nut on the bottom. Loosen the jam nut then back out the Adjusting Bolt until it is loose. To find Zero Preload turn it back in to take up the slack. If you hold it upright you can watch the gap between the washer and the head of the Adjusting Bolt disappear as you turn it in. Count number of turns of Preload.
- Do not measure the bolt extension out the bottom or Valve Spring set length as production tolerances are not held that tightly in these areas.
- Check the tightness of the jam nut before use.

BLEED HOLES

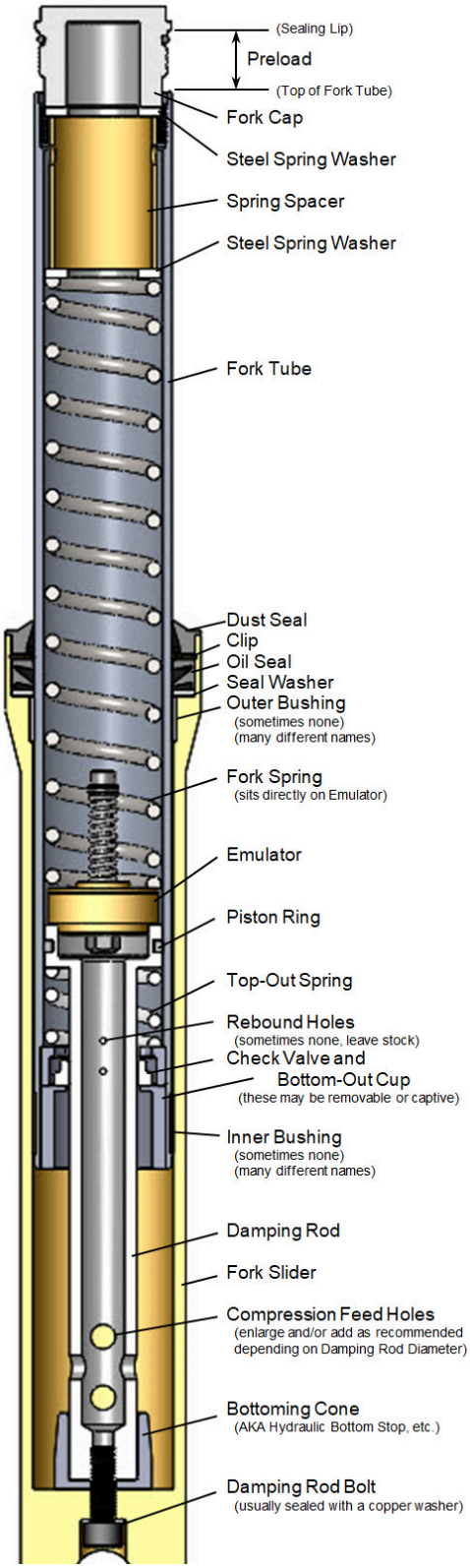
- Check the number of Bleed Holes and switch plates or drill as necessary.
- If Bleed Holes need to be drilled match the hole size of the original.

Be sure to tighten the jam nut before use.

(/wp-content/uploads/DampingRod_A-101.jpg)

10 - Reassemble the forks according to your manual. Remember to install the top-out spring and bottom-out cone. Consult manufacturers specs for damping rod bolt torque.

SETTING FORK SPRING PRELOAD - METHOD #1



(/wp-content/uploads/FK_EMU_CA_STD.jpg)

11 - Setting the fork spring preload is done by making the correct length preload spacers.

Find the recommended preload in Product Search or on your DVS Setup Sheet.

1. If your forks have Preload Adjusters set them to minimum.
2. If you have a fork with an Emulator. Drop the Emulator down the tube. Install the Emulator Adapter first if required. It sits on top of the damping rod with the Emulator Valve Spring facing up and is held in place with the main fork spring. Visually check to make sure the Emulator is sitting squarely on top of the damping rod or the Adapter.
3. Extend the fork tube all the way.
4. Insert the fork springs into the fork tube on top of the Emulator
5. Install a steel fork spring washer
6. **Install the fork spring spacer tube. Any length that goes above the top of the fork tube is ok for now.**
7. Install another steel fork spring washer
8. Set the fork cap on the washer
9. **Measure from the top of the fork tube to the sealing lip on the fork cap. This is a direct measurement of fork spring preload.**

(/wp-content/uploads/FK_PRELOAD_DROD_DSC03055.jpg)

Direct Measure of Preload (THIS ONE HAS WAAAAY TOO MUCH)

10. **Adjust the spring spacer tube length to achieve the proper preload. In this example using the image above:**
If you are looking for 15mm preload you would shorten the spacer by 46 - 15 = 31mm
NOTE: You must have steel washers on both ends of the spacer. The spacer must not rest directly on the spring or the cap.

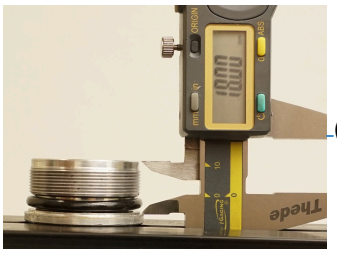
SETTING FORK SPRING PRELOAD - METHOD #2

(/wp-content/uploads/FK_PRELOAD_DROD_DSC03101.jpg)

12 - If there is very little preload the thread on the cap will hit the thread in the fork tube before touching the washer.

Measure from the top of the fork tube to the Steel Spring Washer.

In this case 11mm



(/wp-content/uploads/FK_PRELOAD_DROD_DSC03070.jpg)

13 - Measure the Fork Cap Height

In this case 18mm. (The fork cap is upside down)

Calculate the Preload

(Fork Cap Height) - (Top to Washer) = Preload

18 - 11 = 7mm Preload

Adjust the Spacer Length or add washers to get the recommended Preload.

(/wp-content/uploads/FK_4CS_14WP_600-99.jpg)

TFOL 02

14 - Install the fork fluid and set the oil level.

Use the oil viscosity recommended by the DVS.
Make sure:

1. The Fork Spring is out
2. The Emulator is in completely submerged in oil
3. The fork is fully bled by pumping them slowly through their travel
4. The fork is fully bottomed
5. Measure from the top of the fork tube down to the top of the oil

Setting the oil level can be done with a tape measure or with a Fork Oil Level Setting Tool TFOL 02. The Oil Level Tool is shown being set to the proper level before use.

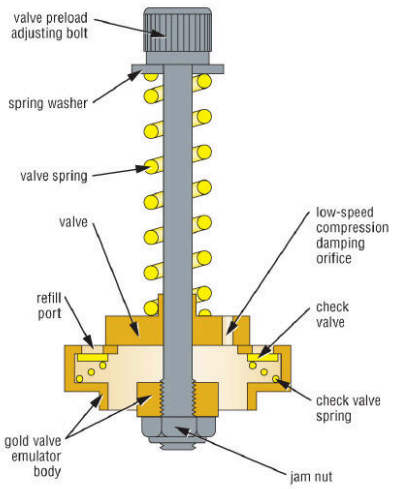
TFOL 02 –

$144.99 ADD TO CART

15 - **Finish reassembly by installing the spring and spacer. Before you install the fork cap, re-check the spring preload. This will indicate whether the Emulator is seated properly.**

Install the fork caps and, with the forks off the bike, push on them, checking for any unusual drag or bind that would indicate an improperly seated Emulator.

Install the forks back on the bike. Align the forks on the axle for minimum bind. Tighten all bolts including the brake caliper bolts. If you have hydraulic brakes, pump them up and enjoy!



(/wp-content/uploads/3-18-500.jpg)

16 - TUNING NOTES

To adjust the Gold Valve Emulator you must remove it from the fork. When you remove the fork springs use a twisting motion to avoid oil drips. To remove the Emulator, use a parts grabber.
Adjust the Emulator Valve Spring Preload a half turn at a time. More Valving Spring Preload will make the forks stiffer.
Before installation, be sure the jam nut is tight.

See the Emulator Tuning Guide for more details.
(/emulator-tuning-guide)

(/wp-content/uploads/BA-3.jpg)

Brake Arcing - cutting the drum

17 - DRUM BRAKES - Vintage

BRAKE ARCING - This service is performed at Race Tech. The performance and feel is amazing. (/brake-arcing)
Call for details.

FRONT WHEEL INSTALLATION with a DRUM BRAKE

Most front axles tighten into the left fork tube. The right side has a pinch on the axle that allows the fork tubes to be aligned. Your bike may be reversed from this.

1. **To center the brake shoes.** Install the front wheel, backing plate and front axle leaving the front axle just loose enough to let the backing plate move around.
2. With the bike on a center stand spin the front wheel and slam on the front brake.
3. Hold the front brake on and tighten the front axle. If the mating surfaces of the backing plate and fork are square the brake shoes will be centered.
4. **To align the fork tubes** spin the front wheel and clamp on the brake. The right axle pinch must be loose enough to allow the axle to move freely. Do this a few times looking for any sideways movement of the axle clamp in relation to the axle.
5. Tighten the right axle clamp to manufacturers specs.

18 - VENTED FORK CAPS - Vintage

Found on European forks in the early 70s. This was not a great idea. If your forks are vented there is typically a hole in one of the flats of the hex or on the top. We suggest you drill and tap the vent hole and plug it with a set screw.
(I am looking for a picture of one of these. If you can help it would be appreciated.)

951.279.6655
info@racetech.com

1501 Pomona Rd. Suite 101
Corona, CA 92878

STOP! Include Service Request Form when shipping components to Race Tech. (/service-request-forms/)

(https://twitter.com/RaceTechSuspen)

(https://www.facebook.com/RaceTechSuspension)

(https://www.instagram.com/racetechinc/)

Downloads (https://racetech.com/downloads/)

Dealer Application (https://racetech.com/wp-content/uploads/dealer-application.pdf)

Policies (https://racetech.com/policies/)

Cookie Policy (EU) (https://racetech.com/cookie-policy-eu/)