



The Science of Winning

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GOLD VALVE CARTRIDGE EMULATOR INSTRUCTIONS

STREET / ROAD RACE

<fegv_s_std.doc> FEGV S STD P Thede © 8-28-02

5 pgs

TOOLS REQUIRED - Long Allen Socket (typically 6, 8 or 10 mm), Air Impact, 5/16" (8 mm) Drill and Drill Motor, Tape Measure (metric/inch), Tubing Cutter, Loctite 242 (Blue Removable), Fork Fluid (see Table)

IMPORTANT NOTE: Most models require different fork springs. Consult www.racetech.com or call Race Tech.

NOTE: If you have aftermarket (non-stock) damping rods fitted in your motorcycle you must use an adapter not supplied in this kit. Please call Race Tech Technical Support for details.

NOTE - BEFORE ASSEMBLY CHECK FOR PROPER FIT (SEE STEPS 2 and 6).

1 **Remove the damping rods.** Take the forks off the bike and disassemble them. An air 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. Unless you are doing a complete overhaul, on most models, you don't 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. Some models have washers or circlips on the damping rod, these require complete disassembly.

2 **Check the fit of the Gold Valve Emulator** by placing it on top of the damping rod. The step on the Emulator must sit into the large hole in the top of the damping rod and must completely cover it so there is no blow-by (figure 1).

NOTES:

- a) Some Emulators (FEGV S4301 and S4101) come with **sizing circlips**. This allows proper fit for more than one ID damping rod. **Check to determine if you need to use the sizing circlips** by installing the circlip and checking to see if it will fit into the top of the damping rod. The circlip is for location only so there is no blow-by, it does not seal.
- b) **Check the inner diameter of the fork spring.** It must be at least 4 mm (0.160") larger than the Emulator Valve Plate OD itself for proper flow (figure 1).
- c) **Non-standard style damping rods** include Flat-top and Protruding-top styles. These require special instructions.
- d) **Models with adjustable rebound:** (ZX11 all, 84-93 FJ 1100/1200 all, 88-98 GSX 600F/750 Katana, 96-98 TRX 850, 86-87 VFR 700) Please see the **Special Instructions for Adjustable Rebound Models.**
- e) **Models that have valves that sit where the Emulator goes:** (86-87 ZX 1000, 85-87 ZX600) Remove them.

3 **Drill the existing compression holes in the damping rod to 5/16 inch (8 mm) and add additional 5/16" holes so you end up with six holes (3 sets of 2 holes) (figure 1).** When drilling new holes, space them axially (lengthwise) at 10 mm (7/16") increments. Each set of two holes must be perpendicular to the last set so as not to weaken the rod (figure 1). After drilling, chamfer and deburr the compression holes, inside and out. **Do not add or enlarge the rebound holes and leave their edges sharp if any exist.**

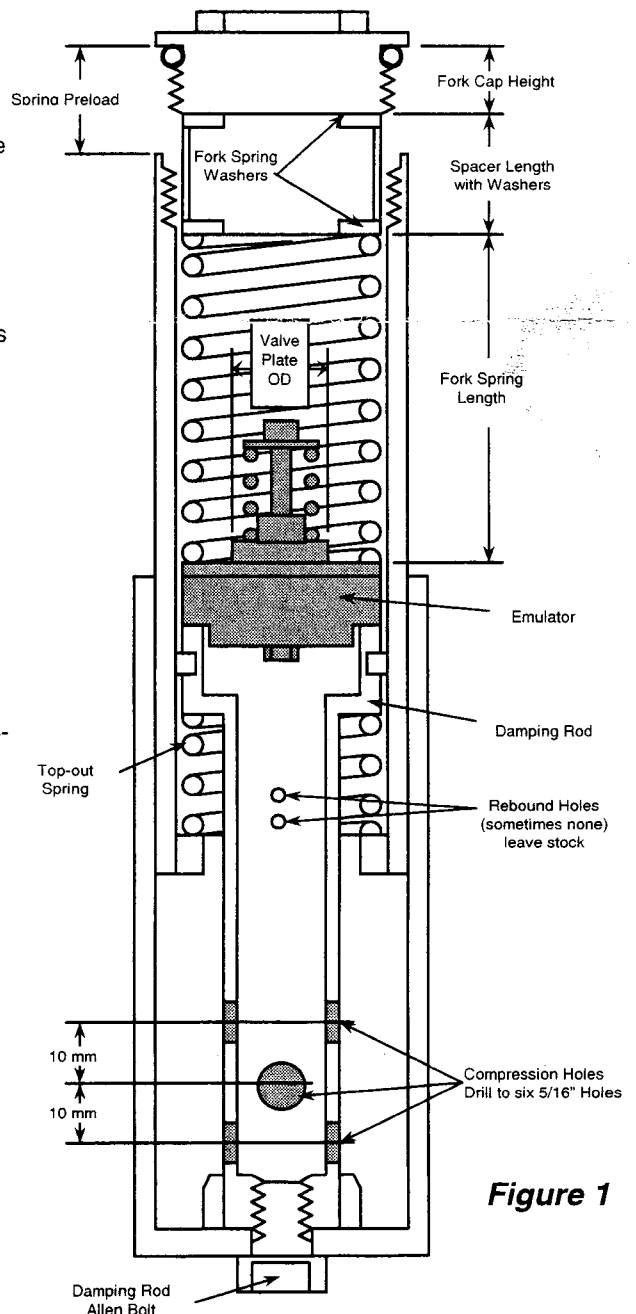


Figure 1

NOTE: If the bike is equipped with an Anti-Dive Mechanism or an External Compression Adjuster, the new holes should be drilled starting just above the Bottom-out Cones (or washers on models with washers). This will bypass the effect of the Anti-Dive but will result in a vastly improved ride. You do not have to disconnect the external Anti-Dive mechanism; it will be disabled with this modification.

- 4 **Check the Emulator Valving.** The standard valving that is pre-installed is a 64 lb/in Emulator Valve Spring with 2 turns of Valve Spring Preload. (Typically use 2 turns of preload for street, 4 turns of preload for racing) Check the tightness of the jam nut on the Emulator.
- 5 **Begin reassembling** the forks according to your manual. Remember to install the top-out spring and bottom-out cone if you have chosen complete disassembly. Consult manufacturers specs for damping rod bolt torque.
- 6 **Set the fork spring preload by making the correct length spacers.** This is done before installing the fork fluid. (*See the Custom Valving Setup at www.racetech.com*)
 - a. Drop the Emulator down the tube. 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. Refer to figure 1. Visually check to make sure the Emulator is sitting squarely on top of the damping rod or the adapter. If you have flat top style damping rods it requires adapters (figure 2) and they should be installed first, before the Emulator.
 - b. Extend the fork tube all the way. Insert the fork springs into the fork tube on top of the Emulator. Install a fork spring spacer washer. Place the fork spring spacer tube in next, then another washer.
 - c. Set the fork cap on the washer and determine the preload by measuring from the top of the fork tube to the sealing lip on the fork cap (see figure 1). This is a direct measurement of fork spring preload. Shorten the spring spacer tube to achieve the proper preload as shown in the Table.

NOTE: If you use the same spring and there is no preload spacer in the forks, it will have more preload and the front end will ride higher. This is not correct.

NOTE: If one end of the spring has a smaller diameter than the other, the large diameter end should go down against the Emulator.

NOTE: You must have washers on both ends of the spacer. The spacer must not rest directly on the spring or the cap.

- 7 **Install the fork fluid.** First remove the fork spring and use the oil viscosity recommended in Table 2. Bleed the fork by pumping them. Install the Emulator and then set the oil level with the forks completely bottomed and the springs out.
- 8 **Finish reassembly** by installing the spring and spacer. Before you install the 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.

We strongly recommend a quality fork brace for racing applications. Be careful to set the brace width for minimum bind. Torque all the bolts including the brake calipers, pump up the brakes and enjoy!

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 Valve Spring Preload will make the forks stiffer. Before installation, be sure the jam nut on the Emulator is tight using a socket. Use Loctite 242 (Blue removable) on the threads.

TUNING VARIABLES - TABLE 1

VARIABLE	STANDARD	OPTIONAL	PRIMARY EFFECT
Valve Spring Preload*	2 Turns (Street use) See Table 2	0 to 7 Turns	Overall firmness, controlling a mushy feel and the speed the front end dives under braking
Oil Viscosity	See Table 2	US-1 (5w) to 30w	Use oil viscosity to set rebound, this affects traction and stability
Valve Spring Rate	64 lbs/in	26, 40, 64 or 101 lbs/in	Overall firmness and the ride on square shaped bumps

* Measured from zero preload (no tension) on the Valve Spring. To find zero preload back off on the adjuster bolt until the spring is loose then tighten it until the spring just touches. More Preload gives more compression damping and a firmer ride. **4 turns of Valve Spring Preload for Racing or for heavy riders.**

Use oil viscosity to set the amount of rebound damping, then adjust the compression with the Emulator settings. The Emulator does not affect rebound, however oil viscosity does. The primary compression adjustment is the amount of Emulator Valve Spring Preload. Increasing Valve Spring Preload makes the fork stiffer. The effect of all the variables will overlap providing extreme tuning flexibility.

SPECIAL INSTRUCTIONS for ADJUSTABLE REBOUND MODELS

Forks with external rebound adjusters require special treatment which involves disabling the external adjustment. *After this procedure you will no longer have external rebound adjustment.* There are two styles: STYLE 1) ZX11's that do not require brazing and STYLE 2) Other models that require brazing. **If you are not experienced with this work STOP!!! DO NOT PROCEED. SEEK OUT A QUALIFIED SUSPENSION TECHNICIAN.**

STYLE 1) KAWASAKI ZX 11 (all) (does not require brazing)

- 1 This is a very simple modification. **Remove the cap.** The "D" shaped adjustment rod that is attached to the cap must be removed with a hacksaw. **Cut the rod off** within 25 mm (1 in) from the cap.
- 2 Remove the damping rod from the forks. There is an adjuster in the center of the damping rod. Simply **position the adjuster so the damping hole is closed.**
- 3 **Use 5w fork fluid at 160 mm oil level.**
- 4 **Follow the standard installation instructions.** This includes drilling the additional compression holes (located at the bottom of the damping rod).

STYLE 2) OTHER MODELS THAT REQUIRE BRAZING

- 1 **Remove the damping rods** from the fork tubes.
- 2 **Disassemble the adjustable rebound mechanism** in the top of the damping rod. This is usually operated with a "D" shaped rod connected to the fork cap and operated with a screwdriver. The rebound mechanism is usually held into the top of the damping rod with a wire clip or a standard circlip.
- 3 The "D" shaped adjustment rod that is attached to the cap must be removed with a hacksaw. **Cut the rod off** within 25 mm (1 in) from the cap. The exact length is not critical.
- 4 The damping rod has extra holes originally used for detent purposes. **These must be brazed shut. Once they are brazed they must be filed smooth. The rebound feed hole must also be brazed shut and smoothed down.**
- 5 You may want to **drill a new rebound hole** in the small diameter portion of the damping rod below the head. This is determined by the setting you normally use. For example: if you use the #2 setting, check what size hole is being used when the adjuster is in that position. Use a set of numbered drills and find the corresponding size drill for the rebound hole in the #2 position. Drill a new rebound hole the size you just determined. Locate it 20 mm below the head and lightly de-burr the opening.
NOTE: If you like the rebound damping best when it is set at another setting, like 1,3 or 4, then drill your new rebound hole to the corresponding size for that adjustment.
- 6 **Follow the standard installation instructions.** This includes drilling the additional compression holes (located at the bottom of the damping rod).

MEASURING STATIC SAG - FORKS

Static Sag is the amount the bike compresses from fully extended, with the rider on board.

- 1 Extend the forks completely and measure from the wiper to the bottom of the triple clamp. This is L1.
- 2 Take the bike off the stand, put the rider on board in riding position. Get an assistant to balance the bike or have the rider hold onto something, push down on the front end and let it extend **very slowly**. Where it stops, measure the distance between the wiper and the bottom of the triple clamp again. **Do not bounce.** This is L2. (If there were no friction in the seals the bike would come up a little further.)
- 3 Next lift up on the front end and let it drop **very slowly**. Where it stops measure again. **Do not bounce.** This is L3. The reason L2 and L3 are different is due to stiction or drag in the seals and bushings. (If there were no friction in the seals the bike would drop a little further.)
- 4 Half way between L1 and L2 is where it would be with no friction. Therefore L2 and L3 must be averaged and subtracted from L1 to calculate true Static Sag.
$$\text{Static Sag} = L1 - (L3 + L2)/2$$
- 5 To adjust Static Sag make longer or shorter preload spacers or use the preload adjusters, if available.

NON-STANDARD INSTALLATIONS

FLAT-TOP or PROTRUDING-TOP DAMPING RODS (CUSTOM ADAPTER REQUIRED)

Before installation, check the fit of the Emulator

by placing it on the top of the damping rod. There are three basic types of damping rods. One that is cupped on the top of the damping rod, second, one that is flat on the top, and third where the damping rod protrudes on top.

On **the cupped style**, the step on the Emulator must sit into the top of the damping rod. This is the most common style. No adapter is required.

The **flat-top style** requires an adapter. The adapter sits on top of the damping rod and the Emulator sits on top of the adapter. These adapters are mostly custom however some of the more common types are available.

The **protruding-top style** is just like the flat top style but the adapter must be slightly taller to insure proper flow to the Emulator.

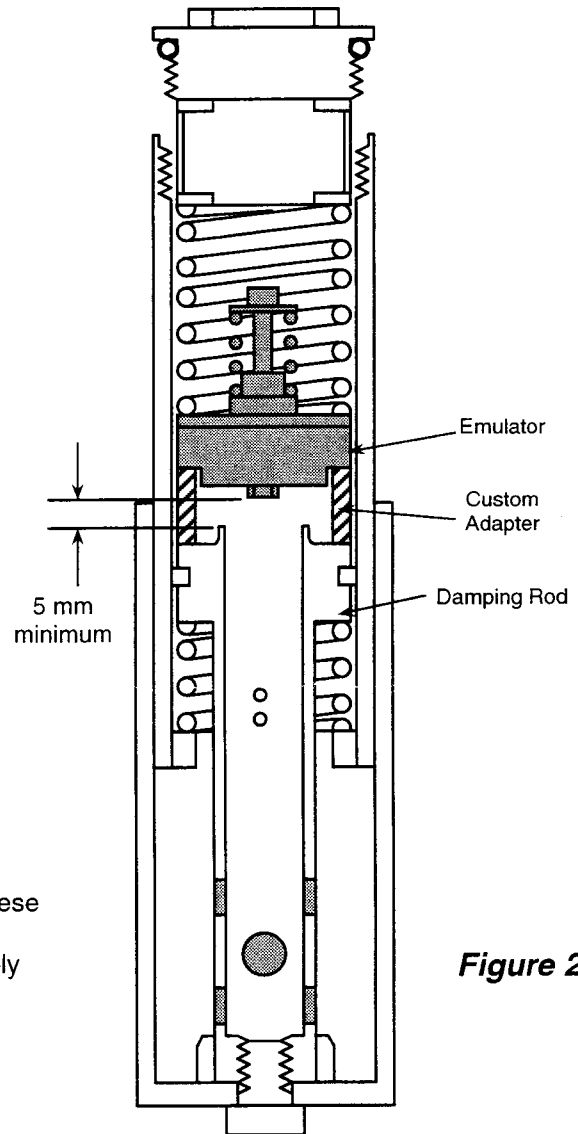


Figure 2

CUSTOM ADAPTER BASIC DESIGN

Since there are many configurations of the top of the damping rod these guidelines will not apply to all applications. Please call the Technical Support Hotline (909) 279-6655 for assistance. Be prepared to supply important dimensions of the fork internals.

Select the proper Emulator (fits into the tube and clears by 0.5 mm (0.020") minimum).

Material - Aluminum

Adapter Outer Diameter – Same as the Emulator Outer Diameter

Adapter Inner Diameter - 0.5 mm (0.020") larger than the Step Diameter of the Emulator

Adapter Height – The adapter must be tall enough to allow 5 mm (0.200") clearance between the top of the hole in the damping rod and the bottom of the jam nut on the Emulator. (Figure 2)

TABLE 2 - RECOMMENDED OIL VISCOSITY and LEVEL

(US-1=5w US-2=10w US-3=15w)

Year	Model	Oil	Oil Level	Emulator Spring	Valve Spring Preload (Turns)
10-5-01 BMW					
92-95	R100 R	15 wt	150 mm	64 lb/in	2.0
91	R100			64 lb/in	2.0
85	K100 RS	15 wt	140 mm	64 lb/in	2.0
86	RT 80			64 lb/in	2.0
92-95	K75 all	15 wt	120 mm	64 lb/in	2.0
97-00	F650	US-2	120 mm	64 lb/in	2.0
HARLEY					
93-00	FXD (except FXDX)	30 wt	160 mm	40 lb/in	3.0
91-92	FXD	30 wt	160 mm	40 lb/in	3.0
94-01	FXDS Conv	30 wt	160 mm	40 lb/in	3.0
87-94	FXL/FXR	30 wt	160 mm	40 lb/in	3.0
98-01	XL 1200C Custom	30 wt	160 mm	26 lb/in	4.0
94-01	XL 883	30 wt	160 mm	26 lb/in	4.0
88-93	XL 883	30 wt	160 mm	26 lb/in	4.0
92-00	XL 883 Hugger	30 wt	160 mm	26 lb/in	4.0
88-91	XL 883 Hugger	30 wt	160 mm	26 lb/in	4.0
HONDA					
86-87	GL 1200	US-2	130 mm	64 lb/in	2.0
84-85	GL 1200	US-2	130 mm	64 lb/in	2.0
91-94	ST 1100	US-2	130 mm	64 lb/in	2.0
97-99	ST 1100 ABS 2			64 lb/in	2.0
88-02	VT 1100 Shadow (all)	15 wt	180 mm	64 lb/in	2.0
83	CB 1100 F			64 lb/in	2.0
87-88	CBR 1000 F	15 wt	130 mm	64 lb/in	2.0
81-82	CBX 1000	US-2	150 mm	64 lb/in	2.0
85-86	VFR 1000			64 lb/in	2.0
89-90	PC 800	US-2	160 mm	64 lb/in	2.0
86	VFR 750 F	US-2	140 mm	64 lb/in	2.0
86-87	VFR 700	20 wt	140 mm	64 lb/in	1.3
91-01	CB 750 Nighthawk	US-2	120 mm	64 lb/in	2.0
84-86	CB 700 SC Nighthawk	US-2	180 mm	64 lb/in	2.0
88-91	NT 650 Hawk GT	US-2	165 mm	64 lb/in	2.0
91-93	CBR 600 F2	US-2	120 mm	64 lb/in	2.0
87-90	CBR 600 F	20 wt	130 mm	64 lb/in	2.0
82-83	FT 500 Ascot	20 wt	180 mm	64 lb/in	2.0
83-86	VF 500 Interceptor	20 wt	185 mm	64 lb/in	2.0
83-84	VT 500 FT Ascot		190 mm	64 lb/in	2.0
89-90	CB 400 F CB1			64 lb/in	2.0
94	CB 400 SF	15 wt	125 mm	64 lb/in	2.0
92	CBR 400 RR	15 wt	110 mm	64 lb/in	2.0
96	NSR 250	15 wt	135 mm	64 lb/in	2.0
86	NSR 250	US-2		64 lb/in	2.0
KAWASAKI					
92-01	VN 1500 A6-A15 Vulcan			64 lb/in	2.0
87-91	VN 1500 A1-A5 Vulcan			64 lb/in	2.0
96-97	VN 1500 L C3-C4			64 lb/in	2.0
98	VN 1500 E1 Classic	US-2	160 mm	64 lb/in	2.0
96-97	VN 1500 D1-D2 Classic	US-2	160 mm	64 lb/in	2.0
99-01	VN 1500 G1-G3 Nomad			64 lb/in	2.0
2000	Voyager XII	US-2	135 mm	64 lb/in	2.0
92-01	ZG 1200 B6-15 Voyager	15 wt	135 mm	64 lb/in	2.0
90-91	ZG 1200 B4-B5 Voyager	15 wt	135 mm	64 lb/in	2.0
83	KZ 1100 A3	US-2	155 mm	64 lb/in	2.0
94-01	ZG 1000 Concours	15 wt	150 mm	64 lb/in	2.0
86-93	ZG 1000 Concours	15 wt	150 mm	64 lb/in	2.0
95-01	ZX-11 D3-D9	US-2	160 mm	64 lb/in	2.0
93-94	ZX-11 D1-D2	US-2	160 mm	64 lb/in	2.0
90-93	ZX-11 C1-C4	15 wt	160 mm	64 lb/in	2.0
88-90	ZX 1000 B1-B3	US-2	170 mm	64 lb/in	2.0
86-87	ZX 1000 A1-A2	US-2	140 mm	64 lb/in	2.0
84-86	ZX 900	US-2	160 mm	64 lb/in	2.0
95-01	VN 800 A1-A7 Vulcan	US-2	160 mm	64 lb/in	2.0
96-01	VN 800 B1-B6 Vulcan	US-2	160 mm	64 lb/in	2.0
91-93	ZR 750 Zephyr	US-2		64 lb/in	2.0
87-90	ZX 750 F1-F4	US-2	175 mm	64 lb/in	2.0
2000	W650		140 mm	64 lb/in	2.0

Year	Model	Oil	Oil Level	Emulator Spring	Valve Spring Preload (Turns)
98-01	ZX-6 E6-E9	15 wt	100 mm	64 lb/in	2.0
94-97	ZX-6 E2-E5	15 wt	100 mm	64 lb/in	2.0
93	ZX-6 E1	15 wt	100 mm	64 lb/in	2.0
90-93	ZX-6 D1-D4	US-2	100 mm	64 lb/in	2.0
85-87	ZX 600 A1-A3	US-2		64 lb/in	2.0
94-01	EX 500 D1-D8	US-2	150 mm	64 lb/in	2.0
92	ZR 400 Zephyr	15 wt	110 mm	64 lb/in	2.0
86-01	EX 250 F1-F15	15 wt	130 mm	64 lb/in	2.0
SUZUKI					
99-01	VL 1500 LC Intruder	15 wt	170 mm	64 lb/in	2.0
87-01	VS 1400 Intruder	15 wt	190 mm	64 lb/in	2.0
86-88	GSX R1100	15 wt	130 mm	64 lb/in	2.0
92-93	GSX 1100 G	15 wt	135 mm	64 lb/in	2.0
91	GSX 1100 G	20 wt	135 mm	64 lb/in	2.0
88	GSX 1100 F	US-2	120 mm	64 lb/in	2.0
82	GS 1100	30 wt	130 mm	64 lb/in	2.0
92-01	VS 800 Intruder			64 lb/in	2.0
86-87	GSX R750	US-2	130 mm	64 lb/in	2.0
98-01	GSX 750 F Katana	15 wt	105 mm	64 lb/in	2.0
89-97	GSX 750 F Katana	15 wt	105 mm	64 lb/in	2.0
2002	SV 650S	20 wt	130 mm	64 lb/in	2.0
2001	SV 650S	20 wt	130 mm	64 lb/in	2.0
2002	SV 650	20 wt	130 mm	64 lb/in	2.0
99-01	SV 650	20 wt	130 mm	64 lb/in	2.0
88-01	GSX 600 F Katana	US-2	115 mm	64 lb/in	2.0
96-01	GSF 600 Bandit	15 wt	160 mm	64 lb/in	2.0
94-96	RF 600	US-2		64 lb/in	2.0
2001	GS 500	15 wt	110 mm	64 lb/in	2.0
91-00	GS 500	15 wt	110 mm	64 lb/in	2.0
89-90	GS 500	15 wt	100 mm	64 lb/in	2.0
85-89	RG 500 Gamma	15 wt	120 mm	64 lb/in	2.0
91-92	GSF 400 Bandit	15 wt	120 mm	64 lb/in	2.0
89-90	RGV 250	US-2		64 lb/in	2.0
TRIUMPH					
94-01	1200 Trophy 4	15 wt	125 mm	64 lb/in	2.0
96-01	900 Adventurer	US-2	140 mm	64 lb/in	2.0
99-01	900 Sprint ST	15 wt	125 mm	64 lb/in	2.0
94-98	900 Sprint	15 wt	125 mm	64 lb/in	2.0
94-01	900 Thunderbird	US-2	140 mm	64 lb/in	2.0
95-01	900 Tiger	US-2	140 mm	64 lb/in	2.0
95-01	900 Trident	US-2	140 mm	64 lb/in	2.0
95-01	900 Trophy 3	15 wt	125 mm	64 lb/in	2.0
YAMAHA					
97-98	XVZ 13A Royal Star	20 wt	130 mm	64 lb/in	2.0
93-99	VMX 1200	20 wt	160 mm	64 lb/in	2.0
85-92	VMX 1200	US-2	140 mm	64 lb/in	2.0
90-93	FJ 1200	15 wt	130 mm	64 lb/in	2.0
86-89	FJ 1200	15 wt	130 mm	64 lb/in	2.0
84-85	FJ 1100	US-2	140 mm	64 lb/in	2.0
87-91	XVZ 1300 Venture	15 wt	130 mm	64 lb/in	2.0
83-86	XVZ 1200 Venture	20 wt	160 mm	64 lb/in	2.0
86-98	XV 1100 Virago	US-2	165 mm	64 lb/in	2.0
89-90	FZR 1000	20 wt	130 mm	64 lb/in	2.0
87-88	FZR 1000	15 wt	120 mm	64 lb/in	2.0
96-98	TRX 850			64 lb/in	2.0
85-86	FZ 750	US-2	130 mm	64 lb/in	2.0
87-88	FZR 750 R	US-2		64 lb/in	2.0
86	FZR 750 R			64 lb/in	2.0
88-97	XV 750 Virago			64 lb/in	2.0
84-87	XV 700 Virago			64 lb/in	2.0
86-88	FZ 600	US-2		64 lb/in	2.0
88-98	FZR 600	15 wt	130 mm	64 lb/in	2.0
92-98	XJ 600 Seca II	US-2	135 mm	64 lb/in	2.0
95	YZF 600	30 wt	160 mm	64 lb/in	2.0
88-90	FZR 400	US-2	120 mm	64 lb/in	2.0
96	XJR 400	15 wt	170 mm	64 lb/in	2.0



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The Science of Winning

RACE TECH HIGH PERFORMANCE FORK SPRINGS - STREET

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3 pgs

INCLUDES: (2) Springs, (4) Preload Washers, Spacer material (if required), Instructions - **Cutting Preload Spacers is required on some models.**

Thank you for choosing Race Tech High-Performance Fork Springs. These Straight Rate Springs are manufactured from "suspension" quality chrome silicon wire, shot peened, heat treated and 100% tested. They are the finest available.

Please read the instructions completely before proceeding. If you have questions please call Race Tech 909-279-6655. If you are unfamiliar with this process, stop and have a qualified mechanic assist you.

GENERAL INSTALLATION INSTRUCTIONS

STEP 1 - Remove the fork cap. Before you remove the cap make a note of your rebound adjustment if you have one.

Use caution as some springs are preloaded heavily and the cap can be released with a lot of force. Remove the spring and spacer. It is helpful to use a Race Tech Spring Compressor (p/n TFSC 01) on some cartridge style forks. If you do not have a spring compressor you may need to take your forks or bike to a local motorcycle shop.

STEP 2 - Identify your fork type. (Refer to the next page for assistance)

Type 1 - Upside-down

Type 2 - Conventional (right-side up) damping rod

Type 3 - Conventional Cartridge Forks. **With this type you must also determine if you have EXTERNAL Top-Out or INTERNAL Top-Out Springs. (Refer to the next page for assistance)**

STEP 3 - Determine the Preload you're going to use. (Refer to the next page for assistance.) If you have fork caps with adjustable Preload, set the minimum preload to 15 to 20 mm. Identify the type of fork cap you have to assist you in measuring Preload. **Calculate the required Spacer Length and cut the spacer. Remember to include spring washer and Emulator thickness if used.**

STEP 4 - Install the springs, spacers (if required) and washers. If you use spacers, you must have washers on both ends of the spacer. **Never let the spring ride directly on the aluminum cap or the spacer. A steel washer should always be between any aluminum cap and the spring.**

STEP 5 - Install the cap. If you have cartridge forks, use Loctite on the damping rod threads at the cap and torque it to manufacturers specs. Most models require careful positioning of the rod in the cap so the proper number of rebound clicks are available for adjustment. For this type, if the rod is threaded too far into the cap there will not be the full number of clicks. If the cap is not threaded on far enough, it will not touch the adjuster and it could come off the shaft.

Consult your owners manual for the proper procedure. Following is an overview. Start with the cap off. **On most KYB's,** screw the adjuster in all the way until it stops, then back it out 2 clicks. **On most Showa's,** there's no stop when you screw the adjuster in, so the procedure is a little different. Screw the adjuster out all the way, then screw it in 3 to 4 turns (or 16 to 20 clicks).

Then for either type, install the cap onto the rod until it starts to feel tight (the adjuster needle is bottomed out). Hold the position of the cap in relation to the rod, back out the adjuster 1 turn (so the needle isn't damaged when the jam nut is tightened) and torque the jam nut to proper specs (consult manual). Check to see you have the proper number of clicks. Set your rebound adjusters.

STEP 6 - Install the forks on the bike and **measure the Static (Race) Sag** (refer to Measuring Static Sag Instructions) and adjust the Preload accordingly. Typical Static Sag is 25 to 35 mm for street applications and 20 to 30 mm for racing. More Preload means less Static Sag.

STEP 7 - Enjoy!

Note for the perfectionists: Different springs and spacers take up different volumes. This affects the required oil level. Regardless of the spring rate, physically heavy springs (ones that weigh a lot), take up more volume than physically light springs. This means that springs that weigh more require a lower oil level than springs that weigh less because oil level is measured with the spring out.

DETAILS FOR STEPS 2 and 3

STEP 2 DETAILS - IDENTIFY YOUR FORK TYPE

There are three types of forks each with slightly different instructions:

- 1 **Upside-down cartridge forks** – Most of these springs are designed to fit “as is”. Preload should be in the proper range with your adjusters. All have INTERNAL Top-Out Springs. Follow the instructions for **INTERNAL**. It is helpful to use a Race Tech Fork Spring Compressor (p/n TFSC 01).
- 2 **Conventional (right-side up) damping rod forks** - A preload spacer must be cut for proper preload. These all have **EXTERNAL** Top-Out Springs. Follow the instructions for **EXTERNAL**.
- 3 **Conventional (right-side up) cartridge forks** - A spacer must be cut for proper preload. These forks could have either **EXTERNAL** or **INTERNAL** Top-Out Springs.

Identify the forks as either **EXTERNAL** or **INTERNAL** Top-Out. To determine where the Top-Out Spring is located, hold the chrome inner fork tube, with the spring out and the cap off, and extend the fork all the way until it stops. **EXTERNAL TYPE** forks have the Top-Out Spring on the outside of the cartridge tube and will stay the same length as when fully assembled. **INTERNAL TYPE** forks have the Top-Out Spring on the inside of the cartridge tube and therefore will extend longer. Once you have determined which type you have, choose the corresponding instructions.

RECOMMENDED PRELOAD

TYPICAL PRELOAD RANGE for STREET FORKS - 15 to 30 mm (5/8 to 1 1/4")

STANDARD PRELOAD – 20 mm (0.8") (using RT recommended rate) If your model has Preload Adjustment and you are making spacers, cut spacers to set the minimum adjustment to 15 mm (5/8").

PRELOAD EXTREMES - 5 to 35 mm (1/4 to 1 1/2") More Preload for heavy bikes or when using softer springs.

NOTES ON PRELOAD: The amount of preload required depends on the sprung weight of bike and rider, the rate of the spring, the front to rear weight bias, the fork angle and personal preference. **There is no magic Preload number.** *If you like the feel of the bike with less or more Preload than these guidelines, great. More Preload means less Static Sag (the front end sits higher). This will make the bike turn slower. Less Preload means more Static Sag (the front end sits lower). This will make it turn quicker and it will feel softer and bottom easier (though Spring Rate has a bigger effect on bottoming than Preload does). Higher oil level does not affect Static Sag but does increase bottoming resistance.*

STEP 3 DETAILS - DETERMINING THE PRELOAD SPACER LENGTH

EXTERNAL TOP-OUT - Assemble the forks without the springs and spacers. Install the Emulator (if used). Extend the fork all the way. Drop the spring and spring washer into the fork tube. Use a tape measure to record the distance from the top of the fork tube down to the top of the spring washer. Set the Preload Adjuster to minimum (if available). Measure the Fork Cap Height from the bottom of the sealing lip (the point that touches the top of the tube when the cap is tightened) to the point on the bottom of the cap where the spring touches (this point might be on a special spacer or washer). Subtract this distance from the first measurement (down to the top of the spring washer). This would be the required length of the spacer for zero preload. Add the amount of preload required to determine the length of your spacers. Be sure to put spring washers on both ends of the preload spacer during final assembly and include them in your calculations.

INTERNAL TOP-OUT - This type requires you to measure the Set Length of the fork. The Set Length is the installed length of the spring and spacer with the fork fully extended. First, set the Preload Adjustment to minimum (if available).

Measuring the Set Length is best accomplished with the cartridge out of the fork, however, it can be done with the fork spring out and cap unscrewed from the outer tube but still attached to the damping rod. Collapse the fork tube. The Set Length is measured from the point the spring touches on the top of the cartridge to the point the spring touches on the cap with the rod fully extended. (Sometimes the point the spring touches on the cap is actually a special washer or spacer.) A tape measure can be put down the fork tube with the spring removed, if you are careful to make sure the tape is resting on the flange when measuring.

Once the Set Length is recorded, measure the Length of the Spring and subtract. This would be the required length of the spacer for zero preload. Add the amount of preload required to determine the length of your spacers. Be sure to include spring washer thickness as they are required on both ends of the preload spacer.

STEP 6 DETAILS - MEASURING STATIC SAG

- 1 Static Sag is the amount the bike settles, from fully extended, with the rider on board in riding position. First, extend the forks completely (bike off the ground). Measure from the wiper to the bottom of the triple clamp on conventional forks or from the wiper to a point on the axle clamp on inverted forks. This is L1.
- 2 Take the bike off the stand and put the rider on board in riding position (Street - sitting or Road race - full tuck). Get an assistant to balance the bike or have the rider hold onto something. Push down on the front end and let it extend **very slowly**. Where it stops, measure the distance between the wiper and the bottom of the triple clamp again. **Do not bounce**. This is L2. (If there were no drag, the bike would come up a little further.)
- 3 Next, lift up on the front end and let it drop **very slowly**. Where it stops, measure again. **Do not bounce**. This is L3. The reason L2 and L3 are different is due to stiction or drag in the seals and bushings. (If there were no drag, the bike would drop a little further.)
- 4 Half way between L2 and L3 is where the Sag would be with no drag or stiction. L2 and L3 must be averaged to find the midpoint and subtracted from L1 to calculate true Static Sag.

$$\text{Static Sag} = L1 - (L2 + L3) / 2$$

- 5 To adjust Static Sag use the preload adjusters, if available, or make longer or shorter preload spacers. **Recommended Static Sag for street applications is 25 to 35 mm, racing from 20 to 30 mm.**

TERMS

Spring Rate - The spring stiffness measured in kg/mm or lbs/in.

Spring Free Length - The length of the spring when it is not installed.

Spring Set Length - The installed length of the spring with the shock or forks fully extended.

Spring Preload Length - Amount the spring is compressed from its Free Length to install it. It is not the length of the spacer.

Spring Spacer Length - Spacer length.

Static (Race) Sag - The amount the bike compresses from fully extended with the rider on board at full riding weight in riding position.

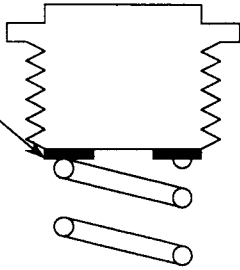
FORK CAP TYPES

This information is provided to assist you in measuring your Set Length. Identify the type of cap you have and note the specific measurement point. There are variations of the types listed below. Be sure to take "special" washer thickness into consideration.

Type A

The Set Length is measured from this point.

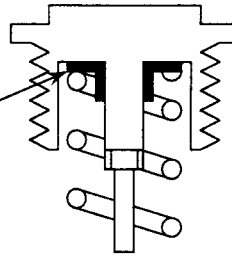
Non-adjustable



Type B

The Set Length is measured from this point.

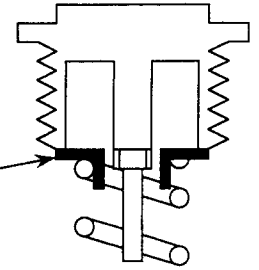
Non-adjustable



Type C

Models with flanged washers.
The Set Length is measured from this point.

Non-adjustable

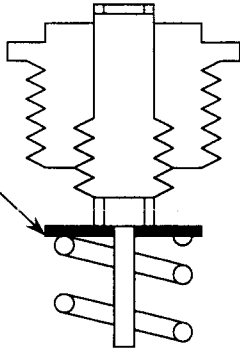


Type D

The Set Length is measured from this point.

This washer could also be a special washer.

Adjustable

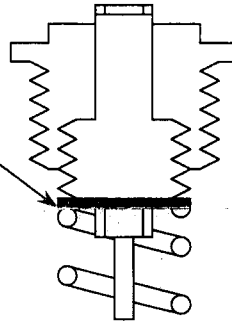


Type E

The Set Length is measured from this point.

This washer could also be a special washer.

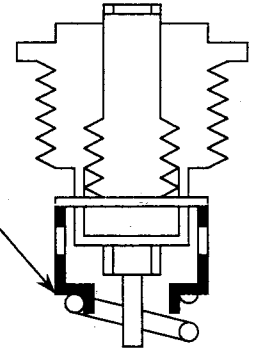
Adjustable



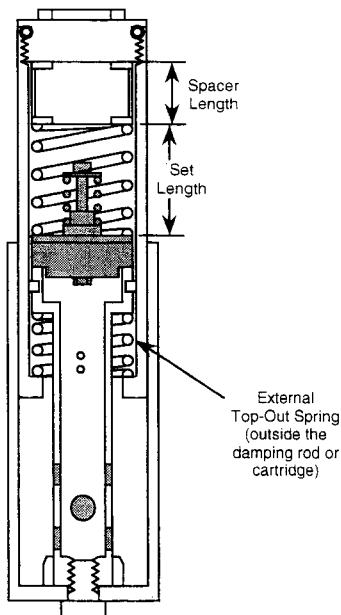
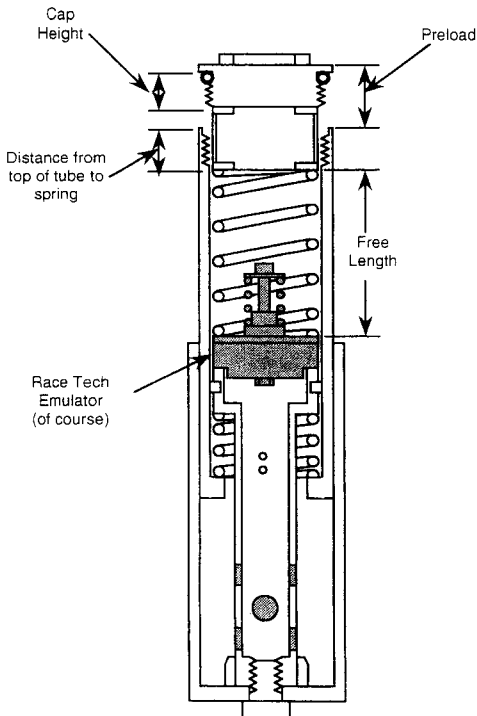
Type F

The Set Length is measured from this point.

Special spacer.
Adjustable



EXTERNAL TOP-OUT



INTERNAL TOP-OUT

