

## How do I adjust the locking tremolo on my Stratocaster guitar?

### INTONATION AND ADJUSTMENT FOR STRATOCASTER® GUITARS

There are two types of locking tremolos found on Fender® guitars. The Floyd Rose® tremolo uses a fine-tuning system at the bridge in combination with a locking nut. The American Deluxe locking tremolo is used in combination with an LSR roller nut and locking tuning keys. Though both are locking tremolos, they are strung, intonated and adjusted slightly differently.

Determine if your bridge is free-floating or flush-mounted to the body. If it's free-floating, we recommend that you place a block or stop-piece under the bridge to prevent it from collapsing when removing strings. The block must have soft foam or cloth on the underside to prevent damage to the finish. A tremolo block device can easily be purchased at your local music store or made at home.

### INTONATION (ROUGHING IT OUT)

With a locking tremolo system, it's desirable to preset your guitar's basic intonation before installing the strings. With a tape measure, measure from the inside of the nut to the center of the 12th fret (the fret wire itself; not the fingerboard). Double that measurement to find the scale length of your guitar.

On a Floyd Rose® locking tremolo, loosen the hex nut on top of the saddle. On an American Deluxe locking tremolo, the hex lock-down screw is found beneath the bridge plate. Adjust the first-string bridge saddle to the scale length, measuring from the inside of the nut to the center of the bridge saddle. Re-tighten the lock-down screw. Now adjust the distance of the second-string saddle back from the first-string saddle, using the gauge of the second string as a measurement. For example, if the second-string gauge is .011", you'd move the second-string saddle back .011" from the first-string saddle. Move the third-string saddle back from the second-string saddle, using the gauge of the third string as a measurement. The fourth-string saddle should be set parallel with the second-string saddle. Proceed with the fifth and sixth strings in the same manner used for the second and third strings.

**Note:** Remember to re-tighten each lock-down screw as you make your adjustments.

### STRING INSTALLATION

To properly install strings on both types of bridges, the hex screw located on the end of each individual saddle must be loosened. Cut the ball-end of the string off directly above the tie-off windings, insert the string as close to the center as possible and tighten the hex screw, locking the string in place. Caution: Do not over-tighten the hex screw.

If the locking system incorporates a locking nut, remove the nut lock-down pieces while installing the strings and going through the setup procedures. After the setup is complete, replace the nut lock-down pieces, check your tuning and tighten the hex screws to lock the strings at the nut. Caution: Do not over-tighten. Use the fine tuners at the bridge to compensate for any tuning changes.

## **TREMOLO ADJUSTMENT**

After the strings are installed, remove the tremolo back cover. Check your tuning. Allowing the bridge to float freely (no tension on the tremolo arm) and using the claw screws in the tremolo cavity, adjust the bridge to your desired angle (on most free-floating systems, it is recommended that the bridge sit parallel to the body). You'll need to re-tune periodically to get the right balance between the strings and the springs. For the flush-mounted bridges, you might want to adjust the bridge to rest on the body. You can adjust the spring tension to an equal string tension, with the bridge resting on body (you might want to put an extra 1/2 turn to each claw screw to ensure that the bridge remains flush to the body during string bends). Finally, you may wish to apply a small dab of lip balm or petroleum jelly at the pivot contact points of the bridge for very smooth operation.

## **How do I set up my Stratocaster® guitar properly?**

### **STRATOCASTER® ADJUSTMENT AND CARE**

The following setup procedures and specifications are for your Stratocaster as equipped with the strings that come on the instrument as standard equipment from the factory. If you plan to change string gauges, you may need to adjust the specs somewhat to compensate for the changes in string sizes. Modifications of the specs may also be made (within limited parameters) to adjust for your individual playing style or application (i.e., how hard you pick, strum or fret the guitar).

*Note: These are minimum specifications that are meant as a guide; they should not be construed as hard and fast rules, as we realize that every player's subjective requirements often differ.*

### **TOOLS NEEDED**

- Set of automotive feeler gauges (.002-.025) (0.05–1 mm)
- 6" (150 mm) ruler (with 1/32" and 1/64" increments) (0.5 mm increments)
- Light machine oil (3-in-1, toy locomotive or gun oil)

- Phillips screwdriver
- Electronic tuner
- Wire cutters
- Peg winder
- Polish and cloth

## STRINGS

For strings to stay in tune, they should be changed regularly. Strings that have lost their integrity (worn where pressed against the fret) or have become oxidized, rusty and dirty will not return to pitch properly. To check if your strings need changing, run a finger underneath the string and feel for dirt, rust or flat spots. If you find any of these, you should change your strings.

No matter what gauge of strings you use, for the best tuning stability we recommend using Fender Bullet® strings. The patented bullet-end is specifically designed for all styles of tremolo use, from extreme dives to smooth vibrato passages. The design allows the string to travel freely in the bridge block channel during tremolo use and return afterwards to its original position, seated snugly in the bridge block. This is accomplished by eliminating the extra string wrap and the ball-end (the ball end doesn't fit properly into the string channel). The bullet end has been shaped and sized to match the design of the bridge block channel.

Make sure to stretch your strings properly. After you've installed and tuned a new set, hold the strings at the first fret and hook your fingers under each string, one at a time, and tug lightly, moving your hand from the bridge to the neck. Re-tune and repeat several times.

## TUNING KEYS

How you wind the strings onto the pegs is very important, whether you're using locking, standard or vintage tuning keys. Start by loading all the strings through the bridge and then loading them onto the keys as follows:

**Locking tuning keys.** Picture the headcap of the neck as the face of a clock, with the top being 12:00 and the nut being 6:00. Line the six tuning machines so that the first string keyhole is set at 1:00, the second at 2:00, the third and fourth at 3:00, the fifth at 4:00, and the sixth at 5:00. Pull the strings through tautly and tighten the thumb wheel, locking the string in. Now tune to pitch.

**Standard keys.** To reduce string slippage at the tuning key, we recommend using a tie technique. This is done by pulling the string through the keyhole and then pulling it clockwise underneath and back over itself; creating a knot. You'll need to leave a bit of slack for the first string so you have at least two or three winds around the post. As you progress to the sixth string, you'll reduce the amount of slack and the number of winds around the keys.

**Vintage keys.** For these, you'll want to pre-cut the strings to achieve the proper length and desired amount of winds. Pull the sixth string (tautly, remember) to the fourth key and cut it. Pull the fifth string to the third key and cut it. Pull the fourth string between the second and first keys and cut it. Pull the third string nearly to the top of the headcap and cut it. Pull the second string about a 1/2" (13 mm) past the headcap and cut it. Finally, pull the first string 1 1/2" (38 mm) past the top of the headcap and cut it. Insert into the center hole in the tuning key, bend and crimp to a 90-degree angle, and wind neatly in a downward pattern, being careful to prevent overlapping of the strings.

If your tuning keys have a screw on the end of the button, check the tightness of the screw. This controls the tension of the gears inside the tuning keys. **Do not** over-tighten these screws. They should be "finger-tight." This is very important, especially on locking tuners.

## TREMOLO

Stratocaster guitars can have four distinctive types of bridges. The most well-known bridge is the vintage-style "synchronized" tremolo. The other three are the American Series bridge, which is a modern-day two-pivot bridge; the non-tremolo hardtail bridge; and a locking tremolo, such as the American Deluxe or Floyd Rose® locking tremolos. If you have a non-tremolo "hardtail" bridge, proceed to "Intonation (Roughing it out)."

First, remove the tremolo back cover. Check your tuning. For a vintage-style tremolo bridge, a great way to enhance its performance is to pull the bridge back flush with the body using the tremolo arm. Then loosen all six screws located at the front edge of the bridge plate, raising them so that they all measure approximately 1/16" (1.6 mm) above the top of the bridge plate. Then tighten the two outside screws back down until they're flush with the top of the bridge plate. The bridge will now pivot on the outside screws, leaving the four inside screws in place for bridge stability. For a two-pivot model such as the American Series bridge, use your tremolo arm to pull the bridge back flush with the body and adjust the two pivot screws to the point where the tremolo plate sits entirely flush at the body (not lifted at the front or back of the plate).

Allowing the bridge to float freely (no tension on the tremolo arm) using the claw screws in the tremolo cavity, adjust the bridge to your desired angle—Fender spec is a 1/8" (3.2 mm) gap at rear of bridge. You'll need to retune periodically to get the right balance between the strings and the springs. If you prefer a bridge flush to the body, adjust spring tension to equal string tension, while the bridge rests on the body (you may want to put an extra 1/2 turn to each claw screw to ensure that the bridge remains flush to the body during string bends). **Caution:** Do not over-tighten the springs, as this can put unnecessary tension on the arm during tremolo use. Finally, you may wish to apply a small dab of Chapstick® or Vaseline® at the pivot contact points of the bridge for very smooth operation.

## INTONATION (ROUGHING IT OUT)

You can preset the basic intonation of your guitar by taking a tape measure and measuring from the inside of the nut to the center of the 12th fret (the fret wire itself; not the fingerboard). Double that measurement to find the scale length of your guitar. Adjust the first-string bridge saddle to this scale length, measuring from the inside of the nut to the center of the bridge saddle. Now adjust the distance of the second-string saddle back from the first saddle, using the gauge of the second string as a measurement. For example, if the second string is .011" (0.3 mm), you would move the second-string saddle back .011" (0.3 mm) from the first saddle. Move the third saddle back from the second saddle using the gauge of the third string as a measurement. The fourth-string saddle should be set parallel with the second-string saddle. Proceed with the fifth and sixth saddles with the same method used for strings two and three.

## **LUBRICATION AND STRING BREAKAGE**

Lubricating all of the contact points of a string's travel may be one of the most important elements in ensuring tuning stability during tremolo use and in reducing string breakage.

The main cause of string breakage is moisture collection at the point of contact on the bridge saddle. This can be attributed to the moisture and acidity that transfers from your hands, or it can be a direct effect of humidity in the air. Another factor is metal-to-metal friction and fatigue. Metal components react to each other over time because of their differences and help break down string integrity. A stronger metal will always attack a softer metal (this is why a stainless-steel string will wear a groove or burr in a vintage-style saddle). You'll also find that different string brands break at different points of tension because of the metal makeup and string manufacturing techniques.

Since Fender manufactures its own strings, they are designed to perform well during extreme tremolo techniques.

One of the best ways to reduce string breakage is to lubricate the string/saddle contact point with a light machine oil (we prefer 3-in-1 oil because it contains anti-rust and anti-corrosive properties) every time you change strings. The oil insulates against moisture and reduces friction and metal fatigue. String trees are another point of contact and should also be lubricated; a small amount of lip balm applied with a toothpick works well.

## **TRUSS ROD**

There are two different styles of truss rod found on Fender instruments—"standard" and "bi-flex" truss rods.

Most Fender guitars and basses are equipped with a standard truss rod (of which there are in turn two types: one that adjusts at the neck heel and one that adjusts at the headstock; both operate on the same principle). The standard truss rod can counteract concave curvature in a

neck that has too much relief, for example, by generating a force in the neck opposite to that caused by excessive string tension.

Fender also uses a unique bi-flex truss rod system on some instruments. Unlike standard truss rods, which can only correct a neck that is too concave (under-bowed), the bi-flex truss rod can compensate concave or convex (over-bowed) curvature by generating a correcting force in either direction as needed.

First, check your tuning. Affix a capo at the first fret and depress the sixth string at the last fret. With a feeler gauge, check the gap between the bottom of the string and the top of the 8th fret—see the spec chart below for the proper gap.

Adjustment at headstock (allen wrench): Sight down the edge of the fingerboard from behind the headstock, looking toward the body of the instrument. If the neck is too concave (action too high), turn the truss rod nut clockwise to remove excess relief. If the neck is too convex (strings too close to the fingerboard), turn the truss rod nut counter-clockwise to allow the string tension to pull more relief into the neck. Check your tuning, then re-check the gap with the feeler gauge and re-adjust as needed.

Adjustment at neck joint (phillips screwdriver): Sight down the edge of the fingerboard from behind the body, looking up toward the headstock of the instrument. If the neck is too concave (action too high), turn the truss rod nut clockwise to remove excess relief. If the neck is too convex (strings too close to the fingerboard), turn the truss rod nut counter-clockwise to allow the string tension to pull more relief into the neck. Check your tuning, then re-check the gap with the feeler gauge and re-adjust as needed.

*Note: In either case, if you meet excessive resistance when adjusting the truss rod, if your instrument needs constant adjustment, if adjusting the truss rod has no effect on the neck, or if you're simply not comfortable making this type of adjustment yourself, take your instrument to your local Fender Authorized Dealer.*

<b>Neck Radius</b>	<b>Relief</b>
7.25"	.012" (0.3 mm)
9.5" to 12"	.010" (0.25 mm)
15" to 17"	.008" (0.2 mm)

## **ACTION**

Players with a light touch can get away with lower action; others need higher action to avoid rattles. First, check tuning. Using a 6" (150 mm) ruler, measure the distance between bottom of strings and top of the 17th fret. Adjust bridge saddles to the height according to the chart, then re-tune. Experiment with the height until the desired sound and feel is achieved.

*Note: For locking tremolo systems, the individual string height is preset. Use the two pivot adjustment screws to achieve the desired overall string height.*

<b>Neck Radius</b>	<b>String Height Bass Side</b>	<b>Treble Side</b>
7.25"	5/64" (2 mm)	4/64" (1.6 mm)
9.5" to 12"	4/64" (1.6 mm)	4/64" (1.6 mm)
15" to 17"	4/64" (1.6 mm)	3/64" (1.2 mm)

## **SHIMMING/MICRO-TILT™ ADJUSTMENT**

Shimming is a procedure used to adjust the pitch of the neck in relation to the body. A shim is placed in the neck pocket, underneath the butt end of the neck. On many American series guitars, a Micro-Tilt adjustment is offered. It replaces the need for a shim by using a hex screw against a plate installed in the butt end of the neck. The need to adjust the pitch (raising the butt end of the neck in the pocket, thereby pitching the neck back) of the neck occurs in situations where the string height is high and the action adjustment is as low as the adjustment will allow.

To properly shim a neck, the neck must be removed from the neck pocket of the body. A shim approximately 1/4" (6.4 mm) wide by 1 3/4" (44.5 mm) long by .010" (0.25 mm) thick will allow you to raise the action approximately 1/32" (0.8 mm). For guitars with the Micro-Tilt adjustment, loosen the two neck screws on both sides of the adjustment access hole on the neckplate by at least four full turns. Tightening the hex adjustment screw with an 1/8" hex wrench approximately 1/4 turn will allow you to raise the action approximately 1/32". Re-tighten the neck screws when the adjustment is complete. The pitch of the neck on your guitar has been preset at the factory and in most cases will not need to be adjusted.

*Note: If you feel that this adjustment needs to be made and you're not comfortable doing it yourself, take your guitar to your local Fender Authorized Dealer.*

## **PICKUPS**

Set too high, pickups can cause myriad inexplicable phenomena. Depress all the strings at the last fret. Using a 6" (150 mm) ruler, measure the distance from the bottom of the first and sixth strings to the top of the pole piece. A good rule of thumb is that the distance should be greatest at the sixth-string neck pickup position, and closest at the first-string bridge pickup position. Follow the measurement guidelines in the chart below as starting points. The distance will vary according to the amount of magnetic pull from the pickup.

	<b>Bass Side</b>	<b>Treble Side</b>
<b>Texas Specials</b>	8/64" (3.2 mm)	6/64" (2.4 mm)
<b>Vintage style</b>	6/64" (2.4 mm)	5/64" (2 mm)
<b>Noiseless™ Series</b>	8/64" (3.2 mm)	6/64" (2.4 mm)
<b>Standard Single-Coil</b>	5/64" (2 mm)	4/64" (1.6 mm)
<b>Humbuckers</b>	4/64" (1.6 mm)	4/64" (1.6 mm)
<b>Lace Sensors</b>	As close as desired (allowing for string vibration)	

## **INTONATION (FINE TUNING)**

Adjustments should be made after all of the above have been accomplished. Set the pickup selector switch in the middle position, and turn the volume and tone controls to their maximum settings. Check tuning. Check each string at the 12th fret, harmonic to fretted note (make sure you are depressing the string evenly to the fret, not the fingerboard). If sharp, lengthen the string by adjusting the saddle back. If flat, shorten the string by moving the saddle forward. Remember, guitars are tempered instruments! Re-tune, play and make further adjustments as needed.

## **ADDITIONAL HINTS**

There are a few other things that you can do to optimize your tuning stability that have more to do with playing and tuning habits.

Each time you play your guitar, before you do your final tuning, play for a few minutes to allow the strings to warm up. Metal expands when warm and contracts when cool. After you've played a few riffs and done a few dive-bombs, you can then do your final tuning. Remember— with most tuning keys, it's preferable to tune up to pitch. However, with locking tuners, go past the note and tune down to pitch. Finally, wipe the strings, neck and bridge with a lint-free cloth after playing. When transporting or storing your guitar, even for short periods, avoid leaving it anyplace you wouldn't feel comfortable yourself.

## How often should I change my strings?

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There is no set rule for how often you should change your strings. If you have strings which are worn, flattened, kinked, corroded, rusted or mucked up with sweat grease and grime, then it is definitely time to change your strings. Really, the only other determining factor should be that if your strings are no longer giving you the tone, brightness and response that you desire, then it's probably time to change them.

## Where can I take my instrument and/or amplifier to be repaired?

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Not all Fender® Authorized Service Centers are equipped to handle every type of service issue. Customers are advised to call first and verify that the service center can address your specific repair needs.

To locate a service center, please visit our [Fender Authorized Service Center information page](#).