FEEDING CONCEPTS INC.
VIBRATORY FEEDER BOWLS & AUTOMATIC PARTS FEEDERS

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Leaf Spring & Spacer Replacement Guide

Vibratory Bowl Drives · Vibratory Hoppers · Vibratory Inlines

Customer Service Guide · Updated November 5, 2026

This guide covers replacing leaf springs and spacers on FCI vibratory bowl drives, hoppers and inlines (straight line drives). In short, work on one spring pack at a time, put every spacer back, torque the bolts, then run the tuning check.

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1. Before you start

Safety

- Turn the controller off and unplug the drive (or lock out the power) before touching any spring or bolt. The only exception is the tuning check, which is done with the unit running.
- Keep hands clear of the coil and armature. Springs and spacers have sharp edges. Wear gloves.

Tools

- Socket set and wrenches to fit the spring bolts
- Torque wrench (breakaway / click type), plus an inch-pound torque wrench or driver for small bolts
- Clean rag and a wire brush
- Paint marker and a phone camera

Parts

- New FCI leaf springs of the **same thickness** as the ones you remove
- New spring spacers (thin shims) if the old ones are bent, worn or missing
- Bolts of the same size, grade and length as the ones you remove

Read this first

1. **Work on one spring pack at a time.** Never remove all the springs at once. The other packs hold the bowl, bin or track in position.
2. **Take a photo before you take anything apart.** Put each spring pack back in the exact order it came out. The thinnest springs always go on the outside of the pack.
3. **A spacer goes between every spring.** Leaving one out acts like adding a spring and throws off the tuning. If a spacer is missing, make or order one. Do not run without it.
4. **Use the right bolt length.** The bolt holes are blind. A bolt that is too long bottoms out and feels tight when it is not. A bolt that is too short strips the threads after you add springs.
5. **Change only one thing, then test.** Add or remove one spring at a time and run the tuning check between changes.

2. Bowl feeder base drive

The springs sit in packs around the drive, bolted between the base and the cross arms that hold the bowl. Some packs sit next to a coil (coil packs) and some do not (non-coil packs). **The non-coil packs must have the same number of springs as the coil packs, or fewer.** Packs on opposite sides do not need to match.

1. Turn off and unplug the drive. Leave the bowl mounted.
2. Photograph the spring pack you will work on. Mark its top with a paint marker.
3. Remove the top and bottom bolts from that one pack.
4. Slide out the springs and spacers. Lay them on the bench in the order they came out.
5. Check each spring for cracks. Cracks usually start near the bottom bolt hole, right where the spring comes out of the lower clamp. Paint can hide them, so tap each spring on a hard surface. A cracked spring will break. Check the thickest spring first.
6. Clean the springs, spacers and both mounting faces. Remove dirt, oil and loose paint so each spring sits flat.
7. Rebuild the pack in the same order: spring, spacer, spring, spacer, with the thinnest springs on the outside. Replace any cracked spring with a new one of the same thickness.
8. Line up the holes and edges so the springs sit square and flat against the mounting faces.
9. Start all bolts by hand, then snug them evenly. Torque them to the value in the torque table below. Top and bottom spring bolts can be different sizes, so check both columns.
10. Repeat steps 2–9 for the next pack. When finished, count the springs. Each non-coil pack must have the same number as the coil packs, or fewer.
11. Check that the four toe clamp bolts holding the bowl are tight (see the torque table) and that nothing (track, hoses, guards) touches the bowl or drive.
12. Plug the drive back in and run the **tuning check** below.

Dead spot in the bowl? Look about 180 degrees across from the dead spot. The usual causes are weight added to the bowl without counterbalancing it, a coil gap set wrong, a cracked weld, or a broken or loose spring or spring bolt.

3. Vibratory hopper

A hopper drive has a front spring pack and a rear spring pack. The two packs **do not need the same number of springs.**

1. Turn off and unplug the hopper. Empty the bin if it is heavy with parts.
2. Photograph the spring pack you will work on and mark which end is front.
3. Remove the top and bottom bolts from that one pack.
4. Slide out the springs and spacers. Keep them in order on the bench.
5. Check each spring for cracks near the bolt holes. Tap it on a hard surface; a cracked spring will break.
6. Clean the springs, spacers and mounting faces.
7. Rebuild the pack in the same order: spring, spacer, spring, spacer, with the thinnest springs on the outside. Replace any cracked spring with a new one of the same thickness.
8. Square up the springs, start the bolts by hand, then tighten them evenly and firmly.
9. Repeat for the other pack.
10. Check that the bolts holding the bin to the drive top are tight and that the bin does not touch the bowl or other equipment.
11. Refill the bin, plug it back in and run the **tuning check** below.

Dead spot at one end? If the front runs slow, add an extra spacer under the lower end of the front pack. If the rear runs slow, add an extra spacer under the top end of the rear pack.

4. Vibratory inline (straight line drive)

An inline drive has a front and a rear spring pack under the aluminum top member that carries the track. The two packs **do not need the same number of springs.**

1. Turn off and unplug the inline. Clear parts off the track.
2. Photograph the spring pack you will work on and mark which end is front.
3. Remove the top and bottom bolts from that one pack. Leave the track mounted.
4. Slide out the springs and spacers. Keep them in order on the bench.
5. Check each spring for cracks near the bolt holes. Tap it on a hard surface; a cracked spring will break.
6. Clean the springs, spacers and mounting faces.
7. Rebuild the pack in the same order: spring, spacer, spring, spacer, with the thinnest springs on the outside. Replace any cracked spring with a new one of the same thickness.
8. Square up the springs, start the bolts by hand, then tighten them evenly and firmly.
9. Repeat for the other pack.
10. Check that the bolts holding the track to the top member are tight. Make sure the track does not touch the bowl discharge, escapement or anything else. Leave a small gap at each end.
11. Plug it back in, fill the track with parts and run the **tuning check** below.

Dead spot at one end? If the front runs slow, add an extra spacer under the lower end of the front pack. If the rear runs slow, add an extra spacer under the top end of the rear pack.

5. Tuning check (all three units)

Run this check every time you change springs. A properly tuned unit feeds well at a low controller setting and runs smooth, with no banging.

1. Load parts to the normal running level (bowl, bin or full track). If the drive has a base cover, keep it on while tuning. Taking it off changes the tuning.
2. Set the controller to 35–40%. Parts should start to move. Raise it slowly until you reach the feed rate you need.
3. If you pass 80% and still don't have enough movement, or the unit runs violently, stop and look for anything touching the unit before going on.
4. With the unit running, **slowly loosen one lower spring bolt** (about a half turn) and watch the parts:
    - **Parts speed up** means too many springs (over-sprung). Remove the thinnest spring. See the table below for which pack.
    - **Parts slow down** means too few springs (under-sprung). Add a thin spring.
5. Retighten the bolt to full torque after each test. When tuning is done, witness mark every spring bolt.
6. Leave the unit **slightly under-sprung**. Parts should slow down just a little when you loosen the bolt.

Where to add or remove springs

Unit	Too many springs (parts speed up)	Too few springs (parts slow down)
Bowl feeder drive	Remove from a non-coil pack	Add to a coil pack
Hopper	Remove from the pack with the most springs	Add to the pack with the fewest springs
Inline	Remove from the pack with the most springs	Add to the pack with the fewest springs

On bowl drives, non-coil packs must never have more springs than the coil packs.

Always put a spacer between springs, and test again after every change.

Tuning won't come out right? If the unit still reads under-sprung after you add a spring, look for a cracked spring. On a drive that has run for years, the springs can work-harden and make it read over-sprung. Also recheck bolt length and make sure no spacer is missing. Adding tooling or weight to a bowl acts like taking springs out, so a retooled bowl usually needs fewer springs.

6. Common mistakes

Mistake	What happens
Spacer left out	Acts like an extra spring, so the tuning reads wrong
Bolt too long (bottoms out)	Feels tight but the spring is loose, giving false tuning
Bolt too short after adding springs	Threads strip
Coil gap too small	Coil clatters (metal hitting metal) and damages the drive
Track, hose or guard touching the unit	Feed slows or stops; use soft flexible air tubing, not rigid lines
Bowl pulled out of its toe clamps to line up a track	Parts fall off or jam; level the drive instead
Turning the controller up to fix slow feeding	Hides a cracked spring or loose bolt; check springs first

7. Torque table: bowl feeder drive units

Use a torque wrench on every bolt. Bolts are socket head cap screws (SHCS) unless noted. Drive size is the bowl diameter the drive is built for.

Drive size	Top spring bolts	Bottom spring bolts	Coil mounting bolts	Coil stand bolts	Toe clamp bolts
6 in	10-32: 33 in-lb, or 1/4": 14 ft-lb	10-32: 33 in-lb, or 1/4": 14 ft-lb	85 in-lb	Application specific	1/4": 14 ft-lb
8 and 10 in	1/4": 14 ft-lb, or 5/16": 25 ft-lb	1/4": 14 ft-lb, or 5/16": 25 ft-lb	85 in-lb	Application specific	1/4": 14 ft-lb
12 and 15 in	3/8": 55 ft-lb	3/8": 55 ft-lb	85 in-lb	1/2-13: 95 ft-lb	1/4": 14 ft-lb
18 and 21 in	1/2-13: 95 ft-lb	5/8-11: 165 ft-lb	85 in-lb	1/2-13: 95 ft-lb	3/8": 55 ft-lb
24 to 42 in	5/8-11: 165 ft-lb	3/4-10: 235 ft-lb	85 in-lb	1/2-13: 95 ft-lb *	3/8": 55 ft-lb

* On 27 to 42 in drives, high-speed or high-mass units may use a different coil stand bolt. Call FCI if yours doesn't match.

After tuning, witness mark every bolt. Draw a paint line across the bolt head and the part it holds. If the line ever breaks, that bolt has moved.

Hopper and inline bolt torque

If your unit has no FCI torque value, use these typical values for socket head cap screws. These are for hoppers and inlines only. For bowl drives, always use the bowl drive table above.

Bolt size	Typical torque
1/4-20	190 in-lb (about 16 ft-lb)
3/8-16	59 ft-lb
1/2-13	144 ft-lb
5/8-11	180 ft-lb
3/4-10	200 ft-lb

8. Setting the coil gap

The coil gap is the space between the coil face and the armature plate on the cross arm. Too small and the coil hammers (clatters) and damages the drive. Too large and the unit runs slow and the coil runs hot. Check the gap whenever you change springs.

Always unplug the unit before turning any coil bolt.

1. With the unit off and unplugged, measure the gap with a feeler gauge at the middle and all four corners of the coil. The readings should be about the same. Write them down before changing anything.
2. Find out whether the drive runs on AC (full wave) or DC (half wave, rectified). Check the controller label or its switch. Then set the gap:

	AC drive (120 cycle)	DC drive (60 cycle)
Also called	Non-rectified, full wave	Rectified, half wave
Pulses per second	120	60
Vibrations per minute	7,200	3,600
Leaf springs	Fewer, thicker springs	More, thinner springs
Coil gap	0.030 in	0.040 in

Switching a drive between AC and DC changes the spring set and the coil gap it needs. Call FCI before you switch.

3. Adjust the gap with the four bolts on the back of the coil. Two bolts pull the coil toward the coil post and two bolts push it away. Keep the coil face parallel to the armature plate.
4. Plug the unit in and run the controller at 80–100%.
5. **If the coil hammers,** the gap is too small. Turn off, unplug, open the gap slightly and test again.
6. **If it does not hammer,** leave the gap at the setting in the table.
7. Record the final gap readings. On bowl drives, torque the coil mounting bolts to 85 in-lb.

9. Help and replacement parts

Call Feeding Concepts at 317-773-2040 (parts: ext. 102) or email parts@feedingconcepts.com. Send the FC serial number from the unit's tag and we will quote the correct springs and spacers.

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