A R Harley & Sons Ltd

Frame Terms and Options when Choosing and ordering a Custom Motorcycle Frame

This clarifies what is involved in Stretch, Rise, and Rake (Head Angle).

Rake

This is actually an incorrect term. Properly speaking, this is "Head Angle". It is the angle that the steering stem of the triple trees goes through the frame relative to the horizontal. Many custom frames available have one fixed angle or a choice of two or three but many have choices of steering head angle normally from 31 to 46 degrees or sometimes even higher.

Effect on handling: Generally speaking, the steeper the head angle (lower number) the faster the handling is on the bike when changing direction when riding. A Standard HD Softail runs a 30-degree head angle. A 35-degree head is a nice compromise between looks and handling.

Usually, steering heads with 38 degrees and above don't handle as good because the front end starts to feel heavy and want to flop over, particularly at low speeds. This can be corrected to some degree with adjustable trees or fixed increased rake trees, which we recommend for the more extreme head angles (40 degrees and above).

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Front Leg Rise (or "Rise" or “Higher Neck”)

The front Legs of the frame are the one or more usually two tubes that run in front of the engine, between the motor mount and headstock. Frames come standard with 0 front leg rise. A stock HD softail is a standard bike with 0 front leg rise. Front leg rise up to 6inch or higher is often possible. This was the "stretch" used in the 70s style "Choppers".

Front leg rise is independent of all other dimensions, and is measured STRAIGHT UP from the base of the frame table. It is NOT extended along the angle of the front legs. THIS IS IMPORTANT! As front leg rise increases, the front tubes get closer to the cylinders (see picture above). For this reason, Frame rises above certain heights MUST be combined with backbone stretch. Or the front tubes will hit the front cylinder of the engine.

This table shows the minimum backbone stretch to use with front leg rises on a Softail Frame

2" Front Leg Rise	2" Backbone Stretch
4" Front Leg Rise	2" Backbone Stretch
6" Front Leg Rise	5" Backbone Stretch

Effect on Handling: Requires a longer front end, which in turn makes the front end a little "heavier" in steering and greater care and time turning the curves and corners. Decisions on fork trail and increased rake triple trees will need to be examined.

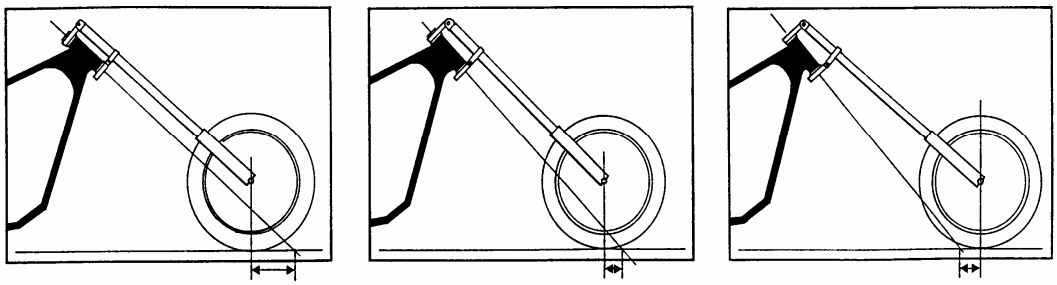
Backbone Stretch (or Backbone or Toptube Stretch)

The Backbone is the tube that the fuel tank sits on, between the steering head and the seat pan. Several different backbone stretches are available at no extra charge from most custom frame builders, although some cheaper frames have just one or a small range of stretches. This is the "Stretch” used in the 80s and 90s style customs as popularised by builders like Arlen Ness and Donnie Smith.

Again, Backbone stretch is independent of any other dimension on the chassis, and DOES NOT MOVE THE FOOTPEGS. It only moves the steering head forward. People with shorter legs will not be disadvantaged by using a frame with extra backbone stretch. You just need longer arms and/or longer handlebars.

Effect on Handling: Major effect is the lengthening of the wheelbase, which means a wider and slower line has to be taken through the curves.

Important Note.
Apart from the comments on the effects on handling from changing various frame dimensions, maintaining the correct trail of the forks for safe riding is very important and sometimes having fork rakes with increased rake triple trees is vital to help maintain the correct trail. Fork length is also vitally important. Building a custom bike is a very expensive process. Ensuring the rider lives to enjoy his custom motorcycle is perhaps the most important part of the bike build.
Free advice and information is only an email or phone call away - from Alistair Harley!



1. Wrong – Too Much 2. Correct 3. Wrong – Too Little

1.Too Much Trail
If the trail is more than 13 cm/5 in the bike will seem almost too steady, and will handle sluggishly at high speed. It will be very hard to manoeuvre. You will have trouble balancing your bike at lower speeds, or on winding roads. It will feel generally sluggish and clumsy.
2.Normal Trail
The trail is between 5-13 cm/ 2-5in. The bike will handle easily at both high and low speeds. Flowing smoothly through curves without swaying or wobbling. If you use a very fat rear tire, you should keep the trail close to the upper limit, around 10-13 cm/4-5in.
3.Too Little Trail
The bike will handle with ease at low speeds, but be completely out of balance at high speed. In extreme cases you can have negative trail, where the wheel axle mark is in front of the steering axle mark. It will easily develop a fatal high-speed wobble. Dangerous!