Bikeworks L.L.C.

Anvil Frame Fixtures 101

Frame fixtures or jigs are designed with a basic build process logic and the Anvil fixtures are no different. This document will explain the logic behind the Anvil frame fixtures so you can better understand how they're designed to work.

Home Is Where the Bottom Bracket Is
All Anvil frame fixtures are designed with the center of the bottom bracket tower as the reference or home dimension (XY zero). With the exception of the head tube angle witness marks, all scales on the fixture are referenced relative to this position. Our fixtures normally place the non-drive side of the bike towards the fixture's base plate which mandates that the head tube be on your right hand side as you're looking at the fixture (we also offer "goofy footed" fixtures with the head tube on the left but they operate on the same logic as the standard fixtures). The reason for this is that this leaves the drive side of the bike facing you. Most bottom brackets are longer than their nominal dimension; for example, a 68mm English BB shell is normally supplied 69mm long. On standard Anvil fixtures you can let the drive side run long and then face to tolerance after the build process. On the Type 3's, Super Journeyman, and Master series fixtures you can center the BB shell to the shell's exact centerline or a lug port centerline without prefacing. That said, it's our position that all builders, regardless of the fixturing they're using, should start their frame construction with a properly faced and blueprinted bottom bracket shell.[1]

Head Tube Height
All Anvil frame fixtures locate the head tube's vertical placement by a measurement we call "head tube height." This is the vertical dimension from the *center of the bottom bracket* to the *bottom center of the head tube*. This dimension can be taken from your design drawing. Again, this the vertical dimension from the **center** of the bottom bracket to the **bottom center** of the head tube. Head tube height is directly read from the bottom of the top tube length arm on the vertical scale which is permanently placed on the fixture's base plate. A change in head tube angle will not affect the head tube height.

Chainstay Length & Bottom Bracket Drop
The Super Master, Super Journeyman, and the Type 3 series Journeyman have a direct reading scale for the "Effective Chainstay Length" (read from the front edge of the Chainstay Tower Assembly's sliding base) and an independent adjustment to establish bottom bracket drop using a direct reading scale integrated into the chain stay length base and a pointer on the chain stay tower. For example, to set the fixture up for 70mm of BB drop, you'd just align the BB drop pointer with 70mm on the scale. Easy as cake.

The Journeyman Type 2 and older models have a direct reading scale for "Actual Chainstay Length" and bottom bracket drop is set by adjusting the chainstay length arm to the design "Chainstay Angle."[2] The Chainstay Angle scale on the Journeyman is integrated with the fixture and the back purge valve. The scale reads from -10 to +16 degrees with 1/8th-degree resolution. The chainstay angle pointer has three distinct witness marks on it which are used like a vernier caliper to give you 1/16th-degree resolution. 1/16th-degree resolution equals 1mm of BB drop at a 400mm chainstay length

"Effective Chainstay Length" (ECL) is the horizontal distance the rear axle is behind the bottom bracket as opposed to "Actual Chainstay Length" (ACL) which is the parallel or bee-line distance between the bottom bracket and axle centers normally provided when discussing bicycle geometry. To be clear:

[1] A blueprinted shell is one that has been measured and dimensionally documented for centerline of the shell itself and/or lug ports.
[2] Chainstay angle is the angle between a theoretical line from the center of the rear axle to the center of the bottom bracket and a line parallel to the ground.

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- Effective Chainstay Length (ECL): The horizontal distance the center of the rear axle is behind the center of the bottom bracket. Changes in bottom bracket drop have no effect on this dimension and it can be used to determine rider center of gravity & balance over a bike frame
- Actual Chainstay Length (ACL): The parallel distance (bee-line) from the BB center to the center of the rear axle. This is the dimension most people refer to when discussing chainstay length.

So, when setting up Type 2 and older Journeyman for chainstay length, it direct reads, so for 420mm chainstays, you'd put the chainstay length pointer at 420mm. On the Super Masters, Super Journeyman, and Type 3 Series Journeyman, 420mm chainstays could be within a range of dimensions considering bottom bracket drop variables so to properly set chainstay length you need to determine the ECL from your design drawing or do the math. In most cases, setting chainstay length on either fixture is not really necessary as the miter length of the chainstays will determine how the fixture is set up.

Head Tube Angle

Head tube angle on all Anvil Frame Fixtures is direct reading with 1/8th-degree resolution. The scale for the head tube angle is engraved directly into the plate at ¼-degree intervals from 60 to 80-degrees while the head tube angle pointer has three distinct witness marks acting as a vernier that allows resolution to the 1/8th-degree. Changing head tube angle does not affect head tube height.

Seat Tube Angle

The seat tube angle offers direct reading 1/2-degree resolution (1/4-degree on the Super Masters). The seat tube angle witness marks are engraved into the base plate relative to the bottom bracket center guaranteeing that the angular relationship between the bottom bracket center and the seat tube angle scale is accurate to within .0005" and the fixtures are proofed using a micrometer protractor with 1-minute (1/60th-degree) resolution. The angle is read from the right hand side of the seat tube arm as you're facing the fixture. There is a shelf on the fixtures which allows a builder to use a vernier protractor if they desire to have finer seat tube angle resolution.