Harley Softail Drivetrain Gear Ratios

Model	Primary	Primary Ratio	1st	2nd	3rd	4th	5th	6th
Sport Glide	36-46	1.278	9.311	6.454	4.793	3.882	3.307	2.790
Low Rider S	36-46	1.278	9.311	6.454	4.793	3.882	3.307	2.790
Softail Slim	36-46	1.278	9.311	6.454	4.793	3.882	3.307	2.790
Fat Boy	36-46	1.278	9.311	6.454	4.793	3.882	3.307	2.790
Heritage Classic 114	36-46	1.278	9.311	6.454	4.793	3.882	3.307	2.790
Breakout	36-46	1.278	9.311	6.454	4.793	3.882	3.307	2.790
Deluxe	36-46	1.278	9.311	6.454	4.793	3.882	3.307	2.790
Low Rider	36-46	1.278	9.311	6.454	4.793	3.882	3.307	2.790
FXDR 114	36-46	1.278	9.311	6.454	4.793	3.882	3.307	2.790
Fat Bob 107 & 114	36-46	1.278	9.311	6.454	4.793	3.882	3.307	2.790
Street Bob	36-46	1.278	9.311	6.454	4.793	3.882	3.307	2.790
Gear Selection			1st	2nd	3rd	4th	5th	6th
% Gain Over Previous Lower Gear			N/A	44.267	34.652	23.467	17.389	18.530

Model	Primary	Primary Ratio	1st	2nd	3rd	4th	5th	6th
Gear Output RPM			**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**
Engine 1000 RPM			**84.037**	**121.238**	**163.250**	**201.560**	**236.610**	**280.455**
Engine 2000 RPM			**168.074**	**242.476**	**326.506**	**403.128**	**473.222**	**560.912**
Engine 3000 RPM			**252.112**	**363.715**	**489.759**	**604.692**	**709.833**	**841.368**
Engine 4000 RPM			**336.149**	**484.953**	**653.012**	**806.257**	**946.444**	**1121.824**
Engine 5000 RPM			**420.187**	**606.191**	**816.266**	**1007.821**	**1183.055**	**1402.280**

In basic terms, the primary ratio is the relationship between the engine crankshaft and the clutch speed and is governed by the sprocket sizes. On the HD Softails, there is a rotational speed reduction between these two points of 1.278. In other words 1000 Engine RPM = 782.47 Clutch to Transmission RPM.

The 1st gear speed reduction is 9.311 which means 1000 Engine RPM to 782.47 Clutch RPM is reduced to 84.037 RPM output to rear wheel
The 2nd gear speed reduction is 6.454 which means 1000 Engine RPM to 782.47 Clutch RPM is reduced to 121.238 RPM output to rear wheel…
3rd gear =163.25 RPM output to rear wheel, 4th gear = 201.56 RPM, 5th gear = 236.61 RPM & 6th gear = 280.455 RPM output to rear wheel. Now the final piece of the puzzle is the relationship between the size of the transmission output sprocket and the rear wheel sprocket or pulley will determine the overall speed of the motorcycle in each gear and ultimately its top speed.

Consider Torque as a force required to turn. Turn the engine, clutch, transmission, and ultimately the rear wheel. If you try to ride off from a standing start in 6th gear, then there isn't enough torque produced to be able to drive the rear wheel, hence why there are graded gears that gradually allow the available torque to turn the rear wheel, keeping in mind it takes relatively more torque to move a stationary object rather than an object that is already in motion.

This is the reason why a motorcycle already in motion is easier to propel by whatever engine power is available, therefore if you wanted to attempt a land speed record and higher gearing is required to achieve the ultimate rear wheel rotational speed given the sprocket and wheel sizes that have been selected, then the only way to achieve continued motion driven by engine power is to first have another vehicle tow the motorcycle until it reaches the appropriate speed for the engine power to produce sufficient torque to be able to continue to drive the rear wheel.

People have suggested that the Softail series has the 6th gear as an overdrive, however this isn't the case as the ratios clearly show an increase of 18.5% rotational RPM between 5th and 6th gear. Therefore the available engine power and RPM will continue to increase speed by that amount if all other conditions are stable.

The Softail series of bikes are all governed by the same primary and secondary gear ratios. Final drive ratios remain the same, therefore each motorcycle should have equal and or comparable maximum speeds given the same engine power delivery if at the same weight, however some of the power is 'lost' to overcome the weight of the bike and rider/pillion whilst other power is lost overcoming rolling road resistance and aerodynamic drag, hence why there will be discrepancies between each model even though their ratios may indeed be the same.

A final thing to note is any modification to affect speed and to increase or decrease the overall ratio of engine power to rear wheel RPM can most easily and effectively be achieved by changing the rear wheel sprocket or pulley to a different size, the transmission output sprocket to a different size…and or both. If the output sprocket size is increased, then rear wheel speed will increase but torque is reduced. If output sprocket is reduced, then rear wheel speed is reduced but torque is increased. If rear wheel sprocket/pulley is increased, the rear wheel speed will reduce but torque will increase and if rear sprocket/pulley size is reduced then rear wheel speed is increased but torque will reduce. Ultimately it is a fine balance between torque and speed, so if you want overall increase in top speed…given everything else stays the same, you would decrease rear wheel sprocket size slightly, but if you wanted a boost in torque available from a standing start at the lights, then a slight increase in rear sprocket would achieve that, but quicker gear changing would be required to maintain a suitable acceleration.