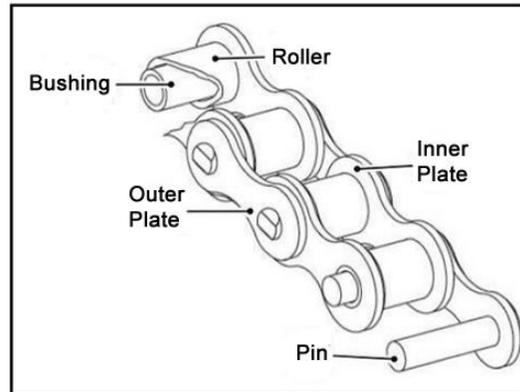


## Randy Recommends...

If your bike has chain drive, here are some things you should know.

### ► Chains part 1: Sizing ◀

Motorcycle drive chains are made up of alternating internal links and external links, connected by pins. The internal links consist of two plates connected to each other through two bushings. Each bushing supports a roller. The external links are made of two external plates fastened to each other through two pins and four O-rings. These O-rings do two important jobs: they hold the lubricant in and keep foreign objects (read dirt and grime) out of the pin-bushing area.



Chains are characterized by two key parameters: Pitch Length and Link Internal Width. There's an international standard that uses a 3-digit code to indicate these two values (for example: 415, 420, 428, 520, 525, 530) marked on the outer link plate.

In this standard, the chain's pitch is the distance between centers of two consecutive pins. It's described by the first digit of the code. Multiplying that digit by 1/8 inch gives the chain's pitch. For example, if those numbers are "520", then the pitch is 5/8" ( $5 \times 1/8 = 5/8$ "). So chains marked 520, 525, 530

or 532 have a 5/8" pitch and those marked 415, 420, 425 or 428 have a 1/2" pitch and those marked 630 or 632 have a pitch of 3/4".

The second and third numbers in the coding standard describe the internal width of the chain. The higher the number, the greater the distance between the two internal plates.

Internal width is calculated by multiplying 1/8 inch by the second and third digits after inserting a decimal between the two digits so 20=2.0, 25=2.5 and 30=3.0. For example, the internal width of a 520 chain is 1/4" ( $1/8 \times 2.0 = 1/4$ ") and a 530 chain has the same pitch (5/8") but its width is different 3/8" ( $1/8 \times 3.0 = 3/8$ ").



Chain size = 520

**IMPORTANT: Make sure that your chain and sprockets have the same pitch and width rating!**

## Randy Recommends...

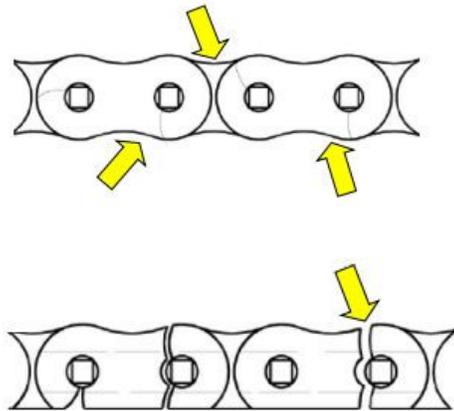
If your bike has chain drive, here are some things you should know.

### ► Chains part 2: Cleaning ◀

Statistically, it has been found that the average service life of a final drive chain is about 20,000 km (about 12400 miles). That's IF it's periodically maintained in accordance with the instructions given in the bike's owner's manual.

To ensure top performance and long life of the chain, follow the instructions relating to washing, lubrication, inspection and tensioning of the chain described below. Cleaning the chain is crucial for its life. Use a jet of water to remove any mud, soil, sand or dirt build-up and immediately dry the chain using compressed air, blown from a distance of at least 30 cm (about 12 inches).

In case of off-road use, there may be excessive wear of the links due to the contact with the chain guide shoe. That friction could even cause chain overheating that would alter the heat treatment of the links making them particularly fragile. In extreme cases, the link failure will likely occur vertically on the link. The transverse cracks start from the base of the link and then extend until they affect the seat of the pin.



**NOTE: Avoid the use of steam, fuels, solvents, hard brushes or other methods that may damage the O-rings. Also avoid direct contact with battery acid as it could cause small fractures of the links.**

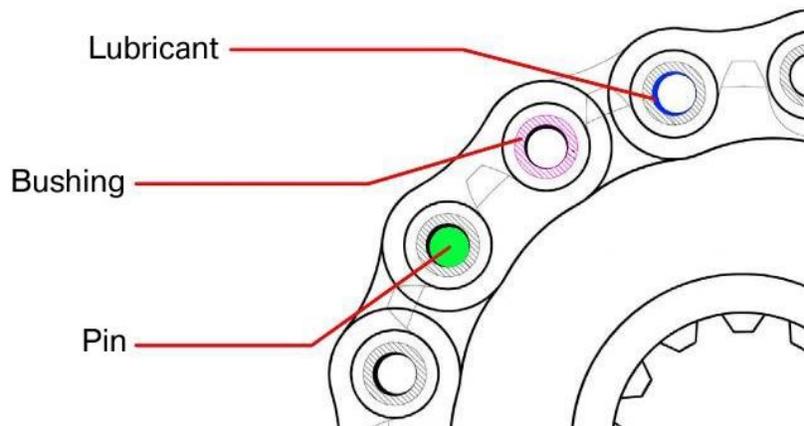
## Randy Recommends...

If your bike has chain drive, here are some things you should know.

### ► Chains part 3: Lubrication ◀

Once the chain has been washed and cleaned, proceed with lubrication. Lubricate the chain at least every 400 km (about 250 miles) or more frequently if the motorcycle is used in high ambient temperatures (40°C / 89° F) or after long trips on the highway at high speed.

Lubricate the chain immediately - while it's warm from use - don't wait for it to cool down. This will help the new lubricant can to go through the internal and external links and enhance its protective action. Don't ride the motorcycle immediately after lubricating the chain because the lubricant will still be fluid and it will be ejected by centrifugal force, possibly "oiling" the rear wheel or the rider footpeg.



The pin-bushing area is the critical point where the greatest stresses occur due to high operating loads and high temperatures. These stresses will reduce the anti-wear effect of the oil film present on all parts of the chain.

The O-rings play a twofold role; they hold the lubricant and prevent foreign objects enter the pin-bushing area.

Poorly lubricated chains will present the following symptoms:

- Reddish areas (due to oxidation).
- Squeaks and noise.
- Stretching.
- Stiff joints.



## Randy Recommends...

If your bike has chain drive, here are some things you should know.

Lubrication is very important because it:

- Reduces friction and heat build-up.
- Keeps the O-rings soft thereby avoiding cracking and consequent failure.
- Protects against oxidation of metal parts.
- Increases drive efficiency.
- Increases the service life of the whole drive system.

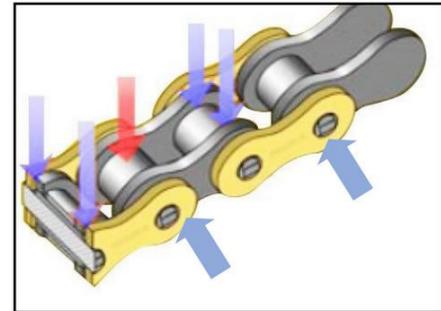
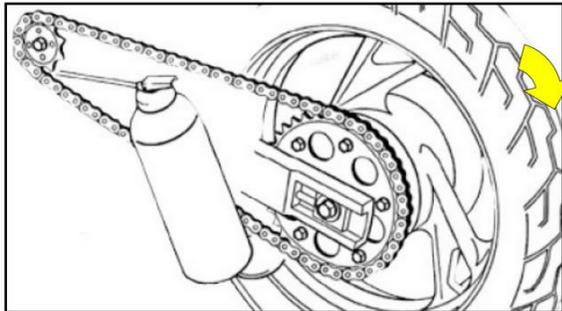
Chain lubrication can be applied by either of two methods:

A) By brush:

- When using a brush, apply a film of oil throughout the length of the chain; then use a clean cloth to eliminate any excess oil.
- **WARNING: Use mineral oil SAE 80W-90 or specific chain lubricants. Ensure that they do not contain any additives that might damage the O-rings.**

B) By spray:

- Position the bike on a center stand or rear paddock stand.
- Quickly spin the rear wheel in the direction opposite to the direction of travel.



- Spray the lubricant inside the chain, between internal and external links, at the point immediately upstream of the sprocket meshing point. Centrifugal force will expand the lubricant (made fluid by the solvents contained in the spray) in the area between the pin and the bushing, ensuring perfect lubrication.
- Repeat the operation by aiming the lubricant spray pattern on the central part of the chain in order to lubricate the rollers and on the external plates.
- Wait 10-15 minutes to allow the lubricant to spread on the internal and external surfaces of the chain. Remove any excess lubricant with a clean cloth.

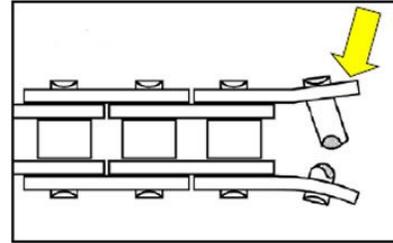
## Randy Recommends...

If your bike has chain drive, here are some things you should know.

### ► Chains part 4: Checking the chain ◀

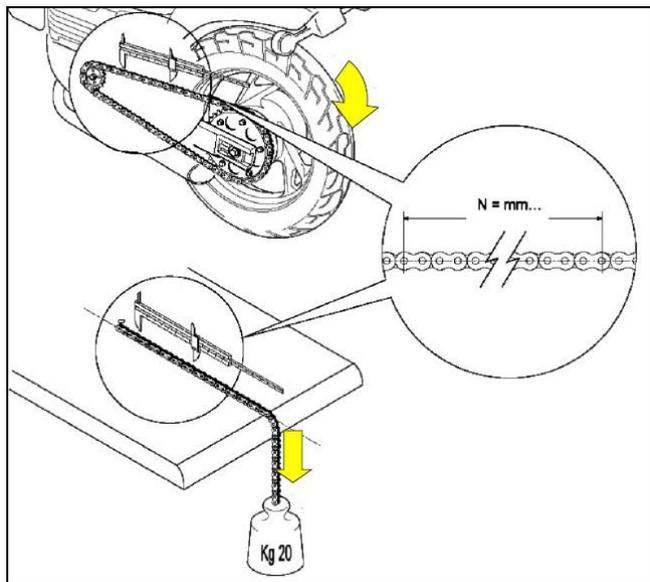
Inspect your bike's chain frequently to ensure that there are no stiff joints, missing or damaged O-rings, or other worn-out components (especially the closing link).

Chain wear can easily be checked by measuring its stretch. If the chain stretches beyond the expected limits, the mechanism will become unreliable, the pitch will no longer be accurate, and the chain could jump to the next tooth of the sprocket and cause breakage and other damage.



**NOTE:** Properly clean and lubricate the drive chain THEN measure and inspect it following the procedure below:

1. *If the chain is installed on the motorcycle*, put tension on the upper or lower length by engaging a low gear (with ignition OFF) and turning the rear wheel clockwise (to check the upper section) or counter clockwise (to check the lower section).
2. *If the chain is **not** installed on the motorcycle*, lay it on a level, flat, horizontal surface; fix it at one end and tension it with a weight of about 20 kg (44 lbs) applied at the opposite end.
3. Use a precision gauge or ruler to measure the distance between centers of two pins separated by a number "N" of links.



**IMPORTANT:** The number "N" of links can be calculated by counting the pins. The number of pins "N" to be considered for the measurement depends on the type of chain. The measured value must not exceed the maximum acceptable length specified by the manufacturer. (See table below. *Note that it gives the specification for the International Standard, but you should verify it for your chain's manufacturer.*)

## Randy Recommends...

If your bike has chain drive, here are some things you should know.

International Standard	"N" number of pins	Maximum acceptable length (O-ring chains)
415 – 420 – 425 – 428	23	29.5000 cm (11.6")
520 – 525 – 530 – 532	16	25.6500 cm (10.1")
630 – 632	16	30.0780 cm (11.8")

**The drive chain MUST be replaced** if its measurement exceeds the maximum specified length. In addition to measuring the length, visually inspect the plates, pins, O-rings and bushings to check chain wear. **The drive chain MUST be replaced** if any of the following conditions are present:

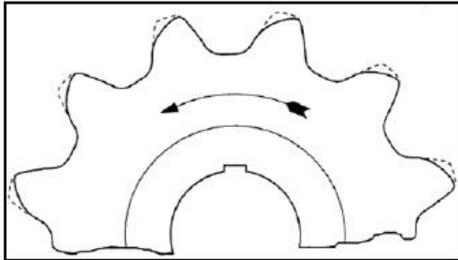
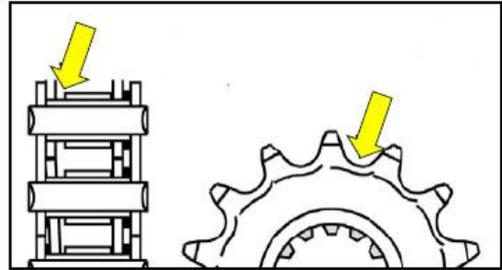
- Cracks on the plates
- Cracks on the pins
- Spinning pins
- Damaged O-Rings
- Scratched rollers

## Randy Recommends...

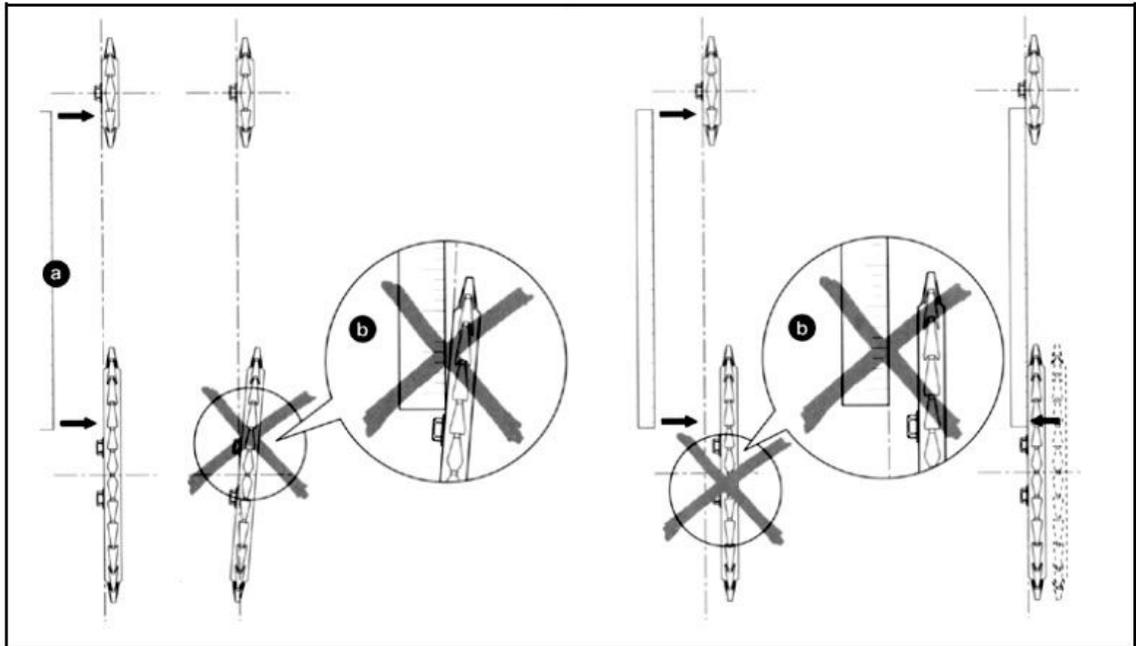
If your bike has chain drive, here are some things you should know.

### ► Chains part 5: Checking the sprockets ◀

To guarantee top performance and long chain life, it is necessary to frequently check the profile and thickness as well as the wear on the teeth of **both** sprockets and replace them if required. Sprocket tooth wear can be identified with a visual inspection because worn teeth are typically shaped like a "hook" or "wave".



When installing new sprockets, turn the rear wheel and inspect for side clearance or runout issues. A misalignment could trigger axial thrusts on the internal link of the chain, which can be detected by lateral wear of the teeth of the sprockets.



**NOTE:** A new chain installed to worn or damaged sprockets will wear or become damaged quickly. To obtain top performance, install new sprockets when replacing a drive chain to ensure the same level of wear and reliability for all the components of the drive system.

## Randy Recommends...

If your bike has chain drive, here are some things you should know.

### ► Chains part 6: Adjusting the chain ◀

Correct chain adjustment (tensioning) is an extremely important factor in its life and efficiency. Inspect and adjust your chain as necessary. - at least:

- For **on-road** use, Inspect and adjust your chain after the first 100 km (approx. 60 miles) and every 400 km (approx. 250 miles) thereafter.
- For **off-road** use, inspect and adjust your chain after every use.

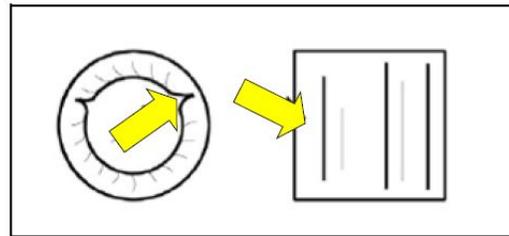
Prior to tensioning, the chain must be set to the position where it is most taut

**NOTE:** The specified chain tension value for your model can be found on the relevant adhesive label on the bike's swingarm and in your owner's manual or workshop manual.

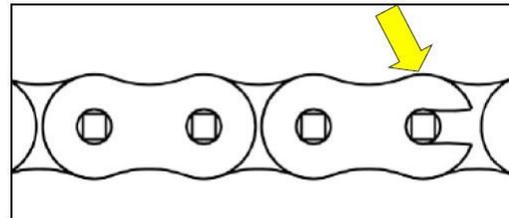
Excessive chain tensioning will cause an increase in the workload between the pins and the bushings, overheating the chain and prematurely consuming the lubricant film. This will result in increased chain wear..

Here are some of the problems that can occur due to incorrect chain tensioning:

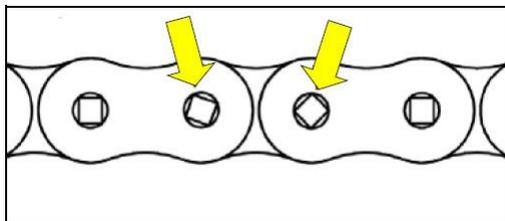
1. Micro cracks in chain rollers are not visible to the naked eye; however, when the chain is inspected, deep scratches can be found on the roller surface.



2. Breakage of the link in the longitudinal direction due to excessive stress.



3. Spinning pins.



## Randy Recommends...

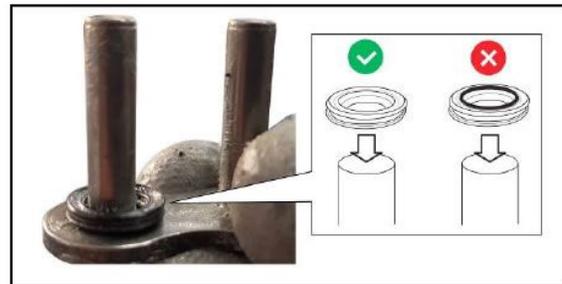
If your bike has chain drive, here are some things you should know.

### ► Chains part 7: Changing the chain ◀

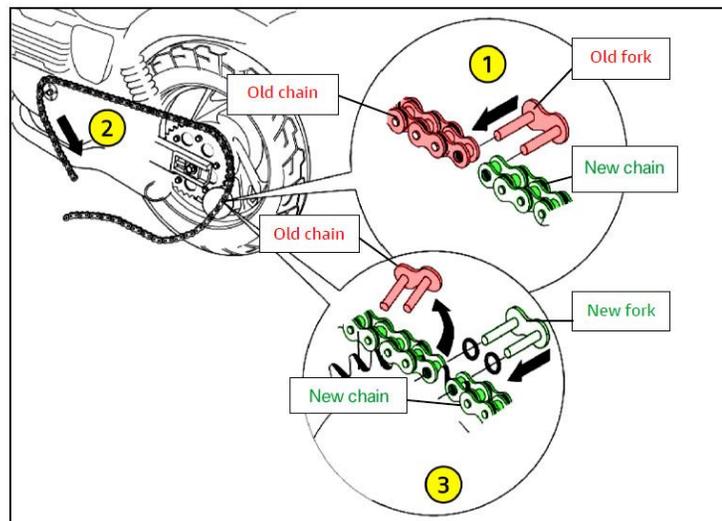
Use a dedicated motorcycle chain tool to replace the final drive chain. After removing the chain master link, follow the procedure below:

1. Use the fork from the old chain to temporarily connect one end of your old chain to the new one.
2. Carefully pull the other end of the old chain until the new chain is wrapped around the front sprocket; continue until the end of the new chain is on the rear sprocket.
3. Remove the old fork along with the old chain.
4. Wrap the other end of the new chain around the rear sprocket so that the two ends are positioned on two consecutive teeth.
5. Install two O-rings on the new fork and make sure that they are resting against the outside plate.

**NOTE:** If you're using a Regina chain: Special O-rings can be used which, in addition to guaranteeing a better sealing of the lubricant, are handed so must also be installed in a specific direction. These special O-rings must have their protruding side facing the internal link, as shown in the figure, right.



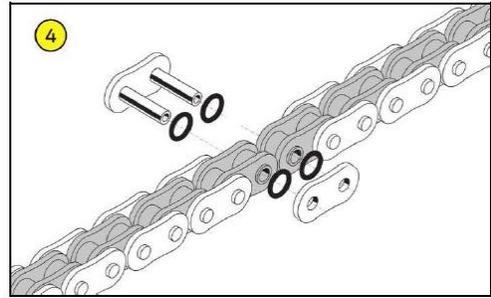
6. Insert the fork of the new master link from the rear part of the chain, avoiding any contact with the pins so as not to push out any lubricant.



## Randy Recommends...

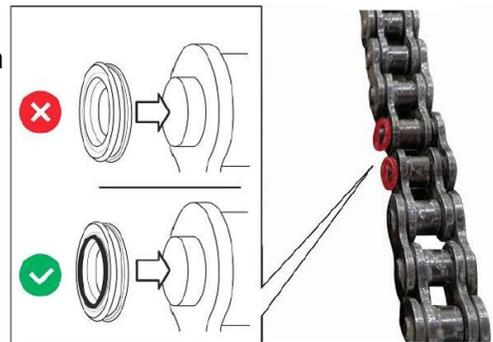
If your bike has chain drive, here are some things you should know.

7. Install the other two new O-Rings, one on each bushing and fit the closing plate.

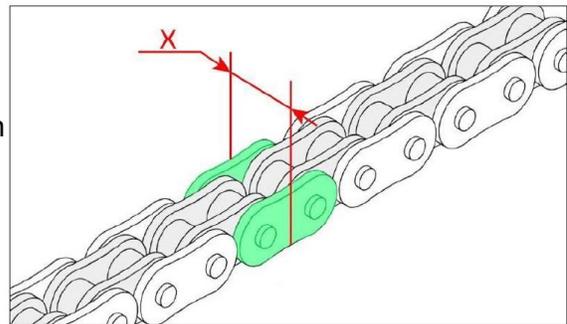


8. Turn the rear wheel so that the link to be riveted is in the chain's lower branch, in a position that will allow you to easily work with the tools required to install the chain link plate.

**NOTE:** If special O-rings are required (for example on Regina chains) install them on the opposite side of the master link, with the protruding side facing out, as shown here:



9. Use the chain tool to rivet the two pins. Don't rush this part of the job. Stop frequently to check that the distance **X** (see figure, right) between the two external links is adjusted within the range specified by the chains' manufacturer.



## Randy Recommends...

If your bike has chain drive, here are some things you should know.

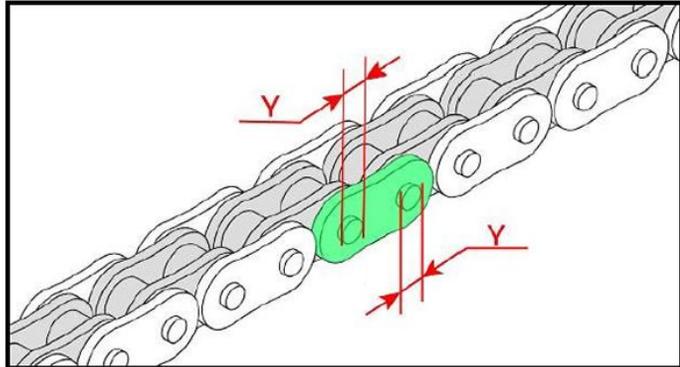
<b>NOTE: This table shows the specified dimensions for Regina and DID chains <u>only</u>. <i>You must use the dimensions specified by your chain's manufacturer.</i></b>			
<b>Distance between the external plates - X (in millimeters)</b>			
		Minimum *	Maximum **
Regina	530 ZRP B2	22.55	22.70
	525 ZRPK	20.15	20.30
	530 ZRPB	22.55	22.70
	520 ZRDK	18.20	18.35
	520 ORAW2	16.68	16.83
DID	525 HV3	19.50	19.70
	525 HV2	19.50	19.70
	520 V6 KAI	17.10	17.35
	520 VP2-T	16.70	16.90
	520 VF	16.46	16.66
	525 HV3	19.50	19.70
	525 VAZ	18.75	18.95

- \* *If the measured X value is lower than the minimum value given in the table, continue to rivet the two pins by applying a higher tightening torque until the correct value is detected.*
- \*\* *If the measured X value is higher than the maximum value given in the table, STOP! Remove the link, order a new riveting link and repeat the entire operation.*

## Randy Recommends...

If your bike has chain drive, here are some things you should know.

10. Use a chain tool to rivet the two pins stopping frequently to check that the value of the diameter  $Y$  (see figure, right) of the two riveted pins is adjusted within the range specified by the chains' manufacturer. (See table below.)



**NOTE:** Use a magnifying glass to make sure there are no cracks on the circular surface of the riveted area, as shown below.



## Randy Recommends...

If your bike has chain drive, here are some things you should know.

Pin diameter - Y (in millimeters)			
<b>NOTE: This table shows the specified dimensions for Regina and DID chains <u>only</u>. <u>You must use the dimensions specified by your chain's manufacturer.</u></b>			
		Minimum	Maximum
Regina	530 ZRP B2	5.45	5.65
	525 ZRPK	5.45	5.65
	530 ZRPB	5.45	5.65
	520 ZRDK	5.45	5.65
	520 ORAW2	5.50	5.65
DID	525 HV3	5.50	5.80
	525 HV2	5.55	5.75
	520 V6 KAI	5.40	5.60
	520 VP2-T	5.40	5.80
	520 VF	5.45	5.80
	525 HV3	5.50	5.80
	525 VAZ	5.70	6.00

- *\* If the measured Y value is lower than the minimum value given in the table, continue to rivet the two pins by applying a higher tightening torque until the correct value is detected.*
- *\*\* If the measured Y value is higher than the maximum value given in the table, STOP! Remove the link, order a new riveting link and repeat the entire operation.*

## Randy Recommends...

If your bike has chain drive, here are some things you should know.

### FAQ (Frequently Asked Questions)

1. When is it necessary to change the final drive kit?  
If any of the following conditions are present:
  - Cracks on the plates
  - Cracks on the pins
  - Spinning pins
  - Damaged O-Rings
  - Scratched rollers
  - Front sprocket teeth wear
  - Rear sprocket teeth wear
  - Drive chain stretch beyond the allowed limit
  
2. What conditions can cause excessive noise of the drive chain?
  - Improper tensioning (chain too taut or slack)
  - Insufficient lubrication
  - Improper front to rear sprocket alignment
  - Improper size match between the chain and the sprockets
  - Chain hitting or scraping onto vehicle parts
  - Wear of the front or rear sprocket
  - Wear of the chain
  - Wear, failure or misalignment of other drive system parts
  
3. What are the causes of an excessive oscillation of the drive chain?
  - Improper tensioning of the chain (too taut or slack)
  - Improper front to rear sprocket alignment
  - Uneven wear of the chain, front or rear sprockets
  - Presence of stiff joints
  
4. What conditions can cause a chain to jump a tooth on the sprockets?
  - Excessive wear of the front or rear sprocket
  - Excessive stretch of the chain due to wear
  - Insufficient tensioning of the chain
  - Improper front to rear sprocket alignment
  - Incorrect positioning of sliders, chain guide or tensioners
  - Wrong sprocket size; bent, waved, damaged sprockets
  - Presence of foreign objects between the chain and the sprockets

## Randy Recommends...

If your bike has chain drive, here are some things you should know.

5. What is the cause of front sprocket wear on just one side and rear sprocket wear on the opposite side?
  - Improper front to rear sprocket alignment
  
6. What are the causes of stiff joints in a drive chain?
  - Excessive tensioning of the chain
  - Insufficient lubrication
  - Improper front to rear sprocket alignment
  - Oxidation of chain joints
  - Incorrect chain rating for stress the demand of the vehicle application
  - Broken or missing O-rings
  - Improper installation
  - Foreign objects or material (sand, mud) in chain joints
  
7. What conditions can cause a possible breakage of the chain pins, rollers or bushings?
  - Excessive load or load applied in a violent manner
  - Excessive wear of the front or rear sprocket
  - Excessive stretch of the chain due to wear
  - Insufficient lubrication
  - Improper tensioning of the chain
  - Improper front to rear sprocket alignment
  - Improper size match between the chain and the sprockets
  - Number of teeth of the front sprocket lower than the suggested minimum
  - Presence of foreign objects between the chain and the sprockets
  
8. What conditions can cause a possible failure of the drive chain links?
  - Chain hitting or scraping onto vehicle parts
  - Excessive tensioning of the chain
  - Presence of foreign objects between the chain and the sprockets
  - Considerable front to rear sprocket misalignment
  - Incorrect chain rating for stress the demand of the vehicle application
  - Corrosion caused by external factors (battery acid, fuel or other fluids)