



**DID**<sup>®</sup>  
*Racing Chain*

D.I.D MOTORCYCLE CHAIN

# CHAIN MANUAL





↑ X-Ring Type

## INDEX

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- |                            |                            |
|----------------------------|----------------------------|
| 1 Structure of Drive Chain | 6 Engine Mechanism Chain   |
| 2 Chain Size               | 7 Connecting Link          |
| 3 Classification           | 8 Troubleshooting Guide    |
| 4 Sealed Chain             | 9 Lubrication & Cleaning   |
| 5 Bushing & Pin            | 10 Drive Chain Replacement |

# Structure of Drive Chain



## Pin

Pins support all the load acting on the chain, together with inner and outer plate, and when the chain is engaged with a sprocket, the pins slide as bearings.

•Tensile Strength •Fatigue Strength •Wear Resistance



## Bushing

Bushing act to prevent the shock received through rollers when the chain is engaged with sprocket from being directly transmitted to pins, and also act as bearing, along with the pins.

•Impact Resistance •Wear Resistance



## Roller

Roller act to smoothly bend the chain when the chain is engaged with a sprocket, to protect the chain from impact with the sprocket.

•Impact Resistance •Crash Strength •Wear Resistance



## Inner/Outer Plate

Plates are subject to repeated tension of the chain, and sometimes a large shock.

•Tensile Strength •Fatigue Strength •Brittleness Strength



## Seal Ring

Seal Ring acts to seal the grease on parts of Pin and Bushing area prevents wear elongation.

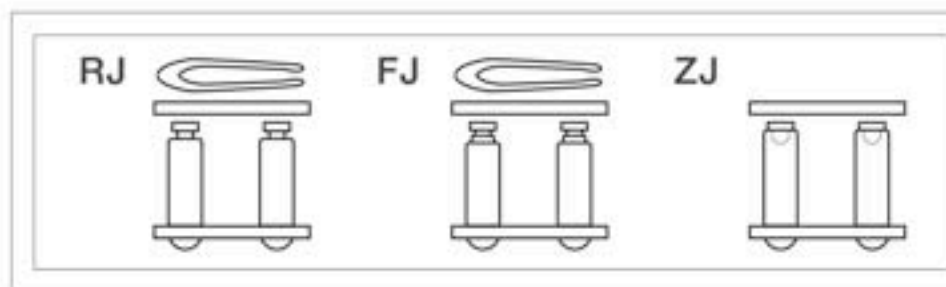
•Wear Resistance •Low Friction •Heat Resistance



## Grease

Lubricates parts of Pin and Bushing area for low friction

•Wear Resistance •Lubricity



## Connecting Link

Type

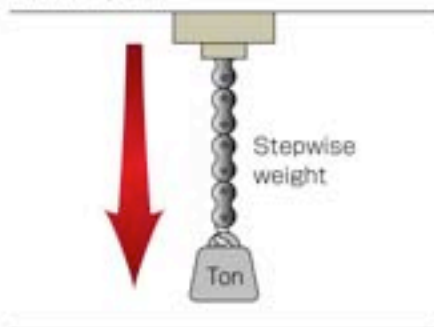
- RJ (Loose-in fit + Clip Type)
- FJ (Press-in fit + Clip Type)
- ZJ (Press-in fit + Rivet)

•Tensile Strength •Fatigue Strength

## Technical Terms

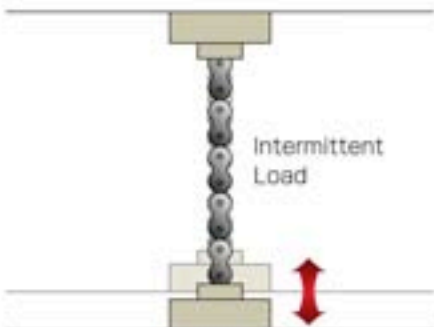
### •Tensile Strength

Tensile strength is brakage load capacity when the chain is damaged affected by maximum torque when driving start.



### •Fatigue Strength

Fatigue strength is continuous load capacity when the chain is damaged affected when on the drive.



### •Wear Resistance

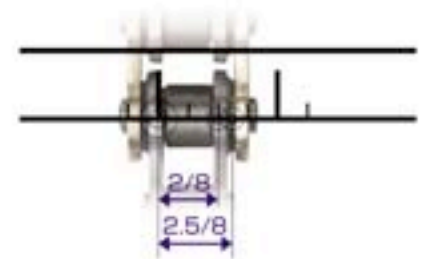
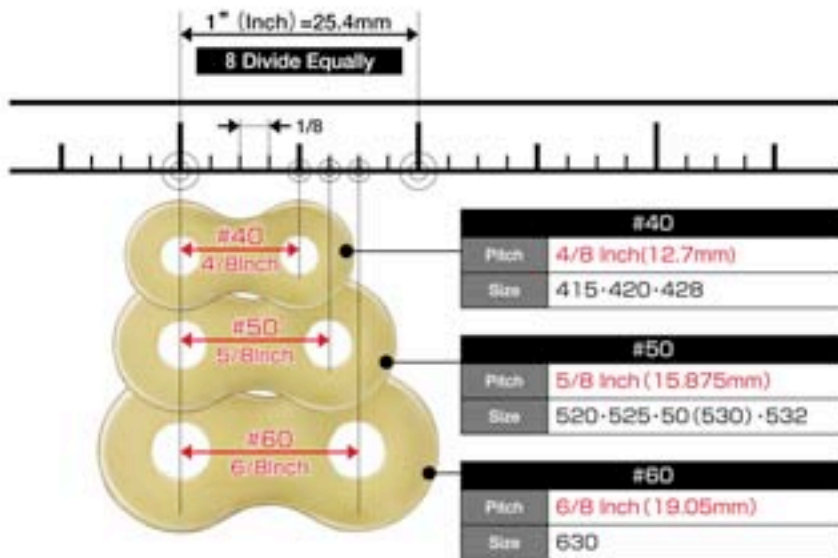
Wear resistance means that the chain retains low friction and increase overall durability against elongation when operating. D.I.D's PATENTED X-Ring construction reduce friction by twisting between the side plates instead of being squashed. Normal O-Ring has squashed points that increase friction. The twisting action of the X-Ring disperses the pressure and minimizes power loss.





# Chain Size

Generally, drive chain is called "Roller Chain" for fractionating cuneatic chain like a tire chain. Roller chain originates in England, this technology has developed and measured by the "Inch" in United States. The current internationally accepted basic dimension is in the "Inch".



Roller Link Width
2.0/8 Inch (6.35mm)
2.5/8 Inch (7.93mm)
3.0/8 Inch (9.53mm)

Ex 1

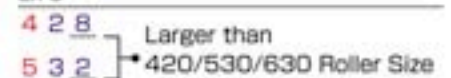


(Ex) 520 is intended the Pitch & Roller Link width.

Ex 2



Ex 3



Upgrade roller strength and size. Sprocket is also different from 420/530/630.

## Standard Size



Item	Pitch (P)	Roller Link Width(W)	Roller Diameter(D)	Pin Length(F)	Plate Thickness(T)
415	12.7mm (4/8 Inch)	4.76mm	7.77mm	13.50mm	1.5mm
420		6.35mm	7.77mm	14.75~16.90mm	1.5~1.8mm
428		7.94mm	8.50mm	16.70~22.70mm	1.5~2.2mm
520	15.875mm (5/8 Inch)	6.35mm	10.16~10.22mm	17.50~21.00mm	1.8~2.2mm
525		7.93mm	10.16~10.22mm	19.25~22.95mm	2.0~2.4mm
50 (530)		9.53mm	10.16~10.32mm	20.85~25.30mm	2.0~2.6mm
532			11.10mm	24.80mm	2.4mm
630	19.05mm (6/8 Inch)		11.96mm	25.30mm	2.4mm

# Classification

## Non-O-Ring Chain

### STANDARD



Item No.

420 428 520 525 50(530)



Family/Business

### Super Non-O-Ring



Item No.

420NZ2 428NZ 520NZ 525NZ 50(530)NZ

High Performance  
 •Wear Resistance •Fatigue & Tensile Strength



Offroad/Sport

## Sealed Chain

### Professional O-Ring



Item No.

420V 428V 520V 525V 50(350)V



Street/Offroad

### Premium X-Ring



Item No.

428VM 520VM 525VM2 50(530)VM  
532ZLV

Good Performance  
 •Wear Resistance  
 •Tensile Strength  
 •Enhanced Bushing



Premium : Street/Offroad

### Super Street X<sup>2</sup>-Ring



Item No.

520ZVM2 525ZVM2 50(530)ZVM2

High Performance  
 •Low Friction  
 •Fatigue Strength



Super street

## Racing Chain

### Exclusive Racing(ER)



Item No.

415ER 520ERS2 520ERT2 520MX

•GP125  
 •GP250  
 •MX125  
 •MX250  
 •MX450  
 •TRIAL



Road/Offroad (SX/MX) Racing



Item No.

520ERV3 525ERV 50(530)ERV

•Moto-GP  
 •Super Bike



Road/Offroad Racing

### ATV Racing



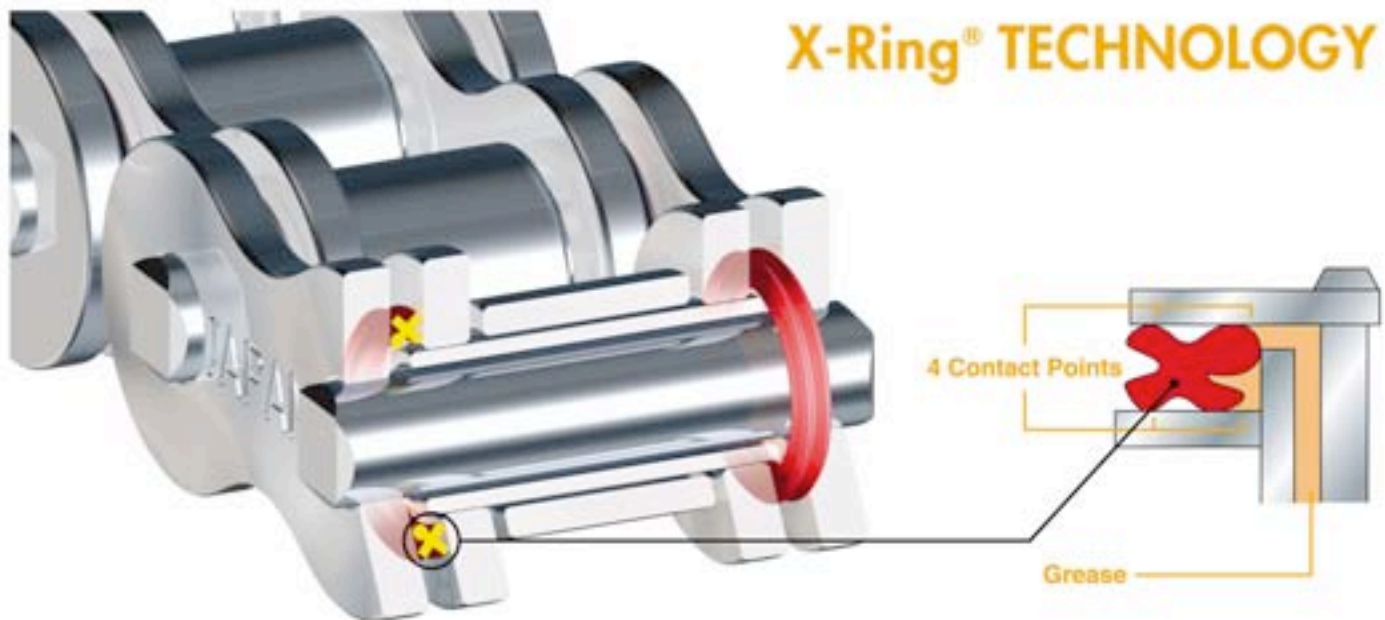
Item No.

520ATV



ATV Racing

# Sealed chain

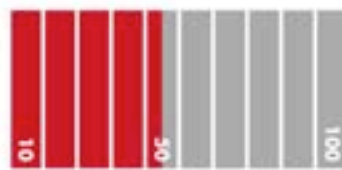


- D.I.D's PATENTED X-Ring's four contact points greatly increase its sealing performance. This keeps the dirt out and the lubrication in much better than any other O-Ring. X-Rings have the greatest wear resistance of any other type of O-Ring or Non-O-Ring chain.
- The X-Ring construction reduces friction by twisting between the side plates instead of being squashed. Normal O-Rings and other maker's modified O-Rings have squashed points that increase friction. The twisting action of the X-Ring disperses the pressure and minimize power loss.

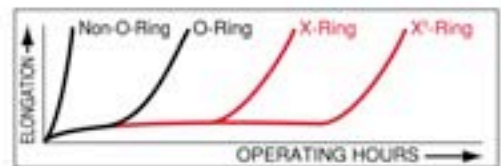
## X-Ring & X<sup>2</sup>-Ring



Friction Loss Ratio (O-Ring = 100)



WEAR RESISTANCE CHART



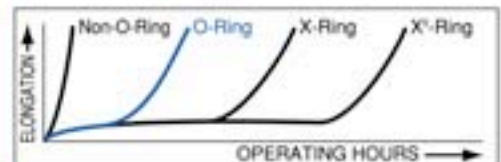
## O-Ring



Friction Loss Ratio (O-Ring = 100)



WEAR RESISTANCE CHART



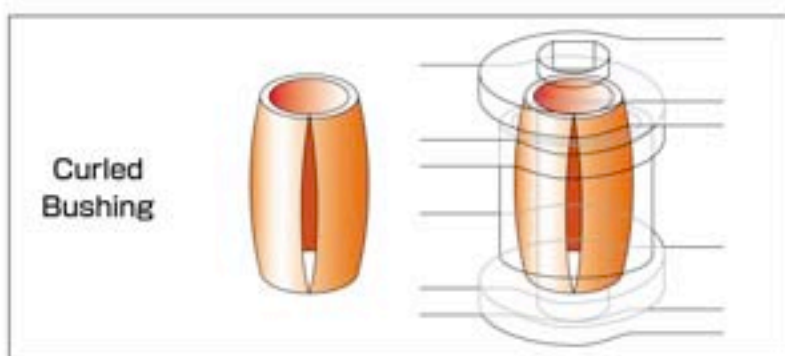
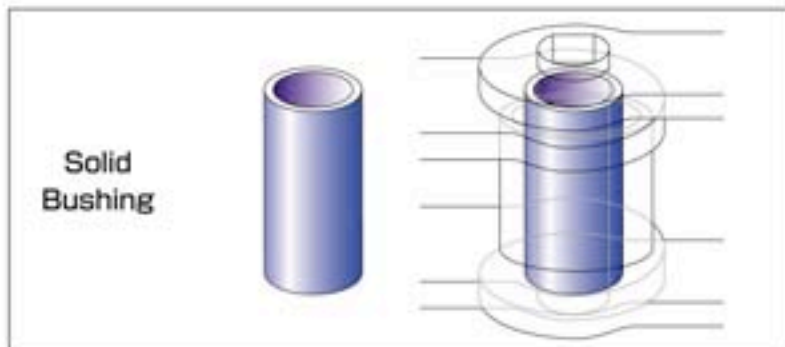


# Bushing & Pin

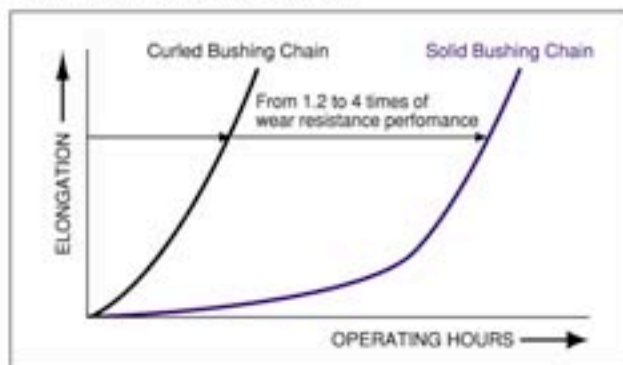
## Bushing

Did Solid Bushing chain is highly wear-resistant using rigid solid bushings with a seamless smooth surface and excellent roundness.

The solid bushings are like barrels when pressed into the inner plates forming optimum contact grease extend the wear life from 1.2 to 4 times compared to curled Bushing chain.

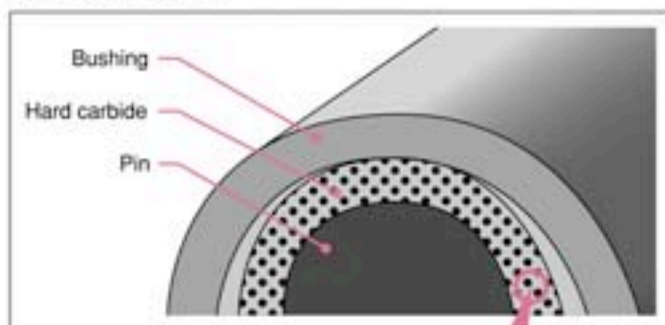


### WEAR RESISTANCE CHART



## Pin

### Structure of SDH



SDH refers to a hard layer formed on the surface of a pin. This layer has a very hard chromium carbide surface as illustrated in the top illustration. Excellent performance can be expected even in adverse conditions the presence of abrasive contaminants.

Furthermore, the SDH pins have excellent oxidation.

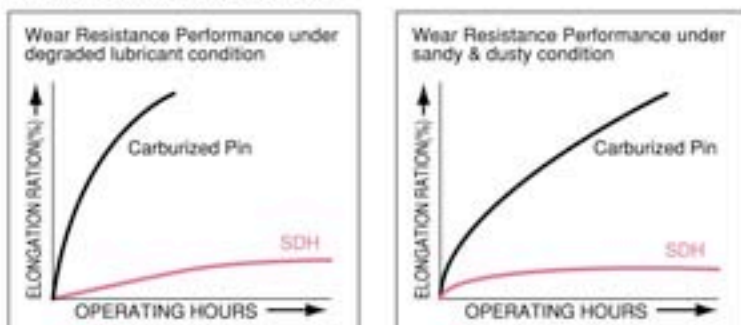
The following table compares the properties of SDH with other surface treatments.



### Microstructure

The white layer is a Layer produced by SDH treatment, and the black grains visible in the layer are chromium carbide.

### WEAR RESISTANCE CHART



### Comparison of properties

	Carburizing	Nitriding	H-Cr plating	SDH
Contents of Layer	High Carbon	Iron Nitride	Chrome	Chrome Carbide
Surface hardness	750~850	750~1,100	900~1,100	1,300 & over
Practical thickness of treated layer	100 & over	10 & over	10~100	5~20
Surface hardness lowering temperature	200 & over	500 & over	300 & over	900 & over
Peeling resistance	○	○	×	○
Wear resistance	△	○	○	○

# Engine Mechanism Chain

Engine mechanism chain such as timing chains for driving cam shafts on 4-cycle engines used in motorcycles and motor vehicles, chains for driving oil pumps and auxiliaries of generators, etc., and chains for driving balancer shafts meet advanced engineering demand in the automobile industry.

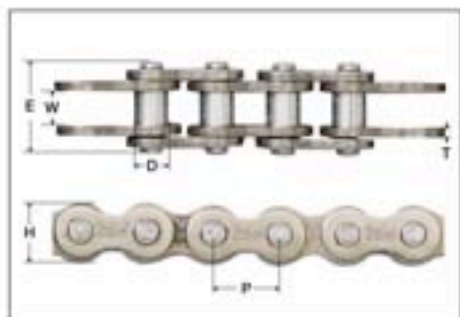
We have world class technical expertise in this area. The DID engine mechanism chains have excellent wear resistance, fatigue strength, silencing effect and shock strength capable of withstanding high speed operation, and can meet the conditions required for today's high performance engines.



Chain No.	Pitch P	Roller Link Width W	Roller Dia D	Pin E	Unit (mm)
					Plate T
DID 25	6.35	3.18	3.30	7.80	0.72
DID 25H		3.18	3.30	9.00	1.00

Chain No.	Pitch P	Lacing	W	E	H	Ave. Tensile Strength		Approx. Weight (kg/m)
						kN	kgf	
DID SCA-0404A SDH	6.35	3.20	6.00	2×3	6.70	6.27	640	0.181
DID SCA-0409A SDH		5.10	8.10	3×4		9.81	1,000	0.238
DID SCA-0412A SDH		7.15	11.00	4×5		12.26	1,250	0.316
DID SCR-0404 SV	6.35	3.20	6.00	2×3	9.50	6.93	705	0.172
DID SCR-0409 SV		5.10	8.10	3×4		10.00	1,020	0.255
DID SCR-0412 SV		7.15	10.30	4×5		13.23	1,350	0.322

## 25/25H



## SCA



## SCR





# Connecting Link

## Type of Indication

The case of RJ connecting link (520ERT2 G&G 119links with 1 RJ connecting link)

**DID 520ERT2 G&G × 120RB**

Size of Chain

Outer Plate = Gold  
Inner Plate = Gold

length of Link

With RJ connecting link

The case of FJ connecting link (525NZ 119links with 1 FJ connecting link)

**DID 525NZ × 120FB**

Size of Chain

length of Link

With FJ connecting link

The case of ZJ connecting link (530ZVM2 G&B × 119links with 1 ZJ connecting link)

**DID 530ZVM2 G&B × 120ZB**

Size of Chain

length of Link

With ZJ connecting link



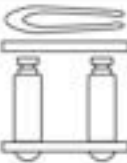

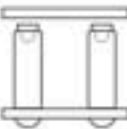



The case of Loop Endless

**DID 25H × 88LE**

Size of Chain

length of Link

Loop Endless

Type	Connecting Link	Strength of Connecting Link (The chain equal to 100)
<b>RJ</b>	 <p><b>Loose hole plate</b> Lock by Spring Clip</p>	
<b>FJ</b>	 <p><b>Press-in Fit on Plate</b> Lock by Spring Clip (Use DID KM500 for plate pressing)</p>	
<b>ZJ</b>	 <p><b>Press-in Fit on Plate</b> Rivet pin (Use DID KN500 for plate pressing &amp; pin riveting)</p>	
<b>LE</b>	 <p><b>Loop Endless Type</b> Factory assemble Non Connecting Link (Chain installing must remount the drive sproket)</p>	

# Troubleshooting Guide

## Fracture of pin, bushing and roller

### 1. Improper lubrication

#### *maintenance*

Lubrication and maintenance must be done on 500km/ride.



Improper lubrication



### 2. Corrosion of chain

#### *maintenance*

Check the condition and lubrication, and replace it with a new one.



### 3. Wear of sprockets

#### *maintenance*

Replace old sprockets with new ones.



### 4. Foreign objects

#### *maintenance*

Immediately remove foreign objects if any.



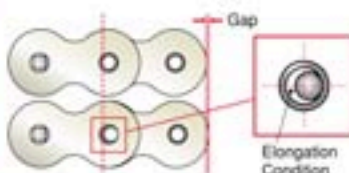
Remove

## Run upon sprocket teeth

### 5. Excessive wear elongation of chain

#### *maintenance*

Replace an excessively worn chain.

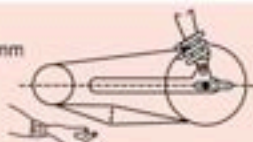


### 6. Chain too loose

#### *maintenance*

Pay constant attention to the chain sag. Correct by adjusting it according to the procedure stated in motorcycle instruction manual.

SAG  
20~25mm



### 7. Worn sprocket or deposit of foreign matter on tooth gap bottom

#### *maintenance*

Replace a worn sprocket immediately and remove foreign objects.



Covered in dirt

## Vibration of chain

### 8. Chain too loose See 6.

### 9. Uneven wear elongation

#### *maintenance*

Lubricate properly.



### 10. Occurrence of stiff link

#### *maintenance*

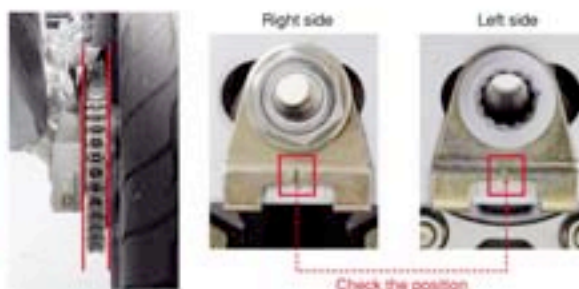
Lubricate the chain properly to avoid the stiff link. Replace the chain if the chain already has the stiff links.

# Abnormal noise

## 11. Incorrect alignment of sprockets

### *maintenance*

Misalignment of drive and driven sprockets result in abnormal wear of sides of link plate, thereby shortening chain life. Checking the chain adjuster on motorcycle.



## 12. Chain is excessively tensioned or slackened See 6.

## 13. Large wear elongation of chain or wear of sprocket

### *maintenance*

Replace a chain that is elongated beyond tolerance and replace worn sprockets with new ones.



## 14. Improper lubrication See 2.

## 15. Improper combination of chain and sprockets

### *maintenance*

When replacing the chain, use the correct chain size and sprocket sizes. Select a chain suitable for sprocket size, and sprockets suitable for the chain size.



# Stiff link

## 16. Load in excess of tolerance

### *maintenance*

Replace it with new one by checking the DID application chart and motorcycle instruction manual.



## 17. Incorrect alignment of sprockets See 11.

## 18. Corrosion of chain & Improper lubrication See 1. 2. 3.

## 19. Interference between plate and foreign matter

### *maintenance*

If a chain is in contact with foreign matter during running, the inner and outer plates may be opened. Immediately remove the foreign matter.



## 20. Ingress of foreign matter into a bendable portion of chain

### *maintenance*

If sand or mud enters a bendable portion, remove the chain, and wash and re-lubricate, or replace the chain. Furthermore, install a case, etc. to prevent the ingress of sand and mud.





# Troubleshooting Guide

## Rotation of pin

### 21. Excessive tension & Riding of chain over sprocket & Corrosion of chain and improper lubrication

#### *maintenance*

Replace it with new one by checking the DID application chart and motorcycle instruction manual.

## Fractured chain

### 22. Fatigue fracture

#### *maintenance*

If a chain is used for a long time at a load exceeding the maximum allowable tension, fatigue fracture of plates and bending fatigue fracture of pins will occur. If the life before fatigue fracture is shorter than the expected life, select a chain on the DID application chart and motorcycle instruction manual.



### 23. Ductile fracture of plates Fracture of pins by shear or bending

#### *maintenance*

If a load or shock load greatly larger than the allowable tension acts on a chain, ductile fracture of plates or fracture of pins by shear or bending occurs. This fracture occurs when the chain size selected is incorrect and allowable tension is too small. Re-select a proper chain.



### 24. When the chain rides over a sprocket

#### *maintenance*

The fracture caused when the chain rides over a sprocket is mainly due to wear elongation. Select a proper chain, and practice correct lubrication.



### 25. Battery Liquid/Anti-Frozen Matielials

#### *maintenance*

When battery (acid) liquid puts on a chain, that causes chain breakage, so replace it with new one. Be sure to clean the chain when contacted with anti-frozen materials like rock salt.



### 26. Interference with foreign matter

#### *maintenance*

If foreign objects should interfere with the running of chain or be caught, the chain is likely to be over loaded and its life will be shortened or it may break suddenly. Check the condition and remove any foreign objects.



## Wear of plates and sprockets on their lateral sides

### 27. Incorrect alignment of sprockets ➡ See 11.

# Lubrication & Cleaning

## CLEANING

### 1. Preparation



1:Chain Cleaner 2:Cloth 3:Brush 4:Tray

### 2. Spray cleaning



1:Set the tray under the chain. 2:spray the chain cleaner.

### 3. Rob off the dirt



Brushing the chain links.

### 4. Wipe off



Wipe the solvent cleaner on each links.

## GREASE UP

### 5. Preparation



1:Chain lube 2:Cloth 3:Tray

### 6. Shaking the lub



Before lubricating, shaking several times.

### 7. Luburication



Lubricating each links and parts of seal.

### 8. Finish



1:Rotate the chain wheel for accustoming chain links and sprokets.  
2:Remove the excess oil.



# Drive chain Replacement

KM500

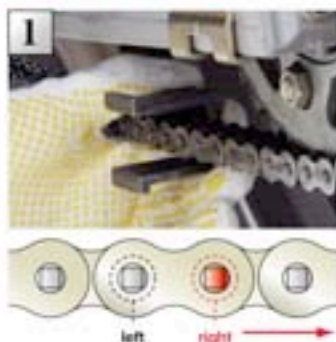


## Preparation



- #27mm wrench  
(For body support)
- #19mm wrench  
(For pin holder)
- Protective Goggle
- Cloth
- Tooth pick

## Cutting



Set U Holder with a chain link (Outer Plate link "left" side pin) to be disconnected.  
\*\* Cutting point is Connecting link, if it is available.\*\*



Join U Holder with the body that is set into cutting & riveting pin.  
Cutting position is mark "A".



Turn a pin holder by hand until that a cutting & riveting pin contacts with a pin of the chain.  
Be sure to check the cutting pin is contacted in the center with the pin of the chain at right angles.

## Press Fitting



Joint new chain to be replaced chain by new connecting link and or wire.  
Rotate chain wheel slowly and pull out the old chain.



Cleaning up new connecting link and grease up in detail by stylus  
For O, X & X2-ring chain, be sure to check that 4pcs of rings are set into the proper position.



Set the connecting link plate.

## Riveting



The connected link as shown above is set U holder.



Set the cutting & riveting pin into the pin holder. Set the body with U holder holding the chain at the mark "B". Turn the pin holder until the cutting & riveting pin contacts with the connecting pin(one side).



Hold the body by #27 wrench and set #19 wrench, turn the pin holder clockwise until that flared part of the riveting pin contacts with the surface of the connecting link plate.



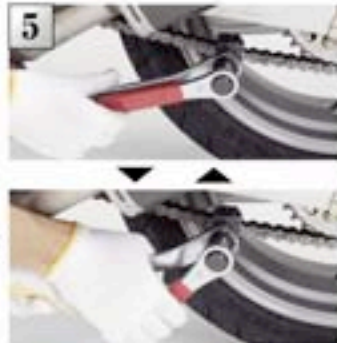
## Caution

- Before use of this tool, please check whether this tool is suitable for your selected chain and/or size of connecting link.
- When press fitting and/or riveting, be sure to check that the connecting link is the same size and type as those of the chain to be connected.
- Be sure to put on safety goggles when working.





4 Hold the body by #27 wrench and set #19 wrench on 30 degrees for the first contact of pushing out.



5 Push out the chain - pin from the link plate by turning a pin holder clockwise.



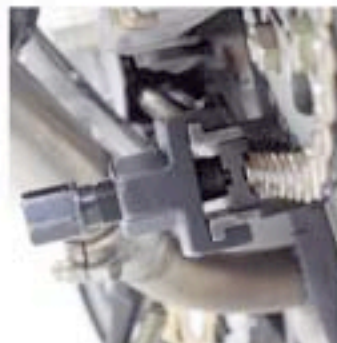
6 Completely push out the chain - pin.



7 Dismount the U holder and the body.



11 Set the pin heads of connectin link into pin-holes of U holder. Set the cutting & riveting pin on a body. Fit the plate holder and set the body on U holder at the mark "A" of U holder. The plate holder contacts with the connecting link plate.



12 Hold the body by #27 wrench and set #19 wrench, turn the pin holder clockwise until that connecting link pin contact with the plate holder.



13 Check the position of outer plate and connecting link plate.



17 For second riveting point, repeat as in the same. 15-16.



18 Check the movement of the connecting link by rotating the chain wheel smoothly.



19 Check the riveted pin head by the cutting & riveting pin. If it is not enough, rivet further more.

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