

KEEL CUTTER

N600LRC Type



INSTRUCTION MANUAL

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Section 1 Prohibition and Caution

◆Prohibition◆

- ⊙ Do not let others operate the machine unless they understand this instruction manual beforehand.
- ⊙ Do not touch the wheel when the machine is running.
- ⊙ Do not use the machine near flammable materials.

◆Caution◆

- ⊙ Wear safety goggles while operating the machine to avoid foreign objects getting in the eye.
- ⊙ Do not touch the machine body and wheel while running or right after shutting down. Those may be still hot and burn the hand.
- ⊙ Always check the machine before use. Keep the machine clean and oiled after use.
- ⊙ Do not wear loose clothing or jewelry around machinery. It may catch on moving equipment and lead to serious injury.

◆Notice◆

- ⊙ Use only genuine parts for this product. Your warranty does not cover damage or liability caused by the use of non-authorized accessories or replacement parts.
- ⊙ This instruction manual does not cover all the potential circumstances. Therefore, always operate the machine with caution for your safety.

Terms and Definitions of symbols used in this manual

⚠ Prohibition!

Unobservant use can result in serious or fatal injury to the operator or others.

⚠ Warning!

Careless and incorrect use can result in injury to the operator or others.



⚠ Caution!

Incorrect use can cause inexpedient influence upon durability of the machine and efficiency of operation.

Tip!

This symbol means complementary guidance and instruction.

Please find a sticker labeled on a wheel cover of the machine body, notifying the instructions below.

Roller bumper ▲ Checking position	
 Caution!	Do not touch the wheel when the machine is running.
 Caution!	Do not use the machine near flammable materials.
← ← ← Wheels rotate this way ← ← ←	

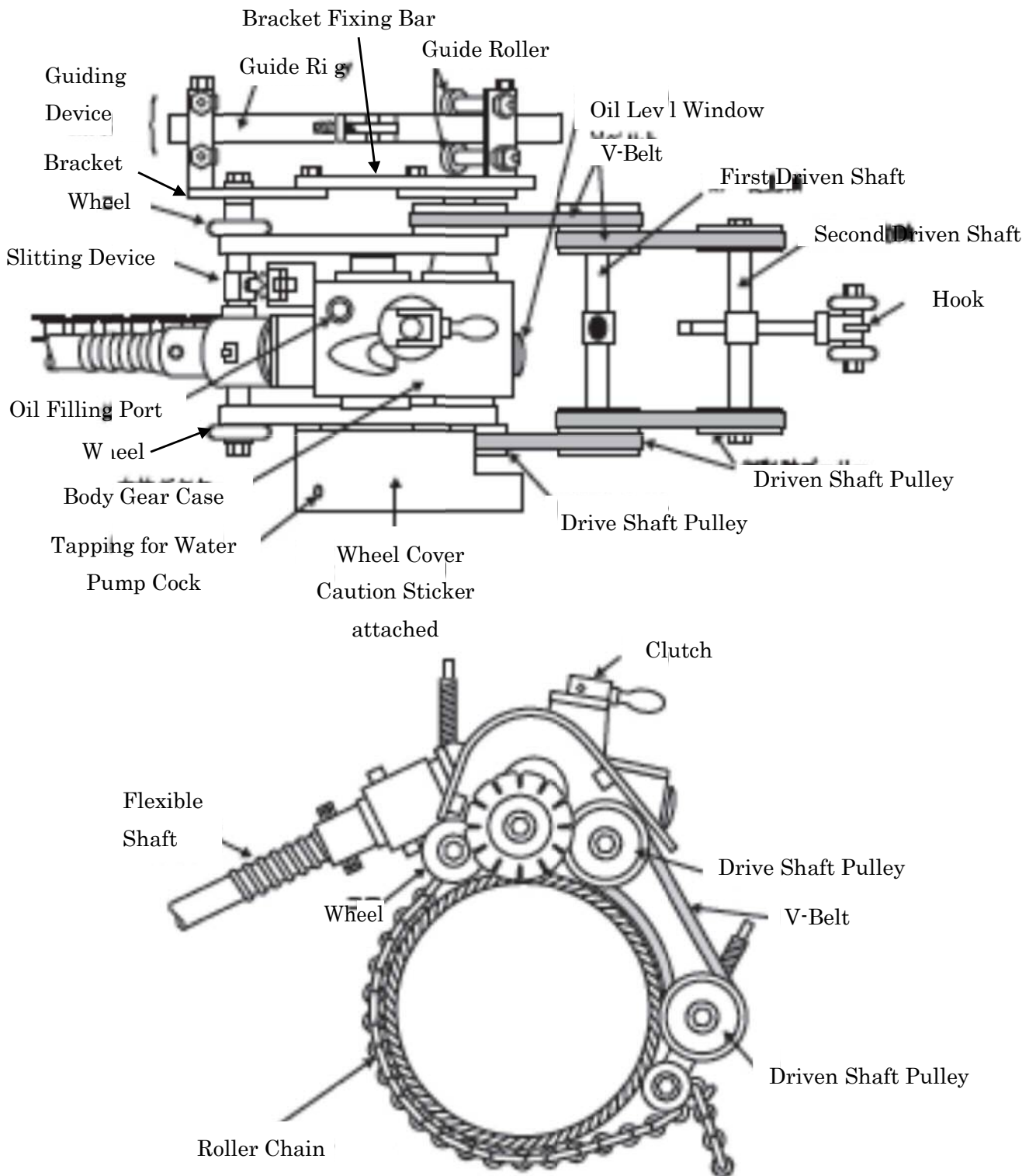
Section 2 Outline of Keel Cutter/N600LRC Type

1. Specification

Applicable Materials	Ductile Iron Pipe, Cast Iron Pipe, Hume Concrete Pipe Steel Pipe, Stainless Steel Pipe					
Dimension unit	Inches/lb			Metric/kg		
Applicable Diameter	4 in. – 60 in.			100 mm – 1500 mm		
Depth of Grooving	0.118 in. 7/64 in.	0.157 in. 5/32 in.	0.196 in. 3/16 in.	3.0mm	4.0mm	5.0mm
Width of Grooving	0.866 in. 7/8 in.	1.102 in. 1 1/8 in.	1.260 in. 1 1/4 in.	22.0mm	28.0mm	32.0mm
Depth of Cutting	Maximum: 1 1/8 in. (1.14 in.) (6 in. Disc Wheel)			Maximum: 29mm (150 mm Disc Wheel)		
Speed of Cutting	Approximately 3.15 in./min			Approximately 80 mm/min		
Guiding Device	Guide Ring Type					
Machine Size	Height 9.84 in.	Width 20.78 in.	Length 13.78 in.	Height 250 mm	Width 528 mm	Length 350 mm
Weight of Machine	Approximately 60 lb			Approximately 27 kg		
Flexible Shaft	Inner Dia. 0.78 in.	Outer Dia. 1.57 in.	Length 19.68 ft	Inner Dia. 20 mm	Outer Dia. 40 mm	Length 6 m
Weight of Flexible Shaft	Approximately 73 lb			Approximately 33 kg		
Engine Output	Maximum 6 PS/2000rpm					
Weight of Engine	Approximately 53 lb			Approximately 24 kg		

2. Main Parts

Fig.1



3. List of Parts

Make sure no parts are missing before using the machine.

Stored in	Items	Size/Description	QTY
Main Body Case	V-Belt	C-40 (Circumference: 16 in.)	2
	V-Belt	C-45 (Circumference: 18 in.)	2
	Hook	Adjusting Long Screw attached	1
	First Driven Shaft	Double Driven Shaft Pulley attached	1
	Second Driven Shaft	Single Driven Shaft Pulley attached	1
	Roller Chain	1.5 m (Length: 60 in.)	1
	Guide Ring Gauge		1
	Hose Jointing Tap	(attached to Main Body)	1
	Cutting Wheel Holder	(attached to Main Body)	1
	Cutting Wheel Pressing Cap	Type A (for Cutting Wheel)	1
	Shaft Key	(attached to Main Body)	1
	Safety (Wheel) Cover	(attached to Main Body)	1
	Safety Wedge	Place in the gap when cutting	2
	Support Bar	Keep the machine from rolling forward	
	Straw Broom (Brush)*	Grooving chips removal	1
Tool Box	Crank Handle		1
	Grooving Wheel Holder	(w/Key)	1
	Grooving Wheel Pressing Cap	Type B (for Grooving Wheel)	1
	Grooving Depth Adjusting Wheel	3 mm DPT	1
	Metric Wrench	10 mm	1
	Metric Wrench	17 mm	1
	Metric Combination Wrench	19 mm x 24 mm	1
	Metric Hex Key	5 mm	1
	Metric Hex Key	6 mm	1
	Soft Hammer		1
	Metric Ratchet	10 mm Dr. (Length: 7 in.)	1
	Safety Goggles		1
	Plug Wrench		1
	Half Round File		1
	Extra Shaft Key	5 mm x 5 mm x 35 mm	1

*Use only a straw broom (brush) for your safety to prevent your hand from getting caught by a grooving wheel in motion when removing grooving chips. If necessary, shut down the machine to clean up chips.

Section 3 Operational Procedures

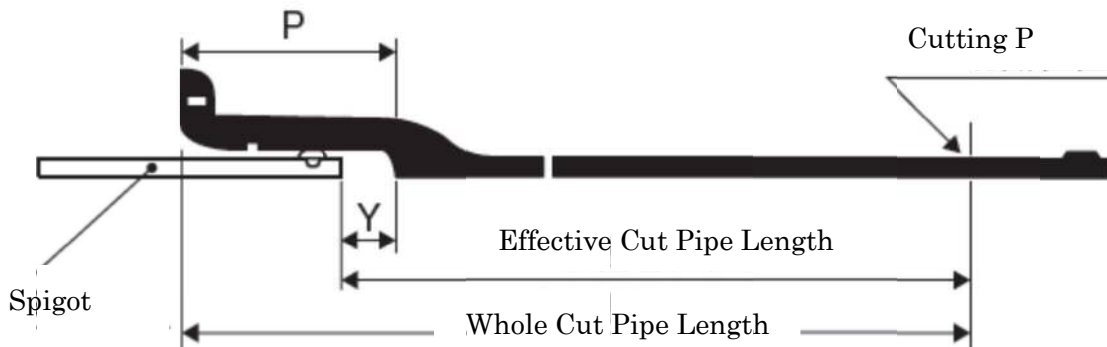
1. Cutting of Pipe

Step 1: Cut Pipe Length and Cutting Position

After deciding where to cut (how long cut pipe length is.), measure cut pipe length and mark a cutting position. Cut pipe length is effective length of cut pipe.

Fig.2

Example: NS Type Pipe



Step 2: Guide Ring Installation


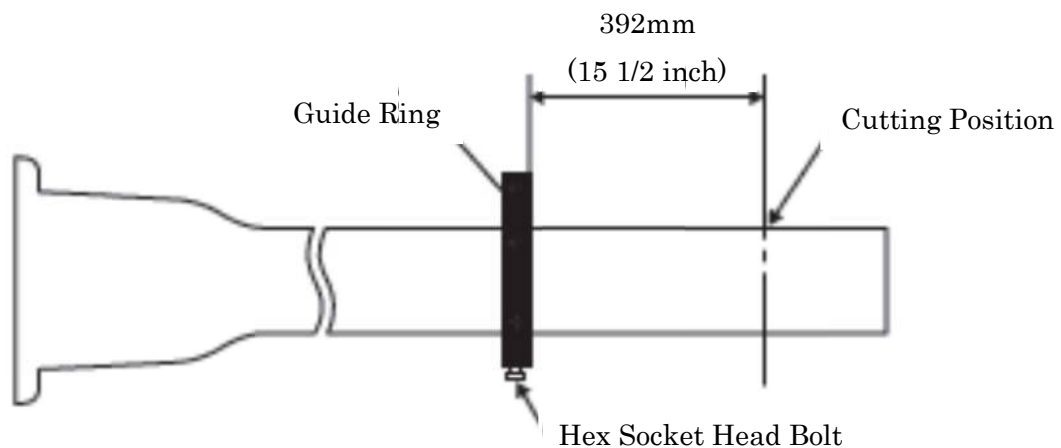
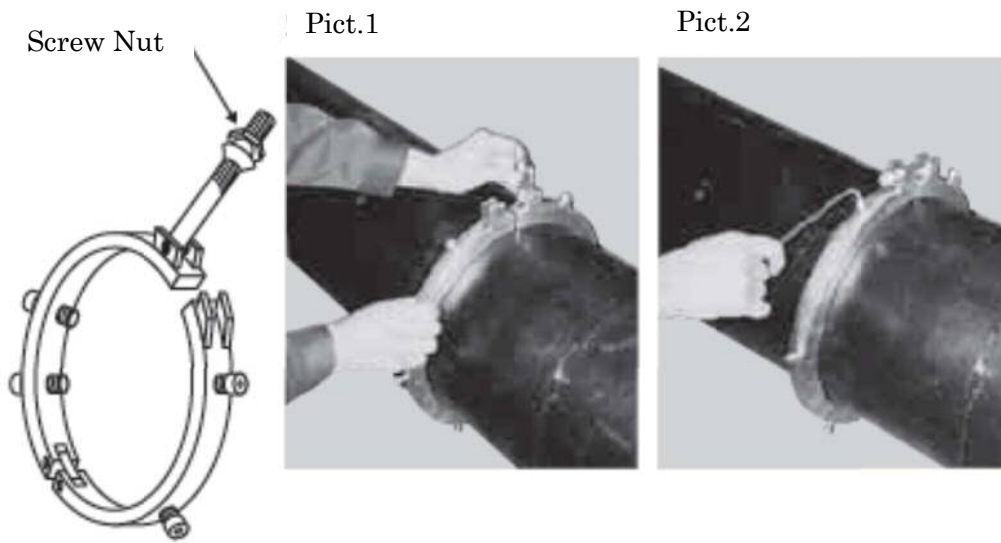
 **Tip!** The Guide Ring is a guide rail to keep the machine and the wheel stayed on track. Make sure the Guide Ring is fixed tight and stable on the pipe for accurate cutting.

Fig.3



- Place the Guide Ring on the pipe 392mm (15 1/2") away from a cutting position. The Guide Ring Gauge is convenient to measure a Guide Ring position. (Fig.3 and Pict.1)
- Tighten all hex socket head bolts evenly, keeping the Guide Ring at a right angle against the pipe. (Pict.2)
- Check at least 4 measurements (top, bottom and sideways) for a proper Guide Ring position.

Fig.4



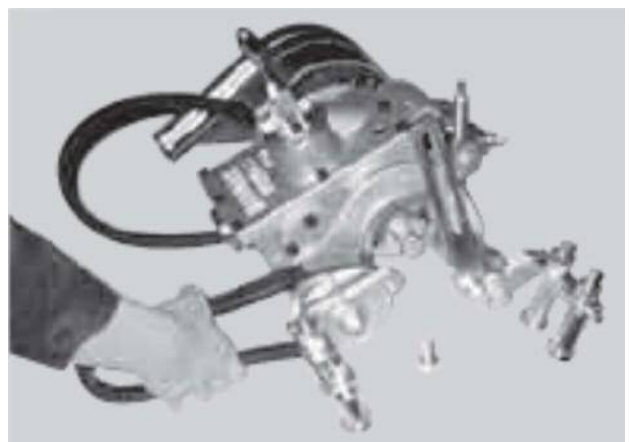
Step 3: V-Belt Installation

- A) Prepare certain number and size of V-Belt accordance with pipe diameter.
20" – 24" (500mm – 600mm) C-40 * 2 and C-45 * 2
- B) Open the Safety (Wheel) Cover. Install the C-40 V-Belt on the Drive Shaft Pulley. (Pict.3)
- C) Remove the bolt of the Bracket Fixing Bar by the Guiding Device. Remove the Bracket Fixing Bar and install another C-40 V-Belt on the Drive Shaft Pulley. Put back and tighten the bolt lightly to replace the Bracket Fixing Bar. (Pict.4)

Pict.3



Pict.4

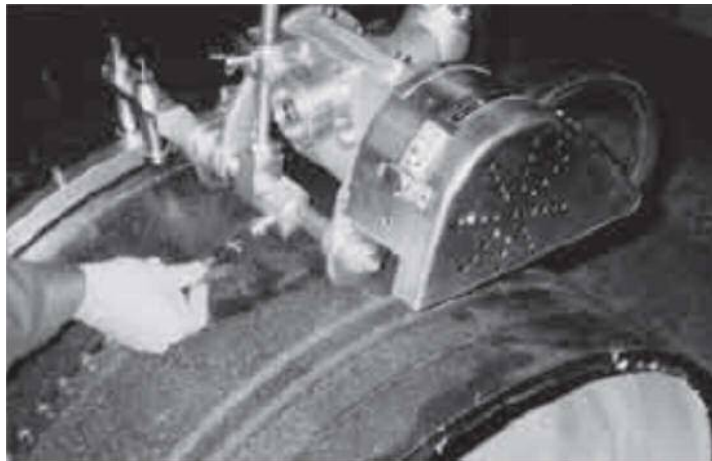


Step 4: Roller Chain Installation

- A) Prepare proper length of Roller Chain accordance with pipe diameter.
20" – 24" (500mm – 600mm) 1.5 m (Length: 60 in.)

- B) Use a chain joint to connect the Roller Chain to the Machine Body or additional Roller Chain.
(Pict.5)

Pict.5



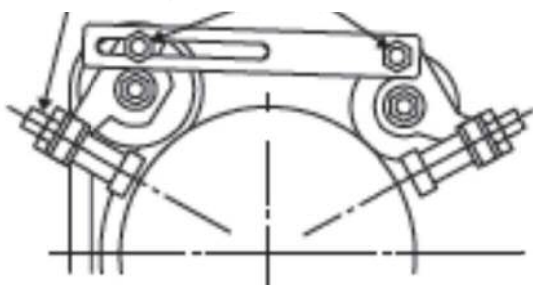
Step 5: Main Body Placement and Guiding Device Adjustment

- A) Place the Main Body on the pipe. Make sure the Guide Rollers are placed on the Guide Ring. After placing the Main Body on the pipe, check if the two Drive Shaft Pulleys (V-Belt) and the two Wheels are on the pipe. (Refer to Fig.1)

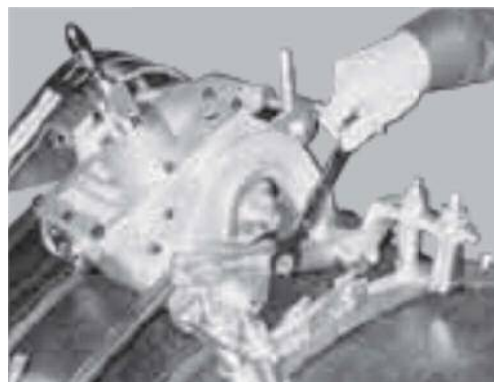
- B) Loosen the two bolts of the Bracket Fixing Bar. (Fig.5) Adjust the Roller Shafts to the center of the pipe. Tighten the two bolts of the Bracket Fixing Bar firmly. (Pict.6)

Fig.5

Roller Shaft Bolts of Bracket Fixing Bar



Pict.6



- C) Loosen the outer side of the Guide Roller Shaft nuts (M16), with the inner Guide Rollers pressed against the Guide Ring. Adjust tightness of the Guide Rollers, using the M6 Adjusting bolts. Make sure the Guide Rollers and Guide Ring contact against each other. After fixing M16 nuts, tighten the M6 Adjusting bolts. (Fig.6, Pict.7)

Pict.7

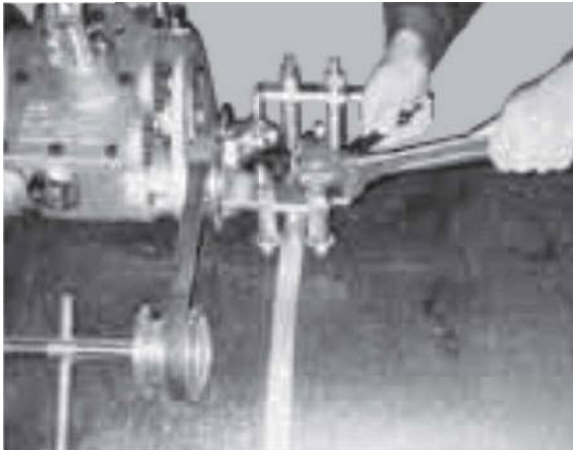
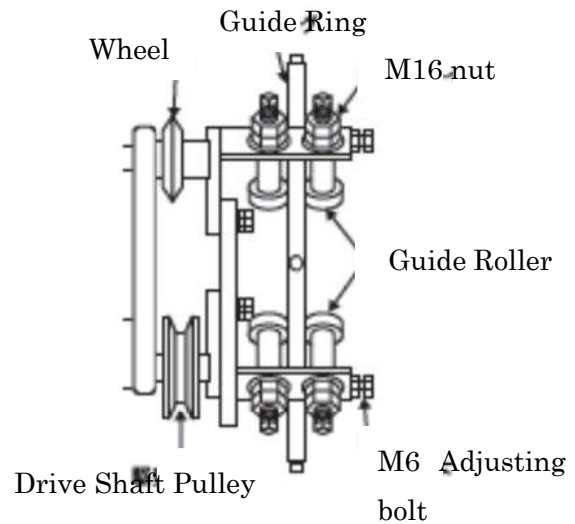



Fig.6



-  Tip! Once the Guide Rollers are adjusted, this adjustment work is not always required as long as all of the Guide Rollers and Guide Ring contact against each other. If there is any gap, there shall be cut face difference due to this gap.

- D) Assemble the First Driven Shaft (V pulley) and the Hook (w/ Adjusting Long Screw) together. Make sure that distance between the pulley and the hook is adjusted the same distance as much as possible. Install the C-40 -Belts on the First Driven Shaft Pulley. Connect the Hook and the Roller Chain at the tightest length. (Pict.8) Use the Crank Handle to turn the Adjusting Long Screw. Make sure the V-Belts and the Roller Chain are slightly tense. (Pict.9)

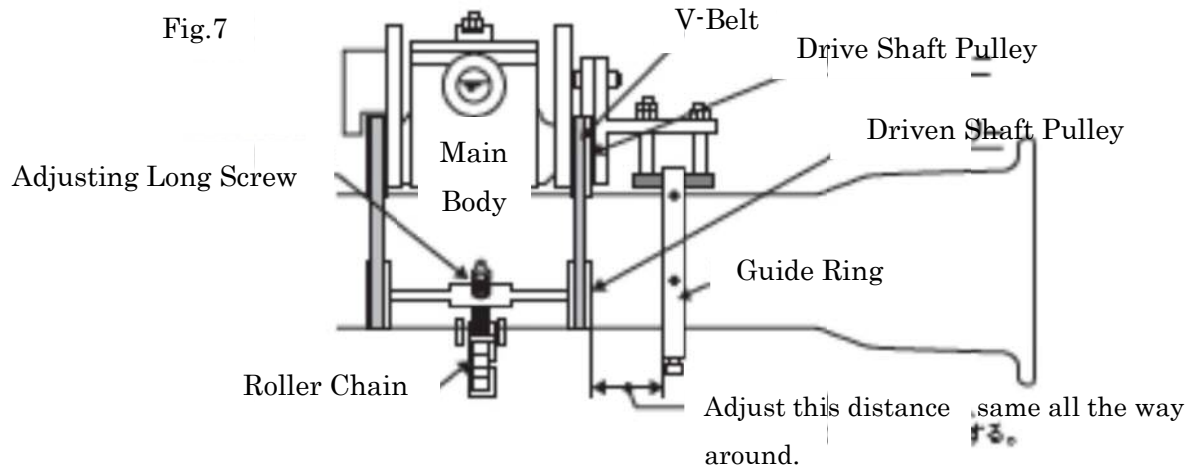
Pict.8






Pict.9



E) Adjustment of the Drive Shaft Pulley, Driven Shaft Pulley, V-Belts and the Roller Chain shall be parallel to the Guide Ring. (Fig.7)



F) Turn the Crank Handle and press the center of the V-Belts to check the tension with your finger once in a while. Tension is appropriate when the V-Belts are not elastic of finger pressing.

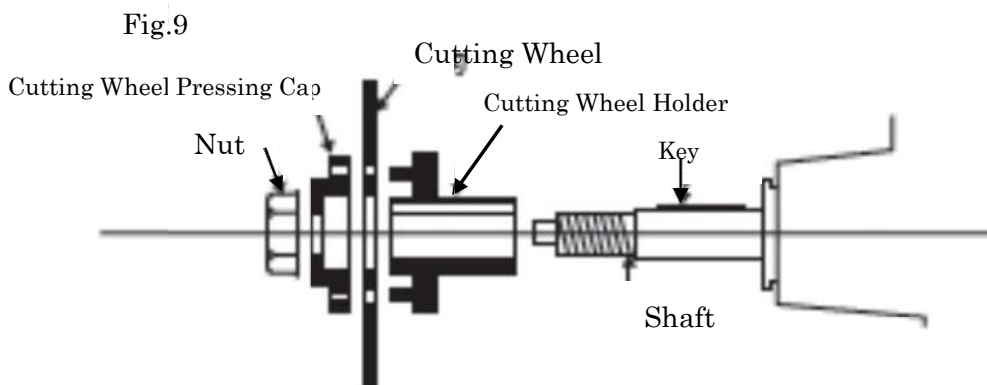
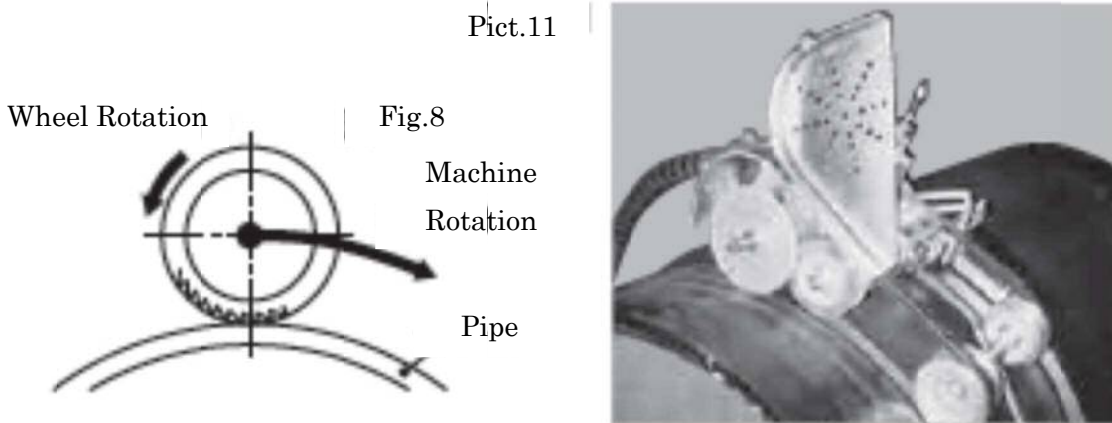
-  Tip! For any pipe larger than 20", Double pulley assembly is necessary. (Pict.10)
-  Tip! Single pulley assembly makes the V-Belts slip on the pipe
-  Tip! When making double pulley assembly, install the C-45 V-Belts on the inner side of the First Driven Shaft (w/ Double Driven Shaft Pulley) at first. Connect the First Driven Shaft and the Drive Shaft Pulley. After this work is finished, install other sides of the C-45 V-Belts on the Second Driven Shaft (w/ Single Driven Shaft Pulley).

Pict.10



Step 6: Cutting Wheel Installation

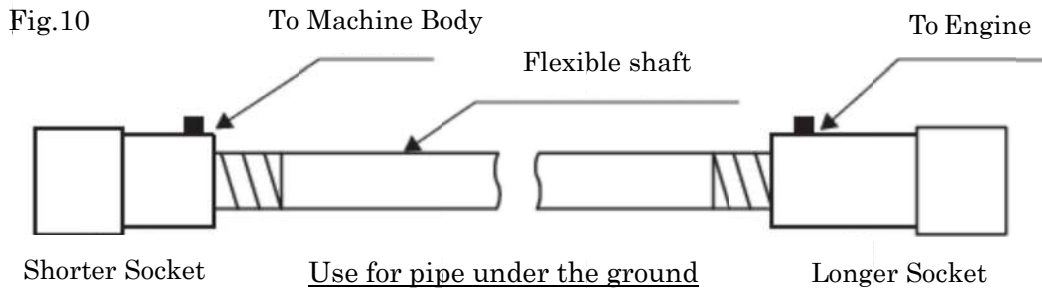
- A) Prepare a proper cutting wheel for the KEEL CUTTER N600LRC.
- B) Put the Crank Handle on the shaft of the Slitting Device and turn it to raise the machine upward until the Cutting Wheel can be fit. Make sure indication (marked on the front side) of the Cutting Wheel facing in front and put the wheel to the Cutting Wheel Holder followed by the Cutting Wheel Pressing Cap. Tighten the nut firmly to hold the wheel. (Fig.8, Fig.9 and Pict.11)
Tightening torque for the bolt holding the wheel is: 20 Nm (180 in.lb).



- ⚠ Warning!
- ⊙ Wrong direction of the wheel can cause damage on the wheel.
- ⊙ Always make sure the nut of the Cutting Wheel Pressing Cap is tight and firm. If the Cutting Wheel becomes loose in the middle of rotation, this can cause serious injury and damage on the wheel.

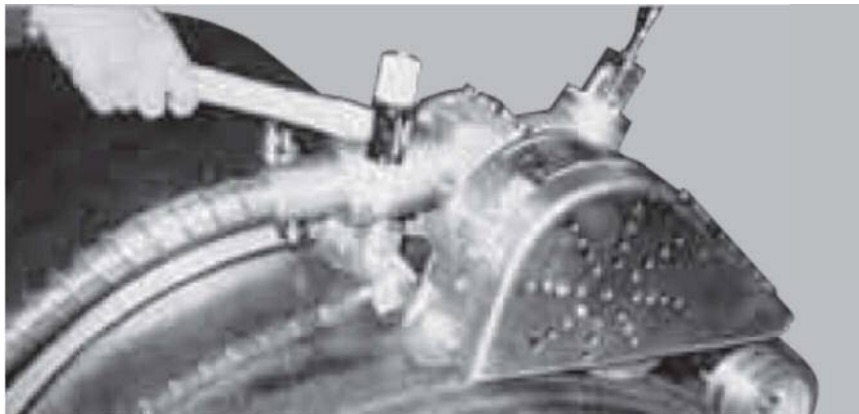
Step 7: Connecting Machine Body and Flexible Shaft

- A) Remove the covers on both ends of the Flexible Shaft. The Flexible Shaft has the longer socket and shorter socket on both ends. Connect the longer socket to a nipple of the engine.



- B) Connect the shorter socket to a nipple of the machine body. Make sure the connection is tight and firm, using a soft hammer.

Pict.12



- C) Rotate the longer socket and shorter socket regularly for the good condition of a shaft in the use of on the ground cutting work.

Step 8: Start of engine

- A) The engine must be checked before starting. (Refer to **Section 4 Maintenance**)

⚠ Warning!

The Cutting Wheel and a pipe must be separated before starting the engine. Raise the wheel to start the engine if it is on the pipe. Never start the engine when the wheel and pipe are in contact.

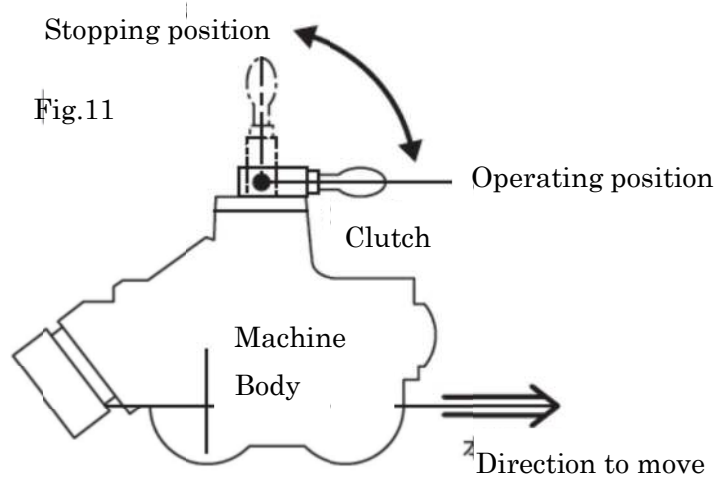
- B) Start the engine. Take notice that the Cutting Wheel starts to move at the same time as the engine is started.

⚠ Warning!

An engine starter and a cutting machine operator should make eye and verbal contact or sign for their safety.

Step 9: Pre-Operation (V-Belt re-adjustment)

- A) Push the clutch handle down to rotate the machine forward. (Fig.11) At this point, the wheel must be off the pipe. Let the machine move forward about 5 inches so that the V-Belts fit on the pipe for good grip. As the machine moves along the pipe, check also other part of the machine (bolts, nut and Guiding Device).



Tip! The clutch is not a switch to start the wheel rotating. It is an ON/OFF switch of machine body to move on a pipe in the same speed.


- B) Disconnect the clutch to stop the machine. Tighten the stretched V-Belts from the pre-operation. (Pict.13)



Pict.13

Step 10: Slitting


Set and turn the Crank Handle slowly counter-clock wise (downward) to lower the cutting wheel.
When the cutting wheel reaches the needed depth, fix the slitting shaft by the wing bolt.

 Prohibition!


Do not touch the rotating parts.

 Warning!

Use safety goggles when cutting a pipe to protect your eyes from chips.


 Caution!

Lower the cutting wheel slowly. Rough slitting can damage the wheel and cause the trouble.

 Tip! Always use the water tank for a diamond chipped wheel.

Step 11: Cutting of pipe

A) Connect the clutch (push down the handle) to operate the machine on an automatic drive mode.

 Tip! Check the belt tension and cutting line while cutting a pipe.

B) Cutting is completed when the machine turns around a pipe.


 Caution!

Use safety wedges when the pipe is almost cut to prevent the wheel from getting caught in pipe ends.

C) When the pipe is completely cut, turn the Crank Handle slowly clock wise (upward) to raise the cutting wheel. Shut down the engine after the wheel is completely raised.


 Caution!

Never shut down the engine when the wheel is in the slit. This can damage the wheel and cause the trouble.

 Tip! A backfire (small explosion) of engine is not trouble.

Step 12: Finish

A) Shut down the engine. Make sure the wheel is completely stopped. Remove the machine from the pipe.

 Warning!

The wheel and the machine are hot. Cool them down before removing.

B) Clean and oil the machine after usage. (Refer to **Section 4 Maintenance**)

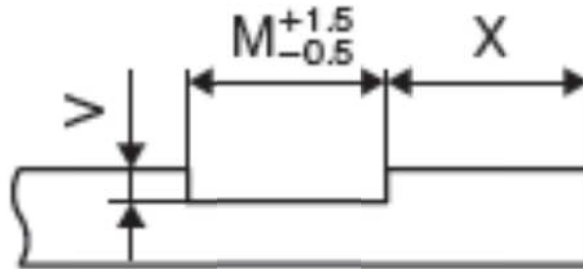
 Caution!

Leaving rusty matter can cause trouble such as wobbling cut and slipping.

2. Grooving of Spigot

Step 1: Grooving Position on the spigot of the cut pipe

Select the Grooving Position shown in the Table1 and Table 2 below.



Metric Dimension: mm

Table 1: Tolerance value of groove

Description	Size	Tolerance	
		+	-
V	20" – 60"	1.0mm	0.5mm
	64"	1.5mm	0.5mm
X	20", 24"	2.0mm	2.0mm
	28" – 64"	4.0mm	4.0mm
M	All size	1.5mm	0.5mm

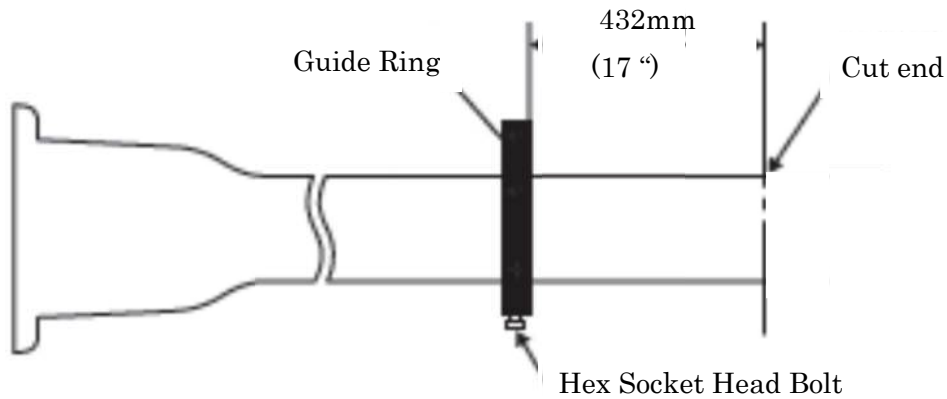
Table 2: Dimension of groove

Size	X	M	V	Grooving Wheel Width	Grooving Depth Adjusting Wheel
20", 24"	40mm	22mm	3mm	22mm	3mm Depth Type Outside Diameter: 104mm
28" – 36"	55mm	27mm	4mm	28mm	4mm Depth Type Outside Diameter: 102mm
40" – 48"	50mm	32mm	5mm	32mm Double Wheels	5mm Depth Type Outside Diameter: 115mm
54"	60mm	32mm	5mm	32mm Double Wheels	5mm DPT Type Outside Diameter: 115mm

Step 2: Guide Ring Installation

Place the Guide Ring on the pipe in the same manner as cutting of pipe. Take notice that Guide Ring placing position is different than cutting of pipe. (432mm or 17", F g.12)

Fig.12



Step 3: Grooving Wheel Installation

- Prepare a proper grooving wheel and grooving depth adjusting wheel for the pipe size.
- Punch marks on the wheel must face in front. Install the Grooving Wheel onto the Grooving Wheel Holder.
- Make sure the Grooving Wheel Holder and the Grooving Wheel Pressing Cap are tightened firmly to hold the wheel. (Fig.13) Tightening torque for the holding the wheel is: 20 Nm (180 in.lb).

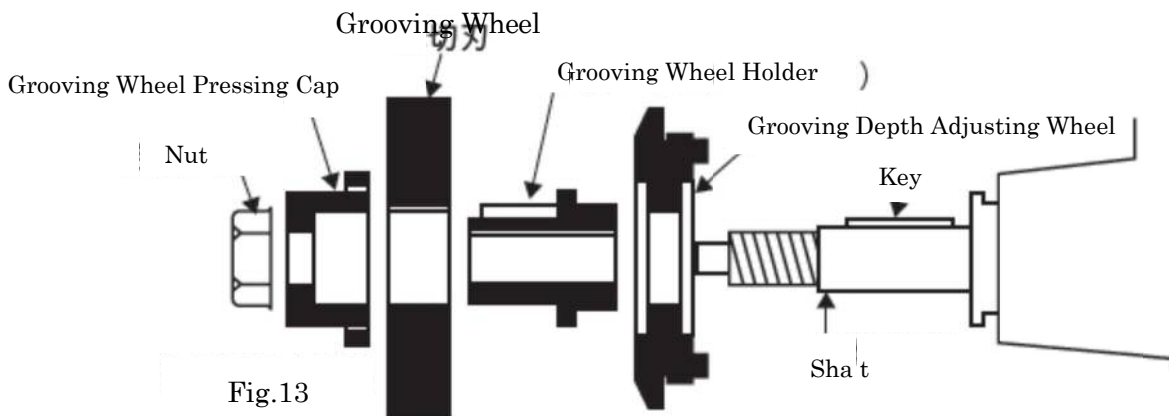



Fig.13

- ⚠ Warning!**
- Pay attention to the direction of the Grooving Wheel. Punch marks on the wheel must face in front, otherwise, the bits of the wheel get severely damaged and this can result in major trouble.
 - Make sure the nut is tightened firmly and does not get loosen while being operated, otherwise this can cause not only damaging the wheel but also serious injury.

Step 4: Start Grooving

Start grooving gently by lowering the Grooving Wheel slowly in the same manner as the Cutting Wheel to avoid kickback.

 Prohibition!

Do not touch the rotating parts.

 Warning!

- ⦿ Use safety goggles when cutting a pipe to protect your eyes from chips.
- ⦿ Grooving work can have larger kickback than cutting work, which can cause not only damaging the wheel but also serious injury. Therefore, make sure to start grooving gently.

Step 5: Grooving depth adjustment

- A) When the wheel starts grooving, keep lowering the wheel until the Grooving Depth Adjusting Wheel hits the pipe surface. This means that the Grooving Wheel reaches the prescribed depth. Take notice that when the Grooving Depth Adjusting Wheel on the pipe surface, it stops rotating.
- B) Tighten the wing nut to hold and keep it from moving. Turn the clutch handle down to start grooving all around the pipe.

Step 6: Finish Grooving

- A) Keep the machine run until grooving noise and chips are not recognized.
- B) When the groove is completed, turn the Crank Handle slowly clock wise (upward) to raise the grooving wheel. Shut down the engine after the wheel is completely raised.

 Caution!

Never shut down the engine when the wheel is in contact with the groove. This can damage the wheel and cause the trouble.

- C) Shut down the engine. Make sure the wheel is completely stopped. Remove the machine from the pipe.

 Warning!

The wheel and the machine are hot. Cool them down before removing.

- D) Clean and oil the machine after usage. (Refer to **Section 4 Maintenance**)

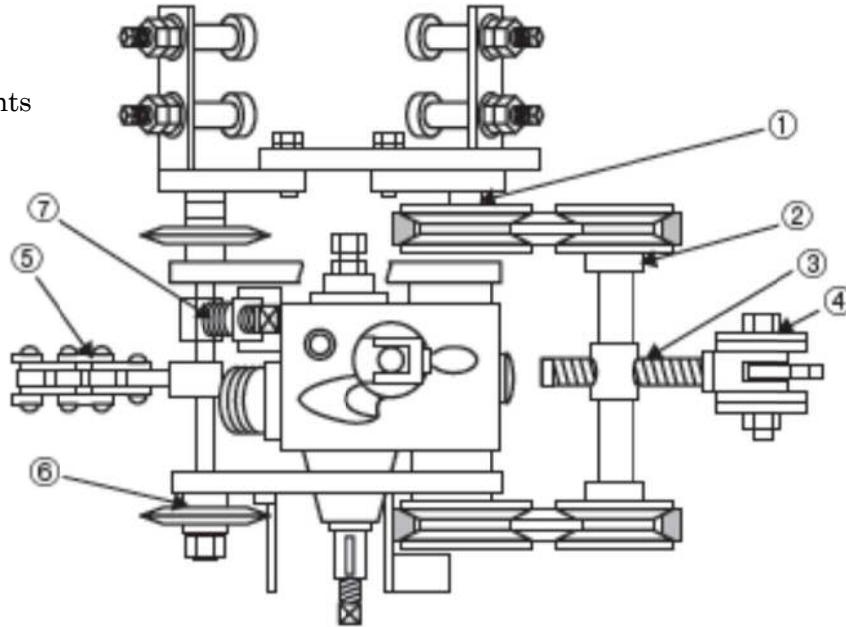
 Caution!

Leaving rusty matter can cause trouble such as wobbling cut and slipping.

Section 4 Maintenance

Maintenance is very important to keep the Keel Cutter in good condition all the time. Clean off dust and stain. After rinsing entire dirt, Oil the frictional and sliding areas shown in the figure below.

Fig.14
Oiling points



1 Wheel

1. Leaving rusty matter on the wheel loses durability. Make sure to rinse the wheel after use.
2. Make sure a diamond chipped wheel is not cracked or damaged in any other way.
3. The Grooving Wheel needs to be sharpened every 40 feet of grooving length as a guide line. Ask the stores for sharpening the wheel.

2 Machine Body Gear case

Check the amount of oil. Keep the machine level to check the amount of oil. Oil level is good if the oil is visible on the oil checking window.

3 Roller Chain

Make sure to clean off dust and stain after use. Oil the chains to keep the Roller Chain in smooth movement. (⑤ of Fig.14)

4 V - Belt

1. Leaving rusty matter on the V-Belt (particularly on the wheel side) loses durability. Make sure to remove any rusty matter after use.
2. Runs of cords are a sign of replacing the belt.

3. Normally the V –Belt is in contact with the groove side walls of pulleys. Shiny pulley groove bottom is a sign of belt bottoming out and belt replacing.
4. Never mix new and used belts. Replace both belts at the same time. Remember that the replacement must be with the right type of new V-Belts for good balance.

5 Slitting Device

Make sure to oil the threads of the shaft for the smooth wheel vertical motion. (⑦ of Fig.14)

6 Inner Shaft of Flexible Shaft

1. Wobbling motion and overheating of the Flexible Shaft is a sign of extension of the inner shaft.
2. In this case, ask for repair before an inner shaft gets disconnected.

7 Checking out Engine

1. Make sure the fuel tank has enough unleaded gasoline.
2. The air cleaner (filter) should be cleaned regularly.
3. Engine oil should be refilled if it is in low level. Old engine oil should be replaced.

8 Engine Maintenance

Maintenance / Hours	50 hours	200 hours
Engine oil change	●	
Air filter cleaning	●	
Fuel strainer cleaning		●
Spark plug Cleaning	●	

*The first engine oil change time shall be 25 hours.

9 Long term storage of engine

1. Empty the gasoline tank completely.
2. New engine oil must be used.