



USER'S MANUAL

KM-2070 SERIES

Electronically Controlled
1-Needle ZigZag Lock Stitch
Machine

- 1) FOR AT MOST USE WITH EASNESS,
PLEASE CERTAINLY READ THIS MANUAL
BEFORE STARTING USE.
- 2) KEEP THIS MANUAL IN SAFE PLACE
FOR REFERENCE WHEN THE MACHINE
BREAKS DOWN.

SunStar CO., LTD.

MME-090929



1. Thank you for purchasing our product. Based on the rich expertise and experience accumulated in industrial sewing machine production, SUNSTAR will manufacture industrial sewing machines, which deliver more diverse functions, high performance, powerful operation, enhanced durability, and more sophisticated design to meet a number of user's needs.
2. Please read this user's manual thoroughly before using the machine. Make sure to properly use the machine to enjoy its full performance.
3. The specifications of the machine are subject to change, aimed to enhance product performance, without prior notice.
4. This product is designed, manufactured, and sold as an industrial sewing machine. It should not be used for other than industrial purpose.



SunStar CO., LTD.

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MACHINE SAFETY REGULATIONS




Safety instruction on this manual are defined as Danger, Warning and Notice.

If you do not keep the instructions, physical injury on the human body and machine damage might be occurred.

Danger : This indication should be observed definitely. If not, danger could be happen during the installation, conveyance and maintenance of machines.

Warning : When you keep this indication, injury from the machine can be prevented.

Notice : When you keep this indication, error on the machine can be prevented.

<p>1-1) Machine Transportation</p>  <p>Danger</p>	<p>Those in charge of transporting the machine should know the safety regulations very well. The following indications should be followed when the machine is being transported.</p> <ul style="list-style-type: none"> Ⓐ More than 2 people must transport the machine. Ⓑ To prevent accidents from occurring during transportation, wipe off the oil on the machine well.
<p>1-2) Machine Installation</p>  <p>Warning</p>	<p>The machine may not work well or breakdown if installed in certain places. Install the machine where the following qualifications agree.</p> <ul style="list-style-type: none"> Ⓐ Remove the package and wrappings starting from the top. Take special notice on the nails on the wooden boxes. Ⓑ Dust and moisture stains and rusts the machine. Install an airconditioner and clean the machine regularly. Ⓒ Keep the machine out of the sun. Ⓓ Leave sufficient space of more than 50cm behind, and on the right and left side of the machine for repairing. Ⓔ EXPLOSION HAZARDS Do not operate in explosive atmospheres. To avoid explosion, do not operate this machine in an explosive atmosphere including a place where large quantities of aerosol spray product are being used or where oxygen is being administered unless it has been specifically certified for such operation. Ⓕ The machine were not provided with a local lighting due to the feature of machine. Therefore the illumination of the working area must be fulfilled by end user. <p>[Refer] Details for machine installation are described in 4. Machine Installation.</p>
<p>1-3) Machine Repair</p>  <p>Notice</p>	<p>When the machine needs to be repaired, only the assigned troubleshooting engineer educated at the company should take charge.</p> <ul style="list-style-type: none"> Ⓐ Before cleaning or repairing the machine, turn off the main power and wait 4 minutes till the machine is completely out of power. Ⓑ Not any of the machine specifications or parts should be changed without consulting the company. Such changes may make the operation dangerous. Ⓒ Spare parts produced by the company should only be used for replacements. Ⓓ Put all the safety covers back on after the machine has been repaired.

1-4) Machine Operation



KM-2070 Series is made to sew patterns on fabrics and other similar material for manufacturing.

Follow the following indications when operating the machine.

- Ⓐ Read through this manual carefully and completely before operating the machine.
- Ⓑ Wear the proper clothes for work.
- Ⓒ Keep hands or other parts of the body away from the machine operation parts (needle, shuttle, thread take-up lever, and pulley etc.) when the machine is being operated.
- Ⓓ Keep the covers and safety plates on the machine during operation.
- Ⓔ Be sure to connect the earthing conductor.
- Ⓕ Turn off the electric main power and check if the switch is turned "off" before opening electric boxes such as the control box.
- Ⓖ Stop the machine before threading the needle or checking after work.
- Ⓗ Do not step on the pedal when turning the power on.
- Ⓘ Do not operate the machine with any cooling fan blocked.
The air-filter on control box must be cleaned once a week.
- ⓷ If possible, install the machine away from source of strong electrical noise such as high frequency welding machines

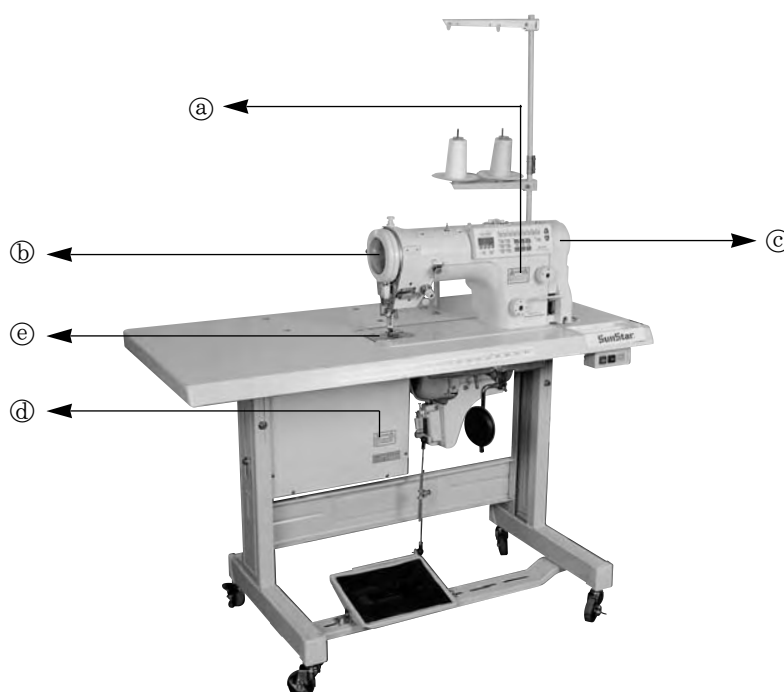
[Warning]

Belt will crush or amputate finger or hand, keep cover in place before operating, turn off power before inspecting or adjusting.

1-5) Devices for Safety



- Ⓐ Safety label : It describes cautions during operating the machine.
- Ⓑ Thread take-up cover : It prevents from any contact between body and take-up lever.
- Ⓒ Belt cover : It prevents from insertion of hands, feet or clothes by belt, electric shock during rotating the motors.
- Ⓓ Label for specification of power : It describes caution for safety to protect against electric shock during rotating the motors.
- Ⓔ Finger guard : It prevent from contacts between a finger and needle.



1-6) Caution Mark Position

CAUTION
주의

Do not operate without finger guard and safety devices. Before threading, changing bobbin and needle, cleaning etc. switch off main switch.
손가락 보호대와 안전장치 없이 작동하지 마십시오.
실, 보빈, 바늘교환시나 청소전에는 반드시 주전원의 스위치를 꺼 주십시오.

WARNING
경고

Hazardous voltage will cause injury. Be sure to wait at least 360 seconds before opening this cover after turn off main switch and unplug a power cord.
고압 전류에 의해 감전될 수 있으므로 커버를 열 때는 전원을 내리고 전원 플러그를 뽑고 나서 360초간 기다린 후 여십시오.

Caution mark is attached on the machine for safety.
When you operate the machine, observe the directions on the mark.

Position of Warning Mark
[View from the right-front]



1-7) Contents of Marks



Caution

1)

CAUTION
주의

Do not operate without finger guard and safety devices. Before threading, changing bobbin and needle, cleaning etc. switch off main switch.
손가락 보호대와 안전장치 없이 작동하지 마십시오.
실, 보빈, 바늘교환시나 청소전에는 반드시 주전원의 스위치를 꺼 주십시오.

2)

WARNING
경고

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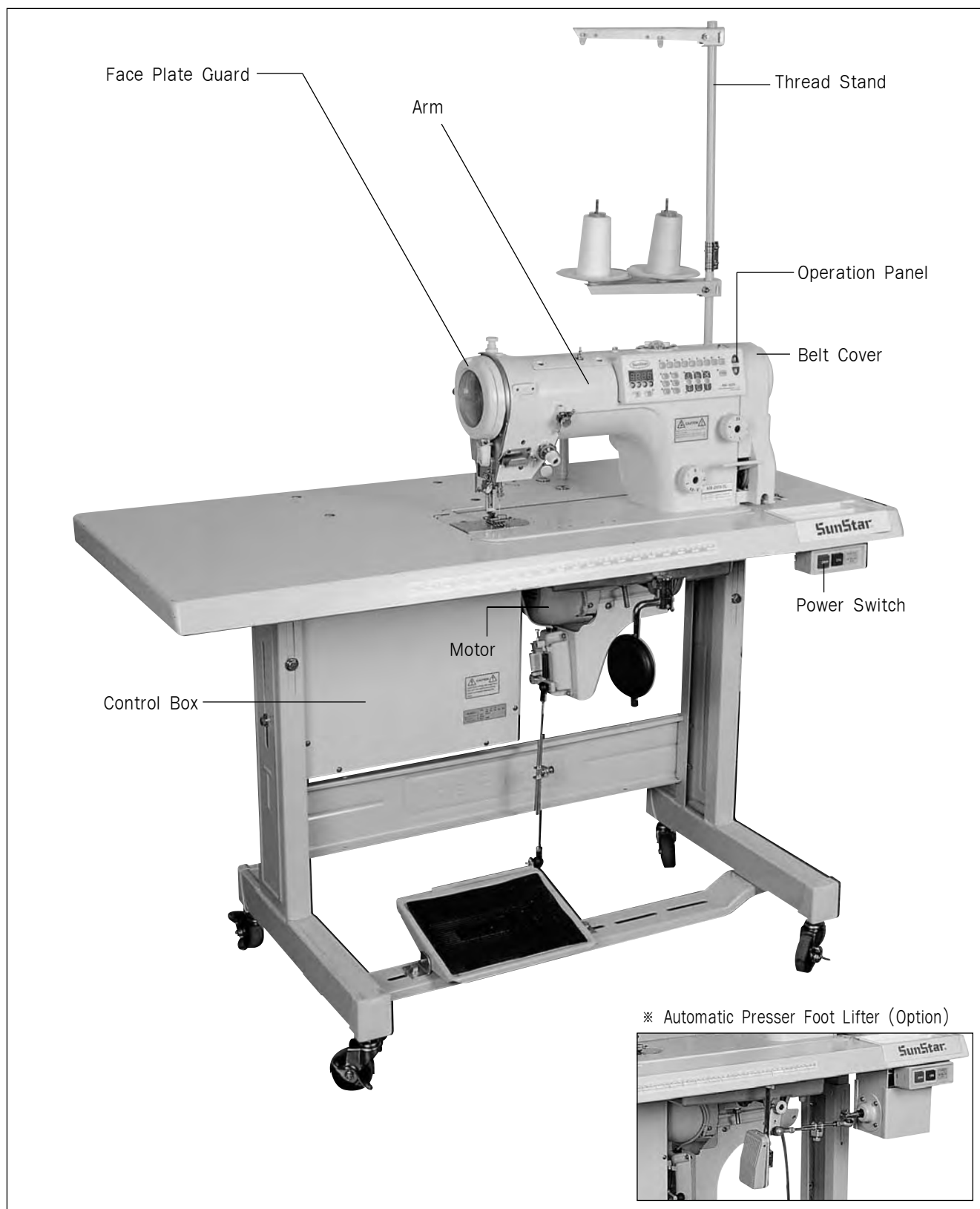
Machine Specifications

MODEL		KM-2070-L	KM-2070-7L	KM-2070-M	KM-2070-7M
Stitch Type		Lock Stitch			
ZigZag Width		Max. 8mm/10mm (2 Step, 3 Step)			
Stitch Length		Max. 2.5mm		Max. 5mm	
Sewing Speed		Max. 5,000 spm(4,000 spm at the time of shipment)			
Needle		SY 1965 Nm 70/10 or DP×5 #10			
Hook		DP Hook (Titanium Coated Inner Hook) : Hook Center is Offset			
Thread Take-up		Rotary Thread Take-up			
Height of Presser Foot	By Hand	6mm			
	By Knee	10mm			
	Automatic	7mm(Optional)			
Presser Foot Pressure		1～3 kgf		2～6kgf	
Needle Bar Stroke		33.3 mm			
Provided Patterns		Basic : 8 Kinds, 16 Patterns User Input Pattern : Max. 99 Patterns, 256 Stitches per pattern			
Pattern Input Function					
Automatic Thread Trimmer		×	★	×	★
Upper Thread Feeding Device		×	★	×	★
Backtack/Condense Device		★	★	★	★
Wiper		×	★	×	★
Height of Feed Dog		1.0mm			
Motor Specification		550W A/C Servo Motor			
Power Supply		1 Phase: 100～240V, 3 Phases: 200～415, 50/60Hz			
Power Consumption		600VA			
Temperature		5°C～40°C			
Humidity		20%～80%			
Airborne noise level		LAP≤79.9dB(A) (at 3500spm)(Noise measurement according to ISO 10821-CA-M1)			

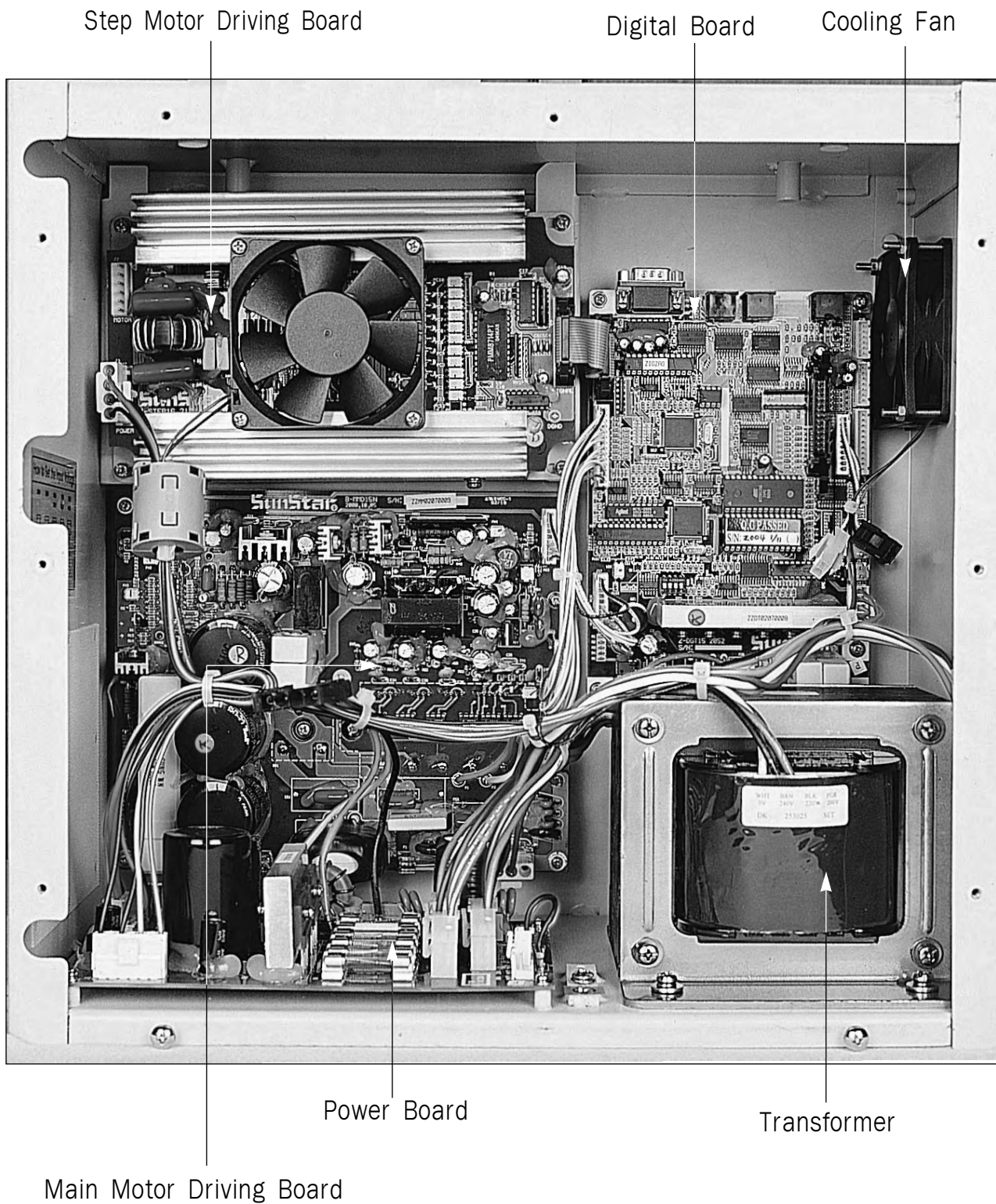
3

Machine Configuration

1) Part Name of Machine



2) Internal Structure of Control Box



4

Machine Installation

1) Environment for Machine Installation

- A. Do not use the machine where the voltage is over regular voltage $\pm 10\%$ to prevent accidents.
- B. In order to use safely, use in the environment as follows:
 - ☐ Ambient Temperature for machine operation: $0^{\circ} \sim 40^{\circ} \text{C}$ ($32^{\circ} \sim 104^{\circ} \text{F}$)
 - ☐ Ambient Temperature for machine reservation: $-10^{\circ} \sim 60^{\circ} \text{C}$ ($14^{\circ} \sim 140^{\circ} \text{F}$)
- C. Humidity: within 45~80% (Relative Humidity)

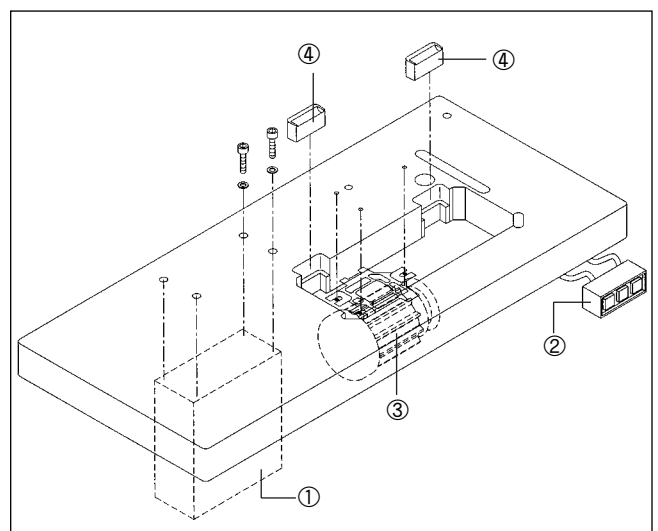
2) Electric Installation Environment

- A. Power Voltage
 - Use the power voltage within 10% of the rated voltage.
 - It is desirable to use frequency of power within 1% of the rated frequency (50/60Hz)
- B. Electromagnetic wave Noise
 - It is desirable to use the power separated from the strong magnetic field and high frequency product and keep away from them.
- C. In case of attaching additional device and accessories to control box, must safe low voltage.
- D. Pay attention that water; coffee and other should not enter into control box and motor.
- E. Do not drop control box and motor.

Notice	
<ul style="list-style-type: none"> • Install the machine by trained technician. • Ask electric wiring to the electric engineer of the purchased selling agent. • Weight of the sewing machine is over 40kg. Please install it by more than two personnel. 	<ul style="list-style-type: none"> • Do not connect power plug until installation is completed. Accidentally stepping on the pedal, the sewing machine gets operating and causes injury. • Execute earth connection. In case that earth connection is no stable, it becomes the cause of electric shock or wrong operation. • Put the belt cover on the head and motor of the sewing machine

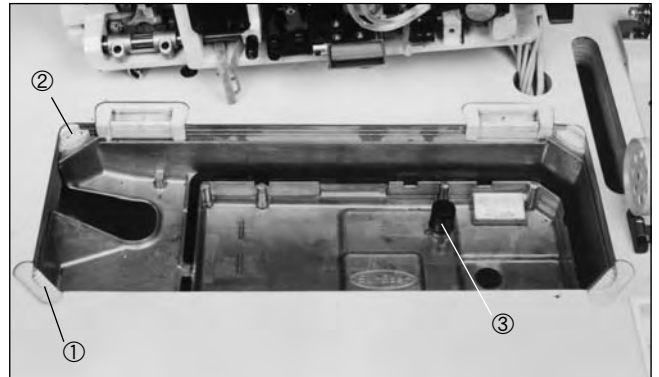
3) Safe Table Mounting of Machine

- A. Please fix control box ①, power switch ②, motor ③, and hinge rubber ④ to the table.



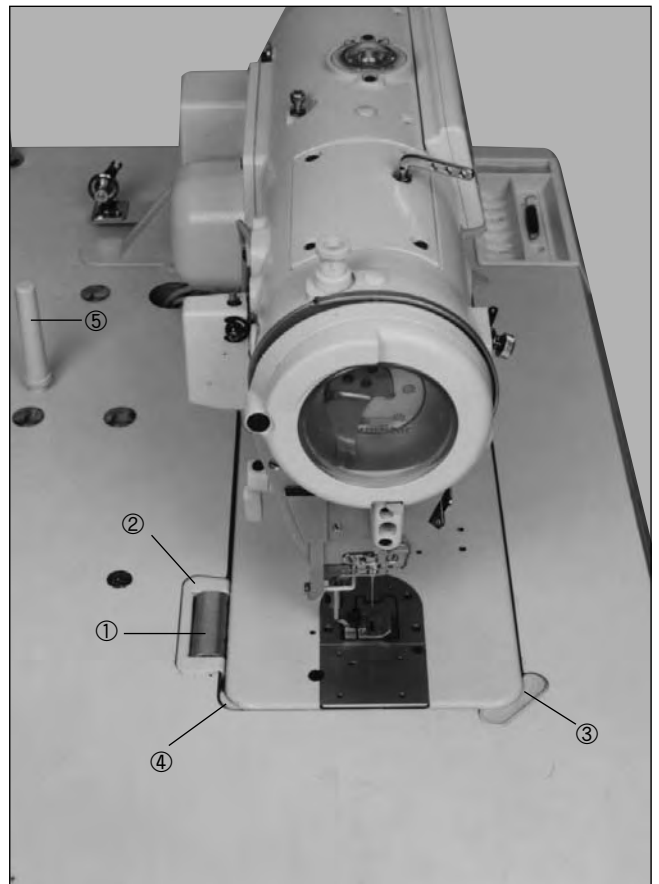
[Fig 1]

B. Insert head support rubber A①, and head support rubber B② to the corner of oil fan and then mount on the table. At this time, insert rising stitch support cap③ on the hole of oil fan.



[Fig. 2]

C. After attaching hinge① inserted to sewing bed to hinge rubber②, put down the head of sewing machine on head support rubber A③ and head support rubber B④ on top of the oil fan.



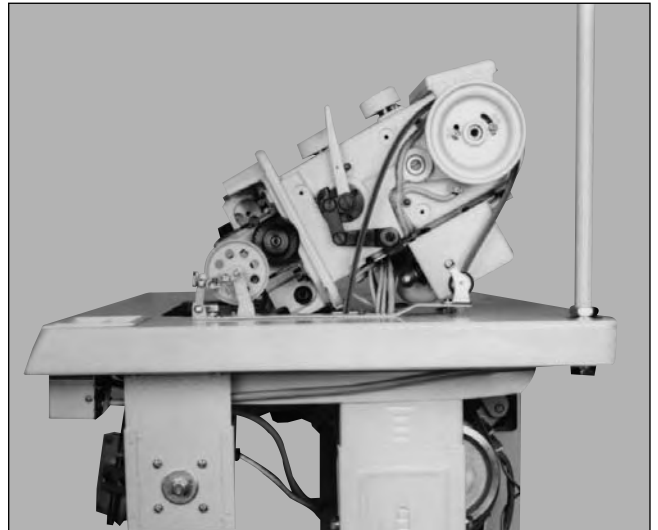
[Fig. 3]

D. Drive Head Support Pole⑤ into table.

[Notice]

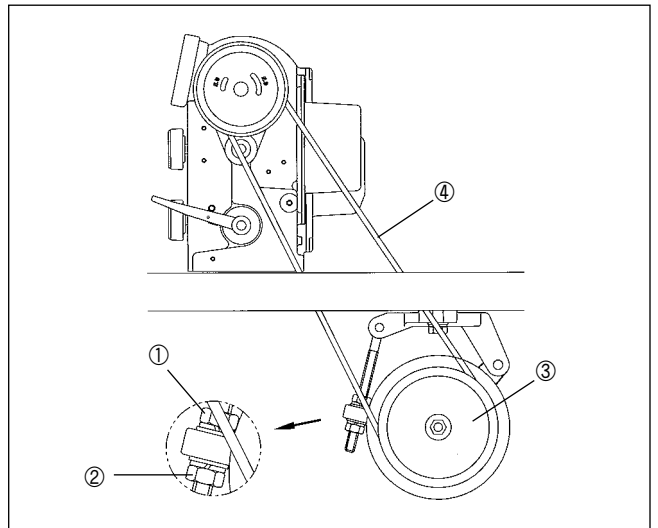
- Drive head support pole⑤ through into end of table firmly.
- Unless drive it into the end, when lay the head of sewing machine, stability is not good and dangerous.

E. On condition that stood the machine as shown in the figure, insert V belt between pulley and motor of the machine.



[Fig. 4]

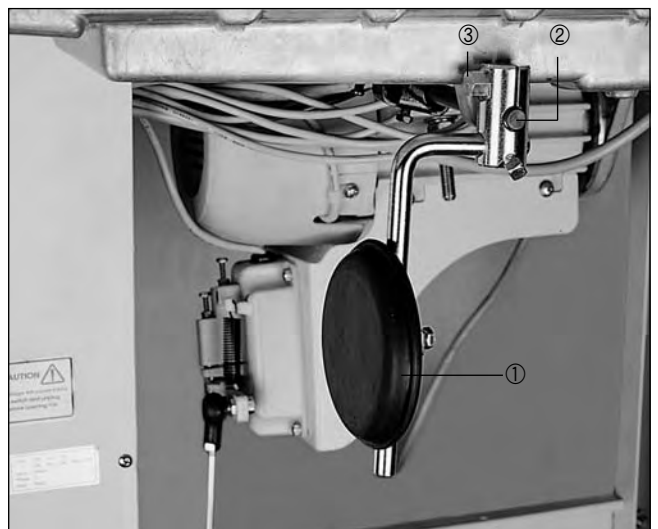
F. After connecting V belt, fully unfasten the fixing nut ①, ② to up and down, tension occurs to belt④ by self weight of motor③. On this condition, fasten the fixing nut① first and the fixing nut ② tightly.



[Fig. 5]

4) Installation of Presser Foot Lifter Pad

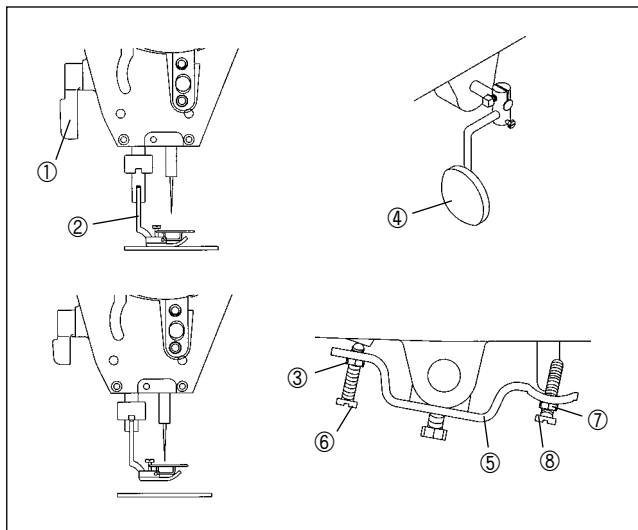
- A. Insert the presser foot lifter pad (group) ① packed in the accessory box into control body shaft ② of oil fan.
- B. After unfastening the volt ③ and deciding the location convenient of operation for presser foot lifter, tightly fasten again.



[Fig. 6]

5) Adjustment of Presser Foot Lifter (group) Pad

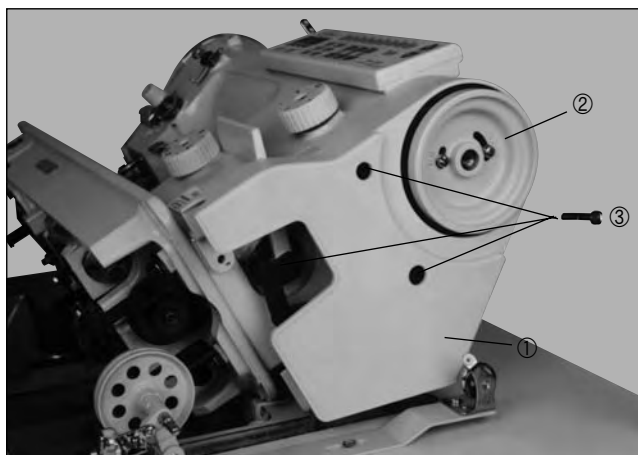
- A. Put down the feed dog lower than top of the needle plate by turning the pulley.
- B. Put down the presser foot^② to presser bar lifter^①.
- C. Unfasten nut^③.
- D. Adjust by turning the joint screw ^⑥ that operation volume (space) of control body ^⑤ should become about 2mm when lightly press the presser foot lifter pad (group)^④ by hands.
- E. After adjustment, joint the nut^③ tightly.
- F. Unfasten the nut^⑦.
- G. Adjust by rotating joint screw^⑧ that joint screw^⑧ becomes about 7mm higher than control body^⑤.
- H. Adjust by turning joint screw^⑧ that presser foot^② becomes within 10mm than needle plate when hardly pressed the presser foot lifter pad (group) ^④.
- I. After adjustment, joint the nut^⑦ tightly.



[Fig. 7]

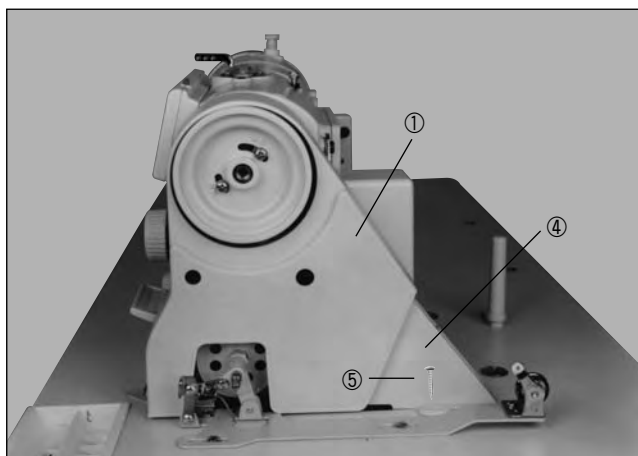
6) Belt Cover Installation

- A. After inserting belt cover A^① into sewing machine pulley^② and attach with joint screw^③ (three screws).



[Fig. 8]

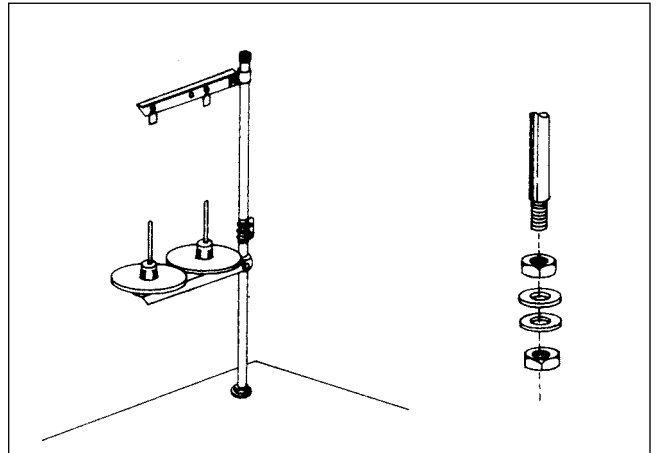
- B. Fasten the tapping screw^⑤ (two) keeping belt cover C^④ not to contact to belt cover A^①.



[Fig. 9]

7) Thread Stand Installation

Install the thread stand on the table.



[Fig. 10]

5

Preparations to use the Machine

1) How to fill lubricating oil

- Push the head backward.
- Fill lubricating oil up to the line marked "HIGH".

[Notice]

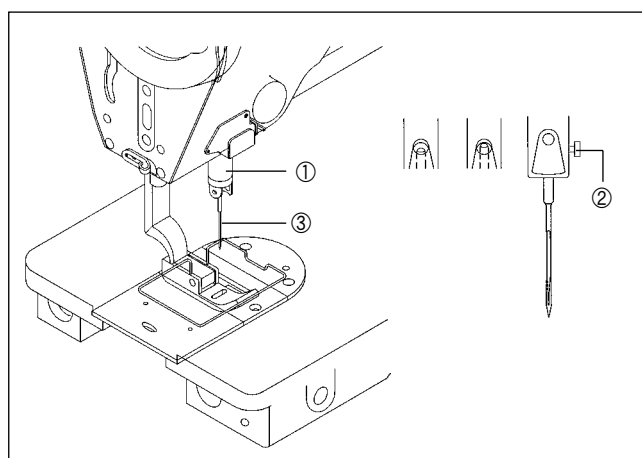
Supply the oil immediately when it gets lower to the line marked "LOW".



[Fig. 11]

2) How to set a needle

- Place the needle bar ① to the highest location by turning the sewing machine pulley.
- Unscrew the needle fixing screw ②.
- The long groove of needle ③ turning to the front, insert it until the top end of needle reaches to end of the insertion hole of the needle bar and fasten the needle fixing screw ② tightly.



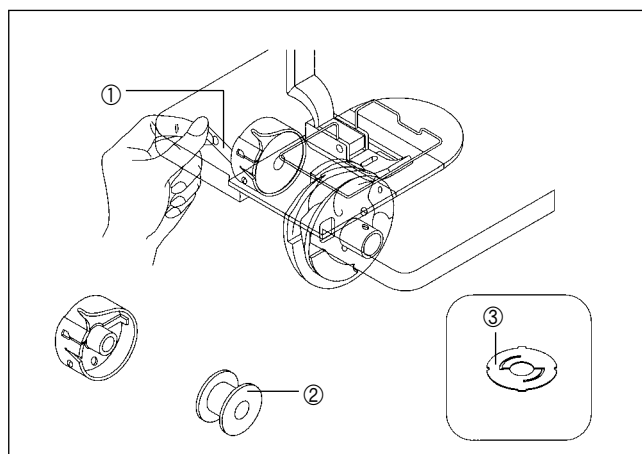
[Fig. 12]

3) How to remove Bobbin Case

- Raise the needle higher than needle plate by turning the sewing machine pulley.
- Remove the bobbin case by pulling out the guip ① of bobbin case.
- Detaching the handle ①, bobbin ② is detached.

[Notice]

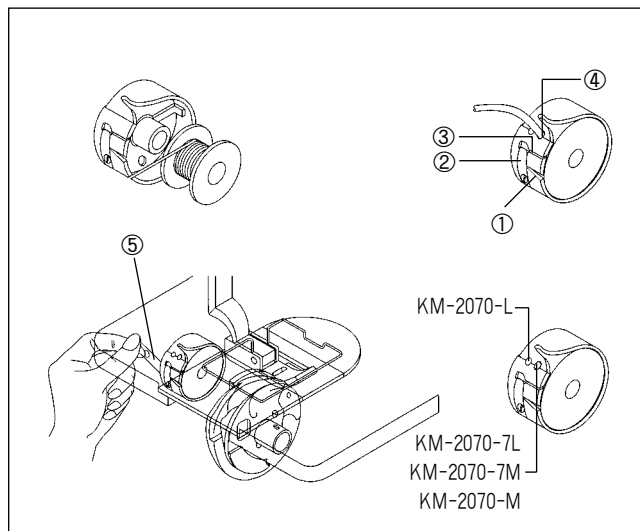
In case of thread trimming type, no-load operation prevention spring ② is attached in bobbin case in order to prevent no-load operation of bobbin.



[Fig. 13]

4) Bobbin Case Attachment Method

- A. Adjust base line of thread take-up lever to meet with U mark of faceplate by turning sewing machine pulley.
- B. Make the thread wound to left and raise the bobbin and put into the bobbin case.
- C. Make the thread go through thread groove① and pass through bottom of spring②.
- D. Make the thread go through thread groove③ once again and pull it from thread guide part④.
 - Properly select and use the thread guide part as shown in the figure according to the machine type.
- E. Confirm whether the bobbin rotate to the left upon taking out the thread.
- F. Raise the grip⑤ of bobbin case and put the bobbin case into hook.



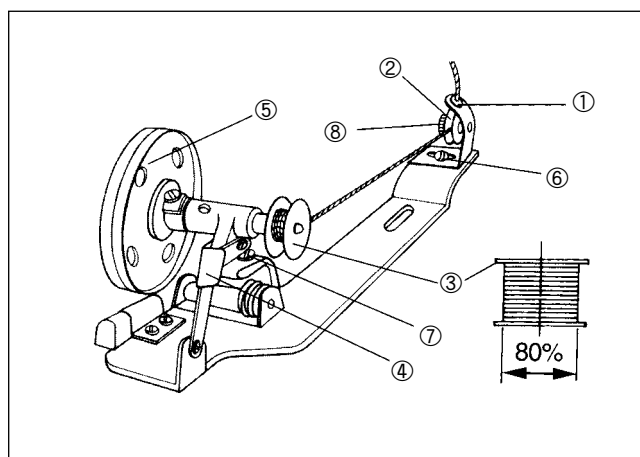
[Fig. 14]

5) How to wind lower thread

- A. Lower Thread Winding
 - a. After passing the thread through hole①, turn it from the behind of tension adjustment dish② to the front.
 - b. Bring the thread to bobbin ③ and wind 5~6 times to clockwise direction from the bottom.
 - c. Making pulley⑤to reach to V-belt by pushing lever ④ and then operate the machine.
 - d. Upon the lower thread is wound all to bobbin, the pulley automatically detaches from V-belt.
 - e. Proper amount of thread wound to bobbin is about 80%.

[Notice]

Please make the amount of thread being wound to be 80% to the maximum.



[Fig. 15]

- B. Adjustment of Lower Thread Winding
 - a. In case that the lower thread is irregularly wound, adjust by unscrewing and moving the screw⑥ to the left and right and then fasten it again.
 - b. Winding amount of the lower thread increases turning the adjustment screw⑦ to clockwise direction and decreases turning to the opposite direction.
 - c. Tension adjustment of lower thread being wound to bobbin gets strong turning the nut⑧to clockwise direction and gets weak turning to opposite direction.

6) Upper Thread Passing Method

After making base line of thread take-up lever to match with U mark on the face plate by turning the sewing machine pulley (Up stop location of need), hang the upper thread as shown in the figure.



[Fig. 16]

7) Adjusting of Stitch Number

Adjust number of stitches turning feed adjustment dial① to the left and right.

- The bigger the number is, the stitch becomes bigger.
- When turning the number of feed adjustment dial① from the big numbers to the small numbers, you can easily operate turning the feed adjustment dial① while pressing to the center of reverse lever②.



[Fig. 17]

6

Connection of Power Voltage and Control Box Cable

1) Power Voltage and Power Code Connection

A. Voltage Specification

- Match the indication of voltage to specification of power code and connect the cable.
 1. Must not use on condition that voltage specification is different.
 2. In case of change the using voltage, refer to article [Power Voltage Changing Method].
 - Single-phase connection (100V, 110V, 120V, 200V, 220V, 240V)
 - Three-phase connection (200V, 220V, 240V, 380V, 440V)

B. Power Voltage Changing Method

- In voltage of 110V series, 220V series and 380~440V specification, you can change into the voltages as follows by just changing the location of power voltage switching connector.

■ Voltage change of 110V specification

Trans former Model: KM-2070-110

Input Voltage	Location of Power Voltage Switching Connector
95V ~ 105V	JP3
106V ~ 115V	JP4
116V ~ 125V	JP5

■ Voltage change of 220V specification

Trans former Model: KM-2070-220

Input Voltage	Location of Power Voltage Switching Connector
190V ~ 210V	JP1
211V ~ 230V	JP2
231V ~ 250V	JP3

■ Voltage change of 380~440V specification

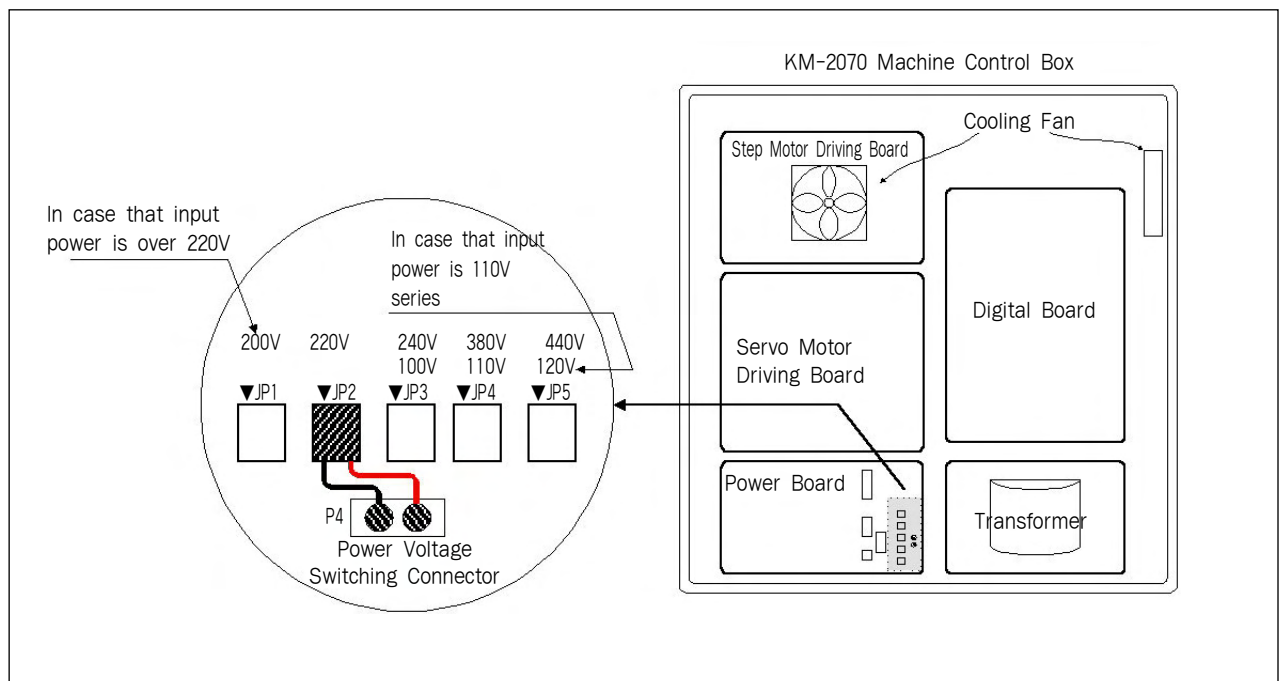
Trans former Model: KM-2070-440

Input Voltage	Location of Power Voltage Switching Connector
345V ~ 415V	JP4
416V ~ 480V	JP5



Notice

If power voltage switching connector is wrongfully set, control box can be damaged.
In case that changes voltages between the phases 110V series and 220V series and 380V~440V series transformer should replace.

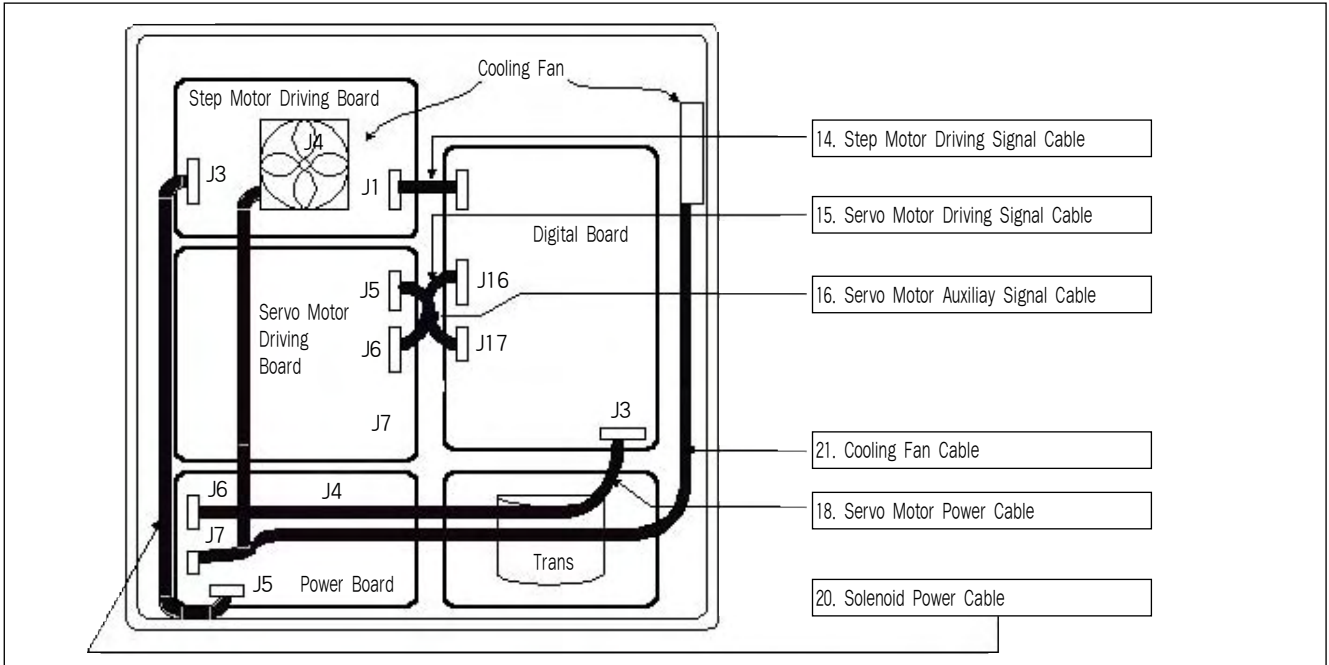


[Power Voltage Switching Connector Setting]

[Fig. 18]

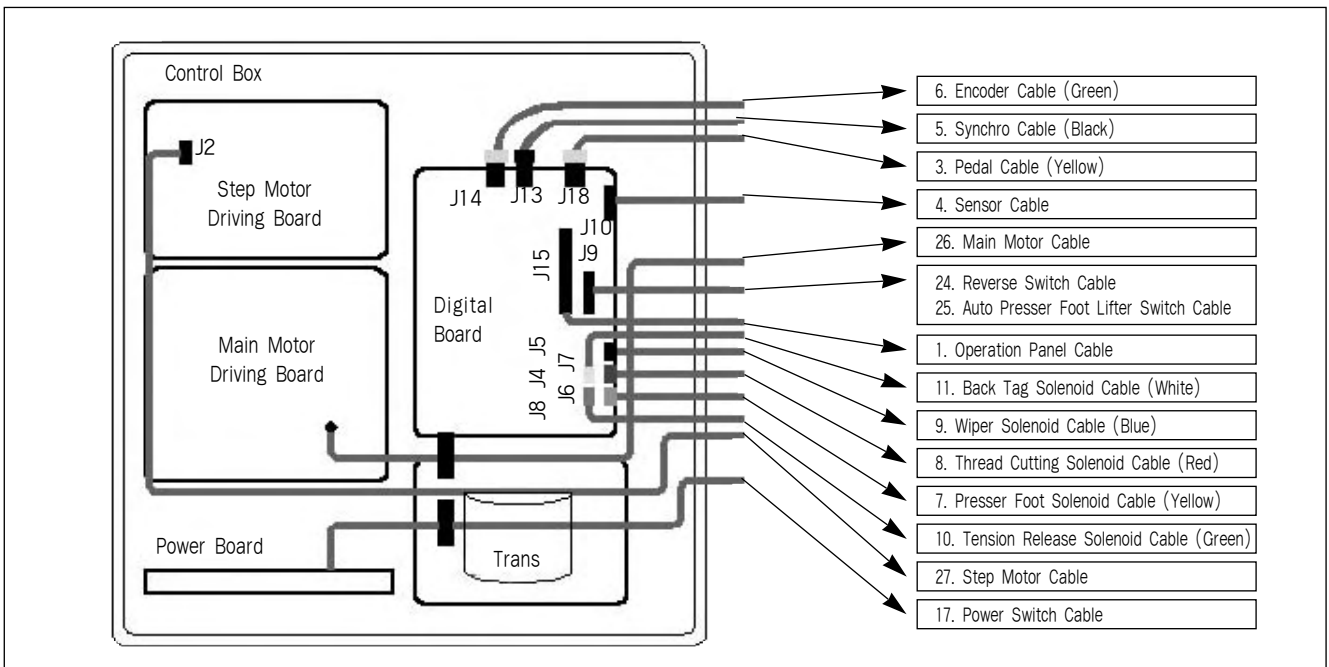
2) Cable Connection to Control Box

A. Internal Wiring of Control Box (Common in all types)



[Fig. 19]

B. External Wiring of Control Box



[Fig. 20]



Notice

See "Block Wiring Diagram".

- [Fig. 20] is wiring diagram based on KM-2070-7L and KM-2070-7M model and the wiring in case that selected knee lifter switch (including presser foot solenoid) for option.
- As KM-2070-L and KM-2070-M model are none-thread cutting type, it does not need to connect cable for thread cutting, wiper, tension release solenoid.
- Switch cable consists of two; white and blue connector(knee-lifter switch is option)
White connector: Connect reverse button (A button)
Blue connector: Connect presser foot lifter switch (connect presser foot solenoid cable as well.)
- In case of power cable connection, pay attention to fix to table that interference does not occur with belt.

3) Exchanging the fuse



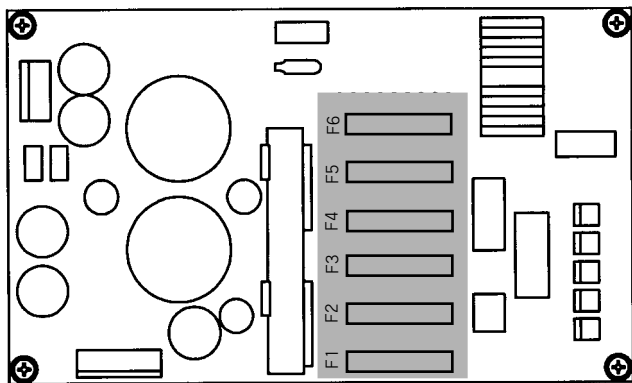
Notice

- To prevent from electric shade, trun off the power and wait 5 minutes, then open the cover.
- Be sure to turn off power and exchange into the fuse of the designated quantity after opening the cover of control box.

(1) Power board

- connection part of fure for shade part (total 6)

- Fuses are used

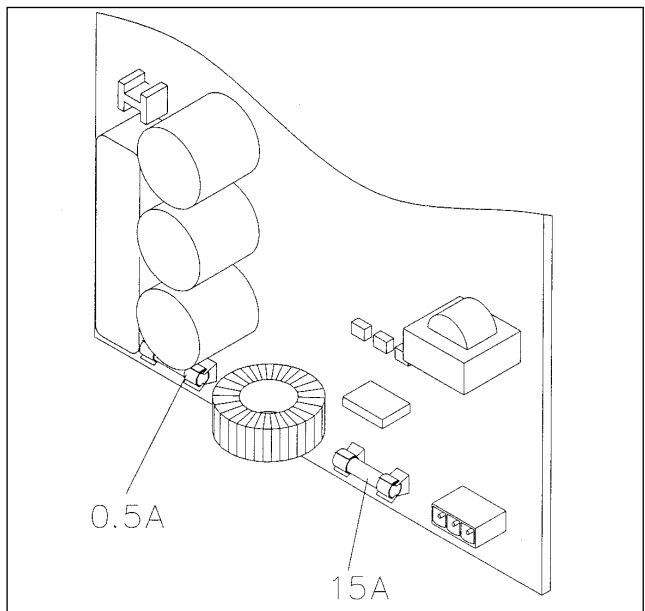


No.	Quantity	Use
F6	5A	For the protection of main power
F5	7A	For the protection of solenoid
F4	0.5A	For the protection of air valve
F3	0.5A	For the protection of cooling fan
F2	0.5A	For the protection of step motor
F1	5A	For the protection of step motor driving board control power

(2) Main motor driving board

15A : For the protection of main motor driving board power.

0.5A : For the protection of main motor driving board control power.

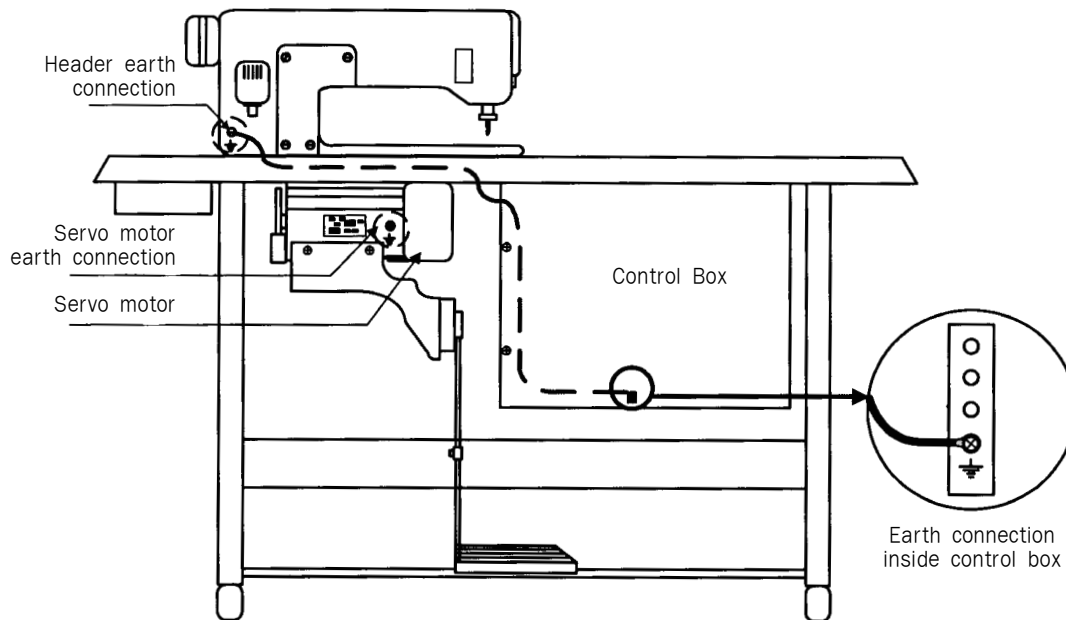


(3) Step motor driving board

8A : For the protection of step motor driving board.

4) Head earth connection

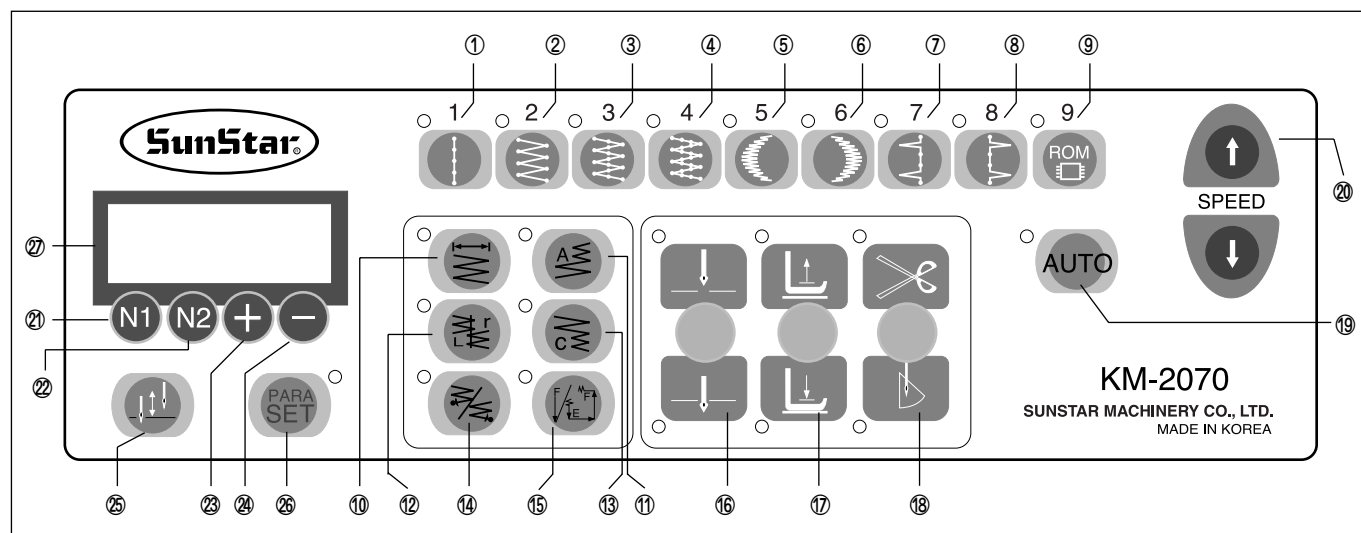
Please connect the header earth connection of KM-2070 as the following pictures.



The back of electronically zigzag M/C

Using Operation Panel and Sewing

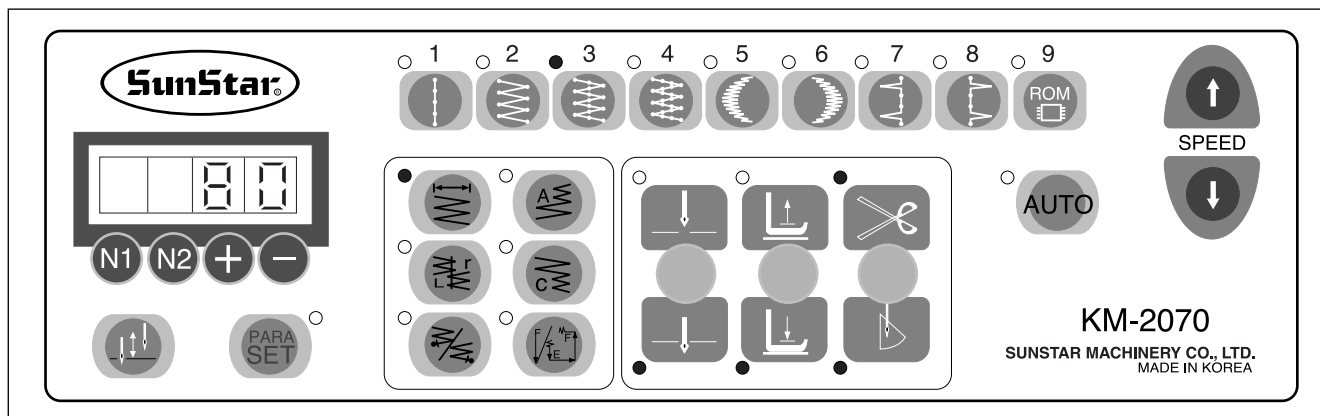
1) Operation Panel and Key Function



- | | | | |
|-----------------------------|----------------------------------|-----------------------------|---------------------|
| ① Straight Line Pattern Key | ⑧ Right-blind pattern key | ⑮ Name stitch key | ⑳ N2 key |
| ② 2 point pattern key | ⑨ ROM pattern (user pattern) key | ⑯ Needle Up/Down stop key | ㉑ + key |
| ③ 3 point pattern key | ⑩ ZigZag-width key | ⑰ Presser foot up/down key | ㉒ - key |
| ④ 4 point pattern key | ⑪ Start Condense key | ⑱ Thread trimming/wiper key | ㉓ Half-Stitch Key |
| ⑤ Left -scallop pattern key | ⑫ Base line key | ⑲ Auto key | ㉔ PARA/SET key |
| ⑥ Right-scallop pattern key | ⑬ End condense key | ㉕ Speed key | ㉖ Indication device |
| ⑦ Left-blind pattern key | ⑭ Needle Left/Right Stop key | ㉗ N1 key | ○ Indication lamp |

2) Pattern Setting Method

■ Operation Panel Indication Status



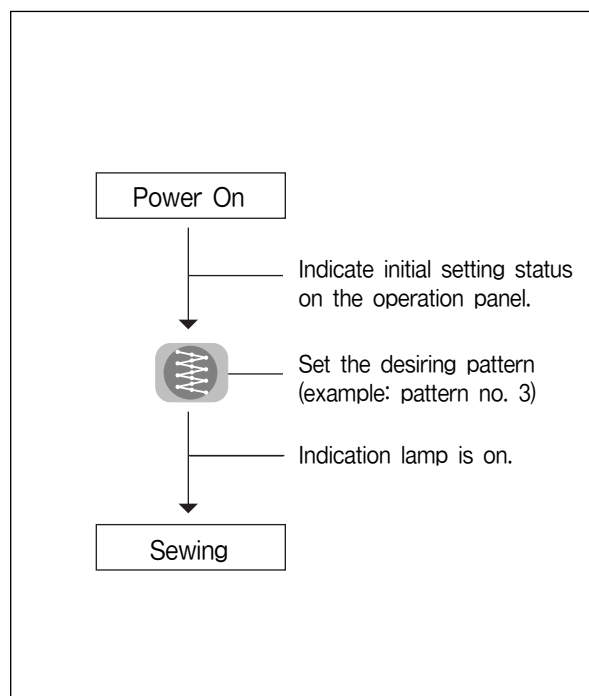
■ Operation Order

1. Turn on the power.

〈Initial Setting Status of Operation Panel〉

Indication Device (Unit: 0.1mm)	ZigZag-Width Indication (8mm)
Indication lamp of 2 point pattern	Turned On
Indication lamp of needle down stop	Turned On
Presser Foot Indication Lamp	Turned On
Thread Trimming Indication Lamp	Turned On
Wiper Indication Lamp	Turned On

2. Pressing the key of the desired pattern, the lamp of selected pattern is on.
 - Example: selection of pattern number 3 (3 point zigzag pattern)
 - See 3) for selection of left, right scallop pattern
 - See 4) for left and right blind pattern
3. Then, start sewing by stepping on the pedal.
4. Execute thread trimming by stepping back the pedal after completion of sewing.
(Thread trimming and wiper are options)

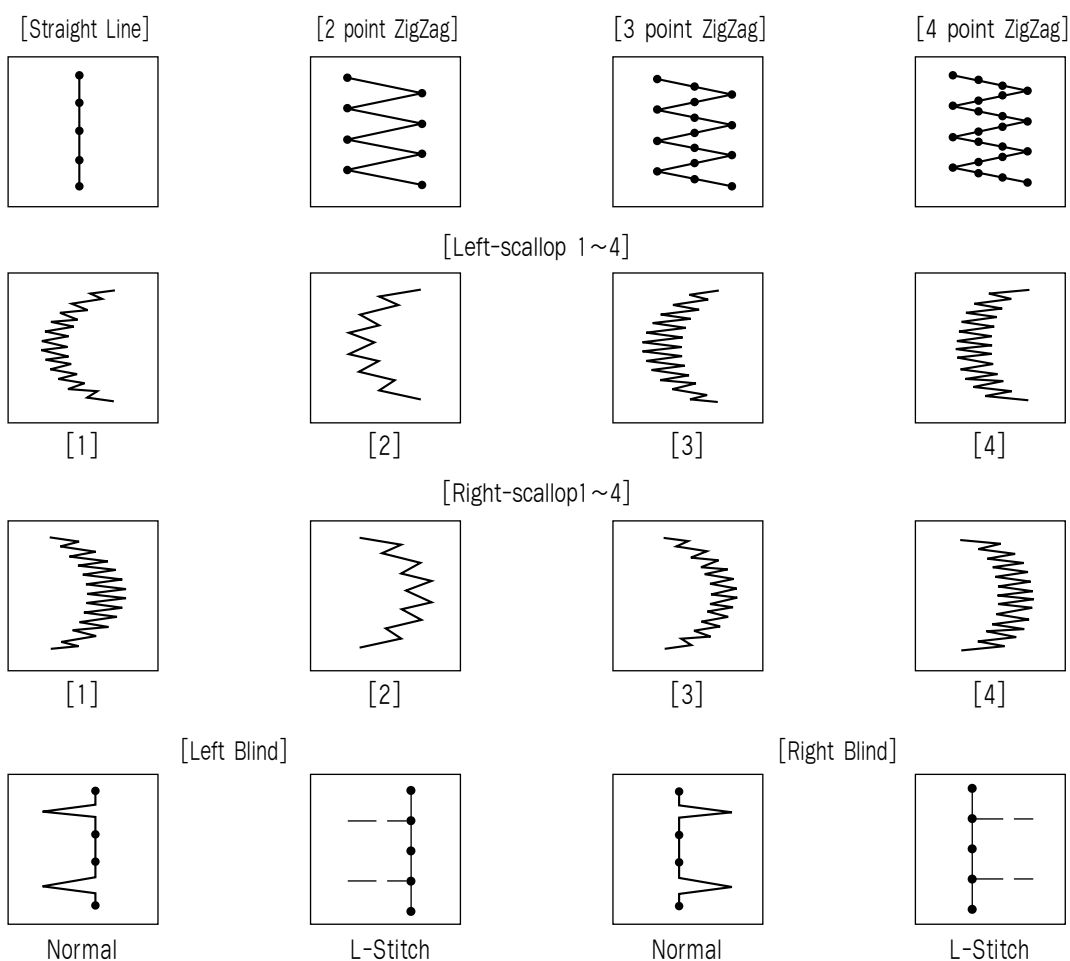


[Notice]

When the power turned on, if buzzer tone rings and $\square\square\cup\text{P}$ is displayed on indication device, it means needle bar is not on the up stop location. Therefore, turn the pulley to the front by hand that the needle bar can be at up stop location. Then, indication device discappers $\square\square\cup\text{P}$ and shows zigzag-width and you can start sewing.

■ Basic Pattern Number and Shape

Pattern No.	Pattern Name		Status of Indication Device
1	Straight Line Pattern		<input type="checkbox"/> 1 <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/>
2	2 point (standard) zigzag pattern		<input type="checkbox"/> 2 <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/>
3	3 point (2 step) zigzag pattern		<input type="checkbox"/> 3 <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/>
4	4 point (3 step) zigzag pattern		<input type="checkbox"/> 4 <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/>
5	Left Scallop pattern	1(24 Stitches)	<input type="checkbox"/> 5 <input type="checkbox"/> - <input type="checkbox"/> 1 <input type="checkbox"/>
		2(12 Stitches)	<input type="checkbox"/> 5 <input type="checkbox"/> - <input type="checkbox"/> 2 <input type="checkbox"/>
		3(24 Stitches)	<input type="checkbox"/> 5 <input type="checkbox"/> - <input type="checkbox"/> 3 <input type="checkbox"/>
		4(24 Stitches)	<input type="checkbox"/> 5 <input type="checkbox"/> - <input type="checkbox"/> 4 <input type="checkbox"/>
6	Right Scull Lap Pattern	1(24 Stitches)	<input type="checkbox"/> 6 <input type="checkbox"/> - <input type="checkbox"/> 1 <input type="checkbox"/>
		2(12 Stitches)	<input type="checkbox"/> 6 <input type="checkbox"/> - <input type="checkbox"/> 2 <input type="checkbox"/>
		3(24 Stitches)	<input type="checkbox"/> 6 <input type="checkbox"/> - <input type="checkbox"/> 3 <input type="checkbox"/>
		4(24 Stitches)	<input type="checkbox"/> 6 <input type="checkbox"/> - <input type="checkbox"/> 4 <input type="checkbox"/>
7	Left	Blind	<input type="checkbox"/> 7 <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/>
		L-Stitch	
8	Right	Blind	<input type="checkbox"/> 8 <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/>
		L-Stitch	
9	ROM Pattern (user input pattern)		<input type="checkbox"/> 9 <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/>

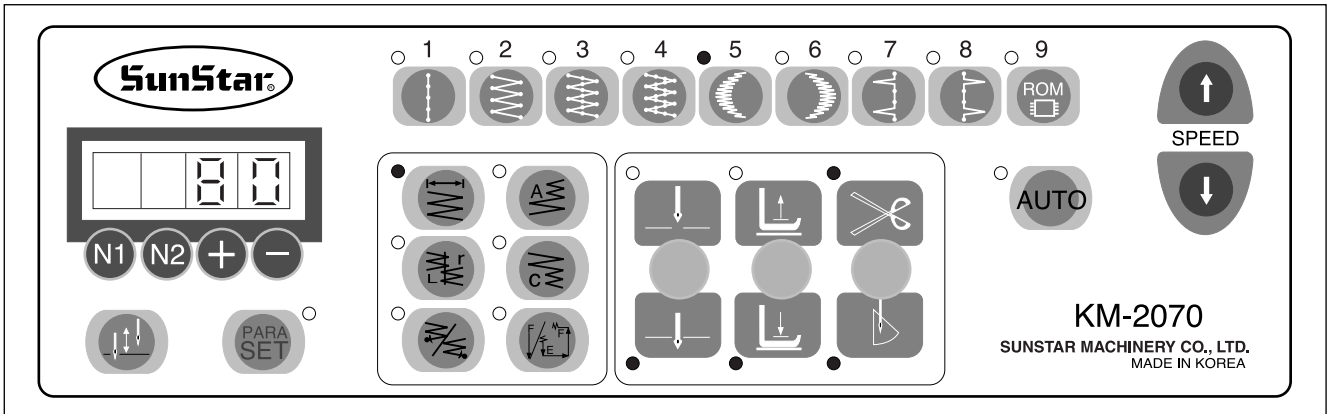


[The Shape of 16 Basic Patterns]

3) Sewing Method of Left/Right Scallop

Ex) Selection shape No. 3 of Left scallop Pattern

■ Operation Panel Indication Status

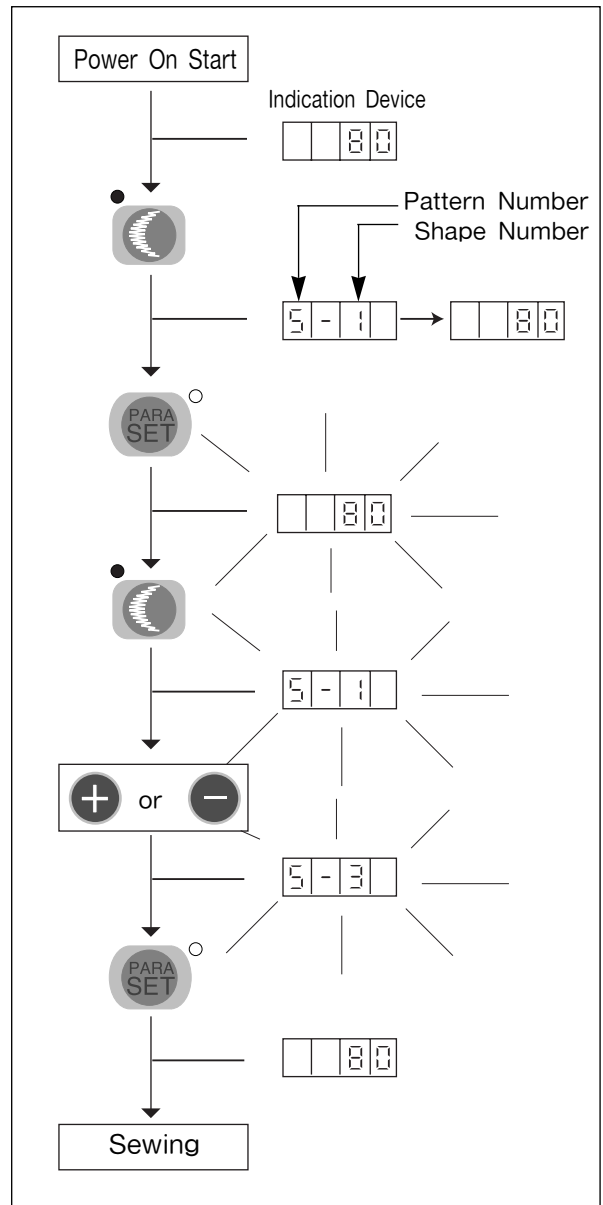


■ Operation Order

1. Press left scallop key.
 - Indication lamp of left scallop turns on. At the same time, pattern number and shape number are displayed on the indication device and after a moment, zigzag-width is displayed.
2. Press PARA/SET key in order to change the shape number.
 - ZigZag-width on indication device blinks and at the time, pressing left scallop key, pattern number and shape number are displayed on the indication device.
3. Change the shape number by using + and - key. (Ex: selection of pattern shape no. 3)
4. Press PARA/SET key when the change is completed.
 - ZigZag-width is displayed on the indication device.
5. You may start sewing by stepping on the pedal.

[Notice]

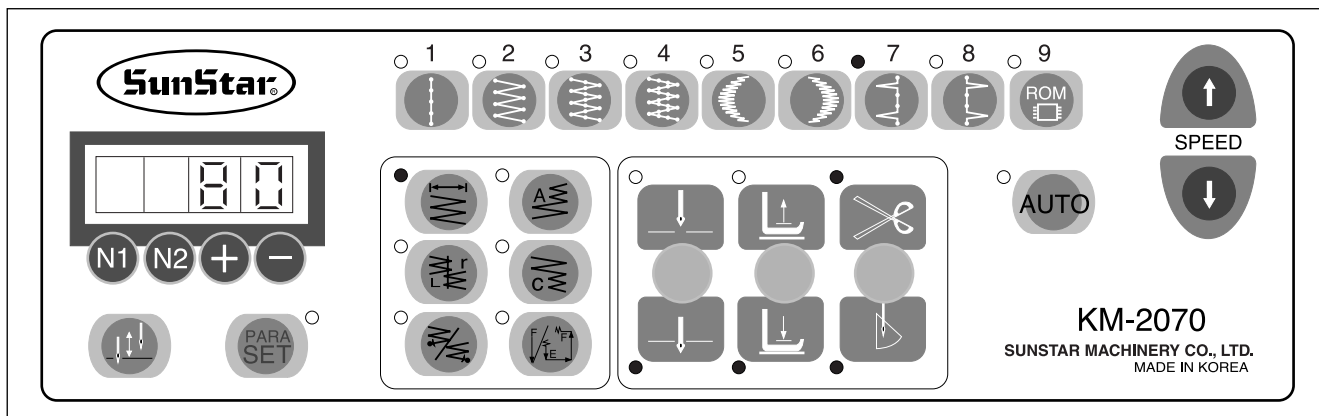
- In case of right scallop, it is the same as the operation method above.



4) Sewing Method of Left/Right Blind

Ex) 5 Stitch Setting of Left Blind

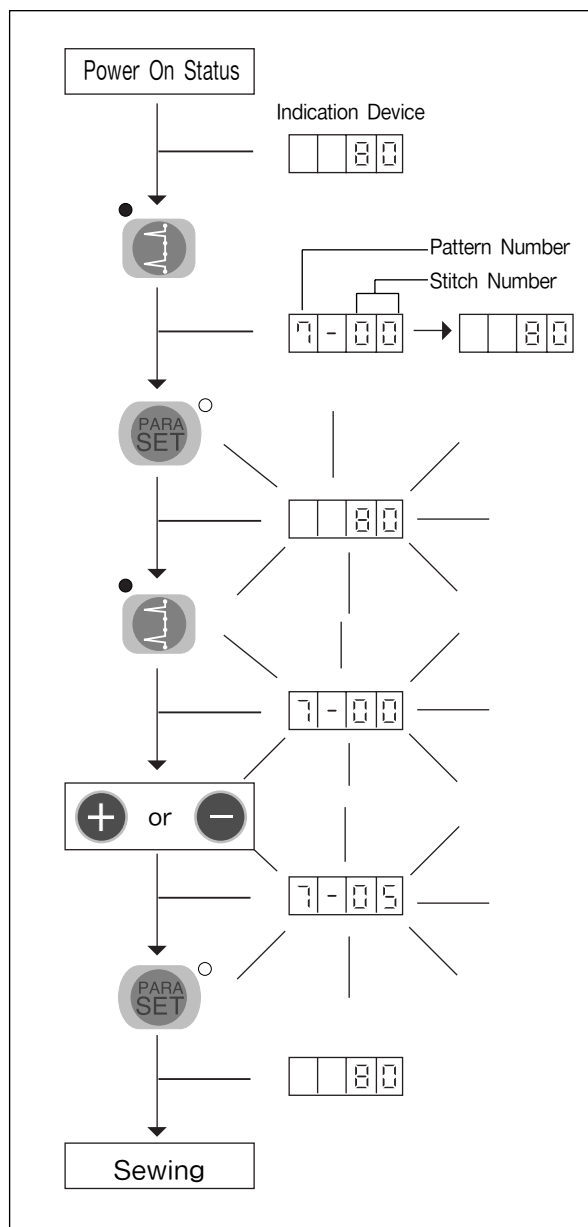
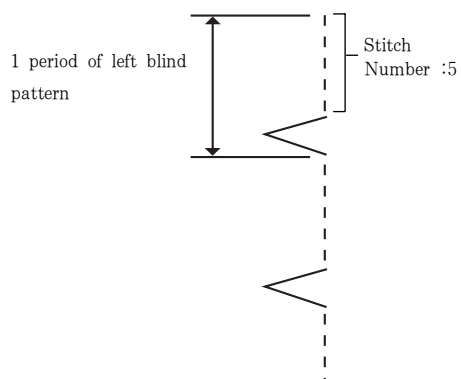
■ Indication Status of Operation Panel



■ Operation Order

1. Press left blind key.
 - Left blind indication lamp turns on and pattern number and stitch number for left blind are displayed on the indication device at the same time and after a moment, zigzag-width is indicated.
2. Press PARA/SET key to change stitch number of left blind.
 - Display of zigzag-width on indication device blinks. At this time, pressing pattern key of left blind, pattern number and stitch number are displayed.
3. Change the number of stitches by using + and - key. (Ex: 5 stitches)
Stitch scope of blind : 0~99 Stitch
4. Press PARA/SET key when the change is completed.
 - Width is displayed on the indication device.
5. You may start sewing by stepping on the pedal.

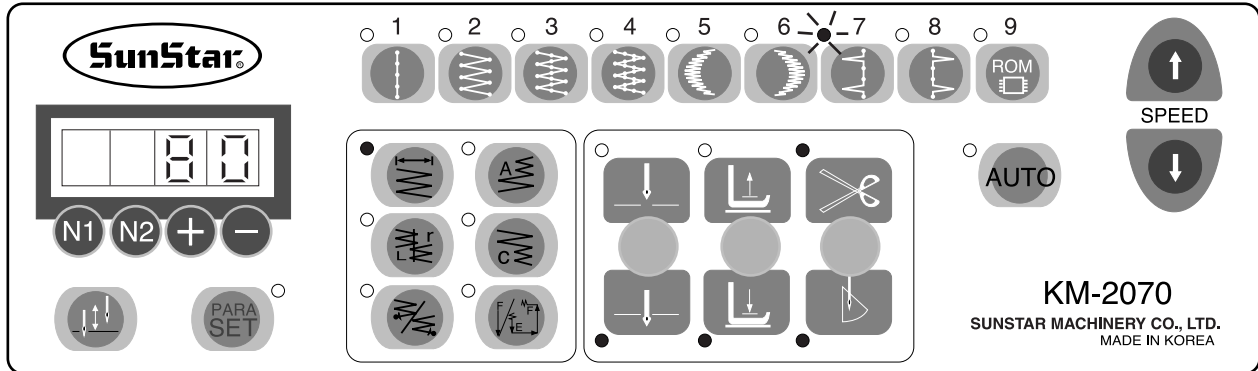
<Example of 5 stitch left blind pattern>



5) Sewing Method of Left/Right L-Stitch

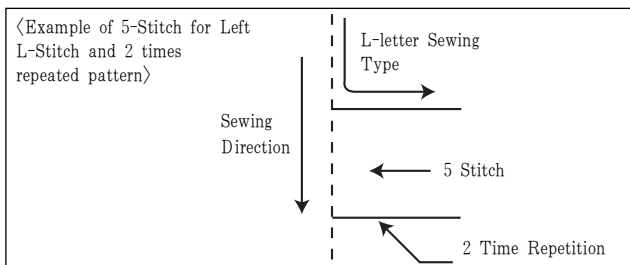
Ex) Set up five stitches for left L-stitch and repeat two times.

■ Operation Panel Indication Status



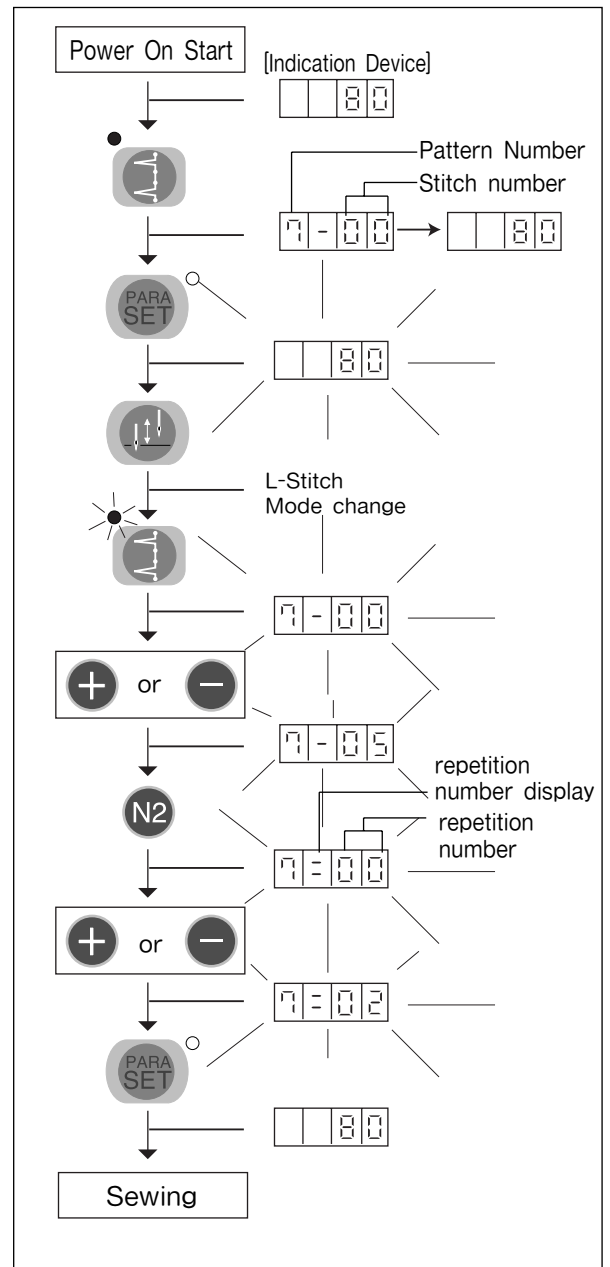
■ Operation Order

1. Press Left Blind key.
 - The left blind display lamp turns on, its pattern number and the number of stitches are displayed on the indication device, then the zigzag-width is displayed.
2. Press PARA/SET key.
 - The zigzag-width blinks on the indication device. At this time, press Pattern key of the left blind, and the pattern number and the number of stitches are displayed.
3. Press Half-Stitch key to change into L-stitch Pattern Mode.
 - The left blind display lamp continues to flicker to display that it has been changed into L-stitch Pattern Mode.
4. Use +, - key to change the repeated number of L-stitch. (Ex: five stitches)
5. Press N2 key.
 - The repeated number of L-stitch is displayed on the indication device.
6. Use +, - key to change the repeated number of L-stitch.
 - Number of Repetition : 2 times (Ex: "7=02")
7. When the change is finished, press PARA/SET key.
 - The amplitude is displayed on the indication device.
8. Press the pedal to start to sew.



[Notice]

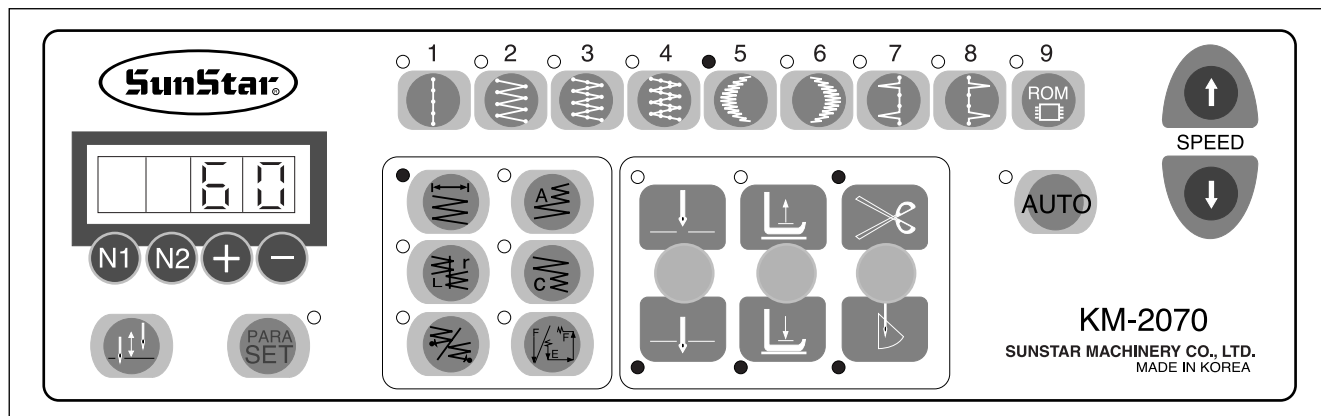
- Set up "Condenser Adjusting Dial" of the body of sewing machine to "0". (It may be a little adjusted to the direction of +/-according to sewing status.)
- According to the sewing results, properly adjust "Sewing Speed" and "Condenser Adjusting Dial".)
- **L-Stitch Pattern Sewing Speed : Max. Speed 1,000spm**



6) ZigZag-Width (Maximum Width: 10mm)

Unit) 0.1mm

■ Indication Status of Operation Panel



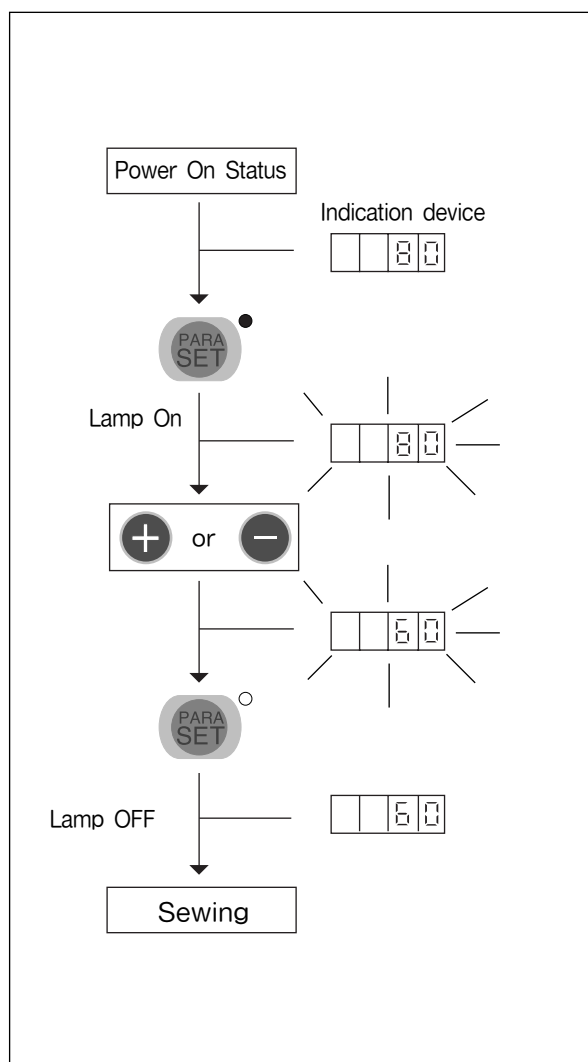
■ Operation Order

※ Status of Power On

- ZigZag-width is displayed on the indication device.
 - Select the desired pattern shape.
(Lamp of the selected pattern turns on. Ex: pattern 5) as above picture.
1. Press PARA/SET key to change zigzag-width.
 - Zigzag-width on the indication device blinks.
 - PARA/SET lamp turn on.
 2. Change size of zigzag-width by using + and - key.
 3. Press PARA/SET key when the change is completed.
 - The changed value is set.
 - The changed size of zigzag-width is displayed on the indication device.
(ZigZag-width is not blinking)
 - PARA/SET indication lamp turns off.
 4. Start sewing by pedaling forward.

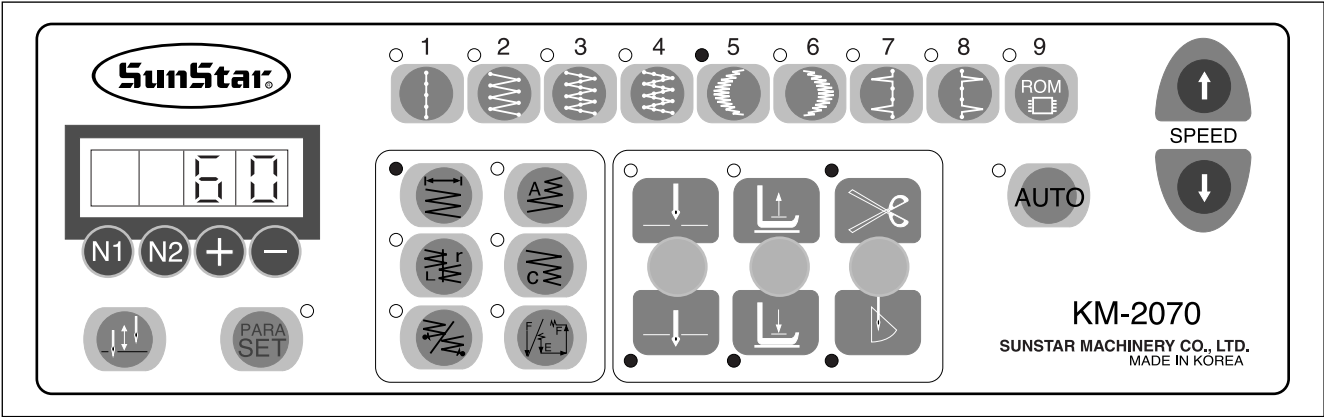
[Notice]

- Width of straight-line pattern (pattern number: 1) is always '0'.
- Maximum zigzag width is set to 8mm at the moment of shipping. When using zigzag-width 10mm, change it into "100" on "A-06" at "Parameter changing method and classification" on page 72 and use as well as 10mm.
- Gauge: stopper, needle plate, presser foot, feed dog.



7) Sewing Speed

■ Indication Status of Operation Panel



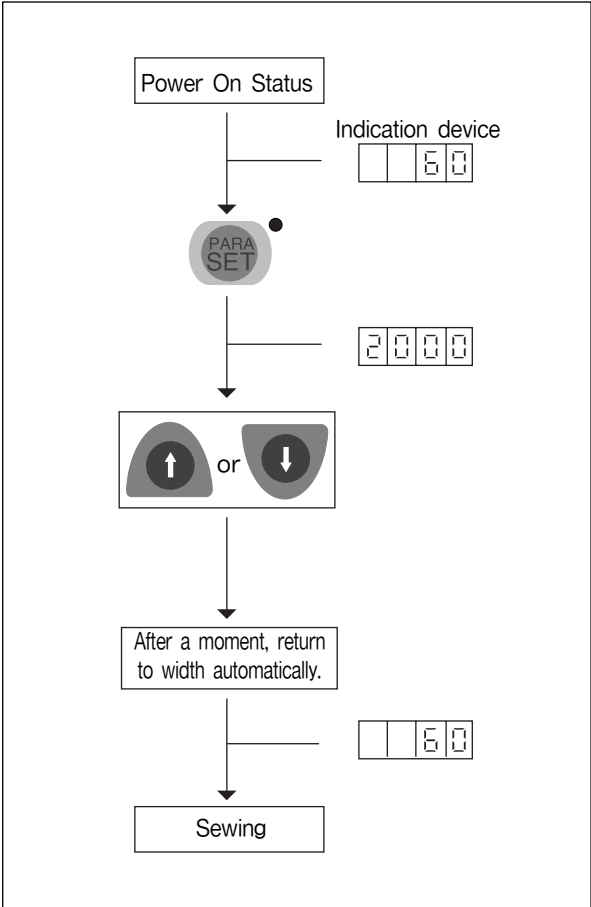
■ Operation Order

- Press speed increase key (arrow direction is up) in order to increase the speed and press speed decrease key (arrow direction is down) in order to decrease the speed.
- The changed speed is on the monitor and then automatically number of with appears.

[Notice]

Speed limit by ZigZag-Width

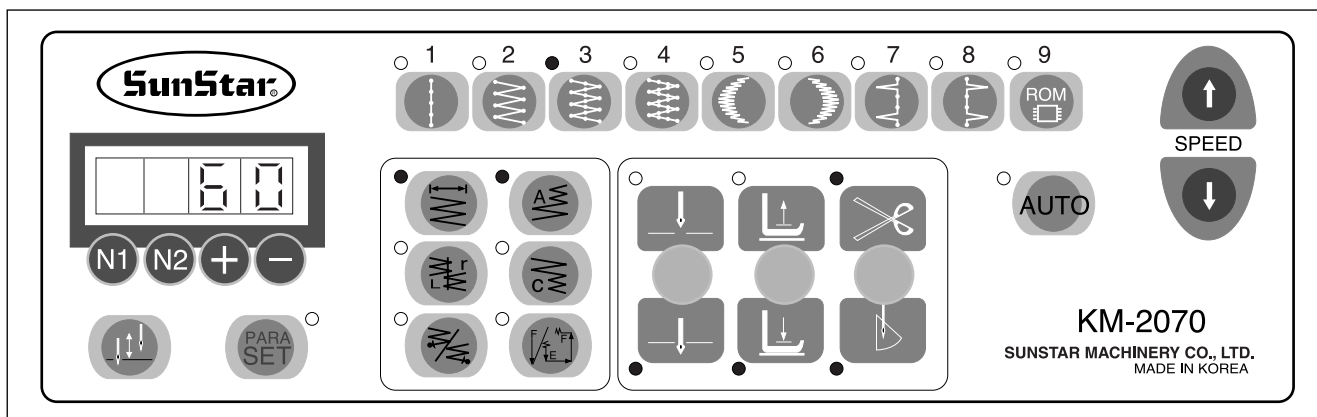
		Speed
ZigZag Width	0.0mm ~ 3.0mm	5000 spm
	3.1mm ~ 4.0mm	4500 spm
	4.1mm ~ 5.0mm	4000 spm
	5.1mm ~ 6.0mm	3500 spm
	6.1mm ~ 8.0mm	3000 spm



8) Using method of start condense

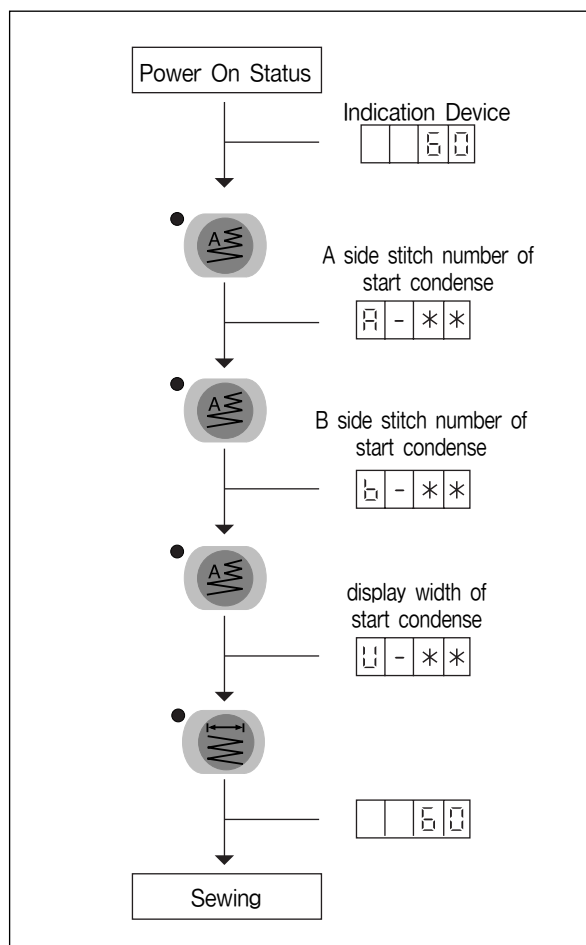
Ex) It is the example of pattern 3 with zigzag-width of 6mm.

■ Indication status of Operation Panel



■ Operation Order

1. Press start condense key on condition that power is on.
 - Lamp of start condense turns on, and A side stitch number of start condense is displayed on the indication device.
 - A side stitch number scope: 0 ~ 99 stitch.
2. Press start condense key once again.
 - B side stitch number of start condense is displayed on the indication device.
 - A side stitch number scope: 0 ~ 99 stitch.
3. Press start condense key once again, then width of start condense is displayed on the indication device.
 - Scope: 0 ~ 8.0mm
4. Press zigzag-width key.
 - ZigZag-width is displayed on the indication device.
5. Start sewing by pedaling forward.
 - Execute the set start condense, and start sewing the pattern shape.
6. Execute thread trimming by stepping back the pedal when the sewing is completed.

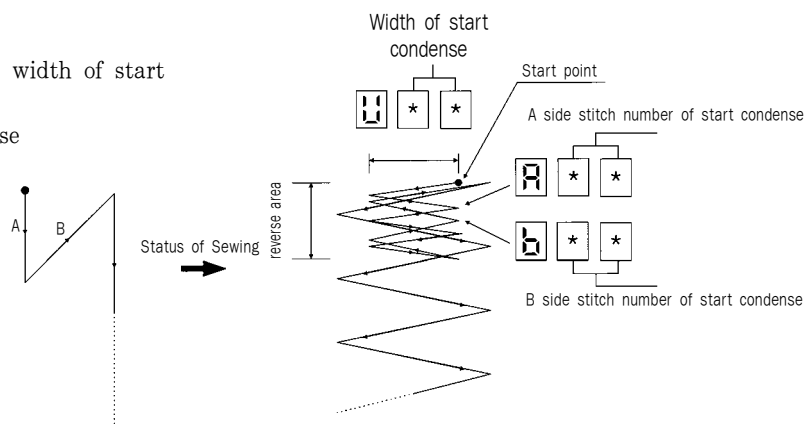


[Notice]

- If you turn on the indication lamp of start condense by pressing start condense key, sewing is possible on that condition as well.
- If you pressed start condense then uses to see the setting status of start condense.
- Adjustment of stitch width (see "20 using reverse feed control lever and reverse button (A button)")
 - A, D side stitch width : setting to feed adjustment dial
 - B, C side stitch width : setting to condense adjustment dial.

■ Changing stitch number and width of start condense

Sewing type of start condense



■ Operation order.

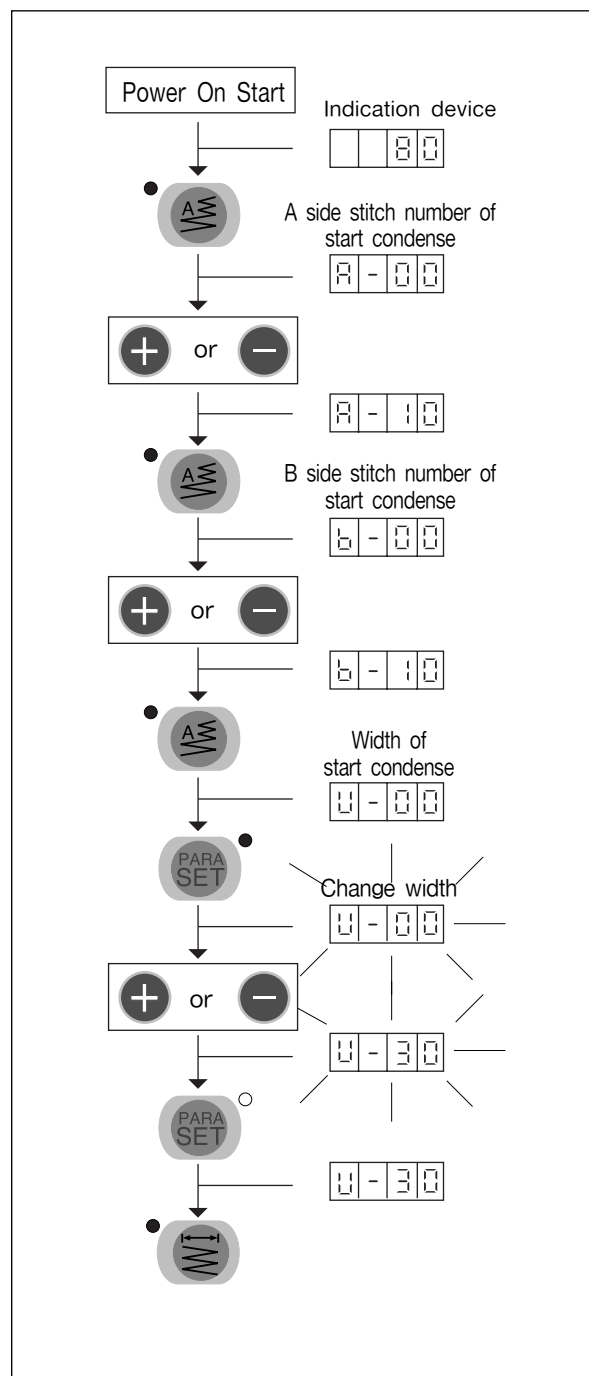
1. Press start condense key on condition that power is on.
 - Indication lamp of start condense turns on and A side stitch number of start condense is displayed on the indication device.
2. Change the number of stitch by using + and - key. (Ex : 10 stitches)
3. Press start condense key once again.
 - B side stitch number of start condense is displayed on the indication device.
4. Change the number of stitches by using + and - key. (Ex : 10 Stitches)
5. Press start condense key again.
 - Width U is displayed on the indication device.
6. Press PARA/SET key to change width of start condense.
 - Indication PARA/SET lamp turn on and indication device blinks at the same time.
7. Change the width by using + and - key (Ex : 3mm)
8. Set the changed value by pressing PARA/SET key.
 - Width is displayed on the indication device.
9. Press ZigZag-width key.
 - ZigZag width is displayed on the indication device
10. Start sewing by pedaling forward.

[Notice]

A,B side stitch number of start condense: 0~99[stitch]
Width of start condense: 0~8[mm]

[Notice]

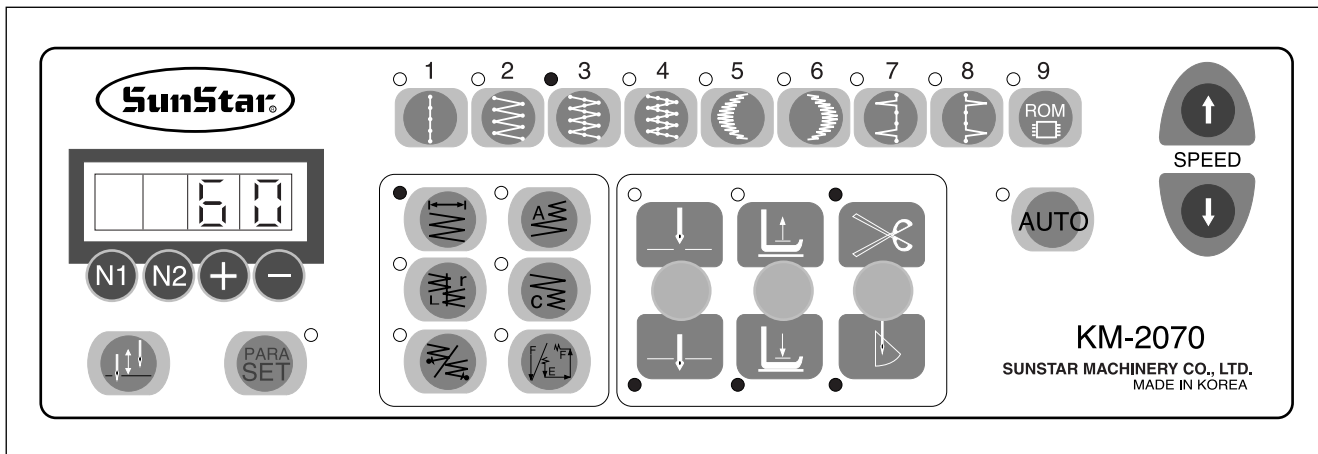
Start speed of start condense is 1200spm (in case of sew-speed is above 1200spm) and execute the set sew-speed in case of sew-speed is below 1200 spm. Press the Condenser Start key four times to cancel the command of Condenser Start. The lamp will be turned off, and the command will be cancelled.



9) Using Method of End Condense

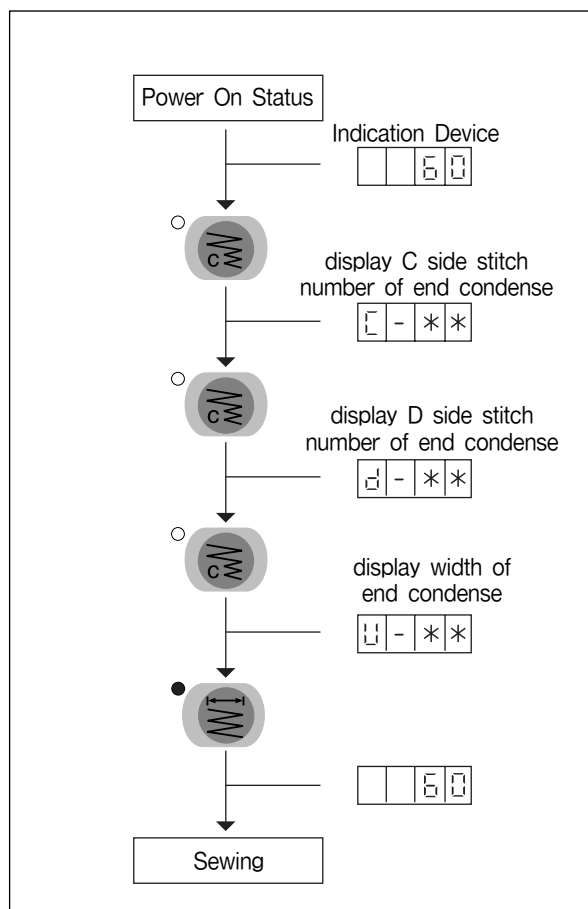
Ex) It is the example of pattern 3 with ZigZag-width of 6mm.

■ Indication Status of Operation Panel



■ Operation Order

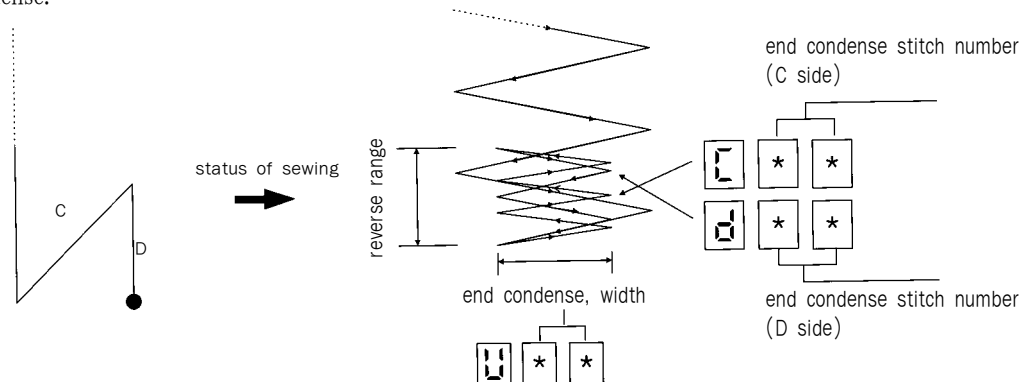
1. Press end condense key on condition that power is on.
 - Indication lamp of end condense turns on and C side stitch number of end condense is displayed on the indication device.
 - C side stitch number scope: 0~99 stitch
2. Press end condense key once again.
 - D side stitch of end condense is displayed on the indication device.
 - D side stitch number scope: 0~99 stitch
3. Press end condense key once again, then width of end condense is displayed on the indication device.
 - Scope: 0~8.0mm
4. Press ZigZag-width key.
 - Width is displayed on the indication device.
5. Start sewing by pedaling front.
6. Execute thread trimming by pedaling back when the sewing is completed.
 - Then end condense executed before thread trimming



[Notice]

- If you turn on the indication lamp of end condense by pressing end condense key, sewing is possible on that condition as well.
- If you pressed end condense then uses to see the setting status of end condense.
- Adjustment of stitch width (see "20 using reverse feed control lever and reverse button (A button)")
 - A, D side stitch width : setting to feed adjustment dial
 - B, C side stitch width : setting to condense adjustment dial.

- Changing stitch number and width of end condense.
Sewing type of end condense.



■ Operation Order

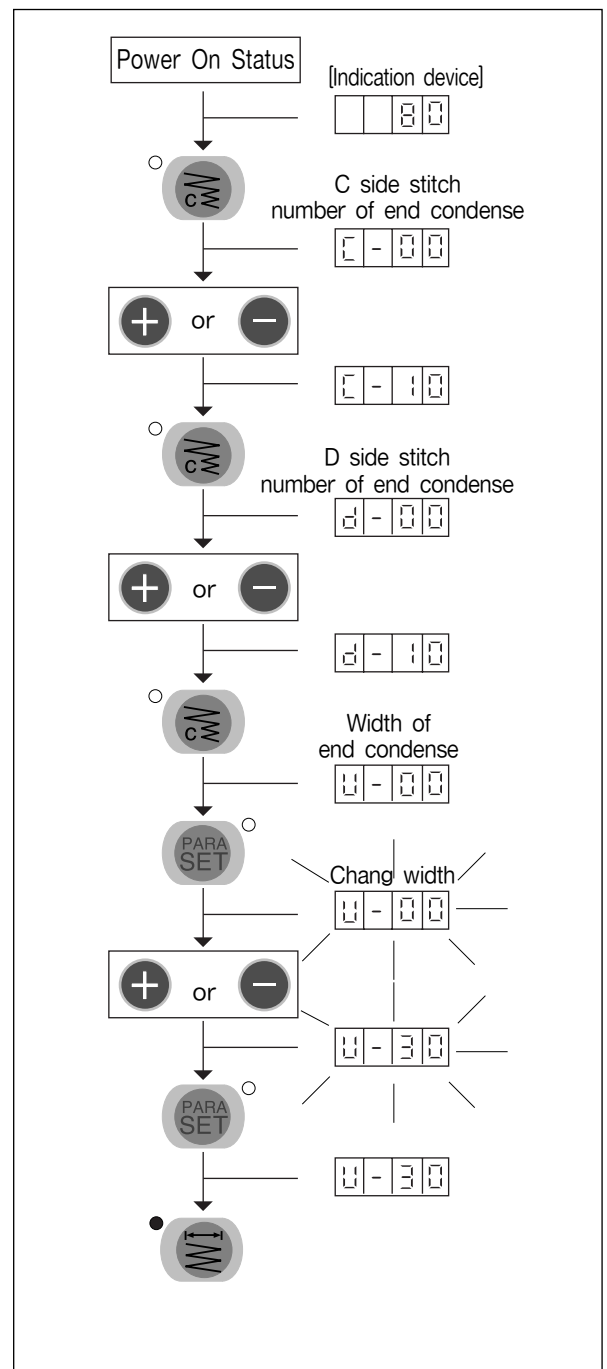
1. Press end condense key on condition that power is on.
• Indication lamp of end condense turns on and C side stitch number of end condense is displayed on the indication device.
2. Change the number of stitch by using + and - key.
(Ex : 10 stitches)
3. Press end condense key once again.
D side stitch number of end condense is displayed on the indication device.
4. Change the number of stitches by using + and - key
(Ex : 10 Stitches)
5. Press end condense Key again.
• Width U is displayed on the indication device.
6. Press PARA/SET key to change width of end condense.
• Indication PARA/SET lamp turn on and indication device blinks at the same time.
7. Change the width by using + and - key (Ex : 3mm)
8. Set the changed value by pressing PARA/SET key.
• Width is displayed on the indication device.
9. Press ZigZag-width key.
10. Start sewing by pedaling forward.
11. Execute thread trimming by pedaling back when the sewing is completed, then end condense executed before thread trimming.

[Notice]

End condense stitch (Stitch number): 0~99[stitch]
End condense width (width): 0~8[mm]

[Notice]

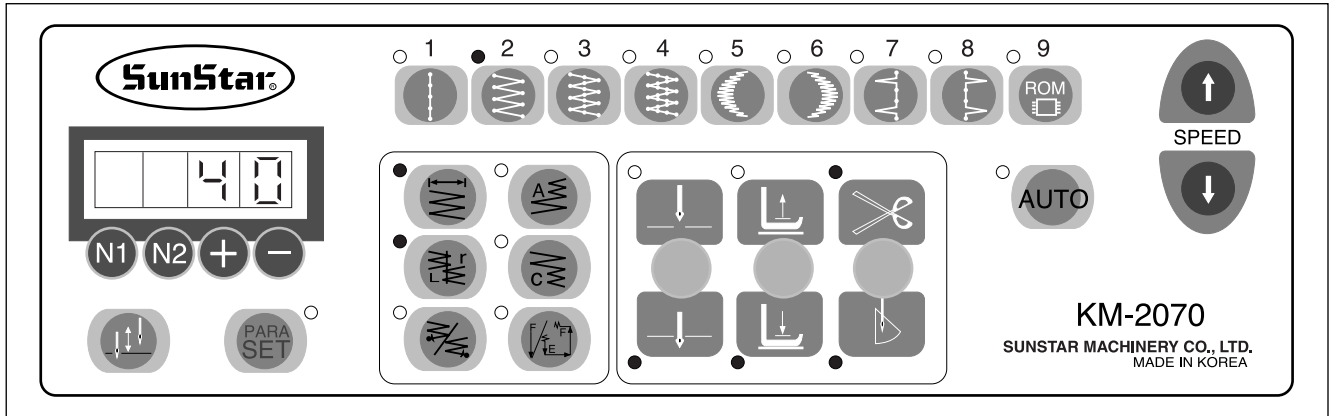
Start speed of end condense is 1200spm (In case of sewing speed is above 1200spm) and execute the set sewing in case of sewing is 1200spm. Press the Condenser Stop key four times to cancel the command of Condenser Stop. The lamp will be turned off, and the command will be cancelled.



10) Location of Base Line

Location of base line is set to '0' at the moment of shipping from factory. Location of base line can be set up to 4[mm] in the left and right from on the origin.

■ Indication Status of Operation Panel



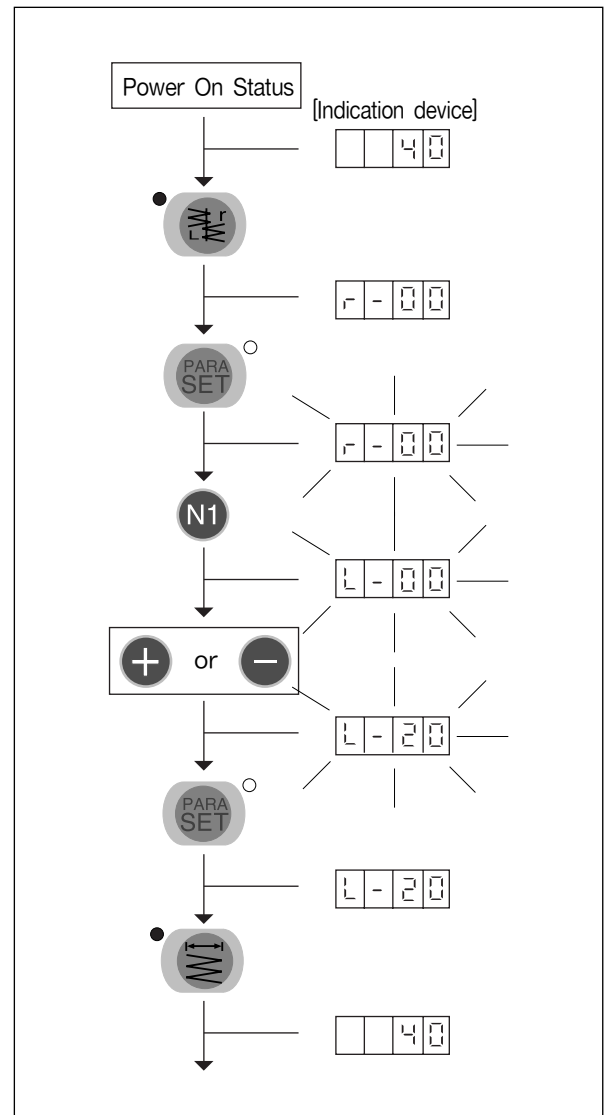
■ Operation Order

Ex) Pattern is set to point zigzag pattern (pattern number 2) and width is set to 4[mm] in advance.

1. Press base line key.
 - Location of base line is displayed on the indication device.
 - Initial location of base line is set to "r-00".
2. Press PARA/SET key.
 - The indication device blinks.
3. Decide left and right by pressing N1 key. (Ex: L-00)
4. Change the location by using + and -key. (Ex: L-20)
5. Set the changed value by pressing PARA/SET key.
 - The changed location of base line is displayed on the indication device.
6. Press ZigZag-width key.
 - ZigZag-width is displayed on the indication device.
7. Start sewing by pedaling forward.

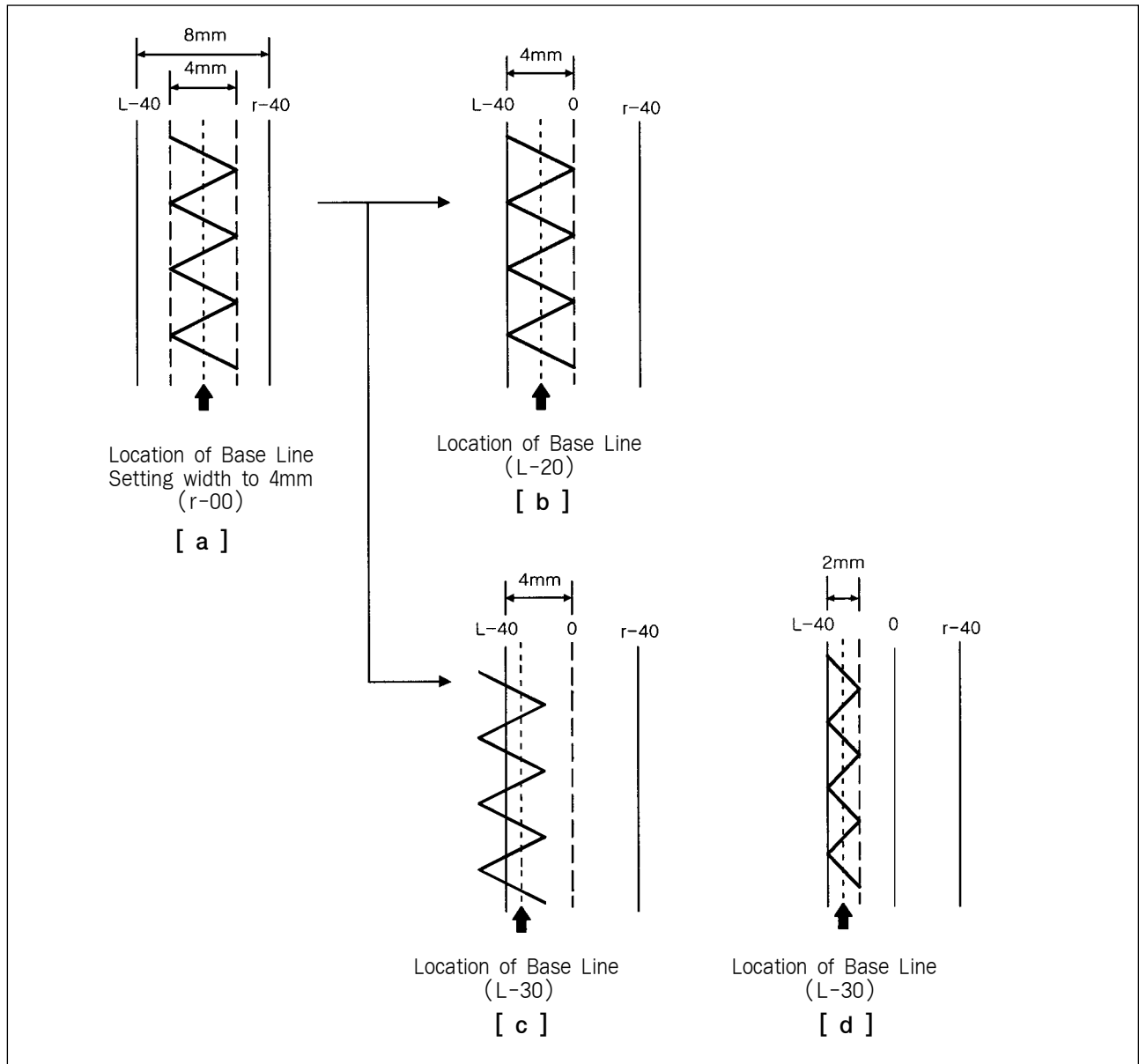
[Notice]

To delete existing baseline information for initialization, set the left and right baselines at "0".



■ Considerations to set location of base line

- In the sewing pattern as [a], moving the location of base line 2mm (L-20) to the left, it is sewn as shown in the figure [b].
- When moving location of base line 3mm (L-30) to the left and setting width of 4mm, due to exceeds the sewing range as shown in the figure [c], so zigzag width is automatically set to the maximum range not exceeding the range and sewing is done such.
- Yet, setting width of 2mm in this condition, sewing is done as figure [d].

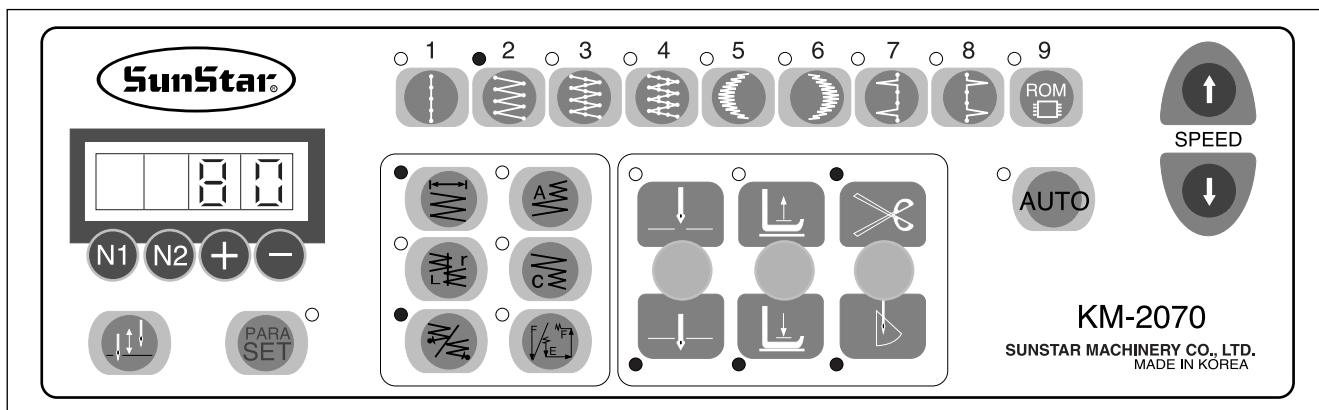


Example of Base Line Setting

[Fig. 7-1]

11) Left/Right Stop Location of Needle

■ Indication Status of Operation Panel



- Operation Order

※ It is the example by 2point pattern(standard zigzag, pattern number 2), width of 8[mm].

1. Press Needle Left/Right stop key on condition that power is on.
 - Left/Right stop location is displayed on the indication device.

2. Press PARA/SET key.
 - The indication device blinks.

3. Decide left/right stop location.
- N1 Key: Left stop
Indication device :

≡	-	-	-
---	---	---	---
 - - Key: Right stop
Indication device :

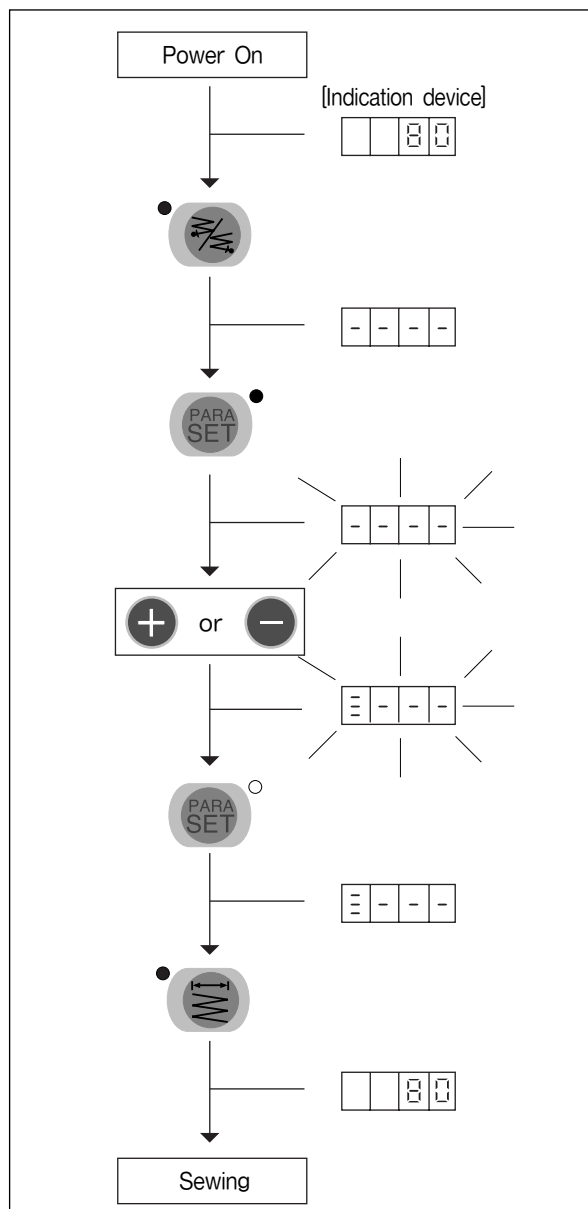
-	-	-	≡
---	---	---	---
 - N2 Key: No stop location
Indication device :

-	-	-	-
---	---	---	---

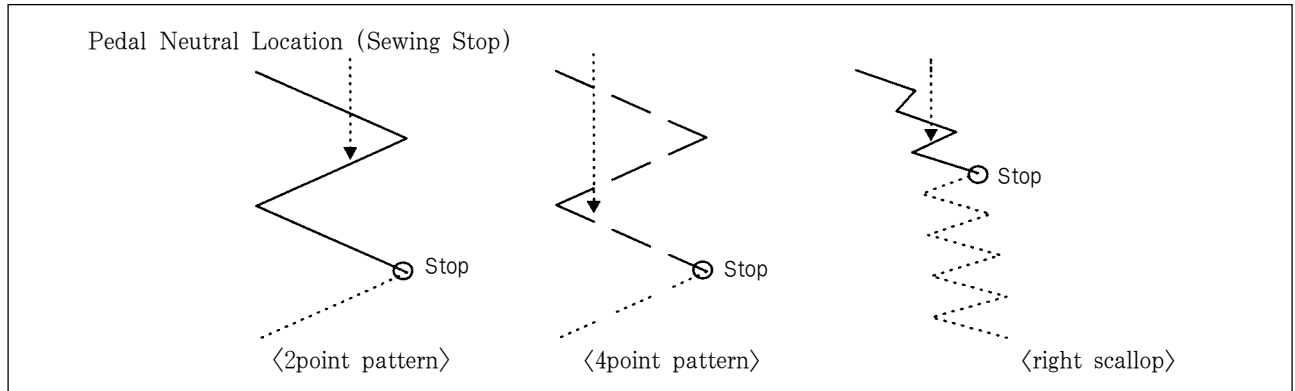
4. Set the changed value by pressing PARA/SET key.
 - The changed stop location is displayed on the indication device.

5. Press width key.
 - ZigZag-width is displayed on the indication device.

6. Start sewing by pedaling forward.



Ex) In case of right stop setting



Example of Needle Right Stop Setting

[Fig. 7-2]

[Notice]

- Unless set the left/right stop location of needle, it can stop anywhere.
- In case of straight-line pattern and blind pattern, left/right stop location of needle is not reflected.
- Setting left or right stop, though step the pedal to neutral or pedal while sewing, the sewing will continue to the designated location.
- In case of left stop, the machine moves to the maximum left stitch and in case of right stop, it moves to the right stitch.
- In scallop, in case of right stop, the machine moves to the next right stitch and in case of left stop, it moves to the next left stitch.

<Sewing Start Location>

- In case of right stop setting, start from the right and in case of left stop setting and start sewing from the left.
- In case needle down stop, exchange the sewing material by making the needle to move to needle up stop by pedaling backward and start sewing. Then, it starts at the very location.
- In scallop, start sewing from the right in case of left scallop and in case of right scallop, it starts from the left (the top of the shape).
- In case of no setting of left/right stop location of needle, sewing starts from the left in case of 2point, 3point and 4point pattern.

[Notice]

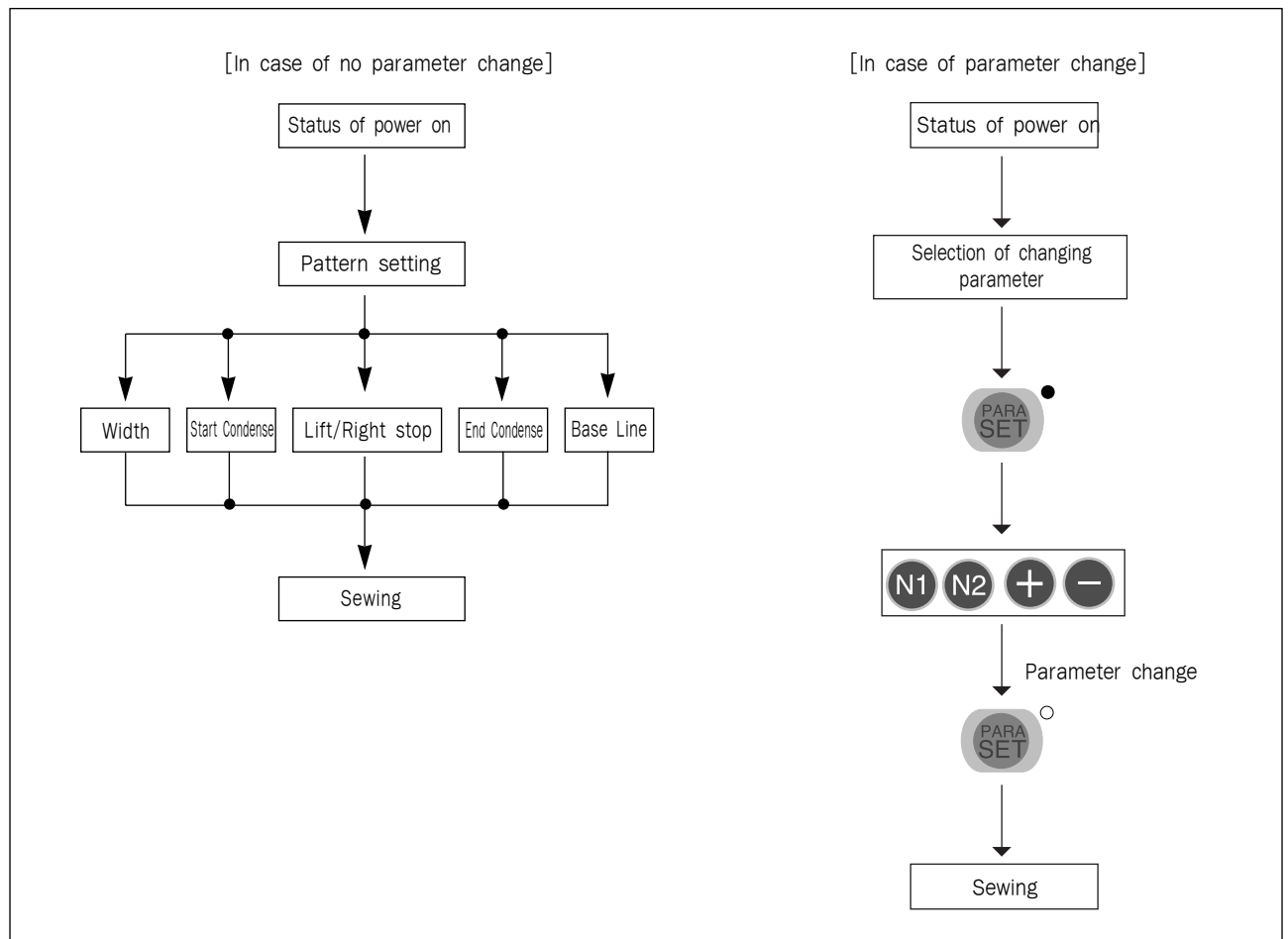
When moving the needle to the needle up stop location, do not move by turning the Half-stitch key or sewing machine pulley by hands. Then, sewing start from left/right stop location of needle becomes invalid.

12) Up/Down Stop of Needle

This setting is used to check location of sewing material correctly or it is usefully used for reverse function (mirror) and name stitch sewing.

- Setting method is to turn on the indication lamp of down stop by pressing up/down stop key of needle. It is selected to initial value of down stop.
- In case of up stop, you can just press down stop key once again.

13) Basic Concept for Operation of Operation Panel



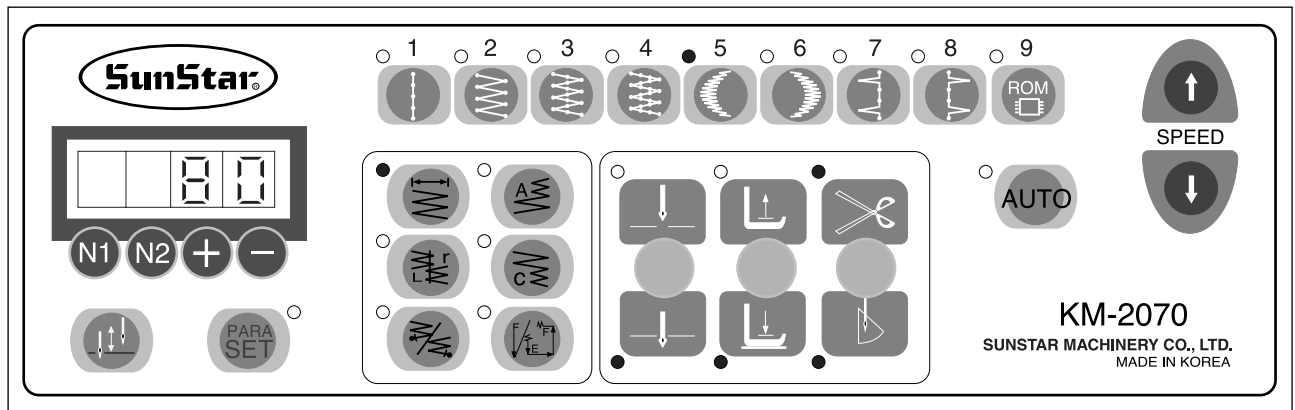
Basic concept of panel operation

[Fig. 7-3]

- Use PARA/SET key in order to change the selected parameters (width, base line location, left/right stop location, etc.)
(See the operation order in case of [parameter change])
- In order to use the set value in advance, turn on the indication lamp by selecting the desired key and start sewing. (Operation order in case of [no parameter change])

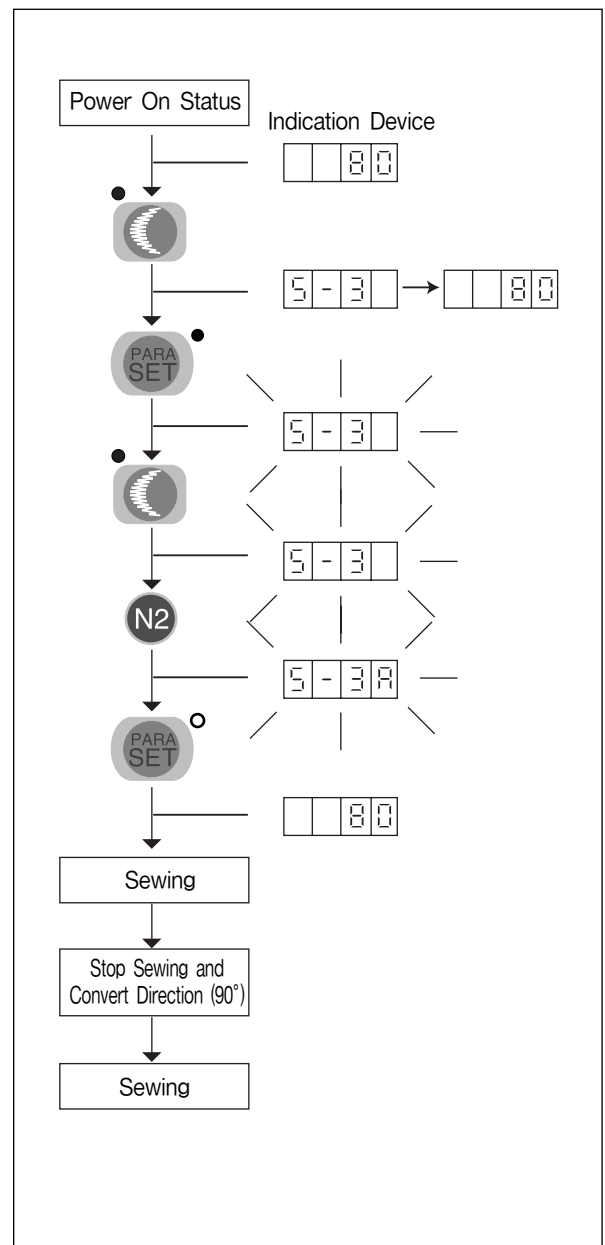
14) Reverse (mirror) Function

■ Indication Status of Operation Panel

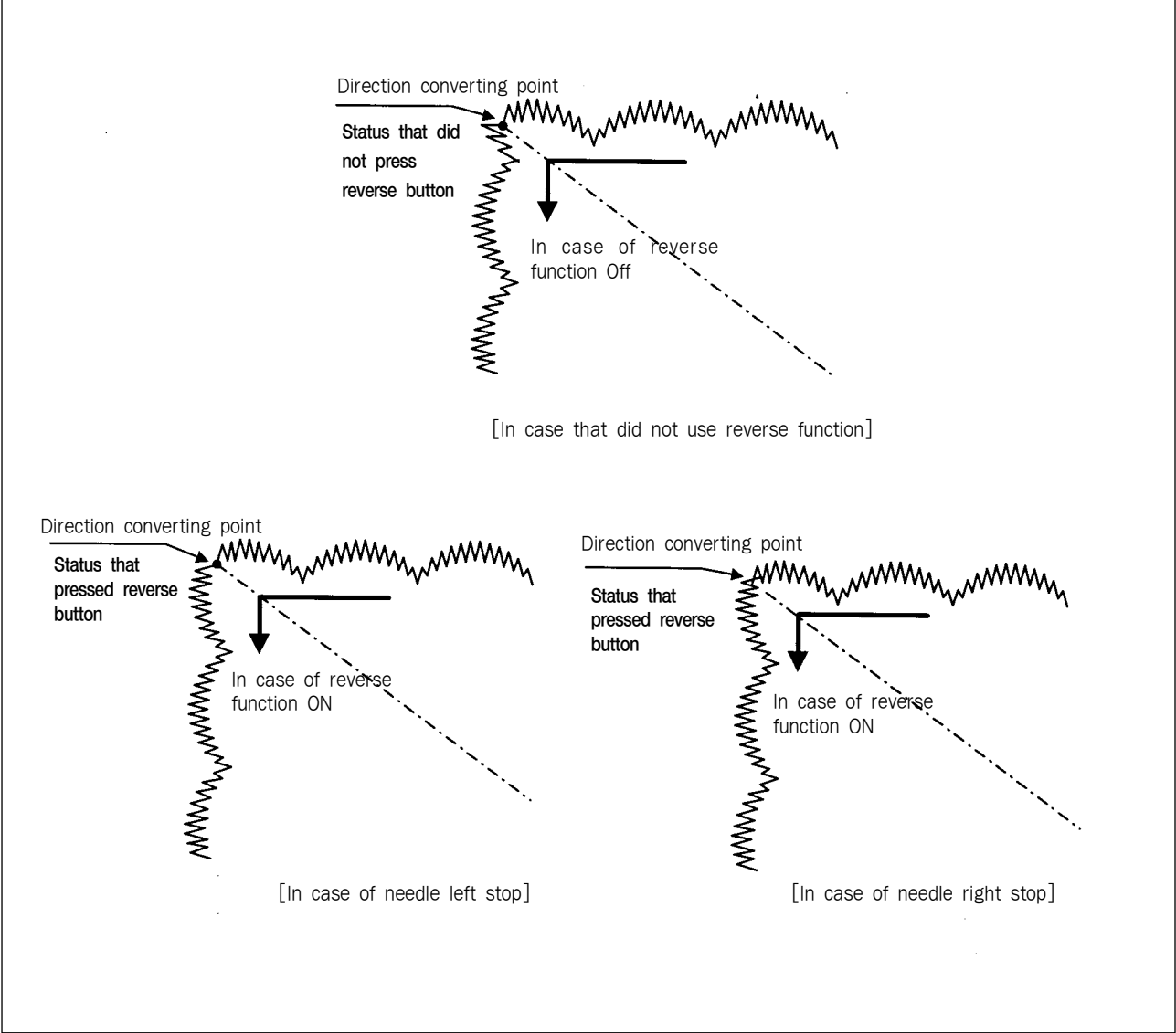


■ Operation Order

- ※ Status that power is on
 - Width displayed on the indication device.
 - ※ Pattern was set to left scallop No. 3 in advance.
 - ※ Needle is at down stop location.
1. Press left scallop pattern key.
 - Pattern number and shape number are displayed on the indication device and after a moment, zigzag-width is displayed.
 2. Press PARA/SET key.
 - The indication device blinks.
 3. Press left scallop pattern key.
 - Indication device blinks and pattern number and shape number are indicated.
 4. Select reverse function by pressing N2 key. (Ex: 5-3A)
 - Indication device continuously blinks.
 5. Set the changed value by pressing PARA/SET key.
 6. Start sewing by pedaling to the front.
 7. Stop while sewing (where reversion is made) and rotate the sewing material to 90°.
 8. Set reverse location by pressing reverse button.
 9. Start sewing by pedaling to the front again.



■ Example applied use of reverse function

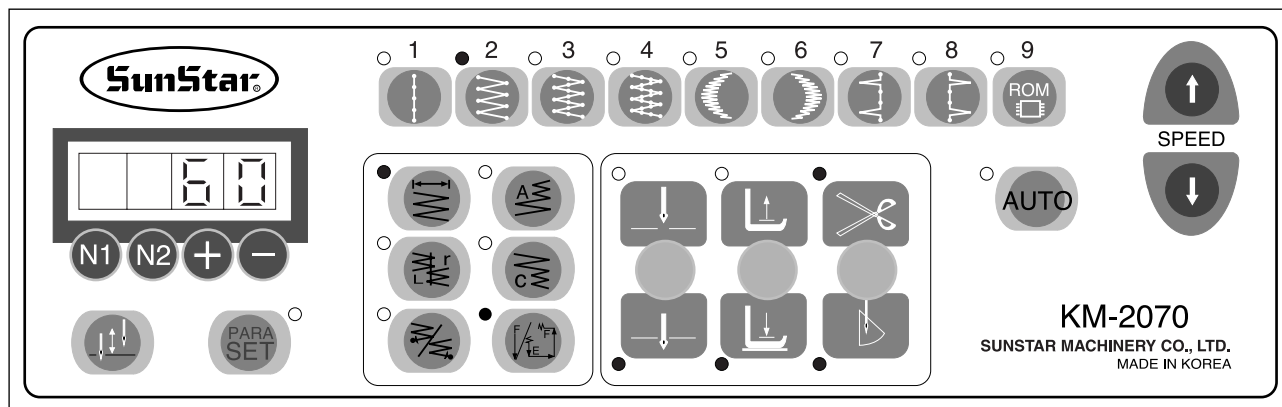


Example of reverse function

[Fig. 7-4]

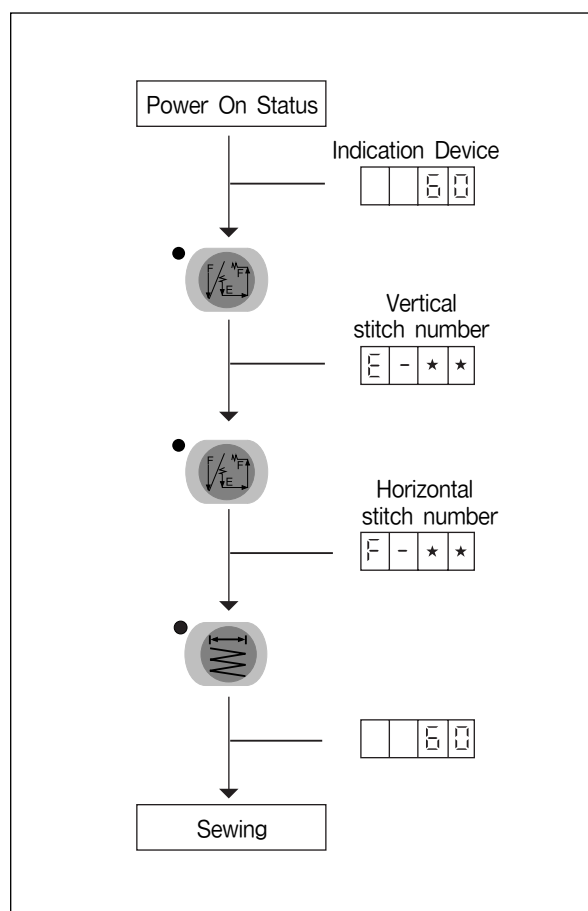
15) Name Stitch

■ Indication Status of Operation Panel



■ Operation Order

- Press name stitch key on condition that power is on. (Confirm the set stitch number)
 - Indication lamp of name stitch turns on.
 - Pressing One Time: display vertical stitch number on the indication device (Ex: E-*)
 - Pressing twice: display horizontal stitch number on the indication device. (Ex: F-*)
 - Pressing three times: Cancel name stitch.
- Press zigzag width key.
 - Width is displayed on the indication device.
- Step or the pedal forward.
 - Sew as much as the set stitch number and then stop. (Vertical stitch number)
- Convert direction and step the pedal again.
 - Sew as much as the set stitch number and then stop. (Horizontal stitch number)
- Repeat stage 3~4.
Stop when the sewing is completed.
- Perform thread cutting by pedaling backward.



[Notice]

- Sewing is possible even on condition that vertical stitch number (E sewing) was set only. (Thread trimming is possible)
- It is possible to conduct name stitch sewing without pressing the amplitude key and specifying the amplitude (2-step sewing possible).
- Turning the lamp on by pressing AUTO key, the machine sews as much as the set stitch number upon you pedal once. And when sewing is completed, it executes thread trimming automatically.
- Press the name stitch key three times when name stitch sewing is not needed.

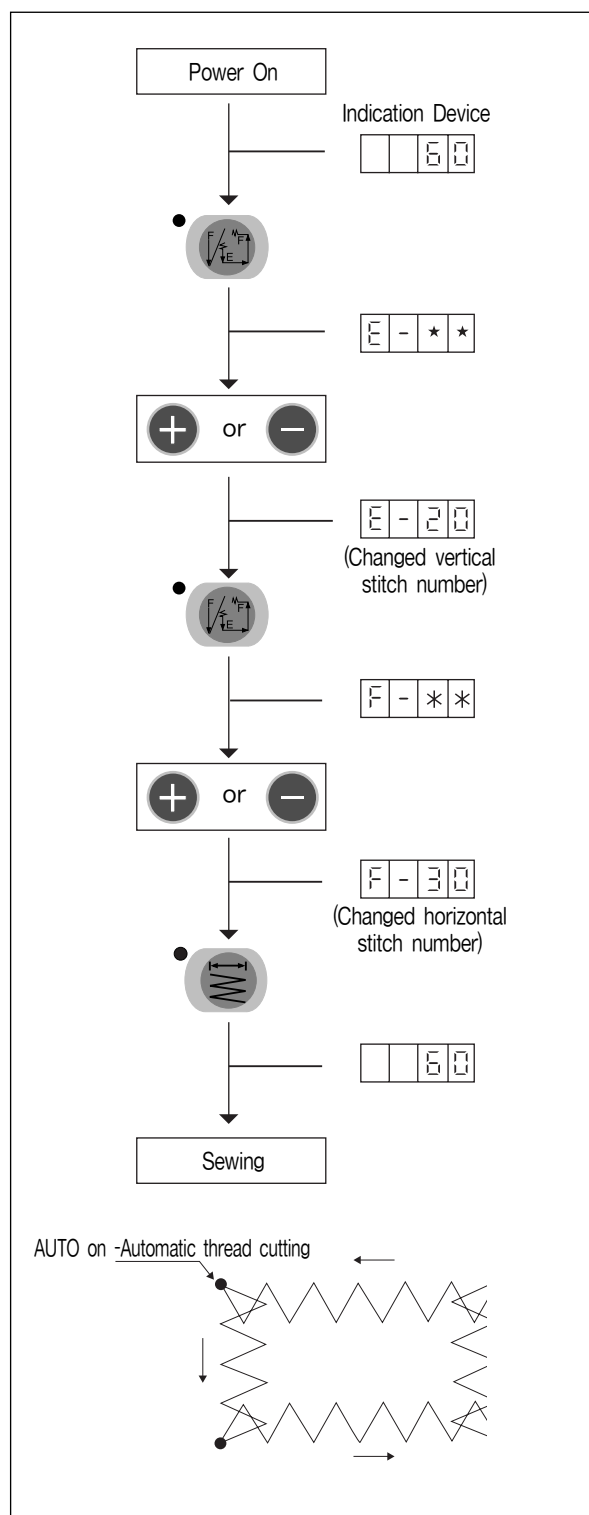
- Change of vertical stitch number (E) and horizontal stitch number (F) of name stitch
Pattern Number: 1point pattern
Width: 6mm

1. Press name stitch key on condition that power is on.
 - Indication lamp of name stitch turns on and vertical stitch number is displayed on the indication device.
2. Change the vertical stitch number by using + and - key.
 - Ex) vertical 20 stitch (E-20)

[Notice]

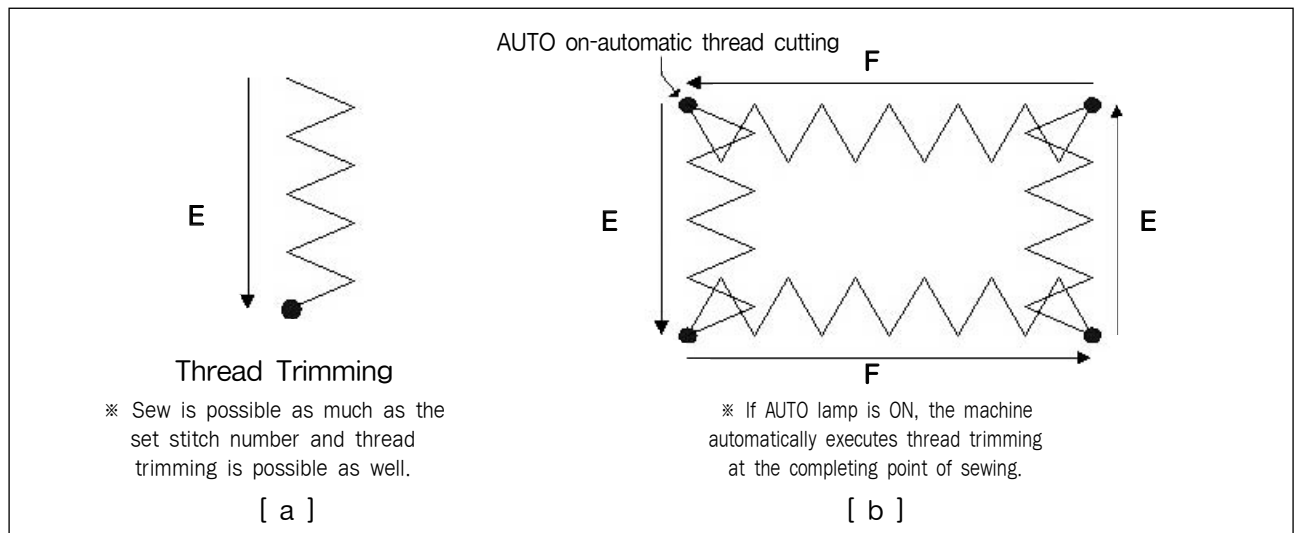
After changing vertical stitch number, upon pedaling, sewing is possible. (Sewing E vertical stitch number)

3. Press name stitch key again.
 - Horizontal stitch number (F) is displayed on the indication device.
4. Change the vertical stitch number by using + and - key.
 - Ex) Horizontal 30 stitch (F-30)
5. Press width key.
 - Width is displayed on the indication lamp.
6. Sew by pedaling.
 - Sew as much as the set stitch number and then stop.
(E: Vertical stitch number)
7. Convert direction and step the pedal again.
 - Sew as much as the set stitch number and then stop.
(F: horizontal stitch number)
8. Repeat stage 6~7.
 - Stop when sewing is completed.
9. Perform thread cutting by pedaling backward.



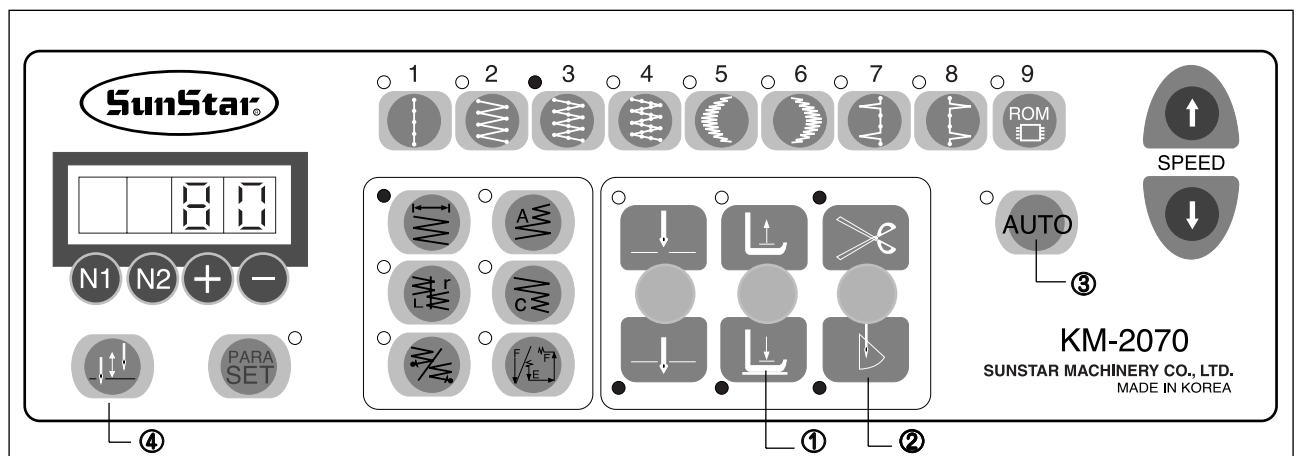
[Notice]

- You can separately do E sewing (vertical stitch number setting). (See figure a in [Figure 7-5]). Automatic stop to the set stitch number is possible and thread trimming is possible.) (Ex: E-**)
- Stop the needle at the four corner of b in [Figure 7-5] and sew the cloth by pedaling after rotating 90°.
- Vertical and horizontal stitch number can set to maximum 99 stitch.
- Using AUTO key, the machine executes sewing as much as the set stitch number upon you pedal once and execute thread trimming automatically.



E (vertical stitch number) sewing and name stitch sewing

[Fig. 7-5]



Status of Operation Panel

[Fig. 7-6]

16) Deciding Presser Foot Up/Down Location

1. Turn on the power.
 - Indication lamp of presser foot down turns on. (Presser foot always falls after thread trimming.)
 2. Press presser foot Up/Down (①) key to change.
 - Indication lamp of presser foot up turns on. (Presser foot always rises after thread trimming.)
- [Notice] After thread trimming, automatic up of presser foot is possible on condition that A-03 of parameter group A was set only.

17) Thread Trimming and Wiper Function

1. Turning the power on, functions of thread trimming and wiper are all selected.
2. In order to remove this function, turn the indication lamp off by pressing thread trimming/wiper key (②).

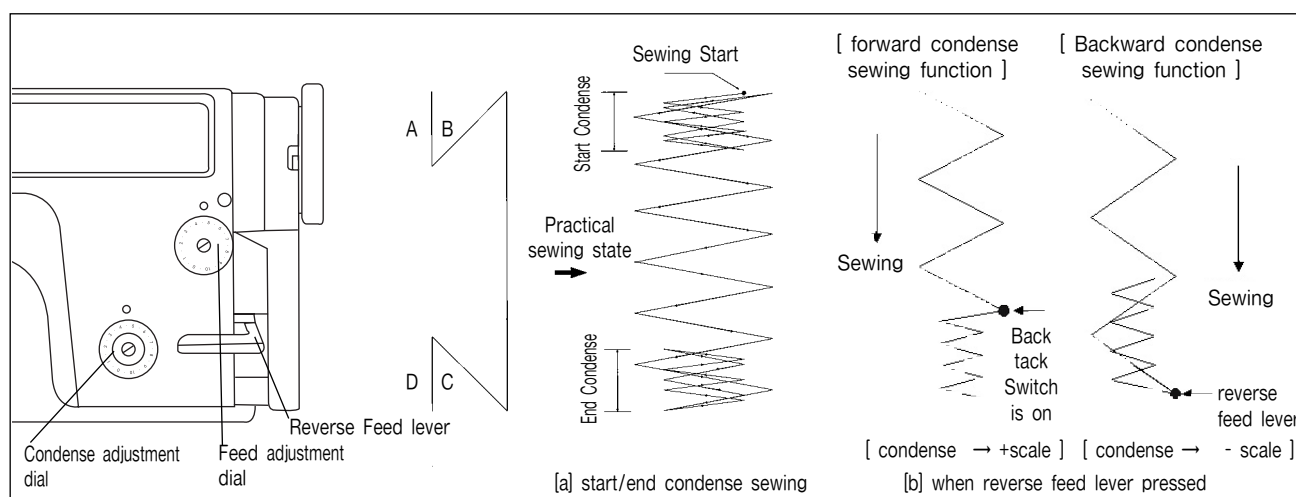
18) AUTO Function

In case of name stitch sewing, turning the indication lamp on by pressing AUTO key (③), the machine sews to the set stitch number by stepping the pedal once automatically and it also performs automatic thread cutting after completing last sewing (completing sewing of the set vertical stitch number).

19) Half Stitch Operation

- When the sewing machine stopped, pressing the half stitch operation key (④), the machine performs half stitch sewing at low speed.
- Speed of Half Stitch Sewing: 100spm

20) Using Reverse Feed Control Lever and Using Reverse Button (A Button)



■ Condense (Back Tack) Function

- Used to prevent the fabric loosening at start and end of sewing work.
- During sewing, if you press reverse feed lever, then performs to condense sewing by the setting value (adjustment of stitch-width by condense adjustment dial and feed adjustment dial), while you pressed the reverse feed lever. (In case of [Fig.b])
- Condense sewing is start and end condense sewing. (In case of [Fig.a])

■ Feed adjustment dial and condense adjustment dial

[In case of condense sewing]

- Feed adjustment dial: adjustment of A, D side stitch width.
- Condense adjustment dial: adjustment of B, C side stitch width.

[In case of Reverse Feed lever]

- Feed adjustment dial: stitch width
- Condense adjustment dial: (+:forward condense function) (-: backward condense function)

[Notice]

Feed adjustment dial > Condense adjustment dial

■ Reverse Button (A Button) Function

To sew Mirror Reverse Shape is available during sewing.

- While pattern shape is set up to '5-*A' or '6-*A', place the pedal to the neutral position during sewing, press reverse button (A button), and 'AAAA' is displayed on the indication device and reverse sewing is available. (Whenever Reverse function is used, Reverse button must be used.)
- If you press Reverse button (A button) at a mistake during sewing stop, press Reverse button once more, and mirror reverse function disappears completely.
- While pattern shape is set up to '5-*A' or '6-*A', during sewing, if you press reverse feed lever (A button), then performs to condense sewing by the setting value, while you pressed the reverse feed lever.

21) User Pattern Input Function (ROM Pattern)

■ Input Method of ROM Pattern (user pattern) shape

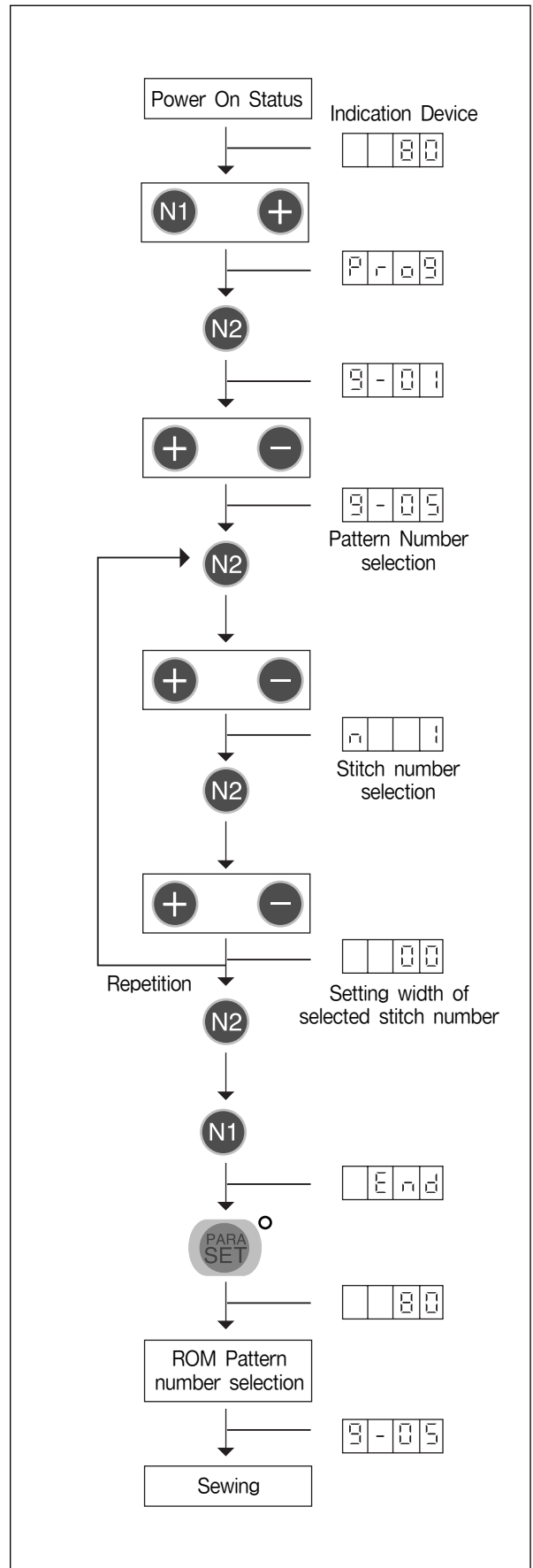
- Press N1 and + key at the same time on condition that power is on. (Stop condition after thread cutting)
 - The abbreviation of programming is **Pr o g** displayed on the indication device.
- Press N2 key.
 - ROM pattern number and pattern shape number are displayed on the indication device. Ex) 9-01
- Select pattern shape number by using + and - key. Ex) 9-05
 - Pattern shape number: input available up to 1 ~ 99
- Press N2 key.
 - Stitch number of pattern shape is displayed on the indication device. Ex) n 1
- Select stitch number by using + and - key.
 - Scope of stitch number: 1 ~ 256 stitch
- Press N2 key.
 - Width of the selected stitch number is displayed on the indication device.
- Decide width by using + and - key.
 - Width scope: -5mm ~ 5mm (in case that needle plate is for 10mm)
 - '-' indicate the left on the basis of the origin.
- Repeat stage 4 ~ 7 until input the desired pattern shape.
- Press N1 and N2 key when input is completed.
 - Buzzer tone rings, indication device displays "End" and then returns to the first (order number 2) of input process. (Buzzer tone rings simultaneously.)
- Repeat again in order to input pattern types more and press PARA/SET key to return to sewing mode.
 - Width is displayed on the indication device.
- Press ROM pattern key and start sewing by selecting the input pattern.

[Notice]

When the needle plate for 8mm is used, the amplitude range can be set at -4mm~4mm. If the range is set at -5mm~5mm, it may cause out-of-range sewing or break the needle. To prevent such trouble, instead of 5mm, set the maximum amplitude at 10mm. See "30.6 Amplitude Setup."
For pattern registration, it is needed to enter only one cycle of the pattern.

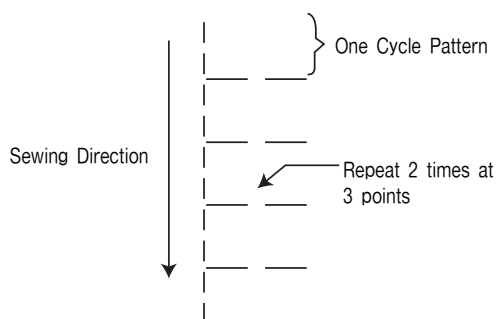
[Notice]

When deciding width, if needle plate is for 8mm, width scope can set up to -4mm~4mm. When setting the width scope to -5mm~5mm, it digresses work scope and the needle can be broken. In this case, use by setting the maximum width to 10mm. See "ZigZag Width" in article 5) on page 30.

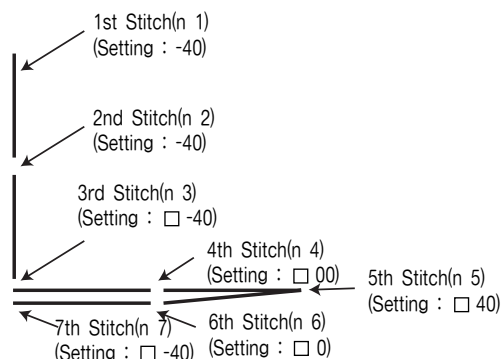


22) How to Input L-Stitch Pattern Shape

Ex) Set up 2 stitches for L-stitch at points and repeat two times.



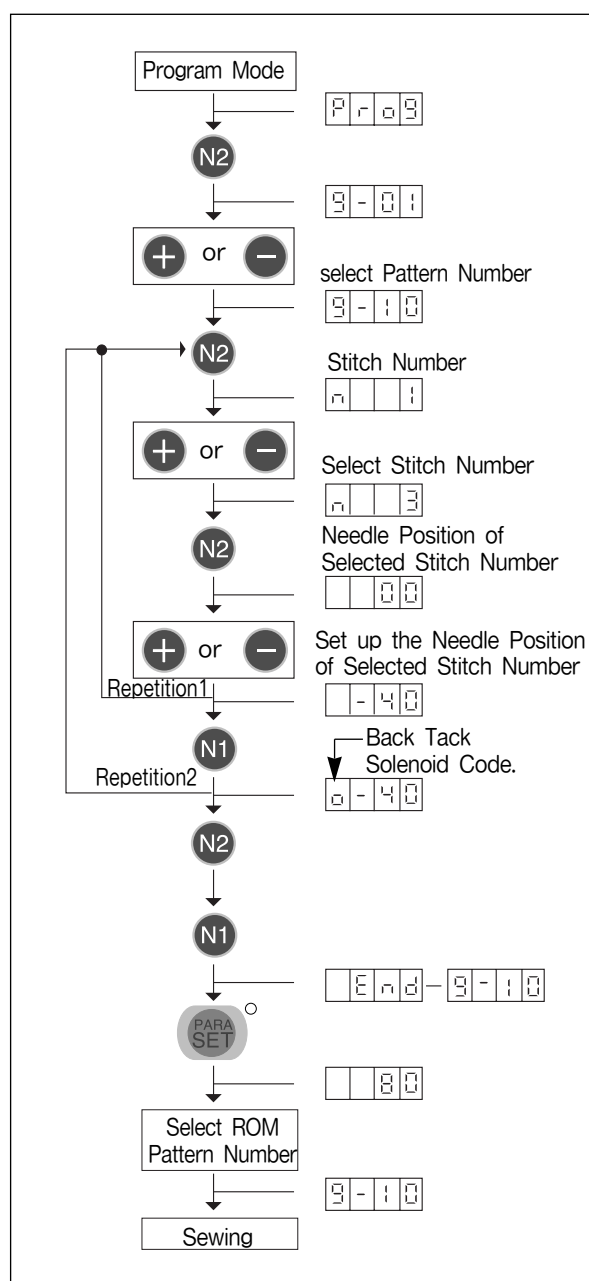
[L-Stitch Pattern Shape]



[One Cycle Pattern Input Data]

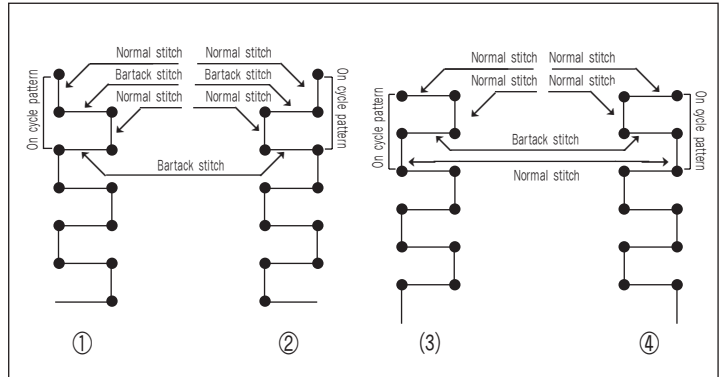
■ Operation Order

1. Return Program Mode.
2. Press N2 Key, use + and -key to select pattern shape number. (Ex: 9 - 10)
3. Press N2 key, use +, -key to select stitch No. (Ex: n 1)
4. Press N2 key, use +, -key to select the needle position.
 - Repeat step 3~4 up to the required number of stitches. (Repetition 1)
 - Input stitch No. up to "n 2".
5. Input codes to operate Back Tack Solenoid from 3rd stitch.
 - Repeat step 3 to select stitch No. (n 3)
 - Set up the required needle position at step 4. Press N1 key to input codes to operate Back Tack Solenoid. (Ex: □ -40)
6. Repeat step 5 as required times. (Repetition 2)
 - Repeat 4th~7th Stitch
7. When completing input, press N1 and N2 Key.
 - Buzz sounds, "End" is displayed on the indication device, then it returns to the first stage(Step 2) of input.
8. If you want to input more patterns, repeat the above sewing order again. Press PARA/SET key to return Sewing Mode. The zigzag is displayed on the indication device.
9. Press ROM pattern key, select inputted patterns to start to sew.

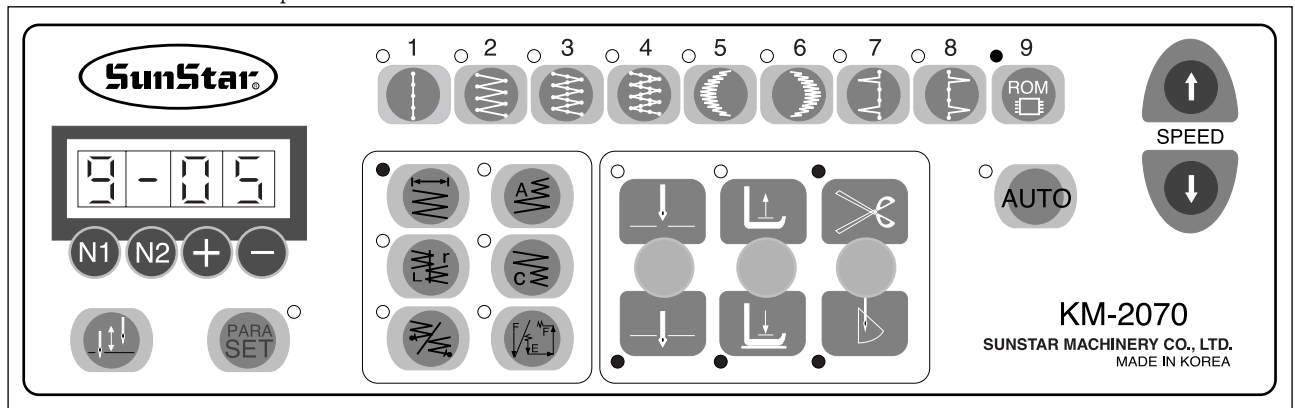


[Notice]

- When using the L-Stitch pattern, setting the sewing pitch at 4mm or below is recommended. If the sewing pitch is 5mm, reduce the sewing speed to 600rpm or below depending on sewing materials.
- Do not run the machine with L-Stitch patterns as shown in the examples ①~④ below.
- If you run the machine with L-Stitch patterns, **Er09** will be displayed and you hear 4 times buzz sound.
- When Er09 will be displayed, you clear the display of error by pressing the **half stitch key**.

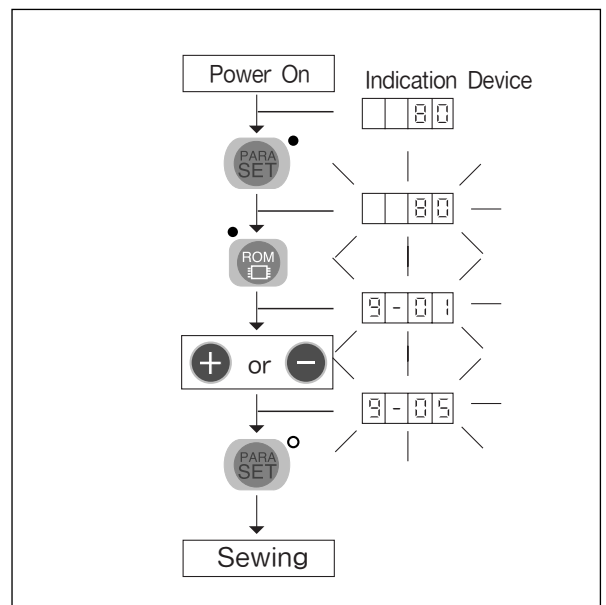


■ Indication Status of Operation Panel



■ Operation Order

1. Press PARA/SET key.
 - Indication device blinks.
2. Press ROM pattern key.
 - ROM pattern number and pattern shape number are displayed on the indication device. (Indication device blinks continuously.)
3. Select ROM pattern shape number by using + and -key. Ex) 9-05
4. Press PARA/SET key.
 - ROM pattern number and pattern shape number are displayed on the indication device. (Indication device does no blink.)

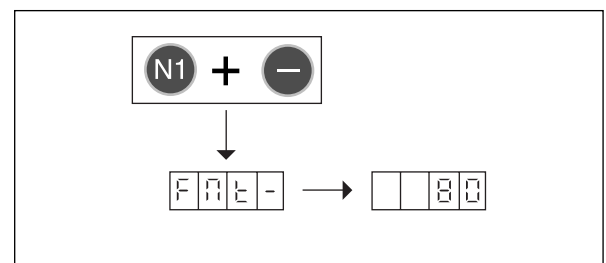


■ Formatting

- Turn on the power with pressing N1 key and -key. Indication device displays as shown in the figure and after a moment, width is displayed on the device and then becomes sewing available status.

[Notice]

- EEPROM is formatted status at the moment of factory shipping. If it is not formatted, the machine can malfunction in case of setting use input pattern.
- Also use only when you want to delete all the input content.



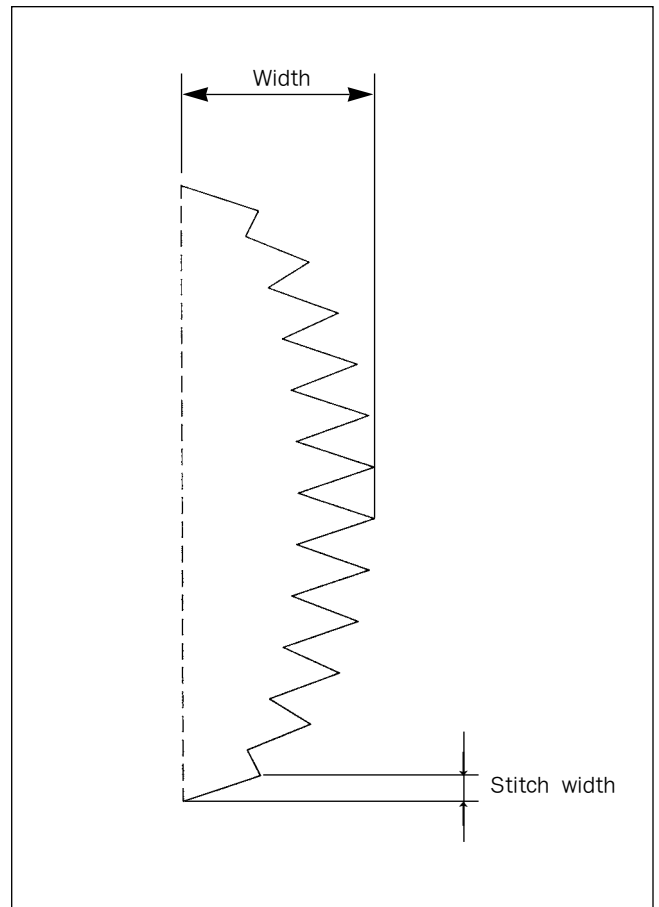
Sewing

Notice

- Please attach protection device for safety.
Using without attaching this device, it becomes cause of injury.
- Please turn off the power in the following cases.
Pedaling by mistake, the sewing machine operates and it becomes cause of injury.
 - Upper Thread passing
 - Exchange of bobbin or needle
 - When not using the sewing machine, or in case of being away from the sewing machine
- Please do not touch or press the operating part while sewing.
It becomes cause of injury or breakage of sewing machine.
- Do not touch the solenoid part in case of the sewing machine with automatic presser foot lifter. You can get burns upon touching it.

1) Sewing Method

- A. Turn on the power switch.
- B. Execute required settings such as [sewing pattern] or [width] on the operation panel.
- C. Set the stitch width with feed adjustment dial.
- D. Step the pedal and start sewing.



[Fig. 21]

Machine Repairing Method

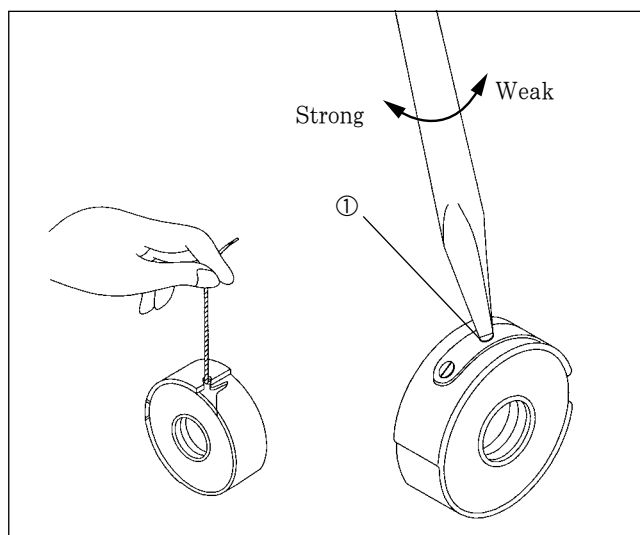
Warning

As the machine was set to the optimal status at the moment of factory shipping, do not adjust the machine status optionally and when exchanging the parts, please change with the genuine parts that the company authorizes.

1) Thread Tension Adjustment

A. Lower Thread Tension

Adjust tension of lower thread by turning the thread tension adjusting screw① of bobbin case. Turning to the clockwise direction, tension gets strong and turning to the opposite direction, it gets weak.



[Fig. 22]

B. Upper Thread Tension

Adjust tension of upper thread after adjusting the tension of lower thread.

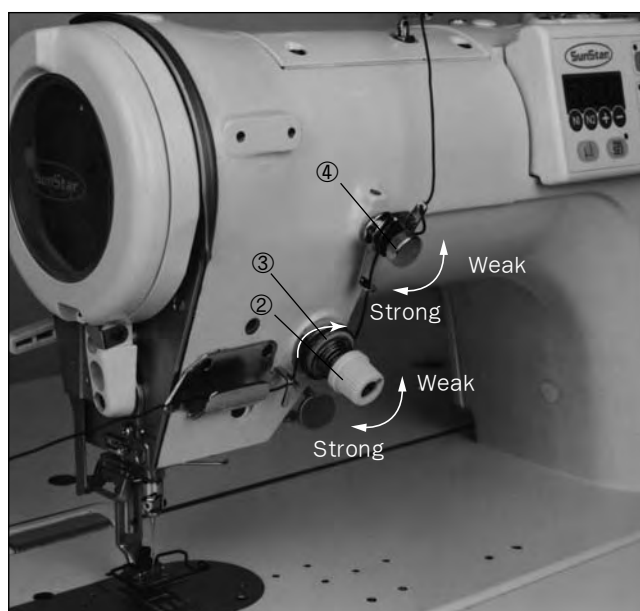
1. Put down the presser foot.
2. Adjust by turning tension adjusting nut②.
3. After adjusting tension of upper thread, check whether rotary dish③ rotates with the upper thread by pulling the upper thread to the arrowed direction.

※ In case that it does not rotate, tighten the auxiliary thread tension adjusting stud④.

[Notice]

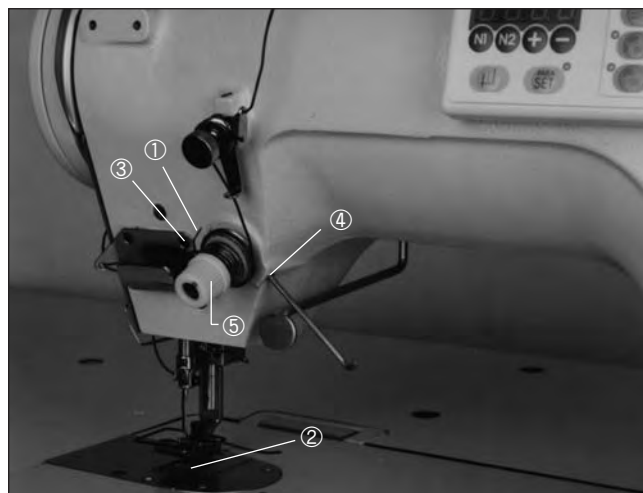
If tension of auxiliary thread adjusting device stud④ is too weak, thread slides and so rotary dish③ becomes not to rotate.

Auxiliary thread adjusting device stud④ should be adjust as weak as possible that rotary dish③ rotates smoothly. Use thread tension adjusting spring in accessory box in case use thick thread or adjust upper thread tension (Recommend three ply or thicker thread)



[Fig. 23]

- C. Adjustment of Thread Take-Up Spring
Standard location of thread take-up spring① is 6-8 mm of distance to face of thread guide③ on condition that put down the presser foot②.
1. Put down presser foot②.
 2. Unfasten the fixing screw④.
 3. Adjust location by turning main thread tension adjusting device⑤.
 4. Unfasten the fixing screw④ firmly.

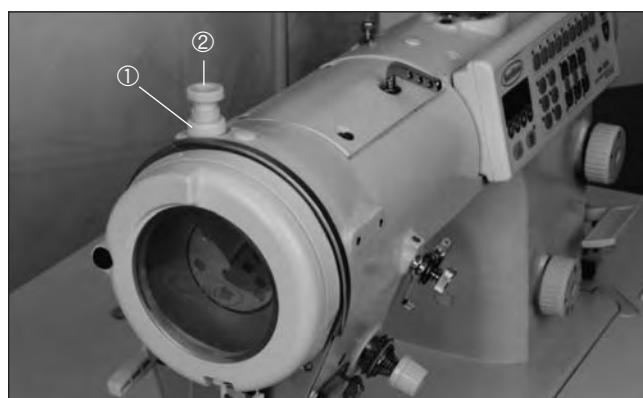


[Fig. 24]

2) Presser Foot Pressure Adjustment

Adjust pressing pressure as weak as possible in order not to be slid the cloth.

- A. Unfasten the pressure adjusting screw nut①.
- B. Adjust pressing pressure by turning pressure adjusting screw②.
- C. Fasten the pressure adjusting screw nut①.

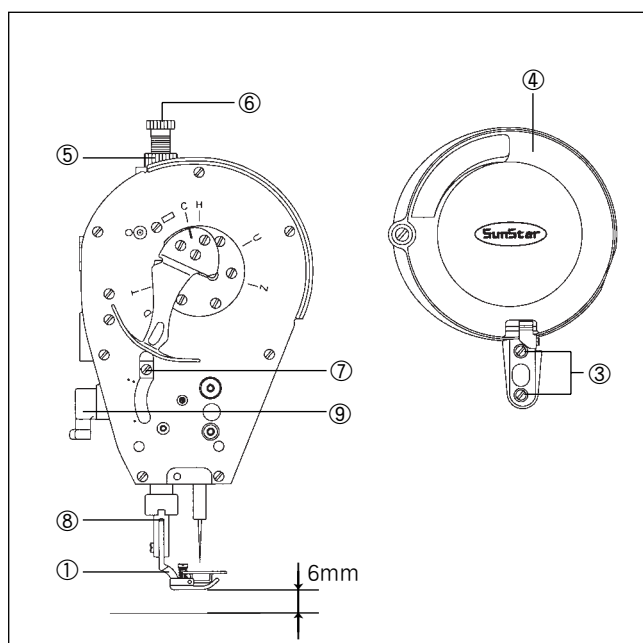


[Fig. 25]

3) Presser Foot Height Adjustment

When put up the presser foot① by presser bar raiser ⑨, standard rising amount of presser bar is 6mm.

- A. Unscrew the joint screw③ (2 pieces) and remove faceplate guard④.
- B. Unfasten nut⑤, and pressure adjustment screw⑥ in order not to be given pressing pressure.
- C. Put up the presser foot① by presser bar raiser⑨.
- D. Unscrew joint screw⑦, move up and down the presser bar⑧ to adjust height of presser foot① to 6mm.
- E. Fasten the adjustment screw⑦.
- F. Adjust pressing pressure by pressure adjustment screw ⑥ and tighten nut⑤.
- G. Attach the face plate guard④ with joint screw③ (2 pieces).

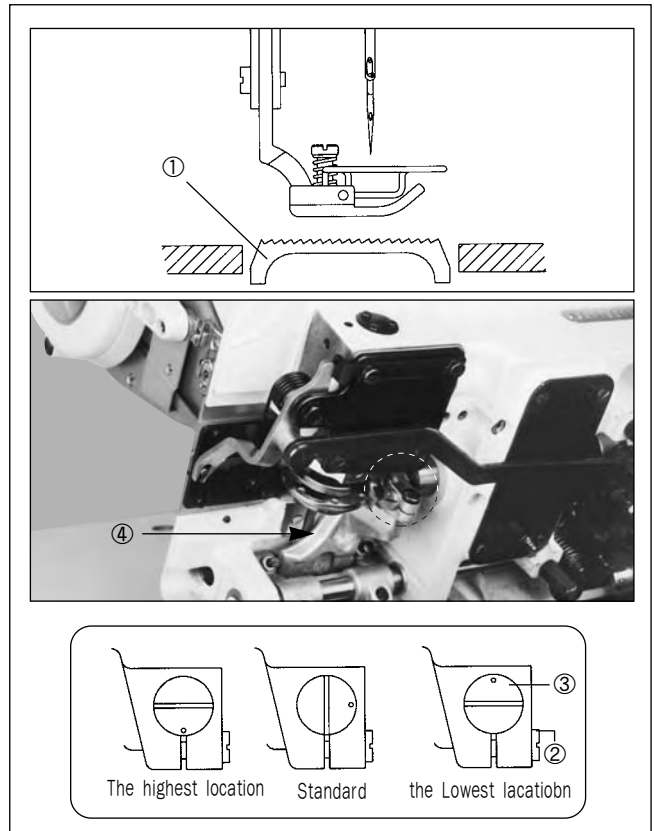


[Fig. 26]

4) Feed Dog Height Adjustment

Standard height is 1mm when the feed dog① went up the most from needle plate upper face.

- Make the transfer value① to stop at the highest location by turning the sewing machine pulley.
- Lay down the sewing machine.
- Unscrew the fixing screw②.
- Adjust feed dog support④ making to move up and down by turning the eccentric axis③ of feed dog support.
- Fasten fixing screw② tightly.



[Fig. 27]

5) Feed Dog Slope Regulation

When the feed dog① went up to the maximum from upper face of needle plate, standard slope is made that upper face of needle plate and upper face of feed dog should be parallel.

(0 mark on eccentric axis ② of feed rolling bracket matches with the mark on feed rolling bracket③.)

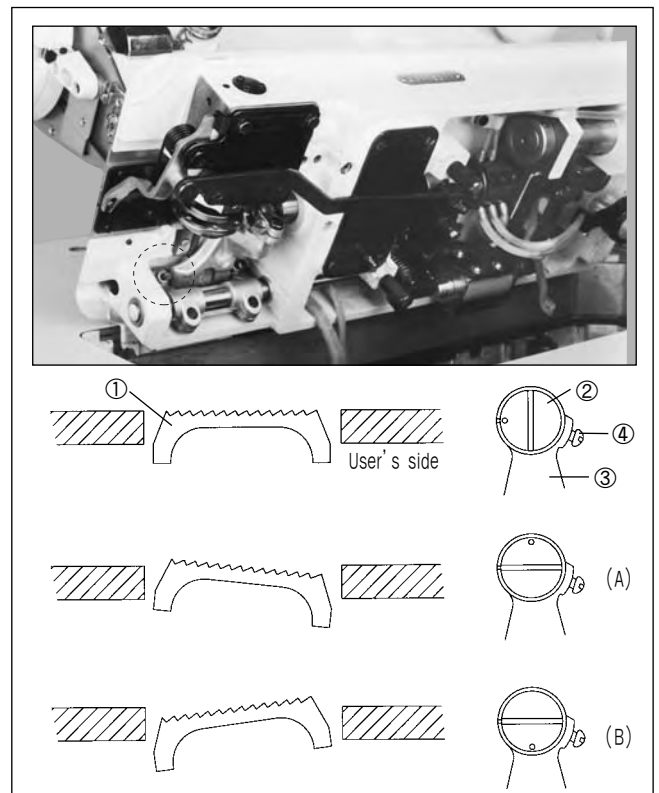
- Make the feed dog① to stop at the highest location by turning the sewing machine pulley.
- Lay down the sewing machine.
- Unscrew 2 pieces of stop screw④.
- Adjust eccentric axis② of feed rolling bracket by turning within 90° to arrowed direction against standard location.

- Place the slope of upper face of feed dog① downward direction to the user's side in order to prevent puckering. (Figure A)

Place the slope of upper face of feed dog① upward to the user's side to prevent the cloth to go crisscross. (Figure B)

- Fasten fixing screw④ (2 pieces) tightly.

※ Adjusting the slope of feed dog①, height of feed dog① and location front and back changes. Hence, please adjust again.

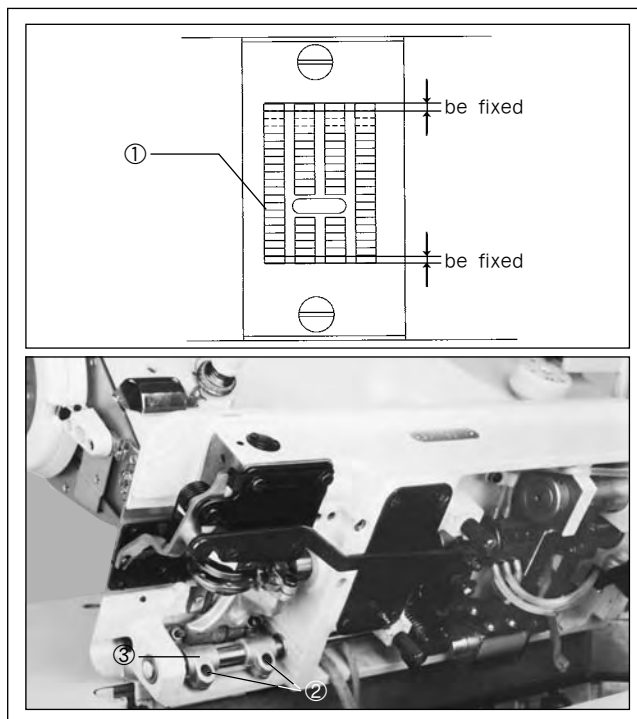


[Fig. 28]

6) Feed Dog Front and Back Adjustment

Gap front and back to the needle plate when the feed dog① moved closest to the user's side and when it moved to the most backward by turning the sewing machine pulley becomes regular.

- A. Lay down the sewing machine.
- B. Unscrew the fixing screw② (2 pieces).
- C. Adjust by turning the feed rolling bracket③ and then moving the feed dog①.
- D. Fasten fixing screw② tightly.

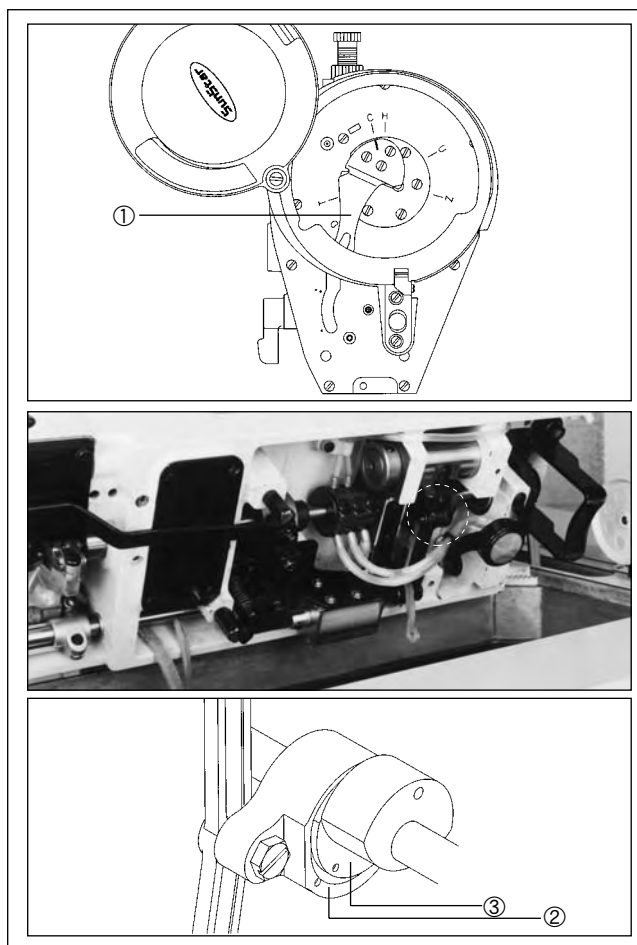


[Fig. 29]

7) Needle and Transfer Timing

Make 0 mark of feed cam bearing cover② and 0 mark of feed cam connection rod③ to match each other when matched base line of thread take-up① to C mark of face plate.

- A. Lay down the sewing machine.
- B. Match the base line of thread take-up① to C mark of face plate.
- C. Unscrew the fixing screw (4 pieces) of lower shaft timing pulley.
- D. Turn the feed cam bearing cover② and match 0 mark to the 0 mark of feed cam connection lot③.
- E. Fasten fixing tightly (4 pieces) of lower shaft timing pulley.



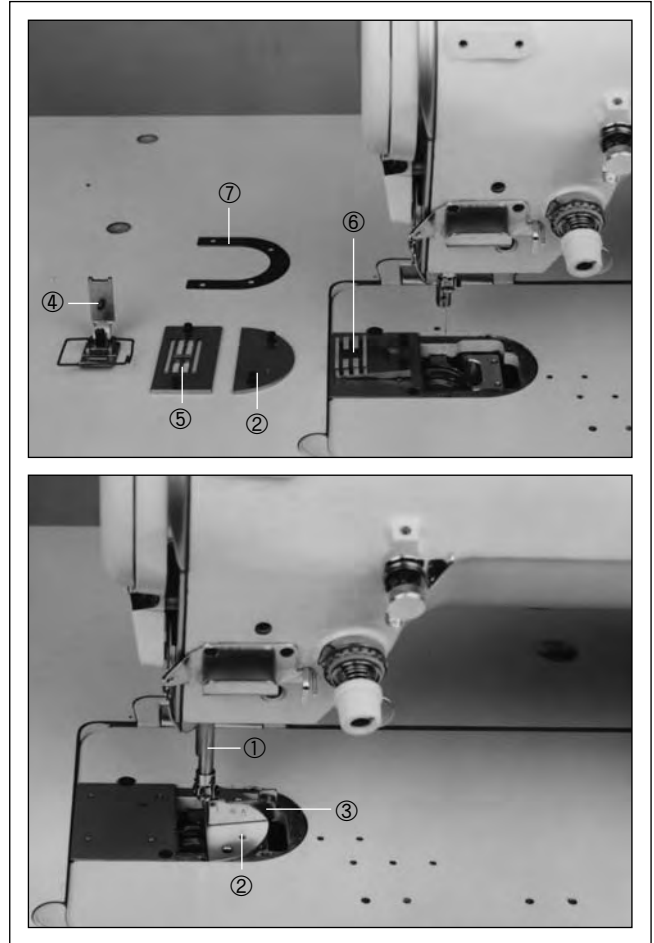
[Fig. 30]

8) Needle Bar Height Adjustment

When the needle bar① came to the lowest point, height is from upper face of auxiliary needle plate② to the bottom of needle bar①, match to the height of timing gauge A③ of the parts.

- A. In case of thread cutting type, take off presser foot④, needle plate⑤, auxiliary needle plate②, feed dog⑥ and needle plate spacer⑦.
- B. Place auxiliary needle plate② to the needle plate attachment face on sewing machine bed.
- C. Put the needle bar① to the lowest point by turning the sewing machine pulley.
- D. Attach needle plate spacer⑦(in case of thread cutting type) that from upper face of auxiliary needle plate② to the bottom of needle bar① should be height of timing gauge A③.

※ When adjusted needle bar height, adjust timing of needle and hook as well.



[Fig. 31]

9) Needle and Hook Timing

- A. Turn on the power switch.
- B. Press N1 and N2 key on the operation panel at the same time.

(Refer to hook test function in 14-3)

- C. Take off presser foot, needle plate, auxiliary needle plate, feed dog, and needle plate spacer.
- D. Place auxiliary needle plate① to needle plate attachment part of sewing machine bed.
- E. When matched from the upper face of auxiliary needle plate① to the bottom of needle bar② with height of timing gauge B③ by turning sewing machine pulley and raising the needle bar② higher than the lowest point, check the followings:
 - Match the sharp end④ of hook with center of needle.
 - Interval of sharp end④ of hook and needle is $0 \sim 0.05\text{mm}$.

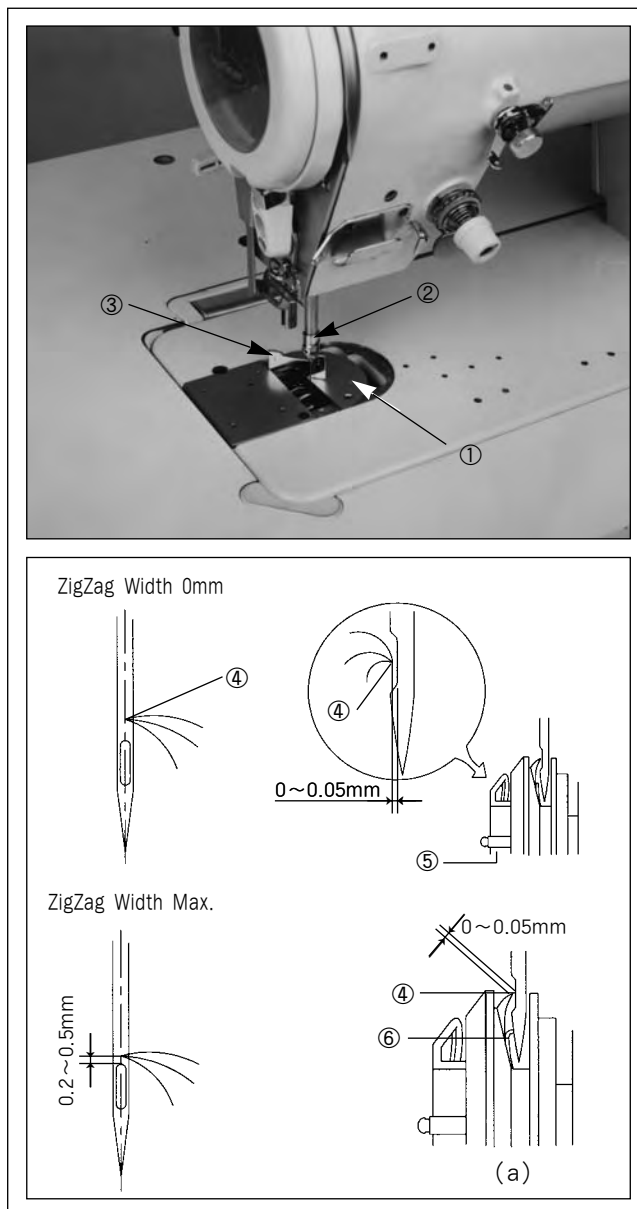
[Notice]

As thickness of needle plate and auxiliary needle plate① is different, must use auxiliary needle plate② for sure.

- F. If the above status is not made, adjust location of hook⑤ by unscrewing the hook fixing screw. After adjusting, fasten the fixing screw.
- G. When the needle is at the closest location to the left(-4 mm), if point④ of hook matched to the center of needle by turning the sewing machine pulley, check whether size of point④ of hook is $0.2 \sim 0.5\text{mm}$ from the upper end.
 - ※ If the size does not meet, adjust height of needle bar.
- H. In case that over-lapped section sewing causes needle flow, make needle support to contact to needle by bending needle support⑥ as shown in the figure (a).
 - ※ Since then, check whether interval of point④ of hook and needle is $0 \sim 0.05\text{ mm}$.
- I. Pressing PARA/SET key on operation panel, it is converted to embroidery available status.

■ In case of using 10mm

- 1) Move the location of needle to the leftest place (-5mm).
- 2) When point④ of hook matched to the center of needle by turning the sewing machine pulley, adjust needle position whether distance is $0.2 \sim 0.5\text{mm}$ to point④ of hook from the upper end of needle hole.
- 3) In case of using ZigZag width 10mm, change needle plate, feed dog, needle bar stopper for 10mm.

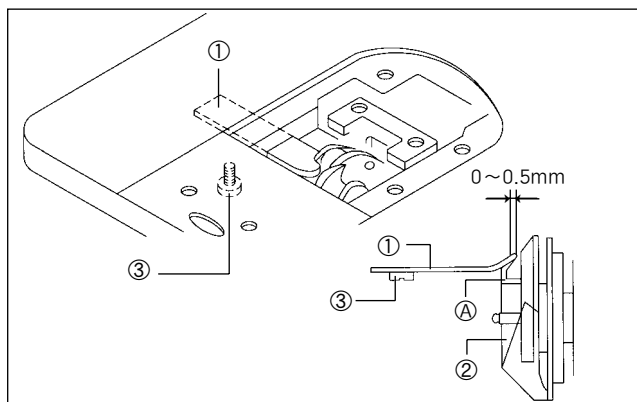


[Fig. 32]

10) Location Adjustment of Hook Holder

Adjust that end of hook holder① should come to the location $0 \sim 0.5$ away from end of A part of internal hook②.

- ※ Keep end of hook holder① never comes out to the right than end of A part of internal hook②.
- A. Unscrew the fixing screw③ and adjust location of hook fixing ①.
- B. Fasten fixing screw③ tightly.

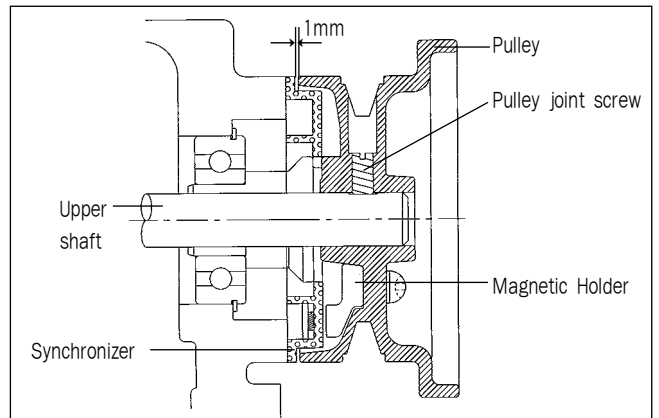


[Fig. 33]

11) Synchronizer Adjustment

A. Mounting of synchronizer

- Fix the synchronizer to back side of arm.
- After setting the location of pulley that interval between synchronizer and pulley becomes 1mm, fasten pulley joint screw.



[Fig. 34]

B. Needle Up Stop

When turn the power switch on and stop the sewing machine at the location of needle up stop, base line of thread take-up stops at around U mark on face plate ($\pm 3\text{mm}$). When stop the sewing machine at location of needle down stop, base line of thread take-up stops at around D mark on face plate ($\pm 4\text{mm}$).

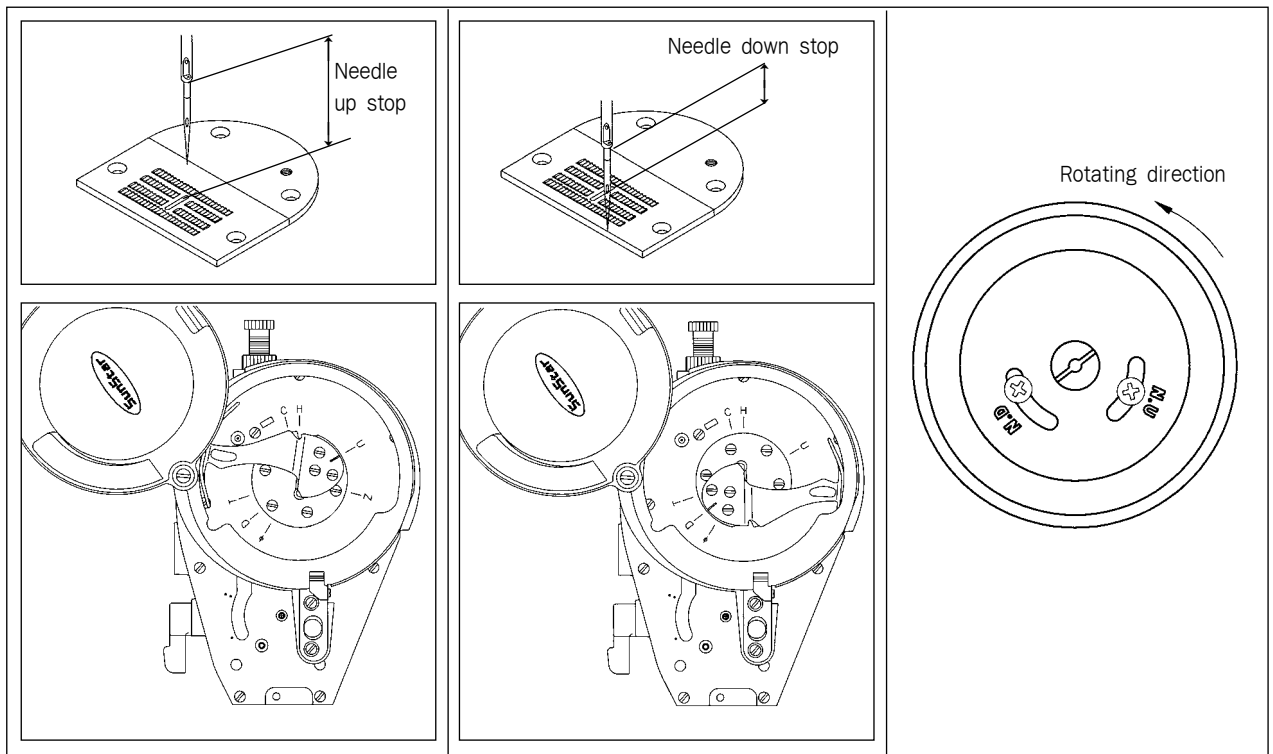
- Turn off the power switch.
- Unfasten fixing screw①(2 pieces).
- Moving the fixing screw① to rotating direction of sewing machine pulley, needle bar② stops at high position.
- Fasten the fixing screw①.

C. Adjustment of needle down stop location

Do not adjust needle down stop location.

[Notice]

- Attachment location of synchronizer was set at the moment of shipping. When taking off the pulley, do not take off the synchronizer. Also, attach the fixing screw(2 pieces) of pulley to around of the screw of upper shaft against the pulley rotating direction.



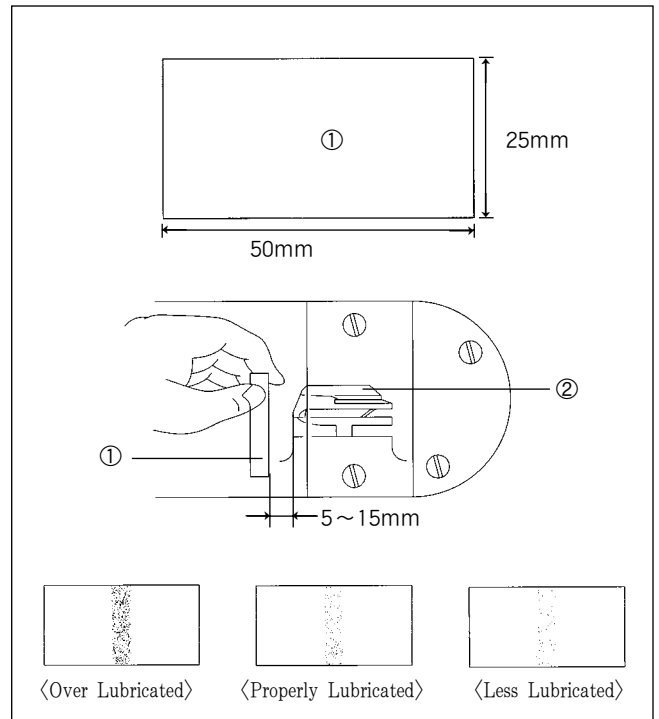
[Fig. 35]

12) Lubrication Adjustment for Hook

When you replace the hook or change sewing speed, adjust lubrication amount of hook as the following order.

■ Confirmation of lubrication amount

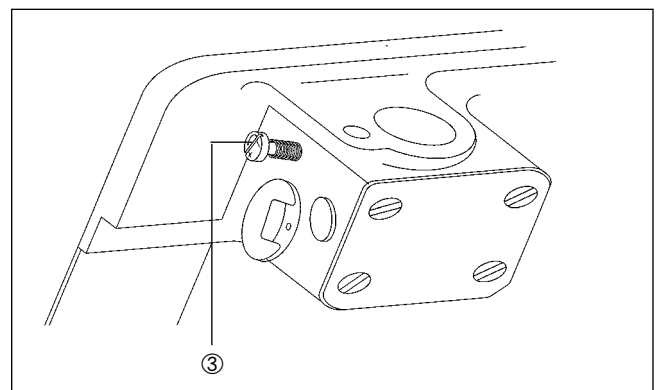
- Perform no load operation over 1 minute at rotation number of sewing machine that actually sews.
- After inserting the lubrication check list① to the left of hook②, operate the sewing machine for about 10 seconds at the speed number of sewing machine that actually sews. (Quality of lubrication check paper① does not matter.)
- Confirm the oil quantity spread on the paper.
 - ※ You must check the average lubrication amount by repeating 3~4 times.



[Fig. 36]

■ Lubrication Adjustment

- Lay down the sewing machine.
- Adjust lubrication amount by turning oil adjusting screw③.
- Confirm the lubrication amount by referring to [Confirmation of lubrication amount] above.
 - ※ Repeat adjustment of oil adjusting screw③ and confirmation of lubrication amount until it becomes proper amount.
- After sewing for about 2 hour, confirm the lubrication amount again.



[Fig. 37]

13) Adjustment of Upper Thread Remainder after Thread Cutting

Standard remainder of upper thread after thread cutting is as shown in the following table according to thread type.

Upper Thread	Upper Thread Remainder
Filament #60	50~60mm
Span(dex) #60	40~50mm

■ Adjusting Upper Thread Feeding Wire

After unfasten the fixing screw①, adjust remainder of upper thread by moving upper thread feeding wire②. In order to make the remainder short, move to arrow A direction and to make the remainder long, move to arrow B direction.



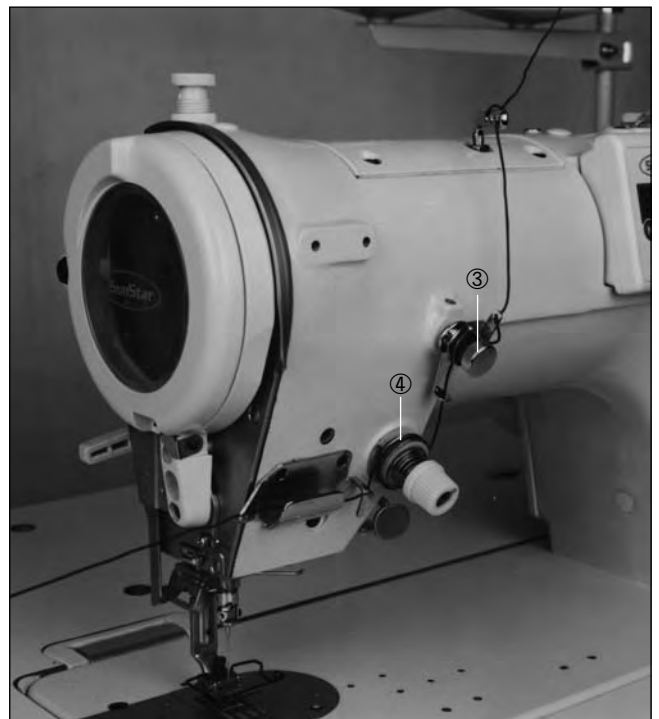
[Fig. 38]

[Notice]

If tension of auxiliary thread tension adjusting device stud③ is too strong, it becomes difficult to adjust remainder of upper thread.

Adjust auxiliary thread tension adjusting device stud③ as weak as possible that thread adjusting device dish④ rotates gently.

※At this time, upper thread tension changes and so adjust upper thread tension.



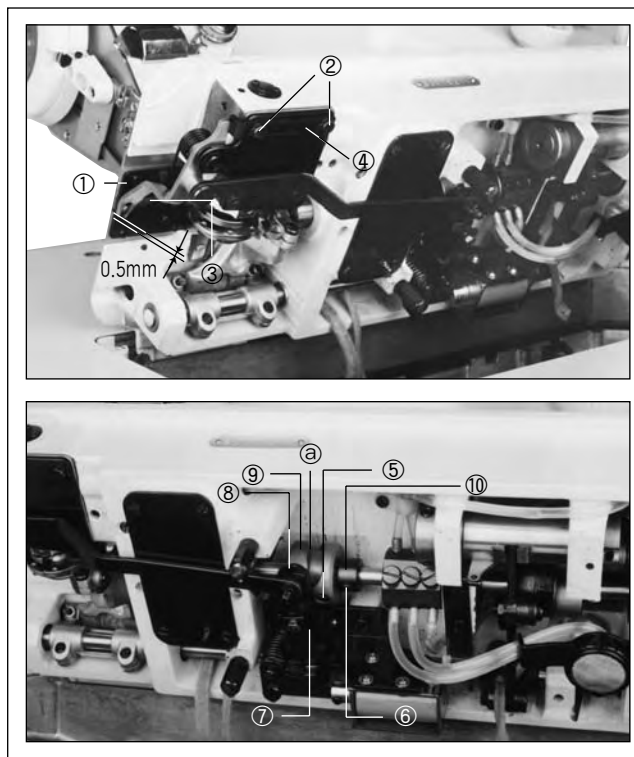
[Fig. 39]

14) Location Adjustment of Thread Cutting Cam

Adjust as shown in the figure on condition that mes unit① is properly attached.

■ Left/Right Location Adjustment

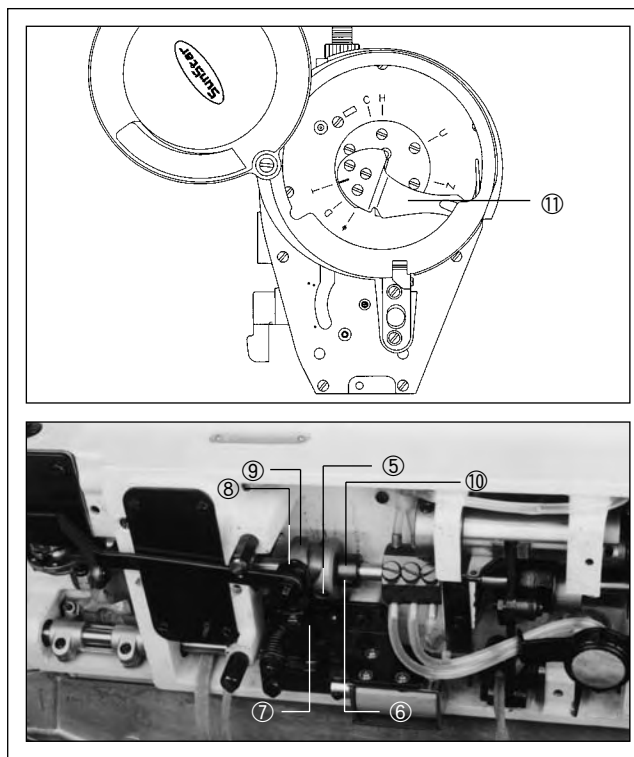
- A. Lay down the sewing machine.
- B. Unscrew the fixing screw②.
- C. Adjust by operating thread cutting operation crank stopper④ that section of mobile mes③ enters about 0.5mm more than section of mes bracket①.
- D. Fasten fixing screw② tightly.
- E. Unscrew the stop screw⑤ and⑥.
- F. While pressing thread cutting roller arm⑦ by hand, adjust left/right location of thread cutting cam⑨ that thread cutting roller comes in and out of groove straight line part⑧ of thread cutting cam⑨ easily.
- G. Fasten the stop screw⑤.
- H. Fasten stop screw⑥ tightly by closing thread cutting cam collar⑩ to thread cutting cam⑨.



[Fig. 40]

■ Adjustment of Rotating Direction

- A. While pressing thread cutting roller arm⑦ by hands, turn the sewing machine pulley toward oneself slowly and when base line of thread take-up⑪ matches with T mark of face plate, adjust rotating location of thread cutting cam⑨ that mes starts to move.
- B. Fasten stop screw⑤ tightly.
- C. While pressing thread cutting roller arm⑦ by hands, turn the sewing machine pulley toward oneself and check whether mes starts to operate when base line of thread take-up ⑪ matches with T mark of face plate and mes returns to the original status until it matches with U mark.

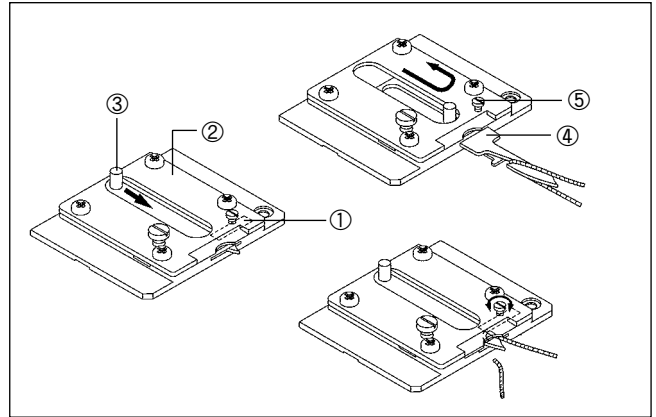


[Fig. 41]

15) Tension Adjustment of Lower Thread Presser

After cutting thread, adjust tension when pulling out the thread holding by lower thread presser① to 0.03~0.08N(3~8gf) in case of filament thread (#60).

- Take off mes unit②.
- Draw out the mobile mes④ by moving handle③ and hang the thread on the groove as shown in the figure.
- Cut the thread by turning the mobile mes④ to original status. Then, measure the tension when pulling out the thread holding by lower thread presser①.
- Adjust tension of lower thread presser① to 0.03~0.08N (3~8gf) by turning screw⑤.

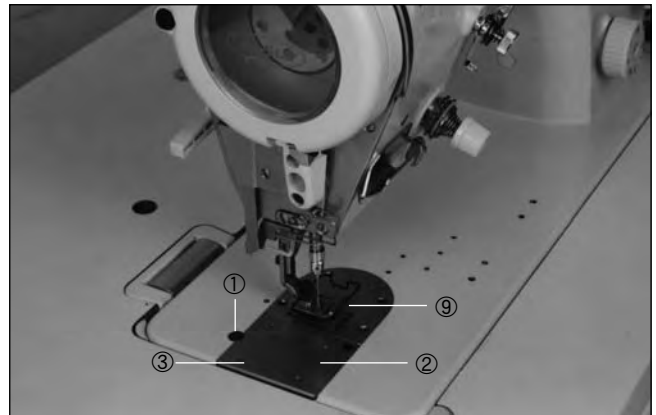


[Fig. 42]

16) Exchange of Fixed Mes and Moving Mes

■ Removing method

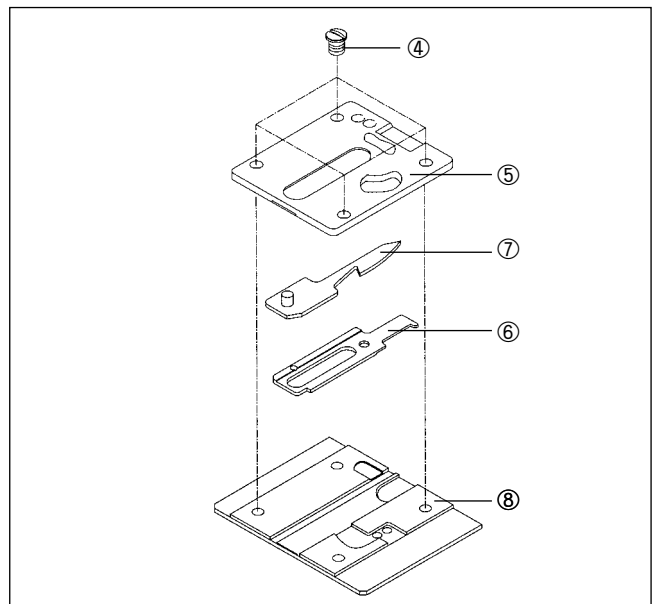
- Remove joint screw① and ②, and remove mes unit③.
- Remove joint screw④ and remove mes presser ⑤.
- Remove fixed mes⑥ and mobile mes⑦.



[Fig. 43]

■ Attachment Method

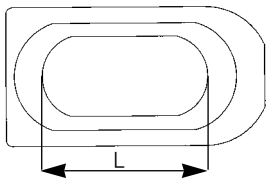
- Attach fixed mes⑥ and mobile mes⑦ to mes bracket⑧.
- Attach mes presser⑤ with joint screw④.
- Put mes unit③ close to section of needle plate ⑨ and attach with joint screw① and ②.



[Fig. 44]

17) Gauge Parts

In case of using presser foot, needle plate, and feed dog for other except 8mm of width, when operating the sewing machine, needle can contact to needle plate or needle can be broken. Hence, limit width as follows and exchange needle bar stopper.

	Classification	L(mm)	Remarks
	A	16.4	For 8mm, basic specification
	B	18.4	For 10mm
	C	13.4	For 5mm
	D	11.4	For 3mm

※ Needle bar stopper for other 8mm can be mounted as standard parts according to specification. In such case, check the parts by L size.

■ Replacing Method of Needle Bar Stopper

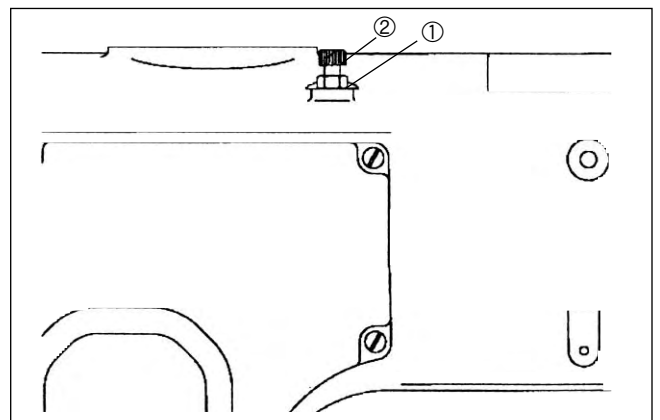
- In case of using presser foot and needle plate (option parts) for 10, 8.5, and 3mm of width, exchange the needle bar stopper for 10, 8.5 and 3mm.
- A. Remove needle bar stopper② by unscrewing the fixing screw① (2 pieces).
- B. Attach needle bar stopper③ inserted into needle bar stopper plate②.
- C. Attach needle bar stopper plate② to head part of sewing machine and fasten fixing screw① tightly.
- D. Turn on the power.
- E. Set the width to the maximum width of gauge.
- F. Confirm that needle hole of needle and each gauge part, and needle bar and needle bar stopper③ do not contact by turning the sewing machine pulley by hands.



[Fig. 45]

18) Adjustment of the Device for raising presser foot minutely.

- A. Take down the presser foot.
- B. Unfasten the nut① in back side of sewing machine.
- C. Adjust the proper presser of working fabric and presser foot by twining the screw②.
- D. Fasten the nut① tightly.



[Fig. 46]

10

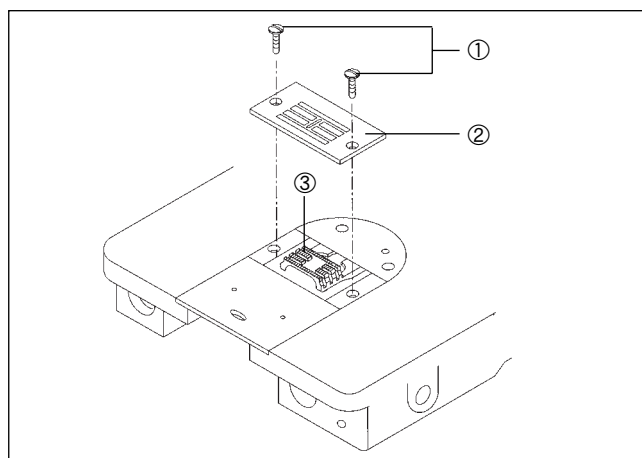
Maintenance

Please execute trimming every day in order to maintain function of the sewing machine and use for long. Also in case that it was not used for long, use the sewing machine after trimming as followings.

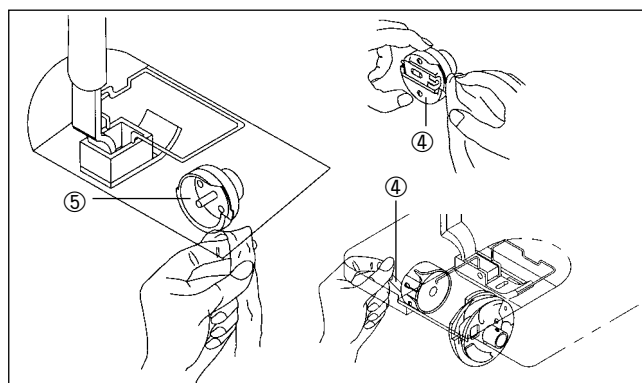
Notice

- Turn off the power switch before work.
Stepping on the pedal by mistake, it becomes cause of injury as the sewing machine starts operation.
- When handling lubricant, use protection glasses or protection gloves that it does not contact to eyes or skin.
It becomes cause of inflammation. Also do not drink lubricant. It can cause vomiting.
Place it where children cannot reach.

- A. Put up the presser foot.
- B. Remove the joint screw① (2 pieces) and remove needle plate②.
- C. Remove dust on the feed dog③ by using smooth brush.
- D. Attach needle plate② with joint screw① (2 pieces).
- E. Remove bobbin④ case.
- F. Remove dust on hook⑤ with smooth cloth and if there is a scratch or not clean or remove.
- G. Take off bobbin from bobbin case④ and wash out the foreign substances from bobbin case④ with cloth.
- H. Put bobbin into bobbin case④ and set bobbin case④ to sewing machine.
- I. Lay down head part of sewing machine.
- J. Wash foreign substances on remove, clean⑥ with cloth.
- K. If oil is lower than arrow of <LOW>, supply lubricant.
 - ※ Use the designated oil for lubricant.
 - ※ When lubricant gets dirty, remove oil fan cork screw and replace lubricant.
 - ※ Wash foreign substances stuck on magnet⑦ and oil fan.
 - ※ Dispose waste oil properly pursuant to regulations.
- L. Return the head part of sewing machine to original status.
- M. Check if lubrication amount of hook is proper.
If it is not proper, handle it by adjusting.
- N. If needle is bent or gets stumpy, replace the needle.
- O. Check if upper thread passes properly.
- P. Execute test sewing.



[Fig. 47]



[Fig. 48]



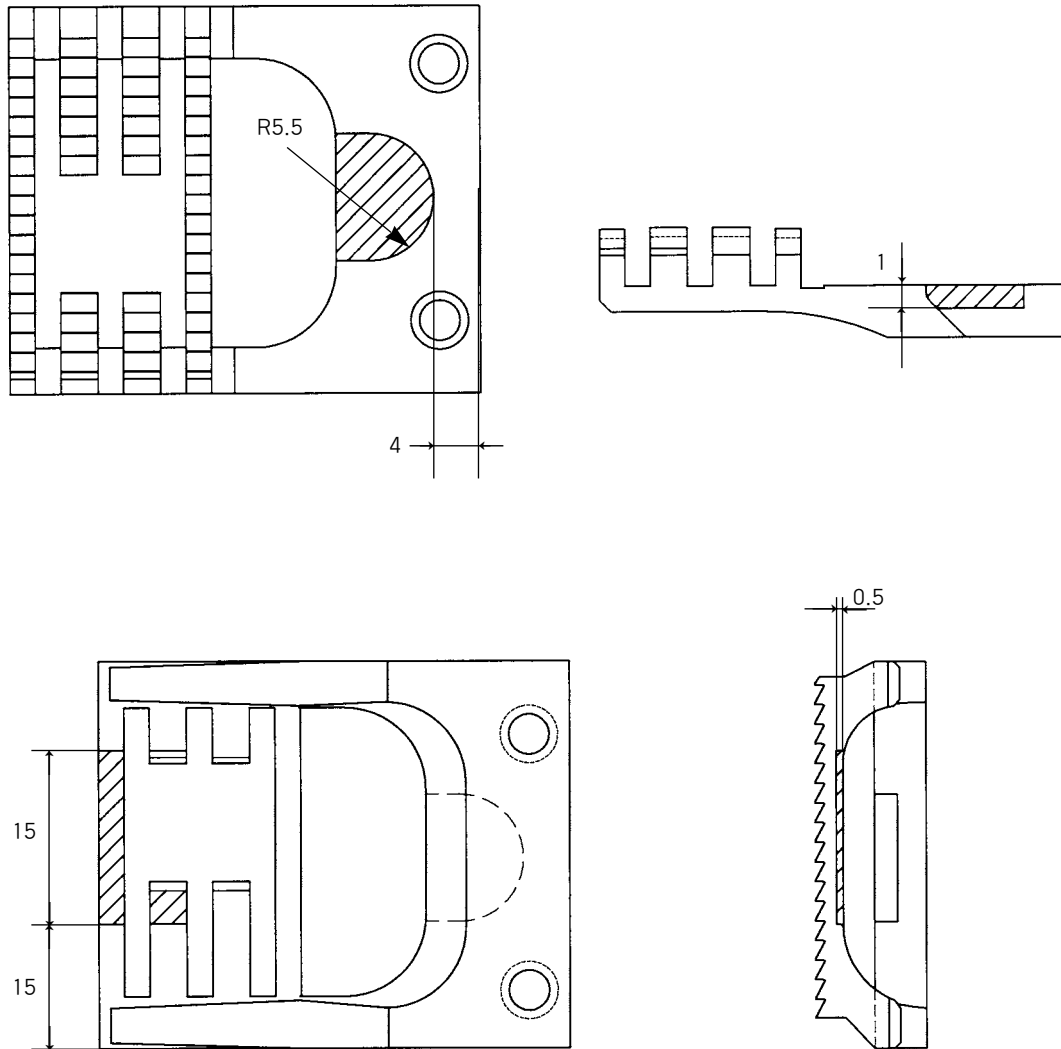
[Fig. 49]

11

In Case of Using Feed Dog Except SunStar's one

In case of using feed dog on the market, process the feed dog as shown in the figure.

※If you use the feed dog without processing, rotary mes and fixed mes are damaged.



Failure Causes and Countermeasures

- Check the below points before you request the repair service.
- If the below process does not improve the status, turn off the power switch and ask to the purchase sales agent.

Danger

- Turn off the power switch before work and pull of the plug.
If you step on the pedal by mistake, the sewing machine starts operating and it becomes cause of injury.

Order	Failure Status	Failure Cause	Actions
1	Problem in machine driving and operation	Excessive relaxation of belt tension or belt breakage	Belt tension adjustment and belt replacement
		Short of fuse for power supply or circuit	After checking short of main motor drive fuse in control box and replace
2	Defect of Stop Location	Relaxation of main driving belt	Belt tension adjustment
		Defect of synchro location	Readjustment of synchro location
3	Needle broken	Damage to needle (bending of needle or abrasion and deformation of needle hole or groove in groove part and needle string)	Needle replacement
		Mounting of wrong needle	Proper mounting of needle
		Contact of needle and shuttle	Interval adjustment of needle and shuttle
4	Cutting phenomenon of thread	Thread inserting is not correct	Proper insertion of needle
		Defective mounting of needle (height, direction and etc.)	Needle remounting
		Needle damage (bending or abrasion and deformation of needle hole or groove in groove part and needle string)	Needle replacement
		Strong tension of upper thread and lower thread	Tension adjustment
		Excessive spring tension and operation of thread take-up spring	Adjustment of thread take-up spring tension and operation

Order	Failure Status	Failure Cause	Actions
5	Skip of sewing point	Using bent needle	Needle replacement
		Using improper needle comparing to using thread	Needle replacement
		Defective needle mounting	Needle remounting
		Improper needle and hook timing	Readjustment of needle and hook timing
		Interval of groove on needle and hook point is too large.	Readjustment of needle bottom dead point
		Excessive spring tension and operation of thread take-up spring	Adjustment of thread take-up spring tension and operation
6	Defective Thread Jointing Status	Weak upper thread tension	Upper thread tension adjustment
		Weak lower thread tension	Lower thread tension adjustment
		Improper needle and hook timing	Readjustment of needle and hook timing
7	Occurrence of thread cutting mistake	Exchange tension of mobile mes and fixed mes is relaxed.	Tension adjustment of fixed mes
		Abrasion of groove on knife part of mobile mes and fixed mes.	Replacement of mobile mes and fixed mes
		Defective location of thread cutting cam	Readjustment of thread cutting cam location

13

Error Indications and Action Plan

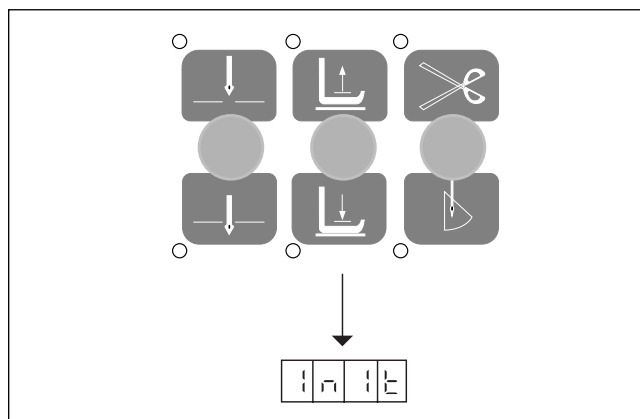
error code	Content	Check error
Er06	origin check error	<ul style="list-style-type: none"> • Check badness of connector connection • Check badness of origin sensor
Er09	Pattern prohibit error	<ul style="list-style-type: none"> • Input pattern data editing
61	synchronizer error	<ul style="list-style-type: none"> • Check badness of synchro connector connection • Check badness of welding
128	encoder off line error	<ul style="list-style-type: none"> • Check badness of connector connection
129	over load	<ul style="list-style-type: none"> • Badness main motor connection
130	Synchronizer signal error (sewing machine lock)	<ul style="list-style-type: none"> • Check synchro signal

14

Others

1) Initialization of Machine

- A. Turn on the power with pressing needle Up/Down key, presser foot up/down key and thread trimming/wiper key.
- B. Indication device displays **I n I t** and after a moment, width is displayed. Then, initialization is completed.

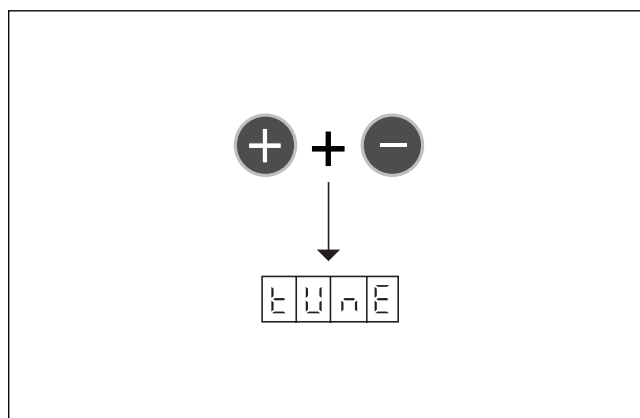


2) Inertia Tuning

- A. Turn on the power with pressing +key and -key.
 - Indication device displays **t U n E**
- B. Stepping on the pedal, the machine automatically performs inertia tuning.
 - It performs driving and controlling 8 times by itself.

[Notice]

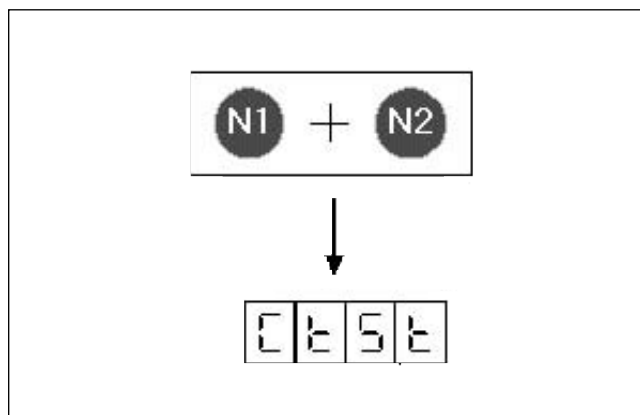
As the needle bar stops at optional location after performing inertia tuning, turn the power on and off.



3) Hook Test Function

※ It is the function to match hook timing.

- A. Turn on the power with pressing N1 and N2.
Indication device is displayed as shown in the figure.
- B. Match hook timing by turning pulley by hands.
- C. Pressing PARA/SET key, the machine converts to sewing available status.

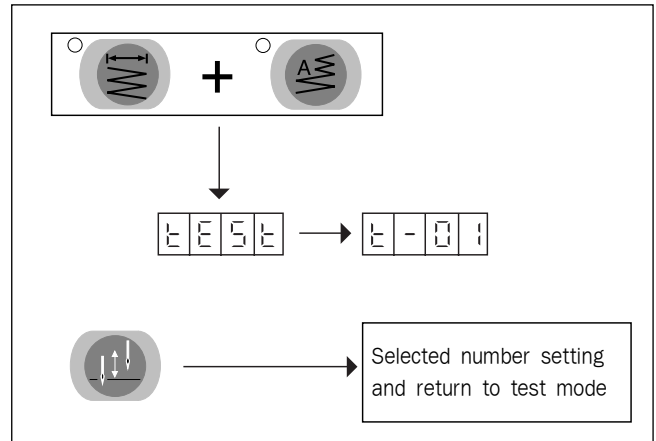


4) Machine Test Function

■ Test Mode and Description

Operation Method

- A. Turn on the power with pressing zigzag-width key.
 - Indication device is displayed "tEst" and after a moment, returns to test function mode.
 - Indication device displays "t-01".
- B. Select test mode number by + and -key. (Mode scope: 1~10)
- C. Set the selected number by pressing half-stitch key.
 - PARA/SET indication lamp blinks.
- D. Set RUN/STOP by straight-line pattern key.
 - Straight-line pattern lamp turns on.
 - PARA/SET indication lamp blinks continuously.
- E. Pressing half-stitch key, return to selection mode.

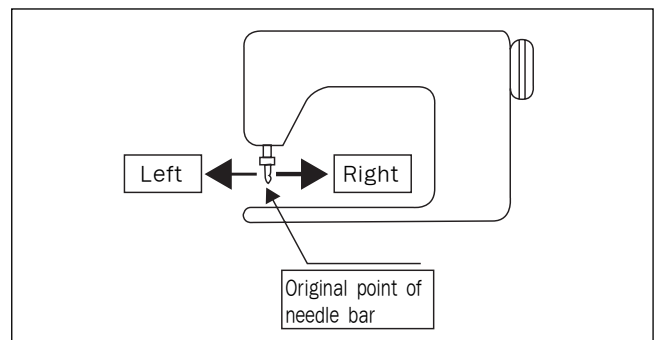


(1) X Y jog & Original Sensor Test

1. After selecting test mode, make "t-01" to be displayed.
 - Set the mode by pressing half-stitch key.
2. Pressing + and -key, step motor rotates to the right and the reverse.

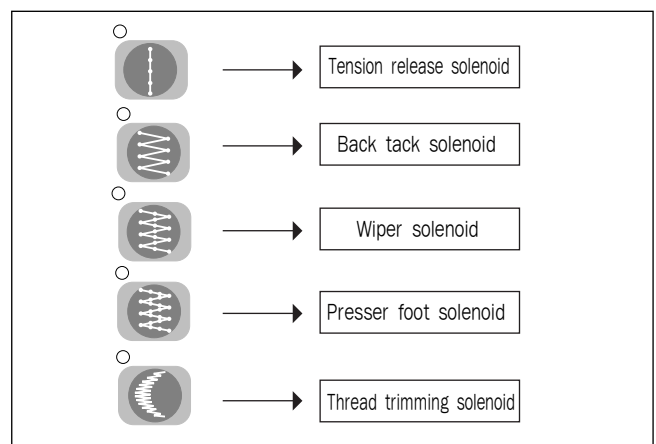
(At this time, whenever needle bar passes the original point, indication lamp of straight-line pattern blinks or turns off.)

 - +Key: Needle bar moves to the right.(Lamp on)
 - -Key: Needle bar moves to the left.(Lamp off)
3. End test by pressing half-stitch key.



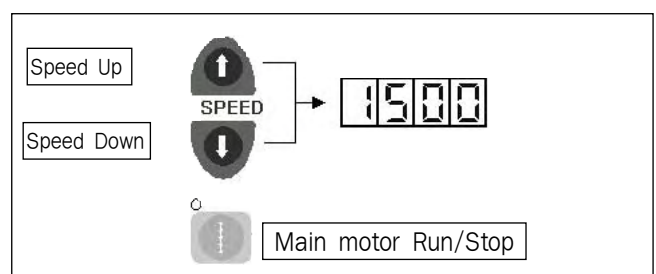
(2) Solenoid on/off test function

1. After selecting test mode, make "t-02" to be displayed.
 - Set the mode by pressing half-stitch key.
2. Pressing the corresponding key as shown in the figure, solenoid acts and corresponding lamp turns on.
3. End test by pressing half-stitch key.



(3) Main Motor Test Function

1. After selecting test mode, make "t-03" to be displayed.
 - Set the mode by pressing half-stitch key.
2. Set speed by pressing speed increase/decrease key.
3. Pressing straight-line pattern key, motor rotates.
4. Pressing straight-line pattern key again, it stops.
5. End test by pressing half-stitch key.

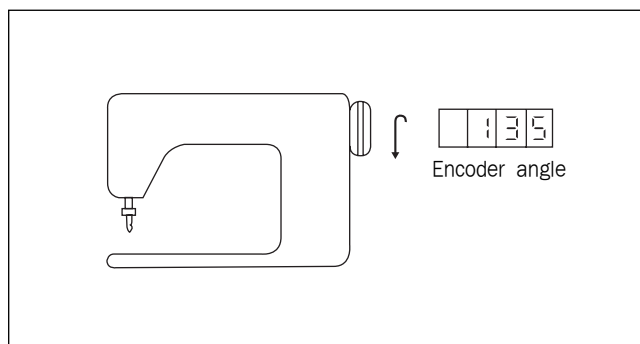


(4) Pulley Location (Encoder) Test Function

1. After selecting test mode, make "t-04" to be displayed.
• Set mode by pressing half-stitch key.
2. Turning by hands as shown in the figure, encoder angle is displayed on the indication device.
3. End test by pressing half-stitch key.

[Notice]

If value does not change, encoder system including connector is in trouble.

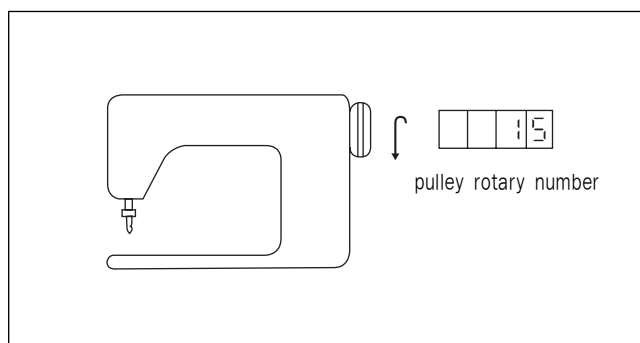


(5) Synchro Test Function

1. After selecting test mode, make "t-05" to be displayed.
• Set mode by pressing half-stitch key.
2. Turning by hands as shown in the figure, number of pulley rotation is displayed on the indication device.
3. End test by pressing half-stitch key.

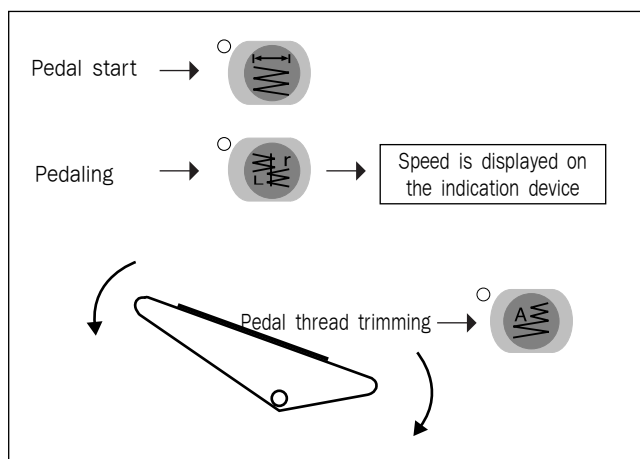
[Notice]

If value does no change despite turning more than 1 circulation, synchro system including connector is in trouble.



(6) Pedal Input Test Function

1. After selecting test mode, make "t-06" to be displayed.
• Set mode by pressing half-stitch key.
2. Starting pedaling forward as shown in the figure, width indication lamp turns off and stepping, base line indication lamp turns off. And stepping backward the pedal, indication lamp of start condense turns off.
(At this time, speed is displayed on the indication device.)
3. End test by pressing half-stitch key.



(7) Aux out Test Function

1. After selecting test mode, make "t-07" to be displayed.
• Set mode by pressing half-stitch key.
2. Pressing straight-line pattern key, all the 8 auxiliary output (J11 on digital board) turn on and pressing straight-line pattern key again, all turn off.
3. End test by pressing half-stitch key.

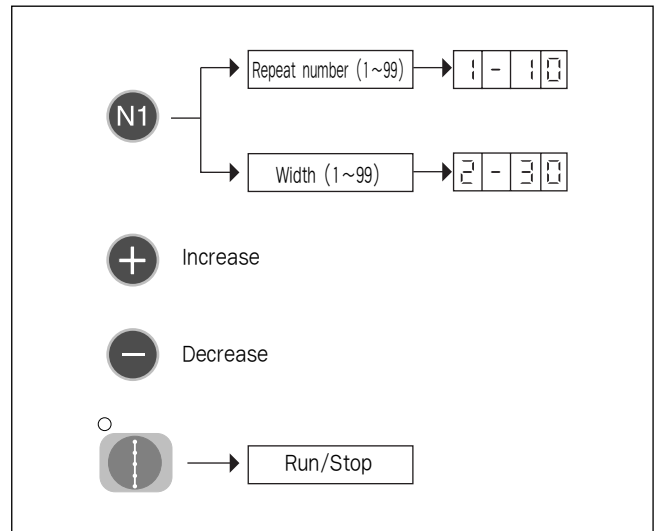
(8) Aux in Test Function

1. After selecting test mode, make "t-08" to be displayed.
 - Set mode by pressing half-stitch key.
2. Pressing knee lifter key, indication lamp of end condense turns on or turns off, and pressing A button (reverse switch), lamp of needle down stop turns on or turn off.
3. End test by pressing half-stitch key.

(9) X direction Stepping Motor Motion Test (1)

-Jumping test

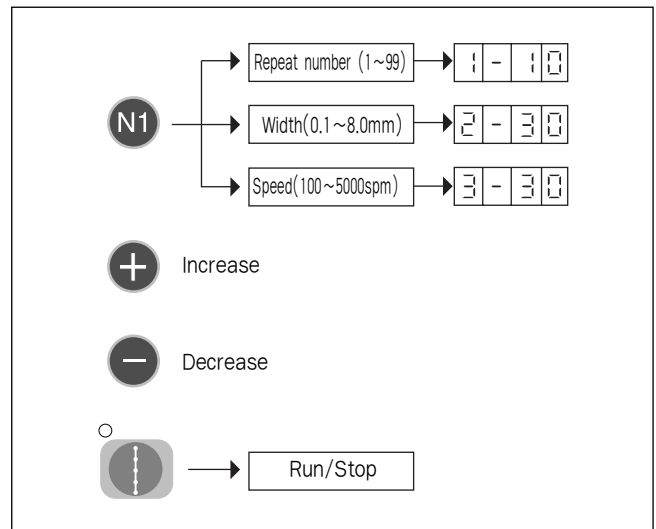
1. After selecting test mode, make "t-09" to be displayed.
 - Set mode by pressing half-stitch key.
2. Set repeat number and width by pressing N1 key as shown in the figure.
 - Repeat number: 1~99 times (ex: 10 times)
 - Width: 0.1~8.0mm (ex: 3.0mm)
3. Pressing straight-line pattern key, it operates.
4. End test by pressing half-stitch key.



(10) X direction Stepping Motor Motion Test (2)

-Moving test

1. After selecting test mode, make "t-10" to be displayed.
 - Set mode by pressing half-stitch key.
2. Set repeat number, width and speed by pressing N1 key as shown in the figure.
 - Repeat number: 1~99 times (ex: 10 times)
 - Width: 0.1~8.0mm (ex: 3.0mm)
 - Speed: 100~5000spm (ex: 3000spm)
3. Pressing straight-line pattern key, it operates.
4. End test by pressing half-stitch key.



5) Parameter Changing Method and Classification

(1) General Sewing related Parameter Number (A Group)

※ Operate by pressing N1 key after turning on the power pressing PARA/SET key.

Select desired number, press straight-line pattern key and change parameter value. Then, store the changed value by pressing straight-line pattern key again.

No.	Function and Description	Setting Scope	Shipping Status	Unit
A-01	Maximum sewing speed	5000 spm	4000 spm	100smp
A-02	Set speed of sewing start 1~5 (soft start setting)	[1]Stitch : 200~900 [2]Stitch : 200~2700 [3]Stitch : 200~2700 [4]Stitch : 200~2700 [5]Stitch : 200~2700	200 spm 500 spm 1000 spm 1500 spm 2000 spm	100smp
A-03	Set whether to use automatic knee lifter	0 : Impossible 1 : Possible	0: impossible	
A-04	Speed of half-stitch	100~510spm	100 spm	2spm
A-05	Set operation key lock function	0 : Impossible 1 : Possible	0: impossible	
A-06	Set maximum zigzag-width	0.1~10.0mm	8.0mm	0.1mm
A-07	Not use			
A-08	Not use			
A-09	Not use			
A-10	Set XY feed start location	0~255	0	1
A-11	Set thread trimming speed	100~510spm	190 spm	2spm
A-12	Set reverse rotation after thread trimming	0 : Impossible 1 : Possible	0: impossible	
A-13	Set reverse rotation angle after thread trimming	0~255°	24°	1°
A-14	Delay time after thread trimming	4~1020ms	4ms	4ms
A-15	Wiper On time	4~1020ms	40ms	4ms
A-16	Wiper Off time	4~1020ms	40ms	4ms
A-17	Time taking to automatically rise presser foot	1~30S	30s	1s
A-18	Presser foot rise time	4~1020ms	4ms	4ms
A-19	Presser foot fall time	4~1020ms	200ms	4ms
A-20	Tension release solenoid Full On time	4~1020ms	500ms	4ms
A-21	Back tack solenoid Full On time	4~1020ms	64ms	4ms
A-22	Wiper solenoid Full On time	4~1020ms	500ms	4ms
A-23	Presser foot solenoid Full On time	4~1020ms	100ms	4ms
A-24	Thread trimming solenoid Full On time	4~1020ms	500ms	4ms
A-25	Tension release solenoid duty	20~70%	50%	5%
A-26	Back tack solenoid duty	20~70%	15%	5%
A-27	Wiper solenoid duty	20~70%	50%	5%
A-28	Presser foot solenoid duty	20~70%	50%	5%
A-29	Thread trimming solenoid duty	20~70%	50%	5%

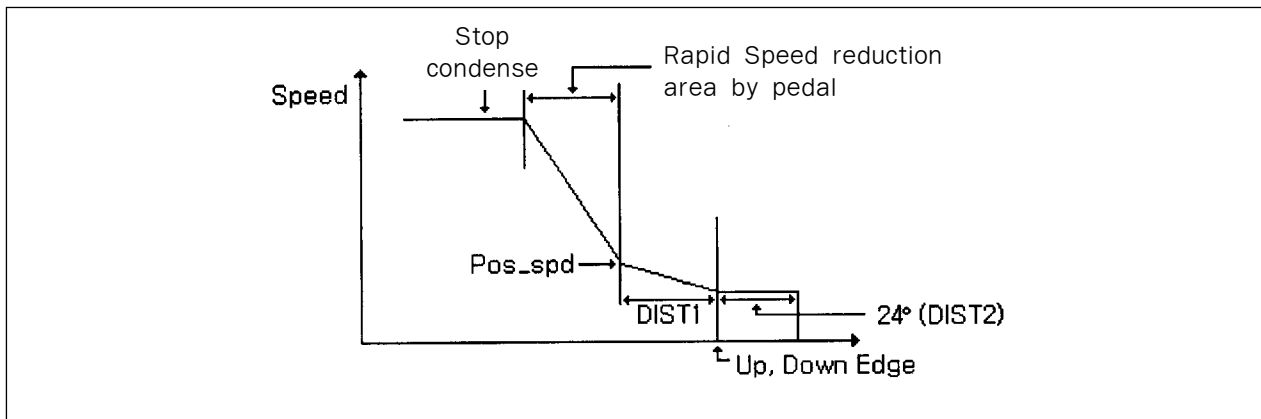
(2) Servo Motor related Parameter Number (B Group)

※ Operate by pressing N2 key after turning on the power while pressing PARA/SET key.

Select desired number, press straight-line pattern key, and change parameter value. Then, store the changed value by pressing straight-line pattern key again.

No.	Function and Description	Function Name	Setting Scope	Shipping Status	Unit,Remarks
B-01	Location detecting speed to stop	pos-spd	2~510spt	220spt	2spt
B-02	Speed just before stop	end spd2	0~255spt	16spt	1spt
B-03	Delay time to be at right location at stopping moment	StopDelay	4~1020ms	80ms	4ms
B-4	1 location detecting distance	DIST1	0~255	150Pluse	1Pulse
B-05	Distance gain A	KC1A	0~255	10	1
B-06	Distance gain B	KC1B	0~255	2	1
B-07	Distance gain C	KC1C	0~255	10	1
B-08	Entire level for distance gain	KC2	0~255	100	1
B-09	Speed gain A	KF1A	0~255	160	1
B-10	Speed gain B	KF1B	0~255	80	1
B-11	Speed gain C	KF1C	0~255	180	1
B-12	Entire level for speed gain	KF2	10~100	100	1
B-13	Strength at pulley stop	KH1	10~100	40	1
B-14	Recovered distance at pulley stop	KH2	2~100	20	1
B-15	Speed reduction rate from stop signal to location detecting speed	accelA	10~100	54	1
B-16	Speed increase rate (the bigger the faster)	accelB	10~100	80	1
B-17	Speed decrease rate (the bigger the slower)	accelC	2~100	30	1
B-18	Decrease ratio from location detecting speed to stop	accelD	0~255	4	1
B-19	Inertia value of sewing machine	Inertia	0~9960smp		Using inertia tuning
B-20		SPMUPPER		1000spm	40ms
B-21		UPPosition			No use
B-22		IND-REFM			No use
B-23		TRStartM			No use
B-24		TREndM			No use
B-25	Pulley size of sewing machine	PULUY-SIZEM			No use
B-26		CutStatM			No use
B-27		CutEndM			No use
B-28	Synchro sensor detecting time	SLockTmM	0.5~127.5sec	4sec	0.5sec
B-29	Overload detecting time	OvLoadM	0.5~127.5sec	3sec	0.5sec
B-30	Possible/impossible of sewing machine pulley fixing	HOLD-FG	1: possible 0: impossible	0: Impossible	
B-31	Servo motor rotating direction	HOLD-MODE	0: Reverse direction 1: right direction	1: right direction	
B-32	Original point detecting time	Orgtm	4~1020ms	500ms	4ms

※Description of Shade Part

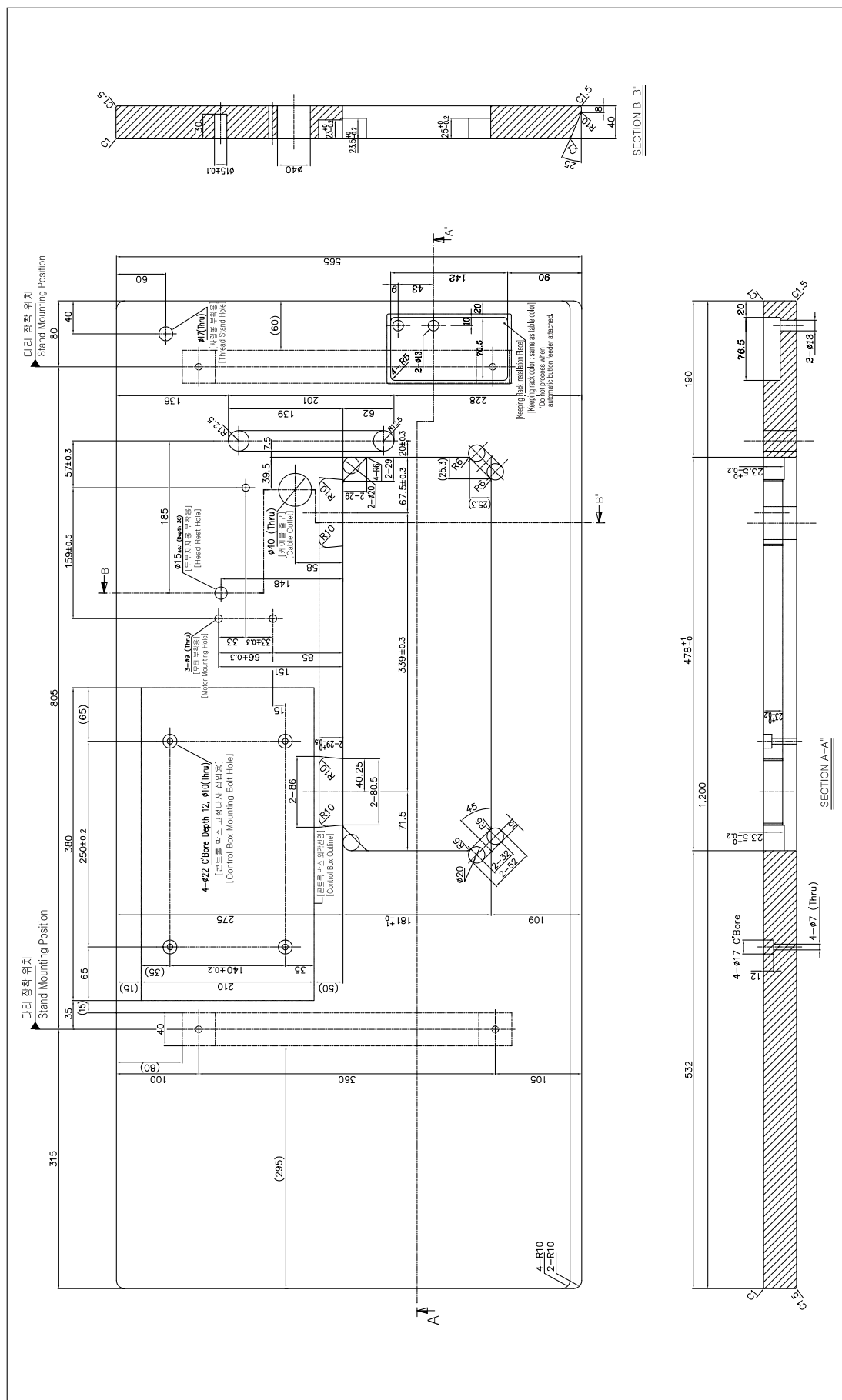


- B-04 (DIST): It is the value indicating location that rapid speed reduction is completed at stop and though stable rapid speed reduction is available as much as the value is bigger, but final stop section gets long.
- B-08 (KC2): It can acquire by inertia tuning and if the value gets bigger, pursuit for speed gets slow. (Common user or/and technician's use is prohibited.)
- B-12 (KF2): It can acquire by inertia tuning and if the value gets bigger, pursuit for speed gets slow. (Common user or/and technician's use is prohibited.)
- B-15 (accelA): It can acquire by inertia tuning and as the reduced speed until completion of rapid speed reduction after input pedal stop signal, if the value is bigger, rapid speed reduction is made but if it gets too big, it may not be done.
- B-16 (accelB): In case of speed increase by pedaling, it is the value indicating how fast speed increases and as this value is bigger, speed increase get faster to the objective speed but speed change can be large at the moment of reaching to objective speed.
- B-17 (accelC): As the value indicating how fast speed increases in case of speed decrease by pedaling, as this value is bigger, speed decrease gets faster to the objective speed, but speed change can be large at the moment of reaching to objective speed.

※Example that can use above function of shade part

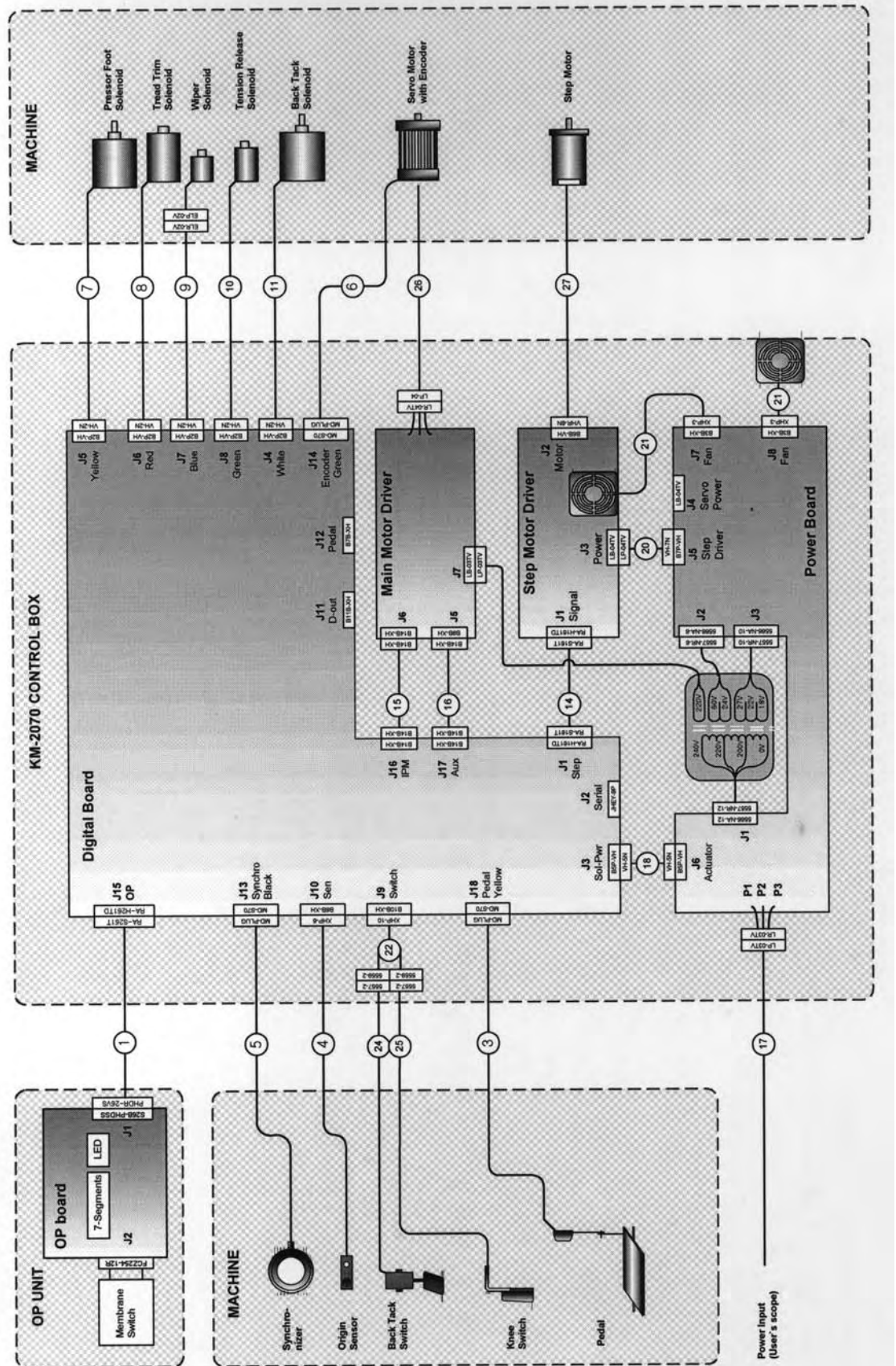
- ① Rapid stop is not done and one stitch goes further.
In this case occurs when sewing machine is operated at high speed, or in case that rapid speed reduction is not possible within short time as load of sewing machine is big. Make value B-14 and B-17 large.
- ② When increase or decrease sewing machine speed, in slow case of the time that motor follows the speed
This case can occur when increase or decrease rate is small comparing to increase/decrease load of sewing machine. Make value B-16 and B-17 large.

Table Drawing



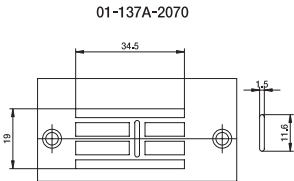
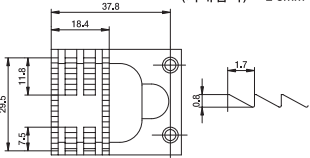
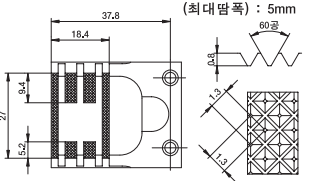
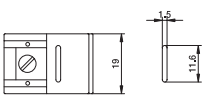

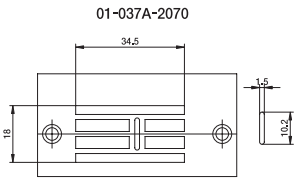
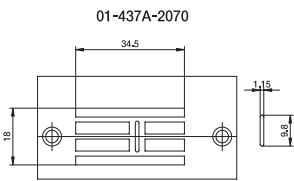
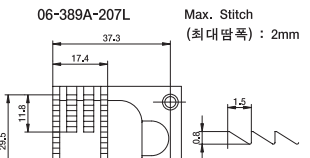
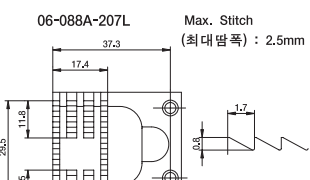
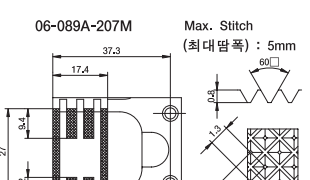
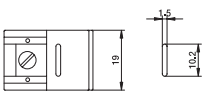
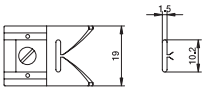
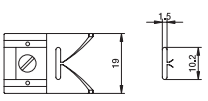
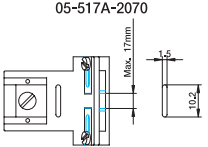

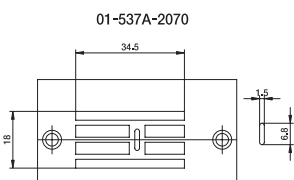
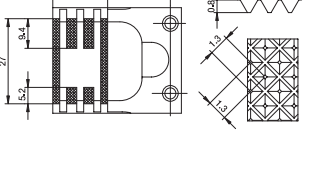
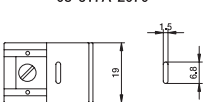

Block Wiring Diagram

KM-2070 Block Diagram



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Gauge Parts

Zigzag Width (진폭)	Part Name (품명)			
	Needle Plate (침판)	Feed Dog (톱니)	Presser Foot (노루발)	Stopper (스토퍼)
10mm	<p>01-137A-2070</p> 	<p>06-188A-207L Max. Stitch (최대밈폭) : 2.5mm</p>  <p>06-189A-207M Max. Stitch (최대밈폭) : 5mm</p> 	<p>05-117A-2070</p> 	<p>04-009C-2070</p> 
8mm	<p>01-037A-2070</p>  <p>01-437A-2070</p> 	<p>06-389A-207L Max. Stitch (최대밈폭) : 2mm</p>  <p>06-088A-207L Max. Stitch (최대밈폭) : 2.5mm</p>  <p>06-089A-207M Max. Stitch (최대밈폭) : 5mm</p> 	<p>05-017A-2070</p>  <p>05-317A-2070</p>  <p>05-817A-2070</p>  <p>05-517A-2070</p> 	<p>04-010C-2070</p> 
5mm	<p>01-537A-2070</p> 		<p>05-617A-2070</p> 	<p>04-011C-2070</p> 

Zigzag Width (진폭)	Part Name (품명)			
	Needle Plate (침판)	Feed Dog (톱니)	Presser Foot (노루발)	Stopper (스토퍼)
5mm	<p>01-637A-2070</p> <p>01-237A-207L</p>	<p>06-488A-207L Max. Stitch (최대밈폭) : 2.5mm</p> <p>06-288A-207L Max. Stitch (최대밈폭) : 5mm</p>	<p>05-217A-2070</p>	<p>04-011C-2070</p>
	<p>01-337A-207M</p>	<p>06-588A-207L Max. Stitch (최대밈폭) : 2.5mm</p> <p>06-289A-207M Max. Stitch (최대밈폭) : 5mm</p>	<p>05-917A-2070</p>	
	<p>01-737A-2070</p>	<p>06-688A-207L Max. Stitch (최대밈폭) : 2.5mm</p> <p>06-389A-207M Max. Stitch (최대밈폭) : 5mm</p>	<p>05-717A-2070</p>	
3mm	—	—	—	<p>04-012C-2070</p>