SWF

USER'S MANUAL

Super High Speed Multi Head Automatic Embroidery Machine

SWF/SB-Series

SunStar CO., LTD.

MME-110103

1. THIS IS AN INSTRUCTION FOR SAFE USE OF SWF AUTOMATIC EMBROIDERY MACHINES. READ THOROUGHLY BEFORE USE.

2. CONTENTS IN THIS INSTRUCTION MAY CHANGE, WITHOUT PRIOR NOTICE, FOR IMPROVEMENT OF MACHINE QUALITY AND THUS MAY NOT CORRESPOND TO THE MACHINE YOU PURCHASED. CONTACT YOUR SALES AGENT FOR INQUIRIES.

3. THIS IS DESIGNED AND MANUFACTURED AS AN INDUSTRIAL MACHINE. IT SHOULD NOT BE USED FOR OTHER THAN INDUSTRIAL PURPOSE.

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1 SAFETY RULES

The following set of safety rules categorized as DANGER, WARNING, and CAUTION indicates possibilities of physical or property damages if not fully observed.

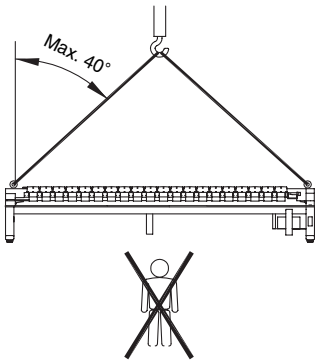
DANGER : These safety instructions MUST be observed to be safe from danger when installing, delivering, or repairing the machine.

WARNING : These safety instructions MUST be observed to be safe from machine injuries.

CAUTION : These safety instructions MUST be observed to prevent predictable machine errors.

1-1) MACHINE DELIVERY

DANGER



※ Make sure all persons and obstacles are out of the way of the moving equipment.

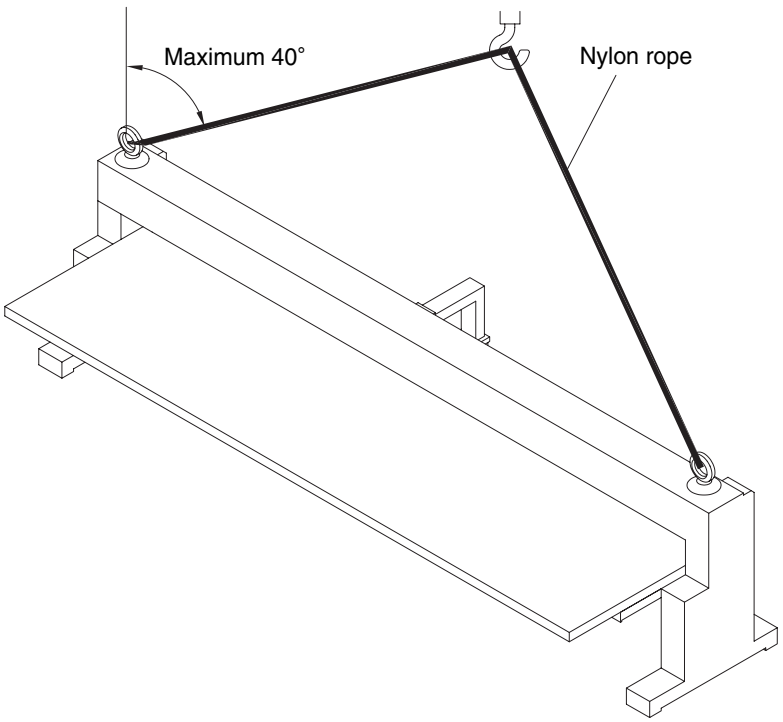
ONLY TRAINED AND EXPERIENCED PERSONS, FAMILIAR WITH THE RELEVANT SAFETY INSTRUCTIONS, SHOULD HANDLE THE MACHINE. MAKE SURE TO FULLY OBSERVE THE FOLLOWING INSTRUCTIONS.

1) Using a crane

① Make sure that the crane is large enough to hold the machine. Use a nylon rope of sufficient strength.

② Place two nylon ropes around the eyebolt respectively. Insert the rope escape-free bolt (M12 × L200) into the rope hanger and fix it with a nut.

③ If you have to hang the ropes on the crane, make sure the rope angle is 40° or less.



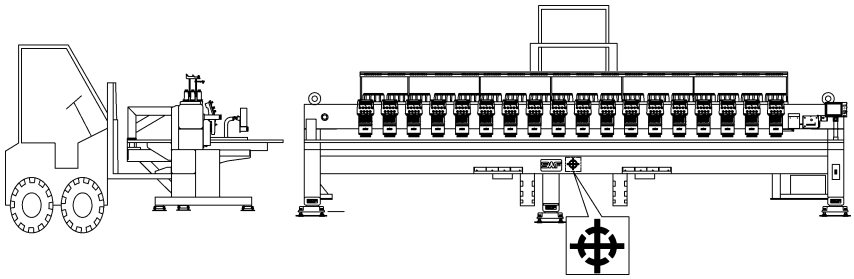
[Fig.1-1]

WARNING

2) Using a Forklift

① Make sure that size and weight of the forklift is sufficient to support the machine.

② Align the fork arm with the center of the machine weight as shown in [Fig.1-2] when lifting the machine. Lift the machine carefully from the back. Prevent the machine from tilting to either side.

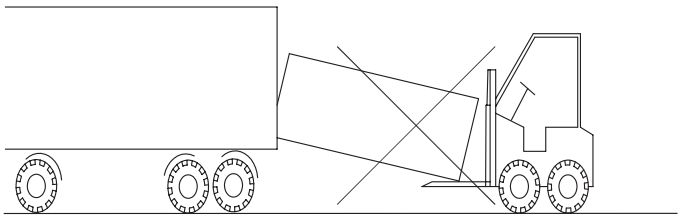


[Fig.1-2]

※ Forklifts are recommended only when cranes are not available. (The crane and the forklift must be sufficient in terms of size and weight to carry the machine.)

[WARNING]

Make sure to maintain the weight balance in machine deliveries, especially when unloading the machine from a forklift or a crane, in order to prevent injury or machine damages.



1-2) MACHINE INSTALLATION

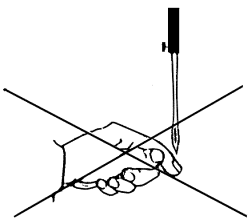
CAUTION

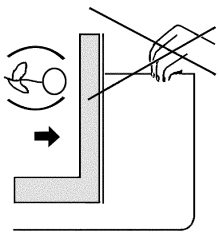
Installation environment may incur machine malfunction or breakdown. Make sure to meet the following conditions.

1) The foundation under the machine, i.e. table or desk, must be strong enough to support the weight of the machine (approximately 3.5 ton).
2) Air conditioning can eliminate dust and humidity that can cause pollution and corrosion of the machine. Make sure your machine is regularly cleaned.
3) Long exposure to direct sunlight can cause the paint of the machine to fade or change of the machine shape.
4) Allow at least 50cm (20 inches) of space on each side of the machine for convenient maintenance.

※ Please refer to 2. Machine Installation and Assembly for installation details.

1-3) MACHINE OPERATION





The SWF Automatic Embroidery Machine is designed for applying embroidery to fabric and other similar materials.

Pay careful attention to the WARNING and CAUTION stickers on certain parts of the machine. Make sure to observe the following when operating the machine:

1) Read thoroughly and fully understand the manual before operating the machine.
2) Dress for safety. Long and unbound hair, jewelry such as necklaces, bracelets, and wide sleeves can get caught in the machine. Wear shoes with non-slip soles.
3) Clear all persons from the machine before turning on the power.
4) Keep your hands or head away from the moving parts of the machine such as needle, hook, take-up lever, and pulley when the machine is in operation.
5) Do not remove the safety cover on the pulley or shaft when the machine is in operation.
6) Be sure the main power is turned off and the power switch is set to OFF before opening the cover of any electrical component or control box.
7) Be sure the main switch is OFF before manually turning the main shaft.
8) Turn the machine off when threading needles or inspecting the finished embroidery.
9) Do not lean against the cradle or place your fingers near the guide grooves of the frame.
10) The machine noise may exceed 85db when it is run at a maximum speed. It is not higher than the standard level, but you may need earplugs or sound-proof facilities for the operator and other workers.

1-4) MACHINE REPAIR

Only SWF-trained and selected repair engineers should do repair work.

1) Turn OFF the power before cleaning or repairing the machine. Wait for 4 minutes so the machine electricity is completely discharged.

[CAUTION]
It takes about 10 minutes after turning off the main switch before the electricity is fully discharged from X/Y main shafts and the drive box.

2) Do not change the settings or any parts on the machine without confirmation from SWF. Such change may cause safety accidents.
3) Use only SWF parts when repairing your machine.
4) Replace all safety covers when you are finished with your repair.

1-5) Location of Warning Stickers

Strictly follow instructions on ALL warning stickers placed on the machine as reminders for your safety.

⚠ WARNING

Fire or death may be caused by high voltage electric shock.
Don't open the cover except for service man assigned by SWF.
When open the cover turn off power and wait for 6 minutes.

⚠ WARNING

Physical damage may be caused by winding.
Don't put your hands near the arrow while the main shaft is rotating

⚠ WARNING

Injury may be caused by winding.
Be sure to turn off the power before cleaning, lubricating, adjusting or repairing.

⚠ WARNING

Physical injury may be caused by crevice.
Don` t put your finger in a groove on the table.

⚠ CAUTION

When the lubrication hose is filled with air, oil might not be properly supplied.
Make sure to remove the air inside the hose before poerating the machine.
Refer to the manual for detailde information.

⚠ WARNING

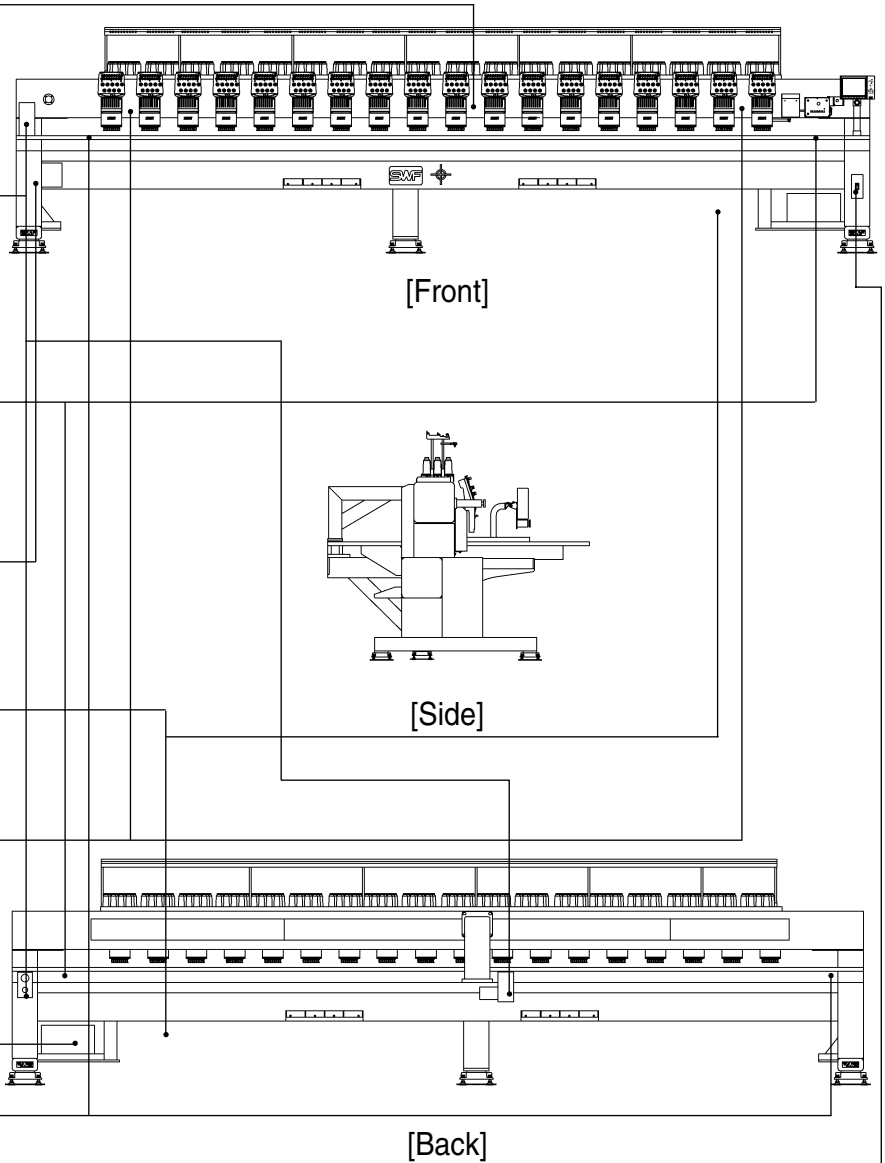
Injury may be caused by moving needle.
Ensure that the machine is in a stop condition before changing, threading or rethreading of needies or changing of needles.

⚠ WARNING

Physical damage may be caused by interposition.
While embroidery frame is running according to the direction of embroidery frame may be injured your hands by gap between fixed body and embroidery frame.

⚠ WARNING

① Turn off the main power before rotating the main shaft by hand!
② Do not remove covers during operation!
③ Turn off the main power before opening electricity-related boxes!



[Fig.1-3]

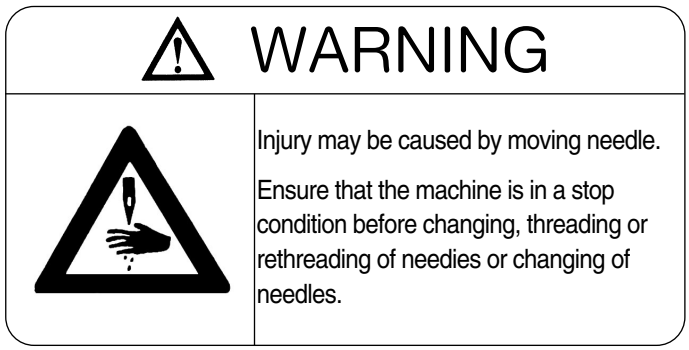
1-6) Contents of Warning Stickers

1) Warning

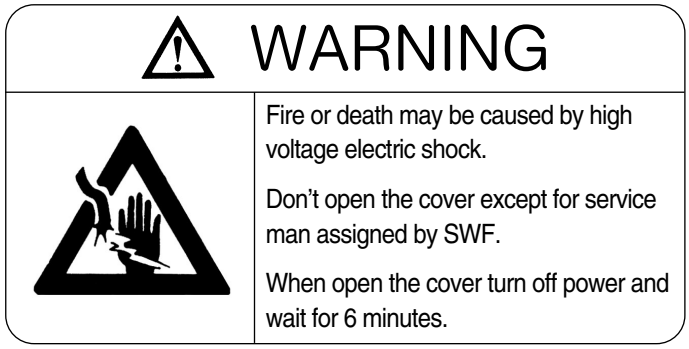
ⓐ

[CAUTION]
Safety cover refers to all covers near the operating parts of the machine.

ⓑ



ⓒ



2
MACHINE INSTALLATION AND ASSEMBLY

Install your machine in an appropriate environment and with adequate electrical supply. Failure to follow the directions may result in machine malfunction.

2-1) INSTALLATION ENVIRONMENT

1) Temperature: ① 0 ~ 40℃ (32 ~ 104˚F) when the machine is in operation
② − 25 ~ 55℃ (− 13 ~ 131˚F) when the machine is not in operation
2) Humidity: 45 ~ 85% (relative)

[CAUTION]
① Do not let moisture drops on the machine.
② Provide air conditioning to control humidity and to prevent dust and corrosion.

3) Grounding: Ensure the electricity is properly grounded.

Properly ground the machine to avoid the possibility of electric shock. Use three-wire grounding (grounding resistance below 100 ohms).

4) Close any doors and windows near the machine to prevent direct light, dust, and humidity.
5) Foundation under the machine must be a sufficiently strong and flat concrete to support the weight of the machine.
6) The machine must be installed and operated in an industrial area (Industrial Environment Classification: Class A)

2-2) ELECTRICITY INSTALLATION

Check if the input electricity of the machine is in the right range of the supply before installing or operating the machine. The electricity input required is as follows:

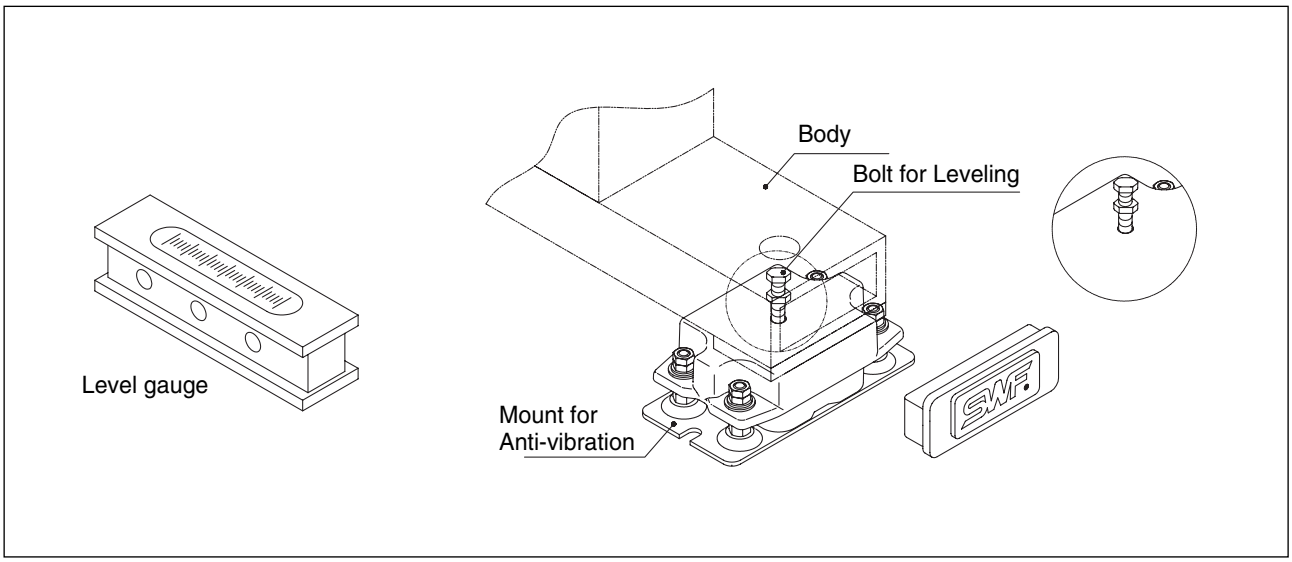
1) Allowed range of voltage: within 10% of the voltage set
2) Electric capacity and voltage consumption: 3 KVA 1.4 ~ 1.6 KW
3) Insulation resistance: over 10M Ω (measured with 500V insulation tester)

① Check the voltage supply where the machine will be installed.
② Install the cable away from the operator's work space to prevent accident or injury.

2-3) LEVELING THE MACHINE

The machine must be accurately leveled (especially front and back) to prevent the needle from moving out of position.

1) Use the adjusting bolts installed at the four stands to level the machine (front, rear, left, and right). Use a level gauge.

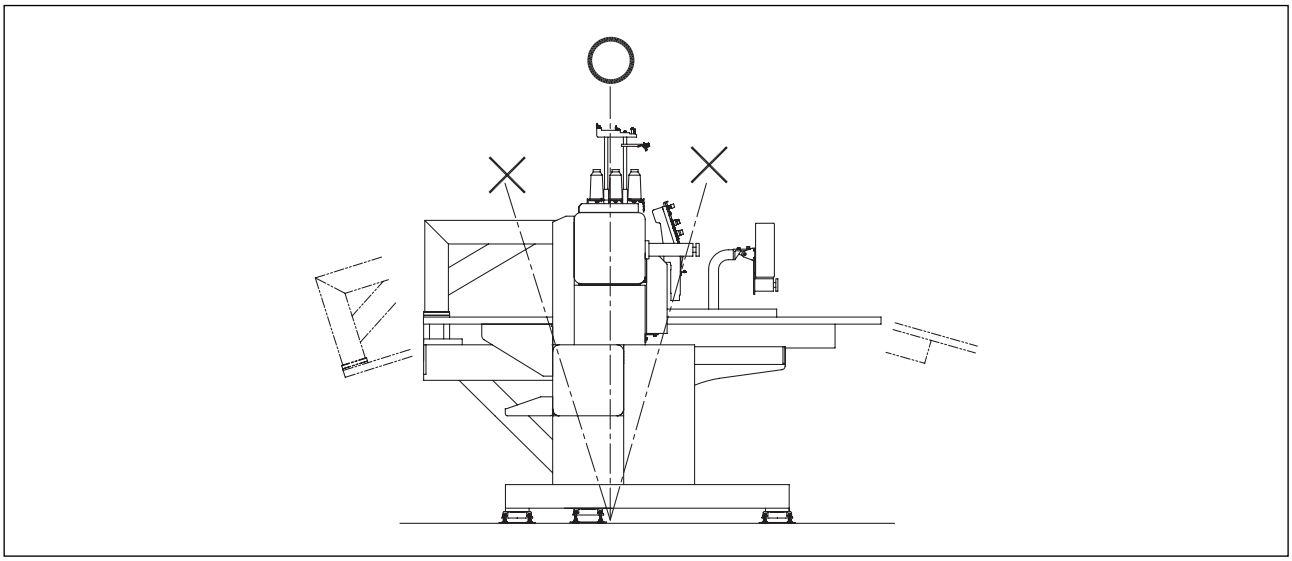


[Fig.2-1]

[CAUTION]

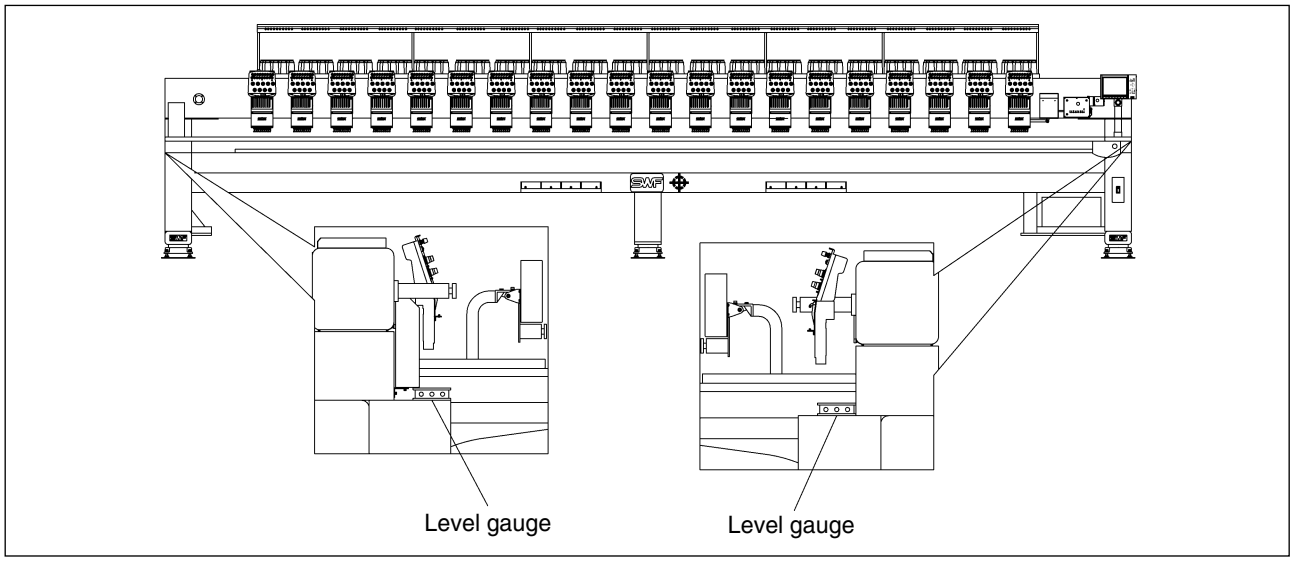
① Check the voltage supply where the machine will be installed.
② Install the cable away from the operator's work space to prevent accident or injury.
③ If the difference in heights of the four bolts is over 10mm, place spacers beneath the lower adjusting bolts to make the heights even.

2) Level the machine both front-back and left-right.



[Fig.2-2]

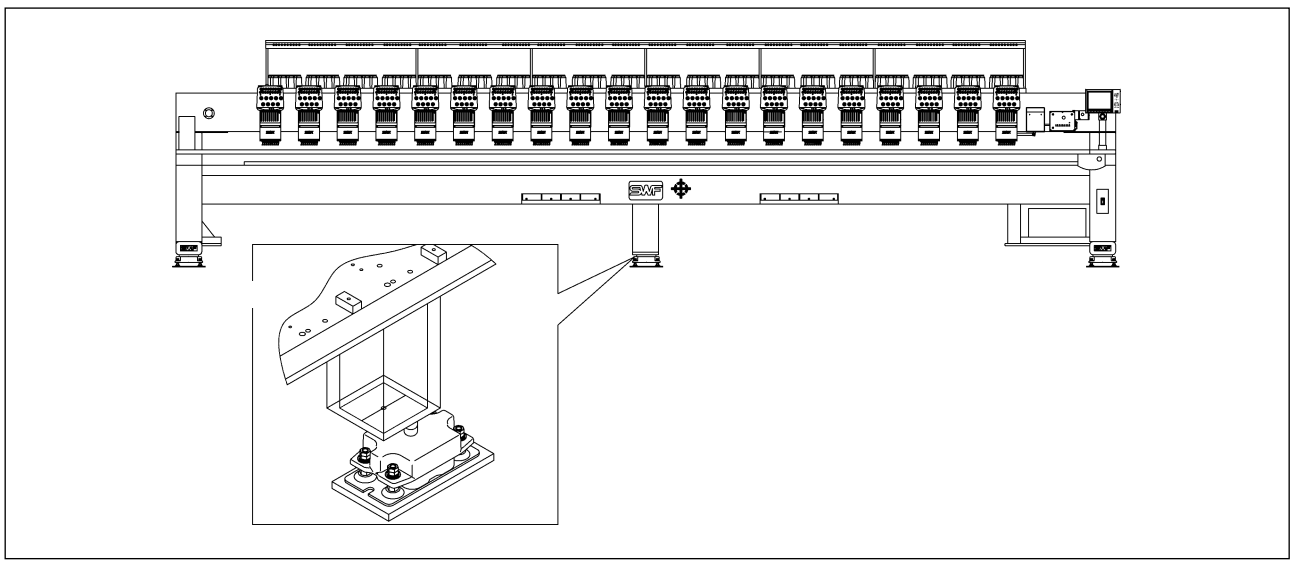
3) Using the level gauge



[Fig.2-3]

[CAUTION 1]
The level gauge does not measure accurately on a square pipe or a table.

4) After the leveling, fix the adjusting bolts with a nut.
5) After the leveling, install the supporting bolts as shown in [Fig.2-4]. Turn the bolts until they touch the level base and turn an additional quarter time. Fix the bolts with a nut.

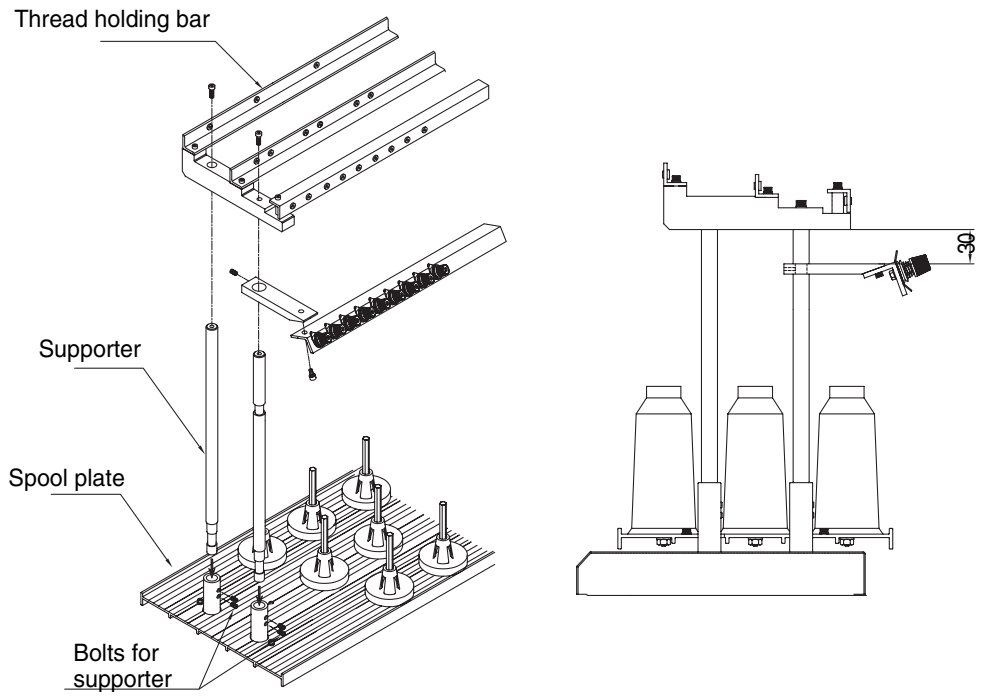


[Fig.2-4]

[CAUTION 2]
Supporting the bolts in the center reduces machine vibration and enhances balance. Make sure not to turn the bolts too much – it may lift the body of the machine.

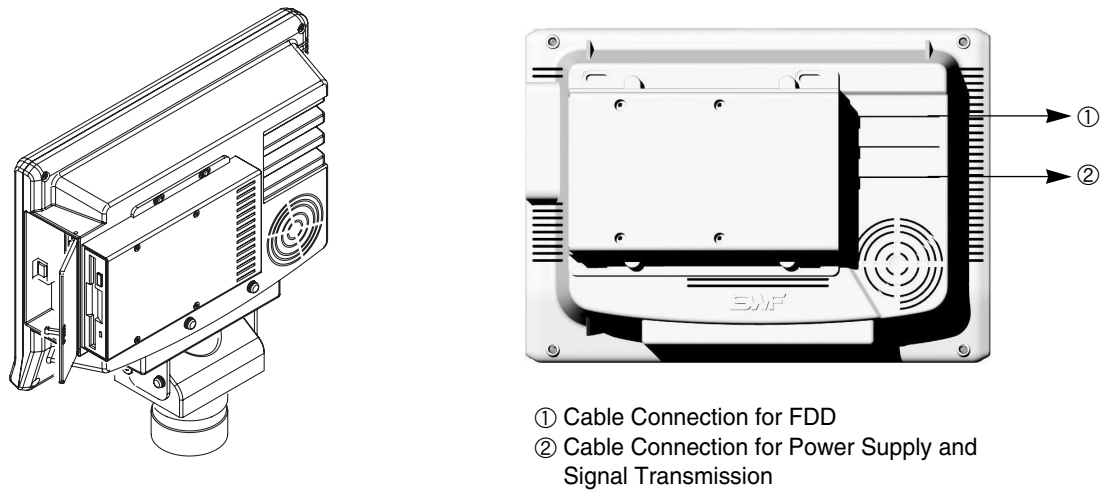
2-4) PERIPHERALS ASSEMBLY

1) Assembling Upper Thread Stand



[Fig.2-5]

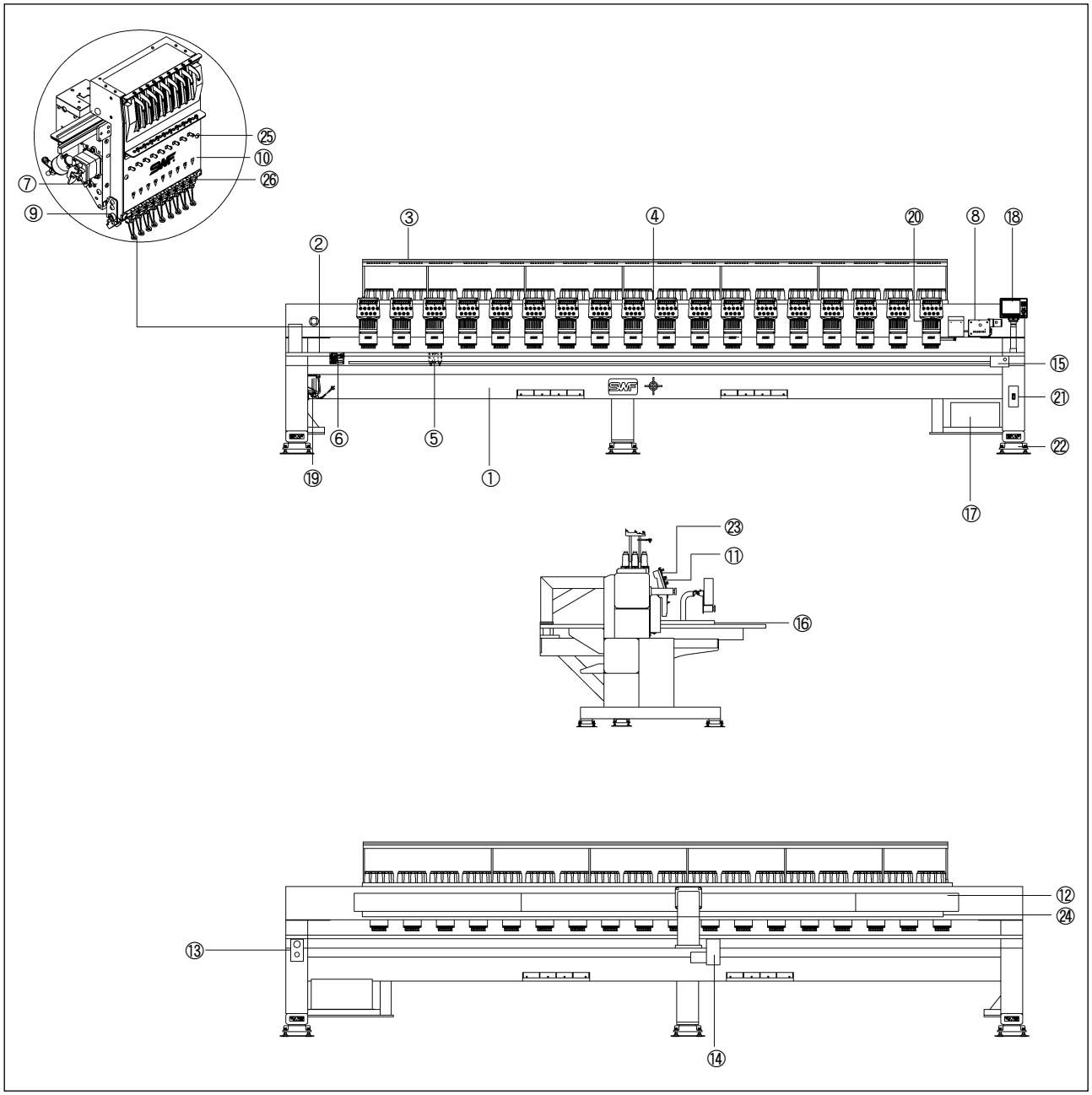
2) Assembling Operation Box



① Cable Connection for FDD
② Cable Connection for Power Supply and Signal Transmission

[Fig.2-6]

3
NAMES OF MACHINE PARTS



[Fig.3-1]

① Machine Body
② Table
③ Upper thread stand
④ Main shaft drive motor
⑤ Rotary hook base
⑥ Trimming driver box
⑦ Arm
⑧ Color change box
⑨ Upper thread holder
⑩ Head
⑪ Thread tension adjustment board
⑫ Sub-controller
⑬ X-axis driving system
⑭ Y-axis driving system
⑮ Bar switch
⑯ Frame
⑰ Main controller box
⑱ Operation box
⑲ Greasing pump
⑳ Encoder
㉑ Main power switch
㉒ Level base
㉓ Thread detector
㉔ Lamp
㉕ Thread detecting guide
㉖ Upper thread holding

4
FEATURES AND SPECIFICATIONS

(1) EXPANDED MEMORY SIZE
The machine can store a maximum of 100 designs. The basic memory size is 2 million stitches.

(2) MIRROR IMAGE CONVERSION AND DESIGN DIRECTION
You can turn the design from 1° to 359° in the increments of 1° and also reverse the design in the X direction (mirror image).

(3) ENLARGING AND REDUCING DESIGN
You can reduce or enlarge the embroidery design in size from 50% to 200% by 1% along the X and Y axis.

(4) AUTOMATIC SELECTION OF NEEDLE BAR
You can select the order of the needle bars up to the 99th bar.

(5) GENERAL REPETITION WORK
The same design can be repeated up to 99 times along the X and Y axis.

(6) SPECIAL REPETITION WORK
Several designs can be repeated freely at different turns (mirror) and angles up to 63 times.

(7) AUTOMATIC OFFSET
The frame automatically returns to the offset point when the embroidery is finished to make it easier for you to switch the frames. You can select AUTOMATIC OFFSET at PARAMETER SELECT MODE to move the frame automatically to the desired point, making it easier to do appliqués and to switch the frames.

(8) MANUAL OFFSET
You can manually move the frame to the pre-selected point to do appliqués or change the frames during embroidery work. The frame can be moved back to its original place by simply pressing the right buttons.

(9) RETURN TO START
The frame can be moved back to the start point of the design during the embroidery work.

(10) NON-STITCHING
The frame and the needle bar can move back and forth by the units of 1, 100, 1000, and 10000 stitches and by color without stitching.

(11) FRAME REVERSAL
When the thread breaks or runs out of track, you can move the needle bar back to the starting point of the design in the units of one to ten stitches.

(12) AUTOMATIC TRIMMING
The automatic trimming function, determined by the design and the machine set-up, enhances work productivity and quality of the finished product.

(13) AUTOMATIC DETECTION OF UPPER AND LOWER THREAD BREAKS
The machine detects when the upper thread breaks or the lower thread is out of the needle and automatically stops the machine.

(14) UPPER THREAD HOLDING DEVICE

Prevents thread escape on unused heads during sample embroidery as well as escape of upper thread during change of embroidery materials.

(15) AUTOMATIC RETURN TO STOP POINT IN UNEXPECTED BLACKOUT

When the power fails unexpectedly, the frame moves back to the exact point where the stitching stopped. This helps reduce the number of defects.

(16) 3.5″ FLOPPY DRIVE (EMBEDDED)

A 3.5″ floppy drive is embedded in the operation panel for you to read or store designs. Both 2DD and 2HD disks can be used.

(17) EDITING

You can delete, change, or insert stitch data and function codes (jump, finish, trimming).

(18) INDIVIDUAL HEAD OPERATION

You can work on the specific head with a broken thread.

(19) MACHINE STOPPAGE

The screen will indicate why the machine has stopped.

(20) RPM

The screen indicates rpm.

(21) FRAME SPEED SET-UP

You can adjust the frame speed to high, medium, or low.

(22) UNUSED MEMORY

The screen indicates the memory available for use.

(23) TAPE CODE COMPATIBILITY

2-binary and 3-binary tape codes can be edited.

(24) 10.4″ COLOR LCD MONITOR

A 10.4″ color LCD monitor helps you read all work-related information at once.

(25) CODES FROM OTHER BRANDS

The machine can automatically read designs of various formats stored in the floppy disk.

[Compatible formats]

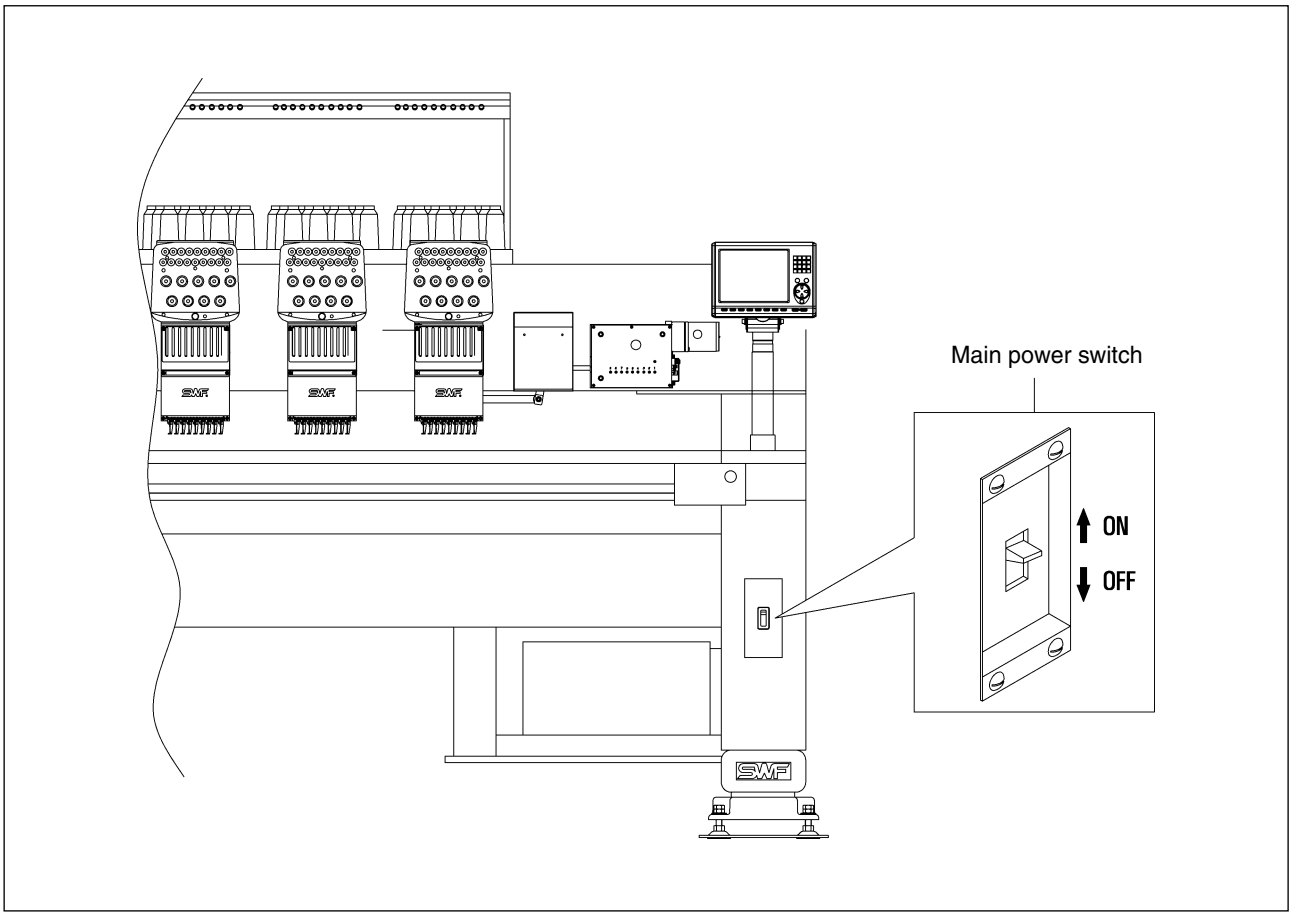
1. SST
2. DST, DSB, DSZ
3. TAP
4. FMC, FDR
5. ZSK
6. 10O
7. EXP.

5
FUNCTIONS FOR BASIC MACHINE OPERATION

5-1) EMERGENCY POWER SWITCH AND START/STOP SWITCH

1) Emergency Power Switch
For initial machine operation, refer to [Fig.5-1]

① Turn ON the main power
② Press the emergency power switch
③ Emergency power switch will not turn on if the main power is off.



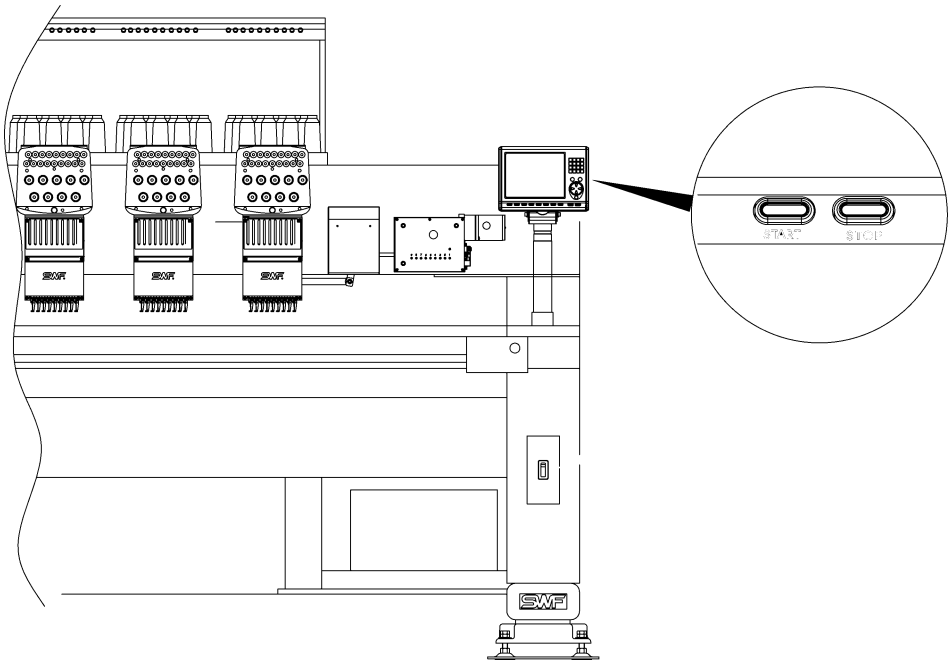
[Fig.5-1]

[NOTE]
① Emergency power switch detects emergency stop failures and prevents accidents.
② Emergency power detects the failure of an emergency switch and prevents the machine from being switched on.

2) START/STOP Switch

Use the START/STOP buttons to:

① Start the embroidery work or stop the machine during operation.
② Move the frame back during machine stop.
③ Move forward in design during machine stop (non-stitching)
④ Move backward in design during machine stop (non-stitching)
⑤ Do work other than embroidery



[Fig.5-2]

① START/STOP for starting embroidery and stopping the machine

BUTTON OPERATION	MACHINE OPERATION
Press START	Machine starts and embroidery work begins.
Hold START	Machine "inches (see Note1)" until you release the button.
Press STOP	Machine stops.

[NOTE]

1. You cannot perform non-stitching (floating) at the start of the embroidery because the function is not in the start menu.
   To perform floating at the start, press STOP to put the machine in STOP MODE.
   Then press "F3 FLOAT" and select the number of non-stitches desired in the sub-menu.

② START/STOP during machine stop

BUTTON OPERATION	MACHINE OPERATION
Press STOP	Frame moves backward in selected movement units (see Note 2).
Hold STOP	Frame starts to move backward. If you press STOP before the machine goes 10 of the selected stitches, the machine will stop immediately (the machine moves back in the selected movement units). If you press STOP after the machine traveled 10 of the selected stitches, the machine will continue to move back.
Press STOP again	Press STOP one more time and the machine will stop moving backward.

③ START/STOP during forward non-stitching (during machine stop)

BUTTON OPERATION	MACHINE OPERATION
Press START	Frame moves forward in selected movement units (see Note 2)
Hold START	Frame starts to move forward. If you press START before the machine goes 10 of the selected stitches, the machine will stop immediately (the machine moves back in the selected movement units). If you press START after the machine traveled 10 of the selected stitches, the machine will continue to move forward.
Press STOP again	Press STOP one more time and the machine will stop moving forward.

④ START /STOP during backward non-stitching (during machine stop)
See (2) START/STOP during machine stop.

⑤ Performing Work Other Than Embroidery
If you want to perform a solenoid test, a thread break sensor test, or manual trimming, select the function and press START.

Select function ➡ Press START

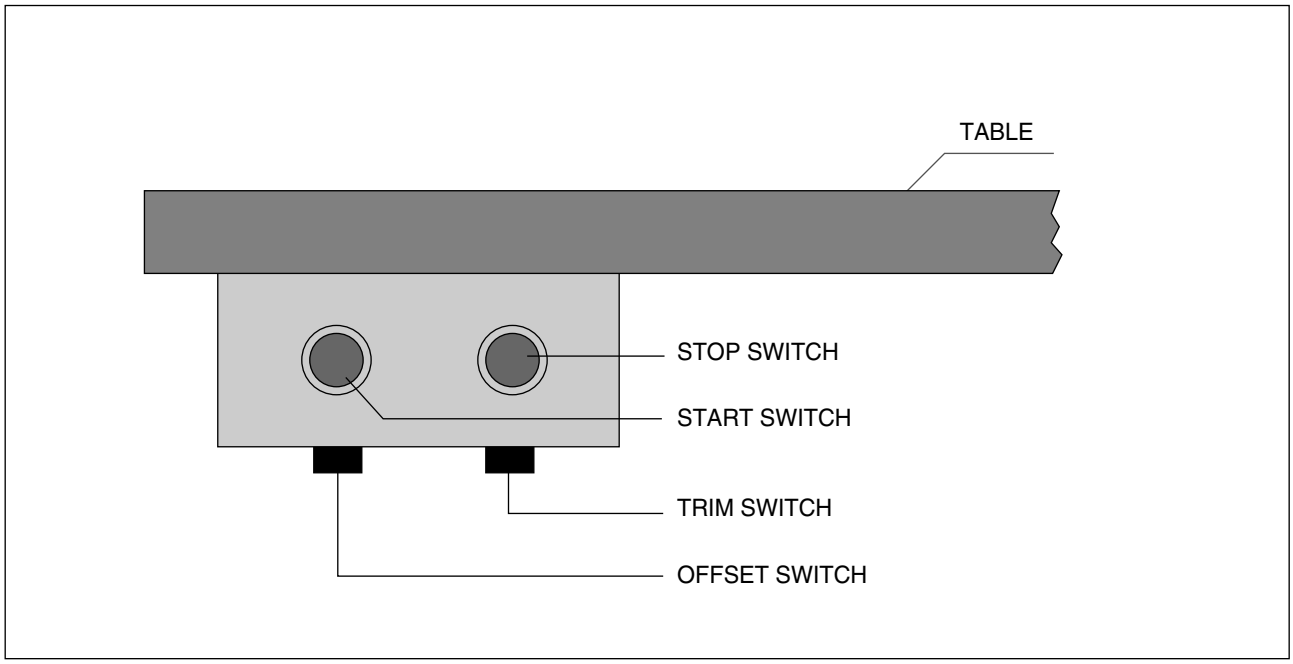
[NOTE 1]
"Inching" refers to low-speed embroidery at a 100 rpm range, performed for stable stitching when the machine is re-started after stop.

[NOTE 2]
"Frame movement unit parameter" refers to the "BK STITCH UNIT" in "SET-UP 1." You can select from 1 to 10 stitches by 1 stitch.

5-2) OFFSET SWITCH BOX

1) When the embroidery frame protrudes over Y 850mm toward a user
   ① It is difficult to operate the bar switch.
   ① It is difficult to insert threads again when threads are broken.
   This device is designed to address the problems above.

2) Components



[Fig.5-3]

No.	Name	Description
1	STOP SWITCH	· Stops the embroidery machine (same to the left movement of the bar switch) · Used for back stitches. · Cancels the execution of the TRIM switch and the OFFSET switch after pressing them.
2	START SWITCH	· Starts the embroidery machine (same to the right movement of the bar switch) · Execute the TRIM switch and the OFFSET switch after pressing them.
3	TRIM SWITCH	· Used for manual thread trimming
4	OFFSET SWITCH	· Used for moving the embroidery frame backwards when threads are broken

3) How to Operate

① TRIM SWITCH

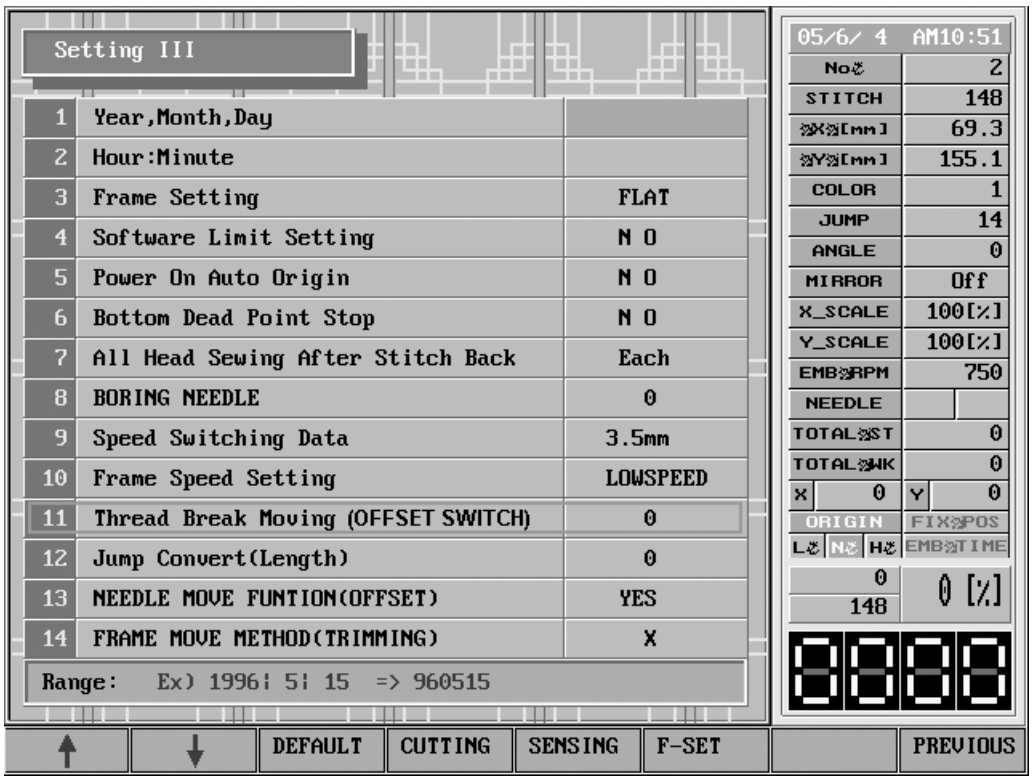
ⓐ Press the trim switch.

ⓑ Press the start switch or move the bar switch to the right side.

② OFFSET SWITCH

- To use the offset switch, a user shall set the embroidery frame's feed when it is recedes.

ⓐ The frame's feed can be set as in "11. Thread Break Moving (OFFSET SWITCH)". (feed range: 0~80cm)



[Fig.5-4]

ⓑ Press the offset switch.

ⓒ Press the start switch or move the bar switch to the right side.

ⓓ The embroidery machine performs manual trimming and the embroidery frame recedes backward by the set distance.

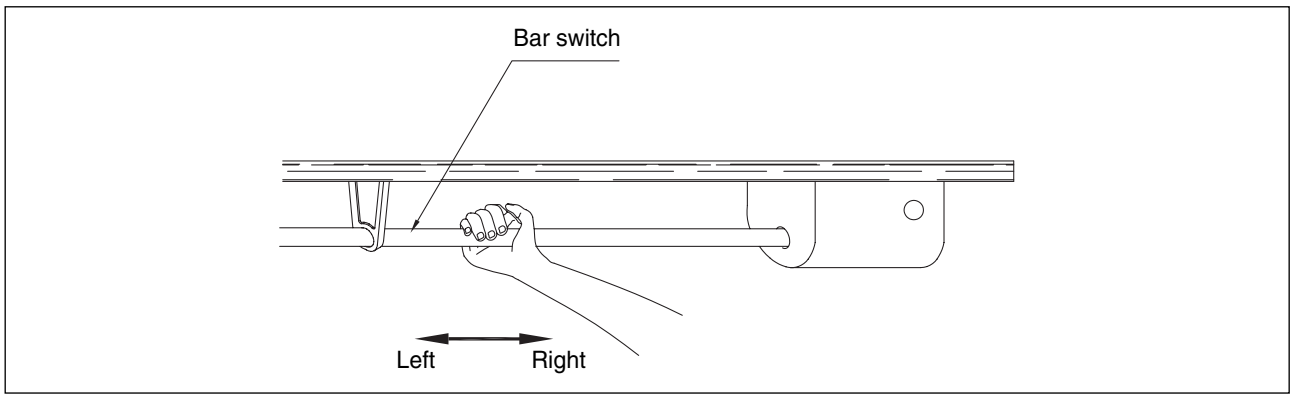
ⓔ Press the start switch after inserting threads and the embroidery frame goes to the original position.

※ Others

- Current Version : Version updated on June 3, 2005
- Joint board : Board after REV04

5-3) BAR SWITCH

1) Refer to [Fig.5-5] for use of the bar switch.



[Fig.5-5]

2) Bar switch
Use the bar switch to:

① Start the embroidery work or stop the machine during operation.
② Move the frame back during machine stop
③ Move forward in design during machine stop (non-stitching)
④ Move backward in design during machine stop (non-stitching)
⑤ Do work other than embroidery

① Bar switch to start the embroidery work or stop the machine during operation

BUTTON OPERATION	MACHINE OPERATION
Push to right	Machine starts and embroidery work begins.
Hold to right	Machine "inches (see Note1)" until you release the button.
Push to left	Machine stops.

[NOTE]

1. You cannot perform non-stitching (floating) at the start of the embroidery because the function is not in the start menu.
   To perform floating at the start, push the bar switch to left go into STOP MODE.
   Then select "F3 FLOAT" and select the number of non-stitches desired in the sub-menu.

② Bar switch during machine stop.

BUTTON OPERATION	MACHINE OPERATION
Push to left	Frame moves backward in selected movement units (see Note 2).
Hold to left	Frame starts to move backward. If you release the bar switch before the machine goes 10 of the selected stitches, the machine will stop immediately (the machine moves back in the selected movement units (see Note 2)). If you release the switch after the machine traveled 10 of the selected stitches, the machine will continue to move back.
Push to right again	Push to right again and the machine will stop moving backward.

③ Bar switch during forward non-stitching (during machine stop)
Refer to LCD Monitor Manual (SWF E-Version) page 3-12.

BUTTON OPERATION	MACHINE OPERATION
Push to right	Frame moves forward in selected movement units (see Note 2)
Hold to right	Frame starts to move forward. If you release the bar switch before the machine goes 10 of the selected stitches, the machine will stop immediately (the machine moves back in the selected movement units). If you release the switch after the machine traveled 10 of the selected stitches, the machine will continue to move forward.
Push to left again	If the frame keeps moving forward, push the bar switch to left again and the machine will stop.

④ Bar switch during backward non-stitching (during machine stop)
Same functions as for forward non-stitching

⑤ Bar switch for work other than embroidery
If you want to perform a solenoid test, a thread-break sensor test, or manual trimming:

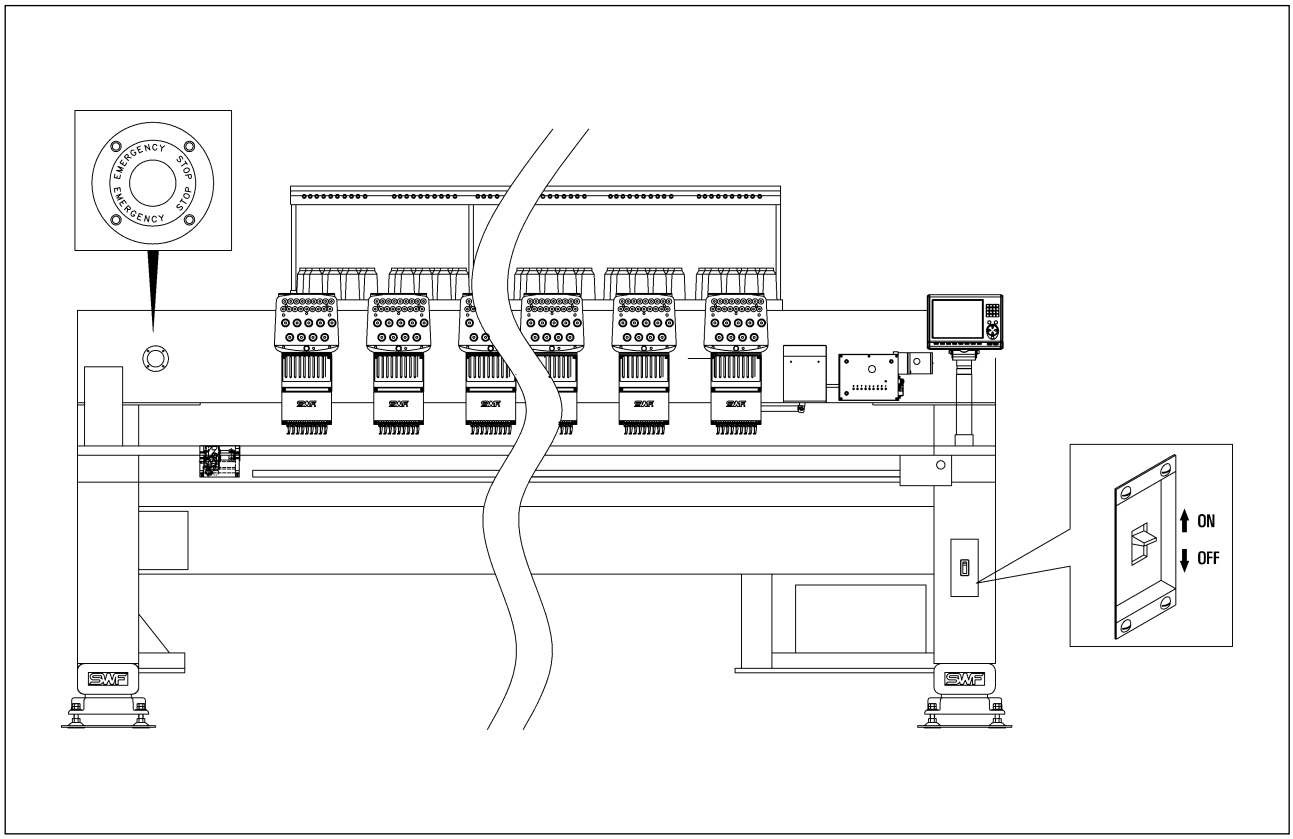
Select function ➡ Push the bar switch to right

[NOTE 1]
"Inching" refers to low-speed embroidery at a 100 rpm range, performed for stable stitching when the machine is re-started after stop.

[NOTE 2]
"Frame movement unit parameter" refers to the "BK STITCH UNIT" in "SET-UP 1." You can select from 1 to 10 stitches by 1 stitch.

5-4) EMERGENCY STOP SWITCH

Use the emergency stop switch to immediately stop the machine in the cases of machine malfunction, etc.



[Fig.5-6]

1) Pressing the emergency stop switch will turn OFF the power
2) To operate the machine again, set the main shaft angle at 100˚.
3) Turn OFF the main power switch as shown in the figure and then ON again.
4) Press the emergency power switch.

5-5) LAMP ON THREAD TENSION ADJUSTMENT BOARD

1) Switch

① For normal operation, turn the toggle switch on to turn on the indicator lamp.

② If the machine stopped after detecting a thread break, move the frame back to the location of the thread break using STOP button and restart the machine to pick up stitching (design edit).

[NOTE]

If you want to move the frame back for any reason when a thread break has NOT occurred, press the toggle twice (OFF and ON again).

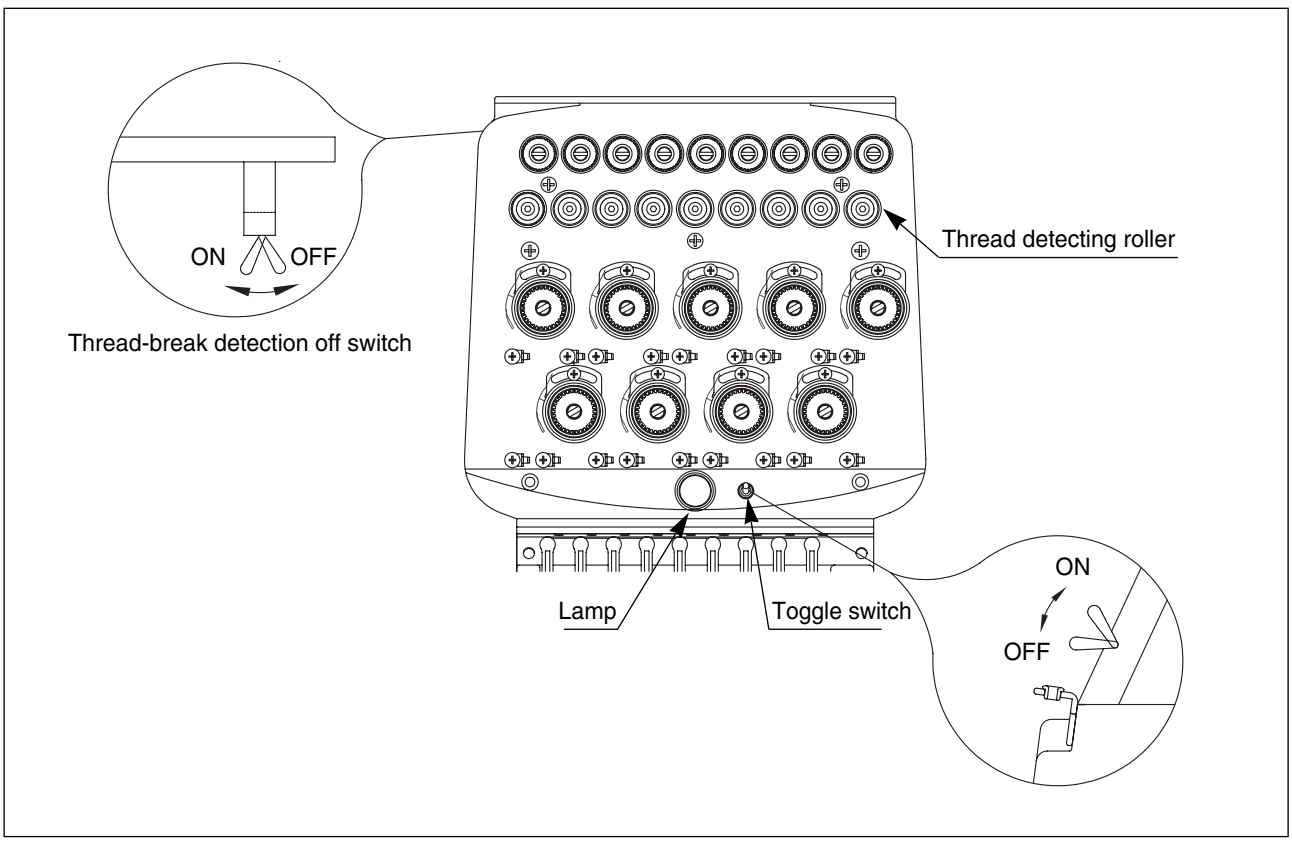
③ To set the needle bar so a specific head does not work, turn the toggle switch off.

[NOTE]

The upper thread holding device fixes the thread on the heads, whose toggle switches are off, and the heads unused for the embroidery at the moment, thus preventing thread escape from the needle.

2) Thread Break Detector Lamp

Lamp on a specific head will blink when thread break is detected at the head, while lamps on other heads will be turned off. You cannot turn the lamp ON or OFF on the other heads using the toggle switch.



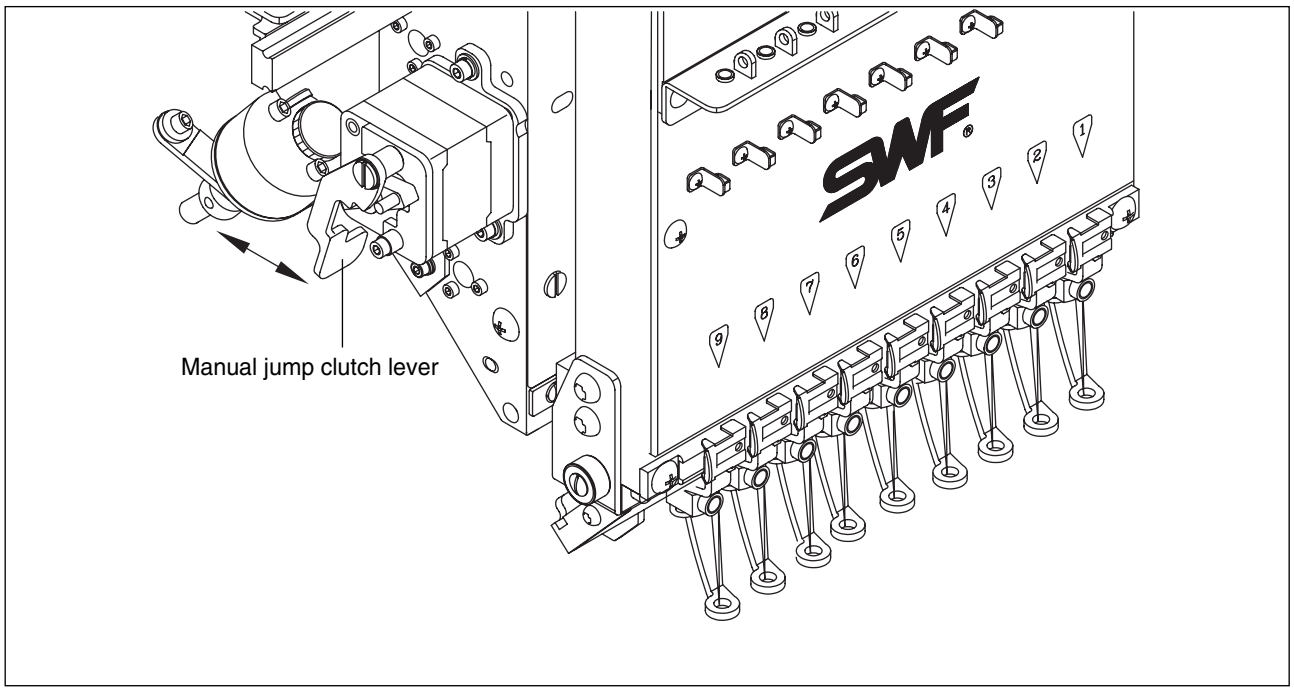
[Fig.5-7]

[CAUTION]
Foreign substances around the thread detector roller may block smooth rotation of the roller and cause wrong detection of thread break.

3) Deletion of Thread-Break Detection Function
Poor function of the thread detecting roller due to foreign substances around it may result in wrong and frequent detections, causing inefficiency of work. In this case, you can turn off the detecting function by turning off the toggle switch at the end of the thread tension adjustment board as shown in [Fig.5-7]. This will turn OFF the detecting function on the head you are working with.

5-6) NEEDLE STOP CLUTCH (JUMP)

As illustrated in [Fig.5-8], the needle bar will not move when you pull the jump clutch lever. Pull the level to the operator to do jump work.



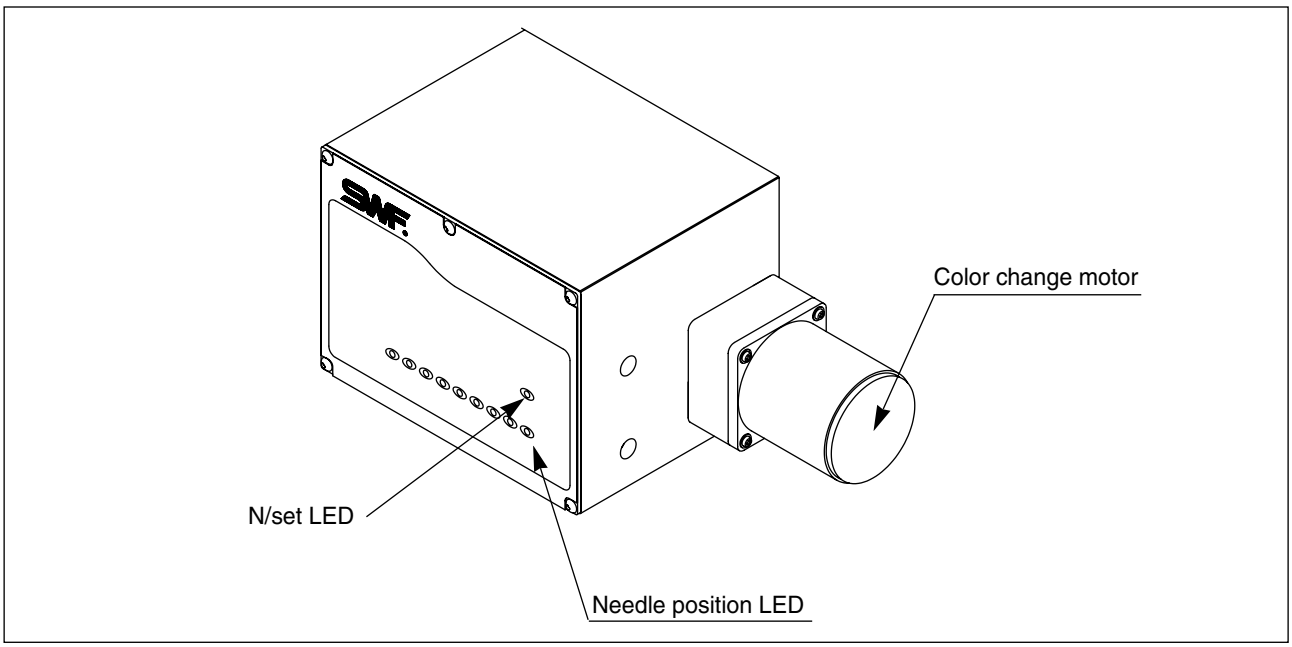
[Fig.5-8]

CAUTION

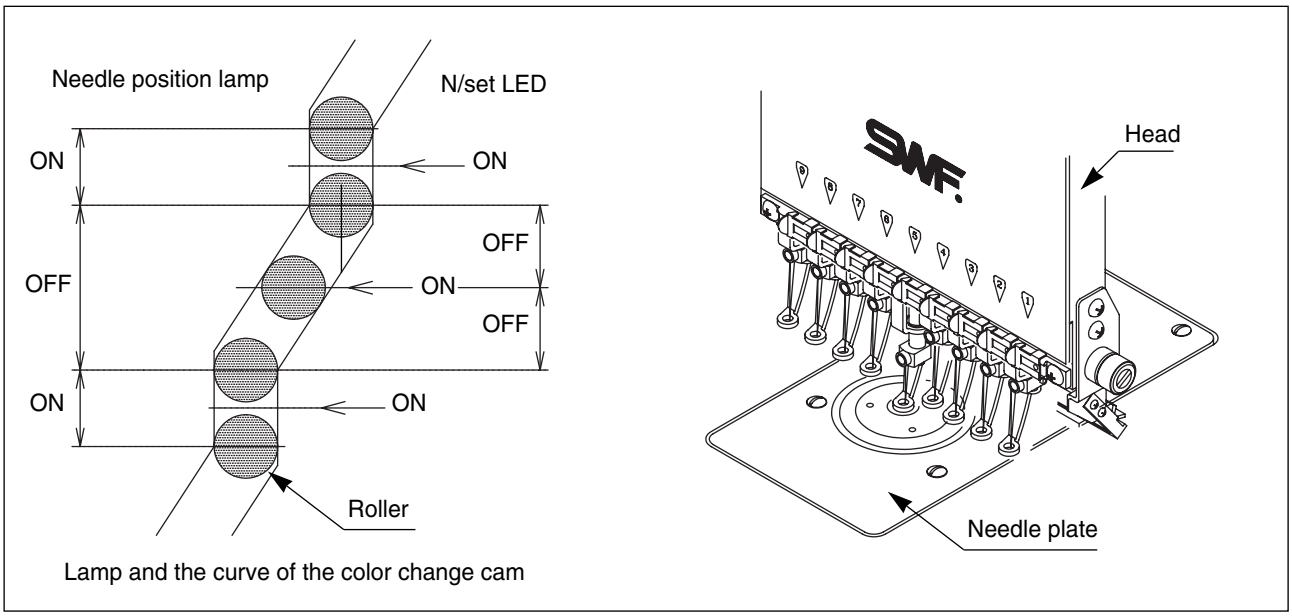
① The trimmer and the take-up lever continue to move even when the needle bar is stopped by the clutch. Avoid any operations, i.e. threading the needle or changing thread.
② Long-time operation of the needle bar with the clutch may damage the bar controller.

5-7) LED ON COLOR CHANGE BOX

Needle position lamp on the color change box blinks at the needle currently in operation. Needle set lamp on the box blinks when the needle reaches the center of the needle hole on the plate (the roller is on the straight line of the color change cam. See [Fig.5-9]). The needle moves only when the both lamps blink – preventing machine errors from incorrect needle position or color change failure.



[Fig.5-9]

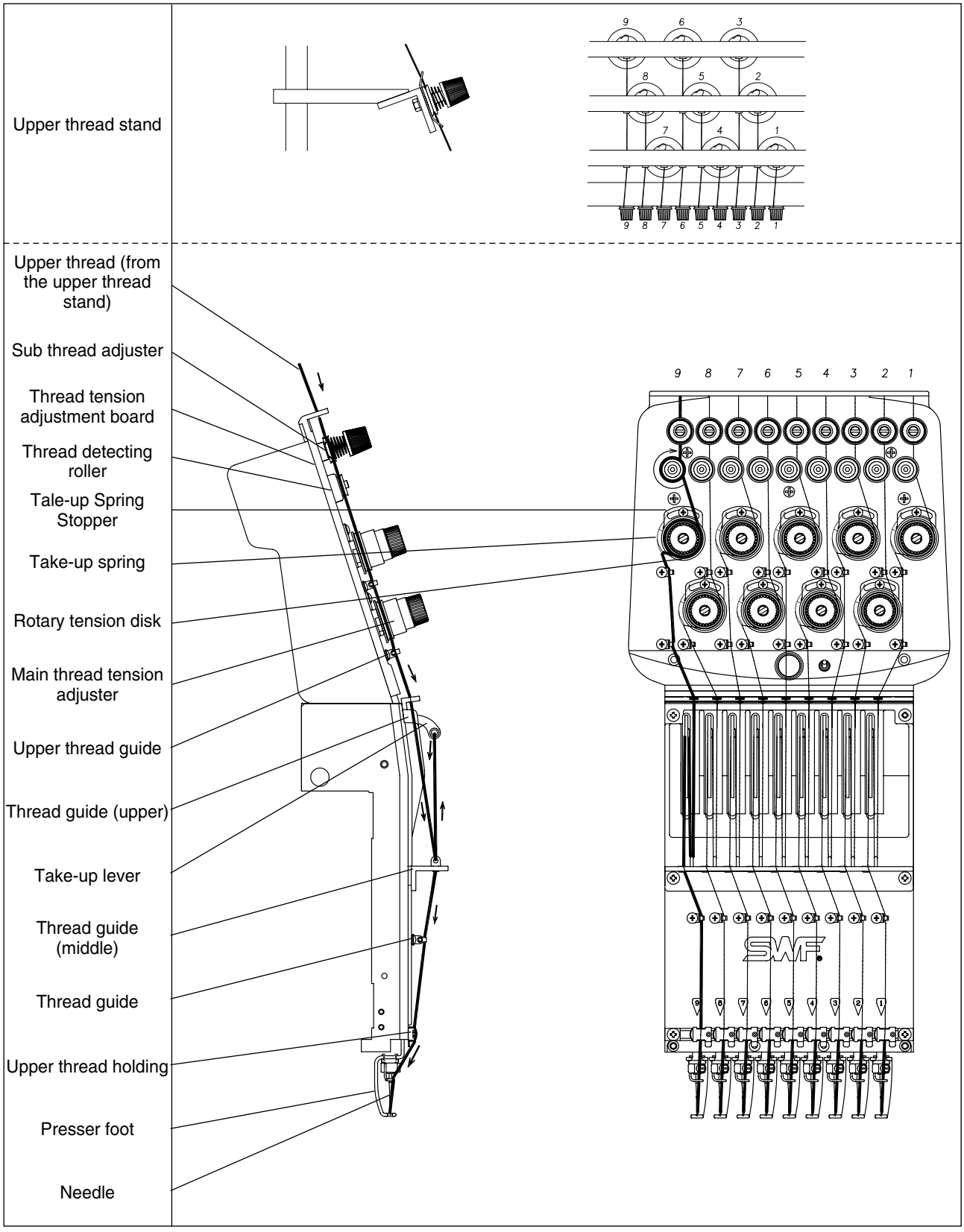


[Fig.5-10]

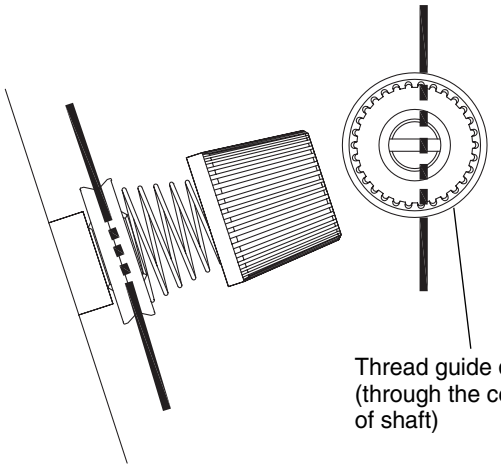
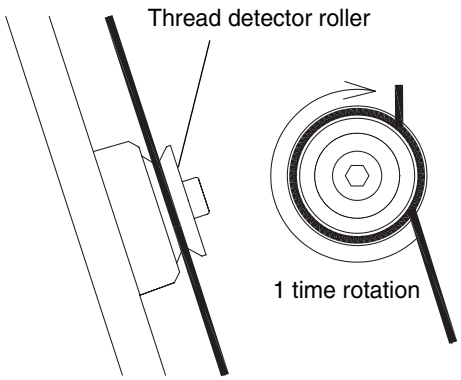
[NOTE]
If any of the two lamps are off, adjust the half-turn film (see 11-8 Adjusting Half-turn Film).

5-8) UPPER THREADING AND TENSION ADJUSTMENT

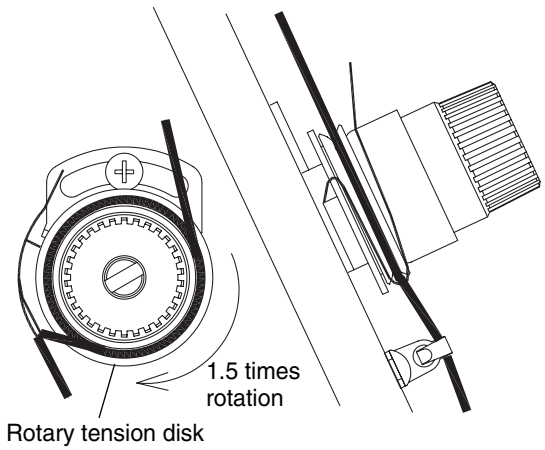
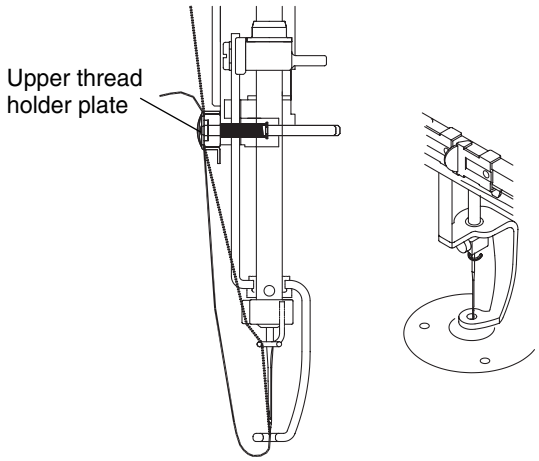
1) Upper Threading



[Fig.5-11]

Threading the sub tension adjuster	Threading the thread detector roller
	
Feed it between the thread guide plates and through the hole in the axis of the thread adjusting device.	Wrap the thread around the detector roller one time.

[Fig.5-12]

Threading the main tension adjuster	Threading around the needle
	
Wrap the thread 1.5 times around the rotary tension disk (V-shaped groove.)	Feed the thread through upper thread holder plate in the upper thread holding. Thread the thread guide and needle. Fix the thread between the holder plate in the upper thread holding.

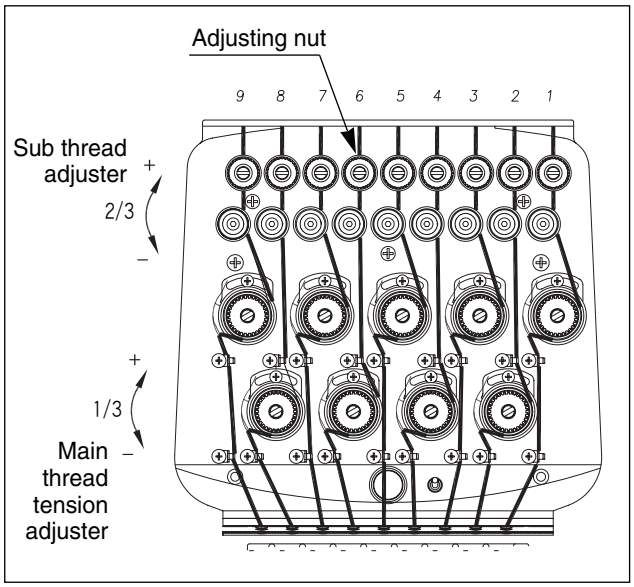
[Fig.5-13]

2) Upper Thread Tension Adjustment

[CAUTION]

Thread tension adjustment is critical for producing high quality of the embroidery. A balance of 2/3 upper thread and 1/3 lower thread generally indicates good tension.
If the tension is too loose, the upper thread will loop, causing thread tangles or breaks. If the tension is too tight, puckering may occur as well as thread and needle breaks.

① The upper thread tension is controlled by sub and main thread tension adjusters. Turn the adjusting nut clockwise to increase the tension and counterclockwise to decrease the tension.
② The sub-tension adjusters should control about 2/3 of the thread tension while the main adjuster should handle the other 1/3. Set the sub-tension adjuster so the upper thread flows smoothly through the rotary tension disks and into the rollers of the main tension adjuster.



[Fig.5-14]

[CAUTION]

① If tension at the sub adjuster is too loose, the detector roller may not rotate well and make wrong detections.
② After adjusting the tension, check if the upper thread tension is what can be pulled with little force of around 100-120g.

[CAUTION]

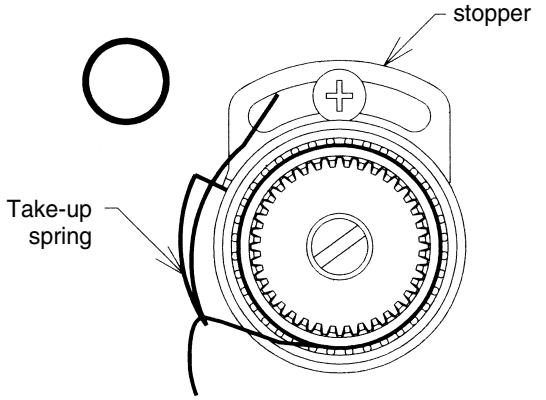
① After adjusting the tension, pull the upper thread to see if the detector roller rotates well.
② Adjust the tension according to the type of thread and fabric used.

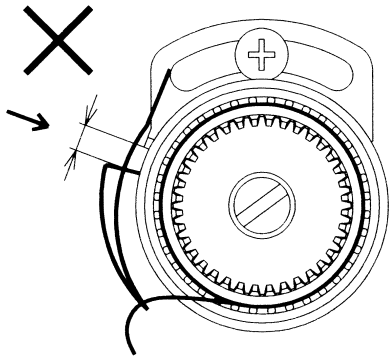
[CAUTION]

Upper thread is always fixed by the upper thread holding device. Therefore, when adjusting the thread tension, pull the upper thread plate toward the operator to feed the thread (see threading around the needle).

3) Take-Up Spring

○ Correct	× Wrong
Connect between the take-up spring and the stopper.	Gap between the take-up lever stopper and the spring (Gap will occur if tension of the take-up lever spring is weak or if the spring stopper is incorrectly positioned)





[Fig.5-15]

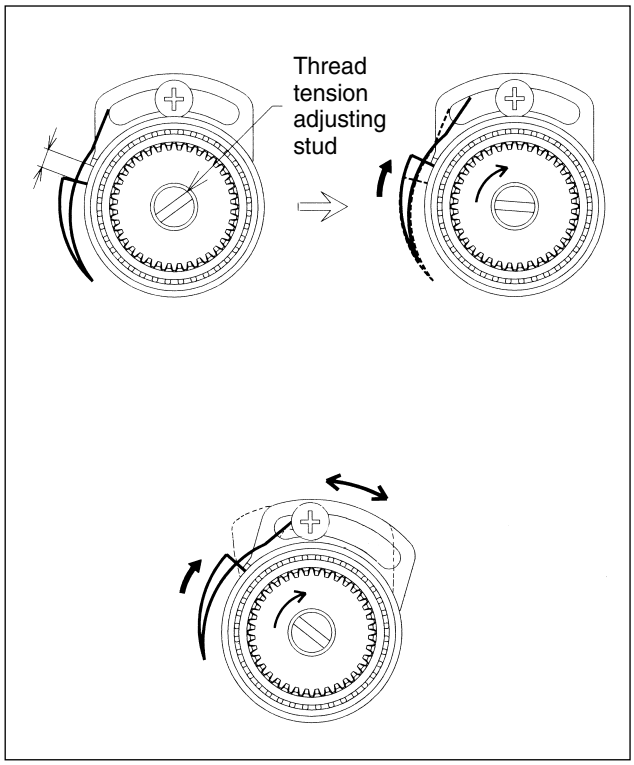
① Take-up Spring Functions

Difference in the length of the upper thread pulled by the take-up lever and pulled by the hook creates tension or looping. When the tension is too weak, the take-up spring handles the leftover length of the upper thread. Increase the tension or the stroke of the spring to form tight stitches on the embroidery.

② Take-up Spring Adjustment

ⓐ Tension on the take-up spring affects the thread tension. Turn the tension adjusting stud clockwise to increase the tension and counter-clockwise to decrease the tension.

ⓑ Adjusting stroke of the take-up spring:
To adjust the stroke of the spring during embroidery work, move the take-up spring stopper to right or left as shown in [Fig.5-16].



[Fig.5-16]

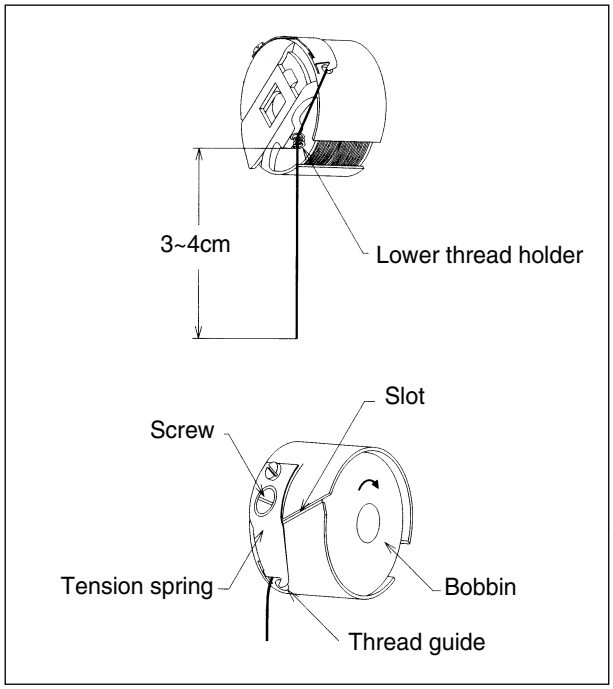
5-9) LOWER THREADING AND TENSION ADJUSTMENT

1) Lower Threading

① Use cotton yarn (#80~#120) for your lower thread.

② Threading the bobbin:

- Insert the threaded bobbin into the bobbin case with the thread coming out from the case slot. Pull the thread through the thread guide. Check if the bobbin is rotating ([Fig.5-17]).
- Thread the lower thread holder and trim the thread to 3~4cm before inserting the bobbin and the case into the hook assembly. Long tail can cause the thread to tangle during stitching.



[Fig.5-17]

[CAUTION]

Direction of the Bobbin Rotation

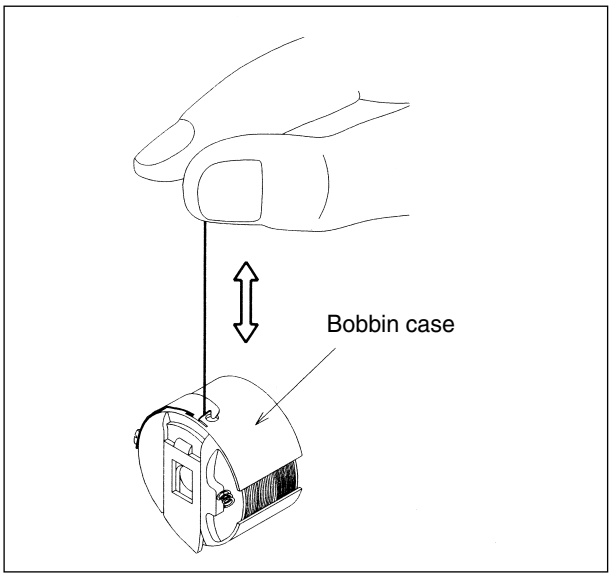
Make sure that the bobbin rotates clockwise when you pull the thread holding the bobbin case in your left hand as illustrated in [Fig.5-17].

2) Lower Thread Tension Adjustment

Adjust the tension of the lower thread using the nut on the tension spring on the bobbin case. Turn the nut clockwise to increase the tension and counterclockwise to decrease the tension.

[CAUTION]

For adequate bobbin thread tension, hold a thread from the bobbin and jiggle the bobbin case lightly up and down as shown in [Fig.5-18]. The case should drop and the tension should be 25-35g.

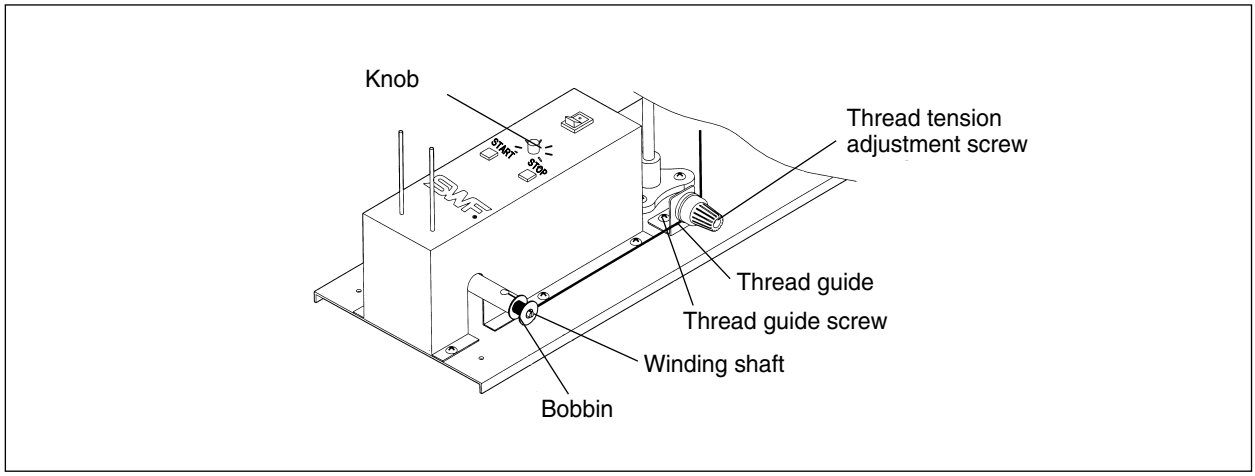


[Fig.5-18]

5-10) BOBBIN WINDER

1) Bobbin Winding

① Insert the bobbin onto the shaft ([Fig.5-19]) and manually wind the thread 5-6 times around the bobbin in the desired direction. Press [START] to rotate the bobbin.



[Fig.5-19]

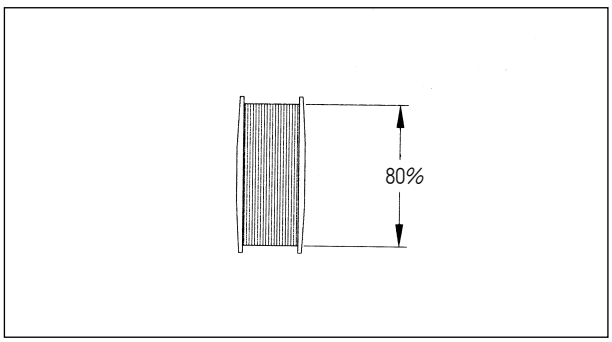
② If the winding is not good, press [STOP] to immediately stop the winding.

2) Adjusting Thread Volume on Bobbin

① Fill the bobbin 80% and make sure the thread is parallel to the bobbin as shown in [Fig.5-20].

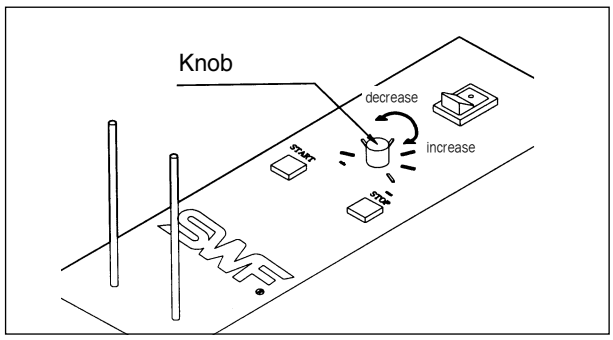
[CAUTION]

1. Overfilling the bobbin may interfere with the smooth pull of the thread.
2. For normal bobbin, 80% fill will render around 80m of thread



[Fig.5-20]

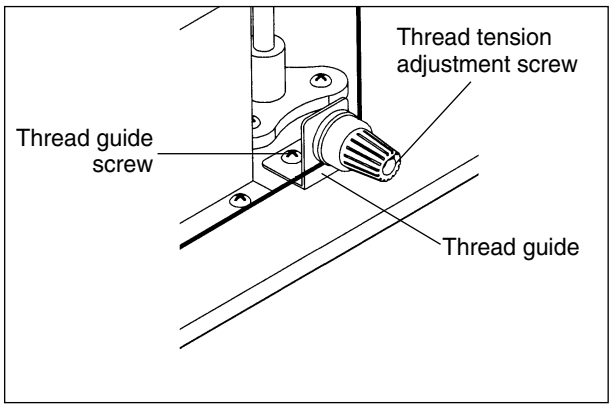
② You can adjust the volume of the thread on the bobbin using a knob. Turn the knob clockwise to increase the volume and counterclockwise to decrease.



[Fig.5-21]

3) Adjusting the Bobbin Wind

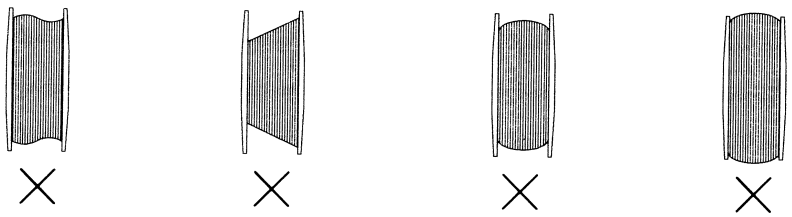
① Make sure to wind the thread parallel to the bobbin. If not, unfasten the screw on the thread guide body and adjust it left or right.



[Fig.5-22]

[CAUTION]

Winding the bobbin off-center or uneven as shown in [Fig.5-23] can cause thread breaks, skipped stitches, or thread tangles.



[Fig.5-23]

② Adjust the thread tension on the bobbin using a tension adjuster nut.

[CAUTION]

Too tight tension of the bobbin thread may block smooth pulling of the thread and cause thread breaks or short tails.

5-11) PRECAUTIONS IN USING FLOPPY DISKS OR USB MEMORY STICKS

Make sure to meet the following conditions when using the above devices.

CAUTION

1) You can use pre-formatted disks, but be sure to use disks of recognized quality.
2) You can use USB memory sticks of FAT 16 (file system). The machine does not accommodate FAT 32.

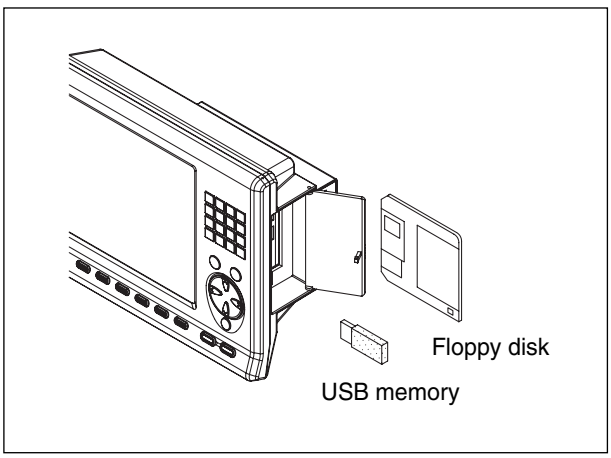
▶ When using floppy disks
- Keep the disks away from objects with magnetic fields, i.e. televisions, radios.
- Protect the disks from excess heat, humidity, and direct sunlight.
- Do not place heavy objects on the disks.
- Do not remove the disk from the drive while formatting, reading, or writing the disk.
- Do not open the cover of the disk drive.
- Data cannot be written onto the write-protected disks.
- Repetitious reading and writing on a single disk may cause errors.
- Save your important data on more than one disk for back up.

▶ When using USB memory sticks
- Do not delete USB memory from the USB port when reading and writing with USB.

5-12) INSERTING FLOPPY DISKS AND USB MEMORY STICKS

- Inserting floppy disks
  Insert the disk in the indicated direction.

- Inserting USB memory sticks
  Insert the USB memory into the USB port.



[Fig.5-24]

5-13) DELETING FLOPPY DISKS AND USB MEMORY STICK

- To take out the disk from the floppy drive, press the OUT button.
- For USB, close the input/output window and delete the USB memory.

CAUTION

Be careful not to remove the floppy disk from the drive when formatting, reading, or writing in order to prevent loss of data.

5-14) READING AND WRITING OF EMBROIDERY DESIGNS

You can use external devices, such as floppy disks, USB memory, CF cards, and serial port to read designs into the operation box. For writing the designs onto floppy disks and USB memory sticks are available.

5-15) RETURN TO PREVIOUS LOCATION IN UNEXPECTED BLACKOUTS

Your SWF machine goes back to the location of stop to pick up stitching when the power comes back on after unexpected blackouts.

[CAUTION]
Make sure to turn OFF the power in unexpected blackouts until the power comes back on.

5-16) NEEDLE-HOOK TIMING CONTROL

1) Needle
   ① It is very important to select the right needle for the type of thread and fabric used.
   ② Inappropriate needle may cause bad embroidery, thread breaks, skipped stitches, etc.
   ③ For normal embroidery, use a DB × K5 needle.

[CAUTION]
DB × K5 needle has an eye twice larger than that of DB1 (used for normal sewing).
Use DB × K5 for normal embroidery.

2) Relationship between Needle and Thread
   ① Inadequate selection of thread and needle may result in thread breaks, skipped stitches, as well as in bad-quality embroidery.
   ② Refer to the following table of threads and needles used for normal embroidery.

Needle Size			Thread Size			
US	Japan	Germany	Cotton #	Silk	Nylon	Rayon
0.25	9	65	70~80	100~120	130~150	70~100
0.27	10	70				
0.29	11	75	50~60	80~100	100~130	100~130
0.32	12	80				
0.34	13	85	36~40	60~70	80~100	130~150
0.36	14	90				

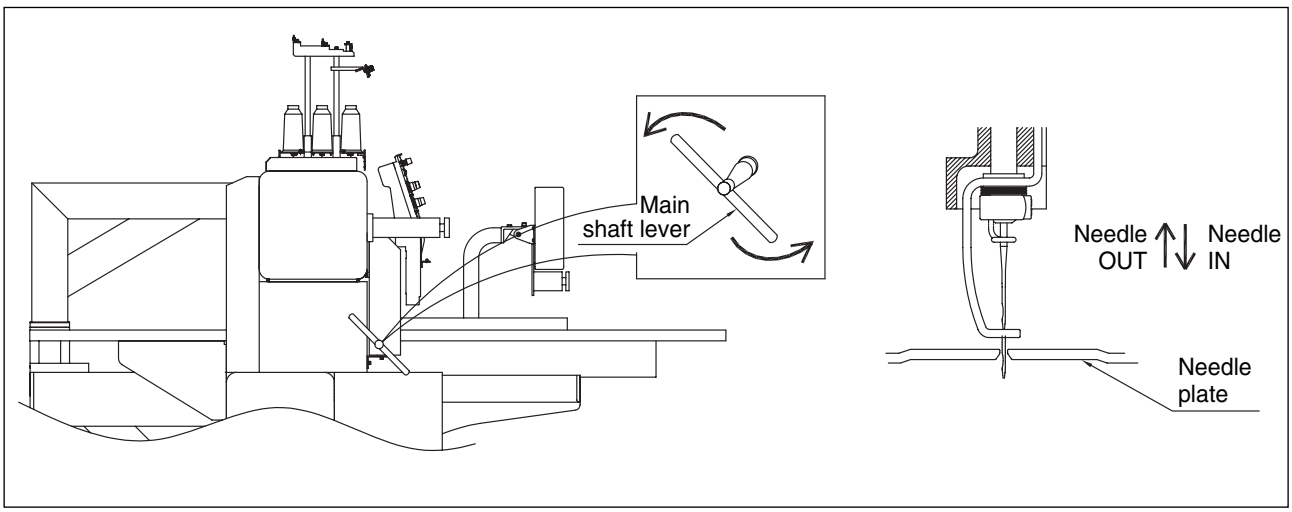
[CAUTION]
Needle and thread most commonly used in embroidery are:
Thread : rayon yarn 120d/2
Needle : DB × K5 #11

3) Changing the Needle

① Make sure the needle is completely clear of the needle plate before attempting to change it. If the needle is not clear of the plate, manually turn the main shaft with a hand lever to put the needle in the right location for change.

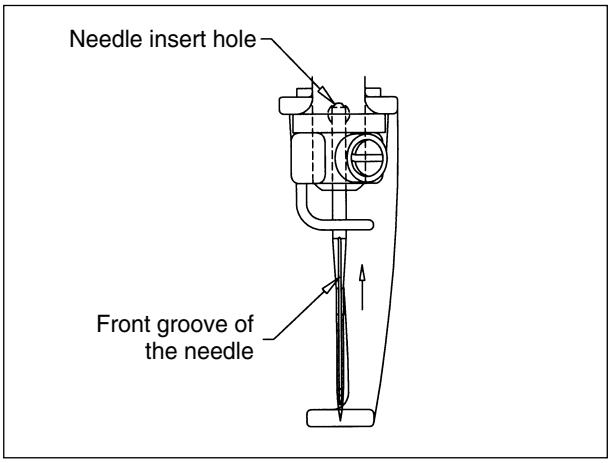
CAUTION

STOP the machine and turn OFF the power before turning the shaft manually. Immediately remove the lever afterward: it is dangerous to operate the machine with the lever inserted.



[Fig.5-25]

② When inserting the needle, make sure that the groove of the needle is facing front. Shaft of the needle should be inserted completely into the needle bar.



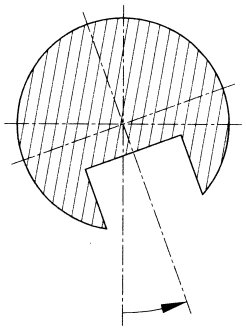
[Fig.5-26]

[CAUTION 1]

For special threads such as artificial silk, turn the needle slightly to the right to prevent thread breaks (see [Fig.5-27]).

[CAUTION 2]

If the needle is not inserted all the way to the top of the needle bar hole, timing of the machine will go off, causing broken needles and thread breaks.

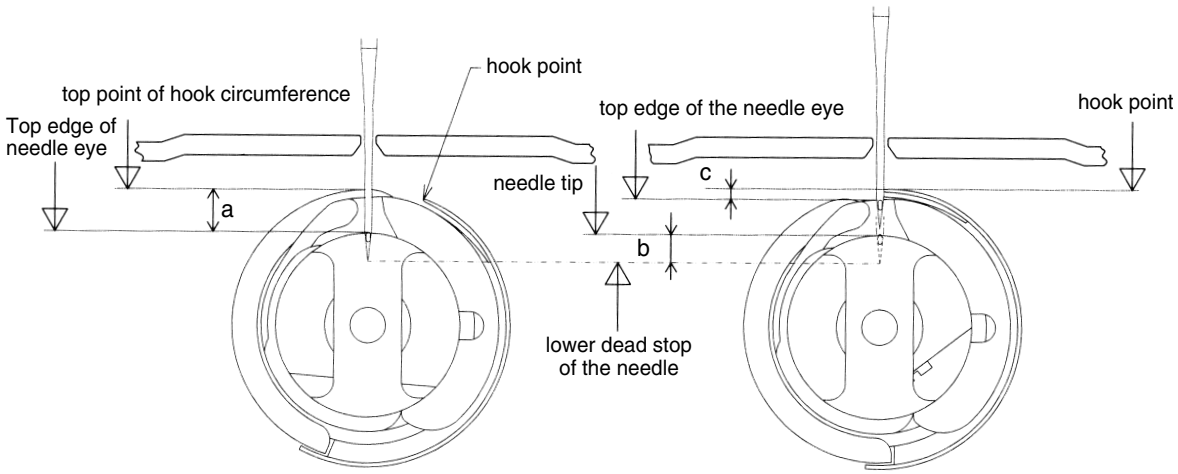


[Fig.5-27]

4) Relationship between Needle and Hook

① Adjusting Timing between Needle and Hook

Default timing of the needle and the hook is set by the main shaft angle of 201° and varies as below.

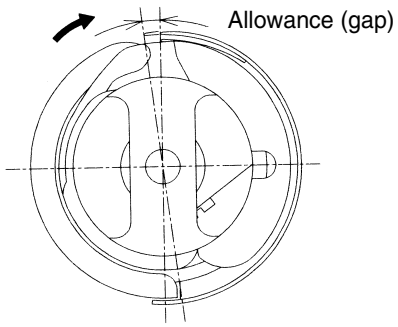


a. At lower dead stop of the needle bar	2.3~3.7 mm	The figures may change according to needle specification/ number.
b. At needle-hook timing	1.8~2.2 mm	
c. At needle-hook timing	0.5~1.5 mm	

[Fig. 5-28]

[CAUTION]

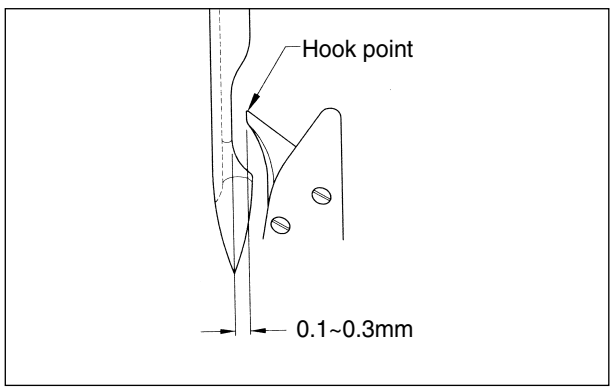
The hook can move right and left if there is an allowance in the lower shaft gear.
Eliminate the allowance (gap) by turning the hook clockwise. Then adjust the timing.



[Fig. 5-29]

② Adjusting Gap between Needle and Hook Point

- Gap between the hook point and the scarf of the needle should be 0.1-0.3 mm minimum.
- Thread skip occurs due to thread looping or inadequate balance/gap between the needle and the hook. The closer the hook point is to the needle, the hook point will be inside the loop and threading will be more stable.



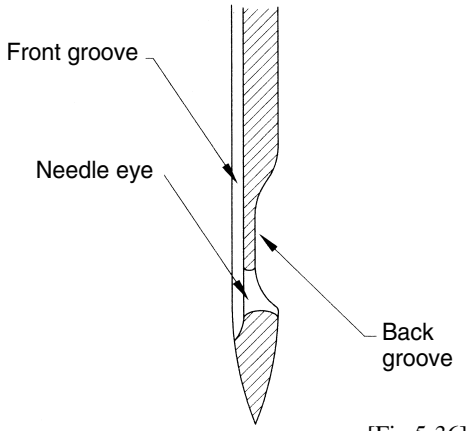
[Fig. 5-30]

[CAUTION] Functions by Needle Shape

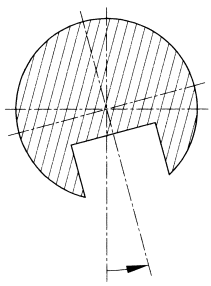
① Size of the hole and groove differs by needle.
- Front groove: protects the thread from the heat of the sewing friction (which may cause thread breaks).
- Back groove: helps regulate the hook timing and prevents looping.

Prevention of looping is important for stitching. Adjust the hook point as close to the needle as possible to achieve the perfect thread position.

② If thread breaks or stitches are unstable, turn the needle slightly to the right.



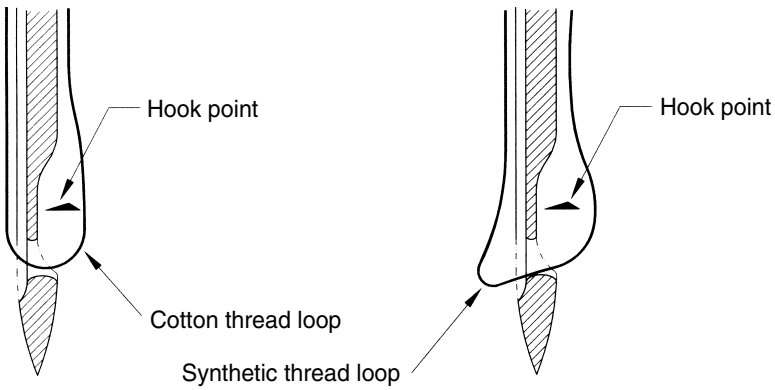
[Fig.5-36]



[Fig.5-31]

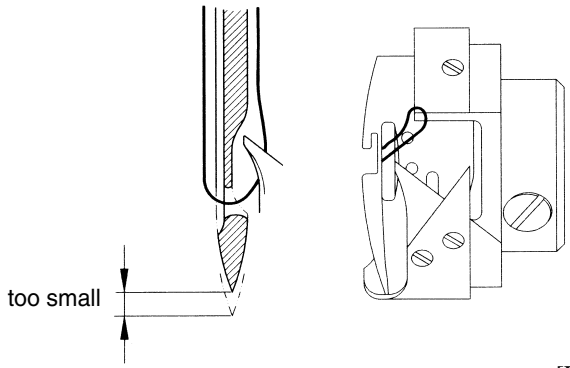
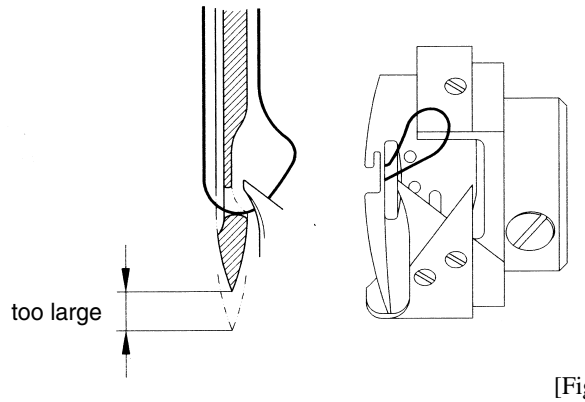
[NOTE]

Shape of the loop varies by the type of thread or fabric. Unstable shape of the loop may result in skipped stitches. The following pictures show different shapes of loop formed by different types of thread.

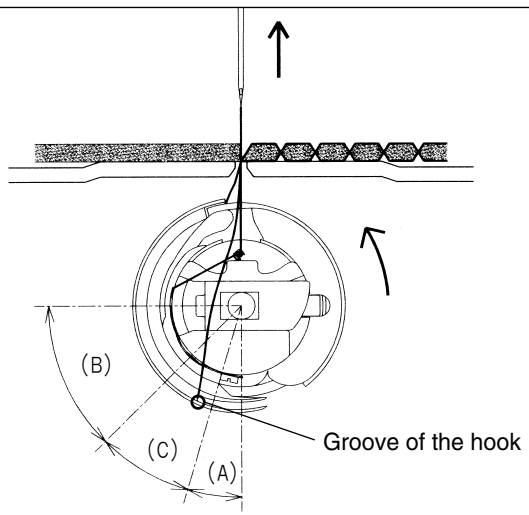


[Fig.5-32]

5) Relationship between the Take-up Lever and the Hook
Hook point timing is directly related to thread tension and thread breaks. The following pictures show the location of hook when the take-up lever starts to move up from the lower dead stop (main shaft rotation angle: 291˚).

Fast Hook Timing	
 [Fig.5-33]	Groove of the hook is in the (A) range. The hook point will take up the thread when the loop is too small. Stitching will be faster than the take-up movement. As a result, the thread tension will be bad, upper thread loop will be too small, and skipped stitches will occur.
Slow Hook Timing	
 [Fig.5-34]	Groove of the hook is in the (B) range. The hook point will take up the thread when the loop is too large, so there may not be skipped stitches. However, the take-up movement will be faster than the stitching and thread breaks may occur.

[CAUTION]
In normal hook timing, the hook should be in the (C) range in the picture below



[Fig.5-35]

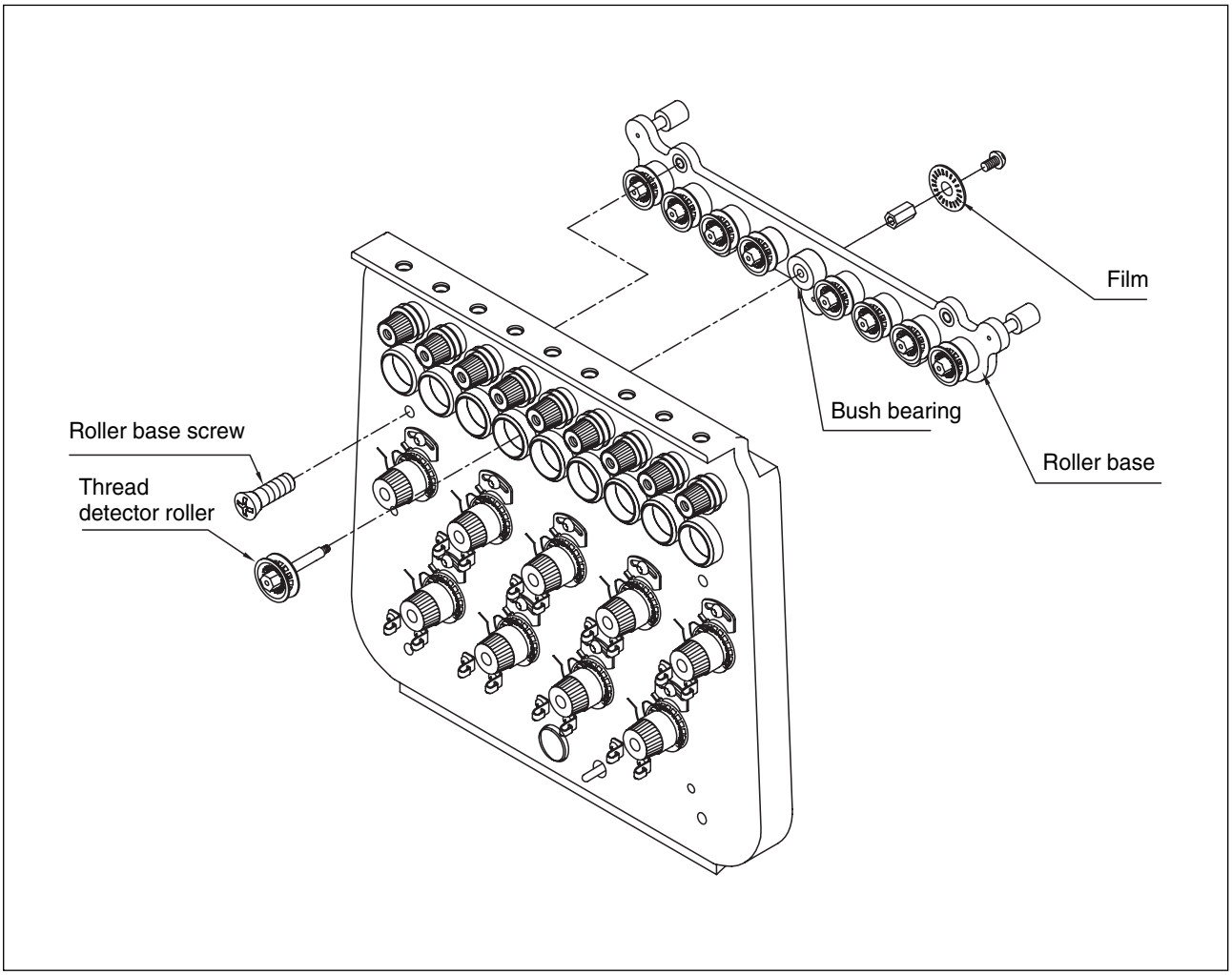
5-17) ASSEMBLY AND FUNCTIONS OF THREAD DETECTOR

1) FUNCTIONS OF THREAD DETECTOR

Detection of the breaks of upper or lower threads prevents ill quality embroidery. The thread- break detector unit contains rollers that sense the smooth feeding of the thread. Any dust, thread remnants, etc. will interfere the rollers' rotation and may cause wrong detection.

2) DISASSEMBLING THREAD DETECTOR

You will need to disassemble the thread-break detector unit to clean. Remove the cover of the thread tension adjusting plate, separate the cables and unfasten the roller base joint screw. The entire unit will be disassembled including the rollers and bush bearing.



[Fig.5-36]

[CAUTION]

Make sure to correctly place the thread detecting roller to have the unit properly function.
Check between the sensor groove and the film.
If needed, unfasten the board base screw to adjust the board.

6
MAINTENANCE AND INSPECTION

Consumable parts shall not be guaranteed even in warranty period.

6-1) CHECK POINTS FOR REGULAR INSPECTION

Safety rules must be observed during the inspection

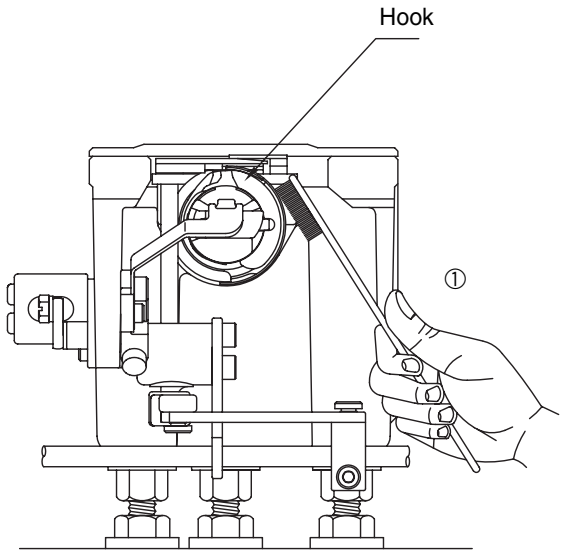
1) Clean, oil, and grease the set parts of the machine on a regular basis.
2) Inspect tension of each driver belt.
3) Failure to perform regular inspections may cause the following:
   ① Corrosion of P/C circuit board
   ② Damage to the semi-conductor on P/C circuit board
   ③ Malfunction of the floppy disk drive
   ④ Ill connection of the connector
   ⑤ Abnormal wear-out of machine parts due to insufficient oiling and greasing

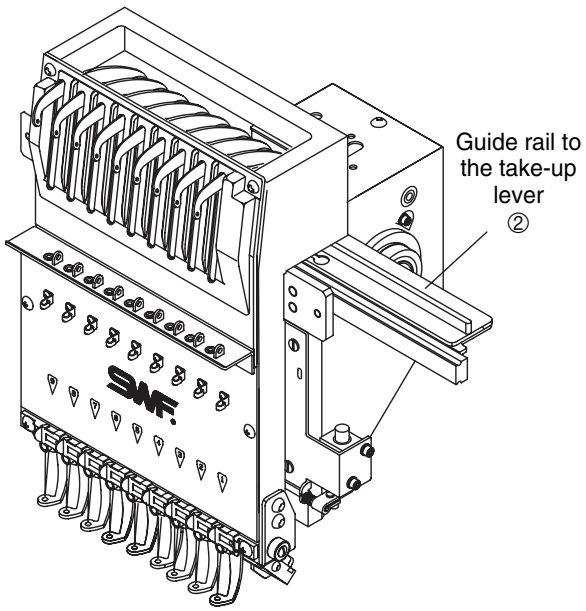
6-2) CLEANING

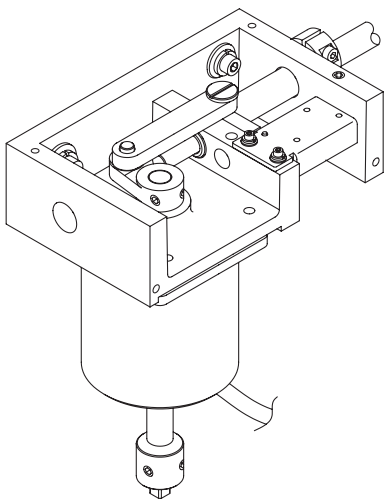
SWF is not responsible for machine damages or malfunctions caused by insufficient cleaning or oiling.

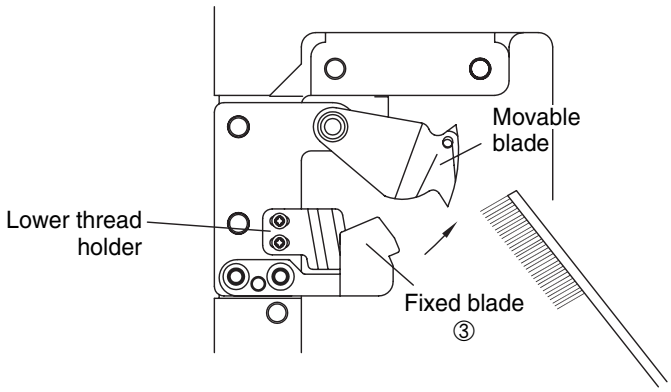
Turn OFF the main power before inspection or cleaning.
Adjust the cleaning cycle according to the conditions of your machine use.

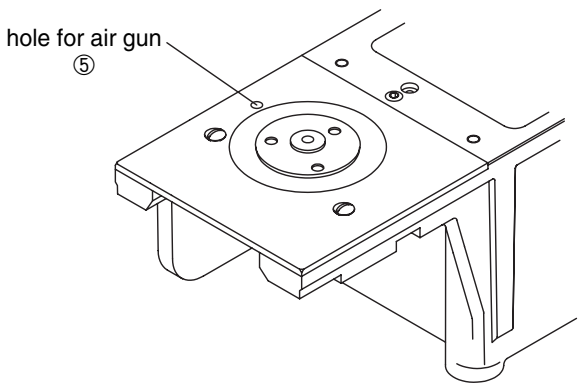
NO.	Major Parts for Cleaning	Cleaning cycle	Reference Fig.
1	Around the hook	Every day	①
2	Guide rail to the take-up lever	Once a week	②
3	Around the movable blade and the fixed blade **[Note: How to Clean]** ■ Remove the needle plate. Manually turn the trimmer driver knob (④) using a spanner and the movable blade will move. Make sure the power is OFF. After cleaning, turn the power on and the blade will automatically return to the basic set position. ■ Use the SWF brush to remove dirt and dust. ■ Align the tip of the air gun to the hole in the needle plate (see figure). Blow the air to remove dust, thread pieces, etc.	Once in 3-7 days	③, ④, ⑤
4	Upper parts of X-Y drive pulley and timing belt **[Note: How to Clean]** ■ Unscrew and open the stainless cover so X-Y drive belt shows. ■ Blow off the dust on the teeth of the timing pulley and the timing belt (turn the pulley once). ■ Close the cover after cleaning.	Once a month	


Hook
①


Guide rail to
the take-up
lever
②


④


Movable
blade
Lower thread
holder
Fixed blade
③


hole for air gun
⑤

[Fig.6-1]

6-3) OIL SUPPLY

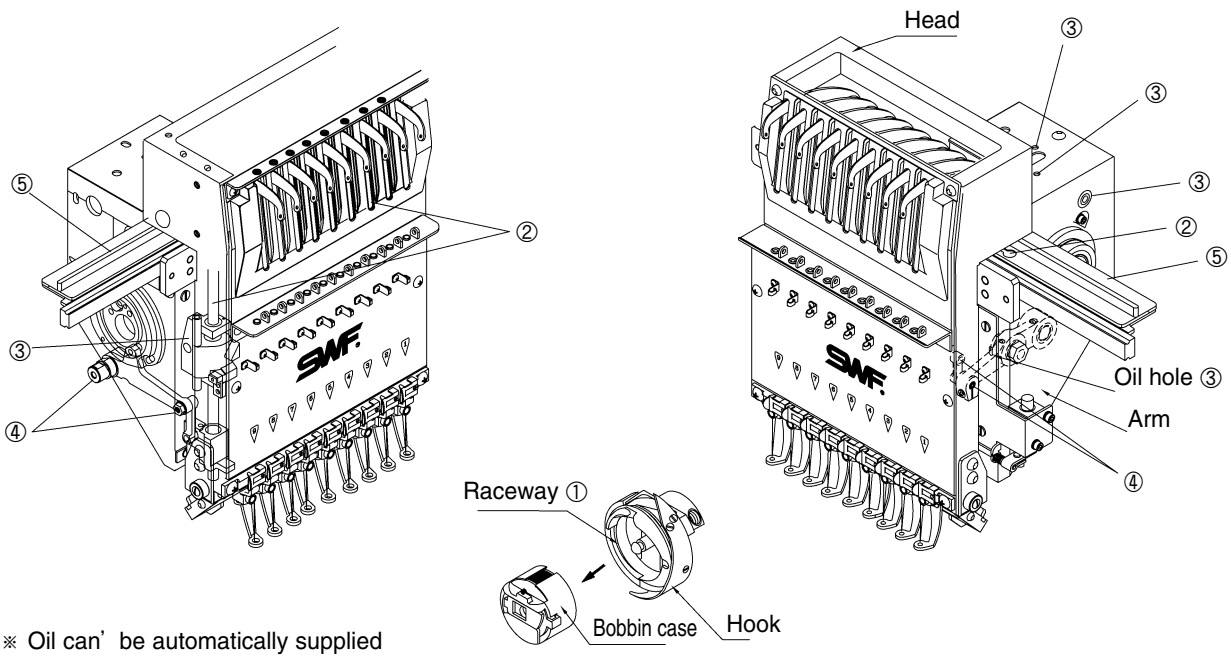
CAUTION	Make sure to turn the power OFF during oil supply.
CAUTION	SWF is not responsible for machine damages or wear-outs caused by insufficient oiling.

1) Oil supply
Use the SWF sewing machine oil (Spindle Oil) or ISO-standard VG18.

2) Manual oiling

No.	Where to Oil	Oiling cycle	Ref. Fig.
1	Take the bobbin case out of the hook. Feed small amount of oil on the raceway.	Once every 3-4 hours	①
2	Needle bar and needle bar shaft	Once a week	②
3	Inside the arm	Once a week	③, ④
4	Guide rail to the take-up lever	Once a week	⑤

[CAUTION]
① Excess oil may stain the thread and the fabric.
② Run the machine without stitching for 2-3 minutes after oiling.
③ Excessive oiling in the hook may cause trimming errors and thread breaks.



※ Oil can' be automatically supplied to ③,④. Make sure of conducting manual oil supply to these areas once a week.

[Fig.6-2]

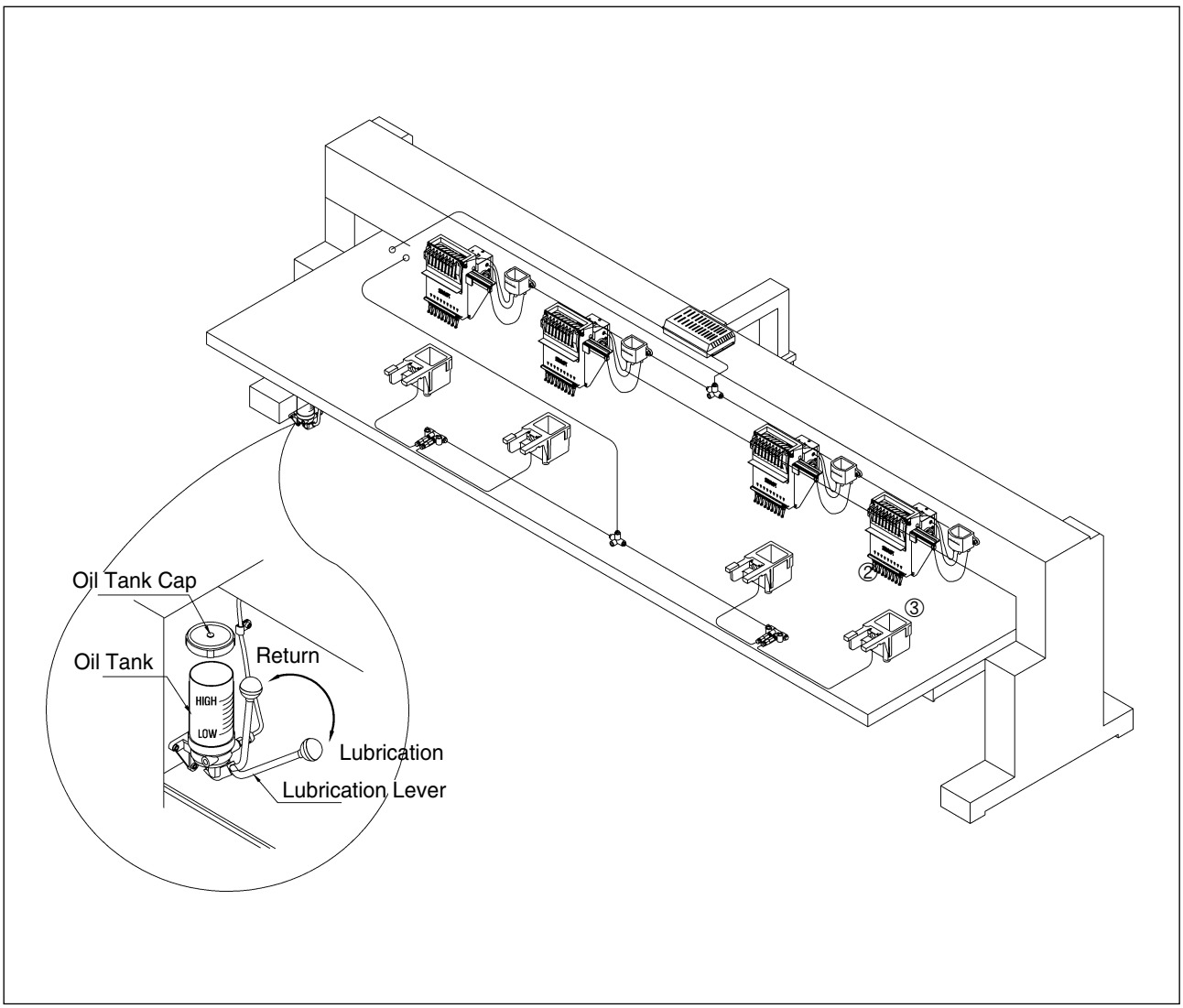
3) Cored drip-feed lubrication

① Location and Cycle of Oiling

No.	Where to oil		Amount	Oiling cycle	Reference Fig.
1	Hook and bushing on hook axis		0.05cc	Once every 50000 stitches	①
2	Needle bar		Manual lubrication	Once every 50000 stitches	②
3	**Inside arm**	a. driver lever pin of the presser foot b. driver shaft of needle bar c. driver lever pin of the take-up lever d. driver lever pin of the needle bar	Supply oil until it reaches the Max mark of the oil tank	Frequent Lubrication from Oil Supply Tank	③

[CAUTION]

1) Use the SWF sewing machine oil (Spindle Oil) or ISO-standard VG18.
2) Supply oil to the oil bank from time to time and fill up the oil tank until the needle reaches below the Max mark.



[Fig.6-3]

6-4) GREASE SUPPLY

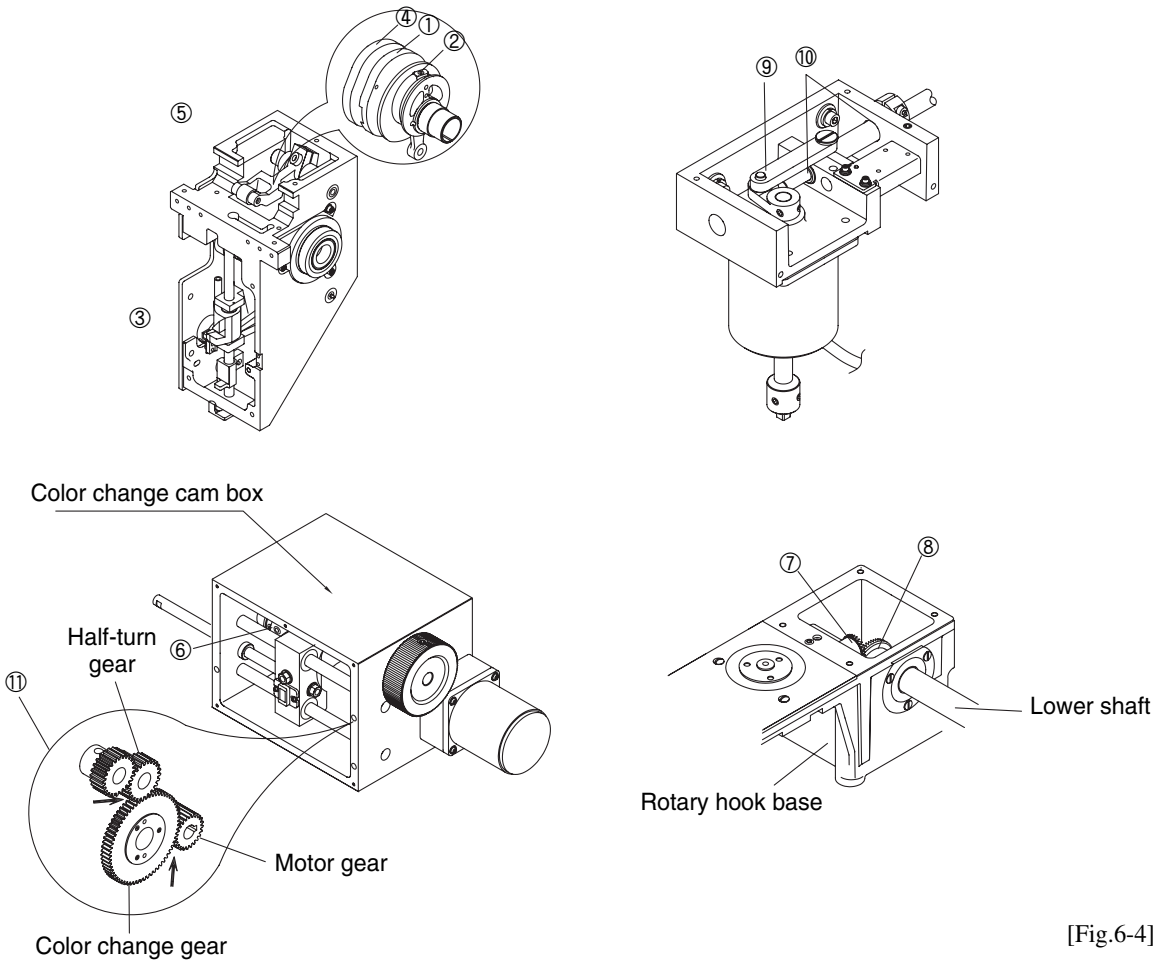
CAUTION

Make sure to turn OFF the main power during the grease supply.

Use high-quality mineral-based lithium grease.

NO.	Where to Grease	Greasing cycle	Fig.
1	Inside the arm Take-up lever drive cam Needle bar drive cam Needle bar controller Presser foot driver cam, take-up lever driver roller	Once in 6 months	① ② ③ ④, ⑤
2	Color change cam, color change-related gears	Once in 6 months	⑥, ⑪
3	Hook gear and lower gear in the rotary hook base	Once in 6 months	⑦, ⑧
4	Trimmer driver link and trimmer driver shaft bushing	Once in 3 months	⑨, ⑩

[CAUTION]
Regular greasing prevents machine noise and abnormal wear-out.



[Fig.6-4]

CAUTION

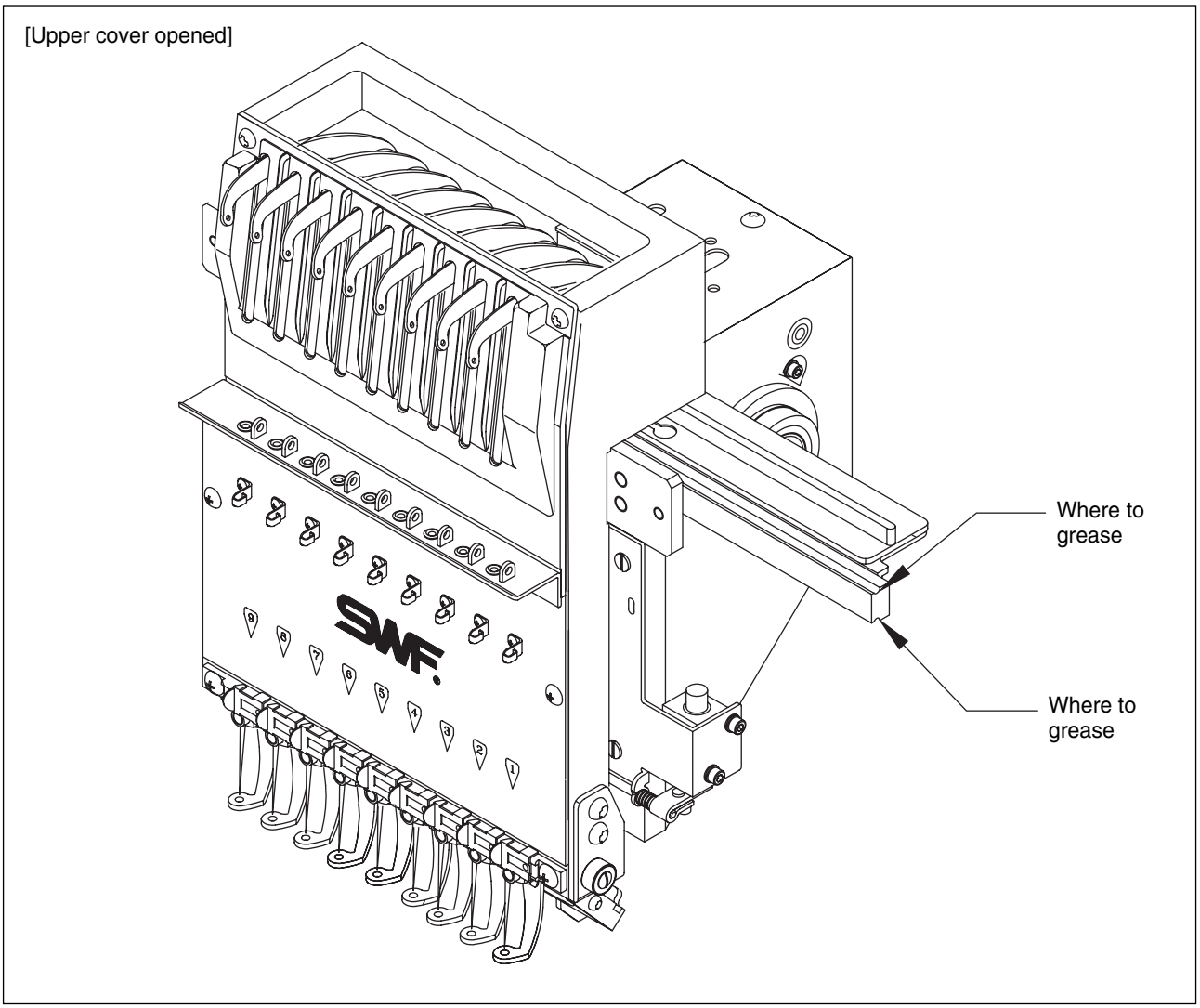
Turn OFF the main power during the grease supply.

Use lithium-type grease (JIS No.2) – Albania No.2.

NO.	Where to Grease	Greasing cycle	Fig.
1	Head drive LM guide	Once a month	Fig.6-5
2	X, Y drive guide rail	Once a month	Fig.6-6

[CATUION]
Regular greasing prevents machine noise and abnormal wear-out.

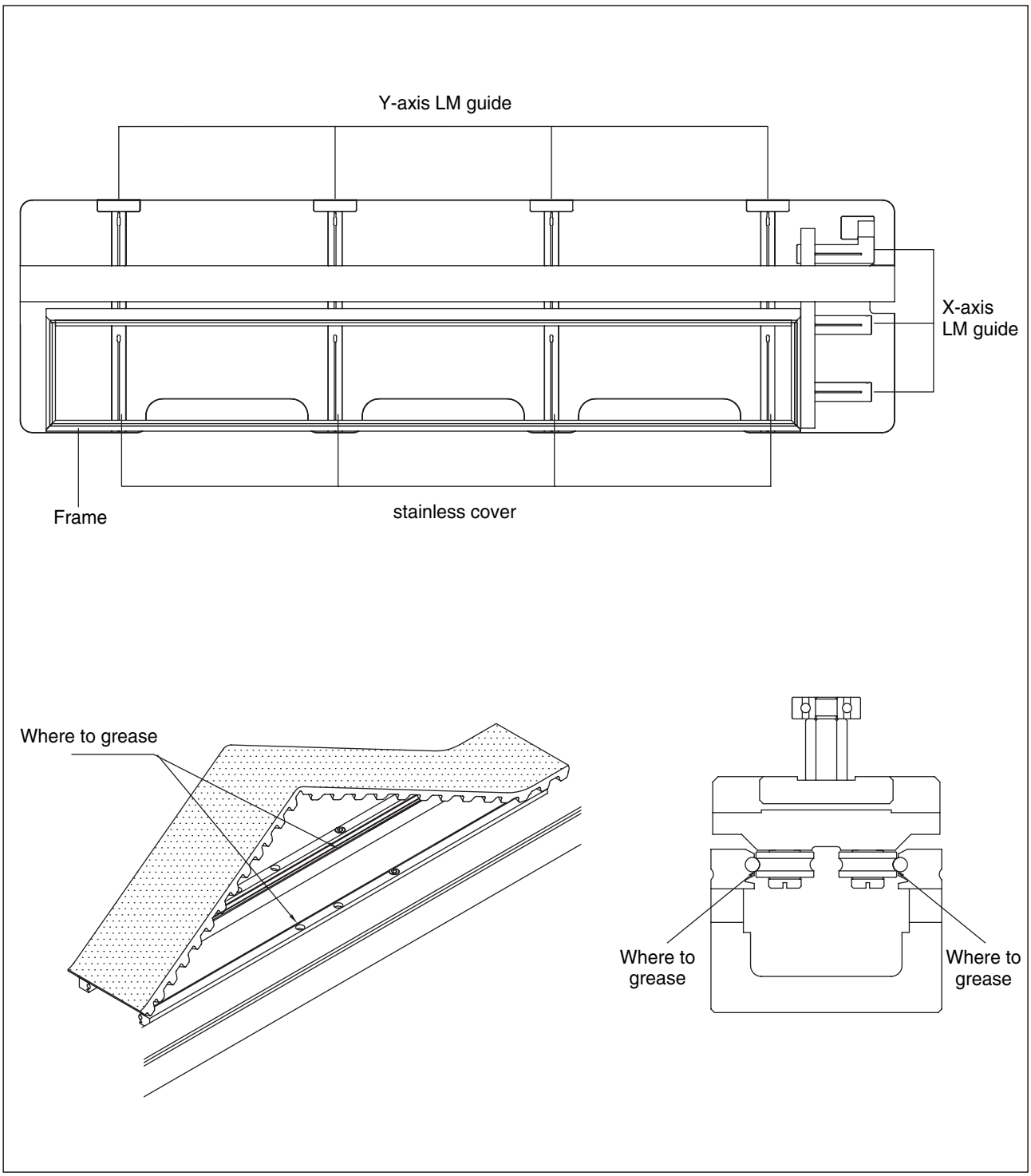
■ Greasing the head drive LM guide



[Fig.6-5]

■ Greasing the X, Y drive guide rail

① Disassemble the frame from the table.
② Unscrew the stainless cover and remove it.
③ Push the guide block farthest to the front of the machine.
④ Lift the timing belt with one hand and grease the entire guide rail.
⑤ Place the cover in the reverse order.



[Fig.6-6]

6-5) DRIVE BELT TENSION

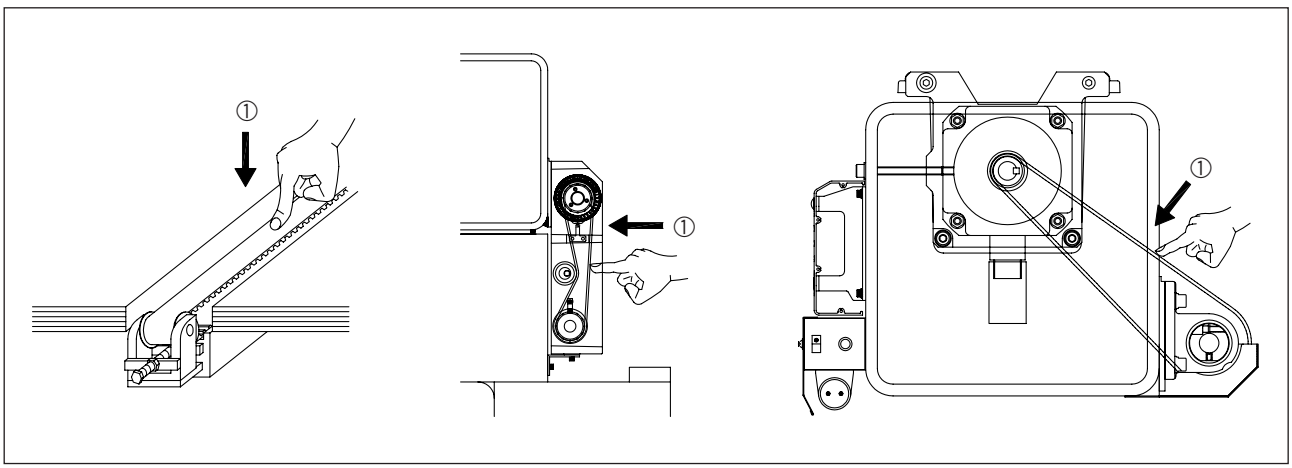
CAUTION

Turn OFF the main power when inspecting drive belt tension.

Too weak or too tight tension on the drive belt may cause machine malfunction or damages (abnormal wear-out of drive unit). Inspect the driver belt on a regular basis.

No.	Location for inspection	Inspection cycle	Inspection	Fig.
1	Belt on main shaft motor	Once in 3 months	① Belt tension ② Belt crack ③ Belt wear-out ④ Bearing damage ⑤ Wear-outs of rotating parts	①
2	Upper & lower shaft belt	Once in 3 months		
3	X-axis timing belt	Once in 3 months		
4	Y-axis timing belt	Once in 3 months		

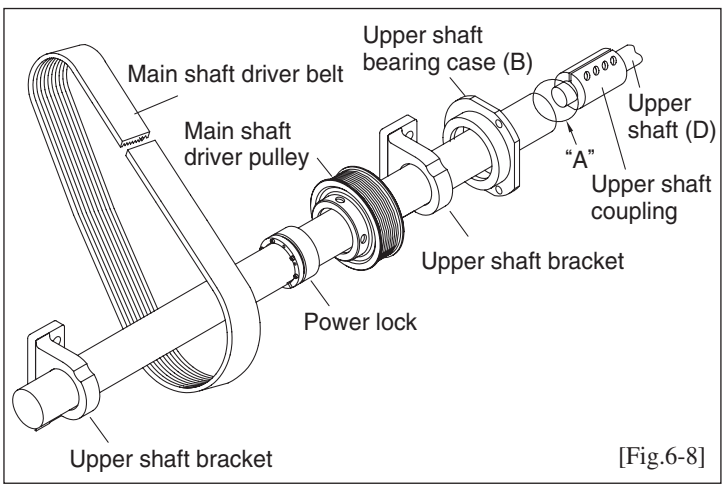
[CAUTION]
Inspect the tension in the direction of the arrows in the picture below.



[Fig.6-7]

6-6) DISASSEMBLING MAIN SHAFT DRIVER BELT

1) Disintegrate the upper shaft coupling and push it to the right side.
2) Disassemble the upper shaft coupling base (B).
3) Unscrew the main shaft driver pulley to secure space.
4) Pull out the belt from the crack in the upper shaft bracket
5) Disassemble the belt from the crack (A) between upper shaft C and D.



[Fig.6-8]

7
MAJOR MACHINE ADJUSTMENTS

WARNING

Turn OFF the main power when adjusting the machine.

7-1) ADJUSTING THE TRIMMERS

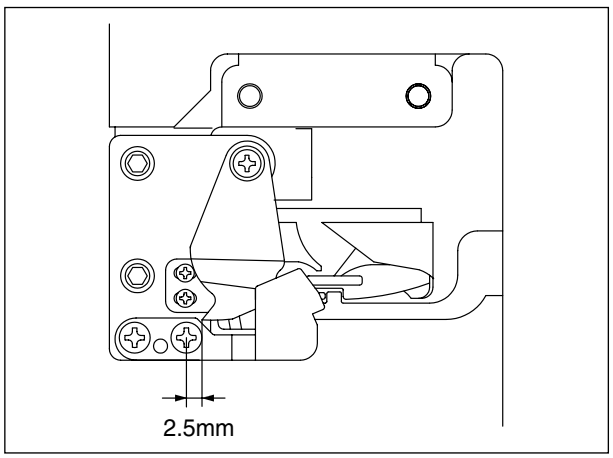
1) Adjusting the Position of Movable Blade

Initial setting of the movable blade means the starting position of the blade signaled by the trimmer cam. It serves as a standard for determining the trimming position.

① To adjust the initial setting of the movable blade, first check if the blade is installed in the correct position.

② The tip of the movable blade must be positioned 2.5mm off the center off the fixing nut of the fixed blade. Incorrect position of the movable blade may lead to separation of the upper thread or trimming errors.

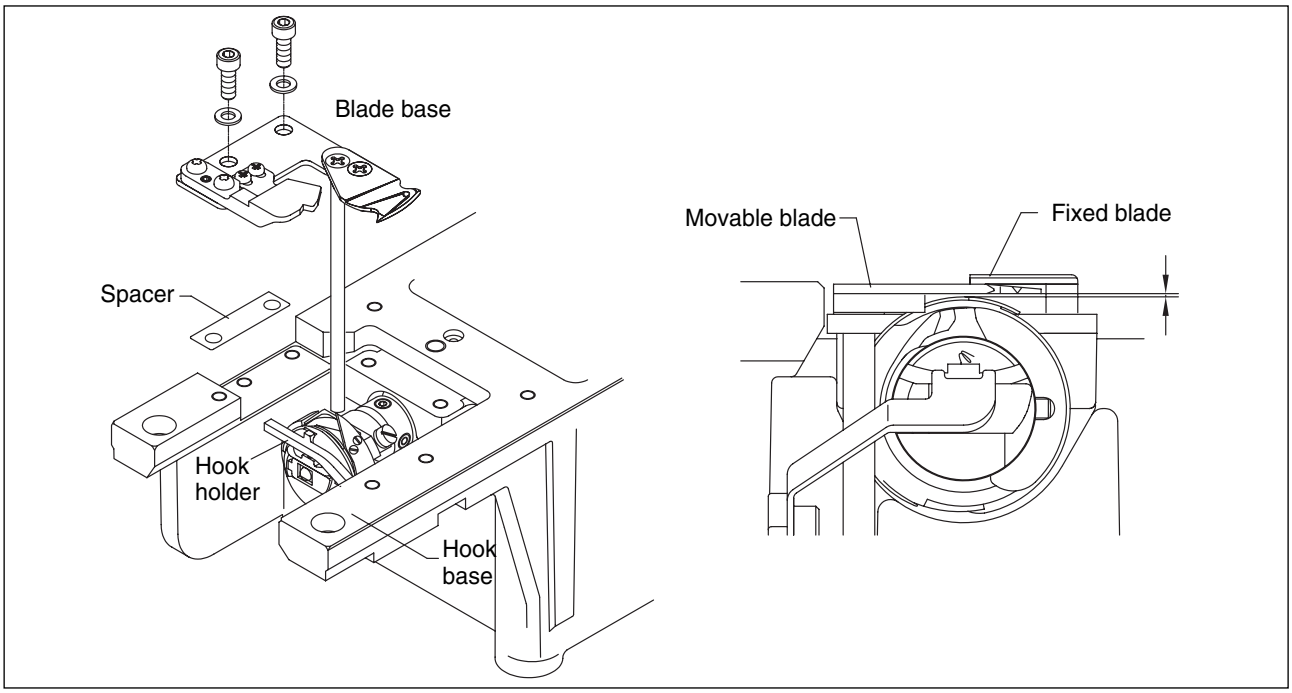
③ Unfasten the crank screw to adjust the location of the movable blade (see [Fig.7-3]). Fasten the screws back.



[Fig.7-1]

2) Adjusting Space between Movable Blade and Hook

To adjust a space between the movable blade and the hook, remove or insert a spacer (t 0.1) between the blade base and the hook base. In the case of spacer removal, make sure to check if the hook does not interfere with the movable blade.



[Fig.7-2]

3) Adjusting Blade Tension

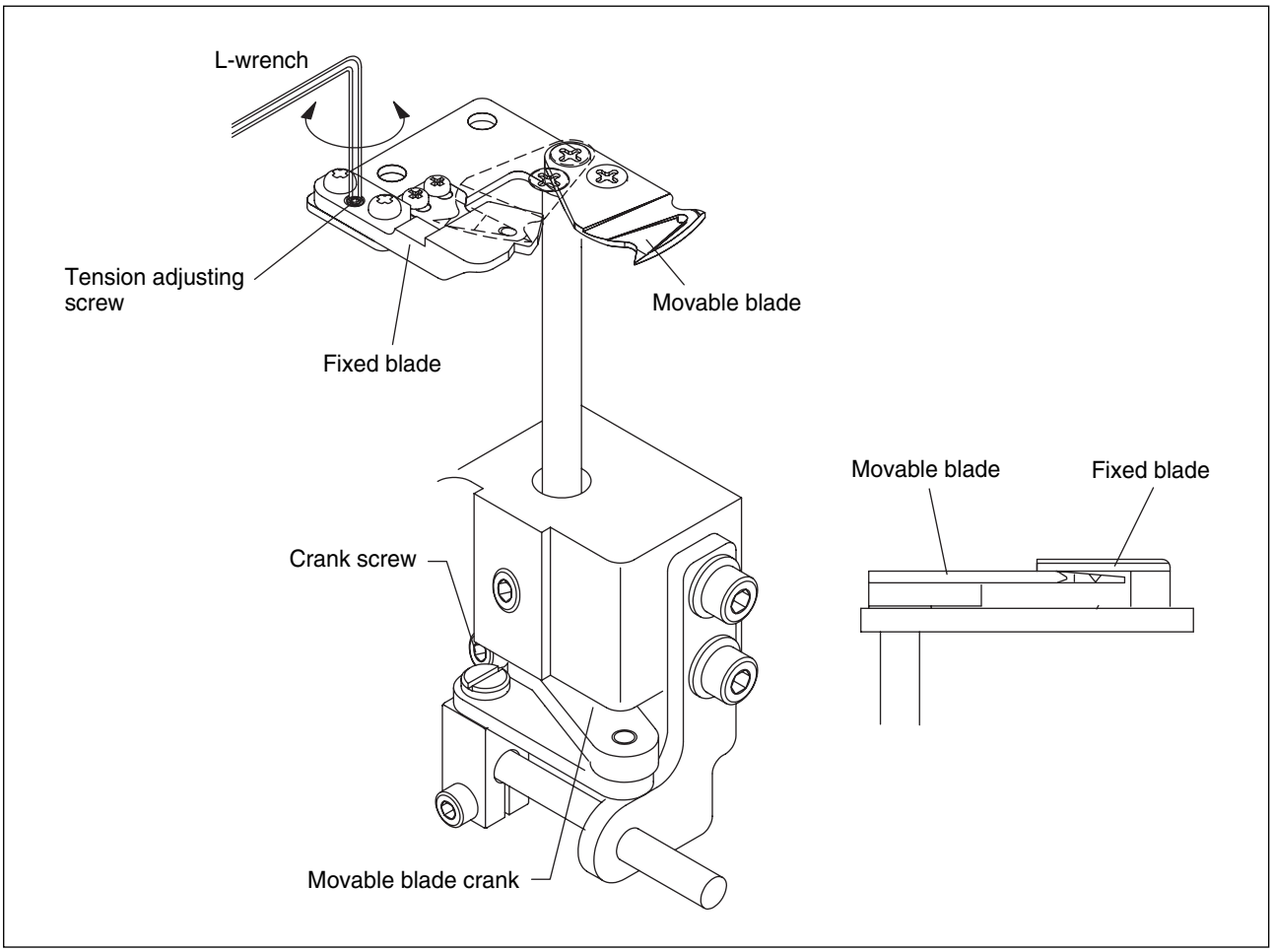
Make sure to check and adjust the cross-tension of the movable and the fixed blades after replacement or repair.

① Checking the cross tension

Manually move the movable blade and cut the upper and the lower threads. Check the cross-section of the thread cut.

② Adjusting the cross tension

Adjust the cross tension using fixed blade tension control screws (see [Fig.7-3]). Manually move the movable blade and adjust that it crosses in parallel with the cutting line of the fixed blade from its entry point to its return point.



[Fig.7-3]

[NOTE]

Avoid excess cross-tension. Excess tension may cause errors or wear-out of the movable blade from overload at its entry or return point. By holding the thread fed from the bobbin case after trimming, the lower thread holder helps to make starting stitches after trimming.

[CAUTION]

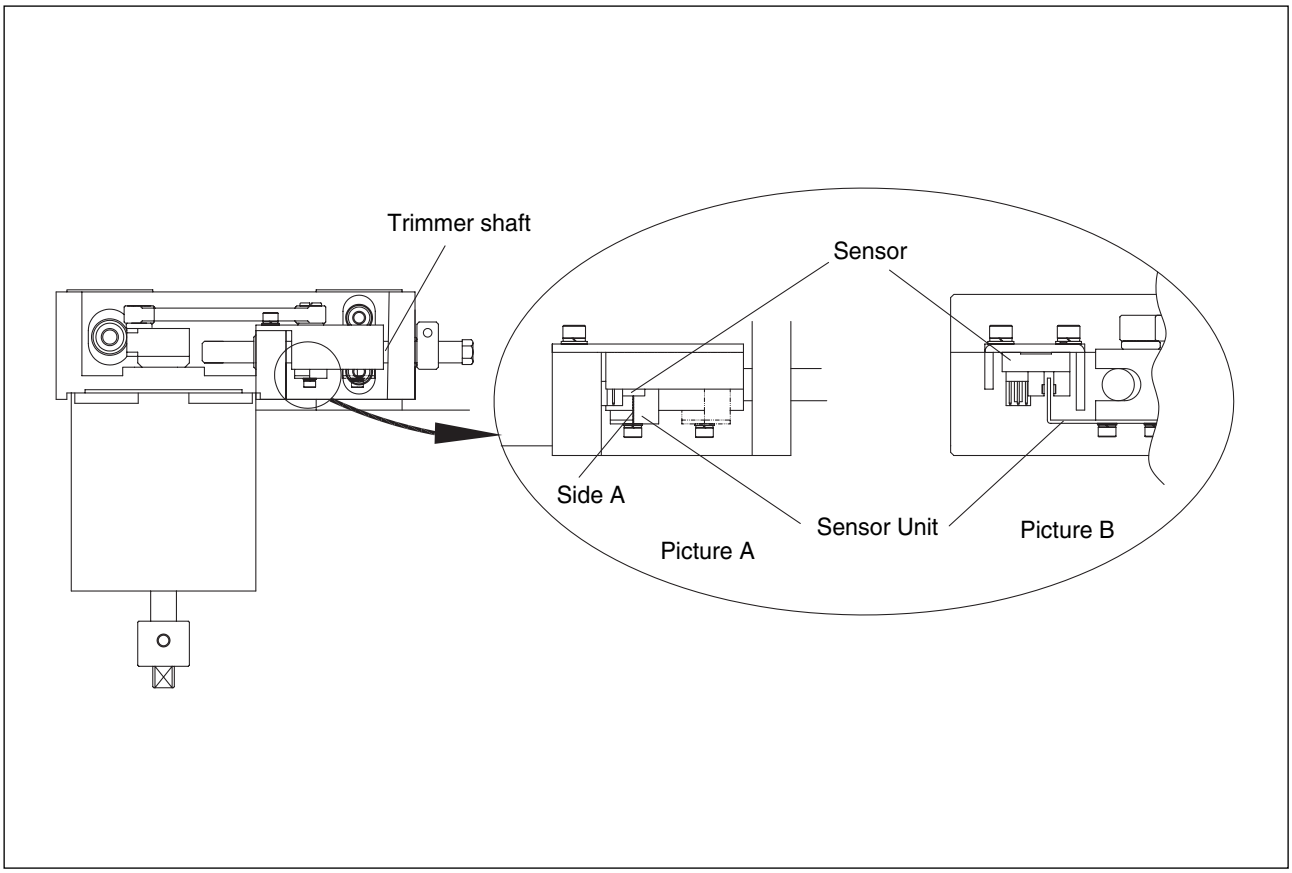
Regularly clean the thread debris around the lower thread holder for efficient functioning of the holder.

4) Adjusting Trimmer Return Spring

① Function: the trimmer return spring detects whether the movable blade has returned to its correct position after trimming. If the blade has not returned, it stops the machine to prevent damages on the needle and the blade.

② Adjustment:

Adjust the position of the sensor and the sensor unit so that the left edge ("side A") of the sensor unit is at the center of the left sensor when the movable blade is in its correct position (see picture A of [Fig.7-4]). Make sure that the sensor unit does not interfere with the operation of the sensor (see picture B of [Fig.7-4]).



[Fig.7-4]

7-2) ADJUSTING THE UPPER THREAD HOLDING UNIT

1) Checking the assembly of upper thread holding lever and upper thread holder plate

① Stroke of the upper thread holder driver plate in the upper thread holder base should be 1mm from the base when the upper thread holding solenoid is on.

② If the space is shorter than 1mm, adjust the position of the upper thread holding solenoid up and down so that the stroke of the plate is 1mm.

③ If the solenoid is not adjusted with the above measure, you must adjust the position of the upper thread holding lever.

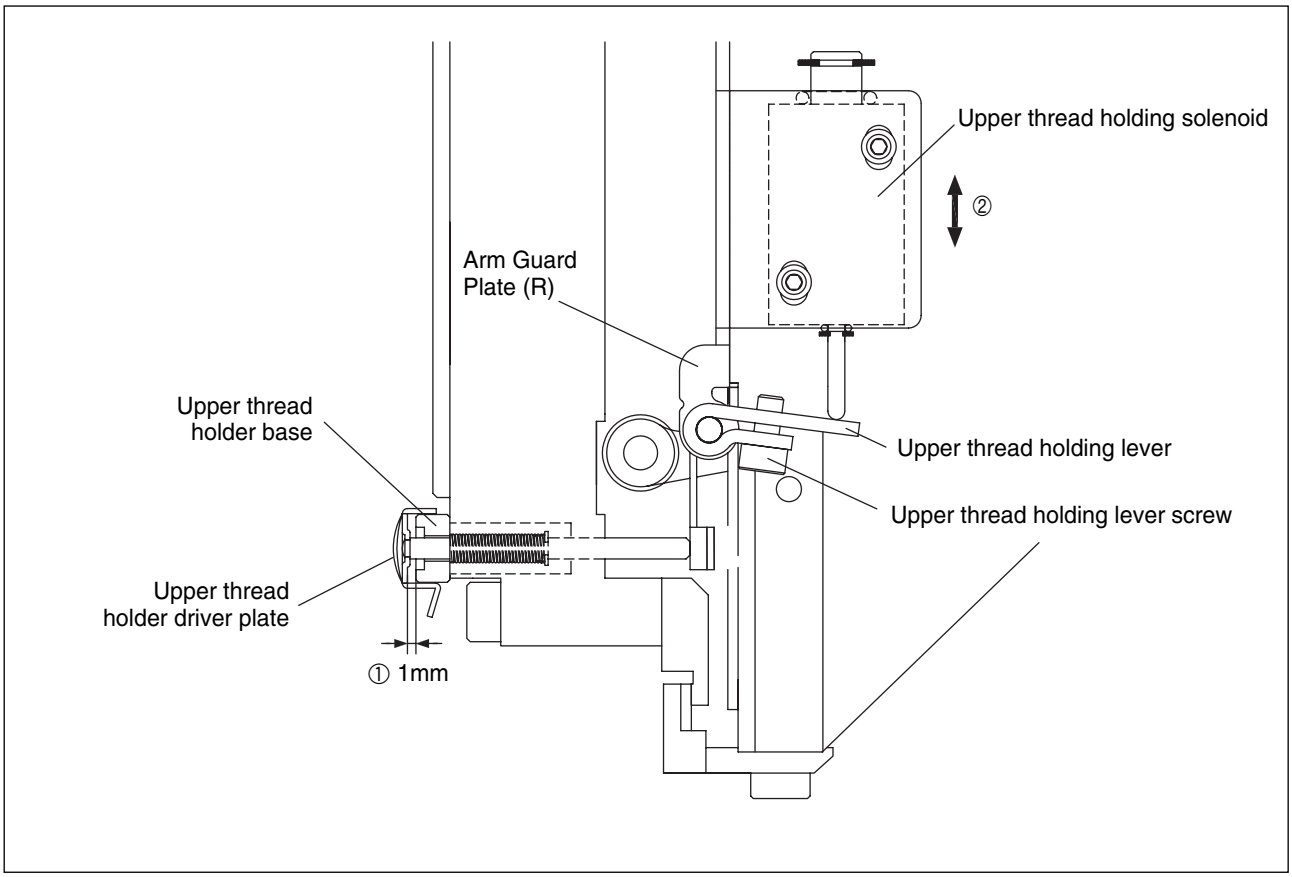
④ To adjust the upper thread holding lever, remove the arm protection plate from the arm. Adjust the upper thread holding solenoid over the center, and unscrew the lever. Support the arm protection plate with a flat plate so the lever touches the flat plate. Fasten the screw of the upper thread holding lever. Make sure that the upper thread holding lever is touching the axis of the upper thread holding solenoid.

⑤ Check if the lever moves smoothly left and right when you manually operate it.

⑥ Install the arm guard plate and go through ① and ② to complete.

[CAUTION]

If the upper thread holding unit does not function well, check if the upper thread holder driver plate of the unit moves smoothly when you manually move it. If not, adjust the position of the upper thread holding base.

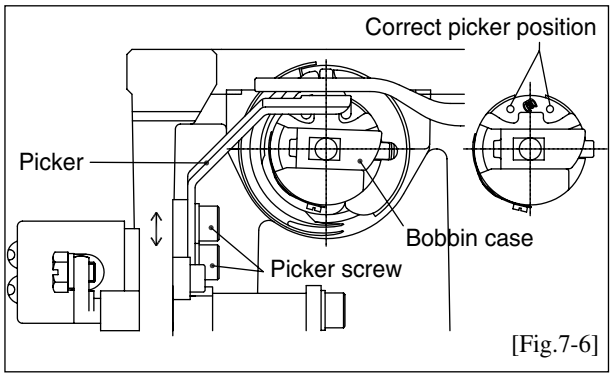


[Fig.7-5]

7-3) PICKER ADJUSTMENT

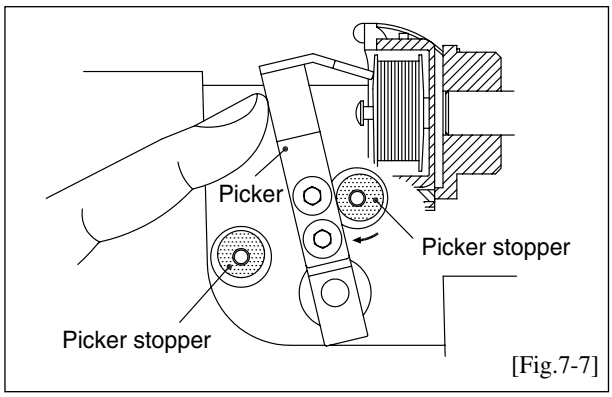
Incorrect position or volume of the picker may result in failures of separation of the upper and lower thread, trimming of both threads, and short upper thread after trimming.

① Adjusting picker position
Manually move the picker so it touches the bobbin. Unfasten the picker screw and adjust the tip of the picker ([Fig.7-7]).



[Fig.7-6]

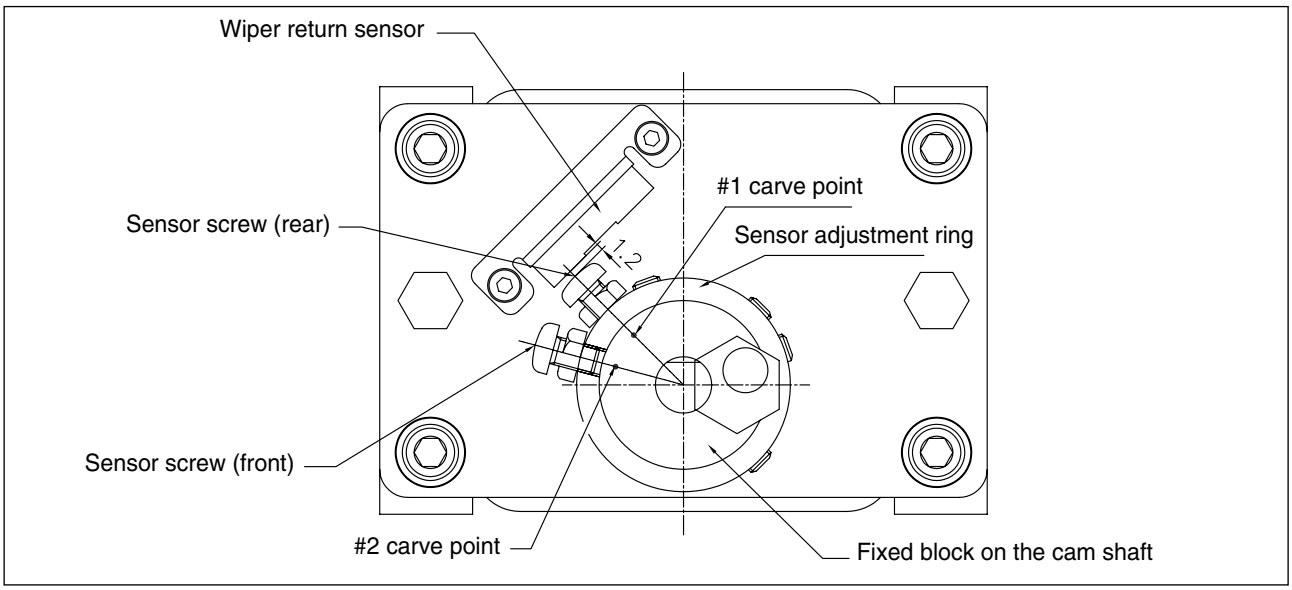
② Adjusting picker volume
Adjust the eccentricity of the picker stopper so the picker slightly touches the bobbin you're your press it with your hand.



[Fig.7-7]

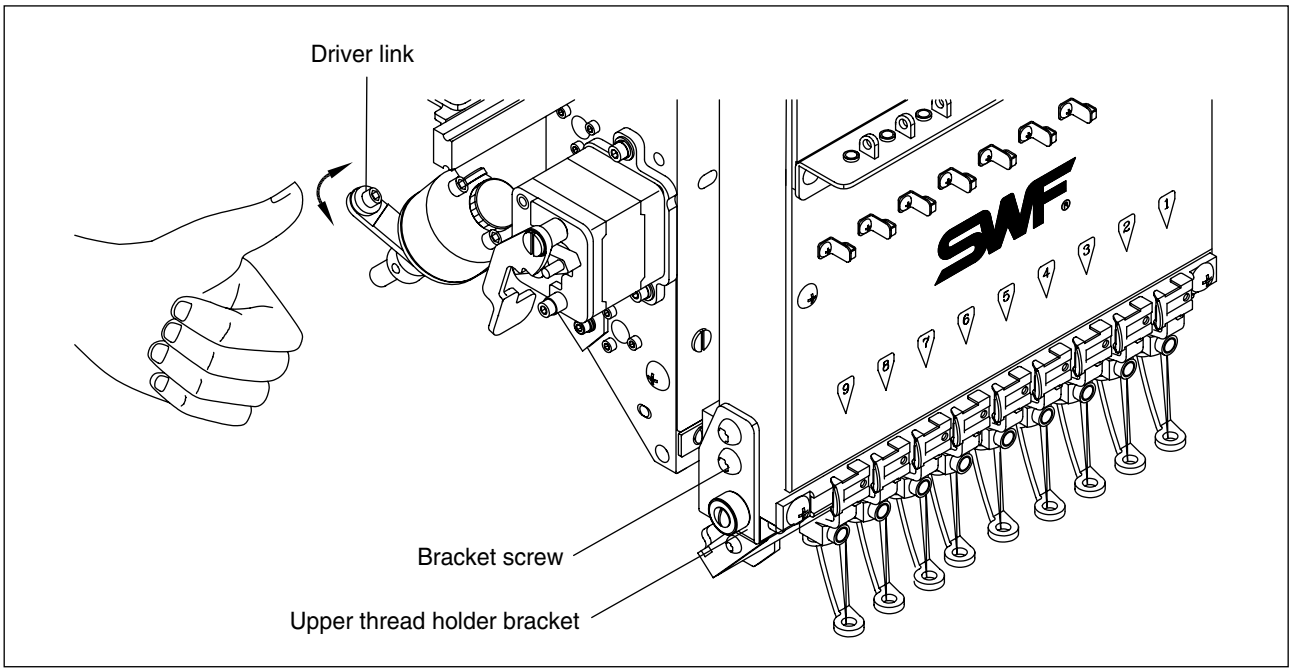
7-4) ADJUSTING UPPER THREAD HOLDER

1) Adjusting Sensor Adjustment Rings
Make the following adjustments if you find errors in the wiper return system.
① Open the cover of the wiper motor. Of the two sensor adjustment rings, align the center of the sensor screw in the rear ring with the #1 carve point on the fixed block on the cam shaft. Align the center of the sensor screw in the front ring with the #2 carve point on the fixed block on the shaft.
② Adjust so the wiper return sensor is 1-1.2mm from the upper head of the sensor screw. Make sure to check if the wiper return sensor turns on.



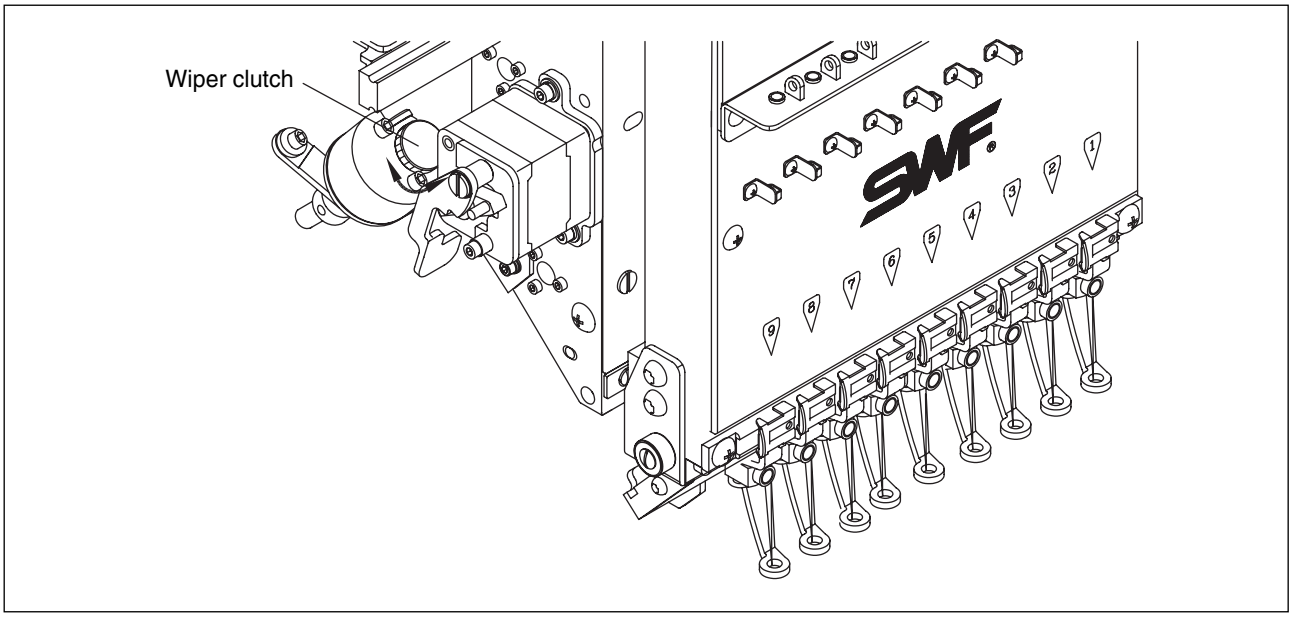
[Fig.7-8]

2) If the wiper does not move well, unscrew the driver link and adjust the wiper lever up and down. Unfasten the bracket screw so there is less overload from upper thread holder bracket. Adjust and fasten the bracket back at the point where the wiper moves well.
3) After adjustment, run the color change to check if the wiper functions well at each needle bar.



[Fig.7-9]

4) If there occurs a trimming or jump problem on a particular head during the embroidery, operate the wiper clutch to protect the embroidery and the wiper.
   - Press and turn the wiper clutch counterclockwise to operate the clutch.
     Press and turn it clockwise to stop the clutch operation



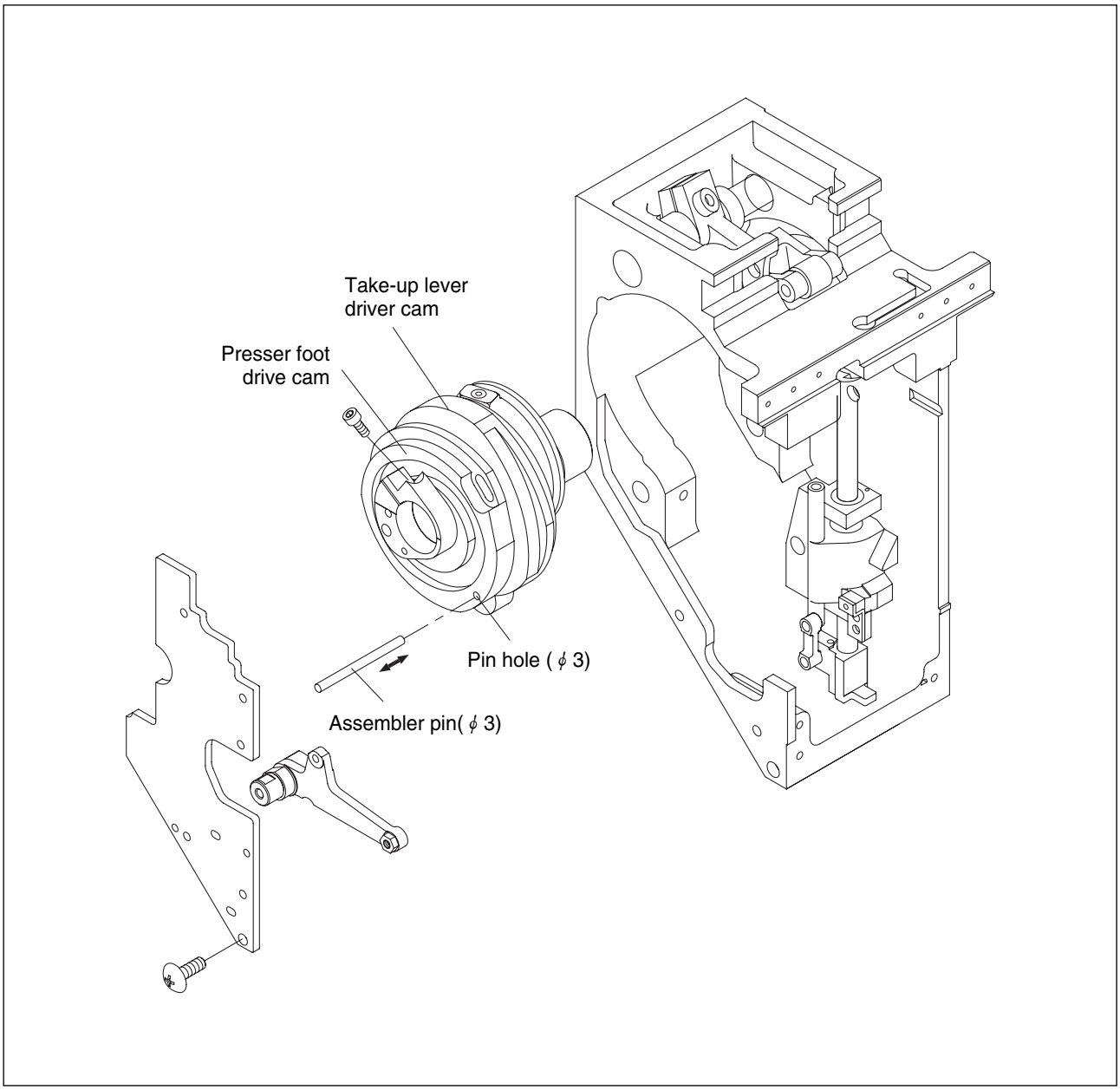
[Fig.7-10]

7-5) ADJUSTING LOW-NOISE PRESSER FOOT

1) Assembling the presser foot cam
   ① Position the main shaft angle 178°. Put two assembler pins (ϕ 3) into the assembler hole (ϕ 3) of the presser foot driver cam as shown in [Fig.7-11] and into the assembler hole of the take-up lever driver cam (ϕ 3).
   ② Adjust the position of the presser foot driver cam so that the assembler pins move freely left and right. Fasten three screws (M4 × L35) snugly.

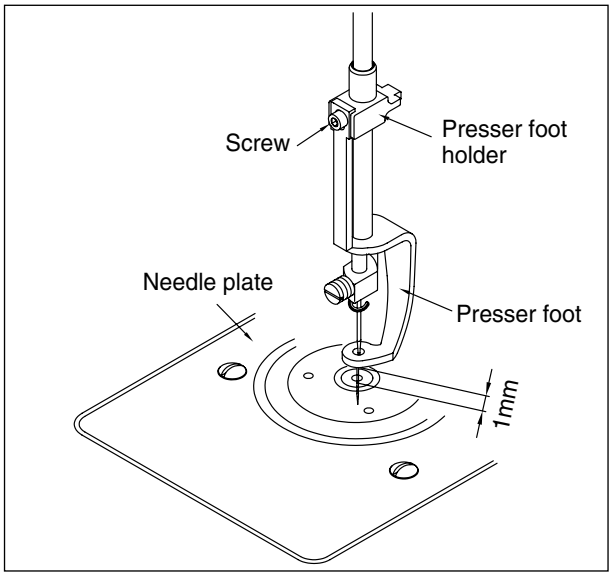
[CAUTION]

1. The assembly pin must smoothly move left and right after the cam is fixed with 3 screws.
2. The assembler and the assembler pin are not for commercial sale.
3. Contact your SWF dealership if you must adjust the presser foot cam.



[Fig.7-11]

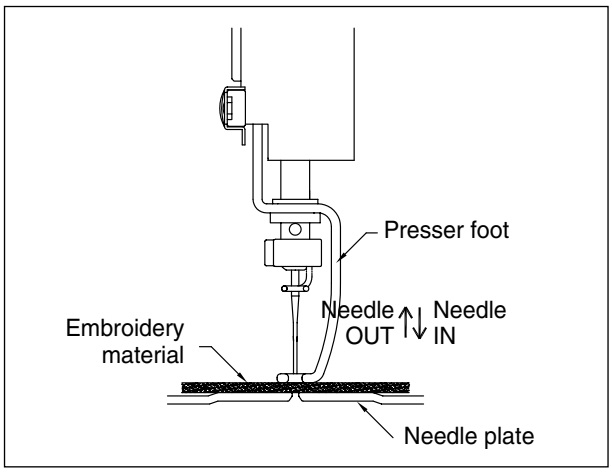
2) Adjusting the height of the presser foot
Check the relationship between the presser foot, the needle, and the embroidery material. Turn the main shaft with the lever and position the needle bar at the lowest point (main shaft angle of 178˚). Uncover the head and unscrew the presser foot so it moves up and down. Place a 1mm-thick gauge on the needle plate. Softly push the presser foot down onto the gauge and fix the screw snugly.



[Fig.7-12]

7-6) RELATIONSHIP BETWEEN PRESSER FOOT AND NEEDLE

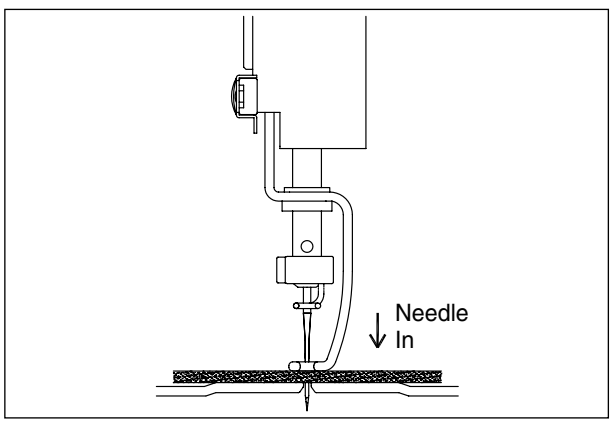
1) Relationship between Presser Foot and Needle/ Embroidery Material
For stable stitching, the presser foot must be pressing the embroidery material before the needle pierces into the material. The same is true for when the needle comes out of the material.



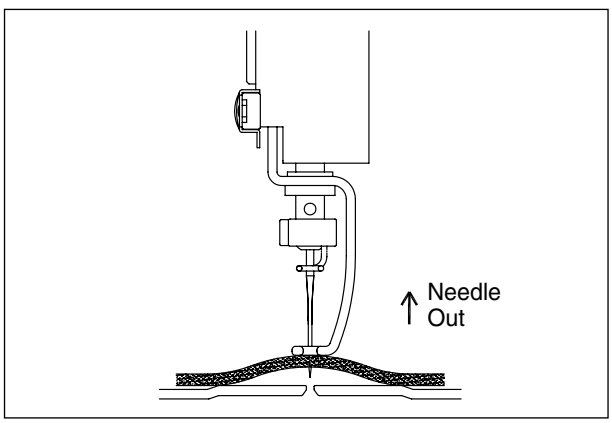
[Fig.7-13]

2) When the Presser Foot is Too High
① Needle In
[Fig.7-14] shows the presser foot fails to press the work material when the needle pierces into the fabric, causing an unstable needlework.

② Needle Out
[Fig.7-15] shows the presser foot fails to press the work material when the needle comes out of the fabric. The embroidery material is lifted up along with the needle, making a gap between the fabric and the needle plate. This may cause thread breaks, skipped stitches, or unstable stitching.



[Fig.7-14]



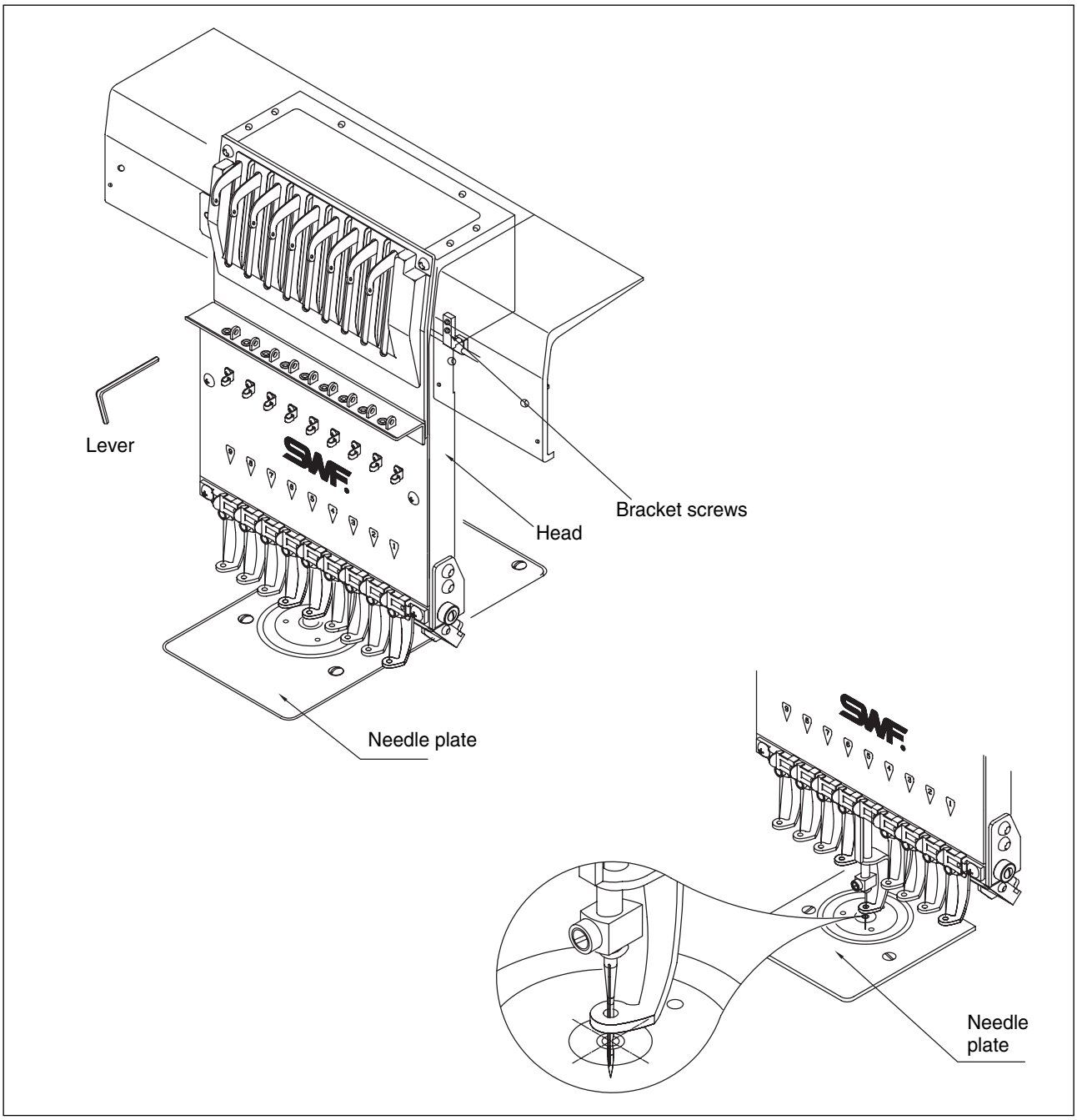
[Fig.7-15]

7-7) CORRECT POSITION OF NEEDLE

① Make sure to check the position of the needle – it may change during machine delivery or leveling. First check if the needle is bent. Then turn the main shaft lever to set the shaft at around 130˚. Position the needle at the lower dead stop and check if the needle is at the center of the needle hole on the plate.

[CAUTION]
Check the needle position on all heads.

② If the needle is not in the correct position, unscrew the brackets (2 screws) to adjust the head and the needle (see [Fig.7-16]).

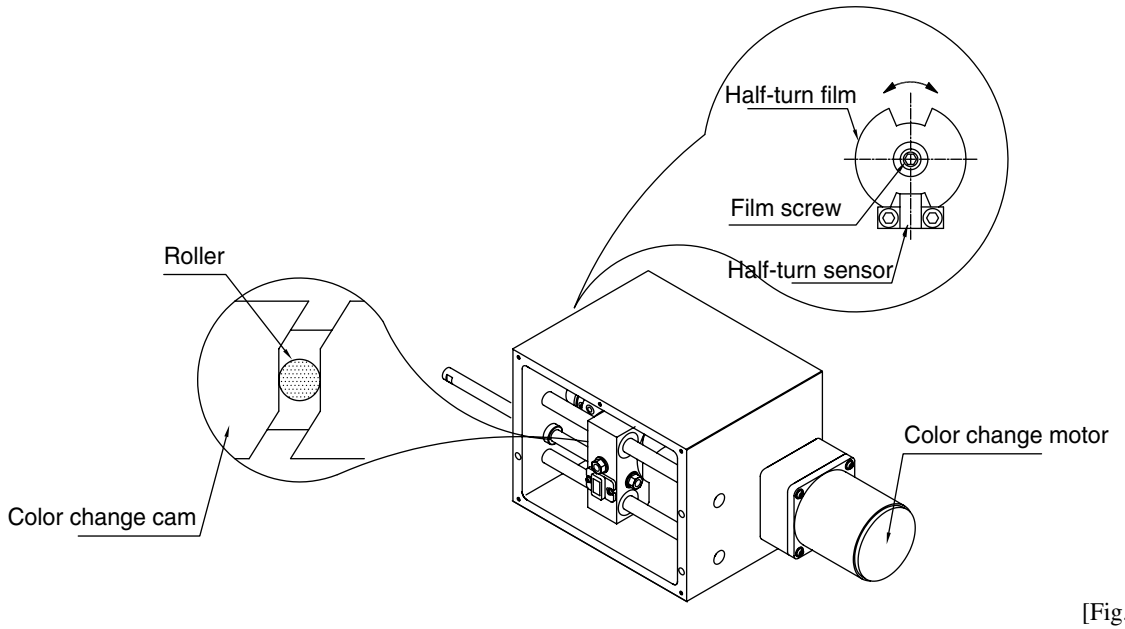


[Fig.7-16]

7-8) ADJUSTING HALF-TURN FILM FOR COLOR CHANGE

1) The machine will stop automatically if either of the needle position lamp or the needle set lamp blinks on the color change box. In this case, adjust the half-turn film as below.

   ■ When the needle comes to the center of the needle hole on the plate, adjust the position of the color change cam, using the manual knob, so that the roller is positioned at the center of the straight line of the cam as shown in [Fig.7-17]. Open the half turn film cover and align the centers of the half turn sensor and the half turn film.



[Fig.7-17]

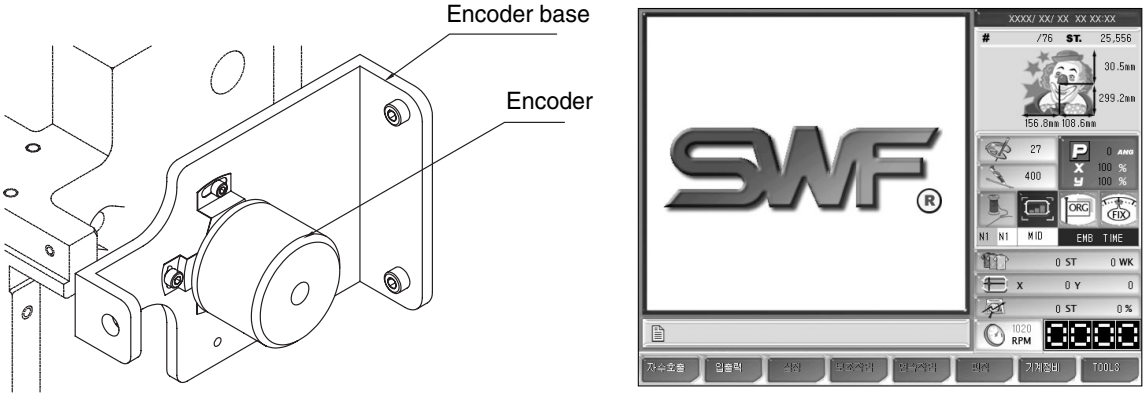
[CAUTION]
Manual color change must be performed at the upper shaft angle of 100°.
Manual adjustment at the upper shaft angles other than 100° may cause damage on the controller and the take-up unit.

7-9) ENCODER ADJUSTMENT

Adjust the encoder as below if the needle bar stops at an incorrect position.

① Unfasten the two screws on the upper shaft of the coupling connected to the encoder.

② Manually fix the upper shaft angle at around 98° by turning the main shaft lever. Adjust the encoder as shown in [Fig.7-18]. Tighten the coupling screws when (FIX) light turns red on the operation box.



[Fig.7-18]

7-10) NEEDLE BAR ADJUSTMENT

1) Adjusting the Lower Dead Stop of the Needle

You should be able to see half or the entire needle hole from the gauge in the bobbin case when the needle is at the lower dead stop.

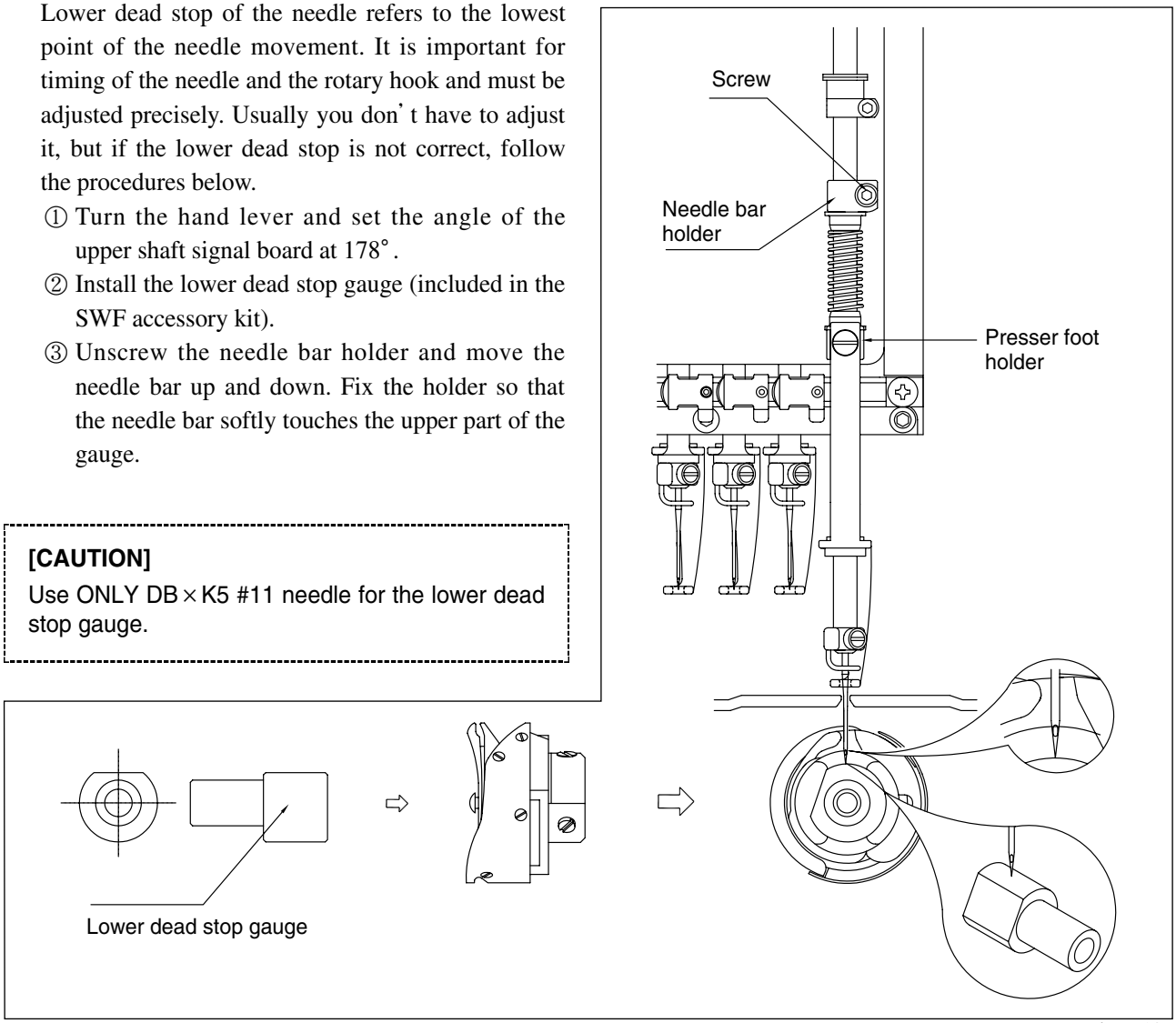
Lower dead stop of the needle refers to the lowest point of the needle movement. It is important for timing of the needle and the rotary hook and must be adjusted precisely. Usually you don't have to adjust it, but if the lower dead stop is not correct, follow the procedures below.

① Turn the hand lever and set the angle of the upper shaft signal board at 178°.

② Install the lower dead stop gauge (included in the SWF accessory kit).

③ Unscrew the needle bar holder and move the needle bar up and down. Fix the holder so that the needle bar softly touches the upper part of the gauge.

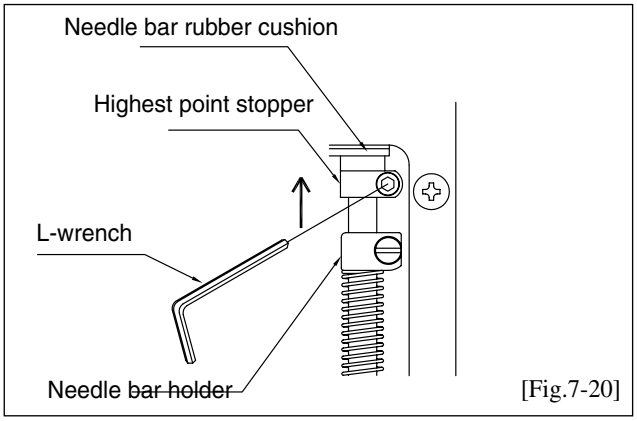
[CAUTION]
Use ONLY DB×K5 #11 needle for the lower dead stop gauge.



[Fig.7-19]

2) Adjusting the Highest Point of the Needle

You have to adjust the highest point of the needle if you adjusted the lower dead stop. Unfasten the screw on the highest point stopper and set the upper shaft angle at 0°. Attach the rubber cushion and the highest point stopper to the head frame as shown in [Fig.7-20]. Tighten the screw.



[Fig.7-20]

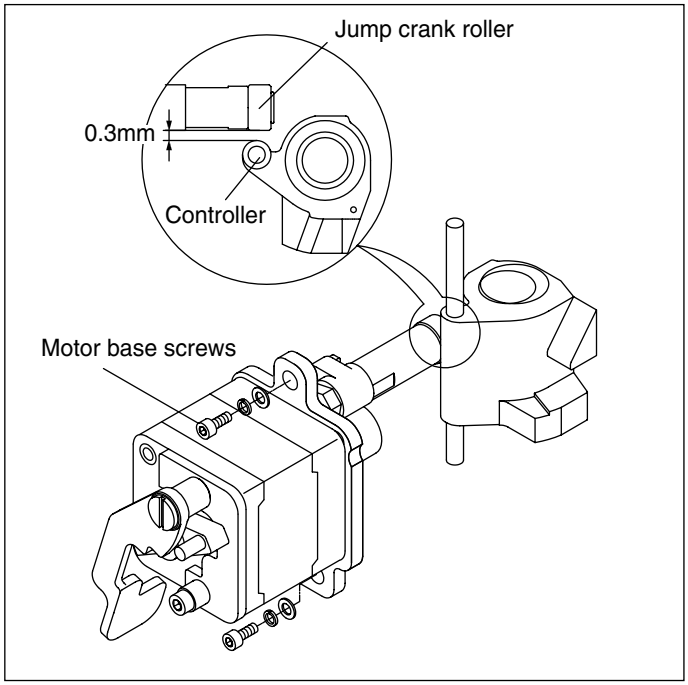
7-11) JUMP MOTOR ADJUSTMENT

Adjust the position of the jump motor if you have to replace it or if you find errors in jump.

1) Adjusting the standby position (adjusting the motor base)

① Unscrew the motor base (3 screws). Adjust so the jump crank roller is 0.3mm from the jump driver unit as shown in [Fig.7-21]. Fix the screws snugly.

② If the distance is longer than 0.3mm, the jumps may be interfered. If the distance is shorter than 0.3mm, there may be noise.



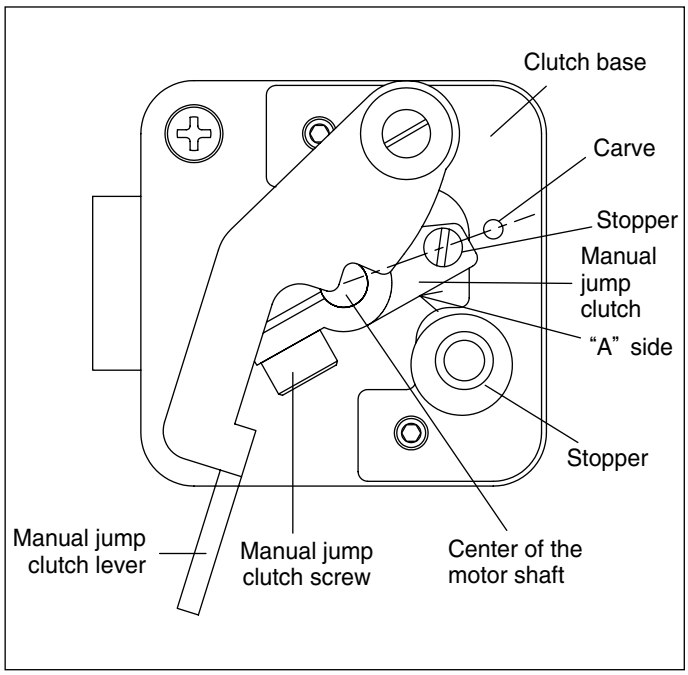
[Fig.7-21]

2) Adjusting the manual jump clutch position

① You can use the manual jump clutch lever to turn off the head mechanically. If the jump does not function well, check the assembly of the clutch.

② First, check, in the standby position, if the center of the motor shaft is in straight line with the centers of the manual clutch pin and the carve point. Refer to [Fig.7-22]. If not, unfasten the screws on the manual jump clutch, with the jump crank roller attached to the stopper, and align the clutch with the center of the carve point. Fasten the screws back.

③ Check if the clutch and the stopper are attached when you pull the clutch lever forward. If not, adjust the eccentricity of the stopper so it is completely attached to the clutch.



[Fig.7-22]

CAUTION

1. Make sure to run the manual jump clutch lever if you do not plan to use the head ON/OFF switch for long hours.
2. If "A" side of the clutch does not touch the stopper when the jump clutch lever is operated, you will hear noises when you do electric jumps.

7-12) ADJUSTING DRIVE BELT TENSION

1) X, Y Timing Belt

[CAUTION]

1. Driver belt tension may affect the quality of your embroidery or the machine performance. Only the SWF-trained engineer or professional engineers must adjust the belt tension.
2. Make sure to turn OFF the main power when adjusting the driver belt tension.

① X, Y Timing Belt

ⓐ Push the frame plate to X or Y axis as shown in [Fig.7-23] and pluck the middle of the belt to check the tension.

ⓑ Tension should measure 5-6mm drop of belt for X and 7-8mm drop of belt for Y when you pluck the middle of the belt span with 2kg force.

ⓒ To adjust the belt tension on the X axis, unfasten the tension base screws (2 screws) and turn the tension bolts. Turn clockwise to increase and counterclockwise to decrease the tension.

ⓓ To adjust the belt tension on the Y axis, unfasten the tension base screws (2 screws) and tension adjustment shaft screw and turn the adjustment shaft. Turn clockwise to increase and counterclockwise to decrease the tension.

Belt Tension Adjuster Specifications (Sound-wave Adjuster)

- Model: U-305 Series Sound-wave belt tension adjustment (standard type)
- Manufacturer: UNITTA

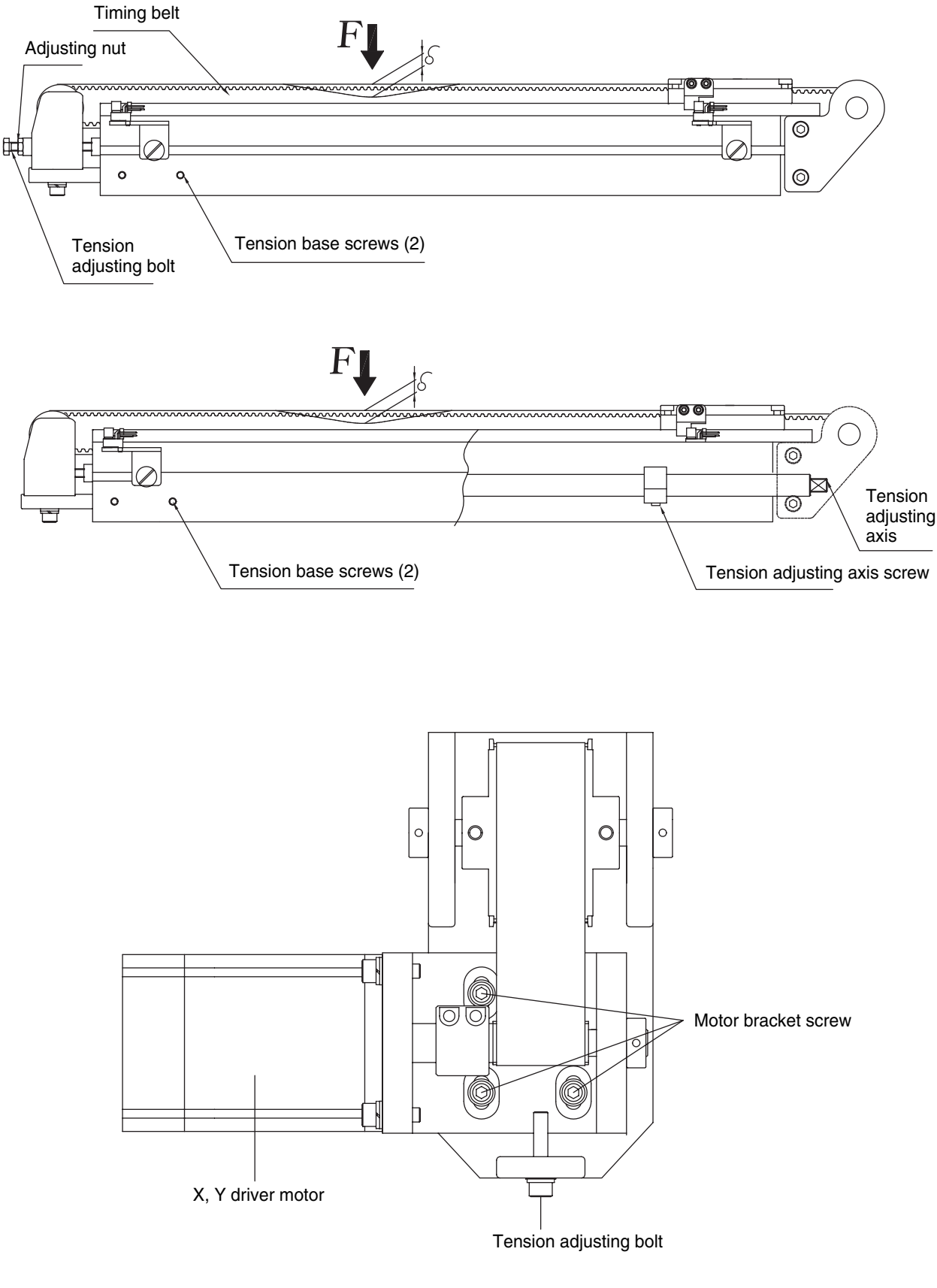
② X, Y Motor Timing Belt (see [Fig.7-23])

ⓐ Adjust the tension on the X, Y motor timing belts so the sound wave tension adjustor measures 35-40kgf when you pluck the belts with your finger or a dull-ended tool.

ⓑ Input data for U-305 Belt Tension Adjustor:

- Weight : 003.8 gf/m
- Width : 50.0/fR
- Span : 0112mm

ⓒ To adjust the belt tension, unscrew the motor bracket and turn the tension adjustment bolt.


Timing belt
Adjusting nut
F
δ
Tension
adjusting bolt
Tension base screws (2)
F
δ
Tension
adjusting
axis
Tension base screws (2)
Tension adjusting axis screw
Motor bracket screw
X, Y driver motor
Tension adjusting bolt

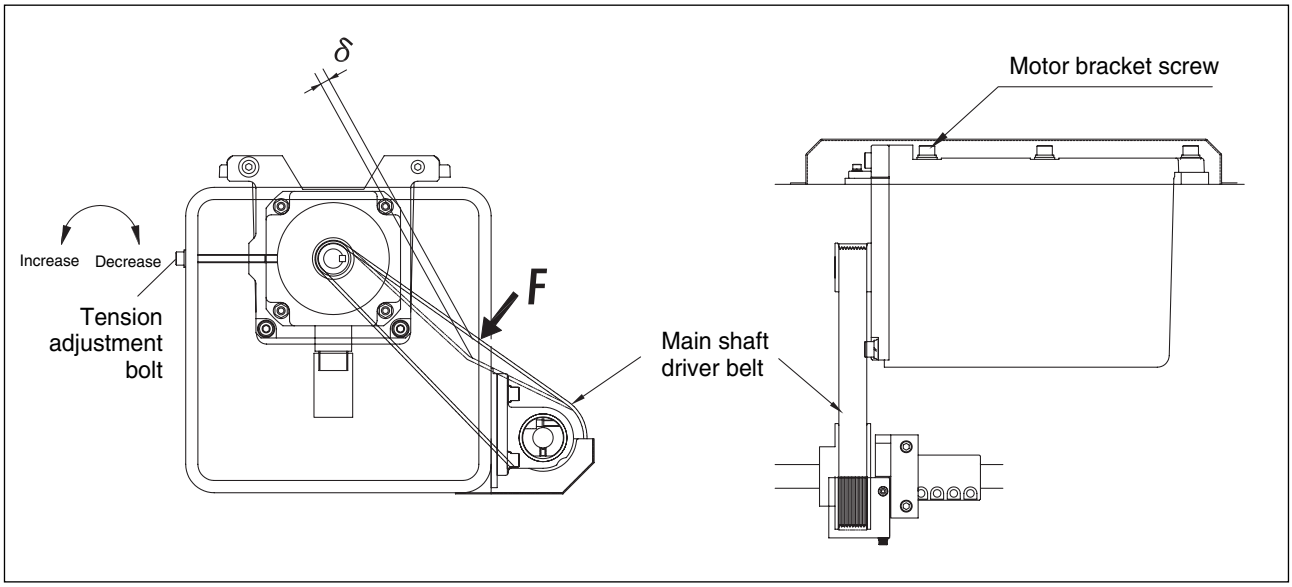
[Fig.7-23]

2) Main Shaft Motor and Upper/Lower Shaft Belt

① Adjusting tension on main shaft motor belt

ⓐ Tension on the timing belt of the main shaft motor should measure 2~3mm drop of belt when you pluck the middle of the belt span with 11kg force ([Fig.7-24]).

ⓑ To adjust the belt tension, unfasten the motor bracket (5 screws) and turn the tension adjustment bolt. Fasten the bolts to increase and unfasten to decrease the tension.



[Fig.7-24]

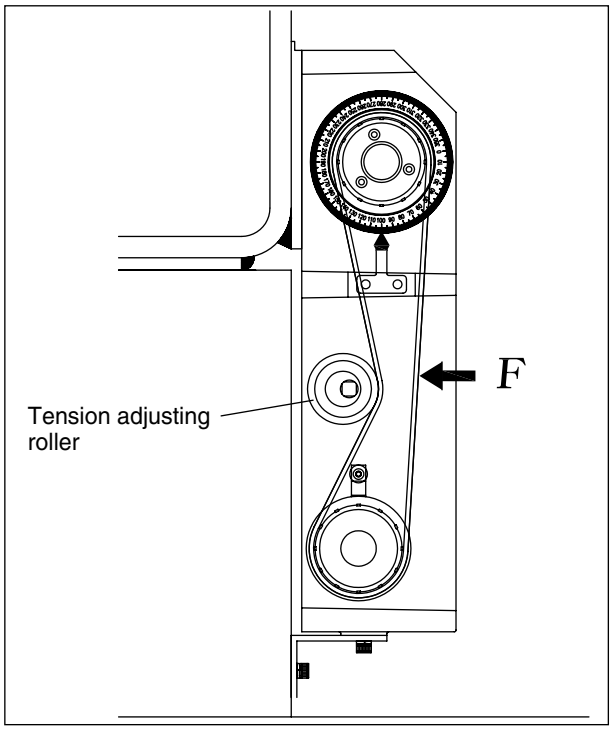
[CAUTION]

Check if the belt is properly arranged before adjust the tension.

② Adjusting tension on upper/lower shaft belt

ⓐ The upper/lower shaft belt should spring back when you lightly press the belt on which the idler is installed.

ⓑ To adjust the tension, unfasten the roller holder (one screw) and adjust the position of the roller front and back (see [Fig.7-25]).

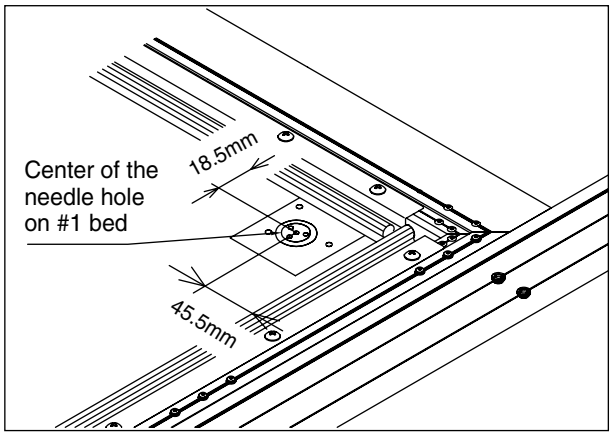


[Fig.7-25]

7-13) ADJUSTING X, Y SCOPE LIMITS

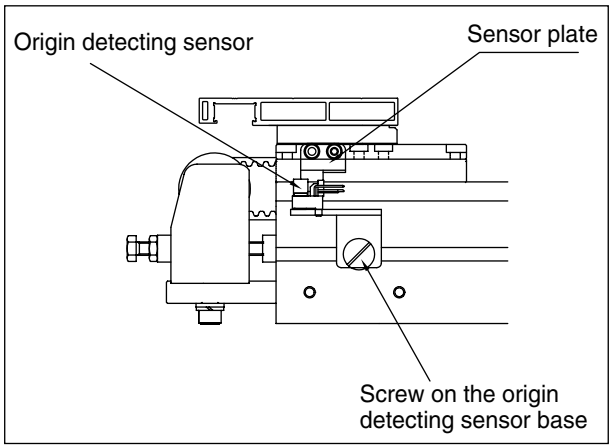
1) Adjusting X scope limit

① Manually move the frame to a point, where the right end of the frame clip is 45.5mm from the center of the needle hole on the #1 bed (see [Fig.7-26])



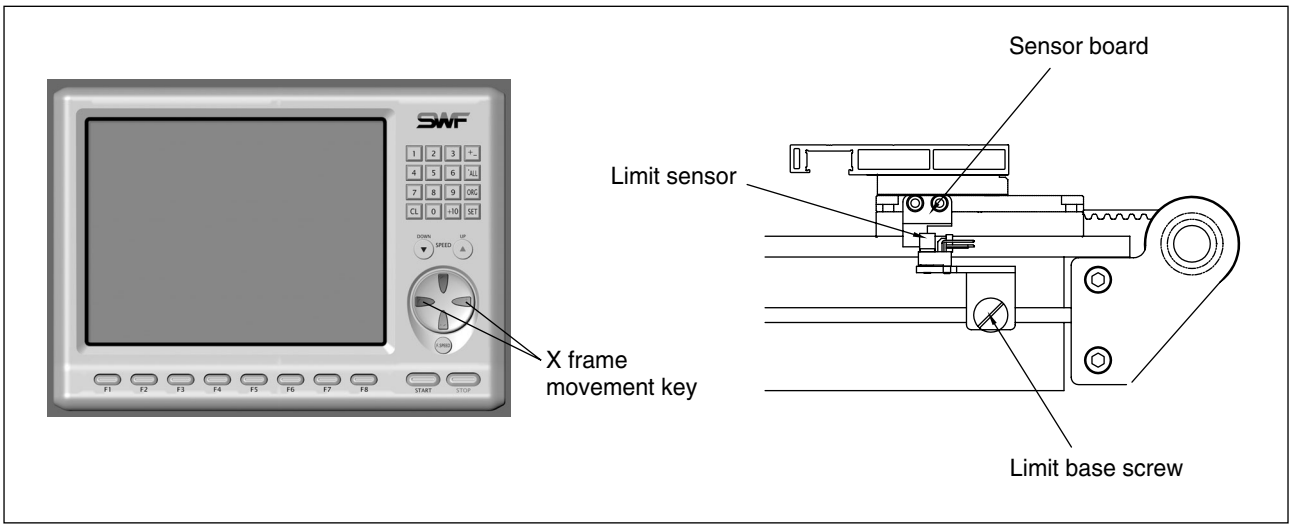
[Fig.7-26]

② Adjust the origin detecting sensor on the left of the X-axis LM guide as shown in [Fig.7-27] and fasten the sensor base.



[Fig.7-27]

③ After adjusting the origin point on the X axis, turn on the main switch and press the X frame movement key on the operation box. When the frame reaches the limit of the X scope (interval between heads? ex. 330. 300. 275. 400 mm. See FRAME-X on the screen), turn off the machine. Fix the position of the limit sensor on the right of the LM guide as shown in [Fig.7-28].

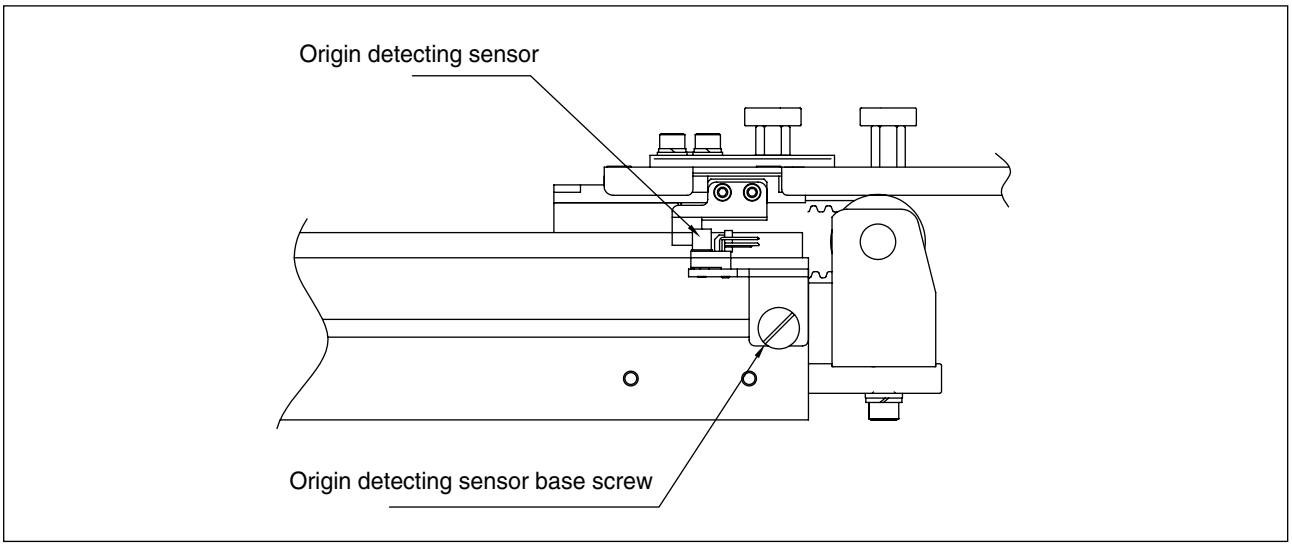


[Fig.7-28]

2) Adjusting Y scope limit

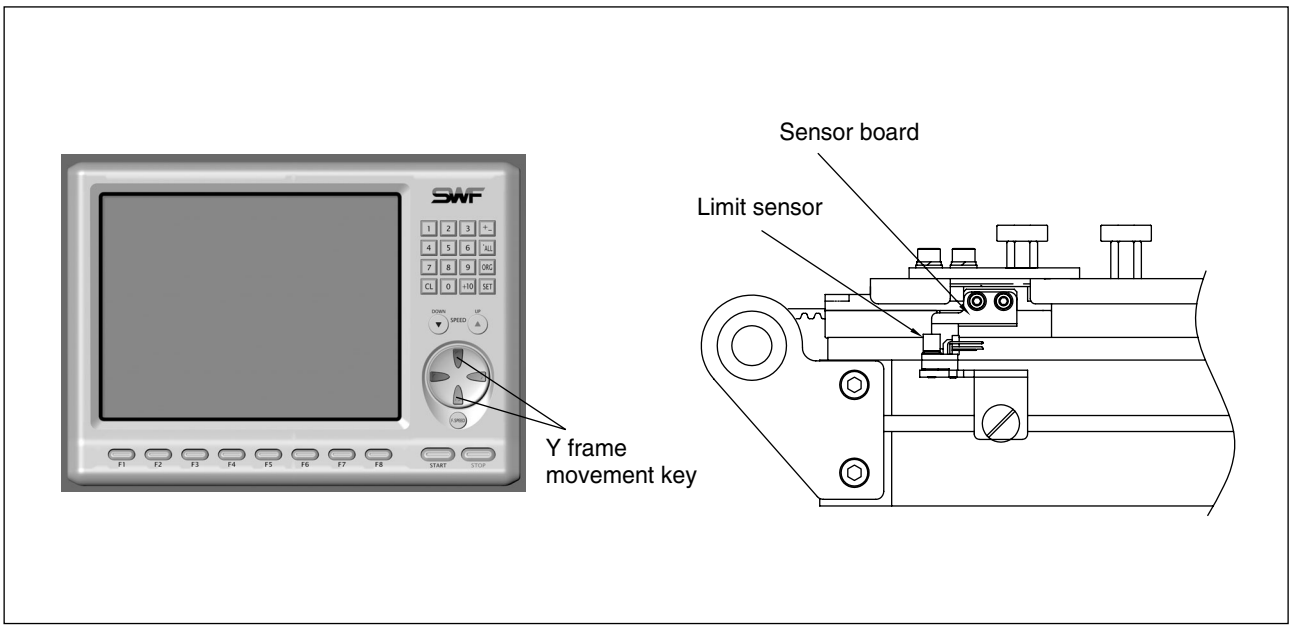
① Manually move the frame to a point, where the rear end of the frame clip is 18.5mm from the center of the needle hole on the #1 bed (see [Fig.7-26]).

② Adjust the origin detecting sensor on the front of the Y-axis LM guide as shown in [Fig.7-29] and fasten the sensor base.



[Fig.7-29]

③ After adjusting the margin Y point, turn on the switch and move the Y frame using the key on the operation box, seeing the current position of Frame-Y on the operation box screen. When it reaches the Y limit, fix the limit sensor at the back of the LM guide on Y axis as shown in [Fig.7-30].



[Fig.7-30]

3) After adjustment, turn on the power and select MACHINE MAINTENANCE in the main function menu and FRAME ORG in the sub menu to check if the scopes are correctly adjusted.

4) Adjusting X scope limit when using odd or even number heads (SWF/SA-WB(X) SERIES)

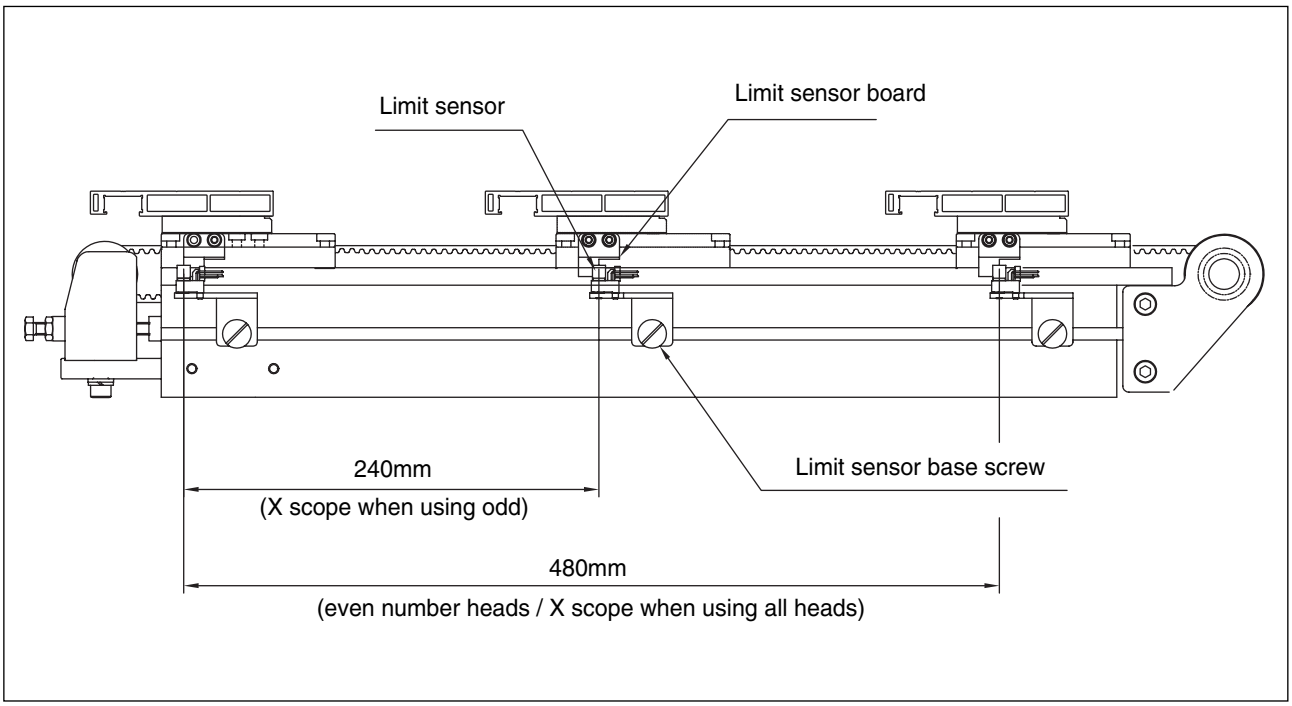
① Set the needle bar stop clutch function for the even number heads and the X scope will double.

[CAUTION]

You can double the X scope of the SWF/SA-WB(X) Series to 480mm by using even/odd number heads, whereas the scope is 240mm when using all heads.

② X scope was factory adjusted for using all heads and you must adjust the scope when using odd/even heads.

- Unfasten the limit switch on the right on the X axis and push it to the end of the axis. Move the frame to 480mm (see FRAME-X on the screen) and fix the limit switch as shown in [Fig.7-31].



[Fig.7-31]

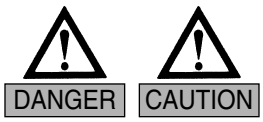
[CAUTION]

Turn OFF the lamp on the tension adjustment boards of the even number heads when using odd/even number heads.

DANGER

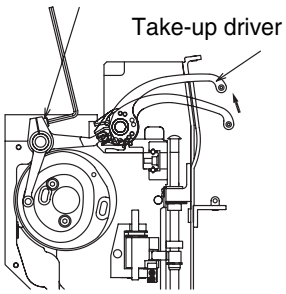
Check if the limit sensor base is firmly fixed. The limit sensor must NOT move during embroidery work.

8
TROUBLE SHOOTING



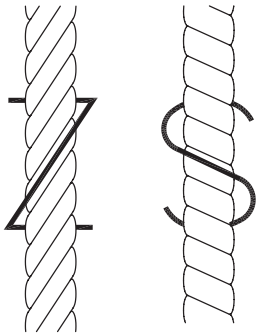
Inspect/repair the machine by the guideline when in machine failures.

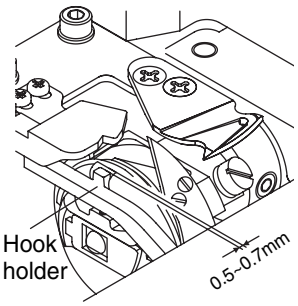
Error Type	Cause	Inspection & Repair	Reference
Operation failure	① Loose belt tension / belt damage	■ Adjust belt tension / change belt	■ Check ① main driver belt ② X-Y timing belt
	② Power failure or short-circuit of fuse	■ Check fuse in main shaft motor and change fuse	
	③ Failure to sense signals for needle position or 1 rotation	■ Run manual color change and check if signal lamps (needle set lamp & needle position lamp) blinks at correct needle position. Adjust the half-turn film.	
	④ Frame out of X or Y limit	■ Move frame back to within the limit ■ Check limit switch	
	⑤ Machine doesn't start with bar switch	■ Check switch connection and connector related to bar switch	
Incorrect Stop Position	① Loose tension on main driver belt	■ Adjust belt tension	
	② Incorrect position of encoder or bad encoder	■ Adjust position or change encoder	

Error Type	Cause	Inspection & Repair	Reference
Bad Color Change	① Incorrect position of needle stop	■ Refer to user' s manual	■ Set main shaft angle back at 100°, if you manually moved it for cleaning, inspection or repair.
	② Failure to sense signals for needle position or 1 rotation	■ Run manual color change and check if signal lamps (needle set lamp & needle position lamp) blinks at correct needle position. Adjust the half-turn film.	
	③ Incorrect position of needle bar	■ Set it to the correct position	
	④ Incorrect position of take-up lever	■ Adjust so take-up lever is in line with the other levers in the stop position (upper shaft angle:100°)	■ Adjusting position of take-up lever Unscrew the driver lever and adjust so it is in line with other levers on the take-up guide rail. Take-up lever driver screw Take-up driver 
	⑤ Fuse failure for color change and wiper motor Bad connection	■ Change fuse F5 in joint board or check connection	■ Check fuse spec. F5 = 250V 2A

Error Type	Cause	Inspection & Repair	Reference
Poor detection of upper thread	① Failure of thread detecting roller	■ Disassemble the roller and clean the roller and bush bearing.	
	② Poor connection & quality of tension adjusting plate	■ Check the plate connection and change the circuit board	
Bad jump	① Bad SMPS for jump	■ Change jump SMPS in controller box	■ Check fuse spec 1) 3-phase: F3 F4 = 250V 15A 2) 1-phase: F3 F4 = 250V 30A
	② Bad wiring for jump motor Bad jump motor	■ Check wiring and change jump motor	
	③ Bad connection	■ Check connection	
	④ Switch failure on tension adjusting board and bad circuit board	■ Change switch and circuit board	
Bad stitch	① Bad design	■ Correct tape	
	② Inadequate tension on X-Y belt	■ Adjust tension	
	③ Foreign substance in X-Y rail	■ Clean the rail	
	④ Failure of X/Y driver board	■ Change circuit board	
	⑤ Heavy load on frame	■ Reduce speed of main shaft	

Error Type	Cause	Inspection & Repair	Reference
Thread breaks	① Stitch is too small/dense for thread	■ Re-punch design tape	■ Check design
	② Frequent thread break in the same spot	■ Re-punch after checking design ■ Correct the stitches on operation box	
	③ Inadequate needle size for thread	■ Change needle	
	④ Needle damage (bent, dent, worn)	■ Change needle	
	⑤ Incorrect needle installation (height, direction, etc.)	■ Re-install needle	
	⑥ Dirty needle (adhesive, etc.)	■ Clean or change needle and hook	■ Use minimum adhesive for applique

Error Type	Cause	Inspection & Repair	Reference
Thread breaks	⑦ Bad thread (weak, uneven thickness, poorly twisted, old)	■ Change thread	Check selecting thread ※ Selecting thread ■ Select soft, tight, and stable thread with even thickness and left-twist
	⑧ Right-twisted thread	■ Change to left-twisted thread	 ■ Z-twist: left ■ S-twist: right
	⑨ Excessive thread tension	■ Adjust tension	
	⑩ Tension imbalance between upper and lower threads	■ Adjust tension	
	⑪ Excessive tension & stroke on take-up spring	■ Adjust tension and stroke	

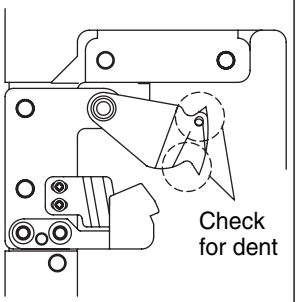
Error Type	Cause	Inspection & Repair	Reference
Thread breaks	⑫ Dent on thread path on hook and bobbin case	■ Remove dent or change the case	■ Check rotary hook
	⑬ Narrow space between hook holder and groove for hook holder (on hook)	■ Adjust space	■ Set it at 0.5-0.7mm for smooth feeding of upper thread 
	⑭ Insufficient oil in hook	■ Oil the raceway of hook	
	⑮ Poor timing of needle and hook	■ Adjust timing	
	⑯ Incorrect lower dead stop	■ Adjust the lower dead stop	
	⑰ Dent on thread path	■ Check: ① Thread path in presser foot ② Around needle hole on needle plate ③ Thread guide on the head ④ Thread path in tension adjuster ⑤ Thread path in upper thread holding unit	
	⑱ Fabric moves on the frame	■ Fix the material firmly	
	⑲ Inadequate height of presser foot (does not press the work material)	■ Adjust height	

Error Type	Cause	Inspection & Repair	Reference
Skipped Stitches	① Bent needle	■ Change needle	
	② Inadequate needle size for thread	■ Use needle of adequate size	
	③ Incorrect installation of needle	■ Install needle correctly	
	④ Poor timing of needle and hook	■ Adjust needle-hook timing	
	⑤ Large gap between needle groove and hook point	■ Adjust space	
	⑥ Incorrect lower dead stop	■ Adjust lower dead stop	
	⑦ Damaged hook point	■ Use whetstone to adjust hook point or change hook	
	⑧ Thread feeding is interfered	■ Adjust thread tension ■ For lower thread, change bobbin or bobbin case	
	⑨ Inadequate thread ■ twist ■ elasticity ■ and flexibility	■ Select right thread for embroidery	
	⑩ Excessive tension or stroke on the take-up lever spring	■ Adjust stroke or tension	
	⑪ Fabric moves with needle – weak or damaged presser foot (spring)	■ Change presser foot spring	

Error Type	Cause	Inspection & Repair	Reference
Poor stitch tension	① Weak upper thread tension	■ Adjust tension	
	② Uneven upper thread tension due to foreign substances	■ Clean main and sub tension adjusters in the thread tension adjusting plate	
	③ Weak lower thread tension	■ Adjust tension	
	④ Uneven lower thread tension	■ Clean bobbin case and check tension on bobbin spring	
	⑤ Thread thickness	■ Change to quality thread	
	⑥ Poor timing of needle and hook	■ Adjust timing	
	⑦ Insufficient oil in hook	■ Use whetstone to adjust hook point or change hook	
Needle breaks	① Bent needle	■ Change needle	
	② Bad quality needle		
	③ Tip of the needle is worn or bent		
	④ Inadequate needle size		
	⑤ Needle touches the hook point	■ Space the needle and the hook point	
	⑥ Incorrect installation of needle	■ Correct the installation	
	⑦ Needle touches the needle hole on the plate	■ Check if needle plate is unscrewed ■ Adjust the position of the needle bar	

Error Type	Cause	Inspection & Repair	Reference
Puckering	① Excessive thread tension	■ Adjust tension	
	② Excessive pressure of presser foot	■ Change presser foot spring	
	③ Needle failure – worn out/damaged needle tip needle is too large for thread	■ Change needle	
	④ Needle hole is too large for needle	■ Use adequate size of needle	■ SWF needle holes are 2.0mm large. SWF/□ specification for needle & thread are: Cotton : #50-70 Rayon : #75-120 needle : DB × K5 #9~#14
Trimming failure	① Short-circuit of trimming fuse	■ Check and change fuse F1 F2 in joint board	■ Check fuse spec 1) 3-phase: F1 F2 = 250V 10A 2) 1-phase: F1 F2 = 250V 10A
	② Poor trimmer motor and connection	■ Check and change trimmer driver motor	
	③ Bad connection	■ Check connection	
	④ Red light on trimmer driver box	■ Address the error cause. Press RESET to turn the light green.	

Error Type	Cause	Inspection & Repair	Reference
Trimmer return failure	① Poor connection of sensor	■ Check connection	
	② Bad circuit board	■ Change circuit board	
	③ Bad sensor or sensor position. Dirty area around the sensor.	■ change sensor	
		■ clean around the sensor	
		■ adjust location of the sensor unit	
Short upper thread after trimming due to separation failure	① Movable blade is too fast or too slow to separate the upper thread	■ Adjust initial position of movable blade	
	② Movable blade and rotary hook are too close or too far	■ Adjust the distance	
	③ Incorrect position of picker	■ Adjust picker position	
	④ Picker failure	■ Check and change fuse F3 F4	■ Check fuse spec. 1) 3-phase: F3 F4 = 250V 15A 2) 1-phase: F3 F4 = 250V 30A
		■ Check/change solenoid and solenoid connection	
		■ Check connection and change joint board	

Error Type	Cause	Inspection & Repair	Reference
Thread break before trimming	① Upper thread is too short ■ check main and sub tension adjuster	■ Adjust upper thread tension	
	■ dent or damage to movable blade	■ Remove dent using whetstone or sandpaper or change movable blade	
	② Lower thread is too short ■ doesn' t unwind smoothly	■ Adjust or change bobbin case spring	■ Too short lower thread cannot make stitches right after trimming
		■ clean/check for dent in thread guide on the bobbin case	
	■ too weak or too elastic	■ Change lower thread	
Short upper thread after trimming	① Upper thread is trimmed too short and comes unthreaded	■ check upper thread tension	
		■ set [LONG] or [MEDIUM] length of trimmed thread in SET-UP III	■ The default is MEDIUM.
	② Upper thread is trimmed too long and thread tail remains on the embroidery	■ set [MEDIUM] or [SHORT] length of trimmed thread in SET-UP III	
		■ if upper thread is held due to narrow velcro space in upper thread holder, clean the velcro	

Error Type	Cause	Inspection & Repair	Reference
Thread is not cut (at specific head)	① Failure of movable and fixed blades	■ Check screws and crank driver clamp screws of the movable blade	
	② Loose cross tension of the blades	■ Check tension of fixed blade	
	③ Movable blade damaged	■ Change movable blade	
	④ Incorrect return position of movable blade	■ Adjust the position of movable blade	
Stitch is not formed after trimming	① Short upper thread ② Short lower thread ③ Lower thread holder failure	■ Adjust tension of lower thread holder	
Failure of upper thread holder motor	① Bad fuse for upper thread holder motor and bad connection.	■ Change front fuse in controller box or check connection	■ Check fuse spec F5 = 250V 2A
	② Poor connection	■ Change joint board	
Failure to hold upper thread	① Short strokes of upper thread holder	■ Adjust stroke	
	② Upper thread holder overloaded	■ Adjust the workload	

9
BLOCK DIAGRAM