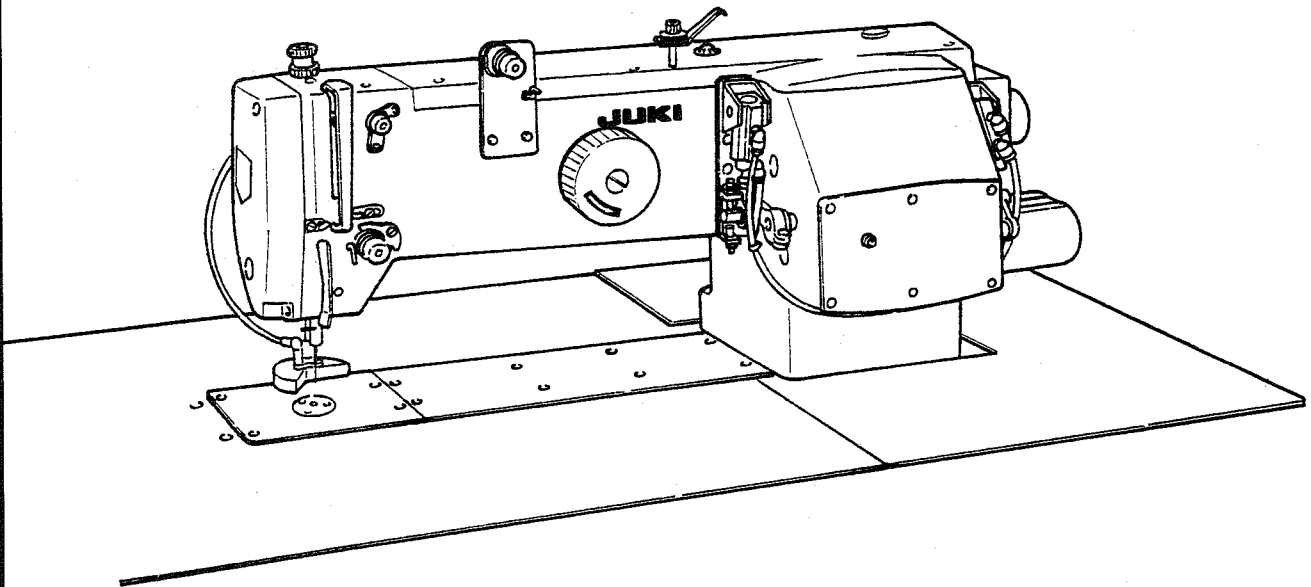


JUKI®

AVP-875

(Machine head volume)

ENGINEER'S MANUAL



29311404

No.00

PREFACE

This Engineer's Manual is written about the sewing machine head components for the technical personnel who are responsible for the service and maintenance of the machine.

The Instruction Manual for these machines contains operating instructions in detail. And this manual describes "Standard Adjustment", "Adjustment Procedures", "Results of Improper Adjustment", and other important information which are not covered by the Instruction Manual.

It is advisable to use the relevant Instruction Manual and Parts List together with the Engineer's Manual when carrying out the maintenance of these machines.

This manual gives the "Standard Adjustment" on the former page under which the most basic adjustment value is described, and on the latter page the "Results of Improper Adjustment" under which troubles arising from mechanical failures and "Adjusting Procedures" are described.

As for the main unit components of this sewing machine, please refer to the separate "Engineer's Manual for AVP-875 (Hardware volume)".

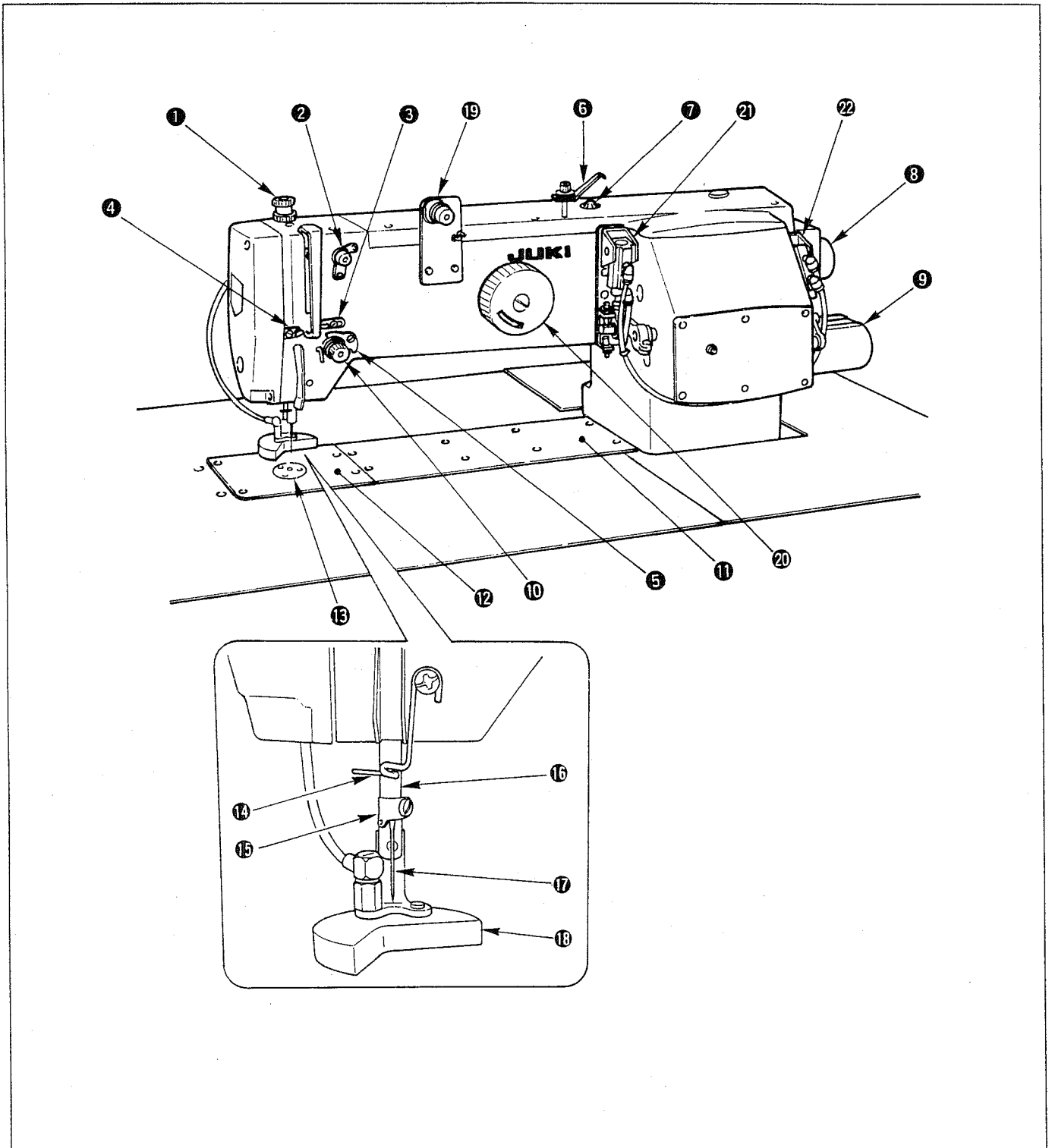
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1. SPECIFICATIONS

Sewing speed	Max. 4,000 s.p.m. (The max. sewing speed will vary in accordance with stitch length or stitch pattern.)
Stitch length	0.1 to 6 mm (adjustable in 0.1 mm steps) Changed by PGM-6 (input device).
Main shaft of machine head drive unit	AC servo motor
Feed drive mechanism	Continuous feed (AC servo motor, 2-shaft drive)
Sewing area	X (lateral) direction : 240 mm Y (longitudinal) direction : 250 mm
Needle	SCHMETZ 134 SERV7 #130
Needle bar stroke	35 mm
Hook	Full-rotary exclusive hook for AVP-875 (forced lubrication)
Bobbin case	Bobbin case for full-rotary exclusive hook
Bobbin	Aluminum bobbin
Thread trimming method	Scissors cutting mechanism using a counter knife and a moving knife (Grooved cam method)
Lubricating oil	JUKI New Defrix Oil No. 1

2. CONFIGURATION



- | | |
|-----------------------------------|---------------------------------|
| ① Presser spring regulator | ⑫ Throat plate A |
| ② Tension nut No. 1 asm. | ⑬ Needle hole guide |
| ③ Arm thread guide A | ⑭ Needle bar thread guide |
| ④ Arm thread guide B | ⑮ Needle bar thread eyelet |
| ⑤ Thread breakage detecting plate | ⑯ Needle bar |
| ⑥ Thread guide rod asm. | ⑰ Needle |
| ⑦ Oil sight window | ⑱ Work clamp plunger |
| ⑧ Handwheel | ⑲ Tension controller No. 3 asm. |
| ⑨ Main shaft servomotor asm. | ⑳ Hand pulley |
| ⑩ Tension controller No. 2 asm. | ㉑ Repositioning cylinder |
| ⑪ Throat plate B | ㉒ Regulating cylinder |

3. TRIAL OPERATION

The machine head can be driven in four different methods as described below.

1) Normal operation

Folding, carrying and stacking operations are included.

2) Test sewing mode

Set a material which matches the work clamp on the sewing machine. Then drive the sewing machine, and the machine head can be driven in accordance with the sewing pattern used.

Refer to the Instruction Manual for the AVP-875 for how to operate the sewing machine.

3) Sewing machine drive

Only the sewing machine head can be driven at a sewing speed within the range of 200 r.p.m. to 4,000 r.p.m.

This function is included in the "sewing machine adjusting" mode on the operation panel.

Refer to the Instruction Manual for the AVP-875 for details.

4) Machine head independent operation

Only the machine head is driven according to the sewing pattern used. At this time, X-Y operation is not performed.

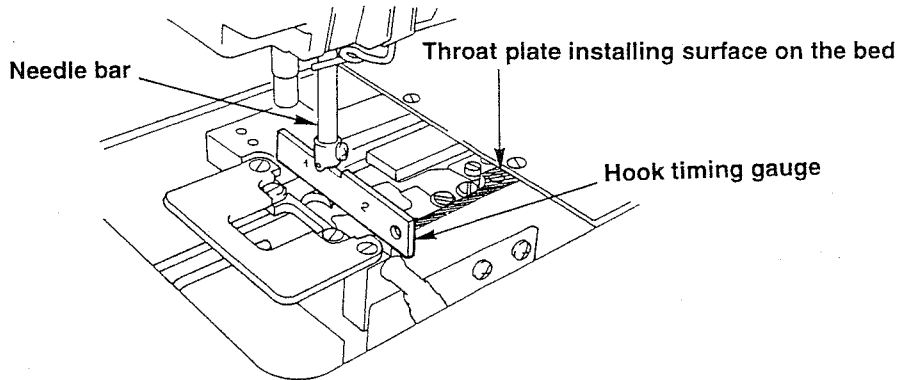
Select one of the aforementioned four different driving methods in accordance with the application of the sewing machine and drive the machine head to check its performance.

4. ADJUSTMENTS

Standard Adjustment

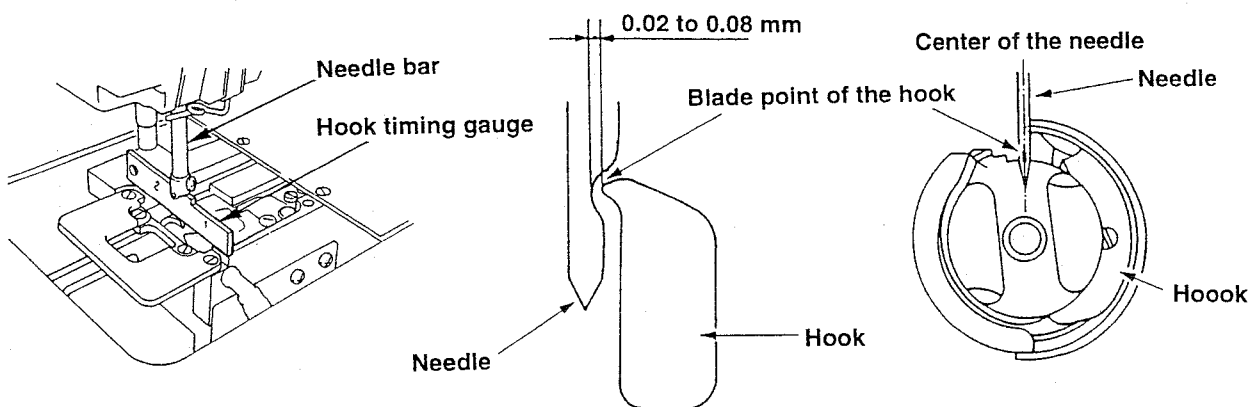
(1) Adjustment of the needle bar height

Adjust the height of the needle bar so that the lower end of the needle bar aligns with the upper end of the gauge on the side 1 of the hook timing gauge which is placed on the throat plate installing surface on the bed when the needle bar is in the lowest dead point of its stroke.



(2) Adjustment of the needle-to-hook relationship

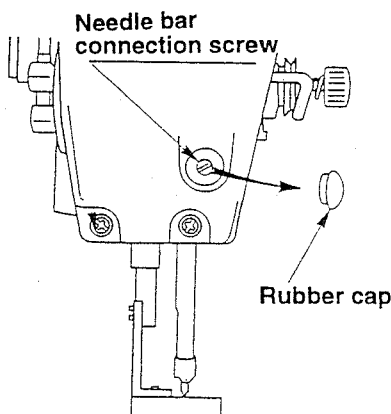
Adjust the needle-to-hook relationship, when the lower end of the needle bar is aligned with the upper end on the side 2 of the hook timing gauge, so that a clearance of 0.02 to 0.08 mm is provided between the needle and the blade point of the inner hook and so that the blade point of the hook meets center of the needle.



Adjustment Procedures

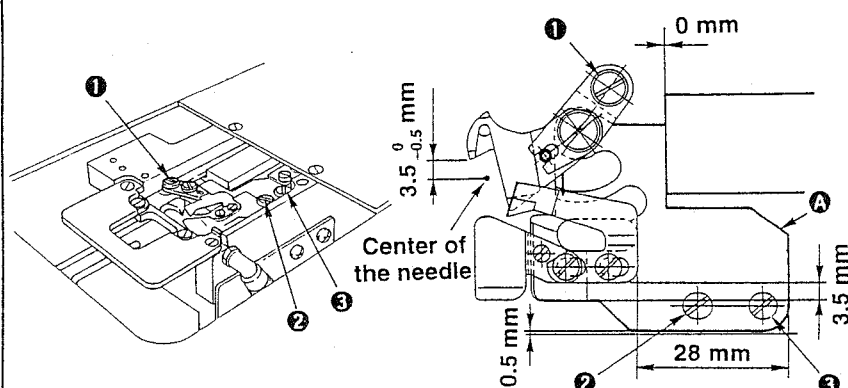
Results of Improper Adjustment

- 1) Remove throat plate A.
- 2) Remove the work clamp plunger.
- 3) Turn the handwheel by hand to bring the needle bar down to the lowest dead point.
- 4) Remove the rubber cap from the face plate cover.
- 5) Loosen the needle bar connection screw and properly adjust the height of the needle bar.
- 6) Loosen the needle bar connection screw and attach the rubber cap to the face plate cover.

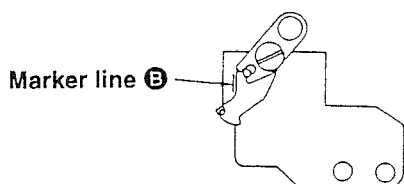


- Stitch skipping or thread breakage will result.

- 1) Remove throat plate A (the front side) from the bed surface. At this time, throat plate B should be held attached to the bed surface.
- 2) Remove screws ①, ② and ③ from the bed surface in the written order. Then remove knife mounting base A from the bed surface.
- 3) Loosen three screws which are used to fix the hook. Properly adjust the relation between the needle and the blade point of the hook, then tighten the screws.
- 4) Attach knife mounting base A to the bed surface. At this time, push the knife mounting base to the right against the processed face of the bed and provide a clearance of 0.5 mm in the lower side. Then, tighten screws ② and ③. Lastly, tighten screw ①.



(Caution) In step 4), confirm that marker line B engraved on knife mounting base A is almost aligned with the end face of the moving knife. If not, thread trimming failure may result.



- 1) If the clearance provided between the needle and the blade point of the hook is smaller than the specified value, the blade point of the hook will be damaged. As a result, thread splits finely or break. If the aforementioned clearance is larger than the specified value, stitch skipping will result.
- 2) If the blade point of the hook rests this side of the center of the needle (hook timing is late), thread will not be sufficiently tensed.

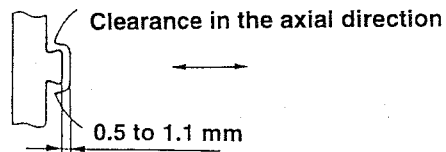
(For spun thread, the hook timing is desired to be slightly retarded to finish higher-quality seams. Frequency of occurrence of isolated idling loops and irregular stitches is reduced.)

- 3) If the blade point of the hook goes beyond the center of the needle (hook timing is early), thread will be excessively tensed. Teton thread
- 4) If the hook timing is excessively advanced or retarded, stitch skipping or thread breakage will result.

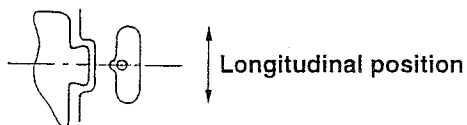
Standard Adjustment

(3) Position of the bobbin case opening lever

- Adjust so that a clearance of 0.5 to 1.1 mm is provided, in axial direction, between the protruding section of the bobbin case opening lever and the slit on the inner hook.

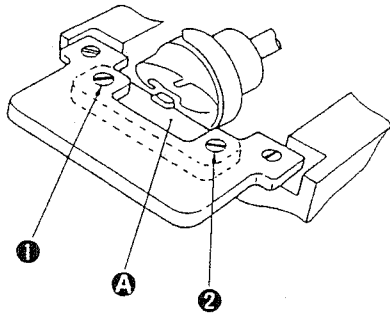


- Adjust the longitudinal position of the bobbin case opening lever so that the needle enters almost the center of the bobbin case opening lever.



Adjustment Procedures

- 1) Remove the front side of the throat plate from the bed surface.
- 2) Loosen screws ① and ② and adjust the position of bobbin case opening lever A by moving it back or forth and to the right or left.



Results of Improper Adjustment

- If the clearance, in axial direction, is smaller than the specified value, thread will be not sufficiently tensed or isolated idling loops will be produced.

Standard Adjustment

(4) Adjusting the lifting amount of the work clamp plunger

Adjust so that the work clamp plunger rises 18.5 to 19 mm above the top surface of the throat plate when the power to the machine is turned ON and that the bottom face of the work clamp plunger is spaced approximately 0.5 mm from the tip of the needle.

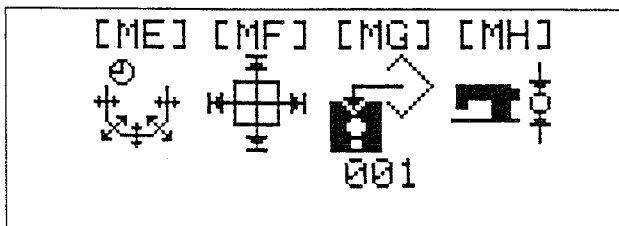
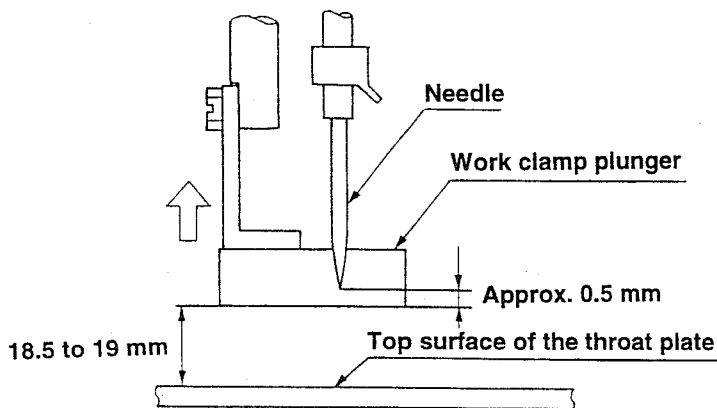


Fig. 1 Mode selection screen

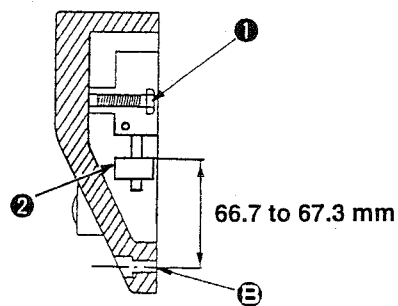


Fig. 3

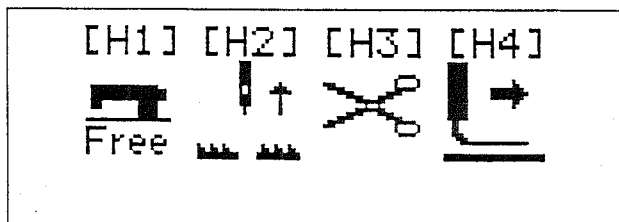
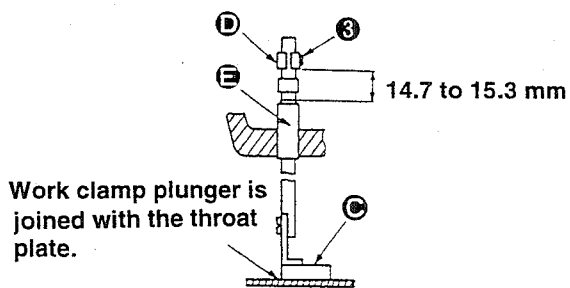


Fig. 2 Sewing machine adjusting mode (1)



Work clamp plunger is joined with the throat plate.

Fig. 4

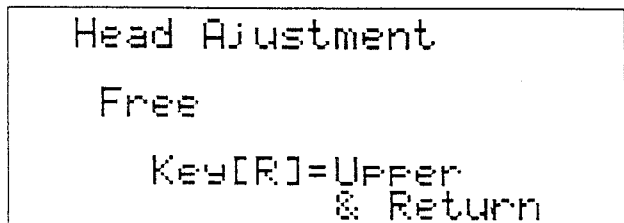





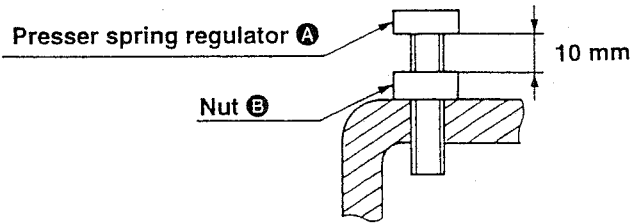
Fig. 5 Main shaft free screen

Adjustment Procedures	Results of Improper Adjustment
<p>1) Turn ON the main power to the machine. Press M (mode screen key) on the operation panel. Then select pictograph No. [MH] (sewing machine adjusting mode) on the mode selection screen.</p> <p>(Caution) While the operation panel is being operated (mode indication LED lights up), [MH] is not indicated. At this time, press machine ready key  to make the standby state (mode indication LED goes off). (Refer to Fig. 1.)</p> <p>2) Select the [H4] work clamp retreat key to move the work clamp away from the work clamp plunger section. (Refer to Fig. 2.)</p> <p>3) Confirm that the bottom of the work clamp plunger is spaced 18.5 to 19 mm from the top surface of the throat plate and approximately 0.5 mm from the tip of the needle.</p> <p>4) If the work clamp plunger is not positioned as described in the aforementioned step 3), set the [H1] key to the adjusting state (lamp flashes on and off). Then press  key to lower the work clamp plunger.</p> <p>5) Remove the face plate cover. Then press the R key to retract the air cylinder in the face plate cover. At this time, adjust screws 1 and 2 so that the tip end metal fitting of the cylinder is spaced 66.7 to 67.3 mm from center B of the tapped screw in the face plate cover. (Refer to Fig. 3.)</p> <p>6) Confirm first that work clamp plunger C is joined with the throat plate by the spring pressure given by the intermediate presser. Then, Adjust screw 3 so that the bottom end of presser bar position bracket D is spaced 14.7 to 15.3 mm from the top end of the presser bar lower bracket E. At this time, slot on presser bar position bracket D should be faced toward you. (Refer to Fig. 4.)</p> <p>7) Set the [H1] key to the adjusting state (lamp flashes on and off), then press  key to extend the air cylinder. Then, attach the face plate cover to the machine arm. (Refer to Fig. 5.)</p> <p>8) Press the R key, and check the adjustment value of step 3).</p>	<p>1) If the work clamp plunger fails to go up sufficiently, the work clamp of the conveyor will interfere with the work clamp plunger.</p> <p>2) If the work clamp plunger goes up excessively, the top end of the needle will protrude from the bottom of the plunger. In this case, the needle tip will interfere with the work clamp of the conveyor, resulting in needle breakage.</p> <p>3) If the face plate cove is positioned outside the specified range of dimension 66.7 to 67.3 mm, the work clamp plunger will fail to go up to the specified height with accuracy.</p> <p>4) If the presser bar position bracket is attached to a position where the distance between the presser bar position bracket and the presser bar lower bushing exceeds 15.3 mm, the presser bar position bracket may interfere with the needle bar crank rod while the sewing machine is in operation.</p>

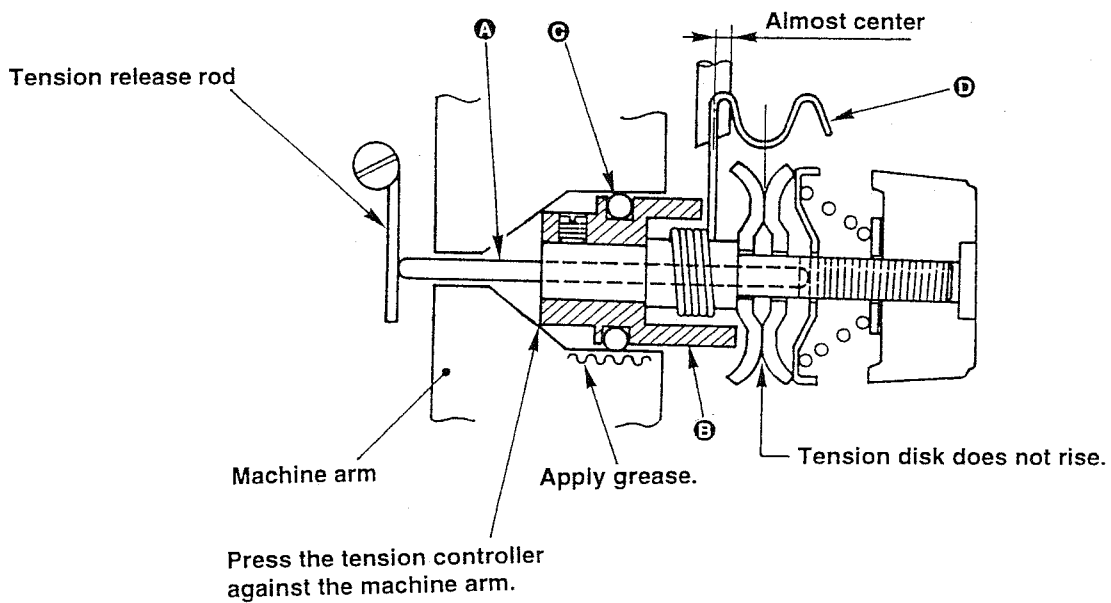
Standard Adjustment

(5) Adjusting the pressure of the presser spring

Adjust the clearance provided between presser spring regulator **A** and nut **B** as shown in the figure below.



(6) Assembling the tension controller No. 2



Adjustment Procedures	Results of Improper Adjustment
<p>Loosen nut B and properly adjust the pressure of the presser spring by turning presser spring regulator A.</p>	<ul style="list-style-type: none"> ○ If the pressure of the presser spring is insufficient, defective stitch pattern will be produced.
<p>To attach the tension controller No. 2, put tension release pin A in tension controller No. 2 B. Apply grease onto the outer periphery of the tension controller No. 2 and the inner periphery of the machine arm to protect O ring C. Then, insert the tension controller No. 2 into the machine arm until it will go no further. Confirm, when the tension controller No. 2 is fully inserted, that the tension disk does not rise and thread take-up spring D is positioned almost the center of the thread trimmer detecting plate.</p>	<ol style="list-style-type: none"> 1) If the end of tension disk B fails to come in contact with the machine arm, timing to release the thread tension will be delayed. In this case, the length of needle thread remaining after thread trimming will be decreased. 2) If grease is not applied onto the O ring and inner periphery of the machine arm when inserting tension controller B, the O ring will be damaged resulting in oil leakage.

Standard Adjustment

(7) Adjusting the timing of the thread tension release cam

Turn ON the tension release cylinder. Adjust so that the tension disk of the tension controller No. 2 starts releasing the thread when the main shaft is turned in the normal direction of rotation until marker dot **A** engraved on the machine arm is aligned with first marker dot **B** engraved on the handwheel in terms of the normal direction of rotation of the handwheel (15° before the highest or lowest dead point).

The timing of releasing the thread tension is acceptable as long as marker dot **B** engraved on the handwheel rests within the diameter of marker dot **A** engraved on the machine arm.

(Caution) Marker dots engraved on the handwheel are used to adjust the thread trimming cam timing **1** upper stop position of the main shaft **2** and tension release cam timing **B**.

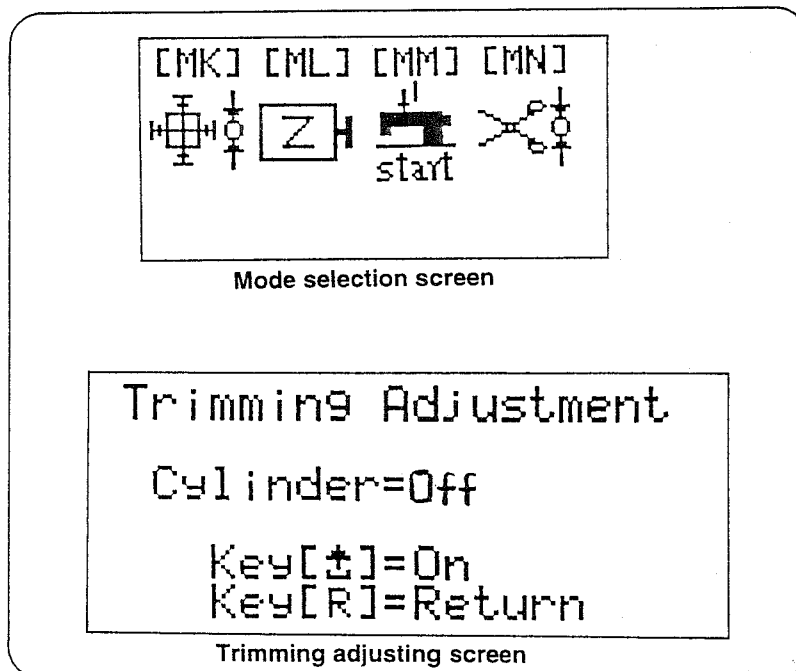
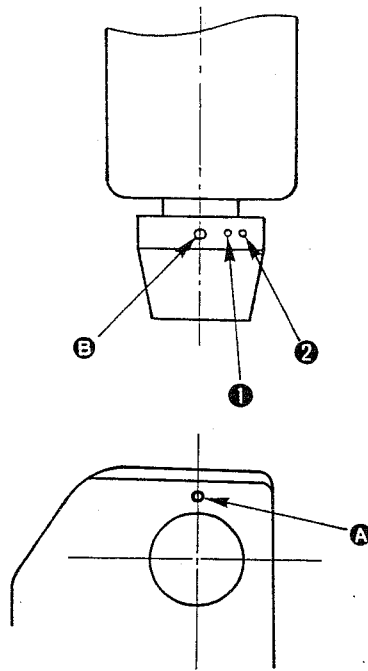

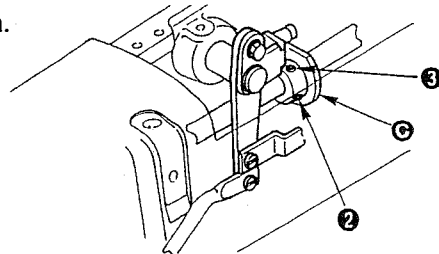


Fig. 1

Adjustment Procedures

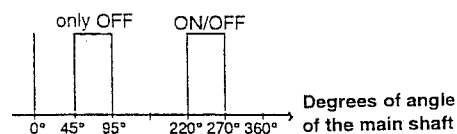
Results of Improper Adjustment

- 1) Turn ON the main power to the machine. Press the **M** key on the operation panel to select pictograph No. [MN]. (Refer to Fig. 1.)
(Caution) 1. The DIP switch should be changed over to the maintenance mode II.
 2. As long as the **Mode** is indicated on the operation panel (mode indication LED lights up), operation mode selection cannot be performed unless the mode is set to **Stand by** mode (mode indication LED goes off).
- 2) Turn the handwheel by hand to bring the needle bar down to the lowest dead point. Then, further turn it by approximately 60° in the direction of rotation of the main shaft.
- 3) Press the  key on the operation panel to turn ON the tension releasing cylinder. (At this time, the thread trimming cylinder also actuates. However, no problem will be caused since the thread trimmer can be normally operated in the procedure taken in step 2).)
- 4) Turning the handwheel by hand in the normal direction of rotation of the main shaft, confirm that tension disk of the tension controller No. 2 starts to rise when marker dot **A** engraved on the machine arm is aligned with marker dot **B** engraved on the handwheel.
(Caution) 3. Turn the handwheel in the normal direction of rotation of the main shaft only. If turning it in the reverse direction of rotation, the machine will be caused to be defective due to the worn-out of the thread trimming cam roller.
- 5) Turn the main shaft further in the normal direction of rotation by approximately 50° from the state described in step 4) in which the needle bar is in the highest dead point. Then, release the air cylinder. (It will be automatically released.)
- 6) If the timing of the thread tension release cam is not correct, loosen screws **2** and **3** in the thread tension release cam **C** and adjust the timing of the cam.



- (Caution) 4. Degrees of angle of the main shaft, when turning the main shaft in the normal direction of rotation while taking the highest dead point of the needle bar as 0°, to allow the tension releasing cylinder ON/OFF are as described below.**

- ① In the range of 220° to 270°, the tension releasing cylinder can be turned ON/OFF.
- ② In the range of 45° to 95°, the tension releasing cylinder can only be turned OFF. So, operate the switch in the aforementioned range. (The machine is designed as described above so as to prevent the thread trimming cam and roller from being damaged.)



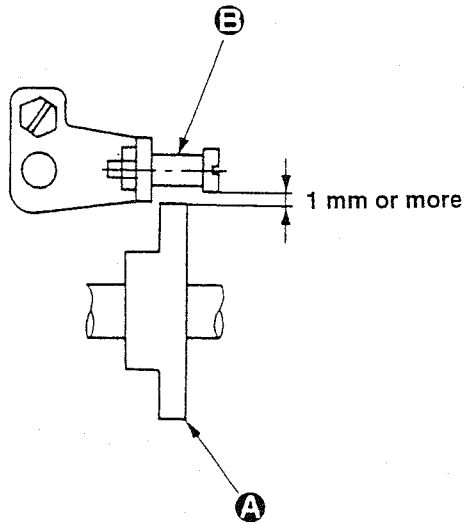
- (Caution) 5. Remove the needle in advance so as to prevent the needle from interfering with the moving knife because of maloperation.**

- 1) If the tension releasing timing is advanced, an excessive amount of needle thread will be fed when the moving knife moves. In this case, the remaining length of the needle thread will be increased or it will vary.
- 2) If the tension releasing timing is retarded, the needle thread is held tensed when the moving knife moves and cuts the thread. In this case, the needle thread will spring off after thread trimming and the needle thread will come off the needle eyelet or the length of thread remaining after thread trimming will be decreased. As a result, thread knots may not be made properly at the sewing start or the needle thread may come off the needle eyelet.

Standard Adjustment

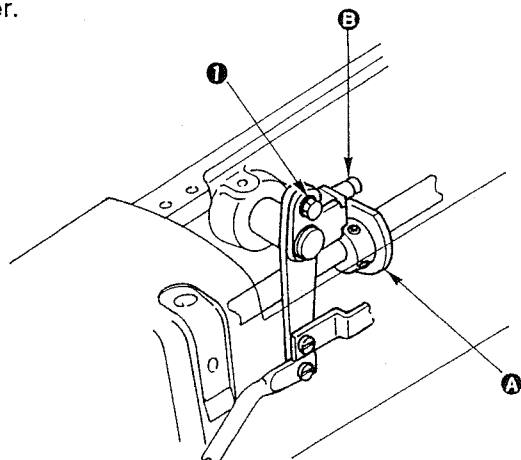
(8) Adjusting the clearance provided between the thread tension release cam and the thread tension cam roller

Adjust so that a clearance of 1 mm or more is provided between the outermost periphery of the thread tension release cam and the thread tension release cam roller when the thread tension releasing cylinder is in the OFF state.



Adjustment Procedures

- 1) Remove the top cover.
- 2) Loosen screw **1** in the tension releasing cylinder and adjust the clearance provided between thread tension release cam **A** and thread tension release cam roller **B** by moving the roller.





(Caution) If the aforementioned clearance is adjusted, the timing of the thread tension release cam will change. So, be sure to confirm the timing of the thread tension release cam after performing the aforementioned adjustment.

Results of Improper Adjustment

- 1) If no clearance is provided between the thread tension release cam and the thread tension release cam roller, a play in the link causes the roller to come in contact with the cam when operating, resulting in abnormal noise.
- 2) If the aforementioned clearance is larger than the specified value, the tension disk of the tension controller No. 2 will rise before the roller comes in contact with the cam. In this case, the timing to release the thread tension cannot be controlled.

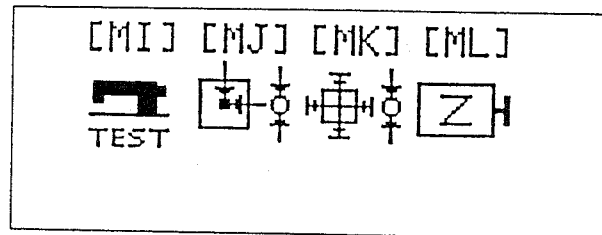
Standard Adjustment

(9) Adjusting the initial position (Z phase) of the main shaft motor

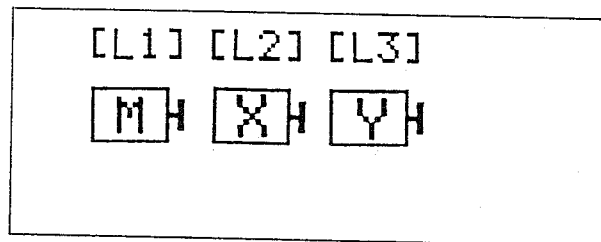
Turn ON the main power to the machine. Press the **M** key to make the [ML] flash on and off. Then press  key to select. Then the motor Z phase lock screen as shown in the figure below will appear on the display. Press further the  key and adjust so that the main shaft turns by almost one revolution, and stops when the highest dead point of the needle bar is reached.

(Caution) 1. To select the aforementioned mode, the related DIP switch should be changed over to the maintenance mode II.

2. If the operation panel indicates **Mode** (mode indication LED lights up.), the operation mode cannot be selected unless the mode is in the **Stand by** mode (mode indication LED goes off.).



Mode selection screen

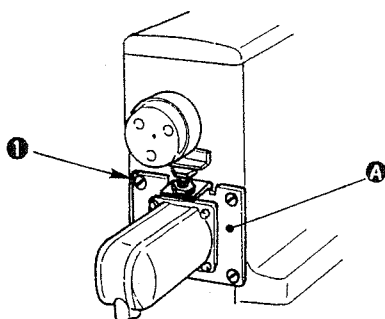


Motor Z phase lock screen

Adjustment Procedures

Results of Improper Adjustment

- 1) Loosen four screws ❶ in the servomotor installing plate ❷. Then, remove the main shaft servomotor from the machine arm.



- 2) Turn the handwheel away from the stop position of the main shaft by 40° to 90° in the direction of rotation of the sewing machine. Then, adjust so that the main shaft stop sensor is aligned with the reflecting portion of the slit plate of the handwheel.

(Caution) If the power to the machine is turned ON when the main shaft stop sensor is not aligned with the reflecting portion, the Z-phase will not return to the origin.

- 3) Turn ON the main power to the machine. Then, the indication as shown in the figure below will appear on the operation panel.

Error No.41
Power OFF

- 4) Turn the handwheel to bring the needle bar up to the highest dead point.
- 5) Now, attach the main shaft servomotor to the machine arm.
- 6) Turn OFF the main power to the machine once, then return it ON.
- 7) Press the **M** key to select the [ML] motor Z-phase lock mode.
- 8) Press the **▲** key when the [L1] flashes on and off. At this time, confirm that the main shaft makes almost one revolution and stops when the needle bar is in the highest dead point. In this case, the stop position may deviate approximately one tooth (approx. 5°) of the timing belt of the motor because of error in assembly. As long as the deviation does not exceed the aforementioned extent, no problem will be caused.

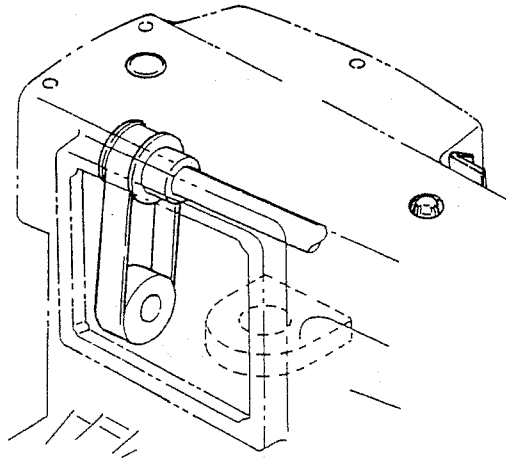
If the initial position of the motor is not aligned with the highest dead point of the needle bar, the timing to actuate the thread trimming cylinder will change. In this case, the roller will fail to enter the thread trimming cam, resulting in thread trimming failure or causing the sewing machine to lock. Furthermore, the needle bar may fail to go back to the highest position, causing the needle to break.

Standard Adjustment

(10) Adjusting the tension of the timing belt for the main shaft servomotor

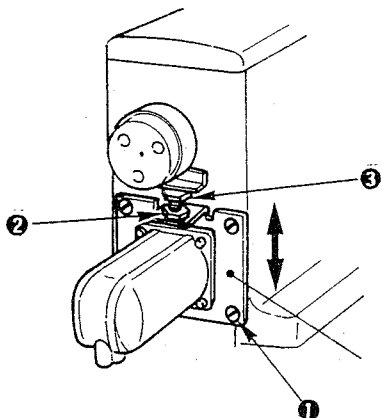
Adjust the timing belt tension so that the belt slackens by approximately 2 mm when a 0.5 kgf load is applied to the center of the timing belt shafts.

(In this case, you can feel elasticity of the belt when you press it with fingers.)



Adjustment Procedures

- 1) Remove machine arm cover **B** to allow the timing belt of the main shaft servomotor to appear.
- 2) Loosen four screws **1** in servomotor installing plate **A**.




- 3) Loosen nut **2**, and adjust the tension of the timing belt by turning bolt **3**.
Turn bolt **3** clockwise to decrease the tension, or counterclockwise to increase it. For reference, adjust the belt tension to such an extent that you feel elasticity of the belt when pressing it with your thumb finger.
- 4) After the belt tension has been appropriately adjusted, tighten nut **2** and screws **1**. Tightening screws **1** will slightly vary the belt tension. So, check the belt tension after tightening them.

- (Caution)**
1. Tighten four screws **1** with a uniform load of approximately 50 kgfcm.
 2. A three-seat gasket is placed between the servomotor installing plate and the machine arm. This means that the seat is slightly lowered causing the tightening torque to change after approximately 30 minutes have passed after tightening the screws. So, be sure to re-tighten the screws.

Results of Improper Adjustment

- 1) If the belt tension is too low, the slackened side of the belt will vibrate and produce abnormal noise.
- 2) If the belt tension is too high, the excessively tensed side of the belt will vibrate with keen noise.

(11) Adjusting the amount of oil (under the maintenance mode II)

- 1) Turn ON the main power to the machine. Press the **M** key to make the [MM] flash on and off. Then, press the  key to select the machine head independent operation mode. (Fig. 1)

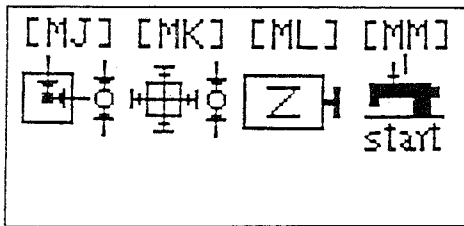


Fig. 1 Mode selection screen

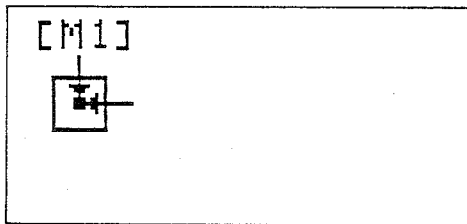


Fig. 2 Independent machine head operation screen (1)

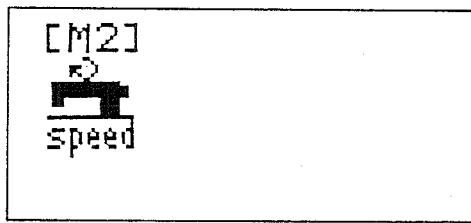





Fig. 3 Independent machine head operation screen (2)

(Caution)

1. To select the aforementioned mode, the related DIP switch should be changed over to the maintenance mode II.
2. As long as the **Mode** (mode indication LED lights up.) is indicated on the operation panel, operation mode selection cannot be performed unless the mode is in the **Stand by** mode (mode indication LED goes off).

- 2) Press the  key to make the machine enter the run state. (Fig. 2)
- 3) When desired to change the speed, press the  key to set the speed. Press the  key so that the indication shown in Fig. 3 appears on the display.

(Caution)

3. In prior to the aforementioned step of procedure, it is necessary to enter the patterns to be used by a customer to which the machine is to be delivered.
- 4) Press the left/right set switches (green) to start the sewing machine.
- 5) After the sewing machine started and has completed **five or more cycles**, put a sheet of checking paper in the hook and face plate to measure trace of oil. Measure the amount of oil in the hook or face plate during the time in which the machine performs **one cycle** of sewing.

Trace of oil on the checking paper placed in the hook

Trace of oil on the checking paper placed in the face plate

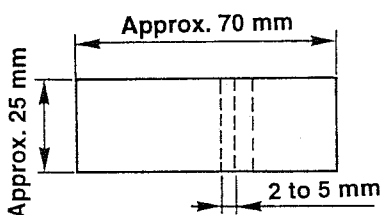


Fig. 4

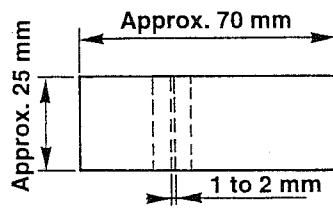


Fig. 5

Figures 4 and 5 show the appropriate amount of oil in the hook and face plate.

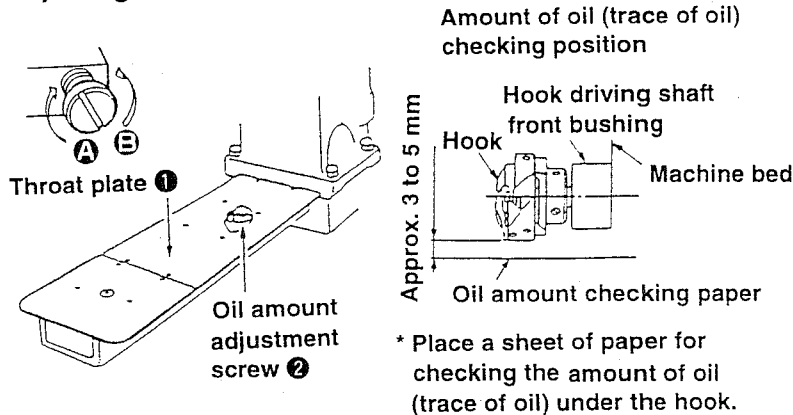
(Caution) 3. When measuring the amount of oil, take care not to allow the checking paper to come in contact with the periphery of the hook or the rotating parts in the face plate. (If the paper comes in contact with such parts, accurate data cannot be obtained.)

4. Confirm that the amount of oil in the oil pan is adequate.
5. Adjusting the amount of oil under the machine head independent operation mode will allow you to accurately adjust it in accordance with sewing patterns to be used by a customer.
6. To run the machine head, remove the bobbin and the needle thread in advance.

Adjustment Procedures

Results of Improper Adjustment

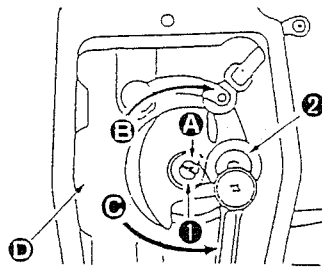
1) Adjusting the amount of oil in the hook



- ① Remove throat plate ①. Turn oil amount adjustment screw ② that is mounted on the hook lubricating manifold in the "+" direction (direction A) to increase the amount of oil (trace of oil), or in the "-" direction (direction B) to decrease it.
- ② After the oil amount is adjusted using oil amount adjustment screw ②, run the machine idle by approximately five cycles and confirm the oil amount.

(Caution) The amount of oil should be checked using three sheets of checking paper. Confirm that the trace of oil remains the same for each of the three sheets.

2) Adjusting the amount of oil in the face plate



- ① Adjust the amount of oil to be fed to the thread take-up lever and needle bar crank unit ② by turning oil amount adjustment screw pin ①.
- ② The oil amount is minimized by turning the adjusting pin in direction B until marker dot A engraved on the pin moves from the position in the figure and reaches near needle bar crank ②.
- ③ The oil amount is maximized by turning the adjusting pin in direction C from the position in the figure to the position opposite to the needle bar crank.
- ④ After the oil amount is adjusted using oil amount adjusting pin, run the sewing machine idle by approximately five cycles and confirm the amount of oil.

(Caution) The amount of oil should be checked using three sheets of checking paper. Confirm that the trace of oil remains the same for each of the three sheets.

1)

- ① If the amount of oil in the hook is insufficient, the hook will be seized or become hot.
- ② If the amount of oil in the hook is excessive, the sewing material will be stained with oil.

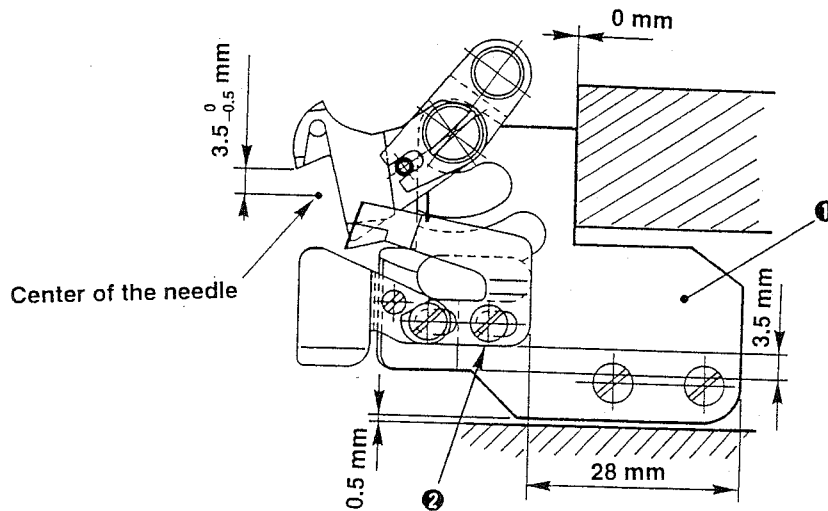
2)

- ① If the amount of oil to be fed to the face plate components is insufficient, the face plate components will extremely wear out or become hot.
- ② If the amount of oil to be fed to the face plate components is excessive, the sewing material will be stained with oil.

Standard Adjustment

(12) Positioning the counter knife and the knife thread guide

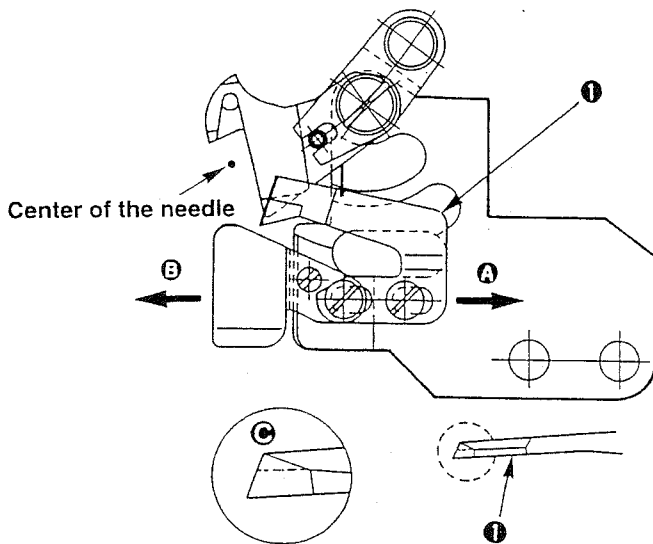
- 1) Knife mounting base ❶ should be attached so that it is positioned 0 mm to the right against the processed section of the machine bed and 0.5 mm above the processed section of the machine bed.
- 2) Attach counter knife ❷ so that it is positioned 28 mm to the left and 3.5 mm above against knife mounting base ❶ that has been attached as in aforementioned step 1).



Adjustment Procedures

- 1) If the mounting position of the counter knife is moved to the right direction **A** from the standard mounting position, length of thread remaining after thread trimming will be longer than the standard length by the distance between the standard position of the knife and the actual mounting position.
- 2) If the mounting position of the knife is moved to the left direction **B**, length of thread remaining after thread trimming will be shorter than the standard length accordingly.

(Caution) If the installing angle of the counter knife blade changes, sharpness of the knife will also change. It is therefore necessary to check the knife for sharpness whenever you have adjusted the position of the counter knife or replaced the knife.

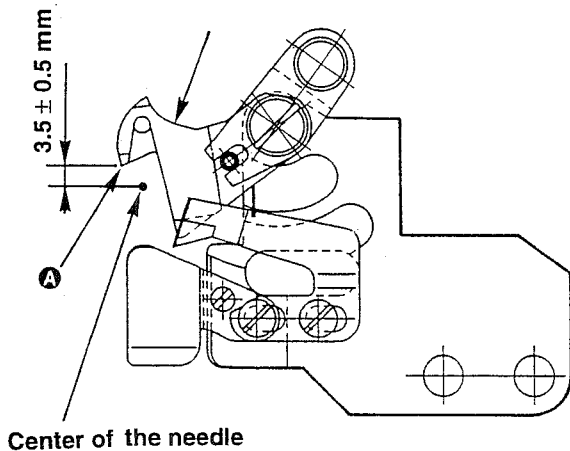


Results of Improper Adjustment

- 1) If the installing angle of the counter knife blade is changed, sharpness of the knife will also change. When the blade of the counter knife meets the blade of the moving knife with accuracy, the knives will cut the thread sharp.

Standard Adjustment

(13) Adjusting the operating position (backward travel amount) of the moving knife



- 1) Turn ON the main power to the machine. Press the **M** key located on the operation panel to make the [MN] flash on and off. Press the key to select the [MN] thread trimming adjusting mode.

(Caution)

1. To select the aforementioned mode, the related DIP switch should be changed over to the maintenance mode II.
2. As long as the **Mode** (mode indication LED lights up.) is indicated on the operation panel, operation mode selection cannot be performed unless the mode is in the **Stand by** mode (mode indication LED goes off.).
3. Remove the needle before performing the adjusting procedure in order to prevent the needle from interfering with the moving knife because of maloperation.

- 2) Turn the handwheel by hand in the normal direction of rotation until it is moved approximately 60° away from the position at which the needle bar is in the lowest dead point of its stroke.
- 3) Press the key on the operation panel, and the thread trimming cylinder will be turned ON and the indication shown in the figure below will appear on the display.

Trimming Adjustment
Cylinder = OFF
Key[↑] = ON
Key[R] = Return

OFF key



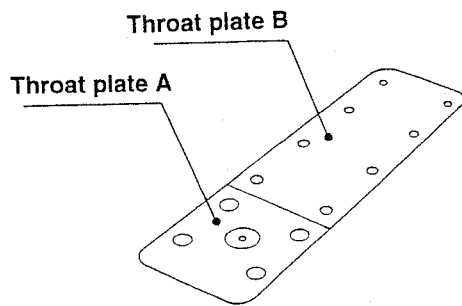
Trimming Adjustment
Cylinder = ON
Key[↑] = OFF
Key[R] = Return

- 4) In the state described in aforementioned step 3), turn the handwheel in the normal direction of rotation, and moving knife **1** will actuate.
When the moving knife reaches the end of stroke (backward travel end), top end **A** of the moving knife should be near center **B** of the needle.
- 5) After step 4) is confirmed, turn the handwheel in the normal direction of rotation to bring the thread take-up lever up close to the highest dead point.
- 6) Keeping the state described in step 5), press the key on the operation panel, and the thread trimming cylinder will be turned OFF. (If the handwheel rotates by approximately 50°, the cylinder will be automatically turned OFF.)

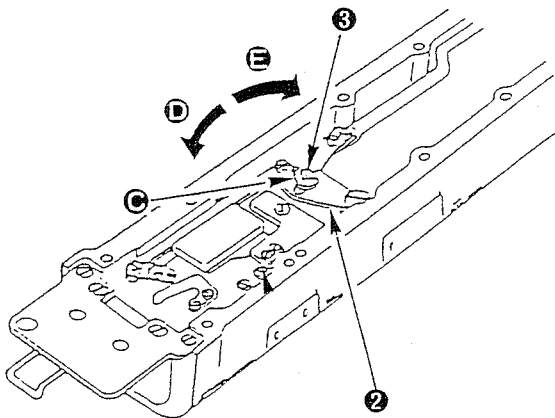
(Caution) 4. The driving procedure for the thread trimming cylinder on the operation panel is the same as the procedure described in “(7) Adjusting the timing of thread tension release cam”.

Adjustment Procedures

- 1) Remove throat plates A and B.



- 2) To adjust the stroke of the moving knife, loosen nut **C** of moving knife link **C** **2**, and change the position of moving knife link pin **A** **3** until the proper stroke of the moving knife is obtained.
- 3) When moving knife link pin **A** **3** is moved to the left direction **D** in the figure, the stroke of the moving knife will be increased. When the link pin **A** is moved to the right direction **E**, it will be decreased.




Results of Improper Adjustment

- 1) If the stroke of the moving knife is smaller than the specified value, the knife will fail to spread the thread, resulting in thread trimming failure. (The knife will fail to cut the bobbin thread in particular.)
- 2) If the stroke of the moving knife is larger than the specified value, the timing of the thread spreader will be excessively advanced. This means that the moving knife spreads the thread before the knife thread guide separates the thread, causing the needle thread to be cut too short.


Standard Adjustment

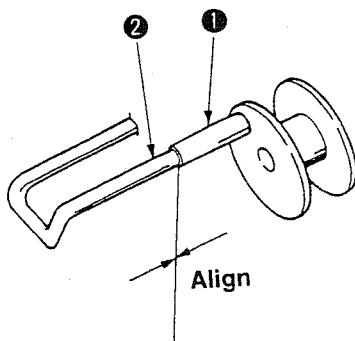
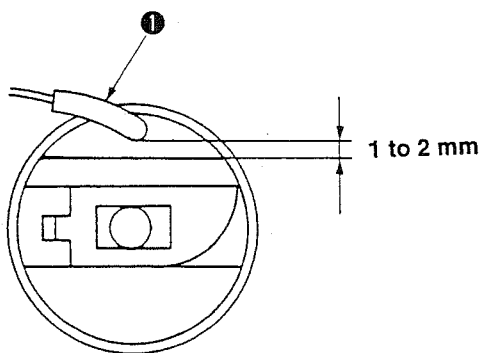
(14) Adjusting the thread take-up finger

- 1) Turn ON the main power to the machine. Press the **M** key on the operation panel to make the [MN] flash on and off. Press  key to select the thread trimming adjusting mode.

(Caution) 1. To select the aforementioned mode, the related DIP switch should be changed over to the maintenance mode II.

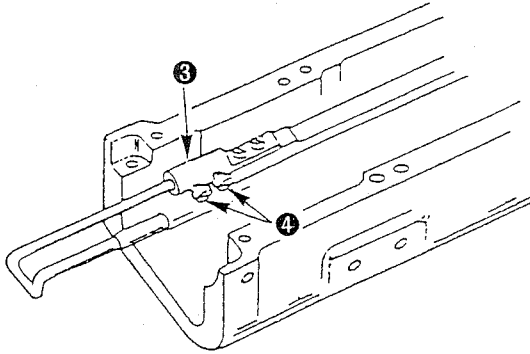
2. As long as the **Mode** (mode indication LED lights up.) is indicated on the operation panel, operation mode selection cannot be performed unless the mode is in the **Stand by** mode (mode indication LED goes off.).

- 2) Turn the handwheel by hand in the normal direction of rotation until it is moved approximately 60° beyond the position at which the needle bar is in its lowest dead point.
- 3) Press the  key on the operation panel, and the thread trimming cylinder will be turned ON and the thread take-up finger presses the bobbin.
- 4) At this time, adjust so that the top end of bobbin presser **①** is spaced 1 to 2 mm from the notch at the top of the bobbin case and that the marker line engraved on thread take-up finger **②** is aligned with the end face of bobbin presser **①**.



Adjustment Procedures

Adjust so that the specified standard value is provided using screws ④ in the thread take-up finger located in picker holder ③.




Results of Improper Adjustment

1) If bobbin presser ① does not come in contact with the bobbin, the bobbin will run idle. This will cause the bobbin thread to be caught in the bobbin case, resulting in bobbin thread breakage or thread knot may not be formed properly at the sewing start.

Furthermore, the needle thread will slip off the bobbin presser at the time of thread trimming. In this case, the length of needle thread remaining after thread trimming will be extremely shortened.


Standard Adjustment

(15) Adjusting the thread trimming cam

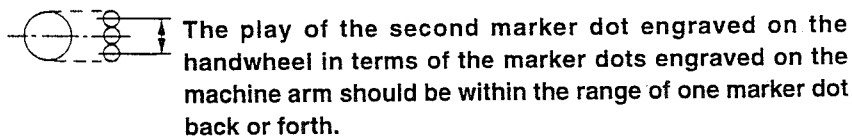
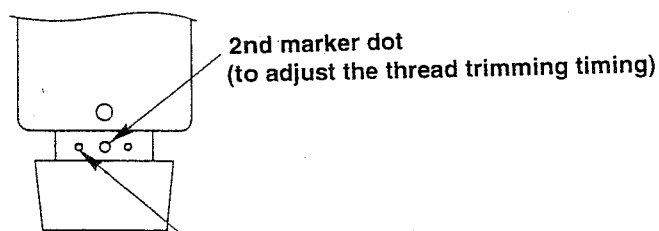
- 1) Turn ON the power to the machine. Press the **M** key on the operation panel to make the [MN] flash on and off. Press the  key to select the thread trimming adjusting mode.

(Caution) 1. To select the aforementioned mode, the related DIP switch should be changed over to the maintenance mode II.

2. As long as the **Mode** (mode indication LED lights up.) is indicated on the operation panel, operation mode selection cannot be performed unless the mode is in the **Stand by** mode (mode indication LED goes off).

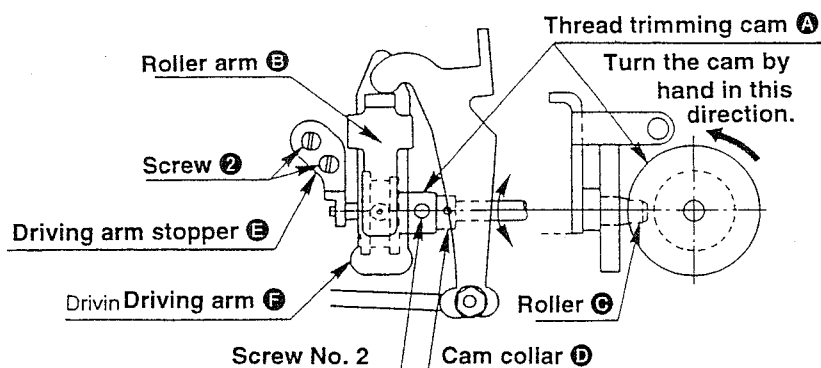
- 2) Turn the handwheel by hand in the normal direction of rotation until it is moved approximately 60° beyond the position at which the needle bar is in its lowest dead point.
- 3) Press the  key on the operation panel, and the thread trimming cylinder will be turned ON and thread trimming cam roller will enter the slit on the thread trimming cam.
- 4) Keeping the state described in step 3), turn the handwheel in the normal direction of rotation by approximately 50° from the position at which the needle bar is in its highest dead point.
(The roller enters the cam and the link moves when turning the handwheel. At this time, the main shaft develops an excessive torque. However, this will not cause any trouble. So, turn the handwheel further.)
- 5) In the state described in step 4), turn the handwheel in the reverse direction, and the roller will be engaged in the stepped part on the cam at a certain position with a click sound. At this time, adjust the position so that the second marker dot engraved on the handwheel in terms of the direction of rotation of the handwheel rests within the range bounded by the marker dots engraved on the machine arm.

(Caution) Remove the needle since the needle and moving knife may be damaged during the aforementioned procedure by mistake.



Adjustment Procedures

- 1) Turn OFF the power to the machine and let the operating air out of the machine.
- 2) Remove the right-side cover.
- 3) Remove the machine head fixing bolt.
- 4) Hold the jaw section of the machine head and raise the head.
- 5) Loosen two screws ① No. 1 and No. 2 in the thread trimming cam in the written order and adjust the position of the marker dot on the handwheel and the height of the needle bar.
- 6) Press roller arm ⑤ until roller ③ is engaged with thread trimming cam ④. Now, press only the cam with fingers, without turning the hook driving shaft, in the reverse direction of rotation of the hook driving cam until the cam will go no further. Then, pressing the cam against the roller, tighten the screws No. 2 and No. 1 following the written order.
(Note that tighten the screws while pressing thread trimming cam ④ against cam collar ⑥ if cam collar ⑥ has not been moved.)
- 7) If cam collar ⑥ has been moved, confirm that roller ③ smoothly fits in cam ④ without hindrance when pressing roller arm ⑤ in the section where the roller is allowed to enter the cam. If the roller fails to fit in the cam smoothly, loosen screws ② and move driving arm ⑦ by moving driving arm stopper ⑤ to adjust so that roller ③ enters cam ④ without hindrance. Then, tighten screws ② while pressing cam collar ⑥ against thread trimming cam ④.



Results of Improper Adjustment

- 1) If the cam timing is excessively advanced or retarded, the thread separating timing will change from the correct one. In this case, the needle thread will be cut too short. Furthermore, the roller will fail to fit in the slit on the thread trimming cam, causing failure of the thread trimming operation.
Main shaft motor error (Error 02) may also occur.

(Caution)

1. If cam collar ⑥ has been moved in step 7) of the adjusting procedures, the stroke of the moving knife will slightly change. So, after step 7), confirm the stroke of the moving knife.
2. If the roller fails to enter the cam smoothly in the range where the roller has been designed to fit in the cam in step 7), the roller will excessively wear out or thread trimming failure will occur.

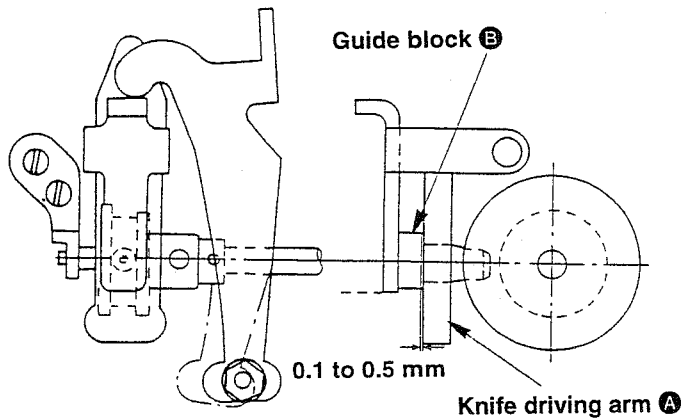
Standard Adjustment

(16) Adjusting the thread trimming cylinder

- 1) Turn OFF the power to the machine and let the operating air out of the machine.
- 2) Remove the right-side cover.
- 3) Remove the machine head fixing bolt.
- 4) Move the thread trimming cylinder to the retracting side.

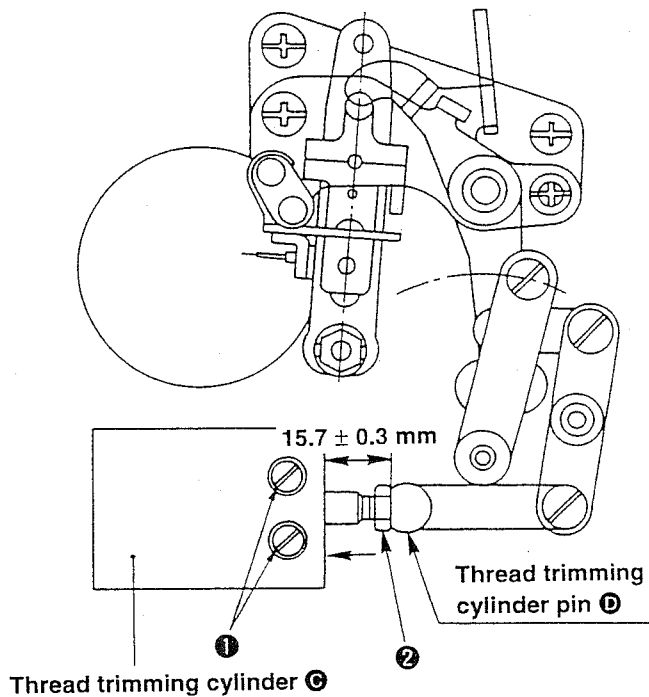
At this time, adjust so that a clearance of 0.1 to 0.5 mm is provided between knife driving arm **A** and guide block **B**.

(Caution) Move the cylinder by applying the compressed air pressure or move it by hand while applying approximately 10 kgf load.



Adjustment Procedures

- 1) Loosen screws ❶ in thread trimming cylinder ❸, and adjust the clearance between the knife driving arm and the guide block by moving the cylinder back or forth.
- 2) When attaching thread trimming cylinder ❸ which you have removed once, adjust the position of the cylinder by turning the cylinder rod so that the end face of thread trimming cylinder is spaced 15.7 ± 0.3 mm from the end face of thread trimming cylinder pin ❹ when the thread trimming cylinder retracts. Then, tighten nut ❷, and perform step 1).




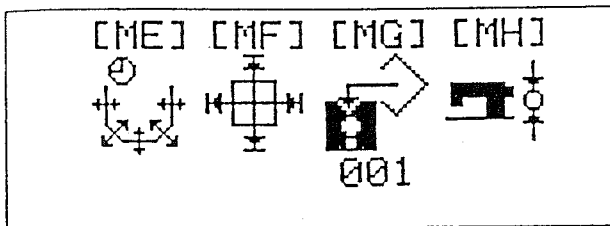
Results of Improper Adjustment

- 1) If the clearance between the knife driving arm and the guide block is larger than the specified value, thread trimming failure will result.
- 2) If no clearance is provided between the knife driving arm and the guide block, a load applied to the links will be increased, causing the links to wear out excessively.





Standard Adjustment

(17) Adjusting the plunger pump


- 1) Turn ON the main power to the machine. Press the **M** key to make the [MH] flash on and off. Press the  key to select the sewing machine adjusting mode.

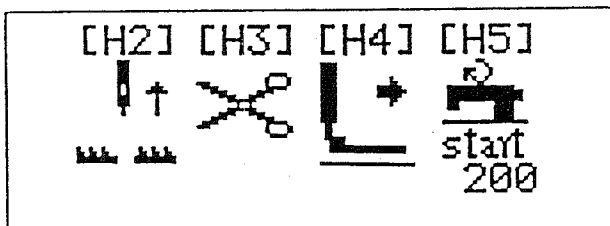


Mode selection screen

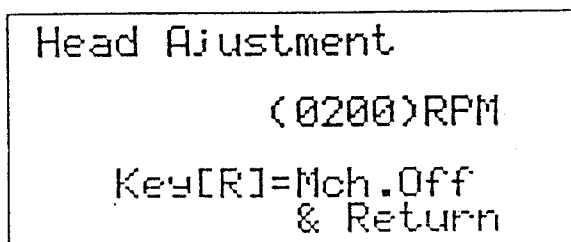
- 2) Press the  key to make the [H4] flash on and off. Press the  key to retract the work clamp.
- 3) Press the  key to make the [H5] flash on and off. Press the  key to select the sewing machine drive screen, and rotate the sewing machine.

(Note) At this time, remove the needle thread and bobbin.

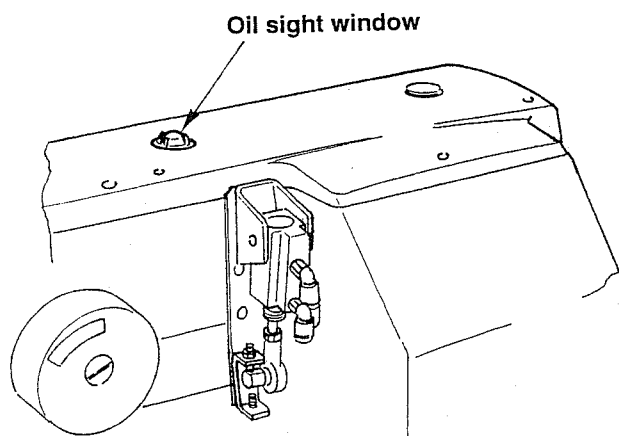
- 4) Press the  key to gradually increase the number of rotations of the sewing machine upto approximately 2,000 r.p.m.
- 5) Confirm that oil comes out through the oil sight window.



Machine adjusting screen (2)

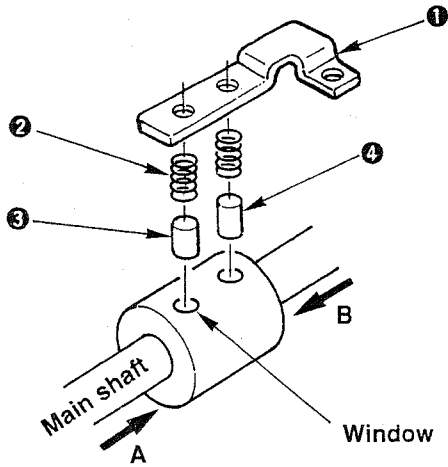


Machine drive screen

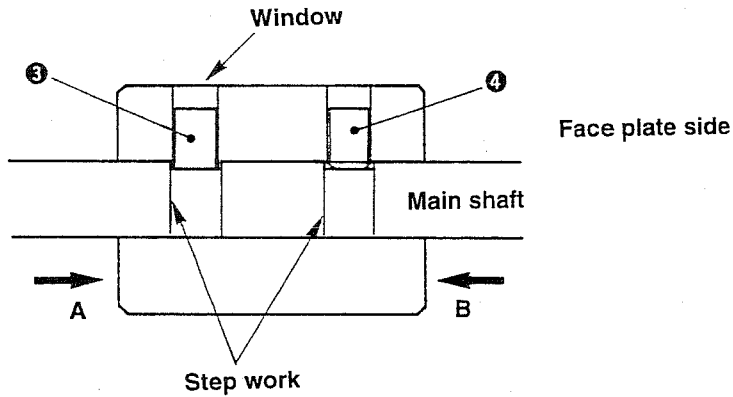


Adjustment Procedures

- 1) Remove the top cover.
- 2) Remove plunger spring support ①.
- 3) Remove plunger pressing spring ②.



- 4) Rotate the main shaft, and confirm that plunger ③ moves up or down.



- 5) If the plunger does not move up or down, strike the bushing from direction A or direction B with a brass bar or the like so that the step work on the main shaft cannot be seen from the window.

(Plunger ③ : Without chamfering on the top end)
 (Plunger ④ : With chamfering on the top end)

Results of Improper Adjustment

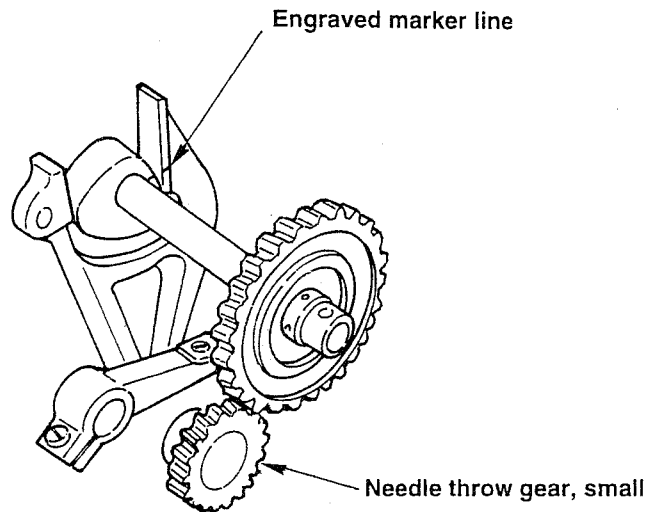
If the timing is excessively advanced or retarded, stitch skipping, fine split thread or thread breakage will result.

- If the timing is excessively advanced, thread will be excessively tensed, but thread breakage will occur.
- If the timing is excessively retarded, stitch skipping is likely to occur very few, but thread will be insufficiently tensed.
- The main shaft, etc. will be seized due to the insufficient oil amount.
- Stitch failure will be produced due to the insufficient oil amount.

Standard Adjustment

(18) Timing of the needle throwing

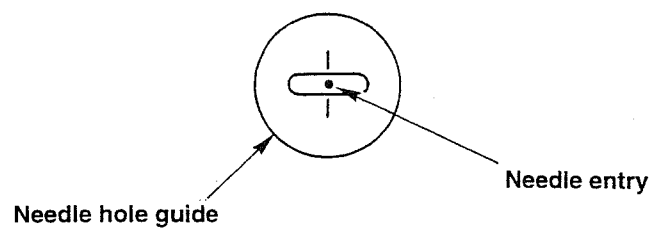
When the needle throws to the left at the right side needle line, the marker line of the forked section of the needle bar rocking rod should be aligned with the engraved marker line of the needle bar rocking cam at the position where the needle bar is in its lowest point. (When the needle lowers and passes the throat plate, the needle should finish its throwing.)



(19) Adjusting the position of needle entry (in terms of the throat plate)

When the needle throwing is not performed, the needle should enter the engraved marker line on the needle hole guide in the throat plate.

(Tie stitch)

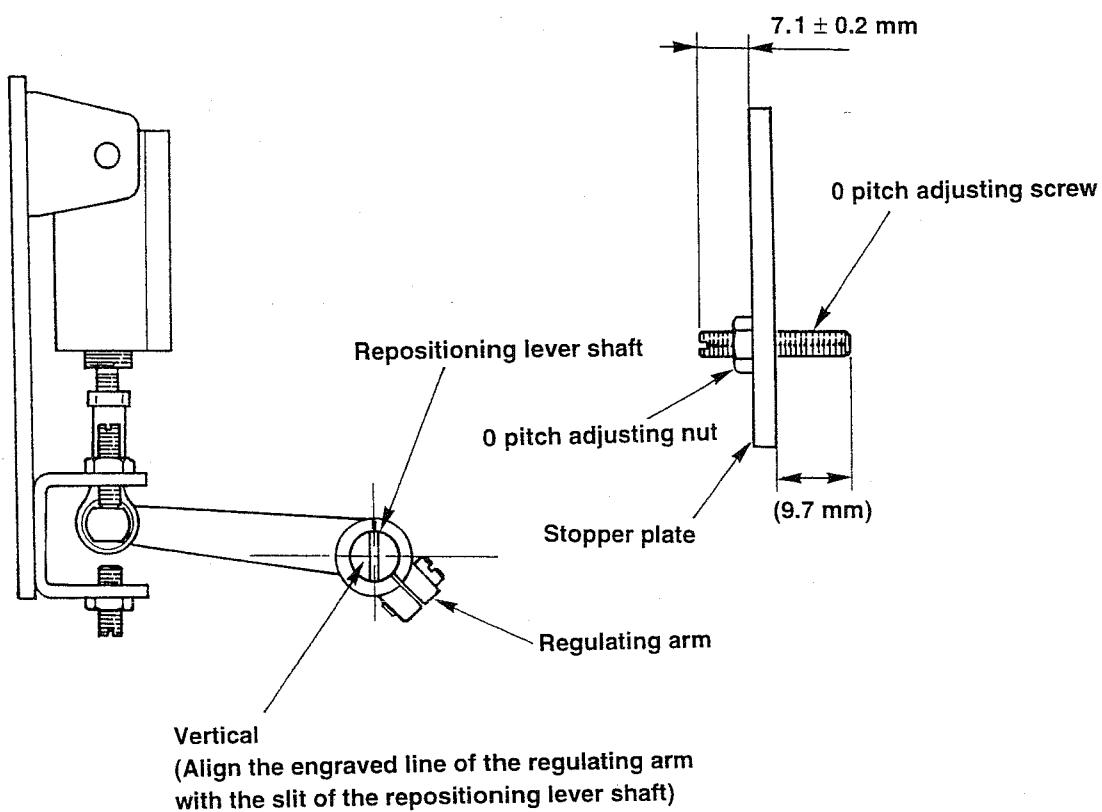


Adjustment Procedures	Results of Improper Adjustment
<ul style="list-style-type: none"> ○ Adjust the timing using the needle throw gear, small. <p><Checking after the adjustment> Place a sheet of paper on the needle entry position, turn the handwheel by hand and check whether the needle sways in the lateral direction.</p>	<ul style="list-style-type: none"> ○ When the engraved marker lines are not aligned with each other, the needle sways, causing needle breakage, stitch skipping, etc.
<ul style="list-style-type: none"> ○ When the needle entry position is not correct even if the engraved marker line of the forked section of the needle bar rocking rod is aligned with the engraved marker line of the needle bar rocking cam when the repositioning lever is at the right side needle line and the needle bar is in its lowest point, adjust the needle entry point by loosening the screw in the needle bar rocking arm, rear. <div data-bbox="370 1541 877 1877" data-label="Image"> </div>	<ul style="list-style-type: none"> ○ If the needle entry position is not correct, the one side of the needle hole guide comes in contact with the needle when the needle throw width is increased, causing needle breakage or thread breakage.

Standard Adjustment

(20) 0 (zero) adjusting

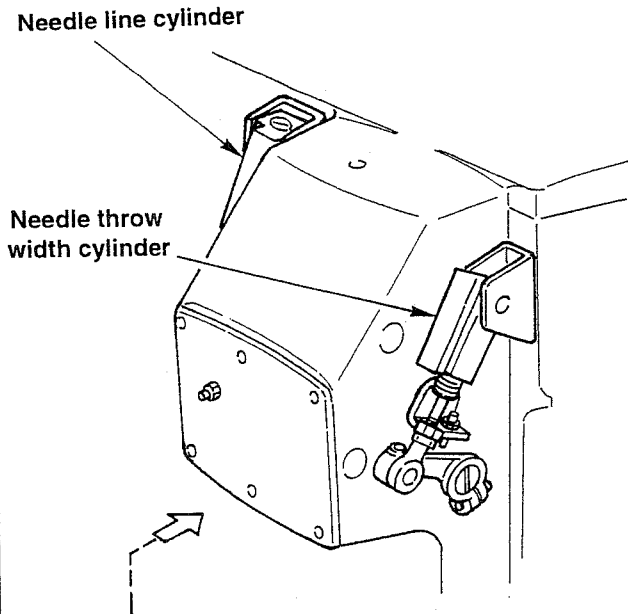
- ① When the level difference between the stopper plate and "0" pitch adjusting screw is 6.9 to 7.3 mm, the needle throw width at the tie stitch is 0 to 0.1 mm.
- ② Loosen the screw in the regulating arm and adjust so that the slit of the repositioning lever shaft becomes level.



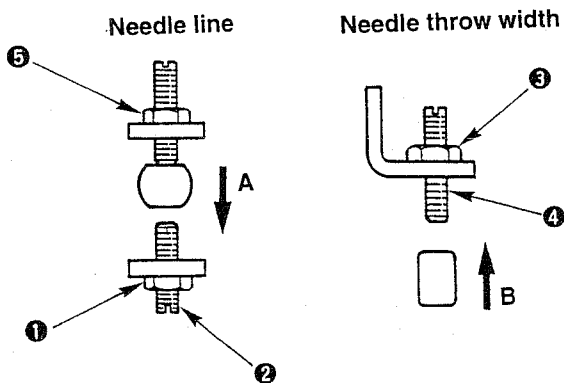
Adjustment Procedures	Results of Improper Adjustment
<ul style="list-style-type: none"> ○ Slightly adjust the needle throw width so that the needle throw width becomes 0 to 0.1 mm at the origin. Loosen the nut and adjust the needle throw width by turning the "0" pitch adjusting screw. 	<ul style="list-style-type: none"> ○ If the adjustment of the "0" adjusting is not correct, causing uneven stitch length.

Standard Adjustment

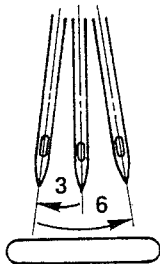
(21) Changing the needle throw width



• View from the right side



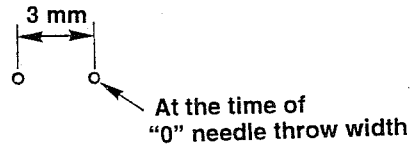
• View from the face plate side



Example) Changing the current 2 mm needle line and 4 mm needle throw width to 3 mm needle line and 6 mm needle throw width

- 1) Loosen nut ① and lower stopper screw ②.

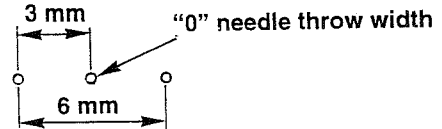
At this time, place a sheet of paper on the needle hole, turn the handwheel, and push down the repositioning lever shaft in direction A. Then, check the needle entry position.



After confirming the 3 mm, tighten nut ①.

- 2) Keeping the repositioning lever held lowered in direction A, loosen nut ③, and shift upward stopper screw ④.

At this time, push up the needle throw width regulating lever in direction B, and turn the handwheel by hand. Then, checking the needle entry position, move stopper screw ④ up or down so that the needle throw width becomes 6 mm. Then, tighten nut ③.



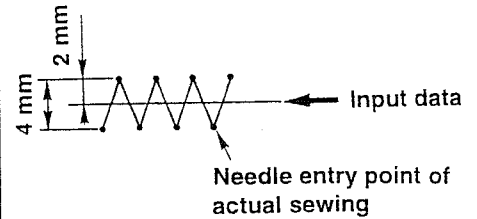
(Max. needle line : 3 mm, max. needle throw width : 6 mm)

Adjustment Procedures

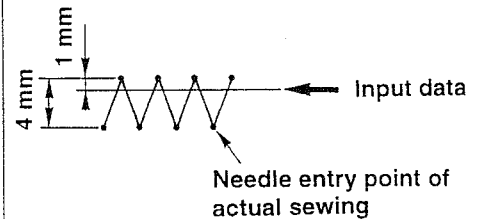
- 1) Although the max. needle throw width is 6 mm same as that of the standard adjustment value, if the needle line and the needle throw width are changed without making a balance, the frame rock components interfere with other components, resulting in motor-lock which is linked to the damage of the parts. So, be careful.
- 2) If loosening nut ⑤, the origin ("0" point) will shift and the work clamp plate interferes with the needle, causing needle breakage. So, do not loosen nut ⑤.
- 3) The actual finish of sewing is smaller by approximately 1 mm than the needle throw width which was dropped on the paper. If desired to obtain the needle throw width of 4 mm, it is necessary to adjust the needle throw width of approximately 5 mm.

Results of Improper Adjustment

- In case of adjusting the needle line of 2 mm and the needle throw width of 4 mm, the sewing shape against the input pattern will be as shown in the figure below.



- In case of adjusting the needle line of 1 mm and the needle throw width of 4 mm, the sewing shape will be as shown in the figure below.



- Standard adjustment value at the time of delivery is set to the needle line of 2 mm and the needle throw width of 4 mm. However, it depends on the customer's specifications.

5. HOW TO MOVE THE SEWING MACHINE HEAD

Standard Adjustment

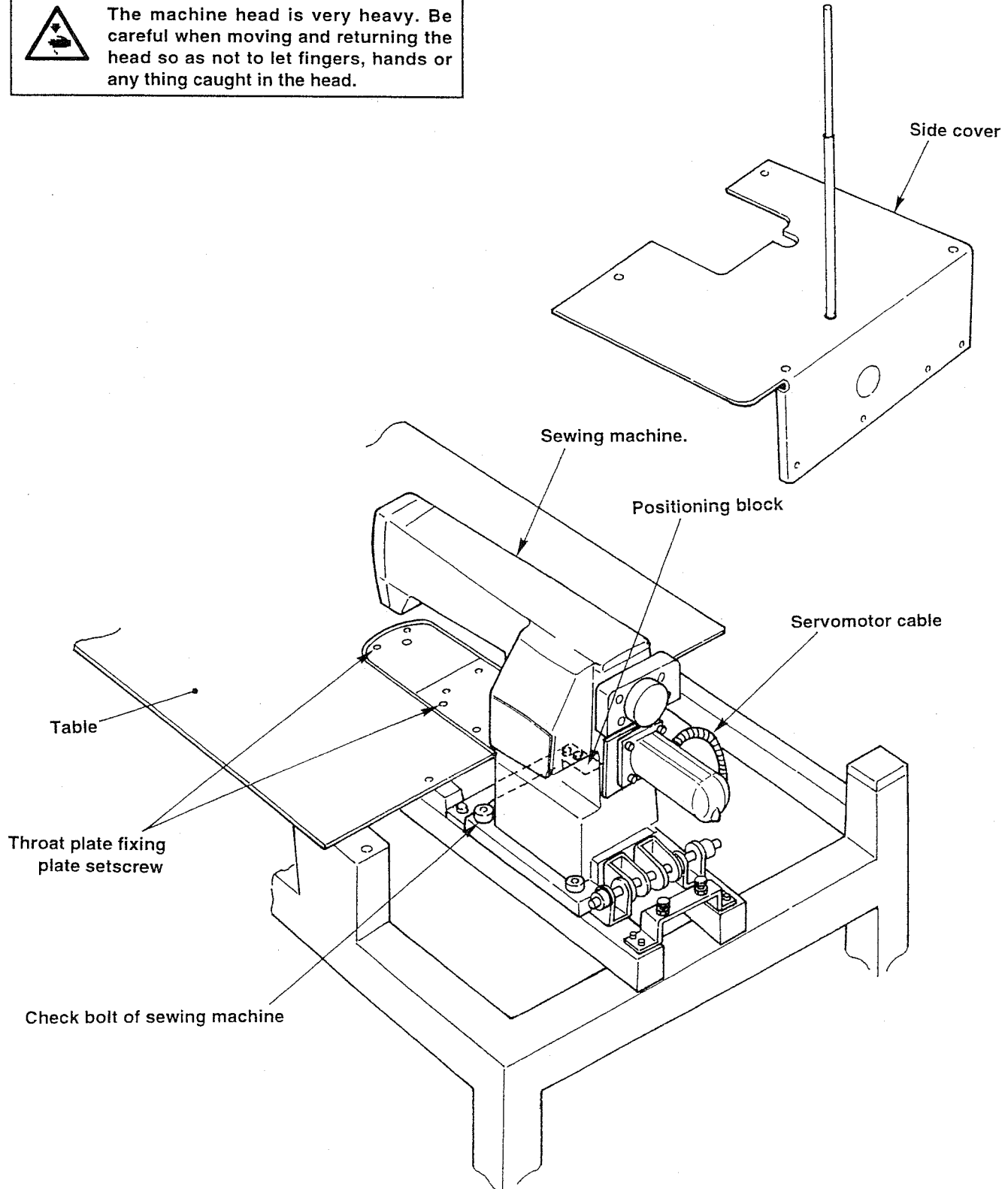
(1) How to move the sewing machine head

- 1) Remove throat plate fixing plate setscrews (6 pcs.).
- 2) Remove the side cover.
- 3) Remove check bolts of sewing machine (4 pcs.).
- 4) Hold the jaw section of the head, and turn the head until it hits the stopper bolt.



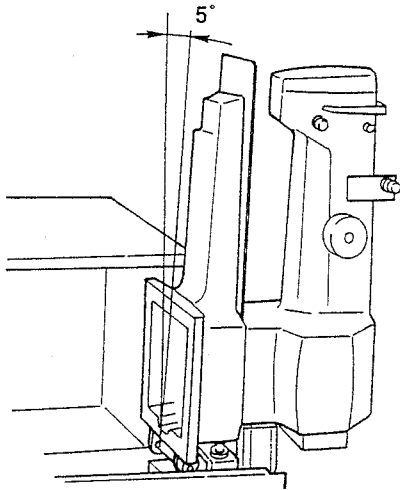
WARNING:

The machine head is very heavy. Be careful when moving and returning the head so as not to let fingers, hands or any thing caught in the head.



Adjustment Procedures

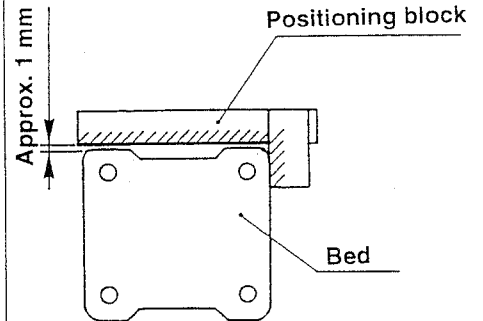
- 1) Be sure to turn OFF the power to the machine when moving the sewing machine head.
- 2) The sewing machine head is very heavy. If fingers or the like is caught in, resulting in a serious injury. So, be careful.
- 3) Set the lifting angle of the head to approximately 95°.



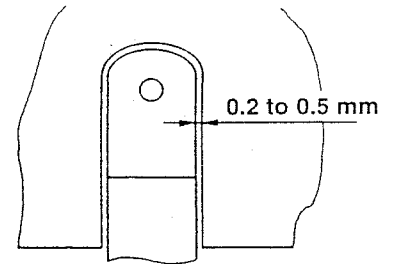
- 4) Be careful not to let the motor cable or air tube caught in.

Results of Improper Adjustment

- 1) When assembling, follow the procedure in the reverse order.
- 2) When installing the sewing machine, determine the position of the machine by pressing the machine bed against the corner of the positioning block, as illustrated in the figure below, and fix the machine there.

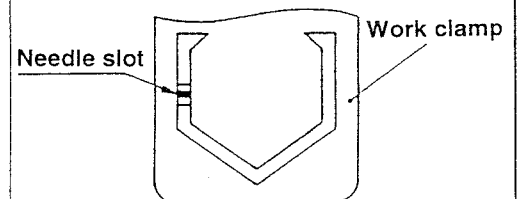


- 3) At this time, a clearance of approximately 0.2 to 0.5 mm should be provided between the table and the throat plate.



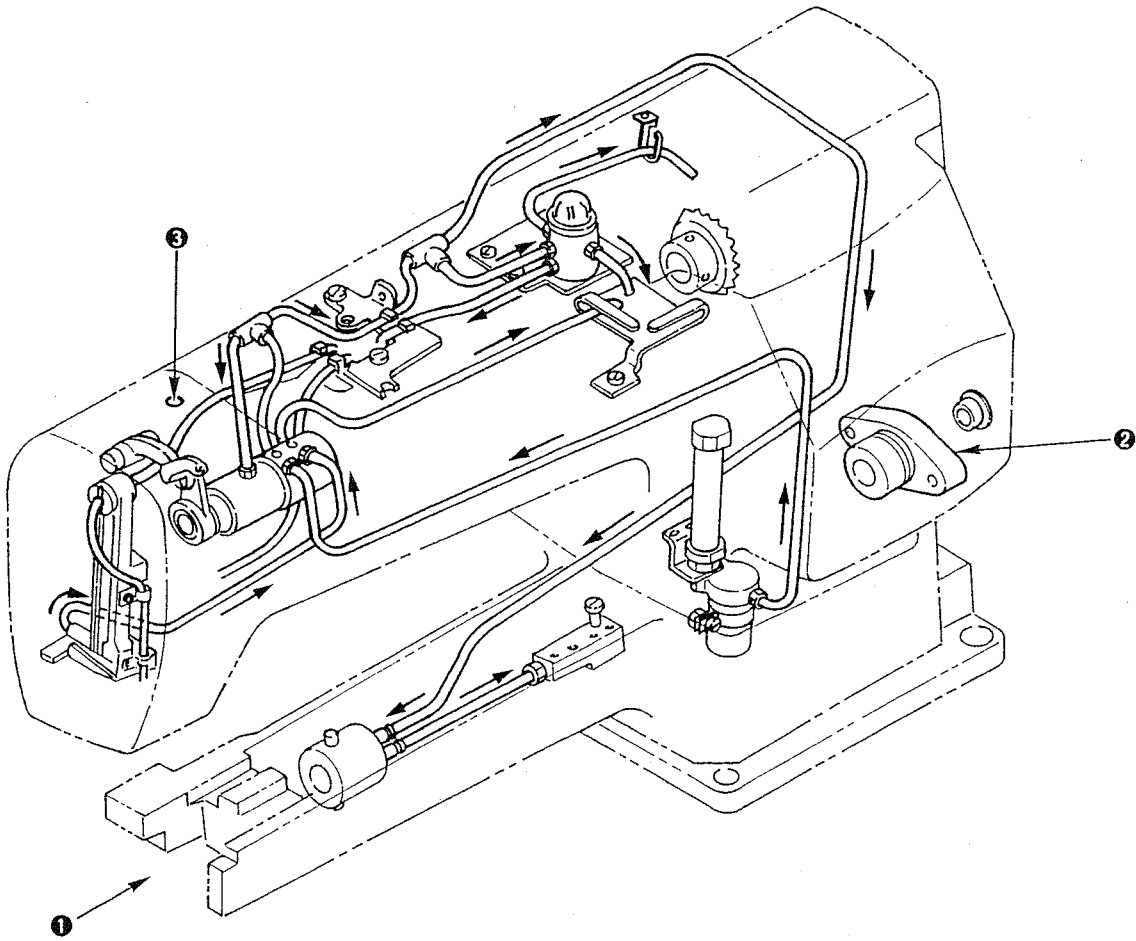
- 4) Before starting the unit, be sure to check the shape of sewing pattern and confirm that the slot in the work clamp does not interfere with the needle slot.

(Caution) If there is an interference (when the origin is shifted.), refer to "X-Y origin adjustment" (2) of the Hardware volume on page 20.



- 5) Be careful not to let fingers caught in between the table and the throat plate since the head is very heavy.
- 6) Return the head so as not to give the shock.

6. LUBRICATION OF THE MACHINE HEAD, CIRCULATION PIPING DIAGRAM AND COMPONENTS TO BE LUBRICATED



When you first use your machine after set-up or after an extended period of disuse, pour approximately 10 cc oil to ① hook components, ② hook driving shaft block and ③ oil hole of main shaft front bushing.

7. TROUBLES AND CORRECTIVE MEASURES

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
1. One or several stitches skip at the sewing start.	Length of thread remaining at the tip of the needle after thread trimming is too short.	Needle thread path is defective and needle thread tension is excessive at the time of thread trimming.	Inspect the needle thread path, remove the thread tangling round the take-up thread guide bar and correct the position of the take-up thread guide on the thread stand.
		Tension controller No. 1 or the tension controller on the take-up thread guide bar excessively tenses the thread.	Turn the tension nut of the tension controller No. 1 or the tension controller on the take-up thread guide bar counterclockwise to decrease the thread tension.
		Tension disk No. 2 fails to fully go up at the time of thread trimming.	Inspect the thread tension releasing mechanism and adjust it properly.
		Thread trimming cam timing has been excessively advanced causing the moving knife to actuate before separating the threads.	Inspect the thread trimmer cam timing and adjust it properly.
		Thread take-up finger is improperly positioned causing the needle thread to move out of position at the time of thread trimming.	Check whether the screw in the thread take-up finger has loosened.
		Counter knife is positioned excessively near the needle. Tip of counter knife blade is too sharp.	Remove the throat plate and check the position of the counter knife and check the moving knife for scratches. Then, properly adjust the components.
		Moving knife or hook has scratches.	Check the scratches. Buff them up when necessary. If the scratches are large, replace the failed component with a new one.
		Tension releasing cam timing has been excessively retarded. As a result, the needle thread fails to be fed.	Inspect the tension releasing components and adjust them properly.
		Thread wastes have gathered in the knife mounting base, which prevents threads from being separated.	Clean up the knife mounting base and moving knife.
	Work clamp is defective.	Sponge rubber piece of the work clamp fails to clamp the material on the machine.	Remove the sponge rubber sheet from the work clamp and adhere a new sheet onto the work clamp.
			Decrease the stitch length at the sewing start.
			Adjust so that the pattern is brought to a position where the sponge rubber sheet of the work clamp securely clamps the material.

To the next page

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
From the previous page	Blade point of the hook fails to catch the needle thread.	Needle-to-hook relation is not proper.	Check the height of the needle bar and adjust it to the standard height.
	Length of bobbin thread at the sewing start is insufficient.	Both the tension and stroke of the thread take-up spring are excessive.	Decrease the tension of the thread take-up spring and reduce the stroke of the spring appropriately (Standard stroke : 10 to 12 mm)
	Needle thread and bobbin thread fail to smoothly interface with each other at the sewing start.	Blade point of the hook has worn out.	Correct the blade tip of hook, or replace the hook with a new one.
	Needle thread remaining at the needle tip after thread trimming is too long.	Needle has been improperly installed.	Properly adjust the inclination of the needle. If the needle has bent, replace it with a new one.
2. Needle thread end is left on upper cloth at the sewing start.	Needle thread and bobbin thread fail to smoothly interface with each other at the sewing start.	Bobbin runs idle in the bobbin case causing the bobbin thread end to be drawn in the bobbin case.	Increase the pressure of the idling prevention spring.
	Needle thread remaining at the needle tip after thread trimming is too long.	Hook has scratches, which shorten the length of bobbin thread remaining.	Increase the bobbin thread tension.
	Needle thread and bobbin thread fail to smoothly interface with each other at the sewing start.	Sewing speed at the sewing start is excessive. As a result, the needle thread and bobbin thread fail to interface with each other.	Correct the scratches on the hook, or replace the hook with a new one.
	Needle thread remaining at the needle tip after thread trimming is too long.	Thread tension controller No. 1 is too low.	Reduce the sewing speed at the sewing start.
	Pattern is defective.	Thread trimming cam timing has been excessively retarded.	Decrease the stitch length at the sewing start.
	Pneumatic wiper is defective.	Counter knife is positioned too far from the needle entry point.	Increase the thread tension controller No. 1.
	Needle thread is too thick for the needle used.	Tension release cam timing has been excessively advanced. As a result, the needle thread is fed excessively.	Inspect the thread trimmer cam timing and properly adjust it.
		Material thickness is excessive at the sewing start.	Properly adjust the position of counter knife.
		Sponge rubber piece of the work clamp is sewn in.	Inspect the tension release cam timing and adjust it properly.
		Pneumatic wiper fails to work. This causes the plunger to depress the needle thread.	Adjust the pattern so that the sewing start is brought to a thin section of the material.
		Pneumatic wiper fails to blow air at the correct position. As a result, the operating air fails to spread the needle thread, causing the plunger to depress the needle thread.	Cut the sponge rubber sheet of the work clamp adequately or modify the pattern so that the needle does not come in contact with the sponge rubber sheet.
		Needle thread is too thick for the needle used.	Check whether the operating air is supplied to the wiper.
			Adjust the installing direction of the work clamp plunger.
			Use a thicker needle or a thread of higher count.

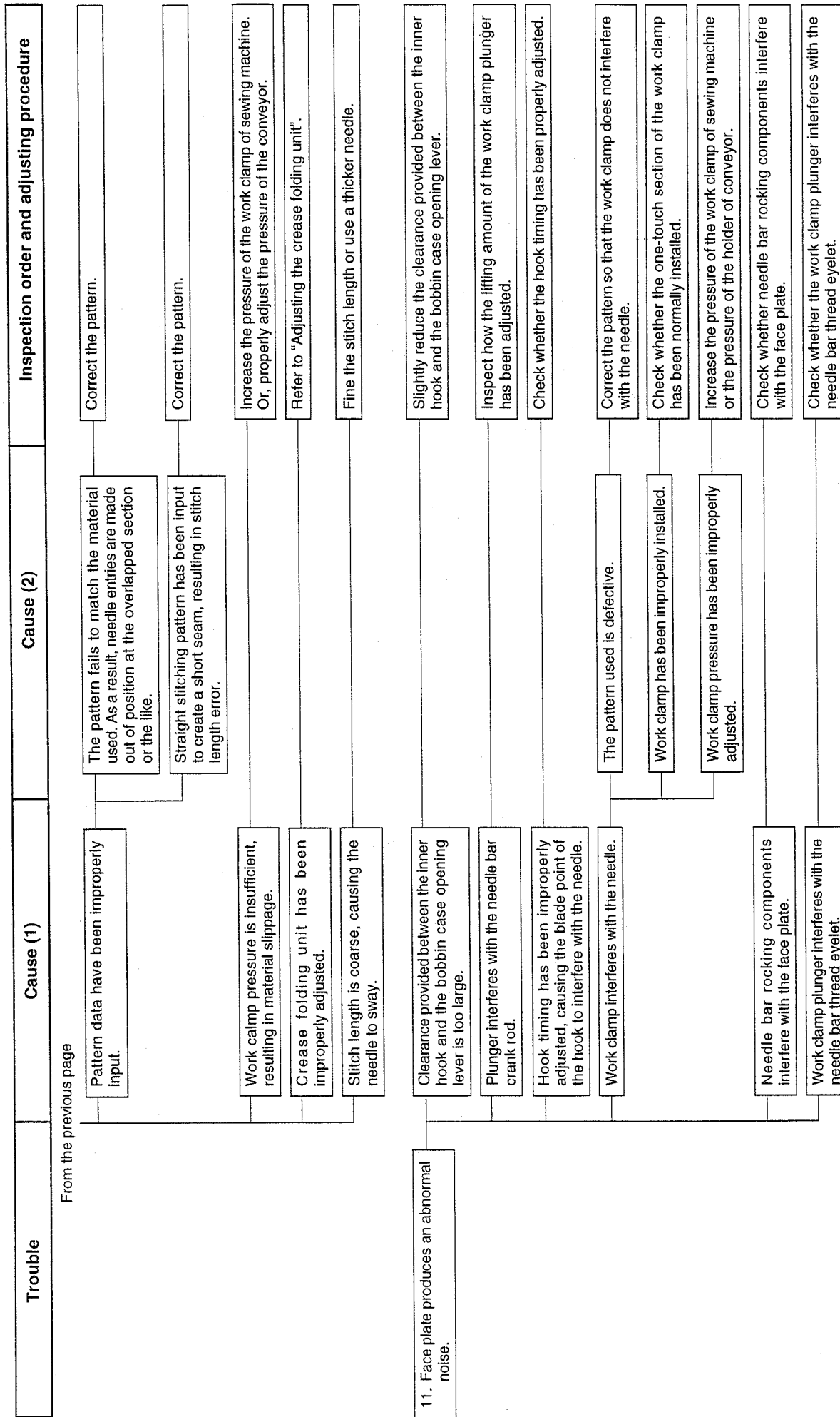
Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
3. Wrong side of the material is poorly finished at the sewing start. (Long needle thread is left under the material.)	Length of needle thread remaining at the tip of needle after thread trimming is excessive.		Refer to "2. Needle thread end is left at the sewing start".
4. Thread comes off the needle eyelet at the sewing start.	Length of needle thread remaining at the tip of needle after thread trimming is not uniform.	Failed operation of the tension release cam	Inspect the tension release mechanism and properly adjust it.
		Thread take-up finger fails to enter the bobbin case deeply enough. So, the needle thread sometimes slips off the thread take-up finger.	Inspect the thread take-up finger and properly adjust it.
		If the counter knife blade has been improperly sharpened (counter knife blade is too sharp), the counter knife alone cuts the thread.	Properly re-grind the counter knife or replace it with a new one.
		Moving knife or hook has scratches.	Correct the scratched component or replace it with a new one.
		Tension release cam timing has been excessively retarded. As a result, the needle thread is not fed.	Inspect the tension release cam timing and properly adjust it.
	Thread slips off the needle eyelet immediately after thread trimming.	Thread trimmer cam timing has been excessively advanced. In this case, the thread near the needle is cut.	If the needle thread slips off the needle eyelet immediately after thread trimming, suppose that the moving knife fails to spread the thread and cuts the thread which should remain at the needle. In this case, remove the throat plate and you will find the trimmed needle thread of approximately 20 mm. To correct this trouble, retard the thread trimmer cam timing.
		Thread tension is not released.	Inspect the tension release components and properly adjust them.
	Needle thread and bobbin thread fail to interlace with each other at the sewing start.	Sewing speed at the sewing start is excessive. As a result, the needle thread and bobbin thread fail to interlace with each other.	Reduce the sewing speed at the sewing start.
	Main shaft stops before the predetermined position, with respect to the highest dead point of the thread take-up lever, is reached.		Adjust so that the stop position of the main shaft approaches the highest dead point of the thread take-up lever.

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
5. Loose stitches are made at the sewing start.	<p>Needle thread tension is insufficient at the sewing start.</p> <p>The pattern used is defective.</p>	<p>Bobbin thread tension is decreased at the sewing start since the bobbin runs idle.</p> <p>Both the bobbin thread tension and needle thread tension are insufficient.</p> <p>Material thickness is excessive at the sewing start.</p> <p>Pressure of the work clamp is insufficient at the sewing start, causing the material to flop.</p>	<p>Increase the pressure of the idling prevention spring.</p> <p>Increase the bobbin thread tension and needle thread tension.</p> <p>Modify the pattern at the thin part of material.</p> <p>Remove the sponge rubber sheet from the work clamp and adhere a new piece of the sponge rubber on it, or modify the pattern to enable the work clamp to securely clamp the material.</p>
6. Needle thread cannot be cut. (Bobbin thread can be cut.)	<p>Last stitch skips at the sewing end.</p>	<p>Needle has been improperly installed.</p> <p>Stroke of the thread take-up spring is too large.</p> <p>Hook timing has been improperly adjusted.</p> <p>Needle entry of the last stitch excessively approaches the previous stitch.</p> <p>Blades of the moving knife and counter knife fail to accurately meet with each other at the time of thread trimming. (Installing angle and position of the counter knife has not been properly adjusted with regard to the moving knife blade.)</p>	<p>Properly install the needle and check whether the needle has bent.</p> <p>Reduce the stroke of the thread take-up spring. (Standard stroke : 10 to 12 mm)</p> <p>Run the sewing machine at low speed and check whether stitches skip. Then, properly re-adjust the hook timing.</p> <p>Correct the pattern.</p> <p>Remove the knife mounting base and cut approximately three cotton thread #50 by moving the knife by hand. As far as the threads are uniformly cut, the counter knife has been properly adjusted. If not, re-grind the counter knife blade or correct the inclination angle of the top end of the counter knife.</p> <p>Properly re-adjust the mounting position of the counter knife.</p>
	<p>Knife blade partly fails to cut the thread sharp.</p> <p>Thread waste has gathered in the moving knife and knife thread guide, resulting in thread spreading failure.</p>		<p>Clean up the moving knife and knife thread guide.</p>

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
7. Bobbin thread cannot be cut. (Needle thread can be cut.)	Backward travel amount of the moving knife is insufficient.	Adjustment of the backward travel amount of the moving knife is defective.	Check the backward travel amount of the moving knife. Then, adjust the lateral position of moving knife link C to set the backward travel amount of the moving knife to 3 to 3.5 mm.
	Thread trimmer cam timing has been excessively retarded. As a result, the moving knife fails to spread the thread.		Properly re-adjust the thread trimmer cam timing.
	Thread waste has gathered in the moving knife and knife thread guide, resulting in thread spreading failure.		Clean up the moving knife and knife thread guide.
	Knife mounting base has been improperly positioned which reduces the backward travel amount of the moving knife.		Properly re-install the knife mounting base.
8. Moving knife locks.	Timing of the related components is defective.	Thread trimmer cam timing is defective.	Inspect the thread trimmer cam timing and properly adjust it.
	Initial position of the main shaft motor has been improperly adjusted, resulting in defective timing of thread trimming signal.		Properly re-adjust the initial position of the motor.
	Thread trimmer control plate fails to move. As a result, the roller fails to fit in the cam.	Installing position of the thread trimmer control plate is defective.	Refer to the description of the adjustment of thread trimmer control plate (given in "Adjusting the thread trimmer cam timing").
	Home position of the moving knife is defective.	Thread cannot be trimmed.	Inspect the backward travel amount of the moving knife and properly adjust it.
	After the thread trimmer has actuated, the thread trimmer actuates again at the start of the next sewing.	Cam roller fails to come off the cam groove in the resting section.	Inspect the engagement between the moving knife and the counter knife and properly adjust it. Properly adjust the positional relation between the cam groove and the roller. Or, check whether the thread trimming cylinder normally operates.

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
9. The sewing machine locks. (The sewing machine produces an abnormal noise.)	Thread trimmer cam roller fails to return to the home position.	Thread trimmer cam timing is defective.	Inspect the thread trimmer cam timing and properly adjust it.
		Air cylinder is defective.	Inspect whether the thread trimming cylinder normally operates.
		Initial position of the main shaft motor has been improperly adjusted. As a result, the actuating timing of the thread trimming cylinder is defective.	Inspect whether the initial position of the main shaft motor has been properly adjusted. Then, adjust it if necessary.
		Moving knife fails to smoothly move. As a result, the moving knife fails to go back to the home position.	Inspect whether the moving knife and counter knife normally engage with each other.
	Presser bar lifting lever fails to properly return to the home position.	Presser bar bracket has been improperly positioned. As a result, the presser bar bracket interferes with the needle bar crank rod.	Inspect whether the presser bar bracket has been properly positioned. (Refer to "Adjusting the lifting amount of the work clamp plunger".)
		Air cylinder is defective.	Inspect whether the presser bar lifting cylinder normally operates.
	Tension release mechanism is defective.	Air cylinder is defective.	Inspect whether the tension release cylinder normally operates.
		The clearance provided between the cam and the roller has not been properly adjusted. As a result, the roller is kept in contact with the cam.	Inspect and adjust the clearance provided between the tension release cam and the roller referring to "Adjusting the clearance between the tension release cam and the roller".
	The pattern used is defective, causing the work clamp to interfere with the needle.		Correct the position of the pattern so that the needle does not interfere with the work clamp.
	Work clamp has been improperly installed. As a result, the work clamp interferes with the needle.		Check whether the one-touch section of the work clamp has been properly installed.
Work clamp plunger and needle bar thread eyelet have been improperly positioned. As a result, they interfere with each other.		Inspect the installing position of the work clamp plunger and properly adjust it.	
10. Sewing shape is deformed.	Sewing speed at corner sections of the pattern is too high.		Reduce the sewing speed at the corner sections of the pattern.
	Work clamp is defective.	Work clamp fails to clamp the material.	Remove the sponge rubber sheet from the work clamp and adhere a new sheet of the sponge rubber on it to allow the work clamp to securely clamp the material. Or, increase the pressure of the work clamp.

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Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure	
12. The machine vibrates heavily during sewing.	Tension of the belt of main shaft motor has been improperly adjusted.		Check whether the tension of the belt of main shaft motor is too high or too low.	
	Sewing machine head has been improperly installed.	Table of the housing interferes with the throat plate.	Check whether the table of the housing interferes with the throat plate. If they interfere with each other, correctly install the table.	
	Backlash in the gear is defective.	Machine head fixing bolt has not been properly tightened.	Check whether the tightening torque of the machine head fixing bolt is adequate.	
		Main shaft gear	Check whether the backlash in the main shaft gear is excessive.	
		Hook driving shaft gear	Check whether the backlash in the hook driving shaft gear is excessive.	
	Play at the main shaft, hook driving shaft or vertical shaft.	Thrust play at the main shaft	Check whether the thrust play at the main shaft is excessive.	
		Thrust play at the hook driving shaft	Check whether the thrust play at the hook driving shaft is excessive.	
		Thrust play at the vertical shaft	Check whether the thrust play at the vertical shaft is excessive.	
	Housing has been improperly installed.	Level adjusters have been improperly installed.	Install the housing level adjusters mounted around the sewing machine securely on the floor.	
		The number of points at which the housing is secured on the floor is insufficient.	Install the machine on the floor under which beams are provided or the floor located near the wall.	
13. Needle breakage	Work clamp is defective.	Material flops.	Remove the sponge rubber sheet from the work clamp and adhere a new piece of the sponge rubber on it.	
	The pattern used is defective.	Material thickness is excessive at the sewing start.	Modify the pattern to enable the machine to sew from the thin part of the material.	
	Initial position of the main shaft motor has been improperly adjusted. As a result, needle malfunctions when returning to the highest position of its stroke.		Inspect whether the initial position of the main shaft motor has been properly adjusted.	Inspect whether the initial position of the main shaft motor has been properly adjusted.
	The pattern used is defective. As a result, the needle interferes with the work clamp.		Correct the pattern so that the needle does not interfere with the work clamp.	Correct the pattern so that the needle does not interfere with the work clamp.
	Work clamp has been improperly installed, causing the work clamp to interfere with the needle.		Check whether the one-touch section of the work clamp has been normally installed.	Check whether the one-touch section of the work clamp has been normally installed.

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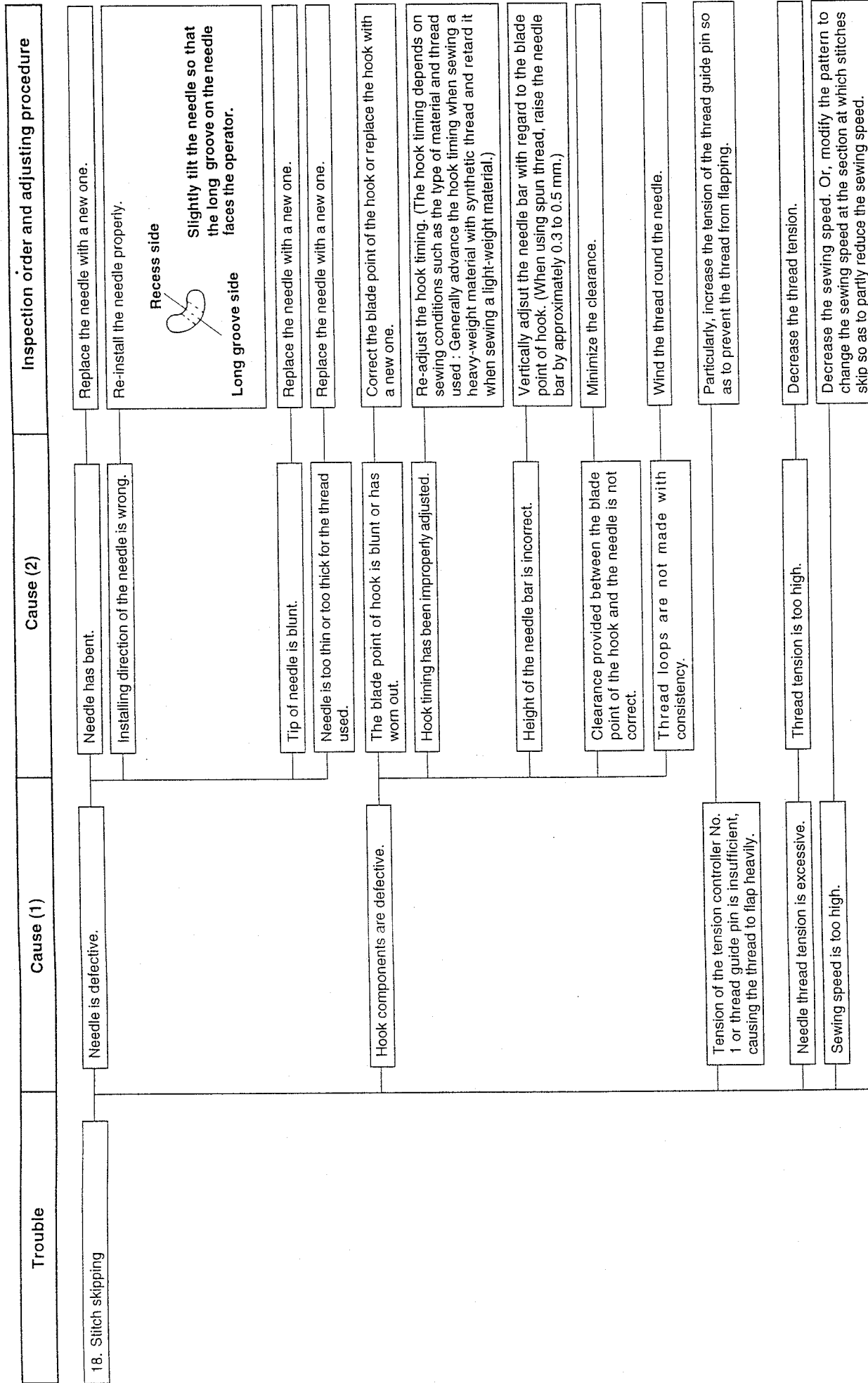
Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
From the previous page	<p>Needle comes in contact with the moving knife.</p> <p>Thread waste has gathered around the hook.</p> <p>Needle comes down under the work clamp plunger.</p>	<p>Stop position of the main shaft is defective.</p> <p>Plunger has been improperly positioned.</p>	<p>Refer to the description given under "Moving knife locks".</p> <p>Remove the throat plate and clean up the related components.</p> <p>Check whether the stop position of the main shaft has been properly adjusted.</p> <p>Check whether the lifting amount of the work clamp plunger has been properly adjusted.</p> <p>Confirm that the throat plate is positioned correctly with respect to the needle entry.</p>
14. Sewing machine stops immediately after it has been started.	<p>Throat plate has been improperly installed, causing the needle to interfere with the needle hole guide.</p> <p>The machine head has not been threaded.</p> <p>Thread breakage detector is defective.</p>		<p>Properly pass the the needle thread through the machine head.</p> <p>Confirm that the thread take-up spring properly comes in contact with the thread breakage detecting plate.</p>
15. Holder of the conveyor interferes with the work clamp plunger of the sewing machine.	<p>Holder of the conveyor has bent.</p> <p>Height of the work clamp is insufficient.</p> <p>Work clamp plunger has been installed too low.</p>	<p>Stopper used for adjusting the height of the holder of the conveyor has been improperly positioned.</p> <p>Plunger has been improperly installed.</p>	<p>Correct the bending part of the holder of the conveyor.</p> <p>Raise the stopper for adjusting the height of the holder of the conveyor. Then, decrease the height of the holder.</p> <p>Inspect the lifting amount of the work clamp plunger and properly adjust it.</p>
16. Puckering	<p>Needle used is too thick.</p> <p>Thread tension (needle thread tension and bobbin thread tension) is excessive.</p>	<p>Thread path has not been smoothly finished.</p> <p>Hook timing has been excessively retarded.</p> <p>Stroke of the thread take-up lever is too large.</p> <p>Stroke of the thread take-up spring is too small.</p>	<p>Use a thinner needle.</p> <p>Smoothly finish the thread path.</p> <p>Advance the hook timing as long as stitch skipping does not occur to allow the thread to smoothly come off the hook.</p> <p>Move the arm thread guide to the right so as to reduce the amount of thread to be fed by the thread take-up lever.</p> <p>Increase the stroke of the spring.</p>

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Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
From the previous page	Work clamp failure causes the material to flop.	Sponge rubber sheet of the work clamp fails to effectively clamp the material.	Adhere a sheet of emery paper or the like on the work clamp to enable the work clamp to securely clamp the material.
		Needle entry is too far from the sponge rubber sheet end.	Correct the pattern so that the needle entry approaches the sponge rubber sheet.
		Swelling on an overlapped section of the material is large and the work clamp fails to clamp it securely.	Remove the sponge rubber sheet and re-adhere it on the work clamp so as to remove swelling on the overlapped section of the material.
		Pressure of the work clamp of the sewing machine and that of the holder of the conveyor are insufficient.	Increase the pressure of each component.
	Sewing speed is too high.		Reduce the sewing speed.
	Diameter of the hole in the needle hole guide is improper.	Needle used is too thin for the diameter of the hole in the needle hole guide.	Use the needle hole guide provided with a hole of which diameter is smaller than the current one.
	Needle tip is blunt.	Needle tip catches the material, causing the material to flop.	Replace the needle with a new one.
17. Isolated idling loops (Loose stitches or looping)	Thread tension is insufficient.		Increase the thread tension.
	Thread take-up spring has been improperly adjusted.	Stroke of the thread take-up spring is too small.	Increase the stroke.
		Tension provided by the spring is insufficient.	Increase the thread tension.
		Thread take-up spring fails to properly come in contact with the thread breakage detecting plate.	Adjust the thread breakage detecting plate so that the thread take-up spring comes in proper contact with the plate.
	Stroke of the thread take-up lever is too large.		Move the arm thread guide A to the right so as to reduce the amount of thread to be fed by the thread take-up lever.
	Hook components are defective.	Hook timing has been excessively advanced.	Adjust the hook timing to the standard or slightly advance it when using cotton thread or spun thread.
		Hook timing has been excessively retarded.	Adjust the hook timing to the standard or slightly advance it when using synthetic thread.
		Clearance provided between the hook and the bobbin case opening lever is too small.	Increase the clearance to allow the thread to smoothly come off the hook.
		Amount of oil in the hook is insufficient or excessive.	Adjust the amount of oil in the hook appropriately.
		Hook is defective. (The thread is caught in the hook.)	Replace the hook with a new one.

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Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
From the previous page	Thread path is defective.	Thread path is not smooth.	Smoothly finish the thread path.
		Thread path has scratches.	Smoothly finish the thread path.
		Thread is caught in the thread path.	Properly correct the thread path.
	Bobbin or bobbin case is defective.	Bobbin fails to properly engage with the bobbin case, the bobbin thread to be caught in the bobbin or bobbin case.	Replace the bobbin or bobbin case with a new one.
		Bobbin has not been properly wound with thread.	Tension provided by the bobbin winder is too high or too low.
		Tension adjusting spring of the bobbin case is defective.	Replace the bobbin case with a new one.
		Bobbin thread runs idle in the bobbin case.	Increase the pressure of the idling prevention spring.
	Thread tension controller is defective.	Tension disk has risen.	Adjust the tension disk so that it properly rises. (Refer to "Adjusting the tension release mechanism".)
	Needle is too thin for the thread used.		Change the needle or the thread.
	Needle is defective.	Needle tip has burrs.	Replace the needle with a new one. (For synthetic thread, it is recommended to use a ball-point needle which has a round tip.)
	Diameter of the hole in the needle hole guide is improper.	Needle and thread are too thick for the diameter of the hole in the needle hole guide.	Use the needle hole guide provided with a hole of which diameter is larger than the current one.



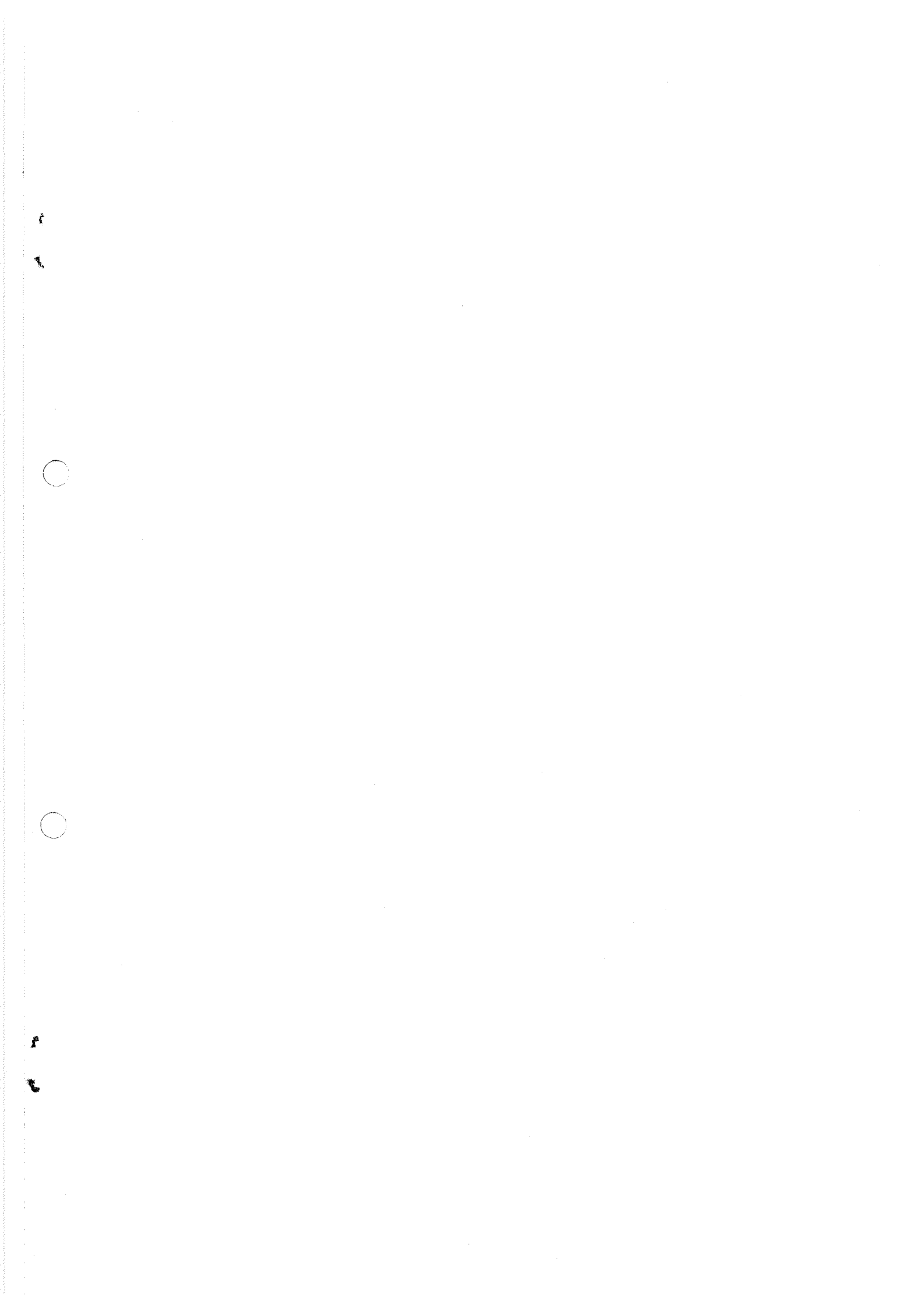
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Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
From the previous page	Thread take-up spring has been improperly adjusted.	Stroke of the thread take-up spring is too large.	Decrease the stroke of the thread take-up spring.
		Tension of the thread take-up spring is too high.	Decrease the tension of the thread take-up spring.
		Thread take-up spring fails to properly come in contact with the thread breakage detecting plate.	Adjust the thread breakage detecting plate so that it properly comes in contact with the thread take-up spring.
	Hook driving shaft has an excessive play.		Remove the play in the hook driving shaft.
	The material flops.		Refer to the description of "Work clamp failure causes the material to flop" given under "16. Puckering".
	Stitch length is coarse.	Stitch length is coarse, causing the needle to sway.	Use a thicker needle or fine the stitch length.
	Diameter of the hole in the needle hole guide is improper.	Diameter of the hole in the needle hole guide is too large for the thread and needle used.	Use the needle hole guide provided with a hole of which diameter is smaller than the current one.
	Needle is too thin for the thread used.		Replace the needle or thread.
19. Needle thread breakage	Thread path is defective.	Thread path is not smooth.	Smoothly finish the thread path.
		Thread path has scratches.	Smoothly finish the thread path.
		Thread is caught in the thread path.	Properly thread the thread path.
	Needle thread tension is inadequate.	Needle thread tension is too high or too low.	Adjust the thread tension to an adequate value.
		Tension regulated by the tension controller No. 1 and that of thread guide pin are insufficient.	Adjust the thread tension so that the thread does not flap.
	Thread take-up spring has been improperly adjusted.	Stroke of the thread take-up spring is too large or too small.	Properly adjust the stroke of the thread take-up spring. (standard stroke : 10 to 12 mm)
		Tension of the thread take-up spring is too high or too low.	Properly adjust the tension of the thread take-up spring.

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Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
From the previous page	Needle is defective.	The needle has bent.	Replace the needle with a new one.
		The needle has scratches.	Replace the needle with a new one.
		The needle tip is blunt.	Replace the needle with a new one.
		Installing direction of the needle is not correct.	Re-install the needle properly.
		The needle is too thin or too thick for the thread used.	Replace the needle with a new one.
		The tip of needle is too sharp.	Use a ball-point needle.
	The material flops.		Refer to the description of "Work clamp failure causes the material to flop" given under "16. Puckering".
	Hook components are defective.	Thread path of the hook has scratches.	Smoothly finish the thread path.
		The blade point of hook is blunt or has worn out.	Correct the blade point of hook or replace the hook with a new one.
		Clearance provided between the hook and the bobbin case opening lever is too small.	Increase the clearance to allow the thread to smoothly come off the hook.
		Amount of oil in the hook is insufficient.	Adjust the amount of oil in the hook appropriately.
		Longitudinal position of the hook and bobbin case opening lever is defective, causing the needle to interfere with the corner of U-groove on the inner hook.	Adjust the installing position of the bobbin case opening lever.
	The pattern used is defective.	The end of the groove on the work clamp interferes with the needle.	Correct the pattern so that the work clamp does not interfere with the needle.
	The needle has been improperly installed.	The needle has been installed with inclined.	Install the needle so that the long groove on the needle faces exactly to the left. Or, install the needle with slightly inclined so that the groove on the needle faces the operator.
		 <p>Long groove side</p>	 <p>Recess side</p>
			Wind the thread round the needle.

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
20. Wobbling	Needle thread tension is too high.		Decrease the thread tension.
	Needle is defective.	Needle has been improperly installed.	Refer to the description of "Needle has been improperly installed" given under "19. Needle thread breakage".
		The needle has bent.	Replace the needle with a new one.
		The tip of needle is blunt.	Replace the needle with a new one.
		The needle is too thin.	Replace the needle with a thicker needle.
	Sewing speed is too high.		Reduce the sewing speed.
	Failed threading	Needle thread has been improperly passed through the machine head.	Thread the machine head correctly.
		Needle bar thread eyelet has been improperly threaded.	Refer to the description of "Needle bar thread eyelet is defective" given under "19. Needle thread breakage".
	Stitch length is coarse.	Stitch length is coarse, causing the needle to sway.	Use a thicker needle or fine the stitch length.
	21. Fabric yarn breakage	Needle is defective.	The needle is hot.
		The needle is too thick.	Use a thinner needle.
		The tip of needle is blunt.	Replace the needle with a new one.
		Shape of the tip of needle is not appropriate. (Type of needle)	Use a ball-point needle.
Sewing speed is too high.			Reduce the sewing speed. (To prevent the needle from becoming hot)



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