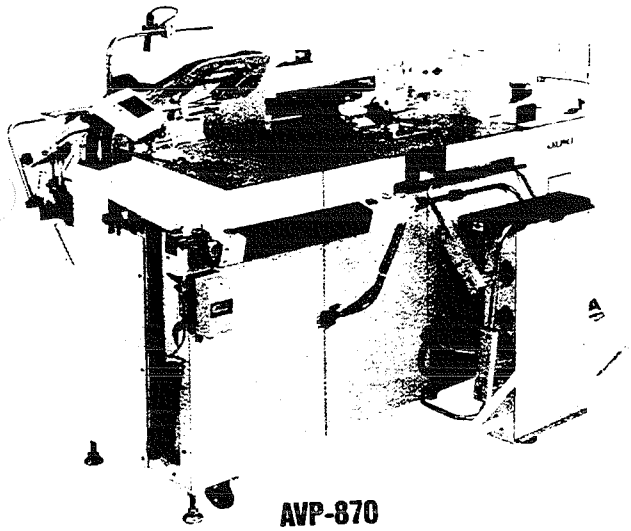
JUKI

(MACHINE HEAD VOLUME)

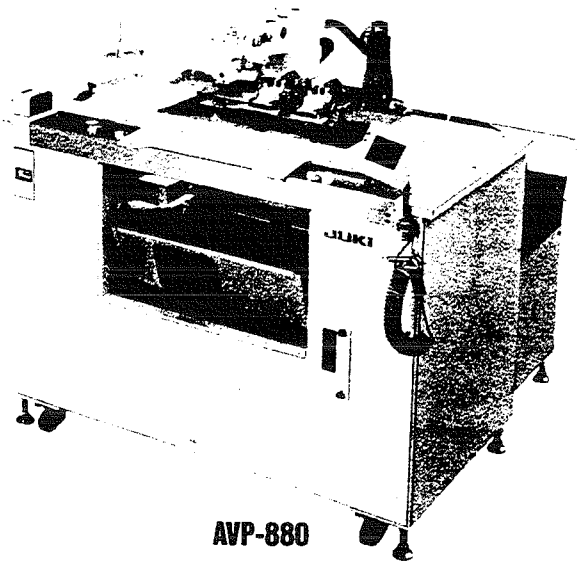
AVP-870 (Automatic pocket setter)

AVP-880 (Automatic collar runstitching machine)

ENGINEER'S MANUAL



AVP-870



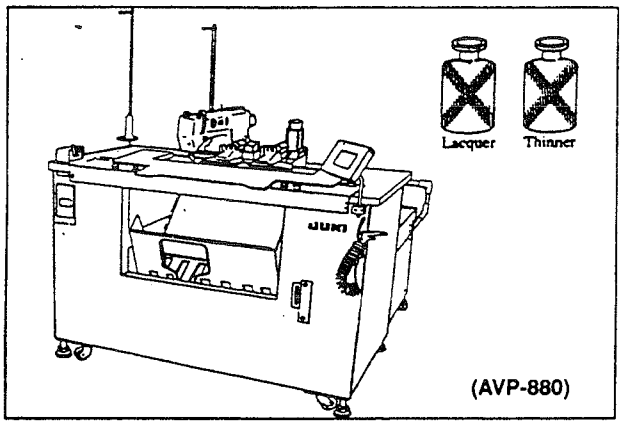
AVP-880

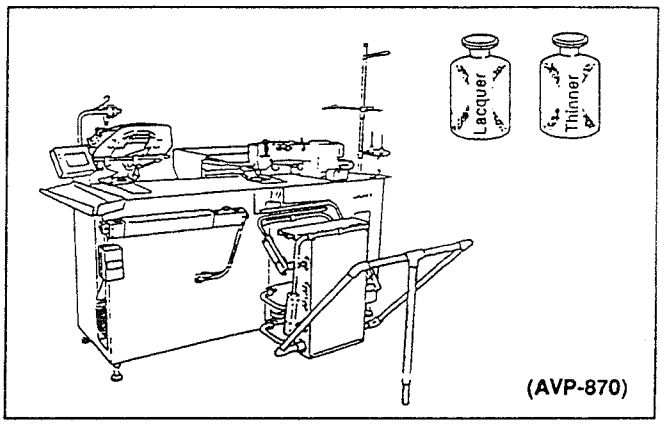
IV-68
1994. 3

PREFACE

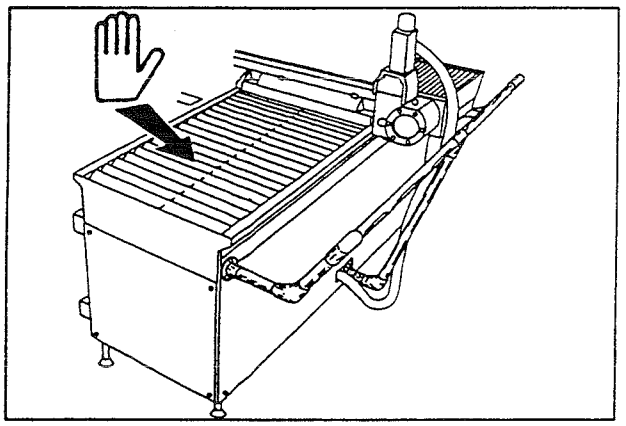
This Engineer's Manual is written for the technical personnel who are responsible for the service and maintenance of the machine. The Instruction Maual for these machines intended for the maintenance personnel and operators at an apparel factory contains operating instructions in detail. And this manual describes "Standard Adjustment", "How to Adjust", "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 this Engineer's Manual when carrying out the maintenance of these machines.

CAUTION



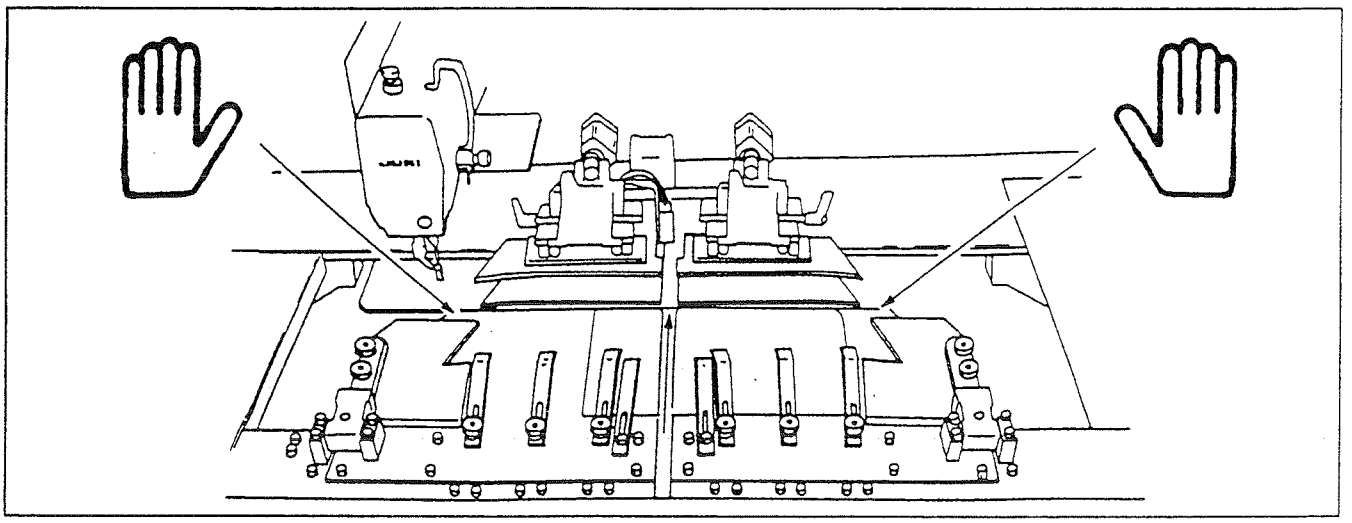


1) Be sure to clean up the surface of this machine using neutral detergent. Never apply lacquer and thinner to your machine.

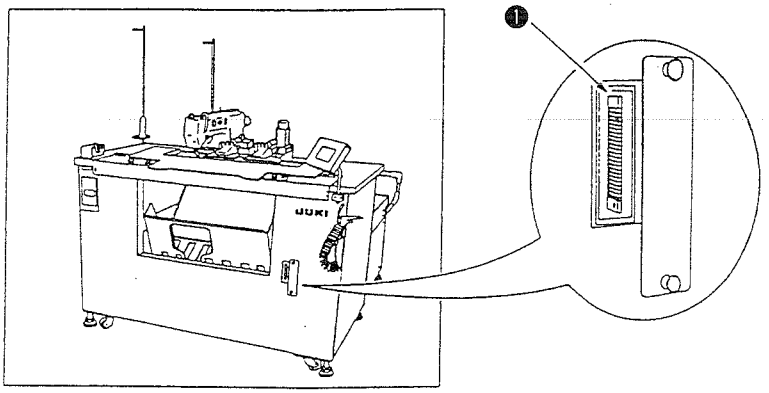


2) Do not go inside the guard pipe on the rear face of the machine while the sewing machine is in operation.
3) Do not put your hands on the top face of the X-Y cover.

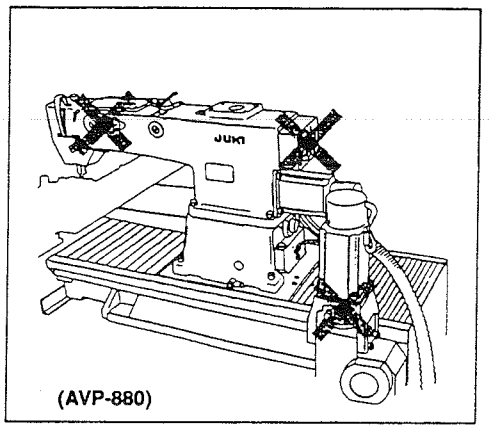
4) Be sure to operate your machine with the pulley cover, eye guard and any other guards mounted on the sewing machine.
5) Do not apply a strong impact to the display of the operation panel.



6) The setting device automatically moves at the time of loading. So, do not put your hands or any other thing near to the setting device. (AVP-880)
7) Do not turn ON the power to the setting machine with any of the operation switches or panel switches pressed.
8) Remove dust accumulated in the hook with an air gun at least once a day. After cleaning up the hook, also remove stains from the chute.

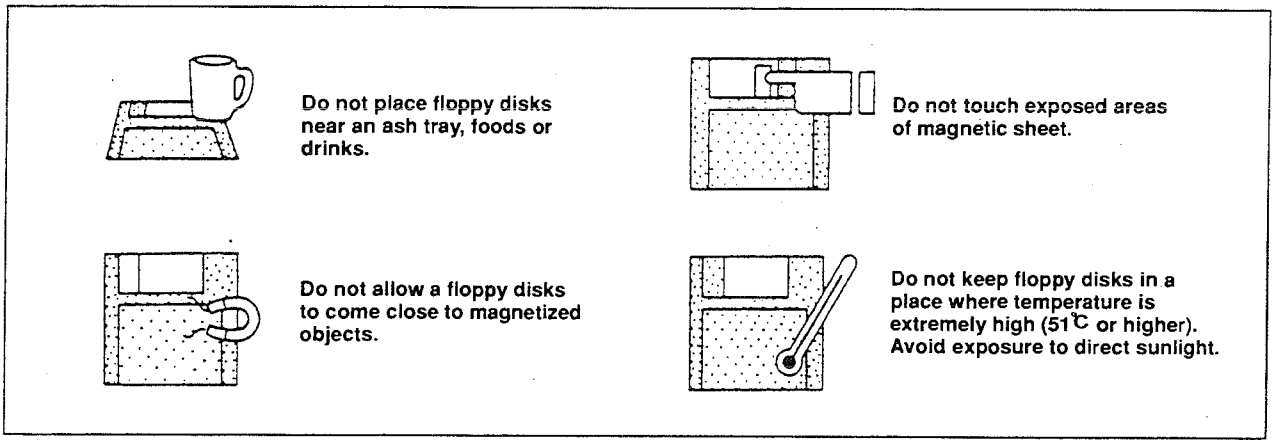


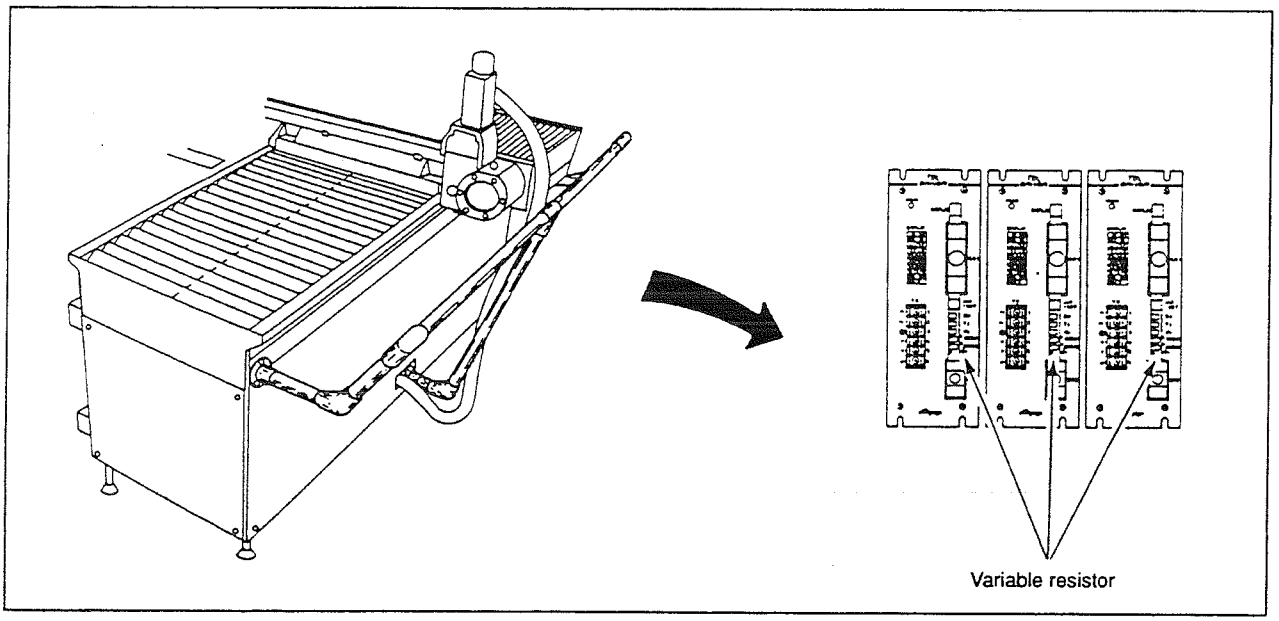
9) Load/unload floppy disk ❶ while the power to the machine is ON. Turning ON/OFF the power to the machine with floppy disk ❶ mounted may destroy data stored in the floppy disk. (AVP-880)



10) During operation, be careful not to allow your or any other person's head or hands to come close to the handwheel, motor coupling and the intermediate presser driving knob. Also, do not place anything near any of these parts while the machine is in operation. Doing so may be dangerous.

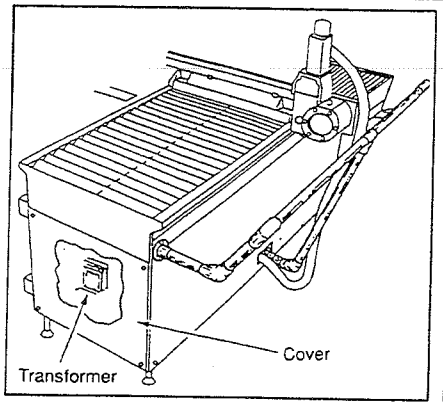
11) Prohibitions with respect to handling of floppy disks.

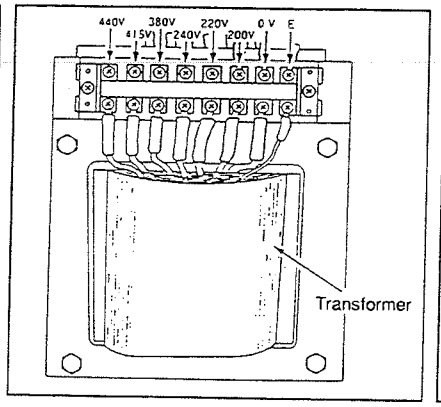


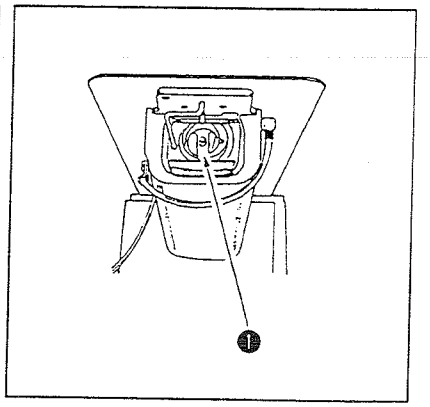


12) Never turn the variable resistors of the servo-driver.

BEFORE OPERATION



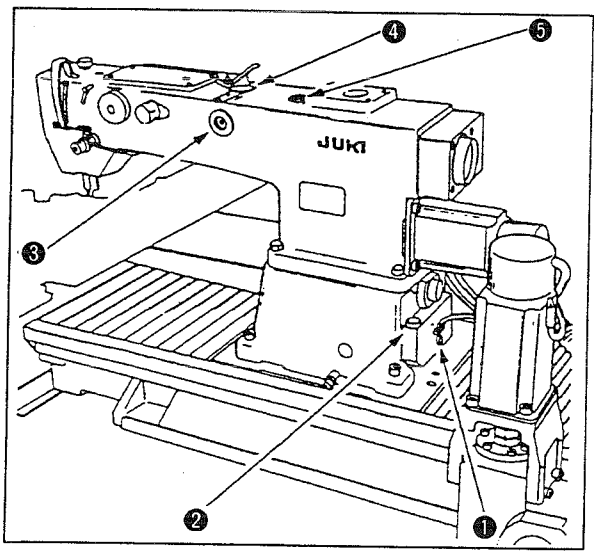




AVP-880, -870

1) Remove the cover, and confirm that the supply voltage is same as that is indicated on the tap of the transformer. Though the machine is a single-phase type, 100V type machine is not available. So be careful.

2) When you first operate your machine after set-up or after an extended period of disuse, apply one drop of oil to shuttle race surface ❶ so that the race surface is blurred with a little amount of oil.

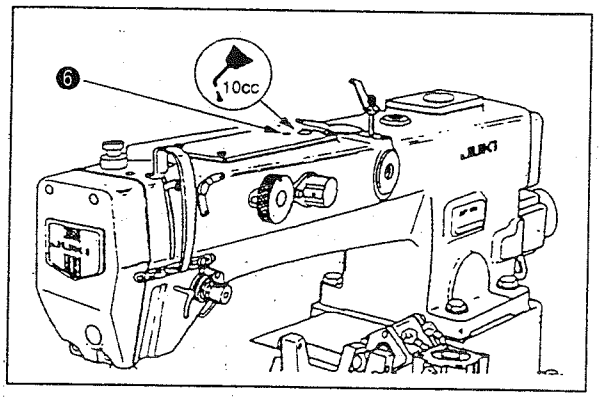


AVP-880

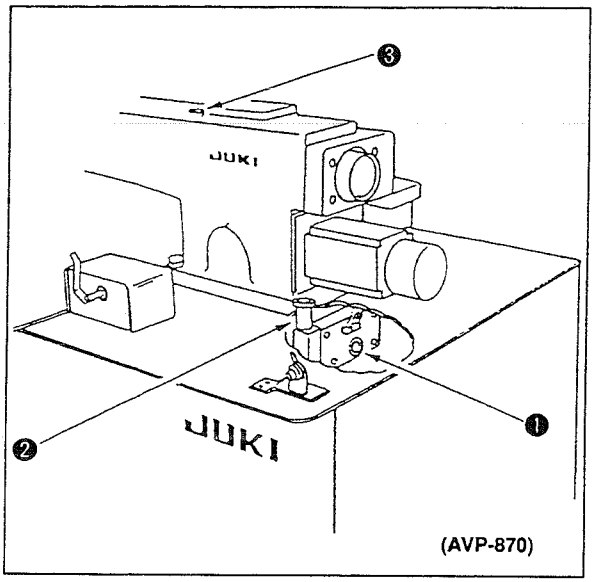
(Caution) 1. Be sure to lubricate the sewing machine before starting running it.

2. Be sure to use JUKI New Defrix Oil No. 1 as the lubrication oil for your sewing machine.

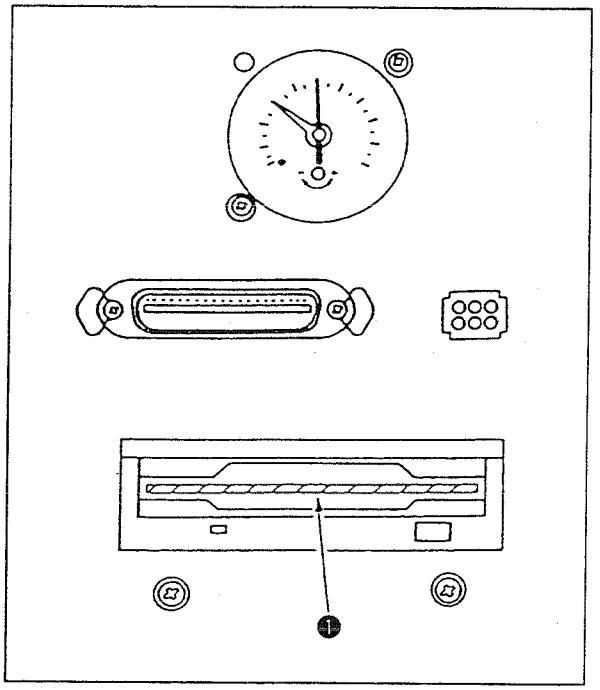
1) Fill oil from lubrication hole ❷ until the center of oil gauge ❶ is reached.
Confirm that the amount of oil reaches the center of oil gauge ❸ . If the amount of oil is not sufficient, add oil from lubrication hole ❹ .
After the machine has been properly filled with oil, oil flow is observed from oil sight window ❺ as long as the machine is normally lubricated. The amount of oil to be flew in the machine does not affect the performance and functions of the sewing machine.



2) When you first operate your machine after set-up or after an extended period of disuse, apply 10 cc of oil to intermediate presser gear drive unit ❻ .



(AVP-870)



AVP-870

(Caution) 1. Be sure to lubricate the sewing machine before starting running it.

2. Be sure to use JUKI New Defrix Oil No. 1 as the lubrication oil for your sewing machine.

1) Fill oil from lubrication hole ❷ until the center of oil gauge ❶ is reached.
After the machine has been properly filled with oil, oil flow is observed from oil sight window ❸ as long as the machine is normally lubricated. The amount of oil to be flew in the machine does not affect the performance and functions of the sewing machine.

2) Use an air pressure of 5 kgf/cm² (0.5MPa).

3) Do not run the sewing machine when the pulley cover or surface cover is removed.

4) Do not apply a strong shock to the operation panel display surface.

5) Load/unload floppy disk ❶ while the power to the machine is ON.
Turning ON/OFF the power to the machine with floppy disk ❶ mounted may destroy data stored in the floppy disk.

CONTENTS

1. SPECIFICATIONS

	AVP-870	AVP-880
Sewing speed	Max. 4,000 s.p.m.	Max. 3,500 s.p.m.
Stitch length	0.1 to 3.4 mm (0.1 mm steps) Data can be changed using PGM-6 (Input programming device)	
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 260 mm	Standard X (lateral) direction Max. 610 mm Y (longitudinal) direction Max. 150 mm Shirring type X (lateral) direction Max. 610 mm Y (longitudinal) direction Max. 120 mm
Needle	DELTA-U1515-01 #9 (standard)	
Needle bar stroke	30.7 mm	
Hook	Full-rotary exclusive hook for AVP-870 (forced lubrication)	Full-rotary exclusive hook for AVP-880 (forced lubrication)
Bobbin case	Bobbin case for full-rotary, standard hook (with an idling prevention spring and spacer)	
Bobbin	Aluminum bobbin (standard) * Exclusive aluminum bobbin (with a hole) when a bobbin thread remaining amount detecting device is used.	
Thread trimming mechanism	Scissors cutting mechanism using a counter knife and a moving knife (grooved cam method)	
Lubrication oil	New Defrix Oil No.1	
Intermediate presser stroke	—	3 mm
Thread	Table 1	Table 2

Needle, thread, hook, needle hole guide and material corresponding table
Table 1 (proper conditions) AVP-870

Thread \ Specifications	Needle (SINGER needle) DELTA U or MR	Needle hole diameter	Hook	Material	Remarks
Tetron #80 Core spun (equivalent to TOYOBO Manado #90 or TEIJIN Spafila #80)	Part No. G1402870000 #9 (Cat, No. 1515-01-#9)	ø1.2 G2422870000	G1814870000 G181487000A	T/C broadcloth Materials for men's shirts	—
Spun #80	#11 { Part No. MDB1AAB1100 (Cat. No. 1515-01-#11)	ø1.4 G242287000A	G1814870A0A	T/C broadcloth Materials for casual wear	When spun thread #80 is used with a #9 needle, thread tension cannot be adjusted with ease.
Spun #60	#11 MR-2.5 { Part No. MDB1ABB2500 (Cat. No. 1515-01-MR2.5)	ø1.4 (MR-2.5: ø1.6)	G1814870A0A	Dungaree type materials	—
Spun #50 Core spun #50	#14 MR-2.5 { Part No. MDB1AAB1400 (Cat. No. 1515-01-#14)	ø1.6 G242287000B	G1814870A0A	Cotton gabardine (for work uniforms)	—
(Spun #80)	MR-2.0 { Part No. MDB1ABB2000 (Cat. No. 1515-01-MR2.0)	ø1.4	G1814870A0A	Knit type materials (for polo-necked shirts)	MR needle is recommended for sewing knits.

Hook, needle and needle hole guide corresponding table

Needle hole guide \ Specification	Needle	Hook
ø1.2	#9	G181487000A
ø1.4	#11, MR-2.0	G1814870A0A
ø1.6	#14, MR-2.5	G1814870A0A

Table 2 (AVP-880) Thread and needle corresponding table
(Proper conditions)

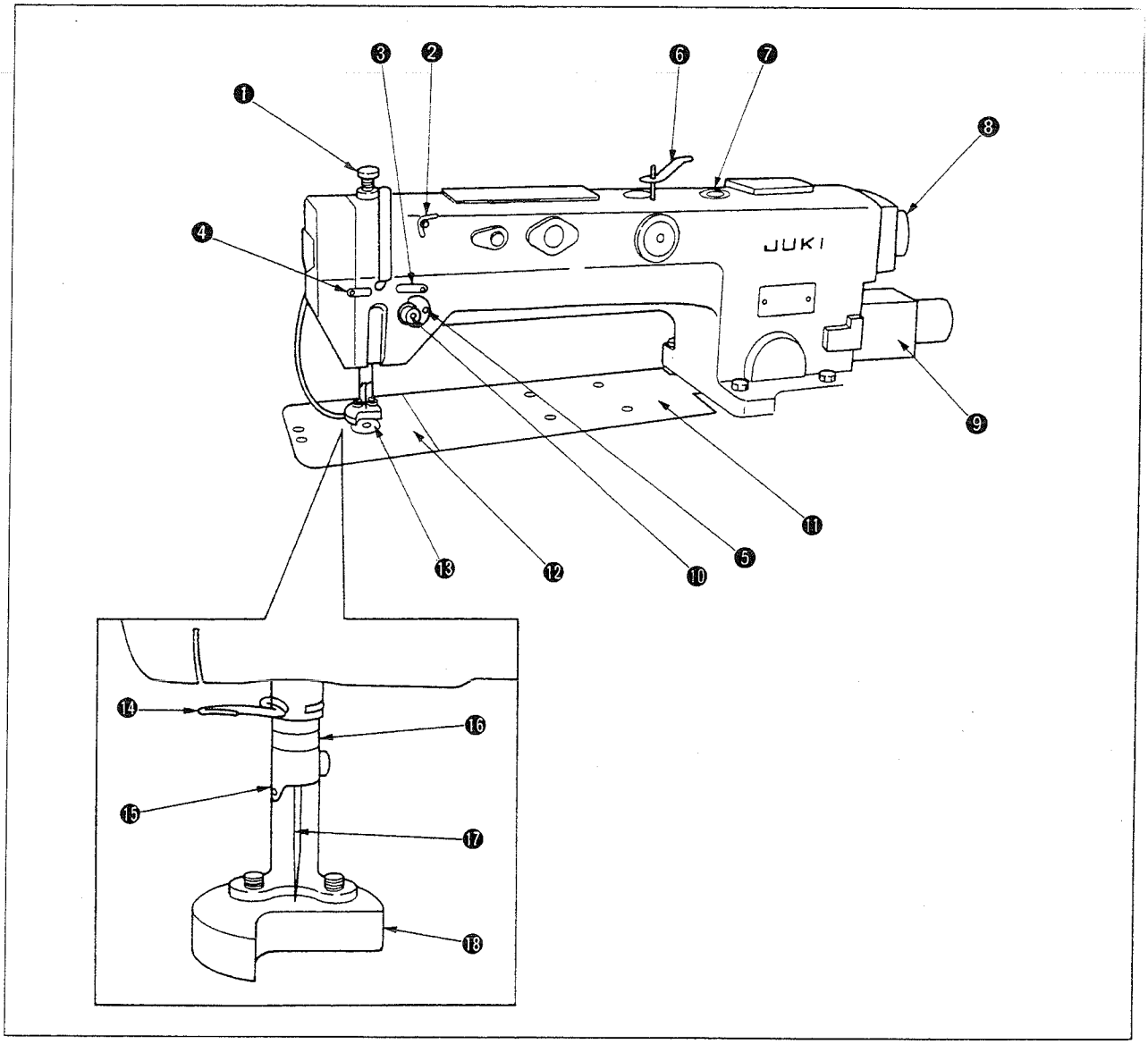
Needle thread	Bobbin thread	Needle (SINGER Delta U)	Needle hole guide	Hook
① Equivalent to TOYOBO Manado #90	Equivalent to tetron #80 or TOYOBO Manado #90	#9 to #11 (Refer to Table 1 for the part No.)	#9 → ø1.2 to ø1.4 #11 → ø1.4 Standard	G1814-880-00A
② Equivalent to TEIJIN Spafila #80	Tetron #80	#9 to #11 (Refer to Table 1 for the part No.)	↑	G181488000A
③ Spun #80	Tetron #80	#11 (Refer to Table 1 for the part No.)	ø1.4 G242288000A	G181488000A

(Note) 1. Under conditions ① and ②, uniform thread tension will be provided. In addition, the adjustable range of thread tension is widened, thereby facilitating the adjustment procedure.

2. We recommend to use a #11 needle if the interlining is resilient.

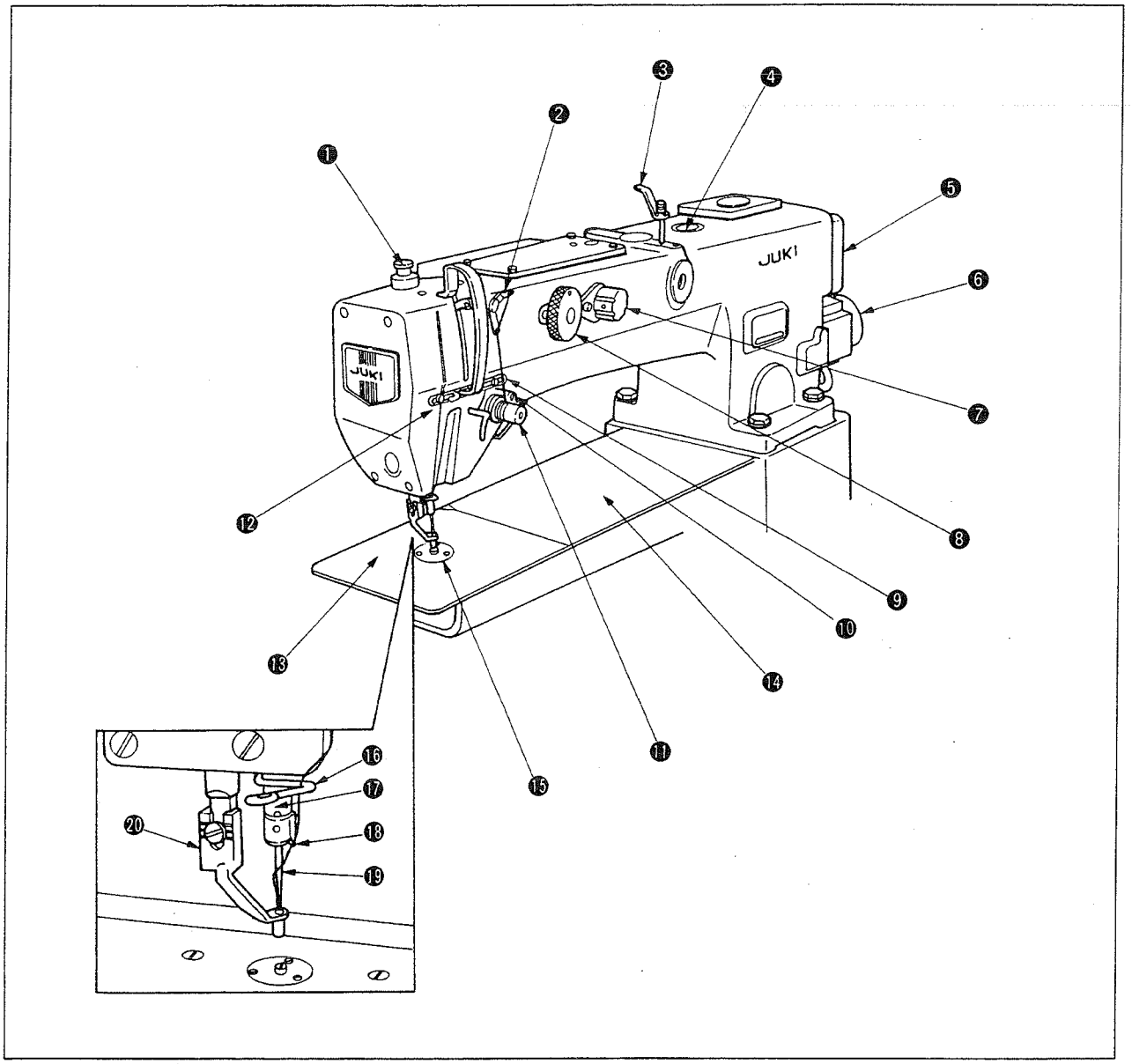
2. CONFIGURATION

(1) AVP-870 (Automatic pocket setter)



❶ Presser spring regulator
❷ Tension nut No. 1 asm.
❸ Arm thread guide A
❹ Arm thread guide B
❺ Thread breakage detecting plate
❻ Thread guide rod asm.
❼ Oil sight window
❽ Handwheel
❾ Main shaft servomotor asm.
❿ Tension controller No. 2 asm.
⓫ Throat plate B
⓬ Throat plate A
⓭ Needle hole guide
⓮ Needle bar thread guide
⓯ Needle bar thread eyelet
⓰ Needle bar
⓱ Needle
⓲ Work clamp plunger

(2) AVP-880 (Automatic collar runstitching machine)



❶ Presser spring regulator
❷ Thread guide No. 1
❸ Thread guide rod asm.
❹ Oil sight window
❺ Handwheel
❻ Main shaft servo motor asm.
❼ Intermediate presser driving knob
❽ Intermediate presser adjusting knob
❾ Arm thread guide A
❿ Thread breakage detecting plate
⓫ Tension controller asm.
⓬ Arm thread guide B
⓭ Throat plate A
⓮ Throat plate B
⓯ Throat plate guide
⓰ Needle bar thread guide
⓱ Needle bar
⓲ Needle bar thread eyelet
⓳ Needle
⓴ Intermediate presser

3. TRIAL OPERATION

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

1) Normal operation
   AVP-870 ..... Folding, carrying and stacking operations are included.
   AVP-880 ..... Material setting, loading 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-870/-880 for how to operate the sewing machine.
3) Sewing machine drive
   Only the machine head can be driven at a sewing speed within the range of 200 to 3,500 s.p.m.
   This function is included in the "sewing machine adjusting" mode on the operation panel.
   Refer to the Instruction Manual for the AVP-870/-880 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. Refer to the "Engineer's Manual for the
   Devices" for how to operate the machine under the machine head independent operation mode.

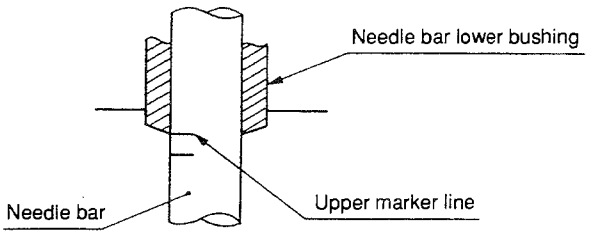
Select one of the aforementioned four different driving methods in accordance with the application of the sewing machine and drive the machine head to check its performance.

4. ADJUSTMENTS

STANDARD ADJUSTMENT

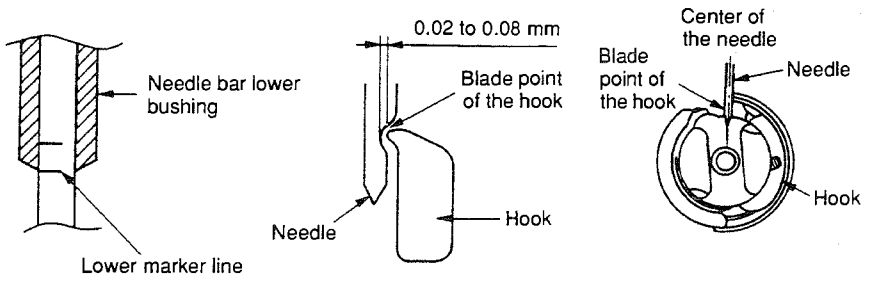
(1) Adjustment of the needle bar height

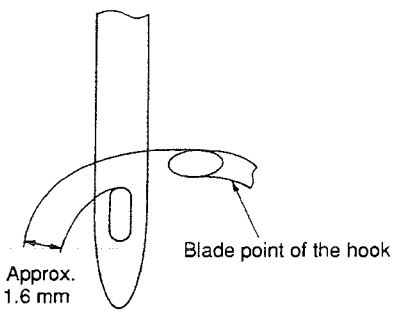
Adjust the height of the needle bar so that the upper marker line engraved on the needle bar aligns with the bottom end of the needle bar lower bushing when the needle bar is in the lowest dead point of its stroke.

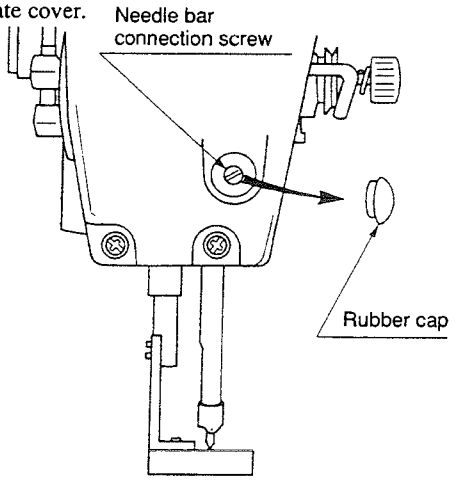
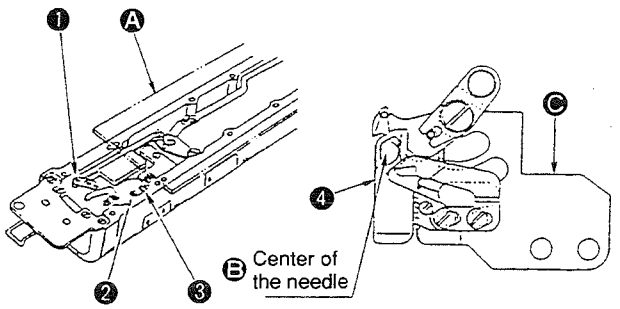
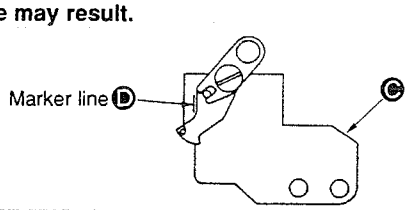


(2) Adjustment of the needle-to-hook relationship

Adjust the needle-to-hook relationship, when the lower marker line engraved on the needle bar is aligned with the bottom end of the needle bar lower bushing, 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. At this time, the top end of the needle eyelet is spaced 1.6 mm from the top end of the blade point of the hook.

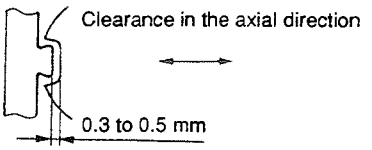


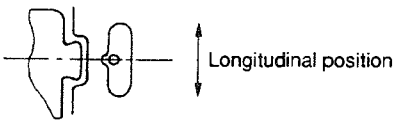


HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Turn the handwheel by hand to bring the needle bar down to the lowest dead point. 2) Remove the rubber cap from the face plate cover. 3) Loosen the needle bar connection screw and properly adjust the height of the needle bar. 4) Tighten the needle bar connection screw and attach the rubber cap to the face plate cover. 	○ Stitch skipping or thread breakage will result.
1) Remove the throat plate (the front side) from the bed surface. At this time, throat plate Ⓐ should be held attached to the bed surface. 2) Remove screws ❶, ❷ and ❸ from the bed surface in the written order. Then, remove knife mounting base Ⓒ from the bed surface. 3) Loosen three screws which are used to fix the hook. Properly adjust the relation between the needle and the hook, then tighten the screws. 4) Attach knife mounting base Ⓒ to the bed surface. At this time, adjust so that center Ⓑ of the needle is brought almost to the center of the window of knife thread guide ❹. Then, tighten screws ❷ and ❸. Lastly, tighten screw ❶.  **(Caution) In step 4), confirm that marker line Ⓓ engraved on knife mounting base Ⓒ 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. (Tetron thread) 4) If the hook timing is extremely advanced or retarded, stitch skipping or thread breakage will result.

(3) Position of the bobbin case opening lever

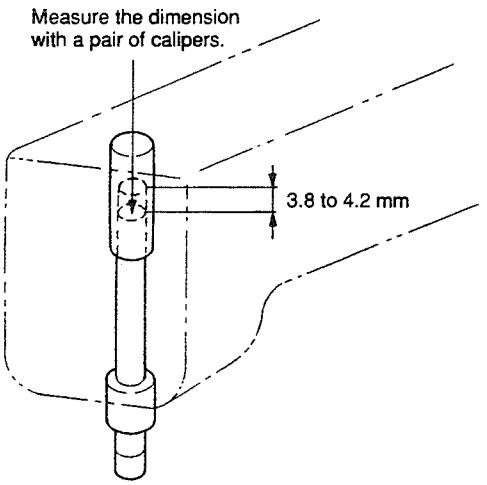
- Adjust so that a clearance of 0.3 to 0.8 mm clearance is provided, in axial direction, between the protruding section of the bobbin case opening lever and the slit on the inner hook.
- Adjust the longitudinal position of the bobbin case opening lever so that the needle enters almost the center of the bobbin case opening lever.

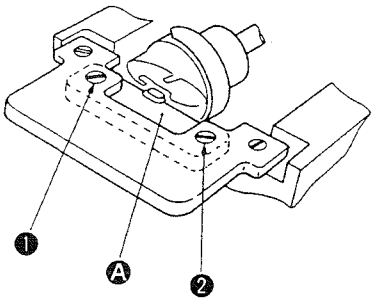
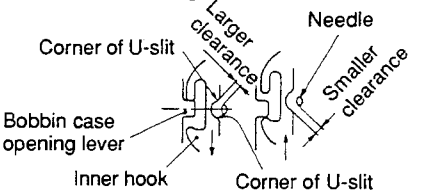
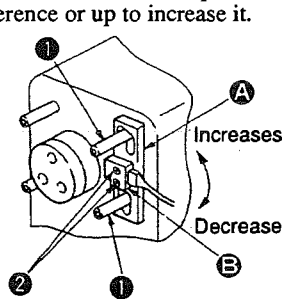
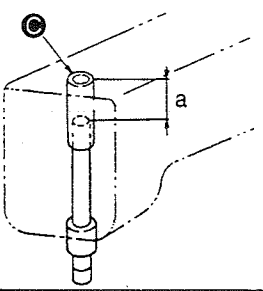
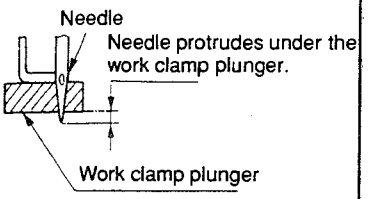




(4) Stop position of the main shaft

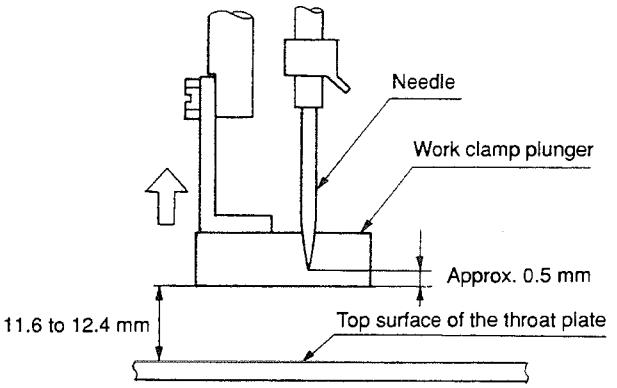
When the main power to the machine is turned ON or the sewing machine stops with its needle up after selecting the sewing machine adjusting mode by operation mode changing function, the needle bar should stop at the position that is 3.8 to 4.2 mm lower than the highest dead point of the needle bar.

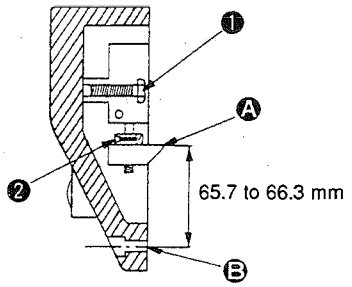
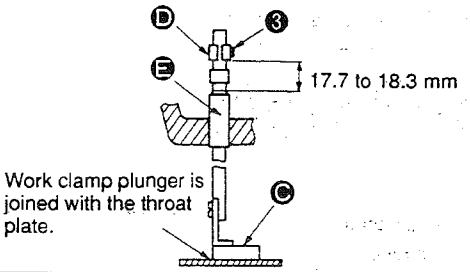


HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Remove the front side of the throat plate from the bed surface. 2) Loosen screws ❶ and ❷ and adjust the position of bobbin case opening lever Ⓐ by moving it back or forth and to the right or left.  	1) If the clearance between the bobbin case opening lever and the inner hook is smaller than the specified value, isolated idling loops will be produced. 2) For the AVP-870, if the bobbin case opening lever is improperly positioned, the needle will interfere with the corner of the U-slit on the inner hook or the thread will break. Adjust so that the clearance between the U-slit on the inner hook and the needle, when moving the inner hook toward you, is larger than that provided when moving the inner hook away from you. (See the figure shown below.)  The aforementioned adjustment is necessary to prevent the needle, inner hook and the blade point of the hook from interfering with one another.
1) Turn ON the main power to the machine. Press the [Mode Select] key on the operation panel. Then press the [+] key and [−] key as [+], [+], [−], [+], [+] and [+] following the written order. Now, press the [13] key to select the sewing machine adjusting mode. **(Caution) As long as the [Operation] mode is shown on the operation panel, operation mode selection cannot be performed. In this case, press the [Run] key to make the machine enter the [Standby] state.** Head adjustment Free Trimming Upper Escape Mch. On 0200 + − 2) Remove the pulley cover to allow the main shaft stop sensor to be adjusted. 3) Press the [Free] key to enable the main shaft to be turned by hand. Turn the handwheel to bring the needle bar up to the highest dead point. 4) When the needle bar rests in the highest dead point, insert a pair of calipers or the like into section Ⓒ of the needle bar upper bushing and measure dimension a provided between the top face of the needle bar and the end face of the needle bar upper bushing. 5) Press the [Upper] key and re-measure the dimension of section Ⓒ to confirm that a difference of 3.8 to 4.2 mm is provided between the value measured in this step and that measured in step 4). 6) If the aforementioned difference is not provided between the values measured in step 4) and 5), loosen screws ❷ in stud ❶ and adjust the stop position of the main shaft by moving the sensor installing plate and the sensor in the direction of rotation of the handwheel. Move the main shaft stop sensor down to decrease the above-stated difference or up to increase it.   	1) If the difference between the dimension Ⓒ measured in step 4) and that measured in step 5) is larger than 4 mm, the top end of the needle will appear under the lower end face of the plunger when the work clamp plunger is raised. In this case, the work clamp of the conveyor unit will interfere with the needle tip, resulting in needle breakage. (For the AVP-870)  2) If the aforementioned difference is smaller than 4 mm, the main shaft will stop before the thread take-up lever reaches the highest dead point. As a result, the needle thread may slip off the needle eyelet at the start of sewing.

(5) Lifting amount of the work clamp plunger (only for the AVP-870)

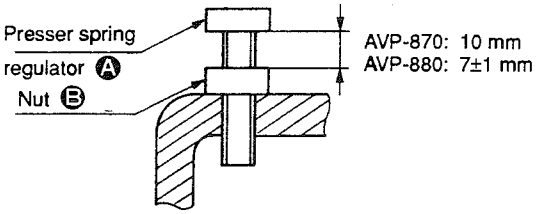
Adjust so that the work clamp plunger rises 11.6 to 12.4 mm above the top surface of the throat plate when the power to the machine is turned ON and that the bottom face of the work clamp plunger is spaced approximately 0.5 mm from the tip of the needle.



HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Turn ON the main power to the machine. Press the [Mode Select] key on the operation panel. Then press the [+] key and [−] key as [+], [+], [−], [+], [+] and [+] following the written order. Now, press the [13] key to select the sewing machine adjusting mode. **(Caution) As long as the [Run] is indicated on the operation panel, operation mode selection cannot be performed. In this case, press the [Run] key to make the machine enter the [Standby] state.** Head adjustment Free Trimming Upper Escape Mch. On 0200 + − 2) Press the [Escape] key to move the work clamp away from the work clamp plunger of the conveyor. 3) Confirm that the bottom of the work clamp plunger is spaced 11.6 to 12.4 mm from the top surface of the throat plate and approximately 0.5 mm from the tip of the needle. 4) If the work clamp plunger is not positioned as described in the aforementioned step 3), press the [Free] key to lower the work clamp plunger. 5) Remove the face plate. Press the [Upper] key to retract the air cylinder. At this time, adjust screws ❶ and ❷ so that end face Ⓐ of the plunger is spaced 65.7 to 66.3 mm from center Ⓑ of the tapped screw in the face plate cover.  6) Confirm first that work clamp plunger Ⓒ is joined with the throat plate by the spring pressure given by the intermediate presser. Then, adjust screw ❸ so that the bottom end of presser bar position bracket Ⓓ is spaced 17.7 to 18.3 mm from the top end of the presser bar lower bracket E. At this time, slot on presser bar position bracket Ⓓ should be faced toward you.  7) Press the [Free] key to extrude the air cylinder. Then, attach the face plate cover to the machine arm. 8) Press the [Upper] key and check the adjustment value of step 3).	1) If the work clamp plunger fails to go up sufficiently, the work clamp of the conveyor will interfere with the work clamp plunger. 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. 3) If the face plate cover is positioned outside the specified range of dimension 65.7 to 66.3 mm, the work clamp plunger will fail to go up to the specified height with accuracy. 4) If the presser bar position bracket is attached to a position where the distance between the presser bar position bracket and the needle bar lower bushing exceeds 18.3 mm, the presser bar position bracket may interfere with the needle bar crank rod while the sewing machine is in operation.

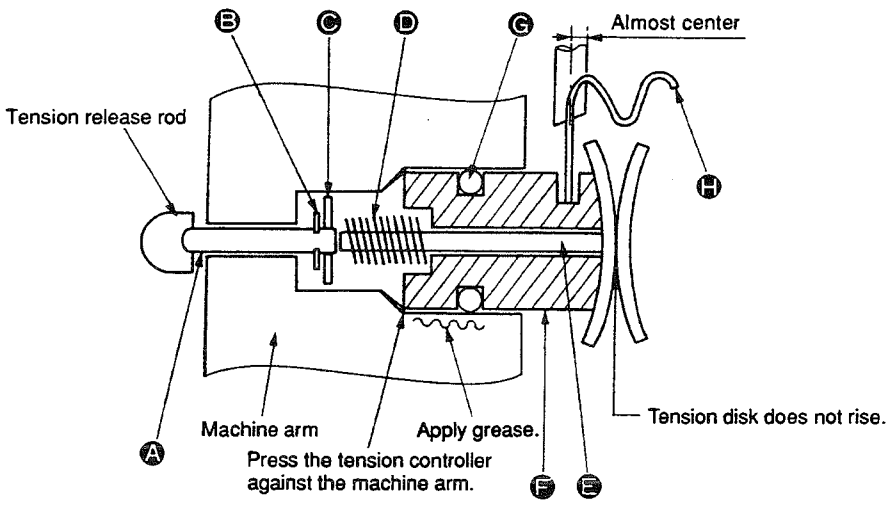
(6) Adjusting the pressure of presser spring

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



(7) Assembling the tension controller No. 2

Attach E ring Ⓑ to tension release auxiliary pin Ⓐ. Then attach washer Ⓒ to the pin. Then put tension release pin Ⓔ in tension controller No. 2 Ⓕ. Fit spring Ⓓ on the tension release pin. Apply grease onto the outer periphery of the tension controller No. 2 and the inner periphery of the machine arm to protect O ring Ⓖ. 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 Ⓗ is positioned almost the center of the thread breakage detecting plate.

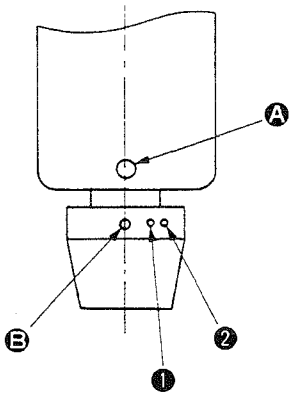


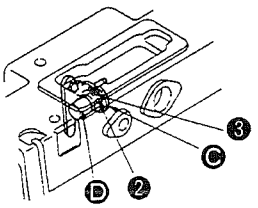
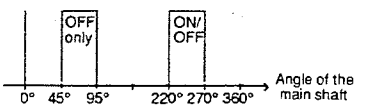
HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
Loosen nut Ⓑ and properly adjust the pressure of the presser spring by turning presser spring regulator Ⓐ.	If the pressure of the presser spring is insufficient, abnormal noise will be produced while the sewing machine is in operation. (AVP-880)
Same as the description given in "Standard adjustment."	1) If E ring Ⓑ and washer Ⓒ are installed in the wrong order, the tension disk will not rise. 2) If the end face of tension disk Ⓕ 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 decreased. 3) If grease is not applied on to the O ring and the inner periphery of the machine arm when inserting tension controller Ⓕ, the O ring will be damaged resulting in oil leakage.

(8) Adjusting the timing of 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 Ⓐ engraved on the machine arm is aligned with first marker dot Ⓑ 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 Ⓑ rests within the diameter of marker dot Ⓐ on the machine arm.

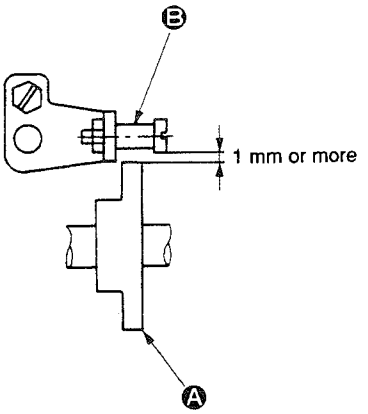
(Caution) Marker dot engraved on the handwheel is used to adjust the thread trimming cam timing ❶, upper stop position of the main shaft ❷ and the tension release cam timing Ⓑ.

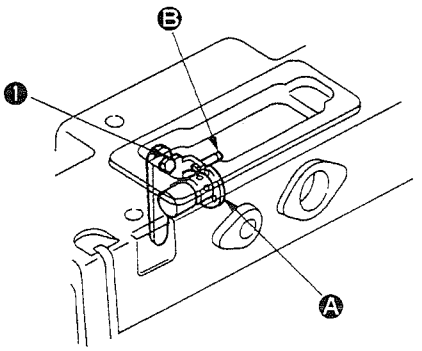


HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Turn ON the main power to the machine. Press the [Mode Select] key on the operation panel. Then press the [+] key and [−] key as [+], [+], [−], [+], [+], [+], [+], [+] and [+] following the written order. Now, press the [21] key to select the thread trimmer adjusting mode. Trimming adj. Cylinder On **(Caution 1) The DIP switch should be changed over to the maintenance mode II.** **(Caution 2) As long as the [Run] is indicated on the operation panel, operation mode selection cannot be performed. In this case, press the [Run] key to make the [Standby] appear on the screen.** 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 [OFF] 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 Ⓐ engraved on the machine arm is aligned with marker dot Ⓑ engraved on the handwheel. 5) Turn the main shaft further by approximately 60° from the state described in step 4) in which the needle bar is in the highest dead point. Now, press the [OFF] key to release the air cylinder. 6) If the timing of the thread tension release cam is not correct, loosens screws ❷ and ❸ in thread tension release cam Ⓒ and adjust the timing of the cam.  **(Caution 3) If the thread tension release cam is moved, carefully check a thrust play in main shaft lubricating unit Ⓓ to which the thread tension release cam applies load. Adjust the play to approximately 0 to 0.03 mm.** **(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 thread tension releasing timing is retarded, the needle thread is held tensed when the moving knife moves. In this case, the needle thread will spring off after thread trimming and the length of thread remaining after thread trimming will be decreased. As a result, thread knots may not be made properly at the start of sewing or the needle thread may come off the needle eyelet. 3) If the thrust play in the main shaft lubricating unit is excessively decreased when the tension release cam is moved, the main shaft lubricating unit will be seized up. If the thrust play is larger than the specified value, abnormal noise will be produced.

(9) Adjusting the clearance provided between the thread tension release cam and the thread tension release 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.



HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Remove machine arm cover Ⓐ . 2) Loosen screw ❶ in the tension releasing cylinder and adjust the clearance provided between thread tension release cam Ⓐ and thread tension release cam roller Ⓑ 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 thread tension release cam after performing the aforementioned 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, 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.

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

Turn ON the main power to the machine. Press the [Mode Select] key on the operation panel. Then press the [+] key and [−] key as [+], [+], [−], [+], [+], [+], [+], [+] and [+] following the written order to select [19]. Then the screen shown in the figure below will appear on the display. Now, adjust so that the main shaft turns by almost one revolution, when pressing the [Z-ph] of the main shaft motor on the display, and stops when the highest dead point of the needle bar is reached.

(Caution 1) It is necessary to change over the DIP switch to the maintenance mode II. Set the SW1-2 on the CPU circuit board to the ON position.

(Caution 2) If the operation panel indicates [Run], change the operation mode to [Standby] to select [19].

★ Screen on the AVP-870

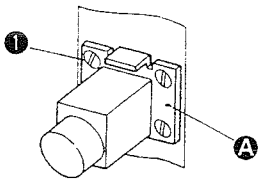
19. Motor Z-phase lock

Motor Z-ph lock	
M-Motor	Z-ph
X-Motor	Z-ph
Y-Motor	Z-ph

★ Screen on the AVP-880

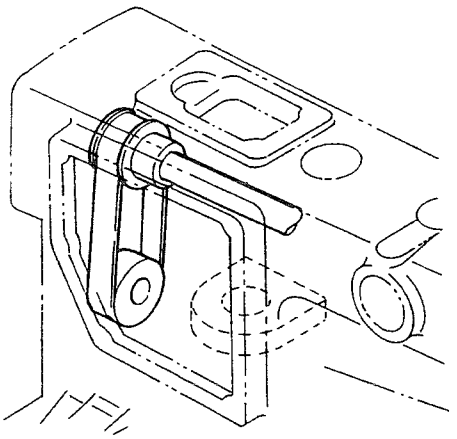
19. Adjustment of highest dead point

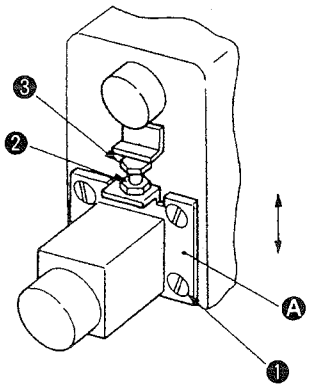
H. Point Adj.	
M-Motor	Z-ph

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Loosen four screws ❶ in the servomotor installing plate Ⓐ. 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 shown 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 once, then return it ON. 7) Press the [Mode Select] key. Press the [+] key and [−] key as [+], [+], [−], [+], [+], [+], [+], [+] and [+] following the written order. Then, press [19] to select the motor Z-phase lock mode. 8) Press the [Z-ph] key of the main shaft motor. 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. Head adjustment Free Trimming Upper Escape Mch. On 0200 + −	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.

(11) 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.)



HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Remove machine arm cover Ⓒ to allow the timing belt of the main shaft servomotor to appear. 2) Loosen four screws ❶ in servomotor installing plate Ⓐ.  3) Loosen nut ❷, and adjust the tension of the timing belt by turning the bolt ❸. Turn bolt ❸ 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, tighten nut ❷ and screws ❶. Tightening screws ❶ will slightly vary the belt tension. So, check the belt tension after tightening them. **(Caution 1) Tighten four screws ❶ with a uniform load of approximately 50 kgfcm.** **(Caution 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.**	1) If the belt tension is too low, the slackened side of the belt will vibrate and produce noise. 2) If the belt tension is too high, the excessively tensed side of the belt will vibrate with keen noise.

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

1) Turn ON the main power to the machine. Press the [Mode Select] key. Press the [+] key and [−] key as [+], [+], [−], [+], [+], [+], [+], [+] and [+] following the written order. Then, press [20] to select the machine head independent operation mode. (Fig. 1)

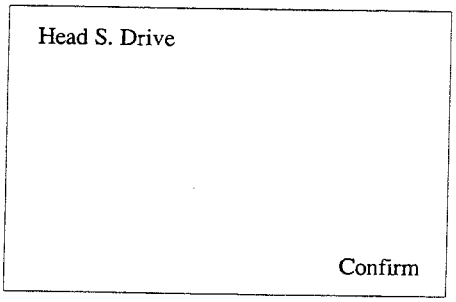


Fig. 1

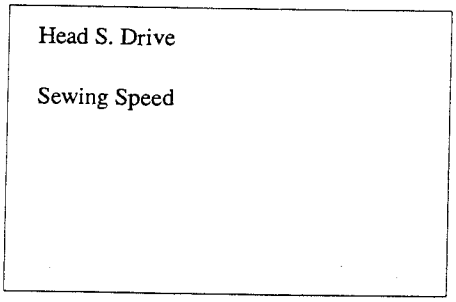


Fig. 2

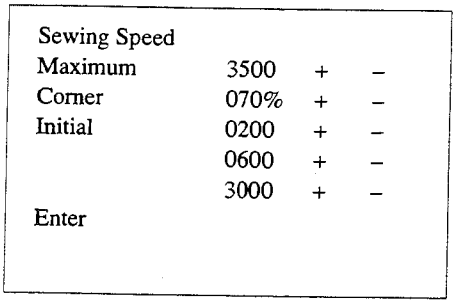


Fig. 3

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

(Caution 2) **As long as the [Run] is indicated on the operation panel, operation mode selection cannot be performed. In this case, press the [Run] key to make the machine enter the [Standby] state.**

2) Press the [Confirm] key to make the machine enter the run state. (Fig. 2)

3) Press the [Sewing speed] key. Then specify data as shown in Fig. 3. Press the [Enter] key so that the indication shown in Fig. 2 appear 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 set release switch (yellow) located on the cloth receiving board to start the sewing machine.

5) After the sewing machine 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.

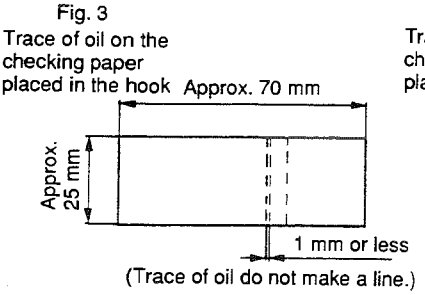


Fig. 4

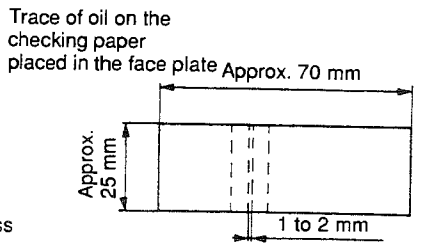


Fig. 5

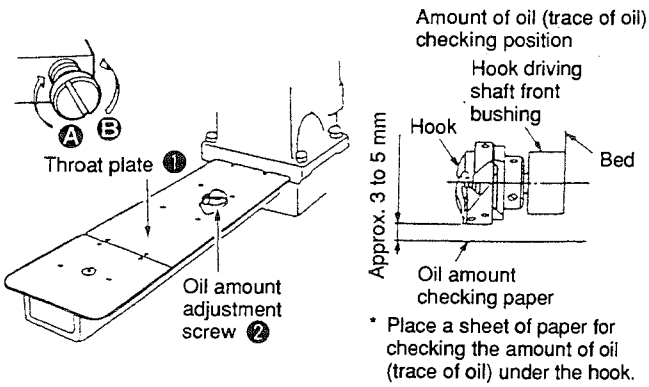
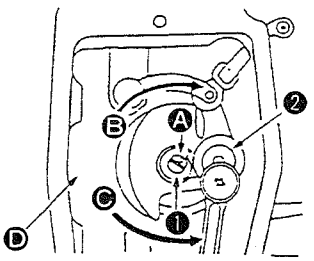
Figures 4 and 5 show the appropriate amount of oil in the hook and face plate.

(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.)**

(Caution 4) **Confirm that the amount of oil in the oil pan is adequate.**

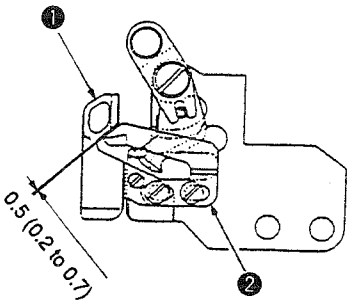
(Caution 5) **Adjusting the amount of oil under the machine head independent operation mode will allow you to accurately adjust it in accordance with sewing patterns to be used by a customer.**

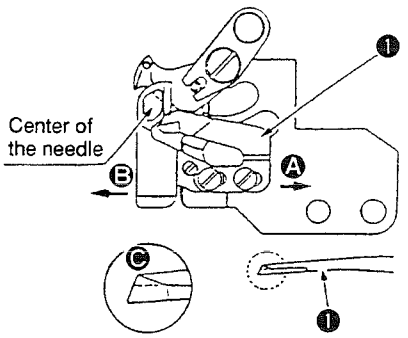
(Caution 6) **To run the machine head, remove the bobbin and the needle thread in advance.**

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Adjusting the amount of oil in the hook  * Place a sheet of paper for checking the amount of oil (trace of oil) under the hook. ① Remove throat plate ❶. Turn oil amount adjustment screw ❷ that is mounted on the hook lubricating manifold in the "+" direction (direction Ⓐ) to increase the amount of oil (trace of oil), or in the "–" direction (direction Ⓑ) to decrease it. ② After the oil amount is adjusted using oil amount adjustment screw ❷, 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.**	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) 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 ❷ by turning oil amount adjusting pin ❶. ② The oil amount is minimized by turning the adjusting pin in direction Ⓑ until marker dot Ⓐ engraved on the pin moves from the position in the figure and reaches near needle bar crank ❷. ③ The oil amount is maximized by turning the adjusting pin in direction Ⓒ 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 ❶, 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.**	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, the sewing material will be stained with oil.

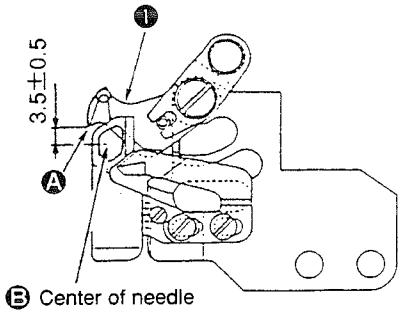
(13) Positioning the counter knife and the knife thread guide

1) Knife thread guide ❶ should be attached so that the needle enters about the center of the window section.
2) Attach counter knife ❷ so that a clearance of 0.2 to 0.7 mm is provided between the top end of the knife and knife thread guide ❶ that has been attached as in aforementioned step 1).



HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) If the mounting position of the counter knife is moved to the right (direction Ⓐ) 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 Ⓑ), 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.**  	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.

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



1) Turn ON the main power to the machine. Press the [Mode Select] key. Press the [+] key and [−] key as [+], [+], [−], [+], [+], [+], [+], [+] and [+] following the written order. Then, press [21] 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.

(Caution 2) As long as the [Run] is indicated on the operation panel, operation mode selection cannot be performed. In this case, press the [Run] key to make the machine enter the [Standby] state.

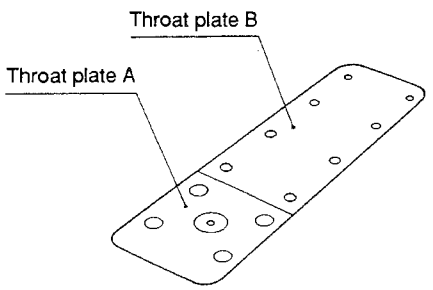
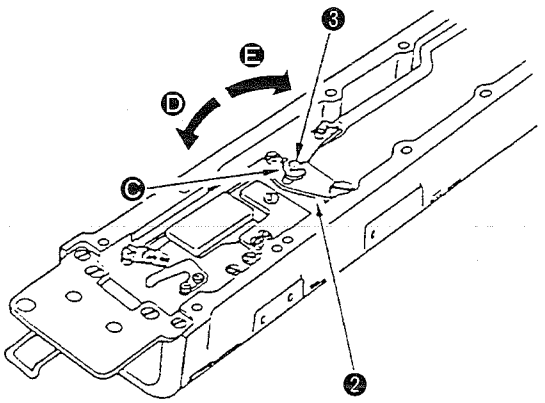
(Caution 3) Remove the needle before performing the adjusting procedure in order to prevent the needle from interfering with the moving knife because of maloperation.

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 highest position of its stroke.
3) Press the [ON] key on the operation panel, and the thread trimming cylinder will be turned ON and the indication shown below will appear on the display.

Trimming Adj. Cylinder On	[OFF] key	Trimming Adj. Cylinder On

4) In the state described in aforementioned step 3), turn the handwheel in the normal direction of rotation, and moving knife ❶ will actuate.
When the moving knife reaches the end of stroke (backward travel end), top end Ⓐ of the moving knife should be spaced 3.5±0.5 mm from center Ⓑ of the needle.
5) After the specified distance stated above 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 [OFF] key on the operation panel, and the thread trimming cylinder will be turned OFF.

(Caution 4) The driving procedure for the thread trimming cylinder on the operation panel is same as the procedure described in "(8) Adjusting the timing of thread tension release cam."

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Remove throat plates A and B.  2) To adjust the stroke of the moving knife, loosen nut Ⓒ of moving knife link C ❷, and change the position of moving knife link pin A ❸ until the proper stroke of the moving knife is obtained. 3) When moving knife link pin A ❸ is moved to the left (in direction Ⓓ) in the figure, the stroke of the moving knife will be increased. When the link pin A is moved to the right (in direction Ⓔ), it will be decreased.  	1) If the stroke of the moving knife is smaller than the specified value, the knife will fail 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.

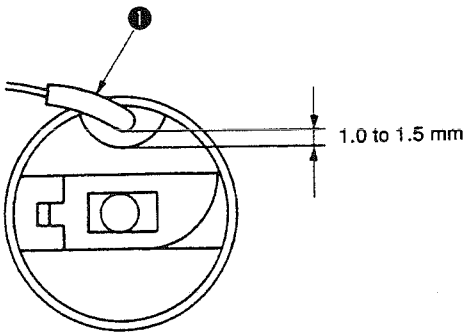
(15) Adjusting the thread take-up finger

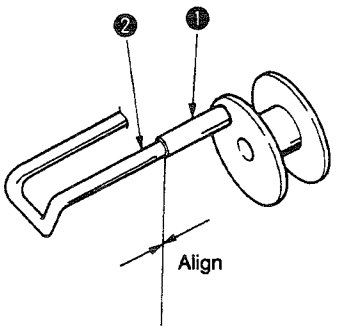
1) Turn ON the main power to the machine. Press the [Mode Select] key. Press the [+] key and [−] key as [+], [+], [−], [+], [+], [+], [+], [+] and [+] following the written order. Then, press [21] to select the thread trimming adjusting mode.

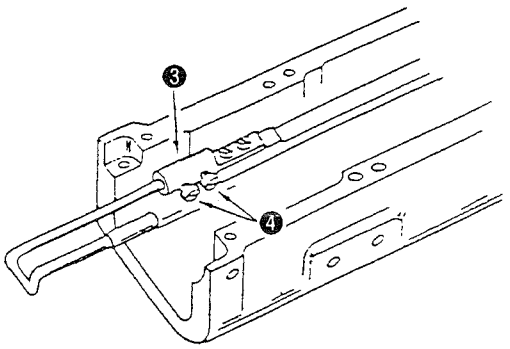
(Caution 1) To select the aforementioned mode, the related DIP switch should be changed over to the maintenance mode II.

(Caution 2) As long as the [Run] is indicated on the operation panel, operation mode selection cannot be performed. In this case, press the [Run] key to make the machine enter the [Standby] state.

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 [ON] 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 ❶ is spaced 1 to 1.5 mm from the notch at the top of the bobbin case and that the marker line engraved on thread take-up finger ❷ is aligned with the end face of bobbin presser ❶.





HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
Adjust so that the specified standard value is provided using screws ❹ in the thread take-up finger located in picker holder ❸.  	1) If bobbin presser ❶ 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 knots may not be formed properly at the start of sewing. Furthermore, the needle thread will slip off the bobbin presser at the time of thread trimming. In this case, the length of thread remaining after thread trimming will be extremely shortened.

(16) Adjusting the thread trimming cam

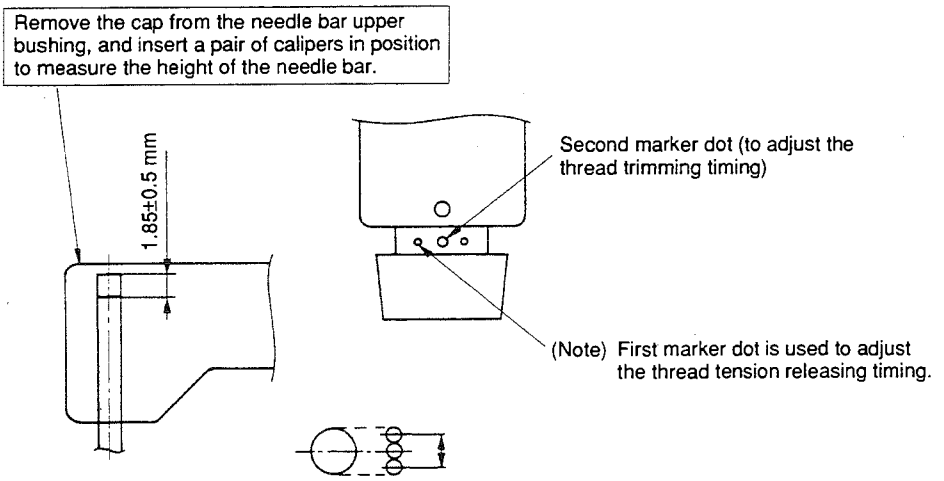
1) Turn ON the main power to the machine. Press the [Mode Select] key. Press the [+] key and [−] key as [+], [+], [−], [+], [+], [+], [+], [+] and [+] following the written order. Then, press [21] to select the thread trimming adjusting mode.

(Caution 1) To select the aforementioned mode, the related DIP switch should be changed over to the maintenance mode II. (SW1-2)

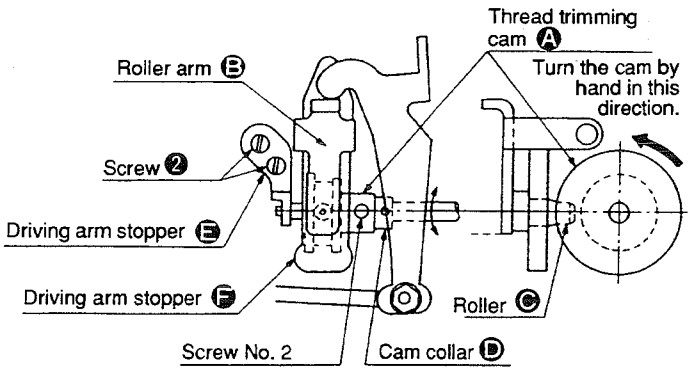
(Caution 2) As long as the [Run] is indicated on the operation panel, operation mode selection cannot be performed. In this case, press the [Run] key to make the machine enter the [Standby] state.

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 [ON] key on the operation panel, and the thread trimming cylinder will be turned ON and the 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 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. At this time, adjust the height of the needle bar to 1.85±0.5 mm below the highest dead point of the needle bar and 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 will be damaged during the aforementioned procedure.



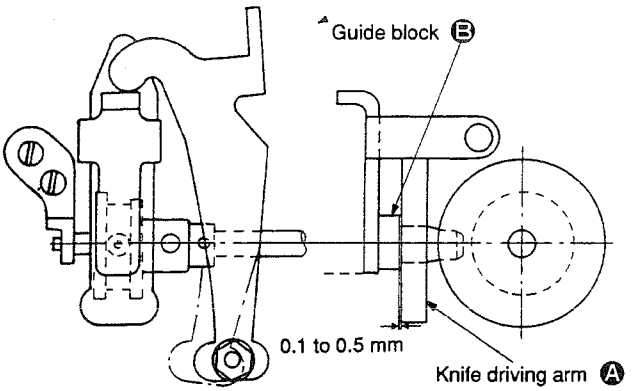
HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Turn OFF the power to the machine and let the operating air out of the machine. 2) Drain oil from the machine head. 3) Remove the machine head from the main unit. 4) Drain remaining oil from the machine head. 5) Remove the oil pan from the machine head. 6) Loosen two screws No. 1 and No. 2 ❶ in the written order and adjust the position of the marker dot on the handwheel and the height of the needle bar. 7) Press roller arm Ⓑ until roller Ⓒ is engaged with thread trimming cam Ⓐ. 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 Ⓐ against cam collar Ⓓ if cam collar Ⓓ has not been moved.) 8) If cam collar Ⓓ has been moved, confirm that roller Ⓒ smoothly fits in cam Ⓐ without hindrance when pressing roller arm Ⓑ in the section where the roller is allowed to enter the cam. If the roller fails to fit in the cam smoothly, loosen screws ❷ and move driving arm Ⓕ by moving driving arm stopper Ⓔ to adjust so that roller Ⓒ enters cam without hindrance. Then tighten screws ❷ and the screws No. 2 while pressing cam collar Ⓓ against thread trimming cam Ⓐ.	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 failed performance of the thread trimmer. Main shaft motor error (Error 02) may also occur. **(Caution 1) If cam collar Ⓓ has been moved in step 8) of the adjusting procedure, the stroke of the moving knife will slightly change. So, after step 8), confirm the stroke of the moving knife.** **(Caution 2) If the roller fails to enter the cam smoothly in the range where the roller has been designed to fit in the cam, the roller will excessively wear out or thread trimming failure.**

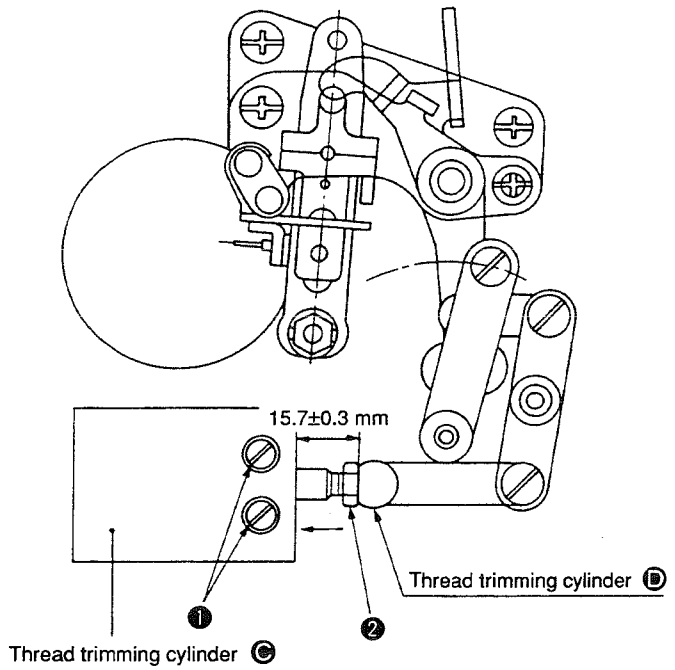


(17) Adjusting the thread trimming cylinder

1) Turn OFF the power to the machine and let the operating air out of the machine.
2) Remove the machine head from the main unit. Then, remove the oil pan from the machine head.
3) Move the thread trimming cylinder to the retracting side.
   At this time, adjust so that a clearance of approximately 0.1 to 0.5 mm is provided between knife driving arm Ⓐ and guide block Ⓑ.

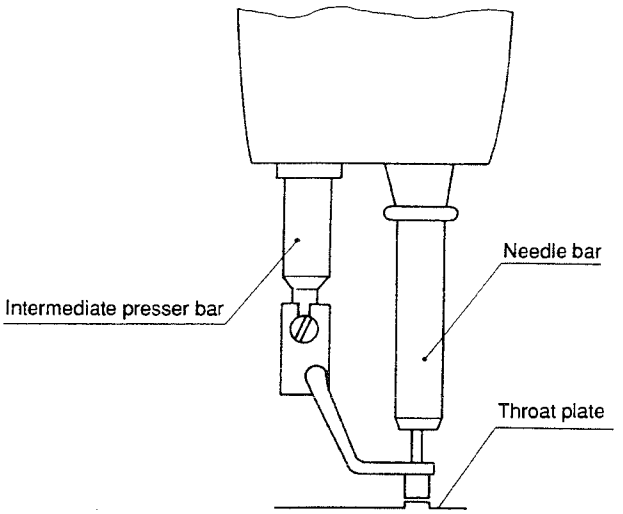
(Caution) **Move the cylinder by applying the compressed air pressure or move it by hand while applying approximately 10 kgf load.**

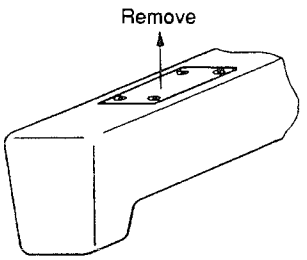
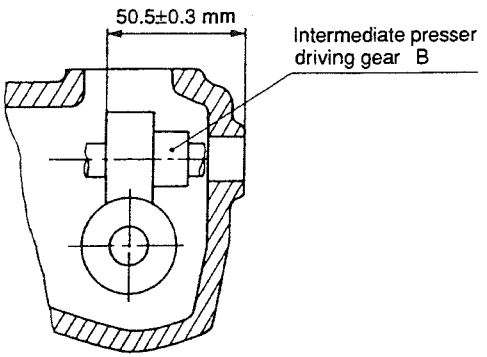
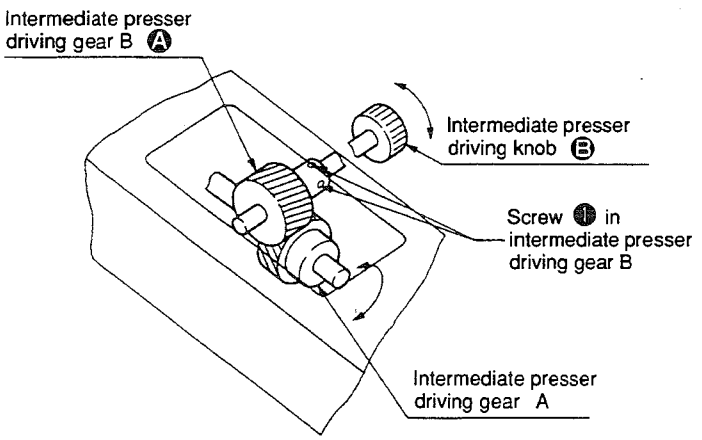


HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Loosen screws ❶ in thread trimming cylinder Ⓒ, and adjust the clearance between the knife driving arm and the guide block by moving the cylinder back or forth. 2) When attaching thread trimming cylinder Ⓒ which you have removed once, adjust the position 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 Ⓓ when the thread trimming cylinder retracts. Then, tighten nut ❷, and perform step 1).  	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 between the knife driving arm and the guide block, a load applied to the links will be increased, causing the link to wear out excessively.

(18) Adjusting the timing of the intermediate presser (for AVP-880 only)

1) Adjust the intermediate presser so that it reaches its lowest dead point when the handwheel is turned in the normal direction of rotation until the needle bar is brought down to its lowest dead point. (Synchronization with the needle bar.)

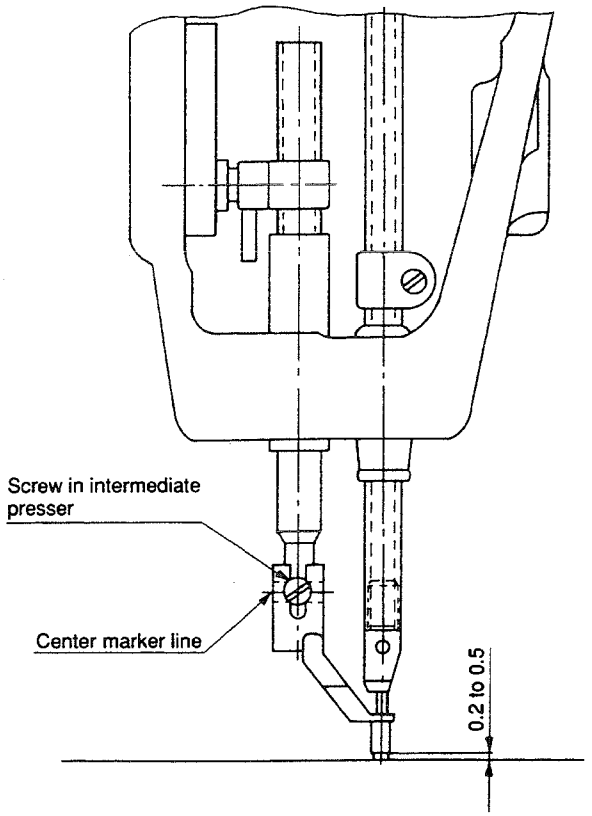


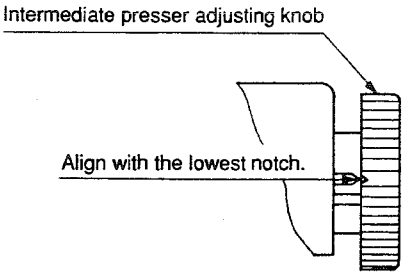
HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Remove arm cover A. 2) Loosen two screws ❶ in intermediate presser driving gear B Ⓐ. 3) Turn the handwheel to bring the needle bar down to its lowest dead point. 4) Turn intermediate presser driving knob Ⓑ to bring the intermediate presser bar down to its lowest dead point. 5) In the state described in steps 3) and 4), tighten screws ❶. **(Caution) At this time, adjust the position of intermediate presser gear B Ⓐ so that it is spaced 50.5±0.3 mm from the installing plane of the bearing plate.**    	It the timing of the intermediate presser is excessively advanced or retarded, stitch skipping, finely-split thread or thread breakage will result. ○ If the intermediate presser timing is excessively advanced, the thread tension will be increased and stitch skipping will be likely to occur. ○ If the intermediate presser timing is excessively retarded, the thread tension will be decreased.

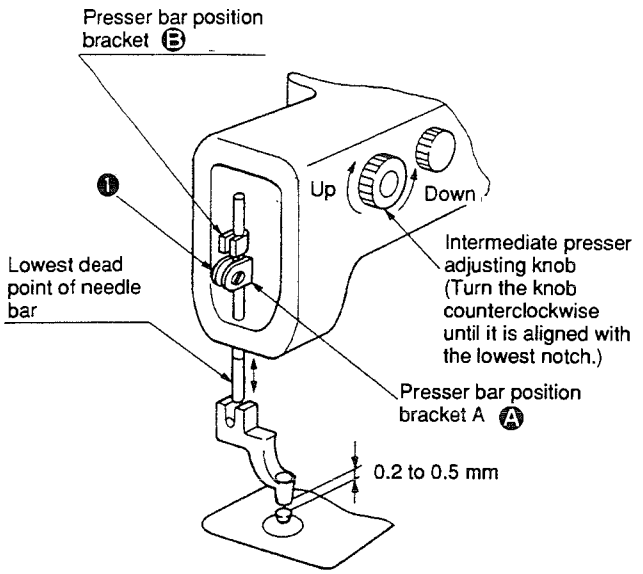
(19) Adjusting the initial height of the intermediate presser bar (for AVP-880 only)

1) Align the intermediate presser adjusting knob to the lowest notch.
2) Turn the handwheel in the normal direction of rotation to bring the intermediate presser bar down to its lowest dead point.
3) In the state described in step 2), adjust so that a clearance of 0.2 to 0.5 mm is provided between the top end of the intermediate presser and the top end of the needle hole guide.

(Caution) At this time, confirm that the screw in the intermediate presser is brought almost to the center of the marker line engraved on the intermediate presser.

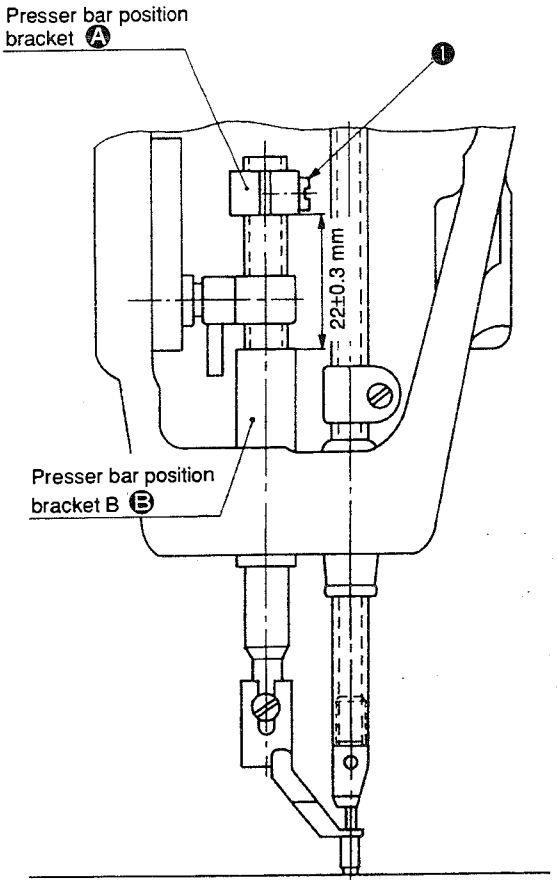


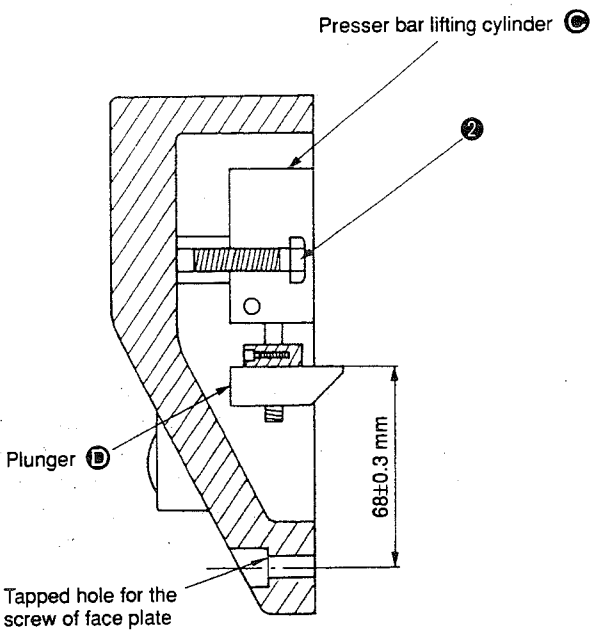


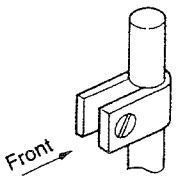
HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Remove the face plate cover. 2) Loosen screw ❶ in the presser bar position bracket A Ⓐ and adjust the initial height of the intermediate presser bar by moving the intermediate presser bar up or down.  **(Caution) If you have changed the position of the intermediate presser bar, the position of presser bar position bracket Ⓑ will also change. So, check how the presser bar position bracket is adjusted referring to "(20) Position of the presser bar position bracket and plunger" when you have changed the position of the intermediate presser bar.**	If the initial height of the intermediate presser bar is not properly adjusted, stitch skipping, thread breakage or material slippage will result. ○ If the initial position of the intermediate presser is too high, stitch skipping will result. ○ If the initial position of the intermediate presser is too low, material slippage will result.

(20) Position of the presser bar position bracket and plunger (for AVP-880 only)

1) Turn the handwheel to bring the intermediate presser bar down to its lowest dead point.
2) In the state described in step 1), align the intermediate presser adjusting knob with the lowest notch.
3) In the state described in step 2), adjust so that intermediate presser bar position bracket Ⓐ is spaced 22±0.3 mm from the end face of intermediate presser bar lower bushing Ⓑ.
4) Adjust the distance between the end face of plunger Ⓓ and the center of tapped holed for the screw of the face plate cover to 68±0.3 mm when presser bar lifting cylinder Ⓒ of the face plate cover retracts.





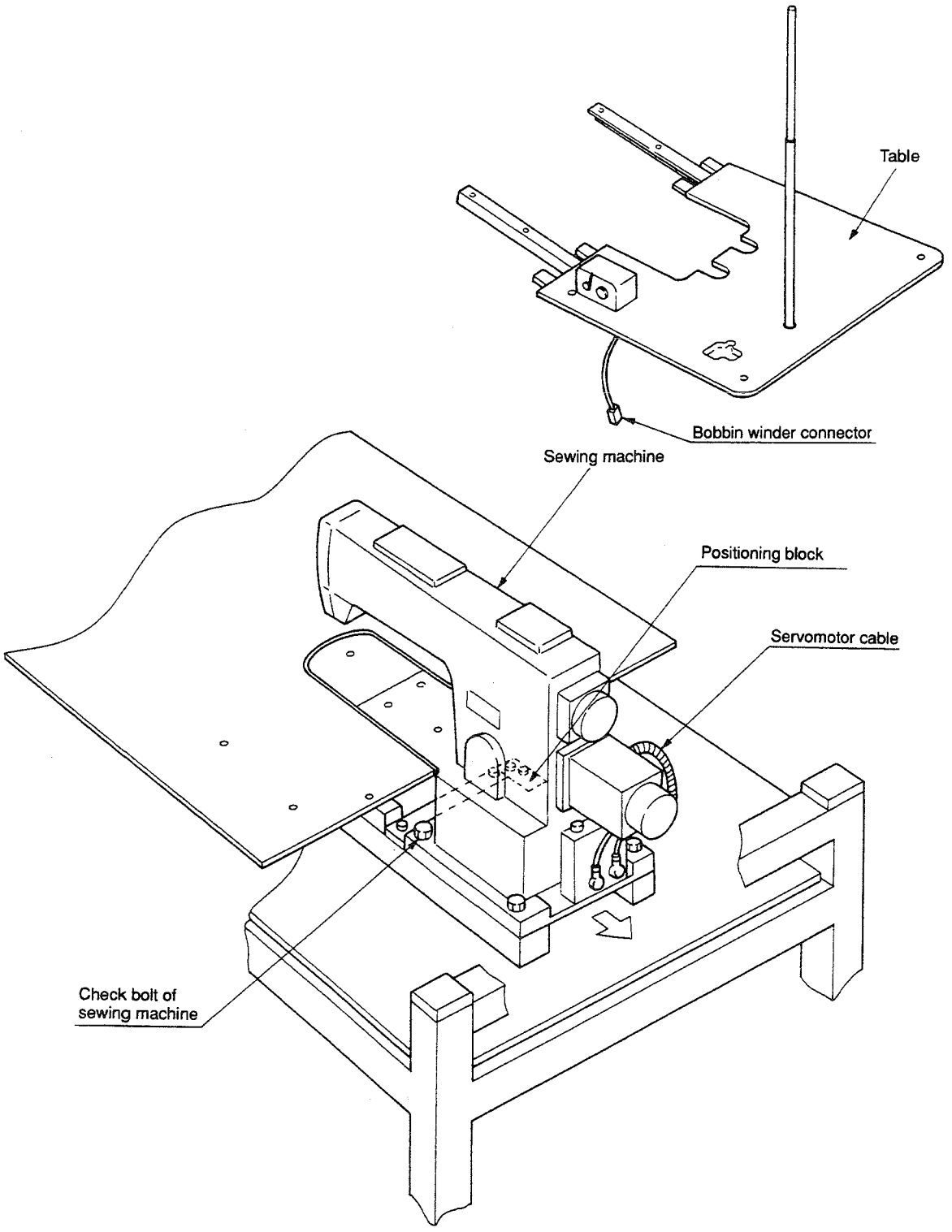
HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Loosen screw ❶ in intermediate presser bar position bracket Ⓐ and properly adjust the position of the bracket. **(Caution) At this time, position the bracket so that the slot in the bracket faces toward you.**  2) Loosen screw ❷ in presser bar lifting cylinder Ⓒ and adjust the position of the cylinder by moving it up or down.	If intermediate presser bar position bracket Ⓐ is positioned too high, the bracket will interfere with the needle bar crank.

5. HOW TO UNLOAD THE MACHINE HEAD

DISASSEMBLING/ASSEMBLING PROCEDURE

(1) How to remove the AVP-870 machine head

1) Drain the sewing machine oil.
2) Remove the connector from the bobbin winder.
3) Remove table C.
4) Remove the four check bolts and remove the machine by drawing it in the direction of the arrow.

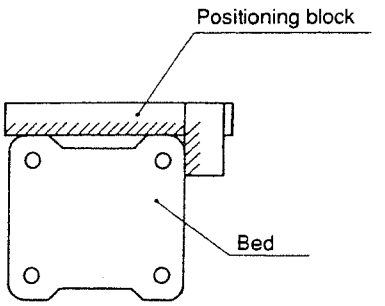


CAUTION IN DISASSEMBLY

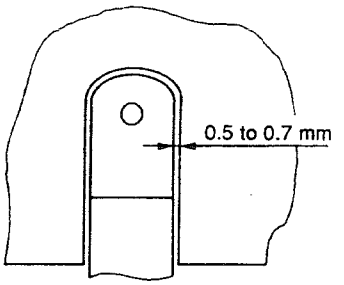
1) Be sure to turn OFF the power to the machine and let the operating air out of the machine before removing the machine.
2) To remove table C, remove the connector beforehand.
3) Remove the machine head taking care of connections of the servomotor.
4) Do not remove the positioning block.
5) Before removing the sewing machine, adhere a sheet of paper or the like on the work clamp of the X-Y unit and mark the needle entry point of the machine head on the paper at the X-Y origin. This will allow you to, when installing the machine head, easily position it.
(Refer to the Engineer's Manual for the main unit of the AVP-870 for how to adjust the origin of the X-Y unit.)
6) It is necessary to prepare a working bench on which the machine head is placed after it has been removed.
7) Then, remove the oil pan from the bottom of the sewing machine head. At this time, the oil remaining in the oil pan after step 1) will run out. So, be careful.

CAUTION IN ASSEMBLY

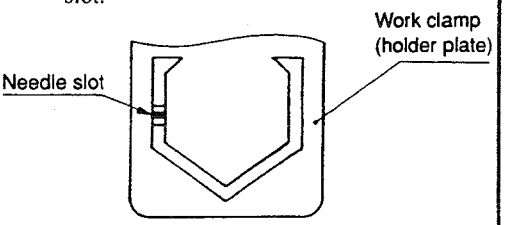
1) When assembling, follow the procedure for disassembling the machine head in the reverse order.
2) When installing the sewing machine, determine the position of the machine by pressing the machine bed against the corner of the positioning block, as illustrated below, and fix the machine there.



3) At this time, a clearance of approximately 0.5 to 0.7 mm should be provided between the table and the throat plate.

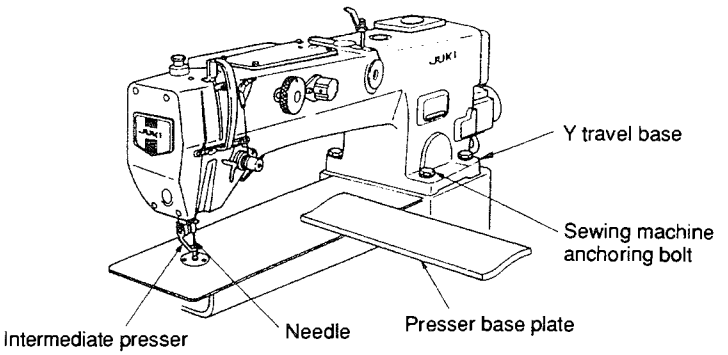


4) Before starting the unit, be sure to check the shape of sewing pattern and confirm that the slot in the work clamp (holder plate) does not interfere with the needle slot.

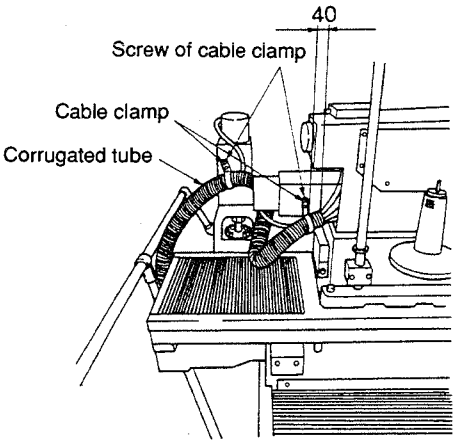


(2) How to remove the AVP-880 machine head

1) Drain the sewing machine oil.

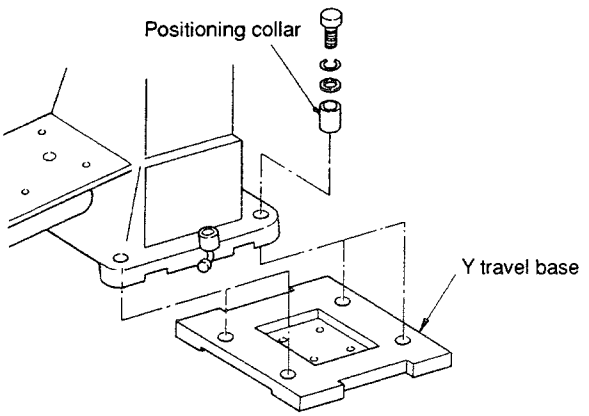


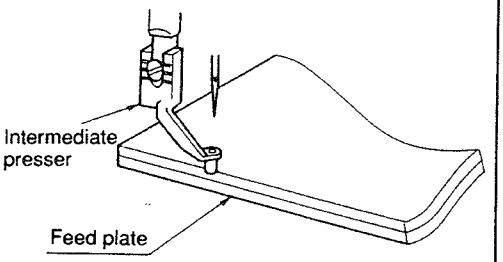
2) Remove the intermediate presser and needle from the machine head.
3) Move the Y travel base on which the machine head is installed to the back end. (It is most desired to move the base to the X-Y origin.)
4) Remove the screws from the cable clamps as shown in the figure on the left. Then remove the cable clamps and slacken the corrugated tube.
5) Remove the four anchoring bolts from the machine.
6) Now, tilt the machine head away from you.



Assembling

7) Put the positioning collar over the screw shown in portion A in the figure on the lower left.
8) Then, assemble the machine head following the procedure for disassembling it in the reverse order.



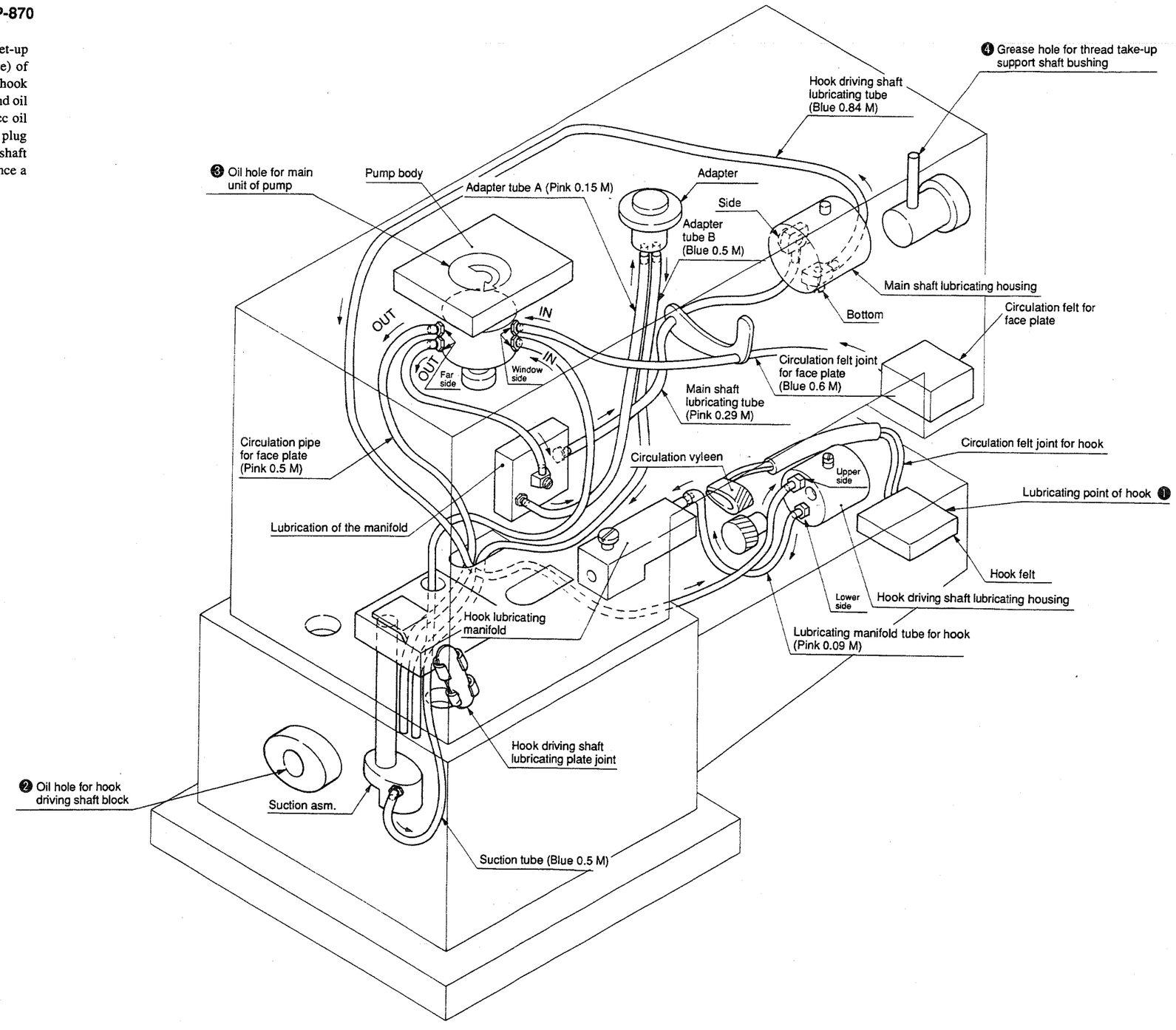
CAUTION IN DISASSEMBLY	CAUTION IN ASSEMBLY
1) Before removing the sewing machine, adhere a sheet of paper or the like on the feed plate and mark the needle entry point of on the paper at the X-Y origin of the machine head. This will allow you to, when installing the machine head, easily position it. (Refer to the Engineer's Manual for the main unit of the AVP-880 for how to adjust the X-Y origin.) 2) It is necessary to prepare a working bench on which the machine head is placed after it has been removed. 3) Then, remove any oil remaining after step 1) before removing the oil pan from the bottom of the sewing machine head. 4) When removing the sewing machine, take care not to allow the needle bar and the presser bar to hit against other components. Also take care not to damage the cords placed inside the corrugated tube. 5) Before removing the machine head, turn OFF the power to the machine and let the operating air out of the machine.	1) Before starting the machine after assembled, be sure to check the sewing pattern to be used to confirm that the intermediate presser does not interfere with the feed plate. 

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

Lubrication piping diagram for AVP-870

Lubrication)

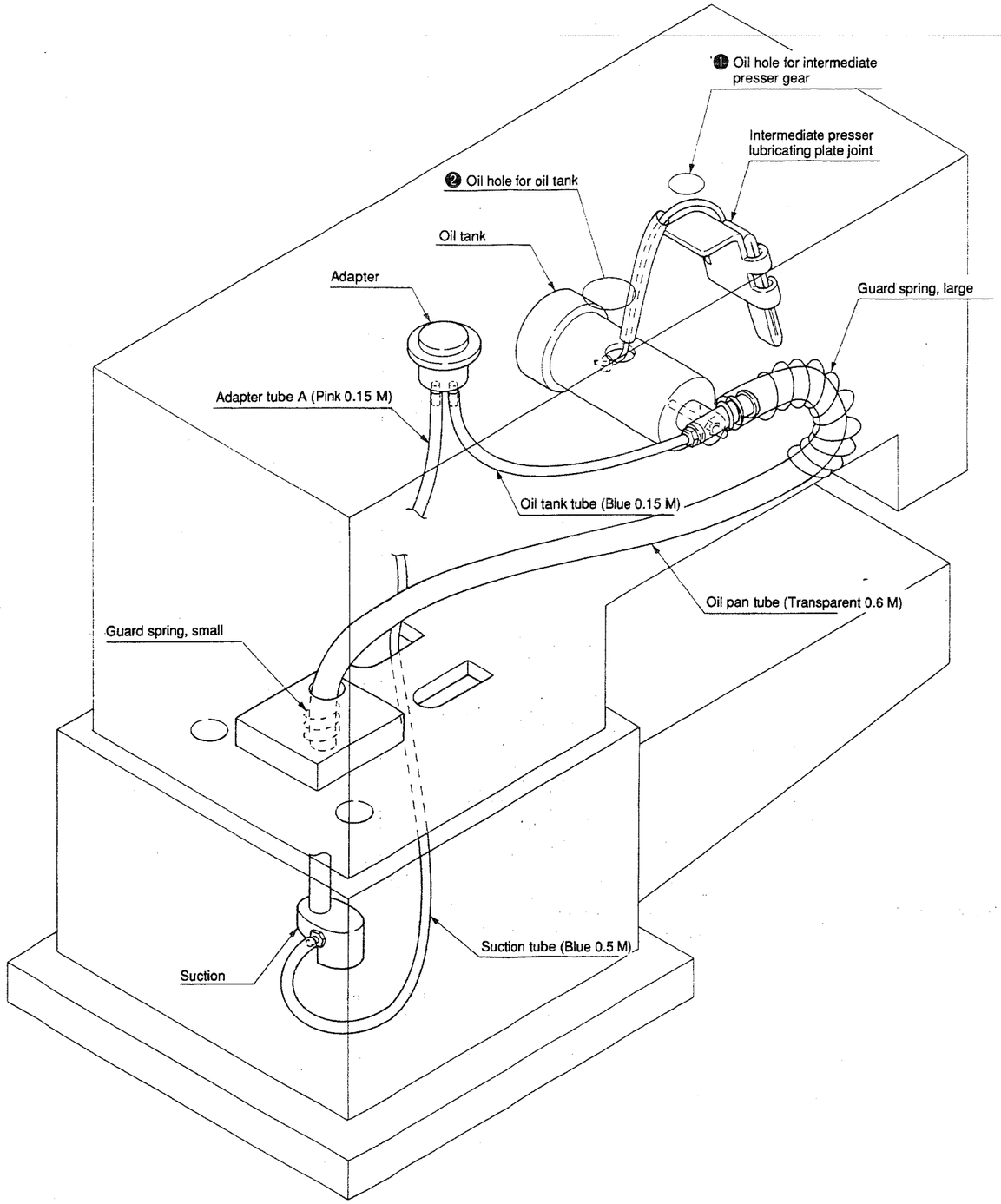
When you first generate your machine after set-up or after an extended period (one week or more) of disuse, remove rubber plugs from hook ❶ (hook face), oil hole of hook driving shaft block ❷ and oil hole of pump ❸ and pour approximately 10 cc oil to the respective components. Remove rubber plug from the grease hole of thread take-up support shaft bushing ❹ and apply grease approximately once a year.



(2) Lubrication piping diagram and components to be lubricated for AVP-880

(Only the items different from the AVP-870)

(Lubrication)
When you first generate your machine after set-up or after an extended period (one week or more) of disuse, remove rubber plugs from oil hole of intermediate presser gear ❶ and oil tank ❷ and pour approximately 10 cc oil to the respective components.
With respect to oil tank ❷, no additional lubrication is required as long as the machine is normally operated since oil is automatically fed to the oil tank.



7. TROUBLES AND CORRECTIVE MEASURES

(1) AVP-870

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
1. One or several stitches skip at the start of sewing.	Length of thread remaining at the tip of 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.
		The knife thread guide cuts the thread with the moving knife instead of the counter knife. In this case, length of thread remaining at the tip of needle after thread trimming will be too short.	The knife thread guide has bent and is pressed against the moving knife. In this case, replace the knife thread guide with a new one.
		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 eedle. 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.
		Knife thread guide, moving knife or hook has scratches.	Check peripheries of holes in the hook and knife thread guide for 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 thread guide, which prevents threads from being separated.	Clean up the knife thread guide 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 start of sewing.
			Adjust so that the pattern is brought to a position where the sponge rubber sheet of the work clamp securely clamp the material.

To be continued to the next page

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
Continued from the previous page			
	Blade point of the hook fails to tuck the needle thread.	Needle-to-hook relation is not proper.	Check the height of needle bar and adjust it to the standard height, if necessary. For spun thread, slightly raise the needle bar and retard the hook timing.
		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).
		Blade point of the hook has worn out.	Correct the blade tip of the hook, or replace the hook with a new one.
		Needle has been improperly installed.	Properly adjust the inclination of the needle. If the needle has bent, replace it with a new one.
	Length of bobbin thread at the sewing start is insufficient.	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.
			Increase the bobbin thread tension.
		Hook has scratches, which shortens the length bobbin thread remaining after thread trimming.	Correct the scratches on the hook, or replace the hook with a new one.
	Needle thread and bobbin thread fail to smoothly interlace with each other at the start of sewing.	Sewing speed at the start of sewing is excessive. As a result, the needle thread and bobbin thread fail to interlace with each other.	Reduce the sewing speed at the start of sewing.
2. Needle thread end is left on the upper cloth at the start of sewing.	Needle thread remaining at the needle tip after thread trimming is too long.	Thread tension controller No. 1 is too low.	Increase the thread tension No. 1.
		Thread trimming cam timing has been excessively retarded.	Inspect the thread trimmer cam timing and properly adjust it.
		Counter knife is positioned too far from the needle entry point.	Properly adjust the position of counter knife.
		Tension release cam timing has been excessively advanced. As a result, the needle thread is fed excessively.	Inspect the tension release cam timing and adjust it properly.
	Pattern is defective.	Material thickness is excessive at the start of sewing.	Adjust the pattern so that the sewing start is brought to a thin section of the material.
		Sponge rubber piece of the work clamp is sewn in.	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 needle.
	Pneumatic wiper is defective.	Pneumatic wiper fails to work. This causes the plunger to depress the needle thread.	Check whether the operating air is supplied to the wiper.
		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.	Adjust the installing direction of the work clamp plunger.
	Needle thread is too thick for the needle used.		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 start of sewing. (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 on the material at the start of sewing."
4. Thread comes off the needle eyelet at the start of sewing.	Length of needle thread remaining at the tip of needle after thread trimming is excessive.	Failed operation of the tension release cam.	Inspect the tension release mechanism and properly adjust it.
		Hook thread presser fails to enter the bobbin case deeply enough. So, the needle thread sometimes slips off the hook thread presser.	Inspect the hook thread presser mechanism 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.
		Knife thread guide, 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.
		Moving knife cuts the thread in the knife thread guide. In this case, the needle thread is cut too short.	The knife thread guide has bent and is pressed against the moving knife. So, replace the knife thread guide with a new one.
	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 smoothly interlace with each other at the start of sewing.	Sewing speed at the start of sewing is excessive. As a result, the needle thread and bobbin thread fail to interlace with each other.	Reduce the sewing speed at the start of sewing.
	Main shaft stops before the predetermined stop 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 start of sewing.	Needle thread tension is insufficient at the start of sewing.	Bobbin thread tension is decreased at the start of sewing since the bobbin runs idle.	Increase the pressure of the idling prevention spring.
		Both the bobbin thread tension and needle thread tension are insufficient.	Increase the bobbin thread tension and needle thread tension.
	The pattern used is defective.	Material thickness is excessive at the start of sewing.	Modify the pattern at the thin part of material.
		Pressure of the work clamp is insufficient at the start of sewing, causing the material to flop.	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.
6. Needle thread cannot be cut. (Bobbin thread can be cut.)	Last stitch skips at the end of sewing.	Needle has been improperly installed.	Properly install the needle and check whether the needle has bent.
		Stroke of the thread take-up spring is too large.	Reduce the stroke of the thread take-up spring. (Standard stroke: 10 to 12 mm)
		Hook timing has been improperly adjusted.	Run the sewing machine at low speed and check whether stitches skip. Then, properly re-adjust the hook timing.
		Needle entry of the last stitch excessively approaches the previous stitch.	Correct the pattern.
	Knife blade partly fails to cut the thread sharp.	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.)	Remove the knife mounting base and cut approximately three cotton threads #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 counter knife.
			Re-adjust the mounting position of the counter knife.
	Thread waste has gathered in the moving knife and knife thread guide, which results in thread spreading failure.		Clean up the moving knife and knife thread guide.
7. Bobbin thread cannot be cut. (Needle thread can be cut.)	Backward travel amount of the moving knife is insufficient.	Properly adjust the backward travel amount of the moving knife.	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 needle.		Properly re-adjust the thread trimmer cam timing.
	Thread waste has gathered in the moving knife and knife thread guide, which results 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.

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
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, which results in ill 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.	Threads cannot be trimmed.	Inspect the backward travel amount of the moving knife and properly adjust it.
			Inspect the engagement between the moving knife and the counter knife and properly adjust it.
	After the thread trimmer has actuated at the end of sewing, 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.	Properly adjust the positional relation between the cam groove and the roller. Or, check whether the thread trimming cylinder normally operates.
9. The sewing machine locks. (The sewing machine produces 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 position bracket has been improperly positioned. As a result, the presser bar position bracket interferes with the needle bar crank rod.	Inspect whether the presser bar position 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, which causes 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.

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
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.
	Pattern data have been improperly input.	The pattern fails to match the material used. As a result, needle entries are made out of position.	Correct the pattern.
		Straight stitching pattern has been input to create a short seam, which results in stitching pitch error.	Correct the pattern.
	Needle is too thin for the material used.		Use a DB1x#11 (DELTA U) needle.
	Work clamp pressure is insufficient, resulting in material slippage.		Increase the pressure of the work clamp of sewing machine. Or, properly adjust the pressure of the conveyor.
	Crease folding unit has been improperly adjusted.		Refer to "Adjusting the crease folding unit."
	Stitching pitch is coarse, causing the needle to sway.		Fine the stitching pitch or use a thicker needle.
11. Face plate produces abnormal noise.	Clearance provided between the inner hook and the bobbin case opening lever is too large.		Slightly reduce the clearance provided between the inner hook and the bobbin case opening lever.
	Plunger interferes with the needle bar crank rod.		Inspect how the lifting amount of the work clamp plunger has been adjusted.
	Hook timing has been improperly adjusted, causing the blade point of hook to interfere with the needle.		Check whether the hook timing has been properly adjusted.
	Work clamp interferes with the needle.	The pattern used is defective.	Correct pattern so that the work clamp does not interfere with the needle.
		Work clamp has been improperly adjusted.	Check whether the one-touch section of the work clamp has been normally installed.
		Work clamp pressure has been improperly adjusted.	Increase the pressure of the work clamp of sewing machine or the pressure of the holder of conveyor. (Pressure of the holder of conveyor should be adjusted to approximately 0.8 kgf/cm^2.)
	Work clamp plunger interferes with the needle bar thread eyelet.		Check whether the work clamp plunger interferes with the needle bar thread eyelet.
	Oil shield of the face plate has been improperly installed.		Check whether the oil shield of the face plate interferes with the link thread take-up.

To be continued to the next page

Continued from the previous page

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.
		Machine head fixing bolt has not been improperly tightened.	Check whether the tightening torque of the machine head fixing bolt is adequate.
	Backlash in the gear is defective.	Main shaft gear	Check whether the backlash in the main shaft gear is excessive.
		Pump body gear	Check whether the backlash in the pump body 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	Bobbin case opening lever and needle entry points have been improperly adjusted, causing the needle to interfere with the U-groove on bobbin case opening lever.		Correct the installing position of the bobbin case opening lever.
	Initial position of the main shaft motor has been improperly adjusted. As a result, the 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.
	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.
	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.
	Needle comes in contact with the moving knife.		Refer to the description given under "Moving knife locks."
	Thread waste has gathered around the hook.		Remove the throat plate and clean up the related components.

To be continued to the next page

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
Continued from the previous page			
	Needle comes down under the work clamp plunger.	Stop position of the main shaft is defective.	Check whether the stop position of the main shaft has been properly adjusted.
		Plunger has been improperly positioned.	Check whether the lifting amount of the work clamp plunger has been properly adjusted.
	Throat plate has been improperly installed, causing the needle to interfere with the needle hole guide.		Confirm that the throat plate is positioned correctly with respect to the needle entry.
14. Sewing machine stops immediately after it has been started.	The machine head has not been threaded.		Properly pass the needle thread through the machine head.
	Thread breakage detector is defective.		Confirm that the thread take-up spring properly comes in contact with the thread breakage detecting plate.
15. Holder of the conveyor interferes with the work clamp plunger of the sewing machine.	Holder of the conveyor has bent.		Correct the bending part of the holder of the conveyor.
	Height of the work clamp is insufficient.	Housing joint is defective.	Confirm that the joint which connect the X-Y housing and main unit housing is installed in parallel to the work clamp. If not, loosen joining bolt and adjust so that the joint is installed in parallel to the work clamp.
		Stopper used for adjusting the height of the holder of the conveyor has been improperly positioned.	Raise the stopper for adjusting the height of the holder of the conveyor. Then, decrease the height of the holder.
	Work clamp plunger has been installed too low.	Plunger has been improperly installed.	Inspect the lifting amount of the work clamp plunger and properly adjust it.
16. Puckering	Needle used is too thick.		If a (DELTA U) DBx1 #11 needle is used, replace it with a (DELTA U) DBx1 #9 needle.
	Thread tension (needle thread tension and bobbin thread tension) is excessive.	Thread path has not been smoothly finished.	Smoothly finish the thread path.
		Hook timing has been excessively retarded.	Advance the hook timing as long as stitch skipping does not occur to allow the thread to smoothly come off the hook.
		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 hread take-up lever.
		Stroke of the thread take-up spring is too small.	Increase the stroke of the spring.
	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.

To be continued to the next page

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
Continued from the previous page			
	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 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 thread take-up spring.
	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 value or slightly retard it when using cotton thread or spun thread.
		Hook timing has been excessively retarded.	Adjust the hook timing to the standard value or slightly advance it when using synthetic thread.
		Clearance provided between the hook and the bobbin case opening lever it 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.
		Hook is defective. (The thread is caught in the hook.)	Replace the hook with a new one.

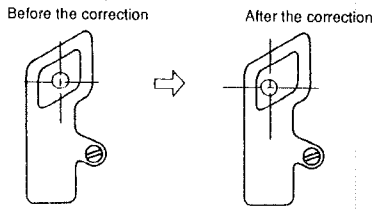
To be continued to the next page

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure

Continued from the previous page

Knife thread guide has been improperly positioned.

→ Shift the knife thread guide to the right with regard to the needle entry when using spun thread.



Thread path is defective.

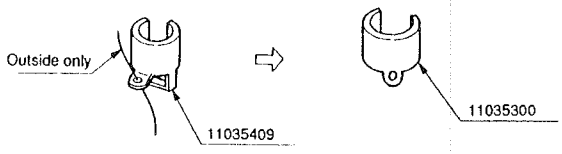
- Thread path is not smooth. → Smoothly finish the thread path.
- Thread path has scratches. → Smoothly finish the thread path.
- Thread is caught in the thread path. → Properly thread the thread path.

Bobbin or bobbin case is defective

- Bobbin fails to properly engage with the bobbin case, causing 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.

Needle bar thread eyelet is defective.

→ If the T type needle bar thread eyelet (part No. 11035409) is used with spun thread, thread only the outside of thread eyelet. Or replace it with the standard type of needle bar thread eyelet (part No. 11035300).



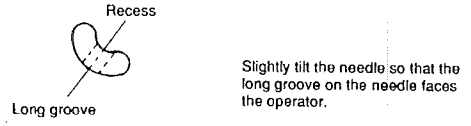
Thread tension controller is defective.

- 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.

To be continued to the next page

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
Continued from the previous page			
	Needle is defective.	Needle tip has burrs.	Replace the needle with another 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.
18. Stitch skipping	Needle is defective.	Needle has bent.	Replace the needle with a new one.
		Installing direction of the needle is wrong.	Re-install the needle properly.  Slightly tilt the needle so that the long groove on the needle faces the operator.
		Tip of needle is blunt.	Replace the needle with a new one.
		Needle is too thin or too thick for the thread used.	Replace the needle with a new one.
	Hook components are defective.	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.
		Hook timing has been improperly adjusted.	Re-adjust the hook timing. (The hook timing depends on sewing conditions such as the type of material and thread used: Generally, advance the hook timing when sewing a heavy-weight material with synthetic thread and retard it when sewing a light-weight material.)
		Height of the needle bar is incorrect.	Vertically adjust the needle bar with regard to the blade point of hook. (When using spun thread, lower the needle bar by approximately 0.3 to 0.5 mm.)
		Clearance provided between the blade point of hook and the needle is not correct.	Minimize the clearance.
		Thread loops are not made with consistency.	Wind the thread round the needle.
	Needle bar thread guide is defective.		If the standard type of thread eyelet (part No. 11035409) is used with filament thread, replace the thread eyelet with T type one (part No. 11035300).
	Tension of thread guide pin of the tension controller No. 1 is insufficient, causing the thread to flap heavily.		Increase the tension of the thread guide pin so as to prevent the thread from flapping.
	Needle thread tension is excessive.	Thread tension is too high.	Decrease the thread tension.
To be continued to the next page			

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
Continued from the previous page			
	Sewing speed is too high.		Decrease the sewing speed. Or, modify the pattern to change the sewing speed at the section at which stitches skip so as to partly reduce the sewing speed.
	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."
	Stitching pitch is coarse.	Stitching pitch is coarse, causing the needle to sway.	Use a thicker needle or fine the stitching pitch.
	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 small 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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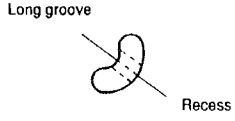
Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
Continued from the previous page			
	Needle is defective.	The needle has bent.	Replace the needle with a new one.
		The needle has scratches.	Replace the needle with a new one.
		The needle tip is blunt.	Replace the needle with a new 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 an appropriate one.
		The tip of needle is too sharp.	Use a ball-point needle.
	Needle bar thread eyelet is defective.		For filament thread, use the T type of thread eyelet (part No. 11035409).
	The material flops.		Refer to the description of "Work clamp failure causes the material to flop" given under "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 it 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.
	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.  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 "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 thin.	Replace the needle with a thicker needle, DBx1#11 (DELTA U).
	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 "Needle thread breakage."
	Stitching pitch is coarse.	Stitching pitch is coarse, causing the needle to sway.	Use a thicker needle or fine the stitching pitch.
21. Fabric yarn breakage	Needle is defective.	The needle is hot.	Reduce the sewing speed.
		The needle is thick.	When a DBx1 #11 (DELTA U) needle has been installed, replace it with a DBx1 #9 (DELTA U) 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)
	Diameter of the hole in the needle hole guide is improper.	Diameter of the hole in the needle hole guide is too small for thickness of the material, thread and needle used.	Use the needle hole guide provided with a hole of which diameter is larger than the current one.

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
22. Irregular stitches	Hook components are defective.	Amount of oil in the hook is excessive or insufficient.	Adjust the amount of oil in the hook appropriately.
		The hook is defective. (The thread is caught in the hook or the thread path is defective.)	Replace the hook with a new one, or correct the thread path.
	Bobbin and bobbin case are defective.	Bobbin fails to properly engage with the bobbin case, causing 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. As a result, the bobbin thread is not smoothly fed.	Adjust the tension of the bobbin winder or adjust the position of the tension controller of the bobbin winder.
		Bobbin thread runs idle in the bobbin case.	Increase the pressure of the idling prevention spring.
		Tension adjusting spring of the bobbin case is defective.	Replace the bobbin case with a new one.
		Bobbin has been improperly fitted in the bobbin case.	Refer the description of the bobbin case provided with an idling prevention spring.
	Needle thread tension and bobbin thread tension are too low.		Increase the thread tension.
	Thread take-up spring has been improperly adjusted.	Thread take-up spring fails to properly come in contact with the thread breakage detecting plate. (The spring is caught in the plate.)	Adjust the thread breakage detecting plate so that it properly comes in contact with the thread take-up spring.
		Stroke of the thread take-up spring is too large or too small.	Properly adjust the stroke of the thread take-up spring.
		Tension of the thread take-up spring is too high or too low.	Adjust the tension of the thread take-up spring.
	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.	Correctly thread the thread path.
	The material flops.		Refer to the description of "Work clamp failure causes the material to flop" given under "Puckering."
	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.
	Start-up speed is high.	Sewing speed is excessive at the start of sewing.	Reduce the set value for sewing speed at the start of sewing.

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Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
1. Puckering	Needle is too thick.		When a (DELTA U) DBx1 #11 needle has been installed on the machine, replace it with a (DELTA U) DBx1 #9 needle.
	Thread tension (needle thread and bobbin thread) is too high.	Thread path is not smooth.	Smoothly finish the thread path.
		Hook timing has been excessively retarded.	Advance the hook timing, as far as stitch skipping does not occur, to allow the needle to come off the hook.
		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.
		Stroke of the thread take-up spring is too small.	Increase the stroke of the thread take-up spring.
	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.
		Pressure provided by the work clamp is insufficient.	Increase the work clamp pressure.
	Sewing speed is too high.		Reduce the sewing speed.
	Diameter of the hole in the needle hole guide is improper.	Needle 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.
	The tip of needle is blunt.	The material is caught by the needle tip, resulting in the material flopping.	Replace the needle with a new one.
	Height of the intermediate presser is insufficient. As a result, the intermediate presser presses the material on the machine.		Raise the intermediate presser.
2. Isolated idling loops (Loose stitches, looping)	Thread tension is too low.		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 of the thread take-up spring.
		Tension of the thread take-up spring is too low.	Increase 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.

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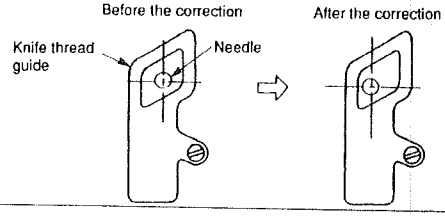
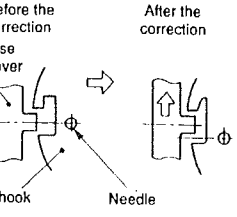
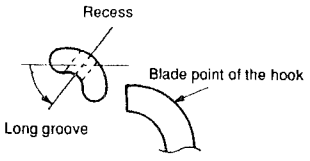
Continued from the previous page

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
	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 value or slightly retard it when using cotton thread or spun thread.
		Hook timing has been excessively retarded.	Adjust the hook timing to the standard value or slightly advance it when using synthetic thread.
		Clearance provided between the hook and the bobbin case opening lever it 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.
		Hook is defective. (The thread is caught in the hook.)	Replace the hook with a new one.
	Knife thread guide has been improperly positioned.		Shift the knife thread guide to the right with regard to the needle entry when using spun thread. 
	Longitudinal position of the bobbin case opening lever is not correct.		Move the bobbin case opening lever forward when using spun thread. 
	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.	Correctly thread the thread path.

To be continued to the next page

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
Continued from the previous page			
	Bobbin and bobbin case are defective.	Bobbin fails to properly engage with the bobbin case, causing 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. As a result, the bobbin thread is not smoothly fed.	Tension of 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.
	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.	The tip of needle has burrs.	Replace the needle with another 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.
3. Stitch skipping	Needle is defective.	The needle has bent.	Replace the needle with a new one.
		Installing direction of the needle is wrong.	Re-install the needle properly.  Tilt the needle so that the long groove on the needle faces slightly to the right.
		The tip of needle is blunt.	Replace the needle with a new one.
		Needle is too thin or too thick for the thread used.	Replace the needle with an appropriate one.
	Height of the intermediate presser is excessive, causing the material to flop.		Lower the intermediate presser.
To be continued to the next page			

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
Continued from the previous page			
	Hook components are defective.	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.
		Hook timing has been improperly adjusted.	Re-adjust the hook timing. (The hook timing depends on sewing conditions such as the type of material and thread used: Generally, advance the hook timing when sewing a heavy-weight material with synthetic thread and retard it when sewing a light-weight material.)
		Height of the needle bar is incorrect.	Vertically adjust the needle bar with regard to the blade point of hook. (When using spun thread, lower the needle bar by approximately 0.3 to 0.5 mm.)
		Clearance provided between the blade point of hook and the needle is not correct.	Minimize the clearance.
		Thread loops are not made with consistency.	Wind the thread round the needle.
	Needle bar thread guide is defective.		If the standard type of thread eyelet (part No. 11035409) is used with filament thread, replace the thread eyelet with T type one (part No. 11035300).
	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.
	Needle thread tension is too high.		Decrease the needle thread tension.
	Sewing speed is too high.		Decrease the sewing speed. Or, modify the pattern to change the sewing speed at the section at which stitches skip so as to partly reduce the sewing speed.
	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 "Puckering."
	Stitching pitch is coarse.	Stitching pitch is coarse, causing the needle to sway.	Use a thicker needle or fine the stitching pitch.
	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.

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
4. 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.	Correctly 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.
	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 an appropriate one.
		The tip of needle is too sharp.	Use a ball-point needle.
	Needle bar thread eyelet is defective.		For filament thread, use the T type of thread eyelet (part No. 11035409).
	The material flops.		Refer to the description of "Work clamp failure causes the material to flop" given under "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 it 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.

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Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
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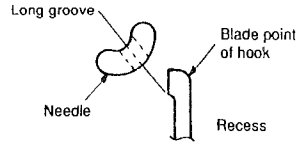
	The needle has been improperly installed.	The needle has been installed with inclined. 	Install the needle so that the long groove on the needle faces slightly to the right.  Wind the thread round the needle.
	Tension regulated by the tension controller of thread guide pin is too high.		Lower the thread tension.
5. Wobbling	Needle thread tension is too high.		Decrease the thread tension.
	Needle is defective.	The needle has been improperly installed.	Refer to the description of "Needle has been improperly installed" given under "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 thin.	Replace the needle with a thicker one, DBx1#11 (DELTA U).
	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 "Needle thread breakage."
	Stitching pitch is coarse.	Stitching pitch is coarse, causing the needle to sway.	Use a thicker needle or fine the stitching pitch.
6. Fabric yarn breakage	The needle is defective.	Needle bar is positioned too high.	Reduce the sewing speed.
		The needle is thick.	When a DBx1 #11 (DELTA U) needle has been installed, replace it with a DBx1 #9 (DELTA U) 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.

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Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure

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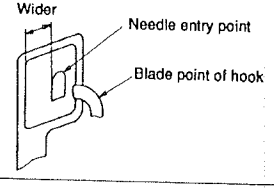
	Sewing speed is too high.		Reduce the sewing speed. (To prevent the needle from becoming hot)
	Diameter of the hole in the needle hole guide is improper.	Diameter of the hole in the needle hole guide is too small for thickness of the material, thread and needle used.	Use the needle hole guide provided with a hole of which diameter is larger than the current one.
7. Irregular stitches	Hook components are defective.	Amount of oil in the hook is excessive or insufficient.	Adjust the amount of oil in the hook appropriately.
		The hook is defective. (The thread is caught in the hook or the thread path is defective.)	Replace the hook with a new one, or correct the thread path.
	Bobbin and bobbin case are defective.	Bobbin fails to properly engage with the bobbin case, causing 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. As a result, the bobbin thread is not smoothly fed.	Adjust the tension of the bobbin winder or adjust the position of the tension controller of the bobbin winder.
		Bobbin thread runs idle in the bobbin case.	Increase the pressure of the idling prevention spring.
		Tension adjusting spring of the bobbin case is defective.	Replace the bobbin case with a new one.
		Bobbin has been improperly fitted in the bobbin case.	Refer the description of the bobbin case provided with an idling prevention spring.
	Needle thread tension and bobbin thread tension are too low.		Increase the thread tension.
	Thread take-up spring has been improperly adjusted.	Thread take-up spring fails to properly come in contact with the thread breakage detecting plate. (The spring is caught in the plate.)	Adjust the thread breakage detecting plate so that it properly comes in contact with the thread take-up spring.
		Stroke of the thread take-up spring is too large or too small.	Properly adjust the stroke of the thread take-up spring.
		Tension of the thread take-up spring is too high or too low.	Properly adjust the tension of the thread take-up spring.
	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.	Correctly thread the thread path.

To be continued to the next page

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
Continued from the previous page			
	The material flops.		Refer to the description of "Work clamp failure causes the material to flop" given under "Puckering."
	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.
	Start-up speed is high.	Sewing speed is excessive at the start of sewing.	Reduce the set value for sewing speed at the start of sewing.
8. Bobbin thread breaks or splits finely.	Bobbin runs idle.		Correct the idling prevention spring so that it effectively works or replace the bobbin with a new one.
	Bobbin thread tension is inadequate.		Increase the bobbin thread tension.
	Diameter of the hole in needle hole guide does not match the needle used.		Use the needle hole guide with a hole of which diameter is larger than the current one.
	Needle sways, which inereases the resistance of the thread path.		Use a thicker needle.
	Needle penetrates the bobbin thread.		Use a ball-point needle.
	Thread naps result in irregular thread tension.		Use tetron thread or thread of higher count as bobbin thread. (Equivalent to TOYOBO MANADO #90)
	Knife thread guide has been improperly positioned.		Adjust the position of the knife thread guide with regard to the needle entry as illustrated in the figure below. 
	Amount of oil in the hook is insufficient.		Increase the amount of oil in the hook.
	Thread path has scratches.		If the needle hole guide and inner hook have scratches, grind the scratched portions of the needle hole guide and inner hook.

Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
9. One or several stitches skip at the start of sewing.	Length of thread remaining at the tip of 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 thread guide pin and correct the position of the thread guide on the thread stand.
		The knife thread guide cuts the thread with the moving knife instead of the counter knife. In this case, length of thread remaining at the tip of needle after thread trimming will be too short.	The knife thread guide has bent and is pressed against the moving knife. In this case, replace the knife thread guide with a new one.
		Tension controller No. 1 or the tension controller on the thread guide pin excessively tenses the thread.	Turn the tension nut of the tension controller No. 1 or the tension controller on the thread guide pin counterclockwise to decrease the thread tension.
		Tension disk No. 2 fails to fully rise 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.
		Knife thread guide, moving knife or hook has scratches.	Check peripheries of holes in the hook and knife thread guide for scratches. Buff them up when necessary. If the scratches are large, replace the failed component with a new one.
		Tension release 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 waste has gathered in the knife thread guide, which prevents threads from being separated.	Clean up the knife thread guide and moving knife.
	Blade point of hook fails to tuck the thread.	Needle-to-hook relation is not proper.	Check the height of needle bar and adjust it to the standard height, if necessary. For spun thread, slightly lower the needle bar and retard the hook timing.
		Both 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).
		Blade point of the hook has worn out.	Correct the blade tip of the hook, or replace the hook with a new one.
		Needle has been improperly installed.	Properly adjust the inclination of the needle. If the needle has bent, replace it with a new one.

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Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
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	Length of bobbin thread at the sewing start is insufficient.	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.
			Increase the bobbin thread tension.
		Hook has scratches, which shortens the length bobbin thread remaining after thread trimming.	Correct the scratches on the hook, or replace the hook with a new one.
	Needle thread and bobbin thread fail to smoothly interlace with each other at the start of sewing.	Sewing speed at the start of sewing is excessive. As a result, the needle thread and bobbin thread fail to interlace with each other.	Reduce the sewing speed at the start of sewing.
10. Needle thread end is left on the upper cloth at the start of sewing.	Needle thread remaining at the needle tip after thread trimming is too long.	Tension of the thread guide pin is too low.	Increase the tension of the thread guide pin.
		Thread trimming cam timing has been excessively retarded.	Inspect the thread trimmer cam timing and properly adjust it.
		Counter knife is positioned too far from the needle entry point.	Properly adjust the position of counter knife.
		Tension release cam timing has been excessively advanced. As a result, an excessive amount of the needle thread is fed.	Inspect the tension release cam timing and adjust it properly.
	Thread is too thick for the needle used.		Replace the needle with a thicker one or replace the thread with a thinner one.
	Pattern is defective.	Material thickness is excessive at the start of sewing.	Adjust the pattern so that the sewing start is brought to a thin section of the material.
11. Wrong side of the material is poorly finished at the start of sewing. (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 "10. Needle thread end is left on the material at the start of sewing."
12. Thread comes off the needle eyelet at the start of sewing.	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.
		Hook thread presser fails to enter the bobbin case deeply enough. So, the needle thread sometimes slips off the hook thread presser.	Inspect the hook thread presser mechanism 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.
		Knife thread guide, 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.
		Moving knife cuts the thread in the knife thread guide. In this case, the needle thread is cut too short.	The knife thread guide has bent and is pressed against the moving knife. So, replace the knife thread guide with a new one.

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Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
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	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 smoothly interlace with each other at the start of sewing.	Sewing speed at the start of sewing is excessive. As a result, the needle thread and bobbin thread fail to interlace with each other.	Reduce the sewing speed at the start of sewing.
	Main shaft stops before the predetermined stop 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.
13. Loose stitches are made at the start of sewing.	Needle thread tension is insufficient at the start of sewing.	Bobbin thread tension is decreased at the start of sewing since the bobbin runs idle.	Increase the pressure of the idling prevention spring.
		Both bobbin thread tension and needle thread tension are insufficient.	Increase the bobbin thread tension and needle thread tension.
	The pattern used is defective.	Material thickness is excessive at the start of sewing.	Modify the pattern at the thin part of material.
		Pressure of the work clamp is insufficient at the start of sewing, causing the material to flop.	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.
	Intermediate presser has been improperly adjusted.	Height of the intermediate presser is excessive, causing the material to flop.	Lower the intermediate presser.
		Timing of the intermediate presser is defective.	Inspect the timing of the intermediate presser and properly adjust it.
14. Needle thread cannot be cut. (Bobbin thread can be cut.)	Last stitch skips at the end of sewing.	Needle has been improperly installed.	Properly install the needle and check whether the needle has bent.
		Stroke of the thread take-up spring is too large.	Reduce the stroke of the thread take-up spring. (Standard stroke: 10 to 12 mm)
		Hook timing has been improperly adjusted.	Run the sewing machine at low speed and check whether stitches skip. Then, properly re-adjust the hook timing.
		Needle entry of the last stitch excessively approaches the previous stitch.	Correct the pattern.

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Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
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	Knife blade partly fails to cut the thread sharp.	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.)	Remove the knife mounting base and cut approximately three cotton threads #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 tip of counter knife. Or, re-adjust the installing position of the counter knife.
	Thread waste has gathered in the moving knife and knife thread guide, which results in thread spreading failure.		Clean up the moving knife and knife thread guide.
15. Bobbin thread cannot be cut. (Needle thread can be cut.)	Backward travel amount of the moving knife is insufficient.	Properly adjust the backward travel amount of the moving knife.	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 needle.		Properly re-adjust the thread trimmer cam timing.
	Thread waste has gathered in the moving knife and knife thread guide, which results 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.
16. 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, which results in ill timing of thread trimming signal.		Properly re-adjust the initial position of the motor.
	Thread trimmer control plate fails to work. 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.	Threads cannot be trimmed.	Inspect the backward travel amount of the moving knife and properly adjust it.
			Inspect the engagement between the moving knife and the counter knife and properly adjust it.
	After the thread trimmer has actuated at the end of sewing, 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.	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
17. The sewing machine locks. (The sewing machine produces 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 position bracket has been improperly positioned. As a result, the presser bar position bracket interferes with the needle bar crank rod.	Inspect whether the presser bar position 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, which causes the work clamp to interfere with the intermediate presser.		Correct the position of the pattern so that the intermediate presser does not interfere with the work clamp.
	Work clamp has been improperly installed. As a result, the work clamp interferes with the intermediate presser.		Check whether the one-touch section of the work clamp has been properly installed.
18. 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.
	Pattern data have been improperly input.	The pattern fails to match the material used. As a result, needle entries are made out of position at overlapped sections of the material.	Correct the pattern.

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Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
	Needle is too thin for the material used.		Use a DB1x#11 (DELTA U) needle.
	Work clamp pressure is insufficient, resulting in material slippage.		Increase the pressure of the work clamp of sewing machine. Or, properly adjust the pressure of the conveyor.
	Stitching pitch is coarse, causing the needle to sway.		Fine the stitching pitch or use a thicker needle.
	Height of the intermediate presser is insufficient. As a result, the intermediate presser shifts the material.		Raise the intermediate presser.
19. Face plate produces abnormal noise.	Clearance provided between the inner hook and the bobbin case opening lever is too large.		Slightly reduce the clearance provided between the inner hook and the bobbin case opening lever.
	Plunger interferes with the needle bar crank rod.		Inspect how the position of the presser bar position bracket and plunger has been adjusted.
	Hook timing has been improperly adjusted, causing the blade point of hook to interfere with the needle.		Check whether the hook timing has been properly adjusted.
	Work clamp interferes with the intermediate presser.	The pattern used is defective.	Correct pattern so that the work clamp does not interfere with the intermediate presser.
		Work clamp has been improperly installed.	Check whether the one-touch section of the work clamp has been installed properly.
		Work clamp pressure is inadequate.	Increase the pressure of the work clamp.
	Oil shield of the face plate has been improperly installed.		Check whether the oil shield of the face plate interferes with the link thread take-up.
	Intermediate presser has been improperly adjusted.	Timing of the intermediate presser is defective.	Inspect the timing of the intermediate presser and adjust it properly.
		Height of the intermediate presser is not correct.	Height of the intermediate presser is insufficient. As a result, the intermediate presser taps the material.
20. 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.	Machine head fixing bolts have not been securely loosened.	Confirm the machine head fixing bolts are tightened with an adequate torque.

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Trouble	Cause (1)	Cause (2)	Inspection order and adjusting procedure
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	Backlash in the gear is defective.	Main shaft gear	Check whether the backlash in the main shaft gear is excessive.
		Pump body gear	Check whether the backlash in the pump body 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 X-Y housing level adjusters 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.
21. Needle breakage	Initial position of the main shaft motor has been improperly adjusted. As a result, the 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.
	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.
	Work clamp has been improperly installed, causing the work clamp to interfere with the needle.		Check whether the one-touch utility work clamp has been normally installed.
	Needle comes in contact with the moving knife.		Refer to the description given under "Moving knife locks."
	Thread waste has gathered around the hook.		Remove the throat plate and clean up the related components.
	Throat plate has been improperly installed, causing the needle to interfere with the needle hole guide.		Confirm that the throat plate is positioned correctly with respect to the needle entry.
22. Sewing machine stops immediately after it has been started.	The machine head has not been threaded.		Properly pass the needle thread through the machine head.
	Thread breakage detector is defective.		Confirm that the thread take-up spring properly comes in contact with the thread breakage detecting plate.

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