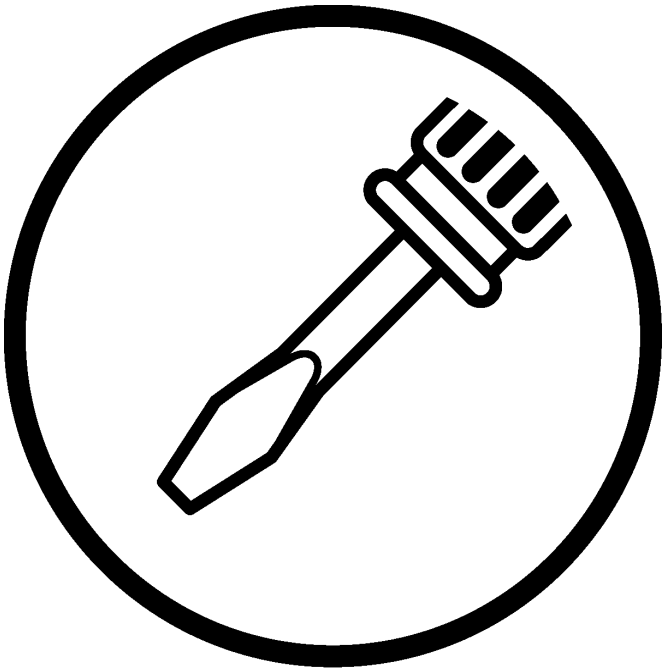
HE-800B

SERVICE MANUAL

Please read this manual before making any adjustments.

ELECTRONIC DIRECT DRIVE LOCKSTITCH BUTTON HOLER



brother

This service manual is intended for HE-800B; be sure to read the HE-800B instruction manual before this manual.
Carefully read the “SAFETY INSTRUCTIONS” below and the whole of this manual to understand this product before you start maintenance.

As a result of research and improvements regarding this product, some details of this manual may not be the same as those for the product you purchased.
If you have any questions regarding this product, please contact a Brother dealer.

SAFETY INSTRUCTIONS

[1] Safety indications and their meanings

This service manual and the indications and symbols that are used on the machine itself are provided in order to ensure safe operation of this machine and to prevent accidents and injury to yourself or other people.
The meanings of these indications and symbols are given below.

Indications

⚠ **DANGER**	The instructions which follow this term indicate situations where failure to follow the instructions will result in death or serious injury.
⚠ **WARNING**	The instructions which follow this term indicate situations where failure to follow the instructions could result in death or serious injury.
⚠ **CAUTION**	The instructions which follow this term indicate situations where failure to follow the instructions may result in minor or moderate injury.

Symbols

 . . . . . This symbol (△) indicates something that you should be careful of. The picture inside the triangle indicates the nature of the caution that must be taken.
(For example, the symbol at left means “beware of injury”.)

 . . . . . This symbol (⃠) indicates something that you must not do.

 . . . . . This symbol (●) indicates something that you must do. The picture inside the circle indicates the nature of the thing that must be done.
(For example, the symbol at left means “you must make the ground connection”.)

[2] Notes on safety

⚠ DANGER

Wait at least 5 minutes after turning off the power switch and disconnecting the power cord from the wall outlet before opening the control box cover. Touching areas where high voltages are present will result in serious injury from electric shocks.

⚠ WARNING

Do not allow any liquids to get onto this sewing machine, otherwise fire, electric shocks or operating problems may occur.

If any liquid gets inside the sewing machine (machine head or control box), immediately turn off the power and disconnect the power plug from the electrical outlet, and then contact the place of purchase or a qualified technician.

⚠ CAUTION

Environmental requirements

Use the sewing machine in an area which is free from sources of strong electrical noise such as electrical line noise or static electric noise.
Sources of strong electrical noise may cause problems with correct operation.

Any fluctuations in the power supply voltage should be within ±10% of the rated voltage for the machine.
Voltage fluctuations which are greater than this may cause problems with correct operation.

The power supply capacity should be greater than the requirements for the sewing machine's power consumption.
Insufficient power supply capacity may cause problems with correct operation.

The ambient temperature should be within the range of 5°C to 35°C during use.
Temperatures which are lower or higher than this may cause problems with correct operation.

The relative humidity should be within the range of 45% to 85% during use, and no dew formation should occur in any devices.
Excessively dry or humid environments and dew formation may cause problems with correct operation.

In the event of an electrical storm, turn off the power and disconnect the power cord from the wall outlet.
Lightning may cause problems with correct operation.

Installation

Machine installation should only be carried out by a qualified technician.

Contact your Brother dealer or a qualified electrician for any electrical work that may need to be done.

The sewing machine weighs approximately 56 kg. The installation should be carried out by two or more people.

Do not connect the power cord until installation is complete, otherwise the machine may operate if the treadle is depressed by mistake, which could result in injury.

Use both hands to hold the machine head when tilting it back or returning it to its original position. If only one hand is used, the weight of the machine head may cause your hand to slip, and your hand may get caught.

Be sure to connect the ground. If the ground connection is not secure, you run a high risk of receiving a serious electric shock, and problems with correct operation may also occur.

All cords should be secured at least 25 mm away from any moving parts. Furthermore, do not excessively bend the cords or secure them too firmly with staples, otherwise there is the danger that fire or electric shocks could occur.

Install the safety covers to the machine head and motor.

If using a work table which has casters, the casters should be secured in such a way so that they cannot move.

Be sure to wear protective goggles and gloves when handling the lubricating oil and grease, so that they do not get into your eyes or onto your skin, otherwise inflammation can result.
Furthermore, do not drink the oil or eat the grease under any circumstances, as they can cause vomiting and diarrhea.
Keep the oil out of the reach of children.

⚠ CAUTION

Sewing

This sewing machine should only be used by operators who have received the necessary training in safe use beforehand.

The sewing machine should not be used for any applications other than sewing.

Be sure to wear protective goggles when using the machine.
If goggles are not worn, there is the danger that if a needle breaks, parts of the broken needle may enter your eyes and injury may result.

Turn off the power switch at the following times, otherwise the machine may operate if the treadle is depressed by mistake, which could result in injury.

- When replacing the needle and bobbin
- When not using the machine and when leaving the machine unattended

Use threading mode or turn off the power first in order to carry out threading.

If using a work table which has casters, the casters should be secured in such a way so that they cannot move.

Attach all safety devices before using the sewing machine. If the machine is used without these devices attached, injury may result.

Do not touch any of the moving parts or press any objects against the machine while sewing, as this may result in personal injury or damage to the machine.

If an error occurs in machine operation, or if abnormal noises or smells are noticed, immediately turn off the power switch. Then contact your nearest Brother dealer or a qualified technician.

If the machine develops a problem, contact your nearest Brother dealer or a qualified technician.

Cleaning

Turn off the power switch before carrying out cleaning, otherwise the machine may operate if the treadle is depressed by mistake, which could result in injury.

Be sure to wear protective goggles and gloves when handling the lubricating oil and grease, so that they do not get into your eyes or onto your skin, otherwise inflammation can result.
Furthermore, do not drink the oil or eat the grease under any circumstances, as they can cause vomiting and diarrhea.
Keep the oil out of the reach of children.

Maintenance and inspection

Maintenance and inspection of the sewing machine should only be carried out by a qualified technician.

Ask your Brother dealer or a qualified electrician to carry out any maintenance and inspection of the electrical system.

Turn off the power switch and disconnect the power cord from the wall outlet at the following times, otherwise the machine may operate if the treadle is depressed by mistake, which could result in injury.

- When carrying out inspection, adjustment and maintenance
- When replacing consumable parts such as the rotary hook

Turn off the power switch before inserting or removing the plug, otherwise damage to the control box could result.

If the power switch needs to be left on when carrying out some adjustment, be extremely careful to observe all safety precautions.

Use both hands to hold the machine head when tilting it back or returning it to its original position. If only one hand is used, the weight of the machine head may cause your hand to slip, and your hand may get caught.

When replacing parts and installing optional accessories, be sure to use only genuine Brother parts.
Brother will not be held responsible for any accidents or problems resulting from the use of non-genuine parts.

If any safety devices have been removed, be absolutely sure to re-install them to their original positions and check that they operate correctly before using the machine.

To prevent accidents and problems, do not modify the machine yourself.
Brother will not be held responsible for any accidents or problems resulting from modifications made to the machine.

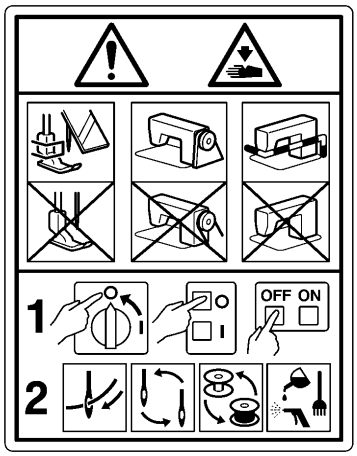
[3] Warning labels

The following warning labels appear on the sewing machine.
Please follow the instructions on the labels at all times when using the machine. If the labels have been removed or are difficult to read, please contact your nearest Brother dealer.

1

	⚠ 危 険	⚠ 危 险	
	高電圧部分にふれて、大けがをすることがある。 電源を切り、5分たってからカバーをはずすこと。	触摸高压电部分，会导致受伤。 在切断电源5分钟后，再开启盖罩。	
⚠ DANGER	⚠ GEFAHR	⚠ DANGER	⚠ PELIGRO
Hazardous voltage will cause injury.Turn off main switch and wait 5minutes before opening this cover.	Hochspannung verletzungsgefahr! Bitte schalten sie den hauptschalter aus und warten sie 5 minuten, bevor sie diese abdeckung öffnen.	Un voltage non adapte provoque des blessures.Eteindre l'interrupteur et attendre 5 minutes avantd'ouvrir le capot.	Un voltaje inadecuado puede provocar las heridas.Apagar el interruptor principal y esperar 5 minutos antes de abrir esta cubierta.

2



CAUTION
Moving parts may cause injury.

Operate with safety devices* installed.

Turn off the power before carrying out operations such as threading, changing the needle, bobbin, knives or hook, cleaning and adjusting.

*Safety devices
(A) Eye guard
(B) Finger guard
(C) Thread take-up cover
(D) Motor cover
(E) Slide cover

3

Be careful to avoid injury from the moving thread take-up.

4

Be careful not to get your hands caught when returning the machine head to its original position after it has been tilted.

5

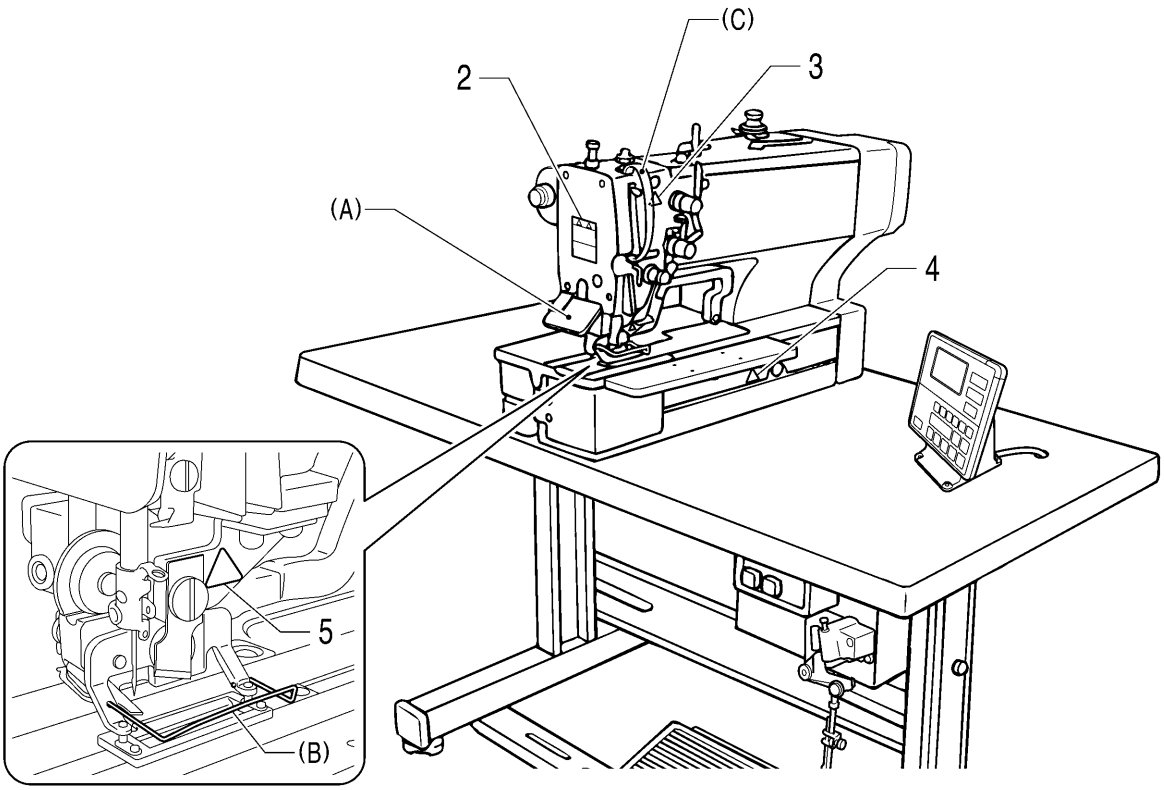
Be careful to avoid injury from the moving cutter.

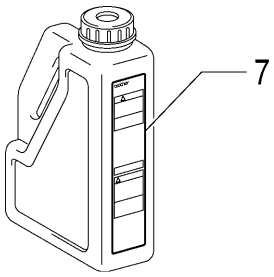
6

Be sure to connect the ground. If the ground connection is not secure, you run a high risk of receiving a serious electric shock, and problems with correct operation may also occur.

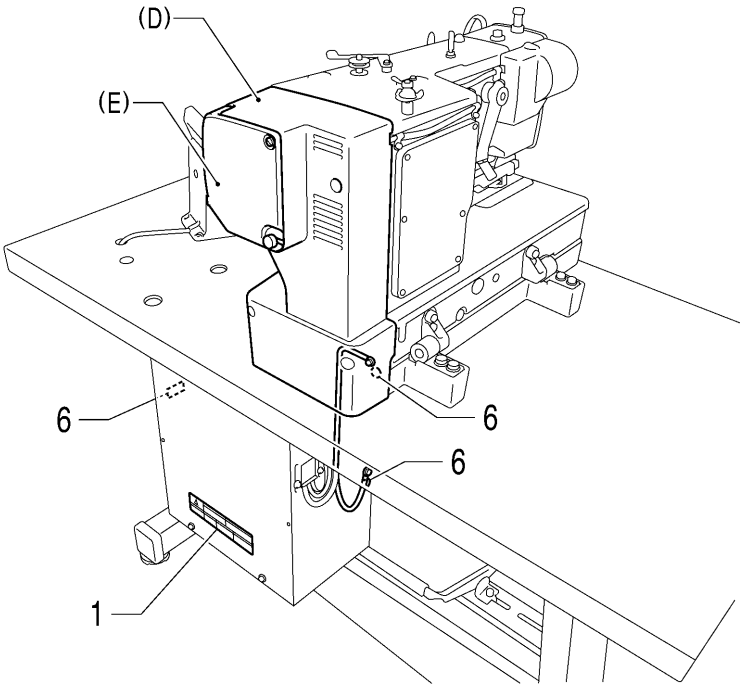
7

4730M





Oil tank
(accessory)



4731M

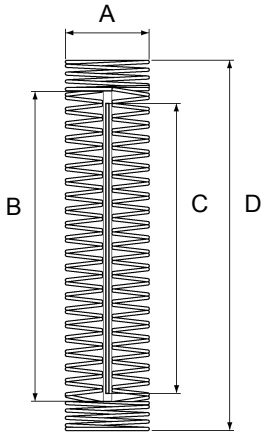
4732M

CONTENTS

1. SPECIFICATIONS

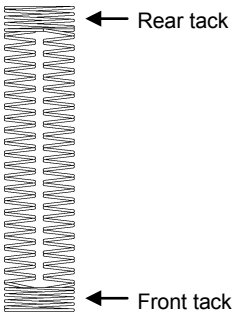
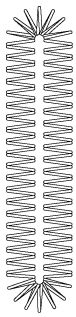
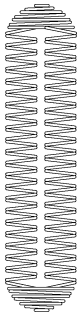
1-1. Specifications

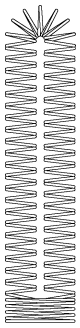
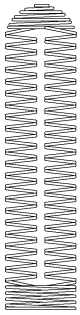
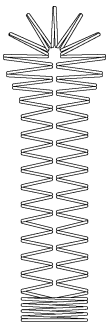
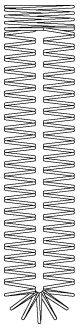
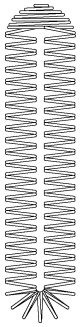
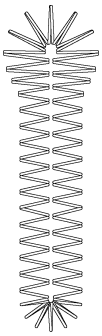
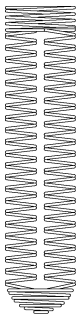
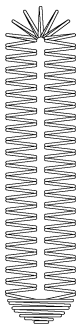
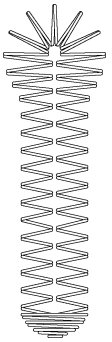
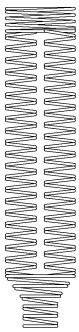
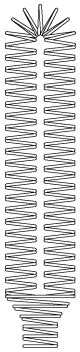
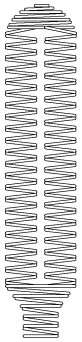
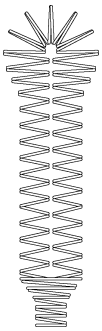
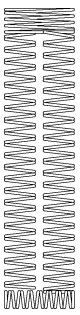
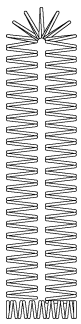
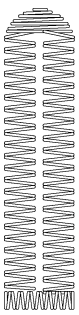
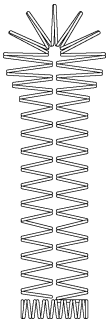
4734M

	Main use	Buttonhole size
2	Buttonholes for clothing such as dress shirts, blouses, work clothes and women's clothes	2193Q  A: Max.6 mm B: Max. zigzag stitch length 36 mm C: Length of the hole 4 – 32 mm D: Max. buttonhole length 40 mm
3	Buttonholes for knitted garments such as knitted underwear, sweaters, cardigans and jerseys	

Max. sewing speed	4,000 sti/min	
Zigzag mechanism	Pulse motor driven mechanism	
Feed mechanism	Pulse motor driven mechanism	
Work clamp lifter mechanism	Pulse motor driven mechanism	
Height of work clamp	13 mm max. (adjustable)	
Cutter drive method	Double position solenoid	
Lower thread holding device	Standard equipment	
Bobbin presser	Standard equipment	
Standard sewing pattern	21	
Memory pattern	50	
Max. number of stitch	999 stitches / program (Overall cycle program stitch no. 3,000 stitches)	
Needle	-2	-3
	Schmetz 134 Nm90	Schmetz 134 Nm75
Data recording media	SD memory card (No guarantees of operation can be given for any media.)	
Power supply	Single-phase 100V / 220V, 3-phase 220V / 380V / 400V (For single-phase 100 V and three-phase 380 V/400 V, the trans box is required.)	

1-2. Standard sewing pattern list

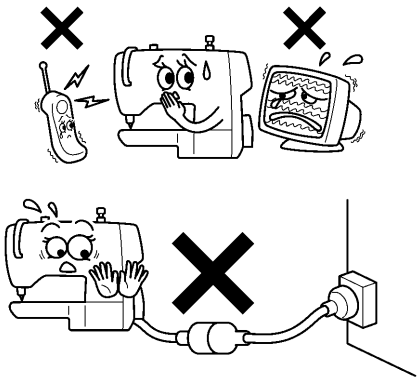
Rectangle	Radial	Round	Straight bar tack
			

Radial-rectangle	Round-rectangle	Eyelet-rectangle	Rectangle-radial	Round-radial	Eyelet-radial
					
Rectangle-round	Radial-round	Eyelet-round	Rectangle-taper tack	Radial-taper tack	Round-taper tack
					
Eyelet-taper tack	Rectangle-tack	Radial-tack	Round-tack	Eyelet-tack	
					

2. NOTES ON HANDLING

About the machine set-up location

- Do not set up this sewing machine near other equipment such as televisions, radios or cordless telephones, otherwise such equipment may be affected by electronic interference from the sewing machine.
- The sewing machine should be plugged directly into an AC wall outlet. Operation problems may result if extension cords are used.



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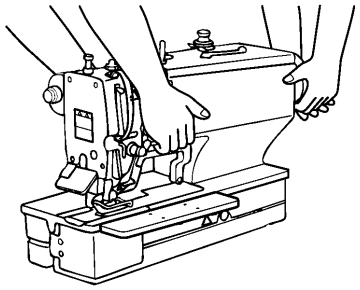
Carrying the machine

- The machine should be carried by the arm by two people as shown in the illustration.

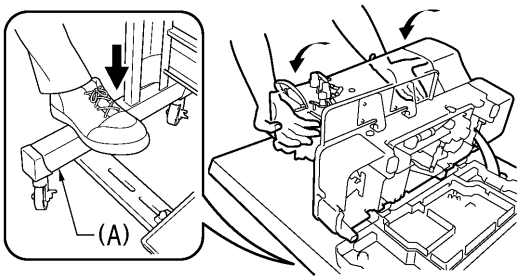


0597B

Tilting back the machine head

1. Pack away any tools which are near the table.
2. Secure the foot (A) so that the table will not move, and then pull the arm with both hands to tilt back the machine head.

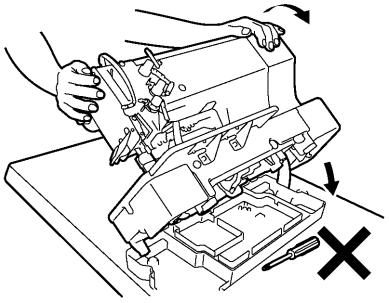
   * While supporting the arm with both hands, gently lower it.



0598D

Returning the machine head to the upright position

1. Pack away any tools which are near the table.
2. While supporting the arm with both hands, gently return the machine head to its original position.

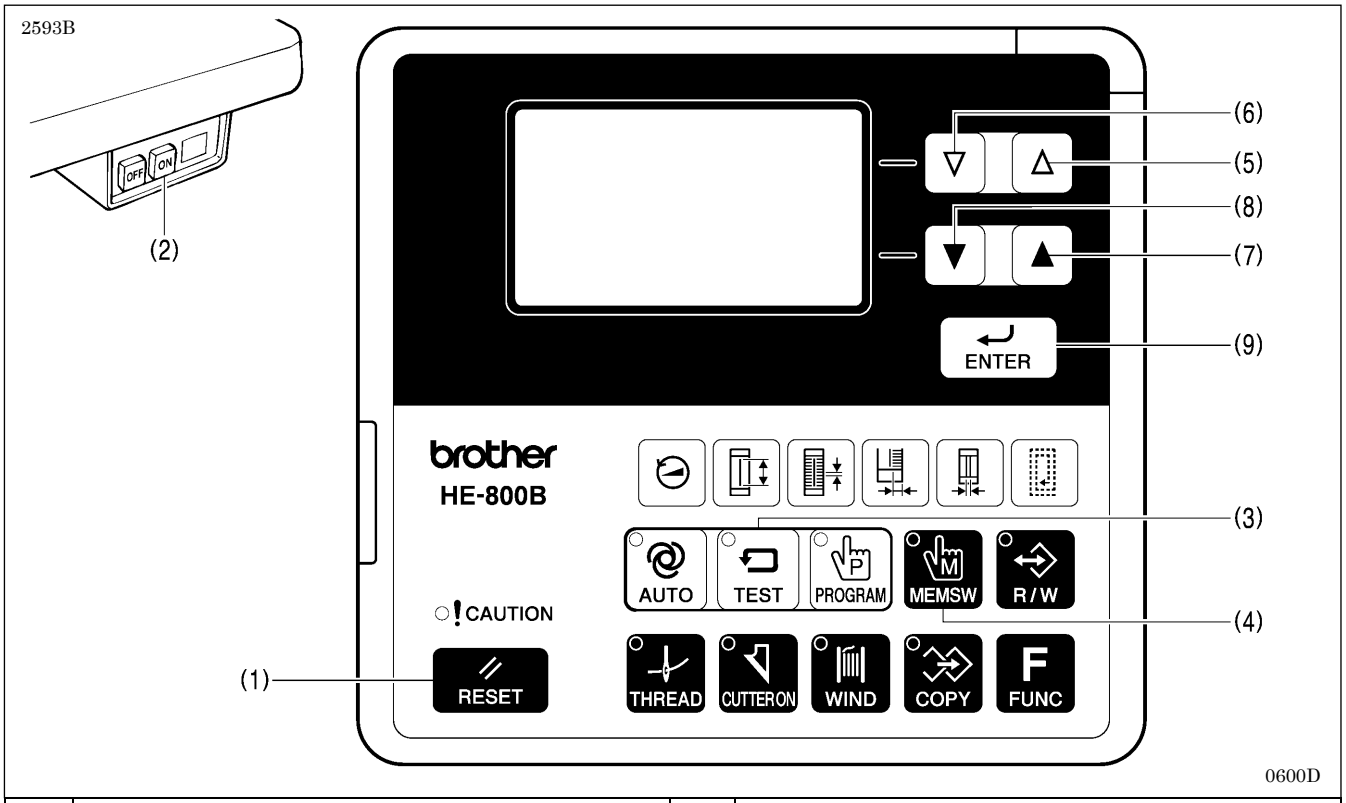


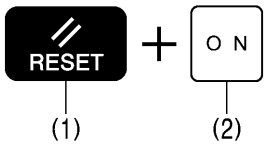
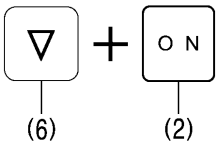
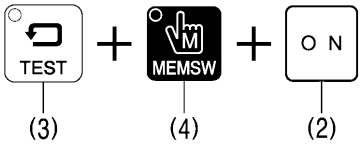
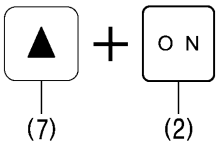
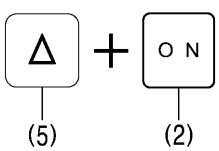
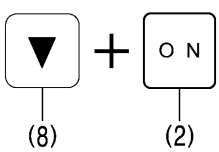
0599D

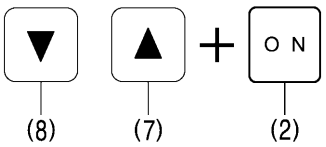
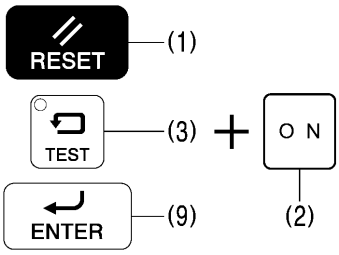
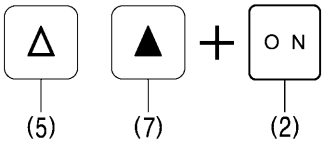
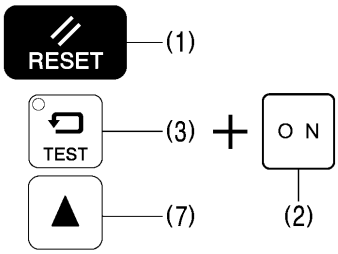
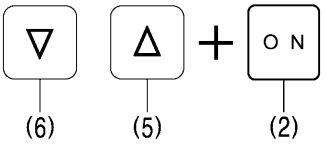
3. FUNCTION SETTINGS

3-1. List of special functions when power is turned on

This list shows the key operations for using special functions.

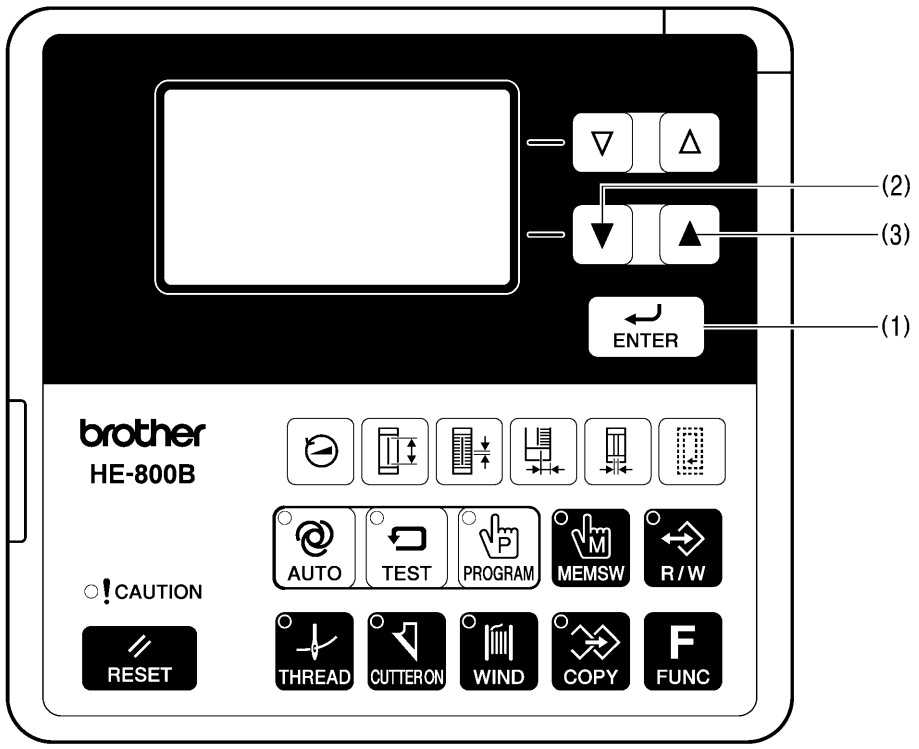


1	Data initialization function  0601D Refer to the CD Instruction Manual.	**4**	Output check function  0604D Refer to “3-8. Output checking method”.
2	Memory switch setting mode (Advanced)  0602D Refer to “3-3. Setting memory switches (Advanced)”.	**5**	Software version display function  0605D Refer to “3-9. Confirming software version”.
3	Input check function  0603D Refer to “3-7. Input checking method”.	**6**	Error log display function  0606D Refer to “3-6. Checking the error history”.

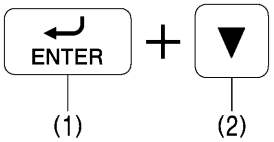
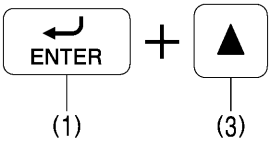
7	Home position adjusting mode  0607D Refer to “7-2. Adjusting the home position”.	**10**	Protect setting mode  0610D Refer to “3-10. Protection settings”.
8	Treadle position adjustment mode  0608D Refer to “7-22. Standard settings for treadle depression stroke”.	**11**	Version update  0611D Refer to “4-11. Updating the control program version”.
9	Upper shaft motor standard position adjustment mode  0609D Refer to “7-20. Adjusting the upper shaft motor reference position”.		

3-2. List of advanced functions

This list shows the key operations for using advanced functions.



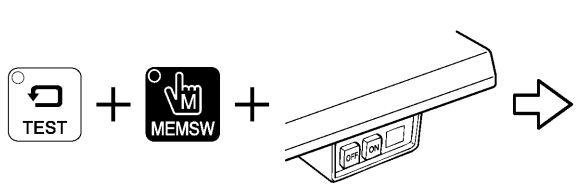
0612D

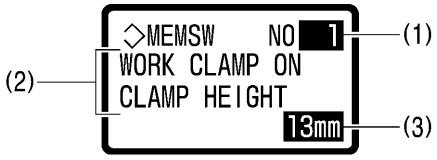
1	Lower thread counter setting mode  0613D Refer to the CD Instruction Manual.	**2**	Production counter setting mode  0614D Refer to the CD Instruction Manual.

3-3. Setting memory switches (Advanced)

The settings for the memory switches are valid for all programs.
Refer to “3-4. List of memory switch” for details on memory switch Nos. and settings.

1 While pressing the TEST and MEMSW keys, turn on the power switch.

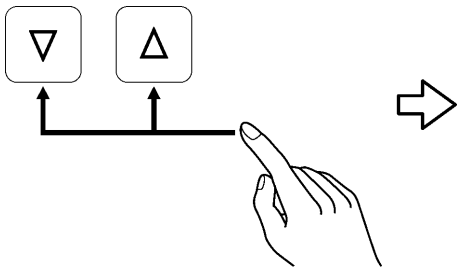


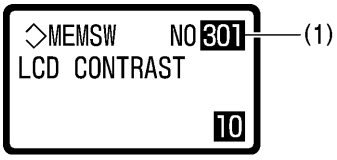


(1) Memory switch number
(2) Setting for selected number
(3) Setting range

0615D 4923M

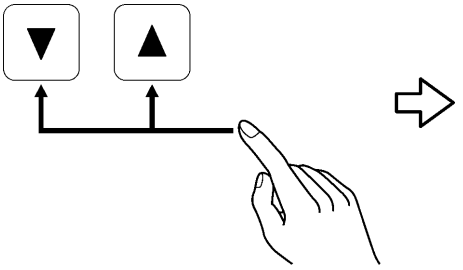
2 Select the memory switch (1) that you would like to change the setting for.

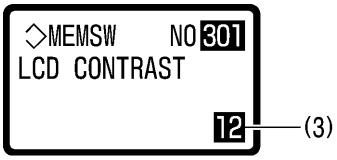




4787M 4924M

3 Change the setting value (3). 4925M

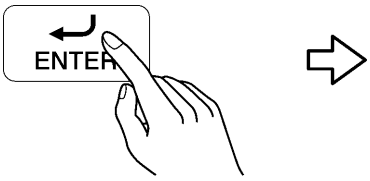


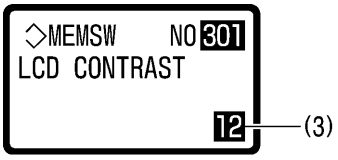


- When the setting value is changed, (3) will start flashing.
- If you would like to return the setting to the default value, press the RESET key.

4792M

4 Apply the changed setting. 4925M



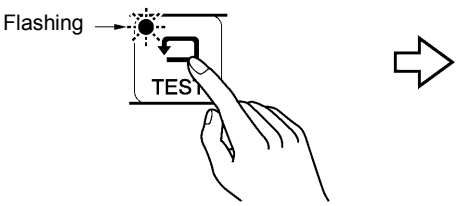


The setting for the memory switch will be stored and (3) will stop flashing and illuminate steadily.

4794M

5 To change the settings for other memory switch Nos., repeat the operations in steps 2 to 4 above.

6 Press the TEST key to exit memory switch mode. 4917M



Normal sewing machine operation will then be possible.

4857M

3-4. List of memory switches

NOTE:
In standard memory switch setting mode (refer to the CD instruction manual), the bottom two digits only display memory switch Nos. 00 to 49.
To make the bottom two digits display memory switch Nos. 50 to 99, switch the sewing machine to Administrator memory switch setting mode. (Refer to the previous page.)

Work clamp setting (001 to 099)

No.	Setting items	Setting range	Default value
001	Work clamp height when treadle is depressed. Settings can be made in units of 1 mm.	1 to 13	13
002	Work clamp height when treadle is at neutral position. Settings can be made in units of 1 mm.	1 to 13	10
003	Work clamp operation when treadle is depressed to the 1st step. * When using a triple pedal (optional part), this number will not be displayed. 1: Work clamp does not drop to intermediate position. 2: Work clamp drops to intermediate position.	1 to 2	1
004	Work clamp height (mm) when dropped to intermediate position. * Displayed when No. 003 above is set to “2”. Settings can be made in units of 0.1 mm.	0.1 to 8.0	1.0
050 *1	Sewing machine starting procedure (pedal type). 1: Treadle. 3: Triple pedal.	1,3	1
052	Pausing enabled during automatic sewing when treadle is depressed backward. * When using a triple pedal (optional part), this number will not be displayed. OFF: Pausing is not allowed. ON: Pausing is allowed.	ON/OFF	OFF
053	Work clamp operation when using a triple pedal. * When using a treadle, this number will not be displayed. (Refer to P. 15.) * Neutral indicates that the work clamp is at the neutral position. 1: Remains lowered even when the work clamp switch is released, intermediate lowering disabled, and starting prohibited when at neutral. 2: Remains lowered even when the work clamp switch is released, intermediate lowering enabled, and starting prohibited when at neutral. 3: Remains lowered even when the work clamp switch is released, intermediate lowering disabled, and starting allowed when at neutral. 4: Remains lowered even when the work clamp switch is released, intermediate lowering enabled, and starting allowed when at neutral. 5: Returns to neutral when the work clamp switch is released, intermediate lowering disabled, and starting prohibited when at neutral. 6: Returns to neutral when the work clamp switch is released, intermediate lowering enabled, and starting prohibited when at neutral. 7: Returns to neutral when the work clamp switch is released, intermediate lowering disabled, and starting allowed when at neutral. 8: Returns to neutral when the work clamp switch is released, intermediate lowering enabled, and starting allowed when at neutral.	1 to 8	1

*1 This is not initialized during initialization mode. Also not overwritten from SD card.

No.	Setting items	Setting range	Default value
055	Work clamp operation after automatic sewing is finished. OFF: Work clamp remains lowered after automatic sewing is finished. To raise the work clamp, carry out the following operations. (A) For treadle: Depress the treadle backward. (B) For triple pedal: Press the work clamp lifter switch. ON: Work clamp remains raised after automatic sewing is finished.	ON/OFF	ON
060	Work clamp lifting speed. -: Lifting speed becomes slower. +: Lifting speed becomes faster.	-4 to 4	0
061	Work clamp lowering speed. -: Dropping speed becomes slower. +: Dropping speed becomes faster.	-4 to 4	0
062	Thread trimming speed. -: Thread trimming speed becomes slower. +: Thread trimming speed becomes faster.	-4 to 4	0

Sewing machine motor settings (100 to 199)

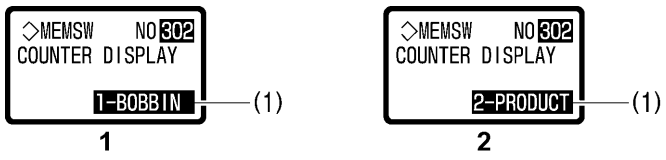
No.	Setting items	Setting range	Default value
150	Automatic needle lifter operation ON/OFF. OFF: If the pulley is at the needle up stop position during needle bar and work clamp home position detection, a needle up error will be generated. ON: If the pulley is not at the needle up stop position during needle bar and work clamp home position detection, it will move automatically to the needle up stop position, and then home position detection will be carried out.	ON/OFF	ON
151	Needle up stop position correction. Setting can be carried out in units of 1°. -: Stopping position becomes earlier. +: Stopping position becomes later.	-7 to 7	0

Feed mechanism (200 to 299)

No.	Setting items	Setting range	Default value
250	Automatic upper shaft deceleration to emphasize feeding. OFF: Normal. ON: The proportional feed time for each stitch is reduced from normal in order to prevent needle deflection with heavy materials. * This may limit the upper shaft speed.	ON/OFF	OFF
251	Feed timing correction. Setting can be carried out in units of 1°. -: Feed timing is advanced in relation to the upper shaft phase. +: Feed timing is retarded in relation to the upper shaft phase.	-20 to 20	0
252 *1	Home position detection method after power is turned on. 1: Home position detection is carried out by pedal operation. 2: Home position detection is carried out by pressing the RESET key.	1 to 2	1

*1 This is not initialized during initialization mode. Also not overwritten from SD card.

Operation panel settings (300 to 399)

No.	Setting items	Setting range	Default value
300	Parameter number assignment for FUNC key. Functions can be assigned to the FUNC key to make it operate as a seventh shortcut key. OFF: No assignment. (The help screen is displayed while the FUNC key is pressed.) 1 to 60: When the FUNC key is pressed, the parameter setting screen for the number which has been set is displayed.	OFF, 1 to 60	OFF
301	Display screen contrast. You can change the degree of contrast. The higher the number, the stronger the contrast.	1 to 15	10
302	Counter display during automatic sewing mode. The contents appearing at (1) in the display during automatic sewing mode can be set to either the lower thread counter display or the production counter display. 1: Lower thread counter 2: Production counter 	1 to 2	1
350	Production counter operation by cycle sewing units during cycle sewing. OFF: Counts in units of individual programs (1 hole). ON: Counts in units of individual cycle programs.	ON/OFF	OFF

User program settings (400 to 499)

No.	Setting items	Setting range	Default value
450	Maximum sewing speed. Setting can be carried out in units of 100 (sti/min). * When setting the sewing speed, the speed will be limited by this value.	1000 to 4000	4000
451	Maximum number of cycle programs. This lets you set the number of cycle programs that can be used. * If you do not want cycle programs to be displayed, set to “0”.	0 to 9	9

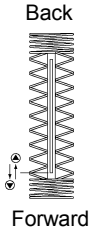
Device settings (500 to 599)

No.	Setting items	Setting range	Default value
550	Cutter power. The larger the value, the stronger the cutting force.	1 to 6	3
551	Cutter home position error checking. OFF: Error checking is not carried out (emergency measures when there is a sensor problem). ON: Error checking enabled.	ON/OFF	ON
552	Upper thread tightening when sewing underlays. OFF: Upper thread is not tightened. ON: Upper thread is tightened.	ON/OFF	OFF
554	Using the thread breakage detector. OFF: Thread breakage detector is not used. ON: Thread breakage detector is used.	ON/OFF	ON
555	Number of stitches before upper thread breakage is detected. * Displayed when No. 554 above is set to “ON”. Upper thread breakage detection starts after the set number of stitches has been sewn.	1 to 10	10
556	Number of stitches for upper thread breakage judgment. * Displayed when No. 554 above is set to “ON”. An upper thread breakage error occurs when the upper thread breakage signal is continuously ON for the set number of stitches.	2 to 7	5

Error processing settings (600 to 699)

No.	Setting items	Setting range	Default value
650	Time from error occurring to buzzer stopping. OFF: Buzzer does not stop. 2 to 30: Buzzer stops after the specified time (set in units of 2 seconds).	OFF, 2 to 30	OFF
651	Needle zigzag and feed motor energization status when a non-resettable error occurs. OFF: Needle zigzag and feed motor energization is turned off. ON: Needle zigzag and feed motor energization remains on.	ON/OFF	OFF
652	Needle zigzag motor status when a pause or thread breakage occurs during automatic sewing. OFF: Needle zigzag motor energization is turned off. ON: Needle zigzag motor energization remains on.	ON/OFF	ON

Maintenance settings (700 to 799)

No.	Setting items	Setting range	Default value
700	Y cutting position (feed direction) correction. The cutter position for the sewing pattern can be corrected in the Y (feed) direction. Settings can be made in units of 0.025 mm. When + is selected, the cutting position moves further to the back.  1445Q	-0.800 to 0.800	0
750	Continuous sewing permission (for administrator). OFF: Disabled (Continuous sewing forbidden). ON: Sewing operation is repeated while the treadle is being depressed to 2nd step. **NOTE:** This setting is test operation mode for use by an administrator. It is dangerous to set it to ON while sewing, so be sure to set it back to OFF after use.	ON/OFF	OFF
751	Continuous sewing interval (for administrator). * Displayed when No. 750 above is set to “ON”. Setting can be carried out in units of 100 ms.	0 to 2500	1000
752	Sewing machine ID code (for specifying SD card folder)	0 to 99	0
755	Thread winding speed limit. OFF: Upper limit is not limited to 2000 sti/min. * Thread winding is carried out at the speed specified at the operation panel. ON: Upper limit is limited to 2000 sti/min. * If the speed specified at the operation panel exceeds 2000 sti/min, thread winding will be limited to 2000 sti/min.	ON/OFF	ON

Specification and destination settings (800 to 899)

No.	Setting items	Setting range	Default value
850 *1	Machine head specifications 2: -2 specifications (for cotton and silk) 3: -3 specifications (for knitted materials)	2,3	-2 specifications: 2 -3 specifications: 3 *2
851 *1	Sewing area(Work clamp size) *4 Sewing area / Work clamp size 1: 4.0 x 15.0mm / 5.4 x 19.0mm 2: 4.0 x 20.0mm / 5.4 x 24.5mm 3: 4.0 x 32.0mm / 5.4 x 36.0mm 4: 5.4 x 20.0mm / 6.8 x 24.5mm 5: 5.4 x 32.0mm / 6.8 x 36.0mm 6: 5.4 x 40.0mm / 6.8 x 47.0mm 7: 6.0 x 20.0mm / 7.3 x 24.5mm 8: 6.0 x 32.0mm / 7.3 x 36.0mm 9: 6.0 x 40.0mm / 7.3 x 47.0mm	1 to 9	3
852 *1	Max. needle zigzag feed width(Needle plate size) *4 4: 4mm(5.4mm) 6: 6mm(7.3mm)	4,6	-2 specifications: 6 -3 specifications: 4 *2
853 *1	Language 0: English 1: Japanese 2: Chinese	0 to 2	China: 2 Europe: 0 Other: 0 *3

*1 This is not initialized during initialization mode. Also not overwritten from SD card.
*2 The initial value is determined by the machine head specifications at the time of shipment from the factory.
*3 The initial value is determined by the shipping destination at the time of shipment from the factory.

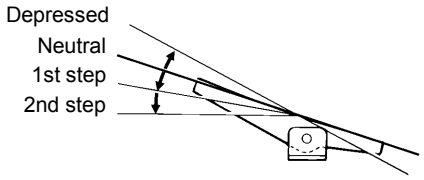
*4 The actual sewing area is determined by the work clamp dimensions and the needle plate dimensions.

		Needle plate size	
		5.4mm	7.3mm
Work clamp size (Width x Length)	5.4 x 19.0mm	4.0 x 15.0mm	4.0 x 15.0mm
	5.4 x 24.5mm	4.0 x 20.0mm	4.0 x 20.0mm
	5.4 x 36.0mm	4.0 x 32.0mm	4.0 x 32.0mm
	6.8 x 24.5mm	4.0 x 20.0mm	5.4 x 20.0mm
	6.8 x 36.0mm	4.0 x 32.0mm	5.4 x 32.0mm
	6.8 x 47.0mm	4.0 x 40.0mm	5.4 x 40.0mm
	7.3 x 24.5mm	4.0 x 20.0mm	6.0 x 20.0mm
	7.3 x 36.0mm	4.0 x 32.0mm	6.0 x 32.0mm
	7.3 x 47.0mm	4.0 x 40.0mm	6.0 x 40.0mm

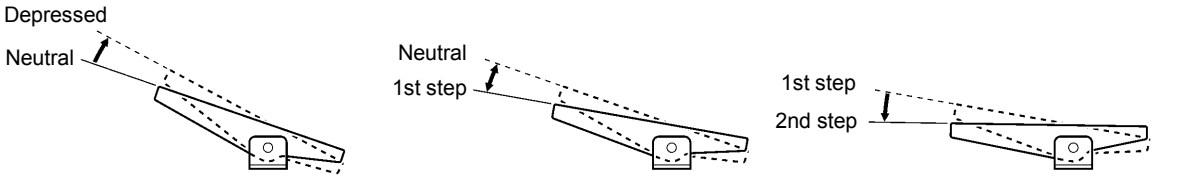
3-5. Pedal operation mode setting method

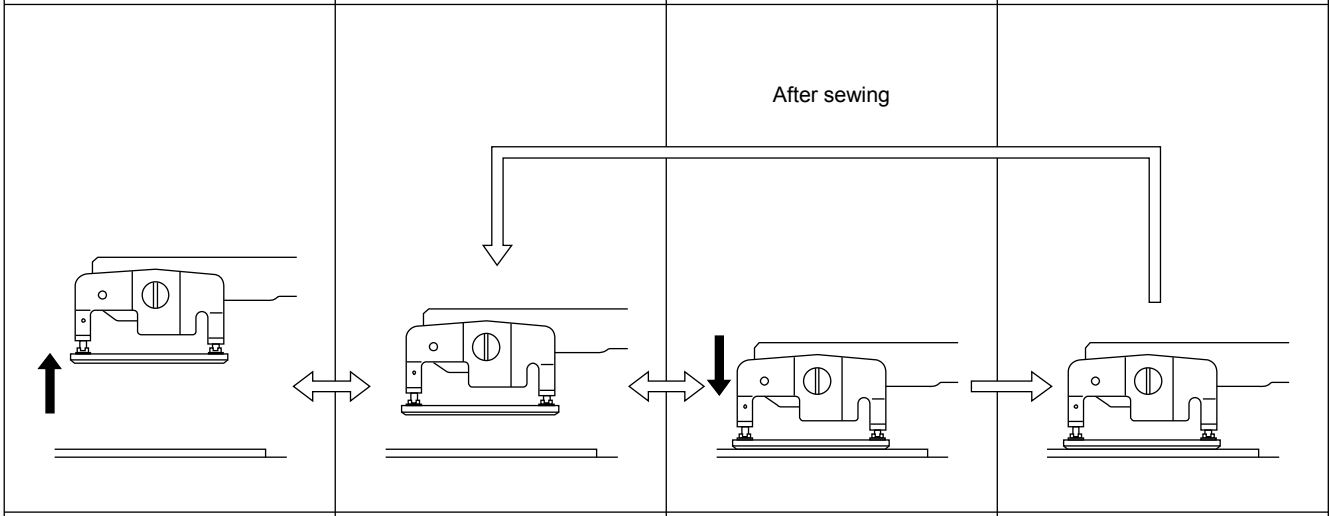
When using the treadle

The following table describes the operation of the work clamp during sewing standby mode when using the treadle.



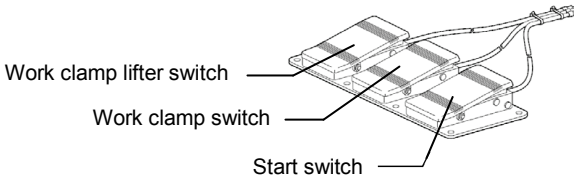
1. Set memory switch No. 050 to “1”.
2. Use memory switch No. 003 to select the desired operation mode from the following.

Setting value No.003	Treadle						
							
	Depressed backward	Release → ← Depress backward	Neutral	→ Depres ← Releas	1st step	→ Depressed further	2nd step
1	Work clamp raised	→ ←	Work clamp neutral position	→ ←	Work clamp maximum drop	→	Sewing machine start
2	Work clamp raised	→ ←	Work clamp neutral position	→ ←	Work clamp intermediate drop	→	Work clamp maximum drop + sewing machine start

Insertion and removal of the material	Normal position	Buttonhole positioning	Sewing
			
Raised	Neutral	Intermediate drop	Maximum drop

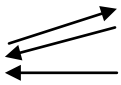
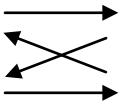
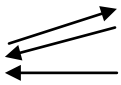
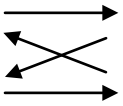
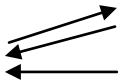
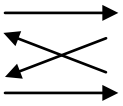
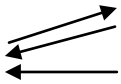
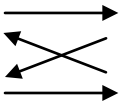
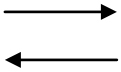
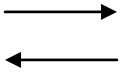
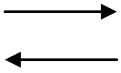
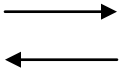
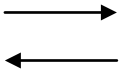
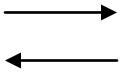
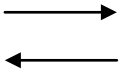
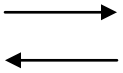
When using a triple pedal (option)

The following table describes the operation of the work clamp during sewing standby mode when using a triple pedal.



0770D

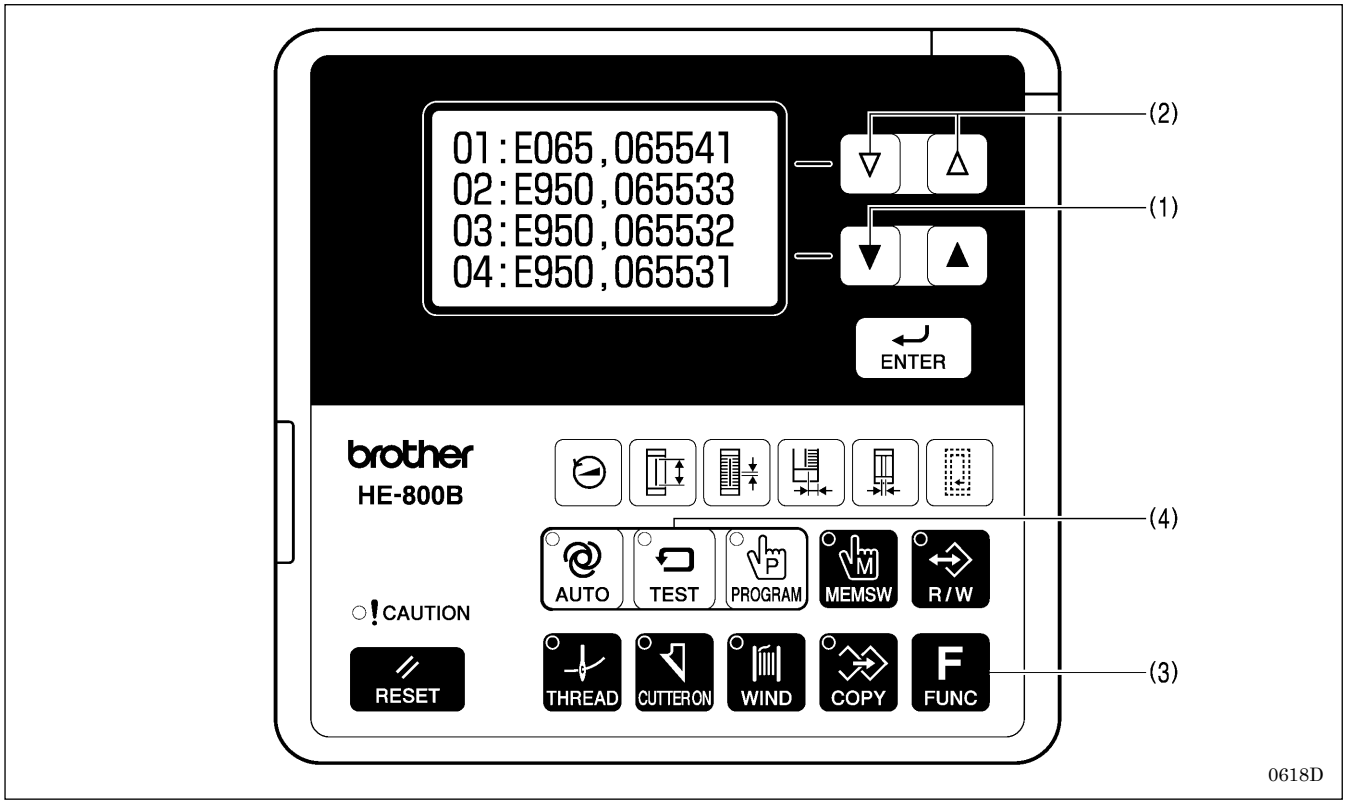
1. Set memory switch No. 050 to “3”.
2. Use memory switch No. 053 to select the desired operation mode from the following.

Setting value No. 053	Work clamp lifter switch	Release → ← Depress	All switches OFF	Depress → ← Release	Work clamp switch	Start switch
1	Work clamp lifts		Work clamp neutral position **[Work clamp maximum drop]**		**[Work clamp maximum drop]** Work clamp neutral position	Sewing machine starts
2	Work clamp lifts		Work clamp neutral position **[Work clamp intermediate drop]**		**[Work clamp intermediate drop]** Work clamp neutral position	Work clamp maximum drop + Sewing machine starts
3	Work clamp lifts		**[Work clamp neutral position]** **[Work clamp maximum drop]**		**[Work clamp maximum drop]** Work clamp neutral position	(Work clamp maximum drop) + Sewing machine starts
4	Work clamp lifts		**[Work clamp neutral position]** **[Work clamp intermediate drop]**		**[Work clamp intermediate drop]** Work clamp neutral position	Work clamp maximum drop + Sewing machine starts
5	Work clamp lifts		Work clamp neutral position		**[Work clamp maximum drop]**	Sewing machine starts
6	Work clamp lifts		Work clamp neutral position		**[Work clamp intermediate drop]**	Work clamp maximum drop + Sewing machine starts
7	Work clamp lifts		**[Work clamp neutral position]**		**[Work clamp maximum drop]**	(Work clamp maximum drop) + Sewing machine starts
8	Work clamp lifts		**[Work clamp neutral position]**		**[Work clamp intermediate drop]**	Work clamp maximum drop + Sewing machine starts

* The start switch is enabled at statuses indicated by [ ].

3-6. Checking the error history

The past error history can be checked by the following procedure.



1. While pressing the ▼ key (1), turn on the power switch.
   Error history numbers, error codes and production counter values (lower 6 digits) will be displayed on the screen.

   NOTE:
   E025, E035, E045, E065, E705 and error codes which can be reset do not remain in the error history, and so they will not be displayed.

2. Press the Δ or ∇ key (2) to switch the error history sequentially.
   Up to 96 histories (01 to 96) are stored in order starting from the newest. No. 01 represents the newest error.
   (If there are no error codes, “E---” will be displayed.)
   While the FUNC key (3) is being pressed, the error codes will be removed from the display and the production counter when the error occurred will be displayed as 10 digits.

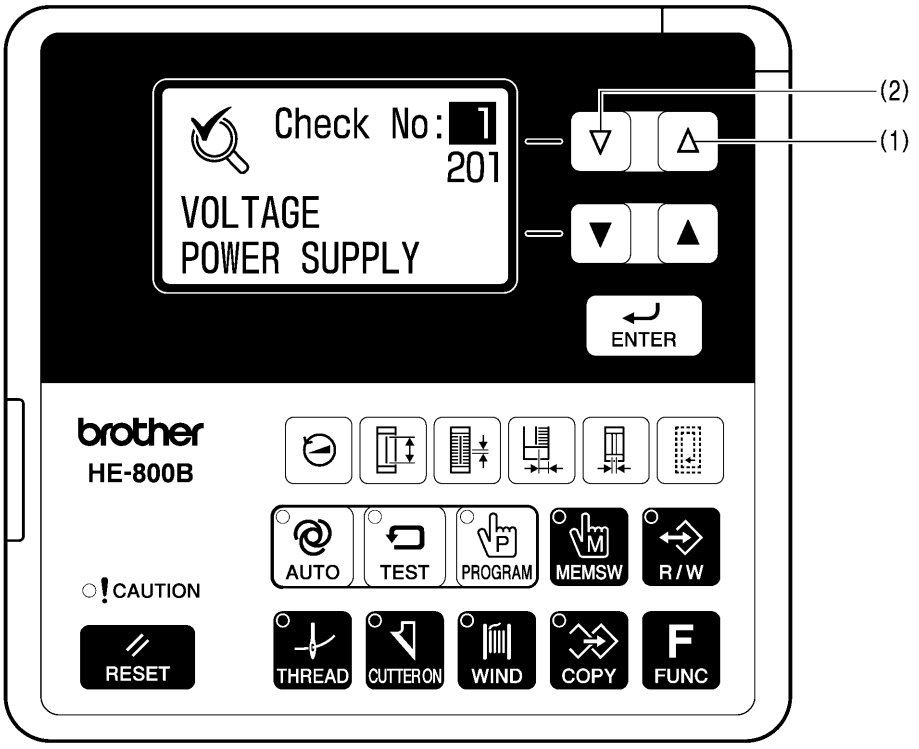
3. Press the TEST key (4) to return to the normal display. The sewing machine will switch to home position detection standby.

3-7. Input checking method

This is used at the following times.

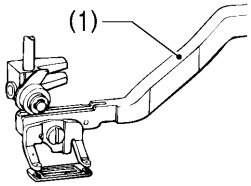
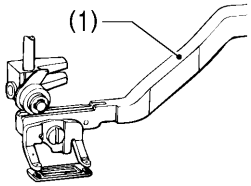
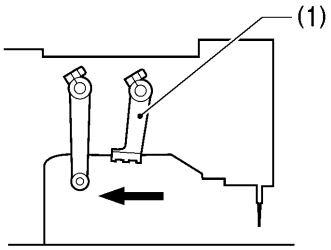
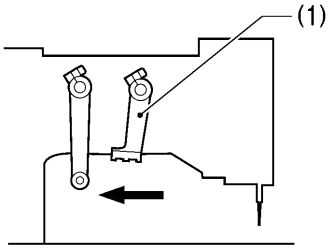
- When you would like to check for problems with the operation panel.
- When you would like to check for broken cords.
- When you would like to adjust a sensor position.

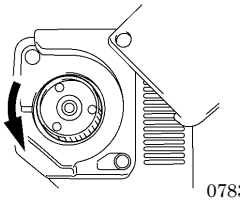
This lets you check if the CPU is reading signals from the keys and the sensors correctly.



1. While pressing the Δ key (1), turn on the power switch.
   Item numbers, item names and input statuses will be displayed on the screen.
2. Press the Δ key (1) or the ∇ key (2) to select the desired item number.
3. Refer to the input check list to check the key and sensor responses.
4. When returning to normal operation, turn power off and then on again.

<Input check list>

Item No.	Input status	Check item and checking method
1	***	Shows the input voltage.
2	ON/OFF	X (needle zigzag) axis motor home position sensor position. Move the needle bar manually. Turns ON when moved to the left.
3	***	X (needle zigzag) axis motor encoder counter value. Move the needle bar manually. Goes down when moved to the left. * When the power is turned on, the position will be “0”.
4	ON/OFF	Y (feed) axis motor home position sensor position. Move the feed arm (1) manually.  0771D Turns on when moved to the inside.
5	***	Y (feed) axis motor encoder counter value. Move the feed arm (1) manually.  0771D Goes down when moved to the inside. * When the power is turned on, the position will be “0”.
6	ON/OFF	Work clamp motor home position sensor position. Move the trimmer driving arm (1) manually.  1770B Turns on when moved in the direction of the arrow.
7	***	Work clamp motor encoder counter value. Move the trimmer driving arm (1) manually.  1770B Goes down when moved in the direction of the arrow. * When the power is turned on, the position will be “0”.
8	0 to 255	Treadle analog value. Depress the treadle. When depressed forward, the value increases. * Should normally display somewhere around 109 when at the neutral position.

9	ON/OFF	Work clamp lifter switch. Turns on when the work clamp lifter switch of the triple pedal (option) is pressed.
10	ON/OFF	Work clamp switch. Turns on when the work clamp switch of the triple pedal (option) is pressed.
11	ON/OFF	Start switch. Turns on when the start switch of the triple pedal (option) is pressed.
12	ON/OFF	STOP switch connection signal. Turns off when the STOP switch is not connected.
13	ON/OFF	STOP switch. Turns on when the STOP switch is pressed.
14	ON/OFF	Safety switch. Turns off when the machine head is tilted back.
15	ON/OFF	Cutter home position sensor. Turns off when the cutter is pushed down by hand.
16	ON/OFF	Upper thread breakage detection signal. Turns off when the upper thread breakage detection guide is moved to the right.
19	ON/OFF	Needle up signal. Turn the pulley by hand. * ON in the needle up region, OFF in any other region.
20	0 to 359	Upper shaft 360 degree rotation signal. Turn the pulley by hand. * Increases when turned forward (counterclockwise rotation).  0783D
21	ON/OFF	▲ key.
22	ON/OFF	▼ key.
23	ON/OFF	ENTER key.
24	ON/OFF	Shortcut 1 key.
25	ON/OFF	Shortcut 2 key.
26	ON/OFF	Shortcut 3 key.
27	ON/OFF	Shortcut 4 key.
28	ON/OFF	Shortcut 5 key.
29	ON/OFF	Shortcut 6 key.
30	ON/OFF	AUTO key.
31	ON/OFF	TEST key.
32	ON/OFF	PROGRAM key.
33	ON/OFF	MEMSW key.
34	ON/OFF	R/W key.
35	ON/OFF	RESET key.
36	ON/OFF	THREAD key.
37	ON/OFF	CUTTER ON key.
38	ON/OFF	WIND key.
39	ON/OFF	COPY key.
40	ON/OFF	FUNC key.
42	ON/OFF	Option input 2.
43	ON/OFF	Option input 3.
44	ON/OFF	Option input 4.
45	ON/OFF	Option input 5.
46	ON/OFF	Option input 6.
47	ON/OFF	Option input 7.
48	ON/OFF	Option input 8.
49	ON/OFF	Option input 9.
50	ON/OFF	Option input 10.

3-8. Output checking method

This is used at the following times.

- When you would like to check for problems with the operation panel.
- When you would like to check for a problem with the drive mechanism.
- When you would like to check for broken cords.

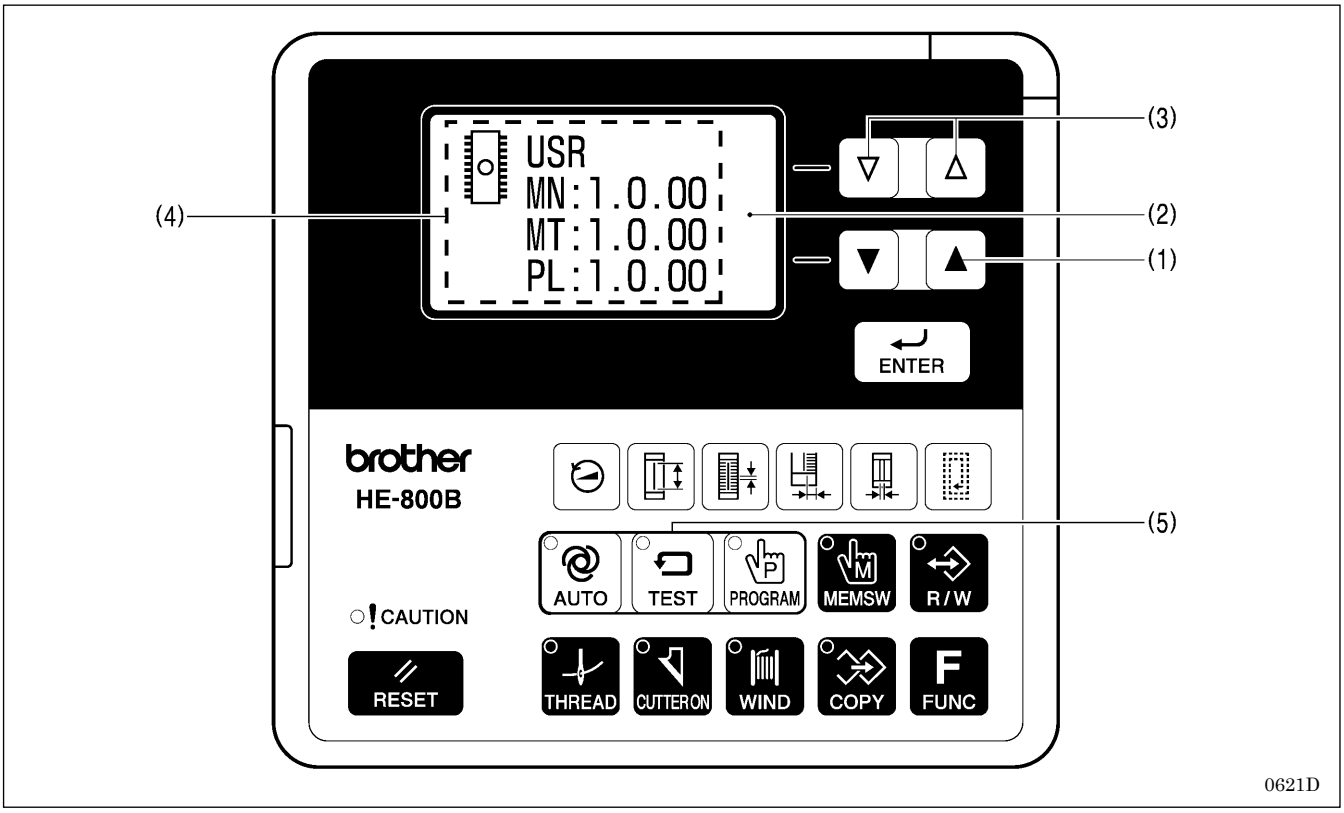
You can check whether the signals being output by the CPU are driving the mechanisms correctly.

NOTE:
Carry out this procedure after checking that the input check is normal. If there are problems with the input signals, it may not be possible to carry out an output check.

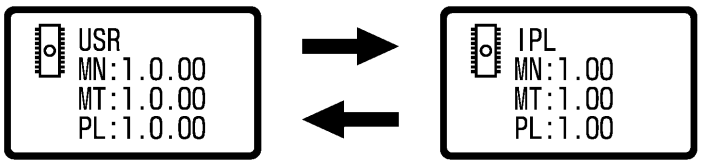
1. While pressing the ∇ key (1), turn on the power switch.
2. Depress the treadle to the 2nd step. (Start switch for a triple pedal)
   The needle bar and the work clamp will move to the home position. Item numbers and item names will be displayed on the screen.
3. Press the Δ key (2) or the ∇ key (1) to select the desired item number.
4. The operations for item codes 51 to 53 can be checked by pressing the ▲ or ▼ key (3).
   * The operation for that check item will be carried out while the key is being pressed.
5. For item numbers 54 and after, depress the treadle to the 2nd step. (Start switch for a triple pedal)
   * The operation for the item being checked will be carried out while the treadle is being depressed.
6. When returning to normal operation, turn power off and then on again.

Item No.	Operation
51	When the ▲ and ▼ keys are pressed, the needle bar will move in units of 1 mm. ▲ : Needle bar moves to the right (+). ▼ : Needle bar moves to the left (-).
52	When the ▲ and ▼ keys are pressed, the work clamp will move in units of 0.1 mm. ▲ : Work clamp moves to the front (+). ▼ : Work clamp moves to the back (-).
53	When the ▲ and ▼ keys are pressed, the work clamp will move in units of 0.12 mm. ▲ : Work clamp moves up (+). ▼ : Work clamp moves down (-). At this time, upper thread trimming and lower thread trimming are carried out in conjunction with the operation of the work clamp.
54	The buzzer will sound for 0.7 second, and then the sewing machine will start (at the longest for 1 minute). Immediately after the motor stops, the upper shaft angle (normally around 55) will be displayed. While the motor is stopped, you can press the ▲ and ▼ keys to change the speed (between 1000 sti/min and 4000 sti/min).
55	The buzzer will sound for 0.7 second, then the work clamp will move 15 mm back and forth, and then the cutter will operate.
56	The tension release solenoid will turn on.
57	The panel indicators will illuminate in order. CAUTION → AUTO → TEST → . . . . → COPY
58	The buzzer will sound.
59	Option output 1 will turn on.
60	Option output 2 will turn on.
61	Option output 3 will turn on.
62	Option output 4 will turn on.
63	Option output 5 will turn on.
64	Option output 6 will turn on.
65	Option output 7 will turn on.
66	Option output 8 will turn on.
67	Option output 9 will turn on.
68	Option output 10 will turn on.
69	Option output 11 will turn on.
70	Option output 12 will turn on.
71	Option output 13 will turn on.
72	Option output 14 will turn on.
73	Option output 15 will turn on.
74	Option output 16 will turn on.
75	Option output 17 will turn on.
76	Option output 18 will turn on.
77	Option output 19 will turn on.
78	Option output 20 will turn on.

3-9. Confirming software version



1. If you turn on the power while pressing the ▲ key (1), the software version will be displayed in the menu display (2).
2. The PROGRAM No. display (4) will change as follows each time the Δ or ∇ key (3) is pressed.



USR	MN	Main control program
	MT	Motor control program
	PL	Panel control program
IPL	MN	Main IPL
	MT	Motor IPL
	PL	Panel IPL

3. Press the TEST key (5) to return to the normal display. The sewing machine will switch to home position detection standby.

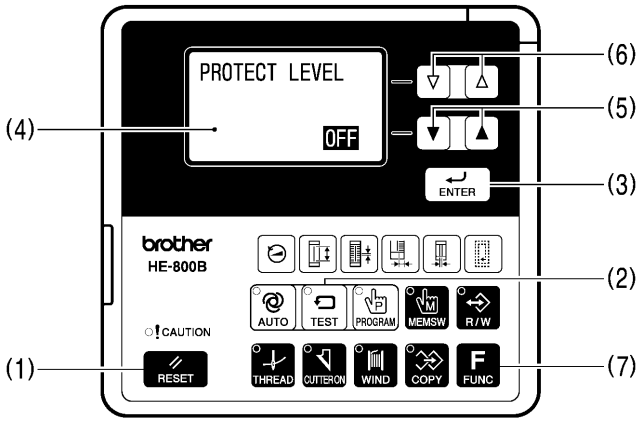
3-10. Protection settings

There are two ways which can be used to switch to protect setting mode: **Method A** (which does not require an SD card) and **Method B** (which requires an SD card).
If you want to set up the sewing machine so that these modes cannot be distinguished, it is recommended that you set the method to Method B.

* If using an SD card, read the section titled “4-1. Notes on handling SD cards (commercially available)”.

Method A

1. While pressing the RESET key (1) and the TEST key (2) and the ENTER key (3), turn on the power switch.
   * The previous protection level (OFF, 1 to 5) will appear in the menu display (4).
   * The protection level is set to OFF at the time of shipment from the factory.



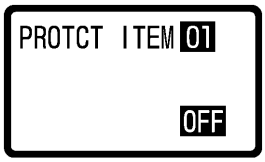
0801D

* If a beeping sound is heard and “Wrong Starting” is displayed, it means that the method has been set to “**Method B**”. In this case, start by means of **method B**. (Refer to the next page.)

2. Press the ▲ or ▼ key (5) to select the protection level.

Protection level	Details
OFF	Nothing is disallowed.
1 to 4	Certain operations are disallowed depending on the protection level. * Protected items have been preset for each level. Refer to “Table of protection levels and corresponding protected items” on page 25.
5	You can set the protection level for each of the 11 items individually. * Set to ON (disallowed) or OFF (allowed) for each item. * All items are set to OFF at the time of shipment from the factory.

3. Press the ENTER key (3) to store the protection level.
   * If setting to a protection level other than level 5, proceed to step 4. If setting to level 5, proceed to step 5.
4. Press the TEST key (2).
   * The display will return to the normal display and the sewing machine will change to home position standby.
5. Item numbers and setting values (ON/OFF) will be displayed on the screen.



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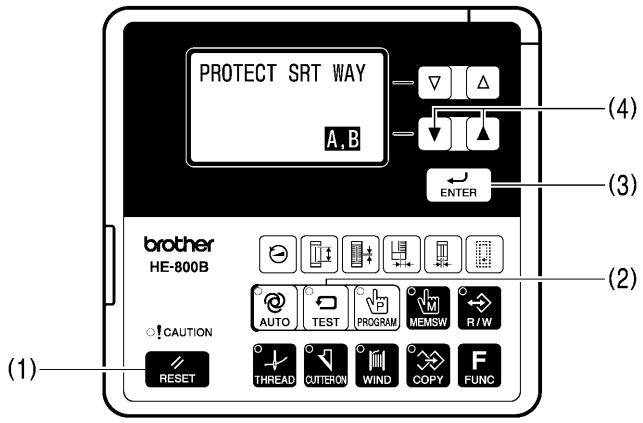
6. Press the Δ or ∇ key (6) to select the item number (1 to 11). (Refer to page 25.)
7. Press the ▲ or ▼ key (5) to change the setting (ON/OFF).
8. Press the ENTER key (3) to store the setting (ON/OFF).
9. Repeat steps 6 to 8 above for each item, and then press the TEST key (2).
   * The protect setting mode will be exited and the sewing machine will change to home position standby.
   * To return to the protection level setting status (step 2 above), press the FUNC key (7).

Method B

Have an SD card ready.

* The SD card is only used at the step of selecting protect setting mode, so any type of SD card can be used as long as it can be accessed. In addition, if making the setting two or more times, a different SD card from the one used before can be used.

1. Insert the SD card, and then while pressing the RESET key (1) and the TEST key (2) and the ENTER key (3), turn on the power switch.
   * The previous starting method (“A, B” or “B”) will appear in the menu display.
   * The method is set to “A,B” at the time of shipment from the factory.



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2. Press the ▲ or ▼ key (4) to select the next starting method.

Starting method	Details
A,B	Protect setting mode can be started using either Method A or Method B.
B	Protect setting mode can only be started using Method B.

3. Press the ENTER key (3) to store the starting method.
4. For the method of operation from this point onward, refer to steps 2 to 9 in “**Method A**” (previous page).

Table of protection levels and corresponding protected items

× : Operation disallowed

Level / Setting items	OFF	1	2	3	4	5										
						1	2	3	4	5	6	7	8	9	10	11
Data initialization		×	×	×	×	×										
Standard memory switch settings		×	×				×									
Administrator memory switch settings		×	×	×				×								
Changing the program number		×	×	×					×							
Changing the sewing speed (Parameters relating to sewing speed)		×	×	×	×					×						
Program editing		×	×	×							×					
Program copy mode		×	×	×							×					
Cutter operation		×	×	×								×				
Production counter editing		×	×										×			
Lower thread counter editing		×	×											×		
Resewing after sewing is interrupted		×	×												×	
Home position adjustment		×														×
Upper shaft motor reference position adjustment		×														×
Treadle position adjustment		×														×

4. USING SD CARDS

4-1. Notes on handling SD cards (commercially available)

- Use an SD card or a multimedia card with a capacity of 2GB or less.
- Do not disassemble or alter SD cards.
- Do not bend, drop, scratch or place heavy objects on top of the SD cards.
- Do not allow the SD cards to become wet, such as with water, oil, solvents, drinks or any other liquids.
- Do not use or store the SD cards in a locations exposed to strong static electricity or electrical interference.
- Do not use or store the SD cards in a locations exposed to vibrations or impacts, direct sunlight, extreme dust (or lint), high temperatures, high humidity, severe temperature fluctuations, or strong magnetic forces (such as from speakers).
- Do not subject the SD cards to vibration or shocks or remove them from the sewing machine while data reading or writing is in progress.
- Data on the SD cards may be lost or damaged due to some malfunction or accident. We recommend backing up important data.
- The SD cards that you purchased is already formatted. We recommend that the SD cards not be reformatted.
- The recommended SD cards are those sold by SanDisk and Panasonic. Cards from other manufacturers may use different formatting methods and may not work correctly as a result.

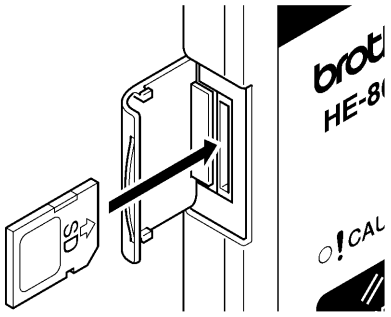
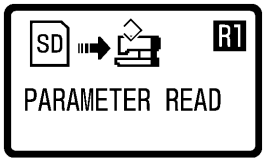
For additional information, refer to the instruction manual included with the SD cards that you have purchased.

* This product is compatible with SD cards that have been formatted using the FAT16/32 method. Cards that have been formatted using other formatting methods cannot be used.
* All other company and product names mentioned in this instruction manual are trademarks or registered trademarks of their respective companies. However, the explanations for markings such as TM are not clearly described within the text.

4-2. Structure of an SD card folder

Data type	Folder name	File name
Control program	\BROTHER\ISM\ISMSYS\	ISM09MN.BVP (Main control program) ISM09MT.BVP (Motor control program) ISM09PL.BVP (Panel control program)
Program data (parameters)	\BROTHER\ISM\ISMDH**\ * '**' represents the value for memory switch No. 752. If program data from other sewing machines in the same SD memory card, change the name of the folder.	ISMUPG.SEW
memory switch data	Same as above	ISMMSW.SEW
cycle program data	Same as above	ISMCYC.SEW
Error log data	\BROTHER\ISM\ISMLDT\	Stores the files which relate to error logs.

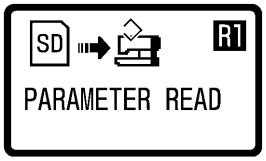
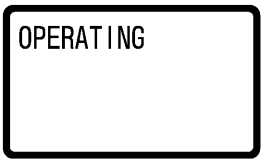
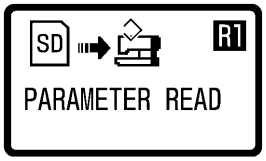
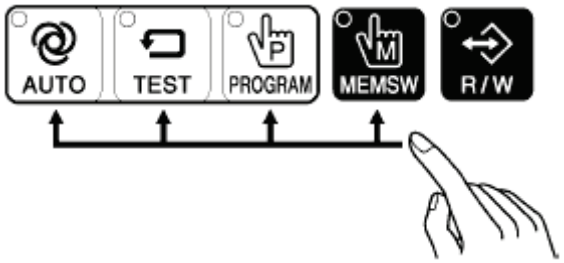
4-3. Preparation for reading and writing data

1	 0626D	Insert the SD card into the SD slot. **NOTE:** • Make sure the SD card is facing the correct way. • The cover should be closed at all times except when the SD card is inserted and removed, otherwise dust may cause trouble
2	Turn on the power switch.	
3	The mode will switch to data read/write mode.  0804D	Press the R/W key.  0628D • The R/W indicator will illuminate and the mode will switch to data read/write mode. • The initial status is parameter reading. (Refer to “Read/write menu list” below.)
4	Select the read/write menu.	Press the ∆ or ∇ key.  0630D

<Read/write mode list>

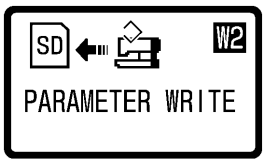
Menu	Details
R1	Program data (parameters) is read from the SD card.
W2	Program data (parameters) is written to the SD card.
R3	Memory switch data is read from the SD card.
W4	Memory switch data is written to the SD card.
R5	All sewing machine data (program data, memory switch data and cycle program data) is read from the SD card.
W6	All sewing machine data (program data, memory switch data and cycle program data) is written to the SD card.
W7	Error log data is written to the SD card.

4-4. Reading program data (parameters)

1	 0804D	Select the [R1] data read/write mode. Refer to “4-3. Preparation for reading and writing data”.
2	  0805D	Press the ENTER key.  2414B • The buzzer will sound and the program data (parameters) will be read from the SD card and copied into the sewing machine’s memory. • The R/W indicator will flash and “OPERATING” will be displayed. • If no program data exists on the SD card, an error buzzer will sound.
3	 0804D	When the display returns to the status in step 1, reading of the program data is complete. • If you would like to read more data, press the Δ or ∇ key to select the read/write menu, and then read the data.
4	Exit data read/write mode.	Press any one of the following four keys to exit data read/write mode.  0662D

4-5. Writing program data (parameters) to an SD memory card

1



0806D

Select the [W2] data read/write mode.
Refer to “4-3. Preparation for reading and writing data”.

2

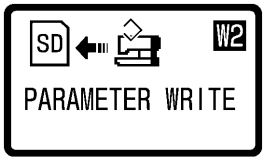
0805D

Press the ENTER key.

2414B

- The buzzer will sound and the program data (parameters) will be copied to the SD card.
- The R/W indicator will flash and “OPERATING” will be displayed.

3



0806D

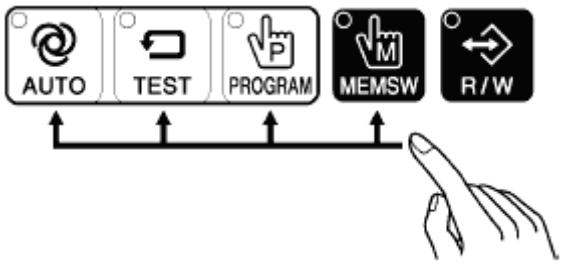
When the display returns to the status in step 1, writing of the program data is complete.

- If you would like to read more data, press the Δ or ∇ key to select the read/write menu, and then read the data.

4

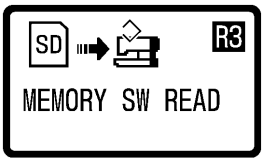
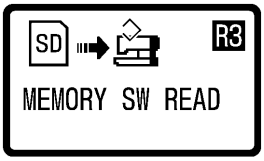
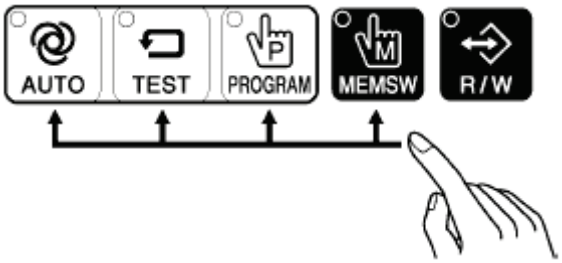
Exit data read/write mode.

Press any one of the following four keys to exit data read/write mode.

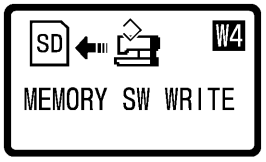
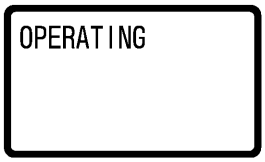
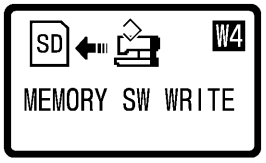
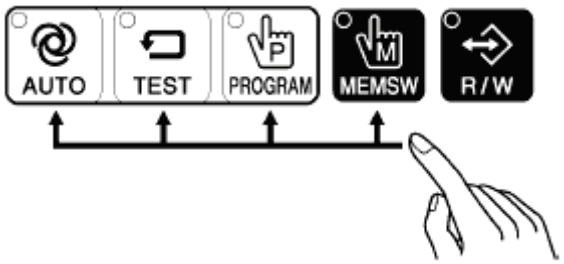


0662D

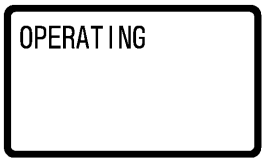
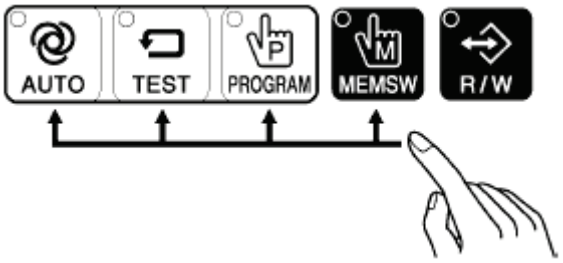
4-6. Reading memory switch data

1	 0807D	Select the [R3] data read/write mode. Refer to “4-3. Preparation for reading and writing data”.
2	  0805D	Press the ENTER key.  2414B • The buzzer will sound and the memory switch data will be read from the SD card into the sewing machine’s internal memory. • The R/W indicator will flash and “OPERATING” will be displayed. • If no memory switch data exists on the SD card, an error buzzer will sound.
3	 0807D	When the display returns to the status in step 1, reading of the memory switch data is complete. • If you would like to read more data, press the Δ or ∇ key to select the read/write menu, and then read the data.
4	Exit data read/write mode.	Press any one of the following four keys to exit data read/write mode.  0662D

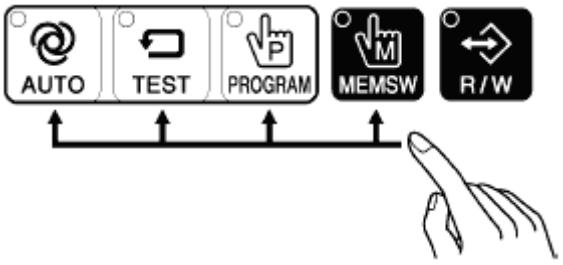
4-7. Writing memory switch data to the SD card

1	 0808D	Select the [W4] data read/write mode. Refer to “4-3. Preparation for reading and writing data”.
2	  0805D	Press the ENTER key.  2414B • The buzzer will sound and the memory switch data will be copied to the SD card. • The R/W indicator will flash and “OPERATING” will be displayed.
3	 0808D	When the display returns to the status in step 1, writing of the memory switch data is complete. • If you would like to read more data, press the Δ or ∇ key to select the read/write menu, and then read the data.
4	Exit data read/write mode.	Press any one of the following four keys to exit data read/write mode.  0662D

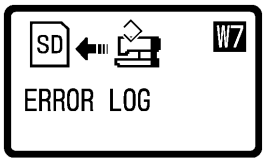
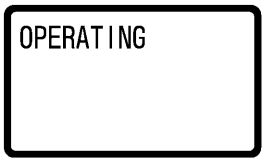
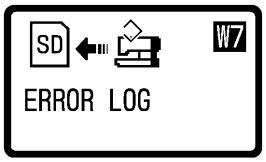
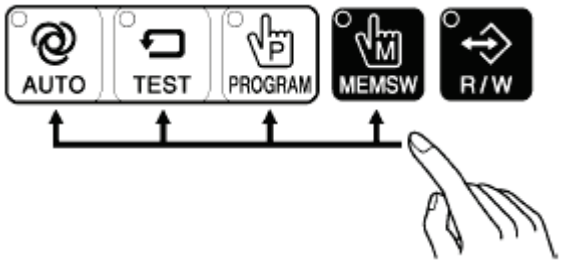
4-8. Reading sewing machine data

1	 0809D	Select the [R5] data read/write mode. Refer to “4-3. Preparation for reading and writing data”.
2	  0805D	Press the ENTER key.  2414B • The buzzer will sound, and the program data, cycle program data and memory switch data will be read from the SD card into the sewing machine’s internal memory. • The R/W indicator will flash and “OPERATING” will be displayed. • If no program data or cycle program data or memory switch data exists on the SD card, an error buzzer will sound.
3	 0809D	When the display returns to the status in step 1, writing of the memory switch data is complete. • If you would like to read more data, press the Δ or ∇ key to select the read/write menu, and then read the data.
4	Exit data read/write mode.	Press any one of the following four keys to exit data read/write mode.  0662D

4-9. Writing sewing machine data to an SD card

1	 0810D	Select the [W6] data read/write mode. Refer to “4-3. Preparation for reading and writing data”.
2	  0805D	Press the ENTER key.  2414B • The buzzer will sound, and the program data, cycle program data and memory switch data will be copied to the SD card. • The R/W indicator will flash and “OPERATING” will be displayed.
3	 0810D	When the display returns to the status in step 1, writing of the sewing machine data is complete. • If you would like to read more data, press the Δ or ∇ key to select the read/write menu, and then read the data.
4	Exit data read/write mode.	Press any one of the following four keys to exit data read/write mode.  0662D

4-10. Writing error log data to an SD card

1	 0811D	Select the [W7] data read/write mode. Refer to “4-3. Preparation for reading and writing data”.
2	  0805D	Press the ENTER key.  2414B • The buzzer will sound and the error log data will be copied to the SD card. • The R/W indicator will flash and “OPERATING” will be displayed.
3	 0811D	When the display returns to the status in step 1, writing of the error log data is complete. • If you would like to read more data, press the Δ or ∇ key to select the read/write menu, and then read the data.
4	Exit data read/write mode.	Press any one of the following four keys to exit data read/write mode.  0662D

4-11. Updating the control program version

1 Place the control program that you would like to update into the folder of the SD memory card as specified in “4-2. Structure of an SD card folder”.

2 With the power turned off, insert the SD card into the SD slot.
Refer to step 1 of “4-3. Preparation for reading and writing data”.

3

0637D

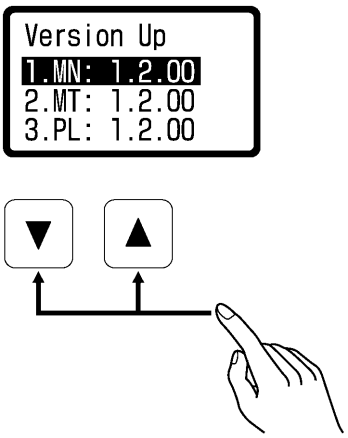
0638D

While holding down the RESET, TEST and ▲ keys, turn on the power switch.

0650D

Keep pressing the key until a beep is heard.

4



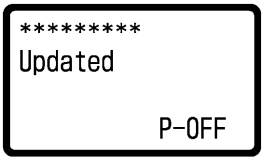
0639D

Press the Δ or ∇ key to select the program to be updated.

	Types	Version No.
Main	[1.Mn]	[*.*.**]
Motor	[2.Mt]	[*.**]
Panel	[3.PL]	[*.**]

- The initial status is for the main program to be selected.
- If there is no program to be updated which is stored on the SD card, “----” will appear in the menu display.

5



0640D

Press the ENTER key.

2414B

- The buzzer will sound and updating of the program version will start.
- While version updating is in progress, the progress status will be displayed.
- When “Updated” is displayed on the screen, version updating is complete.

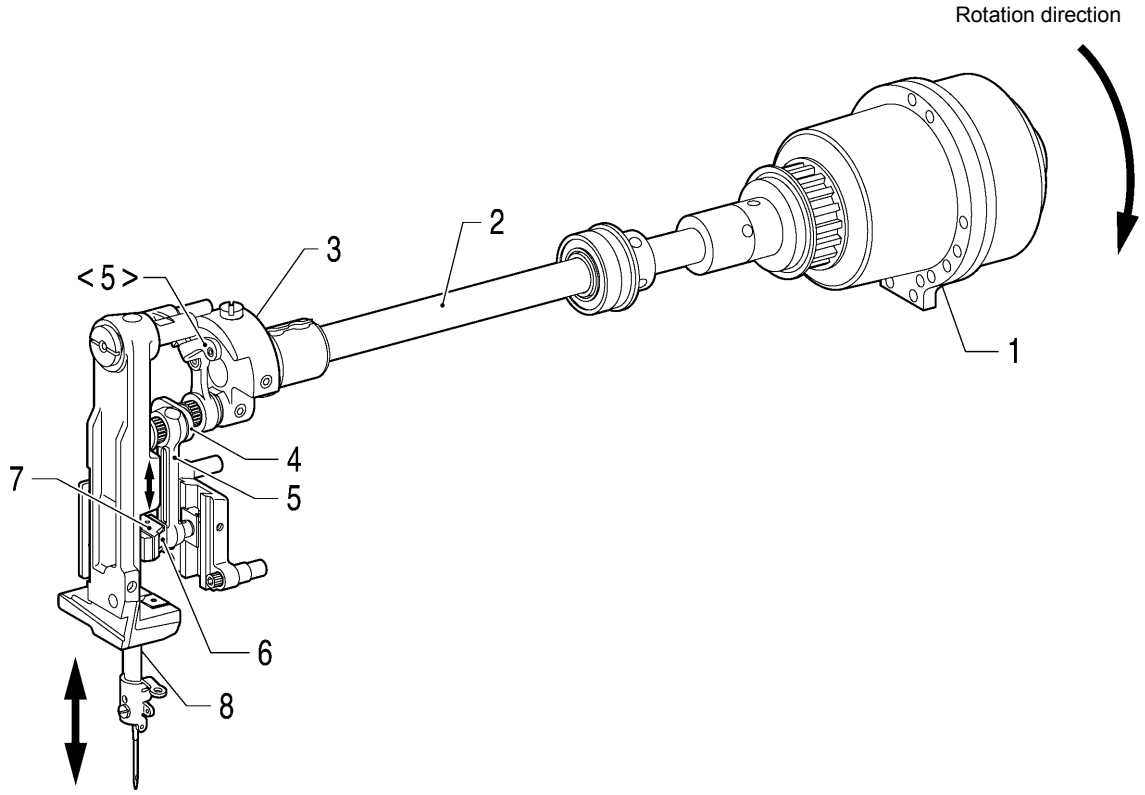
6 Turn off the power switch.

5. MECHANICAL DESCRIPTIONS

The mechanisms operate in the order of the numbers given in the illustrations.

* <number> and [number] indicates the flow of each operations given.
* (number) indicates part names only. (They do not represent the flow of operations.)

5-1. Needle bar and thread take-up mechanisms

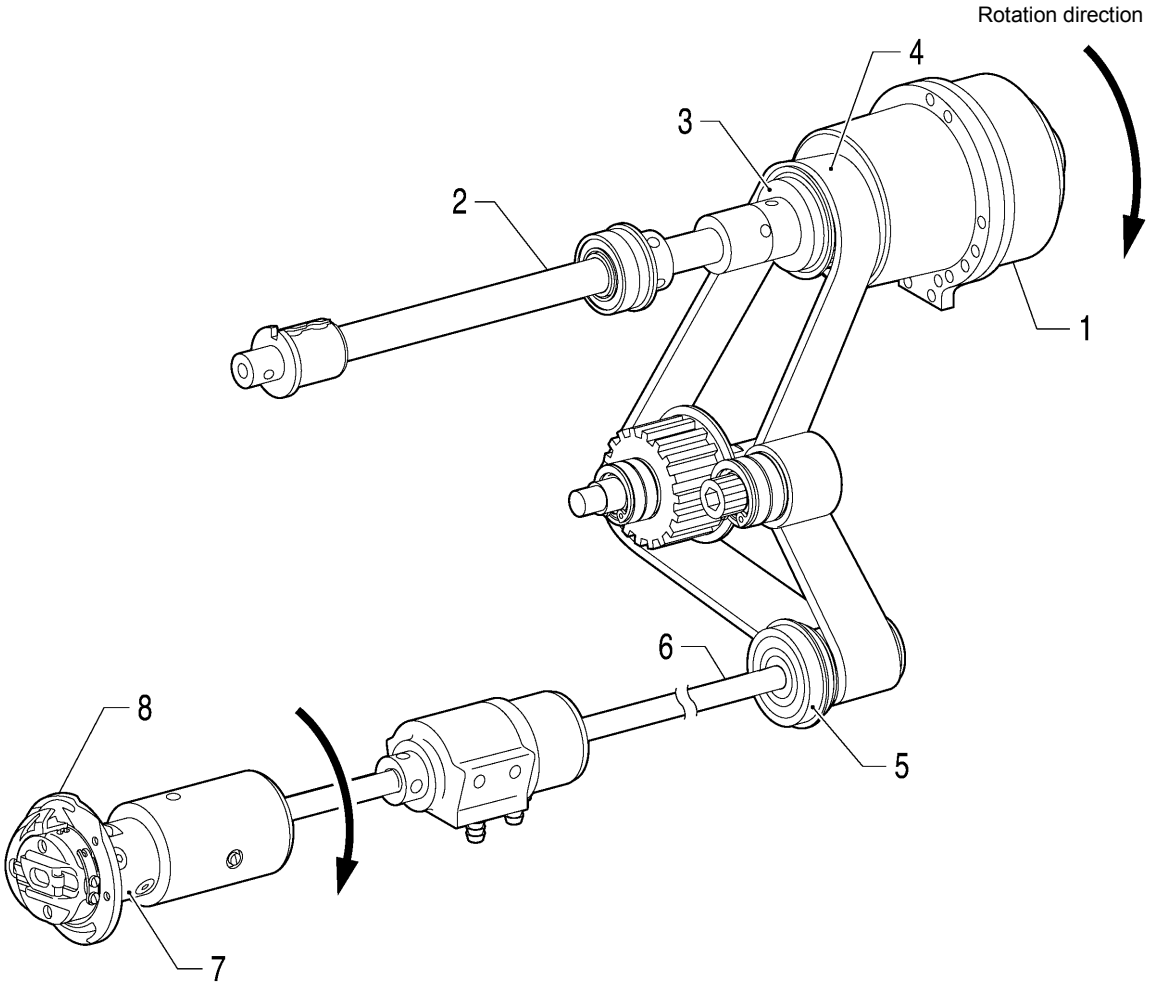


0641D

1. Motor
2. Upper shaft
3. Needle bar crank
4. Needle bar crank

5. Thread take-up crank <5> Thread take-up assembly
6. Slide block
7. Needle bar clamp
8. Needle bar

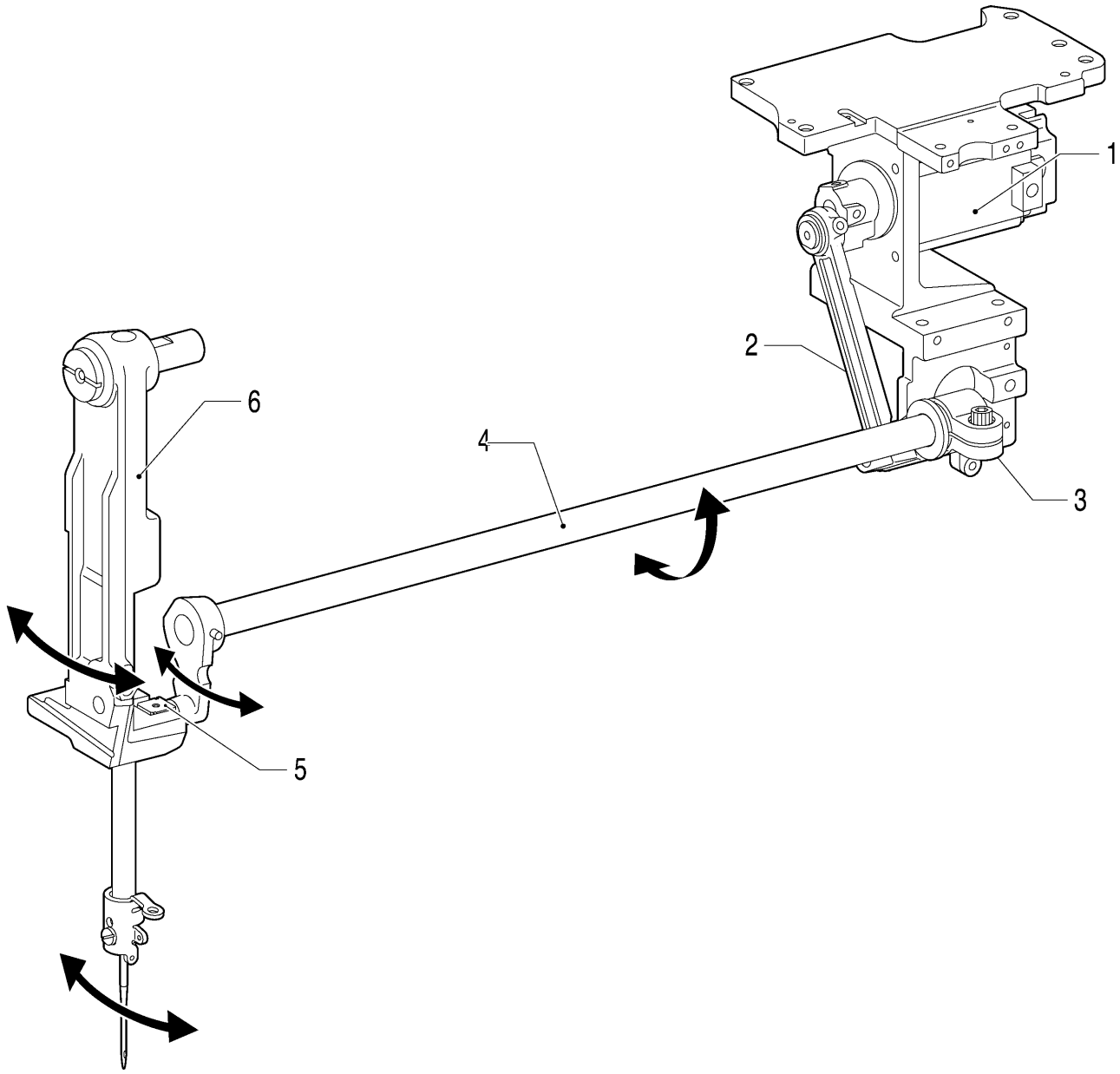
5-2. Upper shaft, lower shaft and rotary hook mechanisms



0642D

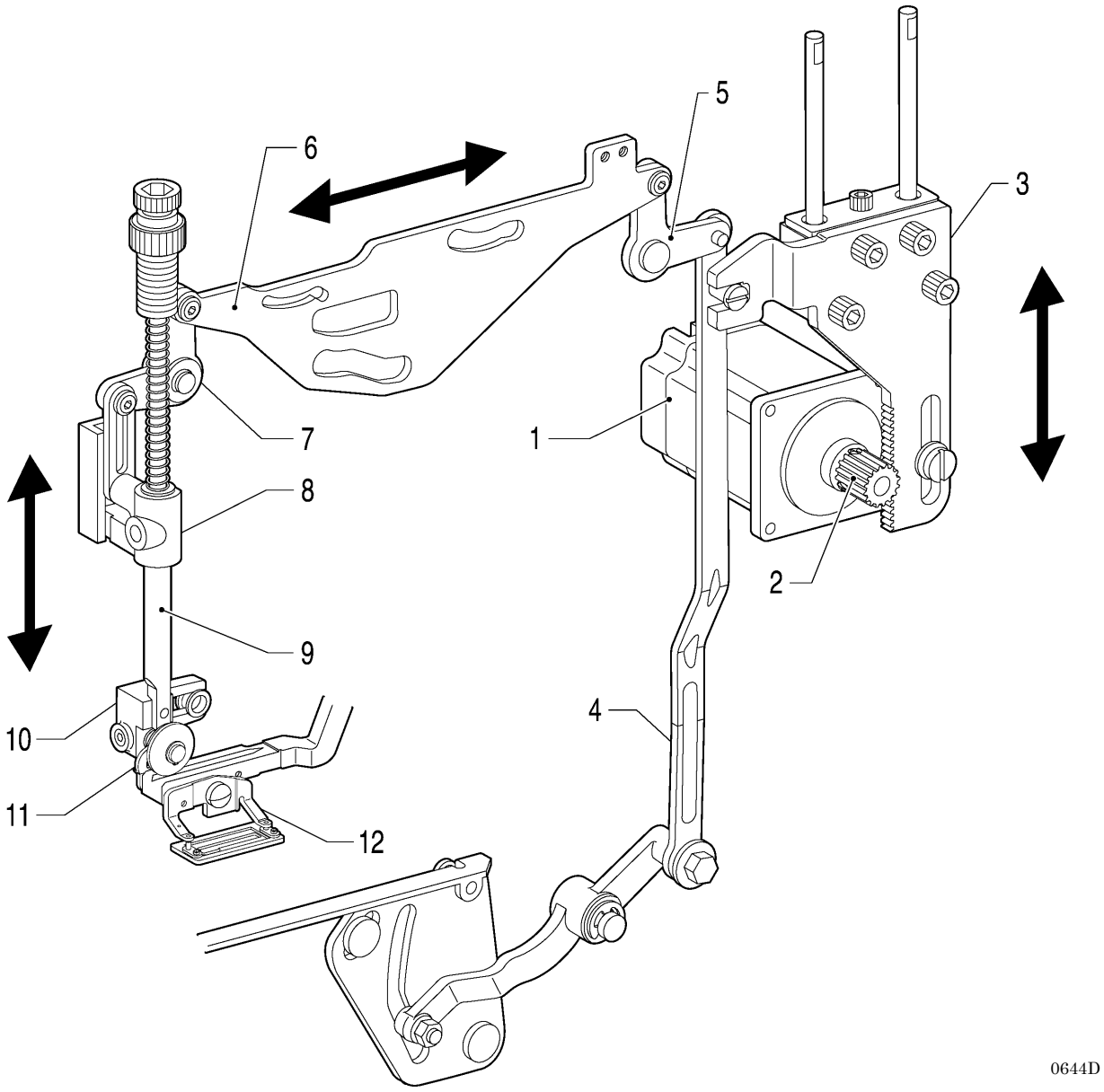
1. Motor
2. Upper shaft
3. Joint assy
4. Timing belt
5. Timing pulley
6. Lower shaft
7. Rotary hook joint
8. Rotary hook

5-3. Needle zigzag mechanism



1. Pulse motor
2. Zigzag connecting rod
3. Zigzag lever
4. Zigzag lever F assembly
5. Needle bar bracket slide block
6. Needle bar bracket

5-4. Presser foot lifter mechanism



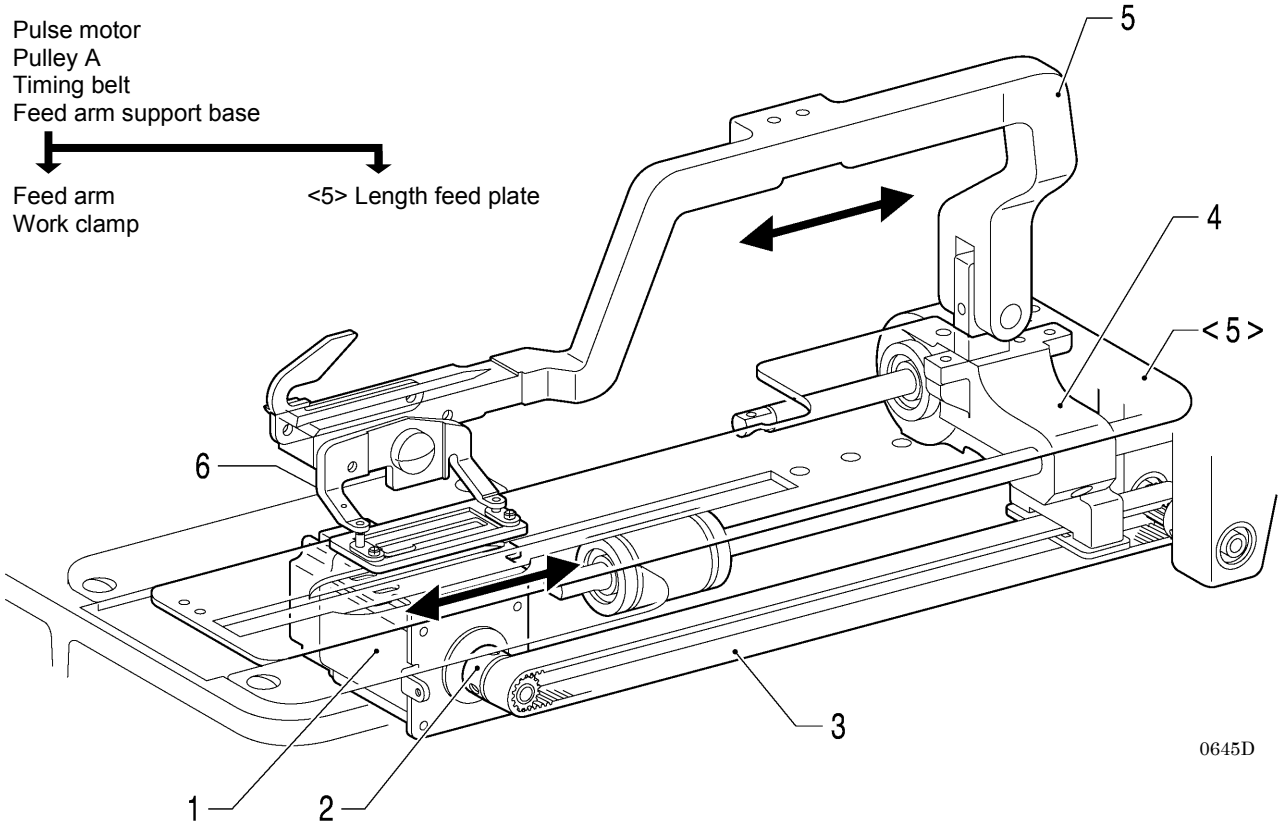
1. Pulse motor
2. Driving gear
3. Presser driving arm
4. Presser foot lifter connecting rod
5. Knee lifter lever
6. Upper thread trimmer driving link
7. Knee lifter lever
8. Presser bar guide bracket assembly
9. Presser bar
10. Presser roller bracket
11. Feed arm support
12. Work clamp

5-5. Feed mechanism

1. Pulse motor
2. Pulley A
3. Timing belt
4. Feed arm support base

5. Feed arm
6. Work clamp

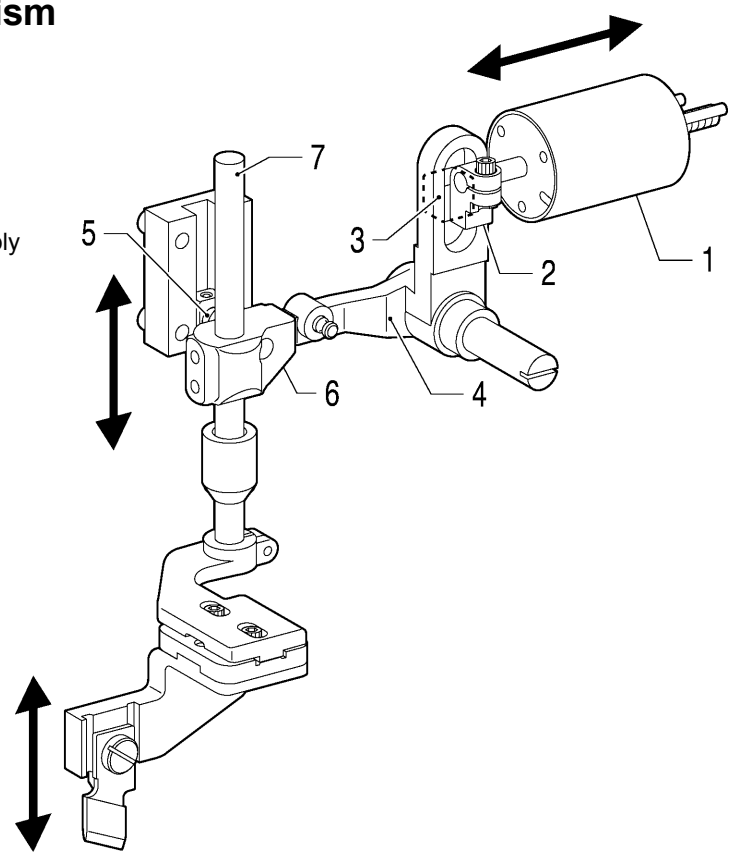
<5> Length feed plate



0645D

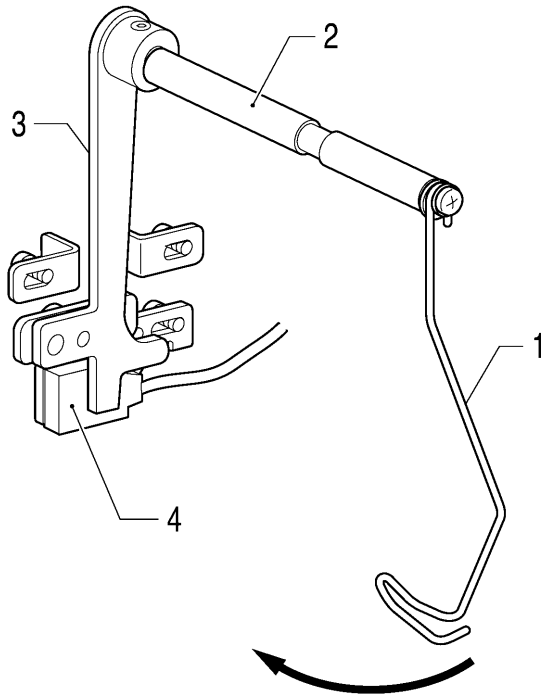
5-6. Cutter mechanism

1. Cutter solenoid
2. Cutter link bracket
3. Slide block
4. Cutter driving arm
5. Cutter driving link
6. Driving shaft holder assembly
7. Cutter driving shaft



0646D

5-7. Thread breakage detection mechanism



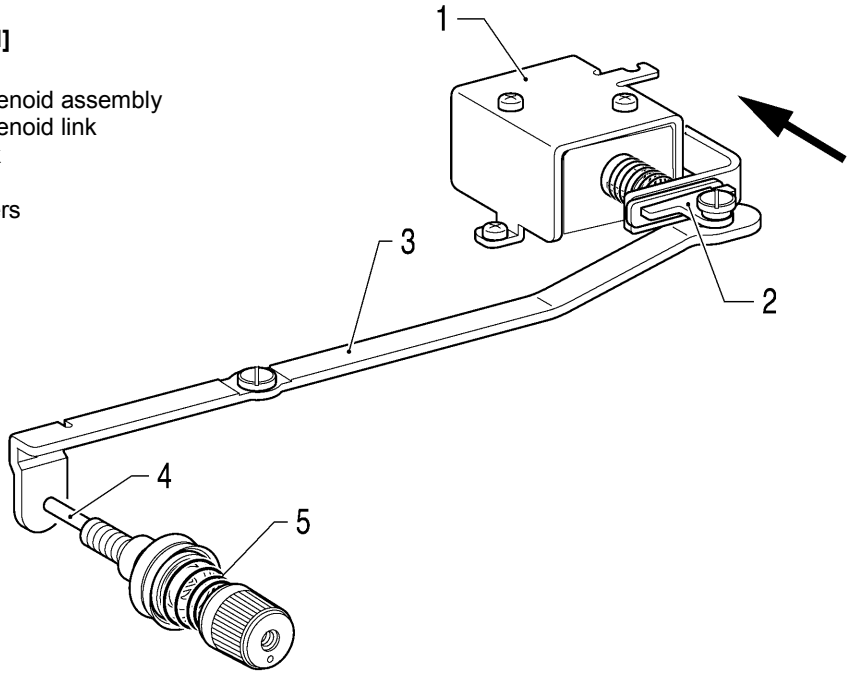
0647D

1. Thread guide
2. Thread breakage perceiving shaft
3. Cutter bar fixed plate assembly
4. Sensor

5-8. Tension release mechanism

[Zigzag tension control]

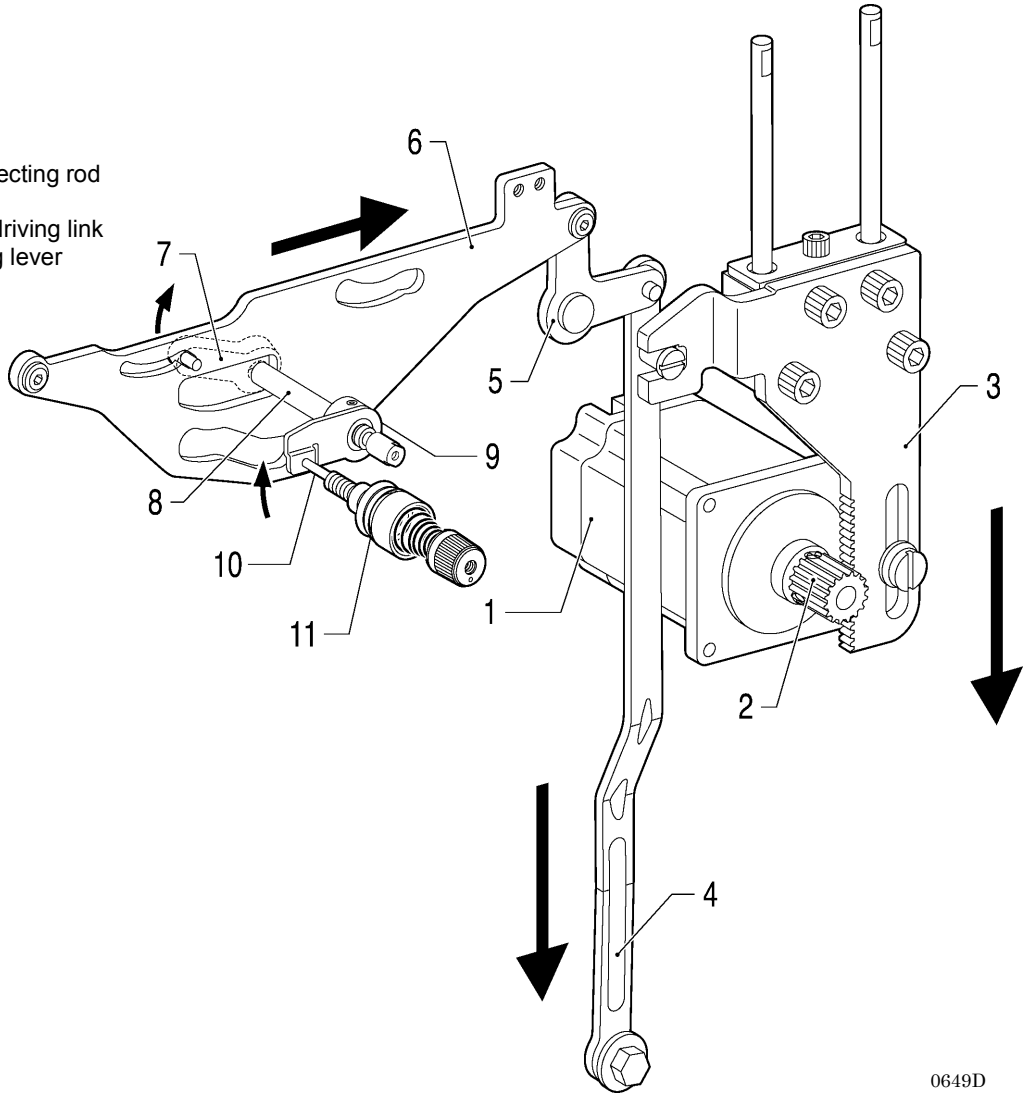
1. Tension release solenoid assembly
2. Tension release solenoid link
3. Tension release link
4. Tension release pin
5. Tension disc pressers



0648D

[Tack tension control]

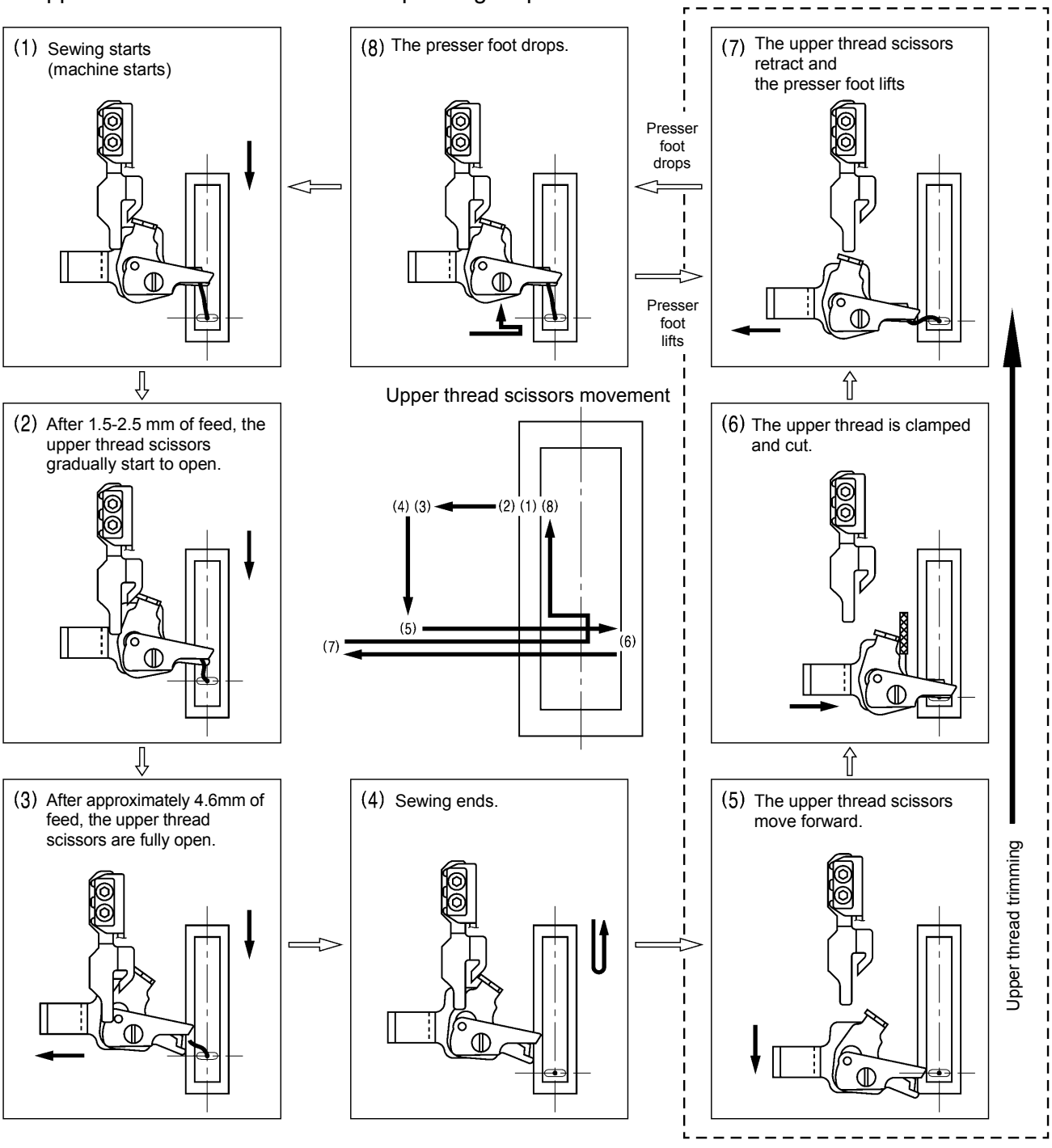
1. Pulse motor
2. Driving gear
3. Presser driving arm
4. Presser foot lifter connecting rod
5. Knee lifter lever
6. Upper thread trimmer driving link
7. Tension release driving lever
8. Tension release shaft
9. Tension release cam
10. Tension release pin
11. Tension disc pressers



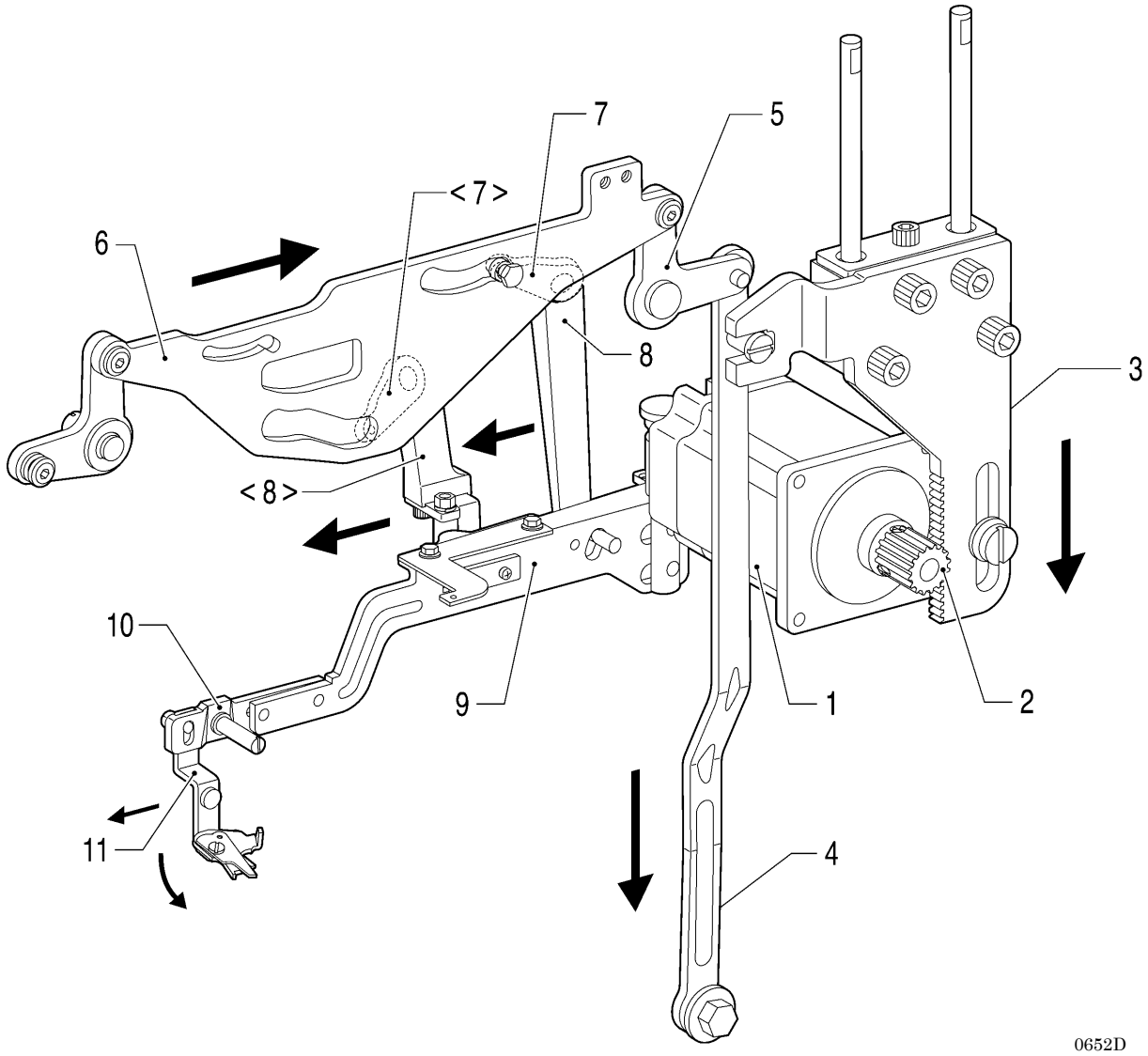
0649D

5-9. Upper thread trimmer mechanism

Upper thread trimmer mechanism operating sequence

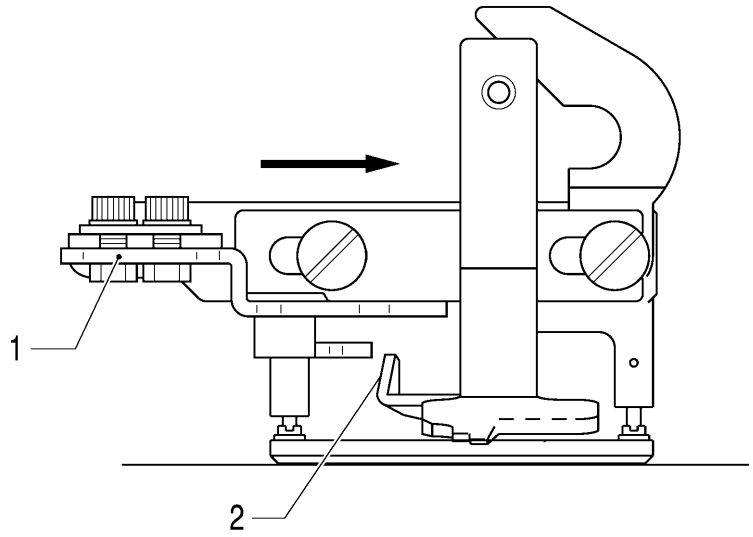


1739B

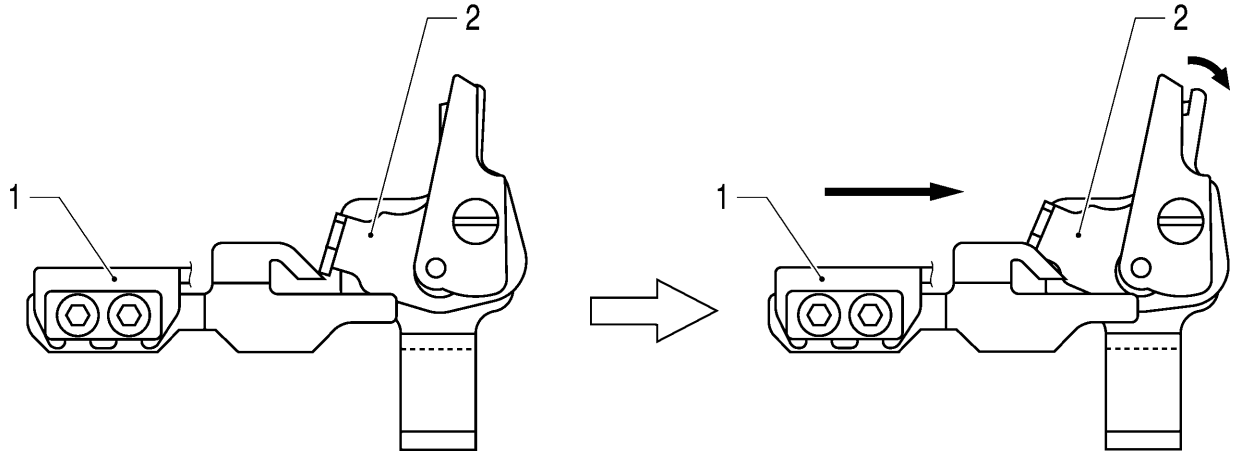


1. Pulse motor
2. Driving gear
3. Presser driving arm
4. Presser foot lifter connecting rod
5. Knee lifter lever
6. Upper thread trimmer driving link
7. Trimmer driving lever <7> Driving lever
8. Longitudinal feed arm <8> Trimmer driving arm
9. Upper thread trimmer lever
10. Setting plate
11. Upper thread trimmer assembly

5-9-1. Upper thread scissors Gradually opens



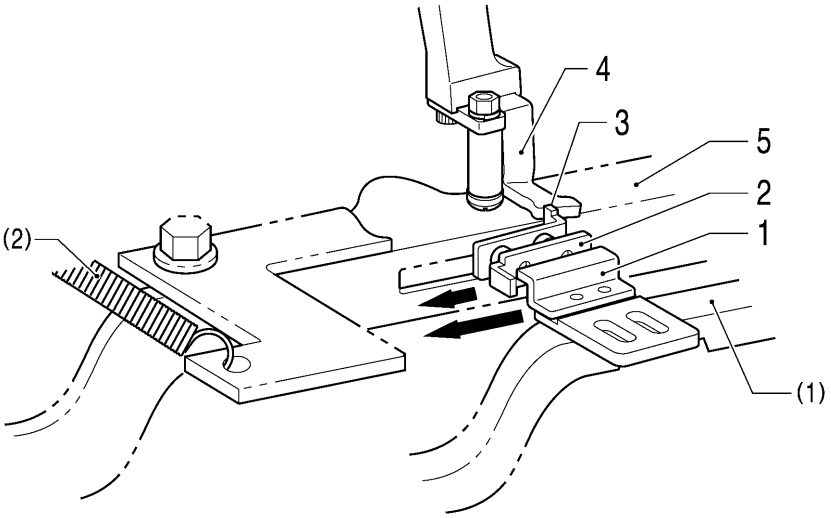
0653D



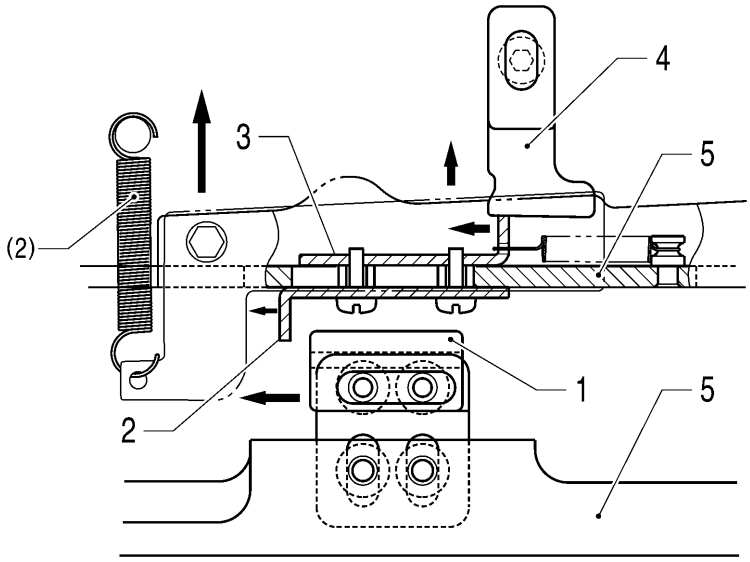
0654D

1. Opening cam
2. Scissors M

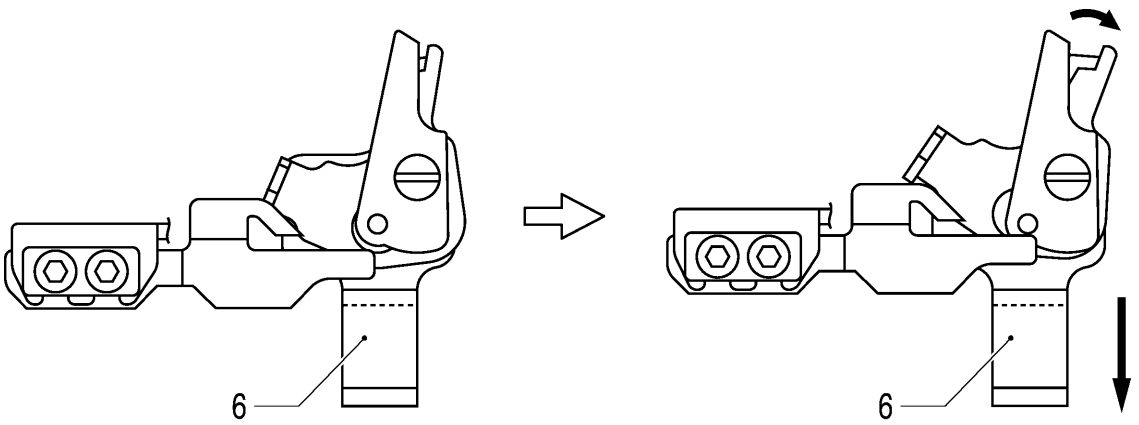
5-9-2. Upper thread scissors Open



0656D



0657D



0658D

1. Cam
2. Back plate
3. Stop plate
4. Back stopper
5. Upper thread trimmer lever
6. Upper thread trimmer assembly

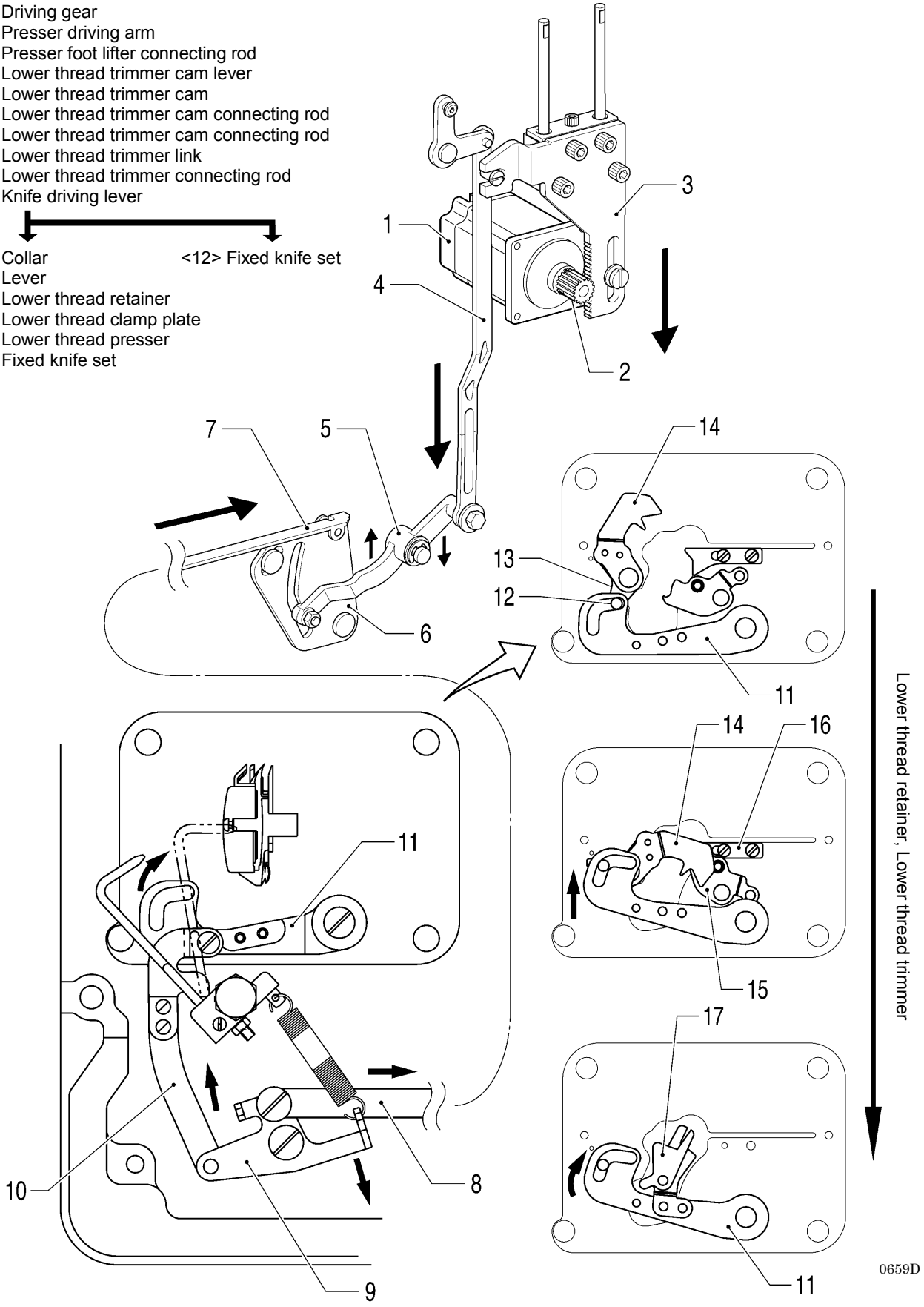
(1) Feed arm
(2) Extension spring

5-10. Lower thread trimmer mechanism

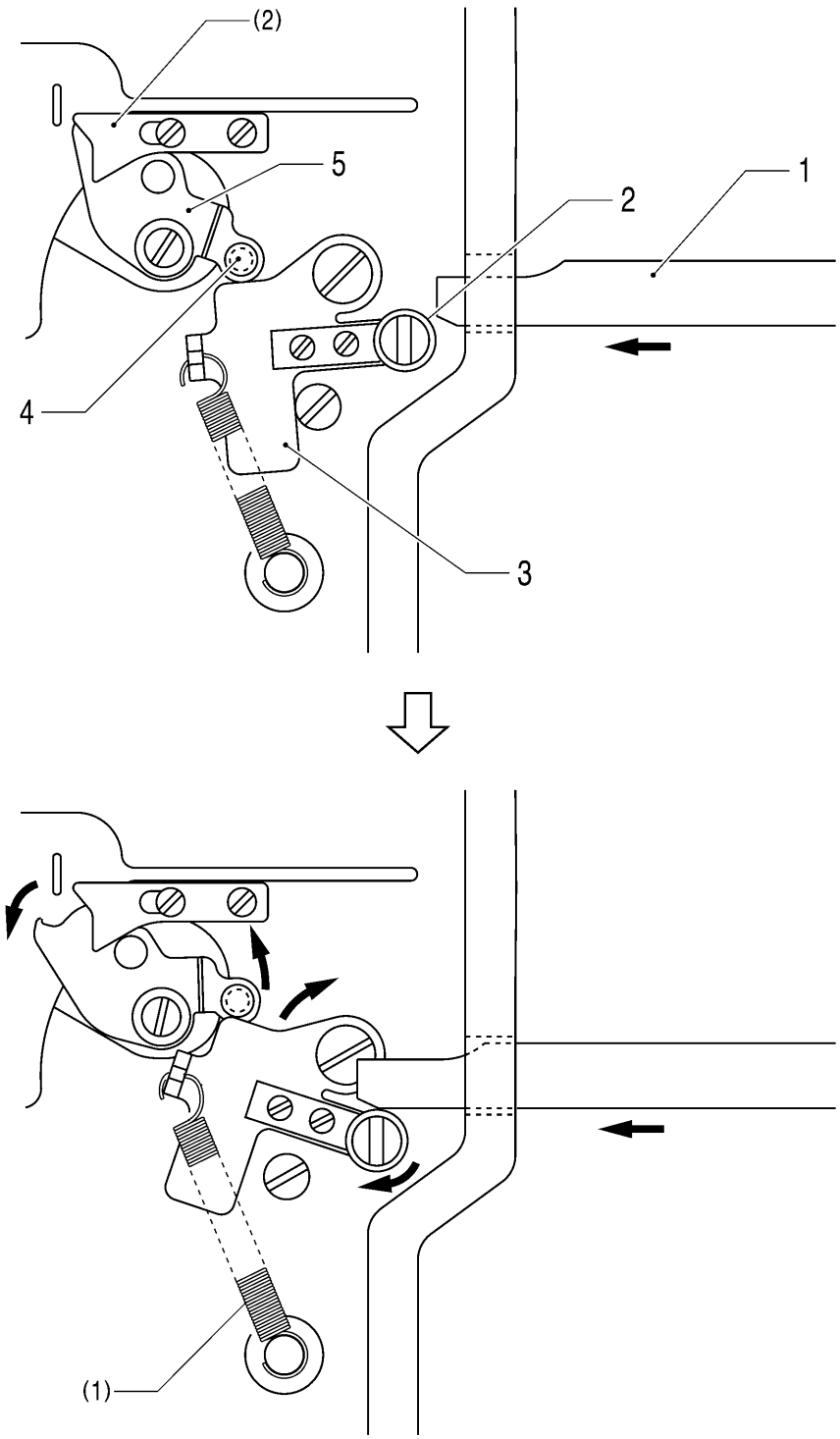
1. Pulse motor
2. Driving gear
3. Presser driving arm
4. Presser foot lifter connecting rod
5. Lower thread trimmer cam lever
6. Lower thread trimmer cam
7. Lower thread trimmer cam connecting rod
8. Lower thread trimmer cam connecting rod
9. Lower thread trimmer link
10. Lower thread trimmer connecting rod
11. Knife driving lever

<12> Fixed knife set

12. Collar
13. Lever
14. Lower thread retainer
15. Lower thread clamp plate
16. Lower thread presser
17. Fixed knife set



5-10-1. Lower thread clamp open at the sewing start Open



0661D

1. Feed guide shaft B
2. Roller
3. Opening plat
4. Collar
5. Lower thread clamp plate

(1) Spring
(2) Lower thread presser

6. ASSEMBLY

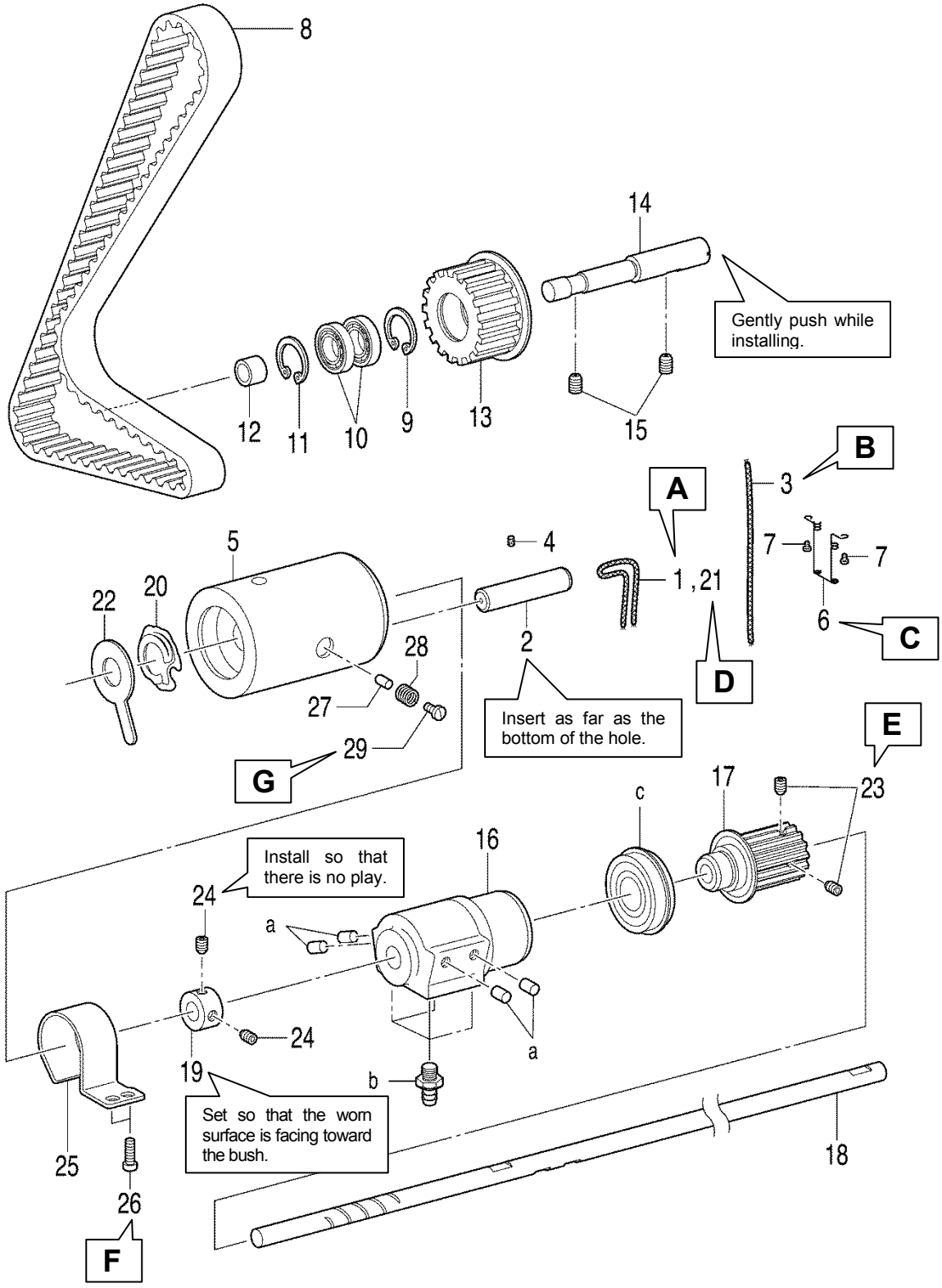
⚠ CAUTION

- Disassembly should only be carried out by a qualified technician.
- Turn off the power switch before disassembly, otherwise the machine may operate if the foot switch is depressed by mistake, which may result in injury.
- Be sure to wear protective goggles and gloves when handling the lubricating oil and grease, so that they do not get into your eyes or onto your skin, otherwise inflammation can result.
  Furthermore, do not drink the oil or eat the grease under any circumstances, as they can cause vomiting and diarrhea.
  Keep the oil out of the reach of children.
- When replacing parts and installing optional accessories, be sure to use only genuine Brother parts.
  Brother will not be held responsible for any accidents or problems resulting from the use of non-genuine parts.
- If any safety devices have been removed, be absolutely sure to re-install them to their original positions and check that they operate correctly before using the machine.
- To prevent accidents and problems, do not modify the machine yourself.
  Brother will not be held responsible for any accidents or problems resulting from modifications made to the machine.

Assemble each part in order of the numbers.

6-1. Lower shaft and idle pulley mechanisms

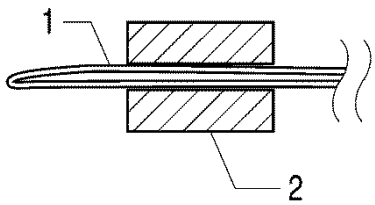
* Refer to the detailed descriptions on the next page for details on A to G in the illustration.



1. Wick
2. Collar
3. Wick
4. Felt
5. Rotary hook shaft bush
6. Rotary hook felt support
7. Screws [2 pcs]
8. Timing belt
9. Retaining ring
10. Ball bearing [2 pcs]
11. Retaining ring
12. Idle pulley
13. Collar
14. Shaft
15. Set screws [2 pcs]
16. Bush assy M
17. Timing pulley
18. Lower shaft
19. Set screw collar
20. Wick
21. Spring
22. Rotary hook felt
23. Set screws [2 pcs]
24. Set screws [2 pcs]
25. Cover
26. Screws [2 pcs]
27. Rubber presser
28. Spring
29. Screw

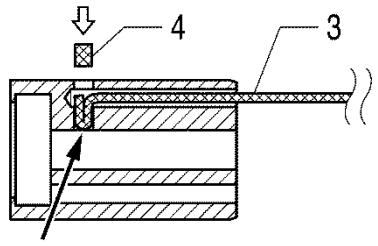
a. Rubber plugs [4 pcs]
b. Oil feeding pipe [4 pcs]
c. Bearing

A



0664D

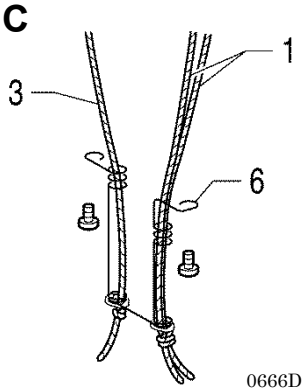
B



Push in the felt (4) so that the wick (3) is touching the lower shaft (18).

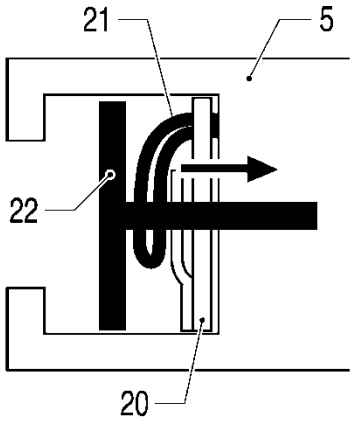
0660D

C



0666D

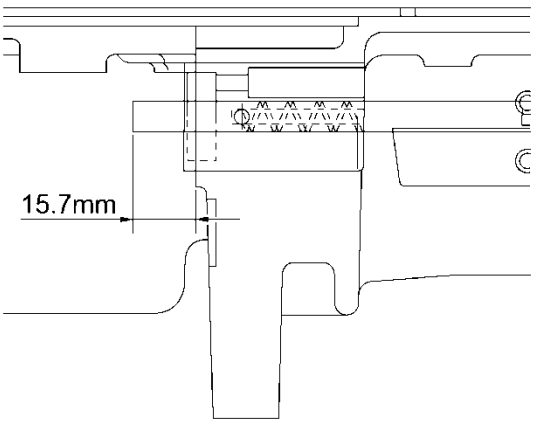
D



0665D

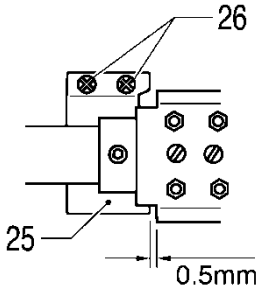
Check that the spring (20) is not compressed when the wick (21) is pulled in the direction of the arrow. Push the end of the felt (22) into the hole in the bush (5) and stop it from turning.

E



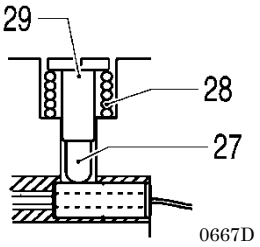
0669D

F



0668D

G

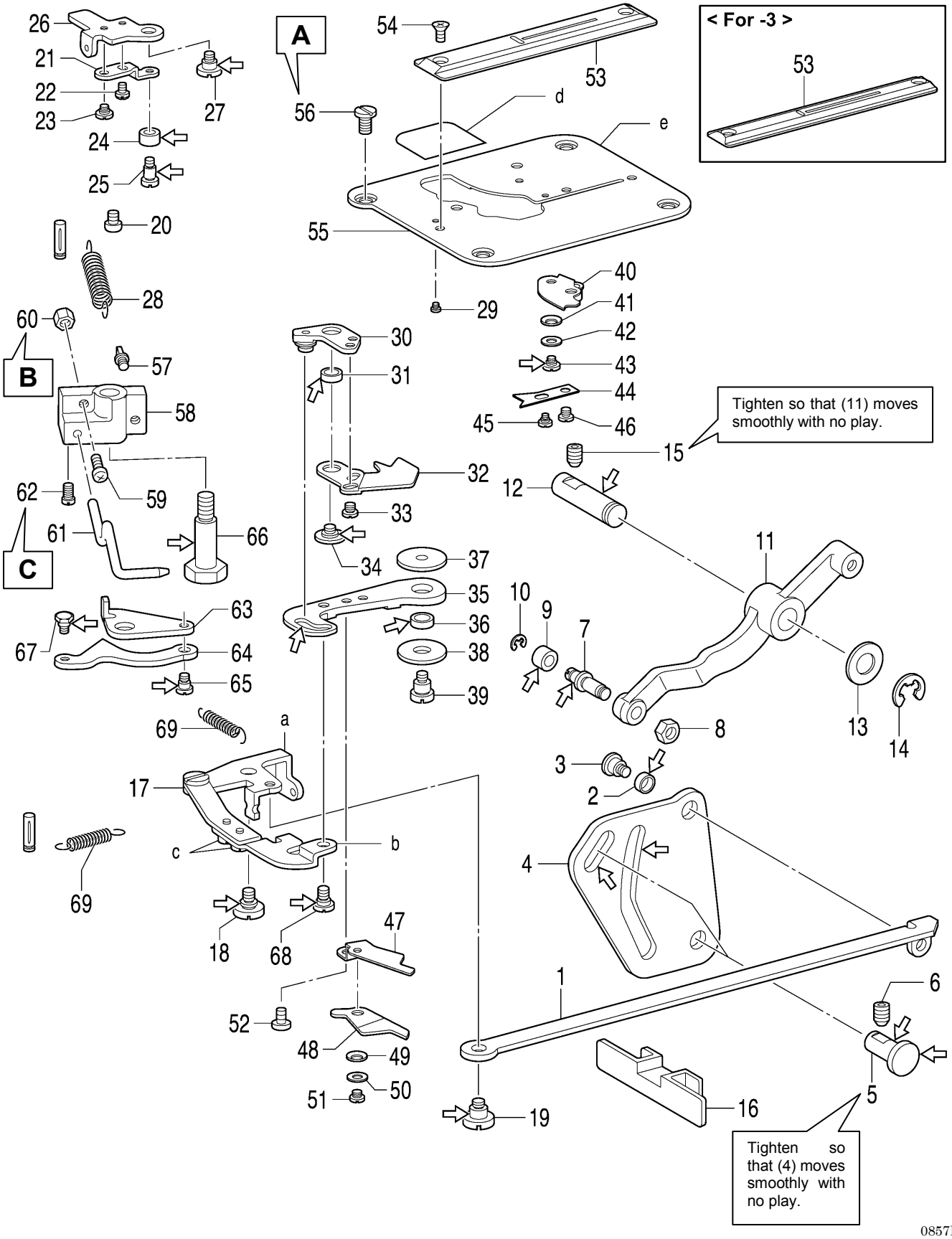


0667D

As a guide for the lubrication amount, the optimum position can be obtained if the screw (29) is tightened as much as possible and then loosened about two turns. Refer to “7-19. Adjusting the rotary hook lubrication” to check and adjust the lubrication amount.

6-2. Lower thread trimmer mechanism

* Refer to the detailed descriptions on the next page for details on A to C in the illustration.
* Apply the grease specified by Brother (**Power Knock WB2 from JX Nippon Oil & Energy**) in the places indicated by ⇦.

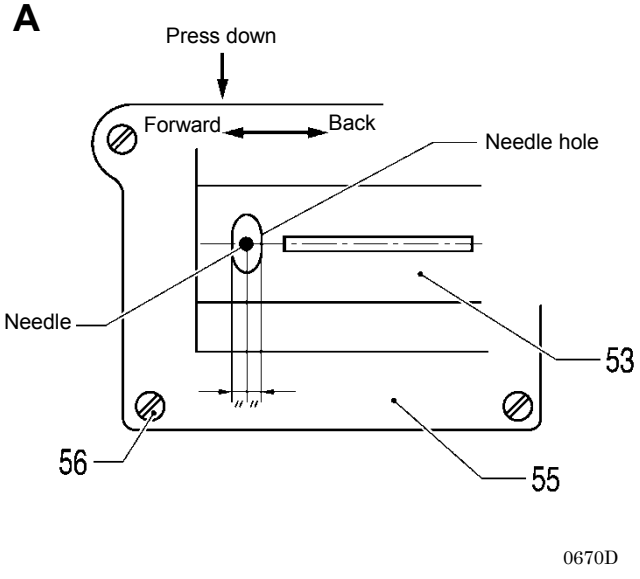


0857D

1. Lower thread trimming cam connecting rod
2. Driving lever roller
3. Shoulder screw
4. Lower thread trimmer cam
5. Lever shaft
6. Set screw
7. Roller shaft
8. Nut
9. Roller
10. Retaining ring
11. Lower thread trimmer cam lever
12. Cam shaft, ;L-TR
13. Washer
14. Retaining ring
15. Set screw
16. Cover
17. Lower thread trimmer link
18. Shoulder screw
19. Shoulder screw
20. Screw
21. Opening plate, B
22. Screw
23. Shoulder screw
24. Roller
25. Roller shaft
26. Opening plate, A
27. Shoulder screw
28. Spring
29. Screw
30. Lever assembly
31. Collar
32. Lower thread retainer
33. Screws [2 pcs]
34. Screw
35. Knife driving lever
36. Collar
37. Plain washer D
38. Plain washer U
39. Shoulder screw
40. Lower thread clamp plate assembly
41. Washer
42. Plain washer
43. Shoulder screw, SM3.18
44. Lower thread presser
45. Shoulder screw
46. Screw
47. Lower fixed knife assy
48. Movable knife assy
49. Washer
50. Plain washer
51. Bind
52. Bind
53. Needle plate
54. Flat screws [2 pcs]
55. Base plate
56. Screws [4 pcs]
57. Spring hook U
58. Bobbin presser bracket
59. Screw
60. Nut
61. Bobbin presser
62. Screw
63. Auxiliary plate
64. Opening plate
65. Shoulder screw
66. Shoulder screw
67. Shoulder screw
68. Shoulder screw
69. Spring [2 pcs]

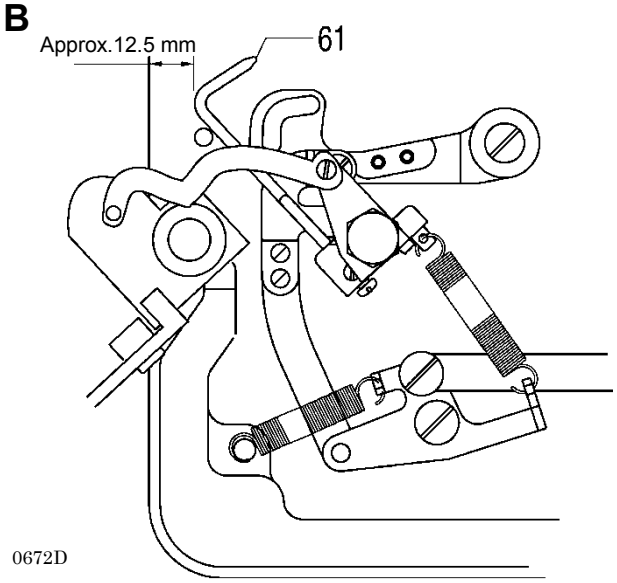
a. Lower thread trimmer link assy A
b. Lower thread connecting rod A
c. Screws [2 pcs]
d. Needle plate cover
e. Base plate

A



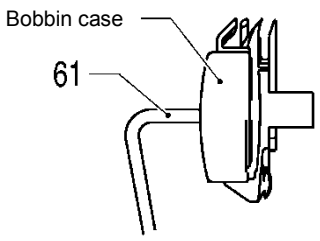
Move the base plate (55) so that the needle is exactly in the middle of the needle hole in the needle plate (53) in the forward and back directions, and then tighten the four screws (56).

B



Turn on the power, and after the sewing machine returns to the home position, turn the screw (59) and the nut (60) to adjust so that the clearance between the bobbin presser (61) and the edge of the bed is approximately 12.5 mm.

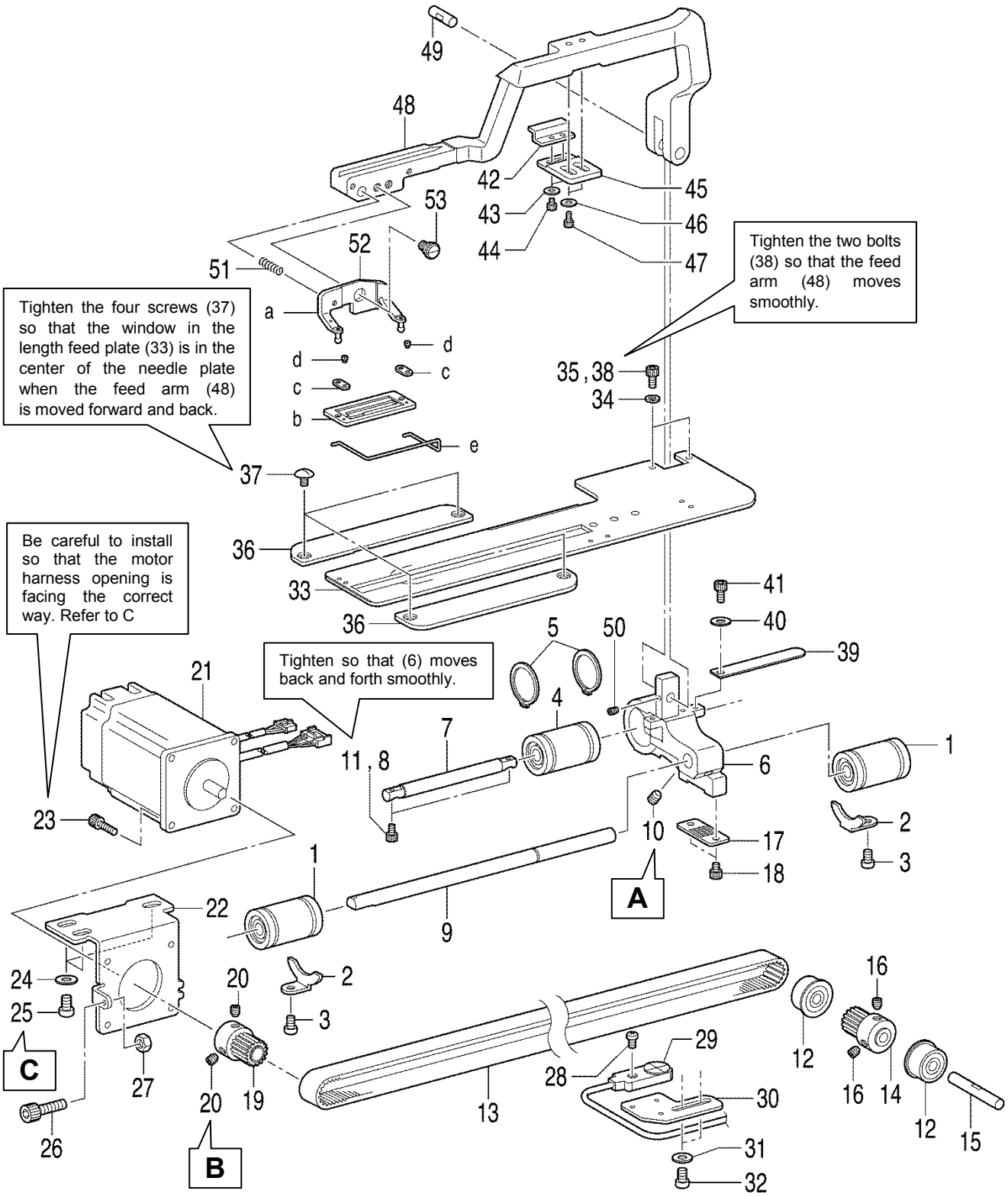
C



Install so that the end of the bobbin presser (61) is at the center of the bobbin case.

6-3. Feed mechanism

* Refer to the detailed descriptions on the next page for details on A to C in the illustration.

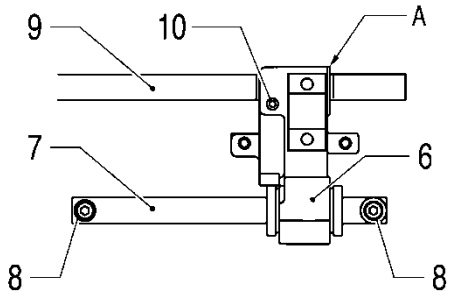


0708D

1. Linear bushing [2 pcs]
2. Ball bearing stoppers [2 pcs]
3. Screws [2 pcs]
4. Linear bushing
5. Retaining rings [2 pcs]
6. Feed arm support base
7. Feed guide shaft A
8. Socket bolts [2 pcs] (Temporarily tighten)
9. Feed guide shaft B
10. Set screw
11. Socket bolts [2 pcs] (Fully tighten)
12. Ball bearing [2 pcs]
13. Timing belt
14. Pulley
15. Support shaft
16. Set screws [2 pcs]
17. Belt holder
18. Bolt [2 pcs]
19. Pulley
20. Set screws [2 pcs]
21. Feed motor
22. Motor mounting bracket
23. Socket bolts [4 pcs]
24. Plain washers [3 pcs]
25. Screws [3 pcs]
26. Socket bolt
27. Nut
28. Feed sensor
29. Screw
30. Feed sensor support plate
31. Washers [2 pcs]
32. Screws [2 pcs]
33. Length feed plate
34. Spring washers [2 pcs]
35. Socket bolts [2 pcs] (Temporarily tighten)
36. Feed presser plate [2 pcs]
37. Screws [4 pcs]
38. Socket bolts [2 pcs] (Fully tighten)
39. Feed cover
40. Plain washer
41. Socket bolt
42. Cam
43. Washers [2 pcs]
44. Socket bolts [2 pcs]
45. Support plate
46. Washers [2 pcs]
47. Socket bolts [2 pcs]
48. Feed arm
49. Feed arm support shaft
50. Set screw
51. Spring
52. Work clamp assembly
53. Shoulder screw
54. Feed arm support

a. Work clamp support M
b. Work clamp 25RS
c. Spring plate [2 pcs]
d. Screws [2 pcs]
e. Finger guard M

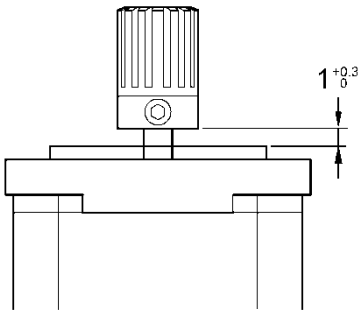
A



0673D

Align reference line A on feed guide shaft B with the edge of the feed arm support base, and then tighten the set screw (10).

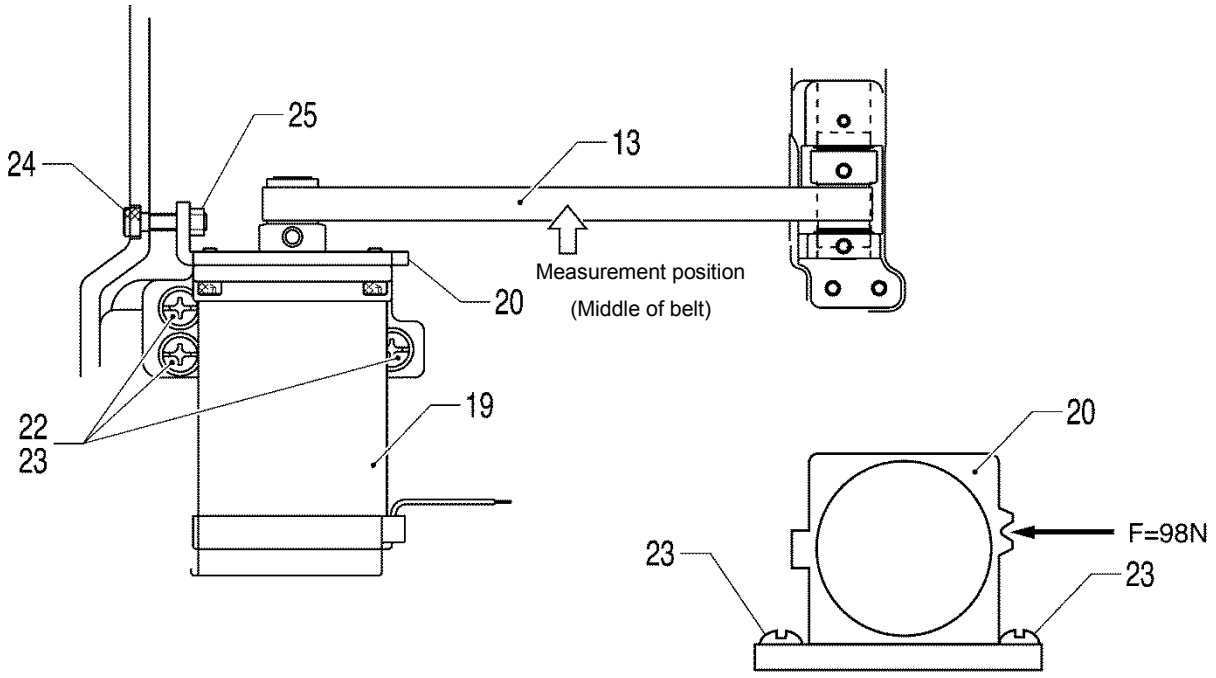
B



0772D

Assemble as shown in the illustration.

C



0675D

Repeat steps1 to 3 to adjust the belt tension until it is within the ranges given below.

- When using a new belt: 40 - 45 N
- When reusing an old belt: 30 - 45 N

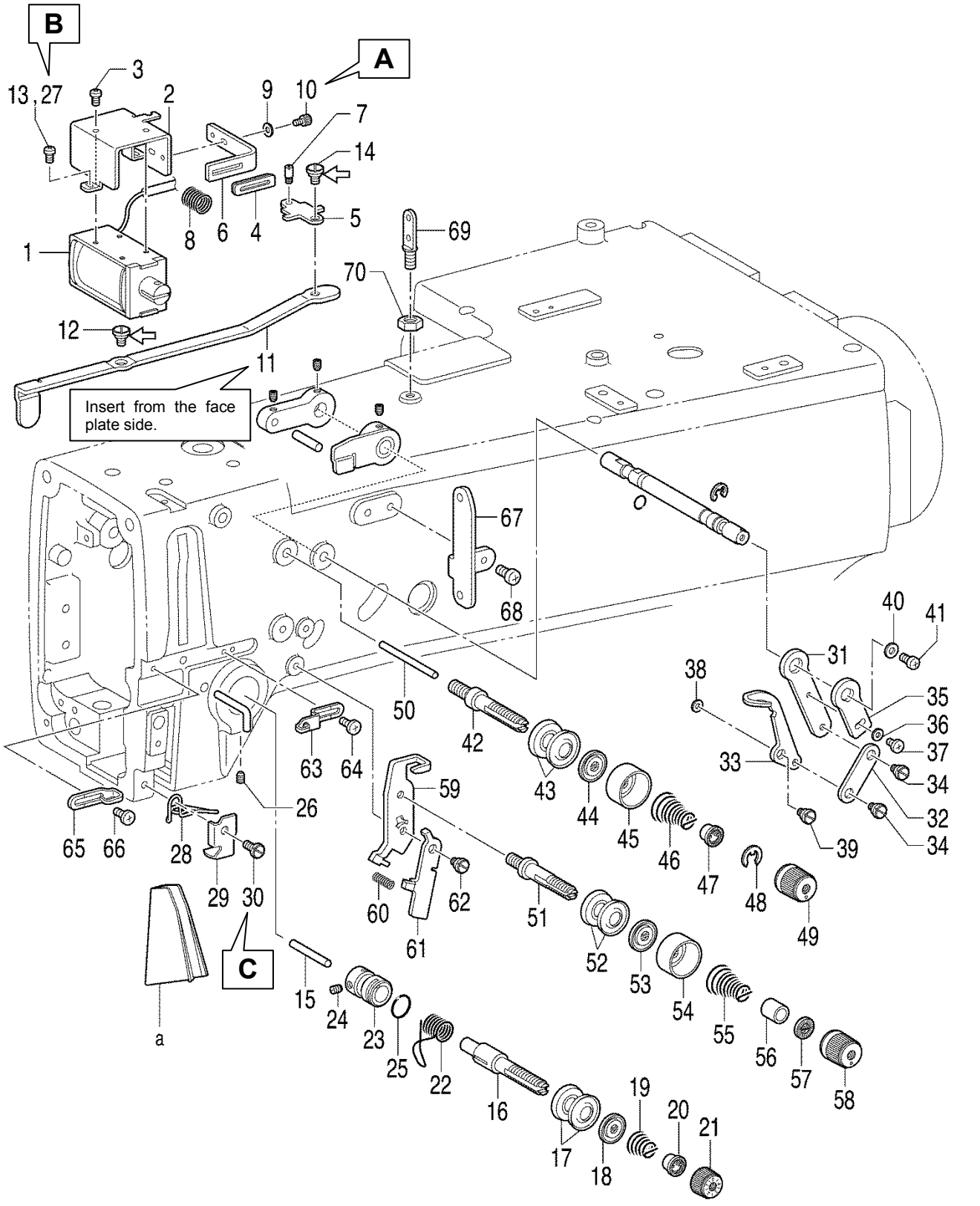
1) Loosen the three screws (23) so that the feed pulse motor (19) moves easily.
2) Use the adjustment screw (24) to adjust the belt tension.
3) Tighten the three screws (23).
4) Check that the timing belt (13) moves smoothly.
5) Loosely tighten the nut (25).

* Be sure to use a belt tension gauge to measure the belt tension, and measure at the position shown in the illustration.
* The belt tension gauge should be set to measure a unit weight of 0.25 gf/cm, a belt width of 10 mm and a span length of 169 mm.

[Reference]
If no belt tension gauge is available, use a push pull gauge to apply 98N of force to the notch in the motor mounting bracket (20) while tightening the three screws (23).

6-4. Threading mechanism

* Before carrying out the assembly in “6-4. Threading mechanism””, carry out the assembly in steps 1 to 13 in “6-9. Lubrication mechanism”.
* Refer to the detailed descriptions on the next page for details on A to C in the illustration.
* Apply the grease specified by Brother (**Power Knock WB2 from JX Nippon Oil & Energy**) in the places indicated by⇦.

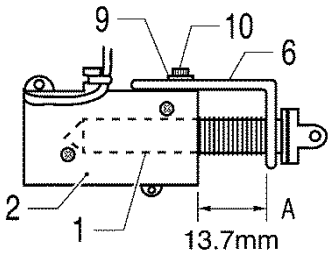


0709D

1. Tension release solenoid
2. Solenoid holder
3. Screws [3 pcs]
4. Tension release rubber assembly
5. Tension release solenoid link
6. Plate
7. Plunger pin
8. Spring
9. Plain washer
10. Socket bolt
11. Tension release link
12. Shoulder screw
13. Screws [2 pcs] (Temporarily tighten)
14. Shoulder screw
15. Tension release pin
16. Tension stud L
17. Tension disc [2 pcs]
18. Tension disc pressers
19. Tension spring
20. Washer on tension spring
21. Tension nut
22. Thread take-up spring
23. Tension stud bracket
24. Set screw
25. O Ring
26. Set screw, socket
27. Screws [2 pcs] (Fully tighten)
28. Thread guide, L ;arm
29. Thread guide cover
30. Screw
31. Adjusting lever
32. Lever link
33. Tension take-up lever
34. Shoulder screws [2 pcs]
35. Lever
36. Washer
37. Screw
38. Washer
39. Shoulder screw
40. Plain washer
41. Screw
42. Sub tension stud
43. Tension disc [2 pcs]
44. Tension disc pressers
45. Tension nut collar
46. Tension spring
47. Washer
48. Knob nut stopper
49. Tension nut
50. Tension release pin
51. Tension stud
52. Tension disc [2 pcs]
53. Tension disc pressers
54. Tension disc pressers
55. Tension spring
56. Tension nut collar
57. Guide block
58. Tension nut
59. Tension release lever bracket
60. Spring
61. Tension release lever
62. Shoulder screw
63. Arm thread guide
64. Screw
65. Arm thread guide
66. Screw
67. Thread retainer
68. Screws [2 pcs]
69. Threading bar, U
70. Nut

a. Threading plate

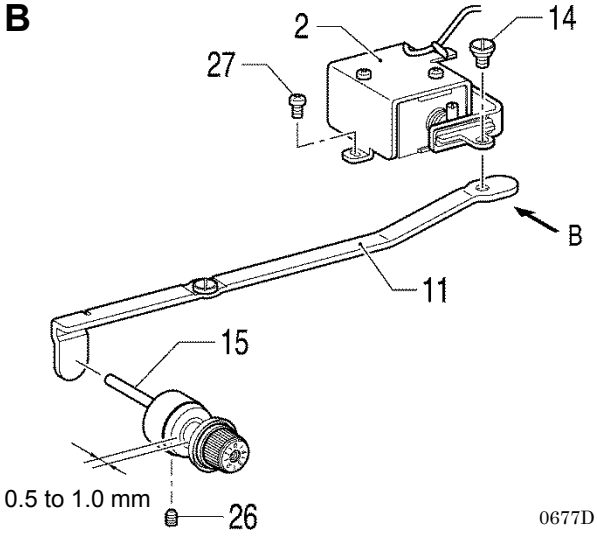
A



Tighten the socket bolt (10) so that the distance A between the end of the solenoid 1 and the plate (6) is 13.7 mm.

0676D

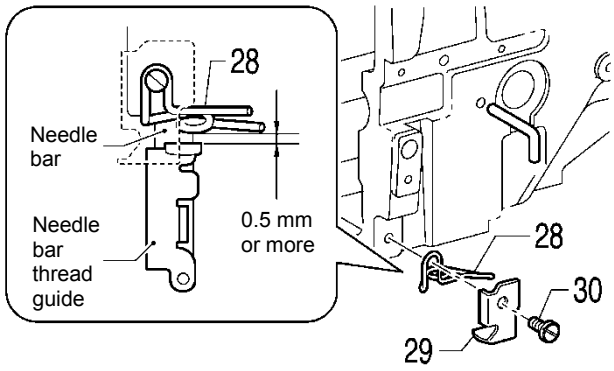
B



0677D

Tighten the two screws (27) so that the tension disc opening amount is 0.5 to 1.0 mm when the tension release link (11) is moved in the direction of B.

C

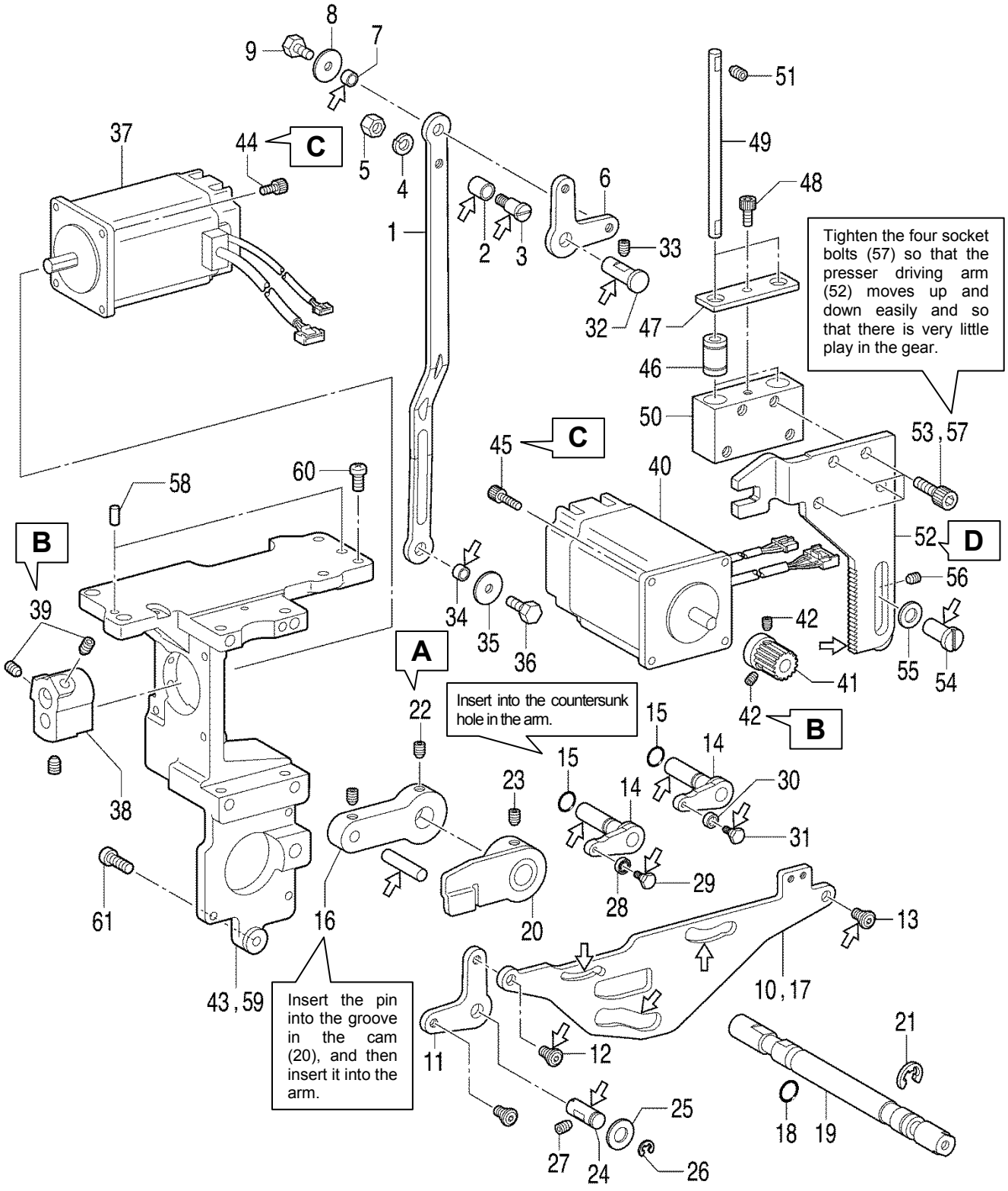


0678D

(After installing the needle bar thread guide by referring to "6-10. Needle bar and thread take-up mechanisms"), tighten the screw (30) to adjust the gap between the needle bar thread guide and arm thread guide L (28) to 0.5 mm or more when the needle bar is at its highest point at the maximum right zigzag position (3 mm).

6-5. Presser lifter mechanism

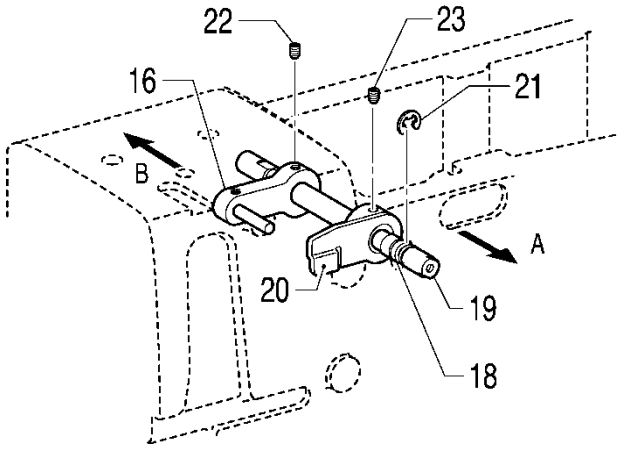
* Refer to the detailed descriptions on the next page for details on A to D in the illustration.
* Apply the grease specified by Brother (**Power Knock WB2 from JX Nippon Oil & Energy**) in the places indicated by ⇦.



0710D

1. Presser foot lifter connecting rod
2. Roller
3. Shoulder screw
4. Spring washer
5. Nut
6. Knee lifter lever
7. Spacer
8. Washer
9. Bolt
10. Upper thread trimmer driving link
11. Knee lifter lever
12. Shoulder screw
13. Shoulder screw
14. Trimmer driving lever [2 pcs]
15. O rings [2 pcs]
16. T-release driving lever assy
17. Upper thread trimmer driving link
18. O Ring
19. Tension release shaft
20. Tension release cam
21. Retaining ring
22. Set screw
23. Set screw (Temporarily tighten)
24. Lifter shaft
25. Plain washer
26. Retaining ring
27. Set screw
28. Bearing
29. Shoulder screw
30. Driving lever roller
31. Shoulder screw
32. Lifter shaft A
33. Set screw
34. Spacer
35. Washer
36. Bolt
37. Zigzag pulse motor
38. Motor lever
39. Set screws [2 pcs]
40. Presser lifter pulse motor
41. Gear
42. Set screws [2 pcs]
43. Motor bracket
44. Socket bolts [4 pcs]
45. Socket bolts [4 pcs]
46. Linear bush [2 pcs]
47. Bearing holder
48. Socket bolt
49. Guide shaft [2 pcs]
50. Guide bracket
51. Set screws [4 pcs]
52. Presser driving arm
53. Socket bolts [4 pcs] (Temporarily tighten)
54. Driving arm presser
55. Washer
56. Set screw
57. Socket bolts [4 pcs] (Fully tighten)
58. Positioning pin [2 pcs]
59. Motor bracket assembly
60. Screws [4 pcs]
61. Screw

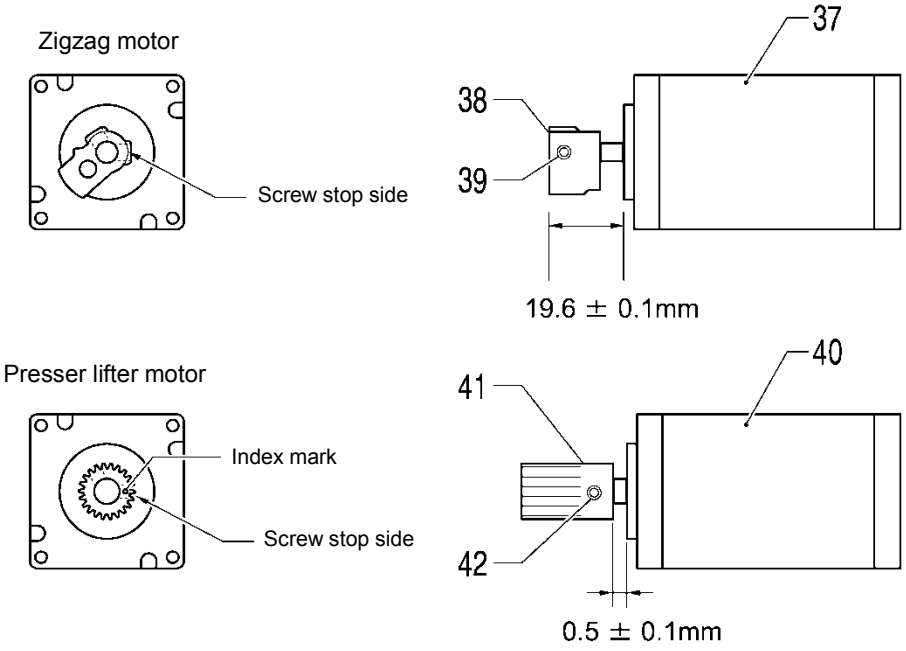
A



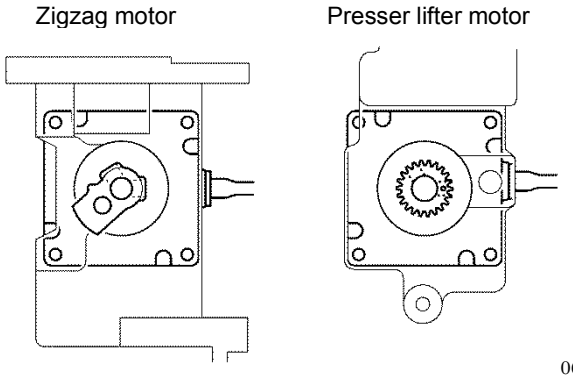
0679D

While pushing the tension release shaft (19) in the direction of the arrow A, and also pushing the tension release driving lever (16) in the direction of the arrow B, tighten the set screw (22) on the screw flat of the tension release shaft (19).

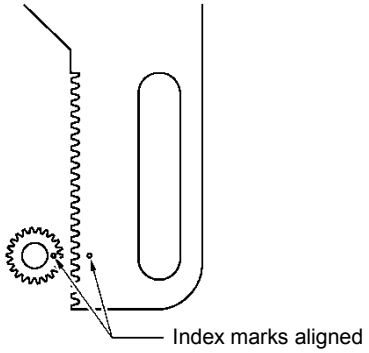
B



C **Direction of the harness**

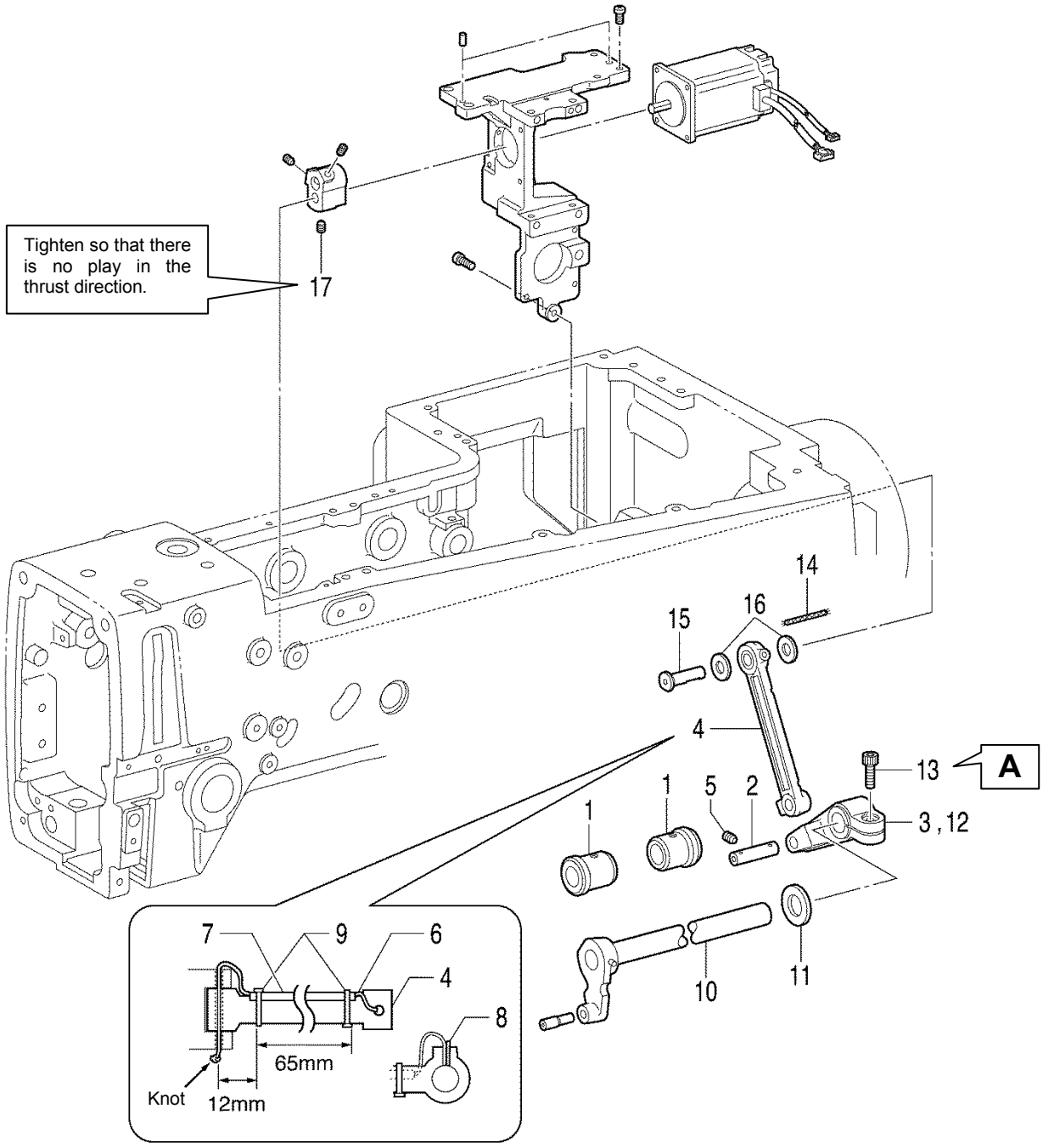


D



6-6. Needle zigzag mechanism

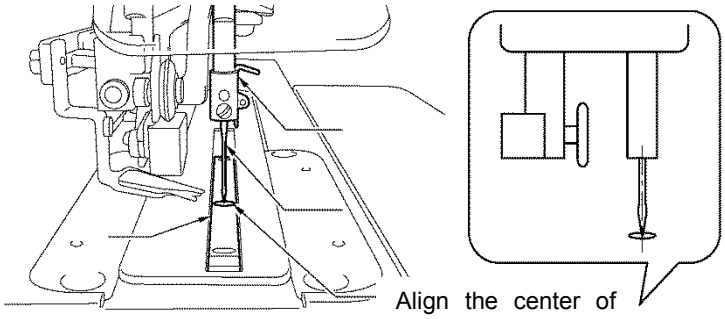
* Refer to the detailed descriptions on the next page for details on A in the illustration.



0711D

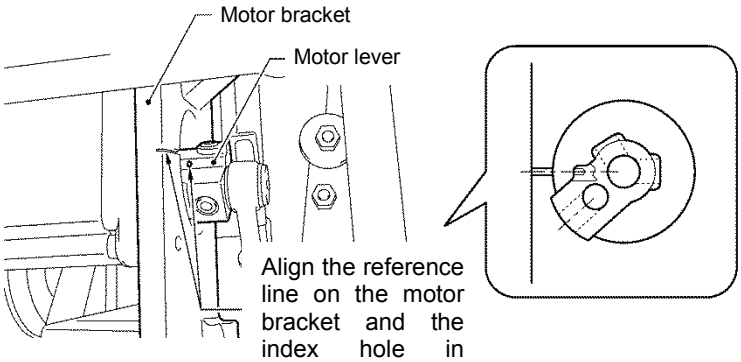
1. Bush, z-lever
2. Zigzag connecting rod shaft
3. Zigzag lever
4. Zigzag connecting rod
5. Set screw
6. Wick
7. Oil tube
8. Felt
9. Fastening bands [2 pcs]
10. Zigzag lever shaft
11. Thrust collar
12. Zigzag lever
13. Socket bolt
14. Wick
15. Motor lever shaft
16. Washer
17. Set screw

A



Align the center of the cutter groove and the tip of the needle.

0683D



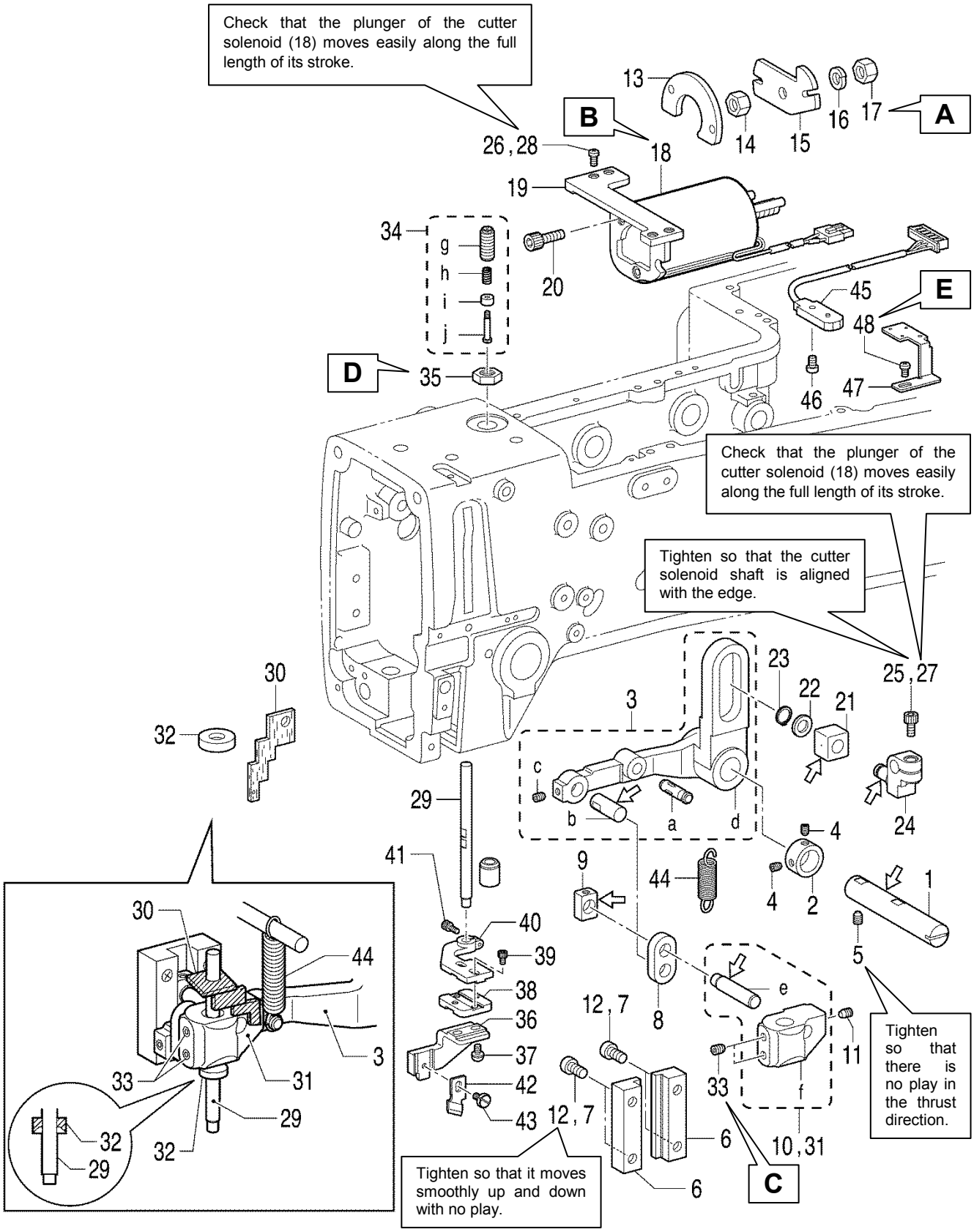
Align the reference line on the motor bracket and the index hole in the motor lever.

0684D

1) Install the needle to the needle bar, and secure it in position so that the tip of the needle is aligned with the center of the cutter groove in the needle plate.
2) Tighten the socket bolt (13) at the position where the index hole in the motor lever and the reference line on the motor bracket are aligned.
   * At this time, tighten so that there is no play in the thrust direction.

6-7. Cutter mechanism

* Refer to the detailed descriptions on the next page for details on A to E in the illustration.
* Apply the grease specified by Brother (**Power Knock WB2 from JX Nippon Oil & Energy**) in the places indicated by⇦.

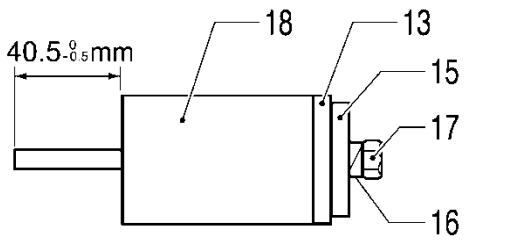


0712D

1. Cutter driving arm shaft
2. Set screw collar
3. Cutter driving arm assembly
4. Set screws [2 pcs]
5. Set screw
6. Cutter bar guide [2 pcs]
7. Screws [4 pcs] (Temporarily tighten)
8. Cutter driving link
9. Needle bar guide slide block
10. Cutter driving shaft holder
11. Set screw
12. Screws [4 pcs] (Fully tighten)
13. Stopper cushion
14. Nut
15. Solenoid stopper
16. Spring washer
17. Nut
18. Cutter solenoid
19. Cutter solenoid bracket
20. Bolts [3 pcs]
21. Slide block
22. Washer
23. Retaining ring
24. Cutter link bracket
25. Bolt (Temporarily tighten)
26. Screws [4 pcs] (Temporarily tighten)
27. Bolt (Fully tighten)
28. Screws [4 pcs] (Fully tighten)
29. Cutter driving shaft
30. Felt
31. Cutter driving shaft holder
32. Oil rejector
33. Set screws [2 pcs] (Temporarily tighten)
34. Adjusting screw assembly
35. Nut
36. Cutter holder DM
37. Screws [2 pcs]
38. Cutter holder M
39. Bolts [2 pcs]
40. Cutter holder
41. Bolt
42. Cutter
43. Screw
44. Spring
45. Cutter sensor
46. Screw
47. Cutter sensor setting plate
48. Screw

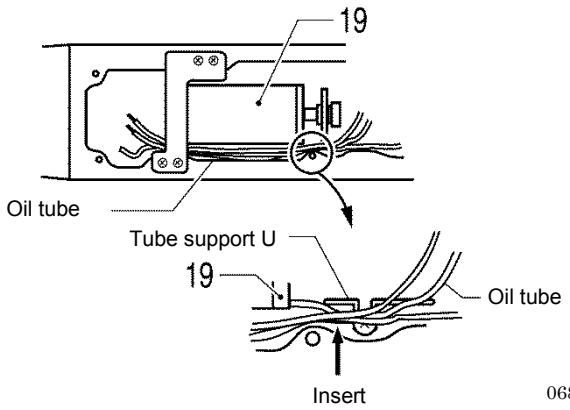
a. Pin, dowel
b. Pin
c. Set screw
d. Cutter driving arm
e. Cutter driving link shaft
f. Cutter driving shaft holder
g. Adjusting screw
h. Cushion spring
i. Cushion support
j. Shoulder screw

A



0685D

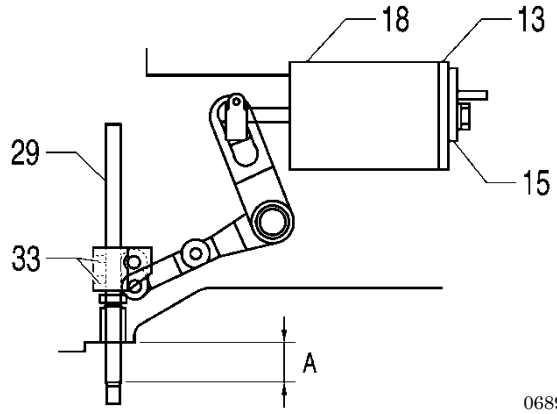
B



0686D

Insert the oil tube and the cord of the cutter solenoid (19) in between tube support U and the arm.

C

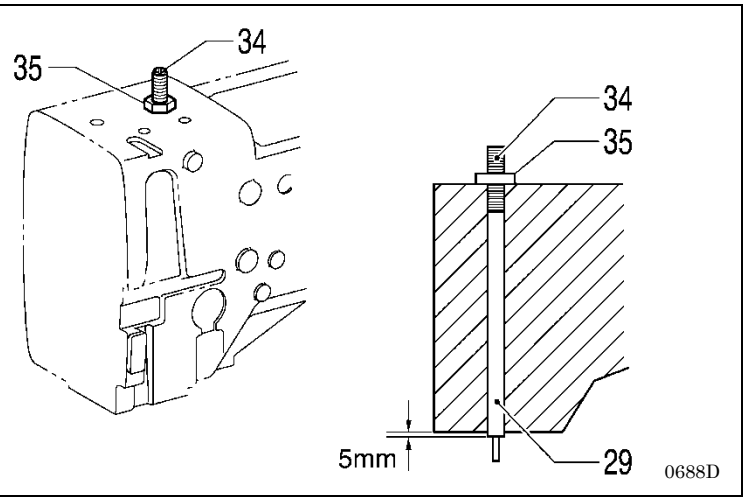


0689D

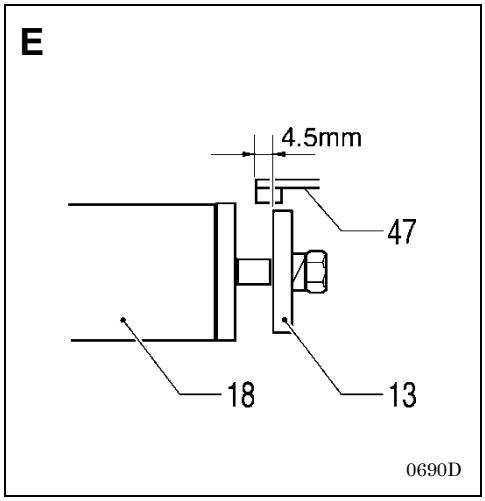
Tighten the two set screws (33) so that the distance A between the processed surface of the arm and the end of the cutter driving shaft (29) is 24.5 mm when the cutter solenoid (18) is at the stroke end (when the solenoid stopper (15) is touching the stopper cushion (13)).

* Lift up the cutter driving shaft by hand at this time and check that it moves by its own weight. If it does not move, loosen the socket bolt (27) and the screw (28) and readjust the cutter driving shaft so that it moves easily.

D

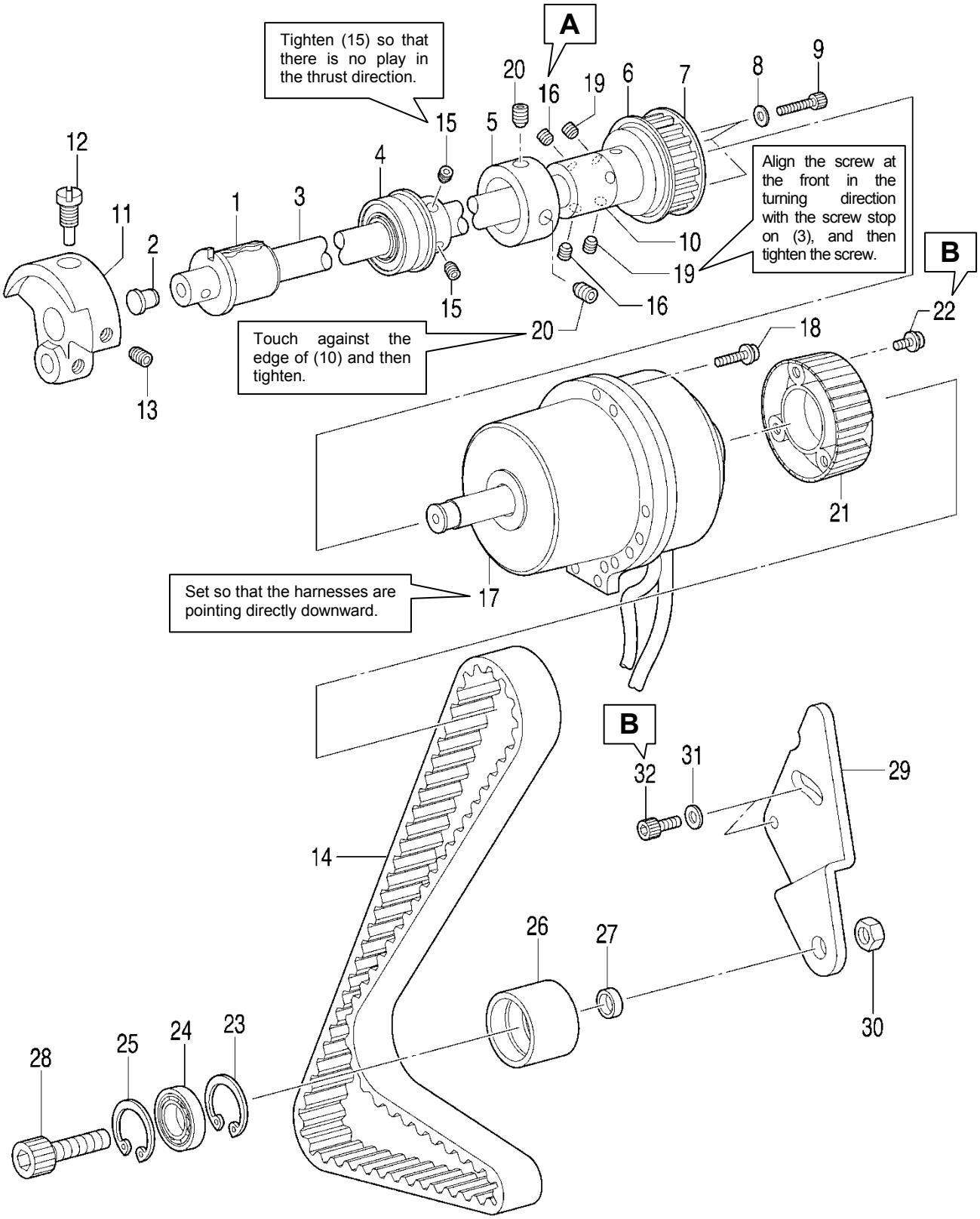


E



6-8. Upper shaft and tension pulley mechanisms

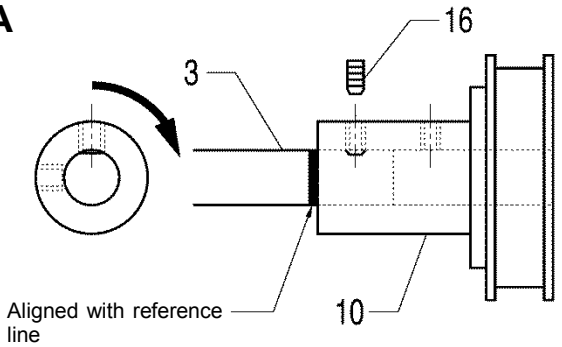
* Refer to the detailed descriptions on the next page for details on A to B in the illustration.



0713D

1. Bush F
2. Cap
3. Upper shaft
4. Bearing bush assy
5. Bobbin winder pulley
6. Flange
7. Timing pulley U
8. Washers [3 pcs]
9. Socket bolts [3 pcs]
10. Joint
11. Thread take-up crank
12. Screw
13. Set screw
14. Timing belt
15. Set screws [2 pcs]
16. Set screws [2 pcs]
17. Motor
18. Screws [3 pcs]
19. Set screws [2 pcs]
20. Set screws [2 pcs]
21. Pulley
22. Screws [3 pcs]
23. Retaining ring
24. Bearing
25. Retaining ring
26. Tension pulley
27. Collar
28. Socket bolt
29. Tension pulley plate
30. Nut
31. Plain washers [2 pcs]
32. Socket bolts [2 pcs]

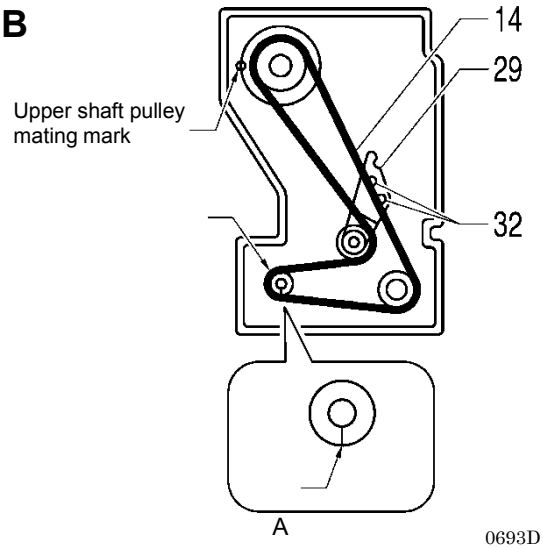
A



0692D

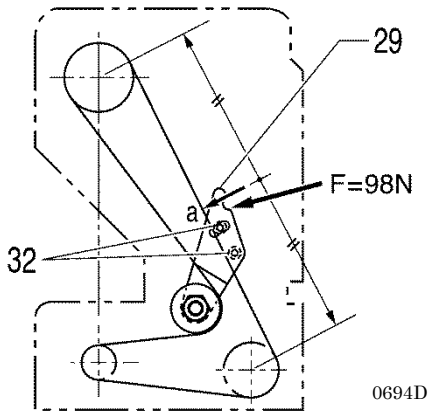
Align the reference line on the upper shaft (3) and the edge of the joint (10), and then tighten the set screw (16) which is at the front in the turning direction so that it is aligned with the screw stop on the upper shaft (3).

B



0693D

After installing the needle bar as described in “6-10. Needle bar and thread take-up mechanisms”, install these parts so that the mating mark on the pulley is on the left when viewed from the rear of the sewing machine when the upper shaft (3) is at the needle up stop position.
Align the phases of the upper shaft and lower shaft so that the mating mark A on the lower shaft timing pulley is pointing straight down when the upper shaft pulley is as described above, and then adjust the belt tension.



0694D

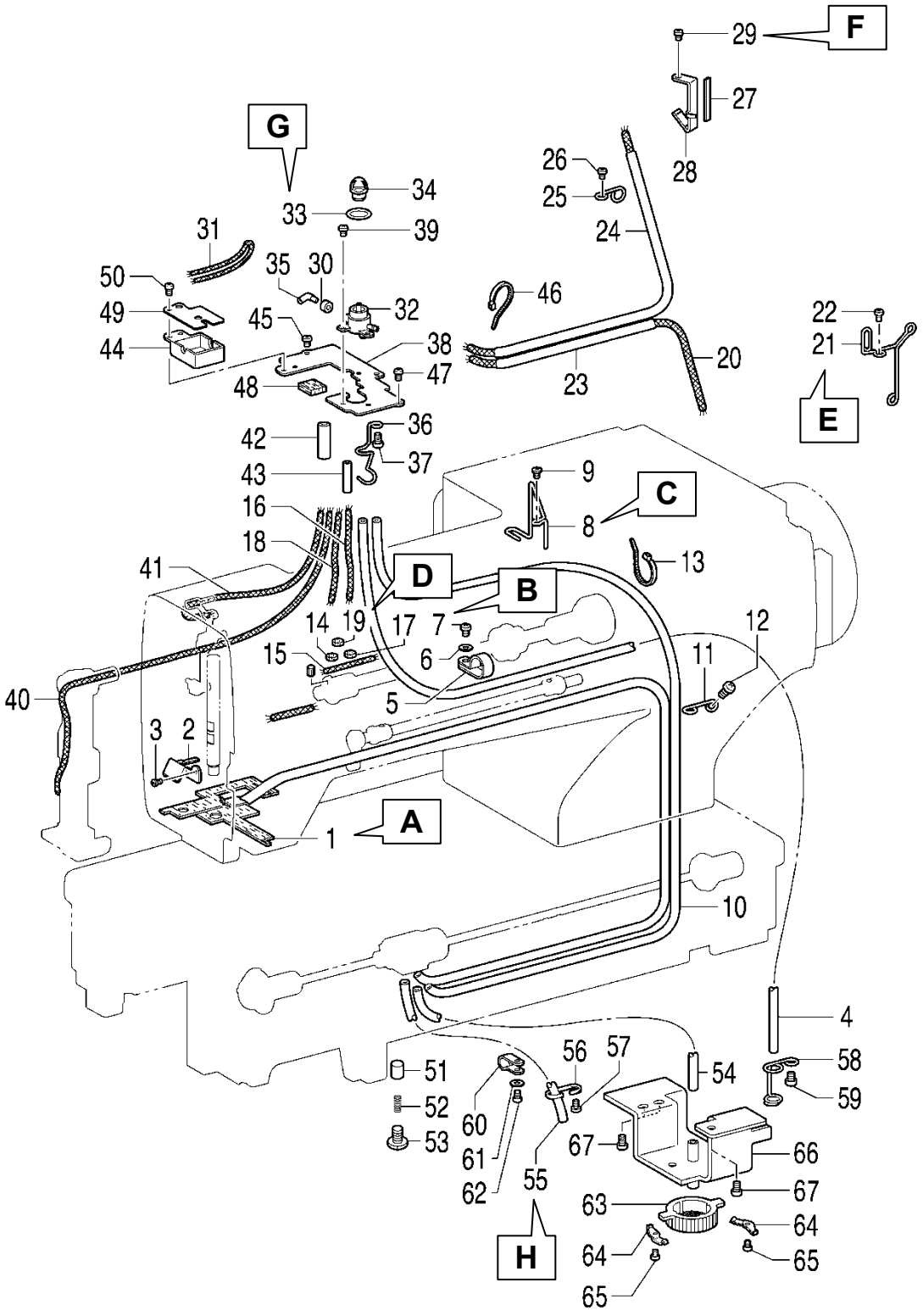
<Belt tension adjustment>

1) Push the tension pulley plate (29) in the direction of the arrow to adjust the belt tension to the value range given below.
- When using a new belt: 75 - 85 N
- When reusing an old belt: 65 - 75 N
  * Re-check at this time to make sure that the upper shaft and lower shaft are not out of phase.
  * Be sure to use a belt tension gauge to measure the belt tension, and measure at position a shown in the illustration.
  * The belt tension gauge should be set to measure a unit weight of 0.25 gf/cm, a belt width of 15 mm and a span length of 228 mm.

[Reference] If no belt tension gauge is available, use a push pull gauge to apply 98 N of force to the tension pulley plate (29) to push it in the direction of the arrow, and then tighten the two socket bolts (32).

6-9. Lubrication mechanism

* Refer to the detailed descriptions on the next page for details on A to H in the illustration.
* Carry out the steps from (1) through to (13) in “6-4. Threading mechanism”.

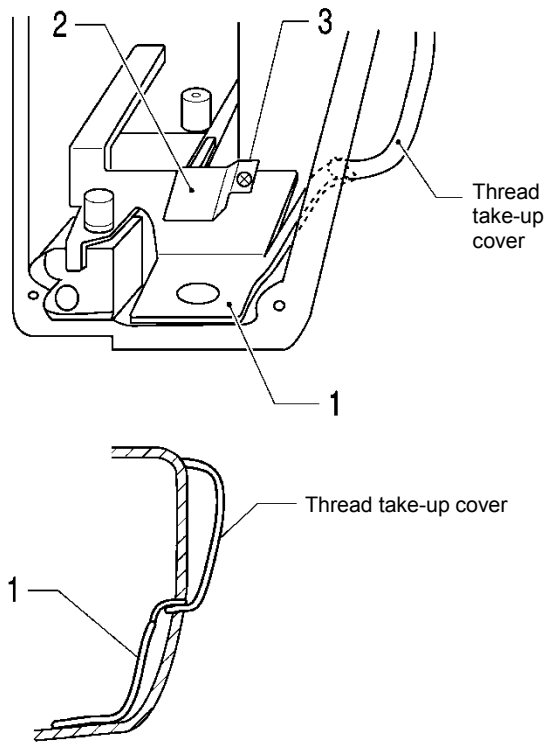


0714D

1. Oil tube assembly
2. Felt holder
3. Screw
4. Oil tube
5. Cord holder #5
6. Plain washer
7. Screw
8. Tube support, R
9. Screw
10. Oil tube
11. Tube support M
12. Screw
13. Fastening bands 1.9×80
14. Felt
15. Wick 4×50
16. Wick 3×150
17. Felt
18. Wick 3×160
19. Felt
20. Wick 4×50×330
21. Tube support U
22. Screw
23. Oil tube
24. Oil tube
25. Tube support
26. Screw
27. Felt
28. Felt support
29. Screw
30. Collar
31. Wick 2×140
32. Oil terminal
33. Packing
34. Oil cap
35. Oil pipe B
36. Tube support
37. Screw
38. Wick base support
39. Screws [2 pcs]
40. Wick 3×290
41. Wick
42. Oil tube
43. Oil tube
44. Felt base A
45. Screw
46. Fastening bands 1.9×80
47. Screws [2 pcs]
48. Felt
49. Cap
50. Screw
51. Plunger [2 pcs]
52. Compression spring [2 pcs]
53. Screws [2 pcs]
54. Oil tube
55. Oil tube
56. Tube support
57. Screw
58. Tube support D
59. Screw
60. Cord holder #10
61. Plain washer
62. Screw
63. Pump filter
64. Spring [2 pcs]
65. Screws [2 pcs]
66. Oil filter mounting plate assy
67. Screws [3 pcs]

A

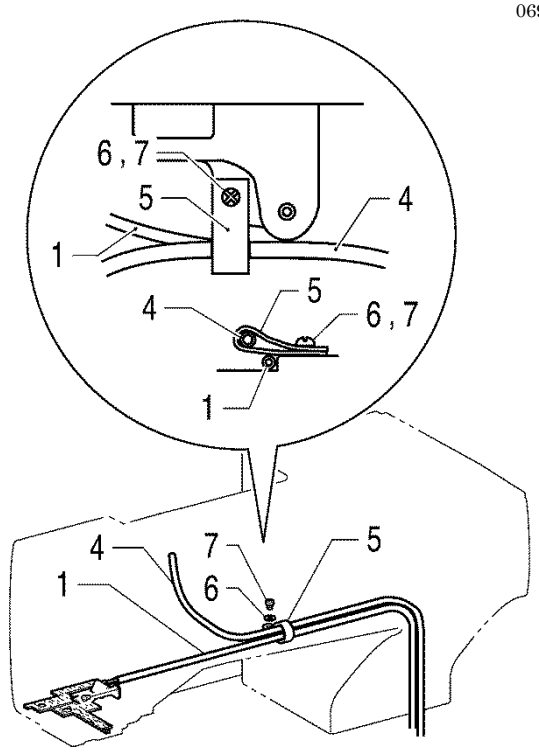
0695D



1) Insert the oil tube assembly (1) into the arm, and then insert it into the hole in the thread take-up cover.
2) Install the felt holder (2) with the screw (3), and then secure the oil tube assembly (1).

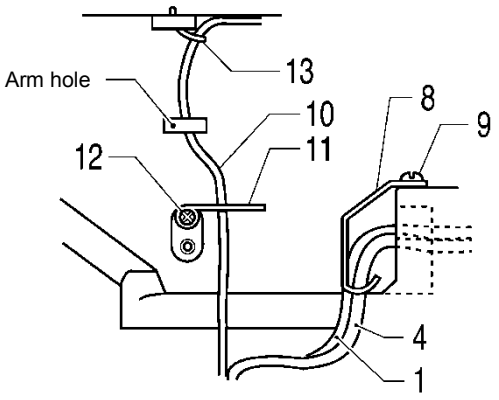
B

0696D



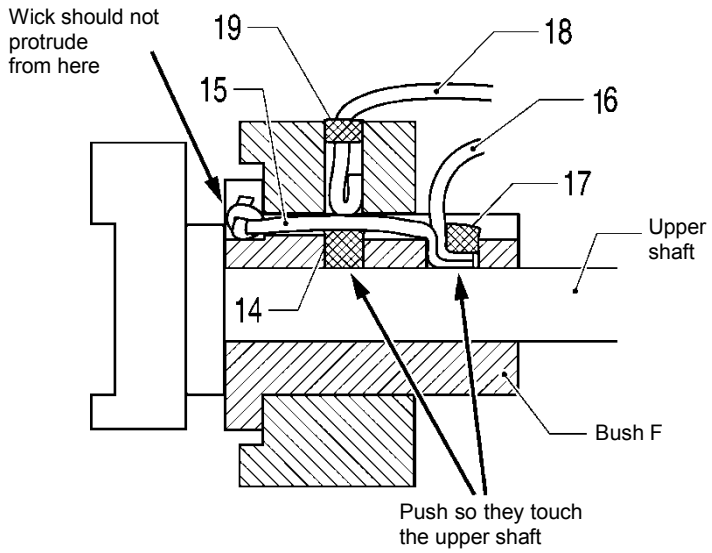
1) Install the oil tube (4) that is connected between the oil terminal and the oil outlet with the cord holder (5), screw (7) and washer (6).
2) Clamp the oil tube assembly (1) under the cord holder (5).

C



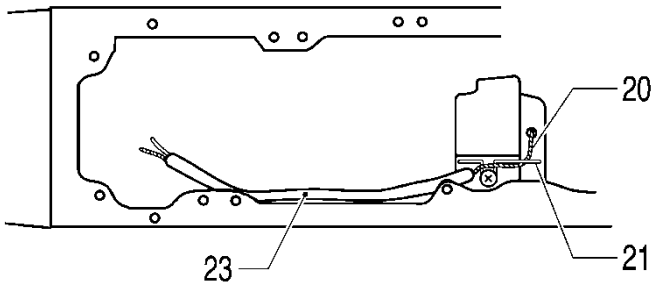
1) Install the tube support (8) with the screw (9), and then secure the oil assembly (1) and the oil tube (4) that is connected between the oil terminal and the oil outlet so that they do not touch the pulse motor (for presser lifter).
2) Install the oil tube (10) that is connected to the oil terminal and the plunger pump with the tube support M (11) and the screw (12), pass it through the arm hole, and then secure it to the arm with the fastening band (13).
   * At this time, bind the oil tube carefully so as not to break it.

D

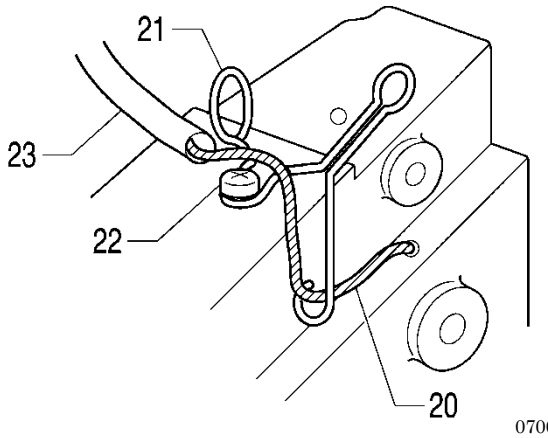


1) Insert the felt (14) into the bush F.
2) Insert the wicks (15) and (16) into the bush F, and insert the felt (17) to stop them from coming out.
   * At this time, push in firmly so that the felt (14) and the wick (15) are touching the upper shaft. If they are not pushed in firmly enough, seizure of the upper shaft may occur.
3) Insert the wick (18) into the bush F, and insert the felt (19) to stop them from coming out.

E



0699D

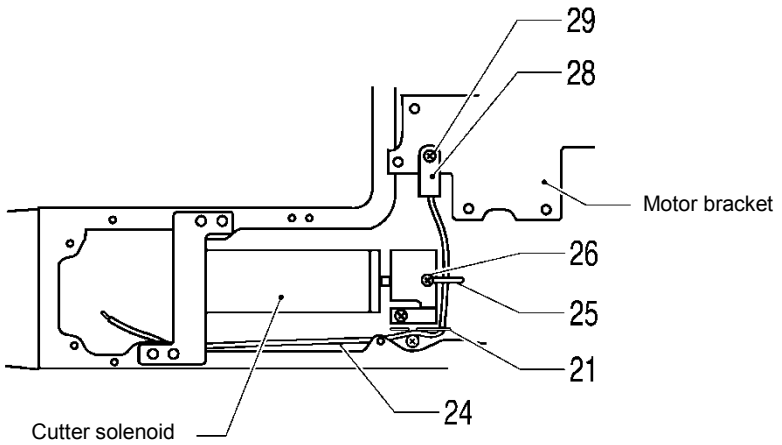


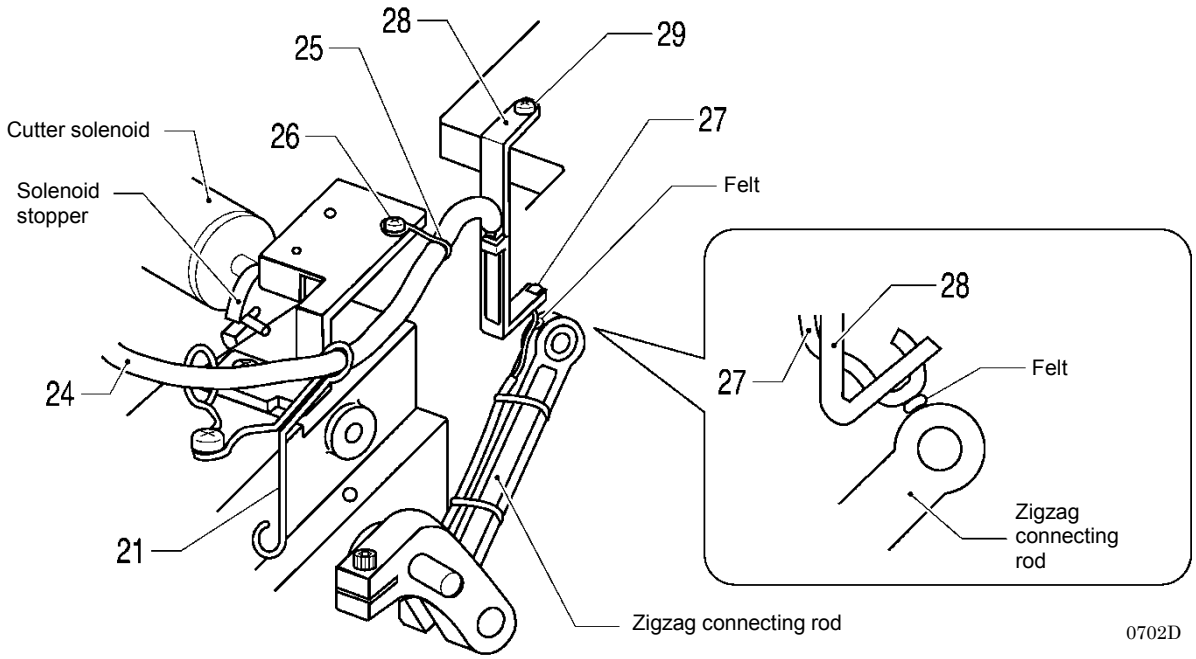
0700D

1) Pass the wick (20) through the tube support U (21) and push it firmly into the zigzag lever shaft lubrication hole.
2) Install the tube support U (21) with the screw (22).
3) Pass the oil tube (23) around the outside of the tube support U (21) as shown in the illustration.

F

0701D



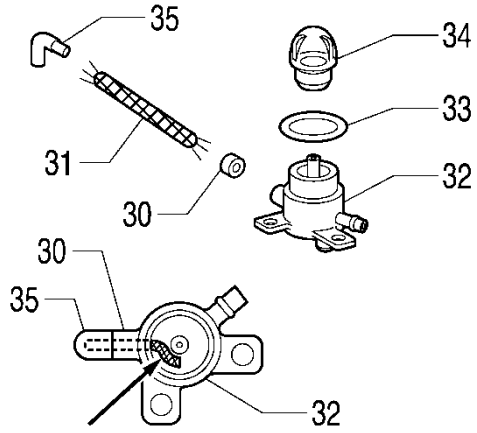


0702D

1) Pass the oil tube (24) through the tube support U (21) and the tube support (25), and then secure the tube support (25) with the screw (26).
2) Install the felt support (28) to the motor bracket with the screw (29) at the position where the felt (27) and the felt of the zigzag connecting rod are gently touching.
3) Pass the oil tube (24) around the outside of the tube support U (21) as shown in the illustration so that it does not touch the solenoid stopper, and then pass it in between the cutter solenoid and the arm.

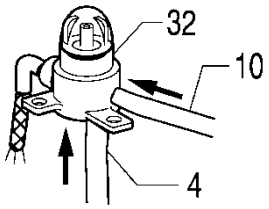
G

0703D

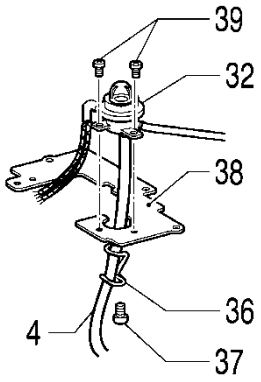


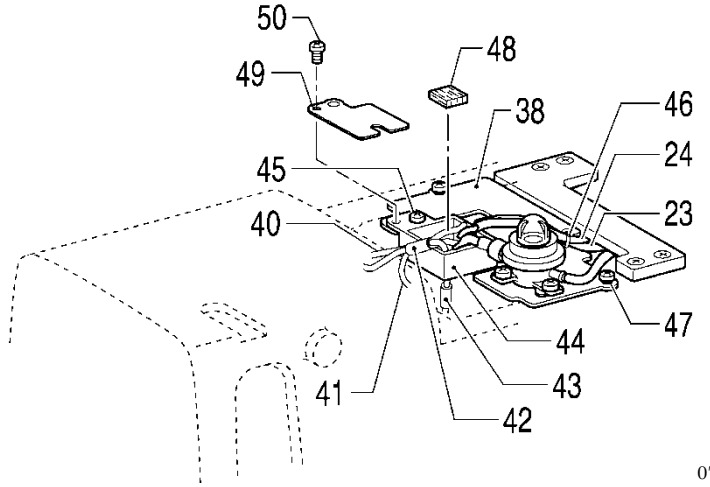
Push into the groove

0704D



0705D

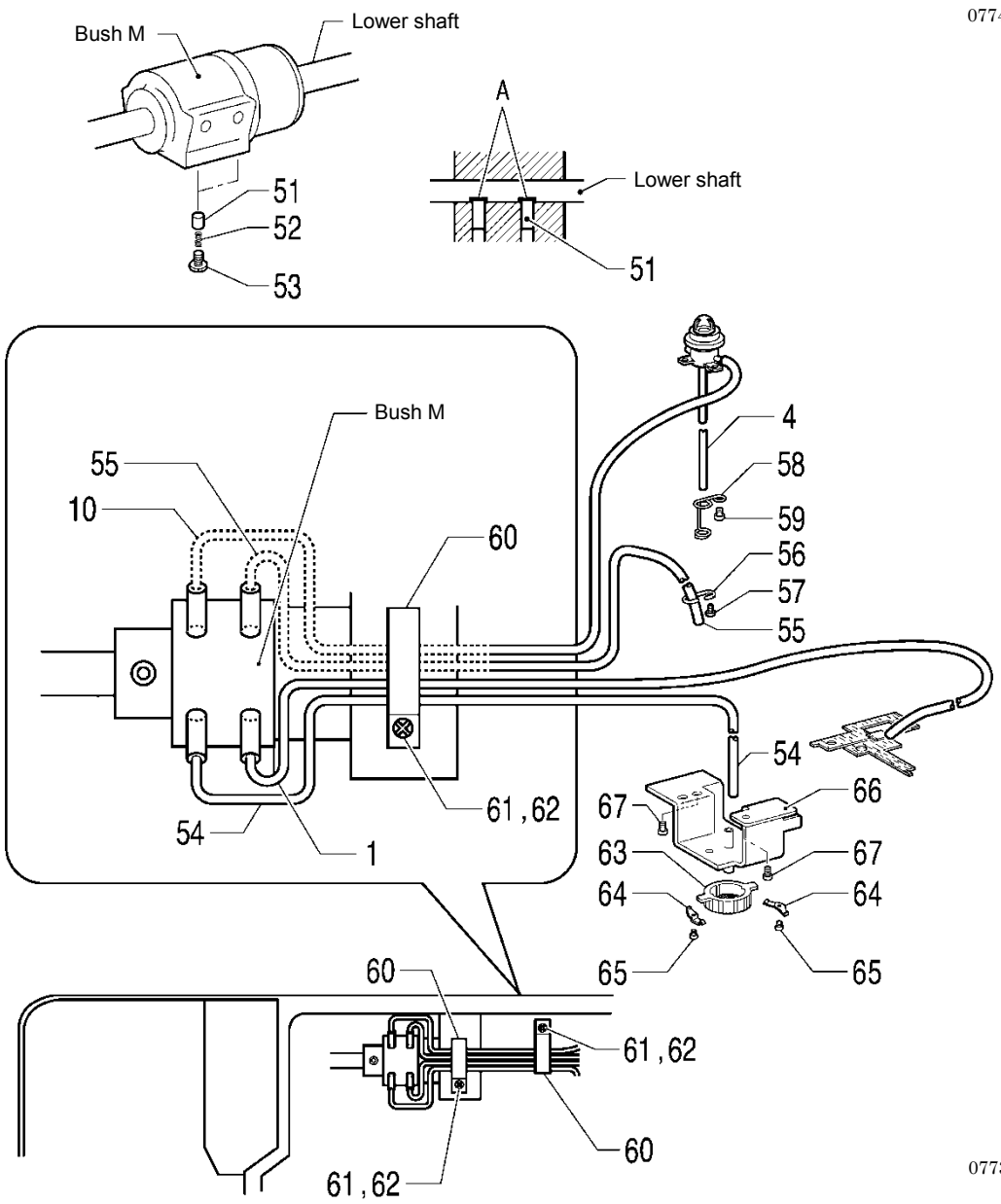




0706D

1) Pass the wick (31) through the collar (30), and then insert it into the oil terminal (32). Push the wick (31) firmly enough into the groove as shown in the illustration.
2) Insert the packing (33) into the oil terminal (32), and then install the oil cap (34).
3) Pass the wick (31) through the oil pipe B (35), and then install it to the oil terminal (32).
4) Push the oil tube (10) that is connected between the oil terminal and the plunger pump into the oil terminal (32).
5) Push the oil tube (4) that is connected between the oil terminal and the oil outlet into the oil terminal (32).
6) Install the tube support (36) to the wick base support (38) with the screw (37).
7) Attach the oil tube (4) to the tube support (36), and then install the oil terminal (32) to the wick base support (38) with the two screws (39).
8) Pass the wick (40) of the needle bar bracket, the two wicks of the bush F, and the wick 41 coming from the thread take-up support shaft through the oil tubes (42) and (43), and then install the wick base A (44) to the wick base support (38) with the screw (45).
9) Install the oil tube (24) for lubricating the bush M and the zigzag lever shaft and the oil tube (23) for lubricating the zigzag mechanism to the wick base support (38) with the fastening band (46).
10) Install the wick base support (38) with the two screws (47).
11) Insert the felt (48), and then install the cap (49) with the screw (50).

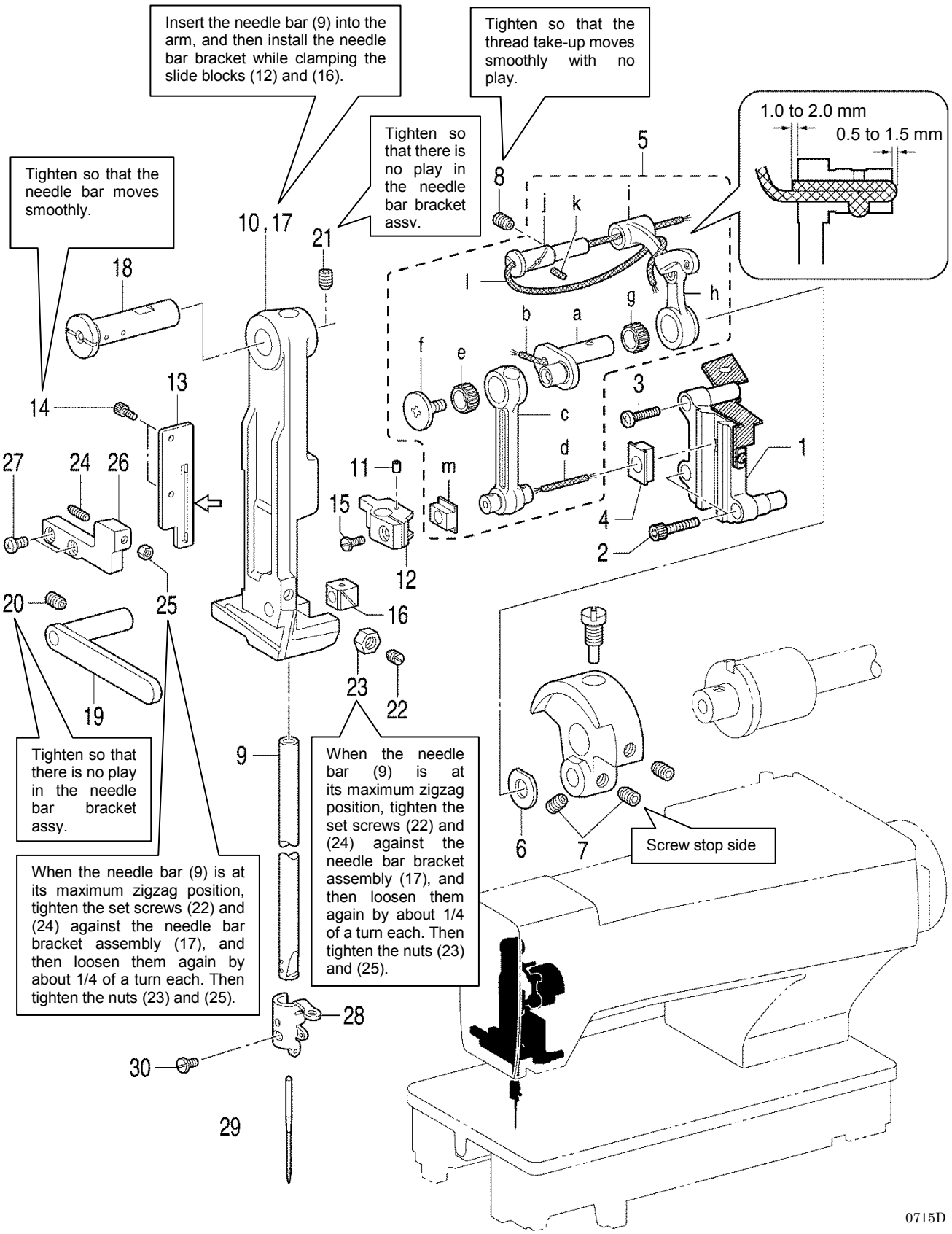
H



1) Check that the notches A of the plungers (51) and the lower shaft are aligned, and then insert the two plungers (51) and the compression springs (52) into the bush M and secure them with the two screws (53).
2) Insert the oil tube (1) into the lubricating hole to the right of the bush M.
3) Insert the oil tube (54) that is connected between the plunger and the filter into the lubricating hole to the left of the bush M.
4) Insert the oil tube (55) into the lubricating hole to the right of the bush M.
5) Pass the outlet of the oil tube (55) through the tube support (56), and then install the tube support (56) to the bed with the screw (57).
6) Insert the oil tube (10) that is connected between the oil terminal and the plunger pump through the lubricating hole to the left of the bush M.
7) Pass the oil tube (4) that is connected between the oil terminal and the oil outlet through the tube support D (58), and then install the tube support D (58) to the bed with the screw (59).
8) Secure the four tubes that are coming out from the bush M to the bed in two places as shown in the illustration with the cord holders (60), screws (62) and plain washers (61).
9) Install the pump filter (63) to the oil filter bracket (66) with the two springs (64) and the two screws (65).
10) Insert the oil tube (54) that is connected between the plunger and the filter through the oil filter bracket (66).
11) Install the oil filter bracket (66) to the bed with the three screws (67).

6-10. Needle bar and thread take-up mechanisms

* Apply the grease specified by Brother (**Power Knock WB2 from JX Nippon Oil & Energy**) in the places indicated by ⇦.

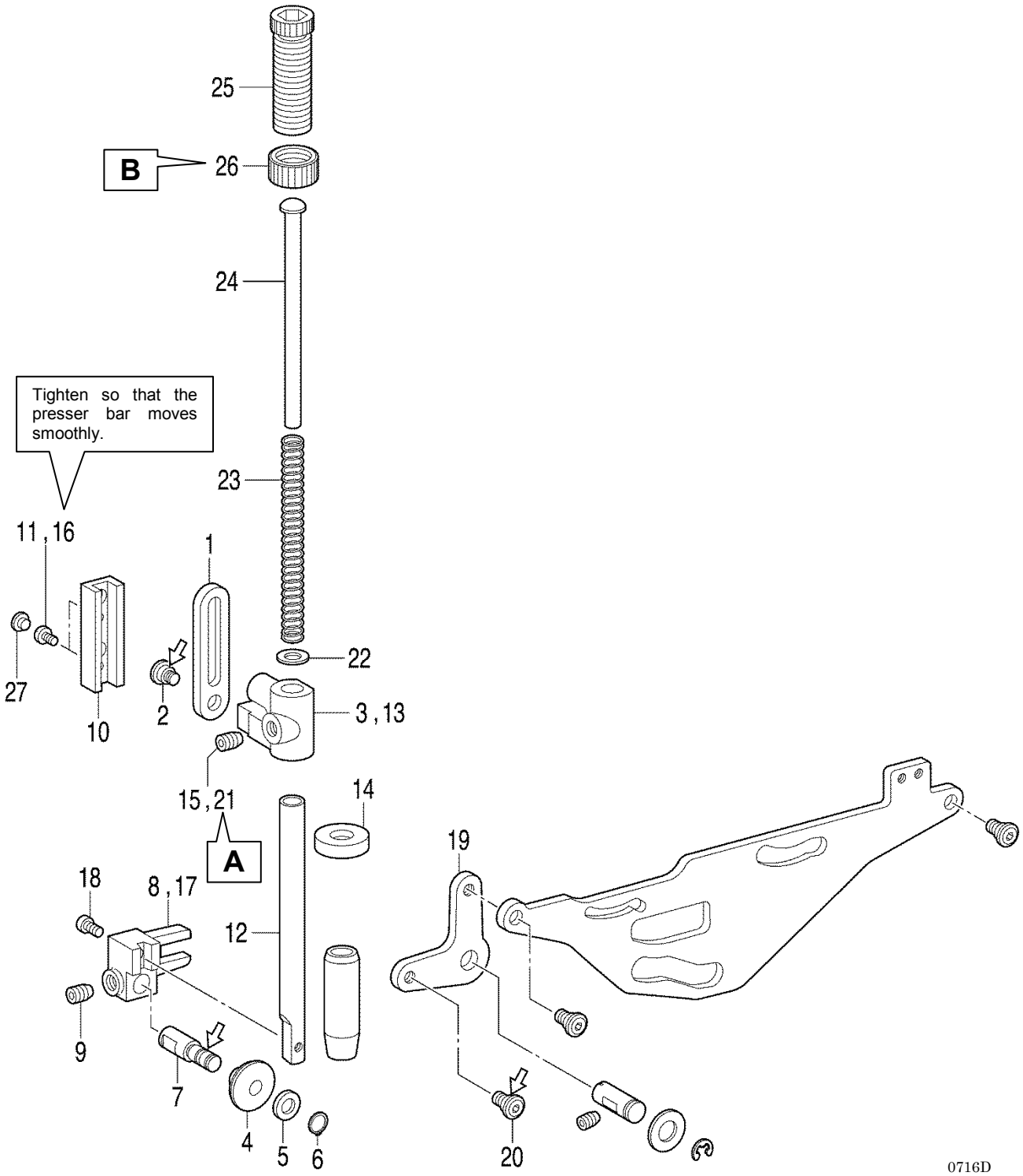


1. Crank rod guide
2. Socket bolts [2 pcs]
3. Screw
4. Needle bar guide slide block
5. Needle bar connecting rod assembly
6. Washer
7. Set screws [2 pcs]
8. Set screw
9. Needle bar
10. Needle bar bracket
11. Felt
12. Needle bar clamp assembly
13. Needle bar guide
14. Set screws [2 pcs]
15. Screw
16. Slide block
17. Needle bar bracket
18. Needle bar bracket support shaft
19. Needle bar bracket guide
20. Set screw
21. Set screw
22. Set screw
23. Nut
24. Set screw
25. Nut
26. Stopper
27. Screws [2 pcs]
28. Needle bar thread guide
29. Needle
30. Set screw

a. Needle bar crank
b. Wick
c. Needle bar connecting rod
d. Wick
e. Needle bearing
f. Screw (Left-hand thread)
g. Needle bearing
h. Thread take-up lever
i. Thread take-up support
j. Support shaft
k. Felt
l. Wick
m. Slide block

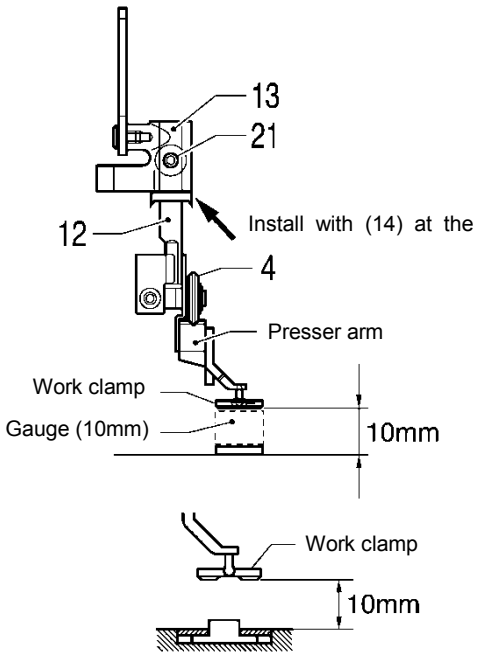
6-11. Presser bar mechanism

* Refer to the detailed descriptions on the next page for details on A to E in the illustration.
* Apply the grease specified by Brother (**Power Knock WB2 from JX Nippon Oil & Energy**) in the places indicated by ⇦.



1. Presser bar lifter link
2. Shoulder screw
3. Presser bar guide bracket
4. Roller
5. Plain washer
6. Retaining ring
7. Roller shaft
8. Presser roller bracket
9. Set screw
10. Needle bar guide
11. Screws [2 pcs] (Temporarily tighten)
12. Presser bar
13. Presser bar guide bracket
14. Oil rejector
15. Set screw (Temporarily tighten)
16. Screws [2 pcs] (Fully tighten)
17. Presser roller bracket
18. Screw
19. Knee lifter lever
20. Shoulder screw
21. Set screw
22. Washer
23. Compression spring
24. Spring guide
25. Presser adjusting screw
26. Presser adjusting nut
27. Rubber caps [2 pcs]

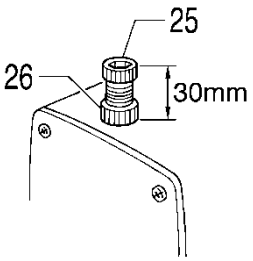
A



0717D

1) Place a 10 mm gauge underneath the work clamp.
2) Turn on the power, move the feed mechanism to the home position, and then check that memory switch No. 002 (Work clamp height when treadle is at neutral) is 10 mm. (If it is not set to 10 mm, set it to 10 mm.)
3) While pushing the presser bar (12) down from above, tighten the set screw (21) so that the roller (4) is not at an angle to the V-shaped groove in the presser arm .
4) Remove the gauge and turn off the power.

B

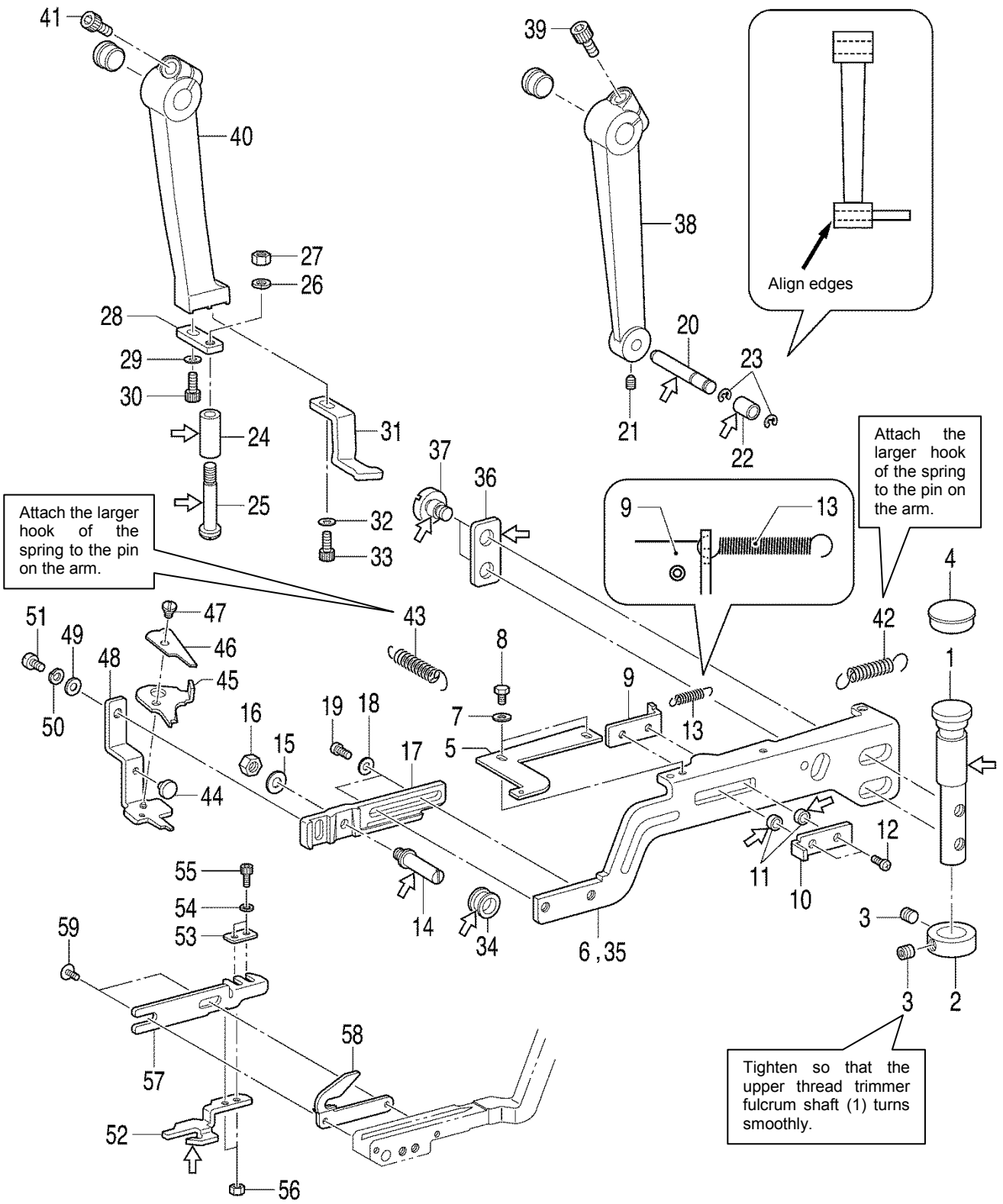


0718D

Insert the spring guide (24), compression spring (23) and plain washer (22), and with the presser adjusting screw (25) at a height of 30 mm, tighten the presser adjusting nut (26).

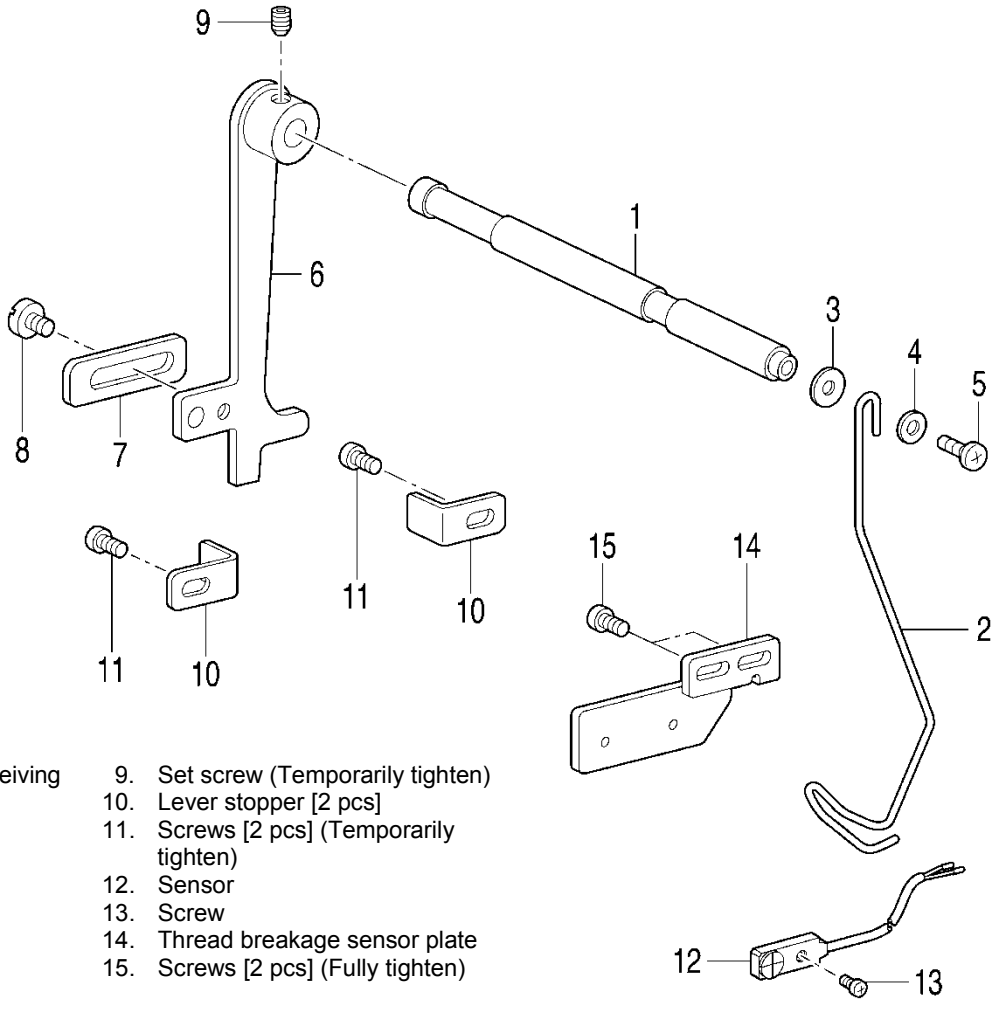
6-12. Upper thread trimmer mechanism

* Apply the grease specified by Brother (**Power Knock WB2 from JX Nippon Oil & Energy**) in the places indicated by⇦.



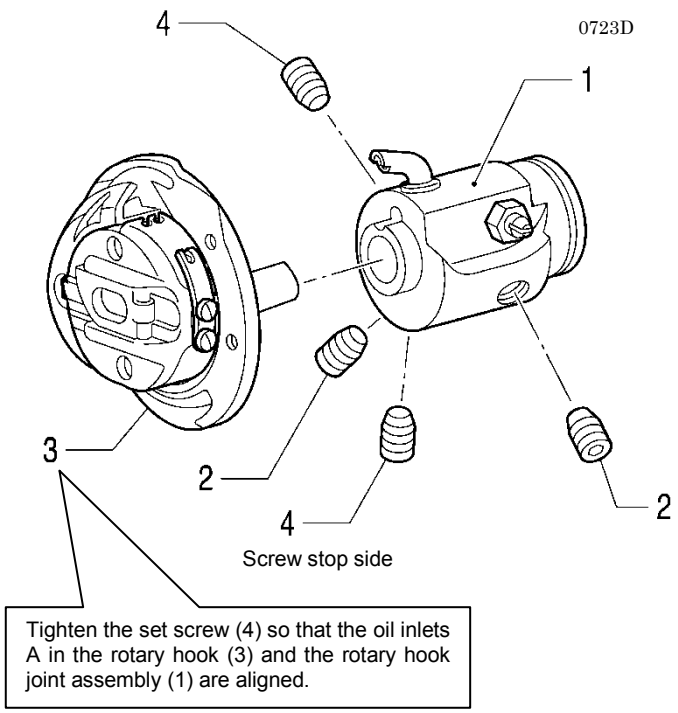
1. Upper thread trimmer fulcrum shaft
2. Set screw collar
3. Set screw [2 pcs]
4. Rubber cap
5. Adjusting plate
6. Upper thread trimmer lever
7. Washers [2 pcs]
8. Bolts [2 pcs]
9. Stop plate
10. Back plate
11. Collar [2 pcs]
12. Screws [2 pcs]
13. Spring
14. Support shaft
15. Plain washer
16. Nut
17. Setting plate
18. Plain washers [2 pcs]
19. Screws [2 pcs] (Temporarily tighten)
20. Longitudinal feed arm pin
21. Set screw
22. Longitudinal feed arm roller
23. Retaining rings [2 pcs]
24. Driving arm roller
25. Roller shoulder screw
26. Spring washer
27. Nut
28. Support plate
29. Plain washer
30. Bolt (Temporarily tighten)
31. Back stopper
32. Plain washer
33. Bolt (Temporarily tighten)
34. Roller
35. Upper thread trimmer lever assembly
36. Washer
37. Screws [2 pcs]
38. Longitudinal feed arm assembly
39. Bolt (Temporarily tighten)
40. Trimmer driving arm
41. Bolt (Temporarily tighten)
42. Extension spring
43. Extension spring
44. Stopper
45. Scissors M
46. Scissors U
47. Shoulder screw, SM3.18
48. Thread trimmer assy D
49. Plain washer
50. Spring washer
51. Screw (Temporarily tighten)
52. Opening cam
53. Washer plain
54. Spring washers [2 pcs]
55. Set screws [2 pcs]
56. Nuts [2 pcs]
57. Cam setting plate
58. Feed arm support
59. Screws [2 pcs] (Temporarily tighten)

6-13. Thread breakage detector mechanism

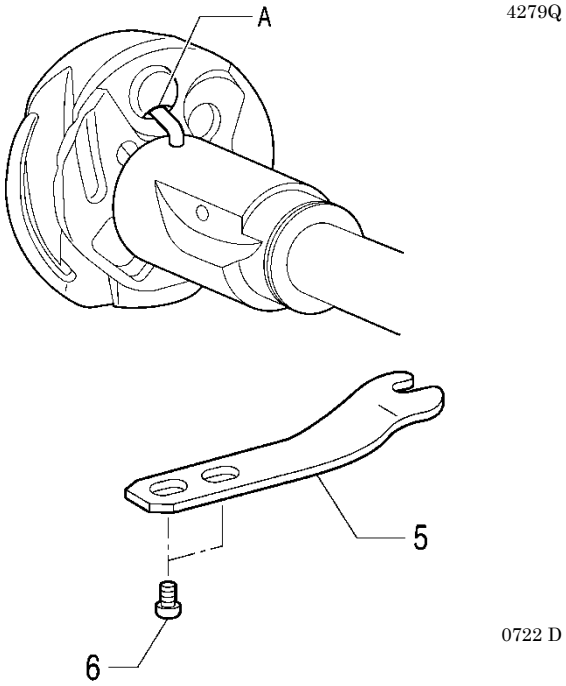


1. Thread breakage perceiving shaft
2. Thread guide
3. Plain washer
4. Plain washer
5. Screw
6. Cutter bar fixed plate
7. Balancer
8. Screw
9. Set screw (Temporarily tighten)
10. Lever stopper [2 pcs]
11. Screws [2 pcs] (Temporarily tighten)
12. Sensor
13. Screw
14. Thread breakage sensor plate
15. Screws [2 pcs] (Fully tighten)

6-14. Rotary hook mechanism



0723D

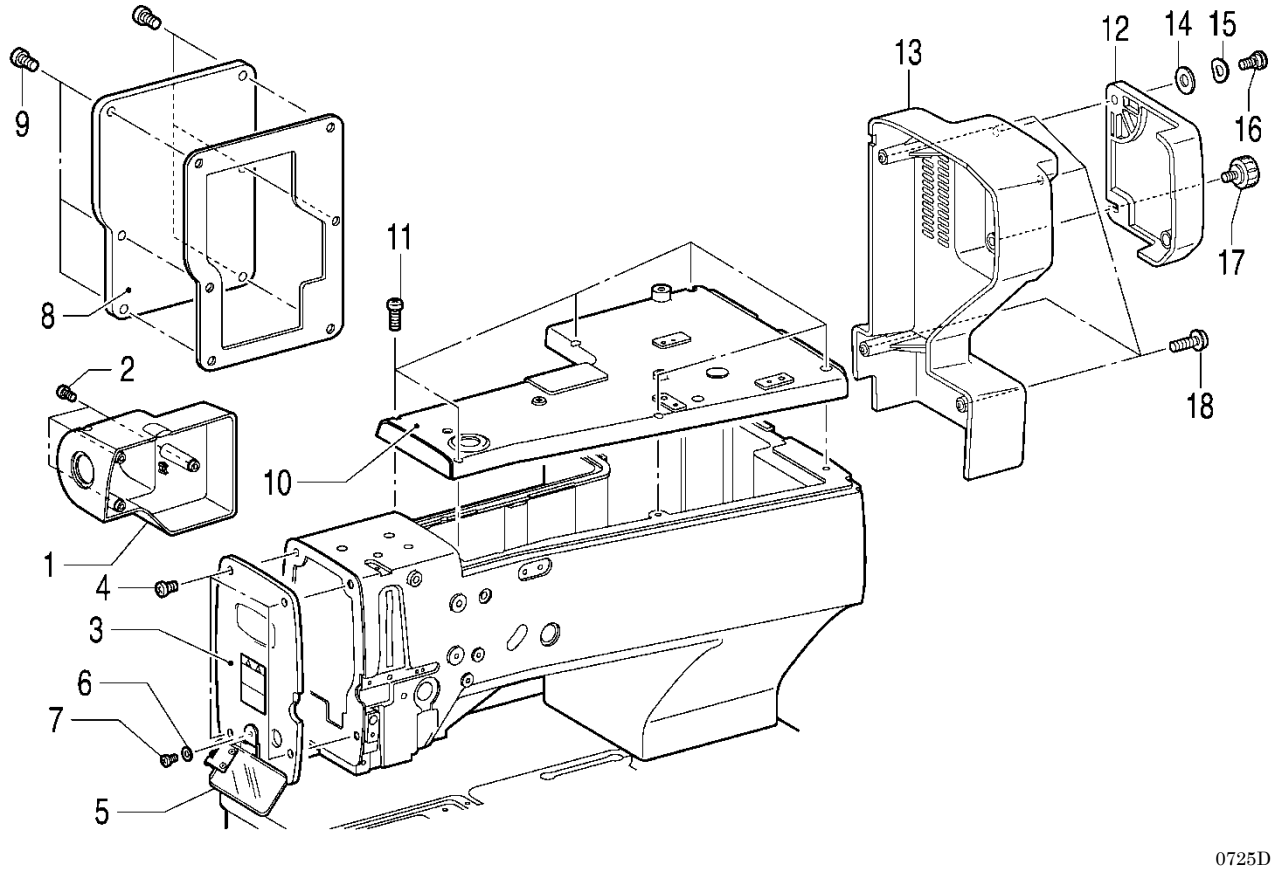


4279Q

0722 D

1. Rotary hook joint assembly
2. Set screw [2 pcs] (Provisionally tighten)
3. Rotary hook
4. Set screw [2 pcs] (Provisionally tighten)
   Adjust the needle clearance and timing. (Refer to “7-4. Adjusting the needle and rotary hook timing”.)
5. Rotary hook holder
6. Screws [2 pcs]

6-15. Covers



1. Cover
2. Screws [3 pcs]
3. Main plate
4. Screws [4 pcs]
5. Eye guard assembly
6. Washer
7. Screw
8. Rear cover
9. Screws [6 pcs]
10. Top cover
11. Screws [6 pcs]
12. Slide cover
13. Motor cover
14. Washer
15. Wave washer
16. Shoulder screw
17. Knob screw
18. Screws [4 pcs]

7. ADJUSTMENT

⚠ CAUTION

- Maintenance and inspection of the sewing machine should only be carried out by a qualified technician.
- Ask your Brother dealer or a qualified electrician to carry out any maintenance and inspection of the electrical system.
- Turn off the power switch and disconnect the power cord from the wall outlet at the following times, otherwise the machine may operate if the treadle is depressed by mistake, which could result in injury.
  - When carrying out inspection, adjustment and maintenance
  - When replacing consumable parts such as the rotary hook
- If the power switch needs to be left on when carrying out some adjustment, be extremely careful to observe all safety precautions.
- Use only the proper replacement parts as specified by Brother.
- If any safety devices have been removed, be absolutely sure to re-install them to their original positions and check that they operate correctly before using the machine.
- Any problems in machine operation which result from unauthorized modifications to the machine will not be covered by the warranty.

7-1. Notes on making adjustments

[When turning on the power to make adjustments]

Turn on the power and set the sewing machine to the home position. Then press the THREAD key to lower the work clamp before carrying out adjustments.

"Threading" will appear in the parameter display LED and the sewing machine will not operate even if the treadle is depressed.

* Some items are adjusted without the THREAD key being pressed. Carry out the adjustment by following the explanations given.

[When turning off the power to make adjustments]

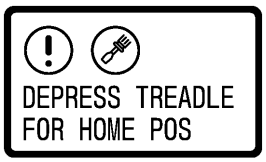
Do not force any of the parts to move, as doing so may result in damage to the parts.

- Be sure to turn the machine pulley to raise the needle bar to its highest position before making adjustments.
  If this is not done, the pulley position (the direction of rotation of the rotary hook) may cause the lower thread trimmer mechanism to touch the rotary hook when the lower thread trimmer mechanism operates.
- When turning the machine pulley, do it at a position where the thread trimmer mechanism will not operate (the position where the presser foot lifter pulse motor is at the home position).
  If the machine pulley is turned at a position where the thread trimmer mechanism operates, the needle may touch the lower thread trimmer mechanism (lower thread retainer and lower thread trimmer knife).
  If the machine pulley is turned at a position where the thread trimmer mechanism operates, the rotary hook and the lower thread trimmer mechanism may touch.
- When moving the feed mechanism, do it at a position where the thread trimmer mechanism will not operate (the position where the presser foot lifter pulse motor is at the home position).
  If this is not done, the lower thread retainer and the feed guide shaft may alternately push against the lower thread clamp and the opening plate, and damage may result.
- When pushing the knife down by hand, be careful not to let it touch the upper thread scissors.
- Do not move the feed mechanism while the stop plate of the upper thread trimmer lever is pulled forward and the upper thread scissors are open (the upper thread trimmer lever is pushed to the left).
  Always return the stop plate to its original position before moving the feed mechanism or returning it to the home position.

7-2. Adjusting the home position

7-2-1. Switching to home position adjustment mode

1



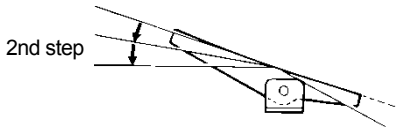
0812D

While pressing the ▲ and ▼ keys simultaneously, turn on the power switch.

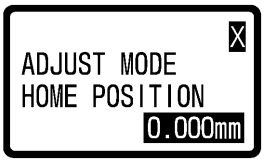
0727D

- The home position detection screen for switching to adjustment mode will be displayed.

2



4441Q



Flashing

0813D

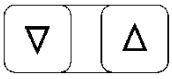
Depress the treadle to the 2nd step (for a triple pedal, depress the start switch).

- Home position detection will be carried out, and then the sewing machine will switch to needle zigzag motor home position adjustment mode.
- When the sewing machine has switched to home position adjustment mode, the TEST indicator will flash.

3

Select the home position menu.

Press the Δ or ∇ key.

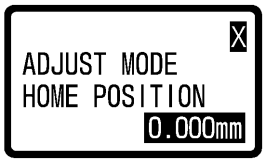


0630D

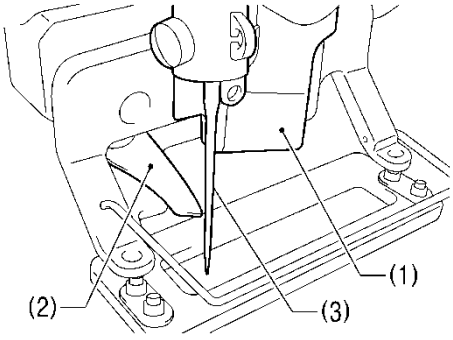
7-2-2. Needle zigzag (X) motor home position

1 Select the "X" home position adjustment mode.

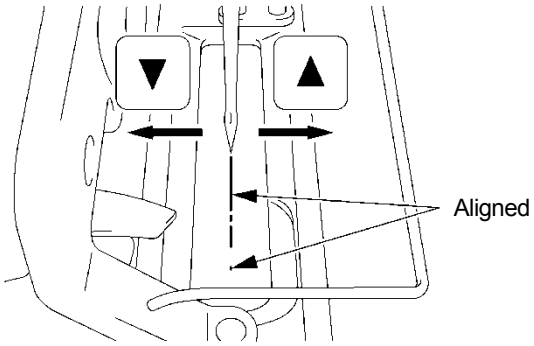
2



0814D



0730D



0731D

1. Move the feed arm forward by hand so that the cutter (1) is not touching the scissors (2), and then move the scissors (2) to the left.
2. Place some paper under the work clamp, and then push the cutter (1) down by hand.
3. Turn the pulley by hand until the tip of the needle (3) drops to the paper.
4. Press the ▲ and ▼ keys to change the offset (-1.500 mm to 1.500 mm) so that the needle drop position is aligned with the mark made by the cutter.
   - The X motor will operate in accordance with the offset value.
   - The offset value will flash in the display.

0732D

* If you press the RESET key for 2 seconds or more at this time, the offset value will be reset to 0.00 mm and X home position detection will be carried out.

2634B

3

0815D

Press the ENTER key to store the offset value.
At this time, X home position detection will be carried out and the offset value will illuminate steadily in the display.

0747D

4 Repeat steps 2 and 3 to set the home position to the correct position.

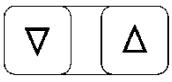
5 End adjustment mode.

Flashing → Illuminates

0816D

Once home position adjustment operation is finished, press the TEST key.
- Normal sewing machine operation will then be possible.

To carry out home position adjustment for another motor
Press the Δ or ∇ key.



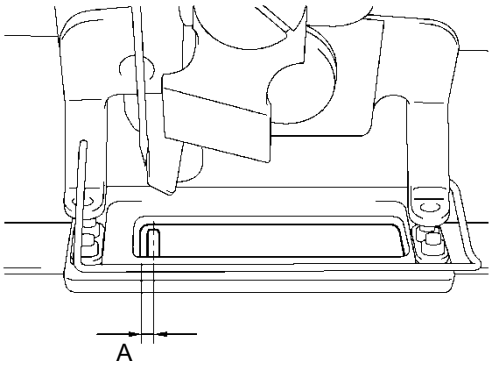
0630D

7-2-3. Feed (Y) motor home position

1 Select the "Y" home position adjustment mode.

2

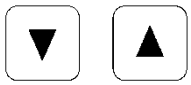
0817D



0724D

Press the ▲ and ▼ keys to change the offset value (-1.500 mm to 1.500 mm) so that the distance A between the center of the needle hole in the needle plate and the inside front edge of the work clamp is 1.8 mm.

- The Y motor will operate in accordance with the offset value.
- The offset value will flash in the display.



0732D

* If you press the RESET key for 2 seconds or more at this time, the offset value will be reset to 0.000 mm and Y home position detection will be carried out.

2634B

3

0818D

Press the ENTER key to store the offset value.
At this time, Y home position detection will be carried out and the offset value will illuminate steadily in the display.

0747D

4 Repeat steps 2 and 3 to set the home position to the correct position.

5 End adjustment mode.

Flashing → Illuminates

0816D

Once home position adjustment operation is finished, press the TEST key.

- Normal sewing machine operation will then be possible.

To carry out home position adjustment for another motor
Press the Δ or ∇ key.

0630D

7-2-4. Work clamp (P) motor home position

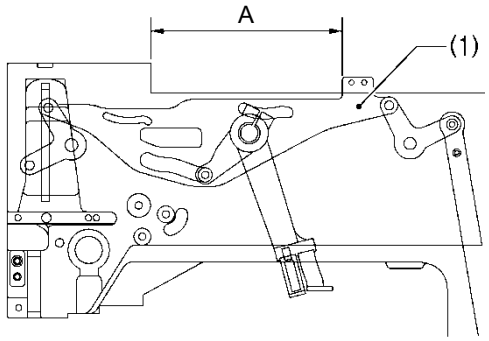
1 Select the “P” home position adjustment mode.

2

0819D

1. Keep pressing the ▼ key briefly until the panel value stops changing.
   (The upper thread trimmer driving link (1) will stop moving.)
2. Measure the distance A in the illustration.
3. Press the ▲ key to adjust the offset value (-6.82 mm to 1.86 mm) so that the dimension shown in the illustration moves to the position where it is equal to distance A + 0.5 mm.

- The P motor will operate in accordance with the offset value.
- The offset value will flash in the display.



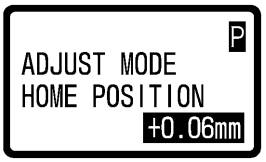
0737D

0732D

* If you press the RESET key for 2 seconds or more at this time, the offset value will be reset to 0.00 mm and P home position detection will be carried out.

2634B

3



0820D

Press the ENTER key to store the offset value.
At this time, P home position detection will be carried out and the offset value will illuminate steadily in the display.

0747D

4 Repeat steps 2 and 3 to set the home position to the correct position.

5 End adjustment mode.

Flashing → Illuminates

0816D

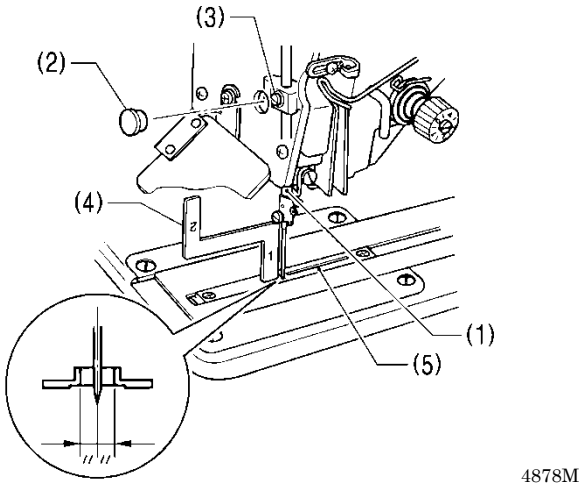
Once home position adjustment operation is finished, press the TEST key.

- Normal sewing machine operation will then be possible.

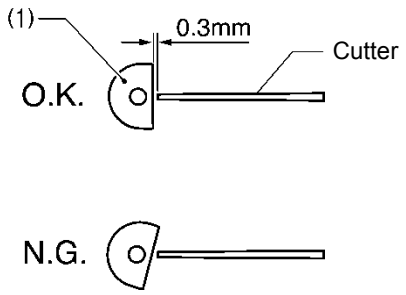
To carry out home position adjustment for another motor
Press the Δ or ∇ key.

0630D

7-3. Adjusting the needle bar height



4878M



4290Q

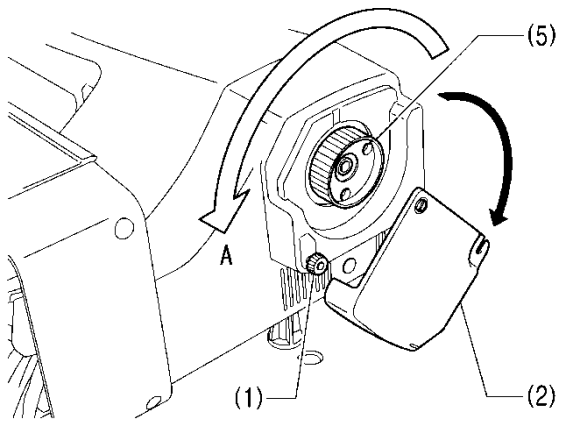
1. Press the THREAD key to switch to threading mode.
2. Press the ▼ key.
3. Set the needle bar (1) to its lowest position.
4. Remove the rubber cap (2) from the face plate, and then loosen the set screw (3) of the needle bar clamp.
5. Insert the “1” part of the gauge (4) between the needle plate (5) and the lower edge of the needle bar (1), and touch the needle bar against the gauge.
   * Different gauges (optional part) are used for each of the two specifications -2 and -3, so make sure that the gauge being used matches the specifications and application for the sewing machine being adjusted.
6. Tighten the set screw (3).
7. Install the rubber cap (2).
8. Check that the cutter flank of the needle bar (1) is at a right angle to the cutter.
9. Press the THREAD key.

Note:

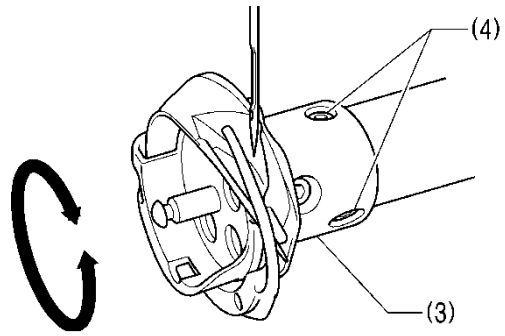
If the installation positions are not correct, the needle bar (1) and the cutter may touch when the needle zigzags, which may result in noise or cause the needle to break.

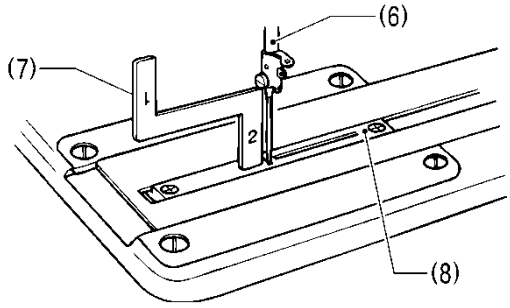
7-4. Adjusting the needle and hook timing

4879M

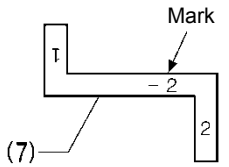


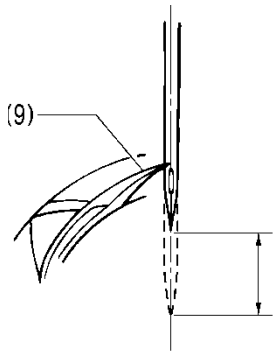
4880M





4881M





4882M 4883M

1. Press the THREAD key to switch to threading mode.
2. Press the ▼ key.
3. Gently tilt back the machine head.
4. Loosen the knob screw (1), and then fully open the slide cover (2).

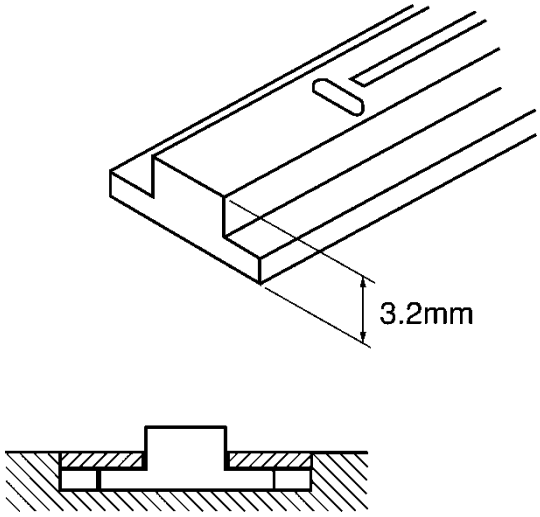
5. Loosen the two screws (4) of the rotary hook joint (3).
6. Turn the pulley (5) in the regular direction of rotation (A: toward the front) so that the needle bar (6) just begins to rise from its lowest position.

7. Insert the “2” part of the gauge (7) between the needle plate (8) and the lower edge of the needle bar (6), and then align the rotary hook tip (9) with the center of the needle when the needle bar (6) contacts the gauge (7).
   * Different gauges (optional part) are used for each of the two specifications -2 and -3, so make sure that the gauge being used matches the specifications and application for the sewing machine being adjusted.
8. Tighten the two set screws (4) of the rotary hook joint (3).
9. Close the slide cover (2), and then tighten the screw (1) to secure it.

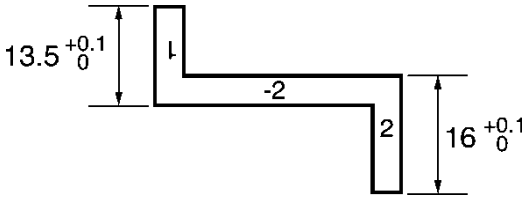
⚠ CAUTION

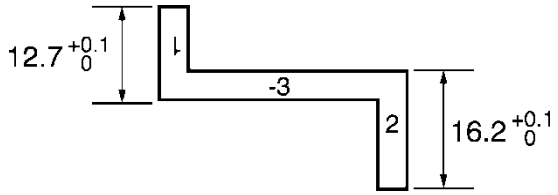
Close the slide cover (2) and secure it. The inner pulley (5) rotates during sewing, so do not touch it, otherwise injury may occur.

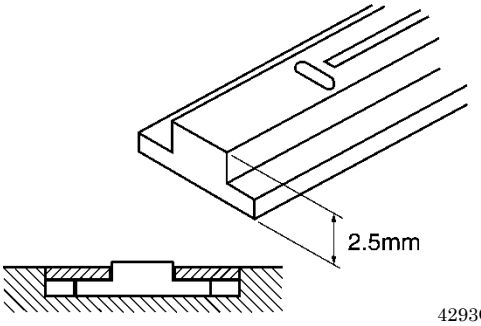
10. Gently return the machine head to its original position.
11. Press the THREAD key.

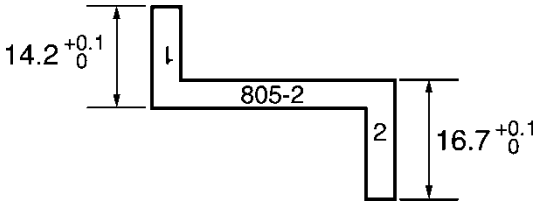
<table>
<tr><th>Needle plate thickness</th><th>Application</th><th>Gauge</th></tr>
<tr><td rowspan="2"> 

4292Q</td><td>Clothing
(-2)

Knitted
wear</td><td>S13595-001 Gauge 815-2
 

4294Q</td></tr>
<tr><td>Knitted
wear
(-3)</td><td>S13596-001 Gauge 815-3
 

4295Q</td></tr>
<tr><td> 

4293Q</td><td>Thin knitted
wear</td><td>S13597-001 Gauge 805-2
 

4296Q</td></tr>
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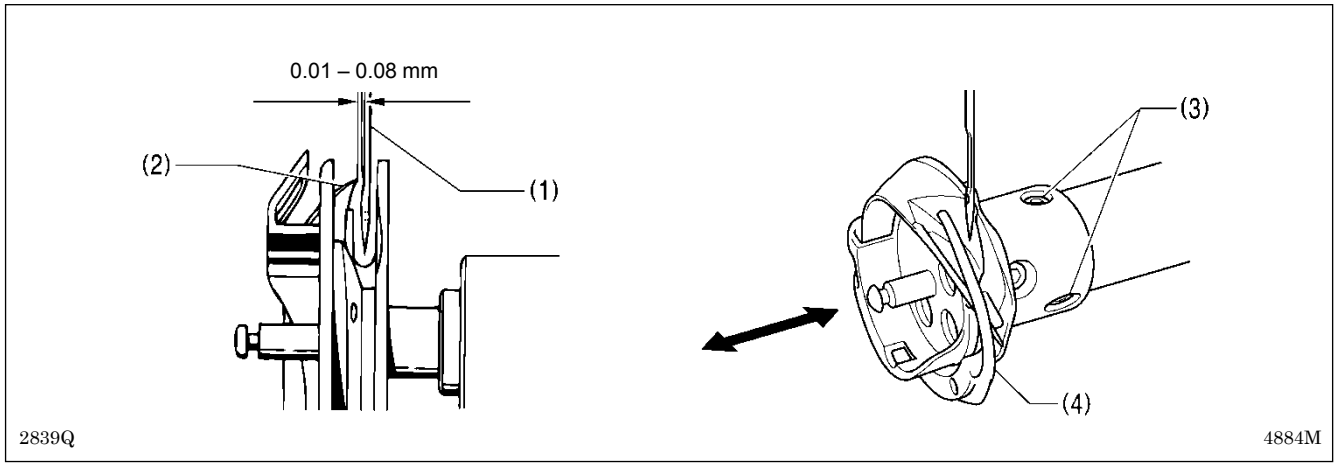
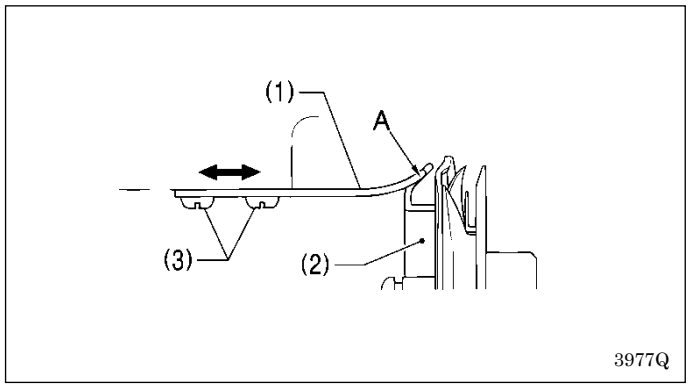
7-4-1. Adjusting the clearance between needle and hook tip



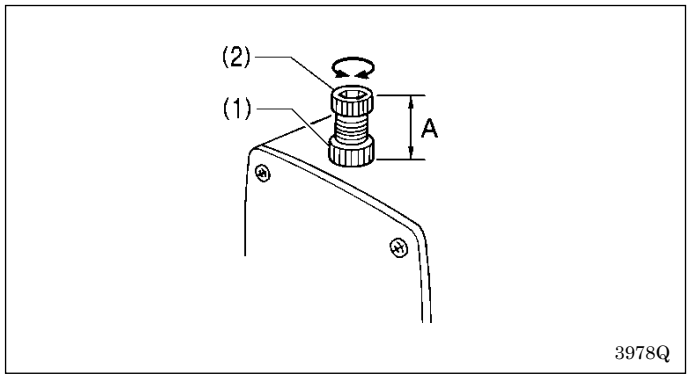
1. Press the THREAD key to switch to threading mode.
2. Press the ▼ key.
3. Gently tilt back the machine head.
4. Loosen the screws (3) and move the rotary hook (4) forward or back until there is a clearance of 0.01 – 0.08 mm between the needle (1) and the hook tip (2).
5. Gently return the machine head to its original position.
6. Press the THREAD key.

7-5. Adjusting the inner rotary hook and rotary hook holder overlap



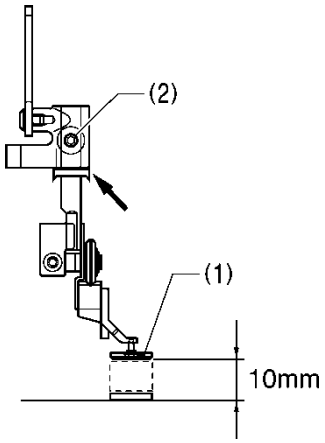
1. Gently tilt back the machine head.
2. Loosen the two screws (3) to adjust so that the tip of the rotary hook holder (1) does not protrude past the edge A of the inner rotary hook (2).
3. Gently return the machine head to its original position.

7-6. Adjusting the work clamp pressure

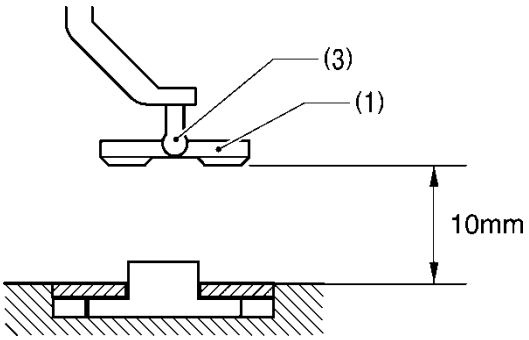


The standard distance A is 30 mm (approximately 30 N). Loosen the nut (1) and turn the adjusting screw (2) to adjust the work clamp pressure.

7-7. Adjusting the work clamp lift amount



4297Q

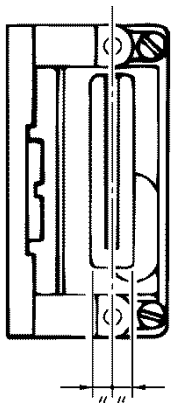


4298Q

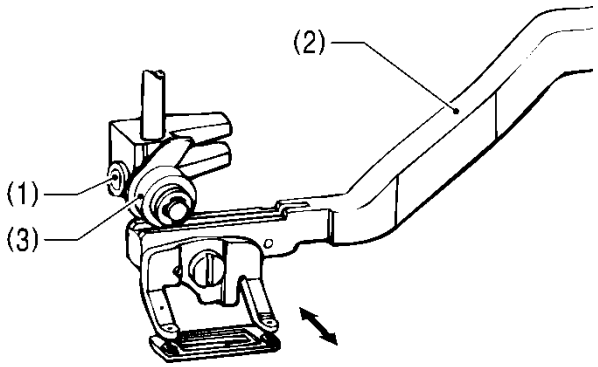
1. Turn on the power and set the sewing machine to the home position.
2. Check that memory switch No. 002 (Work clamp height when treadle is at neutral) is 10 mm. (If it is not set to 10 mm, set it to 10 mm.)
3. Place a 10 mm gauge under the work clamp (1) and then loosen the set screw (2) to make the adjustment.

* Adjust the lift amount (including the play in the work clamp (1) and the pin (3) to 10 mm. If it is set to more than 10 mm, the work clamp will start lifting before lower thread trimming is complete, which may result in thread trimming errors. Furthermore, it may also cause the presser foot lifter pulse motor to go out of step.

7-8. Adjusting the work clamp lateral position



4299Q

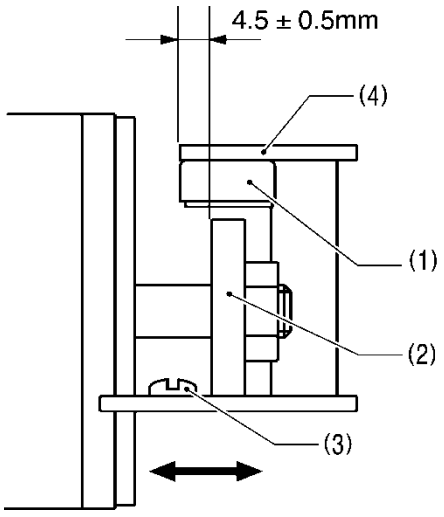


4300Q

1. Loosen the set screw (1), and then move the feed arm (2) and the roller (3) to adjust so that the knife groove comes to the center of the work clamp window.
2. Operate the treadle and check that the work clamp moves up and down smoothly.

* After adjusting, check the upper thread trimmer mechanism and adjust if necessary.

7-9. Adjusting the cutter home position sensor position



4301Q

Loosen the screw (3), and then adjust the cutter sensor setting plate (4) so that there is a clearance of 4.5 ± 0.5 mm between the side of the cutter sensor (1) and the edge of the solenoid stopper (2).

7-10. Adjusting the cutter installation position

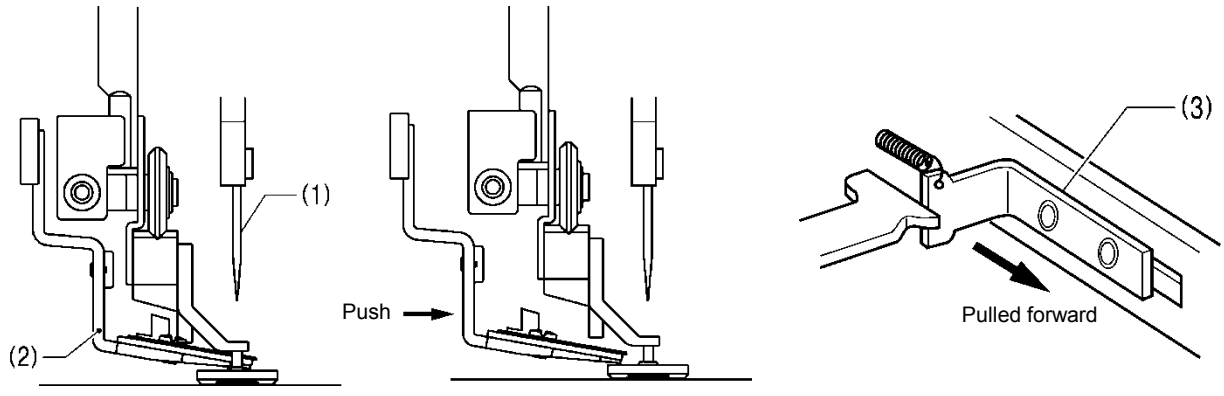
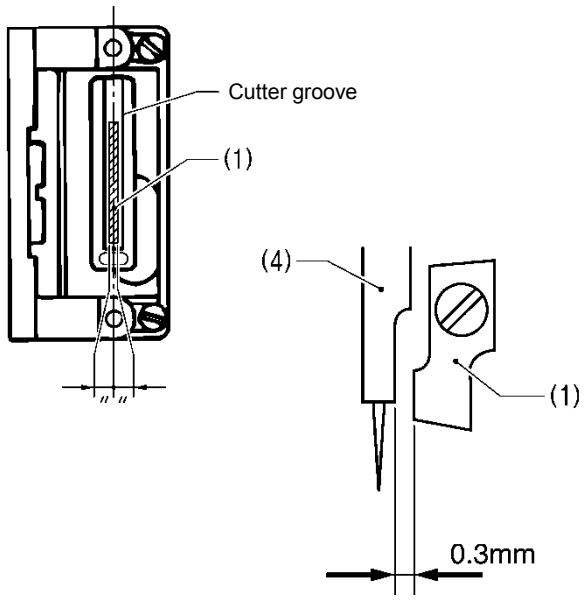


Fig. A Fig. B

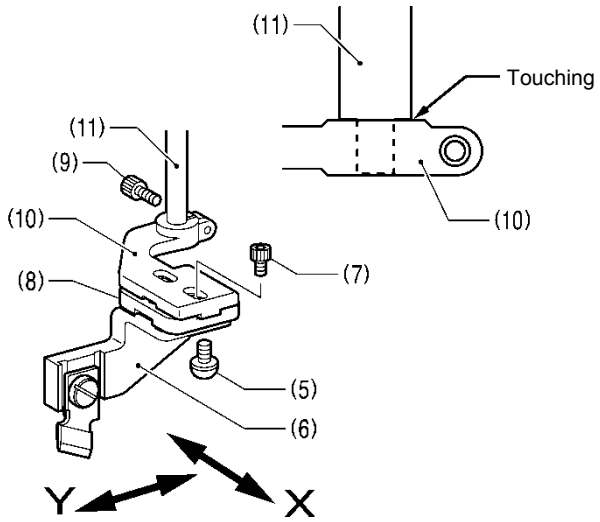
0740D 4303Q

Adjust so that the upper thread scissors (2) and the cutter (1) do not touch when the cutter (1) is pushed down by hand.
If the upper thread scissors (2) extends below the cutter (1), pull the stop plate (3) forward and move the upper thread scissors (2) to the left. (Fig. A → Fig. B)

4304Q



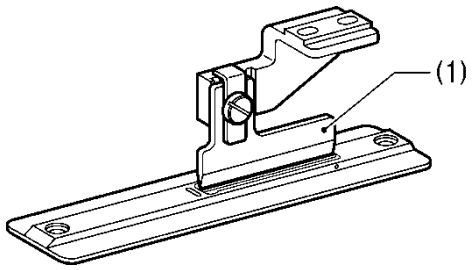
4305Q



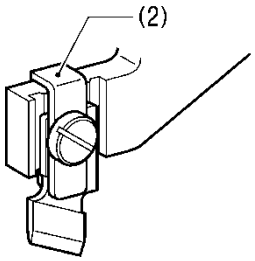
4306Q

1. Loosen the screw (5), and adjust the cutter Y direction using cutter holder DL (6) so that the clearance between the needle bar (4) and the cutter (1) is 0.3 mm.
   Note: ・When replacing the cutter, be careful not to allow the cutter to touch the needle bar because of any play in the cutter installation position.
   ・Check that the needle bar (4) does not touch the cutter when it moves sideways.
2. Loosen the two bolts (7) and adjust the cutter X direction using cutter holder M (8) so that the cutter (1) goes into the center of the cutter groove.
3. Loosen the bolt (9) and move the cutter holder (10) to adjust the direction of rotation.
4. Check that the edge of the cutter holder (10) is touching the stepped section of the cutter driving shaft (11), and then tighten the bolt (9).
5. After adjusting, push the upper thread scissors (2) back to its original position (Fig. A).

7-10-1. When using the special needle plate (needle plate -RB)



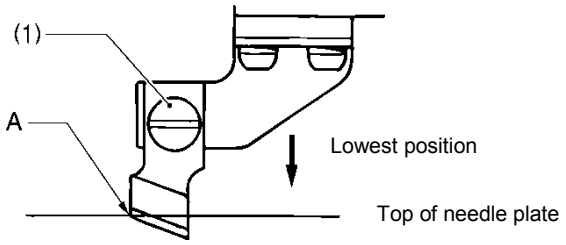
4307Q



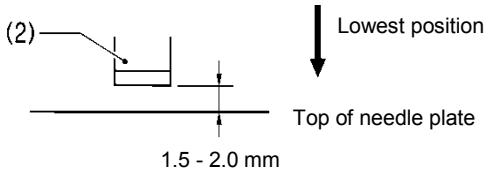
4308Q

The special needle plate is used to prevent the cutter from getting stuck in the material and not returning.
1. The special needle plate has a narrow cutter groove of 0.3 - 0.4 mm, so use the accessory positioning plate (1) to adjust the cutter installation position.
   Note: If this adjustment is not made, the cutter may touch the needle plate, and damage to the cutter may result.
2. Install the cutter holder (2) to minimize any play in the cutter during cutting.

7-11. Adjusting the cutter installation height



4309Q



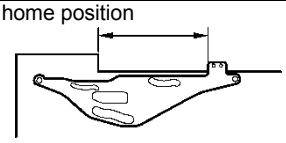
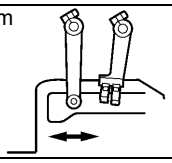
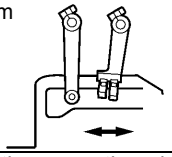
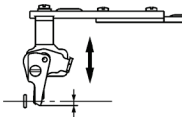
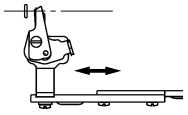
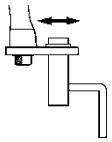
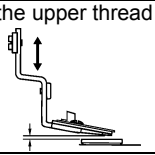
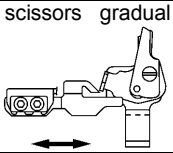
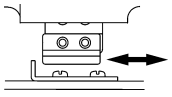
0687D

Adjust so that the upper thread scissors and the cutter do not touch when the cutter is pushed down by hand. (Fig. A → Fig. B in “7-10. Adjusting the cutter installation position”)

Install the cutter with the screw (1) so that the tip A of the cutter blade is aligned with the top of the needle plate when the cutter is pressed down by hand to its lowest position.
If using the flat cutter (2), install with the screw (1) so that there is a clearance of 1.5 - 2.0 mm between the cutter and the top of the needle plate.
* After adjusting, push the upper thread scissors back to its original position (Fig. A in “7-10. Adjusting the cutter installation position”).

Note:
- When the cutter is driven by the solenoid, the movement will be approximately 2 mm greater than that shown in the illustration.
- If the cutter does not cut properly, the cutter may get stuck in the material and not return. If this happens, replace or sharpen the cutter.

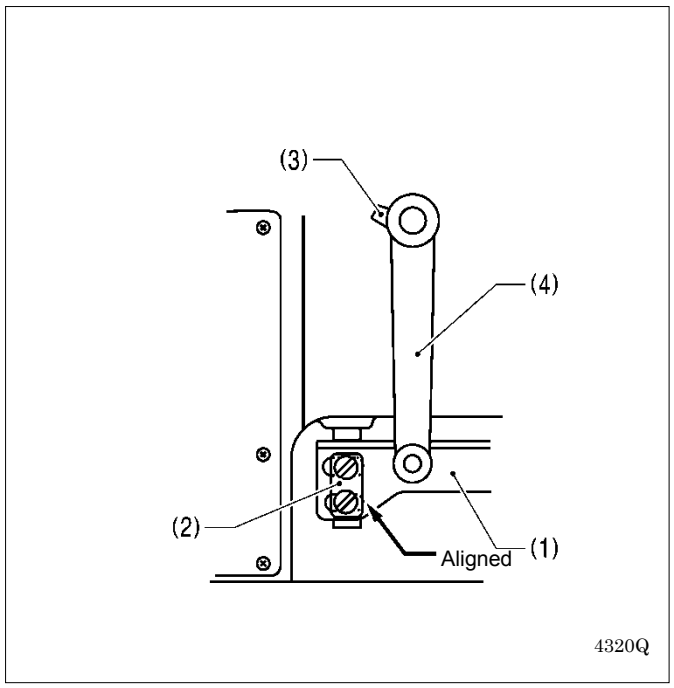
7-12. Adjusting the upper thread trimming

Upper thread trimming adjustment procedure	When adjusting for the first time	When the home position position has been changed	When the longitudinal feed arm position has been changed	When the trimmer driving arm position has been changed	When the lateral position of the upper thread scissors has been changed	When the longitudinal position of the upper thread scissors has been changed	When the cutting depth of the upper thread scissors has been changed	When the installation height of the upper thread scissors has been changed	When the gradual opening timing of the upper thread scissors has been changed	When the opening timing of the upper thread scissors has been changed
7-2-4. Work clamp (P) motor home position  0741D	1	1								
7-12-1. Adjusting the longitudinal feed arm assembly position  1772B	2	2	1							
7-12-2. Adjusting the trimmer driving arm assembly position  1773B	3	3	2	1						
7-12-3. Adjusting the lateral position of the upper thread scissors at the sewing start  4314Q	4				1					
7-12-4. Adjusting the longitudinal position of the upper thread scissors  4315Q	5					1				
7-12-5. Adjusting the cutting depth of the upper thread scissors  0798D	6						1			
7-12-6. Adjusting the installation height of the upper thread scissors  4317Q	7							1		
7-12-7. Adjusting the upper thread scissors gradual opening timing  1775B	8	4	3		2	2			1	
7-12-8. Adjusting the upper thread scissors opening timing  4319Q	9	5	4		3					1

[CAUTION]

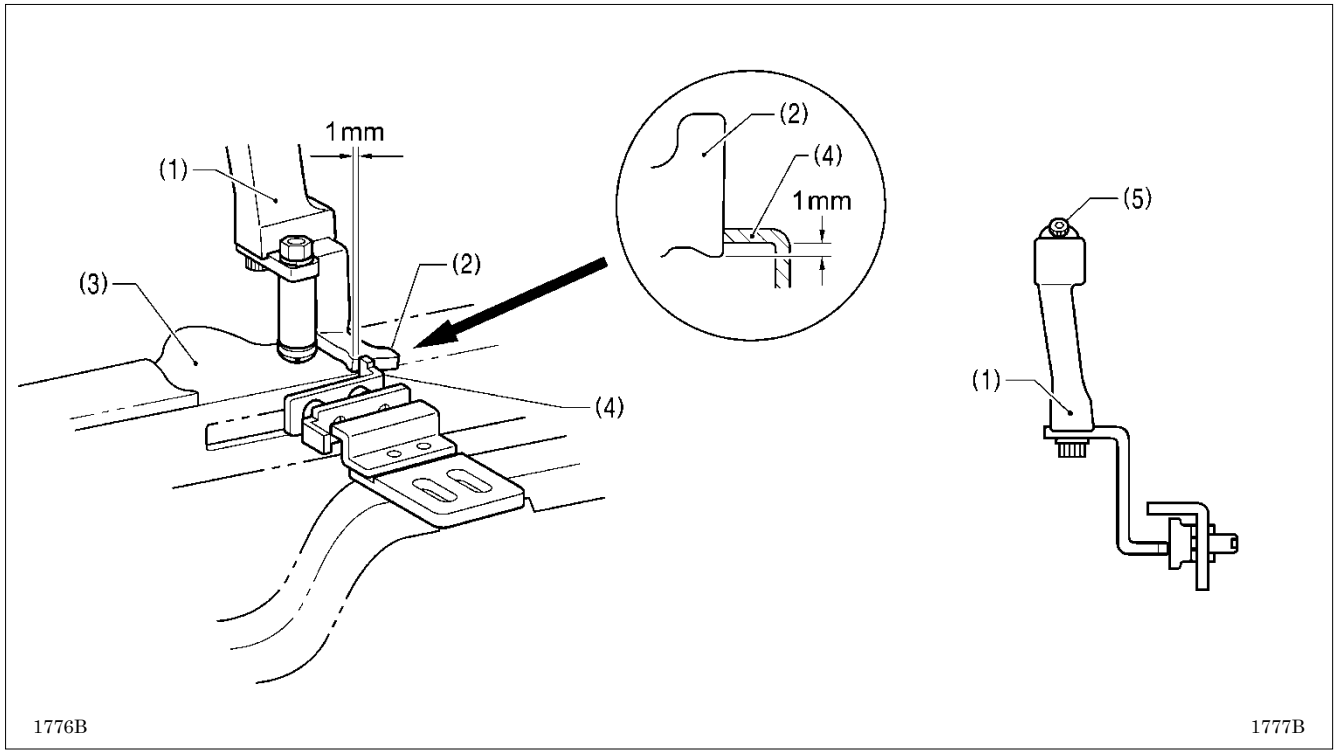
Before adjusting the upper thread trimming, check the home position of the work clamp (P) motor. (Refer to “7-2-4. Work clamp (P) motor home position”.)

7-12-1. Adjusting the longitudinal feed arm assembly position



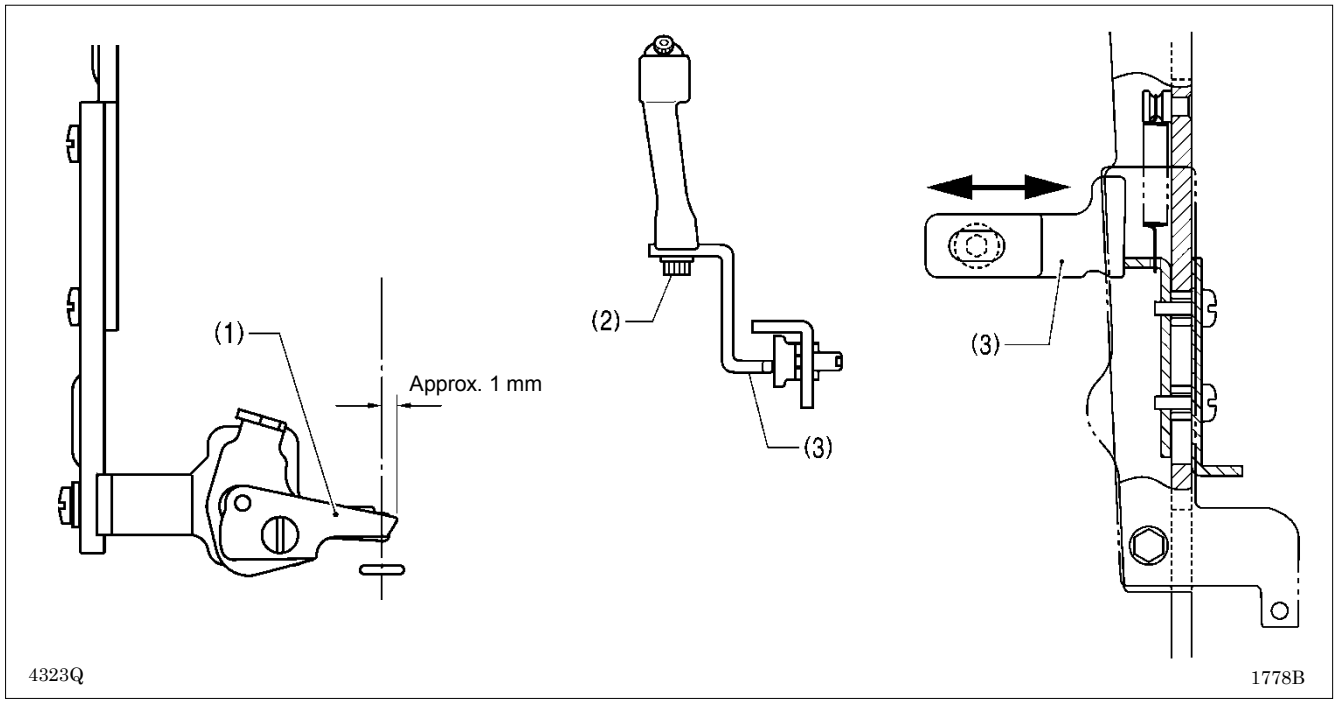
1. Turn on the power and set the sewing machine to the home position. Then press the THREAD key to lower the work clamp.
2. Check that the slot at the bottom of the upper thread trimmer lever set (1) is aligned with the edge of the washer (2).
3. If they are not aligned, loosen the bolt (3) and move the longitudinal feed arm assembly (4) back and forth to adjust.

7-12-2. Adjusting the trimmer driving arm assembly position



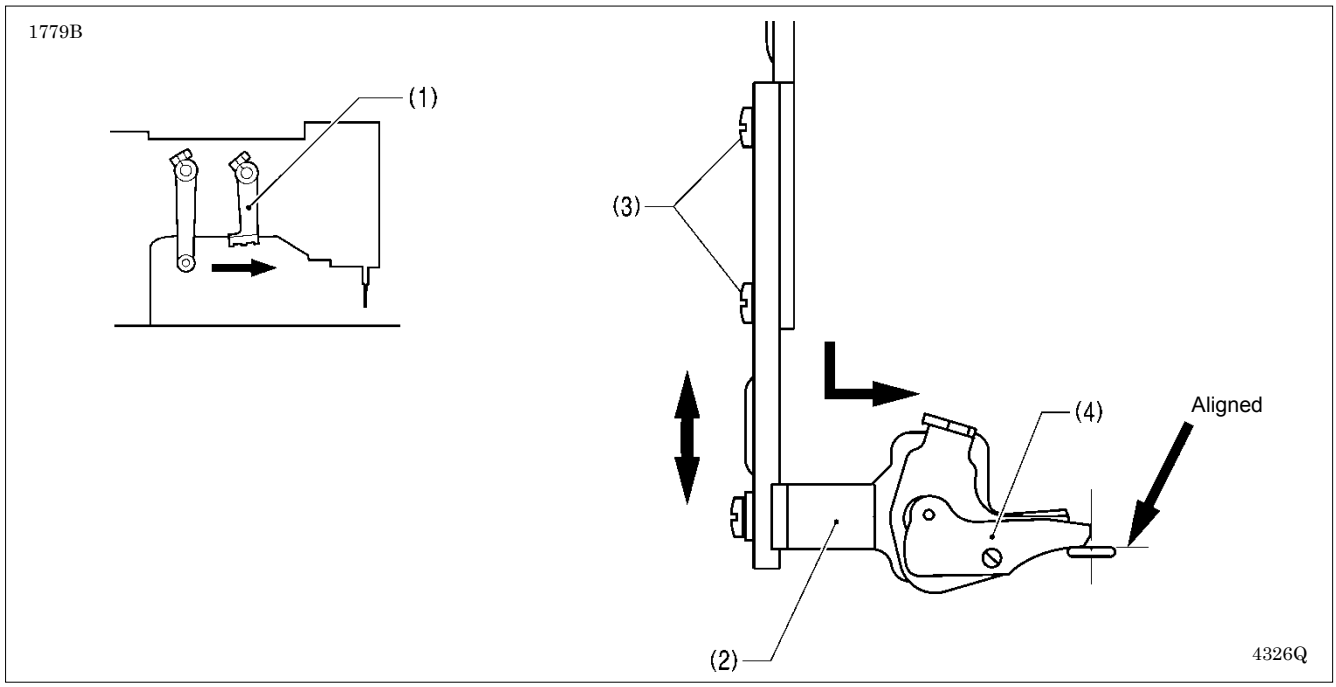
1. Turn on the power and set the sewing machine to the home position. Then press the THREAD key to lower the work clamp.
2. Check that the overlap between the stopper (2) fixed to the trimmer driving arm assembly (1) with the bolt and the stop plate (4) of the upper thread trimmer lever set (3) is 1 mm.
3. If adjustment is necessary, loosen the bolt (5) and move the trimmer driving arm assembly (1) back and forward to adjust.

7-12-3. Adjusting the lateral position of the upper thread scissors at the sewing start



1. Turn on the power and set the sewing machine to the home position. Then press the THREAD key to lower the work clamp.
2. Loosen the bolt (2), and then move the stopper (3) in and out to adjust so that the edge of the upper thread scissors assembly (1) protrudes by approximately 1 mm from the center of the cutter.
   Note: If the amount of protrusion of the upper thread scissors assembly is too great, the scissors may touch the needle when they open.
3. After adjusting, carry out “7-12-8. Adjusting the upper thread scissors opening timing”.

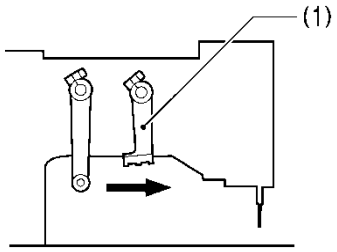
7-12-4. Adjusting the longitudinal position of the upper thread scissors



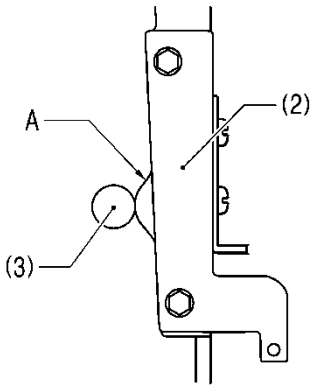
1. Turn off the power (with the feed mechanism at the home position), and then slowly move the trimmer driving arm (1) forward until the upper thread scissors assembly (2) is at the position shown in the illustration.
2. Loosen the two screws (3), and then move the upper thread scissors assembly (2) back and forward to adjust so that the front ridge line of upper thread scissors U (4) is aligned with the edge of the needle hole.
   Note: If this adjustment is not carried out, it may result in thread trimming errors or needle breakages.

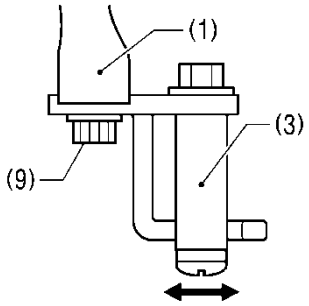
7-12-5. Adjusting the cutting depth of the upper thread scissors

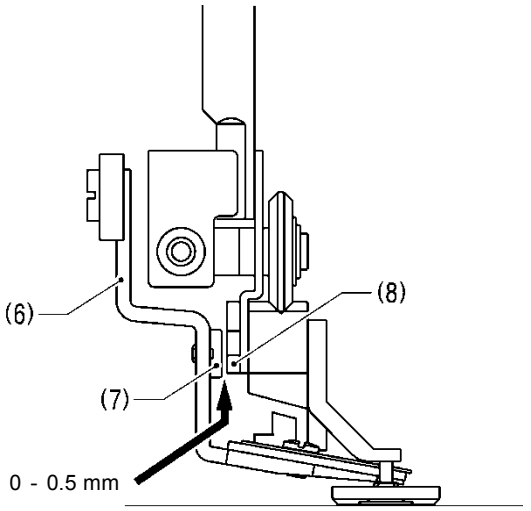
1779B



1780B







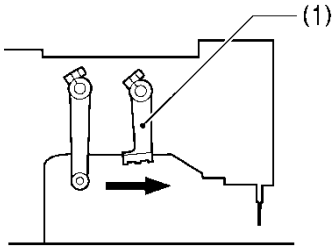
1781B

0720D

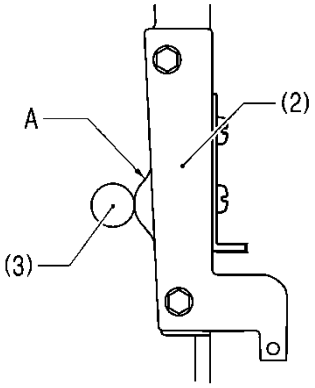
1. Turn off the power (with the feed mechanism at the home position), and then slowly move the trimmer driving arm (1) forward until the driving arm roller (3) is at its highest position on the cam A of the upper thread trimmer lever (2). (Upper thread trimming position)
   * Using the output check code function can help with making this adjustment. If you press the panel ▲ key while operating at check code No. 53, the presser lifter pulse motor will operate one step at a time. Refer to "3-8. Output checking method".
2. Loosen the bolt (9), and then adjust the driving arm roller (3) so that the clearance between the stopper (7) of the upper thread scissors assembly (6) and the opening cam bracket (8) is 0 - 0.3 mm.
   Note: If the stopper (7) is adjusted so that it presses too firmly, it may cause the presser foot lifter pulse motor to go out of step.

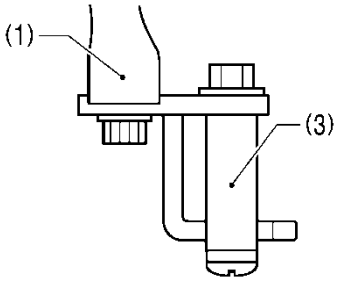
7-12-6. Adjusting the installation height of the upper thread scissors

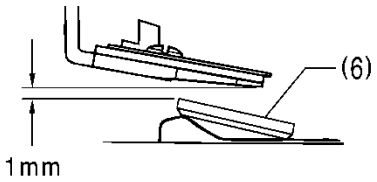
1779B

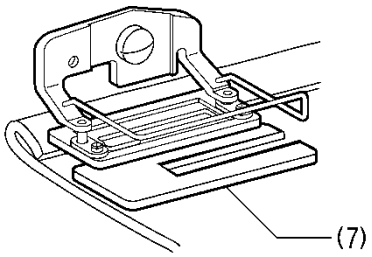


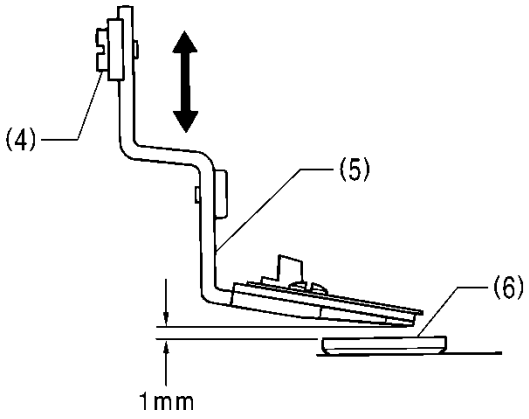
1782B

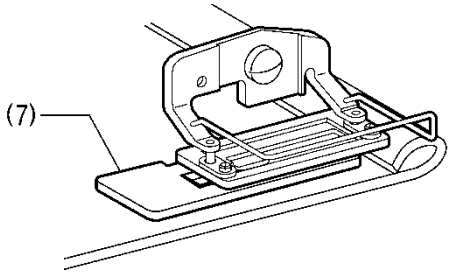












4332Q

4333Q

1. Turn off the power (with the feed mechanism at the home position), and then slowly move the trimmer driving arm (1) forward until the driving arm roller (3) is at its highest position on the cam A of the upper thread trimmer lever (2).
2. Loosen the screw (4), and then move the upper thread scissors (5) up or down to adjust the clearance between the upper thread scissors (5) and the work clamp (6) to approximately 1 mm.

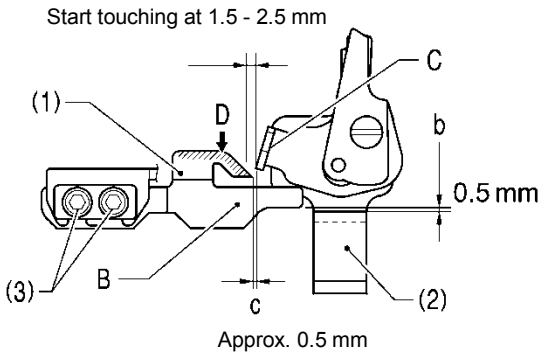
Note:

The work clamp (6) will tilt when sewing joints, so adjust so that the upper thread scissors (5) do not touch it. If the upper thread scissors touch the work clamp, a work clamp lifter pulse motor error may occur.

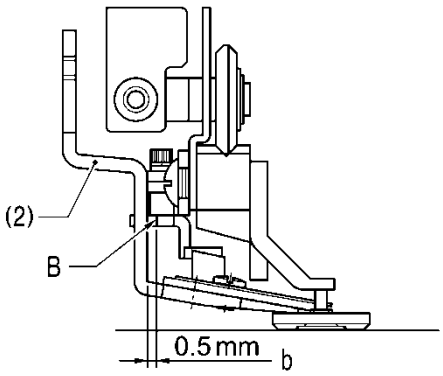
* If the tilting of the work clamp (6) causes skipped stitches to occur when sewing material joints, use the accessory auxiliary sheet (7) as shown in the illustration.

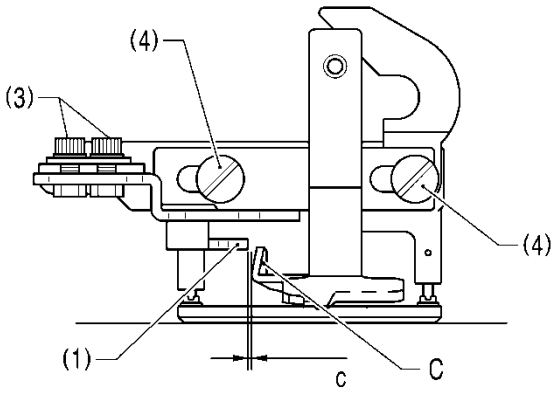
7-12-7. Adjusting the upper thread scissors gradual opening timing

4104M



4105M

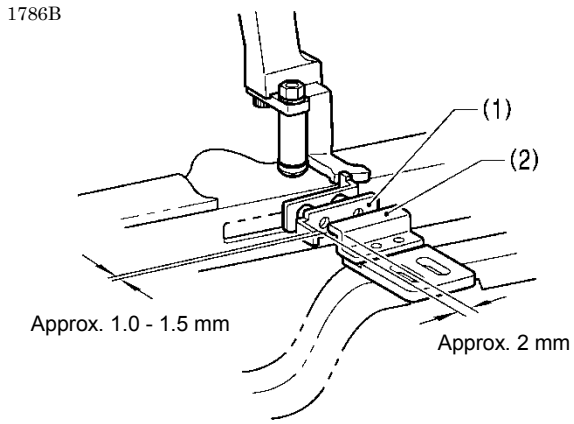


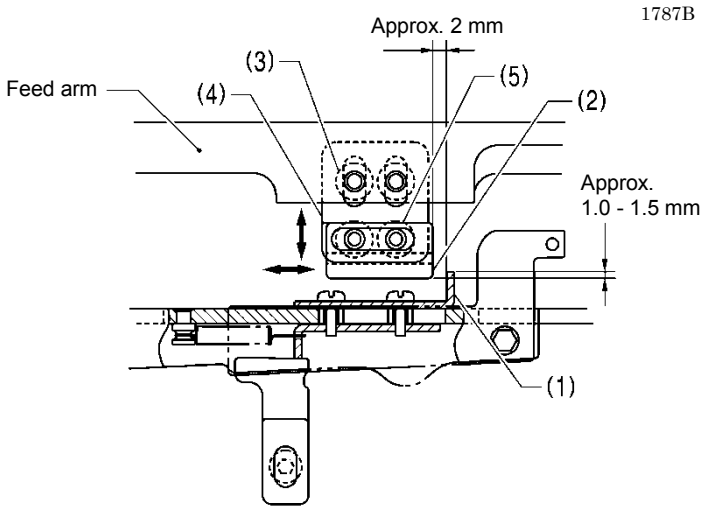


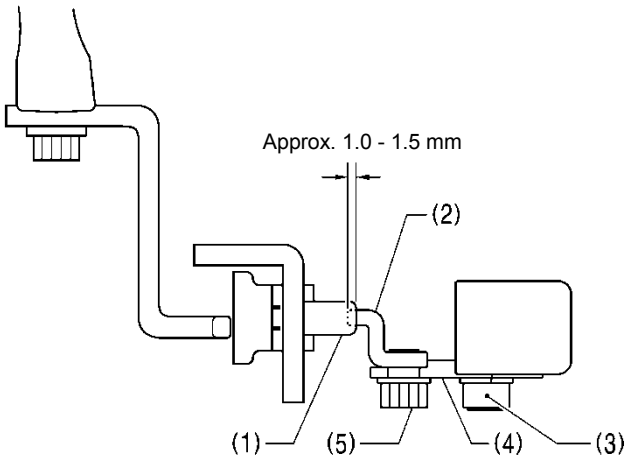
4106M

1. Turn on the power and set the sewing machine to the home position. Then press the THREAD key to lower the work clamp.
2. Loosen the two bolts (3), and then adjust so that the distance b between ridge line B on the opening cam (1) and the upper thread scissors (2) is 0.5 mm, and so that ridge line B on the opening cam is parallel to the feed direction.
3. Loosen the two screws (4), and then adjust so that the distance c between the rising section C of the upper thread scissors (2) and the tip of the opening cam (1) is approximately 0.5 mm when the upper thread scissors (2) are closed.
   * If you would like the scissors to start opening earlier, make the distance smaller. However, if you make the distance smaller, check that the rising section C of the upper thread scissors (2) does not touch the opening cam (1) and prevent the upper thread scissors (2) from opening when the work clamp is lowered.
4. Apply grease to the inclined face D of the opening cam (1).
5. Check that the upper thread scissors (2) gradually start opening after the material has been fed by 1.5 - 2.5 mm.

7-12-8. Adjusting the upper thread scissors opening timing

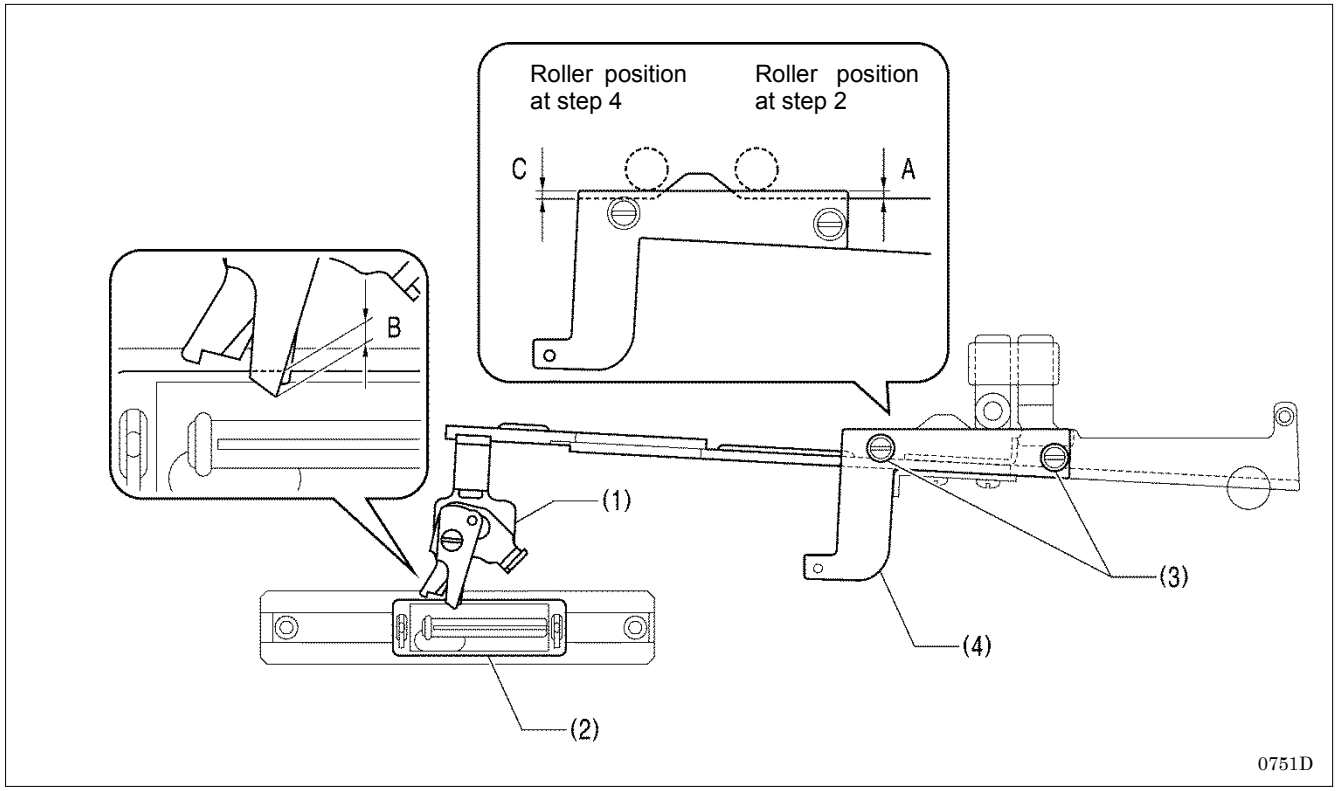






1. Turn on the power and set the sewing machine to the home position. Then press the THREAD key to lower the work clamp.
2. Loosen the two bolts (3), and then adjust the support plate (4) so that the back plate (1) and the cam (2) overlap by approximately 1.0 - 1.5 mm.
   Note: If the amount of overlap is too small, the upper thread scissors will not open properly and the upper thread scissors and the cutter may touch each other.
3. Loosen the two bolts (5), and then adjust the clearance between the bend in the back plate (1) and the cam (2) to approximately 2 mm.
   * If you would like the scissors to start opening earlier, make this clearance smaller.
4. Check the operation in test feed mode.
   * Refer to the operating procedure given in “5-9. Upper thread trimmer mechanism”.

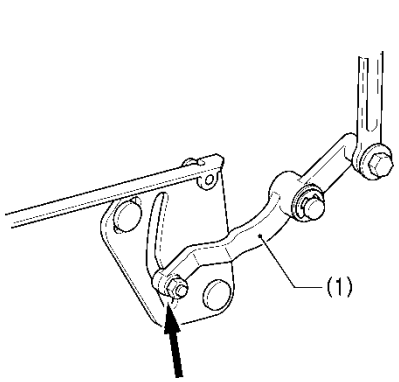
7-12-9. Adjusting the overlapping amount of the upper thread scissors and the work clamp



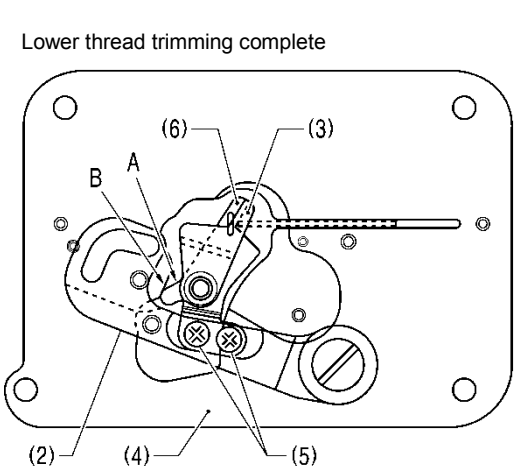
1. Turn on the power, move the feed mechanism to the home position, and then press the THREAD key to lower the work clamp and move the roller of the trimmer driving arm to the home position.
2. With the power turned off, move the feed arm forward by hand until the upper thread scissors begin to open, and then return the feed arm to its position before it was moved.
3. Loosen the two screws (3) and move the adjusting plate (4) to set the distance A in the illustration so that the overlapping amount B between the tip of the scissors D assembly (1) and the work clamp (2) is 1.0 mm to 1.5 mm. Then tighten the two screws (3).
4. Next, with the power turned off, mote the trimmer driving arm forward by hand as far as it will go.
5. Once again loosen the two screws (3) and move the adjusting plate (4) to set the distance C in the illustration so that the overlapping amount B between the tip of the scissors D assembly (1) and the work clamp (2) is 1.0 mm to 1.5 mm. Then tighten the two screws (3).
   * Make sure that the position (distance A) which was set in steps 1 and 2 does not change at this time.
6. Turn on the power, depress the treadle to move the feed mechanism to the home position, and then switch to test mode and check that the scissors D assembly (1) is always overlapping the work clamp (2).

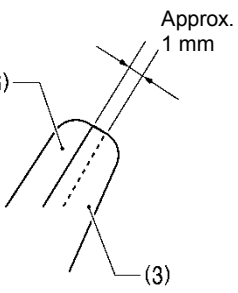
7-13. Adjusting the lower thread trimming

7-13-1. Adjusting the lower thread trimmer fixed knife engagement amount



4342Q

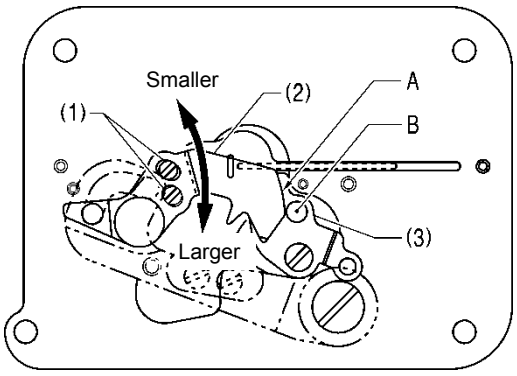




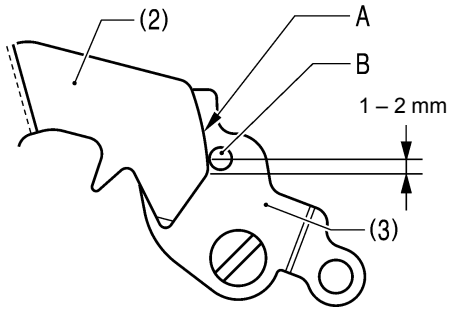
4343Q

1. With the power turned off, move the lower thread trimmer cam lever (1) in the direction of the arrow so that the knife driving lever (2) is in the position shown in the illustration.
2. Check that the cam A of the movable knife (3) is sitting securely on top of the cam B of the base plate (4).
3. Loosen the two screws (5), and then adjust so that the fixed knife (6) and the movable knife (3) are engaged by approximately 1 mm.
   * If the engagement amount is too small, the lower thread may not be fully cut, and the material may get caught when it is removed after sewing.

7-13-2. Adjusting the lower thread retaining amount



4344Q



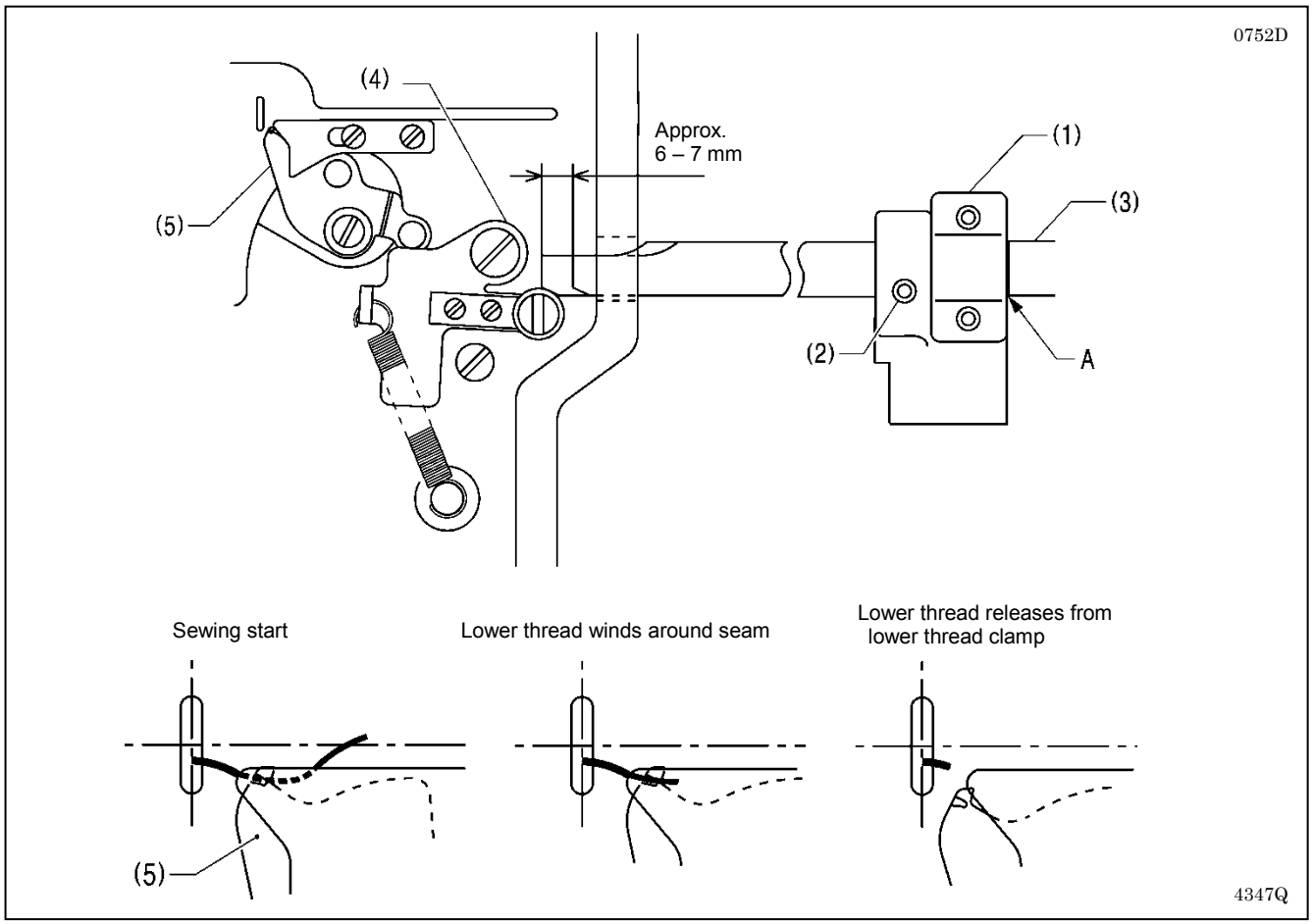
4345Q

1. Turn on the power and set the sewing machine to the home position.
2. Loosen the two screws (1), and then adjust the lower thread retainer (2) to a distance of 1 - 2 mm as shown in the illustration.
   * If the lower thread retaining amount has been reduced, check that the roller B of the lower thread clamp plate (3) is sitting securely on top of the lower thread retainer cam A.
   * If the lower thread is pulling up at the first stitch at the sewing start, check if the lower thread is not being pulled out of the lower thread clamp plate (3), and that it is not too loose when it is coming out from the bobbin case.

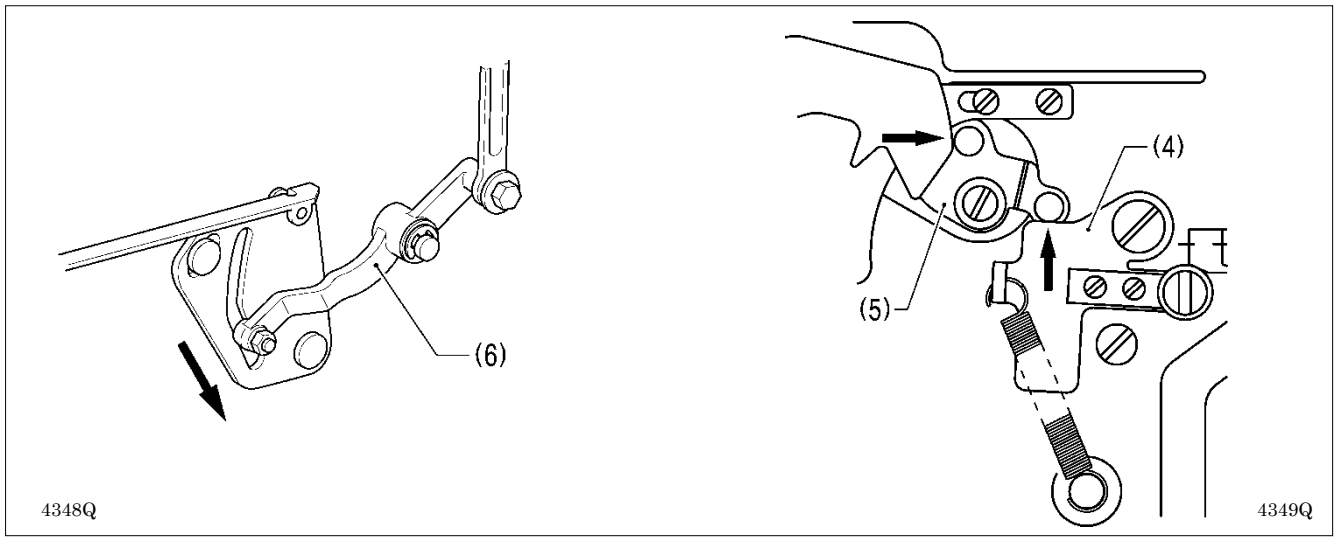
If the lower thread retaining amount is too small
The lower thread will pull out of the lower thread clamp plate at the first stitch at the sewing start, which can cause problems such as lower thread cast-off, lower thread loops or poor lower thread winding.

If the lower thread retaining amount is too great
This can cause problems such as poor sealing at the sewing start, or wound lower thread sticking out of the rear tack.

7-13-3. Adjusting the lower thread clamp opening timing

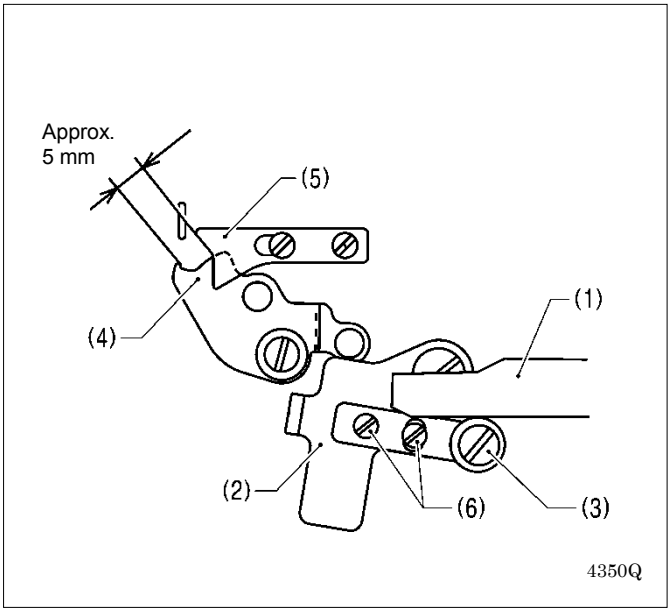


1. Loosen the set screw (2) of the feed arm support (1), and then align reference line A of feed guide shaft B (3) with the edge of the feed arm support (1).
2. When the feed mechanism moves by 6 - 7 mm, the opening plate (4) moves and the lower thread clamp (5) opens.
3. To change the opening timing, loosen the set screw (2) and move the feed guide shaft B (3) to the left or right to adjust.
   * The end of the thread which is being held by the lower thread clamp (5) is wound around inside the seam. If the opening timing is too early, it can cause problems such as poor winding or pulling-up of the lower thread. If the opening timing is too late, it can cause problems such as stretching, uneven seams or bird's nests at the sewing start, depending on the type of material.



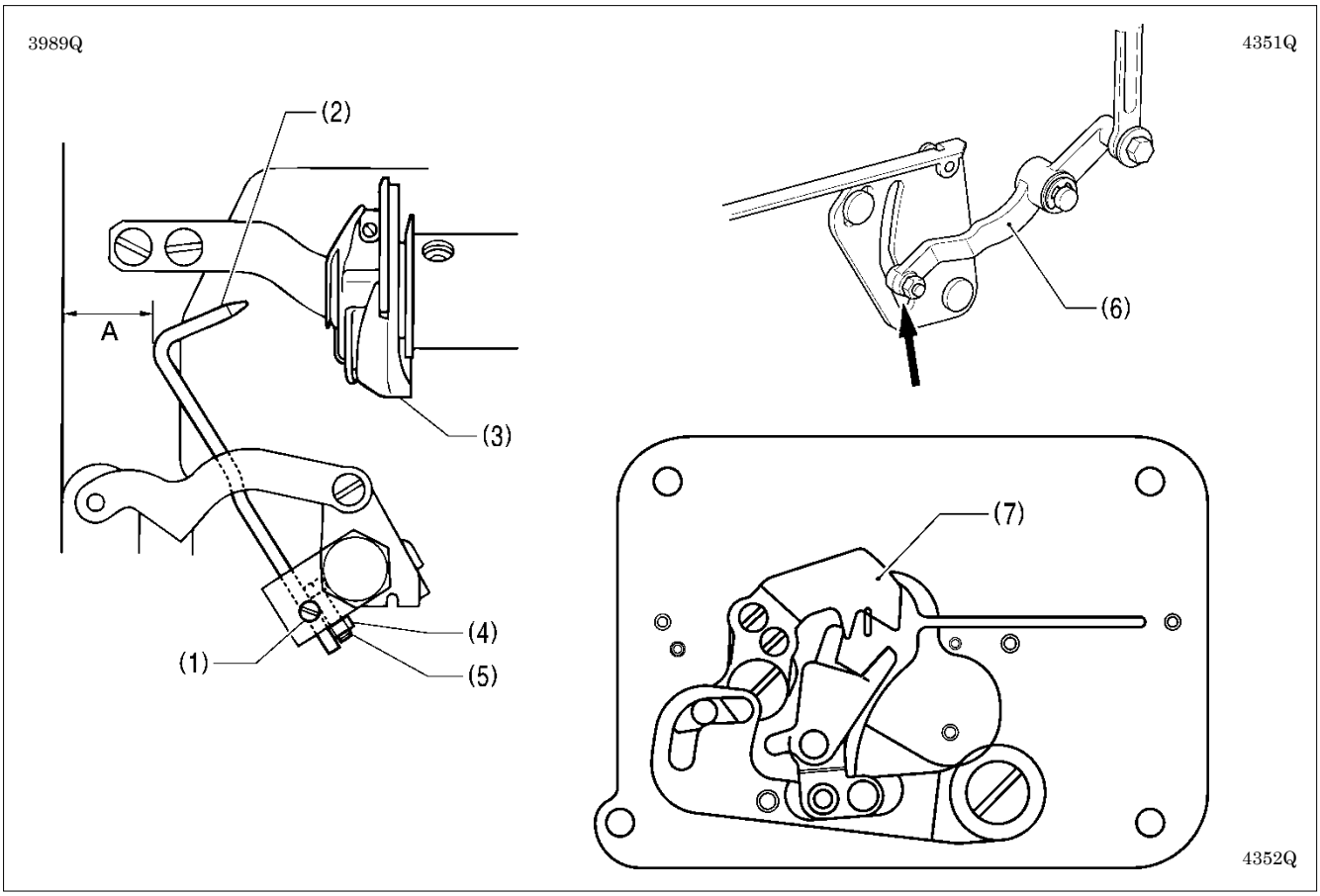
Note: After moving the lower thread trimmer cam lever (6) back in the direction of the arrow, move the feed mechanism. If the feed mechanism is moved when the lower thread trimming has been carried out, the mechanisms will press against each other, which may result in damage to the lower thread clamp (5) and the opening plate (4).

7-13-4. Adjusting the lower thread clamp opening amount



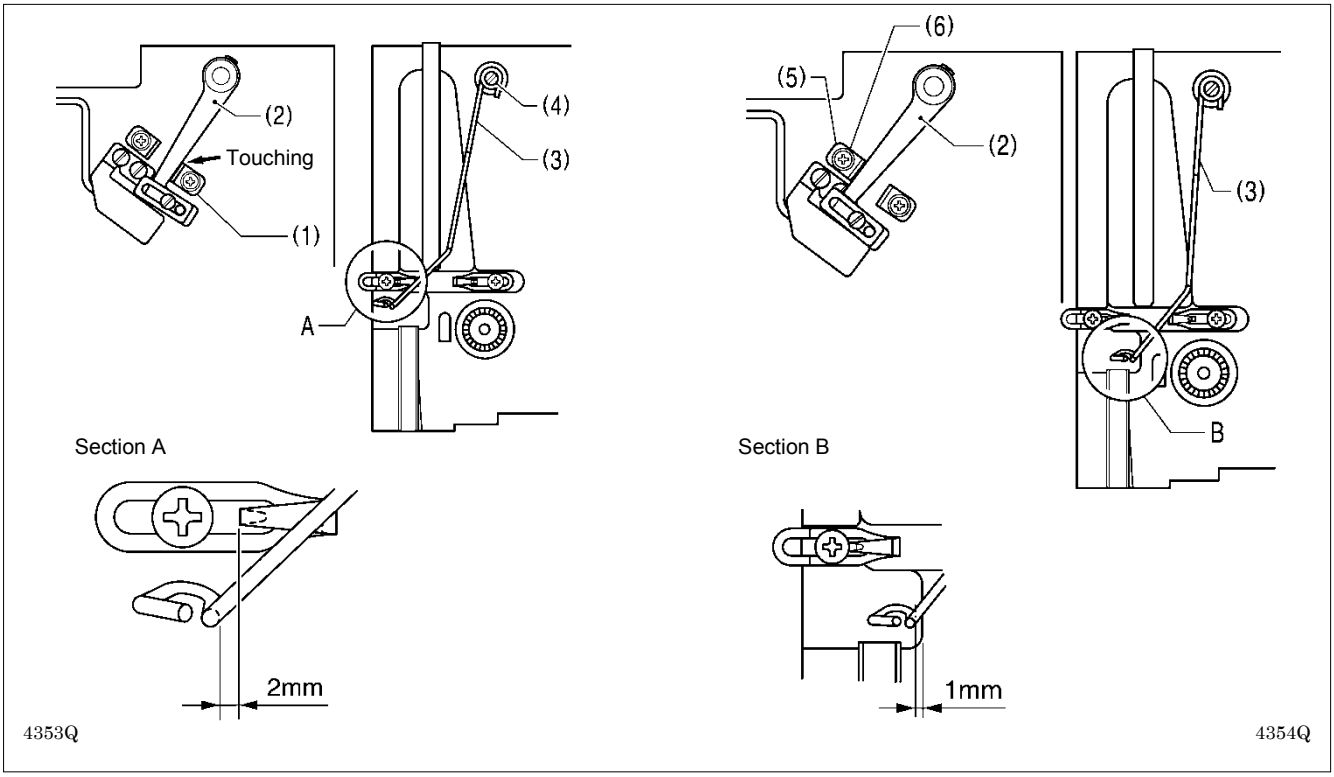
Loosen the two screws (6), and then adjust so that the distance between the lower thread clamp (4) and the lower thread presser (5) is approximately 5 mm when the feed guide shaft (1) is projecting out at the front and is firmly touching the roller (3) of opening plate (2).

7-14. Adjusting the bobbin presser

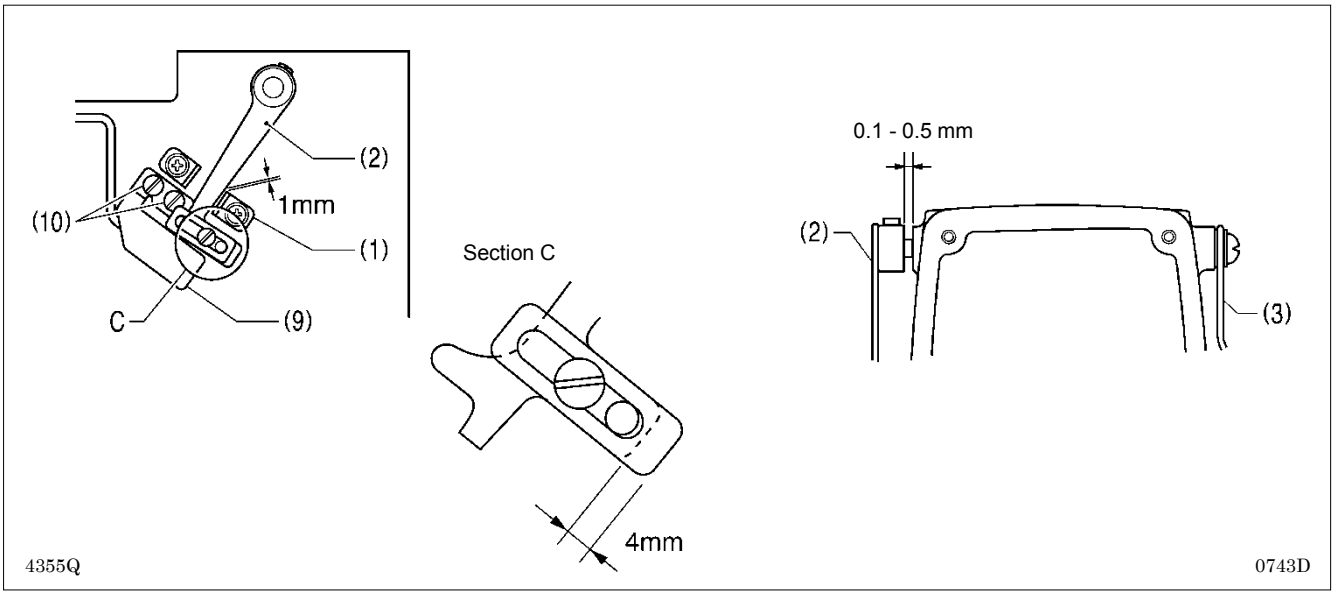


1. Turn on the power and set the sewing machine to the home position. Then press the THREAD key to lower the work clamp.
2. Loosen the set screw (1), and then adjust so that the bobbin presser (2) goes into the hole in the bobbin case (3).
3. Check that the work clamp is at the home position, and then loosen the nut (4) and turn the screw (5) to adjust the clearance A between the bobbin presser (2) and the edge of the bed to approximately 12.5 mm.
4. Turn off the power, move the lower thread trimmer cam lever (6) by hand in the direction of the arrow to check that the bobbin presser (2) presses the bobbin firmly before the lower thread retainer (7) starts to hold the lower thread.
   Note: If this timing is reversed, it will cause problems such as an excess trailing length of upper thread.

7-15. Adjusting the thread breakage detector

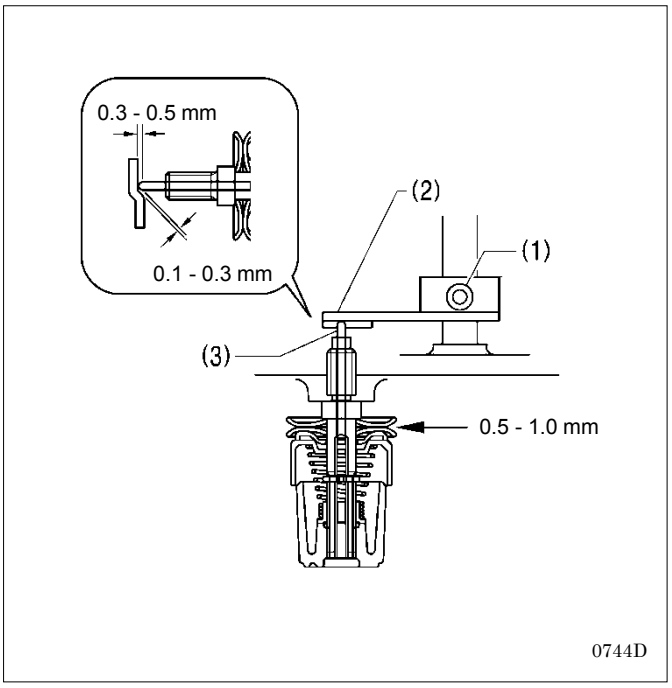


1. Tighten the lever stopper (1) inside the slotted hole.
2. Loosen the screw (4), and then adjust so that the distance A at the thread guide (3) is 2 mm when the thread breakage detector lever (2) contacts the lever stopper (1).
3. Loosen the screw (6) of the lever stopper (5), and then adjust so that the distance B at the thread guide (3) is 1 mm when the thread breakage detection lever (2) contacts the stopper (5).



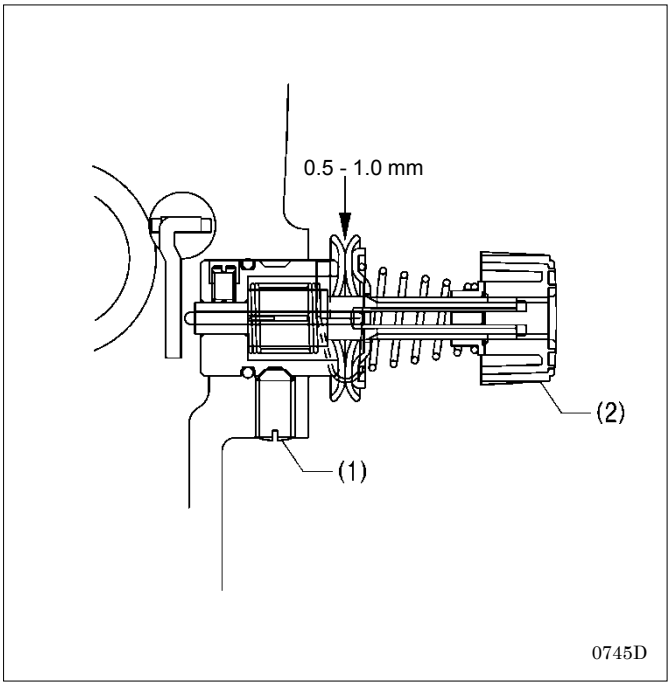
4. Loosen the screw (7), and then adjust so that the distance C at the balancer (8) is 4 mm.
5. Turn on the power and set the sewing machine to the home position. Then press the THREAD key to lower the work clamp.
6. Loosen the two screws (10), and then adjust so that the thread breakage detector sensor (9) turns on (LED illuminates) when the distance between the thread breakage detection lever (2) and the lever stopper (1) is 1 mm.
7. When the thread guide (3) is moved to position B and then released, check that it moves smoothly back to position A.
8. If the thread guide (3) does not move smoothly, check that the clearance between the thread breakage detection lever (2) and the arm is 0.1 - 0.5 mm.

7-16. Adjusting the thread tension at the tack tension control



1. Turn on the power and set the sewing machine to the home position. Then press the THREAD key to lower the work clamp.
2. Loosen the set screw (1), and then adjust the clearances between the tension release cam (2) and the tension release pin (3) as shown in the illustration.
3. Press the THREAD key and check that the tension disc opening amount is 0.5 - 1.0 mm when the work clamp is raised.
4. Press the THREAD key once more and check that the tension discs are fully closed when the work clamp is lowered.

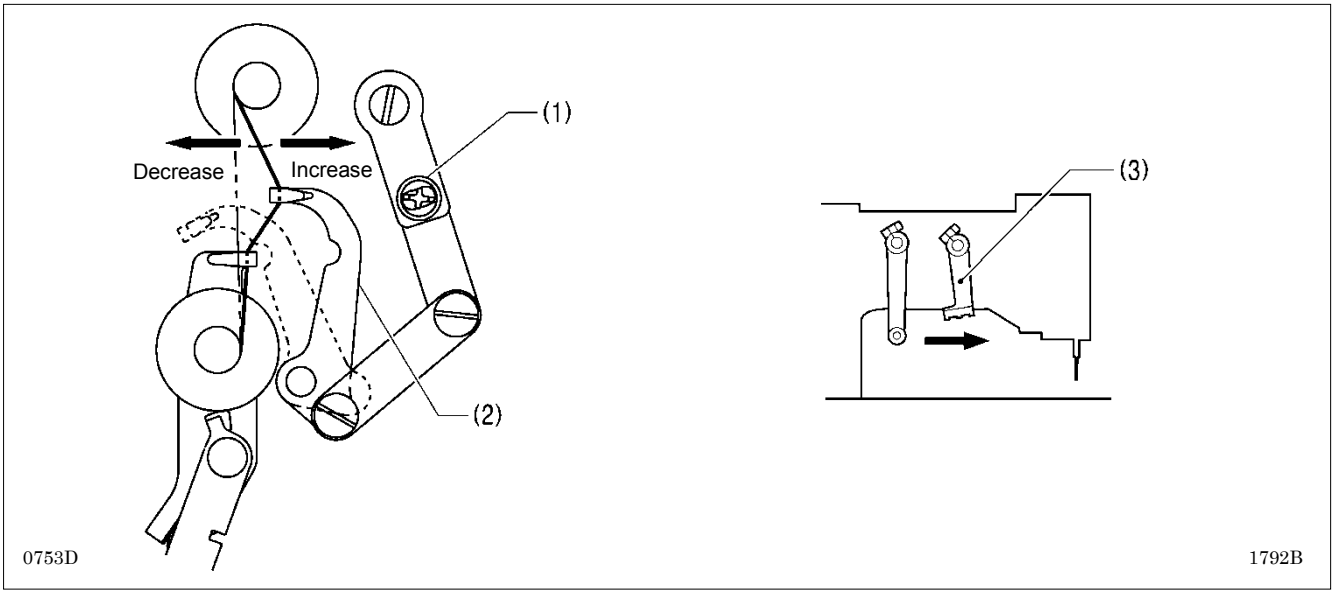
7-17. Adjusting the thread tension at the zigzag tension control



Position the tension release solenoid as described in "6-4. Tension release mechanism (1)" before carrying out this adjustment.

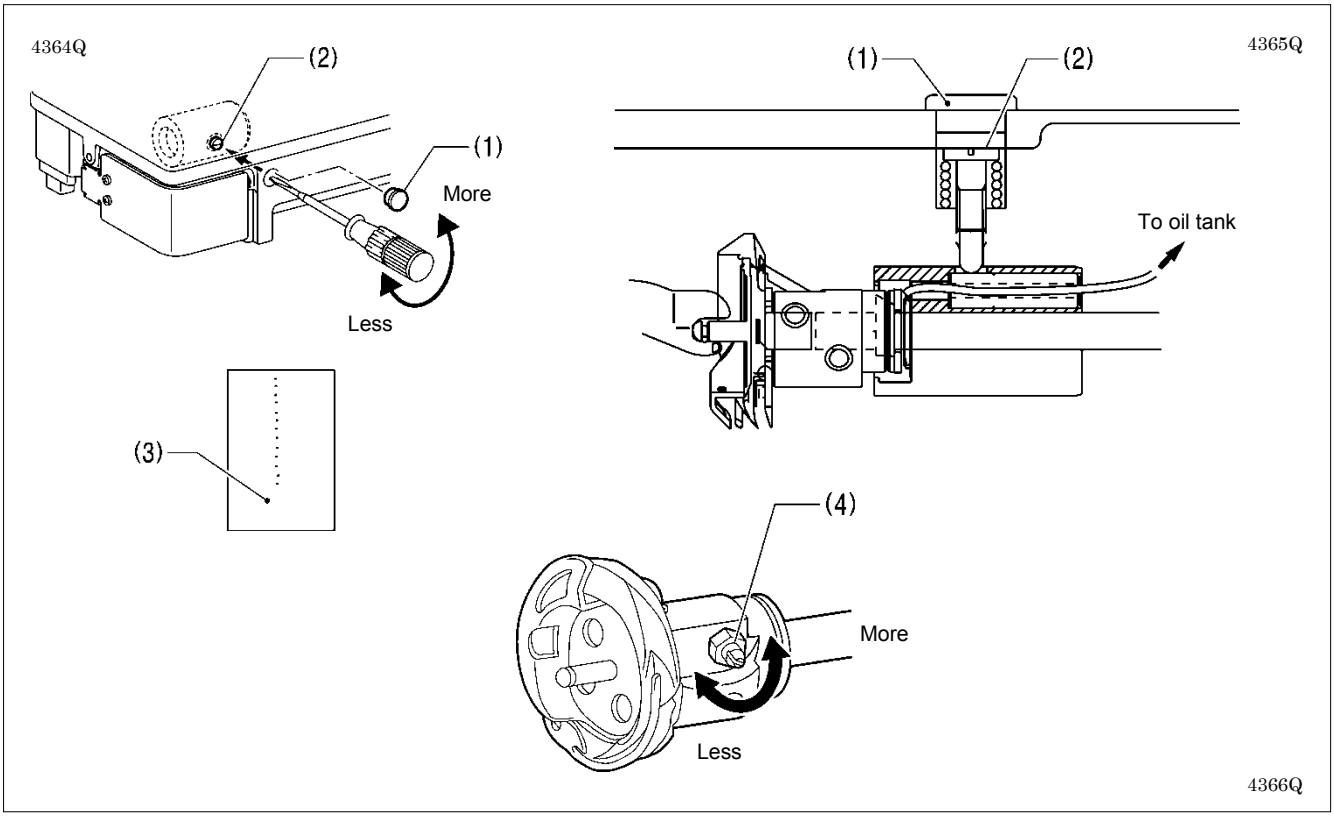
1. Turn on the power and set the sewing machine to the home position. Then press the THREAD key to lower the work clamp.
2. Loosen the set screw (1), and then move the tension stud bracket assembly (2) in and out to adjust so that the tension disc opening amount is 0.5 - 1.0 mm.
3. Check that the tension discs are fully closed when the power is turned off.

7-18. Adjusting the upper thread feeding amount



1. Loosen the screw (1), and then turn the tension take-up lever (2) to adjust the upper thread feeding amount.
2. Move the trimmer driving arm (3) by hand and check that upper thread feeding is completed before the upper thread is cut.
   Note: If the above adjustment is not made, it may result in the upper thread pulling out or in upper thread clamping errors.

7-19. Adjusting the rotary hook lubrication



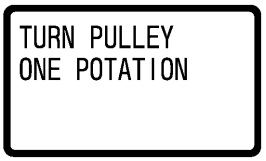
1. Remove the rubber cap (1).
2. Turn the adjusting screw (2) to adjust the lubrication amount.
   * Adjust so that approximately 10 drops of oil are released when the sewing machine is run at a speed of 4,000 rpm for three cycles to sew about 114 stitches. Use Kraft paper (3) or similar to catch the oil drops. As a guide, the optimum position can be obtained if the adjusting screw (2) is tightened as much as possible and then loosened about two turns.
   * Furthermore fine adjustments can then be made using the rotary hook joint screw (4).
   * If the lubrication amount has been reduced, run the machine for 200 - 300 sewing cycles and then check it again.

   Note: If lubrication stops, it will cause problems such as rotary hook seizure and thread breakages.

7-20. Adjusting the upper shaft motor reference position

1 Turn off the power and then remove the needle.

2



Flashing

0821D

While pressing the ∆ and ∇ key simultaneously, turn on the power switch.

0763D

- The TEST indicator will flash and the upper shaft rotation standby screen will be displayed.

3

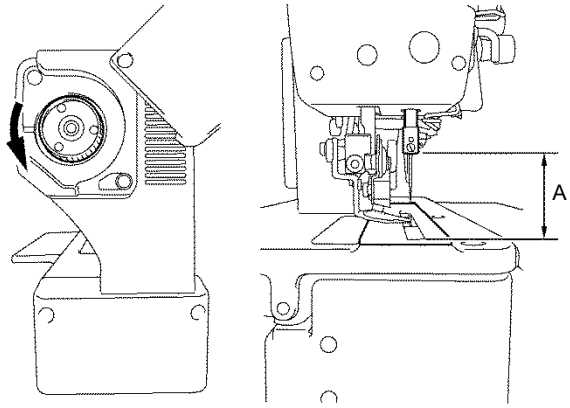
0822D

Turn the pulley one full turn in the direction of the arrow.

- "PRESS ENTER AT STANDARD POINT" will be displayed.

* If nothing is displayed, turn the pulley by hand until the display appears.

4



0754D

Turn the pulley in the direction of the arrow to move the needle bar until the distance A from the top of the needle plate to the bottom edge of the needle bar is as given below.

-2 specifications: 43.2 mm
-3 specifications: 42.4 mm

5 End adjustment mode.

0823D

To confirm the reference position, press the ENTER key.

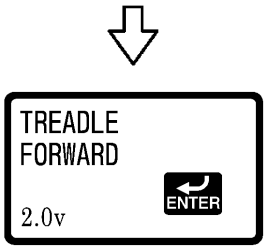
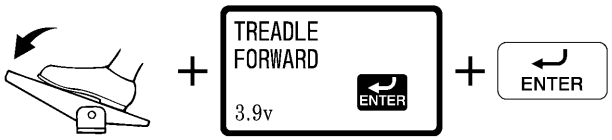
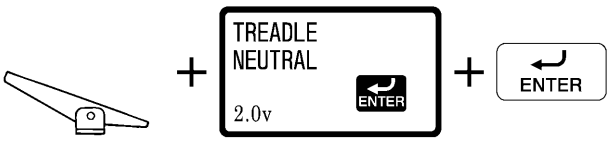
- "SUCCESSFUL COMPLETION" will be displayed for 1.5 seconds, and then the display will return to the normal display and the sewing machine will change to home position standby.

To exit without confirming the reference position, press the TEST key.

- The display will return to the normal display and the sewing machine will change to home position standby.

7-21. Standard settings for treadle depression stroke

The following procedure sets the operating positions for the treadle depression strokes to the standard values.

1	Enter the signal settings.  0739D  0824D	While pressing the Δ and ▲ keys, turn on the power switch.
2	Store the maximum forward depression amount.  0825D	With the treadle depressed all the way forward, wait until the voltage display value stabilizes and then press the ENTER key.
3	Store the neutral position.  0826D	With your foot released from the treadle, wait until the voltage display value stabilizes and then press the ENTER key.
4	Store the maximum backward depression amount.  0827D	With the treadle depressed all the way backward, wait until the voltage display value stabilizes and then press the ENTER key.
5	End the settings.  0828D	"SUCCESSFUL COMPLETION" will be displayed on the screen. **NOTE:** If the operation of the treadle is incorrect, a buzzer will sound. Repeat the operation from step 2.
6	Turn off the power switch.	

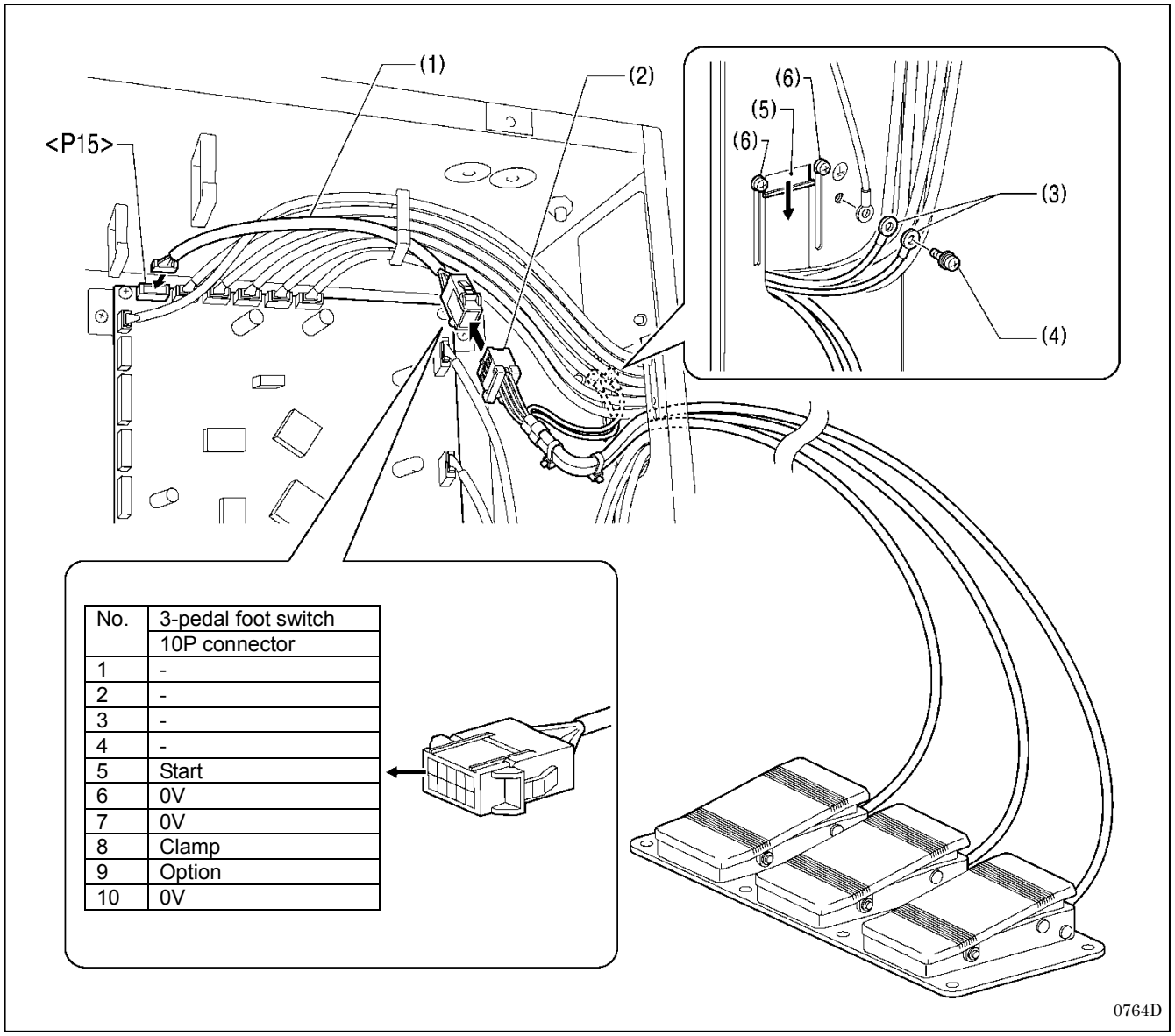
8. INSTALLING THE 3-PEDAL FOOT SWITCH (OPTION)

The foot switch conversion harness (SB1565001) that is sold separately is required.

⚠ DANGER

Wait at least 5 minutes after turning off the power switch and disconnecting the power cord from the wall outlet before opening the face plate of the control box. Touching areas where high voltages are present will result in serious injury from electric shocks.

Be sure to connect the ground.
If the ground connection is not secure, you run a high risk of serious injury from electric shocks, and problems with correct operation will also occur.



No.	3-pedal foot switch 10P connector
1	-
2	-
3	-
4	-
5	Start
6	0V
7	0V
8	Clamp
9	Option
10	0V

1. Insert the foot switch conversion harness (1) into connector <P15> on the main PCB.
2. Connect the connector (2) for the 3-pedal foot switch to the foot switch conversion harness (1).
3. Temporarily remove the screw (4) from the ground terminal of the control box, and then connect the two ground wires (3) in the 3-pedal foot switch harness to the ground terminal and retighten the screw to the ground terminal.
4. Close the cord presser plate (5) in the direction of the arrow, and secure it by tightening the two screws (6).

NOTE:

- Make sure that the ground connections are secure in order to ensure safety.
- Close the cord presser plate (5) securely so that no foreign objects, insects or small animals can get inside the control box.

9. ELECTRIC MECHANISM

⚠ DANGER

Wait at least 5 minutes after turning off the power switch and disconnecting the power cord from the wall outlet before opening the face plate of the control box. Touching areas where high voltages are present will result in serious injury from electric shocks.

9-1. Precautions at the time of adjustment

Pay attention to the following when opening the control box for maintenance.

Electric shock

Some large capacitors may have a high voltage remaining in them for up to 5 minutes after the power is turned off. To prevent electric shock, wait at least 5 minutes after the power is turned off before doing the following:

- Opening and closing the control box
- Replacing fuses
- Separating and joining connectors
- Measuring resistance
- Doing anything with a possibility of touching something inside the control box

Some adjustments require measuring the voltage while the power is turned on with the control box kept open.
In such a case, be careful not to touch any place other than that for the measurement. In addition, always keep in mind that a high voltage remains for about 5 minutes after power is turned off.

Injury

When separating or rejoining connectors, and measuring something, be careful not to cut your fingers on metal parts such as heat sinks and covers.

9-2. Components inside and outside the control box and in the operation panel

Main PCB
Secured to the rear. This PCB drives the pulse motor and solenoids.

Motor PCB
Secured to the side. This PCB drives the main shaft motor. There are two fuses on this PCB.

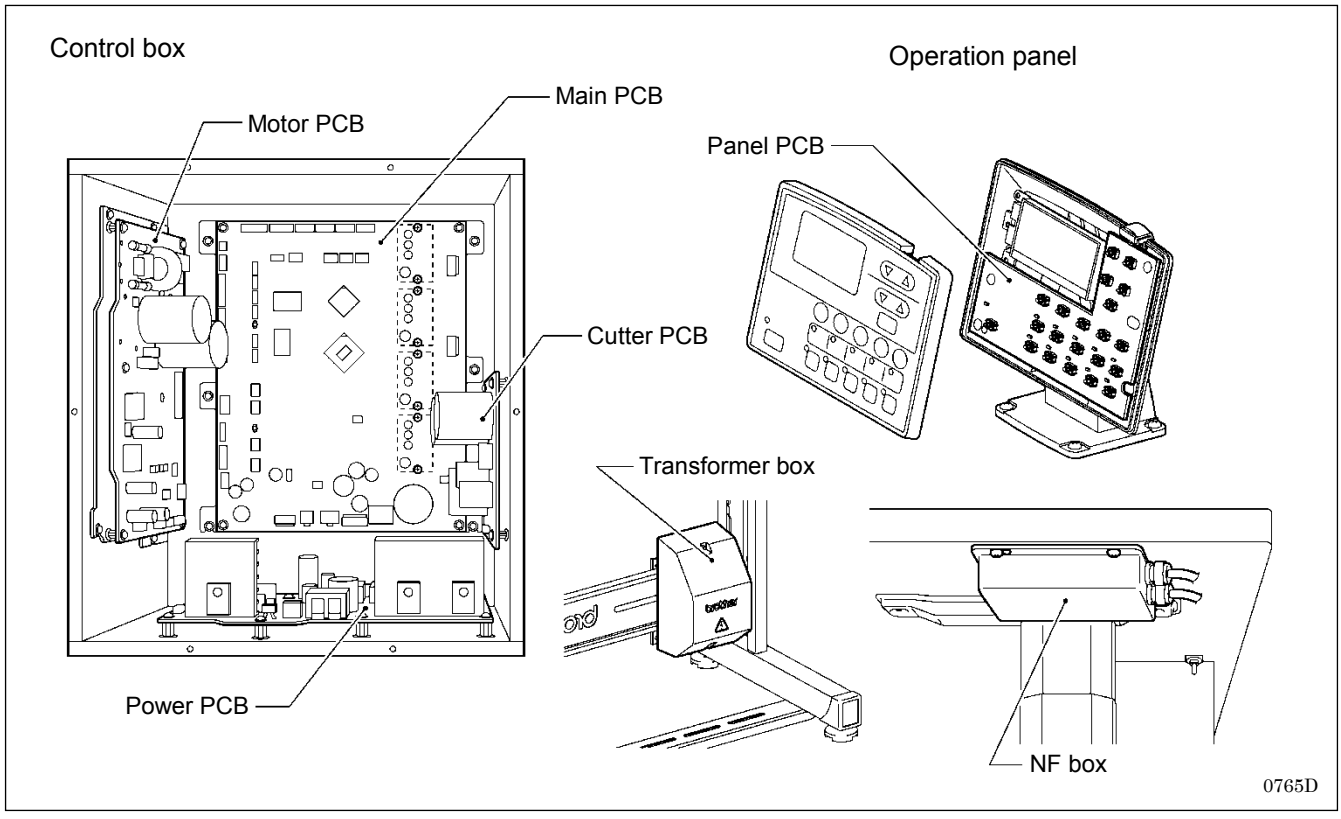
Power PCB
Secured to the base. This PCB generates the voltages which are required for control operations.

Cutter PCB
Secured to the side. This PCB drives the solenoid.

Conversion transformer box (100V, 110V, 380V, 400V AC specifications only)
Steps-down the power supply voltage and generates the voltages that are required for the control box.

NF box (For Europe)
Eliminates electrical noise that is transmitted along the power supply line.

Panel PCB
Secured inside the operation panel. This PCB controls indications of the machine status and the input operation.

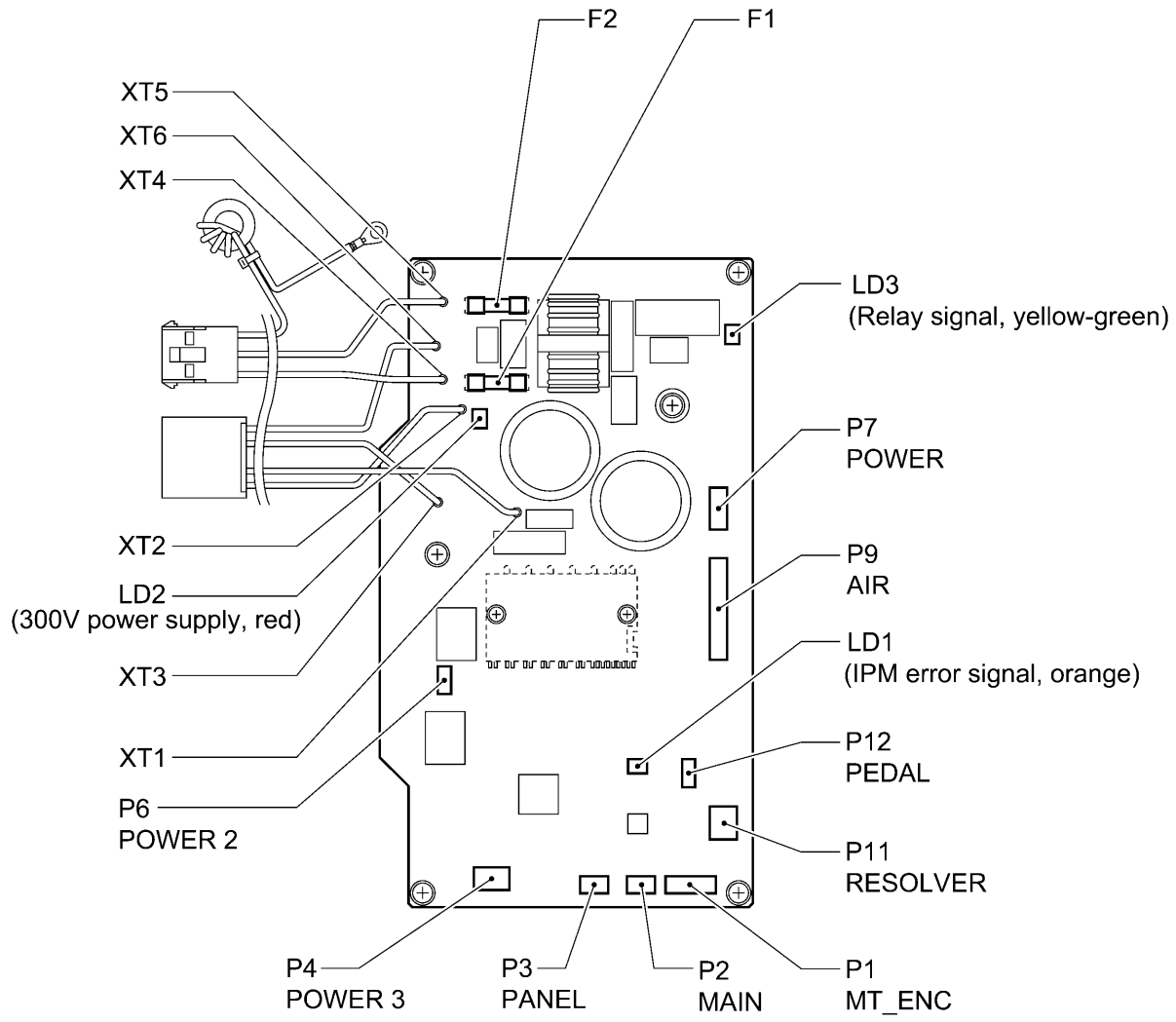


9-3. Fuse explanation

When replacing a fuse, be sure to use the specified ones listed below.
If a component on a PCB is damaged, the fuses may blow again soon even after they have been replaced.

No.	Part name	Part code	When a fuse has blown
F1 F2	G Fuse 10A-250V (glass tube fuse, 10A-250V)	J04417-001	The power indicator is not illuminated, and nothing operates.

Motor PCB

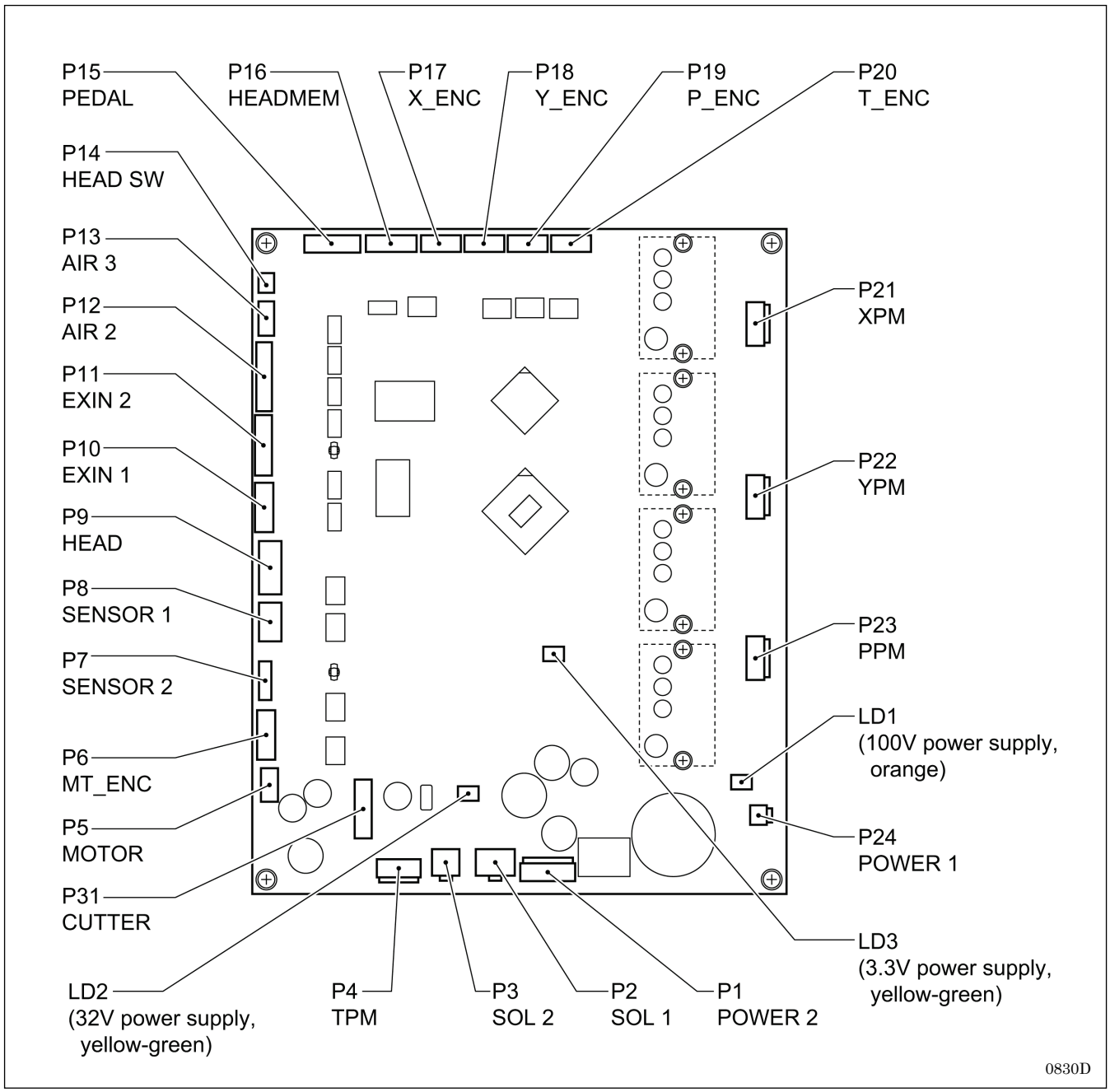


9-4. Connectors

Most of the machine trouble is due to connector problems including improper connection or sufficient contact. Therefore, be sure to check if each connector is correctly inserted and that there is no contact failure between pins and wires before starting troubleshooting procedures.

9-4-1. Connector positions

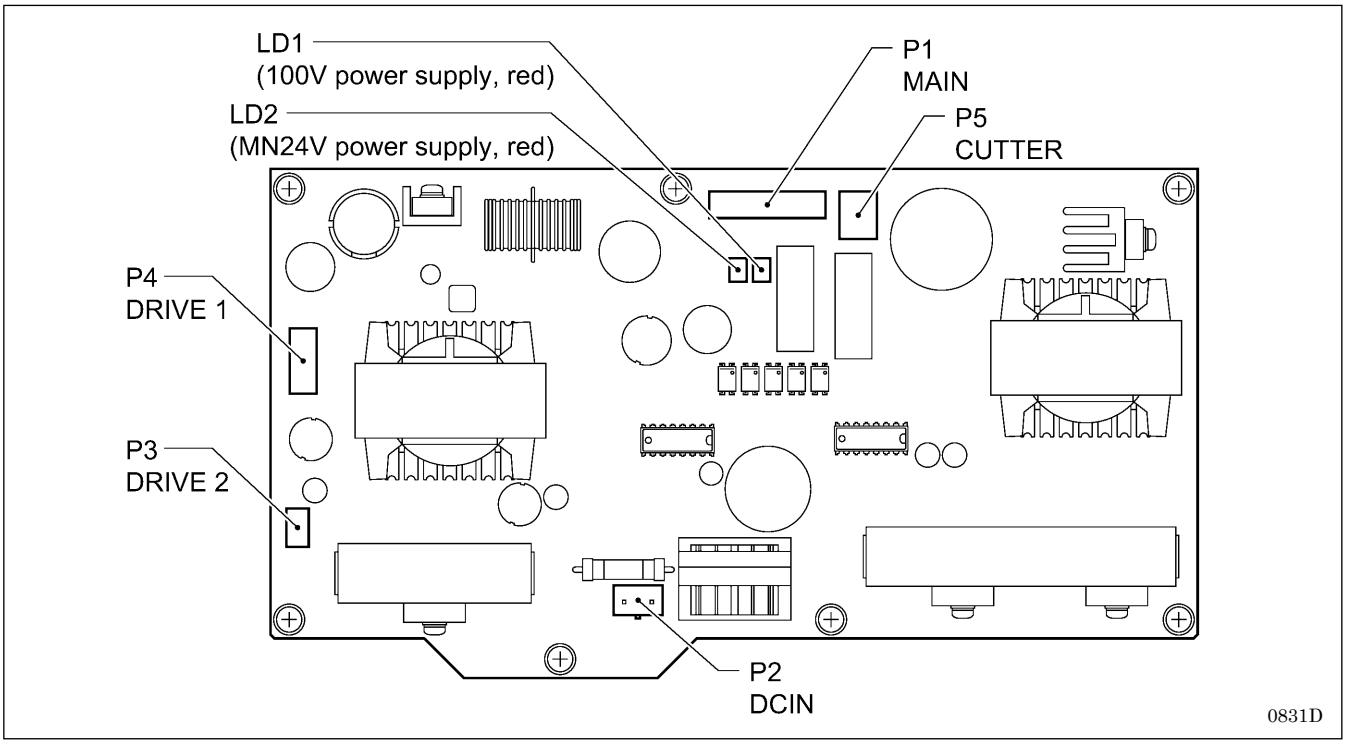
Main PCB



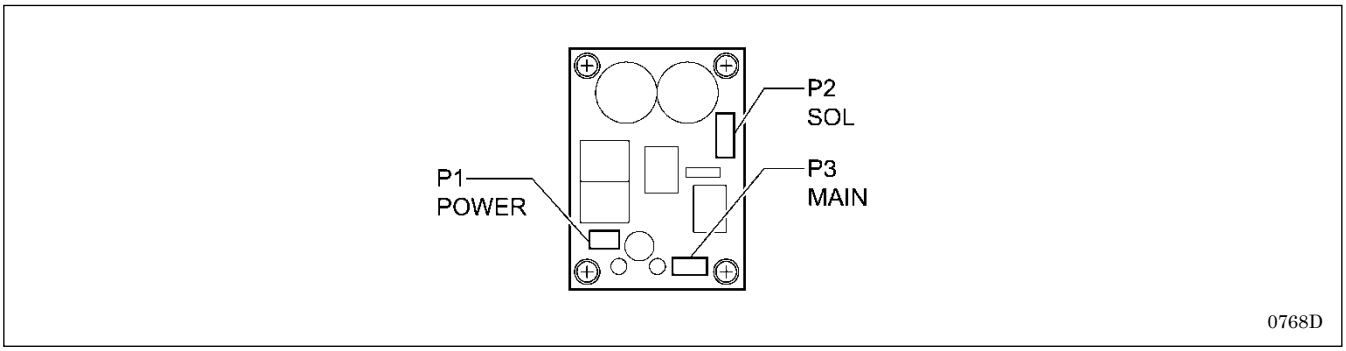
Motor PCB

(Refer to the diagram in “9-3. Fuse explanation”.)

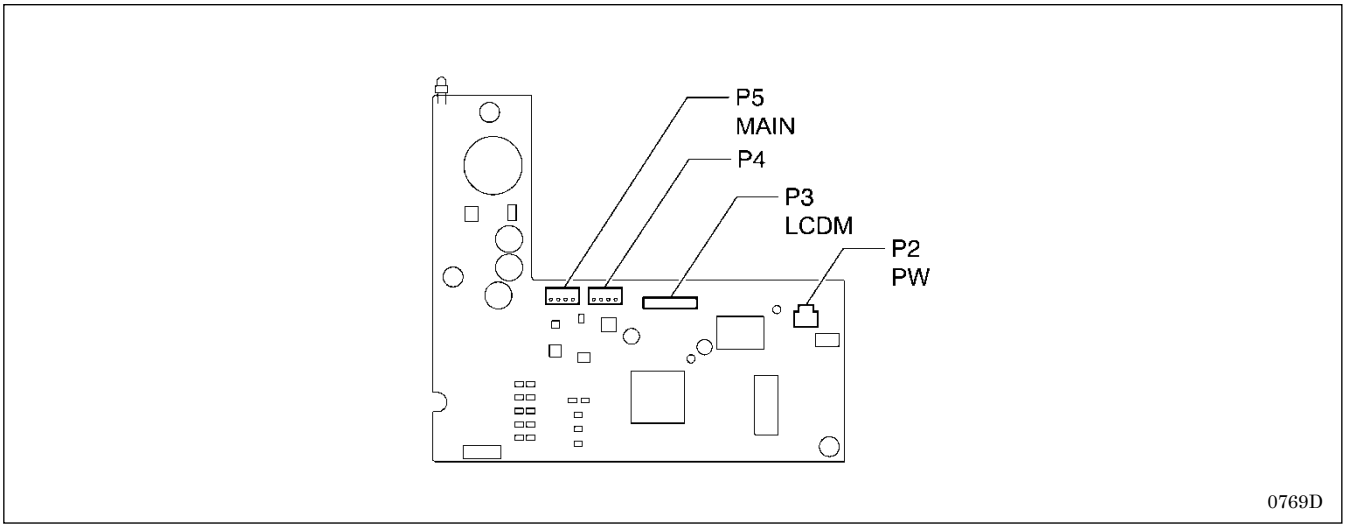
Power PCB



Cutter PCB



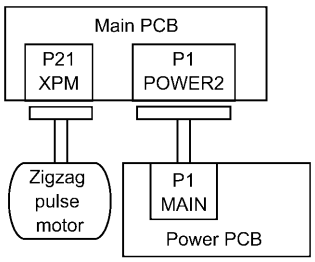
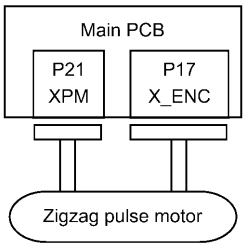
LCD panel PCB



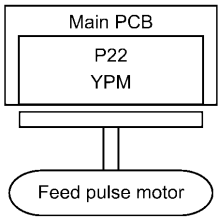
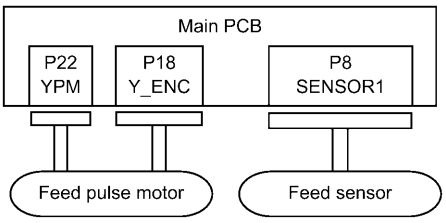
9-4-2. Contact failure

The connectors functions are divided into five categories. Some connectors may belong to more than one group. Be sure to investigate another category if a problem is not found in one category.

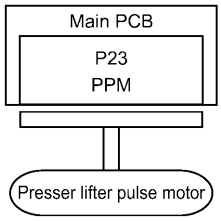
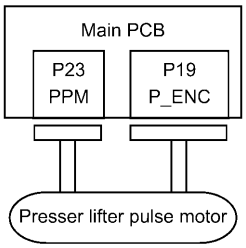
Zigzag mechanism

Problem	Connector No. and position
• The needle bar does not move sideways during home position detection immediately after the power is turned on. • [E200] is displayed.	 0832D
• The needle bar moves sideways but does not detect the home position correctly. • Problem with zigzag operation. • [E200] or [E201] is displayed.	 0833D

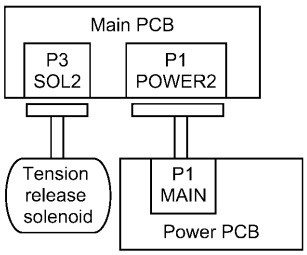
Feed mechanism

Problem	Connector No. and position
• The feed motor does not operate for home position detection immediately after the power is turned on. • Error E210 is displayed.	 0834D
• The feed mechanism moves back and forth but does not detect the home position correctly. • Problem with feed plate operation. • [E210] or [E211] is displayed.	 0835D

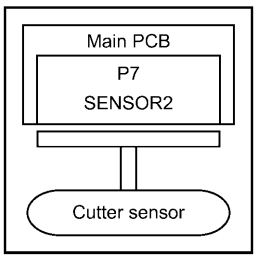
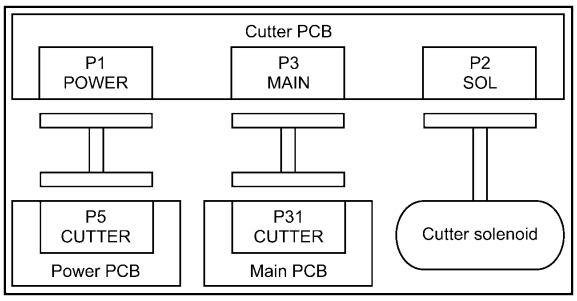
Work clamp mechanism

Problem	Connector No. and position
• Work clamp does not move during home position detection immediately after the power is turned on. • [E300] is displayed.	 0836D
• The work clamp moves up and down but does not detect the home position correctly. • Problem with work clamp operation. • [E300] or [E301] is displayed.	 0837D

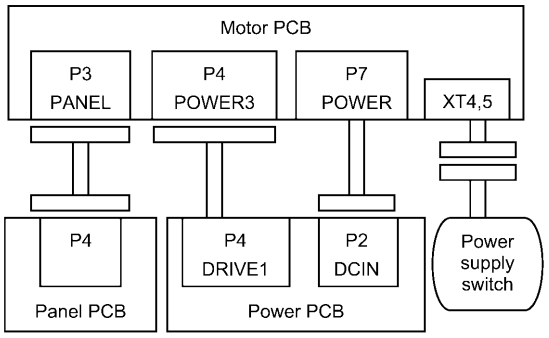
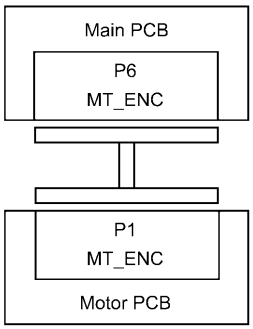
Tension release mechanism

Problem	Connector No. and position
• Tension release does not operate (no error displayed).	 0838D

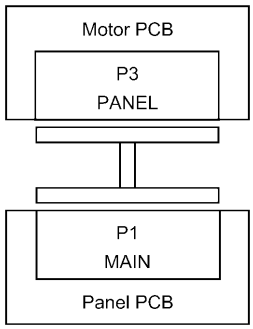
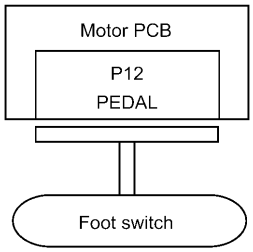
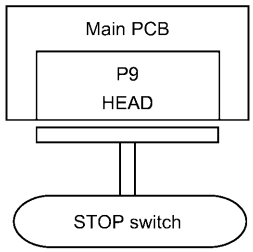
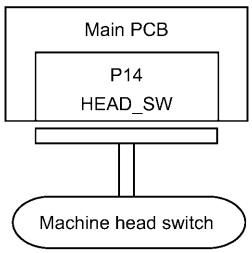
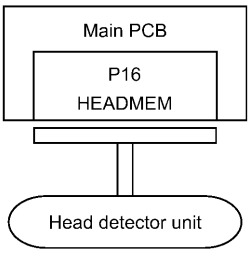
Cutter mechanism

Problem	Connector No. and position
• Error E650 is displayed when the power is turned on.	 0839D
• Cutter does not operate. • [E651] is displayed.	 0840D

Sewing operation

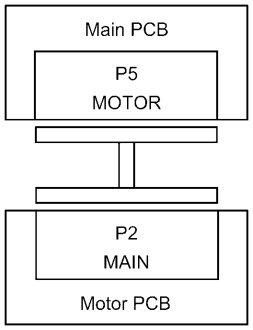
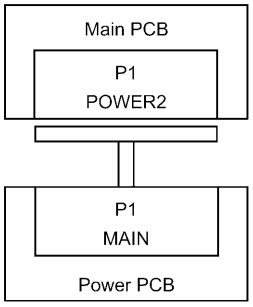
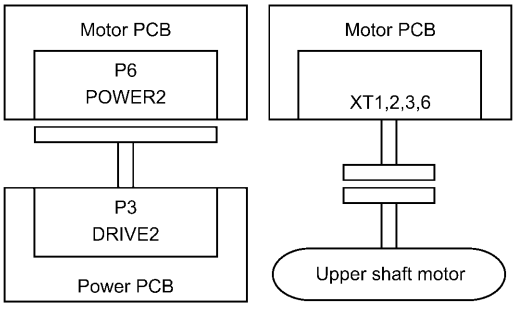
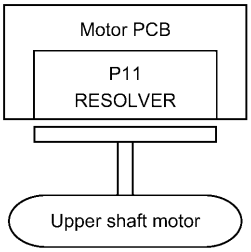
Problem	Connector No. and position
• The power indicator is not illuminated, and nothing operates. • Machine operation is unstable. • [E130] or [E131] is displayed.	 0841D
• The main shaft motor does not operate correctly. • Error E130 is displayed.	 0842D

Others

Problem	Connector No. and position
• Panel indication is strange. • The power indicator is not illuminated. • Any operation panel key does not have any effect.	 2944B
• The sewing machine does not operate when the foot switch is depressed. (No error display.)	 2945B
• After the power is turned on, [E015] or [E016] is displayed.	 0843D
• Error E055 is displayed after the power is turned on.	 0844D
• Error E452 is displayed after the power is turned on.	 0845D

(Continued on next page.)

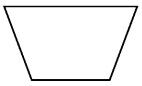
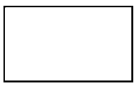
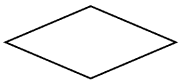
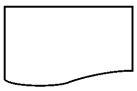
Others

Problem	Connector No. and position
• The WELCOME display does not disappear and the sewing machine does not start.	 2948B
• Only the power indicator illuminates. • Nothing appears on the operation panel display.	 2949B
• The sewing machine does not operate when the foot switch is depressed. • Error E130 is displayed.	 0848D
• Error E131 is displayed.	 0849D

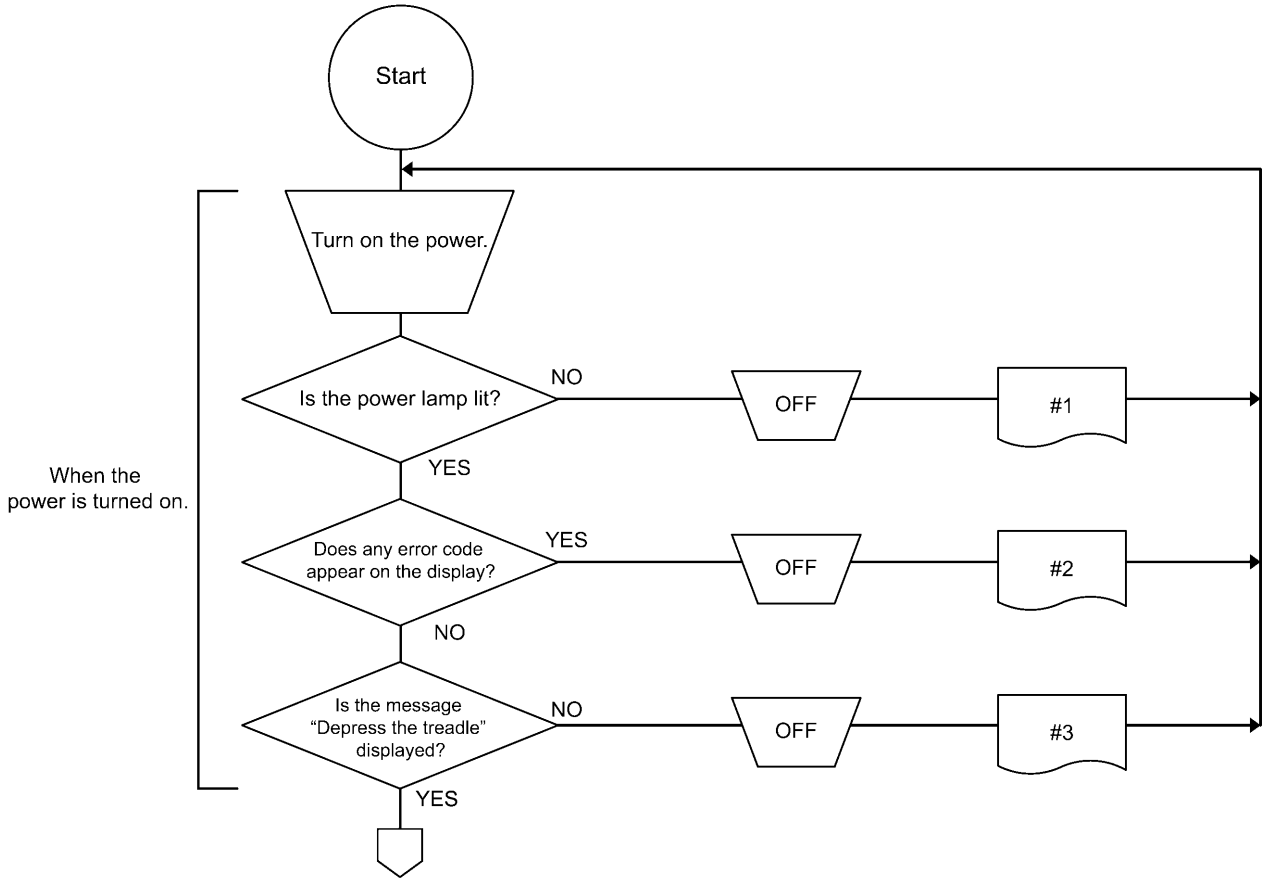
9-5. Troubleshooting

9-5-1. Troubleshooting flowchart

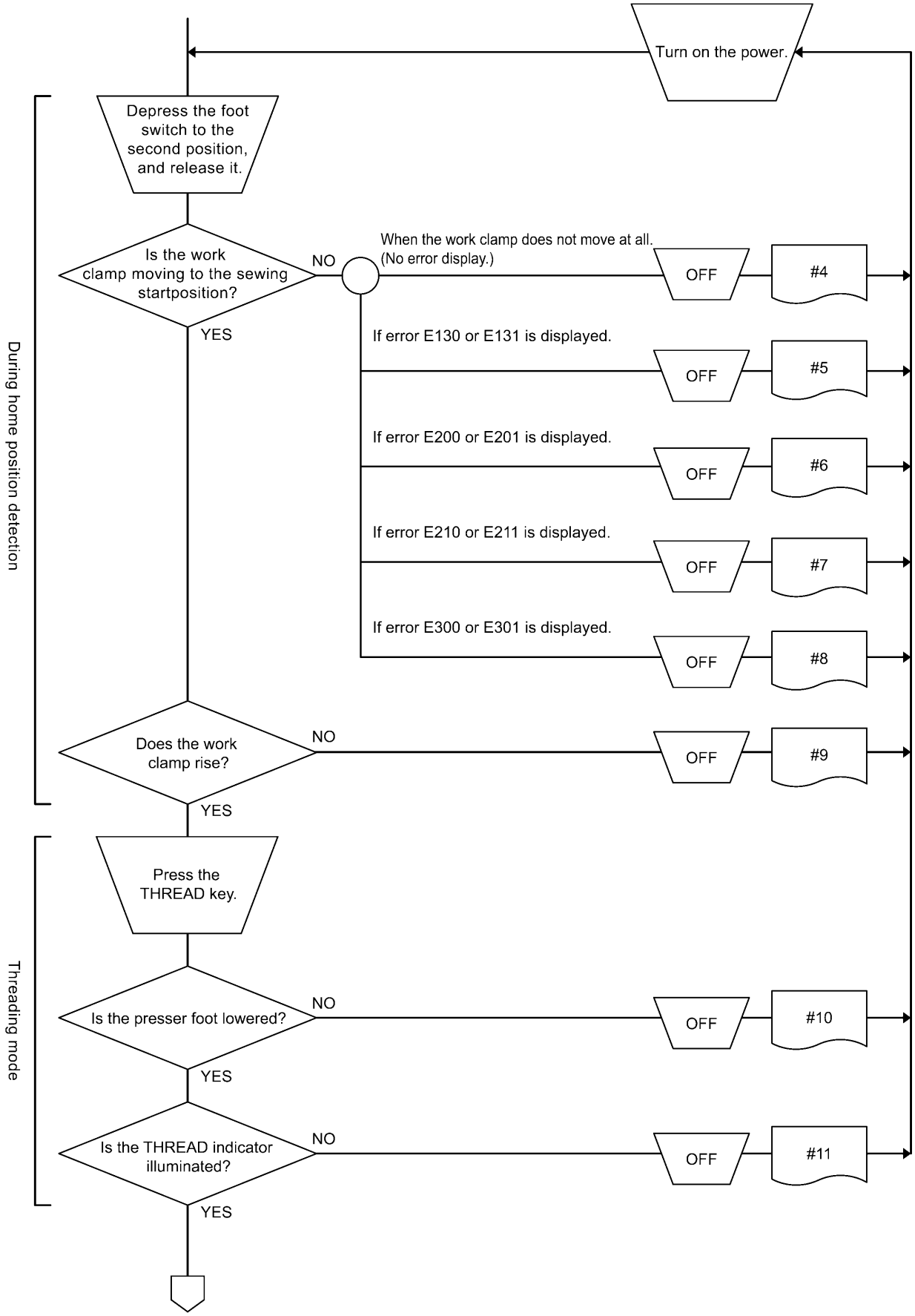
Symbols and their meanings

	Switch operation		Set-up operation or condition
	Yes-or-no decision-making process		The procedure to follow continues on the next page
	The error status number in the first column of the table of “9-5-2. Problem solution and measures”		Turning-off of the power switch

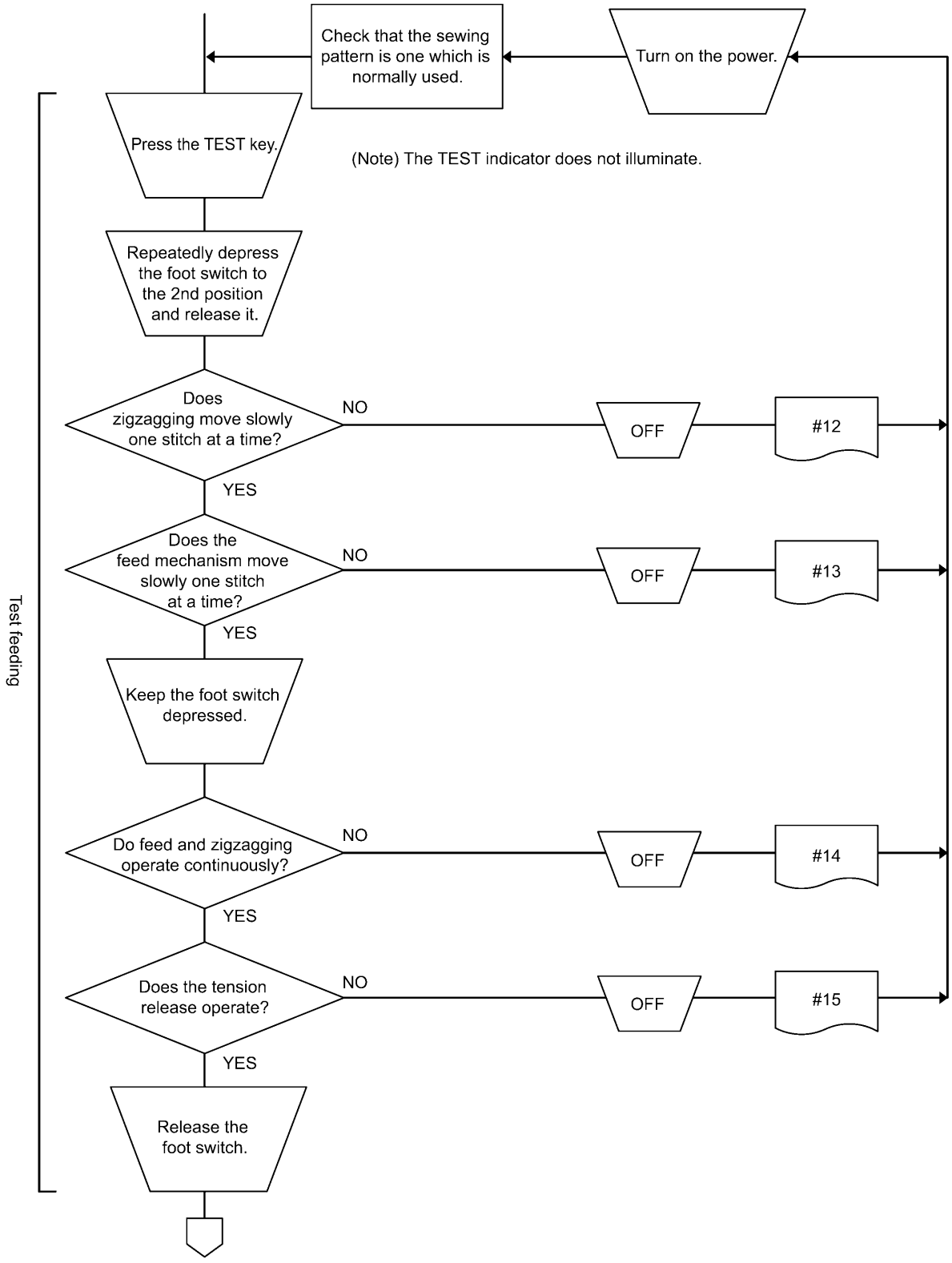
2707B



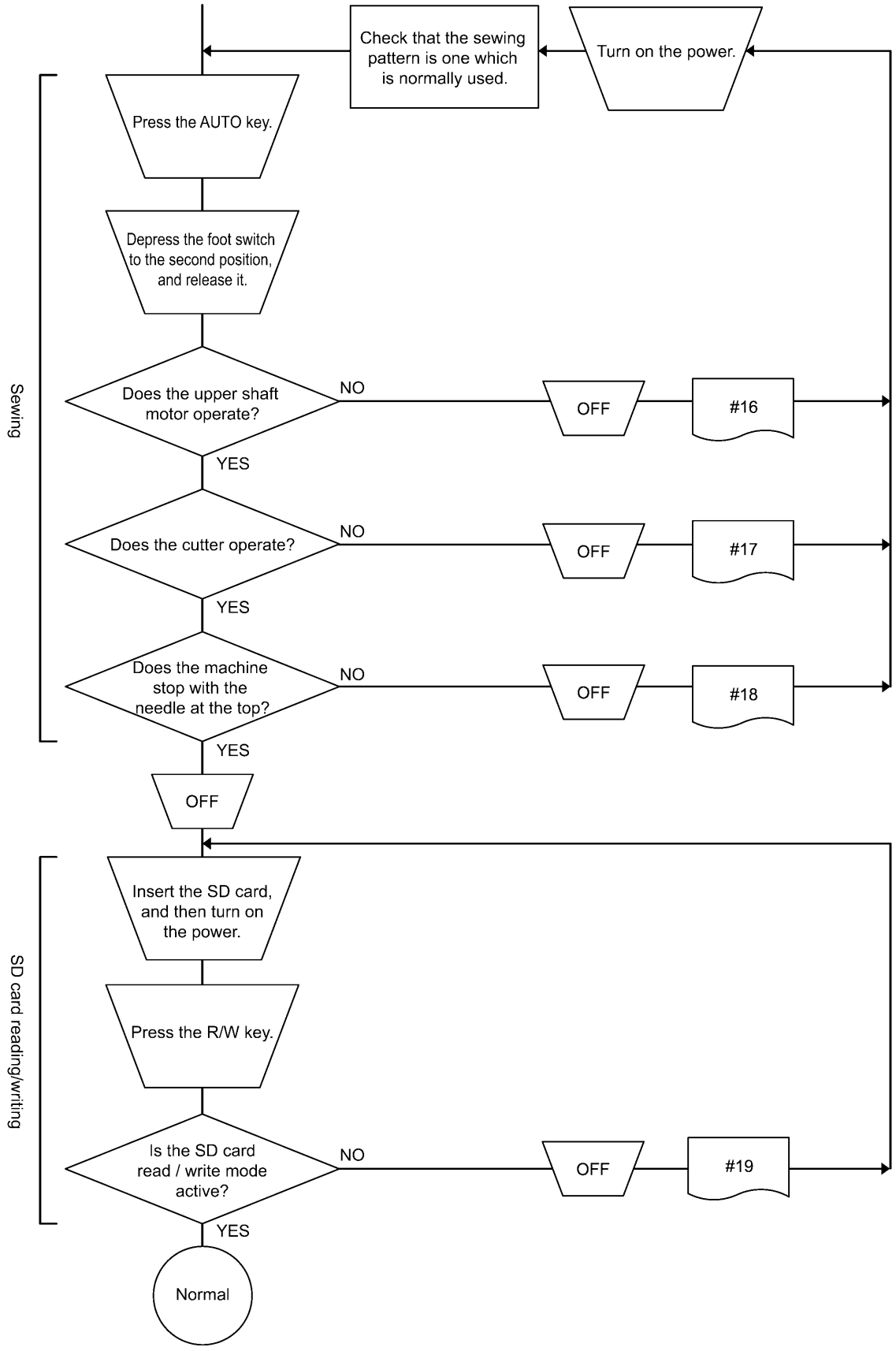
0850D


Turn on the power.
Depress the foot switch to the second position, and release it.
Is the work clamp moving to the sewing startposition?
NO
When the work clamp does not move at all. (No error display.)
OFF
#4
YES
If error E130 or E131 is displayed.
OFF
#5
If error E200 or E201 is displayed.
OFF
#6
If error E210 or E211 is displayed.
OFF
#7
If error E300 or E301 is displayed.
OFF
#8
Does the work clamp rise?
NO
OFF
#9
YES
Press the THREAD key.
Is the presser foot lowered?
NO
OFF
#10
YES
Is the THREAD indicator illuminated?
NO
OFF
#11
YES
During home position detection
Threading mode

0851D


Turn on the power.
Check that the sewing pattern is one which is normally used.
Press the TEST key.
(Note) The TEST indicator does not illuminate.
Repeatedly depress the foot switch to the 2nd position and release it.
Does zigzagging move slowly one stitch at a time?
NO
OFF
#12
YES
Does the feed mechanism move slowly one stitch at a time?
NO
OFF
#13
YES
Keep the foot switch depressed.
Do feed and zigzagging operate continuously?
NO
OFF
#14
YES
Does the tension release operate?
NO
OFF
#15
YES
Release the foot switch.
Test feeding

0852D


Turn on the power.
Check that the sewing pattern is one which is normally used.
Press the AUTO key.
Depress the foot switch to the second position, and release it.
Sewing
Does the upper shaft motor operate?
NO
OFF
#16
YES
Does the cutter operate?
NO
OFF
#17
YES
Does the machine stop with the needle at the top?
NO
OFF
#18
YES
OFF
SD card reading/writing
Insert the SD card, and then turn on the power.
Press the R/W key.
Is the SD card read / write mode active?
NO
OFF
#19
YES
Normal

0853D

9-5-2. Problem solution and measures

⚠ DANGER

Wait at least 5 minutes after turning off the power switch and disconnecting the power cord from the wall outlet before opening the face plate of the control box. Touching areas where high voltages are present will result in serious injury from electric shocks.

1. Pay attention to the following when opening the control box for maintenance.

Electrical shock

Some large capacitors may have a high voltage remaining in them for up to 5 minutes after the power is turned off.
To prevent electrical shock, wait at least 5 minutes after the power is turned off before doing the following:
- Opening and closing the control box
- Replacing fuses
- Separating and joining connectors
- Measuring resistance
- Doing anything with a possibility of touching something inside the control box

Some adjustments require measuring the voltage while the power is turned on with the control box kept open.
In such a case, be careful not to touch any place other than that for the measurement. In addition, always keep in mind that a high voltage remains for about 5 minutes after power is turned off.

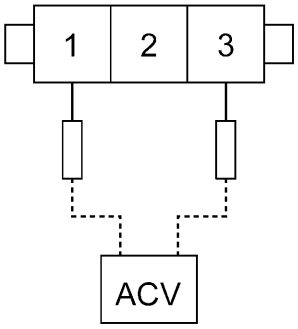
Injury

When separating or rejoining connectors, and measuring something, be careful not to cut your fingers on metal parts such as heat sinks and covers.

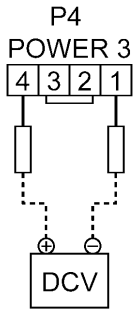
2. When replacing a fuse, be sure to use a new one of the same quality and capacity as the old one.

Before adjustment

1. While the power is turned off, check each connector is securely plugged in by referring to “9-4. Connectors”.
2. Find the error status number in the troubleshooting flowchart.
3. From the applicable part of the flowchart, take the reference number to find the correspondingly numbered details of the problem in the following table.

Error status #1 The power indicator does not light when the power is turned on.		
Probable causes	Check/ repair/ adjust	Parts to be replaced
1. (Check the LEDs)	Turn on the power switch and check that the various LEDs illuminate in the following order. a. LD2 (red) on motor PCB does not illuminate. →#1－2、#1－3、#1－4 b. LD2 (red) on power PCB does not illuminate. →#1－5、#1－6、#1－7、#1－8 c. LD3 (green) on motor PCB does not illuminate. →#1－9 d. Power indicator on panel does not illuminate. →#1－10	
2. Malfunction of power cord  2712B	Turn off the power switch, disconnect the power supply connector which links the power cord for the power switch and the motor PCB, turn on the power switch, and then measure the AC voltage between terminals 1 and 3 of the cord-side connector. OK if the voltage is the same as mains voltage. In addition, check that the power supply voltage at the wall outlet is within the range of the specification voltage +/- 10%. After inspecting, turn off the power switch and connect the power supply connector.	
3. Blown fuse	Turn off the power switch, wait 5 minutes or more, and then remove fuses F1 and F2 on the motor PCB and check their continuity. OK if continuity	GFUSE10A-250V (10A-250V)
4. Malfunction of motor PCB 1	Turn off the power switch, disconnect P2 (DCIN) from the power PCB, and then turn on the power switch and check LD2 (red) on the motor PCB. OK if illuminated. After checking, turn off the power switch, wait for five minutes or more, and then insert P2 into the power PCB. Turn the power switch back on, and then with P2 inserted into the power PCB, check the voltage between terminals 1 and 3 of P2. OK if 240 to 380 V DC.	Motor PCB assembly 800B
5. Malfunction of power PCB	Turn off the power switch, disconnect connector P1 (POWER2) from the main PCB and connectors P4 (POWER3) and P6 (POWER2) from the motor PCB, and then turn on the power switch and check LD2 (red) on the power PCB. OK if illuminated. After checking, turn off the power switch, wait for one minute or more, and then insert P1 into the main PCB and P4 and P6 into the motor PCB.	Power PCB assembly

(Continued on next page.)

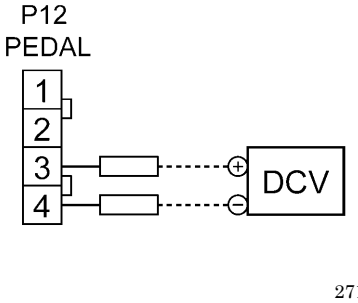
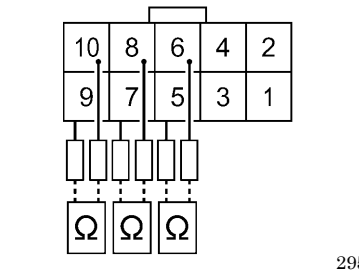
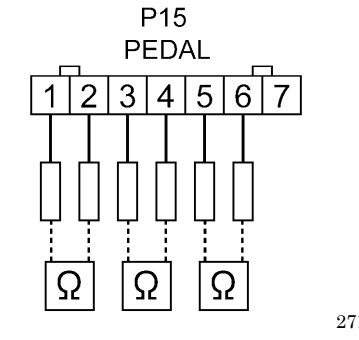
Error status #1 The power indicator does not light when the power is turned on.		
Probable causes	Check/ repair/ adjust	Parts to be replaced
6. Malfunction of main PCB	Turn off the power switch, disconnect connector P4 (POWER3) and P6 (POWER2) from the motor PCB, and then turn on the power switch and check LD2 (red) on the power PCB. OK if illuminated. (LD1 (red) on power PCB does not illuminate) After checking, turn off the power switch, wait for one minute or more, and then insert P4 and P6 into the motor PCB.	Main PCB assembly 800B
7. Malfunction of main PCB 2	Turn off the power switch, disconnect connector P1 (POWER2) from the main PCB and connectors P1 (MT-ENC), P2 (MAIN) and P3 (PANEL) from the motor PCB, and then turn on the power switch and check LD2 (red) on the power PCB. OK if illuminated. After checking, turn off the power switch, wait for one minute or more, and then insert P1 into the main PCB and P1, P2 and P3 into the motor PCB.	Main PCB assembly 800B
8. Malfunction of panel PCB	Turn off the power switch, disconnect connector P1 (POWER2) from the main PCB and connectors P1 (MT-ENC) and P2 (MAIN) from the motor PCB, and then turn on the power switch and check LD2 (red) on the power PCB. OK if illuminated. After checking, turn off the power switch, wait for one minute or more, and then insert P1 into the main PCB and P1 and P2 into the motor PCB.	LCD panel PCB assembly Panel harness
9. Poor harness connection  2713B	Turn off the power switch, check that connector P4 (POWER3) is inserted into the motor PCB, and then turn on the power switch and check the voltage between terminals 1 and 4 of P4. OK if approximately 24 V DC.	Power PCB assembly
10. Malfunction of operation panel	Check that connector P3 (PANEL) of the motor PCB is inserted.	Operation panel assembly LCD panel PCB assembly Panel harness

Error status #2 Error code appears on the display when the power is turned on.		
Probable causes	Check/ repair/ adjust	Parts to be replaced
1. If error E015 or E016 is displayed, there is a poor connection of the STOP switch.	a. Check that the STOP switch is not stuck down. b. Check if there is a harness short-circuit. c. Check that connector P9 (HEAD-SW) is inserted into the main P.C. board.	STOP switch
2. If error E025, E035 or E045 is displayed, the foot switch is still depressed.	a. Check if the foot switch is still depressed. b. Check if there is a short-circuit in the harness. c. Check if connector P12 (PEDAL) is connected to the motor PCB. d. Reset the depression stroke for the foot switch while referring to “7-21. Standard setting for depression stroke (foot switch)”. * For a 3-pedal foot switch, the connector for the main PCB will be P15 (PEDAL).	Treadle unit 3-pedal foot switch assembly
3. If "E055" is displayed, there is a malfunction of the machine head switch.	a. Check if the machine head switch is off. b. Check if there is a broken wire in the harness. c. Check if connector P14 (HEAD-SW) is connected to the main PCB.	Switch assembly machine head
4. If "E065" is displayed, one of the keys on the operation panel is still depressed.	a. Check that there is no incorrect sensitivity when the surface of the panel sheet and the keys are pressed. b. Check that connector P3 (PANEL) is connected to the motor PCB, and that connector P1 (MAIN) is connected to the panel PCB.	Operation panel assembly LCD panel PCB assembly Panel harness
5. If “E131” is displayed, there is a poor connection of the synchronizer.	Check that connector P11 (RESOLVER) and P1 (MT-ENC) is connected to the motor PCB, and that connector P6 (MT-ENC) is connected to the main PCB.	
6. If "E401" and "E410" is displayed, there is a connection fault between the main PCB, motor PCB and the panel PCB.	a. Check LD3 (green) on the main PCB. OK if illuminated. b. Check LD3 (green) on the motor PCB. OK if illuminated. c. Check that connector P5 (MOTOR) is connected to the main PCB, and that connector P2 (MAIN) is connected to the motor PCB. d. Check that connector P3 (PANEL) is connected to the motor PCB, and that connector P4 (MAIN) is connected to the panel PCB. e. Check if there is a broken wire in the harness.	Main PCB assembly 800B Motor PCB assembly 800B LCD panel PCB assembly Connection harness Panel harness

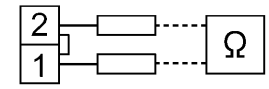
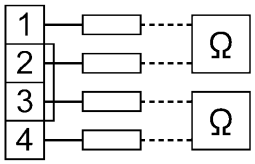
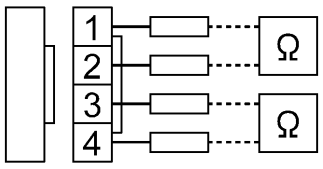
(Continued on next page.)

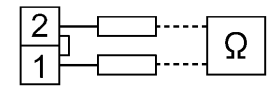
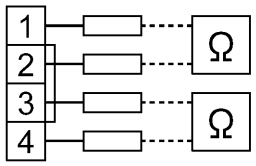
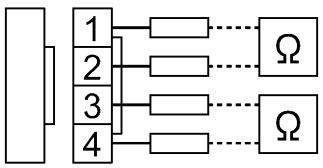
Error status #2 Error code appears on the display when the power is turned on.		
7. If "E450" or "E452" is displayed, the machine head memory cannot be recognized.	a. Check if connector P3 (HEAD-M) is connected to the main PCB. b. Check if there is a broken wire in the harness.	
8. If error E650 is displayed, there is a poor connection of the cutter.	a. Check that connector P7 （SENSOR2） is inserted into the main P.C. board. b. Check if there is a harness short-circuit. c. Open the top cover and check the installation of the cutter sensor.	Cutter sensor
9. If "E700" is displayed, the power supply voltage is abnormally high.	a. Check that the power supply voltage at the mains is at the specification voltage plus or minus 10%. b. See #1-2.	
10. If "E705" is displayed, the power supply voltage is abnormally low.	a. Check that the power supply voltage at the mains is at the specification voltage plus or minus 10%. b. See #1-2.	

Error status #3 “Depress the treadle.” is not displayed when the power switch is turned on.		
Probable causes	Check/ repair/ adjust	Parts to be replaced
1. Main software not installed correctly	Carry out the restore operation by referring to "4-11. Updating the control program version ".	Operation panel assembly Panel PCB assembly Panel harness
2. Poor harness connection	Refer to inspections 9 and 10 in #1.	
3. Malfunction of PCB	Check all of the LEDs while referring to step 1 in #1, and then refer to inspections 5 to 8 in #1	

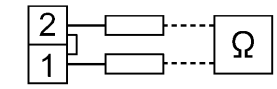
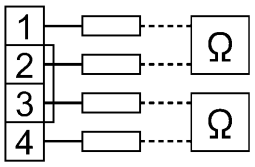
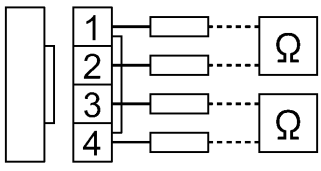
Error status #4 Work clamp does not return to home position during home position detection.		
Probable causes	Check/ repair/ adjust	Parts to be replaced
1. Incorrect depression position adjustment	Adjust the position while referring to "7-21. Setting method for standard depression strokes".	
2. Malfunction of treadle unit  	With the motor PCB connector P12 (PEDAL) connected, turn on the power and measure the voltage between pins 3-4 of the cord connector (No. 3 +, No. 4 -). OK if the voltage is approximately 2 V at neutral, approximately 4 V when the foot switch is depressed as far as it will go, and approximately 0.5 V when it is depressed backward.	Foot switch
3. Malfunction of foot switch and cord (option)  	(Check that the power is turned off.) Disconnect the foot switch from the foot switch adapter harness, and measure the voltage between pins 5-6 and 7-8 of the foot switch connector. (Check between pins 9-10 if using a 3-pedal foot switch.) OK if the resistance is normally ∞ ohms but 0 ohms when depressed.	Foot switch
4. Malfunction of foot switch adapter harness (option)  	After checking the foot switch in step 3, connect the foot switch adapter harness to the foot switch and measure the voltage between pins 1-2 and 3-4 of connector P15 (PEDAL) of the main PCB. (Check between pins 5-6 if using a 3-pedal foot switch.) (Touch the ohmmeter against the lead wires without disconnecting the connector.) OK if the resistance is normally ∞ ohms but 0 ohms when depressed.	Foot switch Foot switch cord

Error status #5 An error code is displayed during home position detection.		
Probable causes	Check/ repair/ adjust	Parts to be replaced
1. If error E130, E131, E132 or E133 is displayed, there is a poor connection of the synchronizer.	Refer to inspection #2-4.	
2. If error E130, E131, E132 or E133 is displayed, there is a poor connection of the upper shaft motor.	Check the connection of the relay connector between the upper shaft motor and the motor PCB.	
3. If error E130, E131, E132 or E133 is displayed, there is a blown fuse.	a. Remove fuses F1 and F2 from the motor PCB and check the continuity. OK if there is continuity. b. If fuses F1 and F2 are blown, check the resistances between each of the pins of the relay connector between the upper shaft motor and the motor PCB, and between the terminals of the fuses. OK if ∞Ω. c. If the fuses blow again after they are replaced, replace the motor PCB.	GFUSE10A-250V (10A-250V) Motor PCB assembly 800B
4. If error E130, E131, E132 or E133 is displayed, there is a malfunction of the motor PCB.	a. Check the synchronizer input while referring to “3-7. Input checking method”. OK if the signal turns on and off. b. If step a. (above) is OK, there is a malfunction of the motor PCB.	Resolver stator 800 assembly Motor PCB assembly 800B

Error status #6 An error code is displayed during home position detection.		
Probable causes	Check/ repair/ adjust	Parts to be replaced
1. If zigzagging does not occur and error E200 is displayed, there is a malfunction of the power PCB.	Disconnect connectors P1 (POWER2) and P24 (POWER1) from the main PCB, and then turn on the power switch and check LD1 (red) on the power PCB. OK if illuminated. After checking, turn off the power switch, wait for one minute or more, and then insert P1 and P24 into the main PCB.	Power PCB assembly
2. If zigzagging does not occur and error E200 is displayed, there is a malfunction of the main PCB. P24 POWER 1  P21 XPM  2717B 2718B	a. Disconnect connector P24 (POWER1) from the main PCB, and check the continuity between terminals 1 and 2 of P24. OK if ∞ ohms. b. Disconnect connector P21 (XPM) from the main PCB, and check the continuity between terminals 1 and 2, 3 and 4 of P21. OK if ∞ ohms. c. Insert P21 and P24 into the main PCB, turn on the power switch and then check LD1 (red) on the power PCB. OK if illuminated. If LD1 is illuminated during the check in step 1 but it does not illuminate when P1 and P24 are connected, there is a malfunction of the main PCB. d. Check LD1 (orange) on the main PCB. OK if illuminated.	Main PCB assembly 800B
3. If zigzagging occurs slightly and error E200 is displayed, there is a malfunction of the encoder.	a. Check that connector P17 (X-ENC) is inserted into the main PCB and that the color matches. b. Check the encoder input while referring to "3-7. Input checking method".	Pulse motor zigzag assembly Main PCB assembly 800B
4. If zigzagging does not occur and error E200 is displayed, there is a malfunction of the pulse motor or cord. P21 XPM  2719B	a. Disconnect the main PCB connector P21 (XPM) and measure the resistance between pins 1-2 and 3-4 of the cord connector. OK if 2-3 ohms. b. If step a. (above) is OK, there is a malfunction of the main PCB.	Pulse motor zigzag assembly Main PCB assembly 800B

Error status #7 An error code is displayed during home position detection.		
Probable causes	Check/ repair/ adjust	Parts to be replaced
1. If feeding does not occur and error E210 is displayed, there is a malfunction of the power PCB.	Disconnect connectors P1 (POWER2) and P24 (POWER1) from the main PCB, and then turn on the power switch and check LD1 (red) on the power PCB. OK if illuminated. After checking, turn off the power switch, wait for one minute or more, and then insert P1 and P24 into the main PCB.	Power PCB assembly
2. If feeding does not occur and error E210 is displayed, there is a malfunction of the main PCB. P24 POWER 1  P22 YPM  2717B 2720B	a. Disconnect connector P24 (POWER1) from the main PCB, and check the continuity between terminals 1 and 2 of P24. OK if ∞ ohms. b. Disconnect connector P22 (YPM) from the main PCB, and check the continuity between terminals 1 and 2, 3 and 4 of P22. OK if ∞ ohms. c. Insert P22 and P24 into the main PCB, turn on the power switch and then check LD1 (red) on the power PCB. OK if illuminated. If LD1 is illuminated during the check in step 1 but it does not illuminate when P1 and P24 are connected, there is a malfunction of the main PCB. d. Check LD1 (orange) on the main PCB. OK if illuminated.	Main PCB assembly 800B
3. If feeding occurs slightly and error E210 is displayed, there is a malfunction of the encoder.	a. Check that connector P18 (Y-ENC) is inserted into the main PCB and that the color matches. b. Check the encoder input while referring to "3-7. Input checking method".	Pulse motor feed assembly Main PCB assembly 800B
4. If zigzagging does not occur and error E210 is displayed, there is a malfunction of the pulse motor or cord. P22 YPM  2721B	a. Disconnect the main PCB connector P22 (YPM) and measure the resistance between pins 1-2 and 3-4 of the cord connector. OK if 2-3 ohms. b. If step a. (above) is OK, there is a malfunction of the main PCB.	Pulse motor feed assembly Main PCB assembly 800B

Error status #8 An error code is displayed during home position detection.

Probable causes	Check/ repair/ adjust	Parts to be replaced
1. If the work clamp pulse motor does not operate and "E300" is displayed, there is a malfunction of the power PCB.	Disconnect connectors P1 (POWER2) and P24 (POWER1) from the main PCB, and then turn on the power switch and check LD1 (red) on the power PCB. OK if illuminated. After checking, turn off the power switch, wait for one minute or more, and then insert P1 and P24 into the main PCB.	Power PCB assembly
2. If the work clamp pulse motor does not move and "E300" is displayed, there is a malfunction of the main PCB. P24 POWER 1  P23 PPM  2717B 2722B	a. Disconnect connector P24 (POWER1) from the main PCB, and check the continuity between terminals 1 and 2 of P24. OK if ∞ ohms. b. Disconnect connector P23 (PPM) from the main PCB, and check the continuity between terminals 1 and 2, 3 and 4 of P23. OK if ∞ ohms. c. Insert P23 and P24 into the main PCB, turn on the power switch and then check LD1 (red) on the power PCB. OK if illuminated. If LD1 is illuminated during the check in step 1 but it does not illuminate when P1 and P24 are connected, there is a malfunction of the main PCB. d. Check LD1 (orange) on the main PCB. OK if illuminated.	Main PCB assembly 800B
3. If the work clamp pulse motor moves slightly and "E300" is displayed, there is a malfunction of the encoder.	a. Check that connector P19 (P-ENC) is inserted into the main PCB and that the color matches. b. Check the encoder input while referring to "3-7. Input checking method".	Pulse motor work clamp assembly Main PCB assembly 800B
4. If the work clamp pulse motor does not move and "E300" is displayed, there is a malfunction of the pulse motor and cord. P23 PPM  2723B	a. Disconnect the main PCB connector P23 (PPM) and measure the resistance between pins 1-2 and 3-4 of the cord connector. OK if 2-3 ohms. b. If step a. (above) is OK, there is a malfunction of the main PCB.	Pulse motor work clamp assembly Main PCB assembly 800B

Error status #9 Work clamp does not rise during home position detection.		
Probable causes	Check/ repair/ adjust	Parts to be replaced
1. Incorrect work clamp home position adjustment	a. Adjust the home position while referring to "7-2. Adjusting the home position". b. Check if the work clamp is touching something else.	
2. Incorrect mechanism adjustment	Check if the work clamp mechanism, upper thread trimming mechanism and lower thread trimming mechanism are moving stiffly.	

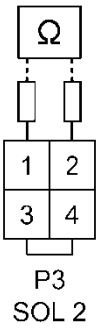
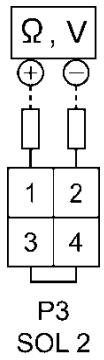
Error status #10 Work clamp does not drop during threading mode.		
Probable causes	Check/ repair/ adjust	Parts to be replaced
1. Incorrect work clamp home position adjustment	a. Adjust the home position while referring to "7-2. Adjusting the home position". b. Check if the work clamp/button clamp is touching anything.	
2. Incorrect mechanism adjustment	Check if the work clamp mechanism, upper thread trimming mechanism and lower thread trimming mechanism are moving stiffly.	

Error status #11 The THREAD indicator does not illuminate during threading mode.		
Probable causes	Check/ repair/ adjust	Parts to be replaced
Malfunction of panel PCB	Check that connector P3 (PANEL) is connected to the motor PCB, and that connector P1 (MAIN) is connected to the panel PCB.	LCD panel PCB assembly Panel harness

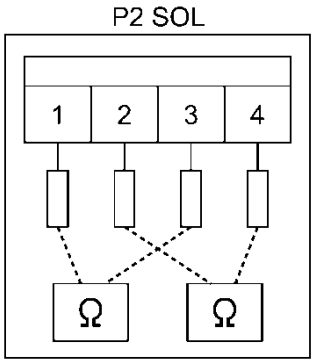
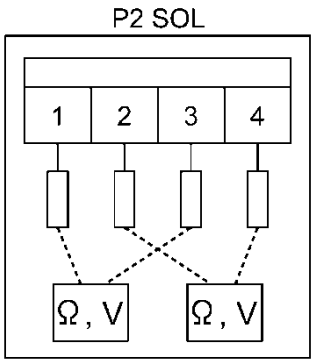
Error status #12 Zigzagging does not move slowly one stitch at a time during test feeding.		
Probable causes	Check/ repair/ adjust	Parts to be replaced
1. Malfunction of foot switch and cord	See #4.	
2. Malfunction of zigzag mechanism	See #6.	

Error status #13 The feed mechanism does not move slowly one stitch at a time during test feeding.		
Probable causes	Check/ repair/ adjust	Parts to be replaced
1. Malfunction of foot switch and cord	See #4.	
2. Malfunction of feed mechanism	See #7.	

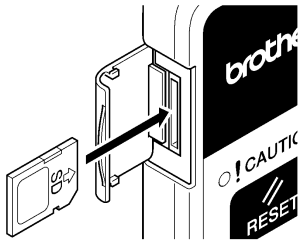
Error status #14 Feeding and zigzagging do not move continuously during test feeding.		
Probable causes	Check/ repair/ adjust	Parts to be replaced
Malfunction of foot switch and cord	See #4.	

Error status #15 Tension release does not operate during test feeding.		
Probable causes	Check/ repair/ adjust	Parts to be replaced
1. Poor connector connection	Check that main PCB connector P2 (SOL1) and P3 (SOL2) is connected.	
2. Malfunction of tension release solenoid  2727B	Disconnect main PCB connector P3 (SOL2) and measure the resistance between pins 1-2 of the cord connector. OK if 6-8 ohms.	Tension release solenoid
3. Malfunction of main PCB.  0651D	a. Turn on the power switch and check LD2 (green) on the main PCB. OK if illuminated. b. With connector P3 (SOL2) disconnected from the main PCB, check the continuity between terminals 1 and 2 of connector P3 on the main PCB. OK if ∞ ohms. c. With main PCB connector P3 (SOL2) connected, turn on the power and carry out sewing, and measure the voltage between pins 1-2 of connector P3 (SOL2). OK if there is voltage output momentarily after sewing stops.	Main PCB assembly 800B

Error status #16 Upper shaft motor does not operate during sewing.		
Probable causes	Check/ repair/ adjust	Parts to be replaced
1. If “E111”, “E130”, “E131”, “E132” or “E133” is displayed after the sewing machine operates, there is a poor connection of the synchronizer.	Check that connectors P11 (RESOLVER) and P1 (MT-ENC) of the motor PCB and connector P6 (MT-ENC) of the main PCB are inserted.	
2. If error E111, E130, E131, E132 or E133 is displayed after the sewing machine operates, there is a poor connection of the upper shaft motor.	Check the connection of the relay connector between the upper shaft motor and the motor PCB.	
3. If “E111”, “E130”, “E131”, “E132” or “E133” is displayed after the sewing machine operates, interference is causing operating errors.	Check that the ground wire is securely connected and that the sewing machine is not close to any equipment that generates strong electrical interference.	
4. If “E111”, “E130”, “E131”, “E132” or “E133” is displayed after the sewing machine operates, there is a malfunction of the motor PCB.	Refer to steps 1 to 4 in #5.	Resolver stator assembly Motor PCB assembly 800B
5. If error E111, E130, E132 or E133 is displayed after the sewing machine operates, there is a malfunction of the motor PCB or of the upper shaft motor.	If an error occurs after inspection steps 1 to 4 above have been carried out, there is a malfunction of the machine motor.	Motor 800 assembly
6. If "E121" is displayed after the sewing machine operates, there is a malfunction of a component.	1) If the area around the motor is not warm, refer to inspections 1 to 5 in #16. 2) If the area around the motor is warm, turn the pulley by hand and check that it is not stiff. If it is stiff, adjust while referring to “6-8. Upper shaft and tension pulley mechanisms”. If it is not stiff, there is a malfunction of the machine motor.	Resolver stator 800 assembly Motor PCB assembly 800B Motor 800 assembly

Error status #17 Upper shaft motor does not operate during sewing.		
Probable causes	Check/ repair/ adjust	Parts to be replaced
1. Poor connector contact	Check that connector P31 (CUTTER) is inserted into the main PCB, that connectors P1 (POWER), P2 (SOL) and P3 (MAIN) are inserted into the cutter PCB, and that connector P5 (CUTTER) is inserted into the power PCB.	
2. Malfunction of cutter solenoid  0780D	Disconnect connector P2 (SOL) from the cutter PCB, and measure the resistances between pins 1 and 3 and pins 2 and 4 of the cord-side connector. OK if 6Ω to 8Ω between 1 and 3, and 13Ω to 15Ω between 2 and 4.	Cutter solenoid assembly
3. Malfunction of cutter PCB  0781D	a. Turn off the power switch, disconnect connector P2 (SOL) from the cutter PCB, and then check the continuity between terminals 1 and 3 and terminals 2 and 4 of connector P2 on the cutter PCB. OK if ∞Ω b. Insert connector P2 (SOL) into the cutter PCB, turn on the power switch and carry out sewing, and measure the voltages between terminals 1 and 3 and terminals 2 and 4 of connector P2. OK if voltage is output momentarily at the sewing end.	Cutter PCB assembly

Error status #18 Needle bar does not stop at the needle up position (“UP” is frequently displayed after sewing)		
Probable causes	Check/ repair/ adjust	Parts to be replaced
1. Incorrect adjustment	Adjust while referring to "7-2. Adjusting the home position”.	
2. Problem with upper shaft motor operation	Refer to steps 1 to 5 in #16	Resolver stator 800 assembly Motor PCB assembly 800B Motor 800 assembly

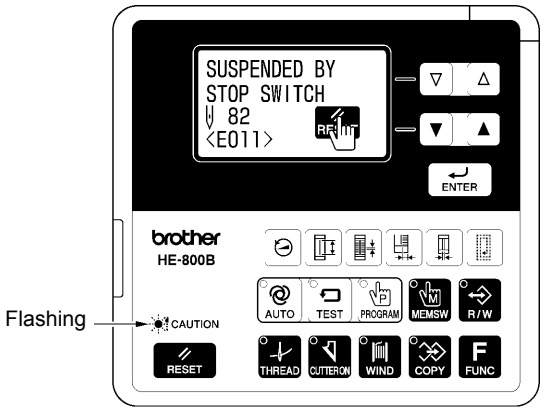
Error status #19 SD card read/write mode cannot be activated.		
Probable causes	Check/ repair/ adjust	Parts to be replaced
1. If error E422 or E425 is displayed, the SD card is inserted incorrectly.  2650B	a. Check the direction of insertion of the SD card. (Insert the card so that it matches the direction of the pattern on the card cover.) b. Check the insertion of the SD card.	
2. If “E424” is displayed, the SD card is incorrectly formatted.	Check the format of the SD card. (Carry out 16-sector formatting.)	
3. Malfunction of SD card	Use a PC to check if the contents of the SD card can be read.	
4. Malfunction of operation panel	See #12.	LCD panel PCB assembly Panel harness

10. TABLE OF ERROR CODES

⚠ DANGER

Wait at least 5 minutes after turning off the power switch and disconnecting the power cord from the wall outlet before opening the control box cover. Touching areas where high voltages are present will result in serious injury from electric shocks.

If a problem should occur with the sewing machine, the buzzer will sound and an error code and error message will appear in the display.
Follow the remedy procedure to eliminate the cause of the problem.



4933M

Switch-related errors

Code	Cause	Remedy
E010	Stop switch was pressed during standby.	Remove your finger from the stop switch (so that it is off).
E011	Stop switch was pressed during sewing.	Press the RESET key to clear the error. * Press the ▼ key to move the needle and the work clamp so that you can continue sewing. * If not continuing sewing, press the RESET key once more.
E012	Stop switch was pressed while sewing machine was operating other than during sewing.	Press the RESET key to clear the error. (Home position detection will be carried out automatically.)
E015	The stop switch was still pressed when the power was turned on, or there is a problem with the stop switch connection.	Turn off the power and check the connection of the stop switch connector P9 at the main P.C. board.
E016	Problem with the stop switch connection.	Turn off the power and check the connection of the stop switch connector P9 at the main P.C. board.
E025	Treadle was still depressed to the 2nd step when the power was turned on, or treadle connection is faulty. (Start switch if a triple pedal is being used)	Turn off the power, and then check that connector P12 on the motor P.C. board is properly connected. (Connector P15 on the main P.C. board if a triple pedal is being used)
E035	Treadle was still depressed to the 1st step when the power was turned on, or treadle connection is faulty. (Work clamp switch if a triple pedal is being used)	Turn off the power, and then check that connector P12 on the motor P.C. board is properly connected. (Connector P15 on the main P.C. board if a triple pedal is being used)
E045	Treadle was still depressed backward when the power was turned on, or treadle connection is faulty. (Work clamp lifter switch if a triple pedal is being used)	Turn off the power, and then check that connector P12 on the motor P.C. board is properly connected. (Connector P15 on the main P.C. board if a triple pedal is being used)

Code	Cause	Remedy
E050	Machine head tilting was detected immediately before the sewing machine started operating.	Turn off the power, and then return the machine head to its original position. Check that safety switch connector P14 on the main P.C. board is properly connected.
E051	Machine head tilting was detected while the sewing machine was operating.	Turn off the power, and then return the machine head to its original position. Check that safety switch connector P14 on the main P.C. board is properly connected.
E055	Machine head tilting was detected when the power was turned on.	Turn off the power, and then return the machine head to its original position. Check that safety switch connector P14 on the main P.C. board is properly connected.
E065	An operation panel key was still being pressed when the power was turned on, or key is faulty.	Turn off the power and check the operation panel.

Upper shaft motor-related errors

Code	Cause	Remedy
E110	Pulley is not in needle up stop position during standby when work clamp is lowered.	Turn off the power, and then open the slide cover. Align the mark (A) on the pulley within the edges of the mark (B) on the motor cover.
E111	The sewing machine could not stop correctly at the needle up stop position after sewing.	Turn off the power, and then check that there are no problems with the cutter mechanism, the thread trimming mechanism and the upper shaft motor mechanism.
E112	The needle bar dropped during home position detection or while the SD card was being accessed.	Turn off the power, and then turn it back on again. * If this error occurs when the work clamp is not lowered, the work clamp will drop automatically in order to prevent interference between the needle and the lower thread retainer.
E113	Pulley is not in needle up stop position during standby when work clamp is not lowered.	Turn off the power, and then open the slide cover. Align the mark (A) on the pulley within the edges of the mark (B) on the motor cover. (Refer to the diagram for “E110” above.) * If this error occurs, the work clamp will drop automatically in order to prevent interference between the needle and the lower thread retainer.
E130	Upper shaft motor stopped due to a problem, or synchronizer is faulty.	Turn off the power, and then open the slide cover. Turn the pulley to check if the machine has locked up. Check that the upper shaft motor 4-pin (UVW) connector and synchronizer connector P11 on the motor P.C. board are properly connected.
E131	Synchronizer is not connected correctly.	Turn off the power, and then check that synchronizer connector P11 on the motor P.C. board is properly connected.

Code	Cause	Remedy
E132	Problem detected with upper shaft motor operation.	Turn off the power, and then check that synchronizer connector P11 on the motor P.C. board is properly connected.
E133	Upper shaft motor stopping position is incorrect. (During automatic needle lifting)	Turn off the power, and then check that synchronizer connector P11 on the motor P.C. board is properly connected.
E150	Upper shaft motor is overheating, or temperature sensor is faulty.	Turn off the power, and then check the upper shaft motor.

Feed mechanism-related errors

Code	Cause	Remedy
E200	Needle zigzag motor home position cannot be detected. Needle zigzag motor, needle zigzag sensor or needle zigzag encoder signal is not connected correctly.	Turn off the power, and then check that the needle zigzag sensor and needle zigzag encoder connector P17 and the needle zigzag motor connector P21 on the main P.C. board are properly connected.
E201	Needle zigzag motor stopped due to a problem.	Turn off the power, and then check if there are any problems in the needle zigzag direction.
E210	Feed motor home position cannot be detected. Feed motor, feed sensor or feed encoder signal is not connected correctly.	Turn off the power, and then check that the feed sensor connector P8, feed encoder connector P18 and feed motor connector P22 on the main P.C. board are properly connected.
E211	Feed motor stopped due to a problem.	Turn off the power, and then check if there are any problems in the feed direction.

Work clamp-related errors

Code	Cause	Remedy
E300	Work clamp motor home position cannot be detected. Work clamp motor, work clamp sensor or work clamp encoder signal is not connected correctly.	Turn off the power, and then check that the work clamp sensor and work clamp encoder connector P19 and the work clamp motor connector P23 on the main P.C. board are properly connected.
E301	Work clamp motor stopped due to a problem.	Turn off the power, and then move the work clamp up and down and check that it moves smoothly.

Communication and memory-related errors

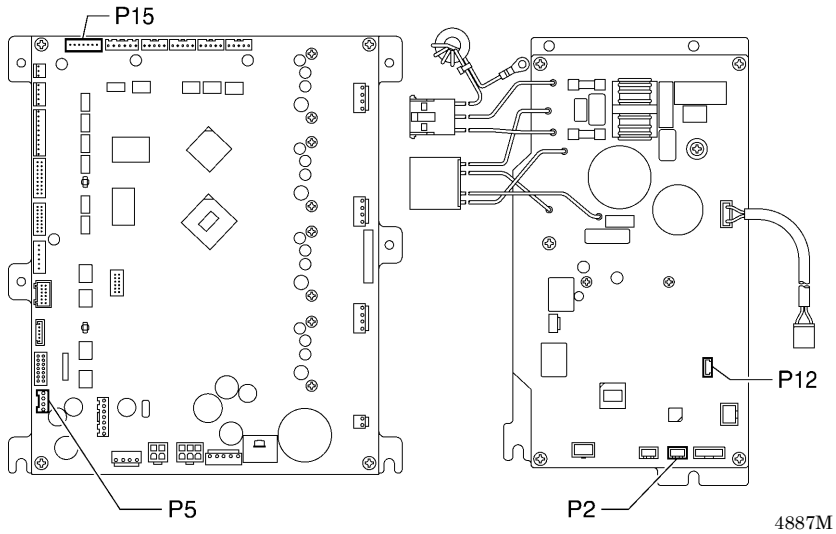
Code	Cause	Remedy
E401	Communication error detected between the main P.C. board and the motor P.C. board when the power was turned on.	Turn off the power, and then check that connector P5 on the main P.C. board and connector P2 on the motor P.C. board are properly connected.
E410	Communication error detected between the main P.C. board and the panel P.C. board.	Turn off the power, and then check that connector P4 on the panel P.C. board and operation panel connector P3 on the motor P.C. board are properly connected.
E411	Communication error detected between the main P.C. board and the motor P.C. board.	Turn off the power, and then check that connector P5 on the main P.C. board and connector P2 on the motor P.C. board are properly connected.
E422	An error occurred while reading from the SD card.	Press the RESET key to clear the error. Check the data on the SD card.
E424	Insufficient free space on the SD card.	Press the RESET key to clear the error. Use a different SD card.
E425	An error occurred while writing to the SD card.	Press the RESET key to clear the error. Check if the media is write-protected and if it has enough free space.
E430	Problem with flash memory on main P.C. board.	Turn the power off and then back on again.
E440	Problem with EEPROM on main P.C. board.	Turn the power off and then back on again.
E450	Model selection cannot be read from the machine head memory.	Turn off the power, and then check that the correct machine head memory is connected. Check that the machine head memory connector P16 on the main P.C. board is properly connected.
E452	Machine head memory is not connected.	Turn off the power, and then check that machine head memory connector P16 on the main P.C. board is properly connected.
E453	Problem with machine head memory.	Turn the power off and then back on again.

[P.C. board and connector positions]

<Control box>

Main P.C. board

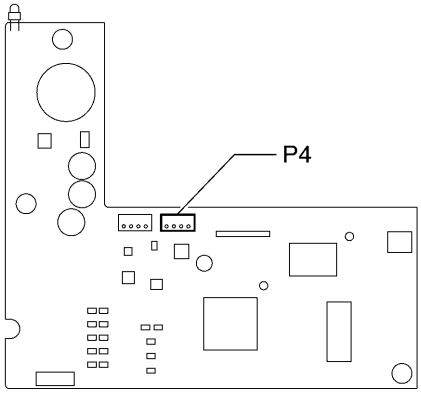
Motor P.C. board



4887M

<Operation panel>

Panel P.C. board



4888M

Software-related errors

Code	Cause	Remedy
E512	Maximum number of stitches for a single program (999 stitches) exceeded.	When the power is turned off and then back on, the zigzag pitch will be set automatically to x1.5 in order to reduce the number of stitches.
E582	Error in memory switch version detected.	Turn off the power and carry out level 2 initialization.
E583	Error in parameter data version detected.	Turn off the power and carry out level 1 initialization.

Device-related errors

Code	Cause	Remedy
E600	Upper thread breakage occurred.	Thread the upper thread, and then press the RESET key to clear the error. * Press the ▼ key to move the needle and the work clamp so that you can continue sewing. * If not continuing sewing, press the RESET key once more.
E650	Cutter is not at home position. (Cutter is lowered.)	Turn off the power, and then check if there are any problems with the cutter mechanism. Check that cutter solenoid connector P2 on the cutter P.C. board is properly connected.
E651	Cutter has not operated. (Does not drop.)	Turn off the power, and then check that cutter sensor connector P7 on the main P.C. board and cutter solenoid connector P2 on the cutter P.C. board are properly connected.

P.C. board-related errors

Code	Cause	Remedy
E700	Abnormal rise in power supply voltage.	Turn off the power and check the input voltage.
E701	Abnormal rise in upper shaft motor drive voltage.	Turn off the power, and then check the voltage.
E705	Abnormal drop in power supply voltage.	Turn off the power and check the input voltage.
E710	Abnormal current detected in upper shaft motor.	Turn off the power, and then check if there are any problems with the upper shaft motor.
E711	Abnormal current detected in pulse motor.	Turn off the power, and then check if there are any problems with the pulse motor.

Version updating errors

Code	Cause	Remedy
E870	No control program for the operation panel is present.	Load the control program for the operation panel from the SD card.
E880	Version update requests cannot be received.	Turn off the power, and then check that there are no problems with the wiring and the P.C. boards inside the control box.
E881	Communication error was detected during version update.	Turn off the power, and then repeat the version update procedure. If the error continues to occur, turn off the power, and then check that there are no problems with the wiring and the P.C. boards inside the control box.
E883	No control program is present on the SD card.	Check that the control program has been saved into the correct folder.
E884	There is a problem with the control program.	Write the correct file onto the SD card.
E885	Writing of the control program cannot begin.	Turn off the power, and then check that there are no problems with the wiring and the P.C. boards inside the control box which are to have their firmware versions updated.
E886	Data error occurred during writing of the control program.	Turn off the power, and then check that there are no problems with the wiring and the P.C. boards inside the control box which are to have their firmware versions updated.
E887	Error occurred during writing of the control program.	Turn off the power, and then check that there are no problems with the wiring and the P.C. boards inside the control box which are to have their firmware versions updated.

If an error code that is not listed above appears or if carrying out the specified remedy does not solve the problem, contact the place of purchase.

11. TROUBLESHOOTING

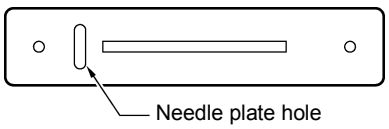
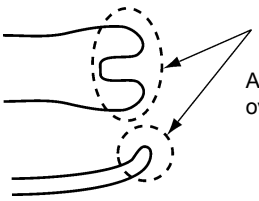
- Please check the following points before calling for repairs or service.
- If the following remedies do not fix the problem, turn off the power switch and consult a qualified technician or the place of purchase.

⚠ CAUTION

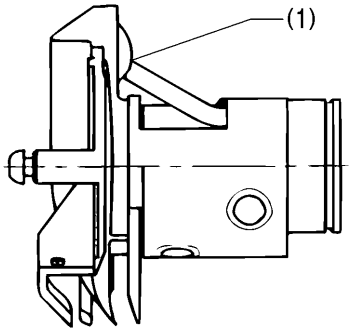
Turn off the power switch and disconnect the power cord before carrying out troubleshooting, otherwise the machine may operate if the treadle is depressed by mistake, which could result in injury.

11-1. Upper thread breakage

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Needle	Needle facing	As viewed from the direction of the face plate, attach the needle so that the groove of the needle faces frontward.	91
	Needle installation height	Insert the end of the needle shank so that it touches the top edge of the needle hole of the needle bar.	–
	Bent needle	Replace needle.	–
	Blunt needle tip or burr	Replace needle.	–
	Needle and thread	Replace needle that fits the thread.	–
Threading	Upper thread threading	Thread the upper thread correctly.	INSTRUCTION MANUAL CD
	Lower thread threading	Thread the lower thread correctly.	INSTRUCTION MANUAL CD
Thread path	Flaw or abrasion on the thread path	Polish with buff or replace the part. Especially, pay attention to finishing around needle plate hole.  3996Q	–
	Flaw on the rotary hook tip and rotary hook edge	Polish with buff or replace the part.	–
	Flaw on the rotary hook holder	Polish with buff or replace the part.  3997Q	91
Thread tension	Zigzag thread upper thread tension	Adjust the upper thread tension appropriately.	INSTRUCTION MANUAL CD
	Bar tack thread upper thread tension	Adjust the upper thread tension while checking stitches. (The stitches on top are the upper thread and the stitches underneath are the bobbin thread.)	INSTRUCTION MANUAL CD
Thread take-up spring	Thread take-up spring tension and height	Loosen the thread take-up spring tension or lower the height to such a degree that does not cause double hooking. Adjust it while checking bar tacking stitches.	INSTRUCTION MANUAL CD

(Continued on next page)

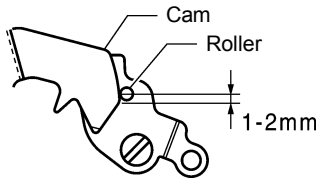
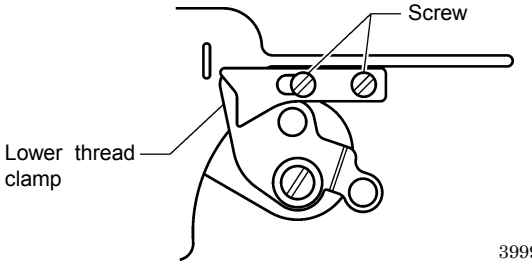
Cause	Check	Remedy	Page
Rotary hook	Needle bar height and needle bar lift amount (The gauge is an option part.)	1. Adjust the needle bar height to “1” on the gauge. 2. Adjust the needle and rotary hook timing to “2” on the gauge.	88 89
	Gap between the needle and the tip of the rotary hook	Adjust the gap between the needle and the rotary hook tip to 0.01 - 0.08 mm. (Adjust to as large as possible without causing skipped stitches to occur.) * Move the needle bar to the left and right with your finger, and check that the tip of the rotary hook does not strike the needle.	91
	Rotary hook lubrication	・Too small quantity of lubrication oil will cause thread breakage. Adjust the quantity of lubrication oil. ・The lubrication holes (1) between rotary hook and rotary hook joint do not match up.  4894M	109 81
	Thread twisted around rotary hook	Remove any twisted thread from the inner and rotary hook.	–
Upper thread amount	Arm thread guide position	Adjust the arm thread guide position.	INSTRUCTION MANUAL CD
Bobbin case	Damaged outside of bobbin case and bent bobbin holder spring, etc.	Polish with buff or replace the part. * Use the HE-800B bobbin case.	–

11-2. Skipped stitches

Items with a “*” in the “Page” column should only be handled by a qualified technician.

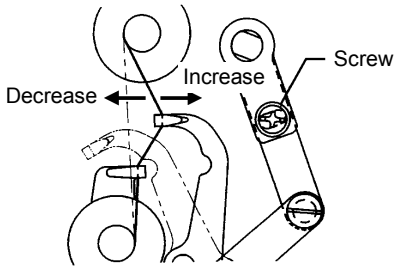
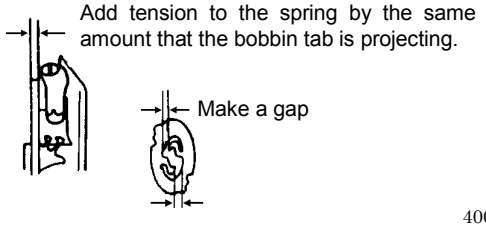
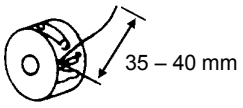
Cause	Check	Remedy	Page
Needle	Needle facing	As viewed from the direction of the face plate, attach needle so that the groove of the needle faces frontward.	91
	Needle installation height	Insert the end of the needle shank so that it touches the top edge of the needle hole of the needle bar.	–
	Bent needle	Replace needle.	–
	Blunt needle tip or burr	Replace needle.	–
	Thin needle	Use a needle with a count that matches the thread and material.	–
Thread take-up spring	Thread take-up spring tension and height	Loosen the thread take-up spring tension or lower the height to such a degree that does not cause double hooking. Adjust it while checking bar tacking stitches.	INSTRUCTION MANUAL CD

(Continued on next page)

Cause	Check	Remedy	Page
Work clamp	Work clamp pressure	Increase work clamp pressure. * The standard height of the adjustment screw is approximately 30 mm, so tighten it further than this.	91
	Relation between work clamp assembly and sewing length	・Replace work clamp assembly that fits for sewing length. ・When using knits or woven materials, replace the parts with the -3 specification parts: Length feed plate (for specification -3), work clamp assembly (for knits), needle plate 1.2 (for specification -3)	–
Rotary hook	Blunt rotary hook tip	Polish with buff or replace the part.	–
	Needle bar height and needle bar lift amount (The gauge is an option part.)	1. Adjust the needle bar height to “1” on the gauge. 2. Adjust the needle and rotary hook timing to “2” on the gauge.	89
	Gap between the needle and the tip of the rotary hook	Adjust the gap between the needle and the rotary hook tip to 0.01 - 0.08 mm. (Adjust to as large as possible without causing skipped stitches to occur.) * Move the needle bar to the left and right with your finger, and check that the tip of the rotary hook does not strike the needle.	91
Thread tension	Zigzag thread upper thread tension	Adjust the upper thread tension appropriately.	INSTRUCTION MANUAL CD
Needle bar play	Vertical and longitudinal needle bar play	Reduce the needle bar play, or replace the parts.	–
Lower thread clamp	Lower thread retainer cam	Lower thread retainer cam should be sitting firmly on lower thread clamp plate roller.  3998Q	104
	Thread scraps and dust blocking area around lower thread clamp and lower thread presser	Clean around the lower thread presser.	–
	Lower thread clamping force	・If the lower thread clamp and lower thread presser are bent, replace them. ・Check that the screws are tightened.  3999Q	–
Needle plate	Relation between material and needle plate	・When using knit material, replace with the -3 needle plate. ・Replace with a needle plate with a smaller needle hole.	–
Joint sewing	Angle of work clamp means that material is not being clamped.	・Replace with short work clamp that matches the sewing length. ・Use the accessory auxiliary sheet. ・Process the work clamp assembly to match the joint section. (Attach or remove rubber.)	– 100 –

11-3. Uneven seams (1) …… At the sewing start

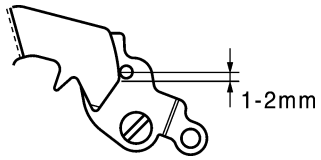
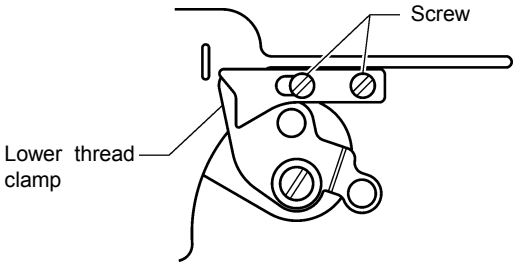
Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Upper thread trimmer	Installation height	Adjust the upper thread trimmer installation height.	100
	Upper thread trimmer opening timing	Adjust to an appropriate opening timing.	101
	Upper thread trimmer operation	Apply grease to the inclined face of the opening cam.	101
Upper thread feeding	Thread take-up amount	Loosen the screw to decrease thread take-up amount so that upper thread does not pull out of trimmer assembly at the sewing start.  4000Q	109
Lower thread (bobbin slip)	Lower thread tension	Adjust the lower thread tension appropriately.	INSTRUCTION MANUAL CD
	Bobbin holder spring	Add tension to the bobbin holder spring.  4001Q	–
	Lower thread retainer position	Adjust the lower thread retainer position. * Adjust lower thread retainer so that a 35 - 40 mm thread leader is left after trimming.  4002Q	104
	Bobbin presser position	Adjust the bobbin presser position.	106
	Bobbin insertion	Insert the bobbin correctly.	INSTRUCTION MANUAL CD

11-4. Uneven seams (2) …… Lower thread is lifted up at the sewing start

The end of the lower thread protrudes above the seam at the sewing start

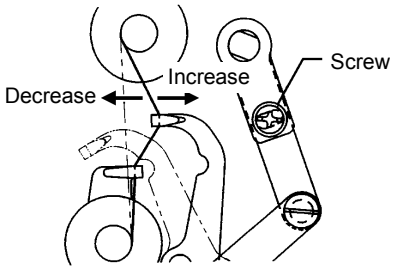
Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Lower thread retainer	Lower thread retaining amount	Adjust the lower thread retaining amount.  4003Q	104
Lower thread clamp	Lower thread clamp opening timing	Adjust so that the lower thread clamp plate opens when the feed mechanism moves 6 - 7 mm.	105
	Lower thread clamping force	・If the lower thread clamp and lower thread presser are bent, replace them. ・Check that the screws are tightened.  3999Q	–

11-5. Uneven seams (3) ……Seam lifts up at the sewing start

Seam lifts up and does not tighten at the sewing start

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Upper thread trimmer	Upper thread trimmer gradual opening timing	Adjust the timing so that the upper thread trimmer gradually start opening when the feed mechanism moves about 1.5 - 2.5 mm.	101
	Upper thread trimmer operation	Apply grease to the inclined face of the opening cam.	101
Upper thread feeding	Thread take-up amount	Loosen the screw to decrease thread take-up amount so that upper thread does not pull out of trimmer assembly at the sewing start.  4000Q	109

11-6. Uneven seams (4) …… Uneven sewing pitch at the sewing start

Bird's nests form at the sewing start, and after 5 - 6 mm the sewing pitch suddenly increases

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Lower thread clamp	Lower thread clamp opening timing	Advance the timing at which the lower thread clamp starts to open.	105

11-7. Uneven seams (5)……Poor rounding of seam

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Thread tension	Zigzag thread upper thread tension	Adjust the upper thread tension appropriately.	INSTRUCTION MANUAL CD
	Zigzag tension disc opening	・Check the opening of the zigzag tension discs. ・Replace the tension release solenoid.	108
	Lower thread tension	Adjust the lower thread tension appropriately.	INSTRUCTION MANUAL CD
Threading	Upper thread threading	Thread the upper thread correctly.	INSTRUCTION MANUAL CD
	Lower thread threading	Thread the lower thread correctly.	INSTRUCTION MANUAL CD
Stitch patterns	Purl stitch, whip stitch	Set using parameter number 53.	INSTRUCTION MANUAL CD
Tension release	Tension release timing	Use parameter numbers 54 to 57 to set the timing for changing the thread tension.	INSTRUCTION MANUAL CD

11-8. Uneven seams (6) …… Around rear tack or front tack

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Tension release	Tension release timing	Use parameter numbers 54 to 57 to set the timing for changing the thread tension.	INSTRUCTION MANUAL CD
Threading	Upper thread threading	Thread the upper thread correctly.	INSTRUCTION MANUAL CD
	Lower thread threading	Thread the lower thread correctly.	INSTRUCTION MANUAL CD
Zigzag thread tension	Zigzag tension disc opening	・Adjust the tension disc opening amount. ・Check the opening of the zigzag tension discs. ・Replace the tension release solenoid.	108
Upper thread trimmer	Upper thread trimmer operation	Apply grease to the inclined face of the opening cam.	101

11-9. Uneven seams (7) …… Loose thread end at end backtack

Cause	Check	Remedy	Page
Backtack shape	Checking the number of end backtack stitches Checking the end backtack width	Adjust the setting values for parameter numbers 51 and 52.	INSTRUCTION MANUAL CD

11-10. Uneven seams (8) …… Thread sticking out at end backtack

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Backtack shape	Checking the number of end backtack stitches Checking the end backtack width	Adjust the setting values for parameter numbers 51 and 52.	INSTRUCTION MANUAL CD
Uneven material feeding	Work clamp pressure	Increase work clamp pressure. * The standard height of the adjustment screw is approximately 30 mm, so tighten it further than this.	91
	Work clamp	When using knit material, replace with the -3 work clamp and needle plate.	–
	Upper thread trimmer opening timing	Adjust to an appropriate opening timing.	101
	Upper thread trimmer operation	Apply grease to the inclined face of the opening cam.	101
	Lower thread clamp opening timing	Adjust so that the lower thread clamp plate opens when the feed mechanism moves 6 - 7 mm.	105

11-11. Uneven seams (9) …… Sticking in needle plate

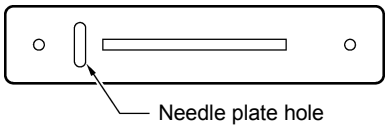
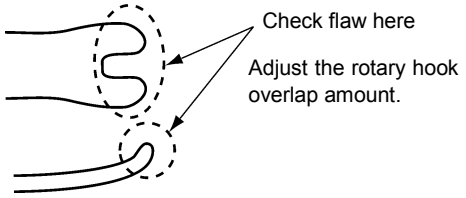
Front and rear tack sections of material gets stuck in needle hole

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Start backtack	Number of start backtack stitches	Use parameter number 38 to reduce the number of stitches in the front tack. * If the material is soft, it can be effective to set the number of stitches to 0.	INSTRUCTION MANUAL CD
Rear tack	Rear tack vector shape	Use parameter number 31 to set the rear tack vector shape to a rectangle. * Setting the vector shape to a rectangle can be effective when the width is less than the bar tack width.	INSTRUCTION MANUAL CD
Needle plate	Needle plate	・When using knit material, replace with the -3 needle plate. ・Replace with a needle plate with a smaller needle hole.	–

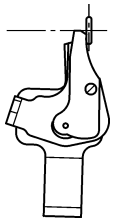
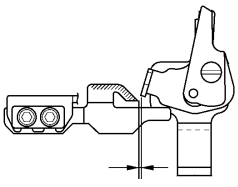
11-12. Uneven seams (10) …… All stitches

Items with a "*" in the "Page" column should only be handled by a qualified technician.

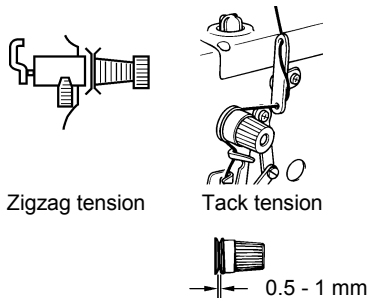
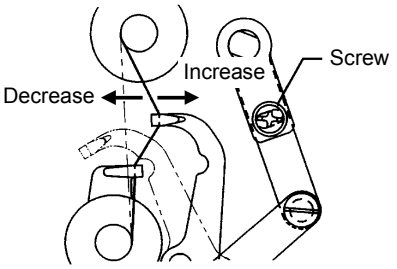
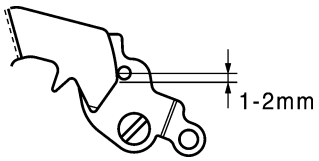
Cause	Check	Remedy	Page
Threading	Upper thread threading	Thread the upper thread correctly.	INSTRUCTION MANUAL CD
	Lower thread threading	Thread the lower thread correctly.	INSTRUCTION MANUAL CD
Thread path	Flaw or abrasion on the thread path	Polish with buff or replace the part. Especially, pay attention to finishing around needle plate hole.  3996Q	–
Needle	Needle installation	Insert needle fully into needle bar.	INSTRUCTION MANUAL CD
	Needle size	Replace needle with thicker one.	–
Thread chips or dust	Rotary hook rim Rotary hook edge Around needle plate hole	Remove thread chips or dust.	–
Upper thread	Upper thread tension	Increase upper thread tension while checking stitches.	INSTRUCTION MANUAL CD
	Thread and needle	Replace needle with one that fits for the thread.	–
Rotary hook holder	Flaw on the rotary hook holder	Polish with buff or replace the part.  3997Q	91
	Rotary hook holder and inner rotary hook overlap amount	Adjust the rotary hook holder and inner rotary hook overlap amount.	91
Rotary hook	Rotary hook lubrication	Decrease the quantity of lubrication oil. * Note that if you reduce the amount of oil too much, thread breakages may occur.	109
Bobbin winder tension bracket	Bobbin thread tension	Use the tension nut to adjust the lower thread winding tension.	–
	Uneven bobbin winding	Move bobbin winder tension bracket up and down to adjust.	INSTRUCTION MANUAL CD
Lower thread	Lower thread tension	Adjust the lower thread tension.	INSTRUCTION MANUAL CD
Bobbin case	Damaged outside of bobbin case and bent bobbin holder spring, etc.	Polish with buff or replace the part. * Use the HE-800B bobbin case.	–
Stitch patterns	Purl stitch, whip stitch	Set using parameter number 53.	INSTRUCTION MANUAL CD

11-13. Upper thread run out

Items with a "*" in the "Page" column should only be handled by a qualified technician.

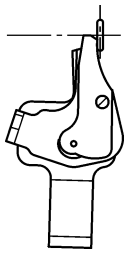
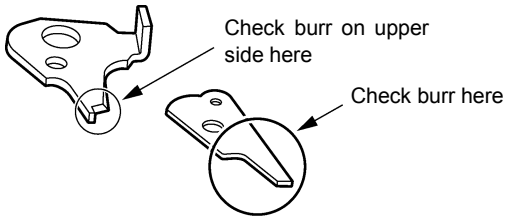
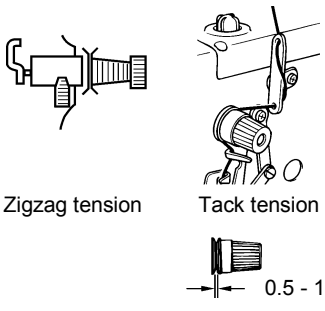
Cause	Check	Remedy	Page
Upper thread trimmer assembly	Installation position of upper thread trimmer assembly	Adjust the installation position of upper thread trimmer assembly by moving the setting plate assembly. ・Upper thread trimmer longitudinal position adjustment ・Upper thread trimmer cutting depth adjustment  4005Q	98, 99
	Upper thread trimmer assembly holding force	Adjust so that the thread does not come out when you cut it with trimmer and hold the end of the thread between your fingers and gently swing the assembly. ・Bend the trimmer U or replace them so that the correct force is applied. ・Repair any damage from striking the needle.  Cotton yarn #60 Holding force approx. 2N 4006Q	–
	Opening cam position	Adjust the position so that the trimmer does not touch the opening cam when the work clamp is lowered.  Approx. 0.5 mm 4107M	101

(Continued on next page)

Cause	Check	Remedy	Page
Tension release timing	End of tension release at the beginning of sewing	Use parameter number 54 to retard the timing for changing the thread tension (increase the setting value).	INSTRUCTION MANUAL CD
	Opening amount of zigzag tension discs and bar tack tension discs	・Adjust the zigzag tension discs by moving the tension stud bracket in and out. ・Adjust the bar tack tension discs opening amount to 0.5 - 1.0 mm by removing the top cover and moving the tension release cam.  4008Q	108
Upper thread feeding	Thread take-up amount	Loosen the screw to decrease thread take-up amount so that upper thread does not pull out of trimmer assembly at the sewing start.  4000Q	109
Rotary hook	Needle bar height and needle bar lift amount (The gauge is an option part.)	1. Adjust the needle bar height to “1” on the gauge. 2. Adjust the needle and rotary hook timing to “2” on the gauge.	88 89
	Thread chips on rotary hook edge	Remove thread chips.	–
Lower thread	Lower thread retaining amount	Adjust the lower thread retaining amount.  4003Q	104
	Lower thread snapping	Adjust the positions of the lower thread retainer, lower thread clamp and lower thread presser plate so that they do not snap the lower thread.	INSTRUCTION MANUAL CD
	Lower thread clamp opening timing	Adjust so that the lower thread clamp plate opens when the feed mechanism moves 6 - 7 mm.	105
Sewing start speed	Slow start	Use parameter numbers 10 to 13 to set the number of stitches and the speed for slow starting.	INSTRUCTION MANUAL CD
Bar tack thread tension	Bar tack thread tension is too strong.	Make the bar tack tension as weak as possible.	INSTRUCTION MANUAL CD

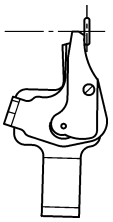
11-14. Unraveling of thread trimmed by upper thread trimmer assembly

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Upper thread trimmer assembly	Installation position of upper thread trimmer assembly	Adjust the installation position of upper thread trimmer assembly by moving the setting plate assembly. ・Upper thread trimmer longitudinal position adjustment ・Upper thread trimmer cutting depth adjustment  4005Q	98, 99
	Burr on tips of upper thread trimmer M and upper thread trimmer U.	Polish with buff or replace the part.  4009Q	–
Tension release timing	Opening amount of zigzag tension discs and bar tack tension discs (particularly zigzag tension discs)	・Adjust the zigzag tension discs by moving the tension stud bracket in and out. ・Adjust the bar tack tension discs opening amount to 0.5 - 1.0 mm by removing the top cover and moving the tension release cam.  4008Q	108

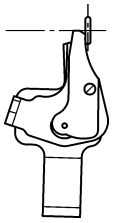
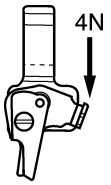
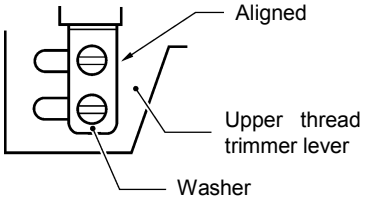
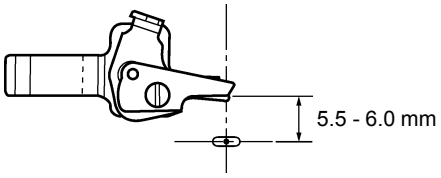
11-15. Upper thread miss-trimming

Items with a "*" in the "Page" column should only be handled by a qualified technician.

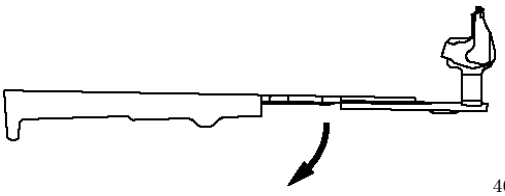
Cause	Check	Remedy	Page
Upper thread trimmer assembly	Installation position of upper thread trimmer assembly	Adjust the installation position of upper thread trimmer assembly by moving the setting plate assembly. ・Upper thread trimmer longitudinal position adjustment ・Upper thread trimmer cutting depth adjustment  4005Q	98, 99
	Upper thread trimmer assembly holding force	Adjust so that the thread does not come out when you cut it with trimmer and hold the end of the thread between your fingers and gently swing the assembly. ・Bend the trimmer U or replace them so that the correct force is applied. ・Repair any damage from striking the needle.  Cotton yarn #60 Holding force approx. 2N 4006Q	–
Trimmer driving arm	Upper thread trimmer cutting depth	Adjust the position of the trimmer driving arm roller.	99

11-16. Needle strikes upper thread trimmer

Items with a "*" in the "Page" column should only be handled by a qualified technician.

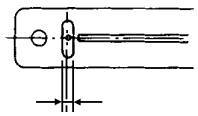
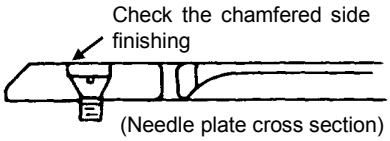
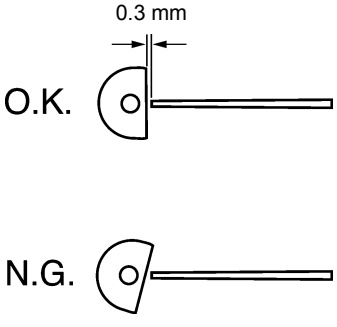
Cause	Check	Remedy	Page
Upper thread trimmer assembly	Installation position of upper thread trimmer assembly	Adjust the installation position of upper thread trimmer assembly by moving the setting plate assembly. ・Upper thread trimmer longitudinal position adjustment ・Upper thread trimmer cutting depth adjustment  4005Q	98, 99
	Upper thread trimmer operating force	Remove any scratches and burrs, and adjust the upper thread trimmer M to open when the projection is pressed with a force of 4N or less.  4010Q	–
Longitudinal feed arm	Installation position of the longitudinal feed arm	Move the upper thread trimmer driving link so that it stops at the face plate. In this position, tighten the bolts so that the small slot in the upper thread trimmer lever and the edge of the washer are aligned.  4011Q	97
Cam	Upper thread trimmer opening timing	Adjust so that the cam opens the stop plate properly.	102
Opening cam	Upper thread trimmer gradual opening timing	Adjust the timing so that the upper thread trimmer gradually start opening when the feed mechanism moves about 1.5 - 2.5 mm.	101
	Upper thread trimmer operation	Apply grease to the inclined face of the opening cam.	101
Work clamp home position	Work clamp home position position	After the home position has been detected, press the THREAD key to lower the work clamp, and then adjust the distance between the upper thread trimmer and the center of the needle to 5.5 - 6.0 mm.  4012Q	–

(Continued on next page)

Cause	Check	Remedy	Page
Upper thread trimmer lever	Upper thread trimmer lever operating force	Adjust so that the upper thread trimmer lever opens gently when the stop plate is separated from the stopper.  4013Q	–

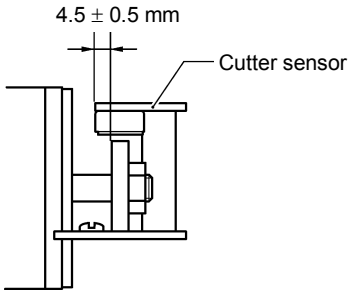
11-17. Needle breakage

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Needle	Needle installation	As viewed from the direction of the face plate, attach the needle so that the groove of the needle faces frontward.	91
Rotary hook	Needle bar height and needle bar lift amount (The gauge is an option part.)	1. Adjust the needle bar height to "1" on the gauge. 2. Adjust the needle and rotary hook timing to "2" on the gauge.	– 89
	Gap between the needle and the tip of the rotary hook	Adjust the gap between the needle and the rotary hook tip to 0.01 - 0.08 mm. (Adjust to as large as possible without causing skipped stitches to occur.) * Move the needle bar to the left and right with your finger, and check that the tip of the rotary hook does not strike the needle.	91
Needle plate	Needle plate position	Adjust the forward/back position of the needle plate so that the needle is in the center of the needle hole.  Bisect 4014Q	–
	Burr on the screw hole edge (in event of uneven material feeding)	Polish with buff.  Check the chamfered side finishing (Needle plate cross section) 4015Q	–
Upper thread trimmer assembly	Needle strikes upper thread trimmer	Refer to "11-16. Needle strikes upper thread trimmer".	160, 161
Cutter	Clearance between needle bar and cutter	Install the cutter so that the clearance between the needle bar and the cutter is 0.3 mm. * The cutter release section of the needle bar should be at a right angle to the cutter.  0.3 mm O.K. N.G. 4016Q	88

11-18. Imperfect cutter function (imperfect material cutting)

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Cutter	Installation position of cutter	Install the cutter so that its edge is aligned with the top of the needle plate.	95
	Cutter blade	・If blade is worn or chipped, sharpen it or replace it. ・Replace with the special needle plate (optional).	INSTRUCTION MANUAL CD
	Damage to cutter mechanism parts Loose screws	・Replace any parts that are damaged. ・Tighten any loose screws.	–
Cutter solenoid	Check for a disconnected cord.	Check that cutter sensor connector P7 on the main P.C. board and cutter solenoid connector P2 on the cutter P.C. board are properly connected.	INSTRUCTION MANUAL CD
Solenoid stopper	Nut	Check if the nut is loose, and tighten it securely.	–
	Cutter sensor position	・Adjust the cutter sensor position. ・Check if the mounting screws are loose, and tighten them securely.  4017Q	66
Cutter bar guide	Smoothness of cutter operation	Adjust the cutter bar guide so that the cutter operates smoothly with no play.	64

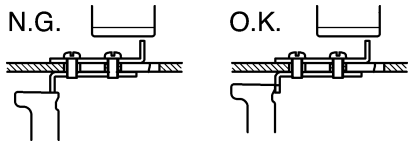
11-19. Cutter does not return

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Cutter	Cutter blade	If blade is worn or chipped, sharpen it or replace it.	–
Sticks in material	Needle plate	Replace with the special needle plate (optional).	INSTRUCTION MANUAL CD
Cutter bar guide	Smoothness of cutter operation	Adjust the cutter bar guide so that the cutter operates smoothly with no play.	64

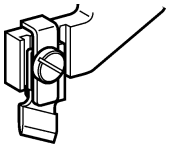
11-20. Cutter and upper thread trimmer touch

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Upper thread trimmer	Check if the cam opens the stop plate.	Adjust the cam position. * If the feed mechanism operates when the cam has not opened the stop plate, the cutter will bump against the upper thread trimmer.  4018Q	102

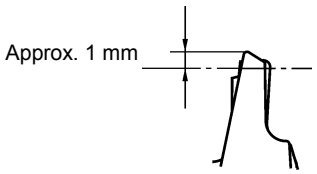
11-21. Seam is cut

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Setting the length of the hole	Length of the hole	Set parameter number 02 to the same value as the length of the cutter being used.	INSTRUCTION MANUAL CD
Setting the cutter spacing	Cutting of zigzag seam	・Use parameter number 04 to set the cutter X space. ・Use parameter number 03 to set the correction of the cutter X position.	INSTRUCTION MANUAL CD
Cutter	Cutter play	Adjust the cutter bar guide so that the cutter operates smoothly with no play.	64
	Cutter knife bending	Use the cutter holder (option) to prevent the cutter knife from becoming bent.  4019Q	95

11-22. Upper thread miss-winding

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Upper thread trimmer	Installation height	Adjust the upper thread trimmer installation height.	100
	Upper thread trimmer gradual opening timing	Adjust the timing so that the upper thread trimmer gradually start opening when the feed mechanism moves about 1.5 - 2.5 mm.	101
	Upper thread trimmer opening timing	Adjust so that the cam opens the stop plate properly.	102
	Upper thread trimmer assembly movement	・Polish blade of upper thread trimmer M and upper thread guide with buffer. ・Check for burrs on the top surface of upper thread trimmer M. ・Replace the parts.	–
	Lateral position of upper thread trimmer	Adjust the lateral position of the upper thread trimmer. 	98
Stitch quality	Upper thread tension	Decrease tension to such a degree that it does not influence stitch quality.	INSTRUCTION MANUAL CD
	Zigzag width in the zigzag stitch portion	Use parameter number 08 to increase the zigzag width to such a degree that it does not influence the seam shape.	INSTRUCTION MANUAL CD
Work clamp	Uneven material feeding	・Increase work clamp pressure. (Press material so that the material is properly stretched.) ・When using knits or woven materials, replace the parts with the -3 specification parts: Length feed plate (for specification -3), work clamp assembly (for knits), needle plate 1.2 (for specification -3)	–
Underlay	Underlay is being sewn.	・Use parameter number 47 to reduce the underlay feed pitch to about 0.5. ・Use parameter number 14 to reduce the underlay sewing speed. * If sewing knitted wear, problems may easily occur with the insertion of the upper thread, so you may need to process the end of the thread.	INSTRUCTION MANUAL CD
Bar tack	Straight bar tacking is being carried out	When carrying out straight bar tacking, problems may easily occur with the insertion of the upper thread, so you will need to process the end of the thread.	–

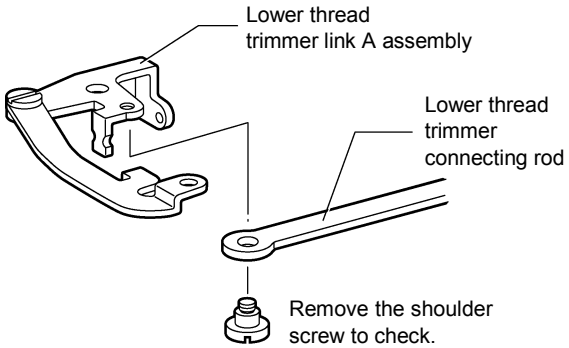
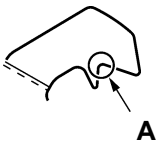
11-23. Work clamp is not raised (1) ……Error does not occur.

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Work clamp lifting height	Check the work clamp lifting height setting	Change the settings of memory switch Nos. 001, 002, 003, 004.	INSTRUCTION MANUAL CD
Work clamp motor	Cord connection	Check if there are any problems with the connection and contacts of work clamp motor connector P23 on the main P.C. board.	INSTRUCTION MANUAL CD
	Work clamp motor drive gear	Check if the drive gear screw is loose.	59

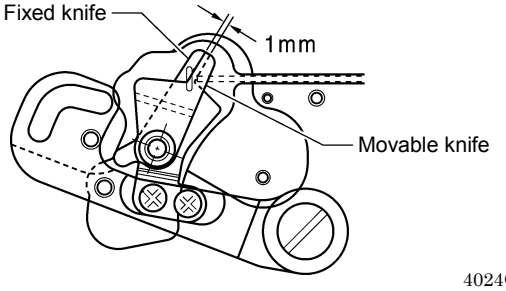
11-24. Work clamp is not raised (2) ……Error occurs.

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Upper thread trimmer	Interference between upper thread trimmer and work clamp	Adjust the installation height of the upper thread trimmer (remove the upper thread trimmer and check). * Be particularly careful when sewing joints.	100
	Upper thread trimmer operation	Apply grease to the inclined face of the opening cam.	101
Lower thread trimmer	Interference between fixed knife set, lower thread clamp, lower thread presser and lower thread retainer.	Repair or replace the parts.  	–
	Rubbish, dust or thread scraps present	Remove all rubbish, dust and thread scraps from the lower thread trimmer.	–
Loose screws	Check for loose screws in the upper thread trimmer, lower thread trimmer and work clamp lifter mechanisms.	Securely tighten all screws.	–
Work clamp lifting height setting	Check the work clamp lifting height setting.	Change the settings of memory switch Nos. 001, 002, 003, 004. * If the work clamp lifting height is too high, the lower thread trimming operation and the work clamp lifting will become stiff, and the work clamp motor may go out of step.	INSTRUCTION MANUAL CD
Threading	Lower thread threading	Insert the bobbin correctly and pass the lower thread through the bobbin case correctly. * If the bobbin is inserted back-to-front, it will spin loosely and the work clamp motor may go out of step.	INSTRUCTION MANUAL CD
	Lower thread tension	・Reduce the lower thread tension. * If the lower thread tension is much too strong, the work clamp motor may go out of step. ・Use memory switch No. 060 to reduce the work clamp lifting speed setting to make the lifting speed slower. ・Buff this section A to reduce the thread retaining resistance.  4023Q	INSTRUCTION MANUAL CD * *
Upper thread trimmer	Upper thread trimmer operation	Carry out opening timing adjustment for the upper thread trimmer.	101
Presser lifter home position	Presser lifter home position	Adjust the presser lifter home position.	87

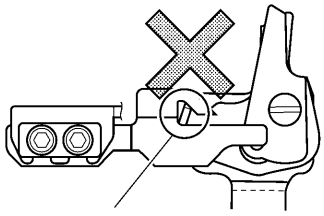
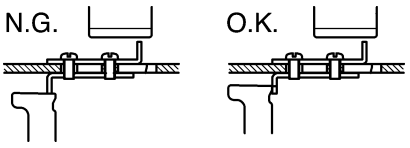
11-25. Lower thread is not trimmed (pulls when material is removed)

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Fixed knife set	Fixed knife and movable knife do not mesh.	Adjust the fixed knife set installation position.  4024Q	104
	Knife tip is bent or chipped.	Repair or replace the knife.	–

11-26. Feed mechanism does not move and error occurs.

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Feed motor	Cord connection	Check if there are any problems with the connection and contacts of feed motor connector P22 on the main P.C. board.	INSTRUCTION MANUAL CD
Upper thread trimmer	Upper thread trimmer position	Remove and re-install the upper thread trimmer.  Install so that the projection on trimmer M is not inserted. * Always make sure that the upper thread trimmer is in the correct position before use. 4895M	101
	Check if the cam opens the stop plate.	Adjust the cam position. * If the feed mechanism operates when the cam has not opened the stop plate, the cutter will bump against the upper thread trimmer.  4018Q	102
Feed home position	Feed home position	Adjust the feed home position.	86
Feed timing belt	Feed timing belt tension	Adjust the feed timing belt.	54

11-27. Needle does not zigzag or noise occurs when needle zigzags

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Stopper	Stopper position	Adjust the stopper position.	75

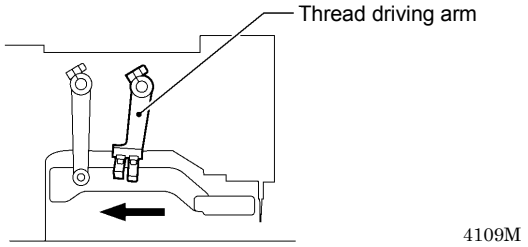
11-28. Sewing machine stops during sewing

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Thread breakage detector	Thread breakage detector position	Adjust the thread breakage detector position. * If the detector is not adjusted, sewing may stop even when the thread is not broken.	107
Threading	Upper thread threading	Pass the thread correctly through the thread guide.	INSTRUCTION MANUAL CD
Error [E301]	Upper thread trimmer operation	Move the work clamp up and down and check that it moves smoothly.	21
	Uneven stitches	Adjust to obtain the optimum stitches.	INSTRUCTION MANUAL CD

11-29. Upper shaft does not rotate as far as the needle up stop position

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Thread retainer and rotary hook are touching.	Thread trimmer mechanism position	1. Turn the machine pulley backward to set the needle bar to the needle up position. 2. Push the thread driving arm in the direction of the arrow to set the thread trimming mechanism to the home position. 	–

11-30. Operation panel display freezes and operation is not possible

Items with a "*" in the "Page" column should only be handled by a qualified technician.

Cause	Check	Remedy	Page
Poor connection inside control box.	P.C. board cord connections	・ Check if there are any problems with the connection and contacts of connector P5 on the main P.C. board. ・ Check if there are any problems with the connection and contacts of connector P2 and operation panel connector P3 on the motor P.C. board.	INSTRUCTION MANUAL CD

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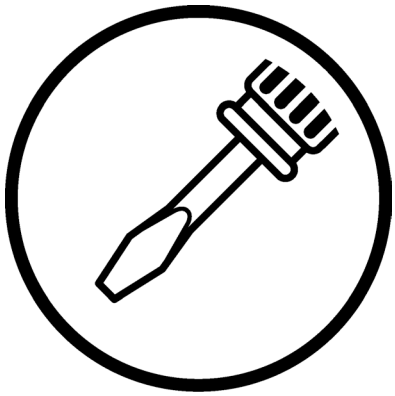

SERVICE MANUAL

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