

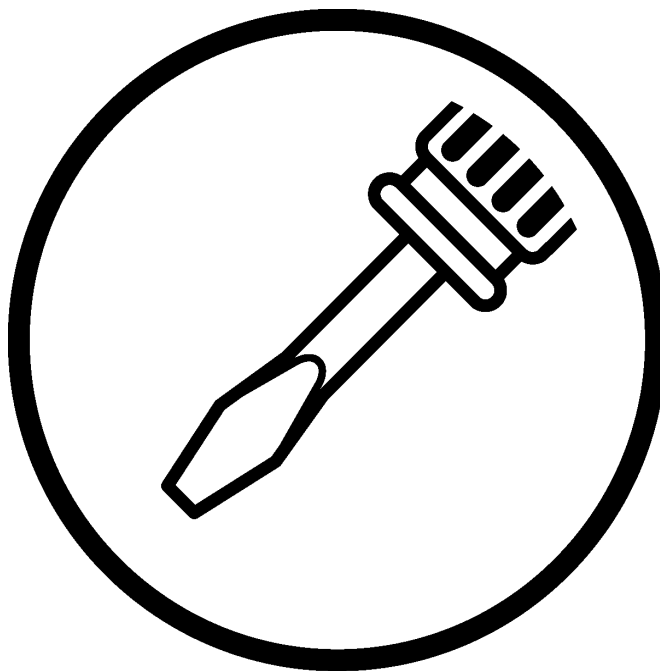
BAS-311G

BAS-326G

SERVICE MANUAL

Please read this manual before making any adjustments.

DIRECT DRIVE
PROGRAMMABLE ELECTRONIC PATTERN SEWER



This service manual is intended for BAS-311G, BAS-326G; be sure to read the BAS-311G, BAS-326G 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 may result in death or serious injury.
 CAUTION	The instructions which follow this term indicate situations where failure to follow the instructions could cause injury when using the machine or physical damage to equipment and surroundings.

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 cover of the control box. Touching areas where high voltages are present can result in severe injury.

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 $\pm 10\%$ 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 pneumatic delivery capability should be greater than the requirements for the sewing machine's total air consumption.

Insufficient pneumatic delivery capability 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 88 kg. The installation should be carried out by two or more people.



Do not connect the power cord until installation is complete. If the foot switch is depressed by mistake, the sewing machine might start operating and injury could result.



Hold the machine head with both hands when tilting it back or returning it to its original position.

Furthermore, do not apply excessive force when tilting back the machine head. The sewing machine may become unbalanced and fall down, and serious injury or damage to the sewing machine may result.



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. If the oil and grease get into your eyes or onto your skin, inflammation can result.



Furthermore, do not drink or eat the lubricating oil or grease. They may cause diarrhea or vomiting. 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. If the foot switch is depressed by mistake, the sewing machine might start operating and injury could result.
 - When threading the needle
 - When replacing the bobbin and needle
 - When not using the machine and when leaving the machine unattended
-  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. If the foot switch is depressed by mistake, the sewing machine might start operating and injury could result.
-  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. If the oil and grease get into your eyes or onto your skin, inflammation can result.
Furthermore, do not drink or eat the lubricating oil or grease. They may cause diarrhea or vomiting.
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 before carrying out the following operations. If the foot switch is depressed by mistake, the sewing machine might start operating and injury could result.
 - Inspection, adjustment and maintenance
 - Replacing consumable parts such as the rotary hook
-  Disconnect the air hoses from the air supply and wait for the needle on the pressure gauge to drop to "0" before carrying out inspection, adjustment and repair of any parts which use the pneumatic equipment.
-  Hold the machine head with both hands when tilting it back or returning it to its original position.
Furthermore, do not apply excessive force when tilting back the machine head. The sewing machine may become unbalanced and fall down, and serious injury or damage to the sewing machine may result.
-  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.

[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 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。	⚠ 危険 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 Hazardous voltage will cause injury. Turn off main switch and wait 5 minutes before opening this cover.	⚠ GEFAHR Hochspannung verletzungsgefahr! Bitte schalten sie den hauptschalter aus und warten sie 5 minuten, bevor sie diese abdeckung öffnen.	⚠ DANGER Un voltage non adapte provoque des blessures. Eteindre l'interrupteur et attendre 5 minutes avant d'ouvrir le capot.	⚠ PELIGRO Un voltaje inadecuado puede provocar las heridas. Apagar el interruptor principal y esperar 5 minutos antes de abrir esta cubierta.

2


	⚠ 注意 触摸运动部分, 易造成受伤。所以在装上安全保护装置后, 再进行缝纫操作。在切断电源后, 进行穿线, 更换梭芯, 机针和做清扫, 调整工作。
⚠ CAUTION Moving parts may cause injury. Operate with safety devices. Turn off main switch before threading, changing bobbin and needle, cleaning etc.	

3




Be careful not to get your hand caught when tilting back the machine head and returning it to its original position.

4



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.

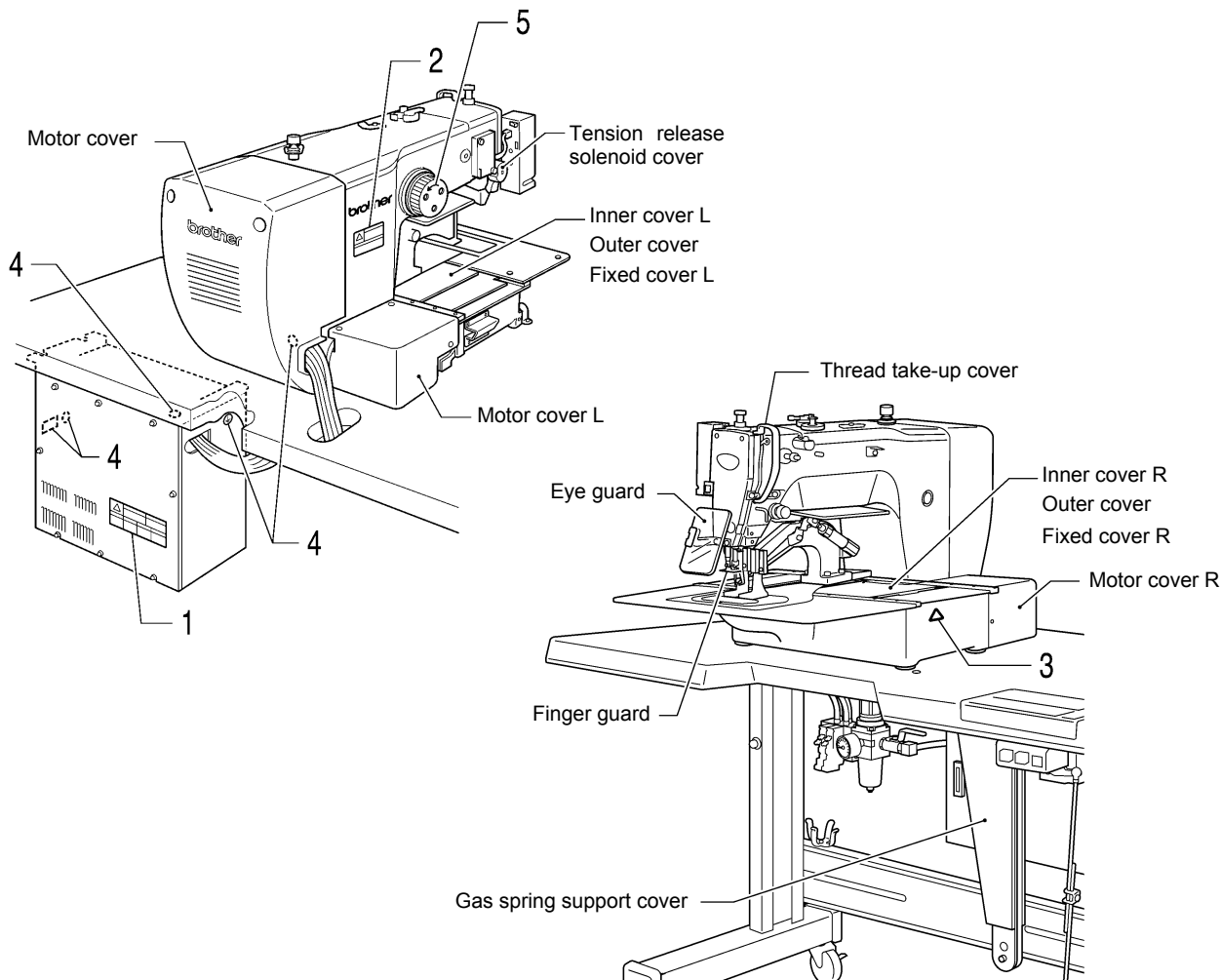
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Direction of operation

Safety devices

Devices such as eye guard, finger guard, thread take-up cover, motor cover, tension release solenoid cover, inner cover, outer cover, fixed cover and gas spring support cover



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1. SPECIFICATIONS



1	Heavy-weight materials
2	Medium-weight materials

S	Solenoid-type work clamp lifter
A	Pneumatic-type work clamp lifter



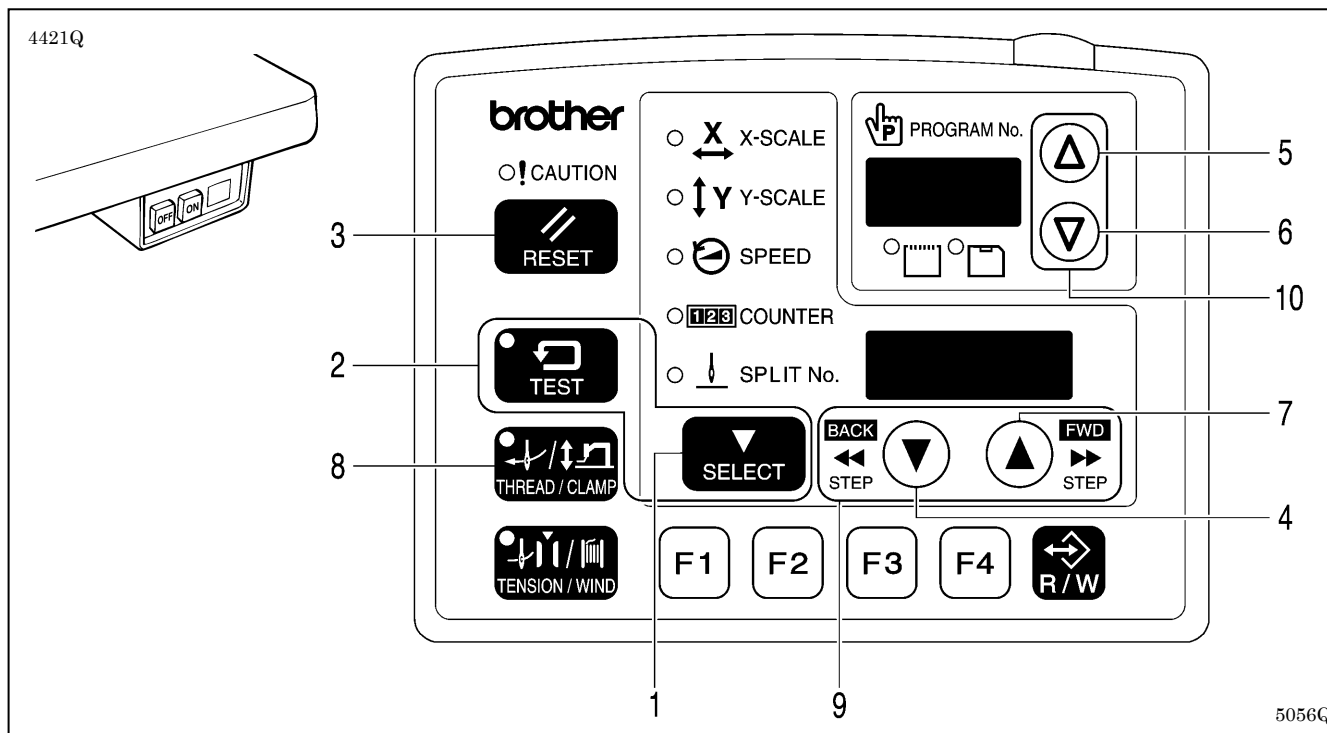
1	Heavy-weight materials
2	Medium-weight materials
























Sewing machine	Lock stitch, pattern tacking sewing machine (with large shuttle hook)
Stitch formation	Single needle lock stitch
Max. sewing speed	2,700 rpm
Sewing area (XxY)	BAS-311G: Max. 130 x 100 mm, BAS-326G: Max. 220 x 100 mm
Feed mechanism	Intermittent feed, pulse motor drive
Stitch length	0.05 – 12.7 mm
No. of stitches	500,000-stitch internal memory (*)
Maximum no. of stitches	20,000 stitches (per program)
No. of sewing data items that can be stored	Internal memory: 512 (*), CF card: 900
Work clamp lift method	Solenoid specifications: Pulse motor drive method Pneumatic specifications: Pneumatic method
Work clamp height	Solenoid specifications: Max. 25 mm, pneumatic specifications: Max. 30 mm
2-step work clamp	Solenoid specifications: Integrated-type work clamp Pneumatic specifications: Separate-type work clamp
Intermittent presser foot lift amount	22 mm
Intermittent stroke	2 – 4.5 mm, 4.5 – 10 mm or 0 (Default setting 3 mm)
Rotary hook	Double-capacity shuttle hook (standard shuttle hook sold separately)
Wiper device	Standard equipment
Thread trimmer	Standard equipment
Data storage method	Internal memory (Flash memory), CF card (32, 64, 128, 256 MB) [Option] 3.5 floppy disk 2HD/1.44MB, 2DD
User programs	50
Cycle programs	9
Motor	550 W AC servo motor
Weights	Machine head approx. 88 kg, operation panel approx. 0.6 kg Control box 14.2 – 16.2 kg (Differs depending on destination)
Power supply	Single-phase 100 V/220 V, Three-phase 200 V/220 V/380 V/400 V 400 VA
Air pressure	0.5 MPa 1.8 l/min.

* The number of data items and stitches that can be stored will vary depending on the number of stitches in each program.

2. FUNCTION SETTINGS

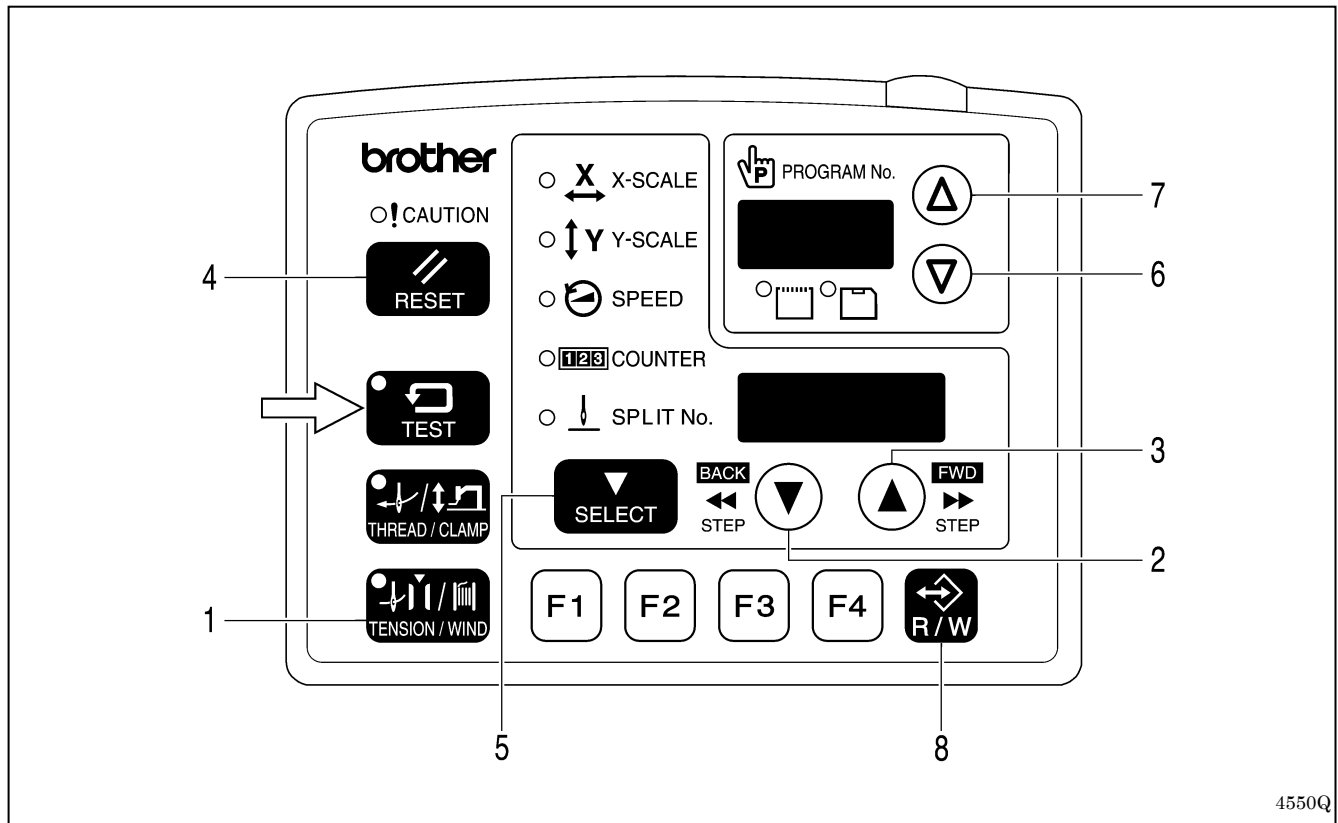
2-1. List of special functions when power is turned on



















1	Memory switch setting mode (Standard)  +  4541Q Refer to the Instruction Manual.	6	Output checking function  +  4546Q Refer to “2-9. Output checking method”.
2	Memory switch setting mode (Advanced)  +  +  4542Q Refer to “2-3. Memory Switch Setting Method (Advanced)”.	7	Software version display function  +  4547Q Refer to “2-10. Software version checking method”.
3	Data initialization function  +  4543Q Refer to the Instruction Manual.	8	Feed plate installation mode  +  5057Q Refer to “7-10-1. Installing the feed plate”.
4	Error log display function  +  4544Q Refer to “2-7. Error history checking method”.	9	Home position adjustment mode  +  +  4548Q Refer to “7-20. Adjusting the home position”.
5	Input checking function  +  4545Q Refer to “2-8. Input checking method”.	10	Needle up stop position adjustment mode  +  +  4549Q Refer to “7-22. Adjusting the needle up stop position”.

2-2. List of advanced functions

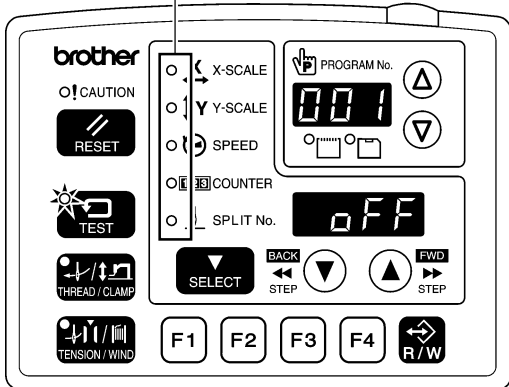

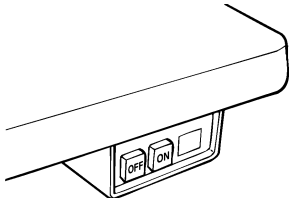
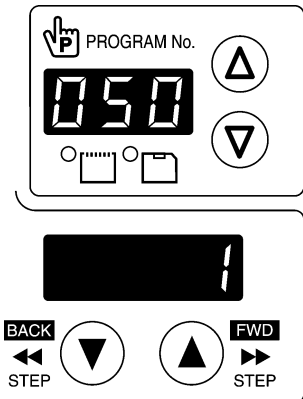
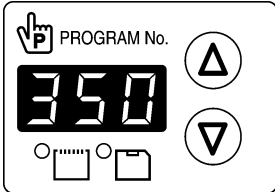

While holding down the TEST key, press the corresponding combination key.



4550Q

1	Memory switch setting mode (Standard)  +  4489Q Refer to the Instruction Manual.	5	User program setting mode  +  4493Q Refer to the Instruction Manual.
2	Lower thread counter setting mode  +  4490Q Refer to the Instruction Manual.	6	Parallel movement mode  +  4551Q Refer to the Instruction Manual.
3	Production counter setting mode  +  4491Q Refer to the Instruction Manual.	7	Stitch counter checking mode  +  4552Q Refer to "2-6. Stitch counter checking method".
4	Production counter temporary display function When SPEED indicator is illuminated  +  4492Q Refer to the Instruction Manual.	8	CF data read/write mode  +  4553Q Refer to "3-4. Data read/write mode".

2-3. Memory switch setting method (Advanced)

1	<p>All indicators switch off</p>  <p>Menu indicator switches off TEST indicator illuminates</p>	<p>While pressing the TEST key and the SELECT key, turn on the power switch.</p> <p>* Keep pressing the TEST key and the SELECT key until the model name is displayed and the buzzer beeps once.</p>   <ul style="list-style-type: none"> The memory switch number will be displayed in the PROGRAM No. display and the setting value for that number will be displayed in the menu display. <p>4449Q 4421Q</p>
2	 <p>If you would like to display only the numbers of memory switches that have been changed from default settings</p> 	<p>Press the Δ or ∇ key to select the memory switch number.</p> <p>Press the \blacktriangle or \blacktriangledown key to change the setting value.</p> <p>While pressing the SELECT key, press the Δ or ∇ key.</p> <ul style="list-style-type: none"> The numbers of memory switches that have been changed from default settings will appear in order. If no memory switches have been changed from their default settings, the display will not change and the buzzer will beep twice. <p>4554Q</p> <p>4555Q</p>
3	<p>Ending setting mode</p>  <p>TEST indicator switches off</p>	<p>Press the TEST key.</p> <ul style="list-style-type: none"> The changes will be memorized and the sewing machine will switch to home position detection standby.



- If you would like to return the setting for a single memory switch to the default setting, press the RESET key while the number for that memory switch is displayed.
- To return the settings for all memory switches to the default settings, keep pressing the RESET key for **two or more seconds** until the buzzer makes a long beep.

2-4. List of memory switch settings

No.	Setting range	Setting items	Initial value
001	Work clamp lift timing after sewing is completed		ON
	OFF	Lifts at the final stitch position.	
	ON	Lifts after moving to the home position.	
002	Separate-type work clamp drop operation (pneumatic specifications)		0
	0	Left and right work clamp drop at the same time.	
	1	Work clamp drops in the order left → right.	
003	Work clamp drop operation (solenoid specifications)		2
	0	Analog dropping: Work clamp drops in direct proportion to the pedal depression amount, and sewing starts when the pedal is fully depressed	
	1	1st step drop: Work clamp drops when pedal is depressed to the 1st step, and sewing starts when pedal is depressed to the 2nd step	
100	Sewing start speed		OFF
	OFF	The sewing speed for the first 1 – 5 stitches is set by memory switch numbers 151 – 155.	
	ON	1st stitch at 400 rpm, 2nd stitch at 400 rpm, 3rd stitch at 600 rpm, 4th stitch at 900 rpm, 5th stitch at 2,000 rpm	
200	Single-stitch test feed		OFF
	OFF	Test feed starts when the foot switch (start switch) is depressed, and it continues automatically until the final stitch.	
	ON	Test feed is carried out one stitch at a time when the foot switch (start switch) is depressed (feed becomes continuous if the foot switch [start switch] is continuously depressed). In addition, when the TEST indicator is illuminated, test feeding will move forward one stitch at a time when the machine pulley is turned by hand.	
300	Production counter display		OFF
	OFF	Lower thread counter display	
	ON	Production counter display	
400	User programs		OFF
	OFF	Disabled	
	ON	User program mode is enabled.	
401	Cycle programs		OFF
	OFF	Disabled	
	ON	When sewing user programs, the set programs are sewn in numeric order.	
402	Maximum reduction ratio (mm display) (*1)		OFF
	OFF	Displayed as %.	
	ON	Displayed as mm.	
403	Split mode selection		0
	0	Continuous split (split menu is disabled before split detection)	
	1	Continuous split (split menu is always enabled)	
403	Split mode selection		0
	2	Independent split	

*1 The mm display may differ slightly from the actual sewing size.

2. FUNCTION SETTINGS

Work clamp settings

No.	Setting range	Setting items	Initial value
050		Work clamp operating mode (*2)	*3
	1	(Standard single pedal) Work clamp rises automatically.	
	2	(Single pedal with no automatic work clamp lifter) Work clamp rises in accordance with foot switch depression amount.	
	3	(Standard 2 pedal) Work clamp rises automatically, and drops in accordance with work clamp switch depression amount * The left and right order can be changed using memory switch No. 002.	
	4	(2 pedal with no automatic work clamp lifter) Work clamp lifts while work clamp switch is being depressed.	
	5	(Left/right work clamp → Intermittent presser foot 2-step work clamp) When the work clamp switch is depressed to the 1st step, both the left and right work clamps drop, and when it is depressed to the 2nd step, the intermittent presser foot drops. (Lifting is in the same order.)	
	6	(Left and right alternating 2-step work clamp) Two-step operation, with left and right order switching for each item sewn. Starts from right → left	
	7	(Forward/reverse pedal) When the start switch is depressed, the work clamp drops and the sewing machine starts in that order with forward control, and when the work clamp switch is depressed, the sewing machine reverses and the work clamp lifts. * The left and right order can be changed using memory switch No. 002.	
	8	(2-step work clamp using two presses) For solenoid specifications (1 pedal) When the foot switch is depressed, the work clamp stops in the intermediate position → work clamp drops → sewing machine starts in that order, and the work clamp lifts when the foot switch is depressed backward. * The work clamp does not stop in the intermediate position if memory switch No. 003 is set to "1" For pneumatic specifications (2 pedal) When the work clamp switch is depressed, the left work clamp drops → right work clamp drops → both work clamps lift in that order. * The left and right order can be changed using memory switch No. 002.	
	9	(Standard 3 pedal) For solenoid specifications The left pedal lowers the work clamp in the intermediate position, the right pedal (center) lowers the work clamp, and the start pedal (right) starts the sewing machine. * The work clamp does not stop in the intermediate position if memory switch No. 003 is set to "1" For pneumatic specifications The left pedal raises and lowers the left work clamp, and the right pedal (center) raises and lowers the right work clamp. The start pedal (right) starts the sewing machine.	
	10	(Triple pedal with independent home detection) The right pedal (center) is used exclusively for detecting the home position. The left pedal raises and lowers the left and right work clamps, and the start pedal (right) starts the sewing machine.	
	11	(Special triple pedal with independent home detection) The right pedal (center) is used exclusively for detecting the home position. The left pedal raises and lowers the left work clamp, and the start pedal (right) lowers the right work clamp and starts the sewing machine.	

*2 Allowable setting values by specification

Pedal specifications	Solenoid specifications	Pneumatic specifications
1 pedal	1, 2, 8	1, 2
2 pedal	3, 4	3, 4, 5, 6, 7, 8
3 pedal	9	9, 10, 11

*3 Solenoid specifications: 1, Pneumatic specifications: 3

No.	Setting range	Setting items	Initial value
051	Work clamp operation before home position detection		ON
	OFF	Work clamp cannot be raised or lowered before home position is detected	
	ON	Work clamp can be raised and lowered before home position is detected	
052	Work clamp operation during split programs		OFF
	OFF	Work clamp lifts automatically when sewing pauses due to a split program	
	ON	Work clamp lifts when the foot switch is depressed when sewing pauses due to a split program	
053	Time from intermittent presser foot lifting until feed mechanism starts moving		100
	0 – 999	Units (mS)	
054	Intermittent presser foot drop timing		0
	0	Presser foot drops when the work clamp switch is depressed, but it does not drop at the feed retract position.	
	1	Presser foot drops when the work clamp switch is depressed.	
	2	Presser foot drops at the sewing start, regardless of the work clamp switch operation.	
055	Work clamp signal valve special output for pneumatic-type work clamp (pneumatic specifications)		0
	0	Disabled	
	1	Valve output is reversed for pneumatic specifications (Connect the air tubes in reverse so that the work clamp can lift when the power is turned off.)	
	2	Reverse valve output is output simultaneously for 2-position valve specifications. (Right work clamp reverse = Option output No. 4, Left work clamp reverse = Option output No. 5)	
056	Thread winding operation before home position is detected		OFF
	OFF	Thread winding cannot be carried out before home position is detected.	
	ON	Thread winding can be carried out before home position is detected.	
057	Work clamp operation when feed moves to sewing start position after home position is detected		ON
	OFF	Work clamp stays dropped after home position is detected Work clamp lifts when pedal is depressed backward (for single pedal) or when work clamp switch is depressed (for 2 pedals)	
	ON	Work clamp lifts automatically after home position is detected. * Disabled when memory switch No. 050 = 2 or 4.	
058	Work clamp operation at sewing end		OFF
	OFF	Work clamp lifts automatically at the sewing end * Disabled when memory switch No. 050 = 2 or 4.	
	ON	Work clamp does not lift automatically at the sewing end	

2. FUNCTION SETTINGS

Sewing machine motor settings

No.	Setting range	Setting items	Initial value
150	Highest needle position stop		OFF
	OFF	Disabled	
	ON	When the upper shaft stops, the motor operates in reverse to return the needle bar close to its highest position. (When the motor operates in reverse to raise the needle, the thread take-up will stop at a position which is lower than its normal stopping position. As a result, the thread take-up will rise slightly at the sewing start, and this may result in the thread pulling out under certain conditions.)	
151	1st stitch sewing speed at the sewing start		4
	4 – 27	(Units x100 rpm)	
152	2nd stitch sewing speed at the sewing start		8
	4 – 27	(Units x100 rpm)	
153	3rd stitch sewing speed at the sewing start		12
	4 – 27	(Units x100 rpm)	
154	4th stitch sewing speed at the sewing start		27
	4 – 27	(Units x100 rpm)	
155	5th stitch sewing speed at the sewing start		27
	4 – 27	(Units x100 rpm)	
156	5th last stitch sewing speed at the sewing end		27
	4 – 27	(Units x100 rpm)	
157	4th last stitch sewing speed at the sewing end		27
	4 – 27	(Units x100 rpm)	
158	3rd last stitch sewing speed at the sewing end		27
	4 – 27	(Units x100 rpm)	
159	2nd last stitch sewing speed at the sewing end		12
	4 – 20	(Units x100 rpm)	
161	Piercing force boosting operation		OFF
	OFF	Disabled	
	ON	Piercing force boosting operations are carried out when the sewing machine motor is locked	
162	Regulation of sewing speed changes due to sewing pitch changes		OFF
	OFF	Sewing speed varies depending on sewing pitch of the sewing data	
	ON	Speed is fixed at the minimum sewing speed for the maximum pitch of the sewing data (Set to ON if there may be a problem with sewing speed changes as a result of pitch changes.)	
163	Limits the maximum sewing speed.		27
	12 – 27	(Units x100 rpm)	
164	Thread trimming disabled		OFF
	OFF	Thread trimming is carried out in accordance with the sewing data.	
	ON	All thread trimming operations are disabled.	
165	Highest needle position stop angle (Units 2 degree steps) (*4)		0
	-15 – 0	0: Normal needle up position: Needle bar height increases for values in the negative direction.	

*4 If the setting value becomes too large in the negative direction, error “E110” may be generated at the first sewing start after the power is turned on.

Feed settings

No.	Setting range	Setting items	Initial value
250	Mechanism home position return when sewing is finished		OFF
	OFF	When sewing is finished, the feed plate returns to the start position.	
	ON	When sewing is finished, the feed plate moves via the machine home position to the start position.	
251	Feed speed		3
	1	100 mm/s Slow	
	2	200 mm/s	
	3	300 mm/s	
	4	400 mm/s	
	5	500 mm/s Fast	
252	High-speed test feeding		OFF
	OFF	Feeding is normally slow, and becomes faster when the foot switch is depressed to the 1st step (For 2 pedals, it becomes faster when the work clamp switch is depressed.)	
	ON	Test feeding is at the same speed as sewing. * This does not apply to checking stitch by stitch.	
253	Home position detection method		OFF
	OFF	Depress the foot switch (start switch) while the PROGRAM No. display is flashing.	
	ON	Press the special external input switch (EXIN3) while the PROGRAM No. display is flashing. (Foot switch/start switch are disabled.)	
254	Movement path from mechanism home position to start position		0
	0	Moves to the start position simultaneously for X and Y, in the order of in front of Y → middle of X.	
	1	Moves to start position in the order of X start point → Y start point in the order of in front of Y → middle of X.	
	2	Moves to start position in the order of right edge of X → Y start point → X start point in the order of right edge of X → in front of Y.	
	3	Moves to start position in the order of left edge of X → Y start point → X start point in the order of left edge of X → in front of Y.	
260	Changes the overall feed timing		0
	-10 – 10	-10: Early ← 0: Standard → 10: Late	
261	Changes the feed timing for the 1st stitch at the sewing start		0
	-10 – 10	-10: Early ← 0: Standard → 10: Late	
262	Changes the feed timing for the 2nd stitch at the sewing start		0
	-10 – 10	-10: Early ← 0: Standard → 10: Late	
263	Changes the feed timing for the 3rd stitch at the sewing start		0
	-10 – 10	-10: Early ← 0: Standard → 10: Late	
264	Changes the feed timing for the 3rd stitch before the sewing end		0
	-10 – 10	-10: Early ← 0: Standard → 10: Late	
265	Changes the feed timing for the 2nd stitch before the sewing end		0
	-10 – 10	-10: Early ← 0: Standard → 10: Late	
266	Changes the feed timing for the 1st stitch before the sewing end		0
	-10 – 10	-10: Early ← 0: Standard → 10: Late	
267	If the overall feed timing (setting for No. 260) is changed from the default value, specify the number of applicable stitches.		0
	0	No limit	
	1 – 99	The feed timing returns to the standard feed timing once the specified number of stitches has been sewn.	
268	Changes feed timing standard		1
	0	[Feed start reference] Makes the timing uniform at the start of feed.	
	1	[Needle up reference] Changes the timing at the start of feed so that the needle zigzagging is even.	
	2	[Feed end reference] Makes the timing uniform at the end of feed.	
	3	[Linked to speed] Feed timing is uniform even if the sewing speed changes.	
269	Adjusts the feed motor output		0
	-5 – 5	-5: Low ← 0: Standard → 5: High	

2. FUNCTION SETTINGS

Operation panel settings

No.	Setting range	Setting items	Initial value
350	Operation panel changing limitation		0
	0	No limits on changing setting values using the operation panel.	
	1	Program numbers, XY scale, sewing speed, lower thread counter, work clamp height, intermittent height and digital tension values cannot be changed.	
	2	Program numbers, XY scale, sewing speed, work clamp height, intermittent height and digital tension values cannot be changed.	
	3	Program numbers cannot be changed.	
	4	Program numbers and XY scale settings cannot be changed.	
	5	Program numbers, XY scale and sewing speed settings cannot be changed.	
	6	XY scale settings cannot be enlarged. (They can be reduced.)	
	7	Sewing speed setting cannot be changed.	
351	Changing memory switches		OFF
	OFF	Allowed	
	ON	Forbidden	
352	Counting method for lower thread counter and production counter		0
	0	Counted for each item of sewing data	
	1	Counted for each thread trimming operation.	
	2	Counted when sewing data ends or when split stops	
353	Counter timing for lower thread counter		OFF
	OFF	Counted at the end of sewing.	
	ON	Counted at the start of sewing.	
354	Switching program numbers using an external switch		0
	0	Disabled	
	1 – 9	Program number is switched by means of the 5 bits of option input (EXIN6 – EXIN10). Applicable numbers are: Setting number = 3rd digit, last two digits can be 1 – 31.	
355	Switches split numbers using an external switch		OFF
	OFF	Disabled	
	ON	Split number is switched by means of the 5 bits of option input (EXIN6 – EXIN10). Applicable numbers are 1 – 31 (only enabled for independent split mode)	

User program settings

No.	Setting range	Setting items	Initial value
450	Moving to start point when switching user programs		OFF
	OFF	Feed moves to the start point after starting and switching.	
	ON	Feed moves to the next sewing start point at the same time as the user program switches.	
452	Limitations on changing settings for user programs		OFF
	OFF	No limit	
	ON	User program contents cannot be changed.	

Data editing settings

No.	Setting range	Setting items	Initial value
460	Sewing area limit in X direction [Units mm]		
	0 – 130	BAS-311G setting value	130
	0 – 220	BAS-326G setting value	220
461	Sewing area limit in Y direction 0 – 100 [Units mm]		100
462	Enlargement/reduction reference point		0
	0	Center of sewing frame	
	1	Sewing start point	
	2	Center of pattern	
463	Enlargement/reduction for bar tacking		OFF
	OFF	Bar tacking stitches (pitch approx. 1 mm or less) cannot be enlarged or reduced.	
	ON	Bar tacking stitches (pitch approx. 1 mm or less) are also enlarged or reduced.	
464	Enlargement/reduction ratio in XY directions		OFF
	OFF	Disabled	
	ON	Enlargement/reduction ratio setting is the same for X and Y (Disabled for user programs)	
465	Storing parallel movement amount for sewing pattern		OFF
	OFF	Initialized when program number or enlargement/reduction ratio is changed and when power is turned off.	
	ON	Initialized when program number or enlargement/reduction ratio is changed but not when power is turned off.	
466	Reading sewing data from eternal media into internal memory		0
	0	[Normal mode] Programs are copied one by one into internal memory.	
	1	[Overwrite mode] Sewing data is overwritten into the temporary buffer area. If sewing data with the same program number already exists in internal memory, it is deleted.	
	2	[Assignment mode] Sewing data is overwritten into the temporary buffer area. If sewing data with the same program number already exists in internal memory, it is not deleted, but only the data in the temporary buffer is used. (If sewing data with the same program number already exists in internal memory and the setting is changed to "0" or "1", the data in the temporary buffer will be cleared.)	
467	Changing gear ratio correction method when reading from a 2DD floppy disk.		0
	0	Automatic conversion as specified by sewing machine model. (For the BAS-311G, data is read as BAS-311A data and then converted.)	
	1	BAS-311A data is read.	
	2	BAS-326A data is read.	
	3	BAS-341A/BAS-342A data is read.	
468	Retract point switching at parallel movement point		OFF
	OFF	Disabled	
	ON	The position moved to by parallel movement is recorded as the retract point.	

Device settings

No.	Setting range	Setting items	Initial value
550	Needle cooler device		OFF
	OFF	Disabled	
	ON	Needle cooler device is used. (Option output No. 12)	
551	Tension release setting at the sewing start		OFF
	OFF	Disabled	
	ON	Enabled	
552	Tension release timing during thread trimming [Units 8 degree steps]		0
	-10 – 1	-10: Early ← 0: Standard → 1: Late	
553	Thread nipping timing (*5)		2
	1 – 4	1: Early ← 2: Standard → 4: Late	

*5 Not used for the BAS-311G and BAS-326G.

2. FUNCTION SETTINGS

No.	Setting range	Setting items	Initial value
554	Thread breakage detector		OFF
	OFF	Disabled	
	ON	Fiber-type thread breakage detector used	
555	Thread breakage detector detection sensitivity		OFF
	OFF	5 stitches at sewing start, 3 stitches while sewing	
	ON	10 stitches at sewing start, 3 stitches while sewing	
556	Inner clamping device (Option output No. 13)		0
	0	Disabled	
	1	Inner clamping device is used. (Retract operation is carried out at the sewing end to prevent interference with the needle.)	
	2	Inner clamping device is used. (No retract operation at the sewing end.)	
	3	Inner clamping device operates for 1/4 of the sewing pattern and returns for the other 3/4. (No retract operation)	
557	External wiper device		1
	0	Disabled	
	1	Solenoid-type wiper device is used.	
	2	Pneumatic-type wiper device is used. (Option output No. 2)	
558	External error monitoring input		OFF
	OFF	Disabled	
	ON	Enabled (P10, option input No. 13 [AIRSW])	
559	Operating indicator output		OFF
	OFF	Disabled	
	ON	Option output No. 9: Output ON while operating Option output No. 10: ON during lower thread conversion and during test mode Option output No. 11: ON when error is generated	
560	Automatic ejector (Option output No. 3 output, option input No. 1 = right sensor, input No. 2 = left sensor) [Pneumatic specifications]		0
	0	Disabled	
	1	Standard operation	
	2	Sewing starts when cassette sensor is ON	
	3	Start switch is enabled even if cassette sensor is OFF.	
561	Timer from sensor detection to sewing start when automatic ejector automatic starting is set (memory switch No. 560 = 2) [Pneumatic specifications]		100
	0 – 999	Time from after the cassette is chucked until automatic starting	
562	Changes the digital tension setting value.		ON
	OFF	Tension number can be changed regardless of the sewing data.	
	ON	Only tension No. 0 and the tension numbers detected in the sewing data can be changed.	
563	2-step tension is possible (When using spring-type main tension)		OFF
	OFF	Disabled	
	ON	2-step tension is used.	
564	Increases maximum tension release force when using a spring-type main tension		0
	0	Disabled (Tension release is open at the sewing end.)	
	1	Increases the force (Tension release is closed at the sewing end. If tension release is open, it will be closed in approximately 5 minutes.)	
	2	Increases force to the maximum. (Tension release is closed at the sewing end. If tension release is open, it will be closed in approximately 1 minute.)	
565	Thread nipper device (*6)		OFF
	OFF	Disabled	
	ON	Thread nipper device installed (Memory switch No. 500 must also be set to ON or OFF.)	

*6 Not used for the BAS-311G and BAS-326G.

Error processing settings

No.	Setting range	Setting items	Initial value
650	Error release method when operation has stopped		0
	0	Press the RESET key.	
	1	Press the RESET key or the STOP switch.	
	2	Press the RESET key or input a signal from the external switch (EXIN3).	
651	Needle stop position when sewing is interrupted by the STOP switch		0
	0	Needle stops in the down position.	
	1	Needle stops in the up position.	
	2	Needle stops in the up position after thread trimming.	
652	Thread trimming operation when sewing is paused		OFF
	OFF	Thread trimming is carried out when the pause is canceled.	
	ON	Thread trimming is not carried out when the pause is canceled.	
653	Resuming sewing after sewing is paused		OFF
	OFF	STOP switch → RESET key → ▼ key → Sewing starts	
	ON	STOP switch → RESET key → Sewing starts	
655	Disables the needle up stop position monitoring sensor		OFF
	OFF	Sensor is enabled and needle up stop position errors [E110] are detected.	
	ON	Disabled	
656	Home position return when sewing is paused		OFF
	OFF	Mechanism moves to home position and then moves to sewing start position.	
	ON	Mechanism steps back to the sewing start position along the sewing path without moving to the home position.	

Maintenance settings

No.	Setting range	Setting items	Initial value
750	Run-in operation mode		0
	0	Disabled	
	1	While the foot switch is being depressed, the work clamp moves up and down once and then continuous operation starts. (Work clamp does not move up or down if memory switch No. 050 = 2 or 4)	
	2	While the foot switch is being depressed, the work clamp moves up and down twice and then continuous operation starts. (Work clamp does not move up or down if memory switch No. 050 = 2 or 4)	
	3	While the foot switch is being depressed, the work clamp moves up and down three times and then continuous operation starts. (Work clamp does not move up or down if memory switch No. 050 = 2 or 4)	
751	Run-in operation cycle time adjustment timer		20
	0 – 255	Units [x10 ms]	
752	00 – 99	Sewing machine ID code	00
		Sewing data specified on CF card	
755	Reading/writing sewing data for old models		OFF
	OFF	Only compatible with floppy disks.	
	ON	Reading and writing using CF cards is possible in data read/write mode.	
756	Main shaft angle display mode		OFF
	OFF	Disabled	
	ON	Main shaft angle is displayed when sewing machine starts.	

Specifications and destination settings

No.	Setting range	Setting items	Initial value
850	Specification code setting (This memory switch does not return to the initial value when all settings are reset.)		0
	0	Specifications at the time of shipment from the factory (Specifications shown on the model plate on the machine head)	
	1	Heavy-weight material specifications	
	2	Medium-weight material specifications	
	3	Extra heavy-weight material specifications	

2. FUNCTION SETTINGS

Unique machine settings

No.	Setting range	Setting items	Initial value
950	Automatic start for extended option output No. 1		OFF
	OFF	Disabled	
	ON	Sewing machine starts when extended option output No. 1 is ON.	
951	Program number output		OFF
	OFF	Disabled	
	ON	When the last two digits of the program number are 1 to 15, the program number is output in 4 bits to extended option output 4 – 7.	

2-5. Setting the work clamp mode

Combinations of memory switch settings can be used to switch the work clamp operating mode to any one of the following modes.

<Solenoid specifications, single pedal standard operations>

Operating mode				Memory switch setting			
Drop operation	Automatic work clamp lifting	After home position detection	After sewing start	003	050	057	058
Analog drop	Yes	Automatic lift	Automatic lift	0	1	ON	OFF
			Dropped (*)	0	1	ON	ON
		Dropped (*)	Automatic lift	0	1	OFF	OFF
			Dropped (*)	0	1	OFF	ON
	No	Dropped (*)	Dropped (*)	0	2	–	–
1st step drop	Yes	Automatic lift	Automatic lift	1	1	ON	OFF
			Dropped	1	1	ON	ON
		Dropped (*)	Automatic lift	1	1	OFF	OFF
			Dropped (*)	1	1	OFF	ON
	No	Dropped (*)	Dropped (*)	1	2	–	–
2nd step drop	Yes	Automatic lift	Automatic lift	2	1	ON	OFF
			Dropped	2	1	ON	ON
		Dropped (*)	Automatic lift	2	1	OFF	OFF
			Dropped (*)	2	1	OFF	ON
	No	Dropped (*)	Dropped (*)	2	2	–	–

(*) If memory switch No. 057 is OFF, the work clamp will lift when the pedal is depressed backward.

<Solenoid specifications, single pedal sequence operation>

Operating mode				Memory switch setting			
Drop operation	Automatic work clamp lifting	After home position detection	After sewing start	003	050	057	058
1st step drop	Yes	Automatic lift	Automatic lift	1	8	ON	OFF
			Dropped (*)	1	8	ON	ON
		Dropped (*)	Automatic lift	1	8	OFF	OFF
			Dropped (*)	1	8	OFF	ON
2nd step drop	Yes	Automatic lift	Automatic lift	2	8	ON	OFF
			Dropped (*)	2	8	ON	ON
		Dropped (*)	Automatic lift	2	8	OFF	OFF
			Dropped (*)	2	8	OFF	ON

(*) Work clamp lifts when pedal is depressed backward.

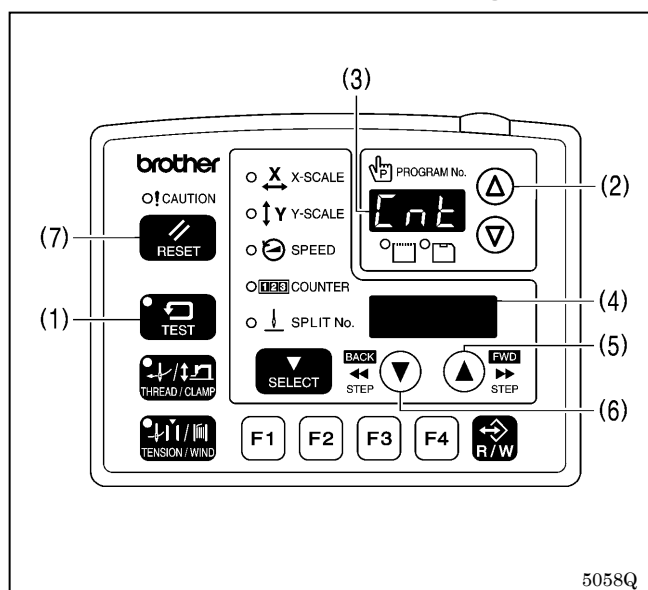
<Pneumatic specifications, 2 pedal standard operations>

Operating mode			Memory switch setting			
Work clamp operation	After home position detection	After sewing start	002	050	057	058
Work clamp lifts automatically and drops when the work clamp switch is depressed.	Automatic lift	Automatic lift	Work clamp drop sequence selection 0: Left and right simultaneously 1: Left → Right 2: Right → Left	3	ON	OFF
		Dropped		3	ON	ON
	Dropped	Automatic lift		3	OFF	OFF
		Dropped		3	OFF	ON
Work clamp rises while work clamp switch is depressed	Dropped	Dropped	–	4	–	–
Work clamp switch 1st step: Both left and right work clamps drop 2nd step: Intermittent presser foot drops Lifting is simultaneous	Automatic lift	Automatic lift	–	5	ON	OFF
		Dropped		5	ON	ON
	Dropped	Automatic lift		5	OFF	OFF
		Dropped		5	OFF	ON
Work clamp drop sequence at work clamp switch 1st and 2nd steps alternates each time an article is sewn. Initially right → left	Automatic lift	Automatic lift	–	6	ON	OFF
		Dropped		6	ON	ON
	Dropped	Automatic lift		6	OFF	OFF
		Dropped		6	OFF	ON

<Pneumatic specifications, 2 pedal sequence operation>

Operating mode			Memory switch setting			
Work clamp operation	After home position detection	After sewing start	002	050	057	058
When start switch is depressed, work clamp drops → sewing starts Lifts in reverse order using work clamp switch	Automatic lift	Automatic lift	Work clamp drop sequence selection 0: Left and right simultaneously 1: Left → Right 2: Right → Left	7	ON	OFF
		Dropped		7	ON	ON
	Dropped	Automatic lift		7	OFF	OFF
		Dropped		7	OFF	ON
Work clamp switch Left (right) work clamp → Right (left) work clamp → Both work clamps lift	Automatic lift	Automatic lift	Work clamp drop sequence selection 0: Left and right simultaneously 1: Left → Right 2: Right → Left	5	ON	OFF
		Dropped		5	ON	ON
	Dropped	Automatic lift		5	OFF	OFF
		Dropped		5	OFF	ON

2-6. Stitch counter checking method



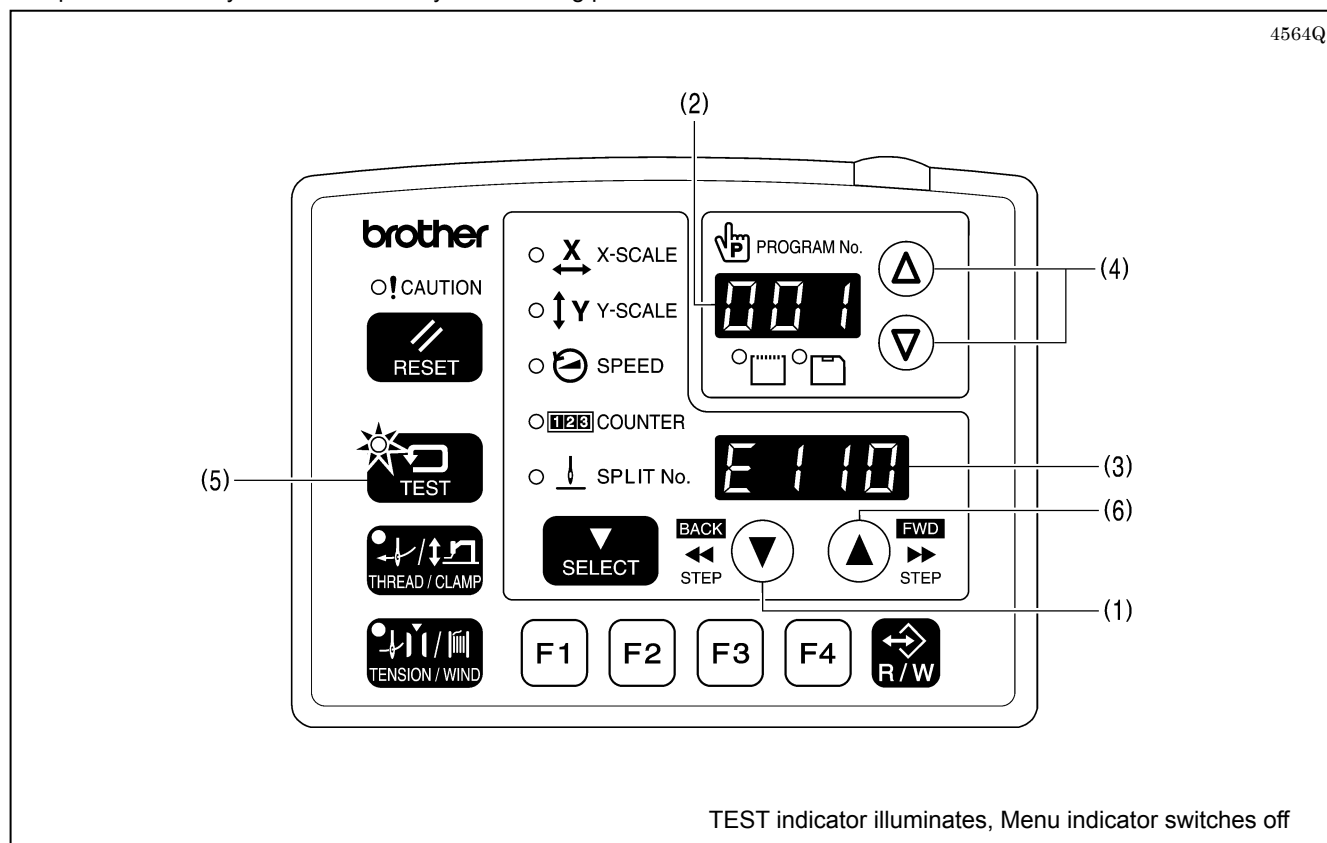
- While holding down the TEST key (1), press the ▲ key (2).
“Cnt” will be displayed in the PROGRAM No. display (3), and the cumulative number of stitches will be displayed in the menu display (4) in units of 100,000 stitches.
(While the ▲ key (5) is being pressed, the cumulative number of stitches will be displayed in units of 100 stitches in all 7 digits of the PROGRAM No. display and the menu display (4).)
- When the TEST key (1) is pressed, the display will return to the normal display.

<Clearing the cumulative number of stitches>

- When “Cnt” is displayed, press the ▼ key (6). The cumulative number of stitches will change to “0000” and the display will flash.
- Press the RESET key (7) for two seconds or more. (The cumulative number of stitches “0000” will stop flashing and illuminate, and the setting will be cleared.)
- When the TEST key (1) is pressed, the display will return to the normal display.

2-7. Error history checking method

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



1. While pressing the ▼ key (1), turn on the power switch.
* Keep pressing the ▼ key (1) until the model name is displayed and the buzzer beeps once.
The error history sequence number will be displayed in the PROGRAM No. display (2) and the error code will be displayed in the menu display (3).
2. Press the ▲ or ▼ key (4) to switch the error history sequentially.
3. When the TEST key (5) is pressed, the display will return to the normal display and the sewing machine will change to home position standby.

<Display example>

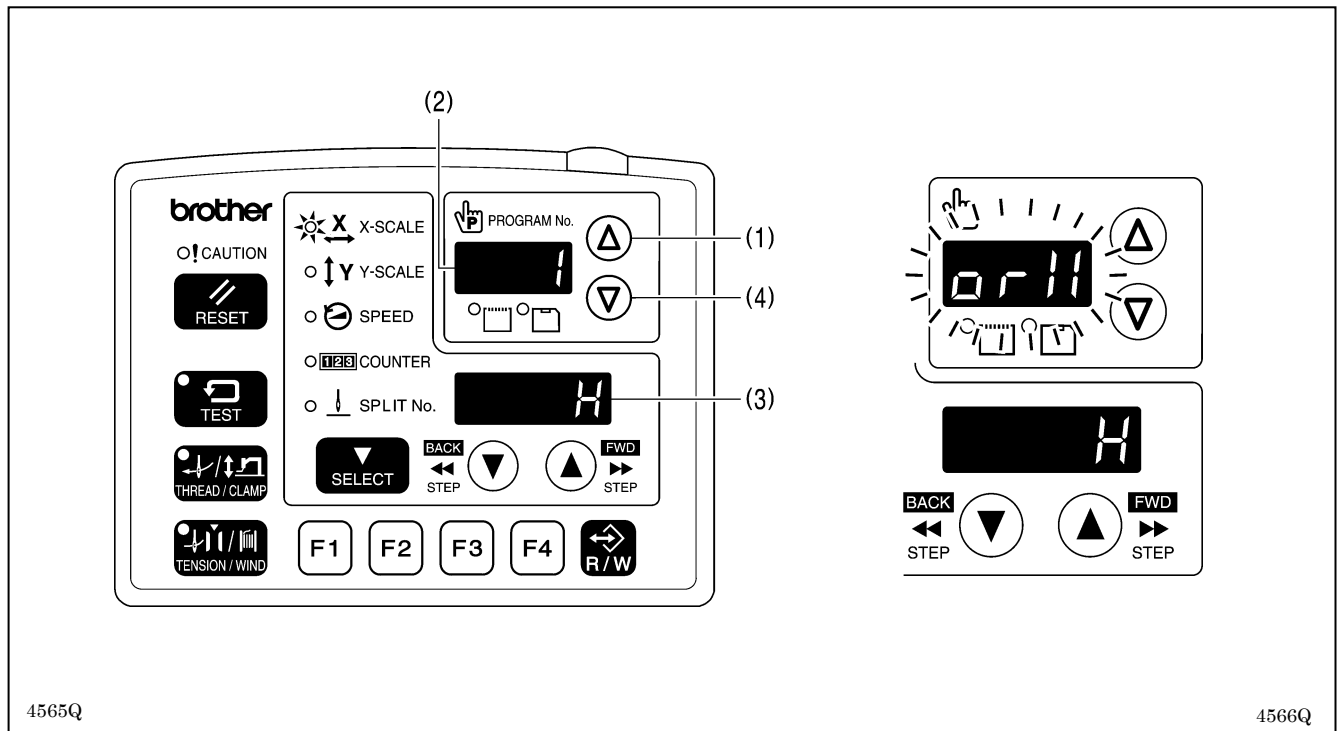
Details	PROGRAM No. display (2)	Menu display (3)
If there is no error history	[000]	[E - - -]
Error [E110] is displayed first.	[001]	[E110]

- While the ▲ key (6) is being pressed, the COUNTER indicator will illuminate and the stitch number counter value at the point where the error occurred will be displayed in the PROGRAM No. display (2) and the menu display (3) in units of 100 stitches.

2-8. Input checking method

Use this to check for any malfunctions of the operation panel keys, circuit boards or sensors, and for checking for broken cords and for adjusting sensor positions.

You can check whether the CPU is correctly reading the signals from keys and sensors.



- While pressing the Δ key (1), turn on the power switch.
* Keep pressing the Δ key (1) until the model name is displayed and the buzzer beeps once.
The check code will be displayed in the PROGRAM No. display (2), and the input status will be displayed in the menu display (3).
- Press the Δ key (1) or ∇ key (4) to select the desired check code.
If no operations are carried out for 5 seconds after a check code has been selected, the check code and the abbreviated input name will flash alternately in the PROGRAM No. display (2).
- Refer to the input check list for key and sensor responses.
- To return to normal operation, turn off the power switch and then turn it back on again.

<Input check list>

PROGRAM No. display		Menu display	Check item and checking method
Check code	Name	Input status	
[1]	[orX]	[H] / [L]	X-axis motor home position sensor signal Move the feed mechanism by hand in the X direction.
[2]	[EnX]	[-999] – [999]	X-axis motor encoder counter value Move the feed mechanism by hand in the X direction.
[3]	[orY]	[H] / [L]	Y-axis motor home position sensor signal Move the feed mechanism by hand in the Y direction.
[4]	[EnY]	[-999] – [999]	Y-axis motor encoder counter value Move the feed mechanism by hand in the Y direction.
[5]	[orP]	[H] / [L]	Work clamp motor home position sensor signal Raise the work clamp by hand.
[6]	[EnP]	[-999] – [999]	Work clamp motor encoder counter value Raise the work clamp by hand.
[7]	[Enn]	[0] – [180]	Upper shaft 180 degree rotation signal Turn the pulley by hand.

2. FUNCTION SETTINGS

PROGRAM No. display		Menu display	Check item and checking method
Check code	Name	Input status	
[8]	[UP]	[on] / [oFF]	Needle up signal Turn the pulley by hand.
[9]	[dn]	[on] / [oFF]	Needle drop signal Turn the pulley by hand.
[10]	[voL]	[0] – [300]	Power supply voltage Displayed as %
[11]	[PnL]	[*] / [oFF]	Operation panel input check While a key is being pressed, the name of the key will be displayed.
		*ON display	Key name
		[rESt]	RESET key
		[tESt]	TEST key
		[tHrE]	THREAD/CLAMP key
		[tEn]	TENSION/WIND key
		[SELE]	SELECT key
		[UP-M]	▲ key
		[dn-M]	▼ key
		[F1]	Function key F1
		[F2]	Function key F2
		[F3]	Function key F3
		[F4]	Function key F4
		[CF]	R/W key
[12]	[FtA]	[0] – [255]	Foot switch analog value (Single pedal specifications) Depress the foot switch.
[13]	[CL1]	[on] / [oFF]	Work clamp 1st step (2 pedal specifications) Depress the foot switch to the 1st step.
[14]	[CL2]	[on] / [oFF]	Work clamp 2nd step (2 pedal specifications) Depress the foot switch to the 2nd step.
[15]	[Stt]	[on] / [oFF]	Start switch (2 pedal specifications) Depress the foot switch to the 2nd step.
[16]	[EMC]	[– on] [on – –] [– – –]	STOP switch Press the STOP switch.
[17]	[HEd]	[on] / [oFF]	Machine head switch Tilt back the machine head.
[18]	[EXE]	[on] / [oFF]	External input error detection (IN13)
[19]	[CAH]	[on] / [oFF]	Thread nipper home position sensor (IN14) (*1) Press the ▲ key to move the thread nipper in the home position direction. Press the ▼ key to move the thread nipper in the retract direction.
[20]	[rEL]	[on] / [oFF]	Thread nipper retract sensor (IN15) (*1) Press the ▲ key to move the thread nipper in the home position direction. Press the ▼ key to move the thread nipper in the retract direction.
[21]	[in1]	[on] / [oFF]	Option input (IN1)
[22]	[in2]	[on] / [oFF]	Option input (IN2)
[23]	[in3]	[on] / [oFF]	Option input (IN3)
[24]	[in4]	[on] / [oFF]	Option input (IN4)
[25]	[in5]	[on] / [oFF]	Option input (IN5)
[26]	[rot]	[on] / [oFF]	Option input (IN11)
[27]	[Fib]	[on] / [oFF]	Fiber-type thread breakage detection [Option compatibility]

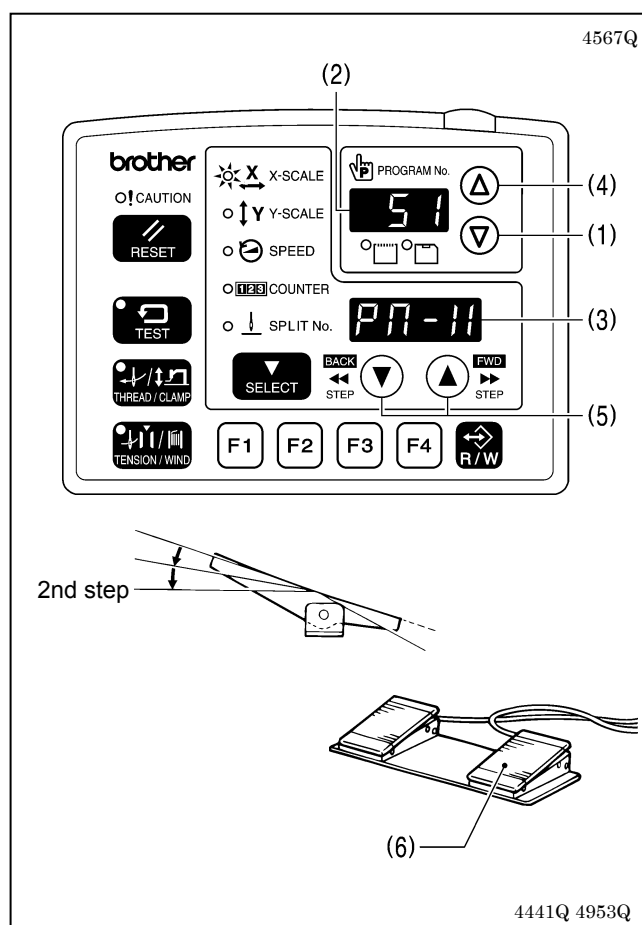
*1 Not used for the BAS-311G and BAS-326G.

PROGRAM No. display		Menu display	Check item and checking method
Check code	Name	Input status	
[28]	[Por]	[on] / [oFF]	Work clamp home position sensor
[29]	[Xor]	[on] / [oFF]	X-feed home position sensor
[30]	[Yor]	[on] / [oFF]	Y-feed home position sensor
[31]	[in6]	[on] / [oFF]	Option input (IN6)
[32]	[in7]	[on] / [oFF]	Option input (IN7)
[33]	[in8]	[on] / [oFF]	Option input (IN8)
[34]	[in9]	[on] / [oFF]	Option input (IN9)
[35]	[in10]	[on] / [oFF]	Option input (IN10)

2-9. Output checking method

Use this to check for any malfunctions of the circuit boards, and for checking for problems with drive mechanisms and broken cords.

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



1. While pressing the ∇ key (1), turn on the power switch.
* Keep pressing the ∇ key (1) until the model name is displayed and the buzzer beeps once.
The check code will be displayed in the PROGRAM No. display (2), and the abbreviated name of the output will be displayed in the menu display (3).
2. Press the Δ key (4) or ∇ key (1) to select the desired check code.
3. The operations for check codes 51 to 54 can be checked by pressing the Δ or ∇ key (5).
4. For check codes 55 and onward, depress the foot switch to the 2nd step.
(If using a two-pedal foot switch, lower the work clamp before depressing the start switch (6).)

The corresponding operation for the check code will be carried out while the foot switch is being depressed (while the foot switch has been depressed once for check code 60).

5. To return to normal operation, turn off the power switch and then turn it back on again.

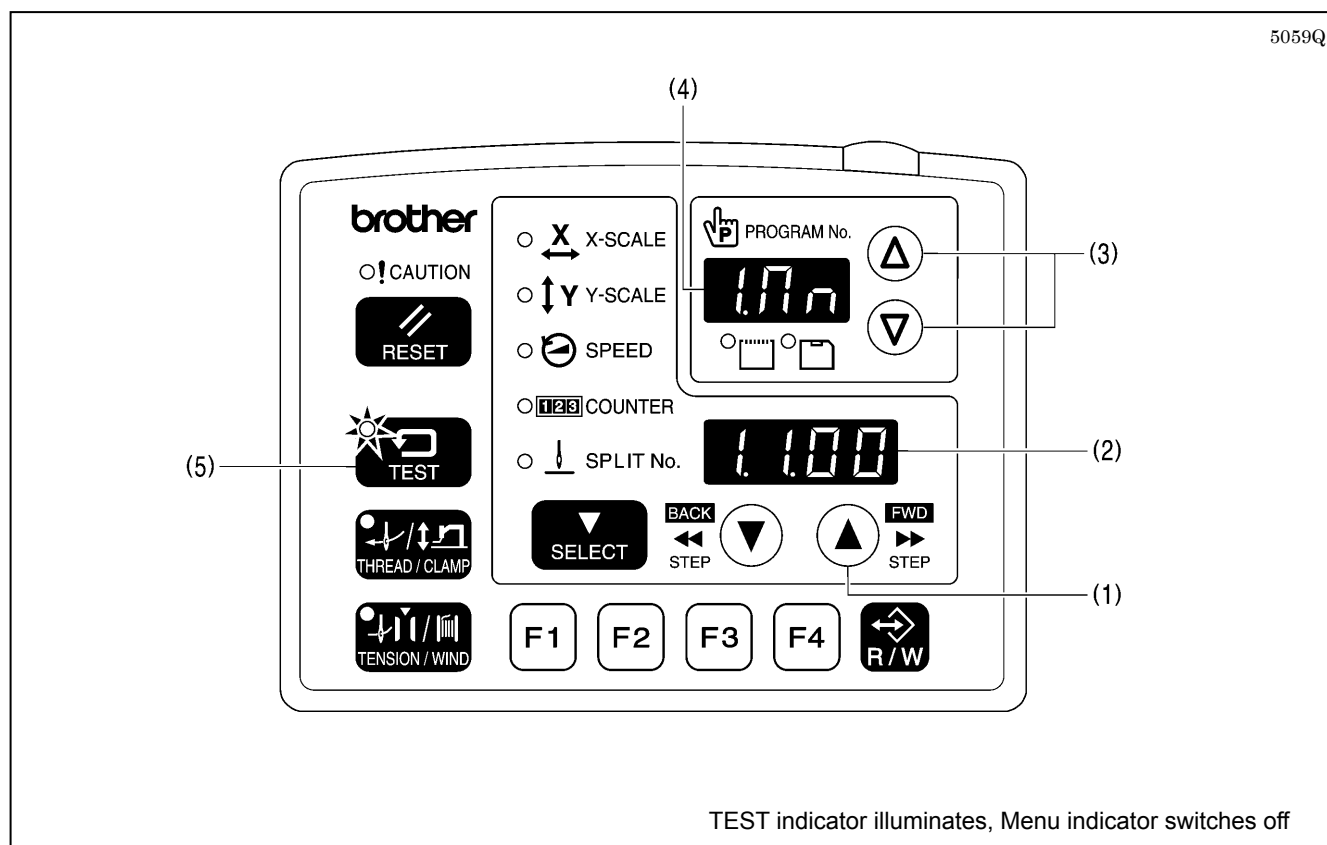
PROGRAM No. display Check code	Menu display Name	Operating details
[51]	[PM-X]	When the Δ key is pressed, the work clamp moves to the left. When the ∇ key is pressed, the work clamp moves to the right.
[52]	[PM-y]	When the Δ key is pressed, the work clamp moves forward. When the ∇ key is pressed, the work clamp moves back.
[53]	[PM-F]	When the Δ key is pressed, the work clamp lifts. When the ∇ key is pressed, the work clamp drops.
[54]	[CAtH]	When the Δ key is pressed, the thread nipper moves to the home position. When the ∇ key is pressed, the thread nipper moves to the retract position. [Option compatibility]
[55]	[CL-r]	Right clamp valve turns on. (OUT16) (*1)
[56]	[CL-L]	Left clamp valve turns on. (OUT15) (*1)
[57]	[Foot]	Intermittent presser foot valve turns on. (OUT14) (*1)
[58]	[FLiP]	Inner clamping device valve turns on. (OUT13) (*1)
[59]	[Cool]	Needle cooler valve turns on. (OUT12) (*1)
[60]		The panel LEDs illuminate in order, and then the seven segments of the PROGRAM No. display and the menu display illuminate one by one.

*1 Applies for pneumatic specifications when corresponding devices are installed.

PROGRAM No. display	Menu display	Operating details
Check code	Name	
[61]	[CUt]	Turns on the thread trimming solenoid.
[62]	[rEL] / [dtEn]	Turns on the tension release solenoid/digital tension solenoid. (*2) However, in the case of digital tension, the solenoid turns on at the tension that has been set.
[63]	[WiP]	Turns on the thread wiper solenoid.
[64]	[StEP]	Turns on the option solenoid. [Option compatibility]
[65]	[oP1]	Turns on option output 1.
[66]	[oP2]	Turns on option output 2.
[67]	[oP3]	Turns on option output 3.
[68]	[oP4]	Turns on option output 4.
[69]	[oP5]	Turns on option output 5.
[70]	[oP6]	Turns on option output 6.
[71]	[oP7]	Turns on option output 7.
[72]	[oP8]	Turns on option output 8.
[73]	[oP9]	Turns on option output 9.
[74]	[oP10]	Turns on option output 10.
[75]	[oP11]	Turns on option output 11.
[76]	[oP17]	Turns on option output 17.
[77]	[oP18]	Turns on option output 18.
[78]	[oP19]	Turns on option output 19.
[79]	[oP20]	Turns on option output 20.

*2 Can be determined automatically using a connector shorting pin.

2-10. Software version checking method



1. While pressing the ▲ key (1), turn on the power. The software version will be displayed in the menu display (2).
* Keep pressing the ▲ key (1) until the model name is displayed and the buzzer beeps once.
2. The display in the PROGRAM No. display (4) switches as follows each time the ▲ or ▼ key (3) is pressed.

PROGRAM No. display (4)	Software
[1.Mn]	Main CPU
[2.Mt]	Motor CPU
[3.PL]	Panel CPU
[4.iP]	Main CPU (IPL)
[5.PG]	Programmer

3. When the TEST key (5) is pressed, the display will return to the normal display and the sewing machine will change to home position standby.

3. READING / WRITING DATA

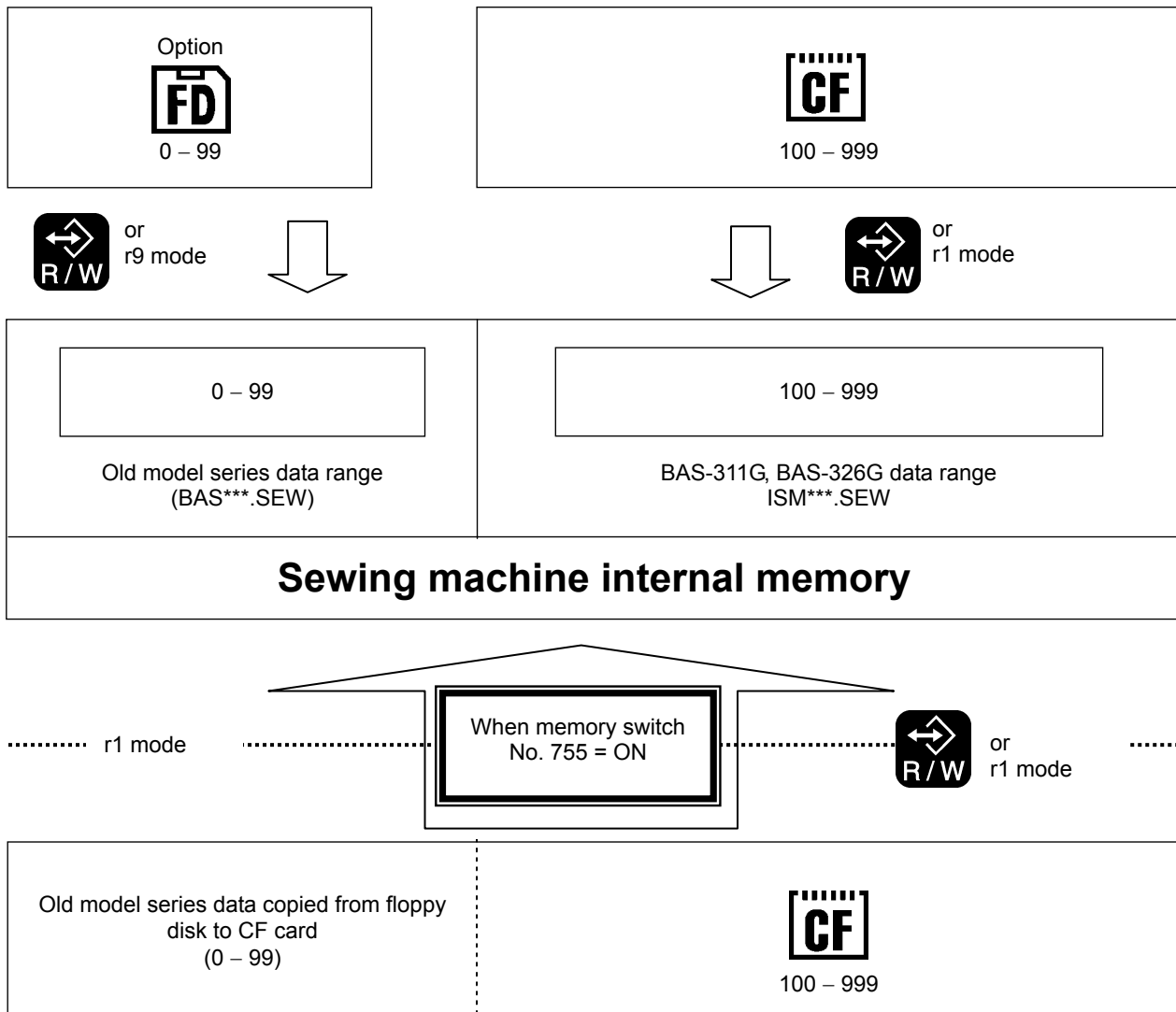
3-1. Handling data

Program numbers (100 – 999) are read from CF cards.

Program numbers (0 – 99) are older BAS-300 series, BAS-300A series and BAS-300E/F series data and can be read from floppy disks.

However, when memory switch No. 755 is set to ON, data for older series models (program numbers 0 – 99) can be transferred from a floppy disk to a CF card using a computer and then be read from the CF card.

* In such cases, the effective reading mode will be [r 1].



3-2. Notes on handling CF cards (sold separately)

- Use a CF card with a memory capacity of 32, 64, 128 or 256 MB.
- Do not disassemble or modify the CF card.
- Do not bend, drop or scratch CF cards or place heavy objects on top of them.
- Avoid contact with liquids such as water, oil, solvents or drinks.
- Use and store CF cards in locations that are free from strong static electricity and electrical interference.
- Do not use or store CF cards in places where they may be subject to vibrations or shocks, direct sunlight, high temperature or humidity or strong magnetic fields from equipment such as speakers, or places which are dusty from thread scraps, etc.
- Do not subject CF cards to shocks or impacts or remove them from the sewing machine while data is being loaded or written.
- The data on the CF cards may become lost or corrupted due to some malfunction or accident. It is recommended that you make a backup of important data.
- CF cards should only be removed after the power for the sewing machine has been turned off.
- CF cards are already formatted when they are purchased, and so you should not reformat them.
- The recommended CF cards are commercially-available ones from SanDisk or HAGIWARA SYS-COM. CF cards from other manufacturers can be used, but different formatting methods may mean that loading from or writing to such cards may not be possible.

For more information, refer to the documentation provided with the CF card.

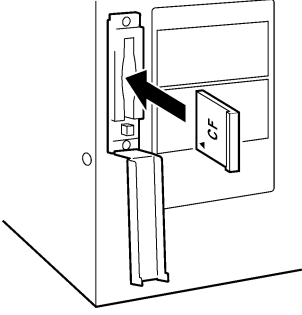
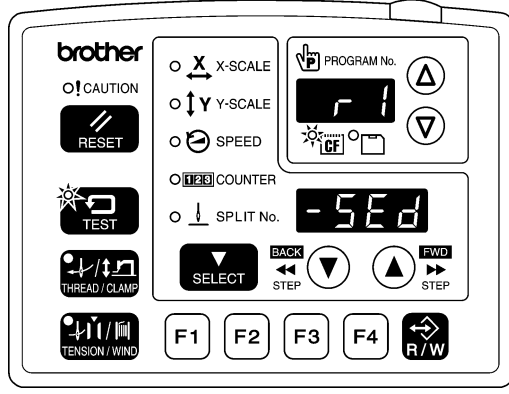


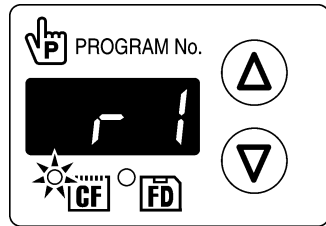
- * This product is compatible with CF cards that have been formatted using the FAT16 method. Cards that have been formatted using the FAT32 method cannot be used.
- * CF™ is a trademark of SanDisk Corporation.
- * Company names and product names appearing in this manual are trademarks or registered trademarks of the respective owners. However, no TM or other similar symbols appear in the main text of this manual.

3-3. Structure of a CF card folder

\BROTHER\ISM\ISMSYS\ISM02MN.MOT	: Control program
\BROTHER\ISM\ISMDB00\ISMMSW.SEW	: Memory switch data
*1 \ISMUPG.SEW	: User program data
\ISMHST.SEW	: Error log data
\ISMS0100.SEW	: Sewing data P No. = 100
\ISMS0101.SEW	: Sewing data P No. = 101
\ISMS0102.SEW	: Sewing data P No. = 102
⋮	⋮

- *1 The underlined portion of the name of the \BROTHER\ISM\ISMDB00 folder for sewing data can be changed by changing the setting for memory switch No. 752 in order to change the folder name. Change the folder name if you would like to store sewing data for different sewing machines on a single CF card.

3-4. Data read/write mode

1		<p>With the power turned off, insert the CF card into the CF slot.</p> <p>NOTE:</p> <ul style="list-style-type: none"> • Make sure the CF card is facing the correct way. • Always be sure to keep the cover closed except when inserting and removing the CF card. If this is not done, dust may get inside and cause problems with operation. • If no valid data can be found, the CF media indicator will not illuminate.
2	Turn on the power switch.	
3	<p>Switch to data read/write mode.</p>  <p>TEST indicator and CF media indicator illuminate</p>	<p>While pressing the TEST key, press the R/W key.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>TEST</p> </div> <div style="text-align: center;">  <p>R/W</p> </div> </div> <ul style="list-style-type: none"> • The mode number will appear in the PROGRAM No. display, and the setting details for that mode will appear in the menu display. • The initial mode is sewing data reading mode. (Refer to the read/write mode list)
4		<p>Press the Δ or ∇ key to select the mode.</p>

[Read/write mode list]

PROGRAM No. display	Menu display	Setting items
r 1	[-SEd]	Sewing data is read from the CF card. (*1)
w 2	[SEd-]	Sewing data is written to the CF card.
r 3	[-MEM]	Memory switch settings are read from the CF card.
w 4	[MEM-]	Memory switch settings are written to the CF card.
r 5	[-UPG]	User programs are read from the CF card.
w 6	[UPG-]	User programs are written to the CF card.
r 7	[-SyS]	Control programs are read from the CF card and used to update the firmware version.
w 8	[LoG-]	Error log data is written to the CF card.
r 9	[-Fdd]	Sewing data is read from the floppy disk. (*2) (*3)
w 10	[Fdd-]	Sewing data is written to the floppy disk. (*2)
r 11	[-EoP]	Extended option output (*4) data is read from the CF card.
w 12	[EoP-]	Extended option output data is written to the CF card.
r 13	[oPFd]	Extended option output data is read from the floppy disk. (*2)

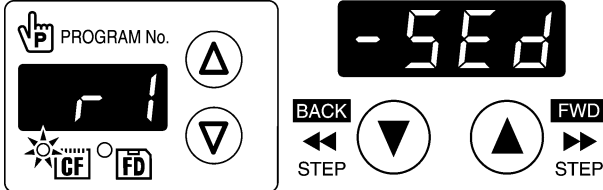



*1 The sewing data that can be use with this sewing machine is data that has been created for the BAS-311G/BAS-326G.

*2 Only valid when using an optional floppy disk drive.

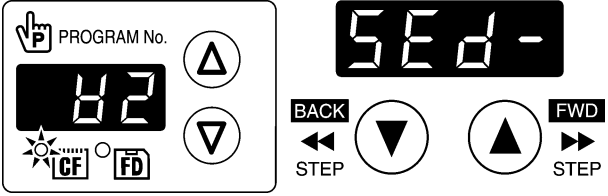
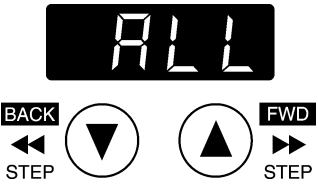
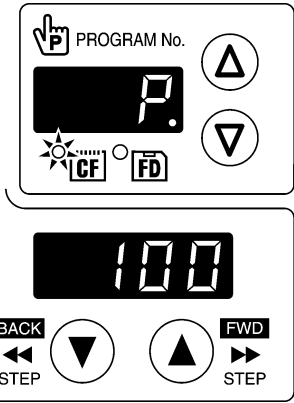

*3 Sewing data for the BAS-300 series, BAS-300A series and BAS-300E/F series can be read.

*4 Refer to the instruction manual for the programmer for details on extended option output.

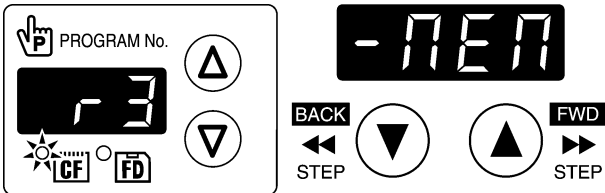
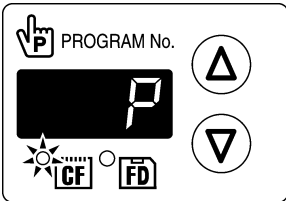

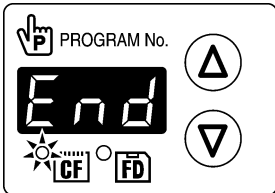
3-5. Reading sewing data from CF cards

1	<p>Select the [r 1] data read/write mode.</p>  <p>4576Q</p>
2	<p>Press the R/W key.</p>  <p>• [-SEd] will change to [ALL].</p> <p>Press the ▲ or ▼ key to select the program number (100 – 999) to be read.</p> <p>* If [ALL] is selected, all sewing data (Nos. 100—999) will be read at once.</p> <p>[When memory switch No. 755 is ON] The program number (0 – 99) is also displayed and can be selected. If you select [ALL] at this time, all sewing data (Nos. 0 – 999) will be read at once.</p> <p>4577Q</p>
3	<p>Press the R/W key.</p>  <p>• The buzzer will sound and the selected sewing data will be loaded from the CF card and copied into the sewing machine's internal memory.</p> <p>• The program numbers that have been read will be displayed in the menu display.</p> <p>* If there is a large volume of data in the CF card, it will take some time for all of it to be read. To halt the reading of data, press the STOP switch. If you then press the RESET key, the display will change back to [ALL].</p> <p>4976Q</p>
4	<p>End data read/write mode</p> <p>Press the TEST key.</p> <p>Turn off the power switch, remove the CF card, and then close the cover of the CF slot.</p>  <p>TEST indicator switches off</p>

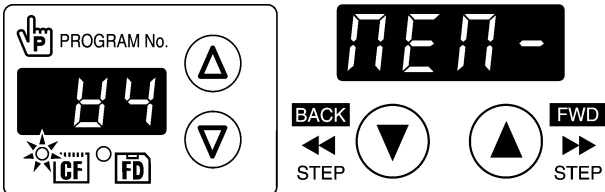
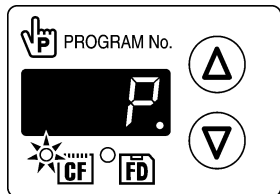


3-6. Writing sewing data to CF cards

1	<p>Select the [w 2] data read/write mode.</p>  <p style="text-align: right;">4578Q</p>
2	<p>Press the R/W key.</p>  <ul style="list-style-type: none"> • [SEd-] will change to [ALL]. <p>Press the ▲ or ▼ key to select the program numbers (100 – 999) to be written.</p> <p>* If you select [ALL], all sewing data (Nos. 100 – 999) will be written at once.</p> <p>[When memory switch No. 755 is ON] The program numbers (0 – 99) will also be displayed and can be selected. If you select [ALL] at this time, all sewing data (Nos. 0 – 999) will be written at once.</p> <p style="text-align: right;">4577Q</p>
3	<p>Press the R/W key.</p>  <ul style="list-style-type: none"> • The buzzer will sound and the selected sewing data will be copied from the internal memory onto the CF card. • The program numbers that have been written will appear in the PROGRAM No. display. <p>* If there is a large volume of data in the internal memory, it will take some time for all of it to be written. To halt the writing of data, press the STOP switch. If you then press the RESET key, the display will change back to [ALL].</p> <p style="text-align: right;">4977Q</p>
4	<p>End data read/write mode</p> <p>Press the TEST key. Turn off the power switch, remove the CF card, and then close the cover of the CF slot.</p>  <p>TEST indicator switches off</p>

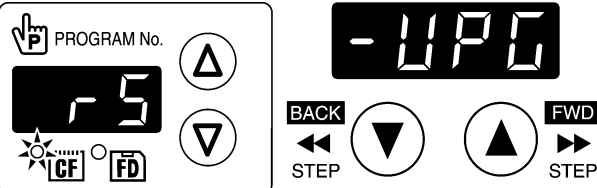
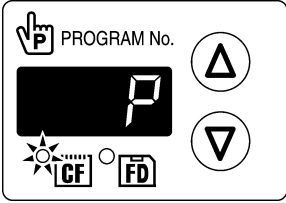

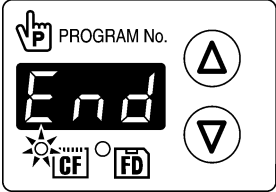
3-7. Reading memory switch data from CF cards

1	 <p>Select the [r 3] data read/write mode.</p> <p>4580Q</p>
2	 <p>Press the R/W key.</p>  <ul style="list-style-type: none"> The buzzer will sound and the memory switch data will be loaded from the CF card and copied into the sewing machine's internal memory. <p>Loading</p> <p>4498Q</p>
3	 <p>When [End] is displayed, the process is complete. Turn off the power switch, remove the CF card, and then close the cover of the CF slot.</p> <p>4581Q</p>

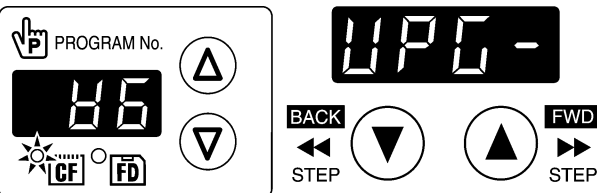
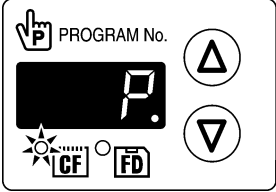


3-8. Writing memory switch data to CF cards

1	 <p>Select the [w 4] data read/write mode.</p> <p>4582Q</p>
2	 <p>Press the R/W key.</p>  <ul style="list-style-type: none"> The buzzer will sound and the memory switch data will be copied from the internal memory onto the CF card. <p>Writing</p> <p>4579Q</p>
3	<p>End data read/write mode</p>  <p>Press the TEST key. Turn off the power switch, remove the CF card, and then close the cover of the CF slot.</p> <p>TEST indicator switches off</p>

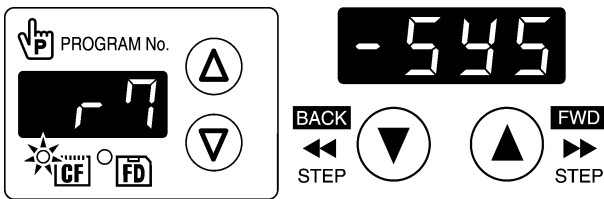

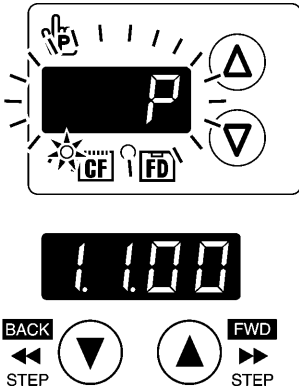

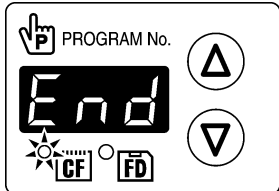
3-9. Reading user program data from CF cards

1		<p>Select the [r 5] data read/write mode.</p> <p style="text-align: right;">4583Q</p>
2		<p>Press the R/W key.</p>  <ul style="list-style-type: none"> The buzzer will sound and the user program data will be loaded from the CF card and copied into the sewing machine's internal memory. <p style="text-align: center;">Loading</p> <p style="text-align: right;">4498Q</p>
3		<p>When [End] is displayed, the process is complete. Turn off the power switch, remove the CF card, and then close the cover of the CF slot.</p> <p style="text-align: right;">4581Q</p>

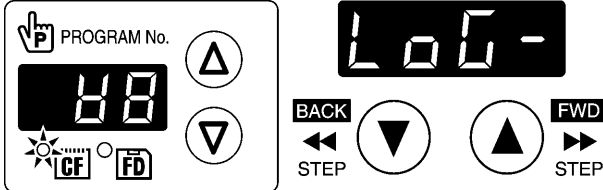
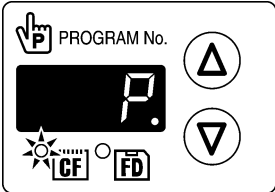

3-10. Writing user program data to CF cards

1		<p>Select the [w 6] data read/write mode.</p> <p style="text-align: right;">4584Q</p>
2		<p>Press the R/W key.</p>  <ul style="list-style-type: none"> The buzzer will sound and the user program data will be copied from the internal memory onto the CF card. <p style="text-align: center;">Writing</p> <p style="text-align: right;">4579Q</p>
3	<p>End data read/write mode</p>  <p style="text-align: center;">TEST indicator switches off</p>	<p>Press the TEST key. Turn off the power switch, remove the CF card, and then close the cover of the CF slot.</p>

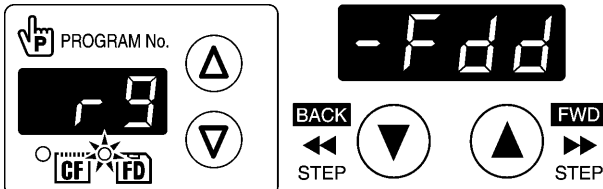
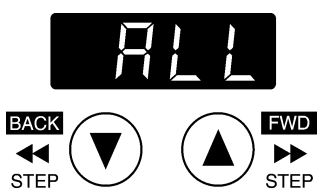
3-11. Updating the control program

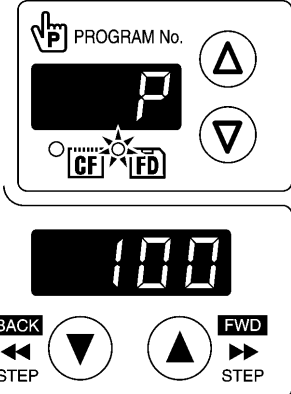


1	<p>Select the [r 7] data read/write mode.</p>  <p>4585Q</p>
2	<p>Press the R/W key.</p>  <ul style="list-style-type: none"> [-SyS] will be displayed for a certain amount of time, and then the display will change to [vEr], and after that the version number of the control program that is stored on the CF card will be displayed.
3	<p>Press the R/W key.</p>   <ul style="list-style-type: none"> [P] will flash in the PROGRAM No. display and the control program will be updated. <p>NOTE: If the filename and folder name for the control program are incorrect, error [E421] will be displayed.</p> <p>5060Q</p>
4	<p>When [End] is displayed, the process is complete. Turn off the power switch, remove the CF card, and then close the cover of the CF slot.</p>  <p>4581Q</p> <p>NOTE:</p> <ul style="list-style-type: none"> Version updating may take about 3 – 10 minutes. (The time taken will vary depending on the manufacturer and storage capacity of the CF card being used.) Never remove the CF card or turn off the power switch while reading of the CF card is in progress.
<p><Restoring the control program if an error occurs during updating></p> <p>If the version updating did not complete normally, such as because of a power outage, the sewing machine will not operate correctly.</p> <p>If this happens, restore the control program by the following procedure.</p> <ol style="list-style-type: none"> 1. Insert the CF card containing the control program data into the CF card slot. 2. Turn on the power switch. The operation panel will switch off and the version updating will be carried out. 3. When the initial screen turns back on, the updating is complete. Turn off the power switch, remove the CF card, and then close the cover of the CF slot. 	

3-12. Writing error log data to CF card

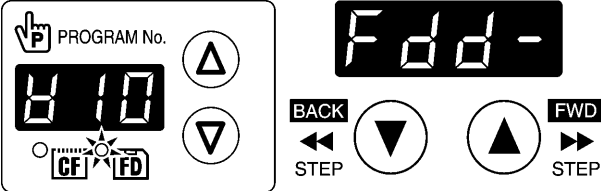

1	<p>Select the [w 8] data read/write mode.</p>  <p style="text-align: right;">5061Q</p>
2	<p>Press the R/W key.</p>  <ul style="list-style-type: none"> The buzzer will sound and the error log data will be copied from the internal memory onto the CF card. <p style="text-align: right;">4579Q</p>
3	<p>End data read/write mode</p> <p>Press the TEST key.</p> <p>Turn off the power switch, remove the CF card, and then close the cover of the CF slot.</p>  <p style="text-align: right;">TEST indicator switches off</p>

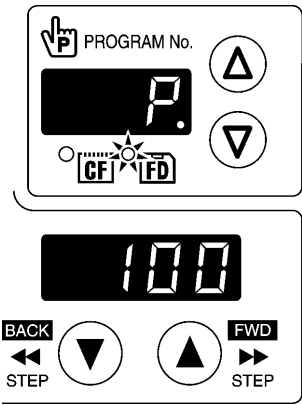


3-13. Reading sewing data from floppy disks

1	<p>Insert the floppy disk into the floppy disk drive.</p>
2	<p>Select the [r 9] data read/write mode.</p>  <p style="text-align: right;">5062Q</p>
3	<p>Press the R/W key.</p>  <ul style="list-style-type: none"> [-Fdd] will change to [ALL]. <p>Press the ▲ or ▼ key to select the program number to be read.</p> <p>* Program numbers that contain no data will also be displayed at this time.</p> <p>* If [ALL] is selected, all sewing data will be read at once.</p> <p style="text-align: right;">4577Q</p>

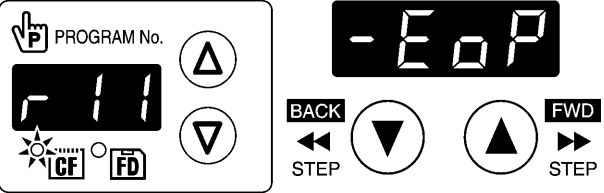
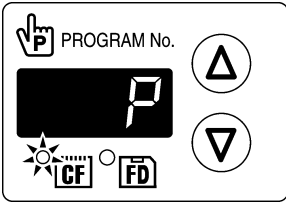

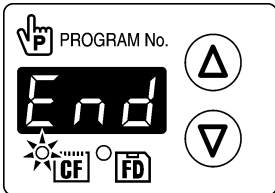
4	<p>Press the R/W key.</p>   <ul style="list-style-type: none"> The buzzer will sound and the selected sewing data will be loaded from the floppy disk and copied into the sewing machine's internal memory. The program numbers that have been read will appear in the menu display. <p>* If there is a large volume of data in the floppy disk, it will take some time for all of it to be read. To halt the reading of data, press the STOP switch. If you then press the RESET key, the display will change back to [ALL].</p> <p>NOTE: If there is no data in the selected program number, error [E421] will be displayed. Press the RESET key and then select another program number.</p> <p style="text-align: right;">Loading 5063Q</p>
5	<p>End data read/write mode</p> <p>Press the TEST key. Turn off the power and remove the floppy disk.</p>  <p style="text-align: center;">TEST indicator switches off</p>

3-14. Writing sewing data to floppy disks

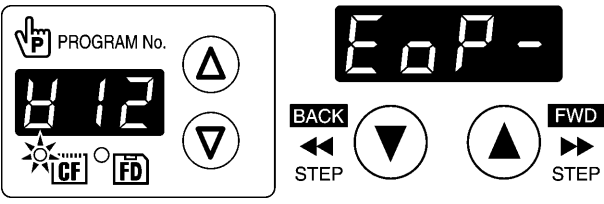
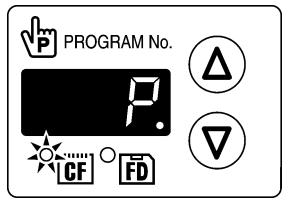

1	<p>Insert the floppy disk into the floppy disk drive.</p>
2	<p>Select the [w 10] data read/write mode.</p>  <p style="text-align: right;">5064Q</p>
3	<p>Press the R/W key.</p>  <ul style="list-style-type: none"> [Fdd-] will change to [ALL]. <p>Press the ▲ or ▼ key to select the program number to be written.</p> <p>* If [ALL] is selected, all sewing data will be written at once.</p> <p style="text-align: right;">4577Q</p>

4		<p>Press the R/W key.</p>  <ul style="list-style-type: none"> • The buzzer will sound and the selected sewing data will be copied from the internal memory onto the floppy disk. • The program numbers that have been written will appear in the menu display. <p>* If there is a large volume of data in the internal memory, it will take some time for all of it to be written. To halt the writing of data, press the STOP switch. If you then press the RESET key, the display will change back to [ALL].</p> <p style="text-align: right;">Writing 5065Q</p>
5	<p>End data read/write mode</p>  <p style="text-align: center;">TEST indicator switches off</p>	<p>Press the TEST key. Turn off the power and remove the floppy disk.</p>

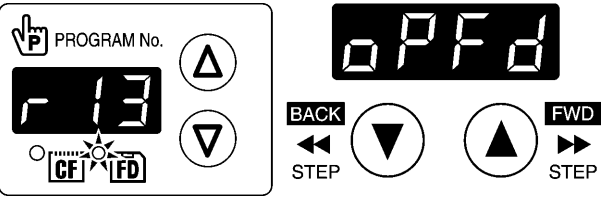
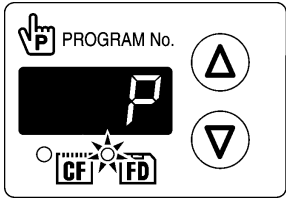
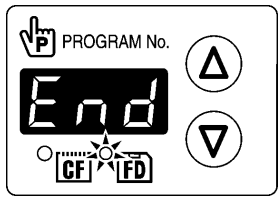
3-15. Reading extended option output data from a CF card

1		<p>Select the [r 11] data read/write mode.</p> <p style="text-align: right;">5066Q</p>
2		<p>Press the R/W key.</p>  <ul style="list-style-type: none"> • The buzzer will sound and the extended option output data will be loaded from the CF card and copied into the sewing machine's internal memory. <p style="text-align: right;">Loading 4498Q</p>
3		<p>When [End] is displayed, the process is complete. Turn off the power switch, remove the CF card, and then close the cover of the CF slot.</p> <p style="text-align: right;">4581Q</p>

3-16. Writing extended option output data to CF cards

1	 <p>Select the [w 12] data read/write mode.</p> <p>5067Q</p>
2	 <p>Press the R/W key.</p> <ul style="list-style-type: none"> The buzzer will sound and the extended option output data will be copied from the internal memory onto the CF card. <p>Writing</p> <p>4579Q</p>
3	<p>End data read/write mode</p>  <p>Press the TEST key. Turn off the power switch, remove the CF card, and then close the cover of the CF slot.</p> <p>TEST indicator switches off</p>

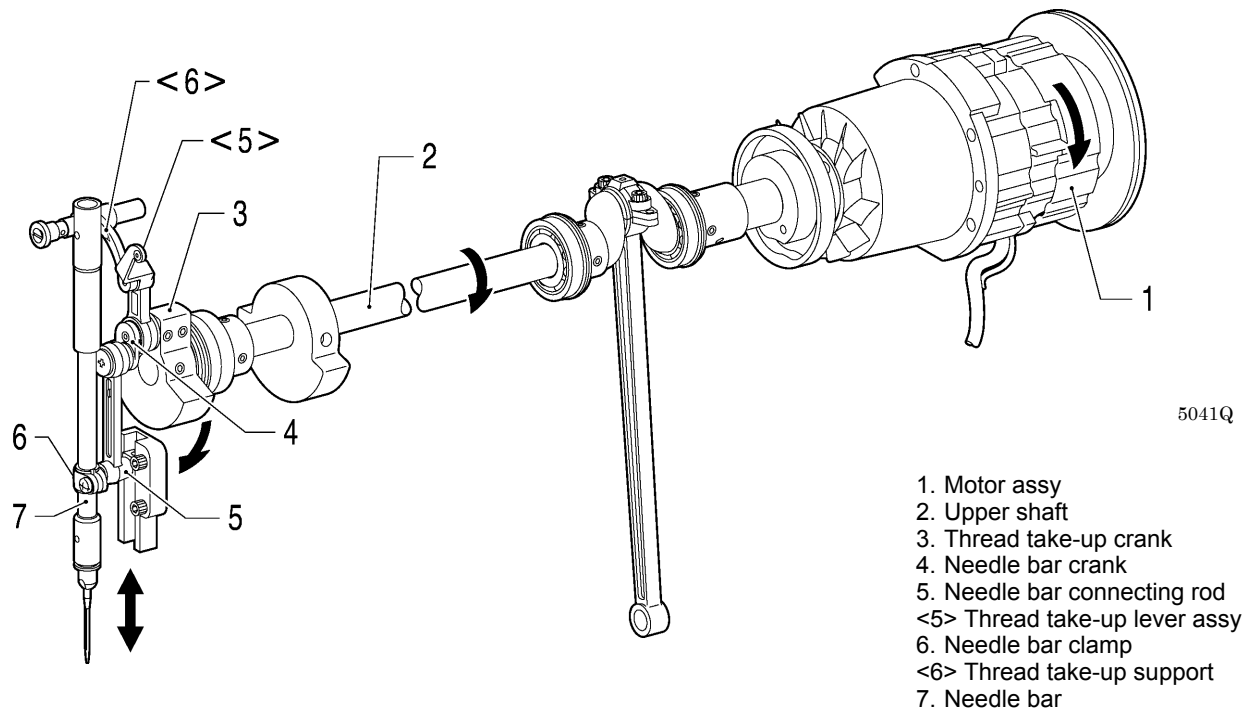
3-17. Reading extended option output data from floppy disks

1	<p>Insert the floppy disk into the floppy disk drive.</p>
2	 <p>Select the [r 13] data read/write mode.</p> <p>5068Q</p>
3	 <p>Press the R/W key.</p> <ul style="list-style-type: none"> The buzzer will sound and the extended option output data will be loaded from the floppy disk and copied into the sewing machine's internal memory. <p>Loading</p> <p>5069Q</p>
4	 <p>When [End] is displayed, the process is complete. Turn off the power and remove the floppy disk.</p> <p>5070Q</p>

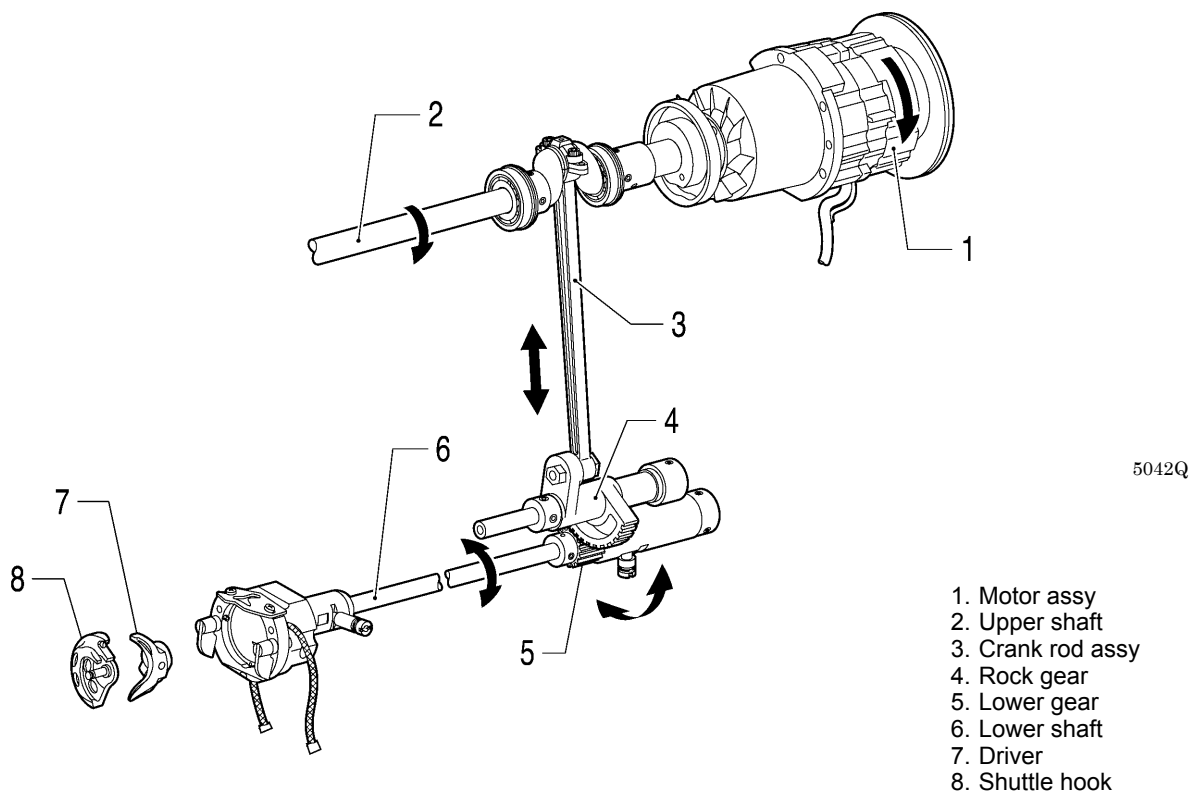
4. MECHANICAL DESCRIPTIONS

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

4-1. Needle bar and thread take-up mechanisms

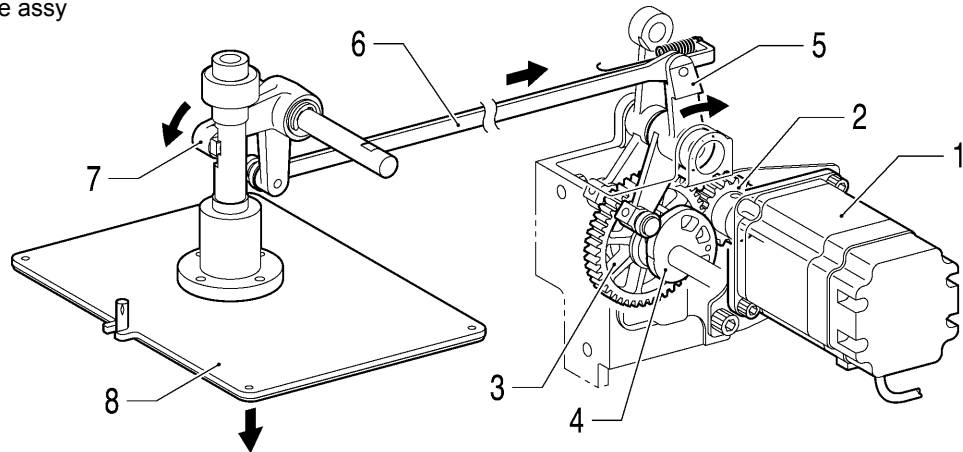


4-2. Lower shaft and shuttle race mechanisms

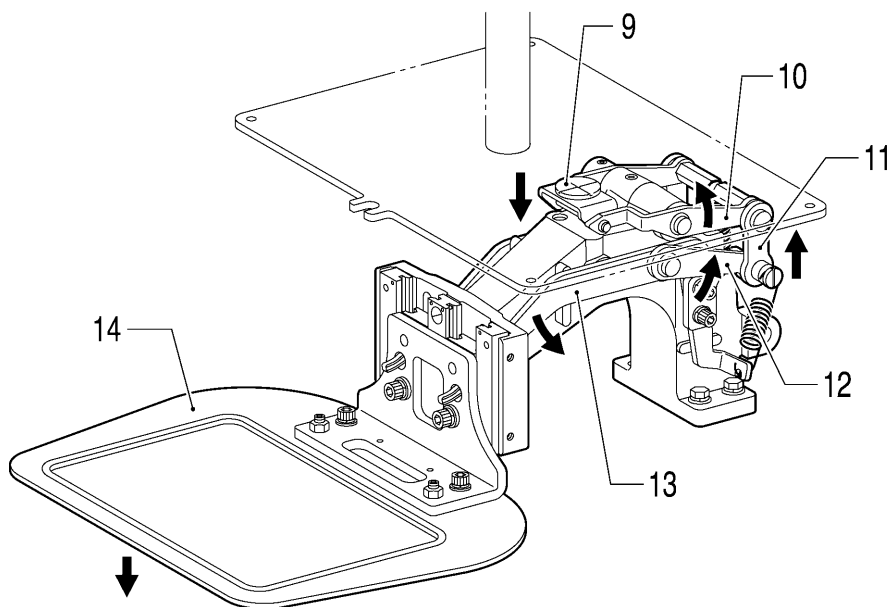


4-3. Work clamp lifter mechanism (Solenoid specifications)

1. Work clamp pulse motor
2. Work clamp driving gear
3. Work clamp cam gear
4. Work clamp cam
5. Work clamp driving lever
6. Work clamp lifter link
7. Work clamp lifter lever
8. Work clamp lifter plate assy



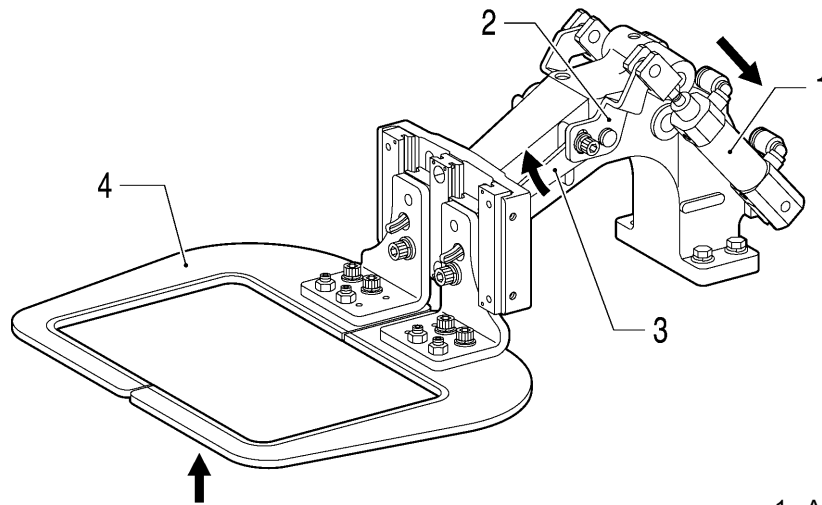
5043Q



9. Slider
10. Work clamp lifter lever
11. Connecting rod
12. Connecting link
13. Work clamp lifter lever
14. Work clamp

5044Q

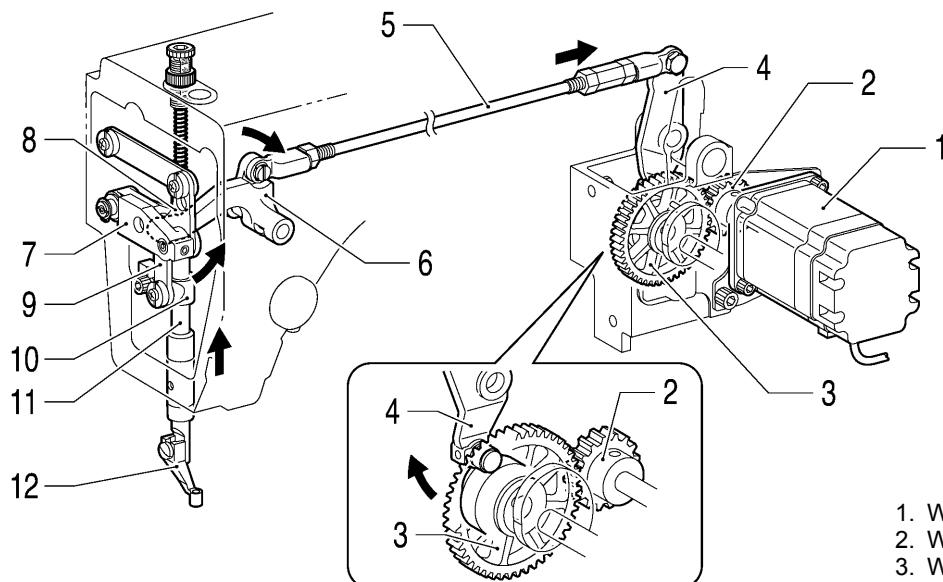
4-4. Work clamp lifter mechanism (Pneumatic specifications)



5045Q

- 1. Air cylinder
- 2. Work clamp lifter lever
- 3. Work clamp lifter lever
- 4. Work clamp

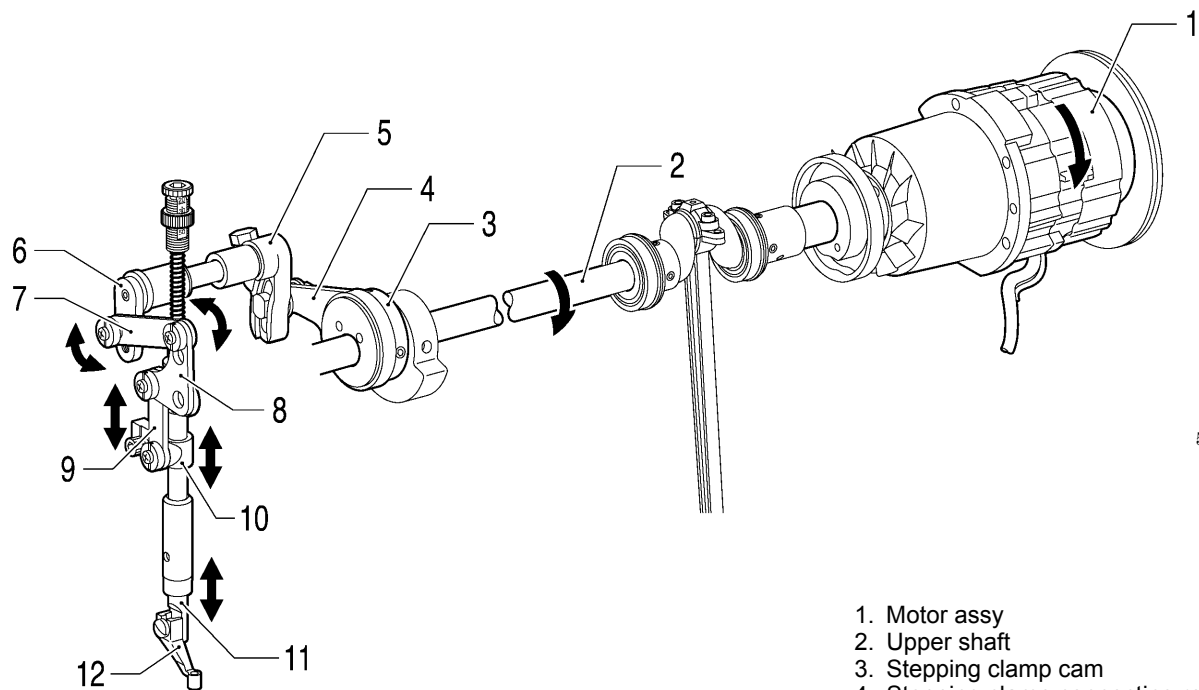
4-5. Intermittent presser foot lifter mechanism



5046Q

- 1. Work clamp pulse motor
- 2. Work clamp driving gear
- 3. Work clamp cam gear
- 4. Stepping foot driving lever
- 5. Stepping clamp lifter rod
- 6. Stepping clamp lifter
- 7. Stepping clamp lifter link
- 8. Stepping clamp link
- 9. Stepping clamp link B
- 10. Presser bar clamp
- 11. Presser bar
- 12. Presser foot

4-6. Intermittent presser foot stroke mechanism



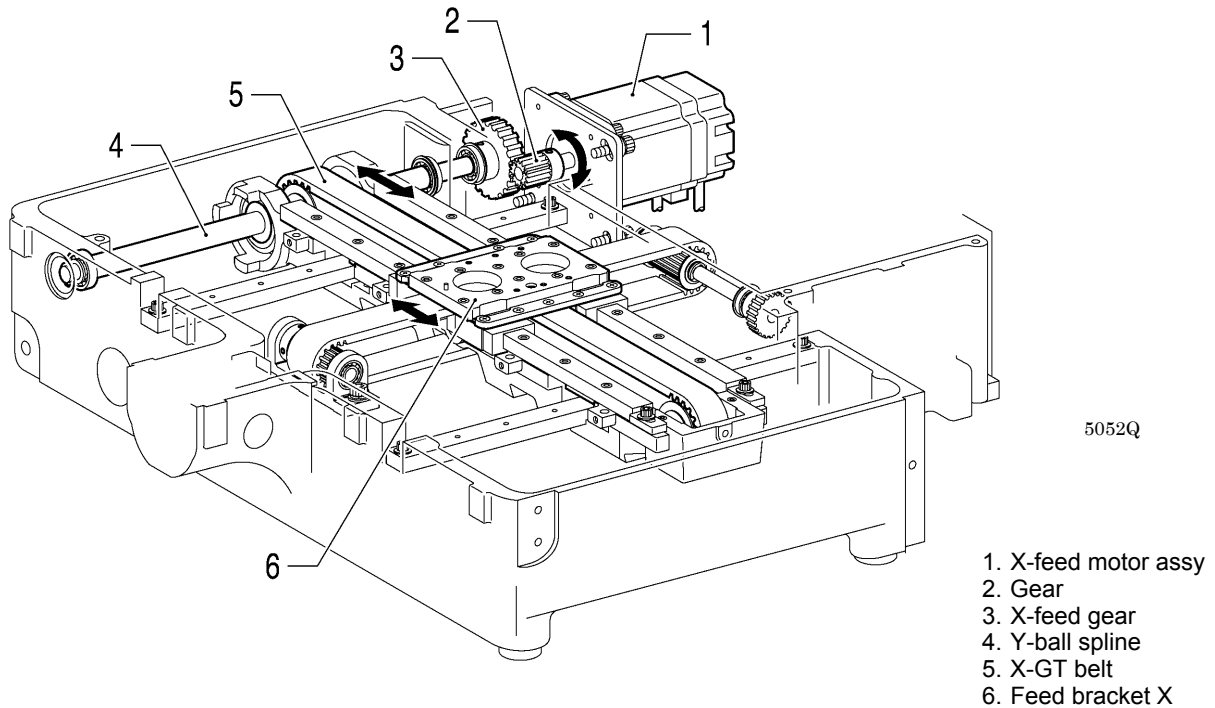
5047Q

1. Motor assy
2. Upper shaft
3. Stepping clamp cam
4. Stepping clamp connecting rod
5. Stepping clamp arm R
6. Stepping clamp arm F
7. Stepping clamp link A
8. Stepping clamp link A
9. Stepping clamp link B
10. Presser bar clamp
11. Presser bar
12. Presser foot

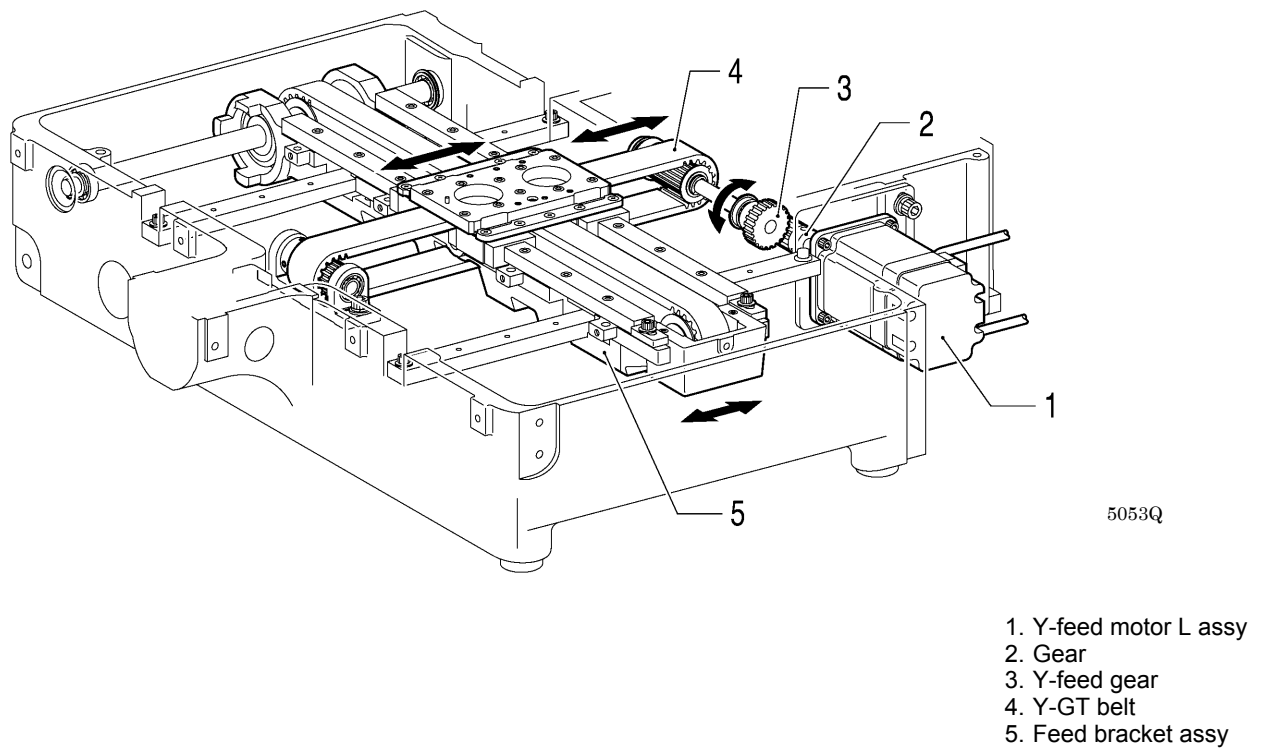
4-7. Feed mechanism

Sewing patterns are created through combinations of X and Y movements.

X direction

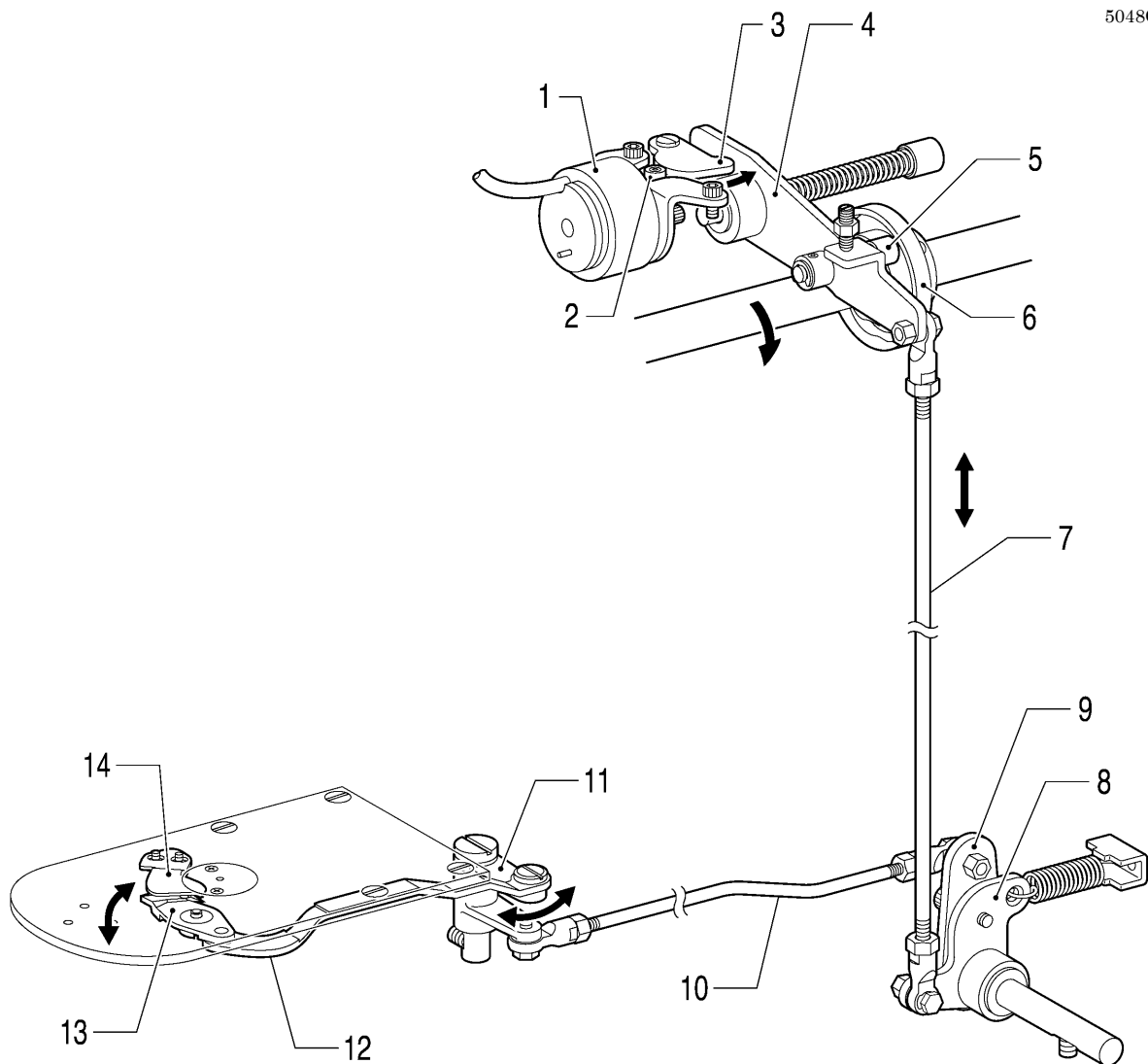


Y direction



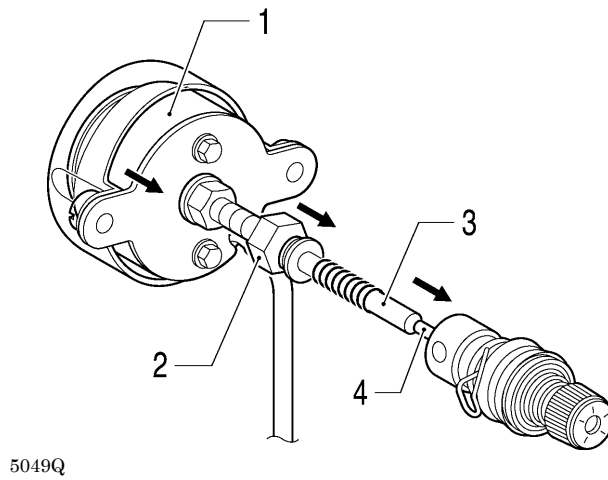
4-8. Thread trimmer mechanism

5048Q



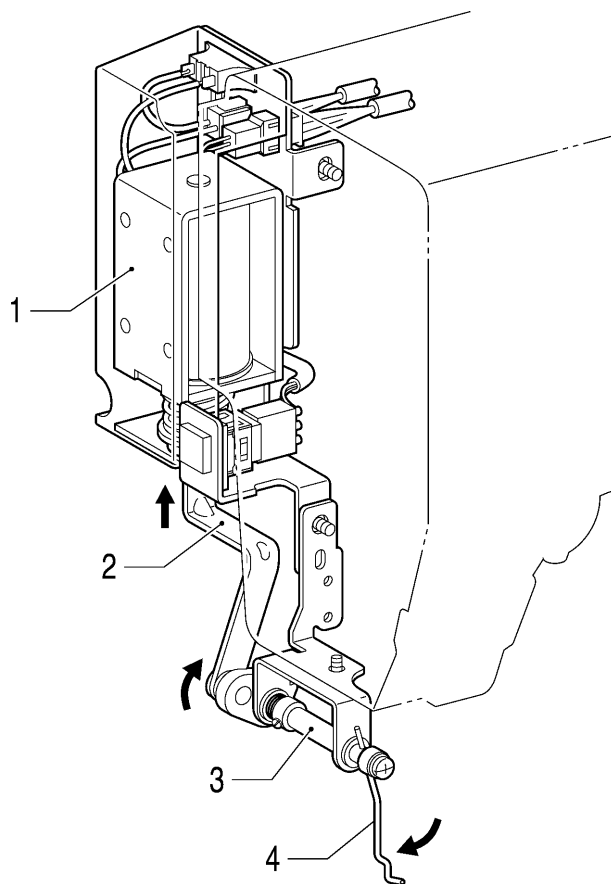
1. Thread trimmer solenoid
2. Solenoid lever
3. Pushing lever
4. Driving lever
5. Thread trimmer collar
6. Thread trimmer cam
7. Thread trimmer rod V
8. Thread trimmer lever V
9. Thread trimmer lever H
10. Thread trimmer rod H
11. Movable knife lever
12. Movable knife connecting plate
13. Movable knife
14. Fixed knife

4-9. Tension release mechanism



- 1. Tension release solenoid
- 2. Bolt
- 3. Tension release bar
- 4. Tension release pin

4-10. Thread wiper mechanism









- 1. Thread wiper solenoid assy
- 2. Thread wiper rod
- 3. Thread wiper crank assy
- 4. Wiper

When the thread wiper solenoid assembly is turned off, the wiper operates in the opposite direction.

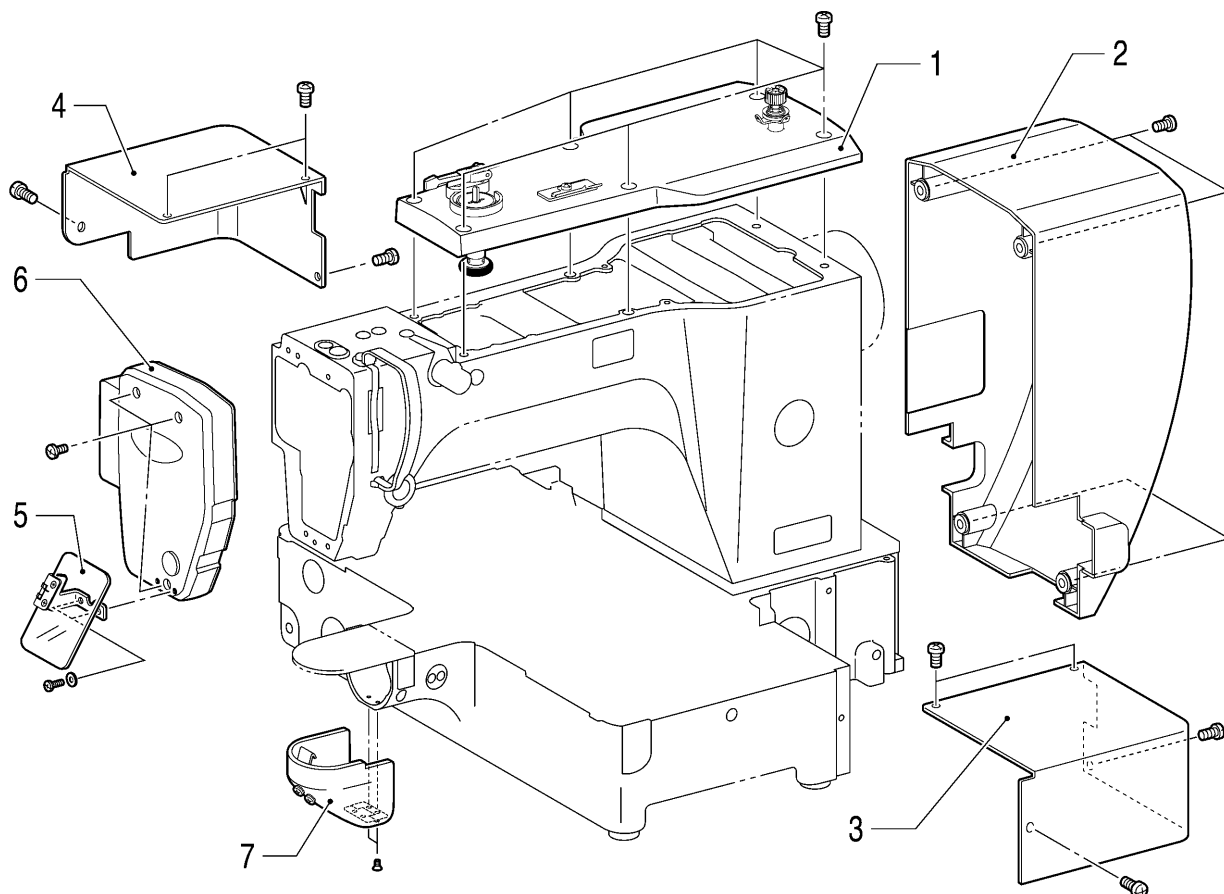
5. DISASSEMBLY

⚠ CAUTION

-  Disassembly should only be carried out by a qualified technician.
-  Turn off the power switch before carrying out disassembly. If the foot switch is depressed by mistake, the sewing machine might start operating and injury could result.
-  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. If the oil and grease get into your eyes or onto your skin, inflammation can result. Furthermore, do not drink or eat the lubricating oil or grease. They may cause diarrhea or vomiting. Keep the oil out of the reach of children.
-  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.

Disassemble each part in order of the numbers.

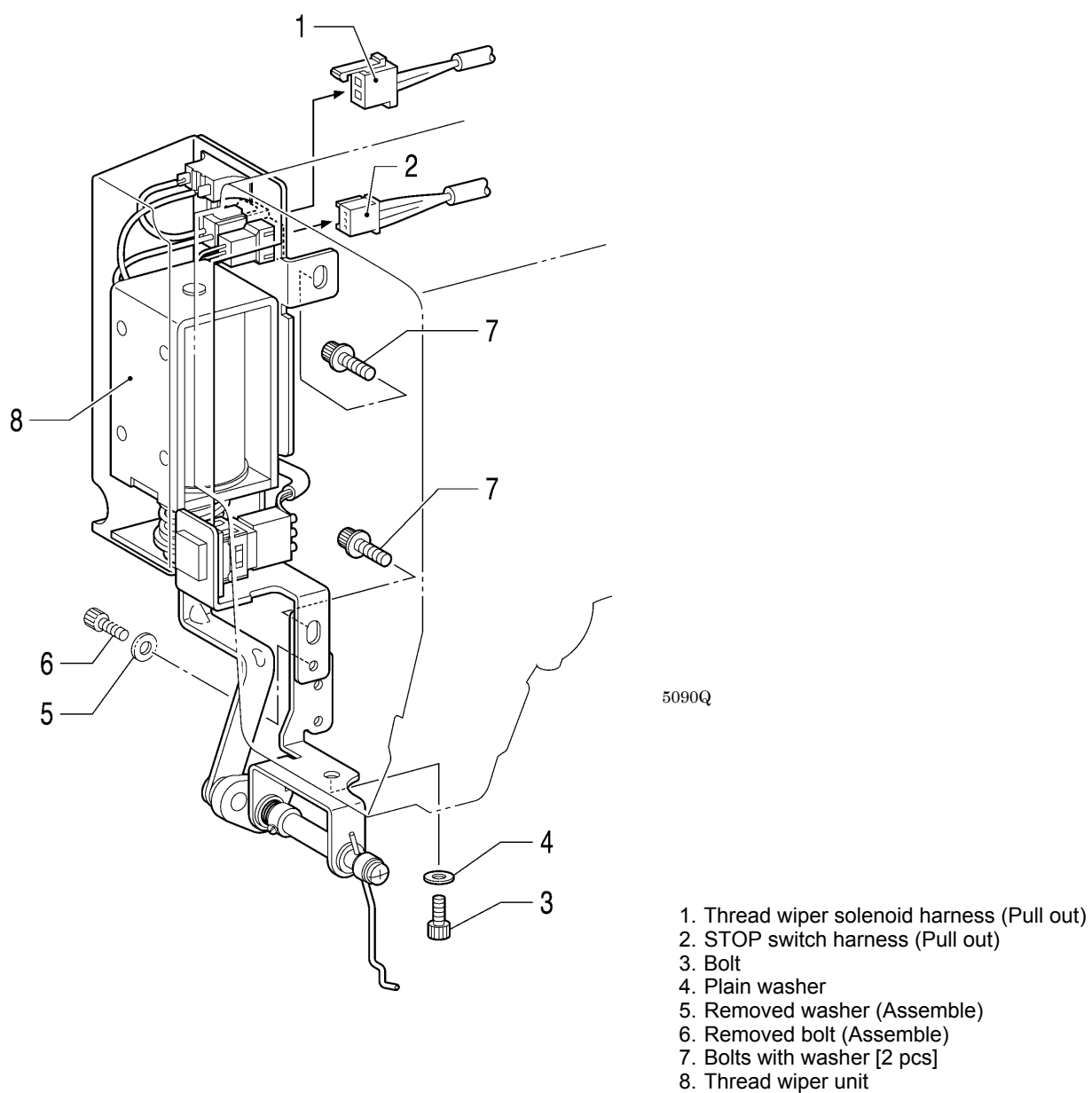
5-1. Covers



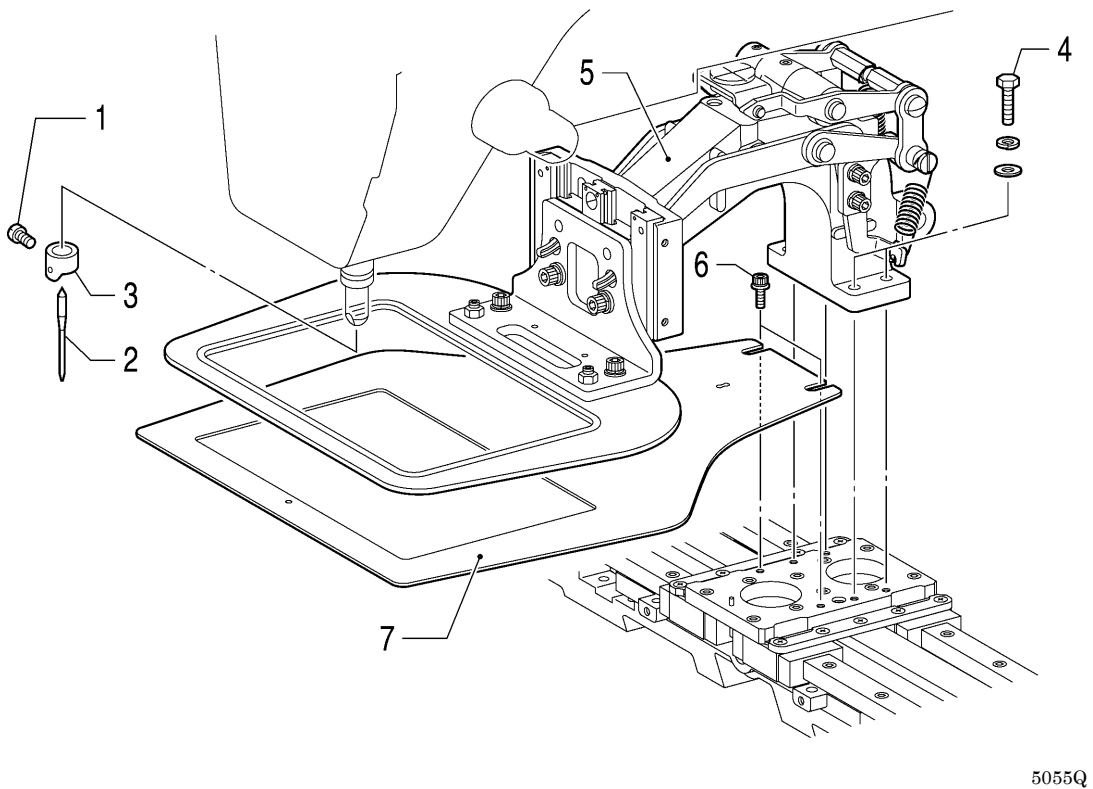
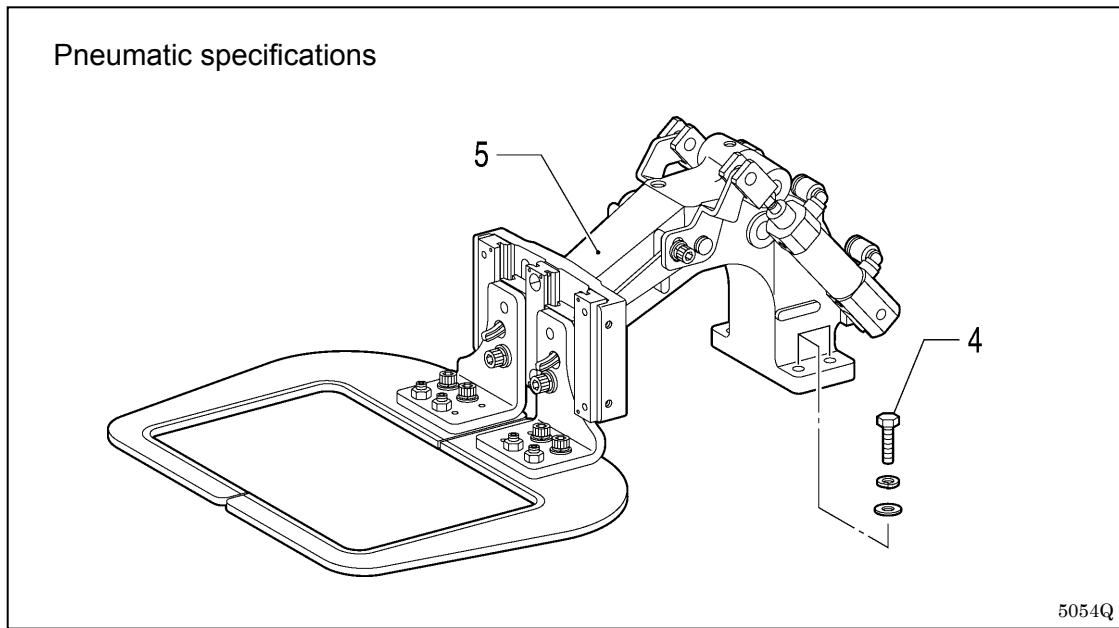
- 1. Top cover
- 2. Motor cover
- 3. Motor cover R
- 4. Motor cover L
- 5. Eye guard
- 6. Face plate
- 7. Shuttle race cover assy

5051Q

5-2. Thread wiper mechanism

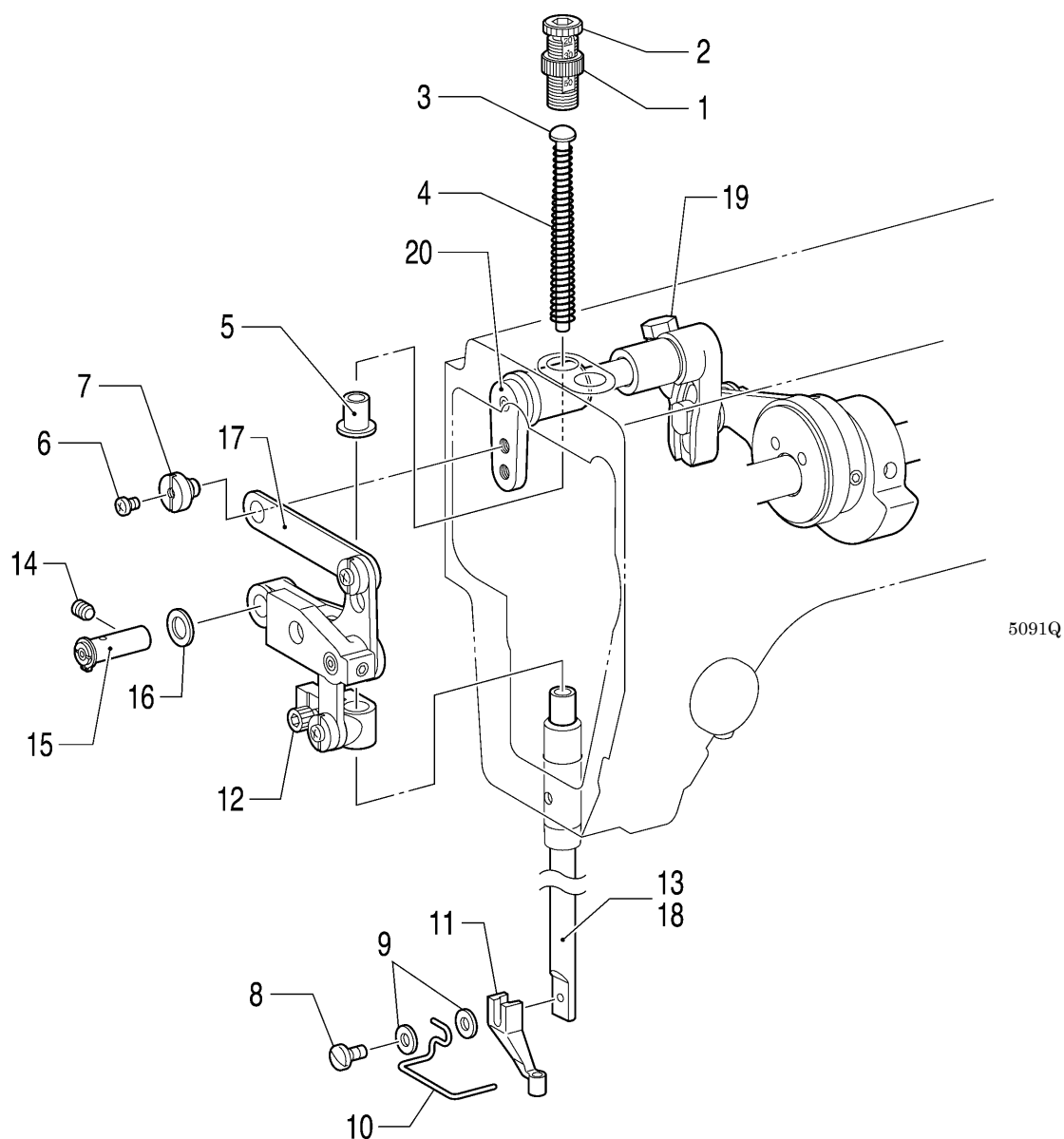


5-3. Work clamp arm mechanism



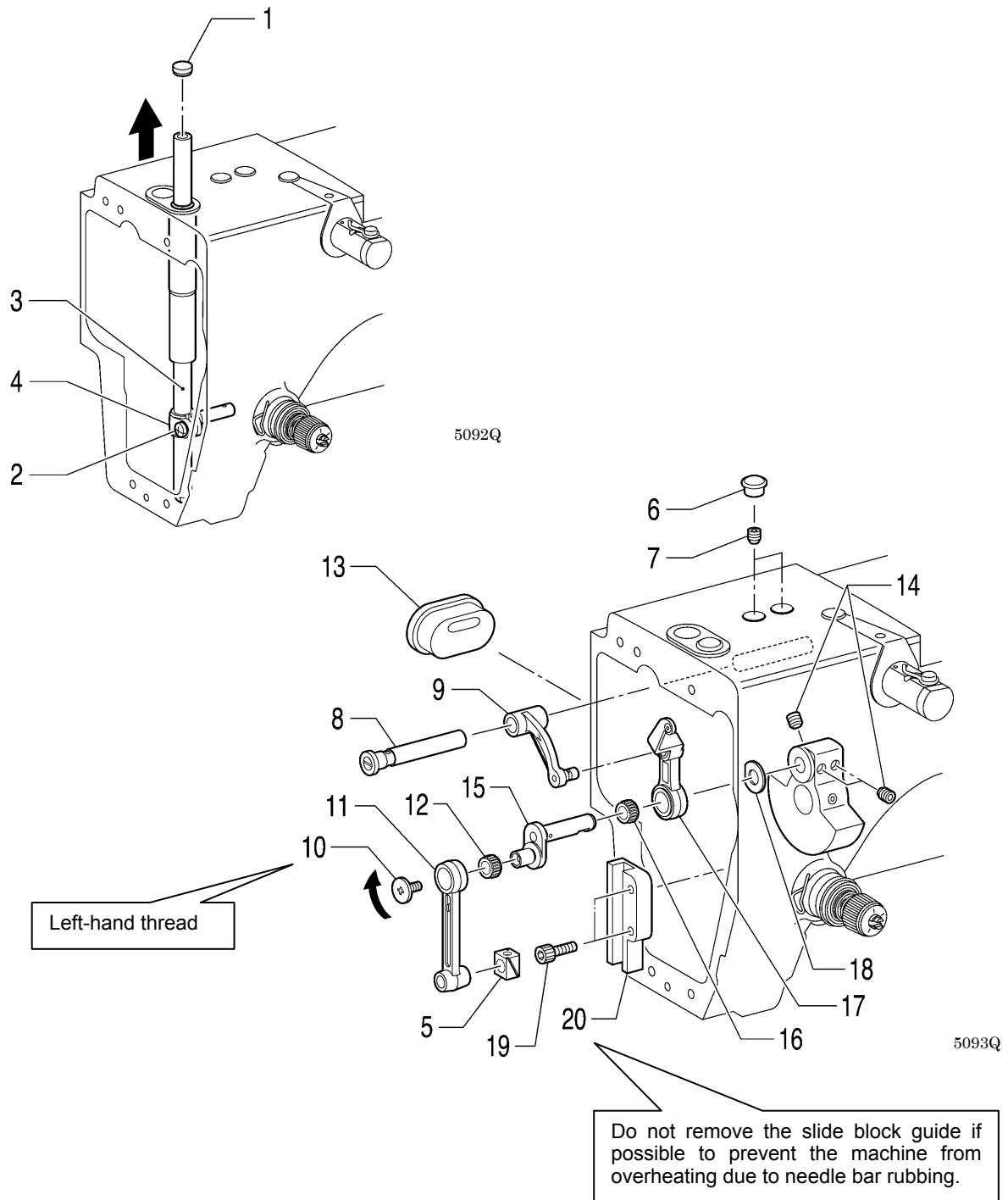
1. Set screw
2. Needle
3. Needle bar thread guide
4. Bolts [4 pcs]
5. Work clamp assy
6. Bolts with washer [2pcs]
7. Feed plate

5-4. Intermittent presser foot lifter mechanism (1)



- | | |
|---------------------------------|--|
| 1. Adjusting screw nut (Loosen) | 11. Presser foot |
| 2. Presser adjusting screw | 12. Bolt (Loosen) |
| 3. Presser bar spring guide | 13. Presser bar (Pull downward from presser bar clamp) |
| 4. Presser bar spring | 14. Set screw (Loosen) |
| 5. Presser bar spring collar | 15. Link shaft (Pull out) |
| 6. Screw | 16. Washer |
| 7. Shoulder screw | 17. Stepping clamp lifter link (Remove as unit) |
| 8. Screw | 18. Presser bar |
| 9. Plain washers [2 pcs] | 19. Bolt (Loosen) |
| 10. Finger guard | 20. Stepping clamp arm F |

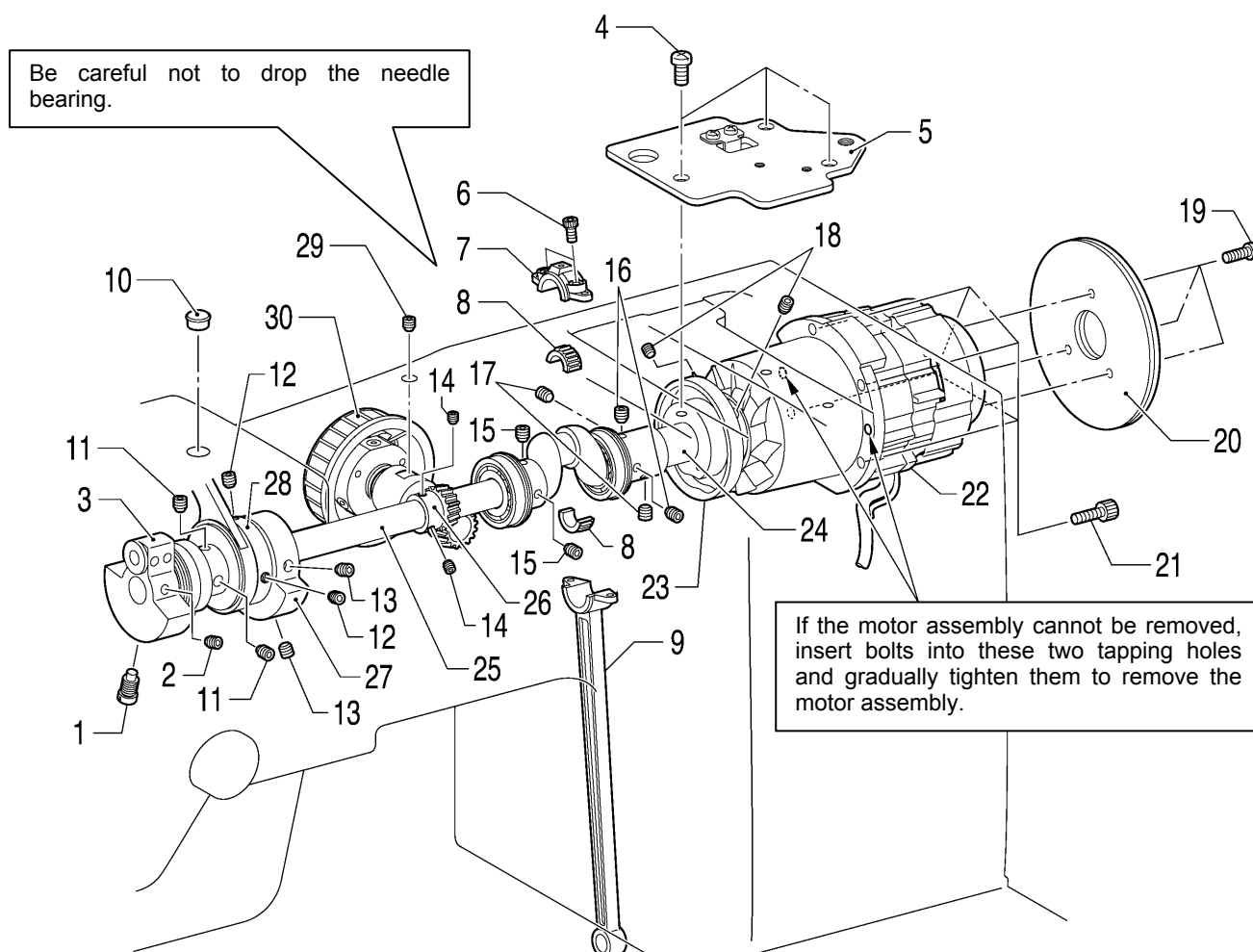
5-5. Needle bar mechanism



1. Rubber cap
2. Screw
3. Needle bar
4. Needle bar clamp (Pull out)
5. Slide block
6. Rubber caps [2 pcs]
7. Set screws [2 pcs] (Loosen)
8. Thread take-up support shaft assy
9. Thread take-up support
10. Screw (Loosen)

11. Needle bar connecting rod
12. Needle bearing
13. Rubber cap
14. Set screws [3 pcs] (Loosen)
15. Needle bar crank
16. Needle bearing
17. Thread take-up lever assy
18. Washer
19. Bolts [2 pcs]
20. Slide block guide

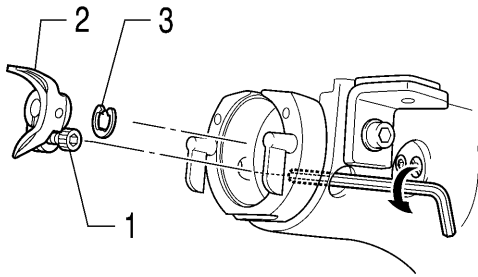
5-6. Upper shaft mechanism



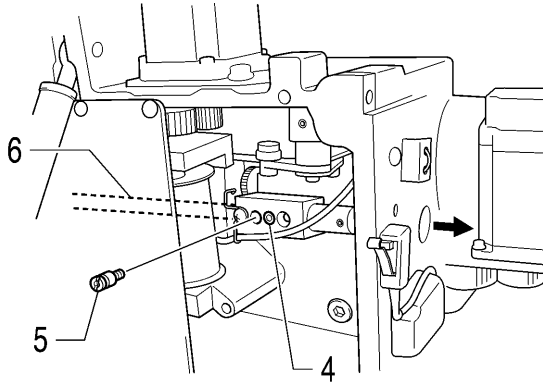
5094Q

- | | |
|--|---------------------------------|
| 1. Screw (Loosen) | 16. Set screws [2 pcs] (Loosen) |
| 2. Set screw (Loosen) | 17. Set screws [2 pcs] (Loosen) |
| 3. Thread take-up crank | 18. Set screws [2 pcs] (Loosen) |
| 4. Screws [3 pcs] (Loosen) | 19. Screws [3 pcs] (Loosen) |
| 5. Crank cover | 20. Fries wheels [2 pcs] |
| 6. Bolts [2 pcs] | 21. Bolts [4 pcs] (Loosen) |
| 7. Crank rod [Upper part] | 22. Motor assy |
| 8. Needle bearing | 23. Thread trimmer cam |
| 9. Crank rod [Lower part] (Lower downward) | 24. Joint assy |
| 10. Rubber cap | 25. Upper shaft |
| 11. Set screws [2 pcs] (Loosen) | 26. Pulley gear R |
| 12. Set screws [2 pcs] (Loosen) | 27. Bobbin winder driving wheel |
| 13. Set screws [2 pcs] (Loosen) | 28. Stepping clamp cam assy |
| 14. Set screws [2 pcs] (Loosen) | 29. Set screw (Loosen) |
| 15. Set screws [2 pcs] (Loosen) | 30. Pulley assy |

5-7. Lower shaft mechanism

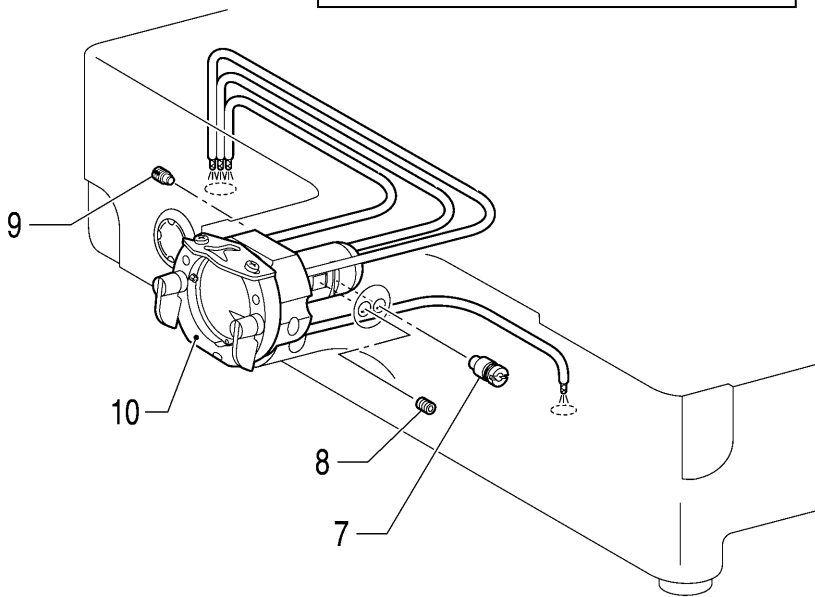


5095Q



5096Q

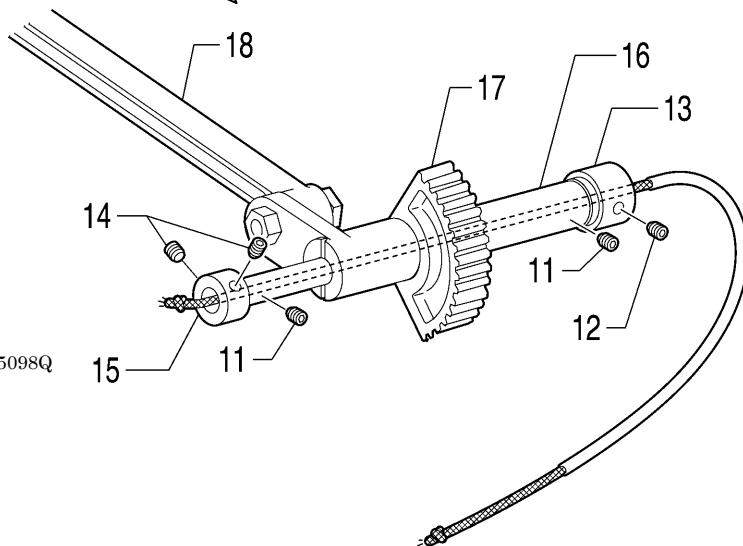
If the adjusting stud will not pull out, insert a M3 screw into the tap hole and then pull out the adjusting stud.



1. Bolt (Loosen)
2. Driver
3. Retaining ring E
4. Set screw (Loosen)
5. Adjusting stud (Pull out)
6. Lower shaft assy
[Pull out from the rear of the machine]
7. Adjusting stud (Pull out)
8. Set screw (Loosen)
9. Screw (Loosen)
10. Shuttle race base assy

5097Q

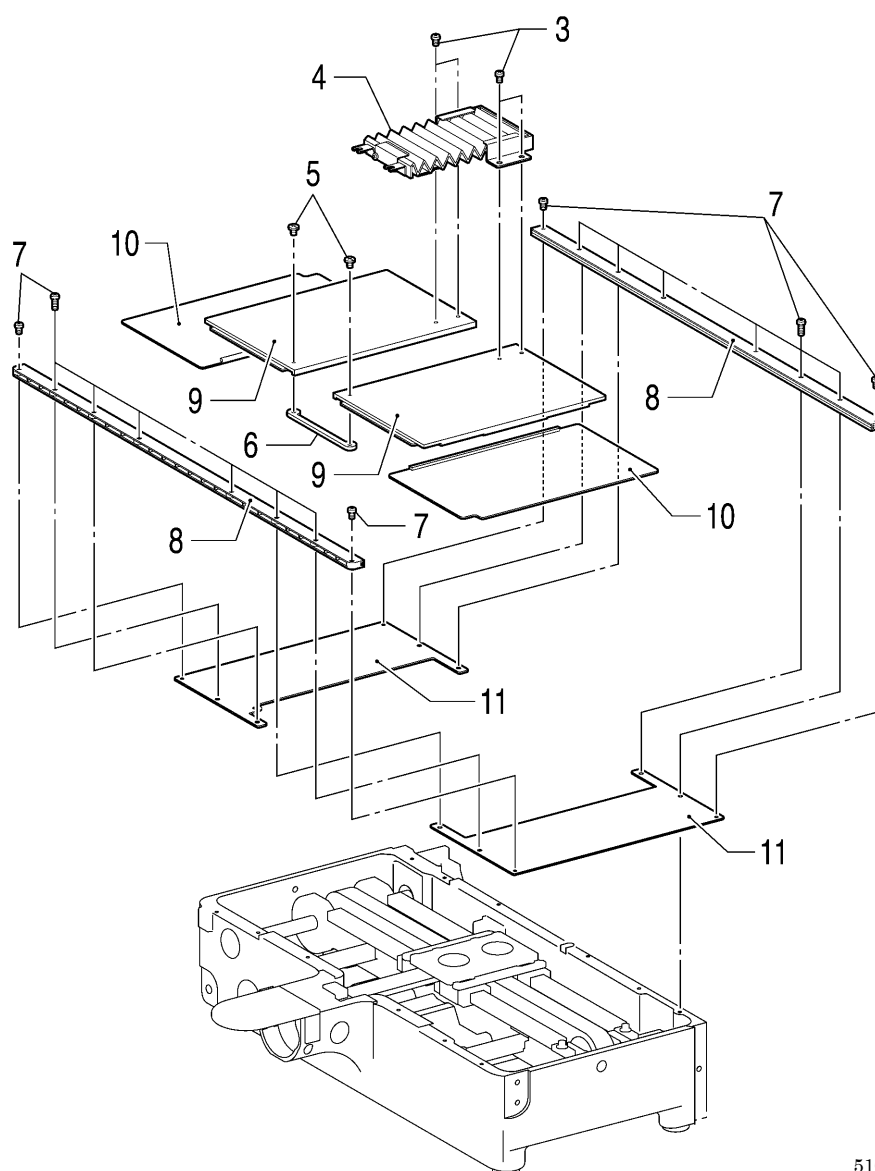
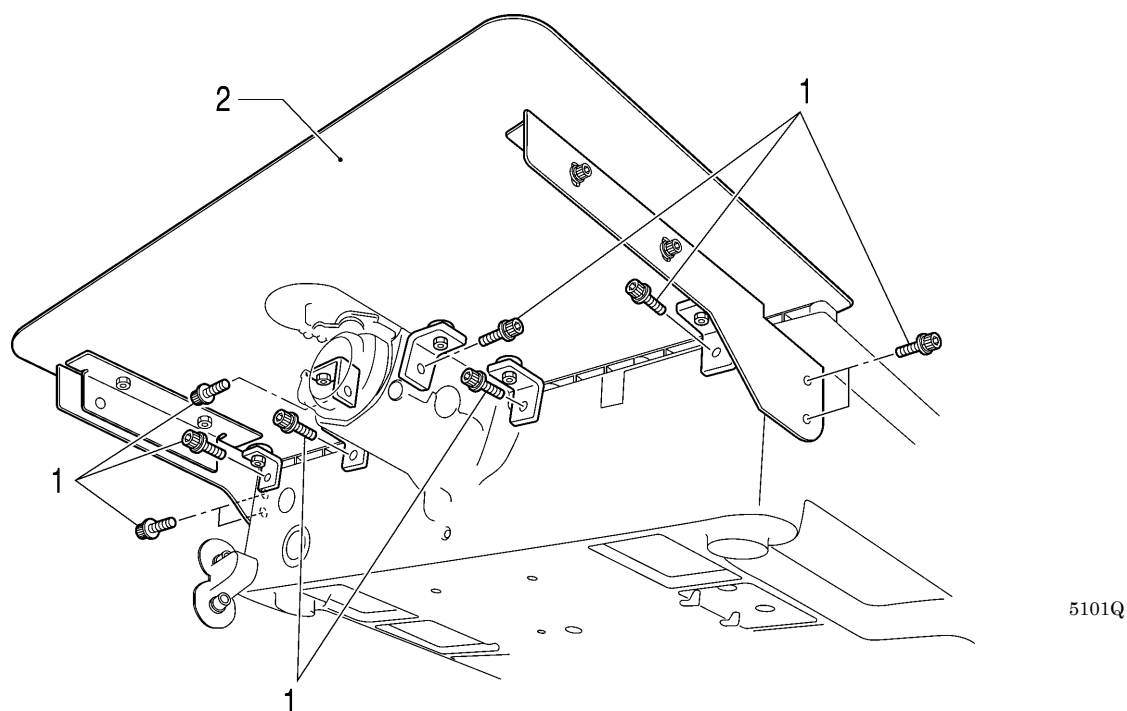
Remove the rock gear and the crank rod together as a single unit.



5098Q

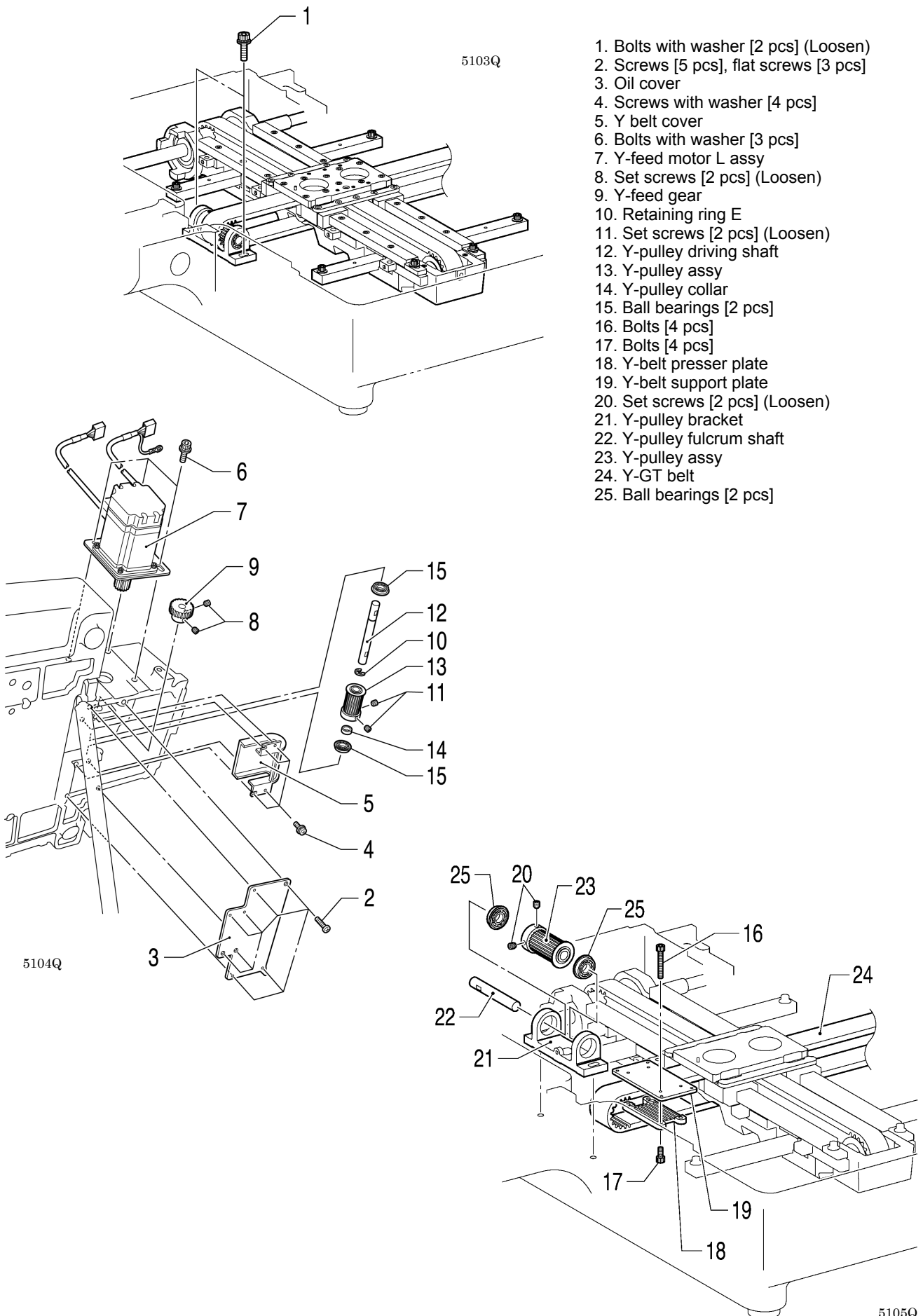
11. Set screws [2 pcs] (Loosen)
12. Set screw (Loosen)
13. Set screw collar, R
14. Set screws [2 pcs] (Loosen)
15. Set screw collar, B
16. Rock gear shaft
[Pull out from the rear of the machine]
17. Rock gear
18. Crank rod [Lower part]

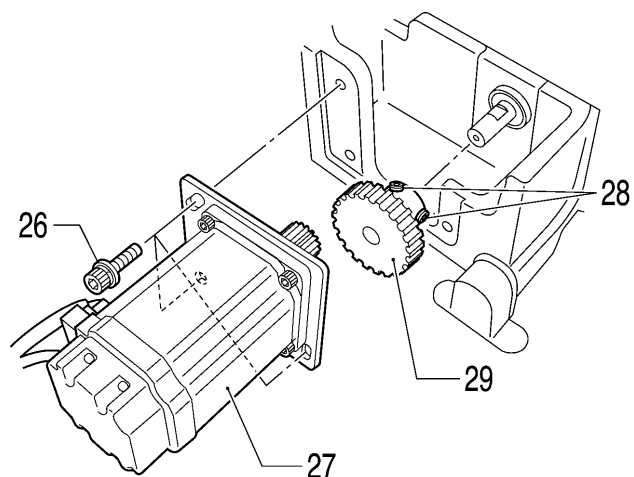
5-8. Feed covers



- 1. Bolts with washer [10 pcs]
- 2. Auxiliary plate
- 3. Screws [4 pcs]
- 4. Bellow assy
- 5. Screws [2 pcs]
- 6. Cover connecting plate
- 7. Screws [16 pcs]
- 8. Cover rails [2 pcs]
- 9. Inside covers [2 pcs]
- 10. Outside covers [2 pcs]
- 11. Fixed covers [2 pcs]

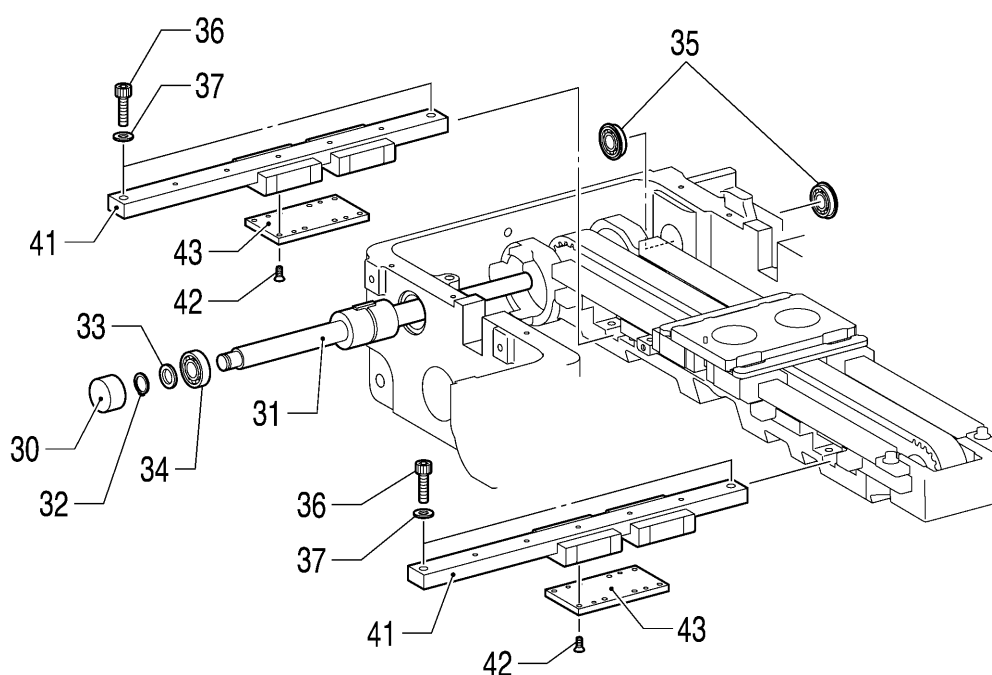
5-9. Feed mechanism



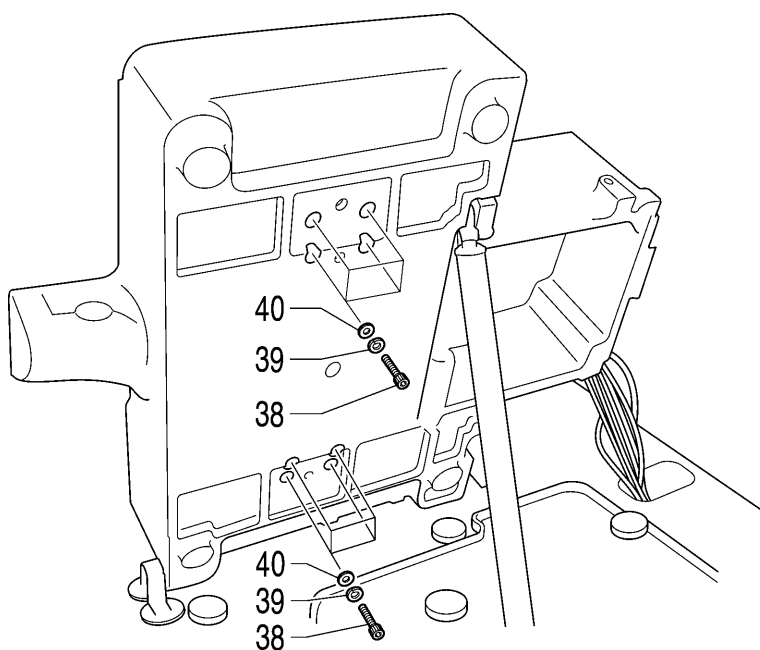


5117Q

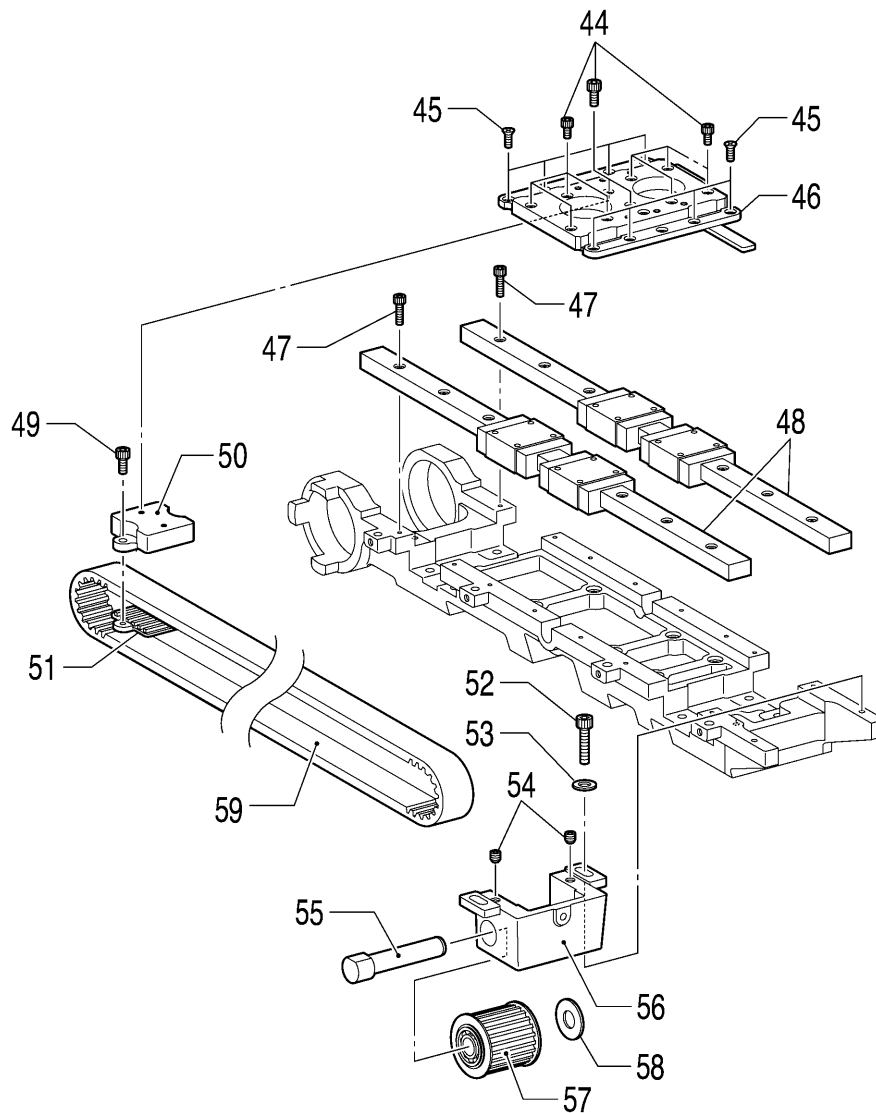
- 26. Bolts with washer [3 pcs]
- 27. X-feed motor assy
- 28. Set screws [2 pcs] (Loosen)
- 29. X-feed gear
- 30. Rubber cap
- 31. Y-ball spline
- 32. Retaining ring C
- 33. Plain washer
- 34. Ball bearing
- 35. Ball bearings [2 pcs]
- 36. Bolts [4 pcs]
- 37. Washers [4 pcs]
- 38. Bolts [8 pcs]
- 39. Spring washers [8 pcs]
- 40. Plain washers [8 pcs]
- 41. Y-LM guides [2 pcs]
- 42. Flat screws [16 pcs]
- 43. Y-LM spacers [2 pcs]



5106Q



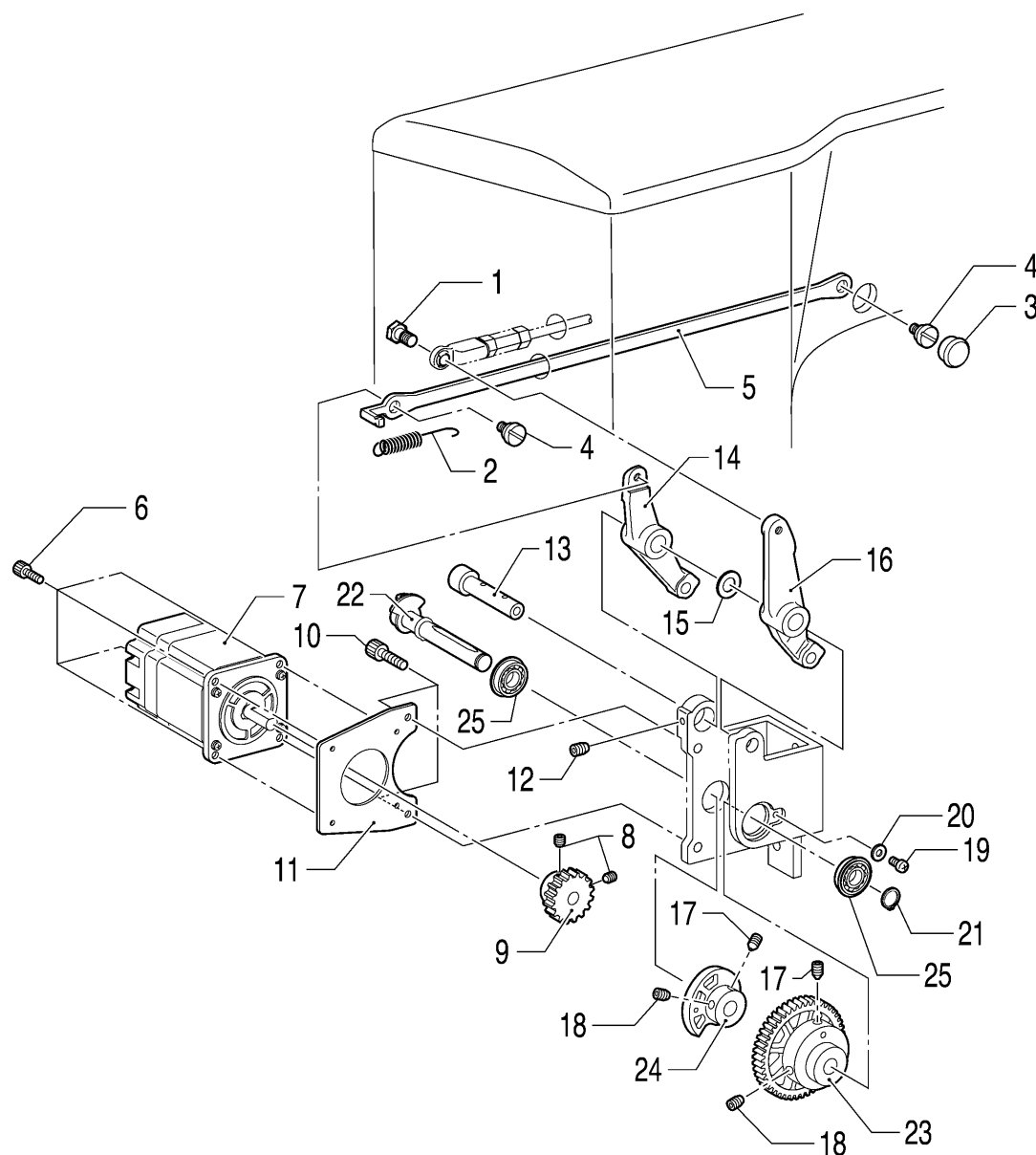
5107Q



5118Q

- 44. Bolts [10 pcs]
- 45. Flat screws [8 pcs]
- 46. Feed bracket X
- 47. Bolts [16 pcs]
- 48. X-LM guide [2 pcs]
- 49. Bolts [2 pcs]
- 50. X-belt holder
- 51. X-belt holder plate
- 52. Bolts [2 pcs]
- 53. Plain washers [2 pcs]
- 54. Set screws [2 pcs] (Loosen)
- 55. X-pulley fulcrum shaft
- 56. X-pulley bracket
- 57. X-right pulley assy
- 58. Plain washer
- 59. X-GT belt

5-10. Work clamp lifter mechanism (Solenoid specifications)



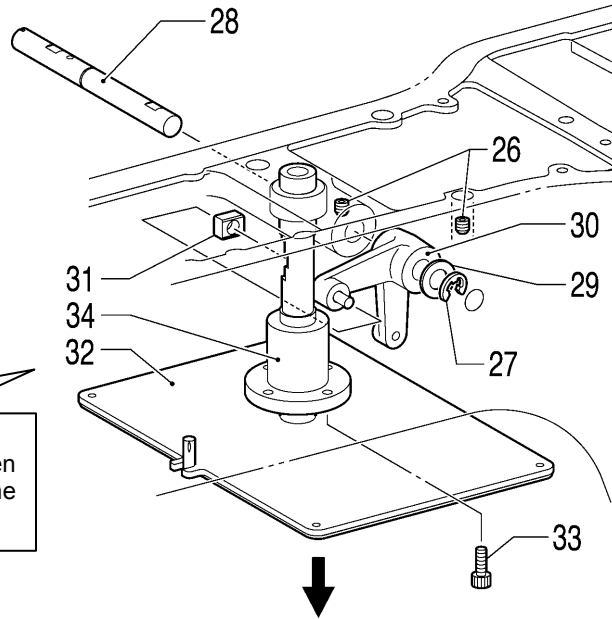
5108Q

- | | |
|---|---------------------------------|
| 1. Shoulder screw | 14. Work clamp driving lever |
| 2. Work clamp spring | 15. Washer |
| 3. Rubber cap | 16. Stepping foot driving lever |
| 4. Link shoulder screws [2 pcs] | 17. Set screws [2 pcs] (Loosen) |
| 5. Work clamp lifter link (Pull backward) | 18. Set screws [2 pcs] (Loosen) |
| 6. Bolts [4 pcs] | 19. Screw |
| 7. Work clamp pulse motor
(Disconnect the harness) | 20. Plain washer |
| 8. Set screws [2 pcs] (Loosen) | 21. Retaining ring C |
| 9. Work clamp driving gear | 22. Work clamp fulcrum shaft |
| 10. Bolts [2 pcs] | 23. Work clamp cam gear |
| 11. Work clamp motor plate | 24. Work clamp cam |
| 12. Set screw (Loosen) | 25. Ball bearings [2 pcs] |
| 13. Work clamp lever shaft | |

- 26. Set screws [2 pcs] (Loosen)
- 27. Retaining ring E
- 28. Work clamp lever shaft B
- 29. Plain washer
- 30. Work clamp lifter lever
- 31. Slide block
- 32. Work clamp lifter plate assy
- 33. Bolts [4 pcs]
- 34. Slide bush

Note:

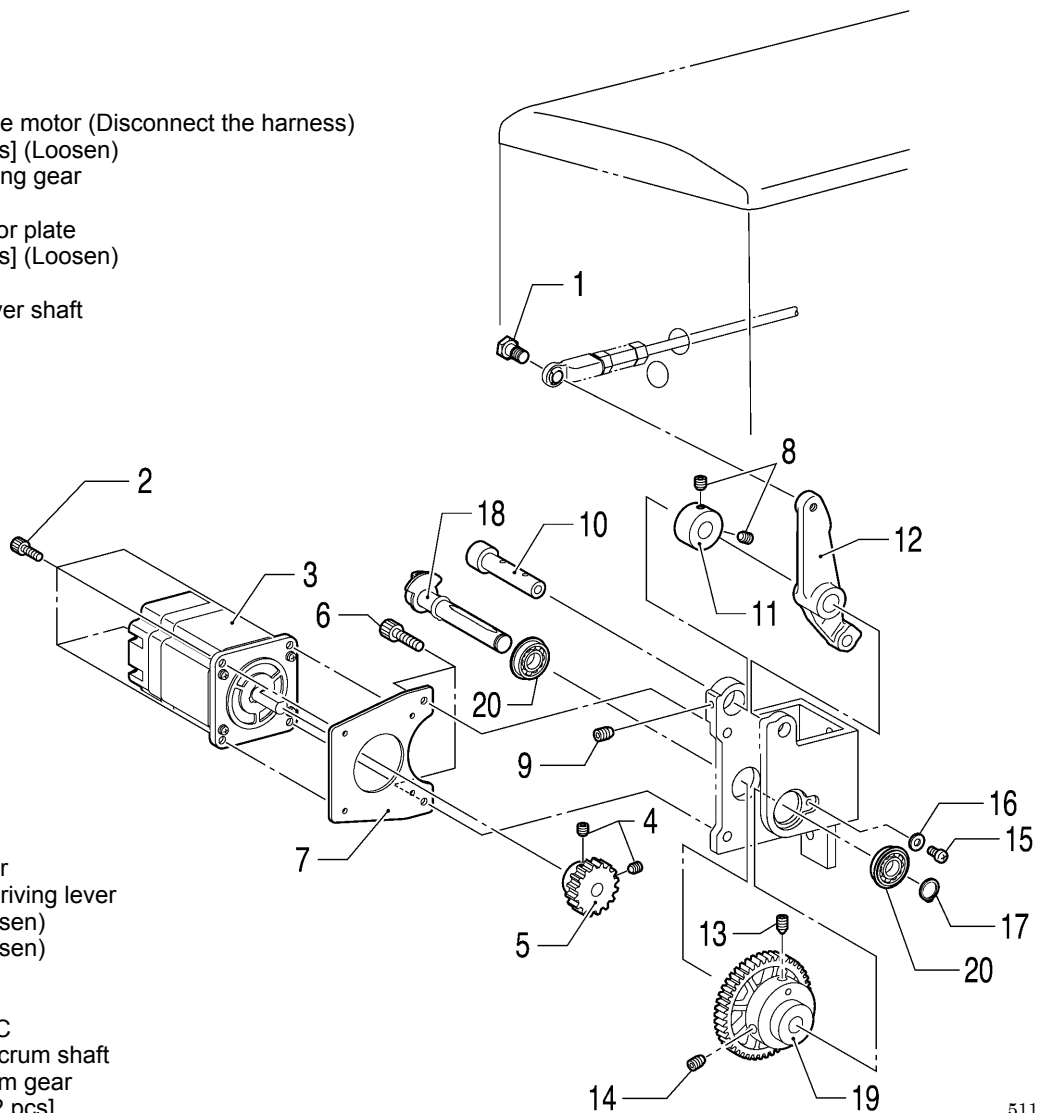
Hold the work clamp lifter plate assembly when removing work clamp lifter lever, otherwise the work clamp lifter plate assembly may fall down.



5109Q

5-11. Work clamp lifter mechanism (Pneumatic specifications)

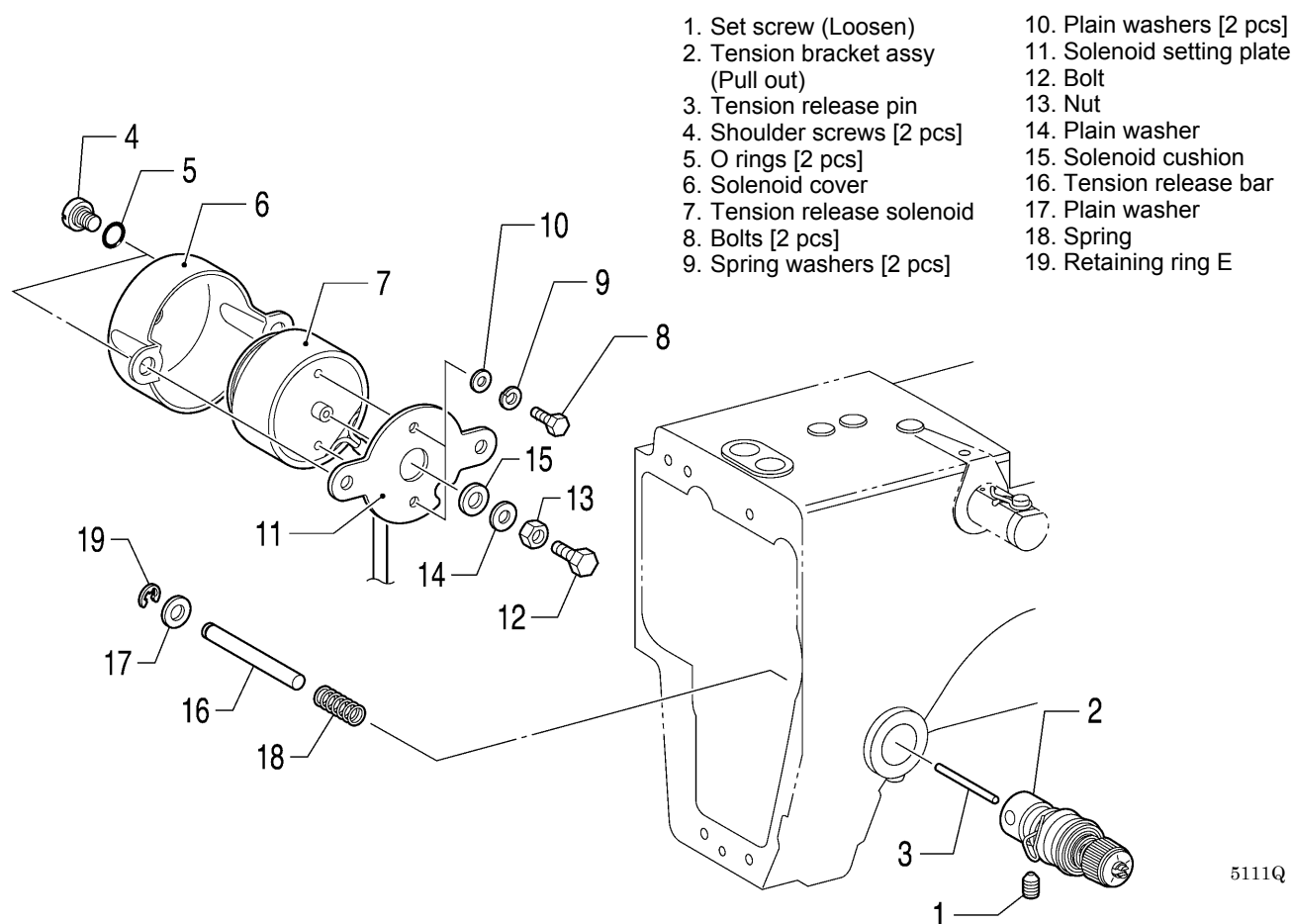
- 1. Shoulder screw
- 2. Bolts [4 pcs]
- 3. Work clamp pulse motor (Disconnect the harness)
- 4. Set screws [2 pcs] (Loosen)
- 5. Work clamp driving gear
- 6. Bolts [2 pcs]
- 7. Work clamp motor plate
- 8. Set screws [2 pcs] (Loosen)
- 9. Set screw
- 10. Work clamp lever shaft



- 11. Set screw collar
- 12. Stepping foot driving lever
- 13. Set screw (Loosen)
- 14. Set screw (Loosen)
- 15. Screw
- 16. Plain washer
- 17. Retaining ring C
- 18. Work clamp fulcrum shaft
- 19. Work clamp cam gear
- 20. Ball bearings [2 pcs]

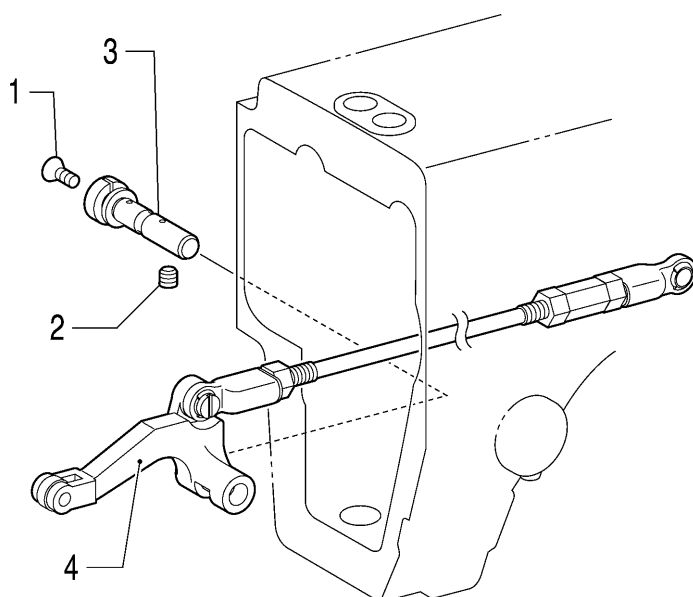
5110Q

5-12. Tension release mechanism



5111Q

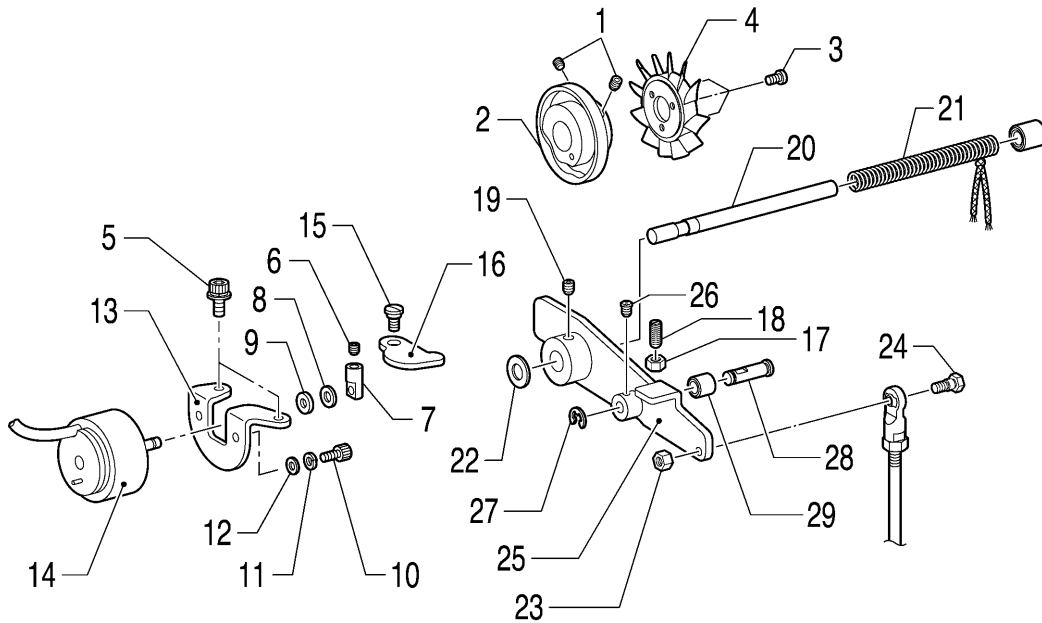
5-13. Intermittent presser foot lifter mechanism (2)



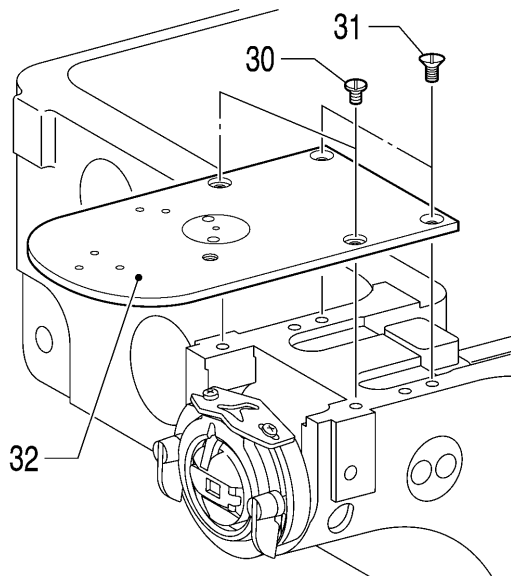
5112Q

1. Flat screw
2. Set screw (Loosen)
3. Stepping clamp lifter shaft (Pull out)
4. Stepping clamp lifter (Pull forward)

5-14. Thread trimmer mechanism

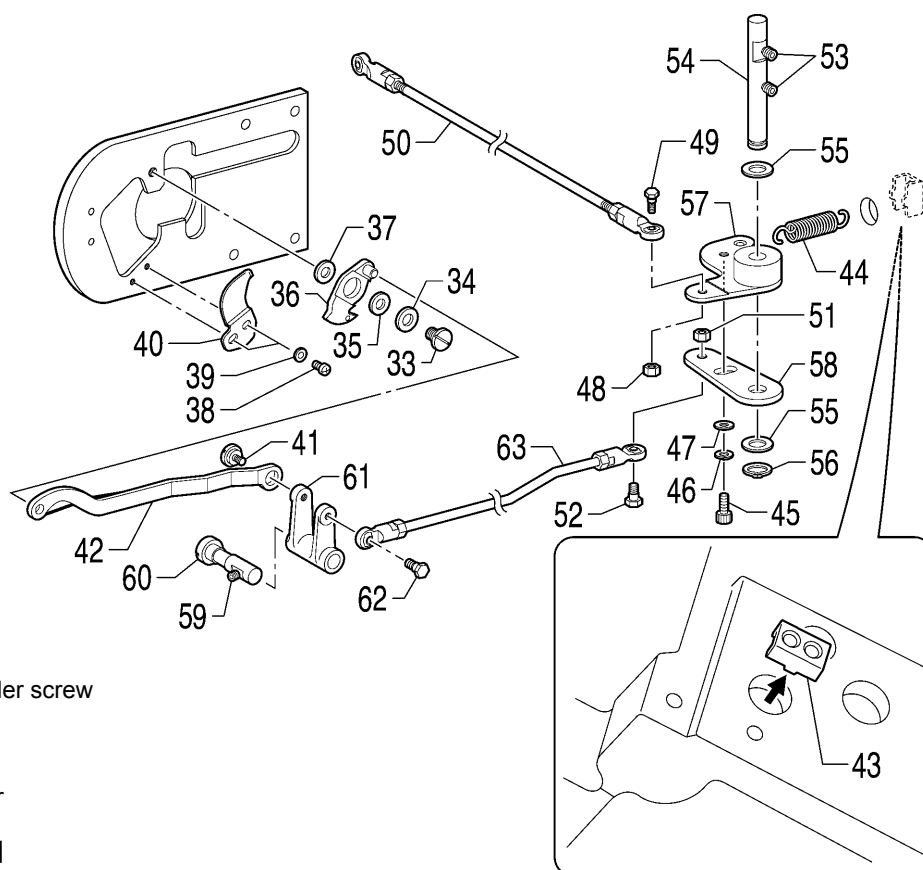


5113Q



5114Q

- | | | |
|--------------------------------|-----------------------------|---------------------------|
| 1. Set screws [2 pcs] (Loosen) | 12. Plain washers [2 pcs] | 23. Nut |
| 2. Thread trimmer cam | 13. Solenoid setting plate | 24. Shoulder screw B |
| 3. Screws [3 pcs] | 14. Thread trimmer solenoid | 25. Driving lever |
| 4. Fan | 15. Shoulder screw | 26. Set screw |
| 5. Bolts with washer [2 pcs] | 16. Pushing lever | 27. Retaining ring E |
| 6. Set screw | 17. Nut | 28. Collar shaft |
| 7. Solenoid lever | 18. Set screw | 29. Thread trimmer collar |
| 8. Washer | 19. Set screw | 30. Screws [2 pcs] |
| 9. Solenoid cushion | 20. Guide shaft | 31. Flat screws [2 pcs] |
| 10. Bolts [2 pcs] | 21. Spring | 32. Needle plate |
| 11. Spring washers [2 pcs] | 22. Cushion | |



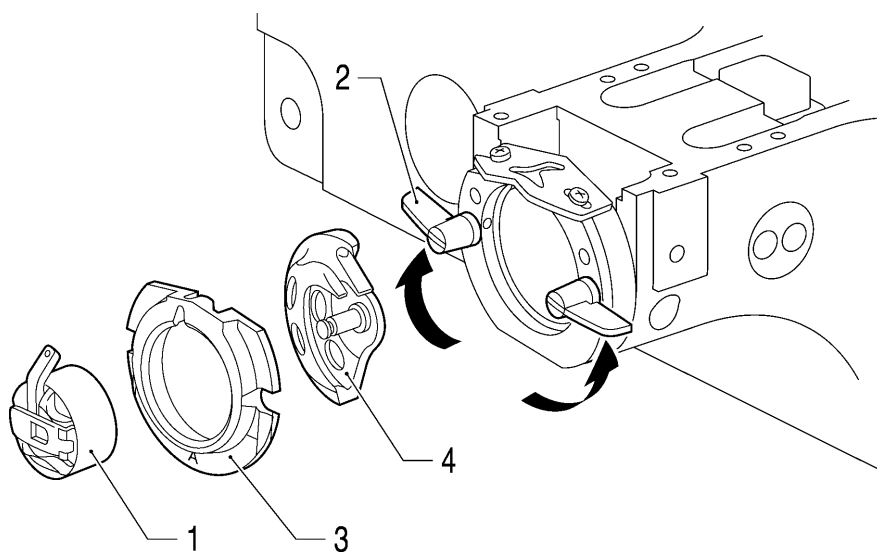
5115Q

- 33. Movable knife shoulder screw
- 34. Thrust washer
- 35. Movable knife collar
- 36. Movable knife assy
- 37. Movable knife spacer
- 38. Screws [2 pcs]
- 39. Plain washers [2 pcs]
- 40. Fixed knife
- 41. Shoulder screw
- 42. Connecting plate
- 43. Spring hook
- 44. Spring
- 45. Bolt
- 46. Spring washer
- 47. Plain washer
- 48. Nut
- 49. Shoulder screw B

- 50. Thread trimmer rod V
- 51. Nut
- 52. Shoulder screw B
- 53. Set screws [2 pcs] (Loosen)
- 54. Thread trimmer lever shaft
- 55. Spacers [2 pcs]
- 56. Retaining ring, C

- 57. Thread trimmer lever V
- 58. Thread trimmer lever H
- 59. Set screw (Loosen)
- 60. Movable knife lever shaft
- 61. Movable knife lever
- 62. Shoulder screw
- 63. Thread trimmer rod H

5-15. Shuttle hook mechanism



5116Q

- 1. Bobbin case assy
- 2. Shuttle race base setting claw
[Open to right and left]
- 3. Shuttle race base
- 4. Shuttle hook

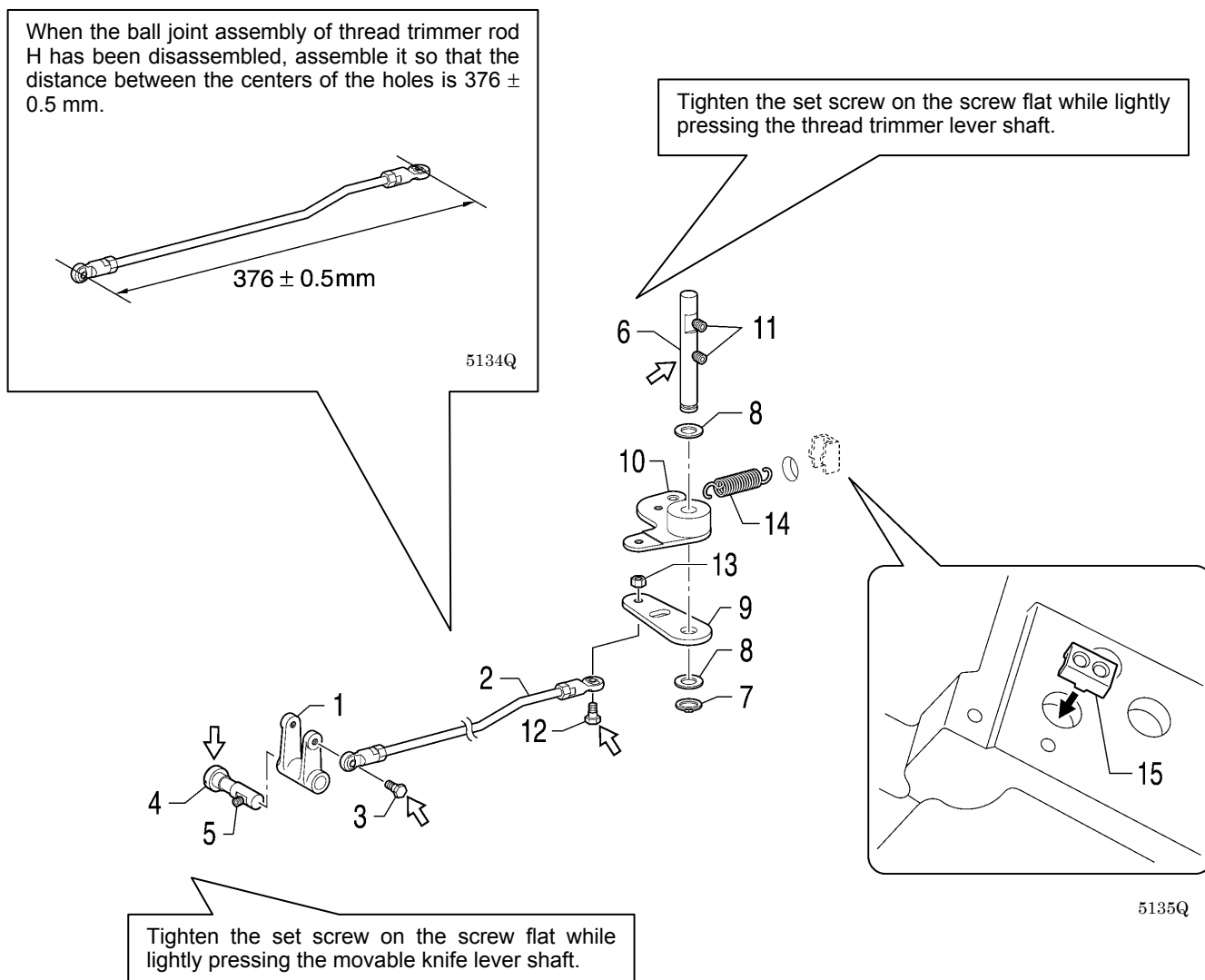
6. ASSEMBLY

Assemble each part in order of the numbers.

Apply grease to the required places when reassembling the parts and once every two years.

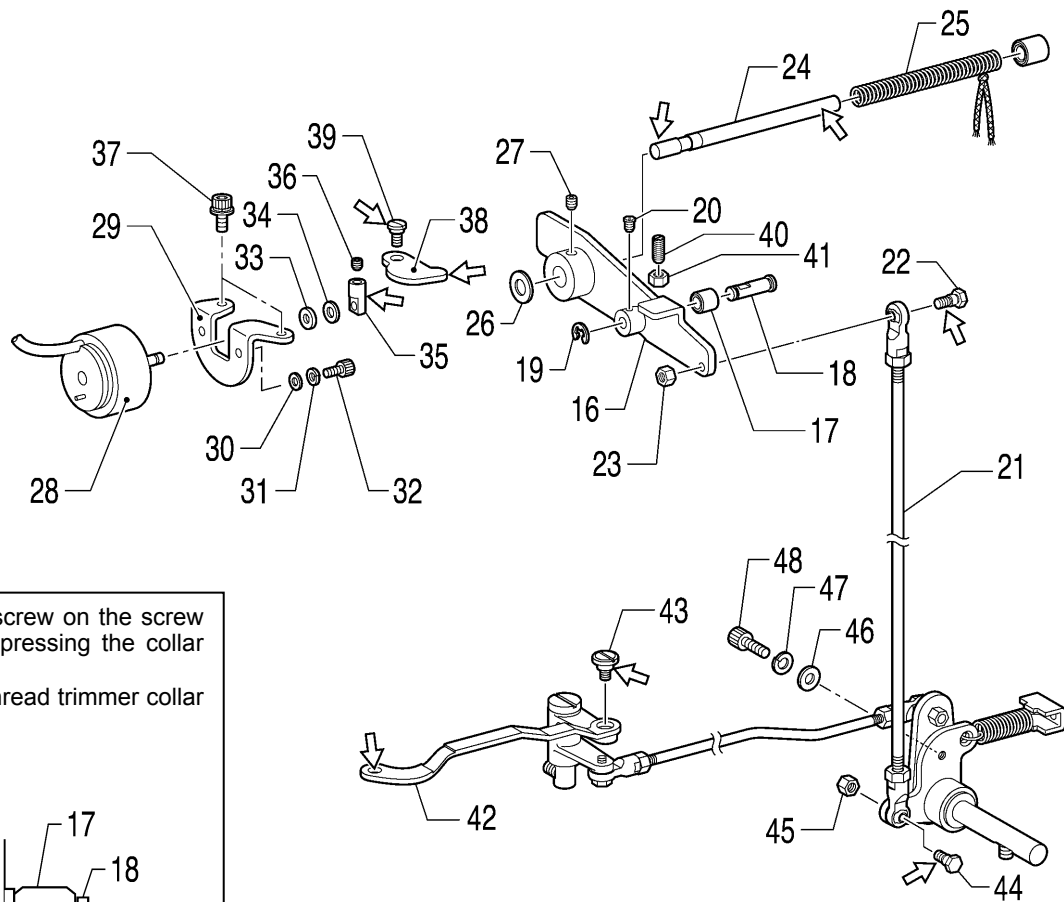
6-1. Thread trimmer mechanism (1)

Apply grease <GREASE BZL-301 (SA2694-001)> specified by Brother to the portions indicated by the white arrows.

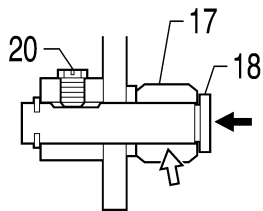


- | | |
|-------------------------------|----------------------------|
| 1. Movable knife lever | 9. Thread trimmer lever H |
| 2. Thread trimmer rod H | 10. Thread trimmer lever V |
| 3. Shoulder screw | 11. Set screws [2 pcs] |
| 4. Movable knife lever shaft | 12. Shoulder screw B |
| 5. Set screw | 13. Nut |
| 6. Thread trimmer lever shaft | 14. Spring |
| 7. Retaining ring, C | 15. Spring hook |
| 8. Spacers [2 pcs] | |

Assemble so that the wick is hanging down.



Tighten the set screw on the screw flat while lightly pressing the collar shaft.
Check that the thread trimmer collar turns smoothly.



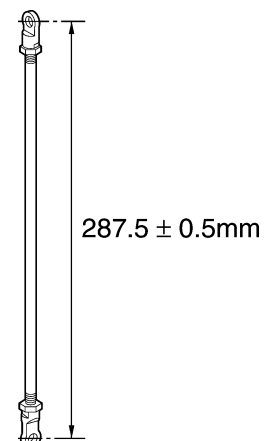
4853Q

Apply grease.

5136Q

- | | |
|-----------------------------|-------------------------------|
| 16. Driving lever | 33. Solenoid cushion |
| 17. Thread trimmer collar | 34. Washer |
| 18. Collar shaft | 35. Solenoid lever |
| 19. Retaining ring, E | 36. Set screw |
| 20. Set screw | 37. Bolts with washer [2 pcs] |
| 21. Thread trimmer rod V | 38. Pushing lever |
| 22. Shoulder screw B | 39. Shoulder screw |
| 23. Nut | 40. Set screw |
| 24. Guide shaft | 41. Nut |
| 25. Spring | 42. Connecting plate |
| 26. Cushion | 43. Shoulder screw |
| 27. Set screw | 44. Shoulder screw B |
| 28. Thread trimmer solenoid | 45. Nut |
| 29. Solenoid setting plate | 46. Plain washer |
| 30. Plain washers [2 pcs] | 47. Spring washer |
| 31. Spring washers [2 pcs] | 48. Bolt |
| 32. Bolts [2 pcs] | |

When the ball joint assembly of thread trimmer rod V has been disassembled, assemble it so that the distance between the centers of the holes is 287.5 ± 0.5 mm.



4615Q

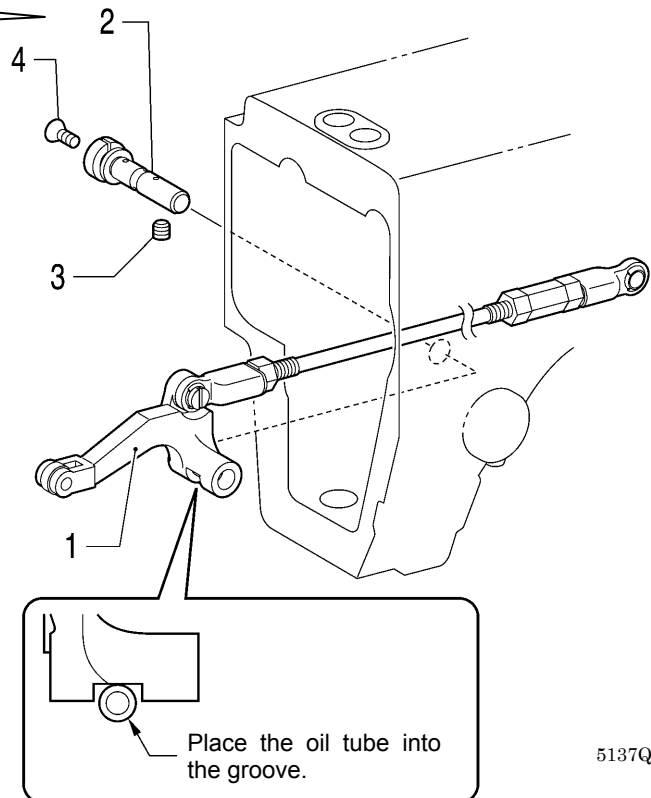
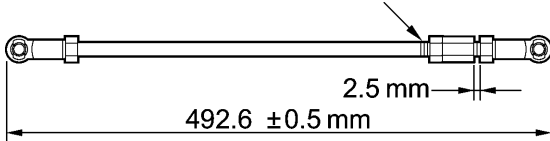
6-2. Intermittent presser foot lifter mechanism (1)

Tighten the set screw on the screw flat while lightly pressing the stepping clamp lifter shaft.

<Stepping clamp lifter rod adjustment>

5138Q

Screw the stepping clamp lifter rod in as far as it will go, then turn it back 3 times.



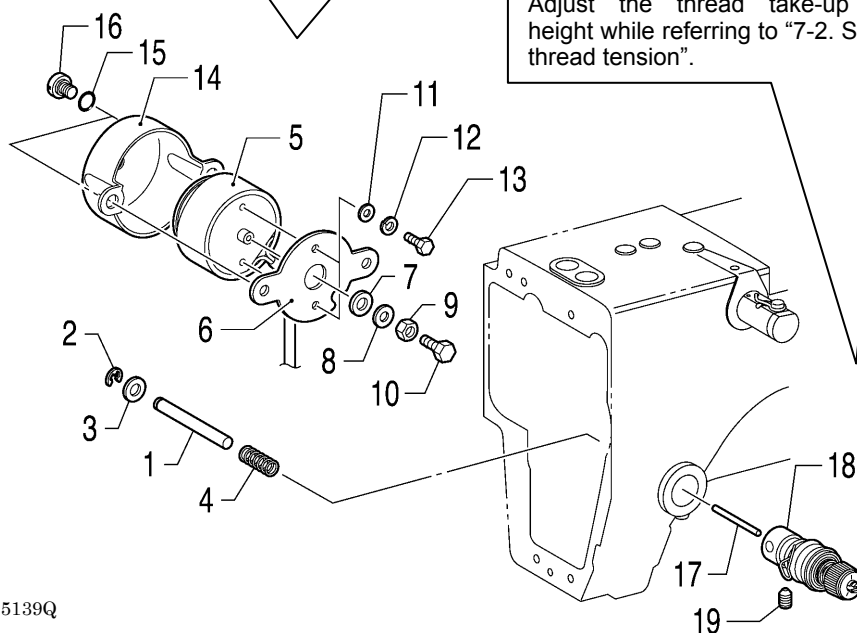
5137Q

1. Stepping clamp lifter (Insert from the front)
2. Stepping clamp lifter shaft
3. Set screw
4. Flat screw

6-3. Tension release mechanism

Adjust while referring to "7-18. Adjusting the tension release amount".

Adjust the thread take-up spring height while referring to "7-2. Standard thread tension".



5139Q

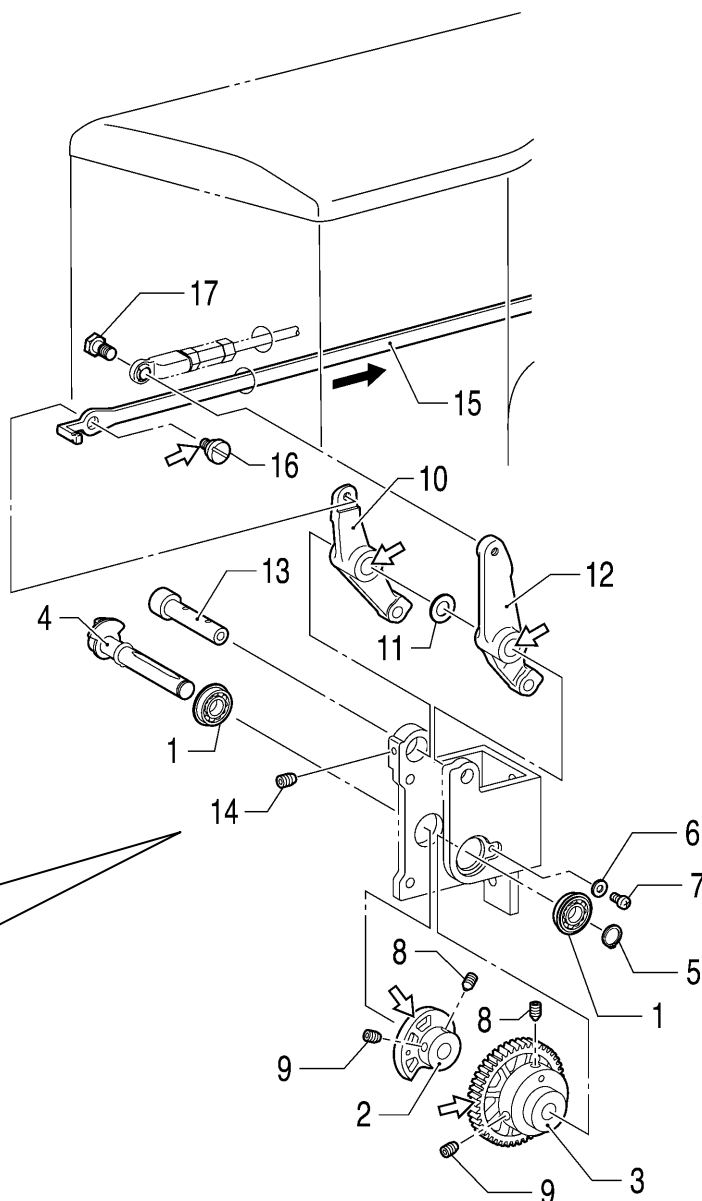
1. Tension release bar
2. Retaining ring, E
3. Plain washer
4. Spring
5. Tension release solenoid
6. Solenoid setting plate
7. Solenoid cushion
8. Plain washer
9. Nut
10. Bolt
11. Plain washers [2 pcs]
12. Spring washers [2 pcs]
13. Bolts [2 pcs]
14. Solenoid cover
15. O rings [2 pcs]
16. Shoulder screws [2 pcs]
17. Tension release pin
18. Tension bracket
19. Set screw

6-4. Work clamp lifter mechanism (Solenoid specifications)

Apply grease <GREASE BZL-301 (SA2694-001)> specified by Brother to the portions indicated by the white arrows.

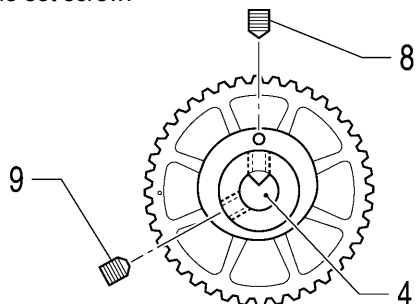
5159Q

1. Ball bearings [2 pcs]
2. Work clamp cam
3. Work clamp cam gear
4. Work clamp fulcrum shaft
5. Retaining ring C
6. Plain washer
7. Screw
8. Set screws [2 pcs]
9. Set screws [2 pcs]
10. Work clamp driving lever
11. Plain washer
12. Stepping foot driving lever
13. Work clamp lever shaft
14. Set screw
15. Work clamp lifter link (Insert from the back)
16. Link shoulder screw
17. Shoulder screw



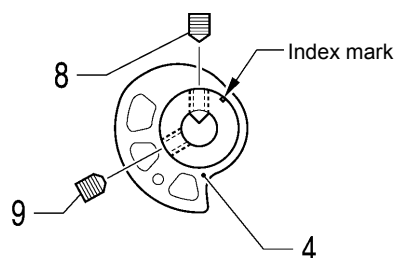
Align the screw stop, and then tighten the screw so that there is no play in the work clamp driving lever and the stepping foot driving lever. Check that the work clamp driving lever and stepping foot driving lever turn smoothly.

- 1) Set the work clamp cam gear so that there is no clearance between it and the ball bearing in the shaft direction, and then align the V groove in the work clamp fulcrum shaft with the thread on the hole side of the work clamp cam gear. Then tighten the set screw.

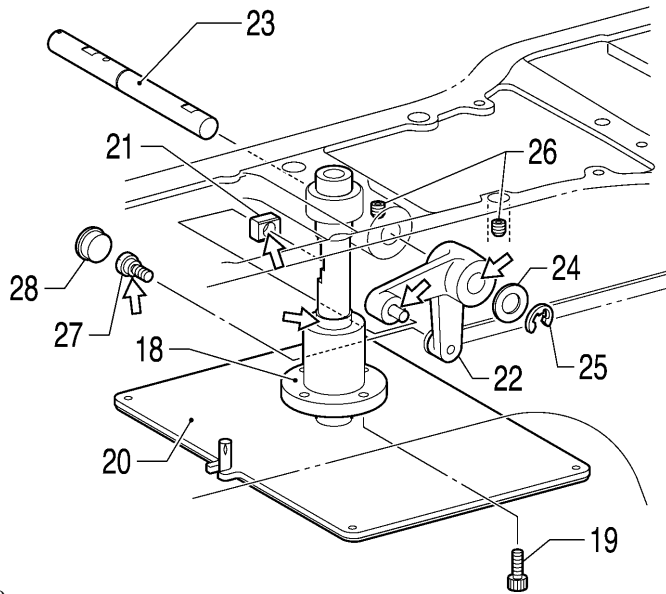


5160Q

- 2) Set the work clamp cam so that there is no clearance between it and the work clamp cam gear in the shaft direction, and then align the V groove in the work clamp fulcrum shaft with the index mark on the work clamp cam. Then tighten the set screw.
- 3) Lastly, tighten the two set screws (9).



5161Q



5162Q

- 18. Slide bush
- 19. Bolts [4 pcs]
- 20. Work clamp lifter plate assy
- 21. Slide block
- 22. Work clamp lifter lever
- 23. Work clamp lever shaft B
- 24. Plain washer
- 25. Retaining ring E
- 26. Set screws [2 pcs]
- 27. Link shoulder screw
- 28. Rubber cap

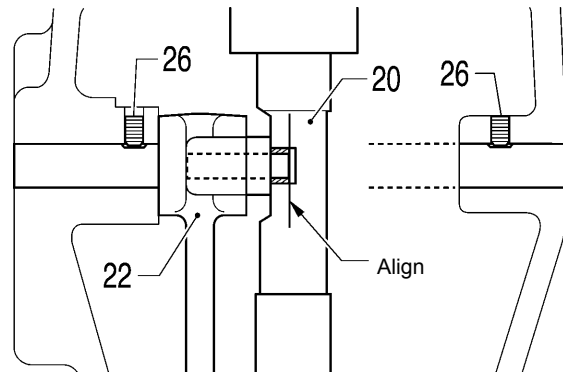
Place the slide block onto the pin of the work clamp lifter lever. The pin and the surface of the slide block should be aligned.

While aligning the slide block with the groove in the work clamp lifter plate assembly, pass the work clamp lever shaft B through the work clamp lifter lever.

NOTE:

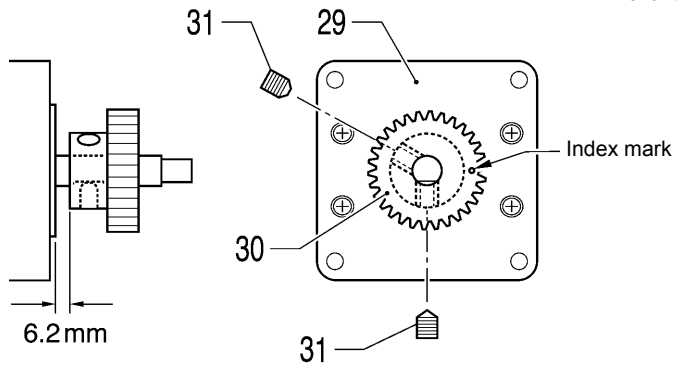
When the work clamp lifter plate assembly is lowered, the slide block moves away, so hold the work clamp lifter plate assembly in place until the link shoulder screw is tightened.

Align the set screw with the screw stop and then tighten it so that there is no play in the work clamp lifter lever. Check that the work clamp lifter lever moves smoothly.



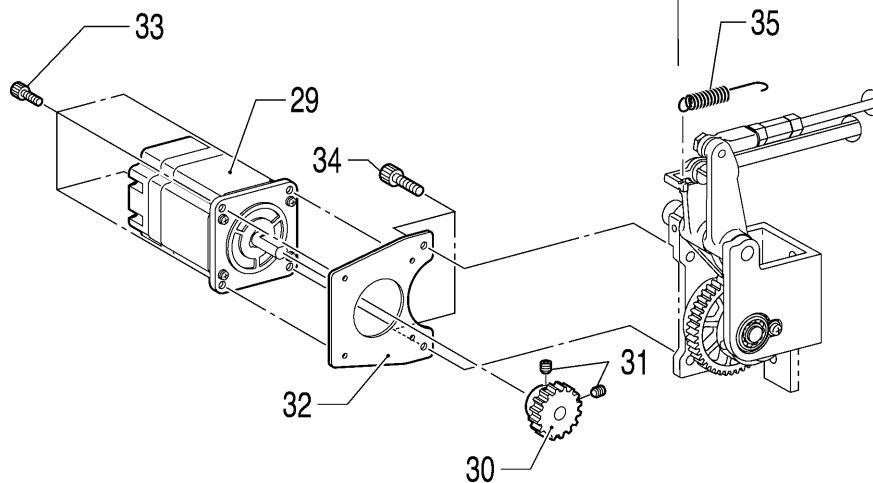
5163Q

5164Q



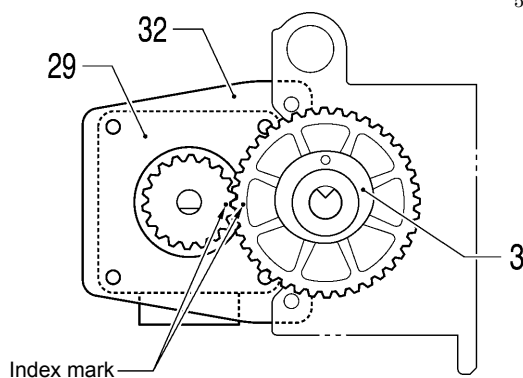
- 1) With the screw stop of the work clamp pulse motor facing downward and the index mark on the work clamp driving gear facing to the right, adjust so that the clearance between the work clamp pulse motor and the work clamp driving gear is 6.2 mm, and then tighten the two set screws.

Hook the spring into the arm hole as shown in the illustration.



5166Q

5167Q



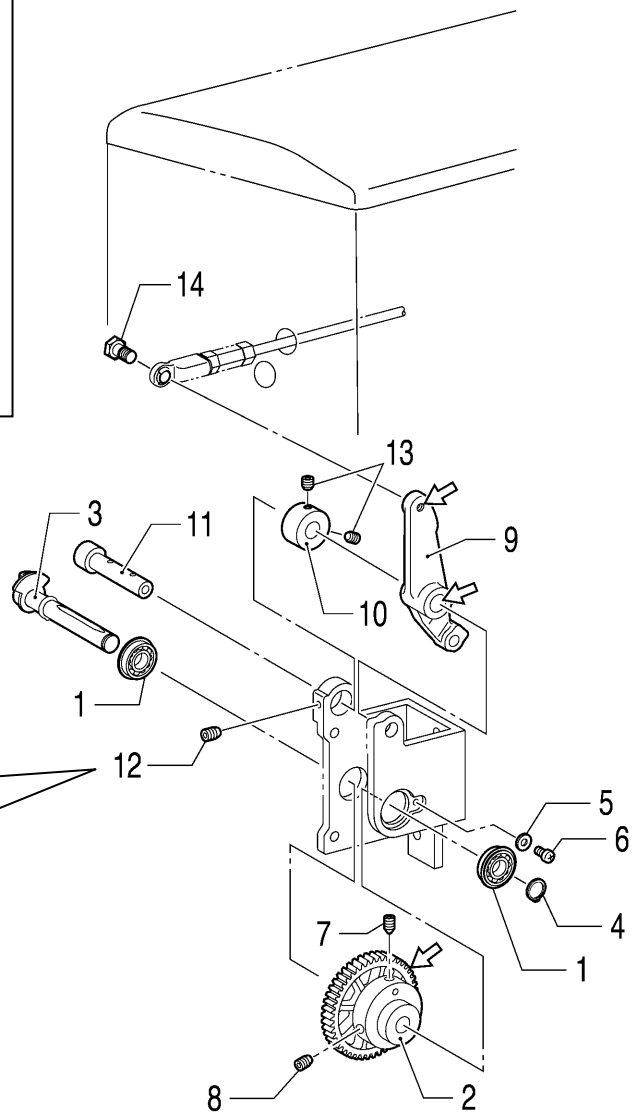
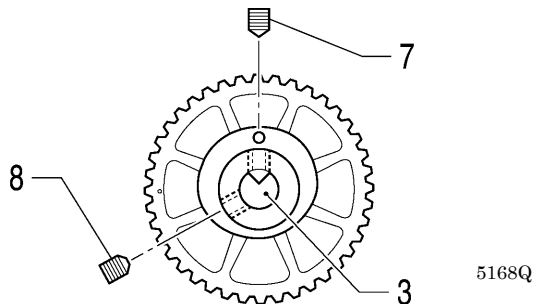
- 2) Install the work clamp pulse motor to the work clamp motor plate with the four bolts so that the motor connector is facing downward.
- 3) Align the index marks on the work clamp cam gear and the work clamp driving gear, and then install the work clamp motor plate with the two bolts so that there is no backlash.

- 29. Work clamp pulse motor
- 30. Work clamp driving gear
- 31. Set screws [2 pcs]
- 32. Work clamp motor plate
- 33. Bolts [4 pcs]
- 34. Bolts [2 pcs]
- 35. Work clamp spring

6-5. Work clamp lifter mechanism (Pneumatic specifications)

Apply grease <GREASE BZL-301 (SA2694-001)> specified by Brother to the portions indicated by the white arrows.

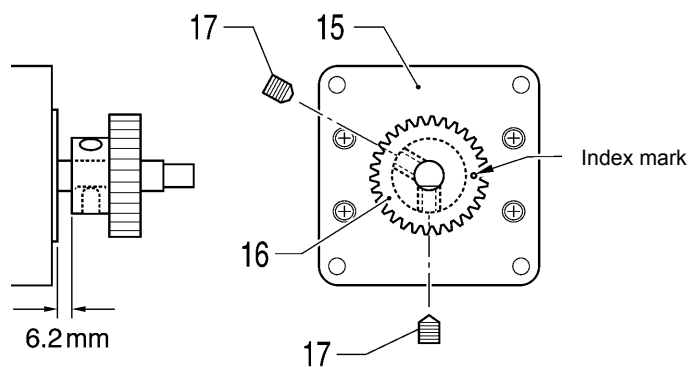
Set the work clamp cam gear so that there is no clearance between it and the ball bearing in the shaft direction, and then align the V groove in the work clamp fulcrum shaft with the thread on the hole side of the work clamp cam gear. Then tighten the set screw.



Align the screw stop, and then tighten the screw so that there is no play in the stepping foot driving lever and the set screw collar. Check that the stepping foot driving lever turns smoothly.

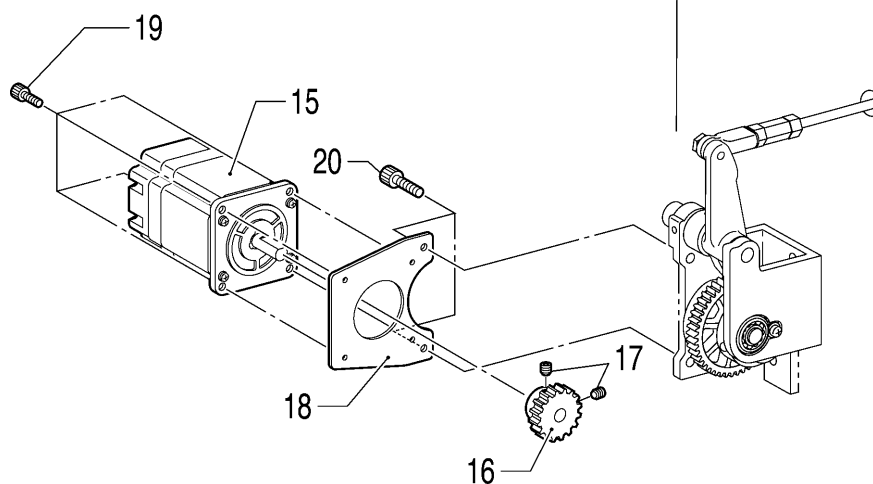
1. Ball bearings [2 pcs]
2. Work clamp cam gear
3. Work clamp fulcrum shaft
4. Retaining ring C
5. Plain washer
6. Screw
7. Set screw
8. Set screw
9. Stepping foot driving lever
10. Set screw collar
11. Work clamp lever shaft
12. Set screw
13. Set screws [2 pcs]
14. Shoulder screw

5169Q

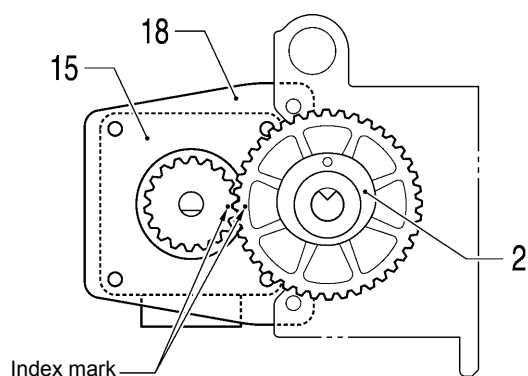


- 1) With the screw stop of the work clamp pulse motor facing downward and the index mark on the work clamp driving gear facing to the right, adjust so that the clearance between the work clamp pulse motor and the work clamp driving gear is 6.2 mm, and then tighten the two set screws.

5170Q



5172Q



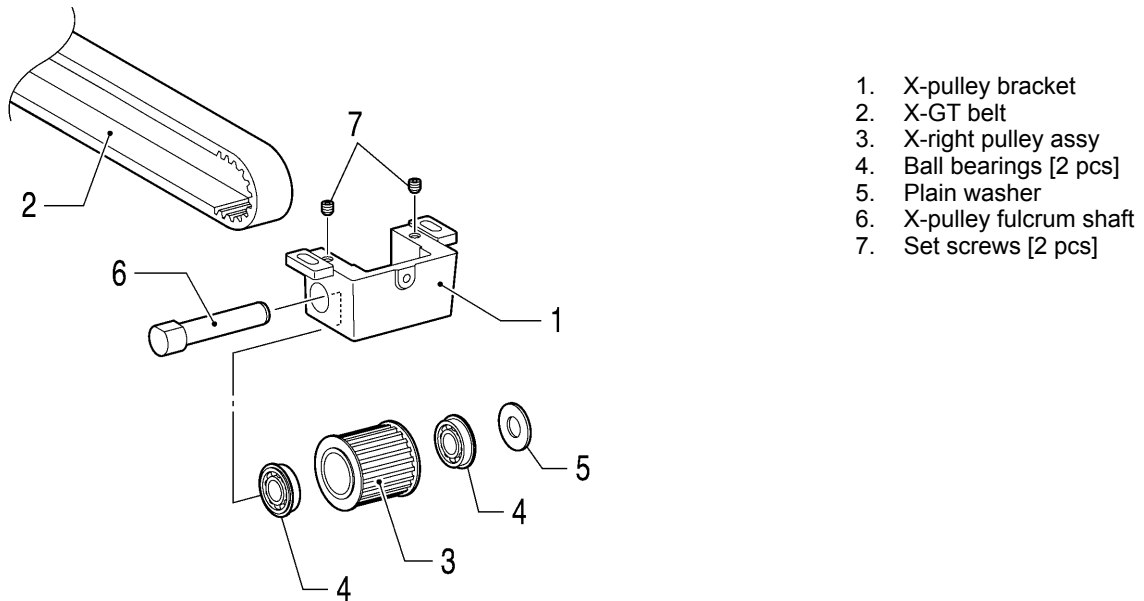
5171Q

- 2) Install the work clamp pulse motor to the work clamp motor plate with the four bolts so that the motor connector is facing downward.
- 3) Align the index marks on the work clamp cam gear and the work clamp driving gear, and then install the work clamp motor plate with the two bolts so that there is no backlash.

15. Work clamp pulse motor
16. Work clamp driving gear
17. Set screws [2 pcs]
18. Work clamp motor plate
19. Bolts [4 pcs]
20. Bolts [2 pcs]

6-6. Feed mechanism

Apply grease (AFC manufactured by THK or equivalent) to the areas indicated by the white arrows.

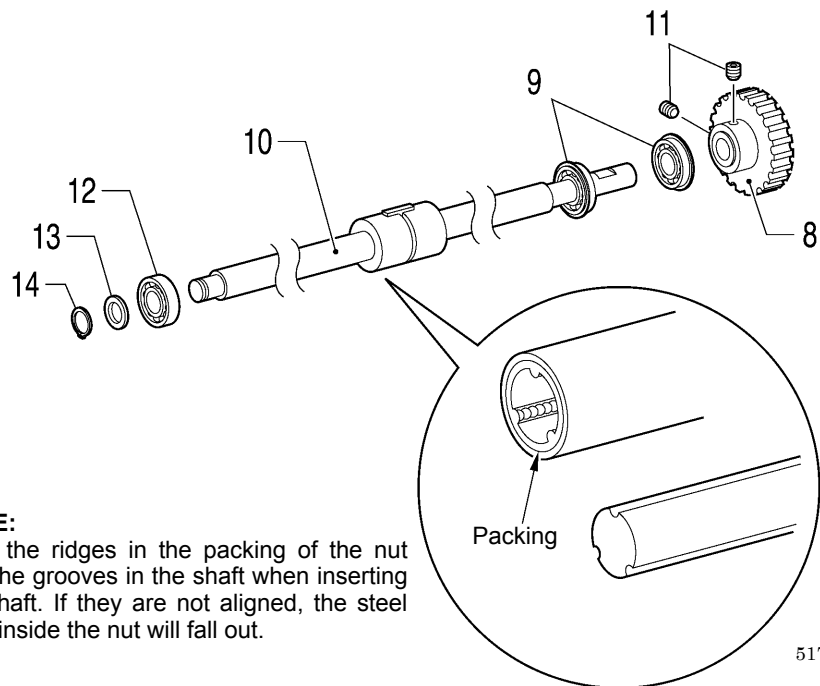


5173Q

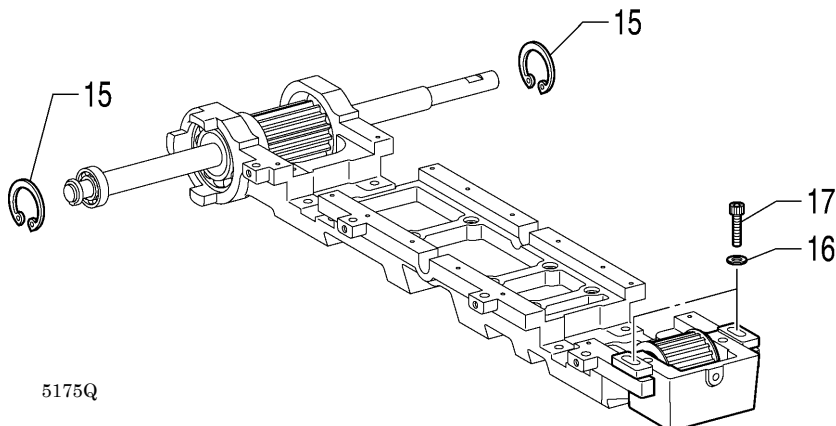
- 8. X-feed gear
- 9. Ball bearings [2 pcs]
- 10. Y-ball spline
- 11. Set screws [2 pcs]
- 12. Ball bearing
- 13. Plain washer
- 14. Retaining ring C

NOTE:

Align the ridges in the packing of the nut with the grooves in the shaft when inserting the shaft. If they are not aligned, the steel balls inside the nut will fall out.



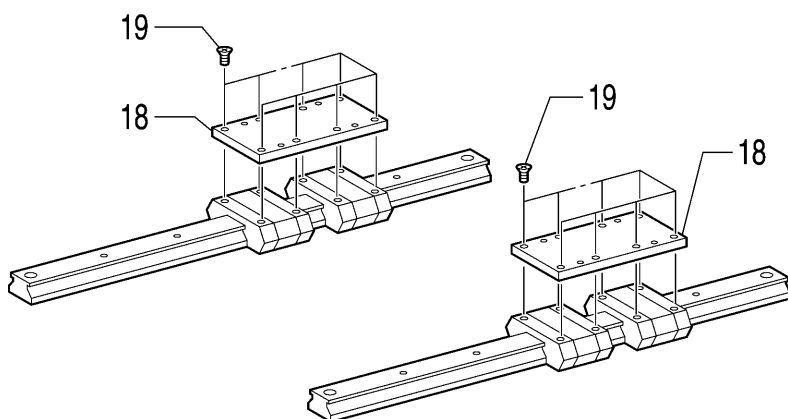
5174Q



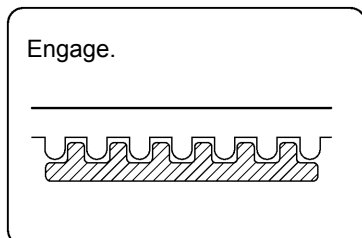
5175Q

- 15. Retaining rings C [2 pcs]
- 16. Plain washers [2 pcs]
- 17. Bolts [2 pcs] (Temporarily tighten)

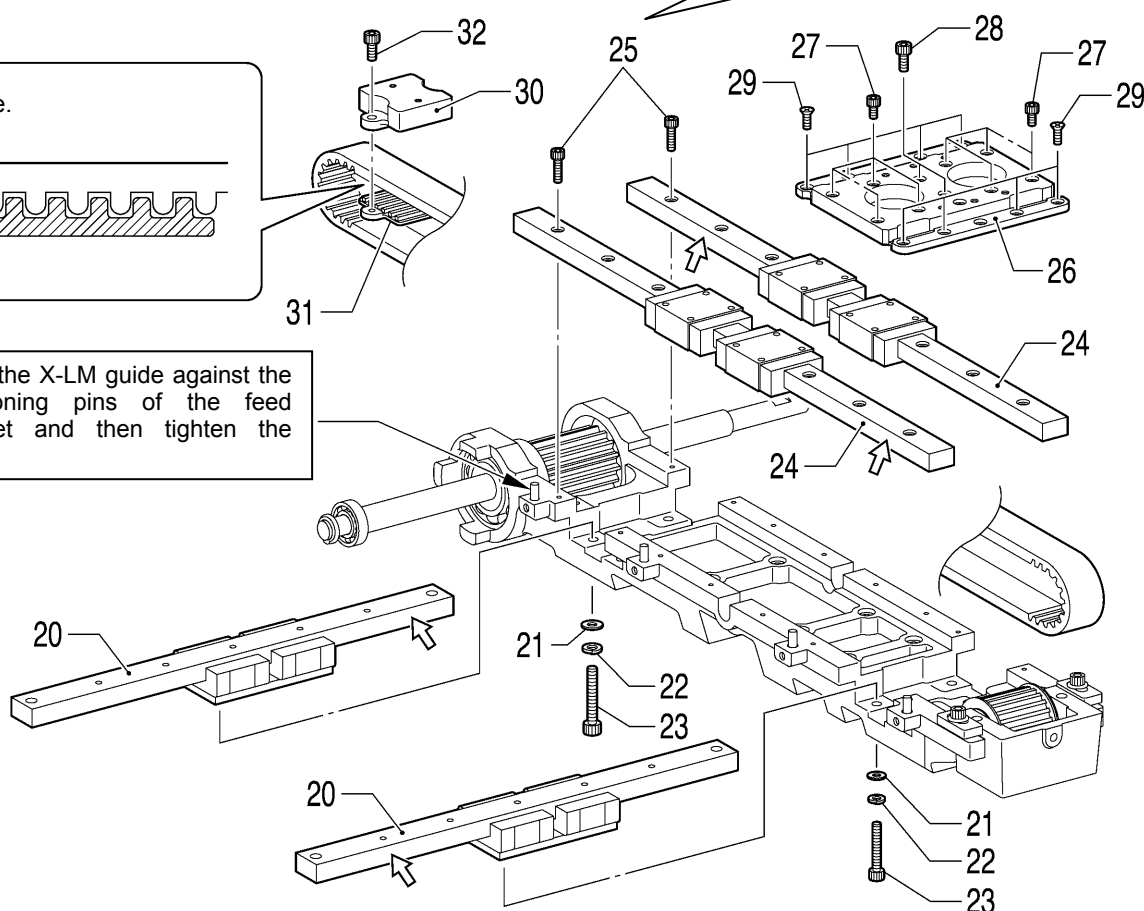
5176Q



Provisionally tighten the bolts so that their heads do not protrude from the top of the X-LM guide on the inside.

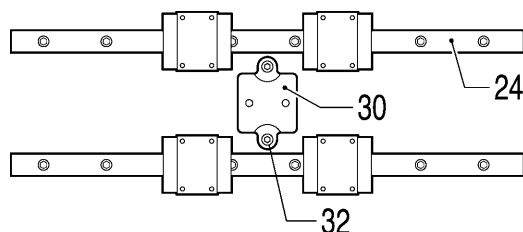


Push the X-LM guide against the positioning pins of the feed bracket and then tighten the bolts.



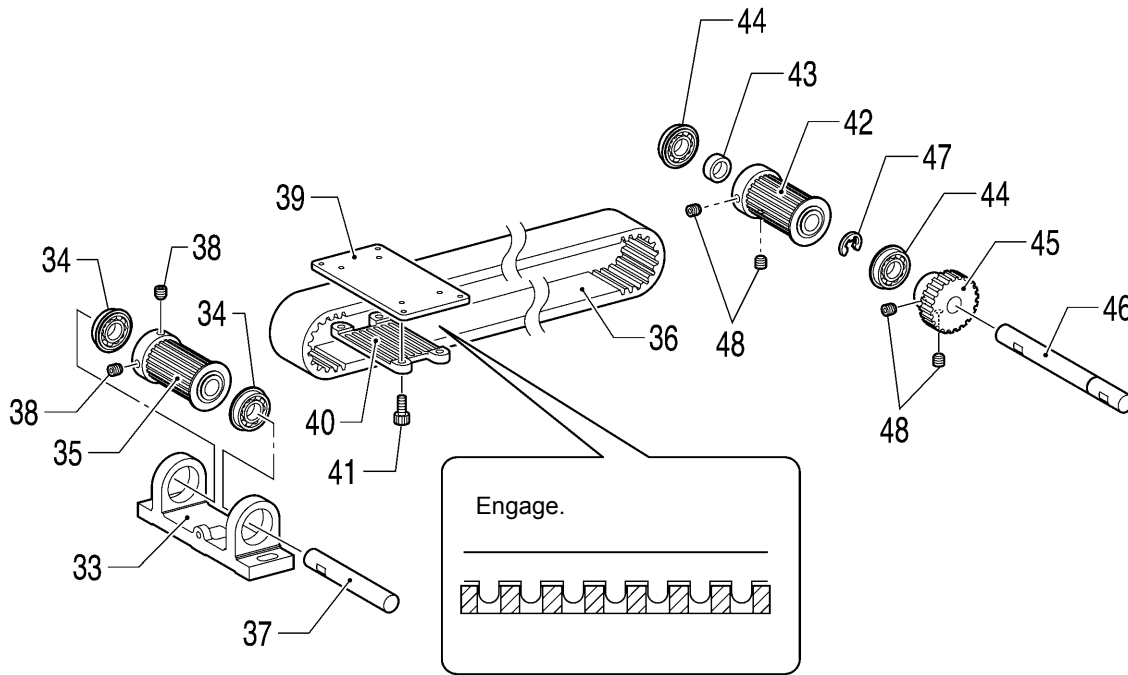
5177Q

Install the X-belt holder in between the X-LM guides as shown in the diagram.



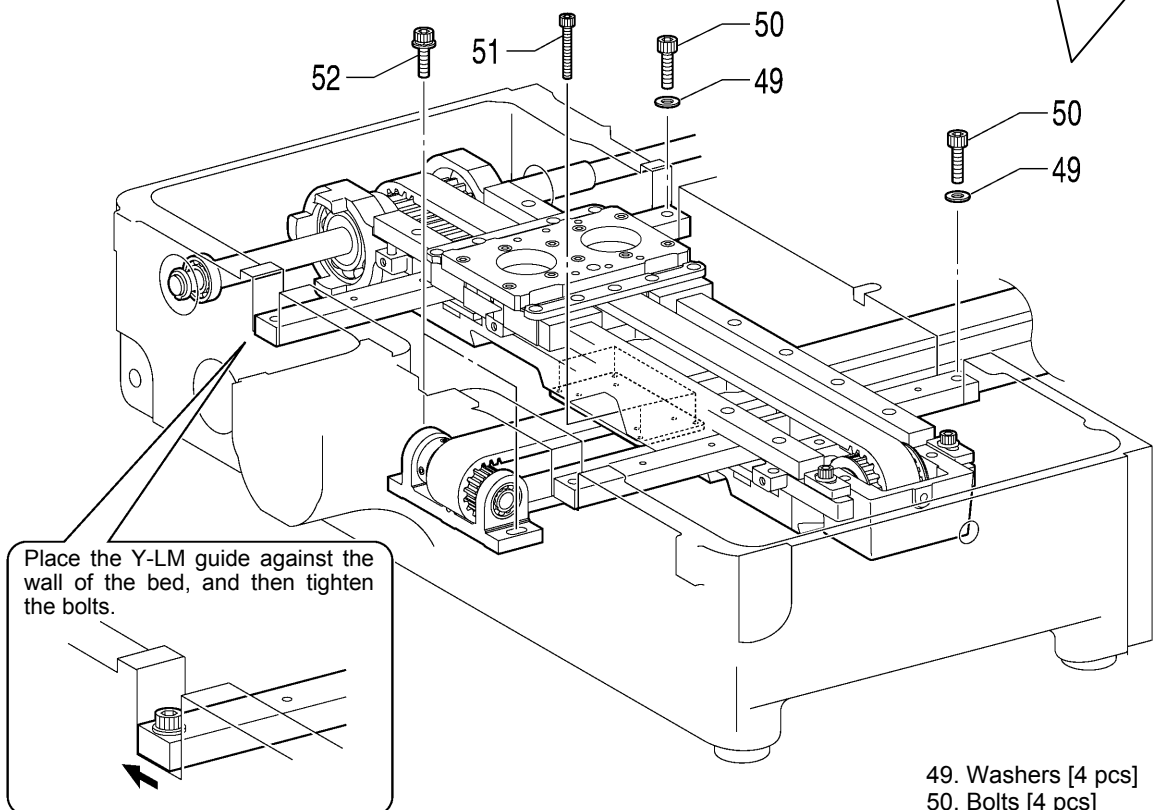
5215Q

- | | |
|----------------------------|-------------------------|
| 18. Y-LM spacers [2 pcs] | 26. Feed bracket X |
| 19. Flat screws [16 pcs] | 27. Bolts M3X6 [8 pcs] |
| 20. Y-LM guides [2 pcs] | 28. Bolts M4X8 [2 pcs] |
| 21. Plain washers [8 pcs] | 29. Flat screws [8 pcs] |
| 22. Spring washers [8 pcs] | 30. X-belt holder |
| 23. Bolts [8 pcs] | 31. X-belt holder plate |
| 24. X-LM guide [2 pcs] | 32. Bolts [2 pcs] |
| 25. Bolts [8 pcs] | |



- | | |
|----------------------------|----------------------------|
| 33. Y-pulley bracket | 41. Bolts [4 pcs] |
| 34. Ball bearings [2 pcs] | 42. Y-pulley assy |
| 35. Y-pulley assy | 43. Y-pulley collar |
| 36. Y-GT belt | 44. Ball bearings [2 pcs] |
| 37. Y-pulley fulcrum shaft | 45. Y-feed gear |
| 38. Set screws [2 pcs] | 46. Y-pulley driving shaft |
| 39. Y-belt support plate | 47. Retaining ring E |
| 40. Y-belt presser plate | 48. Set screws [4 pcs] |

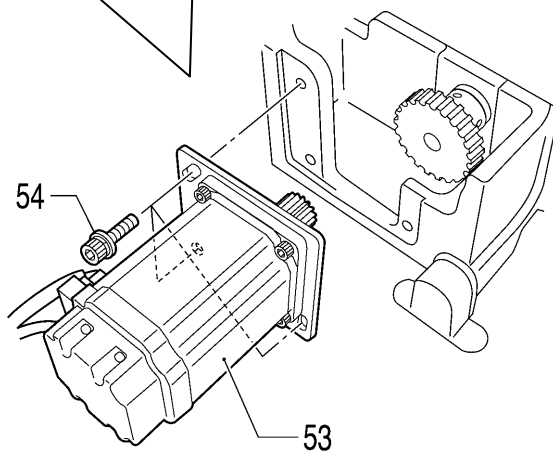
Provisionally tighten the bolts so that their heads do not protrude from the top of the Y-LM guide at the right.



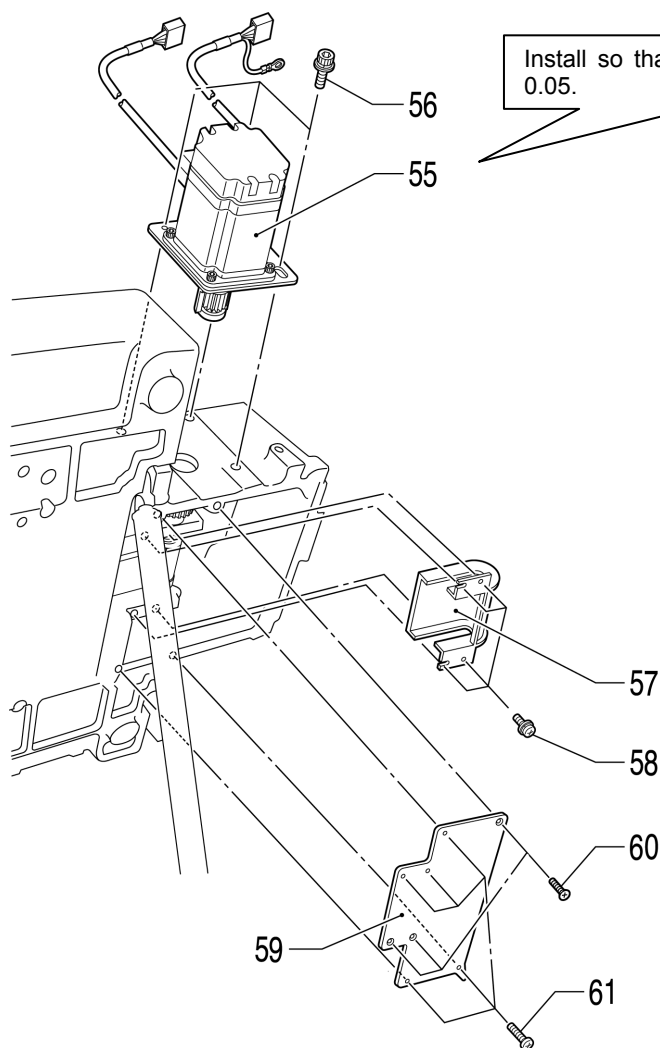
Place the Y-LM guide against the wall of the bed, and then tighten the bolts.

- | |
|---|
| 49. Washers [4 pcs] |
| 50. Bolts [4 pcs] |
| 51. Bolts [4 pcs] |
| 52. Bolts with washers [2 pcs]
(Temporarily tighten) |

Install so that the backlash is 0.01 – 0.05.



5180Q

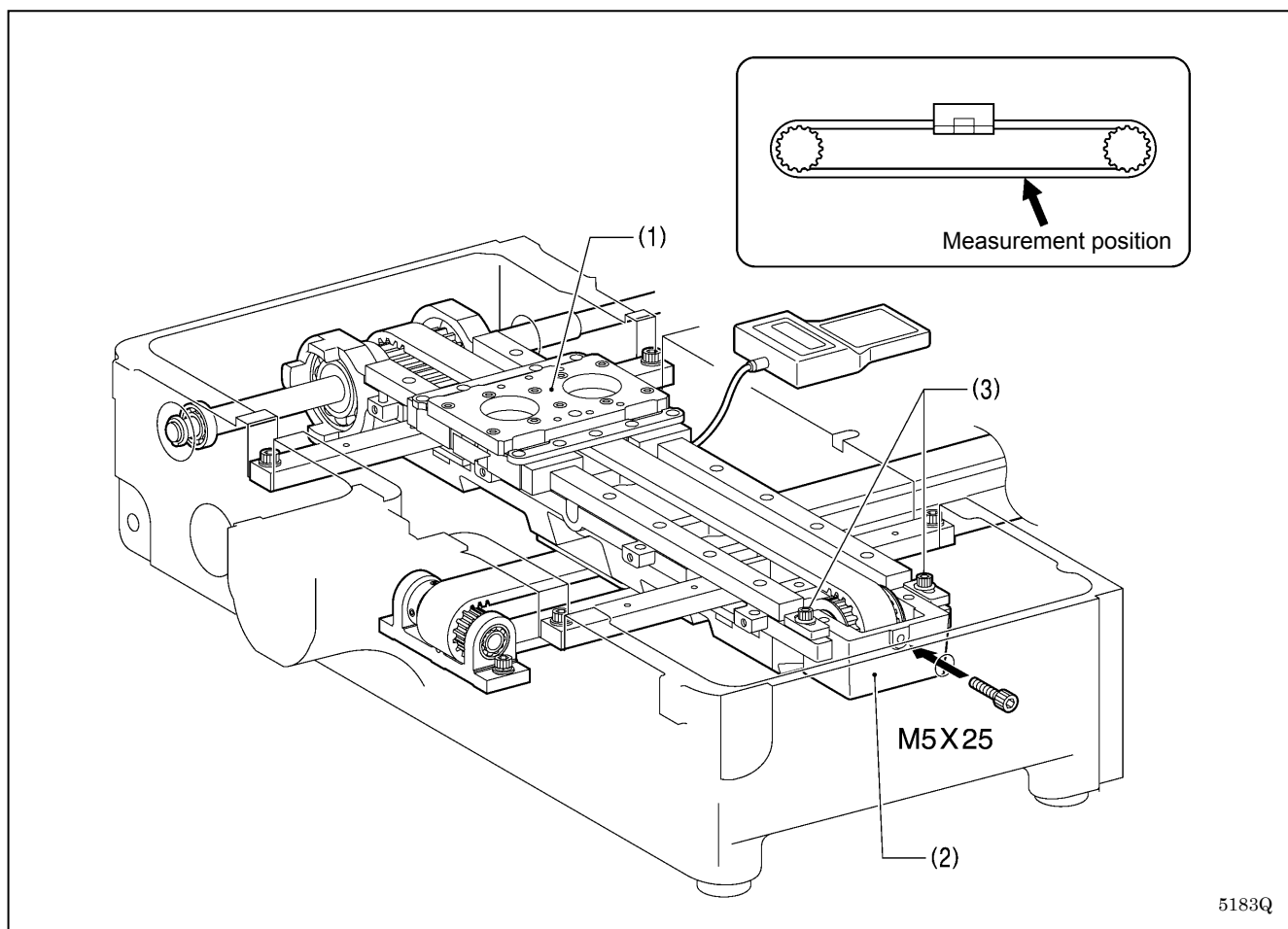


Install so that the backlash is 0.01 – 0.05.

- 53. X-feed motor assy
- 54. Bolts with washer [3 pcs] (Temporarily tighten)
- 55. Y-feed motor L assy
- 56. Bolts with washer [3 pcs] (Temporarily tighten)
- 57. Y belt cover
- 58. Screws with washer [4 pcs]
- 59. Oil cover
- 60. Screws [5 pcs]
- 61. Flat screws [3 pcs]

5181Q

<X-GT belt tension adjustment>

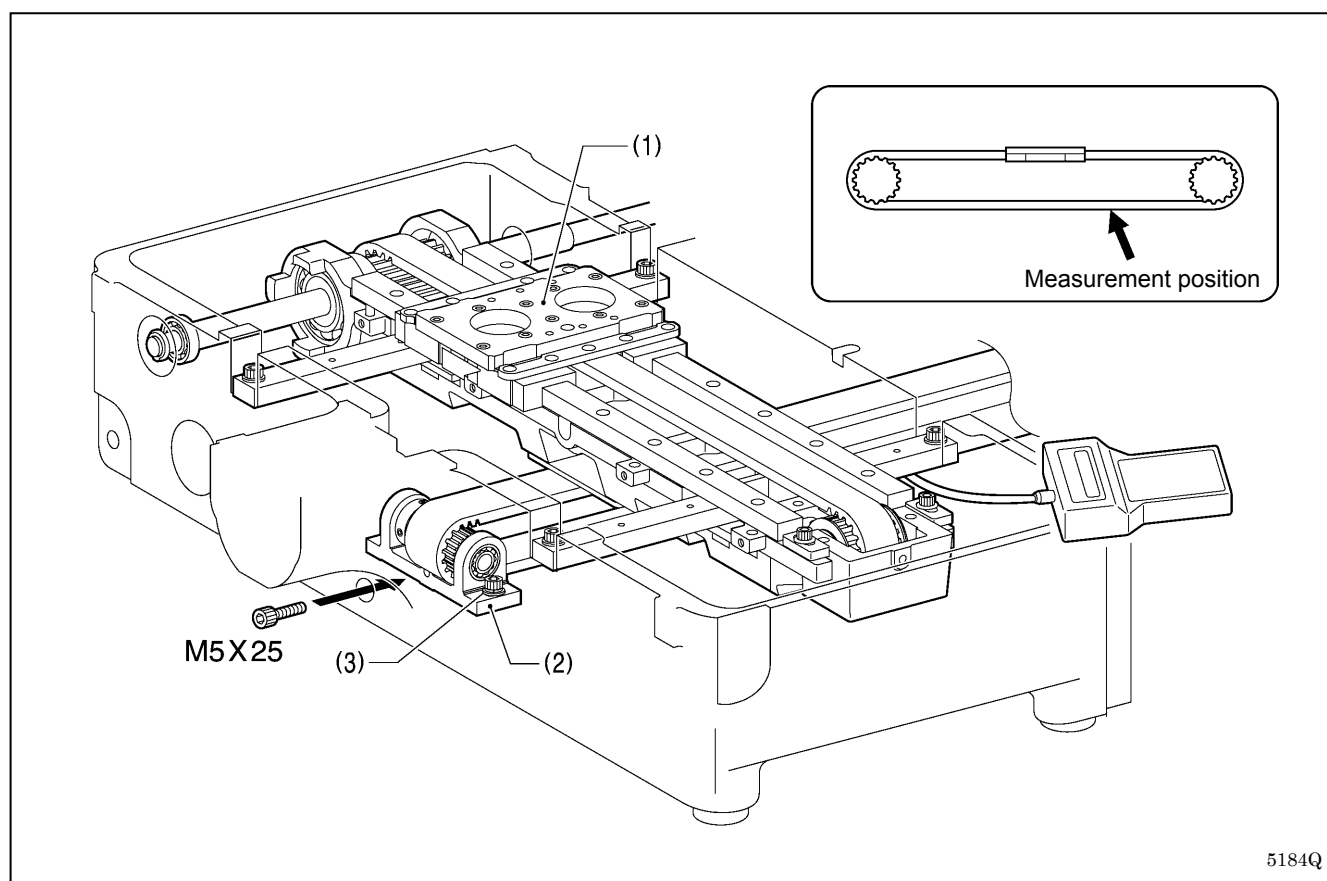


5183Q

1. Move the X feed bracket (1) so that it is in the middle of the sewing area in the Y direction and at the left edge of the sewing area in the X direction.
2. Loosen the two bolts (3) of the X-pulley bracket (2), and then provisionally tighten them at $19.6 \text{ mN} \cdot \text{m}$.
3. Pass the M5x25 screw through the countersunk hole in the side of the bed and screw it into the tap hold in the X-pulley bracket (2). Then adjust the belt tension to the following value.
[For a new belt: $290 - 330 \text{ N}$; For a reused belt: $220 - 250 \text{ N}$]
4. Tighten the two bolts (3), and then remove the M5x25 screw.
5. Measure the belt tension once more and check that it is at the following value.
[For a new belt: $400 - 440 \text{ N}$; For a reused belt: $320 - 350 \text{ N}$]

- * Be sure to use a belt tension gauge to measure the belt tension, and measure from the bottom of the belt.
- * The belt tension gauge should be set to measure a unit weight of 0.04 kg/m , a belt width of 30 mm and a span length of 370 mm .
- * The recommended belt tension gauge to use is the Dr. TENSION TYPE-II manufactured by MITSUBOSHI BELTING LTD.

<Y-GT belt tension adjustment>

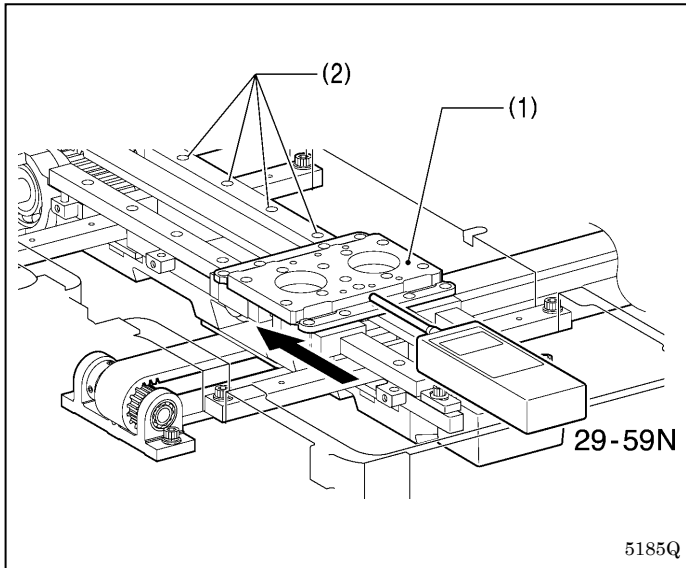


5184Q

1. Move the X feed bracket (1) so that it is in the middle of the sewing area in the Y direction and at the left edge of the sewing area in the X direction.
2. Loosen the two bolts (3) of the Y-pulley bracket (2), and then provisionally tighten them at $19.6 \text{ mN} \cdot \text{m}$.
3. Pass the M5x25 screw through the countersunk hole in the side of the bed and screw it into the tap hold in the Y-pulley bracket (2). Then adjust the belt tension to the following value.
[For a new belt: $250 - 320 \text{ N}$; For a reused belt: $160 - 240 \text{ N}$]
4. Tighten the two bolts (3), and then remove the M5x25 screw.
5. Measure the belt tension once more and check that it is at the following value.
[For a new belt: $500 - 600 \text{ N}$; For a reused belt: $400 - 480 \text{ N}$]

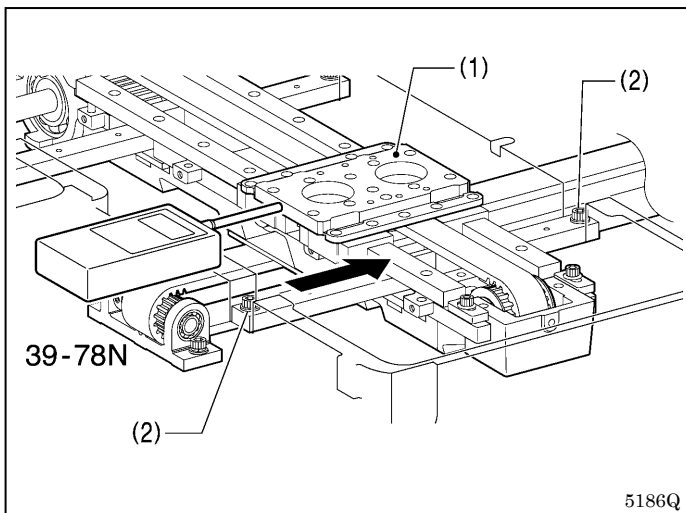
- * Be sure to use a belt tension gauge to measure the belt tension, and measure from the bottom of the belt.
- * The belt tension gauge should be set to measure a unit weight of 0.04 kg/m , a belt width of 30 mm and a span length of 370 mm .
- * The recommended belt tension gauge to use is the Dr. TENSION TYPE-II manufactured by MITSUBOSHI BELTING LTD.

<Inside X-LM guide installation>



1. With tension applied to the X-GT belt and the X-feed motor assembly installed, use a push-pull tension gauge to push the X feed bracket (1) from one edge to the other in the X direction.
2. Tighten the eight bolts (2) at the place where the load is 29 – 59 N (variation within 20 N).

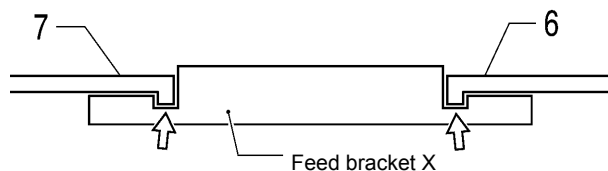
<Right Y-LM guide installation>



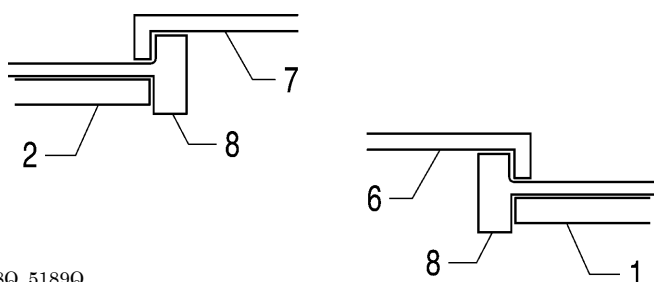
1. With tension applied to the Y-GT belt and the Y-feed motor L assembly installed, use a push-pull tension gauge to push the X feed bracket (1) from one edge to the other in the Y direction.
2. Tighten the two bolts (2) at the place where the load is 39 – 78 N (variation within 20 N).

6-7. Feed covers

- 1) Place the inside cover into the groove in the X feed bracket. Apply grease (MOLYKOTE LONGTERM W2 manufactured by Dow Corning or equivalent) to the areas indicated by the white arrows.

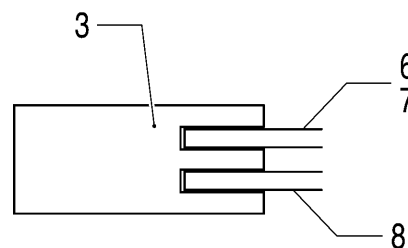


- 2) Set so that the rubber part of the inside cover is on the outside of the rubber part of the outside cover and so that the stopper of the inside cover is on the inside of the fixed cover.



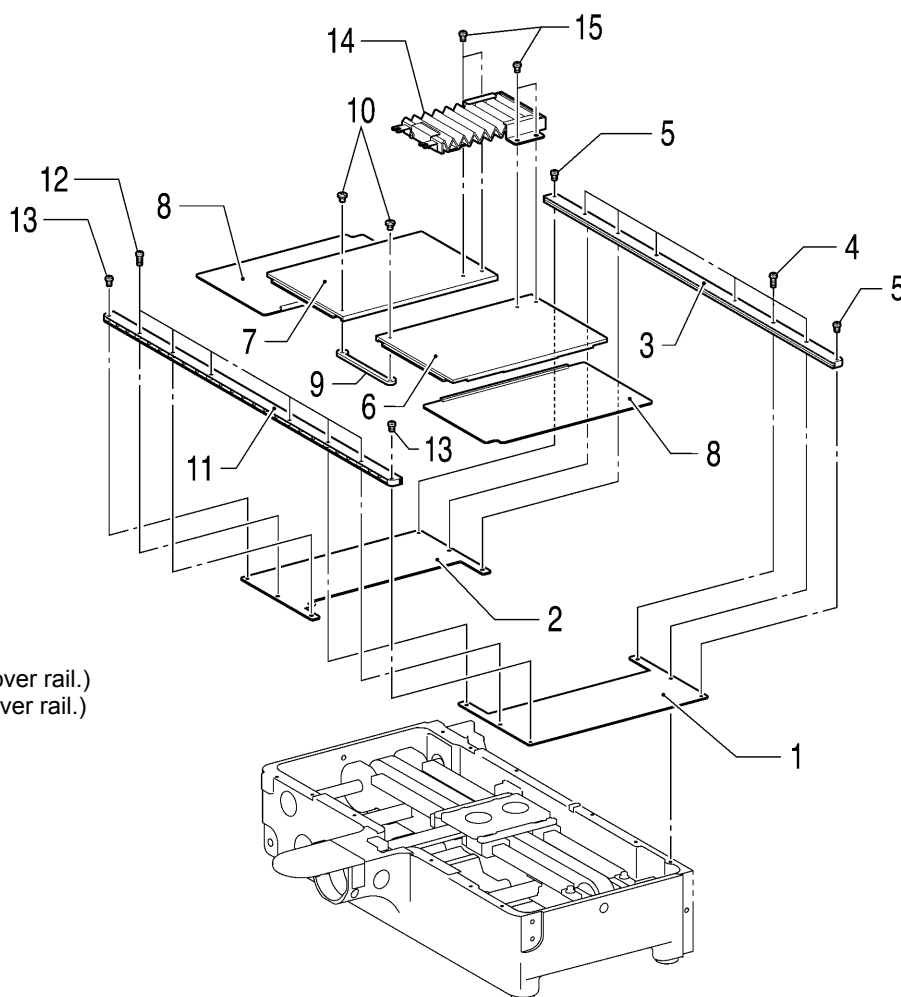
5188Q 5189Q

Place the inside cover into the upper cover rail, and place the outside cover into the lower cover rail.



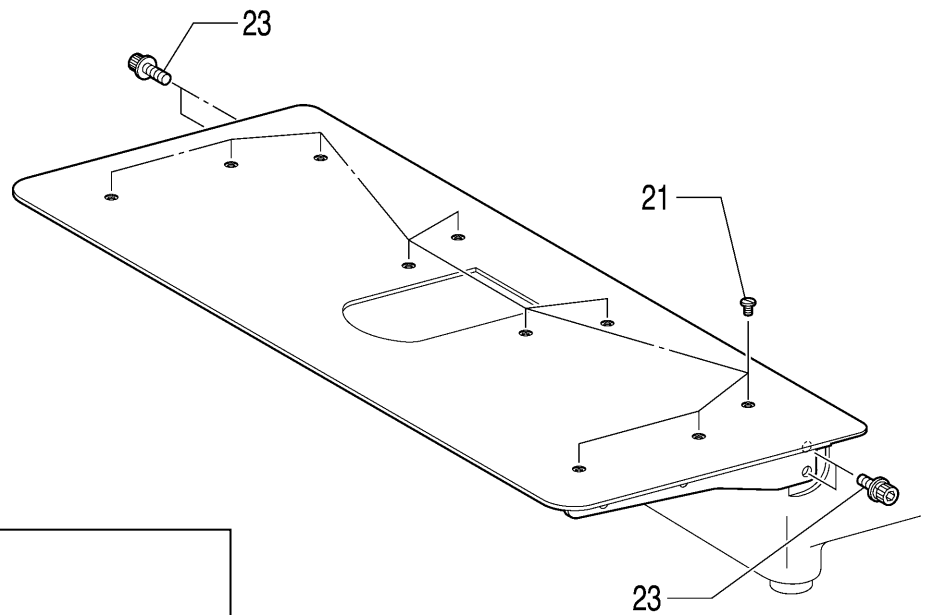
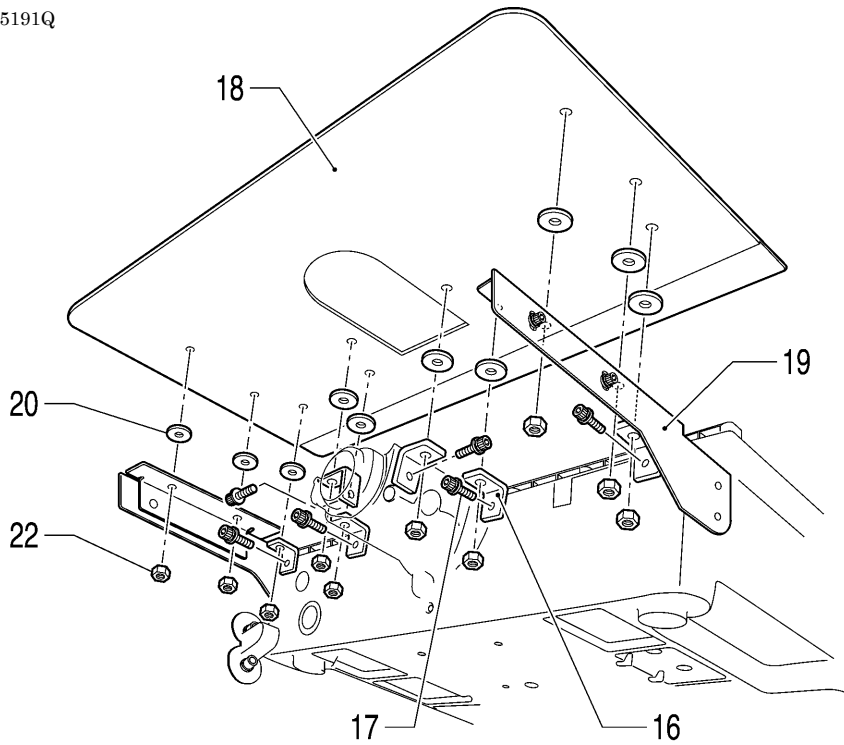
5187Q

1. Fixed cover R
2. Fixed cover L
3. Cover rail
4. Screws M4X10 [6 pcs]
5. Screws M4X4 [2 pcs]
6. Inside cover R assy (Place into cover rail.)
7. Inside cover L assy (Place into cover rail.)
8. Outside cover assemblies [2 pcs]
(Place into cover rail.)
9. Cover connecting plate
10. Screws [2 pcs]
11. Cover rail
12. Screws M4X10 [6 pcs]
13. Screws M4X4 [2 pcs]
14. Bellow assy
15. Screws [4 pcs]

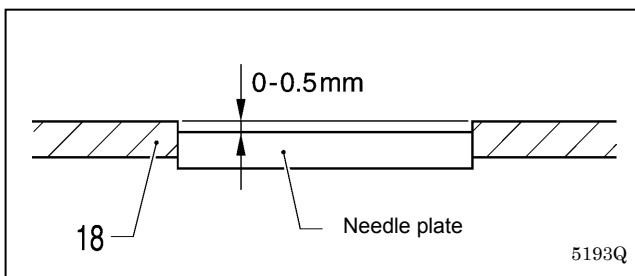


5190Q

5191Q



5192Q

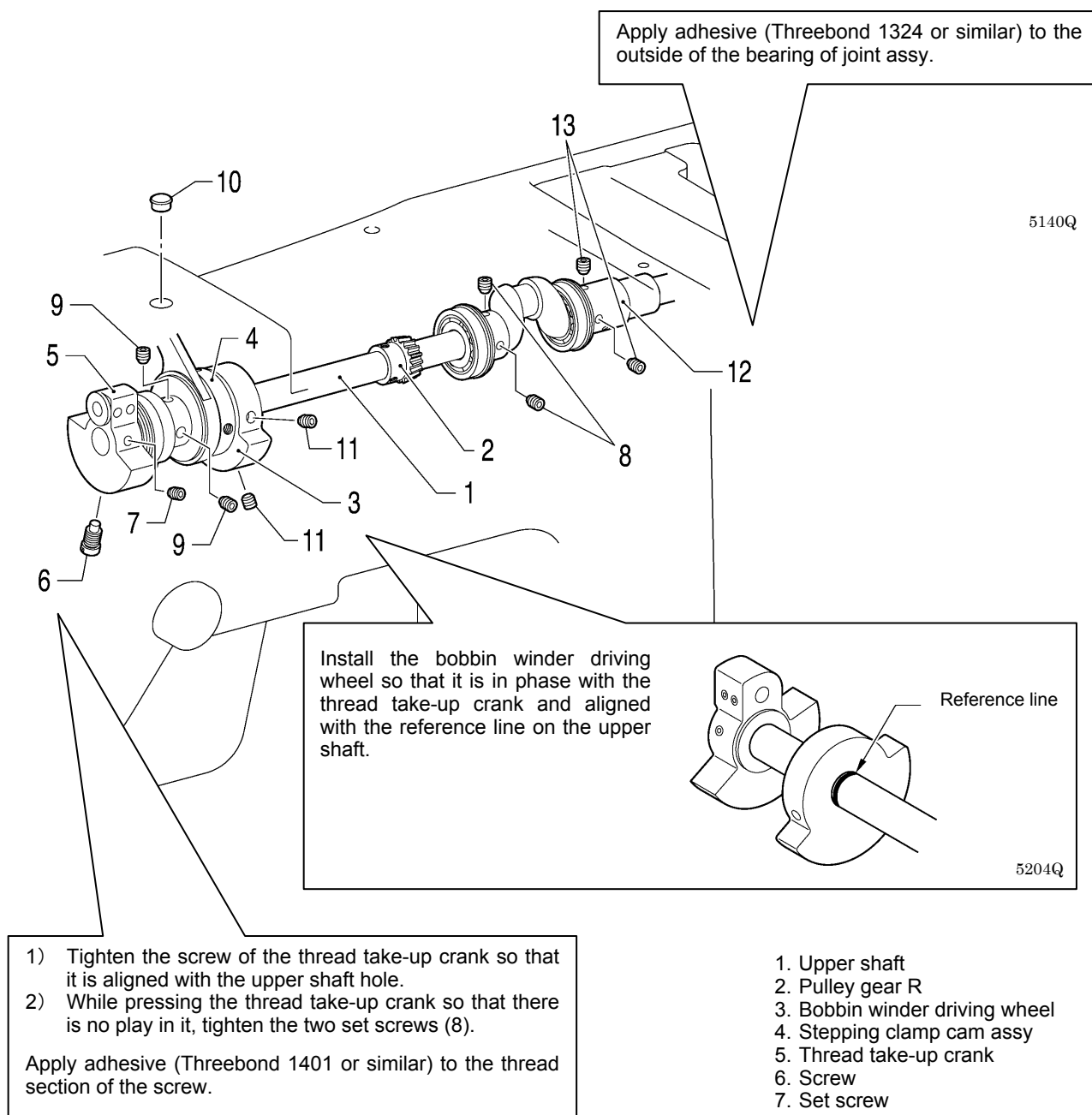


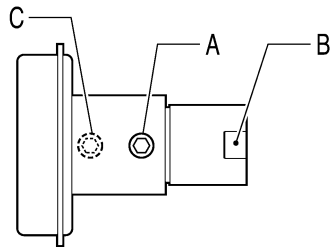
5193Q

- 16. Auxiliary plate brackets [6 pcs]
- 17. Bolts with washer [6 pcs]
- 18. Auxiliary plate
- 19. Support plate guides [2 pcs]
- 20. Auxiliary plate cushions [10 pcs]
- 21. Screws [10 pcs] (Tighten to 0.5 N·m.)
- 22. Nuts [10 pcs]
- 23. Bolts with washer [4 pcs]

After installing, carry out the adjustments in "7-20-2. X-Y feed home position".

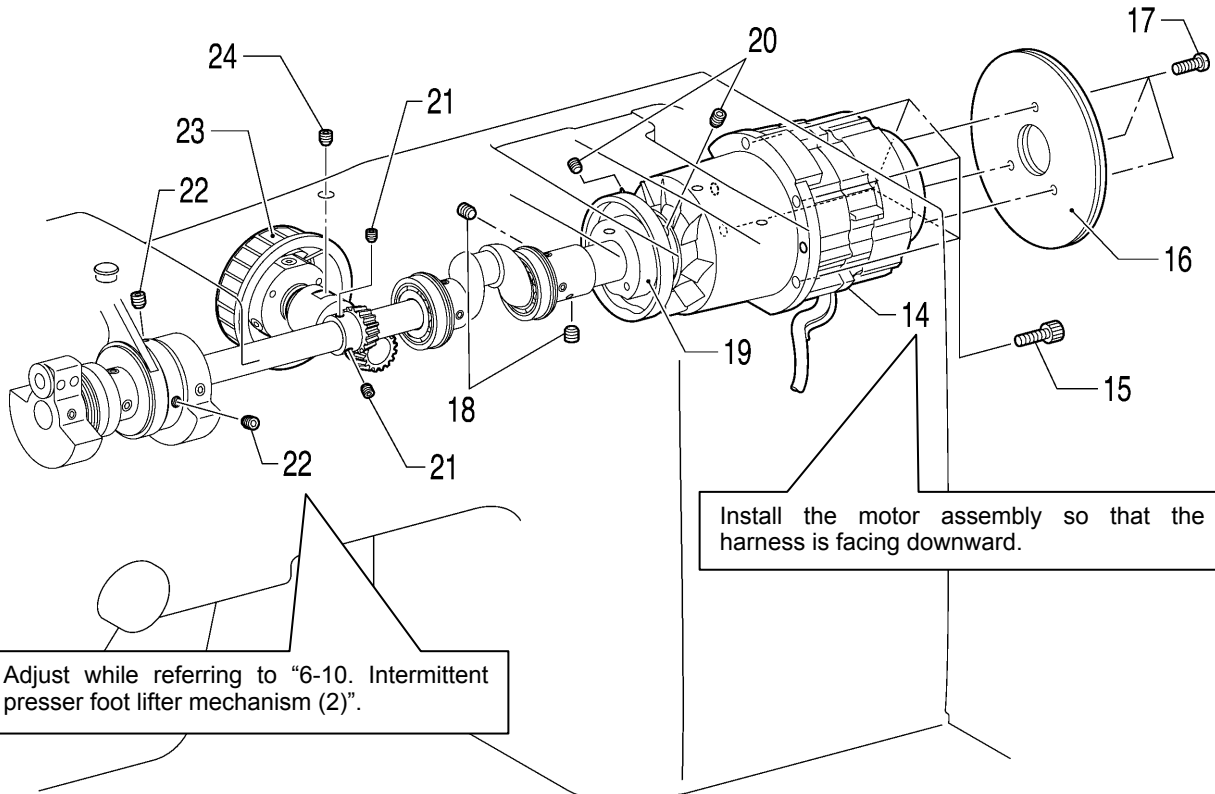
6-8. Upper shaft mechanism





Tighten the set screw so that the screw stop A on the motor shaft is in the same phase as the screw stop B on the thread trimmer cam.
Tighten the set screw so that the screw stop C on the upper shaft is at a phase of approximately 180 degrees from the screw stop A on the motor shaft.

4644Q

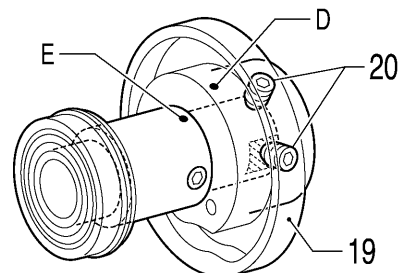


5141Q

- 14. Motor assy
- 15. Bolts [4 pcs]
- 16. Fries wheels [2 pcs]
- 17. Screws [3 pcs]
- 18. Set screws [2 pcs]
- 19. Thread trimmer cam
- 20. Set screws [2 pcs]
- 21. Set screws [2 pcs]
- 22. Set screws [2 pcs] (Temporarily tighten)
- 23. Pulley assy
- 24. Set screw

- 1) Align the index mark D on the thread trimmer cam and the index mark E on the joint assembly, and then provisionally tighten the set screw at the index mark side.
- 2) After tightening the set screw at the screw stop side, fully tighten the set screw at the index mark side.
- 3) Carry out the adjustments in "7-17. Adjusting the thread trimmer cam position".

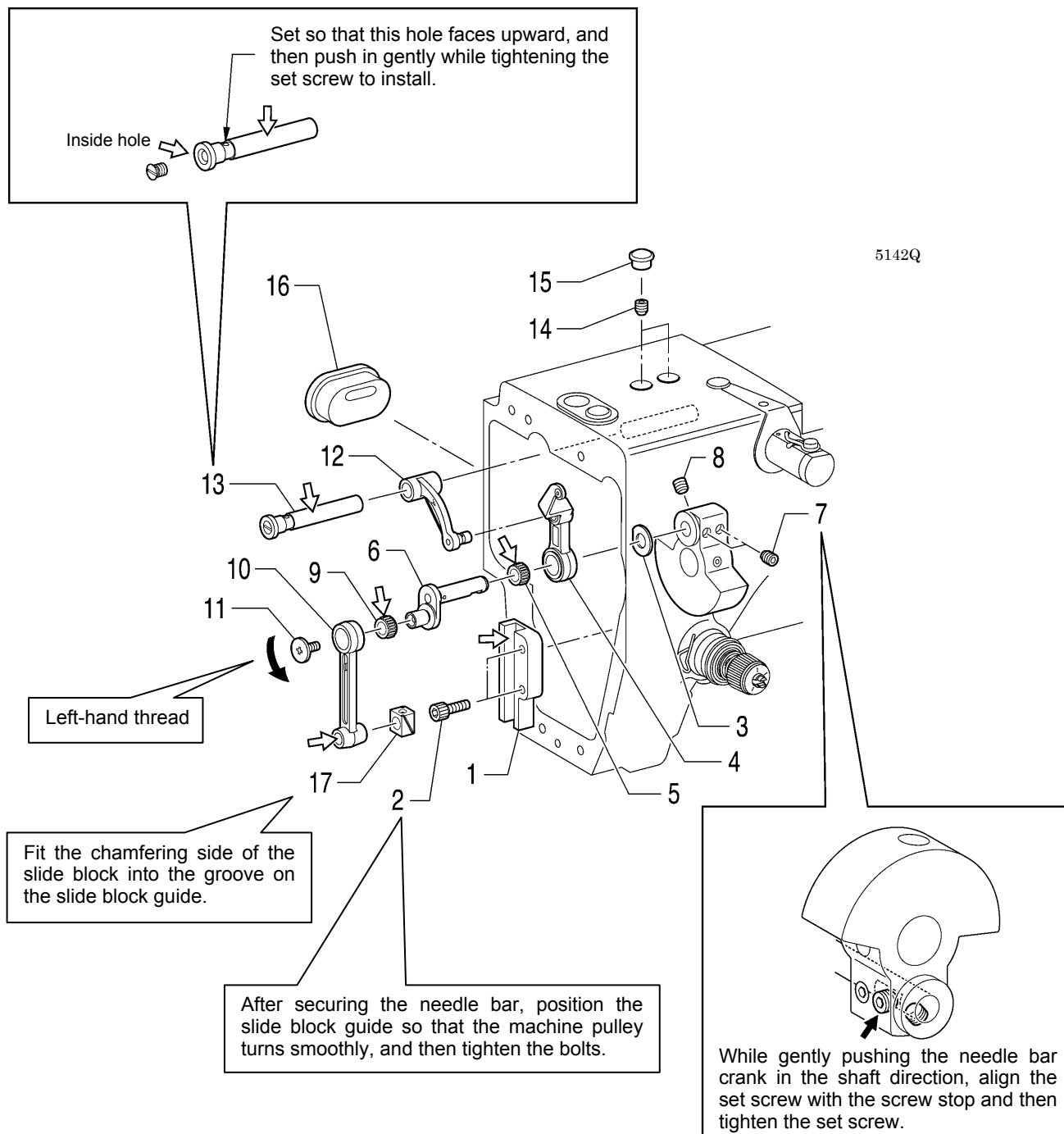
Apply the specified grease (GREASE BZL-301) to the grooves.



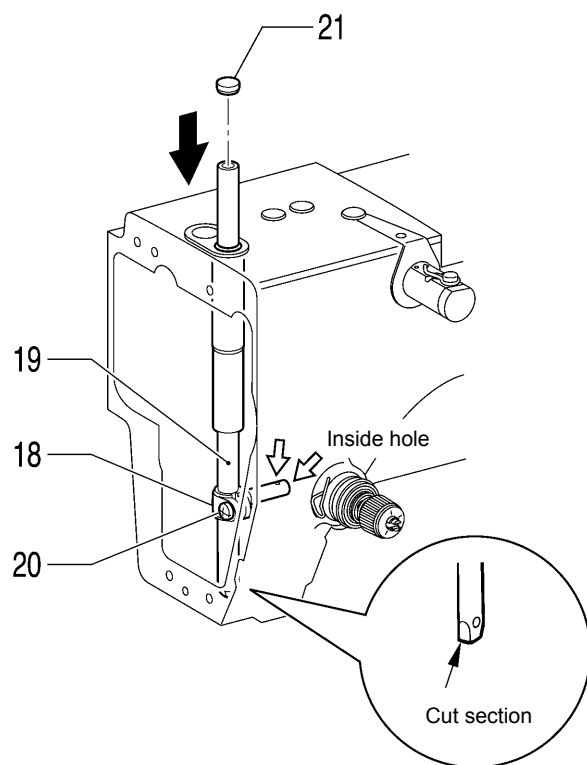
5182Q

6-9. Needle bar mechanism

Apply grease <GREASE BZL-301 (SA2694-001)> specified by Brother to the portions indicated by the white arrows.



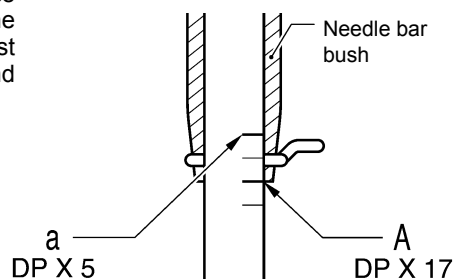
- | | |
|--|---------------------------------------|
| 1. Slide block guide | 10. Needle bearing |
| 2. Bolts [2 pcs] (Temporarily tighten) | 11. Screw |
| 3. Washer | 12. Thread take-up support |
| 4. Thread take-up lever assy | 13. Thread take-up support shaft assy |
| 5. Needle bearing | 14. Set screws [2 pcs] |
| 6. Needle bar crank | 15. Rubber caps [2 pcs] |
| 7. Set screws [2 pcs] | 16. Rubber cap |
| 8. Set screw | 17. Slide block |
| 9. Needle bearing | |



- 18. Needle bar clamp
- 19. Needle bar (Insert from above)
- 20. Screw
- 21. Rubber cap

5143Q

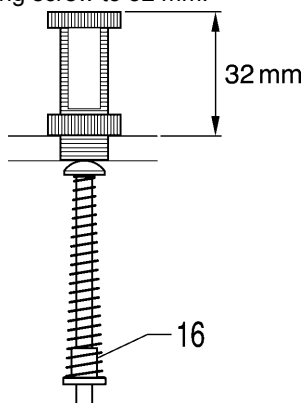
Align the needle bar so that reference line A (the second lowest reference line on the needle bar) or reference line a (top reference line) is aligned with the lower edge of the needle bar bush when the machine pulley is turned to raise the needle bar from its lowest position, and then set the cut section so that it is facing forward and tighten the screw.



4647Q

6-10. Intermittent presser foot lifter mechanism (2)

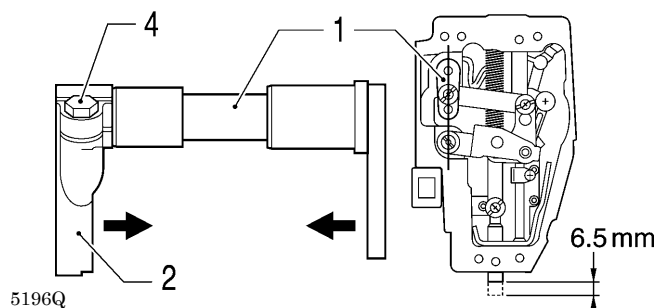
Install the presser bar spring collar as shown in the illustration, and then adjust the height of the presser adjusting screw to 32 mm.



5195Q

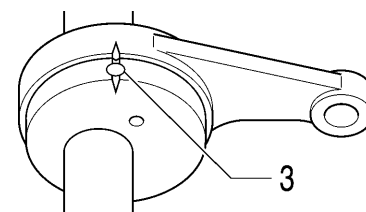
Notes on the installation position
(Refer to "7-13. Changing the intermittent stroke".)

- 1) With the needle bar lowered approximately 6.5 mm from its highest position, set the stepping clamp arm F to the position of the straight line in the illustration.
- 2) Place a bushing in between stepping clamp arm F and stepping clamp arm R so that there is no play, and then tighten the bolt.

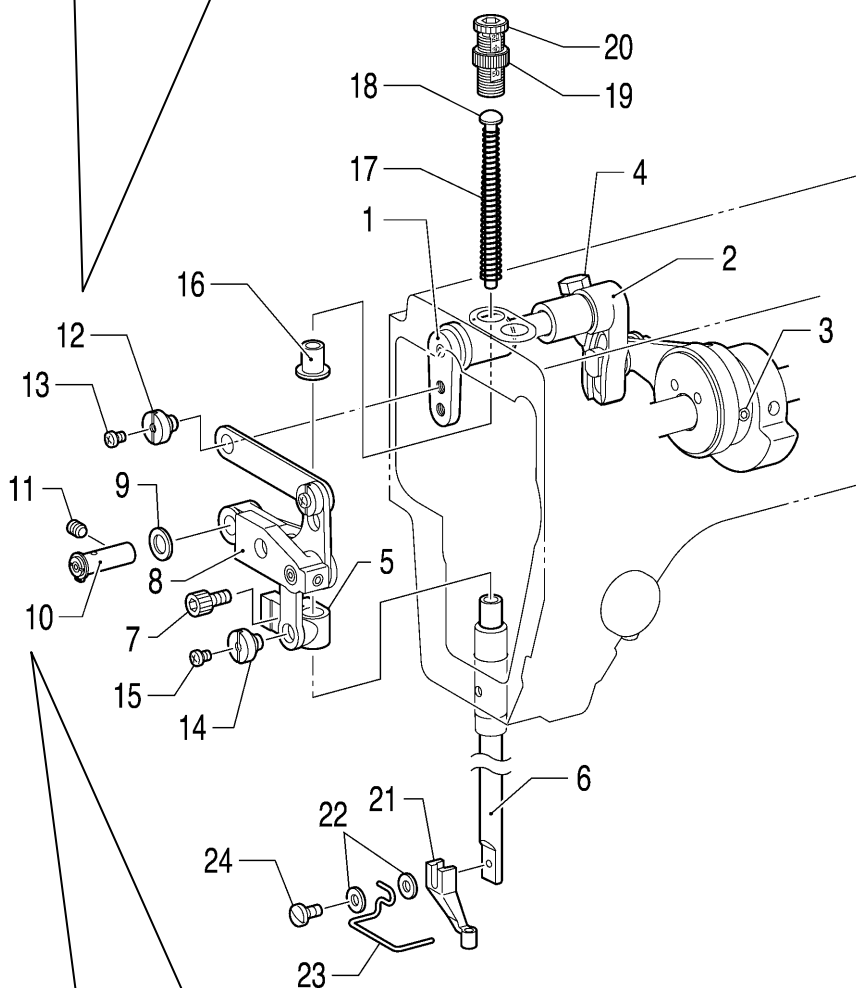


5196Q

At the needle bar timing position, align the index marks of the stepping clamp cam and the stepping clamp connecting rod, and then tighten the set screw.



5197Q



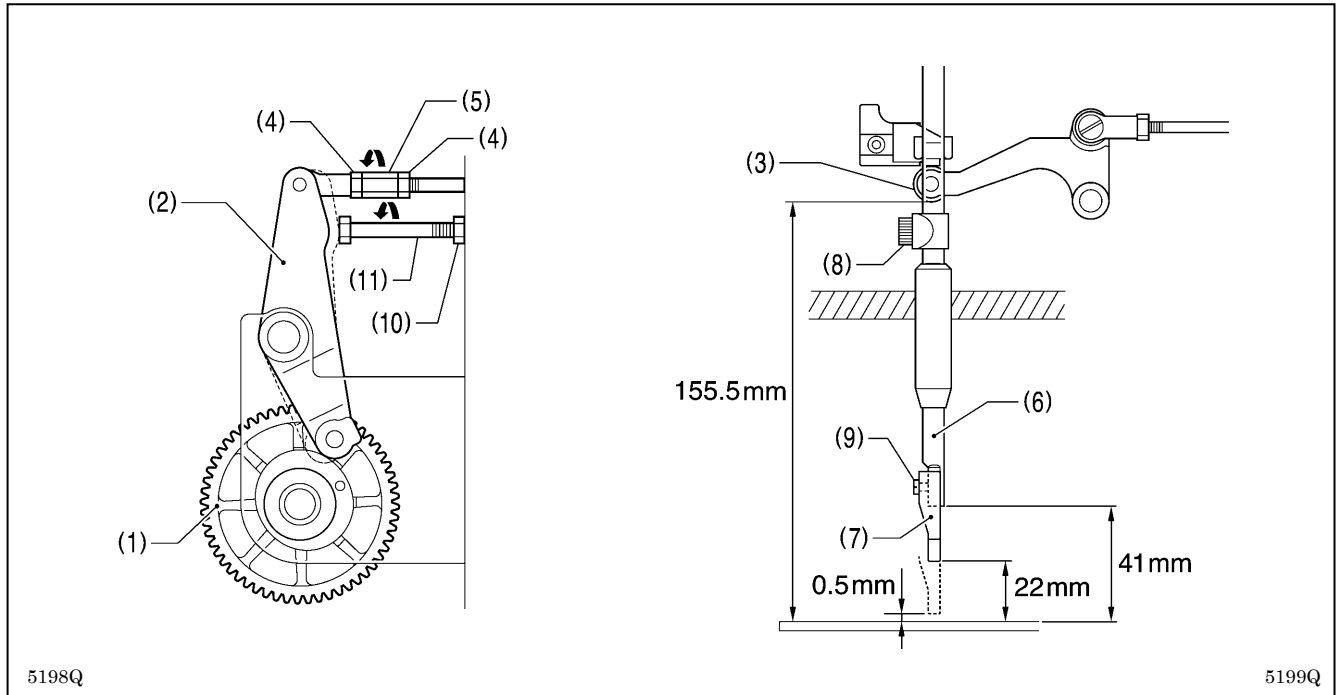
Tighten the set screw on the screw flat while lightly pressing the link shaft.

1. Stepping clamp arm F
2. Stepping clamp arm R
3. Set screws [2 pcs]
4. Bolt
5. Presser bar clamp
6. Presser bar
7. Bolt (Temporarily tighten)
8. Stepping clamp lifter link
9. Washer
10. Link shaft (with retaining ring)
11. Set screw
12. Shoulder screw
13. Screw
14. Shoulder screw
15. Screw
16. Presser bar spring collar
17. Presser bar spring
18. Presser bar spring guide
19. Adjusting screw nut
20. Presser adjusting screw
21. Presser foot
22. Plain washers [2 pcs]
23. Finger guard
24. Screw (Temporarily tighten)

5194Q

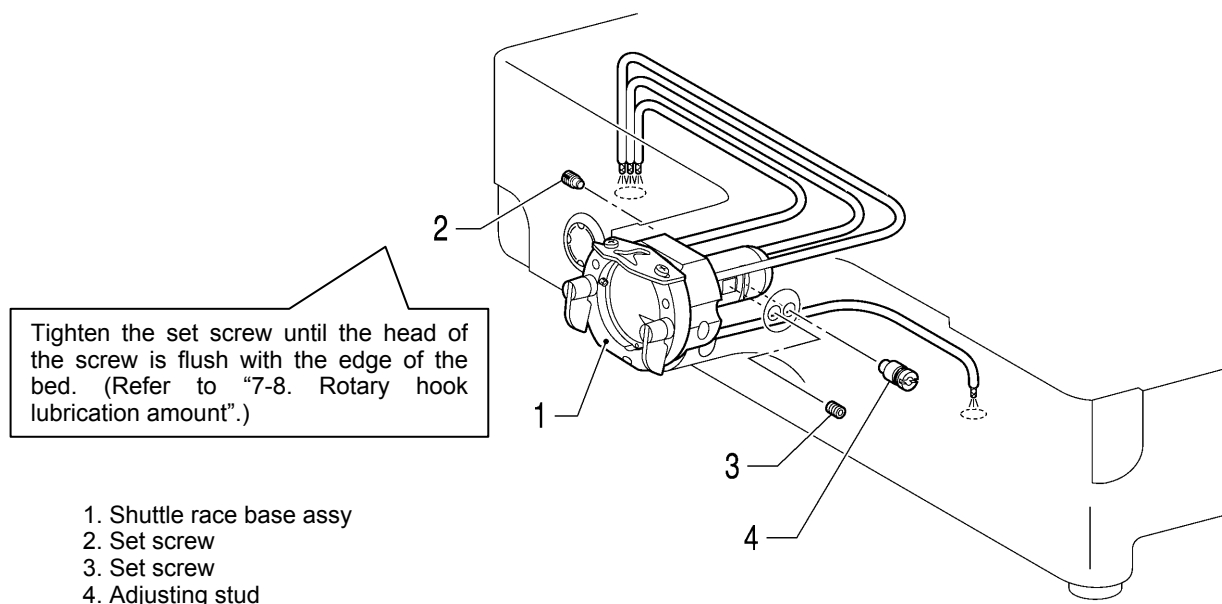
6. ASSEMBLY

After installing the needle plate while referring to "6-13. Thread trimmer mechanism (2)", carry out the following adjustments.

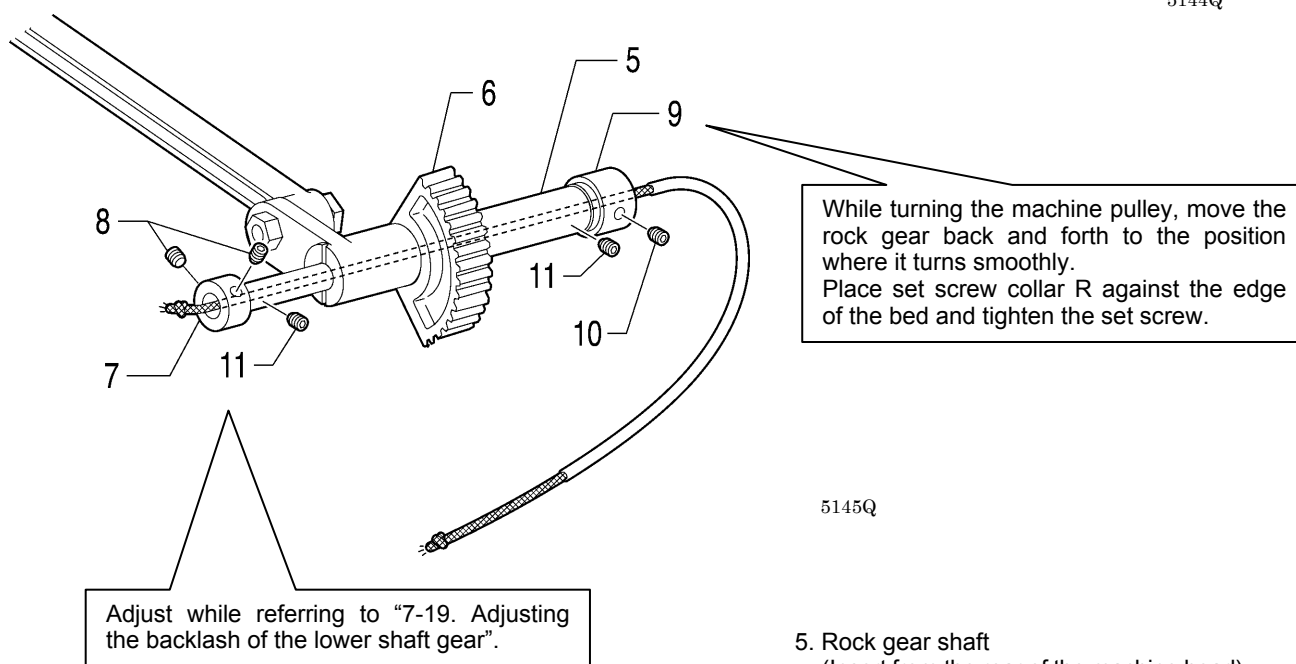


1. Turn the work clamp cam gear (1) to move the stepping foot driving lever (2) to the solid line position shown in the illustration.
2. Loosen the two nuts (4) and turn the joint (5) to adjust the height of the roller (3) so that it is 155.5 mm above the top of the needle plate.
3. Lower the needle bar approximately 6.5 mm from its highest position.
4. Set the height of the presser bar (6) to 41 mm above the needle plate, align the center of the presser foot (7) and the needle hole, and then tighten the bolt (8).
5. Set the height of the presser foot (7) to 22 mm above the needle plate, and then tighten the screw (9).
6. Turn the work clamp cam gear (1) to move the stepping foot driving lever (2) to the dotted line position shown in the illustration.
7. Set the needle bar to the timing position.
8. Loosen the nut (10) and turn the bolt (11) to set the height of the presser foot (7) to 0.5 mm above the needle plate.

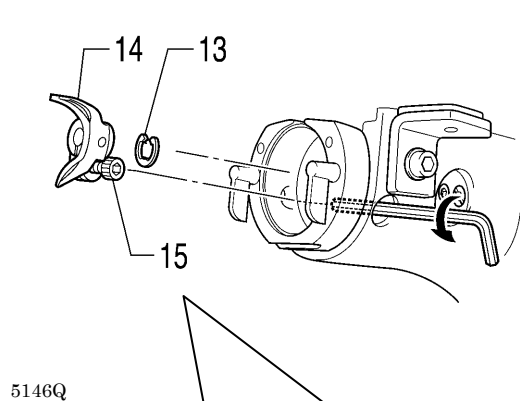
6-11. Lower shaft mechanism



5144Q

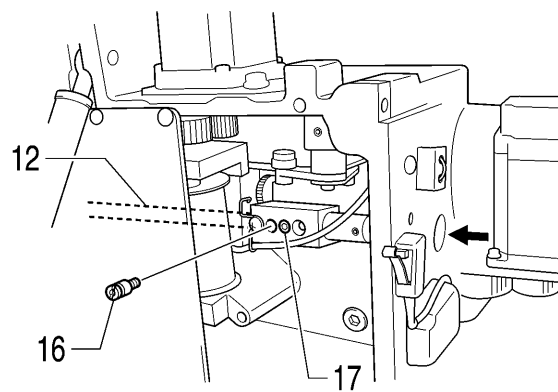


5145Q

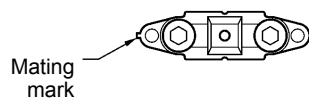


5146Q

Provisionally tighten the bolt while lightly pressing the driver against the retaining ring.

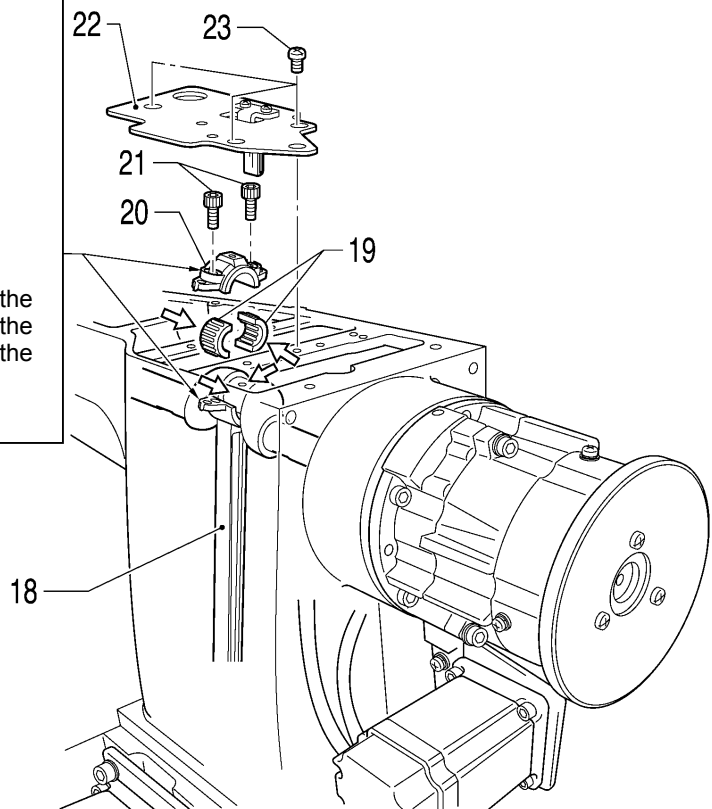


5147Q



Insert the crank rod (lower part) into the crank of the upper shaft, and then align the mating mark on the crank rod (upper part) from above and gently tighten the bolts.

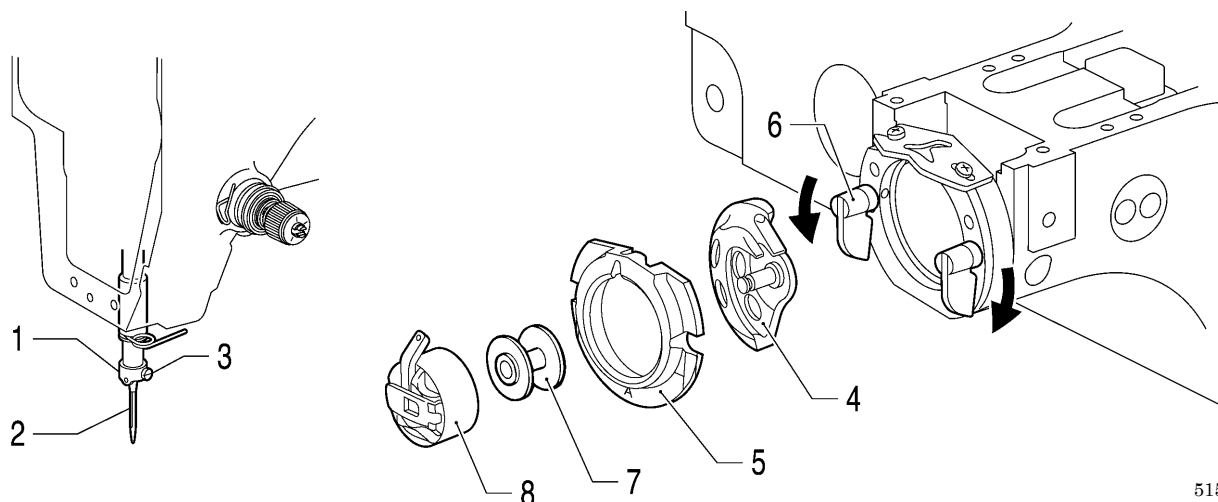
* Check that the machine pulley turns smoothly.



5148Q

- 12. Lower shaft assy
(Insert from the rear of the machine head)
- 13. Retaining ring E
- 14. Driver
- 15. Bolt (Temporarily tighten)
- 16. Adjusting stud
- 17. Set screw
- 18. Crank rod [Lower part] (Insert into upper shaft crank)
- 19. Needle bearing
- 20. Crank rod [Upper part] (Align the mating mark)
- 21. Bolts [2 pcs]
- 22. Crank cover
- 23. Screws [3 pcs]

6-12. Shuttle hook mechanism



5149Q

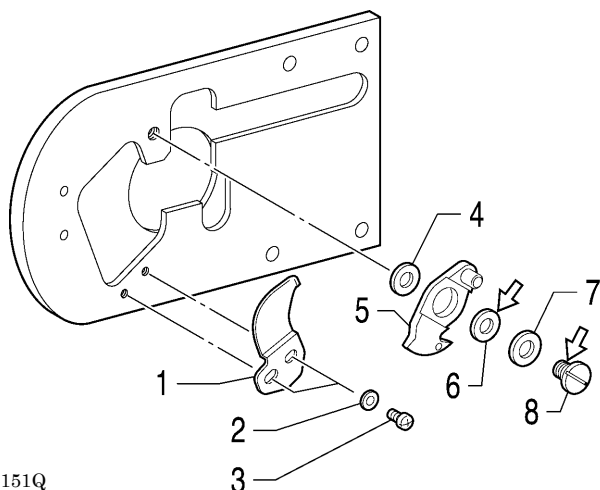
5150Q

After installing the shuttle hook, carry out the adjustments in “7-4. Adjusting the needle bar lift amount”, “7-5. Adjusting the driver needle guard” and “7-6. Adjusting the needle clearance”.

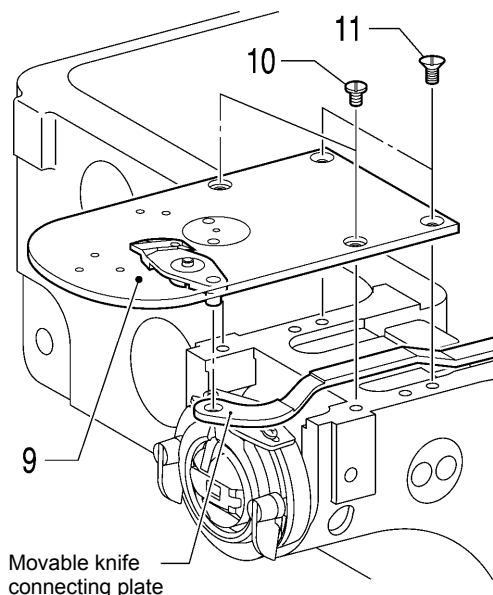
1. Needle bar thread guide
2. Needle
3. Set screw
4. Shuttle hook
5. Shuttle race base
6. Shuttle race base setting claw (Close)
7. Bobbin
8. Bobbin case

6-13. Thread trimmer mechanism (2)

Apply grease <GREASE BZL-301 (SA2694-001)> specified by Brother to the portions indicated by the white arrows.



5151Q

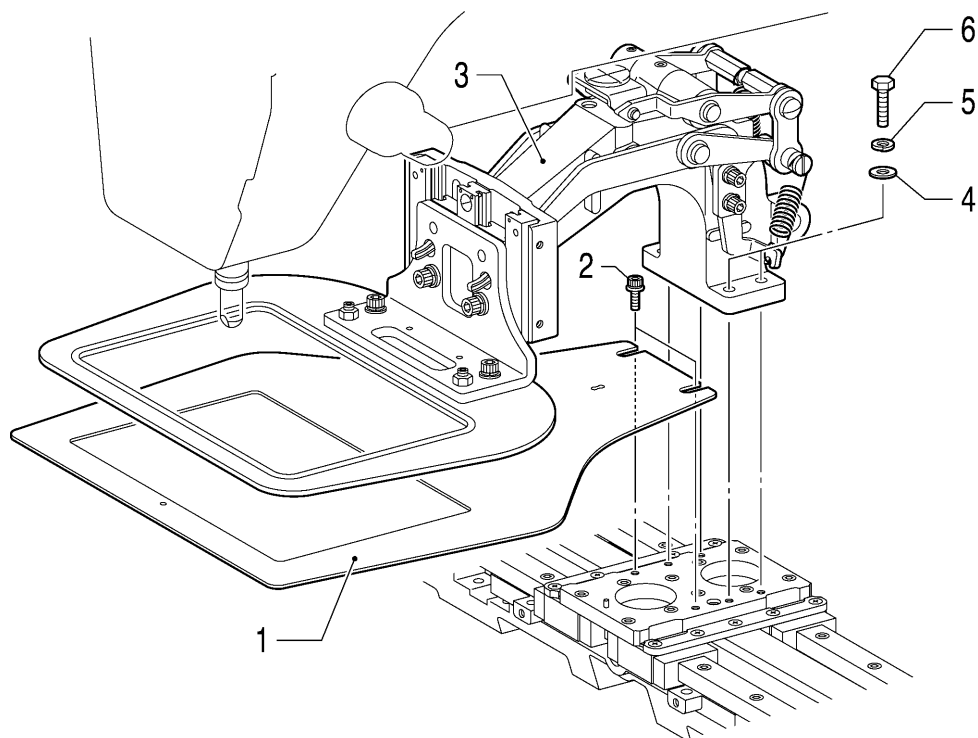
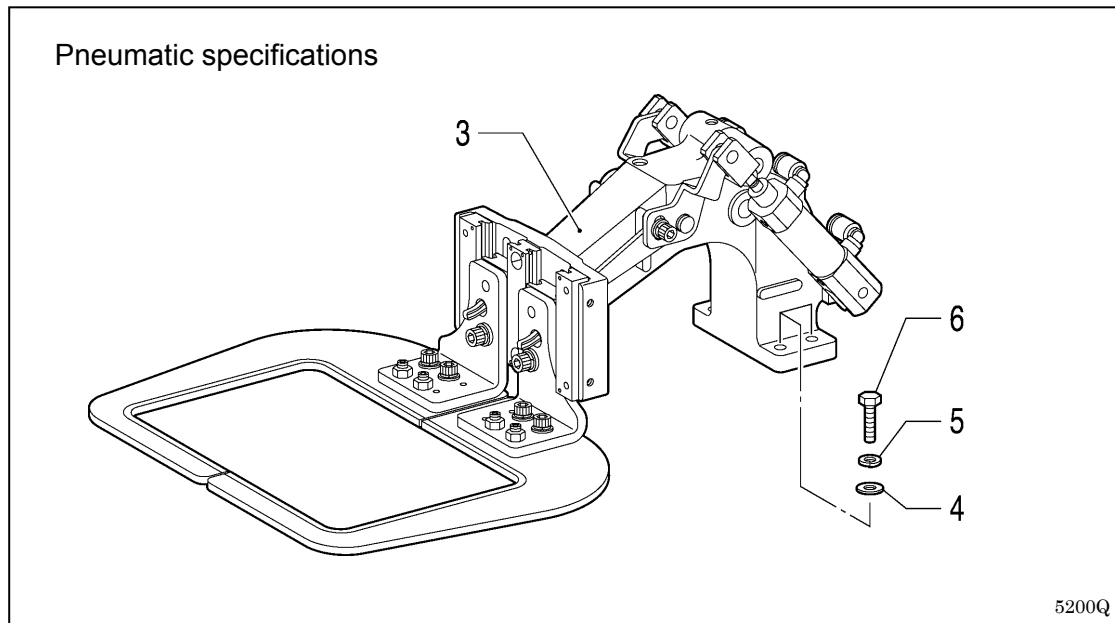


5152Q

1. Fixed knife
2. Plain washers [2 pcs]
3. Screws [2 pcs]
4. Movable knife spacer
5. Movable knife assy
6. Movable knife collar
7. Thrust washer
8. Movable knife shoulder screw
9. Needle plate
10. Screws [2 pcs]
11. Flat screws [2 pcs]

Insert the pin of the movable knife assembly into the hole in the movable knife connecting plate, and then install the needle plate with the screws and flat screws so that the needle drops into the center of the needle hole.

6-14. Work clamp arm mechanism

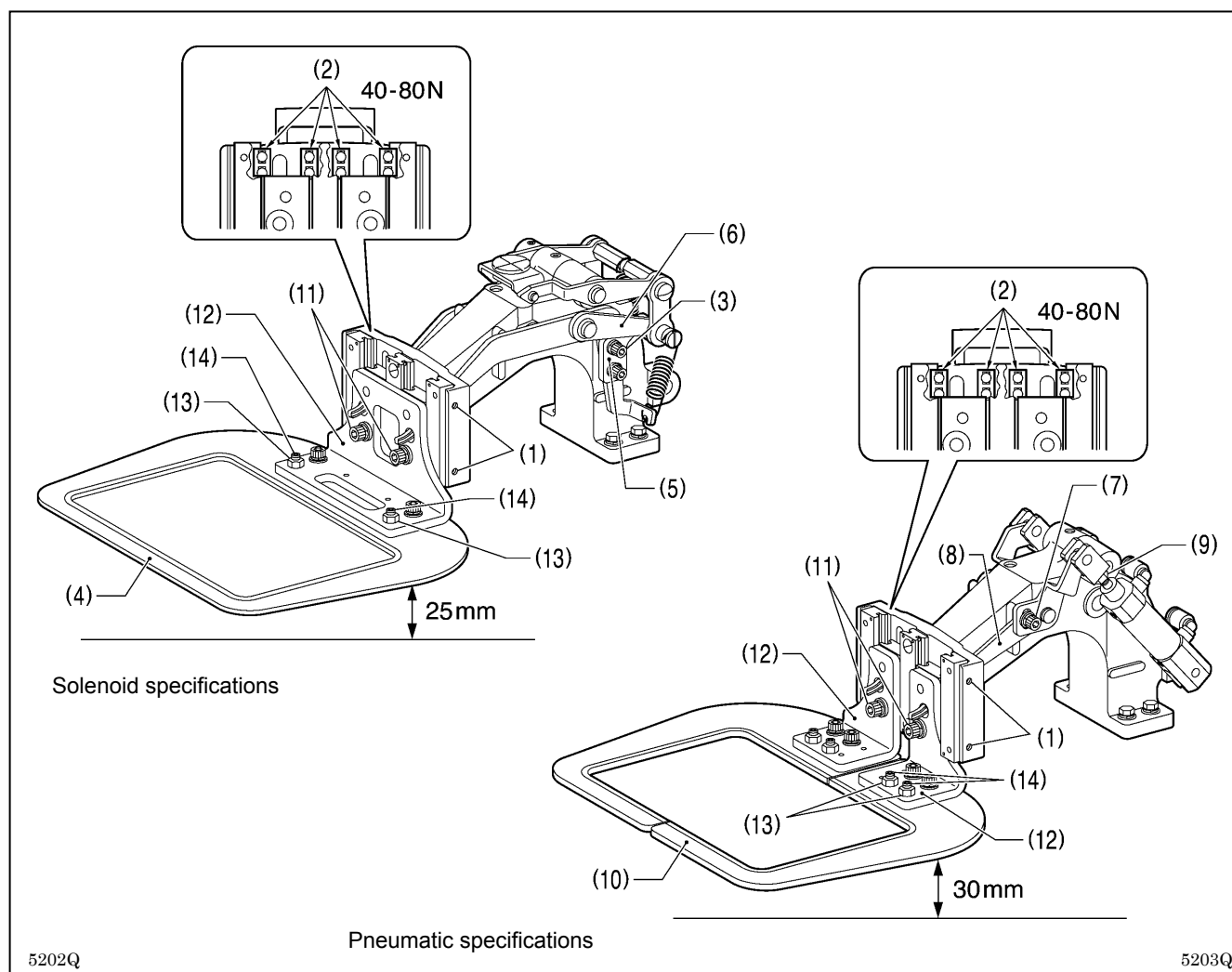


5201Q

- 1. Feed plate
- 2. Bolts with washer [2pcs]
- 3. Work clamp assy
- 4. Plain washers [4 pcs]
- 5. Spring washers [4 pcs]
- 6. Bolts [4 pcs]

After installing, carry out test feeding and check that the needle hole is inside the work clamp and the feed plate frame. If the needle hole is not inside the frame, adjust the position of the work clamp arm assembly and feed plate.

6-14-1. Adjustments after work clamp arm installation



<Retainer adjustment>

1. Screw in the M4 tap (1) on the side of the work clamp arm to apply pressure.
2. Adjust so that the sliding load of the retainers (2) is 40 – 80 N.

<Work clamp height adjustment (Solenoid specifications)>

1. Set the work clamp height to “25” on the operation panel.
2. Loosen the bolt (3).
3. Set the height of the work clamp (4) to 25 mm above the top of the needle plate, and with the stopper (5) touching the connecting link (6), tighten the bolt (3).

<Work clamp height adjustment (Pneumatic specifications)>

1. Raise the work clamp arm electronically.
2. Loosen the bolt (7), lift the work clamp lifter lever (8) by hand to its maximum height, and then tighten the bolt (7).
3. Loosen the nut (9) of the air cylinder.
4. Turn the shaft of the air cylinder until the work clamp (10) is 30 mm above the top of the needle plate, and then tighten the nut (9).

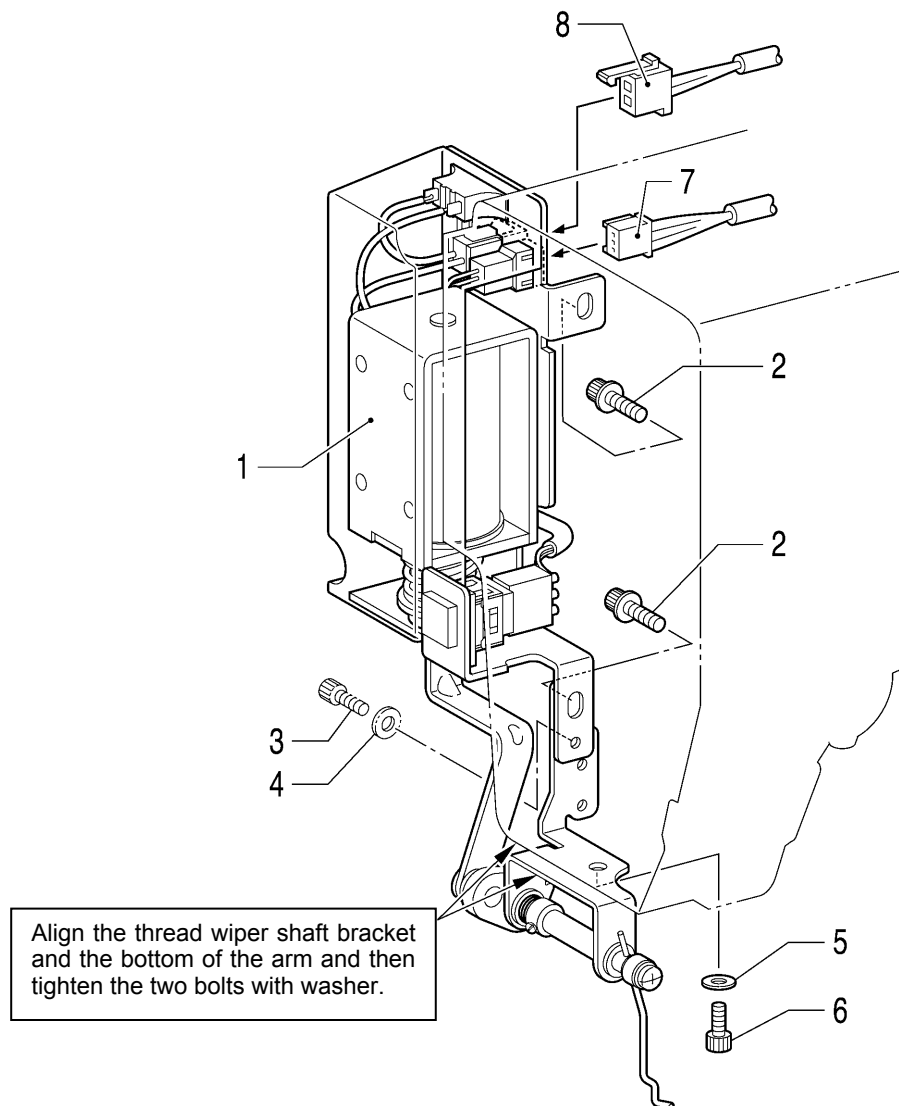
<Work clamp adjustment>

1. Loosen the bolt (11).
2. Lower the work clamp arm electronically, and in that condition, tighten the work clamp (12) with the bolt (11).

<Work clamp pressure adjustment>

1. Loosen the nut (13), and tighten the set screw (14).
(Up to a maximum of 0.3 mm)
2. When the work clamp pressure is even at the front and back of the work clamp, tighten the nut (13).

6-15. Thread wiper mechanism

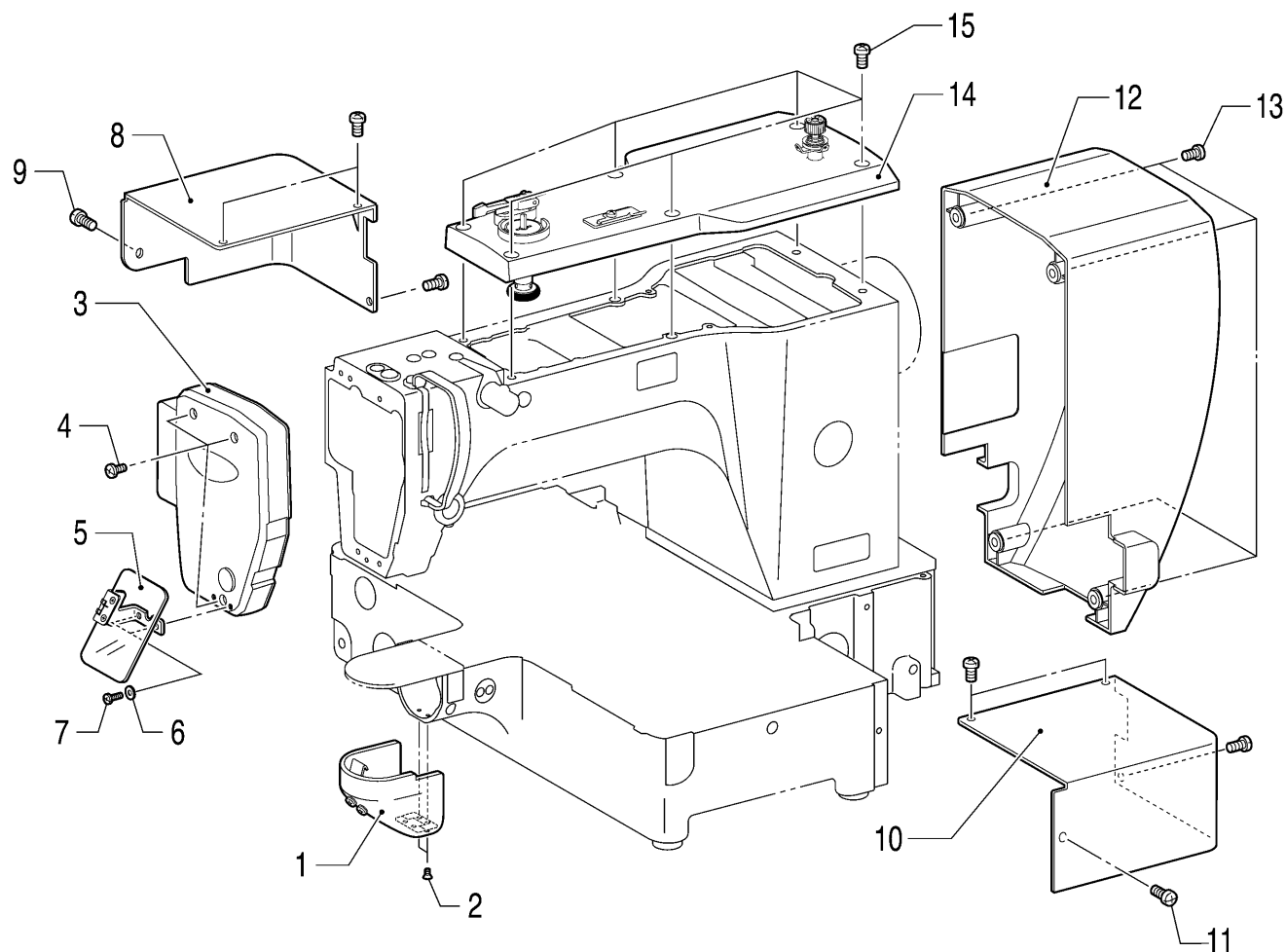


5153Q

1. Thread wiper unit
2. Bolts with washer [2 pcs]
3. Bolt (Remove)
4. Plain washer (Remove)
5. Removed plain washer
6. Removed bolt
7. STOP switch harness
8. Thread wiper solenoid harness

Adjust the thread wiper after installing. (Refer to "7-11. Adjusting the thread wiper".)

6-16. Covers



- | | |
|----------------------------|--------------------|
| 1. Shuttle race cover assy | 8. Motor cover L |
| 2. Screws [2 pcs] | 9. Screws [4 pcs] |
| 3. Face plate assy | 10. Motor cover R |
| 4. Screws [3 pcs] | 11. Screws [4 pcs] |
| 5. Eye guard assy | 12. Motor cover |
| 6. Plain washers [2 pcs] | 13. Screws [4 pcs] |
| 7. Screws [2 pcs] | 14. Top cover |
| | 15. Screws [6 pcs] |

5154Q

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 before carrying out the following operations. If the foot switch is depressed by mistake, the sewing machine might start operating and injury could result.

- Inspection, adjustment and maintenance
- Replacing consumable parts such as the rotary hook



Hold the machine head with both hands when tilting it back or returning it to its original position.

In addition, do not apply excessive force when tilting back the machine head. The sewing machine may become unbalanced and fall down, and serious injury or damage to the sewing machine may result.

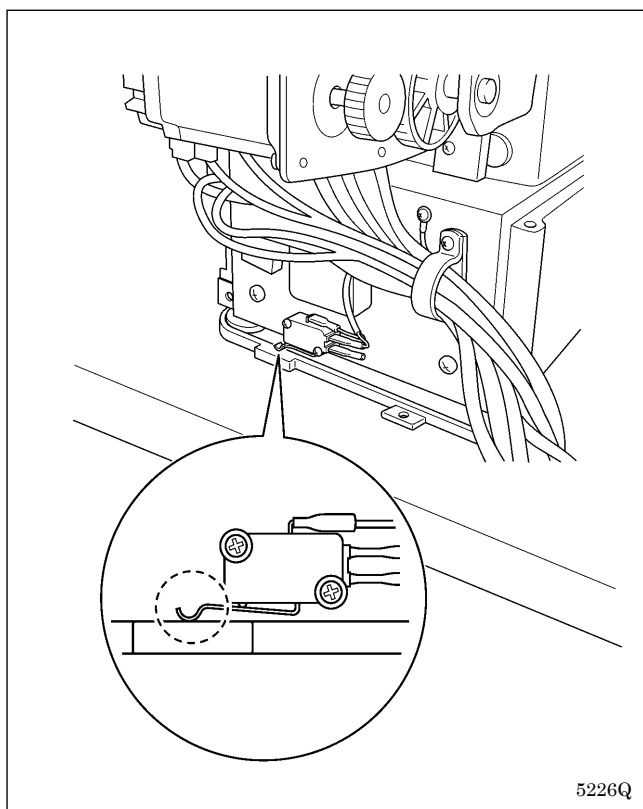


If the power switch needs to be left on when carrying out some adjustment, be extremely careful to observe all safety precautions.



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.

7-1. Checking the machine head switch



Check that the machine head switch is turned on as shown in the illustration.

NOTE:

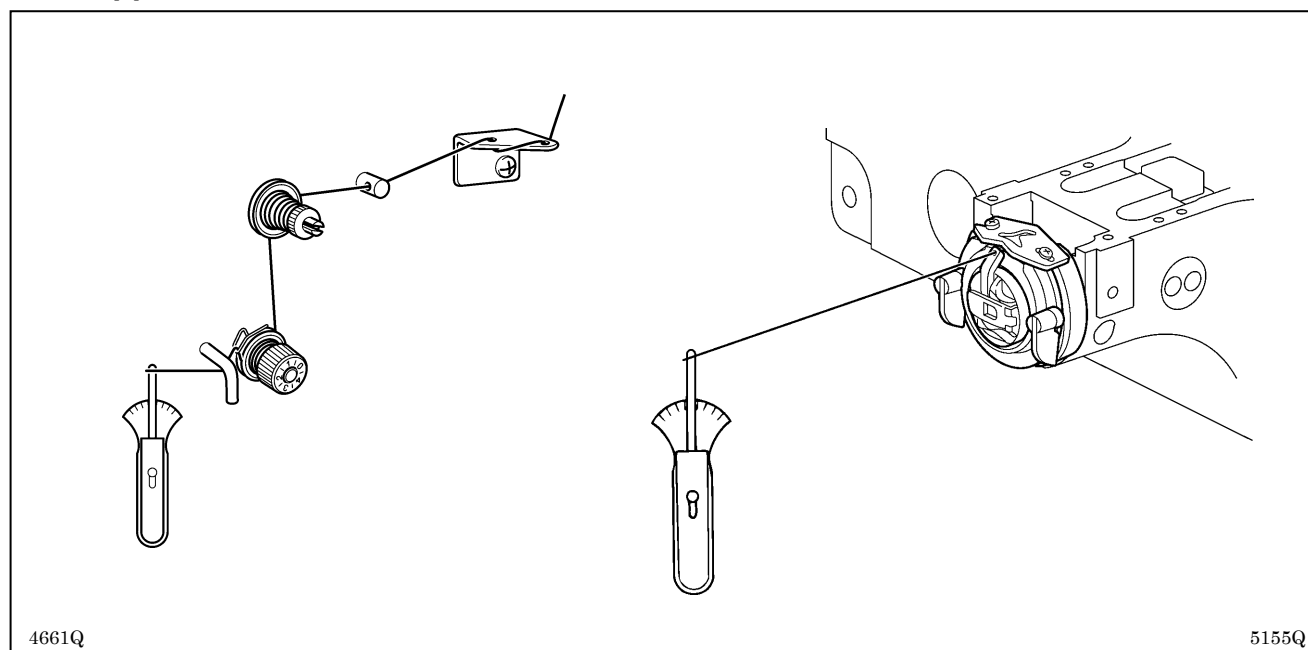
If the machine head switch is not turned on, errors "E050", "E051" and "E055" will be generated.

5226Q

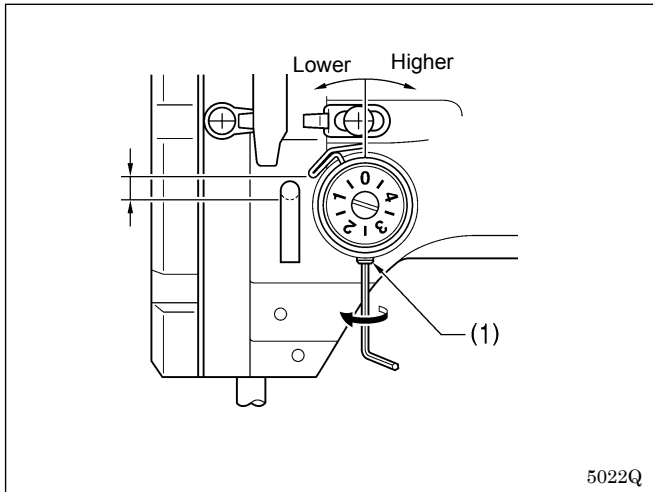
7-2. Standard thread tension

Specifications	Heavy-weight materials (-01)	Medium-weight materials (-02)
Upper thread	#20 or similar	#50 or similar
Lower thread	#20 or similar	#50 or similar
Upper thread tension (N)	1.4 – 1.8	0.8 – 1.2
Lower thread tension (N)	0.2 – 0.3	
Thread take-up spring height (mm)	7 – 10	
Thread take-up spring tension (N)	0.6 – 1.2	0.2 – 0.5
Pre-tension (N)	0.1 – 0.6	0.1 – 0.3
Needle	DP x 17 #19	DP x 5 #16
Normal sewing speed	2,000 rpm	2,000 rpm

7-2-1. Upper and lower thread tension



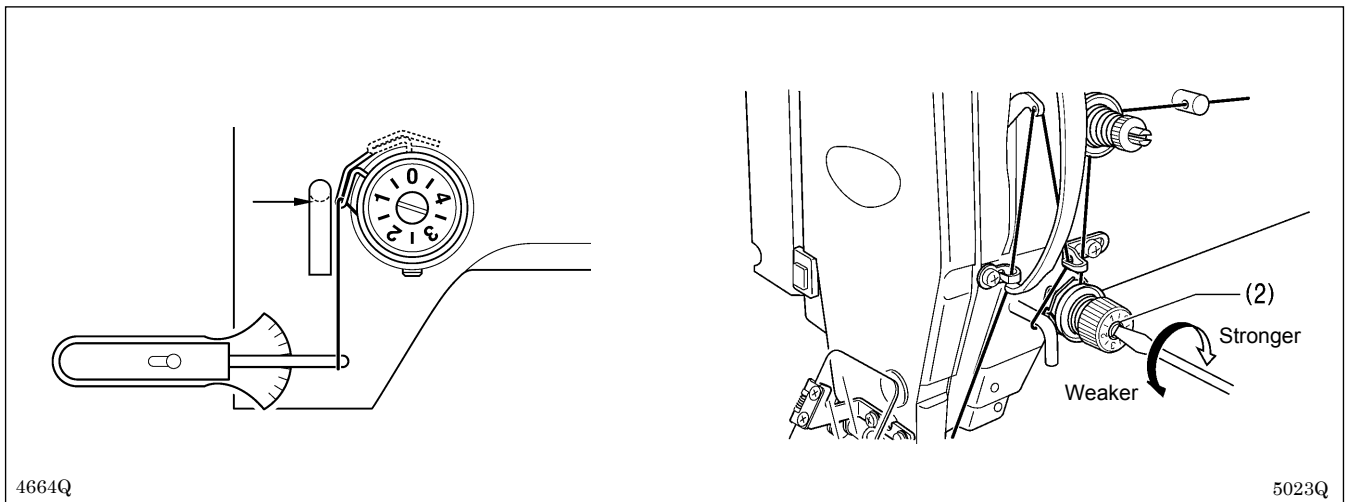
7-2-2. Thread take-up spring



<Thread take-up spring height>

Loosen the set screw (1) and turn the adjuster to adjust.

<Thread take-up spring tension>

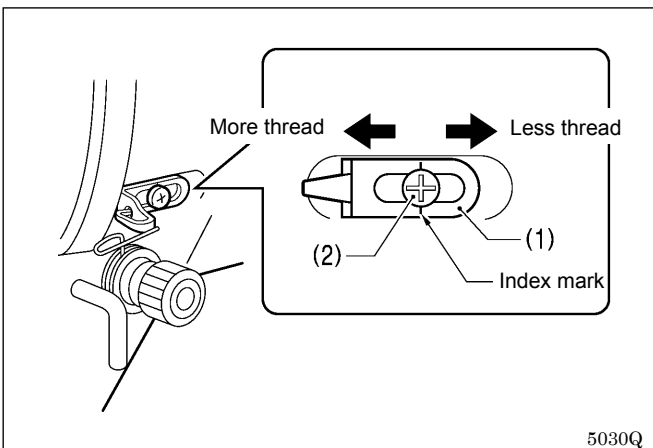


Turn the tension stud (2) with a screwdriver to adjust the tension.

NOTE:

If the thread tension spring is not adjusted correctly, the upper thread trailing length will be uneven after thread trimming.

7-2-3. Arm thread guide R

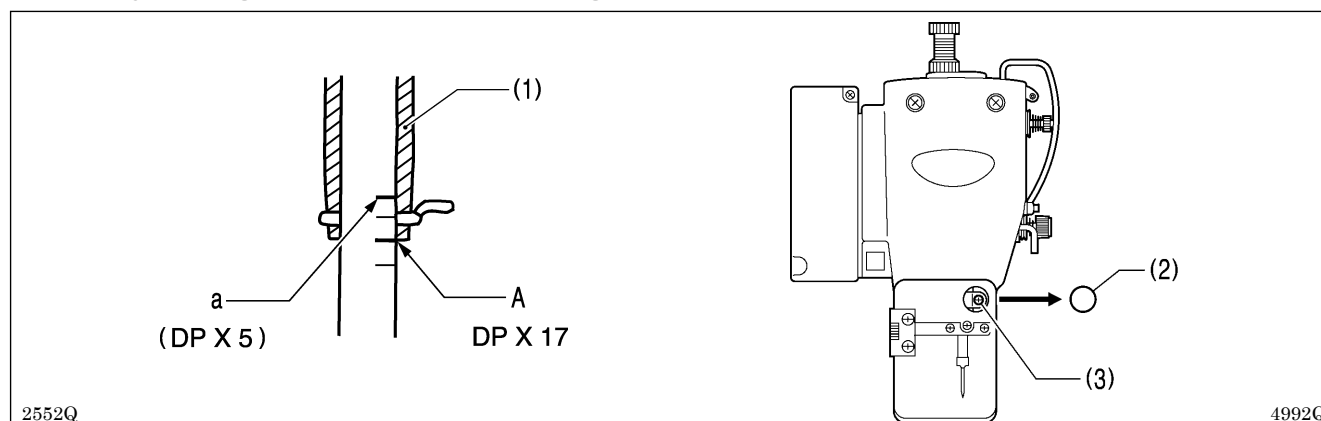


The standard position of arm thread guide R (1) is when the screw (2) is aligned with the index mark. Loosen the screw (2) and move arm thread guide R (1) to adjust.

* When sewing heavy material, move arm thread guide R (1) to the left. (The thread take-up amount will become greater.)

* When sewing light material, move arm thread guide R (1) to the right. (The thread take-up amount will become less.)

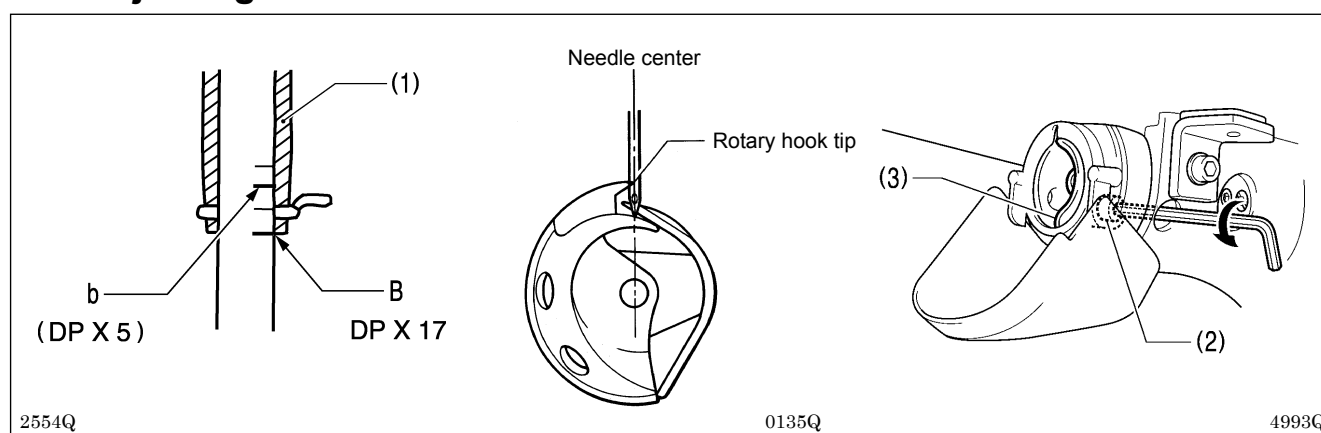
7-3. Adjusting the needle bar height



Turn the machine pulley to move the needle bar to the lowest position. Then remove the rubber plug (2), loosen the screw (3) and then move the needle bar up or down to adjust so that the second reference line from the bottom of the needle bar (reference line A) is aligned with the lower edge of the needle bar bush (1).

* If using a DP X 5 needle, use the highest reference line (reference line a).

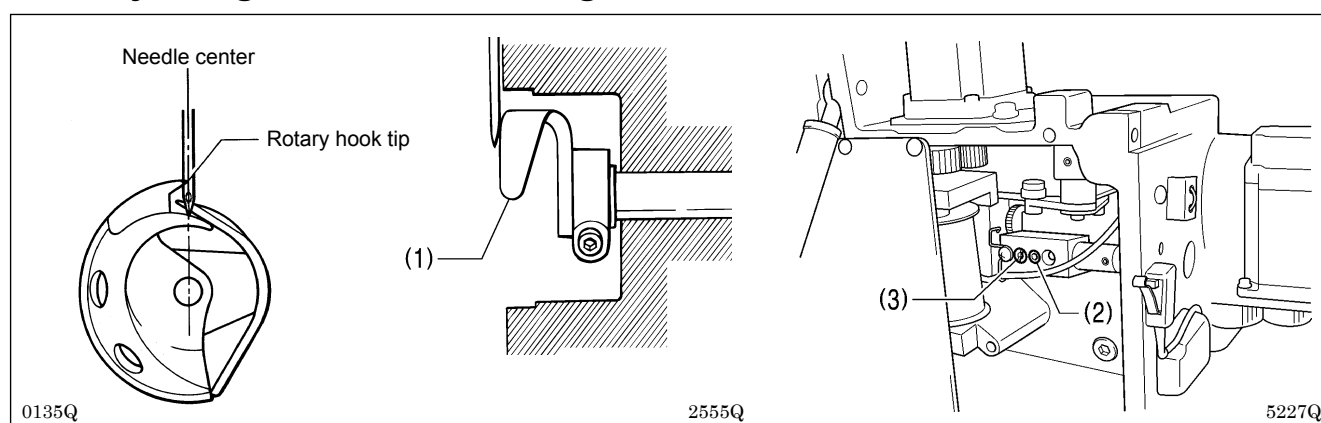
7-4. Adjusting the needle bar lift amount



Turn the machine pulley to raise the needle bar from the lowest position until the lowest reference line on the needle bar (reference line B) is aligned with the lower edge of the needle bar bush (1), and then loosen the bolt (2) and move the driver (3) so that the tip of the rotary hook is aligned with the center of the needle.

* If using a DP X 5 needle, use the second reference line from the top of the needle bar (reference line b).

7-5. Adjusting the driver needle guard



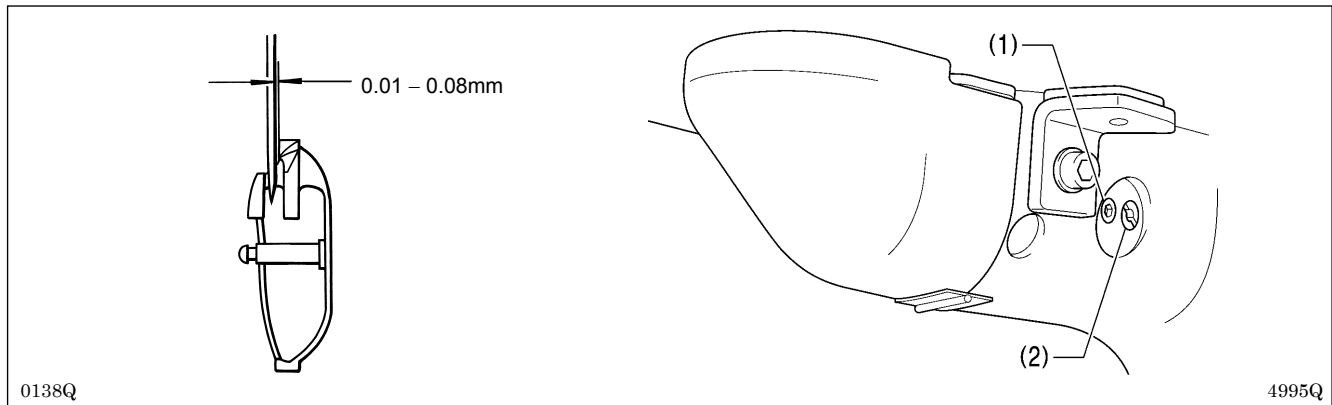
Turn the machine pulley to align the tip of the rotary hook with the center of the needle, and then loosen the set screw (2) and turn the eccentric shaft (3) to adjust so that the driver needle guard (1) is touching the needle.

NOTE:

If it crosses the needle more than necessary, it will place a load on the needle, or it may cause poor thread tension.

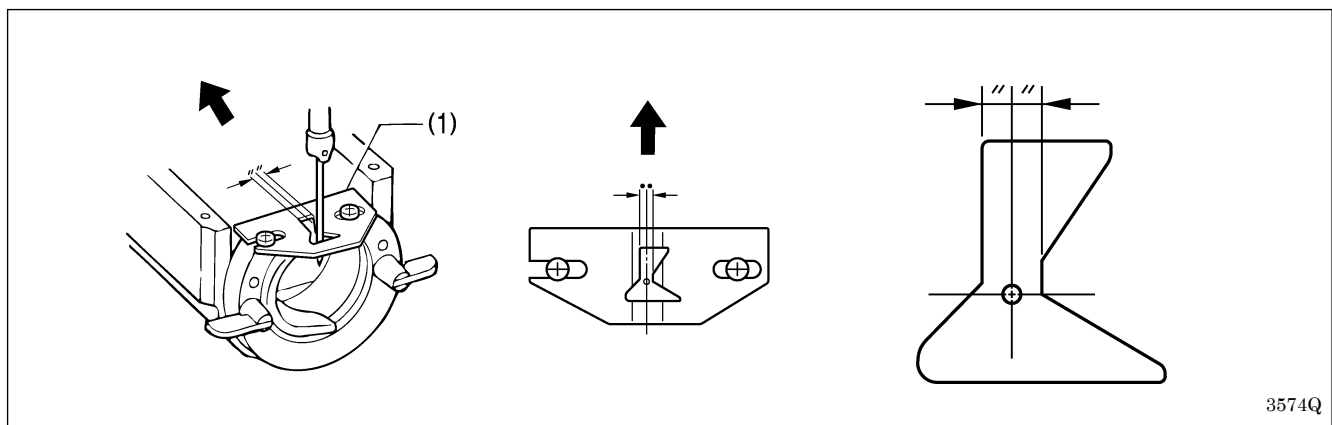
Furthermore, if it does not cross the needle at all, the tip of the rotary hook will interfere with the needle and skipped stitches may occur.

7-6. Adjusting the needle clearance



Turn the machine pulley to align the tip of the rotary hook with the center of the needle, and then loosen the set screw (1) and turn the eccentric shaft (2) to adjust so that the clearance between the needle and the rotary hook is 0.01 – 0.08 mm.

7-7. Adjusting the shuttle race thread guide



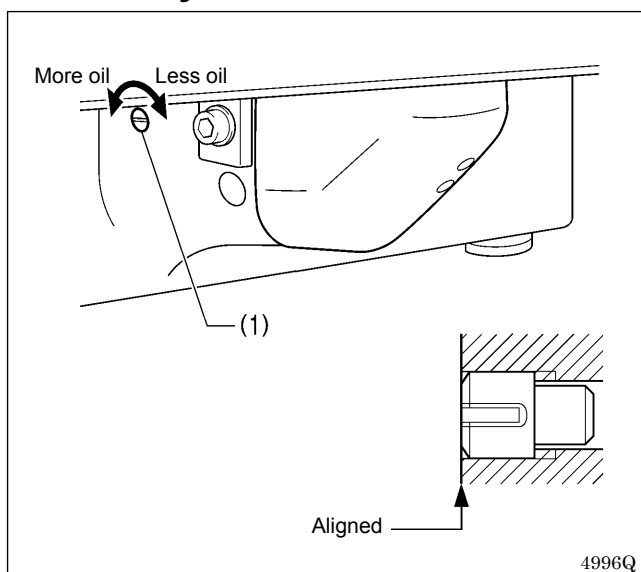
Install the shuttle race thread guide (1) by pushing it in the direction of the arrow so that the needle groove is aligned with the center of the needle plate hole.

NOTE:

If the shuttle race thread guide is in the wrong position, thread breakages, soiled thread or tangling of the thread may occur.

The position of the shuttle race thread guide is adjusted at the time of shipment from the factory. It should not be changed if possible.

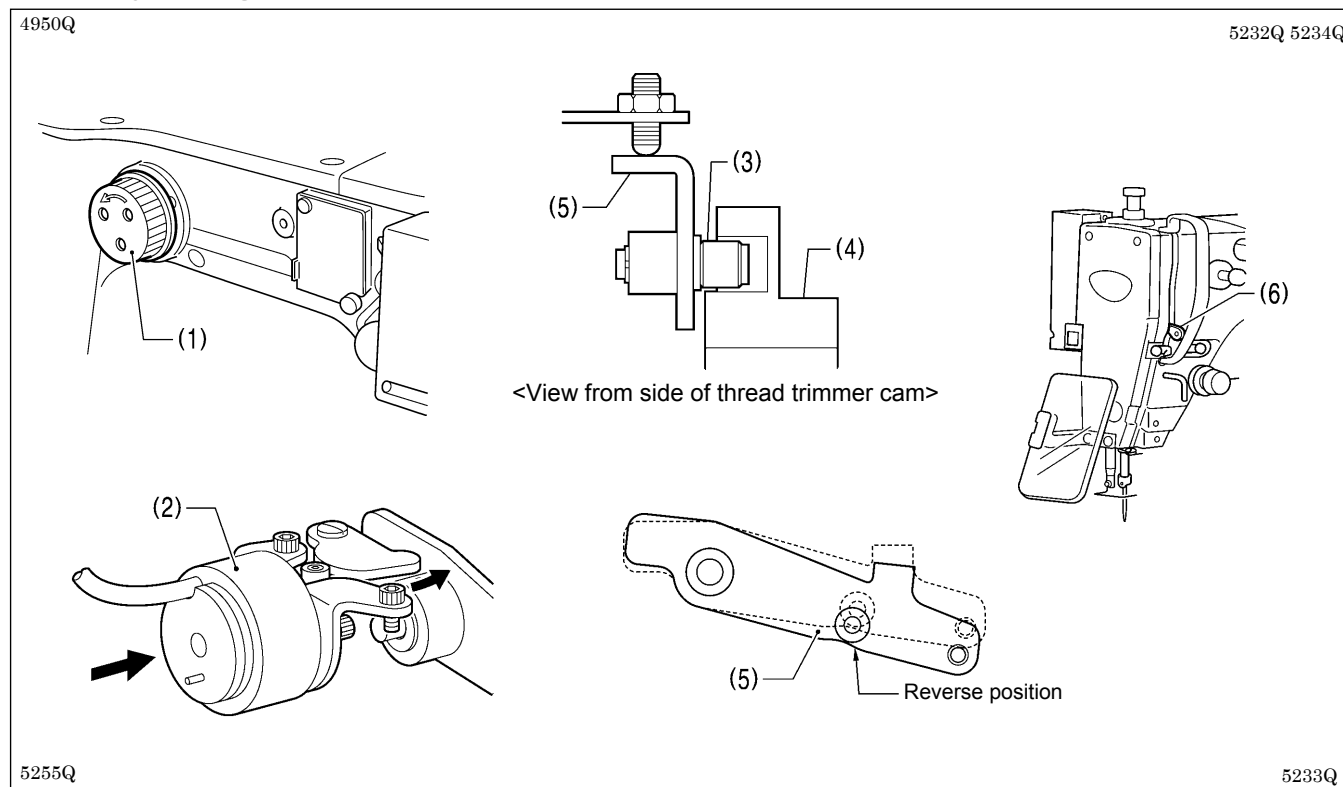
7-8. Rotary hook lubrication amount



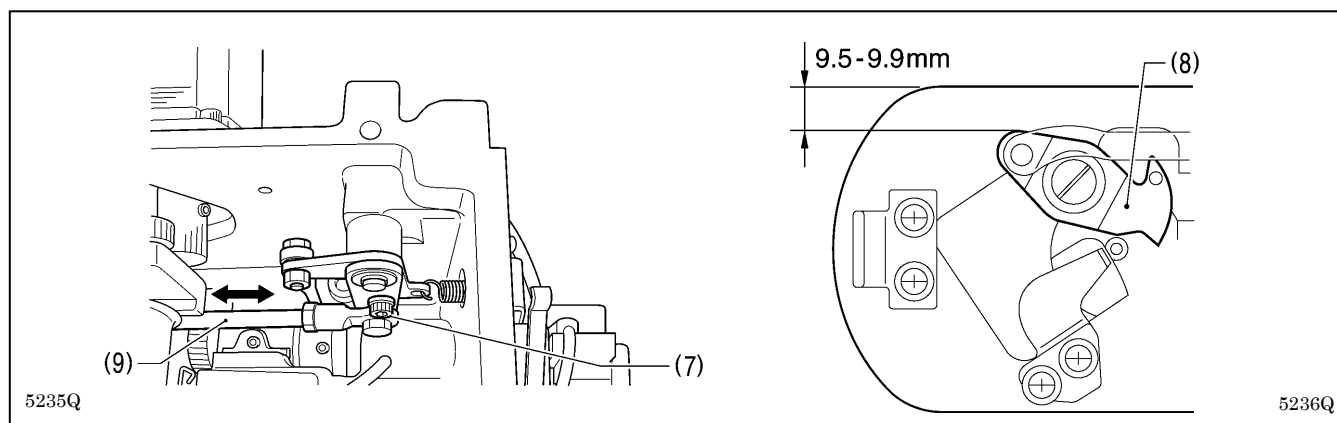
The optimum position is when the head of the set screw (1) is aligned with the edge of the bed. The rotary hook lubrication amount can be adjusted within three turns to the right from that position.

- If the set screw (1) is turned clockwise, the lubrication amount becomes smaller.
- If the set screw (1) is turned counterclockwise, the lubrication amount becomes greater.

7-9. Adjusting the position of the movable knife



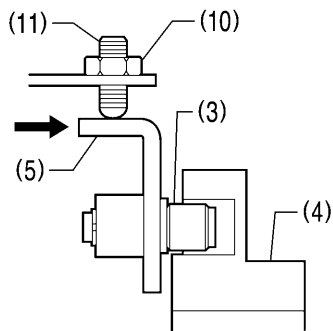
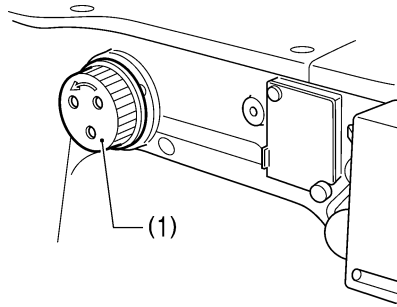
1. Open the top cover and tilt back the machine head.
2. Turn the pulley (1) by hand to lower the needle bar to its lowest position, and push the thread trimmer solenoid (2) as far as it will go.
3. With the collar (3) inserted into the groove of the thread trimmer cam (4), turn the pulley (1) by hand to set the driving lever (5) to the reverse position (when the thread take-up (6) is close to its lowest position).



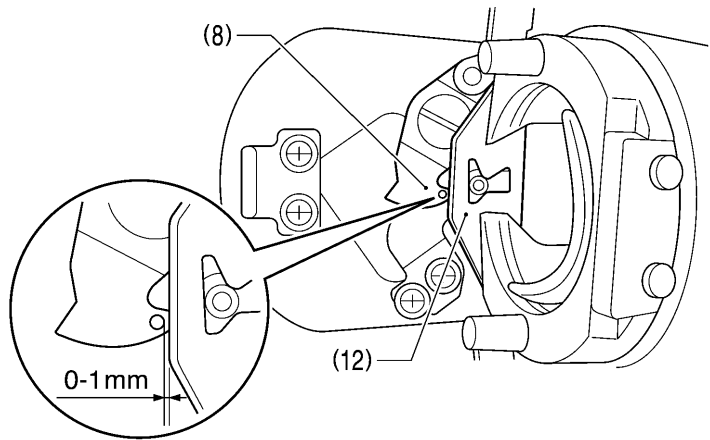
4. Loosen the bolt (7).
5. Move the thread trimming rod H (9) forward or back to adjust so that the distance from the ridge line on the right side of the needle plate to the ridge line on the movable knife (8) is 9.5 – 9.9 mm.
6. After tightening the bolt (7), check the above position once more.

7. ADJUSTMENT

4950Q



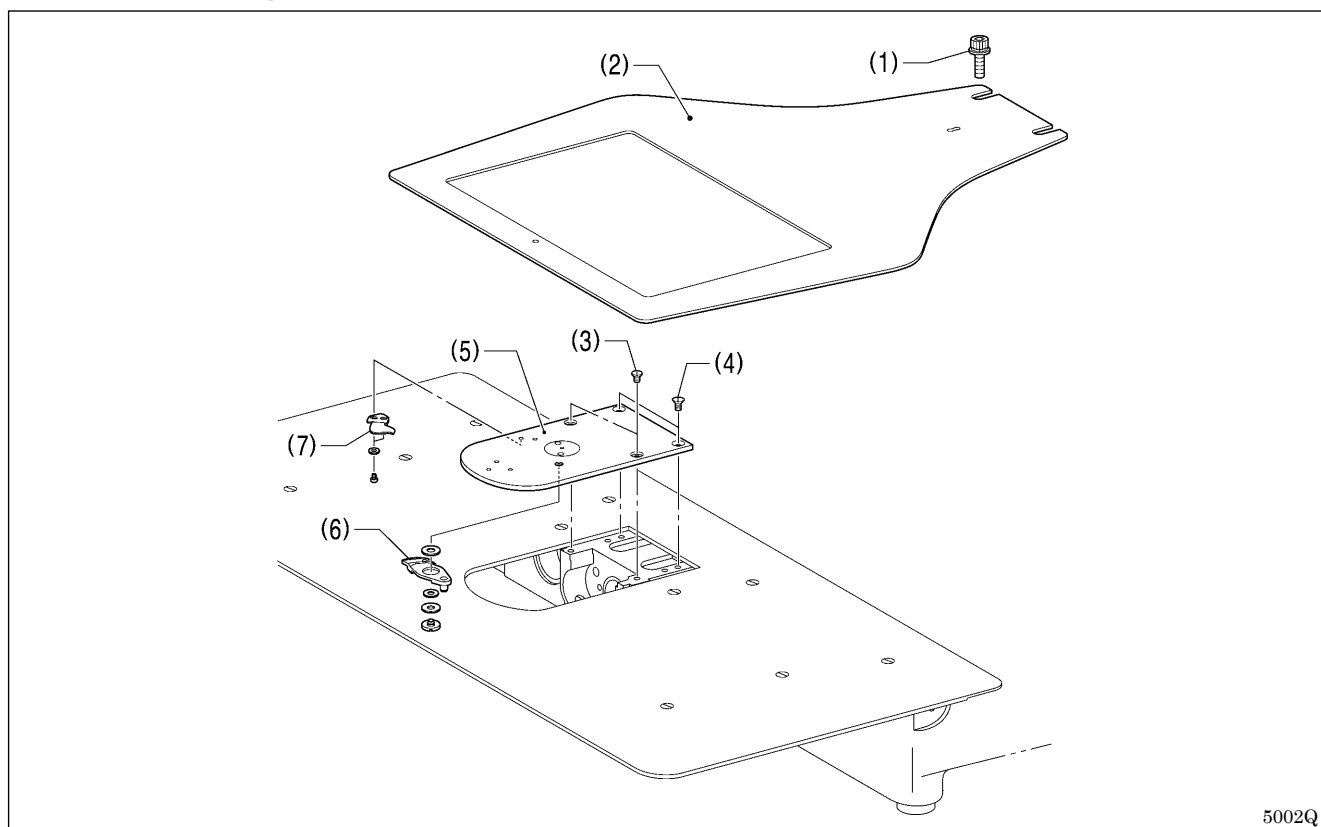
5237Q



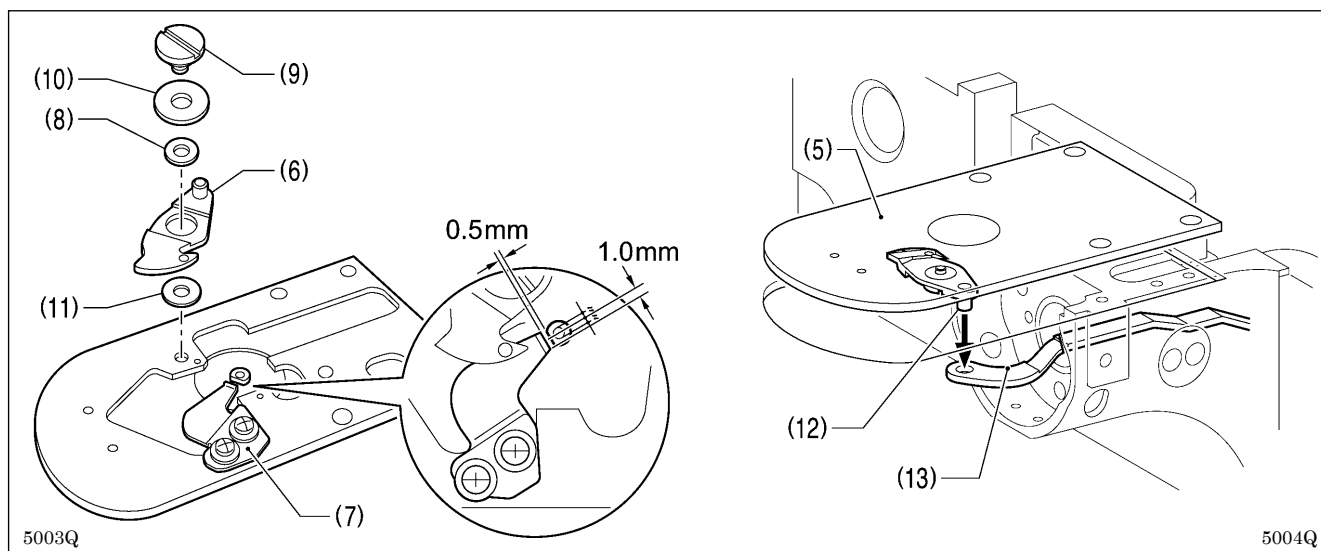
5238Q

7. Turn the pulley (1) by hand to move the needle bar to its lowest position.
8. Loosen the nut (10), tighten the set screw (11) until the collar (3) is touching the inside of the groove in the thread trimmer cam (4), and then turn it back in the counterclockwise direction by approximately 1/4 of a turn.
9. Tighten the nut (10), and then check that the collar (3) is not touching the inside of the groove in the thread trimmer cam (4). In addition, push the driving lever (5) by hand toward the thread trimmer cam until the collar (3) touches the groove of the thread trimmer cam (4), and then check that the driving lever (5) returns smoothly to its original position when it is released.
10. Check that there is a gap of about 0 - 1 mm between the outside of the hole in the movable knife (8) and the ridge line on the shuttle race thread guide (12) when there is still play between the parts.

7-10. Replacing the movable and fixed knives

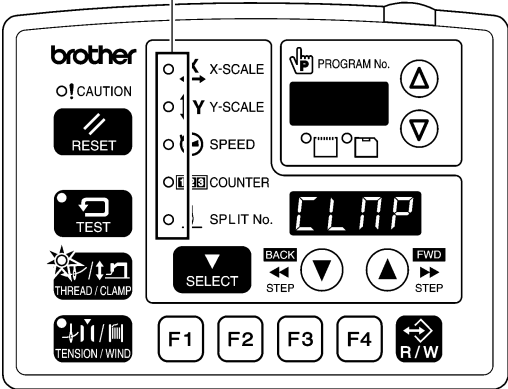

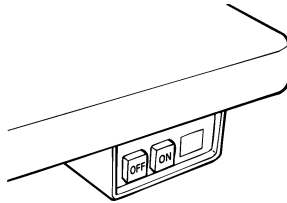
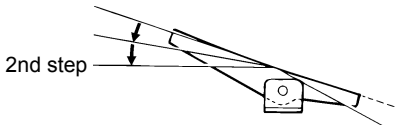
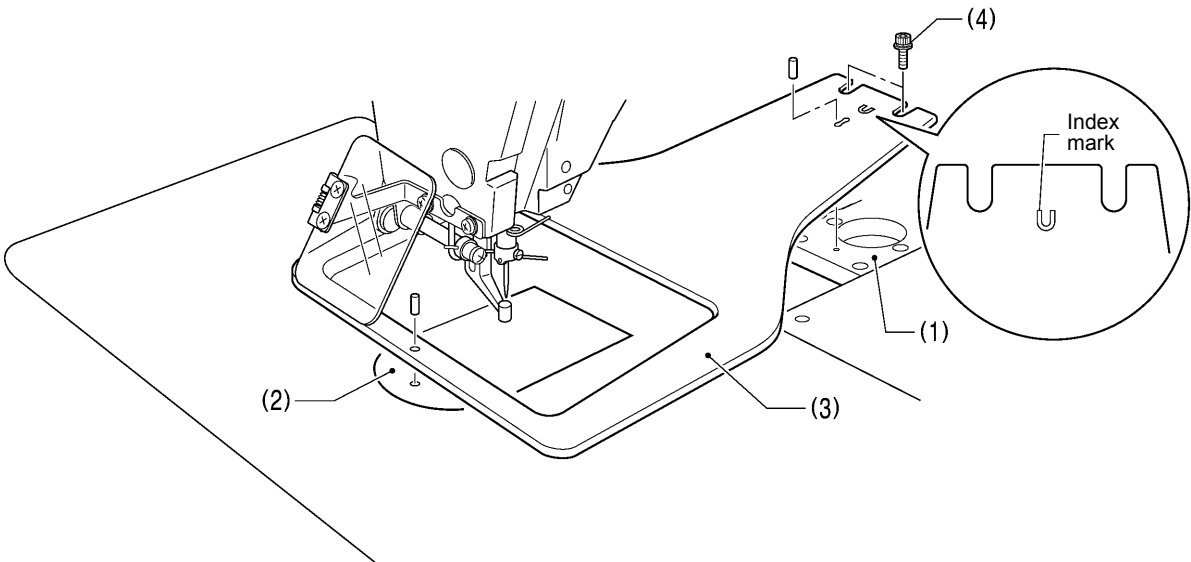


1. Loosen the two bolts (1) and then remove the feed plate (2).
2. Open the shuttle race cover, remove the two screws (3) and the two flat screws (4), and then remove the needle plate (5).
3. Remove the movable knife (6) and the fixed knife (7).

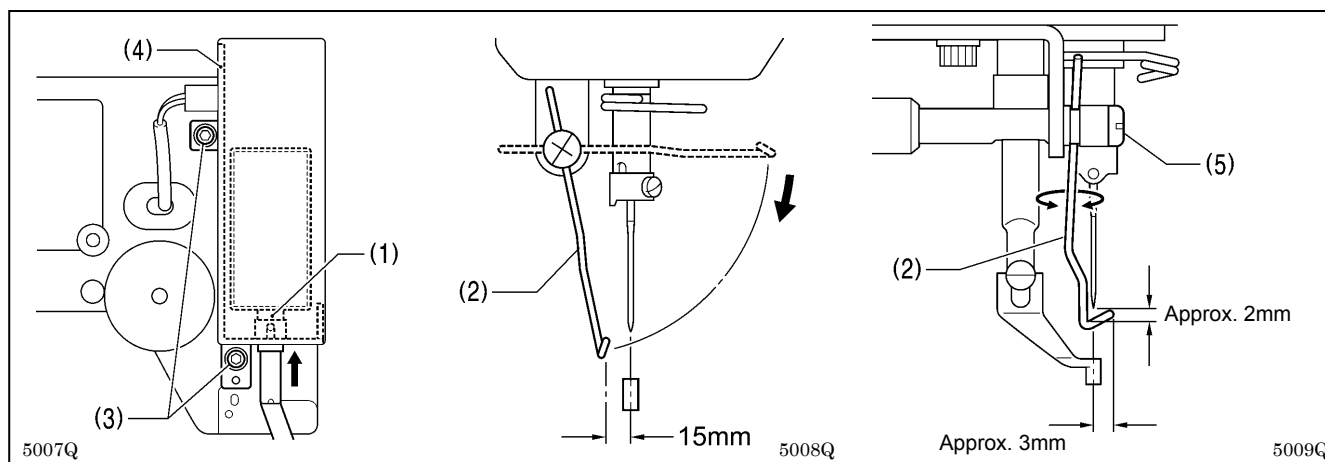


4. Install the new fixed knife (7) in the position shown in the illustration.
5. Apply grease to the outside of the collar (8) and to the shoulder screw (9), and then install the new movable knife (6) together with the thrust washer (10) and the movable knife spacer (11).
6. Check that the movable knife (6) and fixed knife (7) cut the thread cleanly. Replace the movable knife spacer with accessory spacers ($t=0.2, 0.3, 0.4$) so that the knives trim the thread accurately.
 - * If the knife pressure is too weak and the thread is not completely cut, use a thinner movable knife spacer.
 - * If the knife pressure is too strong and the movable knife (1) turns stiffly, use a thicker movable knife spacer.
7. Apply grease to the pin (12), place it into the movable knife connecting plate (13), and install it to the needle plate (5).
8. Check that the needle is aligned with the center of the needle hole.

7-10-1. Installing the feed plate

1	<p>All indicators switch off</p>  <p>MENU indicator switches off THREAD/CLAMP indicator illuminates</p> <p>While pressing the THREAD/CLAMP key, turn on the power switch.</p> <ul style="list-style-type: none"> * Keep pressing the THREAD/CLAMP key until the model name is displayed and the buzzer beeps once.   <ul style="list-style-type: none"> "CLMP" will appear in the menu display. <p>5005Q 4421Q</p>
2	 <p>2nd step</p> <p>Depress the foot switch to the 2nd step. (If using a two-pedal foot switch, lower the work clamp before depressing the start switch.)</p> <ul style="list-style-type: none"> After the home position is detected and the work clamp drops, the feed mechanism will move to the feed plate installation position and then the work clamp will rise. <p>4441Q</p>
3	 <p>Use a 2 mm diameter pin to align the holes in the X feed bracket (1) and the needle plate (2) with the two holes in the feed plate (3), and then tighten the two bolts (4).</p> <p>NOTE: Install the feed plate so that the surface with the index mark is facing upward.</p> <p>5006Q</p>
4	<p>End feed plate installation mode</p> <p>Turn off the power.</p>

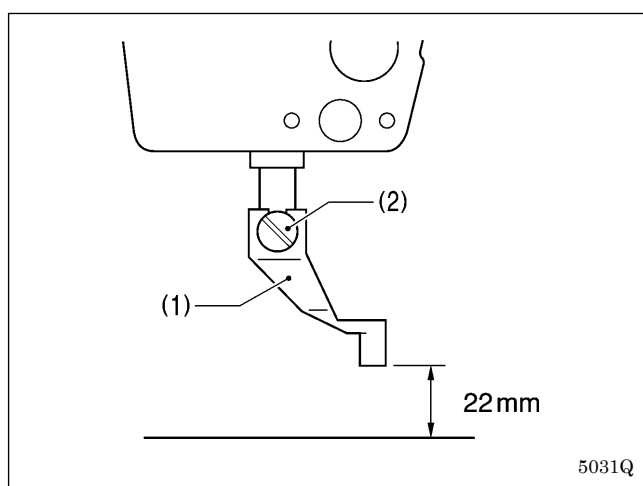
7-11. Adjusting the thread wiper



1. Loosen the two screws (3) and shift the entire solenoid setting plate (4) up or down to adjust so that the thread wiper (2) is 15 mm in front of the needle center when the plunger (1) of the thread wiper solenoid is driven to the full stroke.
2. Loosen the screw (5) and adjust the position of the thread wiper (2) so that the distance from the thread wiper to the tip of the needle is approximately 2 mm and the tip of the thread wiper (2) is approximately 3 mm from the center of the needle when the thread wiper (2) passes below the needle during operation.

NOTE: Check that the thread wiper (2) does not touch the finger guard.

7-12. Presser foot installation position

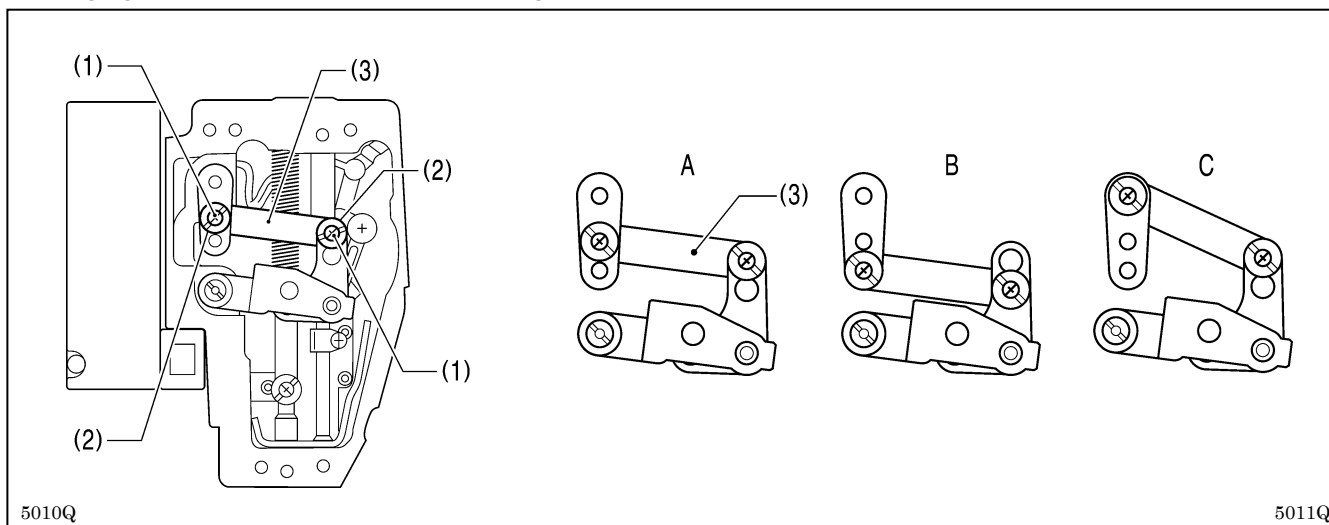


Install the presser foot (1) with the screw (2) so that the distance from the bottom of the presser foot to the top of the needle plate is 22 mm when the sewing machine is stopped and the presser foot (1) is raised.

7-13. Changing the intermittent stroke

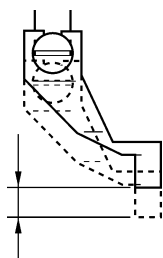
The intermittent stroke can be adjusted to within 2 – 10 mm by adjusting the position of the stepping clamp connecting rod and changing the installation position of stepping clamp link A.

<Changing the installation position of stepping clamp link A>



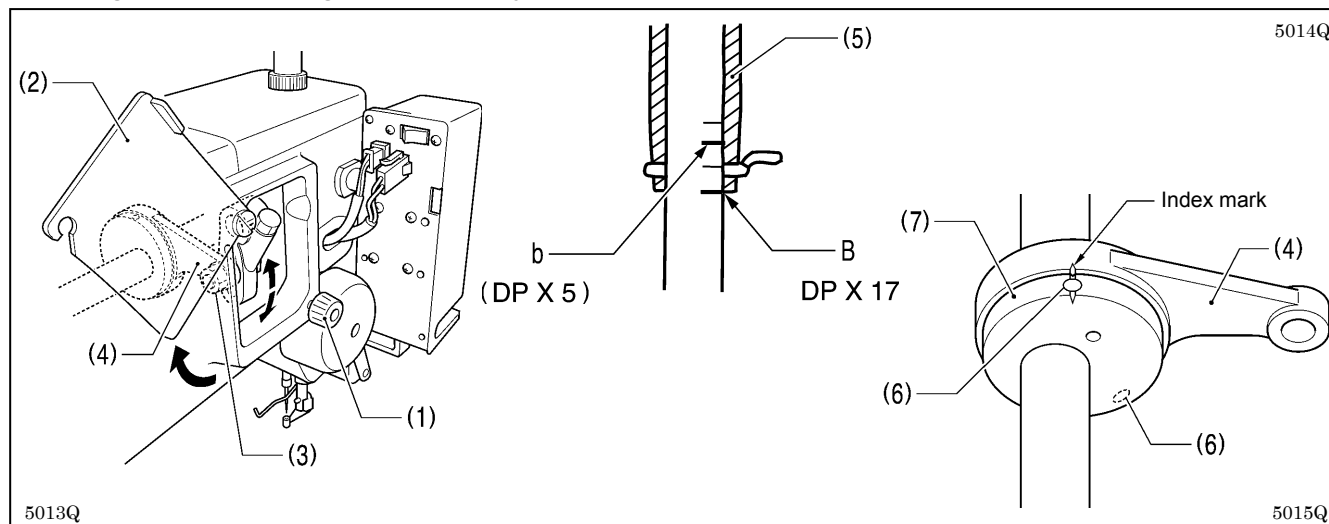
1. Remove the face plate.
 2. Remove the two screws (1) and the two shoulder screws (2), and then remove stepping clamp link A (3).
 3. Change the installation position for stepping clamp link A (3) to either A, B or C above.
- If the position of the stepping clamp connecting rod is adjusted as described in the following at any one of the installation positions, the adjustment range for the intermittent stroke will as given in the following table.

Installation position	Intermittent stroke range
A	2 – 4.5mm
B	4.5 – 10mm
C	0 mm (Presser foot does not move up and down)



5012Q

<Stepping clamp connecting rod position adjustment>



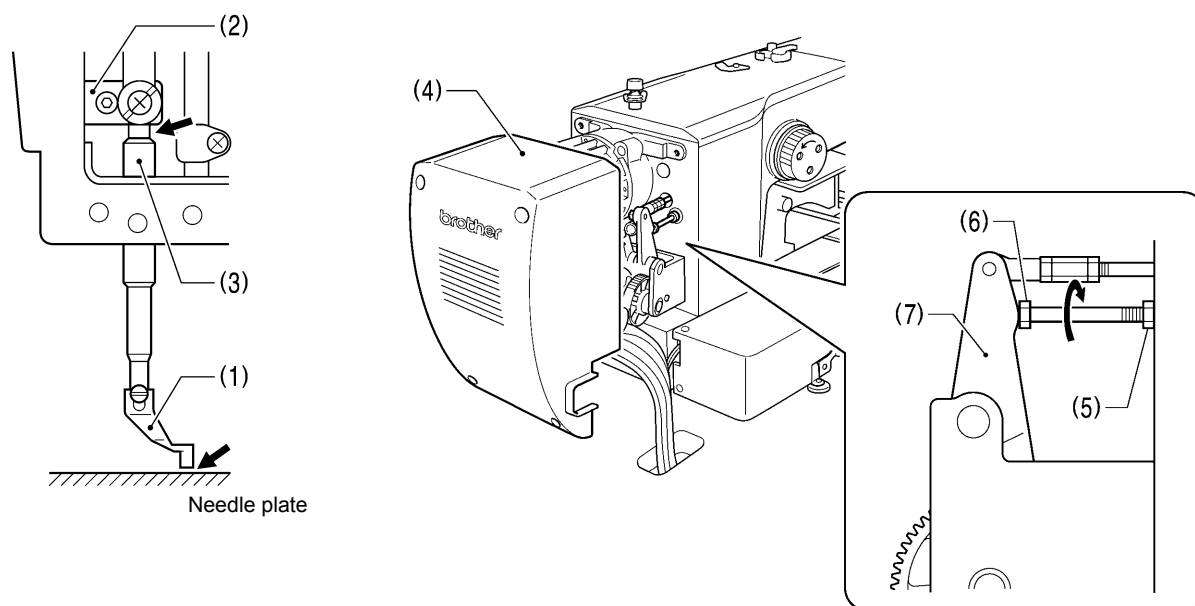
1. Loosen the screw (1), and then open the cover (2).
2. Loosen the nut (3), and then adjust the position of the stepping clamp connecting rod (4).
 - When the stepping clamp connecting rod (4) is raised, the intermittent stroke will increase.
 - When the stepping clamp connecting rod (4) is lowered, the intermittent stroke will decrease.

Next, adjust the needle bar and presser foot timing.

3. Turn the machine pulley to raise the needle bar from the lowest position until the lowest reference line on the needle bar (reference line B) is aligned with the lower edge of the needle bar bush (5).
(If using a DP x 5 needle, align with the second reference line from the top (reference line b).)
4. Open the top cover and loosen the two set screws (6).
5. Align the index marks on the stepping clamp cam (7) and the stepping clamp connecting rod (4), and then tighten the set screws (6).

Check the following after changing the intermittent stroke.

5016Q 5228Q



1. With the intermittent presser foot (1) lowered, turn the pulley to move the intermittent presser foot (1) to its lowest position.
2. Check that the presser foot (1) does not touch the needle plate and that the presser bar clamp (2) does not touch the presser bar bush (3).

<If they are touching>

Remove the motor cover (4).

Loosen the nut (5), and turn the bolt (6) until it is pressing against the intermittent drive lever (7), and then adjust until the two points mentioned above are not touching.

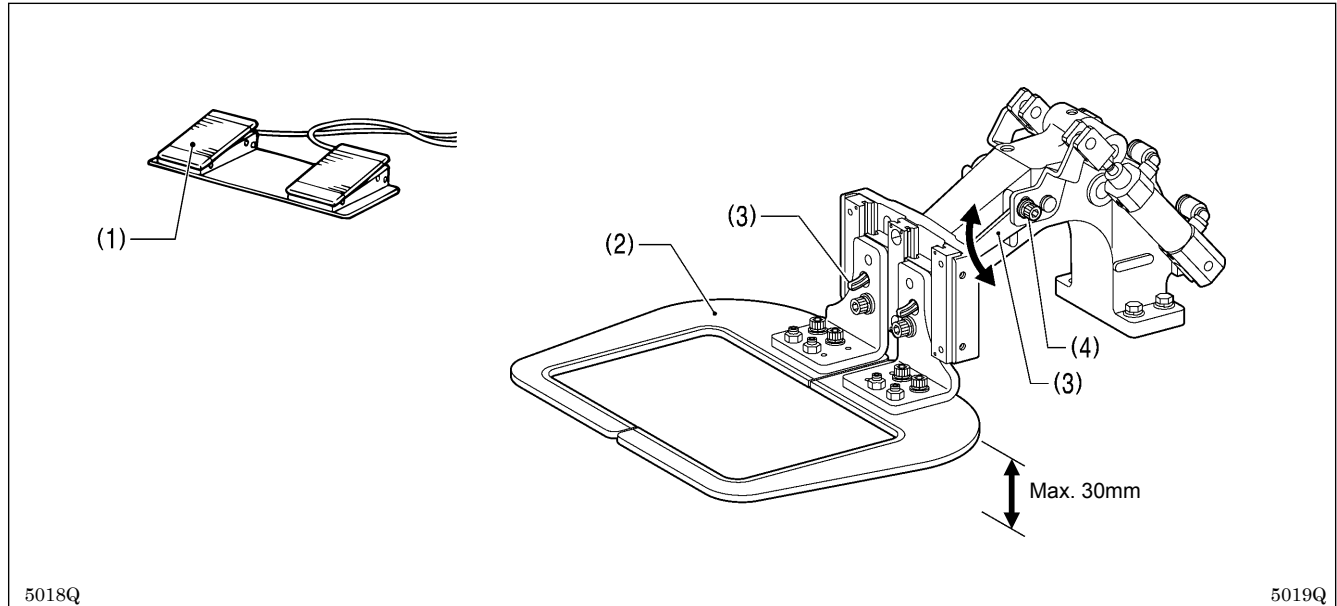
7-14. Adjusting the work clamp lift amount

<Solenoid specifications>

The operation panel settings can be used to adjust the height to within 15 – 25 mm. (Refer to "5-7. Setting the work clamp lift amount.")

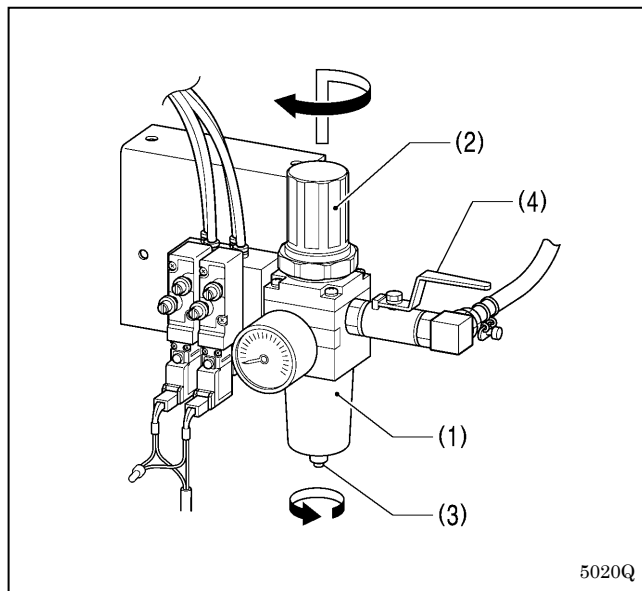
<Pneumatic specifications>

The maximum lift amount for the work clamp is 30 mm above the top of the needle plate.



1. Turn on the air, and depress the work clamp switch (1) to raise the work clamp (2).
2. Loosen the two bolts (4) of the work clamp arm lever (3), and move the work clamp arm lever (3) up or down to adjust.

7-15. Adjusting the air pressure (pneumatic specifications)



Lift up the handle (2) of the regulator (1) and then turn it to adjust the air pressure to 0.5 MPa.

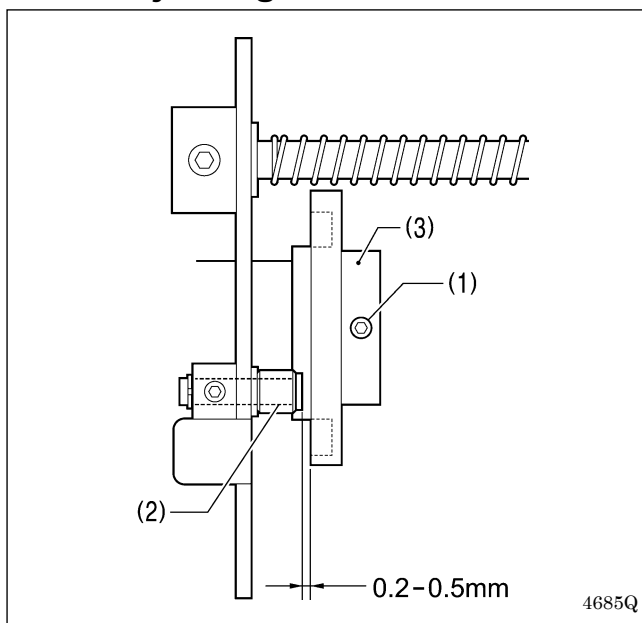
After adjustment is complete, push the handle (2) downward to lock it.

If water has collected in the bottle of the regulator (1), turn the drain cock (3) in the direction indicated by an arrow to drain the water.

NOTE:

Open the air cock (4) slowly.

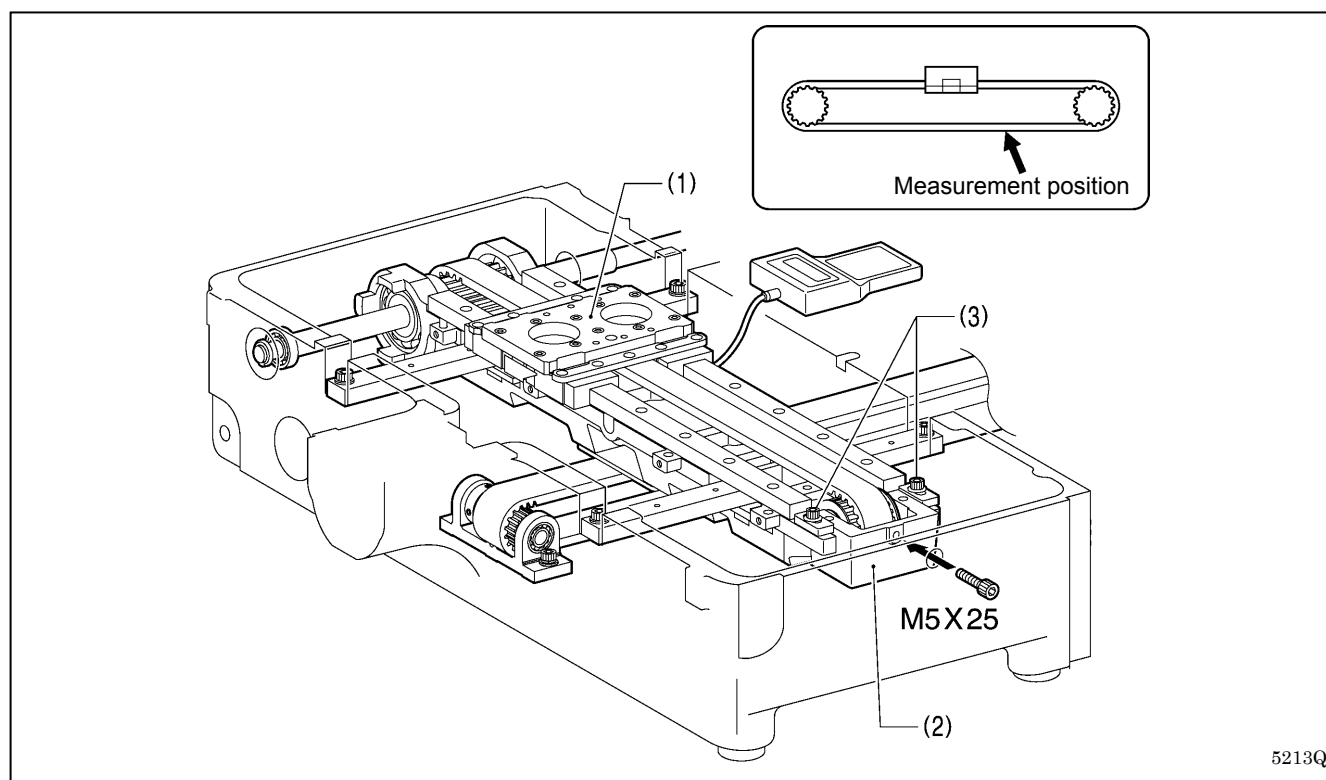
7-16. Adjusting the thread trimmer cam position



1. Remove the top cover.
2. Loosen the two set screws (1), and then adjust the position of the thread trimmer cam (3) so that the distance between the edge of the collar shaft (2) and the edge of the thread trimmer cam (3) is 0.2 - 0.5 mm. After adjusting, tighten the two set screws (1).

7-17. Belt tension adjustment

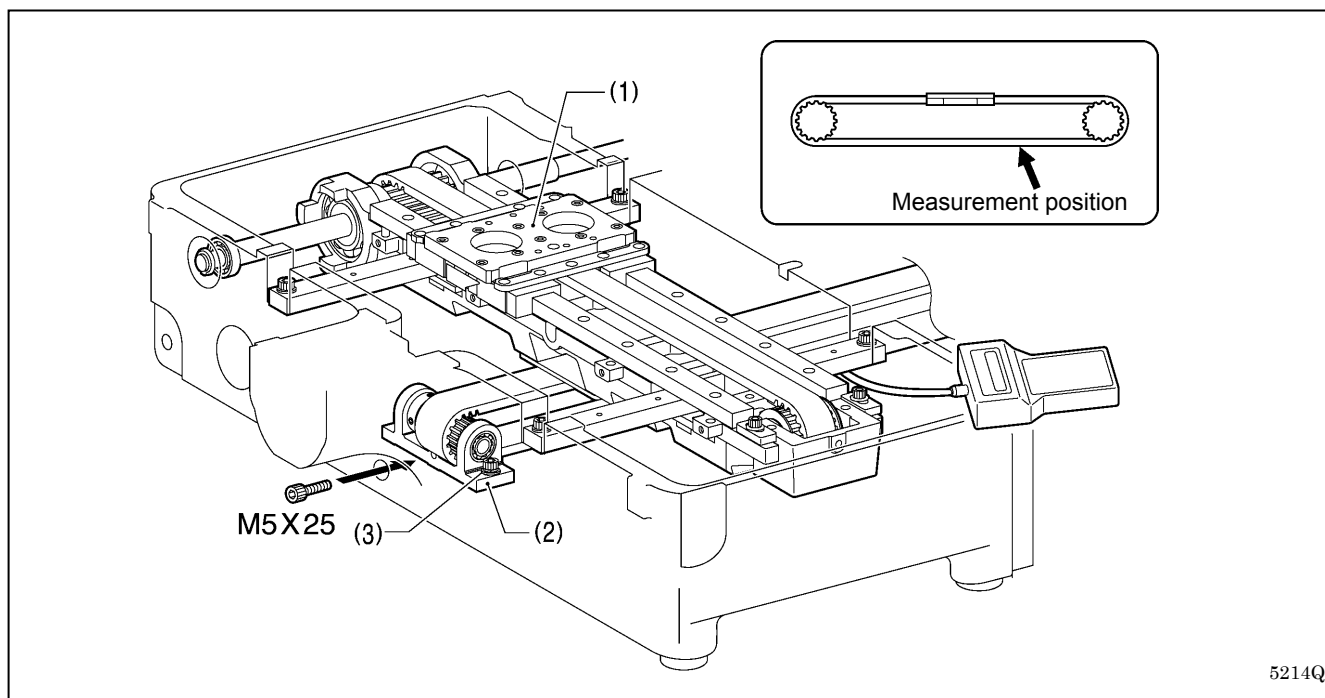
<X-GT belt>



1. Move the X feed bracket (1) so that it is in the middle of the sewing area in the Y direction and at the left edge of the sewing area in the X direction.
 2. Loosen the two bolts (3) of the X-pulley bracket (2), and then provisionally tighten them at 19.6 mN·m.
 3. Pass the M5x25 screw through the countersunk hole in the side of the bed and screw it into the tap hold in the X-pulley bracket (2). Then adjust the belt tension to 220 - 250 N.
 4. Tighten the two bolts (3), and then remove the M5x25 screw.
 5. Measure the belt tension once more and check that it is 320 - 350 N.
- * Be sure to use a belt tension gauge to measure the belt tension, and measure from the bottom of the belt.
- * The belt tension gauge should be set to measure a unit weight of 0.04 kg/m, a belt width of 30 mm and a span length of 370 mm.
- * The recommended belt tension gauge to use is the Dr. TENSION TYPE-II manufactured by MITSUBOSHI BELTING LTD.

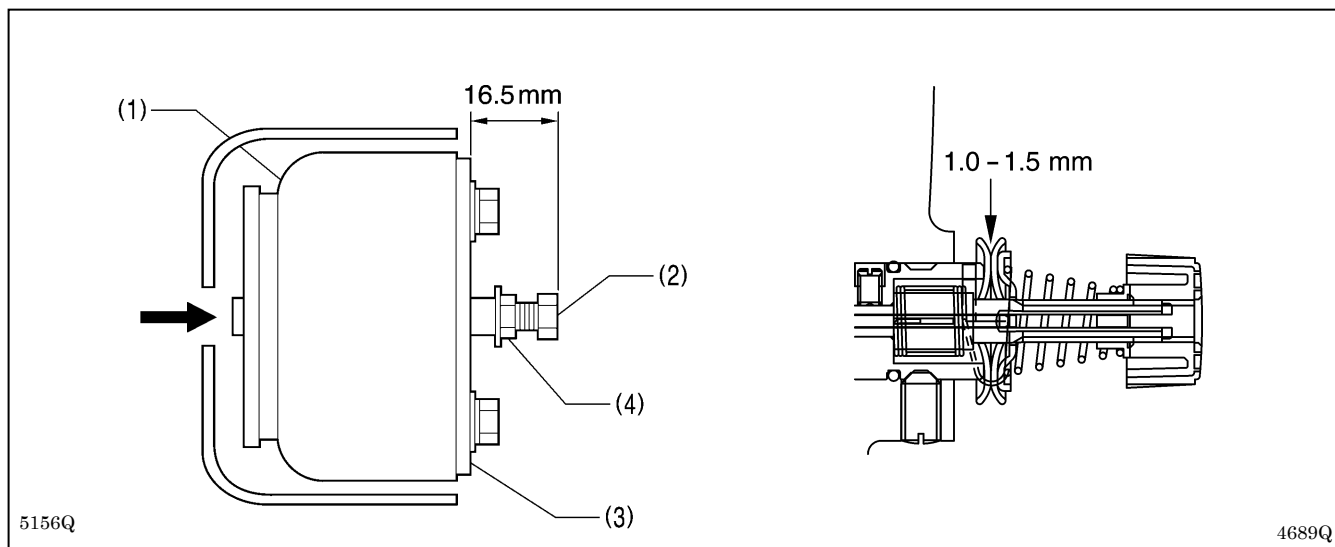
7. ADJUSTMENT

<Y-GT belt>



1. Move the X feed bracket (1) so that it is in the middle of the sewing area in the Y direction and at the left edge of the sewing area in the X direction.
 2. Loosen the two bolts (3) of the Y-pulley bracket (2), and then provisionally tighten them at $19.6 \text{ mN} \cdot \text{m}$.
 3. Pass the M5x25 screw through the countersunk hole in the side of the bed and screw it into the tap hold in the Y-pulley bracket (2). Then adjust the belt tension to $160 - 240 \text{ N}$.
 4. Tighten the two bolts (3), and then remove the M5x25 screw.
 5. Measure the belt tension once more and check that it is $400 - 480 \text{ N}$.
- * Be sure to use a belt tension gauge to measure the belt tension, and measure from the bottom of the belt.
 - * The belt tension gauge should be set to measure a unit weight of 0.04 kg/m , a belt width of 30 mm and a span length of 370 mm .
 - * The recommended belt tension gauge to use is the Dr. TENSION TYPE-II manufactured by MITSUBOSHI BELTING LTD.

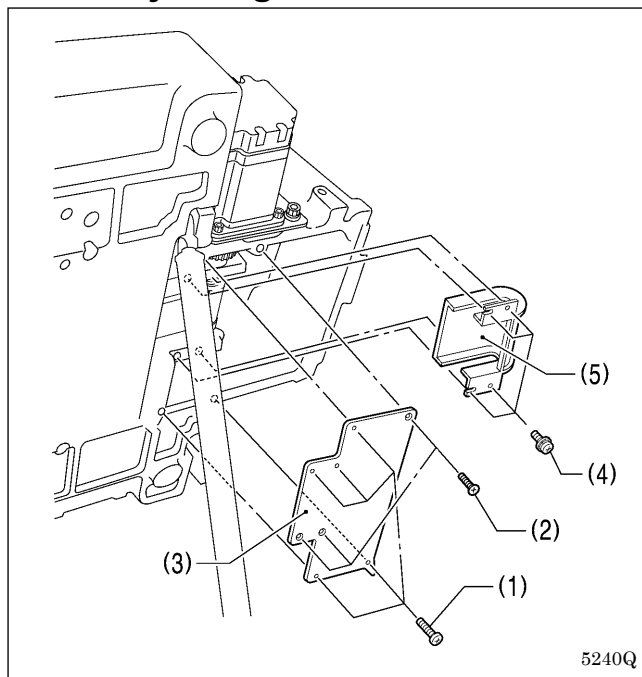
7-18. Adjusting the tension release amount



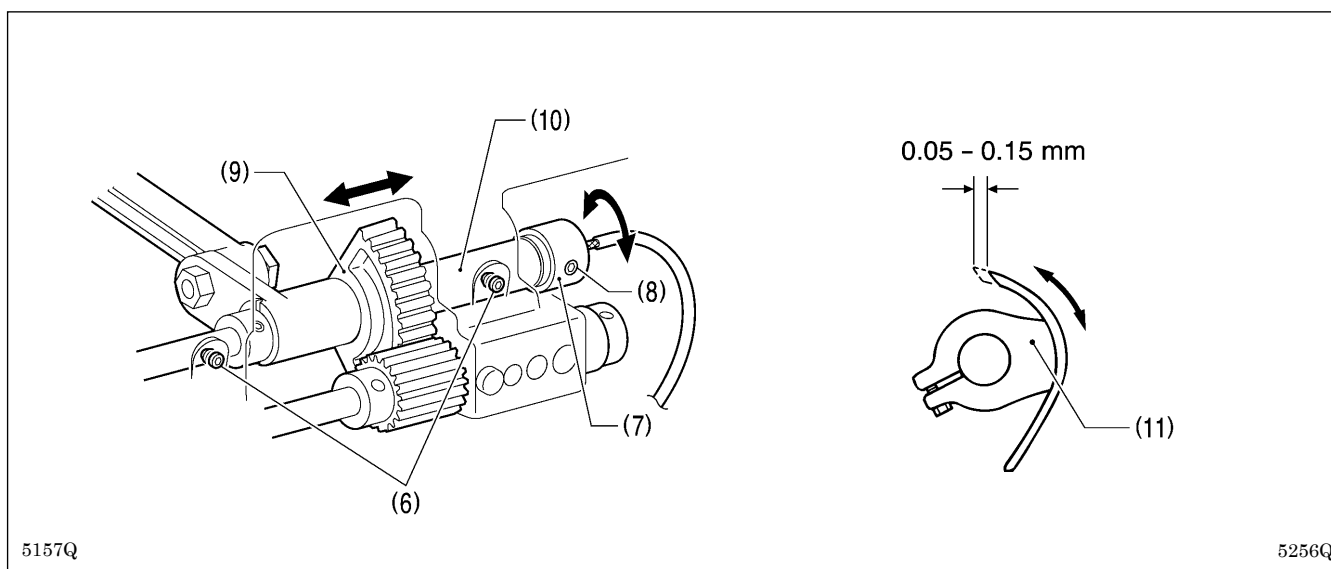
1. Loosen the nut (4) and turn the bolt (2) to adjust so that the distance between the tip of the bolt (2) and the solenoid setting plate (3) is 16.5 mm when the plunger of the tension release solenoid (1) is pushed in as far as it will go.
2. Check that the tension disc opening amount is $1.0 - 1.5 \text{ mm}$ when the tension release solenoid (1) is installed to the arm and the plunger is pushed with a screwdriver or similar tool through the hole in the solenoid cover.

- * If memory switch No. 552 has been set so that the tension release timing is early, you can increase the trailing length for the upper thread.

7-19. Adjusting the backlash of the lower shaft gear



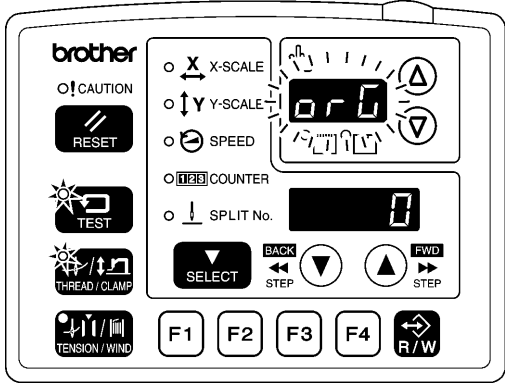
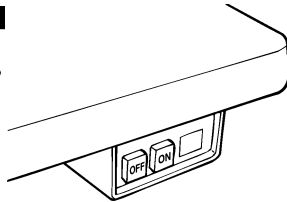

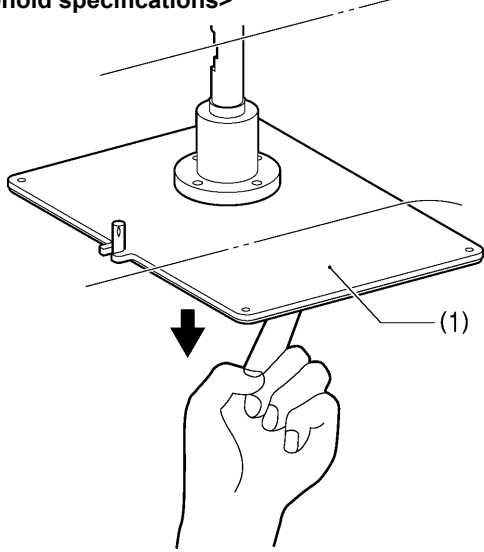
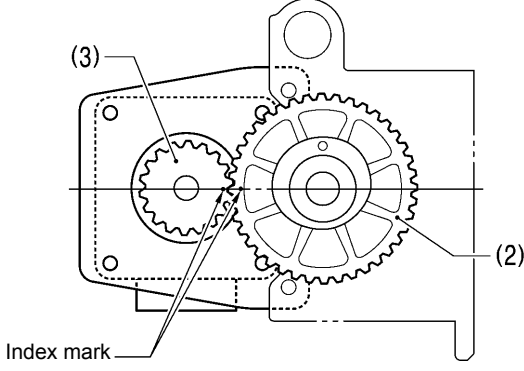
1. Gently tilt back the machine head.
2. Remove the five screws (1) and three flat screws (2), and then remove the oil cover (3).
3. Remove the four screws (4) and Y-belt cover (5).





4. Loosen the two set screws (6).
5. Place set screw collar R (7) against the edge of the bed so that the pulley can turn easily.
 * If the pulley cannot turn easily, loosen the set screw (8) and turn the pulley while moving the rock gear (9) back and forth. At the position where the pulley moves freely, place set screw collar R (7) against the edge of the bed and tighten the set screw (8).
6. Turn the rock gear shaft (10) to adjust the play at the end of the driver (11) to 0.05 – 0.15 mm, and tighten the set screws (6).

7-20. Adjusting the home position

7-20-1. Work clamp lift home position

1	Turn the pulley to set the needle to the needle up stop position.
2	<div data-bbox="236 342 743 723">  <p>brother O! CAUTION RESET TEST THREAD / CLAMP TENSION / WIND X-SCALE Y-SCALE SPEED COUNTER SPLIT No. SELECT BACK STEP FWD STEP F1 F2 F3 F4 R/W</p> </div> <div data-bbox="834 297 1463 409"> <p>While pressing the ▼▲ keys simultaneously, turn on the power switch. * Keep pressing the ▼▲ keys until the model name is displayed and the buzzer beeps once.</p> </div> <div data-bbox="834 421 1153 510"> <p>BACK STEP ▼ ▲ FWD STEP</p> </div> <div data-bbox="1153 421 1441 622">  </div> <div data-bbox="834 656 1463 745"> <p>• "orG" will flash in the PROGRAM No. display and the offset value (default: 0) will be displayed in the menu display.</p> </div> <div data-bbox="252 761 1463 790"> <p>TEST indicator and THREAD/CLAMP indicator light 5205Q 4443Q 4421Q</p> </div>
3	<div data-bbox="236 824 379 913">  <p>RESET</p> </div> <div data-bbox="451 801 1463 936"> <p>Press the RESET key. • Home position detection will be carried out, and the work clamp will stop at the currently-registered home position. * If you press the RESET key for 2 seconds or more at this time, the offset value will be reset to " 0".</p> </div>
4	<div data-bbox="189 958 499 990"> <p><Solenoid specifications></p> </div> <div data-bbox="260 969 746 1518">  <p>(1)</p> </div> <div data-bbox="834 947 1463 1025"> <p>Press the ▲ or ▼ key to change the offset value (-999 to 999) so that the work clamp lifter plate (1) moves to the position where it starts to lower.</p> </div> <div data-bbox="962 1081 1289 1261"> <p>BACK STEP ▼ ▲ FWD STEP</p> </div> <div data-bbox="834 1328 1463 1384"> <p>• The work clamp lifter plate (1) will move in conjunction with the setting value.</p> </div> <div data-bbox="189 1529 818 1585"> <p>Touch the bottom of the work clamp lifter plate and check the position where it starts to lower.</p> </div> <div data-bbox="1329 1574 1463 1597"> <p>5206Q 5208Q</p> </div>
	<div data-bbox="189 1619 515 1650"> <p><Pneumatic specifications></p> </div> <div data-bbox="228 1664 754 2033">  <p>(3) (2) Index mark</p> </div> <div data-bbox="834 1608 1463 1720"> <p>Remove the motor cover, align the index marks of the work clamp cam gear (2) and the work clamp driving gear (3) to the center line, and then press the ▲ or ▼ key to change the offset value (-999 – 999).</p> </div> <div data-bbox="962 1753 1289 1933"> <p>BACK STEP ▼ ▲ FWD STEP</p> </div> <div data-bbox="834 1989 1463 2045"> <p>• The work clamp driving gear (3) will move in conjunction with the setting value.</p> </div> <div data-bbox="1329 2045 1463 2067"> <p>5207Q 5208Q</p> </div>

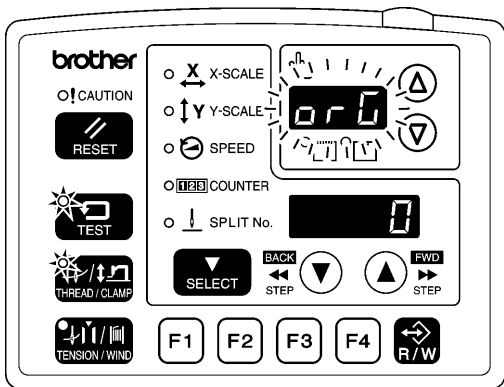




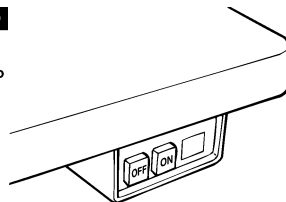
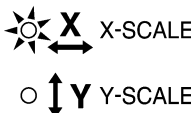


5		Press the RESET key. <ul style="list-style-type: none"> The work clamp will move to the home position. Check the home position.
7	Repeat steps 4 and 5 to adjust the home position.	
8		Press the TEST key. <ul style="list-style-type: none"> The display will return to the normal display and the sewing machine will switch to home position detection standby.

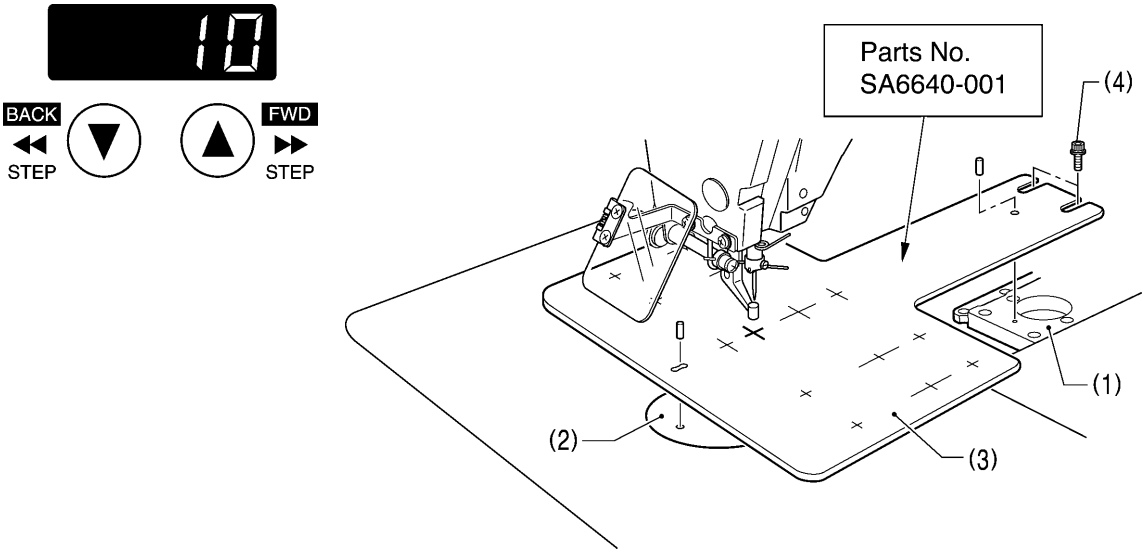


TEST indicator switches off

NOTE:

Always be sure to press the RESET key and check the home position before ending adjustment mode. If you end adjustment mode without checking the home position, error "E303" may be generated.

7-20-2. X-Y feed home position

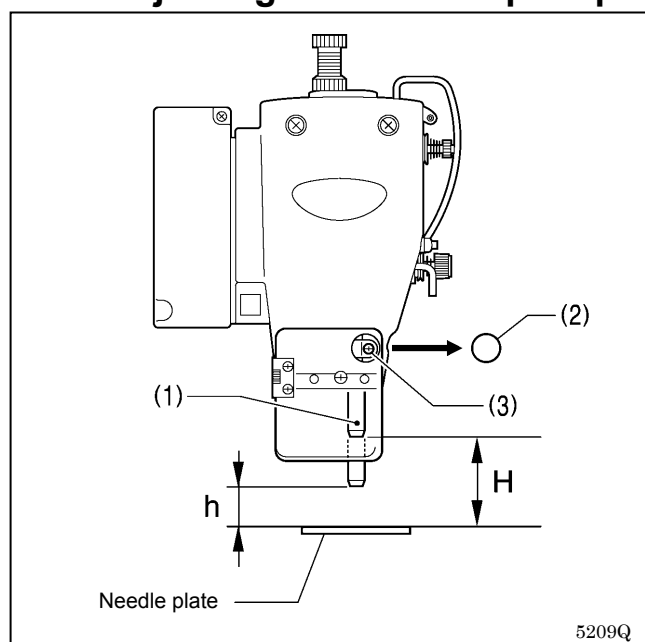
1	Turn the pulley to set the needle to the needle up stop position.	
2		While pressing the ▼▲ keys simultaneously, turn on the power switch. * Keep pressing the ▼▲ keys until the model name is displayed and the buzzer beeps once. <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center;">  </div> <div style="margin: 0 10px;">  </div> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>  <ul style="list-style-type: none"> "orG" will flash in the PROGRAM No. display and the offset value (default: 0) will be displayed in the menu display.
TEST indicator and X-SCALE indicator light		5205Q 4443Q 4421Q
3		Press the SELECT key so that either the X-SCALE indicator or the Y-SCALE indicator illuminates. <div style="text-align: center;">  </div>
		4570Q
4		Press the RESET key. <ul style="list-style-type: none"> Home position detection will be carried out, and the feed mechanism will stop at the currently-registered home position. * If you press the RESET key for 2 seconds or more at this time, the offset value will be reset to " 0 ".

5	 <p>Use 2 mm diameter pins (shaped like a needle) to align the holes in the X feed bracket (1) and the needle plate (2) with the two holes in the home position reference plate (3), press the ▲ or ▼ key to change the offset value (-999 – 999) in order to lower the needle to the home position.</p> <ul style="list-style-type: none"> • The feed mechanism will move in conjunction with the setting value. <p>Once the home position is aligned, tighten the two bolts (4) and remove the pins (shaped like a needle).</p> <p style="text-align: right;">5208Q 5276Q</p>
6	 <p>Press the RESET key.</p> <ul style="list-style-type: none"> • The feed mechanism will move to the home position. Check the home position. Once the home position is correctly aligned, remove the home position reference plate (3).
7	<p>Repeat steps 5 and 6 to adjust the home position.</p>
8	<p>End adjustment mode.</p>  <p>Press the TEST key.</p> <ul style="list-style-type: none"> • The display will return to the normal display and the sewing machine will switch to home position detection standby. <p style="text-align: center;">TEST indicator switches off</p>

NOTE:

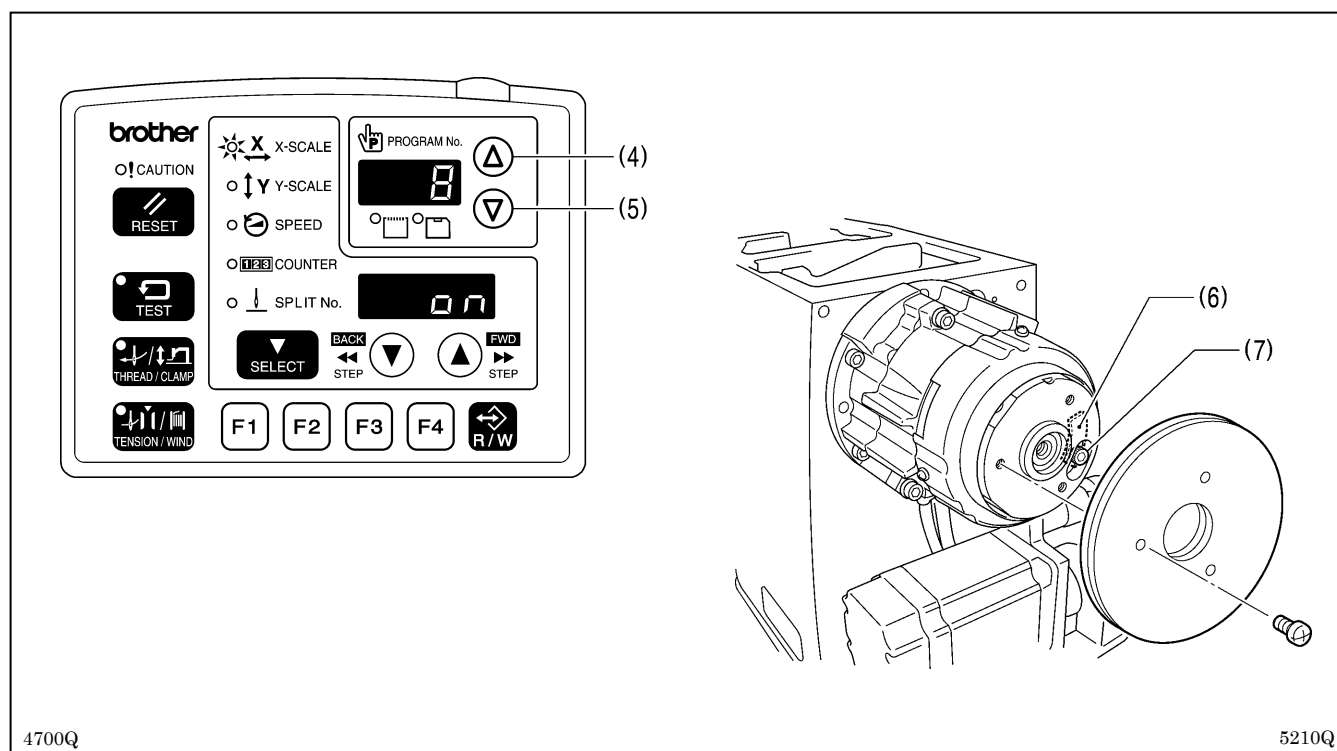
Always be sure to press the RESET key and check the home position before ending adjustment mode. If you end adjustment mode without checking the home position, error "E202" may be generated.

7-21. Adjusting the needle stop home position



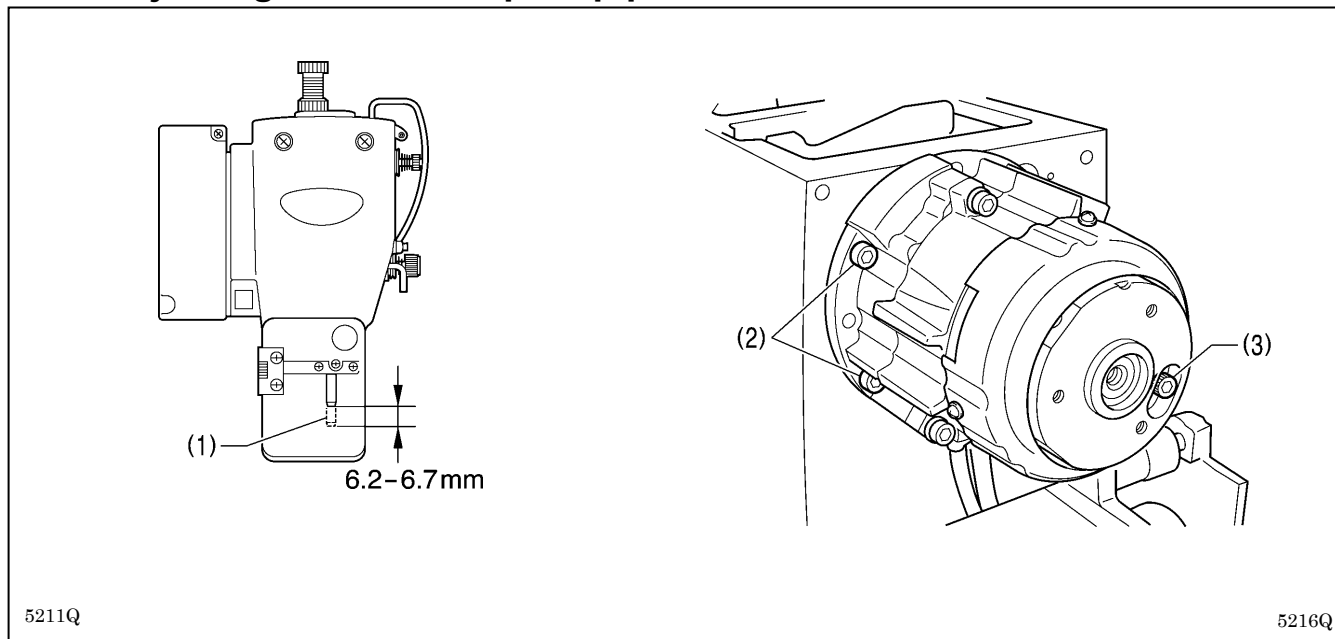
1. Remove the needle and the needle bar thread guide.
2. Turn the pulley to move the needle bar (1) to the lowest position.
3. Remove the rubber cap (2) from the face plate, and then loosen the screw (3) of the needle bar clamp.
4. Adjust so that the distance h is as shown below when the needle bar is at its lowest position.
5. Tighten the screw (3), and then install the rubber cap (2).
6. Turn the machine pulley to lower the needle bar (1) from its highest position to height H.

Needle	DP x 17	DP x 5
H	55.5 mm	50.4 mm
h	18.0 mm	12.9 mm



7. While pressing the Δ key (4), turn on the power switch.
* Keep pressing the Δ key (4) until the model name is displayed and the buzzer beeps once.
8. Press the Δ key (4) or ∇ key (5) to select check code "8". (Refer to "2-8. Input checking method".)
9. Remove the fries wheels and loosen the bolt (7) of the magnet (6) by 1/4 of a turn.
10. Move the magnet (6) to the precise point where the menu display switches from " on" to " oFF", and then tighten the bolt (7).

7-22. Adjusting the needle up stop position

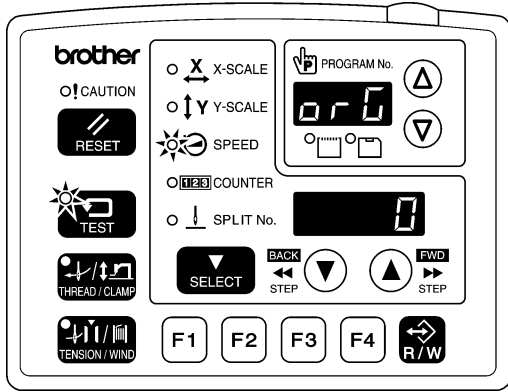
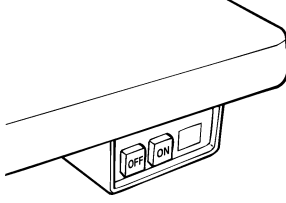
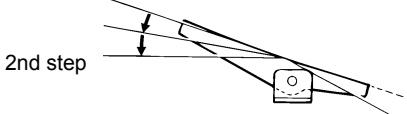


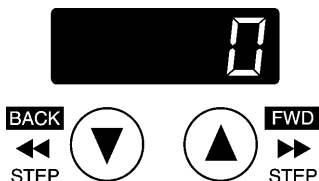
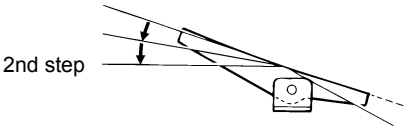

Use the operation panel to adjust the needle up stop position so that the needle bar (1) is lowered 6.2 – 6.7 mm from its highest position (near the highest stop position for the thread take-up).

NOTE:

When the four bolts (2) of the sewing machine motor and the bolt (3) of the magnet are loosened, the feed timing may move out of adjustment. Do not loosen these bolts when the settings are at the factory defaults or after adjusting the needle up stop home position.

[Adjustment method]

1	 <p>While pressing the ∇ Δ keys simultaneously, turn on the power switch. * Keep pressing the ∇ Δ keys until the model name is displayed and the buzzer beeps once.</p>  <ul style="list-style-type: none"> • "orG" will flash in the PROGRAM No. display and the offset value will be displayed in the menu display. <p>TEST indicator and SPEED indicator light</p> <p style="text-align: right;">4703Q 4448Q 4421Q</p>
2	 <p>Depress the foot switch to the 2nd step. (If using a two-pedal foot switch, lower the work clamp before depressing the start switch.)</p> <ul style="list-style-type: none"> • X-Y home position detection will be carried out and the "orG" will stop flashing and illuminate steadily. <p style="text-align: right;">4441Q</p>

3		<p>Press the ▲ or ▼ key to set the offset value (-9 - 10).</p> <ul style="list-style-type: none"> • When you press the ▲ key, the needle bar will drop, and when you press the ▼ key, it will rise. <p>NOTE: After changing the offset value, check that the thread trimming operation is normal and that error [E110] is not generated.</p> <p style="text-align: right;">5212Q</p>
4		<p>Depress the foot switch to the 2nd step. (If using a two-pedal foot switch, lower the work clamp before depressing the start switch.)</p> <ul style="list-style-type: none"> • The upper shaft will move and stop at the offset value that has been set. <p style="text-align: right;">4441Q</p>
5	<p>End adjustment mode.</p>  <p style="text-align: center;">TEST indicator switches off</p>	<p>Press the TEST key.</p> <ul style="list-style-type: none"> • The offset value will be memorized and the sewing machine will switch to home position detection standby.

8. ELECTRICAL 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 cover of the control box. Touching areas where high voltages are present can result in severe injury.

8-1. Precautions while carrying out adjustments

Be sure to note the following cautions when opening the control box to carry out inspections and adjustments.

Electric shocks

High voltages can remain in large-capacity capacitors for up to 5 minutes in some circumstances, even when the power has been turned off. Accordingly, wait at least 5 minutes after turning off the power before carrying out the following operations.

- Opening and closing the control box
- Replacing fuses
- Inserting and disconnecting connectors
- Measuring resistance values
- Any other tasks that may involve touching components inside the control box

Some inspection items require the control box to be open when the power is turned on and voltages are measured.

At such times, be extremely careful never to touch anywhere other than the specified locations. In addition, note that high voltages may remain for up to 5 minutes after the power is turned off.

Injury

The fan inside the control box turns while the power is turned on, so be careful not to get anything caught in it.

Be careful not to touch metallic objects such as the heat sink and cover when connecting and disconnecting connectors and making measurements.

8-2. Inside the control box and operation panel structure

Main P.C. board

Secured to the side. This is the P.C. board that controls sewing machine operation.

PMD P.C. board

Secured to the base plate. This P.C. board drives the pulse motors and solenoids.

Power supply motor P.C. board

Secured to the rear. This P.C. board generates the voltages that are required for control, and drives the main shaft motor. There are 8 fuses on this P.C. board.

DC fan motor

This fan cools the inside of the control box.

The filters at the air intake slots in the cover and base plate should be cleaned about once a month.

Conversion transformer (Two types are used depending on the power supply voltage specifications.)

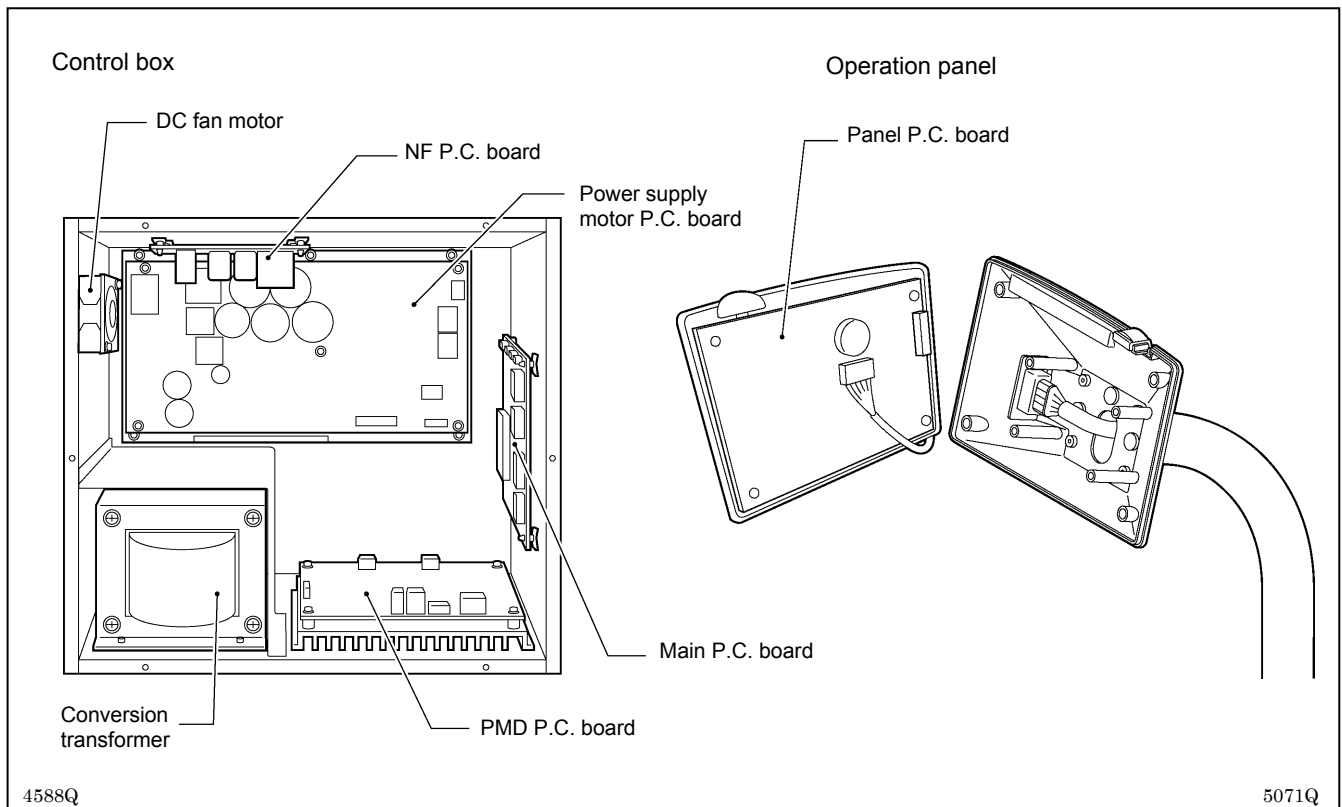
This breaks down the power supply voltage into the voltages that are required for control operations.

NF P.C. board (European destinations only)

This eliminates the electrical interference that is generated by the power supply fan.

Panel P.C. board

Secured to the inside of the operation panel. This P.C. board is used for displaying the sewing machine status and for input operations.



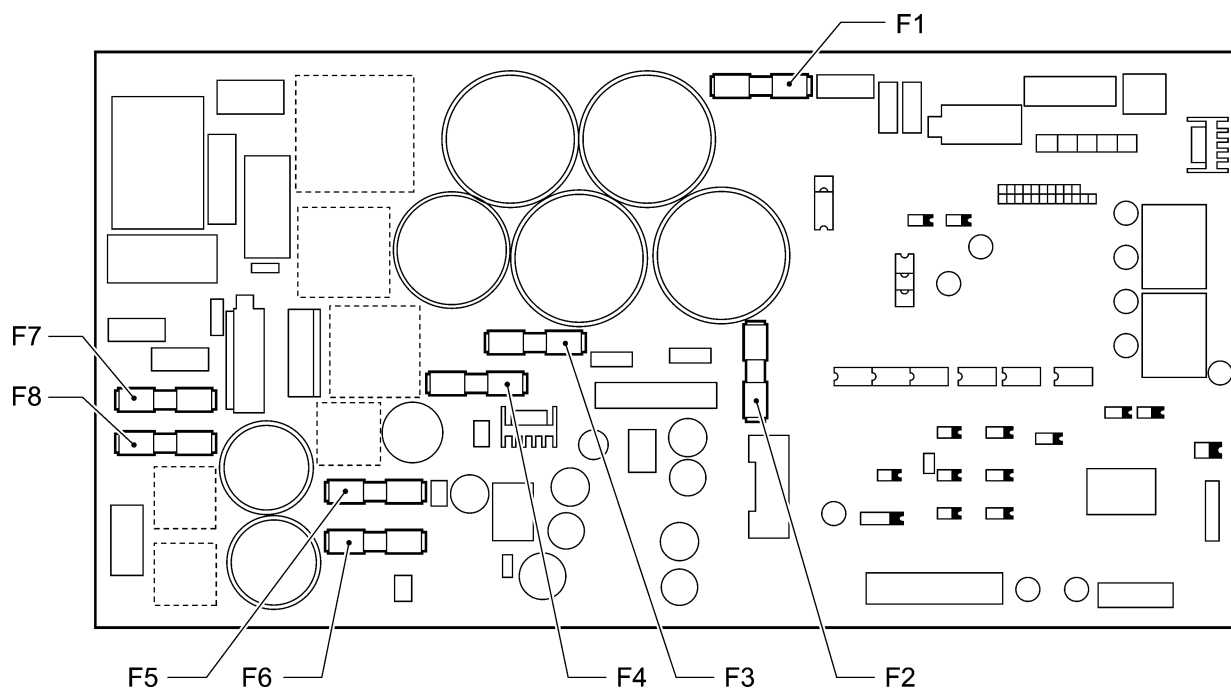
8-3. Description of fuses

When replacing the fuses, be sure to use the fuses specified below.

If the components on the P.C. boards are damaged, the fuses may blow again soon even after they have been replaced.

No.	Part name	Parts code	Symptom when fuse blows
F1	Fuse 15AFB (Glass tube fuse 15A-250V)	SA3794-001	Sewing machine motor does not operate and [E130] is displayed.
F2	Fuse 6AFB (Glass tube fuse 6A-250V)	SA3759-001	Feed mechanism does not operate and [E201] or [E211] is displayed. Work clamp does not operate and [E300] is displayed.
F3	Fuse 6AFB (Glass tube fuse 6A-250V)	SA3759-001	Thread trimming solenoid or digital tension/tension release solenoid does not operate, and thread trimming or thread tightening problems occur.
F4	Fuse 3AFB (Glass tube fuse 3A-250V)	616167-001	Communication problem with PMD P.C. board and [E403] is displayed.
F5	Fuse 3AFB (Glass tube fuse 3A-250V)	616167-001	Power indicator does not illuminate and nothing operates.
F6	Fuse 3AFB (Glass tube fuse 3A-250V)	616167-001	DC fan motor does not operate and [E740] is displayed.
F7 F8	Fuse 15AFB (Glass tube fuse 15A-250V)	SA3794-001	Power indicator does not illuminate and nothing operates.

Power supply motor P.C. board



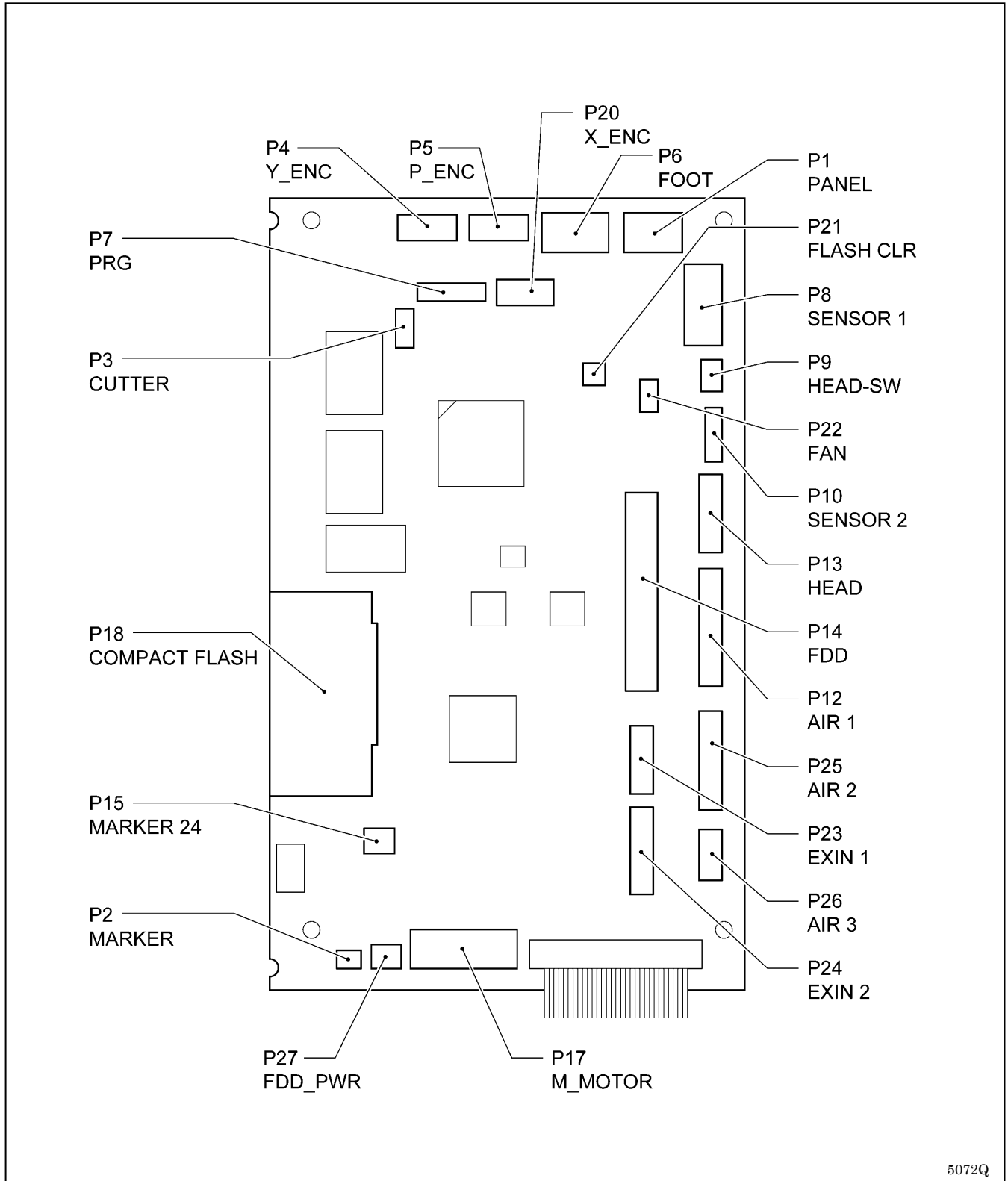
4590Q

8-4. Description of connectors

A large number of problems are often caused by connectors that are not inserted correctly or which are contacting poorly. As a result, check that all connectors are inserted correctly and that the pins and wires are crimped properly before carrying out problem diagnosis.

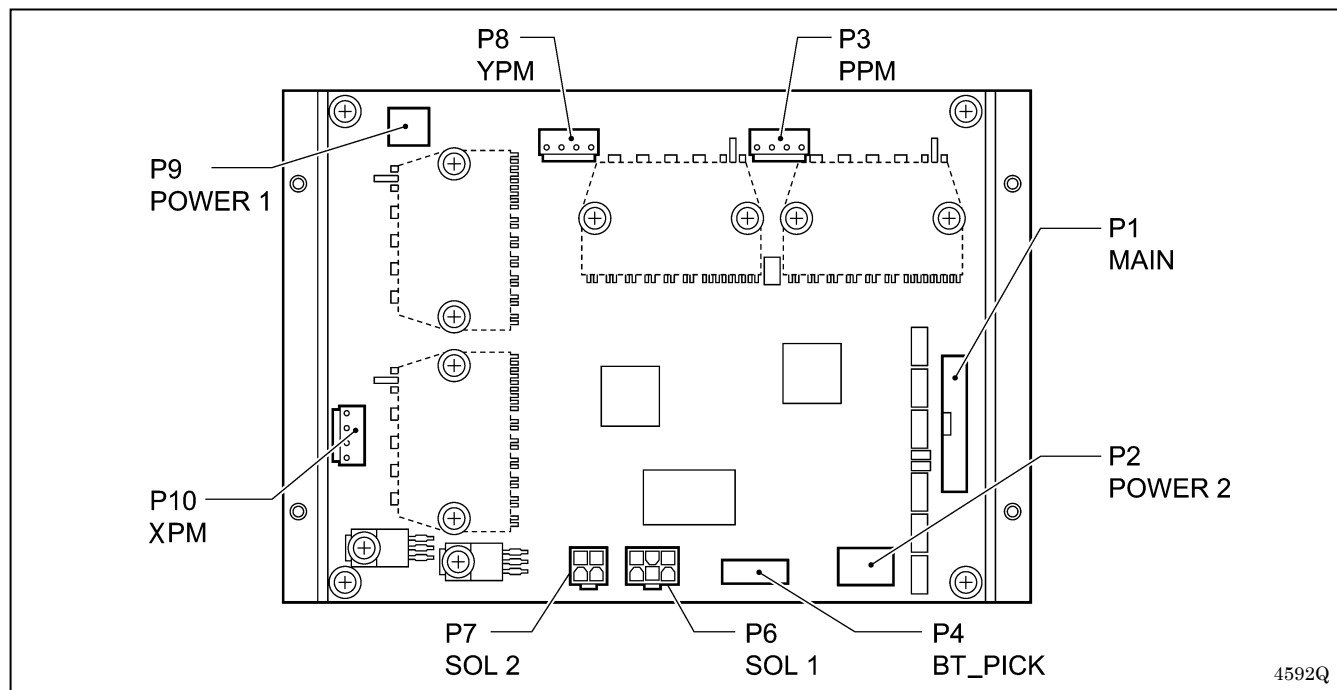
8-4-1. Connector positions

Main P.C. board

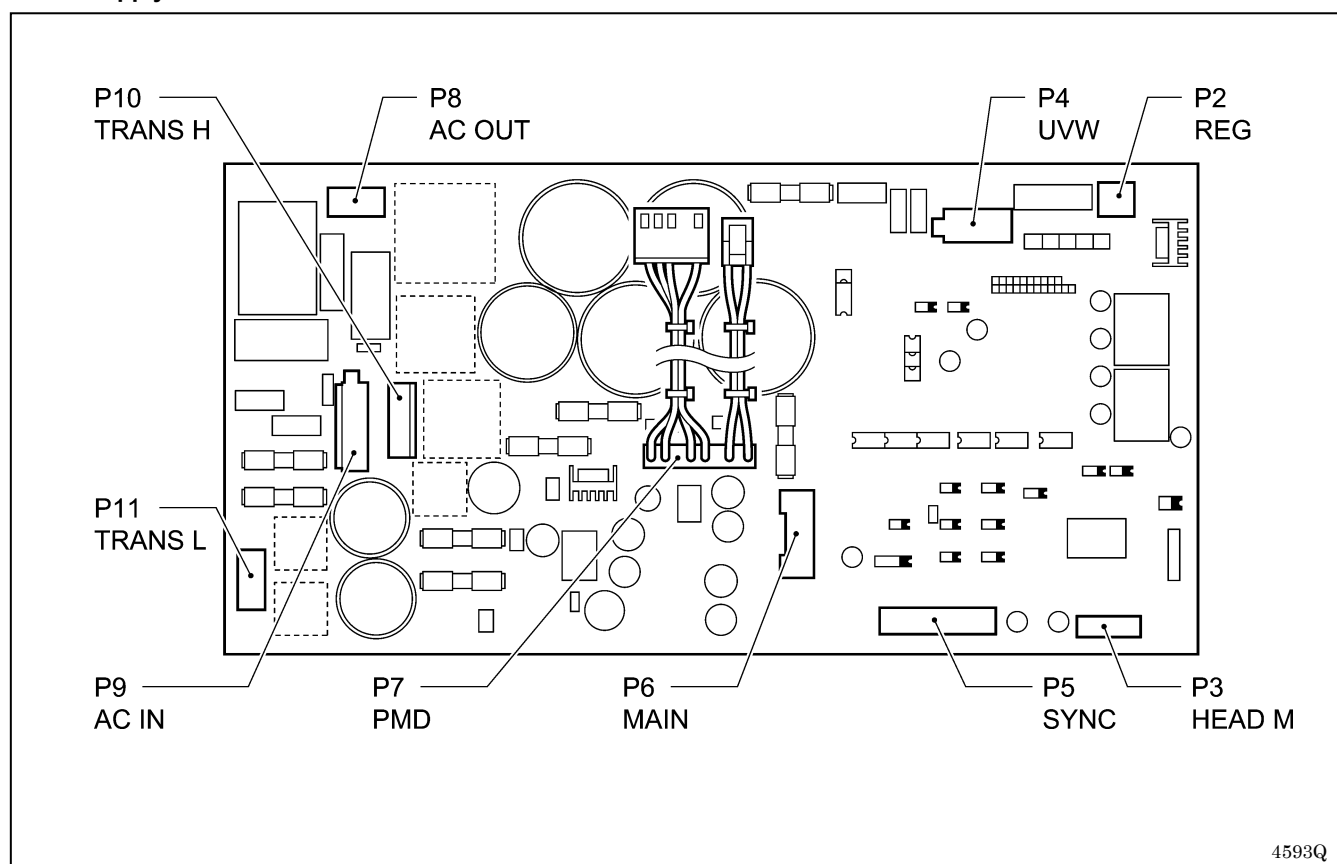


5072Q

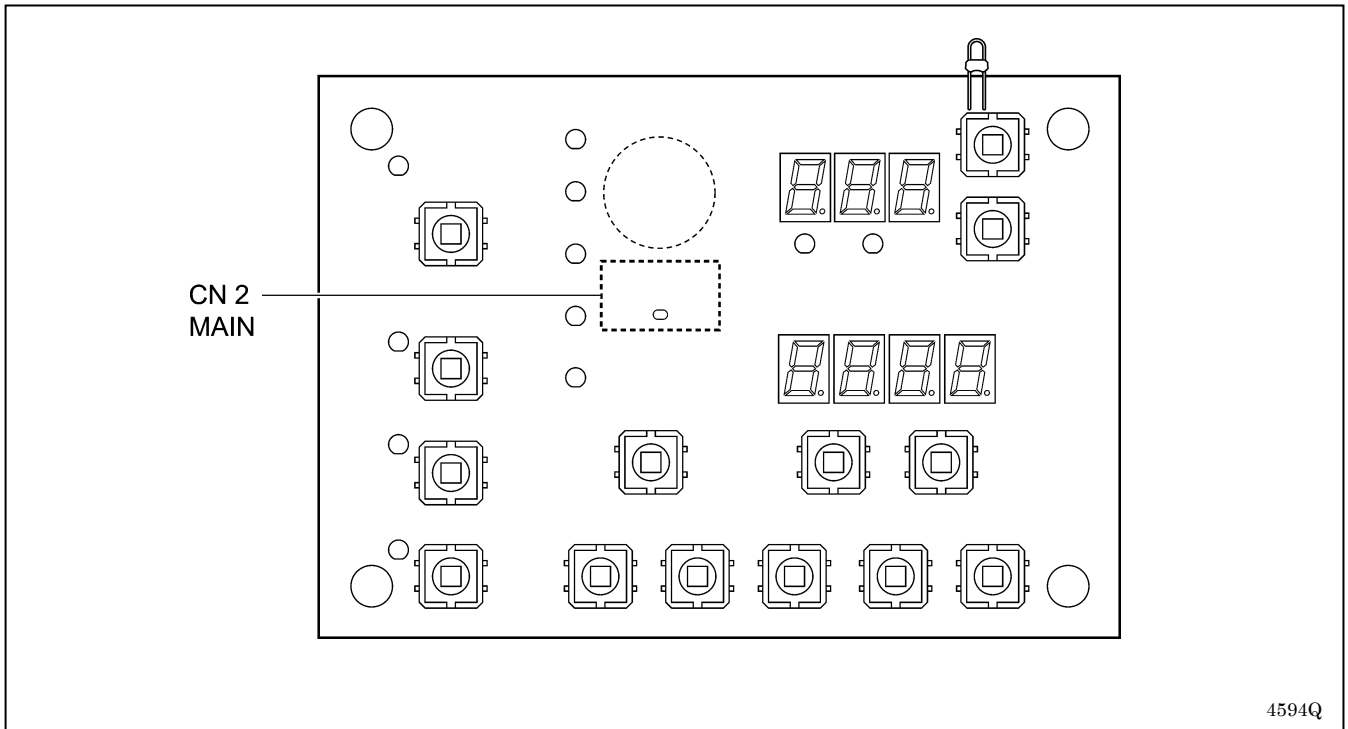
PMD P.C. board



Power supply motor P.C. board



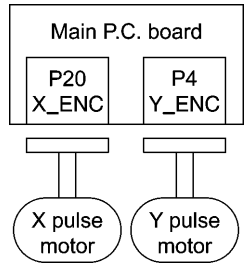
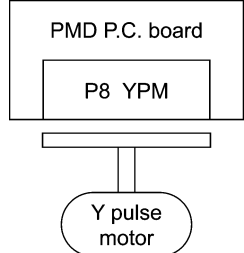
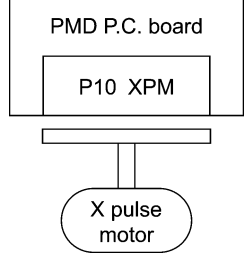
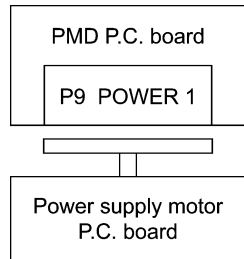
Panel P.C. board



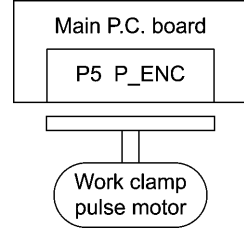
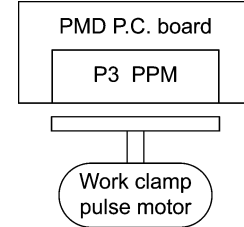
8-4-2. Symptoms when there are poor connections

This divides the functions of the connectors into five sections, but some connectors have more than one function, so be sure to refer to the trouble symptoms in other sections too.

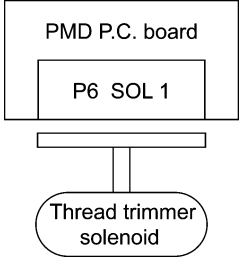
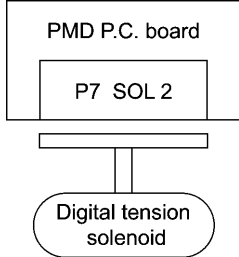
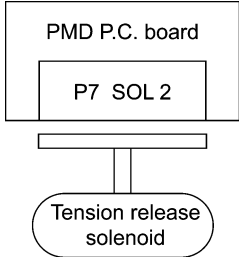
Feed mechanism

Trouble symptom	Connector No. and position
<ul style="list-style-type: none"> The feed mechanism operates briefly but does not detect the home position correctly. [E200] or [E210] is displayed. 	 <p>5241Q</p>
<ul style="list-style-type: none"> Problems with feed mechanism moving forward and back. [E210] or [E211] is displayed. 	 <p>4708Q</p>
<ul style="list-style-type: none"> Problems with feed mechanism moving to the left and right. [E200] or [E201] is displayed. 	 <p>4709Q</p>
<ul style="list-style-type: none"> Feed motor does not operate. [E200] is displayed. 	 <p>4710Q</p>

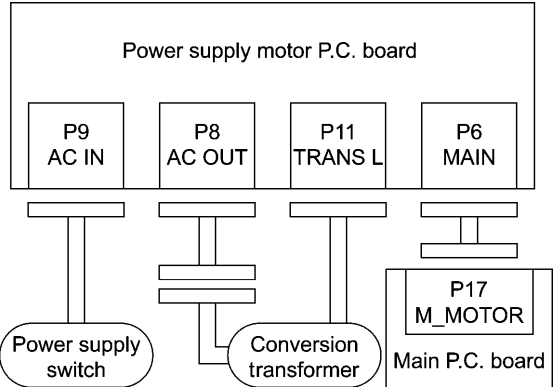
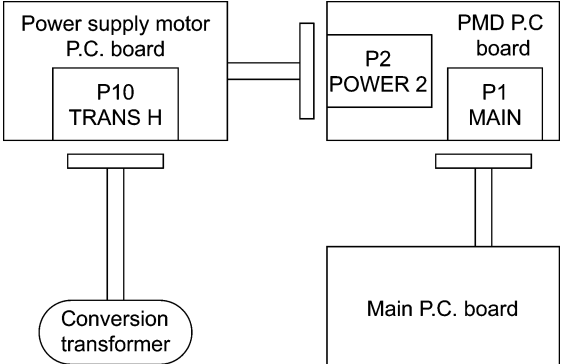
Work clamp mechanism

Trouble symptom	Connector No. and position
<ul style="list-style-type: none"> The work clamp pulse motor operates, but the home position is not detected correctly. [E300] is displayed. 	 <p>5242Q</p>
<ul style="list-style-type: none"> The work clamp pulse motor does not operate. [E300] or [E301] is displayed. 	 <p>4712Q</p>

Thread trimming mechanism

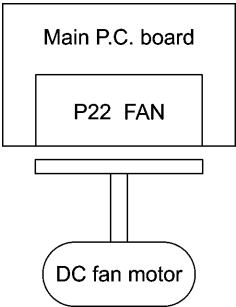
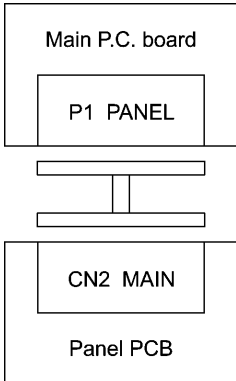
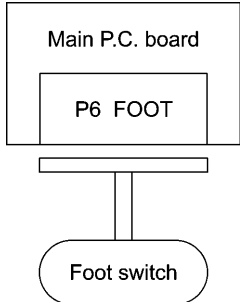
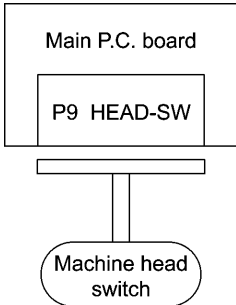
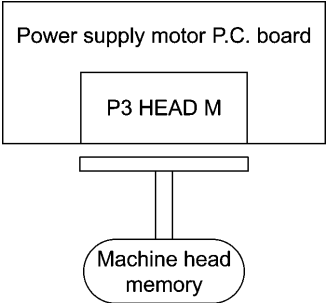
Trouble symptom	Connector No. and position
<ul style="list-style-type: none"> Thread trimming does not operate. (No error displayed) 	 <p>4713Q</p>
<ul style="list-style-type: none"> Digital tension does not operate. (No error displayed) [Digital tension specifications] 	 <p>5243Q</p>
<ul style="list-style-type: none"> Analog tension does not operate. (No error displayed) [Analog tension specifications] 	 <p>4714Q</p>

Sewing operations

Trouble symptom	Connector No. and position
<ul style="list-style-type: none"> Power indicator does not illuminate and sewing machine does not operate. Operation is unstable. 	 <p>5244Q</p>
<ul style="list-style-type: none"> [E403] is displayed when the power is turned on and the sewing machine does not start. 	 <p>4717Q</p>

8. ELECTRICAL MECHANISM





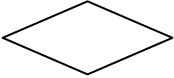


Other

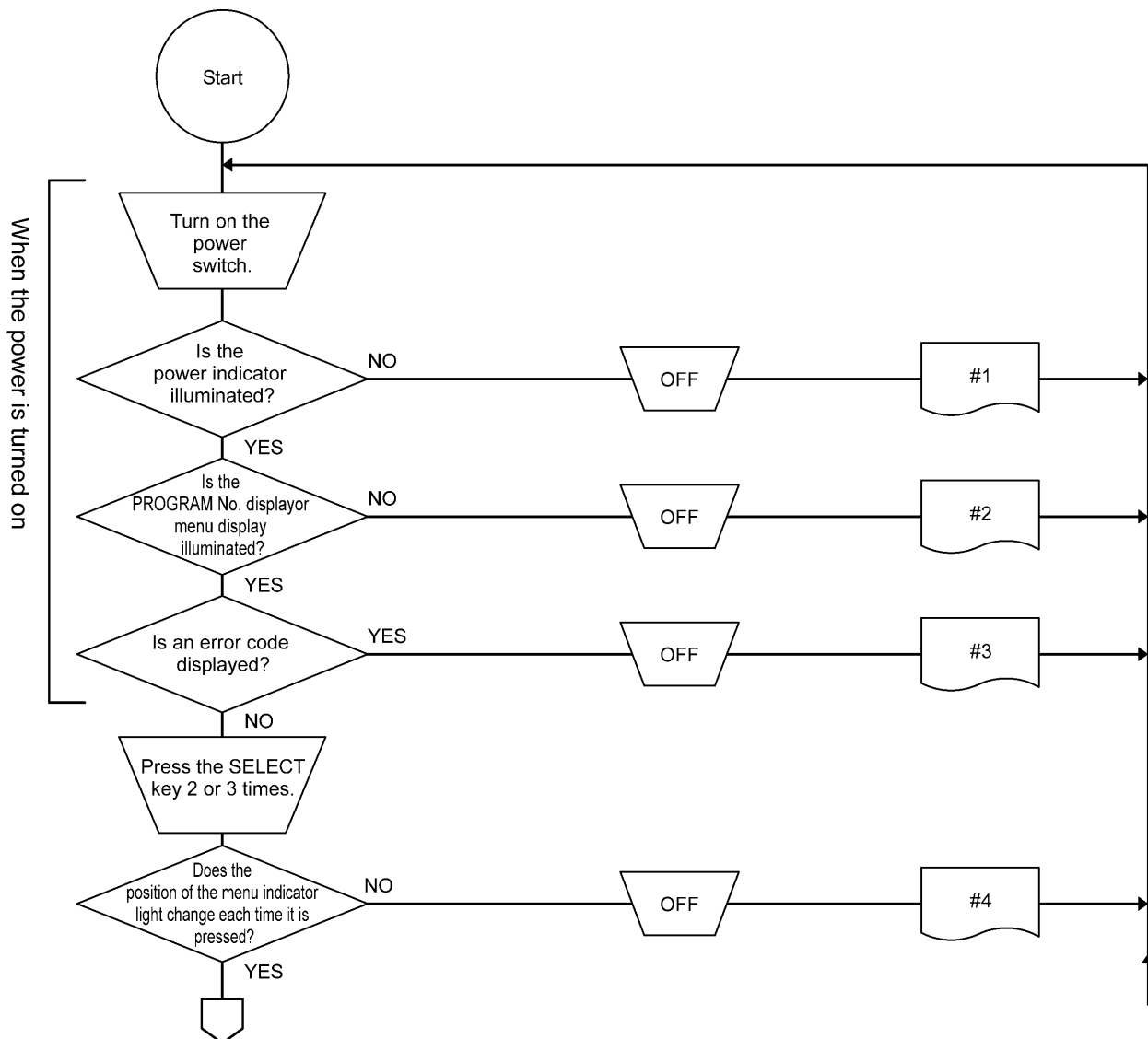
Trouble symptom	Connector No. and position
<ul style="list-style-type: none"> DC fan motor does not operate. [E740] is displayed. 	 <p>5245Q</p>
<ul style="list-style-type: none"> Operation panel display is incorrect. Power indicator does not illuminate. Operation panel keys do not work. 	 <p>5246Q</p>
<ul style="list-style-type: none"> Sewing machine does not start when foot switch is depressed. <p>[Single pedal] Work clamp drops when depressed to the 1st step Home position is detected and sewing machine starts when depressed to the 2nd step</p> <p>[2 pedal] Work clamp drops when work clamp switch (left) is depressed Home position is detected and sewing machine starts when start switch (right) is depressed</p>	 <p>5247Q</p>
<ul style="list-style-type: none"> After the power is turned on, [E055] is displayed. 	 <p>5248Q</p>
<ul style="list-style-type: none"> After the power is turned on, [E452] is displayed. 	 <p>5249Q</p>

8-5. Troubleshooting

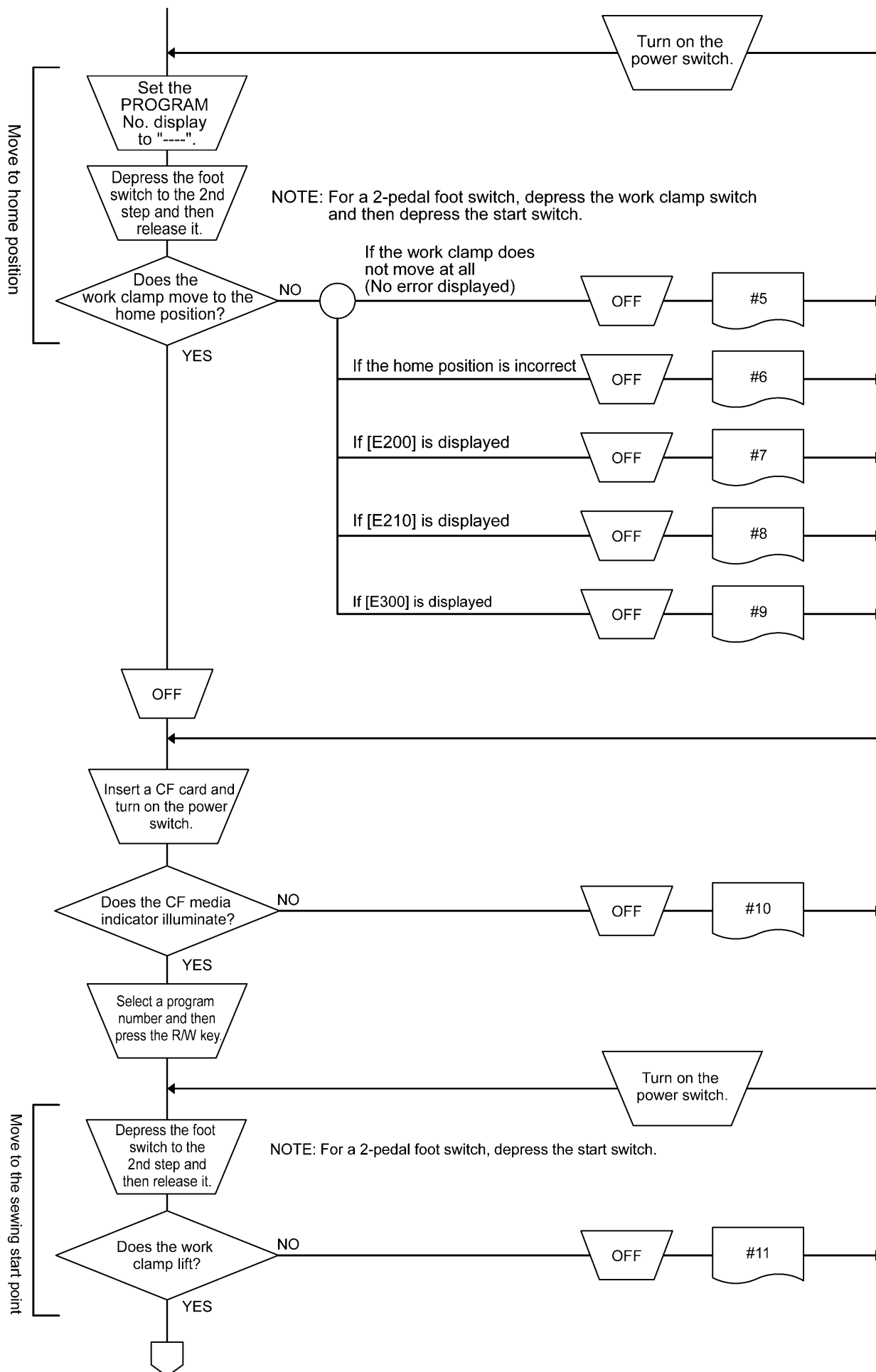
8-5-1. Diagnosis flowchart

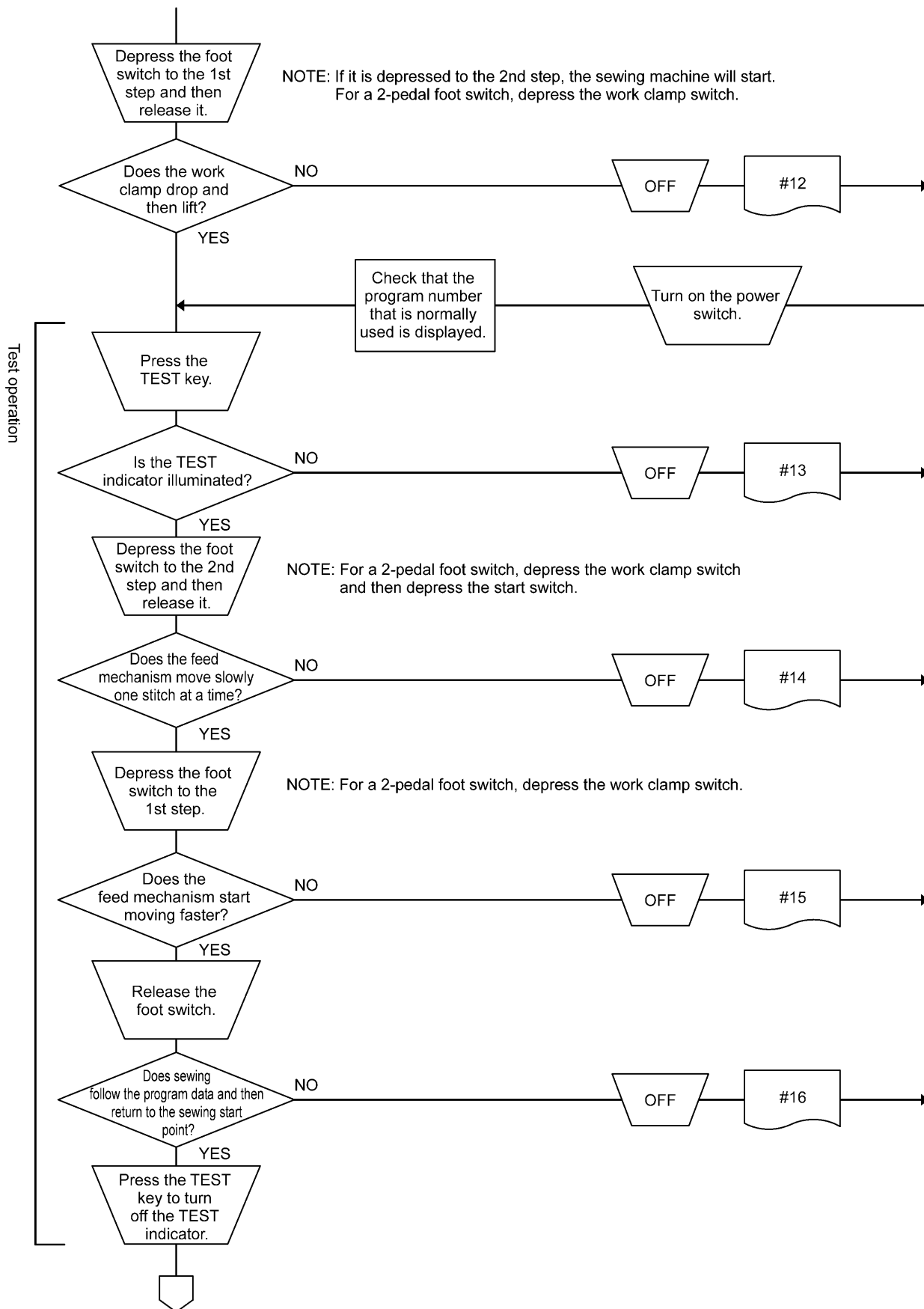
Description of symbols

	Manual procedure		Setting and status
	Switch operation		Continued on previous/next page
	Judgment		Power switch OFF
	"Problem" symbol in the "8-5-2. Remedy" lists		

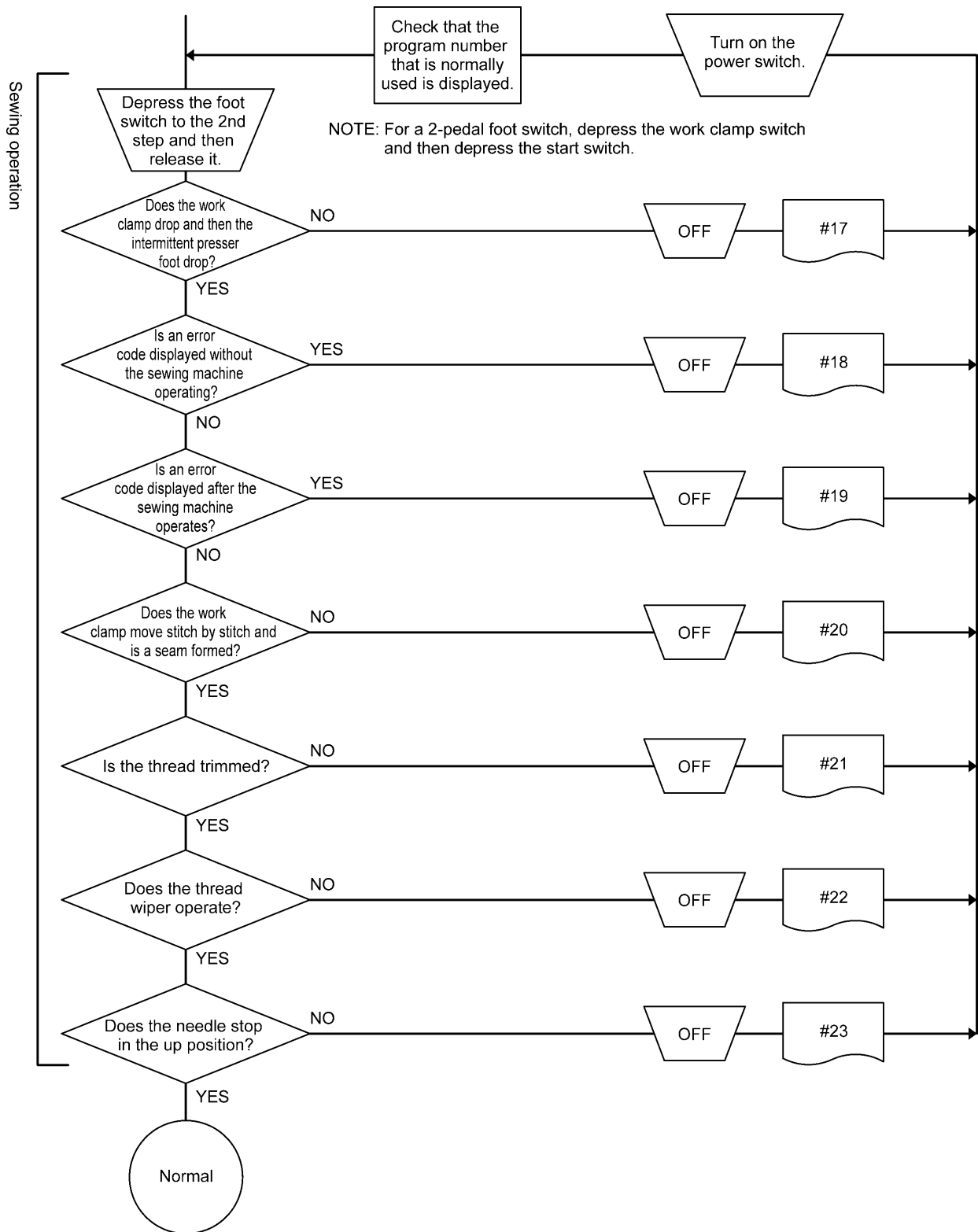


5250Q





5252Q



5253Q

8-5-2. Remedy

DANGER



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

1. Be sure to note the following cautions when opening the control box to carry out inspections and adjustments.

Electric shocks

High voltages can remain in large-capacity capacitors for up to 5 minutes in some circumstances, even when the power has been turned off. Accordingly, wait at least 5 minutes after turning off the power before carrying out the following operations.

- Opening and closing the control box
- Replacing fuses
- Inserting and disconnecting connectors
- Measuring resistance values
- Any other tasks that may involve touching components inside the control box

Some inspection items require the control box to be open when the power is turned on and voltages are measured. At such times, be extremely careful never to touch anywhere other than the specified locations. In addition, note that high voltages may remain for up to 5 minutes after the power is turned off.

Injury

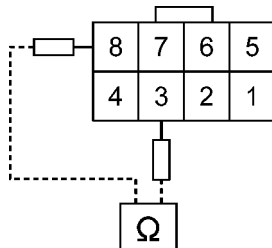
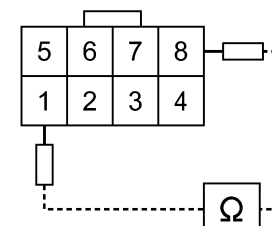
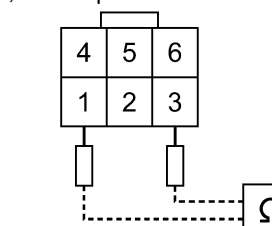
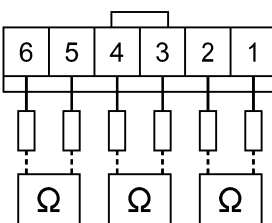
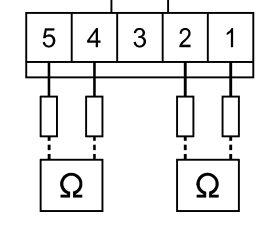
The fan inside the control box turns while the power is turned on, so be careful not to get anything caught in it. Be careful not to touch metallic objects such as the heat sink and cover when connecting and disconnecting connectors and making measurements.

2. When replacing the fuses, be sure to use a fuse with the same material and rating.

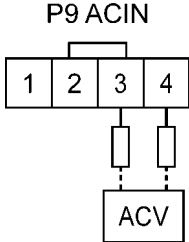
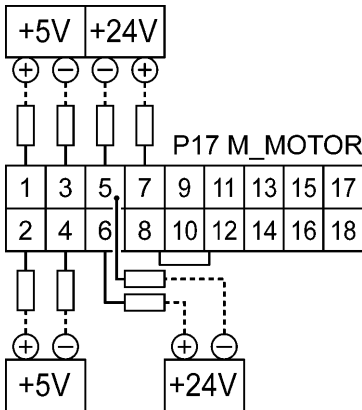
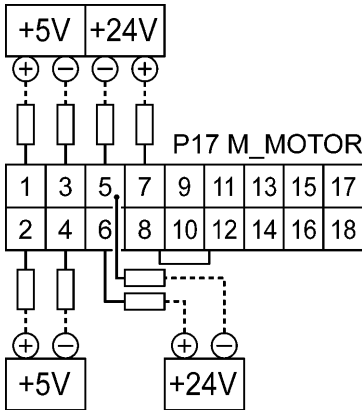
Before carrying out adjustment

1. With the power turned off, check that all of the connectors are securely connected by referring to "8-4. Description of connectors".
2. Use the flowchart to check what sort of conditions the problem occurs under (#*).
3. Carry out the inspections for the problems in the order of the numbers in the "Cause" column.

Problem #1 The power indicator does not illuminate when the power is turned on.

Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction																				
<div>1. Malfunction of voltage select harness ***</div> <div>For 200 V specifications</div> <div></div> <div>4876Q</div>	<div>a. Check if there is a broken wire in the voltage select harness.</div> <div>b. Disconnect the connector at the transformer side, turn on the power and then measure the voltage at the cord. (The wiring position may vary depending on the voltage specifications.) OK if same as wall outlet voltage</div> <div><table><tr><th>Voltage specifications</th><th>Pin No.</th></tr><tr><td>100V</td><td>6-8</td></tr><tr><td>110V</td><td>5-8</td></tr><tr><td>120V</td><td>4-8</td></tr><tr><td>200V</td><td>3-8</td></tr><tr><td>220V</td><td>2-8</td></tr><tr><td>240V</td><td>2-7</td></tr><tr><td>H220V</td><td>3-6</td></tr><tr><td>380V</td><td>2-3</td></tr><tr><td>400V</td><td>1-3</td></tr></table></div>	Voltage specifications	Pin No.	100V	6-8	110V	5-8	120V	4-8	200V	3-8	220V	2-8	240V	2-7	H220V	3-6	380V	2-3	400V	1-3	<div>Voltage select harness *** (*** indicates voltage specifications)</div>
Voltage specifications	Pin No.																					
100V	6-8																					
110V	5-8																					
120V	4-8																					
200V	3-8																					
220V	2-8																					
240V	2-7																					
H220V	3-6																					
380V	2-3																					
400V	1-3																					
<div>2. Malfunction of transformer</div> <div>100V, 200V, 220 V specifications</div> <div>[A]</div> <div></div> <div>4877Q</div> <div>380V, 400V specifications</div> <div>[B]</div> <div></div> <div>4878Q</div> <div>[C]</div> <div></div> <div>[D]</div> <div></div> <div>4879Q</div>	<div>• For 100V, 200V, 220 V specifications</div> <div>1) OK if there is continuity between pins 1-8, 2-8, 3-8, 4-8, 5-8 and 6-8 of the 8-pin connector coming out from the transformer. [Fig. A]</div> <div>2) OK if there is continuity between pins 1-2, 3-4 and 5-6 of the 6-pin connector coming out from the transformer. [Fig. C]</div> <div>3) OK if there is continuity between pins 1-2 and 4-5 of the 5-pin connector coming out from the transformer. [Fig. D]</div> <div>• For 380V, 400V specifications</div> <div>1) OK if there is continuity between pins 1-3, 2-3 and 3-6 of the 6-pin connector coming out from the transformer. [Fig. B]</div> <div>2) OK if there is continuity between pins 1-2, 3-4 and 5-6 of the 6-pin connector coming out from the transformer. [Fig. C]</div> <div>3) OK if there is continuity between pins 1-2 and 4-5 of the 5-pin connector coming out from the transformer. [Fig. D]</div>	<div>Transformer</div>																				

Problem #1 The power indicator does not illuminate when the power is turned on.

Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction																	
3. Malfunction of power cord  4880Q	<p>Disconnect connector P9 (ACIN) on the power supply motor P.C. board from the circuit board, turn on the power, and then measure the voltage between pins 3-4 of the cord-side connector. OK if same as wall outlet voltage</p> <p>After inspecting, turn off the power and insert connector P9.</p>																		
4. Blown fuse	<p>Remove fuses F7 and F8 and check the continuity. OK if continuity (If there is no continuity, replace the fuse and then carry out the inspections in 5.)</p>	Glass tube fuse 15A-250V																	
5. Malfunction of power supply motor P.C. board  5085Q	<p>Disconnect connector P17 (M-MOTOR) of the main P.C. board, turn on the power, and then measure the voltages between the pins at the cord-side connector.</p> <p>OK if the voltages are as shown in the table below.</p> <table border="1"> <thead> <tr> <th colspan="2">Pin Nos.</th> <th rowspan="2">Normal voltage</th> </tr> <tr> <th>+ side</th> <th>- side</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>3</td> <td>+5V</td> </tr> <tr> <td>2</td> <td>4</td> <td>+5V</td> </tr> <tr> <td>6</td> <td>5</td> <td>+24V</td> </tr> <tr> <td>7</td> <td>5</td> <td>+24V</td> </tr> </tbody> </table> <p>After measuring, turn off the power, wait 5 minutes or more and then insert P14.</p>	Pin Nos.		Normal voltage	+ side	- side	1	3	+5V	2	4	+5V	6	5	+24V	7	5	+24V	Power supply motor P.C. board
Pin Nos.		Normal voltage																	
+ side	- side																		
1	3	+5V																	
2	4	+5V																	
6	5	+24V																	
7	5	+24V																	
6. Malfunction of main P.C. board  5085Q	<p>With connector P17 (M-MOTOR) inserted into the main P.C. board, turn on the power and then measure the voltages between the pins at the cord-side connector.</p> <p>OK if the voltages are as shown in the table below.</p> <table border="1"> <thead> <tr> <th colspan="2">Pin Nos.</th> <th rowspan="2">Normal voltage</th> </tr> <tr> <th>+ side</th> <th>- side</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>3</td> <td>+5V</td> </tr> <tr> <td>2</td> <td>4</td> <td>+5V</td> </tr> <tr> <td>6</td> <td>5</td> <td>+24V</td> </tr> <tr> <td>7</td> <td>5</td> <td>+24V</td> </tr> </tbody> </table> <p>After measuring, turn off the power.</p>	Pin Nos.		Normal voltage	+ side	- side	1	3	+5V	2	4	+5V	6	5	+24V	7	5	+24V	Main P.C. board
Pin Nos.		Normal voltage																	
+ side	- side																		
1	3	+5V																	
2	4	+5V																	
6	5	+24V																	
7	5	+24V																	
7. Malfunction of panel P.C. board	<p>Check that connector P1 (PANEL) is inserted into the main P.C. board, and that connector CN2 (MAIN) is inserted into the panel P.C. board.</p>	Panel P.C. board Panel harness																	

8. ELECTRICAL MECHANISM

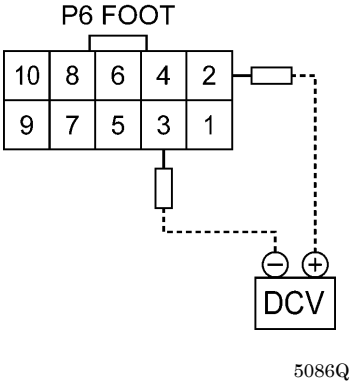
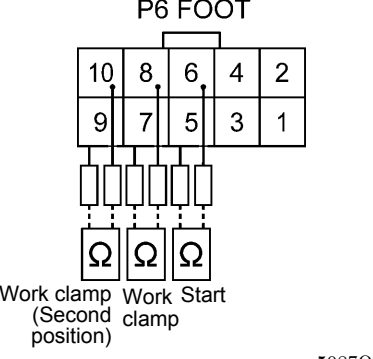
Problem #2 When the power is turned on, nothing is displayed in the PROGRAM No. display or the menu display.		
Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
Control program does not operate.	Insert a CF card containing the control program, turn on the power switch and update the program version. (Refer to "3-11. Updating the control program".)	Main P.C. board

Problem #3 When the power is turned on, an error code is displayed.		
Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
1. If [E025] or [E035] is displayed, the foot switch is still depressed.	1) Check if the foot switch is still depressed. 2) Check if there is a harness short-circuit. 3) Check that connector P6 (FOOT) is inserted into the main P.C. board.	Treadle unit Two-pedal foot switch
2. If [E055] is displayed, there is a malfunction of the machine head switch.	1) Check that the machine head switch is OFF. 2) Check if there is a harness short-circuit. 3) Check that connector P9 (HEAD-SW) is inserted into the main P.C. board.	Machine head switch
3. If [E065] is displayed, one of the keys on the operation panel is still depressed.	Check that connector P1 (PANEL) is inserted into the main P.C. board, and that connector CN2 (MAIN) is inserted into the panel P.C. board.	Panel P.C. board Panel harness
4. If [E403] is displayed, there is a poor connection between the main P.C. board and the PMD P.C. board.	1) Check that connector P17 (M-MOTOR) is inserted into the main P.C. board, and that connector P6 (MAIN) is inserted into the power supply motor P.C. board. 2) Check if there is a harness short-circuit.	Harness Power supply motor P.C. board Main P.C. board
5. If [E401] is displayed, there is a poor connection between the main P.C. board and the power supply motor P.C. board.	1) Check that connector P1 (MAIN) is inserted into the power supply motor P.C. board. 2) Check if there is a harness short-circuit.	Main P.C. board
6. If [E450] or [E452] is displayed, the machine head memory cannot be verified.	1) Check that connector P3 (HEAD-M) is inserted into the power supply motor P.C. board. 2) Check if there is a harness short-circuit.	Machine head memory
7. If [E700] is displayed, there is an abnormal rise in the power supply voltage.	1) Check that the power supply voltage at the wall outlet is within the range of the specification voltage $\pm 10\%$. 2) Refer to check items #1-2 and #1-3.	
8. If [E705] is displayed, there is an abnormal drop in the power supply voltage.	1) Check that the power supply voltage at the wall outlet is within the range of the specification voltage $\pm 10\%$. 2) Refer to check items #1-2 and #1-3.	
9. If [E740] is displayed, there is a malfunction of the cooling fan.	1) Check if there are any thread scraps blocking the cooling fan. 2) Check that connector P22 (FAN) is inserted into the main P.C. board.	DC fan motor assembly

Problem #4 Panel keys do not work.

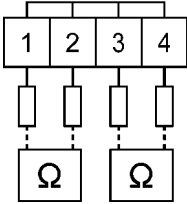
Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
Malfunction of panel P.C. board	Check that connector P1 (PANEL) is inserted into the main P.C. board, and that connector CN2 (MAIN) is inserted into the panel P.C. board.	Panel P.C. board Panel harness

Problem #5 The work clamp does not return to the home position when the foot switch is depressed.

Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
1. Malfunction of treadle unit 	<p>With connector P6 (FOOT) inserted into the main P.C. board, turn on the power and then measure the voltages between pins 2-3 at the cord-side connector. (No. 2 +, No. 3 -)</p> <p>OK if the voltage is approximately 2 V at neutral and approximately 4 V when the foot switch is depressed as far as it will go.</p>	Treadle unit
2. Malfunction of two-pedal foot switch 	<p>Disconnect connector P6 (FOOT) from the main P.C. board, and check the continuity between pins 5-6, 7-8 and 8-9 at the cord-side connector.</p> <p>OK if normally $\infty \Omega$, and 0 Ω when the foot switch is depressed.</p>	Foot switch Foot switch cord assembly

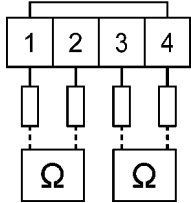
Problem #6 Home position is incorrect.

Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
Incorrect home position adjustment	Switch to home position adjustment mode, and adjust the position of the home position dog. (Refer to "7-20. Adjusting the home position".)	

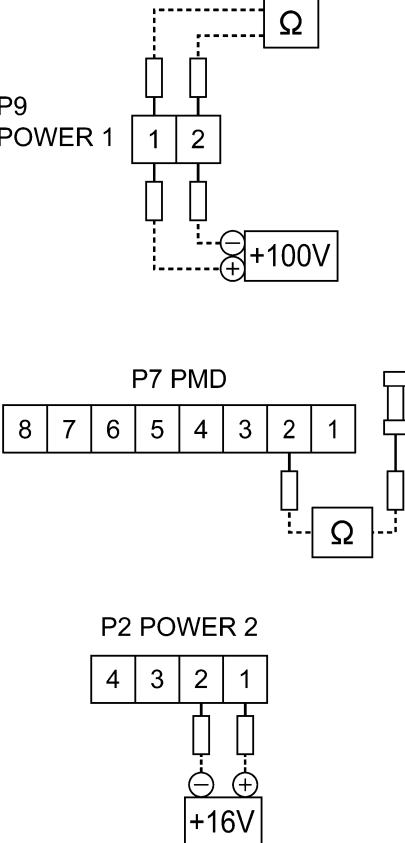
Problem #7 When the foot switch is depressed, an error code is displayed.		
Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
1. If the X feed moves slightly and then [E200] is displayed, there is a malfunction of the encoder.	1) Check that connector P20 (X-ENC) is inserted into the main P.C. board. 2) Check the encoder input while referring to "2-8. Input checking method".	Pulse motor X assembly
2. If the X feed moves and then [E200] is displayed, there is a malfunction of the X home position sensor.	1) Check that connector P8 (SENSOR1) is inserted into the main P.C. board. 2) Check the X home position sensor input while referring to "2-8. Input checking method". 3) If a metallic object is brought close to the X home position sensor and the LED inside the sensor does not illuminate, there is a malfunction of the sensor. 4) If it illuminates, the home position dog is incorrectly adjusted. Switch to home position adjustment mode, and adjust the position of the home position dog. (Refer to "7-20. Adjusting the home position".)	X home position sensor
3. If the feed mechanism does not move and [E200] is displayed, there is a malfunction of the pulse motor or cord. <div style="text-align: center;"> <p>P10 XPM</p>  <p>4885Q</p> </div>	1) Disconnect connector P10 (XPM) from the PMD P.C. board, and measure the resistance between pins 1-2 and 3-4 at the cord-side connector. OK if 2-3 Ω After measuring, insert P10. 2) If 1) is OK, there is a malfunction of the PMD P.C. board.	Pulse motor assembly PMD P.C. board

Problem #8 When the foot switch is depressed, an error code is displayed.		
Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
1. If the Y feed moves slightly and then [E210] is displayed, there is a malfunction of the encoder.	1) Check that connector P4 (Y-ENC) is inserted into the main P.C. board. 2) Check the encoder input while referring to "2-8. Input checking method".	Pulse motor Y assembly
2. If the Y feed moves and then [E210] is displayed, there is a malfunction of the Y home position sensor.	1) Check that connector P8 (SENSOR1) is inserted into the main P.C. board. 2) Check the Y home position sensor input while referring to "2-8. Input checking method". 3) If a metallic object is brought close to the Y home position sensor and the LED inside the sensor does not illuminate, there is a malfunction of the sensor. 4) If it illuminates, the home position dog is incorrectly adjusted. Switch to home position adjustment mode, and adjust the position of the home position dog. (Refer to "7-20. Adjusting the home position".)	Y home position sensor

Problem #8 When the foot switch is depressed, an error code is displayed.

Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
<p>3. If the feed mechanism does not move and [E210] is displayed, there is a malfunction of the pulse motor or cord.</p> <p>P8 YPM</p>  <p>4886Q</p>	<p>1) Disconnect connector P8 (YPM) from the PMD P.C. board, and measure the resistance between pins 1-2 and 3-4 at the cord-side connector. OK if 2-3 Ω After measuring, insert P8.</p> <p>2) If 1) is OK, there is a malfunction of the PMD P.C. board.</p>	<p>Pulse motor Y assembly</p> <p>PMD P.C. board</p>

Problem #9 When the foot switch is depressed, an error code is displayed.

Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
<p>1. If the work clamp does not operate and [E300] is displayed, there is a blown fuse.</p>	<p>Remove fuse F2 from the power supply motor P.C. board and check the continuity. OK if continuity (If there is no continuity, carry out the inspections in 2.)</p>	<p>Fuse 6A-250V</p>
<p>2. If the work clamp does not operate and [E300] is displayed, there is a malfunction of the PMD P.C. board or of the power supply motor P.C. board.</p>  <p>4884Q</p>	<p>1) Disconnect connector P9 (POWER1) from the PMD P.C. board and measure the resistance between pins 1-2 at connector P9. OK if $\infty \Omega$; if 0 Ω, there is a malfunction of the PMD P.C. board.</p> <p>2) Measure the resistance between the fuse F2 terminal that is close to P6 (MAIN) and pin 2 of connector P7 (PMD) on the power supply motor P.C. board. (D10 check) OK if $\infty \Omega$</p> <p>3) Disconnect connector P9 (POWER1) from the PMD P.C. board, and then measure the voltage between pins 1-2 of the cord-side connector. OK if approx. +100 V After measuring, turn off the power, wait 5 minutes or more and then insert P9.</p> <p>4) Disconnect connector P2 (POWER2) from the PMD P.C. board, and then measure the voltage between pins 1-2 of the cord-side connector. OK if approx. +16 V After measuring, turn off the power, wait 5 minutes or more and then insert P2.</p> <p>5) Check that connector P1 (MAIN) is inserted into the PMD P.C. board.</p>	<p>PMD P.C. board or power supply motor P.C. board</p>

8. ELECTRICAL MECHANISM

Problem #9 When the foot switch is depressed, an error code is displayed.		
Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
3. If the work clamp moves slightly and then [E300] is displayed, there is a malfunction of the encoder.	1) Check that connector P5 (P-ENC) is inserted into the main P.C. board. 2) Check the encoder input while referring to "2-8. Input checking method".	Pulse motor P assembly
4. If the work clamp operates and [E300] is displayed, there is a malfunction of the work clamp home position sensor.	1) Check that connector P8 (SENSOR1) is inserted into the main P.C. board. 2) Check the work clamp home position sensor input while referring to "2-8. Input checking method". 3) If a metallic object is brought close to the work clamp home position sensor and the LED inside the sensor does not illuminate, there is a malfunction of the sensor. 4) If it illuminates, the home position dog is incorrectly adjusted. Switch to home position adjustment mode, and adjust the position of the home position dog. (Refer to "7-20. Adjusting the home position".)	Work clamp home position sensor
5. If the work clamp does not move and [E300] is displayed, there is a malfunction of the pulse motor or cord. <div data-bbox="236 925 426 1171" data-label="Diagram"> <p>P3 PPM</p> </div> <p>4888Q</p>	1) Disconnect connector P3 (PPM) from the PMD P.C. board, and measure the resistance between pins 1-2 and 3-4 at the cord-side connector. OK if 2-3 Ω After measuring, insert P3. 2) If 1) is OK, there is a malfunction of the PMD P.C. board.	Pulse motor P assembly PMD P.C. board

Problem #10 CF media indicator does not illuminate.		
Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
1. Incorrectly inserted	1) Check the insertion direction of the CF card. (The side with the projection should be at the left.) 2) Check the insertion of the CF card.	
2. CF card incorrectly formatted.	Check the format of the CF card. (Use 16-sector formatting.)	
3. Malfunction of CF card	Use a computer to check whether the contents of the CF card can be read.	

Problem #11 Work clamp does not rise.		
Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
1. Incorrect work clamp home position adjustment	Adjust the home position while referring to "7-20. Adjusting the home position".	
2. Incorrect mechanism adjustment	Check if the movement of the work clamp arm is stiff.	Work clamp arm assembly

Problem #12 Work clamp does not drop.		
Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
1. Incorrect work clamp home position adjustment	1) Adjust the home position while referring to "7-20. Adjusting the home position". 2) Check if the thread wiper or work clamp are touching something else.	
2. Incorrect mechanism adjustment	Check if the movement of the work clamp arm is stiff.	Work clamp arm assembly

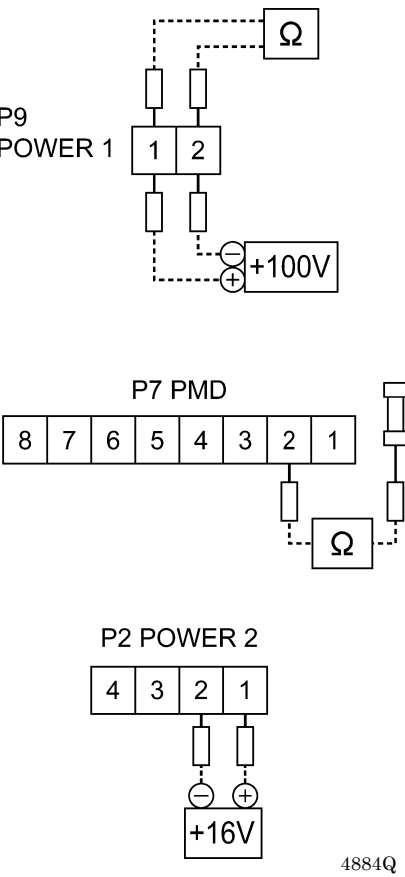
Problem #13 TEST indicator does not illuminate when the TEST key is pressed.		
Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
1. Malfunction of panel P.C. board	Check that connector P1 (PANEL) is inserted into the main P.C. board, and that connector CN2 (MAIN) is inserted into the panel P.C. board.	Panel P.C. board Panel harness
2. Malfunction of main P.C. board	Replace the main P.C. board.	Main P.C. board

Problem #14 The feed mechanism does not move one stitch at a time during test feed.		
Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
1. Malfunction of foot switch or cord	Refer to inspection #5.	
2. Incorrect memory switch setting	1) Set memory switch No. 200 to OFF. 2) Set memory switch No. 252 to OFF.	

Problem #15 Feed mechanism does not move fast during test feed.		
Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
Malfunction of foot switch or cord	Refer to inspection #5.	

Problem #16 Feed mechanism does not follow program during test feed.		
Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
Malfunction of foot switch or cord	Refer to inspection #5.	

Problem #17 Intermittent presser foot does not drop during sewing.		
Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
1. If the presser foot does not operate and [E300] is displayed, there is a blown fuse.	Remove fuse F2 from the power supply motor P.C. board and check the continuity. OK if continuity (If there is no continuity, carry out the inspections in 2.)	Fuse 6A-250V

Problem #17 Intermittent presser foot does not drop during sewing.		
Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
<p>2. If the presser foot does not operate and [E300] is displayed, there is a malfunction of the PMD P.C. board or of the power supply motor P.C. board.</p>  <p>P9 POWER 1</p> <p>P7 PMD</p> <p>P2 POWER 2</p> <p>4884Q</p>	<ol style="list-style-type: none"> 1) Disconnect connector P9 (POWER1) from the PMD P.C. board and measure the resistance between pins 1-2 at connector P9. OK if $\infty \Omega$; if 0Ω, there is a malfunction of the PMD P.C. board. 2) Measure the resistance between the fuse F2 terminal that is close to P6 (MAIN) and pin 2 of connector P7 (PMD) on the power supply motor P.C. board. (D10 check) OK if $\infty \Omega$ 3) Disconnect connector P9 (POWER1) from the PMD P.C. board, and then measure the voltage between pins 1-2 of the cord-side connector. OK if approx. +100 V After measuring, turn off the power, wait 5 minutes or more and then insert P9. 4) Disconnect connector P2 (POWER2) from the PMD P.C. board, and then measure the voltage between pins 1-2 of the cord-side connector. OK if approx. +16 V After measuring, turn off the power, wait 5 minutes or more and then insert P2. 5) Check that connector P1 (MAIN) is inserted into the PMD P.C. board. 	<p>PMD P.C. board, or power supply motor P.C. board</p>
<p>3. If the presser foot moves slightly and then [E300] is displayed, there is a malfunction of the encoder.</p>	<ol style="list-style-type: none"> 1) Check that connector P5 (P-ENC) is inserted into the main P.C. board. 2) Check the encoder input while referring to "2-8. Input checking method". 	<p>Pulse motor P assembly</p>
<p>4. If the presser foot operates and [E300] is displayed, there is a malfunction of the work clamp home position sensor.</p>	<ol style="list-style-type: none"> 1) Check that connector P8 (SENSOR1) is inserted into the main P.C. board. 2) Check the work clamp home position sensor input while referring to "2-8. Input checking method". 3) If a metallic object is brought close to the work clamp home position sensor and the LED inside the sensor does not illuminate, there is a malfunction of the sensor. 4) If it illuminates, the home position dog is incorrectly adjusted. Switch to home position adjustment mode, and adjust the position of the home position dog. Refer to "7-20. Adjusting the home position". 	<p>Work clamp home position sensor</p>

Problem #17 Intermittent presser foot does not drop during sewing.

Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
5. If the presser foot does not move and [E300] is displayed, there is a malfunction of the pulse motor or cord. <div style="text-align: center;"> <p>P3 PPM</p> </div> 4888Q	1) Disconnect connector P3 (PPM) from the PMD P.C. board, and measure the resistance between pins 1-2 and 3-4 at the cord-side connector. OK if 2-3 Ω After measuring, insert P3. 2) If 1) is OK, there is a malfunction of the PMD P.C. board.	Pulse motor P assembly PMD P.C. board

Problem #18 Sewing machine does not operate during sewing and [E120] is displayed.

Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
1. Malfunction of sewing machine motor cord	Check connector P4 (UVW) of the power supply motor P.C. board and the sewing machine motor connector.	Motor cable
2. If the fuse (F1) on the power supply motor P.C. board is blown, there is a malfunction of the main P.C. board.	1) If the fuse (F1) is blown, check the resistance values between all pins of the connector P4 (UVW) and the pins of the fuse ($\infty \Omega$) and replace the fuse. 2) If the fuse blows again, replace the power supply motor P.C. board.	Power supply motor P.C. board
3. Sewing machine motor overheats and the thermostat inside the motor operates when the sewing machine is operated at short cycle.	1) Turn off the power and let the sewing machine stand for 30 minutes. 2) Turn the power back on; OK if operation is normal. Avoid repeated sewing of sewing data that is less than 15 stitches.	Motor cable

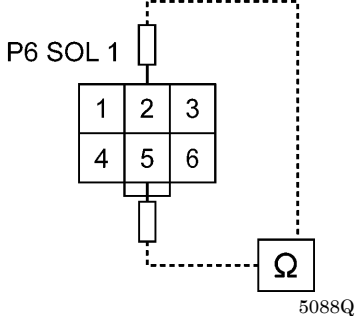
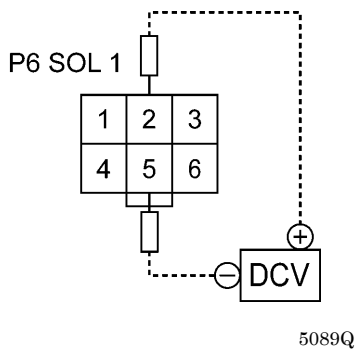
8. ELECTRICAL MECHANISM

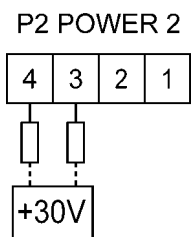
Problem #19 An error code is displayed after the sewing machine operates.		
Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
1. If [E120], [E121] or [E130] is displayed after the sewing machine operates, there is a malfunction of the synchronizer, interference is causing operating problems, or the sewing machine is incorrectly adjusted.	<ol style="list-style-type: none"> 1) Check that connector P5 (SYNC) is connected to the power supply motor P.C. board and that the synchronizer is connected. 2) Check the synchronizer input while referring to "2-8. Input checking method". OK if the signal turns on and off. 3) Turn the pulley by hand and check that it turns smoothly. 4) Check that connector P17 (M_MOTOR) is connected to the main P.C. board and that connector P6 (MAIN) is connected to the power supply motor P.C. board. 5) Check the harness between connector P17 (M_MOTOR) of the main P.C. board and connector P6 (MAIN) of the power supply motor P.C. board. 6) Check that the ground wire is connected to a secure ground and that there is no equipment nearby that is generating strong electrical interference. 7) If [E121] is displayed when the sewing machine stops: <ul style="list-style-type: none"> • Check if the thread trimming solenoid is operating. • Adjust the thread trimming mechanism. 	Motor assembly CCD-430D
2. If [E150] is displayed after the sewing machine operates, the motor is abnormally overheating.	<ol style="list-style-type: none"> 1) Turn off the power and let the sewing machine stand for 30 minutes. 2) Turn the power back on; OK if operation is normal. 3) If the area around the motor is not hot, carry out the steps for [E121]. <p>Avoid repeated sewing of sewing data that is less than 15 stitches.</p>	

Problem #20 Sewing is incorrect.		
Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
1. Malfunction of synchronizer	Refer to inspection #19.	
2. If uneven seams occur, there is a malfunction of the pulse motor or the mechanism is incorrectly adjusted.	<ol style="list-style-type: none"> 1) Refer to inspection #7-3. 2) If uneven seams are occurring because the work clamp pressure is too weak, adjust the work clamp lift amount while referring to "7-14. Adjusting the work clamp lift amount". 3) If there is play in the feed mechanism, adjust the feed mechanism. 	

Problem #21 Thread is not trimmed.		
Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
1. Incorrect mechanism adjustment	Adjust the thread trimming mechanism while refer to "7-17. Adjusting the thread trimming cam position". (If it is clear that the thread trimming mechanism is not operating, carry out inspections 2. and 3. below.)	
2. Poor connector contact	Check that connector P1 (MAIN) is inserted into the PMD P.C. board.	
3. Malfunction of thread trimming solenoid <div style="text-align: center;"> P6 SOL 1 4889Q </div>	Disconnect connector P6 (SOL1) from the PMD P.C. board, and measure the resistance between pins 3-6 of the cord-side connector. OK if 6 – 8 Ω	Thread trimming solenoid
4. Malfunction of tension release solenoid/digital tension <div style="text-align: center;"> P7 SOL 2 4890Q </div>	Disconnect connector P7 (SOL2) from the PMD P.C. board, and measure the resistance between pins 1-2 of the cord-side connector. OK if 6 – 8 Ω	Tension release solenoid/ digital tension solenoid
5. Malfunction of PMD P.C. board <div style="text-align: center;"> P6 SOL 1 P7 SOL 2 4891Q </div>	1) With connector P6 (SOL1) connected to the PMD P.C. board, turn on the power and carry out sewing, and measure the voltage between pins 3-6 of connector P6 (SOL1). OK if voltage is output momentarily at the sewing end. 2) With connector P7 (SOL2) connected to the PMD P.C. board, turn on the power and carry out sewing, and measure the voltage between pins 1-2 of connector P7 (SOL2). OK if voltage is output momentarily at the sewing end.	PMD P.C. board

8. ELECTRICAL MECHANISM

Problem #22 Thread wiper does not operate.		
Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
1. Incorrect mechanism adjustment	Adjust the thread wiper while referring to "7-11. Adjusting the thread wiper". (If it is clear that the thread wiper mechanism is not operating, carry out inspections 2. and 3. below.)	
2. Poor connector contact	Check that connector P1 (MAIN) is inserted into the PMD P.C. board.	
3. Malfunction of thread wiper solenoid	Disconnect connector P6 (SOL1) from the PMD P.C. board, and measure the resistance between pins 2-5 of the cord-side connector. OK if approximately 4 Ω	Thread wiper solenoid
		
4. Malfunction of PMD P.C. board	With connector P6 (SOL1) connected to the PMD P.C. board, turn on the power and carry out sewing, and measure the voltage between pins 2-5 of connector P6 (SOL1). OK if voltage is output momentarily at the sewing end.	PMD P.C. board
		

Problem #23 Needle does not stop in the up position ([E110] is displayed.)		
Cause	Inspection/Remedy/Adjustment	Replacement if a malfunction
1. Incorrect adjustment	Adjust while referring to "7-21. Adjusting the needle up stop home position" and "7-22. Adjusting the needle up stop position".	
2. Malfunction of synchronizer	Refer to inspection #19.	
3. Malfunction of cord	Refer to inspection #18.	
4. Malfunction of power supply motor P.C. board	With connector P2 (POWER2) connected to the PMD P.C. board, measure the voltage at the cord. OK if approximately 30 V DC between pins 3-4	Power supply motor P.C. board
		
5. Malfunction of main P.C. board		Main P.C. board
6. Malfunction of motor		Motor

9. 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 cover of the control box. Touching areas where high voltages are present can result in severe injury.

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

Switch-related errors

Code	Cause and remedy
E010	Stop switch was pressed. Press the RESET key to clear the error.
E011	Stop switch was pressed. Press the RESET key to clear the error. Press the ▼ key to move the feed mechanism so that you can continue sewing.
E015	The stop switch was still being pressed, or there is a problem with the stop switch connection. Turn off the power, and then check that connector P13 on the main P.C. board is properly connected.
E016	Problem with the stop switch connection. Turn off the power, and then check that connector P13 on the main P.C. board is properly connected.
E025	Foot switch is depressed to the 2nd step. (If using a two-pedal foot switch, the power was turned on while the start switch was still depressed, or the start switch was pressed without the work clamp being lowered.) Turn off the power and check the foot switch.
E035	Foot switch is depressed to the 1st step. (Work clamp switch if using a two-pedal foot switch) Turn off the power and check the foot switch.
E036	Work clamp motions are not set correctly. Set memory switch No. 050 or 003 correctly in accordance with the type of foot switch being used.
E050	Machine head tilting was detected after the power was turned on. Turn off the power, and then return the machine head to its original position. Check that connector P9 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 check that connector P9 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 connector P9 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.

9. TABLE OF ERROR CODES

Upper shaft motor-related errors

Code	Cause and remedy
E110	Needle up stop position error. Turn the machine pulley until the point where the error display disappears.
E111	Upper shaft did not stop at the needle up stop position when the sewing machine stopped. Turn the machine pulley until the point where the error display disappears.
E120	Needle drop signal could not be detected. Turn off the power, and then check the synchronizer connection.
E121	Thread trimming was not completed. Turn off the power, and then check if the cutting edges of the fixed knife and movable knife are damaged or worn.
E130	Sewing machine motor stopped due to a problem, or synchronizer is faulty. Turn off the power, and then turn the machine pulley and check if the sewing machine has locked up. Check that connectors P4 and P5 on the power supply motor P.C. board are properly connected. Check if the fuse (F1) is blown.
E131	Synchronizer is faulty. Turn off the power, and then check that connector P5 on the power supply motor P. C. board is properly connected.
E132	Problem detected with sewing machine motor operation. Turn off the power, and then check that connector P4 on the power supply motor P. C. board is properly connected.
E133	Sewing machine motor stopping position is incorrect. Turn off the power, and then check that connector P5 on the power supply motor P. C. board is properly connected.
E150	Sewing machine motor is overheating, or temperature sensor is faulty. Turn off the power, and then check the sewing machine motor. (When sewing data with a small number of stitches (15 stitches or less) is sewn repeatedly (short cycle operation), the upper shaft motor may overheat and the "E150" error code may be generated.)

Feed mechanism-related errors

Code	Cause and remedy
E200	X-feed motor home position cannot be detected. Problem with X-feed motor or poor X home position sensor connection. Turn off the power, and then check that connector P10 on the PMD P.C. board and connector P20 on the main P.C. board are properly connected.
E201	X-feed motor stopped due to a problem. Turn off the power, and then check if there are any problems in the X-feed direction. Check if the fuse (F2) is blown.
E202	Problem with X-feed motor or Y-feed motor home position adjustment data. Re-adjust the home position.
E210	Y-feed motor home position cannot be detected. Problem with Y-feed motor or poor Y home position sensor connection. Turn off the power, and then check that connector P8 on the PMD P.C. board and connector P4 on the main P.C. board are properly connected.
E211	Y-feed motor stopped due to a problem. Turn off the power, and then check if there are any problems in the Y-feed direction. Check if the fuse (F2) is blown.

Work clamp-related errors

Code	Cause and remedy
E300	Work clamp home position cannot be detected. Problem with work clamp motor or poor work clamp home position sensor connection. Turn off the power, and then check that connector P3 on the PMD P.C. board and connector P5 on the main P.C. board are properly connected. Check if the fuse (F2) is blown.
E301	Work clamp raised or lowered position cannot be detected. Turn off the power, and then check if there are any problems in the work clamp vertical direction.
E303	Problem with work clamp motor home position adjustment data. Re-adjust the home position.

Communication and memory-related errors

Code	Cause and remedy
E401	Connection communication error with power supply motor P. C. board detected when power was turned on. Turn off the power, and then check that connector P6 on the power supply motor P.C. board and connector P17 on the main P.C. board are properly connected.
E402	Communication error with programmer detected when power is turned on. Turn off the power, and then check that connector P7 on the main P.C. board is properly connected.
E403	Connection error with PMD P. C. board detected when power was turned on. Turn off the power, and then check that connector P1 on the PMD P.C. board is properly connected.
E410	Communication error with main P. C. board detected. Turn off the power, and then turn it back on again.
E411	Communication error with power supply motor P. C. board detected. Turn off the power, and then turn it back on again. Check if the fuse (F4) is blown.
E412	Communication error with programmer detected. Turn off the power, and then turn it back on again.
E413	Communication error with PMD P. C. board detected. Turn off the power, and then turn it back on again.
E420	No CF card is inserted.
E421	Program contents are incorrect and cannot be used, or no data. Check that the CF card or floppy disk contains data with this program number.
E422	Error occurred while reading the CF card or floppy disk. Check the data on the CF card or floppy disk.
E424	Insufficient free space on CF card. Use a different CF card.
E425	Error occurred while writing to the CF card or floppy disk. Use the specified type of CF card. Check if the floppy disk is write-protected and if it has enough free space.
E426	R/W key has not been pressed. Press the R/W key to load the data.
E427	CF card or floppy disk does not contain any data with this program number. Check the program number. Data that has already been loaded into internal memory can be used without having to press the R/W key again.
E430	Data cannot be backed up to main P.C. board. Turn off the power, and then turn it back on again.
E440	Data memory error on main P.C. board. Turn off the power, and then turn it back on again.
E450	Model selection cannot be read from the machine head memory. Turn off the power and check that connector P3 on the power supply motor P.C. board is properly connected.
E451	Data cannot be backed up to machine head memory. Turn off the power, and then turn it back on again.
E452	Machine head memory is not connected. Turn off the power and check that connector P3 on the power supply motor P.C. board is properly connected.
E474	Internal memory is full and copying is not possible. Clear the sewing data, or change the settings so that sewing data is not copied to internal memory when it is loaded (memory switch No. 466 = ON).

9. TABLE OF ERROR CODES

Data editing-related errors

Code	Cause and remedy
E500	The enlargement ratio setting caused the sewing data to extend outside the sewing area. Set the enlargement ratio again.
E501	Sewing data that exceeds the sewing machine's sewing area was loaded. Check the size of the sewing data.
E502	The enlargement ratio caused the data pitch to exceed the maximum pitch of 12.7 mm. Set the enlargement ratio again.
E510	Invalid code in sewing data. Reload the data from the CF card or floppy disk.
E511	No end code has been input into sewing data. Input an end code, or change the program number.
E512	Number of stitches exceeds allowed maximum.
E520	Extended option output number already exists. Change the extended option output number. If not using the extended option output, initialize the data to clear the extended option output data.
E530	Changing program number is prohibited.

Device-related errors

Code	Cause and remedy
E600	Upper thread breakage occurred. Thread the upper thread. Resewing is then possible.
E690	Thread nipper home position error. Turn off the power, and then clean underneath the needle plate to remove any dust and thread scraps. Check that connector P10 on the main P.C. board is properly connected.
E691	Thread nipper retract position error Check if the upper thread trailing length is too long. Turn off the power, and then clean underneath the needle plate to remove any dust and thread scraps. Check that connector P10 on the main P.C. board is properly connected.

P.C. board-related errors

Code	Cause and remedy
E700	Abnormal rise in power supply voltage. Turn off the power and check the input voltage.
E701	Abnormal rise in sewing machine 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 sewing machine motor. Turn off the power, and then check if there are any problems with the sewing machine.
E711	Abnormal current detected in X-feed motor. Turn off the power, and then check if there are any problems in the X-feed direction.
E712	Abnormal current detected in Y-feed motor. Turn off the power, and then check if there are any problems in the Y-feed direction.
E713	Abnormal current detected in work clamp motor. Turn off the power, and then check if there are any problems with the X-feed mechanism, Y-feed mechanism or work clamp lifter.
E730	External error input (AIRSW) detected. Turn off the power, and then check the air pressure.
E740	Cooling fan does not operate. Turn off the power, and then check if the cooling fan is blocked with scraps of thread. Check that connector P22 on the main P.C. board is properly connected. Check if the fuse (F6) is blown.

If an error code that is not listed above appears, contact the place of purchase.

10. 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





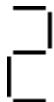


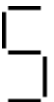








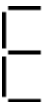
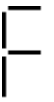












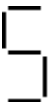
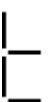





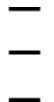
Turn off the power switch and disconnect the power cord before carrying out troubleshooting.
If the foot switch is depressed by mistake, the sewing machine might start operating and injury could result.

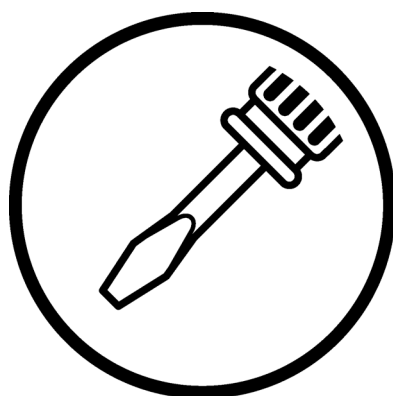
Problem	Cause	Remedy	Reference
Work clamp does not lift.	Work clamp moves stiffly.	Apply a suitable amount of grease to the sliding parts of the work clamp.	
	Air tube of presser lifter cylinder is bent or damaged (Pneumatic specifications).	Straighten the bend in the tube or replace the tube.	
Work clamp does not drop.	Work clamp moves stiffly.	Apply a suitable amount of grease to the sliding parts of the work clamp.	
	Air tube of presser lifter cylinder is bent or damaged (Pneumatic specifications).	Straighten the bend in the tube or replace the tube.	
Work clamp lift amount is incorrect.	Work clamp lift amount setting at operation panel is incorrect (Solenoid specifications).	Change the work clamp lift amount setting.	Instruction manual
	Work clamp arm lever position is incorrect. (Pneumatic specifications)	Adjust the position of the work clamp arm lever.	P. 100
Work clamp does not lift to the maximum height.	Work clamp arm stopper position is incorrect (Solenoid specifications).	Adjust the position of the stopper.	P. 85
	Cylinder joint position is incorrect. (Pneumatic specifications)	Adjust the position of the cylinder joint.	P. 85
Thread wiper does not operate correctly.	The thread wiper is obstructing the needle.	Adjust the height of the thread wiper.	P. 97
		Adjust the stroke of the thread wiper.	P. 97
	Thread wiper position is incorrect.	Adjust the stroke of the thread wiper.	P. 97
Lower thread winds to one side.	Bobbin winder tension assembly height is incorrect.	Adjust the height of the bobbin winder tension assembly.	Instruction manual
Lower thread winding amount is incorrect.	Bobbin presser position is incorrect.	Adjust the position of the bobbin presser.	Instruction manual
Thread slips out of the needle.	Stitches being skipped at the sewing start.	Refer to "Skipped stitches occur".	P. 142
	Upper thread length is irregular.	Adjust the sub-tension.	Instruction manual
	Position of shuttle race thread guide is incorrect	Adjust the position of the shuttle race thread guide.	P. 92

Problem	Cause	Remedy	Reference
Upper thread breaks.	Upper thread tension is too strong.	Adjust the upper thread tension.	P. 89
	Needle is incorrectly installed.	Install the needle correctly.	Instruction manual
	Thread is too thick for the needle.	Select a thread that matches the needle.	P. 89
	Thread take-up spring tension and height are incorrect.	Adjust the tension and height of the thread take-up spring.	P. 90
	Damage or burring of the rotary hook, needle hole plate or needle.	Repair or replace the problem part.	
	Thread breaking from heat (Synthetic thread)	Use a cooling tank.	Instruction manual
	Thread is threaded incorrectly.	Thread the thread correctly.	Instruction manual
Lower thread breaks.	Lower thread tension is too strong.	Adjust the lower thread tension.	P. 89
	Damage to corners of needle hole plate or bobbin case.	Repair or replace the problem part.	
Skipped stitches occur.	Clearance between needle and rotary hook tip is too great.	Adjust the needle clearance.	P. 92
	Needle and rotary hook timing is incorrect.	Adjust the needle bar lift amount.	P. 91
	The driver is covering the needle more than necessary.	Adjust the driver needle guard.	P. 91
	Needle is bent.	Replace the needle.	
	Needle is incorrectly installed.	Install the needle correctly.	Instruction manual
Needle is broken.	Clearance between needle and rotary hook tip is too great.	Adjust the needle clearance.	P. 92
		Adjust the needle bar lift amount.	P. 91
	Needle is bent.	Replace the needle.	
	Needle deflection	Select a needle that is suitable for the sewing conditions. Reduce the sewing speed.	P. 89
	Needle is too thin.	Select a needle that is suitable for the sewing conditions.	P. 89
Thread jamming.	Thread take-up spring tension and height are incorrect.	Adjust the tension and height of the thread take-up spring.	P. 90
	Needle and rotary hook timing is incorrect.	Adjust the needle bar lift amount.	P. 91
	Shuttle race thread guide is not separating the threads.	Adjust the position of the shuttle race thread guide.	P. 92

Problem	Cause	Remedy	Reference
Upper thread is not trimmed.	Movable knife is not cutting cleanly.	Replace with a new one.	P. 95
	Fixed knife is not cutting cleanly.	Sharpen the fixed knife or replace it with a new one.	P. 95
	Movable knife is not picking up the upper thread.	Adjust the position of the shuttle race thread guide.	P. 92
		Adjust the needle bar lift amount.	P. 91
	Movable knife is not picking up the upper thread because the last stitch is being skipped.	Refer to "Skipped stitches occur".	P. 142
	Movable knife position is incorrect.	Adjust the position of the movable knife.	P. 93 P. 94
	Sub-tension is too weak.	Turn the sub-tension nut to adjust the tension.	Instruction manual
Poor stitch finish on underside of material.	Shuttle race thread guide is not separating the threads enough.	Adjust the position of the shuttle race thread guide.	P. 92
	Incorrect tightening of the upper thread	Adjust the upper thread tension.	P. 89
	Upper thread length is irregular.	Adjust the sub-tension.	Instruction manual
Incorrect tightening of the thread	Upper thread tension is too weak.	Adjust the upper thread tension.	P. 89
	Lower thread tension is too weak.	Adjust the lower thread tension.	P. 89
	Thread take-up spring tension and height are incorrect.	Adjust the tension and height of the thread take-up spring.	P. 90
	Position of arm thread guide R is incorrect.	Adjust the position of arm thread guide R.	P. 90
Upper thread length is irregular.	Thread take-up spring tension and height are incorrect.	Adjust the tension and height of the thread take-up spring.	P. 90
	Sub-tension is too weak.	Turn the sub-tension nut to adjust the tension.	Instruction manual
	Fixed knife is not cutting cleanly.	Sharpen the fixed knife or replace it with a new one.	P. 95
Sewing machine does not operate when the power is turned on and the foot switch is depressed.	Machine head switch does not work.	Check if the machine head switch cord is disconnected.	Instruction manual
		Adjust the position of the machine head switch.	P. 88
		If the machine head switch is malfunctioning, replace it with a new one.	

11. 7-SEGMENT DISPLAY

0	1	2	3	4	5	6	7	8	9
									
A	B	C	D	E	F	G	H	I	J
									
K	L	M	N	O	P	Q	R	S	T
									
U	V	W	X	Y	Z				
									



SERVICE MANUAL

BROTHER INDUSTRIES, LTD. <http://www.brother.com/>

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Printed in Japan

BAS-311G, BAS-326G
I5060885B
2005.07. B (1)