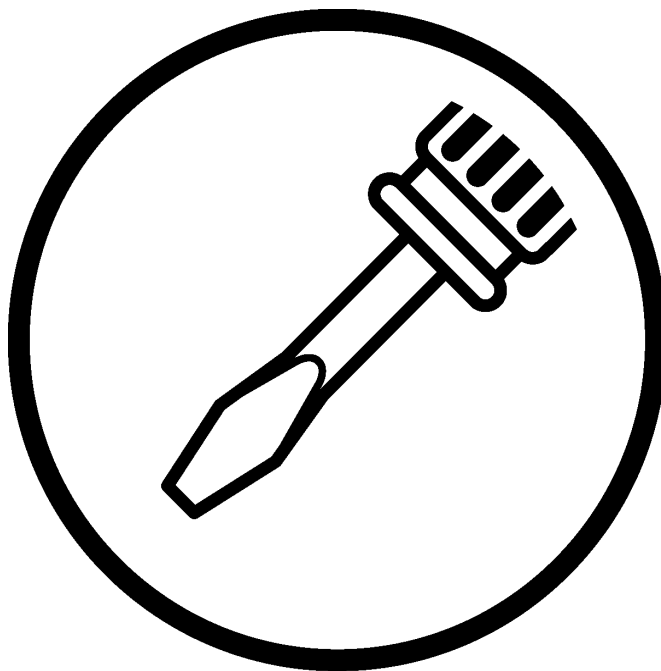


---

Please read this manual before making any adjustments.

---

DIRECT DRIVE  
PROGRAMMABLE ELECTRONIC PATTERN SEWER



This service manual is intended for BAS-342G; be sure to read the BAS-342G instruction manual before this manual.

Carefully read the "SAFETY INSTRUCTIONS" 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

|                                                                                                  |                                                                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <b>DANGER</b>  | The instructions which follow this term indicate situations where failure to follow the instructions will result in death or serious injury.                                                     |
|  <b>CAUTION</b> | 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 160 kg. Use equipment such as a crane or hoist when installing the machine head and adjusting the height of the table.

If you try to lift the machine head yourself, it may cause injuries such as back injury.



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.

In addition, do not subject the machine head to extra force while it is tilted back. If this is not observed, the machine head 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.



Use a table with a height of 84 cm or less. If the table is too high, the machine head may become unbalanced and fall down, and serious injury or damage to the sewing machine may 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.

## 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.  
In addition, do not subject the machine head to extra force while it is tilted back. If this is not observed, the machine head may become unbalanced and fall down, and serious injury or damage to the sewing machine may result.
-  If the power switch and air need 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**

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

**2**

|                                                                                                                                              |                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|                                                                                                                                              | <b>⚠ 注意</b><br>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。 |
| <b>⚠ CAUTION</b>                                                                                                                             |                                                                                      |
| Moving parts may cause injury. Operate with safety devices. Turn off main switch before threading, changing bobbin and needle, cleaning etc. |                                                                                      |

**3**



Be careful to avoid getting hands caught in sliding parts.

**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.

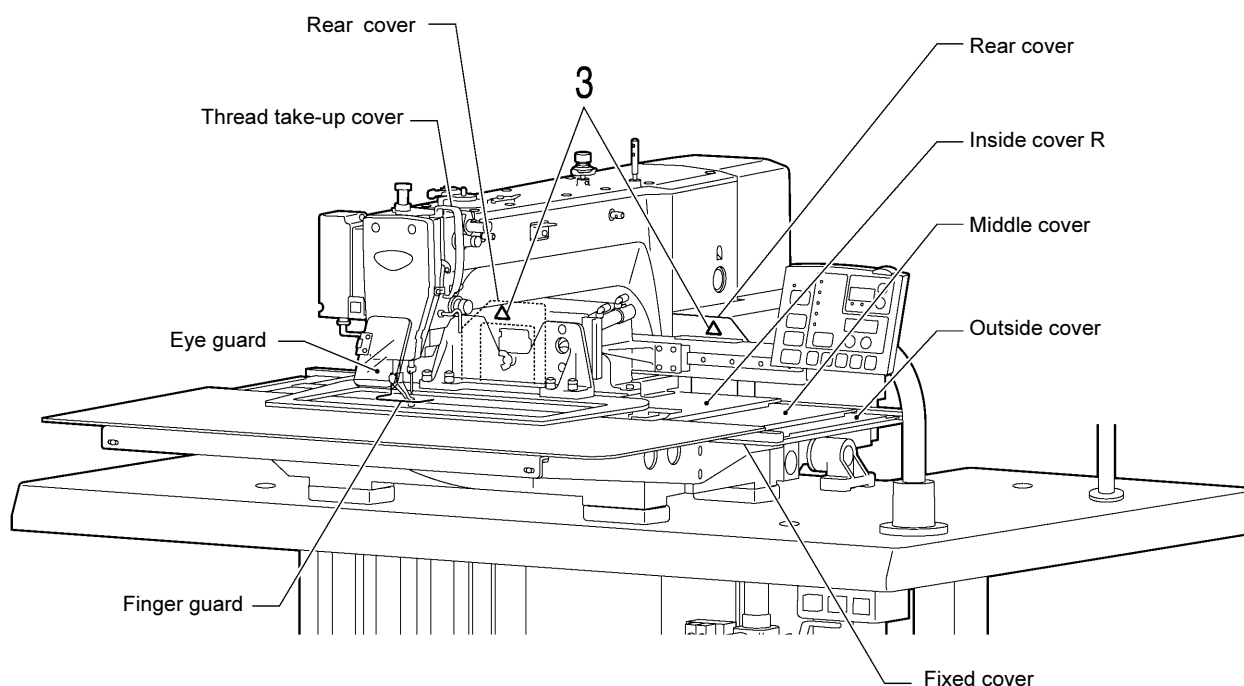
**5**



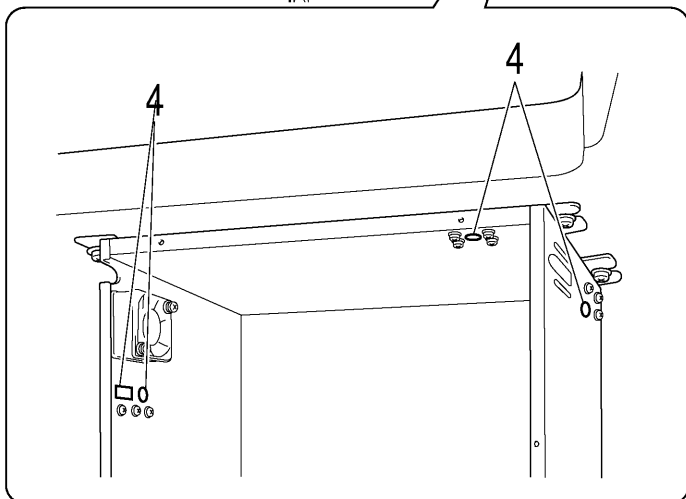
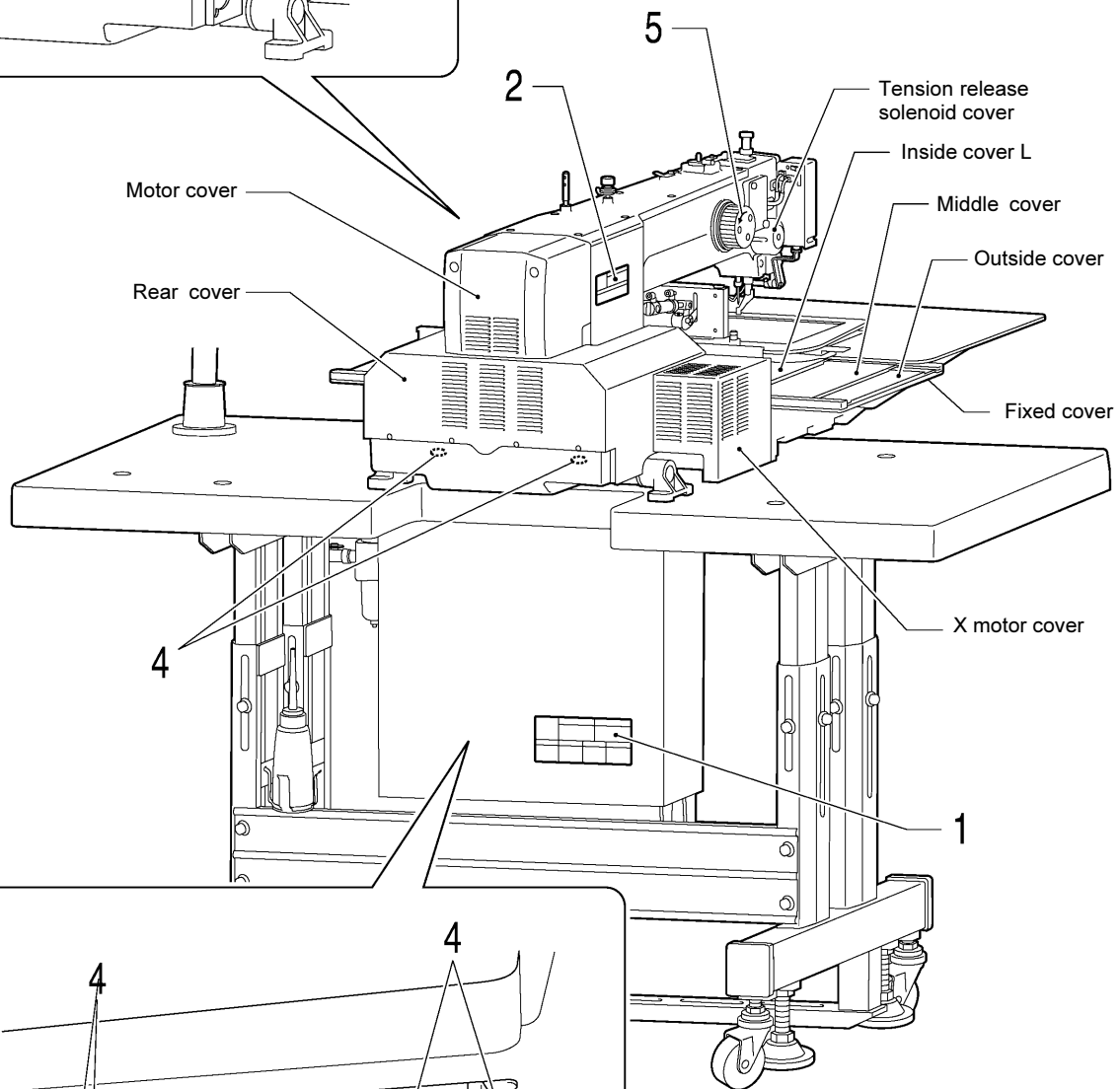
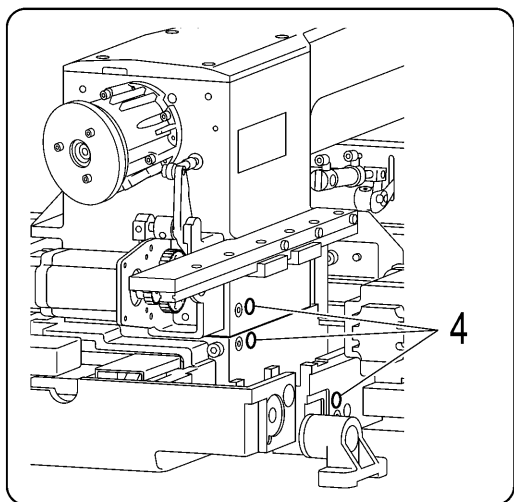
Direction of operation

Safety devices:

Devices such as eye guard, finger guard, thread take-up cover, motor cover, X motor cover, tension release solenoid cover, inside cover, outside cover, middle cover, fixed cover and rear cover



3956M



3957M

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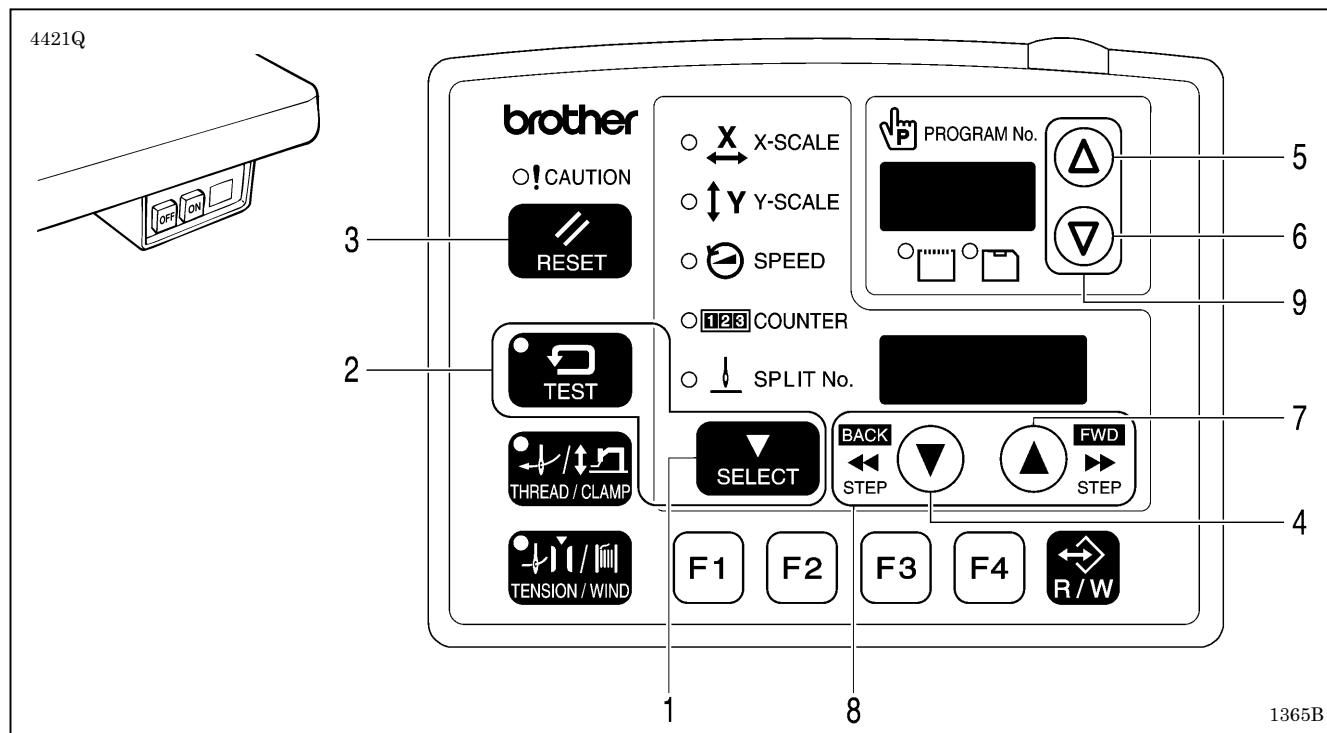
# 1. SPECIFICATIONS

|                                             |                                                                                                                              |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| 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 (X x Y)                         | Max. 300 x 200 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                      | Pneumatic method                                                                                                             |
| Work clamp height                           | Max. 30 mm                                                                                                                   |
| 2-step work clamp                           | Integrated-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 MB – 2GB)<br>[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. 160 kg, operation panel approx. 0.6 kg<br>Control box 14.2 – 16.2 kg (Differs depending on destination) |
| Power supply                                | Single-phase 220 V, Three-phase 220 V/380 V/400 V 500 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

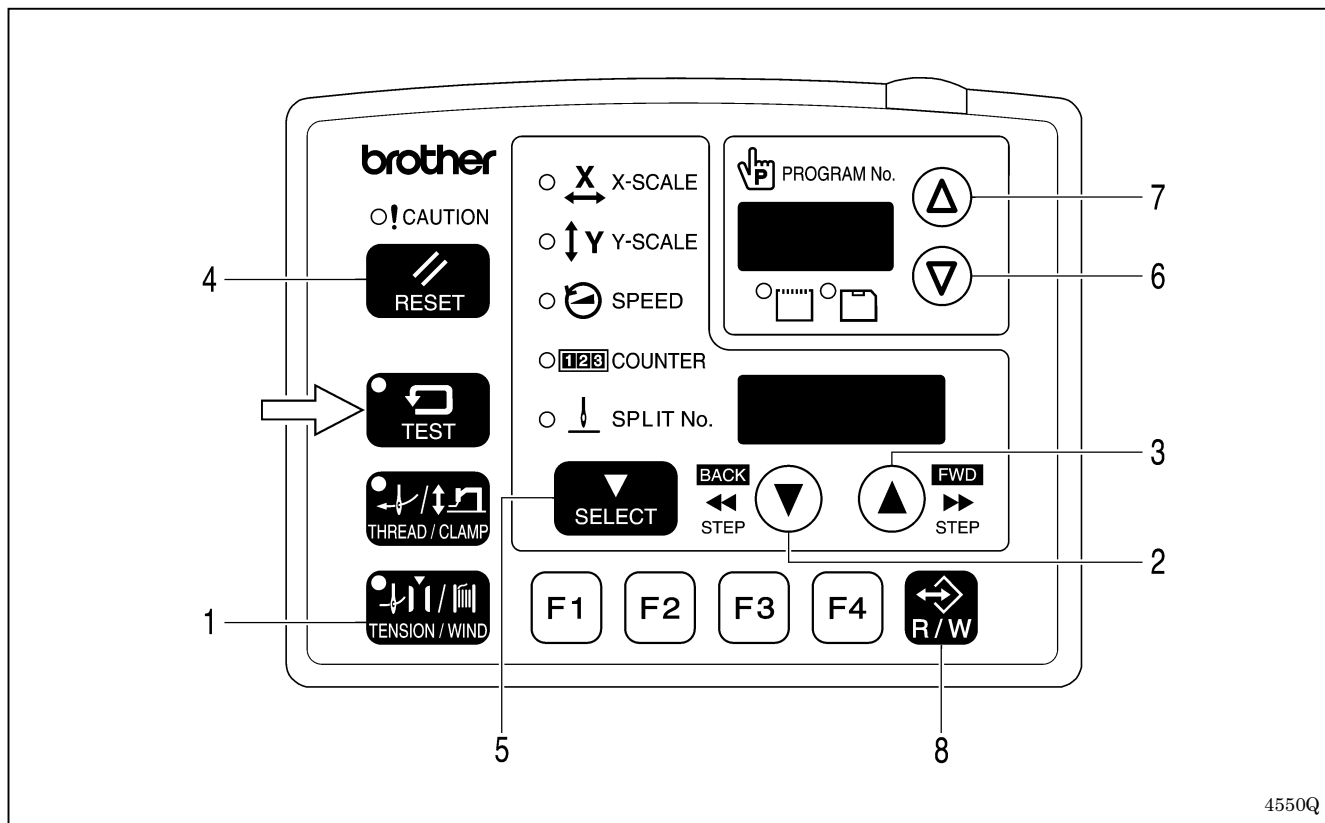
### 2-1. List of special functions when power is turned on



|   |                                                                                                                                                                                                                                                                                                                                                                            |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Memory switch setting mode (Standard)<br> +  4541Q<br>Refer to the Instruction Manual.                                                                                                               | 6 | Output checking function<br> +  4546Q<br>Refer to "2-8. Output checking method".                                                                                                                                                                                      |
| 2 | Memory switch setting mode (Advanced)<br> +  +  4542Q<br>Refer to "2-3. Memory switch setting method (Advanced)". | 7 | Software version display function<br> +  4547Q<br>Refer to "2-9. Software version checking method".                                                                                                                                                                    |
| 3 | Data initialization function<br> +  4543Q<br>Refer to the Instruction Manual.                                                                                                                        | 8 | Home position adjustment mode<br>   +  4548Q<br>Refer to "7-20. Adjusting the home position". |
| 4 | Error log display function<br>  +  4544Q<br>Refer to "2-6. Error history checking method".                        | 9 | Needle up stop position adjustment mode<br> +  4549Q<br>Refer to "7-22. Adjusting the needle up stop position".                                                                                                                                                        |
| 5 | Input checking function<br> +  4545Q<br>Refer to "2-7. Input checking method".                                                                                                                       |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

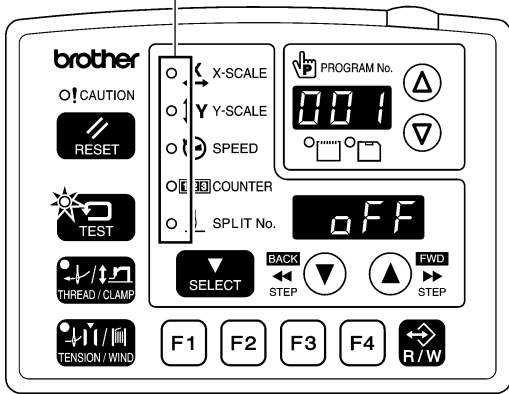
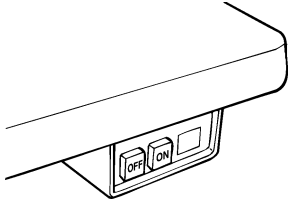
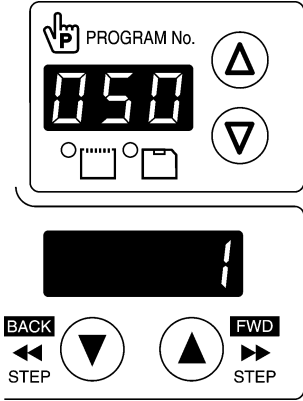
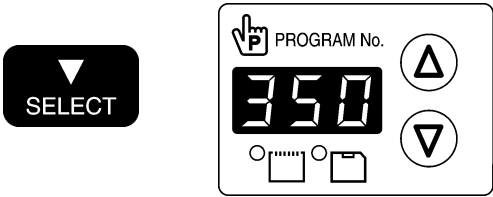
## 2-2. List of advanced functions

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



|   |                                                                                                                                                                                                                                                                                                                       |   |                                                                                                                                                                                                                                                                          |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Memory switch setting mode (Standard)<br> + <br>4489Q<br>Refer to the Instruction Manual.                                                       | 5 | User program setting mode<br> + <br>4493Q<br>Refer to the Instruction Manual.                   |
| 2 | Lower thread counter setting mode<br> + <br>4490Q<br>Refer to the Instruction Manual.                                                           | 6 | Parallel movement mode<br> + <br>4551Q<br>Refer to the Instruction Manual.                      |
| 3 | Production counter setting mode<br> + <br>4491Q<br>Refer to the Instruction Manual.                                                             | 7 | Stitch counter checking mode<br> + <br>4552Q<br>Refer to "2-5. Stitch counter checking method". |
| 4 | Production counter temporary display function<br><b>When SPEED indicator is illuminated</b><br> + <br>4492Q<br>Refer to the Instruction Manual. | 8 | CF data read/write mode<br> + <br>4553Q<br>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<br/>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"> <li>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.</li> </ul> <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 <math>\Delta</math> or <math>\nabla</math> key to select the memory switch number.</p> <p>Press the <math>\blacktriangle</math> or <math>\blacktriangledown</math> key to change the setting value.</p> <p>While pressing the SELECT key, press the <math>\Delta</math> or <math>\nabla</math> key.</p> <ul style="list-style-type: none"> <li>The numbers of memory switches that have been changed from default settings will appear in order.</li> <li>If no memory switches have been changed from their default settings, the display will not change and the buzzer will beep twice.</li> </ul> <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"> <li>The changes will be memorized and the sewing machine will switch to home position detection standby.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                            |



- 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

### Note: Regarding the term “work clamp” in the table

Normally the intermittent presser foot is lifted and dropped at the same time the work clamp is lifted and dropped.

However, the intermittent presser foot can be set not to operate by means of settings such as the setting for memory switch No. 54.

| No. | Setting value | Setting item                                                                                                                                                                                                                                                                                            | Default value |
|-----|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| 001 |               | Work clamp lift timing after sewing is completed                                                                                                                                                                                                                                                        | ON            |
|     | OFF           | Lifts at the final stitch position.                                                                                                                                                                                                                                                                     |               |
|     | ON            | Lifts after moving to the sewing start position.                                                                                                                                                                                                                                                        |               |
| 002 |               | Integrated-type work clamp drop operation                                                                                                                                                                                                                                                               | 0             |
|     | 0             | Work clamp dropping in 1 step                                                                                                                                                                                                                                                                           |               |
|     | 1             | Work clamp dropping in two steps (*1)                                                                                                                                                                                                                                                                   |               |
|     | 2             | Do not use this setting.                                                                                                                                                                                                                                                                                |               |
| 100 |               | Sewing start speed                                                                                                                                                                                                                                                                                      | OFF           |
|     | OFF           | The sewing speed for the first 1 to 5 stitches is set by memory switch numbers 151 to 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 start switch is depressed, and it continues automatically until the final stitch.                                                                                                                                                                                             |               |
|     | ON            | Test feeding <ul style="list-style-type: none"> <li>Is carried out one stitch at a time each time the work clamp switch is depressed</li> <li>Is carried out continuously while the start switch is depressed</li> <li>Is carried out one stitch at a time when the pulley is turned by hand</li> </ul> |               |
| 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) (*2)                                                                                                                                                                                                                                                               | 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)                                                                                                                                                                                                                                                         |               |
|     | 2             | Independent split                                                                                                                                                                                                                                                                                       |               |

\*1 The position of the work clamp stopper must be set. (Refer to the Instruction Manual.)

\*2 The mm display may differ slightly from the actual sewing size.

## Work clamp settings

| No. | Setting value | Setting item                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Default value |
|-----|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| 050 |               | Work clamp operating mode (*3)                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 3             |
|     | 1             | [Standard single pedal] Do not use this setting. (*4)                                                                                                                                                                                                                                                                                                                                                                                                                          |               |
|     | 2             | [Single pedal with no automatic work clamp lifter] Do not use this setting. (*4)                                                                                                                                                                                                                                                                                                                                                                                               |               |
|     | 3             | [Standard double pedal]<br>Work clamp lifts automatically, and drops when the work clamp switch is depressed.<br>* Dropping in one step or two steps can be set by means of memory switch No. 002.                                                                                                                                                                                                                                                                             |               |
|     | 4             | [Double pedal with no automatic work clamp lifter]<br>Work clamp lifts while work clamp switch is being depressed.                                                                                                                                                                                                                                                                                                                                                             |               |
|     | 5             | [Work clamp → intermittent presser foot 2-step clamping]<br>When the work clamp switch is depressed to the 1st step, the work clamp is lowered, and when it is depressed to the 2nd step, the intermittent presser foot is lowered. (Lifting is carried out simultaneously.)                                                                                                                                                                                                   |               |
|     | 6             | Do not use this setting.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |               |
|     | 7             | [Forward/reverse pedal]<br>When the start switch is depressed, the work clamp is lowered 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 is lifted.<br>* Dropping in one step or two steps can be set by means of memory switch No. 002.                                                                                                                         |               |
|     | 8             | [2-step work clamp using two presses]<br>When the work clamp switch is depressed, the work clamp drops to the intermediate position (when two-step operation is set), then drops fully, and then lifts in that order.<br>* Dropping in one step or two steps can be set by means of memory switch No. 002.                                                                                                                                                                     |               |
|     | 9             | [Standard triple pedal]<br>The left pedal lowers the work clamp to the intermediate position and the right pedal (center) lowers it all the way.<br>The start pedal (right) starts the sewing machine.<br>(If the right pedal (center) is depressed first, the work clamp will drop to the intermediate position and it will then drop fully when the left pedal is depressed. However, the speed of work clamp operation cannot be controlled, so do not use this operation.) |               |
|     | 10            | [Triple pedal with independent home detection]<br>The right pedal (center) is used exclusively for detecting the home position.<br>The left pedal raises and lowers the work clamp, and the start pedal (right) starts the sewing machine.                                                                                                                                                                                                                                     |               |
|     | 11            | [Special triple pedal with independent home detection]<br>The right pedal (center) is used exclusively for detecting the home position.<br>The left pedal moves the work clamp back and forth to the intermediate position, and when the start pedal (right) is depressed, the work clamp is lowered and the sewing machine starts.                                                                                                                                            |               |
|     | 12            | [Single pedal operation using work clamp switch]<br>When the work clamp switch is depressed to the 1st step, the work clamp is lowered, and when it is depressed to the 2nd step, the sewing machine starts.                                                                                                                                                                                                                                                                   |               |

\*3 The operating modes given here are for the integrated-type work clamp. The same settings can also be made for separate-type work clamps, but some parts and air tubes will need to be changed.

\*4 No devices are compatible with the BAS-342G.

## 2. FUNCTION SETTINGS

| No. | Setting value | Setting item                                                                                                                                                                                                              | Default value |
|-----|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| 051 |               | Work clamp operation before home position detection                                                                                                                                                                       | ON            |
|     | OFF           | Work clamp cannot be raised or lowered before home position detection (*5)                                                                                                                                                |               |
|     | ON            | Work clamp can be raised and lowered before home position is detected                                                                                                                                                     |               |
| 052 |               | Work clamp operation during split programs                                                                                                                                                                                | OFF           |
|     | OFF           | Work clamp is raised automatically when sewing pauses due to a split program                                                                                                                                              |               |
|     | ON            | Work clamp is raised if the work clamp 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 lowering timing                                                                                                                                                                                 | 0             |
|     | 0             | Intermittent presser foot is lowered when the work clamp switch is depressed, but it is not lowered at the feed retract position.                                                                                         |               |
|     | 1             | Intermittent presser foot is lowered when the work clamp switch is depressed.                                                                                                                                             |               |
|     | 2             | Intermittent presser foot is lowered at the sewing start, regardless of the work clamp switch operation.                                                                                                                  |               |
| 055 |               | Work clamp signal valve special output for pneumatic-type work clamp                                                                                                                                                      | 0             |
|     | 0             | Disabled                                                                                                                                                                                                                  |               |
|     | 1             | Valve output is reversed for pneumatic specifications (Switch the air tube connections 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: When using a separate-type work clamp) |               |
| 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. (*5)                                                                                                                                                  |               |
| 057 |               | Work clamp operation when feed moves to sewing start position after home position is detected                                                                                                                             | ON            |
|     | OFF           | Work clamp stays lowered after home position is detected<br>Work clamp rises when the work clamp switch is depressed.                                                                                                     |               |
|     | ON            | Work clamp lifts automatically after home position is detected.<br>* 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.<br>* Disabled when memory switch No. 050 = 2 or 4.                                                                                                                      |               |
|     | ON            | Work clamp does not lift automatically at the sewing end                                                                                                                                                                  |               |
| 059 |               | Weight of work clamp                                                                                                                                                                                                      | 0             |
|     | -1            | Light (no work clamp)                                                                                                                                                                                                     |               |
|     | 0             | Standard                                                                                                                                                                                                                  |               |
|     | 1             | Heavy                                                                                                                                                                                                                     |               |

\*5 If the thread winding operation is to be carried out before home position detection, first carry out operations such as lowering the intermittent presser foot to check that the needle does not interfere with any other parts when it is being raised and lowered. In addition, if raising and lowering of the work clamp is disabled before home position detection is carried out, thread winding cannot be carried out before home position detection, regardless of the setting for memory switch No. 056.



## Sewing machine motor settings

| No. | Setting value                                                  | Setting item                                                                                                                                                                                                                                                                                                                                                                                                                | Default 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.<br>(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             |
|     | 2 - 27                                                         | (Units x100 rpm)                                                                                                                                                                                                                                                                                                                                                                                                            |               |
| 152 | 2nd stitch sewing speed at the sewing start                    |                                                                                                                                                                                                                                                                                                                                                                                                                             | 8             |
|     | 2 - 27                                                         | (Units x100 rpm)                                                                                                                                                                                                                                                                                                                                                                                                            |               |
| 153 | 3rd stitch sewing speed at the sewing start                    |                                                                                                                                                                                                                                                                                                                                                                                                                             | 12            |
|     | 2 - 27                                                         | (Units x100 rpm)                                                                                                                                                                                                                                                                                                                                                                                                            |               |
| 154 | 4th stitch sewing speed at the sewing start                    |                                                                                                                                                                                                                                                                                                                                                                                                                             | 27            |
|     | 2 - 27                                                         | (Units x100 rpm)                                                                                                                                                                                                                                                                                                                                                                                                            |               |
| 155 | 5th stitch sewing speed at the sewing start                    |                                                                                                                                                                                                                                                                                                                                                                                                                             | 27            |
|     | 2 - 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<br>(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) (*6) |                                                                                                                                                                                                                                                                                                                                                                                                                             | 0             |
|     | -15 - 0                                                        | 0: Normal needle up position: Needle bar height increases for values in the negative direction.                                                                                                                                                                                                                                                                                                                             |               |

\*6 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.

## 2. FUNCTION SETTINGS

### Feed settings

| No. | Setting value                                                                                                                         | Setting item                                                                                                           | Default value |
|-----|---------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|---------------|
| 250 | Mechanism home position return when sewing is finished                                                                                |                                                                                                                        | OFF           |
|     | OFF                                                                                                                                   | The feed plate returns to the sewing start position at the sewing end.                                                 |               |
|     | ON                                                                                                                                    | When sewing is finished, the feed plate moves via the machine home position to the sewing 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                                                                                                                                   | Normally slow, but becomes faster when the work clamp switch is depressed.                                             |               |
|     | ON                                                                                                                                    | Test feeding is at the same speed as sewing.<br>* This does not apply to checking stitch by stitch.                    |               |
| 253 | Home position detection method                                                                                                        |                                                                                                                        | OFF           |
|     | OFF                                                                                                                                   | Depress the start switch while the program number is flashing.                                                         |               |
|     | ON                                                                                                                                    | Press the special external input switch [EXIN3] while the program number is flashing. (Start switch is disabled.)      |               |
| 254 | Movement route to home position and sewing start position (*7)                                                                        |                                                                                                                        | 0             |
|     | 0                                                                                                                                     | No route specified                                                                                                     |               |
|     | 1                                                                                                                                     | Moves in the order X→Y when moving to the home position, and in the order Y→X when moving to the sewing start position |               |
|     | 2                                                                                                                                     | Moves in the order Y→X when moving to the home position, and in the order X→Y when moving to the sewing start position |               |
|     | 3                                                                                                                                     | Moves while avoiding the middle of the work clamp                                                                      |               |
| 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, this specifies 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 reference                                                                                                         |                                                                                                                        | 1             |
|     | 0                                                                                                                                     | [Feed start reference] Makes the timing uniform at the start of feed.                                                  |               |
|     | 1                                                                                                                                     | [Need 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                                                                                                                                     | This cannot be set for the BAS-342G.                                                                                   |               |
| 270 | Home position detection operation when the program is changed                                                                         |                                                                                                                        | 0             |
|     | 0                                                                                                                                     | Disabled                                                                                                               |               |
|     | 1                                                                                                                                     | Home position detection operation is disabled, but feed moves through the middle of the sewing area.                   |               |
|     | 2                                                                                                                                     | Enabled                                                                                                                |               |

\*7 Also change the settings for memory switch No. 250 and No. 270 as necessary.

## Operation panel settings

| No. | Setting value                                                   | Setting item                                                                                                                                                         | Default value |
|-----|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| 350 | Operation panel changing limitation                             |                                                                                                                                                                      | 0             |
|     | 0                                                               | No limits on changing setting values using the operation panel.                                                                                                      |               |
|     | 1                                                               | Program numbers, XY scale settings, sewing speed, lower thread counter, intermittent presser foot height and digital tension values cannot be changed.               |               |
|     | 2                                                               | Program numbers, XY scale settings, sewing speed, intermittent presser foot 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 settings 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).<br>The applicable numbers are: Setting number: 3rd digit; last 2 digits: 1 to 31 |               |
| 355 | Switching 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).<br>The applicable numbers are: 1 to 31 (*8)                                        |               |

\*8 Only enabled for independent split mode. In addition, it is disabled when the setting for memory switch No. 354 is 1 to 9.

## User program settings

| No. | Setting value                                                    | Setting item                                                           | Default value |
|-----|------------------------------------------------------------------|------------------------------------------------------------------------|---------------|
| 450 | Moving to the sewing start position when user program is changed |                                                                        | OFF           |
|     | OFF                                                              | Moves to the next sewing start position after starting.                |               |
|     | ON                                                               | Moves to the next sewing start position at the same time as switching. |               |
| 452 | Limitations on changing settings for user programs               |                                                                        | OFF           |
|     | OFF                                                              | No limit                                                               |               |
|     | ON                                                               | User program contents cannot be changed.                               |               |

## 2. FUNCTION SETTINGS

### Data editing settings

| No. | Setting value                                                              | Setting item                                                                                                                                                                                                                                                                                                                                                                                                 | Default value |
|-----|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| 460 | Sewing area limit in X direction                                           |                                                                                                                                                                                                                                                                                                                                                                                                              | 300           |
|     | 0 – 300                                                                    | [Units mm]                                                                                                                                                                                                                                                                                                                                                                                                   |               |
| 461 | Sewing area limit in Y direction                                           |                                                                                                                                                                                                                                                                                                                                                                                                              | 200           |
|     | 0 – 200                                                                    | [Units mm]                                                                                                                                                                                                                                                                                                                                                                                                   |               |
| 462 | Enlargement/reduction reference point                                      |                                                                                                                                                                                                                                                                                                                                                                                                              | 0             |
|     | 0                                                                          | Center of sewing frame                                                                                                                                                                                                                                                                                                                                                                                       |               |
|     | 1                                                                          | Sewing start position                                                                                                                                                                                                                                                                                                                                                                                        |               |
|     | 2                                                                          | Center of pattern                                                                                                                                                                                                                                                                                                                                                                                            |               |
| 463 | Enlargement/reduction for bar tacking                                      |                                                                                                                                                                                                                                                                                                                                                                                                              | ON            |
|     | 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 settings are the same in X and Y directions (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 external media into internal memory               |                                                                                                                                                                                                                                                                                                                                                                                                              | 0             |
|     | 0                                                                          | [Normal mode] Programs are copied one by one into internal memory.                                                                                                                                                                                                                                                                                                                                           |               |
|     | 1                                                                          | [Overwriting 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                                                                          | [Interrupt 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 based on model type (For the BAS-342G, data is read as BAS-342A 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 value                                                         | Setting item                                        | Default 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                           |                                                     | 0             |
|     | 0 – 3                                                                 | [Units: No. of stitches]                            |               |
| 552 | Tension release timing during thread trimming [Units: 8-degree steps] |                                                     | 0             |
|     | -10 - 1                                                               | -10: Early ← 0: Standard → 1: Late                  |               |

| No. | Setting value                                                                                                            | Setting item                                                                                                                                                                              | Default value |
|-----|--------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| 554 | Thread breakage detector                                                                                                 |                                                                                                                                                                                           | OFF           |
|     | OFF                                                                                                                      | Disabled                                                                                                                                                                                  |               |
|     | ON                                                                                                                       | Fiber-type upper thread breakage detector is used                                                                                                                                         |               |
| 555 | Detection sensitivity for thread breakage detector                                                                       |                                                                                                                                                                                           | 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 is carried out 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 during operation ON<br>Option output No. 10: ON during lower thread replacement and during test mode<br>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)             |                                                                                                                                                                                           | 0             |
|     | 0                                                                                                                        | Disabled                                                                                                                                                                                  |               |
|     | 1                                                                                                                        | Operates as standard. (*9)                                                                                                                                                                |               |
|     | 2                                                                                                                        | Sewing starts when cassette sensor is ON (*9)                                                                                                                                             |               |
|     | 3                                                                                                                        | Start switch is enabled even if cassette sensor is OFF. (*9)                                                                                                                              |               |
| 561 | Timer from sensor detection to sewing start when automatic ejector automatic starting is set (memory switch No. 560 = 2) |                                                                                                                                                                                           | 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 thread tension device (when using spring-type main tension)                                                       |                                                                                                                                                                                           | OFF           |
|     | OFF                                                                                                                      | Disabled                                                                                                                                                                                  |               |
|     | ON                                                                                                                       | 2-step thread tension device is used.                                                                                                                                                     |               |
| 564 | Increases maximum tension release force when using a spring-type main tension                                            |                                                                                                                                                                                           | 0             |
|     | 0                                                                                                                        | Disabled (Thread tension discs are open at the sewing end.)                                                                                                                               |               |
|     | 1                                                                                                                        | Increase the maximum tension release force (The thread tension discs close at the sewing end. If the thread tension discs are open, they will be closed for approximately 5 minutes.)     |               |
|     | 2                                                                                                                        | Maximum tension release force is set to maximum (The thread tension discs close at the sewing end. If the thread tension discs are open, they will be closed for approximately 1 minute.) |               |

\*9 Set memory switch No. 002 to 0.

## 2. FUNCTION SETTINGS

| No. | Setting value | Setting item                                                                                                       | Default value |
|-----|---------------|--------------------------------------------------------------------------------------------------------------------|---------------|
| 566 |               | Thread nipper device (wiper replacement type)                                                                      | OFF           |
|     | OFF           | Disabled                                                                                                           |               |
|     | ON            | Thread nipper device is used.                                                                                      |               |
| 567 |               | Thread tension disc status during feeding                                                                          | OFF           |
|     | OFF           | Released                                                                                                           |               |
|     | ON            | Not released                                                                                                       |               |
| 568 |               | Auxiliary tension release device                                                                                   | OFF           |
|     | OFF           | Disabled                                                                                                           |               |
|     | ON            | Auxiliary tension release device is used.<br>(Tension release operation is the same as if memory switch No. 564=0) |               |

### Error processing settings

| No. | Setting value | Setting item                                                                                                 | Default 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. |               |

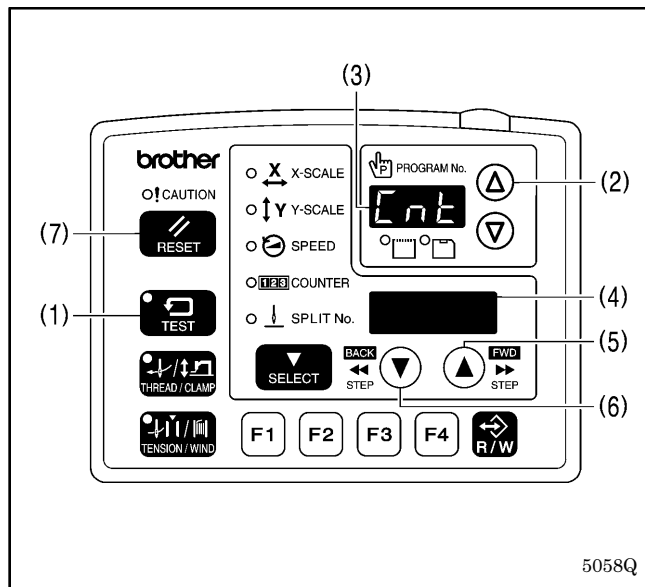
**Maintenance settings**

| No. | Setting value                                | Setting item                                                                                                                                                                                    | Default 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. (No work clamp up/down movement when 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. (No work clamp up/down movement when 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. (No work clamp up/down movement when 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.                                                                                                                                       |               |

**Unique machine settings**

| No. | Setting value                                    | Setting item                                                                                                                         | Default 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 to 7. |               |

## 2-5. Stitch counter checking method



1. While holding down the TEST key (1), press the Δ 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).)
2. When the TEST key (1) is pressed, the display will return to the normal display.

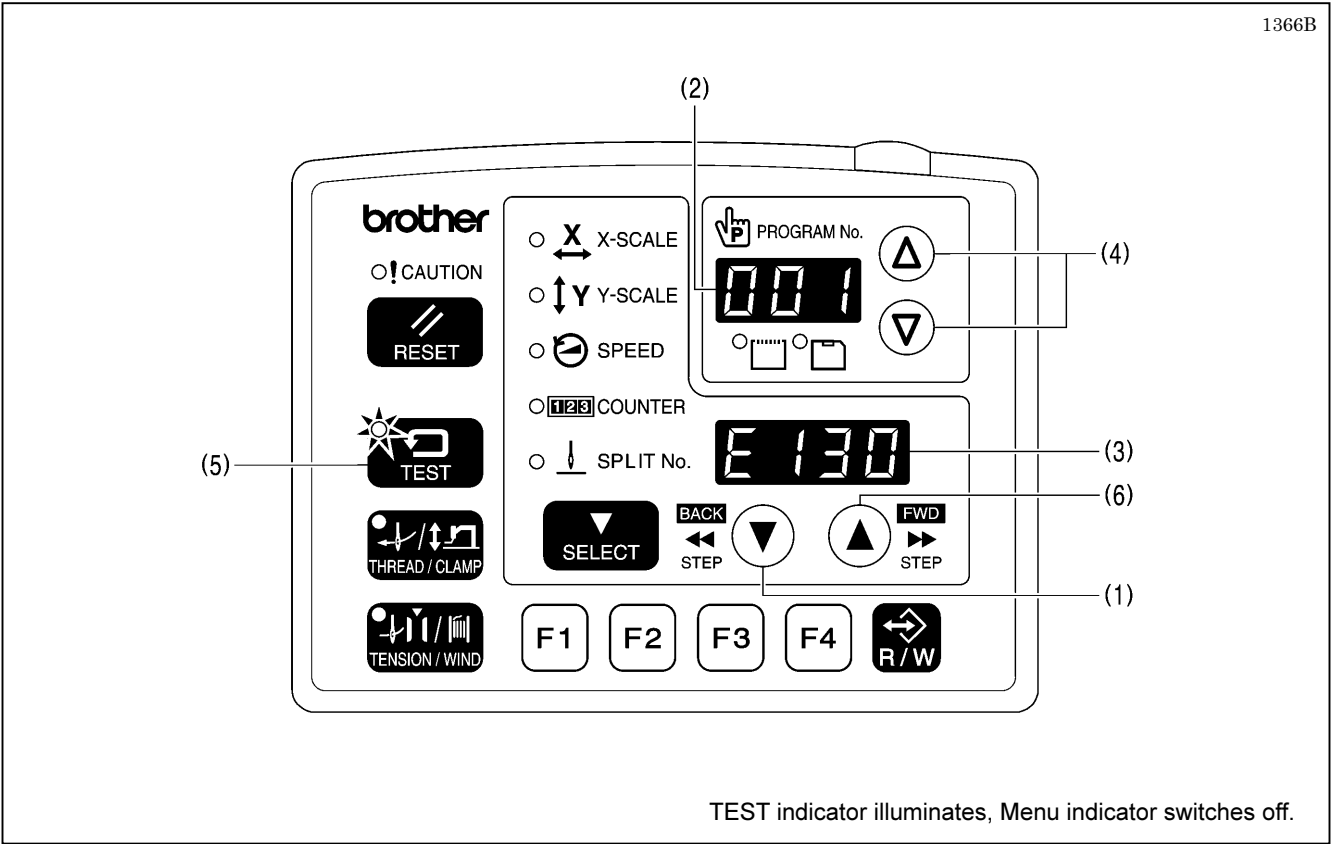
**<Clearing the cumulative number of stitches>**

1. When “Cnt” is displayed, press the ▼ key (6). The cumulative number of stitches will change to “0000” and the display will flash.
2. 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.)
3. When the TEST key (1) is pressed, the display will return to the normal display.



2-6. 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>

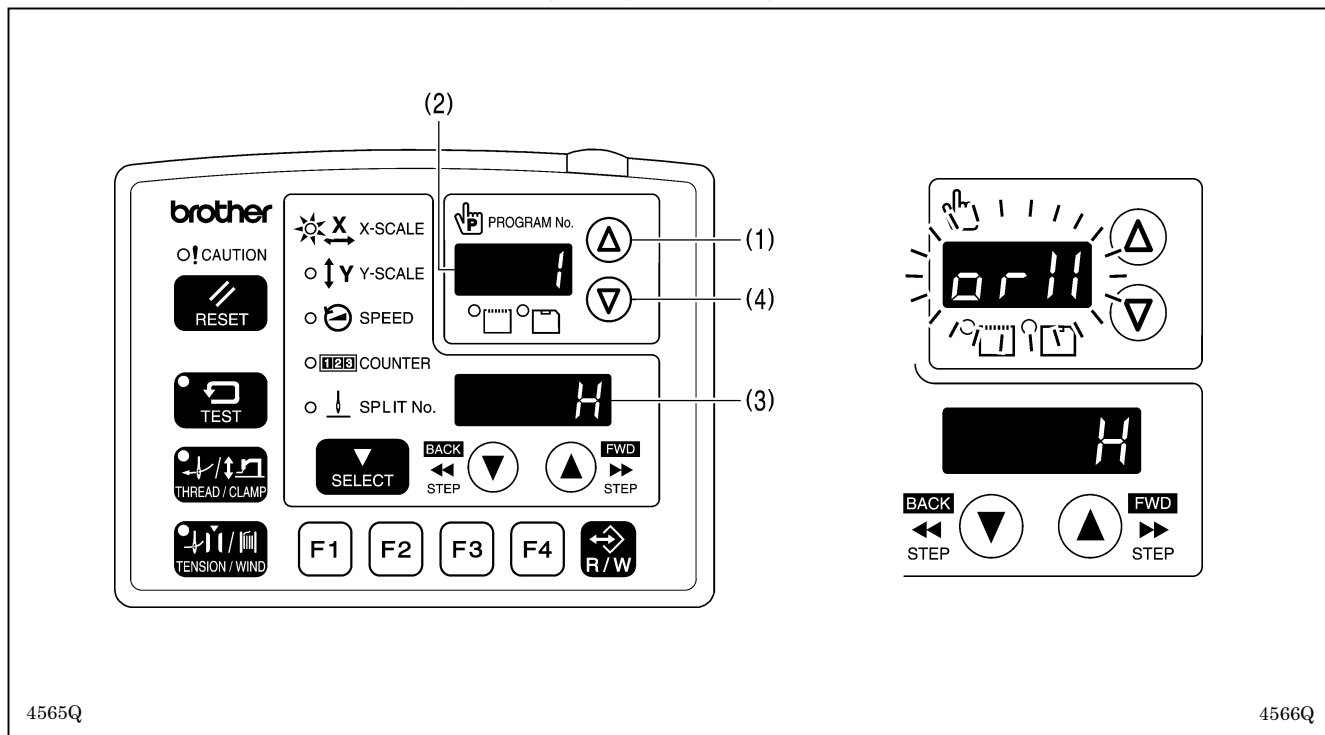
| Details                          | PROGRAM No. display (2) | Menu display (3) |
|----------------------------------|-------------------------|------------------|
| If there is no error history     | [000]                   | [E - - -]        |
| Error [E130] is displayed first. | [001]                   | [E130]           |

- 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.

## 2-7. 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  $\Delta$  key (1), turn on the power switch.  
\* Keep pressing the  $\Delta$  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  $\Delta$  key (1) or  $\nabla$  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<br>Move the feed mechanism by hand in the X direction. |
| [ 2 ]               | [EnX] | [-999] - [999] | X-axis motor encoder counter value<br>Move the feed mechanism by hand in the X direction.       |
| [ 3 ]               | [orY] | [ H ] / [ L ]  | Y-axis motor home position sensor signal<br>Move the feed mechanism by hand in the Y direction. |
| [ 4 ]               | [EnY] | [-999] - [999] | Y-axis motor encoder counter value<br>Move the feed mechanism by hand in the Y direction.       |
| [ 5 ]               | [orP] | [ H ] / [ L ]  | Work clamp motor home position sensor signal<br>Operate the work clamp motor by hand.           |
| [ 6 ]               | [EnP] | [-999] - [999] | Work clamp motor encoder counter value<br>Operate the work clamp motor by hand.                 |
| [ 7 ]               | [Enn] | [ 0 ] - [179]  | Upper shaft 180 degree rotation signal<br>Turn the pulley by hand.                              |

| PROGRAM No. display |       | Menu display              | Check item and checking method                                                                          |
|---------------------|-------|---------------------------|---------------------------------------------------------------------------------------------------------|
| Check code          | Name  | Input status              |                                                                                                         |
| [ 8]                | [ UP] | [ on]/[oFF]               | Needle up signal<br>Turn the pulley by hand.                                                            |
| [ 9]                | [ dn] | [ on]/[oFF]               | Needle down signal<br>Turn the pulley by hand                                                           |
| [ 10]               | [voL] | [0] - [300]               | Power supply voltage<br>Displayed as %                                                                  |
| [ 11]               | [PnL] | [*]/[ oFF]                | Operation panel key input check<br>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 (when one pedal is installed)<br>Depress the foot switch.                      |
| [ 13]               | [CL1] | [ on]/[oFF]               | Work clamp switch 1st step<br>Depress the work clamp switch to the 1st step.                            |
| [ 14]               | [CL2] | [ on]/[oFF]               | Work clamp switch 2nd step<br>Depress the work clamp switch to the 2nd step.                            |
| [ 15]               | [Stt] | [ on]/[oFF]               | Start switch                                                                                            |
| [ 16]               | [EMC] | [--on]<br>[on--]<br>[---] | STOP switch<br>Press the STOP switch.                                                                   |
| [ 17]               | [HEd] | [ on]/[oFF]               | Safety switch<br>Tilt back the machine head.                                                            |
| [ 18]               | [Air] | [ on]/[oFF]               | External input error detection (IN13)                                                                   |
| [ 19]               | [FnX] | [ on]/[oFF]               | Cooling fan for X pulse motor                                                                           |
| [ 20]               | [FnY] | [ on]/[oFF]               | Cooling fan for Y pulse motor                                                                           |
| [ 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]               | No devices are compatible with the BAS-342G.                                                            |
| [ 27]               | [Fib] | [ on]/[oFF]               | Fiber-type thread breakage detection (option) (IN14)                                                    |

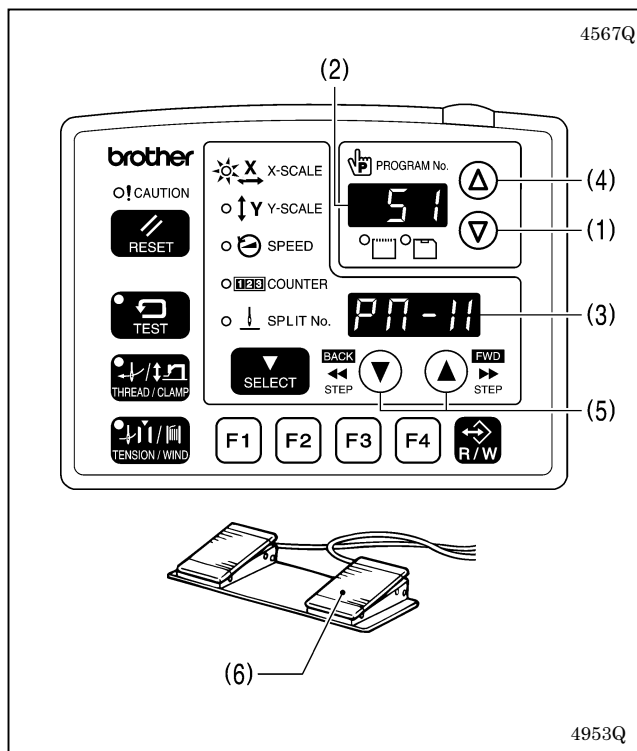
## 2. FUNCTION SETTINGS

| 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)             |

## 2-8. 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.



- While pressing the  $\nabla$  key (1), turn on the power switch.  
\* Keep pressing the  $\nabla$  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).
- Press the  $\Delta$  key (4) or  $\nabla$  key (1) to select the desired check code.
- The operations for check codes 51 to 54 can be checked by pressing the  $\Delta$  or  $\nabla$  key (5).
- For check codes 55 and after, lower the work clamp and then depress the start switch (6).

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

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

| Program No. display | Menu display | Operating details                                                                                                                           |
|---------------------|--------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Check code          | Name         |                                                                                                                                             |
| [ 51 ]              | [PM-X]       | When the $\Delta$ key is pressed, the work clamp moves to the left.<br>When the $\nabla$ key is pressed, the work clamp moves to the right. |
| [ 52 ]              | [PM-y]       | When the $\Delta$ key is pressed, the work clamp moves forward.<br>When the $\nabla$ key is pressed, the work clamp moves back.             |
| [ 53 ]              | [PM-F]       | When the $\Delta$ key is pressed, the work clamp is raised.<br>When the $\nabla$ key is pressed, the work clamp is lowered.                 |
| [ 54 ]              | [CAth]       | No devices are compatible with the BAS-342G.                                                                                                |
| [ 55 ]              | [CL-r]       | The right clamp valve (clamp valve 1) is turned ON (OUT16) (*1)                                                                             |
| [ 56 ]              | [CL-L]       | The left clamp valve (clamp valve 2) is turned ON (OUT15) (*1)                                                                              |
| [ 57 ]              | [SUpt]       | Auxiliary tension release valve is turned ON (OUT14) (*1)                                                                                   |
| [ 58 ]              | [FLiP]       | Inner clamping device valve is turned ON (OUT13) (*1)                                                                                       |
| [ 59 ]              | [Cool]       | Needle cooling valve is turned 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 when corresponding devices are installed.

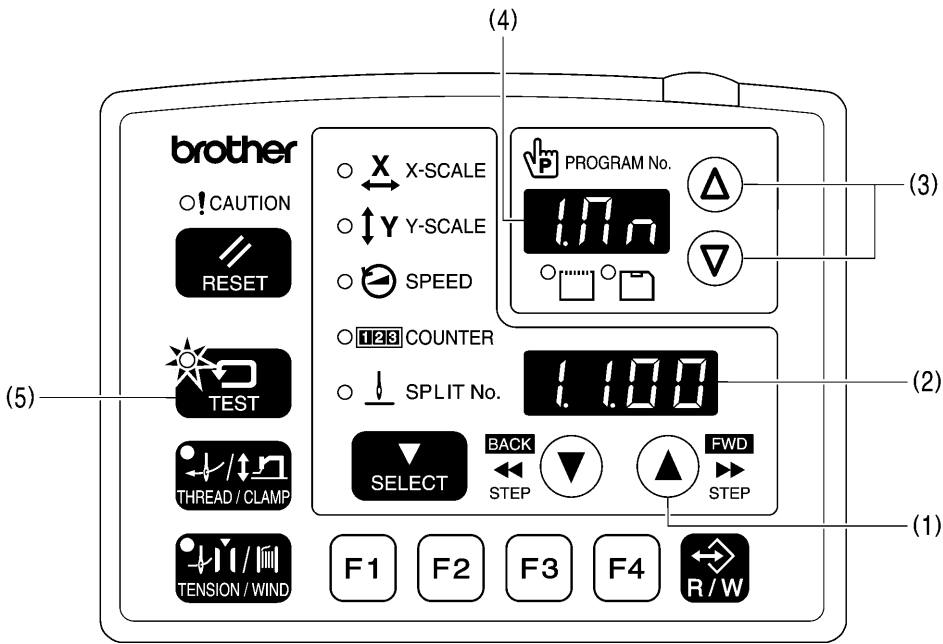
## 2. FUNCTION SETTINGS

| PROGRAM No.<br>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.<br>(*2)<br>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]          | No devices are compatible with the BAS-342G.                                                                                                                                |
| [ 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.

2-9. Software version checking method

5059Q



TEST indicator illuminates, Menu indicator switches off

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

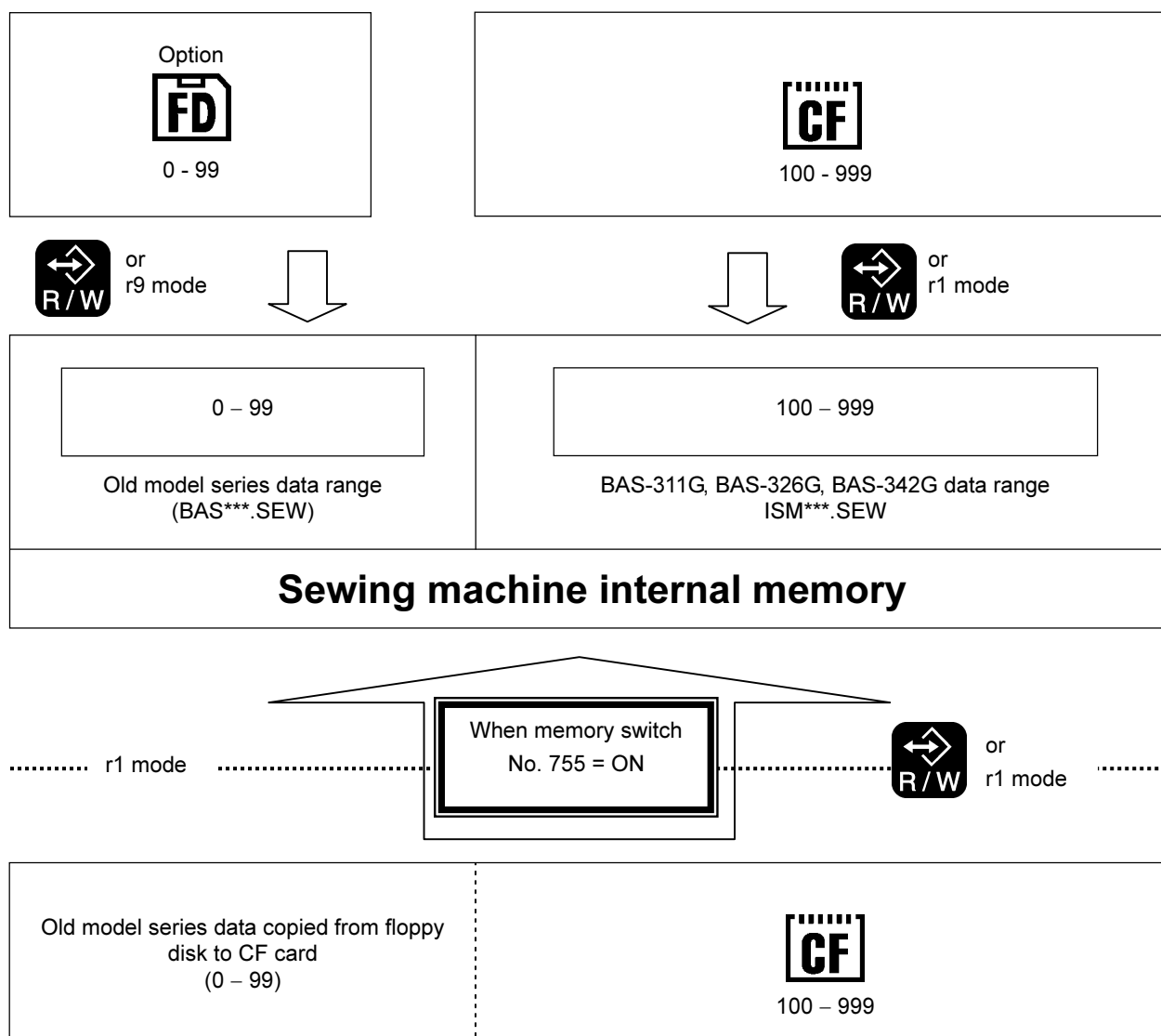
### 3-1. Handling data

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 CF cards with a capacity of 32MB, 64MB, 128MB, 256MB, 512MB, 1GB or 2 GB. (Cards which are larger than 2GB cannot be used.)
- 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.

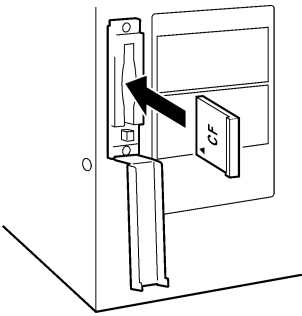
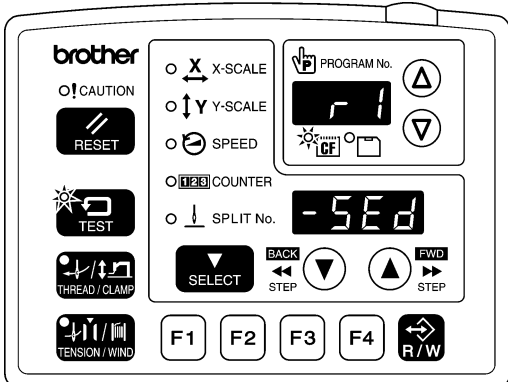
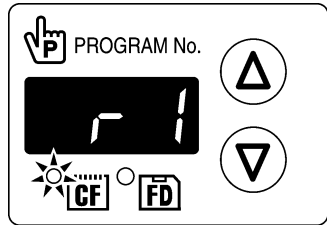
- \* This product is compatible with CF cards that have been formatted using the FAT16 method. Cards that have been formatted using the FAT32 method cannot be used.
- \* CF™ is a trademark of SanDisk Corporation.
- \* Company names and product names appearing in this manual are trademarks or registered 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\ISM05MN.MOT | : Control program         |
| \BROTHER\ISM\ISMDD00\ISMMSW.SEW | : Memory switch data      |
| *1 \ISMUPG.SEW                  | : User program data       |
| \ISMS0100.SEW                   | : Sewing data P No. = 100 |
| \ISMS0101.SEW                   | : Sewing data P No. = 101 |
| \ISMS0102.SEW                   | : Sewing data P No. = 102 |
| ⋮                               | ⋮                         |
| \BROTHER\ISM\ISMDB00\ISMLDT00\  | : Log data                |

- \*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><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>• Make sure the CF card is facing the correct way.</li> <li>• 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.</li> <li>• If no valid data can be found, the CF media indicator will not illuminate.</li> </ul>                                                                                                                                  |
| 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> <ul style="list-style-type: none"> <li>• The mode number will appear in the PROGRAM No. display, and the setting details for that mode will appear in the menu display.</li> <li>• The initial mode is sewing data reading mode. (Refer to the read/write mode list)</li> </ul> |
| 4 |                                                                                                | <p>Press the <math>\Delta</math> or <math>\nabla</math> 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)                      |

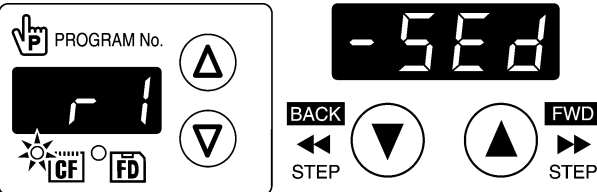
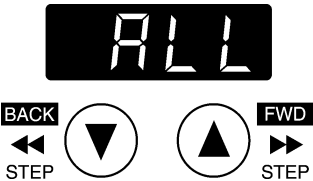
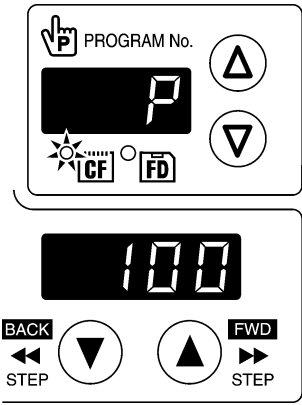
\*1 The sewing data that can be use with this sewing machine is data that has been created for the BAS-311G/BAS-326G /BAS-342G.

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

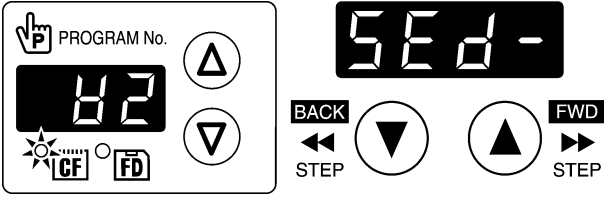
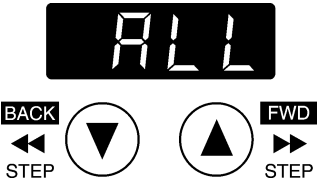
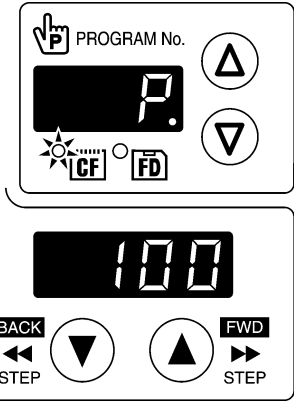
\*3 Sewing data for the BAS-300 series, BAS-300A series and BAS-300E/F series can be read.

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

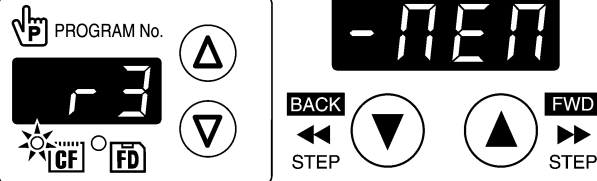
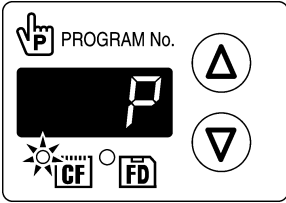
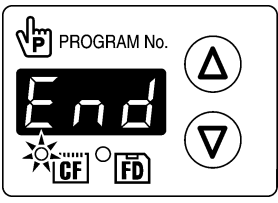
### 3-5. Reading sewing data from CF cards

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <p>Select the [r 1] data read/write mode.</p>  <p style="text-align: right;">4576Q</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 2 | <p>Press the R/W key.</p>   <ul style="list-style-type: none"> <li>• [-SEd] will change to [ ALL].</li> </ul> <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><b>[When memory switch No. 755 is ON]</b><br/>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 style="text-align: right;">4577Q</p>                                                                                                       |
| 3 | <p>Press the R/W key.</p>   <ul style="list-style-type: none"> <li>• 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.</li> <li>• The program numbers that have been read will be displayed in the menu display.</li> </ul> <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 style="text-align: center;">Loading</p> <p style="text-align: right;">4976Q</p> |
| 4 | <p><b>End data read/write mode</b></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: center;">TEST indicator switches off</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

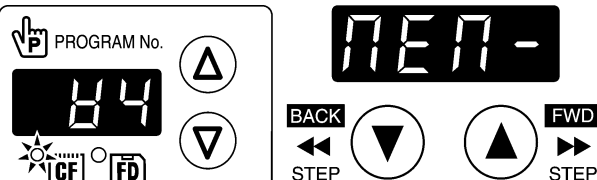
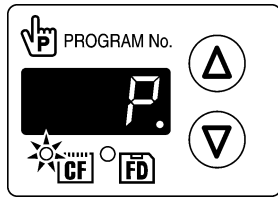
## 3-6. Writing sewing data to CF cards

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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"> <li>• [SEd-] will change to [ALL].</li> </ul> <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><b>[When memory switch No. 755 is ON]</b><br/>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"> <li>• The buzzer will sound and the selected sewing data will be copied from the internal memory onto the CF card.</li> <li>• The program numbers that have been written will appear in the PROGRAM No. display.</li> </ul> <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><b>End data read/write mode</b></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>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

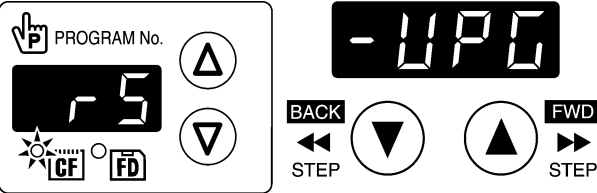
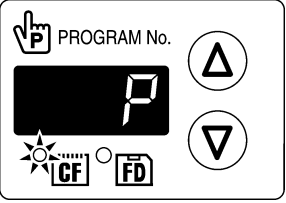
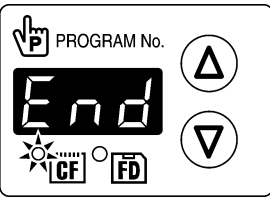
### 3-7. Reading memory switch data from CF cards

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 |  <p>Select the [r 3] data read/write mode.</p> <p style="text-align: right;">4580Q</p>                                                                                                                                                                                                                                                        |
| 2 |  <p>Press the R/W key.</p>  <ul style="list-style-type: none"> <li>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.</li> </ul> <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>                                                                                                                                                   |

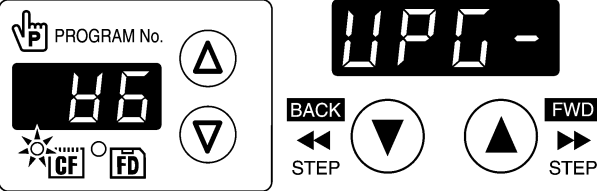
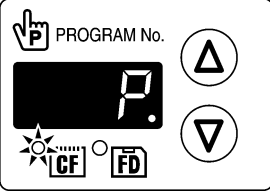
### 3-8. Writing memory switch data to CF cards

|   |                                                                                                                                                                                                                                                                                                                                                                                                        |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 |  <p>Select the [w 4] data read/write mode.</p> <p style="text-align: right;">4582Q</p>                                                                                                                                                                                                                              |
| 2 |  <p>Press the R/W key.</p>  <ul style="list-style-type: none"> <li>The buzzer will sound and the memory switch data will be copied from the internal memory onto the CF card.</li> </ul> <p style="text-align: right;">4579Q</p> |
| 3 | <p><b>End data read/write mode</b></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>                                                                                     |

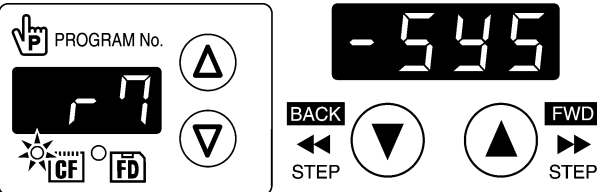
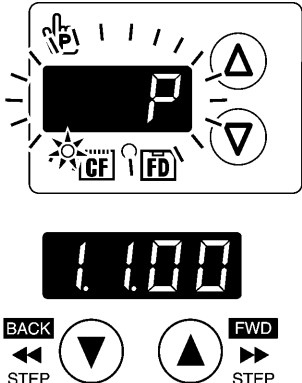
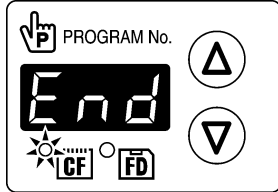
## 3-9. Reading user program data from CF cards

|   |                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 |  <p>Select the [r 5] data read/write mode.</p> <p>4583Q</p>                                                                                                                                                                                                                                                                      |
| 2 |  <p>Press the R/W key.</p>  <ul style="list-style-type: none"> <li>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.</li> </ul> <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>                                                                                                                                                                 |

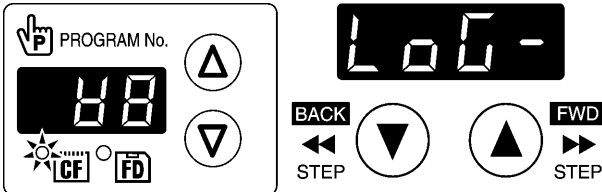
## 3-10. Writing user program data to CF cards

|   |                                                                                                                                                                                                                                                                                                                                                                                           |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 |  <p>Select the [w 6] data read/write mode.</p> <p>4584Q</p>                                                                                                                                                                                                                                            |
| 2 |  <p>Press the R/W key.</p>  <ul style="list-style-type: none"> <li>The buzzer will sound and the user program data will be copied from the internal memory onto the CF card.</li> </ul> <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>                                                                                                                 |

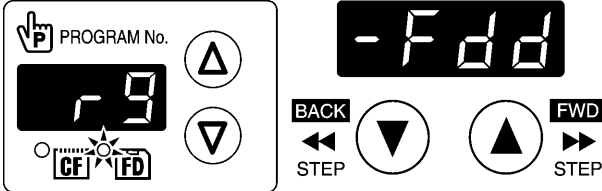
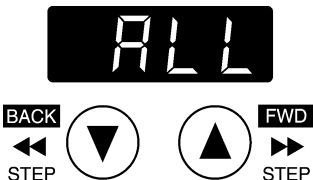
### 3-11. Updating the control program

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <p>Select the [r 7] data read/write mode.</p>  <p style="text-align: right;">4585Q</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <p>Press the R/W key.</p>  <ul style="list-style-type: none"> <li>[-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.</li> </ul>                                                                                                                                                                                                                                                   |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <p>Press the R/W key.</p>  <p style="text-align: right;">5060Q</p> <p>Press the R/W key.</p>  <ul style="list-style-type: none"> <li>[ P ] will flash in the PROGRAM No. display and the control program will be updated.</li> </ul> <p><b>NOTE:</b><br/>If the filename and folder name for the control program are incorrect, error [E421] will be displayed.</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 style="text-align: right;">4581Q</p> <p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>Version updating may take about 3 – 10 minutes. (The time taken will vary depending on the manufacturers and storage capacity of the CF card being used. )</li> <li>Never remove the CF card or turn off the power switch while reading of the CF card is in progress.</li> </ul> |
| <p><b>&lt;Restoring the control program if an error occurs during updating&gt;</b></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"> <li>1. Insert the CF card containing the control program data into the CF card slot.</li> <li>2. Turn on the power switch. The operation panel will switch off and the version updating will be carried out.</li> <li>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.</li> </ol> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

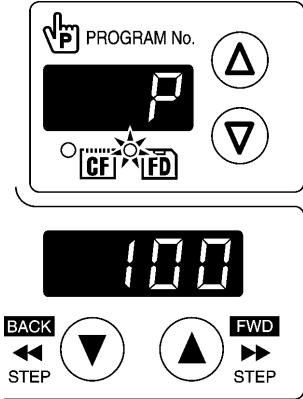
## 3-12. Writing error log data to CF card

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

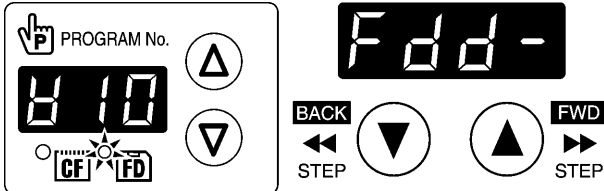
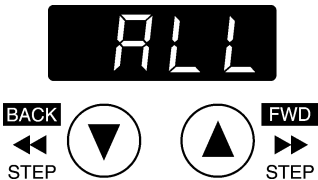
## 3-13. Reading sewing data from floppy disks

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



|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4 | <p>Press the R/W key.</p>   <ul style="list-style-type: none"> <li>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.</li> <li>The program numbers that have been read will appear in the menu display.</li> </ul> <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.<br/>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><b>NOTE:</b><br/>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 <span style="float: right;">5063Q</span></p> |
| 5 | <p><b>End data read/write mode</b></p> <p>Press the TEST key.<br/>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

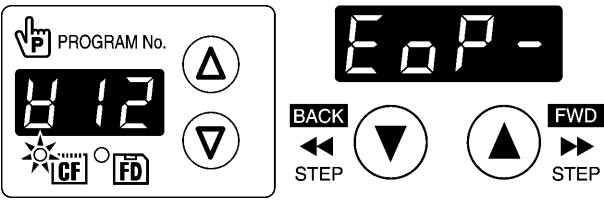
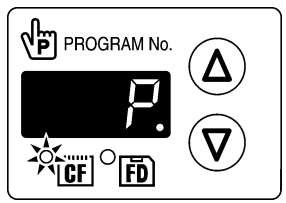
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Insert the floppy disk into the floppy disk drive.                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 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"> <li>[Fdd-] will change to [ ALL].</li> </ul> <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 | <div data-bbox="295 275 598 674"> </div> <div data-bbox="842 203 1046 232">Press the R/W key.</div> <div data-bbox="938 253 1023 338"> </div> <div data-bbox="842 369 1471 483"> <ul style="list-style-type: none"> <li>• The buzzer will sound and the selected sewing data will be copied from the internal memory onto the floppy disk.</li> <li>• The program numbers that have been written will appear in the menu display.</li> </ul> </div> <div data-bbox="842 510 1471 651"> <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.<br/>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> </div> <div data-bbox="738 752 815 779">Writing</div> <div data-bbox="1410 748 1471 770">5065Q</div> |
| 5 | <div data-bbox="188 786 483 813">End data read/write mode</div> <div data-bbox="842 786 1337 842">           Press the TEST key.<br/>Turn off the power and remove the floppy disk.         </div> <div data-bbox="295 869 434 949"> </div> <div data-bbox="523 974 815 996">TEST indicator switches off</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

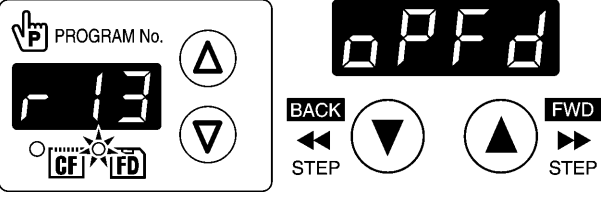
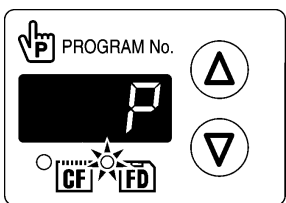
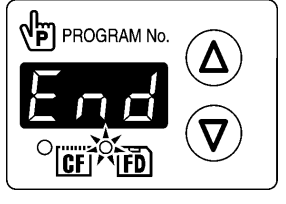
### 3-15. Reading extended option output data from a CF card

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <div data-bbox="196 1155 802 1346"> </div> <div data-bbox="834 1120 1243 1146">Select the [r 11] data read/write mode.</div> <div data-bbox="1390 1339 1452 1361">5066Q</div>                                                                                                                                                                                                                                                                                                                         |
| 2 | <div data-bbox="295 1435 584 1637"> </div> <div data-bbox="834 1379 1040 1406">Press the R/W key.</div> <div data-bbox="922 1413 1007 1498"> </div> <div data-bbox="834 1507 1452 1585"> <ul style="list-style-type: none"> <li>• 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.</li> </ul> </div> <div data-bbox="722 1650 810 1677">Loading</div> <div data-bbox="1390 1646 1452 1668">4498Q</div> |
| 3 | <div data-bbox="295 1697 572 1890"> </div> <div data-bbox="834 1686 1452 1765">           When [ End] is displayed, the process is complete.<br/>Turn off the power switch, remove the CF card, and then close the cover of the CF slot.         </div> <div data-bbox="1390 1892 1452 1915">4581Q</div>                                                                                                                                                                                              |

### 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"> <li>The buzzer will sound and the extended option output data will be copied from the internal memory onto the CF card.</li> </ul> <p>Writing</p> <p>4579Q</p> |
| 3 | <p><b>End data read/write mode</b></p>  <p>Press the TEST key.<br/>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>                                                                                                               |

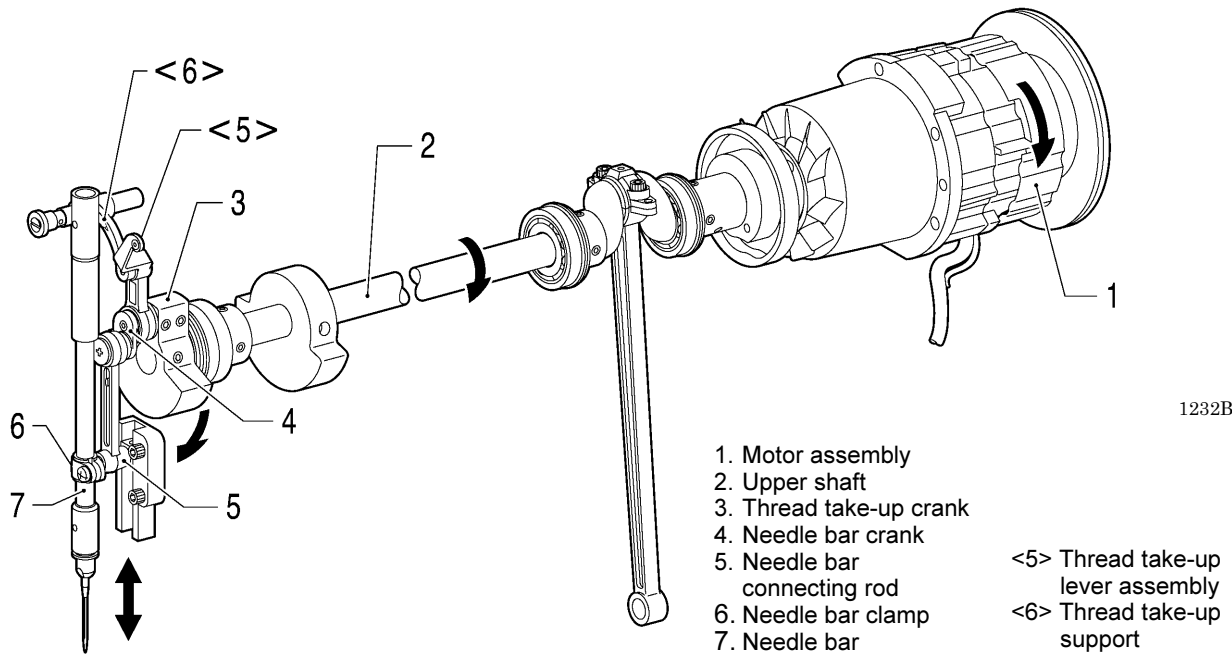
### 3-17. Reading extended option output data from floppy disks

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <p><b>Insert the floppy disk into the floppy disk drive.</b></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"> <li>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.</li> </ul> <p>Loading</p> <p>5069Q</p> |
| 4 |  <p>When [ End] is displayed, the process is complete.<br/>Turn off the power and remove the floppy disk.</p> <p>5070Q</p>                                                                                                                                                                                                                        |

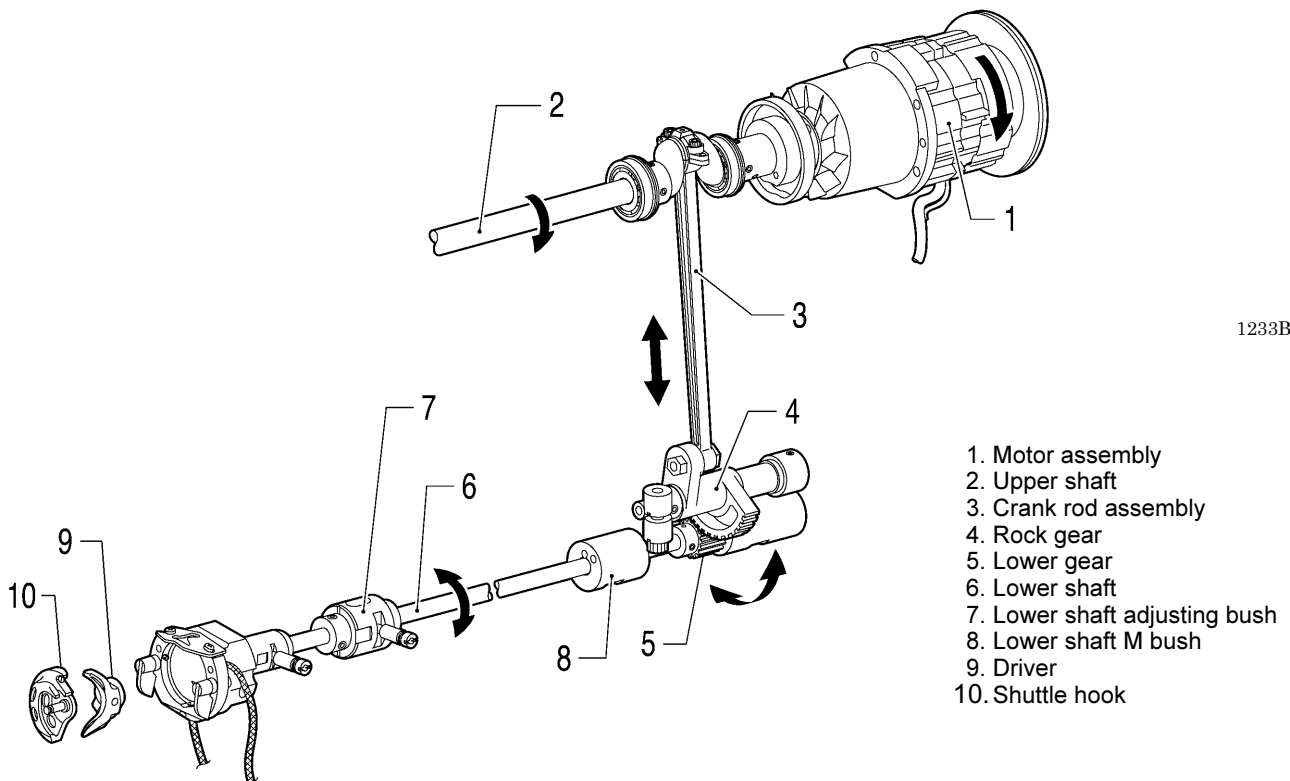
## 4. MECHANICAL DESCRIPTIONS

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

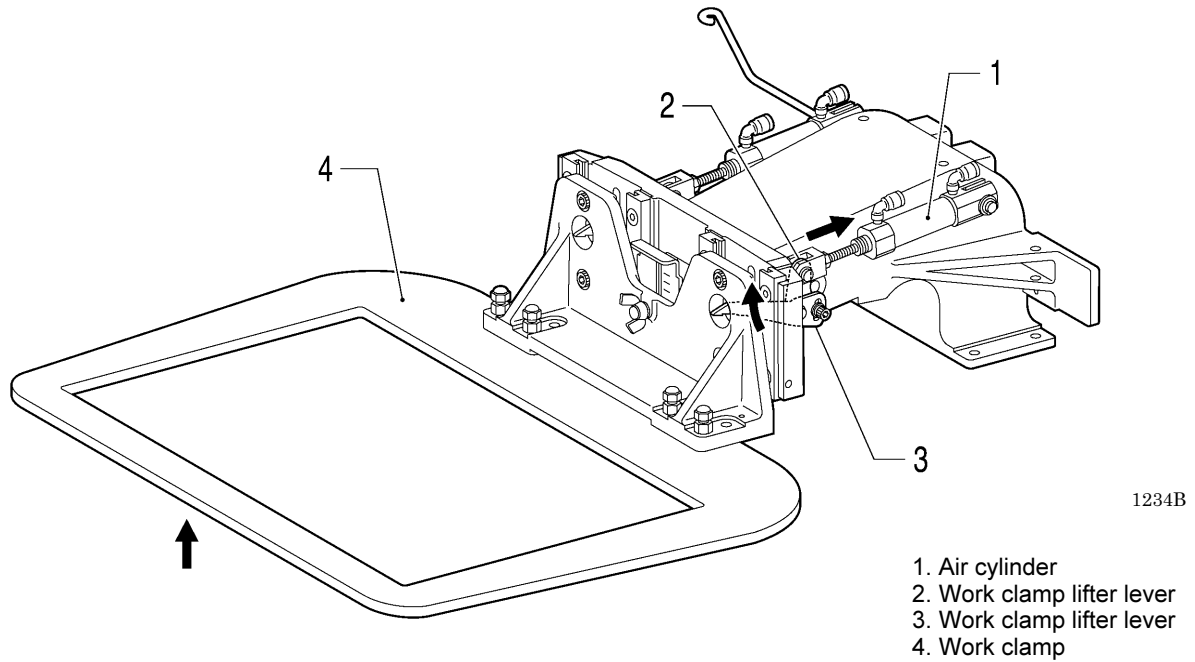
### 4-1. Needle bar and thread take-up mechanisms



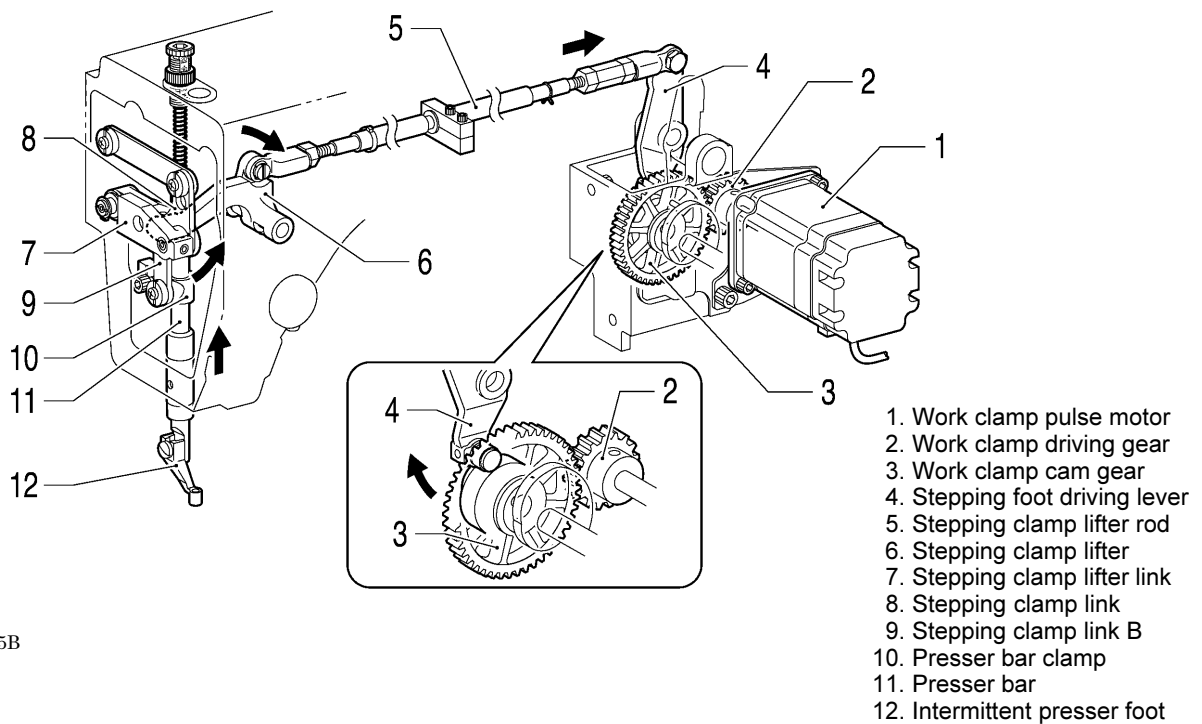
### 4-2. Lower shaft and shuttle race mechanisms



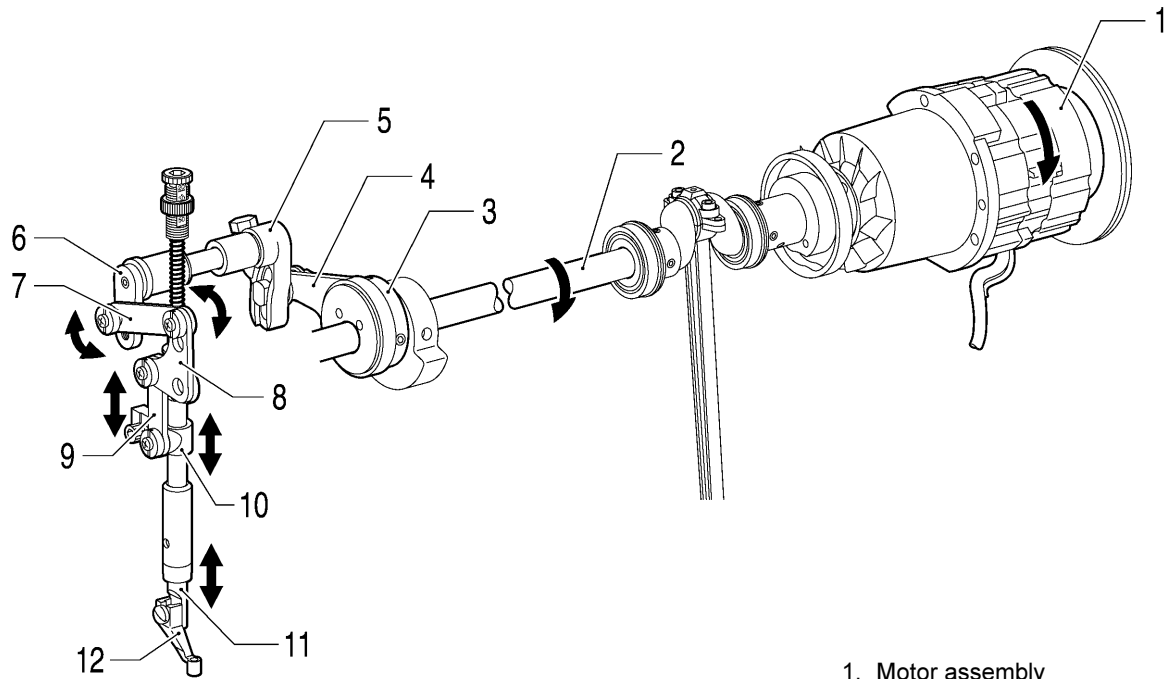
### 4-3. Work clamp lifter mechanism



### 4-4. Intermittent presser foot lifter mechanism



## 4-5. Intermittent presser foot stroke mechanism



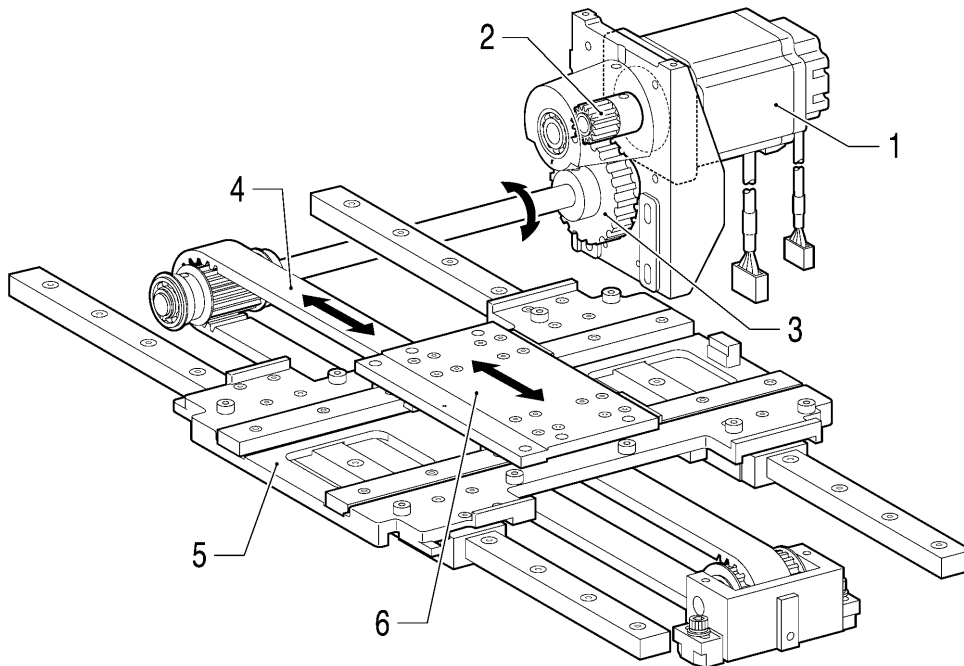
1236B

1. Motor assembly
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. Intermittent presser foot

## 4-6. Feed mechanism

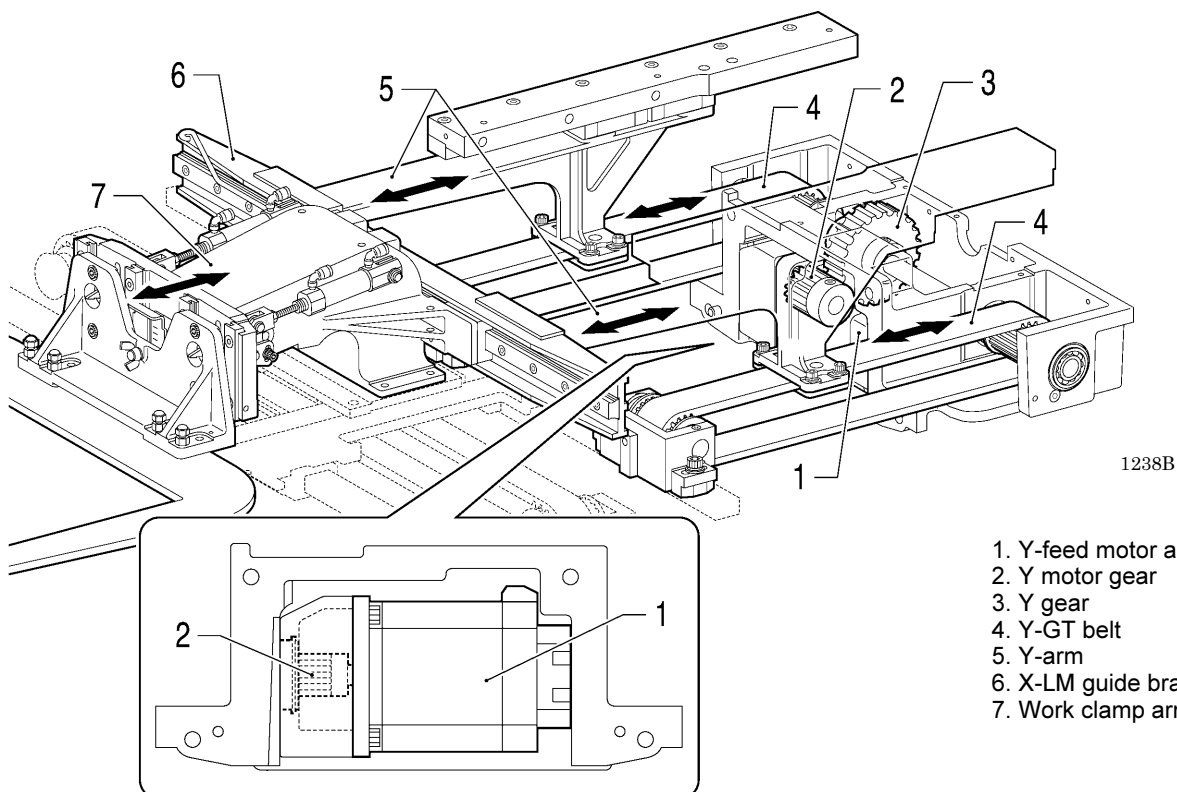
Sewing patterns are created through combinations of X and Y movements.

### X direction



- 1. X-feed motor assembly
- 2. Y motor gear
- 3. X gear
- 4. X-GT belt
- 5. X base plate
- 6. Y base plate

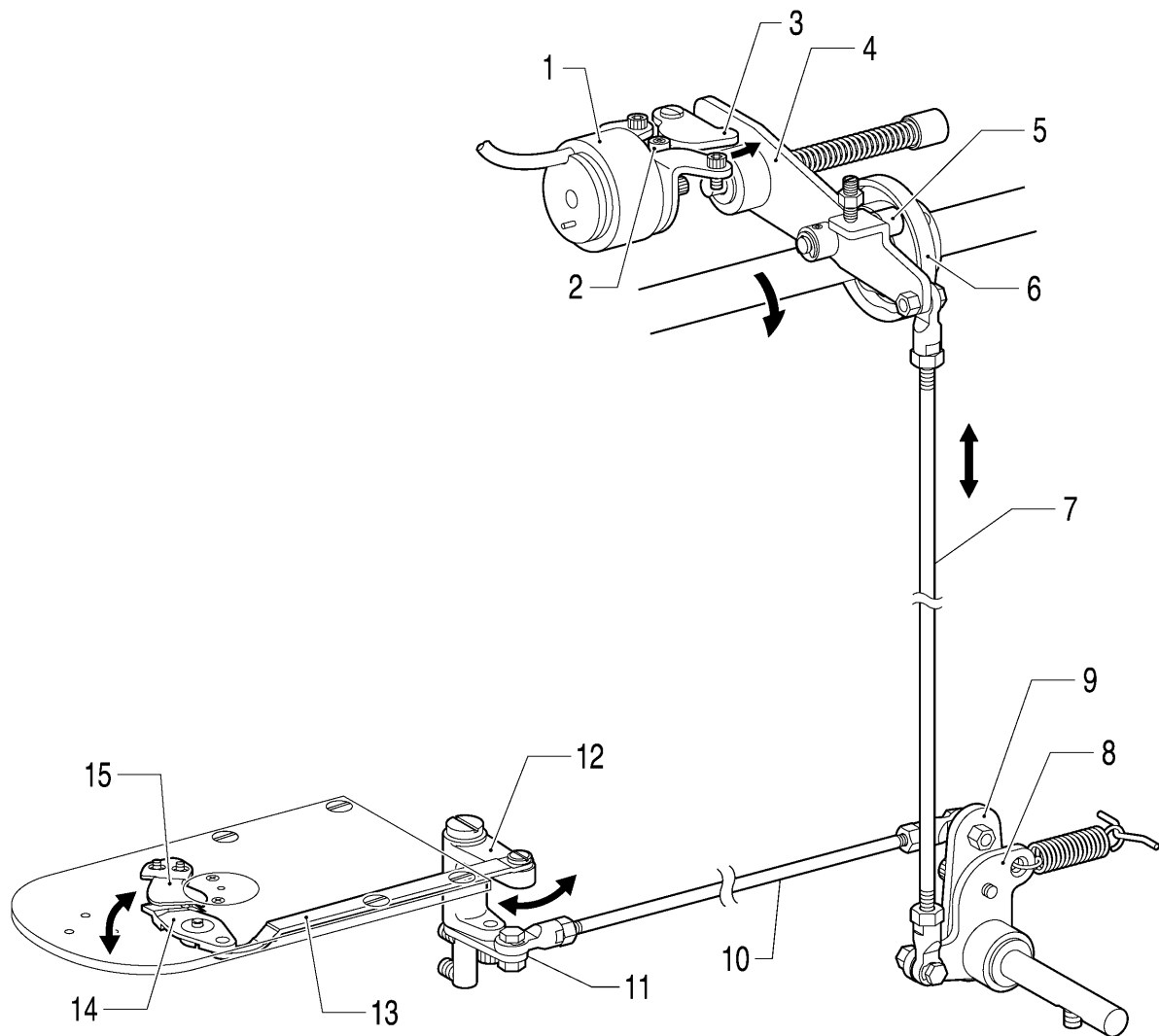
### Y direction



- 1. Y-feed motor assembly
- 2. Y motor gear
- 3. Y gear
- 4. Y-GT belt
- 5. Y-arm
- 6. X-LM guide bracket
- 7. Work clamp arm

## 4-7. Thread trimmer mechanism

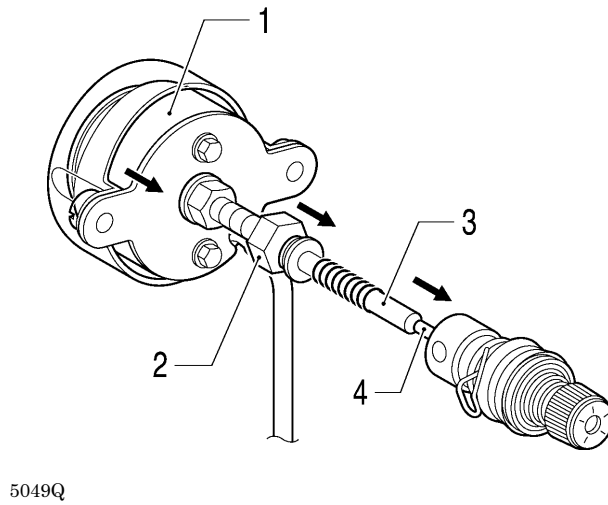
1239B



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 D
12. Movable knife lever
13. Movable knife connecting plate
14. Movable knife
15. Fixed knife

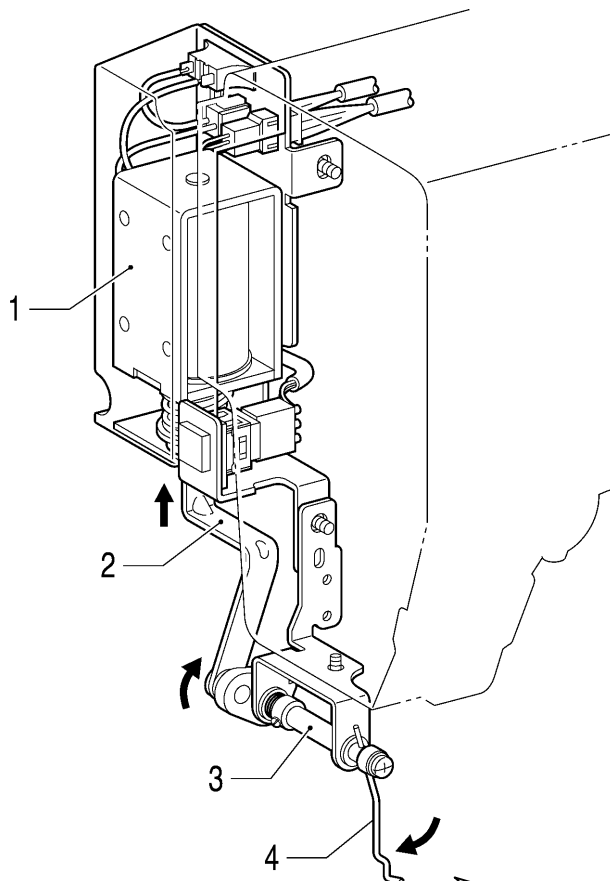


#### 4-8. Tension release mechanism



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

#### 4-9. Thread wiper mechanism



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

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

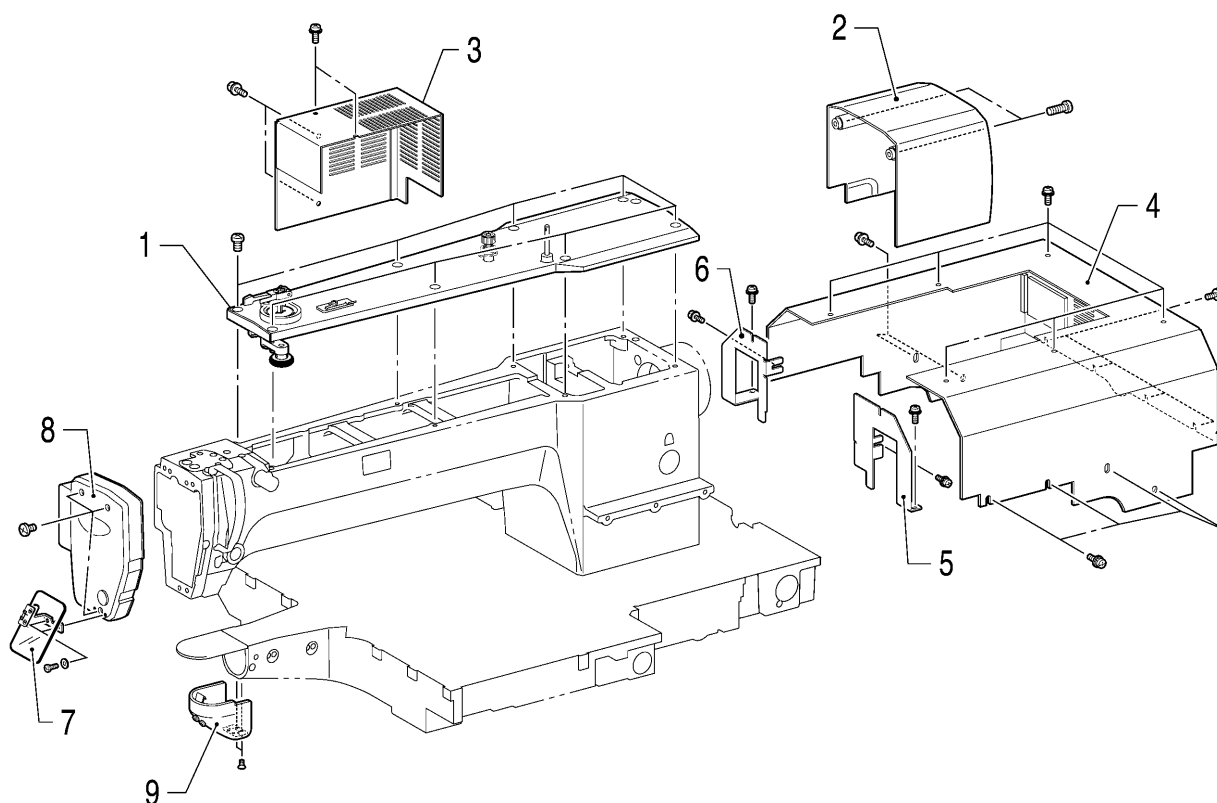
## 5. DISASSEMBLY

### ! 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.

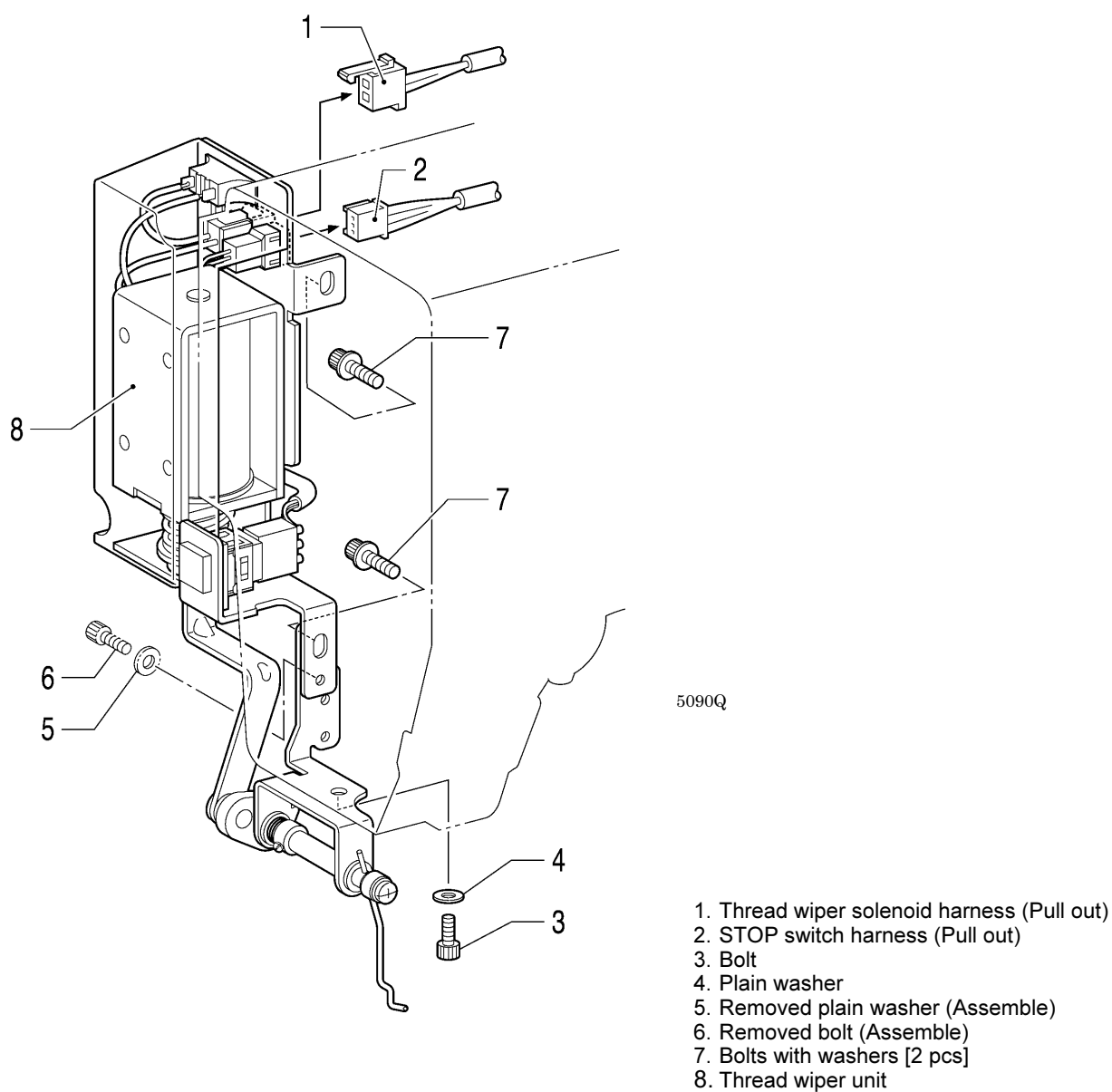
### 5-1. Covers



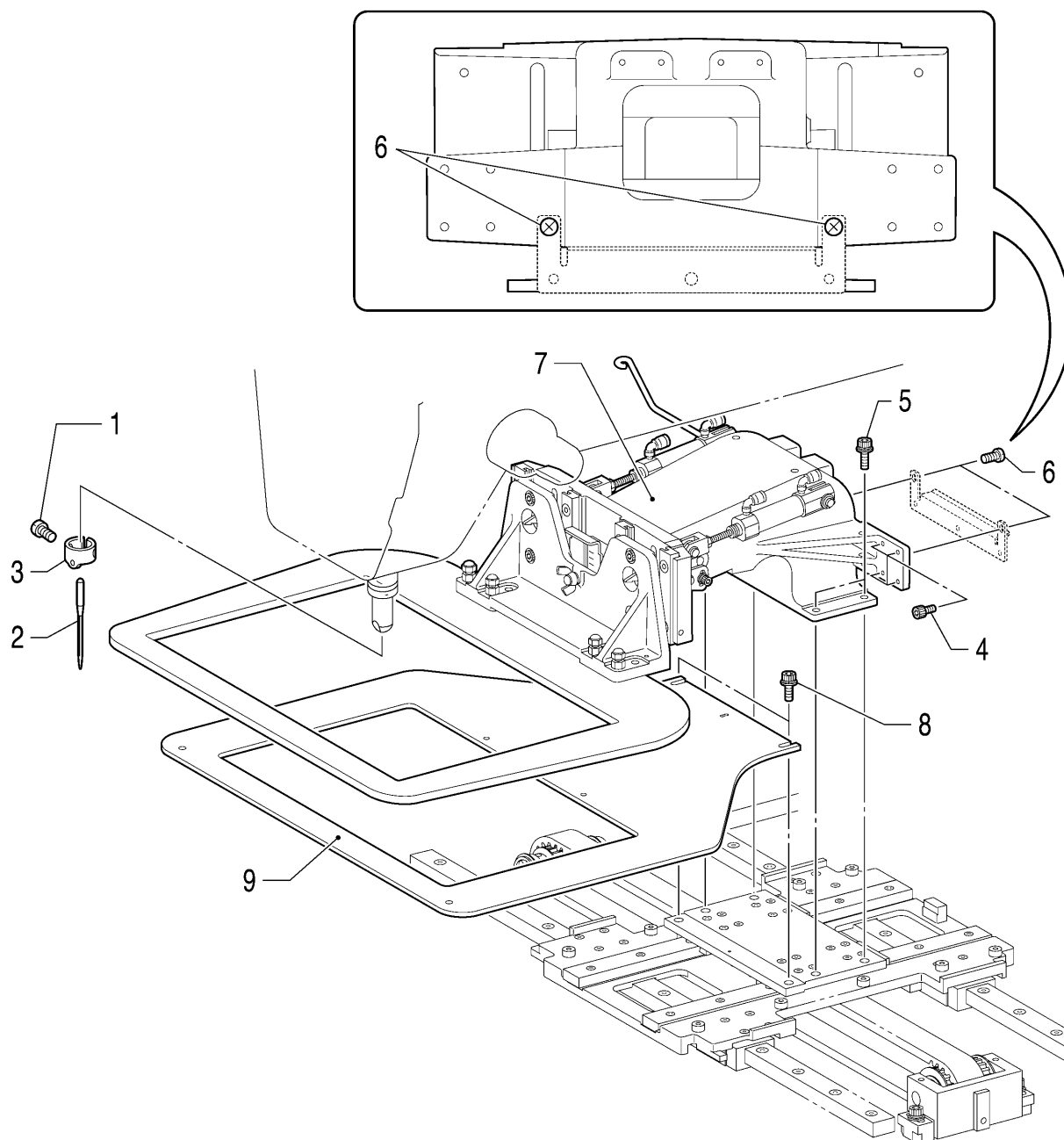
1240B

- |                  |                                |
|------------------|--------------------------------|
| 1. Top cover     | 6. Rear cover FL               |
| 2. Motor cover   | 7. Eye guard                   |
| 3. X motor cover | 8. Face plate                  |
| 4. Rear cover    | 9. Shuttle race cover assembly |
| 5. Rear cover FR |                                |

## 5-2. Thread wiper mechanism



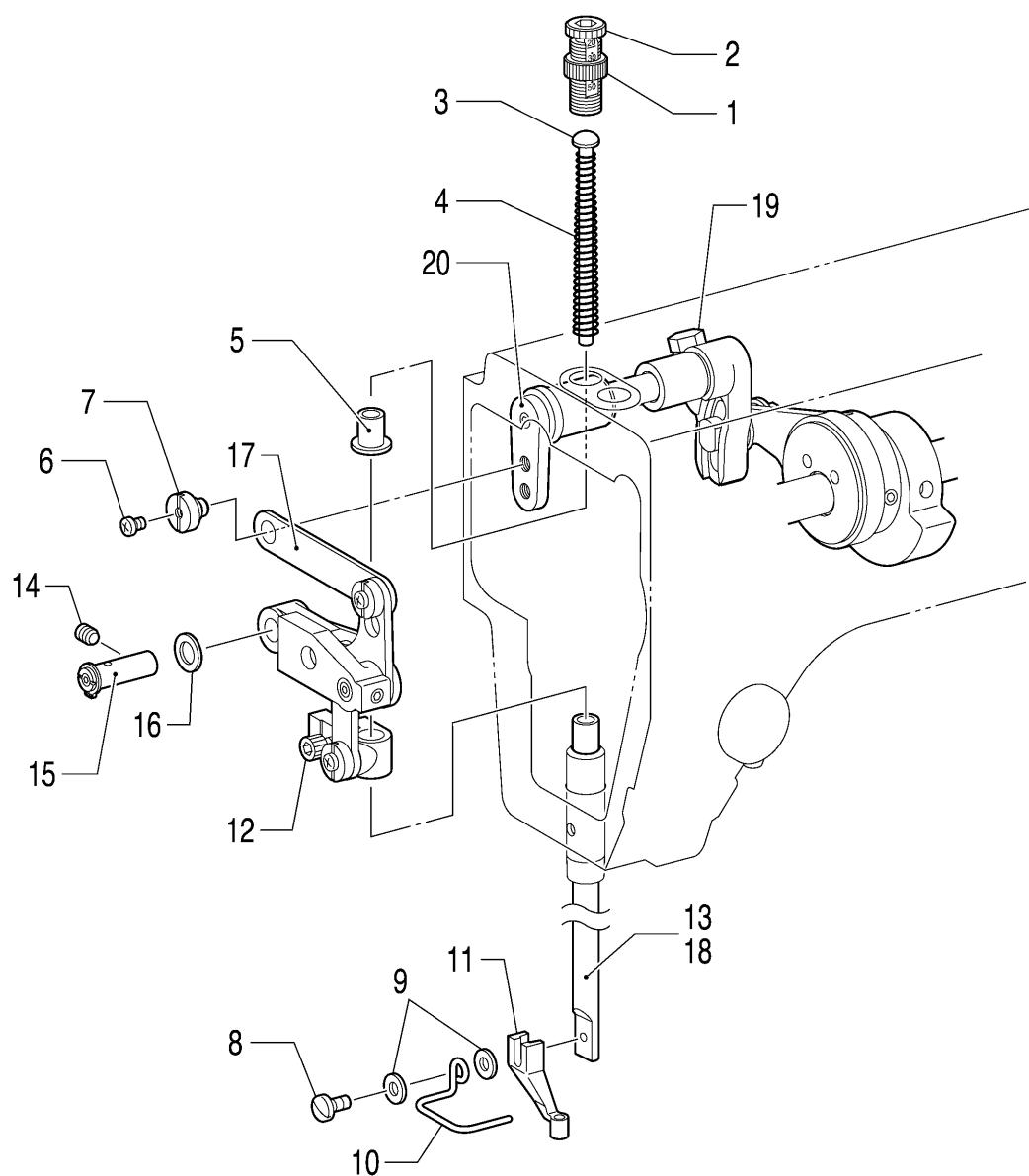
### 5-3. Work clamp arm mechanism



1241B

1. Set screw
2. Needle
3. Needle bar thread guide
4. Bolts [8 pcs]
5. Bolts with washers [4 pcs]
6. Screws [2 pcs]
7. Work clamp arm assembly
8. Bolts with washers [2 pcs]
9. Feed plate

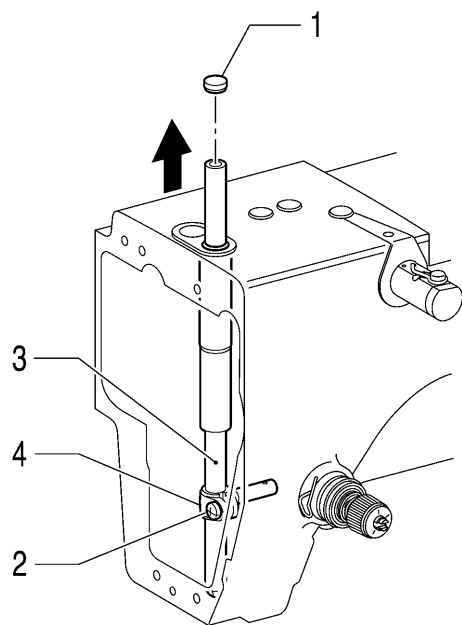
## 5-4. Intermittent presser foot lifter mechanism (1)



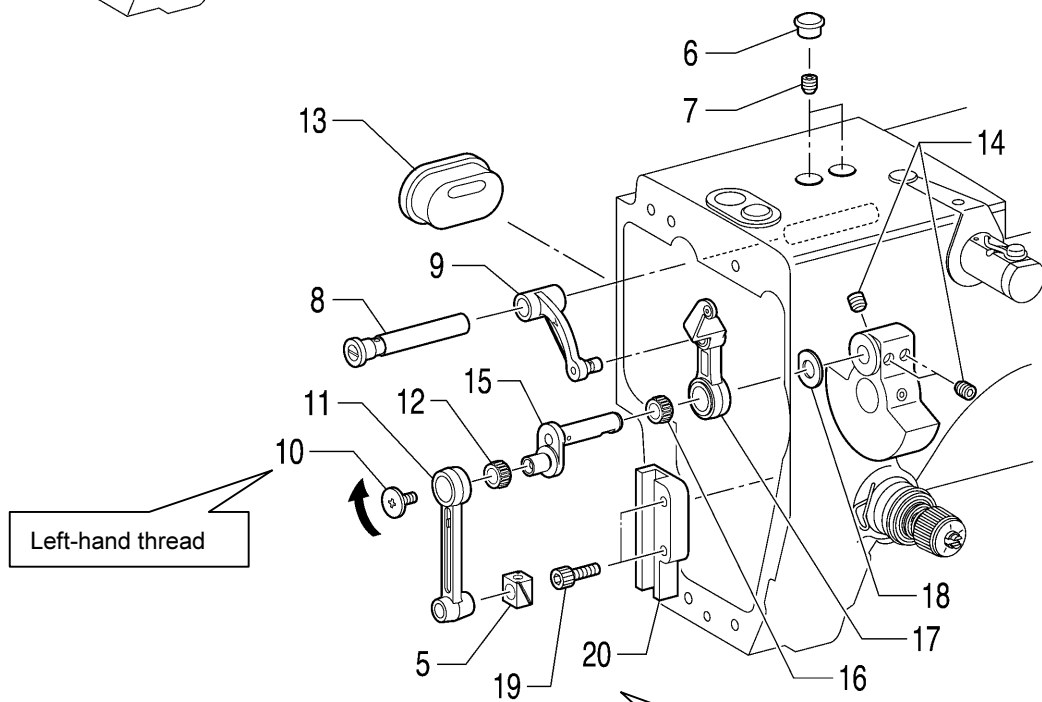
1242B

- |                                 |                                                           |
|---------------------------------|-----------------------------------------------------------|
| 1. Adjusting screw nut (Loosen) | 11. Intermittent presser foot                             |
| 2. Presser adjusting screw      | 12. Bolt (Loosen)                                         |
| 3. Presser bar spring guide     | 13. Presser bar<br>(Pull downward from presser bar clamp) |
| 4. Presser bar spring           | 14. Set screw (Loosen)                                    |
| 5. Presser bar spring collar    | 15. Stepping clamp lifter 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



5092Q

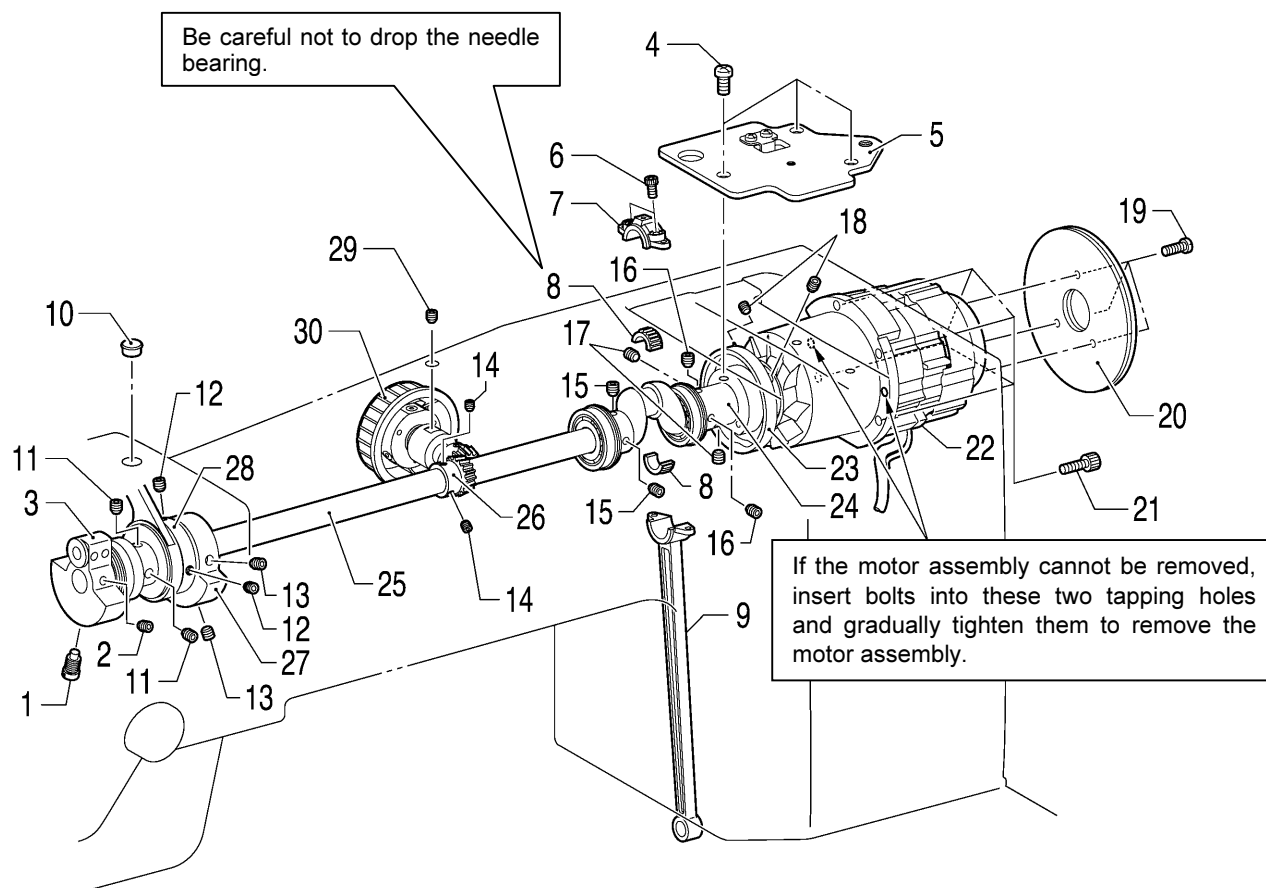


5093Q

Do not remove the slide block guide if possible to prevent the machine from overheating due to needle bar rubbing.

- |                                          |                                   |
|------------------------------------------|-----------------------------------|
| 1. Rubber cap                            | 11. Needle bar connecting rod     |
| 2. Screw                                 | 12. Needle bearing                |
| 3. Needle bar                            | 13. Rubber cap                    |
| 4. Needle bar clamp (Pull out)           | 14. Set screws [3 pcs] (Loosen)   |
| 5. Slide block                           | 15. Needle bar crank              |
| 6. Rubber caps [2 pcs]                   | 16. Needle bearing                |
| 7. Set screws [2 pcs] (Loosen)           | 17. Thread take-up lever assembly |
| 8. Thread take-up support shaft assembly | 18. Washer                        |
| 9. Thread take-up support                | 19. Bolts [2 pcs]                 |
| 10. Screw (Loosen)                       | 20. Slide block guide             |

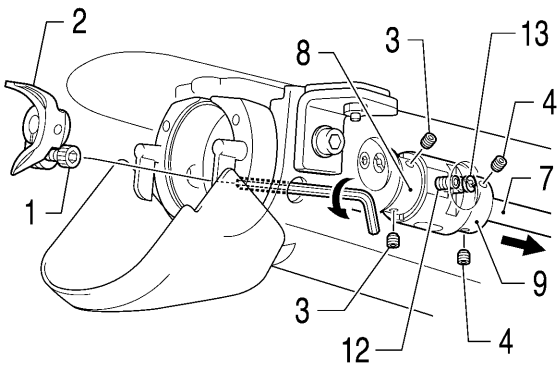
## 5-6. Upper shaft mechanism



1243B

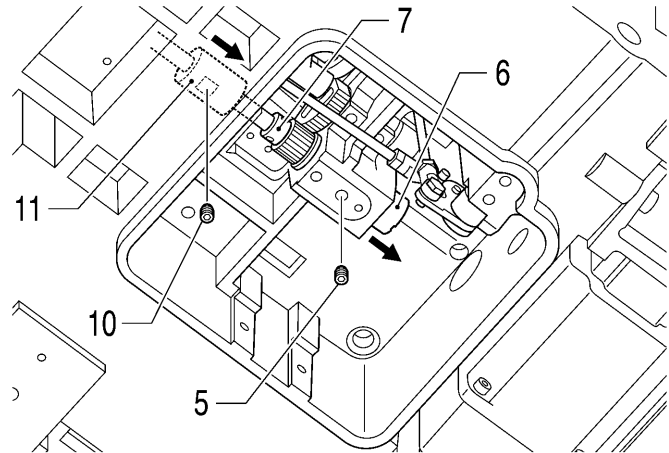
1. Screw (Loosen)
2. Set screw (Loosen)
3. Thread take-up crank
4. Screws [3 pcs] (Loosen)
5. Crank cover
6. Bolts [2 pcs]
7. Crank rod [Upper part]
8. Needle bearing
9. Crank rod [Lower part]  
(Lower downward)
10. Rubber cap
11. Set screws [2 pcs] (Loosen)
12. Set screws [2 pcs] (Loosen)
13. Set screws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

## 5-7. Lower shaft mechanism

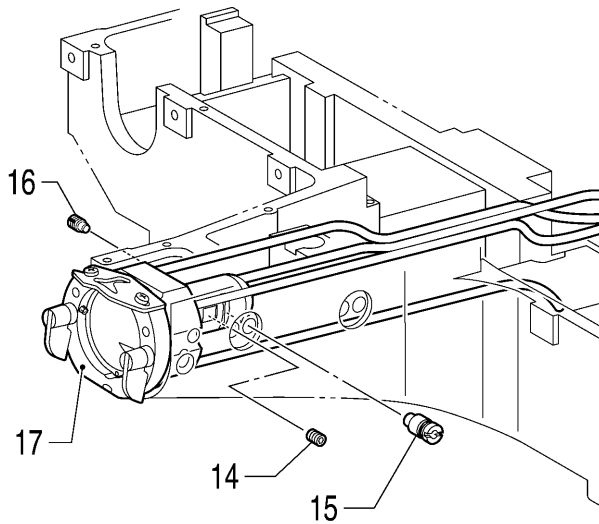


1244B

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

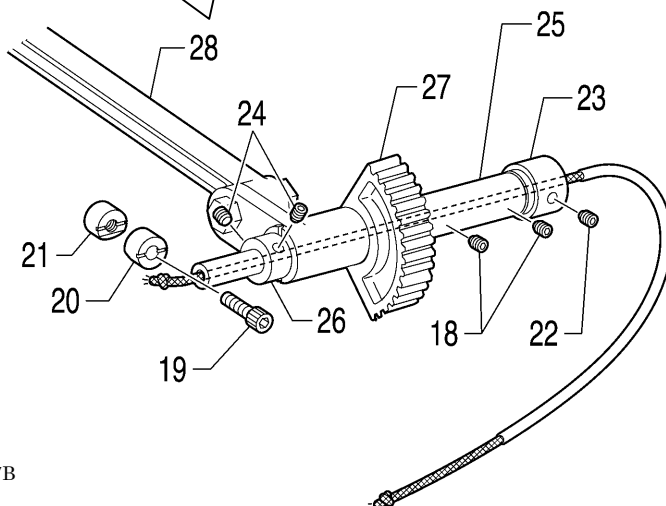


1245B



1246B

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

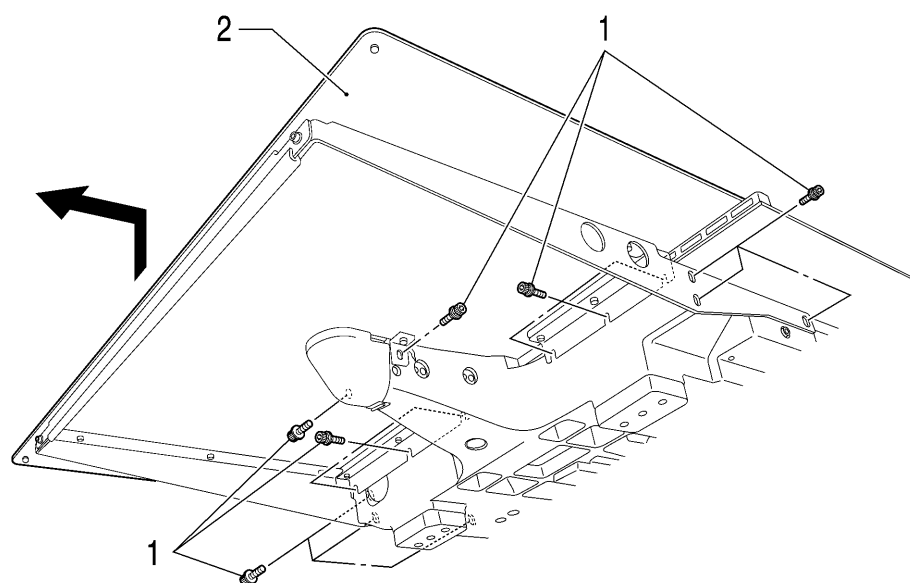


1247B

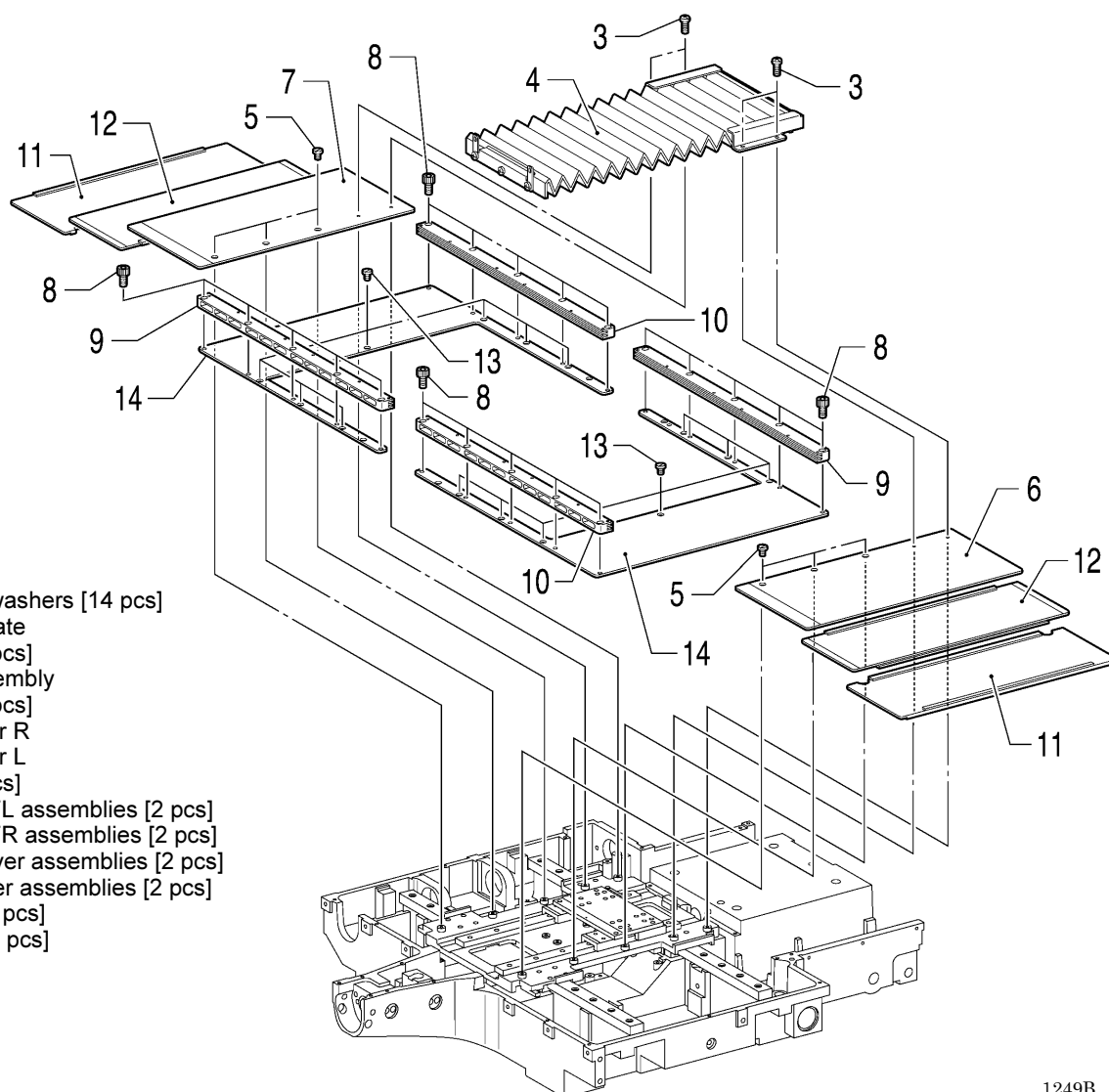
1. Bolt (Loosen)
2. Driver
3. Set screws [2 pcs] (Loosen)
4. Set screws [2 pcs] (Loosen)
5. Set screws (Loosen)
6. Lower shaft bush
7. Lower shaft assembly  
(Pull out from the rear of the machine)
8. Set screw collar
9. Set screw collar
10. Set screw (Loosen)
11. Lower shaft M bush
12. Set screw (Loosen)
13. Adjusting stud (Pull out)
14. Set screw (Loosen)
15. Adjusting stud (Pull out)
16. Set screw (Loosen)
17. Shuttle race base assembly
18. Set screws [2 pcs] (Loosen)
19. Bolt (Loosen)
20. Pinch sleeve A
21. Pinch sleeve B
22. Set screw (Loosen)
23. Set screw collar R
24. Set screws [2 pcs] (Loosen)
25. Rock gear shaft  
(Pull out from the rear of the machine)
26. Set screw collar B
27. Rock gear
28. Crank rod [Lower part]



## 5-8. Feed covers



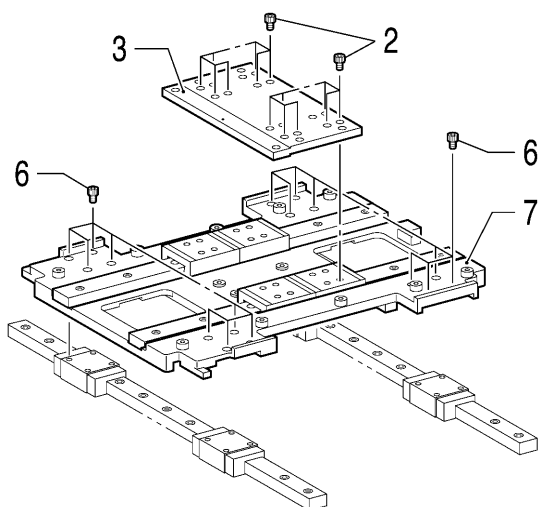
1248B



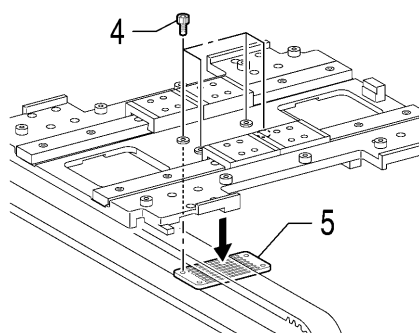
1. Bolts with washers [14 pcs]
2. Auxiliary plate
3. Screws [4 pcs]
4. Bellow assembly
5. Screws [6 pcs]
6. Inside cover R
7. Inside cover L
8. Bolts [20 pcs]
9. Cover rail FL assemblies [2 pcs]
10. Cover rail FR assemblies [2 pcs]
11. Outside cover assemblies [2 pcs]
12. Middle cover assemblies [2 pcs]
13. Screws [14 pcs]
14. Fixations [2 pcs]

1249B

## 5-9. Feed mechanism

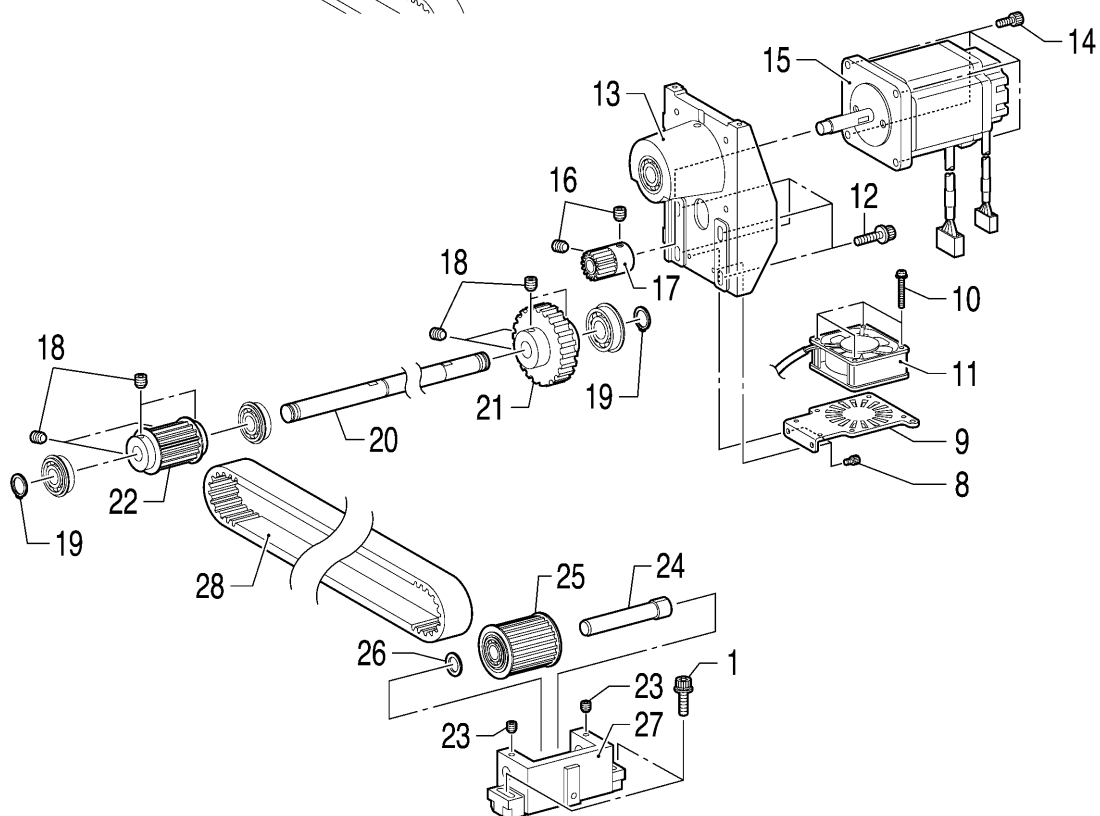


1250B

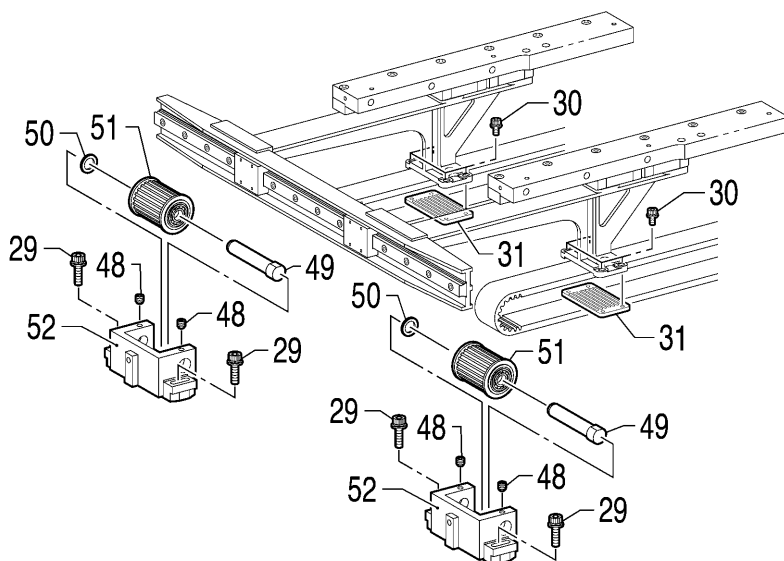


1251B

1252B

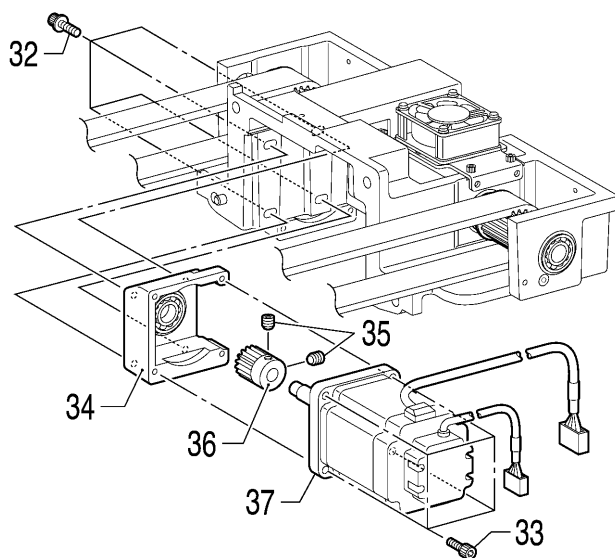


- |                                |                                 |
|--------------------------------|---------------------------------|
| 1. Bolts with washers [2 pcs]  | 15. X motor                     |
| 2. Bolts [16 pcs]              | 16. Set screws [2 pcs] (Loosen) |
| 3. Y base plate assembly       | 17. X motor gear                |
| 4. Bolts [4 pcs]               | 18. Set screws [8 pcs] (Loosen) |
| 5. Belt holder                 | 19. Retaining rings C [2 pcs]   |
| 6. Bolts [16 pcs]              | 20. X drive shaft               |
| 7. X base plate                | 21. X gear                      |
| 8. Screws [2 pcs]              | 22. Pulley B assembly           |
| 9. Fan bracket                 | 23. Set screws [2 pcs] (Loosen) |
| 10. Screws [4 pcs]             | 24. Pulley fulcrum shaft        |
| 11. Fan                        | 25. Pulley A assembly           |
| 12. Bolts with washers [4 pcs] | 26. Pulley fulcrum shaft collar |
| 13. X motor bracket            | 27. X pulley bracket            |
| 14. Bolts [4 pcs]              | 28. X-GT belt                   |

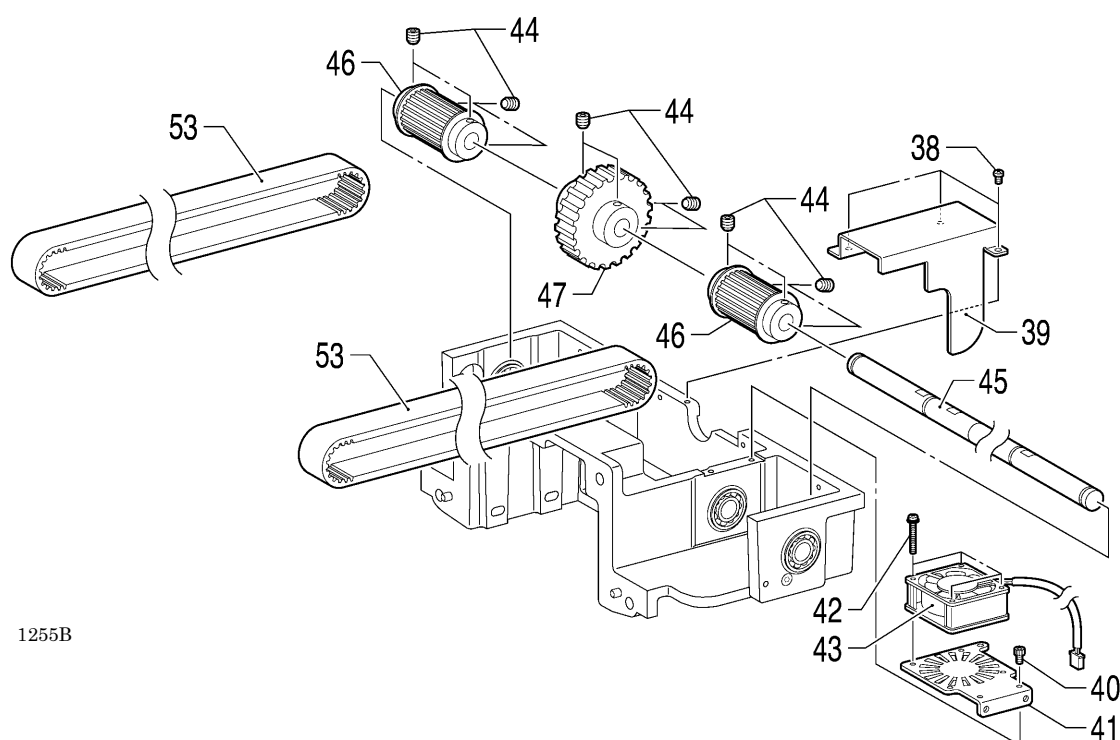


- 29. Bolts with washers [4 pcs]
- 30. Bolts with washers [8 pcs]
- 31. Belt holders [2 pcs]
- 32. Bolts with washers [4 pcs]
- 33. Bolts [4 pcs]
- 34. Y motor bracket
- 35. Set screws [2 pcs] (Loosen)
- 36. Y motor gear
- 37. Y motor
- 38. Screws [3 pcs]
- 39. Y gear cover
- 40. Bolts [2 pcs]
- 41. Fan bracket
- 42. Screws [4 pcs]
- 43. Fan
- 44. Set screws [12 pcs] (Loosen)
- 45. Y drive shaft
- 46. Pulley B assemblies [2 pcs]
- 47. Y gear
- 48. Set screws [4 pcs] (Loosen)
- 49. Pulley fulcrum shafts [2 pcs]
- 50. Pulley fulcrum shaft collars [2 pcs]
- 51. Pulley A assemblies [2 pcs]
- 52. Y pulley brackets [2 pcs]
- 53. Y-GT belts [2 pcs]

1253B



1254B

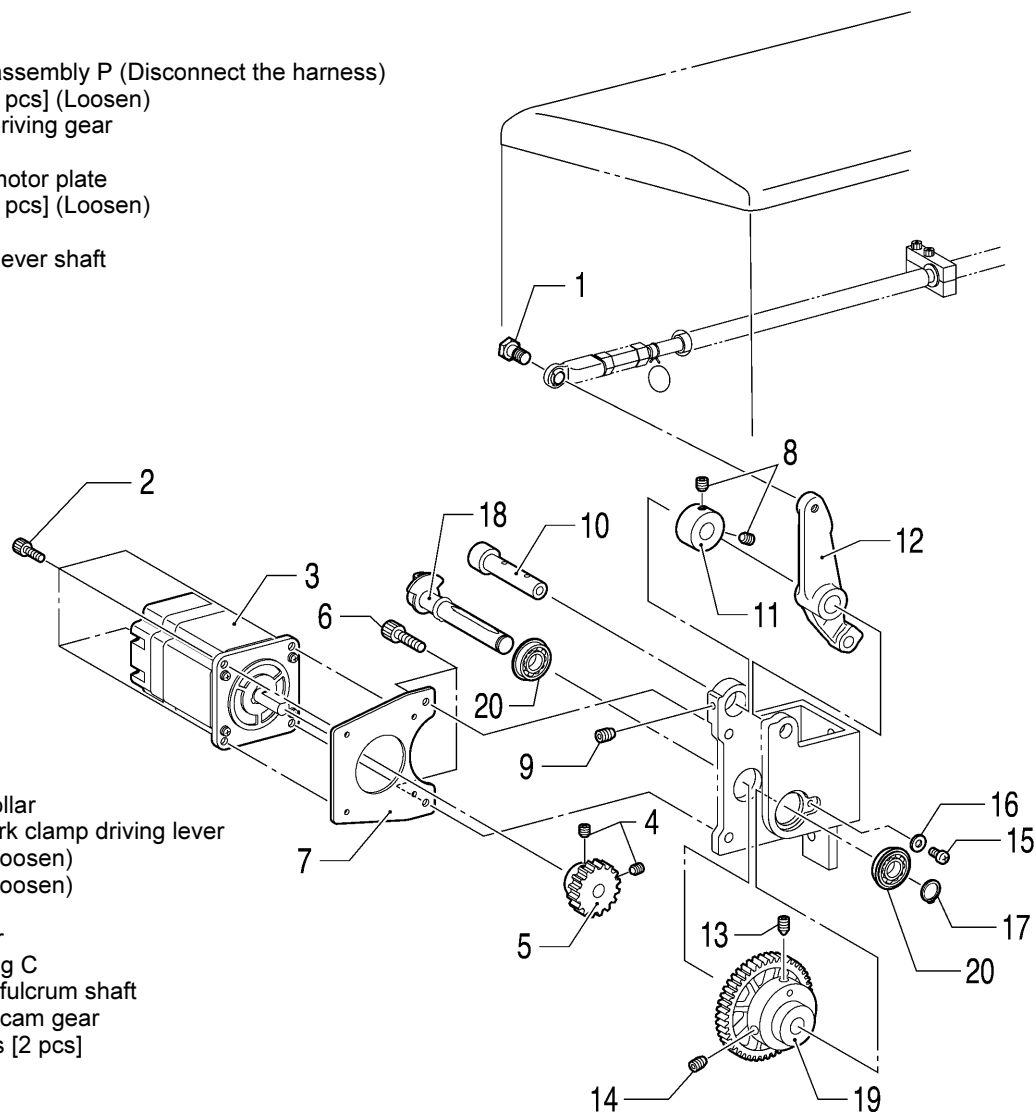


1255B

## 5-10. Work clamp lifter mechanism

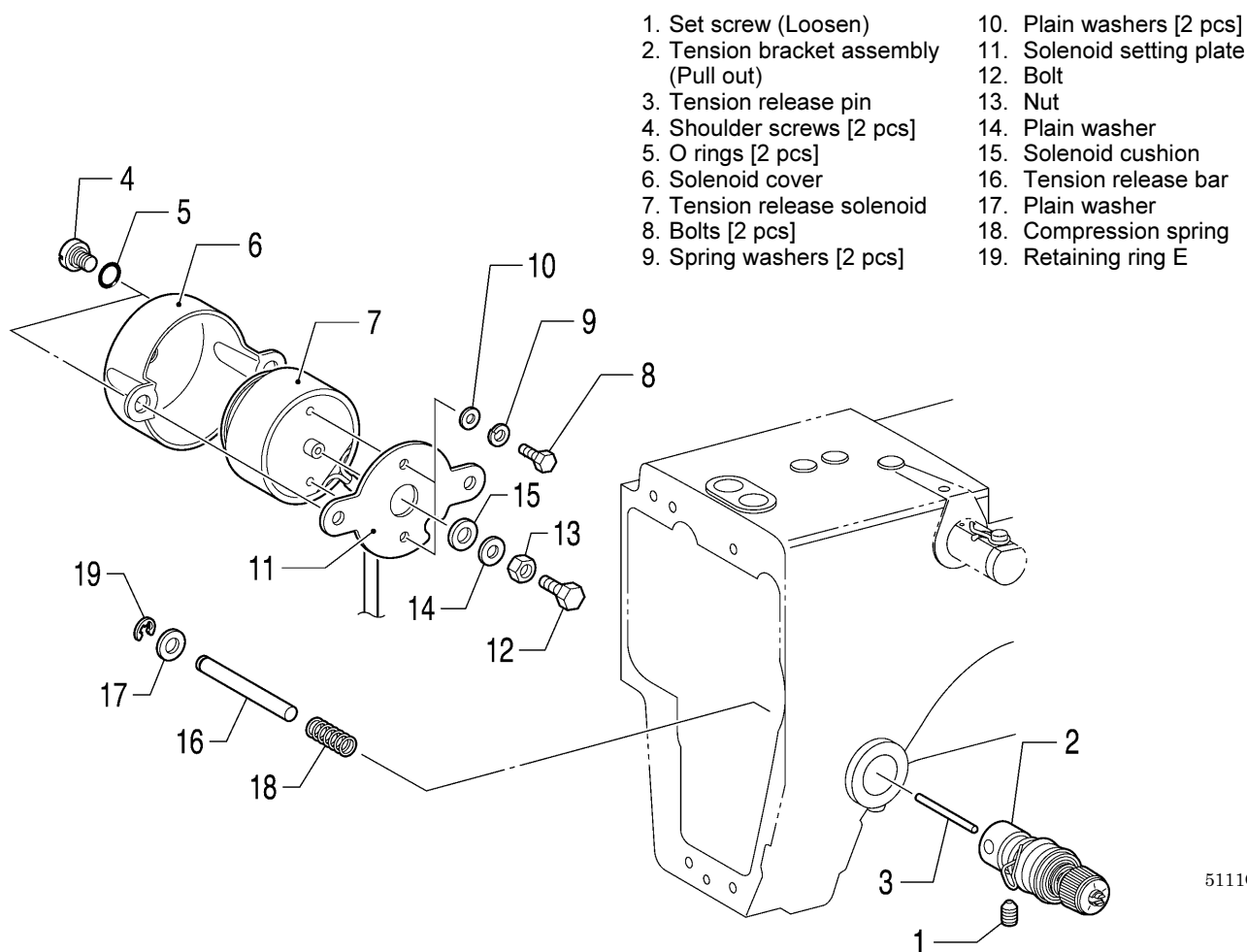
1. Bolt
2. Bolts [4 pcs]
3. Pulse motor assembly P (Disconnect the harness)
4. Set screws [2 pcs] (Loosen)
5. Work clamp driving gear
6. Bolts [2 pcs]
7. Work clamp motor plate
8. Set screws [2 pcs] (Loosen)
9. Set screw
10. Work clamp lever shaft

11. Set screw collar
12. Stepping work clamp 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]

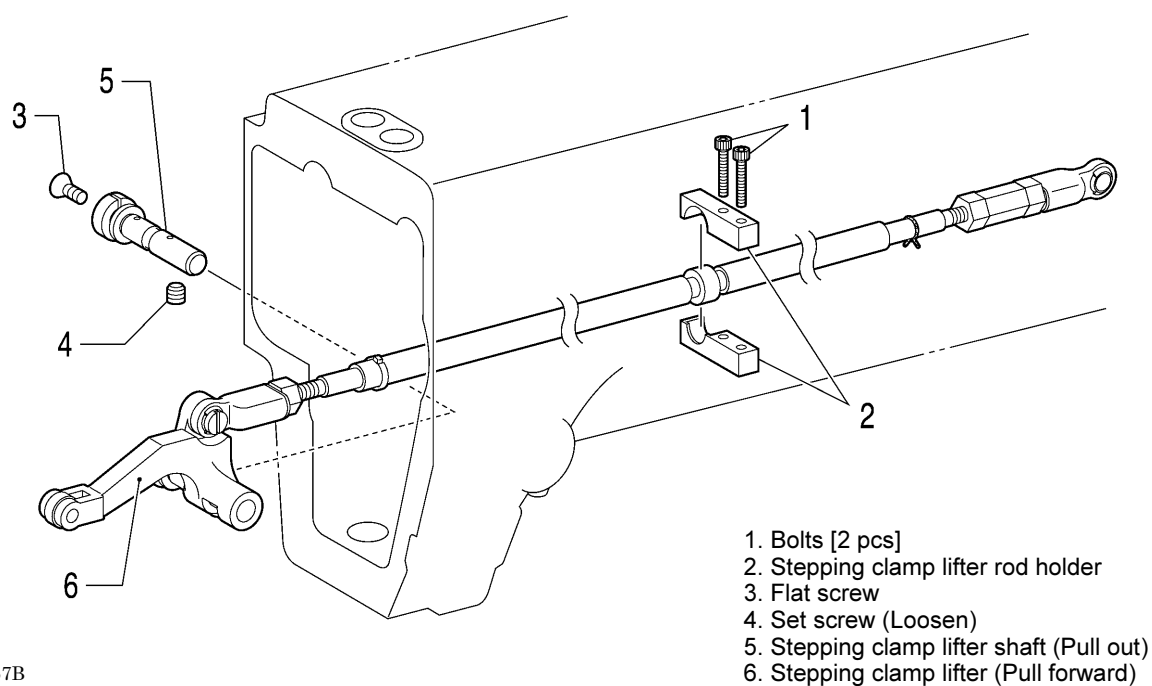


1256B

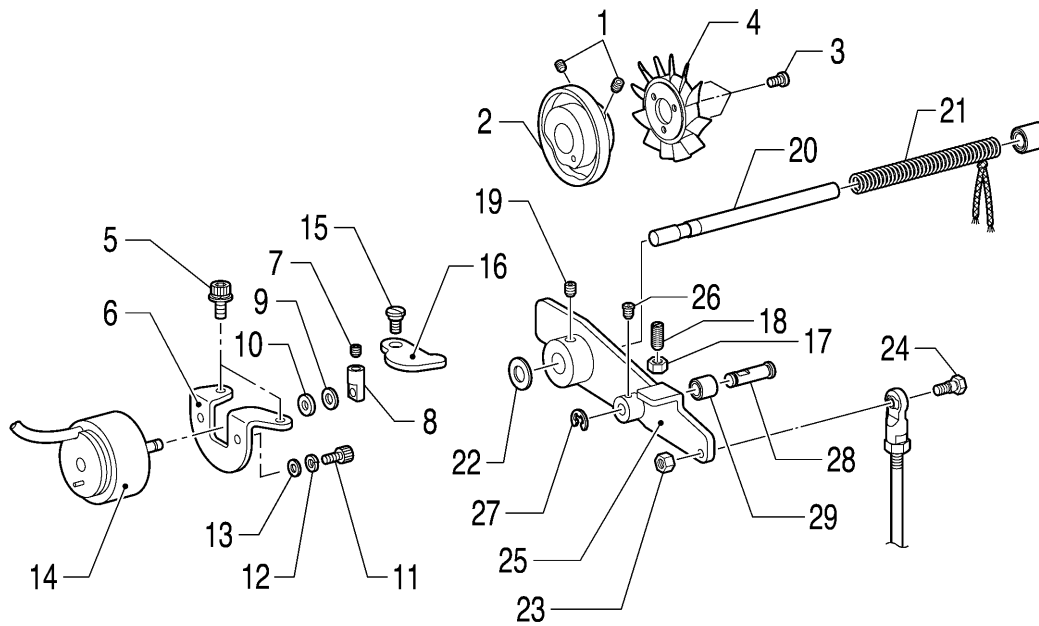
## 5-11. Tension release mechanism



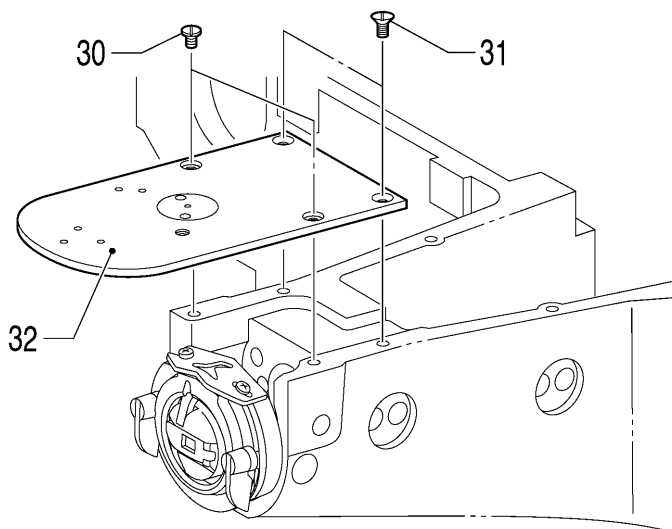
## 5-12. Intermittent presser foot lifter mechanism (2)



## 5-13. Thread trimmer mechanism

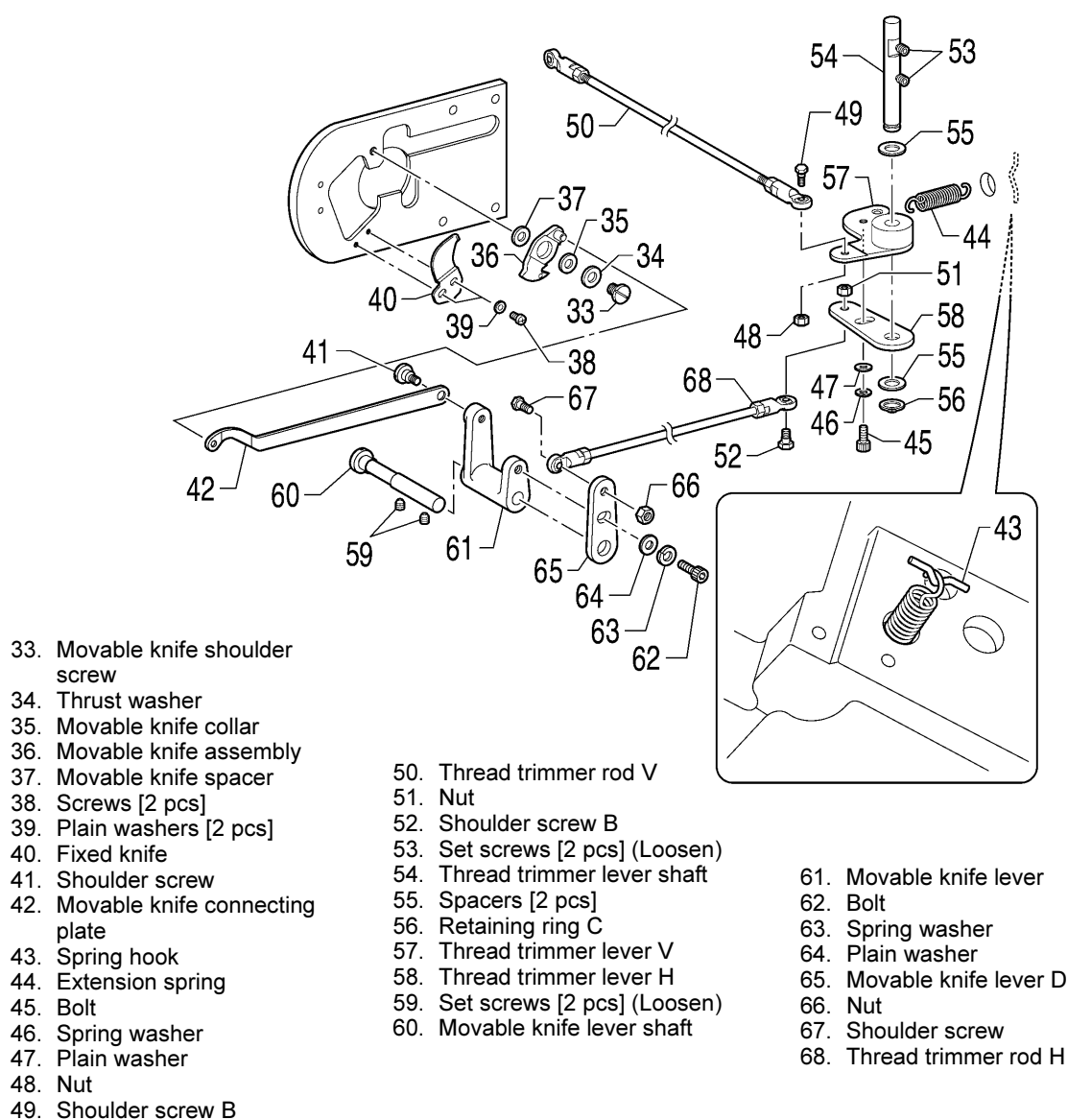


1317B



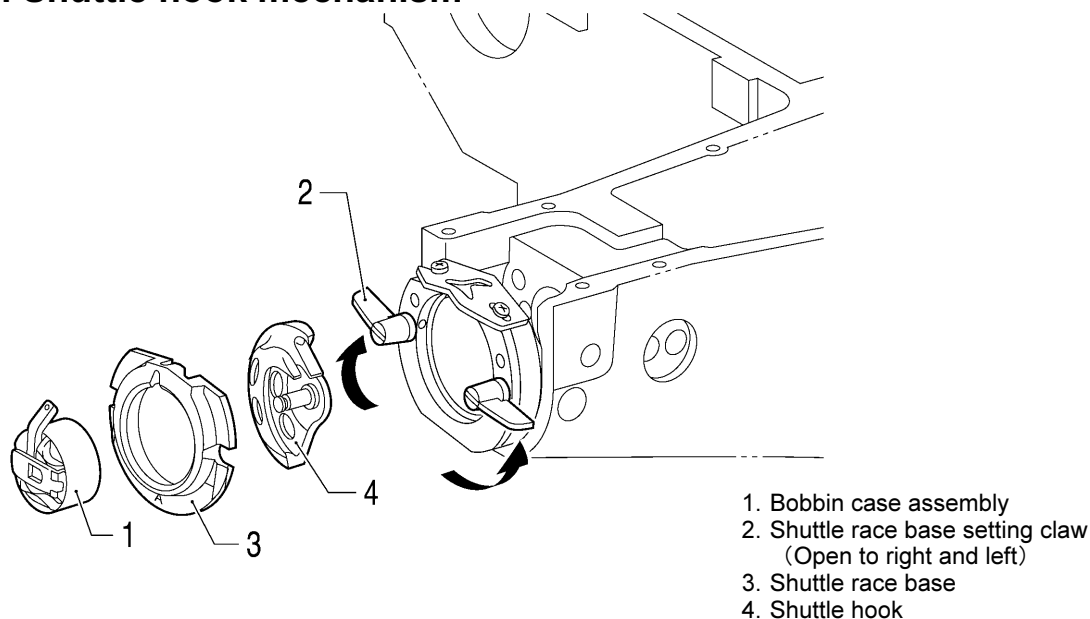
1258B

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



1259B

## 5-14. Shuttle hook mechanism



1318B

## 6. ASSEMBLY

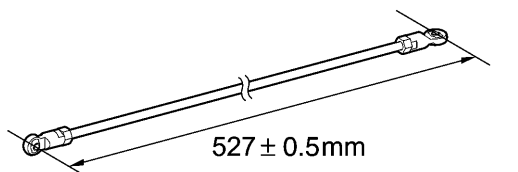
Assemble each part in order of the numbers.

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

### 6-1. Thread trimmer mechanism (1)

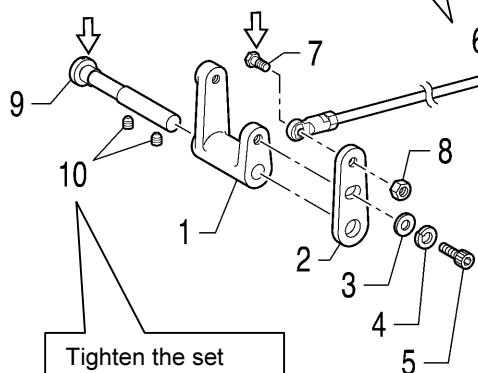
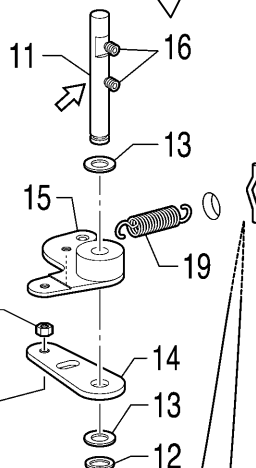
Apply the grease <SA8837-001> specified by Brother in the places indicated by .

When the ball joint assembly of the thread trimmer rod H (6) has been disassembled, assemble it so that the distance between the centers of the holes is  $527 \pm 0.5$  mm.

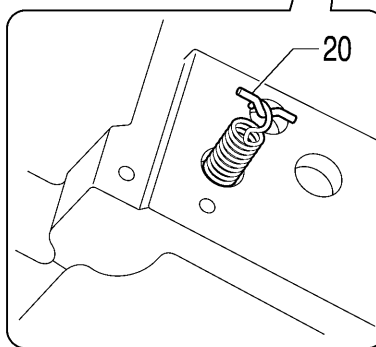


1267B

Tighten the two set screws (16) on the screw stop while lightly pressing the thread trimmer lever shaft.



Tighten the set screw on the screw stop while lightly pressing the movable knife lever shaft.

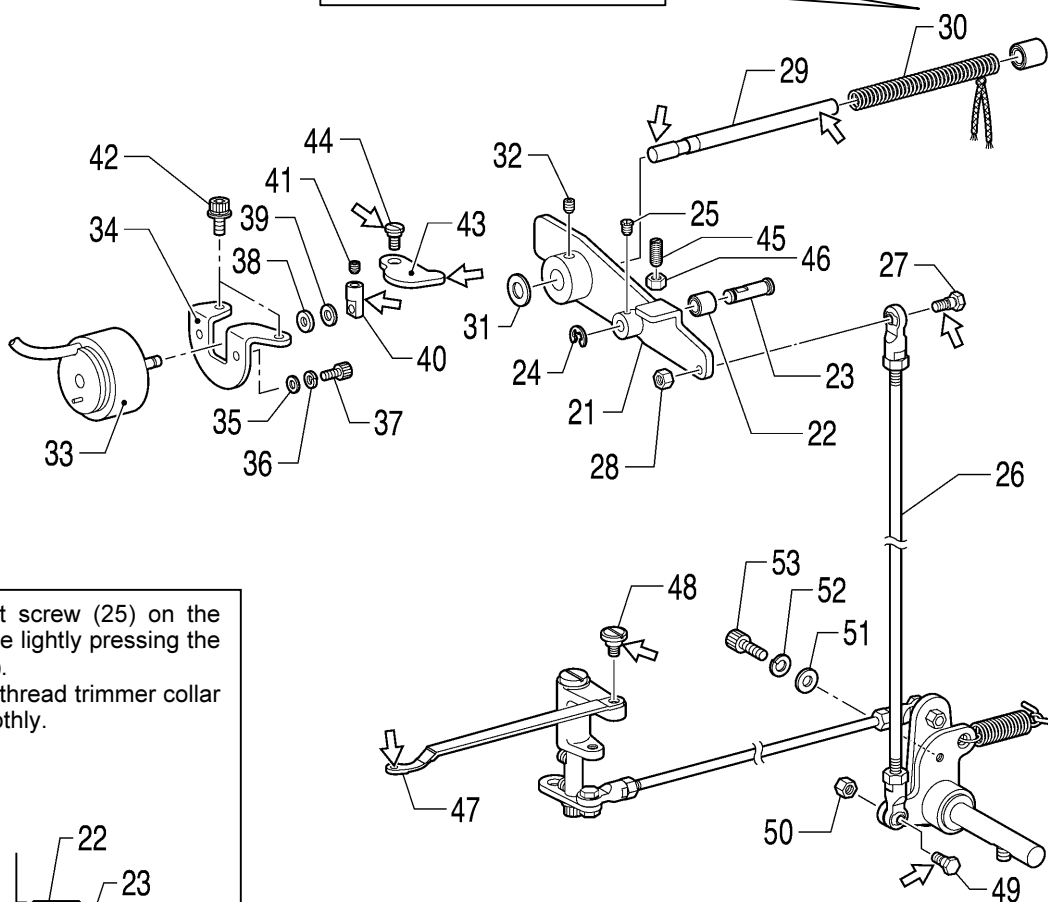


1268B

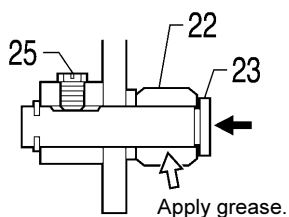
1. Movable knife lever
2. Movable knife lever D
3. Plain washer
4. Spring washer
5. Bolt
6. Thread trimmer rod H
7. Shoulder screw
8. Nut
9. Movable knife lever shaft
10. Set screws [2 pcs]
11. Thread trimmer lever shaft
12. Retaining ring C
13. Spacers [2 pcs]
14. Thread trimmer lever H
15. Thread trimmer lever V
16. Set screws [2 pcs]
17. Shoulder screw B
18. Nut
19. Extension spring
20. Spring hook



Assemble so that the wick is hanging down.



Tighten the set screw (25) on the screw stop while lightly pressing the collar shaft (23). Check that the thread trimmer collar (22) turns smoothly.

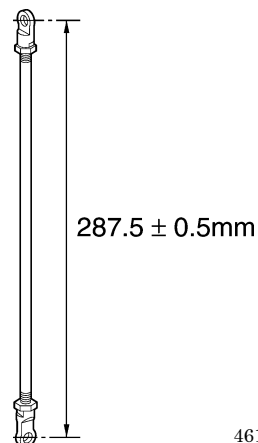


1270B

1269B

- |                             |                                    |
|-----------------------------|------------------------------------|
| 21. Thread driving lever    | 38. Solenoid cushion               |
| 22. Thread trimmer collar   | 39. Washer                         |
| 23. Collar shaft            | 40. Solenoid lever                 |
| 24. Retaining ring E        | 41. Set screw                      |
| 25. Set screw               | 42. Bolts with washers [2 pcs]     |
| 26. Thread trimmer rod V    | 43. Driving lever pushing lever    |
| 27. Shoulder screw B        | 44. Shoulder screw                 |
| 28. Nut                     | 45. Set screw                      |
| 29. Guide shaft             | 46. Nut                            |
| 30. Compression spring      | 47. Movable knife connecting plate |
| 31. Cushion                 | 48. Shoulder screw                 |
| 32. Set screw               | 49. Shoulder screw B               |
| 33. Thread trimmer solenoid | 50. Nut                            |
| 34. Solenoid bracket        | 51. Plain washer                   |
| 35. Plain washers [2 pcs]   | 52. Spring washer                  |
| 36. Spring washers [2 pcs]  | 53. Bolt                           |
| 37. Bolts [2 pcs]           |                                    |

When the ball joint assembly of the thread trimmer rod V (26) has been disassembled, assemble it so that the distance between the centers of the holes is  $287.5 \pm 0.5$  mm.



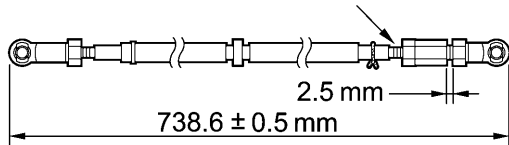
4615Q

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

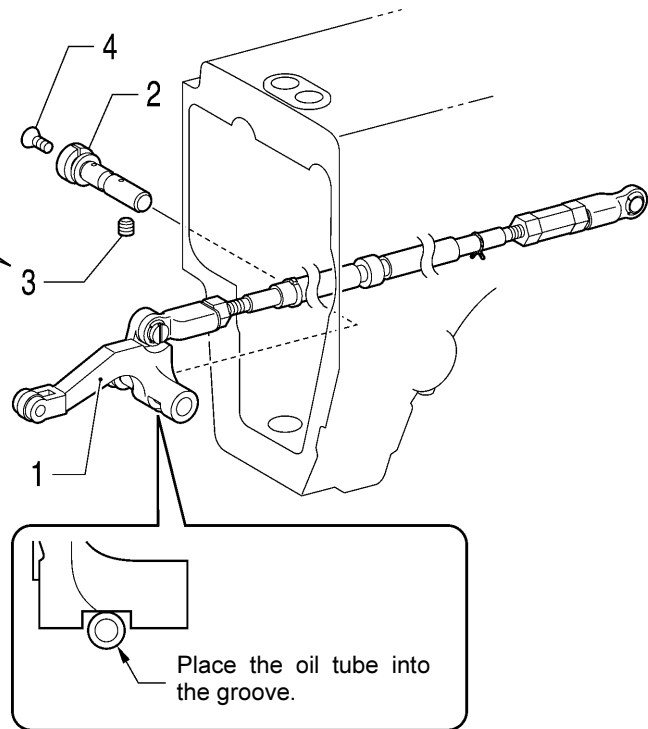
Tighten the set screw (3) on the screw stop while lightly pressing the stepping clamp lifter shaft (2).

### <Stepping clamp lifter rod adjustment> 1272B

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

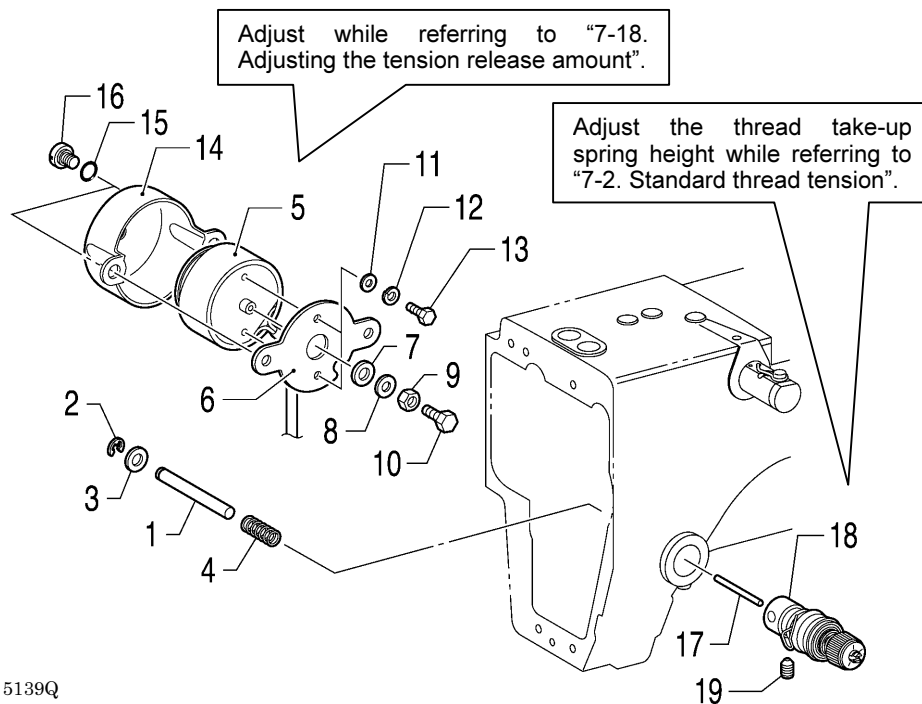


1. Stepping clamp lifter (Insert from the front)
2. Stepping clamp lifter shaft
3. Set screw
4. Flat screw



1271B

## 6-3. Tension release mechanism



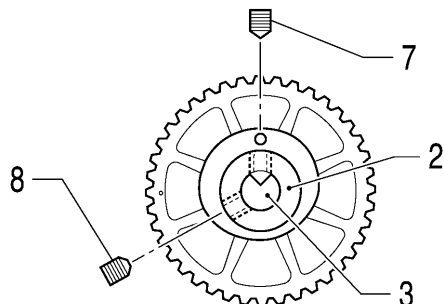
1. Tension release bar
2. Retaining ring E
3. Plain washer
4. Compression spring
5. Tension release solenoid
6. Solenoid setting plate
7. Solenoid cushion
8. Plain washer
9. Nut
10. Bolt
11. Plain washers [2 pcs]
12. Spring washers [2 pcs]
13. Bolts [2 pcs]
14. Solenoid cover
15. O rings [2 pcs]
16.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

5139Q

## 6-4. Work clamp lifter mechanism

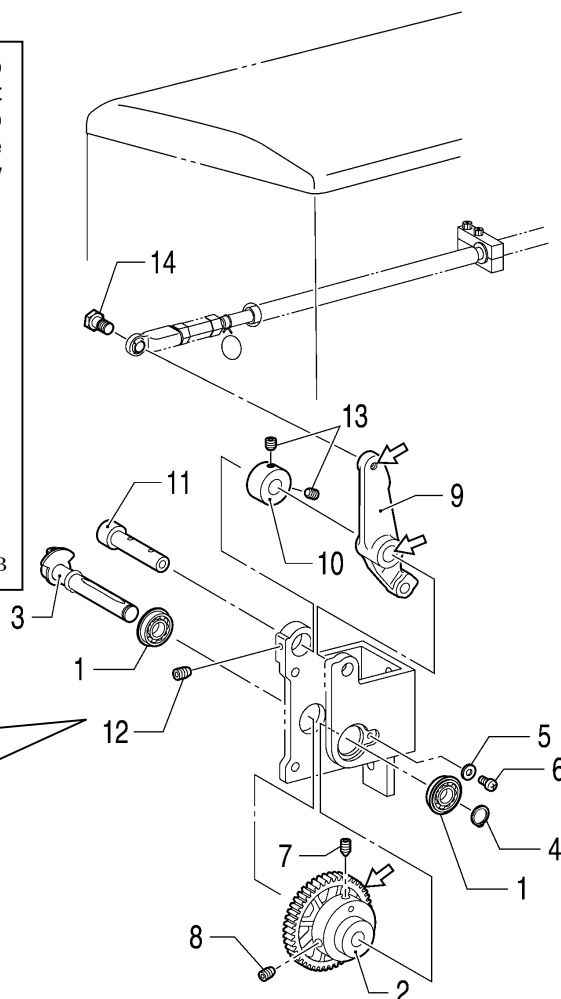
Apply the grease <SA8837-001> specified by Brother in the places indicated by ←.

Set the work clamp cam gear (2) 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 (3) with the thread on the hole side of the work clamp cam gear (2). Then tighten the set screw (7).



1354B

Align the screw stop, and then tighten the screw (12) so that there is no play in the stepping work clamp driving lever (9) and the set screw collar (10). Check that the stepping work clamp driving lever (9) turns smoothly.

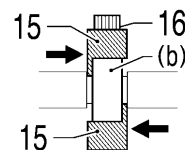


1273B

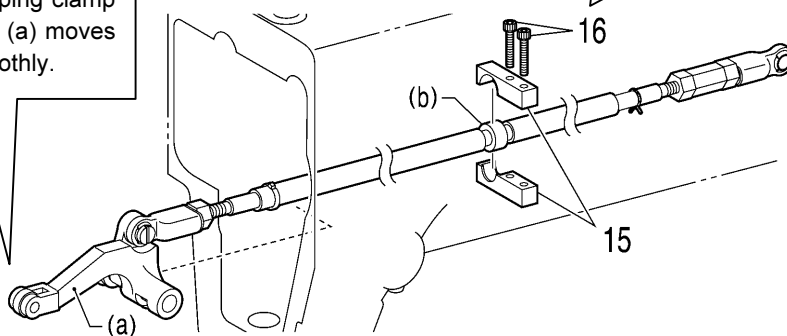
1. Ball bearings [2 pcs]
2. Work clamp cam gear
3. Work clamp fulcrum shaft
4. Retaining ring C
5. Plain washer
6. Screw
7. Set screw
8. Set screw
9. Stepping work clamp driving lever
10. Set screw collar
11. Work clamp lever shaft
12. Set screw
13. Set screws [2 pcs]
14. Shoulder screw
15. Stepping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

After installing the stepping clamp lifter rod holders (15), check that the stepping clamp lifter (a) moves smoothly.

Gently fit the rubber bushing (b) into the stepping clamp lifter rod holders (15), and then secure it with the two bolts (16).



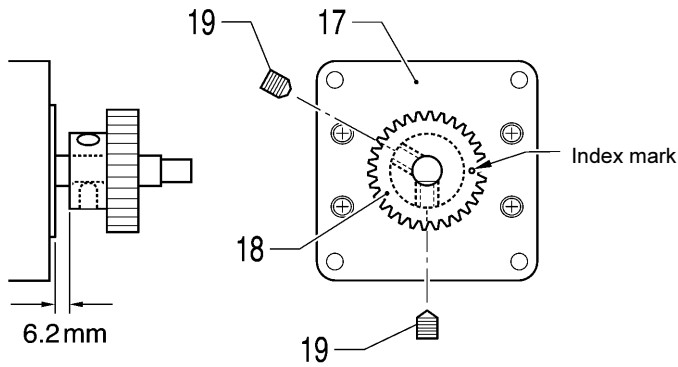
1390B



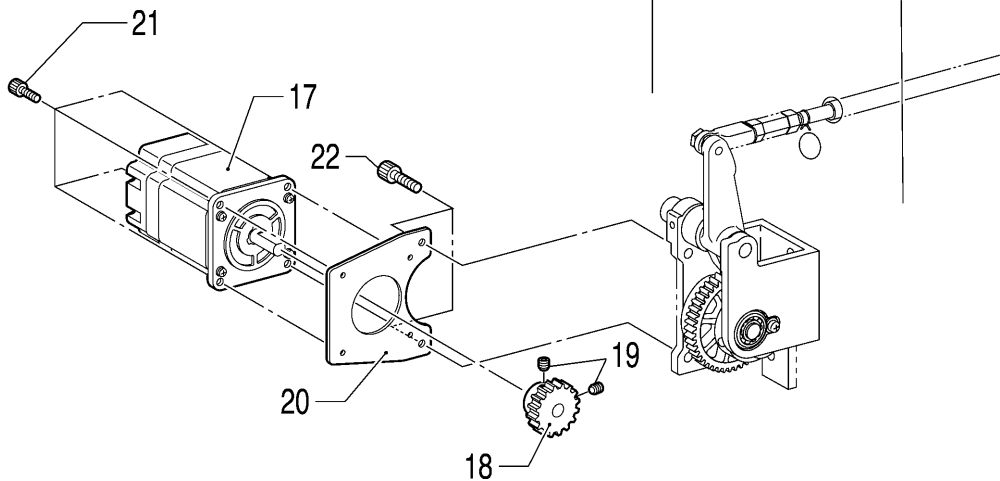
1274B

(Continued on the next page.)

1275B

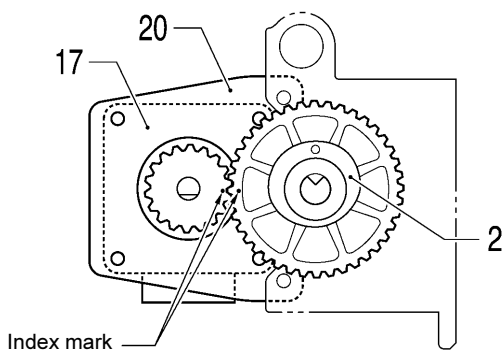


- 1) With the screw stop of the pulse motor assembly P (17) facing downward and the index mark on the work clamp driving gear (18) facing to the right, adjust so that the clearance between the pulse motor assembly P (17) and the work clamp driving gear (18) is 6.2 mm, and then tighten the two set screws (19).



1276B

1277B



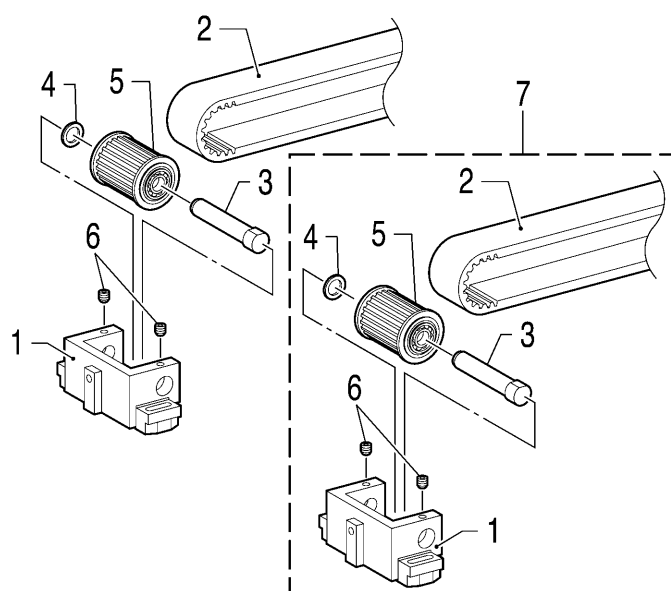
- 2) Install the pulse motor assembly P (17) to the work clamp motor plate (20) with the four bolts (21) so that the motor connector is facing downward.
- 3) Align the index marks on the work clamp cam gear and the work clamp driving gear, and then install the work clamp motor plate (20) with the two bolts (22) so that there is no backlash.

- 17. Pulse motor assembly P
- 18. Work clamp driving gear
- 19. Set screws [2 pcs]
- 20. Work clamp motor plate
- 21. Bolts [4 pcs]
- 22. Bolts [2 pcs]

## 6-5. Feed mechanism

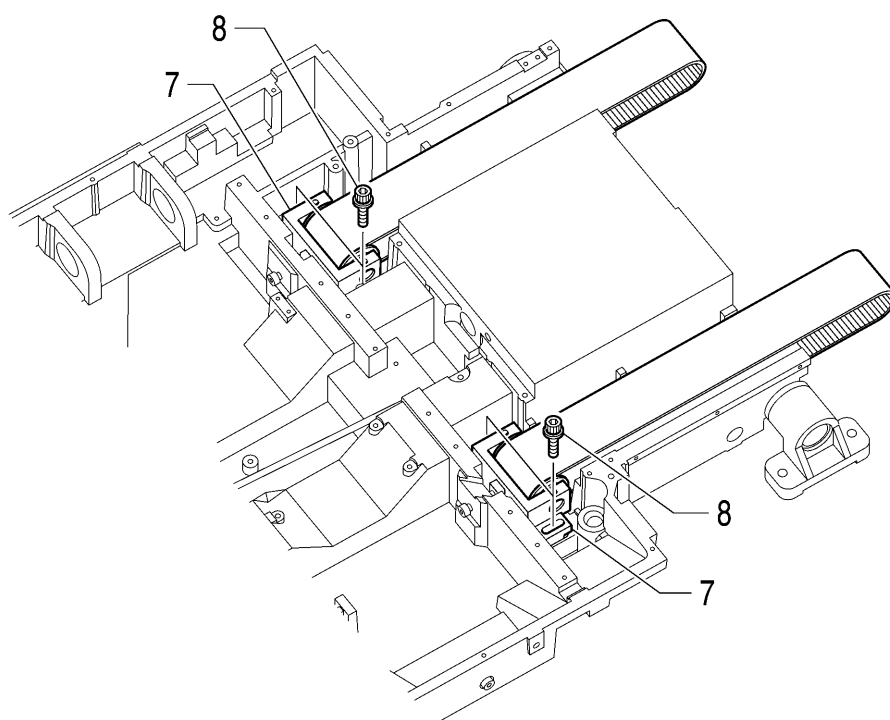
### 6-5-1. Y-feed mechanism

Apply the grease <SA8837-001> specified by Brother in the places indicated by ←



1. Y-pulley brackets [2 pcs]
2. Y-GT belts [2 pcs]
3. Pulley fulcrum shafts [2 pcs]
4. Pulley fulcrum shaft collars [2 pcs]
5. Pulley A assemblies [2 pcs]
6. Set screws [4 pcs]
7. Y-pulley bracket assemblies [2 pcs]
8. Bolts with washers [4 pcs]  
(Temporarily tighten)

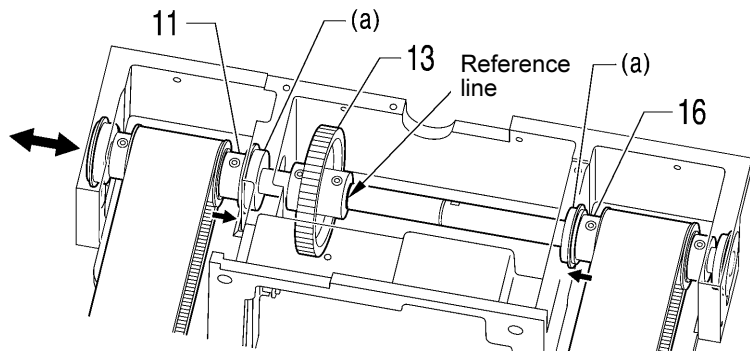
1278B



1279B

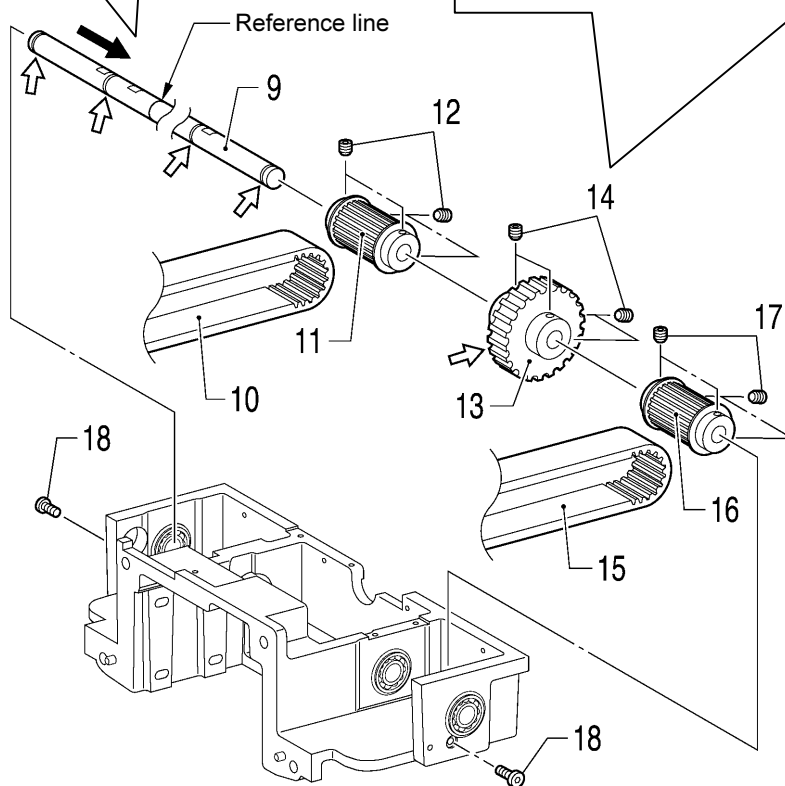
(Continued on the next page)

Align the reference line and the edge of the Y gear (13), and then tighten the set screw. Push the pulley B assembly (11) and pulley B assembly (16) against the ball bearings (a), tighten the set screw, and then move the Y drive shaft (9) in the direction of the arrow and check that there is no play.

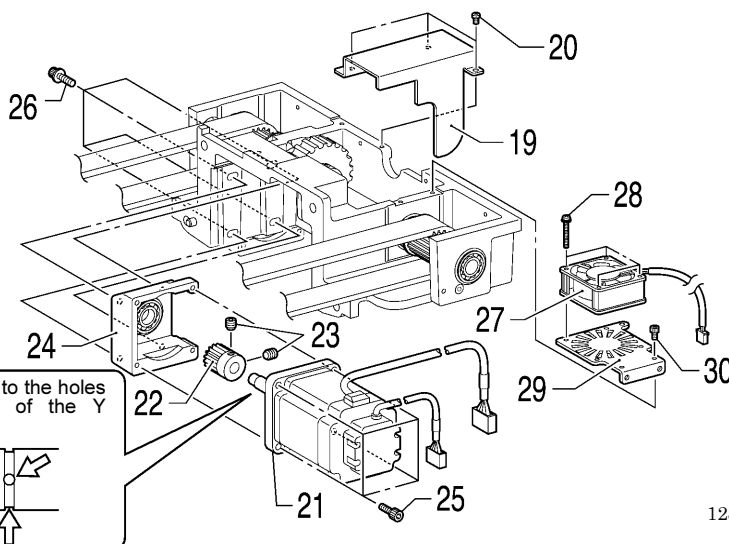


1281B

Before inserting the Y drive shaft (9), apply grease in the places indicated by ←.

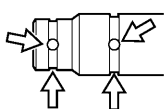


- 9. Y drive shaft
- 10. Y-GT belt
- 11. Pulley B assembly
- 12. Set screws [4 pcs]
- 13. Y gear
- 14. Set screws [4 pcs]
- 15. Y-GT belt
- 16. Pulley B assembly
- 17. Set screws [4 pcs]
- 18. Screws [2 pcs]



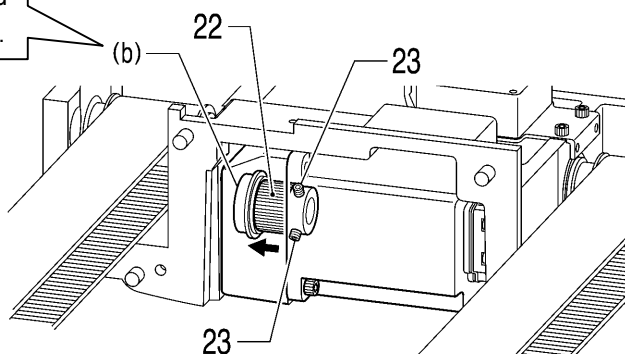
- 19. Y gear cover
- 20. Screws [3 pcs]
- 21. Y motor
- 22. Y motor gear
- 23. Set screws [3 pcs]
- 24. Y motor bracket
- 25. Bolts [4 pcs]
- 26. Bolts with washers [4 pcs] (Temporarily tighten)
- 27. Fan
- 28. Screws [4 pcs]
- 29. Fan bracket
- 30. Bolts [2 pcs]

Apply grease to the holes and grooves of the Y motor shaft.

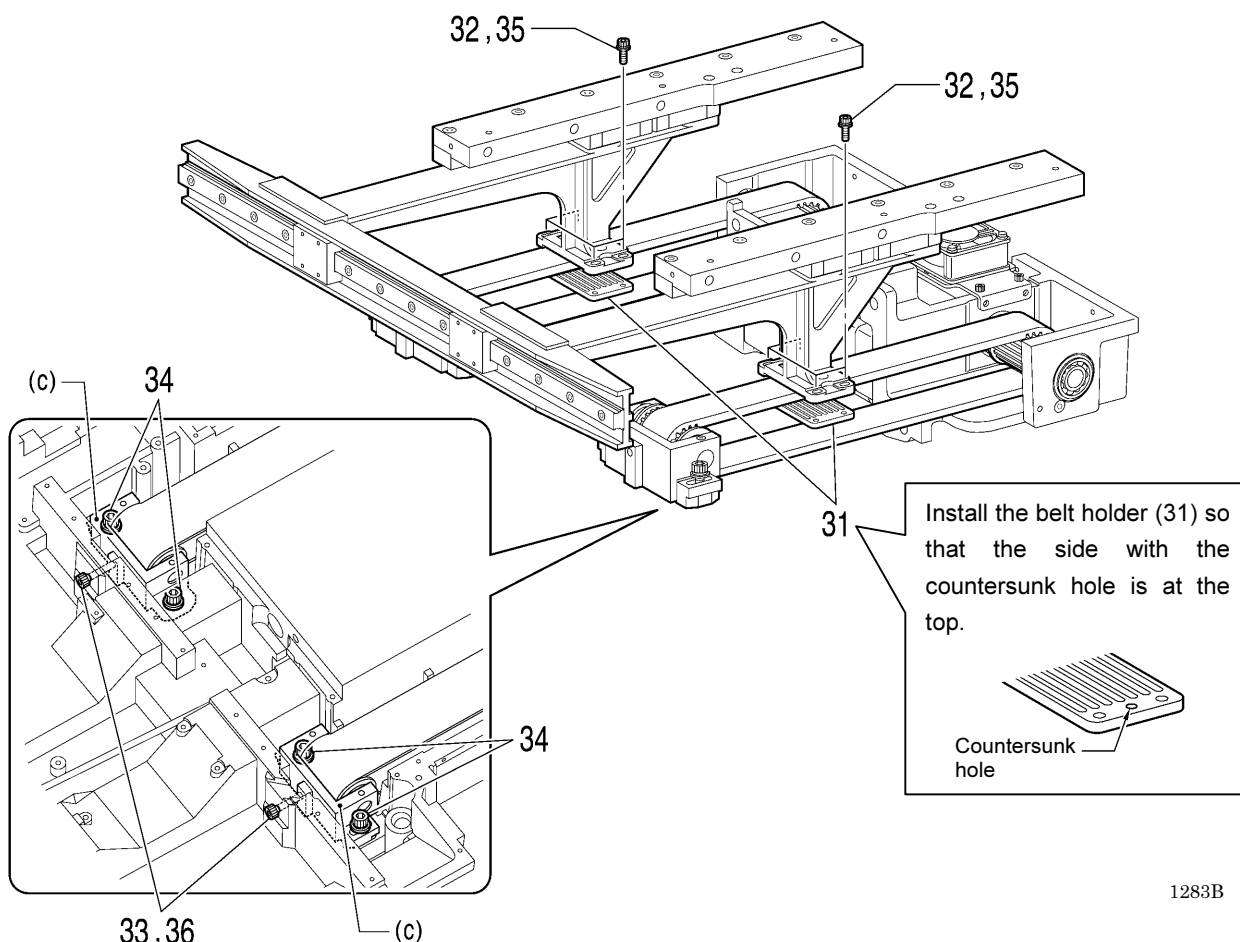


1282B

Place the Y motor gear (22) against ball bearing (b), and then tighten the set screw (23).



1391B



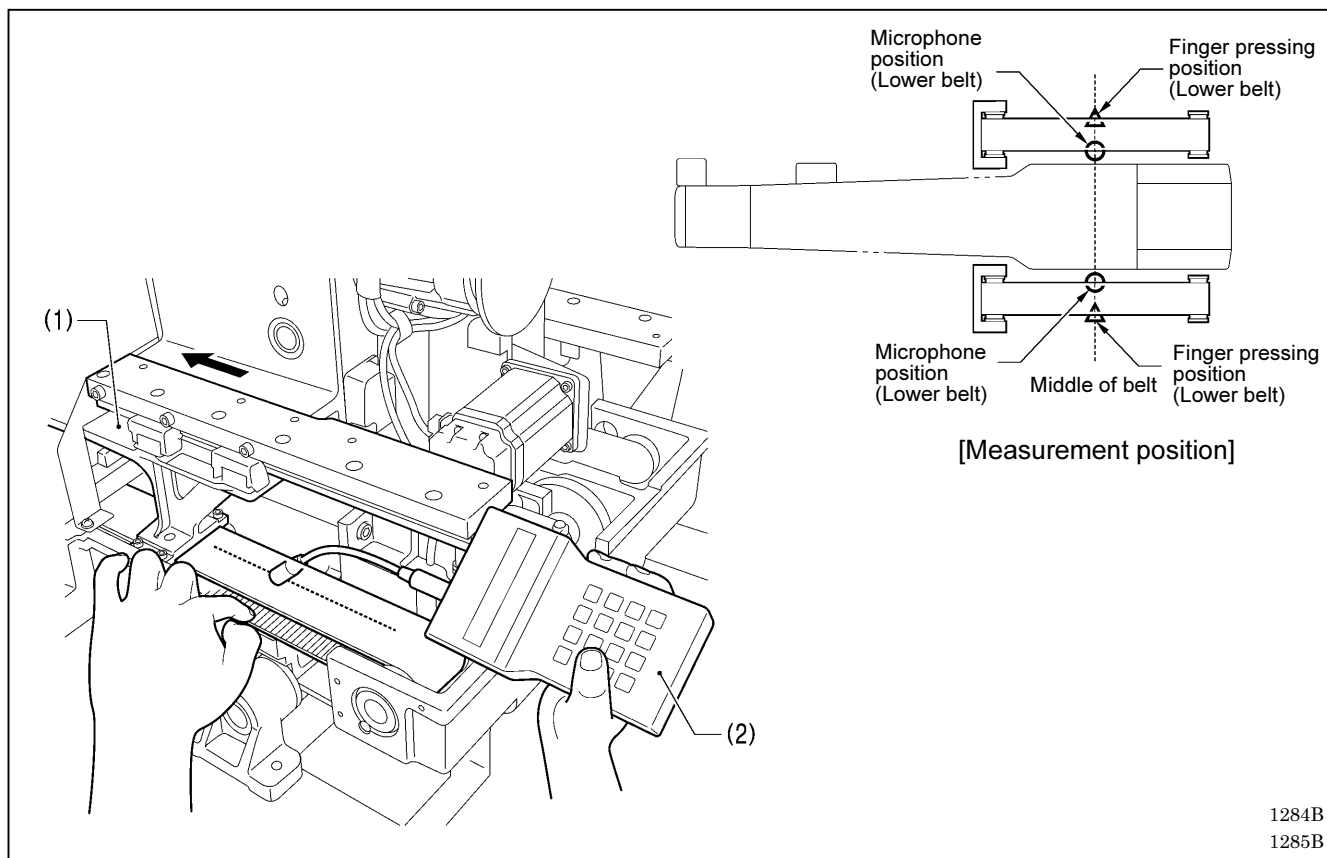
1283B

Tighten the two bolts (M6X35) (33) into the holes in the side of the bed, and then pull the Y pulley bracket assembly (c) to adjust the belt tension.

- 31. Belt holders [2 pcs]
- 32. Bolts [8 pcs] (Temporarily tighten)
- 33. Bolts M6X35 [2 pcs] (Tighten and then pull.)
- 34. Bolts with washers [4 pcs] (Fully tighten)
- 35. Bolts [2 pcs] (Fully tighten)
- 36. Bolts M6X35 [2 pcs] (Remove)

\* After adjusting the belt tension, measure the tension. (Refer to the next page.)

(Continued on the next page.)



1284B  
1285B

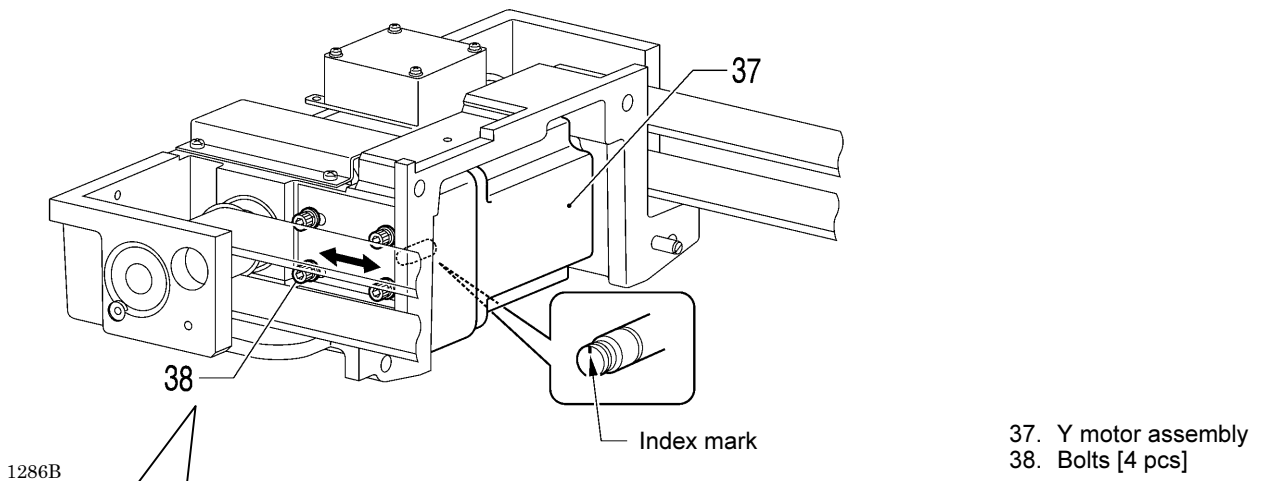
### <Measuring the tension>

1. Move the Y arm (1) forward (in the direction of the arrow) as far as it will go.
2. Use a tension gauge (2) to measure the tension at the middle of the lower belt while referring to "Measurement position" in the illustration.

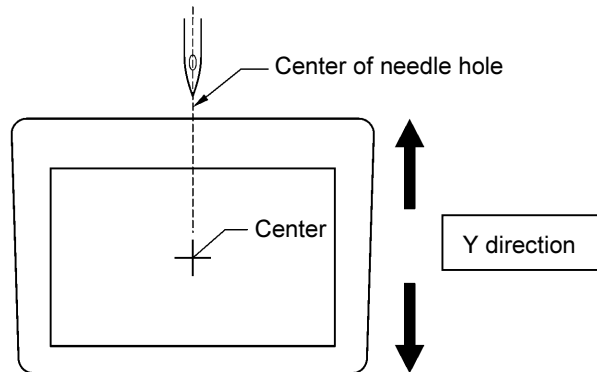
\* Check that the value for the belt tension is within the following value ranges.  
[For a new belt: 650 to 750 N; For a reused belt: 520 to 600 N]

- \* Be sure to use a belt tension gauge to measure the belt tension, and measure from the middle of the lower belt.
- \* The belt tension gauge should be set to measure a unit weight of 0.04 kg/m, a belt width of 50 mm and a span length of 333 mm.
- \* It is recommended that you use the Yunita U-505 tension gauge.





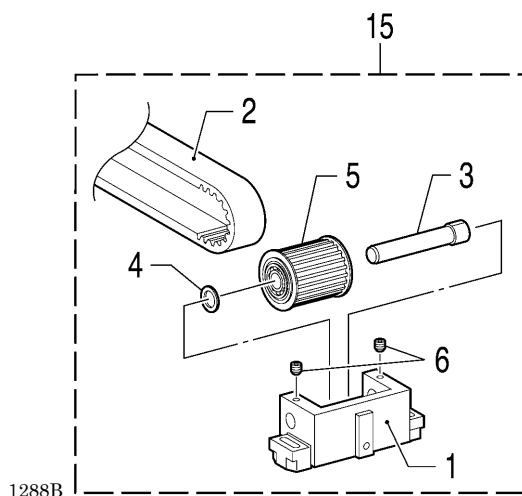
Move the feed plate in the Y direction so that the center of the feed plate is aligned with the center of the needle hole, and then install the Y motor so that the index mark on the end of the Y motor shaft is facing directly upward.



1287B

## 6-5-2. X-feed mechanism

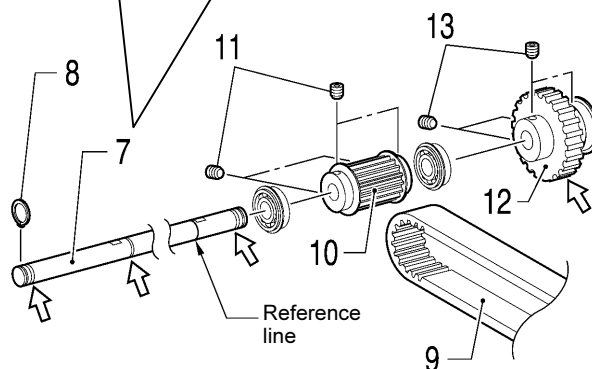
Apply the grease <SA8837-001> specified by Brother in the place indicated by ←



1. X pulley bracket
2. X-GT belt
3. Pulley fulcrum shaft
4. Pulley fulcrum shaft collar
5. Pulley A assembly
6. Set screws [2 pcs]

Before inserting the X drive shaft (7), apply grease in the place indicated by ←.

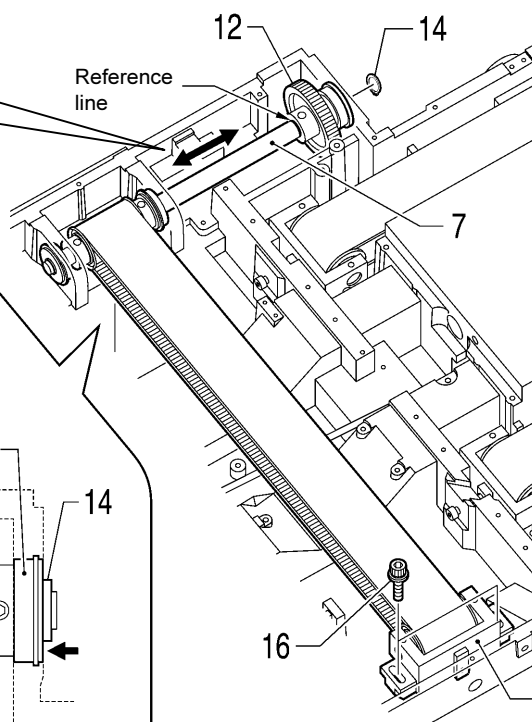
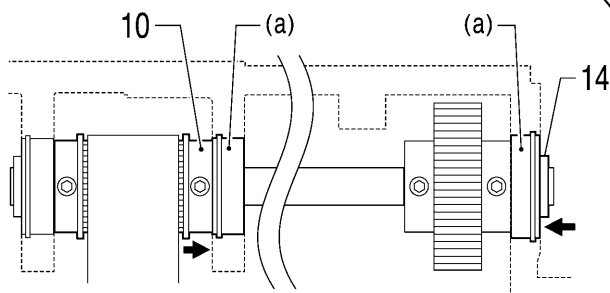
7. X drive shaft
8. Retaining ring
9. X-GT belt
10. Pulley B assembly
11. Set screws [4 pcs]
12. X gear
13. Set screws [4 pcs]
14. Retaining ring
15. X pulley bracket assembly
16. Bolts with washers [2 pcs] (Temporarily tighten)



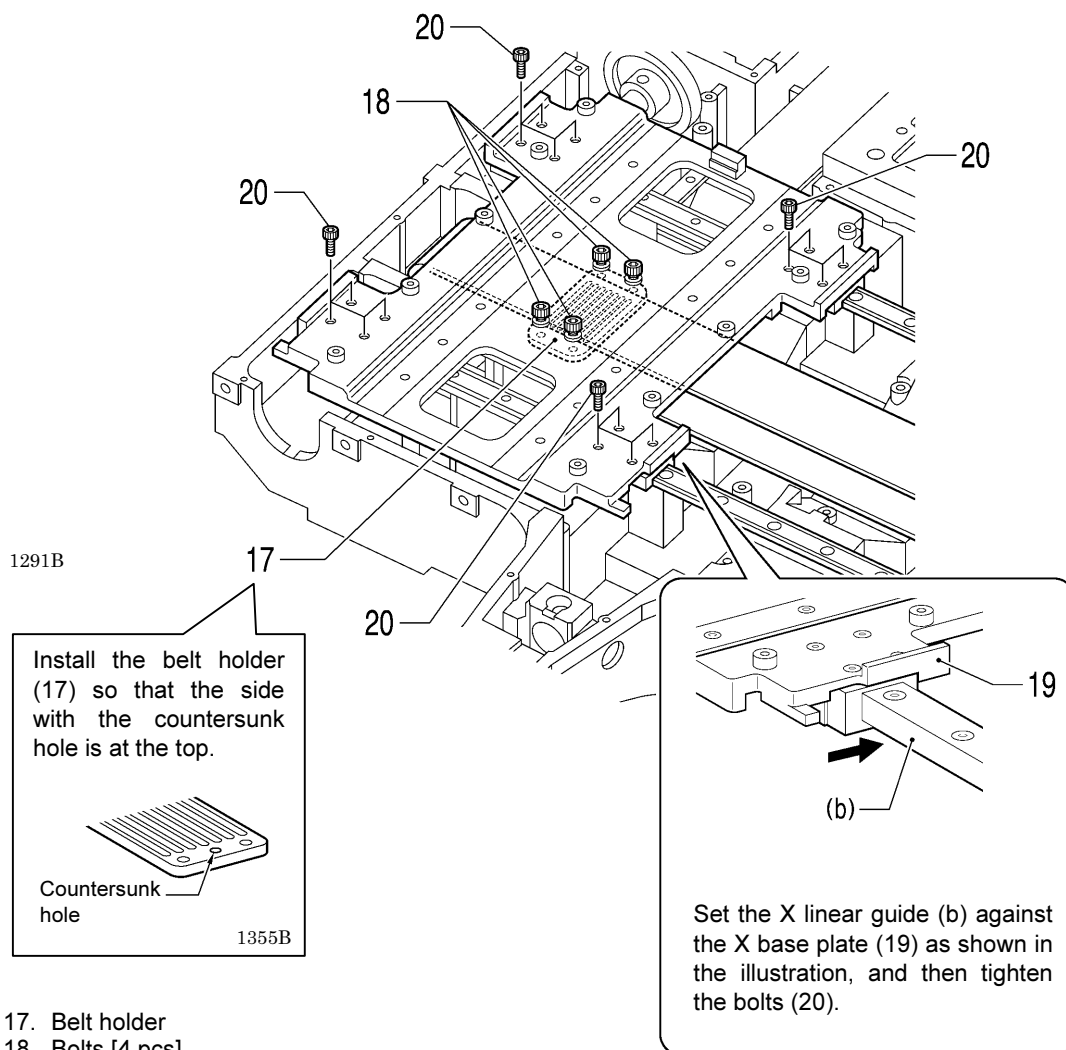
1289B

Align the reference line and the edge of the X gear (12), and then tighten the set screws (13).

Push the retaining ring (14) and the pulley B assembly (10) against the ball bearings (a), tighten the set screws (11), and then move the X drive shaft (7) in the direction of the arrow and check that there is no play.

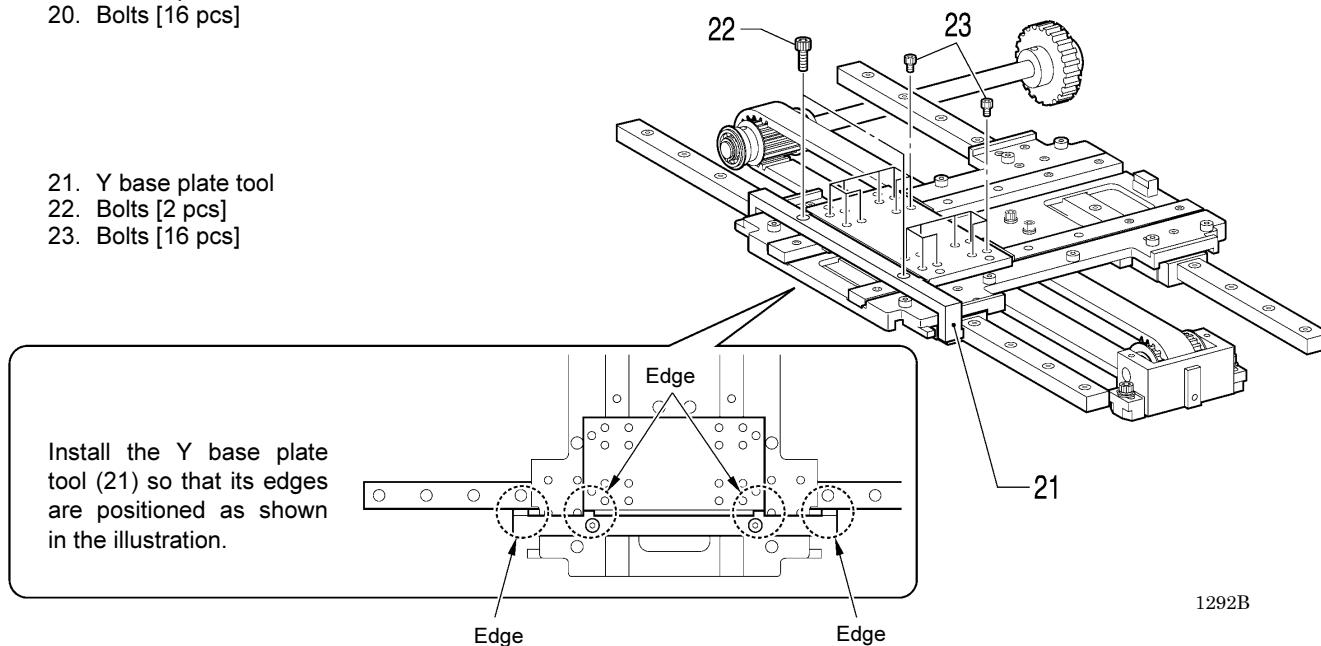


1290B



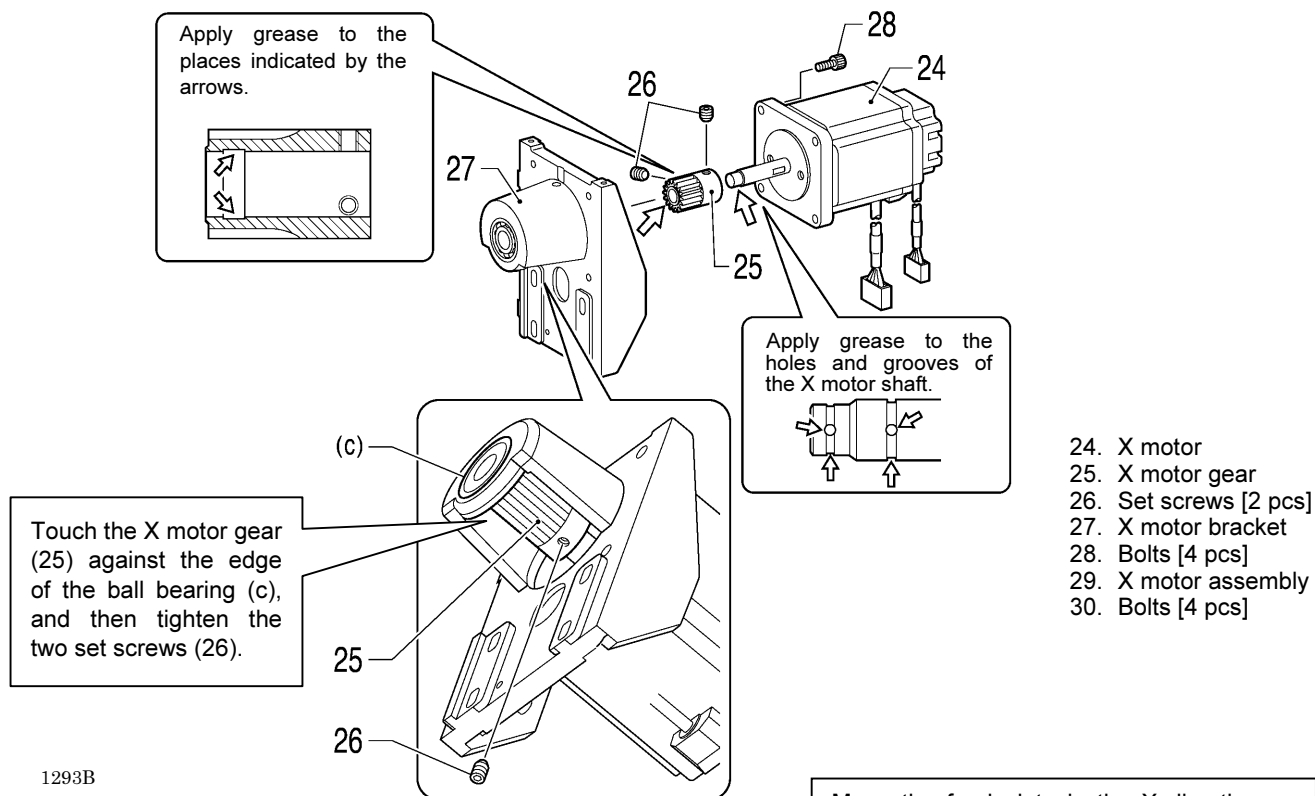
- 17. Belt holder
- 18. Bolts [4 pcs]  
(Temporarily tighten)
- 19. X base plate
- 20. Bolts [16 pcs]

- 21. Y base plate tool
- 22. Bolts [2 pcs]
- 23. Bolts [16 pcs]

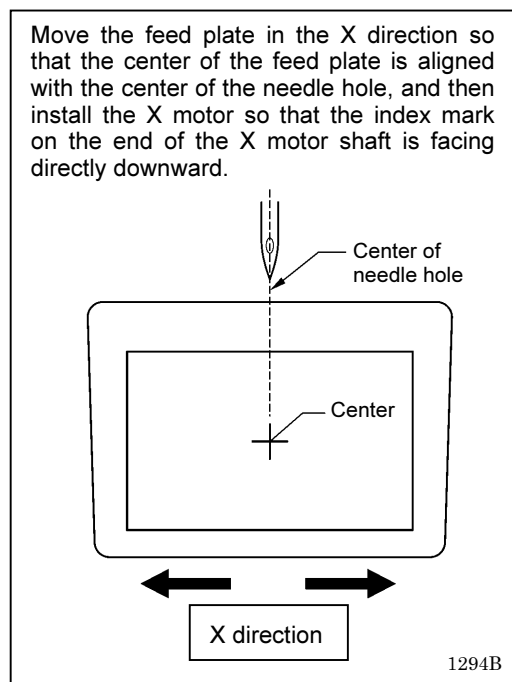
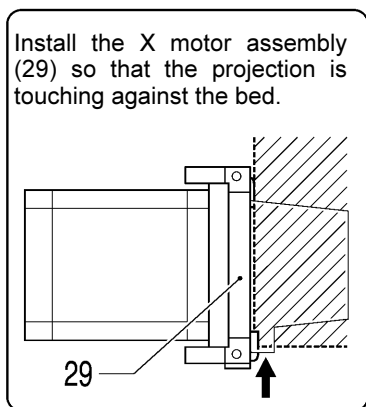


\* Once installation is complete, remove the Y base plate tool (21).

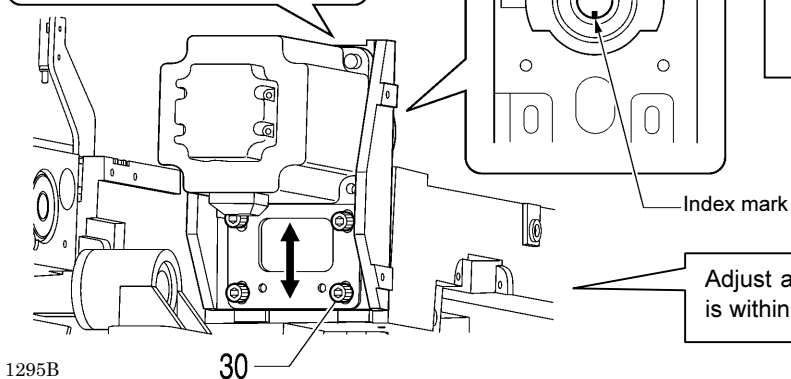
(Continued on the next page.)



1293B

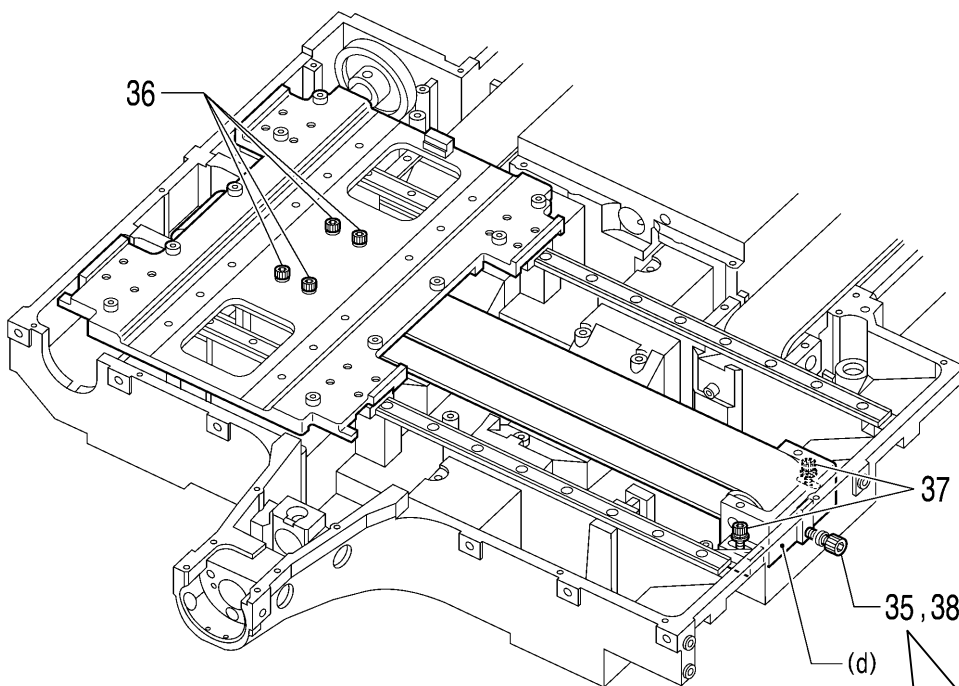
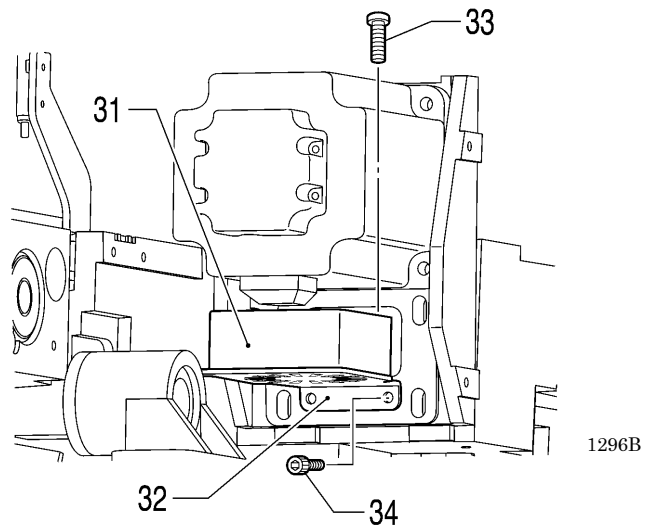


1294B



1295B

- 31. Fan
- 32. Fan bracket
- 33. Screws [4 pcs]
- 34. Bolts [2 pcs]

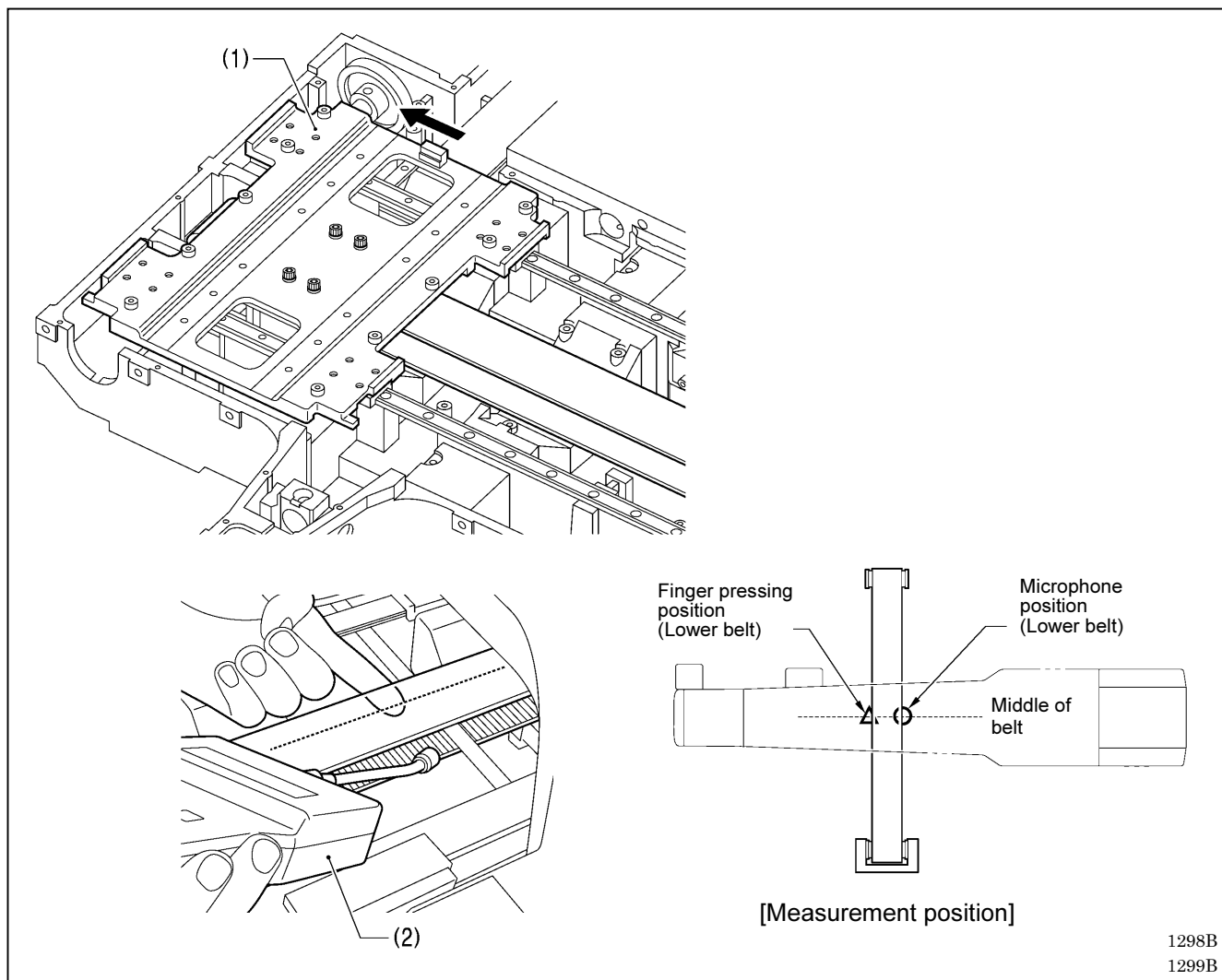


- 35. Bolts M6X30 (Tighten and then pull)
- 36. Bolts [4 pcs] (Fully tighten)
- 37. Bolts with washers [2 pcs] (Fully tighten)
- 38. Bolts M6X30 (Remove)

Tighten the bolts (M6X30) (35) into the holes in the side of the bed, and then pull the Y pulley bracket assembly (d) to adjust the belt tension.

\* After adjusting the belt tension, measure the tension. (Refer to the next page.)

(Continued on the next page.)



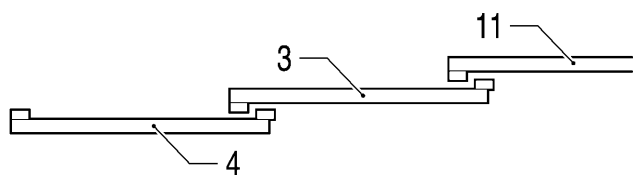
### <Measuring the tension>

1. Move the X base plate (1) to the left edge (in the direction of the arrow).
  2. Use a tension gauge (2) to measure the tension at the middle of the lower belt while referring to "Measurement position" in the illustration.
- \* Check that the value for the belt tension is within the following value ranges.  
[For a new belt: 650 to 750 N; For a reused belt: 520 to 600 N]

- \* Be sure to use a belt tension gauge to measure the belt tension, and measure from the middle of the lower belt.
- \* The belt tension gauge should be set to measure a unit weight of 0.04 kg/m, a belt width of 50 mm and a span length of 485 mm.
- \* It is recommended that you use the Yunita U-505 tension gauge.

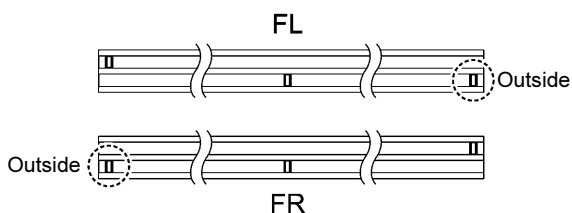
## 6-6. Feed covers

Lock the projections together as shown in the illustration.

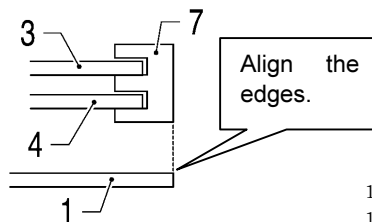


1352B

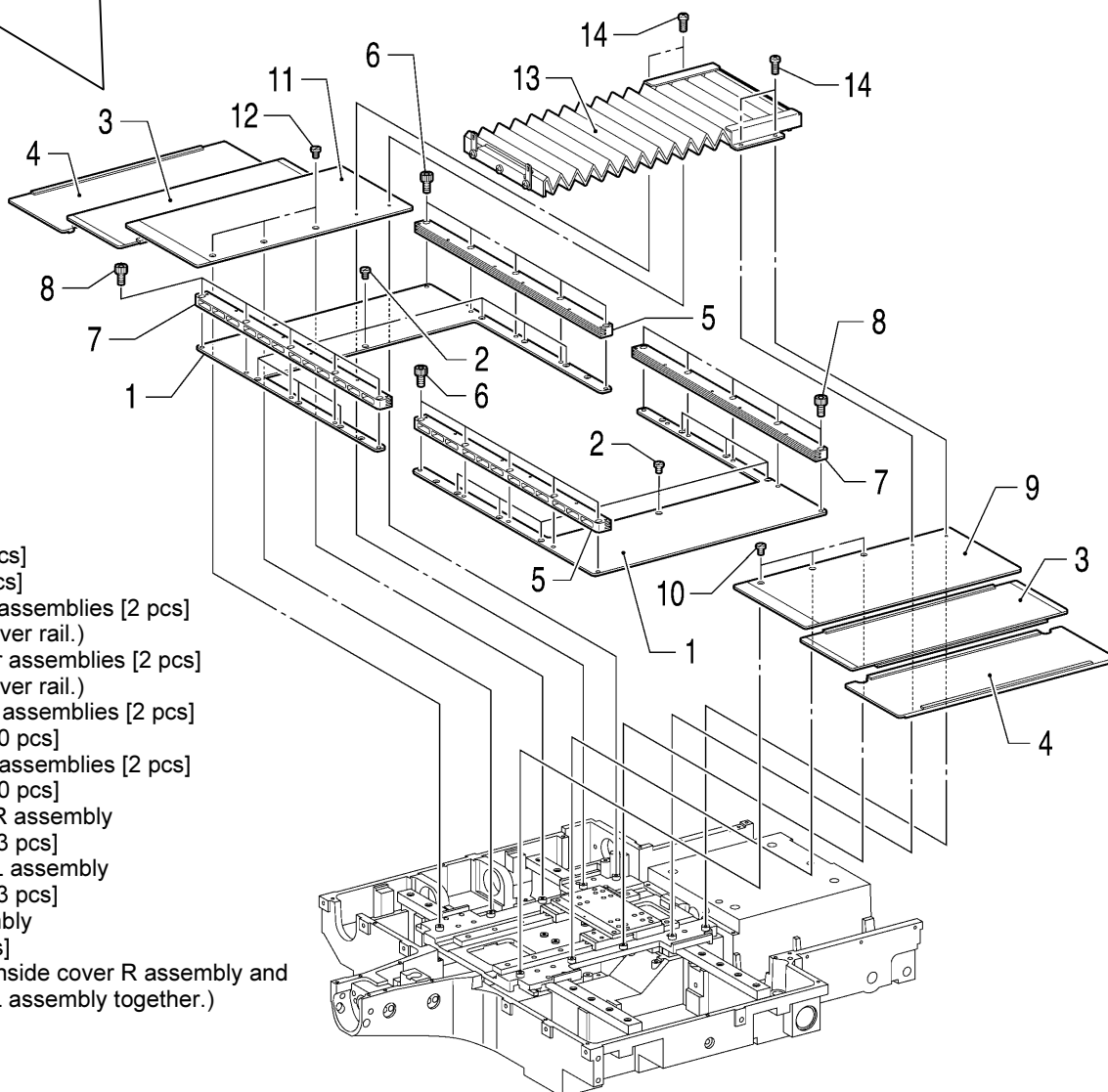
Install the cover rails so that the pins at the bottom edges are on the outside.



Place the middle cover on top of the cover rails and outside cover on the bottom.

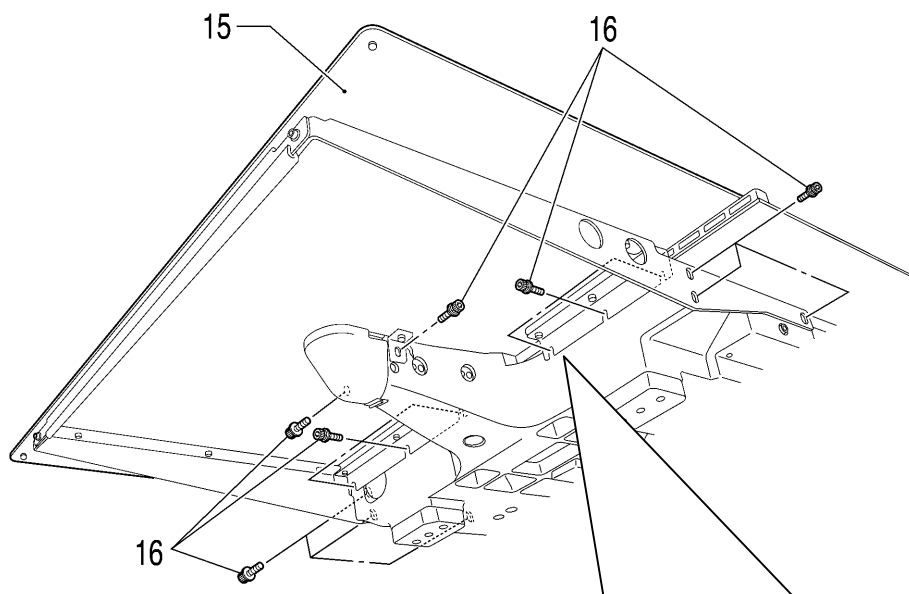
1301B  
1353B

1. Fixations [2 pcs]
2. Screws [14 pcs]
3. Middle cover assemblies [2 pcs]  
(Place into cover rail.)
4. Outside cover assemblies [2 pcs]  
(Place into cover rail.)
5. Cover rail FR assemblies [2 pcs]
6. Bolts 4X10 [10 pcs]
7. Cover rail FL assemblies [2 pcs]
8. Bolts 4X10 [10 pcs]
9. Inside cover R assembly
10. Screws 4X8 [3 pcs]
11. Inside cover L assembly
12. Screws 4X8 [3 pcs]
13. Bellow assembly
14. Screws [4 pcs]  
(Tighten the inside cover R assembly and inside cover L assembly together.)



1300B

(Continued on the next page.)

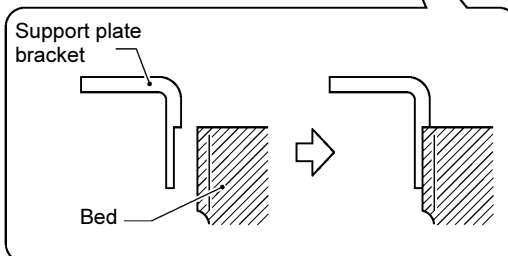
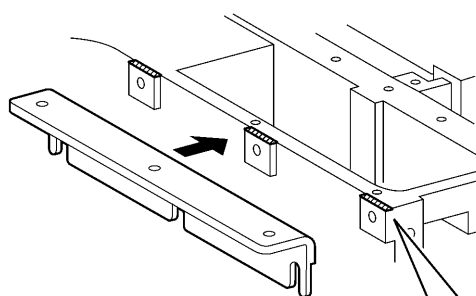


1302B

15. Auxiliary plate

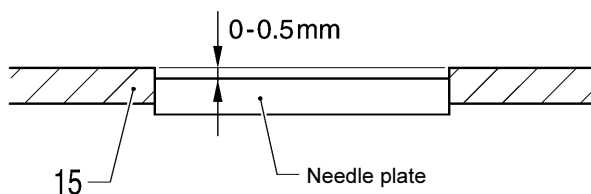
16. Bolts with washers [14 pcs]

Install the support plate bracket so that the notches are aligned with the edge of the bed.



1303B

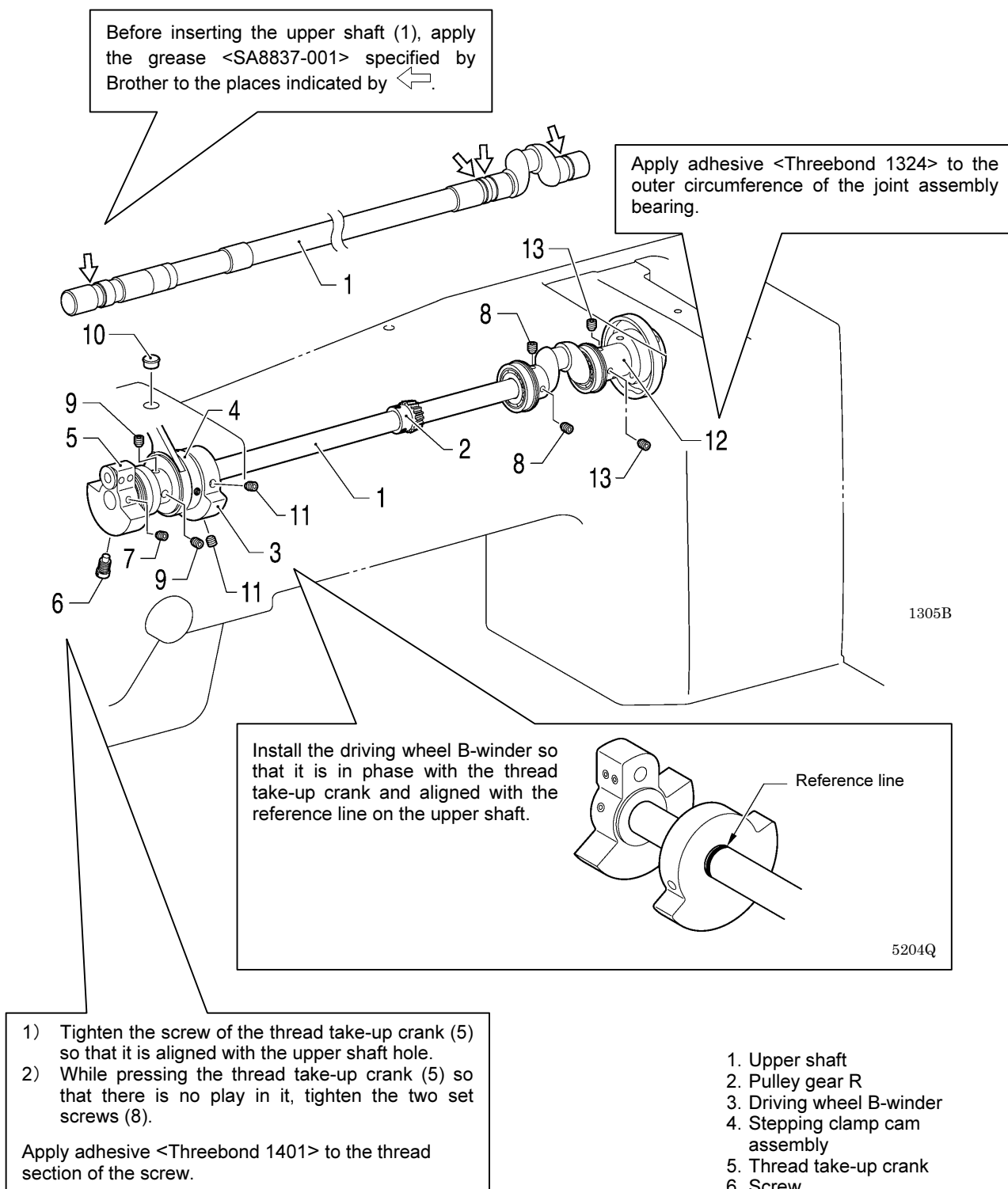
After installing, check that the height of the needle plate is as shown in the illustration.



1304B

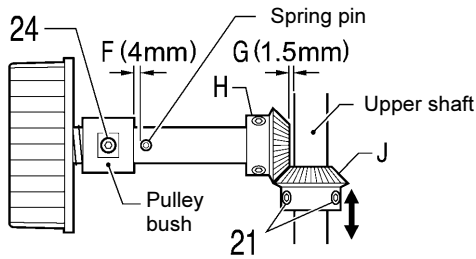


## 6-7. Upper shaft mechanism

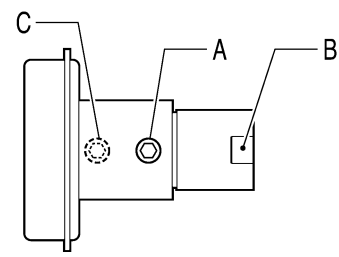


- 1. Upper shaft
- 2. Pulley gear R
- 3. Driving wheel B-winder
- 4. Stepping clamp cam assembly
- 5. Thread take-up crank
- 6. Screw
- 7. Set screw
- 8. Set screws [2 pcs]
- 9. Set screws [2 pcs]
- 10. Rubber cap
- 11. Set screws [2 pcs]
- 12. Joint assembly
- 13. Set screws [2 pcs]

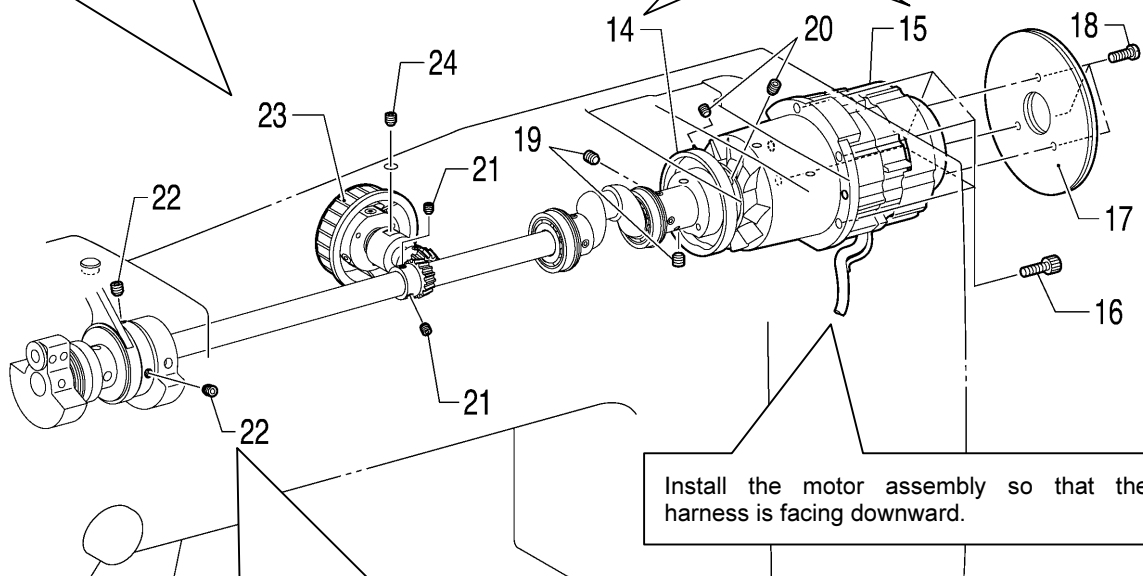
(Continued on the next page.)



- 1) Set so that distance F is 4 mm and distance G is 1.5 mm, and then tighten the set screw (24).
- 2) Move pulley gear R (J) to the position where the teeth of pulley gear L (H) and pulley gear R (J) are engaged at a right angle, and then tighten the two set screws (21).



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.



Adjust while referring to "6-9. Intermittent presser foot lifter mechanism (2)".

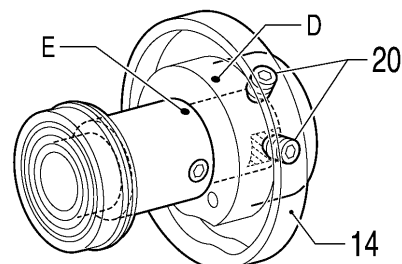
Install the motor assembly so that the harness is facing downward.

1306B

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

- 1) Align the index mark D on the thread trimmer cam (14) 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 "7-16. Adjusting the thread trimmer cam position".

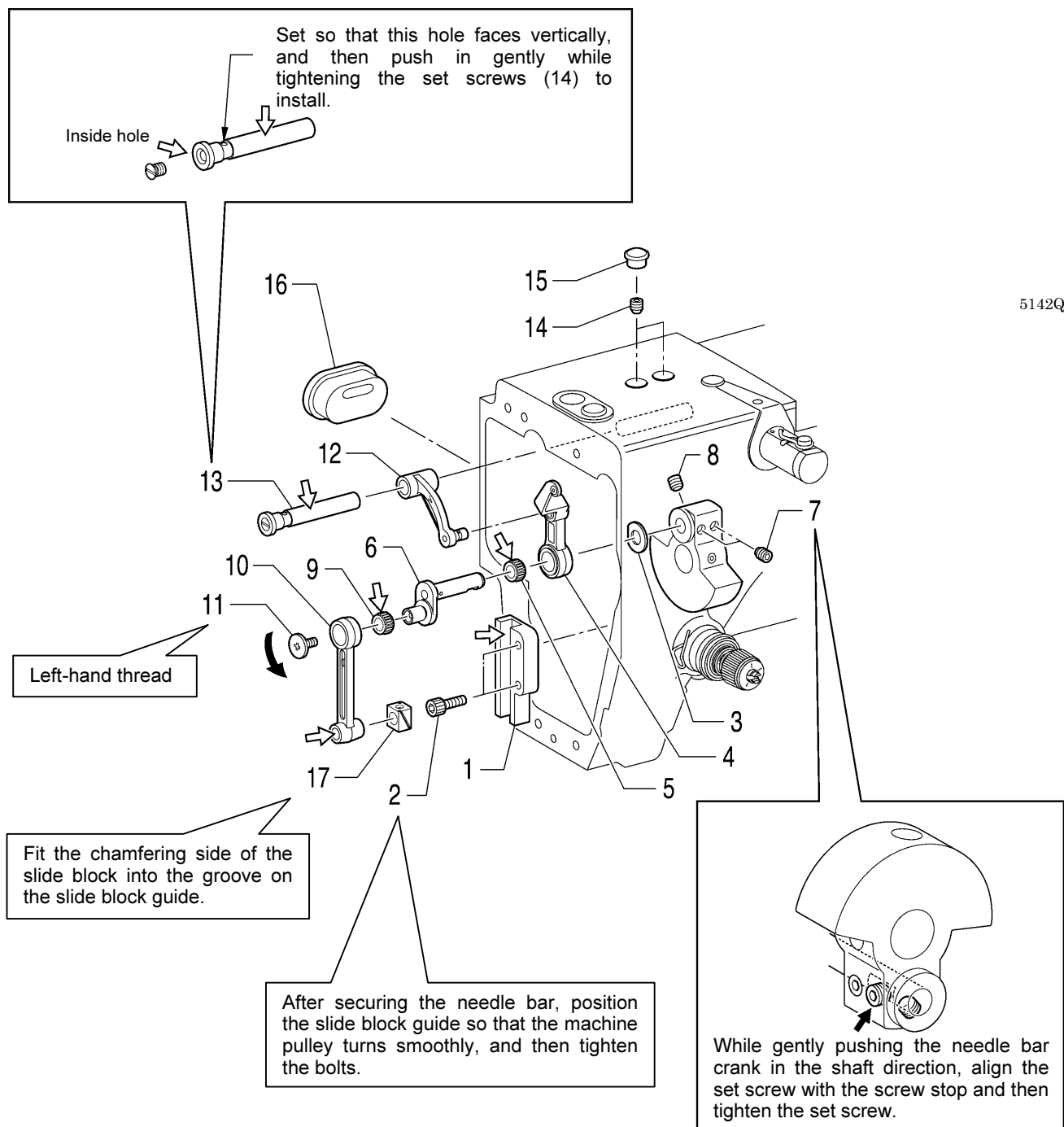
Apply the grease <SA8837-001> specified by Brother to the groove.



1419B

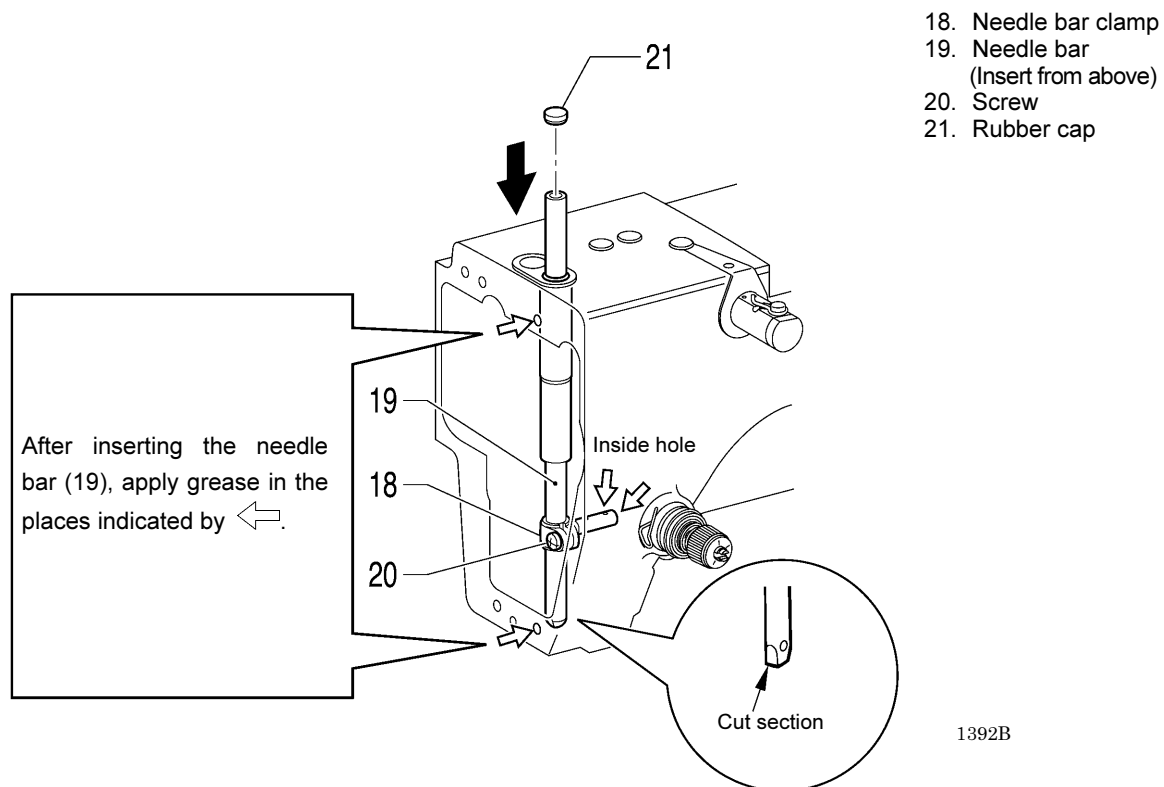
## 6-8. Needle bar mechanism

Apply the grease <SA8837-001> specified by Brother in the places indicated by ← .

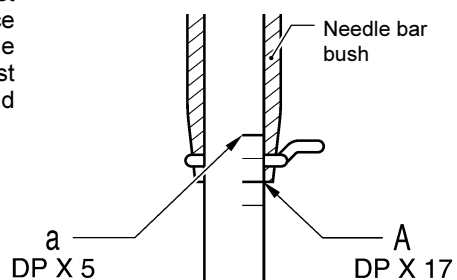


- |                                           |                                           |
|-------------------------------------------|-------------------------------------------|
| 1. Slide block guide                      | 10. Needle bearing                        |
| 2. Bolts [2 pcs]<br>(Temporarily tighten) | 11. Screw                                 |
| 3. Washer                                 | 12. Thread take-up support                |
| 4. Thread take-up lever<br>assembly       | 13. Thread take-up support shaft assembly |
| 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                         |                                           |

(Continued on the next page.)



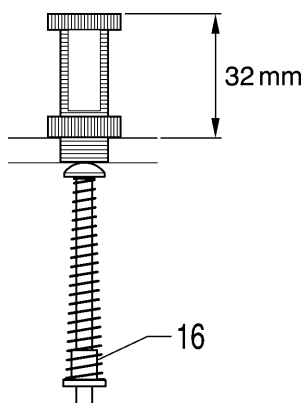
Align the needle bar so that reference line A (the second lowest reference line on the needle bar) or reference line a (top reference line) is aligned with the lower edge of the needle bar bush when the machine pulley is turned to lower the needle bar to its lowest position, and then set the cut section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



4647Q

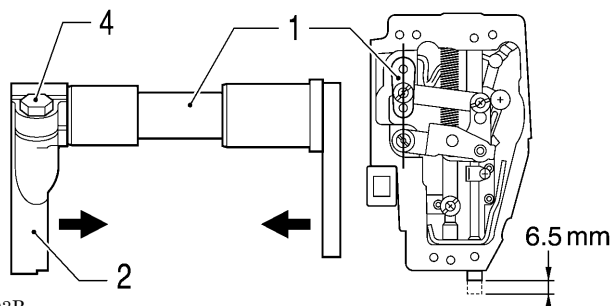
## 6-9. Intermittent presser foot lifter mechanism (2)

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



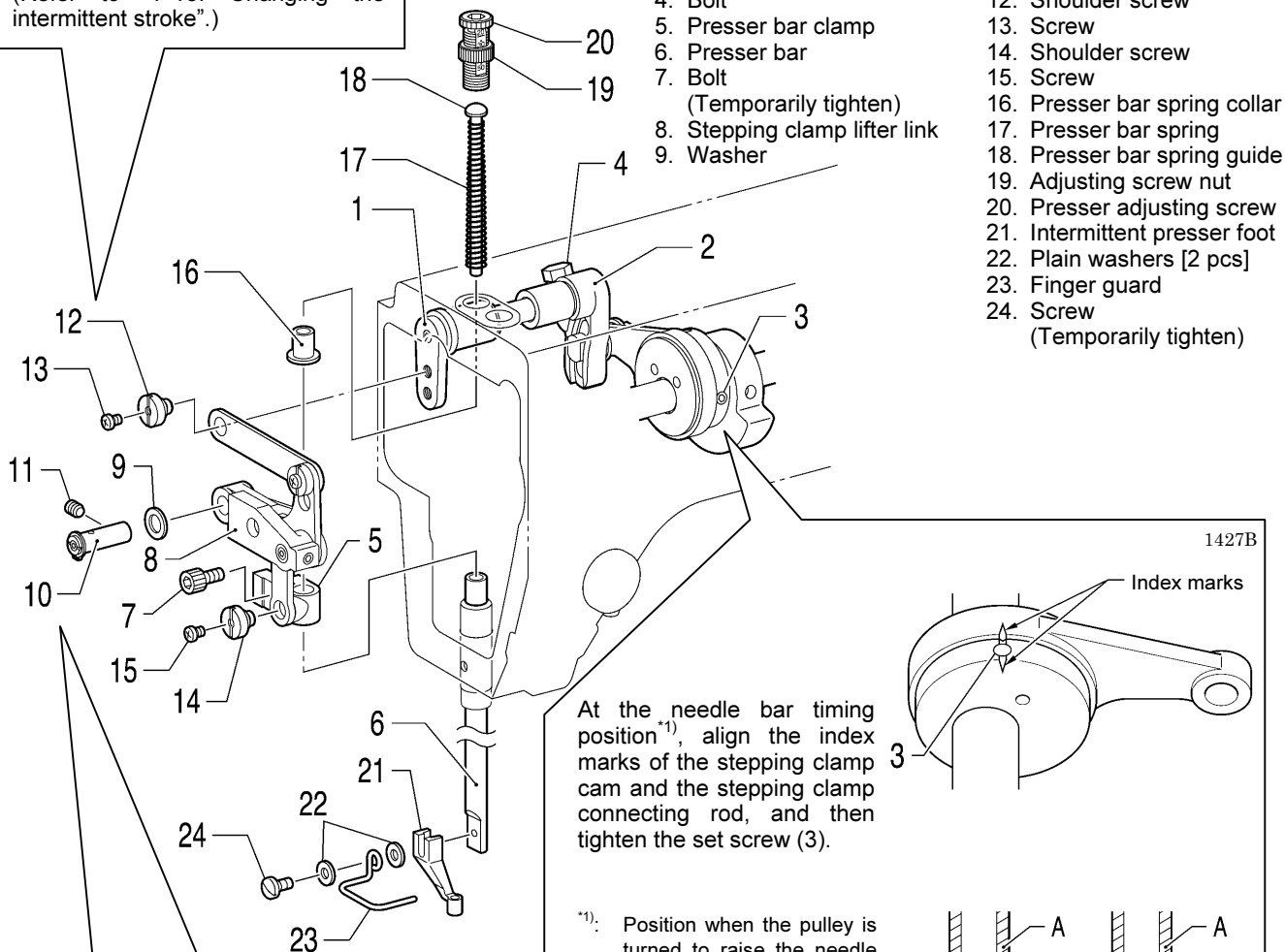
5195Q

- 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.



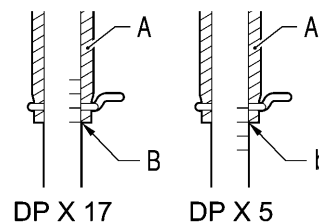
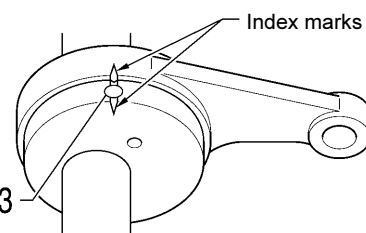
1393B

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



At the needle bar timing position<sup>\*1)</sup>, align the index marks of the stepping clamp cam and the stepping clamp connecting rod, and then tighten the set screw (3).

<sup>\*1)</sup>: Position when the pulley is turned to raise the needle bar from its lowest position until the reference line B (or b) on the needle bar is aligned with the lower edge of the needle bar bush A



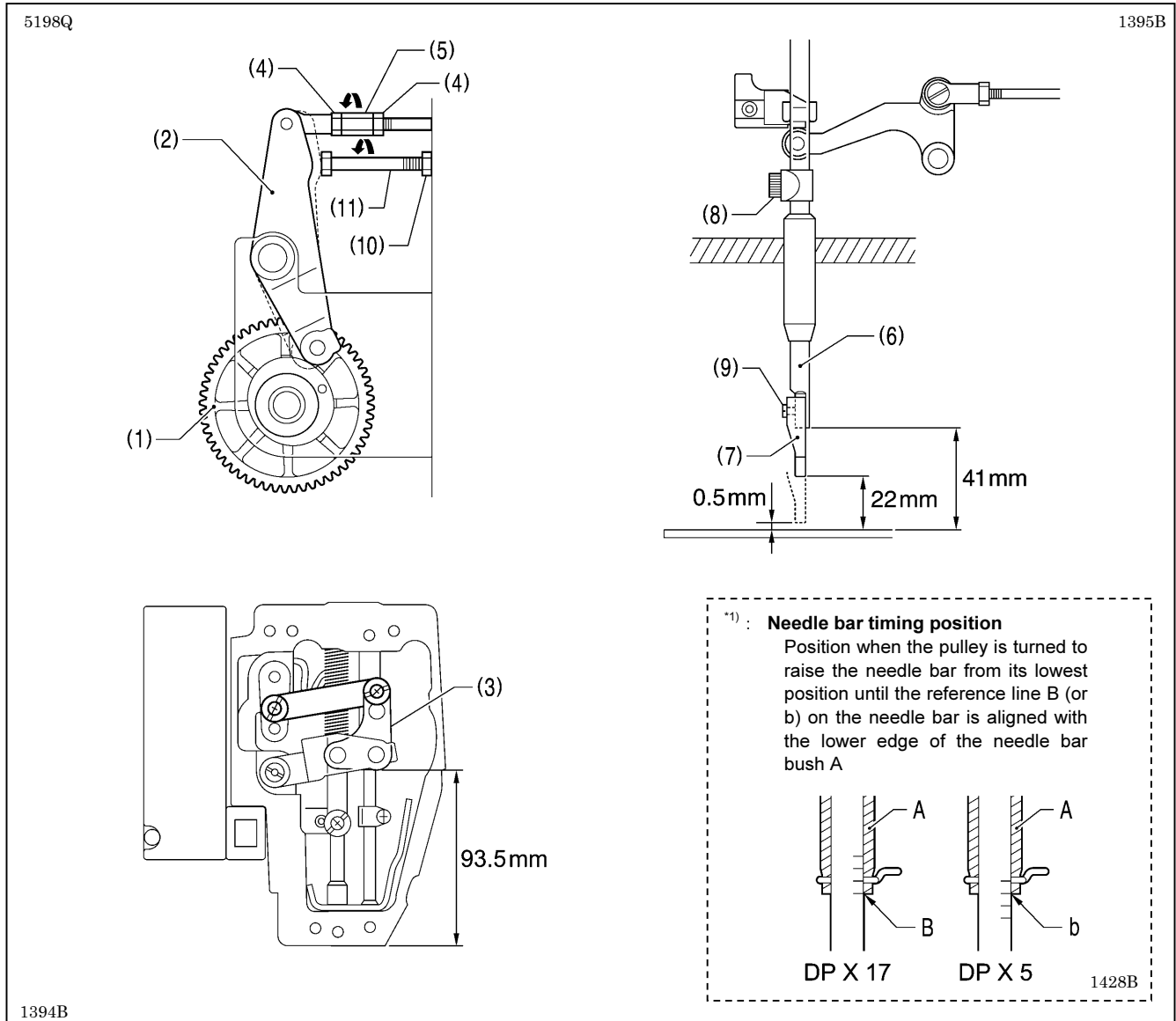
1428B

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

(Continued on the next page.)

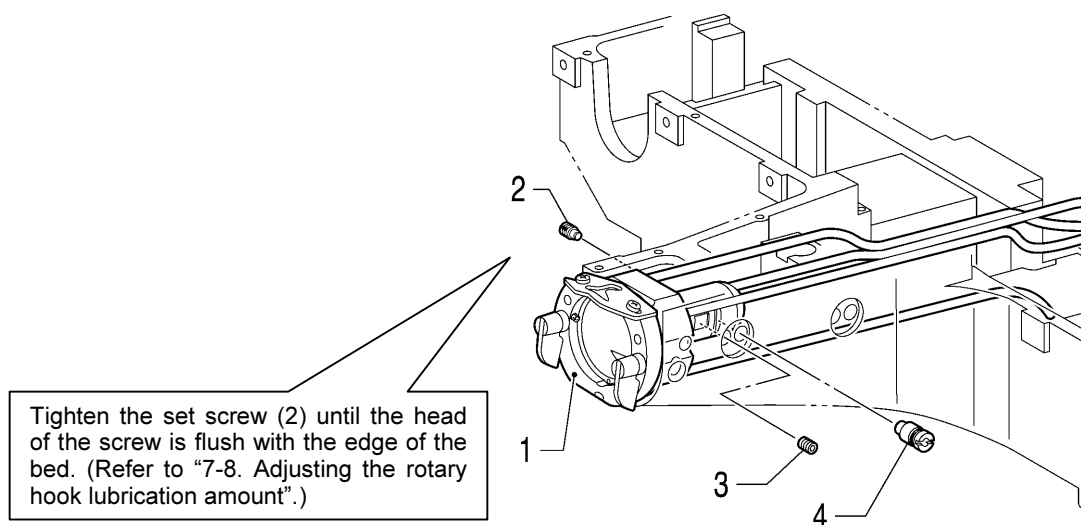
## 6. ASSEMBLY

After installing the needle plate while referring to “6-12. Thread trimmer mechanism (2)”, carry out the following adjustments.



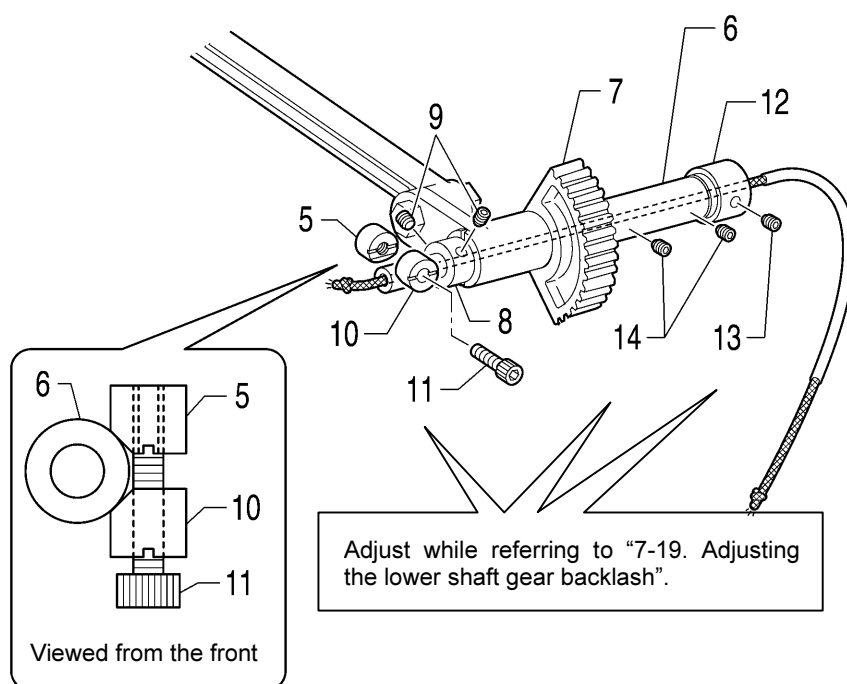
1. Turn the work clamp cam gear (1) to move the stepping work clamp driving lever (2) to the solid line position shown in the illustration.
2. Loosen the two nuts (4) and then turn the stepping rod joint (5) to adjust so that the height of the stepping clamp link (3) is 93.5 mm from the bottom edge of the arm.
3. Set the height of the presser bar (6) to 41 mm above the needle plate, align the center of the intermittent presser foot (7) and the needle hole, and then tighten the bolt (8).
4. Set the height of the intermittent presser foot (7) to 22 mm above the needle plate, and then tighten the screw (9).
5. Turn the work clamp cam gear (1) to move the stepping work clamp driving lever (2) to the dotted line position shown in the illustration.
6. Set the needle bar to the timing position<sup>\*\*1)</sup>.
7. Loosen the nut (10) and turn the bolt (11) to set the height of the intermittent presser foot (7) to 0.5 mm above the needle plate.

## 6-10. Lower shaft mechanism



1. Shuttle race base assembly
2. Set screw
3. Set screw
4. Adjusting stud

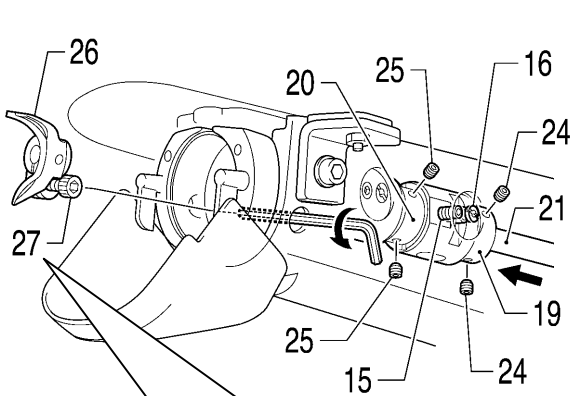
1308B



1309B

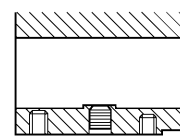
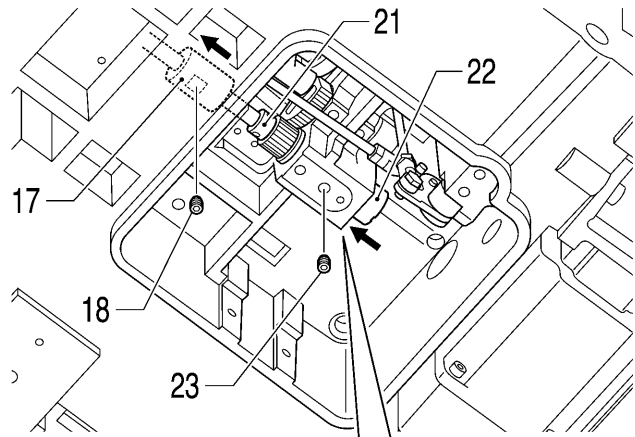
5. Pinch sleeve A
6. Rock gear shaft  
(Insert from the rear of the machine head)
7. Rock gear
8. Set screw collar B
9. Set screws [2 pcs]
10. Pinch sleeve B
11. Bolt (Temporarily tighten)
12. Set screw collar R
13. Set screw (Temporarily tighten)
14. Set screws [2 pcs] (Temporarily tighten)

(Continued on the next page.)



1310B

Push a screwdriver gently against the stepped section of the lower shaft, and then provisionally tighten the bolt.



Align the lower shaft bush (22) with the edge of the bed.

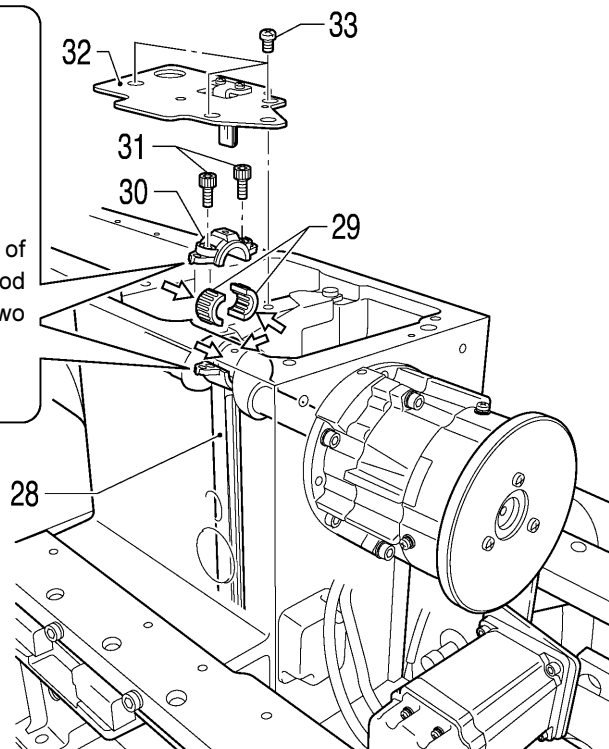
1311B

Mating Mark



Insert the crank rod [lower part] (28) into the crank of the upper shaft, align the marks on the crank rod (30) [upper part], and then gently tighten the two bolts (31).

\* Check that the pulley turns smoothly.

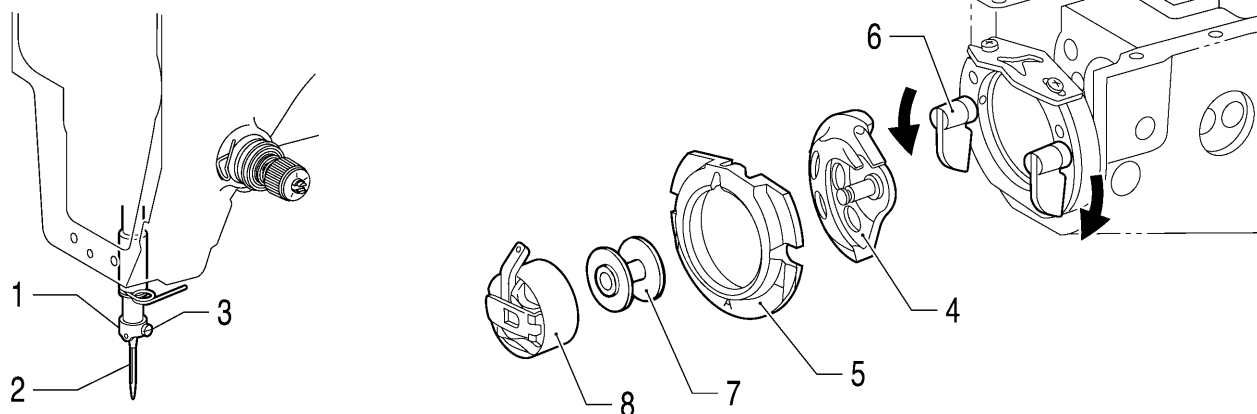


15. Set screw
16. Adjusting stud
17. Lower shaft M bush
18. Set screw
19. Set screw collar
20. Set screw collar
21. Lower shaft assembly  
(Insert from the rear of the machine head)
22. Lower shaft bush
23. Set screw
24. Set screws [2 pcs]
25. Set screws [2 pcs]
26. Driver
27. Bolt (Temporarily tighten)
28. Crank rod [Lower part] (Insert into upper shaft crank)
29. Needle bearing
30. Crank rod [Upper part] (Align the mating mark)
31. Bolts [2 pcs]
32. Crank cover
33. Screws [3 pcs]

1312B



## 6-11. Shuttle hook mechanism



1313B

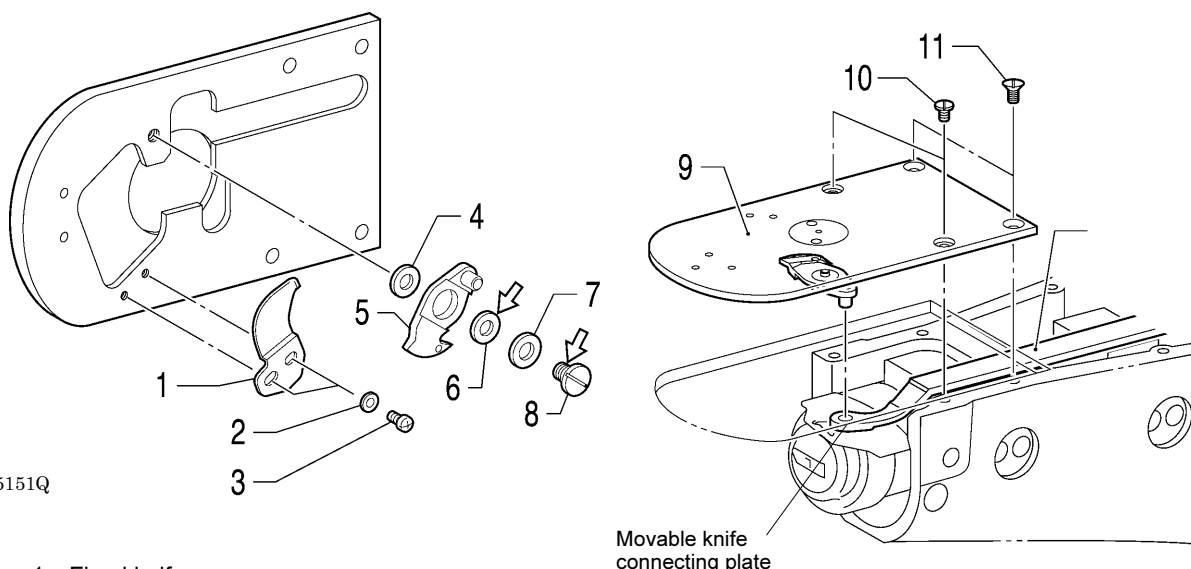
5149Q

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

## 6-12. Thread trimmer mechanism (2)

Apply the grease <SA8837-001> specified by Brother in the places indicated by ←



5151Q

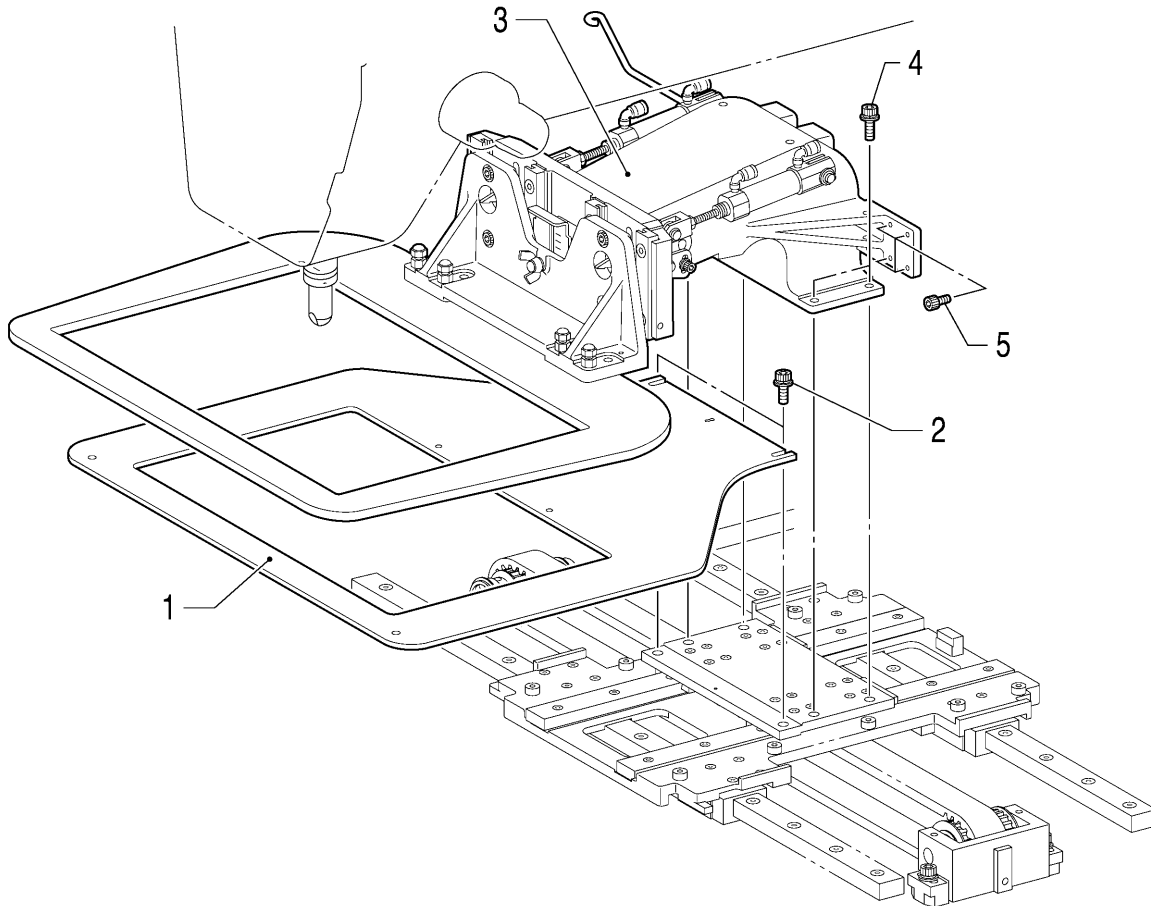
1. Fixed knife
2. Plain washers [2 pcs]
3. Screws [2 pcs]
4. Movable knife spacer
5. Movable knife assembly
6. Movable knife collar
7. Thrust washer
8. Movable knife
9. Shoulder screw
10. Needle plate
11. Screws [2 pcs]
12. Flat screws [2 pcs]

Movable knife  
connecting plate

1314B

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.

## 6-13. Work clamp arm mechanism

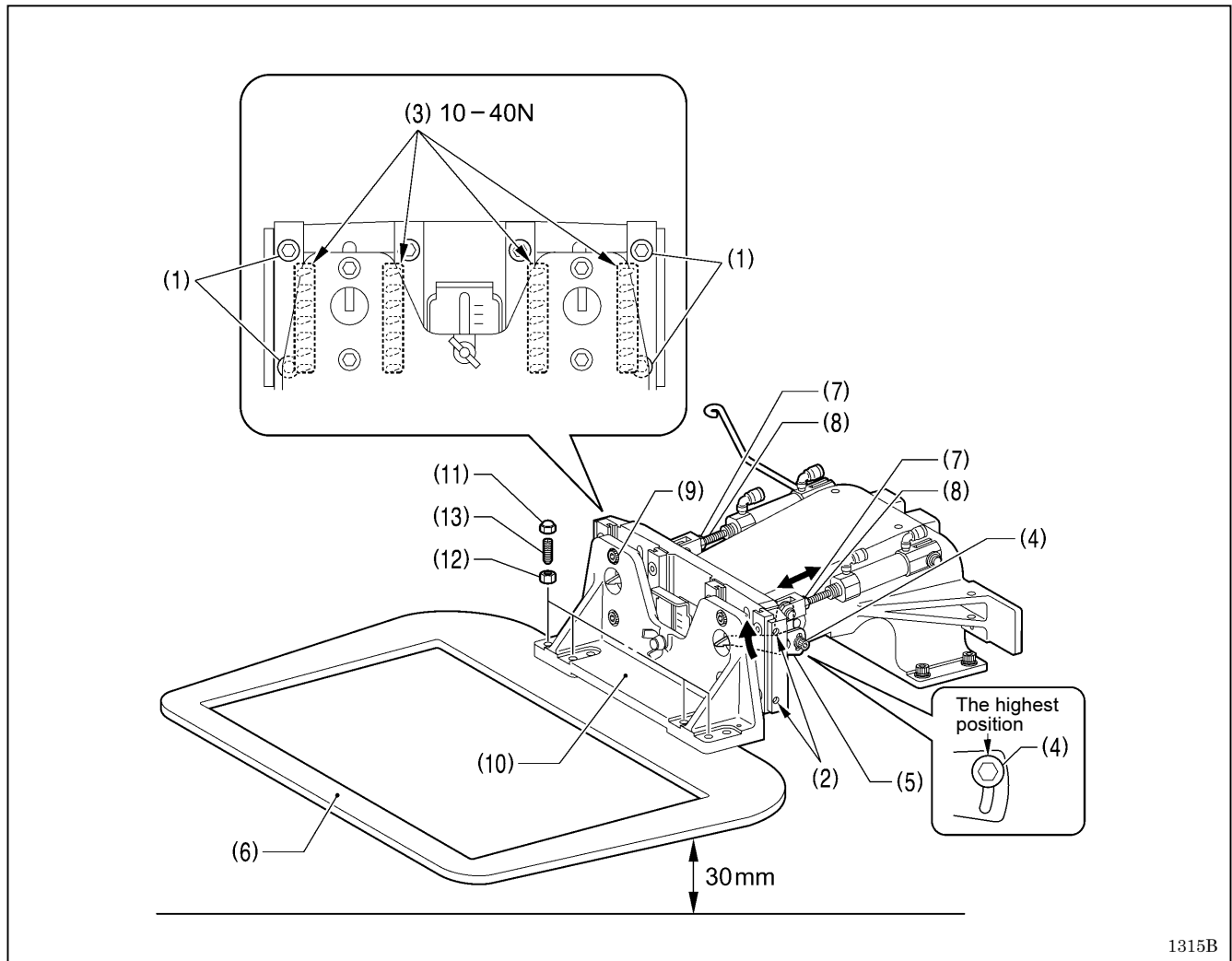


1349B

1. Feed plate
2. Bolts with washers [2 pcs]
3. Work clamp arm assembly
4. Bolts with washers [4 pcs]
5. Bolts [8 pcs]

After assembling, adjust the home position. (Refer to “7-20. Adjusting the home position”.) After that, carry out a test feed to check that the needle hole does not go outside the frames of the work clamp and feed plate. If the needle hole goes outside the frames, adjust the position of the feed plate or readjust the home position.

### 6-13-1. Adjusting the lift of the work clamp arm assembly



1315B

#### <Cross roller adjustment>

1. Loosen the four screws (1) on the outside at left and right.
2. Screw in the four M4 taps (2) on the left and right sides of the work clamp arm to apply pressure.
3. Adjust so that the sliding load of the cross rollers (3) is 10 to 40 N.
4. Tighten the four screws (1).

#### <Work clamp height adjustment>

1. Loosen the two bolts (4) at left and right.
2. Lift up the left and right work clamp arm levers (5) by hand to their highest positions, and then tighten the two bolts (4).
3. Loosen the two nuts (7) at left and right.
4. Turn the shafts of the air cylinders (8) at left and right until the work clamp (6) is 30 mm above the top of the needle plate, and then tighten the two nuts (7).

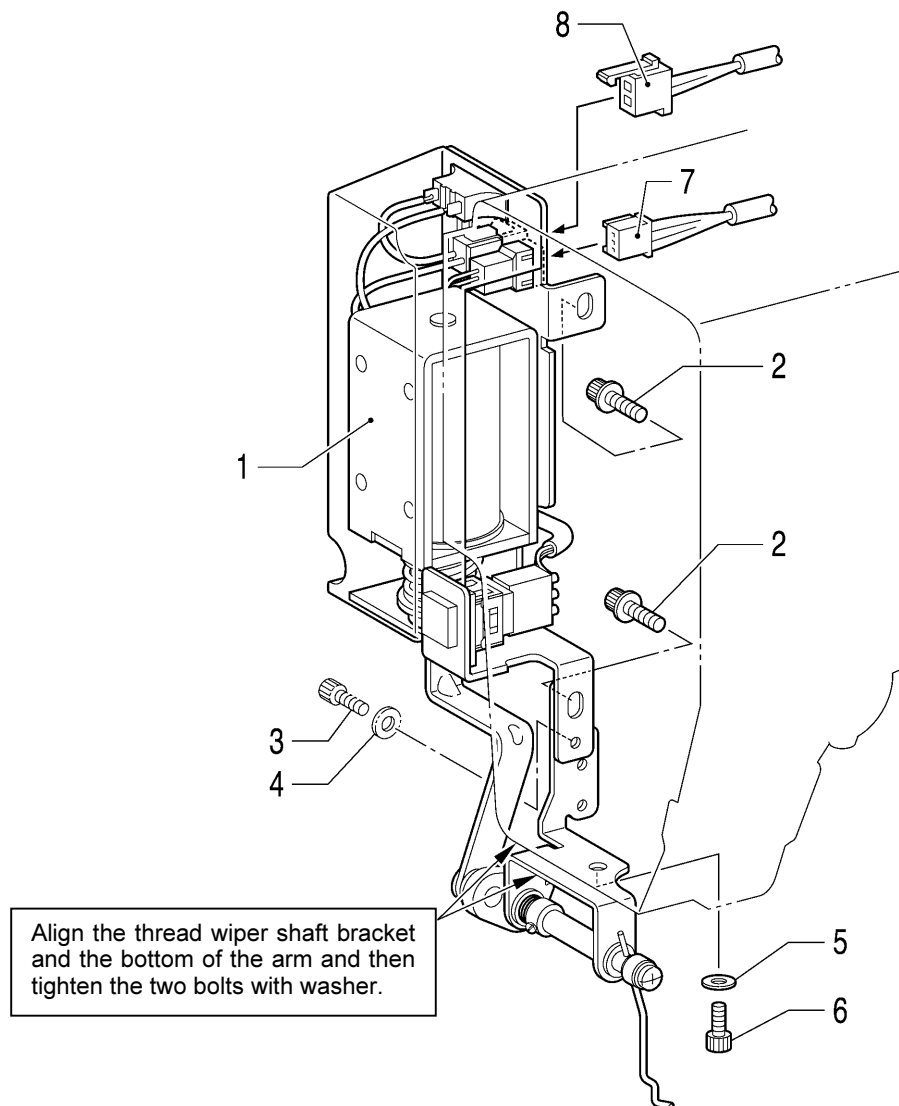
#### <Work clamp adjustment>

1. Loosen the four bolts (9).
2. Lower the work clamp (6), and then install the work clamp (10) with the four bolts (9).

#### <Work clamp pressure adjustment>

1. Remove the four nuts (11).
2. Loosen the four nuts (12).
3. Tighten the four set screws (13) so that the pressure is uniform at the front and back of the work clamp (6), and then tighten the four nuts (12). (Reference dimension: When the edge of the work clamp (6) is 26 mm above the top of the needle plate)
4. Tighten the four nuts (11).

## 6-14. Thread wiper mechanism

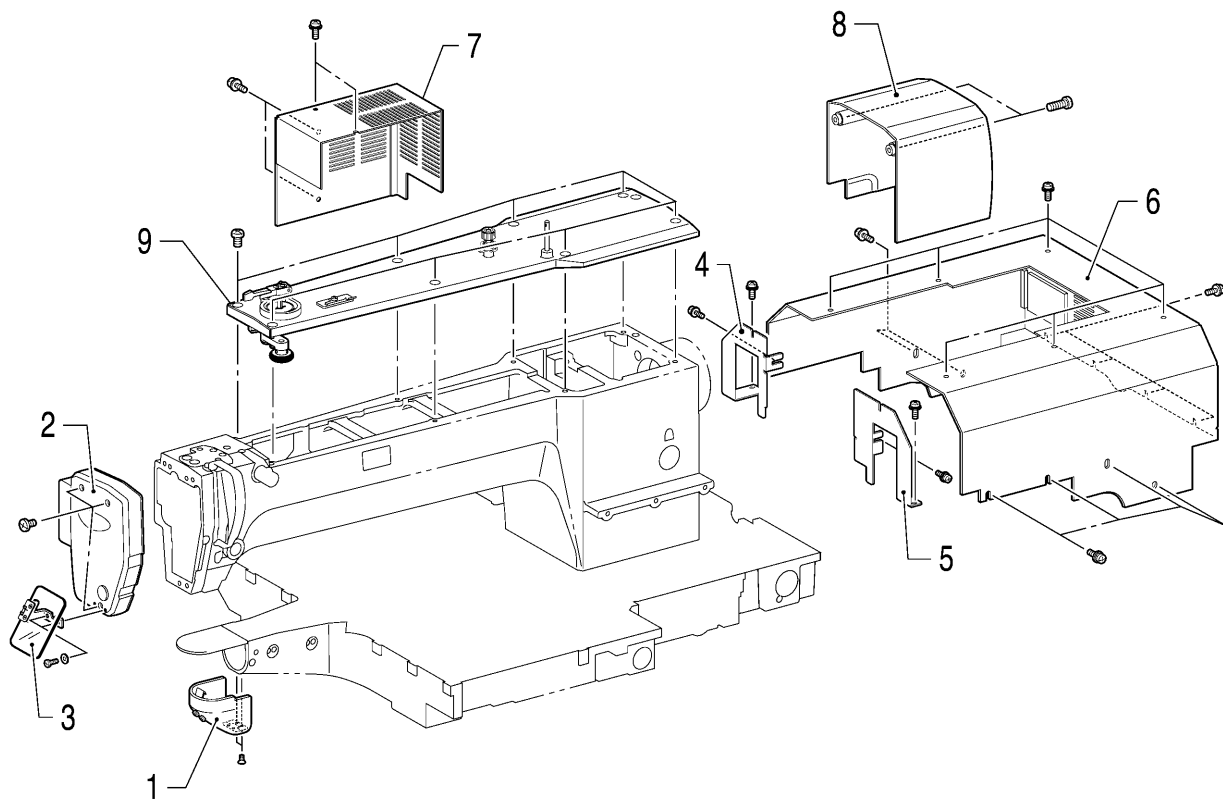


5153Q

1. Thread wiper unit
2. Bolts with washers [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".)

## 6-15. Covers



1316B

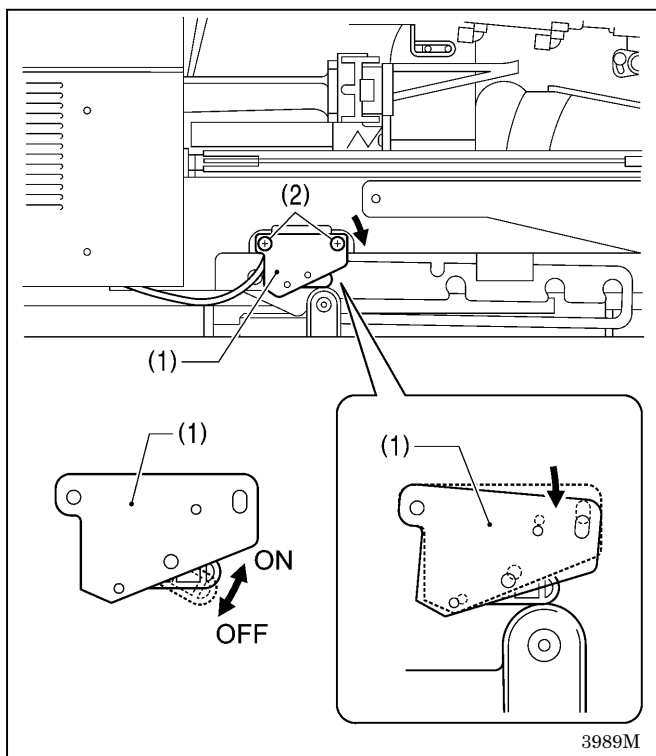
1. Shuttle race cover assembly
2. Face plate
3. Eye guard
4. Rear cover FL
5. Rear cover FR
6. Rear cover
7. X motor cover
8. Motor cover
9. Top cover

## 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
-  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.
-  If the power switch and air need to be left on when carrying out some adjustment, be extremely careful to observe all safety precautions.
-  Hold the machine head with both hands when tilting it back or returning it to its original position. In addition, do not subject the machine head to extra force while it is tilted back. If this is not observed, the machine head may become unbalanced and fall down, and serious injury or damage to the sewing machine may 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.
-  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 safety switch



1. If the machine head is tilted back, gently return it to its original position.
2. Turn on the power switch.
3. Check that no error numbers are displayed on the operation panel.

#### < If error [E050], [E051] or [E055] is displayed >

If the safety switch (1) is not turned on, error [E050], [E051] or [E055] will occur.

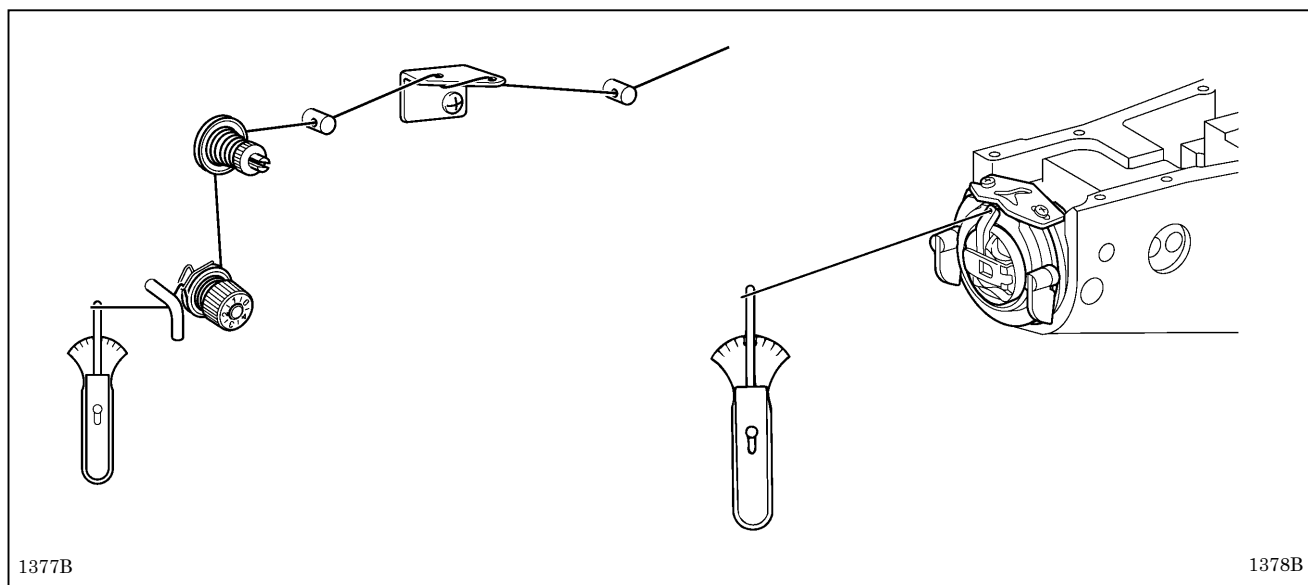
Check the installation position of the safety switch (1).

- 1) Turn off the power switch.
- 2) Loosen the two screws (2).
- 3) Push down the right side of the safety switch (1) so that the safety switch (1) turns on, and then tighten the two screws (2).
- 4) Turn on the power and check that no error numbers are displayed.

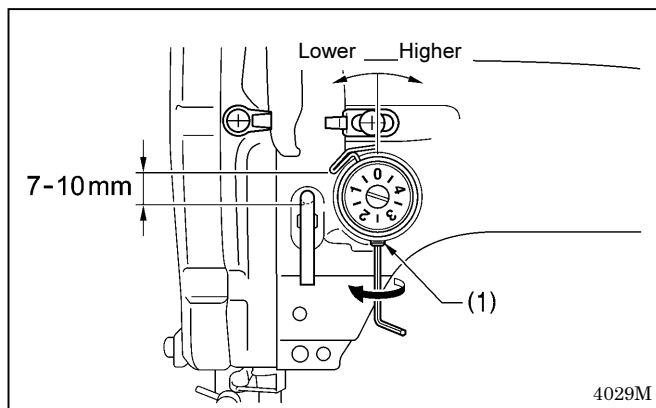
## 7-2. Standard thread tension

|                                   |                |
|-----------------------------------|----------------|
| Upper thread                      | #20 or similar |
| Lower thread                      | #20 or similar |
| Upper thread tension (N)          | 1.4 – 1.8      |
| Lower thread tension (N)          | 0.3 – 0.4      |
| Thread take-up spring height (mm) | 7 – 10         |
| Thread take-up spring tension (N) | 0.6 – 1.2      |
| Pre-tension (N)                   | 0.2 – 0.4      |
| Needle                            | DP x 17 #19    |

### 7-2-1. Upper and lower thread tension

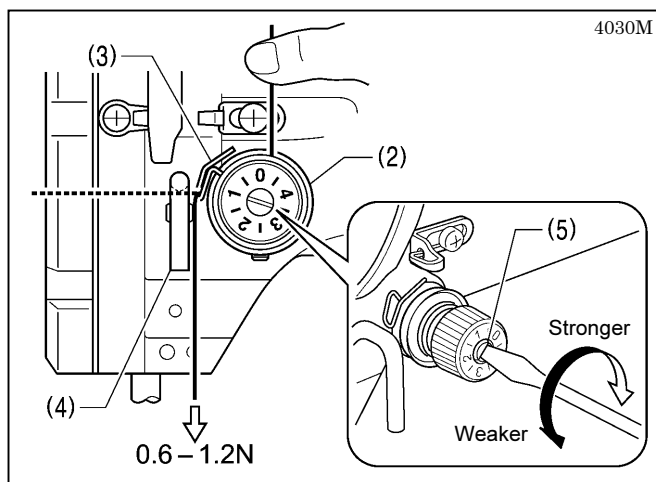


### 7-2-2. Thread take-up spring



#### <Thread take-up spring height>

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



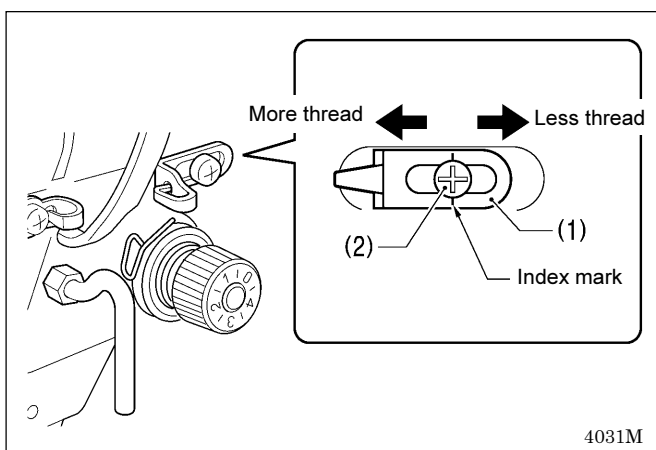
#### <Thread take-up spring tension>

1. Press the upper thread slightly above the tension bracket (2) with a finger to stop the thread spooling out.
2. Pull the upper thread downward so that the thread take-up spring (3) is extended to the same height as the base of the thread guide arm (4), and then measure the tension of the thread take-up spring (3).
3. Use a screwdriver to turn the tension stud (5) in order to adjust the tension of the thread take-up spring (3).

#### NOTE:

If the thread tension spring (3) is not adjusted correctly, the upper thread trailing length will be uneven after thread trimming.

### 7-2-3. Arm thread guide R



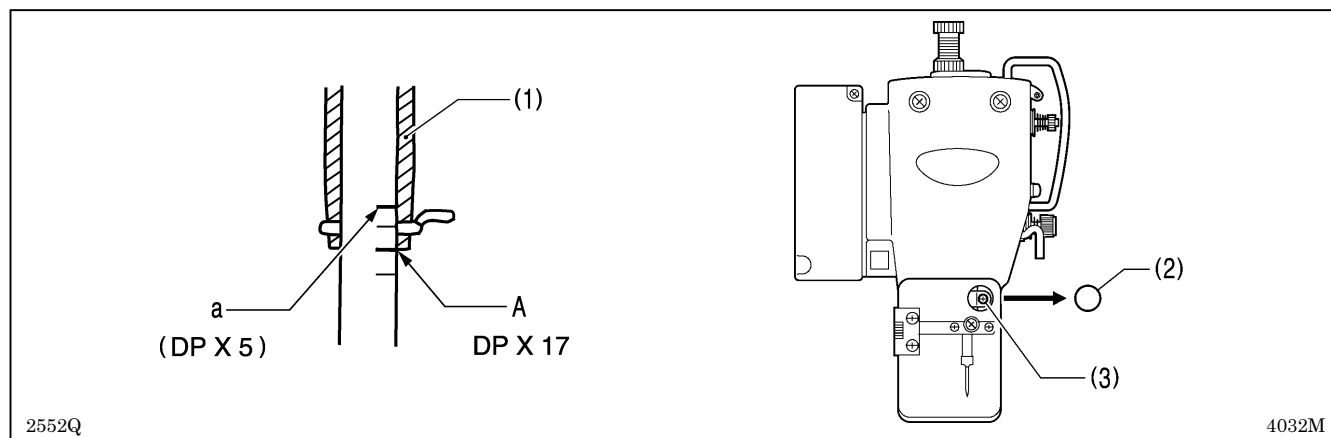
The standard position of arm thread guide R (1) is when the screw (2) is aligned with the index mark.

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.)



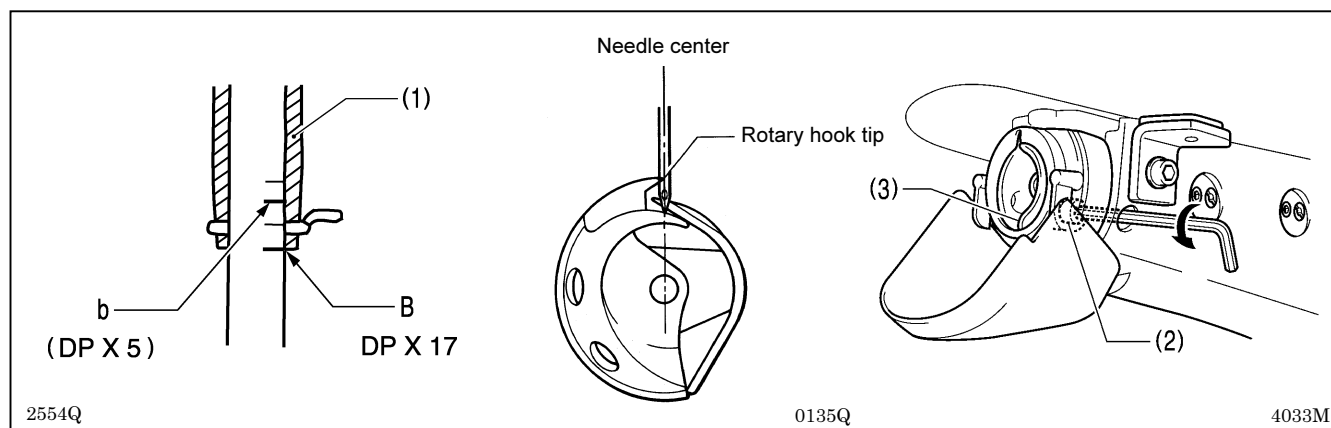
### 7-3. Adjusting the needle bar height



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).

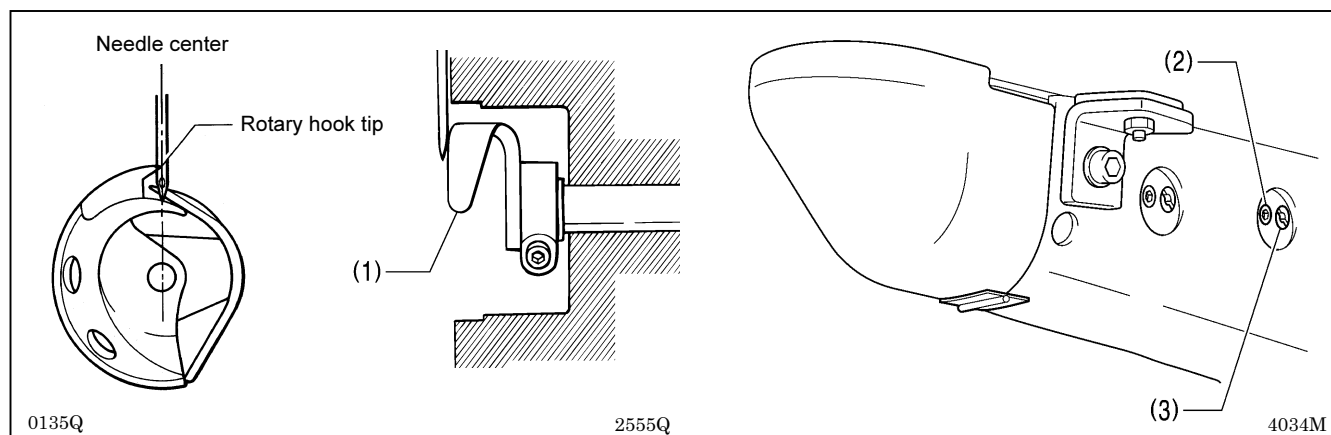
### 7-4. Adjusting the needle bar lift amount



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



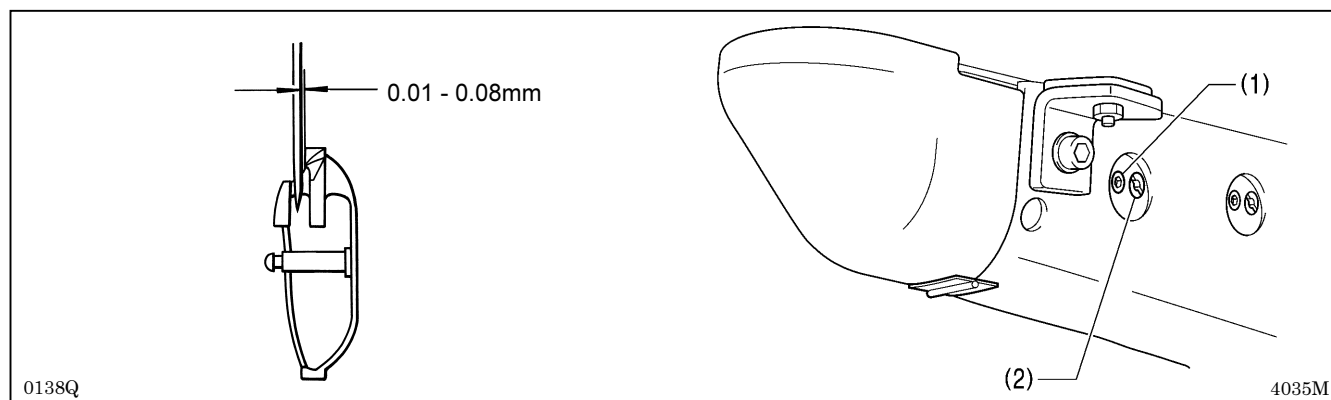
Turn the machine pulley to align the tip of the rotary hook with the center of the needle, and then loosen the set screw (2) and turn the adjusting stud (3) to adjust so that the driver (1) is touching the needle.

**NOTE:**

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

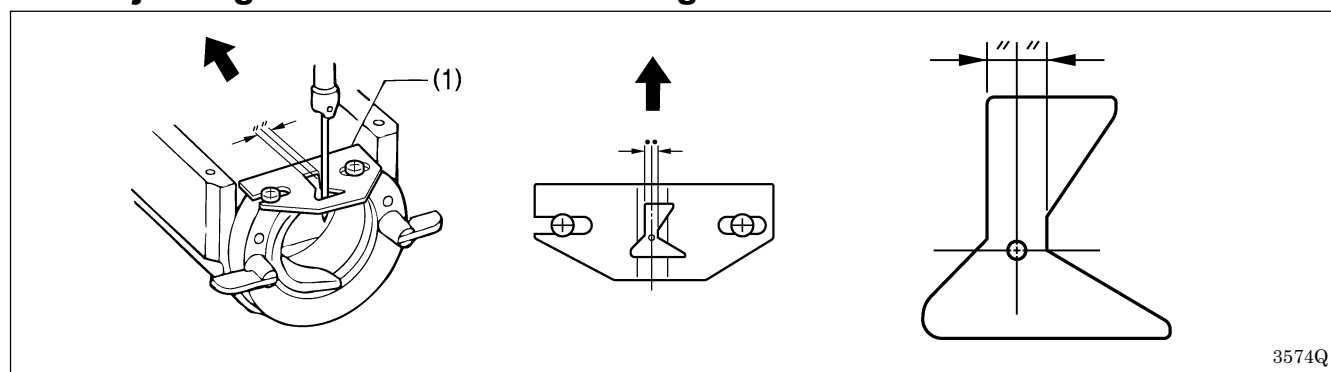
Furthermore, if it does not cross the needle at all, the tip of the rotary hook will interfere with the needle and skipped stitches may occur.

### 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 adjusting stud (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



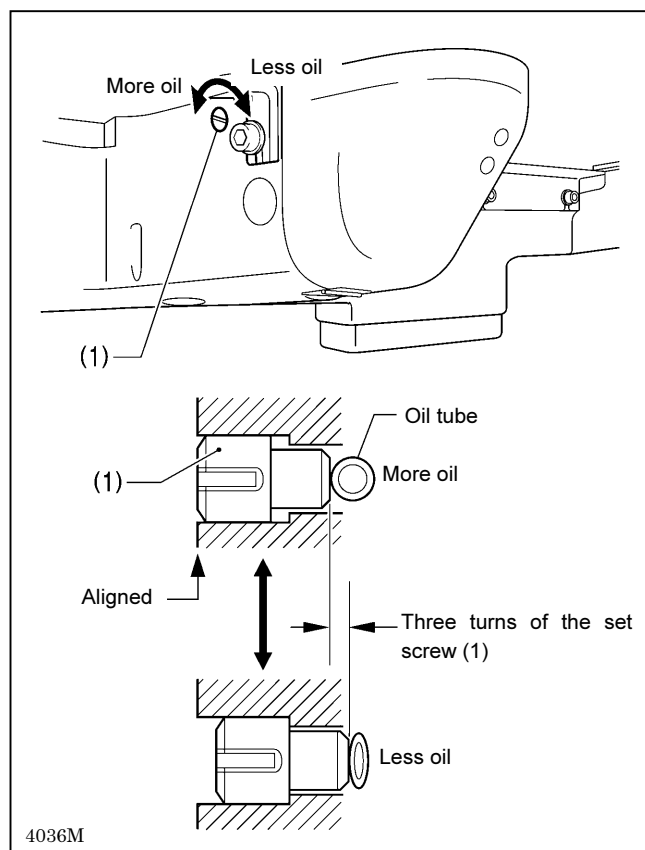
Install the shuttle race thread guide (1) by pushing it in the direction of the arrow so that the needle groove is aligned with the center of the needle plate hole.

#### NOTE:

If the shuttle race thread guide (1) is in the wrong position, thread breakages, soiled thread or tangling of the thread may occur.

The position of the shuttle race thread guide (1) is adjusted at the time of shipment from the factory. It should not be changed if possible.

## 7-8. Adjusting the rotary hook lubrication amount

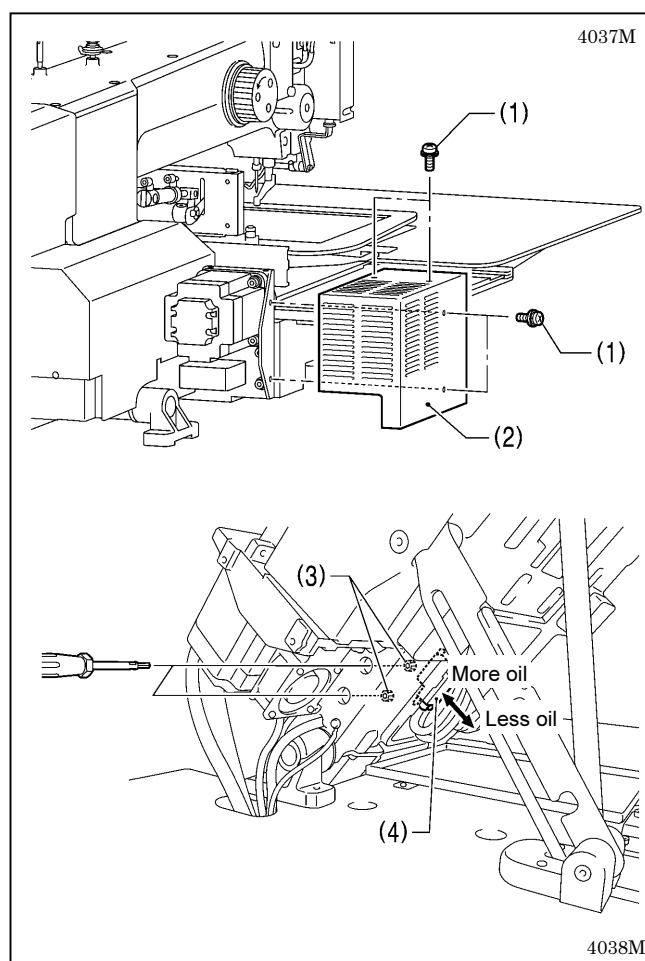


### <Adjusting by changing the pressure on the oil tube>

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.

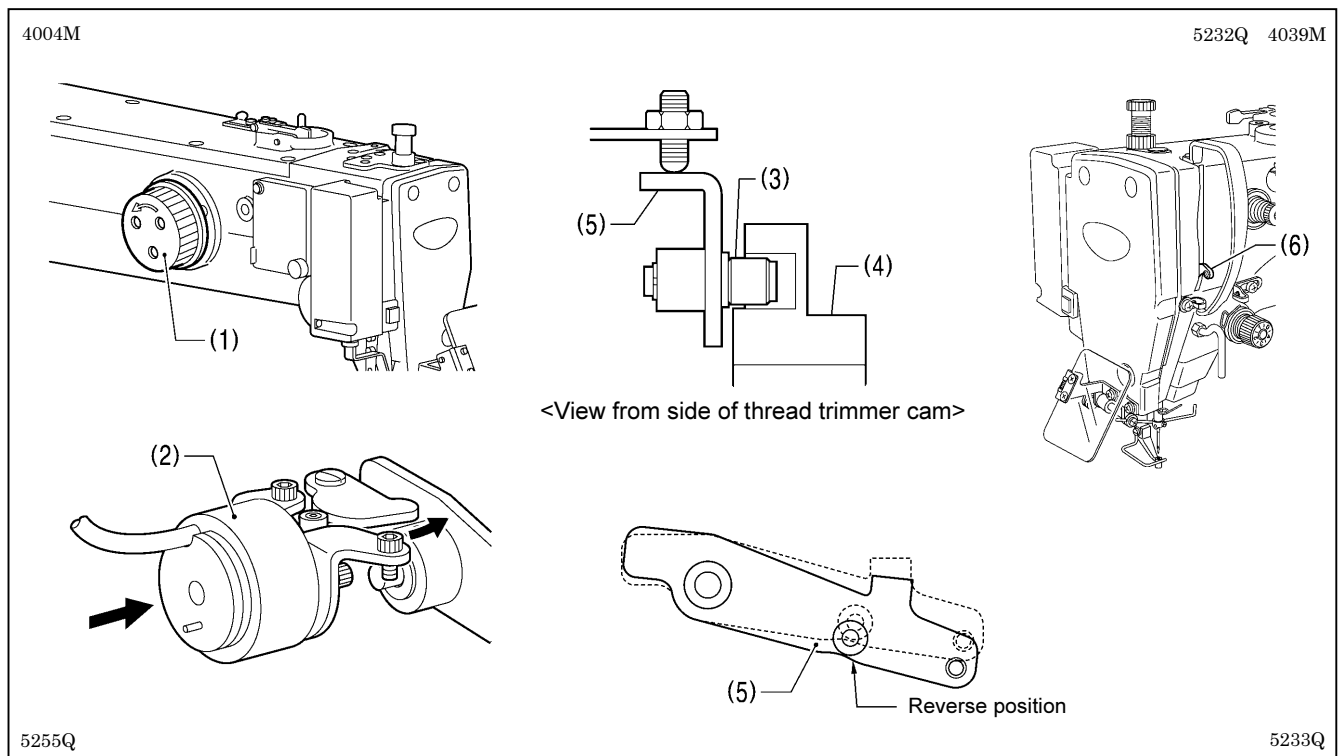
\* If you would like the lubrication amount to be increased further from the position the head of the set screw (1) is aligned with the edge of the bed, use the following method to make the adjustment.



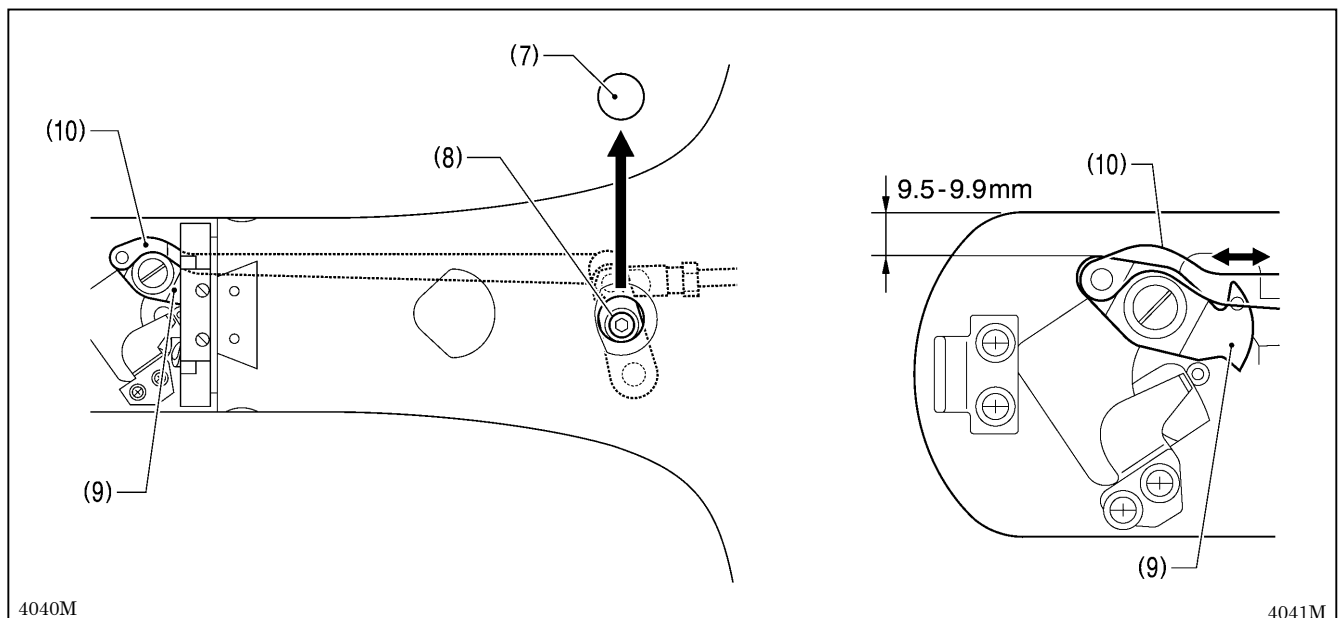
### <Adjusting by changing the amount of oil supplied from the sub-tank>

1. Remove the four screws (1), and then remove the X motor cover (2).
2. Tilt back the machine head.
3. Insert a screwdriver into the holes in the left side of the sewing machine bed and loosen the two bolts (3).
4. Move the sub-tank (4) up or down to adjust its position, and then tighten the two bolts (3).
  - If the position of the sub-tank (4) is raised, the lubrication amount will increase.
  - If the position of the sub-tank (4) is lowered, the lubrication amount will decrease.
5. Return the machine head to its original position.
6. Install the X motor cover (2) with the four screws (1).

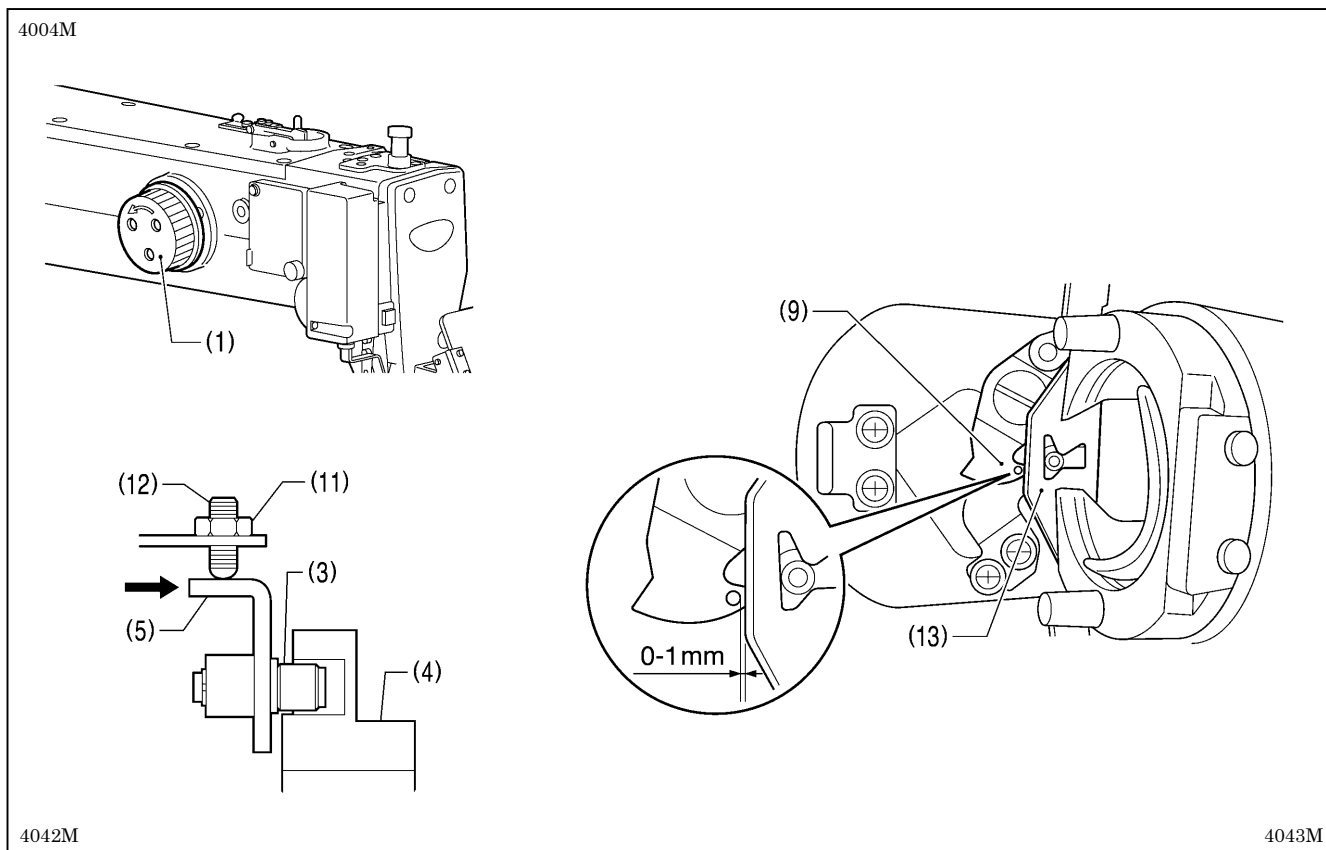
## 7-9. Adjusting the position of the movable knife



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).

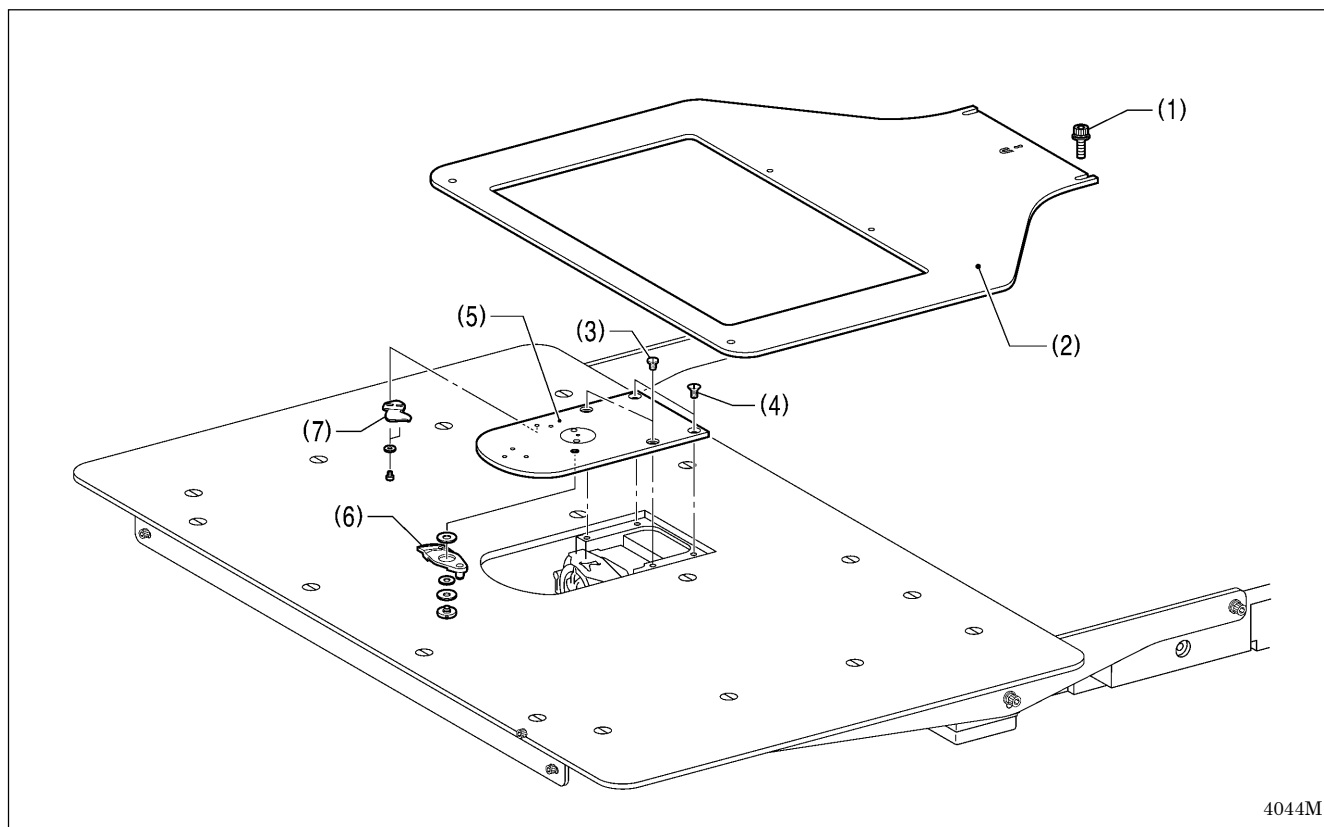


4. Remove the rubber cap (7).
5. Loosen the bolt (8).
6. Move the movable knife connecting plate (10) back and forth to adjust so that the distance from the ridge on the right side of the needle plate to the ridge on the movable knife (9) is 9.5 to 9.9 mm.
7. After tightening the bolt (8), check the above position once more.

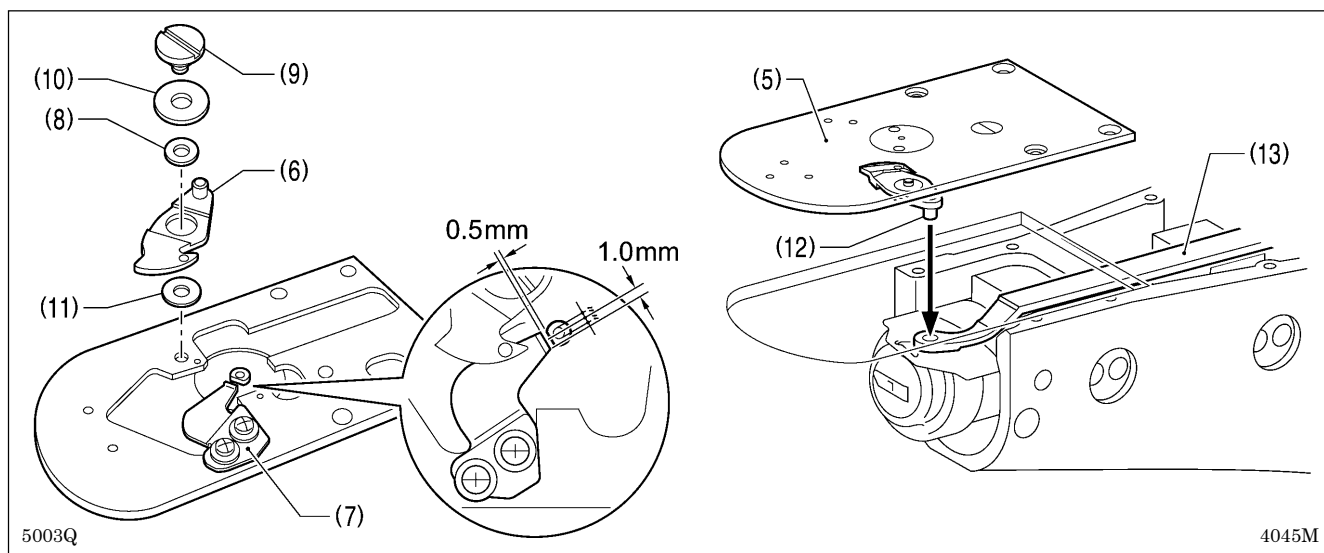


8. Turn the pulley (1) by hand to move the needle bar to its lowest position.
9. Loosen the nut (11), tighten the set screw (12) until the collar (3) is touching the inside of the groove in the thread trimmer cam (4), and then turn it back in the counterclockwise direction by approximately 1/4 of a turn.
10. Tighten the nut (11), 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.
11. Check that there is a gap of about 0 - 1 mm between the outside of the hole in the movable knife (9) and the ridge line on the shuttle race thread guide (13) when there is still play between the parts.

## 7-10. Replacing the movable and fixed knives

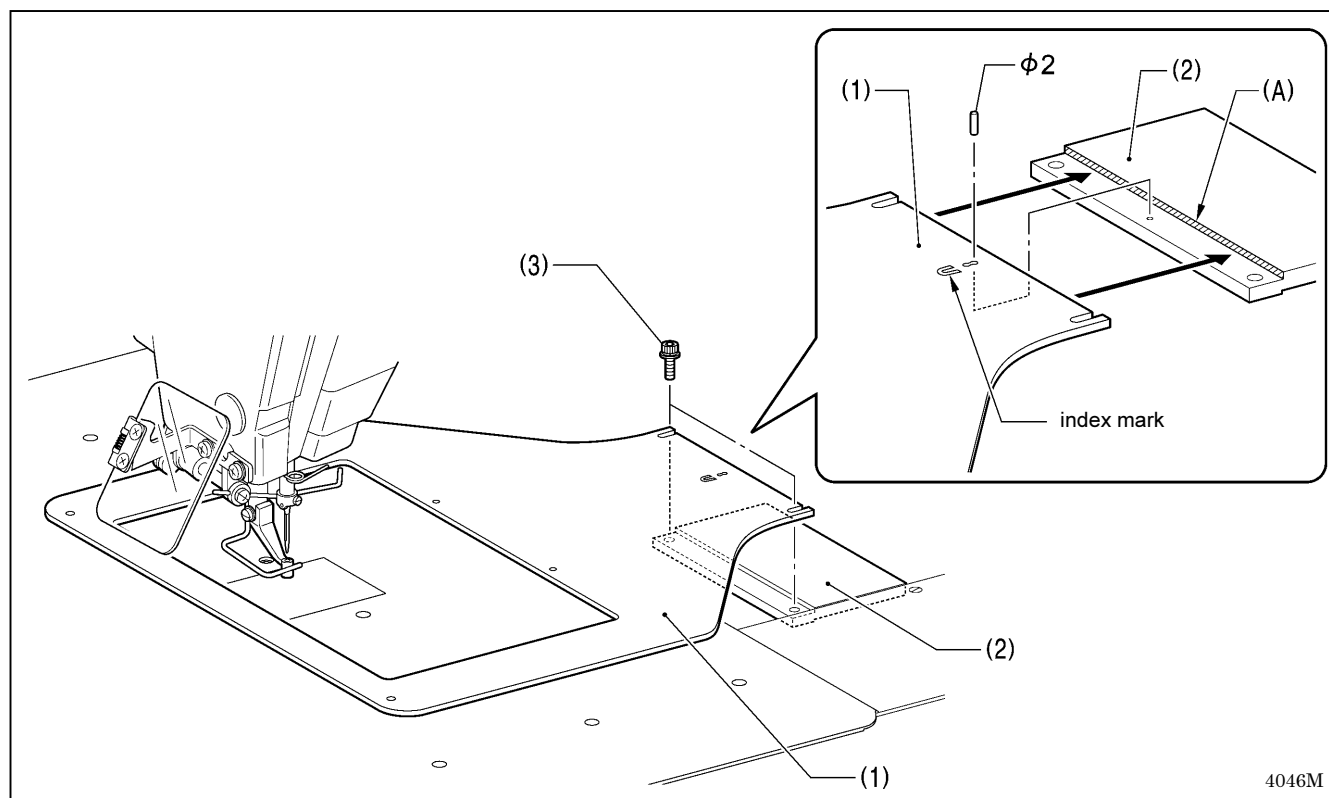


1. Loosen the two bolts (1) and then remove the feed plate (2).
2. Open the shuttle race cover, remove the two screws (3) and the two flat screws (4), and then remove the needle plate (5).
3. Remove the movable knife (6) and the fixed knife (7).



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.
9. Install the feed plate (2). (Refer to the next page.)

### 7-10-1. Installing the feed plate

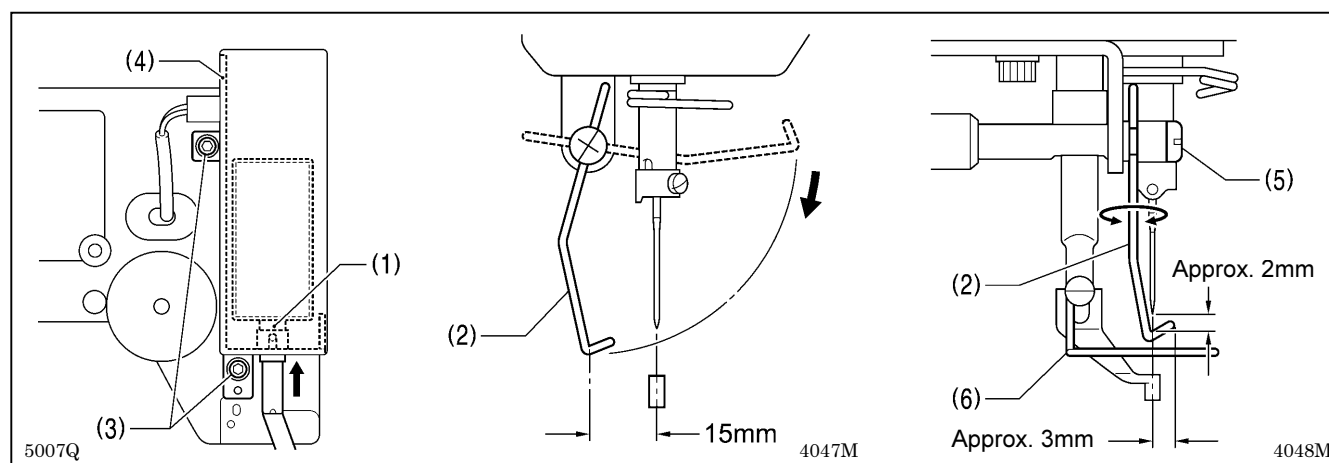


**NOTE:**

Install the feed plate so that the surface with the index mark (U) is facing upward.

Place the rear edge of the feed plate (1) against the stepped part of base plate Y (2) (shaded section (A)) and use a 2 mm diameter pin (such as a needle) to align the hole in the feed plate (1) with the hole in base plate Y (2); then tighten the two bolts (3).

### 7-11. Adjusting the thread wiper

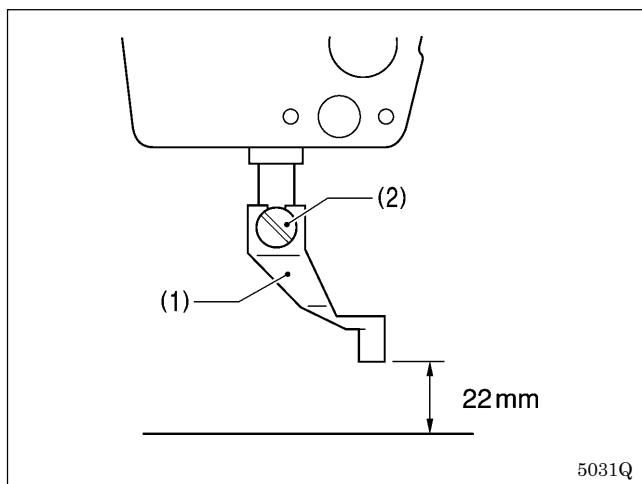


1. Loosen the two screws (3) and shift the entire solenoid setting plate (4) up or down to adjust so that the thread wiper (2) is 15 mm in front of the needle center when the plunger (1) of the thread wiper solenoid is driven to the full stroke.
2. Loosen the screw (5) and adjust the position of the 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 (6).

## 7-12. Presser foot installation position

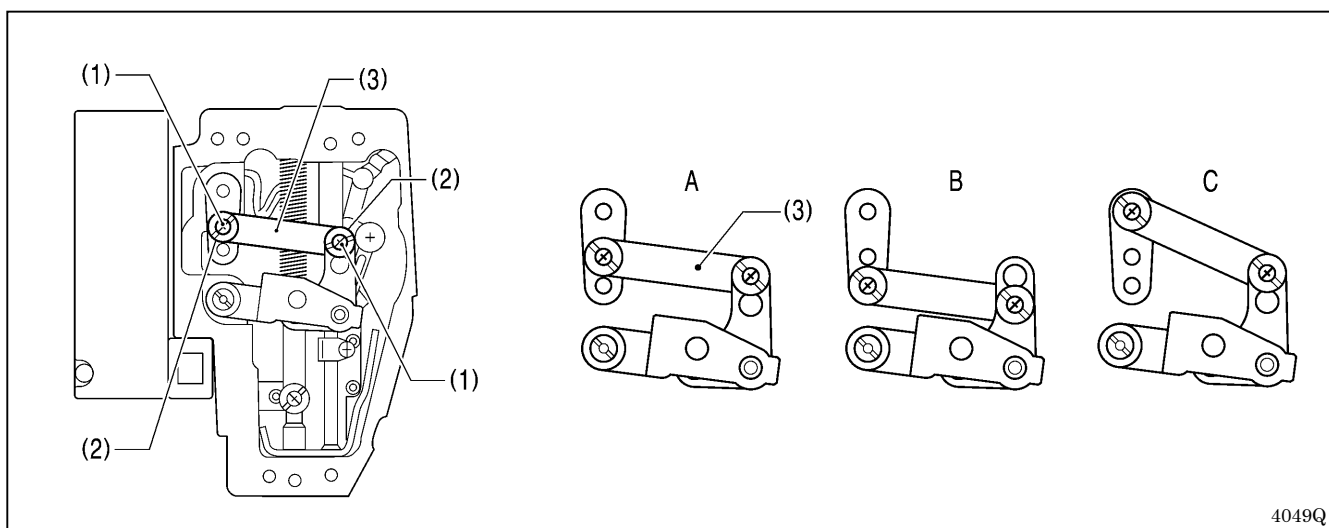


Install the presser foot (1) with the screw (2) so that the distance from the bottom of the presser foot to the top of the needle plate is 22 mm when the sewing machine is stopped and the presser foot (1) is raised.

## 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>



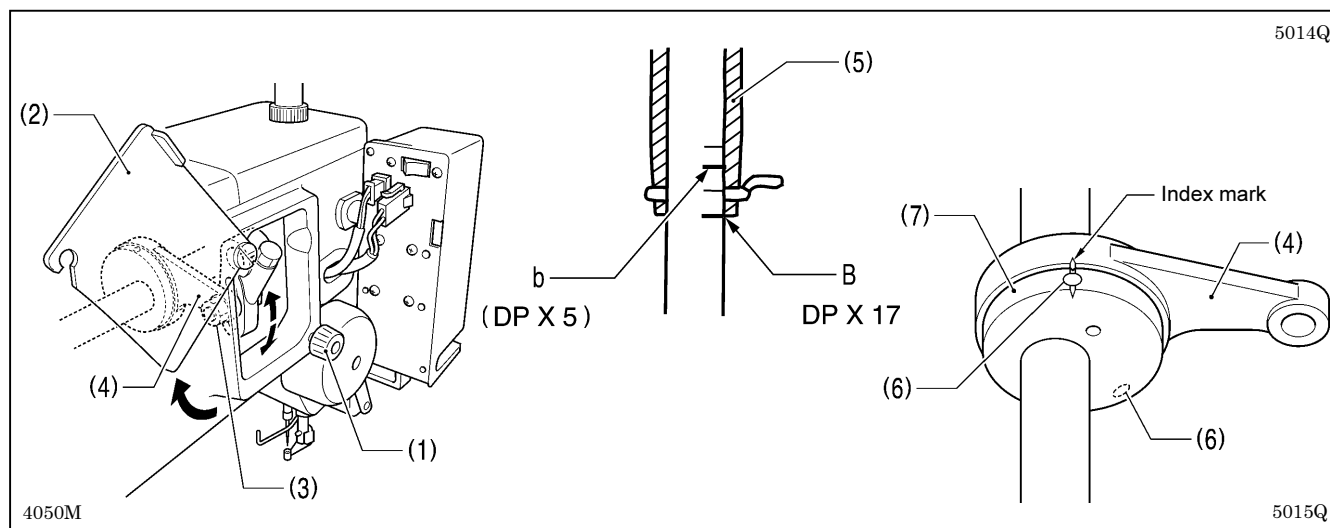
1. Remove the face plate.
2. Remove the two screws (1) and the two shoulder screws (2), and then remove stepping clamp link A (3).
3. Change the installation position for stepping clamp link A (3) to either A, B or C above.

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. (Refer to the next page.)

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



## &lt;Stepping clamp connecting rod position adjustment&gt;



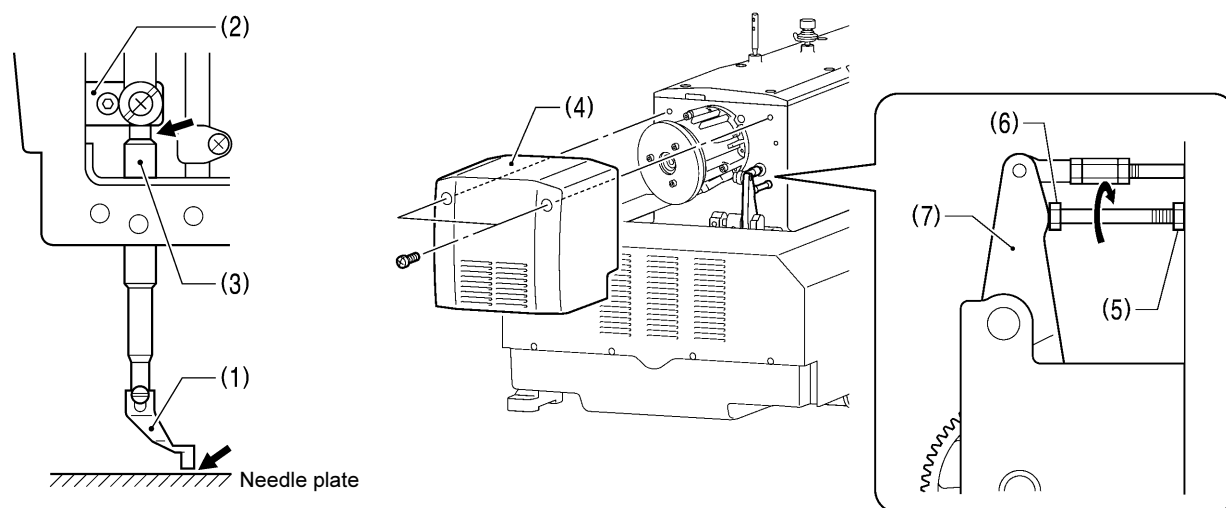
1. Loosen the screw (1), and then open the cover (2).
2. Loosen the nut (3), and then adjust the position of the stepping clamp connecting rod (4).
  - When the stepping clamp connecting rod (4) is raised, the intermittent stroke will increase.
  - When the stepping clamp connecting rod (4) is lowered, 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 4051M



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).

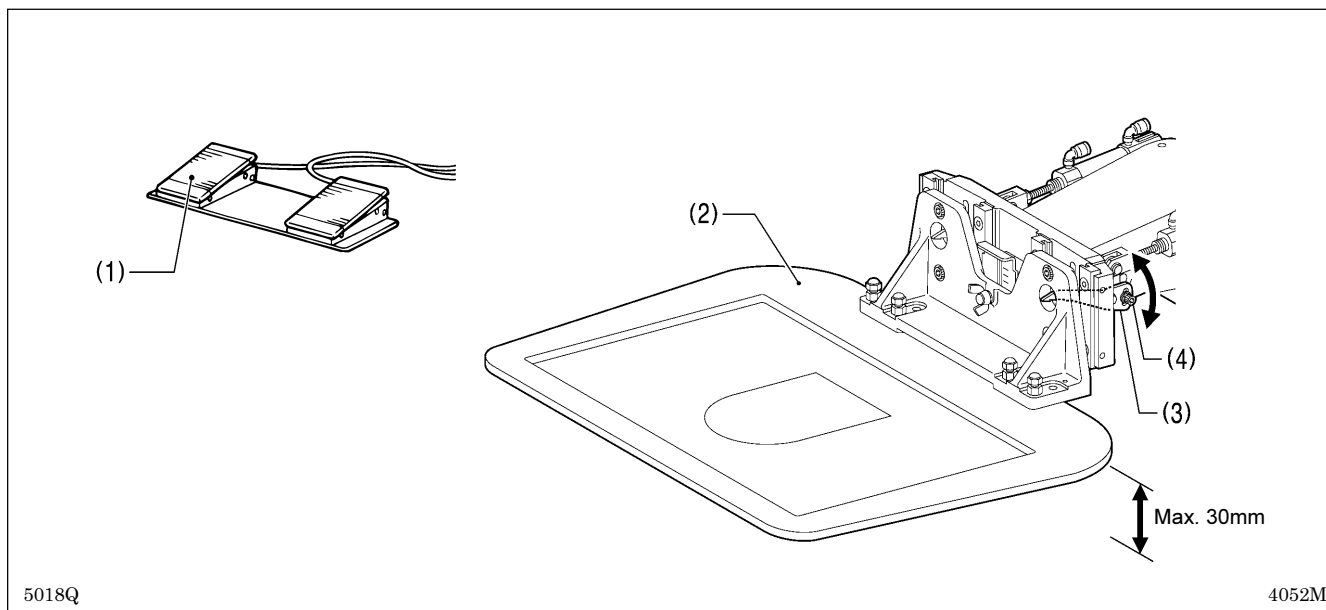
## &lt;If they are touching&gt;

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.

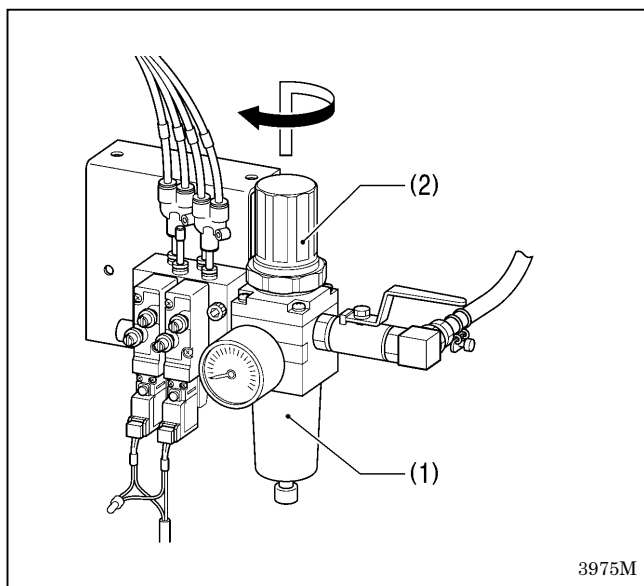
### 7-14. Adjusting the work clamp lift amount

The maximum lift amount for the work clamp (2) is 30 mm above the top of the needle plate.



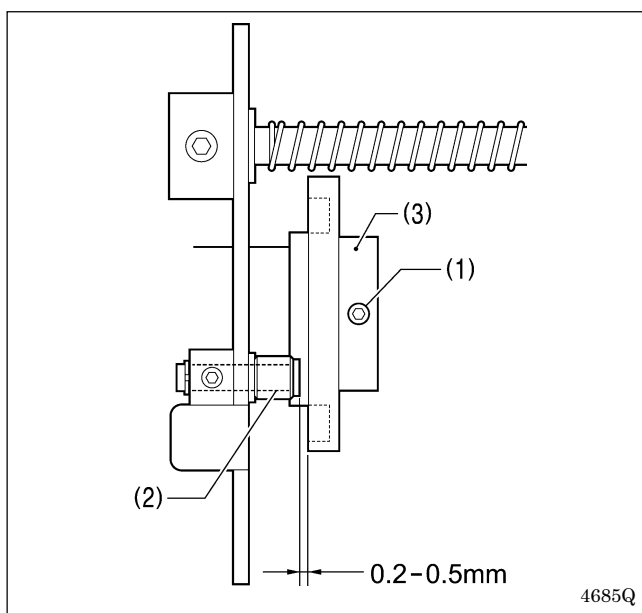
1. Turn on the air, and then turn on the power switch.
2. Depress the work clamp switch (1) to raise the work clamp (2).
3. Loosen the two bolts (4) of the work clamp lifter lever (3), and then move the work clamp lifter lever (3) up or down to adjust the lift amount.

### 7-15. Adjusting the air pressure



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.

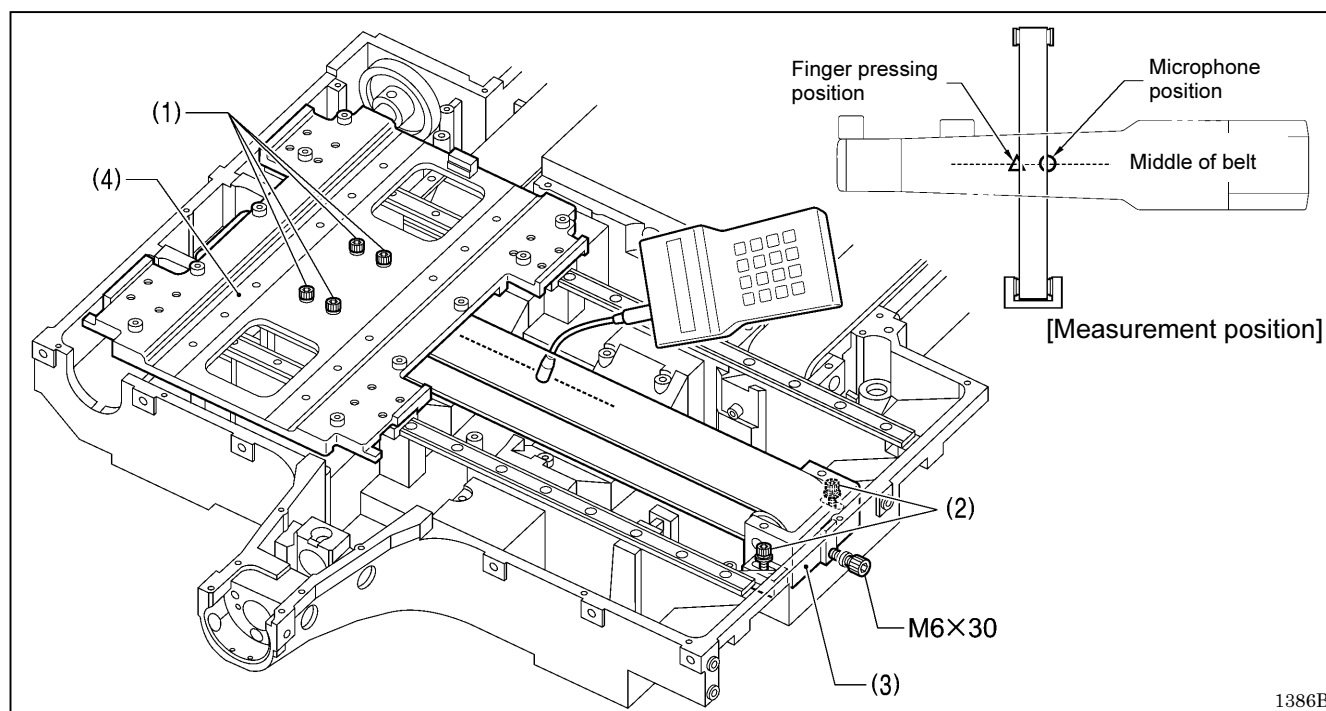
## 7-16. Adjusting the thread trimmer cam position



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

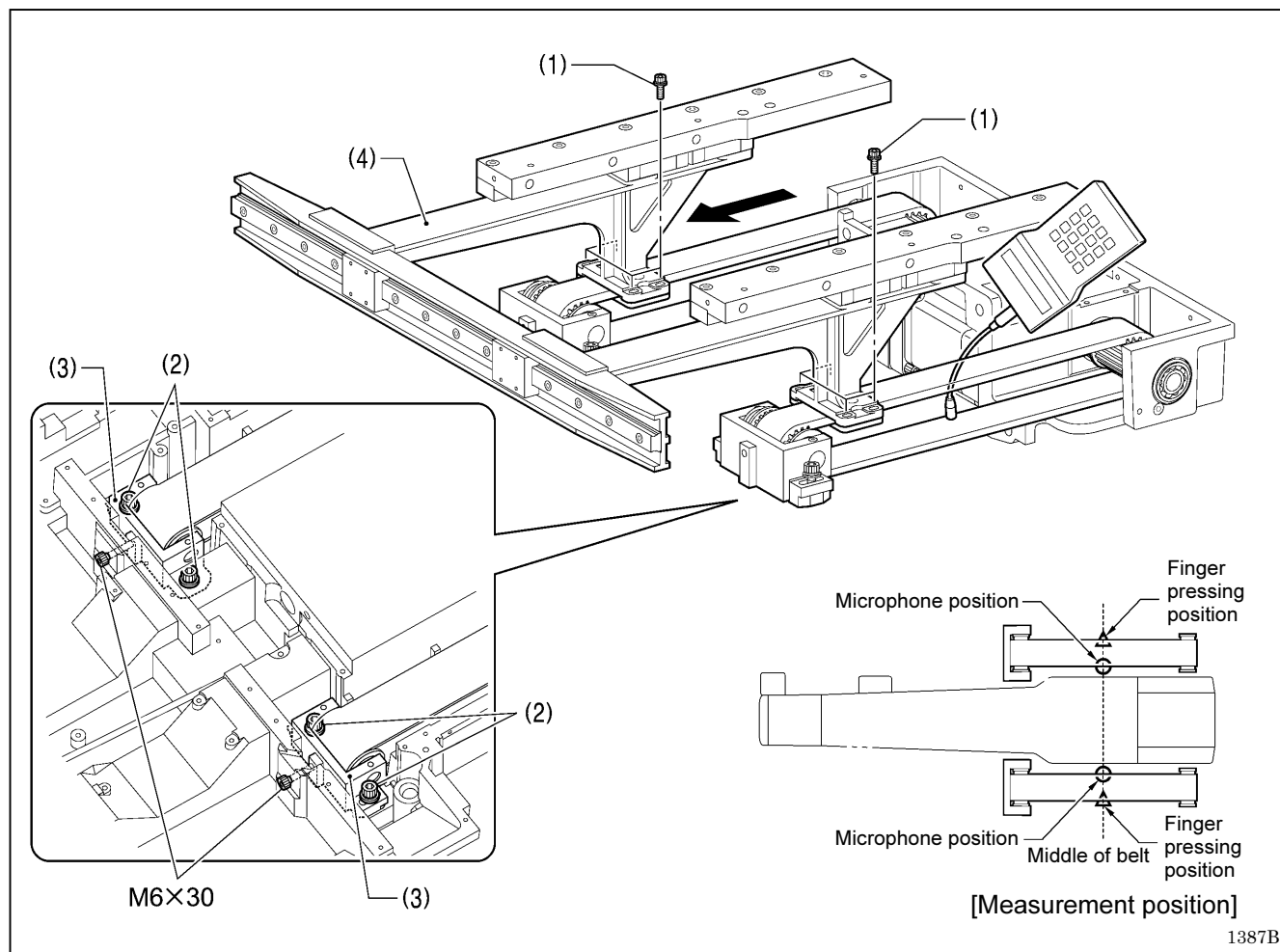
<X-GT belt>



1. Provisionally tighten the four bolts (1) and the two bolts (2).
  2. Tighten the M6x30 bolt, and then pull the X pulley bracket (3) to adjust the tension.
  3. Fully tighten the four bolts (1) of the X base plate (4) and the two bolts (2) of the X pulley bracket (3).
  4. Remove the M6x30 bolt.
  5. Move the X base plate (4) to the left edge.
  6. Use a tension gauge to measure the tension at the middle of the lower belt while referring to "Measurement position" in the illustration. (Refer to "6-5-2. X-feed mechanism" for details on measuring the tension.)
- \* Check that the value for the belt tension is within the following value ranges. If it is not within this range, repeat steps 2 to 6.  
[For a new belt: 650 - 750 N; For a reused belt: 520 - 600 N]
- \* The belt tension gauge should be set to measure a unit weight of 0.04 kg/m, a belt width of 50 mm and a span length of 485 mm.
- \* It is recommended that you use the Yunita U-505 tension gauge.

## 7. ADJUSTMENT

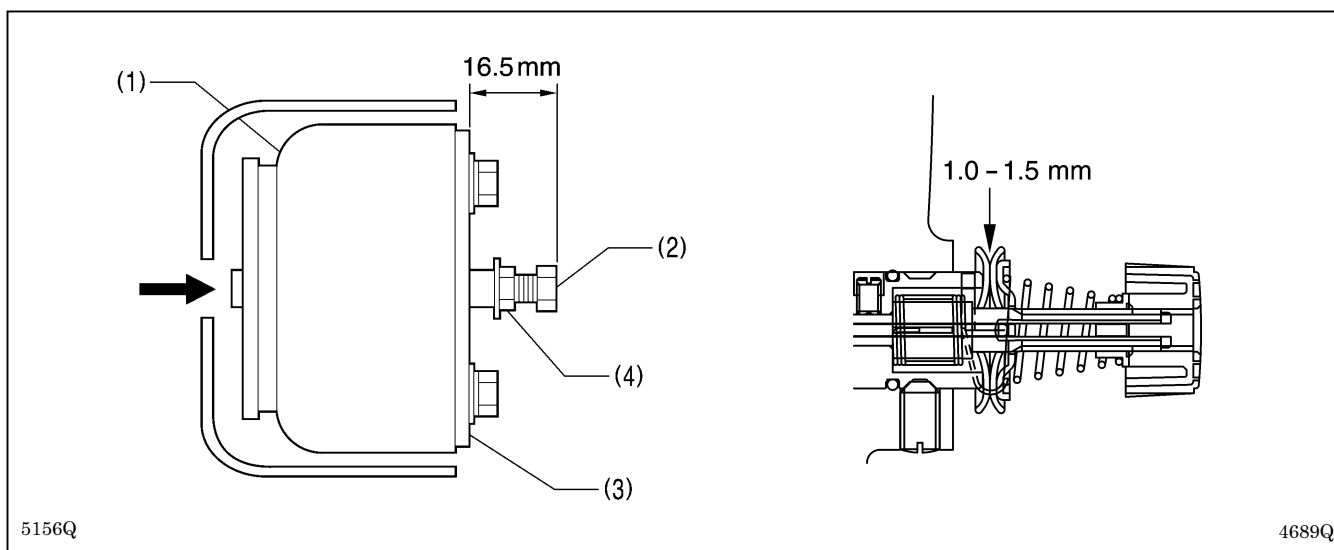
### <Y-GT belt>



1. Provisionally tighten the eight bolts (1) and the four bolts (2).
  2. Tighten the M6x30 bolt, and then pull the Y pulley bracket (3) to adjust the tension.
  3. Fully tighten the four bolts (2) of the Y pulley bracket (3).
  4. Fully tighten the eight bolts (1).
  5. Remove the M6x30 bolt.
  6. Move the Y arm (4) forward (in the direction of the arrow).
  7. Use a tension gauge to measure the tension at the middle of the lower belt while referring to "Measurement position" in the illustration. (Refer to "6-5-1. Y-feed mechanism" for details on measuring the tension.)
- \* Check that the value for the belt tension is within the following value ranges. If it is not within this range, repeat steps 2 to 7.  
[For a new belt: 650 - 750 N; For a reused belt: 520 - 600 N]
  - \* The belt tension gauge should be set to measure a unit weight of 0.04 kg/m, a belt width of 50 mm and a span length of 333 mm.
  - \* It is recommended that you use the Yunita U-505 tension gauge.

1387B

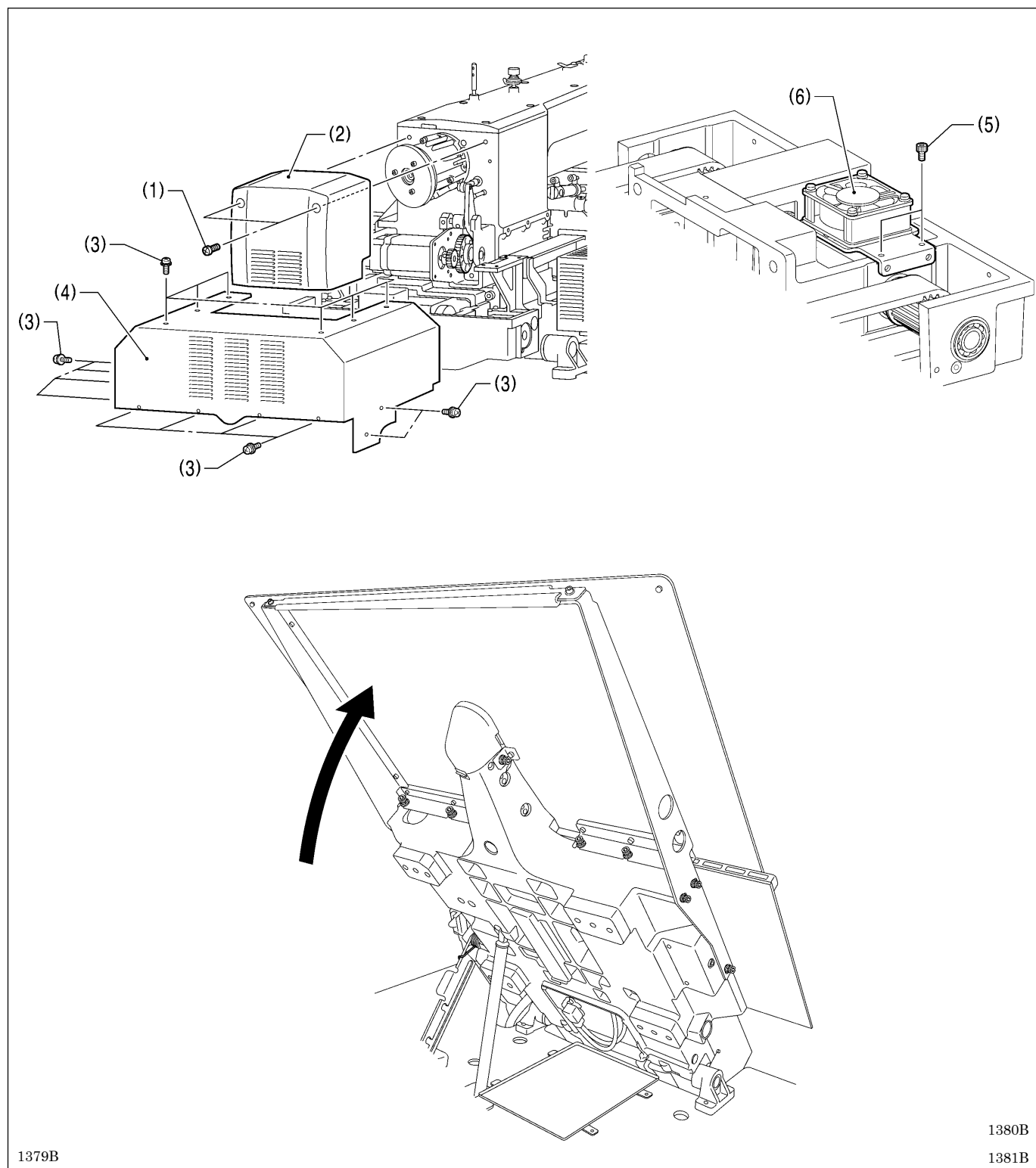
## 7-18. Adjusting the tension release amount



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 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.

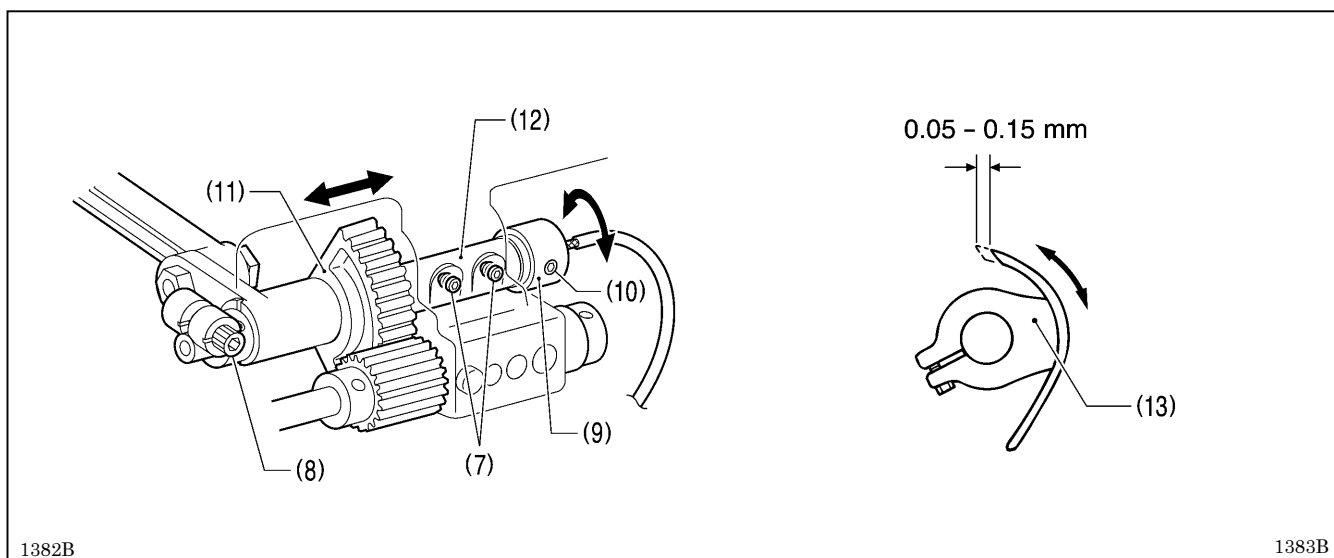
### 7-19. Adjusting the lower shaft gear backlash



1. Remove the two screws (1), and then remove the motor cover (2).
2. Remove the sixteen screws (3), and then remove the rear cover (4).
3. Remove the two screws (5), and then remove the Y motor fan (6).
4. Gently tilt back the machine head.

1380B

1381B



5. Loosen the two set screws (7) and the bolt (8).
6. Push set screw collar R (9) against the edge of the bed, and then turn the pulley by hand and check that it turns smoothly.
  - \* If the pulley cannot turn smoothly, loosen the set screw (10) and turn the pulley while moving the rock gear (11) back and forth. At the position where the pulley moves smoothly, place set screw collar R (9) against the edge of the bed and tighten the set screw (10).
7. Turn the rock gear shaft (12) to adjust the tip of the driver (13) so that there is 0.05 to 0.15 mm of play, and then tighten the two set screws (7) and the bolt (8).

## 7-20. Adjusting the home position

### 7-20-1. Presser foot lift home position

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Turn the pulley to set the needle to the needle up stop position.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 2 | <div data-bbox="236 421 743 801" data-label="Image"> </div> <div data-bbox="831 376 1455 504" data-label="Text"> <p>While pressing the ▼ ▲ keys simultaneously, turn on the power switch.<br/>       * Keep pressing the ▼ ▲ keys until the model name is displayed and the buzzer beeps once.</p> </div> <div data-bbox="831 504 1157 584" data-label="Image"> </div> <div data-bbox="1157 504 1444 698" data-label="Image"> </div> <div data-bbox="831 748 1455 840" data-label="List-Group"> <ul style="list-style-type: none"> <li>"orG" will flash in the PROGRAM No. display and the offset value (default: 0) will be displayed in the menu display.</li> </ul> </div> <div data-bbox="189 828 809 855" data-label="Text"> <p>TEST indicator and THREAD/CLAMP indicator illuminate.</p> </div> <div data-bbox="1268 840 1455 862" data-label="Text"> <p>5205Q 4443Q 4421Q</p> </div> |
| 3 | <div data-bbox="236 898 379 981" data-label="Image"> </div> <div data-bbox="448 884 689 911" data-label="Text"> <p>Press the RESET key.</p> </div> <div data-bbox="448 918 1455 1046" data-label="List-Group"> <ul style="list-style-type: none"> <li>Intermittent presser foot home position detection will be carried out, and the intermittent presser foot will stop at the currently-registered home position.</li> <li>* If you press the RESET key for 2 seconds or more at this time, the offset value will be reset to " 0 ".</li> </ul> </div>                                                                                                                                                                                                                                                                                                                                    |
| 4 | <div data-bbox="217 1115 754 1480" data-label="Image"> </div> <div data-bbox="831 1059 1455 1182" data-label="Text"> <p>Remove the rear 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="963 1229 1283 1408" data-label="Image"> </div> <div data-bbox="831 1491 1455 1552" data-label="List-Group"> <ul style="list-style-type: none"> <li>The work clamp driving gear (3) will move in conjunction with the setting value.</li> </ul> </div> <div data-bbox="687 1525 812 1547" data-label="Text"> <p>5207Q 5208Q</p> </div>                                                                                                                                                                                         |
| 5 | <div data-bbox="212 1592 352 1675" data-label="Image"> </div> <div data-bbox="831 1565 1075 1592" data-label="Text"> <p>Press the RESET key.</p> </div> <div data-bbox="831 1599 1455 1688" data-label="List-Group"> <ul style="list-style-type: none"> <li>Intermittent presser foot home position detection will be carried out. Check if the index marks are aligned with the center line.</li> </ul> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 6 | Repeat steps 4 and 5 until the index marks are aligned with the center line.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 7 | <div data-bbox="212 1827 352 1910" data-label="Image"> </div> <div data-bbox="189 1787 453 1814" data-label="Text"> <p>End adjustment mode.</p> </div> <div data-bbox="831 1792 1056 1818" data-label="Text"> <p>Press the TEST key.</p> </div> <div data-bbox="831 1823 1455 1915" data-label="List-Group"> <ul style="list-style-type: none"> <li>The display will return to the normal display and the sewing machine will switch to home position detection standby.</li> </ul> </div> <div data-bbox="480 1935 812 1964" data-label="Text"> <p>TEST indicator switches off</p> </div>                                                                                                                                                                                                                                                                                                  |

#### NOTE:

Always be sure to press the RESET key and check that the index marks are aligned with the center line 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 | <div data-bbox="236 342 743 728"> </div> <div data-bbox="831 288 1452 414"> <p>While pressing the ▼ ▲ keys simultaneously, turn on the power switch.</p> <p>* Keep pressing the ▼ ▲ keys until the model name is displayed and the buzzer beeps once.</p> </div> <div data-bbox="826 427 1145 510"> <p>BACK STEP    ▼    ▲    FWD STEP</p> </div> <div data-bbox="1141 427 1433 629"> </div> <div data-bbox="831 663 1452 757"> <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="274 748 809 777"> <p>TEST indicator and X-SCALE indicator illuminate.</p> </div> <div data-bbox="1256 748 1452 777"> <p>5205Q 4443Q 4421Q</p> </div> |
| 3 | <div data-bbox="296 842 493 954"> <p>☀ X X-SCALE</p> <p>○ Y Y-SCALE</p> </div> <div data-bbox="831 786 1452 846"> <p>Press the SELECT key so that either the X-SCALE indicator or the Y-SCALE indicator illuminates.</p> </div> <div data-bbox="895 875 1034 958"> <p>SELECT</p> </div> <div data-bbox="1382 949 1452 976"> <p>4570Q</p> </div>                                                                                                                                                                                                                                                                                                                                                                                           |
| 4 | <div data-bbox="236 1014 379 1097"> <p>RESET</p> </div> <div data-bbox="448 987 1452 1149"> <p>Press the RESET key.</p> <ul style="list-style-type: none"> <li>• Home position detection will be carried out, and the work clamp will stop at the currently-registered home position.</li> <li>* If you press the RESET key for 2 seconds or more at this time, the offset value will be reset to " 0 ".</li> </ul> </div>                                                                                                                                                                                                                                                                                                                |

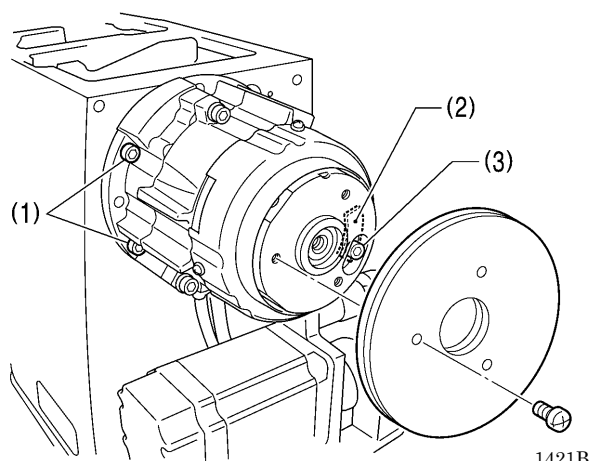
(Continued on the next page)

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>5</p> | <p>1) Remove the feed plate.</p> <p>2) Place the rear edge of the home position reference plate (1) against the stepped part of base plate Y (2) (shaded section (A)) and use a 2 mm diameter pin (such as a needle) to align the hole in the home position reference plate (1) with the hole in base plate Y (2); then tighten the two bolts (3).</p> <p>3) Press the ▲ or ▼ key to change the offset value (-999 to 999) so that the needle drops to the center of the mark (B) on the home position reference plate (1).</p> <ul style="list-style-type: none"> <li>The home position reference plate (1) will move in accordance with the setting value.</li> </ul> |
| <p>6</p> | <p>Press the RESET key.</p> <ul style="list-style-type: none"> <li>Home position detection will be carried out. Check the home position. If the home position is correct, remove the home position reference plate (1), and then install the feed plate. (Refer to "7-10-1. Installing the feed plate".)</li> </ul>                                                                                                                                                                                                                                                                                                                                                     |
| <p>7</p> | <p><b>End adjustment mode.</b></p> <p>Press the TEST key.</p> <ul style="list-style-type: none"> <li>The display will return to the normal display and the sewing machine will change to home position standby.</li> </ul> <p>TEST indicator switches off</p>                                                                                                                                                                                                                                                                                                                                                                                                           |

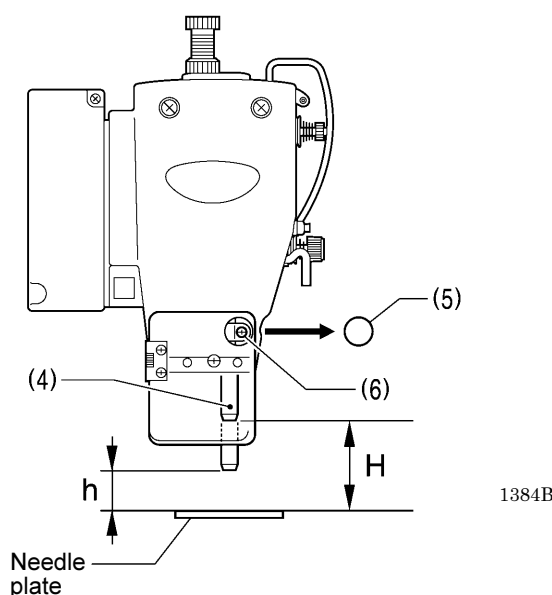
## NOTE:

Be sure to press the RESET key to check the home position before ending adjustment mode. If adjustment mode is ended without checking the home position, error "E202" will be generated.

## 7-21. Adjusting the needle stop home position

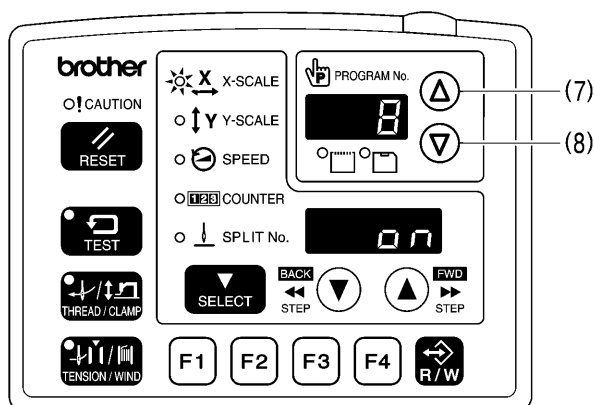


1421B



1384B

| Needle     | DPx17   | DPx5    |
|------------|---------|---------|
| Distance H | 55.5 mm | 50.4 mm |
| Distance h | 18.0 mm | 12.9 mm |



1420B

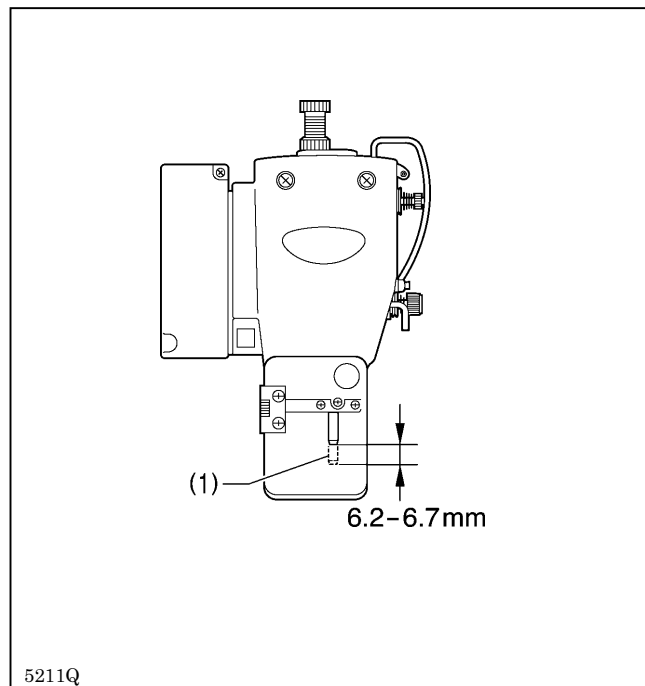
### NOTE:

If the four bolts (1) of the sewing machine motor and the bolt (3) of the magnet are loosened, it may disrupt the feed timing.

Do not loosen these bolts at the time of shipment from the factory or after the needle up stop home position has been adjusted.

1. Remove the needle and the needle bar thread guide.
2. Turn the pulley to move the needle bar (4) to its lowest position.
3. Remove the rubber cap (5) from the face plate, and then loosen the screw (6) of the needle bar clamp.
4. Adjust so that the lowest needle bar position is at the distance h.
5. Tighten the screw (6) and then install the rubber cap (5).
6. While pressing the  $\Delta$  key (7), turn on the power switch.
  - \* Keep pressing the  $\Delta$  key (7) until the model name is displayed and the buzzer beeps once.
7. Press the  $\Delta$  key (7) or the  $\nabla$  key (8) to select check code "8". (Refer to "2-7. Input checking method" for details.)
8. Remove the flywheels, and then loosen the bolt (3) of the magnet (2) 1/4 of a turn.
9. Turn the pulley to lower the needle bar (4) to a distance H from the highest position.
10. Move the magnet (2) to the precise point where the menu display switches from "on" to "oFF", and then tighten the bolt (3).
11. Turn the pulley to move the needle bar (4) to the position of H and check that the menu display switches from "on" to "oFF"

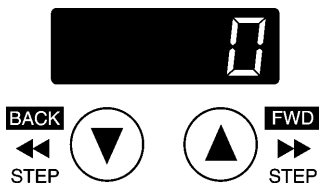
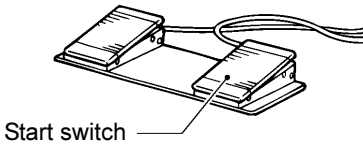
## 7-22. Adjusting the needle up stop position



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).

## [Adjustment method]

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <p>While pressing the <math>\nabla</math> and <math>\Delta</math> keys simultaneously, turn on the power switch.</p> <p>* Keep pressing the <math>\nabla</math> and <math>\Delta</math> keys until the model name is displayed and the buzzer beeps once.</p> <p>• “orG” will flash in the PROGRAM No. display, and the home position offset value will appear in the menu display.</p> <p>TEST indicator and SPEED indicator illuminate.</p> <p>4703Q 4448Q 4421Q</p> |
| 2 | <p>Start switch</p> <p>Lower the work clamp and then depress the start switch.</p> <ul style="list-style-type: none"> <li>• X-Y feed home position detection will be carried out, and then “orG” will stop flashing and illuminate steadily.</li> </ul> <p>1385B</p>                                                                                                                                                                                                   |
| 3 | <p>Start switch</p> <p>Depress the start switch once more.</p> <ul style="list-style-type: none"> <li>• The upper shaft will operate and the needle bar will stop at the needle up stop position.</li> </ul>                                                                                                                                                                                                                                                           |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4 | <div data-bbox="256 266 576 450">  </div> <p>Press the ▲ or ▼ key to set the offset value (-9 to 10) so that the needle up stop position is 6.2 to 6.7 mm below the highest position for the needle bar (1).</p> <ul style="list-style-type: none"> <li>When the ▲ key is pressed, the needle bar will move down, and when the ▼ key is pressed, the needle bar will move up.</li> </ul> <p><b>NOTE:</b><br/>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> |
| 5 | <div data-bbox="244 562 608 707">  </div> <p>Lower the work clamp and then depress the start switch.</p> <ul style="list-style-type: none"> <li>The upper shaft will operate and stop at the offset value which has been set.</li> </ul> <p style="text-align: right;">1385B</p>                                                                                                                                                                                                                                                                                                     |
| 6 | <p><b>End adjustment mode</b></p> <div data-bbox="269 786 408 864">  </div> <p>Press the TEST key.</p> <ul style="list-style-type: none"> <li>The changes to the offset value will be memorized and the sewing machine will switch to home position detection standby.</li> </ul> <p>TEST indicator switches off</p>                                                                                                                                                                                                                                                                 |

## 8. ELECTRICAL MECHANISM



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

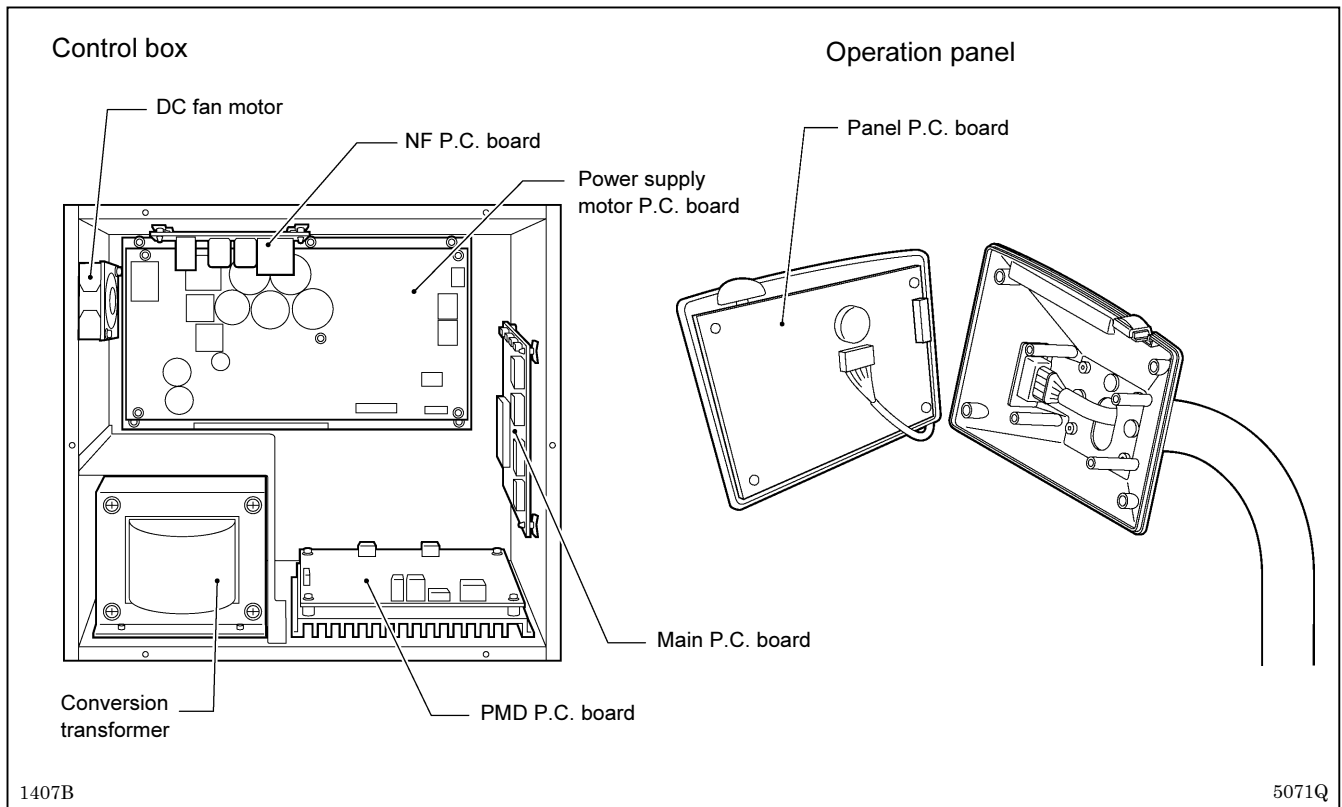
This breaks down the power supply voltage into the voltages that are required for control operations.

### NF P.C. board

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.



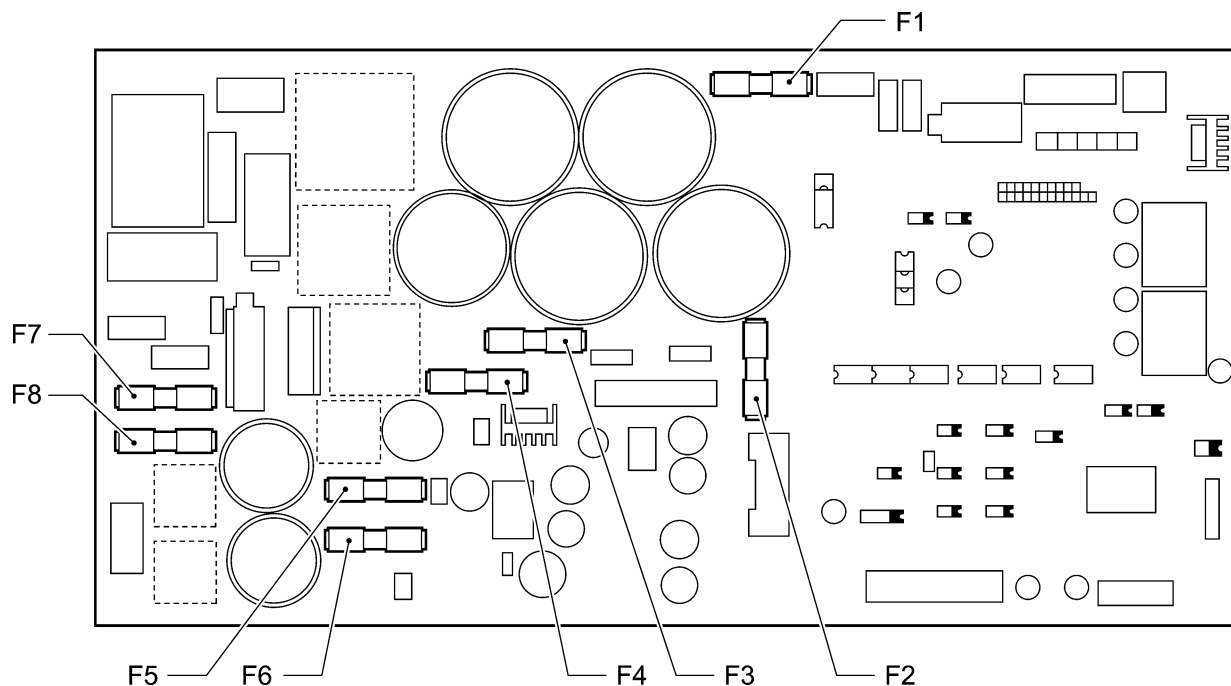
### 8-3. Description of fuses

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<br>(Glass tube fuse 15A-250V) | SA3794-001 | Sewing machine motor does not operate and [E130] is displayed.                                                                                  |
| F2       | Fuse 6AFB<br>(Glass tube fuse 6A-250V)   | SA3759-001 | Feed mechanism does not operate and [E201] or [E211] is displayed.<br>Intermittent presser foot does not operate and [E300] is displayed.       |
| F3       | Fuse 6AFB<br>(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<br>(Glass tube fuse 3A-250V)   | 616167-001 | Communication problem with PMD P.C. board and [E403] is displayed.                                                                              |
| F5       | Fuse 3AFB<br>(Glass tube fuse 3A-250V)   | 616167-001 | Power indicator does not illuminate and nothing operates.                                                                                       |
| F6       | Fuse 3AFB<br>(Glass tube fuse 3A-250V)   | 616167-001 | DC fan motor does not operate and [E740] is displayed.                                                                                          |
| F7<br>F8 | Fuse 15AFB<br>(Glass tube fuse 15A-250V) | SA3794-001 | Power indicator does not illuminate and nothing operates.                                                                                       |

Power supply motor P.C. board



4590Q

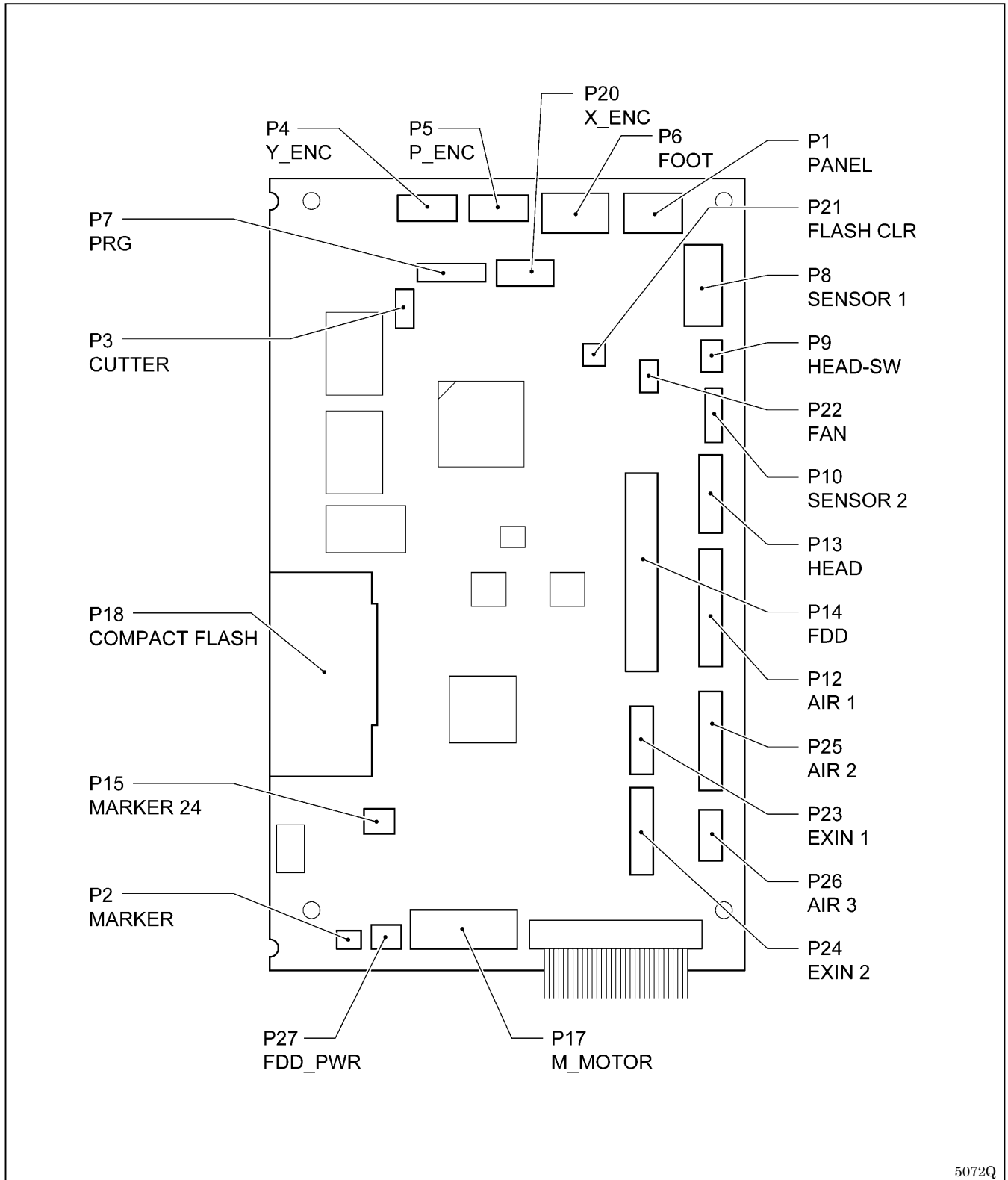


## 8-4. Description of connectors

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.

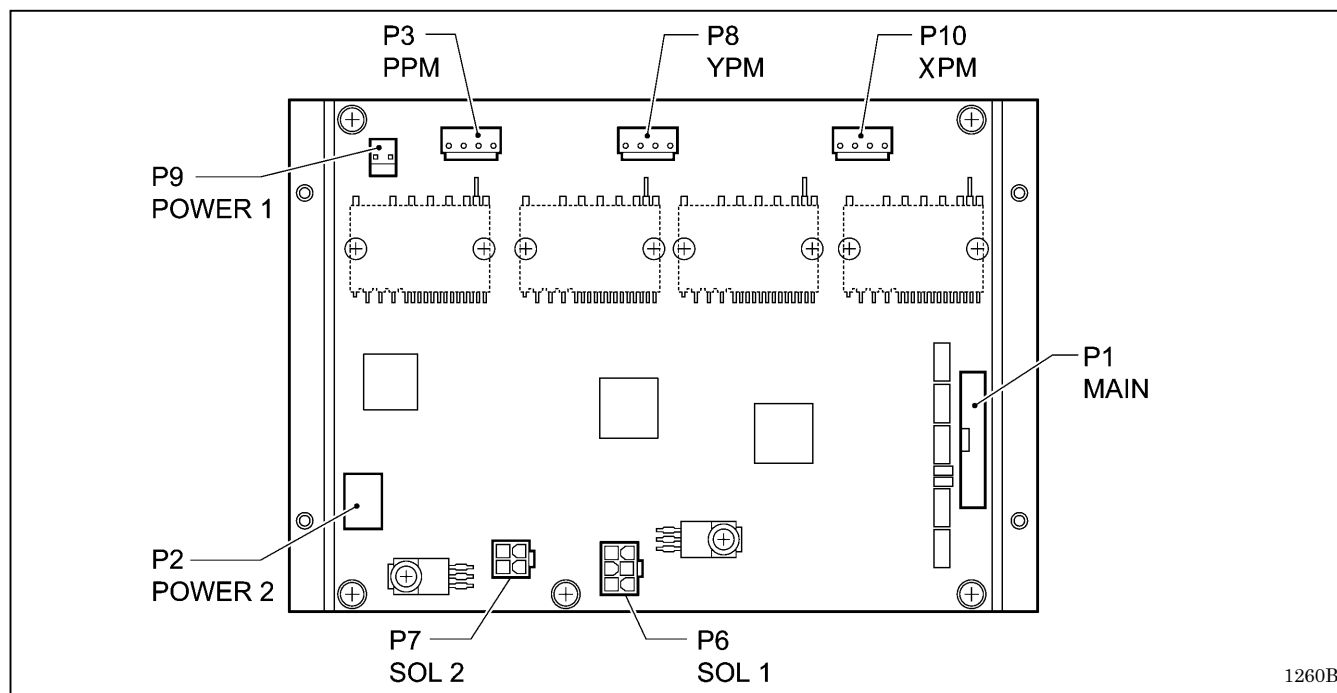
### 8-4-1. Connector positions

Main P.C. board

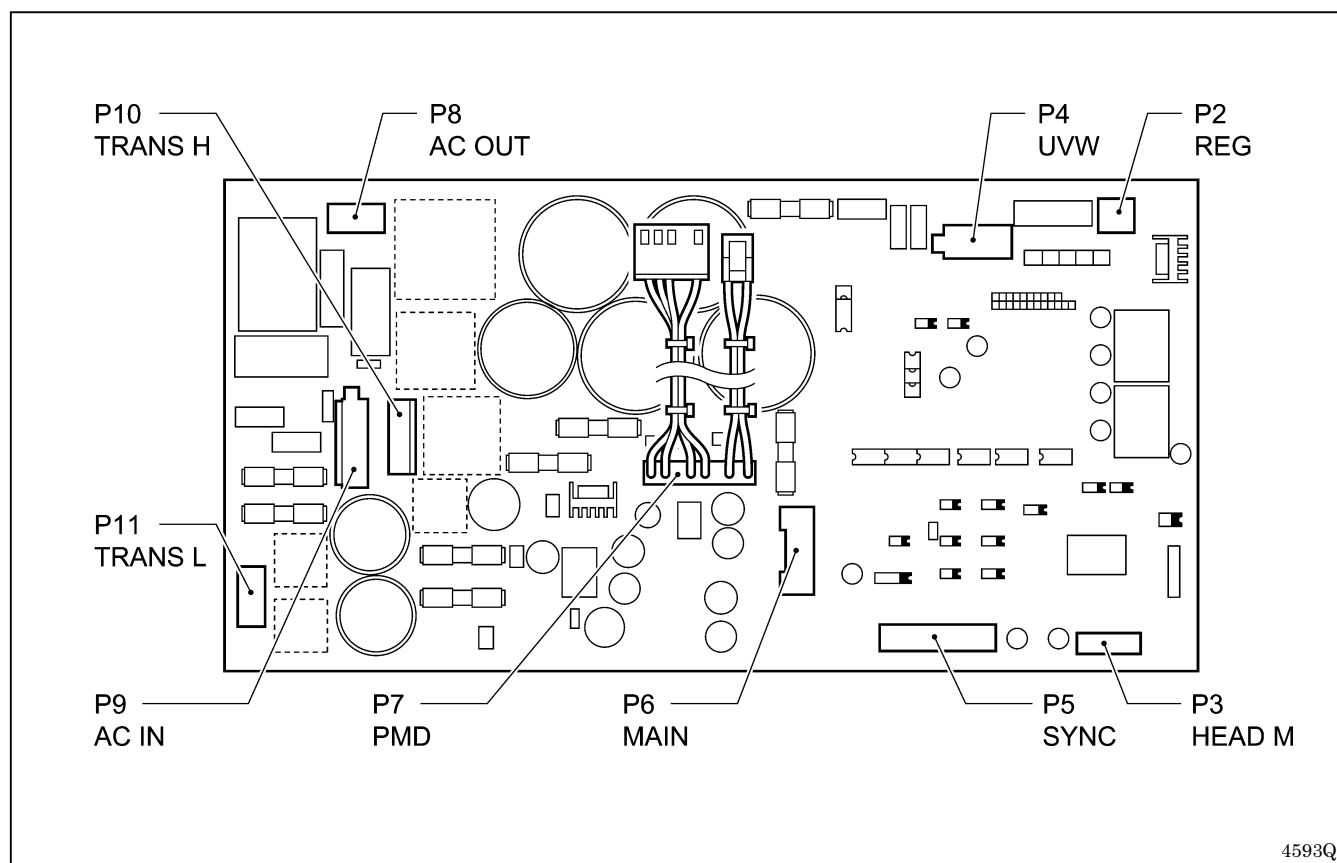


5072Q

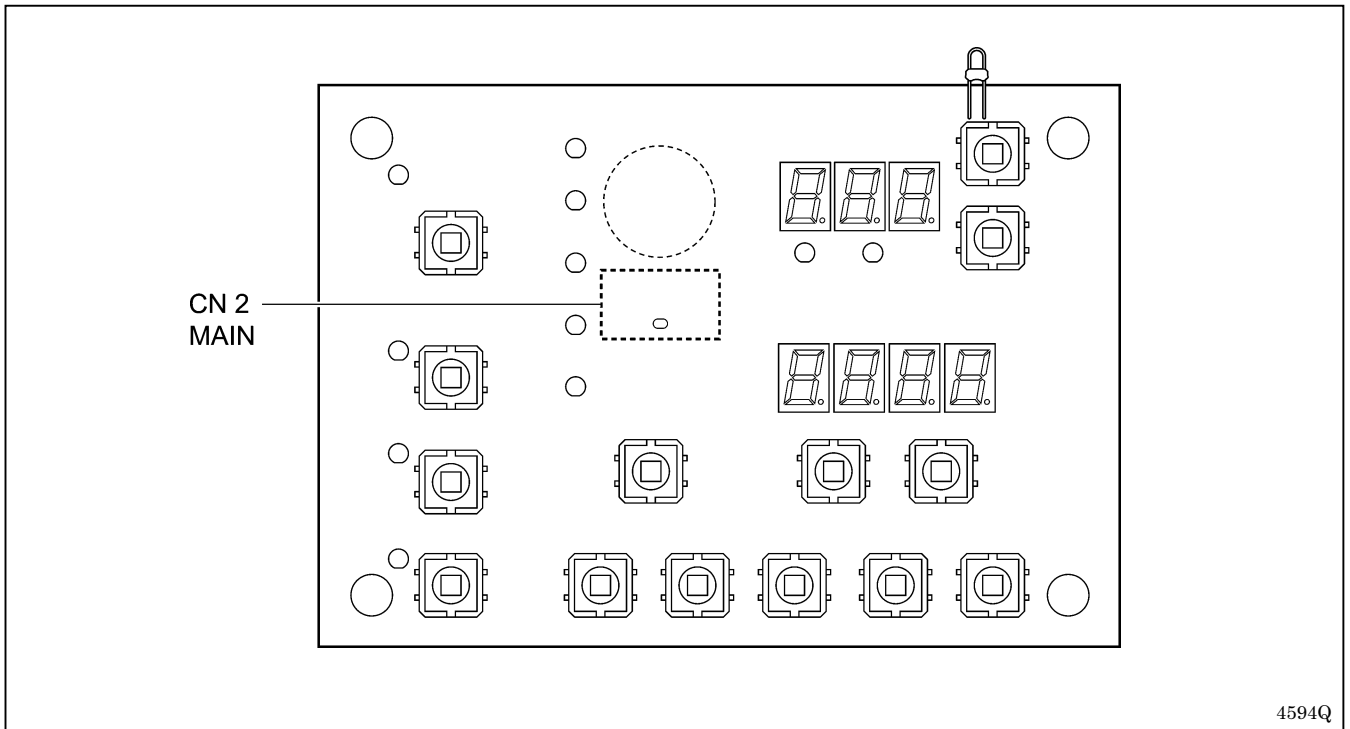
**PMD P.C. board**



**Power supply motor P.C. board**



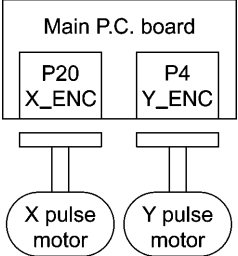
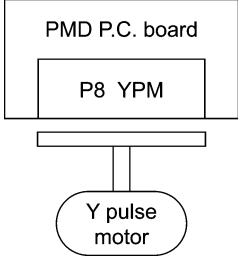
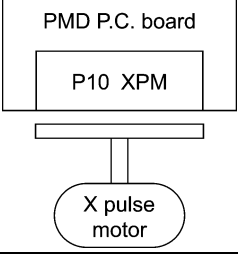
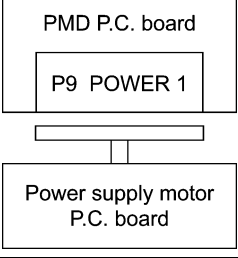
Panel P.C. board



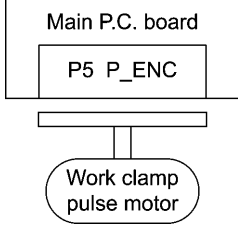
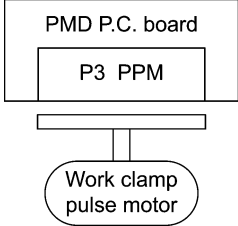
### 8-4-2. Symptoms when there are poor connections

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.

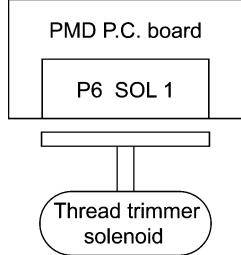
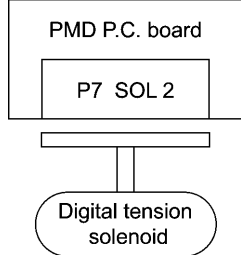
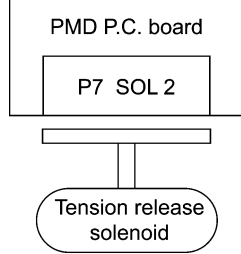
#### Feed mechanism

| Trouble symptom                                                                                                                                                                                       | Connector No. and position                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>The feed mechanism operates briefly but does not detect the home position correctly.</li> <li>[E200] (P20 X_ENC) or [E210] (P4 Y_ENC) is displayed.</li> </ul> |  <p>5241Q</p>   |
| <ul style="list-style-type: none"> <li>Feed mechanism moves to the left and right briefly, and then error [E210] appears.</li> </ul>                                                                  |  <p>4708Q</p>   |
| <ul style="list-style-type: none"> <li>Feed mechanism moves forward and back briefly, and then error [E200] appears.</li> </ul>                                                                       |  <p>4709Q</p>  |
| <ul style="list-style-type: none"> <li>Feed mechanism does not move, and [E300] appears.</li> </ul>                                                                                                   |  <p>4710Q</p> |

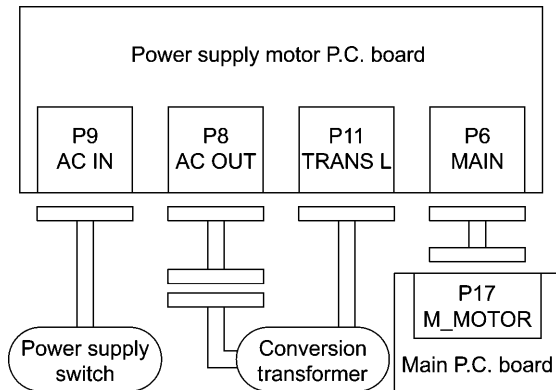
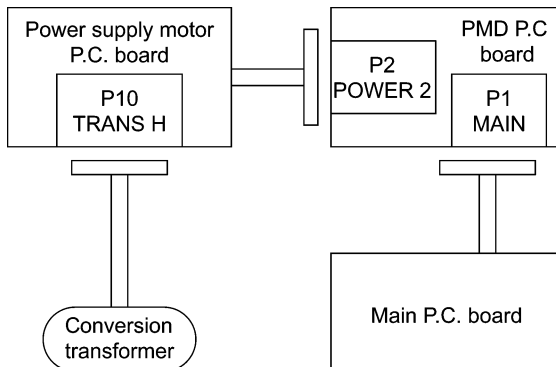
#### Work clamp mechanism

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

## Thread trimming mechanism

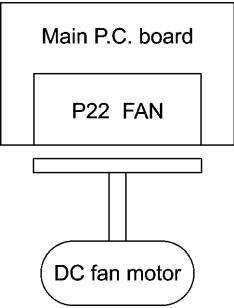
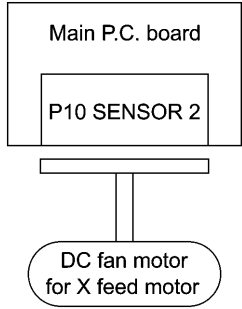
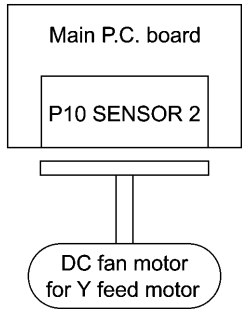
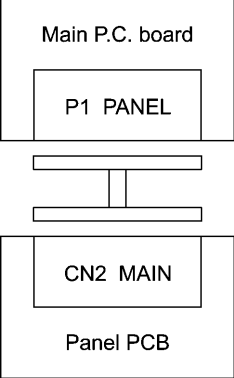
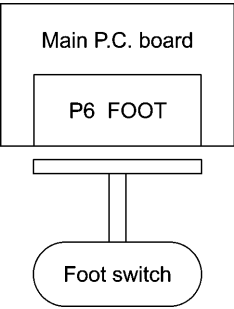
| Trouble symptom                                                                                                                               | Connector No. and position                                                                        |
|---------------------------------------------------------------------------------------------------------------------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

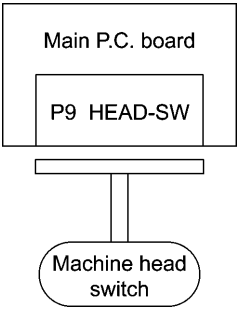
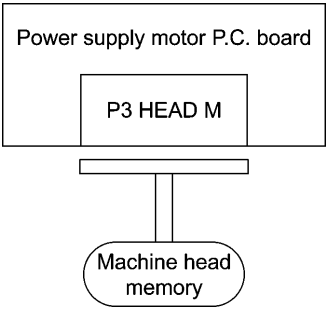
## Sewing operations

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

## 8. ELECTRICAL MECHANISM

### Other

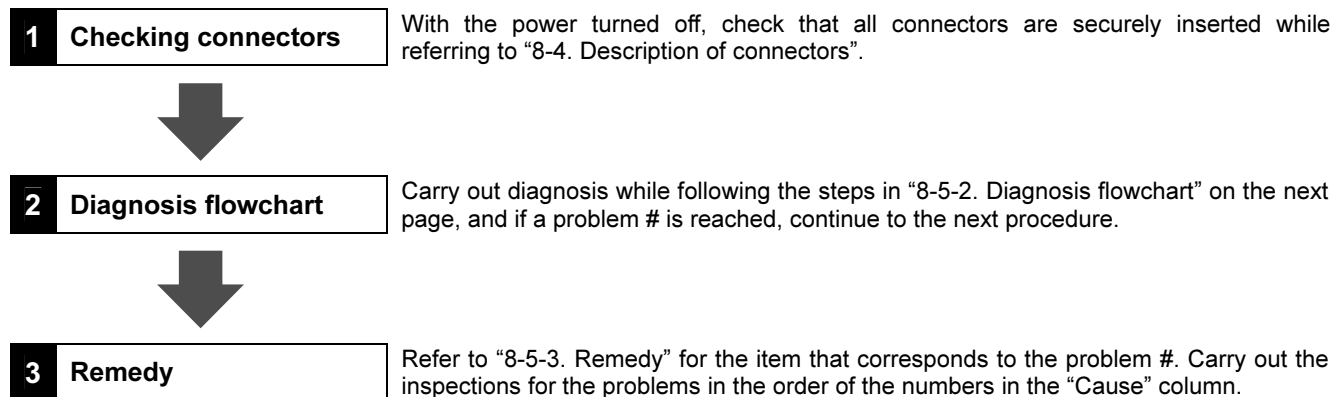
| Trouble symptom                                                                                                                                                                                                                                                                         | Connector No. and position                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>The DC fan motor inside the control box does not operate.</li> <li>[E740] is displayed.</li> </ul>                                                                                                                                               |  <p>5245Q</p>   |
| <ul style="list-style-type: none"> <li>DC fan motor for X feed motor does not operate.</li> <li>[E741] is displayed.</li> </ul>                                                                                                                                                         |  <p>1422B</p>   |
| <ul style="list-style-type: none"> <li>DC fan motor for Y feed motor does not operate.</li> <li>[E742] is displayed.</li> </ul>                                                                                                                                                         |  <p>1423B</p>  |
| <ul style="list-style-type: none"> <li>Operation panel display is incorrect.</li> <li>Power indicator does not illuminate.</li> <li>Operation panel keys do not work.</li> </ul>                                                                                                        |  <p>5246Q</p> |
| <ul style="list-style-type: none"> <li>Sewing machine does not start when foot switch is depressed.</li> </ul> <p>Work clamp is lowered when work clamp switch (left) is depressed.<br/>Home position is detected and sewing machine starts when start switch (right) is depressed.</p> |  <p>5247Q</p> |

|                                                                                                      |                                                                                                                                                                                                                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>• After the power is turned on, [E055] is displayed.</li></ul> |  <p>The diagram shows a rectangular box labeled 'Main P.C. board' containing a smaller box labeled 'P9 HEAD-SW'. A vertical line connects this box to a horizontal bar, which is then connected to an oval labeled 'Machine head switch'.</p> <p>5248Q</p>              |
| <ul style="list-style-type: none"><li>• After the power is turned on, [E452] is displayed.</li></ul> |  <p>The diagram shows a rectangular box labeled 'Power supply motor P.C. board' containing a smaller box labeled 'P3 HEAD M'. A vertical line connects this box to a horizontal bar, which is then connected to an oval labeled 'Machine head memory'.</p> <p>5249Q</p> |

### 8-5. Troubleshooting

#### 8-5-1. Troubleshooting procedure

Carry out troubleshooting by following the procedure given below.



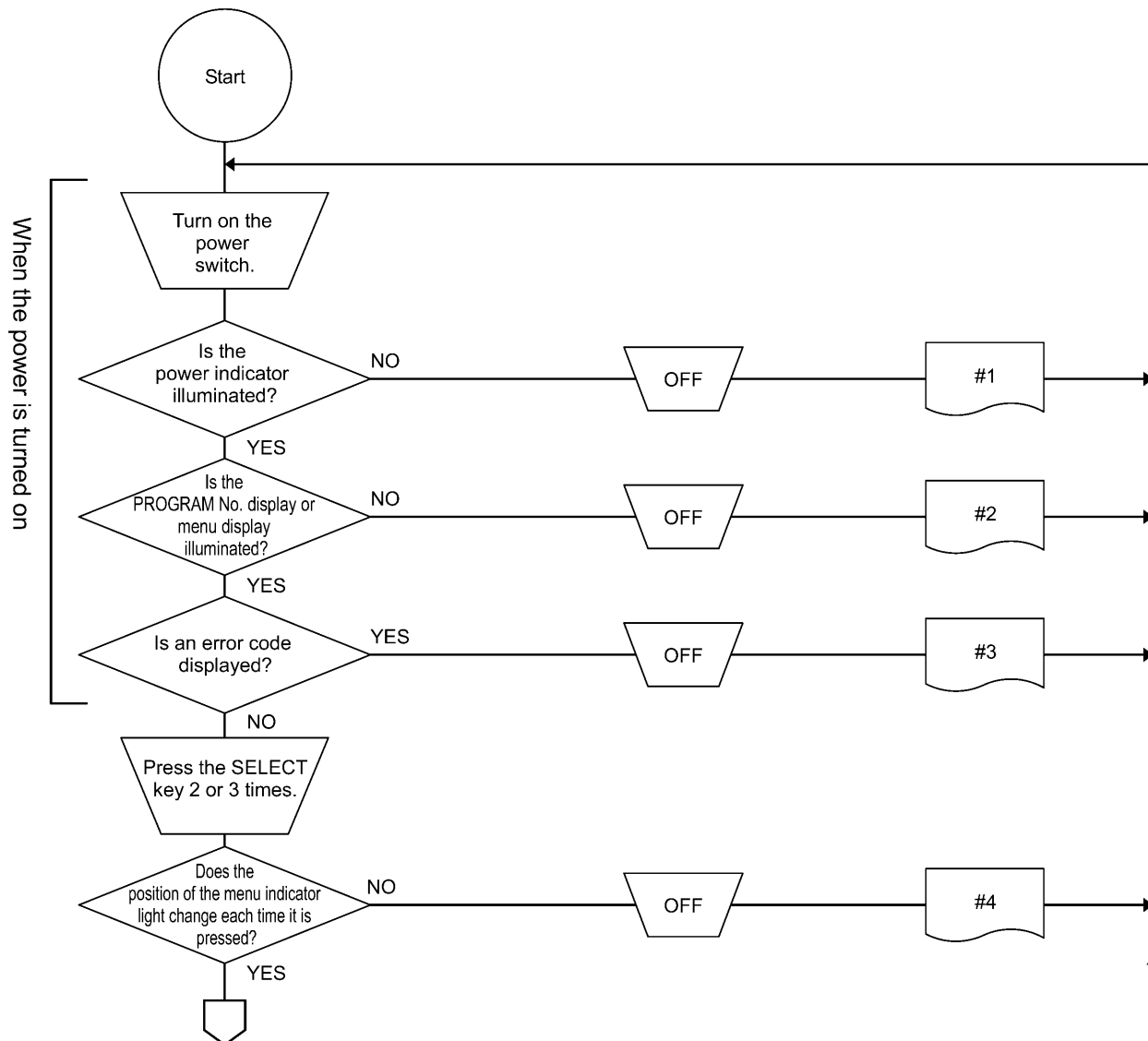
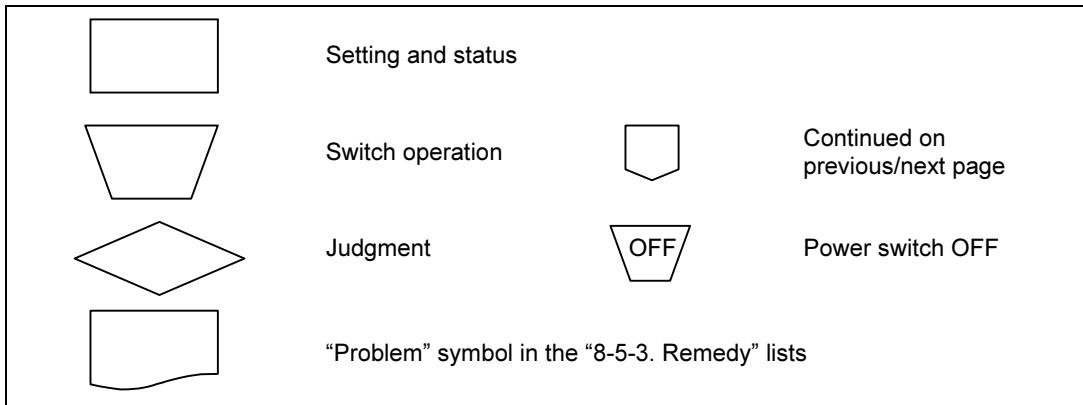
**NOTE:**

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

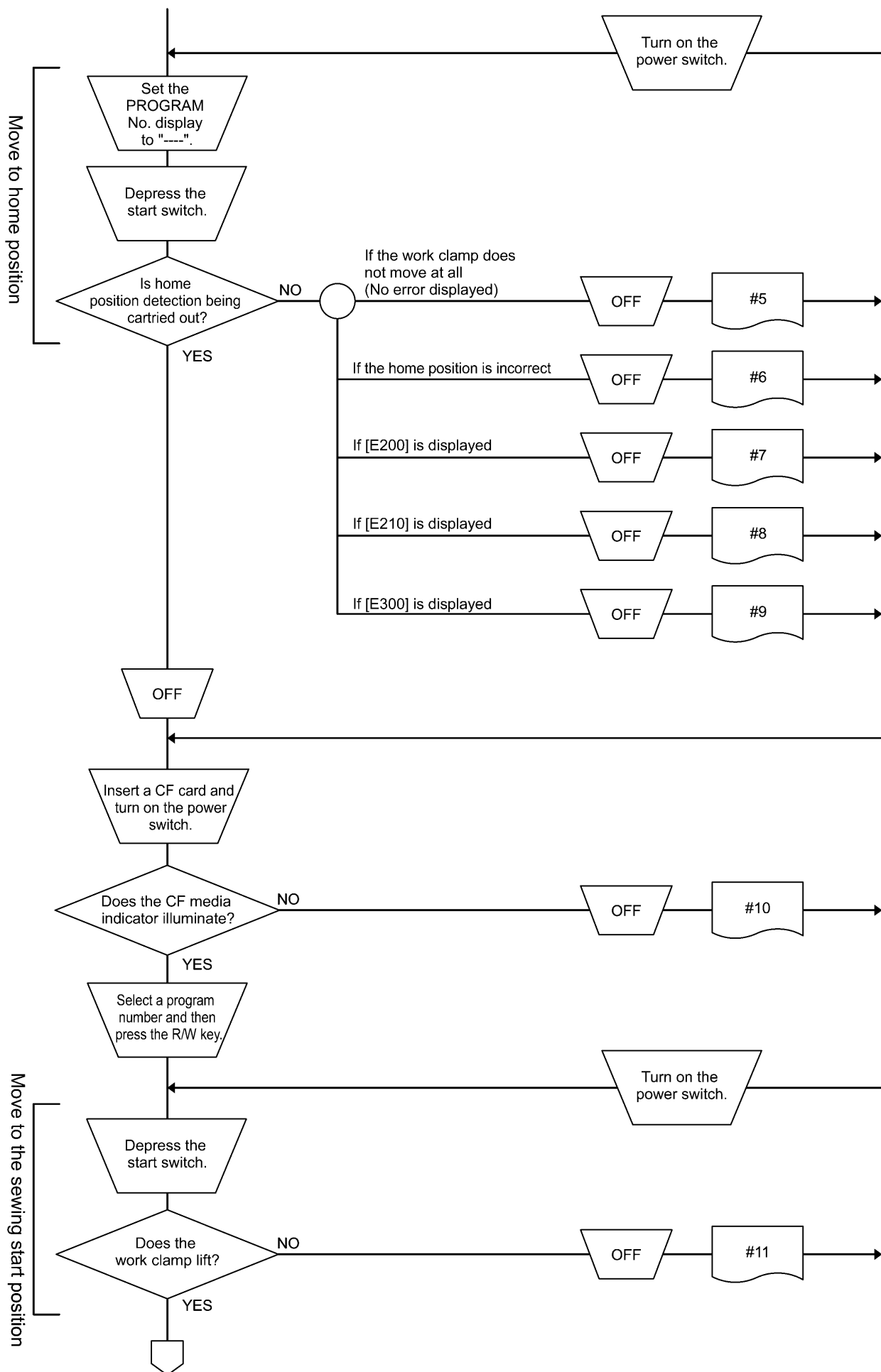


## 8-5-2. Diagnosis flowchart

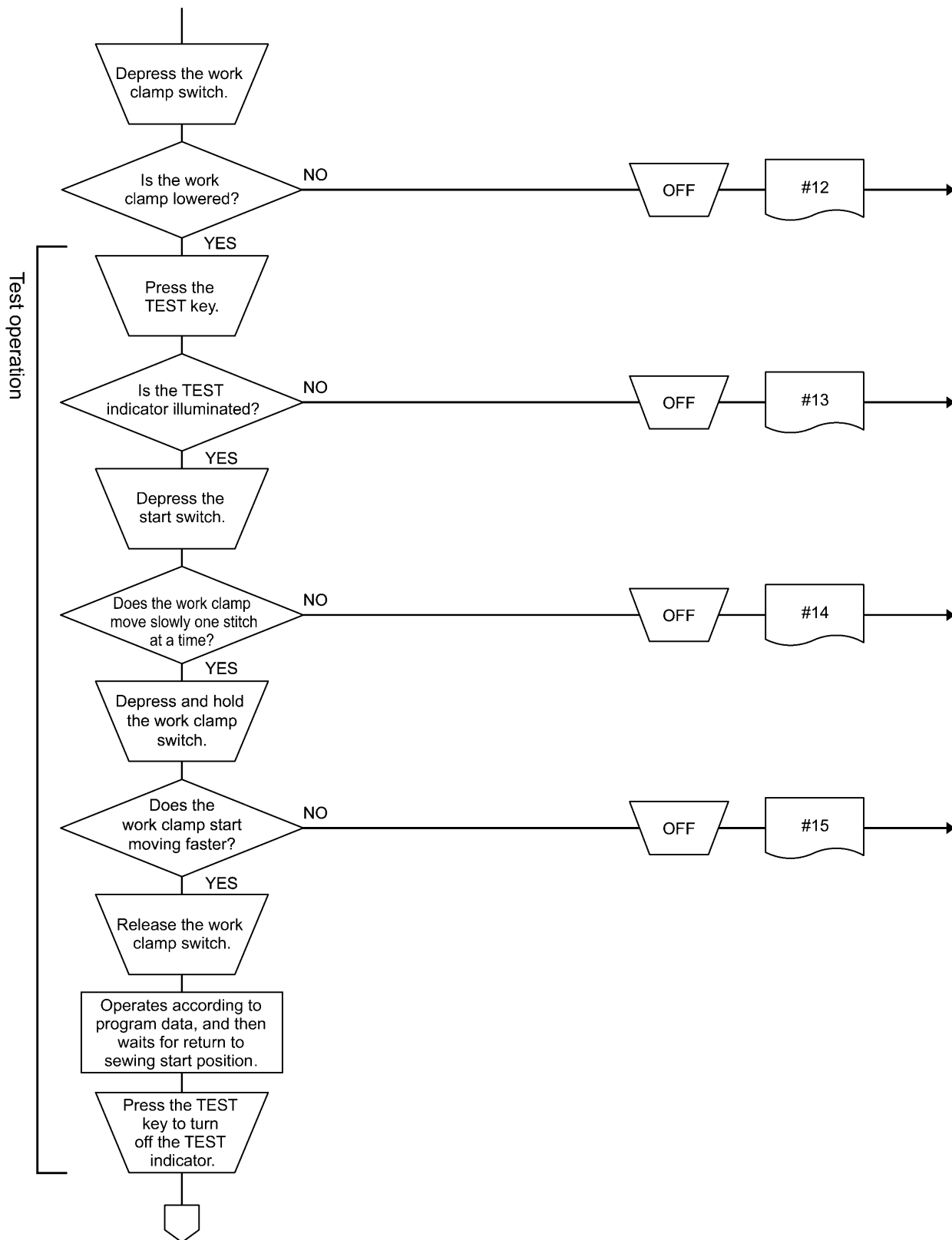
## Description of symbols



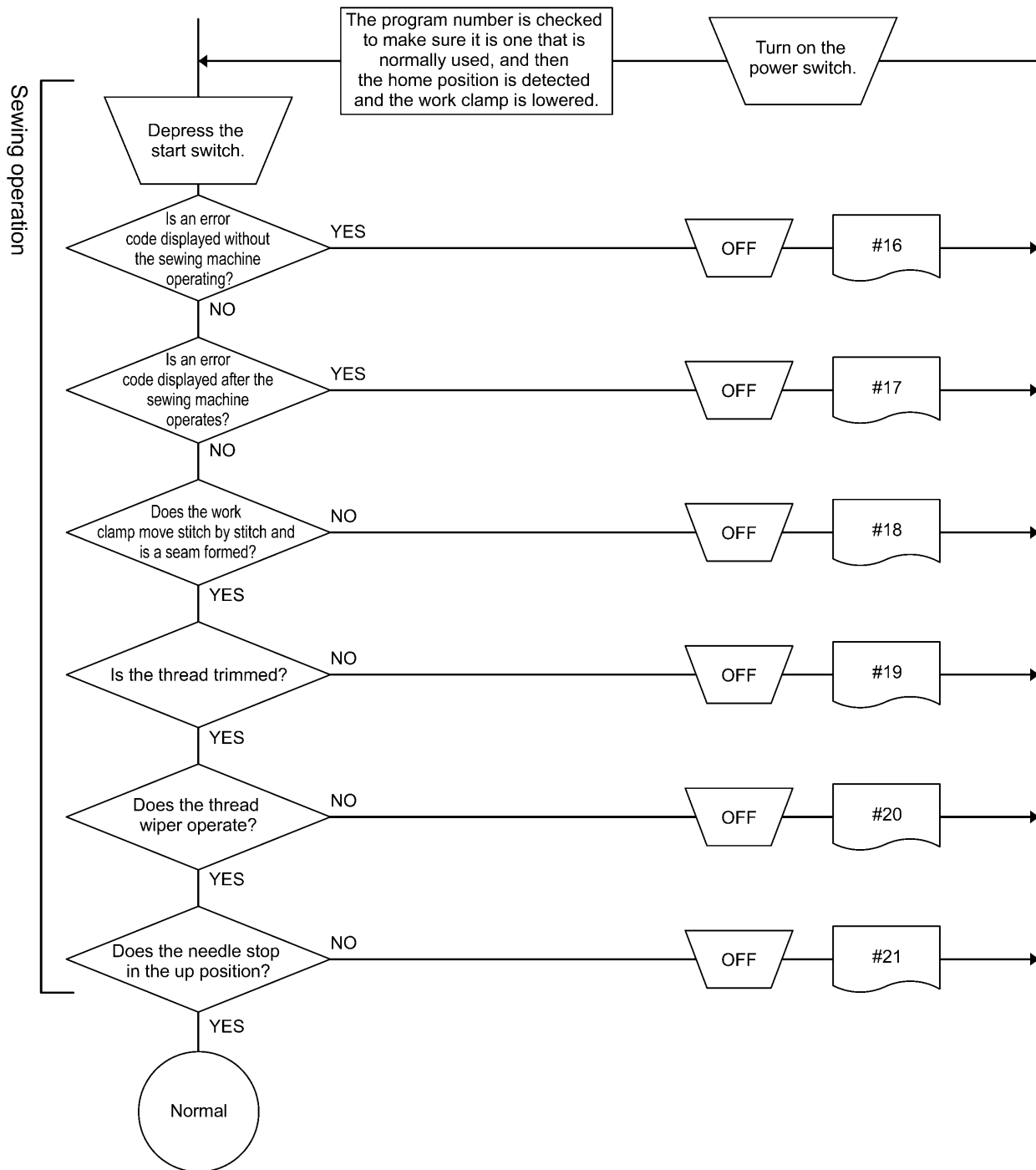
1429B



1424B

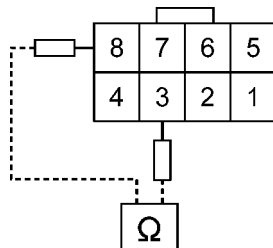
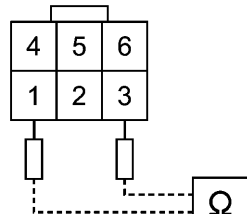
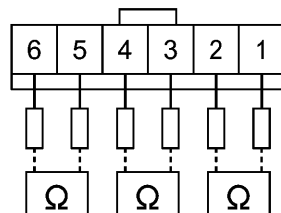
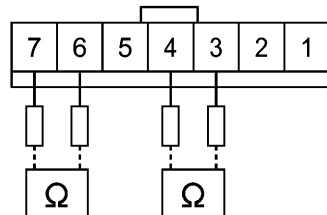


1425B

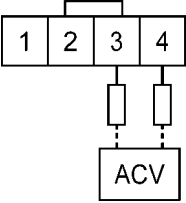
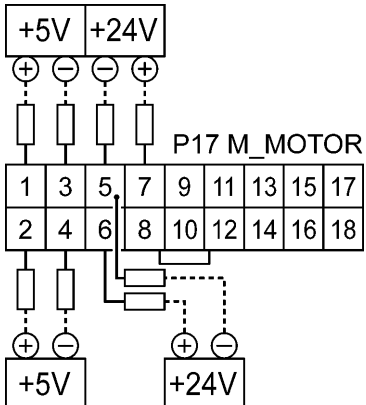
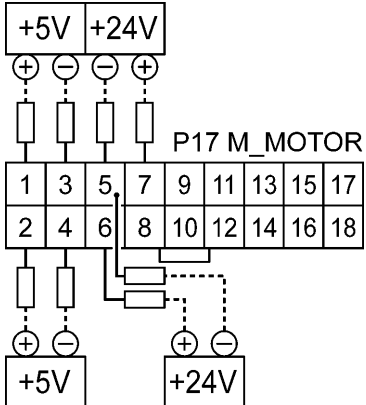


## 8-5-3. Remedy

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

| Cause                                                                                                                                                                                                                                                                                                                                                      | Inspection/Remedy/Adjustment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Replacement if a malfunction |         |      |     |       |     |      |     |      |     |                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------|------|-----|-------|-----|------|-----|------|-----|------------------------------------------------------------------------------|
| <p>1. Malfunction of voltage select harness ***</p> <p>For 200 V specifications</p>  <p>4876Q</p>                                                                                                                                                                         | <p>a. Check if there is a broken wire in the voltage select harness.</p> <p>b. Disconnect the connector at the transformer side, turn on the power and then measure the voltage at the cord.<br/>(The wiring position may vary depending on the voltage specifications.)<br/>OK if same as wall outlet voltage</p> <table><tr><th>Voltage specifications</th><th>Pin No.</th></tr><tr><td>200V</td><td>3-5</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> | Voltage specifications       | Pin No. | 200V | 3-5 | H220V | 3-6 | 380V | 2-3 | 400V | 1-3 | <p>Voltage select harness ***<br/>(*** indicates voltage specifications)</p> |
| Voltage specifications                                                                                                                                                                                                                                                                                                                                     | Pin No.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                              |         |      |     |       |     |      |     |      |     |                                                                              |
| 200V                                                                                                                                                                                                                                                                                                                                                       | 3-5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                              |         |      |     |       |     |      |     |      |     |                                                                              |
| H220V                                                                                                                                                                                                                                                                                                                                                      | 3-6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                              |         |      |     |       |     |      |     |      |     |                                                                              |
| 380V                                                                                                                                                                                                                                                                                                                                                       | 2-3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                              |         |      |     |       |     |      |     |      |     |                                                                              |
| 400V                                                                                                                                                                                                                                                                                                                                                       | 1-3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                              |         |      |     |       |     |      |     |      |     |                                                                              |
| <p>2. Malfunction of transformer</p> <p>[A]</p>  <p>1319B</p> <p>[B]</p>  <p>[C]</p>  <p>1266B</p> | <p>1) OK if there is continuity between pins 1-3, 2-3, 3-4, 3-5, and 3-6 of the 6-pin connector coming out from the transformer. [Fig. A]</p> <p>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. B]</p> <p>3) OK if there is continuity between pins 3-4 and 6-7 of the 7-pin connector coming out from the transformer. [Fig. C]</p>                                                                                                                      | <p>Transformer</p>           |         |      |     |       |     |      |     |      |     |                                                                              |

## 8. ELECTRICAL MECHANISM

| 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<br><br>4880Q                     | 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.<br>OK if same as wall outlet voltage<br><br>After inspecting, turn off the power and insert connector P9.                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |  |                |        |        |   |   |     |   |   |     |   |   |      |   |   |      |                               |
| 4. Blown fuse                                                                                                                                  | Remove fuses F7 and F8 and check the continuity.<br>OK if continuity<br>(If there is no continuity, replace the fuse and then carry out the inspections in 5. )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Glass tube fuse<br>15A-250V       |  |                |        |        |   |   |     |   |   |     |   |   |      |   |   |      |                               |
| 5. Malfunction of power supply motor P.C. board<br><br>5085Q | 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.<br><br>OK if the voltages are as shown in the table below. <table border="1" data-bbox="598 913 1034 1093"> <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><br>After measuring, turn off the power, wait 5 minutes or more and then insert P14. | 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<br><br>5085Q              | 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.<br><br>OK if the voltages are as shown in the table below. <table border="1" data-bbox="598 1433 1034 1612"> <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><br>After measuring, turn off the power.                                        | 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                                                                                                             | 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<br>Panel harness |  |                |        |        |   |   |     |   |   |     |   |   |      |   |   |      |                               |

| 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] is displayed, the start switch is still depressed.<br>If [E035] is displayed, the work clamp switch is still depressed.                                         | 1) Check if the start switch or the work clamp switch is still depressed.<br>2) Check if there is a harness short-circuit.<br>3) Check that connector P6 (FOOT) is inserted into the main P.C. board.         | Two-pedal foot switch                                       |
| 2. If [E055] is displayed, there is a malfunction of the safety switch.                                                                                                      | 1) Check that the safety switch is OFF<br>2) Check if there is a harness short-circuit.<br>3) Check that connector P9 (HEAD-SW) is inserted into the main P.C. board.                                         | Safety 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<br>Panel harness                           |
| 4. If [E403] is displayed, the connection to the PMD P.C. board is defective.                                                                                                | 1) Check that connector P1 (MAIN) is inserted into the PMD P.C. board.<br>2) Check if there is a harness short-circuit.                                                                                       | Harness<br>Power supply motor P.C. board<br>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 P6 (MAIN) is inserted into the power supply motor P.C. board, and that connector P17 (M-MOTOR) is inserted into the main P.C. board.<br>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.<br>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 +/- 10%.<br>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 +/- 10%.<br>2) Refer to check items #1-2 and #1-3.                                                 |                                                             |
| 9. If [E740] is displayed, there is a malfunction of the cooling fan for control box.                                                                                        | 1) Check if there are any thread scraps blocking the cooling fan.<br>2) Check that connector P22 (FAN) is inserted into the main P.C. board.                                                                  | Cooling fan<br>(for control box)                            |
| 10. If [E741] is displayed, there is a malfunction of the cooling fan for the X motor.<br>If [E742] is displayed, there is a malfunction of the cooling fan for the Y motor. | 1) Check if there are any thread scraps blocking the cooling fan.<br>2) Check that connector P10 (SENSOR2) is inserted into the main P.C. board.                                                              | Cooling fan<br>(for X motor or Y motor)                     |

## 8. ELECTRICAL MECHANISM

| 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<br>Panel harness |

| Problem #5 Home position detection is not carried out (nothing moves at all)                                                                  |                                                                                                                                                                                                                                  |                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Cause                                                                                                                                         | Inspection/Remedy/Adjustment                                                                                                                                                                                                     | Replacement if a malfunction |
| Malfunction of two-pedal foot switch<br><br><div style="text-align: center;"> <p>P6 FOOT</p> <p>Work clamp      Start</p> <p>1201B</p> </div> | Disconnect connector P6 (FOOT) from the main P.C. board, and check the continuity between pins 5-6 and 7-8 at the cord-side connector.<br><br>OK if normally $\infty \Omega$ , and $0 \Omega$ when the foot switch is depressed. | Two-pedal foot switch        |

| Problem #6 Home position is incorrect. |                                                                                                                       |                              |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------|------------------------------|
| Cause                                  | Inspection/Remedy/Adjustment                                                                                          | Replacement if a malfunction |
| Incorrect home position adjustment     | Switch to adjustment mode and adjust the X and Y feed home positions. (Refer to "7-20. Adjusting the home position".) |                              |



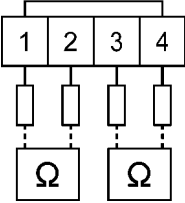
## Problem #7 An error code is displayed.

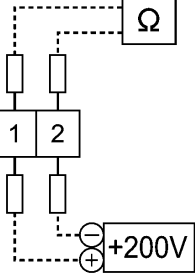
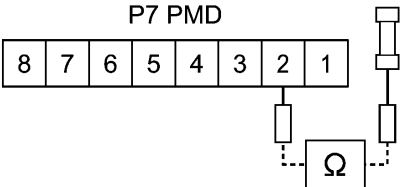
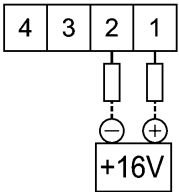
| Cause                                                                                                                                                                         | Inspection/Remedy/Adjustment                                                                                                                                                                                                                                                                                                                                                                                 | Replacement if a malfunction                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| 1. If the work clamp moves slightly in the X feed direction 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.<br>2) Check the encoder input while referring to "2-7. Input checking method".                                                                                                                                                                                                                                                     | Pulse motor X assembly                       |
| 2. If the work clamp moves in the X feed direction and then [E200] is displayed, there is a malfunction of the X home position sensor.                                        | 1) Check that connector P10 (XPM) is inserted into the PMD P.C. board, and that connector P20 (X_ENC) is inserted into the main P.C. board.<br>2) Check the X home position sensor input while referring to "2-7. Input checking method".<br>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. | X home position sensor                       |
| 3. If the work clamp does not move and [E200] is displayed, there is a malfunction of the pulse motor or cord.<br><br><div style="text-align: center;"> <p>P10 XPM</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.<br>OK if 2-3 Ω<br>After measuring, insert P10.<br>2) If 1) is OK, there is a malfunction of the PMD P.C. board.                                                                                                                                                   | Pulse motor X assembly<br><br>PMD P.C. board |

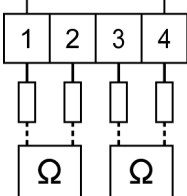
4885Q

## Problem #8 An error code is displayed.

| Cause                                                                                                                                  | Inspection/Remedy/Adjustment                                                                                                                                                                                                                                                                                                                                                                               | Replacement if a malfunction |
|----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| 1. If the work clamp moves slightly in the Y feed direction 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.<br>2) Check the encoder input while referring to "2-7. Input checking method".                                                                                                                                                                                                                                                    | Pulse motor Y assembly       |
| 2. If the work clamp moves in the Y feed direction and then [E210] is displayed, there is a malfunction of the Y home position sensor. | 1) Check that connector P8 (YPM) is inserted into the PMD P.C. board, and that connector P4 (Y_ENC) is inserted into the main P.C. board.<br>2) Check the Y home position sensor input while referring to "2-7. Input checking method".<br>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. | Y home position sensor       |

| Problem #8 An error code is displayed.                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                    |                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| Cause                                                                                                                                                                                                                                                                                     | Inspection/Remedy/Adjustment                                                                                                                                                                                                                                                                                       | Replacement if a malfunction                        |
| <p>3. If the work clamp does not move and [E210] is displayed, there is a malfunction of the pulse motor or cord.</p> <p style="text-align: center;">P8 YPM</p>  <p style="text-align: right;">4886Q</p> | <ol style="list-style-type: none"> <li>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.<br/>OK if 2-3 Ω<br/>After measuring, insert P8.</li> <li>2) If 1) is OK, there is a malfunction of the PMD P.C. board.</li> </ol> | <p>Pulse motor Y assembly</p> <p>PMD P.C. board</p> |

| Problem #9 An error code is displayed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| Cause                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Inspection/Remedy/Adjustment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Replacement if a malfunction                           |
| <p>1. If the intermittent presser foot 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.<br/>OK if continuity<br/>(If there is no continuity, carry out the inspections in 2.)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <p>Fuse<br/>6A-250V</p>                                |
| <p>2. If the intermittent 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 style="text-align: center;">P9<br/>POWER 1</p>  <p style="text-align: center;">P7 PMD</p>  <p style="text-align: center;">P2 POWER 2</p>  <p style="text-align: right;">1267B</p> | <ol style="list-style-type: none"> <li>1) Disconnect connector P9 (POWER1) from the PMD P.C. board and measure the resistance between pins 1-2 at connector P9.<br/>OK if ∞ Ω; if 0 Ω, there is a malfunction of the PMD P.C. board.</li> <li>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)<br/>OK if ∞ Ω.</li> <li>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.<br/>OK if approx. +200 V<br/>After measuring, turn off the power, wait 5 minutes or more and then insert P9.</li> <li>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.<br/>OK if approx. +16 V<br/>After measuring, turn off the power, wait 5 minutes or more and then insert P2.</li> <li>5) Check that connector P1 (MAIN) is inserted into the PMD P.C. board.</li> </ol> | <p>PMD P.C. board or power supply motor P.C. board</p> |

| Problem #9 An error code is displayed.                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| Cause                                                                                                                                                                                                                                                                          | Inspection/Remedy/Adjustment                                                                                                                                                                                                                                                                                                                                                                                                 | Replacement if a malfunction                     |
| 3. If the intermittent presser foot 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.<br>2) Check the encoder input while referring to "2-7. Input checking method".                                                                                                                                                                                                                                                                      | Pulse motor P assembly                           |
| 4. If the intermittent presser foot operates and [E300] is displayed, there is a malfunction of the work clamp home position sensor.                                                                                                                                           | 1) Check that connector P3 (PPM) is inserted into the PMD P.C. board, and that connector P5 (P_ENC) is inserted into the main P.C. board.<br>2) Check the work clamp home position sensor input while referring to "2-7. Input checking method".<br>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. | Work clamp home position sensor                  |
| 5. If the intermittent presser foot does not move and [E300] is displayed, there is a malfunction of the pulse motor or cord.<br><br><div style="text-align: center;"> <p>P3 PPM</p>  </div> | 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.<br>OK if 2-3 Ω<br>After measuring, insert P3.<br>2) If 1) is OK, there is a malfunction of the PMD P.C. board.                                                                                                                                                                     | Pulse motor P assembly<br><br><br>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.<br>(The side with the projection should be at the left.)<br>2) Check the insertion of the CF card. |                              |
| 2. CF card incorrectly formatted.                   | Check the format of the CF card.<br>(Format according to FAT16.)                                                                                    |                              |
| 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. Insufficient air pressure          | Set to an appropriate pressure while referring to "7-15. Adjusting the air pressure". |                              |
| 2. Incorrect mechanism adjustment     | Move the air valve manually and check that the work clamp does not move stiffly.      |                              |

## 8. ELECTRICAL MECHANISM

| Problem #12 Work clamp does not drop. |                                                                                       |                              |
|---------------------------------------|---------------------------------------------------------------------------------------|------------------------------|
| Cause                                 | Inspection/Remedy/Adjustment                                                          | Replacement if a malfunction |
| 1. Insufficient air pressure          | Set to an appropriate pressure while referring to "7-15. Adjusting the air pressure". |                              |
| 2. Incorrect mechanism adjustment     | Move the air valve manually and check that the work clamp does not move stiffly.      |                              |

| 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<br>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 start switch or cord                                              | Refer to inspection #5.                                                      |                              |
| 2. Incorrect memory switch setting                                                  | 1) Set memory switch No. 200 to OFF.<br>2) Set memory switch No. 252 to OFF. |                              |

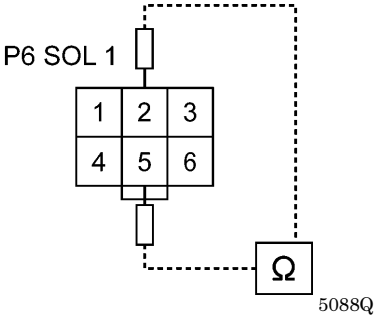
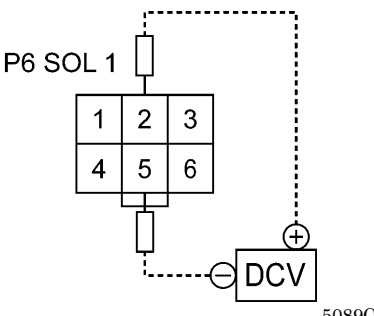
| Problem #15 Feed mechanism does not move fast during test feed. |                              |                              |
|-----------------------------------------------------------------|------------------------------|------------------------------|
| Cause                                 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

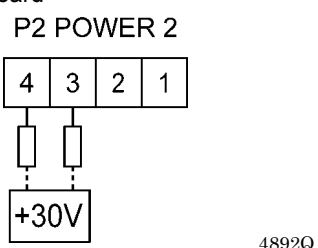
| Problem #16 Sewing machine does not operate during sewing and an error code is displayed.                                          |                                                                                                                                                                                                                                                   |                               |
|------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| 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.<br>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.<br>2) Turn the power back on; OK if operation is normal.<br><br>Avoid repeated sewing of sewing data that is less than 15 stitches.                                        | Motor cable                   |

| Problem #17 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"> <li>1) Check that connector P4 (UVW) is inserted into the power supply motor P.C. board and that the synchronizer is connected.</li> <li>2) Check the synchronizer input while referring to "2-7. Input checking method".<br/>OK if the signal turns on and off.</li> <li>3) Turn the pulley by hand and check that it turns smoothly.</li> <li>4) 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.</li> <li>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.</li> <li>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.</li> <li>7) If [E121] is displayed when the sewing machine stops: <ul style="list-style-type: none"> <li>• Check if the thread trimming solenoid is operating.</li> <li>• Adjust the thread trimming mechanism.</li> </ul> </li> </ol> | 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"> <li>1) Turn off the power and let the sewing machine stand for 30 minutes.</li> <li>2) Turn the power back on; OK if operation is normal.</li> <li>3) If the area around the motor is not hot, carry out the steps for [E121].</li> </ol> <p>Avoid repeated sewing of sewing data that is less than 15 stitches.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                              |

| Problem #18 Sewing is incorrect.                                                                              |                                                                                                                                                                                                                                                                                                                                                                                       |                              |
|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Cause                                                                                                         | Inspection/Remedy/Adjustment                                                                                                                                                                                                                                                                                                                                                          | Replacement if a malfunction |
| 1. Malfunction of synchronizer                                                                                | Refer to inspection #17.                                                                                                                                                                                                                                                                                                                                                              |                              |
| 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"> <li>1) Refer to inspection #7-3 or #8-3.</li> <li>2) If uneven seams occur because there is insufficient air pressure for the work clamp, adjust the work clamp pressure while referring to "6-13-1. Adjusting the lift of the work clamp arm assembly."</li> <li>3) If there is play in the feed mechanism, adjust the feed mechanism.</li> </ol> |                              |

| Problem #19 Thread is not trimmed.                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                       |
|-----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| Cause                                                                                   | Inspection/Remedy/Adjustment                                                                                                                                                                                                                                                                                                                                                                                                                                       | Replacement if a malfunction                          |
| 1. Incorrect mechanism adjustment                                                       | Adjust the thread trimming mechanism while refer to "7-16. Adjusting the thread trimmer cam position".<br>(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<br><br>P6 SOL 1<br><br>4889Q                 | Disconnect connector P6 (SOL1) from the PMD P.C. board, and measure the resistance between pins 3-6 of the cord-side connector.<br>OK if 6 – 8 Ω                                                                                                                                                                                                                                                                                                                   | Thread trimming solenoid                              |
| 4. Malfunction of tension release solenoid/digital tension<br><br><br>P7 SOL 2<br>4890Q | Disconnect connector P7 (SOL2) from the PMD P.C. board, and measure the resistance between pins 1-2 of the cord-side connector.<br>OK if 6 – 8 Ω                                                                                                                                                                                                                                                                                                                   | Tension release solenoid/<br>digital tension solenoid |
| 5. Malfunction of PMD P.C. board<br><br>P6 SOL 1<br><br><br>P7 SOL 2<br>4891Q           | 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).<br>OK if voltage is output momentarily at the sewing end.<br>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).<br>OK if voltage is output momentarily at the sewing end. | PMD P.C. board                                        |

| Problem #20 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".<br>(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.<br>OK if approximately 4 $\Omega$                                                            | 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).<br>OK if voltage is output momentarily at the sewing end. | PMD P.C. board               |
|  |                                                                                                                                                                                                                              |                              |

| Problem #21 Needle does not stop in the up position ([E110] or [E111] 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 #17.                                                                                                                     |                               |
| 3. Malfunction of cord                                                               | Refer to inspection #16.                                                                                                                     |                               |
| 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.<br>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                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E010</b> | Stop switch was pressed. Press the RESET key to clear the error.                                                                                                                                                                                                                                                                                                                                             |
| <b>E011</b> | Stop switch was pressed. Press the RESET key to clear the error.<br>Press the ▼ key to move the work clamp so that you can continue sewing.                                                                                                                                                                                                                                                                  |
| <b>E015</b> | The stop switch was still being pressed, or there is a problem with the stop switch connection.<br>Turn off the power, and then check that connector P13 on the main P.C. board is properly connected.                                                                                                                                                                                                       |
| <b>E016</b> | Problem with the stop switch connection.<br>Turn off the power, and then check that connector P13 on the main P.C. board is properly connected.                                                                                                                                                                                                                                                              |
| <b>E025</b> | The power was turned on while the start switch was still being depressed, or the start switch was depressed without the work clamp being lowered.<br>If the power has been turned on while the start switch was still depressed, turn off the power and check the start switch.<br>If the start switch was depressed without lowering the work clamp, depress the work clamp switch to lower the work clamp. |
| <b>E035</b> | The work clamp switch is depressed.<br>Turn off the power, and then check the work clamp switch.                                                                                                                                                                                                                                                                                                             |
| <b>E036</b> | A foot switch that does not match specifications is connected, or work clamp mode has not been set correctly.<br>Use a foot switch that matches specifications, or initialize the memory switch settings.                                                                                                                                                                                                    |
| <b>E050</b> | Machine head tilting was detected after the power was turned on.<br>Turn off the power, and then return the machine head to its original position.<br>Check that connector P9 on the main P.C. board is properly connected.                                                                                                                                                                                  |
| <b>E051</b> | Machine head tilting was detected while the sewing machine was operating.<br>Turn off the power, and then check that connector P9 on the main P.C. board is properly connected.                                                                                                                                                                                                                              |
| <b>E055</b> | Machine head tilting was detected when the power was turned on.<br>Turn off the power, and then return the machine head to its original position.<br>Check that connector P9 on the main P.C. board is properly connected.                                                                                                                                                                                   |
| <b>E065</b> | An operation panel key was still being pressed when the power was turned on, or key is faulty.<br>Turn off the power and check the operation panel.                                                                                                                                                                                                                                                          |

#### Upper shaft motor-related errors

| Code        | Cause and remedy                                                                                                                                                        |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E110</b> | Needle up stop position error.<br>Turn the machine pulley until the point where the error display disappears.                                                           |
| <b>E111</b> | Upper shaft did not stop at the needle up stop position when the sewing machine stopped.<br>Turn the machine pulley until the point where the error display disappears. |
| <b>E120</b> | Needle drop signal could not be detected.<br>Turn off the power, and then check the synchronizer connection.                                                            |
| <b>E121</b> | Thread trimming was not completed.<br>Turn off the power, and then check if the cutting edges of the fixed knife and movable knife are damaged or worn.                 |



| Code        | Cause and remedy                                                                                                                                                                                                                                                                                                                             |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E130</b> | Sewing machine motor stopped due to a problem, or synchronizer is faulty.<br>Turn off the power, and then turn the machine pulley and check if the sewing machine has locked up.<br>Check that connectors P4 and P5 on the power supply motor P.C. board are properly connected.                                                             |
| <b>E131</b> | Synchronizer is faulty.<br>Turn off the power, and then check that connector P5 on the power supply motor P. C. board is properly connected.                                                                                                                                                                                                 |
| <b>E132</b> | Problem detected with sewing machine motor operation.<br>Turn off the power, and then check that connector P4 on the power supply motor P.C. board is properly connected.                                                                                                                                                                    |
| <b>E133</b> | Sewing machine motor stopping position is incorrect.<br>Turn off the power, and then check that connector P5 on the power supply motor P.C. board is properly connected.                                                                                                                                                                     |
| <b>E150</b> | Sewing machine motor is overheating, or temperature sensor is faulty.<br>Turn off the power, and then check the sewing machine motor.<br>(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                                                                                                                                                                                                                                                        |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E200</b> | X-feed motor home position cannot be detected.<br>Problem with X -feed motor or poor X home position sensor connection.<br>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. |
| <b>E201</b> | X-feed motor stopped due to a problem.<br>Turn off the power, and then check if there are any problems in the X-feed direction.                                                                                                                                         |
| <b>E202</b> | Problem with X-feed motor or Y-feed motor home position adjustment data.<br>Re-adjust the home position.                                                                                                                                                                |
| <b>E204</b> | X feed motor stopped abnormally during sewing.<br>Turn off the power, and then check if there are any problems in the X-feed direction.                                                                                                                                 |
| <b>E205</b> | X feed motor stopped abnormally while moving to the sewing start position.<br>Turn off the power, and then check if there are any problems in the X-feed direction.                                                                                                     |
| <b>E206</b> | X feed motor stopped abnormally during test feeding.<br>Turn off the power, and then check if there are any problems in the X-feed direction.                                                                                                                           |
| <b>E207</b> | X feed motor stopped abnormally during programming.<br>Turn off the power, and then check if there are any problems in the X-feed direction.                                                                                                                            |
| <b>E210</b> | Y-feed motor home position cannot be detected.<br>Problem with Y-feed motor or poor Y home position sensor connection.<br>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.    |
| <b>E211</b> | Y-feed motor stopped due to a problem.<br>Turn off the power, and then check if there are any problems in the Y-feed direction.                                                                                                                                         |
| <b>E214</b> | Y feed motor stopped abnormally during sewing.<br>Turn off the power, and then check if there are any problems in the Y-feed direction.                                                                                                                                 |
| <b>E215</b> | Y feed motor stopped abnormally while moving to the sewing start position.<br>Turn off the power, and then check if there are any problems in the Y-feed direction.                                                                                                     |
| <b>E216</b> | Y feed motor stopped abnormally during test feeding.<br>Turn off the power, and then check if there are any problems in the Y-feed direction.                                                                                                                           |
| <b>E217</b> | Y feed motor stopped abnormally during programming.<br>Turn off the power, and then check if there are any problems in the Y-feed direction.                                                                                                                            |

**Work clamp-related errors**

| Code        | Cause and remedy                                                                                                                                                                                                                                                                |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E300</b> | Work clamp home position cannot be detected.<br>Problem with work clamp motor or poor work clamp home position sensor connection.<br>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. |
| <b>E301</b> | Intermittent presser foot raised or lowered position cannot be detected.<br>Turn off the power, and then check if there are any problems in the intermittent presser foot vertical direction.                                                                                   |
| <b>E303</b> | Problem with work clamp motor home position adjustment data.<br>Re-adjust the home position.                                                                                                                                                                                    |

## 9. TABLE OF ERROR CODES

### Communication and memory-related errors

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

**Data editing-related errors**

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

**Device-related errors**

| Code        | Cause and remedy                                                                     |
|-------------|--------------------------------------------------------------------------------------|
| <b>E600</b> | Upper thread breakage occurred.<br>Thread the upper thread. You can continue sewing. |

**P.C. board-related errors**

| Code        | Cause and remedy                                                                                                                                                                                                |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E700</b> | Abnormal rise in power supply voltage.<br>Turn off the power and check the input voltage.                                                                                                                       |
| <b>E701</b> | Abnormal rise in sewing machine motor drive voltage.<br>Turn off the power, and then check the voltage.                                                                                                         |
| <b>E705</b> | Abnormal drop in power supply voltage.<br>Turn off the power and check the input voltage.                                                                                                                       |
| <b>E710</b> | Abnormal current detected in sewing machine motor.<br>Turn off the power, and then check if there are any problems with the sewing machine.                                                                     |
| <b>E711</b> | Abnormal current detected in X-feed motor.<br>Turn off the power, and then check if there are any problems in the X-feed direction.                                                                             |
| <b>E712</b> | Abnormal current detected in Y-feed motor.<br>Turn off the power, and then check if there are any problems in the Y-feed direction.                                                                             |
| <b>E713</b> | Abnormal current detected in work clamp motor.<br>Turn off the power, and then check if there are any problems with the X-feed mechanism, Y-feed mechanism or work clamp lifter.                                |
| <b>E730</b> | External error input (AIRSW) detected.<br>Turn off the power, and then check the air pressure.                                                                                                                  |
| <b>E740</b> | Control box cooling fan does not operate.<br>Turn off the power, and then check if the cooling fan is blocked with scraps of thread.<br>Check that connector P22 on the main P.C. board is properly connected.  |
| <b>E741</b> | X-feed motor cooling fan does not operate.<br>Turn off the power, and then check if the cooling fan is blocked with scraps of thread.<br>Check that connector P10 on the main P.C. board is properly connected. |
| <b>E742</b> | Y-feed motor cooling fan does not operate.<br>Turn off the power, and then check if the cooling fan is blocked with scraps of thread.<br>Check that connector P10 on the main P.C. board is properly connected. |

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

# 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.

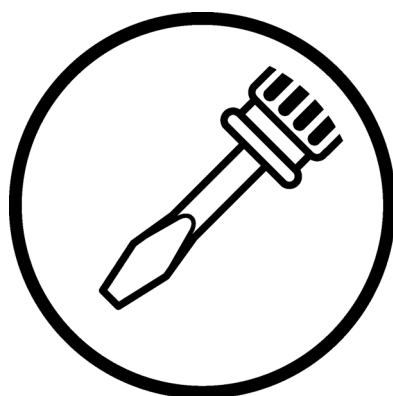
| Problem                                                              | Cause                                                   | Remedy                                                                           | Reference          |
|----------------------------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------------------------------|--------------------|
| <b>Work clamp does not lift.</b><br><b>Work clamp does not drop.</b> | Work clamp moves stiffly.                               | Apply a suitable amount of grease to the sliding parts of the work clamp slider. |                    |
|                                                                      | Air tube of presser lifter cylinder is bent or damaged. | Straighten the bend in the tube or replace the tube.                             |                    |
| <b>Work clamp lift amount is incorrect.</b>                          | Work clamp lifter lever position is incorrect.          | Adjust the position of the work clamp lifter lever.                              | P. 97              |
| <b>Work clamp does not lift to the maximum height.</b>               | Cylinder joint position is incorrect.                   | Adjust the position of the cylinder joint.                                       |                    |
| <b>Thread wiper does not operate correctly.</b>                      | The thread wiper is obstructing the needle.             | Adjust the height of the thread wiper.                                           | P. 94              |
|                                                                      |                                                         | Adjust the stroke of the thread wiper.                                           | P. 94              |
|                                                                      | Thread wiper position is incorrect.                     | Adjust the stroke of the thread wiper.                                           | P. 94              |
| <b>Lower thread winds to one side.</b>                               | Bobbin winder tension assembly height is incorrect.     | Adjust the height of the bobbin winder tension assembly.                         | Instruction manual |
| <b>Lower thread winding amount is incorrect.</b>                     | Bobbin presser position is incorrect.                   | Adjust the position of the bobbin presser.                                       | Instruction manual |
| <b>Thread slips out of the needle.</b>                               | Stitches being skipped at the sewing start.             | Refer to "Skipped stitches occur".                                               | P. 140             |
|                                                                      | Upper thread trailing length is uneven.                 | Adjust the sub-tension.                                                          | Instruction manual |
|                                                                      | Position of shuttle race thread guide is incorrect      | Adjust the position of the shuttle race thread guide.                            | P. 89              |

| Problem                        | Cause                                                              | Remedy                                                                                  | Reference          |
|--------------------------------|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------|--------------------|
| <b>Upper thread breaks.</b>    | Upper thread tension is too strong.                                | Adjust the upper thread tension.                                                        | Instruction manual |
|                                | Needle is incorrectly installed.                                   | Install the needle correctly.                                                           | Instruction manual |
|                                | Thread is too thick for the needle.                                | Select a thread that matches the needle.                                                | Instruction manual |
|                                | Thread take-up spring tension and height are incorrect.            | Adjust the tension and height of the thread take-up spring.                             | P. 87              |
|                                | 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 |
| <b>Lower thread breaks.</b>    | Lower thread tension is too strong.                                | Adjust the lower thread tension.                                                        | Instruction manual |
|                                | Damage to corners of needle hole plate or bobbin case.             | Repair or replace the problem part.                                                     |                    |
| <b>Skipped stitches occur.</b> | Clearance between needle and rotary hook tip is too great.         | Adjust the needle clearance.                                                            | P. 89              |
|                                | Needle and rotary hook timing is incorrect.                        | Adjust the needle bar lift amount.                                                      | P. 88              |
|                                | The driver is covering the needle more than necessary.             | Adjust the driver.                                                                      | P. 88              |
|                                | Needle is bent.                                                    | Replace the needle.                                                                     |                    |
|                                | Needle is incorrectly installed.                                   | Install the needle correctly.                                                           | Instruction manual |
| <b>Needle is broken.</b>       | Clearance between needle and rotary hook tip is too great.         | Adjust the needle clearance.                                                            | P. 89              |
|                                |                                                                    | Adjust the needle bar lift amount.                                                      | P. 88              |
|                                | Needle is bent.                                                    | Replace the needle.                                                                     |                    |
|                                | Needle deflection                                                  | Select a needle that is suitable for the sewing conditions.<br>Reduce the sewing speed. | Instruction manual |
|                                | Needle is too thin.                                                | Select a needle that is suitable for the sewing conditions.                             | Instruction manual |
| <b>Thread jamming.</b>         | Thread take-up spring tension and height are incorrect.            | Adjust the tension and height of the thread take-up spring.                             | P. 87              |
|                                | Needle and rotary hook timing is incorrect.                        | Adjust the needle bar lift amount.                                                      | P. 88              |
|                                | Shuttle race thread guide is not separating the threads.           | Adjust the position of the shuttle race thread guide.                                   | P. 89              |

| Problem                                                                                              | Cause                                                                                      | Remedy                                                             | Reference          |
|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------|--------------------|
| <b>Upper thread is not trimmed.</b>                                                                  | Movable knife is not cutting cleanly.                                                      | Replace with a new one.                                            | P. 93              |
|                                                                                                      | Fixed knife is not cutting cleanly.                                                        | Sharpen the fixed knife or replace it with a new one.              | P. 93              |
|                                                                                                      | Movable knife is not picking up the upper thread.                                          | Adjust the position of the shuttle race thread guide.              | P. 89              |
|                                                                                                      |                                                                                            | Adjust the needle bar lift amount.                                 | P. 88              |
|                                                                                                      | Movable knife is not picking up the upper thread because the last stitch is being skipped. | Refer to "Skipped stitches occur".                                 | P. 140             |
|                                                                                                      | Movable knife position is incorrect.                                                       | Adjust the position of the movable knife.                          | P. 91              |
|                                                                                                      | Sub-tension is too weak.                                                                   | Turn the sub-tension nut to adjust the tension.                    | Instruction manual |
| <b>Poor stitch finish on underside of material.</b>                                                  | Shuttle race thread guide is not separating the threads enough.                            | Adjust the position of the shuttle race thread guide.              | P. 89              |
|                                                                                                      | Incorrect tightening of the upper thread                                                   | Adjust the upper thread tension.                                   | Instruction manual |
|                                                                                                      | Upper thread trailing length is uneven.                                                    | Adjust the sub-tension.                                            | Instruction manual |
| <b>Incorrect tightening of the thread</b>                                                            | Upper thread tension is too weak.                                                          | Adjust the upper thread tension.                                   | Instruction manual |
|                                                                                                      | Lower thread tension is too weak.                                                          | Adjust the lower thread tension.                                   | Instruction manual |
|                                                                                                      | Thread take-up spring tension and height are incorrect.                                    | Adjust the tension and height of the thread take-up spring.        | P. 87              |
|                                                                                                      | Position of arm thread guide R is incorrect.                                               | Adjust the position of arm thread guide R.                         | P. 87              |
| <b>Upper thread trailing length is uneven.</b>                                                       | Thread take-up spring tension and height are incorrect.                                    | Adjust the tension and height of the thread take-up spring.        | P. 87              |
|                                                                                                      | 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. 93              |
| <b>Sewing machine does not operate when the power is turned on and the foot switch is depressed.</b> | Safety switch does not work.                                                               | Check if the safety switch cord is disconnected.                   | Instruction manual |
|                                                                                                      |                                                                                            | Adjust the position of the safety switch.                          | Instruction manual |
|                                                                                                      |                                                                                            | If the safety 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-342G  
I7070928B  
2007.09. B (1)