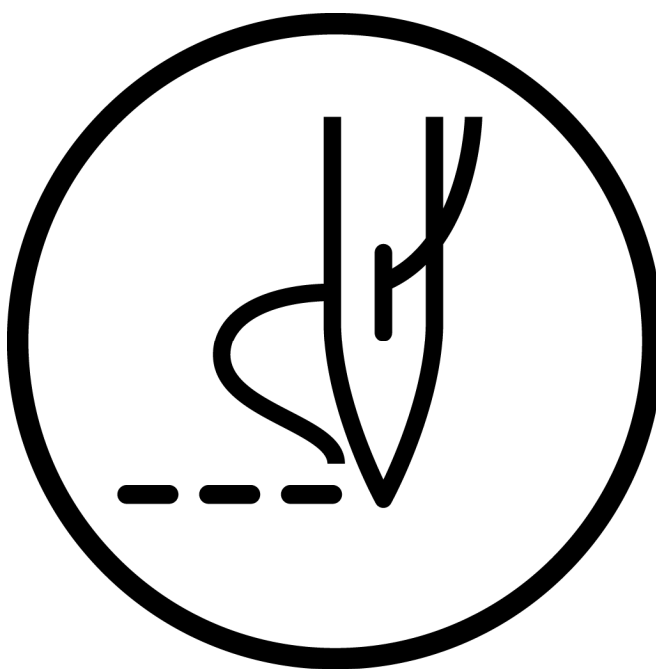


S-7220C

INSTRUCTION MANUAL

Please read this manual before using the machine.
Please keep this manual within easy reach for quick reference.

SINGLE NEEDLE DIRECT DRIVE NEEDLE FEED LOCK STITCHER
WITH THREAD TRIMMER



Thank you very much for buying a BROTHER sewing machine. Before using your new machine, please read the safety instructions and the explanations given in the instruction manual.

With industrial sewing machines, it is normal to carry out work while positioned directly in front of moving parts such as the needle and thread take-up, and consequently there is always a danger of injury that can be caused by these parts. Follow the instructions from training personnel and instructors regarding safe and correct operation before operating the machine so that you will know how to use it correctly.

SAFETY INSTRUCTIONS

[1] Safety indications and their meanings

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

Indications

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

Symbols



.

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



.

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



.

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

[2] Notes on safety



DANGER



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



WARNING



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



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



CAUTION

Environmental requirements



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



Any fluctuations in the power supply voltage should be within $\pm 10\%$ 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 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 46 kg (101 lb). The installation should be carried out by two or more people.



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



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



When securing the cords, do not bend the cords excessively or fasten them too hard with staples, otherwise there is the danger that fire or electric shocks could occur.



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



Secure the table so that it will not move when tilting back the machine head. If the table moves, it may crush your feet or cause other injuries.



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



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

! CAUTION

Sewing

- | | |
|--|--|
| <p> This sewing machine should only be used by operators who have received the necessary training in safe use beforehand.</p> <p> The sewing machine should not be used for any applications other than sewing.</p> <p> 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.</p> <p> Turn off the power switch at the following times. The machine may operate if the treadle is depressed by mistake, which could result in injury.</p> <ul style="list-style-type: none"> • When threading the needle • When replacing the bobbin and needle • When not using the machine and when leaving the machine unattended <p> If using a work table which has casters, the casters should be secured in such a way so that they cannot move.</p> | <p> Attach all safety devices before using the sewing machine. If the machine is used without these devices attached, injury may result.</p> <p> 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.</p> <p> Secure the table so that it will not move when tilting back the machine head. If the table moves, it may crush your feet or cause other injuries.</p> <p> Use both hands to hold the machine head when tilting it back or returning it to its original position. If only one hand is used, the weight of the machine head may cause your hand to slip, and your hand may get caught.</p> <p> 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.</p> <p> If the machine develops a problem, contact your nearest Brother dealer or a qualified technician.</p> |
|--|--|

Cleaning

- | | |
|---|--|
| <p> Turn off the power switch before carrying out cleaning. The machine may operate if the treadle is depressed by mistake, which could result in injury.</p> <p> Secure the table so that it will not move when tilting back the machine head. If the table moves, it may crush your feet or cause other injuries.</p> <p> Use both hands to hold the machine head when tilting it back or returning it to its original position. If only one hand is used, the weight of the machine head may cause your hand to slip, and your hand may get caught.</p> | <p> Be sure to wear protective goggles and gloves when handling the lubricating oil and grease, so that they do not get into your eyes or onto your skin, otherwise inflammation can result.
Furthermore, do not drink the oil or eat the grease under any circumstances, as they can cause vomiting and diarrhea.
Keep the oil out of the reach of children.</p> |
|---|--|

Maintenance and inspection

- | | |
|--|--|
| <p> Maintenance and inspection of the sewing machine should only be carried out by a qualified technician.</p> <p> Ask your Brother dealer or a qualified electrician to carry out any maintenance and inspection of the electrical system.</p> <p> Turn off the power switch and disconnect the power cord from the wall outlet at the following times, otherwise the machine may operate if the treadle is depressed by mistake, which could result in injury.</p> <ul style="list-style-type: none"> • When carrying out inspection, adjustment and maintenance • When replacing consumable parts such as the rotary hook and knife <p> If the power switch needs to be left on when carrying out some adjustment, be extremely careful to observe all safety precautions.</p> <p> Secure the table so that it will not move when tilting back the machine head. If the table moves, it may crush your feet or cause other injuries.</p> | <p> Use both hands to hold the machine head when tilting it back or returning it to its original position. If only one hand is used, the weight of the machine head may cause your hand to slip, and your hand may get caught.</p> <p> When replacing parts and installing optional accessories, be sure to use only genuine Brother parts.
Brother will not be held responsible for any accidents or problems resulting from the use of non-genuine parts.</p> <p> 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.</p> <p> To prevent accidents and problems, do not modify the machine yourself.
Brother will not be held responsible for any accidents or problems resulting from modifications made to the machine.</p> |
|--|--|

[3] Warning labels

The following warning labels appear on the sewing machine.

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

1

⚠ 危険		⚠ 危険	
高電圧部分にふれて、大けがをすることがある。 電源を切り、5分たってからカバーをはずすこと。		触摸高压电部分, 会导致受伤。 在切断电源5分钟后, 再开启盖罩。	
⚠ DANGER	⚠ GEFAHR	⚠ DANGER	⚠ PELIGRO
Hazardous voltage will cause injury. Turn off main switch and wait 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.	Un voltaje inadecuado puede provocar las heridas. Apagar el interruptor principal y esperar 5 minutos antes de abrir esta cubierta.

2



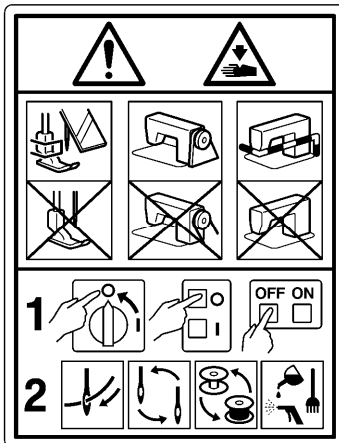
Touching areas where high voltages are present can result in severe injury. Turn off the power before opening the cover.

4



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

3



CAUTION

Moving parts may cause injury.

Operate with safety devices* installed.

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

5



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

6



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

7



Direction of operation

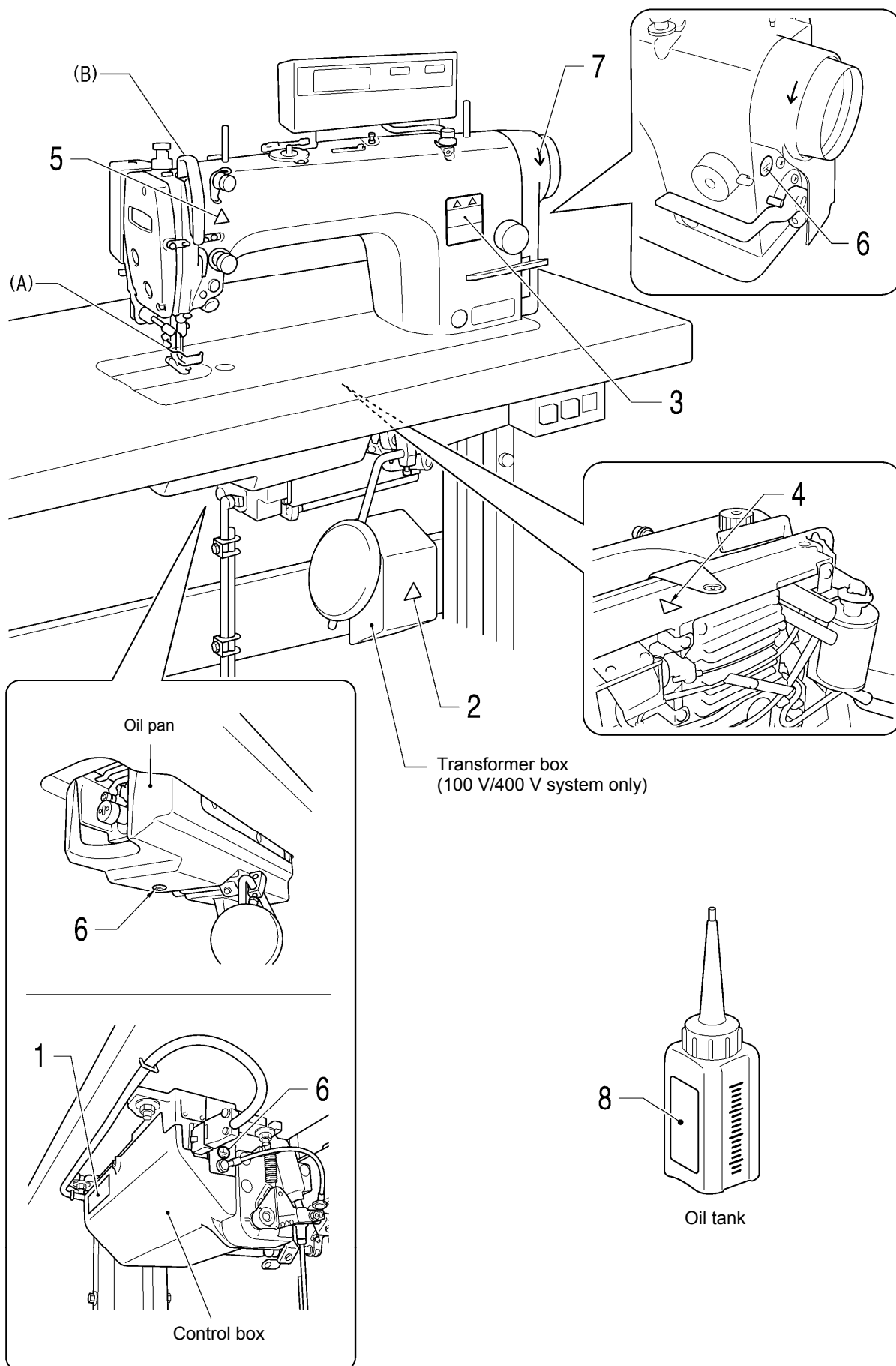
* Safety devices: (A) Finger guard
(B) Thread take-up cover

8

brother
 Lubricating Oil for Machining

⚠ CAUTION
 Lubricating oil may cause inflammation to eye and skin.
 Wear protective glasses and gloves.
 Swallowing oil can cause diarrhoea and vomiting.
 Do not swallow.

Keep away from children.
FIRST AID
 Eye contact :
 -Rinse with plenty of cold water.
 -Seek medical help.
 Skin contact :
 -Wash with soap and water.
 If swallowed :
 -Seek medical help immediately.



0545D

CONTENTS

1. MACHINE SPECIFICATIONS	1	
2. INSTALLATION	2	
2-1. Table processing diagram	3	
2-2. Installation	3	
2-3. Lubrication	7	
2-4. Connecting the cords.....	8	
2-4-1. Opening the control box cover	8	
2-4-2. Connecting the cords	8	
3. USING THE OPERATION PANEL (BASIC OPERATIONS).....	13	
3-1. Names and functions.....	13	
3-2. Sewing start and end backtack stitches	15	
3-3. Sewing continuous backtack stitches	16	
3-4. Sewing fixed stitches	17	
3-5. Sewing name labels	18	
3-6. Sewing pleat presser stitches.....	19	
3-7. Using the lower thread counter	20	
4. USING THE OPERATION PANEL (ADVANCED OPERATIONS)	21	
4-1. Names and functions.....	21	
4-2. Adjusting the needle up stop position.....	22	
4-3. LOCK key	23	
4-4. Resetting all settings to their defaults.....	24	
5. SEWING	25	
5-1. Adjusting the presser foot floating amount (minute lifting amount)	25	
5-2. Sewing condensed stitches	26	
6. CLEANING	27	
6-1. Daily cleaning procedures	27	
6-2. Applying grease (When “GrEASEUP” appears...).....	30	
7. REPLACING THE FIXED KNIFE AND MOVABLE KNIFE	32	
8. STANDARD ADJUSTMENTS.....	33	
8-1. Adjusting the safety switch position	34	
8-2. Adjusting the needle bar height.....	35	
8-3. Adjusting the needle and rotary hook timing	36	
8-4. Adjusting of the feed dog height.....	37	
8-5. Adjusting the feed dog angle.....	38	
8-6. Adjusting the needle and feed mechanism timing	39	
8-7. Adjusting arm thread guide R.....	40	
8-8. Adjusting the presser foot height.....	40	
8-9. Adjusting the rotary hook lubrication amount.....	41	
9. TROUBLESHOOTING	42	
9-1. Sewing	42	
9-2. Error code displays	47	
10. 7-SEGMENT DISPLAY	51	

1. MACHINE SPECIFICATIONS

The diagram shows a black rectangular model plate for the Brother S-7220C machine. The plate has the text "BROTHER INDUSTRIES, LTD." at the top, "S-7220C-■■■" in the middle, and a white bar at the bottom. Three callout lines originate from the plate: one from the top right corner pointing to a table, one from the middle right side pointing to a second table, and one from the bottom right corner pointing to a third table. The first table has three rows: a header row with a diagonal line, a row for "Quick reverse" with value "0", and a row for "Thread wiper" with value "0". The second table has two rows: a header row with values "0" and "3", and a row for "Lubrication type" with values "Minimum lubrication" and "Semi dry". The third table has two rows: a header row with values "3" and "5", and a row for "Use" with values "For medium-weight materials" and "For heavy-weight materials".

	4
Quick reverse	0
Thread wiper	0

	0	3
Lubrication type	Minimum lubrication	Semi dry

	3	5
Use	For medium-weight materials	For heavy-weight materials

0547D

		-403	-433	-405
Max. sewing speed		5,000 sti/min* ¹	4,000 sti/min	4,000 sti/min * ²
Start backtacking and continuous backtacking speed		220 - 3,000 sti/min		
End backtacking speed		1,800 sti/min		
Max. stitch length		4.5 mm		5.5 mm
Presser foot height	Lifting lever	6 mm		
	Knee lifter	16 mm		
Feed dog height		1.0 mm		1.2 mm
Needle (DB×1, DP×5)		#11 - #18		#19 - #22
Motor		AC servo motor		
Control circuit		Microprocessor		

*¹ ...When sewing at speeds of 4,000 sti/min or higher, set the stitch length to 3.5 mm or less.

*² ...When sewing at speeds of 3,000 sti/min or higher, set the stitch length to 4.5 mm or less.

Rotary hook

-403, -433	-405
Lubricated / for medium materials	Lubricated / for heavy materials

Lubricating oil

	-403, -405	-433
Rotary hook	High-speed spindle	High-speed spindle
Needle bar		Special Brother grease

2. INSTALLATION

CAUTION



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 46 kg (101 lb). The installation should be carried out by two or more people.



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



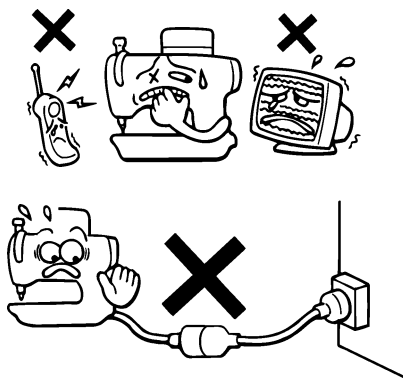
Secure the table so that it will not move when tilting back the machine head. If the table moves, it may crush your feet or cause other injuries.



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

About the machine set-up location

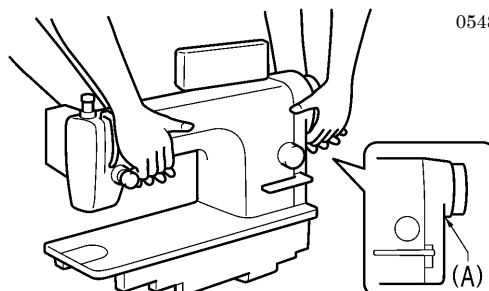
- Do not set up this sewing machine near other equipment such as televisions, radios or cordless telephones, otherwise such equipment may be affected by electronic interference from the sewing machine.
- The sewing machine should be plugged directly into an AC wall outlet. Operation problems may result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



2086M

Carrying the machine

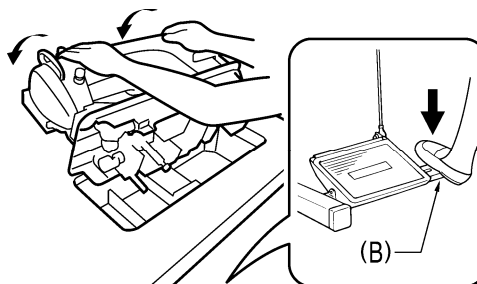
- The machine should be carried by the arm by two people as shown in the illustration.
 - Hold the motor cover (A) by hand also so that the pulley does not rotate.



0548D

Tilting back the machine head

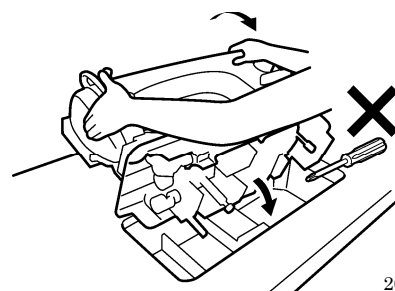
- Hold section (B) with your foot so that the table does not move, and then push the arm with both hands to tilt back the machine head.



2088M

Returning the machine head to the upright position

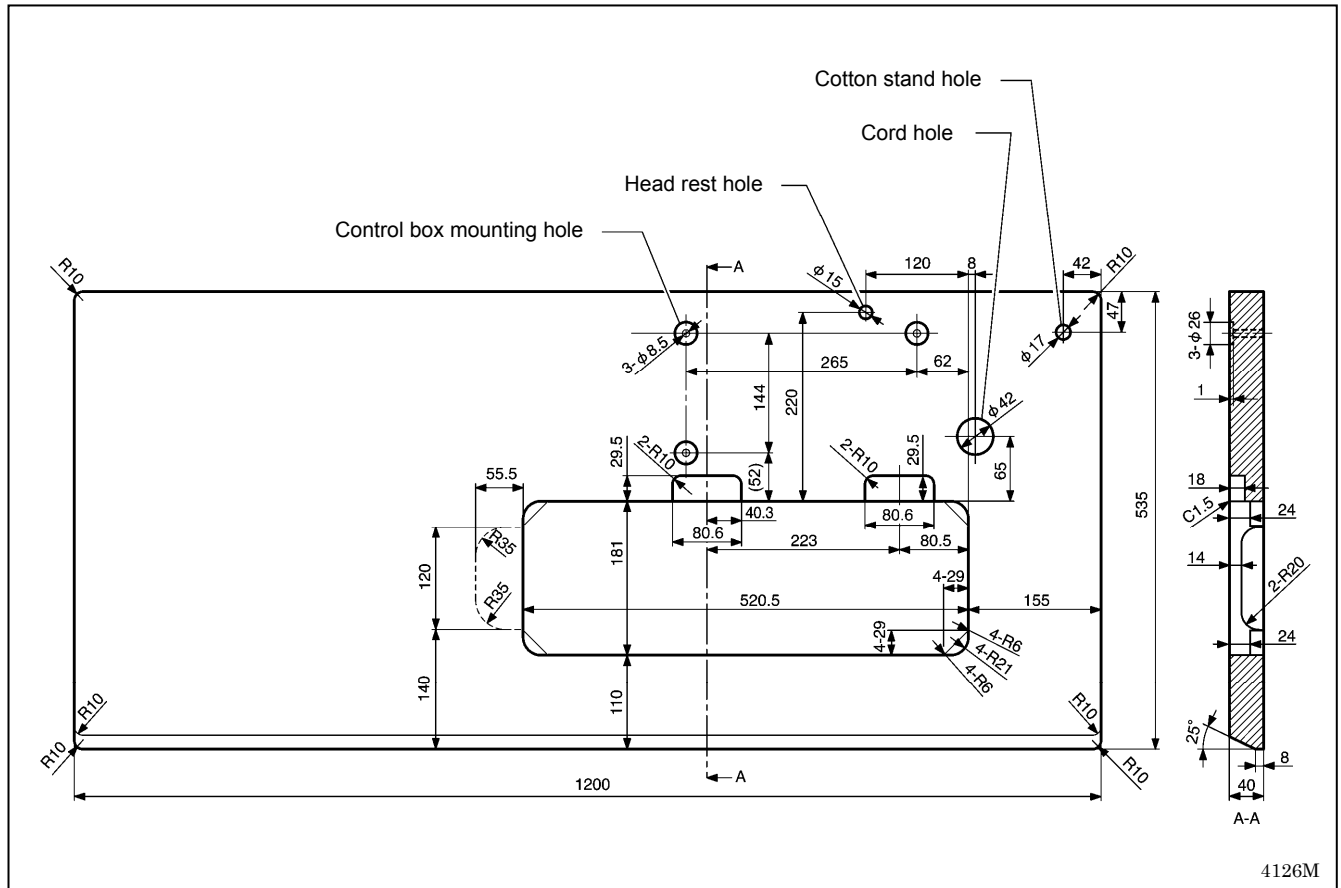
- Clear away any tools, etc. which may be near the table holes.
- While holding the face plate with your left hand, gently return the machine head to the upright position with your right hand.



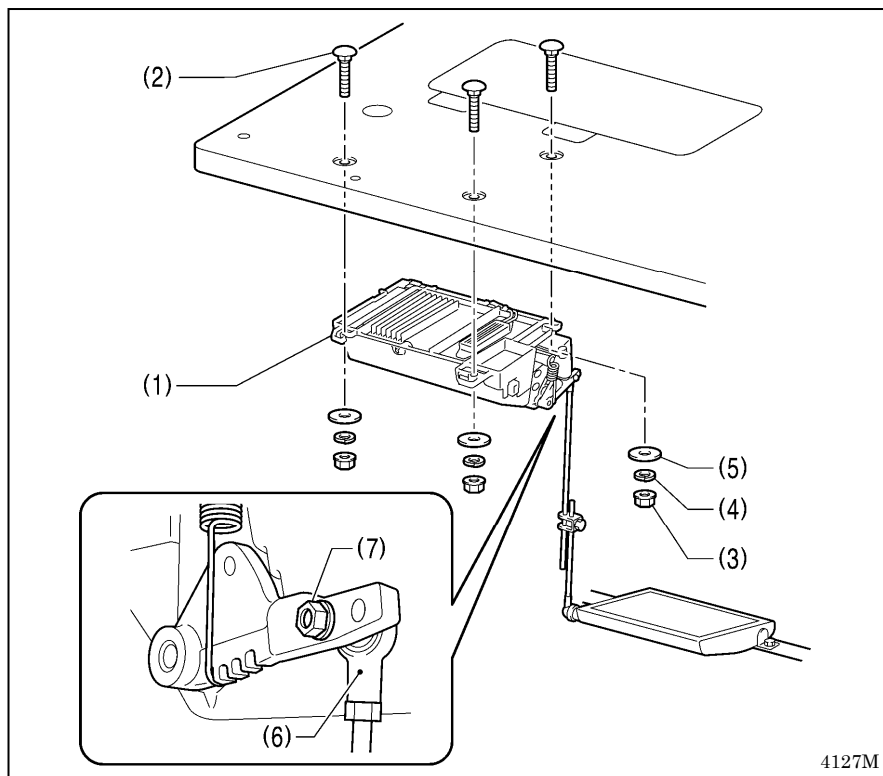
2089M

2-1. Table processing diagram

- The top of the table should be 40 mm in thickness and should be strong enough to hold the weight and with-stand the vibration of the sewing machine.
- Drill holes as indicated in the illustration below.



2-2. Installation

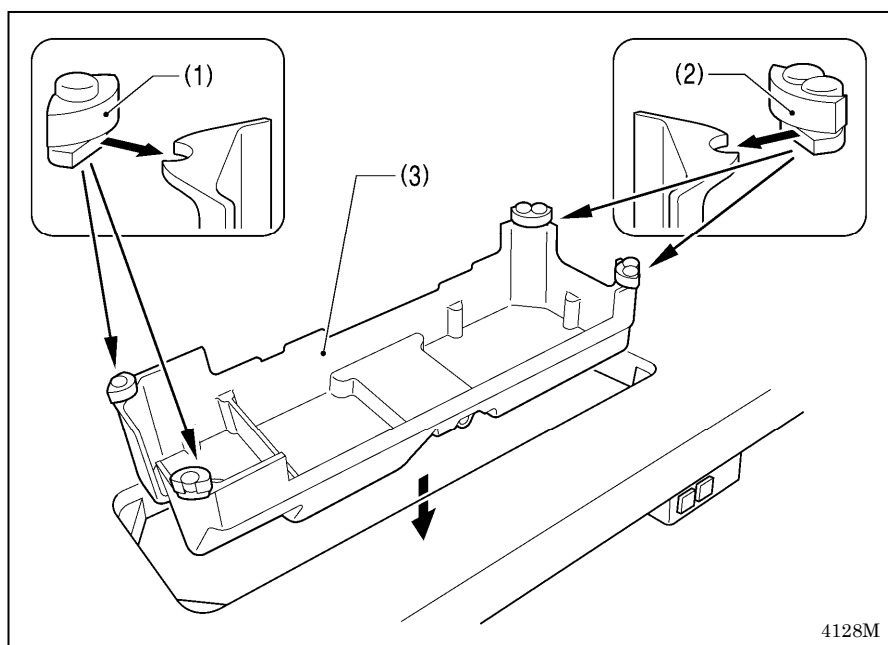


1. Control box

- (1) Control box
- (2) Bolts [3 pcs]
- (3) Nuts [3 pcs]
- (4) Spring washers [3 pcs]
- (5) Washers [3 pcs]

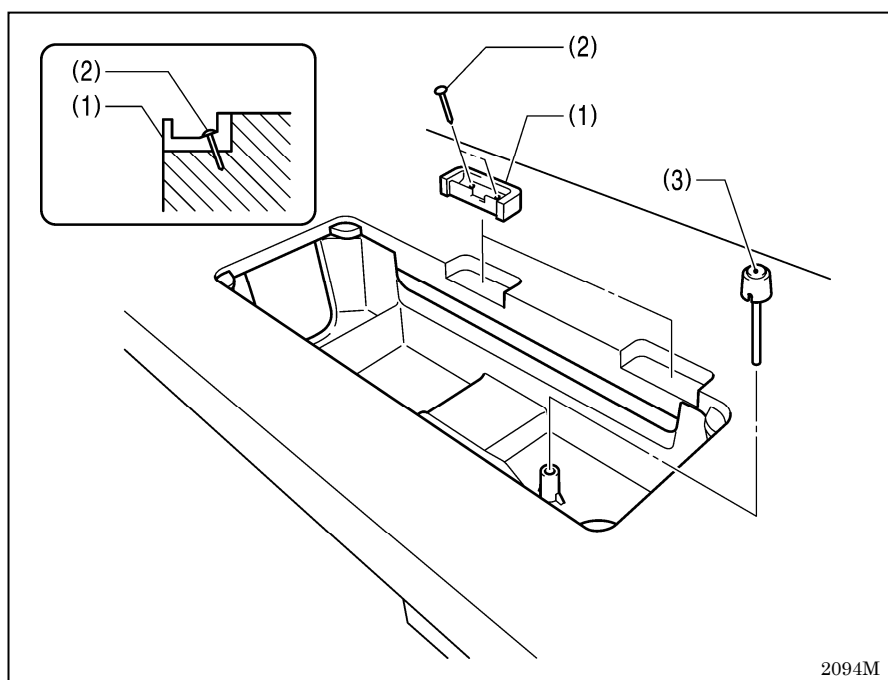
2. Connecting rod

- (6) Connecting rod
(7) Nut



3. Oil pan

- (1) Head cushions (left) [2 pcs]
- (2) Head cushions (right) [2 pcs]
- (3) Oil pan

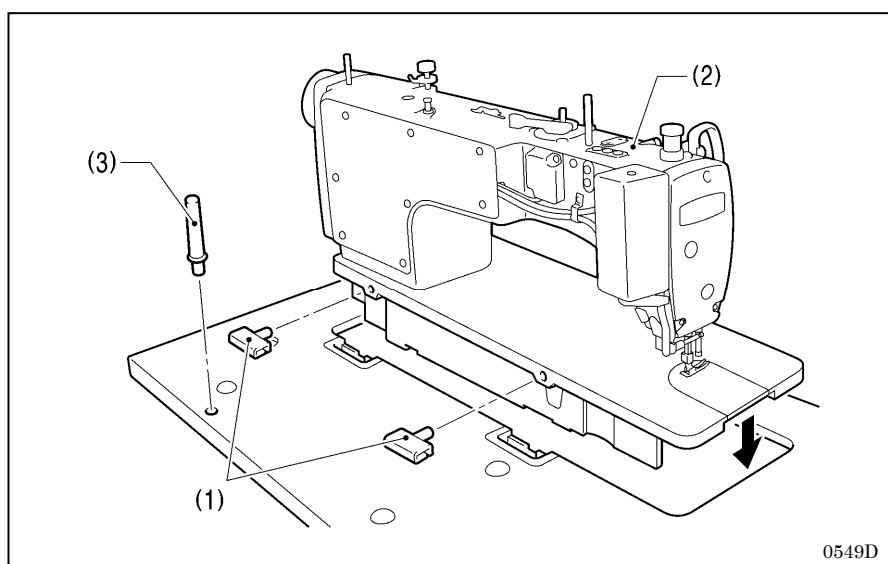


4. Rubber cushions

- (1) Rubber cushions [2 pcs]
- (2) Nails [4 pcs]

5. Knee lifter complying bar

- (3) Knee lifter complying bar



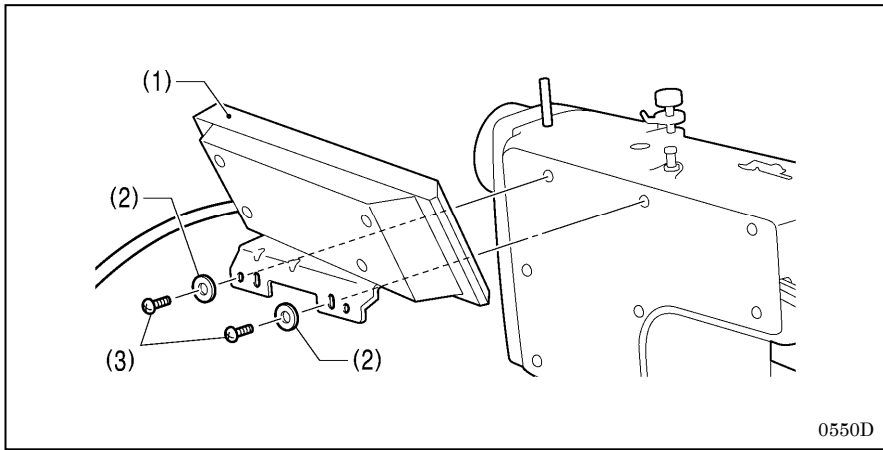
6. Machine head

- (1) Hinges [2 pcs]
- (2) Machine head
- (3) Head rest

NOTE:

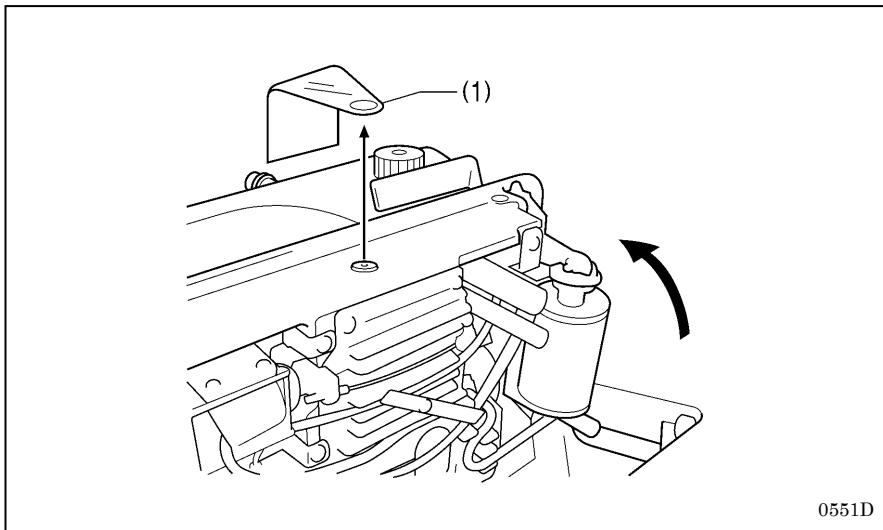
Tap the head rest (3) securely into the table hole. If the head rest (3) is not pushed in as far as it will go, the machine head will not be sufficiently stable when it is tilted back.

2. INSTALLATION



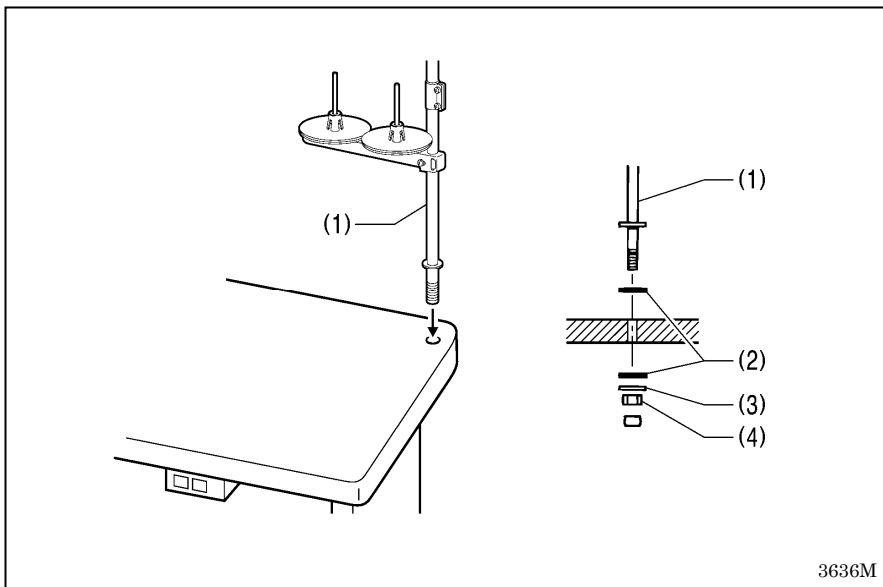
7. Operation panel

- (1) Operation panel
 - (2) Washers [2 pcs]
 - (3) Screws [2 pcs]
- (Use the washers (2) and the screws (3) which are secured to the side plate.)



8. Sticker (Remove)

- (1) Sticker

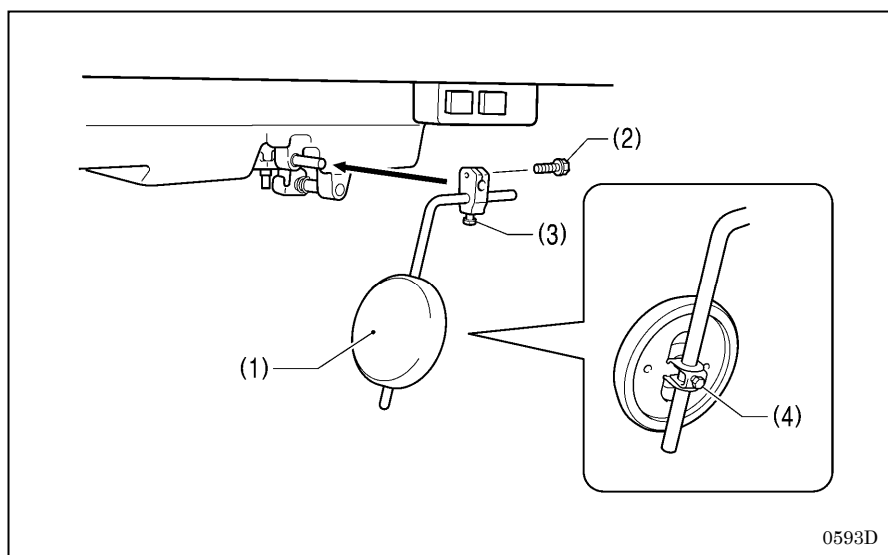


9. Cotton stand

- (1) Cotton stand

NOTE:

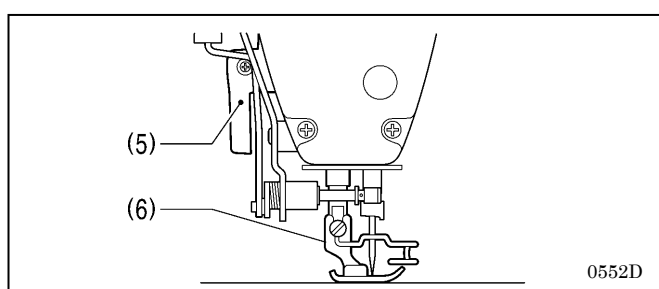
Securely tighten the nut (4) so that the two rubber cushions (2) and the washer (3) are securely clamped and so that the cotton stand (1) does not move.



10. Knee lifter plate

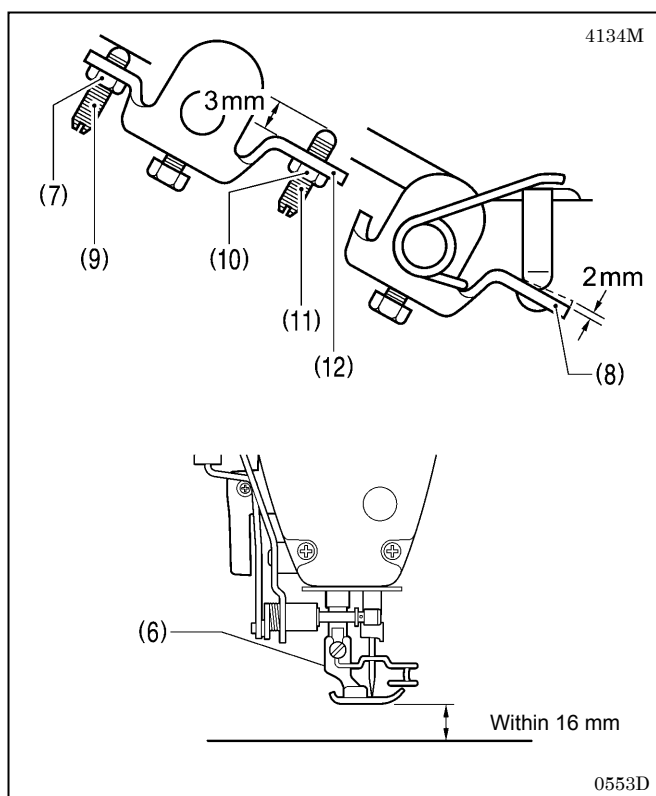
- (1) Knee lifter plate
(2) Bolt

* Loosen the bolt (3) and the bolt (4), and then adjust the position of the knee lifter plate (1) so that it is easy to use.



<Knee lifter adjustment>

1. Turn the machine pulley so that the feed dog is below the top of the needle plate.
2. Lower the presser foot (6) by using the lifting lever (5).

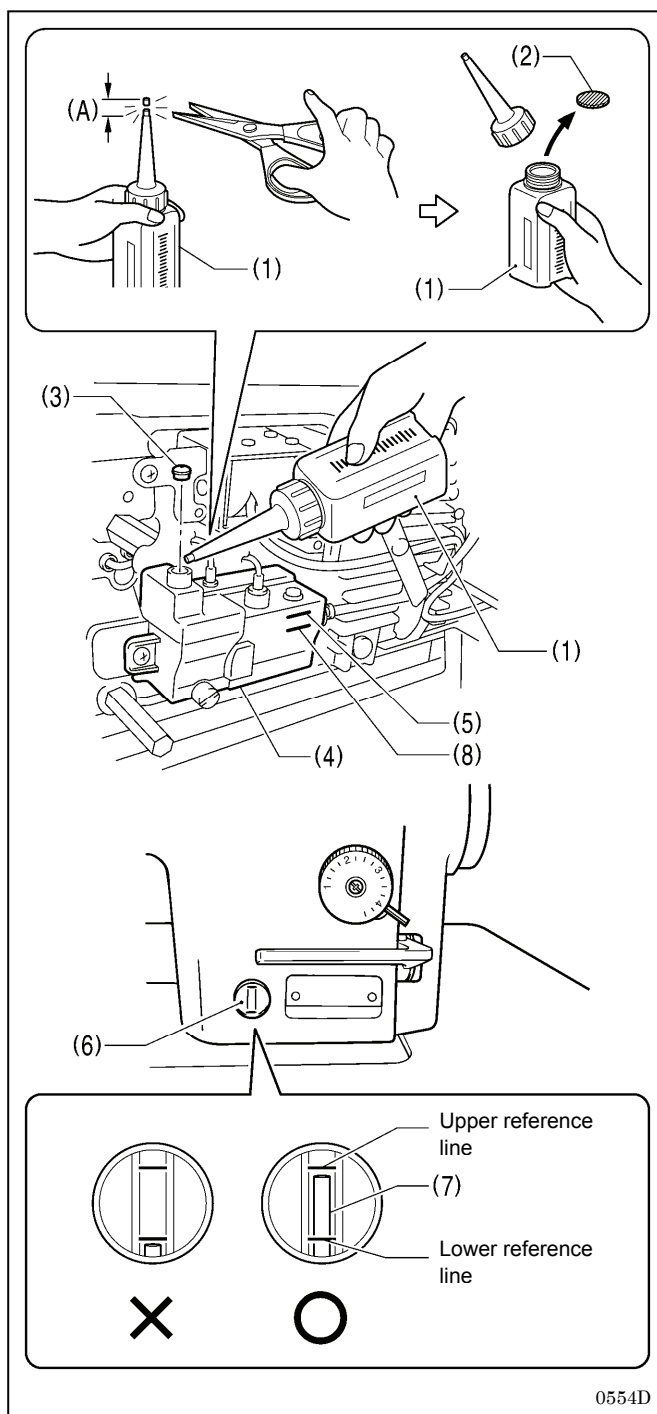


3. Loosen the nut (7).
4. Turn the screw (9) to adjust so that the amount of play in the knee lifter (8) is approximately 2 mm when the knee lifter plate (1) is gently pressed.
5. Securely tighten the nut (7).
6. Loosen the nut (10).
7. Turn the screw (11) until the distance between the end of the screw (11) and the knee lifter (12) is approximately 3 mm.
8. Turn the adjusting screw (11) to adjust so that the presser foot (6) is at the desired position within a distance of 16 mm of the needle plate when the knee lifter plate (1) is fully pressed.
9. After adjustment is completed, securely tighten the nut (10).

2-3. Lubrication

CAUTION

-  Do not connect the power cord until lubrication has been completed, otherwise the machine may operate if the treadle is depressed by mistake, which could result in injury.
-  Be sure to wear protective goggles and gloves when handling the lubricating oil and grease, so that they do not get into your eyes or onto your skin, otherwise inflammation can result. Furthermore, do not drink the oil or eat the grease under any circumstances, as they can cause vomiting and diarrhea. Keep the oil out of the reach of children.
-  When cutting the nozzle of the oil tank, hold the base of the nozzle securely. If you hold the end of the nozzle, injury from the scissors may result.



The sewing machine should always be lubricated and the oil supply replenished before it is used for the first time, and also after long periods of non-use.

1. Hold the base of the nozzle of the accessory oil tank (1), and use scissors to cut about half-way along the straight section (A) of the nozzle.
2. Loosen and remove the nozzle, and then remove the seal (2).
3. Tighten the nozzle.
4. Tilt back the machine head.
5. Remove the rubber cap (3), and pour 120ml of lubricating oil into the oil tank (4). (Use the upper reference line (5) as a guide when pouring.)
6. Replace the rubber cap (3).
7. Return the machine head to its original position.
8. Check that the oil gauge (7) comes to the upper reference line in the oil gauge window (6).

<Lubrication oil replenishment interval>

If the oil gauge (7) drops below the lower reference line (or if the oil level drops below the lower reference line (8) on the oil tank (4)), be sure to replenish the oil.

0554D

2-4. Connecting the cords

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



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



Do not connect the power cord until all cords have been connected.

The machine may operate if the treadle is depressed by mistake, which could result in injury.

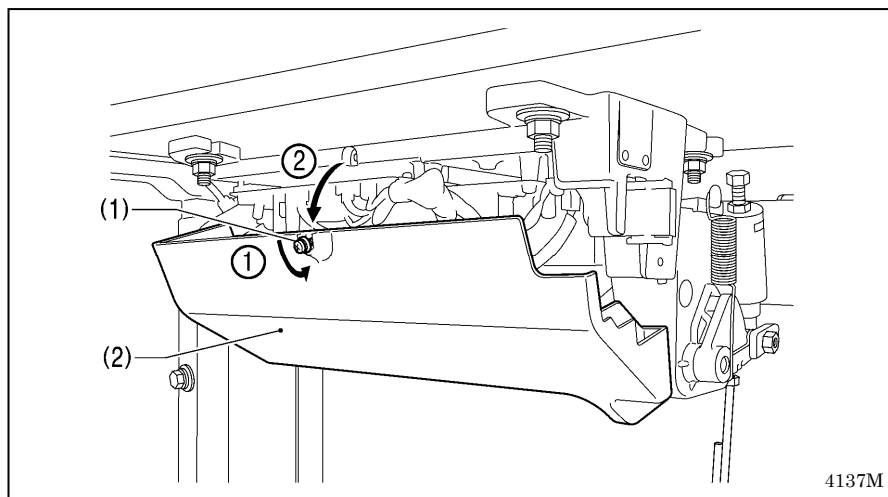


When securing the cords, do not bend the cords excessively or fasten them too hard with staples, otherwise there is the danger that fire or electric shocks could occur.



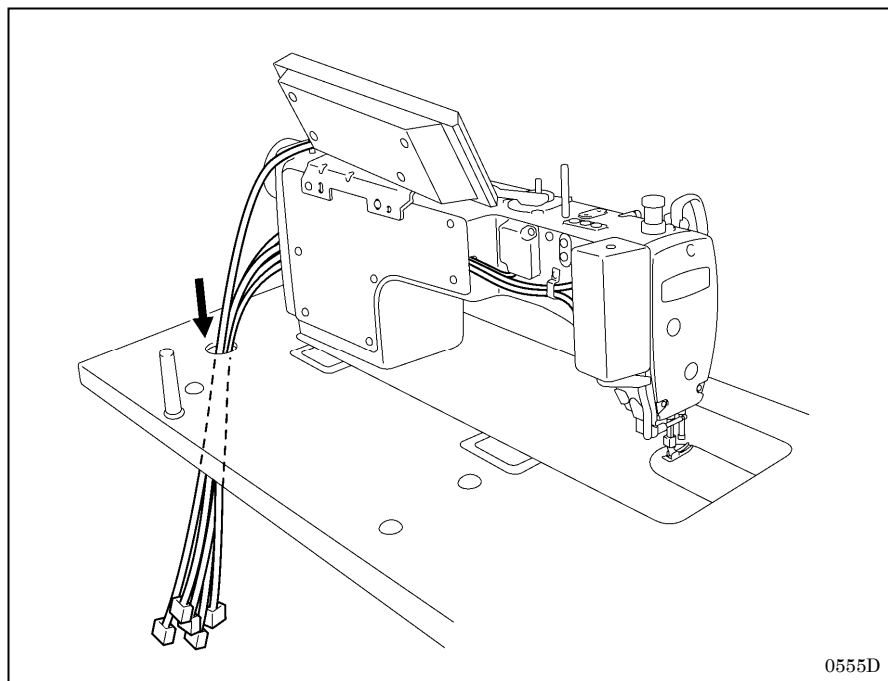
Be sure to connect the ground. If the ground connection is not secure, you run a high risk of receiving a serious electric shock, and problems with correct operation may also occur.

2-4-1. Opening the control box cover



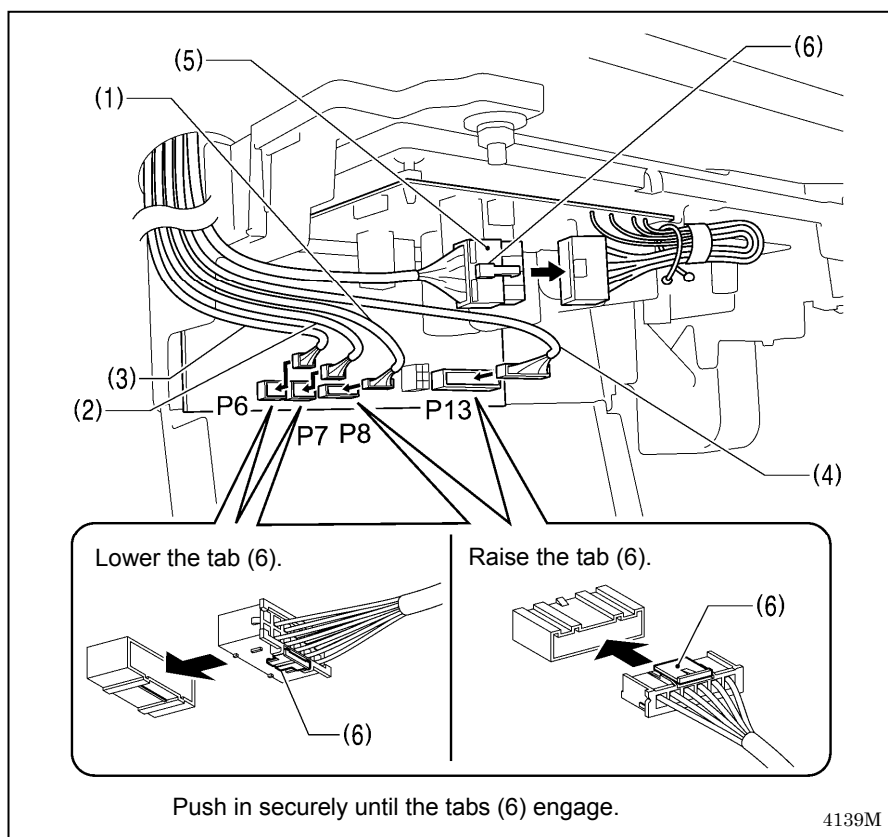
- (1) Screw
- (2) Cover

2-4-2. Connecting the cords

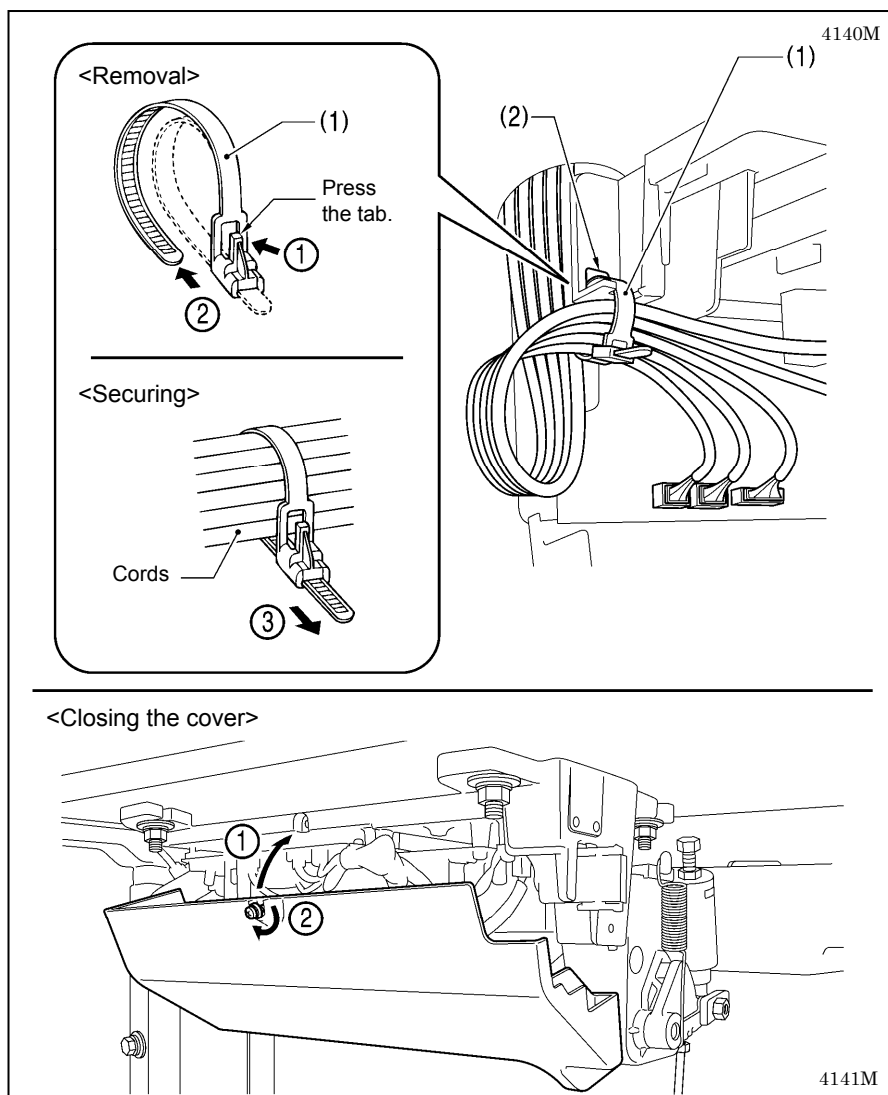


1. Sewing machine cords

2. INSTALLATION



- (1) 6-pin head detector unit connector
- (2) 12-pin operation panel connector
- (3) 10-pin resolver connector
- (4) 14-pin machine connector
- (5) 4-pin motor connector

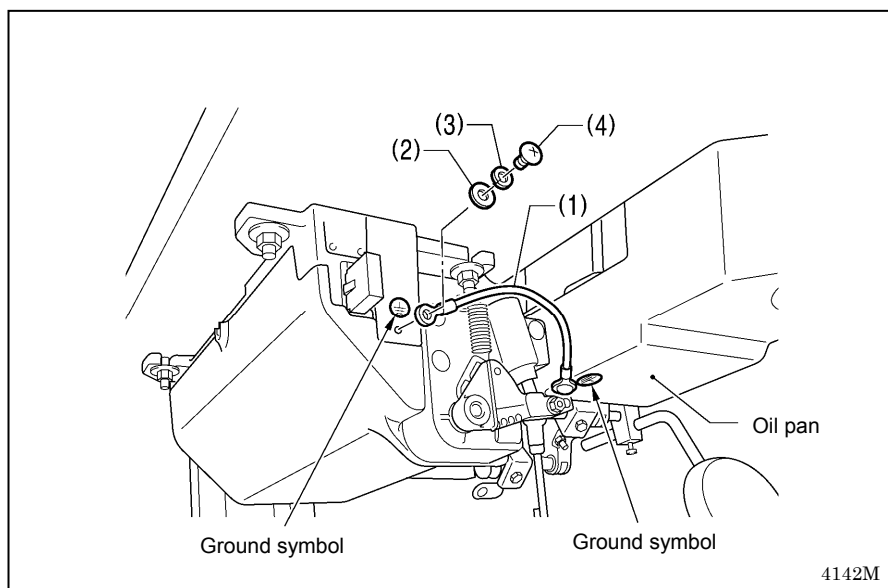


2. Binding the cords

- (1) Repeat cable tie

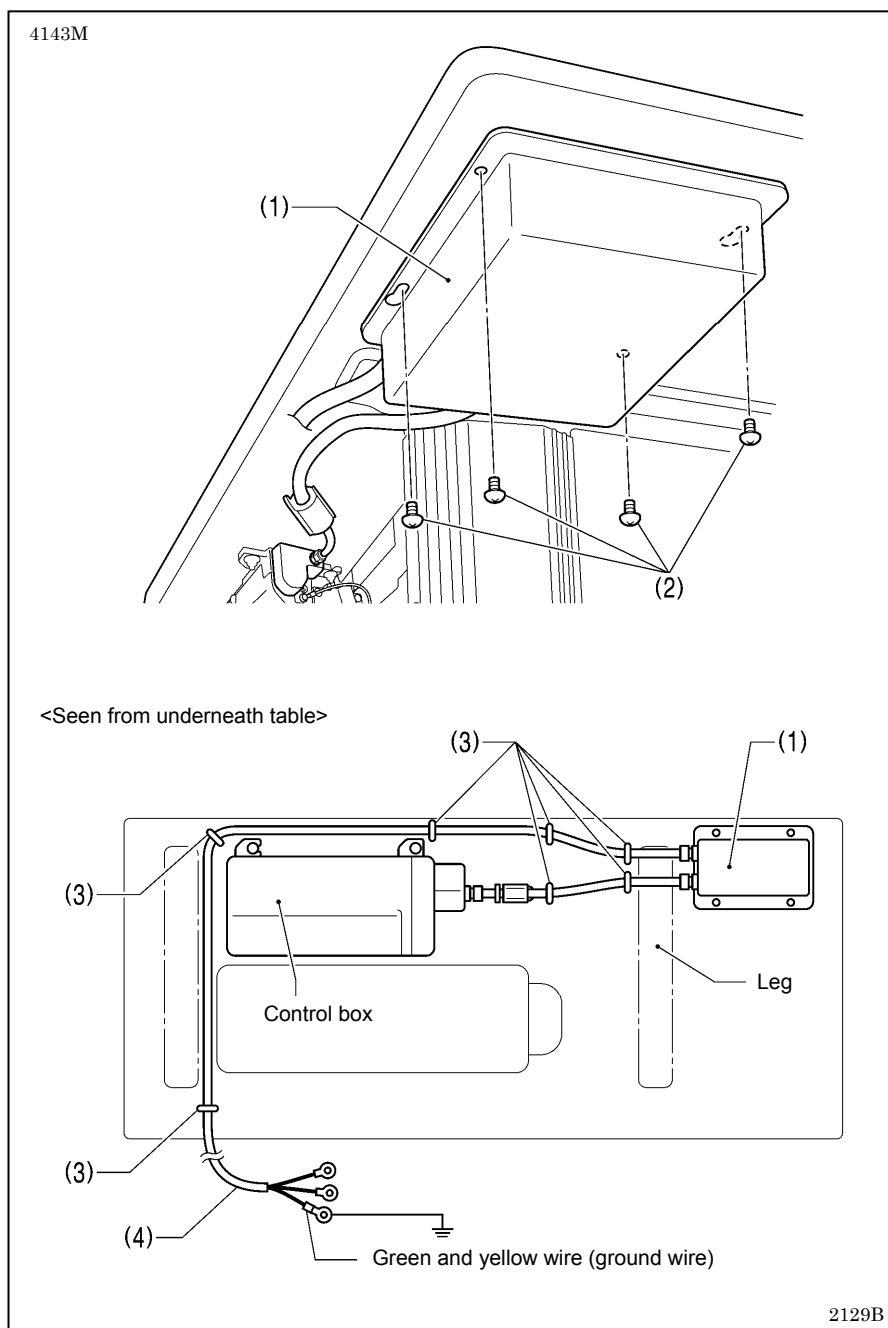
NOTE:

- Bind the cords in such a way that the connector does not get pulled out.
- All cords that come out from the control box should be secured to the cord holder (2) using the repeat cable tie (1), otherwise vibration from the sewing machine may cause the cords to become disconnected, which can cause problems with the operation of the control box.



3. Ground wire

- (1) Ground wire
- (2) Washer
- (3) Spring washer
- (4) Screw



4. Other cords

Connect cords that match the voltage specifications.

<Europe specifications>

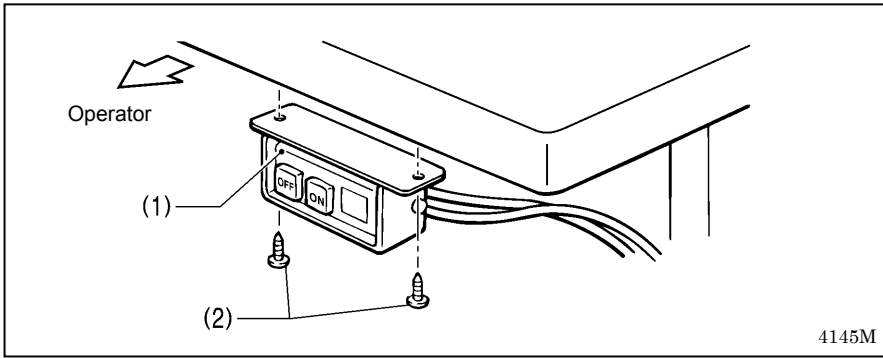
- (1) Filter box
- (2) Screws [4 pcs.]
- (3) Staples [7 pcs.]
- (4) Power cord

1. Attach an appropriate plug to the power cord (4). (The green and yellow wire is the ground wire.)
2. Insert the power plug into a properly-grounded electrical outlet.

NOTE:

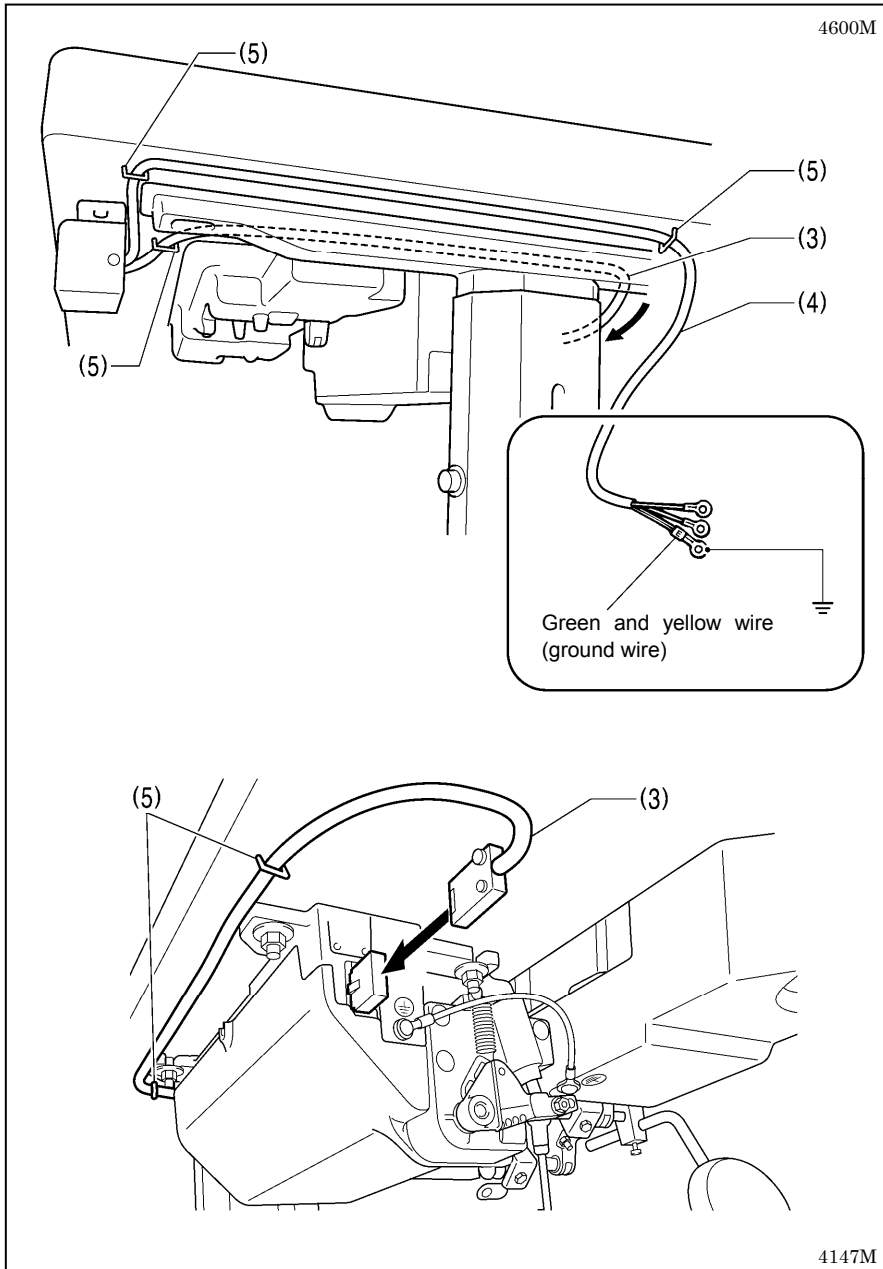
- Take care when tapping in the staples (3) to make sure that they do not pierce the cords.
- Do not use extension cords, otherwise machine operation problems may result.

2. INSTALLATION



<200 V system>

- (1) Power switch
- (2) Screws [2 pcs]

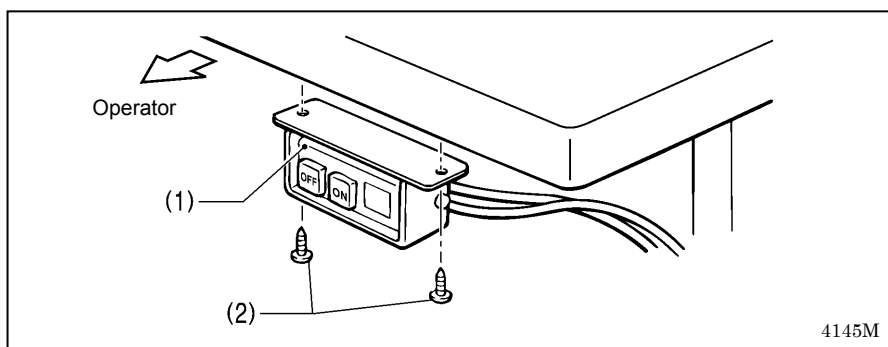


- (3) 3-pin power supply connector
- (4) Power cord
- (5) Staples [5 pcs.]

1. Attach an appropriate plug to the power cord (4). (The green and yellow wire is the ground wire.)
2. Insert the power plug into a properly-grounded electrical outlet.

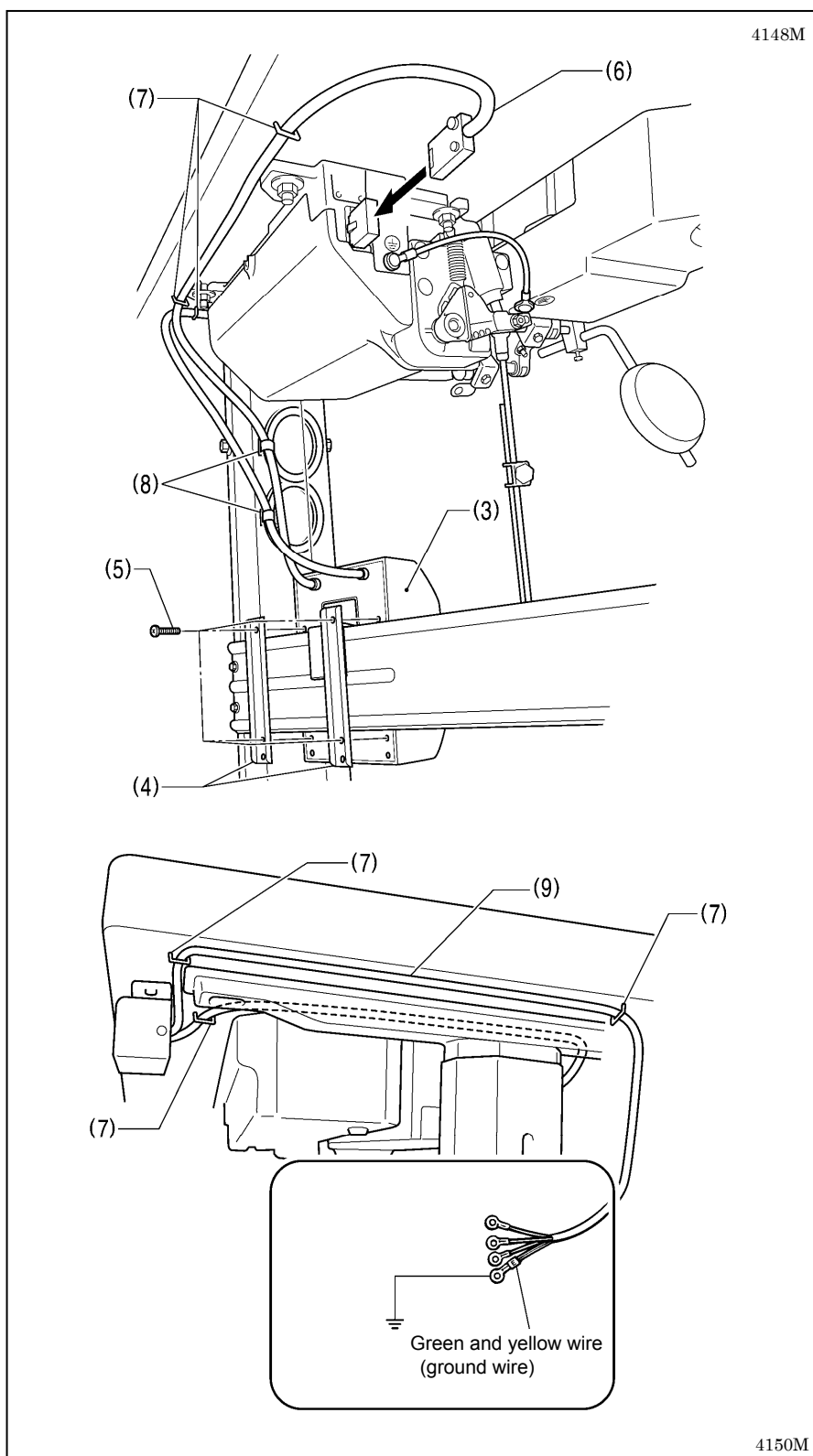
NOTE:

- Take care when tapping in the staples (5) to make sure that they do not pierce the cords.
- Do not use extension cords, otherwise machine operation problems may result.



<100 V/400 V system>

- (1) Power switch
- (2) Screws [2 pcs]



- (3) Transformer box
- (4) Transformer box plates [2 pcs.]
- (5) Screw [4 pcs (with washer)]
- (6) 3-pin power supply connector
- (7) Staples [6 pcs.]
- (8) Cord clamps [2 pcs.]
- (9) Power cord

1. Attach an appropriate plug to the power cord (9). (The green and yellow wire is the ground wire.)
2. Insert the power plug into a properly-grounded electrical outlet.

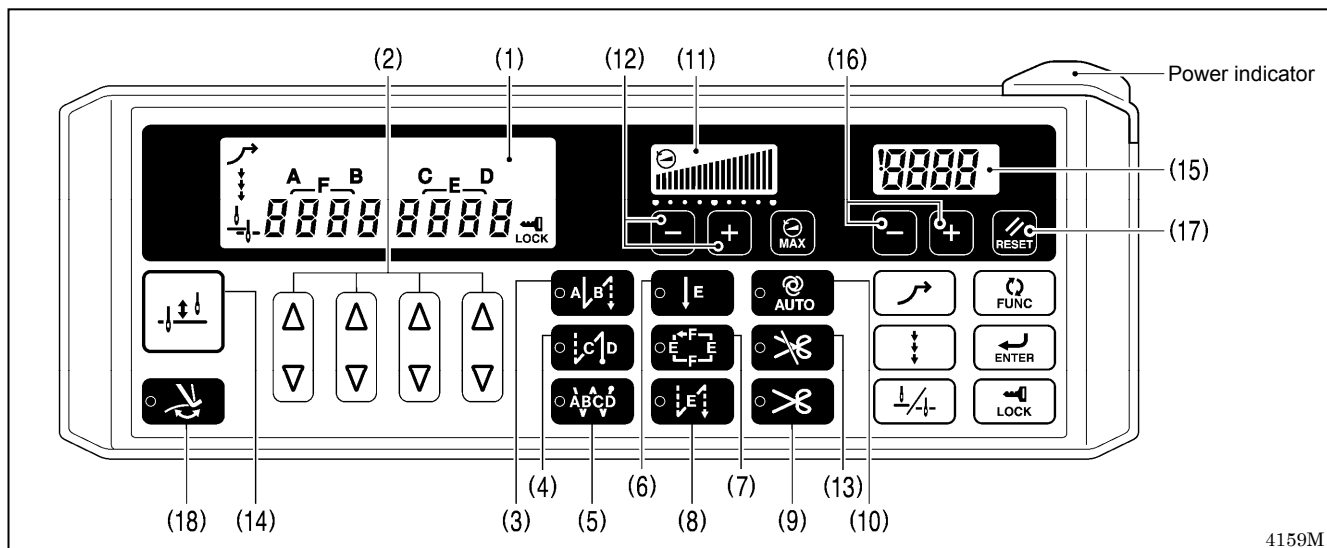
NOTE:

- Take care when tapping in the staples (7) to make sure that they do not pierce the cords.
- Do not use extension cords, otherwise machine operation problems may result.

3. USING THE OPERATION PANEL (BASIC OPERATIONS)

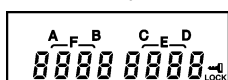
3-1. Names and functions

- The operation panel keys cannot be operated while sewing is in progress. Select the keys and set the number of stitches before starting sewing.
- In the case of keys with indicators, the indicator illuminates when that function is operating, and the indicator switches off when the key is pressed once more.



The power indicator illuminates when the power switch is turned on.

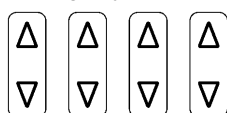
(1) Main display



- In start backtick display, AB illuminates and the number of stitches for A and B are displayed.
- In end backtick display, CD illuminates and the number of stitches for C and D are displayed.
- In continuous backtick display, ABCD illuminates and the number of stitches for A, B, C and D are displayed.
- In fixed stitch display, E or F illuminates and the number of stitches for E or F are displayed.

2136M

(2) Setting keys



These keys are used to set the number of backtick stitches for A, B, C and D and the number of fixed stitches for E and F.

- When the Δ key is pressed, the setting increases from 0 up to 99.
- When the ∇ key is pressed, the setting decreases from 99 down to 0.

4160M 2138M 2139M

(3) Start backtick key



When this key is pressed so that the indicator illuminates, the number of start backtick stitches (0-99) in the A and B stitch number displays is sewn.

4161M

(4) End backtick key



When this key is pressed so that the indicator illuminates, the number of end backtick stitches (0-99) in the C and D stitch number displays is sewn. When the treadle is depressed backward, the end backtick stitches are sewn and then the thread is trimmed automatically.

If the treadle has not yet been depressed backward, the end backtick function can be set to ON, the number of stitches can be changed and the function can be set back to OFF.

4162M

(5) Continuous backtick key



When this key is pressed so that the indicator illuminates, the number of backtick stitches (0-99) in the A, B, C and D stitch number displays is sewn continuously. After the sewing machine sews a full cycle of stitches set by A, B, C and D, the thread is trimmed automatically.

4163M

(6) Fixed stitch key

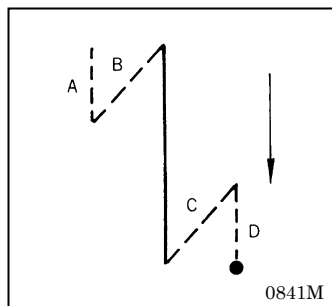


When this key is pressed so that the indicator illuminates, the number of stitches (1-1999) in the E stitch number display is sewn, and then the sewing machine stops automatically.

4164M

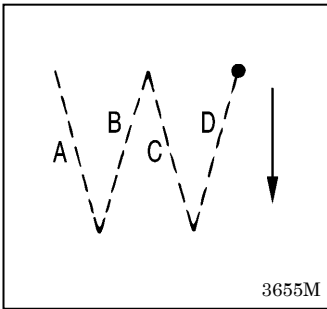
(7) Name label key		When this key is pressed so that the indicator illuminates, fixed stitch sewing of the number of stitches (1-1999) in the E and F stitch number displays is carried out repeatedly.	4165M
(8) Pleat presser sewing key		When this key is pressed so that the indicator illuminates, the number of backtack stitches (1-1999) in the E stitch number display can be sewn by pressing the actuator switch.	4166M
(9) Thread trimming key		• This can only be set for use together with the fixed stitch key (6) or the name label key (7). • When this key is pressed so that the indicator illuminates, the set number of stitches (start or end backtack stitches or fixed stitches) are sewn, and then the thread is trimmed automatically.	4167M
(10) AUTO key		• This can only be set for use together with the continuous backtack key (5), the fixed stitch key (6) or the name label key (7). • When this key is pressed so that the indicator illuminates, the set number of stitches (start or end backtack stitches, fixed stitches or thread trimming) are sewn automatically simply by depressing the treadle once.	4168M
(11) Sewing speed control display		This shows the sewing speed when the treadle is depressed to the maximum amount. • If all bars are illuminated, it indicates that the maximum speed can be set. • If all bars are switched off, it indicates the minimum speed (220 sti/min).	4169M
(12) Sewing speed control keys		These keys let you adjust the sewing speed that is used when the treadle is depressed to the maximum amount. The sewing speed can also be adjusted while sewing is in progress. • When the + key is pressed, the sewing speed becomes faster. • When the - key is pressed, the sewing speed becomes slower.	4170M
(13) Thread trimming lock key		• When this key is pressed so that the indicator illuminates, the sewing machine stops in the needle up position without thread trimming being carried out even if the treadle is depressed backward. • If the indicator of the AUTO key (10) is illuminated, the sewing machine stops in the needle up position without thread trimming being carried out after the set number of stitches have been sewn.	4171M
(14) Half stitch key		When the sewing machine is stopped, the needle bar can be moved up and down by pressing this key.	4172M
(15) Lower thread counter display		This shows the lower thread counter value. The counter is reduced by "1" for every ten stitches sewn.	2154M
(16) Lower thread counter keys		These keys are used to set the initial value for the lower thread counter. (Refer to "3-7. Using the lower thread counter".)	4170M
(17) RESET key		This key is used to return the lower thread counter to its initial value and to cancel warning conditions. (Refer to "3-7. Using the lower thread counter".)	4173M
(18) Thread wiper key		• When this key is pressed so that the indicator illuminates, the thread wiper operates. • When the indicator of the thread trimming lock key (13) is illuminated, the thread wiper key (18) is disabled. • If you press the thread trimming lock key (13) so that its indicator illuminates while the indicator of the thread wiper key (18) is illuminated, the indicator of the thread wiper key (18) will switch off.	4174M

3-2. Sewing start and end backtack stitches



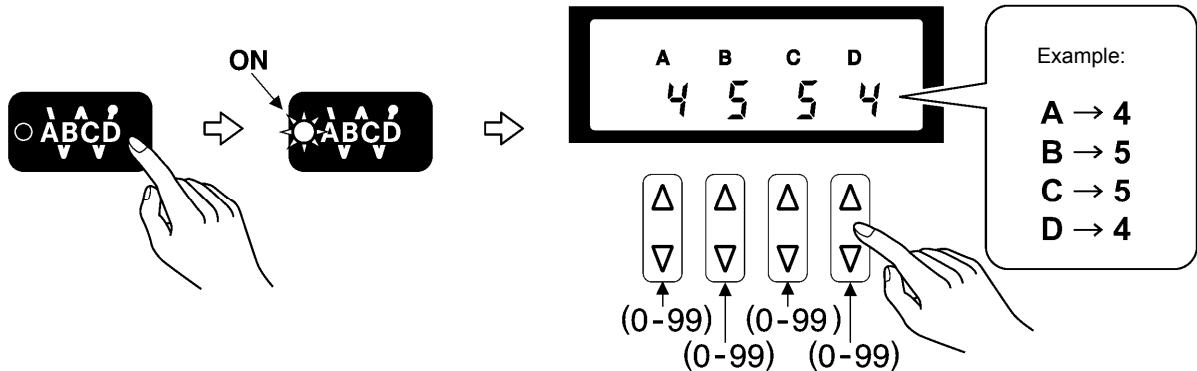
1	Setting start backtack stitches 4175M
2	Setting end backtack stitches 4176M
3	Start backtacking is carried out. After it has finished, normal sewing continues for as long as the treadle remains depressed. NOTE: If the treadle is returned to the neutral position, the sewing machine will continue operating until the set number of start backtack stitches has been sewn. 2159M
4	End backtacking is carried out. After it has finished, the thread is trimmed automatically and the sewing machine stops in the needle up position. NOTE: • If the treadle is depressed backward before sewing of the set number of start backtack stitches is complete, end backtacking will not be carried out. • If the indicator of the thread trimming lock key is illuminated, the sewing machine will stop in the needle up position without thread trimming being carried out. 2160M

3-3. Sewing continuous backtack stitches



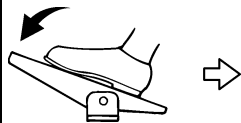
1

Setting continuous backtack stitches



4177M

2



If the treadle is simply depressed continuously, the number of stitches set for A, B, C and D will be sewn in a single cycle, the thread will be trimmed automatically and then the needle bar will stop in the needle up position.

NOTE:

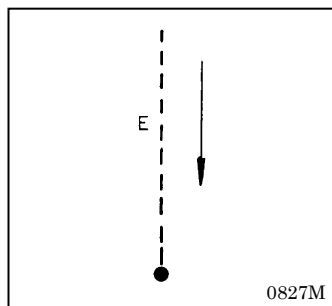
- If the treadle is returned to the neutral position while continuous backtacking is being carried out, the sewing machine will stop at the point where the treadle returns to the neutral position. If the treadle is depressed again, operation will resume from the point where it was interrupted.
- If the indicator of the thread trimming lock key is illuminated, the sewing machine will stop in the needle up position without thread trimming being carried out.

2159M

<Automatic sewing>

When the AUTO key is pressed to turn on the automatic sewing function, operation will be carried out automatically from continuous backtack sewing through to thread trimming just by depressing the treadle once, without needing to keep it depressed continuously.

3-4. Sewing fixed stitches



1	Setting the number of fixed stitches 4178M From 1 to 1999 stitches can be set.
2	After the set number of stitches in E (fixed stitches) have been sewn, the sewing machine stops in the needle position that has been set by the needle up/down key (refer to p.21). After this, normal sewing is carried out if the treadle is depressed. 2159M
3	After the thread is trimmed, fixed stitch sewing mode is enabled. 2160M

<Automatic thread trimming>



Press the thread trimming key to turn on the thread trimming function. When the treadle is continuously depressed, thread trimming is carried out after the fixed stitches have been sewn.

<Automatic sewing>



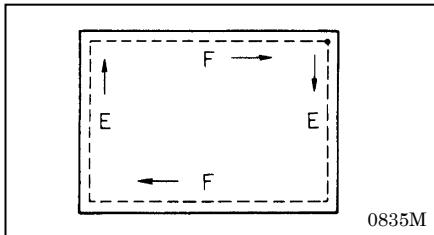
When the AUTO key is pressed to turn on the automatic sewing function, the fixed stitches are sewn simply by depressing the treadle once without needing to depress it continuously.

<Start and end backtack sewing>



- The start backtack key and end backtack key can be pressed to turn on the backtack sewing function.
- If changing the number of end backtack stitches in C and D, press the fixed stitch key to temporarily turn off the fixed stitch function before making the change. (The CD display will show the number of stitches and the setting can then be changed.)

3-5. Sewing name labels



1	Setting the number of name label stitches 4179M From 1 to 1999 stitches can be set for the E and F stitch numbers.
2	After the set number of stitches in E (fixed stitches) have been sewn, the needle bar stops in the position that has been set by the needle up/down key (refer to p.21). 2159M
3	After the set number of stitches in F (fixed stitches) have been sewn, the needle bar stops in the position that has been set by the needle up/down key (refer to p.21).
4	Repeat steps 2 and 3 above.
5	Thread trimming is carried out. 2160M

<Automatic thread trimming>



Press the thread trimming key to turn on the thread trimming function. Thread trimming is carried out automatically after the second set of F stitches has been sewn.

<Automatic sewing>



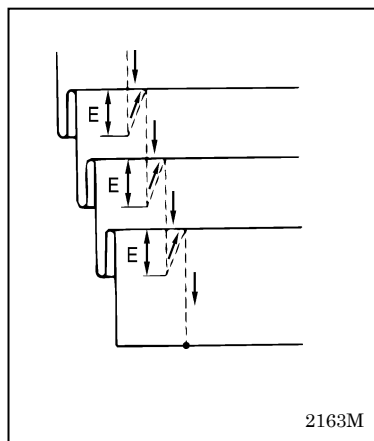
When the AUTO key is pressed to turn on the automatic sewing function, the fixed stitches in E and F are sewn respectively simply by depressing the treadle once without needing to depress it continuously.

<Start and end backtack sewing>



- The start backtack key and end backtack key can be pressed to turn on the backtack sewing function.
- If changing the number of start and end backtack stitches in A, B, C and D, press the name label stitch key to turn off the name label function before making the change. (The ABCD display will show the number of stitches and the settings can then be changed.)

3-6. Sewing pleat presser stitches



1	From 1 to 1999 stitches can be set.
2	If the treadle is continuously depressed and then you press the actuator switch while sewing is in progress, the number of backtack stitches set in E is sewn and then normal sewing resumes.
3	Thread trimming is carried out.

<Automatic sewing and automatic thread trimming>



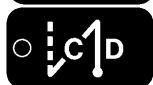
These functions cannot be used.



<Start and end backtack sewing>



- The start backtack key and end backtack key can be pressed to turn on the backtack sewing function.

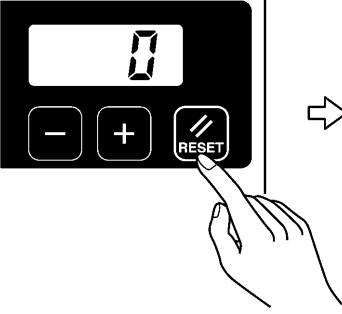
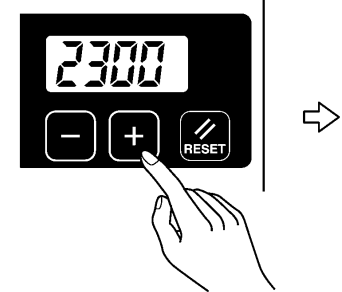


- If changing the number of end backtack stitches indicated in C and D, press the pleat presser sewing key to turn off the pleat presser sewing function before making the change. (The CD display will show the number of stitches and the setting can then be changed.)

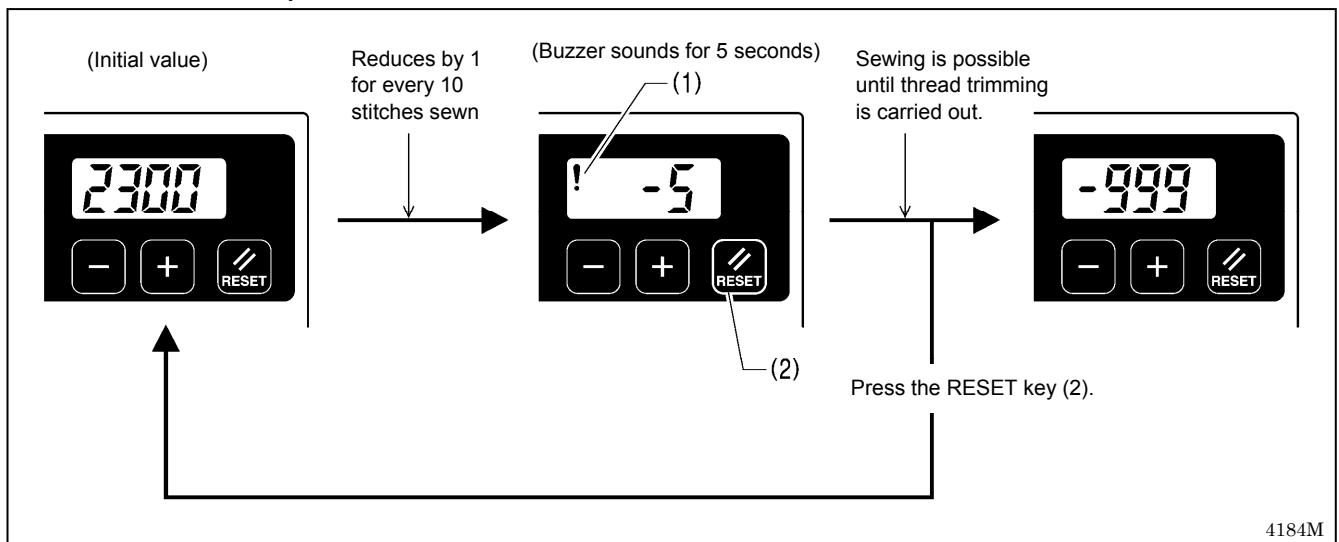
3-7. Using the lower thread counter

- The lower thread counter can be used to let you know approximately how much lower thread is remaining.
- The value displayed by the lower thread counter display is reduced by 1 from the initial setting value each time the sewing machine sews 10 stitches, and a warning is given when the counter goes below "0".

<Initial value setting>

1		After about 2 seconds, the buzzer will sound and the lower thread counter display will show the initial value which was set previously.	4182M
2		• When the + key is pressed, the setting increases. • When the - key is pressed, the setting decreases. • If you hold down the keys, the setting will change more quickly. • If a value of "0" is set, the lower thread counter will not operate. • The initial setting value will be accepted when sewing starts.	4183M

<Lower thread counter operation>

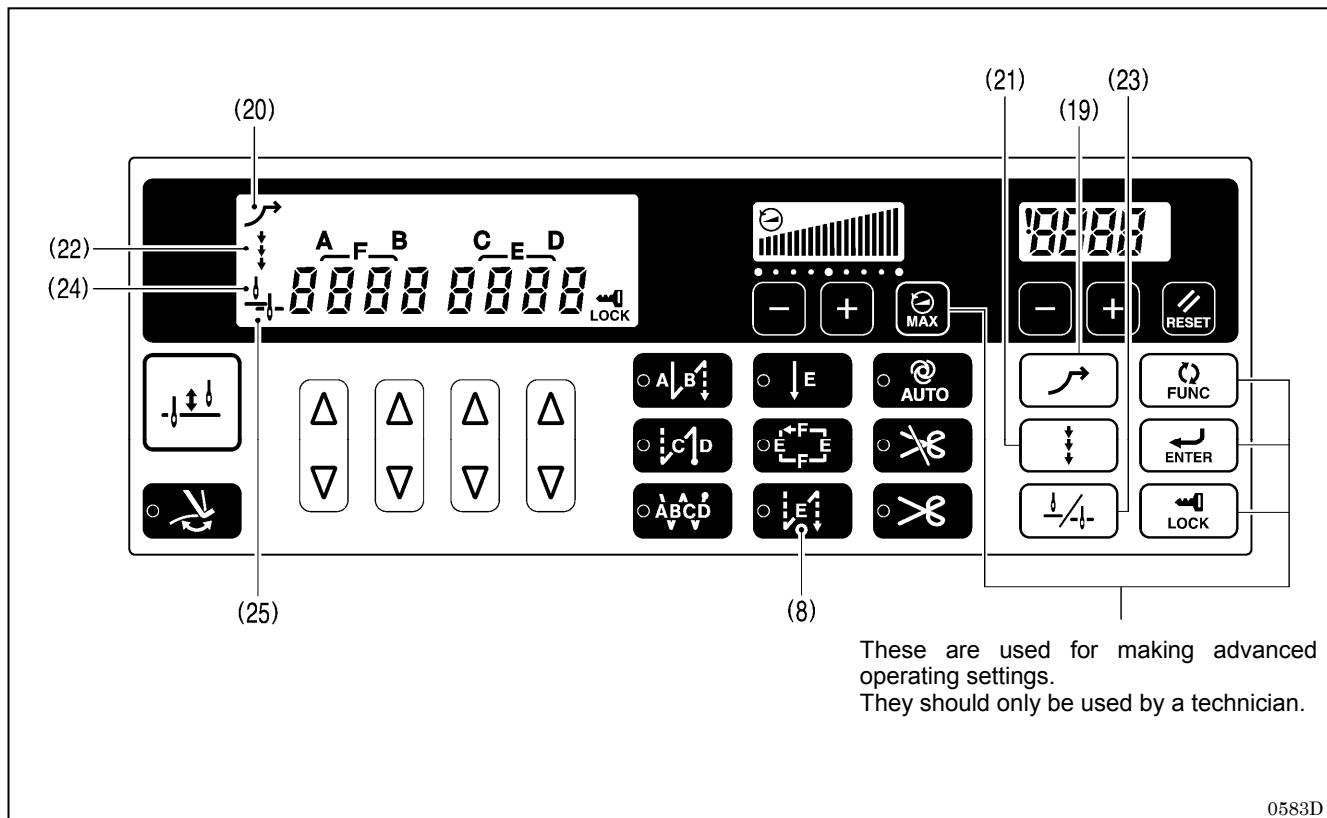


1. When sewing is carried out, the value shown in the lower thread counter display is reduced by 1 for every 10 stitches sewn. (When the value goes below zero ("0"), a minus sign appears and counting continues to a maximum of "-999".)
2. When the value goes below "0", a warning icon (1) illuminates and an electronic buzzer sounds for 5 seconds.
3. Sewing will be possible even after the treadle is returned to the neutral position and the sewing machine stops. However, after the treadle has been depressed backward and thread trimming has been carried out, sewing using the treadle will no longer be possible.
4. When the RESET key (2) is pressed, the warning icon (1) will switch off and the display will return to showing the initial values. Sewing using the treadle will then be possible.

4. USING THE OPERATION PANEL (ADVANCED OPERATIONS)

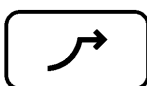
The operations described in this section should only be carried out by a technician.

4-1. Names and functions



0583D

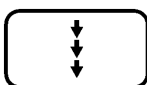
(19) Slow start key



- When this key is pressed so that the slow start icon (20) illuminates, the first two stitches sewn after the thread is trimmed are sewn at 700 sti/min. After this, the sewing speed corresponds to the treadle depression amount.
- If you press this key again while the icon (20) is illuminated, the icon (20) will turn off.

4186M

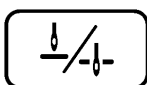
(21) Correction key



- When this key is pressed so that the correction icon (22) illuminates, correction sewing can be carried out.
If the sewing machine is stopped, sewing will be carried out at slow speed (220 sti/min) while the actuator switch is being pressed.
- NOTE:**
 - If you press the actuator switch while sewing is in progress, backtack stitches will be sewn.
 - Correction sewing cannot be carried out while the indicator of the pleat presser sewing key (8) is illuminated.
- If you press this key again while the icon (22) is illuminated, the icon (22) will turn off.

4187M

(23) Needle up/down key



Use this key to select whether the needle bar stops in the up position or the down position when the treadle is returned to the neutral position and sewing stops.

- When the needle up icon  (24) is illuminated, the needle bar stops in the up position.
- When the needle down icon  (25) is illuminated, the needle bar stops in the down position.

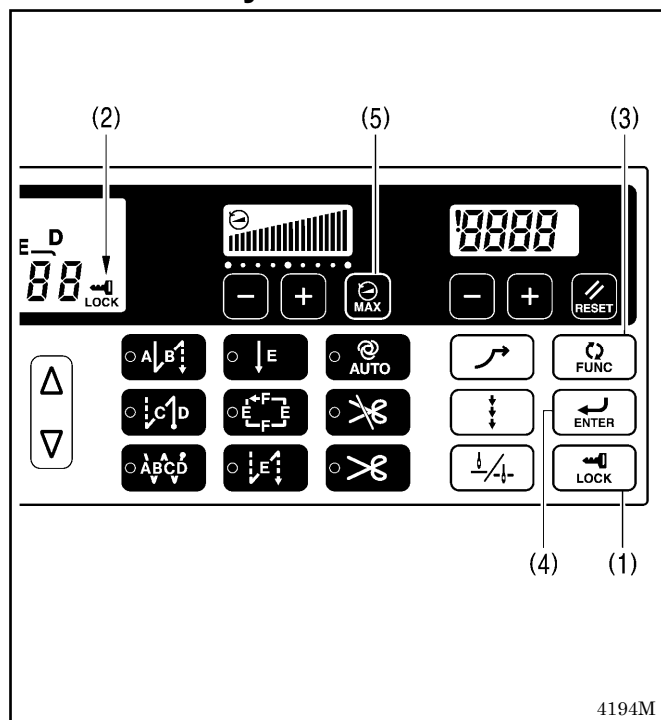
4188M 2207M 2208M

4-2. Adjusting the needle up stop position

1	4189M 2138M (While pressing the Δ key (1), press the power ON switch.) "MorG xxx" will appear in orange in the main display (2).
2	4190M Selecting "UpoS xxx" (Press once) "xxx" is the setting value for the needle up stop position, and "0" is the default setting.
3	Needle up stop position setting Example: 5 • If you press the Δ key, the setting value will increase and the needle up stop position will become lower. • If you press the ∇ key, the setting value will decrease and the needle up stop position will become higher. • The setting range is from -5 to 10. * A setting value of "10" corresponds to an angle of rotation of approximately 10° for the upper shaft. 0557D 2138M 2139M
4	The setting values will be memorized. 4192M
5	Normal sewing machine operation will then be possible. 4193M

* For details on other adjustment items, refer to the Service Manual.

4-3. LOCK key



When the power switch is turned on, the LOCK key (1) turns ON. (The icon (2) is illuminated.)

In this state, the following three key operations are disabled so that the setting values cannot be changed accidentally.

FUNC key (3)

This key is used to make settings for various functions.

ENTER key (4)

This key is used to accept function settings.

MAX key (5)

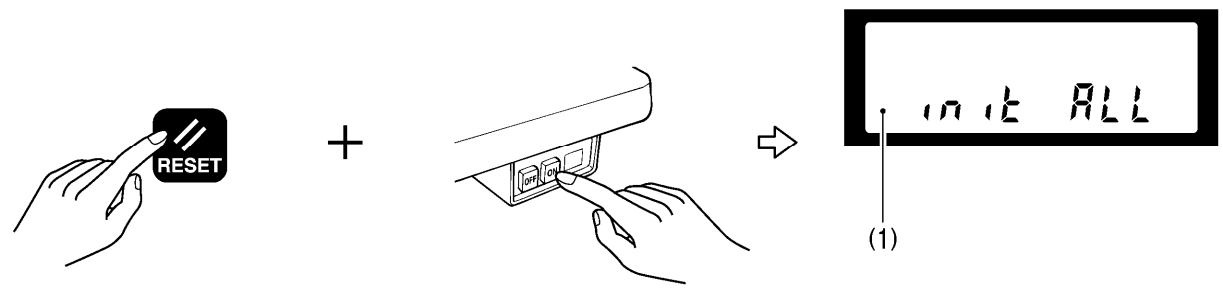
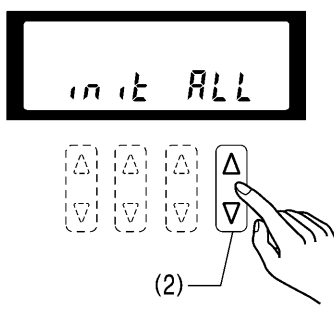
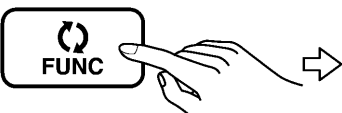
This key is used to change the maximum sewing speed.

* Refer to the Service Manual for details on using these keys.

4194M

4-4. Resetting all settings to their defaults

If the sewing machine stops operating normally, the cause may be that an incorrect setting may have been made for the memory data by means of memory switches, for instance. In such cases, it may be possible to restore normal operation by following the steps given below to initialize the memory setting data.

1	Activating initialization mode 4195M  (While pressing the RESET key, press the power ON switch.) "init ALL" will appear in orange in the main display (1). Reference  (2) If the Δ ∇ keys (2) are pressed at this time, you can select the items to be initialized as shown below. * For details on initialization items other than "init ALL", refer to the Service Manual. <table border="1" style="width: 100%;"> <thead> <tr> <th>Main display</th> <th>Initialization items</th> </tr> </thead> <tbody> <tr> <td>"init ALL"</td> <td>Clears all settings</td> </tr> <tr> <td>"init MEM"</td> <td>Initializes memory switches</td> </tr> <tr> <td>"init SPd"</td> <td>Initializes sewing speed</td> </tr> <tr> <td>"init SEW"</td> <td>Initializes programs</td> </tr> </tbody> </table> 4196M 2138M 2139M	Main display	Initialization items	"init ALL"	Clears all settings	"init MEM"	Initializes memory switches	"init SPd"	Initializes sewing speed	"init SEW"	Initializes programs
Main display	Initialization items										
"init ALL"	Clears all settings										
"init MEM"	Initializes memory switches										
"init SPd"	Initializes sewing speed										
"init SEW"	Initializes programs										
2	Once initialization is complete, the main display will return to green.  (Press for 2 seconds or more) 4192M										
3	Initialization mode will be exited and normal sewing machine operation will then be possible.  4193M										

5. SEWING

! CAUTION



Turn off the power switch before carrying out cleaning.

The machine may operate if the treadle is depressed by mistake, which could result in injury.

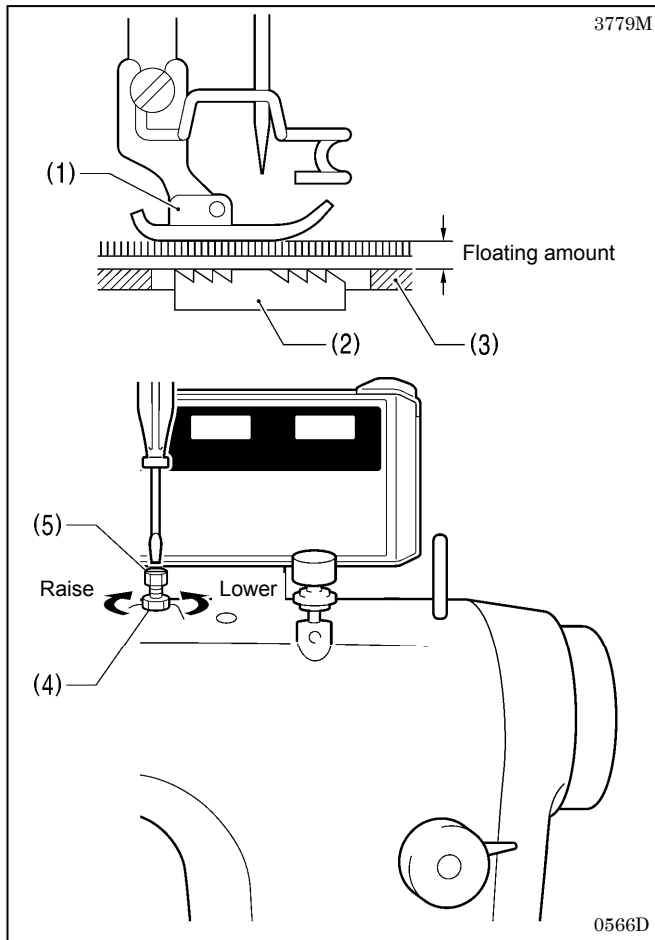


Secure the table so that it will not move when tilting back the machine head. If the table moves, it may crush your feet or cause other injuries.



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

5-1. Adjusting the presser foot floating amount (minute lifting amount)

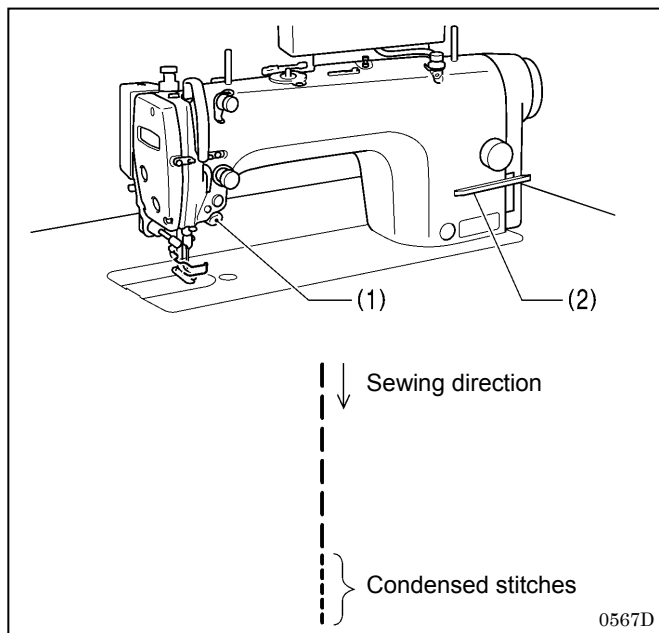


When sewing stretch materials and materials with long pile, you can make minute adjustments to the floating amount for the presser foot (1) in accordance with the material.

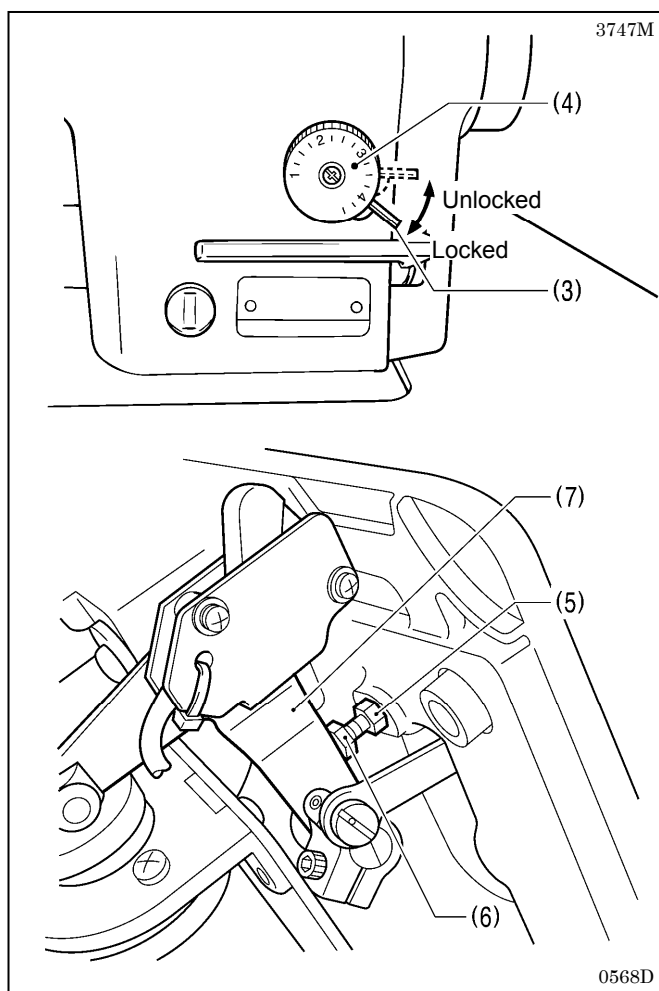
1. Turn the sewing machine pulley by hand to move the feed dog (2) below the needle plate (3).
2. Use the lifting lever to lower the presser foot (1).
3. Loosen the nut (4).
4. Use a screwdriver to turn the adjustment screw (5) to adjust the floating amount.
 - To raise the presser foot (1) ...
Turn the adjusting screw (5) clockwise.
 - To lower the presser foot (1) ...
Turn the adjusting screw (5) counterclockwise.
5. Tighten the nut (4).

* After making the adjustment, sew a piece of material to check the floating amount.

5-2. Sewing condensed stitches



- If you press the actuator switch (1) or the reverse lever (2) while sewing is in progress, you can sew stitches (forward direction) with small stitch lengths.
- Before carrying out sewing, set the stitch length for condensed stitches as follows.



<Setting>

1. Lift up the dial lock lever (3) to release the lock.
2. Turn the stitch length dial (4) to the stitch length to be used for condensed stitches.
3. Tilt back the machine head.
4. Loosen the nut (5) and then turn the bolt (6) until its head is touching the solenoid lever (7).
5. Tighten the nut (5) to secure the bolt (6).
6. Return the machine head to its normal position.

<Sewing>

1. Return the stitch length dial (4) to the stitch length for normal sewing.
2. Push down the dial lock lever (3) to engage the lock.
3. Start sewing.
4. At the position where you would like to start sewing condensed stitches, press the actuator switch (1) or the reverse lever (2).
(Condensed stitches are sewn while the actuator (1) or reverse lever (2) is being pressed.)

- * To stop sewing condensed stitches, tighten the bolt (6) so that its head is not touching the solenoid lever (7).

6. CLEANING

! CAUTION



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



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



Secure the table so that it will not move when tilting back the machine head. If the table moves, it may crush your feet or cause other injuries.

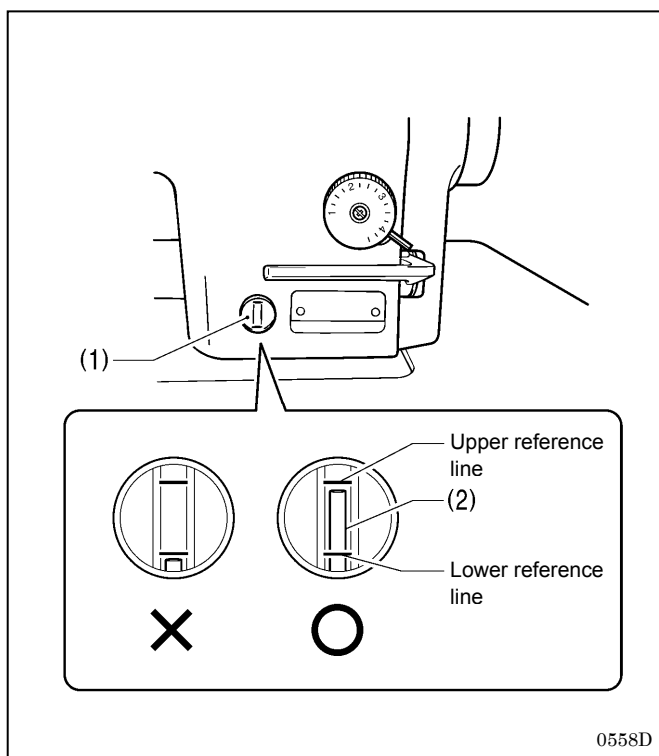


Use both hands to hold the machine head when tilting it back or returning it to its original position. If only one hand is used, the weight of the machine head may cause your hand to slip, and your hand may get caught.

6-1. Daily cleaning procedures

The following cleaning operations should be carried out each day in order to maintain the performance of this machine and to ensure a long service life.

Furthermore, if the sewing machine has not been used for a long period of time, carry out the following cleaning procedures before using it again.

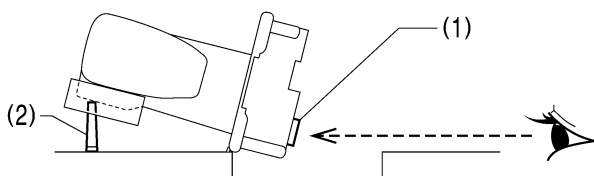
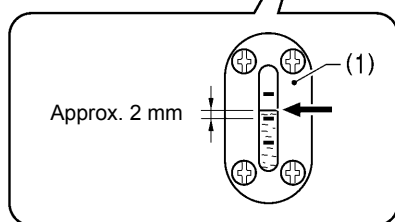
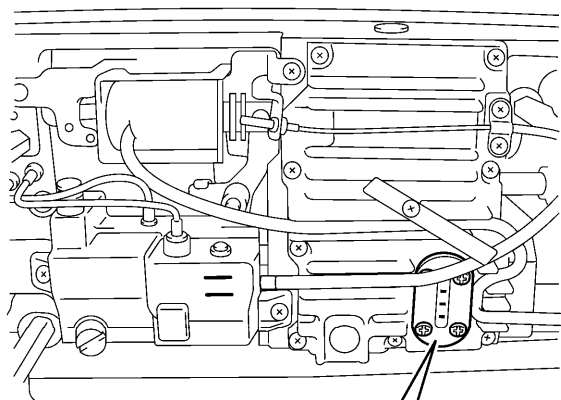


1. Lubrication

A. Oil tank oil quantity

Check the oil gauge window (1), and add more oil if the oil gauge (2) is below the lower reference line.
(Refer to page 7.)

0564D



2186M

B. Gearbox oil quantity

NOTE:

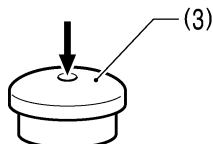
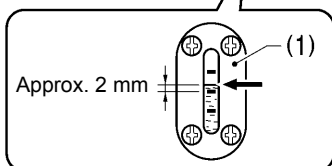
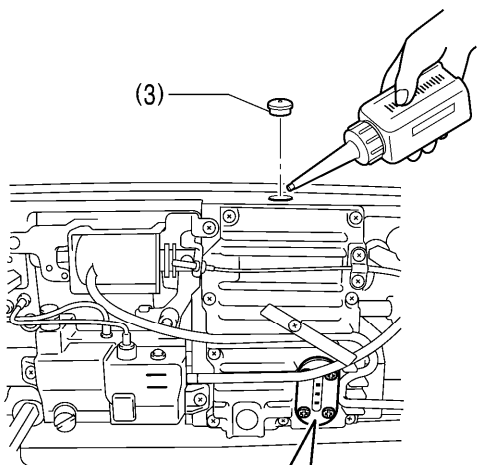
- Check the quantity of oil in the gearbox immediately after tilting back the machine head.
When the machine head is left for long periods in the tilted-back position, the amount of oil in the felt inside the gearbox drops and the oil level seen from the oil window (1) rises, so that it becomes impossible to measure the actual oil level accurately.
- The position of the oil level in the oil window (1) will vary depending on the angle of the machine head.
Tilt back the machine head while the head rest (2) is installed in the correct position as shown in the table processing diagram on page 3 (refer to page 4).

<Checking the oil quantity>

The oil level should normally be approximately 2 mm above the center reference line in the oil window (1). (70 ml of lubricating oil is added to the gearbox at the time of shipment from the factory.)

- Look at the oil window (1) from directly in front.
- If the oil level is below the normal level, add more lubricating oil as described in the following procedure.

0565D



2188M

<Lubrication>

- Remove the rubber cap (3).
- Add lubricating oil until the oil level is approximately 2 mm above the center reference line in the oil window (1).
Do not pour all of the lubricating oil in at once at this time. Pour the lubricating oil 10 ml at a time while checking the oil window (1).

NOTE:

Do not pour too much lubricating oil into the specified location.

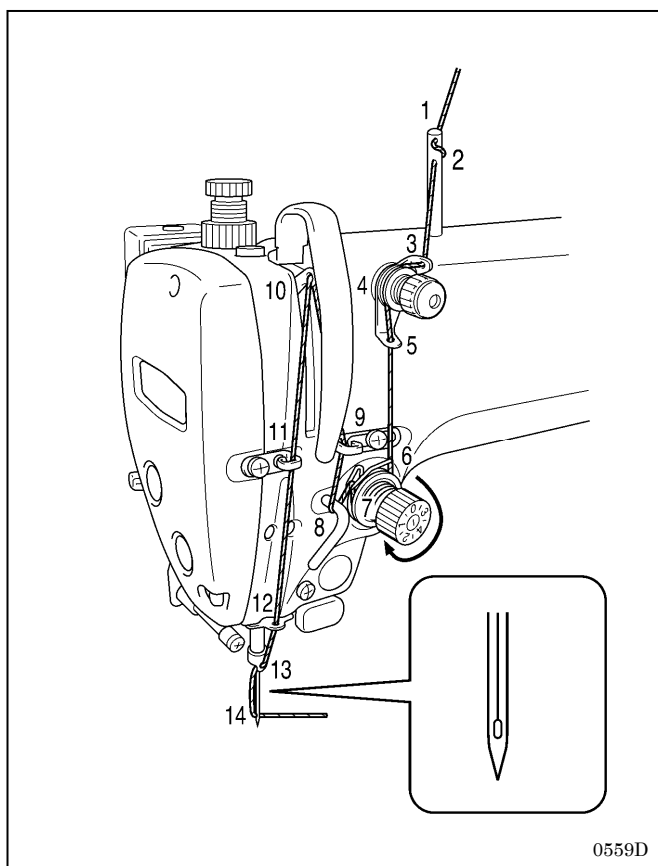
If too much oil is added, oil leaks may result.

- Insert the rubber cap (3) securely.
- Return the machine head to its original position.

NOTE:

The rubber cap (3) has a hole in it for adjusting the air pressure.

When replacing the rubber cap (3) use only the replacement part specified by Brother.

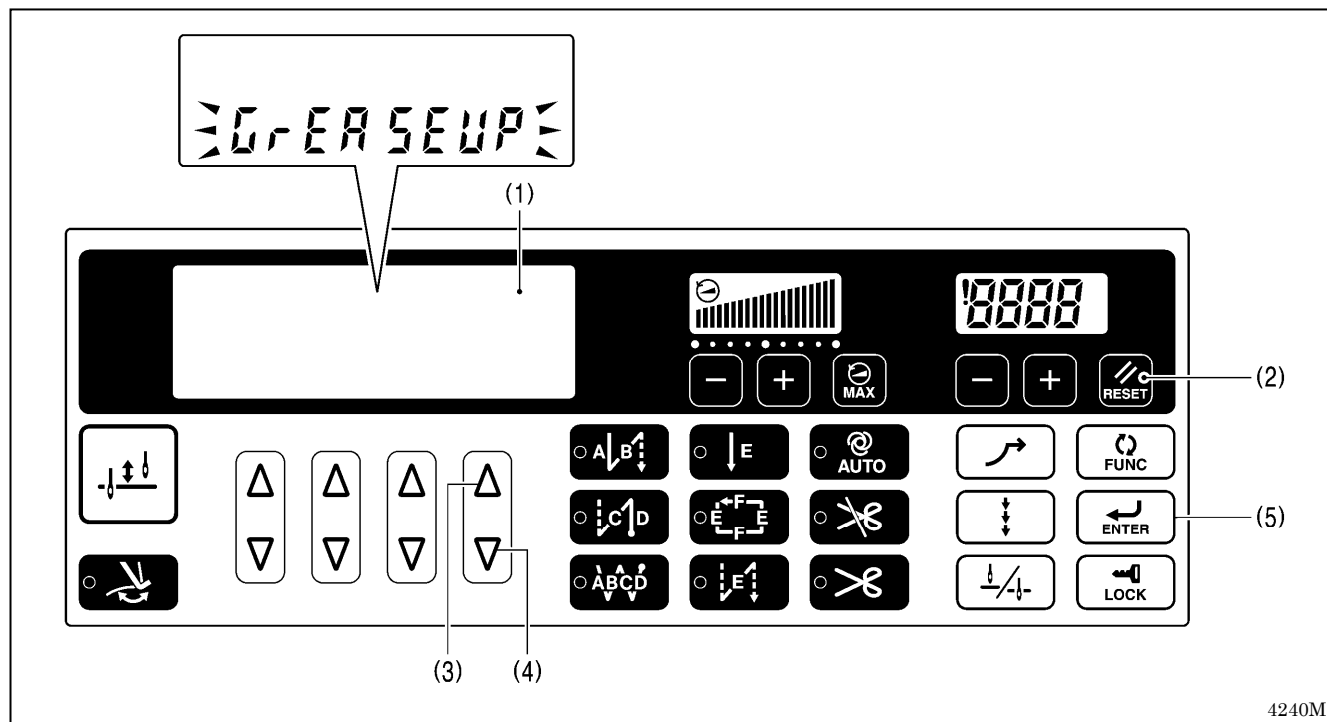


2. Checking

1. Replace the needle if it is bent or if the tip is broken.
2. Check that the upper threads have been threaded correctly.
3. Carry out a test sewing.

6-2. Applying grease (When “GrEASEUP” appears...)

If “GrEASEUP” flashes on the main display (1) and a buzzer sounds when the power switch is turned on, it means that grease needs to be applied. (The sewing machine will not operate at this time, even if the treadle is depressed.) Apply grease as required, while referring to the following for details.



<To continue sewing without applying grease>

1. Press the RESET key (2).
2. The main display (1) will change to stitch number display mode, and sewing will be possible when the treadle is depressed.

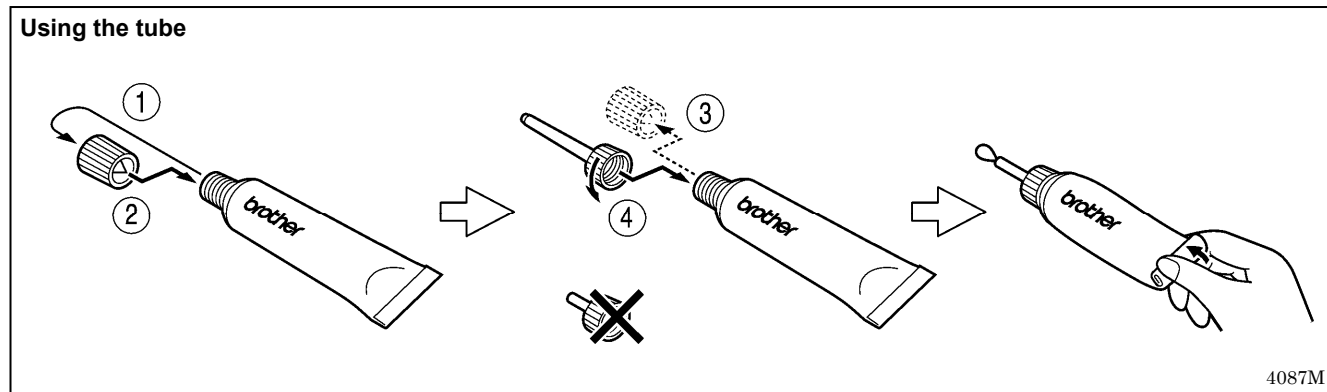
NOTE

- If you do not apply grease when the “GrEASEUP” notification flashes, the notification will continue to flash each time the power is turned on until you reset the notification by carrying out the procedure on the following page.
- If you continue to use the sewing machine after the “GrEASEUP” notification appears without applying grease (or without carrying out the reset procedure), “E100” will appear after a certain period of time and the sewing machine will be forcibly prevented from operating for safety reasons. If this happens, apply grease and carry out the reset procedure.

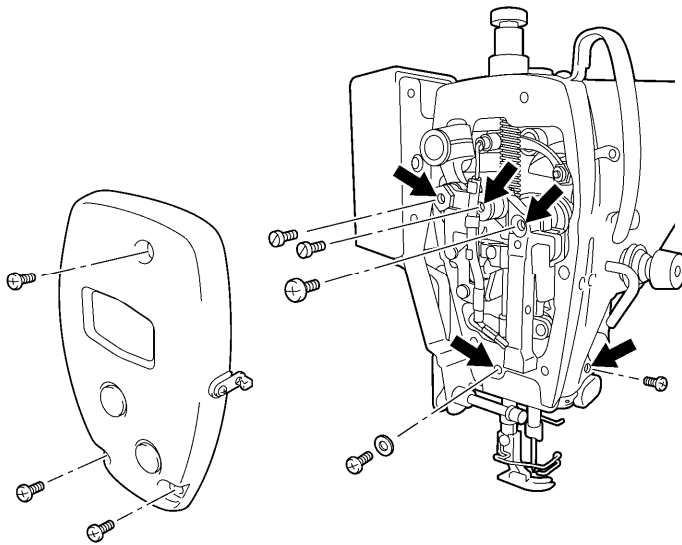
* If you continue to use the sewing machine after carrying out the reset procedure but without applying grease, problems with the sewing machine may result.

<Applying grease>

Use Brother-specified “Grease unit (SA8837-001)”.

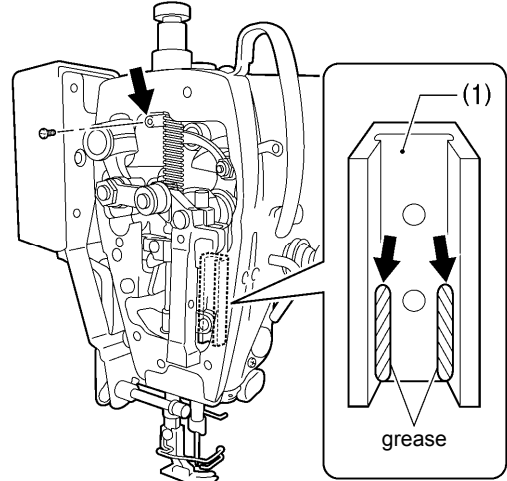


<-403,405,433 specifications>



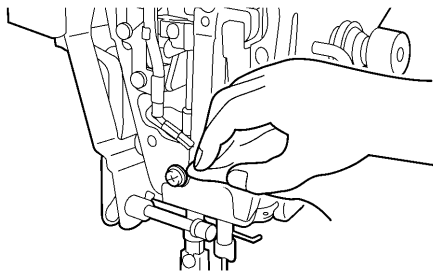
0560D

<-433 specifications>



1. Turn the pulley to raise the needle bar to a position where the slide block guide (1) can be seen.
2. Apply grease to the slide block guide (1) in the places shown in the illustration.

0561D



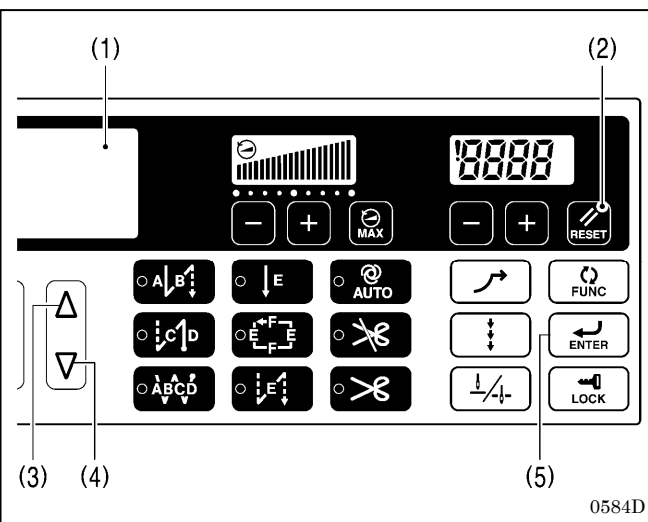
0562D

1. Turn the power switch to "OFF".
2. Remove the screws.
3. Apply grease to each of the holes until the grease overflows slightly.
4. The grease will be pushed in when the screws are tightened.
5. Turn the machine pulley by hand to move the needle bar up and down several times in order to disperse the grease.
6. Use a cloth to wipe away any excess grease from around the screws.
7. Carry out the reset procedure given below.

<Resetting the grease consumption amount>

After the grease has been applied, carry out the following procedure to reset the grease consumption amount.

1. While pressing the Δ key (3) and the ∇ key (4) at the right end simultaneously, press the power ON switch.
2. "GuCt xxx" will appear in the main display (1). ("xxx" represents the amount of grease consumed. For example, "100" means that 100% of the grease has been consumed.)
3. Press the RESET key (2) for two seconds or more.
4. The main display (1) will change to "GuCt 0".
5. Press the ENTER key (5). The main display (1) will change to stitch number display mode and treadle operation will be possible. (This completes the reset procedure.)



0584D

2138M 2139M

7. REPLACING THE FIXED KNIFE AND MOVABLE KNIFE

! CAUTION



Replacement of parts should only be carried out by a qualified technician.



Turn off the power switch and disconnect the power cord from the wall outlet before replacing any parts, otherwise the machine may operate if the treadle is pressed by mistake, which could result in injury.



Secure the table so that it will not move when tilting back the machine head. If the table moves, it may crush your feet or cause other injuries.

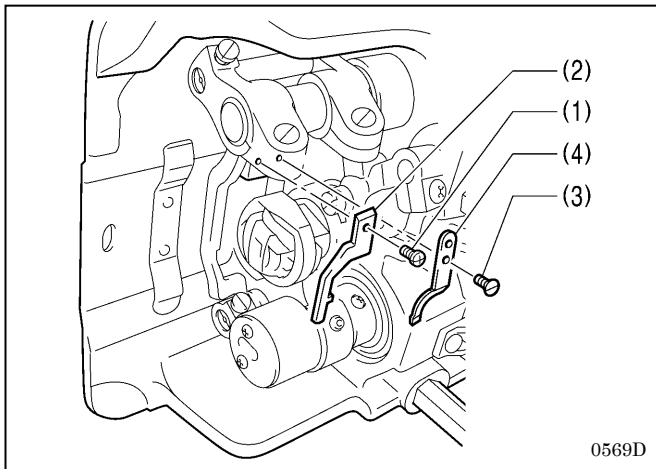


Use both hands to hold the machine head when tilting it back or returning it to its original position. If only one hand is used, the weight of the machine head may cause your hand to slip, and your hand may get caught.



When replacing parts and installing optional accessories, be sure to use only genuine Brother parts.

Brother will not be held responsible for any accidents or problems resulting from the use of non-genuine parts.



<Fixed knife>

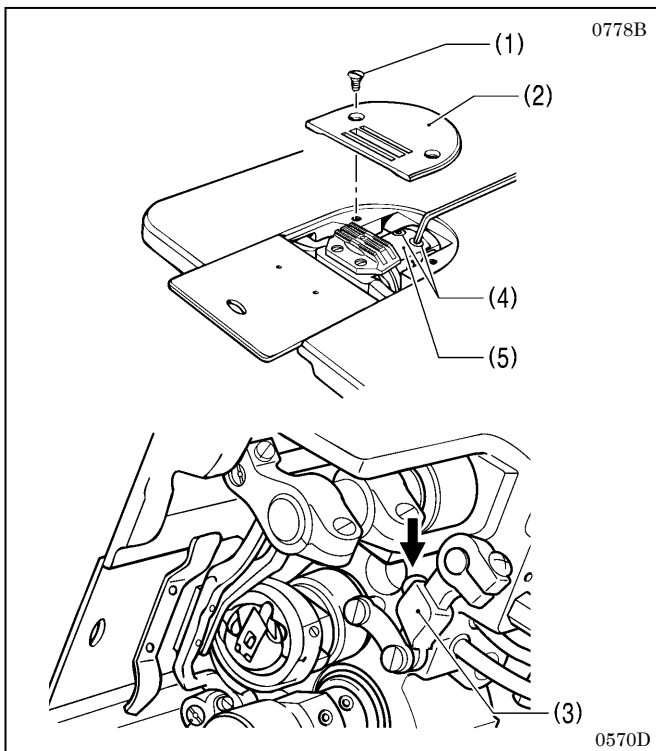
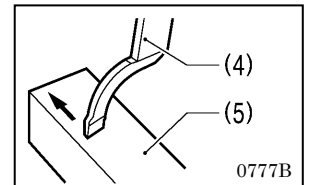
1. Tilt back the machine head.
2. Remove the screw (1), and then remove the hook stopper (2).
3. Remove the screw (3), and then remove the fixed knife (4).

NOTE:

Carry out the above steps in reverse to install the fixed knife (4).

Sharpening the fixed knife

If the cutting performance deteriorates, sharpen the fixed knife (4) on a whetstone (5) as shown in the illustration.



<Movable knife>

1. Remove the needle.
2. Lift up the presser foot using the lifting lever.
3. Remove the two screws (1), and then remove the needle plate (2).
4. Turn the machine pulley to raise the needle bar to its highest position.
5. Tilt back the machine head.
6. Push the thread trimmer lever (3) by hand in the direction of the arrow until the two screws (4) can be seen.
7. Remove the two screws (4), and then remove the movable knife (5).

NOTE:

Carry out the above steps in reverse to install the movable knife (5).

8. STANDARD ADJUSTMENTS



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.



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.



Secure the table so that it will not move when tilting back the machine head. If the table moves, it may crush your feet or cause other injuries.



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



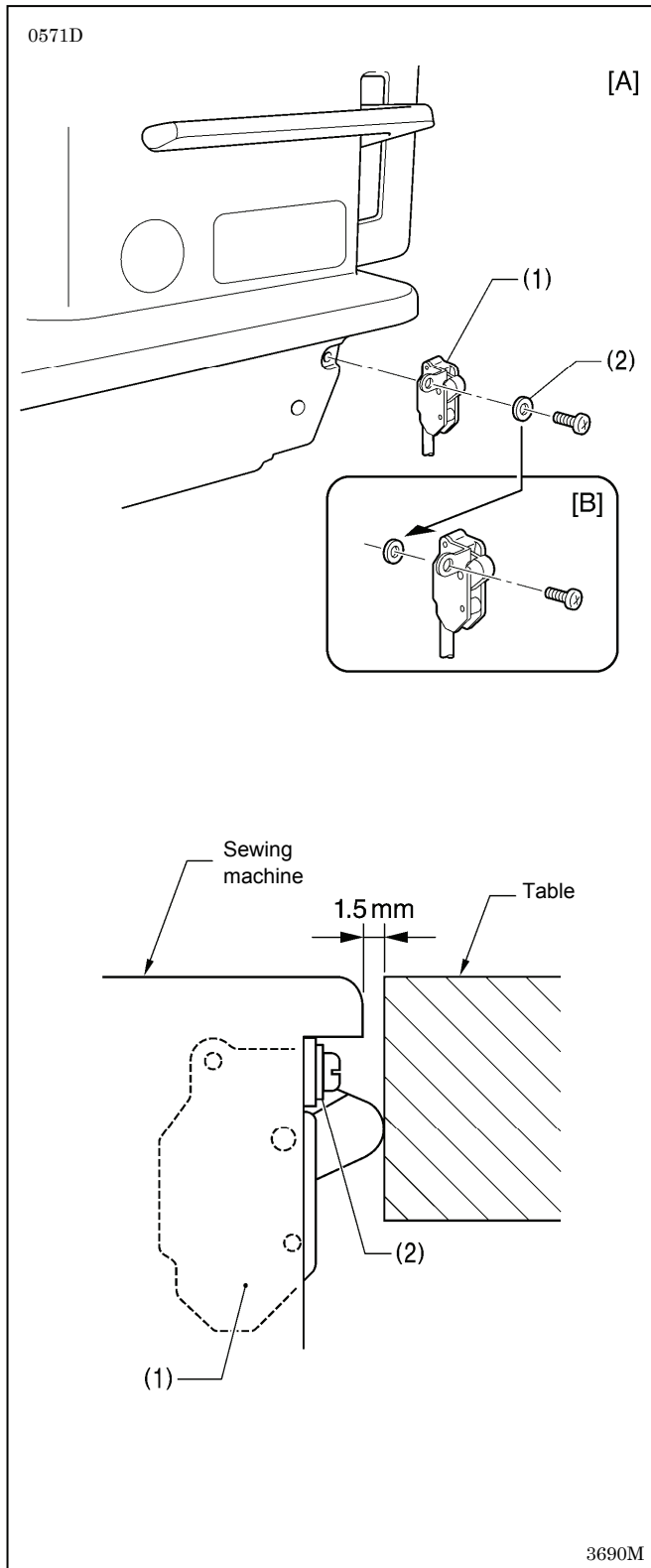
Turn off the power switch and disconnect the power cord from the wall outlet at the following times, otherwise the machine may operate if the treadle is depressed by mistake, which could result in injury.

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



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

8-1. Adjusting the safety switch position



The safety switch (1) is normally installed as shown in figure [A].

However, if the processing method used for the table leaves too much space between the machine head and the table hole, it may adversely affect the operation of the safety switch (1).

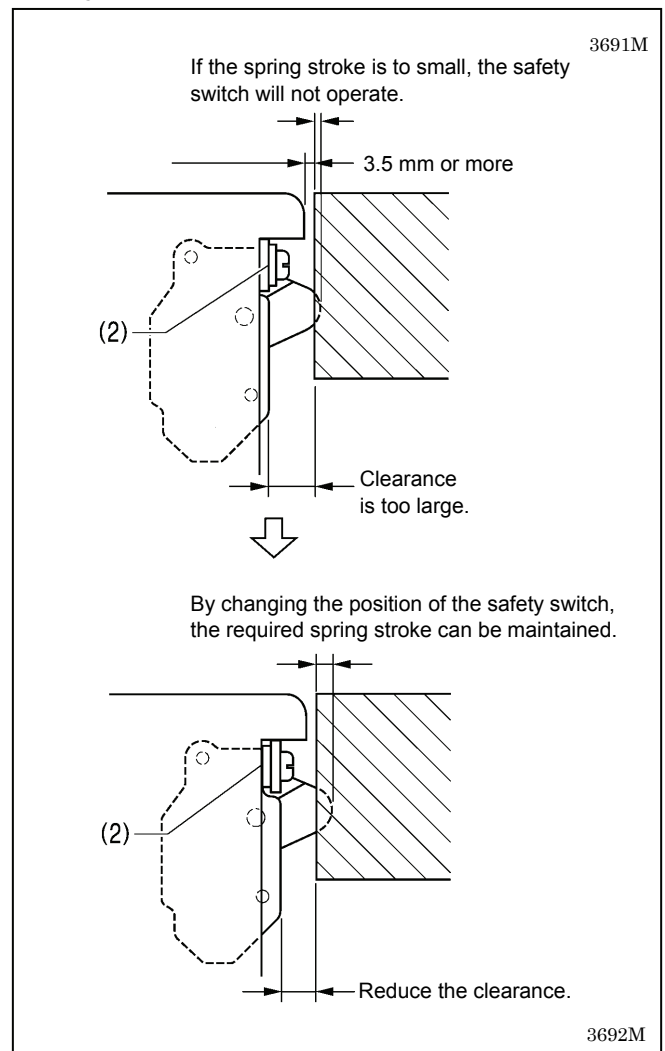
<Adjustment method>

The standard amount of clearance between the machine head and the table hole is 1.5 mm.

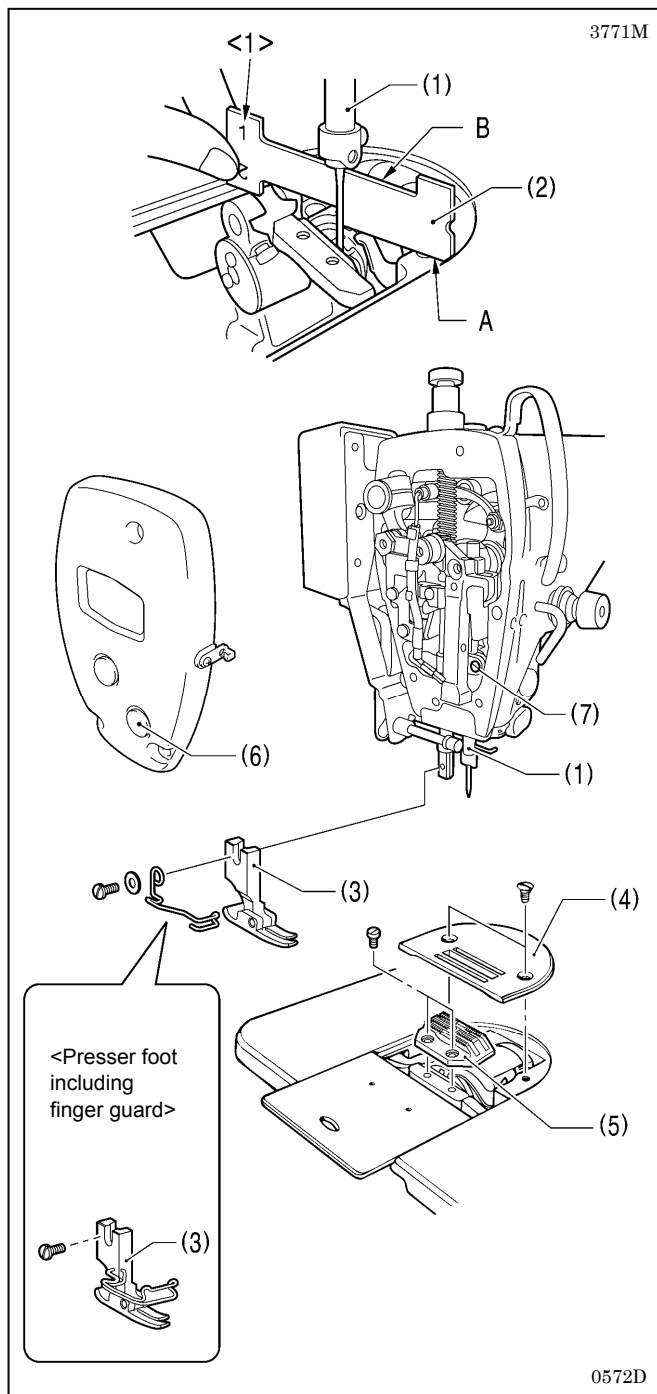
If the clearance is 3.5 mm or more, install the safety switch (1) so that the washer (2) is on the machine head side as shown in Figure [B].

* If the position cannot be satisfactorily adjusted in this way, add more washers of the same thickness.

<Safety switch operation>



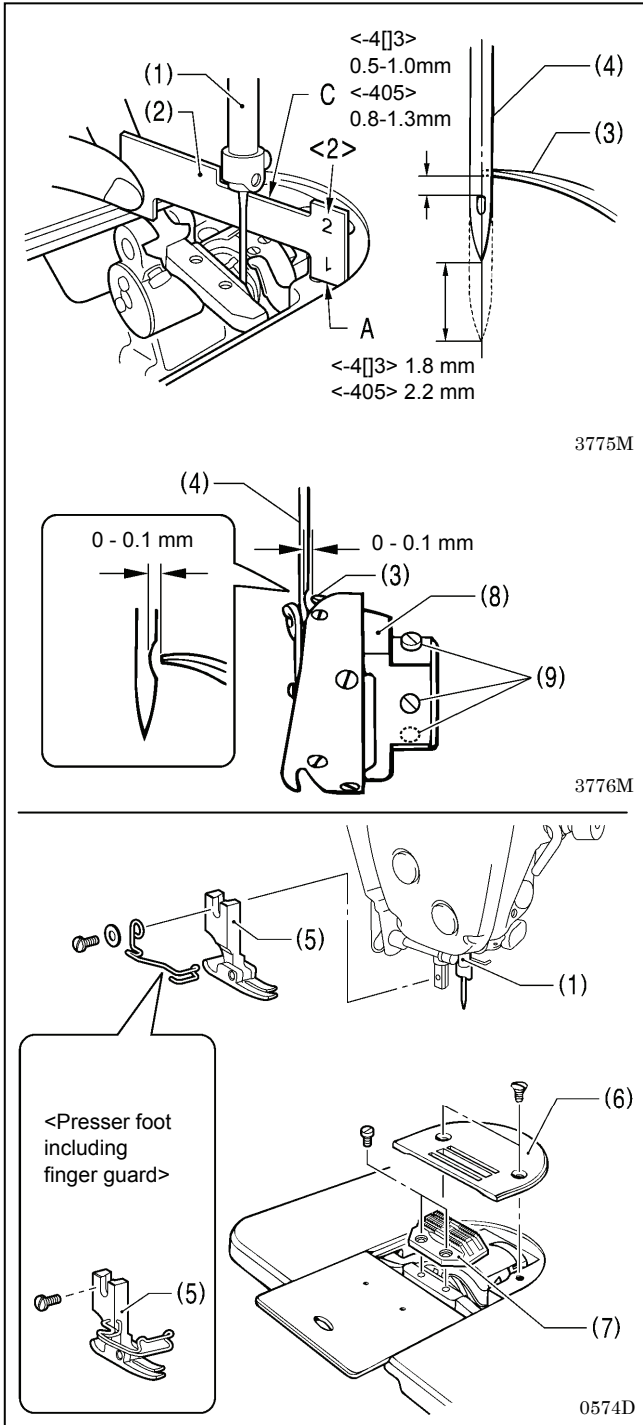
8-2. Adjusting the needle bar height



Adjust so that the distance from needle plate mounting surface A to the bottom edge of the needle bar (1) is the same as the height of surface B on the <1> side of the accessory timing gauge (2) when the needle bar (1) is at its lowest position as shown in the illustration.

1. Remove the presser foot (3), the needle plate (4) and the feed dog (5).
2. Turn the machine pulley to set the needle bar (1) to its lowest position.
3. Remove the rubber cap (6) from the face plate.
4. Loosen the screw (7).
5. Move the needle bar (1) up or down to adjust so that the distance from needle plate mounting surface A to the bottom edge of the needle bar (1) is the same as the height of surface B on the <1> side of the accessory timing gauge (2).
6. Securely tighten the screw (7).
7. Install the rubber cap (6).
8. Install the feed dog (5), the needle plate (4) and the presser foot (3).

8-3. Adjusting the needle and rotary hook timing



When the machine pulley is turned forward to raise the needle bar (1) 1.8 mm (2.2 mm for -405 specifications) from its lowest position, the rotary hook tip (3) should be aligned with the center of the needle (4) as shown in the illustration when the distance from needle plate mounting surface A to the bottom edge of the needle bar (1) is the same as the height of surface C on the <2> side of the accessory timing gauge (2).

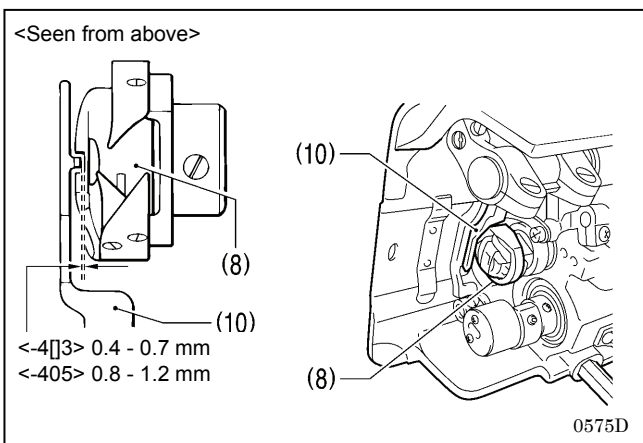
(At this time, the gap between the upper edge of the needle hole and the rotary hook tip (3) will be 0.5 - 1.0 mm (0.8 - 1.3 mm for -405 specifications).)

1. Remove the presser foot (5), needle plate (6) and feed dog (7).
2. Set the stitch length dial as follows.

<-4[]3>... Stitch length dial 0 setting.

<-405>... Stitch length dial 3 setting.

3. Loosen two of the three set screws (9) which are securing the rotary hook (8).
4. Turn the machine pulley to raise the needle bar (1) from its lowest position until the distance from needle plate mounting surface A to the bottom edge of the needle bar (1) is the same as the height of surface C on the <2> side of the accessory timing gauge (2).
5. Loosen the remaining set screw (9) and align the rotary hook tip (3) with the center of the needle (4). There should be a gap of 0 - 0.1 mm between the rotary hook tip (3) and the needle (4) at this time.
6. Securely tighten the three set screws (9).
7. Install the feed dog (7), needle plate (6) and presser foot (5).

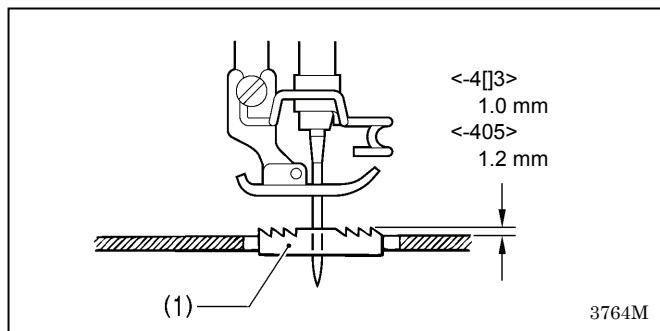


<Clearance between rotary hook and hook stopper>

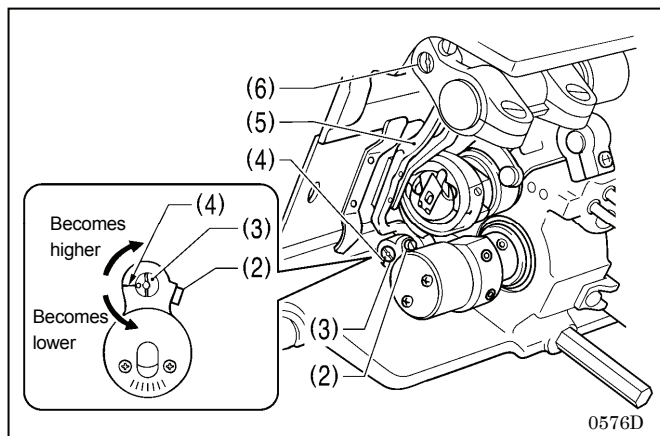
Check that the thread being used passes smoothly through the clearance between the rotary hook (8) and the hook stopper (10).

The clearance is 0.4 to 0.7 mm for -4[]3 specifications, and 0.8 to 1.2 mm for -405 specifications.

8-4. Adjusting of the feed dog height

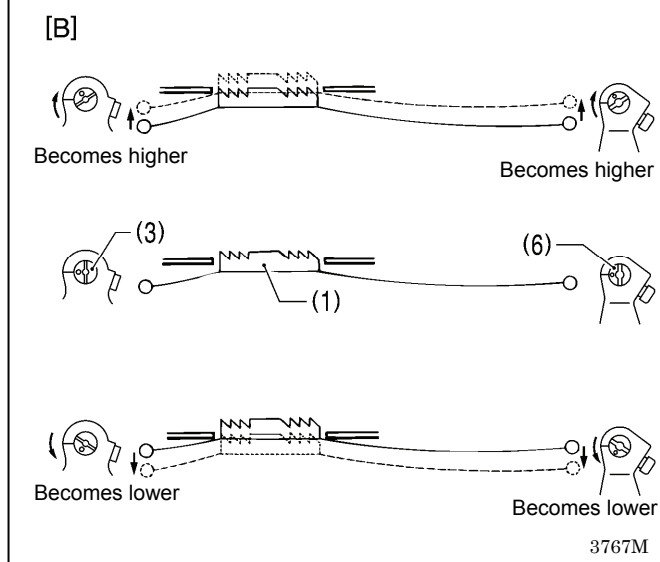
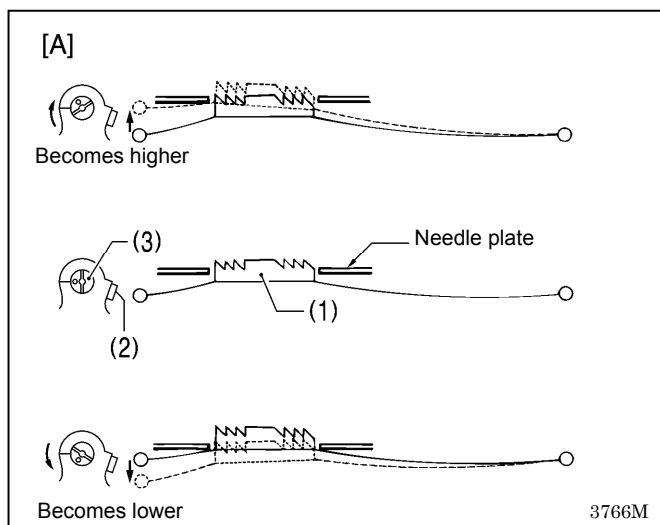


The standard height of the feed dog (1) when it is at its maximum height above the top of the needle plate is 1.0 mm for -4[3] specifications, and 1.2 mm for -405 specifications.

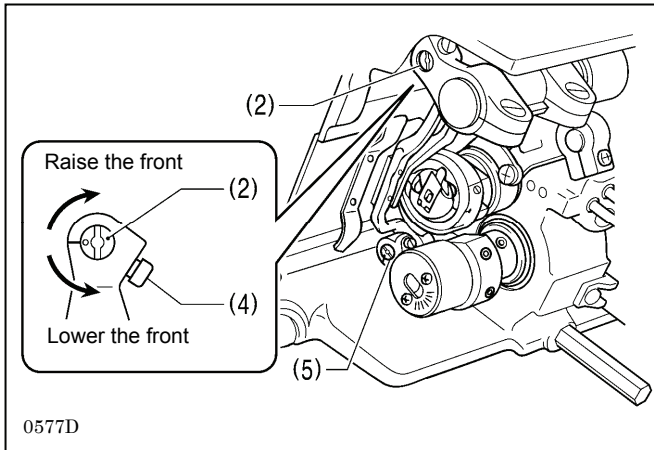


1. Turn the pulley until the feed dog (1) rises to the highest position.
2. Tilt back the machine head.
3. Loosen the screw (2).
4. Turn the feed lifting rock bracket stud (3) within a range of 90° from the reference line (4) to adjust the vertical height of the feed bar (5). (Fig. [A])
5. Tighten the screw (2).

* If you are worried about the angle of the feed dog (1), turn the shaft (6) while carrying out the above adjustment. (Fig. [B])
(Refer to "8-5. Adjusting the feed dog angle" on the next page for details of this operation.)



8-5. Adjusting the feed dog angle



The standard angle is for the feed dog (1) to be parallel to the needle plate when the machine pulley is turned forward to raise the feed dog (1) from its lowest position until it is flush with the top of the needle plate.

1. Turn the machine pulley forward to raise the feed dog (1) from its lowest position until it is flush with the top of the needle plate, and stop turning the pulley at that point.
2. Tilt back the machine head.
3. Loosen the two set screws (4).
4. Turn the shaft (2) in the direction of the arrow within a range of 90° with respect to the standard position. (Fig. [C])

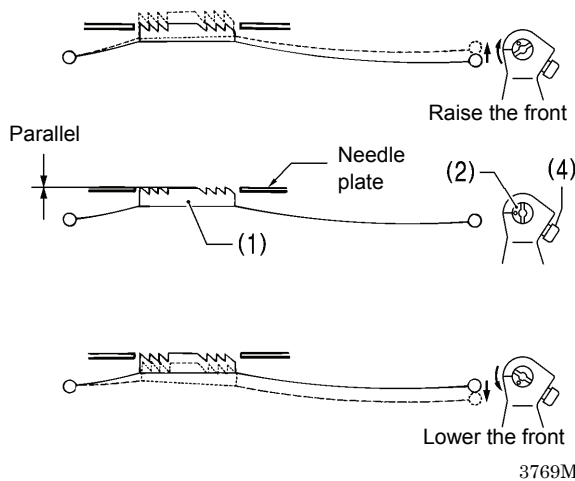
- In order to prevent puckering, lower the front of the feed dog (1).
- In order to prevent the material from slipping, raise the front of the feed dog (1).

5. Securely tighten the set screws (4).

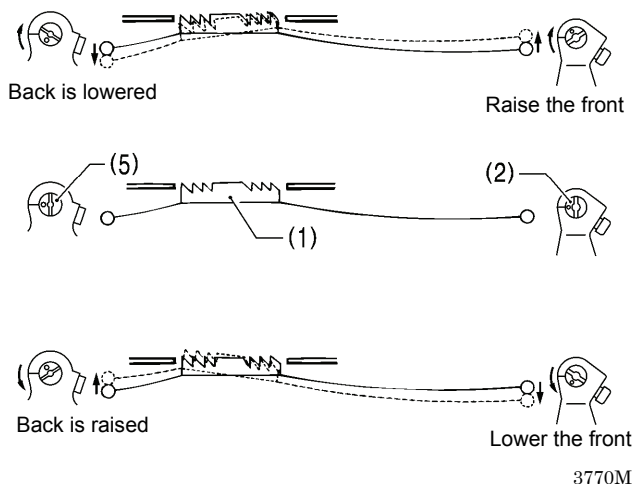
* If you would like to tilt the feed dog (1) further, turn the feed lifting rock bracket stud (5) while carrying out the above adjustment. (Fig. [D]) (Refer to "8-4. Adjusting the feed dog height" on the previous page for details of this operation.)

* The height of the feed dog (1) will change after the angle has been adjusted, so it will be necessary to re-adjust the height of the feed dog (1).

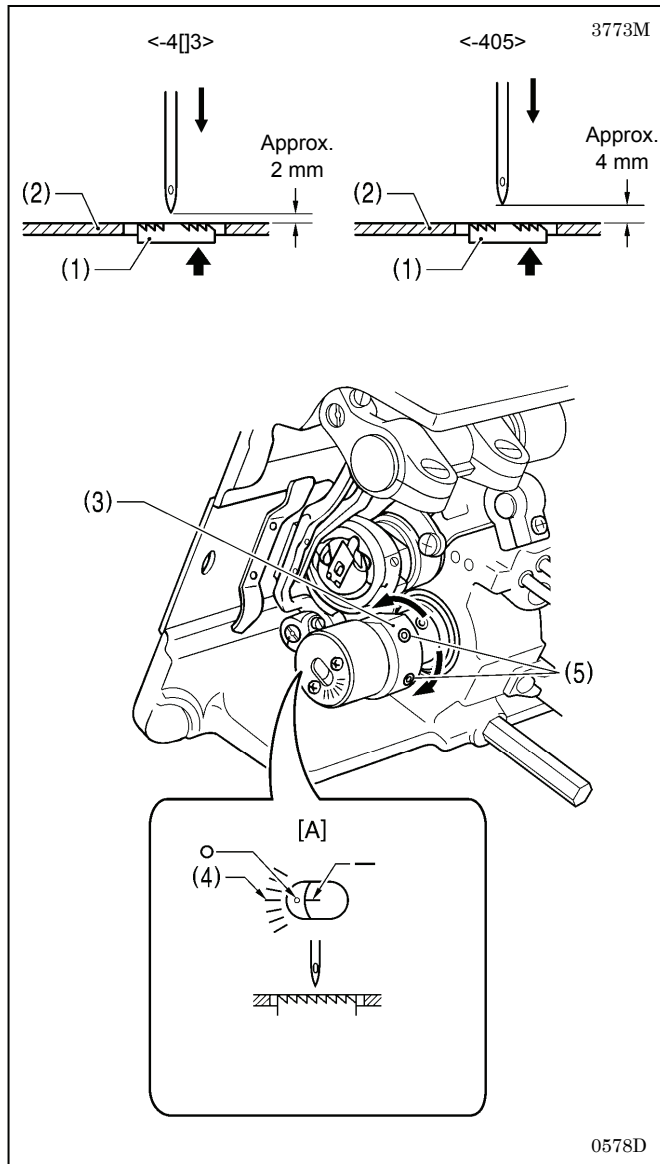
[C]



[D]



8-6. Adjusting the needle and feed mechanism timing



The standard timing is for the tip of the needle to be in the position given below when the machine pulley is turned forward to raise the feed dog (1) from its lowest position until it is flush with the top of the needle plate (2).

(At this time, the “-” mark on the lower shaft will be aligned with the center of the scale (4) (“O” mark) on the vertical cam (3).)

<-4[]3>... There is a gap of approximately 2 mm between the tip of the needle and the top of the needle plate (2).

<-405>... There is a gap of approximately 4 mm between the tip of the needle and the top of the needle plate (2).

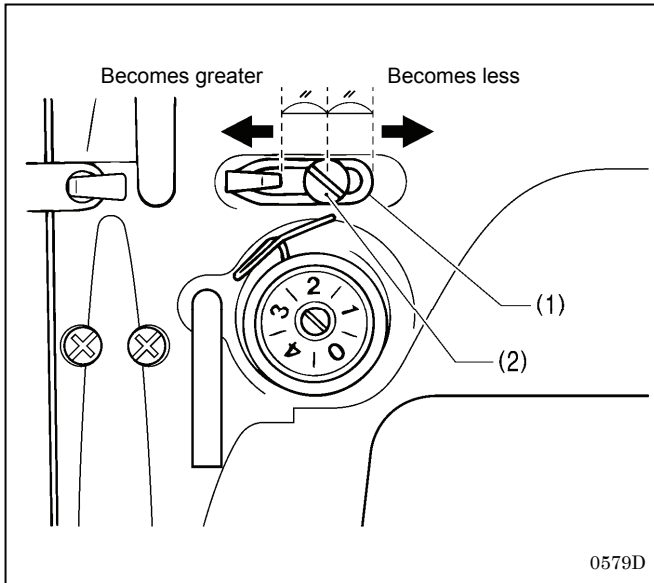
1. Set the stitch length dial to the maximum setting.
2. Tilt back the machine head.
3. Loosen the two set screws (5), and then turn the vertical cam (3) slightly to adjust the timing.

NOTE: Use the standard needle and feed mechanism timing.

If the timing is changed, broken needles may occur.

4. After adjustment is completed, securely tighten the two screws (5).

8-7. Adjusting arm thread guide R

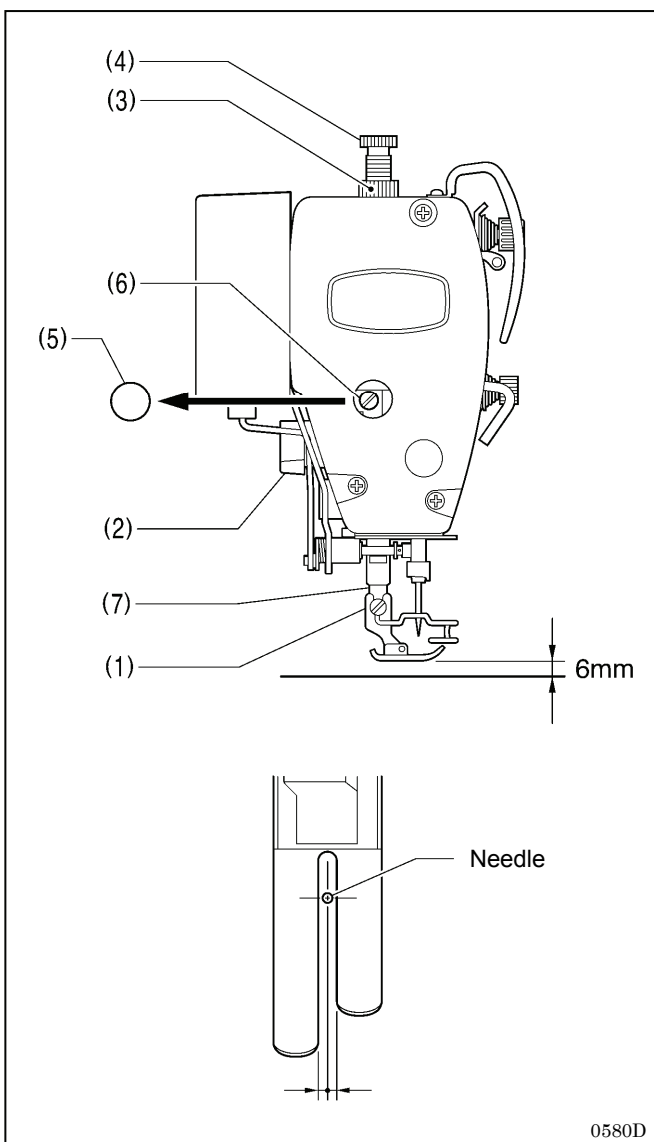


The standard position of arm thread guide R (1) is the position where the screw (2) is in the center of the adjustable range for arm thread guide R (1).

* To adjust the position, loosen the screw (2) and then move arm thread guide R (1).

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

8-8. Adjusting the presser foot height



The standard height of the presser foot (1) is 6 mm when the presser foot (1) is raised by means of the lifting lever (2).

1. Loosen the nut (3) of the adjustment screw (4), and then turn the adjustment screw (4) so that there is no pressure applied to the presser foot.
2. Raise the lifting lever (2). The presser foot (1) will also rise.
3. Remove the oil cap (5).
4. Loosen the bolt (6) and then move the presser bar (7) up or down until the presser foot (1) is at the standard height of 6 mm.
5. Tighten the bolt (6).
6. Replace the oil cap (5).
7. Adjust the presser foot pressure using the adjustment screw (4), and then tighten the nut (3).

NOTE:

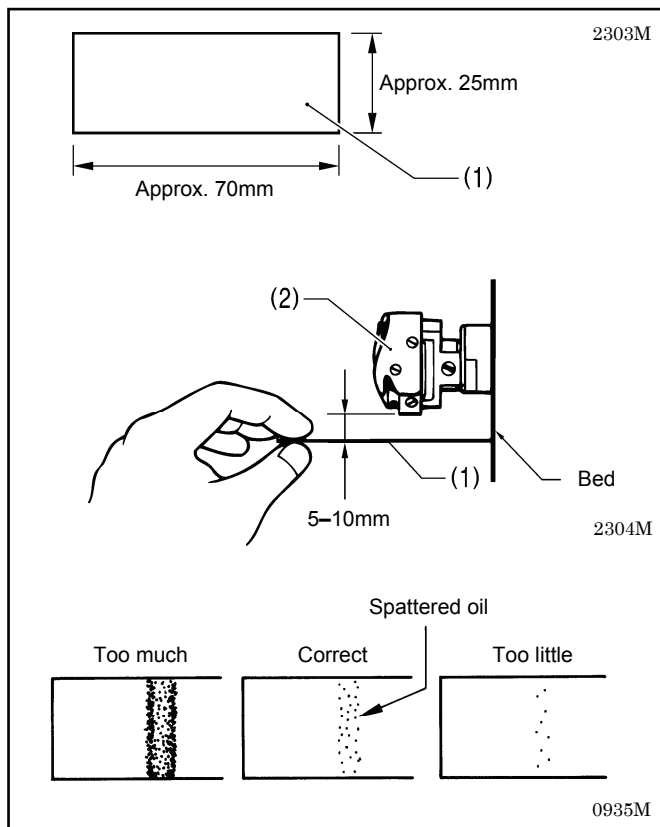
After adjusting, check that the needle moves down into the center of the groove in the presser foot.

8-9. Adjusting the rotary hook lubrication amount

CAUTION

Be careful not to touch your fingers or the lubrication amount check sheet against moving parts such as the rotary hook or the feed mechanism when checking the amount of oil supplied to the rotary hook, otherwise injury may result.

Use the following procedure to check the amount of oil being supplied to the rotary hook when replacing the rotary hook or when changing the sewing speed.

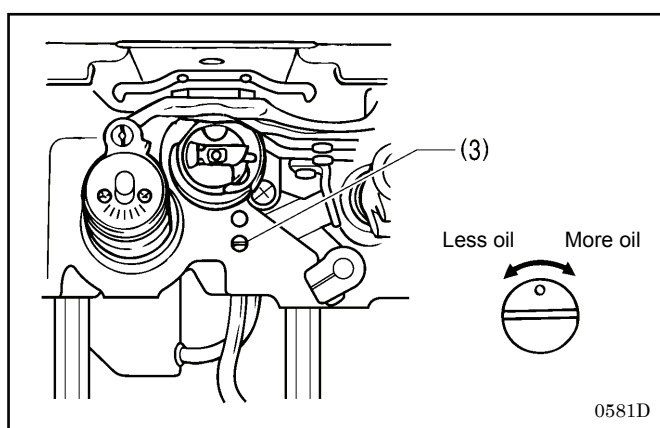
**<Checking the lubrication amount>**

1. Remove the thread from all points from the thread take-up to the needle.
2. Use the lifting lever to lift the presser foot.
3. Run the machine at the normal sewing speed for approximately 1 minute without sewing any material (following the same start/stop pattern as when actually sewing).
4. Place the lubrication amount check sheet (1) underneath the rotary hook (2) and hold it there. Then run the sewing machine at the normal sewing speed for 8 seconds. (Any type of paper can be used as the lubrication amount check sheet (1).)
5. Check the amount of oil which has spattered onto the sheet.

If adjustment is necessary, carry out the following operations in <Adjusting the lubrication amount>.

NOTE:

If the lubrication amount does not match the correct amount shown in the illustration at left (if the amount of spattered oil is too much or none at all), turn the adjusting screw (3) clockwise to fully tighten it, turn it back counterclockwise by 2 1/2 turns, and then carry out the following adjustment.

**<Adjusting the lubrication amount>**

1. Tilt back the machine head.
2. Turn the adjusting screw (3) to adjust the lubrication amount.
 - If the rotary hook adjusting screw (3) is turned clockwise, the lubrication amount becomes greater.
 - If the rotary hook adjusting screw (3) is turned counterclockwise, the lubrication amount becomes smaller.
3. Check the lubrication amount again according to the procedure given in <Checking the lubrication amount> above.
 - * Turn the adjusting screw (3) and check the lubrication amount repeatedly until the lubrication amount is correct.
4. Check the lubrication amount again after the sewing machine has been used for approximately two hours.

9. 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.

DANGER



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

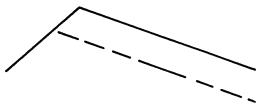
CAUTION

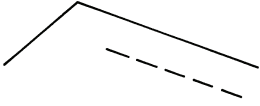
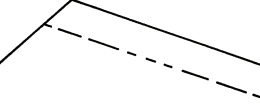


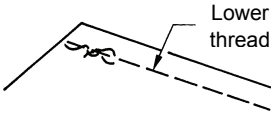
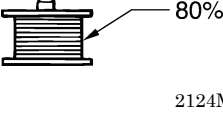
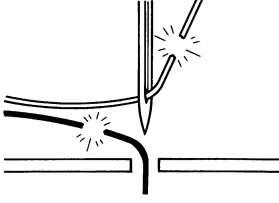
Turn off the power switch and disconnect the power cord before carrying out troubleshooting. The machine may operate if the treadle is depressed by mistake, which could result in injury.

9-1. Sewing

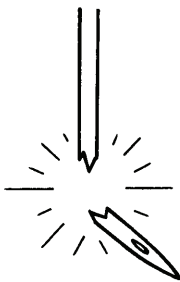
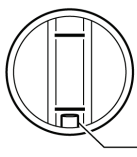
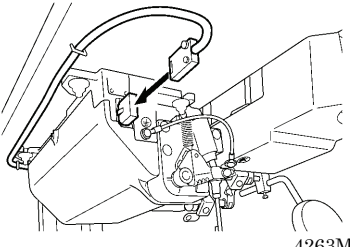
Items with a “*” in the “Page” column should only be checked by a qualified technician.

Problem		Possible cause	Page
1	Upper thread is not tight.  0573M	• Is the upper thread tension too weak, or is the lower thread tension too strong? Adjust the upper thread tension or lower thread tension.	
2	Lower thread is not tight.  0574M	• Is the lower thread tension too weak, or is the upper thread tension too strong? Adjust the lower thread tension or upper thread tension.	
3	Loops appear in seam.  0977M	• Is the thread path not smooth enough? Use a file with a fine grain or sandpaper to polish smooth the thread path. • Is the bobbin not turning smoothly? Pull out the lower thread to check that there is no slackness in the thread tension, or replace the bobbin or bobbin case.	
4	Skipped stitches occur while sewing  0470M	• Is the needle tip bent? Is the needle tip blunt? If the needle tip is bent or broken, replace the needle. • Is the needle properly installed? If it is incorrect, install the needle correctly. • Is the machine properly threaded? If it is incorrect, thread the thread correctly. • Is the presser foot pressure too weak? Adjust the presser foot pressure. • Is the needle too thin? Replace the needle with a needle that is one rank thicker. • Is the presser foot too high? Adjust the height of the presser foot. • Is the thread take-up spring too weak? Adjust the tension of the thread take-up spring. • Is the needle and rotary hook timing correct? Adjust the height of the needle bar. Adjust the clearance between the needle and the tip of the rotary hook.	29 40* * 35* 36*

	Problem	Possible cause	Page
5	Skipped stitches at sewing start Thread unravelling at sewing start  0749M	- Is the thread take-up spring tension too strong? Reduce the tension of the thread take-up spring. - Is the thread take-up spring operating range too large? Lower the position of the thread take-up spring. - Are the trailing lengths of the upper threads too short after thread trimming? Adjust the pretension. - Are the threads not being trimmed cleanly? Sharpen the fixed knives, or replace the fixed and movable knives if necessary. - Is the needle too wide? Try using a needle with a count that is one lower than the current needle. - Is the length of thread trailing out from the bobbin case after thread trimming too short. If the bobbin is spinning loosely, replace the anti-spin spring in the bobbin case. - Is the sewing speed too fast at the sewing start? Use the slow start feature. - Is the needle up stop position too high? Adjust the needle up stop position.	* * 32* 21* 22*
6	Uneven seam  0473M	- Is the presser foot pressure too weak? Adjust the presser foot pressure. - Is the feed dog too low? Adjust the feed dog height. - Is the bobbin scratched? If the bobbin is damaged, smooth it with an oiled grindstone or replace it.	*
7	Large degree of puckering (excess tension)  0978M	- Is the upper thread tension too strong? Make the upper thread tension as weak as possible. - Is the lower thread tension too strong? Make the lower thread tension as weak as possible. - Is the needle tip blunt? Replace the needle if it is blunt. - Is the needle too thick? Replace with as thin a needle as possible. - Are the thread take-up spring tensions too strong? Make the thread take-up spring tension as weak as possible. - Is the thread take-up spring operating range too large? Lower the position of the thread take-up spring to as low a position as possible. - Is the presser foot pressure too strong? Adjust the presser foot pressure. - Is the sewing speed too fast? Use the sewing speed control keys to gradually reduce the sewing speed. - Is the angle of the feed dog correct? Tilt the front of the feed dog down slightly.	* * 14 38*

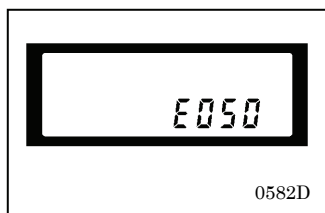
	Problem	Possible cause	Page
8	Lower thread is tangled at the sewing start. Spinning of bobbin during thread trimming  0751M	- Is the bobbin spinning direction correct when the lower thread is being pulled? Set the bobbin so that it turns in the opposite direction to the rotary hook. - Is there too much thread wound onto the bobbin? The bobbin winding amount should not be more than 80 %. - Is the anti-spin spring attached? Attach the anti-spin spring. - Is the bobbin turning smoothly? If the bobbin is not turning smoothly, replace the bobbin. - Is a bobbin other than the light-alloy bobbins specified by Brother being used? Use only bobbins which are specified by Brother.  2124M	
9	Upper and lower threads are breaking.  0471M	- Is the needle bent or is the needle tip broken? Replace the needle if it is bent or broken. - Is the needle properly installed? If it is incorrect, install the needle correctly. - Is the machine properly threaded? If it is incorrect, thread the thread correctly. - Is the rotary hook sufficiently lubricated? If the oil gauge is down to the lower reference line in the oil gauge window, add more oil. - Is the upper or lower thread tension too weak or too strong? Adjust the upper thread or lower thread tension. - Is the upper thread may be loose because the thread take-up spring operating range is too small? Adjust the position of the thread take-up spring. - Is the rotary hook, feed dog or other part damaged? If they are damaged, smooth them with an oiled grindstone or replace the damaged parts. - Is the thread path damaged? If the thread path is damaged, smooth it with sandpaper or replace the damaged part.	29 7 * * *
10	Incorrect thread trimming (Upper and lower threads are both not being trimmed)	Is the fixed knife or movable knife damaged or worn? Replace the fixed knife or the movable knife.	32*
11	Incorrect thread trimming (Upper thread or lower thread is not being trimmed)	- Is the needle properly installed? If it is incorrect, install the needle correctly. - Is the fixed knife or movable knife blunt? Replace the fixed knife or the movable knife.	32*

9. TROUBLESHOOTING

	Problem	Possible cause	Page
12	Broken needles  0469M	- Is the material being pushed or pulled with excessive force during sewing? - Is the needle properly installed? If it is incorrect, install the needle correctly. - Is the needle bent, is the needle tip broken, or is the needle hole blocked? Replace the needle. - Is the needle and rotary hook timing correct? Adjust the height of the needle bar. Adjust the clearance between the needle and the tip of the rotary hook. - Is the needle and feed mechanism timing correct? Adjust to the standard timing. Caution - It is extremely dangerous to leave any pieces of broken needle sticking in the material. If the needle breaks, search for all pieces until the whole of the needle is found again. - Furthermore, we recommend that through steps be taken to account for such needles to comply with product liability regulations.	35* 36* 39*
13	Oil gauge (1) is not visible in oil gauge window.  (1) 4262M	Is the oil tank empty? Fill the oil tank with oil.	7
14	Machine does not operate when power is turned on and treadle is pressed.	Is the power supply connector disconnected from the control box? Insert the connector securely.  4263M	11,12
15	Machine does not operate at high speed.	Is the sewing speed setting or backtack speed setting incorrect? Use the sewing speed control keys to set the high speed.	14
16	Machine stops during sewing.	- Is the fixed stitch key turned on? Press the fixed stitch key so that the indicator turns off. - Is the power supply voltage too low? Check the power supply. (If the power cord is too long or too many appliances are being run from a single outlet, this may cause voltage drops which will in turn cause the reset function to activate and stop the machine, even if the power supply itself is normal.)	17 *

4263M

9-2. Error code displays



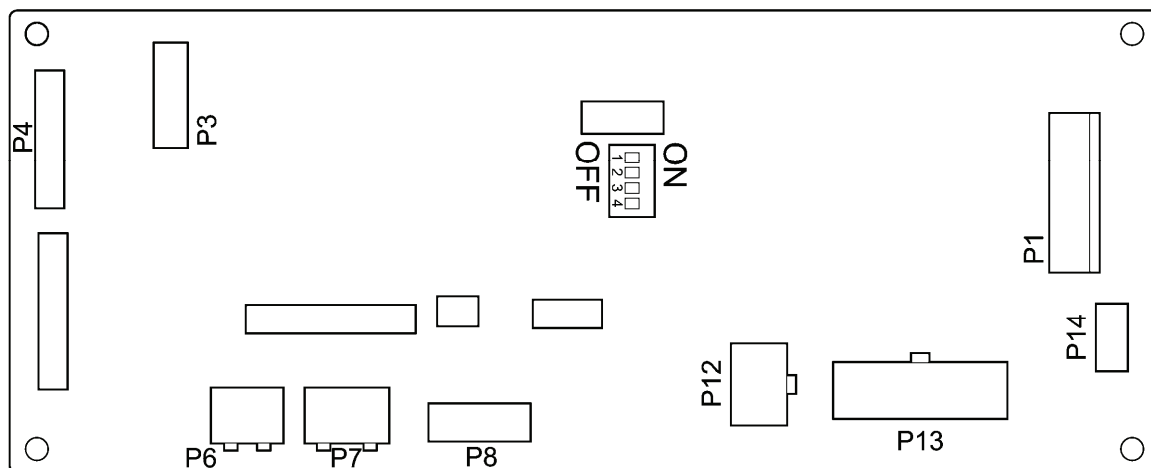
If an error code appears on the operation panel display

1. Make a note of the error code and then turn off the power.
2. After the operation panel display has turned off, eliminate the cause of the error and then turn the power back on.

- Items with a “*” in the “Page” column should only be checked by a qualified technician.
- For items with “**” appearing in the “Page” column, ask the place of purchase for advice.

< Connector and DIP switch layout diagram >

Main PCB



4266M

Error code	Possible cause	Page
E050	• The machine head was detected as being tilted back when the treadle was depressed. Press the power OFF switch and then return the machine head to the upright position. (If tilting back the machine head to carry out any tasks, press the power OFF switch first.)	
E051	• The machine head was detected as being tilted back during sewing. Turn the power off and then back on again.	
E055	• Was the power ON switch pressed while the machine head was still tilted back? Press the power OFF switch and then return the machine head to the upright position. • Is the 14-pin machine connector inside the control box disconnected? Press the power OFF switch, and then check that the 14-pin machine connector is connected to connector P13 on the main PCB.	9*
E065	• Was the power ON switch pressed while an invalid key was being pressed on the operation panel? Press the power OFF switch and check that no operation panel keys are being pressed. • There is a malfunction of the operation panel. Replace the operation panel.	**
E066	• Was the actuator switch being pressed when the power ON switch was pressed? Press the power OFF switch and check that the actuator switch is not being pressed • There is a problem with the actuator switch. Replace the actuator switch.	*

Error code	Possible cause	Page
E090 Treadle connector is not connected.	Is the 4-pin treadle connector inside the control box disconnected? Press the power OFF switch, and then check that the 4-pin treadle connector is connected to connector P14 on the main PCB. If there is a broken wire in the cord of the treadle connector, replace the treadle unit.	47* **
E091	- The settings in "Setting method for standard depression stroke" may be incorrect. Redo the settings in "Setting method for standard depression stroke". - Problem with treadle unit. Replace the treadle unit.	* **
E095	- Was the power ON switch pressed while the treadle was still depressed? Return the treadle to the neutral position. When the treadle neutral position is detected, the error will be cleared and normal operation will then be possible. - Is the power supply voltage too low? Check the power supply voltage.	*
E111	The sewing machine could not stop correctly at the needle up stop position after thread trimming. Remove any thread scraps that may be blocking the motor. Press the power OFF switch and then turn the machine pulley by hand and check that it turns easily. Check that there are no problems with the thread trimming mechanism.	* * **
E112	- The needle bar stops before the needle stop position (needle up or needle down). Turn the pulley by hand and check that it does not turn stiffly. Remove any thread scraps that may be stuck in the area around the rotary hook. - Abnormal needle up signal. Press the power OFF switch, and then check that the 10-pin resolver connector is connected to connector P6 on the main PCB.	* * 9*
E113	Stopping could not be confirmed. This error is displayed when the machine could not be immediately stopped because of an abnormal load causing the machine speed to increase during a stopping operation. Turn the pulley by hand and check that it does not turn stiffly. Remove any thread scraps that may be stuck in the area around the rotary hook.	* *
E130	The sewing machine or motor do not operate when the treadle is depressed. - Is the 4-pin motor connector inside the control box disconnected? Press the power OFF switch and check the connection of the 4-pin motor connector. - Has the sewing machine locked up? Press the power OFF switch and then turn the machine pulley by hand and check that it turns easily. - Problem with control box. Replace the control box.	9* * **
E131 Problem with motor encoder signal.	- Is the 10-pin resolver connector inside the control box disconnected? Press the power OFF switch, and then check that the 10-pin resolver connector is connected to connector P6 on the main PCB. - Problem with motor or main PCB. Replace the motor or the control box.	9* **
E132 Problem with motor operation.	- Problem with motor. Replace the motor. - Problem with drive PCB. Replace the control box.	** **
E140 Motor reverse operation.	Motor reverse operation was detected. Replace the motor.	**

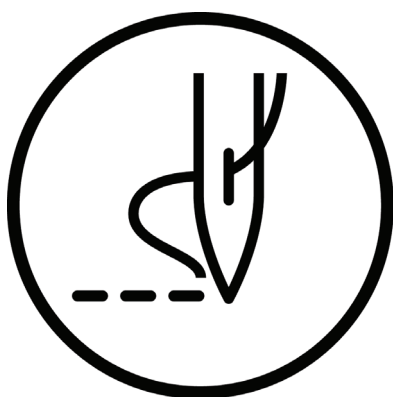
Error code	Possible cause	Page
E453 Abnormal head detection counting data	There is a problem with the head detector unit counting data. The counting data was initialized. Turn the power off and then back on again.	*
E701 Abnormally high power supply voltage.	- Does the power supply voltage match the control box voltage specifications? Check that the voltage matches. - Is the power supply voltage abnormally high? Check the power supply voltage. - Problem with control box. Replace the control box.	 * * **
E705 Abnormally low power supply voltage.	- Is the power supply voltage abnormally low? Check the power supply voltage. - Problem with control box. Replace the control box.	 * **
E709 Power switch ON verification cannot be carried out.	- Is the electrical equipment connector inside the control box disconnected? Press the power OFF switch, and then check that the drive PCB connector is connected to connector P3 on the main PCB. - Problem with drive PCB. Replace the control box.	 * **
E710 Motor overcurrent.	- Is the electrical equipment connector inside the control box disconnected? Press the power OFF switch, and then check that the drive PCB connector is connected to connector P4 on the main PCB. - This is displayed if the machine pulley moves stiffly when it is turned by hand, or if the sewing machine locks up and an abnormal current is flowing. Press the power OFF switch, and then turn the machine pulley by hand and check that it turns easily. - This is displayed if there is some problem with the motor and an abnormal current is flowing. Replace the motor. - Problem with control box. Replace the control box.	 * * ** **
E791 Solenoid overcurrent.	- This is displayed when there is overcurrent in any of the solenoids (thread trimming, thread wiping, quick reverse or presser lifter). Check the resistances of the solenoids. - Problem with main PCB. Replace the control box.	 * **
E901	DIP switch No. 4 inside the control box is set to ON. Press the power OFF switch and set DIP switch No. 4 to OFF.	47*

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. 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				
									

4268M



INSTRUCTION MANUAL

* Please note that the contents of this manual may differ slightly from the actual product purchased as a result of product improvements.

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