

S-7220B

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 may result in death or serious injury.
 CAUTION	The instructions which follow this term indicate situations where failure to follow the instructions could cause injury when using the machine or physical damage to equipment and surroundings.

Symbols




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



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



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

[2] Notes on safety

DANGER



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

CAUTION

Environmental requirements



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



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



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



The 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. 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.



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

-  This sewing machine should only be used by operators who have received the necessary training in safe use beforehand.
-  The sewing machine should not be used for any applications other than sewing.
-  Be sure to wear protective goggles when using the machine.
If goggles are not worn, there is the danger that if a needle breaks, parts of the broken needle may enter your eyes and injury may result.
-  Turn off the power switch at the following times. The machine may operate if the treadle is depressed by mistake, which could result in injury.
 - When threading the needle
 - When replacing the bobbin and needle
 - When not using the machine and when leaving the machine unattended
-  If using a work table which has casters, the casters should be secured in such a way so that they cannot move.
-  Attach all safety devices before using the sewing machine. If the machine is used without these devices attached, injury may result.
-  Do not touch any of the moving parts or press any objects against the machine while sewing, as this may result in personal injury or damage to the machine.
-  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.
-  If an error occurs in machine, or if abnormal noises or smells are noticed, immediately turn off the power switch. Then contact your nearest Brother dealer or a qualified technician.
-  If the machine develops a problem, contact your nearest Brother dealer or a qualified technician.

Cleaning

-  Turn off the power switch before carrying out cleaning. The machine may operate if the treadle is depressed by mistake, which could result in injury.
-  Use both hands to hold the machine head when tilting it back or returning it to its original position. If only one hand is used, the weight of the machine head may cause your hand to slip, and your hand may get caught.
-  Be sure to 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.
-  Use only the proper replacement parts as specified by Brother.

Maintenance and inspection

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

[3] Warning labels

The following warning labels appear on the sewing machine.

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

1

	⚠ 危険		⚠ 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分たつ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

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

3



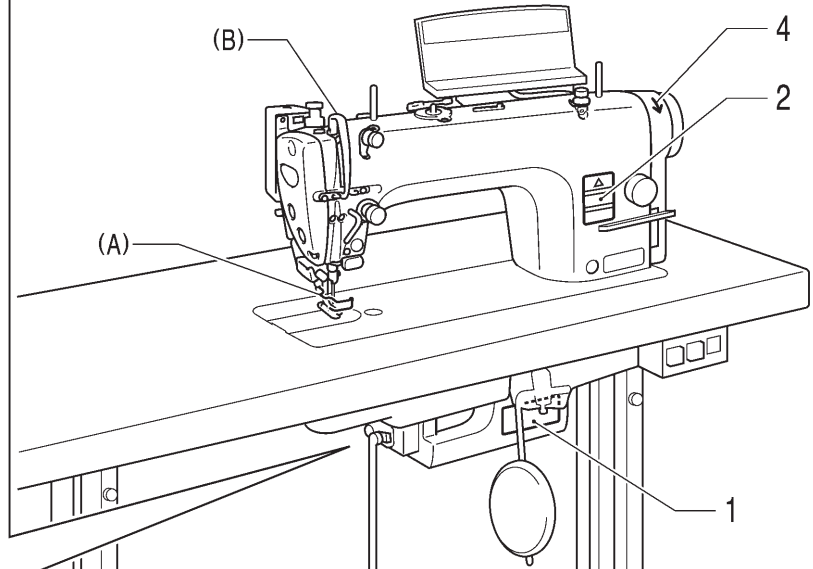
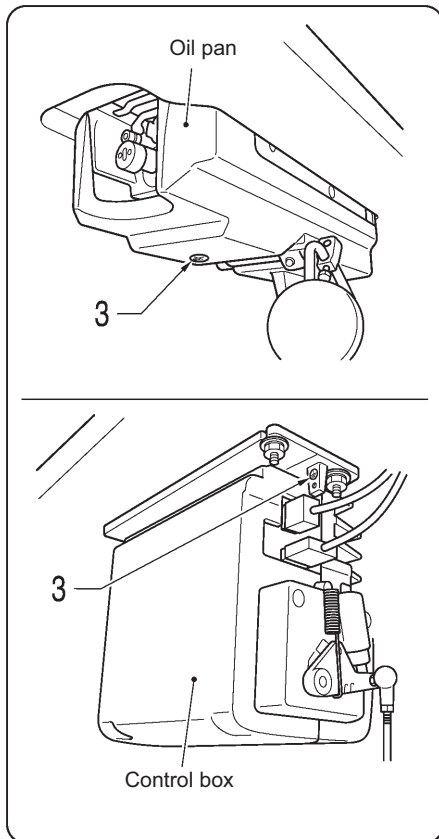
Be sure to connect the ground. If the ground connection is not secure, you run a high risk of receiving a serious electric shock, and problems with correct operation may also occur.

4



Direction of operation

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

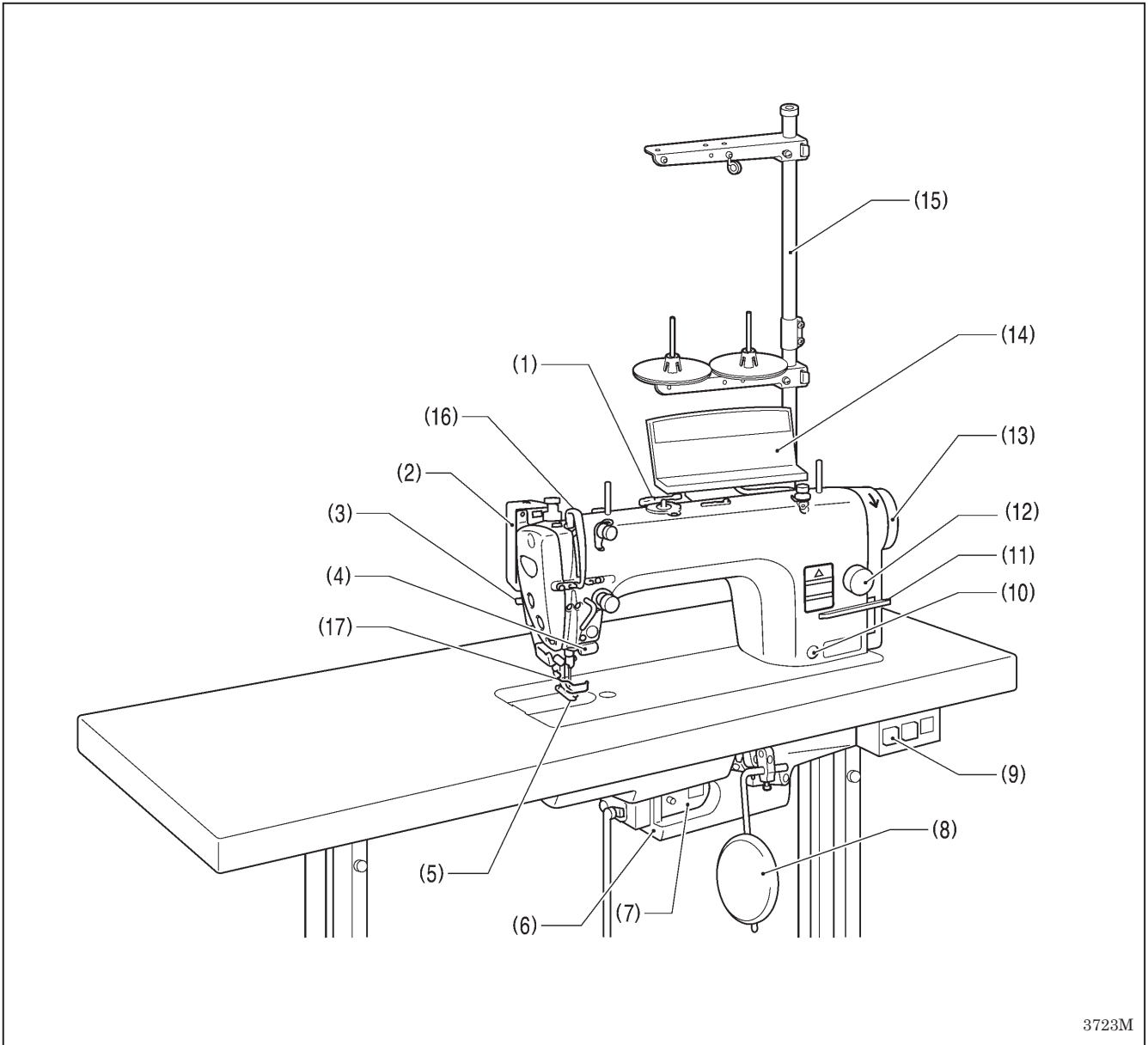


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1. NAMES OF MAJOR PARTS




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- | | |
|-----------------------|--|
| (1) Bobbin winder | (2) Thread wiper |
| (3) Lifting lever | (4) Quick reverse (Actuator) |
| (5) Presser foot | (6) Control box |
| (7) Control box panel | (8) Knee lifter assembly |
| (9) Power switch | (10) Oil gauge window |
| (11) Reverse lever | (12) Stitch length dial |
| (13) Machine pulley | (14) Operation panel (Models with operation panel) |
| (15) Cotton stand | |

Safety devices

- | | |
|---------------------------|-------------------|
| (16) Thread take-up cover | (17) Finger guard |
|---------------------------|-------------------|

2. MACHINE SPECIFICATIONS

			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	

	-403	-433	-405
Max. sewing speed	5,000 rpm ^{*1}	4,000 rpm	4,000 rpm ^{*2}
Start backtacking and continuous backtacking speed	220 - 3,000 rpm		
End backtacking speed	1,800 rpm		
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 (4-pole, 450W)		
Control circuit	Microprocessor		

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

*2 ...When sewing at speeds of 3,000 rpm 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

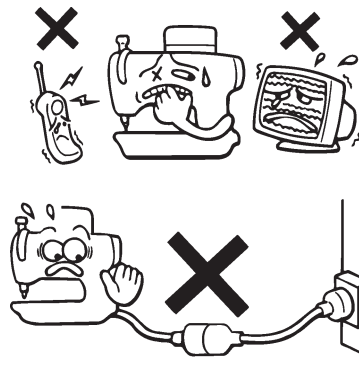
3. INSTALLATION

⚠ CAUTION

-  Machine installation should only be carried out by a qualified technician.
-  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.
-  Contact your Brother dealer or a qualified electrician for any electrical work that may need to be done.
-  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.
-  The sewing machine weighs approximately 46 kg. The installation should be carried out by two or more people.

About the machine set-up location

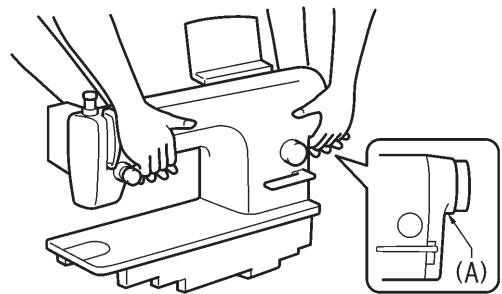
- Do not set up this sewing machine near other equipment such as televisions, radios or cordless telephones, otherwise such equipment may be affected by electronic interference from the sewing machine.
- The sewing machine should be plugged directly into an AC wall outlet. Operation problems may result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



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Carrying the machine

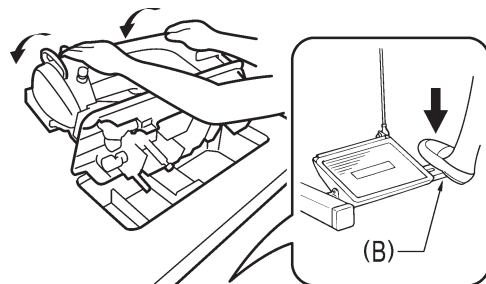
- The machine should be carried by the arm by two people as shown in the illustration.
- * Hold the motor cover (A) by hand also so that the pulley does not rotate.



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Tilting back the machine head

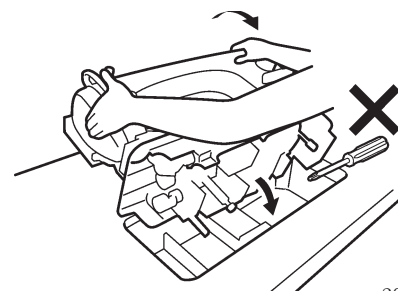
- Hold section (B) with your foot so that the table does not move, and then push the arm with both hands to tilt back the machine head.



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Returning the machine head to the upright position

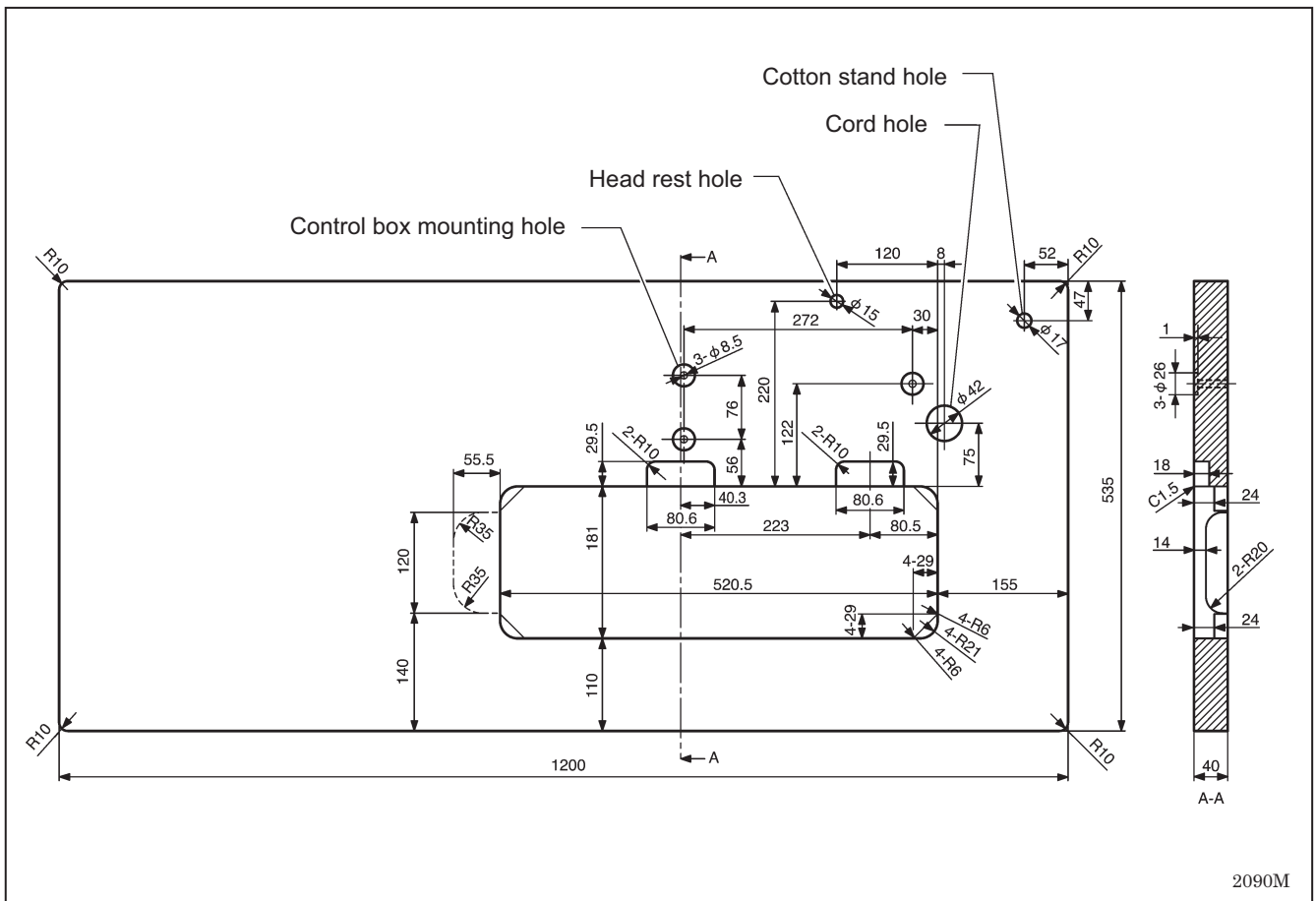
1. Clear away any tools, etc. which may be near the table holes.
2. While holding the face plate with your left hand, gently return the machine head to the upright position with your right hand.



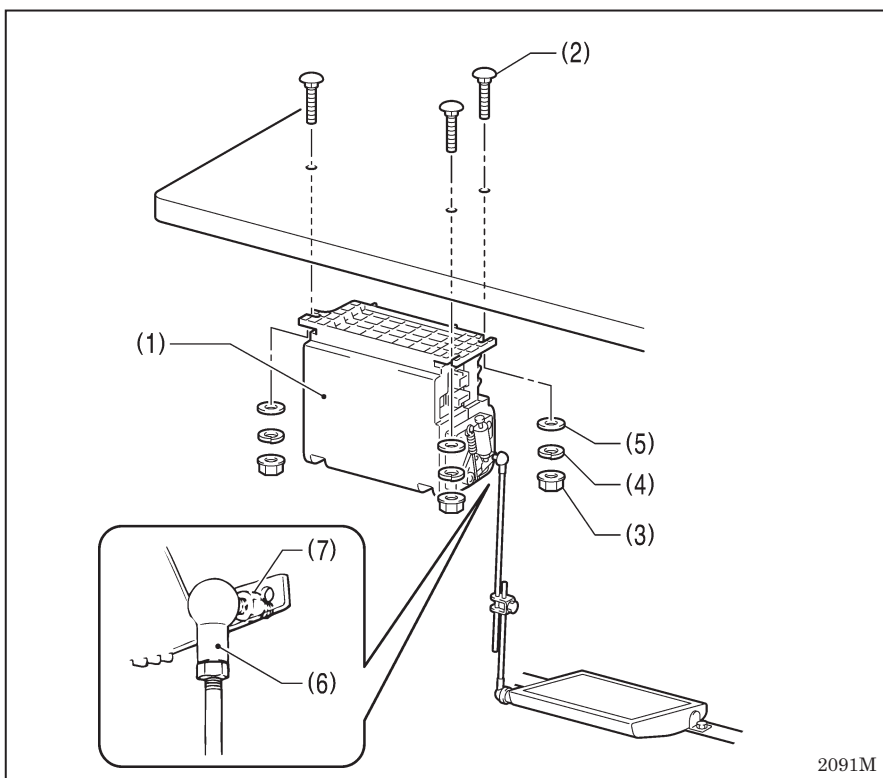
2089M

3-1. 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.



3-2. Installation



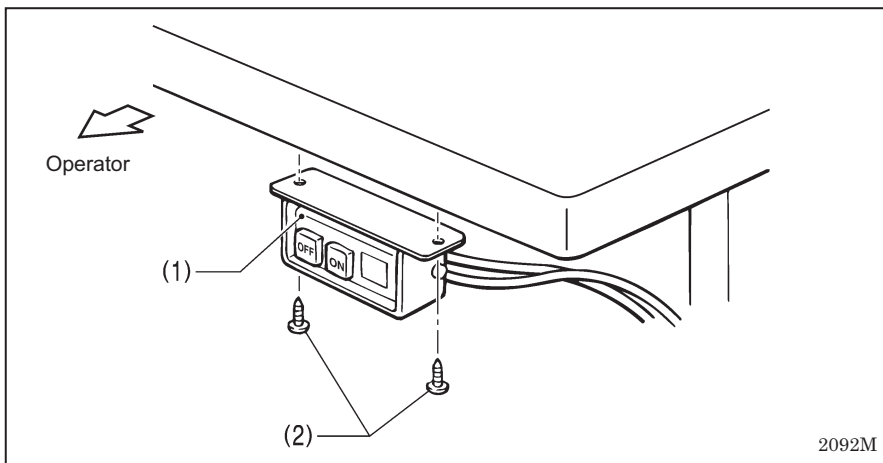
1. Control box

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

2. Connecting rod

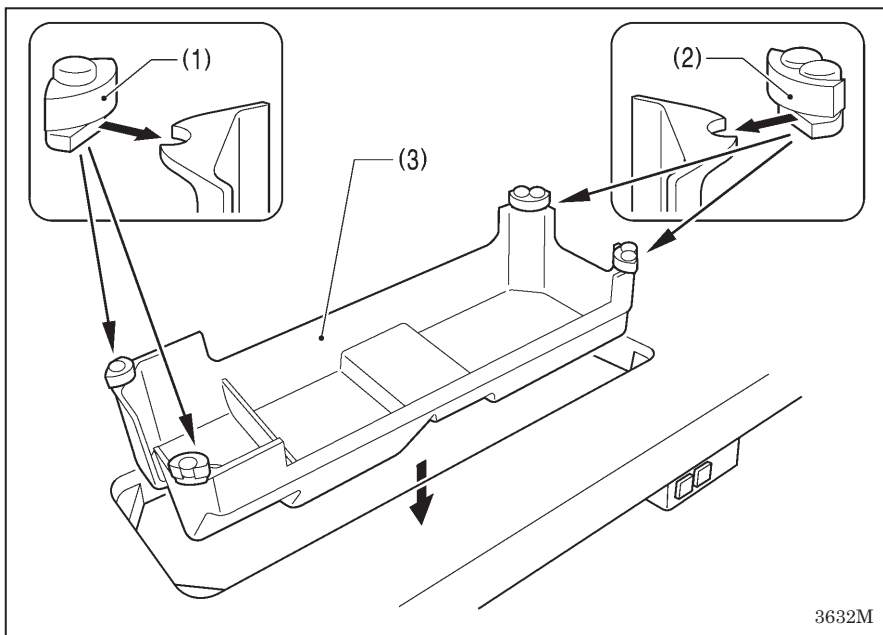
- (6) Connecting rod
- (7) Nut

3. INSTALLATION



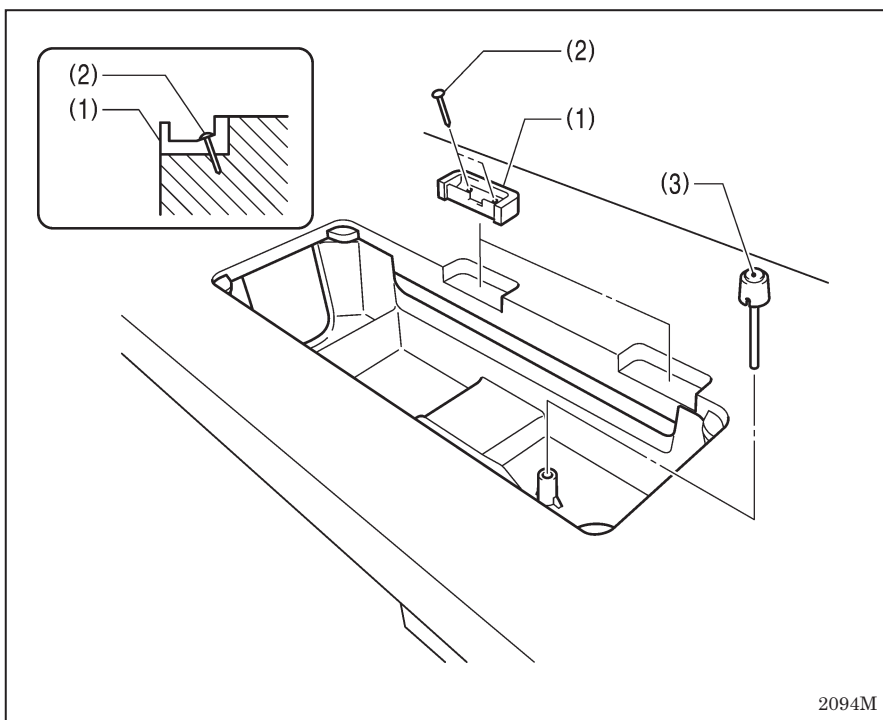
3. Power switch

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



4. Oil pan

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

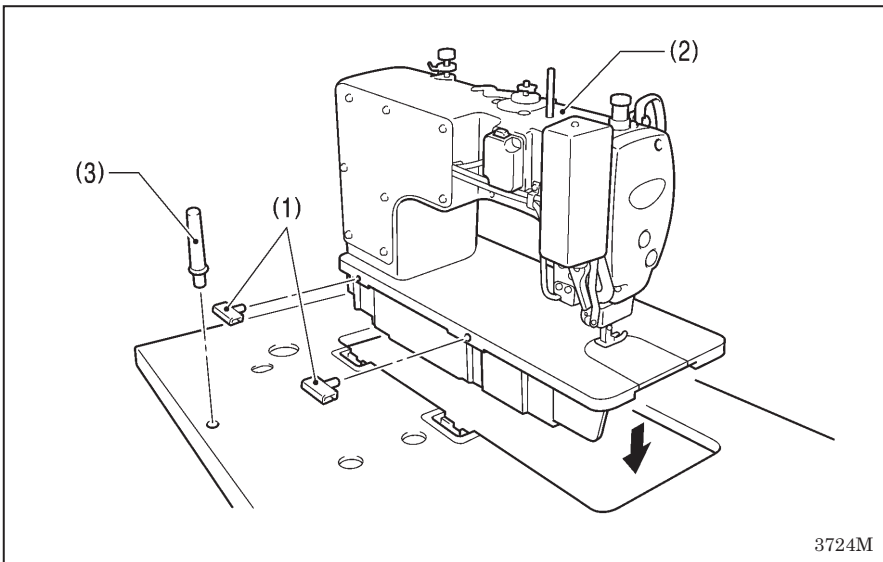


5. Rubber cushions

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

6. Knee lifter complying bar

- (3) Knee lifter complying bar



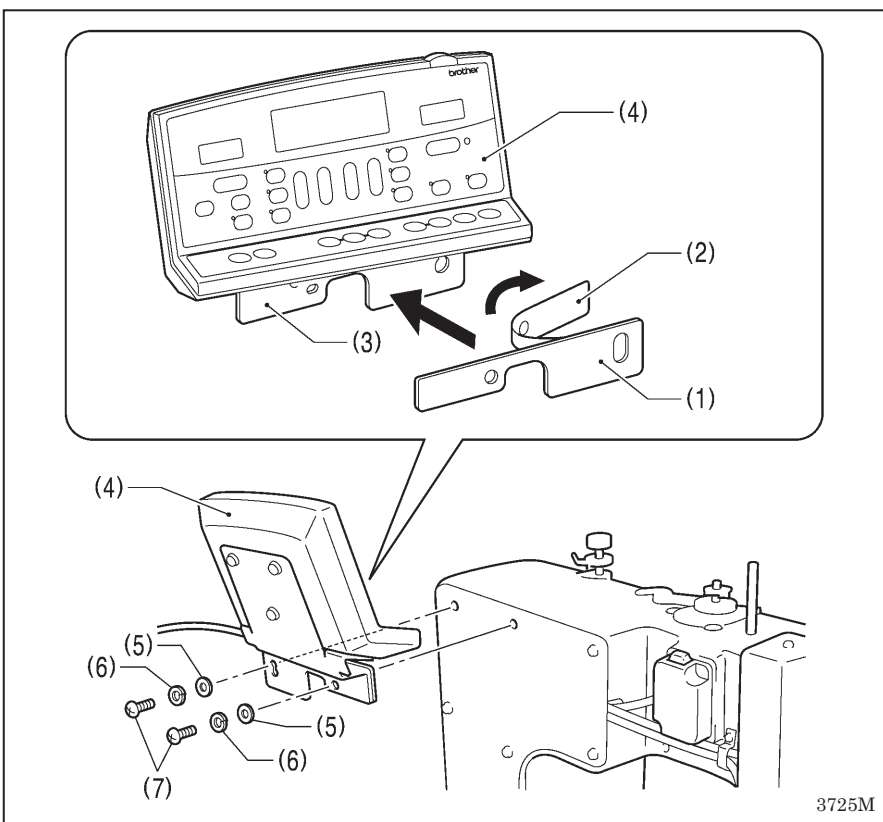
7. Machine head

- (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.

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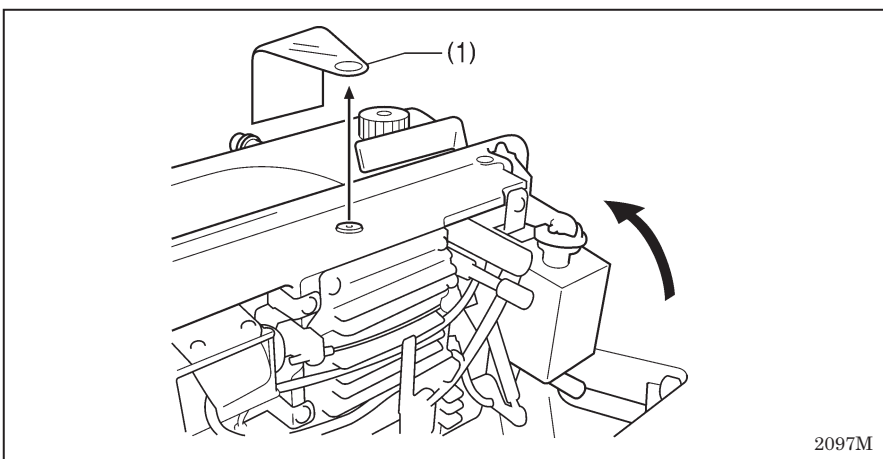
8. Operation panel

- (1) Rubber cushion
(Remove the seal (2), and then attach the rubber cushion (1) to the panel setting plate (3).)

- (4) Operation panel
- (5) Washers [2 pcs.]
- (6) Spring washers [2 pcs.]
- (7) Screws [2 pcs.]

(The washers (5), spring washers (6) and screws (7) are used to secure the side plate)

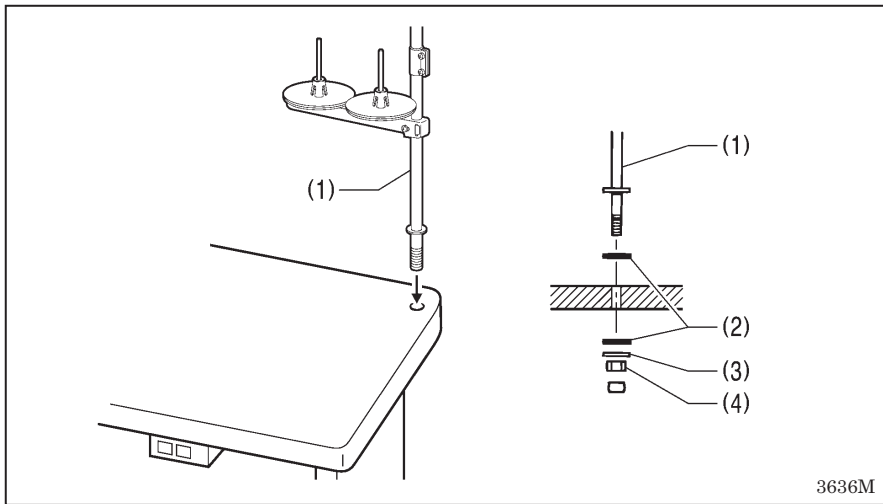
3725M



9. Sticker (Remove)

- (1) Sticker

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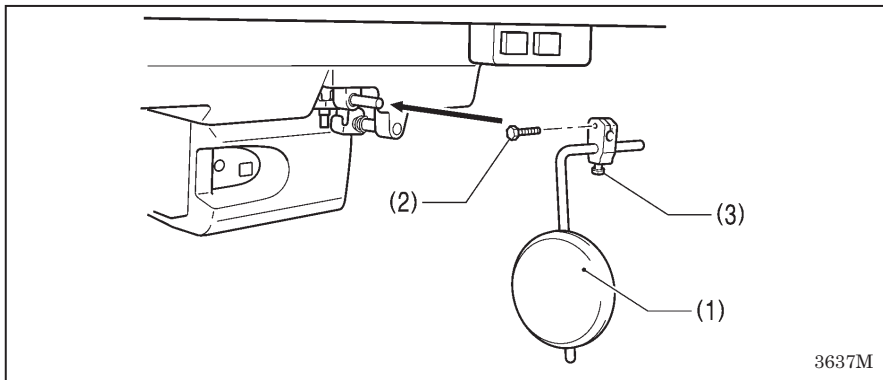


10. Cotton stand

(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.

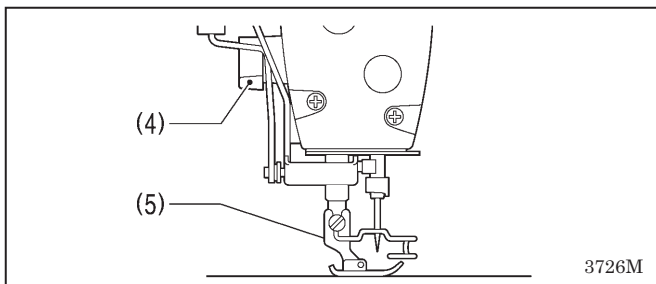


11. Knee lifter plate

(1) Knee lifter plate

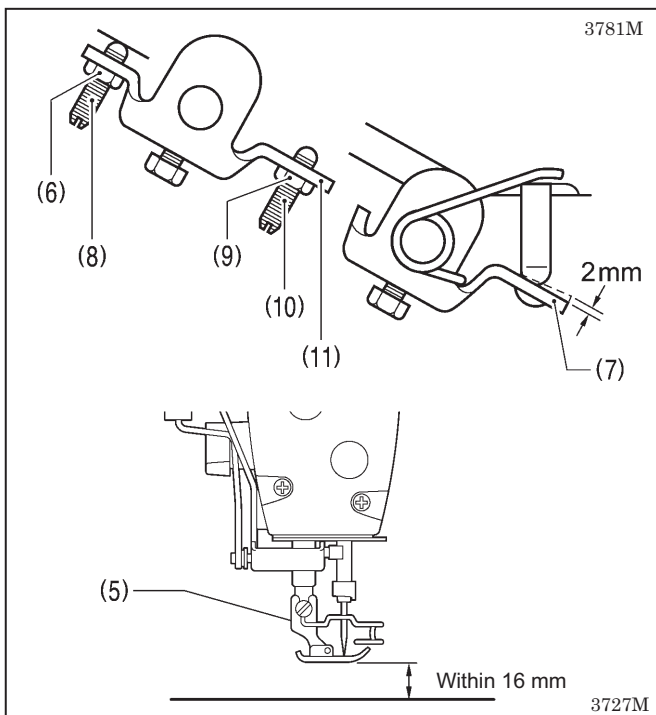
(2) Bolt

* Loosen the bolt (3) and move the knee lifter plate (1) to a position where 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 (5) by using the lifting lever (4).



3. Loosen the nut (6).
4. Turn the screw (8) to adjust so that the amount of play in the knee lifter (7) is approximately 2 mm when the knee lifter plate (1) is gently pressed.
5. Securely tighten the nut (6).




<Adjusting the height of the presser foot>

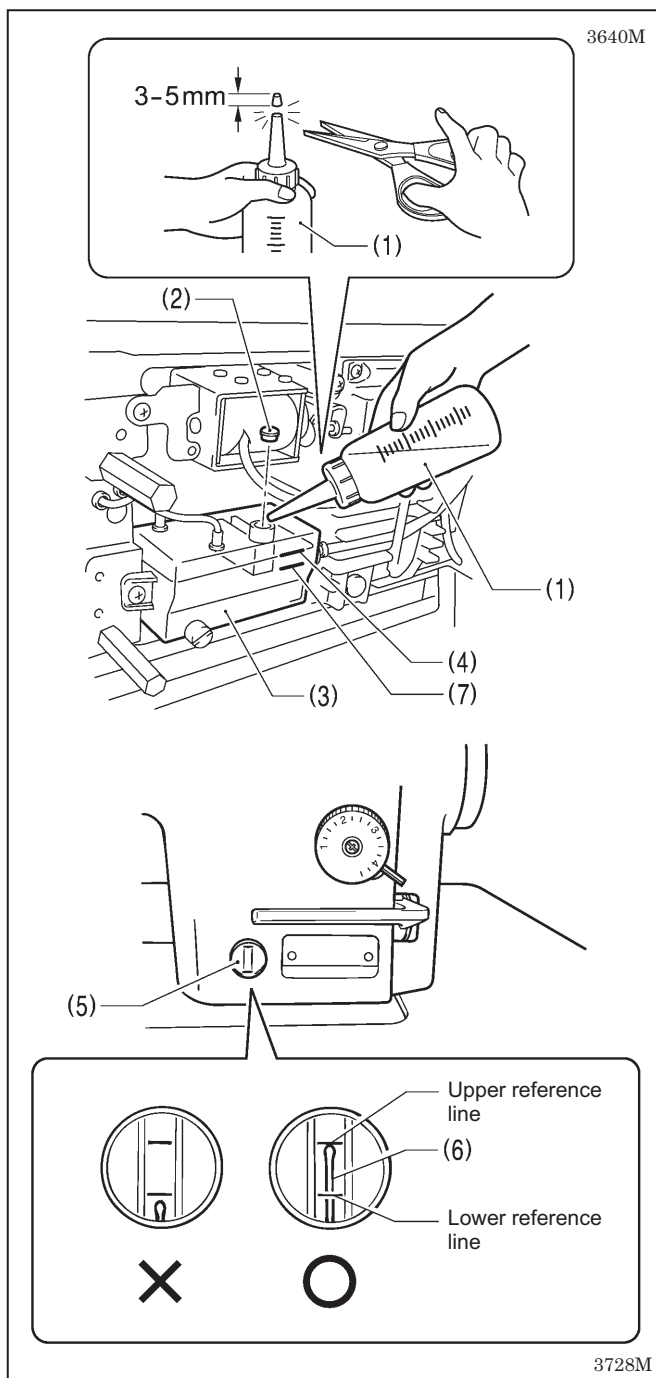
The height of the presser foot can be adjusted to a maximum of 16 mm.

1. Loosen the nut (9).
2. Turn the adjusting screw (10) to adjust so that the presser foot (5) is at the desired position within a distance of 16 mm of the needle plate when the knee lifter plate (1) is fully pressed.
3. After adjustment is completed, securely tighten the nut (9).

3-3. 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.
- Use only the lubricating oil (Nisseki Mitsubishi Sewing Lube 10N; VG10) specified by Brother.
* If this type of lubricating oil is difficult to obtain, the recommended oil to use is <Exxon Mobil EssoTex SM10; VG10>.

1. Hold the base of the nozzle on the accessory oil tank (1), and then use scissors to cut 3 - 5 mm off the end of the nozzle.
2. Tilt back the machine head.
3. Remove the rubber cap (2), and pour 120ml of lubricating oil into the oil tank (3). (Use the upper reference line (4) as a guide when pouring.)
4. Replace the rubber cap (1).

5. Return the machine head to its original position.
6. Check that the oil gauge (6) comes to the upper reference line in the oil gauge window (5).

<Lubrication oil replenishment interval>

If the oil gauge (6) drops below the lower reference line (or if the oil level drops below the lower reference line (7) on the oil tank (3)), be sure to replenish the oil.

3. INSTALLATION

3-4. 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 face plate 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.

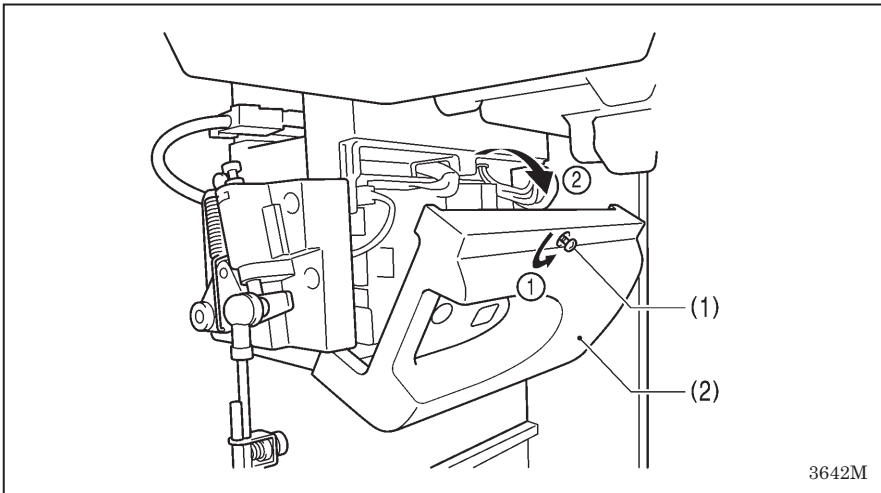


Do not connect the power cord until all cords have been connected. The machine may operate if the treadle is depressed by mistake, which could result in injury.



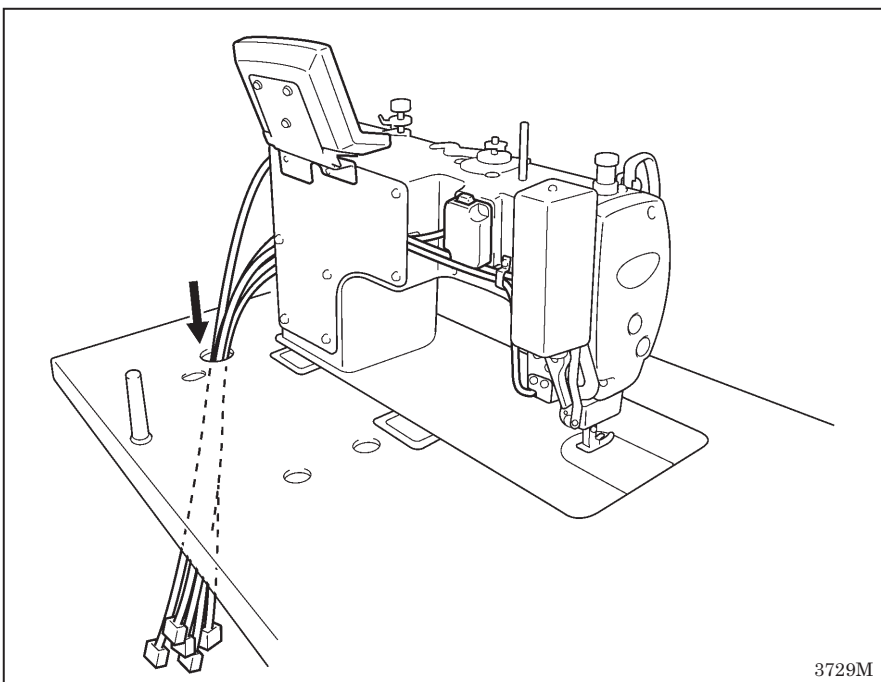
Be sure to connect the ground. If the ground connection is not secure, you run a high risk of receiving a serious electric shock, and problems with correct operation may also occur.

3-4-1. Opening the control box cover

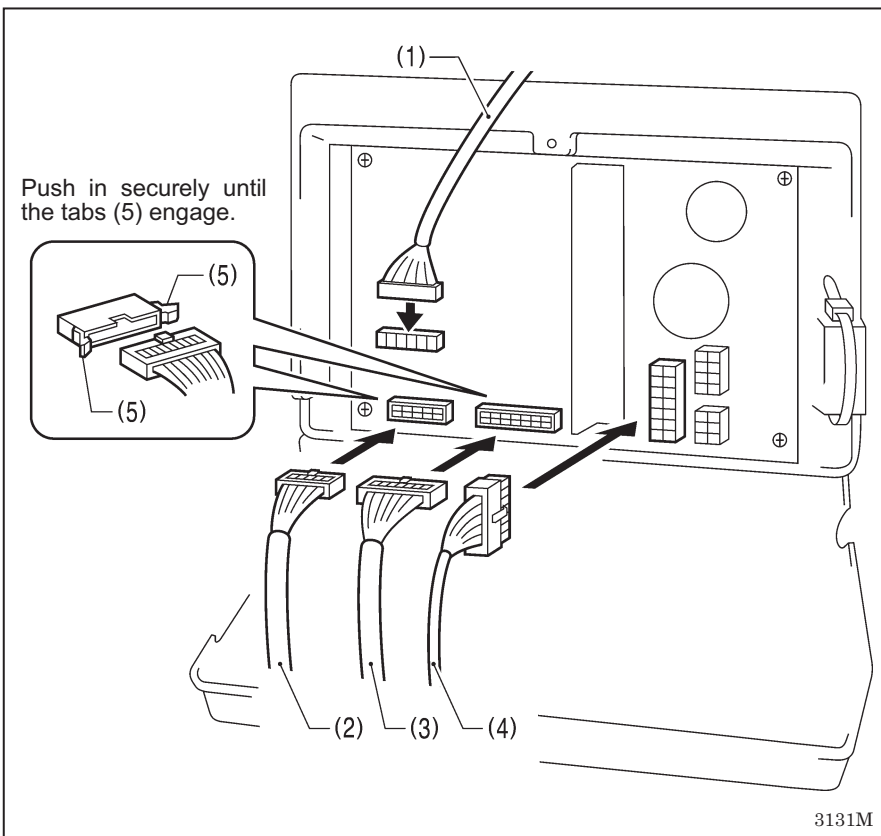


- (1) Screw
- (2) Cover

3-4-2. Connecting the cords

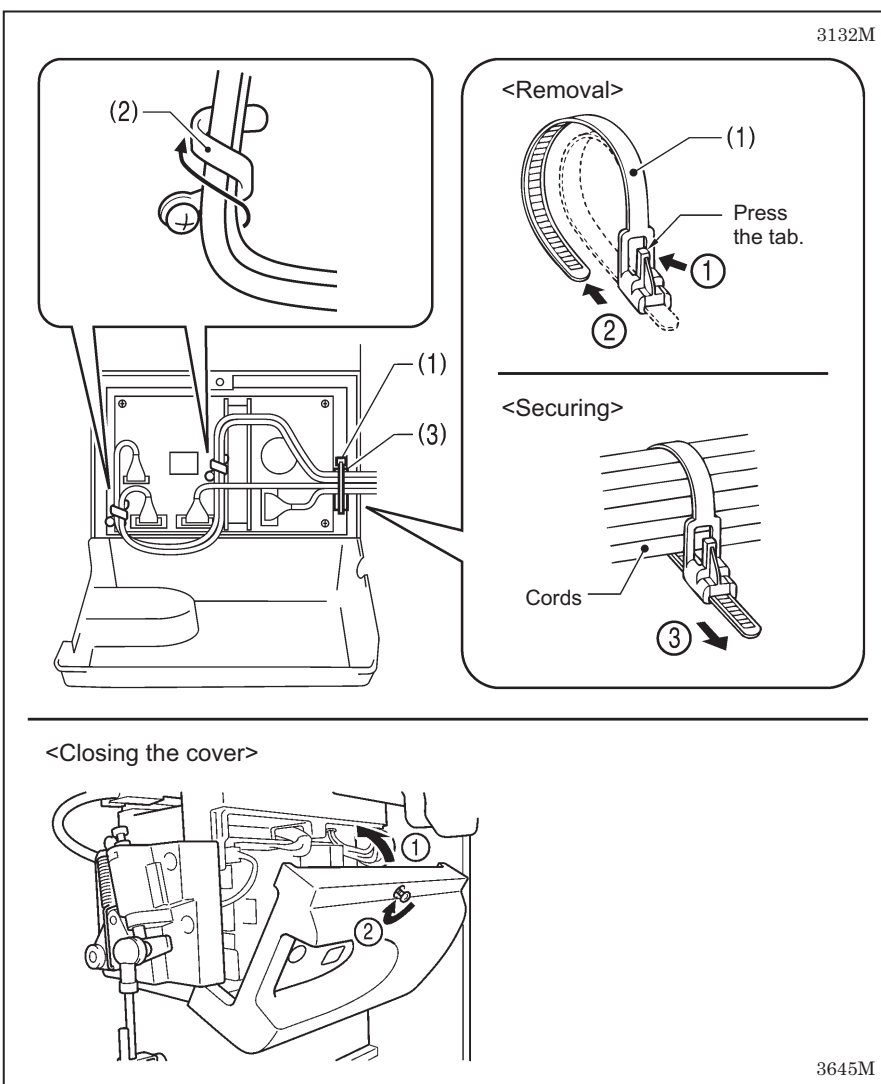


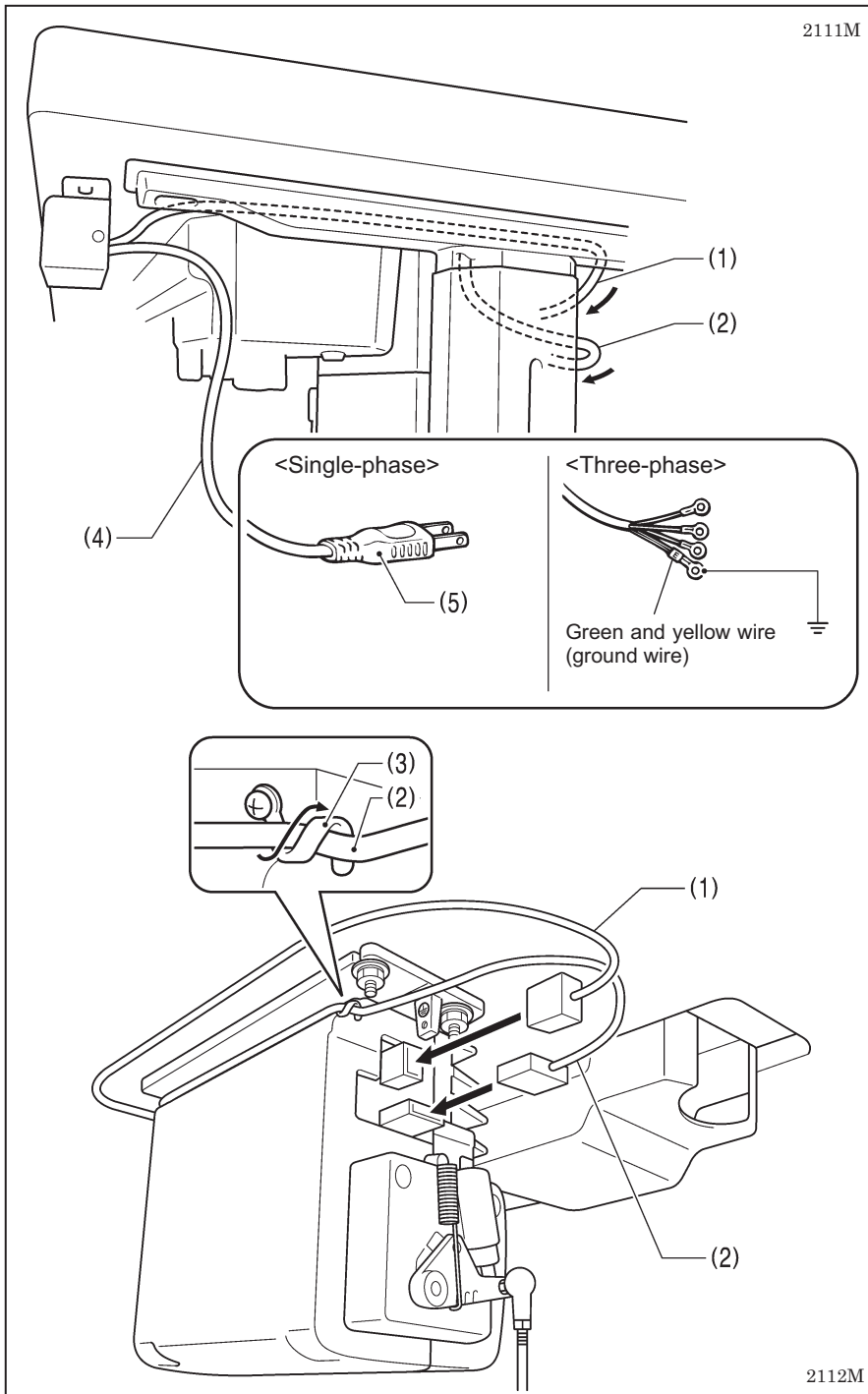
1. Sewing machine cords



- (1) 7-pin head detector unit connector
- (2) 10-pin operating panel connector (Models with operation panel)
- (3) 14-pin encoder connector
- (4) 14-pin machine connector

Refer to the following page for the 4-pin motor connector.





2111M

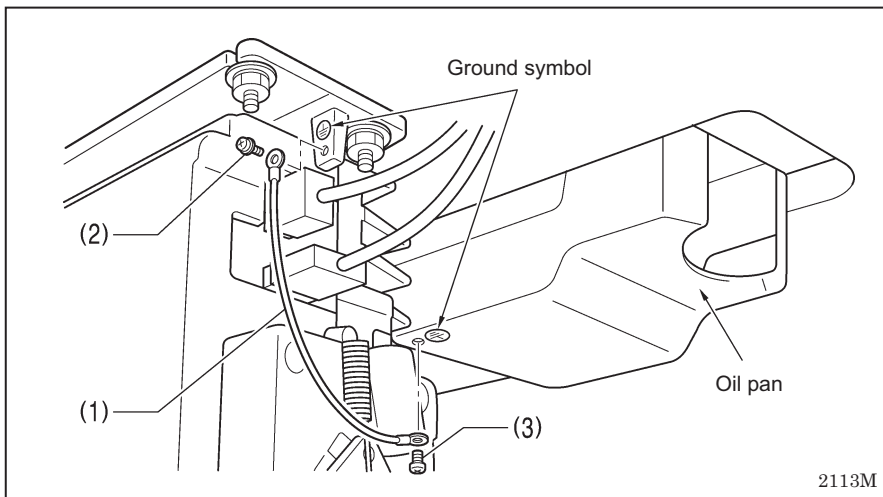
3. Other cords

- (1) 6-pin power supply connector
- (2) 4-pin motor connector
- (3) Wire clip
- (4) Power cord

<For single-phase specifications>
Insert the power cord plug (5) into a wall outlet.

- <For three-phase specifications>
1. Attach an appropriate plug to the power cord (4). (The green and yellow wire is the ground wire.)
 2. Insert the plug into a properly-grounded AC power supply.

NOTE:
Do not use extension cords, otherwise machine operation problems may result.



2113M

4. Ground wire

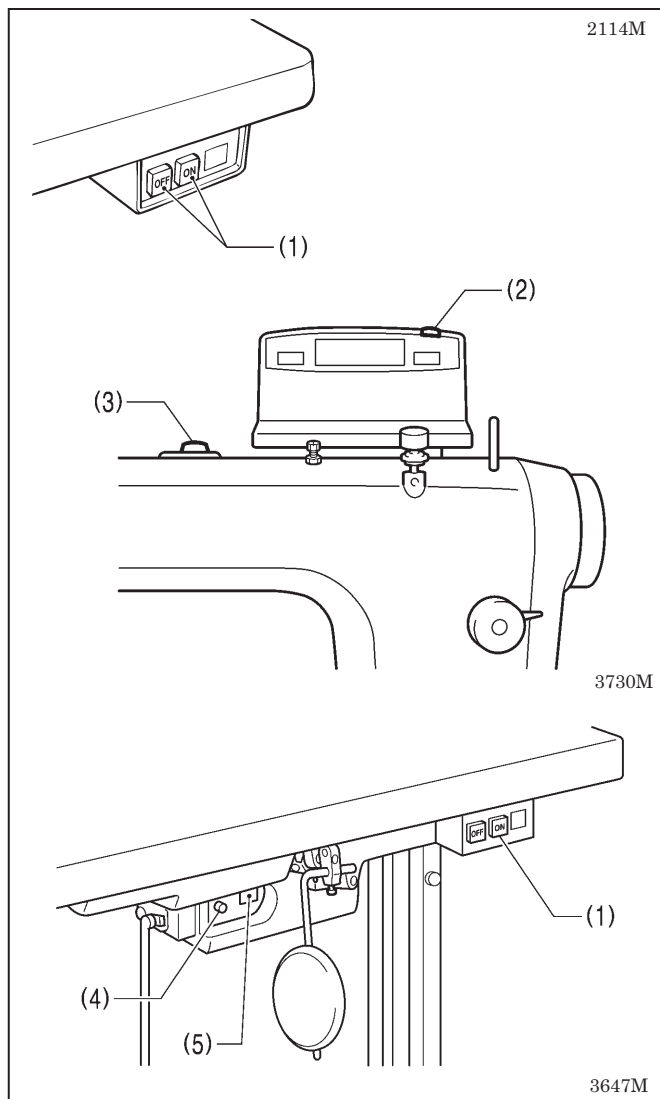
- (1) Ground wire
- (2) Screw [With washer]
- (3) Screw

3-5. Test operation (Operating the treadle)

! CAUTION



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.



1. Turning on the power

<Models with operation panel>

Press the ON power switch (1).
The power indicators (2) and (3) will illuminate.

NOTE: When turning the power switch on for the first time

The treadle and the operation panel will not operate for approximately four seconds after the power switch is turned on.

After approximately 4 seconds, "iniT rPM" (speed initialization) or "iniT ALL" (full initialization) will be displayed on the operation panel. After "iniT rPM" or "iniT ALL" is displayed, the treadle can be operated. (The operation panel will change to the stitch number display.)

This message will not appear the second and subsequent times that the power switch is turned on.

<Models without operation panel>

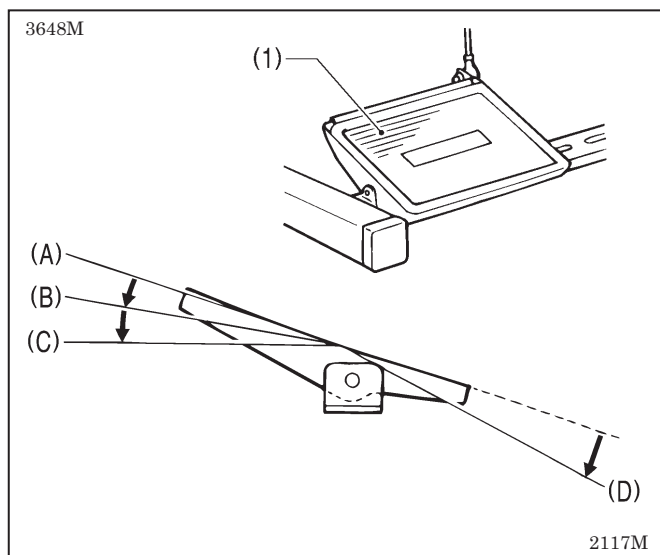
Press the ON power switch (1).
The power indicators (3) and (4) will illuminate.

NOTE: When turning the power switch on for the first time

The treadle and control box panel cannot be operated for approximately 4 seconds after the power switch has been turned on.

After approximately 4 seconds, "Ar (All reset)" may appear in the stitch number display (5).

If this happens, turn the power switch off and then back on again. After that, normal treadle operation will then be possible.



2. Test operation

1. Check that the machine sews at low speed when the treadle (1) is gently pressed to position (B).
2. Then check that it sews at high speed when the treadle (1) is gently pressed to position (C).
3. After pressing the treadle (1) forward, check that the needle is lowered to the top of the needle plate when the treadle (1) is returned to the neutral position (A). (when needle down stopping has been set.)
4. If the treadle (1) is pressed to position (D), thread trimming is carried out and the needle then rises above the needle plate and stops.

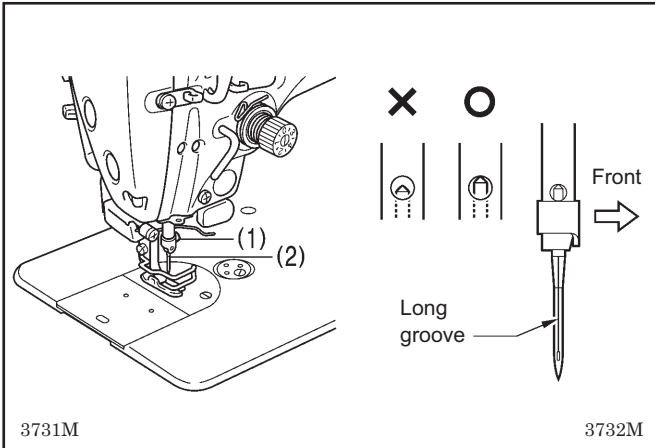
4. PREPARATION BEFORE SEWING

4-1. Installing the needle

! CAUTION



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



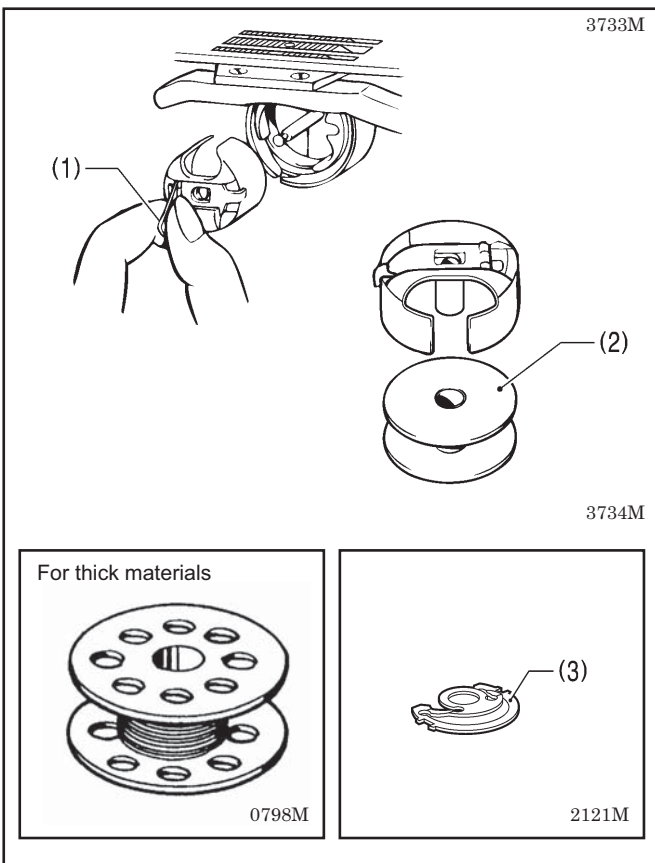
1. Turn the machine pulley to move the needle bar to its highest position.
2. Loosen the screw (1).
3. Insert the needle (2) in a straight line as far as it will go, making sure that the long groove on the needle is at the left, and then securely tighten the screw (1).

4-2. Removing the bobbin case

! CAUTION



Turn off the power switch before removing the bobbin case.
The machine may operate if the treadle is depressed by mistake, which could result in injury.



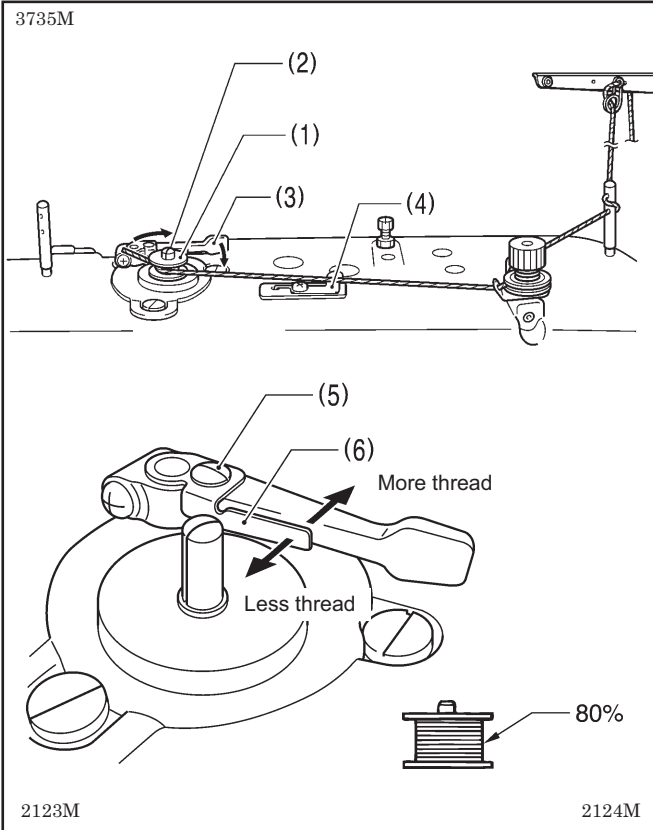
1. Turn the machine pulley to raise the needle until it is above the needle plate.
2. Pull the latch (1) of the bobbin case upward and then remove the bobbin case.
3. The bobbin (2) will come out when the latch (1) is released.

- * There is an anti-spin spring (3) inside the bobbin case. The anti-spin spring (3) prevents the bobbin from racing at times such as during thread trimming.
- * Use bobbins (2) made of light alloy as specified by BROTHER.

4-3. Winding the lower thread

! CAUTION

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



1. Turn on the power switch.
2. Place the bobbin (1) onto the bobbin winder shaft (2).
3. Wind the thread several times around the bobbin (1) in the direction indicated by the arrow.
4. Push the bobbin presser arm (3) toward the bobbin (1).
5. Raise the presser foot with the lifting lever.
6. Depress the treadle. Lower thread winding will then start.
7. Once winding of the lower thread is completed, the bobbin presser arm (3) will return automatically.
8. After the thread has been wound on, remove the bobbin and cut the thread with the knife (4).

- * Loosen the screw (5) and move the bobbin presser (6) to adjust the amount of thread wound onto the bobbin.

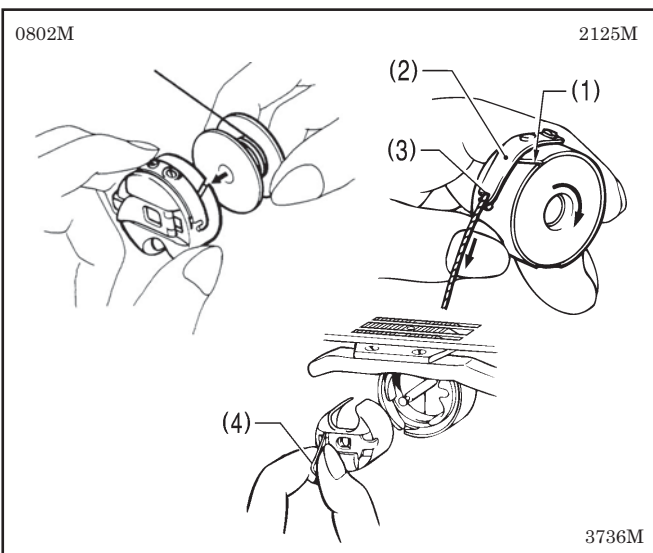
NOTE:

The amount of thread wound onto the bobbin should be a maximum of 80 % of the bobbin capacity.

4-4. Installing the bobbin case

! CAUTION

Turn off the power switch before installing the bobbin case. The machine may operate if the treadle is depressed by mistake, which could result in injury.



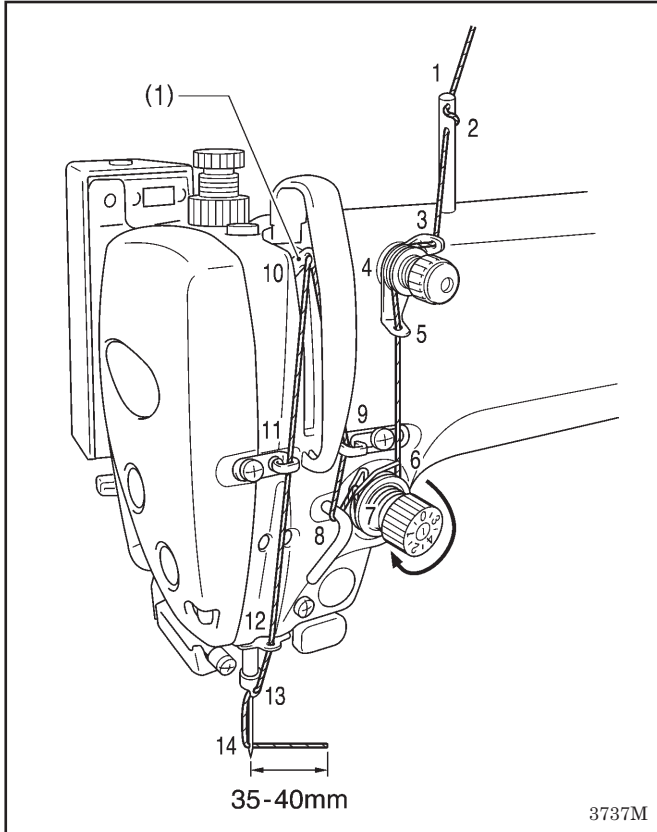
1. Turn the machine pulley to raise the needle until it is above the needle plate.
2. While holding the bobbin so that the thread winds to the right, insert the bobbin into the bobbin case.
3. Pass the thread through the slot (1) and under the tension spring (2), and then pull it out from the thread guide (3).
4. Check that the bobbin turns clockwise when the thread is pulled.
5. Hold the latch (4) on the bobbin case and insert the bobbin case into the rotary hook.

4-5. Threading the upper thread

! CAUTION

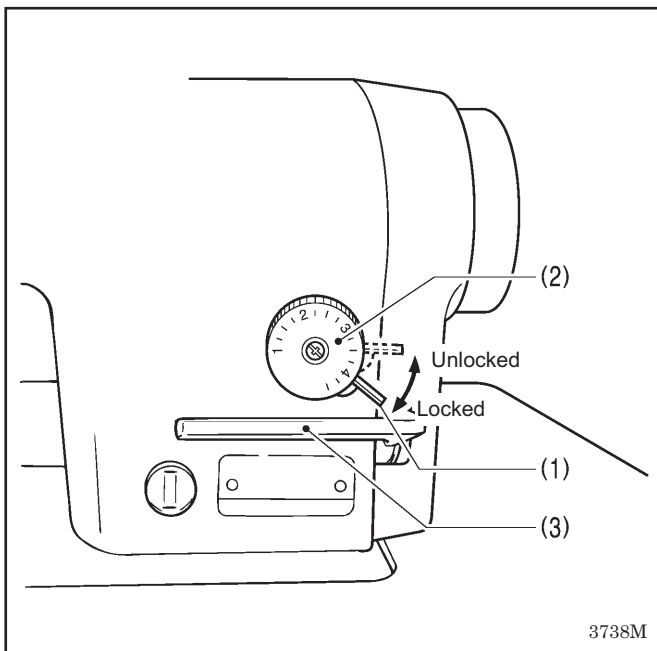


Turn off the power switch before threading the upper thread.
The machine may operate if the treadle is depressed by mistake, which could result in injury.



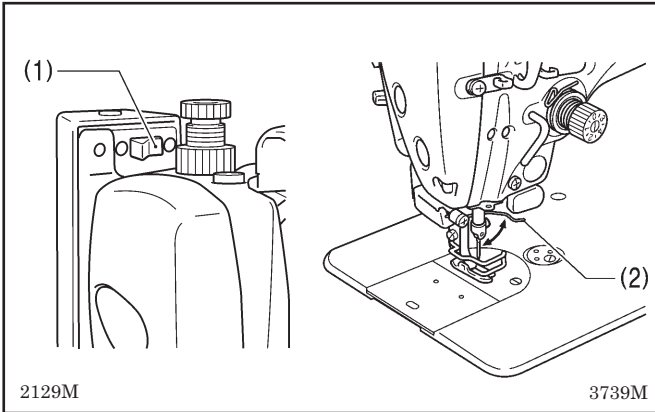
Turn the machine pulley and raise the thread take-up (1) before threading the upper thread. This will make threading easier and it will prevent the thread from coming out at the sewing start.

4-6. Adjusting the stitch length



1. Push the dial lock lever (1) up until it clicks to release the lock.
 2. Turn the stitch length dial (2) clockwise or counter-clockwise so that the desired stitch length is at the uppermost position on the dial.
 - The larger the number, the longer the stitch length will be.
(The numbers on the dial are for use as a guide. The length of the finished stitches may vary depending on the type and thickness of material being sewn. Adjust while looking at the finished stitches.)
 - When turning the stitch length dial (2) from a larger setting to a smaller setting, it will be easier to turn the dial if the reverse lever (3) is pushed to the halfway-down position.
 3. Push the dial lock lever (1) down firmly to lock it.
- * Check that the stitch length dial (2) does not rotate.

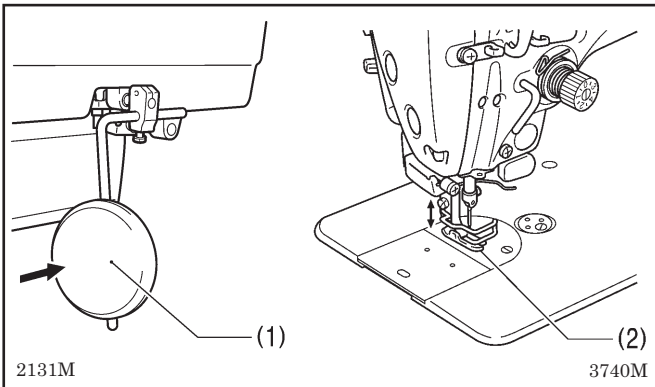
4-7. Using the thread wiper



Press the thread wiper switch (1) to the side. If this is done, the thread wiper (2) will operate after the thread is trimmed.

2209M

4-8. Using the knee lifter

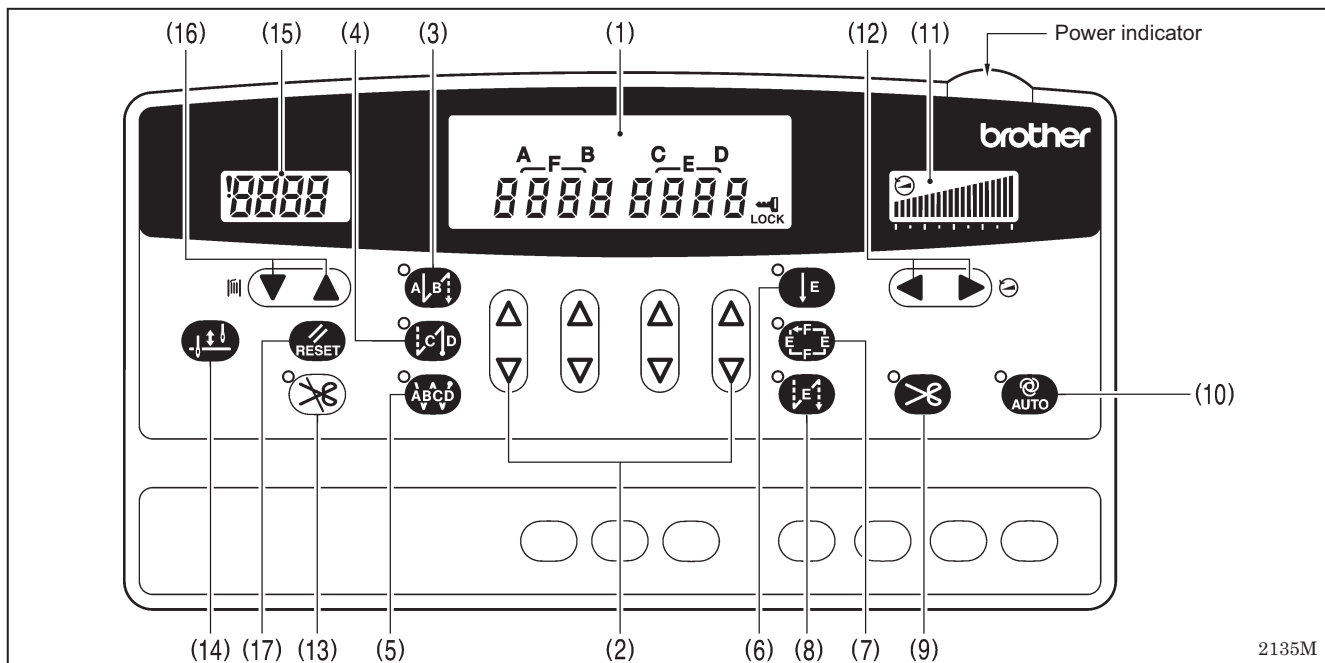


The presser foot (2) can be raised by pressing the knee lifter plate (1).

5. USING THE OPERATION PANEL (BASIC OPERATIONS)

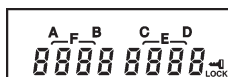
5-1. Names and functions

- 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.

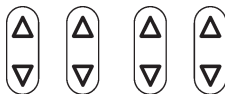
(1) Main display



- 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.

2137M 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.

2140M

(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.






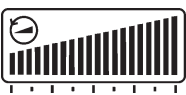






2141M

(5) Continuous backtick key

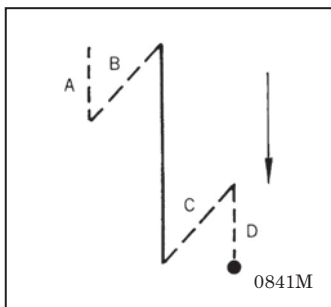


When this key is pressed so that the indicator illuminates, the number of backtick stitches (0-99) in the A, B, C and D stitch number displays is sewn continuously. After the sewing machine sews a full cycle of stitches set by A, B, C and D, the thread is trimmed automatically.

2142M

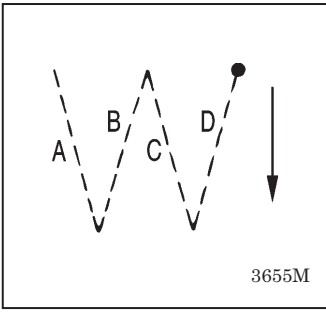
(6) Fixed stitch key		When this key is pressed so that the indicator illuminates, the number of stitches (1-1999) in the E stitch number display is sewn, and then the sewing machine stops automatically. 2143M
(7) Name label key		When this key is pressed so that the indicator illuminates, fixed stitch sewing of the number of stitches (1-1999) in the E and F stitch number displays is carried out repeatedly. 2144M
(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. 2145M
(9) Thread trimming key		<ul style="list-style-type: none"> 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. 2146M
(10) AUTO key		<ul style="list-style-type: none"> 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. 2147M
(11) Sewing speed control display		This shows the sewing speed when the treadle is depressed to the maximum amount. <ul style="list-style-type: none"> 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 rpm). 2148M
(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. <ul style="list-style-type: none"> When the ► key is pressed, the sewing speed becomes faster. When the ◀ key is pressed, the sewing speed becomes slower. 2149M 2150M 2151M
(13) Thread trimming lock key		<ul style="list-style-type: none"> 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. 2152M
(14) Half stitch key		When the sewing machine is stopped, the needle bar can be moved up and down by pressing this key. 2153M
(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 p.24.) 2155M
(17) RESET key		This key is used to return the lower thread counter to its initial value and to cancel warning conditions. (Refer to p.24.) 2156M

5-2. Sewing start and end backtack stitches



<p>1</p>	<p>Setting start backtack stitches</p> <p>ON</p> <p>Example: A → 9 B → 12</p> <p>A(0-99) B(0-99)</p> <p>2157M</p>
<p>2</p>	<p>Setting end backtack stitches</p> <p>ON</p> <p>Example: C → 13 D → 12</p> <p>C(0-99) D(0-99)</p> <p>2158M</p>
<p>3</p>	<p>Start backtacking is carried out. After it has finished, normal sewing continues for as long as the treadle remains depressed.</p> <p>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.</p> <p>2159M</p>
<p>4</p>	<p>End backtacking is carried out. After it has finished, the thread is trimmed automatically and the sewing machine stops in the needle up position.</p> <p>NOTE:</p> <ul style="list-style-type: none"> • 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. <p>2160M</p>

5-3. Sewing continuous backtack stitches



1 Setting continuous backtack stitches

Example:
A → 4
B → 5
C → 5
D → 4

3656M

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.

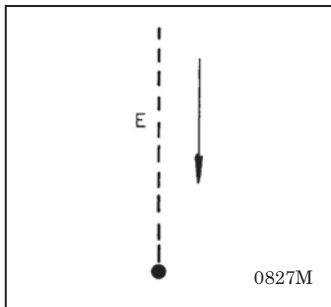
2159M

<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.

5-4. Sewing fixed stitches



1	<p style="text-align: right;">2161M</p> <p style="text-align: right;">Example: E → 120</p> <p style="text-align: center;">(1-19) (0-99)</p> <p style="text-align: right;">From 1 to 1999 stitches can be set.</p>
2	<p>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.25). After this, normal sewing is carried out if the treadle is depressed.</p> <p style="text-align: right;">2159M</p>
3	<p>After the thread is trimmed, fixed stitch sewing mode is enabled.</p> <p style="text-align: right;">2160M</p>

<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>



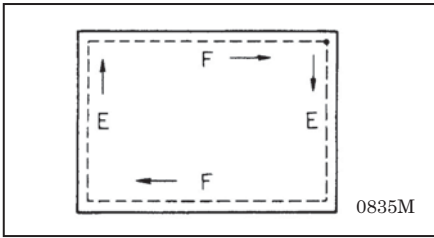
When the AUTO key is pressed to turn on the automatic sewing function, the fixed stitches are sewn simply by depressing the treadle once without needing to depress it continuously.

<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.)

5-5. Sewing name labels



1	<p style="text-align: right;">2162M</p>
From 1 to 1999 stitches can be set for the E and F stitch numbers.	
2	<p>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.25).</p> <p style="text-align: right;">2159M</p>
3	<p>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.25).</p>
4	<p>Repeat steps 2 and 3 above.</p>
5	<p>Thread trimming is carried out.</p> <p style="text-align: right;">2160M</p>

<If using a solenoid-type presser lifter>

After the fixed stitches in E and F are sewn, the presser foot is also lifted automatically.

<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>



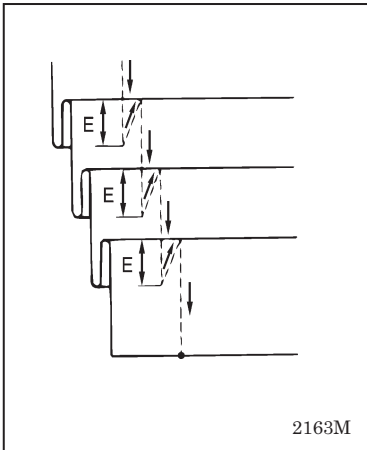
When the AUTO key is pressed to turn on the automatic sewing function, the fixed stitches in E and F are sewn respectively simply by depressing the treadle once without needing to depress it continuously.

<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.)

5-6. Sewing pleat presser stitches



1	<p style="text-align: right;">2164M</p>
2	<p>If the treadle is continuously depressed and then you press the actuator while sewing is in progress, the number of backtack stitches set in E is sewn and then normal sewing resumes.</p> <p style="text-align: right;">3741M</p>
3	<p>Thread trimming is carried out.</p> <p style="text-align: right;">2160M</p>

<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.

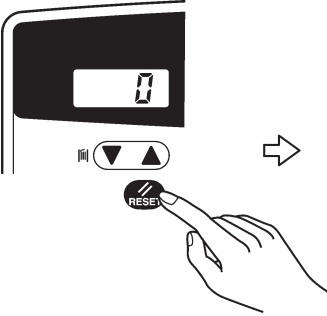
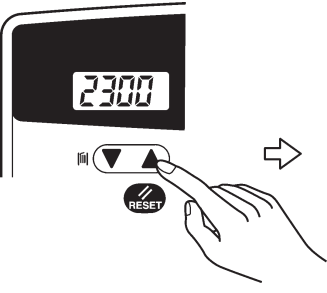


- If changing the number of end backtack stitches indicated in C and D, press the pleat presser sewing key to turn off the pleat presser sewing function before making the change. (The CD display will show the number of stitches and the setting can then be changed.)

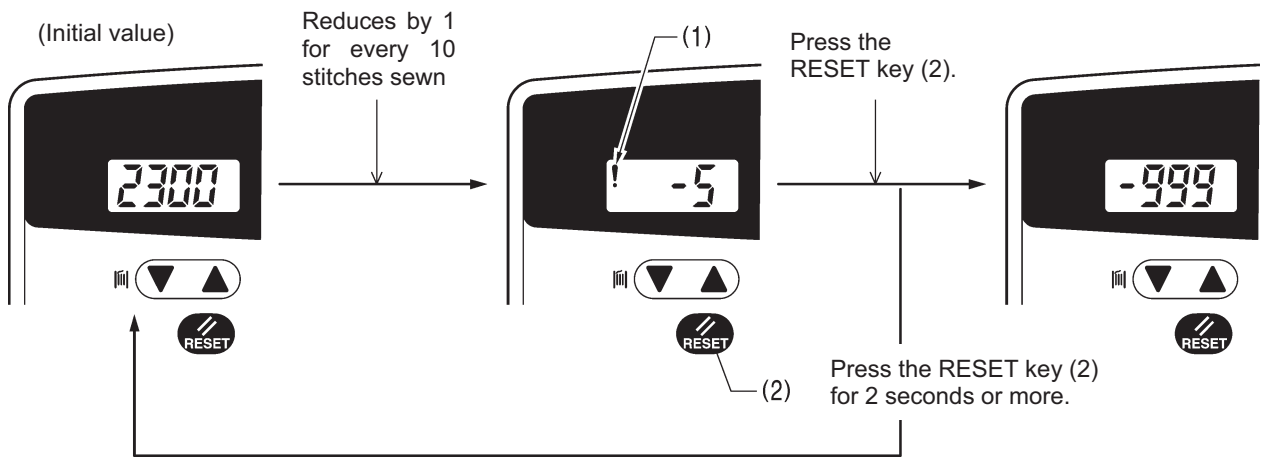
5-7. Using the lower thread counter

- 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 reaches “-5”.

<Initial value setting>

1	 <p>After about 2 seconds, the buzzer will sound and the lower thread counter display will show the initial value which was set previously.</p>	2166M
(Press for 2 seconds or more)		
2	 <ul style="list-style-type: none"> • 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. 	2167M 2168M 2169M

<Lower thread counter operation>



(Initial value)

Reduces by 1 for every 10 stitches sewn

(1)

Press the RESET key (2).

Press the RESET key (2) for 2 seconds or more.

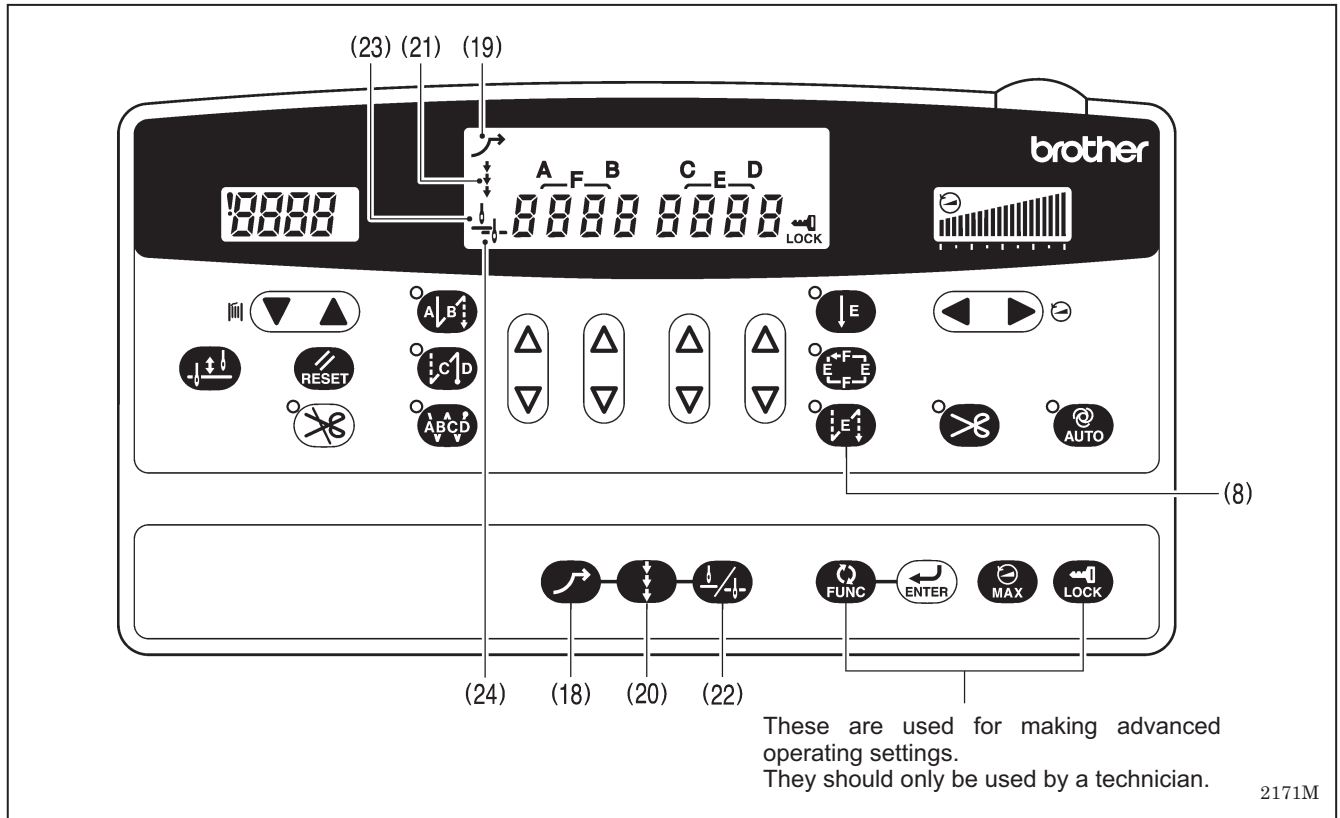
2170M

1. When sewing is carried out, the value shown in the lower thread counter display is reduced by 1 for every 10 stitches sewn. (After the value reaches zero “0”, a minus sign appears and counting continues to a maximum of “-999”.)
 2. When the value is “-5” or less, a warning icon (1) illuminates and an electronic buzzer sounds for 5 seconds.
 3. After the treadle returns to the neutral position and the sewing machine stops, the sewing machine will not start up again even if the treadle is depressed. However, thread trimming can be carried out by depressing the treadle backward.
- If you press the RESET key (2), the warning icon (1) will disappear and sewing will be possible when the treadle is depressed.
 - If you press and hold the RESET key (2) for 2 seconds or more, the display will return to the initial value.

6. USING THE OPERATION PANEL (ADVANCED OPERATIONS)

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

6-1. Names and functions



(18) Slow start key



- When this key is pressed so that the slow start icon (19) illuminates, the first two stitches sewn after the thread is trimmed are sewn at 700 rpm. After this, the sewing speed corresponds to the treadle depression amount.
- If you press this key again while the icon (19) is illuminated, the icon (19) will turn off.

2172M

(20) Correction key



- When this key is pressed so that the correction icon (21) illuminates, correction sewing can be carried out. If the sewing machine is stopped, sewing will be carried out at slow speed (220 rpm) while the actuator is being pressed.
- NOTE:**
 - If you press the actuator 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 (21) is illuminated, the icon (21) will turn off.

2173M

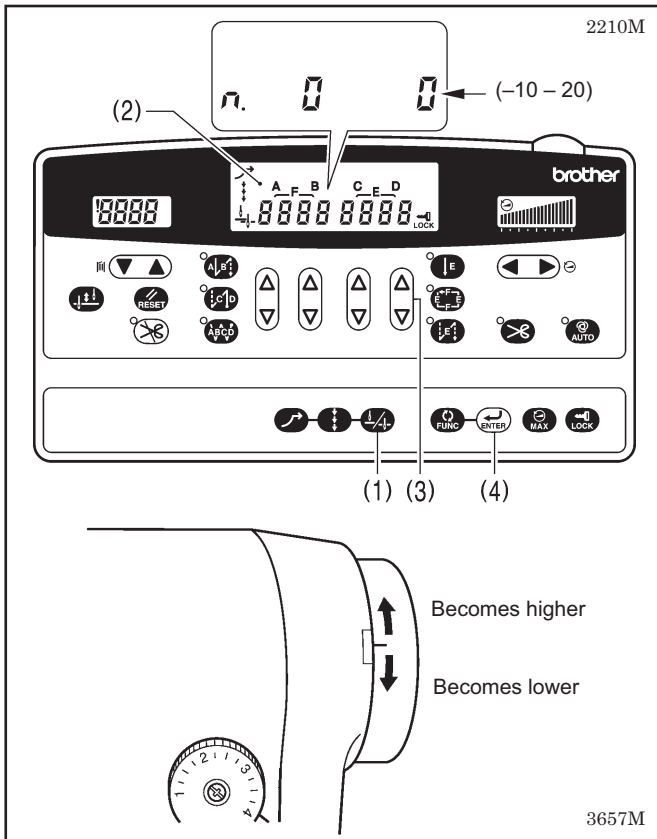
(22) Needle up/down key



- 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 \downarrow (23) is illuminated, the needle bar stops in the up position.
 - When the needle down icon \downarrow (24) is illuminated, the needle bar stops in the down position.

2207M 2208M 2174M

6-2. Adjusting the needle up stop position

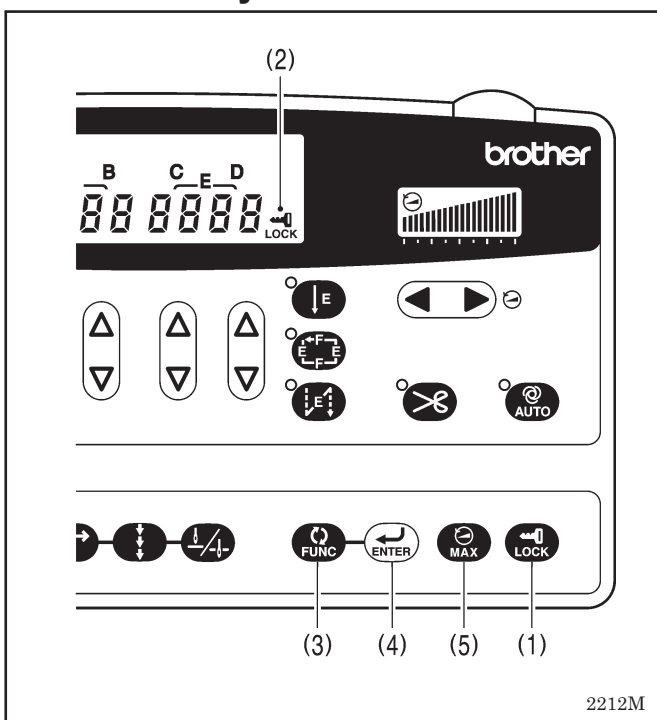


1. While pressing the needle up/down key (1), turn on the power switch.
2. "n.0 xx" will appear in the main display (2). ("xx" is the setting value for the needle up stop position, and "0" is the default setting.)
3. Press the Δ or ∇ key (3) to change the setting value for the needle up stop position.
 - If you press the Δ key, the setting value will increase up to 20 and the needle up stop position will become lower.
 - If you press the ∇ key, the setting value will decrease down to -10 and the needle up stop position will become higher.
4. Press the ENTER key (4) for two seconds or more. A long buzzer will sound and the main display (2) will change to stitch number display mode. (This completes the needle up stop position setting.)

* A setting value of "10" corresponds to an angle of rotation of approximately 10° for the upper shaft.

2138M 2139M

6-3. 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.

6-4. Resetting all settings to their defaults

While holding down the RESET key, turn on the power switch.

If you press the ENTER key, the settings will then be reset.

Once the settings have been reset, "init ALL" appears in the display and the operation panel settings are reset to their factory default settings.

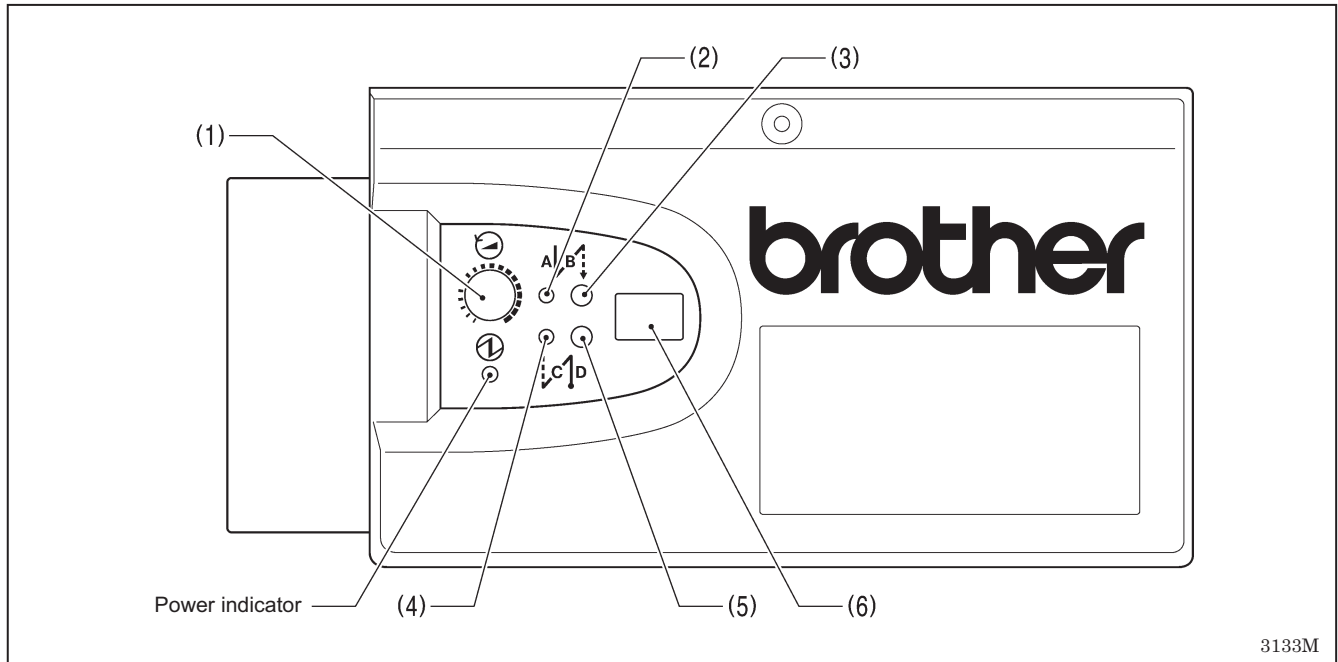
Once the above display appears, normal operation will then be possible.

7. USING THE CONTROL BOX PANEL (BASIC OPERATIONS)

NOTE

The control box panel will not operate when the machine head operation panel is connected.

7-1. Names and functions



3133M

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

(1) Speed control

- This lets you adjust the sewing speed when the treadle is fully depressed.
- The sewing speed becomes faster when the speed control (1) is turned clockwise.

(2) Start backtick indicator

(3) Start backtick key

<For start and end backtacking mode>

When the start backtick key (3) is pressed so that the start backtick indicator (2) illuminates, the number of start backtick stitches set for A and B (0-9) are sewn.

<For continuous backtacking mode>

When the start backtick key (3) is pressed so that the start backtick indicator (2) illuminates, the number of stitches (0-9) set for A, B, C and D will be sewn continuously for a single cycle.

(4) End backtick indicator

(5) End backtick key

When the end backtick key (5) is pressed so that the end backtick indicator (4) illuminates, the number of end backtick stitches set for C and D (0-9) are sewn.

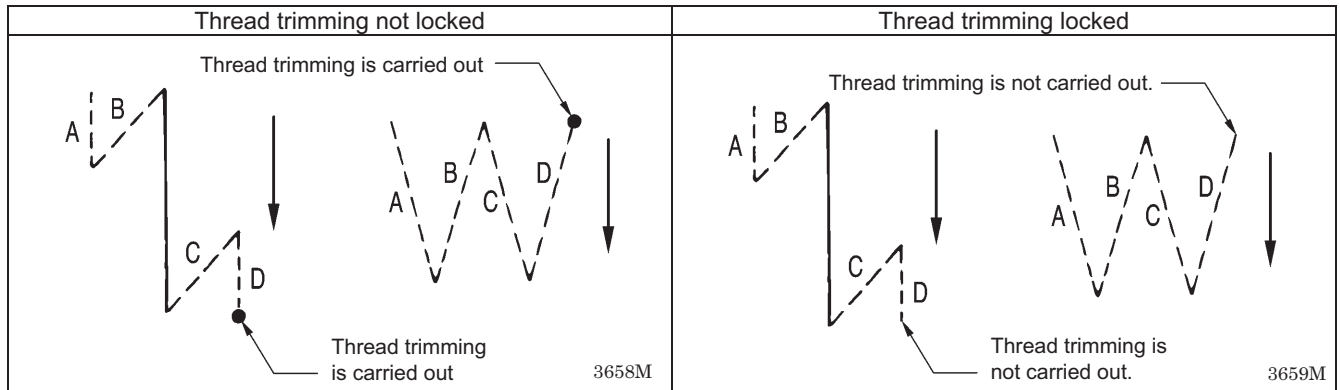
NOTE: This key (5) and indicator (4) are only enabled during start and end backtacking mode.

(6) Stitch number display

- This shows the backtacking processes (A, B, C and D) and the number of stitches for each.
NOTE: This is only displayed when making the settings.
- It also displays error codes.

7-2. Sewing start and end backtacking and continuous backtacking and locking thread trimming

<Setting method>



1 Activating setting mode

1. If the power is turned on, turn off the power switch (1) temporarily.
2. While pressing the start backtack key (2), turn on the power switch (1).

3660M

2 Switching between start and end backtacking mode and continuous backtacking mode

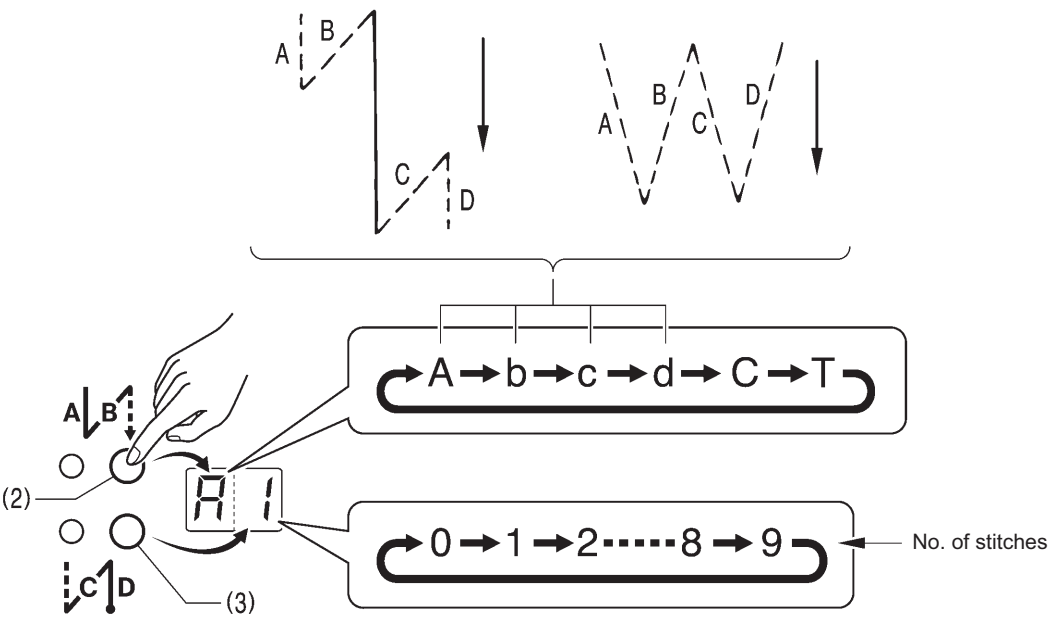
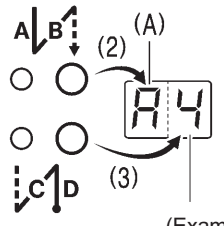
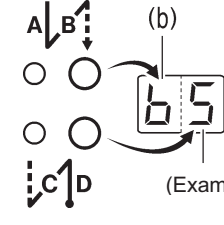
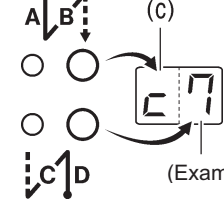
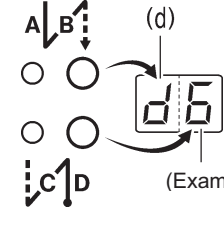
(For example 0: Start and end backtacking mode)

1. Press the start backtack key (2) so that "C" is displayed in the top row of the stitch number display.
2. Press the end backtack key (3) to set the mode in the bottom row of the stitch number display.

3661M

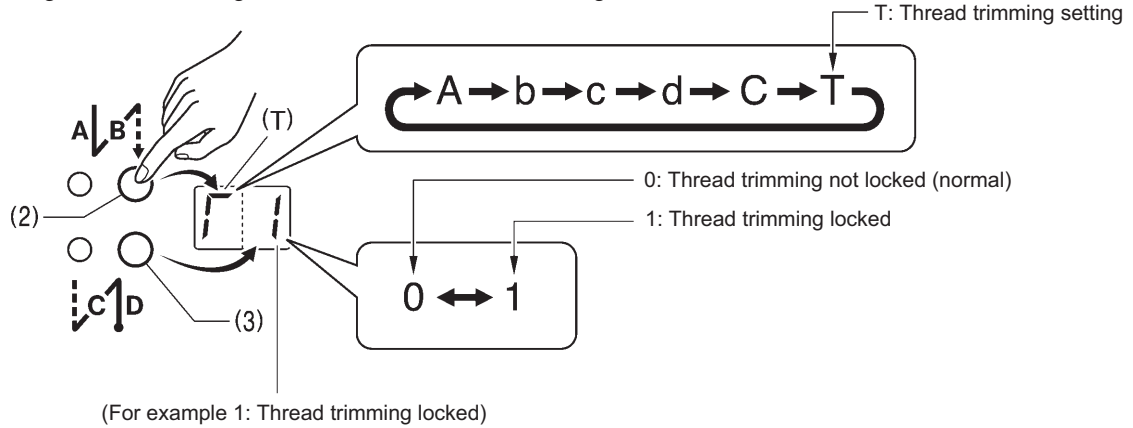
(Continued on next page)

7. USING THE CONTROL BOX PANEL (BASIC OPERATIONS)

	<p>Setting the number of stitches for start and end backtacking and continuous backtacking</p> 	3662M	
<p>3</p>	<p>Stitch number setting (A)</p>  <p>(Example: 4)</p>	<ol style="list-style-type: none"> 1. Press the start backtack key (2) so that "A" is displayed in the top row of the stitch number display. 2. Press the end backtack key (3) to set the number of stitches for A in the bottom row of the stitch number display. 	3663M
<p>4</p>	<p>Stitch number setting (B)</p>  <p>(Example: 5)</p>	<ol style="list-style-type: none"> 1. Press the start backtack key (2) so that "b" is displayed. 2. Press the end backtack key (3) to set the number of stitches for b. 	3137M
<p>5</p>	<p>Stitch number setting (C)</p>  <p>(Example: 7)</p>	<ol style="list-style-type: none"> 1. Press the start backtack key (2) so that "c" is displayed. 2. Press the end backtack key (3) to set the number of stitches for c. 	3138M
<p>6</p>	<p>Stitch number setting (D)</p>  <p>(Example: 6)</p>	<ol style="list-style-type: none"> 1. Press the start backtack key (2) so that "d" is displayed. 2. Press the end backtack key (3) to set the number of stitches for d. 	3139M

7

Selecting "Thread trimming not locked" and "Thread trimming locked"



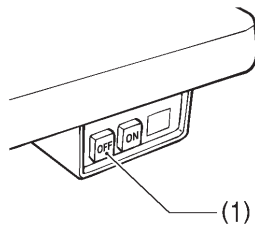
1. Press the start backtack key (2) so that "T" is displayed in the top row of the stitch number display.
2. Press the end backtack key (3) to set either "Thread trimming not locked" or "Thread trimming locked" in the bottom row of the stitch number display.

3664M

8

Exiting setting mode

Set the power switch (1) to OFF.

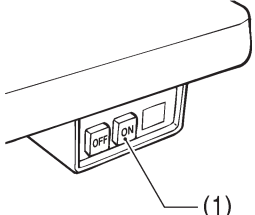
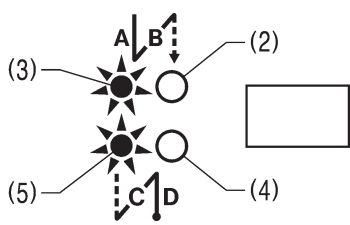
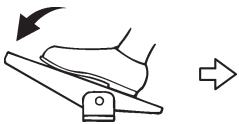
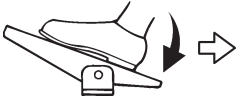


3665M

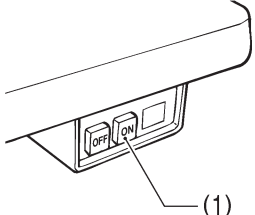
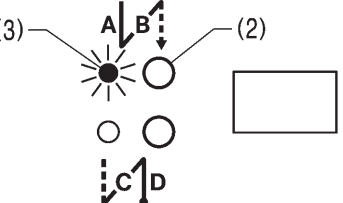
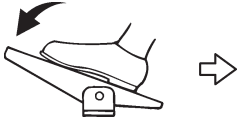
Refer to the next page for details on sewing "Start and end backtacking" or "Continuous backtacking".

7. USING THE CONTROL BOX PANEL (BASIC OPERATIONS)

<Start and end backtack sewing method>

<p>1</p>		<p>Press the power switch (1) to turn on the power.</p> <p style="text-align: right;">3141M</p>
<p>2</p>		<ol style="list-style-type: none"> 1. Press the start backtack key (2) so that the start backtack indicator (3) illuminates. 2. Press the end backtack key (4) so that the end backtack indicator (5) illuminates. <p style="text-align: right;">3142M</p>
<p>3</p>		<p>Start backtacking is carried out. After it has finished, normal sewing continues for as long as the treadle remains depressed.</p> <p>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.</p> <p style="text-align: right;">2159M</p>
<p>4</p>		<p>End backtacking is carried out. After it has finished, the thread is trimmed automatically and the sewing machine stops in the needle up position.</p> <p>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.</p> <p style="text-align: right;">2160M</p>

<Continuous backtack sewing method >

<p>1</p>		<p>Press the power switch (1) to turn on the power.</p> <p style="text-align: right;">3141M</p>
<p>2</p>		<p>Press the start backtack key (2) so that the start backtack indicator (3) flashes.</p> <p style="text-align: right;">3666M</p>
<p>3</p>		<p>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.</p> <p>NOTE:</p> <ul style="list-style-type: none"> • If "Thread trimming locked" is set, the sewing machine will stop in the needle up position without thread trimming being carried out. • 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. <p style="text-align: right;">2159M</p>

8. USING THE CONTROL BOX PANEL (ADVANCED OPERATIONS)

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

NOTE:

The control box panel will not operate when the machine head operation panel is connected.

8-1. Before setting any functions

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.

1		<p>Set DIP switch -3 to OFF. (This will cancel the lock so that the functions can be set.)</p> <p style="text-align: right;">3143M</p>
2		<p>While pressing the end backtack key (2), press the power switch (3) to turn on the power.</p> <p style="text-align: right;">3144M</p>
3		<ol style="list-style-type: none"> 1. The top row of the stitch number display will change in the order shown each time the start backtack key (4) is pressed. 2. Select the display that matches the required setting, and then make the setting. (Refer to section 8-2 and after.) <p style="text-align: right;">3145M</p>

8-2. Changing the needle stop position

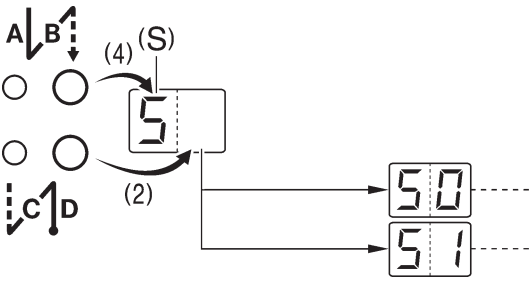
This sets whether the needle bar stops in the needle up stop position or the needle down stop position when the treadle is returned to the neutral position and sewing stops.

1		<ol style="list-style-type: none"> 1. Press the start backtack key (4) so that "n" is displayed in the top row of the stitch number display. 2. Press the end backtack key (2) to set the "n" or "-" in the bottom row of the stitch number display. <p style="text-align: right;">3146M</p>
2	<p>Set DIP switch -3 to ON. (The settings will be locked.)</p>	

8. USING THE CONTROL BOX PANEL (ADVANCED OPERATIONS)

8-3. Slow start

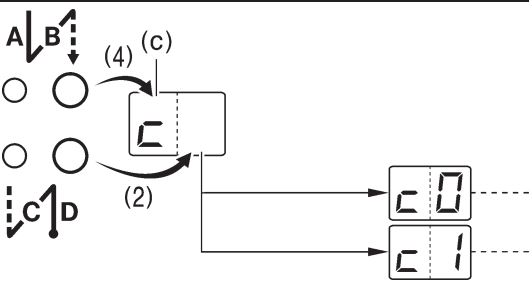
The first two stitches sewn after the thread is trimmed are sewn at a speed of 700 rpm. After this, the sewing speed corresponds to the treadle depression amount.

<p>1</p> 	<ol style="list-style-type: none"> 1. Press the start backtack key (4) so that “S” is displayed in the top row of the stitch number display. 2. Press the end backtack key (2) to set the value in the bottom row of the stitch number display.
<p>2</p>	<p>Set DIP switch -3 to ON. (The settings will be locked.)</p>

3147M

8-4. Correction sewing

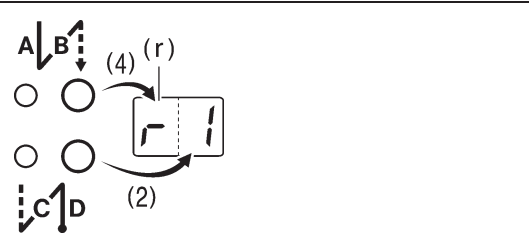
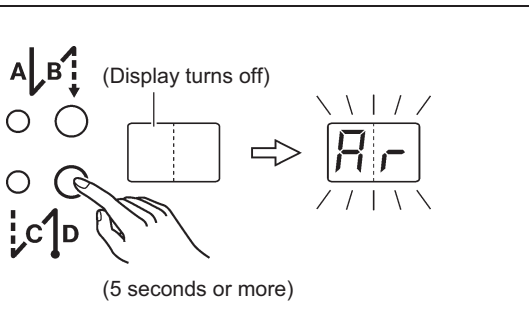
This sews at slow speed (220 rpm) while the actuator is being pressed when the sewing machine is stopped.

<p>1</p> 	<ol style="list-style-type: none"> 1. Press the start backtack key (4) so that “c” is displayed in the top row of the stitch number display. 2. Press the end backtack key (2) to set the value in the bottom row of the stitch number display.
<p>2</p>	<p>Set DIP switch -3 to ON. (The settings will be locked.)</p>

3148M

8-5. Initialization method

This returns the control box panel settings to the factory default settings.

<p>1</p> 	<ol style="list-style-type: none"> 1. Press the start backtack key (4) so that “r” is displayed in the top row of the stitch number display. 2. Press the end backtack key (2) to set the value in the bottom row of the stitch number display to “1”.
<p>2</p>  <p>(5 seconds or more)</p>	<ol style="list-style-type: none"> 1. Then, press and hold the end backtack key (2) for 5 seconds or more. (The display will turn off.) 2. After this, “Ar” will flash and the initialization will be complete.
<p>3</p>	<p>Set DIP switch -3 to ON. (The settings will be locked.)</p>

3149M

3150M

8-6. Setting the needle up stop position and needle down stop position

Meaning of displays during setting

- The stop position is set numerically, and "A" to "F" represent the numbers "10" to "15" respectively.
- A setting value of "8" corresponds to an angle of rotation of approximately 8° for the upper shaft.

Display	A	b	c	d	E	F
Value	10	11	12	13	14	15

<Needle up stop position>

1

3151M

- Press the start backtick key (4) so that "-" is displayed in the top row of the stitch number display.
- Press the end backtick key (2) to set the value.

3657M

2 Set DIP switch -3 to ON.
(The settings will be locked.)

<Needle down stop position>

1

3152M

- Press the start backtick key (4) so that "-" is displayed in the top row of the stitch number display.
- Press the end backtick key (2) to set the value.

2 Set DIP switch -3 to ON.
(The settings will be locked.)

9. SEWING

! CAUTION



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



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.

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

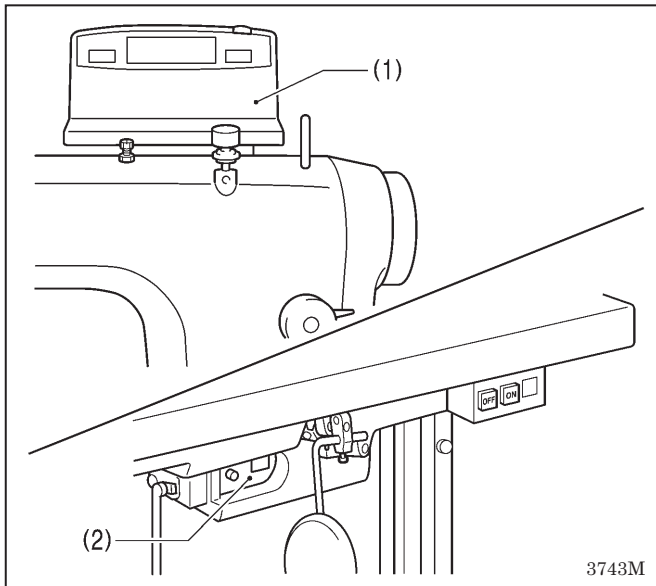


Do not touch any of the moving parts or press any objects against the machine while sewing, as this may result in personal injury or damage to the machine.



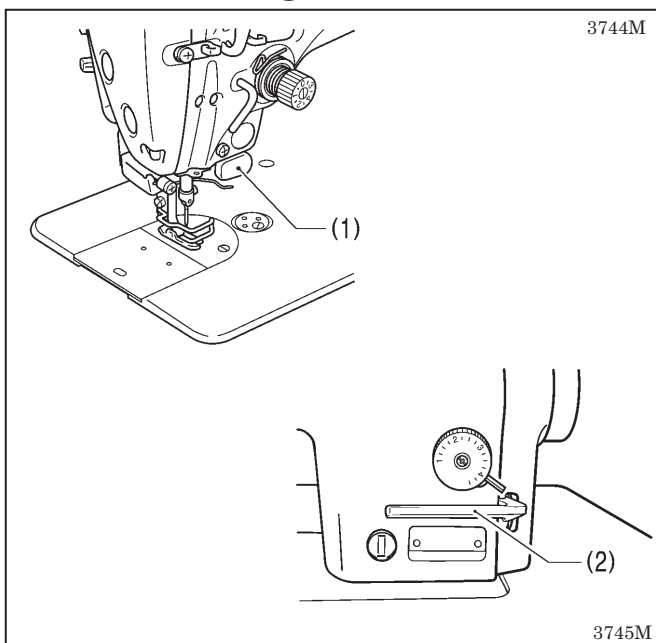
Use both hands to hold the machine head when tilting it back or returning it to its original position. If only one hand is used, the weight of the machine head may cause your hand to slip, and your hand may get caught.

9-1. Sewing



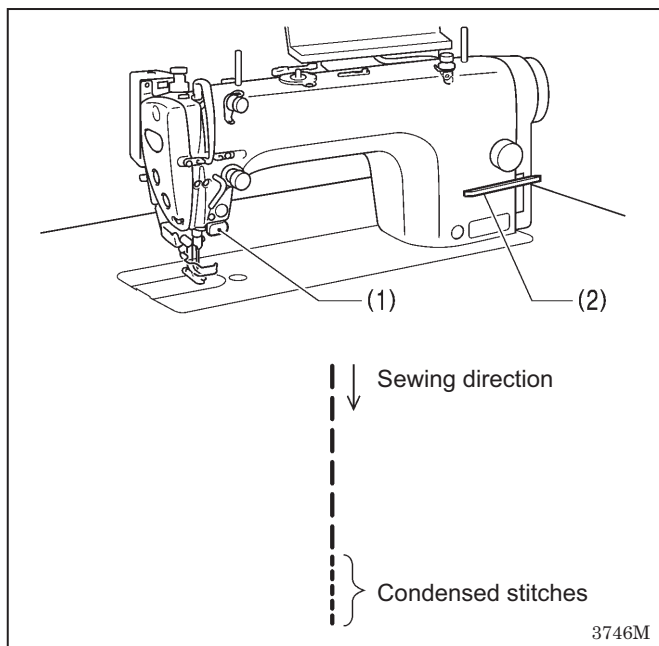
1. Carry out the programming which is necessary for sewing. (Refer to "Using the operation panel (1)" or "Using the control box panel (2)".)
2. Depress the treadle to start sewing.

9-2. Backtacking

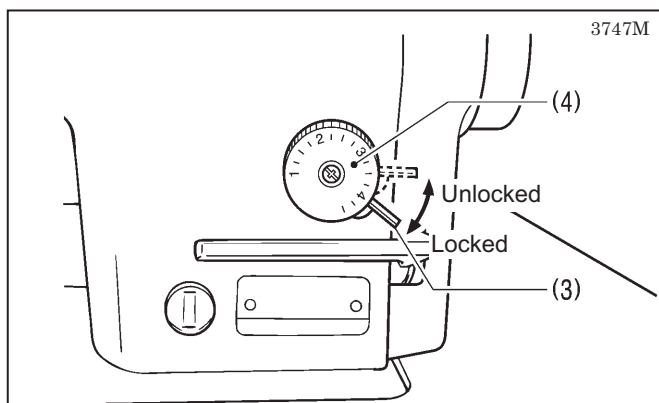


When the actuator (1) or the reverse lever (2) is pressed during sewing, the feed direction will be reversed. When it is released, the feed direction will return to normal.

9-3. Sewing condensed stitches



- If you press the actuator (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.



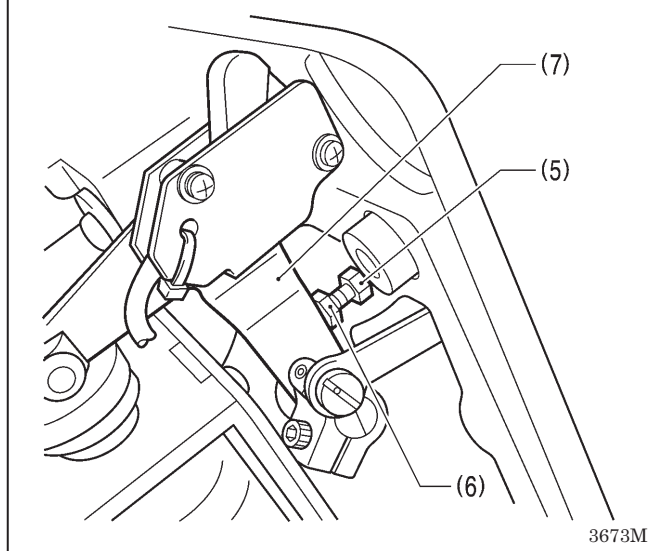
<Setting>

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 (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).



10. THREAD TENSION

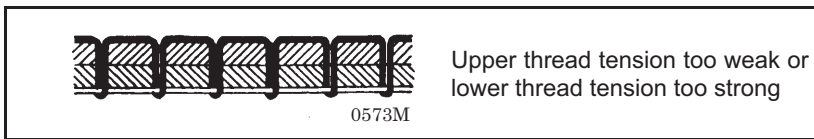
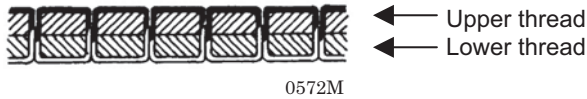
10-1. Adjusting the thread tension

⚠ CAUTION



Turn off the power switch before removing or inserting the bobbin case.
The machine may operate if the treadle is depressed by mistake, which could result in injury.

Good even stitches



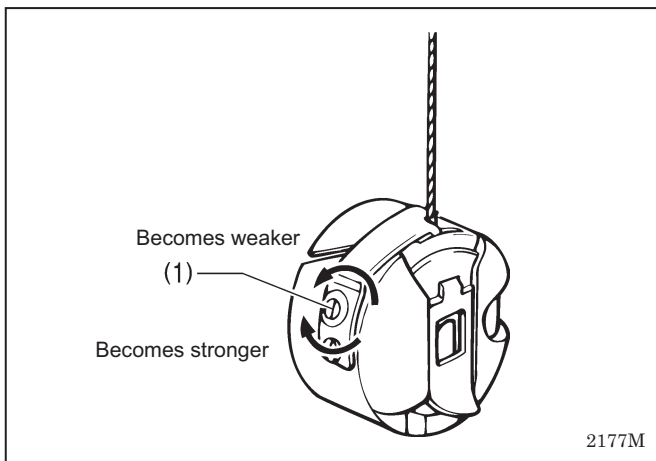
Upper thread tension too weak or lower thread tension too strong

→ Increase the upper thread tension.
Decrease the lower thread tension.



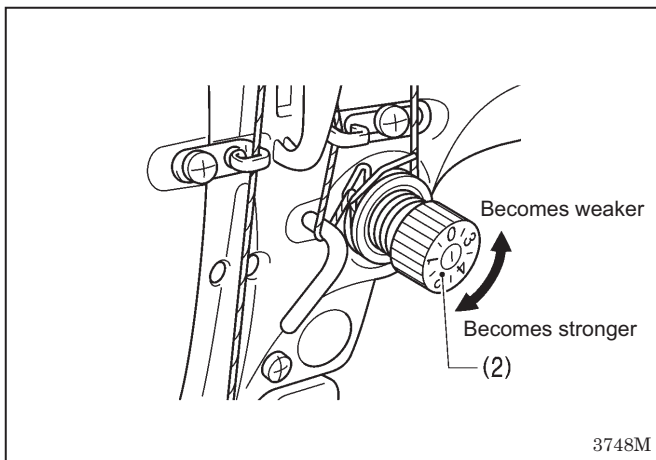
Upper thread tension too strong or lower thread tension too weak

→ Decrease the upper thread tension.
Increase the lower thread tension.



<Lower thread tension>

Adjust by turning the adjustment screw (1) until the bobbin case drops gently by its own weight while the thread end coming out of the bobbin case is held.



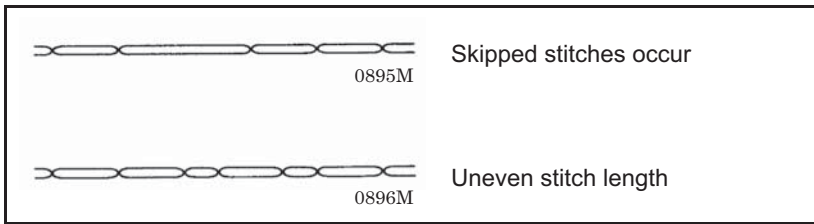
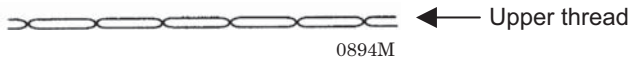
<Upper thread tension>

After the lower thread tension has been adjusted, adjust the upper thread tension so that a good, even stitch is obtained.

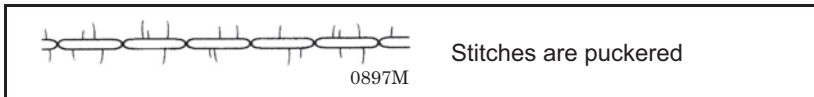
1. Lower the presser foot.
2. Adjust by turning the tension nut (2).

10-2. Adjusting the presser foot pressure

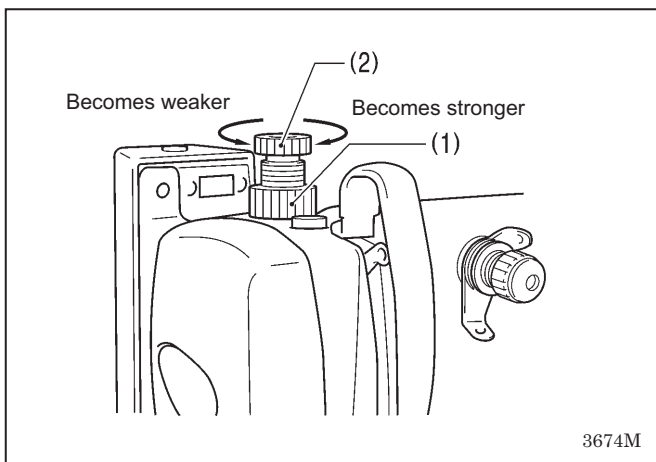
Correct stitches



→ Increase the pressure.



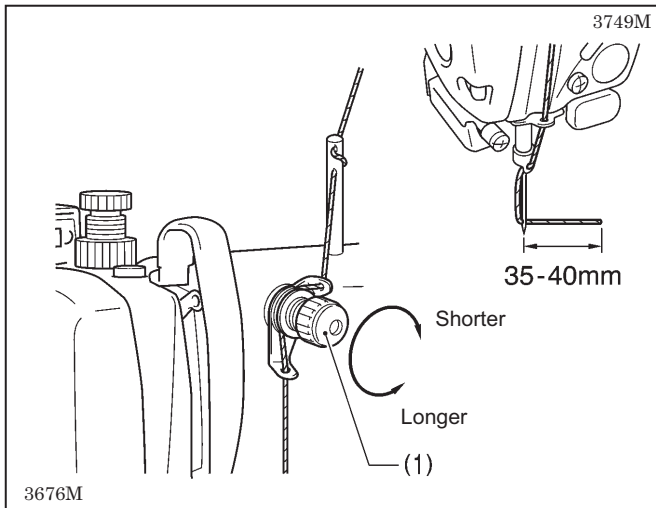
→ Decrease the pressure.



The presser foot pressure should be as weak as possible, but strong enough so that the material does not slip.

1. Loosen the adjusting nut (1).
2. Turn the presser adjusting screw (2) to adjust the presser foot pressure.
3. Tighten the adjusting nut (1).

10-3. Adjusting the trailing length after thread trimming



- At the time of thread trimming, the thread tension is loosened and tension is applied by the pretension (1) only.
- The standard trailing length for the upper thread is 35-40 mm.
- If the tension of the pretension (1) is increased, the lengths of the threads trailing from the needle tips will be reduced; if the tension is reduced, the lengths will be increased.

Adjust by turning the pretension (1).

11. 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.

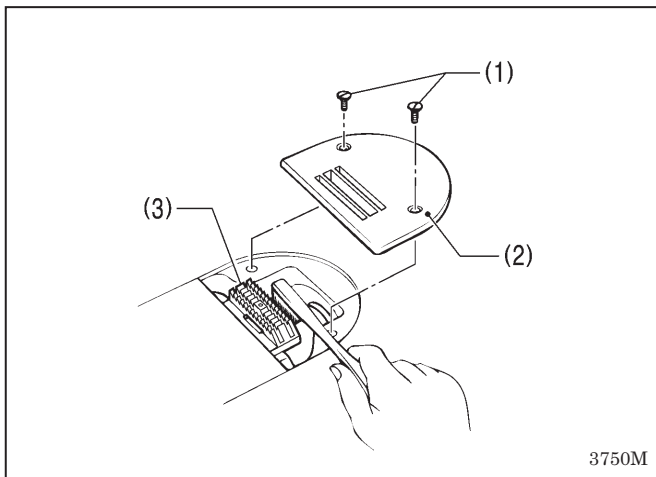


Use both hands to hold the machine head when tilting it back or returning it to its original position. If only one hand is used, the weight of the machine head may cause your hand to slip, and your hand may get caught.

11-1. Daily cleaning procedures

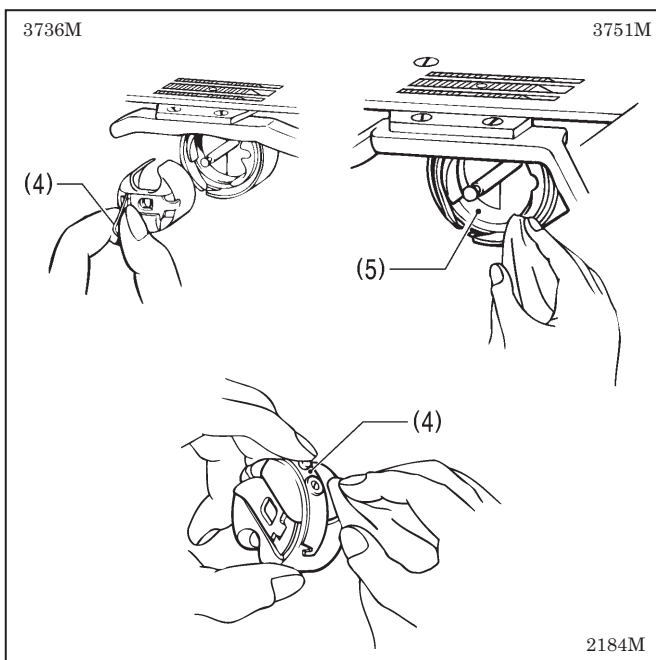
The following cleaning operations should be carried out each day in order to maintain the performance of this machine and to ensure a long service life.

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.

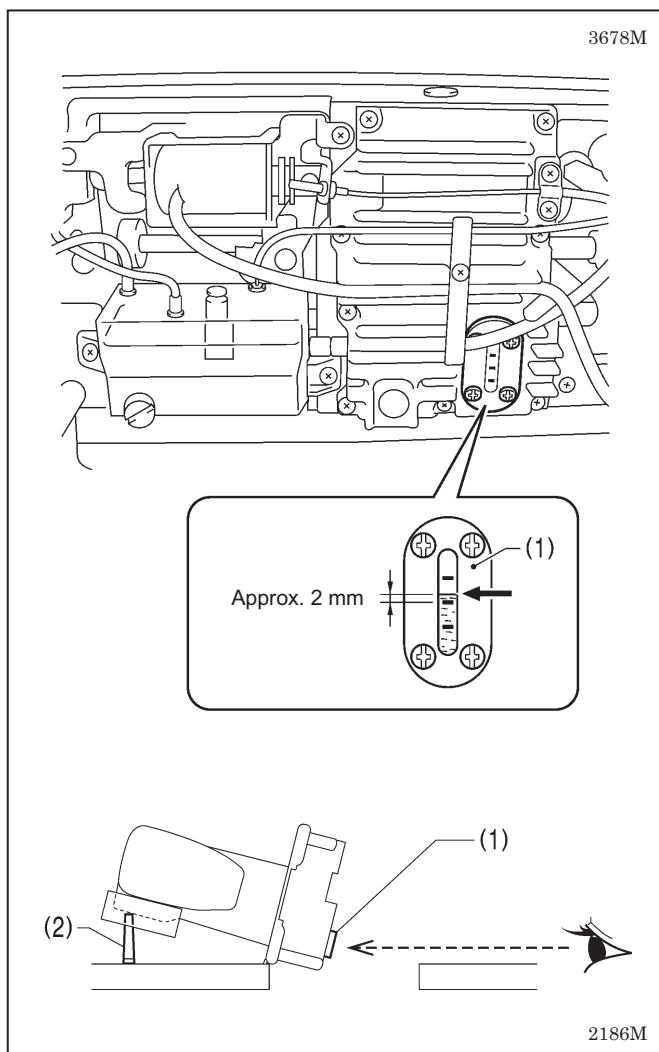


1. Cleaning

1. Raise the presser foot.
2. Remove the two screws (1), and then remove the needle plate (2).
3. Use a soft wire brush to clean any dust from the feed dog (3).
4. Install the needle plate (2) with the two screws (1).



5. Tilt back the machine head.
6. Remove the bobbin case (4).
7. Wipe off any dust from the rotary hook (5) with a soft cloth, and check that there is no damage to the rotary hook (5).
8. Remove the bobbin from the bobbin case (4) and clean the bobbin case (4) with a cloth.
9. Insert the bobbin into the bobbin case (4), and then place the bobbin case (4) back into the machine.



2. Lubrication

A. Gearbox oil quantity

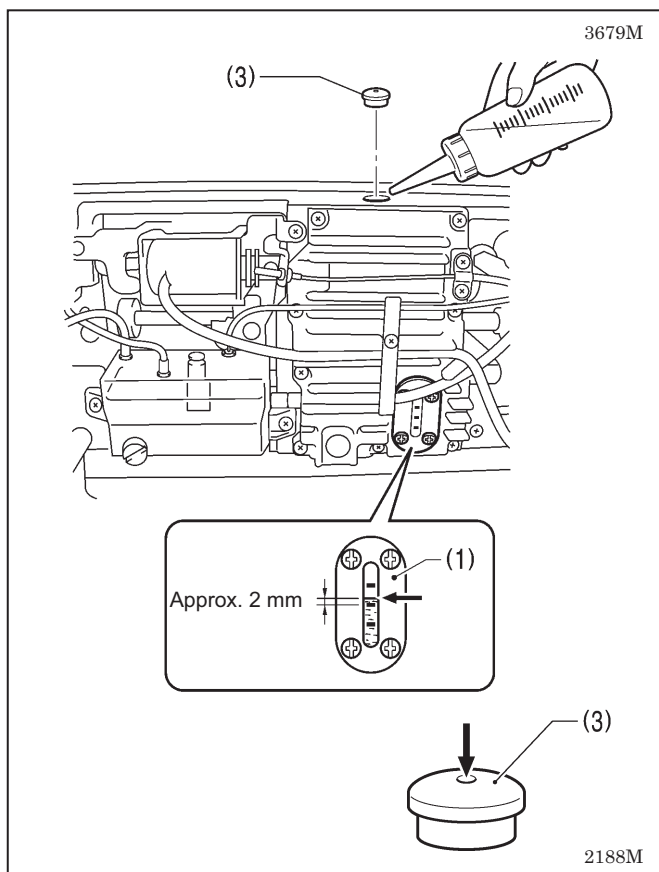
NOTE:

- 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 4 (refer to page 6).

<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.)

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



<Lubrication>

Use only the lubricating oil (Nisseki Mitsubishi Sewing Lube 10N; VG10) specified by Brother.

* If this type of lubricating oil is difficult to obtain, the recommended oil to use is <Exxon Mobil Essotex SM10; VG10>.

1. Remove the rubber cap (3).
2. 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.

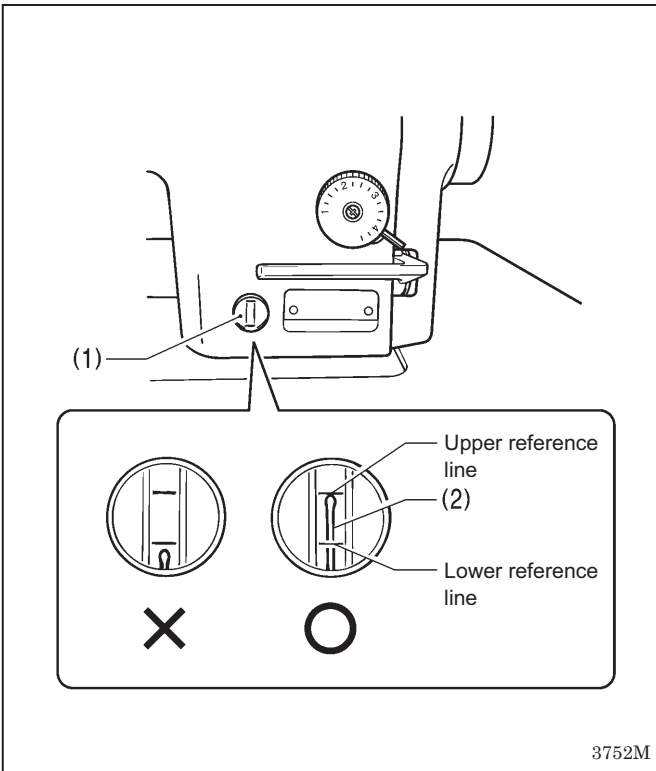
If too much oil is added, oil leaks may result.

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

NOTE:

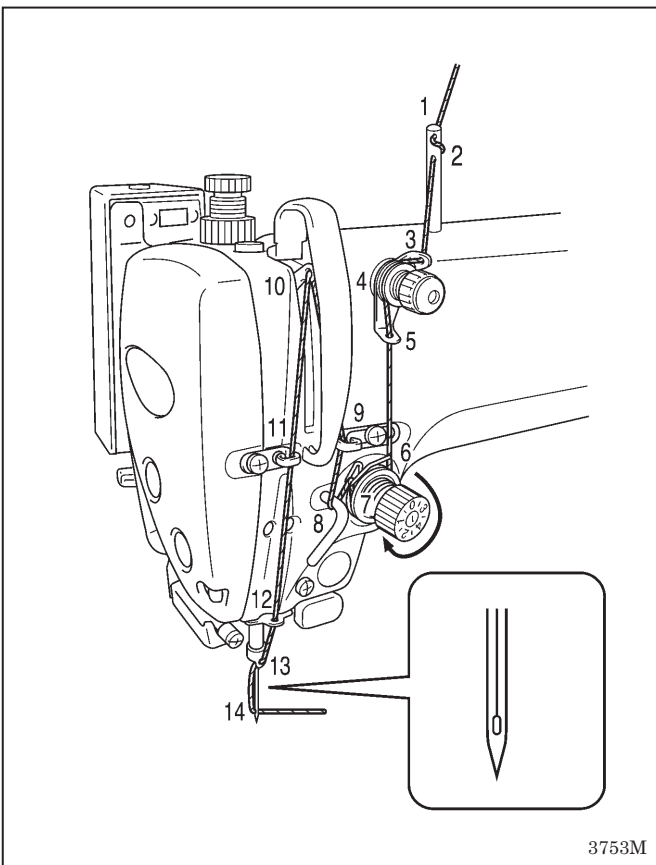
The rubber cap (3) has a hole in it for adjusting the air pressure.

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



B. 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 8.)



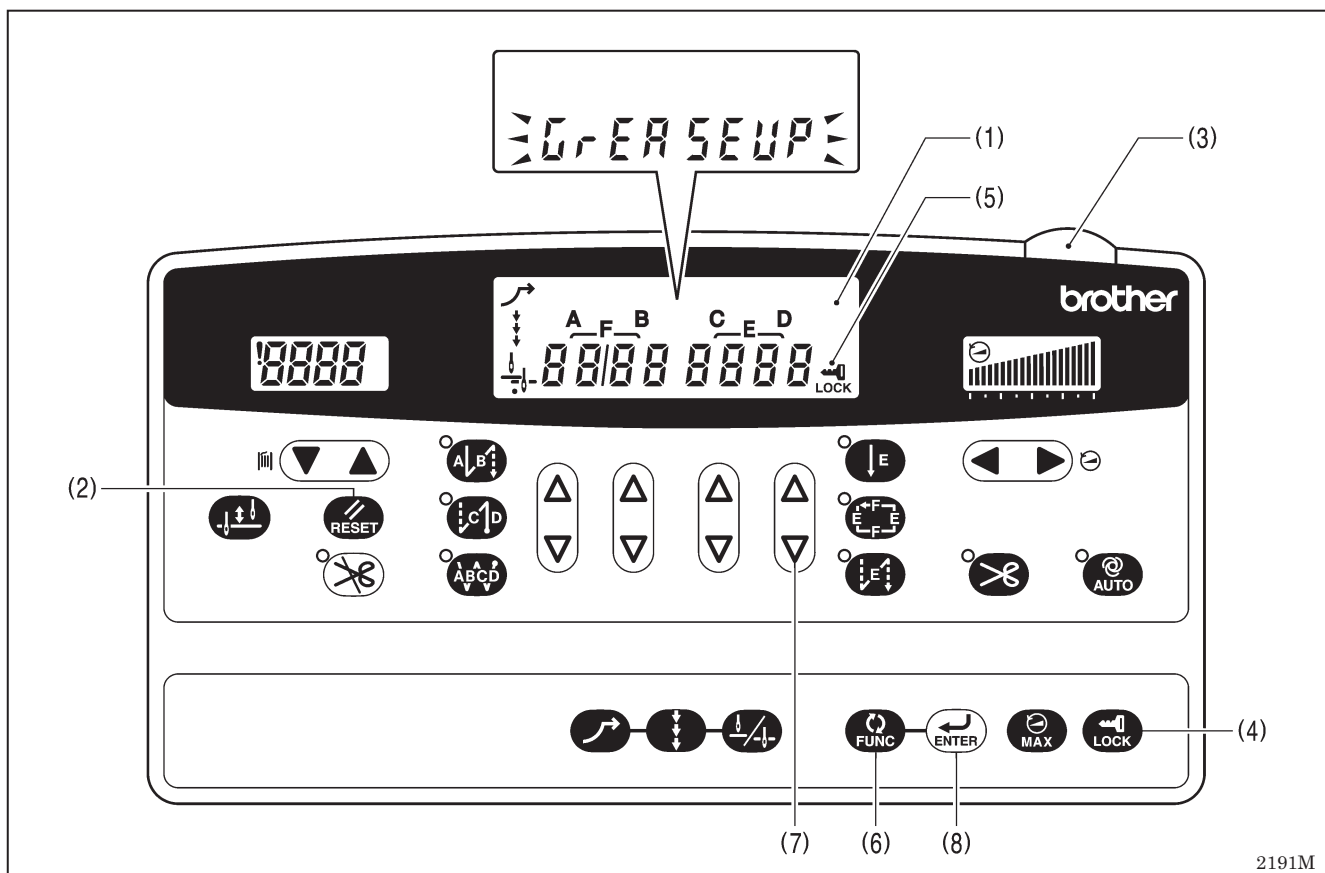
3. Checking

1. Replace the needle if it is bent or if the tip is broken.
2. Check that the upper threads have been threaded correctly. (Refer to page 15.)
3. Carry out a test sewing.

11-2. Applying grease

[When “GrEASEUP” appears...when using the operation panel]

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. (The power indicator (3) will keep flashing.)

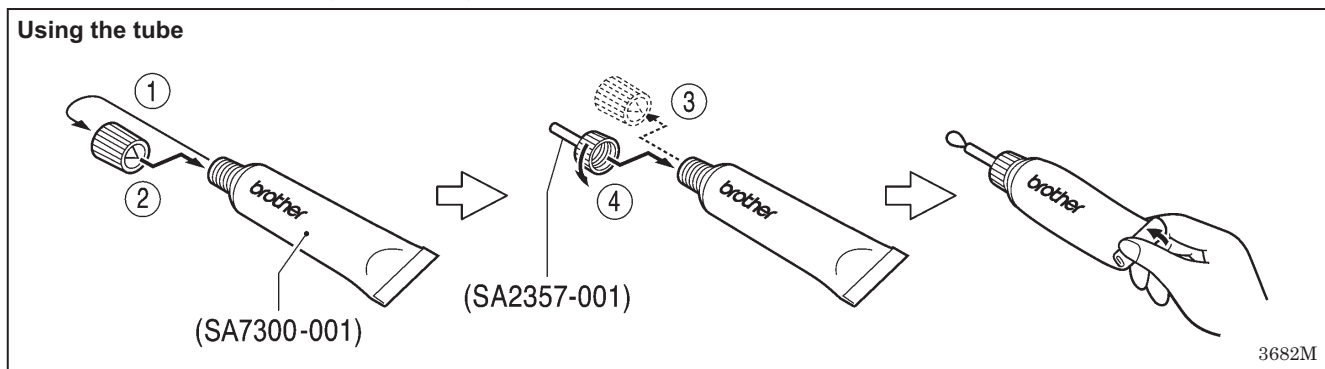
NOTE

- If you do not apply grease when the “GrEASEUP” notification appears, the notification will continue to appear and the power indicator (3) will 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), “Err100” 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>

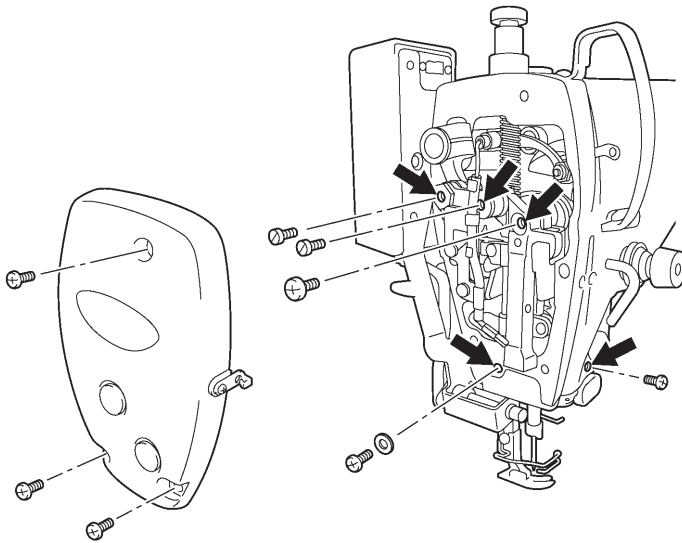
Use Brother-specified grease (SA7300-001).



(Continued on next page)

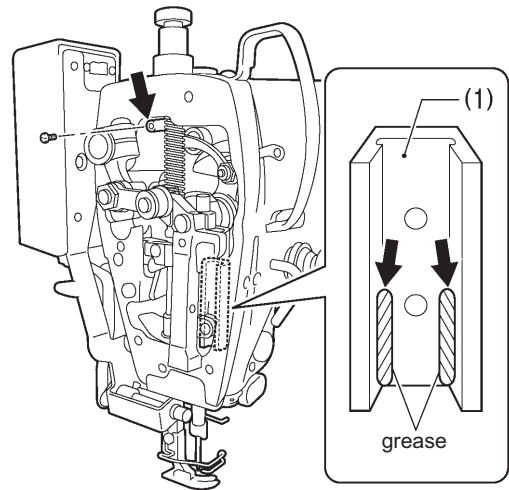
11. CLEANING

<-403, 405, 433 specifications>



3754M

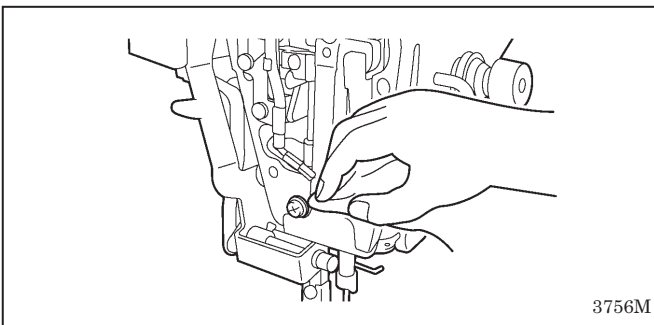
<-433 specifications>



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.

3755M

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.



3756M

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. Turn the power switch to "ON". "GrEASEUP" will flash in the main display (1) and the buzzer will sound.
2. Press the RESET key (2). The main display (1) will change to stitch number display mode.
3. Press and hold the LOCK key (4) for 2 seconds or more.
The lock icon (5) will switch off and the lock will be released.
4. Press the FUNC (Function) key (6). "n.134 Pxxx" will appear in green in the main display (1). ("Pxxx" indicates the grease consumption amount. For example, "P100" means that 100% of the grease has been consumed.)
5. Press the rightmost ∇ key (7). The "Pxxx" will change to "P 0".
6. Press and hold the ENTER key (8) for two seconds or more.
The buzzer will make a long beep, and then the main display (1) will change to stitch number display mode.
7. Depress the treadle to run the sewing machine for 1 second or more.
8. Turn the power switch to "OFF". (This completes the reset procedure.)

2139M

11-3. Applying grease

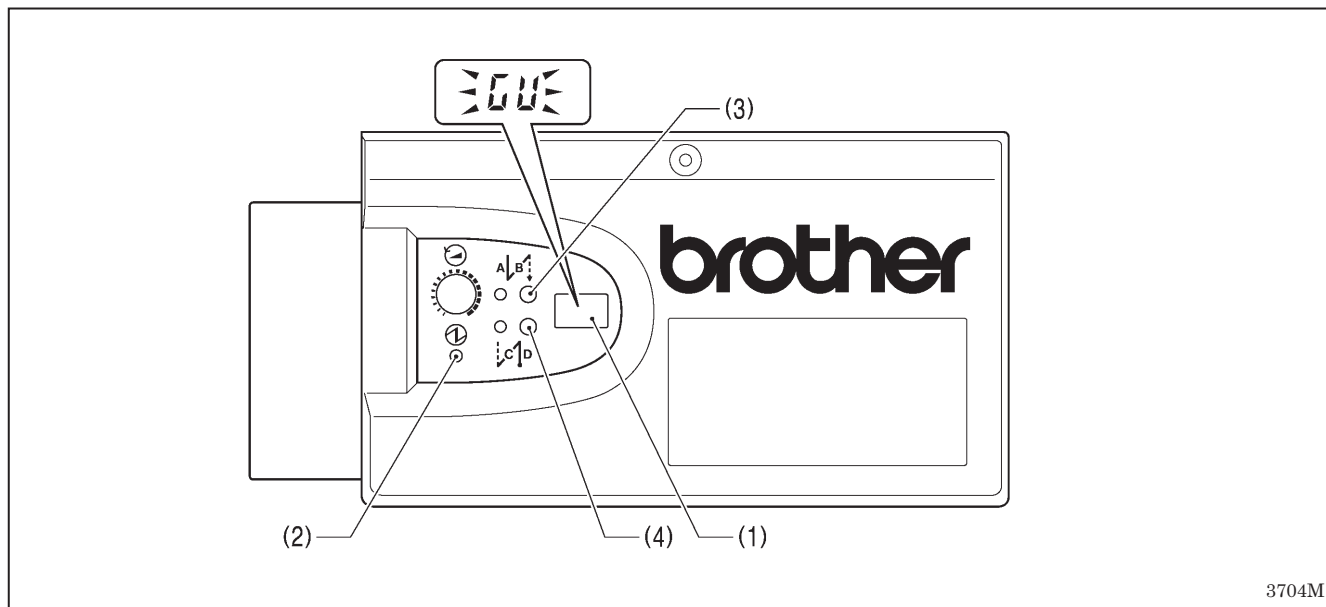
[When “GU” appears ... when using the control box panel]

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.

If “GU” flashes in the stitch number display (1) on the control box panel when the power switch is turned on, it indicates that it is time for grease 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.



3704M

<To continue sewing without applying grease>

1. Press the start backtick key (3).
2. The “GU” in the stitch number display (1) will stop flashing and disappear, and sewing will be possible when the treadle is depressed.
(The power indicator (2) will flash.)

NOTE

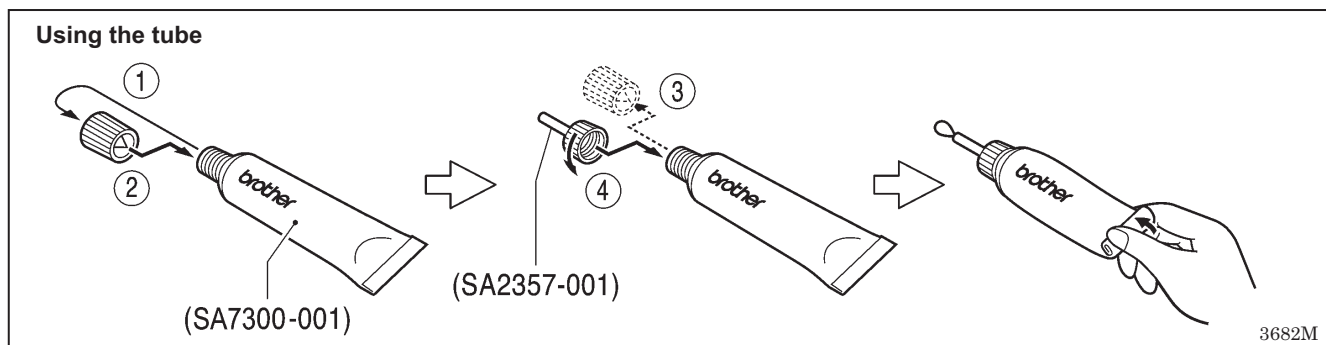
- “GU” will appear each time the power is turned on until you apply grease and reset the notification by carrying out the reset procedure on the following page.
- If you continue to use the sewing machine after the “GU” notification appears without applying grease (or without carrying out the reset procedure), “-0” will appear in the stitch number display (1) 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 (SA7300-001).

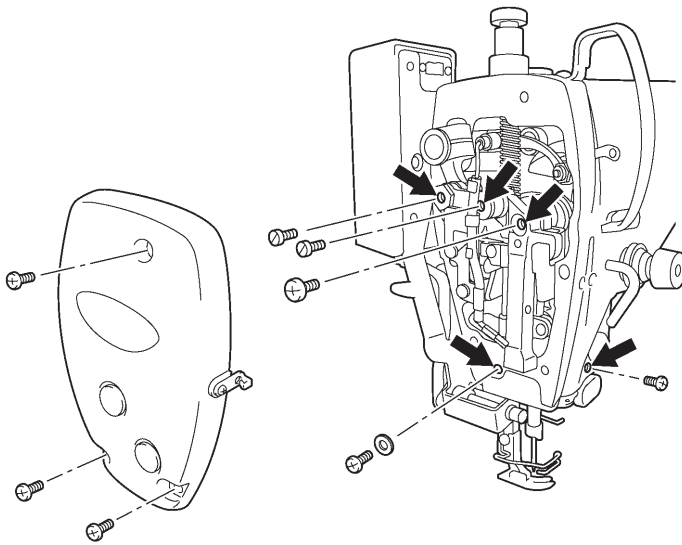


3682M

(Continued on next page)

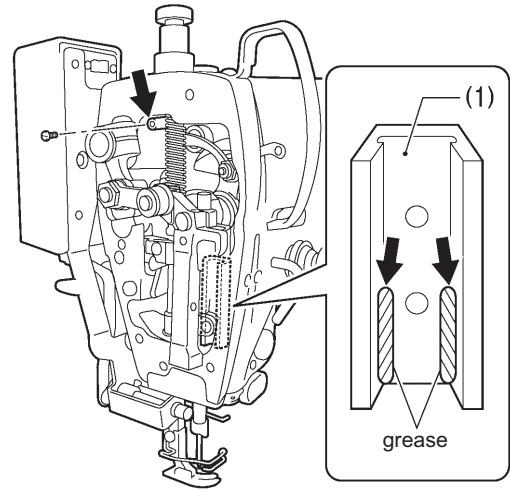
11. CLEANING

<-403, 405, 433 specifications>



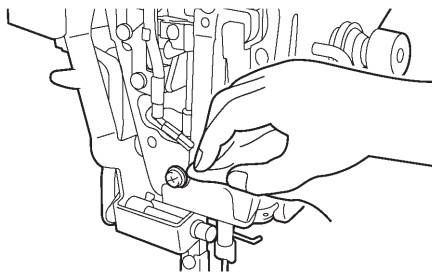
3754M

<-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.

3755M



3756M

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.

<To continue sewing without applying grease>

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

1. Set DIP switch -3 inside the control box to OFF.
(This will cancel the lock so that the functions can be set.)
2. While pressing the end backtack key (4), press the power switch to turn on the power.
3. Press the start backtack key (3) so that "G" is displayed in the top row of the stitch number display.
4. Press the end backtack key (4) to set the value in the bottom row of the stitch number display to "1".
5. Then, press and hold the end backtack key (4) for 5 seconds or more.
(The display will turn off.)
6. After this, "Gr" will flash and the reset operation will be complete.
7. After the reset operation is complete, set DIP switch -3 to ON. (The settings will be locked.)

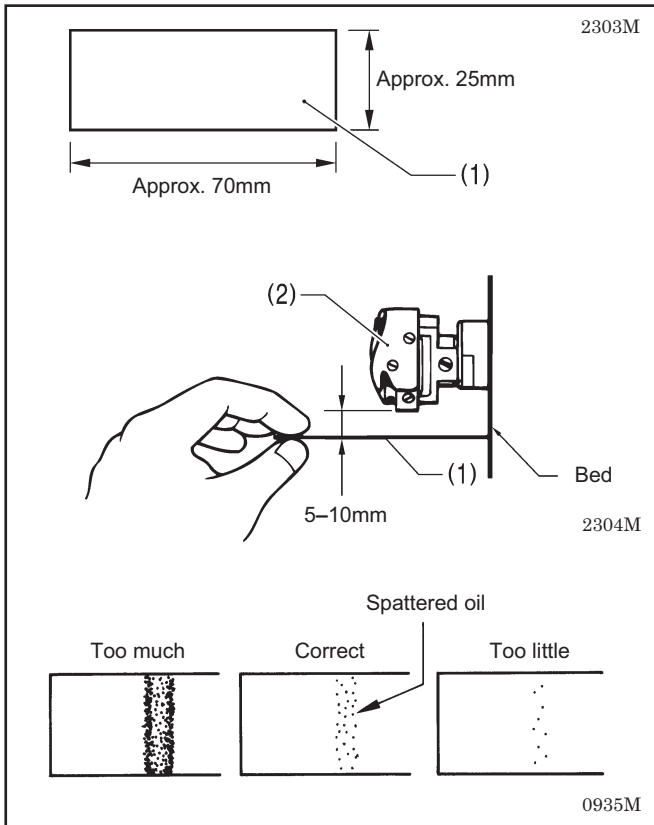
12. ADJUSTING THE ROTARY HOOK LUBRICATION AMOUNT

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.



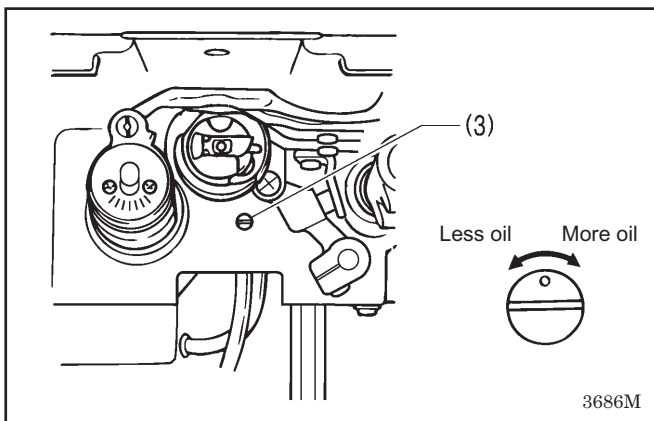
<Checking the lubrication amount>

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>

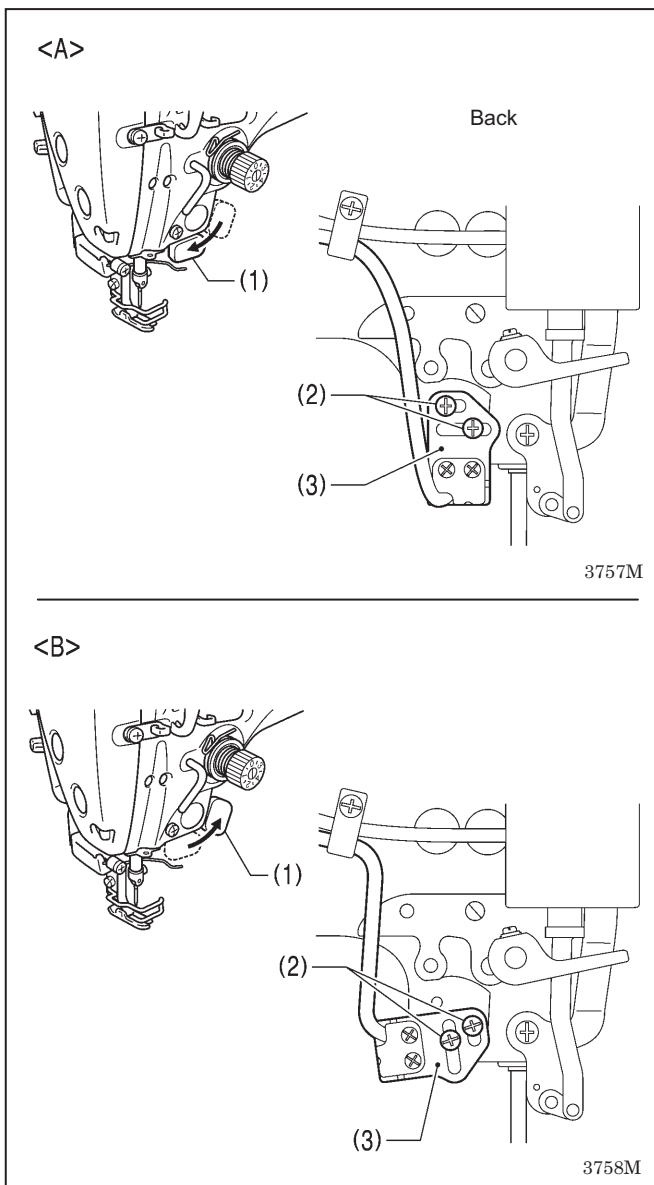
1. Tilt back the machine head.
2. Turn the adjusting screw (3) to adjust the lubrication amount.
 - If the rotary hook adjusting screw (3) is turned clockwise, the lubrication amount becomes greater.
 - If the rotary hook adjusting screw (3) is turned counterclockwise, the lubrication amount becomes 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.

13. 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.
-  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.

13-1. Adjusting the actuator position

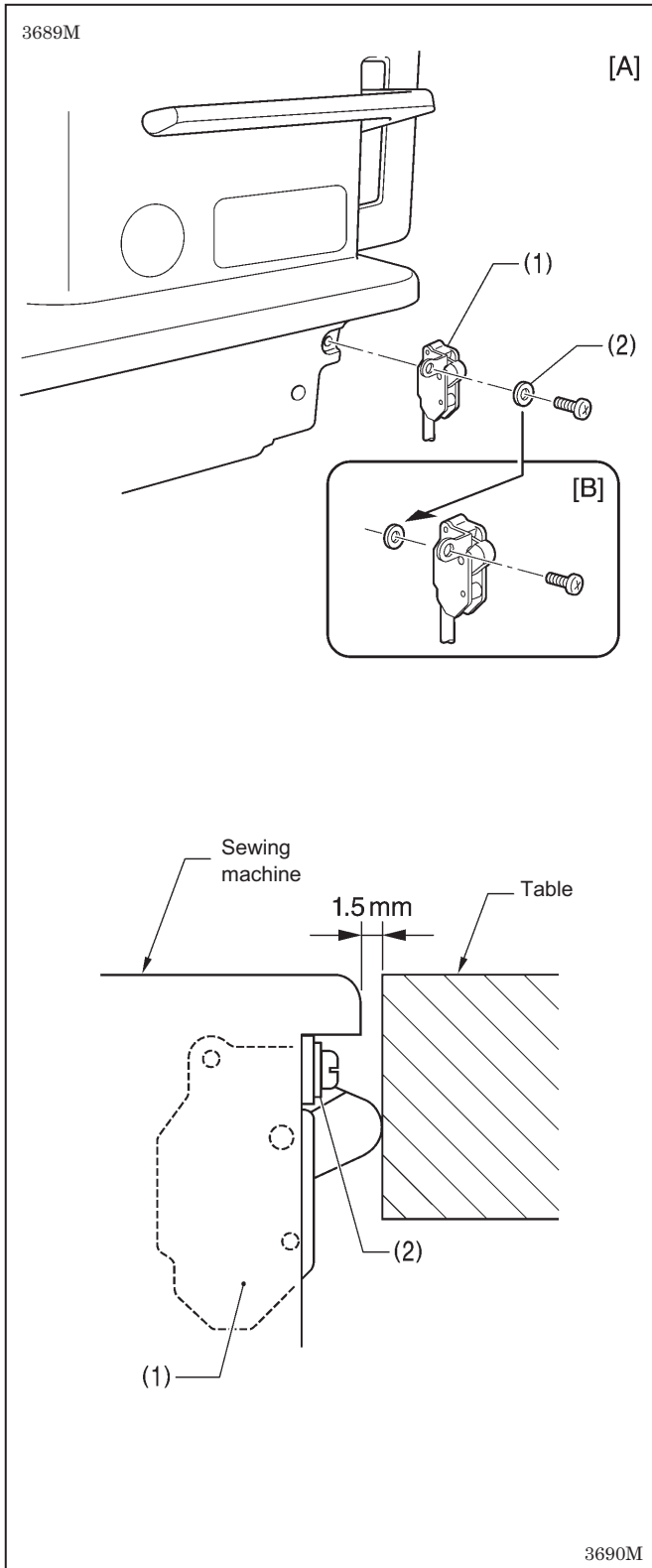


The installation position for the actuator (1) can be adjusted to <A> or .

Adjust so that it is in a position where it is easy to operate.

1. Remove the two screws (2).
2. Move the switch setting base (3) to move the actuator (1) to the preferred position <A> or .
3. Tighten the two screws (2).

13-2. Adjusting the safety switch position



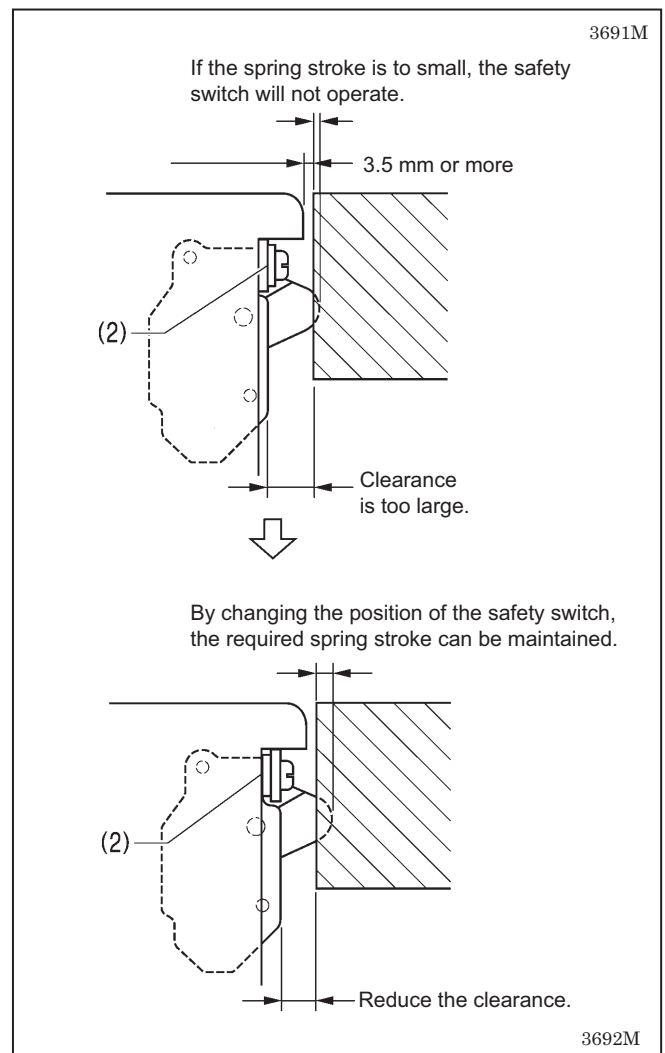
The safety switch (1) is normally installed as shown in figure [A]. However, if the processing method used for the table leaves too much space between the machine head and the table hole, it may adversely affect the operation of the safety switch (1).

<Adjustment method>

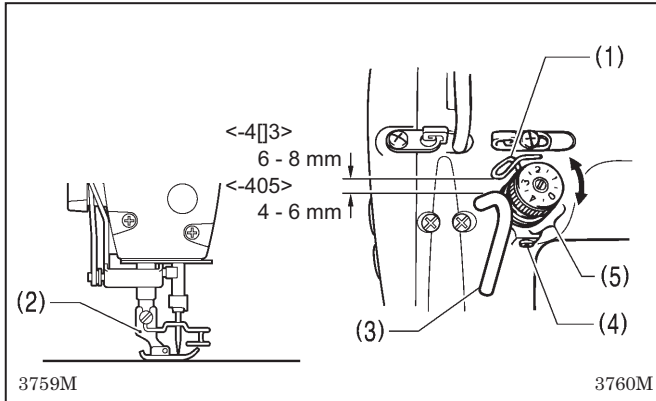
The standard amount of clearance between the machine head and the table hole is 1.5 mm. If the clearance is 3.5 mm or more, install the safety switch (1) so that the washer (2) is on the machine head side as shown in Figure [B].

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

<Safety switch operation>



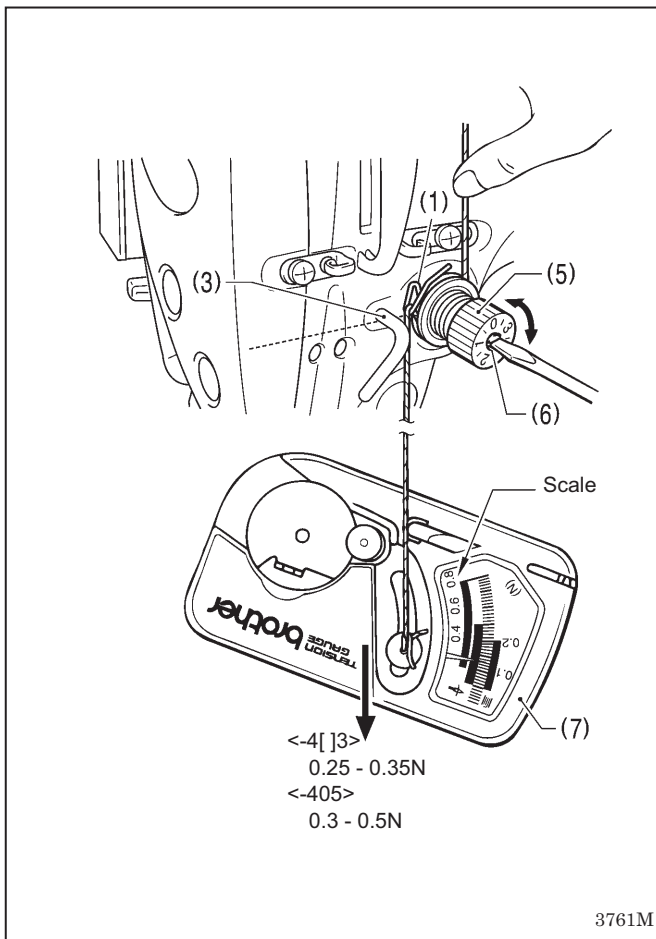
13-3. Adjusting the thread take-up spring



<Thread take-up spring position>

The standard position of the thread take-up spring (1) is 6-8 mm [4-6 mm for -405 specifications] above the surface of the thread guide (3) when the presser foot (2) is lowered.

1. Lower the presser foot (2).
2. Loosen the set screw (4).
3. Turn the thread tension bracket (5) to adjust the spring position.
4. Securely tighten the set screw (4).



<Thread take-up spring tension>

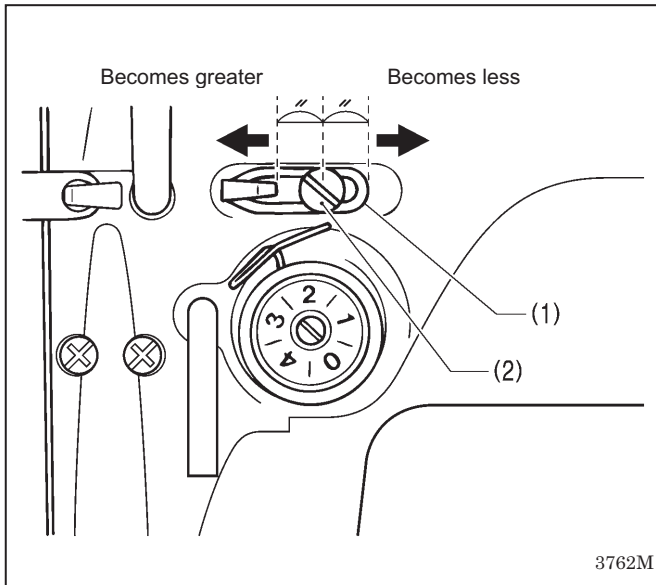
The standard tension of the thread take-up spring (1) varies in accordance with the machine specifications as shown in the table.

-4[]3 specifications	0.25 - 0.35N
-405 specifications	0.30 - 0.5N

1. Push the needle thread with your finger until it is slightly higher than the thread tension bracket (5) and so that the upper thread is not pulled out.
2. Pull the upper thread down until the thread take-up spring (1) is at the same height as the base of the thread guide (3), and then measure the tension of the thread take-up spring (1).
3. Insert a screwdriver into the slot of the tension stud (6), and turn the screwdriver to adjust the tension of the thread take-up spring (1).

NOTE: If using the tension gauge (7) (sold separately) to measure the tension, take the reading from the scale on the side of the red line.

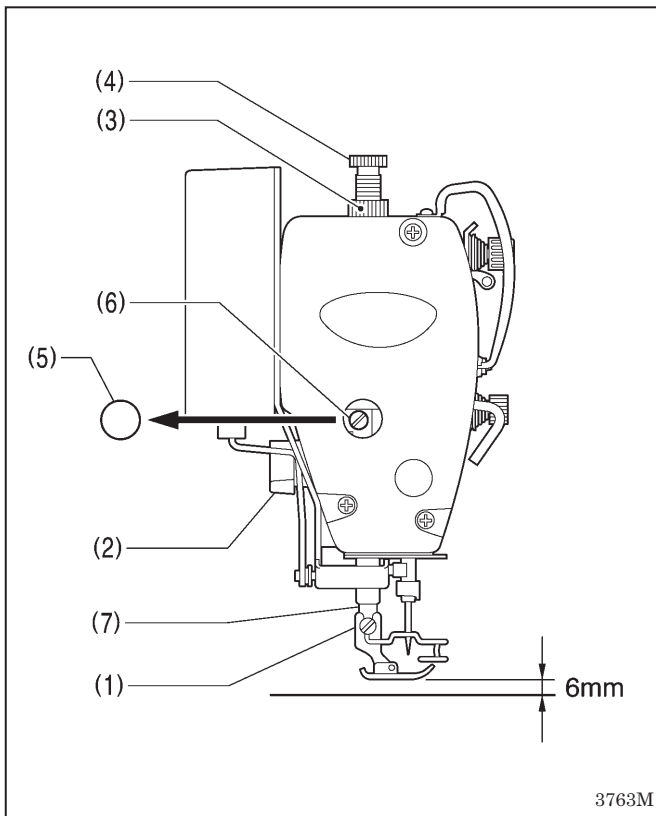
13-4. Adjusting arm thread guide R



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.)

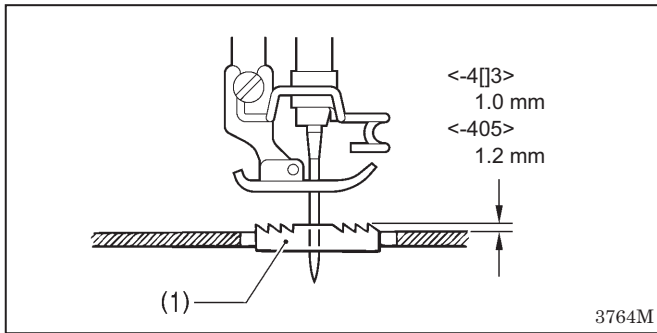
13-5. Adjusting the presser foot height



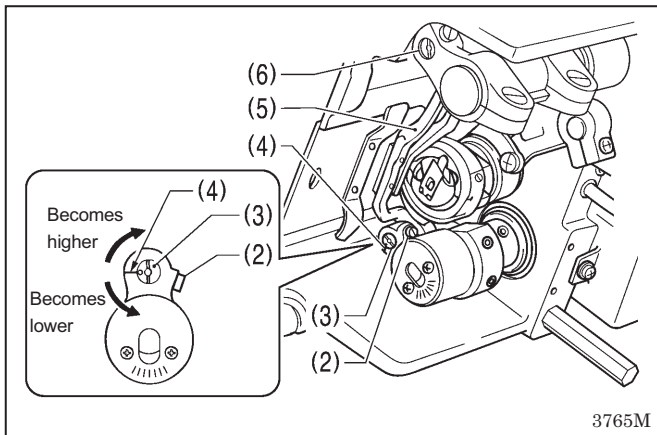
The standard height of the presser foot (1) is 6 mm when the presser foot (1) is raised by means of the lifting lever (2).

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).

13-6. Adjusting of the feed dog height

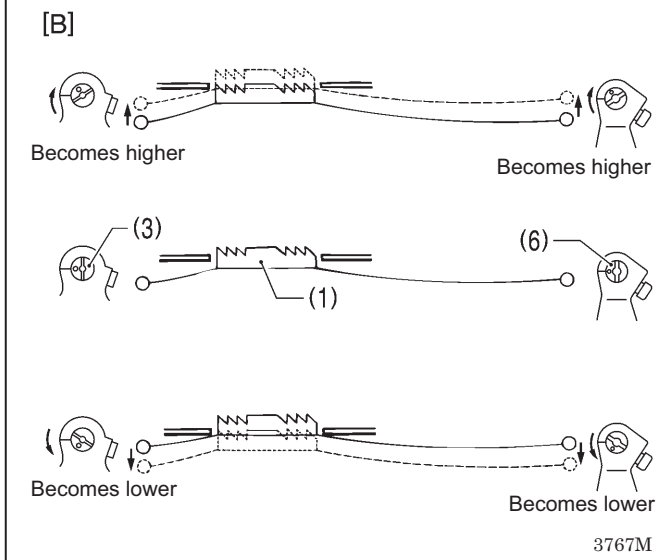
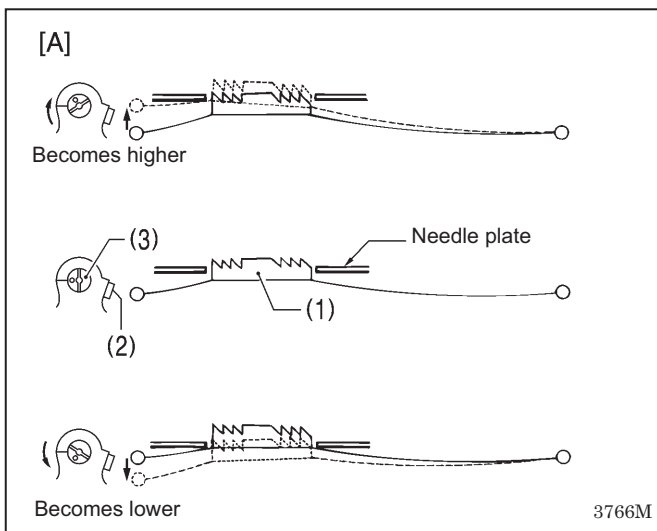


The standard height of the feed dog (1) when it is at its maximum height above the top of the needle plate is 1.0 mm for -4[]3 specifications, and 1.2 mm for -405 specifications.

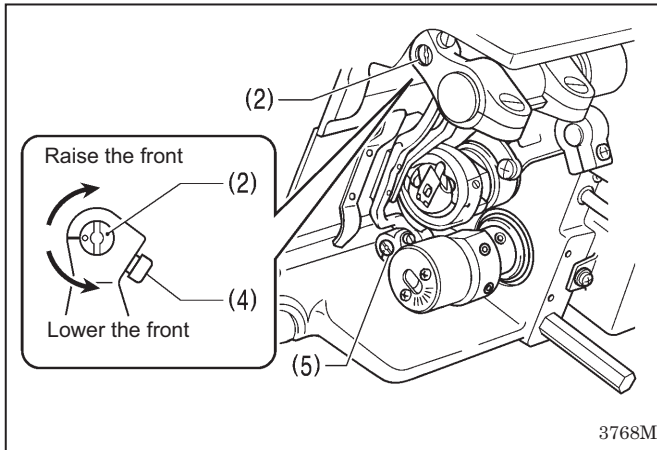


1. Turn the pulley until the feed dog (1) rises to the highest position.
2. Tilt back the machine head.
3. Loosen the screw (2).
4. Turn the feed lifting rock bracket stud (3) within a range of 90° from the reference line (4) to adjust the vertical height of the feed bar (5). (Fig. [A])
5. Tighten the 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 "13-7. Adjusting the feed dog angle" on the next page for details of this operation.)



13-7. Adjusting the feed dog angle



3768M

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).

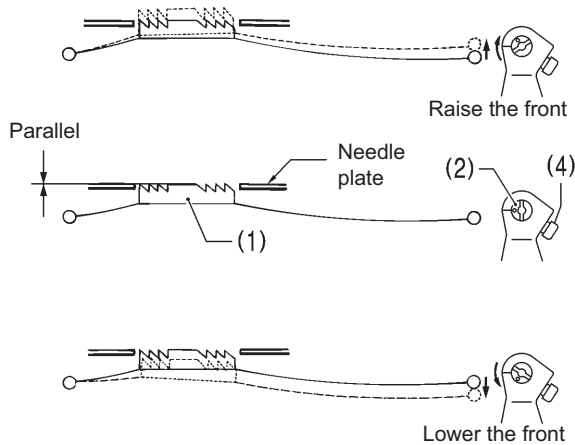
5. Securely tighten the set screws (4).

* 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 "13-6. Adjusting the feed dog height" on the previous page for details of this operation.)

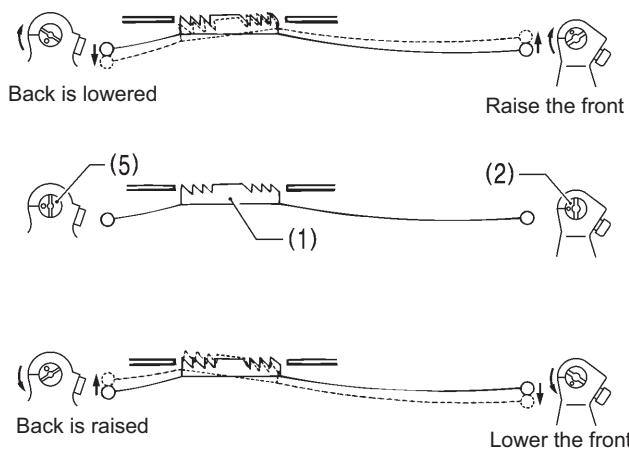
* The height of the feed dog (1) will change after the angle has been adjusted, so it will be necessary to re-adjust the height of the feed dog (1).

[C]



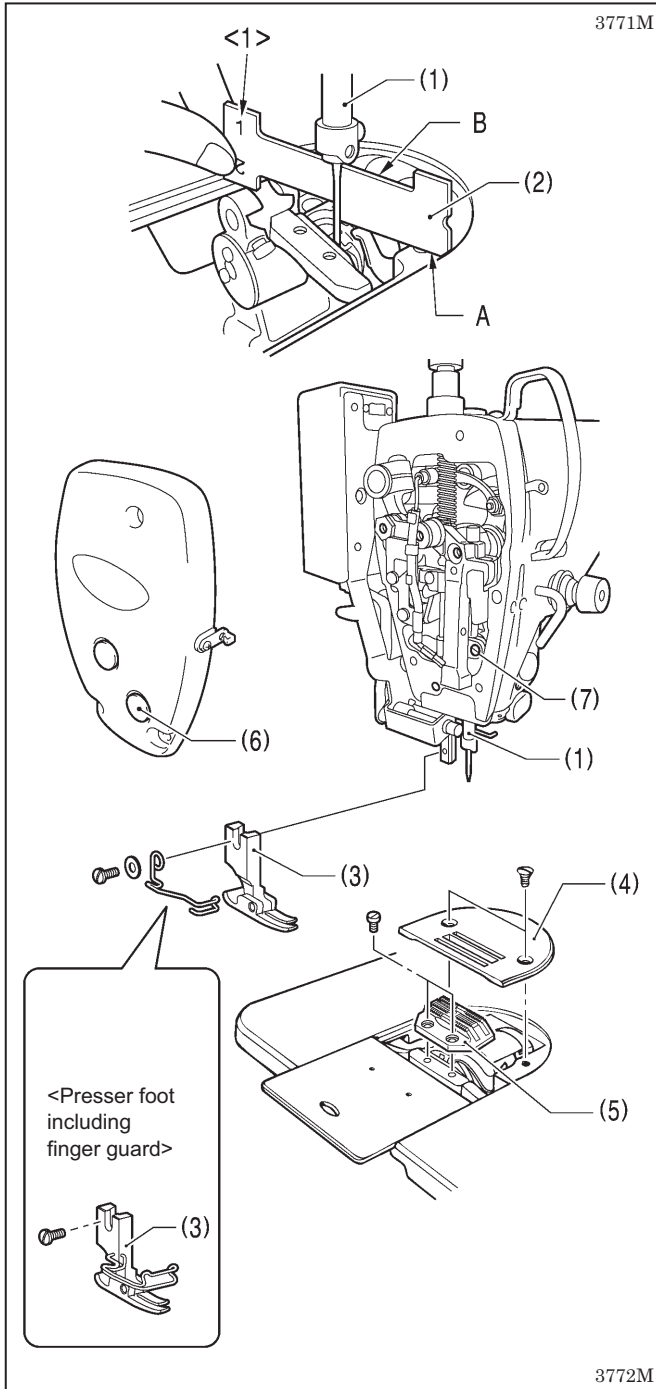
3769M

[D]



3770M

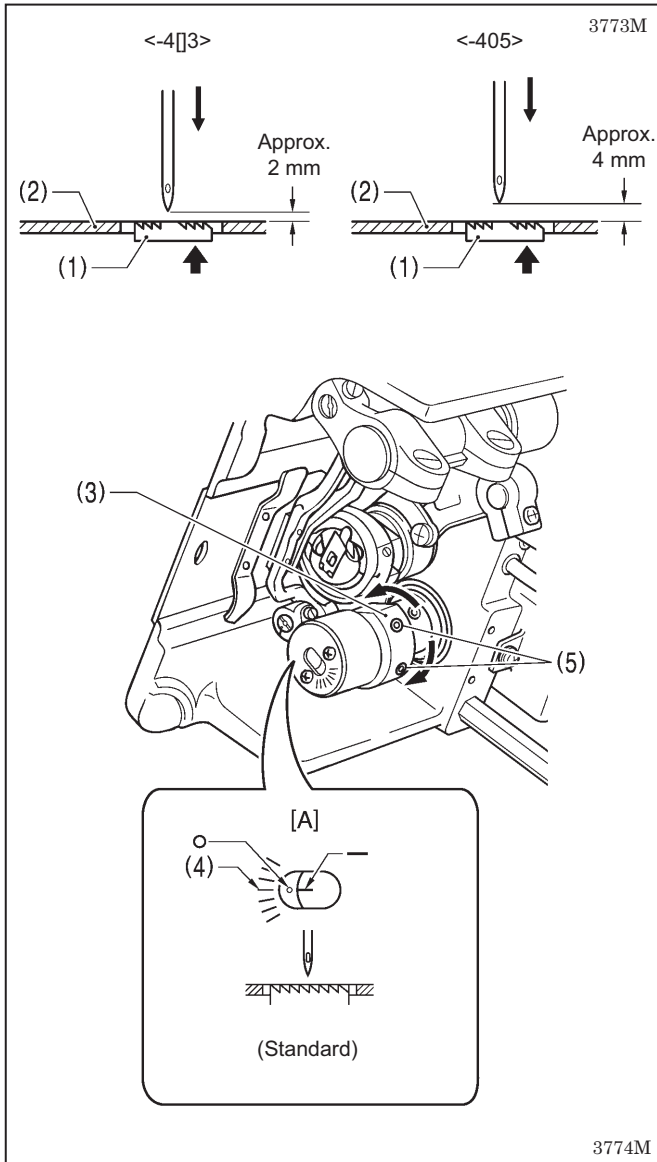
13-8. Adjusting the needle bar height



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).

13-9. 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).

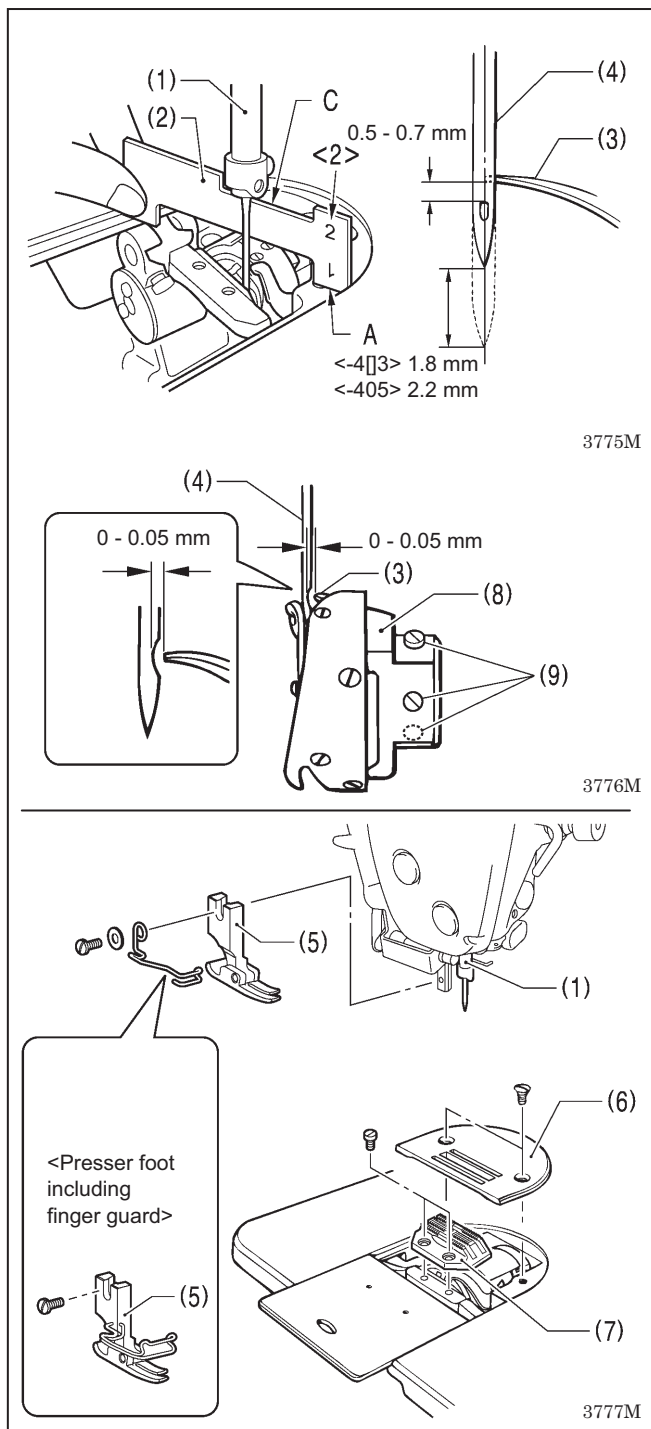
1. Set the stitch length dial to the maximum setting.
2. Tilt back the machine head.
3. Loosen the two set screws (5), and then turn the vertical cam (3) slightly to adjust the timing.

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).

13-10. 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 - 0.7 mm.)

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.

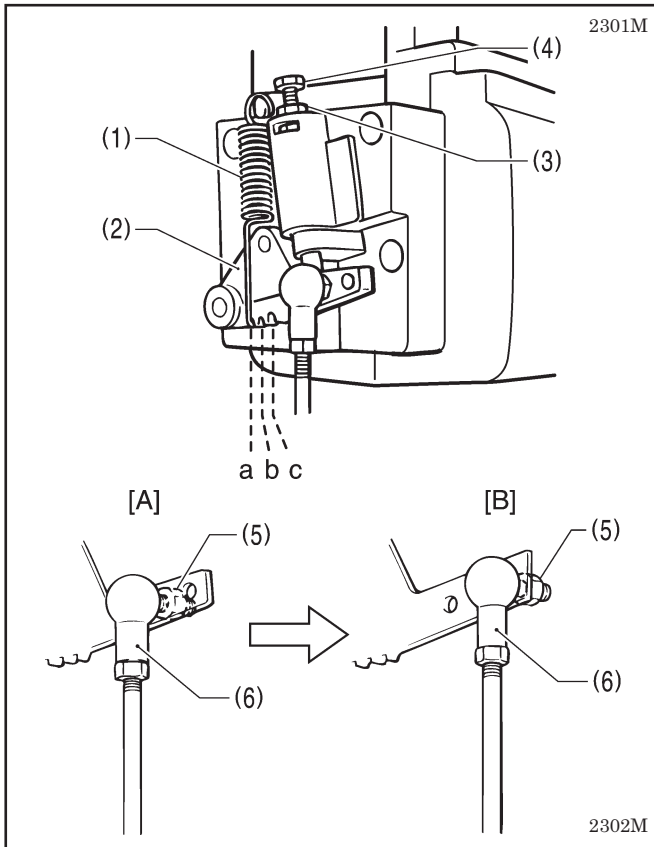
3. Loosen two of the three set screws (9) which are securing the rotary hook (8).
4. Turn the machine pulley to raise the needle bar (1) from its lowest position until the distance from needle plate mounting surface A to the bottom edge of the needle bar (1) is the same as the height of surface C on 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 - 0.5 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).

<Checking the clearance between the rotary hook and bobbin case holder position bracket>

Check that the clearance between the rotary hook (8) and the bobbin case holder position bracket (10) is enough to allow the thread being used to pass through smoothly.

The clearance should be 0.4 - 0.7 mm for -4[]3 models, and 0.6 - 1.1 mm for -405 models.

13-11. Adjusting the treadle



<Forward depression sensitivity adjustment>

If the machine starts running at low speed when your foot is simply resting on the treadle, or if the treadle pressure is felt to be too weak, adjust the position (a to c) at which the treadle spring (1) is hooked onto the treadle lever (2).

* a is the weakest position, and it becomes gradually stronger at b and c respectively.

<Backward depression sensitivity adjustment>

1. Loosen the nut (3) and turn the bolt (4).

* When the bolt (4) is tightened, the treadle operation becomes heavier, and when it is loosened, the operation becomes lighter.

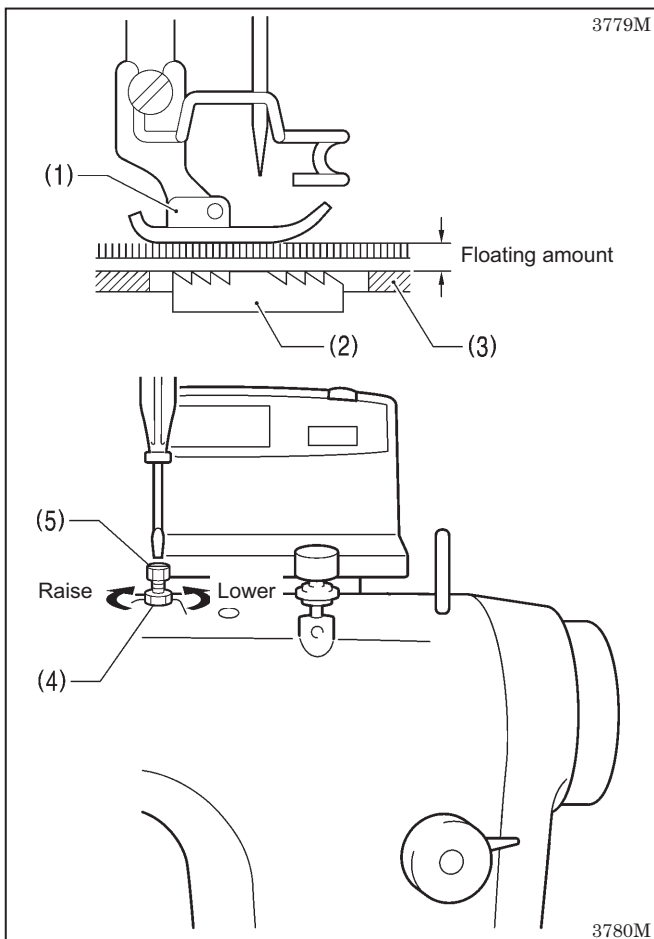
2. Tighten the nut (3).

<Adjusting the treadle stroke>

Remove the nut (5), and then move the connecting rod joint (6) from the position in figure A to the position in figure B. The treadle stroke will then be increased by approximately 27%.

At this time, the treadle forward and backward depression sensitivity will change, so readjust if necessary.

13-12. 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.

14. 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.




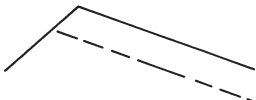
⚠ CAUTION

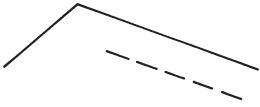
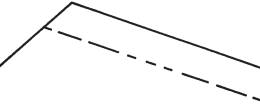


Turn off the power switch and disconnect the power cord before carrying out troubleshooting. The machine may operate if the treadle is depressed by mistake, which could result in injury.


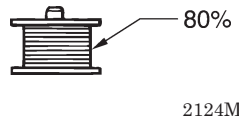
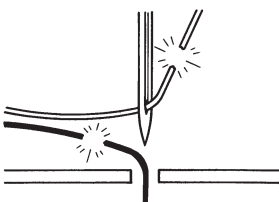
14-1. Sewing

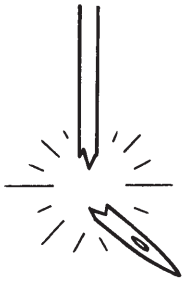
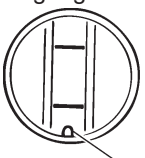
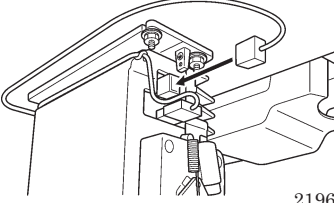
Items with a "*" in the "Page" column should only be checked by a qualified technician.

Problem		Possible cause	Page
1	Upper thread is not tight.  0573M	<ul style="list-style-type: none"> • Is the upper thread tension too weak, or is the lower thread tension too strong? Adjust the upper thread tension or lower thread tension. 	37
2	Lower thread is not tight.  0574M	<ul style="list-style-type: none"> • Is the lower thread tension too weak, or is the upper thread tension too strong? Adjust the lower thread tension or upper thread tension. 	37
3	Loops appear in seam.  0977M	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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. 	13 15 38 50* 49* 53* 55*

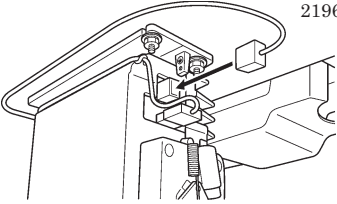
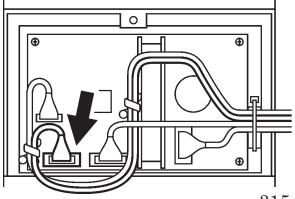
	Problem	Possible cause	Page
5	<p>Skipped stitches at sewing start</p> <p>Thread unravelling at sewing start</p>  <p>0749M</p>	<ul style="list-style-type: none"> • Is the thread take-up spring tension too strong? Reduce the tension of the thread take-up spring. • Is the thread take-up spring operating 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. 	<p>49*</p> <p>49*</p> <p>38</p> <p>*</p> <p>13</p> <p>25, 33*</p> <p>26,34*</p>
6	<p>Uneven seam</p>  <p>0473M</p>	<ul style="list-style-type: none"> • 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. 	<p>38</p> <p>51*</p>
7	<p>Large degree of puckering (excess tension)</p> <p>0978M</p>	<ul style="list-style-type: none"> • 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. 	<p>37</p> <p>37</p> <p>49*</p> <p>49*</p> <p>38</p> <p>18</p> <p>52*</p>

14. TROUBLESHOOTING

	Problem	Possible cause	Page
8	<p>Lower thread is tangled at the sewing start. Spinning of bobbin during thread trimming</p>  <p style="text-align: right;">0751M</p>	<ul style="list-style-type: none"> • 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. 	<p style="text-align: right;">14</p> <p style="text-align: right;">14</p> <p style="text-align: right;">13</p> <p style="text-align: right;">13</p>
9	<p>Upper and lower threads are breaking.</p>  <p style="text-align: right;">0471M</p>	<ul style="list-style-type: none"> • 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. 	<p style="text-align: right;">13</p> <p style="text-align: right;">15</p> <p style="text-align: right;">8</p> <p style="text-align: right;">37</p> <p style="text-align: right;">49*</p> <p style="text-align: right;">*</p> <p style="text-align: right;">*</p>
10	<p>Incorrect thread trimming (Upper and lower threads are both not being trimmed)</p>	<ul style="list-style-type: none"> • Is the fixed knife or movable knife damaged or worn? Replace the fixed knife or the movable knife. 	<p style="text-align: right;">*</p>
11	<p>Incorrect thread trimming (Upper thread or lower thread is not being trimmed)</p>	<ul style="list-style-type: none"> • 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. 	<p style="text-align: right;">13</p> <p style="text-align: right;">*</p>

	Problem	Possible cause	Page
12	Broken needles  0469M	<ul style="list-style-type: none"> 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. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Caution</p> <ul style="list-style-type: none"> 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 we recommend that through steps be taken to account for such needles to comply with product liability regulations. </div>	13 53* 55* 54*
13	Oil gauge (1) is not visible in oil gauge window.  (1) 2195M	<ul style="list-style-type: none"> Is the oil tank empty? Fill the oil tank with oil. 	8
14	Machine does not operate when power is turned on and treadle is pressed.	<ul style="list-style-type: none"> Is the power supply connector disconnected from the control box? Insert the connector securely.  2196M	11
15	Machine does not operate at high speed.	<ul style="list-style-type: none"> Is the sewing speed setting or backtack speed setting incorrect? Use the sewing speed control keys to set the high speed. 	18
16	Machine stops during sewing.	<ul style="list-style-type: none"> 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.) 	18 *

14. TROUBLESHOOTING

	Problem	Possible cause	Page
17	Nothing appears on the operation panel display.	<ul style="list-style-type: none"> Is the power supply connector disconnected from the control box? Insert the connector securely. Is the operation panel connector inside the control box disconnected? Insert the connector securely.  	11 10*
18	"GrEASEUP" or "GU" flashes in the panel display when the power switch is turned on.	<ul style="list-style-type: none"> This display is to notify you that it is time to apply grease. Apply grease. 	42, 44*

14-2. Error code displays

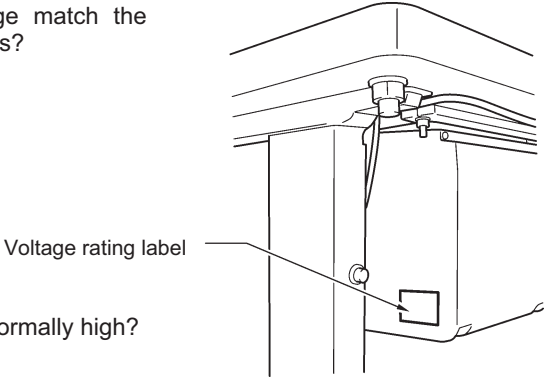
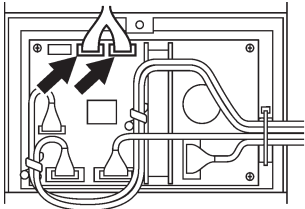
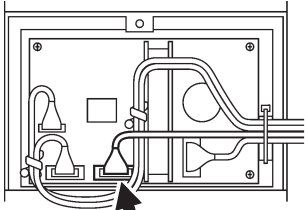
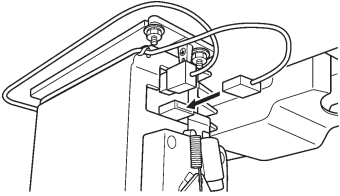


If an error code appears on the operation panel display

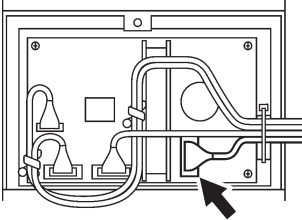
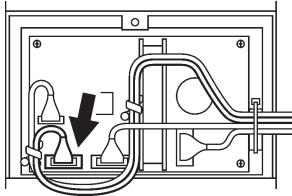
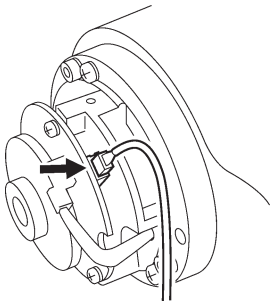
1. Make a note of the error code and then turn off the power.
2. After the operation panel display has turned off, eliminate the cause of the error and then turn the power back on.

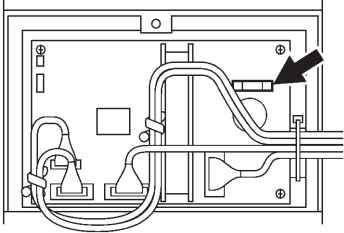
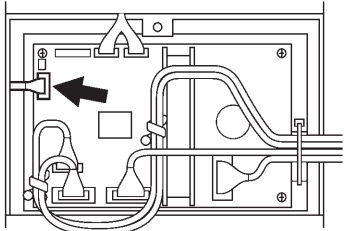
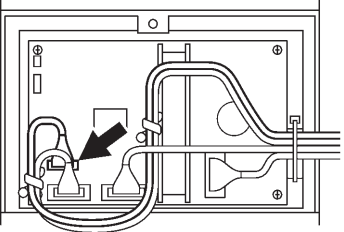
2198M

- 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.

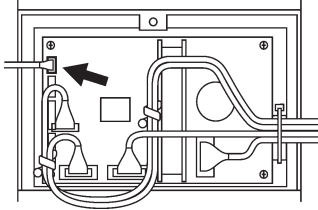
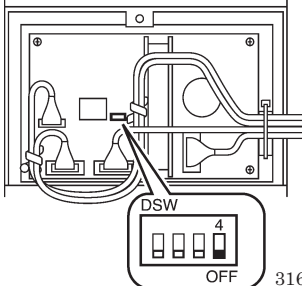
Error code	Possible cause	Page
<p>Err 1 (Overvoltage)</p>	<ul style="list-style-type: none"> • Does the power supply voltage match the control box voltage specifications? Check the voltage.  <ul style="list-style-type: none"> • Is the power supply voltage abnormally high? Check. • Problem with control box. Replace the control box. <p style="text-align: right;">2199M</p>	<p style="text-align: center;">*</p> <p style="text-align: center;">*</p> <p style="text-align: center;">**</p>
<p>Err 2 (Overcurrent)</p>	<ul style="list-style-type: none"> • Is the electrical equipment connector inside the control box disconnected? Insert the connector securely.  <p style="text-align: right;">3155M</p>	<p style="text-align: center;">*</p>
<p>Err 3 (Encoder error)</p>	<ul style="list-style-type: none"> • Is the encoder connector inside the control box disconnected? Insert the connector securely.  <p style="text-align: right;">3156M</p>	<p style="text-align: center;">10*</p>
<p>Err 4 (Motor lock)</p>	<ul style="list-style-type: none"> • Is the motor connector disconnected from the control box? Insert the connector securely.  <ul style="list-style-type: none"> • Has the machine locked up? Turn off the power and then turn the machine pulley by hand and check that it turns easily. <p style="text-align: right;">2202M</p>	<p style="text-align: center;">11</p>

14. TROUBLESHOOTING

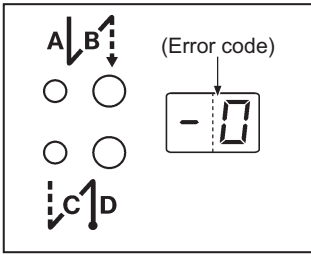
Error code	Possible cause	Page
<p>Err 5 (Safety switch operated)</p>	<ul style="list-style-type: none"> Is the machine connector inside the control box disconnected? Insert the connector securely. Is the machine head tilted back? Return the machine head to its normal position. Check the operation of the safety switch.  <p style="text-align: right;">3157M</p>	<p>10*</p> <p>48*</p>
<p>Err 6 (Voltage drop)</p>	<ul style="list-style-type: none"> Was the power turned on while the treadle was still depressed? Return the treadle to the neutral position, and then turn on the power switch. Is the power supply voltage too low? Check the power supply voltage. 	<p>*</p>
<p>Err 7 (Panel communication error)</p>	<p>This is displayed when there is a problem communicating with the operation panel CPU.</p> <ul style="list-style-type: none"> Is the operation panel connector inside the control box disconnected? Insert the connector securely. Problem with operation panel or control box. Replace the operation panel or control box.  <p style="text-align: right;">3154M</p>	<p>*</p> <p>**</p>
<p>Err 8 (Over time)</p>	<ul style="list-style-type: none"> This appears on the display when the sewing machine has been operating continuously for 3 minutes or more. Turn the power switch off and then back on again, and then operate the sewing machine normally. 	
<p>Err 9 (Motor overheating abnormally)</p>	<ul style="list-style-type: none"> This is displayed when the motor becomes abnormally hot and the temperature protection has activated. After the temperature has dropped, turn the power switch back on and operate the sewing machine as normal. Problem with motor. Replace the motor. 	<p>**</p>
<p>Err 10 (Solenoid overcurrent)</p>	<ul style="list-style-type: none"> 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 control P.C. board. Replace the control box. 	<p>**</p> <p>**</p>
<p>Err 11 (Problem with motor overheating sensor)</p>	<ul style="list-style-type: none"> Is connector CN5 inside the motor disconnected? Insert the connector securely.  <p style="text-align: right;">3116M</p>	<p>*</p>

Error code	Possible cause	Page
Err 12 (Solenoid power supply error)	<ul style="list-style-type: none"> Is solenoid fuse F2 (5A) blown? Replace the fuse. Problem with control P.C. board. Replace the control box.  <p style="text-align: right;">3702M</p>	* **
Err 13 (Treadle unit error)	<ul style="list-style-type: none"> Is the treadle unit connector inside the control box disconnected? Insert the connector securely. Is there an open circuit in the treadle connector harness? Replace the treadle unit.  <p style="text-align: right;">3158M</p>	* **
Err 14 (Head detector unit error)	<ul style="list-style-type: none"> Problem with head detector unit Check that the head detector unit connector inside the control box is securely inserted. Replace the head detector unit.  <p style="text-align: right;">3703M</p>	* **
Err 15 (Problem with sewing machine motor operation)	<ul style="list-style-type: none"> Problem with motor. Replace the motor. Problem with power P.C. board. Replace the control box. 	** **
Err 16 (Thread trimming solenoid timeout)	<ul style="list-style-type: none"> This is displayed if the sewing machine motor locks during thread trimming. Remove any thread scraps that may be blocking the motor. Check that there are no problems with the thread trimming mechanism. 	* **
Err 18 (EEROM error)	<ul style="list-style-type: none"> This is displayed if data could not be correctly read from or written to the memory element on the control P. C. board. Replace the control box. 	**
Err 19 (Control box overheating)	<ul style="list-style-type: none"> This is displayed when the control box becomes abnormally hot. (Three-phase high-voltage specifications only) Check that there are no problems with the cooling fan. If there is a problem, replace the cooling fan. 	** **
Err 20 (Treadle pedal position error)	<ul style="list-style-type: none"> 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. 	* **

14. TROUBLESHOOTING

Error code	Possible cause	Page
Err 21 (Thermistor error)	<ul style="list-style-type: none"> Is connector CN16 inside the control box disconnected? Insert the connector securely.  <p style="text-align: right;">3159M</p>	*
Err 100 (GrEASEUP)	<ul style="list-style-type: none"> This appears on the display when the sewing machine has continued to be used for a certain period after the “GrEASEUP” notification appears without the grease being applied (without the reset procedure being carried out). Apply grease and then carry out the reset procedure. 	42*
Err 101 (diP SW4)	<ul style="list-style-type: none"> Is DIP switch No.4 inside the control box set to ON? Set DIP switch No.4 to OFF.  <p style="text-align: right;">3160M</p>	*

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.



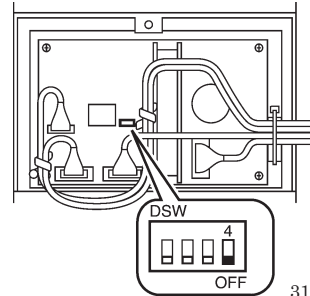
If an error code is displayed on the control box panel

1. Make a note of the error code and then turn off the power.
2. After the display of the control box panel turns off, eliminate the cause of the error and then turn the power switch back on.

3161M

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- For items with “ ** ” appearing in the “Page” column, ask the place of purchase for advice.

Error code	Possible cause	Page
-0 (Grease up)	<ul style="list-style-type: none"> • If you continue to use the sewing machine for a certain length of time without applying grease (and without carrying out the reset operation) after “GU” has appeared on the control box panel, this will be displayed. Apply grease and then carry out the reset procedure. 	44*
-1 (Dip switch 4)	<ul style="list-style-type: none"> • Is DIP switch No.4 inside the control box set to ON? Set DIP switch No.4 to OFF. 	*
1	Overvoltage	Refer to pages 62-65 for the items corresponding to these error codes.
2	Overcurrent	
3	Encoder error	
4	Motor lock	
5	Safety switch operated	
6	Voltage drop	
7	Panel communication error	
8	Over time	
9	Motor overheating abnormally	
10	Solenoid overcurrent	
11	Problem with motor overheating sensor	
12	Solenoid power supply error	
13	Treadle unit error	
14	Head detector unit error	
15	Problem with sewing machine motor operation	
16	Thread trimming solenoid timeout	
18	EEROM error	
19	Control box overheating	
20	Treadle pedal position error	
21	Thermistor error	



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.

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INSTRUCTION MANUAL

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