

ENGLISH

**AW-3S
INSTRUCTION MANUAL**

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1. GENERAL

Conventionally, a series of operations including the replacement of a bobbin in the sewing machine hook, removal of thread remaining on a bobbin, winding of a bobbin, threading of the bobbin case tension spring and trimming of thread have been carried out manually. Now, this device has been developed to carry out the series of operations full-automatically. This device not only helps increase efficiency of sewing work but also ensures stable product making in such processes that require high seam quality.

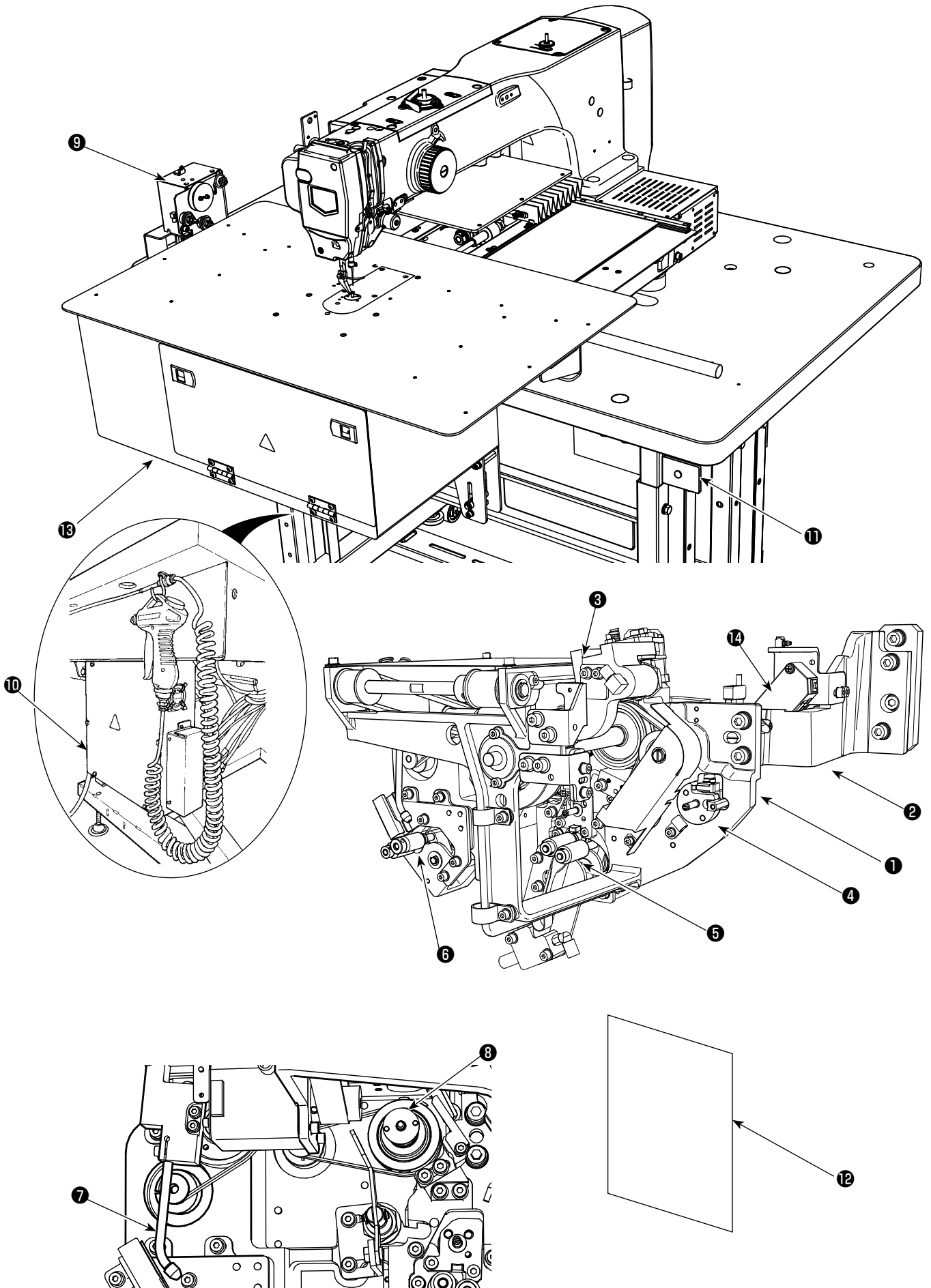
Refer to the Instruction Manual for the AMS-221EN/AMS224EN/IP-420 for information about the main body of the sewing machine.

1-1. Specifications of AW-3

1	Applicable bobbin, bobbin case	Exclusive double-capacity bobbin and bobbin case.
2	Applicable thread count	#5 to #30 (Japan), 135 to 45 (TEX), 020 to 060 (TKT)
3	Applicable type of thread	Synthetic thread
4	Remaining-thread removal and bobbin winding operation	Possible while the sewing machine is in operation.
5	Condition setting according to the thread type	Conditions to be met to unravel the thread at the beginning of winding a bobbin can be set.
6	Line voltage	100,120/200,220,240 Vac \pm 10 %, Single phase 50/60 Hz
7	Power consumption	100 VA
8	Air pressure used	0.5 to 0.55 MPa
9	Air consumption	156 N ℓ / min (max. value)
10	Dimensions	700 mm (W) \times 650 mm (L) \times 430 mm (H) (Accessories included)
11	Mass of the device	38 kg
12	Operating temperature range	5 $^{\circ}$ C to 35 $^{\circ}$ C
13	Operating humidity range	35 % to 85 % (No dew condensation)
14	Noise	- Equivalent continuous emission sound pressure level (L _{pA}) at the workstation : A-weighted value \leq 75 dB ; (Includes K _{pA} = 2.5 dB) ; according to ISO 10821- C.6.2 -ISO 11204 GR2 at remaining-thread removal length = 2 m; Bobbin-thread winding length (22 m).

1-2. Configuration

* The illustration shows the AMS-221EN.



	Name	Function
①	Main body of device	It is mounted under the sewing machine bed and is the mechanical section of the device which carries out replacement of the bobbin, removal of thread remaining on the bobbin, winding of thread on a bobbin, threading, thread trimming and thread unraveling automatically.
②	Angle section	It connects the main body of the AW device to the sewing machine bed.
③	Carrier arm	It is the mechanism for carrying a bobbin case to the hook, bobbin setting section, remaining thread removal section and bobbin winding section.
④	Bobbin setting section	It serves as an intermediary place used in the case of putting/removing a bobbin on/from the device.
⑤	Remaining thread removal section	It is the mechanism for removing the thread remaining on the bobbin taken out from the hook. It consists of the remaining thread removal roller, suction vacuum, etc.
⑥	Thread unraveling section	It is the mechanism for unraveling the tip of thread to be wound on a bobbin at the beginning of bobbin winding. It consists of the bobbin unraveling roller, etc.
⑦	Nozzle	Thread from the bobbin thread cone comes from the tip of the nozzle by way of the thread path. The thread coming out of the nozzle is wound on a bobbin.
⑧	Bobbin thread winding section	It is the mechanism for winding thread on a new bobbin, threading the bobbin case and trimming the thread. It consists of the clutch plate, threader, thread trimming knife, etc.
⑨	Thread feeding unit	It is used to feed the thread bit by bit from the tip of the nozzle and accurately measure the length of thread wound on a bobbin during bobbin winding.
⑩	Electrical control box of the device	It is the box which contains the PCB for controlling the operation of the device. This electrical control box is different from the one for the sewing machine.
⑪	Device operation lamp	It indicates that the device is in operation.
⑫	Dust bag	It is the place to store the remaining thread removed from the bobbin.
⑬	Cover	It is used to prevent the operator from coming in contact with the moving part of the device.
⑭	Remaining thread detection section (optional)	It controls the amount of thread which remains on the bobbin with its micro-laser distance measurement sensor.

2. INSTALLATION

2-1. Installing the AW-3S


For details, refer to the "Retrofit Instructions for the AW-3SB" in the case of installing the AW-3S to the AMS-221EN or "Retrofit Instructions for the AW-3SC" in the case of installing it to the AMS-224EN.

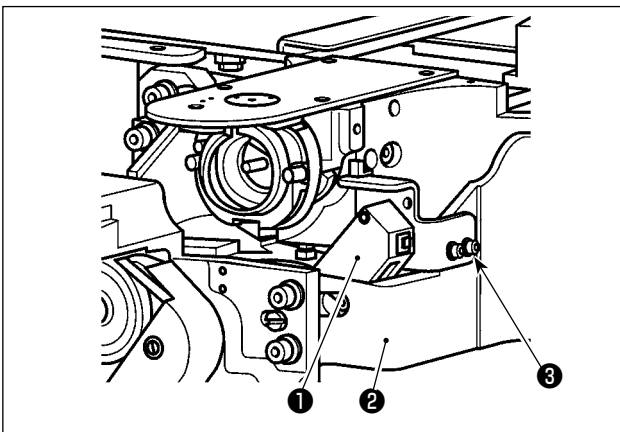
2-2. Installation location

For the installation location, carefully check the following points.

- (1) This device uses an optical sensor. In order to protect the optical sensor from malfunctioning, do not install the device near a window or in any other location where it is likely to be exposed to direct sunlight. Alternatively, install the device in a direction where it will not be exposed to direct sunlight.
- (2) In order to avoid malfunctioning, do not use the device near any equipment that generates large electrical noise. In addition, it is preferable to keep the power supply line away from the aforementioned equipment.

2-3. Installing the bobbin thread remaining amount detection sensor (optional)

	<p>DANGER :</p> <ol style="list-style-type: none">1. There will be a risk of vision impairment if laser light directly enters the eye. Do not look into the laser output port.2. Never attach/remove the sensor unit with the power remained ON. In addition, do not use the sensor for any purpose other than for detecting the bobbin thread remaining amount.
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Temporarily secure bobbin thread remaining amount detection sensor unit ① to base ② with supplied screws ③ .

Specifications of the bobbin thread remaining amount detection sensor

Class 2 sensor product
Maximum output : 1mW
Wave length : 655 nm (red)

Safety standards

JIS / IEC60825-1 2014

For details, refer to the "Retrofit Instructions for the AW-3SB" in the case of installing the AW-3S to the AMS-221EN or "Retrofit Instructions for the AW-3SC" in the case of installing it to the AMS-224EN.

3. OPERATION PROCEDURE

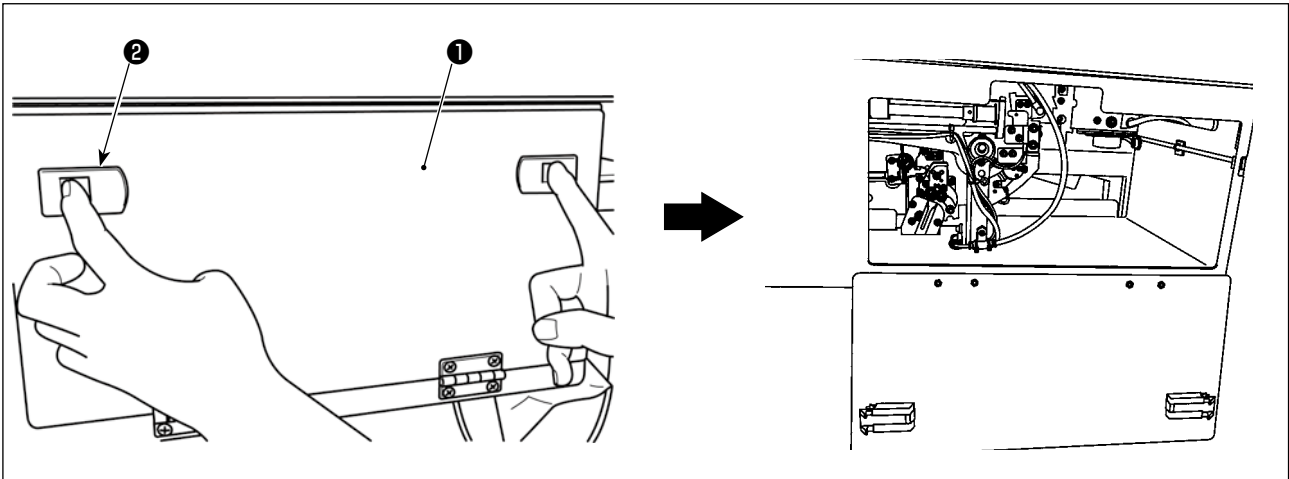


WARNING :

Turn OFF the power before starting the work so as to prevent accidents caused by abrupt start of the sewing machine.

3-1. Opening/closing the cover door

It is necessary to open front cover door ❶ in order to set up the bobbin thread. When you want to open front cover door ❶, open it while pushing both snaps ❷ in the direction of the arrow simultaneously with both hands.

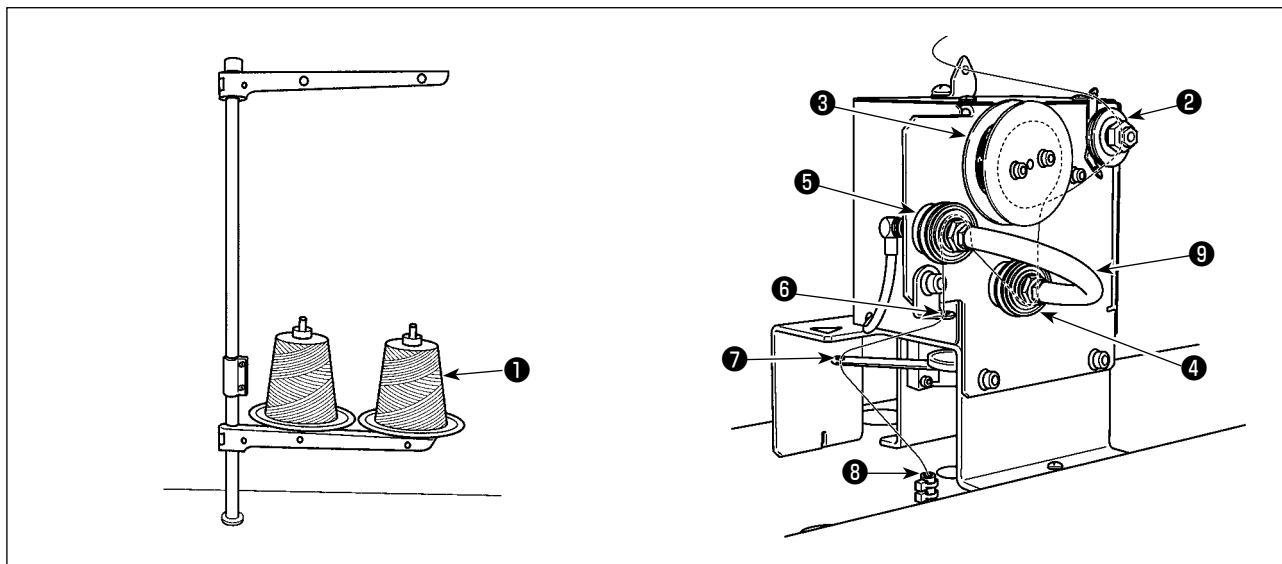



Be sure to close cover door ❶ for the sake of safety whenever you carry out sewing.

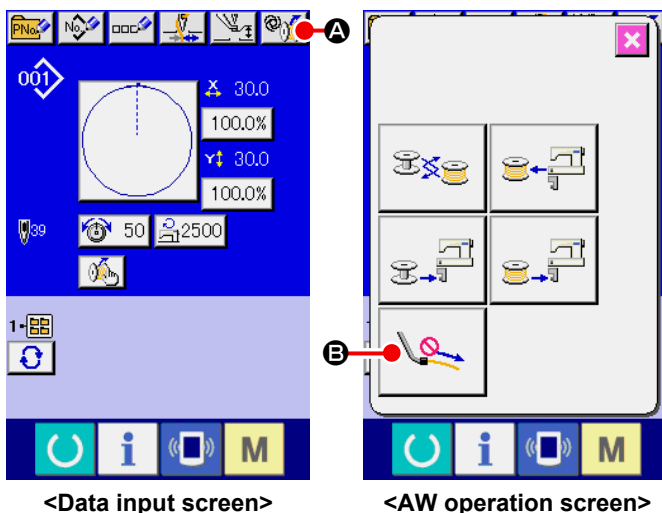
3-2. How to thread the device with the bobbin thread



In order to accurately measure the length of thread from the bobbin thread cone ❶ to be wound on a bobbin, guide the thread from the bobbin thread cone ❶ through the bobbin thread feeding unit and draw the thread out from the nozzle as illustrated in the figure.


Install the spool holder disk to the lowest possible position. If it is installed at a high position, an excessive tension will be applied to the thread drawn from the bobbin thread cone ❶, causing a trouble.

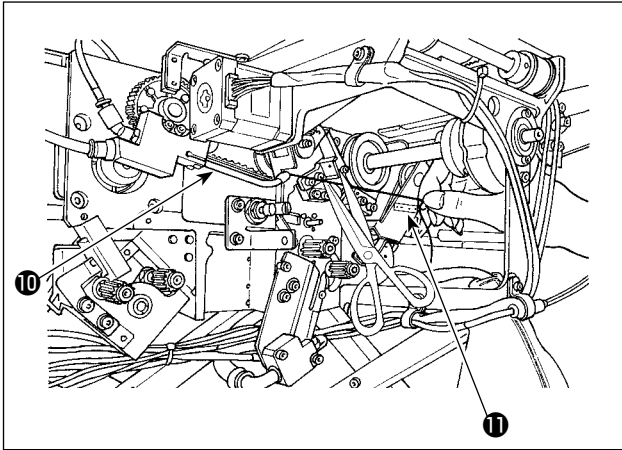


- 1) Insert the power plug to a receptacle and turn ON the power to the device. Press . Wait until initialization operation of the device is completed. (Approx. 10 seconds)
 - 2) Pass the thread drawn from bobbin thread cone ❶ through thread tension controller ❷.
 - 3) Wind the thread on thread length measuring roller ❸ by one layer.
 - 4) Pass the thread through thread guide ❹ by way of tension controllers ❺ and ❻.
- It should be noted that the tube extending between thread tension controllers ❹ and ❻ is intended to prevent thread from tangling on the shaft of the respective thread tension controllers. Pass the thread through the space inside the curved part of tube ❼.
- 5) Pass the thread through the hole in the tip of thread feed arm ❼.




- 6) When the data input screen is displayed on the operation panel, press  A. When the AW operation screen is displayed, press  B.

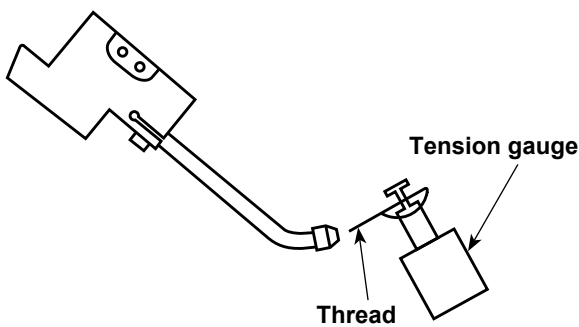
Caution Be aware that the thread feed arm ❼ may operate when  B is pressed.



When the thread is put in thread path tube ⑧, it is sucked. Put the thread in the tube, while pulling the thread from the bobbin thread cone, until the length of thread coming out of the tip of nozzle ⑩ becomes approximately 13 cm. If the thread stops halfway, pull it back slightly several times.

At this time, the bobbin winder nozzle is at its advanced position. In this state, adjust the length of thread while observing the scale on label ⑪ as a guide.

- 7) Suction is stopped by pressing  ⑬ again.



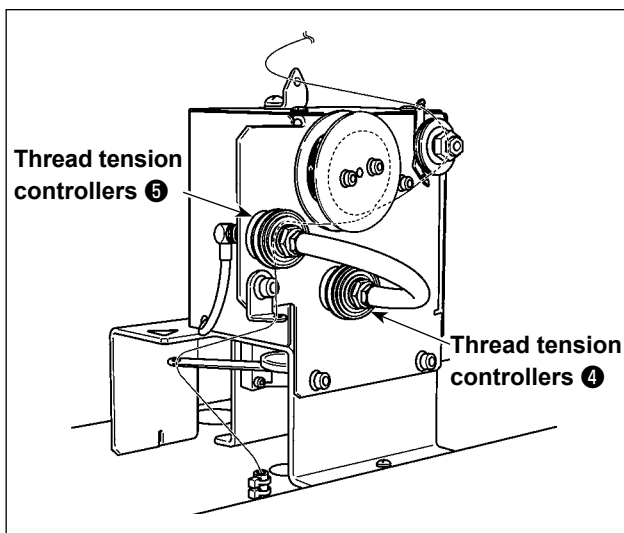
Basically, adjustment of the thread tension controlled by the thread tension controller is not required.

It should be noted, however, that you need to re-adjust the tension setting of the thread tension controller whenever you replace the bobbin thread with a larger-count thread.

Adjust the tension setting of the thread tension controller to 300 to 350 gf.



[How to thread the sewing machine head in the case a thread winding error occurs when non-slip thread is used]

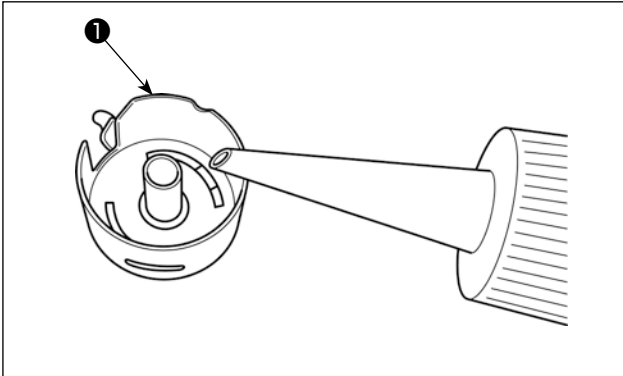


Do not thread thread tension controller ④ .

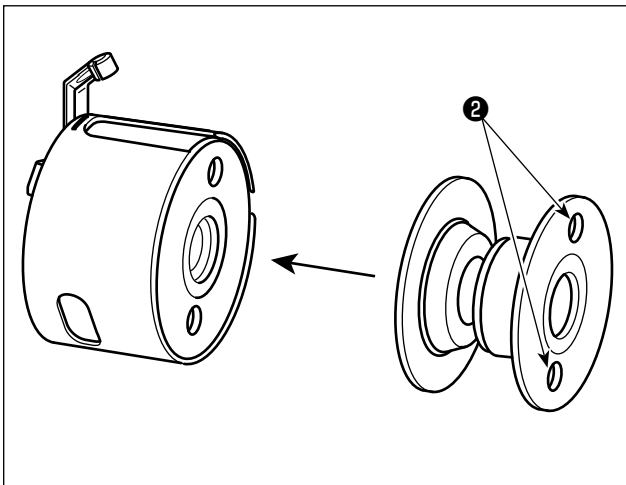
3-3. How to set a bobbin

This device uses two bobbin cases each of which is fitted with a bobbin.

(1) How to fit a bobbin in the bobbin case



- 1) Put a drop of oil No. 2 in the bobbin case before placing bobbin ① in it.

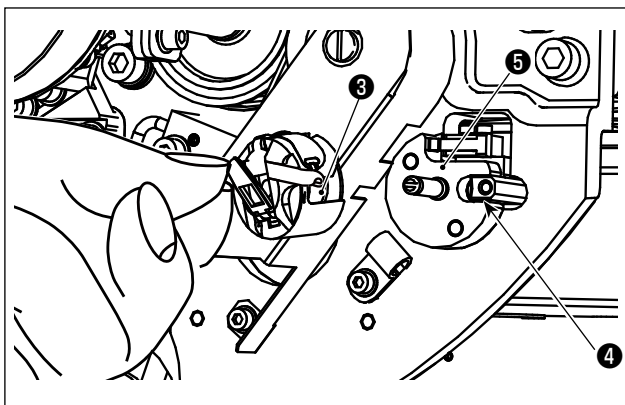


- 2) Fit a bobbin in the bobbin case so that clutch holes ② (at two locations) of bobbin are brought to the open side.



Before fitting a bobbin in the bobbin case, wipe the bobbin case to remove oil and dust. In particular, wipe the shaft section of bobbin case to remove oil and dust. In addition, blow out, with an air gun, oil and dust gathering under the bobbin idling prevention spring in the bobbin case.

(2) How to load a bobbin in the device



Load the bobbin case fitted with a bobbin, as described in (1), in bobbin setting section ⑤ of the device.

Load the bobbin case fitted with a bobbin while putting your hand from under the right side of the cover located this side of the device.

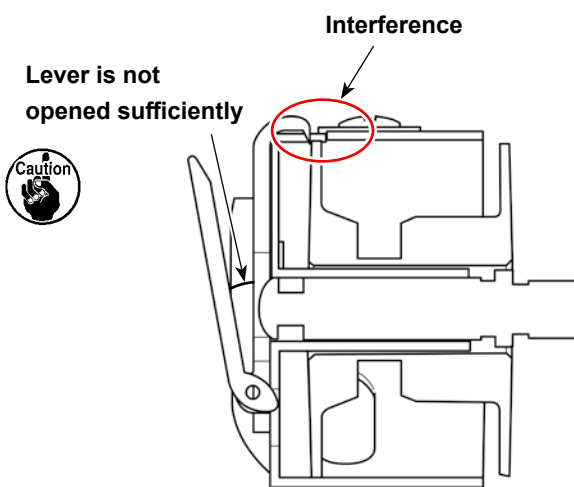
Set the bobbin case in such a way that its opening section ③ aligns with lock member ④.

Place the bobbin case in the device with the claw of bobbin case raised. Push the bobbin case in the device fully until it will go no further.

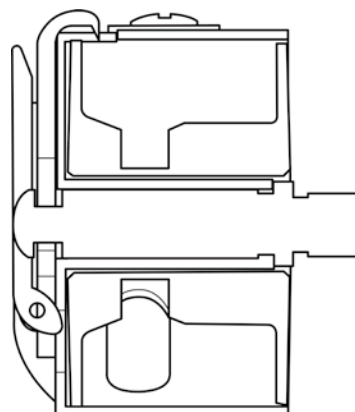
If the bobbin case is not correctly placed in the bobbin setting section ⑤ of the device, an error such that the gripper fails to catch the bobbin case can occur.

If the bobbin case is not correctly placed in the device, the bobbin case can drop from the device without raising its claw.

Keeping the bobbin case lever held opened widely with your fingers, insert the bobbin case into the hook as far as it will go. If the lever is not opened widely enough, the bobbin may interfere with the claw part of the hook to prevent the bobbin case from being inserted to its locking position. If the bobbin case is not correctly inserted in the hook, it may drop during sewing to cause needle breakage or bobbin case breakage.



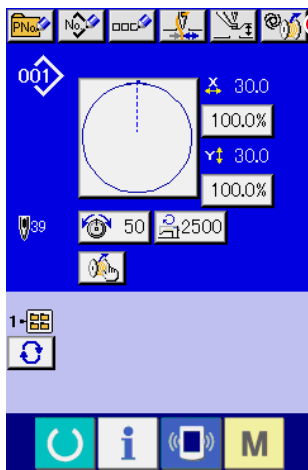
The state that the bobbin case is correctly placed in the hook



In order to set the bobbin case in the hook section without fail, do not carry out attachment, removal or setting of the bobbin case directly by hand but place the bobbin case firstly on the standby position.

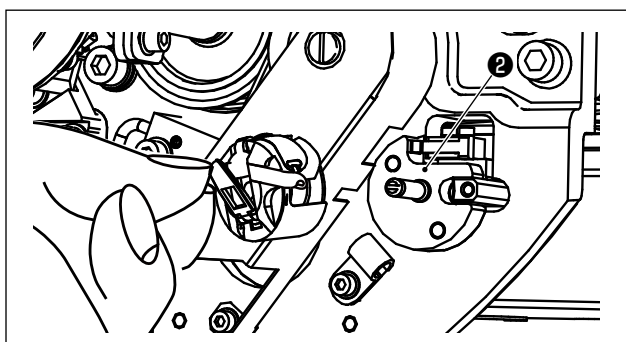
After you have set the bobbin case in the device, make sure that the bobbin case has not dropped from the device.

(3) How to remove/set the bobbin from/in the hook section

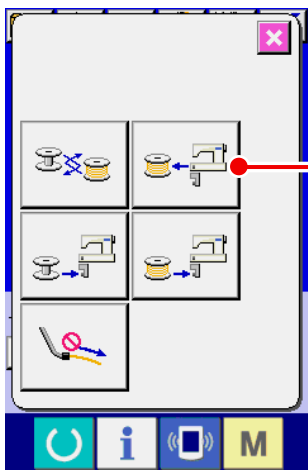


< Data input screen >


- 1) Turn the power ON.
- 2) When you press  **A** on the data input screen, the AW operation screen is displayed.




- 3) Take out the bobbin from bobbin setting section **2** by hand.

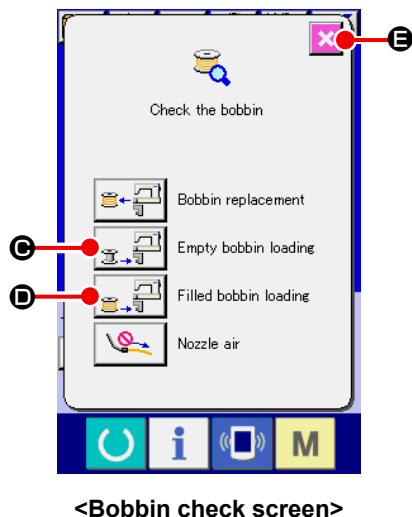


<AW operation screen>

- 4) When you press  **B** button on the AW operation screen, the bobbin placed in the device (or in the hook) is carried to the bobbin setting section **2**.
- 5) Take out the bobbin from bobbin setting section **2** by hand.

When you want to take out the bobbin that is placed in the hook, be sure to firstly press  **B to carry the bobbin from the hook to the bobbin setting section. Then, take out the bobbin from the bobbin setting section. If you directly remove the bobbin from the hook, the sewing machine may run with no bobbin placed in the hook.**





6) Place the first bobbin in bobbin setting section ② by hand.

- In the case of an empty bobbin, press ③.
- In the case of a bobbin that has already been wound with thread, press ④ firstly, then press ⑤.

The bobbin is carried to the hook.

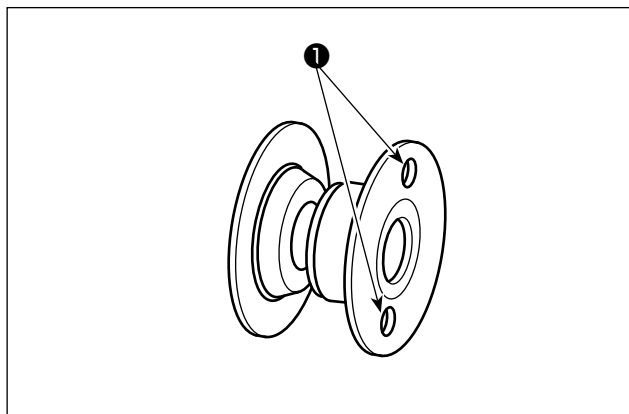
7) Subsequently, place the second bobbin in bobbin setting section ②.

- As with step 6), press ③ in the case of an empty bobbin.
- Press ④ in the case of a bobbin that has already been wound with thread.

8) Press ⑥ to return the screen to the data input screen.

If one of the bobbins placed in the bobbin setting section is an empty bobbin, the device will wind thread on the bobbin. After the device completes winding of the bobbin, it will enter the standby state in preparation for bobbin replacement.

3-4. Length of remaining thread to be removed

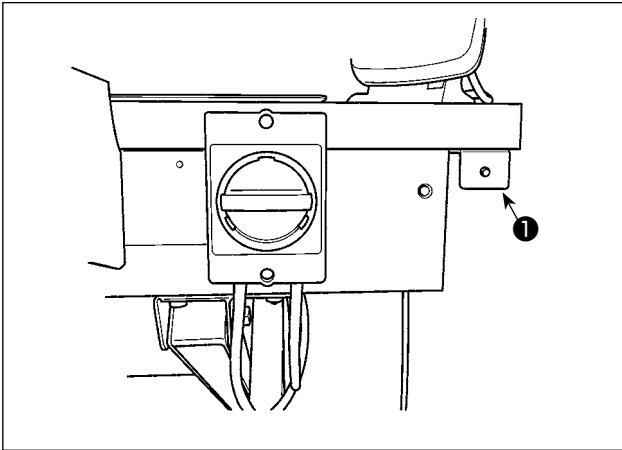


During the remaining-thread removal operation, bobbin clutch holes ① turn as the bobbin rotates. The device recognizes that the remaining thread is being removed by detecting turning of the bobbin clutch holes ①.



The maximum length of remaining thread that can be removed is 8 m. Be aware that a remaining-thread removal error may occur if the bobbin is wound with thread to such an extent that the bobbin clutch holes ① are hidden by the thread. If the length of thread remaining on the bobbin exceeds 8 m, it is necessary to remove the thread from the bobbin by hand.

3-5. Device operation lamp



Lamp ❶ mounted next to the power switch indicates that the device is in operation.

Lamp status	Meaning
Light up (ON state)	Indicates that the device is in operation. While the lamp lights up, the device is engaged in removal of remaining thread from the bobbin or winding of a bobbin. Do not turn the power OFF unless there is an emergency.
Light off (OFF state)	Indicates that the device is in the standby state. Make sure that the lamp has gone out before turning the power OFF.



1. In the case the power is turned OFF while the lamp is in the ON state intentionally or unintentionally due to power failure or the like, it is necessary to remove the cover to check whether or not the device is tangled with thread. (Refer to **"3-1. Opening/closing the cover door"** p.5.)
2. If the device is tangled with thread, remove the thread and draw out thread from the bobbin winder nozzle by approximately 13 cm. Then, attach the cover back. (Refer to **"3-2. How to thread the device with the bobbin thread"** p.6.)

3-6. To use the AW-3

When using the AW-3, the memory switch (level 2) " **K200** " (AW-3 enable/disable setting) must be set to "enable".

No.	Description		Initial value
K200	Enabled		Disabled
	Disabled (AW-3 is not installed)		
	Disabled (AW-3 is installed/with communication) *		
	Disabled (AW-3 is installed/no communication) *		

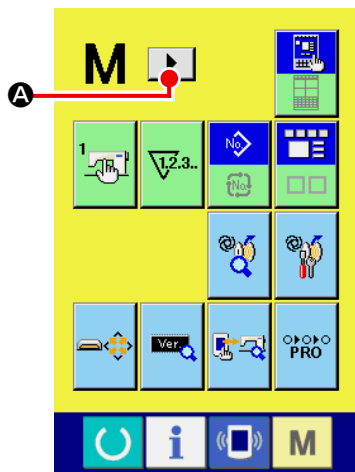
* Select when the AW-3 is installed but not operated.

If the memory switch is set to "With communication", the version of AW-3 software can be confirmed and rewritten.

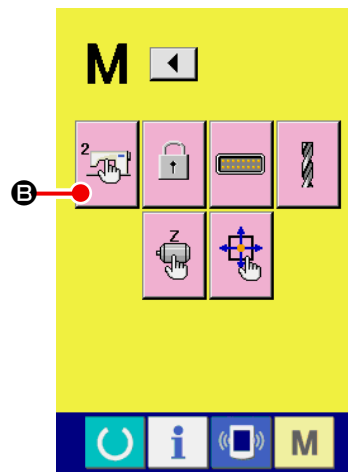


When the memory switch is initialized, the AW-3 is disabled. Re-set the memory switch " **K200** " to "enable".

[How to change the memory switch (level 2)]



<Mode changeover screen>

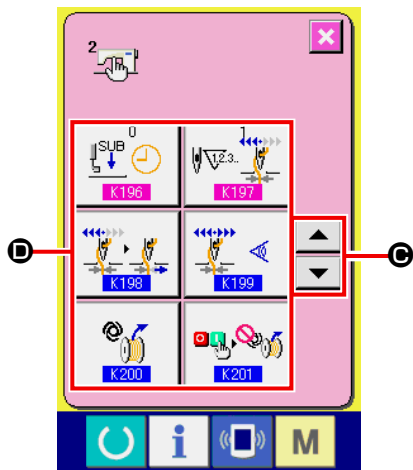


<Mode changeover screen>

(1) Displaying the memory switch data (level 2) list screen

When **M** switch is held pressed by approximately six seconds, **A** is displayed on the upper section of screen.

When **A** is pressed to display next page on the screen, memory switch (level 2) **B** is displayed. When the button of **B** is pressed, the memory switch (level 2) list screen is displayed.



<Memory switch data
(level 2) list screen>

(2) Selecting the button of memory switch to be changed

Press to select data item **D** you want to change.

For the memory switch data (level 2) other than " **K200** ", refer to the Engineer's Manual.

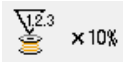




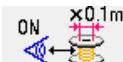









3-7. Behavior of the AW-3 device when the power is turned ON

When or is pressed after the power is turned ON, the AW-3 carries out its initialization operation if it is operated for the first time.



The AW-3 device operates when the power is turned ON, on the assumption that bobbins wound with thread are loaded in the hook and in the bobbin setting section. If the power to the device is turned ON in other situation, it is necessary to operate the AW-3 to load the bobbins. (Refer to "3-9. Basic operation and setting" p.16 for details.)

3-8. Memory switch data list

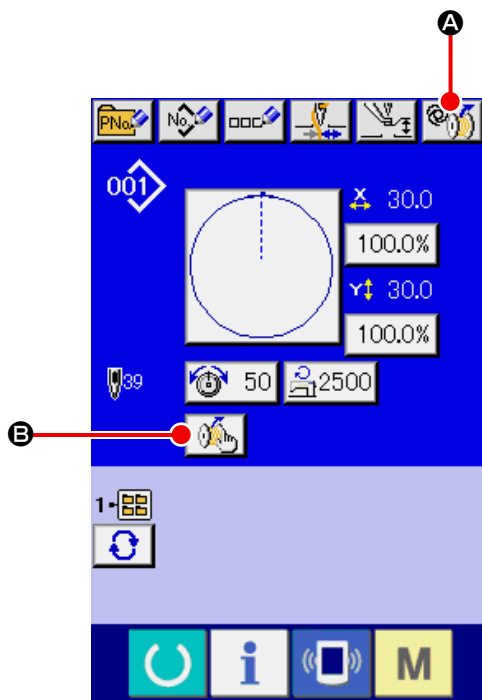
No.	Item		Setting range	Editing unit	Initial value
U166	Thread consumption margin		0 to 25	1	11
U167	Selection of enable/disable of ignorance of remaining thread removal error (0: Enable, 1: Disable)		0 to 1	1	0
U168	Insufficient remaining bobbin thread amount determination timing (0: For each thread trimming, 1: For each pattern)		0 to 1	1	0
U169	Remaining amount detection angle		0 to 3	1	3
U170	Remaining amount threshold		0 to 1023	1	0
U171	Remaining thread length at thread breakage detection		0 to 50	1	0
U172	Sensor value correction		-200 to 200	1	0
K200	Selection of enable/disable of optional AW device  Disable  Enable  Communication only  Neither operation nor communication	---	---	 Disable	
K201	Selection of enable/disable of AW device operation at power-ON  Disable  Enable	---	---	 Disable	

3-9. Basic operation and setting

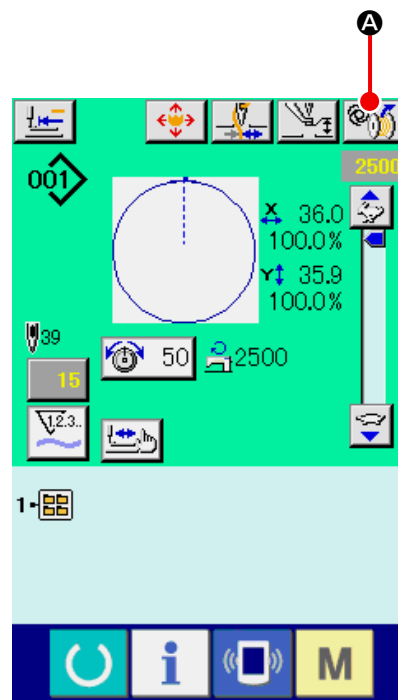
The AMS-221EN or AMS-224EN is provided with the independent operation function for carrying out setup of the AW-3S and the setting function related to automatic bobbin changing.

Open up the AW operation screen for carrying out the independent operation, or the AW setting screen for carrying out setting.



- * **The AW operation screen can be opened up from the data input screen or sewing screen.**
The AW setting screen can be opened up from the data input screen.




<Data input screen>



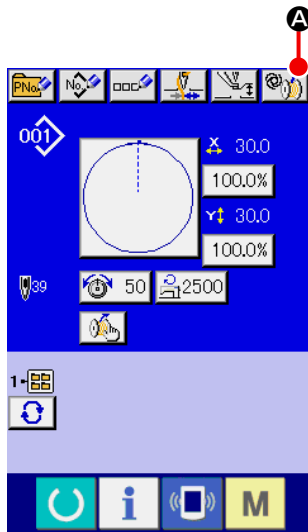
<Sewing screen>

	Button and display	Description
A		The AW operation screen is opened up. On the AW operation screen, setup of the AW such as loading/changing of bobbins can be carried out.
B		The AW setting screen is opened up. On the AW setting screen, setting of data related to the automatic bobbin changing such as the bobbin-thread winding quantity can be carried out.




While the AW3 is in operation and while the sewing machine is running (engaged in sewing), there will be no response if you press AW operation button  A. (Button operation is disabled.)

3-10. Operating the AW

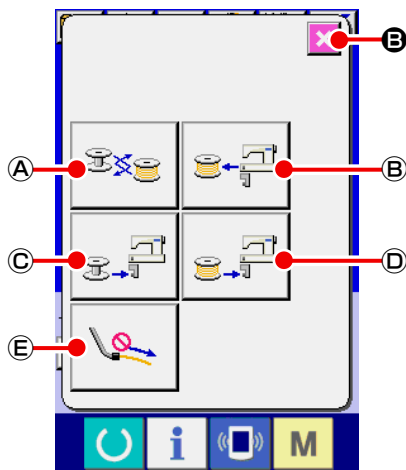


<Data input screen>

When  **A** is pressed on the data input screen, the AW operation screen is displayed.


At this time, the bobbin check screen is displayed when no bobbin is loaded in the device, or the error screen is displayed when an AW error has occurred. On these screens, the error will be reset by completing loading of a bobbin.

The AW operation screen is displayed after resetting the error.



<AW operation screen>

When one of the following buttons is pressed on the AW operation screen, the corresponding independent operation of AW can be carried out.

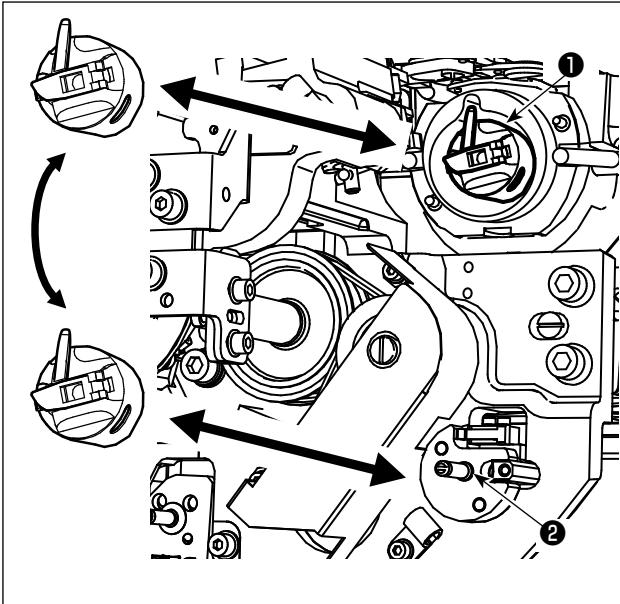
Press  **B** to close the screen.

- A** : Bobbin change button
- B** : Bobbin take-out button
- C** : Empty bobbin loading button
- D** : Threaded bobbin loading button
- E** : Nozzle air button

Detailed explanation will be given from the next page.




Be aware that an error can be caused if the bobbin in hook ① is directly changed, etc. by hand without operating the AW operation screen after turning the power ON.





Ⓐ : Bobbin change button

This button is used for winding a bobbin with new thread in the case of changing the thread, etc.

When  Ⓐ is pressed, the bobbin fitted in hook ① is replaced by another bobbin which is present at bobbin case standby position ② . Then, the thread remaining on the bobbin in hook ① is removed and new thread is wound on the empty bobbin.

Ⓑ : Bobbin take-out button

This button is used for taking out the bobbin loaded in hook ① . Take out the bobbin that is present at bobbin case standby position ② by hand

before pressing  Ⓑ . Then, when  Ⓑ is pressed, the bobbin loaded in hook ① is brought to bobbin case standby position ② .

Ⓒ : Empty bobbin loading button


This button is used for loading an empty bobbin in the hook ① .





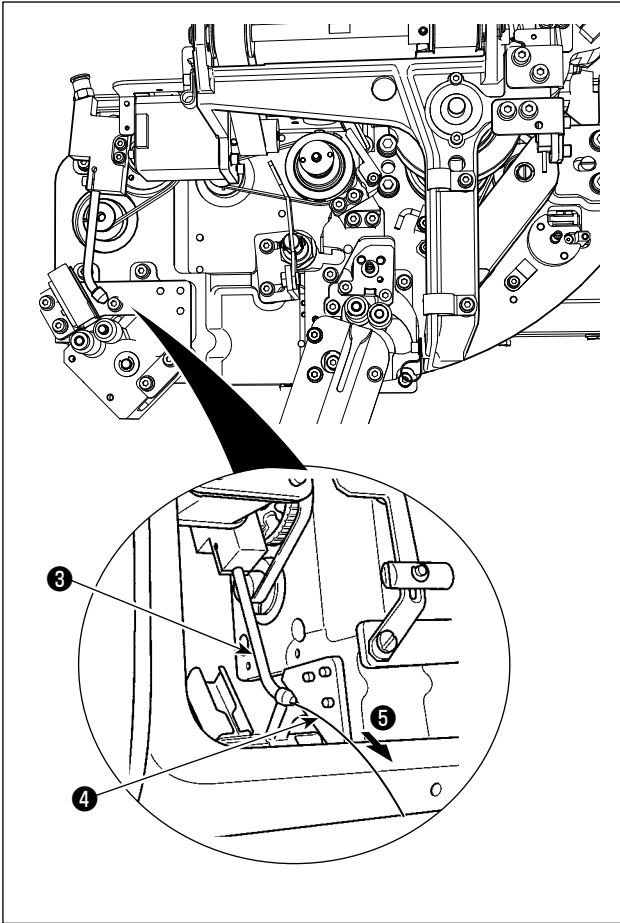
Be sure to check that the bobbin to be loaded in the hook ① is empty before pressing



Ⓒ . If a threaded bobbin is loaded in the hook ① , a malfunction can occur when winding the bobbin or removing the thread remaining on the bobbin.

Place an empty bobbin at bobbin case standby position ② and press  Ⓒ .


- If no bobbin is present in hook ① , the empty bobbin placed as described above will be brought to hook ① . Then, the device waits until the display is restored to the previous one and the next bobbin is placed. The device starts winding a bobbin when  Ⓒ or  Ⓓ is pressed after placing the next bobbin in the hook ① .
- If a bobbin is already present in hook ① , the device will start winding of the bobbin.




ⓓ : Threaded bobbin loading button

This button is used for loading a threaded bobbin in the hook ❶ .




Be sure to check the bobbin to be loaded in the hook ❶ is wound with thread before pressing  ⓓ . If an empty bobbin is loaded in the hook ❶ , a malfunction can occur during sewing.

Place the threaded bobbin at bobbin case standby position ❷ . Press  ⓓ .

- If no bobbin is present in hook ❶ , the threaded bobbin placed as described above will be brought to hook ❶ . Then, the device waits until next bobbin is placed at the bobbin case standby position.
- If a threaded bobbin is present in hook ❶ , the device will stand ready as it is.

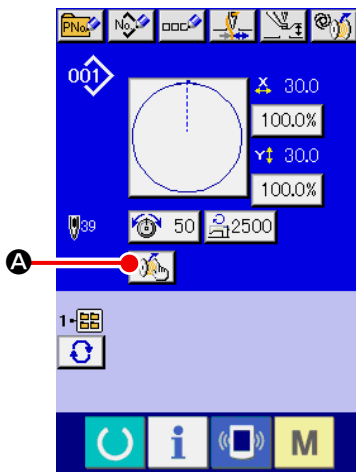
ⓔ : Nozzle air button

This button is used for operating nozzle air ❺ to feed thread ❹ from nozzle ❸ . Every time  ⓔ is pressed, nozzle air ❺ status will be changed over between "ON" and "OFF".




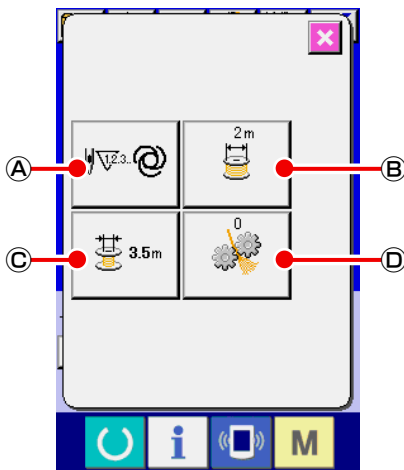
Be aware that the thread feed arm may operate when  ⓔ is pressed.

3-11. Setting the AW number-of-stitches input mode, AW operation mode and remaining-thread allowance length



<Data input screen>

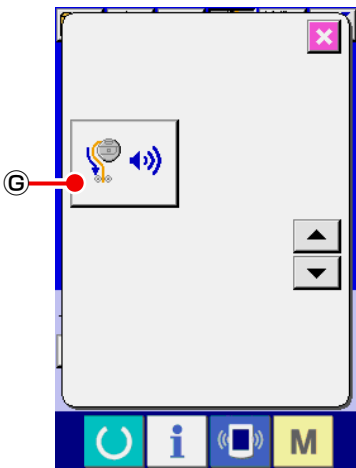
When  (A) is pressed on the data input screen, the AW setting screen is displayed.



<AW setting screen, first page>

When one of the following buttons is pressed on the AW setting screen, the corresponding setting of the AW can be carried out.

- (A) : Bobbin changing method setting button
- (B) : Bobbin-thread winding length setting button
- (C) : Remaining-thread allowance length selection button
- (D) : Thread unraveling strength setting button
- (E) : Bobbin thread end length adjustment button
- (F) : Remaining thread removal motor speed setting button




<AW setting screen, second page>

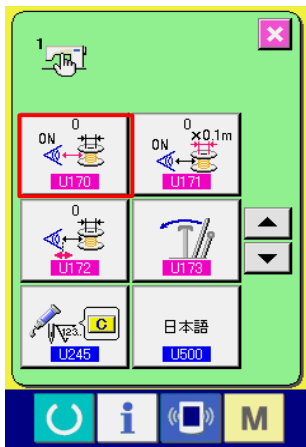
- (G) : Remaining thread removal air changeover setting button

Detailed explanation will be given from the next page.

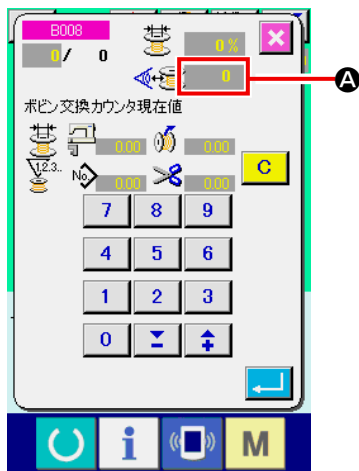
3-11-1. Selecting the bobbin changing method

When you press  (A), the bobbin thread changing method setting screen is displayed.

AW bobbin changing method can be set to the "auto" or "manual".



<Memory switch data list screen>



<Sensor screen>

- In the case you have selected 0 (zero) with the memory switch U170, the remaining thread detection sensor will not be used. The number of stitches to be sewn before changing the bobbin is automatically set in accordance with the loaded pattern and the preset bobbin thread winding length. In addition, the number of stitches to be sewn before changing the bobbin is automatically updated by the remaining thread margin length at the time of changing the bobbin.

- In the case you have selected a setting other than 0 (zero) with the memory switch U170, the detection sensor will be used.

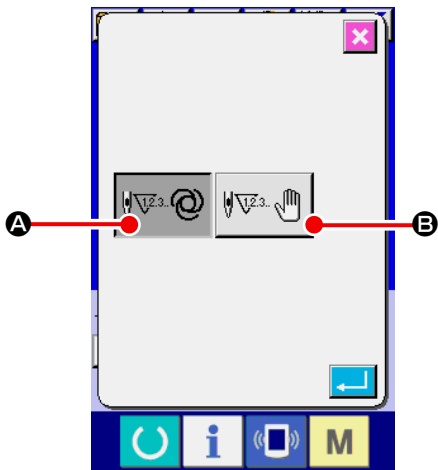
If the sensor input value becomes smaller than the threshold of the remaining amount detection sensor, the remaining thread amount will be calculated using the U171 setting and the bobbin will be changed automatically. In addition, the number of stitches to be sewn before changing the bobbin will be automatically updated by the remaining thread margin length at the time of changing the bobbin.

■ Method of adjusting the remaining thread amount (optional)

- 1) Place an empty bobbin in the bobbin case. Then, put the bobbin case in the hook.
 - 2) Sensor value (A) is displayed on the sensor screen.
 - Upper limit value → The maximum value of U170 (remaining amount detection threshold)
 - Lower limit value → The minimum value of U170 (remaining amount detection threshold)
- * When you want to adjust the remaining thread length so that a longer thread remains on the bobbin, increase the setting of U170.
- * When you want to adjust the remaining thread length so that a shorter thread remains on the bobbin, decrease the setting of U170.



The maximum setting of U170 is the "lower limit value + 50".



<AW number-of-stitches input mode setting screen>

A : Auto

The number of stitches to be sewn before changing the bobbin is automatically selected from read-in patterns and the preset bobbin-thread winding lengths. In addition, the number of stitches to be sewn before changing the bobbin is automatically updated according to the remaining-thread allowance length at the time of changing the bobbin. In the case the "auto" is selected, the updated number of stitches will be returned to the initial value by carrying out one of the following operations.

- In the case of reading in a pattern on the AW operation screen
- In the case the bobbin change is carried out on the AW operation screen
- In the case the bobbin is taken out on the AW operation screen
- In the case the bobbin thread winding length is changed on the AW setting screen
- In the case of changing the AW number-of-stitches input mode from "manual" to "auto"

1. If the remaining-thread allowance length setting does not match the sewing conditions, the bobbin thread may run out during sewing.

2. If the remaining-thread allowance length is set to a small value, the bobbin thread may run out due to changes in bobbin-thread consumption. It is therefore necessary to check the actual remaining-thread length before changing the set value.

3. If the remaining-thread allowance length is 3.5 m, some waiting time can occur according to the swing conditions such as the thread count, bobbin-thread winding length and sewing pattern. In such a case, check the actual remaining thread length and re-set it.

4. If the bobbin thread tension of two bobbins differs, the remaining-thread length will also differ. It is necessary, therefore, to adjust so that the bobbin thread tensions of two bobbins are equal.

5. Automatic update of the preset number of stitches is carried out from the fourth automatic change of bobbin.

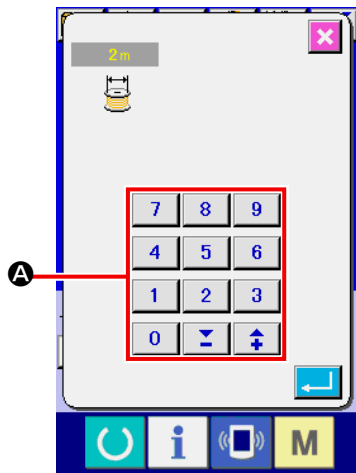
6. Under the trial stitching mode, the preset number of stitches is not automatically updated. In addition, note that the preset number of stitches is initialized after the completion of trial stitching.




B : Manual

Bobbin is changed according to the number of stitches to be sewn before changing the bobbin. Under the manual mode, the number of stitches to be sewn before changing the bobbin is counted using the bobbin thread counter on the counter setting screen.

3-11-2. Bobbin-thread winding length



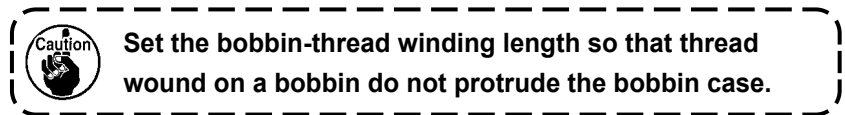
<Bobbin-thread winding length setting screen>

When  (B) is pressed, the bobbin-thread winding length setting screen is displayed.

(A) : Numeric keypad

Bobbin-thread winding length can be entered with the numeric keypad.

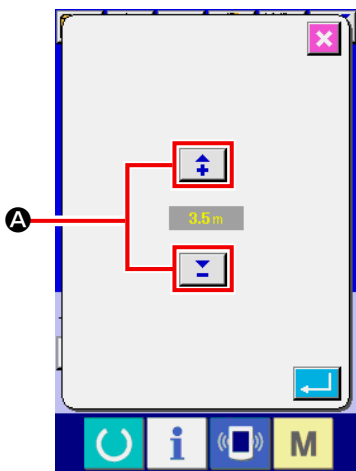
Bobbin-thread winding length : Min. 2 m
Max. 200 m




Refer to the table shown below for a guide for the bobbin-thread winding length.

Nylon bond 6.6	TEX 135	TKT 020	Max. 12 m
Nylon bond 6.6	TEX 105	TKT 030	Max. 22 m
Nylon bond 6.6	TEX 70	TKT 040	Max. 30 m
Nylon bond 6.6	TEX 45	TKT 060	Max. 45 m

3-11-3. Selecting the remaining-thread allowance length



<Remaining-thread allowance length selection screen>

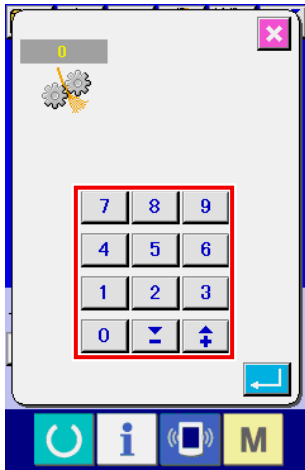
When  (C) is pressed on the AW setting screen, the remaining-thread allowance length selection screen is displayed.

On the remaining thread margin length selection screen, the remaining thread margin length can be set from 0 m to 3.5 m with




The remaining-thread allowance length is used when the bobbin change method is set to "auto".

3-11-4. Setting the thread unraveling strength



<Thread unraveling strength setting screen>

When  is pressed on the AW setting screen, the thread unraveling strength setting screen is displayed.

Thread unraveling strength can be set in five different stages as 1 to 5 on the thread unraveling strength setting screen. If "0" is entered for the thread unraveling strength, thread unraveling will not be carried out.

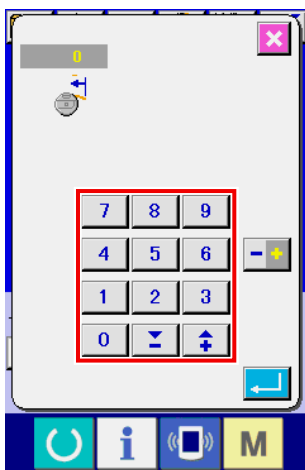
In the case the thread is stiffened with resin such as the bond thread (coating thread), it is not possible to wind the thread on a bobbin. In such a case, enable the thread loosener to allow it to loosen the thread end.

The thread loosener operates to loosen the thread end. Its reference set value is "1". The larger the set value becomes, the more times the thread loosener operates in repetition according to the set value.




1. Thread loosening operation takes time. It is recommended to minimize the set value as long as the thread can be wound on a bobbin. The larger the set value becomes, the longer time is required for bobbin winding. In such a case, sewing cannot be started until the bobbin replacement is completed.
2. Do not enable the thread loosener when using any thread other than the bond thread (coating thread). If the thread loosener is enabled when using any other thread, the thread will be fluffed and will be caught in the bobbin. In such a case, the thread remaining in the bobbin cannot be completely removed.

3-11-5. Adjusting the bobbin thread end length

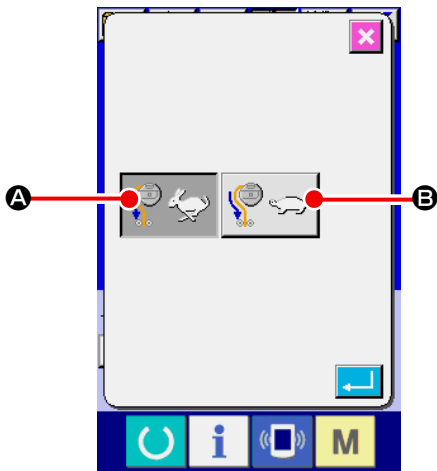


<Bobbin thread end length adjustment screen>

When you press  on the AW setting screen, the bobbin thread end length adjustment screen is displayed.

On the bobbin thread end length adjustment screen, the bobbin thread end length can be set from -100 to 0. If you input 0 (zero), the thread end length adjustment will not be carried out. In this case, the thread end length will remain as is cut by the AW device.

3-11-6. Selecting the remaining thread removal motor speed



<Remaining thread removal motor speed selection screen>

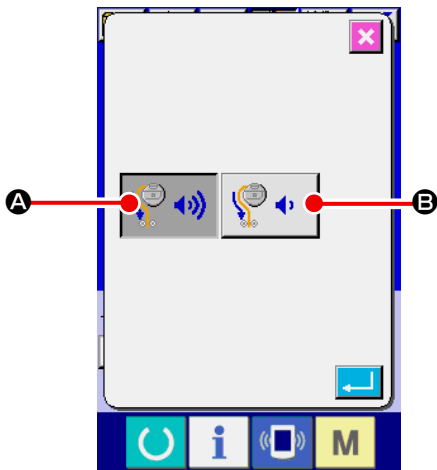
When you press **F** on the AW setting screen, the remaining thread removal motor speed selection screen is displayed.

On this screen, you can set the remaining thread removal motor speed to either high speed or low speed.

- **A** High speed: Standard
- **B** Low speed: Speed is reduced to half of the standard speed.

Caution In the case of using thin thread or fragile thread, the remaining thread removal motor speed should be set to the low speed.

3-11-7. Selecting the remaining thread removal air changeover (only supported as an option)



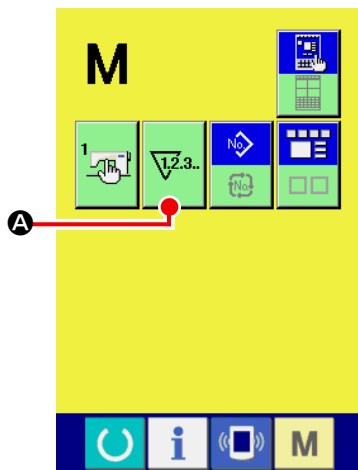
<Remaining thread removal air changeover selection screen>

When you press **G** on the AW setting screen, the remaining thread removal air changeover selection screen is displayed.

On this screen, the remaining thread removal air changeover can be set to either standard or air consumption, small.


- **A** Standard
- **B** Air consumption, small

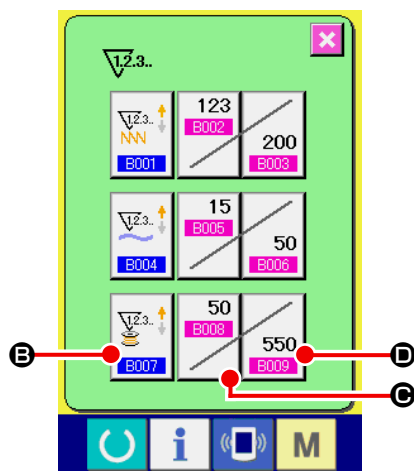
3-11-8. Setting the number of stitches to be sewn before changing the bobbin



<Mode changeover screen>

Caution The number of stitches to be sewn before changing the bobbin has to be set only under the manual mode. In the case of the auto mode, preset number of stitches will be automatically updated.

The number of stitches to be sewn before changing the bobbin is set on the counter setting screen. The bobbin thread counter indicates the number of stitches to be sewn before changing the bobbin. Press  **A** on the mode changeover screen to display the counter setting screen.



<Counter setting screen>

- B** : Number-of-stitches counter type button
When this button is pressed, the counter-type screen is displayed. Counting method can be selected between the UP counter and DOWN counter. Do not select "disable the counter".
- C** : Counter current-value button
When this button is pressed, the counter current-value screen is displayed. On this screen, the current count value can be set and cleared. The unit of the counter set value is "×10" stitches.
- D** : Counter set value button
When this button is pressed, the counter set value screen is displayed. On this screen, the counter set value can be set and cleared. The unit of the counter set value is "×10" stitches.

Number of stitches : Min. 10 stitches (Display: 1)
Max. 99990 stitches (Display: 9999)

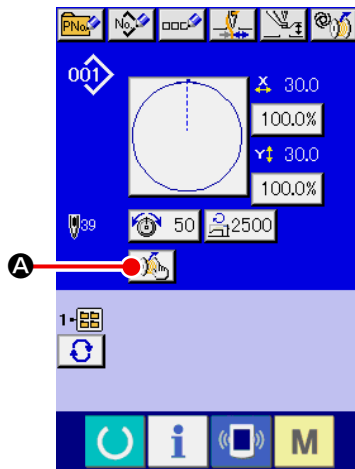
Caution

1. Under the automatic mode, the set value of counter is automatically updated. So, do not change it.
2. The remaining-thread length is 8 m at the maximum.
Be aware that a remaining-thread removal error may occur if the length of thread to be removed exceeds 8 m. It is recommended to set the number of stitches to be sewn before changing the bobbin so that the remaining thread length is 8 m or less.


3-12. Example of operation

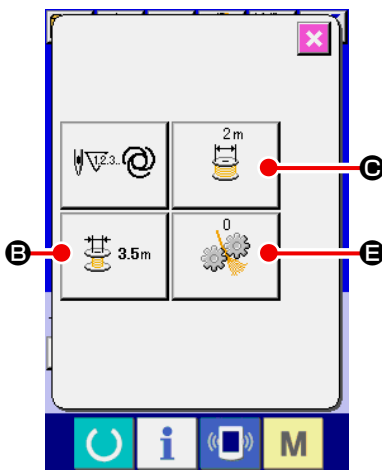
This clause gives an example of how to actually operate the device.

- (1) In the case both of the two bobbins have been taken out of the device or both of the two bobbins are empty

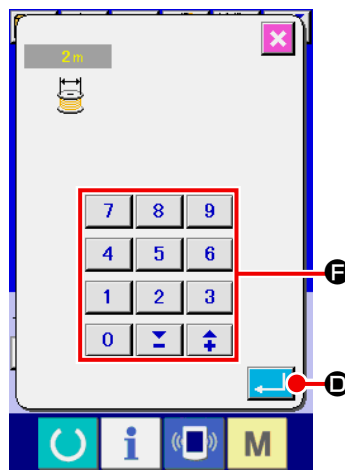


<Data input screen>


- 1) Turn the power to the device.
- 2) Set the bobbin-thread winding length to be wound on a bobbin.
Press  **A** on the data input screen.




<AW setting screen>

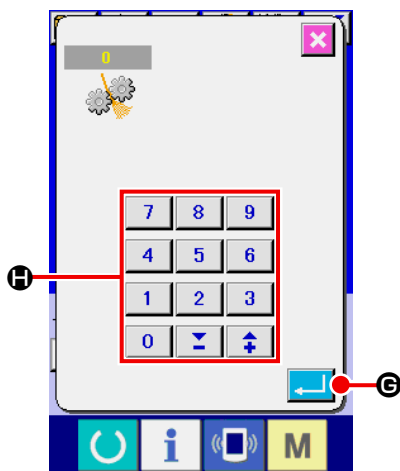


<Bobbin-thread winding length setting screen>

Press  **C** on the AW setting screen.


Set the bobbin-thread winding length using the +/- button or the numeric keypad **F** on the bobbin-thread winding length setting screen.

After the entry of bobbin-thread winding length, press  **D**.




<Thread unraveling strength setting screen>

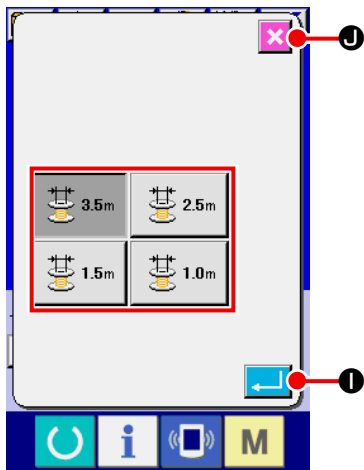
- 3) Setting the thread unraveling conditions

Press  **E** on the AW setting screen.

(0: Without thread unraveling function)
1: Min. to 5: Max.

Then, specify the thread unraveling conditions using the +/- button or the numeric keypad **H**.


After the entry of bobbin-thread winding length, press  **G**.




<Remaining-thread allowance length selection screen>


4) Set the number of stitches where necessary. It is necessary to set the number of stitches without exceptions in the case the "manual" is selected.

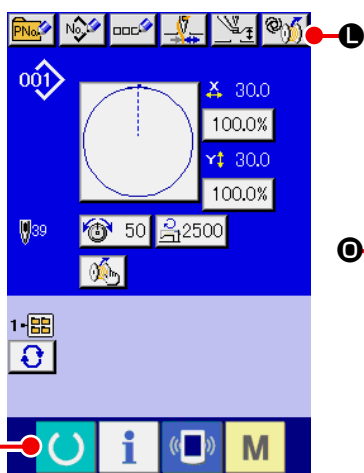
* In the case the "manual" is selected, set the counter set value on the counter setting screen.

* In the case the "auto" is selected, press  **B** on the AW setting screen.

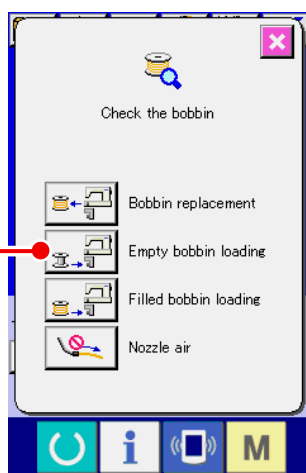
Choose the remaining thread margin length from 0 to 3.5 m.

After the entry of bobbin-thread winding length, press  **I**.


Press  **J** to return to the data input screen.




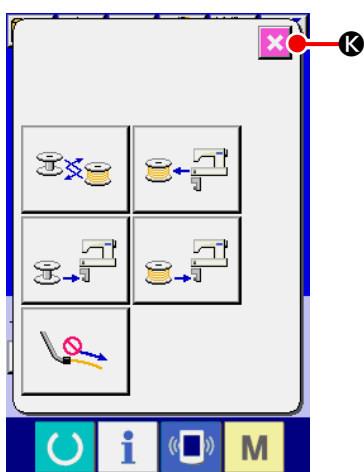
<Data input screen>



<Bobbin check screen>

5) Press  **L**. Wait until the initialization operation of the device is completed.

6) Place the first bobbin in the bobbin setting section. Then, press  **O**. The bobbin is taken in the device. (Refer to "[3-3. How to set a bobbin](#)" p.8 for the bobbin setting procedure.)





<AW operation screen>

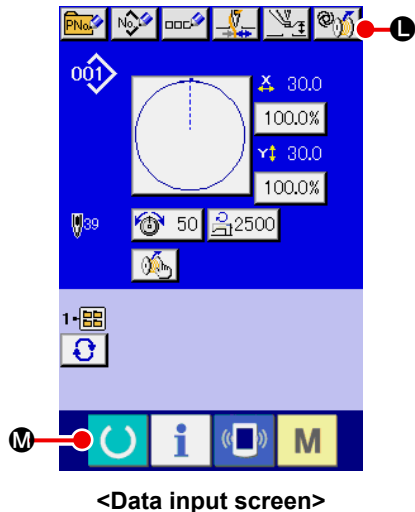
7) Subsequently, place the second bobbin in the bobbin setting section.

8) Press  **O** in the similar manner.

9) Now, the device starts winding bobbin. Wait a moment until the device completes winding of bobbin.

10) Press  **K** to return to the data input screen. Press  **M** to display the sewing screen. Once the sewing screen is displayed, sewing can be started.

(2) In the case both of the two bobbins have been taken out of the device or one (or both) of the two bobbins is wound with thread



In this case, the steps of procedure to be taken up to step 5) are same with those in the case of (1). From step 6), take the following steps of procedure.

- 6) Place the first bobbin in the bobbin setting section. (Refer to "3-3. How to set a bobbin" p.8 for the bobbin setting procedure.)

In the case the bobbin placed is:

- empty bobbin, press L, then press O.
- already wound with thread, press L, then press P.

The bobbin is placed in the hook.

- 7) Subsequently, place the second bobbin in the bobbin setting section.

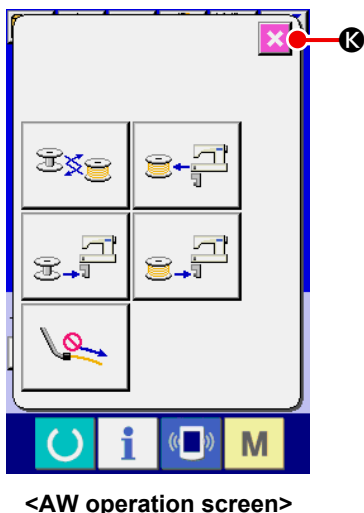
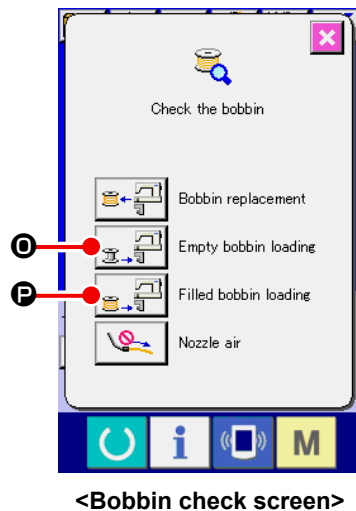
- 8) As with step 6), in the case the bobbin placed in the bobbin setting section is:

- empty bobbin, press L, then press O.
- already wound with thread, press L, then press P.

The bobbin is placed in the hook.

- 9) Press K to return the screen to the data input screen.

Press M to display the sewing screen. Once the sewing screen is displayed, sewing can be started.

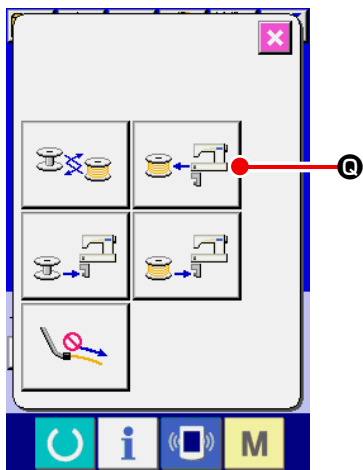


If one of the bobbins is empty, the device winds thread on the bobbin. After the device completes winding of the bobbin, it enters the standby state waiting for the moment to change the bobbin.

Special care should be taken when using a bobbin that has been already wound with thread, since the preset number of stitches may not be sewn in its entirety (i.e, bobbin thread may run out during sewing) if the quantity of thread wound on the bobbin is not sufficient.


It is recommended to avoid the use of bobbin which has been used halfway or the bobbin wound with unknown quantity of thread (or to use such a bobbin after removing the thread wound on it by hand until it becomes empty) in order to totally prevent the aforementioned problem. If it is necessary to use the bobbin which has been used halfway, it is necessary to set the number of stitches to a smaller value. The quantity of thread to be removed from a bobbin is large initially, but it will become more and more adequate if the "auto" is selected.

(3) In other case





<AW operation screen>

(In the case one or two bobbins are loaded in the device (including the hook) other than the case (2).)

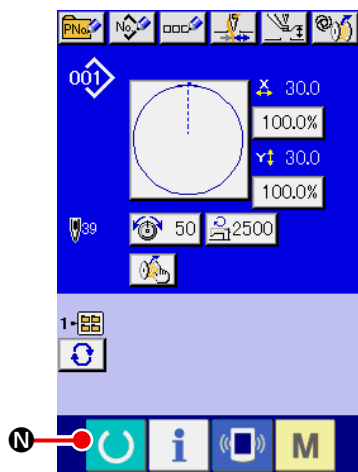
- 1) Turn the power to the device.
- 2) If a bobbin is loaded in the bobbin setting section, take it out.
- 3) If any other bobbin still remains in the device (or in the hook), press  **A** to make the bobbin setting section to feed the bobbin to a position at which the bobbin can be taken out.

Then, carry out the operation procedure (1) or (2).

Be sure to carry the bobbin to the bobbin setting section with  **A before removing the bobbin which is placed in the hook where necessary. If you attempt to remove the bobbin directly from the hook, the sewing machine may operate while no bobbin is placed in the hook.**


 **Caution**

(4) In the case the device remains in the finished state of previous sewing



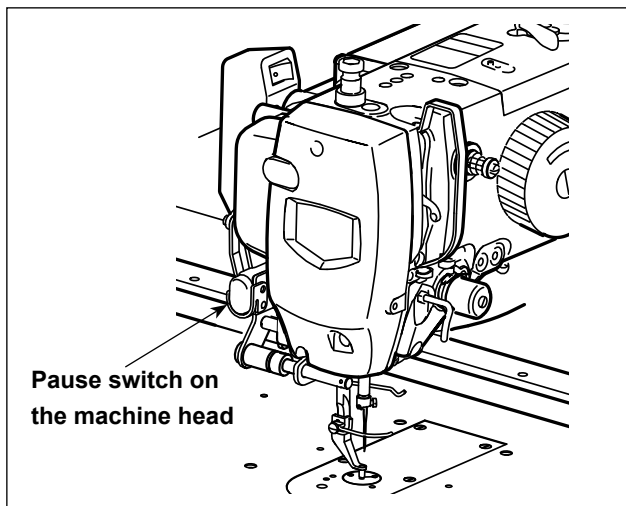
<Data input screen>

(In the case the previous sewing has been normally finished, and one bobbin is placed in the hook and the other bobbin is placed in the bobbin setting section.)

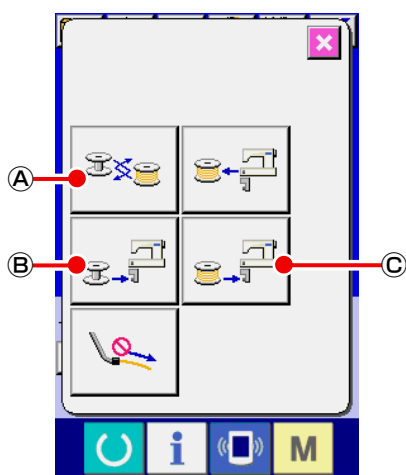
- 1) Turn the power to the device.
- 2) Press  **N** to display the sewing screen. Once the sewing screen is displayed, sewing can be started.

In other words, the operation required in the aforementioned state is only to turn ON the power to the device. Note that the number of stitches is set at the value that is effective at the end of previous sewing. So, sewing can be started continuously from the previous sewing.

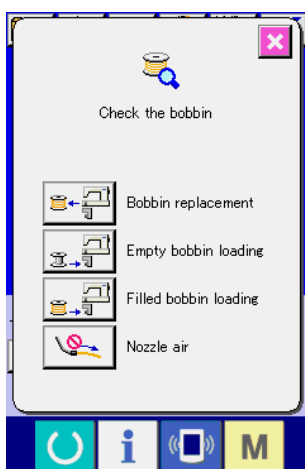
(5) Malfunctioning operation cancel function



* This function is used with the pause switch mounted on the machine head.







<AW operation screen>





<Bobbin check screen>

1) Determination of acceptability of cancellation operation

In the case you have pressed bobbin change button  (A), empty bobbin loading button  (B) or wound bobbin loading button  (C), you can cancel bobbin winding by pressing the pause switch mounted on the machine head.

- In the case  (A) is pressed, the cancellation operation is not accepted during bobbin carrying operation before the start of removal of the remaining thread.

The cancellation operation is accepted after the start of removal of the remaining thread.

- In the case  (B) or  (C) is pressed, the cancellation operation is not accepted during bobbin carrying operation before the start of winding of the bobbin.

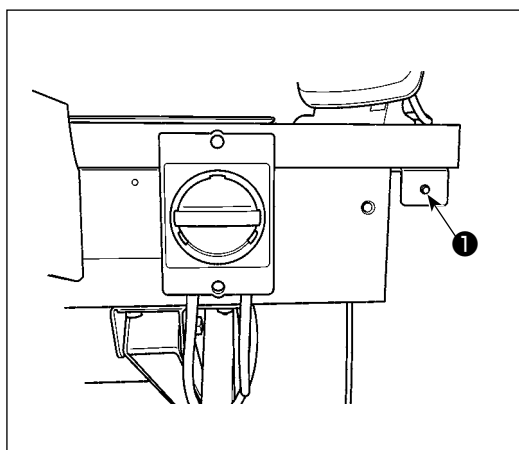
The cancellation operation is accepted after the start of winding of the bobbin.

If the cancellation operation is acceptable, bobbin winding will be cancelled and the AW-3 will return to the previous state.

2) After the cancellation, the bobbin check screen may be displayed depending on the bobbin status.

3-13. Turning OFF of the power

Do not turn OFF the power to the device in the following cases unless there is an emergency.



Device movement:

- ① While the device is engaged in the removal of thread remaining on the bobbin
- ② While the device is engaged in bobbin winding, threading or thread trimming


If the power is turned OFF while the device is performing one of the aforementioned procedures, the bobbin case will move while the thread is still engaged with the bobbin, causing troubles such that the mechanism is entangled with thread.



In the case of aforementioned ① or ②, device operation lamp ❶ is on. Do not turn OFF the power to the device while device operation lamp ❶ is lighted.

3-14. Error display and error handling procedure

If any of the following errors occurs while the device is in operation, the relevant error is displayed on the operation panel. Handle the errors according to the table shown below. Errors which are not included in the table below must be handled after turning OFF the power to the device once.

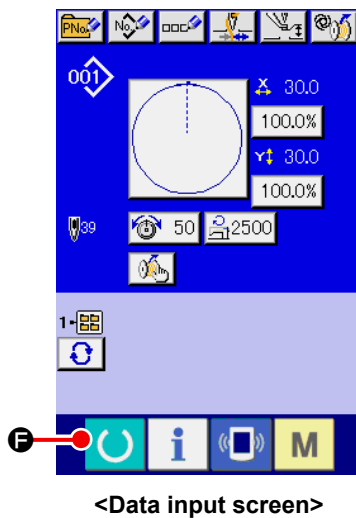
Refer also to "5. TROUBLESHOOTING" p.44.


Error code	Description	Error handling procedure
E074	Thread remaining on the used-up bobbin cannot be removed after changing the bobbin.	<ol style="list-style-type: none"> ① Take out the relevant bobbin from the bobbin setting section. If any thread remaining on the bobbin, remove it by hand. ② Load the bobbin again in the bobbin setting section. Press  displayed on the error screen. The device takes the bobbin in it and starts winding the bobbin. ③ When the bobbin winding is completed, the error screen is closed.

Error code	Description	Error handling procedure
E075	When winding a bobbin, the device has failed to tangle the thread in the hook.	<ol style="list-style-type: none"> ① Take out the relevant bobbin from the bobbin setting section. If any thread remaining on the bobbin, remove it by hand. ② Check to be sure that the thread appears properly from the nozzle. ③ Load the bobbin again in the bobbin setting section. Press  displayed on the error screen. The device takes the bobbin in it and starts winding the bobbin. ④ When the bobbin winding is completed, the error screen is closed.
E076	A fault has occurred during bobbin winding.	<ol style="list-style-type: none"> ① Take out the relevant bobbin from the bobbin setting section. If the thread is engaged with the bobbin, cut off the thread. If any thread remaining on the bobbin, remove it by hand. ② Check to be sure that the thread appears properly from the nozzle. ③ Load the bobbin again in the bobbin setting section. Press  displayed on the error screen. The device takes the bobbin in it and starts winding the bobbin. ④ When the bobbin winding is completed, the error screen is closed.
E077	After bobbin winding, an fault has occurred during the threading of tension regulating spring of bobbin case or during thread trimming after threading the spring.	Turn OFF the power

3-15. Detection of errors related to the AW

3-15-1. Error detection under the normal conditions

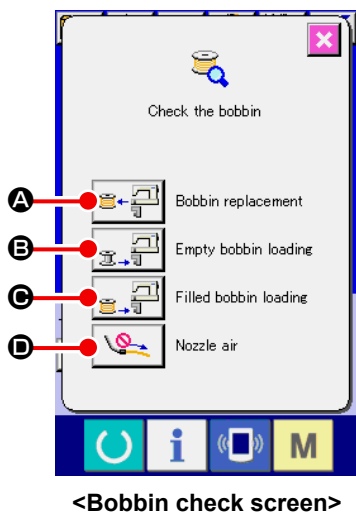


If  **E** is pressed or use of any function of the AW device is attempted in the state no bobbin is loaded in the AW (in the state two bobbins are not loaded) or in the state an error has been detected on the data input screen, the AW error screen will be displayed.

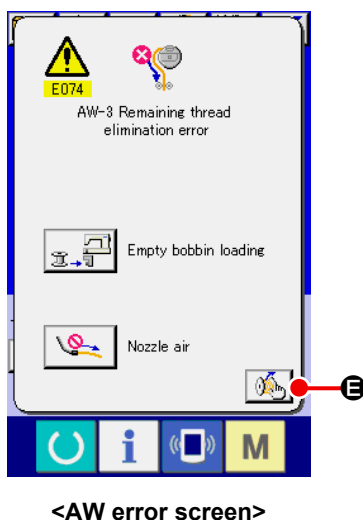
If no bobbin is loaded in the AW device, the bobbin check screen will be displayed. On the bobbin check screen, carry out the bobbin loading operation to load two bobbins in the AW device to reset the error. After the error is reset, the panel display returns to the normal screen.

The following switches can be operated on the bobbin check screen. Refer to "[3-10. Operating the AW](#)" p.17 for detailed functions.

The button to be displayed differs according to the bobbin condition.




- A** : Bobbin take-out button
- B** : Empty bobbin loading button
- C** : Threaded bobbin loading button
- D** : Nozzle air button

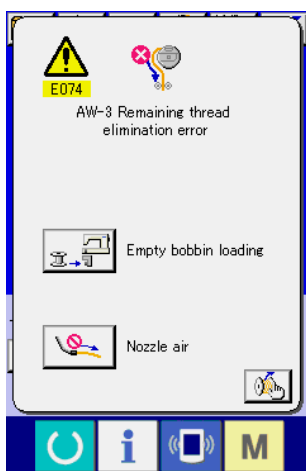


In the case "E074 Remaining-thread removal error", "E075 Tangling error", "E076 Bobbin winding error", "E077 Threading error, or thread trimming" has been detected, the AW error screen will be displayed.

On this screen, the error is reset by loading an empty bobbin or a thread bobbin in the AW device. The item to be operated differs with the error number.

When  **E** is pressed, the AW setting screen is displayed. On this screen, settings of the AW can be changed.

3-15-2. Detection of errors during sewing



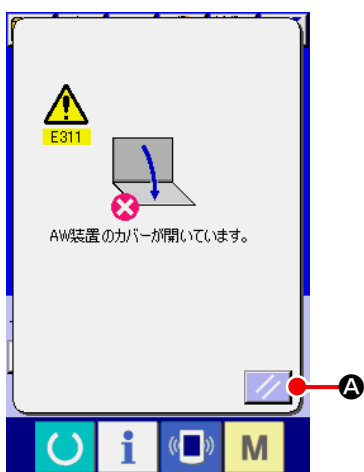
<AW error screen>

In the case an error related to the AW device is detection during sewing, the AW error screen will be displayed after the sewing machine has finished sewing and stopped.

The error resetting procedure is same with the error detected under the normal state.


Refer to **"3-15-1. Error detection under the normal conditions"** p.34 for detailed functions.


3-15-3. Cover error detection




<AW error screen>

Error can be reset on the cover error screen.






To reset the error, close the cover and press reset button  **A**.

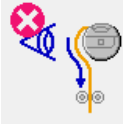
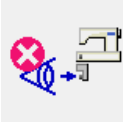




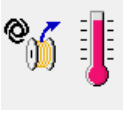


In addition, no action will be taken even if you press reset button  **A** unless the closed cover is displayed on the error screen.

Caution If you press  **A** without closing the cover, the error cannot be reset.

3-15. List of errors

AW-related errors are listed in the table below.

Error No.	Display	Description of error	How to recover
E074		Remaining-thread removal error	Refer to "3-13. Error display and error handling procedure" p.32 for the error resetting method.
E075		Thread twining fault	Refer to "3-13. Error display and error handling procedure" p.33 for the error resetting method.
E076		Bobbin winding fault	Refer to "3-13. Error display and error handling procedure" p.33 for the error resetting method.
E077		Threading/thread trimming fault	Turn OFF the power
E311		Cover fault	Close the cover. Then, press the reset button.
E715		Device fault due to direct-drive failure	Turn OFF the power
E716		Device fault due to rotation failure	Turn OFF the power
E717		Device fault due to nozzle failure	Turn OFF the power
E718		Device fault due to moving knife failure	Turn OFF the power
E719		Device failure due to thread-feeding failure	Turn OFF the power
E720		AW device fault (origin error)	Turn OFF the power

Error No.	Display	Description of error	How to recover
E721		AW device fault (Remaining-thread removal position bobbin-sensor error)	Turn OFF the power
E722		AW device fault (Standby position bobbin-sensor error)	Turn OFF the power
E723		AW data fault (EEPROM)	Turn OFF the power
E724		AW data fault (Adjustment value)	Turn OFF the power
E725		AW CPU fault	Turn OFF the power
E951		AW-disconnection error	Turn OFF the power
E952		AW temperature-rise error	Turn OFF the power
E953		AW communication error	Turn OFF the power
E954		Bobbin carrier fault	Turn OFF the power

4. MAINTENANCE

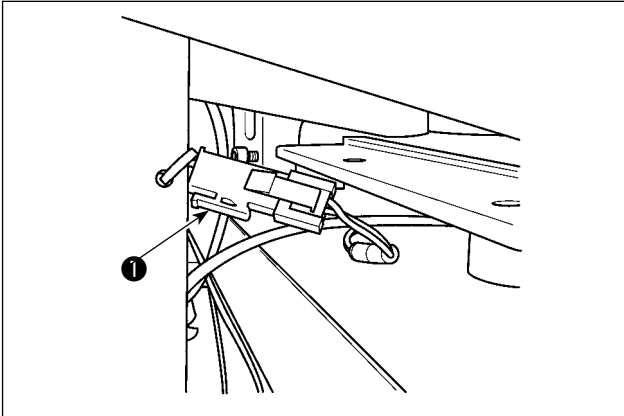
4-1. Attaching / removing the cover



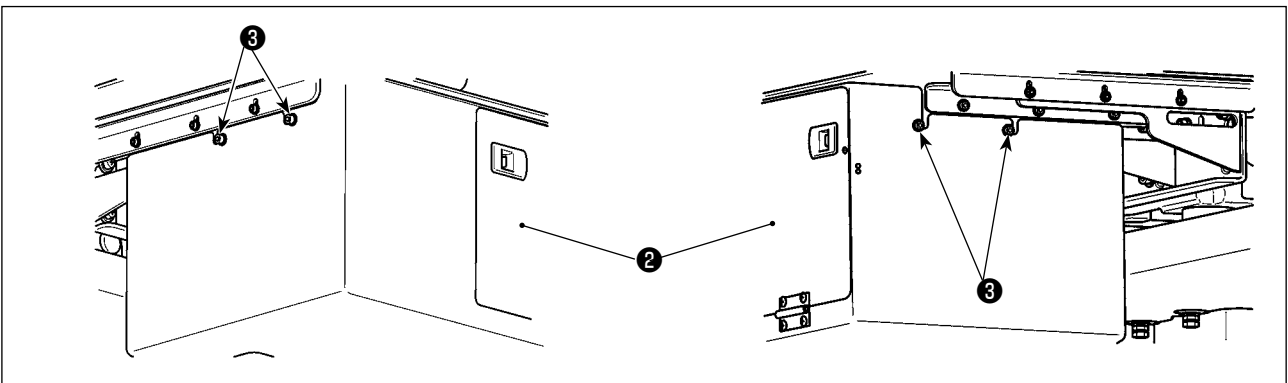
WARNING :

Turn OFF the power before starting the work so as to prevent accidents caused by abrupt start of the sewing machine.

Remove front cover ❶ from the device before carrying out cleaning, etc.



1) Remove sensor cover connector ❶ .



2) Loosen four setscrews ❷ on the right and left side faces of the device.

3) Slightly shift the cover ❶ upward, then carefully draw it toward you.

Install the cover ❶ reversing the removal procedure.



When you want to carry out sewing, it is necessary to attach cover ❶ for the sake of safety.

4-2. Cleaning

Periodically carry out cleaning of each section of the device with an air gun supplied with the unit as an accessory.

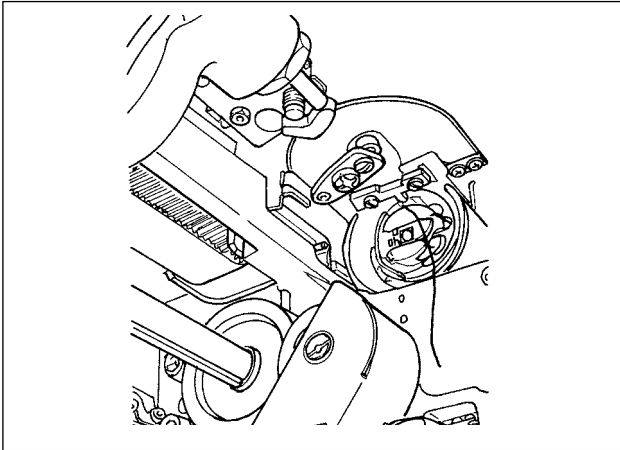
WARNING :



In order to prevent the device from malfunctioning or being damaged, be sure to check the following items before using it.

- ① Turn OFF the power before starting the work so as to prevent accidents caused by abrupt start of the sewing machine.
- ② If a large quantity of sewing-machine hook oil gathers on the mechanical section of the device, wipe off the oil before carrying out cleaning with an air gun.

(1) Cleaning the periphery of hook

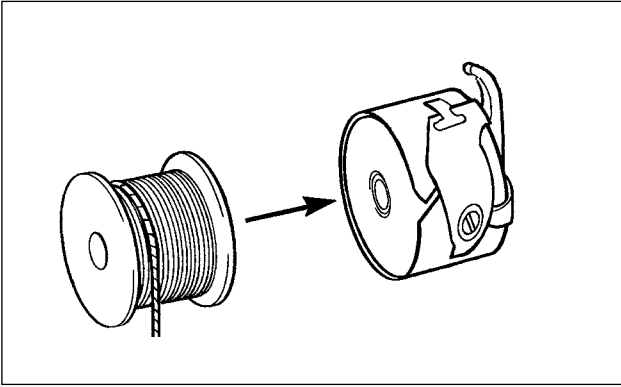


*** Be sure to carry out cleaning of the periphery of hook every working day.**

When sewing some types of materials, a great deal of dust can be generated. In such a case, carry out cleaning of the periphery of hook several times a day where necessary.

- 1) Remove the front cover from the device in accordance with "[4-1. Attaching / removing the cover](#)" p.38.
- 2) Remove large dust balls lint around the hook with a pair of tweezers or the like.
- 3) Carry out cleaning by blowing away dust remaining around the hook with an air gun.

(2) Cleaning the bobbin and bobbin case



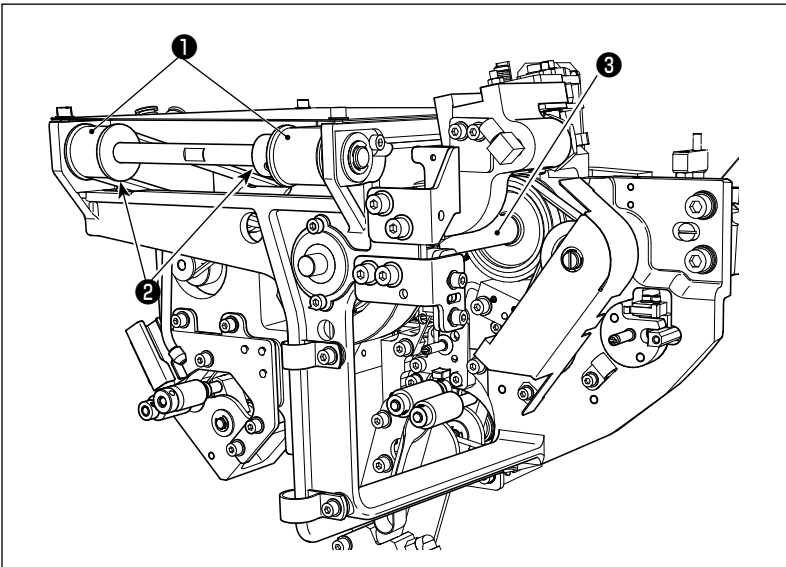
* **Be sure to carry out cleaning of the periphery of hook every working day.**

When sewing some types of materials, a great deal of dust can be generated. In such a case, carry out cleaning of the periphery of hook several times a day where necessary.

- 1) Wipe off oil and dust gathering on the bobbin case. In particular, carefully wipe off oil and dust from the bobbin case shaft section. In addition, blow away oil and dust gathering under the bobbin idling prevention spring inside the bobbin case with an air gun.

- 2) Put a drop of oil No. 2 in the bobbin case in accordance with **"3-3. How to set a bobbin" p.8.**

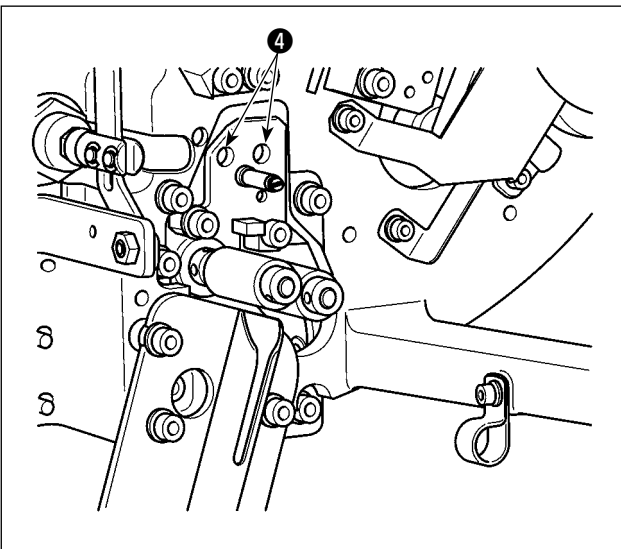
(3) Cleaning the mechanical section



Carry out cleaning of the mechanical section once a twice a week.

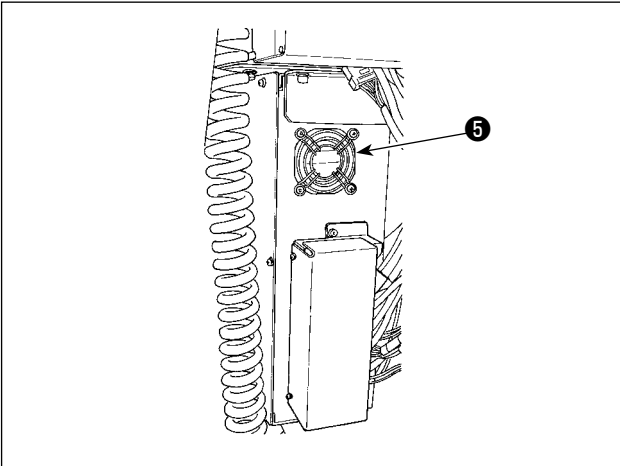
- 1) Carry out cleaning of each belt **1** and pulley **2** with an air gun. In addition, carry out cleaning of moving sections other than those shown in the figure appropriately.
- 2) Carry out cleaning of each shaft **3** with an air gun.

(4) Cleaning the sensor



Carry out cleaning of sensor **4** in the remaining-thread removal section with an air gun once or twice a week.

(5) Cleaning the control box for the device



Carry out cleaning of the control box once a week.

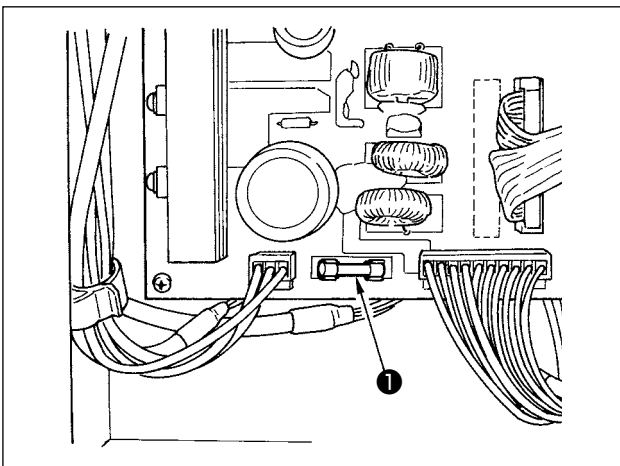
- 1) Carry out cleaning to remove dust from around the ventilation hole on the bottom of control box with an air gun.
- 2) Carry out cleaning to remove dust gathering in exhaust outlet ⑤ of fan motor with an air gun.

4-3. Replacing the fuse



DANGER :

In order to prevent accidents due to an electrical shock, be sure to turn OFF the power switch and remove the power plug from the receptacle before replacing the fuse. In addition, be sure to attach the rated fuse.



Carry out the following steps of procedure to replace fuse ① of the device.

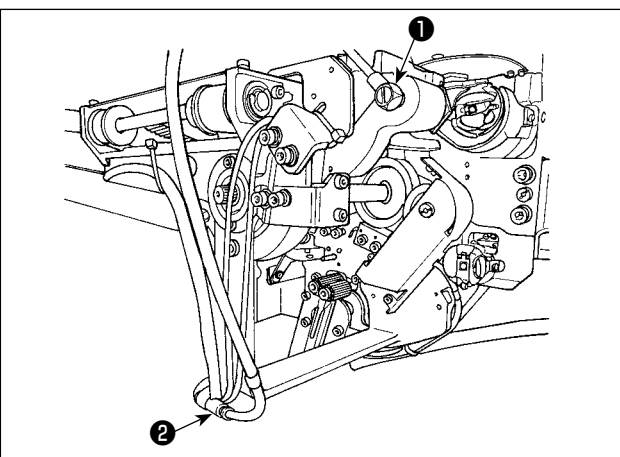
- 1) Turn OFF the power switch and wait for five or more minutes.
- 2) Remove the cover of control box for the device.
- 3) Replace fuse ① attached on the PCB with a new one. Use the fuse with a specified capacity (HF0037060PA, 125V/T6A).
- 4) Attach the cover removed in step 2) back in place.

4-4. Replacing the gripper tube



WARNING :

Turn OFF the power before starting the work so as to prevent accidents caused by abrupt start of the sewing machine. In addition, close the air valve before replacing the tube.



If the air tube at the gripper has worn out or is damaged, replace it with a spare tube supplied with the unit as an accessory following the steps of procedure described below.

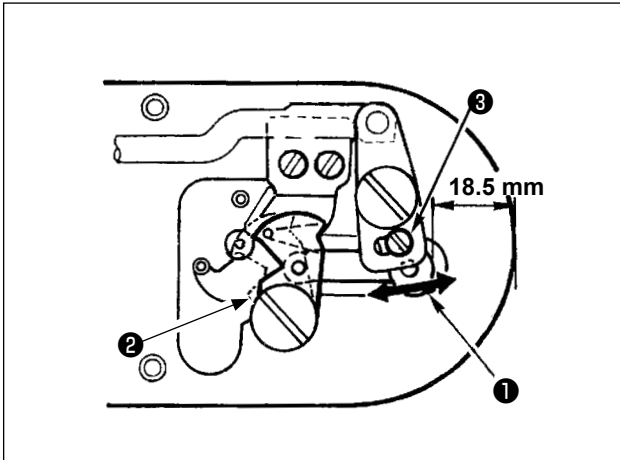
- 1) Detach hose nipple ① from the rear end of gripper. Then, detach the tube.
- 2) Detach the other end of tube from joint ② .
- 3) Connect a new tube following the aforementioned steps of procedure in the reverse order.

4-5. Corrective measure against idling of the bobbin



WARNING :

Turn OFF the power before starting the work so as to prevent accidents caused by abrupt start of the sewing machine.



If a sewing trouble occurs due to frequent idling of bobbin when performing thread trimming, loosen screw ③ and adjust the initial position of moving knife ②.

According to the initial value representing the initial position of moving knife, the distance from the top end of throat plate to the top end of moving knife link ① is 18.5 mm. Change the initial value to a value between 17.5 and 18mm.



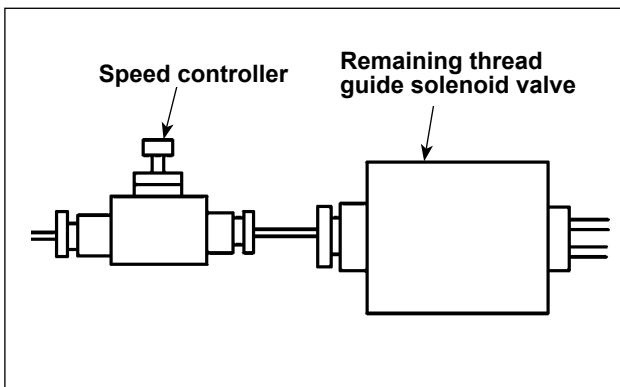
If the distance from the top end of throat plate to the top end of moving knife link ① is increased excessively, the needle thread and bobbin thread sometimes cannot be trimmed at a time.

4-6. Adjusting the air flow for the remaining thread guide



WARNING :

Turn OFF the power before starting the work so as to prevent accidents caused by abrupt start of the sewing machine.



The initial adjustment value of the speed controller has been adjusted to the value which is obtained by turning it in the reverse direction by seven revolutions from the fully-opened position.

If the remaining thread removal is not carried out stably according to the type and count of thread, finely adjust the speed controller.



Thick thread can be guided more smoothly by opening the speed controller since the air flow is increased by opening it. However, thin thread will be likely to flop when the air flow is excessively increased.

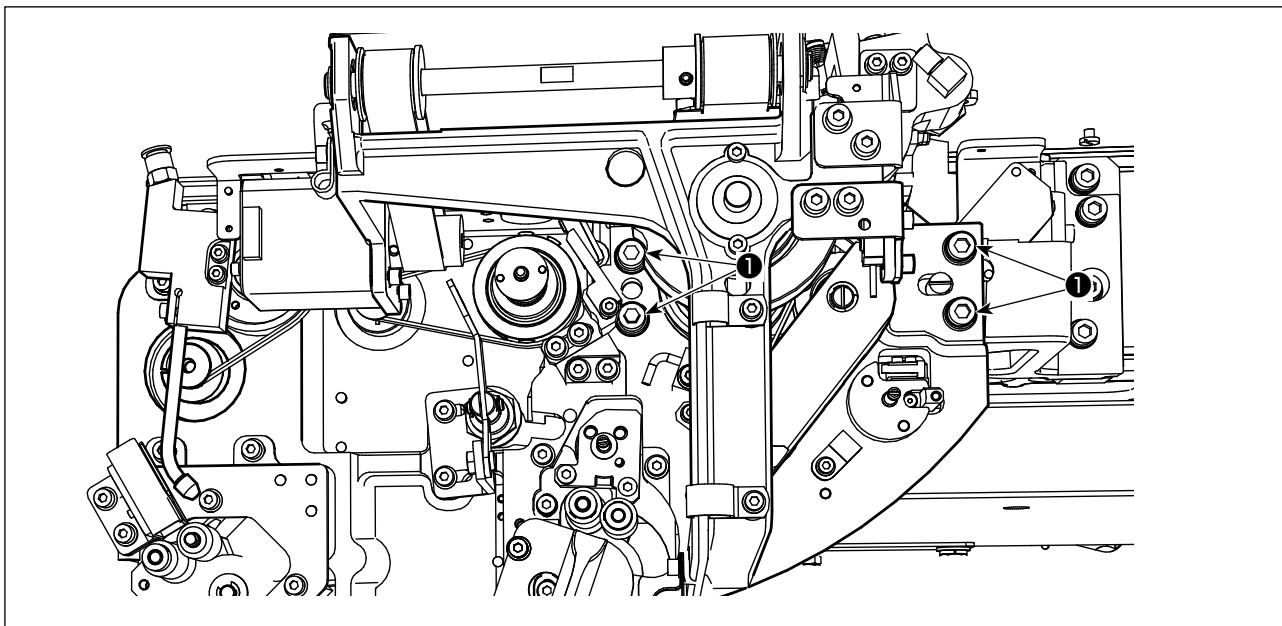
Thin thread can be guided more smoothly by closing the speed controller since the air flow is decreased by closing it. However, thick thread will be likely not to be guided smoothly.

4-7. Attaching/removing the AW main body



WARNING :

1. Turn OFF the power before starting the work so as to prevent accidents caused by abrupt start of the sewing machine.
2. Put the AW main body in a safe place.



Be sure to remove the sensor cover connector before detaching the cover from the AW device.

- 1) Detach the sensor cover referring to **"4-1. Attaching / removing the cover" p.38.**
- 2) Remove four screws **1** . Carry out maintenance.

5. TROUBLESHOOTING

If an error occurs while the device is in operation, the relevant error is displayed on the operation panel. Handle the error referring to **"3-14. Error display and error handling procedure" p.32**.

If the error cannot be reset or the error recurs, it is assumed there is some cause of malfunctions. In such a case, handle the error according to the table given below.

Display and description of error	Cause	Error handling procedure
Power cannot be turned ON.	<ol style="list-style-type: none"> ① The power plug is not inserted or contact failure. ② Fuse has blown. 	<ul style="list-style-type: none"> ○ Check how the power is supplied. ○ Replace the fuse according to "4-3. Replacing the fuse" p.41. If the device cannot be powered even after the replacement of the fuse, the device may have failed. In such a case, stop using the device.
E074 Removal of thread remaining on the bobbin is not carried out normally.	<ol style="list-style-type: none"> ① Obstacles such as dust, etc. gather on the moving section. ② Thread is entangled with unwinding elimination roller. ③ Remaining-thread sucking vacuum force is insufficient. ④ Thread end is not properly guided. ⑤ Type or count of thread is different from the specification. 	<ul style="list-style-type: none"> ○ Carry out maintenance referring to "4-2. Cleaning" p.39. ○ Remove the thread. ○ Check whether or not the dust bag is full of dust. ○ Check whether or not the air pressure has dropped.
E075 Thread has failed to twine properly on the bobbin.	<ol style="list-style-type: none"> ① Obstacles such as dust, etc. gather on the moving section. ② Length of thread coming out of the nozzle is not appropriate. ③ Thread unraveling is not performed appropriately. ④ No thread on bobbin thread cone. ⑤ Thread tension is high at thread route. ⑥ Thread route is not correct. ⑦ Mounting position and direction of the nozzle are not appropriate. ⑧ Bobbin fails to rotate. ⑨ Bobbin thread feeding unit fails to operate. ⑩ Bobbin tape has worn out. 	<ul style="list-style-type: none"> ○ Carry out maintenance referring to "4-2. Cleaning" p.39. ○ Adjust the length of thread coming out of the nozzle to approximately 13 cm. ○ Check the thread unraveling condition setting. ○ Check the length of thread coming out of the nozzle. ○ Put the bobbin thread cone in place. ○ Referring to "3-2. How to thread the device with the bobbin thread" p.6, check the thread tension. ○ Check the threading route referring to "3-2. How to thread the device with the bobbin thread" p.6. In particular, the roller and actuating arm, etc. of the bobbin thread feeding unit are threaded correctly. ○ Referring to "3-3. How to set a bobbin" p.8, check whether or not the bobbin is fitted in the bobbin case correctly. ○ Check whether or not the connector, air tube, etc. coming from the bobbin thread feeding unit are correctly connected. ○ Change the bobbin with a new one.

Display and description of error	Cause	Error handling procedure
E076 Bobbin-thread winding is not carried out normally.	<ul style="list-style-type: none"> ① Obstacles such as dust, etc. gather on the moving section. ② Thread of the bobbin thread cone has run out during winding of a bobbin. ③ Thread has broken during winding of a bobbin. ④ Thread wound on the bobbin overflows from the bobbin flange. ⑤ Bobbin fails to rotate. ⑥ Thread slips out of the roller of bobbin thread feeding unit. ⑦ Bobbin thread feeding unit fails to operate. ⑧ Thread has tangled on the thread stand, etc. since the thread has vibrated excessively halfway through threading route. 	<ul style="list-style-type: none"> ○ Carry out maintenance referring to "4-2. Cleaning" p.39. ○ Put the bobbin thread cone in place. ○ Referring to "3-2. How to thread the device with the bobbin thread" p.6, check the thread tension. ○ Check the setting of bobbin-thread winding length. ○ Check whether or not the thread used in the previous sewing still remains on the bobbin. ○ Referring to "3-3. How to set a bobbin" p.8, check whether or not the bobbin is fitted in the bobbin case correctly. ○ If the thread tension is not sufficient, thread may slip off the roller. Check the thread tension. ○ Check whether or not the connector, air tube, etc. coming from the bobbin thread feeding unit are correctly connected. ○ Check the threading route referring to "3-2. How to thread the device with the bobbin thread" p.6. In particular, the roller and actuating arm, etc. of the bobbin thread feeding unit are threaded correctly.
E311 Cover of the AW device is left opened.	<ul style="list-style-type: none"> ① Cover is left opened. ② Microswitch is not correctly positioned. ③ Microswitch cable is disconnected. ④ There is no microswitch signal. 	<ul style="list-style-type: none"> ○ Check the cover status. ○ Check the position of the microswitch. ○ Check whether the microswitch cable is connected to the AMS main PCB. ○ Check the microswitch signal.