

**JUKI®**

High-Speed Chip Shooter

**KE-1070/1070C/2070C/2070**

High-Speed Flexible Mounter

**KE-1080/2080/2080R**

# MAINTENANCE GUIDE

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## PART I

Contact [info@goldlandsmt.com](mailto:info@goldlandsmt.com) for PART II

JUKI AUTOMATION SYSTEMS CORPORATION  
CUSTOMER SUPPORT DEPARTMENT

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# Maintenance Guide

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# Maintenance Guide

 <b>DANGER</b>	To prevent any trouble caused by accidental machine start, always shut-down the power before starting the maintenance and adjustment work.
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## [1] X-Y UNIT

### 1-1. Replacing the Timing Belt and Adjusting the Belt Tension

If a tension of any belt drops below the criteria value, you must adjust it.

For details about the criteria value, see “Readjustment on market” of Specification values on page 1-4.

#### 1-1-1. Timing Belt XM

To carry out the work efficiently, detach the side cover. Remove the cover fixing screws and slide the cover toward the rear to detach the side cover.

- (1) Remove the SM1051052TN (3 pcs.), SL6051292TN (1 pc.) and SL6061092TN (2 pcs.) fixing the CB support. (No right side cover is equipped.)

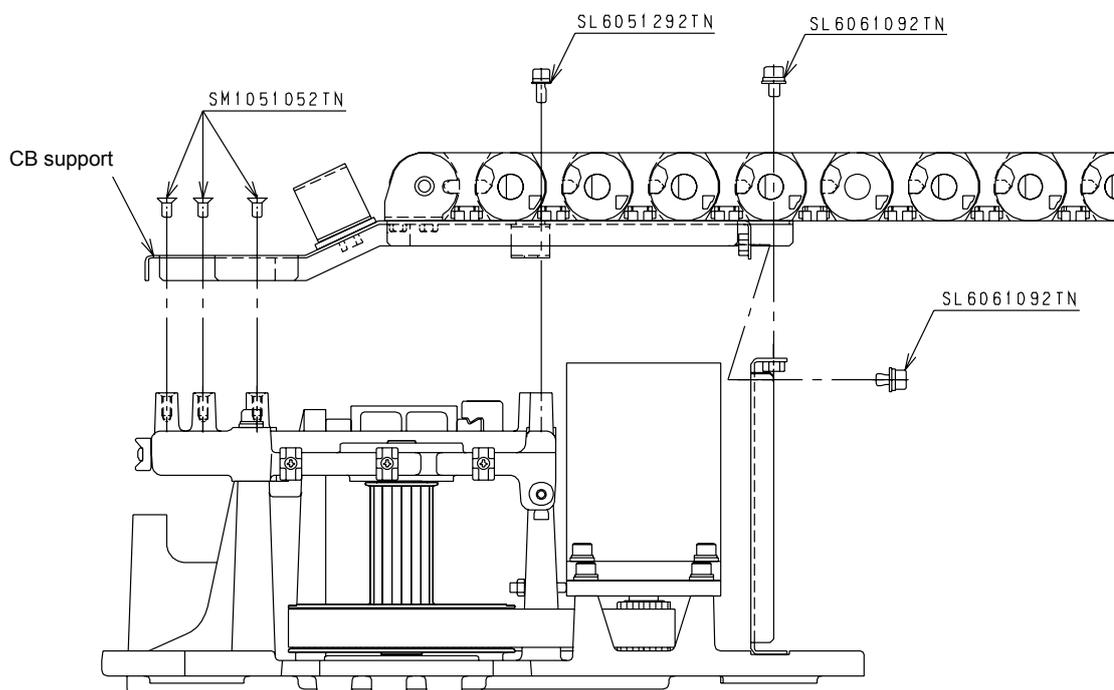
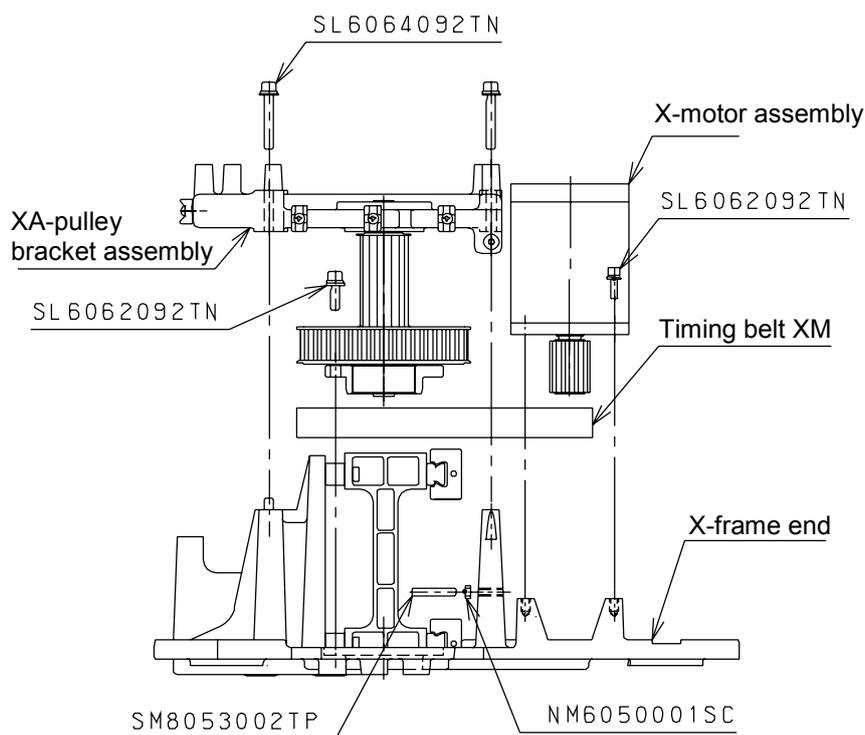


Figure 1-1-1-1

 <b>Caution</b>	If the belt has been replaced, measure the tension again after several days have elapsed.
--	---

# Maintenance Guide

- (2) Loosen the NM6050001SC, and then SM8053002TP that applies the tension to the timing belt XM.
- (3) Remove the timing belt XB. (See section 1-1-2.)
- (4) Remove the SL6064092TN fixing the XA-pulley bracket assembly, and SL6062092TN fixing the XA-pulley base to detach the XA-pulley bracket assembly.
- (5) Remove the SL6062092TN fixing the motor assembly to detach the X-motor assembly.
- (6) Replace the timing belt XM.
- (7) Reassemble the components in the reverse order of disassembly.
- (8) Adjust the tensions of the timing belts XM and XB. For details, refer to the description of timing belts XM and XB on QA Table, XY Unit (1). (See also Adjustment Procedure on page 1-4.)



\* This figure shows the left side of the unit when viewed from the side. (The right side has the same structure.)

Figure 1-1-1-2

# Maintenance Guide

## 1-1-2. Timing Belt XB

- (1) Remove the SL6053592TN (2 pcs.) and SL6052592TN (2 pcs.), then detach the head plate and the X-belt support assembly.

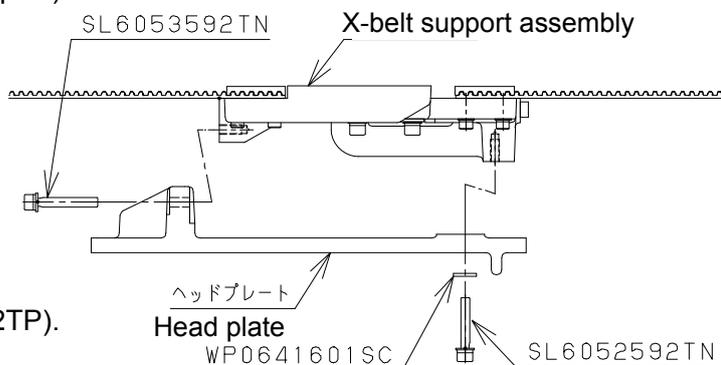


Figure 1-1-2-1

- (2) Loosen the X-belt tension adjustment screw (SM6057552TP).

- (3) Remove the SM6042092TN sandwiching the timing belt to replace the belt.

- (4) Sandwich the timing belt XB by the X-belt support (2) and X-belt tensioner, and secure them using the SM6042092TN. At this time, apply Loctite 277 to the SM6042092TN and tighten the SM6042092TN evenly with a tightening torque of 5 N·m.

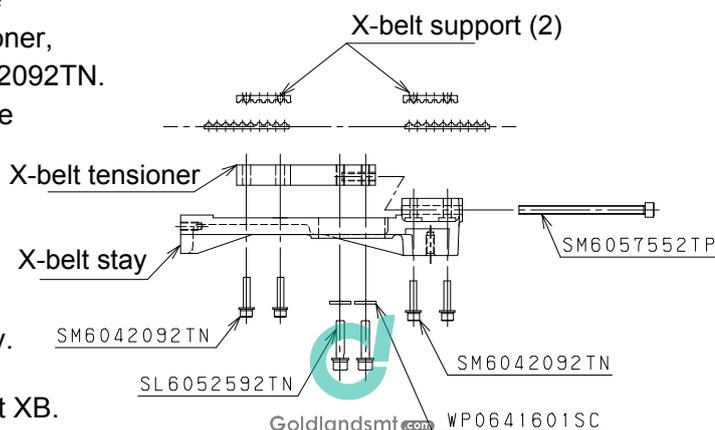


Figure 1-1-2-2

- (5) Reassemble the components in the reverse order of disassembly.
- (6) Adjust the tension of the timing belt XB. (See the adjustment procedure on page 1-4.)

# Maintenance Guide

## <Adjustment Procedure>

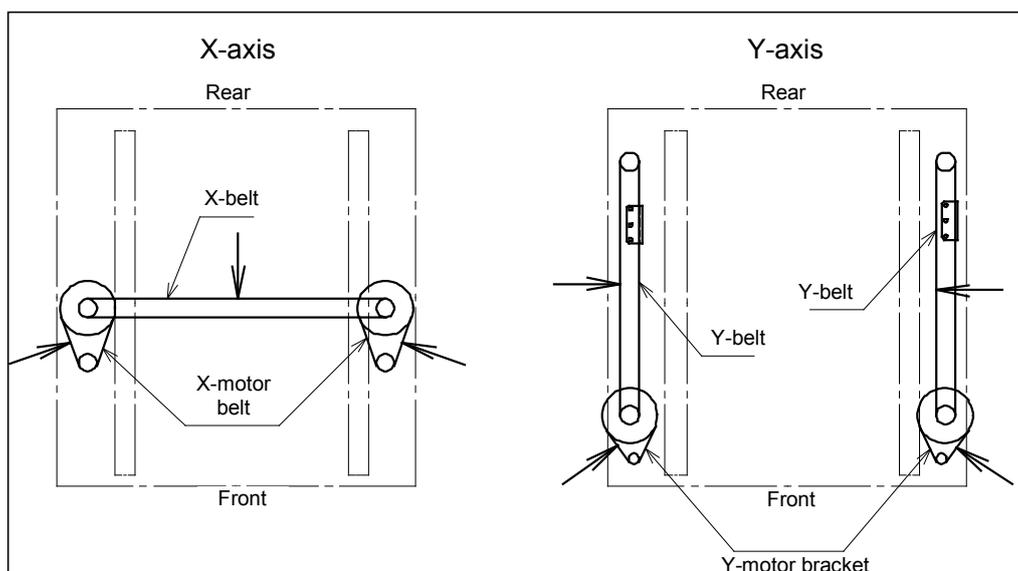
① Make measurements with a Yunitta's tension meter placed at the positions indicated by the arrows in the figure below and check to make sure that the values are within the specification value range.

- \* When adjusting the X-motor belt, measure the tension at several positions (at least five positions) while rotating the pulley and check that the averaged value is within the specification value range.

### • Tension meter input values

Belt type	Model	Belt unit weight (g/m·mm)	Belt width (mm)	Belt span (mm)
Timing belt XM	All models	2.5	20	119
Timing belt XB	All models	3.8	60	1157

### • Position of measurement



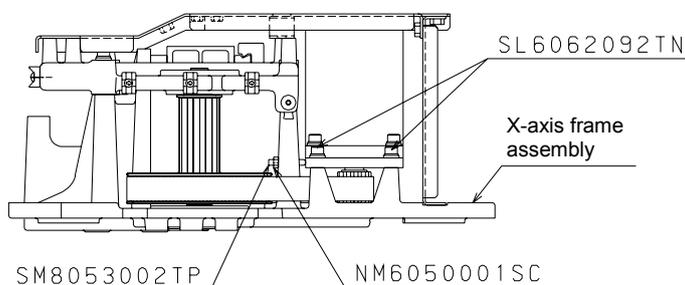
### • Specification values

1. Factory default setting
  - X-belt (timing belt XB):  $1070 \pm 50\text{N}$
  - X-motor belt (timing belt XM):  $175 \pm 20\text{N}$
2. Readjustment on market
  - X-belt (timing belt XB): If the tension becomes less than 650N, readjust the belt tension.
  - X-motor belt (timing belt XM): If the tension becomes less than 100N, readjust the belt tension.

# Maintenance Guide

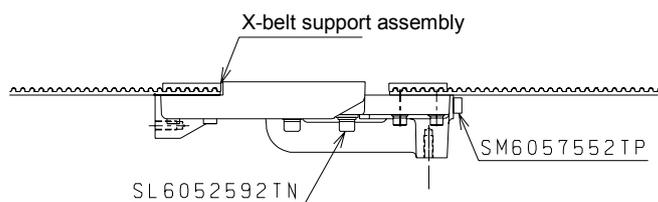
## ② Adjusting method

### • Timing belt XM



- ① Loosen the SL6051692TN fixing the X-motor.
- ② Loosen the NM605001YN and adjust the tension using the SM8053002TN.
- ③ Tighten the SL6051692TN firmly. (Tightening torque: 15 N·m)
- ④ Lock the NM6050001TN.

### • Timing belt XB



- ① Loosen the SL6052592TN fixing the X-belt support L and X-belt support R.
- ② Adjust the tension using the SM6057552TP.
- ③ Tighten the SL6052592TN firmly. (Tightening torque: 8.5 N·m)

## 1-1-3. Timing Belt YM

- (1) Detach the pulley cover.
- (2) Remove the timing belt YB. (See section 1-1-4.)
- (3) Loosen the SL6061492TN fixing the Y-motor assembly.
- (4) Loosen the SM6041202TN to loosen the tension of the timing belt YM.
- (5) Loosen the SL6064092TN to detach the YM-bracket assembly.
- (6) Loosen the SL6063592TN to replace the YA-pulley bracket assembly.  
(Replacement of only the timing belt YM is not allowed. Always replace the YA-pulley bracket assembly as a set.)
- (7) Reassemble the components in the reverse order of disassembly. Then adjust the tensions of the timing belts YM and YB. (See the adjustment procedure on page 1-8.)

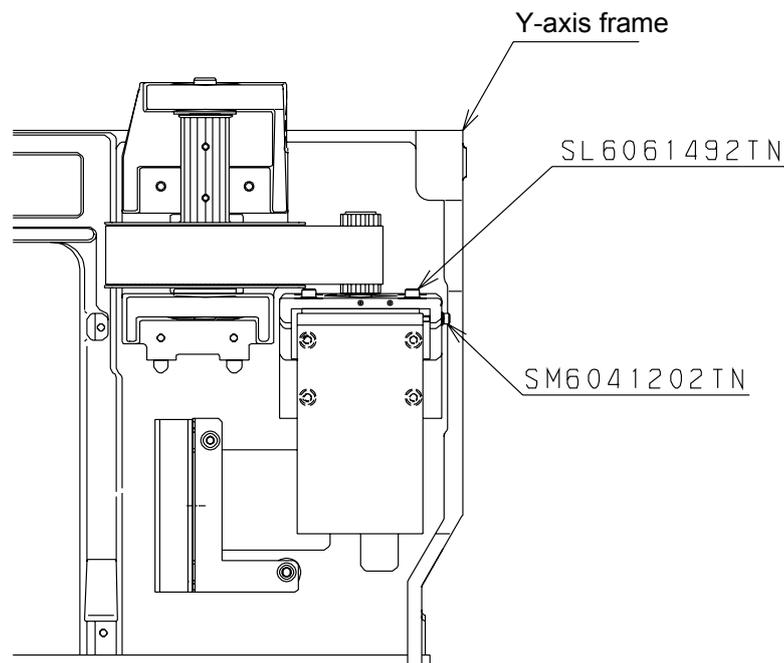


Figure 1-1-3-1

# Maintenance Guide

## 1-1-4. Timing Belt YB

To carry out the work efficiently, detach the side covers. Remove the cover fixing screws and slide the cover toward the rear to detach the side cover.

- (1) Remove the SL6062092TN fixing the Y-belt support (1) to the X-frame end.
  - \* If it is not easy to remove it, use a heat gun or other tool to heat the connection part before removing it.
- (2) Loosen the SL6062592TN fixing the YB-pulley bracket assembly.
- (3) Loosen the SM6084002TN to detach the YB-pulley bracket assembly.
- (4) Remove the SL6041292TN sandwiching the timing belt YB. Replace the timing belt YB.
- (5) Reassemble the components in the reverse order of disassembly. Adjust the tension of the timing belt YB. (See also Adjustment Procedure on page 1-8.)  
Apply Locktite 242 to SL6062092TN.

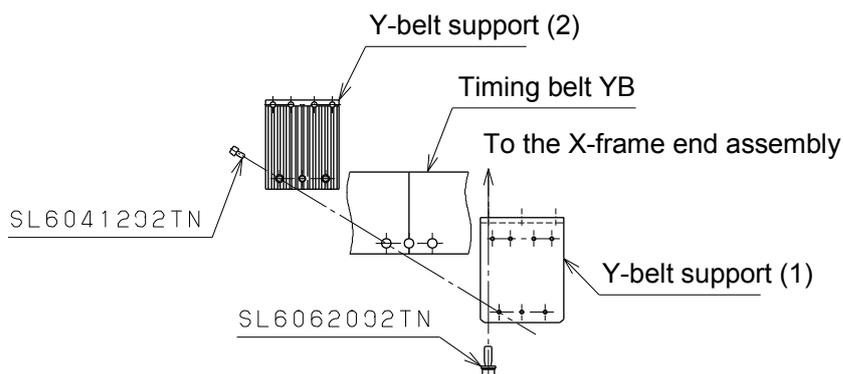


Figure 1-1-4-1

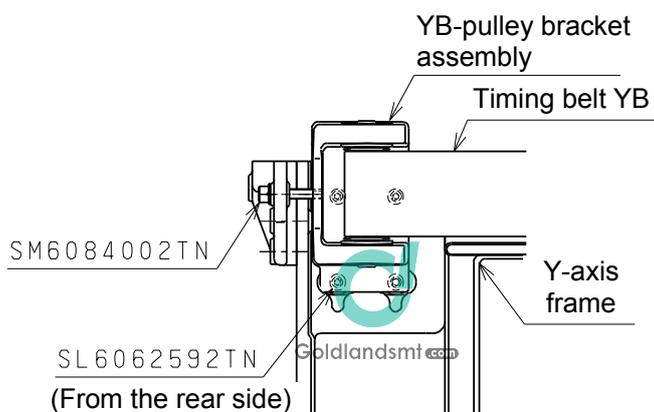


Figure 1-1-4-2

# Maintenance Guide

## <Adjustment Procedure>

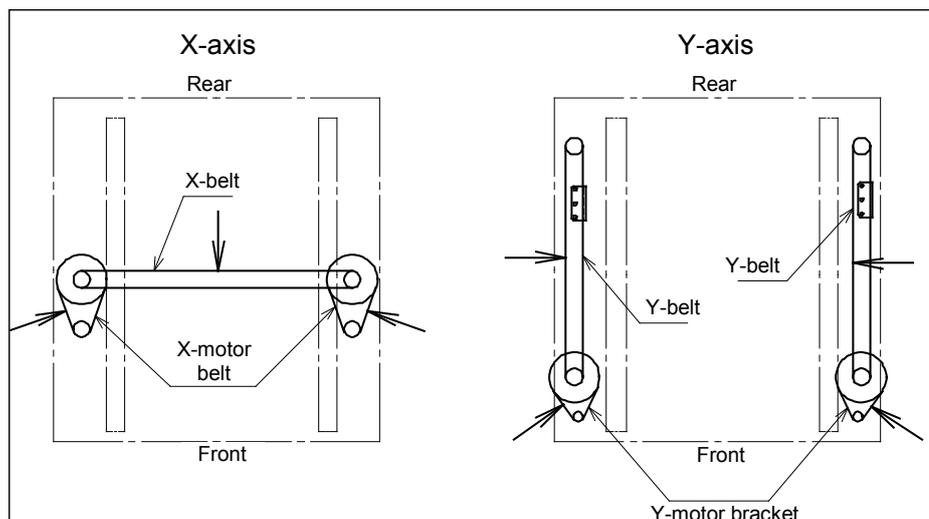
① Make measurements with a Yunitta's tension meter placed at the positions indicated by the arrows in the figure below and check to make sure that the values are within the specification value range.

\* When adjusting the Y-motor belt, measure the tension at several positions (at least five positions) while rotating the pulley and check that the averaged value is within the specification value range.

### • Tension meter input values

Belt type	Model	Belt unit weight (g/m·mm)	Belt width (mm)	Belt span (mm)
Timing belt YM	All models	2.5	40	93
Timing belt YB	1070M/1070CM 2070M/2080M	3.8	70	1115
	1070L/1070CL/1080L/ 2070L/2070CL/2080L	3.8	70	1221
	1080E/2080E	3.8	70	1325

### • Position of measurement



### • Specification values

1. Factory default setting

Y-belt (timing belt YB):  $1230 \pm 50\text{N}$

Y-motor belt (timing belt YM):  $325 \pm 20\text{N}$

2. Readjustment on market

Y-belt (timing belt YB):

If the tension becomes less than 800N, readjust the belt tension.

Additionally, the difference between the left and right belt tension values does not exceed 100N.

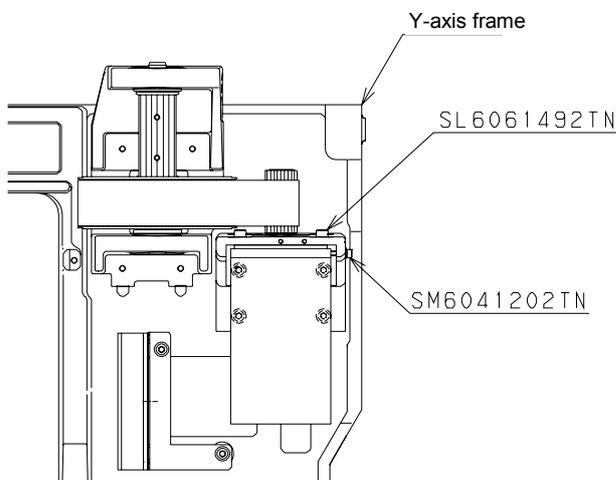
Y-motor belt (timing belt YM):

If the tension becomes less than 190N, readjust the belt tension.

# Maintenance Guide

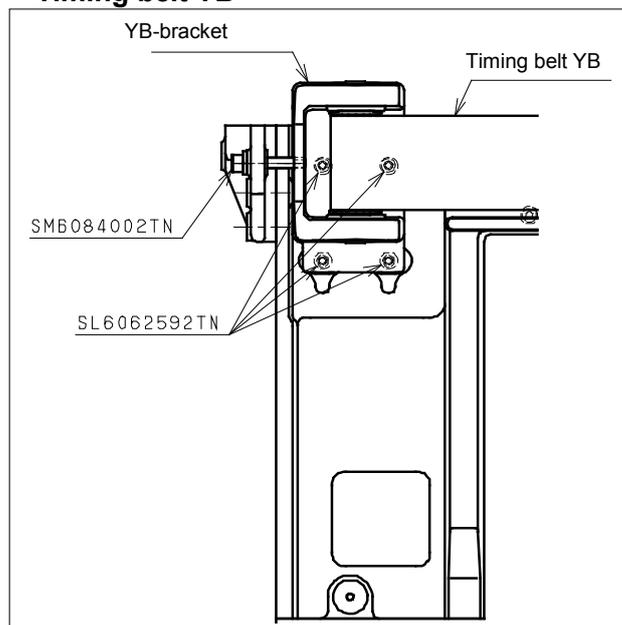
## ② Adjusting method

### • Timing belt YM



- ① Loosen the SL6061492TN fixing the Y-motor.
- ② Adjust the tension using the SM6041602TN.
- ③ Tighten the SL6061492TN firmly. (Tightening torque: 10 N·m)

### • Timing belt YB



- ① Loosen the SL6062592TN fixing the YB-pulley bracket.
- ② Adjust the tension using the SM6084002TN.
- ③ Tighten the SL6062592TN firmly.

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# Maintenance Guide

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## **1-2. Replacing the Pulleys**

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### **1-2-1. Replacing the Pulley XA**

Carry out the replacement work in the same manner as for the timing belt XM in 1-1-1.

### **1-2-2. Replacing the Pulley XM (X-Motor Assembly)**

Carry out the replacement work in the same manner as for the timing belt XM in 1-1-1.

### **1-2-3. Replacing the Pulley YA**

Carry out the replacement work in the same manner as for the timing belt YM in 1-1-3.

### **1-2-4. Replacing the Pulley YM (Y-Motor Assembly)**

Carry out the replacement work in the same manner as for the timing belt YM in 1-1-3.

### **1-2-5. Replacing the Pulley YB**

Carry out the replacement work in the same manner as for the timing belt YB in 1-1-4.

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# Maintenance Guide

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## **1-3. Replacing the Servomotors**

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### **1-3-1. Replacing the X-Motor**

Carry out the replacement work in the same manner as for the timing belt XM in 1-1-1.

### **1-3-2. Replacing the Y-Motor**

Carry out the replacement work in the same manner as for the timing belt YM in 1-1-3.

# Maintenance Guide

## 1-4. Replacing the Magnescale

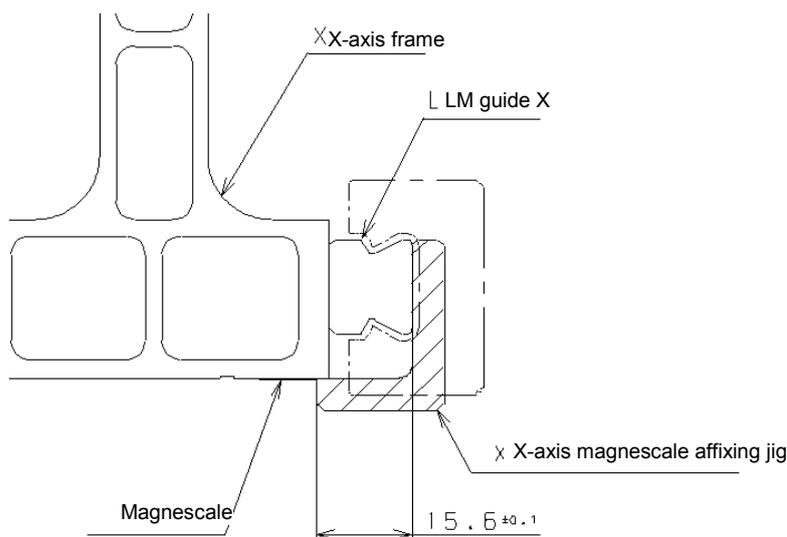
\* Before replacing the magnescale, leave a new magnescale near the machine for 1 hr. or longer so that its temperature becomes the same as that of the machine.

- (1) Detach the magnescale head from the bracket.
- (2) Peel off the old magnescale.
- (3) Degrease the magnescale mounting surface and magnescale completely.
  - \* It is recommended to use "Mechafine Mate" for the degreasing agent.

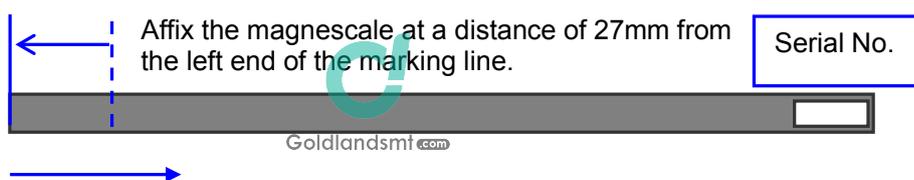
### 1-4-1. Magnescale Affixing Position

- **X-axis magnescale affixing procedure**

- (1) With the X-axis affixing jig (part No. 40046036) made in contact with the front of the LM-guide and the bottom of the X-axis frame, make the magnescale in contact with the X-axis affixing jig to affix the magnescale.



**Magnescale affixing position (deviation in the horizontal direction):**  
**Specification value  $\pm 0.1$  mm**

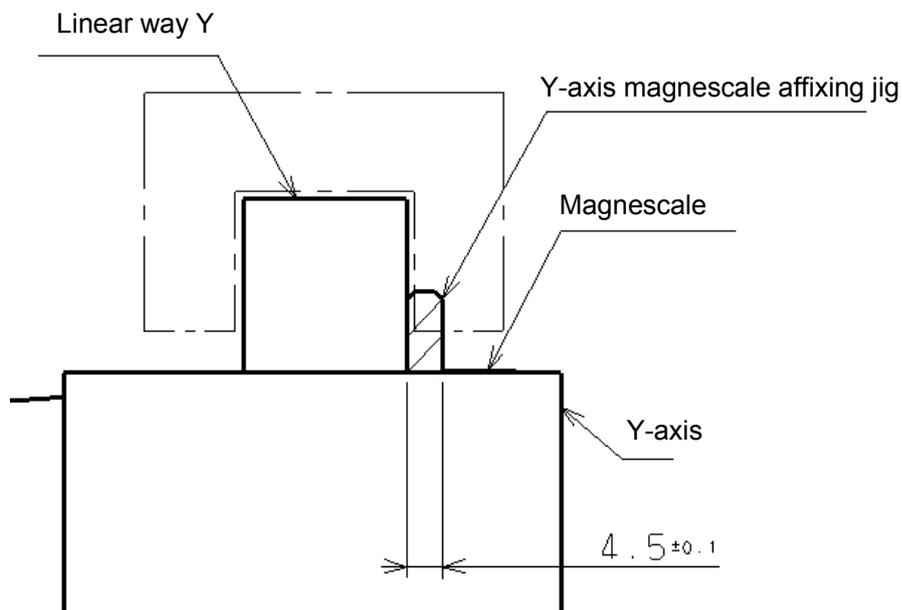


**Magnescale affixing position and direction**

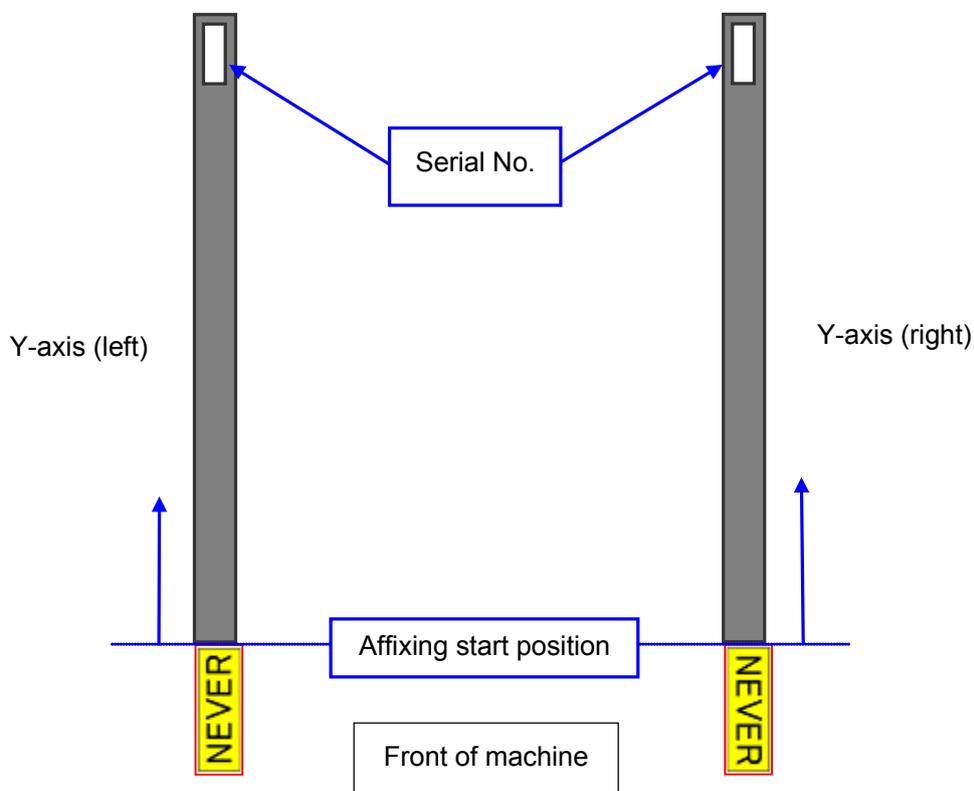
# Maintenance Guide

- **Y-axis magnescale affixing procedure**

- (1) With the Y-axis affixing jig (part No. 40008105) made in contact with the side of the Linear way Y and the top of the Y-axis, make the magnescale in contact with the Y-axis affixing jig to affix the magnescale.



**Magnescale affixing position (deviation in the horizontal direction):  
Specification value  $\pm 0.1$  mm**

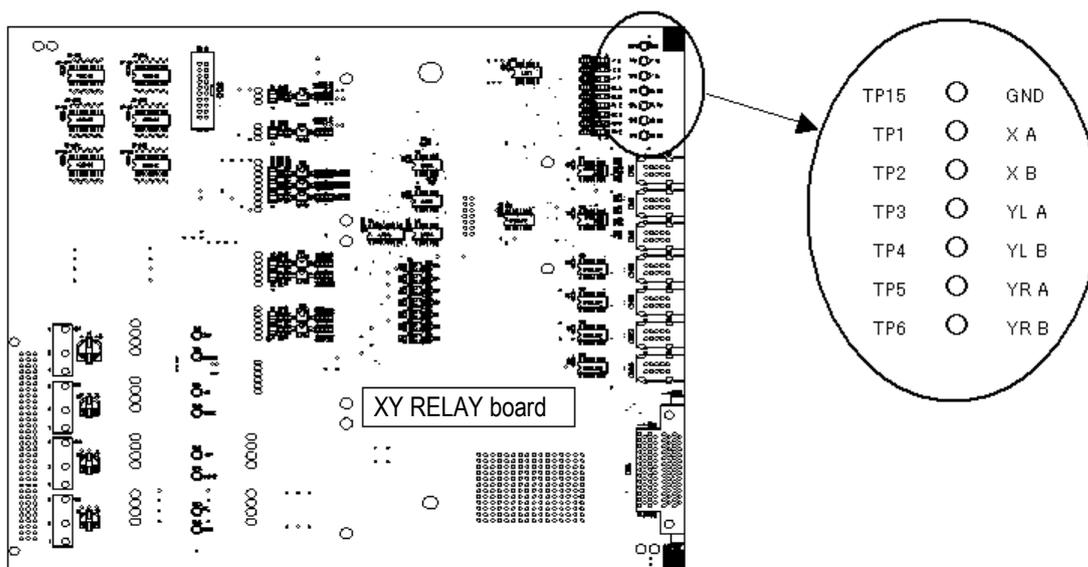


**Magnescale affixing position and direction**

# Maintenance Guide

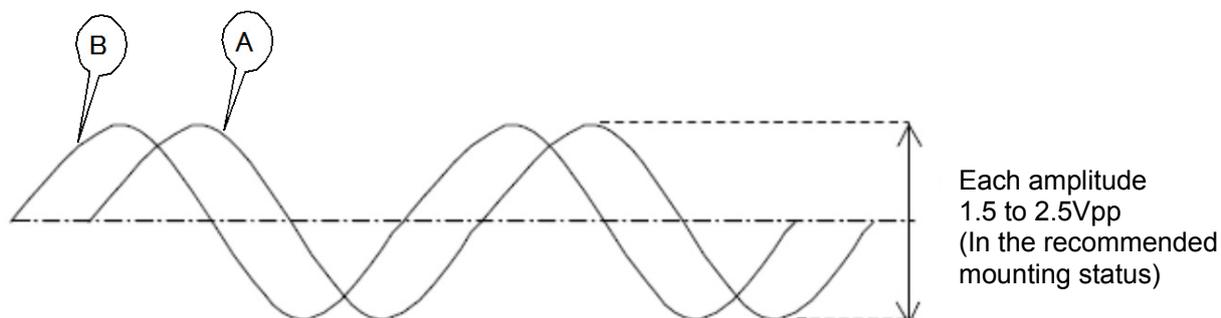
## 1-4-2. Clearance of the Magnescale

- (1) Put the MSC clearance jig (part No. 40008106) with a thickness of 0.25 mm in the clearance between the magnescale and sensor head, and then tighten the screw again.
- (2) Check that the MSC clearance jig with a thickness of 0.35 mm is not put in the clearance between the magnescale and sensor head in the XY-axes full-stroke.
- (3) In the same manner, check that the MSC clearance jig 0.15 (part number: 40073350) with a thickness of 0.15 mm can be put in the clearance between these devices.
- (4) Use the test pins on the XY RELAY board (part No. 40044556) shown in the figure below.



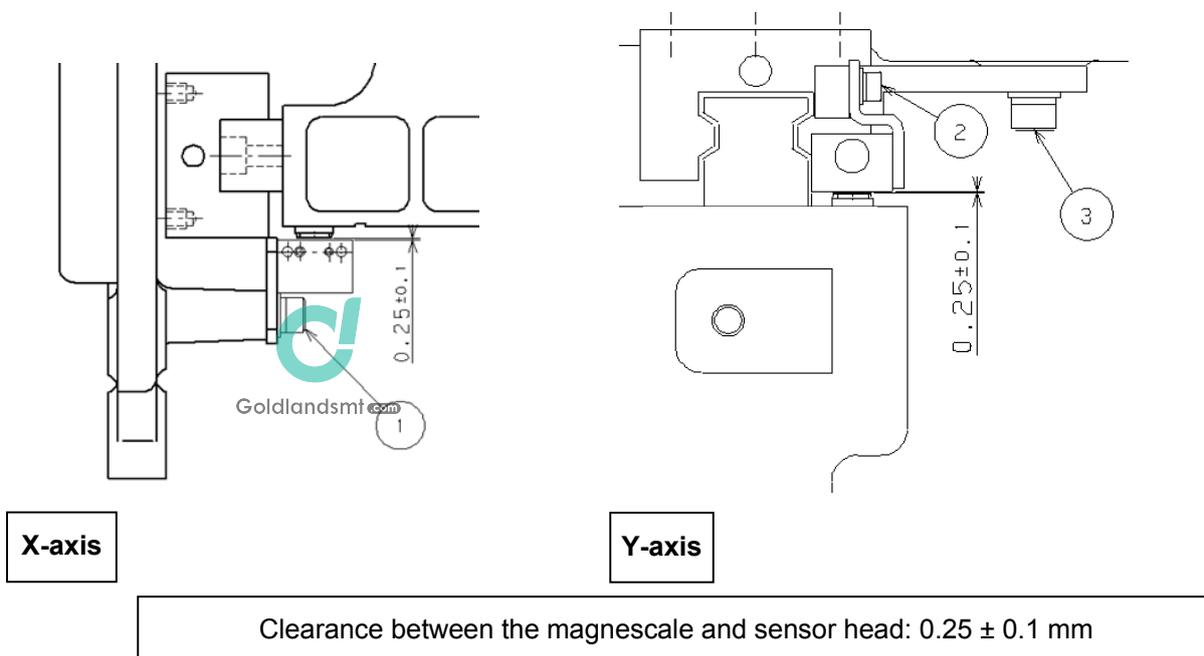
*Note) Detach or attach the cover and probe with the power turned OFF.*

- (5) For every axis, connect the probe of the oscilloscope to the GND terminal "GND (TP15)", "XA (TP1)", "YLA (TP3)" or "YRA (TP5)" respectively to measure the voltage waveform. At this time, observe the amplitude of the A-phase and B-phase waveforms shown on the oscilloscope to make sure that the P-P value is  $2.0V \pm 0.5V$  in the entire area.



# Maintenance Guide

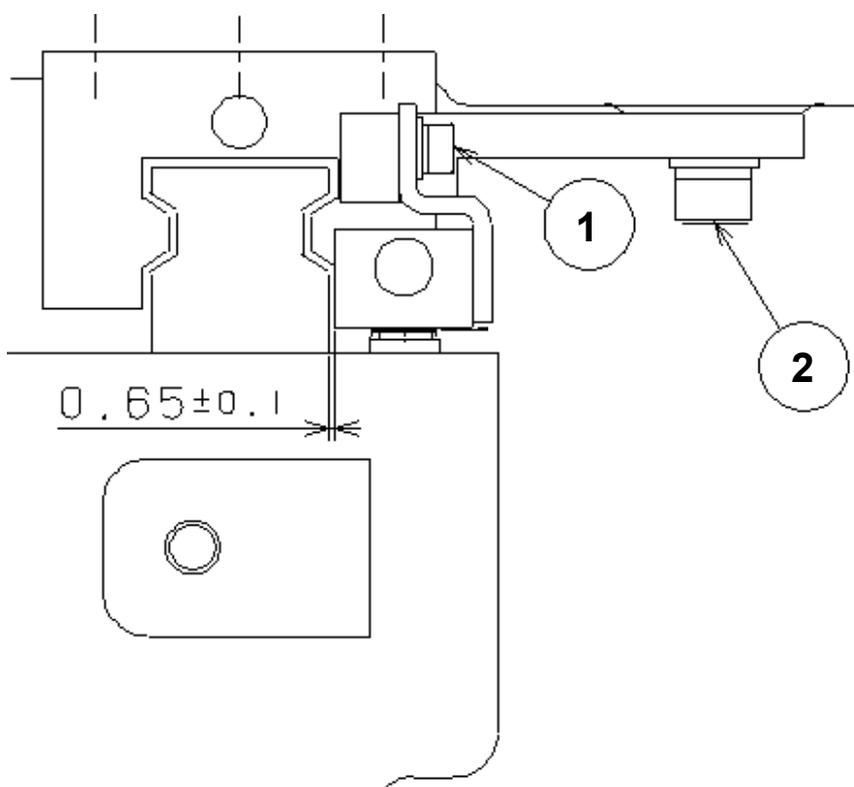
- (6) If the P-P value is not  $2.0V \pm 0.5V$ , loosen the screw securing the sensor (screw ① for the X-axis and screw ③ for the Y-axis shown in the figure below).



## Maintenance Guide

### 1-4-3. Clearance between the Sensor Head and the Y-Axis Linear Way (for Y-Axis Only)

- (1) Put a 0.65-mm clearance gauge in the clearance between the Y-axis linear way and sensor head, and check that no play exists and that the clearance gauge is inserted smoothly.
- (2) If the clearance is not 0.65 mm in the check in (1) above, loosen the screw fixing the sensor bracket (screw ② shown in the figure below).
- (3) Put a 0.65-mm clearance gauge in the clearance between the Y-axis linear way and sensor head, and tighten the screw again.
- (4) Carry out the check stated in above (1) above.



Clearance between the sensor head and the Y-axis linear way:  $0.65 \pm 0.1$  mm (for Y-axis only)

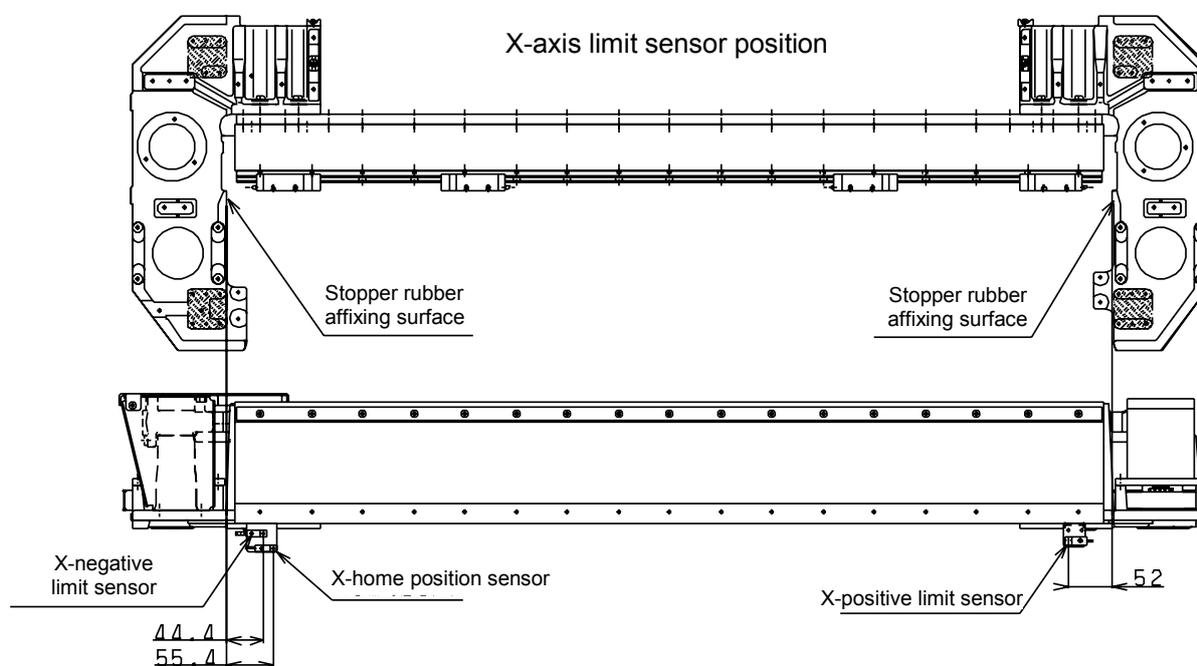
# Maintenance Guide

## 1-5. Replacing the Limit Sensor and the X-Axis Home Proximity Sensor

### 1-5-1. Replacing the X-Axis Limit Sensor and the X-Axis Home Proximity Sensor

- \* If only the sensor is replaced, it is not necessary to adjust the position.
- \* If the sensor is replaced together with the bracket, it is necessary to adjust the position.

- (1) Loosen the screw fixing the X-limit sensor bracket and make the adjustment so that the distances from the X-frame L and R are those shown in the figure below. After the adjustment has been completed, tighten the screw firmly.
- (2) For the backward direction, make the adjustment so that the clearance between the sensor dog mounted on the rear of the head plate and the sensor surface is 0.8 to 1.5 mm (target: 1.0 mm), and then tighten the screw.

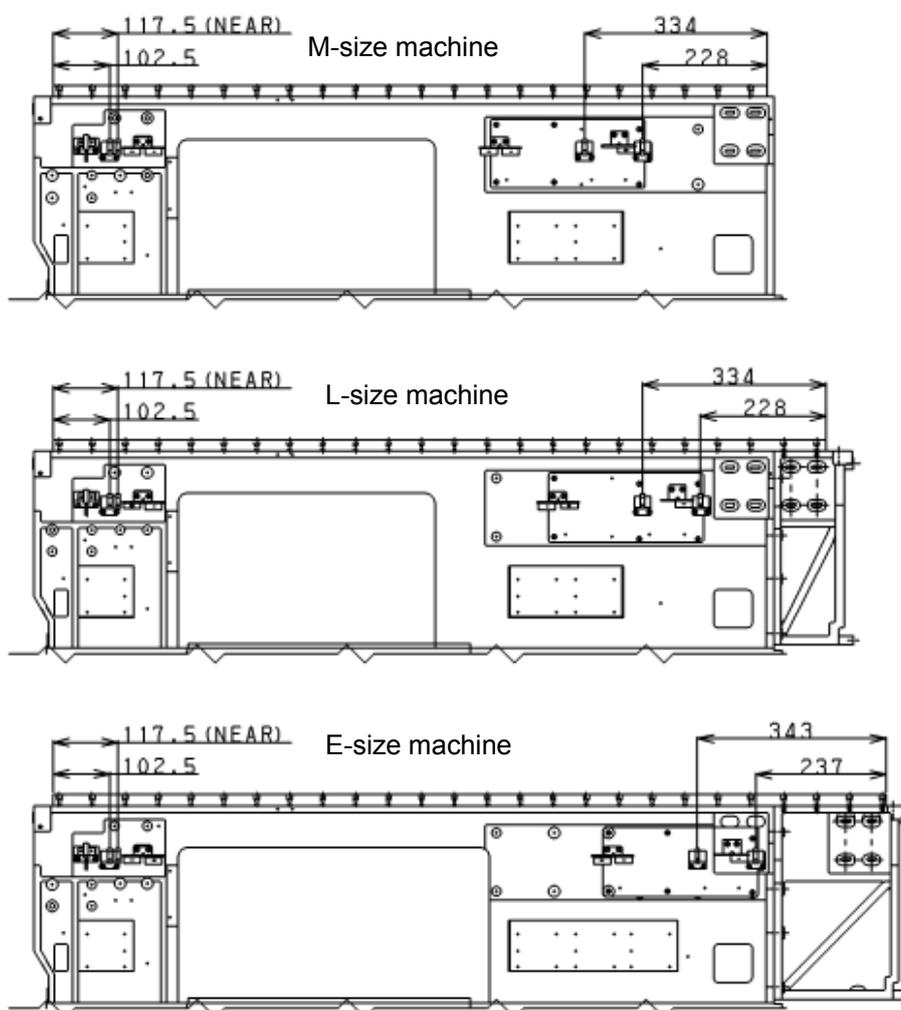


Left (X-negative limit sensor)	Distance between the stopper rubber affixing surface of the X-frame end L and the center of the sensor: 44.4 mm
Center (X-home position sensor)	Distance between the stopper rubber affixing surface of the X-frame end L and the center of the sensor: 55.4 mm
Right (X-positive limit sensor)	Distance between the stopper rubber affixing surface of the X-frame end R and the center of the sensor: 52 mm
Clearance between the limit sensor and the dog	0.8 to 1.5 mm (target: 1.0 mm)

# Maintenance Guide

## 1-5-2. Replacing the Y-Axis Limit Sensor and the Y-Axis Home Proximity Sensor

- \* If only the sensor is replaced, it is not necessary to adjust the position.
  - \* If the sensor is replaced together with the bracket, it is necessary to adjust the position.
- (1) Loosen the screw fixing the Y-limit sensor bracket and make the adjustment so that the distance from the end face of the linear way is that shown in the figure below. After the adjustment has been completed, tighten the screw firmly.
  - (2) For adjustment in the vertical direction, make the adjustment so that the clearance between the Y-MSW bracket mounted on the X-frame end L and sensor surface is 0.8 to 1.5 mm (target: 1.0 mm), and then tighten the screw.

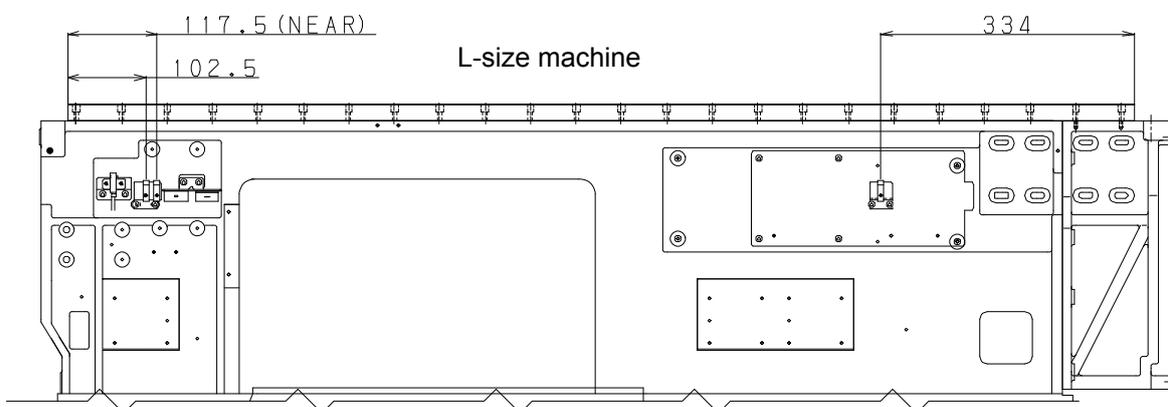
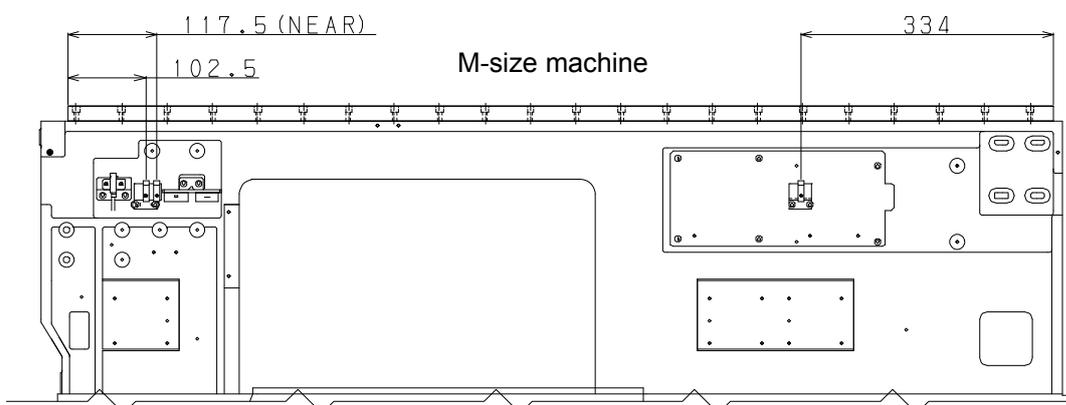


Front (Y-negative limit sensor)	Distance between the front end of the linear way and the center of the sensor: 102.5 mm
Front 2 (Y home proximity sensor)	Distance between the front end of the linear way and the center of the sensor: 117.5 mm
Center (Y-positive limit sensor)	Distance between the rear end of the linear way and the center of the sensor: 334 mm (E-size 343 mm)
Far (Y-++ limit sensor)	Distance between the rear end of the linear way and the center of the sensor: 228 mm (E-size 237 mm)
Clearance between the limit sensor and the dog	0.8 to 1.5 mm (target: 1.0 mm)

# Maintenance Guide

## 1-5-3. Replacing the Y-Axis Limit Sensor and the Y-Axis Home Proximity Sensor (KE-1070C/2070C)

- \* If only the sensor is replaced, it is not necessary to adjust the position.
  - \* If the sensor is replaced together with the bracket, it is necessary to adjust the position.
- (1) Loosen the screw fixing the Y-limit sensor bracket and make the adjustment so that the distance from the end face of the linear way is that shown in the figure below. After the adjustment has been completed, tighten the screw firmly.
  - (2) For adjustment in the vertical direction, make the adjustment so that the clearance between the Y-MSW bracket mounted on the X-frame end L and sensor surface is 0.8 to 1.5 mm (target: 1.0 mm), and then tighten the screw.



Front (Y-negative limit sensor)	Distance between the front end of the linear way and the center of the sensor: 102.5 mm
Front 2 (Y home proximity sensor)	Distance between the front end of the linear way and the center of the sensor: 117.5 mm
Center (Y-positive limit sensor)	Distance between the rear end of the linear way and the center of the sensor: 334 mm (E-size 334 mm)
Clearance between the limit sensor and the dog	0.8 to 1.5 mm (target: 1.0 mm)

# Maintenance Guide

## 1-6. Replacing the Home Position Sensor

### 1-6-1. X-Axis

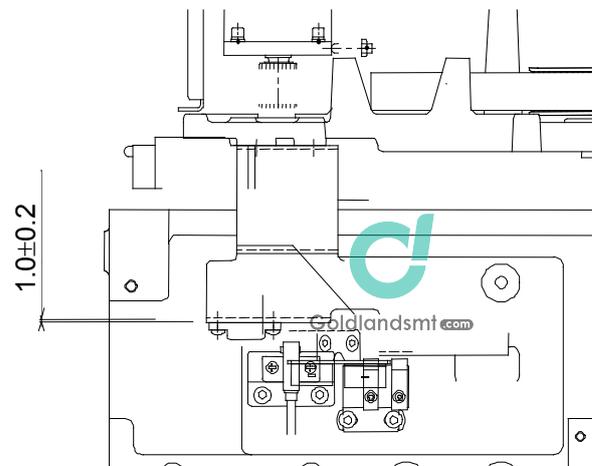
The X-axis home position sensor is not provided on the KE-2070/80. It is built in the magnescale.

### 1-6-2. Y-Axis

The Y-axis home position sensor is an important device that determines the squareness between the X-axis and Y-axis. If the position of the Y-axis home position sensor is not adjusted correctly after it has been replaced, the squareness between the X-axis and Y-axis may deviate, causing the mounting accuracy to lower.

- (1) After the sensor has been replaced, start up the machine, cancel "Home Position Return", and press the emergency stop button.

After replacement, move the X-axis to the front side and check that the distance between the Y-axis home position sensor and the magnetic switch is  $1.0 \pm 0.2$ mm. If this is not satisfied, loosen the sensor fixing screw and vertically move the sensor to adjust the distance  $1.0 \pm 0.2$ mm.



- (2) Manually move the head from the front side toward the far side, and stop it at a position where the Y-axis home position sensor, which has not been replaced, is turned ON.
- (3) Move the newly mounted Y-axis home position sensor from the far side toward the front side and secure it temporarily at a position where the sensor is turned ON.
- (4) Select the MS parameter mode.
- (5) Press the F9 key to display the control menu and select [Y Setup].  
The machine performs the home position return only with the left Y-axis home position sensor.
- (6) Manually move the head from the far side toward the front side with inching operation (jog movement at a low speed) in the teaching mode, and stop it at a position where the Y-axis home position sensor, which has not been replaced, is turned ON.
- (7) Move the newly mounted Y-axis home position sensor from the far side toward the front side and secure it temporarily at a position where the sensor is turned ON.
- (8) Manually move the head from the front side toward the far side with inching operation (which moves the head step by step) in the teaching mode to check that the newly mounted sensor is turned ON within  $\pm 3$  steps from the position where the Y-axis home position sensor, which has not been replaced, is turned ON.  
If the newly mounted sensor is not turned ON within  $\pm 3$  steps, readjust the position of the newly mounted sensor and repeat the adjustment from step (6).
- (9) Press the emergency button again to cancel the emergency state and conduct the home position return operation.

# Maintenance Guide

## 1-7. Replacing the Plastic Rail

### 1-7-1. Replacing the X-Axis Plastic Rail X-Axis Plastic Rail (Part No. 40046023)

- (1) Loosen the SL3051292TN and NM6060001SC, and then detach the X-axis plastic rail from the nut plate and X-axis frame assembly.
- (2) Loosen the SL6040892TN and detach the cable clamp X.
- (3) Open the flap of the X-axis plastic rail to remove the cables, and replace the X-axis plastic rail.
- (4) Reassemble the components in the reverse order of disassembly. At this time, pay special attention so that the cables in the plastic rail are properly arranged and not entangled.

\* Figure when viewed from the rear

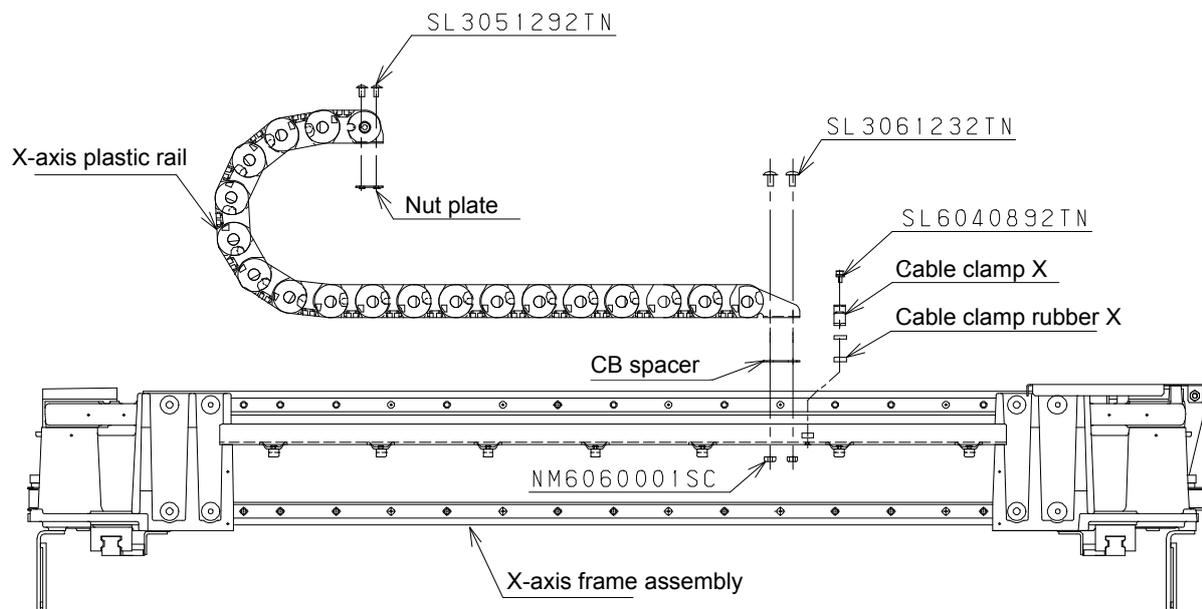


Figure 1-7-1-1

# Maintenance Guide

## 1-7-2. Replacing the Y-Axis Plastic Rail Y-Axis Plastic Rail (Part No. 40046022)

- (1) Loosen the NM3061232TN and remove the X-axis plastic rail from the nut plate. Loosen the SL3061232TN and remove the Y-axis plastic rail from the X-frame end assembly.
- (2) Loosen the SL6061092TN and detach the cable clamp YB.
- (3) Open the flap of the Y-axis plastic rail to remove the cables, and replace the Y-axis plastic rail.
- (4) Reassemble the components in the reverse order of disassembly. At this time, pay special attention so that the cables in the plastic rail are properly arranged and not entangled.

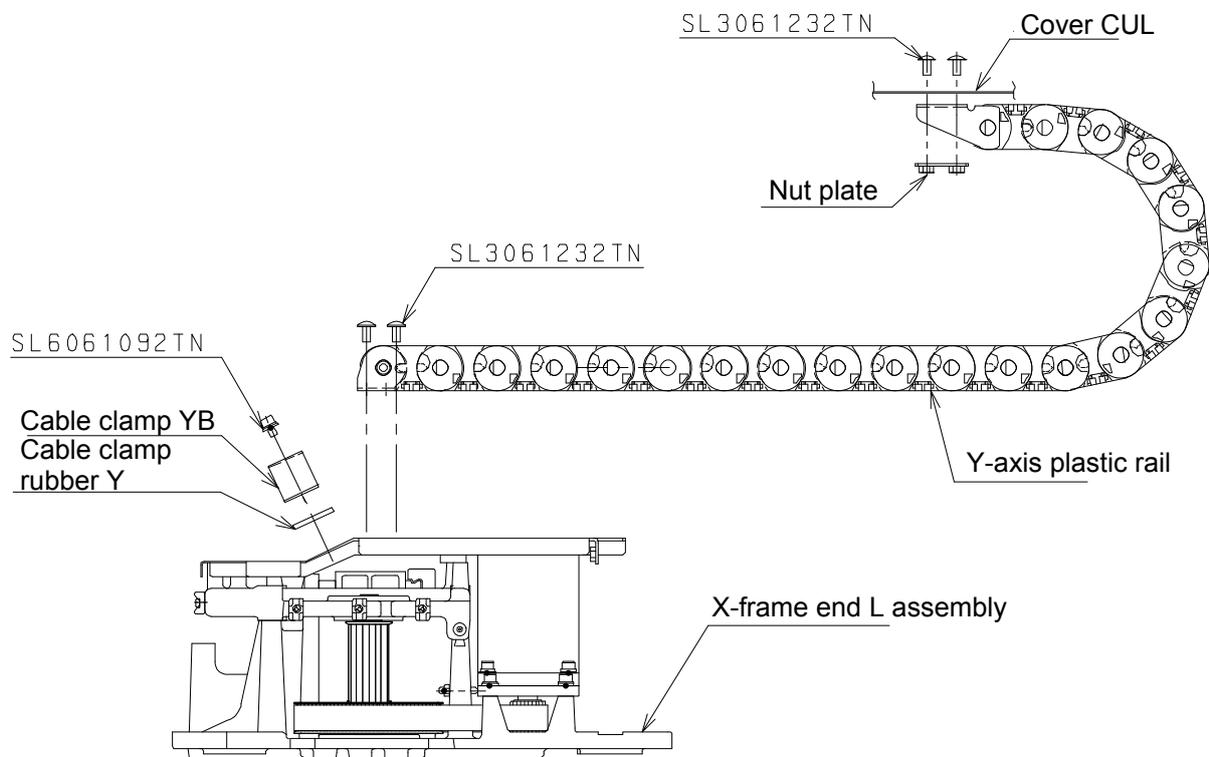


Figure 1-7-2-1

# Maintenance Guide

## 1-8. Replacing the Cables in the X/Y Veyor-Cable

### 1-8-1. Removing the X Cable

- (1) Detach the head top cover and disconnect the connectors connected to XY veyor-cable, 1394 robot cable, and OPTICAL FIBER CABLE 7M.

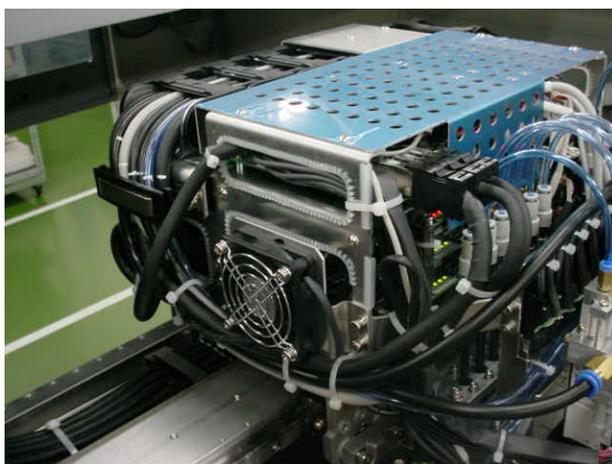


Figure 1-8-1-1

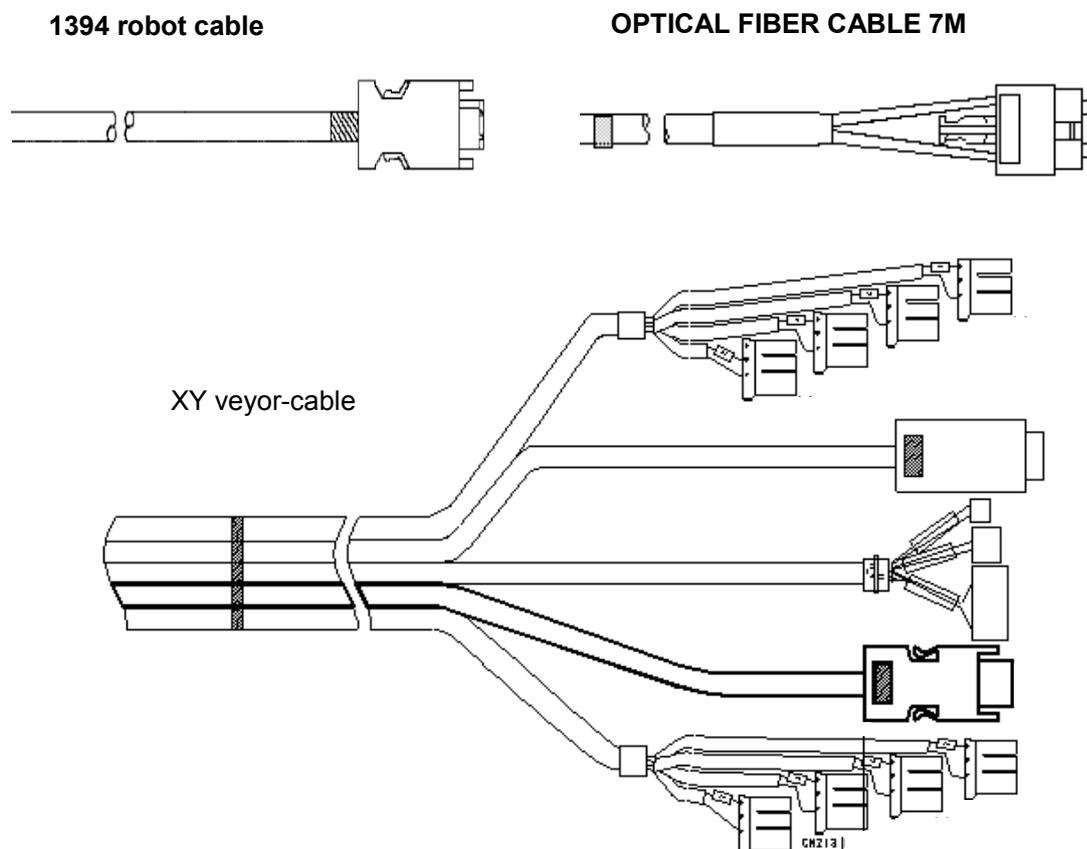


Figure 1-8-1-2

- (2) Detach the FC support. Then cut and remove the tie-up band.

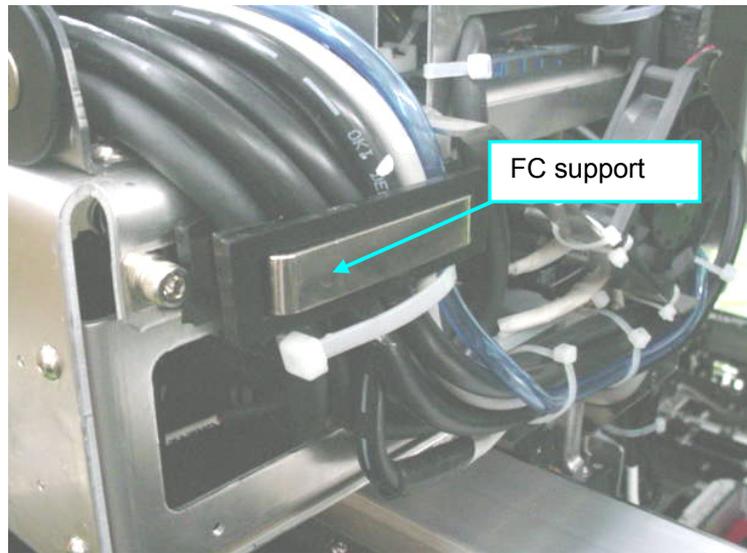


Figure 1-8-1-3

- (3) Detach the cable clamp X from the X-axis plastic rail CB support, and then cut and remove the tie-up bands.

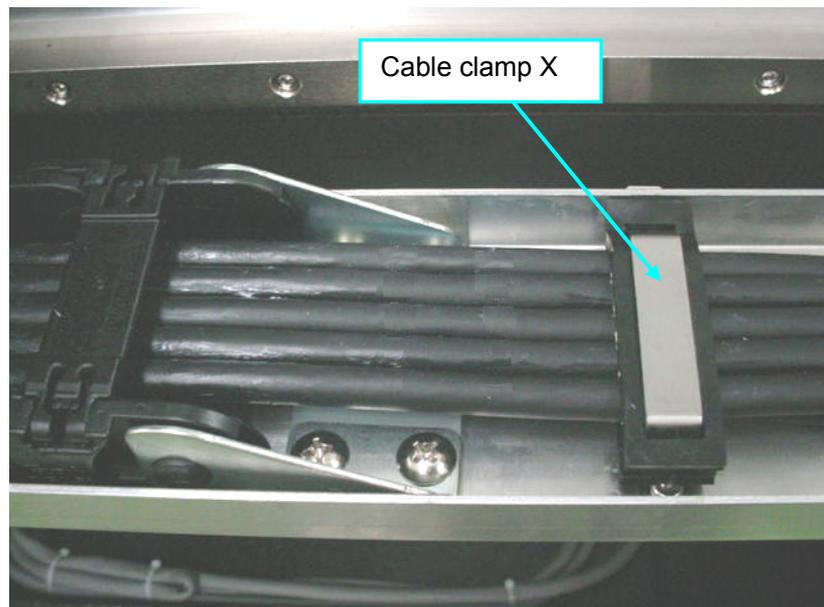


Figure 1-8-1-4

- (4) Detach the cover of the plastic rail and remove the cable to be replaced.

# Maintenance Guide

## 1-8-2. Checking the Cable Marking (X)

- (1) Check the marking position of the XY veyor-cable (40058385).  
(Place the marks at a position 350mm from the CN805 connector end.)
- \* For the machine with the extra specifications, the following cables are used.  
XY veyor-cable (E) 40059779  
Y veyor-cable (E) 40059789

This instruction also applies to the following pages.

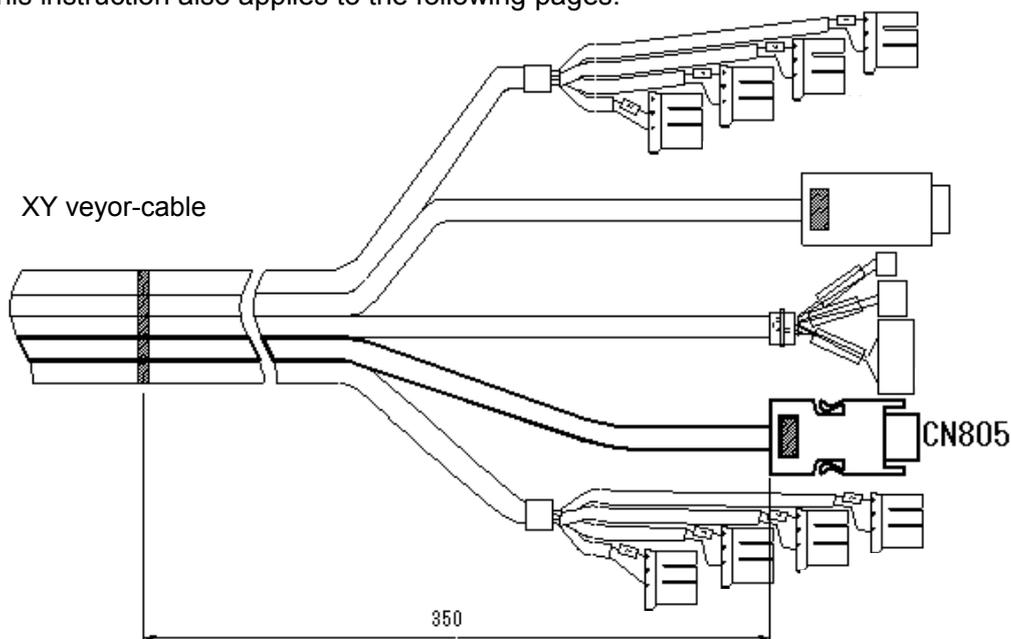
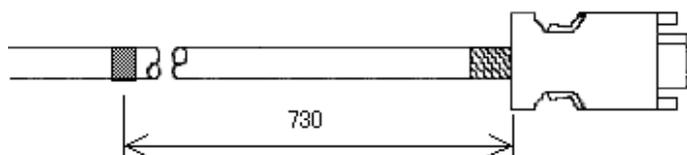


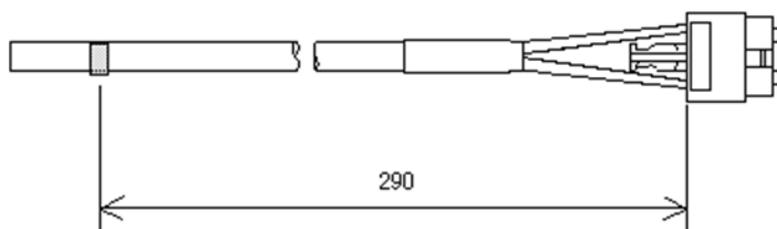
Figure 1-8-2-1

- (2) Check the marking positions of the 1394 robot cable (40044517) and the optical fiber cable 7M (40044543).  
(At this time, place a mark at a position 730mm from the connector end of the robot cable and at a position 290mm from the connector end of the fiber cable.)

### 1394 robot cable



### OPTICAL FIBER CABLE 7M



# Maintenance Guide

## 1-8-3. Assembling the Cable

(1) Apply the grease to portions where the 40058385, 40044517, and 40048070 cables are put in the plastic rail, and place the cables and air tubes in the X-axis plastic rail as shown in the figure below (figure viewed from A).

\* Check the connector orientation and take care so that the air tubes do not become warped.

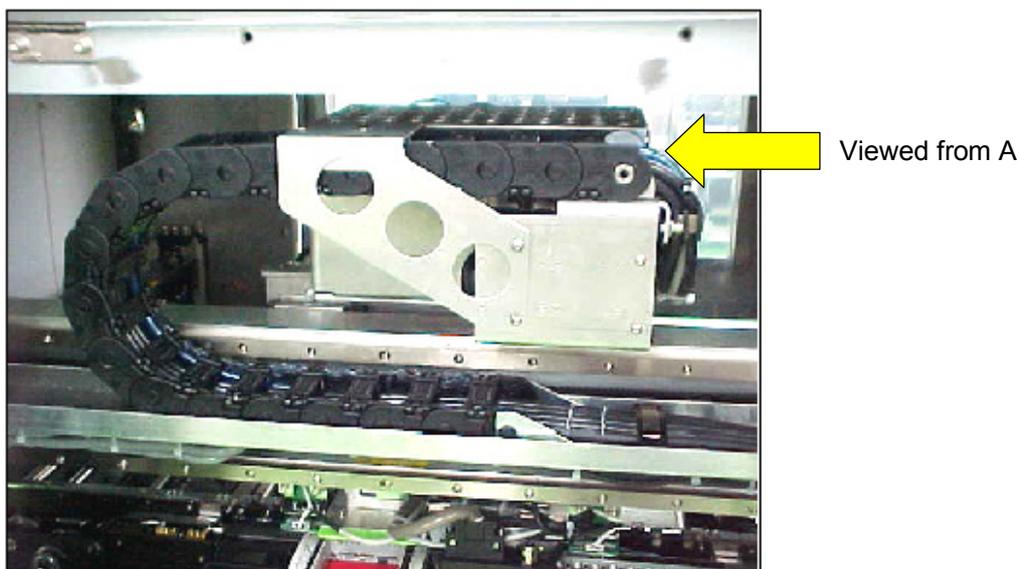


Figure 1-8-3-1

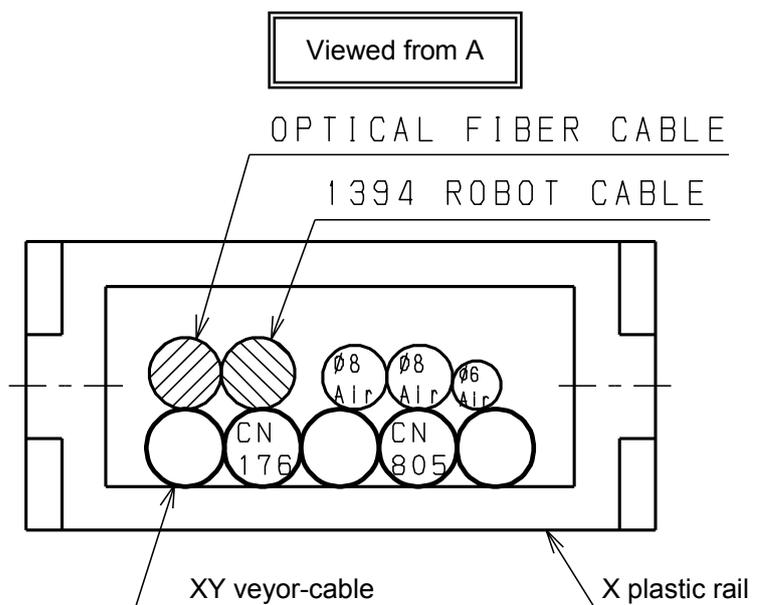


Figure 1-8-3-2

(2) After the cables and air tubes have been run correctly, put the cover of the plastic rail.

# Maintenance Guide

- (3) For the head side of the cable, align the marking positions of the cables with the upper end of the FC support and secure them.
- (4) For the opposite side, place a mark at the top end of the mounting fixture with the cable pulled in the direction ① shown in the figure below. In the same manner, place a mark with the cable pushed in the direction ②. (For details, see the figure below.)
- (5) Hold the cables with the cable clamp X at a position where the center position between two mark positions meets the top end of the mounting fixture to secure them.

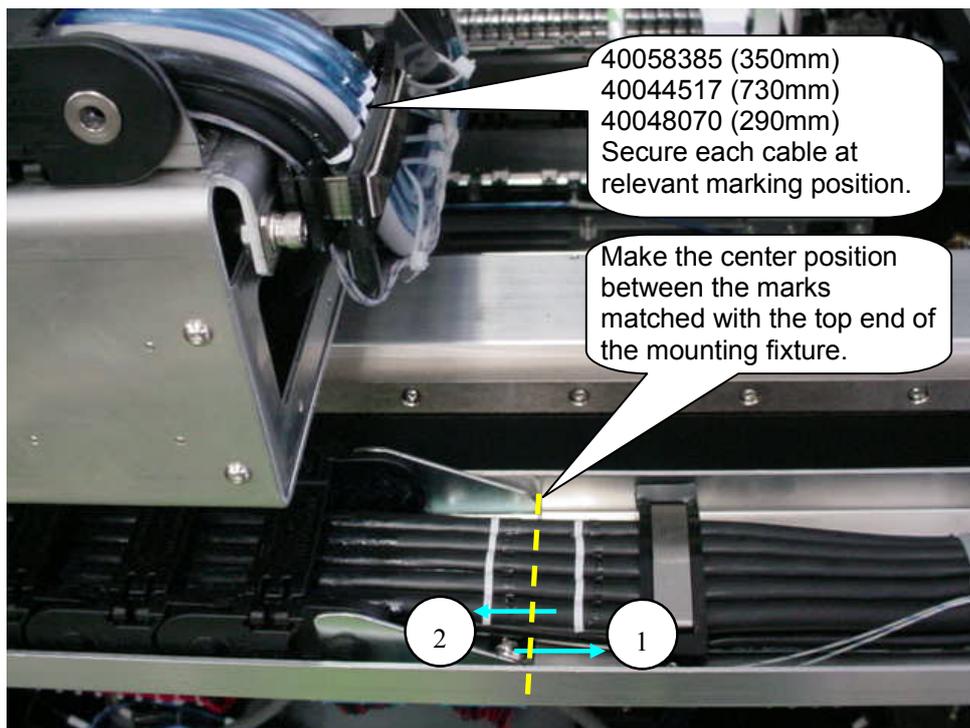


Figure 1-8-3-3

- (6) Cable check inside the plastic rail:  
Press in the cables inside the plastic rail by hand and check to make sure that they yield.

# Maintenance Guide

## 1-8-4. Separating the Fusion-bonded Parts of the Cables

- (1) Separate the fusion-bonded parts of the cables with a cutter so that the 40058384 and 40058385 cables can be bent to the Y-axis veyor-cables at an angle of 90 degrees.

Incise with a cutter. At this time, take care so that the sheath is not damaged.

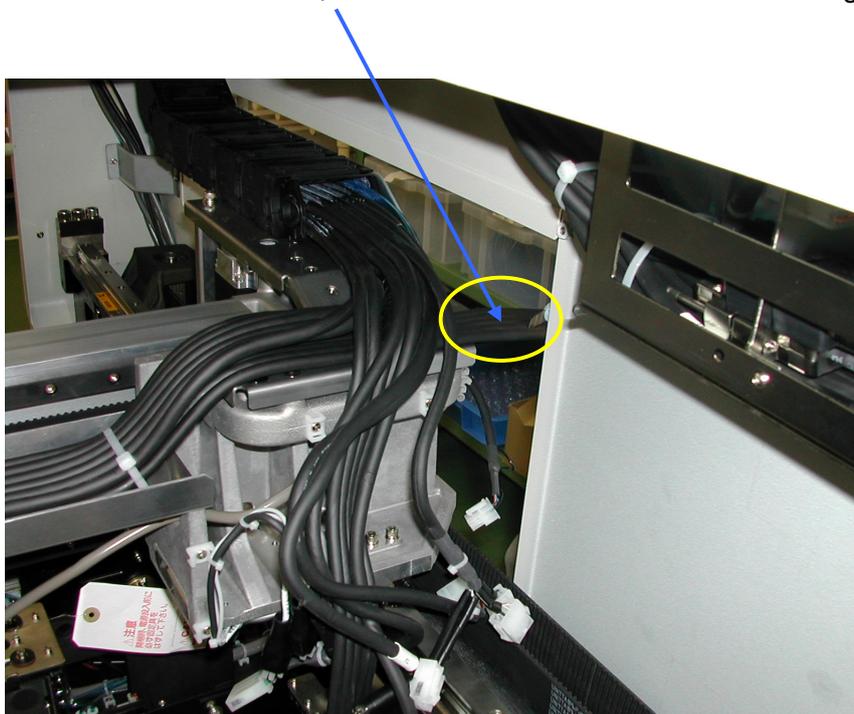


Figure 1-8-4-1

Cables separated by a cutter



Figure 1-8-4-2

# Maintenance Guide

## 1-8-5. Removing the Y Veyor-Cable

- (1) Disconnect the binding of the swing part (connector bracket) at the entrance of the Y-axis plastic rail and the relay connector.



Figure 1-8-5-1

- (2) Detach the cover of the Y plastic rail and remove the cable to be replaced.



Figure 1-8-5-2

## 1-8-6. Placing Marks on the Y Veyor-Cable

- (1) Check the marking position of the Y veyor-cable (40058384). (Place marks at a position 410mm from the end of the CN141 connector.)

- \* For the machine with the extra specifications, the following cables are used.

XY veyor-cable (E) 40059779  
Y veyor-cable (E) 40059789

This instruction also applies to the following pages.

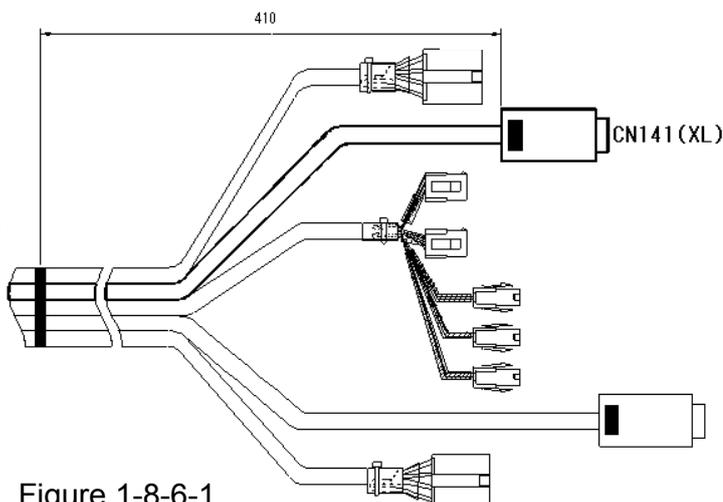


Figure 1-8-6-1

# Maintenance Guide

## 1-8-7. Assembling the Cables

- (1) Apply the grease to the portions of the 40058384 and 40058385 cables, which are to be stored into the plastic rail.
- (2) Place the 40058384 cables on the cables routed from the X-axis so that its CN166 side is located inside (Figure 1-8-7-1). Equate the lengths of the swing part relay connectors for 40058385 and 40058384 (Figure 1-8-7-2).

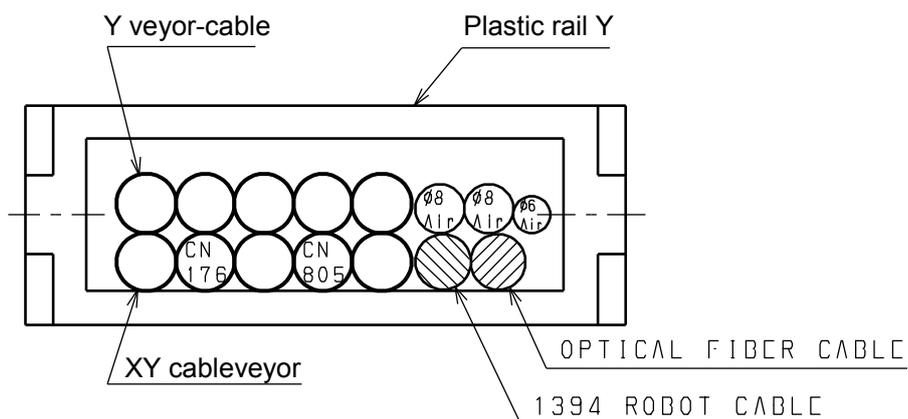


Figure 1-8-7-1

- (3) Pull out the cables to the front side and align the connectors for 40058384 with the connector bracket relay connectors (CN161/CN151/CN127/CN165/CN152/CN201/CN202/CN245/CN246/CN479 sides) for 40058385.

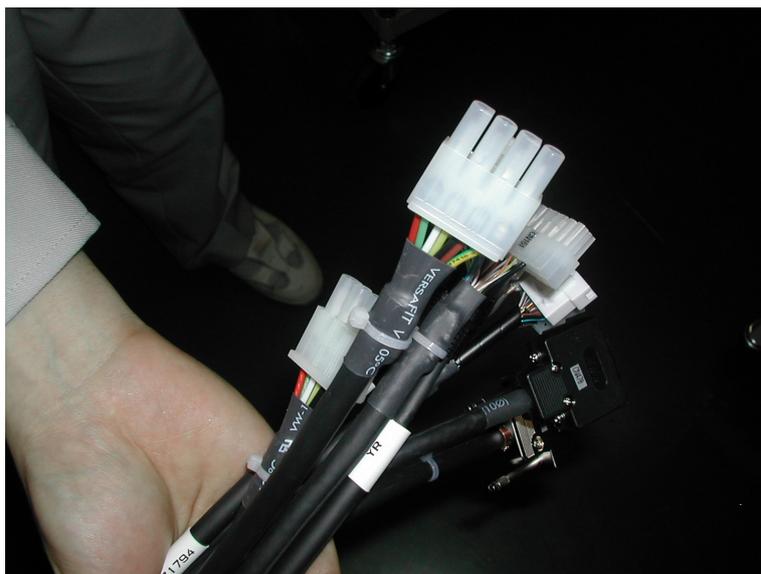


Figure 1-8-7-2

# Maintenance Guide

- (4) Align the marking of the 40058384 cables with the end surface of the cable clamp YB (of the plastic rail side) and fix the cables. Place marks on the sides of 40058385 cables aligning with the marking of 40058384 cables.

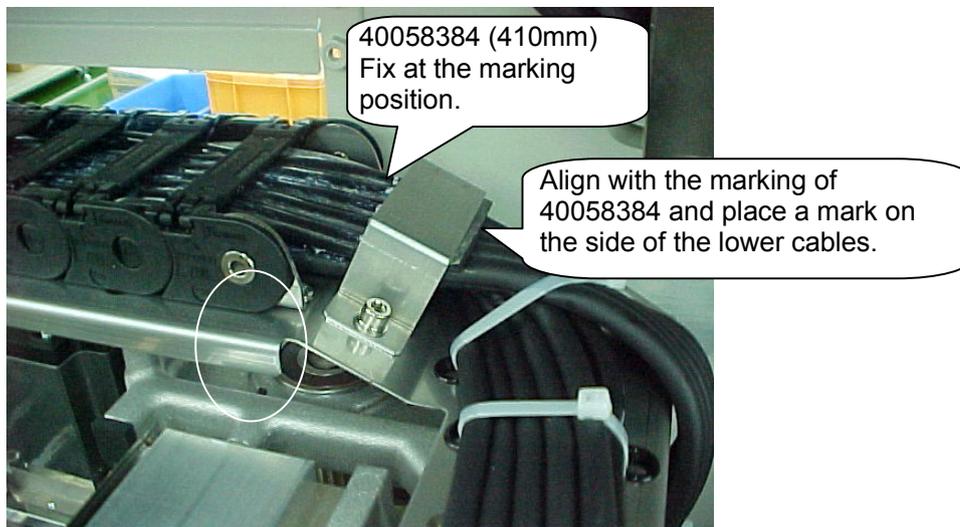


Figure 1-8-7-3

- (5) Pull out the connectors of 40058384 as shown in the figure below and fix them with the tie-up band.

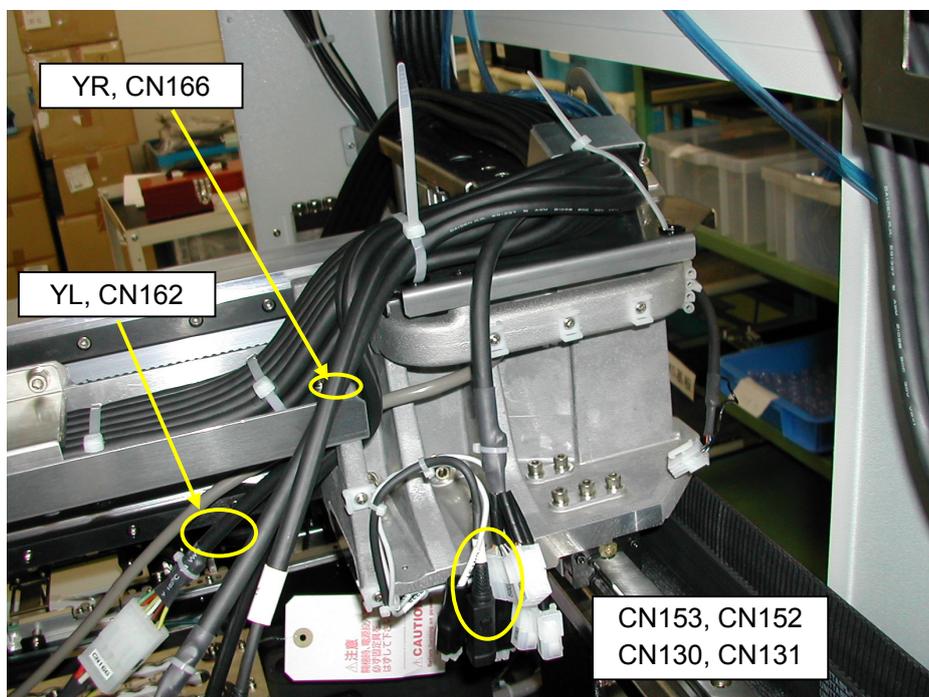


Figure 1-8-7-4

# Maintenance Guide

(6) Bind the lower portion of the plastic rail support as shown in the figure below.



Figure 1-8-7-5

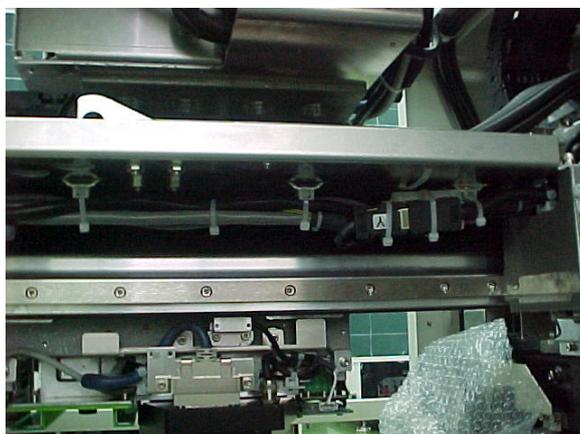


Figure 1-8-7-6

(7) Wiring of the XL motor

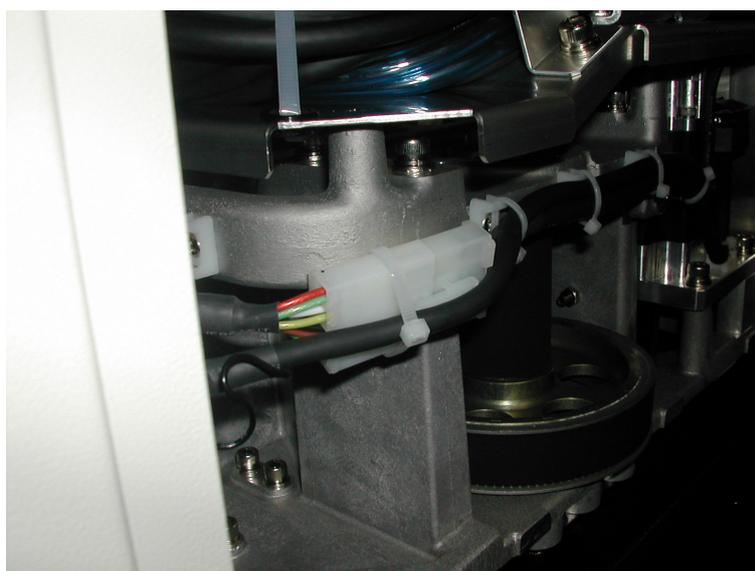


Figure 1-8-7-7

# Maintenance Guide

- (8) Wiring of the XL motor relay line, limit sensor relay line, and YL magnescale relay line



Figure 1-8-7-8

- (9) Wiring of the XR motor relay line, limit sensor relay line, and YR magnescale relay line



Figure 1-8-7-9

# Maintenance Guide

- (10) Place a mark at the top end of the mounting fixture with the Y-veyor-cable pulled in the direction ① shown in the figure below. Next, place a mark with the cable pushed in the direction ② in the same manner as described above. (For details, see the figure below.)
- (11) Hold the cables with the cable clamp YB at a position where the center position between two mark positions meets the top end of the mounting fixture and secure them.
- (12) Place marks on the sides of 40058385 cables aligning with the marking of 40058384 cables.

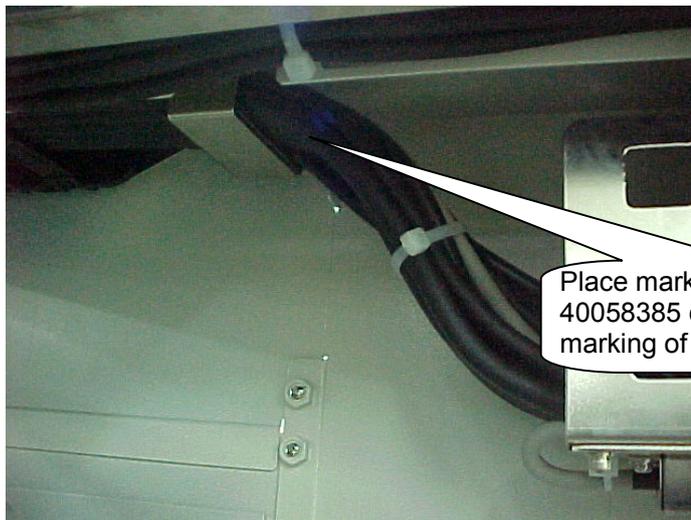


Figure 1-8-7-10



Figure 1-8-7-11

- (13) Move the Y-axis to the position closest to the operator. Then press the cables inside the plastic rail by hand and check that they yield.

# Maintenance Guide

## 1-8-8. Wiring around the Head

Connect the cables coming from the XY-veyor-cable (40058385) to the following locations.  
(It is common throughout KE2070/2070C/2080, KE1070/1070C/1080)

- (1) Pass the cables CN801, CN802, and CN808 through the hole shown in the following figure and insert them until the far side of the head main board.
- (2) Insert the camera cable (CN805) into the left side of the triple-connector on the head main board.
- (3) Insert the power supply cables (CN211A, B, CN212A, B, CN213A, B, CN214A, B) into the connectors shown in the figure.
- (4) Connect the X-scale sensor cable (CN175) at the position shown in the figure below and secure it firmly
- (5) Run the 1394 robot cable along the route shown in the figure below and connect it to the connector coming from the LNC through the right side of the head.
- (6) Pass the OPTIXAL FIBER cable (7M) from the lower portion of the fan and insert it into the connector CN1A at the lowest portion of the servo amplifier board.

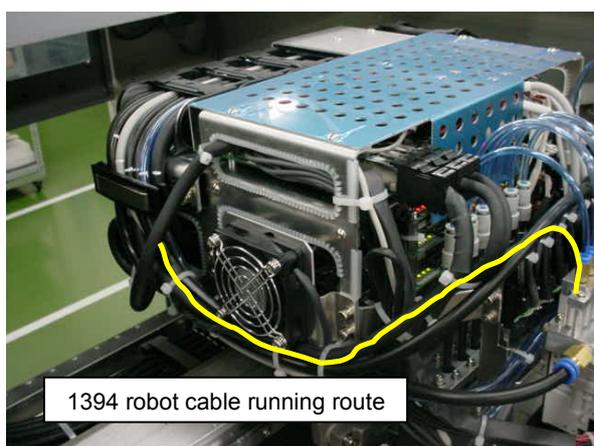


Figure 1-8-8-1

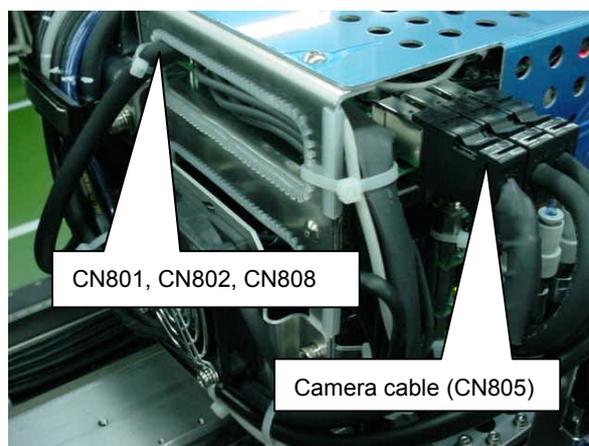


Figure 1-8-8-2

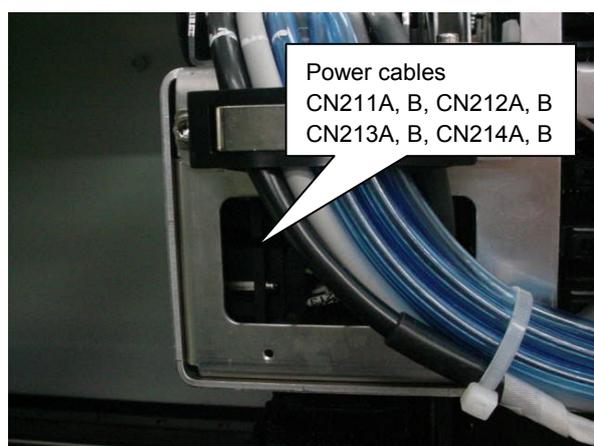


Figure 1-8-8-3

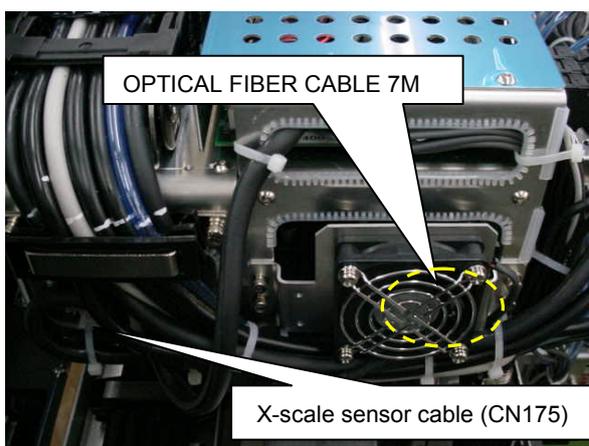


Figure 1-8-8-4

- Clamp the cables while referring to the figure above. When clamping the cables, do not apply any buckling or load to the cables forcibly. In particular, carefully handle the fiber cable.

# Maintenance Guide

## 1-9. Replacing the Cables in the X/Y Veyor-Cable (KE-2080R)

### 1-9-1. Removing the X Cable

- (1) Detach the head top cover and disconnect the connectors connected to XY veyor-cable, 1394 robot cable, and OPTICAL FIBER CABLE 7M LA sensor veyor-cable.

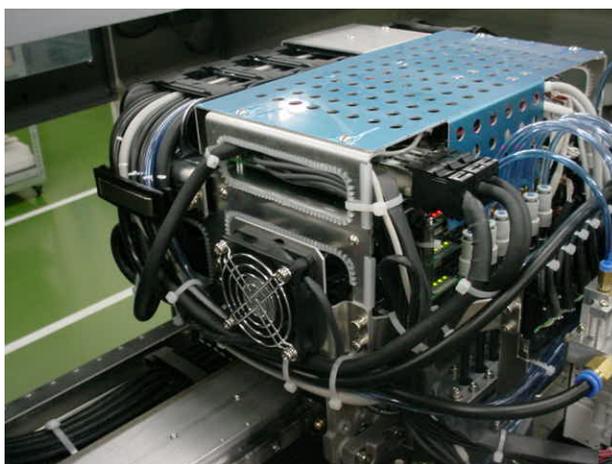


Figure 1-9-1-1

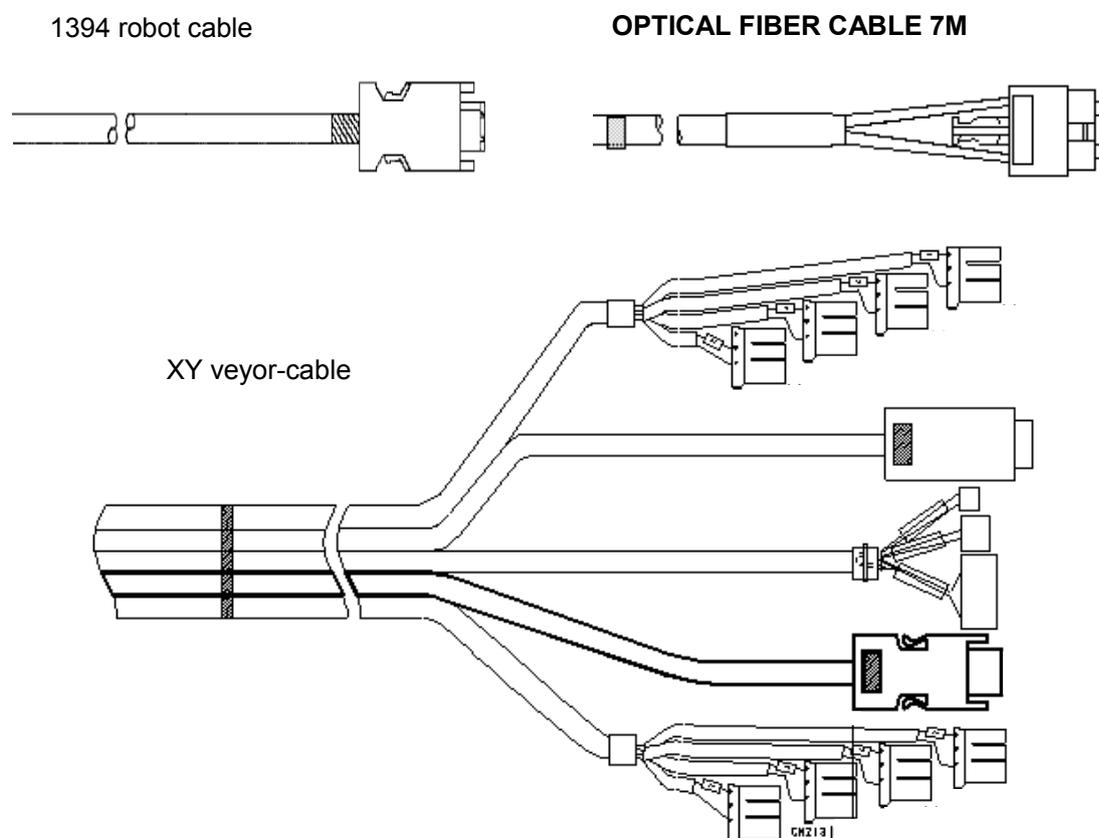


Figure 1-9-1-2

**LA sensor veyor-cable**

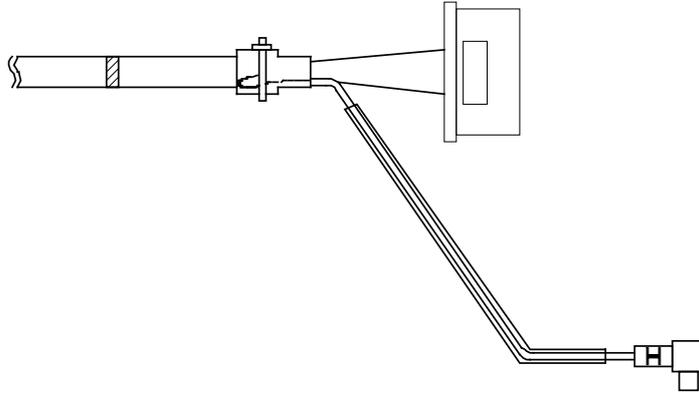


Figure 1-9-1-3

- (2) Detach the FC support. Then cut and remove the tie-up band.

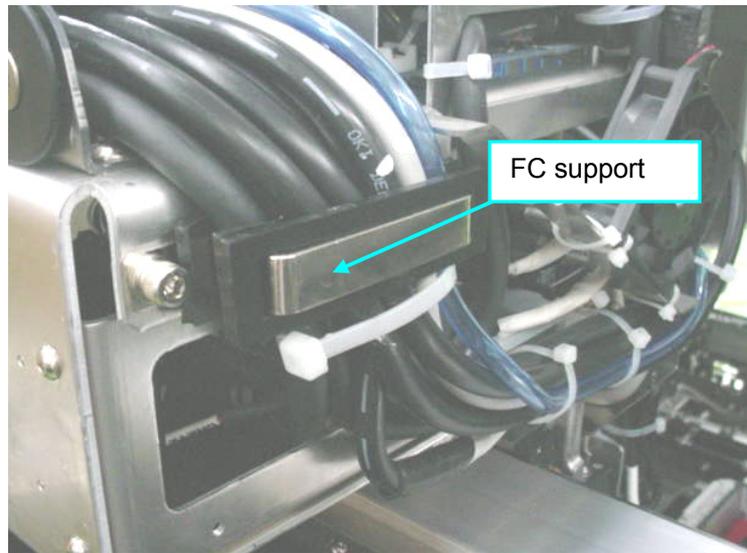


Figure 1-9-1-4

- (3) Detach the cable clamp X from the X-axis plastic rail CB support, and then cut and remove the tie-up bands.

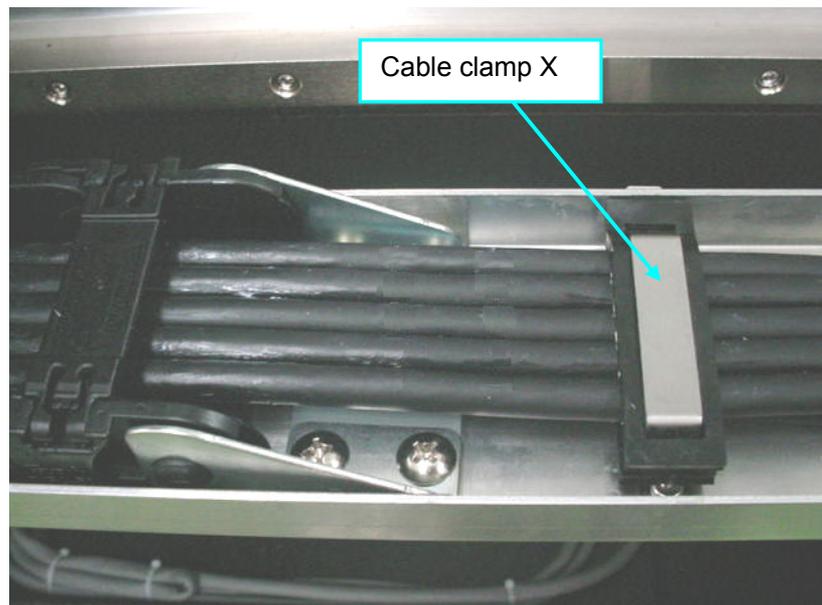


Figure 1-9-1-5

- (4) Detach the cover of the plastic rail and remove the cable to be replaced.

# Maintenance Guide

## 1-9-2. Checking the Cable Marking (X)

- (1) Check the marking position of the XY veyor-cable (40058385).  
(Place the marks at a position 350mm from the CN805 connector end.)
- \* For the machine with the extra specifications, the following cables are used.  
XY veyor-cable (E) 40059779  
Y veyor-cable (E) 40059789

This instruction also applies to the following pages.

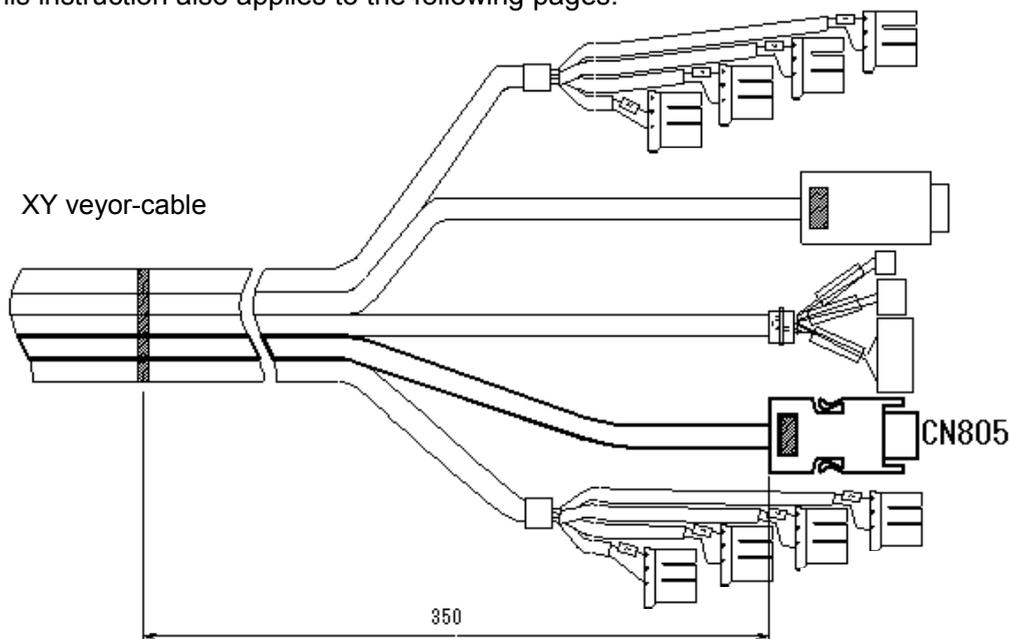
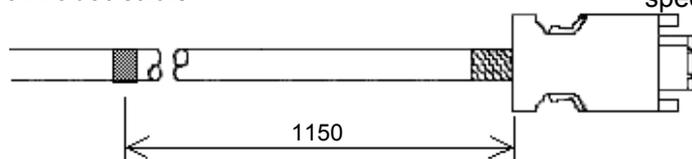


Figure 1-9-2-1

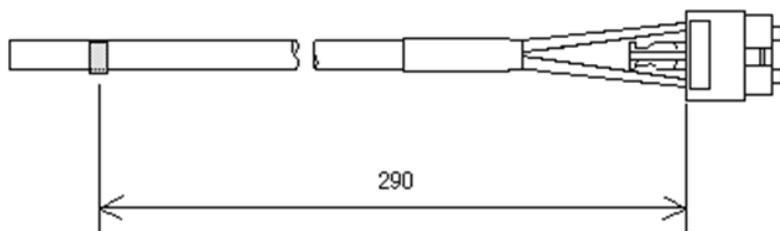
- (2) Check the marking positions of the 1394 robot cable (40044517) and the optical fiber cable 7M (40044543).  
(At this time, place a mark at a position 1150mm from the connector end of the 1394 robot cable and at a position 290mm from the connector end of the fiber cable.)

### 1394 robot cable



- \* For the machine with the extra specifications, the following cable is used.  
1394 robot cable (E) 40080215  
This instruction also applies to the following pages.

### OPTICAL FIBER CABLE 7M



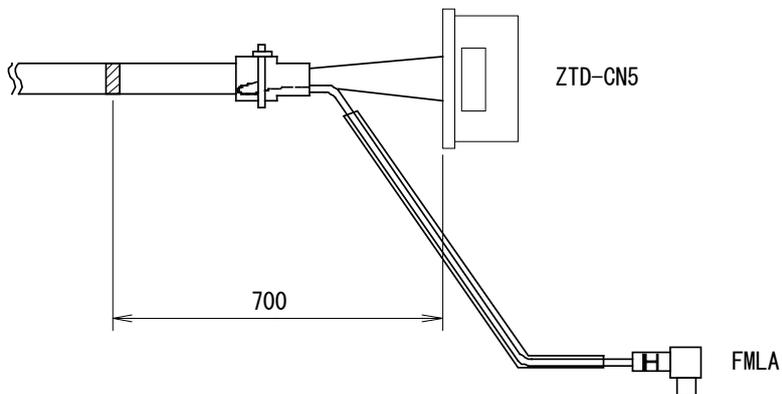
## Maintenance Guide

(3) Check the marking position of the LA sensor veyor-cable (40080206).  
(Place the marks at a position 700mm from the ZTD-CN5 connector end.)

\* For the machine with the extra specifications, the following cable is used.

LA sensor veyor-cable (E) 40080214

This instruction also applies to the following pages.



# Maintenance Guide

## 1-9-3. Assembling the Cable

- (1) Apply the grease to portions where the 40058385, 40044517, 40044543, and 40080206 cables are put in the plastic rail, and place the cables and air tubes in the X-axis plastic rail as shown in the figure below (figure viewed from A).

\* Check the connector orientation and take care so that the air tubes do not become warped.

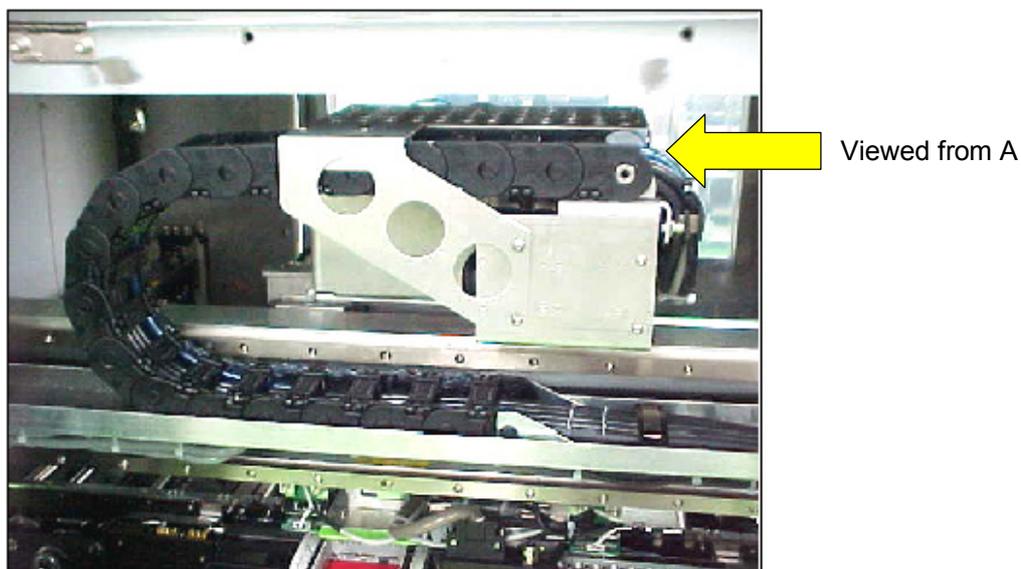


Figure 1-9-3-1

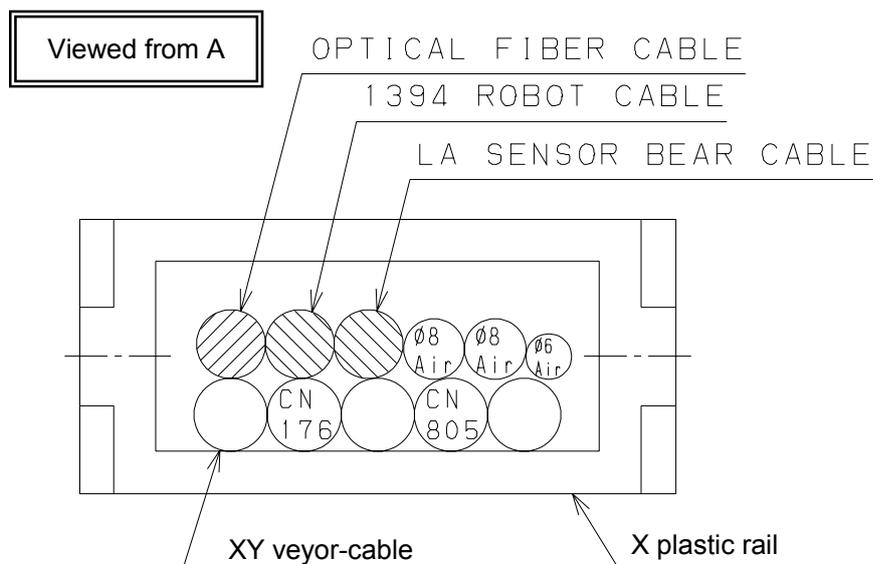


Figure 1-9-3-2

- (2) After the cables and air tubes have been run correctly, put the cover of the plastic rail.

## Maintenance Guide

- (3) For the head side of the cable, align the marking positions of the cables with the upper end of the FC support and secure them.
- (4) For the opposite side, place a mark at the top end of the mounting fixture with the cable pulled in the direction ① shown in the figure below. In the same manner, place a mark with the cable pushed in the direction ②. (For details, see the figure below.)
- (5) Hold the cables with the cable clamp X at a position where the center position between two mark positions meets the top end of the mounting fixture to secure them.

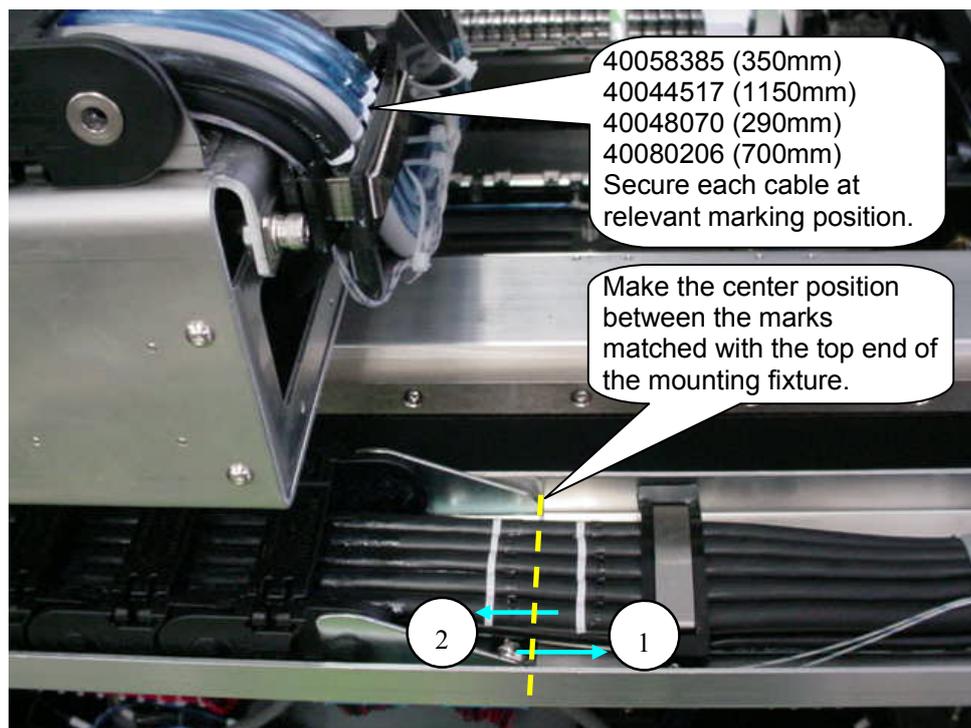


Figure 1-9-3-3

- (6) Cable check inside the plastic rail:  
Press in the cables inside the plastic rail by hand and check to make sure that they yield.

## 1-9-4. Separating the Fusion-bonded Parts of the Cables

- (1) Separate the fusion-bonded parts of the cables with a cutter so that the 40058384 and 40058385 cables can be bent to the Y-axis veyor-cables at an angle of 90 degrees.

Incise with a cutter. At this time, take care so that the sheath is not damaged.

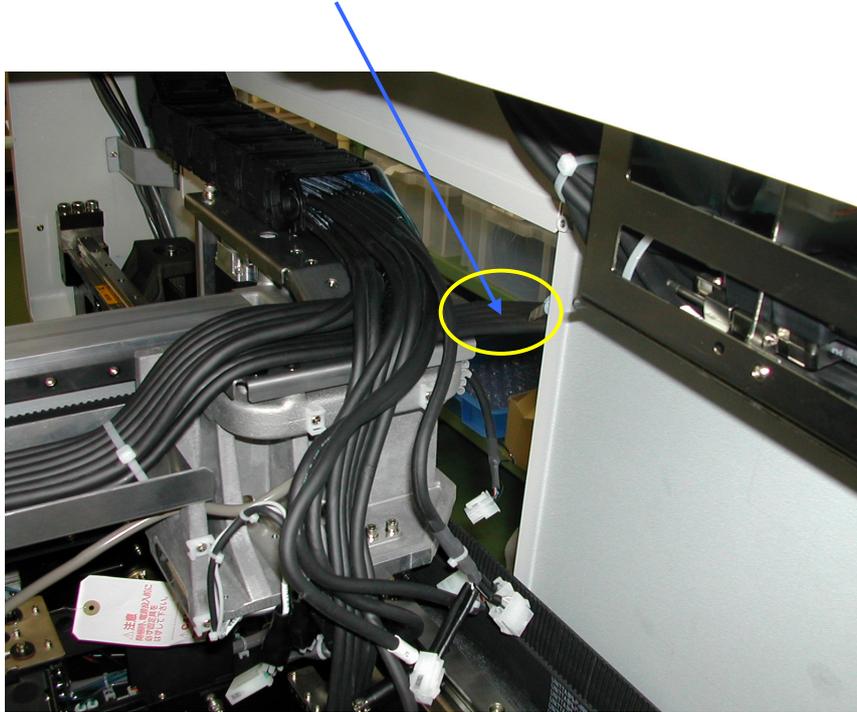


Figure 1-9-4-1

Cables separated by a cutter



Figure 1-9-4-2

# Maintenance Guide

## 1-9-5. Removing the Y Veyor-Cable

- (1) Disconnect the binding of the swing part (connector bracket) at the entrance of the Y-axis plastic rail and the relay connector.



Figure 1-9-5-1

- (2) Detach the cover of the Y plastic rail and remove the cable to be replaced.



Figure 1-9-5-2

## 1-9-6. Placing Marks on the Y Veyor-Cable

- (1) Check the marking position of the Y veyor-cable (40058384). (Place marks at a position 410mm from the end of the CN141 connector.)

- \* For the machine with the extra specifications, the following cables are used.

XY veyor-cable (E) 40059779  
Y veyor-cable (E) 40059789

This instruction also applies to the following pages.

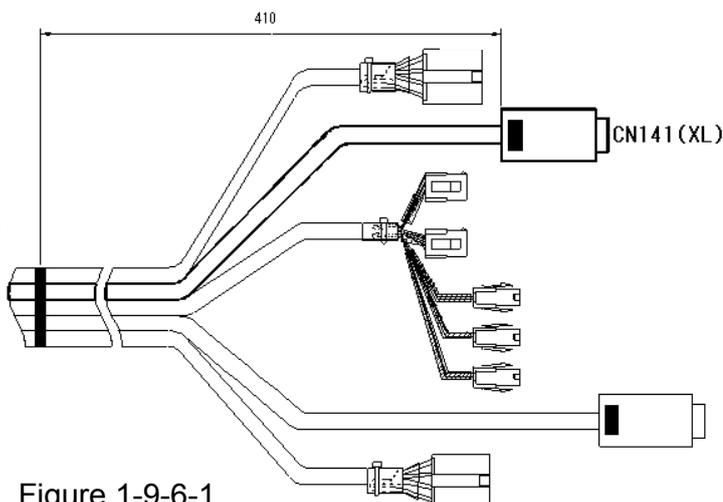


Figure 1-9-6-1

# Maintenance Guide

## 1-9-7. Assembling the Cables

- (1) Apply the grease to the portions of the 40058384 and 40058385 cables, which are to be stored into the plastic rail.
- (2) Place the 40058384 cables on the cables routed from the X-axis so that its CN166 side is located inside (Figure 1-9-7-1). Equate the lengths of the swing part relay connectors for 40058385 and 40058384 (Figure 1-9-7-2).

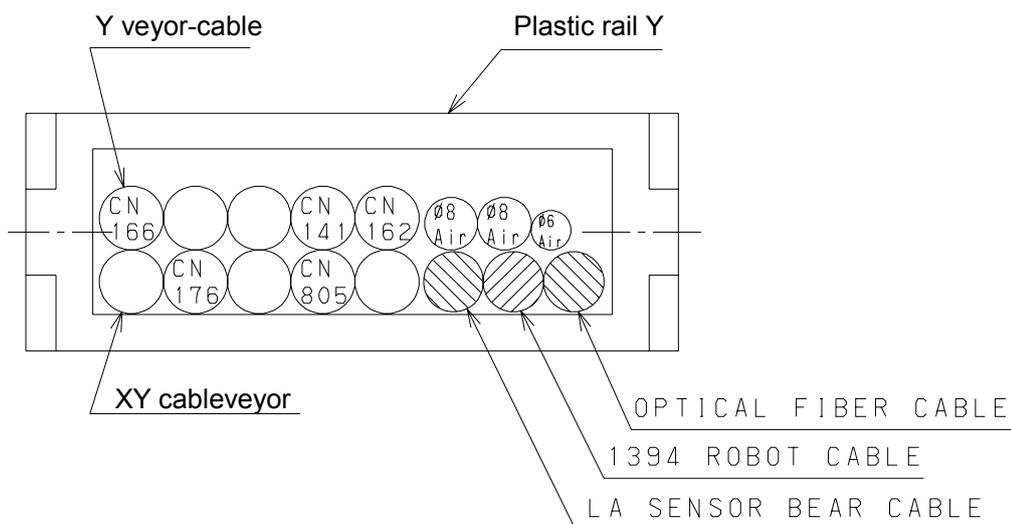


Figure 1-9-7-1

- (3) Pull out the cables to the front side and align the connectors for 40058384 with the connector bracket relay connectors (CN161/CN151/CN127/CN165/CN152/CN201/CN202/CN245/CN246/CN479 sides) for 40058385.

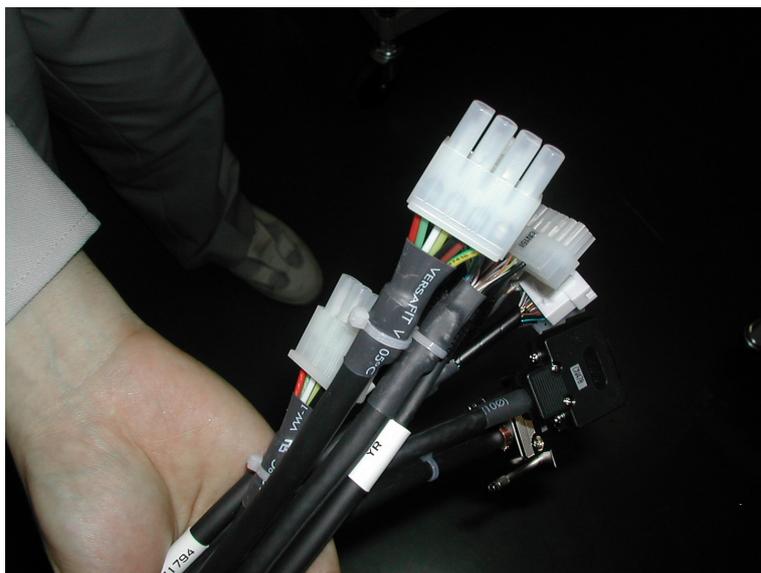


Figure 1-9-7-2

# Maintenance Guide

- (4) Align the marking of the 40058384 cables with the end surface of the cable clamp YB (of the plastic rail side) and fix the cables. Place marks on the sides of 40058385 cables aligning with the marking of 40058384 cables.

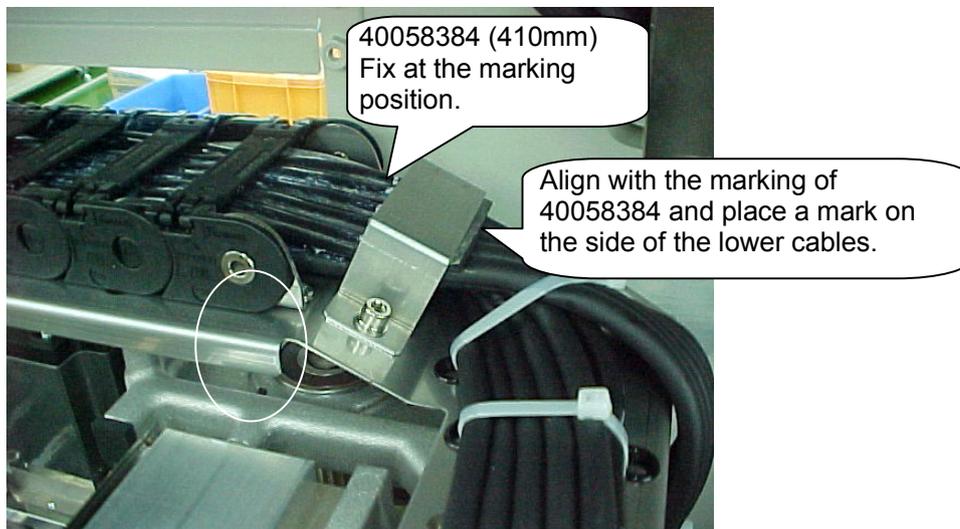


Figure 1-9-7-3

- (5) Pull out the connectors of 40058384 as shown in the figure below and fix them with the tie-up band.

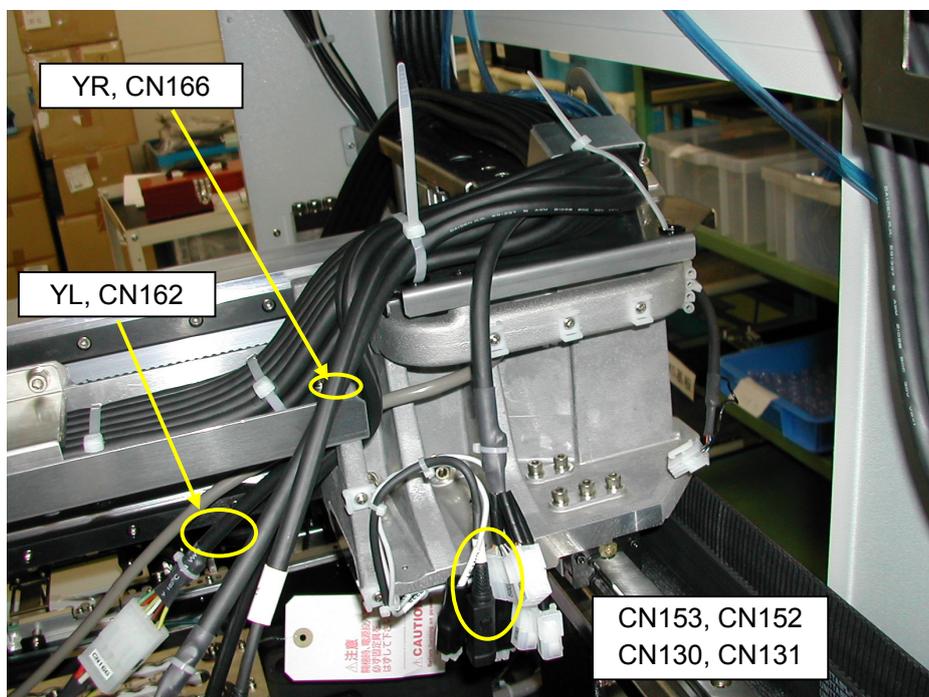


Figure 1-9-7-4

# Maintenance Guide

(6) Bind the lower portion of the plastic rail support as shown in the figure below.



Figure 1-9-7-5



Figure 1-9-7-6

(7) Wiring of the XL motor

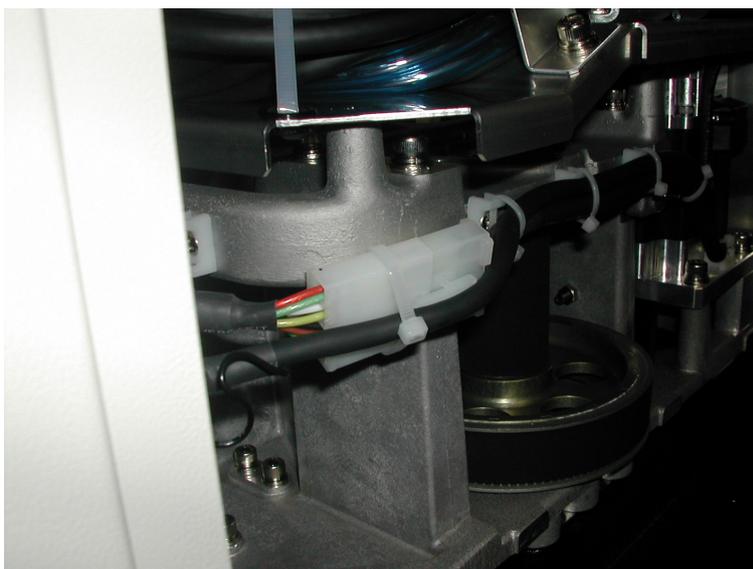


Figure 1-9-7-7

## Maintenance Guide

- (8) Wiring of the XL motor relay line, limit sensor relay line, and YL magnescale relay line



Figure 1-9-7-8

- (9) Wiring of the XR motor relay line, limit sensor relay line, and YR magnescale relay line

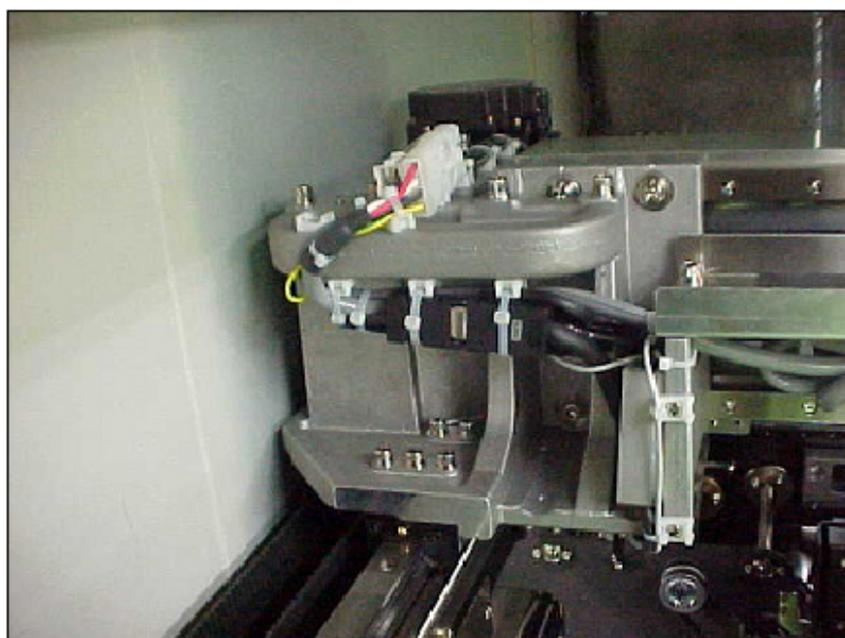


Figure 1-9-7-9

## Maintenance Guide

- (10) Place a mark at the top end of the mounting fixture with the Y-veyor-cable pulled in the direction ① shown in the figure below. Next, place a mark with the cable pushed in the direction ② in the same manner as described above. (For details, see the figure below.)
- (11) Hold the cables with the cable clamp YB at a position where the center position between two mark positions meets the top end of the mounting fixture and secure them.
- (12) Place marks on the sides of 40058385 cables aligning with the marking of 40058384 cables.

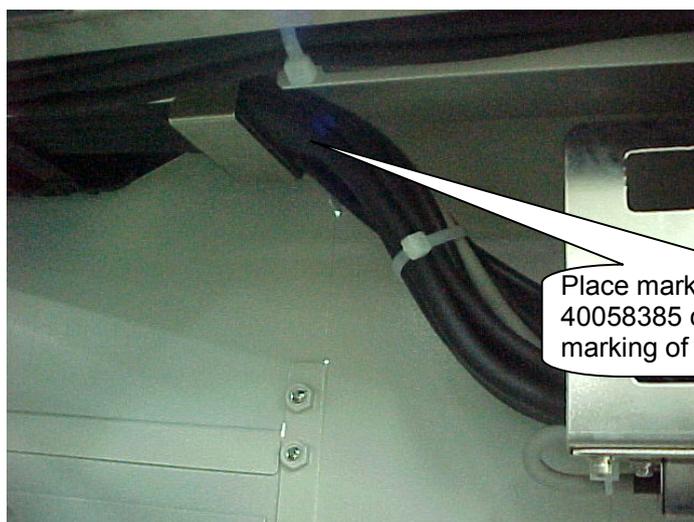


Figure 1-9-7-10



Figure 1-9-7-11

- (13) Move the Y-axis to the position closest to the operator. Then press the cables inside the plastic rail by hand and check that they yield.

# Maintenance Guide

## 1-9-8. Wiring around the Head

Connect the cables coming from the XY-veyor-cable (40058385) to the following locations.  
(Common for KE2070/2080)

- (1) Pass the cables CN801, CN802, and CN808 through the hole shown in the following figure and insert them until the far side of the head main board.
- (2) Insert the camera cable (CN805) into the left side of the triple-connector on the head main board.
- (3) Insert the power supply cables (CN211A, B, CN212A, B, CN213A, B, CN214A, B) into the connectors shown in the figure.
- (4) Connect the X-scale sensor cable (CN175) at the position shown in the figure below and secure it firmly
- (5) Run the 1394 robot cable along the route shown in the figure below and connect it to the connector coming from the LNC through the right side of the head.
- (6) Pass the OPTIXAL FIBER cable (7M) from the lower portion of the fan and insert it into the connector CN1A at the lowest portion of the servo amplifier board.
- (7) Run the LA sensor veyor-cable along the route shown in the figure below and connect it to the servo amplifier board and FMLA sensor.

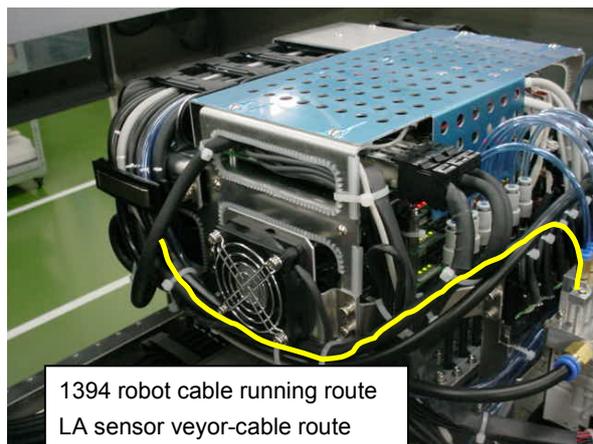


Figure 1-9-8-1

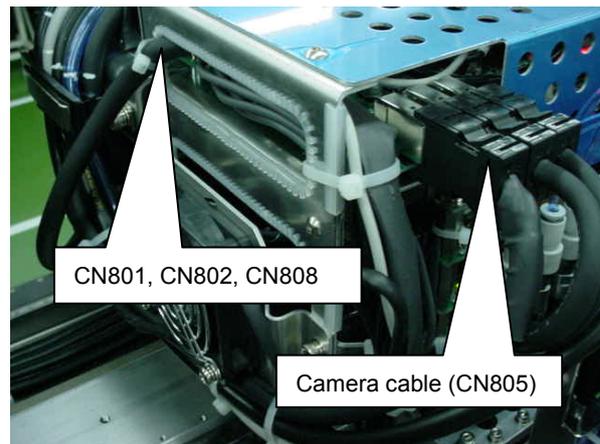


Figure 1-9-8-2

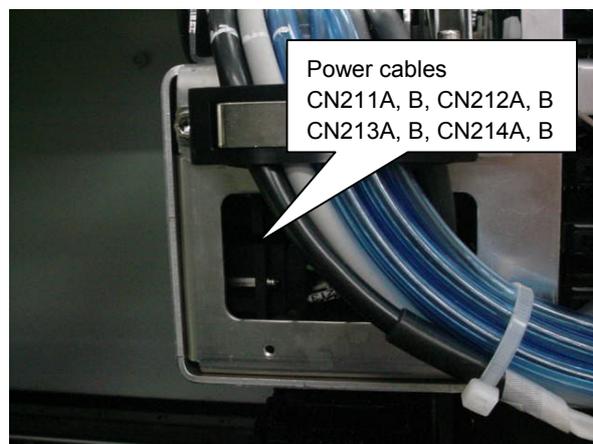


Figure 1-9-8-3

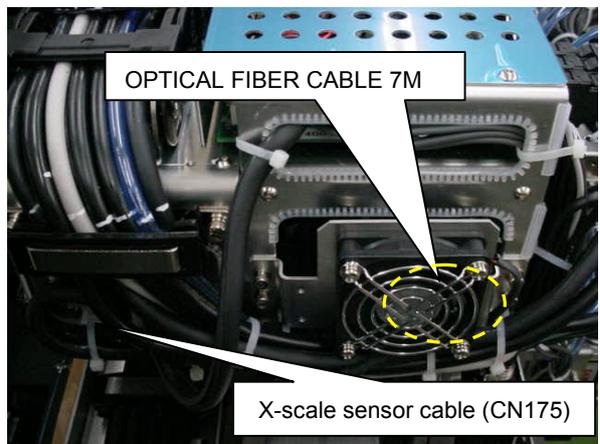


Figure 1-9-8-4

- Clamp the cables while referring to the figure above. When clamping the cables, do not apply any buckling or load to the cables forcibly. In particular, carefully handle the fiber cable.



**DANGER**

To prevent any trouble caused by accidental machine start, always shut-down the power before starting the maintenance and adjustment work.

## [2] HEAD UNIT

### 2-1. Replacing and Adjusting the Head

#### 2-1-1. LNC Head

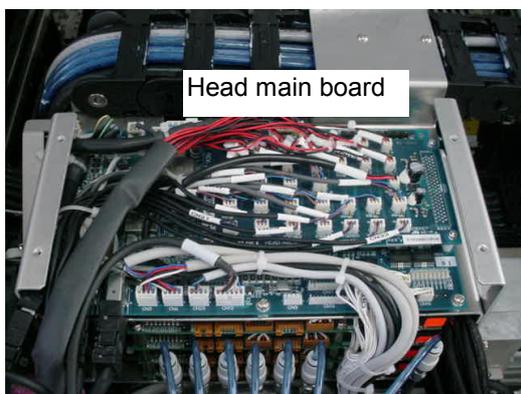


Figure 2-1-1

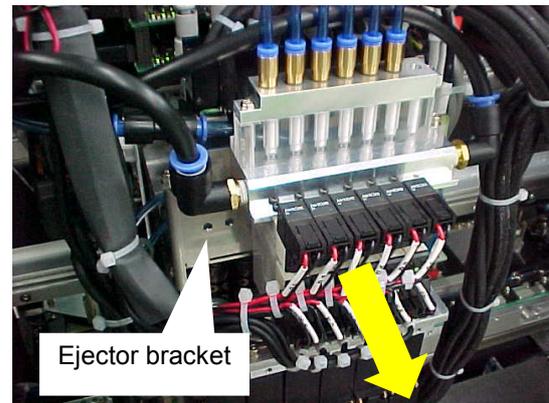


Figure 2-1-2

- (1) Turn OFF the compressed air to the machine main unit.
- (2) Detach the head top cover. (4 mounting screws)
- (3) Disconnect the ejector solenoid valve cable and vacuum sensor cable from the head main board.
- (4) Disconnect the  $\phi 4$  and  $\phi 8$  air tubes from the ejector.
- (5) Detach the ejector bracket. (4 mounting screws)
- (6) Disconnect the Z $\theta$ -motor cables from the servo amplifier board.
- (7) Detach the Z sensor bracket from the head.
- (8) Disconnect the HMS relay connector.  
If the BMR is mounted, disconnect the fiber.
- (9) Detach the LNC encoder, 1394 cable and the magnescape amplifier.
- (10) Disconnect the  $\phi 4$  air tube from the union Y for the head up cylinder.
- (11) Detach the air cylinder. (See also section 2-5.)



Figure 2-1-3

# Maintenance Guide

- (12) While keeping the head by hand so that it does not fall down, remove the M5 × 16 SEMS cap bolts (6 pcs.).
- (13) Pull out two parallel pins. Raise the head so that it is not in contact with other components, and then detach it.
- (14) Reassemble the components in the reverse order of disassembly.
  - \* **Apply Loctite 242 to the head mounting screws (6 pcs.) and tighten them with a tightening torque of 7.0 N·m.**
  - \* **Connect each motor connector while referring to the location label.**
- (15) After the head has been replaced, it is necessary to input the MS parameters again. For details about input items, see section 2-9.

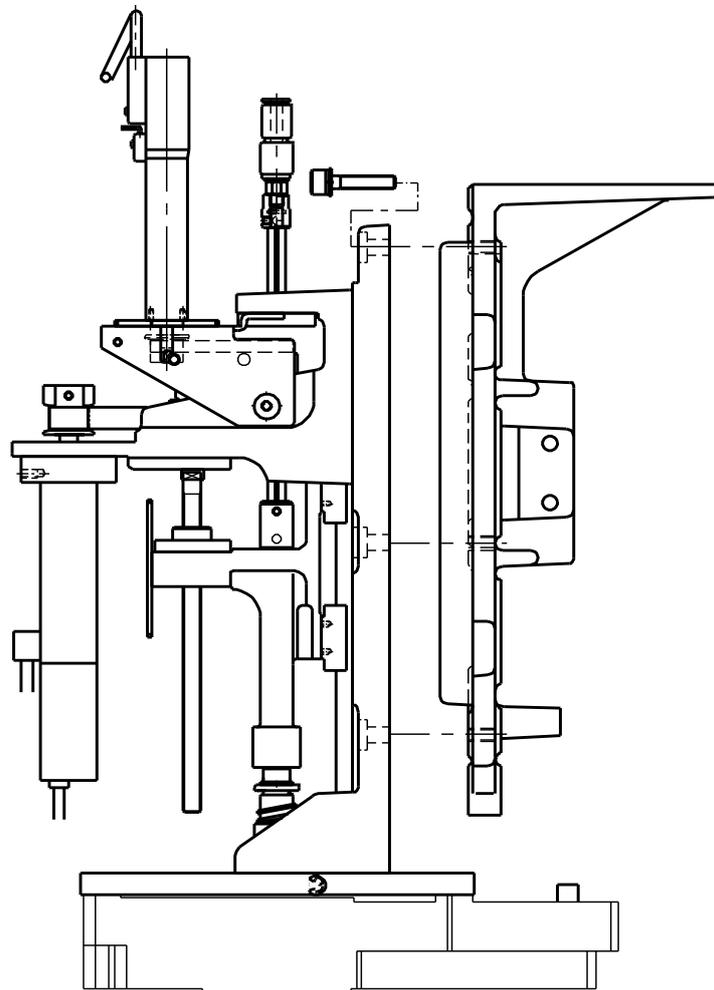


Figure 2-1-4

## 2-1-2. IC Head (KE-1080/2080)

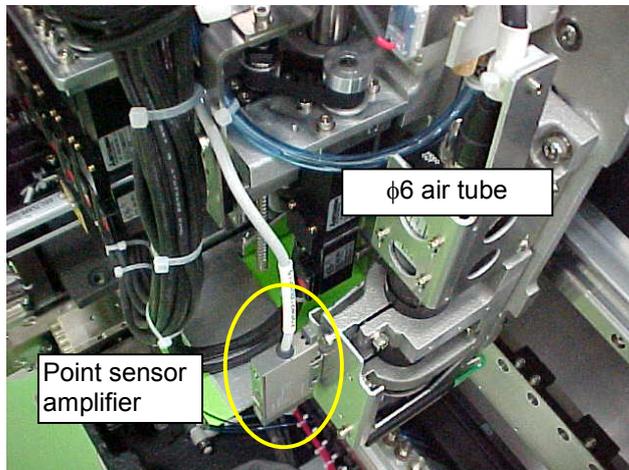


Figure 2-1-5

- (1) Disconnect the Zθ-motor cables from the servo amplifier board.
- (2) Disconnect the Z-sensor cables from the head main board.
- (3) Disconnect the fibers (2 pcs.) from the point sensor amplifier and detach the amplifier main unit from the bracket.
- (4) Disconnect the φ4 and φ6 air tubes.
- (5) Detach the release bar. (See also section 2-5.)
- (6) While keeping the IC head by hand so that it does not fall down, remove the M5 × 16 SEMS cap bolts (6 pcs.).
- (7) Pull out two parallel pins. Raise the IC head so that it is not in contact with other components, and then detach it.
- (8) Reassemble the components in the reverse order of disassembly.

\* **Apply Loctite 242 to the IC head mounting screws (6 pcs.) and tighten them with a tightening torque of 7.0 N·m.**

- (9) After the head has been replaced, it is necessary to input the MS parameters again. For details about input items, see section 2-9.

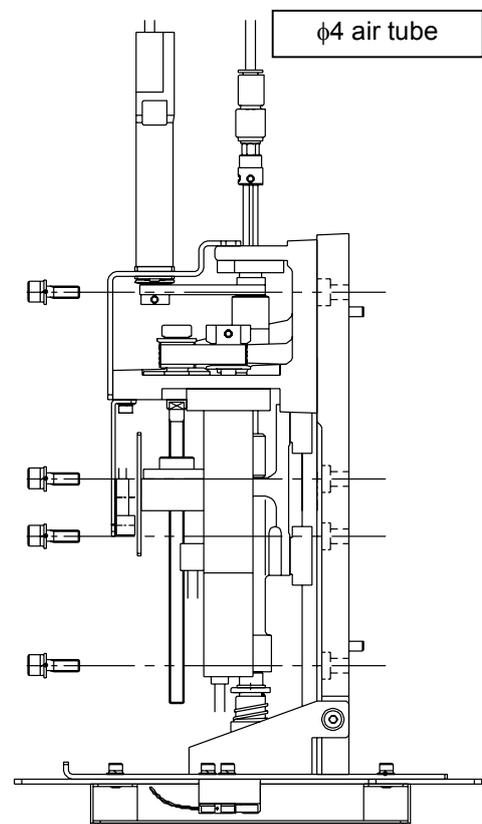


Figure 2-1-6

# Maintenance Guide

## 2-1-3. IC Head (KE-2080R)

- (1) Disconnect the Z $\theta$ -motor cables from the servo amplifier board.
- (2) Disconnect the Z-sensor cables ① and T-sensor cables ② from the head main board.
- (3) Disconnect the connector of the LA connection cable from the FMLA sensor.
- (4) Disconnect the  $\phi 4$  and  $\phi 6$  air tubes. (See also section 2-1-2.)
- (5) Detach the release bar. (See also section 2-5.)
- (6) While keeping the IC head by hand so that it does not fall down, remove the M5  $\times$  16 SEMS cap bolts (6 pcs.) ③, M3  $\times$  6 SEMS cap bolt (1 pc.) ④, and M4  $\times$  8 SEMS cap bolt (1 pc.) ⑤.
- (7) Pull out two parallel pins. Raise the IC head so that it is not in contact with other components, and then detach it.  
(Pay special attention so that the FMLA is not in contact with the release bar of the LNC-head.)
- (8) Reassemble the components in the reverse order of disassembly.

\* **Apply Loctite 242 to the IC head mounting screws (6 pcs.) and tighten them with a tightening torque of 7.0 N·m.**

- (9) After the head has been replaced, it is necessary to input the MS parameters again. For details about input items, see section 2-9.

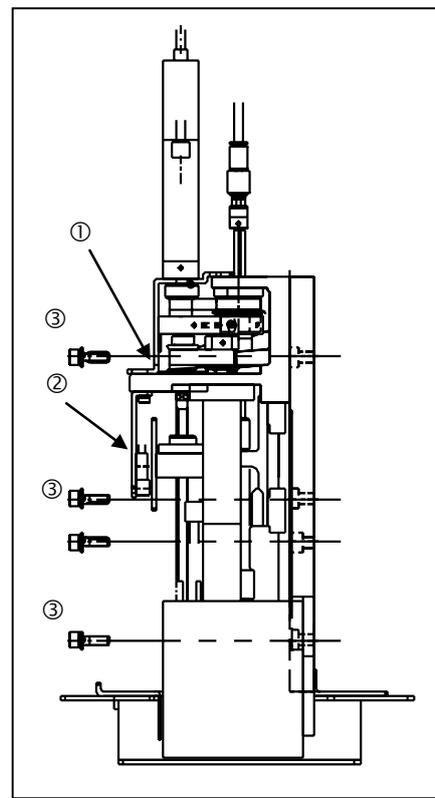


Figure 2-1-7

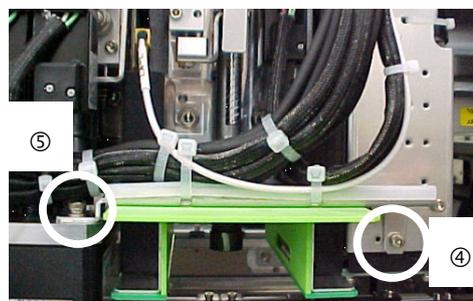


Figure 2-1-8

## 2-2. Replacing the Motor

### 2-2-1. Z-Motor (LNC Head)

After the Z motor has been replaced, it is absolutely necessary to re-input the MS parameters related to the Z-axis home position adjustment, Z-axis height, and laser.  
(For details of input items, see section 2-9.)

- (1) Disconnect the motor cables from the servo amplifier board.
- (2) Carry out the steps (1) through (5) in section 2-1-1 to detach the ejector bracket.
- (3) Loosen the set screw ① of the Z-motor pulley.
- (4) Remove the motor mounting screws ② (3 pcs.).  
Detach the Z motor by pulling out the pulley.

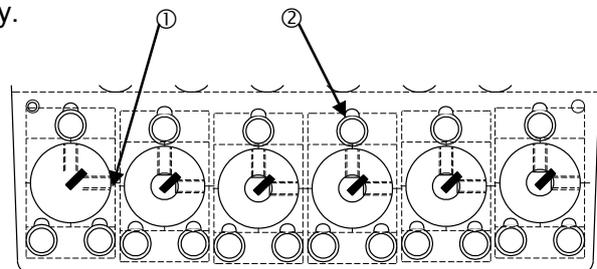


Figure 2-2-1

- (5) Reassemble the components in the reverse order of disassembly.
- (6) Follow the steps below to adjust the belt tension.

# Maintenance Guide

## <Procedure>

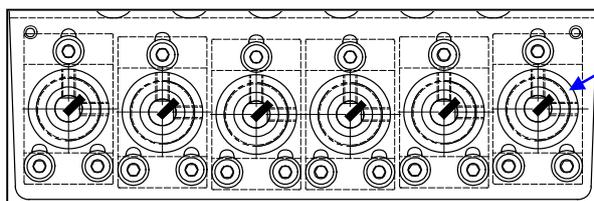
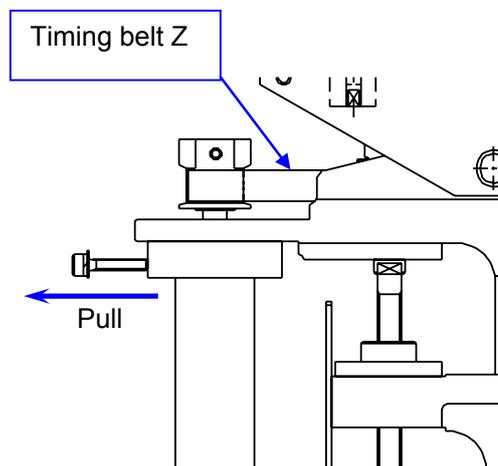
- ① Put the screw in the tap of the Z-motor and lock the mounting screw with the screw pulled in the direction indicated by an arrow with a force of 21.6 N (2.2 kgf) using a tension gauge.

Tension meter set value (For check)

Weight: 0.9g/m Width: 8.0mm Span: 45mm

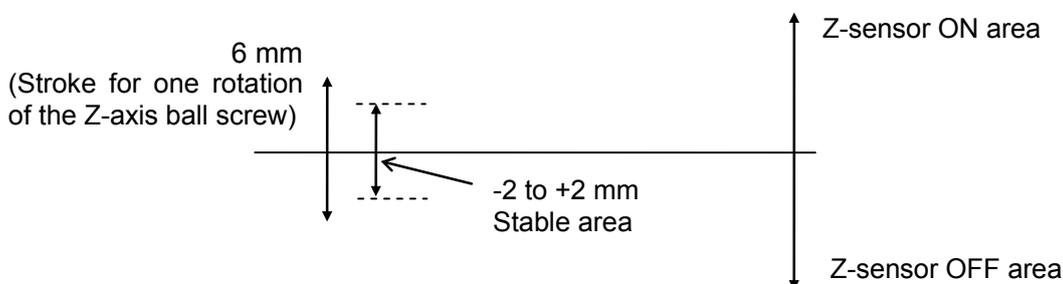
Proper tension 10.5±1N

- \* **Apply Loctite 242 to the Z-motor mounting screws (3 pcs.) and tighten them with a tightening torque of 2.3 Nm.**
- \* **When tightening the setscrew of the Z-motor pulley, make sure to align the orientation of the flat part of the Z-motor shaft and the setscrew of the pulley. Tighten the setscrew with a torque of 0.5 Nm.**



When the Z-motor pulley is secured at a position where the marking on the shaft is located at 2-o'clock position as shown in the figure on the left or the shaft D cut surface is located at a position as shown in the figure with the Z-axis raised to its uppermost position, this becomes the conditions for item ②.

- ② After the Z-axis motor has been assembled, obtain the PWB top surface height of the MS parameter. If this value does not fall between -2 and +2mm, readjust the positional relationship of the Z-motor axis and the ball screw, obtain the MS parameter again, and check to make sure that the PWB top surface height falls between -2 and +2mm.



# Maintenance Guide

## 2-2-2. $\theta$ -Motor (LNC Head)

After the  $\theta$ -motor has been replaced, it is absolutely necessary to re-input the MS parameters related to the axis home. (For details of input items, see section 2-9.)

- (1) Disconnect the motor cables from the servo amplifier board.
- (2) Carry out the steps (1) through (5) in section 2-1-1 to detach the ejector bracket.
- (3) Loosen the set screw ① of the T pulley.
- (4) Remove the motor mounting screws ② (2 pcs.) and pull out the pulley to detach it.
- (5) Remove the flat head screws ③ (2 pcs.) and detach the TM flange.
- (6) Reassemble the components in the reverse order of disassembly.

\* **Apply Loctite 242 to the flat head screws ③ and tighten them with a tightening torque of 0.14 N·m.**

\* **Make an adjustment so that the clearance between the T pulley ① and the TM nut plate ④ becomes 0.3mm and fasten the setscrew of the T pulley.**

- (7) Follow the steps below to adjust the belt tension.

<Procedure>

- ① Make a ring using a tie-up band or belt at the top end of the T pulley of the  $\theta$ -motor. Hang the bar tension on this ring. With the bar tension kept pulled with a force of 12.7N (1.3kgf), secure the T pulley using the mounting screws.

Tension meter set value (For check)

Weight: 0.9g/m Width: 4.0mm

Span: 38.2mm

Proper tension 4.5 to 12.5 N

Average measured value: 6 to 11N

Or, sum of measured values: 12 to 22N

\* **Apply Loctite 242 to the  $\theta$ -motor mounting screws (2 pcs.) and tighten them with a tightening torque of 2.3 Nm.**

\* **When tightening the setscrew of the T pulley, make sure to align the orientation of the flat part of the  $\theta$ -motor shaft and the setscrew of the pulley. Tighten the setscrew with a torque of 0.5 Nm.**

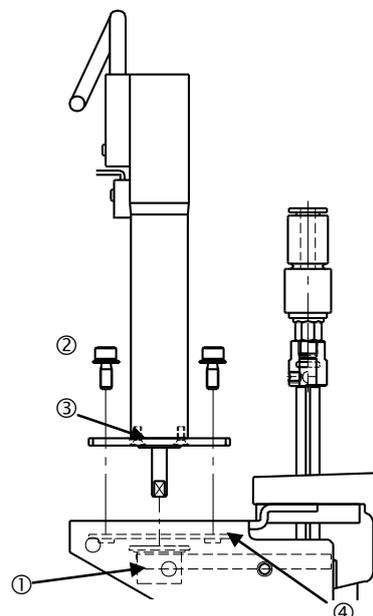
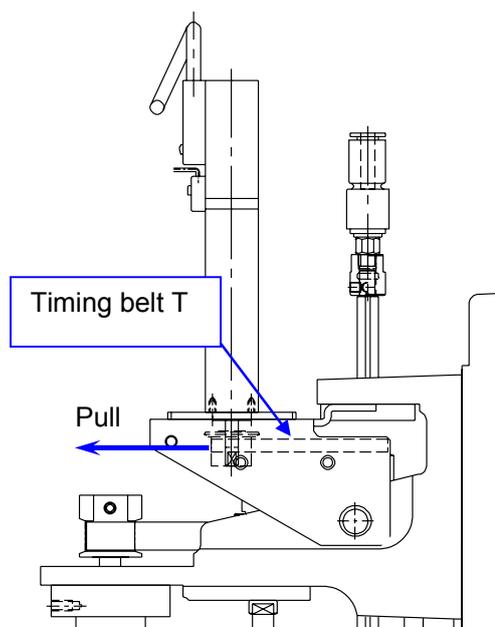


Figure 2-2-2



## 2-2-3. Z-Motor (IC Head)

After the Z-motor has been replaced, it is absolutely necessary to re-input the MS parameters related to the Z-axis home position adjustment, Z-axis height, and laser.

(For details of input items, see section 2-9.)

(1) Disconnect the motor cables from the servo amplifier board.

(2) Loosen the set screw ① of the Z-motor pulley.

(3) Remove the motor mounting screws ② and ③ (3 pcs.).

Detach the Z motor by pulling out the pulley.

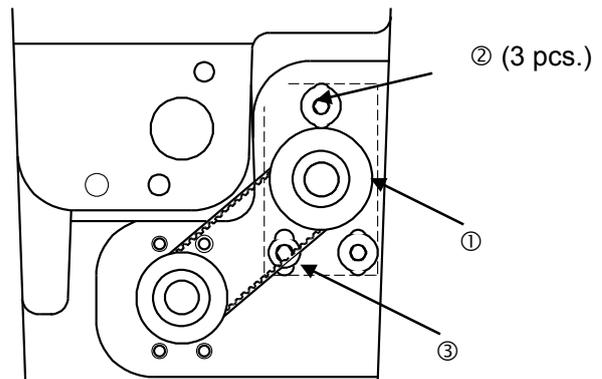


Figure 2-2-3

(4) Reassemble the components in the reverse order of disassembly.

(5) Follow the steps below to adjust the belt tension.

# Maintenance Guide

## <Procedure>

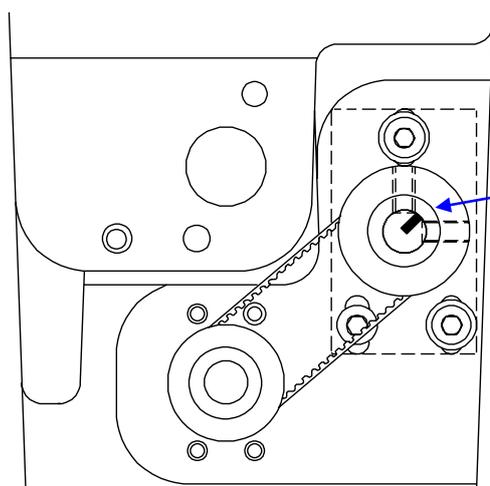
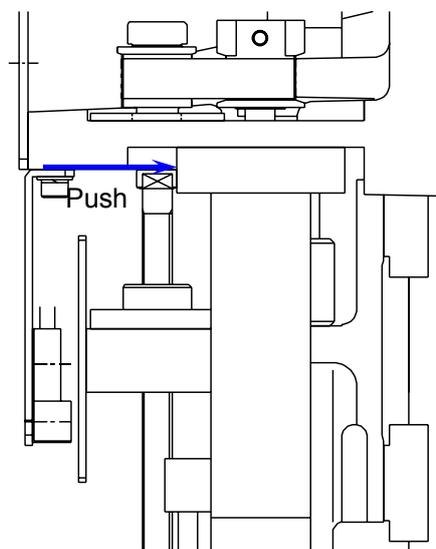
- ① With the flange part of the Z-motor kept pushed with a force of 21.6N (2.2kgf) using the bar tension in the direction indicated by an arrow, secure the flange part using the mounting screws.

Tension meter set value (For check)

Weight: 0.9g/m Width: 8.0mm Span: 32mm

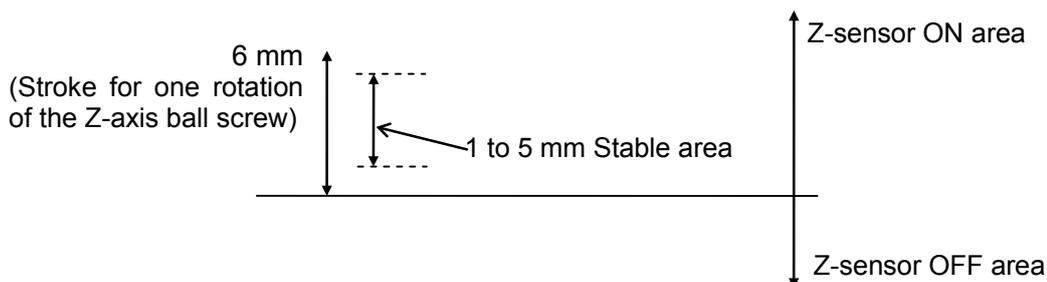
Proper tension  $10.5 \pm 1N$

- \* Apply Loctite 242 to the Z-motor mounting screws (3 pcs.) and tighten them with a tightening torque of 2.3 Nm.
- \* When tightening the setscrew of the Z-motor pulley, make sure to align the orientation of the flat part of the Z-motor shaft and the setscrew of the pulley. Tighten the setscrew with a torque of 0.5 Nm.



When the Z-motor pulley is secured at a position where the marking on the shaft is located at 2-o'clock position as shown in the figure on the left or the shaft D cut surface is located at a position as shown in the figure with the Z-axis raised to its uppermost position, this becomes the conditions for item ②.

- ② After the Z-axis motor has been assembled, obtain the PWB top surface height of the MS parameter. If this value does not fall between 1 and 5mm, turn the Z-motor pulley 180° against the Z-axis motor shaft and secure it again. Then obtain the MS parameter again, and check to make sure that the PWB top surface height falls between 1 and 5mm.



# Maintenance Guide

## 2-2-4. $\theta$ -Motor (IC Head: KE-1080/2080)

After the  $\theta$ -motor has been replaced, it is absolutely necessary to re-input the MS parameters related to the axis home. (For details of input items, see section 2-9.)

- (1) Disconnect the motor cables from the servo amplifier board.
- (2) Remove the mounting screws ① (3 pcs.) of the IC T-motor bracket.
- (3) Loosen the set screws (2 pcs.) of the IC T-pulley to detach the pulley.
- (4) Remove the mounting screws ③ (3 pcs.) from the IC T-motor bracket to detach the motor.
- (5) Reassemble the components in the reverse order of disassembly.

\* **Apply Loctite 242 to the mounting screws ③ and tighten them with a tightening torque of 2.3N·m.**

\* **Make the adjustment so that the end face of the motor shaft is aligned with the end face of the pulley, and then fix the set screws of the T-pulley.**

- (6) Follow the steps below to adjust the belt tension.

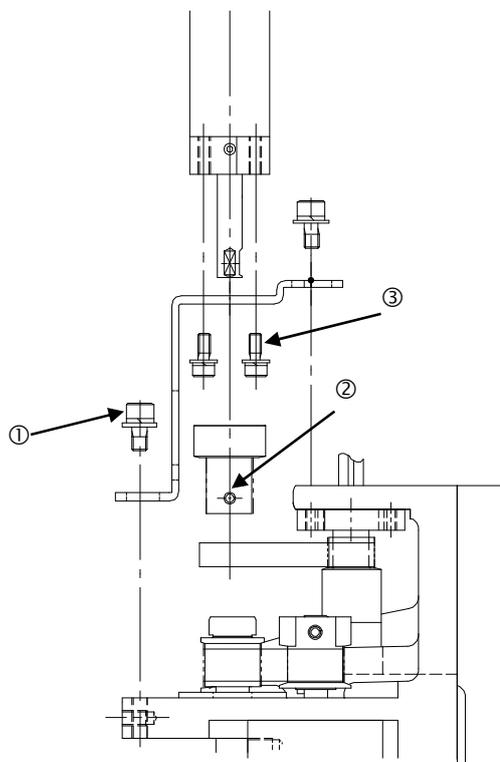


Figure 2-2-4

### <Procedure>

- ① Pull the IC T-motor bracket to adjust the tension of the timing belt to the status shown below.

Tension meter set value (For check)

Machine rev. D or earlier

Weight: 0.9g/m Width: 4.0mm Span:  
38.2mm

Proper tension  $6.5 \pm 1\text{N}$

Machine rev. E or later

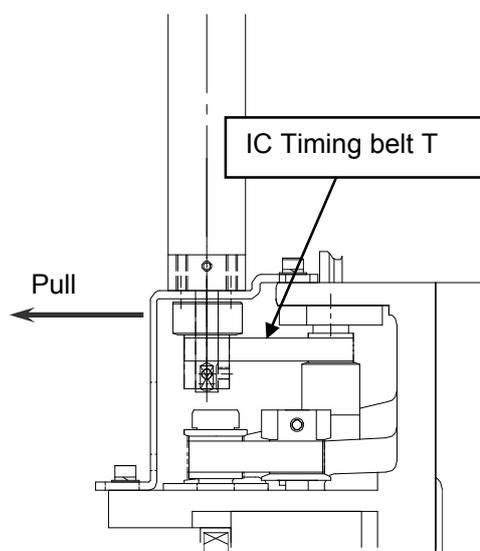
Weight: 0.9g/m Width: 6.0mm Span:  
31.5mm

Proper tension  $9.0 \pm 1\text{N}$

Note that machine rev. F is an exception.

Namely its set values shall be the ones for machine rev. D or earlier.

- \* **When tightening the set screw of the T pulley, make sure to align the orientation of the flat part of the  $\theta$ -motor shaft and the setscrew of the pulley. Tighten the setscrew with a torque of 0.5 Nm.**



# Maintenance Guide

## 2-2-5. $\theta$ -Motor (IC Head: KE-2080R)

After the  $\theta$ -motor has been replaced, it is absolutely necessary to re-input the MS parameters related to the axis home. (For details of input items, see section 2-9.)

- (1) Disconnect the motor cables from the servo amplifier board.
- (2) Remove the mounting screws ① (3 pcs.) of the IC T-motor bracket.
- (3) Loosen the set screws (2 pcs.) of the IC T-pulley to detach the pulley.
- (4) Remove the mounting screws ③ (3 pcs.) from the IC T-motor bracket to detach the motor.
- (5) Reassemble the components in the reverse order of disassembly.

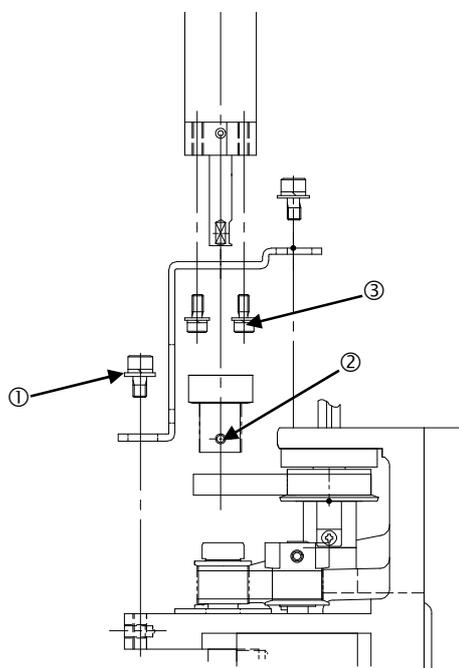


Figure 2-2-5

- \* **Apply Loctite 242 to the mounting screws ③ and tighten them with a tightening torque of 2.3 N·m.**
- \* **Make the adjustment so that the end face of the motor shaft is aligned with the end face of the pulley, and then fix the set screws of the T-pulley.**

- (6) Follow the steps below to adjust the belt tension.

### <Procedure>

- ① Pull the IC T-motor bracket to adjust the tension of the timing belt to the status shown below.

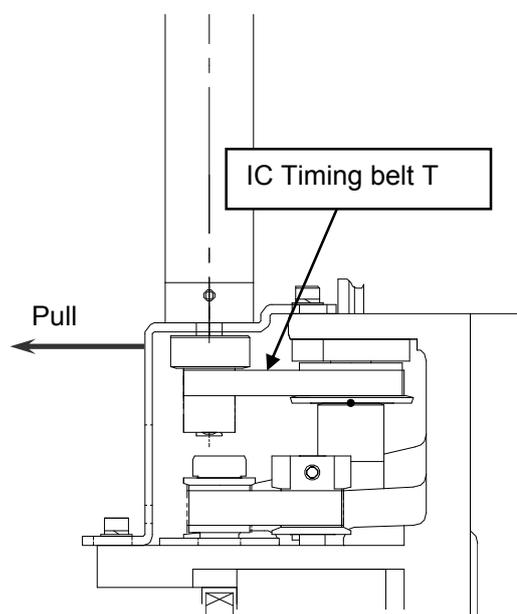
Tension meter set value (For check)

Weight: 1.0g/m Width: 6.0mm

Span: 30.8mm

Proper tension 9.0±1N

- \* **When tightening the set screw of the T pulley, make sure to align the orientation of the flat part of the  $\theta$ -motor shaft and the setscrew of the pulley. Tighten the setscrew with a torque of 0.5 Nm.**



# Maintenance Guide

## 2-3. Replacing the Z-Sensor

After the Z-sensor has been replaced, perform the home position return to check that it functions correctly.

After the home position return has been completed, it is necessary to input the MS parameters related to the Z-axis again.

(For details about input items, see section 2-9.)

### 2-3-1. LNC Head

- (1) Remove the mounting screws ① (4 pcs.) of the Z-sensor bracket and detach the bracket.
- (2) Cut the tie-up bands binding the Z-sensor cable and replace the Z-sensor.
- (3) Reassemble the components in the reverse order of disassembly.

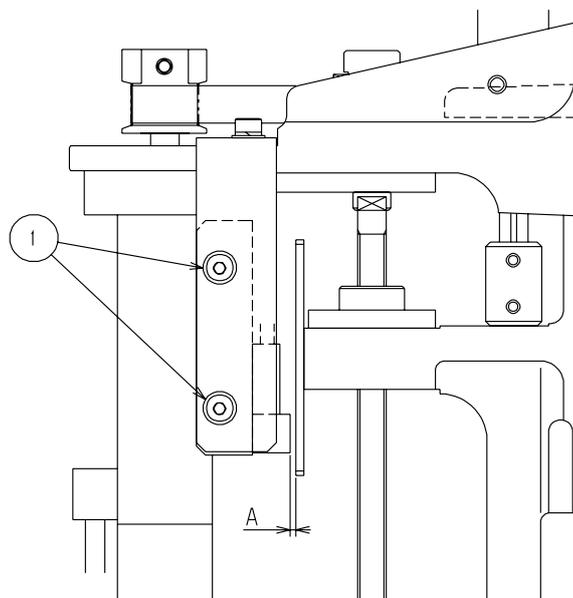


Figure 2-3-1

- (4) Check following the procedure below and make adjustments if necessary.

#### <Procedure>

- ① Measure the clearance between the Z-sensor and Z-sensor dog. (Dimension A in the figure at right)  
Move the Z-sensor dog up and down to check that the values measured at the upper and lower positions are within  $1.4 \pm 0.2$  mm.
- ② If the values are out of the specification range, loosen the Z-sensor bracket mounting screws and adjust the Z-sensor position.

# Maintenance Guide

## 2-3-2. IC Head

- (1) Remove the mounting screws ① (2 pcs.) of the IC Z-sensor bracket and detach the bracket.
- (2) Cut the tie-up bands binding the Z-sensor cable and replace the Z-sensor.
- (3) Reassemble the components in the reverse order of assembly.

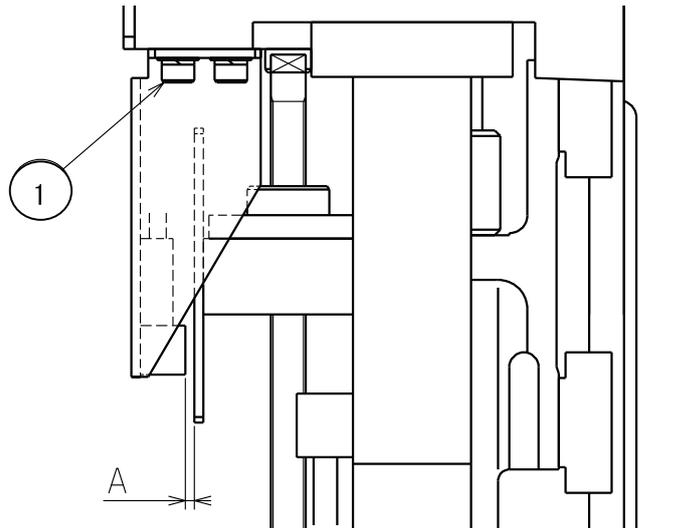


Figure 2-3-2

- (4) Check following the procedure below and make adjustments if necessary.

### <Procedure>

- ① Measure the clearance between the Z-sensor and Z-sensor dog. (Dimension A in the figure at right)  
Move the Z-sensor dog up and down to check that the values measured at the upper and lower positions are within  $1.4 \pm 0.2$  mm.
- ② If the values are out of the specification range, loosen the IC Z-sensor bracket mounting screws and adjust the Z-sensor position.

# Maintenance Guide

## 2-4. Replacing the T-Sensor (KE-2080R)

After the T-sensor has been replaced, perform the home position return to check that it functions correctly.

(For details about input items, see section 2-9.)

- (1) Detach the T-sensor bracket from the head.
- (2) Remove the mounting screws ② (2 pcs.) of the T-sensor bracket ① and detach the bracket.
- (3) Cut the tie-up band securing the T-sensor cables.
- (4) Remove the T-sensor ③ from the bracket and replace it.
- (5) Reassemble the components in the reverse order of disassembly.
- (6) Check following the procedure below and make adjustments if necessary.

### <Procedure>

- ① Make the adjustment so that the clearance between the T-sensor ③ and T-sensor dog ④ is 2 mm or less and that the T-sensor is not in contact with other part around it, such as pulley.
- ② Manually rotate the  $\theta$ -axis to make sure that the T-sensor is not in contact with the T-sensor dog.
- ③ Put the servo in the free status with the power to the machine turned ON and manually rotate the  $\theta$ -axis to make sure that the sensor is turned ON or OFF if the sensor gets close to the dog.

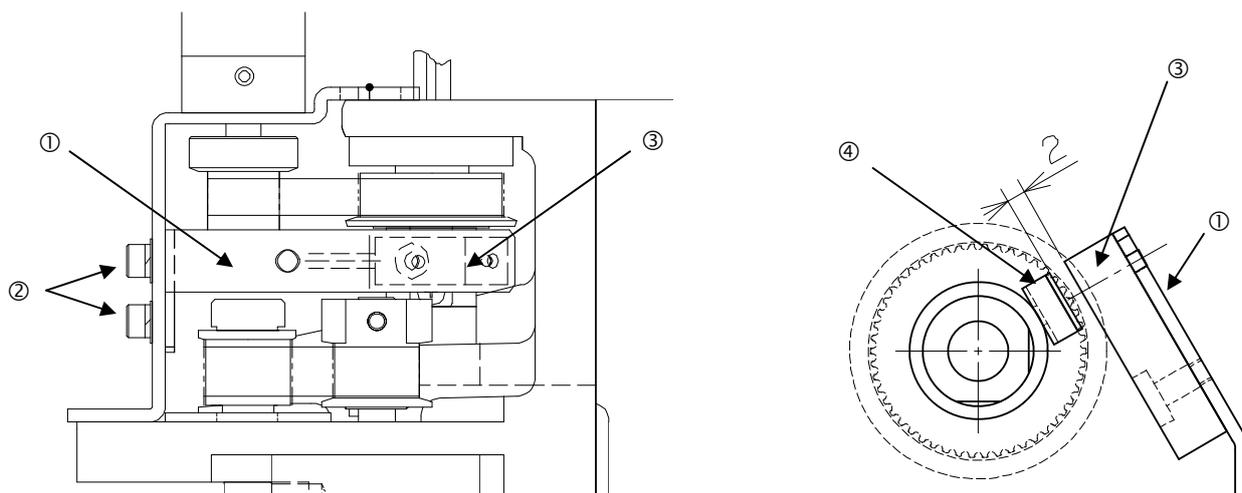


Figure 2-4-1

# Maintenance Guide

## 2-5. Replacing the Laser Sensor

### 2-5-1. Replacing the LNC

After the LNC has been replaced, it is absolutely necessary to re-input the MS parameters related to the laser. (See section 2-9.)

- (1) Disconnect the connectors (encoder and IEEE1394) and remove the mounting screws ① and ② (3 pcs.) to detach the LNC.
- (2) Reassemble the components in the reverse order of disassembly.
  - \* **Before mounting the components, remove Loctite sticking to the sensor bracket as much as possible.**
  - \* **When attaching the sensor, insert the sensor pin into the positioning hole of the bracket first. Then fix the sensor.**
  - \* **Apply Loctite 242 to the sensor mounting screws ① and ② and tighten them with a tightening torque of 2.6 Nm.**
  - \* **After the LNC has been replaced, clean the laser beam window of the LNC with a clean cloth rag.**

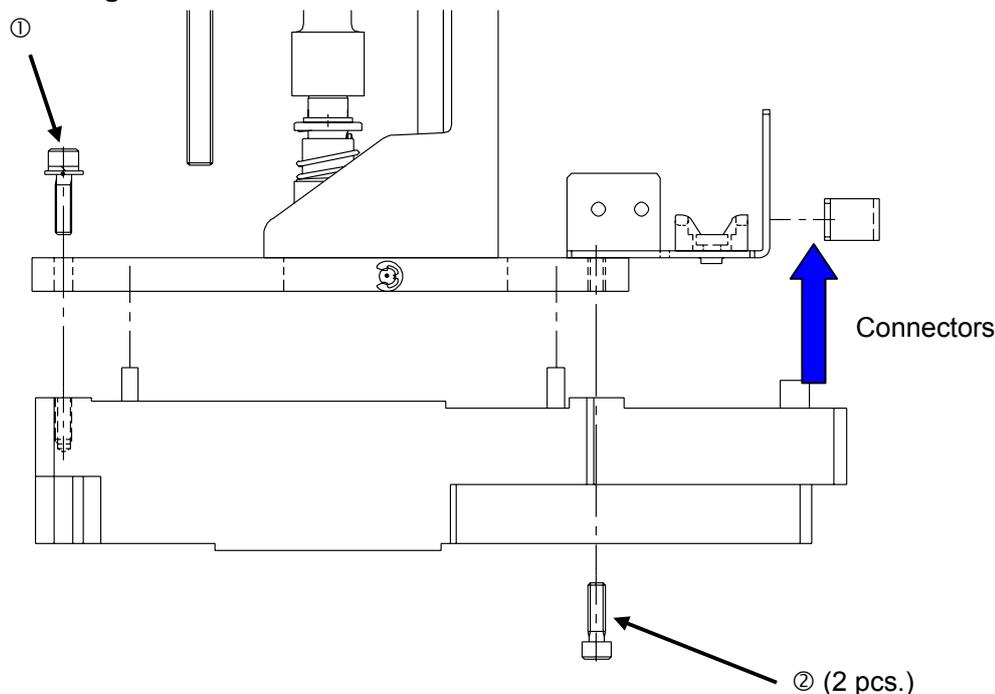
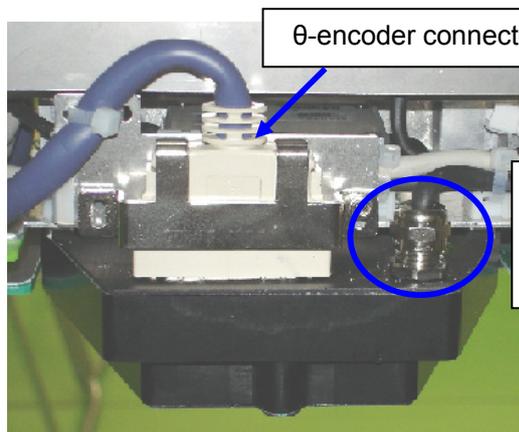


Figure 2-5-1



Pay special attention so that this connector is not disconnected.  
1394-relay connector is located on the rear of the bracket fixing the encoder connector.

# Maintenance Guide

## 2-5-2. Replacing the Point Sensor (KE-1080/2080)

After the point sensor has been replaced, it is absolutely necessary to re-input the MS parameters related to the laser. (See section 2-9.)

- (1) Disconnect the fiber from the point sensor amplifier.
  - (2) Remove the mounting screws ① (4 pcs.) from the diffuser base and detach the point sensor assembly.
  - (3) Reassemble the components in the reverse order of disassembly.
  - (4) After the point sensor has been mounted, follow the steps on the following page to adjust the offset and sensitivity of the point sensor.
- \* **Apply Loctite 242 to the mounting screws ① and tighten them with a tightening torque of 2.3 N·m.**
  - \* **After the point sensor has been replaced, make sure that no dirt and dust are sticking to the lens and slit of the point sensor.**
  - \* **Be sure not to put a load of 5N or larger to the fiber to prevent any damage.**
  - \* **Be sure to insert the fiber securely into the insertion opening of the sensor amplifier. If not, erroneous detection could occur due to insufficient light intensity.**

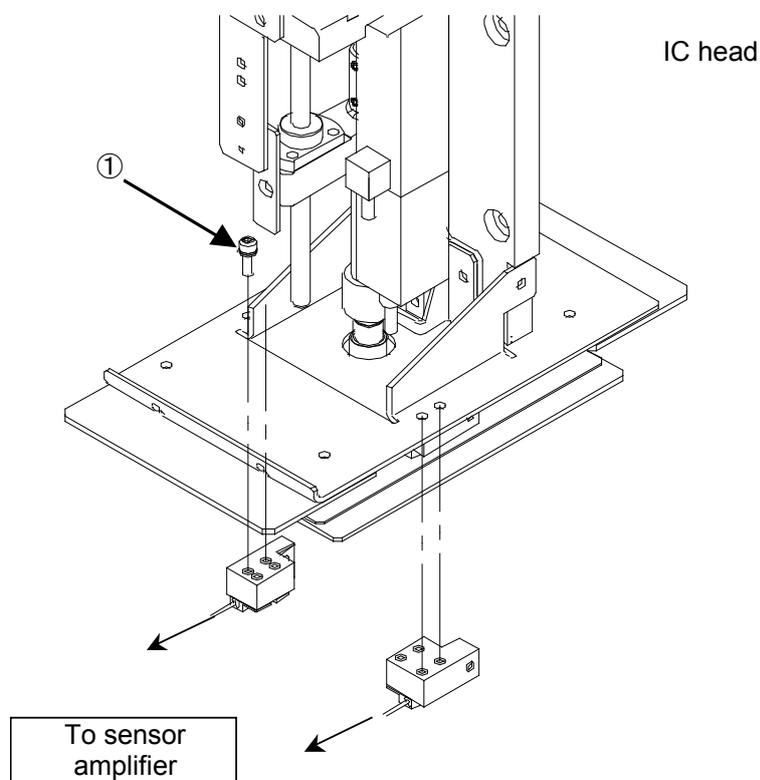


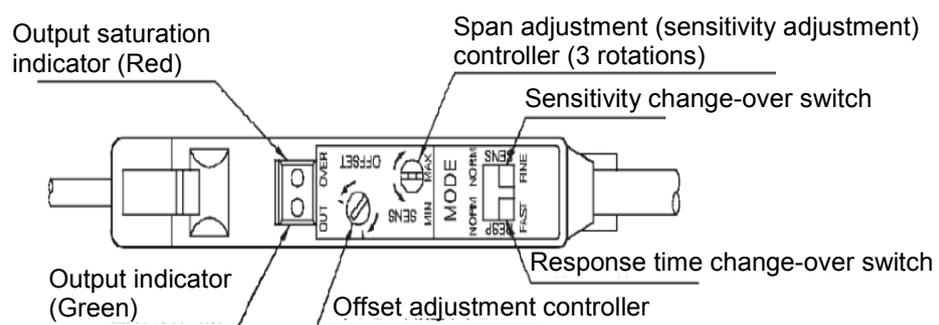
Figure 2-5-2

# Maintenance Guide

## <Adjusting the offset and sensitivity of the point sensor>

- (1) Before starting the adjustment, set the sensitivity change-over switch to “NORM” and the response time change-over switch to “FAST”.
- (2) Connect “+” and “-“ of the voltmeter to the check terminals TP23 and TP21 on the HEAD MAIN PCB ASM, respectively.
- (3) Set the span adjustment controller of the sensor amplifier to “MAX” and the offset adjustment controller to “MIN”.
- (4) Interrupt the light between the light emitting and receiving parts of the fiber unit completely. (At this time, do not use any light transmission material, such as paper sheets.)
- (5) While carefully observing the voltmeter, gradually turn the offset adjustment controller toward “MAX” to adjust the voltage value to “ $1V \pm 0.01V$ ”.
- (6) Then put the status between the light emitting and receiving parts to the light receiving one.
- (7) While carefully observing the voltmeter, gradually turn the span adjustment controller toward “MIN” to adjust the voltage value to “ $5V \pm 0.05V$ ”. The voltage output is about 7.3V when the span adjustment controller is set to Max with maximum light emitting.
- (8) When the status is put in the light interrupt status again, check that the voltmeter shows “ $1V \pm 0.01V$ ”. When the status is put in the light receiving status, check that the voltmeter shows “ $5V \pm 0.3V$ ”. If the voltmeter value is beyond the set range, make the fine adjustment of the offset adjustment controller and span adjustment controller so that the voltmeter value is within the set value range.

Be sure adjust the offset adjustment controller first and then the span adjustment controller.



**Note)** If the output voltage is less than 7V with the span adjustment controller set to Max, there could be misalignment of optical axis, dirty lens, or assembling failure or damage of the fiber unit. Check these possible causes in this case..

# Maintenance Guide

## 2-5-3. Replacing the FMLA (KE-2080R)

After the LA sensor has been replaced, it is absolutely necessary to re-input the MS parameters related to the laser. (See section 2-9.)

After the replacement work has been completed, clean the laser window of the LA sensor with a clean cloth rag.

- (1) Remove the magnescape guard ① of the X-axis.
  - (2) Remove the M4 × 8 SEMS cap bolts (3 pcs.) ② and M3 × 6 SEMS cap bolt (1 pc.) ③ mounting the diffuser base to disconnect the LA cable connectors ④ (3 pcs.) from the sensor.
  - (3) Detach the diffuser and remove the screws ⑤ (4 pcs.) mounting the sensor in the broken line portion of the Figure.
  - (4) Reassemble the components in the reverse order of disassembly.
- \* **Apply Loctite 242 to the sensor mounting screw ⑤ (4 pcs.) and tighten them with a tightening torque of 2.3 Nm.**
  - \* **When attaching the sensor, insert the pin into the positioning hole of the bracket first. Then fix the sensor.**
  - \* **For details about adjustment of clearance at the diffuser mounting position, see QA Table, Head 12.**

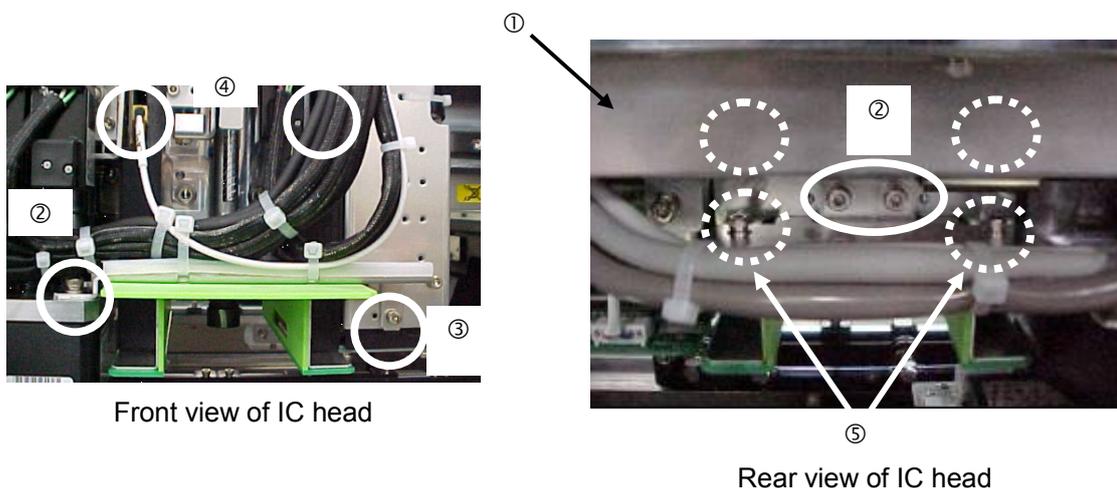
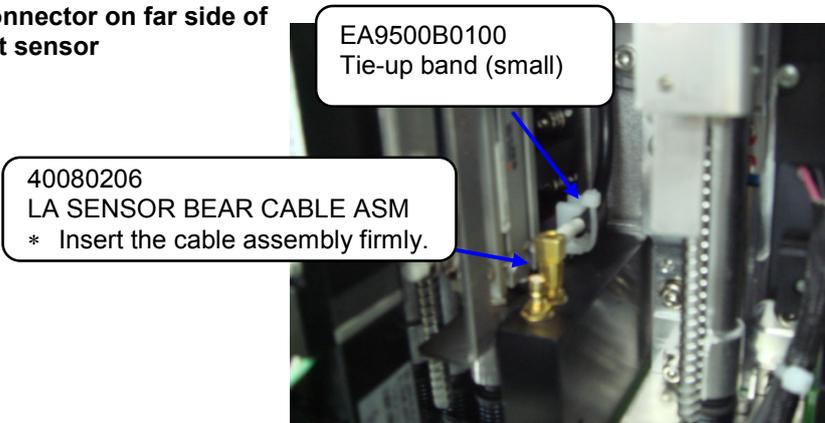


Figure 2-5-3

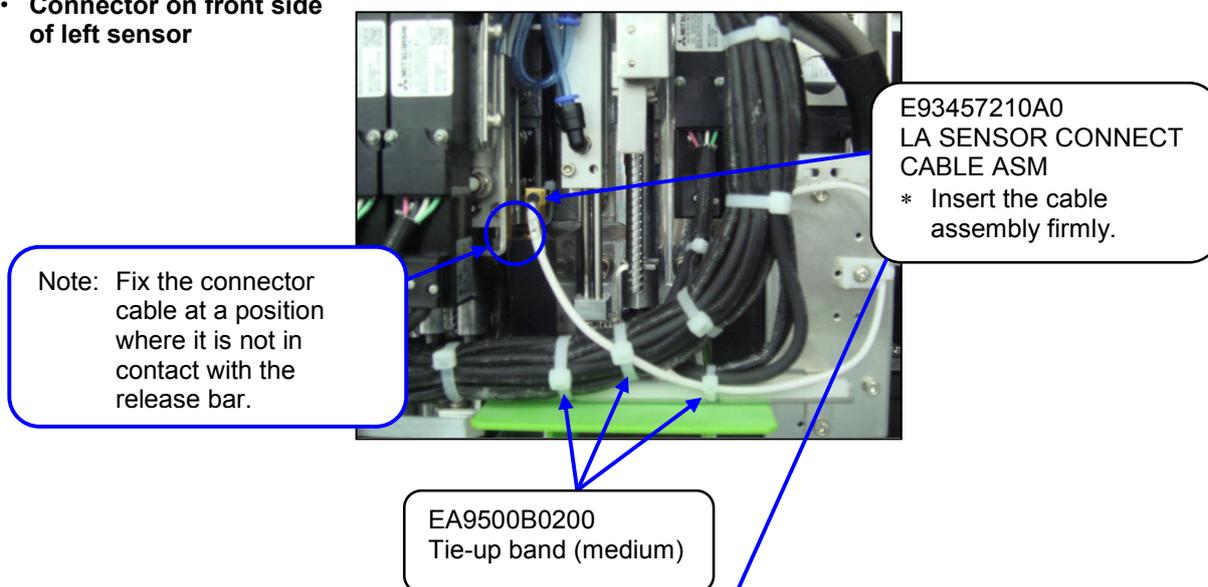
# Maintenance Guide

\* After cutting the tie-up band(s) to remove the FMLA, bundle cables as shown below.

- Connector on far side of left sensor



- Connector on front side of left sensor



- Connector on front side of right sensor

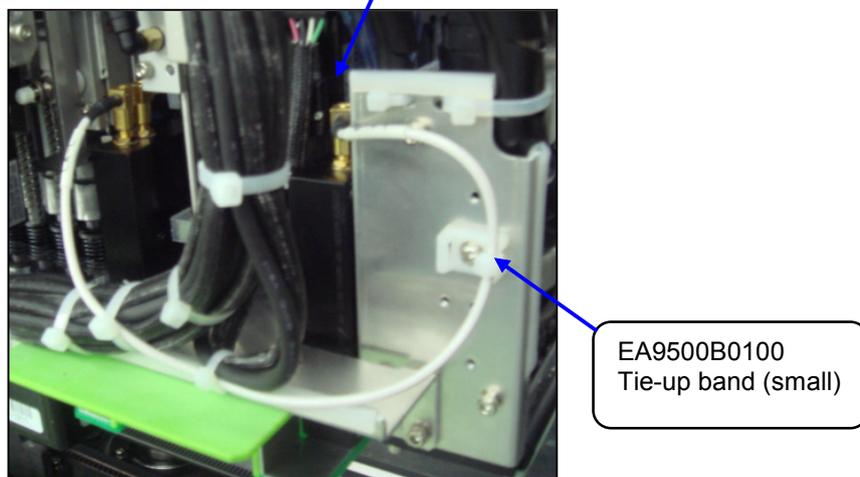
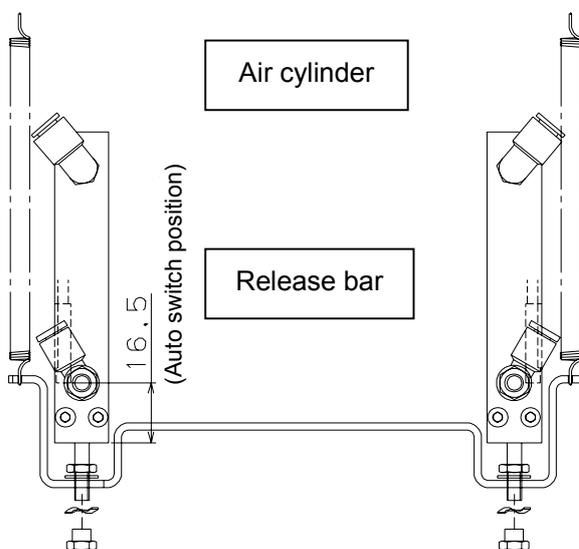


Figure 2-5-4

# Maintenance Guide

## 2-6. Replacing the Head Up Cylinder

- (1) Turn OFF the compressed air to the main unit and disconnect the air tubes.
- (2) Remove the head up springs from both ends, and then remove the nut from the top end of the air cylinder to detach the release bar. (Pay special attention so that the wave washer is not lost.)
- (3) Loosen the set screws of the auto switch.
- (4) Remove the M3 × 30 cap bolts securing the air cylinder and detach the air cylinder.
- (5) When mounting the air cylinder, adjust the end face so that it is in parallel to the cylinder mount and secure them.
- (6) Mount the auto switch. At this time, mount the auto switch at a position 16.5mm from the lower end of the cylinder.
- (7) If the speed controller has also been replaced, it is necessary to carry out the adjustment before mounting the release bar.



### <Procedure>

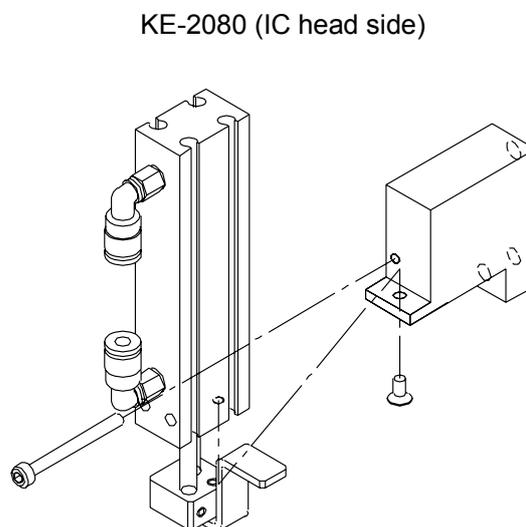
- ① Carry out the origin return once to call up the MS parameter, and press the right mouse button. In this status, press the emergency stop button.
- ② Select the head up cylinder and turn ON or OFF the cylinder to adjust the displayed time (msec.) to the specification value. Adjust the time by turning the knob of the speed controller.

**Specification value    Air cylinder down time...120±5 msec.**

**(The difference between the left and right is 5 msec. or less.)**

- ③ After the adjustment has been completed, secure the knob firmly.
- (8) Insert the release bar into the rod of the cylinder, put the wave washer, and turn the release bar until the cylinder nut is stopped.
- (9) For the air cylinder on the IC head side, remove two screws shown in the Figure on the right, and then replace the cylinder.  
(At this time, it is not necessary to adjust the speed controller and MS parameter.)

- \* **Manually operate the solenoid valve to check that the release bar moves up or down smoothly.**



# Maintenance Guide

## 2-7. Replacing the Belts

### 2-7-1. LNC Head

<Replacing the timing belt Z>

After the timing belt Z has been replaced, it is absolutely necessary to re-input the MS parameters related to the Z-axis home position adjustment, Z-axis height, and laser. (For details of input items, see section 2-9.)

- (1) Loosen the screws ① (3 pcs.) shown in the figure on the right.
- (2) Replace the timing belt Z.
- (3) Reassemble the components in the reverse order of disassembly.

- \* **Apply Loctite 242 to the Z-motor mounting screws (3 pcs.) and tighten them with a tightening torque of 2.3 Nm.**
- \* **Adjust the belt tension following section 2-2-1.**

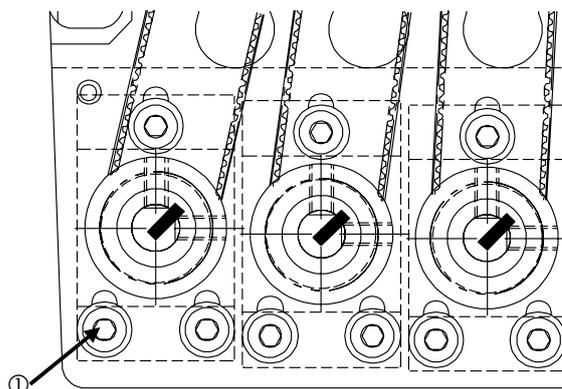


Figure 2-7-1

<Replacing the timing belt  $\theta$ >

After the timing belt  $\theta$  has been replaced, it is absolutely necessary to re-input the MS parameters related to the Z-axis home. (For details of input items, see section 2-9.)

- (1) Detach the bearing base L ①.
- (2) Detach the spline shaft from the coupling ②.
- (3) Pull out the spline housing downward and the spline shaft upward.
- (4) Replace the timing belt  $\theta$ .
- (5) Reassemble the components in the reverse order of disassembly.

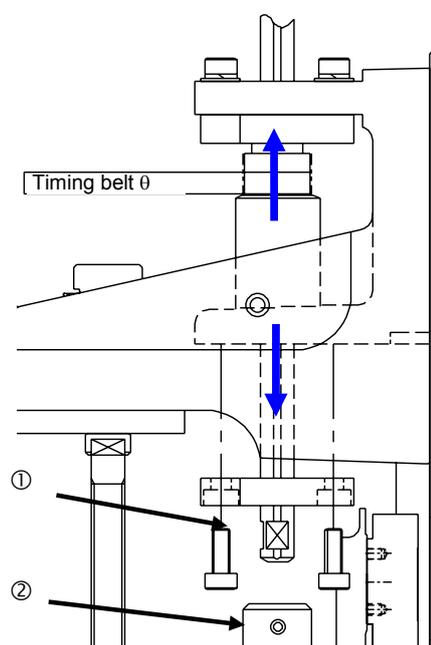


Figure 2-7-2

- \* **When the bearing base L is secured, make sure that the shaft is rotated smoothly.**
- \* **Adjust the belt tension following section 2-2-2.**

# Maintenance Guide

## 2-7-2. IC Head

<Replacing the timing belt Z IC>

After the timing belt Z IC has been replaced, it is absolutely necessary to re-input the MS parameters related to the Z-axis home position adjustment, Z-axis height, and laser. (For details of input items, see section 2-9.)

- (1) Loosen the screws ① and ② (3 pcs.) shown in the figure on the right.
- (2) Replace the timing belt Z IC.
- (3) Reassemble the components in the reverse order of disassembly.

- \* **Apply Loctite 242 to the Z-motor mounting screws (3 pcs.) and tighten them with a tightening torque of 2.3 Nm.**
- \* **Adjust the belt tension following section 2-2-1.**

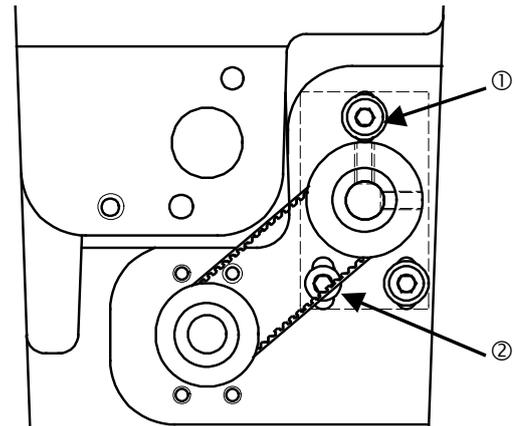


Figure 2-7-3

<Replacing the timing belt  $\theta$ : KE-1080/2080>

After the timing belt  $\theta$  has been replaced, it is absolutely necessary to re-input the MS parameters related to the Z-axis home. (For details of input items, see section 2-9.)

- (1) Detach the bearing base L ①.
- (2) Detach the spline shaft from the coupling ②.
- (3) Pull out the spline housing downward and the spline shaft upward.
- (4) Replace the timing belt  $\theta$ .
- (5) Reassemble the components in the reverse order of disassembly.

- \* **When the bearing base L is secured, make sure that the shaft is rotated smoothly.**
- \* **When inserting the spline shaft into the coupling, secure the spline shaft with it kept pushed-in.**
- \* **Adjust the belt tension following section 2-2-4.**

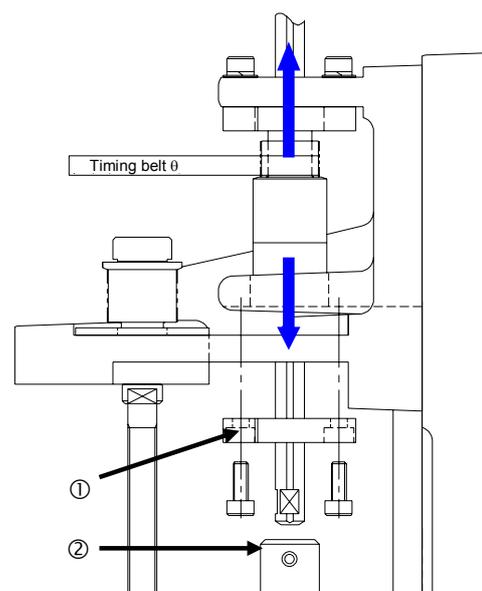


Figure 2-7-4

# Maintenance Guide

## <Replacing the timing belt $\theta$ : KE-2080R>

After the timing belt  $\theta$  has been replaced, it is absolutely necessary to re-input the MS parameters related to the Z-axis home. (For details of input items, see section 2-9.)

- (1) Detach the T-sensor dog ①.
- (2) Loosen the stop screws (2 pcs.) of the spline pulley ②.
- (3) Detach the bearing base L ③.
- (4) Detach the spline shaft from the coupling.
- (5) Pull out the spline housing assembly ④ downward while detaching the spline pulley. Additionally, pull out the spline shaft upward.
- (6) Replace the timing belt  $\theta$ .
- (7) Reassemble the components in the reverse order of disassembly.

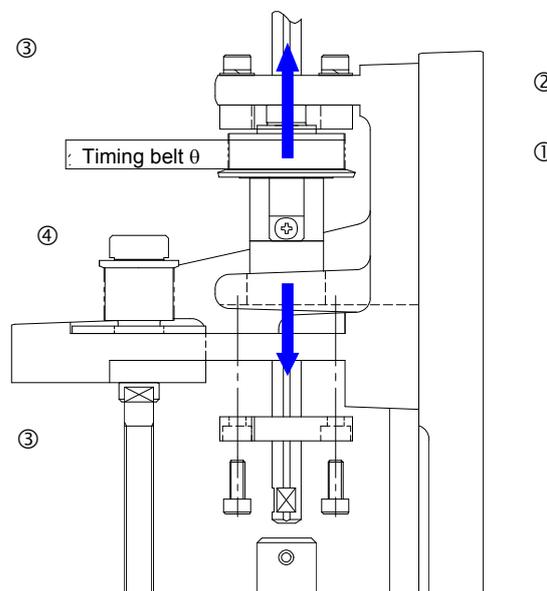


Figure 2-7-5

- \* **When the bearing base L is secured, make sure that the shaft is rotated smoothly.**
- \* **Make sure that the spline pulley and T-sensor dog do not have any play.**
- \* **When inserting the spline shaft into the coupling, secure the spline shaft with it kept pushed-in.**
- \* **Adjust the belt tension following section 2-2-5.**

# Maintenance Guide

## 2-8. Replacing the Z-Slide Shaft

When the Z-slide shaft has been replaced, it is necessary to input the MS parameters related to the  $\theta$ -axis and Z-axis home position adjustment, Z-axis height, and laser again.  
 (For details about input items, see section 2-9.)

- (1) Remove the set screws from the lower portion of the coupling.
  - (2) Detach the Z-slide shaft from the Z-slide bracket.
  - (3) Reassemble the components in the reverse order of disassembly.
- \* **Secure the coupling with it kept pushed-in and make sure that any vertical play does not exist on the slide shaft.**
  - \* **When tightening the set screws of the coupling, align the flat part of the slide shaft with the orientation of the coupling set screw. Tighten the set screw with a tightening torque of 0.5 N·m.**
  - \* **Replace also the IC head in the same manner as described above.**

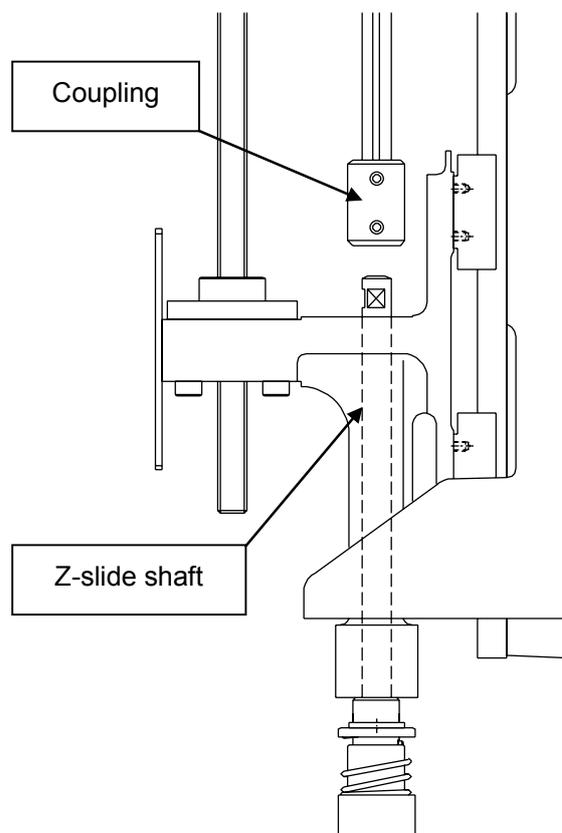


Figure 2-8-1

# Maintenance Guide

## 2-9. List of Readjustment Items after Replacement

	Laser offset	Laser scaling	Head offset	Mounting general offset	VCS camera offset	VCS general offset
Head unit assembly	○	○ (Note 2)	○	○	○ (Note 1)	○ (Note 1)
Z-motor	○	-	-	-	-	-
θ-motor	○	○ (Note 2)	-	-	○ (Note 1)	○ (Note 1)
Z-sensor	○	-	-	-	-	-
T-sensor	○	-	-	-	-	-
LNC	○	-	○	○	-	-
FMLA	○	○ (Note 2)	○	○	-	-
Point sensor	○	-	-	-	-	-
Head-up cylinder	-	-	-	-	-	-
Timing belt Z	○	-	-	-	-	-
Timing belt θ	○	-	-	-	-	-
Z-slide shaft	○	-	○	○	-	-
LNC61/62 (Note 3)	○	-	○	○	-	-
EPV61/62 (Note 3)	○	-	○	○	-	-

(Note 1) Only the KE-1080/KE-2080/KE-2080R and machines with optional MNVC mounted need this adjustment.

(Note 2) IC head (FMLA) of KE-2080R only

(Note 3) This is for placement monitor (optional).

The MS parameters must be input from the left in order.

When inputting a laser offset after the head unit assembly, Z-motor, and/or timing belt Z have been replaced, obtain the laser offset again after the height of the top surface of the laser offset board has been set to "0". According to the offset value before replacement, the offset cannot be obtained correctly or it cannot be obtained automatically.

 <b>CAUTION</b>	To prevent personal injury, do not put your hand inside the machine or your face or head close to the machine during operation of the HOD.
--	--

# Maintenance Guide

 <b>DANGER</b>	To prevent any trouble caused by accidental machine start, always shut-down the power before starting the maintenance and adjustment work.
---	--

## [3] PARTS AROUND THE HEAD

### 3-1. Replacing the Ejector Unit

Before replacing the ejector unit, always shut-down the main compressed air.

Since both the solenoid valve and pressure sensor are a type of connector connection, carefully connect them to avoid improper connections. After the ejector unit has been replaced, turn on and off the manual control head vacuum blow to check that the ejector unit functions correctly.

*(Note) Carefully disassemble the unit so that oil seals on the rear of the solenoid valve and O-ring of the pressure sensor are not lost.*

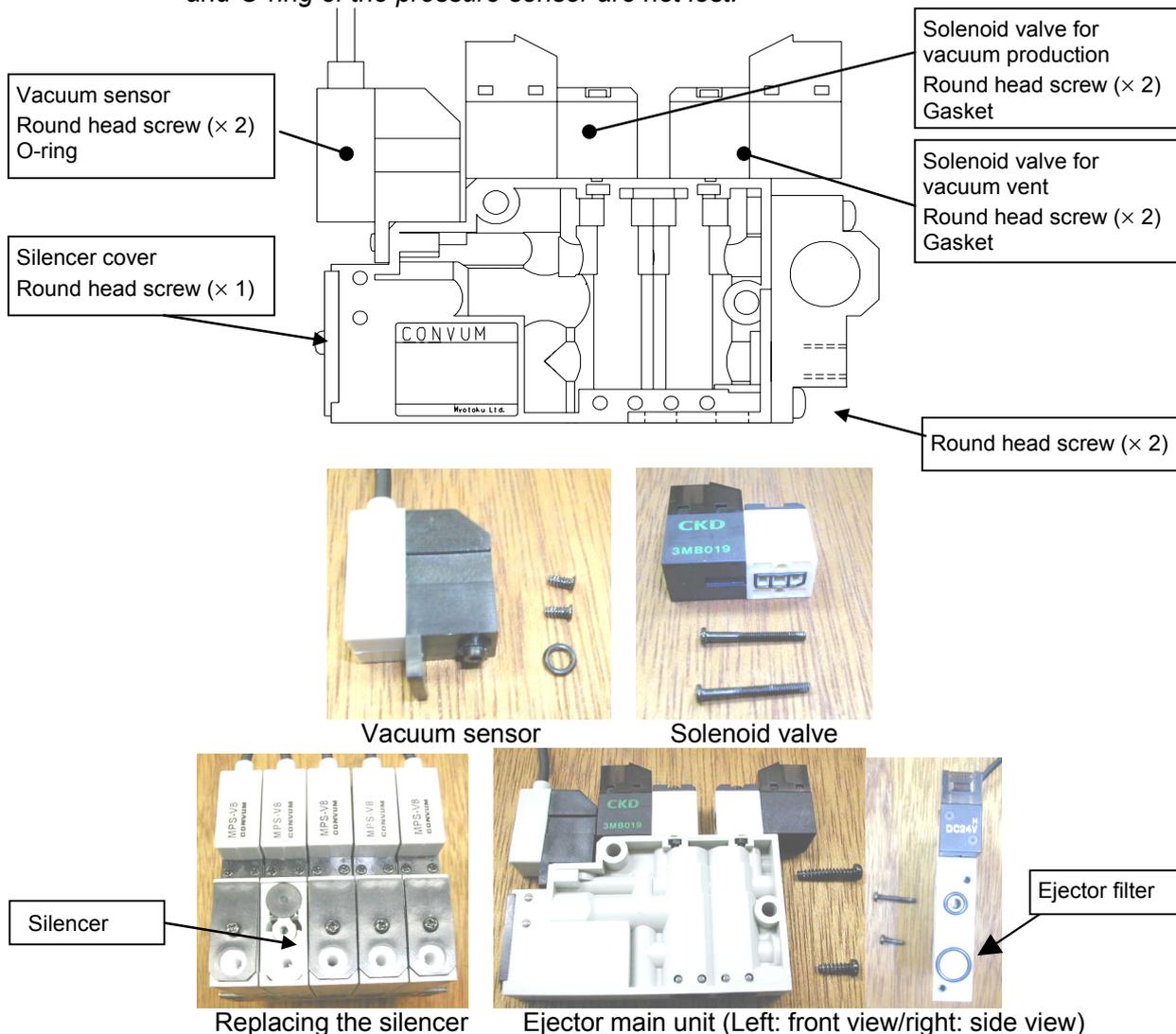


Figure 3-1-1 Replacing the Ejector

# Maintenance Guide

## 3-2. Replacing the Bad Mark Sensor

### 3-2-1. Sensor Assembly

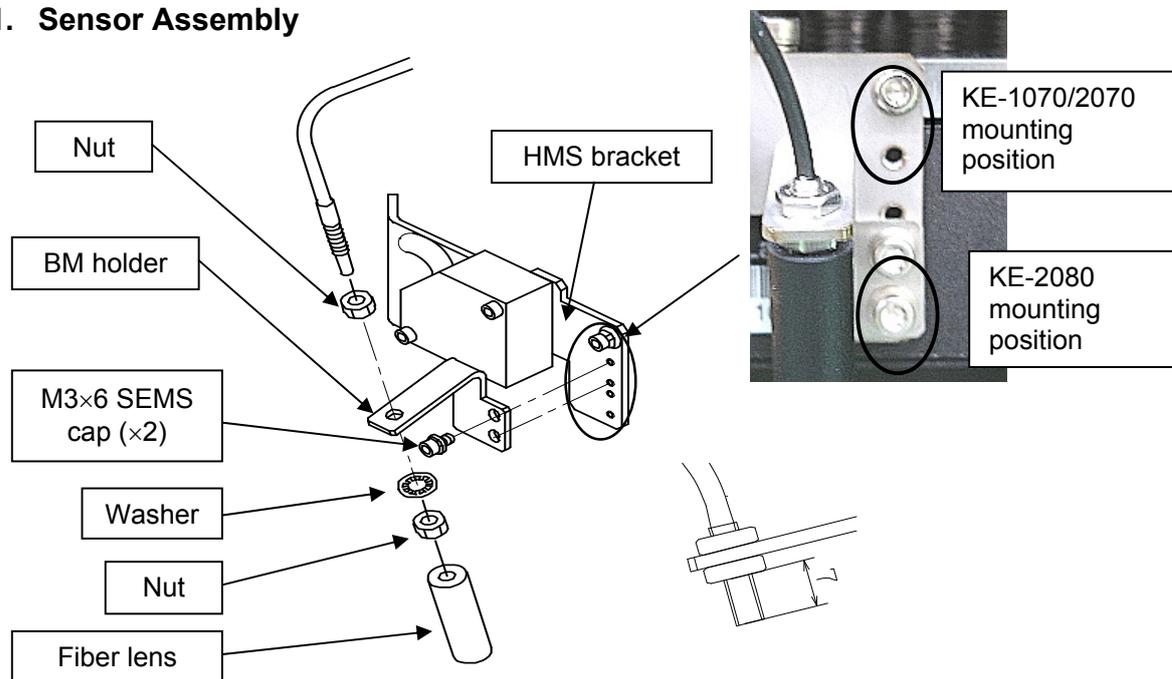


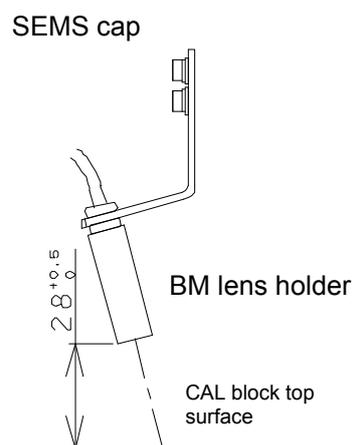
Figure 3-2-1 Replacing the Bad Mark Sensor

Secure the fiber with the nut and washer supplied with the fiber. After the fiber is secured as illustrated in the figure above, mount the zoom lens.

### 3-2-2. Adjusting the Sensor Height

Move the bad mark sensor to a point above the calibration block. Loosen the SEMS cap bolts at two places and move the BM lens holder so that the distance between the surface of the bad mark sensor and the top surface of the calibration block becomes  $28^{+0.5}_0$  mm. When the specified distance is reached, secure the bad mark sensor with SEMS cap bolts.

After the bad mark sensor has been mounted, input a bad mark sensor offset of the MS parameters. (For details about how to input MS parameters, see "MS Parameters".)



#### CAUTION

To prevent personal injury, do not put your hand inside the machine or your face or head close to the machine during operation of the HOD.

# Maintenance Guide

## 3-2-3. Amplifier

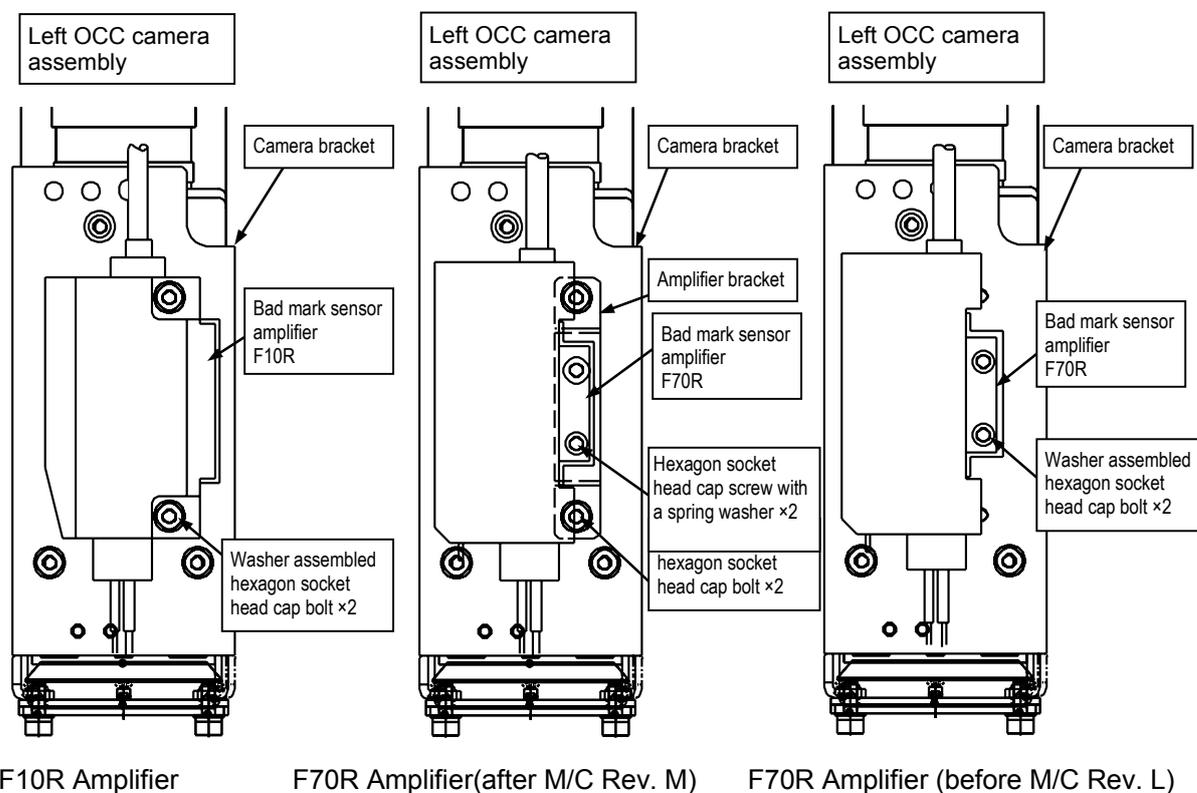


Figure 3-2-2 Mounting the Amplifier

## 3-2-4. Assembling the Fiber Unit to the Amplifier (F10R Amplifier)

Make the projection on the fiber unit facing toward a position where the LED does not exist on the amplifier and insert it completely until it is in contact with the far side.

After the fiber has been inserted until it is in contact with the far side, turn the connector clockwise to check that the fiber unit cannot be removed.

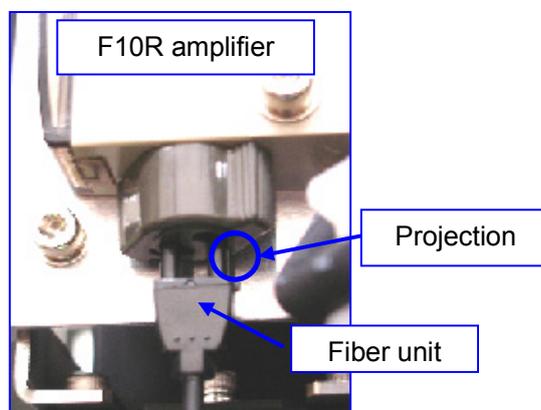


Figure 3-2-3 Assembling the Fiber Unit

# Maintenance Guide

## 3-2-5. Setting the Switches on the Bad Mark Sensor Assembly (F10R Amplifier)

Use the bad mark sensor assembly with the settings made before shipment from the factory (default settings).

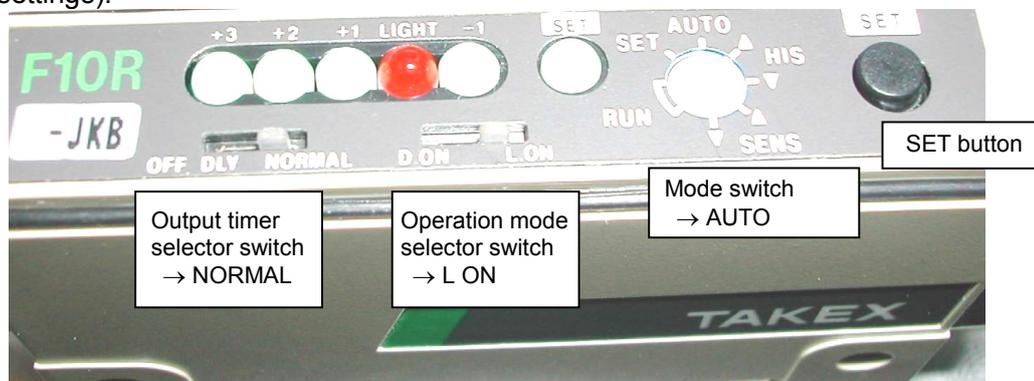
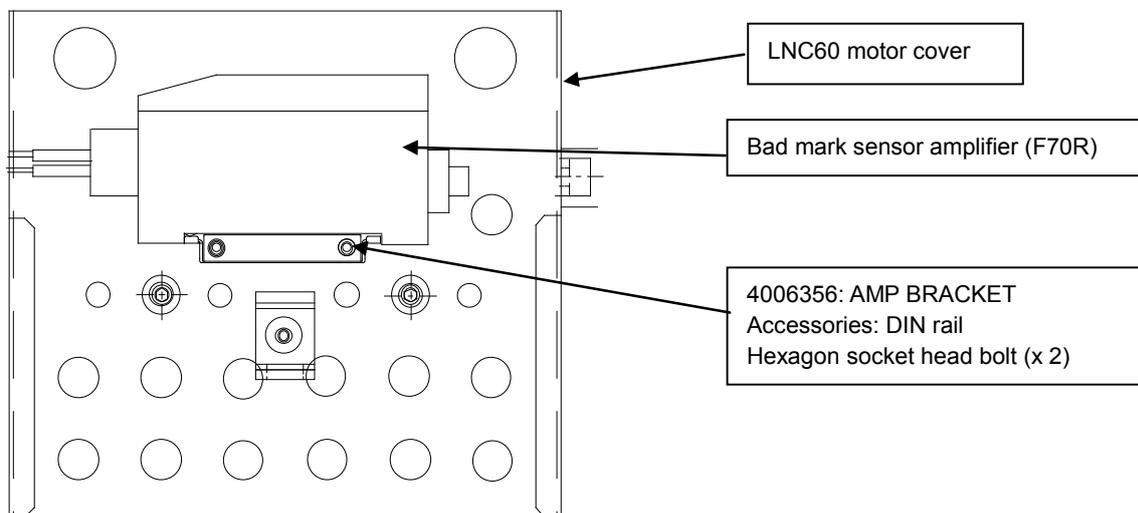


Figure 3-2-4 Switch Settings

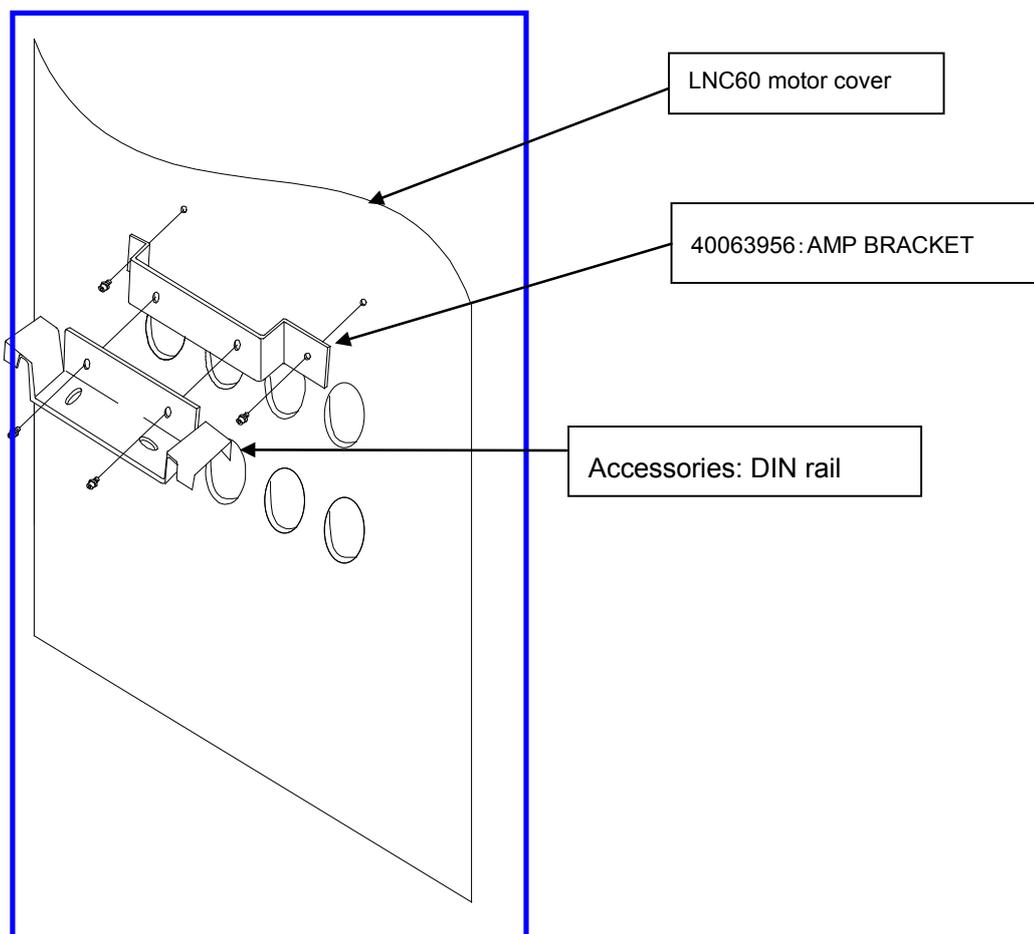
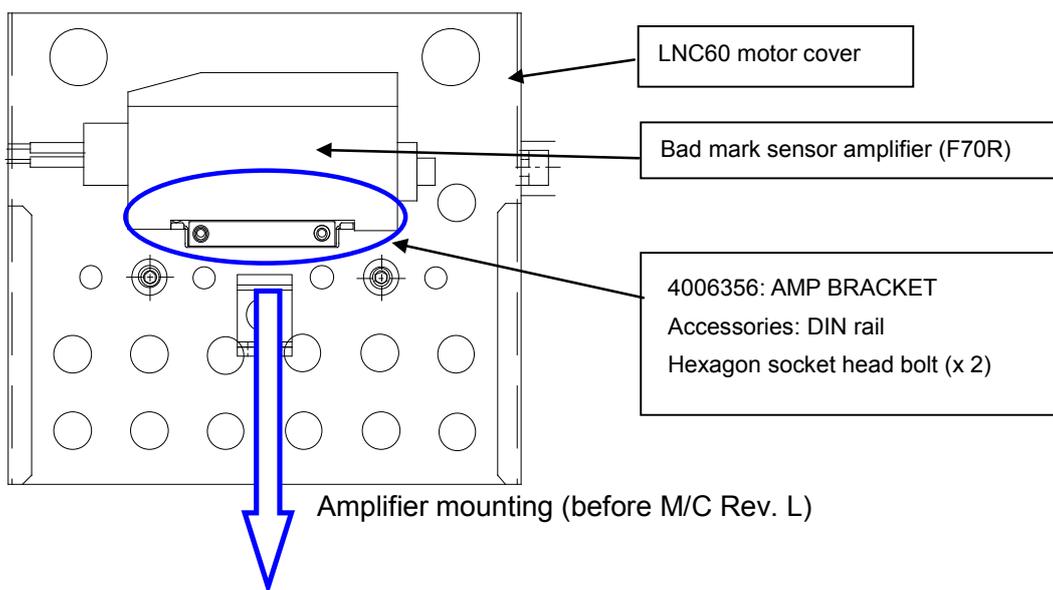
## 3-2-6. Assembling and Setting the F70R Fiber Sensor Amplifier

The assembling method varies depending on the M/C Rev. Perform replacement operations after checking the M/C Rev. (For assembly of earlier models than M/C Rev. L, 40063956: AMP BRACKET is used.)



Amplifier mounting (after M/C Rev. M)

# Maintenance Guide



# Maintenance Guide

## - Mounting onto the amplifier of the fiber unit

Set down the lock lever of the main unit, and insert the projecting side of the fiber unit up to the innermost while turning this side toward the bottom of the amplifier. After inserting the projecting side up to the innermost, set the lock lever at the original status and make sure that the fiber unit cannot come out.

Close the cover so that the fiber unit can be surely locked.

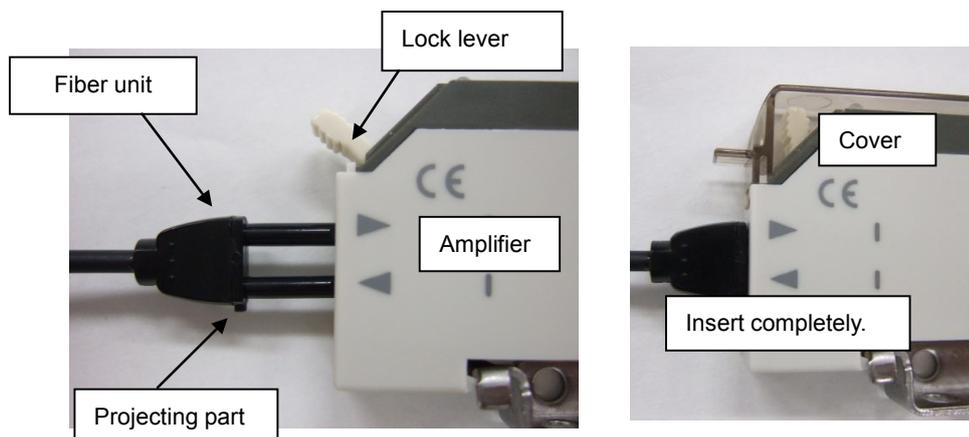


Figure 3-2-5 Mounting the F70R fiber unit

## - Amplifier setting

Use as it is the amplifier in the factory-settings.

Turn on the power supply to make sure that the status shown in the following figure is provided.

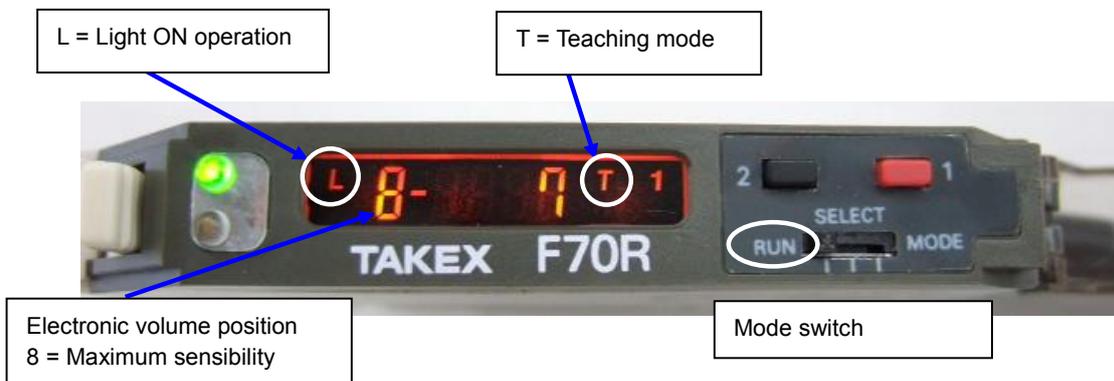


Figure 3-2-6 Bad mark sensor indication

### <LED status>

The orange and green LEDs come on simultaneously. → Stable operation status at ON

Only the orange LED comes on. → Unstable operation status at ON

The orange and green LEDs go out simultaneously. → Unstable operation status at OFF

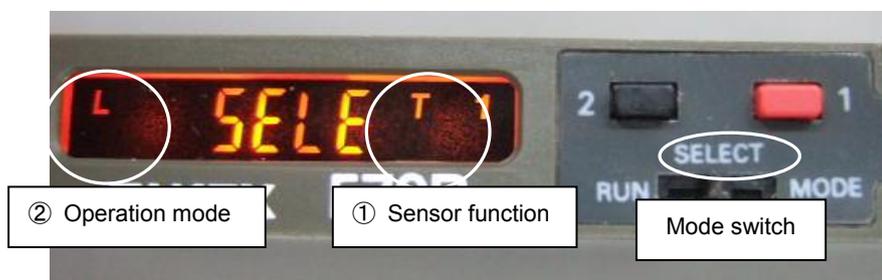
Only the green LED comes on. → Stable operation status at OFF

# Maintenance Guide

## 3-2-7. Manual Setting Method for the F70R Fiber Sensor Amplifier

The amplifier setting method is different from the factory-set status. Set this amplifier manually.

### - Setting the operation mode



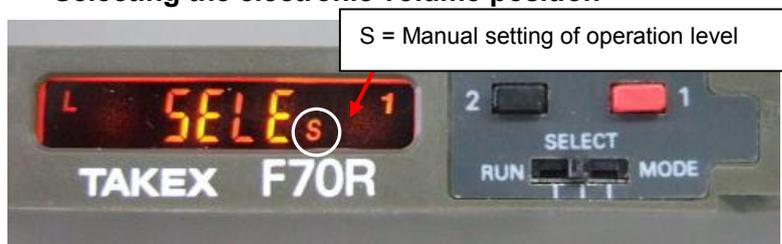
### - Selecting the sensor function (teaching mode setting method)

- ① Switch the sensor mode switch from [RUN] to [SELECT]. [SELE] appears on the display.
- ② Each time the button [1] (red) is pressed, the sensor function display changes sequentially in the order of A, AV, T, TV, L, LV, S, H, and V. Select [T] and reset the mode switch to [RUN].

### - Selecting the operation mode (light ON operation setting method)

- ① Switch the sensor mode switch from [RUN] to [SELECT]. [SELE] appears on the display.
- ② Each time the button [2] (black) is pressed, the operation mode display changes sequentially in the order of L, LO, LF, LOF, D, DO, DF, and DOF. Select [L] and reset the mode switch to [RUN].

### - Selecting the electronic volume position



- ① Switch the sensor mode switch from [RUN] to [SELECT]. [SELE] appears on the display.
- ② Each time the button [1] (red) is pressed, the sensor function display changes sequentially in the order of A, AV, T, TV, L, LV, S, H, and V. Select [S].



- ③ Switch the sensor mode switch from [SELECT] to [MODE]. The numeric value of the electronic volume blinks.
- ④ When the button [1] is pressed, the blinking numeric value is counted up. Select [8]. Reset the mode switch from [MODE] to [SELECT].
- ⑤ Each time the button [1] (red) is pressed, the sensor function display changes sequentially in the order of A, AV, T, TV, L, LV, S, H, and V. Select [T] and reset the mode switch to [RUN].

# Maintenance Guide

## 3-3. Replacing the HMS

### 3-3-1. Replacing the HMS Head

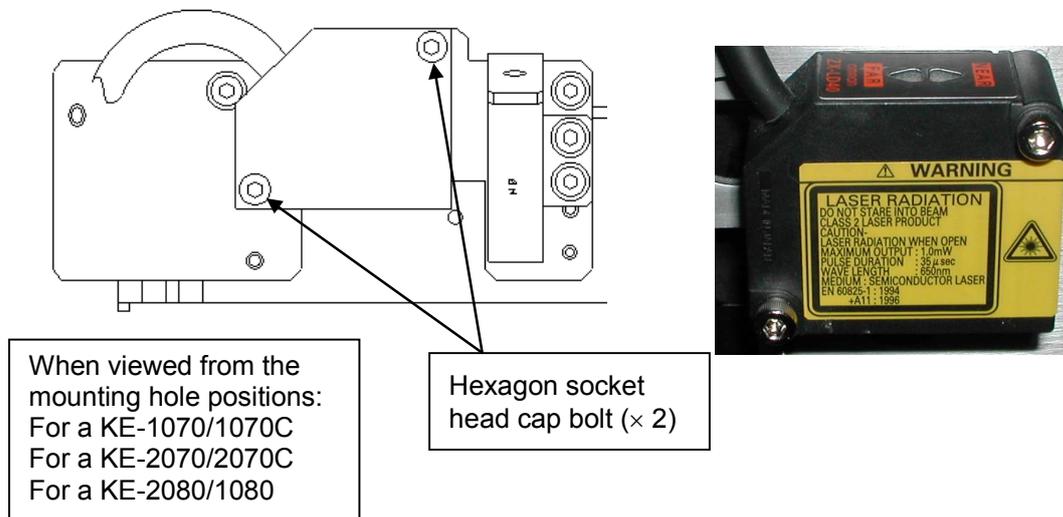


Figure 3-3-1 Replacing the HMS Head

### 3-3-2. Replacing the Amplifier

After the amplifier has been mounted, try to move it to check that it does not come off.

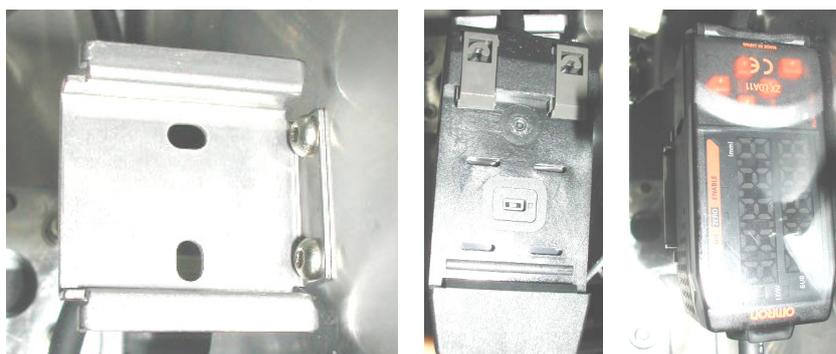


Figure 3-3-2 Replacing the Amplifier  
 (Left: amplifier base/center: rear view/right: amplifier mounted)

# Maintenance Guide

## 3-3-3. Sticking the Label

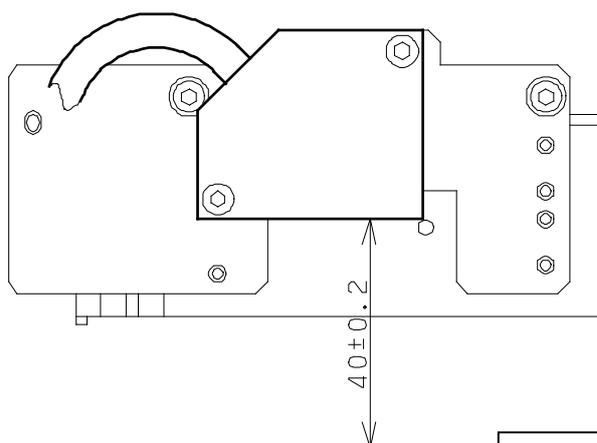
After the label sticking surface has been degreased, stick the label.



Figure 3-3-3 Replacing the Amplifier  
(Left: label/right: label stuck)

## 3-3-4. Adjusting the HMS Height

Move the HMS sensor to a point above the calibration block. Loosen the SEMS cap bolts at two places so that the distance between the bottom surface of the height sensor and the top surface of the calibration block becomes  $40 \pm 0.2$  mm. At this time, check that both the FAR and NEAR indicators are lit. When the specified distance is reached, secure the bad mark sensor with SEMS cap bolts.



Top surface of the calibration block



Range indicator: lighting status	
NEAR/FAR	Both are lit: Measurement center distance $\pm 1$ mm
NEAR	Light on: Near side within measurement range
FAR	Light on: Far side within measurement range
NEAR/FAR	Both are flashing: Beyond measurement range

After the sensor height has been adjusted, input the MS parameters related to the bad mark sensor offset. For details about how to input MS parameters, see “MS Parameters”.

 <b>CAUTION</b>	<p>To prevent personal injury, do not put your hand inside the machine or your face or head close to the machine during operation of the HOD.</p>
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# Maintenance Guide

## 3-4. Replacing the Head Board

### 3-4-1. Replacing the Head Main Board

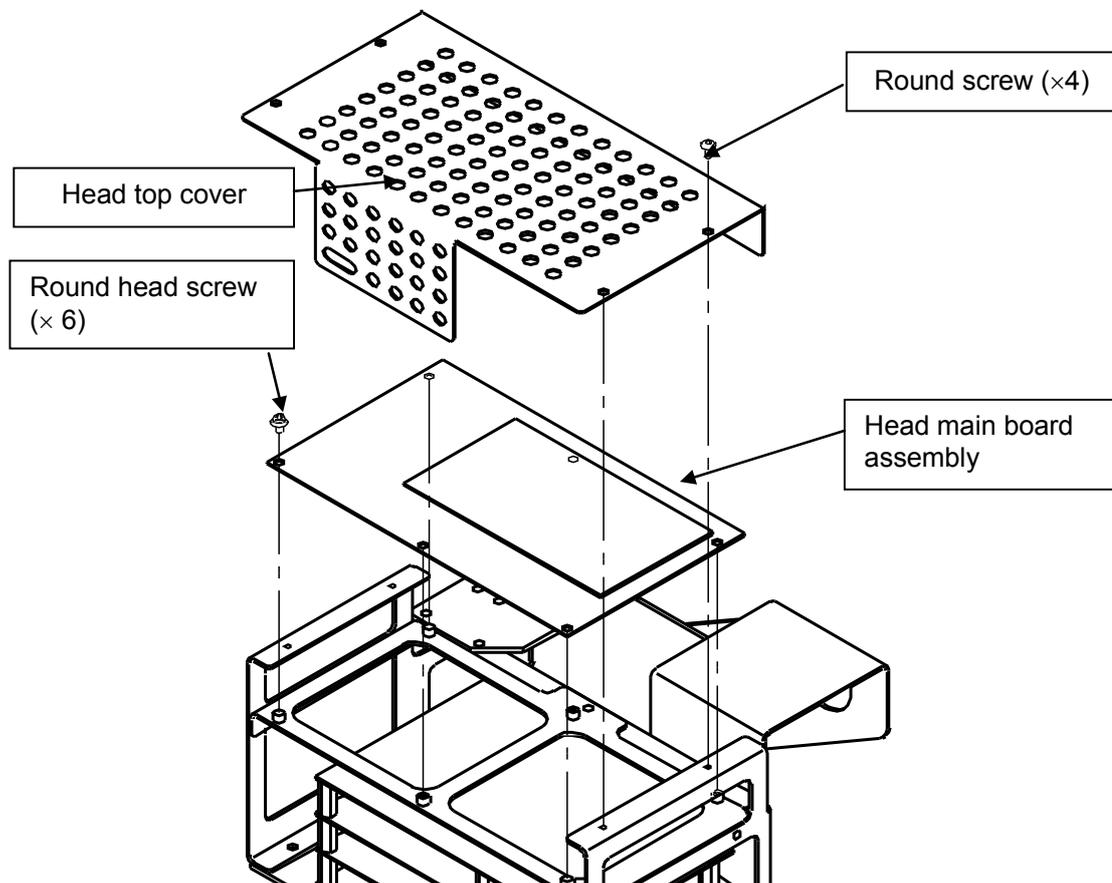


Figure 3-4-1 Replacing the Head Main Board

Since the head main board is delivered after it has been adjusted correctly, no adjustment work is required.

Follow the steps stated in “Adjusting the Boards of the Head Unit”, in section 14-8, “Head Unit”, only if any fault is found.

# Maintenance Guide

To replace the head main board and the servo amplifier board with other ones respectively, cut the tie-up band shown in Figure 3-4-2, and then remove them only after confirming that any load will not be applied to each wire.

In addition, be careful so that any bending load exceeding 60 degrees cannot be applied to the root of the connector. Repetition of bending load may disconnect a wire.



Figure 3-4-2 Head Section Board Layout

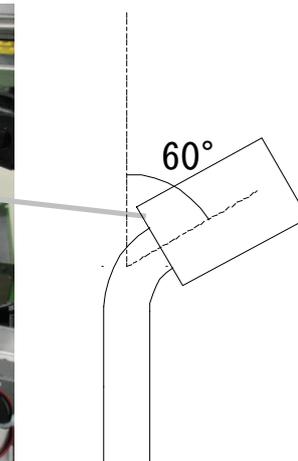


Figure 3-4-3 Enlarged View

# Maintenance Guide



**DANGER**

To prevent any trouble caused by accidental machine start, always shut-down the power before starting the maintenance and adjustment work.

## [4] OCC ASSEMBLY

### 4-1. Replacing the OCC Assembly

- (1) Remove the SEMS cap bolts ①, the head screws ④ and detach the camera.
- (2) The camera assembly has been secured with the SEMS cap bolts ② while the light assembly has been secured with the SEMS cap bolts ③.  
Disconnect the connectors and remove relevant mounting screws, and then replace the camera assembly.
- (3) Reassemble the components in the reverse order of disassembly.
- (4) After the camera assembly has been replaced, adjust the focus and input the MS parameters.  
After the light assembly has been replaced, adjust the OCC light. (See also section 4-8, List of Readjustment Items After Replacement.)

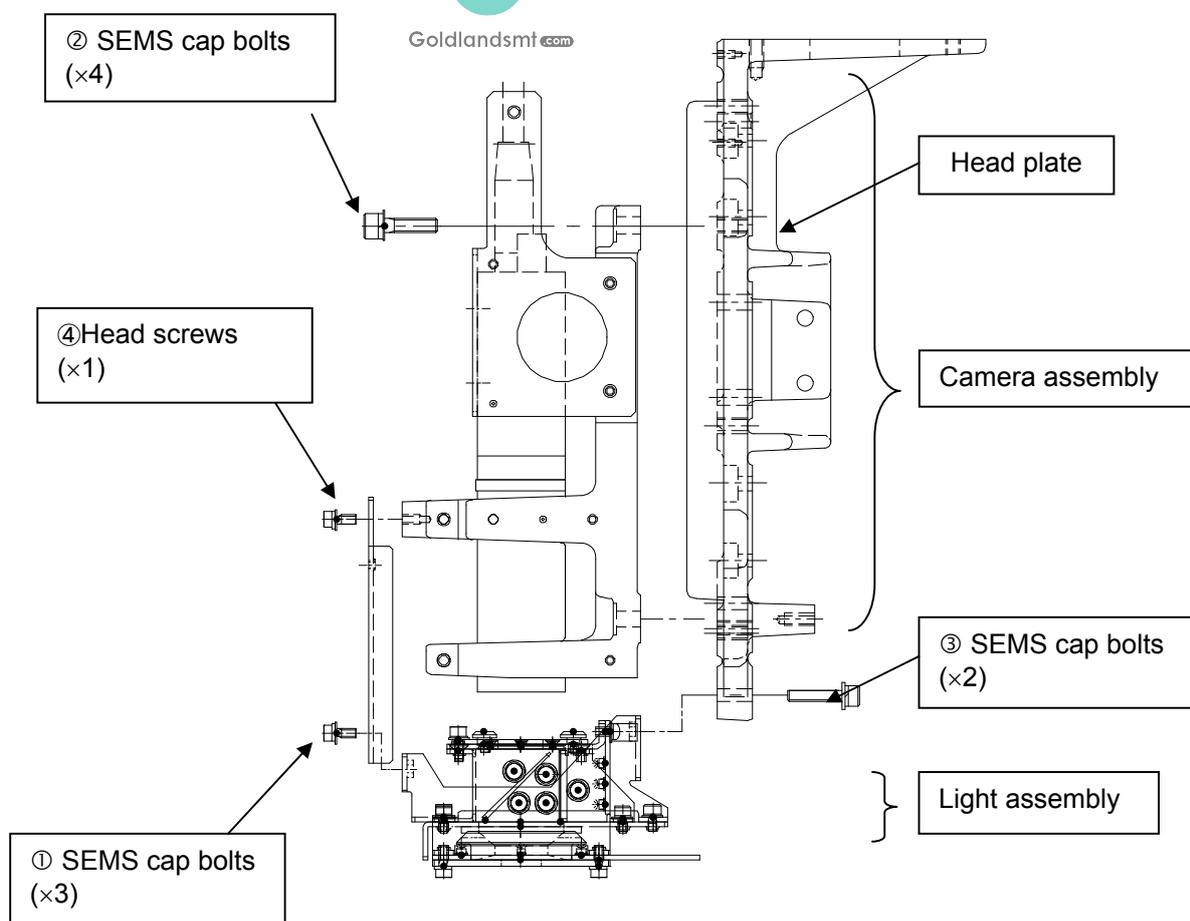


Figure 4-1-1 OCC Assembly

# Maintenance Guide

## 4-2. Replacing the CCD Camera and Lens

- (1) Detach the camera assembly from the head plate using the procedure described in **section 4-1, Replacing the OCC Assembly**.
- (2) Remove the fixing screws securing the CCD camera and lens, and replace the CCD camera and lens.
- (3) Reassemble the components in the reverse order of disassembly.  
(Apply Loctite 242 to each screw and tighten it with a tightening torque.)
- (4) After the CCD camera and lens have been replaced, adjust the focus and input the MS parameters. (See 4-8, List of Readjustment Items After Replacement.)

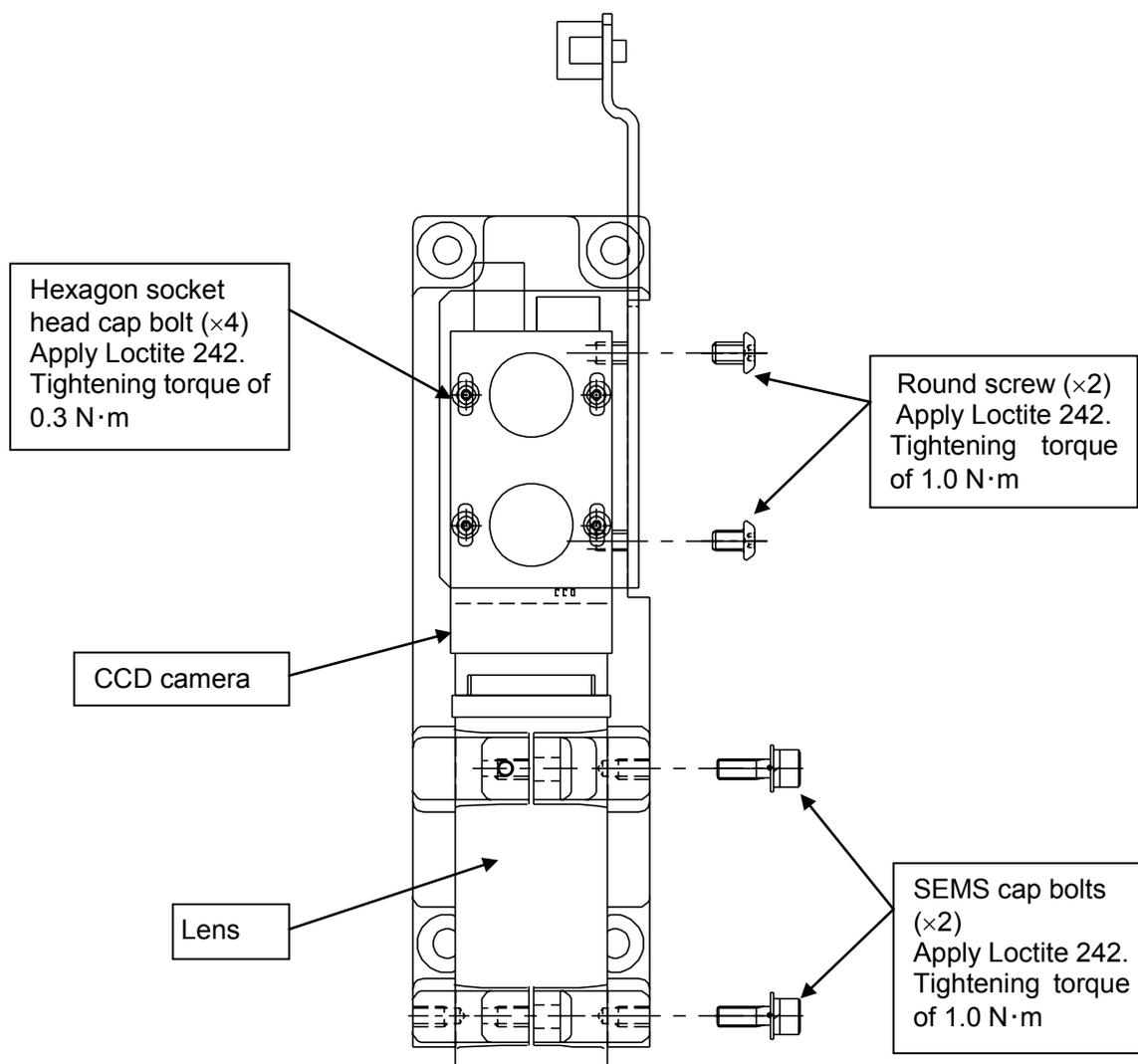


Figure 4-2-1 CCD Camera/Lens

# Maintenance Guide

## 4-3. Replacing the OCC Front/Angle Light Board Assembly

- (1) Detach the light assembly from the head plate using the procedure described in 4-1. "Replacing the OCC Assembly".
- (2) Remove the pan head machine screw ① to detach the OCC front light board assembly.
- (3) Remove the washer assembled hexagon socket head cap bolt ② to detach the OCC angle light board assembly.
- (4) Reassemble the components in the reverse order of disassembly.
- (5) After replacement, it is necessary to adjust the light filter U and OCC light. (See 4-8. "List of Readjustment Items After Replacement".)

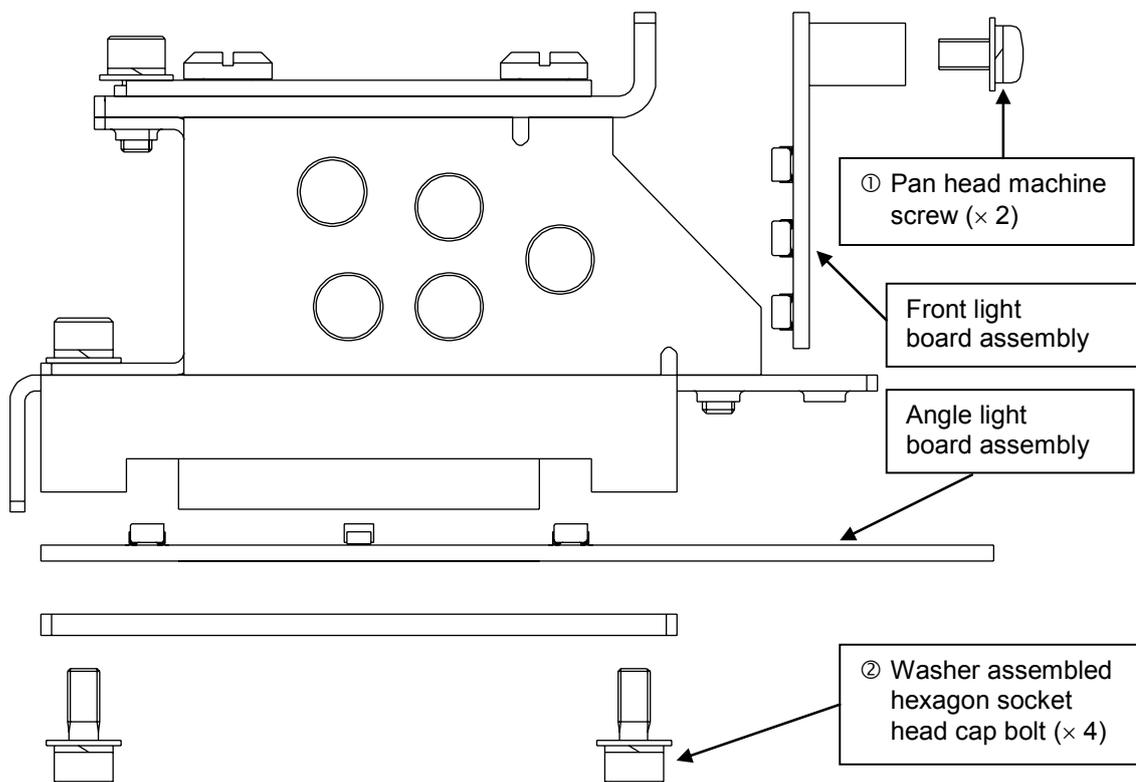


Figure 4-3-1 Replacing the OCC Front/Angle Light Board Assembly

# Maintenance Guide

## 4-4. Replacing the Lens Filter

- (1) Detach the light assembly from the head plate using the procedure described in "Replacing the OCC Assembly".
- (2) Remove the washer assembled hexagon socket head cap bolt, collar and shoulder screws to detach the light filter U support, lens filter and guide plate.
- (3) Remove the countersunk-head screws to detach the lens filter
- (4) Reassemble the components in the reverse order of disassembly.
- (5) After the filter has been replaced, it is necessary to adjust the polarizing filter and OCC light. (See 4-8. "List of Readjustment Items After Replacement".)

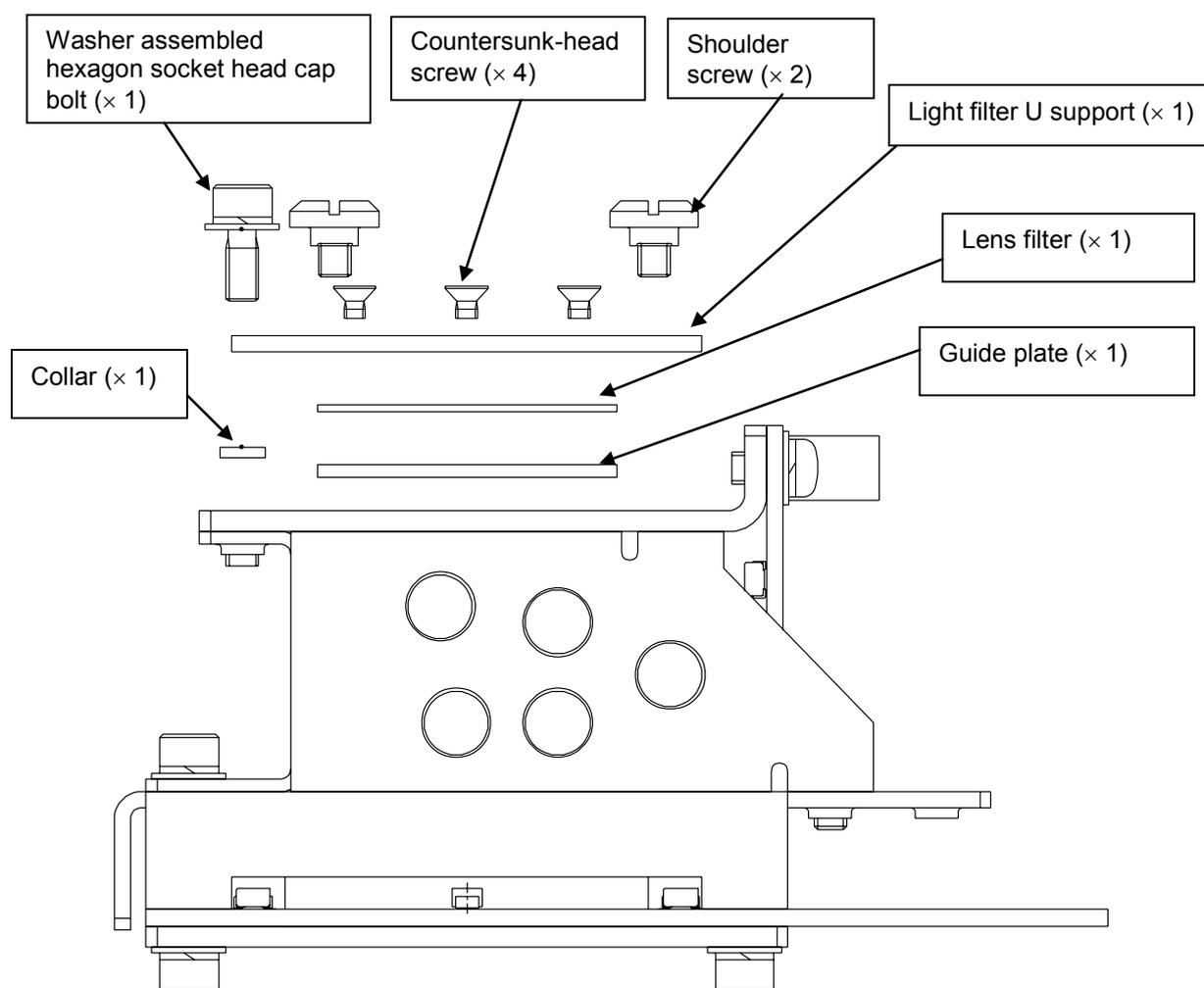


Figure 4-4-1 Replacing the Lens Filter