

High-Speed Chip Shooter

KE-3010

High-Speed Flexible Mounter

KE-3020V/3020VR

MAINTENANCE GUIDE



JUKI CORPORATION
CUSTOMER SUPPORT DEPARTMENT
ELECTRONIC ASSEMBLY SYSTEMS BUSINESS UNIT

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Maintenance Guide

Table of Contents

[1] X-Y UNIT	1-1
1-1. Replacing the Servomotor.....	1-1
1-1-1. Replacing the X-Motor.....	1-1
1-1-2. Replacing the YL-Motor.....	1-3
1-1-3. Replacing the YR-Motor.....	1-5
1-2. Replacing the Magnescale.....	1-7
1-2-1. X-Axis Magnescale Affixing Position.....	1-9
1-2-2. Y-Axis Magnescale Affixing Position.....	1-11
1-2-3. Adjusting the Clearance of the Magnescale.....	1-13
1-2-4. Clearance between the Sensor Head and Y-Axis LM Guide (Y-axis_XL Board Specifications Only).....	1-16
1-3. Replacing the Limit Sensor and Origin Near Sensor.....	1-17
1-3-1. Replacing the X-Axis Limit Sensor and the X-Axis Home Proximity Sensor.....	1-17
1-3-2. Replacing the Y-Axis Limit Sensor and the Y-Axis Home Proximity Sensor.....	1-21
1-3-3. Checking the Limit Sensor Operation.....	1-25
1-3-4. Checking the X- and Y-NEAR SENSOR Operation.....	1-27
1-4. Replacing the Home Position Sensor.....	1-29
1-4-1. X-Axis.....	1-29
1-4-2. Y-Axis.....	1-29
1-5. Replacing the Cableveyor.....	1-30
1-5-1. Replacing the X-Axis Cableveyor.....	1-30
1-5-2. Replacing the Y-Axis Cableveyor.....	1-32
1-6. Replacing the Cables in the X/Y Veyor-Cable.....	1-34
1-6-1. Removing the X Cable.....	1-34
1-6-2. Checking the Cable Marking (X).....	1-36
1-6-3. Assembling the Cable.....	1-37
1-6-4. Removing the Y Veyor-Cable.....	1-40
1-6-5. Placing Marks on the Y Veyor-Cable.....	1-40
1-6-6. Assembling the Cable.....	1-41
1-6-7. Wiring around the Head.....	1-48
1-7. Replacing the Cableveyor Link.....	1-51
1-7-1. X Cableveyor Structure and Part Names.....	1-51
1-7-2. Detaching the Arm and Lock Stay.....	1-51
1-7-3. Separating the Link.....	1-52

Maintenance Guide

1-7-4.	Connecting the Cableveyor.....	1-52
1-7-5.	Mounting the Arm and Lock Stay	1-53
1-7-6.	Y Cableveyor Structure and Part Names	1-54
1-7-7.	Detaching the Arm and Lock Stay	1-54
1-7-8.	Separating the Link.....	1-55
1-7-9.	Connecting the Cableveyor.....	1-56
1-7-10.	Mounting the Arm and Lock Stay	1-56
1-8.	Replacing the X Ball Screw	1-58
1-8-1.	Preparations for X Ball Screw Replacement	1-58
1-8-2.	Removing the X Ball Screw	1-60
1-8-3.	Mounting the X Ball Screw	1-63
1-8-4.	Adjusting the X Ball Screw	1-66
1-9.	Replacing the Y Ball Screw	1-70
1-9-1.	Preparations for Y Ball Screw Replacement	1-70
1-9-2.	Removing the Y Ball Screw	1-78
1-9-3.	Mounting the Y Ball Screw	1-83
1-9-4.	Adjusting the Y Ball Screw	1-88
[2]	HEAD UNIT	2-1
2-1.	Replacing and Adjusting the Head	2-1
2-1-1.	LNC60 Head	2-1
2-1-2.	IC Head (KE-3020V)	2-4
2-1-3.	IC Head (KE-3020VR)	2-5
2-2.	Replacing the Motor	2-6
2-2-1.	Replacing the Z-Motor (LNC60 Head)	2-6
2-2-2.	Replacing the θ -Motor.....	2-7
2-2-3.	Replacing the Z-Motor (IC Head)	2-8
2-2-4.	Replacing the θ -Motor (IC Head)	2-9
2-3.	Replacing the T-Sensor.....	2-10
2-4.	Replacing the Laser Sensor	2-11
2-4-1.	Replacing the Laser Sensor (LNC60)	2-11
2-4-2.	Replacing the Point Sensor (KE-3020V)	2-12
2-4-3.	Replacing the FMLA (KE-3020VR)	2-14
2-5.	Replacing the Head Up Cylinder	2-16
2-6.	Replacing the Belts	2-17
2-6-1.	Replacing the Timing Belt Z.....	2-17
2-6-2.	Replacing the Timing Belt θ	2-17
2-6-3.	IC Head.....	2-18
2-7.	Replacing the Z-Slide Shaft.....	2-20

Maintenance Guide

2-8.	Readjustment After Replacement of Head Unit.....	2-21
[3]	PARTS AROUND THE HEAD	3-1
3-1.	Replacing the Solenoid Valve Components	3-1
3-1-1.	Replacing the Solenoid Valves	3-1
3-1-2.	Replacing the Filter	3-2
3-1-3.	Replacing the Filter for Release to Atmosphere	3-2
3-2.	Replacing the Bad Mark Sensor (Optional)	3-3
3-2-1.	Sensor Assembly	3-3
3-2-2.	Adjusting the Sensor Height	3-4
3-2-3.	Amplifier	3-5
3-2-4.	Assembling the Fiber Unit to the Amplifier	3-5
3-2-5.	Setting the Switches on the Bad Mark Sensor Assembly	3-6
3-3.	Replacing the HMS	3-6
3-3-1.	Replacing the HMS Head	3-6
3-3-2.	Adjusting the HMS Height.....	3-7
3-4.	Replacing the Head Board	3-8
3-4-1.	Replacing the Head Main Board	3-8
3-4-2.	Replacing the Servo Amplifier Board	3-9
[4]	OCC ASSEMBLY.....	4-1
4-1.	Replacing the OCC Assembly	4-1
4-2.	Replacing the CCD Camera and Lens	4-2
4-3.	Replacing the OCC Coaxial/Angle Light Board Assemblies	4-3
4-4.	Replacing the Lens Filter/Light Diffuser.....	4-4
4-5.	Adjusting the Focus.....	4-6
4-6.	Adjusting the OCC Light Quantity.....	4-7
4-7.	Readjustment After Replacement of OCC Unit	4-7
[5]	BOARD TRANSPORT UNIT	5-1
5-1.	Replacing the Transport Belt.....	5-1
5-2.	Replacing the Transport Pulley	5-2
5-2-1.	Transport Pulley A Assembly: E21117150A0	5-2
5-2-2.	Transport Pulley B Assembly: E20897210A0	5-2
5-3.	Replacing the IN and OUT Motors	5-3
5-4.	Replacing the CENTER Motor	5-4
5-5.	Replacing the Timing Belt	5-5
5-5-1.	Replacing the Timing Belt for Adjustment of the Transport Width.....	5-5
5-5-2.	Replacing the Timing Belt for the Transport Motor	5-7
5-6.	Replacing the LEFT and RIGHT Sensors	5-8

Maintenance Guide

5-6-1.	Replacing the LEFT and RIGHT Sensors (M and L Board Specifications).....	5-8
5-6-2.	Replacing the LEFT and RIGHT Sensors (XL Board Specifications).....	5-10
5-7.	Replacing the WAIT/STOP/C-OUT Sensors	5-12
5-7-1.	Replacing the WAIT Sensor (M and L Board Specifications).....	5-12
5-7-2.	Replacing the WAIT Sensor (M and L Board Specifications).....	5-13
5-7-3.	Replacing the WAIT, STOP and C-OUT Sensors (XL Board Specifications)	5-15
5-8.	Replacing the Stopper Cylinder.....	5-20
5-9.	Replacing the Support Table Home Position Sensor (BU Home Position Sensor)	5-21
5-10.	Replacing the T-PIN Sensor (Optional)	5-22
5-11.	Replacing the Pusher Y Cylinder (Outer Shape Reference)	5-23
5-12.	Replacing the Pressure Reducing Valve	5-24
5-13.	Replacing the Centering Pin (Option).....	5-25
5-14.	Replacing the Support Table Motor (BU Motor)	5-26
5-14-1.	Adjusting the Gap between Torque Supporter and Support Motor	5-27
5-14-2.	Adjusting the Tension of the Support Table Driving Timing Belt.....	5-28
5-14-3.	Placing the Support Table Surface Horizontally.....	5-29
5-15.	Replacing the Support Table Encoder.....	5-30
5-16.	Replacing the Backup Stopper (for EN Type Only)	5-31
5-17.	Solenoid Valve	5-32
[6]	CAL BLOCK	6-1
6-1.	Replacing the CAL Block Board Assembly.....	6-1
6-2.	Replacing the Ejector	6-2
6-3.	Replacing the Load Cell	6-3
[7]	ATC	7-1
7-1.	Replacing the Air Cylinder.....	7-1
7-2.	Replacing the ATC OPEN and CLOSE Sensors	7-4
7-3.	Adjusting the Speed Controller.....	7-4
[8]	VCS	8-1
8-1.	Replacing the CCD Camera Lens (Replace the CCD Camera and Lens as S-VCS Camera Assembly.).....	8-1
8-2.	Replacing the Standard S-VCS → Optional S-VCS Switching Cylinder.....	8-3
8-3.	Replacing the Light Boards	8-4
8-3-1.	Transmission Light Board, Coaxial Light Board	8-4
8-3-2.	Downward Light Board, Side Light Board	8-5

Maintenance Guide

[9]	FEEDER BANK AND REPLACEMENT TABLE (OPTIONAL)	9-1
9-1.	Common Parts and Units for Mechanical Feeder and Electric Feeder.....	9-1
9-1-1.	Replacing the Mechanical Valve (Optional Replacement Table)	9-3
9-1-2.	Replacing the Bank-up Cylinder (Optional Replacement Table).....	9-5
9-1-3.	Adjusting the Speed Controller of the Bank-Up Cylinder (Optional Replacement Table)	9-7
9-1-4.	Replacing the Bank-Up Detection Sensor (Optional Replacement Table)	9-8
9-1-5.	Replacing the Selector Switch (Optional Replacement Table).....	9-9
9-1-6.	Replacing the Cylinder for Drive Cylinder Unit Up/Down (Specifications Common to Optional Electric and Mechanical Replacement Tables).....	9-10
9-1-7.	Replacing the Cylinder Sensor for Drive Cylinder Unit Up/Down (Specifications Common to Optional Electric and Mechanical Replacement Tables).....	9-11
9-1-8.	Replacing the Electric Bank Support Cylinder (Optional Replacement Table)	9-12
9-2.	Bank and Replacement Table for Mechanical Feeder.....	9-14
9-2-1.	Replacing the Drive Cylinder (Mechanical Fixed Bank and Mechanical Replacement Table)	9-15
9-2-2.	Replacing the Drive Cylinder (Specifications Common to Optional Electric and Mechanical Replacement Tables).....	9-17
9-2-3.	Adjusting the Speed Controller of the Drive Cylinder	9-19
9-2-4.	Replacing the Feeder Bank Board (Optional)	9-19
9-2-5.	Replacing the Bank PCB	9-20
9-3.	Bank and Replacement Table for Electric Feeder	9-21
9-3-1.	Replacing the Bank PCB	9-23
9-3-2.	Replacing the Connector Cable	9-24
9-3-3.	Replacing the Connector for Off-Line Setup	9-25
9-4.	Trash Box.....	9-26
[10]	PNEUMATIC UNITS	10-1
10-1.	Replacing the Digital Pressure Switch.....	10-1
10-1-1.	Adjusting the Digital Pressure Switch (Positive Pressure)	10-2
10-1-2.	Adjusting the Digital Pressure Switch (Negative Pressure).....	10-4
10-2.	Replacing the Filter Element	10-6
10-3.	Replacement of Vacuum Pump Parts	10-7
[11]	SWITCH AND COVER RELATED	11-1

Maintenance Guide

11-1. Replacing the Push-Button Switch	11-1
11-1-1. Replacing the Push-Button Switch (Machine with the Standard Specifications)	11-1
11-1-2. Replacing the Push-Button Switch (Machine with the EN Specifications)	11-3
11-2. Replacing the EMERGENCY STOP Switch	11-4
11-3. Replacing the Cover Open Switch.....	11-5
11-4. Replacing the Safety Cover Lock Cylinder	11-6
[12] REPLACING AND ADJUSTING THE FEEDER FLOAT SENSOR	12-1
12-1. Replacing the Sensor and Adjusting the Height	12-1
12-2. Checking and Adjusting the Sensor Operation.....	12-8
[13] OTHER UNITS.....	13-1
13-1. LCD Monitor	13-1
13-1-1. Replacing the LCD Monitor	13-1
13-1-2. Setting Up the Touch Panel	13-2
13-2. Replacing the System Disk	13-4
13-2-1. Replacing the SSD	13-4
13-2-2. Setting Up the BIOS.....	13-7
13-2-3. Setting Up the Network (Setup is required when communicating with the IS.)	13-13
13-2-4. KE-3010/3020V/3020VR System Programs	13-24
13-2-5. Upgrading the System Version	13-33
13-2-6. Installing the Main Unit Software into the SSD for the White List Type Antivirus Software (Optional)	13-39
13-3. Load Cell (Optional)	13-41
13-3-1. Replacing the Load Cell.....	13-41
13-4. Coplanarity Sensor (Optional)	13-43
13-4-1. Replacing the Sensor.....	13-43
13-4-2. Changing the IP Address of the Coplanarity CPU	13-45
13-4-3. Changing the Mounter Settings	13-49
[14] ELECTRICAL COMPONENTS.....	14-1
14-1. Layout of Electrical Components.....	14-1
14-1-1. Layout of Electrical Components (M and L Board Specifications)	14-1
14-1-2. Layout of Electrical Components (XL Board Specifications).....	14-3
14-2. Power Supply Unit.....	14-5
14-2-1. Structure of Power Supply Unit (M and L Board Specifications).....	14-5
14-2-2. Structure of Power Supply Unit (XL Board Specifications).....	14-12

Maintenance Guide

14-3. Control Unit	14-19
14-3-1. Structure of Control Unit	14-19
14-3-2. CPU Board (40103723)	14-20
14-3-3. Position Board (40044540)	14-21
14-3-4. IEEE1394 Board (40048003).....	14-22
14-3-5. ETHER-MAIN Board (40048066).....	14-23
14-3-6. IP-X7 BASE ASM (40071283), IP-X7 SUB ASM (40071293).....	14-24
14-3-7. MOUSE/KEYBOARD Selector (40003281)	14-25
14-3-8. SUPERIMPOSE Board (40048082).....	14-26
14-3-9. SCM3 Board (40114496) Laser Board for FMLA (KE-3020VR Only)	14-27
14-3-10. S-Light Control (40108607).....	14-27
14-3-11. Feeder Board (40047560).....	14-27
14-3-12. S-XY Relay Board (40106795)	14-27
14-3-13. MAGNETIC SCALE Board (40095130) (XL Specifications Only)	14-27
14-3-14. BASE IO Board (40071680).....	14-27
14-4. ATX Power Supply (40048006).....	14-28
14-4-1. Battery Unit (40048007).....	14-29
14-5. X-Y Unit.....	14-31
14-5-1. Structure of X-Y Unit.....	14-31
14-5-2. Display Indication of XY Servo Amplifier.....	14-32
14-6. Z-θ Unit	14-33
14-6-1. Structure of Z-θ Unit.....	14-33
14-6-2. LED Indications.....	14-34
14-7. Transport Unit.....	14-35
14-7-1. Structure of Transport Unit.....	14-35
14-7-2. Adjusting the BASE I/O Board (40071680).....	14-39
14-7-3. Adjusting the Stepping Driver	14-39
14-8. Head Unit	14-41
14-8-1. S-HEAD MAIN PCB ASM (40106799).....	14-41
14-8-2. Adjusting the Point Sensor.....	14-43
14-9. Covers.....	14-44
14-9-1. Structure of Operation Unit	14-44
14-9-2. Jumper Switch Settings on the Operation Board Assembly.....	14-44
14-9-3. Mounting Switches onto the Operation Switchboard	14-46
14-10. Replacing the Fuse of the AC Input Unit.....	14-52
14-11. ETF Power Supply (Option for M and L Board Specifications)	14-53
14-11-1. Replacing the ETF Power Supply Unit.....	14-53

Maintenance Guide

[15]	AUTO BOARD WIDTH ADJUSTMENT (OPTIONAL)	15-1
	15-1. Assembling the AWC Bracket	15-1
	15-2. Assembling to the Machine Main Unit	15-2
	15-2-1. Mounting the AWC Bracket Assembly	15-2
	15-2-2. Mounting the Origin Sensor Dog.....	15-3
	15-3. Support Pin Detection Sensor	15-4
	15-3-1. Mounting the Support Pin Detection Sensor	15-4
	15-4. Bundling the Support Pin Detection Sensor	15-6
	15-4-1. Mounting the Support Pin Detection Sensor (Bundling the Cables).....	15-6
	15-5. Adjusting the Sensor	15-7
	15-6. Mounting the Driver Bracket.....	15-7
	15-7. Setting the Driver.....	15-8
	15-8. Mounting the Support Pin Sensor Dog	15-9
[16]	FEEDER POSITION INDICATOR (FPI) (OPTIONAL)	16-1
	16-1. Detaching the FPI (Front) (M and L Board Specifications)	16-1
	16-2. Detaching the FPI (Rear) (M and L Board Specifications).....	16-2
	16-3. Structure of Parts and Components inside FPI (Front) (M and L Board Specifications)	16-3
	16-4. Structure of Parts and Components inside FPI (Rear) (M and L Board Specifications)	16-4
	16-5. Detaching the FPI (Front) (XL Board Specifications).....	16-5
	16-6. Detaching the FPI (Rear) (XL Board Specifications)	16-6
	16-7. Structure of Parts and Components inside FPI (Front) (XL Board Specifications).....	16-7
	16-8. Structure of Parts and Components inside FPI (Rear) (XL Board Specifications).....	16-8
[17]	OFFSET PLACEMENT AFTER SOLDER SCREEN-PRINTING LIGHT (OPTIONAL)	17-1
	17-1. Replacing the Offset Placement after Solder Screen-Printing Light	17-1
	17-2. Adjusting the Light Quantity of the Offset Placement after Solder Screen-Printing Light	17-2
[18]	TAPE CUTTER (OPTIONAL)	18-1
	18-1. Overall Drawing.....	18-1
	18-2. Replacing the Tape Cutter Main Unit	18-2
	18-3. Replacing the Tape Cutter Blade	18-5
[19]	CVS (OPTIONAL)	19-1
	19-1. Replacing the CONTACT SUB UNIT	19-1

Maintenance Guide

19-2. Replacing the PCB	19-4
[20] ROTARY SOLDER TRANSFER UNIT (OPTIONAL).....	20-1
20-1. Replacing the Squeegee	20-1
20-2. Replacing the Pan	20-3
20-3. Replacing the Motor	20-4
20-4. Checking the Pan Mounting Status	20-6
[21] MULTI-CODE READER (OPTIONAL).....	21-1
21-1. Replacing the Multi-code Reader (Head)	21-1
21-2. Replacing the Multi-code Reader (Transport).....	21-2
[22] PLACEMENT MONITOR (OPTIONAL)	22-1
22-1. Replacing the LNC61/62	22-1
22-2. Replacing the EPV61/62	22-2
22-3. Replacing the Head Up Cylinder (KE-3020V/3020VR).....	22-3
22-4. Obtaining the Offset After Replacement.....	22-5
22-5. Checking the Images After Replacement.....	22-6
22-5-1. Calibration Application	22-6
22-5-2. EPV Calibration	22-9
 APPENDIX	
JIG LISTS.....	A-1

Maintenance Guide

[1] X-Y UNIT

1-1. Replacing the Servomotor

1-1-1. Replacing the X-Motor

<M and L board specifications>

- 1) Remove the SL6061292TN, NM6060001SC to detach the COVER_SUL_F_M.
 - 2) Loosen the COUPLING_X_screw (do not remove the screw at this time) and disconnect the connector of the SERVO MOTOR 750W cable.
 - 3) Remove the SL6062042TN and replace the SERVO MOTOR 750W.
 - 4) Reassemble the components in the reverse order of disassembly.
- * The clearance between the COUPLING and motor is 8 mm.
The tightening torque of the COUPLING_X_screw is 3.4 N·m. (Figure 1-1-1-4)
Carefully check the motor orientation.

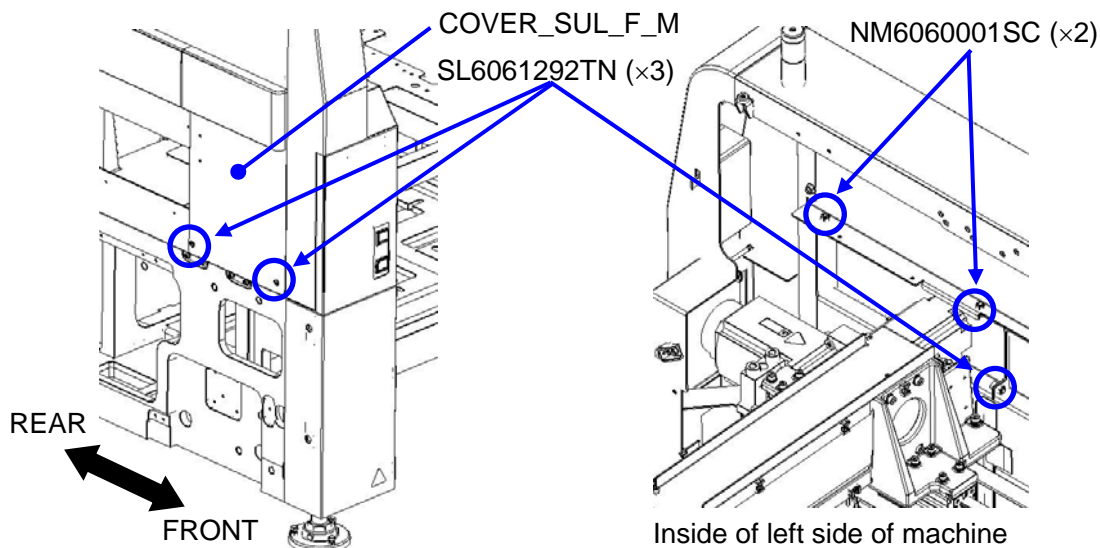


Figure 1-1-1-1 Removal of Cover of Machine with M and L Board Specifications

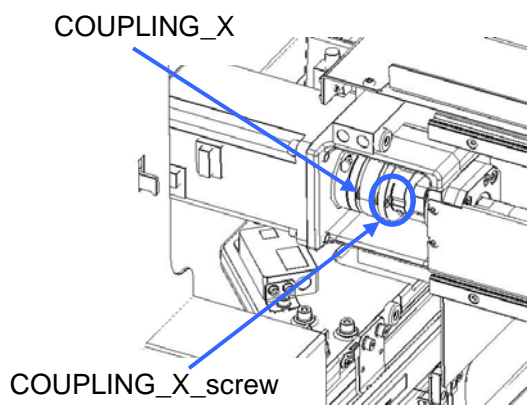


Figure 1-1-1-2 8

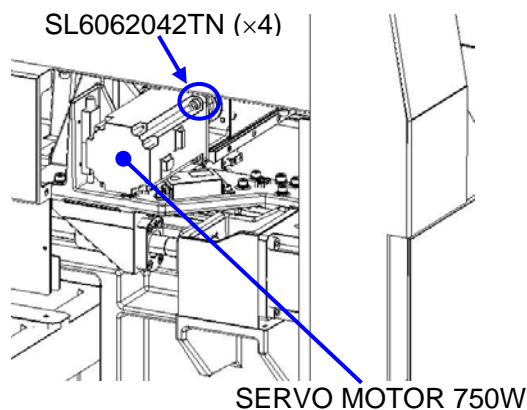


Figure 1-1-1-3

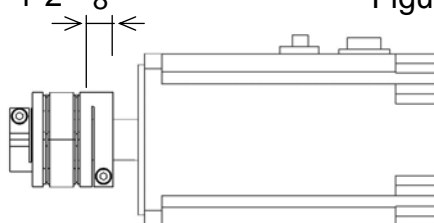


Figure 1-1-1-4

Maintenance Guide

<XL board specifications>

- 1) Remove the SL6061292TN to detach the CABLE_SIDE_COVER.
 - 2) In the same manner as described for the machine with the M and L board specifications, loosen the COUPLING_X_screw (do not remove the screw at this time) and disconnect the connector of the SERVO MOTOR 750W cable.
 - 3) Remove the SL6062042TN and replace the SERVO MOTOR 750W.
 - 4) Reassemble the components in the reverse order of disassembly.
- * The clearance between the COUPLING and motor is 8 mm.
The tightening torque of the COUPLING_X_screw is 3.4 N·m. (Figure 1-1-1-4)
Carefully check the motor orientation.

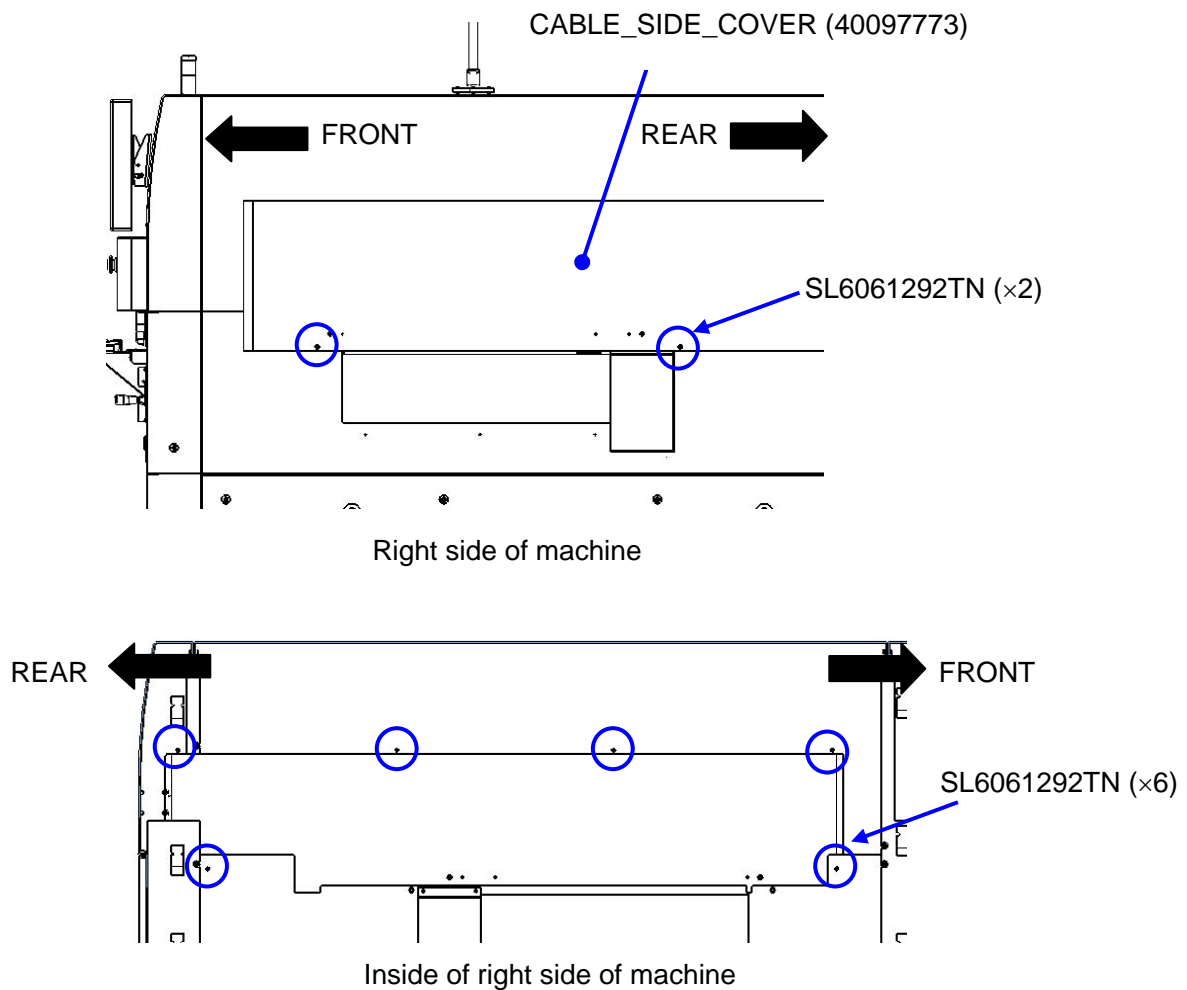


Figure 1-1-1-5 Removal of Cover of Machine with XL Board Specifications

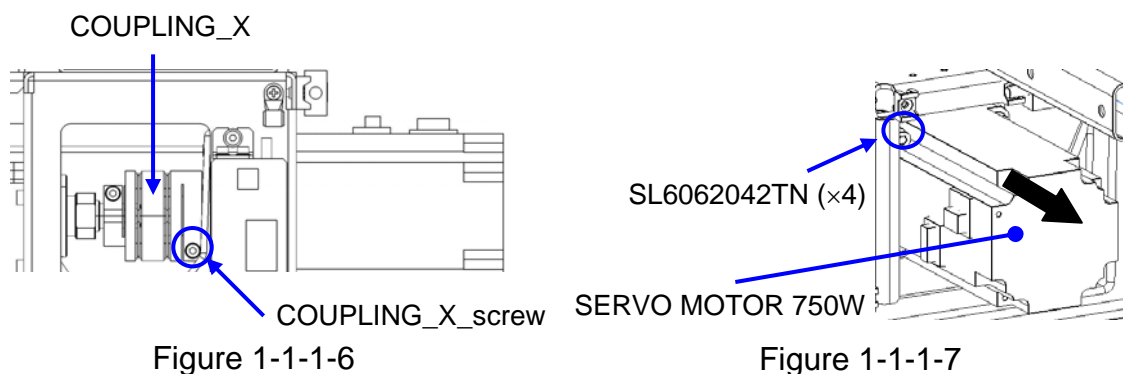


Figure 1-1-1-6

Figure 1-1-1-7

Maintenance Guide

1-1-2. Replacing the YL-Motor

<M and L board specifications>

- 1) Remove the SL3061232TN to detach the COVER_FBL.
 - 2) Remove the SL6041092TN to detach the SUB_COVER_FUL.
 - 3) Loosen the COUPLING_Y_screw (do not remove the screw at this time) and disconnect the connector of the SERVO MOTOR 1500W cable.
 - 4) Remove the SM6082002TN and replace the SERVO MOTOR 1500W.
 - 5) Reassemble the components in the reverse order of disassembly.
- * The clearance between the COUPLING and motor is 4 mm. The tightening torque of the COUPLING_Y_screw is 7 N·m. (Figure 1-1-2-4)

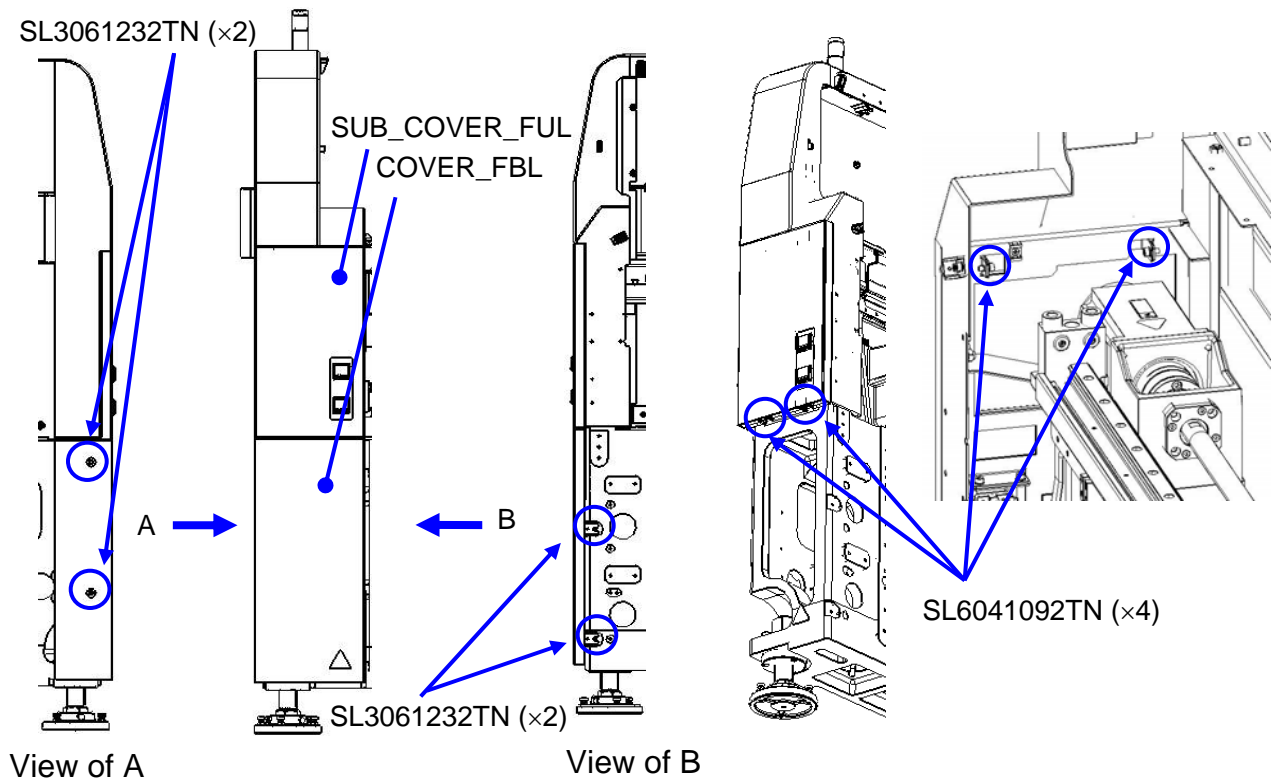


Figure 1-1-2-1 Removal of Cover of Machine with M and L Board Specifications

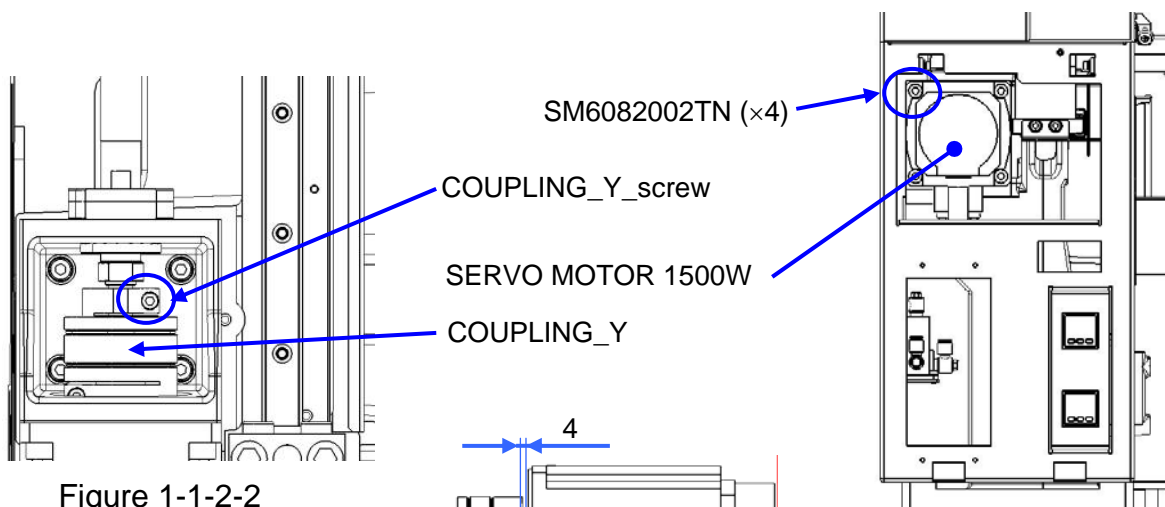


Figure 1-1-2-2

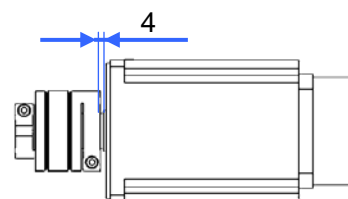


Figure 1-1-2-4

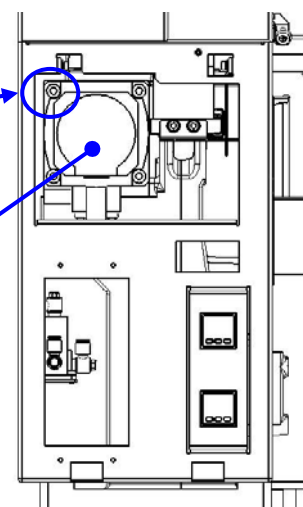


Figure 1-1-2-3

Maintenance Guide

<XL board specifications>

- 1) Remove the SL3061232TN and SL6040892TN, detach the COVER_FBL_XL.
 - 2) In the same manner as described for the machine with the M and L board specifications, loosen the COUPLING_Y_screw (do not remove the screw at this time) and disconnect the connector of the SERVO MOTOR 1500W cable.
 - 3) Remove the SM6082502TN and replace the SERVO MOTOR 1500W.
 - 4) Reassemble the components in the reverse order of disassembly.
- * The clearance between the COUPLING and motor is 8 mm.
The tightening torque of the COUPLING_X_screw is 3.4 N·m. (Figure 1-1-2-4)

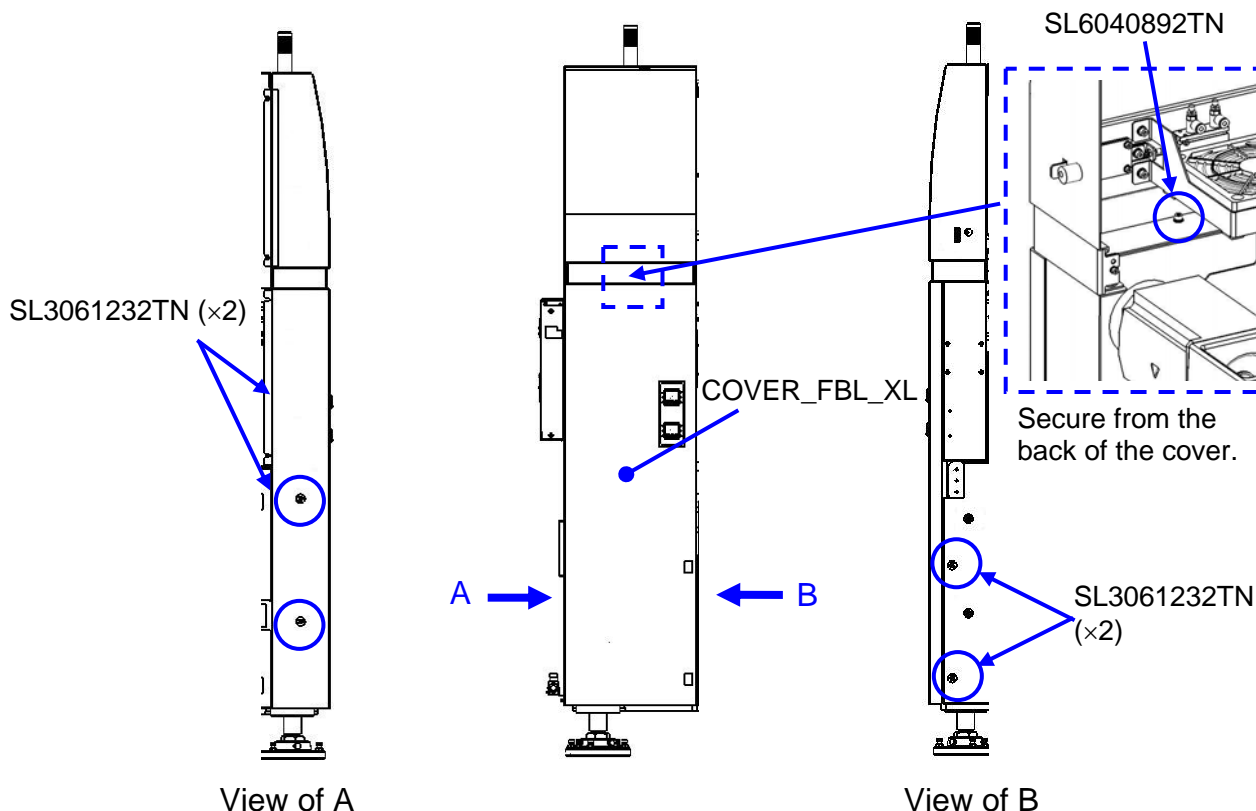


Figure 1-1-2-5 Removal of Cover of Machine with XL Board Specifications

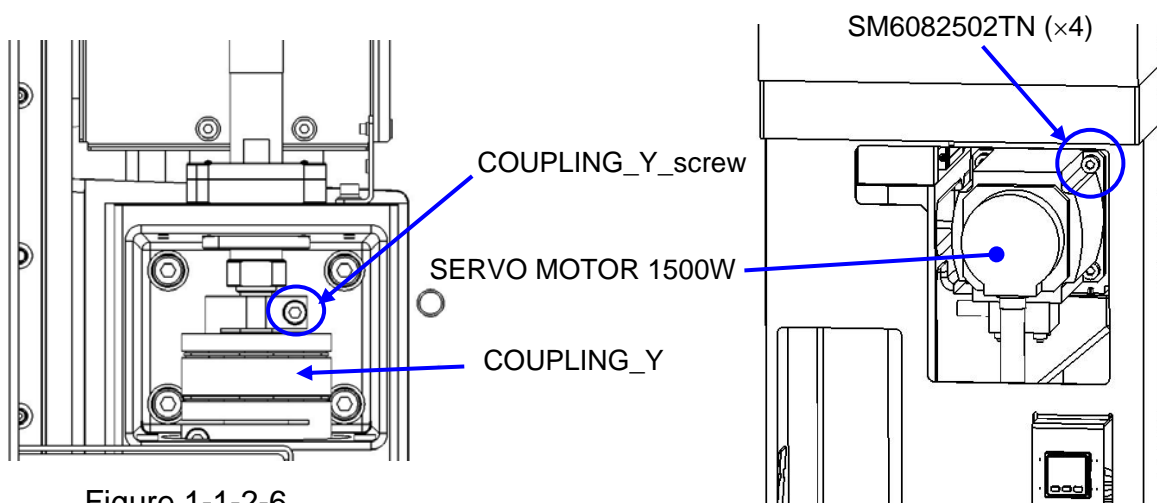


Figure 1-1-2-6

Figure 1-1-2-7

Maintenance Guide

1-1-3. Replacing the YR-Motor

<M and L board specifications>

- 1) Remove the SL3061232TN to detach the COVER_FBR.
- 2) Remove the SL6041092TN, NM3060810SF to detach the SUB_COVER_FUR.
- 3) Loosen the COUPLING_Y_screw (do not remove the screw at this time) and disconnect the connector of the SERVO MOTOR 1500W cable.
- 4) Remove the SL6082002TN and replace the SERVO MOTOR 1500W.
- 5) Reassemble the components in the reverse order of disassembly.

* The clearance between the COUPLING and motor is 4 mm. The tightening torque of the COUPLING_Y_screw is 7 N·m. (Figure 1-1-3-4)

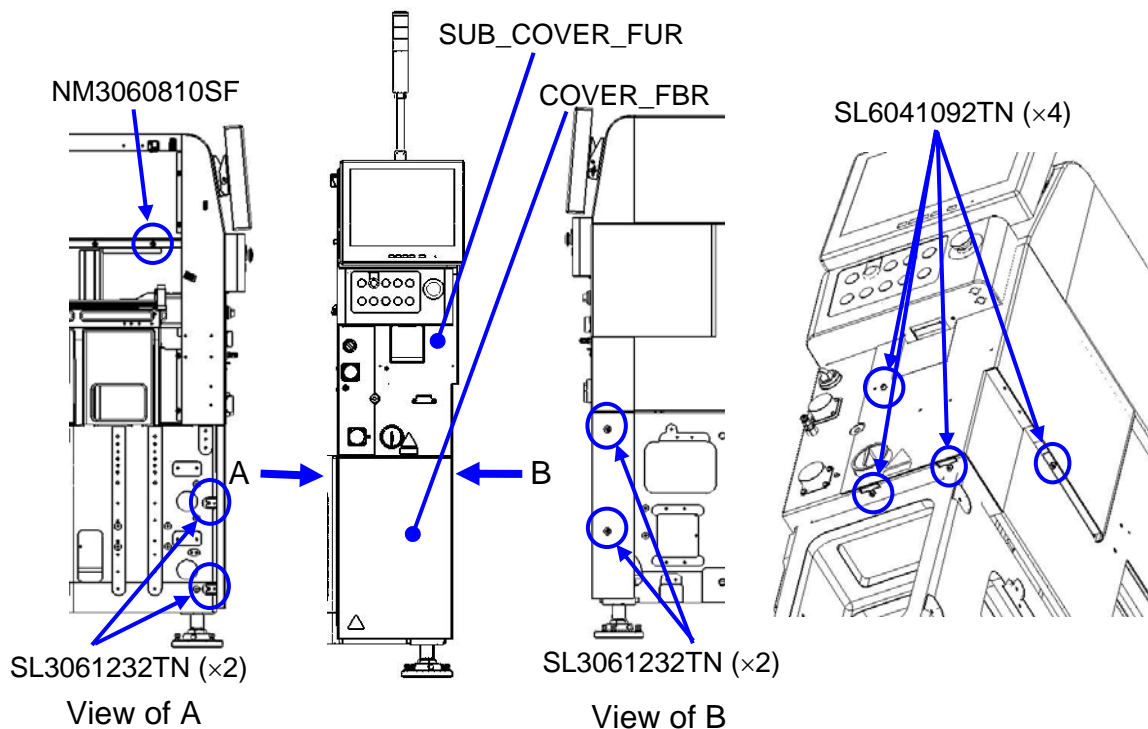


Figure 1-1-3-1 Removal of Cover of Machine with M and L Board Specifications

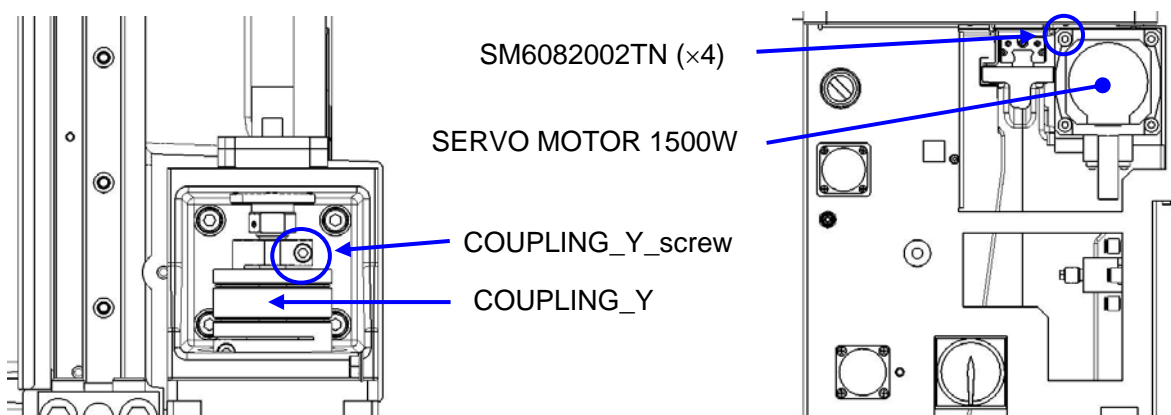


Figure 1-1-3-2

Figure 1-1-3-3

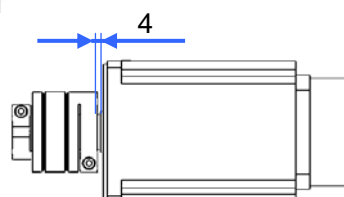


Figure 1-1-3-4

Maintenance Guide

<XL board specifications>

- 1) Remove the SL6061292TN, SL3061232TN to detach the COVER_FBR_XL.
 - 2) In the same manner as described for the machine with the M and L board specifications, loosen the COUPLING_Y_screw (do not remove the screw at this time) and disconnect the connector of the SERVO MOTOR 1500W cable.
 - 3) Remove the SL6082502TN and replace the SERVO MOTOR 1500W.
 - 4) Reassemble the components in the reverse order of disassembly.
- * The clearance between the COUPLING and motor is 4 mm. The tightening torque of the COUPLING_Y_screw is 7 N·m. (Figure 1-1-3-4)

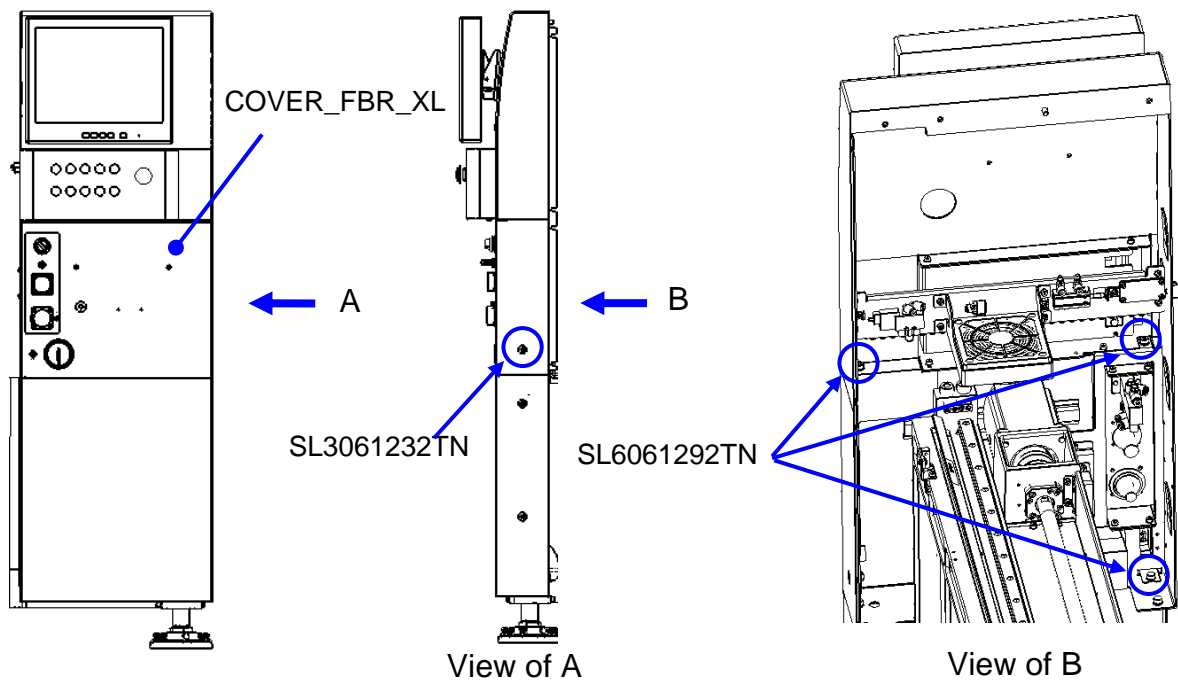


Figure 1-1-3-5 Removal of Cover of Machine with XL Board Specifications

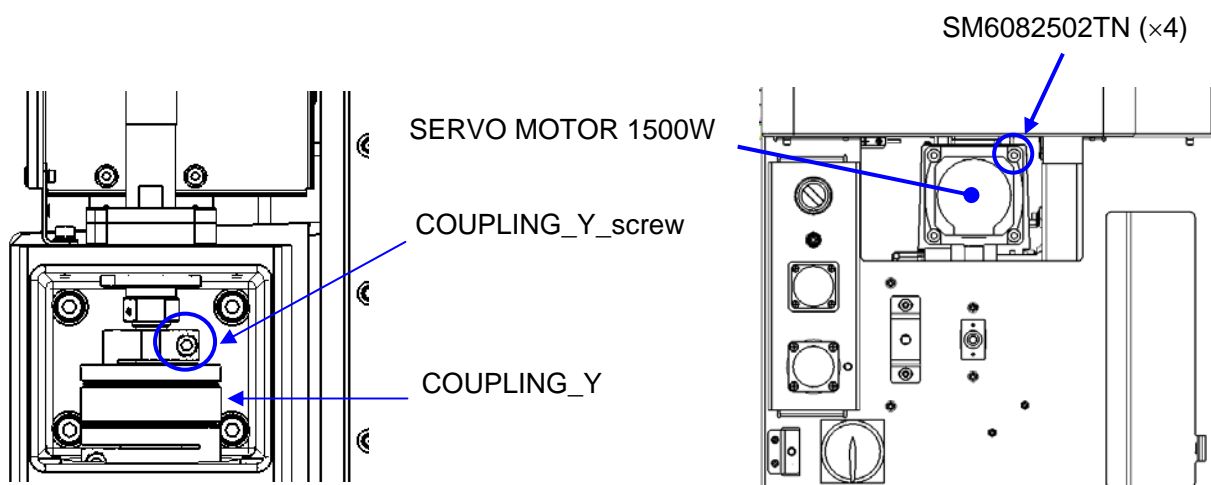


Figure 1-1-3-6

Figure 1-1-3-3

Maintenance Guide

1-2. Replacing the Magnescale

- 1) For the machine with the XL board specifications, detach the side cover. For the machine with the M and L board specifications, do not detach the side cover and move to step 2).

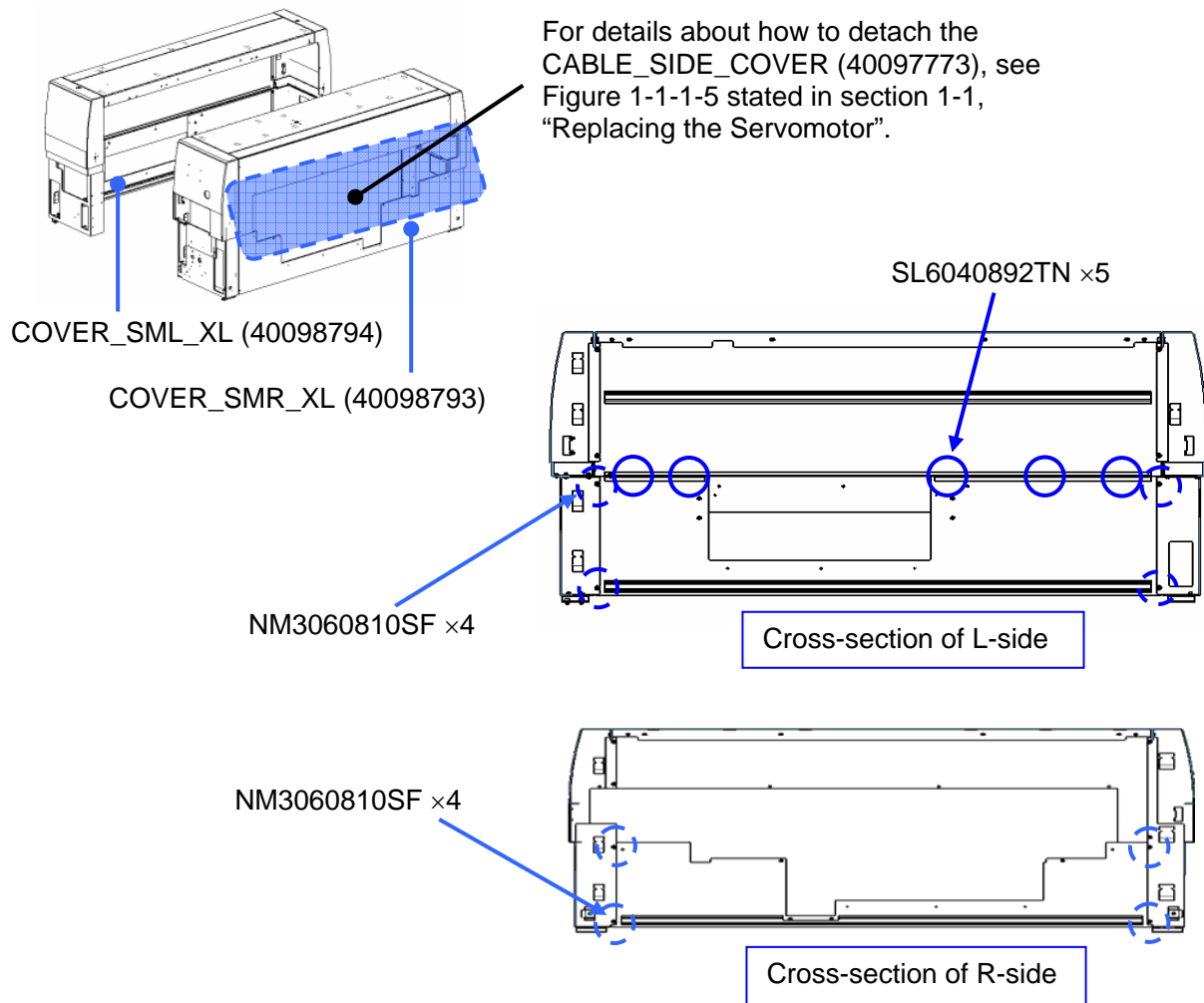


Figure 1-2-1

Maintenance Guide

- 2) Detach the magnescale head from the bracket.
- 3) Peel off the old magnescale.
- 4) Degrease the magnescale mounting surface and magnescale completely.

Note 1: Before replacing the magnescale, put the magnescale near the machine and leave it for 1 hr. or longer to make the temperature of the magnescale similar to that of the machine.

Note 2: "Mecha fine mate" is recommended for the degreasing agent.

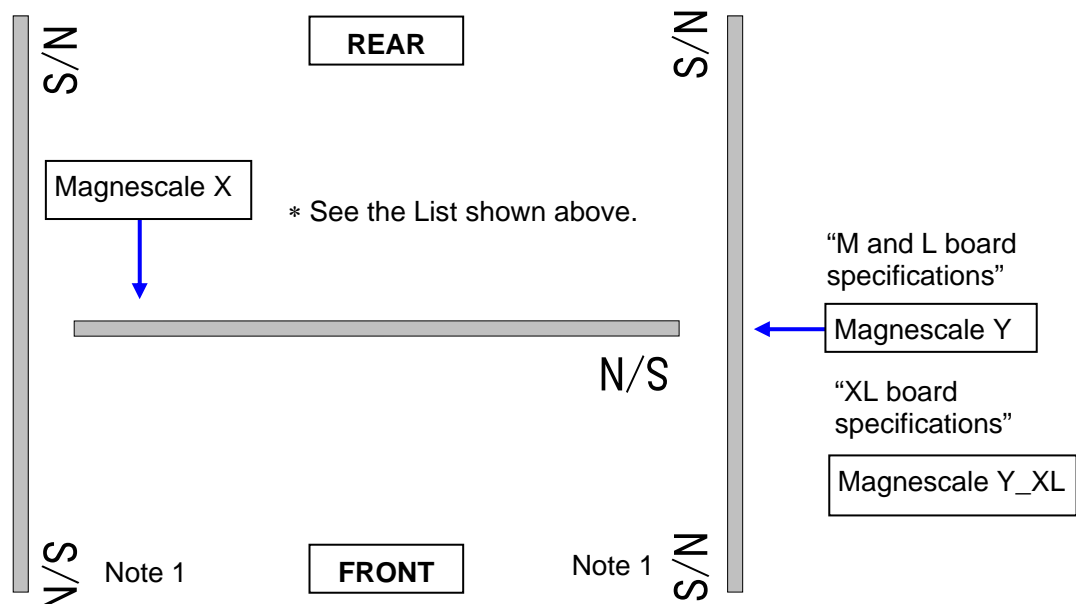
Note 3: Deviation amount when compared to the specified value of the magnescale in the X-direction: ± 0.1 mm or less.

Note 4: Do not put any magnet, such as magnetized screwdriver or support pin close to the magnescale. Doing so may cause the magnescale to malfunction.

Note 5: The magnescale has the affixing orientation. Affix the magnescale in the same orientation as the S/N shown in the Figure. For details about magnescale to be used, see the List below.

List of magnescale specifications

	M and L board specifications	XL board specifications
KE-3010	Magnescale X (40113692)	Magnescale X (40113693)
	Magnescale Y (40091396)	Magnescale Y_XL (40048080)
KE-3020V/KE-3020VR	Magnescale X (40044528)	
	Magnescale Y (40091396)	Magnescale Y_XL (40048080)



(* S/N: Serial No. of the magnescale)

Note 1: Orientation of Serial No. of Machine with XL Specifications

Figure 1-2-2 Affixing Orientation of the Magnescale (Main Body Top View)

Maintenance Guide

1-2-1. X-Axis Magnescale Affixing Position

- 1) With the X-axis magnescale affixing jig (40094362) put tightly 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 magnescale affixing jig to affix the magnescale.

A marking-off line is provided at the affixing start position on the left when viewed from the front.

Adjust the end face position of the magnescale to the marking-off line and affix the magnescale.

Specification value: Magnescale affixing position (distance deviation in parallel to the head moving direction) ± 0.1 mm

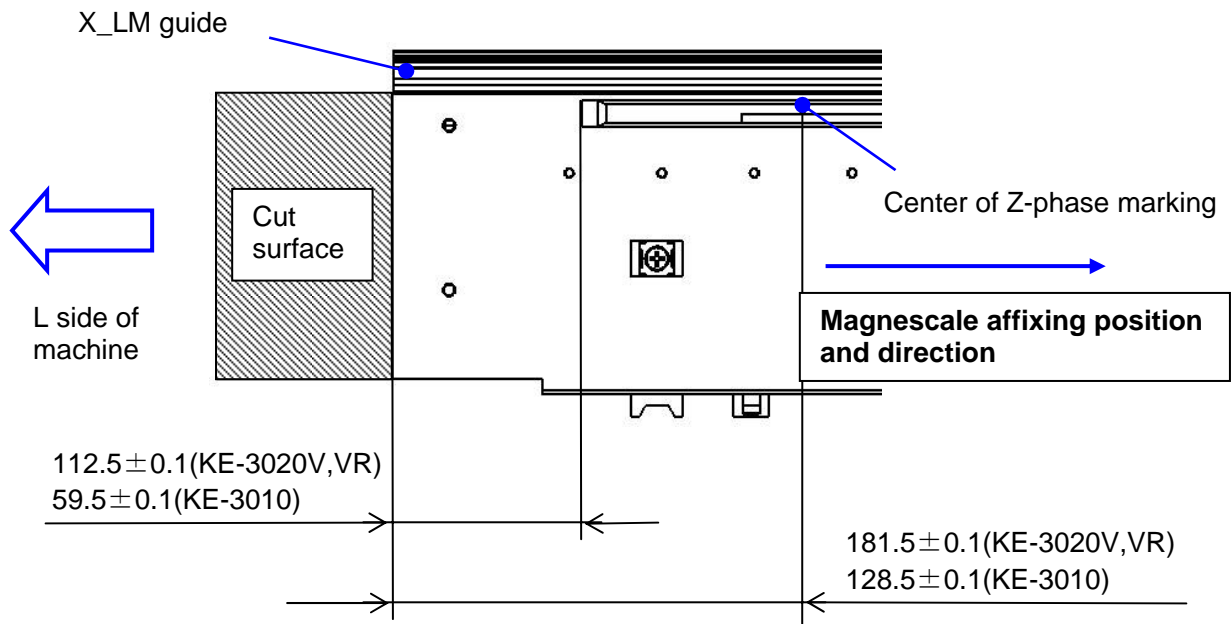


Figure 1-2-1-1 Magnescale Affixing Positions of M and L Board Specifications

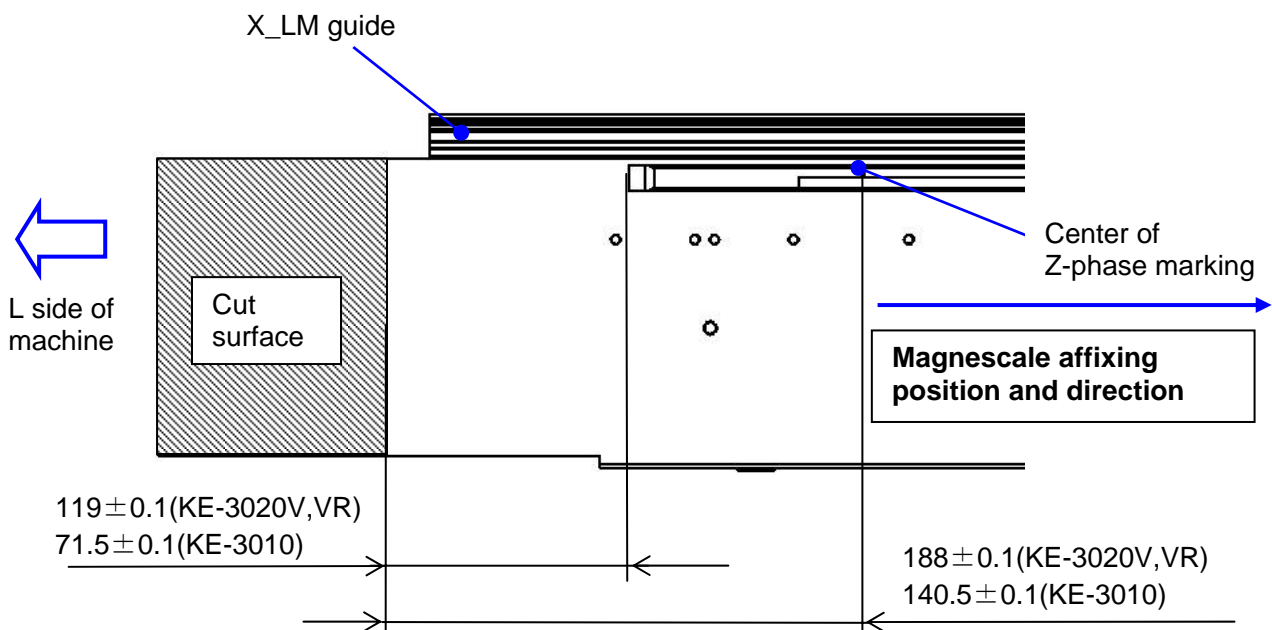


Figure 1-2-1-2 Magnescale Affixing Positions of X L Board Specifications

Maintenance Guide

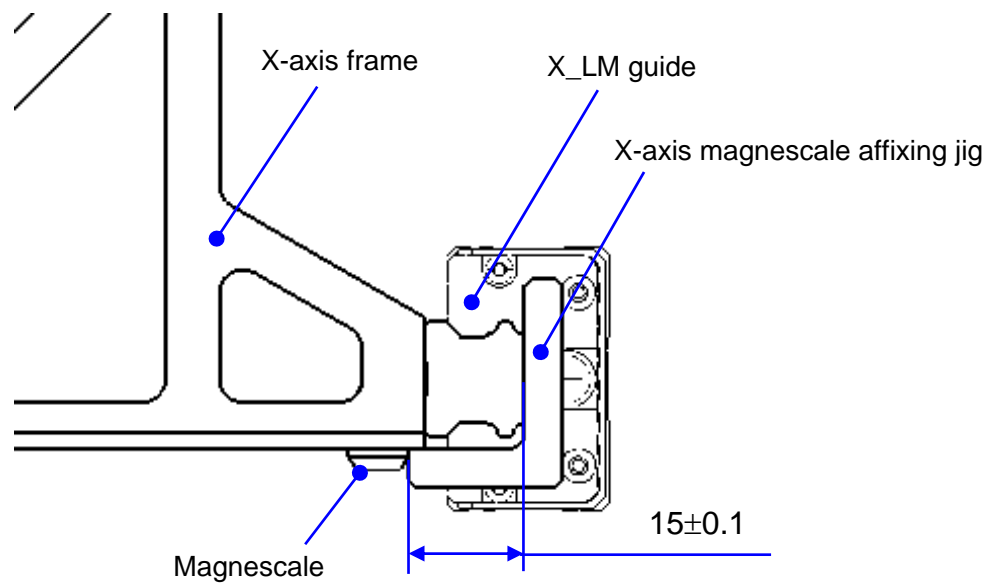


Figure 1-2-1-3 Example of X_MSC Install Jig Mounting

Maintenance Guide

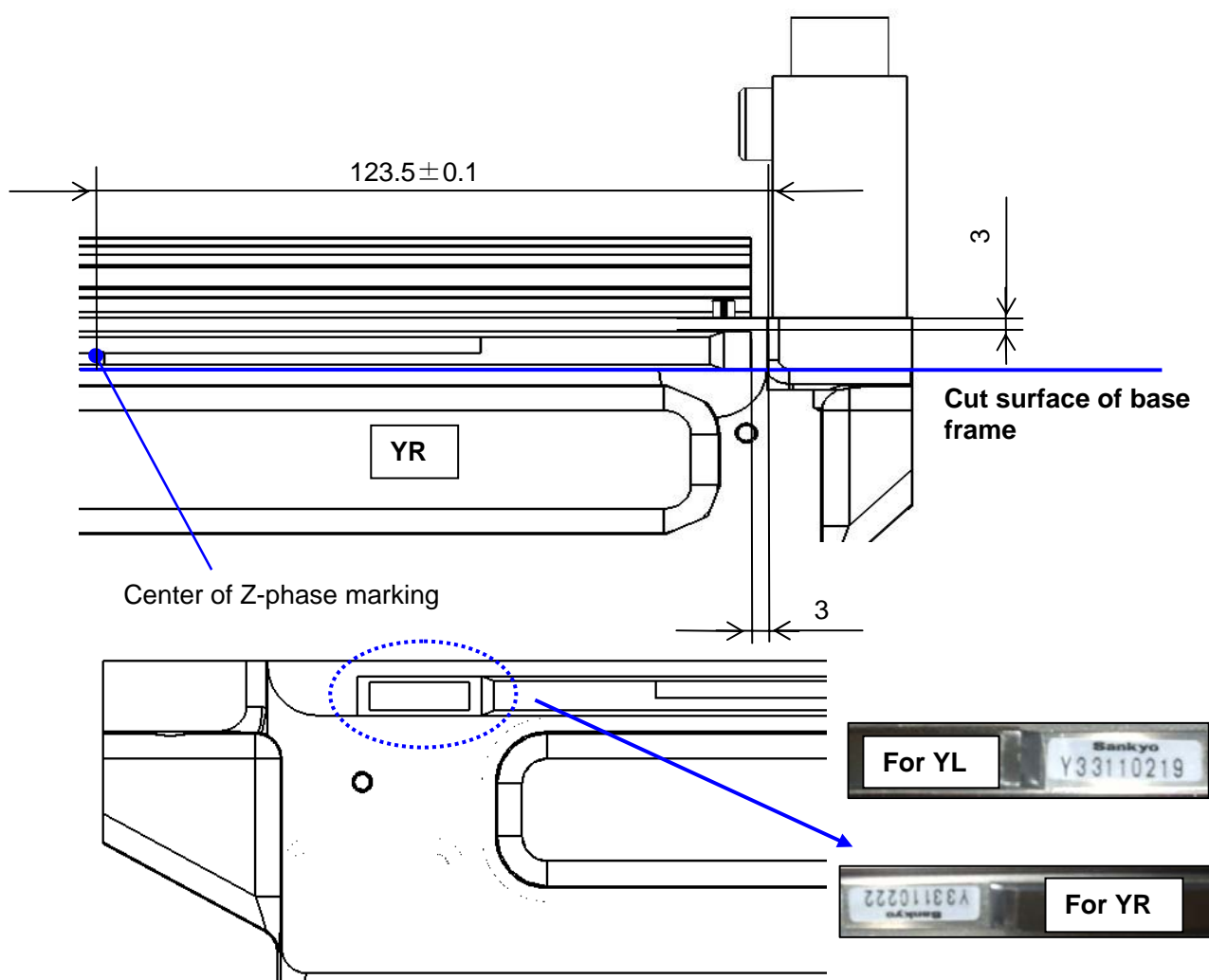
1-2-2. Y-Axis Magnescale Affixing Position

< M and L board specifications >

Affix the magnescale while keeping it in contact with the cut surface of the base frame.

The Y-axis magnescale affixing start position is a position where the distance between the cut end face of the base frame and the end face of the magnescale is 3 mm.

Specification value: Magnescale affixing position (distance deviation in the horizontal direction to the head moving direction) ± 0.1 mm



- ①: Affix the magnescale so that the bottom of the Y-magnescale meets the bottom of the base frame YL and the R cutting surface.
- ②: The Y-magnescale affixing position is common to the YR and YL.
- * When affixing the Y-magnescale of the YR or YL, carefully check the orientation of the serial No.

Figure 1-2-2-1 Y-Axis Magnescale Affixing Start Position
<M and L board specifications >

Maintenance Guide

<XL board specifications>

With the Y-axis magnescale affixing jig (40094363) put tightly in contact with the side surface of the LM guide Y and the top of the Y-axis, make the magnescale in contact with the Y-axis magnescale affixing jig to affix the magnescale.

The Y-axis magnescale affixing start position is a position where the distance between the center of the reference pin and the end face of the magnescale is 19 mm.

Specification value: Magnescale affixing position (distance deviation in the horizontal direction to the head moving direction) ± 0.1 mm

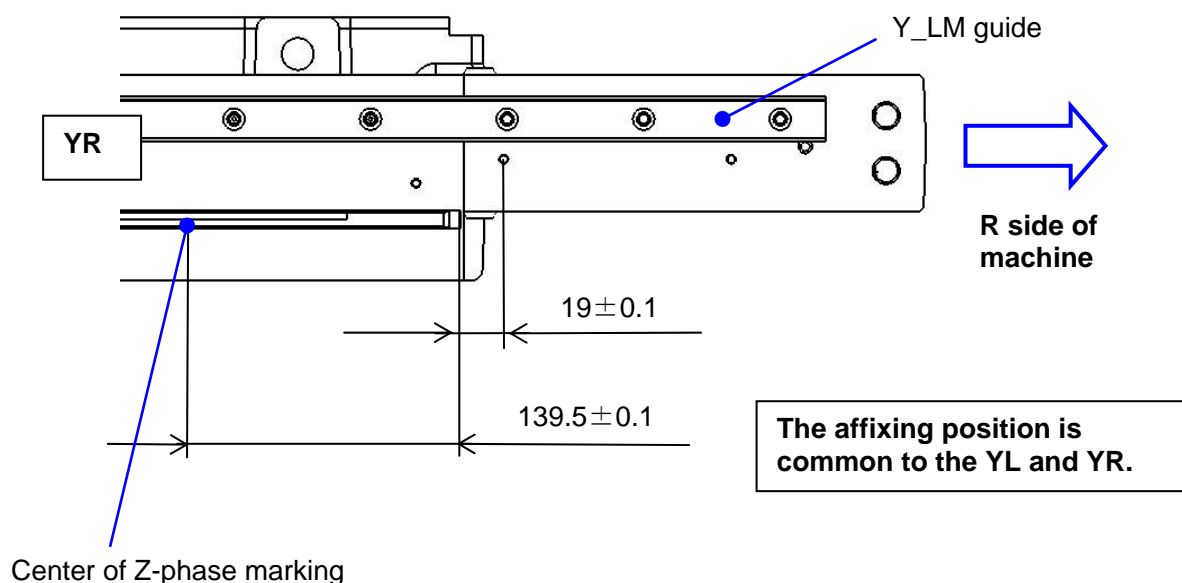


Figure 1-2-2-2 Y-Axis Magnescale Affixing Start Position

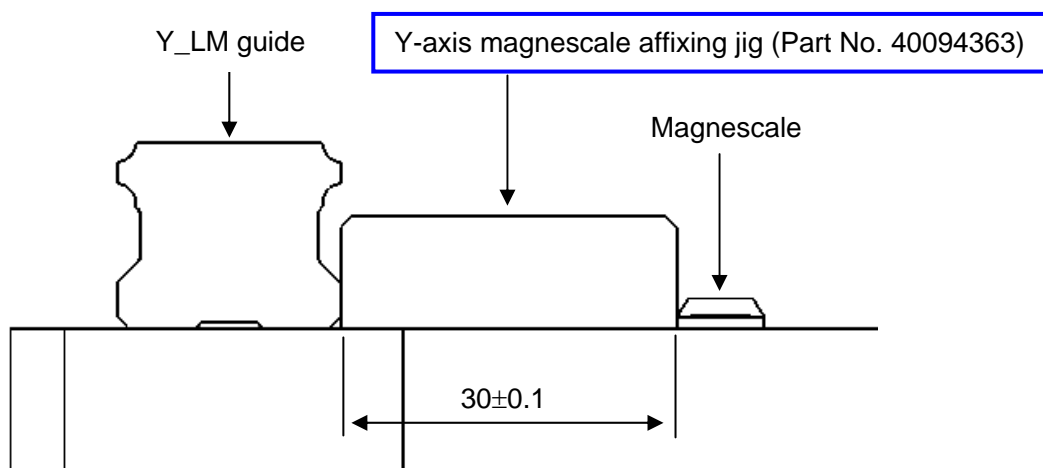
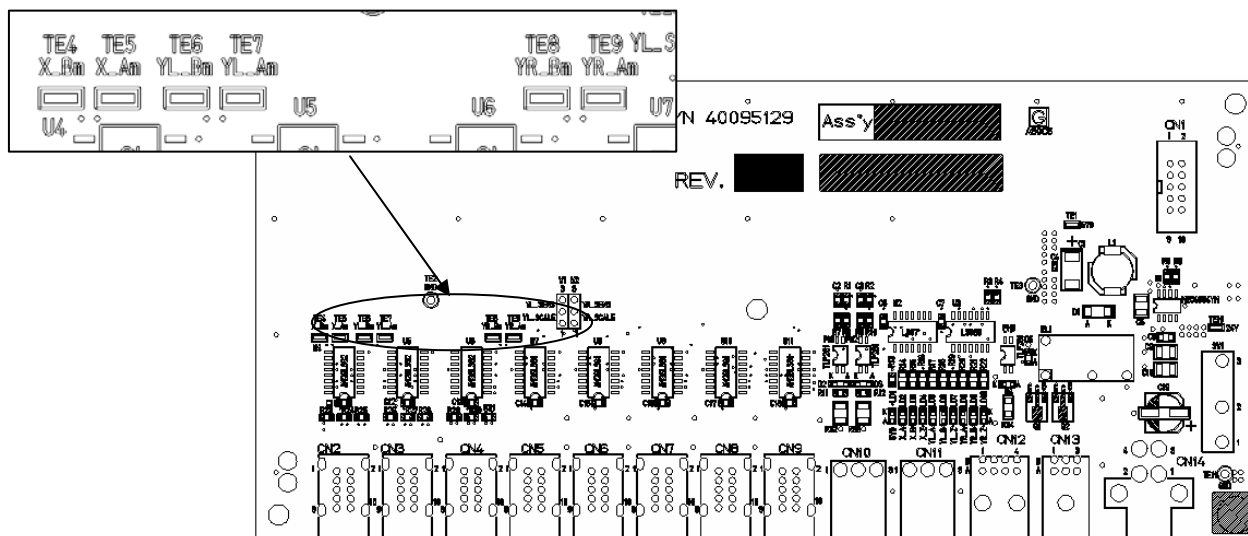


Figure 1-2-2-3 Y-Axis Magnescale Affixing Position

Maintenance Guide

1-2-3. Adjusting the 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 and the jig with a thickness of 0.15 mm is put in the clearance between the magnescale and sensor head in the XY-axes full-stroke.
- 3) Use the test pins on the MAGNET IC SCALE board (part No. 40095130) shown in the figure below.



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

Figure 1-2-3-1

- 4) For every axis, connect the probe of the oscilloscope to the GND terminal "GND (TE3)", "XA (TE5)", "YLA (TE7)" or "YRA (TE9)" 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.

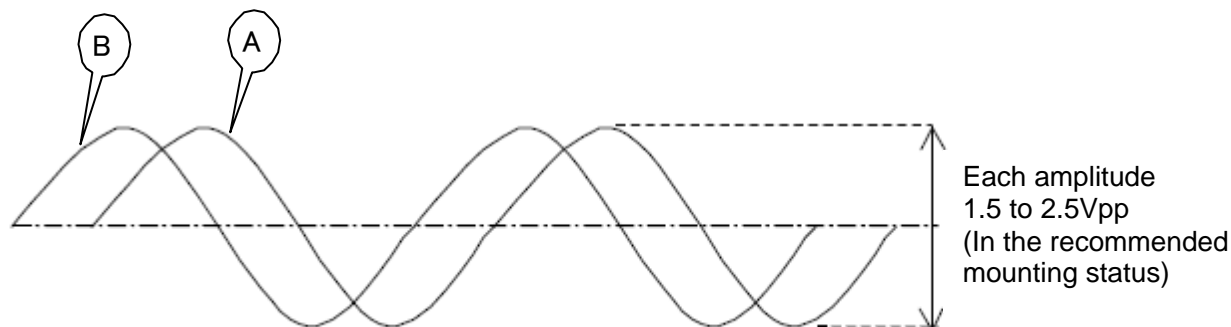


Figure 1-2-3-2

- 5) If the P-P value is not $2.0V \pm 0.5V$, loosen the screw securing the sensor (SL6040892TN (M and L board specifications), SL6041092TN (XL board specifications) for the X-axis and SM6030502TN, SL6041092TN for the Y-axis shown in the figure below).

Maintenance Guide

<X-axis_M and L board specifications>

Clearance between the magnescale and sensor head: 0.25 ± 0.1 mm

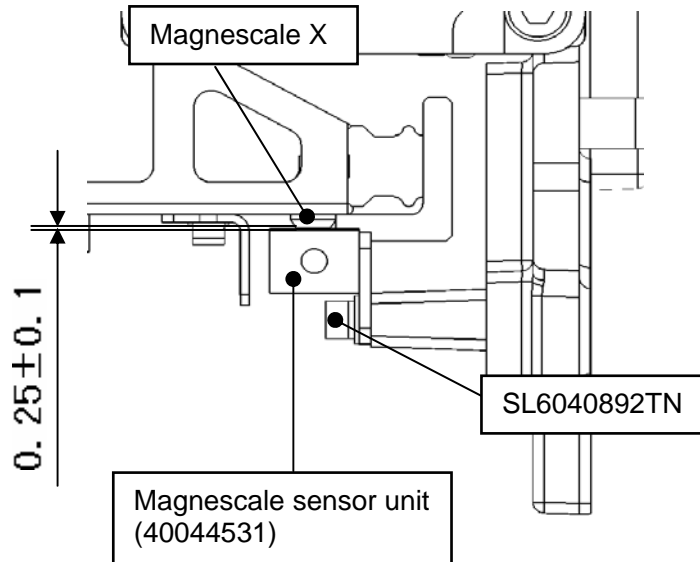


Figure 1-2-3-3

<X-axis_XL board specifications>

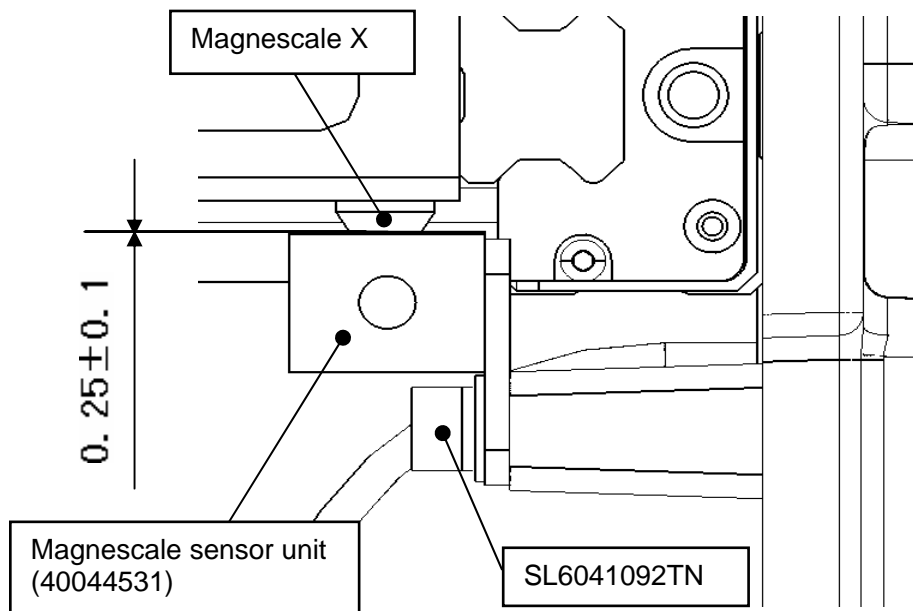


Figure 1-2-3-4

Maintenance Guide

<Y-axis_M and L board specifications>

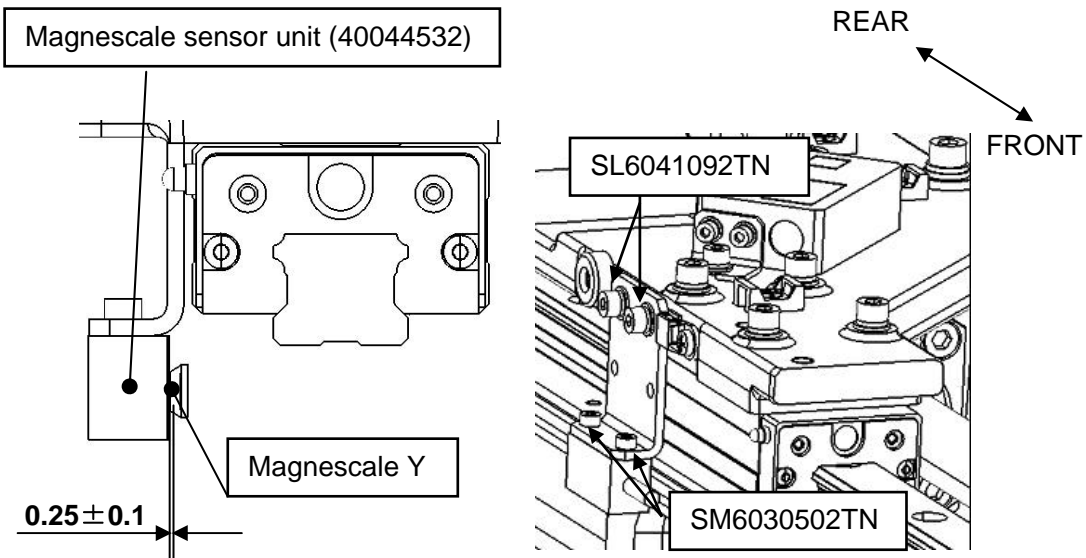


Figure 1-2-3-5

<Y-axis_XL board specifications>

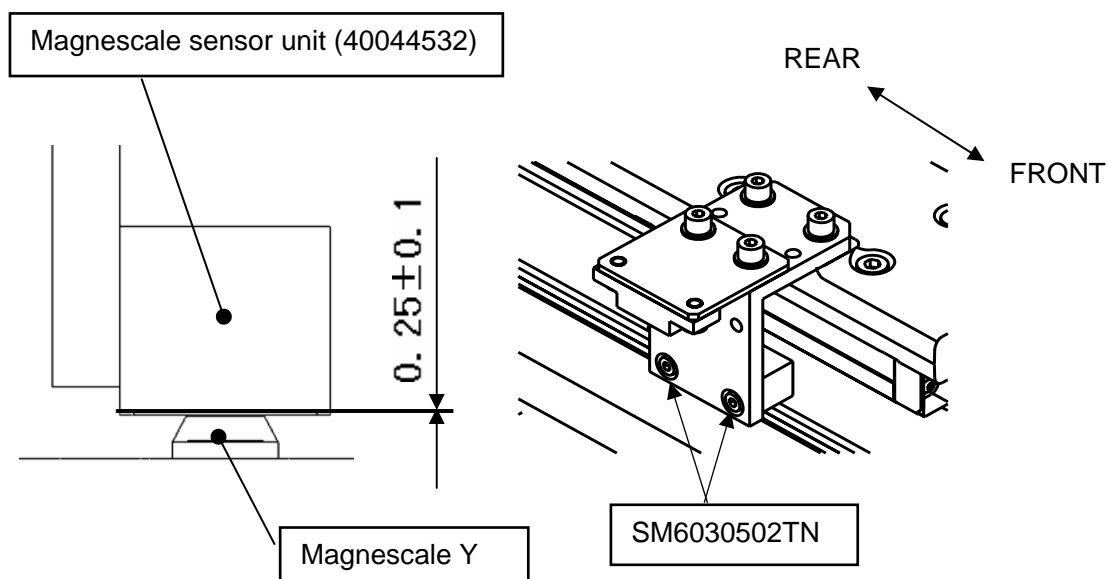


Figure 1-2-3-6

Maintenance Guide

1-2-4. Clearance between the Sensor Head and Y-axis LM Guide (Y-axis_XL Board Specifications Only)

- 1) Put the 14mm-ceramic block and the MSC clearance jig (part No. 40098185) in the clearance between the Y-axis LM guide and sensor head in the XY-axes full-stroke to check that they are put in the clearance smoothly without play.
- 2) If the clearance is beyond 14.15 mm in the check conducted in step 1), loosen the screw SL6041292TN fixing the sensor bracket.
- 3) Put the 14mm-ceramic block and the MSC clearance jig (part No. 40098185) in the clearance between the Y-axis LM guide and sensor head, and then tighten the screw again.
- 4) Conduct the same check as described in step 1).

**Clearance between the sensor head and Y-axis LM guide:
14.15±0.1 mm (Y-axis only)**

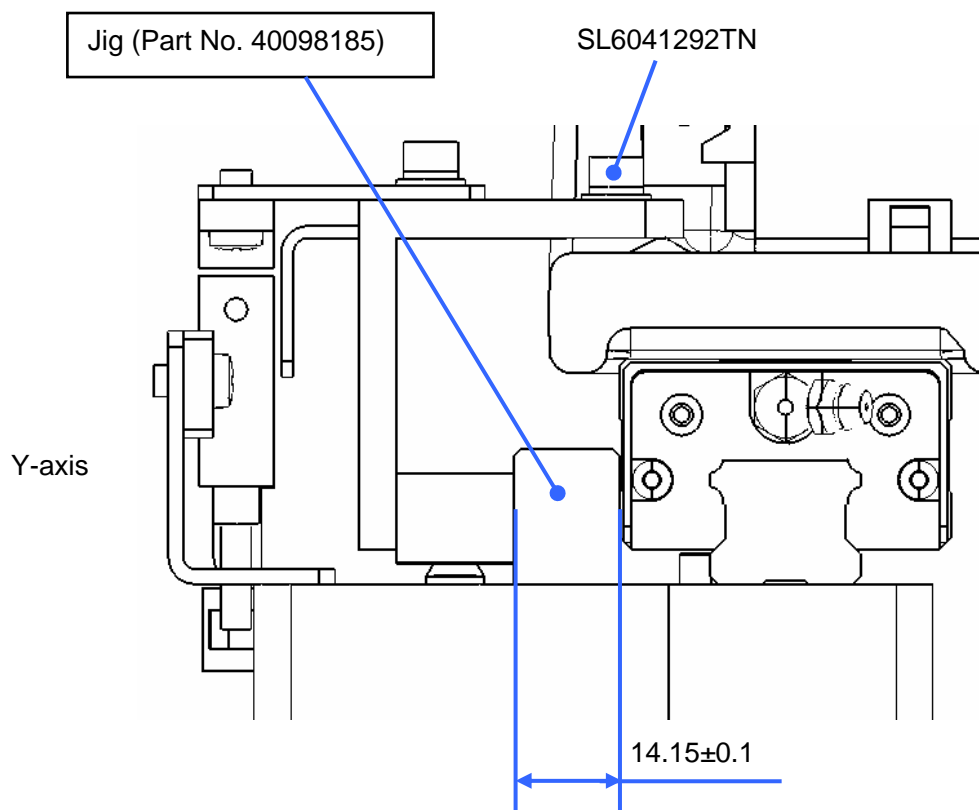


Figure 1-2-4-1

Maintenance Guide

1-3. Replacing the Limit Sensor and Origin Near Sensor

- 1) When replacing only the sensor, it is not necessary to adjust the position.
 - 2) When replacing the sensor together with the bracket, it is necessary to adjust the position.
- * The home position of the X-axis is the Z-phase of the magnescale. Therefore, there is no home position sensor for the X-axis.

1-3-1. Replacing the X-Axis Limit Sensor and the X-Axis Home Proximity Sensor

- 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. (See Figure 1-3-1-1 (M and L board specifications) and Figure 1-3-1-2 (XL board specifications).)

<M and L board specifications (Examples of KE-3020V and VR)>

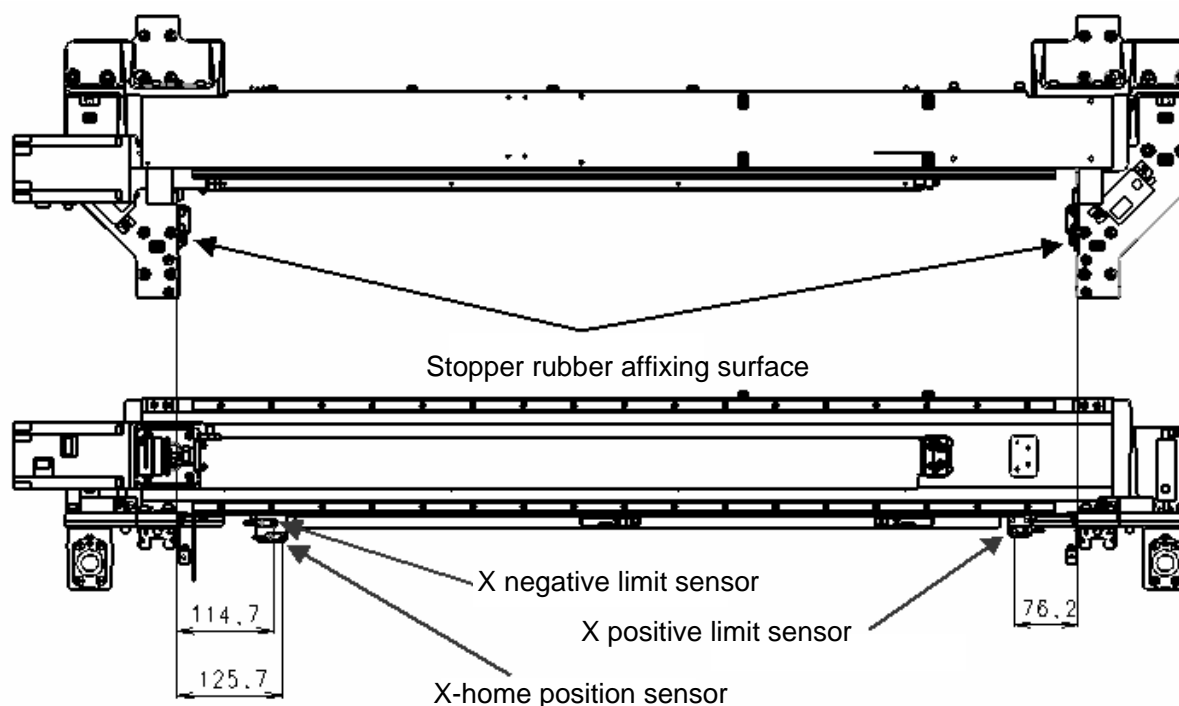


Figure 1-3-1-1 M and L Board Specifications (Examples of KE-3020V and VR)

Left (X negative limit sensor)	Distance between the stopper rubber affixing surface of the X-frame end L and the center of the sensor: 114.7 mm (KE-3010: 85.7 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: 125.7 mm (KE-3010: 96.7 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: 76.2 mm (KE-3010: 112.2 mm)
Clearance between the limit sensor and the dog	0.8 to 1.5 mm (target: 1.0 mm)

Maintenance Guide

<XL board specifications (Example of KE-3020V and VR)>

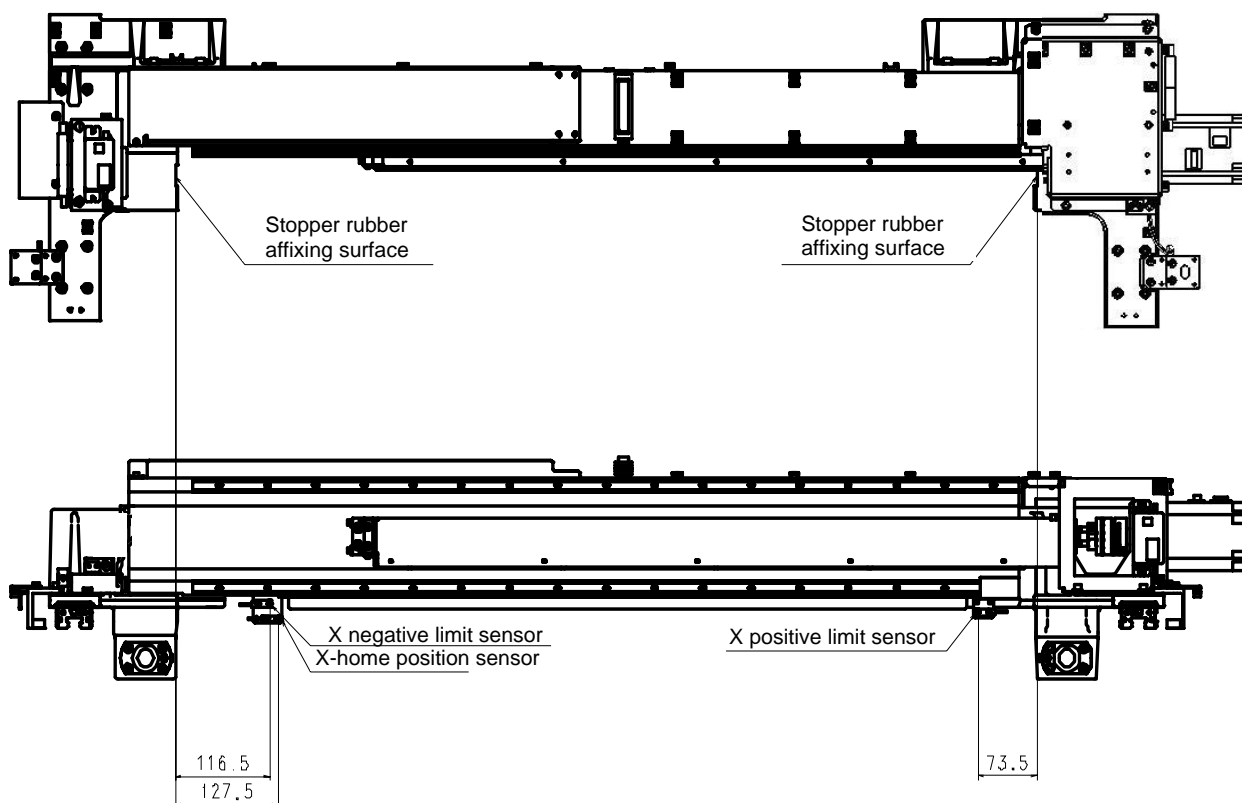


Figure 1-3-1-2 XL Board Specifications (Example of KE-3010V)

Left (X negative limit sensor)	Distance between the stopper rubber affixing surface of the X-frame end L and the center of the sensor: 116.5 mm (KE-3010: 93.2 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: 127.5 mm (KE-3010: 104.2 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: 73.5 mm (KE-3010: 119.7 mm)
Clearance between the limit sensor and the dog	0.8 to 1.5 mm (target: 1.0 mm)

Maintenance Guide

- 2) For the backward direction, make the adjustment so that the clearance between the X_LMT 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. (See Figure 1-3-1-3 (M and L board specifications) and Figure 1-3-1-4 (XL board specifications).)

<M and L board specifications>

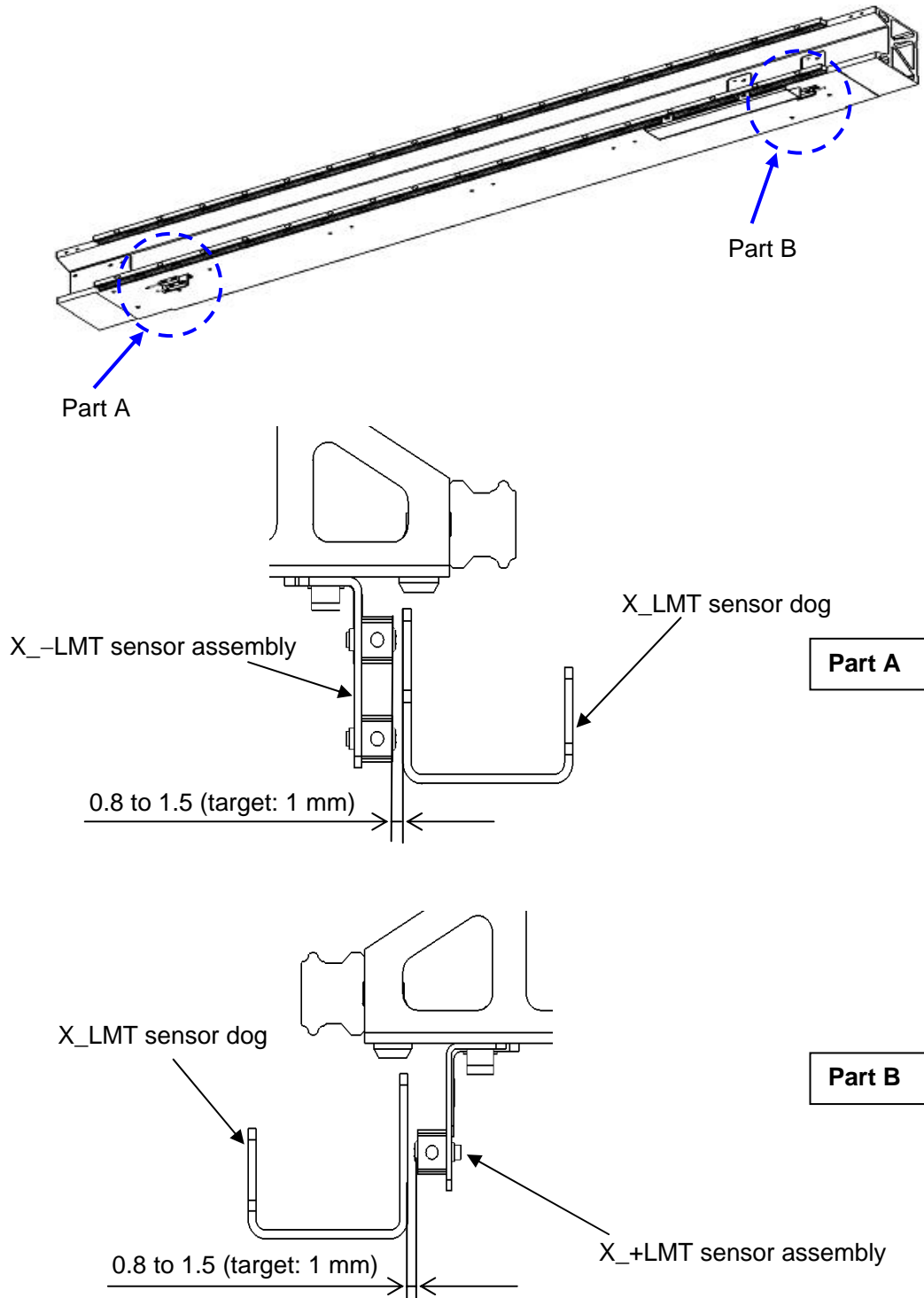


Figure 1-3-1-3 M and L Board Specifications

Maintenance Guide

<XL board specifications>

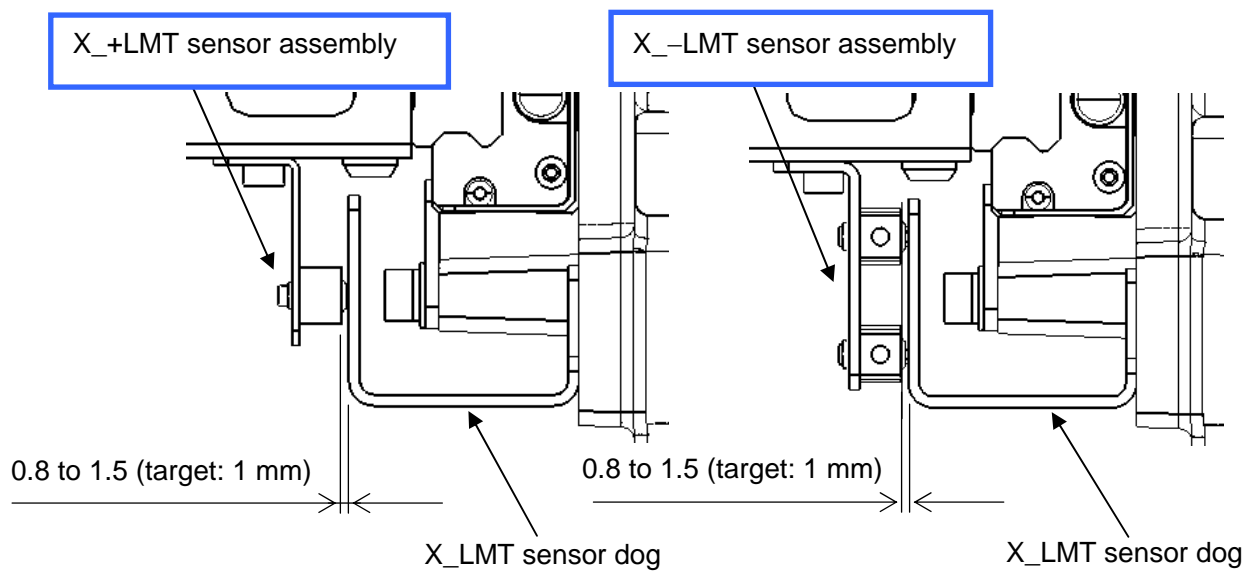
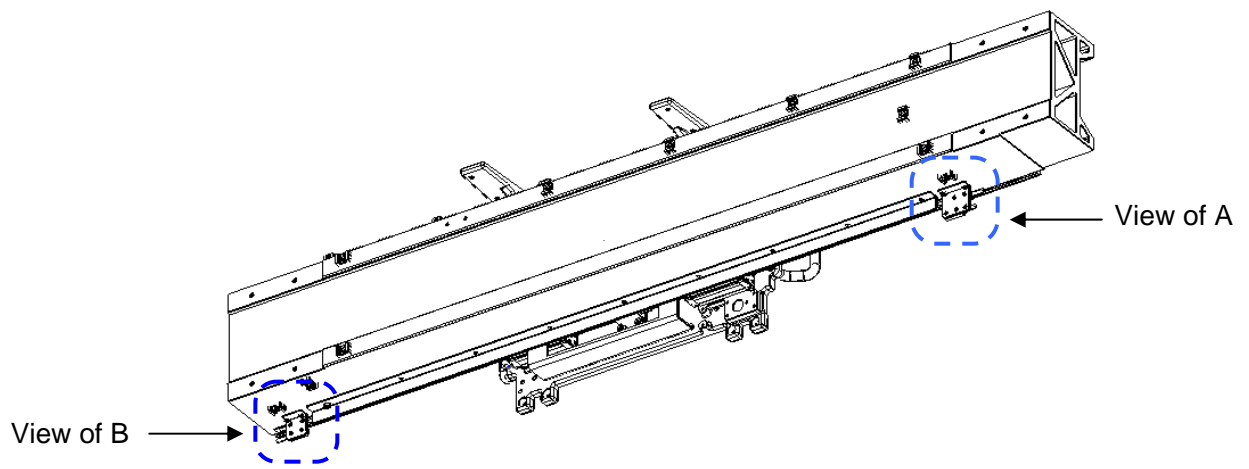


Figure 1-3-1-4 XL Board Specifications

Maintenance Guide

1-3-2. 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 screws fixing the Y-limit sensor bracket and make the adjustment so that the distances from the split pin mounting center position of the base frame are those shown in the Figure below. After the adjustment has been completed, tighten the screws firmly. (See Figure 1-3-2-1 (M and L board specifications) and Figure 1-3-2-2 (XL board specifications).)

<M and L board specifications>

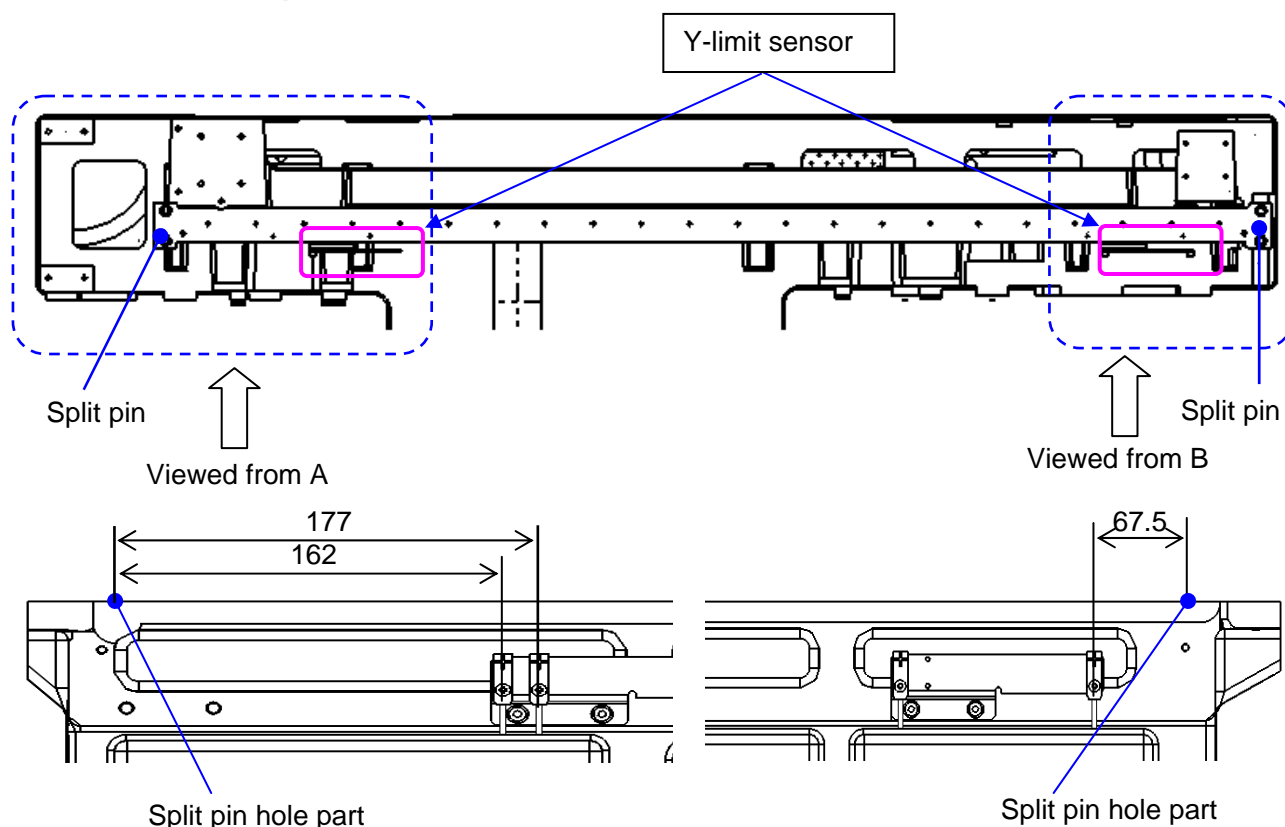


Figure 1-3-2-1 M and L Board Specifications

Front side (Y negative limit sensor)	Distance from the split pin mounting center position on the front of the base frame to the center of the sensor: 162 mm
Front side 2 (Y near sensor)	Distance from the split pin mounting center position on the front of the base frame to the center of the sensor: 177 mm
Rear side 2 (Y ++ limit sensor)	Distance from the split pin mounting center position on the rear of the base frame to the center of the sensor: 67.5 mm
Clearance between the limit sensor and the dog	1.8 to 2.5 mm (target: 2.0 mm)

Maintenance Guide

<XL board specifications>

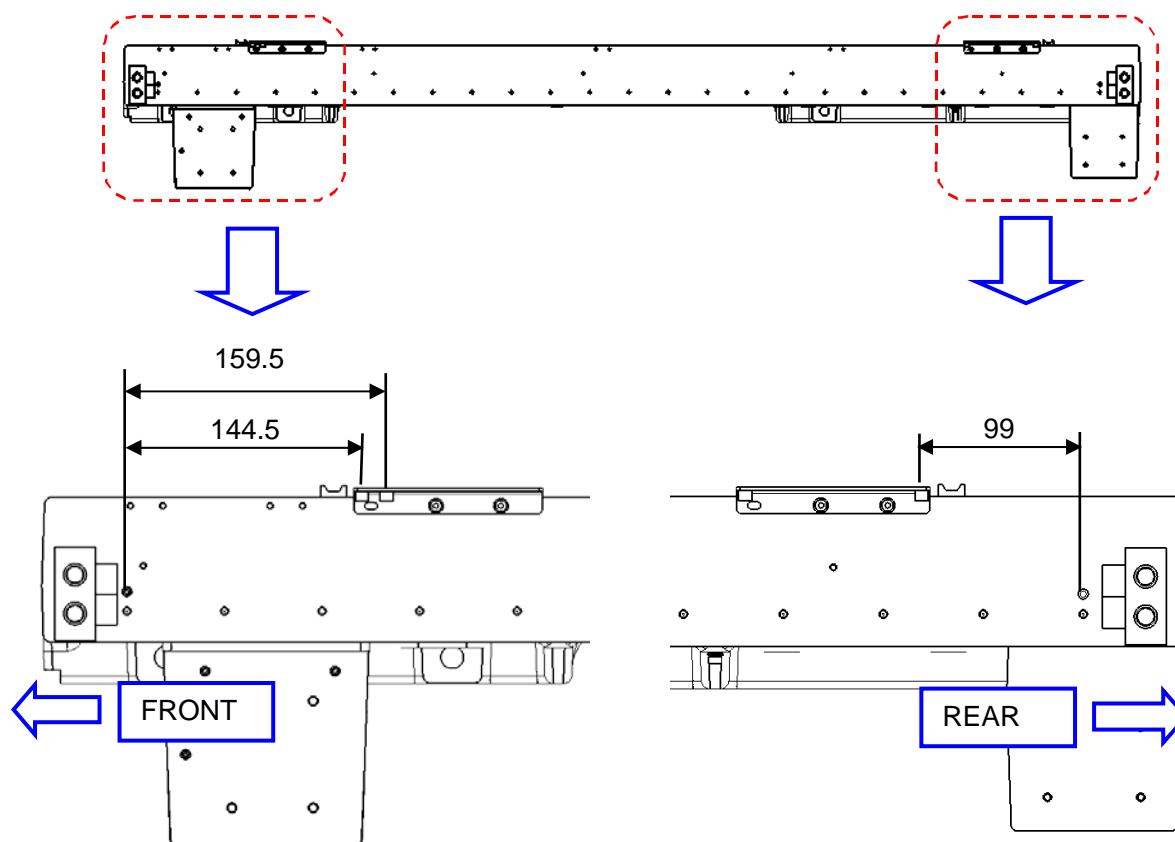


Figure 1-3-2-2 XL Board Specifications

Front side (Y negative limit sensor)	Distance from the split pin mounting center position on the front of the base frame to the center of the sensor: 144.5 mm
Front side 2 (Y near sensor)	Distance from the split pin mounting center position on the front of the base frame to the center of the sensor: 159.5 mm
Rear side 2 (Y ++ limit sensor)	Distance from the split pin mounting center position on the rear of the base frame to the center of the sensor: 99 mm
Clearance between the limit sensor and the dog	1.8 to 2.5 mm (target: 2.0 mm)

Maintenance Guide

- 2) Make the adjustment so that the clearance between the Y sensor dog and the sensor surface is 1.8 to 2.5 mm (target: 2.0 mm), and then tighten the screw. (See Figure 1-3-2-3 (M and L board specifications) Figure 1-3-2-4 (XL board specifications).)

<M and L board specifications>

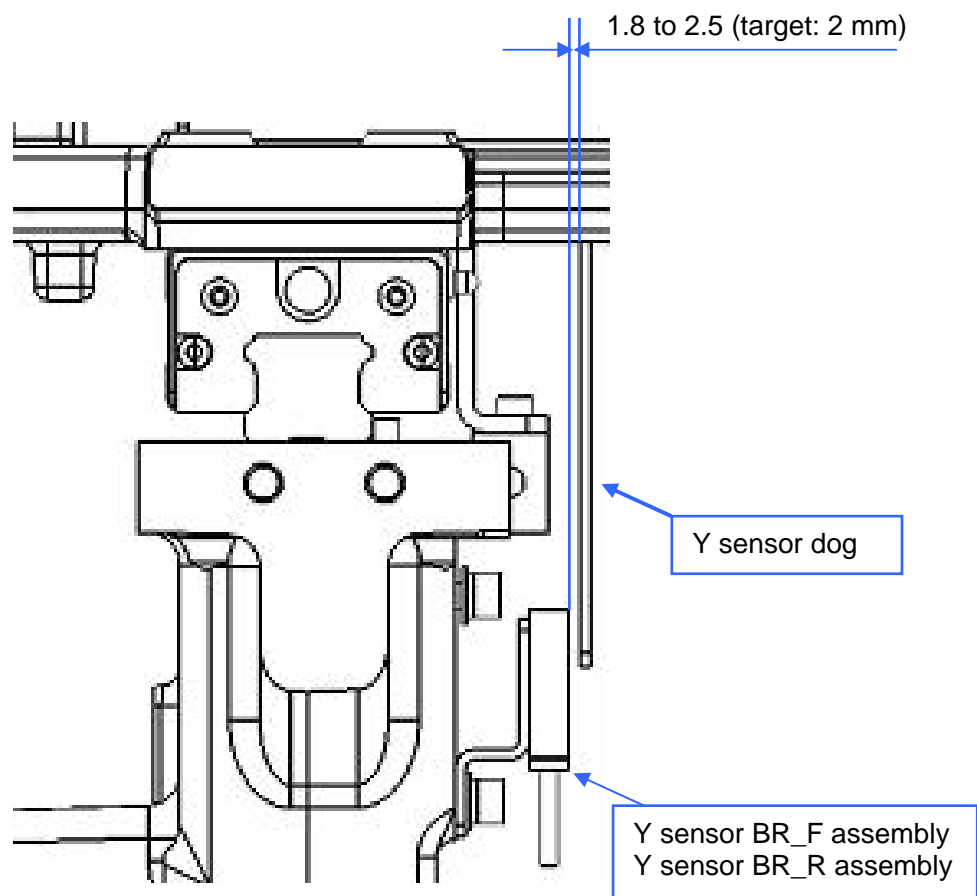
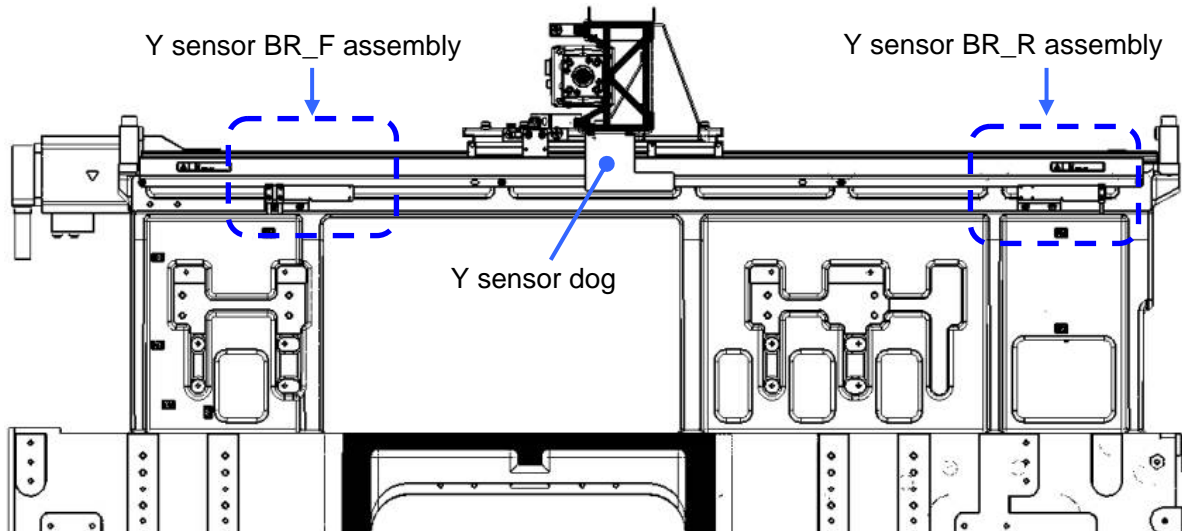


Figure 1-3-2-3 M and L Board Specifications

Maintenance Guide

<XL board specifications>

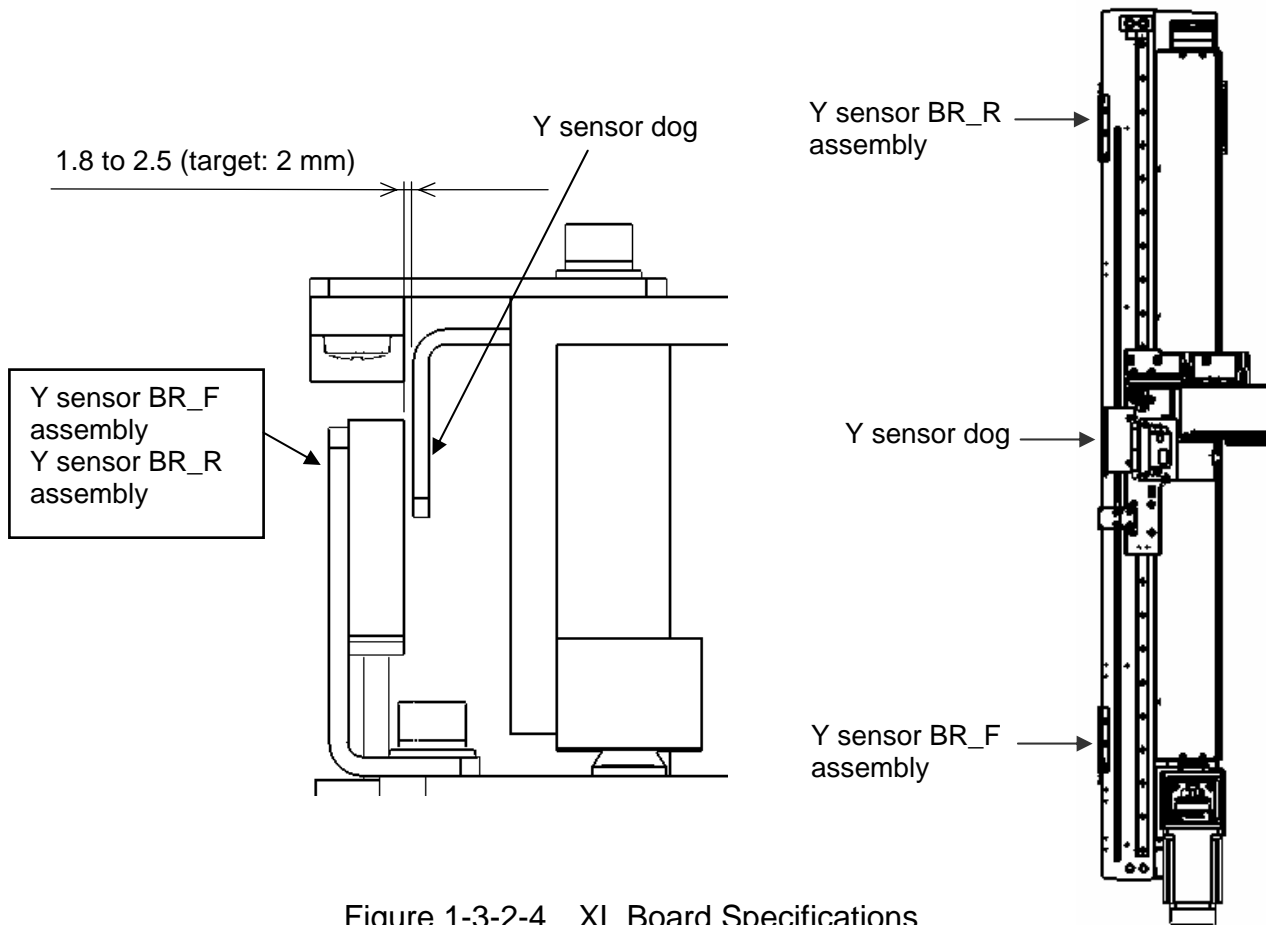


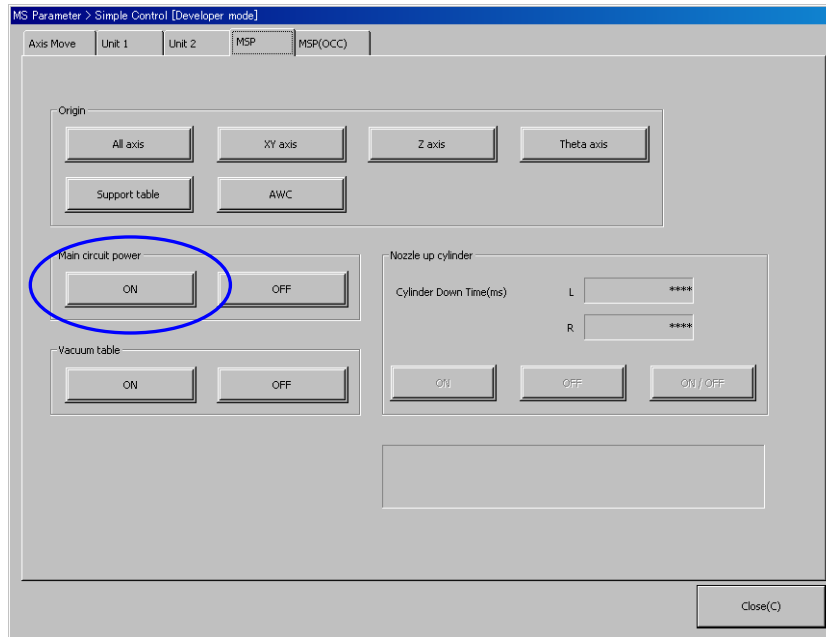
Figure 1-3-2-4 XL Board Specifications

Maintenance Guide

1-3-3. Checking the Limit Sensor Operation

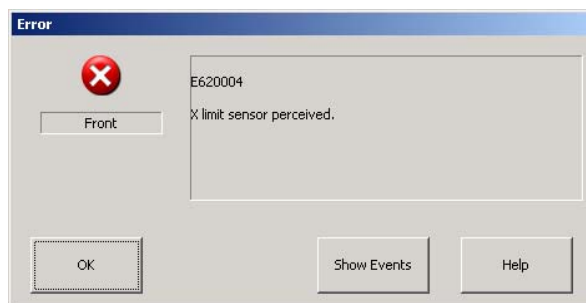
1-3-3-1. Checking the X-Limit Sensor Operation

- 1) After the sensor has been replaced, start up the machine. The “Origin Return” dialog box will appear. Do not perform the origin return and click [Cancel].
- 2) From the Maintenance menu of the main unit software, select [MS Parameter Setup].
- 3) Start up the simple control on the MS Parameter screen. In the MSP tab window, select [ON] in the “Main Circuit Power” area.



- 4) Check the operation of the $-X$ -limit sensor (X negative limit sensor). Manually move the head left to a position where it interrupts the light to the $-X$ -limit sensor.

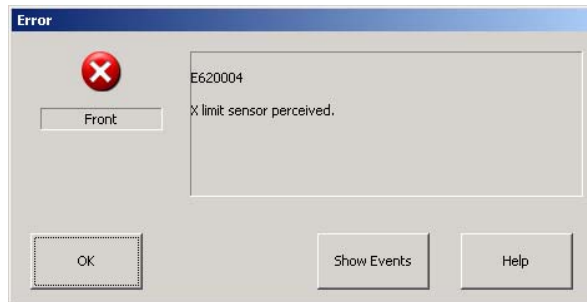
At this time, check that the “X-axis movement limit” dialog box pops up on the monitor.



- 5) Move the head right to reset the $-X$ -limit sensor.
- 6) After resetting, perform the same operation as described in step 3) to turn ON the main circuit power and close the “X-axis movement limit” dialog box.

Maintenance Guide

- 7) Check the operation of the +X-limit sensor (X positive limit sensor). Manually move the head right to a position where it interrupts the light to the +X-limit sensor.
- 8) Check that the “X-axis movement limit” dialog box pops up on the monitor.



- 9) Move the head left to reset the +X-limit sensor.
- 10) After resetting, perform the same operation as described in step 3) to turn ON the main circuit power and close the “X-axis movement limit” dialog box.

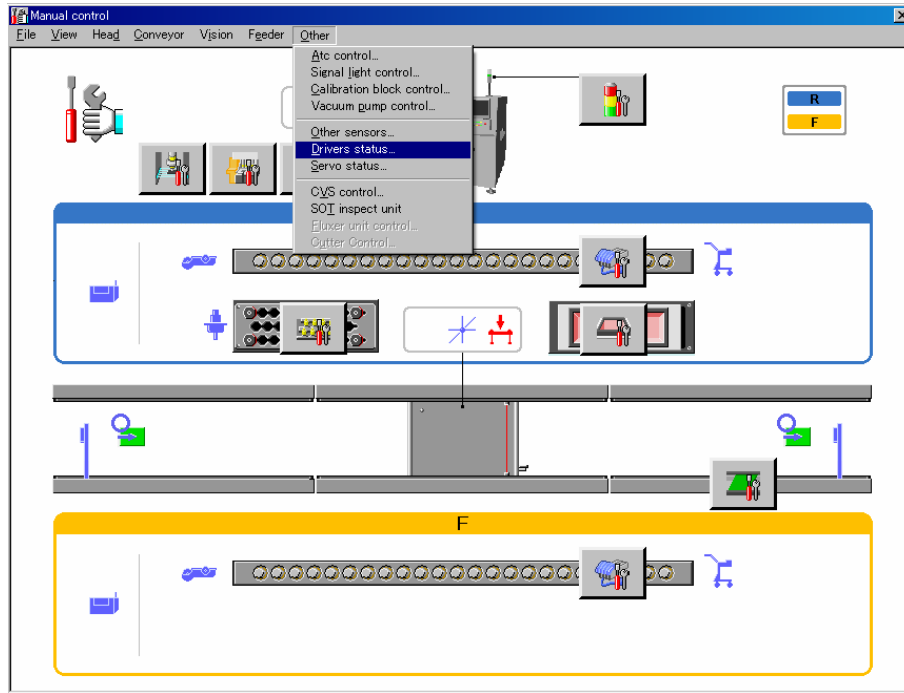
1-3-3-2. Checking the Y-Limit Sensor Operation

- 1) In the same manner as described for the section, Checking the X-limit sensor operation, check the operation of the Y-limit sensor.
- 2) After the operations of both the X- and Y-sensors have been checked completely, exit the main unit software and set the safety direction setup to “No”.
- 3) When the machine is ready to power OFF, turn OFF the POWER switch.
- 4) Turn ON the POWER switch again.

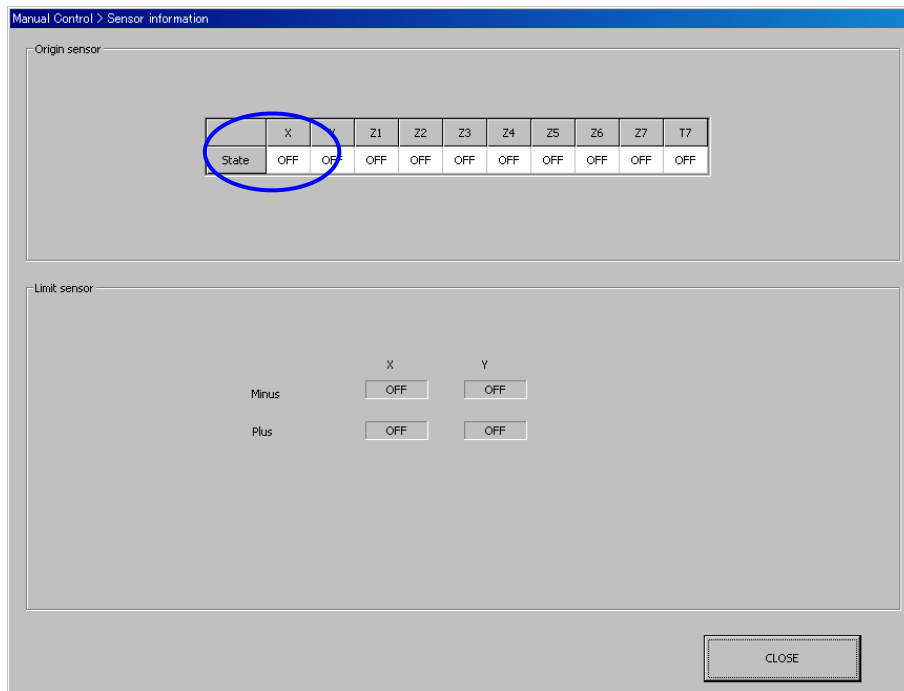
Maintenance Guide

1-3-4. Checking the X- and Y-NEAR SENSOR Operation

- 1) Perform steps 1) to 3) in the section, Checking the X-limit sensor operation.
- 2) Select [Manual Control] from the Menu screen of the main unit software.
- 3) From the [Other] menu on the Manual Control screen, select [Driver Status].



- 4) The “Driver Status” screen will appear. Select [Sensor Information]. After the sensor information has been selected, the following screen will appear.



Maintenance Guide

- 5) Check the operation of the X-near sensor. Check that the display item "X-Near" is OFF.
Manually move the head left to a position where it passes the near sensor.
- 6) After the head has passed the near sensor, check that "X-Near" shown in the Figure above is ON. Furthermore, visually check that the LED on the X-near sensor is lit.
- 7) Check the operation of the Y-near sensor. Check that the display item "Y-Near" is OFF.
Manually move the head toward you to a position where it passes the near sensor.
- 8) After the head has passed the near sensor, check that "Y-Near" is ON. Furthermore, visually check that the LED on the Y-near sensor is lit.
- 9) Exit the main unit software. When the machine is ready to power OFF, turn OFF the POWER switch.
- 10) Turn ON the POWER switch again and perform the origin return.

Maintenance Guide

1-4. Replacing the Home Position Sensor

1-4-1. X-Axis

The X-axis home position sensor is not provided on the KE-3010/3020V/3020VR. It is built in the magnescale.

1-4-2. Y-Axis

<M and L board specifications>

The Y-axis home position sensor is not provided on the KE-3010/3020V/3020VR. It is built in the magnescale.

After replaced, perform the steps stated in sections 3-5, Y Set up and 3-6, Adjust Square, in the MS Parameter.

<XL board specifications>

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 ± 0.2 mm. If this is not satisfied, loosen the sensor fixing screw and vertically move the sensor to adjust the distance 1.0 ± 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) Perform the steps stated in section 3-6, Adjust Square, in the MS Parameter.

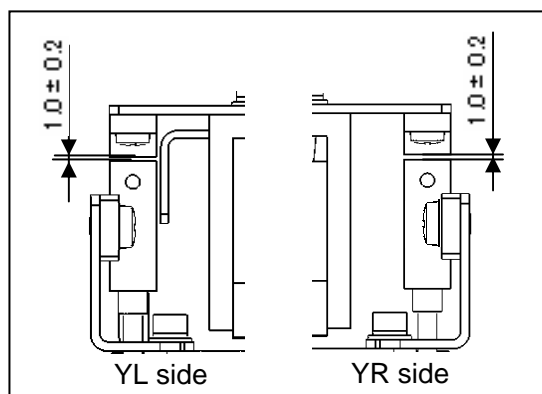


Figure 1-4-2-1 XL Specifications

[After each home position sensor has been replaced, perform the steps stated in section 4-1, Rough Adjustment of Origin, in the MS Parameter.]

Maintenance Guide

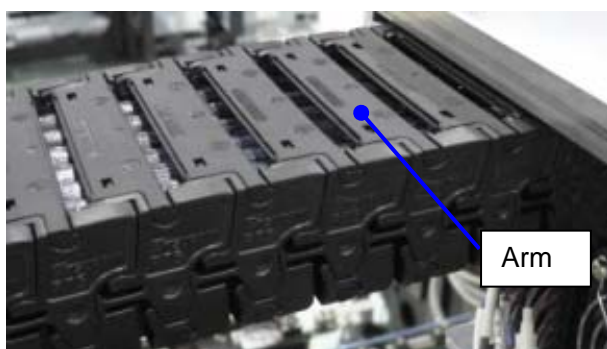
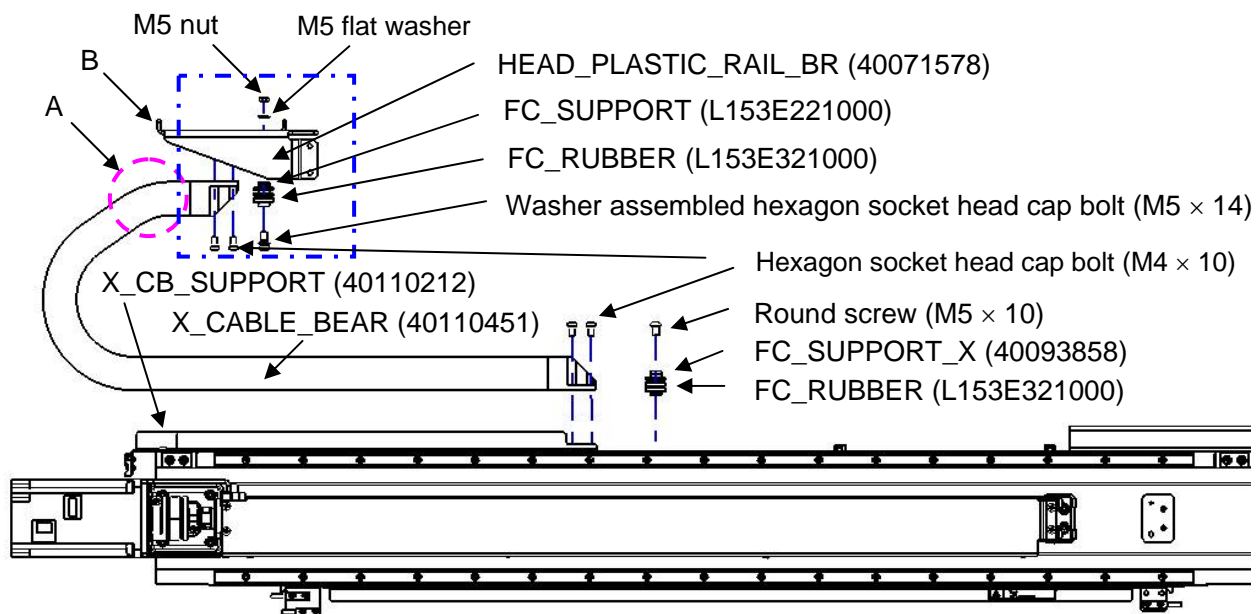
1-5. Replacing the Cableveyor

1-5-1. Replacing the X-Axis Cableveyor

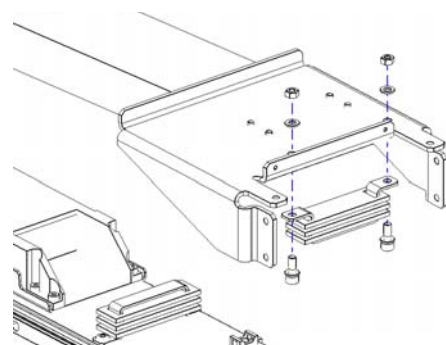
<M and L board specifications> X_CABLE_BEAR (Part No.: 40110451)

- 1) Remove the hexagon socket head cap bolt (M4×10) to detach the X_CABLE_BEAR from the HEAD_PLASTIC_RAIL_BR and X_CB_SUPPORT.
- 2) Remove the M5 nut and washer assembled hexagon socket head cap bolt (M5×14) to detach the M5 flat washer, FC_SUPPORT, and FC_RUBBER.
- 3) Remove the round screw (M5×10) to detach the FC_SUPPORT_X and FC_RUBBER.
- 4) Remove the arm of the X-axis cableveyor, take out the cables, and replace the cableveyor.
- 5) Reassemble the components in the reverse order of disassembly. At this time, pay special attention so that the cables inside the cableveyor are not entangled.

Additionally, push the cables inside the X-cableveyor by hand to check that they are flexible.



Part A



Part B

Figure 1-5-1-1 X-Axis Cableveyor (M and L Board Specifications)

Maintenance Guide

<XL board specifications> X_PLASTIC_RAIL_XL (Part No.: 40098059)

- 1) Remove the hexagon socket head cap bolt (M4×10) to detach the X_PLASTIC_RAIL_XL from the HEAD_PLASTIC_RAIL_BR and X_PLASTIC_RAIL_SUPPORT_XL.
 - 2) Remove the M5 nut and washer assembled hexagon socket head cap bolt (M5×14) to detach the M5 flat washer, FC_SUPPORT, and FC_RUBBER.
 - 3) Remove the hexagon socket head cap bolt (M5×10) to detach the FC_SUPPORT_X and FC_RUBBER.
 - 4) Remove the arm of the X-axis cableveyor, take out the cables, and replace the cableveyor.
 - 5) Reassemble the components in the reverse order of disassembly. At this time, pay special attention so that the cables inside the cableveyor are not entangled.
- Additionally, push the cables inside the X-cableveyor by hand to check that they are flexible.

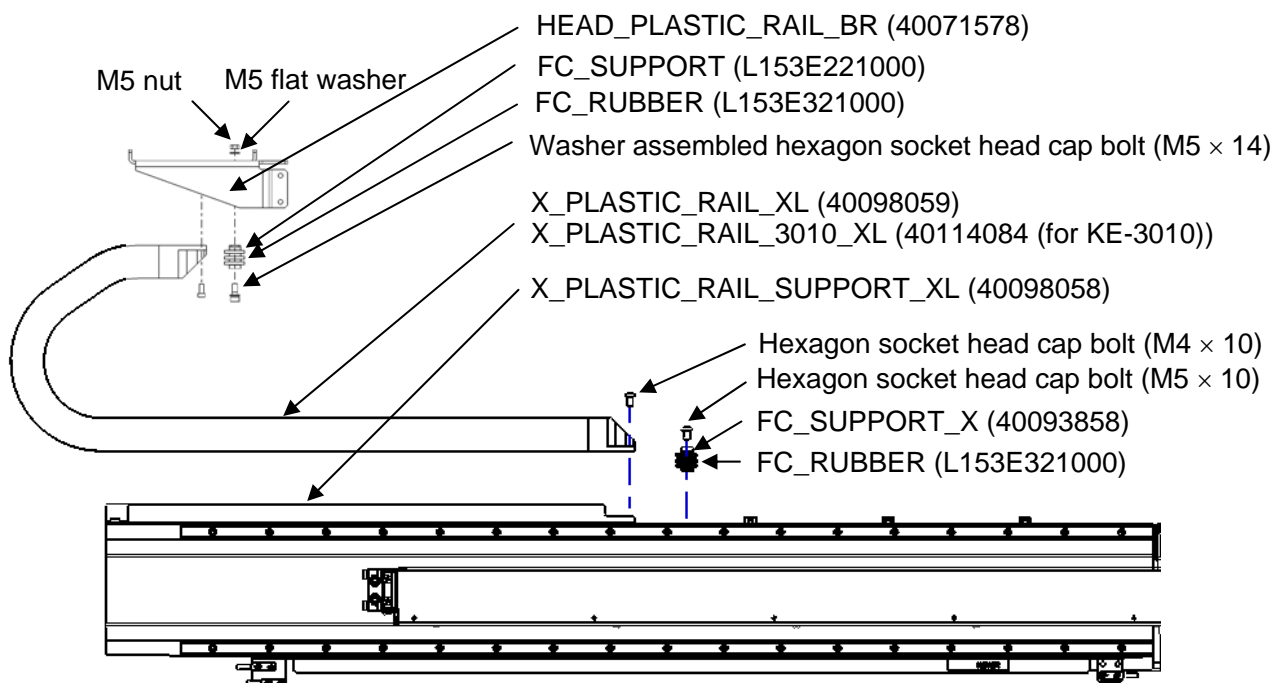


Figure 1-5-1-2 X-Axis Cableveyor (XL Board Specifications)

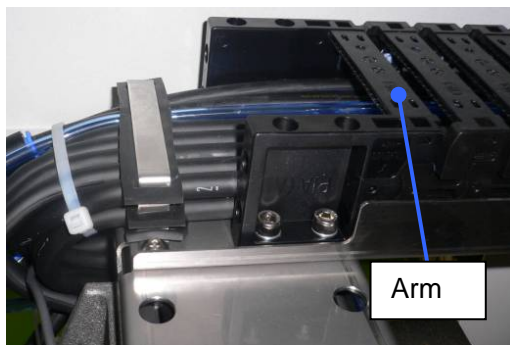
Maintenance Guide

1-5-2. Replacing the Y-Axis Cableveyor

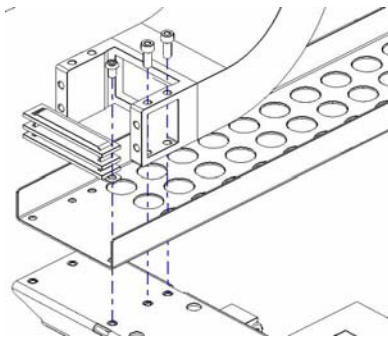
<M and L board specifications> Y_CABLE_BEAR_M (Part No.: 40110452)

Y_CABLE_BEAR_L (Part No.: 40111993)

- 1) Remove the hexagon socket head cap bolt (M6×16) to detach the Y_CABLE_BEAR from the CB_BRACKET and Y_CB_SUPPORT.
- 2) Remove the round screw (M6×10) to detach the FC_SUPPORT_Y, FC_SUPPORT_Y_V2 and FC_RUBBER_Y.
- 3) Remove the arm of the Y-axis cableveyor, take out the cables, and replace the cableveyor.
- 4) Reassemble the components in the reverse order of disassembly. At this time, pay special attention so that the cables inside the cableveyor are not entangled. Additionally, move the Y-axis to the foremost position and push the cables inside the Y-cableveyor by hand to check that they are flexible.



Part A



Part B

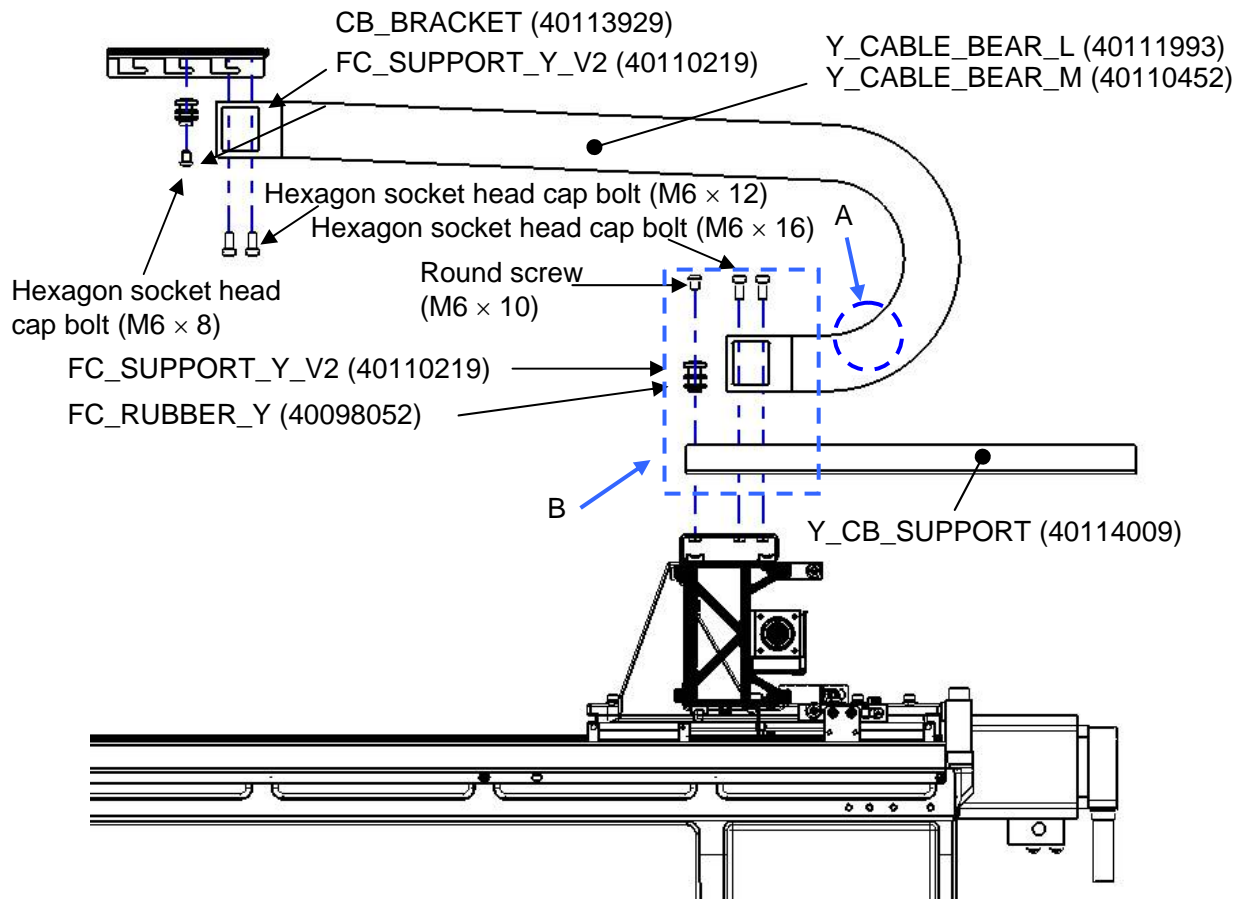


Figure 1-5-2-1 Y-Axis Cableveyor (M and L Board Specifications)

Maintenance Guide

<XL board specifications> Y_PLASTIC_RAIL_XL (Part No.: 40098060)

- 1) Remove the hexagon socket head cap bolt (M4×10) to detach the Y_PLASTIC_RAIL_XL from the Y_PLASTIC_RAIL_BR_XL and Y_PLA_RAIL_SUPPORT_XL.
- 2) Remove the round screw (M6×10) to detach the FC_SUPPORT_Y and FC_RUBBER_Y.
- 3) Remove the arm of the Y-axis cableveyor, take out the cables, and replace the cableveyor.
- 4) Reassemble the components in the reverse order of disassembly. At this time, pay special attention so that the cables inside the cableveyor are not entangled.
Additionally, move the Y-axis to the foremost position and push the cables inside the Y-cableveyor by hand to check that they are flexible.

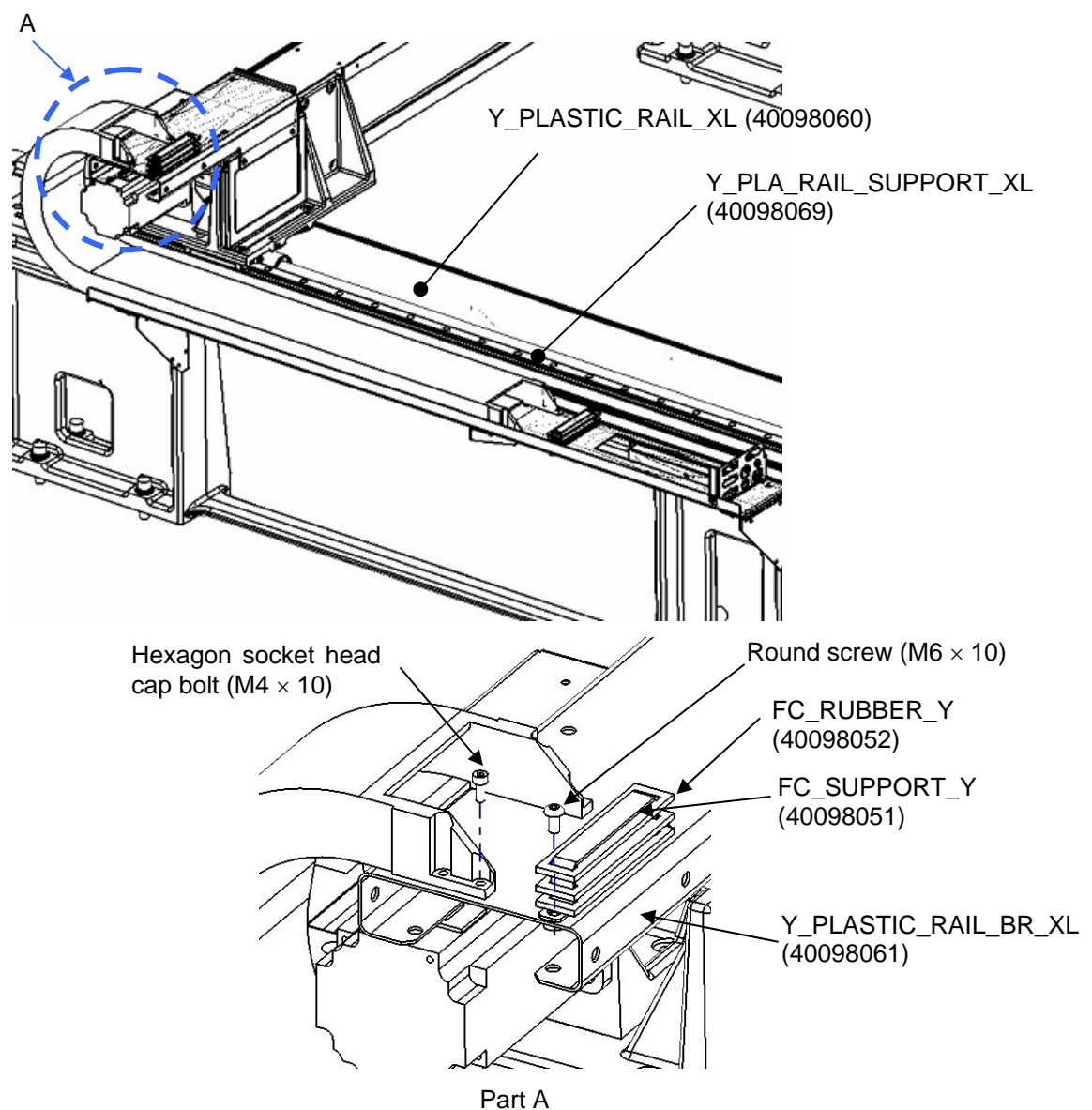


Figure 1-5-2-2 Y-Axis Cableveyor (XL Board Specifications)

Maintenance Guide

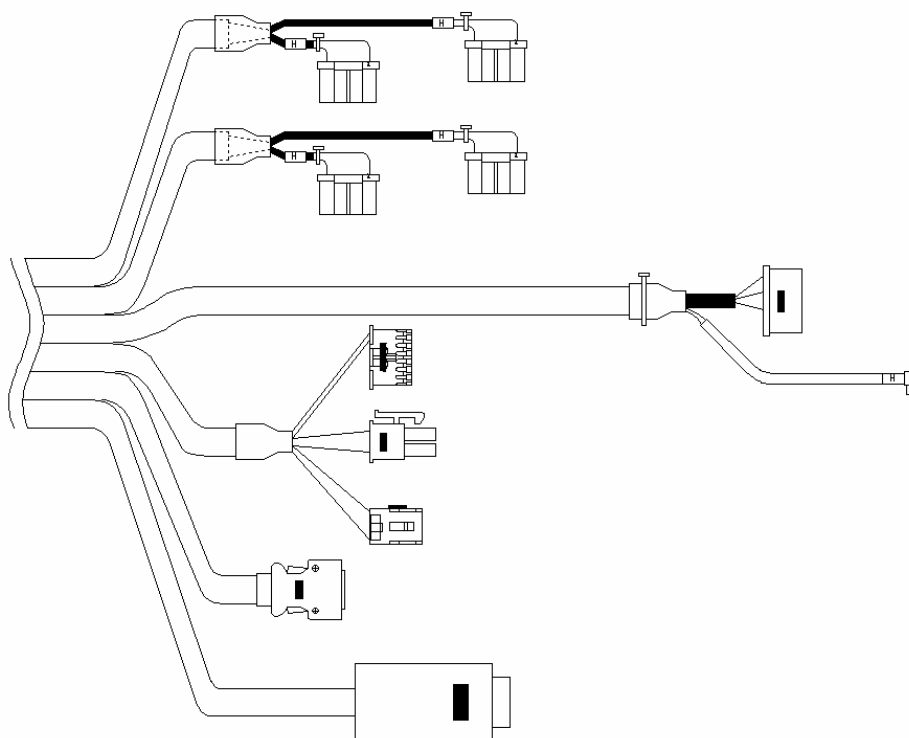
1-6. Replacing the Cables in the X/Y Veyor-Cable

1-6-1. 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.

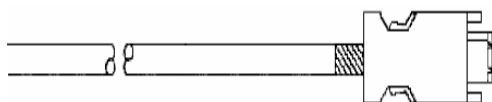
XY veyor-cable

M and L board specifications: XY veyor-cable (40113621)
 XL board specifications: XY veyor-cable XL (40092637)



1394 robot cable

M and L board specifications: 1394 ROBOT CABLE ASM
 (40044517)
 XL board specifications: 1394 ROBOT CABLE ASM _XL
 (40095138)



OPTICAL FIBER CABLE 7M

M and L board specifications: OPTICAL FIBER
 CABLE7M (40048070)
 XL board specifications: OPTICAL FIBER CABLE 7M
 (40092448)



Figure 1-6-1-1

Maintenance Guide

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

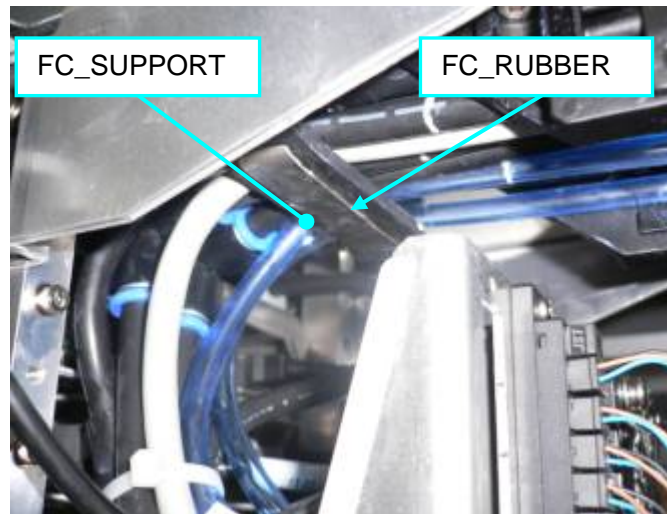


Figure 1-6-1-2 Movement End of Cableveyor

- 3) Perform the same work in step 2) at the fixed end of the cableveyor.

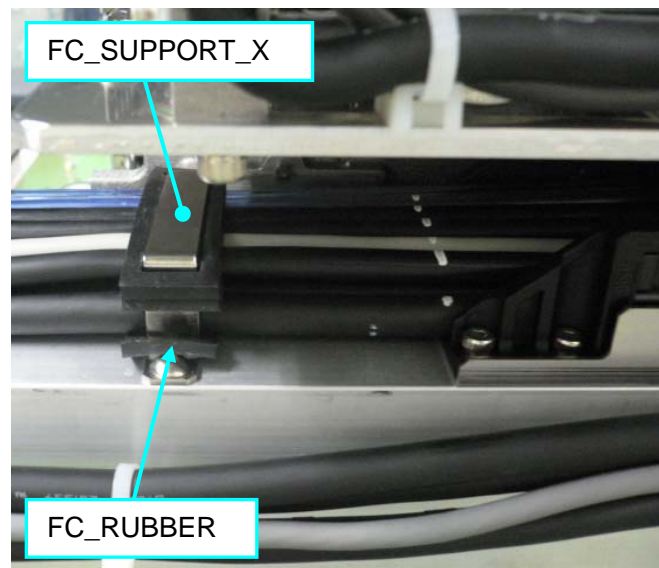


Figure 1-6-1-3 Fixed End of Cableveyor

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

Maintenance Guide

1-6-2. Checking the Cable Marking (X)

- 1) Check the marking position of the XY veyor-cable (XY veyor-cable XL).
(Place the marks at a position 115mm from the HEAD-CN2 connector end.)

XY veyor-cable (XY veyor-cable XL)

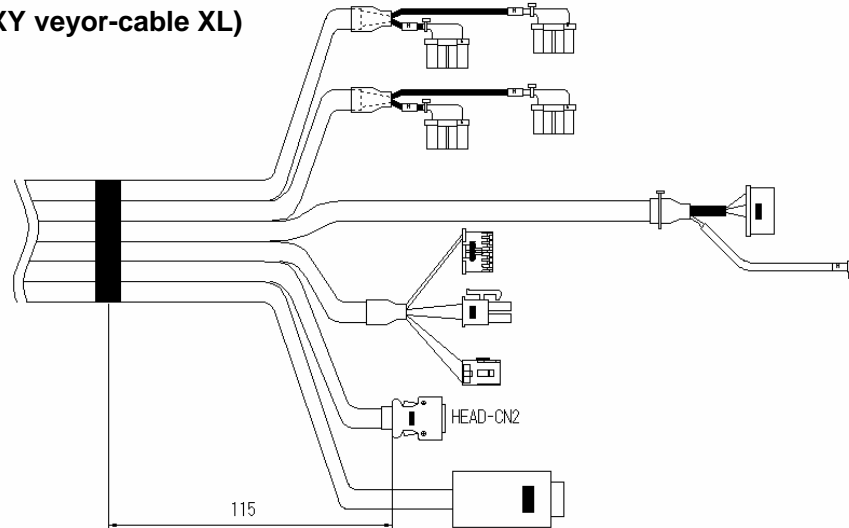
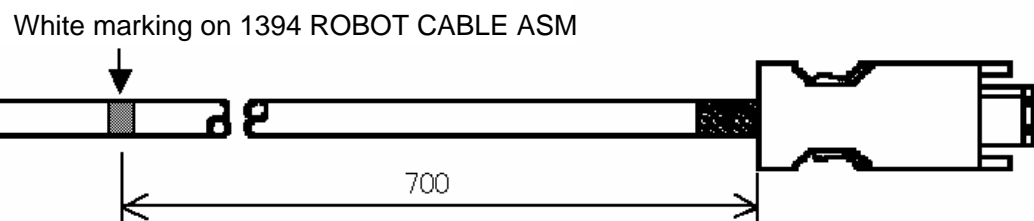


Figure 1-6-2-1

- 2) Check the marking positions of the 1394 robot cable and the optical fiber cable 7M.
(At this time, place a mark at a position 700mm from the connector end of the robot cable and at a position 200mm from the connector end of the fiber cable.)

1394 robot cable



OPTICAL FIBER CABLE 7M

White marking on OPTICAL FIBER CABLE 7M

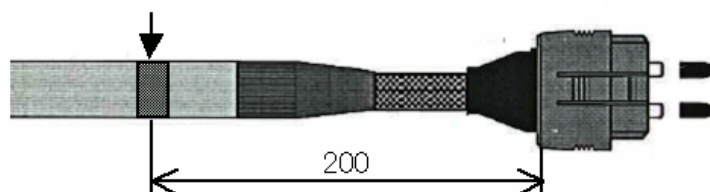


Figure 1-6-2-2

Maintenance Guide

1-6-3. Assembling the Cable

- 1) Apply the grease to portions where the cables (XY veyor-cable (XY veyor-cable XL), 1394 robot cable and the optical fiber cable 7M) are put in the cableveyor, and place the cables and air tubes in the X-axis cableveyor 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.

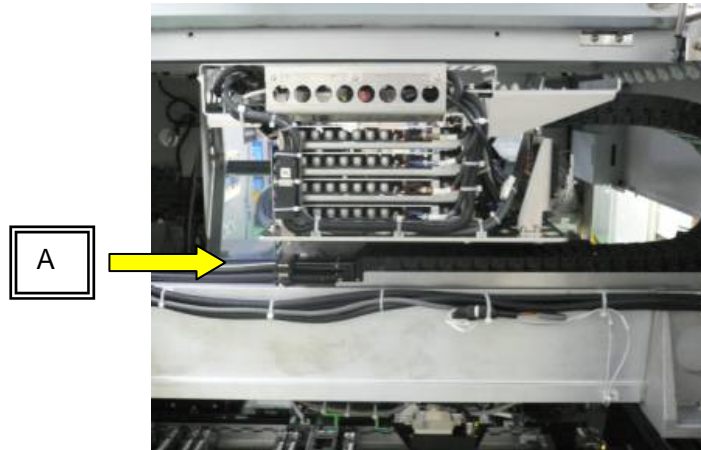


Figure 1-6-3-1 Head Unit (Rear Side)

Maintenance Guide

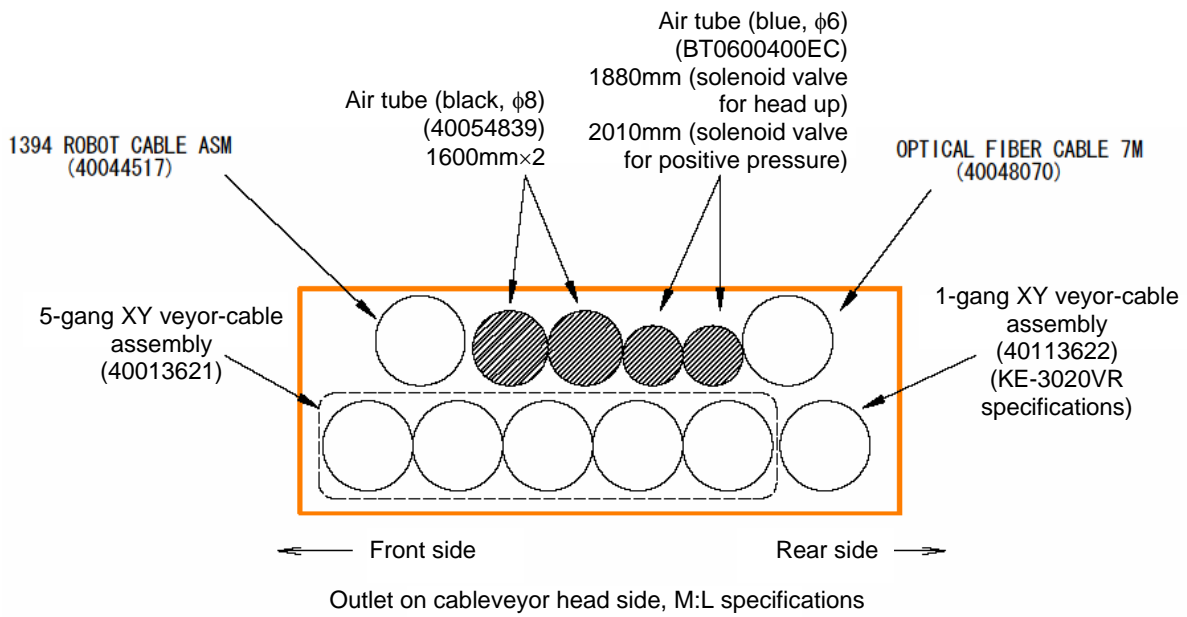


Figure 1-6-3-2-1 Figure Viewed from A

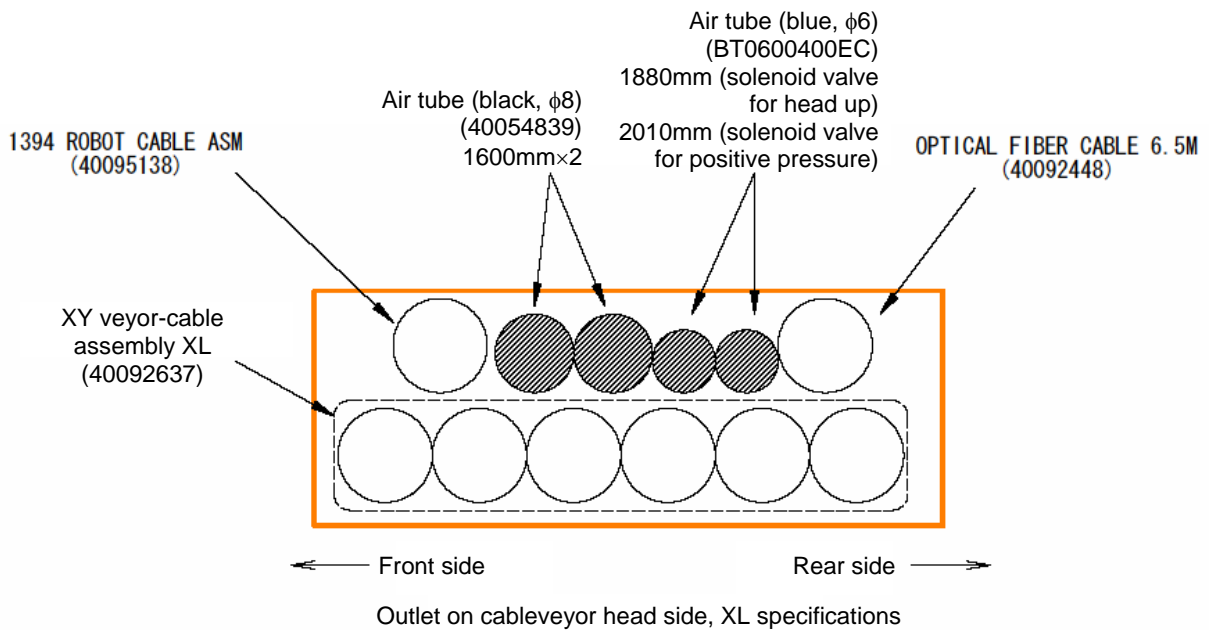


Figure 1-6-3-2-2 Figure Viewed from A

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

Maintenance Guide

- 3) For the cable head side (movable end), adjust the marking position of each cable to the upper end of “FC_SUPPORT” (end on the outlet side) and secure them.

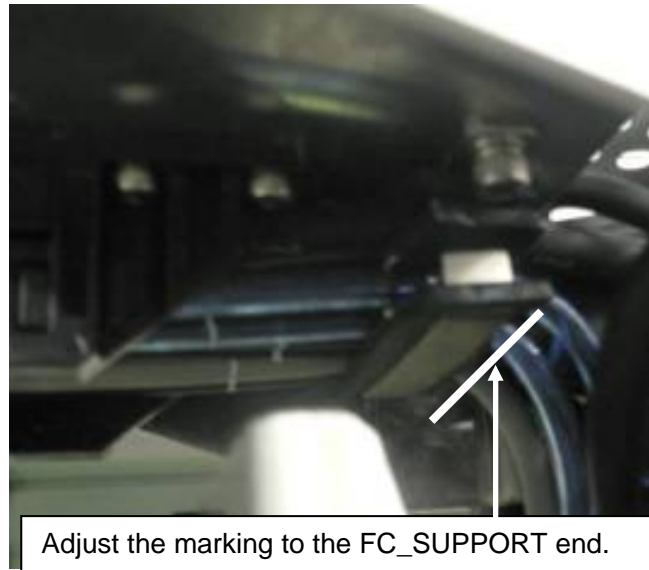
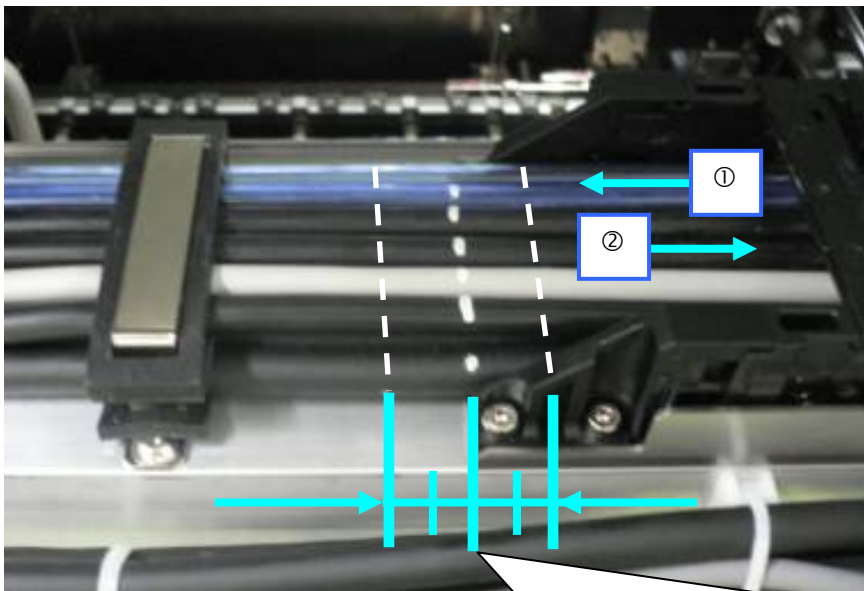


Figure 1-6-3-3

- 4) Push in the XY veyor-cable (XY veyor-cable XL), 1394 robot cable and the optical fiber cable 7M in the direction ② and put the white marking at the end of the X-cableveyor in the cable arrangement direction. Pull the cables in the direction ① shown in the Figure and put the white marking at the end of the X-cableveyor in the cable arrangement direction.
- 5) Adjust the cable position so that the center position between two markings is located at the end of the X-cableveyor, and then secure the cables.



Make the adjustment so that the center position between two markings (white lines) of the XY veyor-cables is located at the end of the cableveyor.

Figure 1-6-3-4

- 6) Push the cables inside the cableveyor by hand to check that they are flexible.

Maintenance Guide

1-6-4. Removing the Y Veyor-Cable

- 1) Disconnect the binding of the connector bracket at the entrance of the Y-axis cableveyor and the relay connector.



Figure 1-6-4-1 Examples of M and L Board Specifications

- 2) Detach the cover of the Y cableveyor and remove the cable to be replaced.

1-6-5. Placing Marks on the Y Veyor-Cable

- 1) Check the marking position of the Y veyor-cable (Y veyor-cable XL).
(Place marks at a position 200mm from the end of the XMTR connector.)

Y veyor-cable

M and L board specifications: Y veyor-cable (40113623)
XL board specifications: Y veyor-cable XL (40092638)

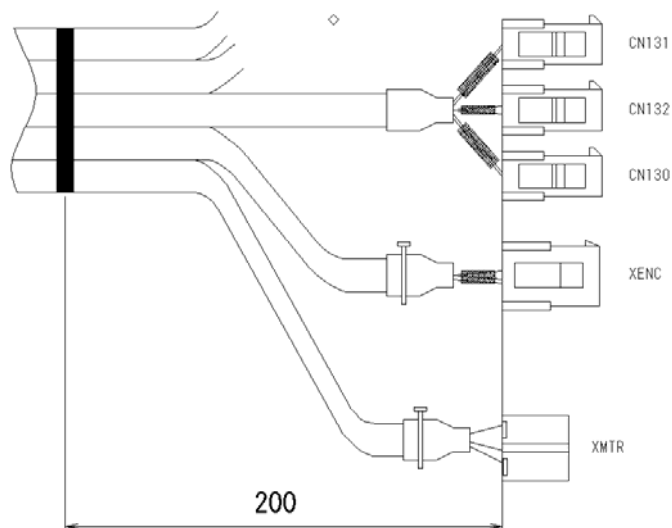


Figure 1-6-5-1

Maintenance Guide

1-6-6. Assembling the Cable

- 1) Apply the GERALYN grease (MGREAS400GA) to portions where the cables (XY veyor-cable (XY veyor-cable XL), 1394 robot cable and the optical fiber cable 7M) are put in the cableveyor.
- 2) Arrange the cables as shown in Figure 1-6-6-1 and adjust their lengths.

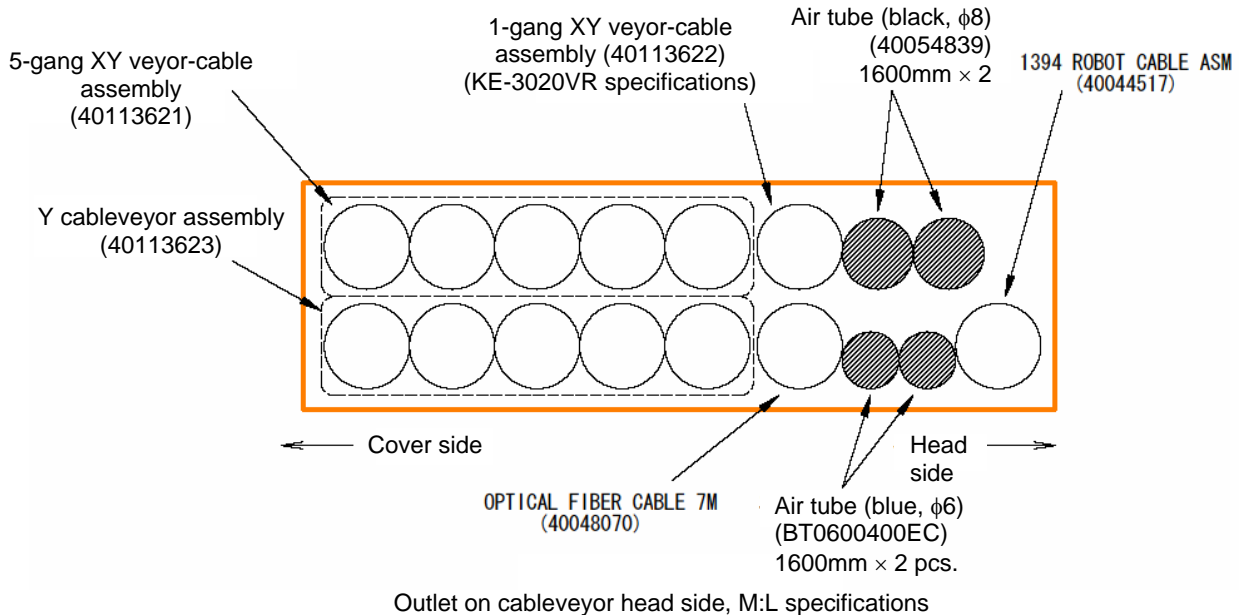


Figure 1-6-6-1-1

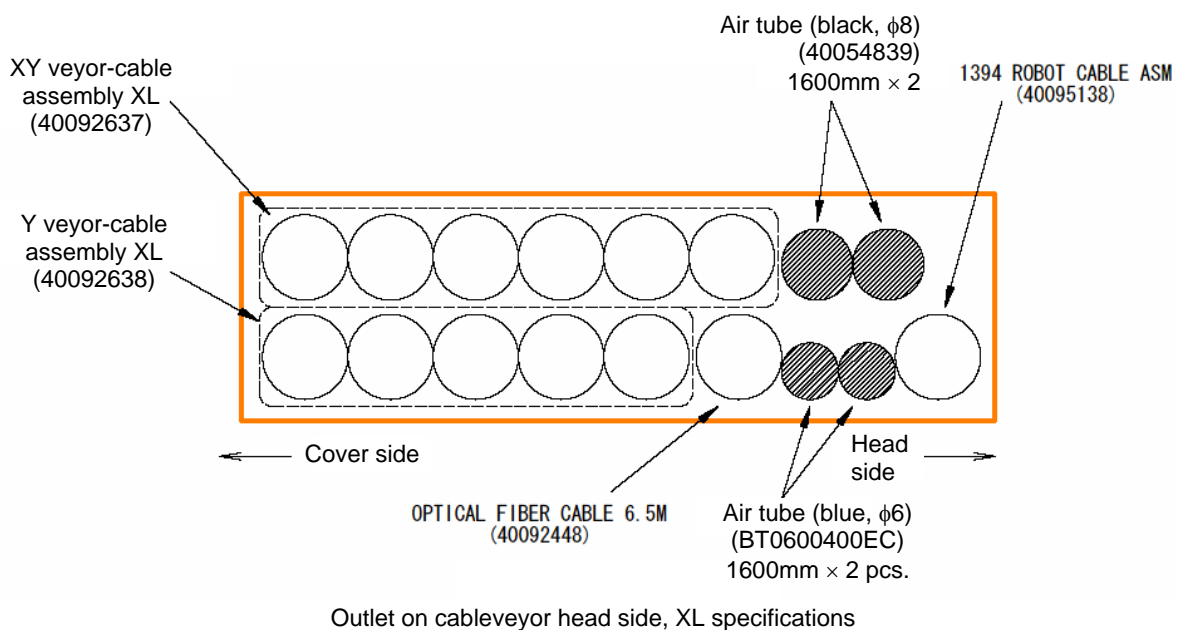


Figure 1-6-6-1-2

Maintenance Guide

- 3) Arrange the relay connectors (CN127, CN151, CN165, CN201, CN245, CN813, ZTPWR1, ZTPWR2) of the connector brackets of the Y veyor-cable (Y veyor-cable XL) and XY veyor-cable (XY veyor-cable XL).
Adjust the end (rear) of the cable clamp to the white marking on the Y veyor-cable, and then secure the cables.
Put the white marking on the XY veyor-cable along the end (rear) of the cable clamp.

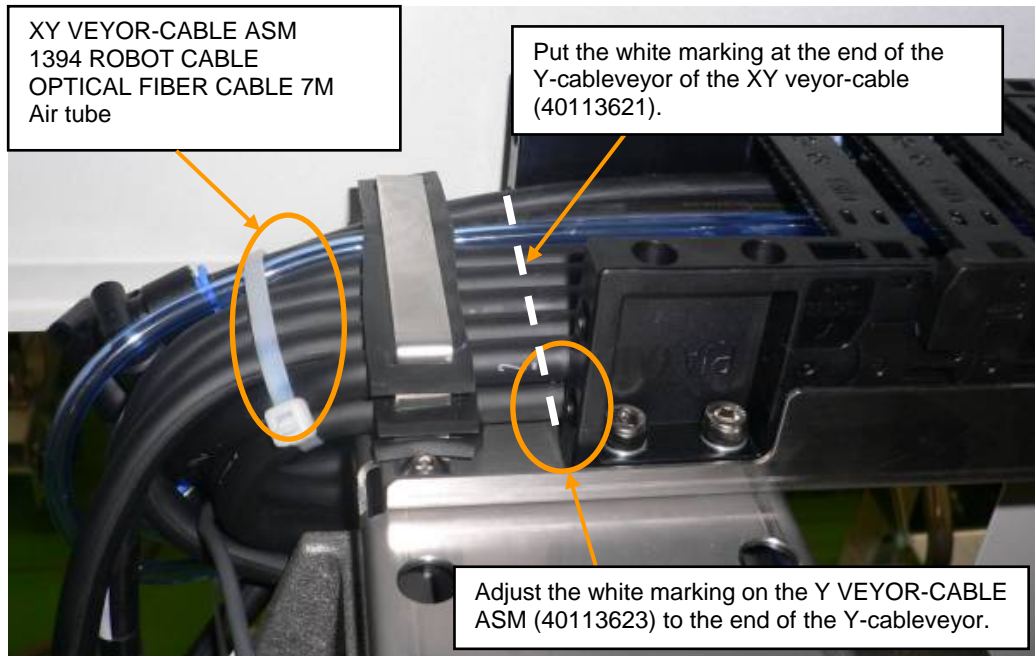


Figure 1-6-6-2-1 M and L Board Specifications

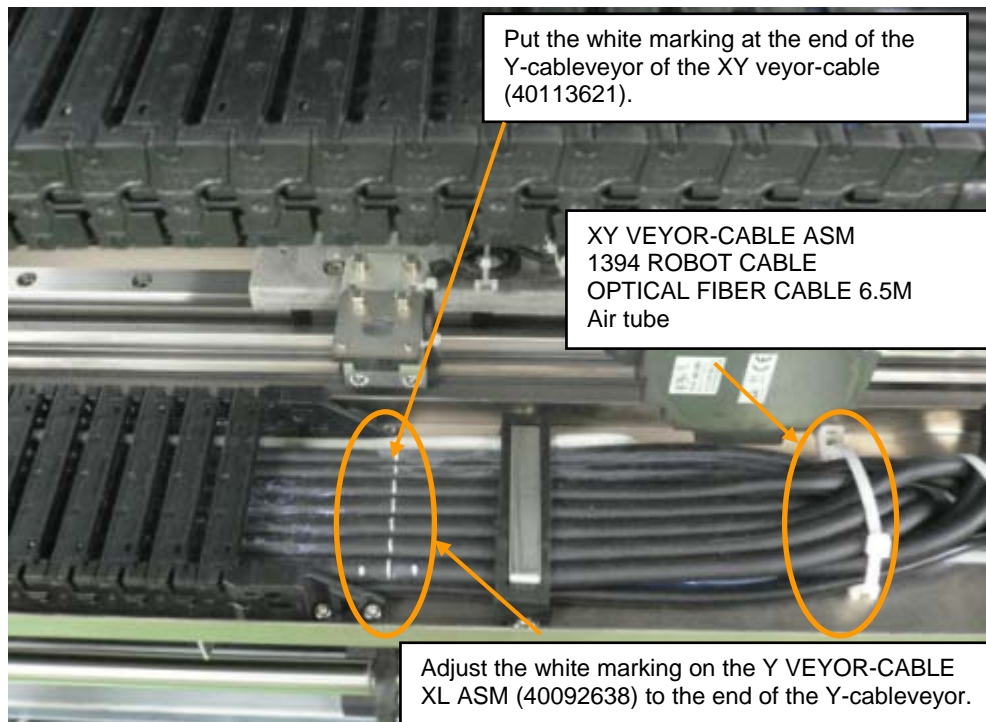


Figure 1-6-6-2-2 XL Board Specifications

Maintenance Guide

- 4) Pull the Y veyor-cable, XY veyor-cable in the direction ① and put the white marking at the movable end (rear side) of the Y-cableveyor in the cable arrangement direction.
- 5) Push in the cables in the direction ② and put the white marking at the movable end (rear side) of the Y-cableveyor in the cable arrangement direction.
- 6) Adjust the cable position so that the center position between two markings is located at the end (movable end) of the Y-cableveyor, and then secure the cables.

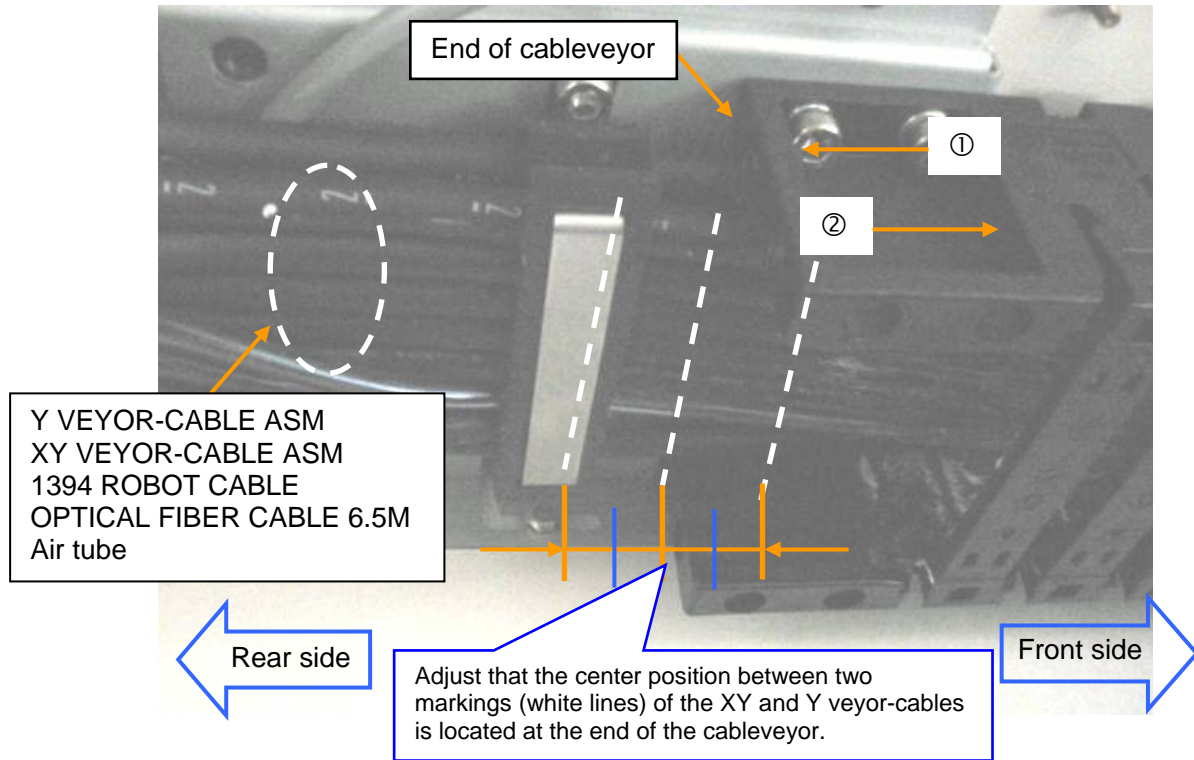


Figure 1-6-6-3

- 7) According to the Figure below, connect each connector and secure the cables with the tie-up bands.

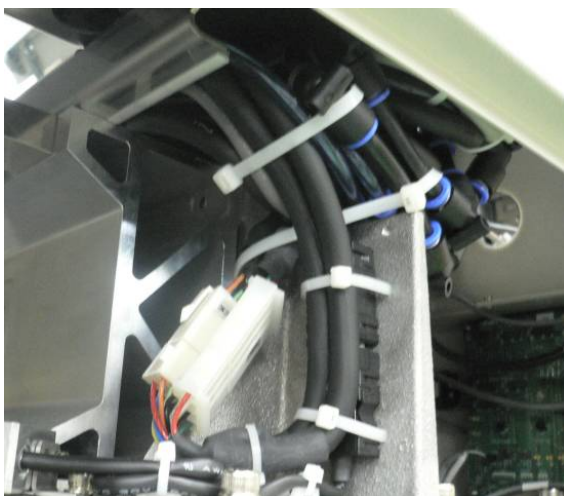


Figure 1-6-6-4-1 M and L Board Specifications



Figure 1-6-6-4-2 XL Board Specifications

Maintenance Guide

- 8) Bundle the cables on the rear of the X-axis according to the Figures below.



Figure 1-6-6-5 (Left: M and L Board Specifications, Right: XL Board Specifications)

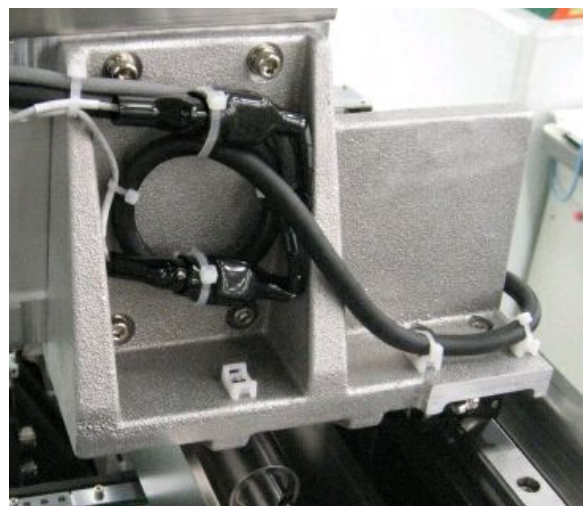
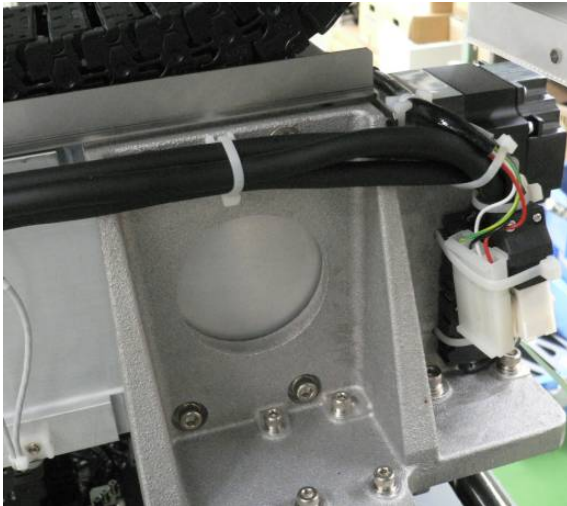


Figure 1-6-6-6 (Left: M and L Board Specifications, Right: XL Board Specifications)

Maintenance Guide

9) Wiring of the YL magnescale relay line

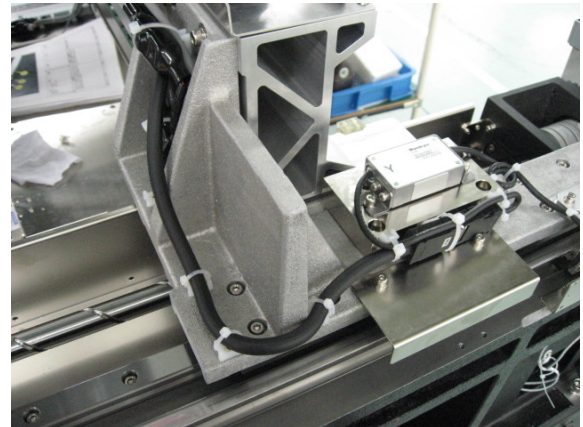
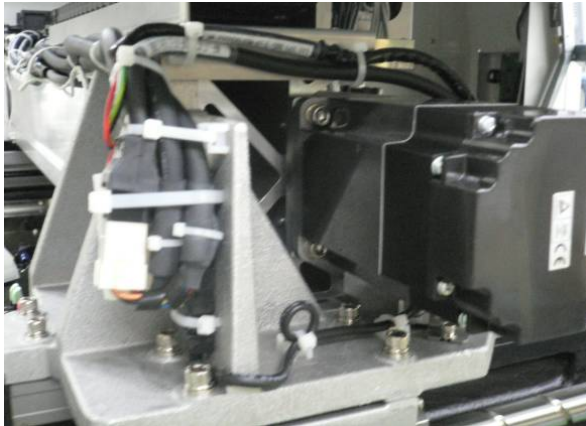


Figure 1-6-6-7 Left: M and L Board Specifications, Right: XL Board Specifications

10) Wiring of the YR magnescale relay line

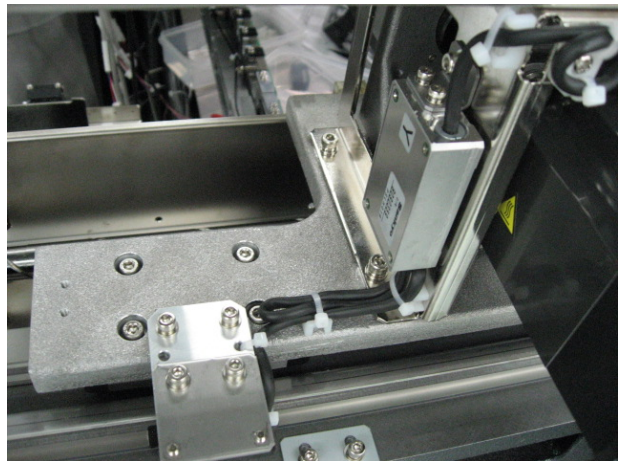
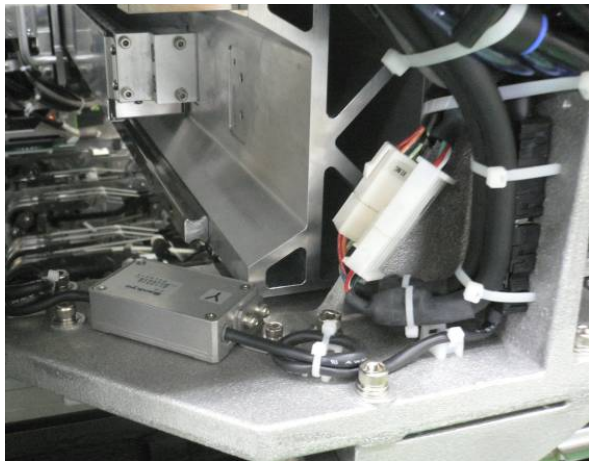


Figure 1-6-6-8 Left: M and L Board Specifications, Right: XL Board Specifications

Maintenance Guide

- 11) Move the Y-axis to the foremost position and push the cables inside the Y-cableveyor by hand to check that they are flexible.

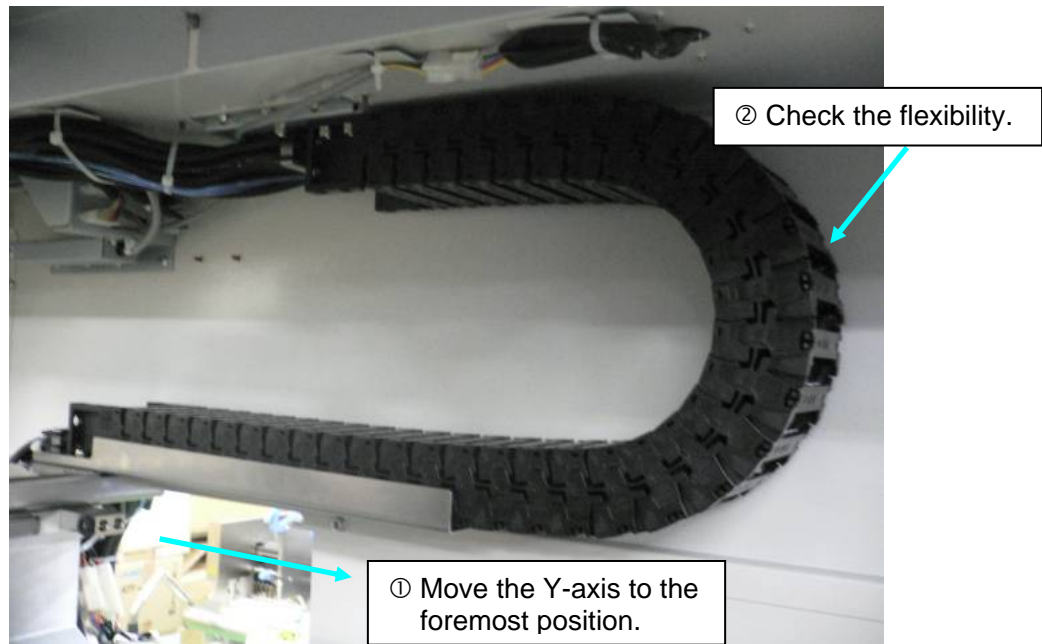


Figure 1-6-6-9-1 M and L Board Specifications

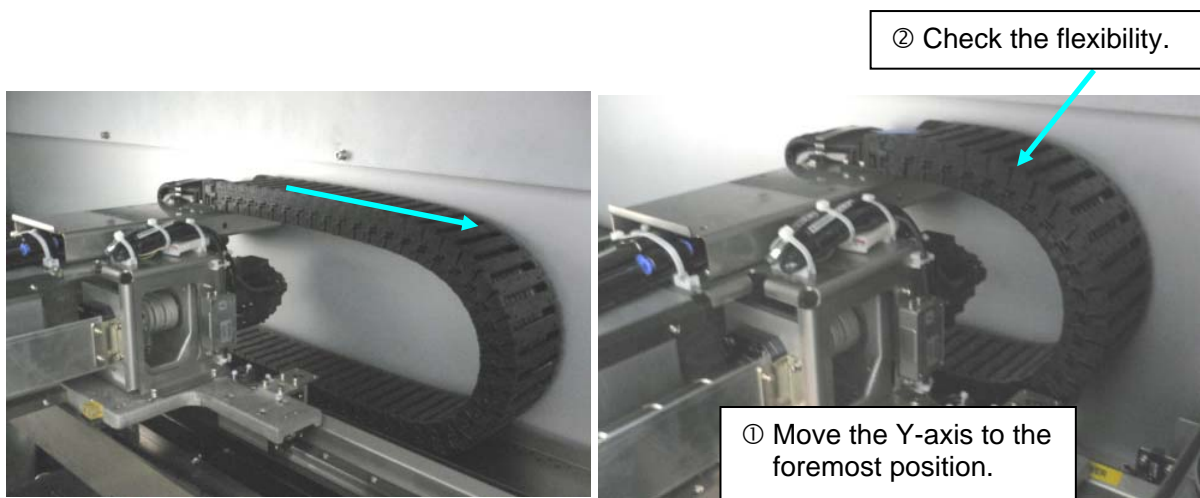


Figure 1-6-6-9-2 XL Board Specifications

Maintenance Guide

- 12) With the tie-up bands, secure the cables at the positions shown in the Figure below.
- * Do not bend the OPTICAL FIBER CABLE (40092448) at an acute angle (up to 50R) as it is an optical cable and pay special attention so that any excessive force is not applied when bundling the cables with the tie-up bands.

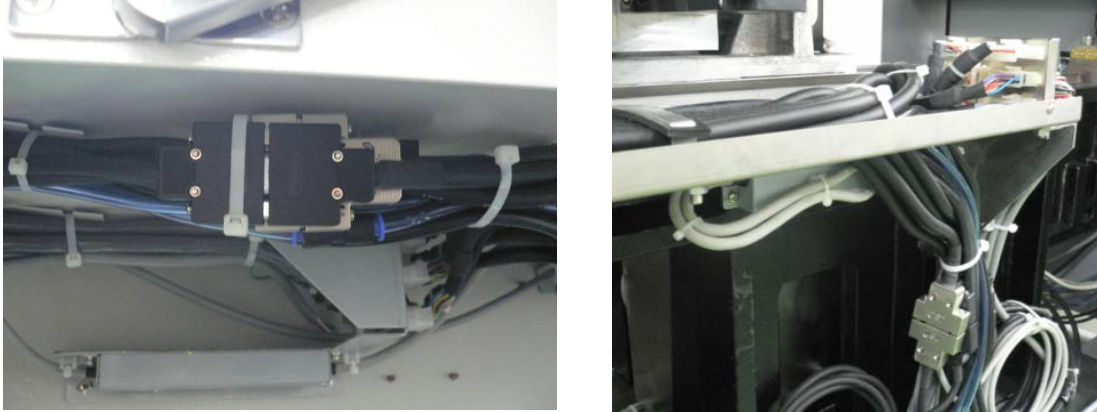


Figure 1-6-6-10 (Left: M and L Board Specifications, Right: XL Board Specifications)

Maintenance Guide

1-6-7. Wiring around the Head

Connect the cables coming from the XY veyor-cable (40113621) and XY veyor-cable XL (40092637) to the following locations. When connecting the cables, do not bend any cable excessively nor apply any load. In particular, carefully handle the fiber cables.

- 1) Insert the HEAD-CN13, HEAD-CN15, EN1, and HEAD-CN2 into the locations shown in the Figure 1-6-7-1.
- 2) Insert the ZTA-CNP1, ZTB-CNP1, ZTC-CNP1, and ZTD-CNP1 into the locations shown in the Figure 1-6-7-2.
- 3) Relay the SENS X at the location shown in the Figure 1-6-7-2. Secure the connectors and cables.

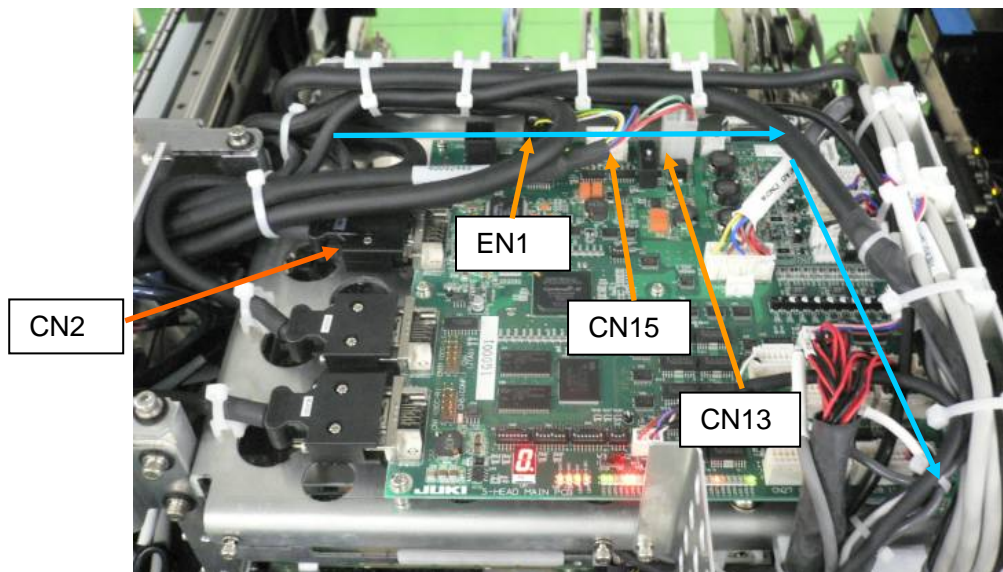


Figure 1-6-7-1

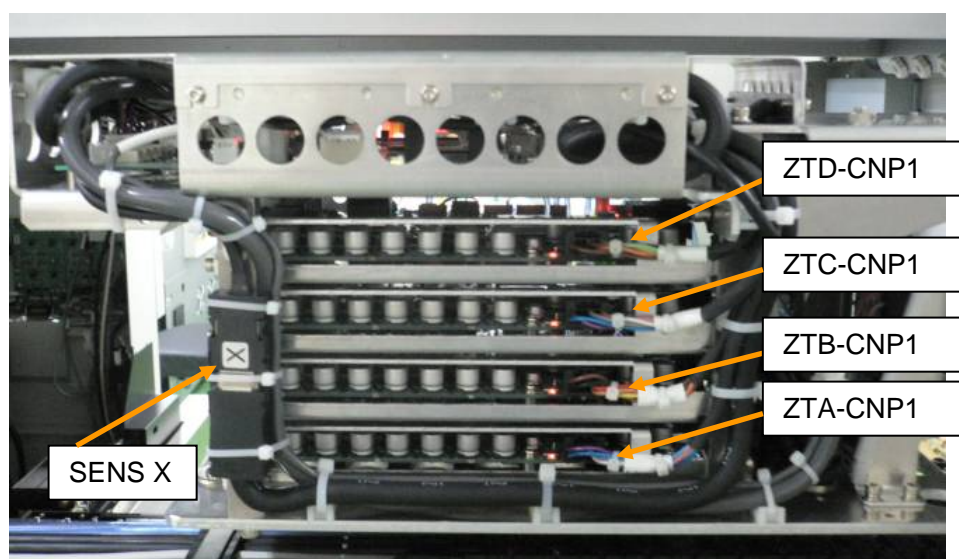


Figure 1-6-7-2

Maintenance Guide

- 4) Run the ZTD-CN5 cable through the route indicated by a blue arrow mark shown in the Figure 1-6-7-1 and insert it into the location shown in the Figure 1-6-7-3.
- 5) Run the FMLA cable through the same route as the ZTD-CN5 and the route indicated by a blue arrow mark shown in the Figure 1-6-7-3. Insert the cable into the location shown in the Figure 1-6-7-4.

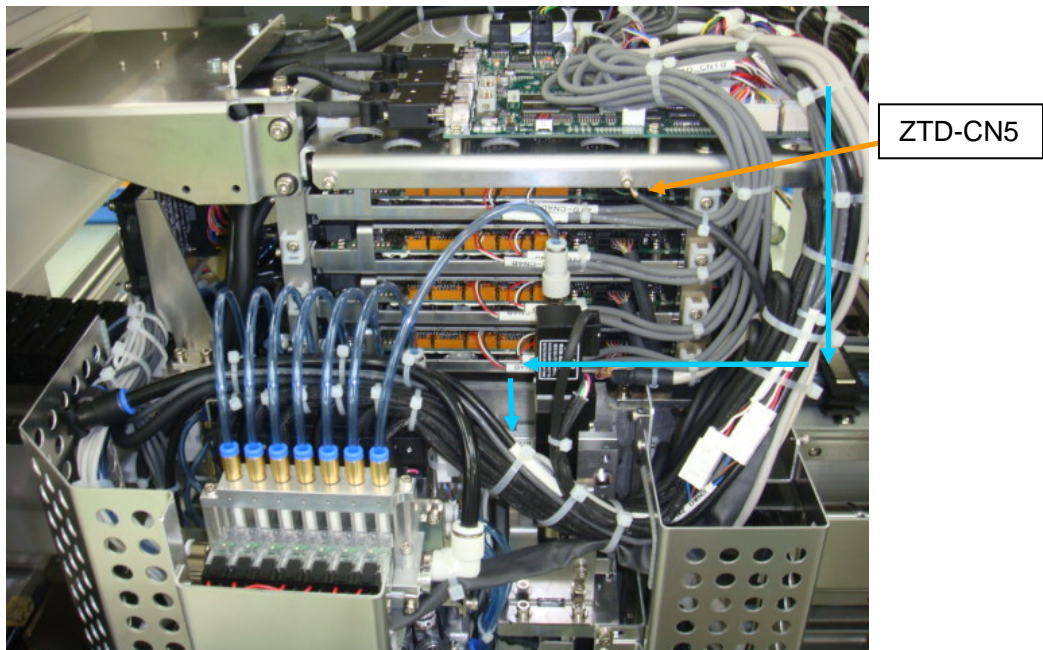


Figure 1-6-7-3 (Figure above shows the case of XL board specifications.)

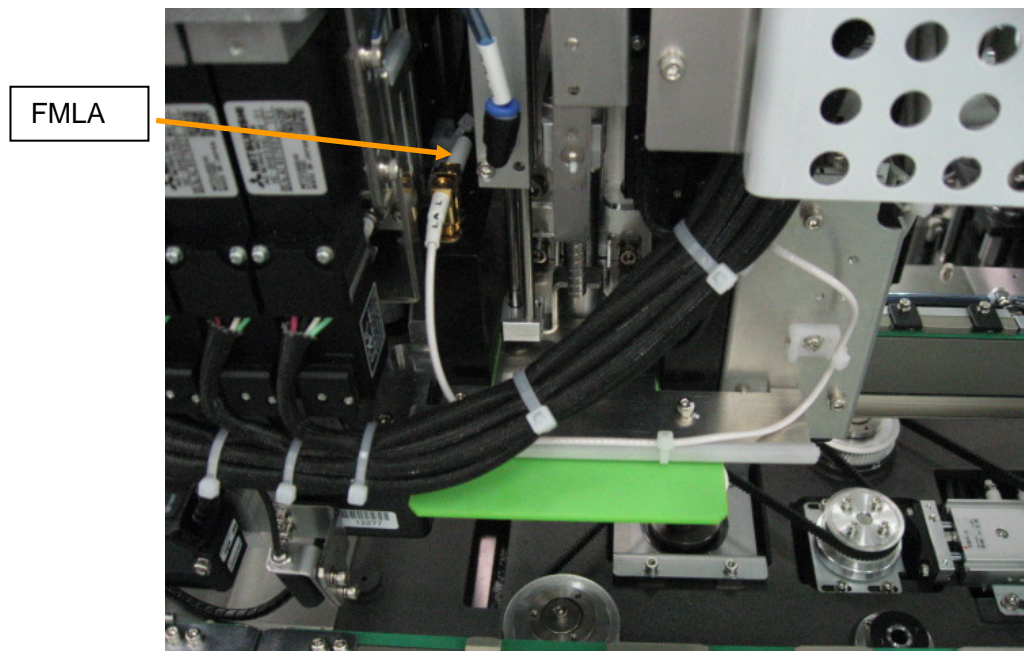


Figure 1-6-7-4

- 6) Run the 1394 ROBOT CABLE through the route shown in the Figure 1-6-7-5 and relay it at the location shown in the Figure 1-6-7-6.

The cable is relayed on the rear of the connector enclosed by a red circle.

Maintenance Guide

- 7) Insert the OPTICAL FIBER CABLE into the location shown in the Figure 1-6-7-7.

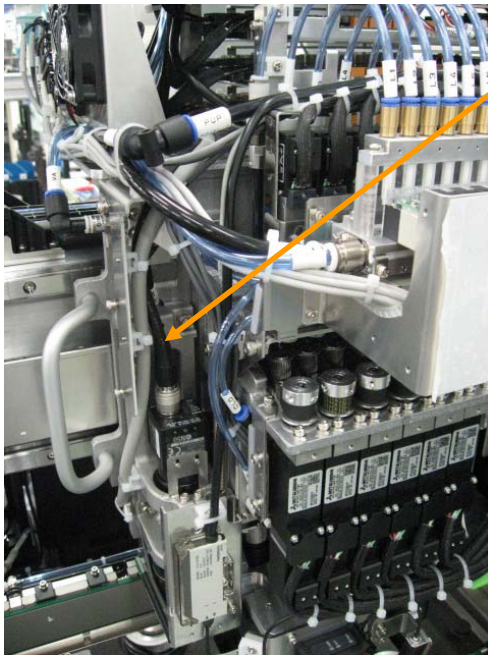


Figure 1-6-7-5

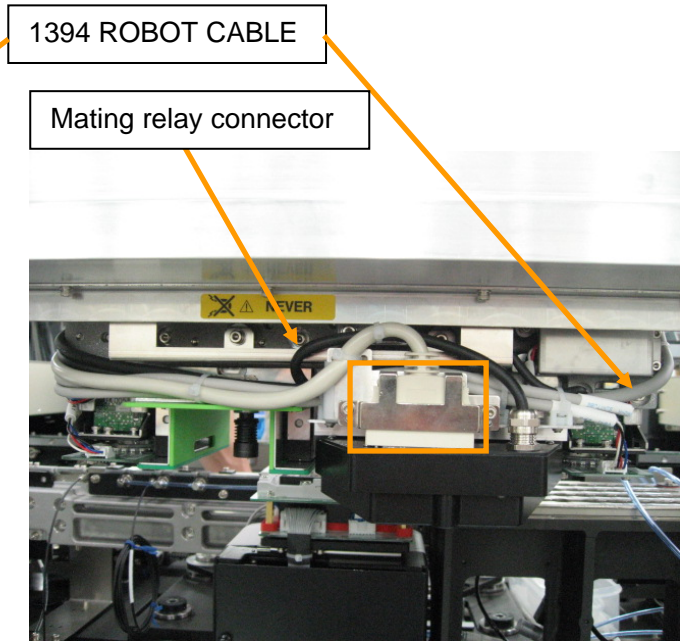


Figure 1-6-7-6

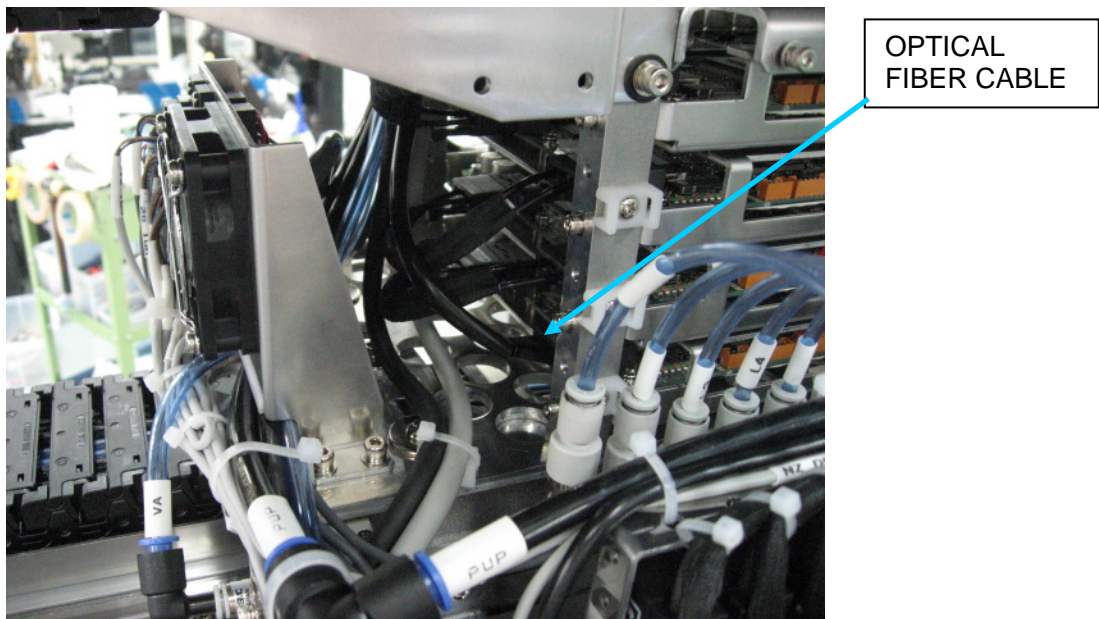
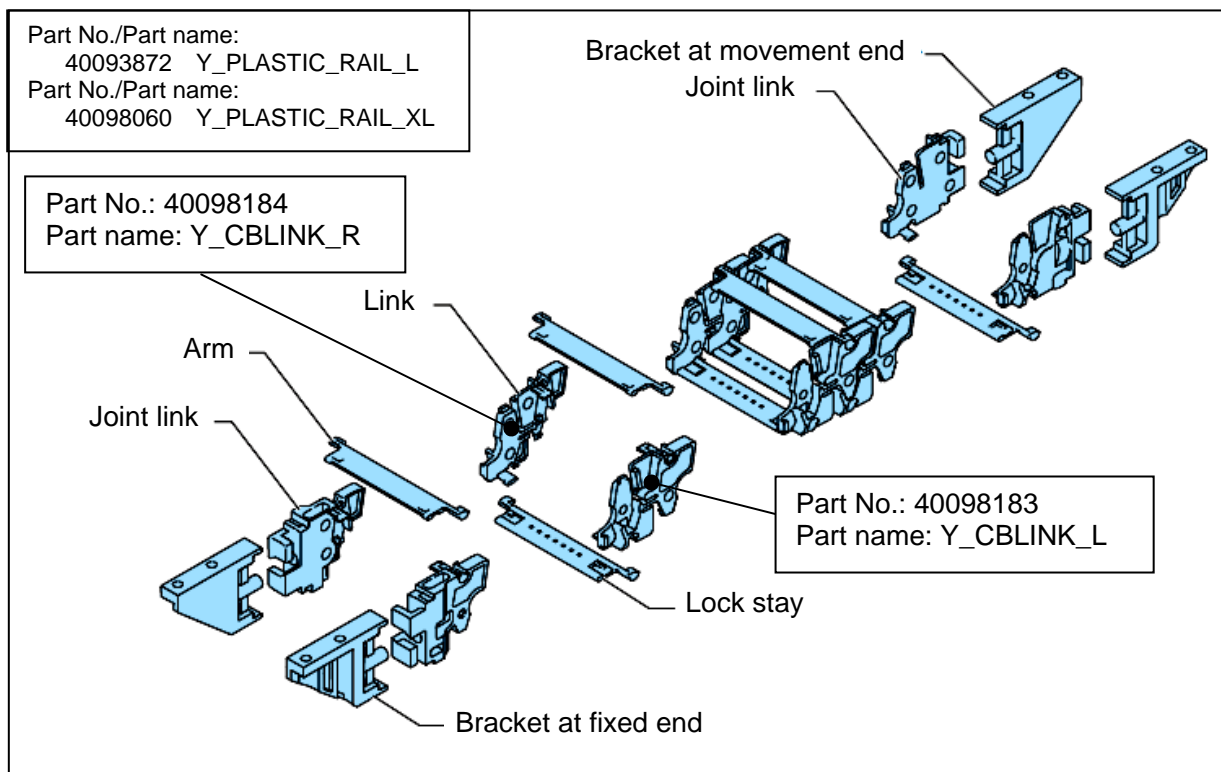


Figure 1-6-7-7

Maintenance Guide

1-7. Replacing the Cableveyor Link

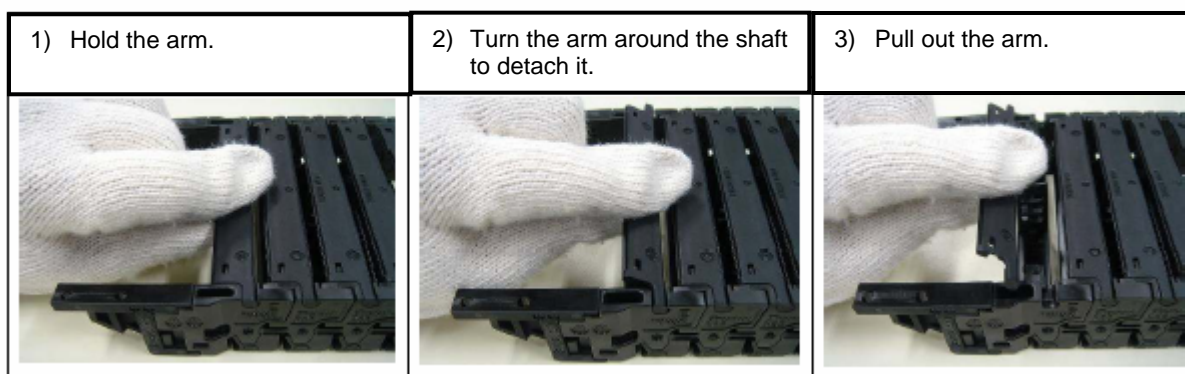
1-7-1. X Cableveyor Structure and Part Names



1-7-2. Detaching the Arm and Lock Stay

Follow the steps below to detach the arm and lock stay.

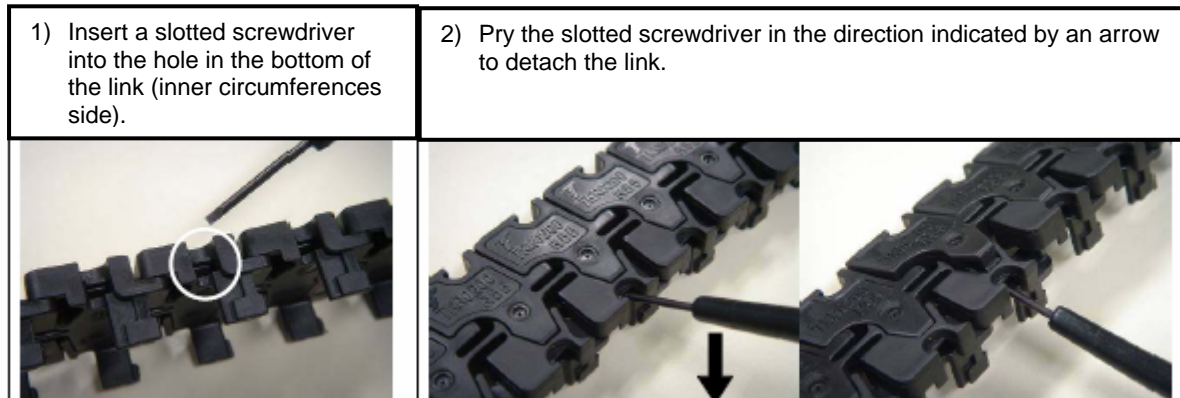
* Wear cotton gloves since the geraldyn (white cream) is sticking to the cable inside the cableveyor.



Maintenance Guide

1-7-3. Separating the Link

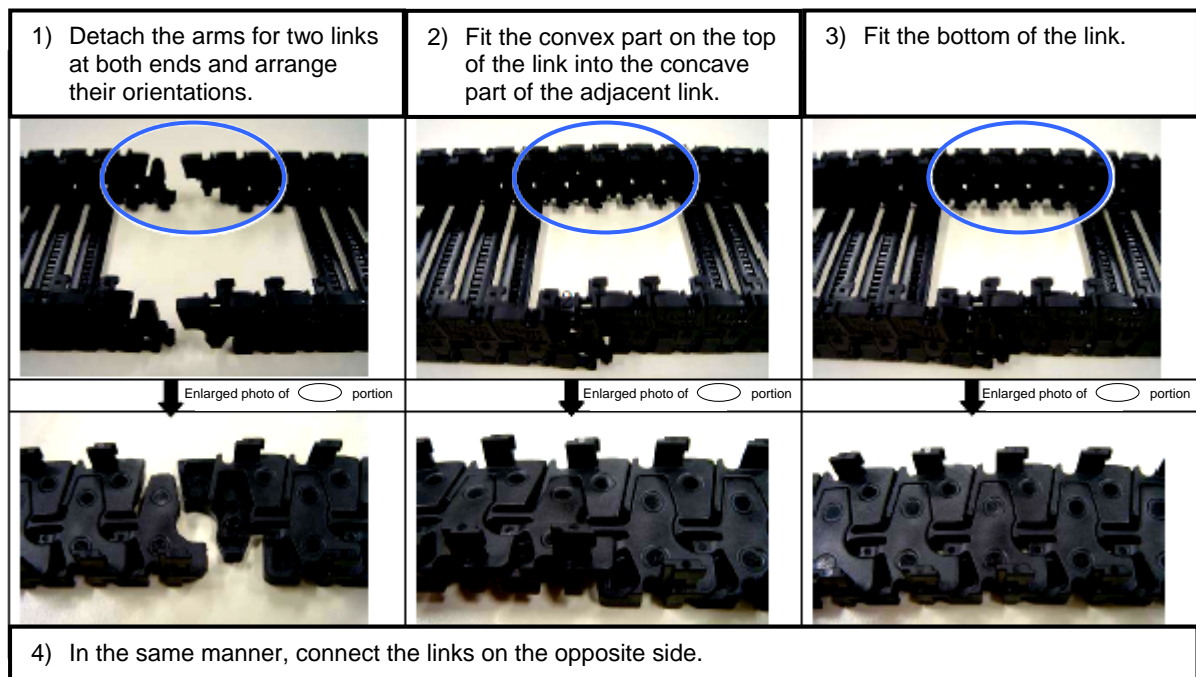
Follow the steps below to separate the link and detach it.



Note) Use a slotted screwdriver with a tip blade width of 3.5 mm or less.

1-7-4. Connecting the Cableveyor



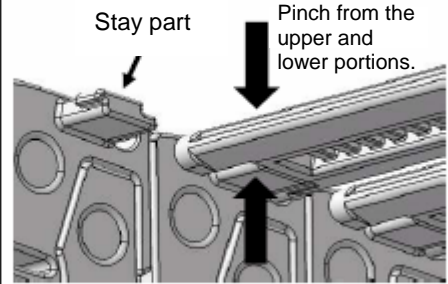
Replace the link and follow the steps below to connect the links.



Maintenance Guide

1-7-5. Mounting the Arm and Lock Stay

Follow the steps below to mount the arm and lock stay on the link.

<p>1) Insert the arm shaft into the link.</p>	<p>2) Push the portions about 20 mm away from the both ends of the arm with both hands to mount the link.</p>	<p>3) Pinch the link stay and arm by fingers to press-fit them.</p>
		

Note 1) Make sure that the arm is fit into the link stay securely.
If the arm is not mounted correctly, the arm may drop during operation.

- * If the arm is not mounted correctly, the end part floats up as shown in Photo ①. Be sure to make the inspection before starting the operation.
- * If the arm floats up, fit the left and right ends of the arm of the link stay and arm connection part securely with the arm mounting jig as shown in Photo ②.

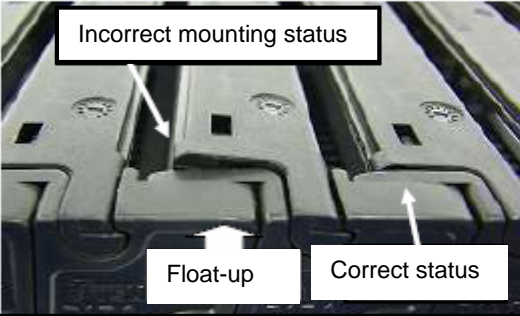


Photo ① Arm float-up status (incorrect mounting status)

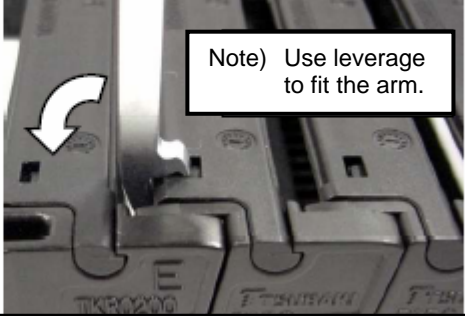



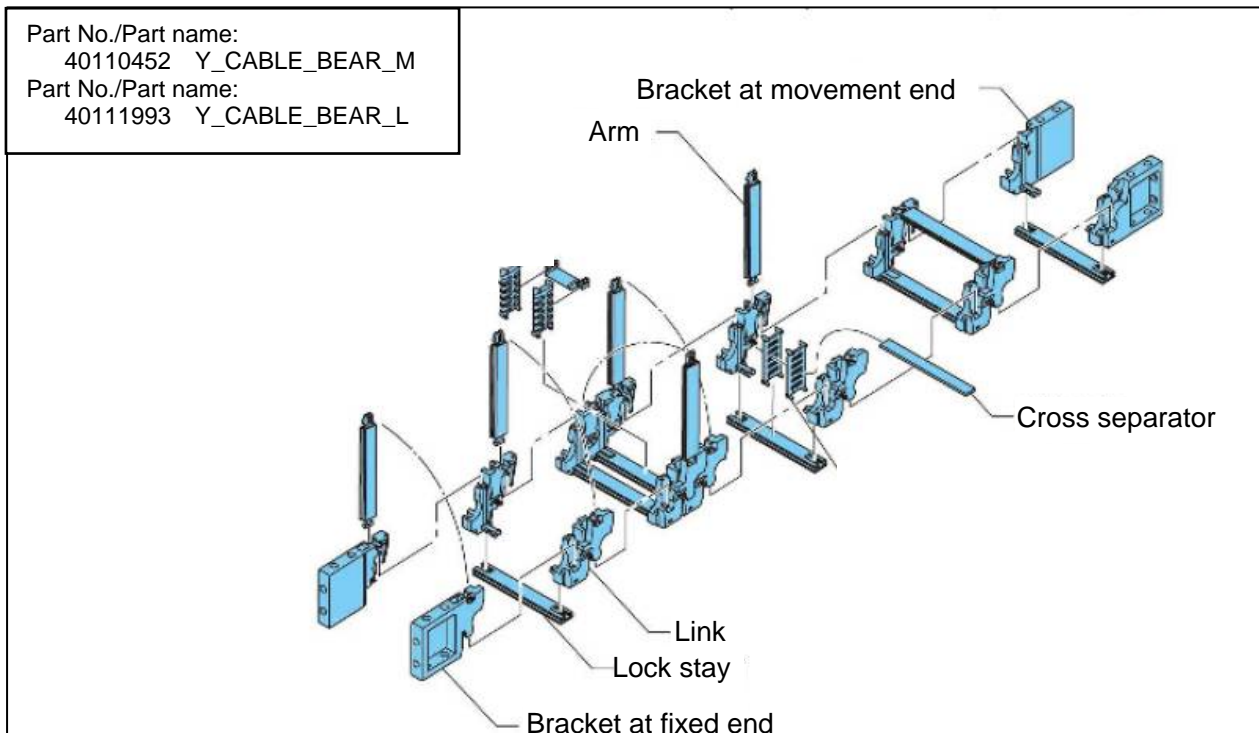
Photo ② Mounting with the arm mounting jig

Arm mounting jig



Maintenance Guide

1-7-6. Y Cableveyor Structure and Part Names



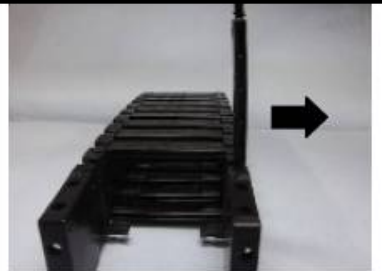


1-7-7. Detaching the Arm and Lock Stay

Follow the steps below to detach the arm and lock stay.

* Wear cotton gloves since the geraldyn (white cream) is sticking to the cable inside the cableveyor.




Detaching the arm

1) Insert a slotted screwdriver into the clearance between the arm lock claw and link (see the Figure below) and turn it to float up the lock claw on one side.	2) In the same manner as described in step 1), turn the slotted screwdriver toward the opposite side to float up the arm.	3) Turn the arm 90° (so that the lock claw is located at the top) and pull it out horizontally. The arm is then detached.
		

Note) Use a slotted screwdriver with a tip blade width of 4 mm or less.

Maintenance Guide



Lock stay

<p>1) Insert a slotted screwdriver into the dent on the lock stay and lightly pry it to slightly float up the lock stay. Note) If the slotted screwdriver is pried strongly, the lock stay is broken and fragments may fly out.</p>	<p>2) In the same manner as described in step 1), insert the slotted screwdriver into the dent on the opposite side (lock stay length direction) and lightly pry it to slightly float up the lock stay.</p>	<p>3) Detach the lock stay by hand.</p>
		

Note) Use a slotted screwdriver with a tip blade width of 4 mm or less.

1-7-8. Separating the Link

Follow the steps below to separate the link and detach it.

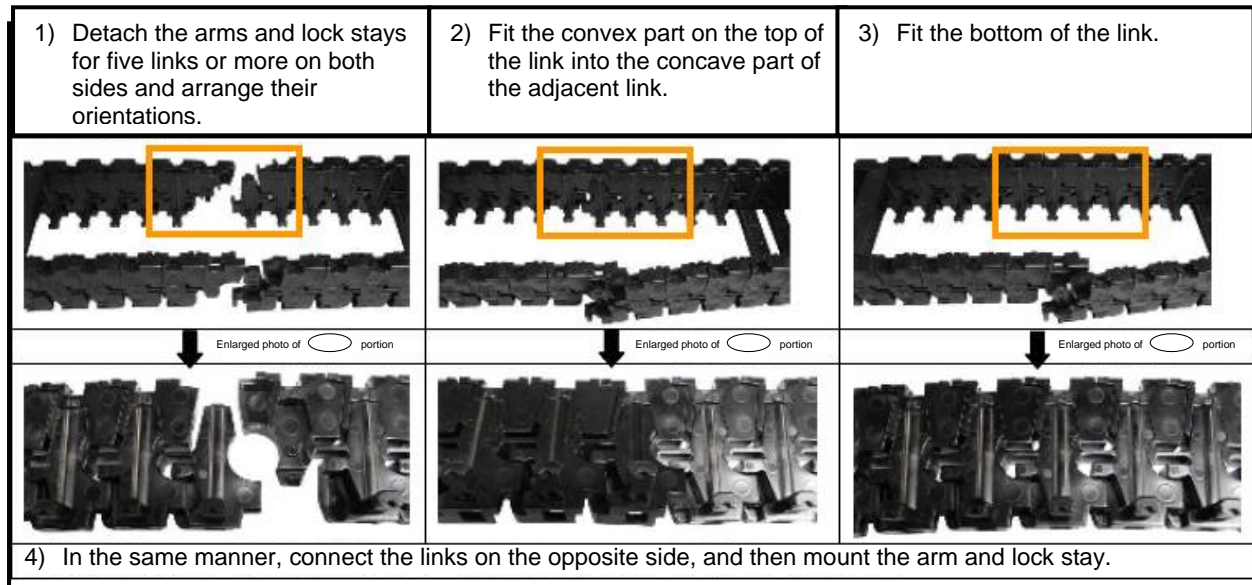
<p>1) Detach the arms and lock stays for five links or more on both sides of the portion to be separated and insert a slotted screwdriver into the hole in the bottom of the link (inner circumference side).</p>	<p>2) Pry the slotted screwdriver in the direction indicated by an arrow to detach the link.</p>
	

Note) Use a slotted screwdriver with a tip blade width of 4 mm or less.

Maintenance Guide

1-7-9. Connecting the Cableveyor

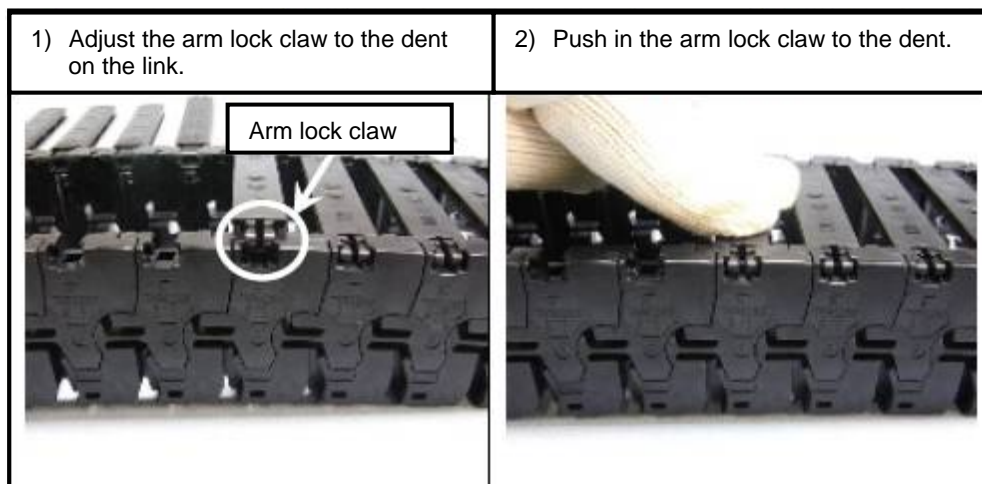
Replace the link and follow the steps below to connect the links.



1-7-10. Mounting the Arm and Lock Stay

Follow the steps below to mount the arm and lock stay on the link.

Mounting the arm

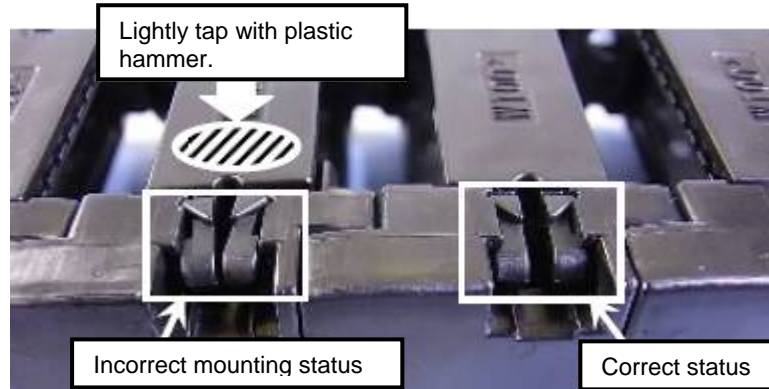


Note 1) Push in the arm lock claw by hand. If the lock claw is pushed in a different way, this may cause the claw to break.




Note 2) Check that the arm is mounted on the link securely. If the arm is not mounted securely, it may drop during operation.

Maintenance Guide

- * If the arm is not mounted correctly, it becomes as shown in the Photo below. Be sure to make the inspection before starting the operation.
- * If the arm is not mounted correctly, tap the portion indicated by ○ in the Photo below several times with a plastic hammer. After checking that the arm is mounted correctly, start the operation.



Mounting the lock stay

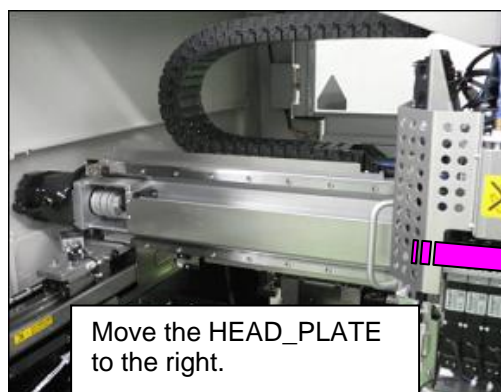
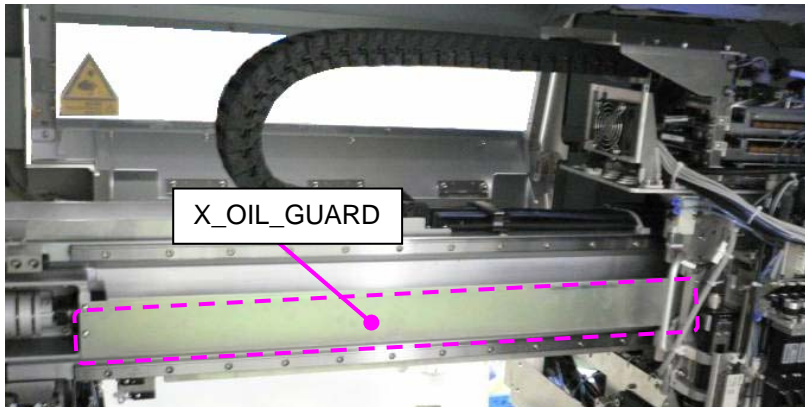
1) With the lock stay inclined 45° or more, adjust the projection of the link to the dent on the lock stay in the horizontal direction.	2) Hold the center part of the lock stay and turn it.	3) Push the portions about 30 mm away from the both ends of the lock stay with both hands to mount the lock stay.
		

Maintenance Guide

1-8. Replacing the X Ball Screw

1-8-1. Preparations for X Ball Screw Replacement

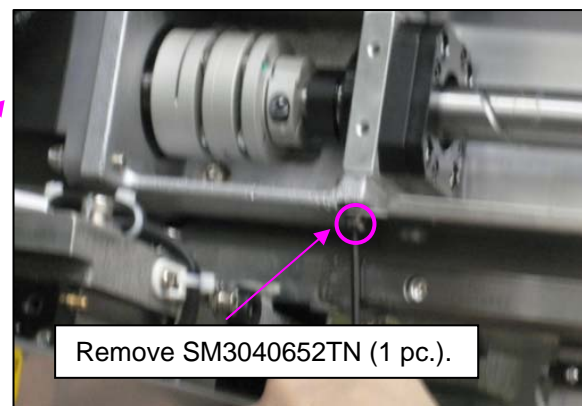
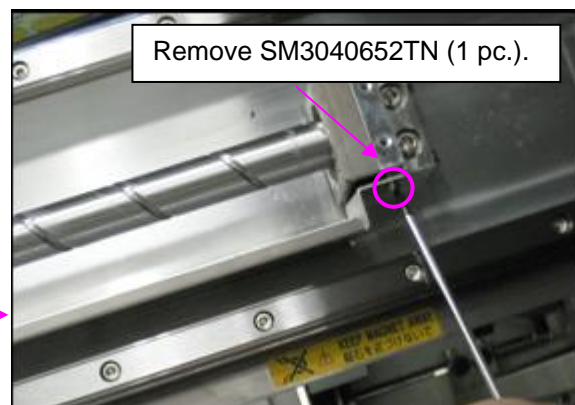
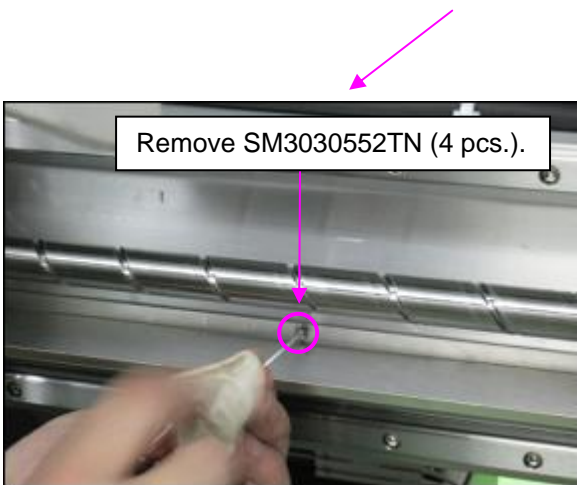
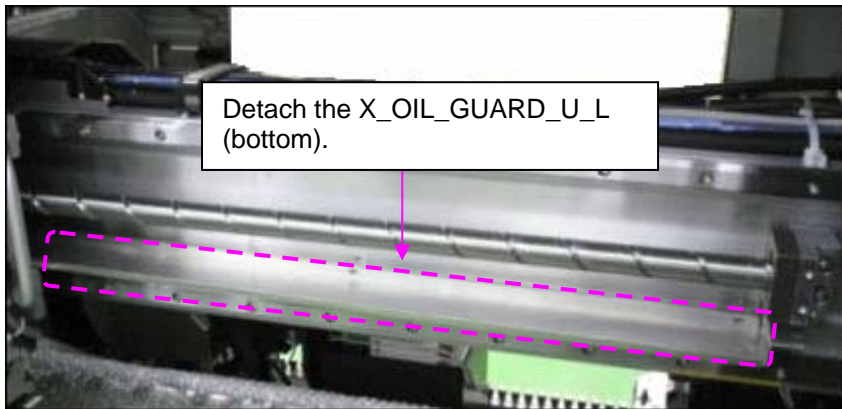
- (1) Detach the X_OIL_GUARD_F_L.



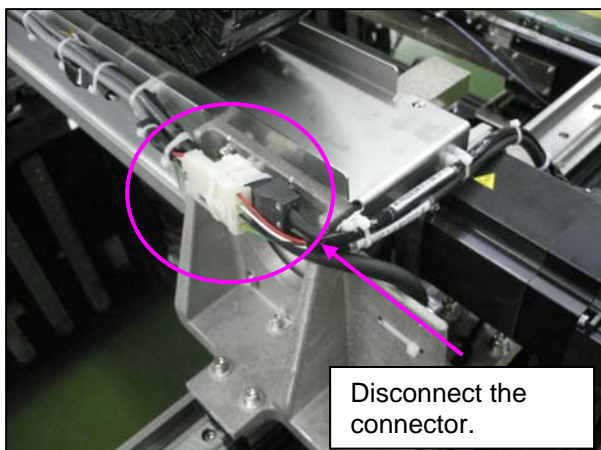
Move the HEAD_PLATE to the left and detach the X_OIL_GUARD_F_L (front).

Maintenance Guide

(2) Detach the X_OIL_GUARD_U_L.



(3) Disconnect the X_MOTOR cable.



Maintenance Guide

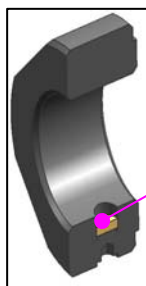
1-8-2. Removing the X Ball Screw

- (1) Loosen the coupling on the X motor ball screw side.

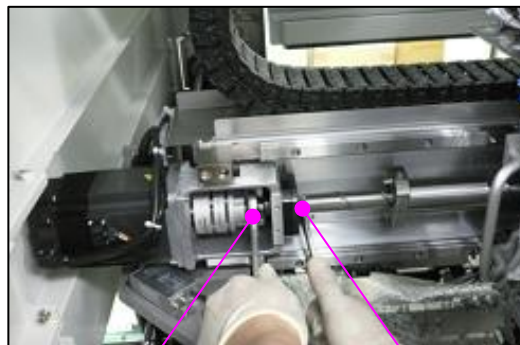


- (2) Loosen the set screw, remove the set screw and set piece, and loosen the lock nut.
* After the set screw has been removed, pay special attention so that the set piece is not lost.

The set piece and lock nut are used as a set.
[Lock nut (Part No.: 40093876)]



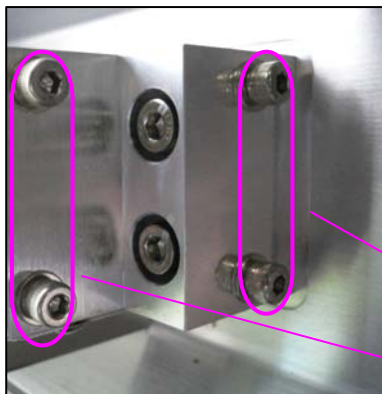
Set piece



Wrench 22

Wrench 17

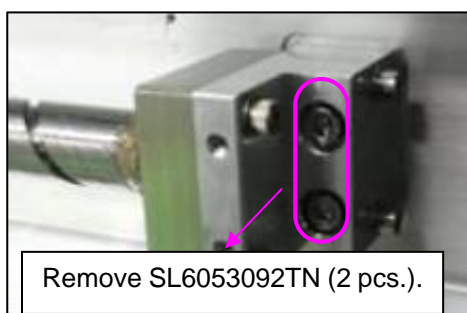
- (3) Detach the X ball screw frame assembly.



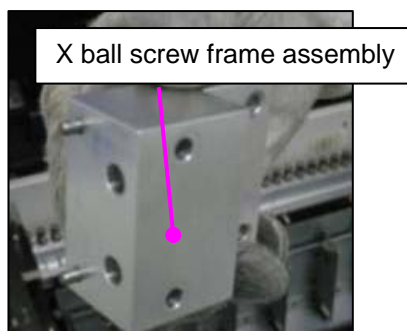
Remove SL6044092TN (2 pcs.).

Remove SL6042592TN (2 pcs.).

- (4) Remove the screws that secure the X ball screw frame assembly.



Remove SL6053092TN (2 pcs.).



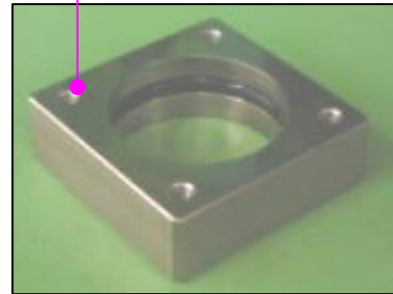
X ball screw frame assembly

Maintenance Guide

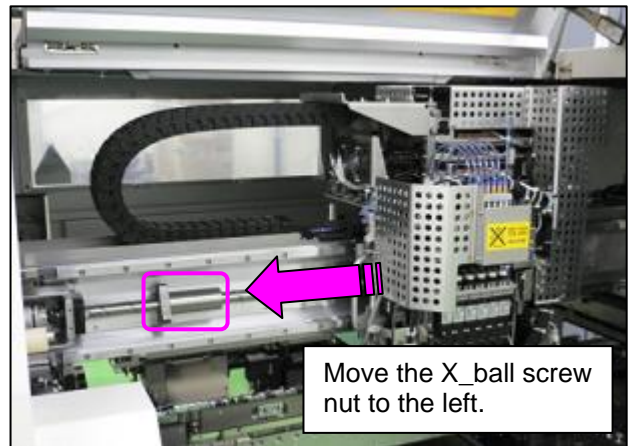
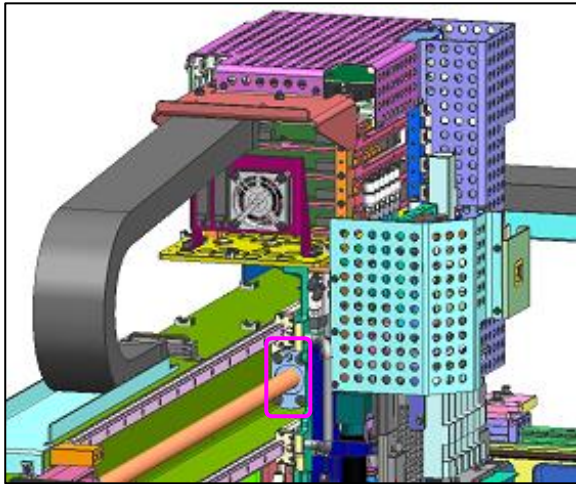
(5) Detach the X ball screw support from the X ball screw.



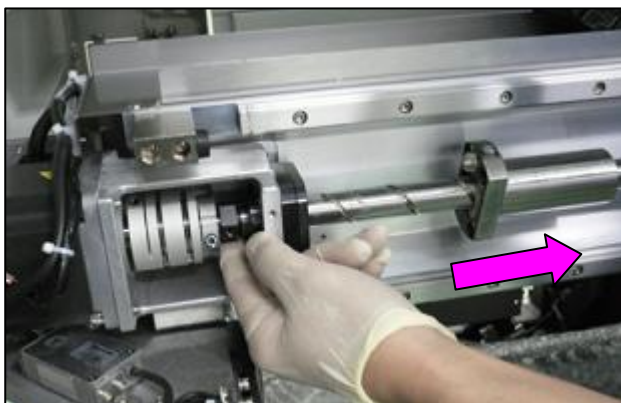
X_ball screw support



(6) Remove the screws that secure the X ball screw_nut.



(7) Remove the lock nut and spacer.



Turn the lock nut to remove it while stretching the X ball screw rightward. In the same manner, remove the spacer.

Spacer

Lock nut



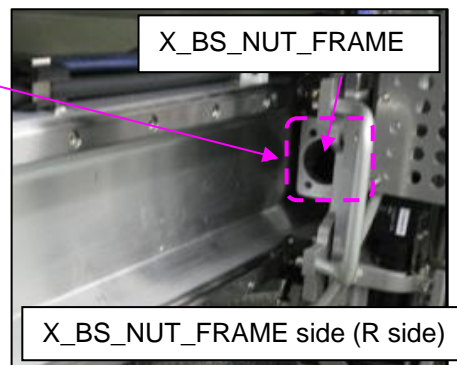
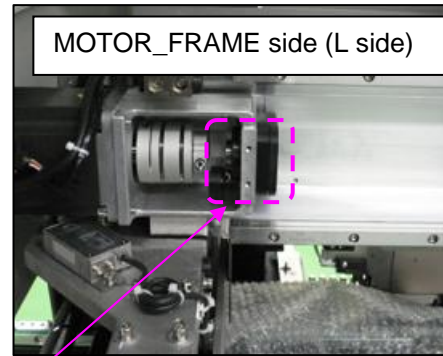
Spacer (Part No.: 40093877)
Lock nut (Part No.: 40093876)

Maintenance Guide

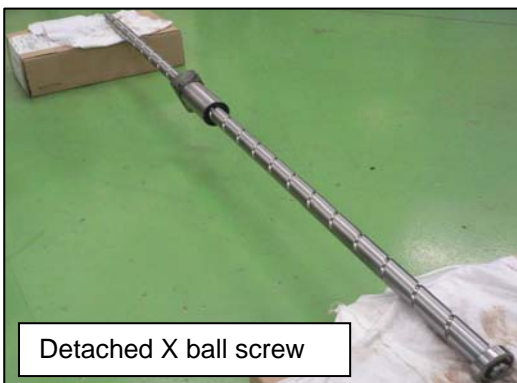
- (8) With the HEAD_UNIT moved to the right, detach the X ball screw.



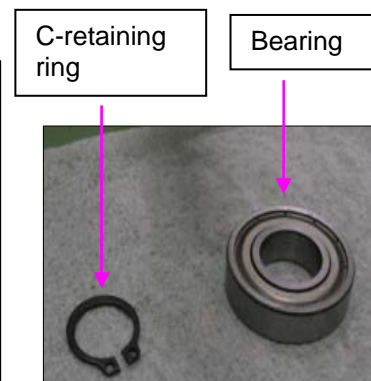
Status after the X ball screw has been detached.



- (9) Remove the C-retaining ring and bearing from the X ball screw that has been detached.



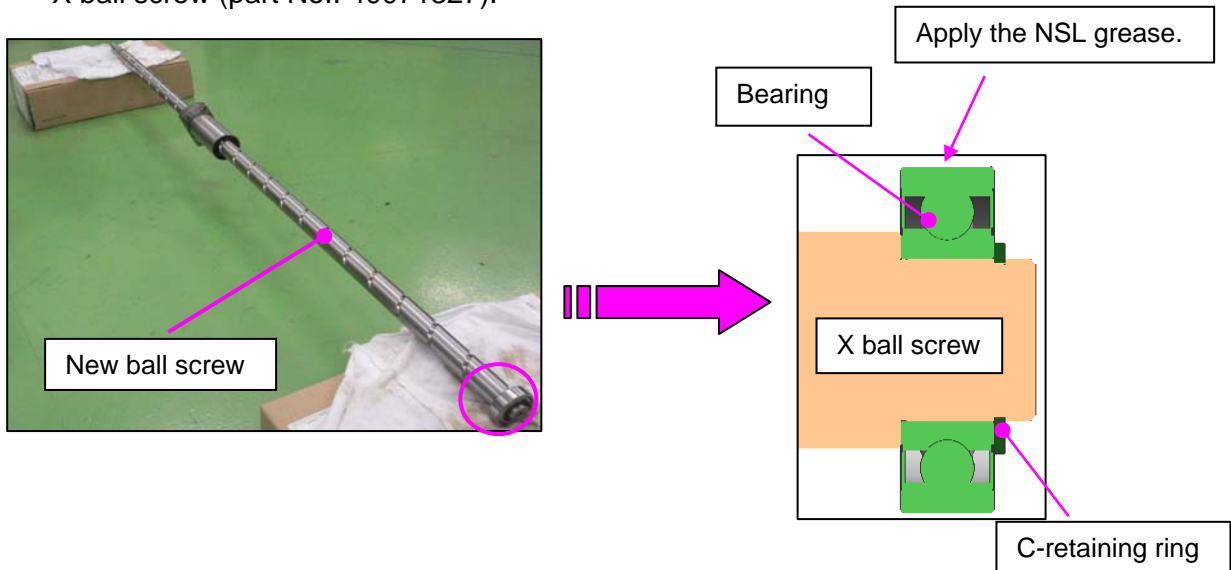
- (10) Remove the C-retaining ring, and then remove the bearing from the X ball screw.
The C-retaining ring is supplied with the FIXED_SUPPORT_UNIT.
[FIXED_SUPPORT_UNIT (Part No.: 40093855)]



Maintenance Guide

1-8-3. Mounting the X Ball Screw

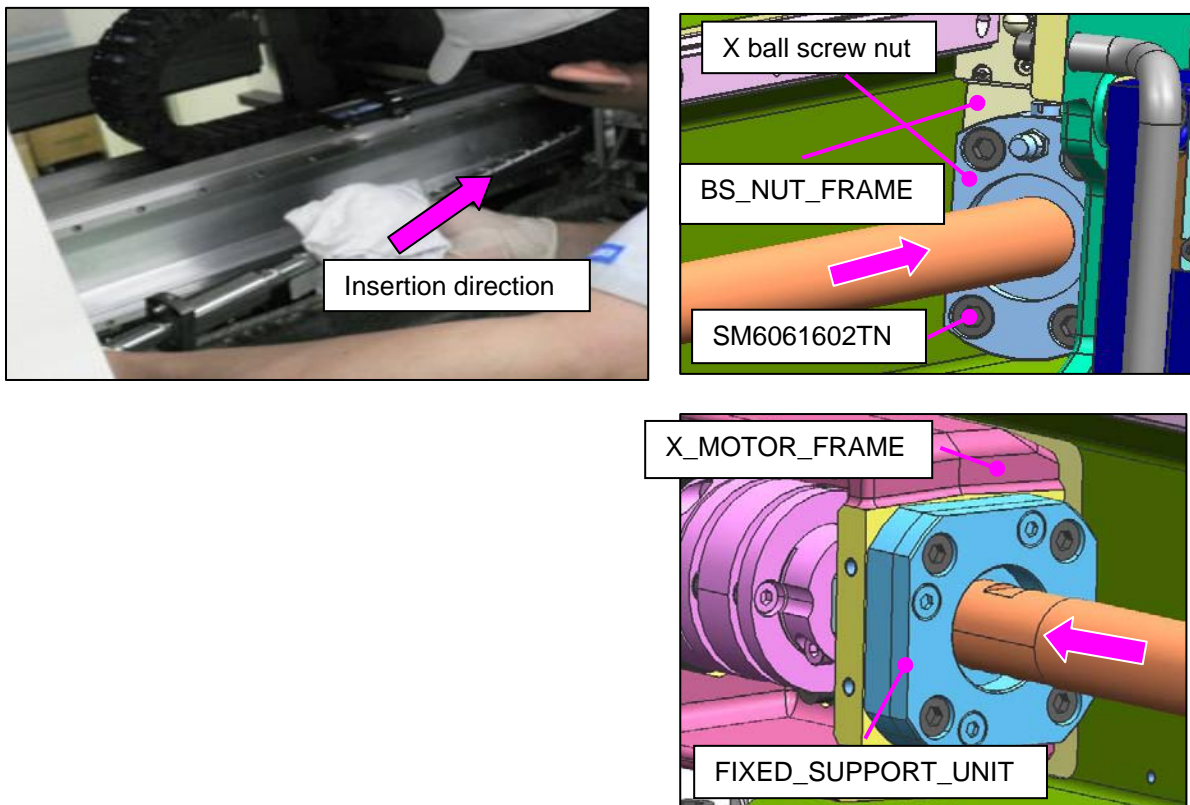
- (1) Mount the C-retaining ring and bearing that have been removed in step 1-8-2 (10) on a new X ball screw (part No.: 40071327).



- (2) Mount the X ball screw that has been assembled in step 1-8-3 (1).

Move the HEAD_UNIT to the right and insert the X ball screw_nut into the BS_NUT_FRAME. After that, secure it temporarily with SM6061602TN (4 pcs.).

After secured temporarily, insert the X ball screw into the FIXED_SUPPORT_UNIT while moving the HEAD_UNIT leftward.

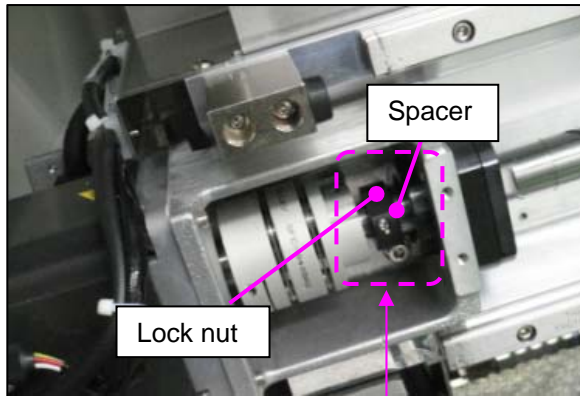


Maintenance Guide

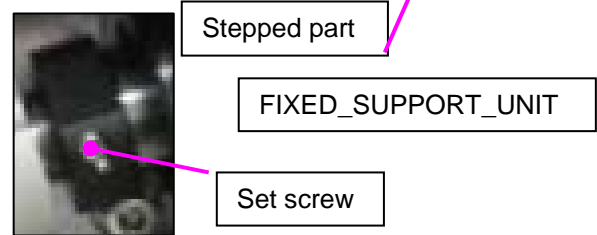
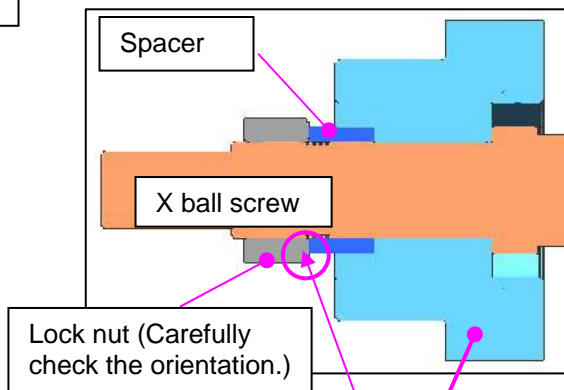
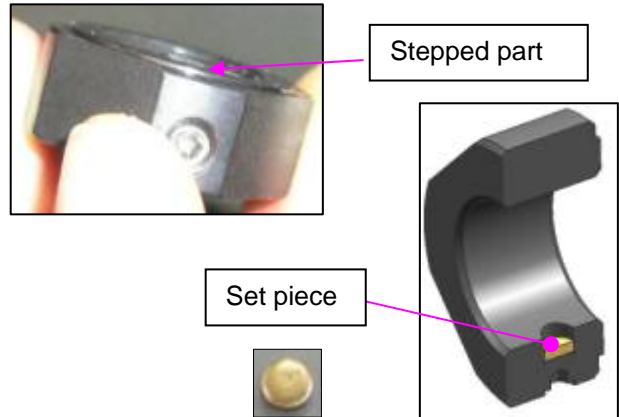
- (3) Fit the spacer and lock nut into the X ball screw and secure them temporarily. Put the set piece and secure it with the set screw.

* At this time, be careful not to drop the set piece.

Put the stepped part of the lock nut in contact with the spacer.

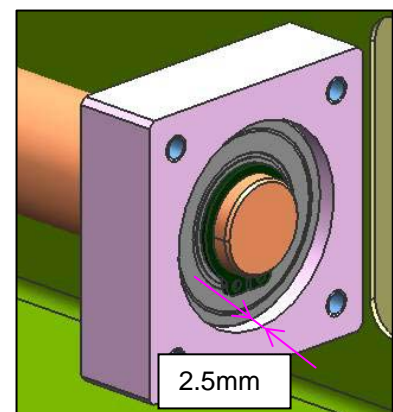
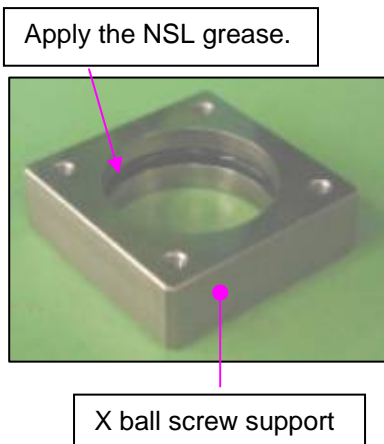


Mount the spacer and lock nut before fitting into the coupling.



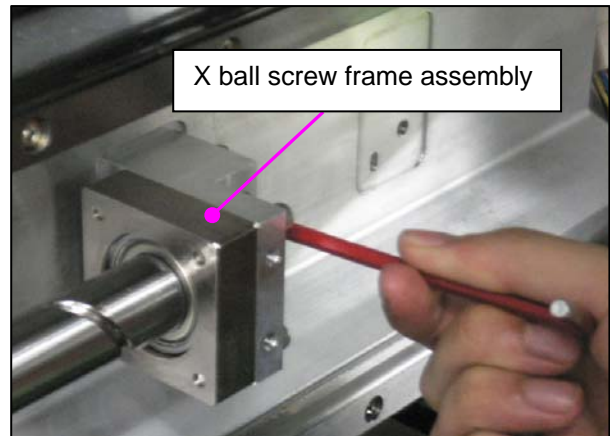
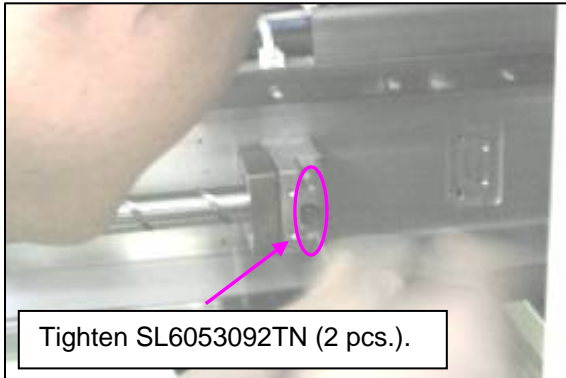
- (4) Apply the NSL grease to the inner circumference of the X ball screw support evenly and assemble it into the bearing.

* The reference for the assembly is 2.5 mm.



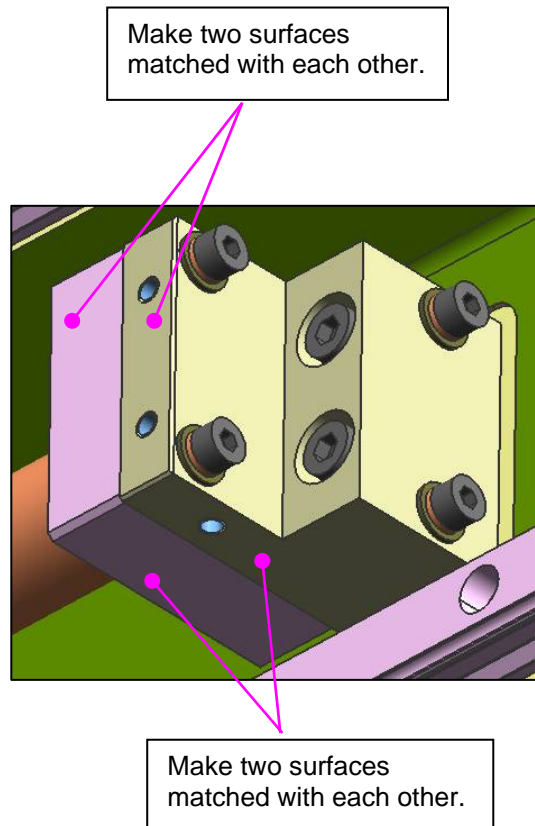
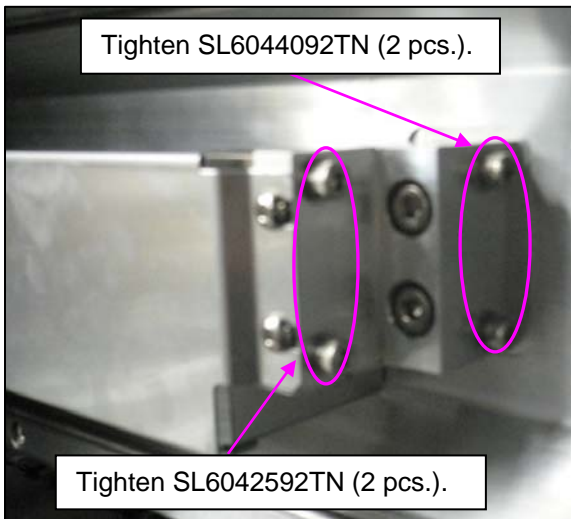
Maintenance Guide

(5) Mount the X ball screw frame assembly.



(6) Secure the X ball screw support temporarily.

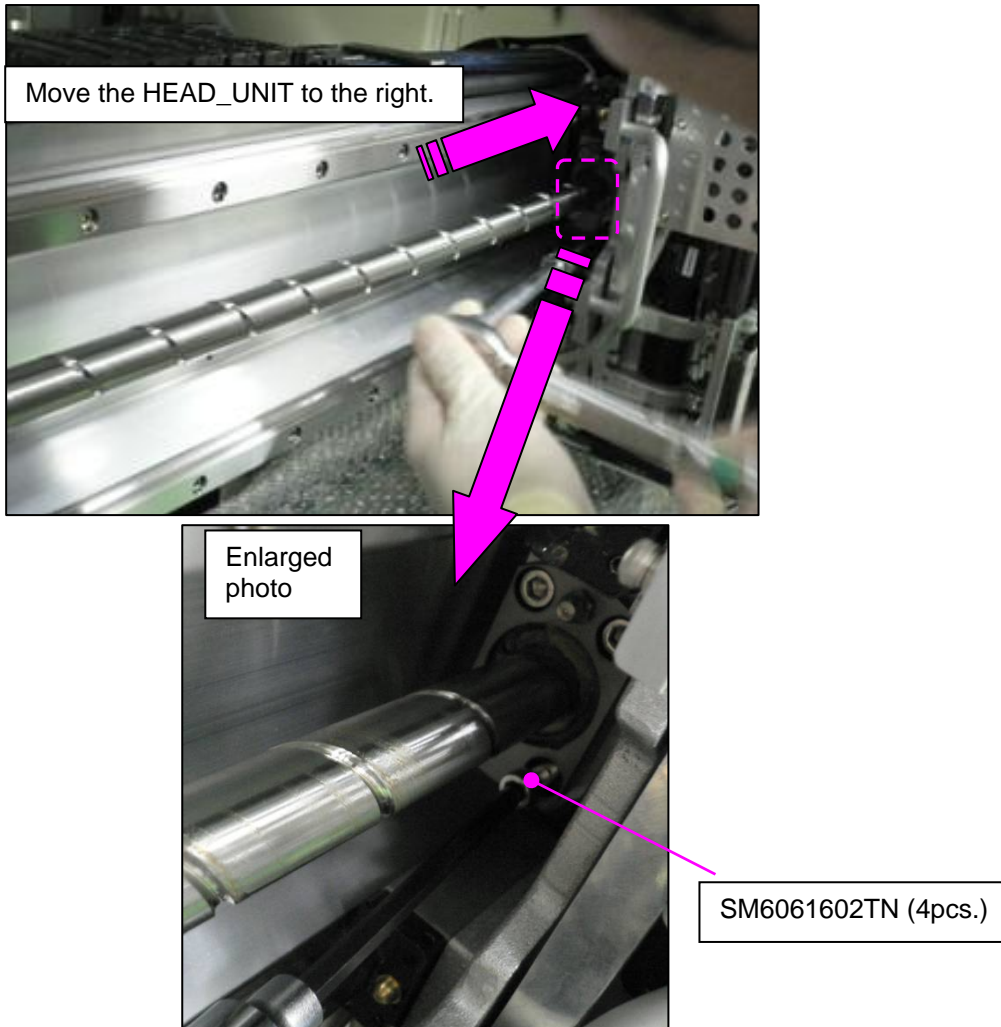
* At this time, secure temporarily so that two surfaces match with each other.



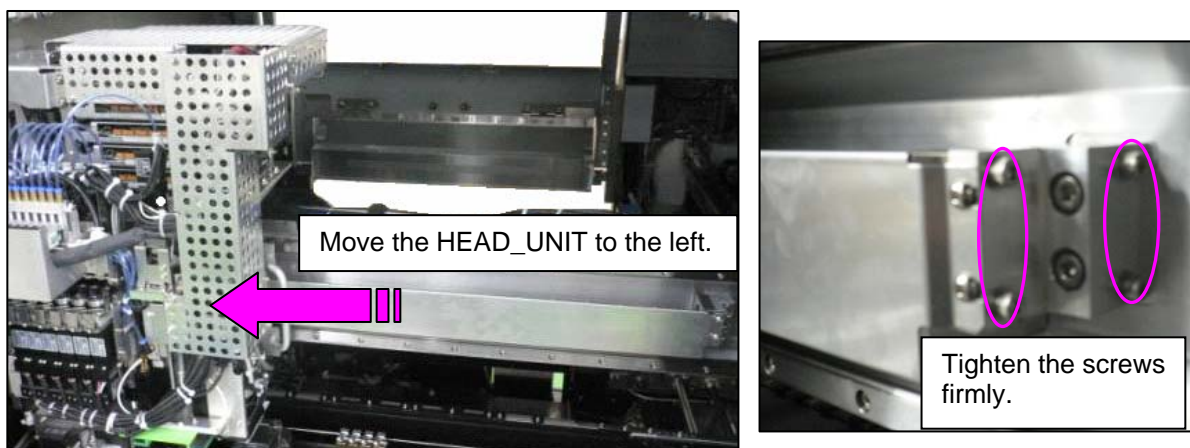
Maintenance Guide

1-8-4. Adjusting the X Ball Screw

- (1) Move the HEAD_UNIT to the right and tighten the fixing screws (SM6061602TN, 4 pcs.) of the X ball screw nut firmly that has been secured temporarily in step 1-8-3 (3).



- (2) Move the HEAD_UNIT to the left and tighten the fixing screws (4 pcs.) of the X ball screw support firmly that has been secured temporarily in step 1-8-3 (6).



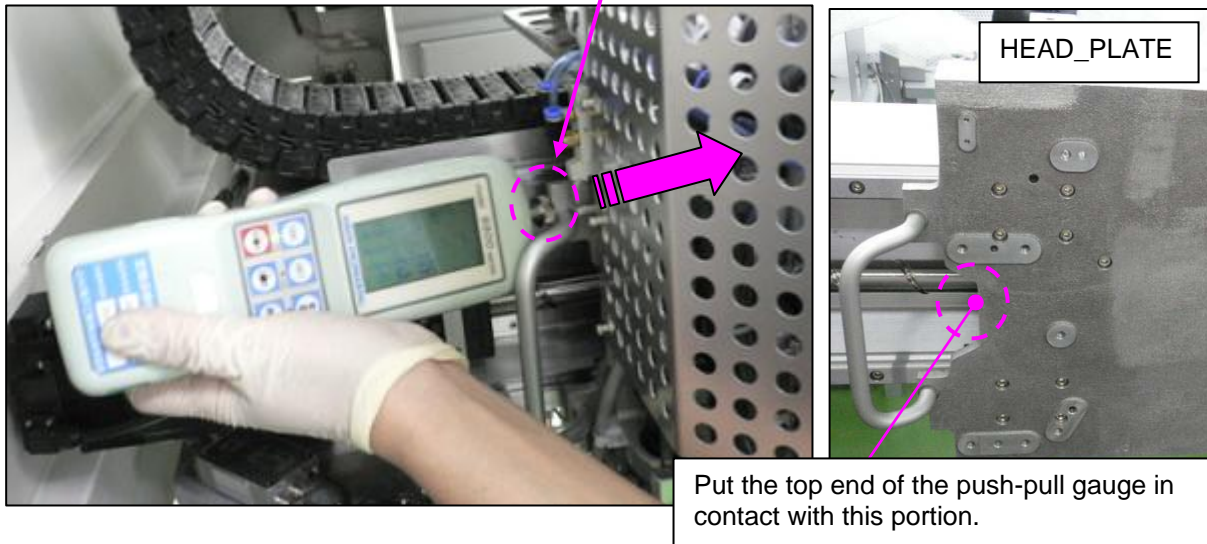
Maintenance Guide

- (3) Reciprocate the HEAD_UNIT several times until it is in contact with the X_STOPPER, and then check that the movement is smooth. Measure the sliding load and check that the measured value is 50[N] or less.

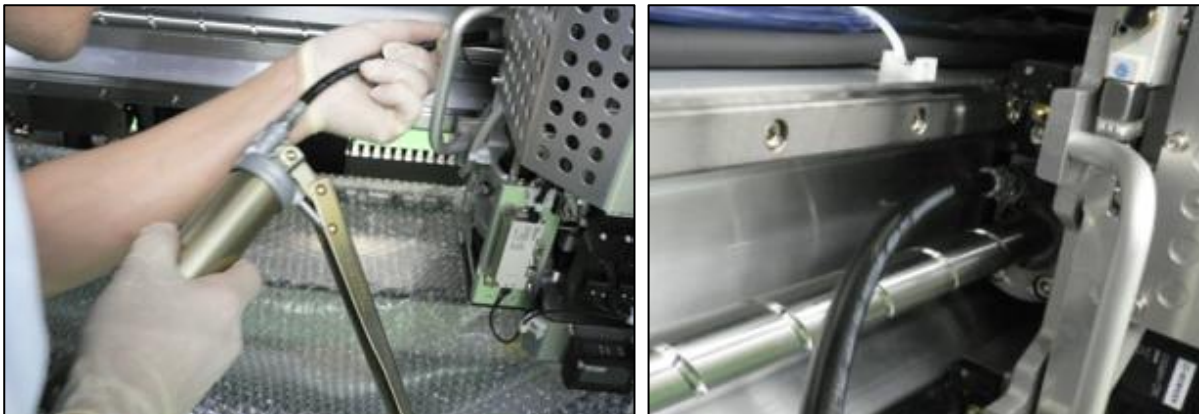
If the measured value does not satisfy the standard level, make the adjustment again from step 1-8-4 (1).

(For details about how to measure the sliding load of the X-axis, see step 1-8-4 (5).)

* Put the top end of the push-pull gauge in contact with the HEAD_PLATE and move the HEAD from the left to the right.



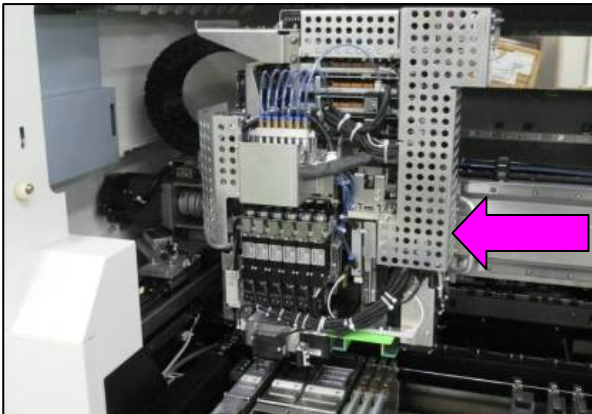
- (4) Apply the grease and move the HEAD_UNIT left and right to conform it to the entire shaft.
- * Wipe off the oozed NSL grease with a cloth rag.



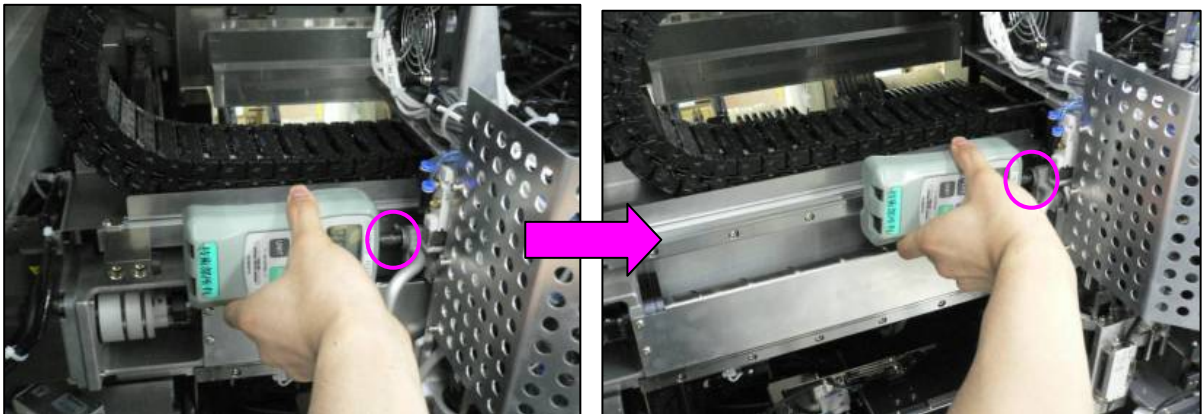
Maintenance Guide

(5) How to measure the sliding load of the X-axis

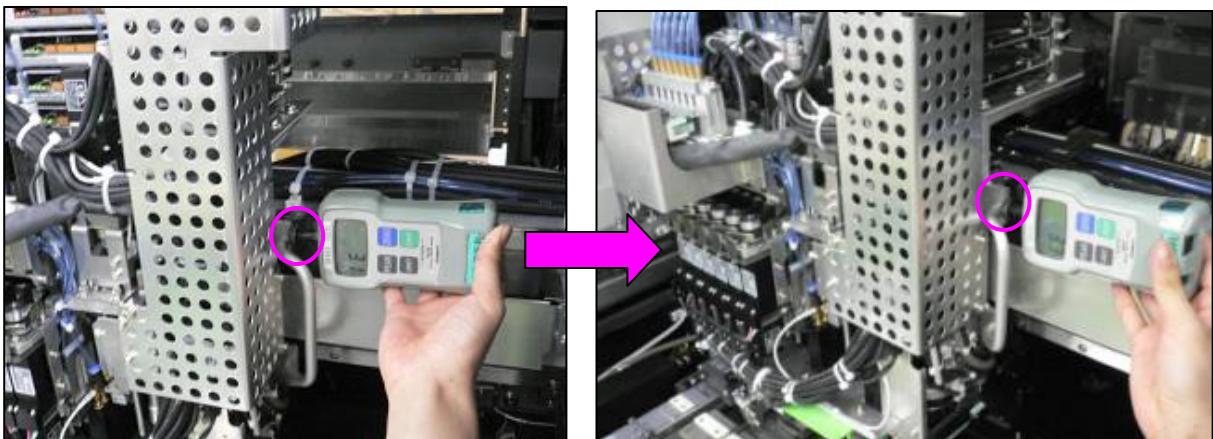
1) Move the HEAD_UNIT to the left.



2) Push the HEAD_UNIT from the left to the right repeatedly to measure the maximum value three times, and then calculate the average value.



3) Push the HEAD_UNIT from the right to the left repeatedly to measure the maximum value three times, and then calculate the average value.



(6) Check that the difference between the average value obtained in step (5)-2) and that obtained in (5)-3) is 5 [N] or less.

Maintenance Guide

- (7) Tighten the screw of the coupling_X. (Screw tightening torque: 3.4 [N·m])



- (8) Mount the X_OIL_GUARD.

Mount the X_MOTOR cable, the X_OIL_GUARD_F_L and X_OIL_GUARD_U_L.
(Perform the work in the reverse order of the work described in Chapter 1-8-1.)

- (9) Readjust the home position rough adjustment and check the operation.

- 1) Turn ON the power to the machine main unit and perform the home position rough adjustment.
- 2) Turn OFF the power to the machine main unit, and then turn it ON again. After that, check that the machine units return to their home positions.
- 3) Perform the aging (warm-up_diagonal/high-speed 2) for about 8 hrs.

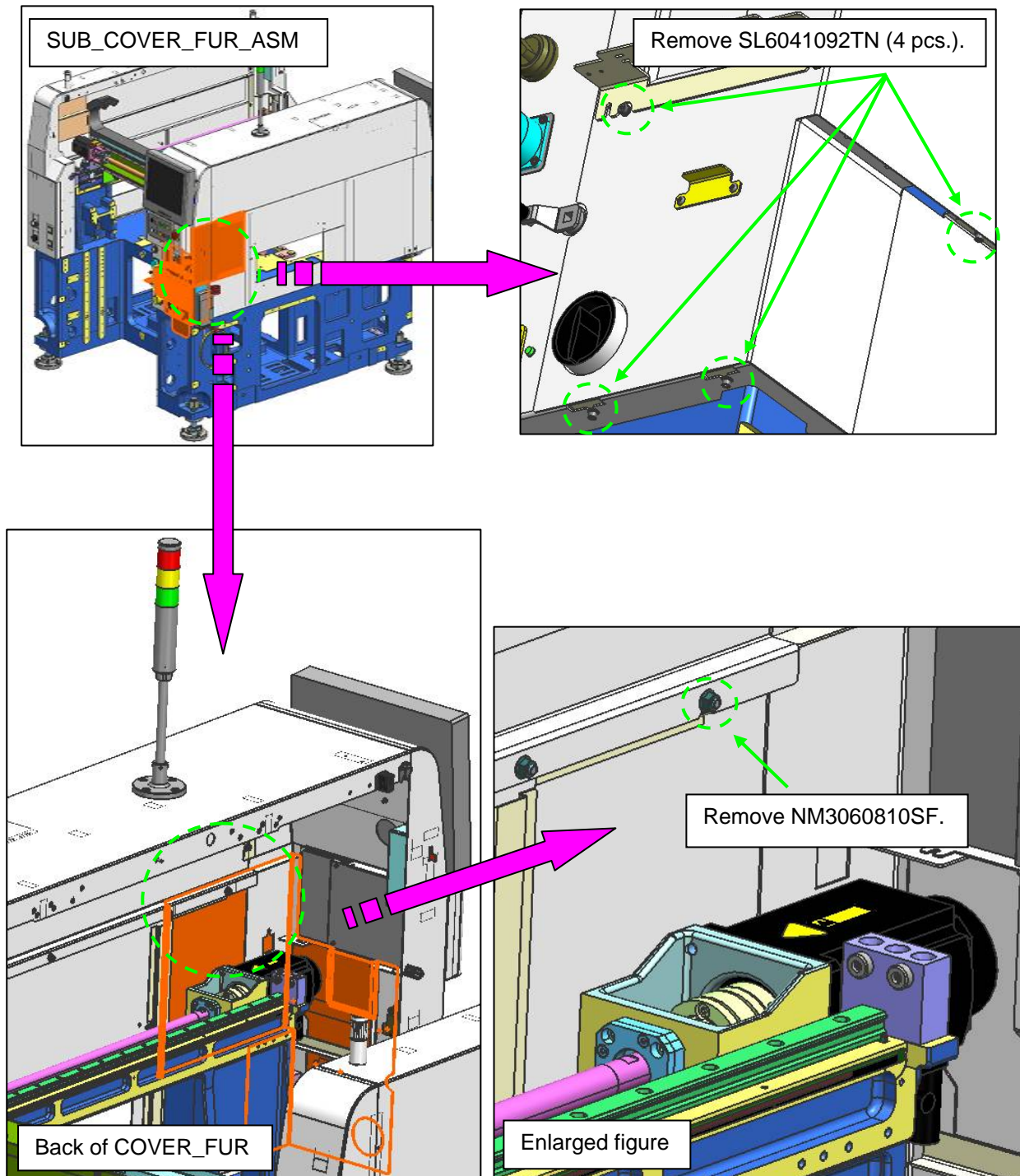
* 8 hrs. are reference value.

Maintenance Guide

1-9. Replacing the Y Ball Screw

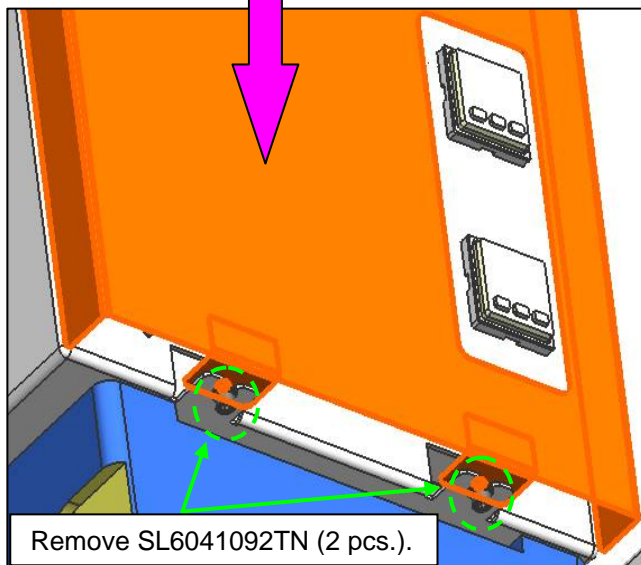
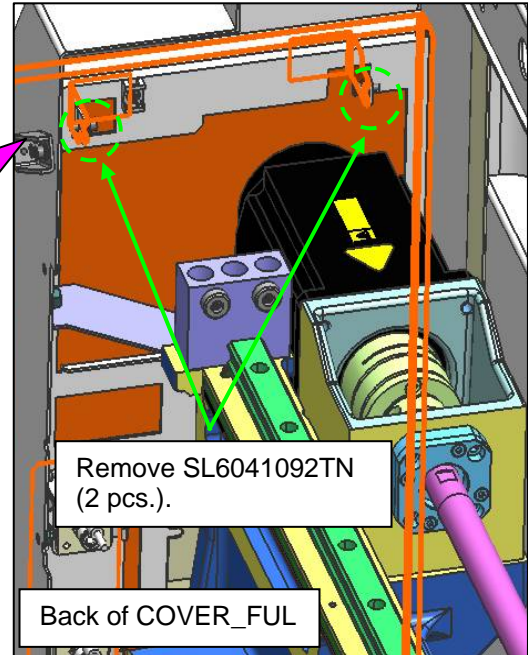
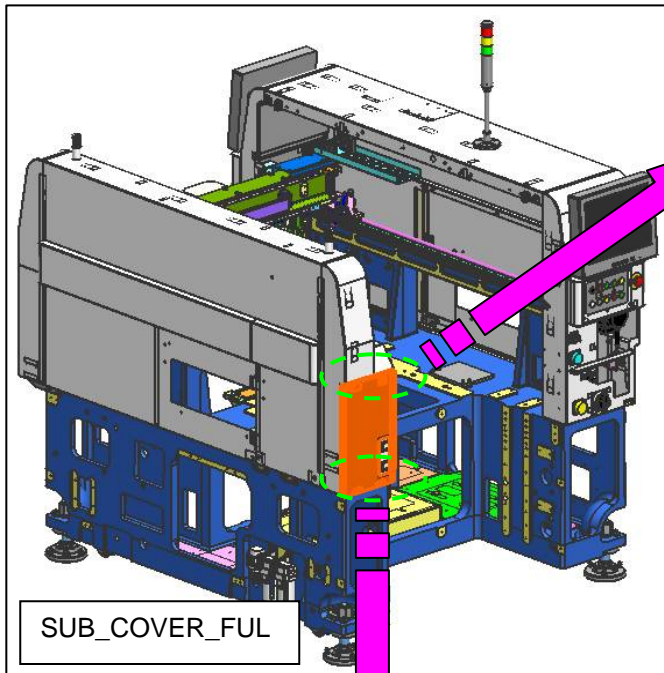
1-9-1. Preparations for Y Ball Screw Replacement

- (1) Detach the SUB_OIL_COVER_FUR.



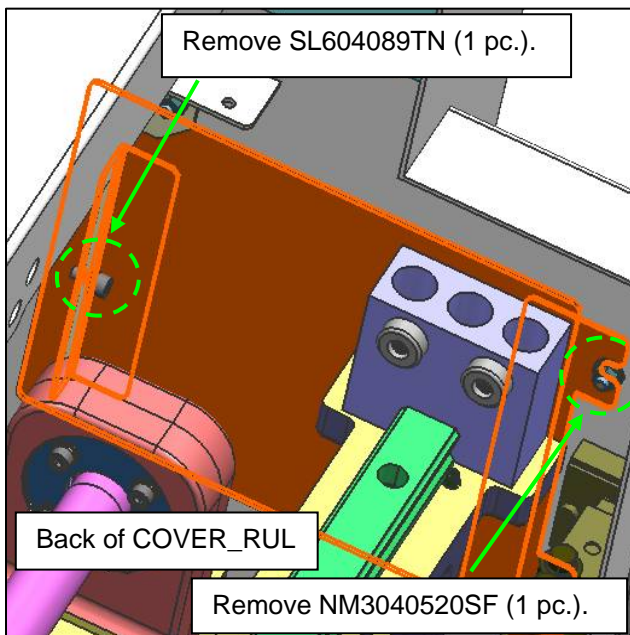
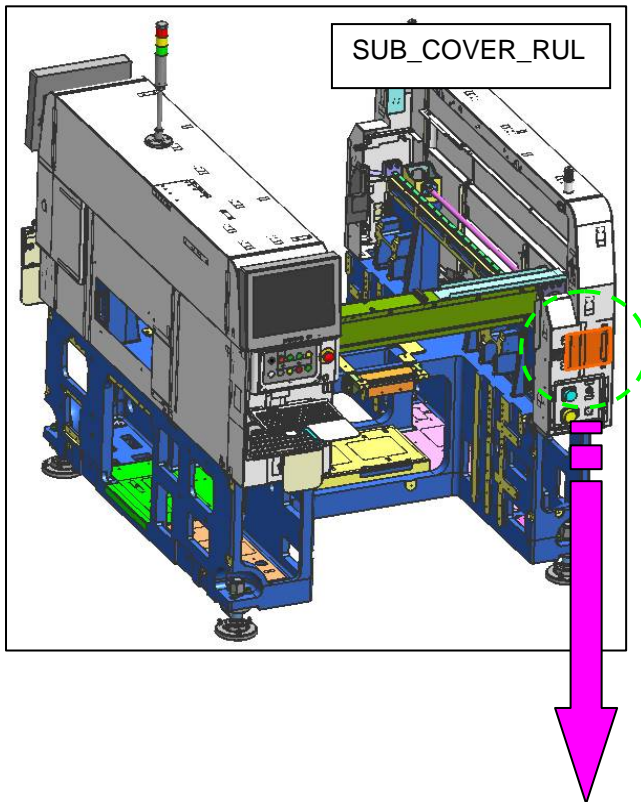
Maintenance Guide

(2) Detach the SUB_COVER_FUL.



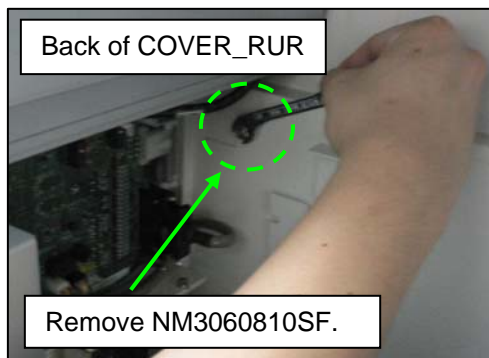
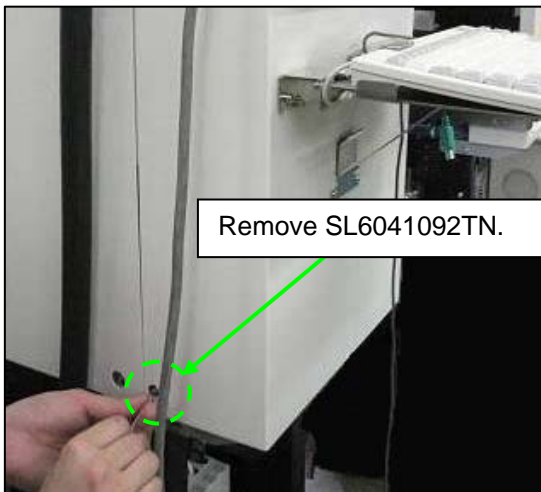
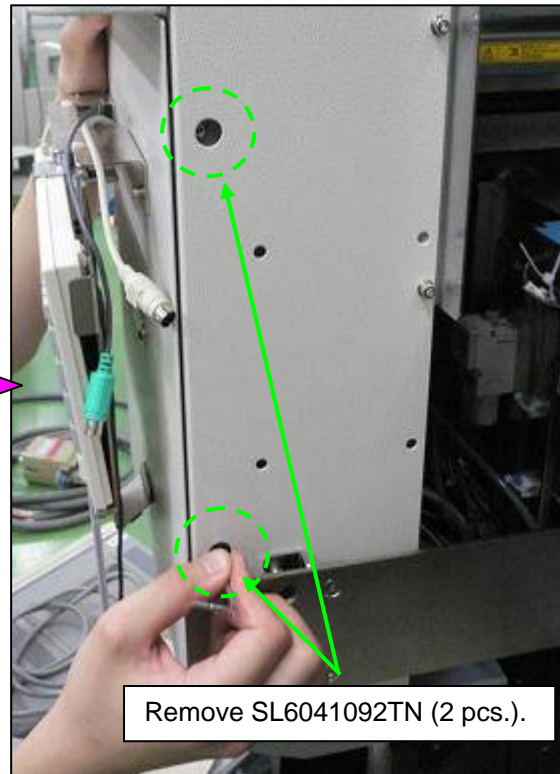
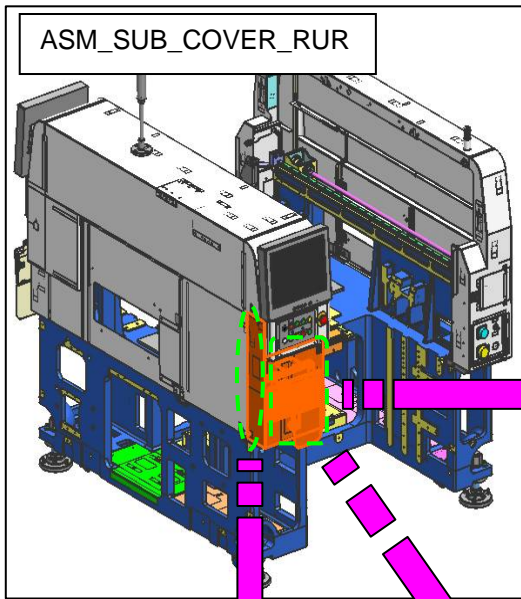
Maintenance Guide

(3) Detach the SUB_COVER_RUL.



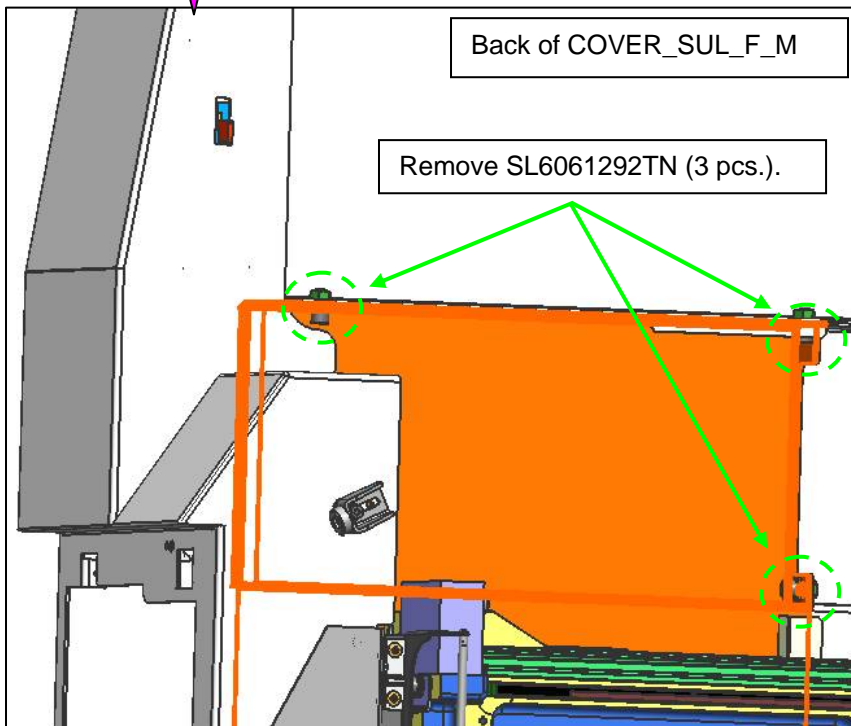
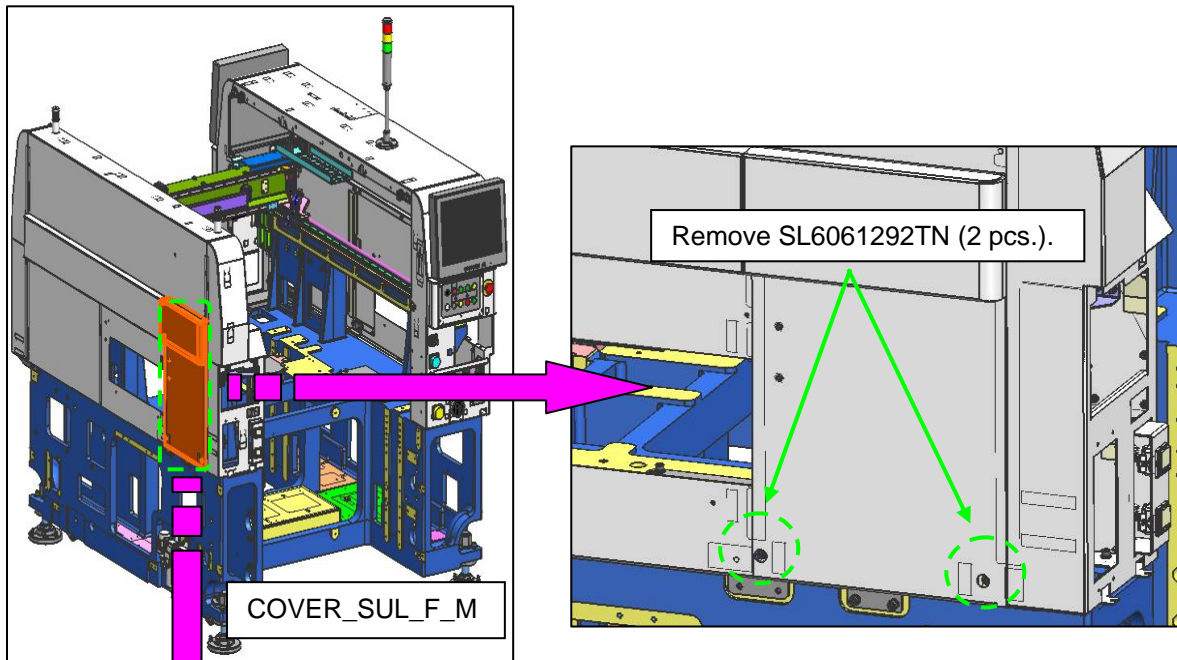
Maintenance Guide

(4) Detach the SUB_COVER_RUR.



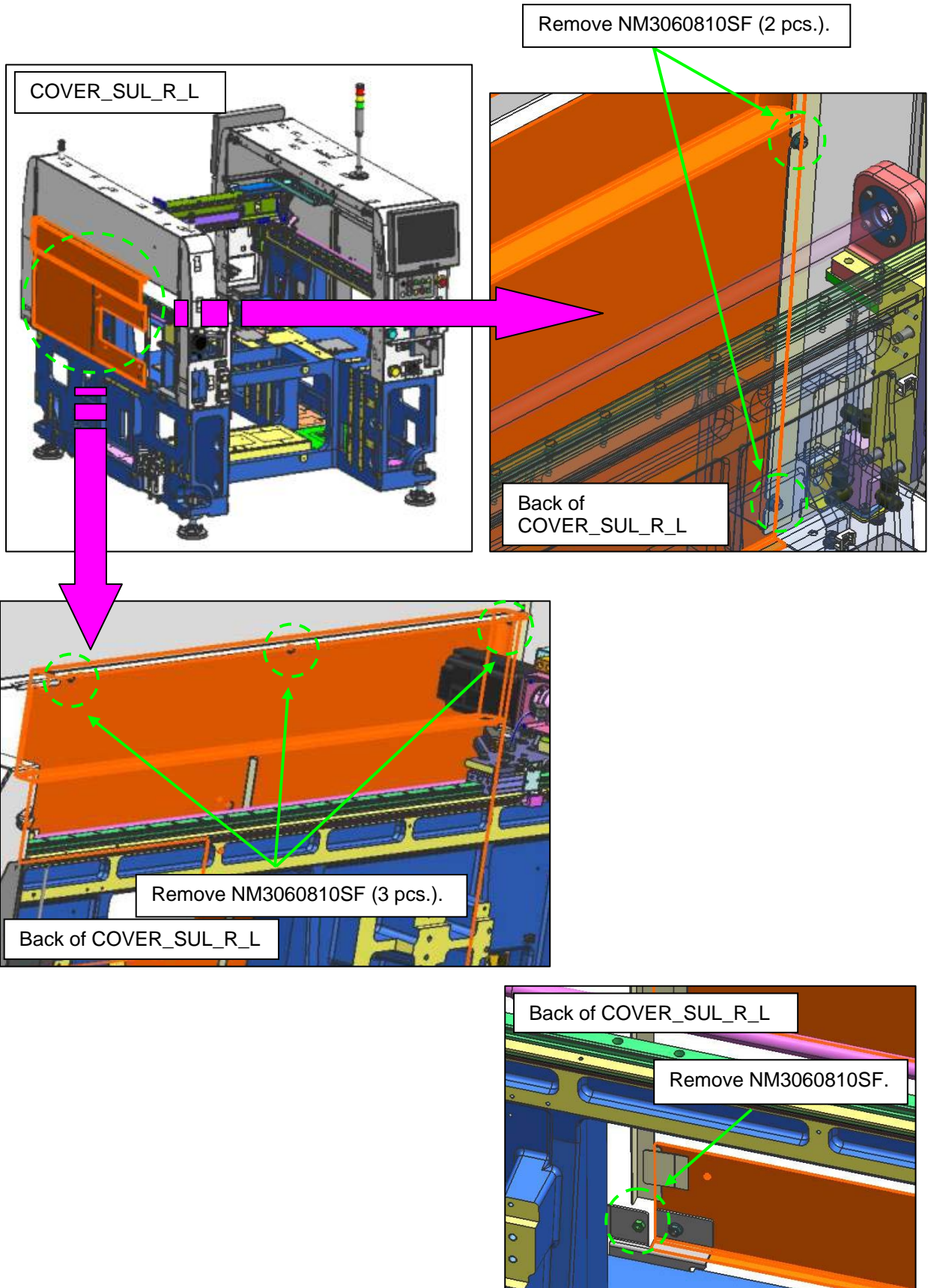
Maintenance Guide

(5) Detach the COVER_SUL_F_M.



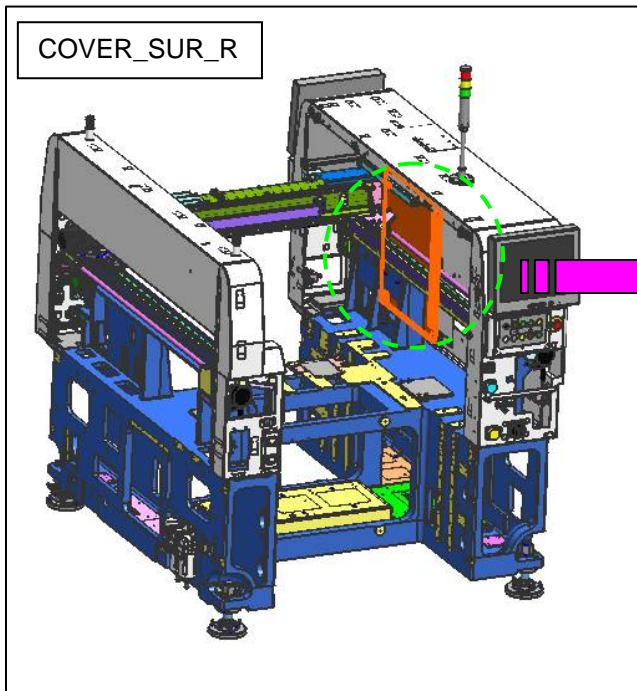
Maintenance Guide

(6) Detach the COVER_SUL_R_L.

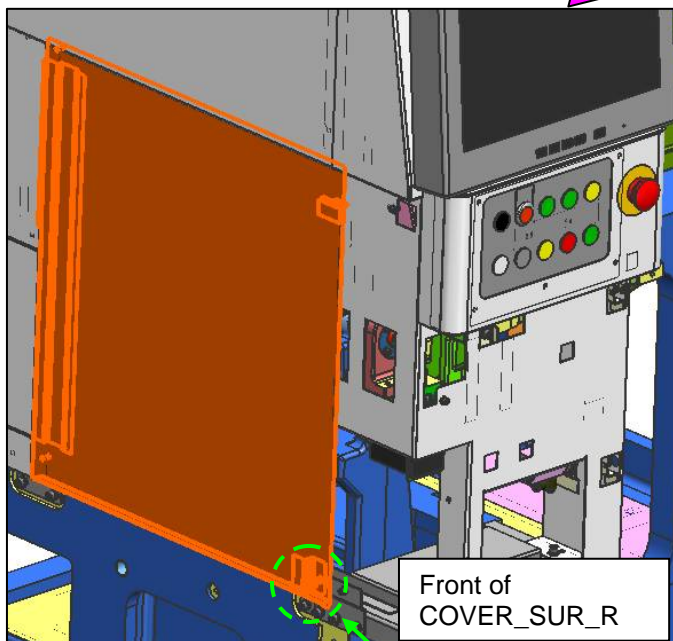
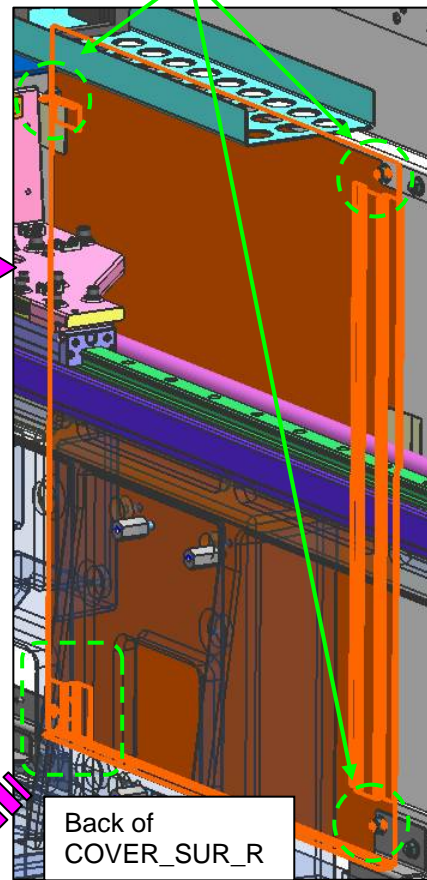


Maintenance Guide

(7) Detach the COVER_SUR_R.



Remove NM3060810SF (3 pcs.).



Remove SL6061292TN (1 pc.).

Maintenance Guide

- (8) Disconnect the Y_MOTOR cable.

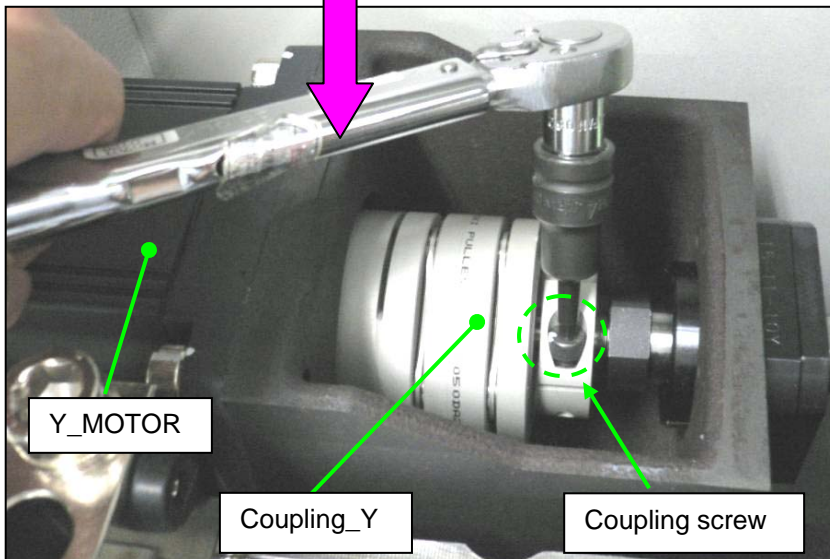
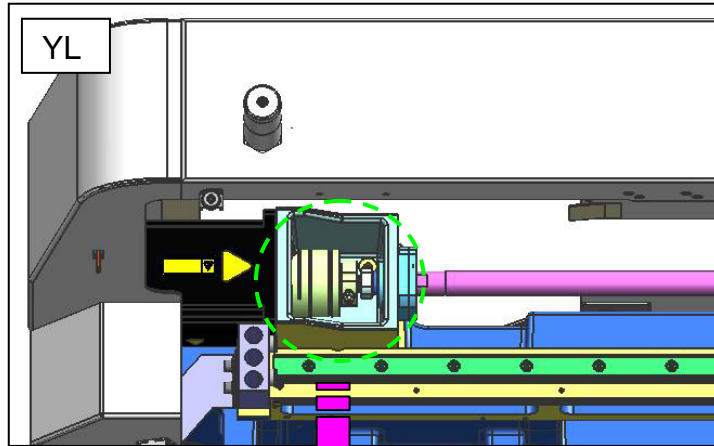


Maintenance Guide

1-9-2. Removing the Y Ball Screw

(1) Loosen the coupling on the ball screw side.

* Be careful not to remove the coupling screw.

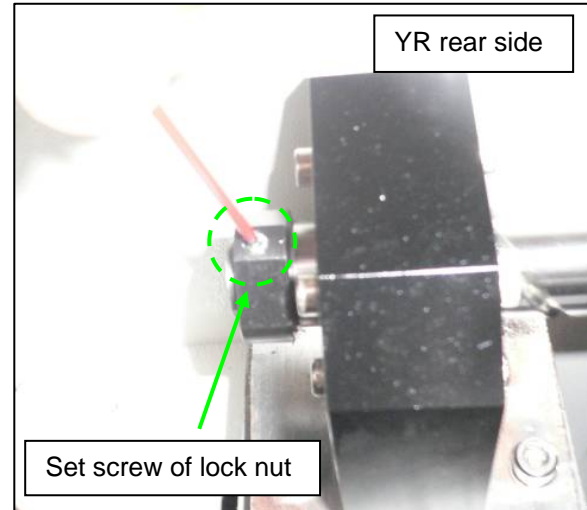
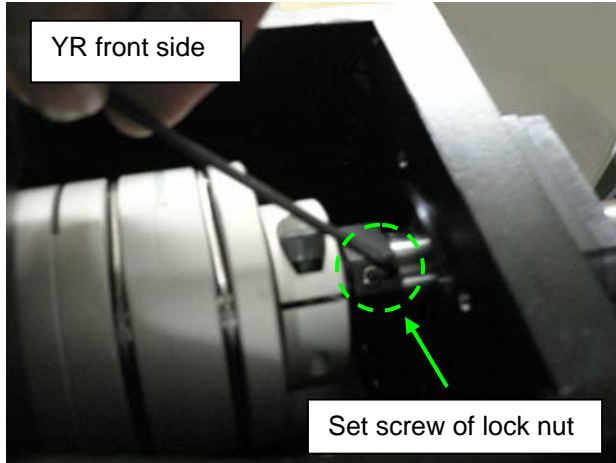


Perform the same work for the YR.

Maintenance Guide

- (2) Loosen the set screw of the lock nut. Put the wrench 22 on the lock nut and wrench 17 on the groove of the ball screw, and then loosen the lock nut.

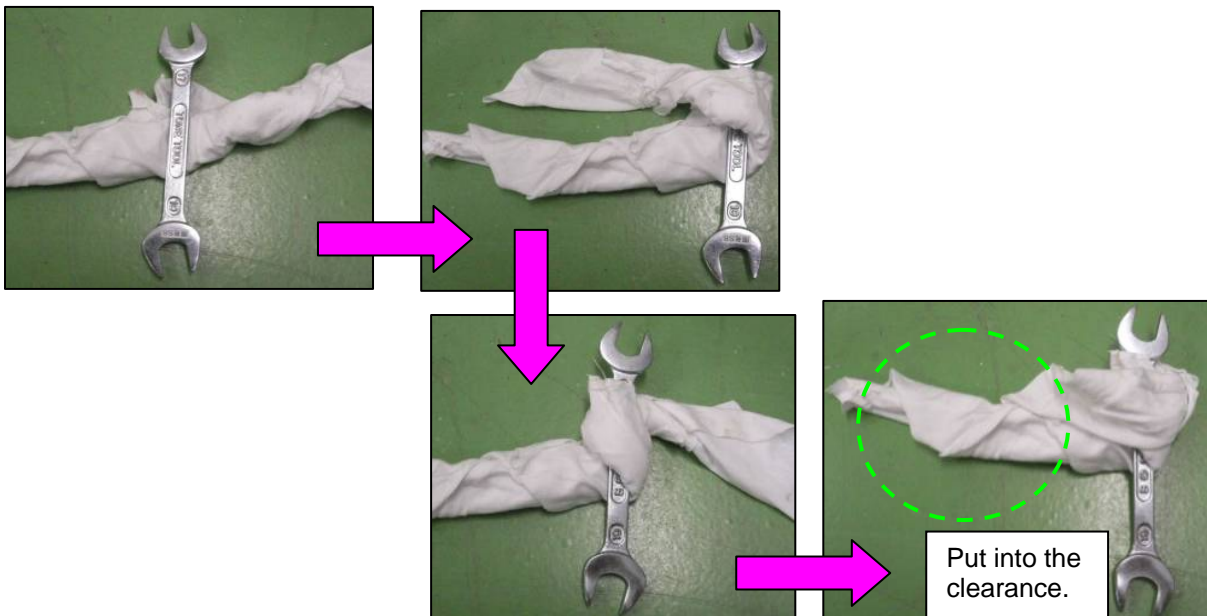
* Pay special attention so that the set screw of the lock nut does not project from the lock nut surface.



- (3) Wrap the wrench in cloth rag.

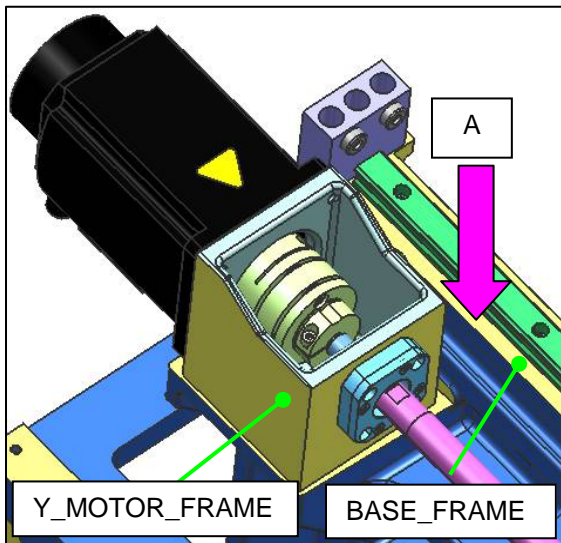
* This work must be performed to improve the workability and protect the machine.

How to wrap the wrench
in cloth rag

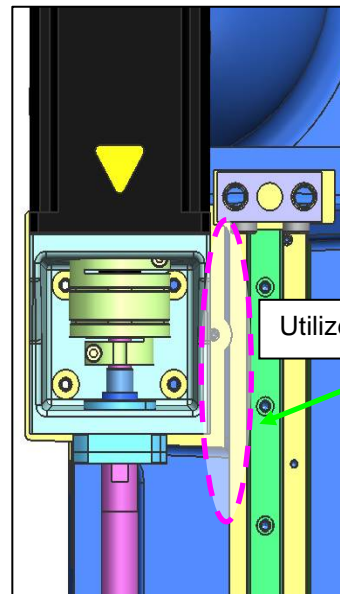


Maintenance Guide

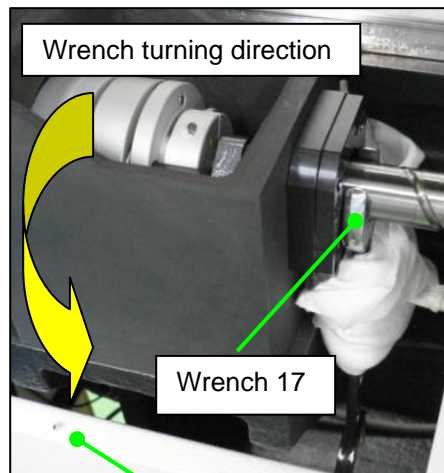
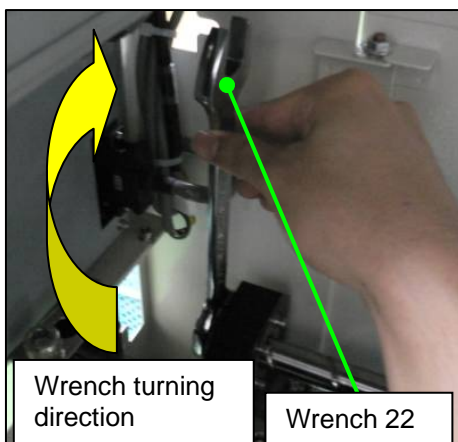
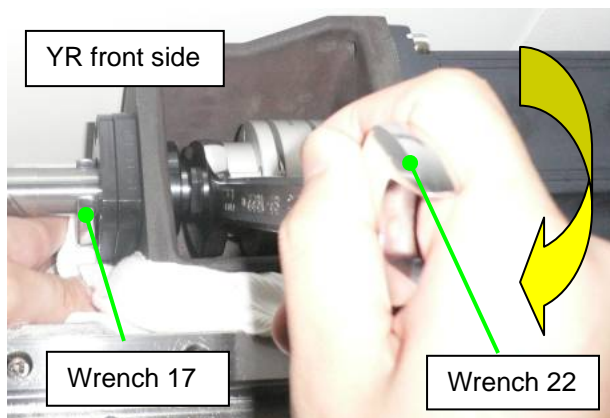
To loosen the lock nut on the rear of the ball screw on the YR side, put the wrench wrapped in cloth rag into the clearance between the Y motor frame and base frame.



YR rear side



View of A



Protect the cover with cloth rags.

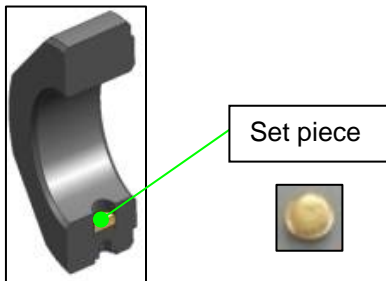
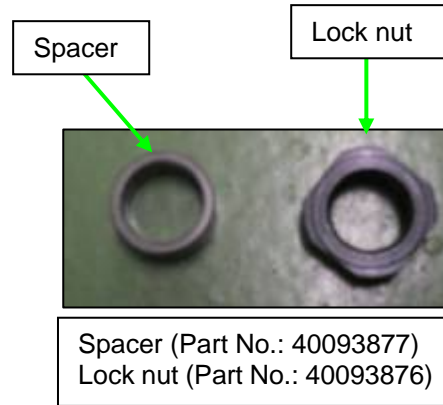
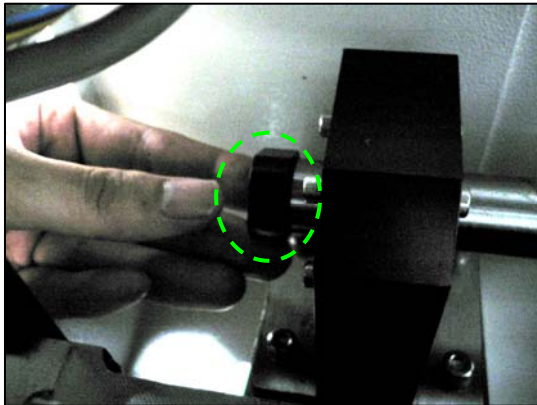
Perform the same work for the YL.

Maintenance Guide

(4) Remove the lock nut and spacer on the rear.

* Be careful not to drop the set piece. The set piece and lock nut are used as a set.

[Lock nut (Part No.: 40093876)]

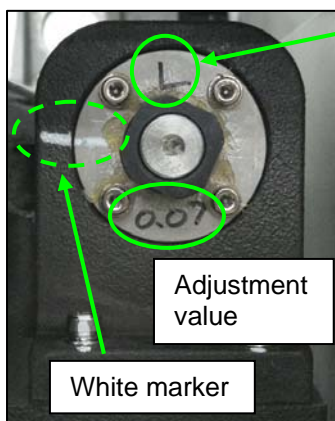


(5) Pull out the Y_BEARING_ASM from the Y_BS_FRAME.



Y_BS_FRAME

Y_BEARING_ASM

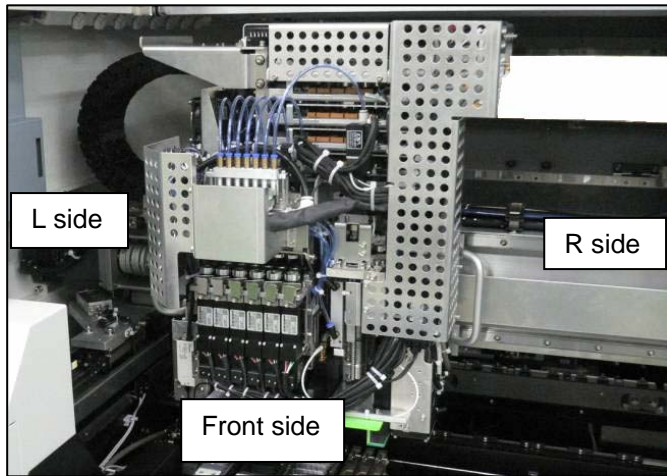


Rear L indication

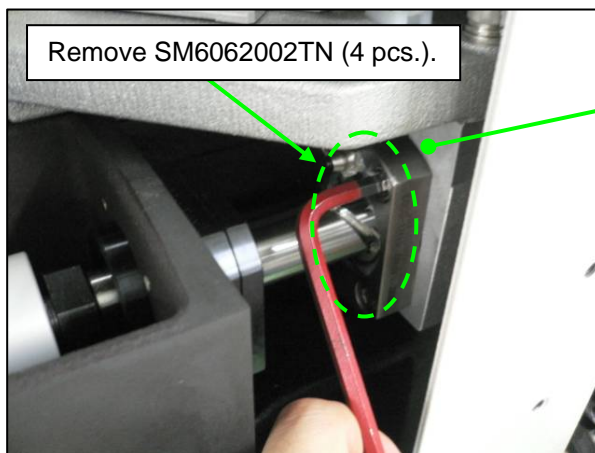
[To use the Y_BEARING_ASM later, check the following items.]
 When pulling out the Y_BEARING_ASM, check that the rear L indication (rear R indication) and the adjustment value are written, and that the white marker is put.
 * If the rear L indication (rear R indication), the adjustment value, and the white marker line are faded, write them again.

Maintenance Guide

(6) Remove the screws that secure the ball screw nut.

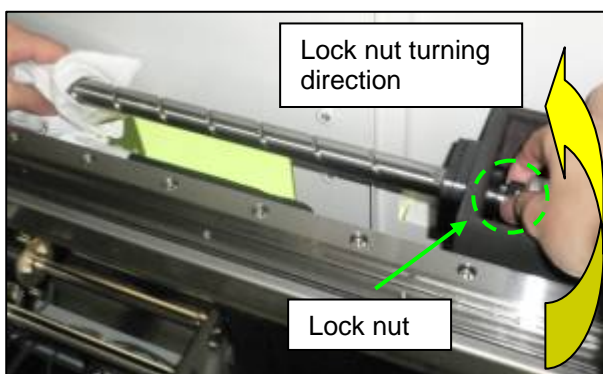


Before starting the work, move the HEAD_UNIT to the front.
 To replace the ball screw on the R side, move the HEAD_UNIT to the L side.
 To replace the ball screw on the L side, move the HEAD_UNIT to the R side.



Remove SM6062002TN (4 pcs.).
 After SM6062002TN has been removed, move the HEAD_UNIT to the rear.
 Replace the ball screw on the opposite side in the same manner.
 * Move the HEAD_UNIT to the rear so that the ball screw nut is not removed from the Y_BS_CONNECTOR.

(7) Remove the lock nut and spacer on the front.

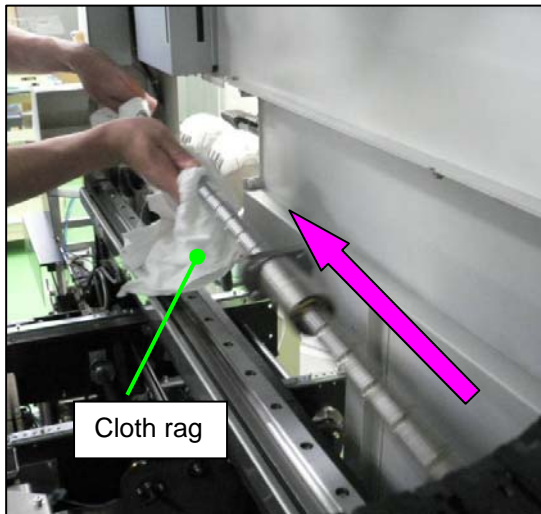


After the HEAD_UNIT has been moved to the rear, hold the shaft of the ball screw by your left hand and turn the lock nut by your right hand to loosen it while pushing the ball screw toward the rear. At this time, also remove the spacer.

Maintenance Guide

(8) Pull out the Y ball screw.

* Do not touch the ball screw by bare hand. (Doing so may cause the ball screw to rust.)

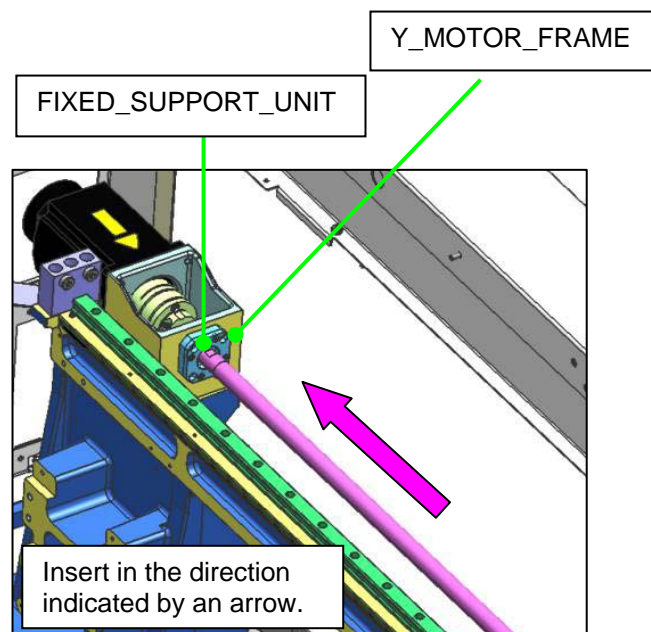


Cloth rag

After the lock nut and spacer on the front have been removed, pull out the ball screw while holding the ball screw shaft by your left hand.

1-9-3. Mounting the Y Ball Screw

(1) Put a new Y ball screw.



Put the ball screw nut in the Y_BS_CONNECTOR in the reverse order of step 1-9-2 (6) and secure it temporarily at four locations with SM6062002TN.

(* At this time, be sure to use new screws.)

After secured temporarily, insert the Y ball screw so that it is in contact with the FIXED_SUPPORT_UNIT mounted on the Y_MOTOR_FRAME.

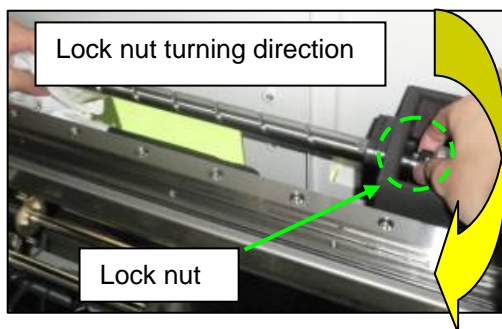
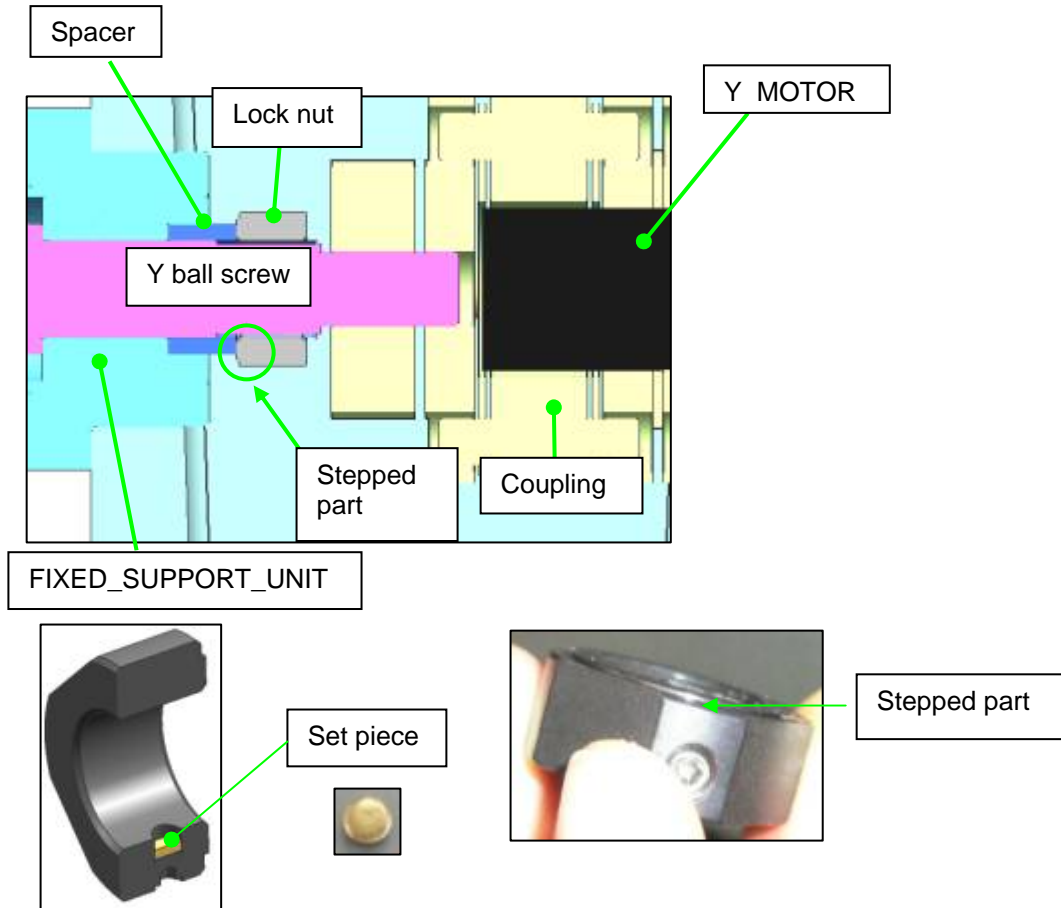
(* Do not insert the Y ball screw into the coupling since the lock nut and spacer are mounted in the later work.)

Maintenance Guide

- (2) Fit the spacer and lock nut into the ball screw on the front (same procedures as described in steps 1-9-2 (6) and 1-9-2 (7)).

* Be careful not to drop the set piece.

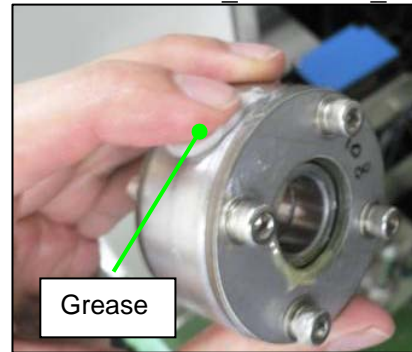
Put the stepped part of the lock nut in contact with the spacer.



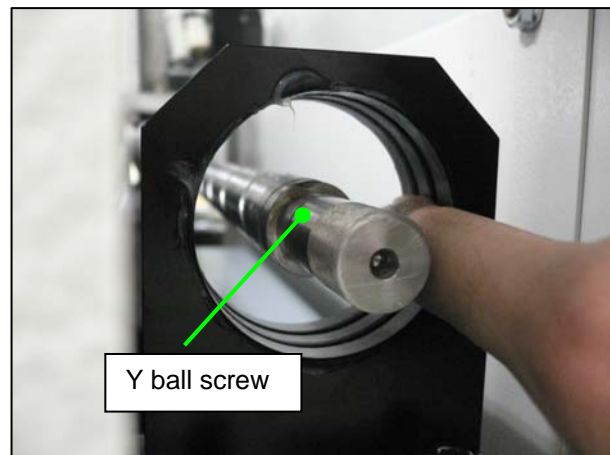
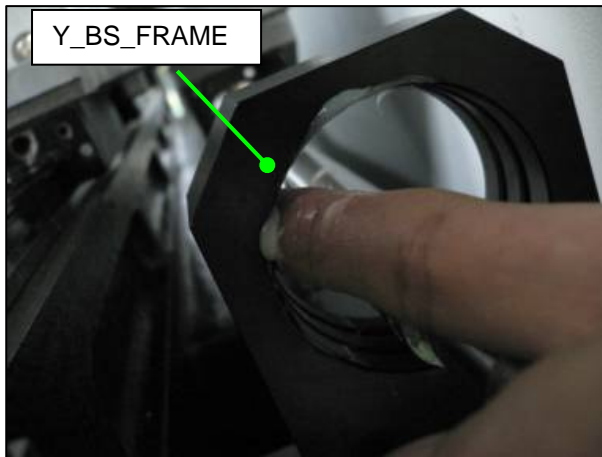
Mount the spacer and lock nut on the Y ball screw.
To mount the lock nut on the Y ball screw, turn the lock nut to mount it to the top end of the Y ball screw, and then insert the Y ball screw into the coupling.

Maintenance Guide

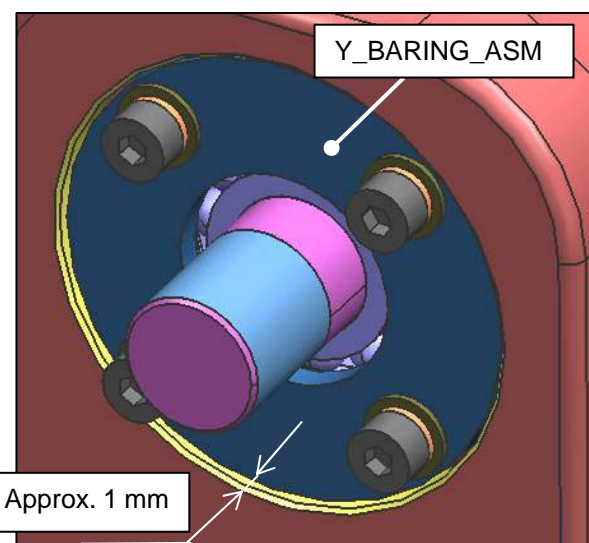
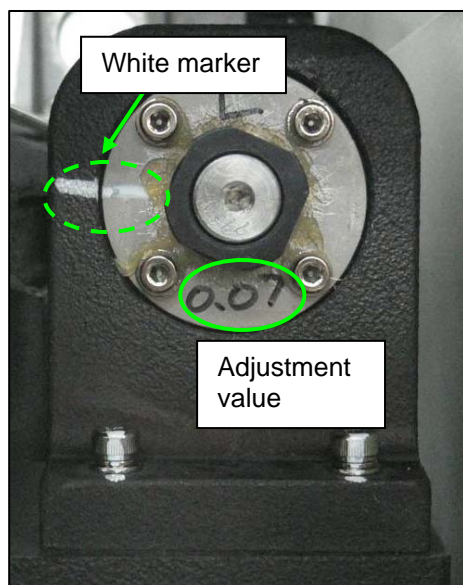
- (3) Apply the NSL grease (40094361) to the side surface of the Y_BEARING_ASM evenly.



- (4) Apply the NSL grease to the hole in the Y_BS_FRAME evenly (portion where the Y_BEARING_ASM is to be put).
Also, apply the NSL grease to the top end of the Y ball screw evenly (portion where the Y_BEARING_ASM is to be put).



- (5) Fit the Y_BEARING_ASM into the Y_BS_FRAME (rear side).

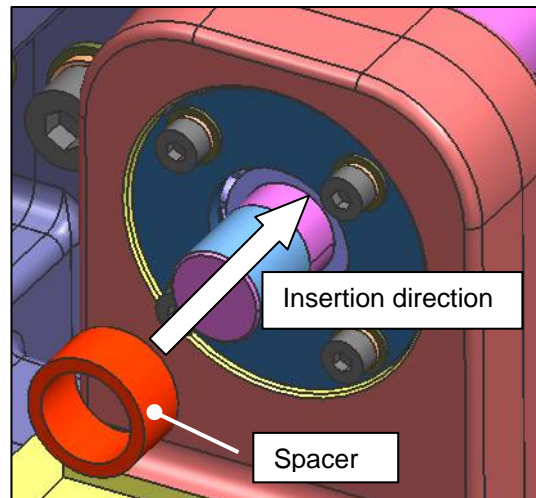


- Insert so that the side on which the adjustment value is written is located on the rear.
- * When fitting the Y_BEARING_ASM, adjust it to the white marker position.

- Push the Y_BARRING_ASM until it is no longer pushed. (The dimension shown above is the reference value.)

Maintenance Guide

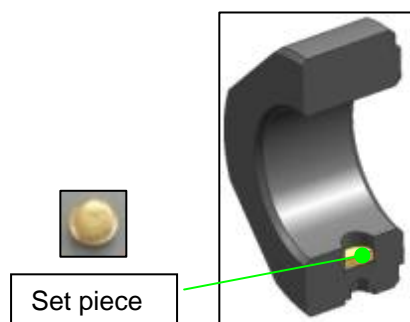
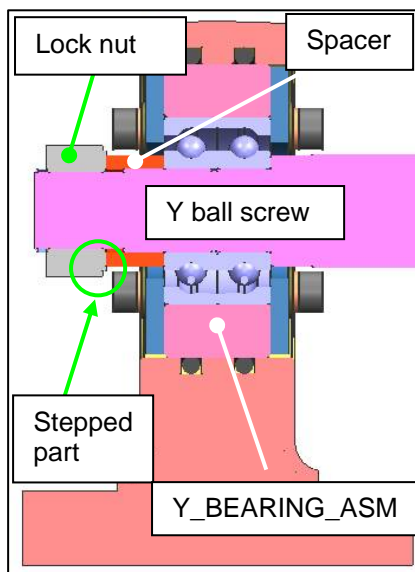
- (6) Apply the NSL grease to the inside of the spacer evenly, and then fit it into the ball screw (rear side).



- (7) Put the set piece in the lock nut and fit it into the ball screw (rear side).

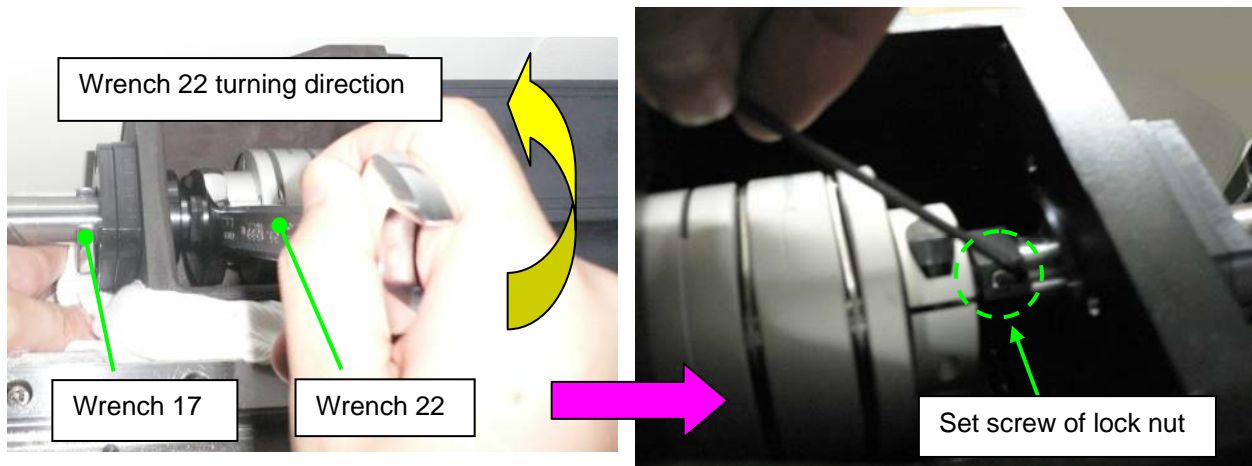
* Be careful not to drop the set piece.

Put the stepped part of the lock nut in contact with the spacer.



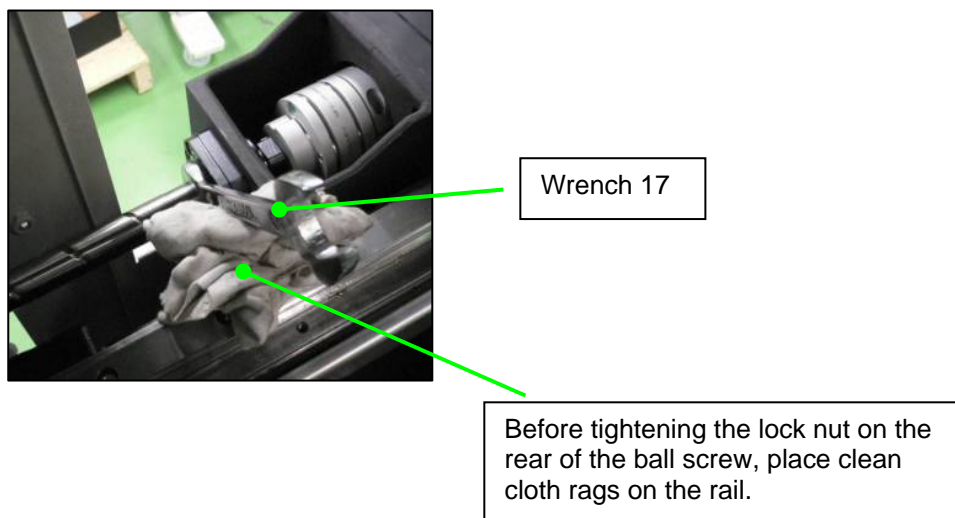
Maintenance Guide

- (8) Tighten the lock nut on the front with the wrenches 17 and 22. Tighten the set screw of the lock nut.

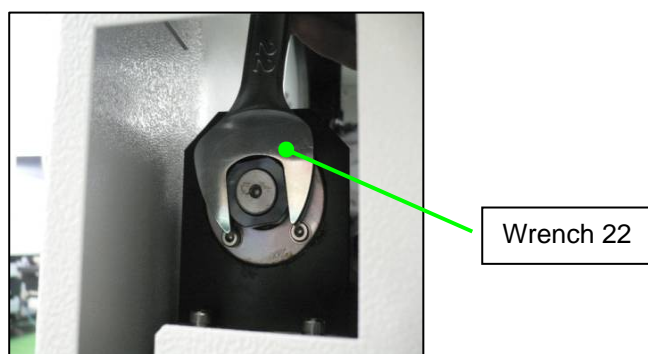


- (9) Tighten the lock nut on the rear with the wrenches 17 and 22.

- 1) Put the wrench on the groove of the ball screw on the front.

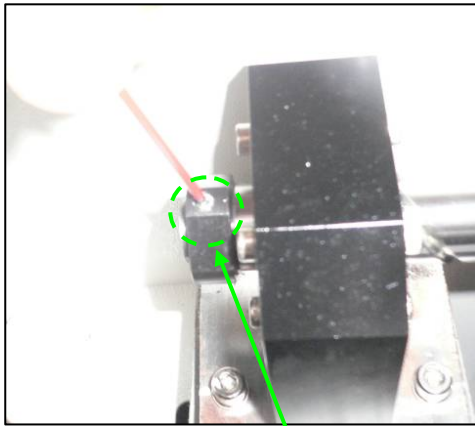


- 2) Put the wrench 22 on the lock nut on the rear, and then tighten it.



Maintenance Guide

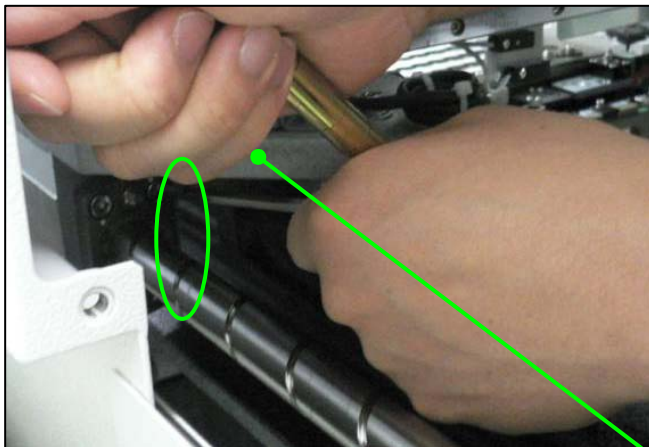
- 3) Tighten the set screw of the lock nut.



Set screw of lock nut

1-9-4. Adjusting the Y Ball Screw

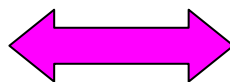
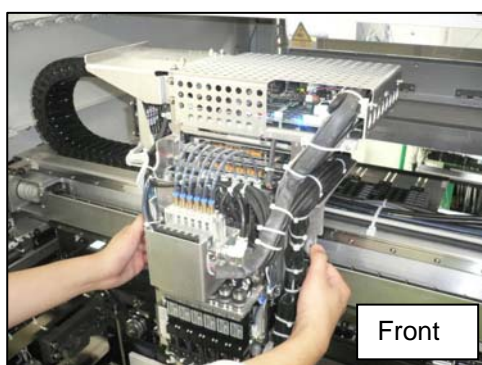
- (1) Move the X_AXIS_FRAME_ASM to a front limit where the wrench can be put, and then retighten the screws (2 pcs.) (SM6062002TN) inside the machine.



X_AXIS_FRAME_ASM

- (2) Reciprocate the HEAD_UNIT several times until the X_AXIS_FRAME_ASM is in contact with both the Y_STOPPER on the front and the Y_STOPPER on the rear to check that the movement is smooth.

If the movement is not smooth, make the adjustment again from step 1-9-4 (1).

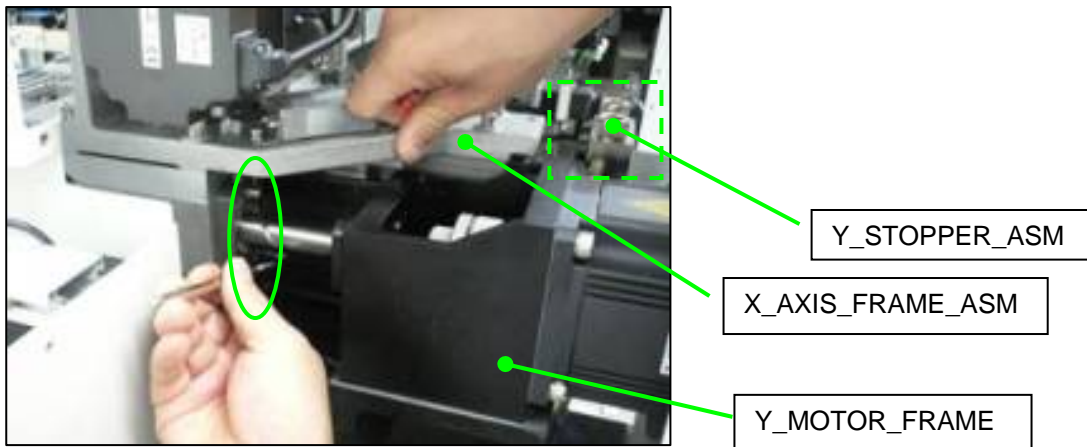


Repeat
several times.

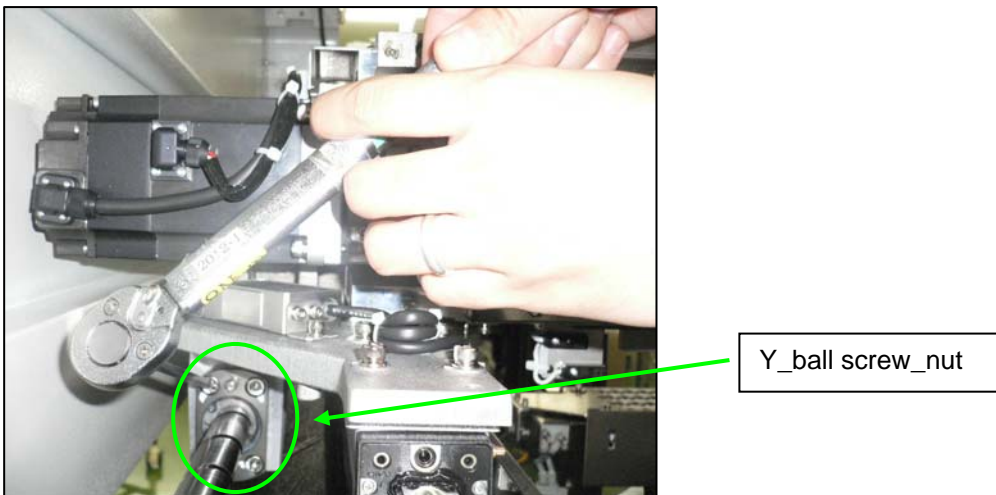


Maintenance Guide

- (3) After checking, move the X_AXIS_FRAME_ASM to the front until it is in contact with the Y_STOPPER, and then retighten the screws (SM6062002TN, 2 pcs.) outside the machine.



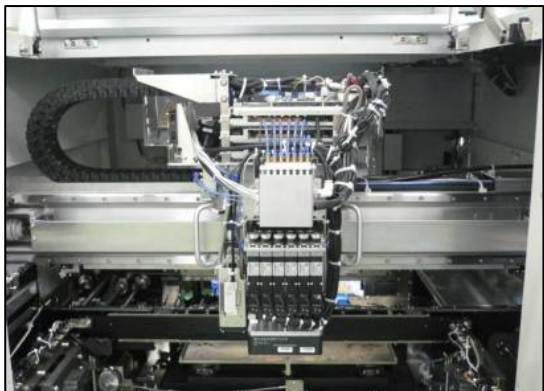
- (4) Reciprocate the HEAD_UNIT several times again until the X_AXIS_FRAME_ASM is in contact with both the Y_STOPPER on the front and the Y_STOPPER on the rear to check that the movement is smooth.
After tightened firmly, measure the sliding load and check that the measured value is 120[N] or less.
If the measured value does not satisfy the standard level, make the adjustment again from step 1-9-4 (3).
(For details about how to measure the sliding load of the Y-axis, see step 1-9-4 (6).)
- (5) Move the X_AXIS_FRAME_ASM to the front until it is in contact with the Y_STOPPER. Tighten all of four fixing screws (SM6062002TN) of the Y ball screw nut.



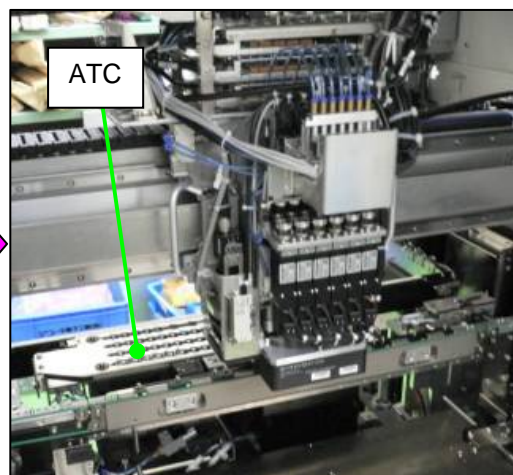
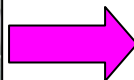
Maintenance Guide

(6) how to measure the sliding load of the Y-axis.

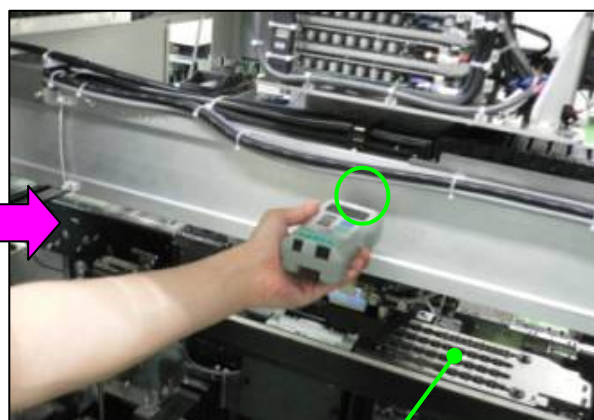
1) Move the HEAD_UNIT to the center, and then move the X-axis frame to the front.



2) Push the HEAD_UNIT from the front to a portion close to the ATC repeatedly to measure the maximum values three times, and then calculate the average value.



3) Move the X-axis frame to the rear and push it from the rear to a portion close to the ATC repeatedly to measure the maximum values three times, and then calculate the average value.



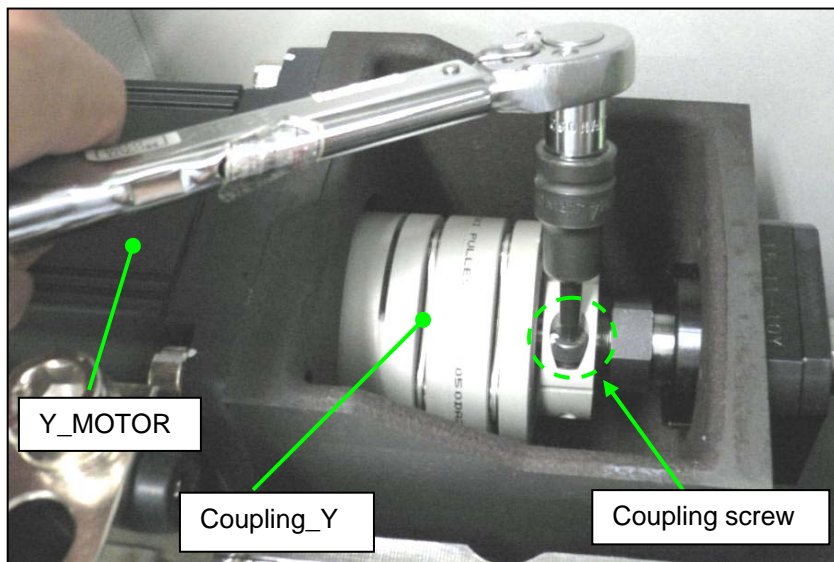
ATC

(7) Check that the difference between the average values obtained in (6)-2) and (6)-3) is 15 [N] or less.

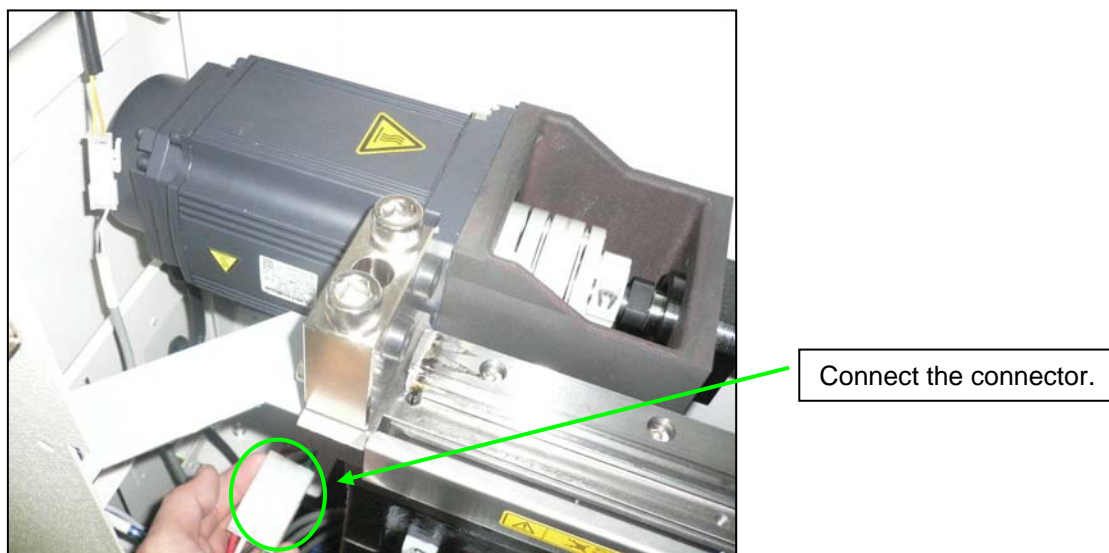
Maintenance Guide

- (8) Reciprocate the Head several times again until the X_AXIS_FRAME_ASM is in contact with both the Y_STOPPER on the front and the Y_STOPPER on the rear to check that the movement is smooth.
If the movement is not smooth, make the adjustment again from step 1-9-4 (5).

- (9) Secure the YL and YR coupling screws. (Tightening torque = 7[N·m])



- (10) Connect the Y_MOTOR encoder cable that has been disconnected in step 1-9-1 (8).



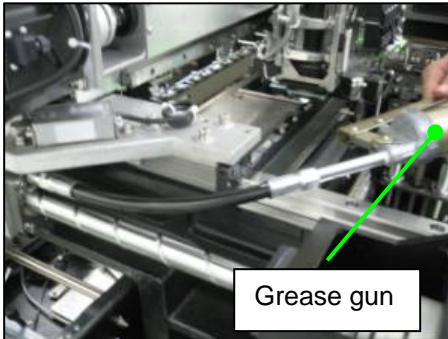
- (11) Readjust the home position rough adjustment and check the operation.

- 1) Turn ON the power to the machine main unit and perform the home position rough adjustment.
- 2) Turn OFF the power to the machine main unit, and then turn it ON again. After that, check that the machine units return to their home positions.

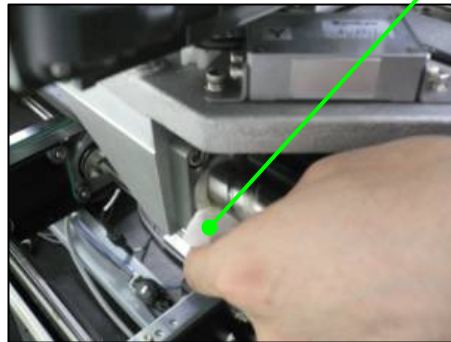
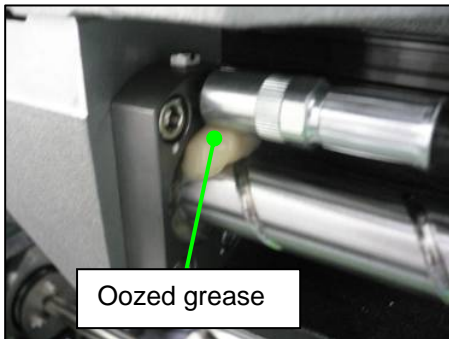
Maintenance Guide

(12) Before starting the aging, apply the NSL grease and move the HEAD_UNIT f from the front to the rear and from the rear to the front conform it to the entire shaft.

* Wipe off the oozed grease with a cloth rag.



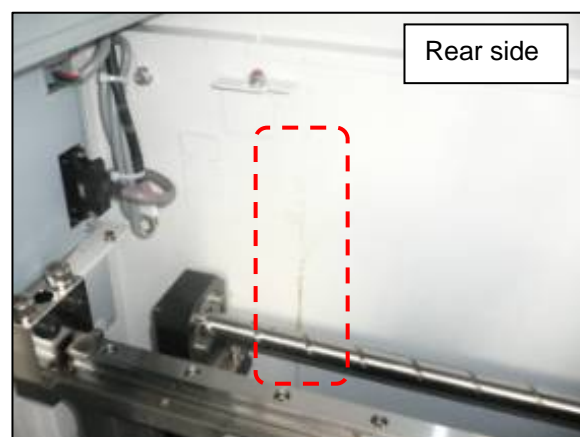
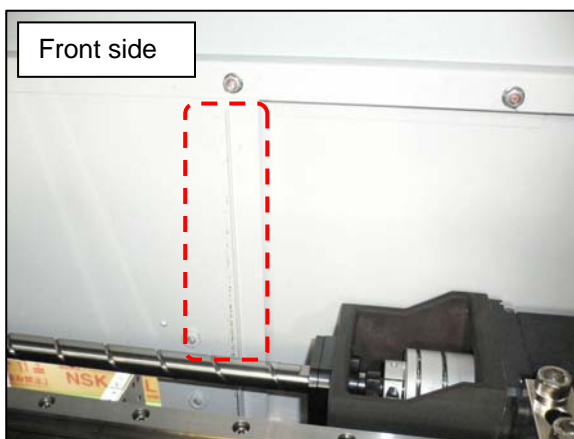
Wipe off the oozed grease with a cloth rag.



(13) Perform the aging (warm-up_diagonal/high-speed 2) for about 8 hrs.

* 8 hrs. are reference value.

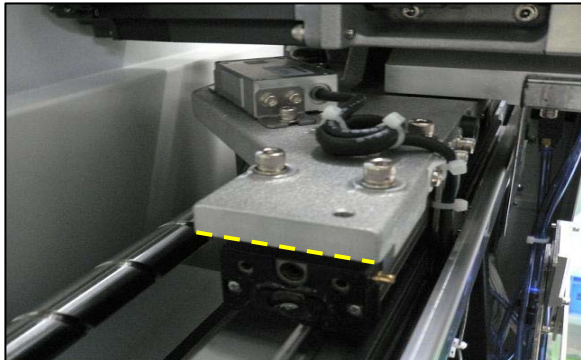
(14) Wipe off the grease splashed by the aging.



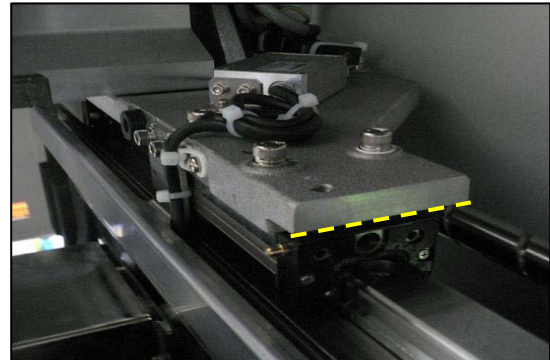
The portions on the rear and front indicated by the red frames are those where the grease splashes particularly. So, wipe off the grease with a cloth rag.

Maintenance Guide

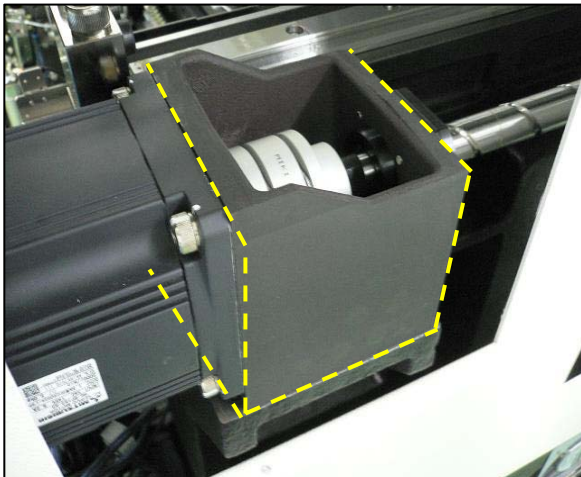
Portions needing cautions during replacement of the X ball screw and Y ball screw (edge and burr portions)



● X_FRAME_END_L



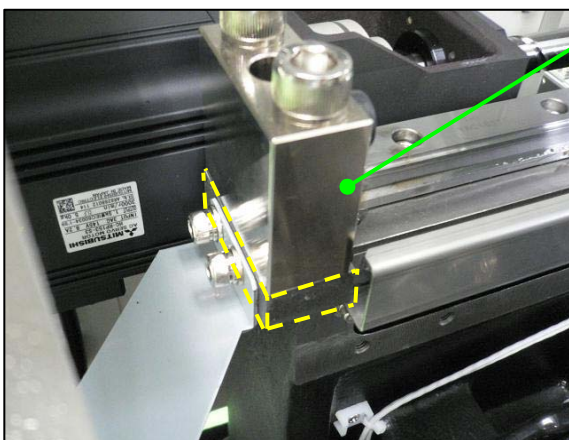
● X_FRAME_END_R



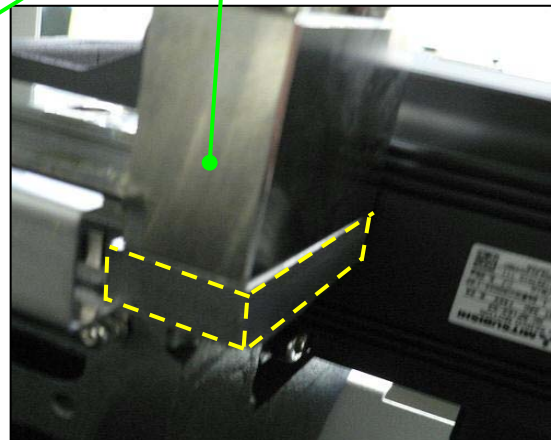
Y_MOTOR_FRAME

BASE_FRAME_B

Y_STOPPER_ASM



● Y_BASE_FRAME_L



● Y_BASE_FRAME_R

Maintenance Guide

**DANGER**

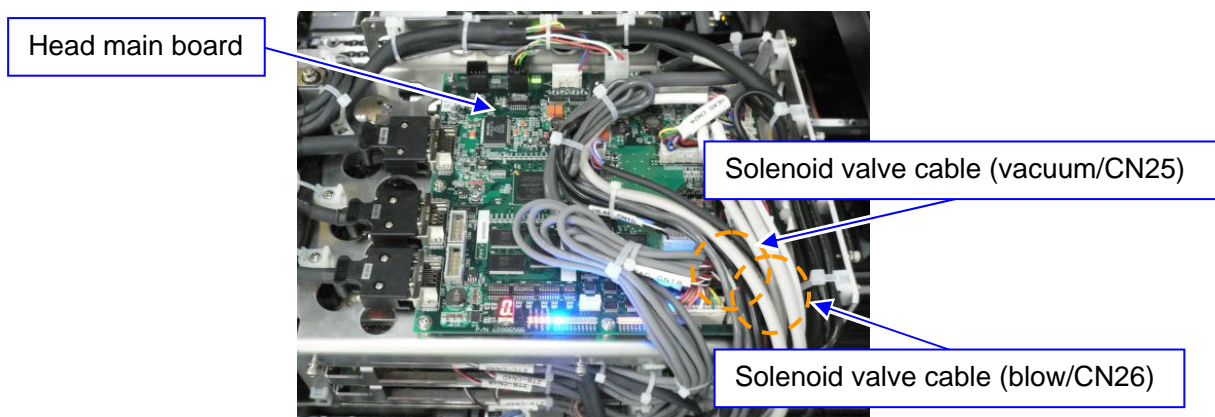
To prevent any trouble caused by accidental machine start, always shut-down the power before starting the maintenance and adjustment work.

[2] HEAD UNIT

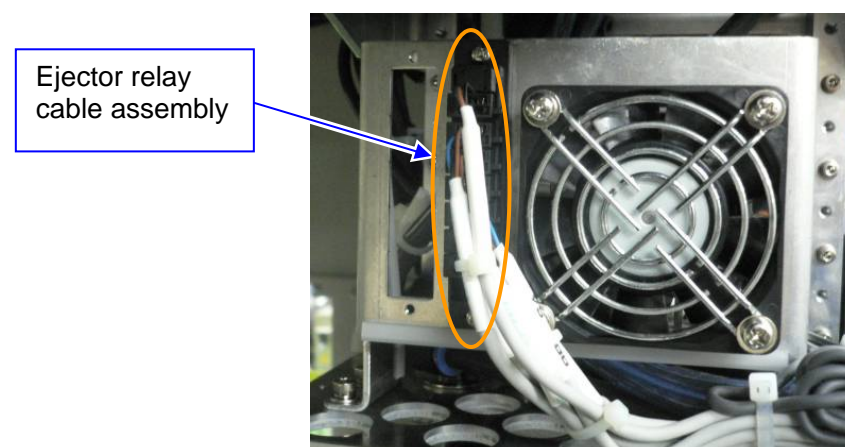
2-1. Replacing and Adjusting the Head

2-1-1. LNC60 Head

- 1) Turn OFF the compressed air to the machine main unit.
- 2) Detach the head top cover, head left cover, head right cover, and head cover.
- 3) Disconnect the solenoid valve cables (vacuum/CN25, blow/CN26) from the head main board. (Figure 2-1-1)

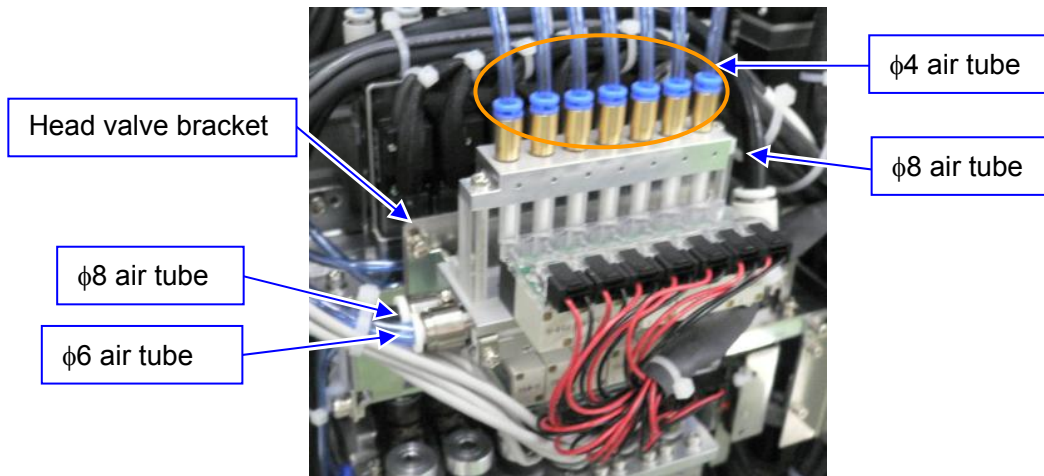


- 4) Disconnect the vacuum sensor of the ejector relay cable assembly from the head top fan assembly. (Figure 2-1-2)

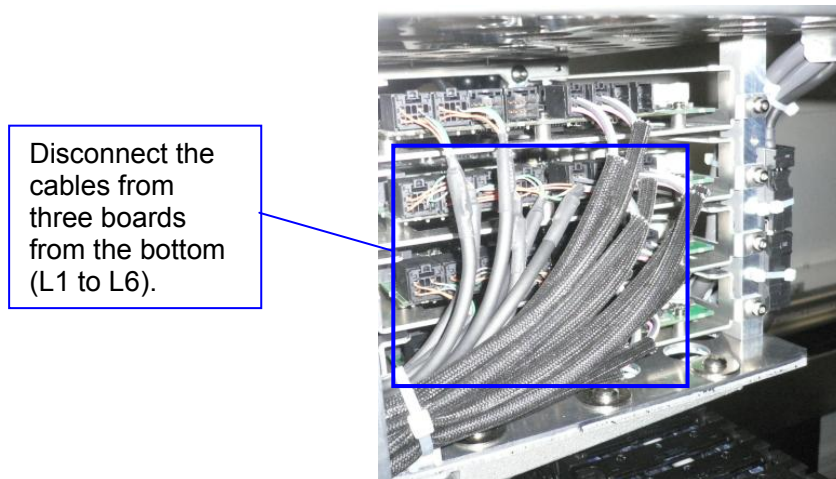


Maintenance Guide

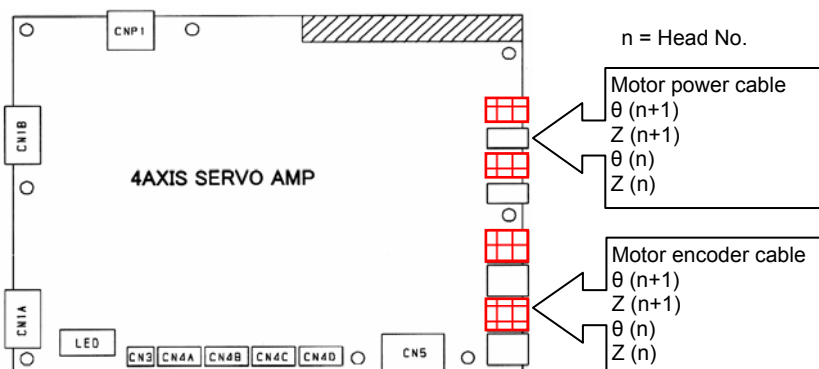
- 5) Disconnect the $\phi 4$, $\phi 6$ and $\phi 8$ air tubes from the solenoid valve.
- 6) Detach the head valve bracket.



- 7) Disconnect the Z- and θ -motor cables from the servo amplifier board.

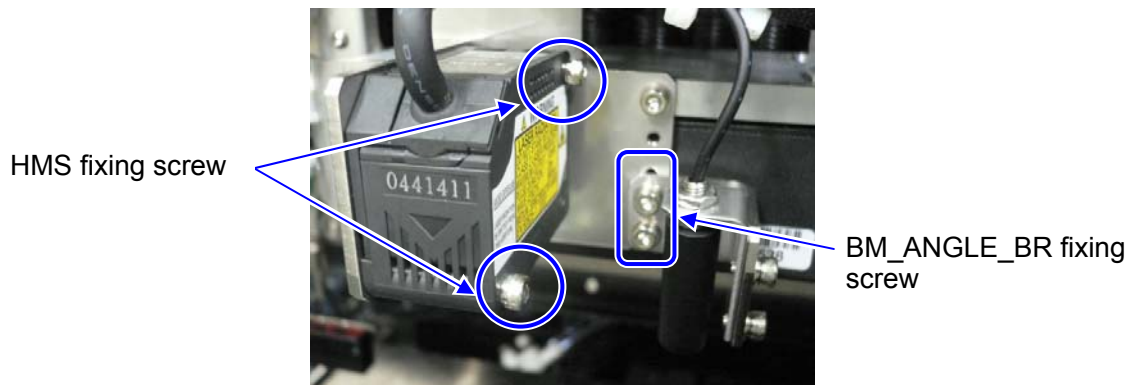


	Motor encoder cable				Motor power cable			
4th stage	R1-Z	R1- θ			R1-Z	R1- θ		
3rd stage	L5-Z	L5- θ	L6-Z	L6- θ	L5-Z	L5- θ	L6-Z	L6- θ
2nd stage	L3-Z	L3- θ	L4-Z	L4- θ	L3-Z	L3- θ	L4-Z	L4- θ
1st stage	L1-Z	L1- θ	L2-Z	L2- θ	L1-Z	L1- θ	L2-Z	L2- θ

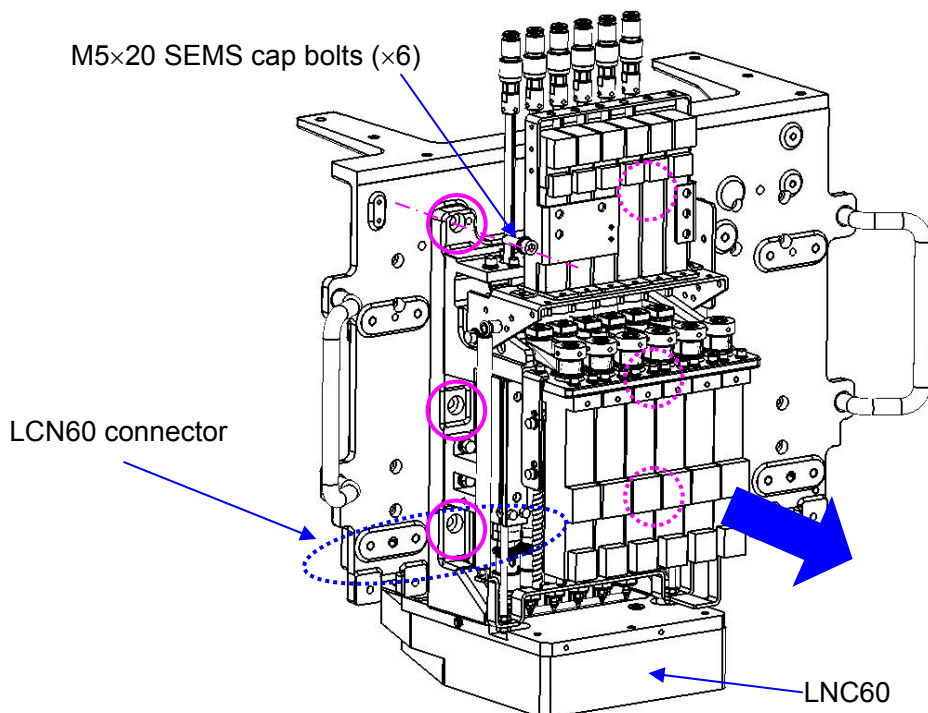


Maintenance Guide

- 8) Remove the HMS fixing screws. If the BMR is mounted, remove the BM_ANGLE_BR fixing screws.



- 9) Detach the encoder of the LNC60 and disconnect the 1394 cable.
 10) Disconnect the $\phi 4$ air tube from the union Y for the head-up cylinder.
 11) Detach the air cylinder. (See also 2-5.)
 12) With the head kept held by hand, remove the M5 \times 20 SEMS cap bolts (6 pcs.) and move the head in parallel toward you to detach it so that it is not in contact with other parts (Figure 2-1-5).

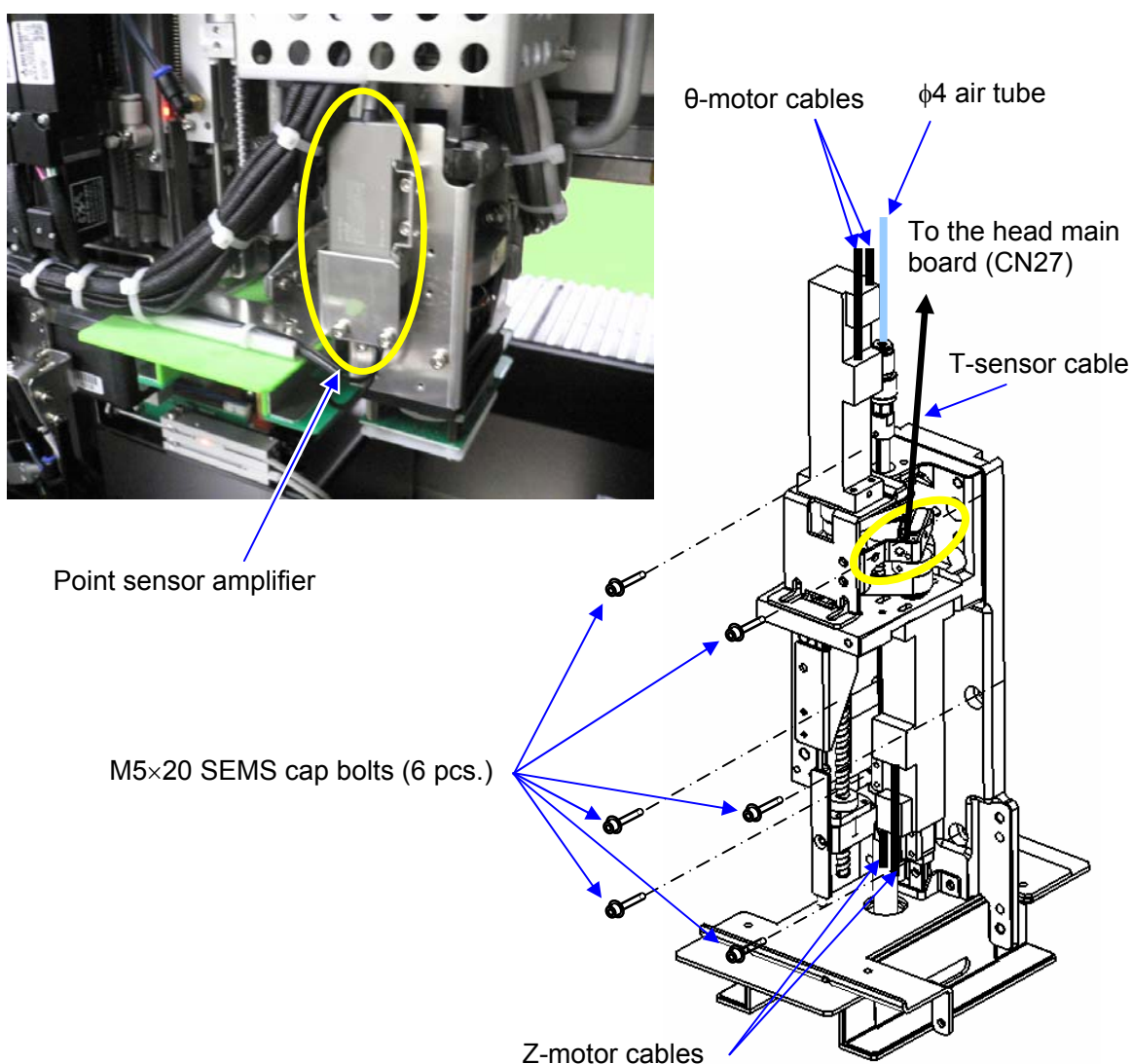


- 13) Reassemble the components in the reverse order of disassembly.
 14) After the head has been replaced, it is necessary to input MS parameters again. For details about input items, see section 2-8.
- * **Apply Loctite 242 to the head mounting screws (6 pcs.) and tighten them with a tightening torque of 7.0 N·m during assembly**
 - * **Connect each motor connector while referring to the location label.**

Maintenance Guide

2-1-2. IC Head (KE-3020V)

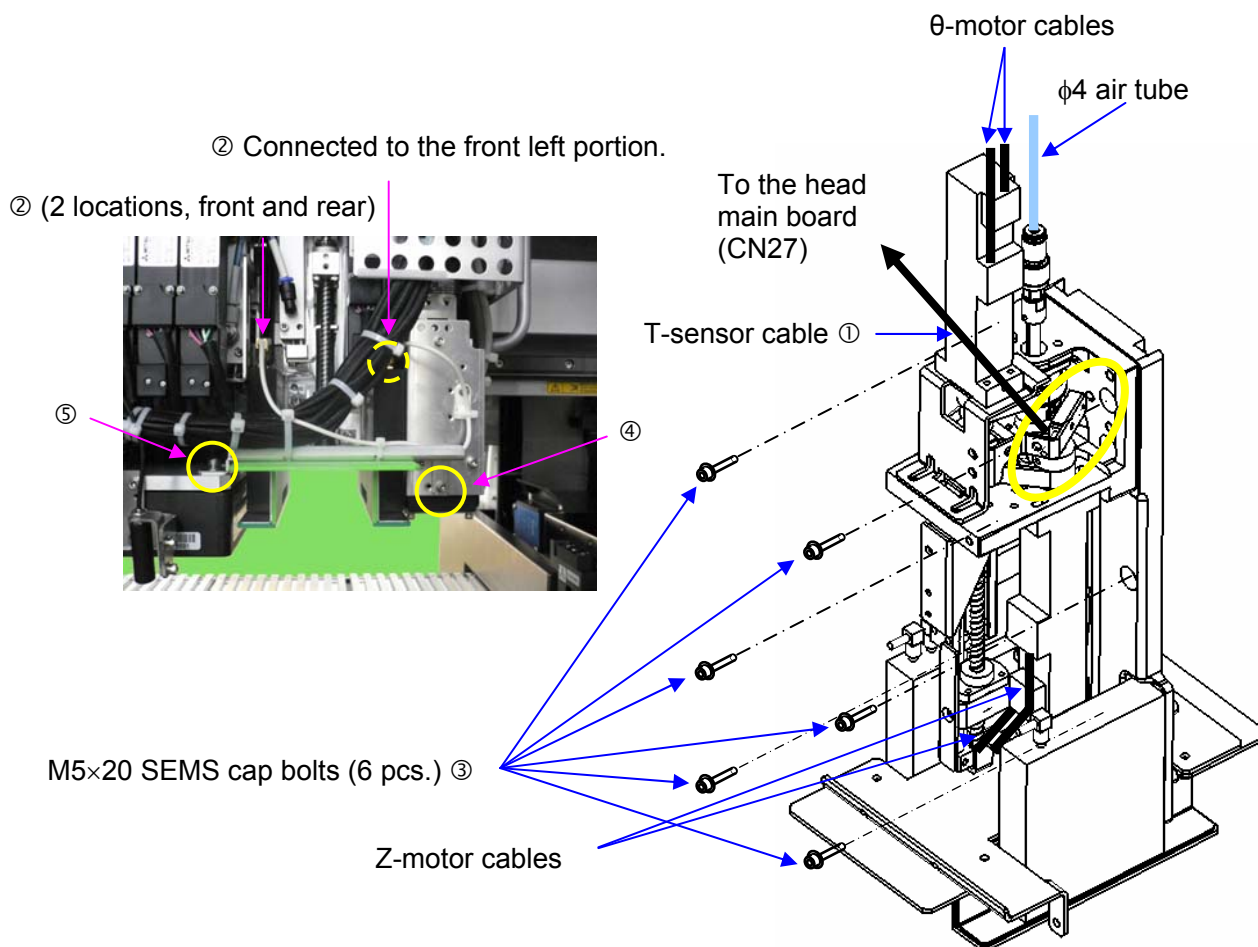
- 1) Disconnect the Z θ -motor cables from the servo amplifier board. (Disconnect all connectors from the 4th stage described in step 7) of section 2-1-1.)
- 2) Disconnect the T-sensor cables from the head main board (CN27).
- 3) Disconnect the fibers (2 pcs.) from the point sensor amplifier and detach the amplifier main unit from the bracket.
- 4) Disconnect the $\phi 4$ air tube.
- 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 20 SEMS cap bolts (6 pcs.). (Figure 2-1-7)
- 7) 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 head mounting screws (6 pcs.) and tighten them with a tightening torque of 7.0 N·m during assembly**
- 9) After the head has been replaced, it is necessary to input the MS parameters again. For details about input items, see section 2-8.



Maintenance Guide

2-1-3. IC Head (KE-3020VR)

- 1) Disconnect the Z θ -motor cables from the servo amplifier board. (Disconnect all connectors from the 4th stage described in step 7) of section 2-1-1.)
- 2) Disconnect the T-sensor cable ① from the head main board (CN27).
- 3) Disconnect the connector ② (3 locations) of the LA connection cable from the FMLA sensor.
- 4) Disconnect the ϕ 4 air tube. (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 20 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) 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 head mounting screws (6 pcs.) and tighten them with a tightening torque of 7.0 N·m during assembly**
- 9) After the head has been replaced, it is necessary to input the MS parameters again. For details about input items, see section 2-8.



Maintenance Guide

2-2. Replacing the Motor

2-2-1. Replacing the Z-Motor (LNC60 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 2-8.)

- 1) Disconnect the motor cables from the servo amplifier board.
- 2) Carry out the steps 1) through 6) in section 2-1-1 to detach the head valve bracket.
- 3) Loosen the setscrew ① of the Z-motor pulley.
- 4) Remove the motor mounting screws ② (3 pcs.).
Detach the Z motor by pulling out the pulley.
- 5) Reassemble the components in the reverse order of disassembly.
- 6) Follow the steps below to adjust the belt tension.

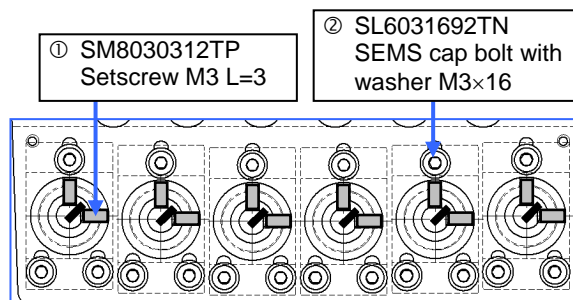


Figure 2-2-1-1 Z-motor Assembly
(Top View)

<Belt tension adjustment 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 (design value)

- Tension meter input value

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 N·m.

- * 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 N·m.

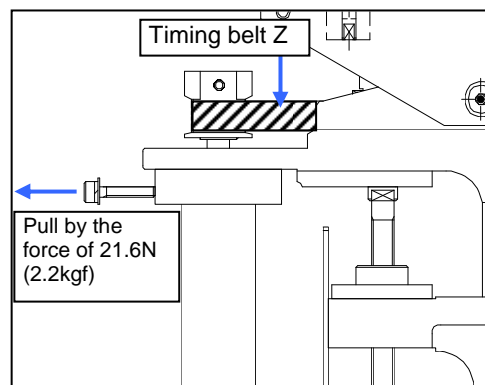
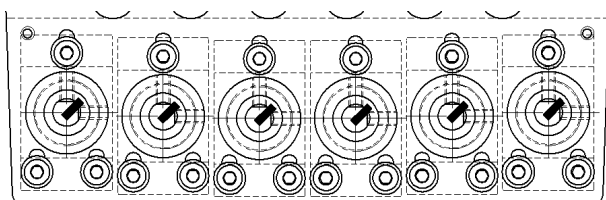


Figure 2-2-1-2 Timing Belt Z



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.

Figure 2-2-1-3 Z-motor Pulley Assembling Method

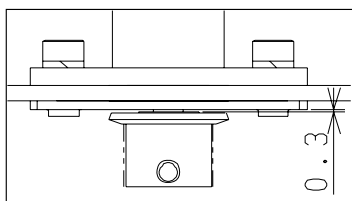
- ② After the Z-axis motor has been assembled, obtain the PWB top surface height of the MS parameter.

Maintenance Guide

2-2-2. Replacing the θ -Motor

After the θ -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 2-8.)

- 1) Disconnect the motor cables from the servo amplifier board.
Carry out the steps 1) through 6) in section 2-1-1 to detach the head valve bracket.
 - 2) Loosen the setscrews ① (hollow setscrews ($\times 2$)) of the T pulley.
 - 3) Remove the motor mounting screws ② (SEMS cap bolts ($\times 2$)) and pull out the pulley to detach it.
 - 4) Remove the flat head screws ③ ($\times 2$) and detach the TM flange.
 - 5) 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.



Assemble so that the clearance between the T pulley and TM nut plate is 0.3 mm.

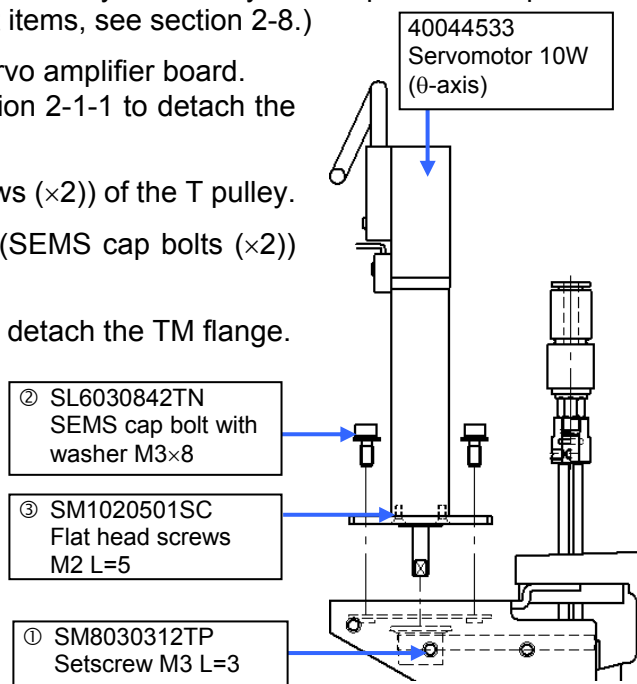


Figure 2-2-2-1 Replacing the θ -motor

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

<Belt tension adjustment procedure>

- ① Make a ring using a tie-up band or belt at the top end of the T pulley of the θ -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 (design value)

- Tension meter input value

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

- Specification value: 4.5 to 12.5N

- * Apply Loctite 242 to the θ -motor mounting screws (2 pcs.) and tighten them with a tightening torque of 2.3 N·m.
- * When tightening the setscrew of the T pulley, make sure to align the orientation of the flat part of the θ -motor shaft and the setscrew of the pulley. Tighten the setscrew with a torque of 0.5 N·m.

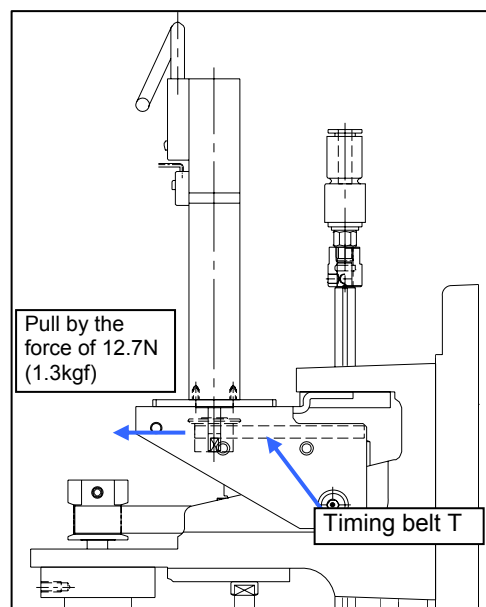


Figure 2-2-2-2 Adjustment of the θ -motor Belt Tension

Maintenance Guide

2-2-3. Replacing the 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 2-8.)

- 1) Disconnect the motor cables from the servo amplifier board.
- 2) Loosen the setscrew 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.
- 4) Reassemble the components in the reverse order of disassembly.
- 5) Follow the steps below to adjust the belt tension.

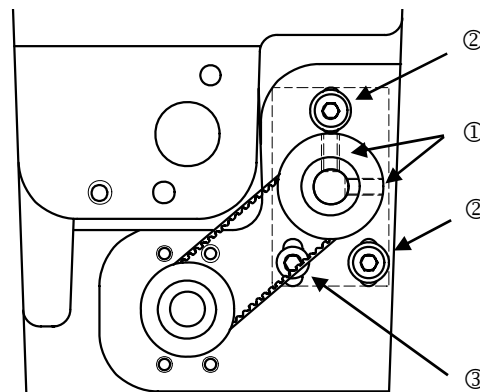


Figure 2-2-3-1

<Belt tension adjustment procedure>

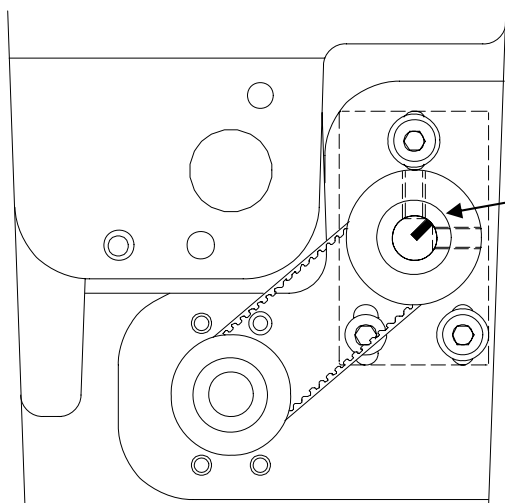
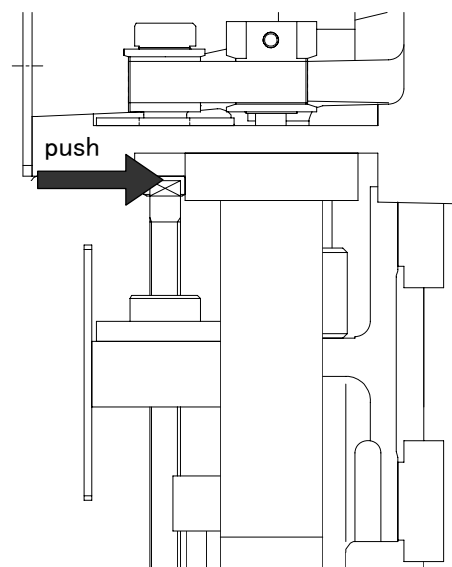
- ① With the flange part of the Z-motor kept pushed with a force of 21.6N (2.2kgf) using the bar tension in the direction indicated by an arrow, secure the flange part using the mounting screws.

Tension meter set value (design value)

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

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 N·m.
- * 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 N·m.



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. (on the next page.)

- ② After the Z-axis motor has been assembled, obtain the PWB top surface height of the MS parameter.

Maintenance Guide

2-2-4. Replacing the θ -Motor (IC Head)

After the θ -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 2-8.)

- 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 setscrews (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 0.14 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 setscrews of the T-pulley.
- 6) Follow the steps below to adjust the belt tension.

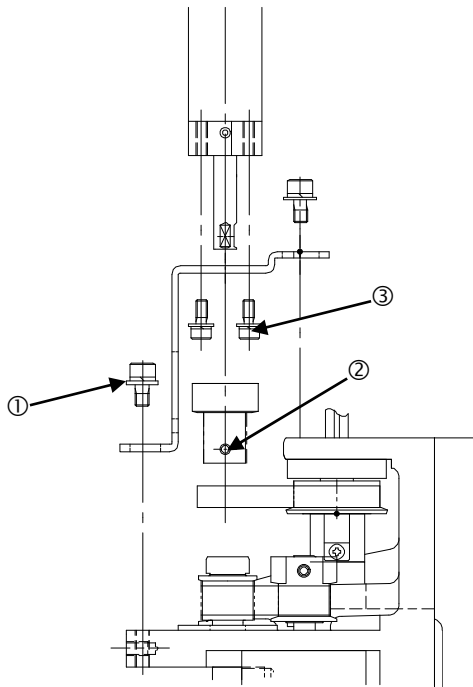


Figure 2-2-4-1

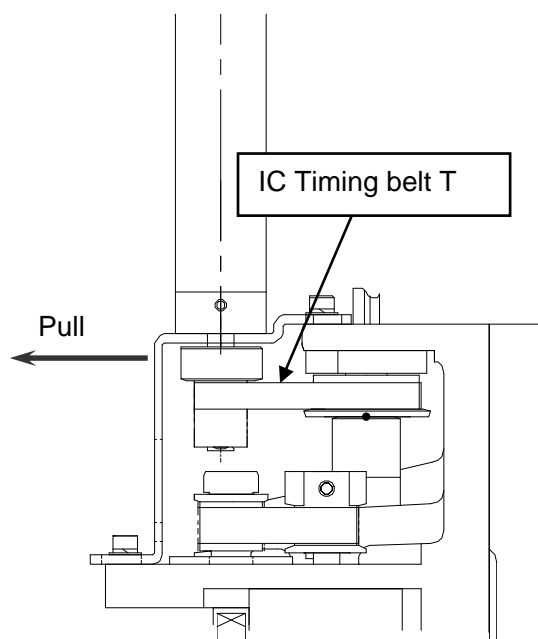
<Belt tension adjustment procedure>

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

Weight: 1.0g/m Width: 6.0mm Span:
30.8mm

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

- * When tightening the setscrew of the T pulley, make sure to align the orientation of the flat part of the θ -motor shaft and the setscrew of the pulley. Tighten the setscrew with a torque of 0.5 N·m.



Maintenance Guide

2-3. Replacing the T-Sensor

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 2-8.)

- 1) Detach the T-sensor bracket from the head.
- 2) Remove the mounting screws ② (2 pcs.) of the T-sensor bracket 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.
 - * Apply Loctite 242 to the mounting screws ③ and tighten them with a tightening torque of 0.14 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 setscrews of the T-pulley.
- 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 θ -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 θ -axis to make sure that the sensor is turned ON or OFF if the sensor gets close to the dog.

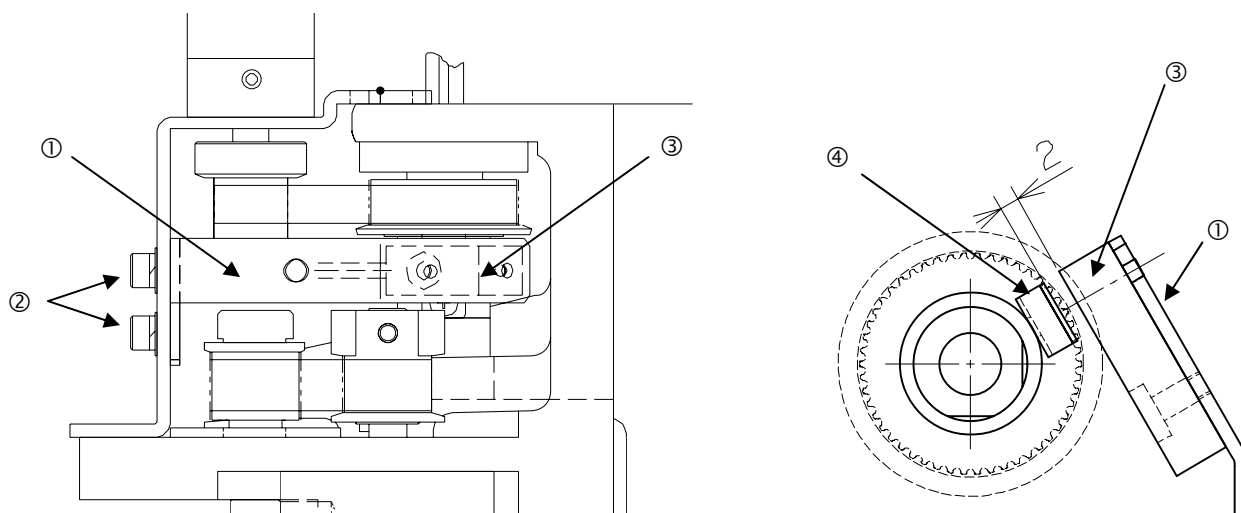


Figure 2-3-1

Maintenance Guide

2-4. Replacing the Laser Sensor

2-4-1. Replacing the Laser Sensor (LNC60)

After the LNC60 has been replaced, it is absolutely necessary to re-input the MS parameters related to the laser. (See section 2-8.)

- 1) Disconnect the connectors (encoder and IEEE1394) and remove the mounting screws ① and ② (3 pcs.) to detach the LNC60.
- 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 N·m.
- * After the LNC60 has been replaced, clean the laser beam window of the LNC60 with a clean cloth rag.

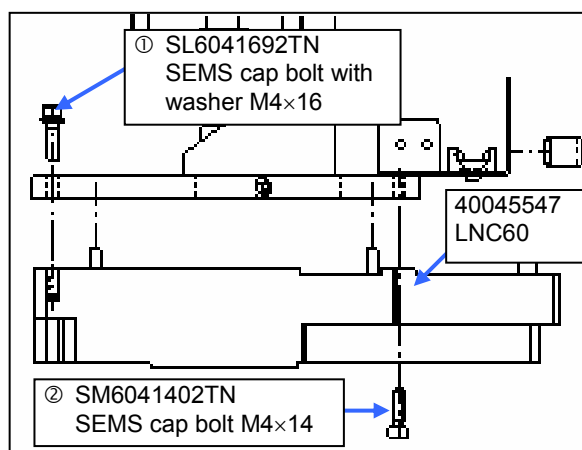
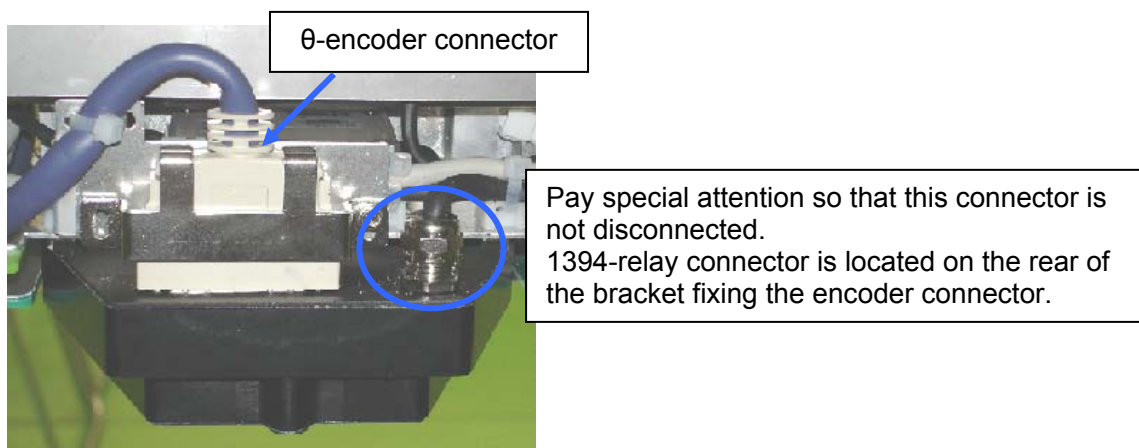


Figure 2-4-1-1 Laser Sensor
Assembling Position



Maintenance Guide

2-4-2. Replacing the Point Sensor (KE-3020V)

After the point sensor has been replaced, it is absolutely necessary to re-input the MS parameters related to the laser. (See section 2-8.)

- 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.

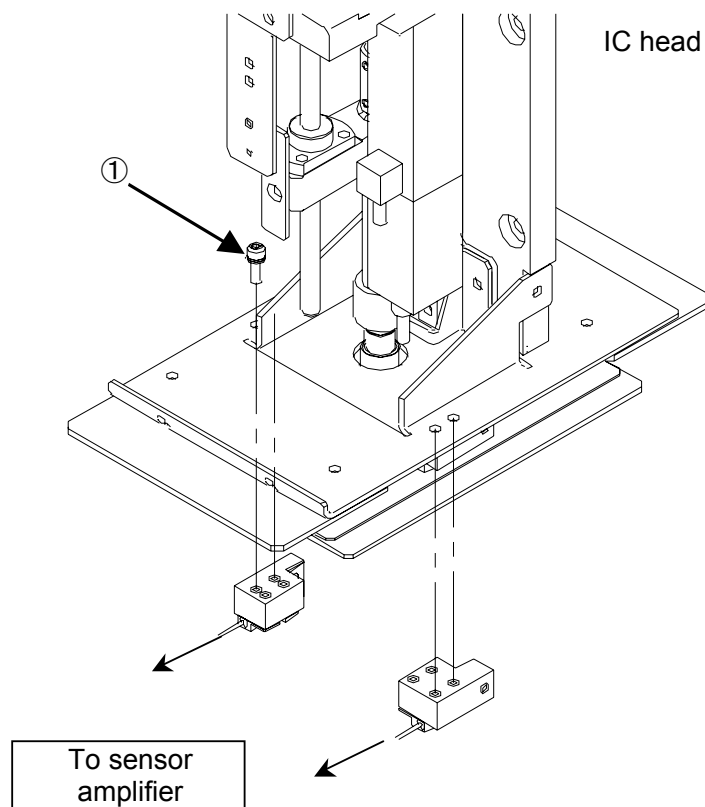
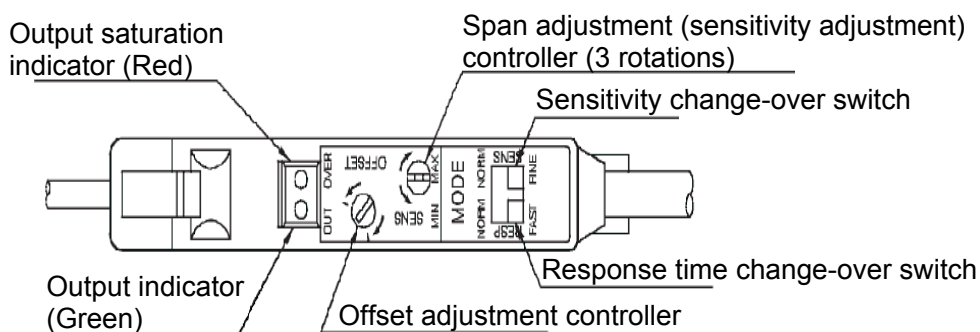


Figure 2-4-2-1

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 TE27 and GND on the S-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 “ $5V \pm 0.01V$ ”.
- 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 “ $5V \pm 0.01V$ ”. 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.



- Note) If the voltage is not increased to “5V” even though the controller is turned fully, the light axis between the light emitting and receiving parts may deviate. At this time, while observing the voltmeter, adjust the light axis again to a position where the voltage is increased to the maximum level.

Maintenance Guide

2-4-3. Replacing the FMLA (KE-3020VR)

After the LA sensor has been replaced, it is absolutely necessary to re-input the MS parameters related to the laser.

(See section 2-8.)

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

- 1) Remove the magnescale 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 N·m.**

* **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, 2. Head Unit page 2-11.**

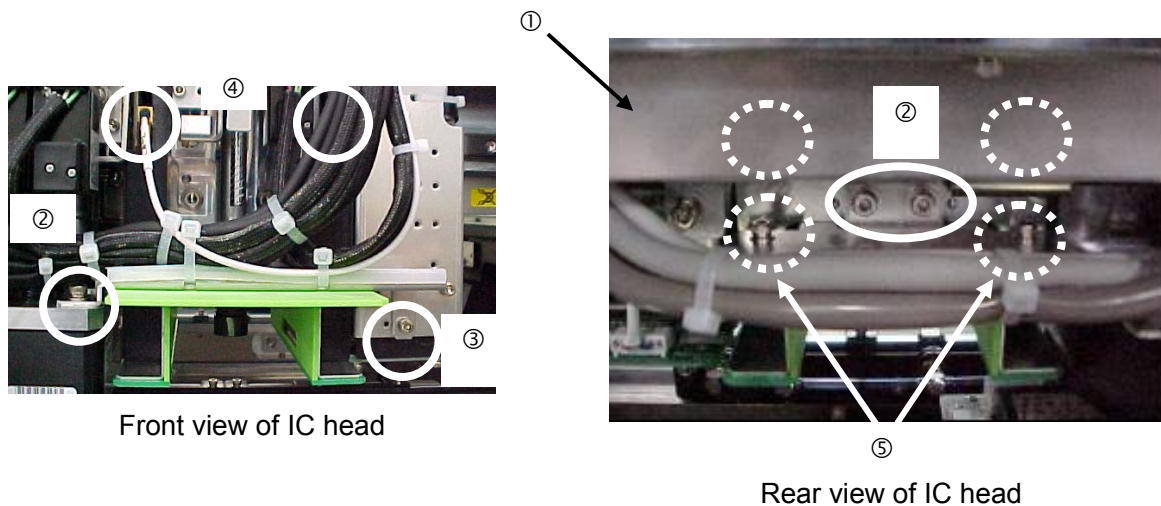


Figure 2-4-3-1

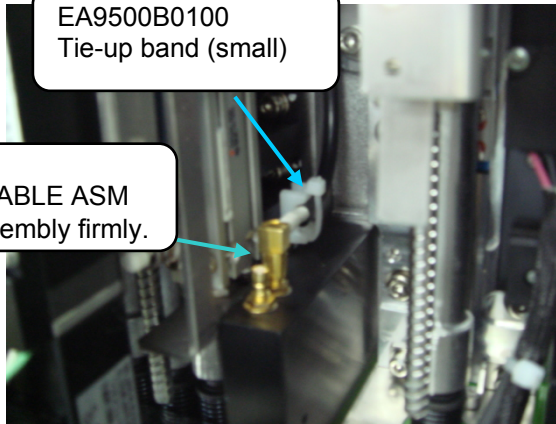
Maintenance Guide

* If the tie-up bands have been cut when detaching the FMLA sensor, bundle the cables as shown in the Figure below.

- **Connector on far side of left sensor**

EA9500B0100
Tie-up band (small)

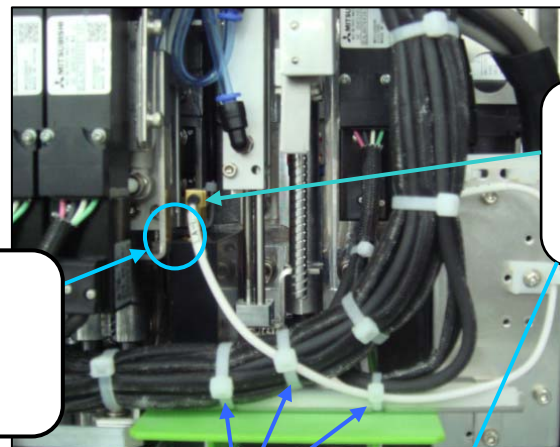
40080206
LA SENSOR BEAR CABLE ASM
* Insert the cable assembly firmly.



- **Connector on front side of left sensor**

E93457210A0
LA SENSOR CONNECT
CABLE ASM
* Insert the cable assembly firmly.

Note: Fix the connector cable at a position where it is not in contact with the release bar.



EA9500B0200
Tie-up band (medium)

- **Connector on front side of right sensor**

EA9500B0100
Tie-up band (small)



Figure 2-4-3-2

Maintenance Guide

2-5. Replacing the Head Up Cylinder

- 1) Turn the finger valve to stop the air supply 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 setscrews 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.

<Speed controller adjustment procedure>

- ① Call up the MS parameters from the top menu and select [Simple Control] → [MSP] tab in the function bar. In this status, press the emergency stop button.
- ② Select [nozzle 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.)

After the adjustment has been completed, secure the knob firmly.

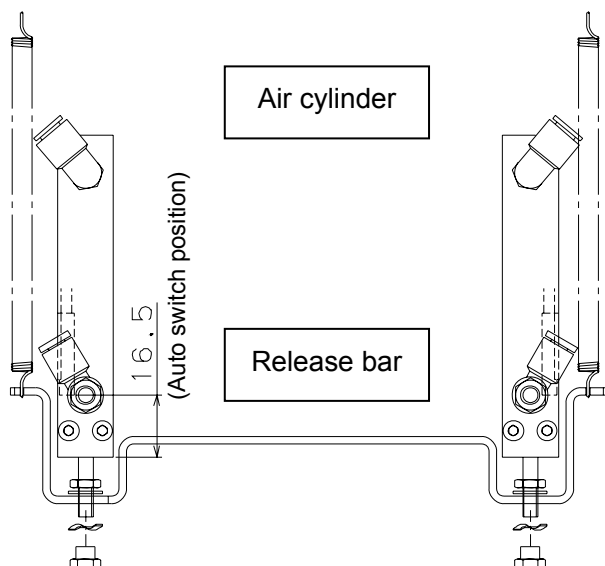
- 8) Insert the release bar into the rod of the cylinder, put the wave washer, and turn the release bar until the cylinder nut is stopped.

Secure the cylinder at a position where the lower nut is aligned with the end face of the rod.

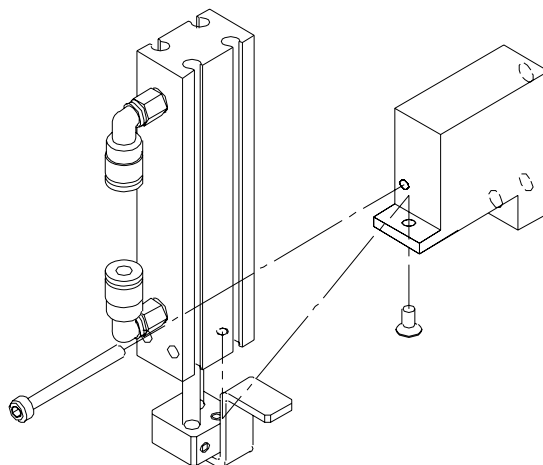
For the air cylinder on the IC head, remove two screws shown in the Figure on the right and replace the cylinder.

(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.



KE-3020V (IC head side)



Maintenance Guide

2-6. Replacing the Belts

2-6-1. 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 2-8.)

- 1) Loosen the SEMS cap bolts ① (×3) 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 N·m.
 - * Adjust the belt tension following section 2-2-1.

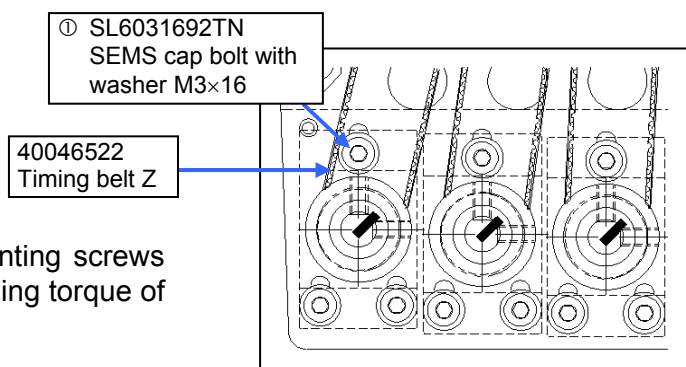


Figure 2-6-1-1 Removing the Z-motor

2-6-2. Replacing the Timing Belt θ

After the timing belt θ 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 2-8.)

- 1) Detach the bearing base ①.
 - 2) Detach the ball spline from the coupling ②.
 - 3) Pull out the spline housing downward and the spline shaft upward.
 - 4) Replace the timing belt θ .
 - 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.
 - * Adjust the belt tension following section 2-2-2.

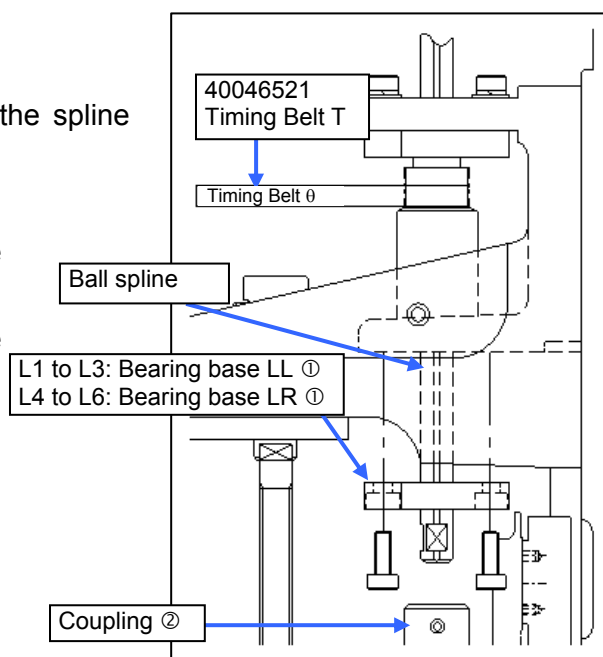


Figure 2-6-2-1 Replacing the Timing Belt θ

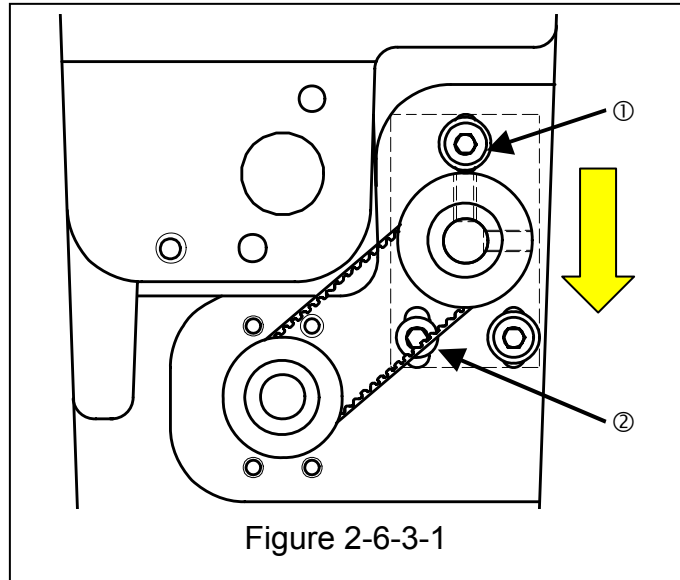
Maintenance Guide

2-6-3. 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 2-8.)

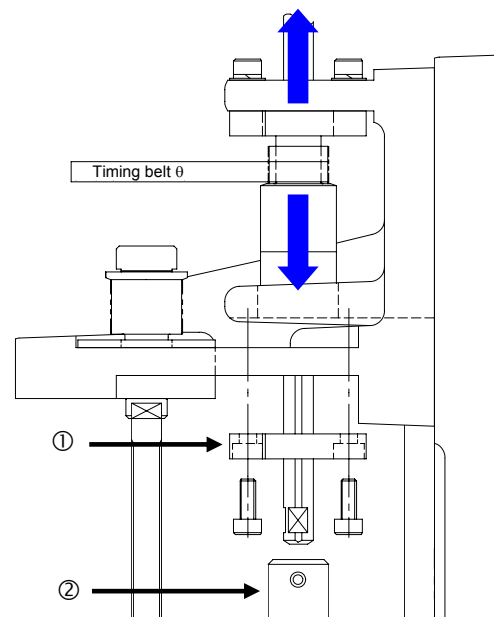
- 1) Loosen the screws ① and ② (3 pcs.) shown in the figure on the right.
 - 2) Replace the timing belt Z IC.
 - 3) Reassemble the components in the reverse order of disassembly.
- * **Apply Loctite 242 to the Z-motor mounting screws (3 pcs.) and tighten them with a tightening torque of 2.3 N·m.**
 - * **Adjust the belt tension following section 2-2-3.**



<Replacing the timing belt θ : KE-3020V>

After the timing belt θ 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 2-8.)

- 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 θ .
 - 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.**



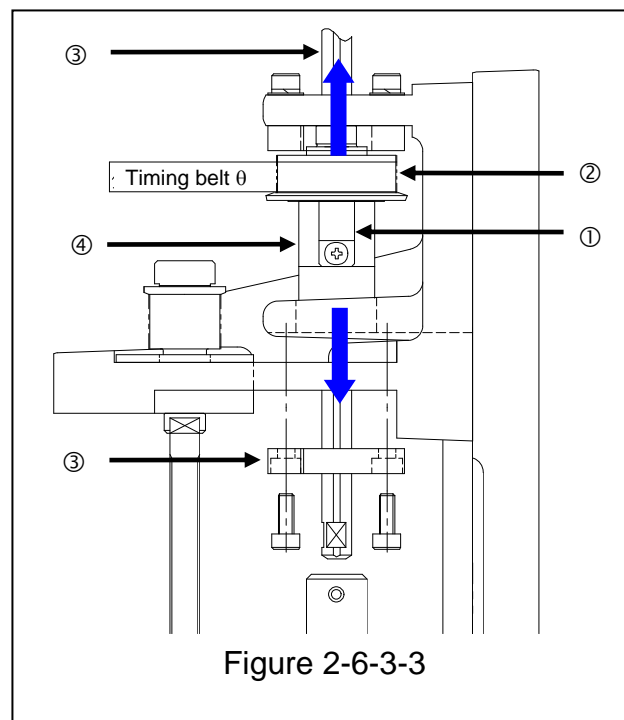
Maintenance Guide

<Replacing the timing belt θ : KE-3020VR>

After the timing belt θ 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 2-8.)

- 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 θ .
- 7) Reassemble the components in the reverse order of disassembly.

- * 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 2-2-4.



Maintenance Guide

2-7. Replacing the Z-Slide Shaft

When the Z-slide shaft has been replaced, it is necessary to input the MS parameters related to the θ -axis and Z-axis home position adjustment, Z-axis height, and laser again.

(For details about input items, see section 2-8.)

- 1) Remove the hollow setscrew ① ($\times 1$) 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 setscrews of the coupling, align the flat part of the slide shaft with the orientation of the coupling setscrew. Tighten the setscrew with a tightening torque of 0.5 N·m.

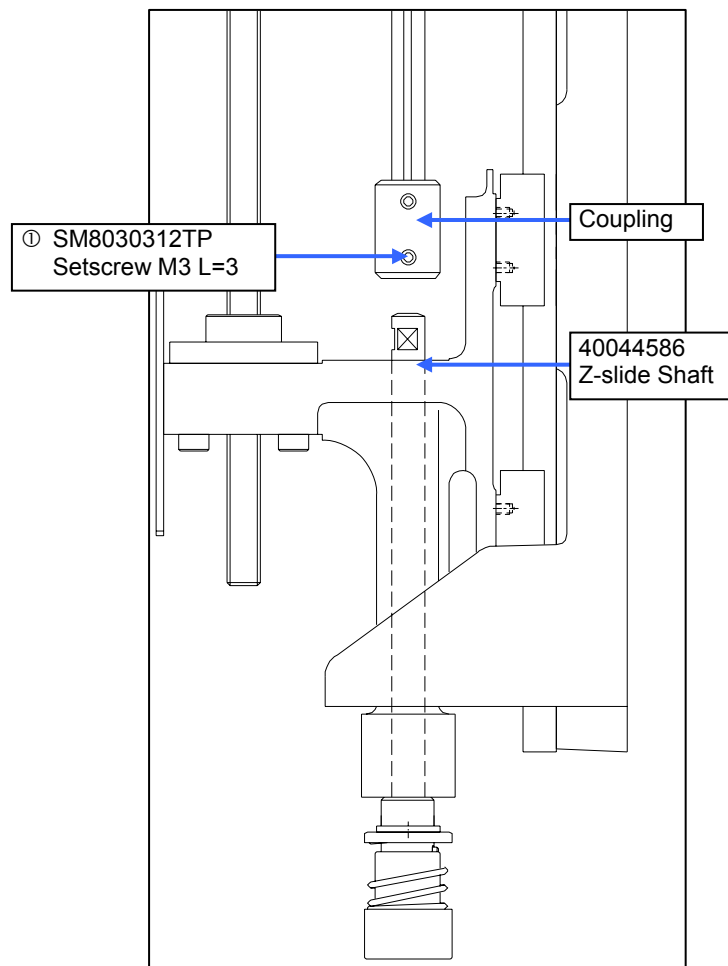


Figure 2-7-1 Z-slide Shaft

Maintenance Guide

2-8. Readjustment After Replacement of Head Unit

Table 2-8-1 List of Readjustment Items After Replacement of Head Unit

	Laser offset	Laser scaling	Head offset	Mounting general offset	VCS camera offset	VCS general offset
Head unit assembly	○	○ (Note 1)	○	○	○	○
Z-motor	○	○ (Note 1)				
θ-motor	○				○	○
T-sensor	○					
LNC60	○		○	○		
FMLA	○	○ (Note 1)	○	○		
Point sensor	○					
Head-up cylinder						
Timing belt Z	○					
Timing belt θ	○					
Z-slide shaft	○		○	○		
LNC61/62 (Note 2)	○		○	○		
EPV61/62 (Note 2)	○		○	○		


(Note 1) Only the KE-3020VR needs this adjustment.

(Note 2) These units need to be readjusted when the placement monitor (option) is mounted.

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.

 CAUTION	To prevent any personal injury, do not put your hand inside the machine or your face or head close to the machine during operation of the touch panel and/or HOD.
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Maintenance Guide

**DANGER**

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

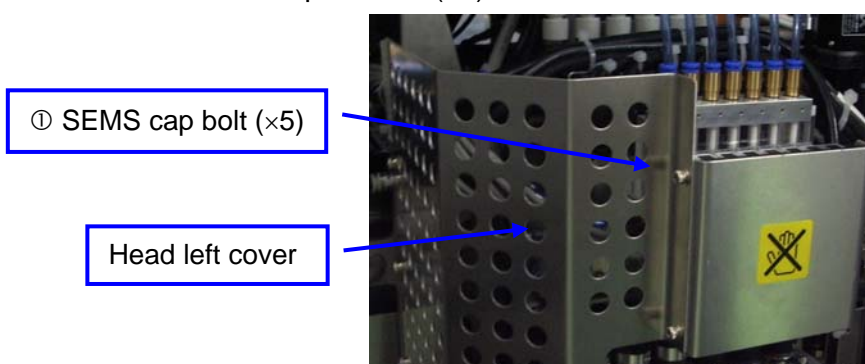
[3] PARTS AROUND THE HEAD

3-1. Replacing the Solenoid Valve Components

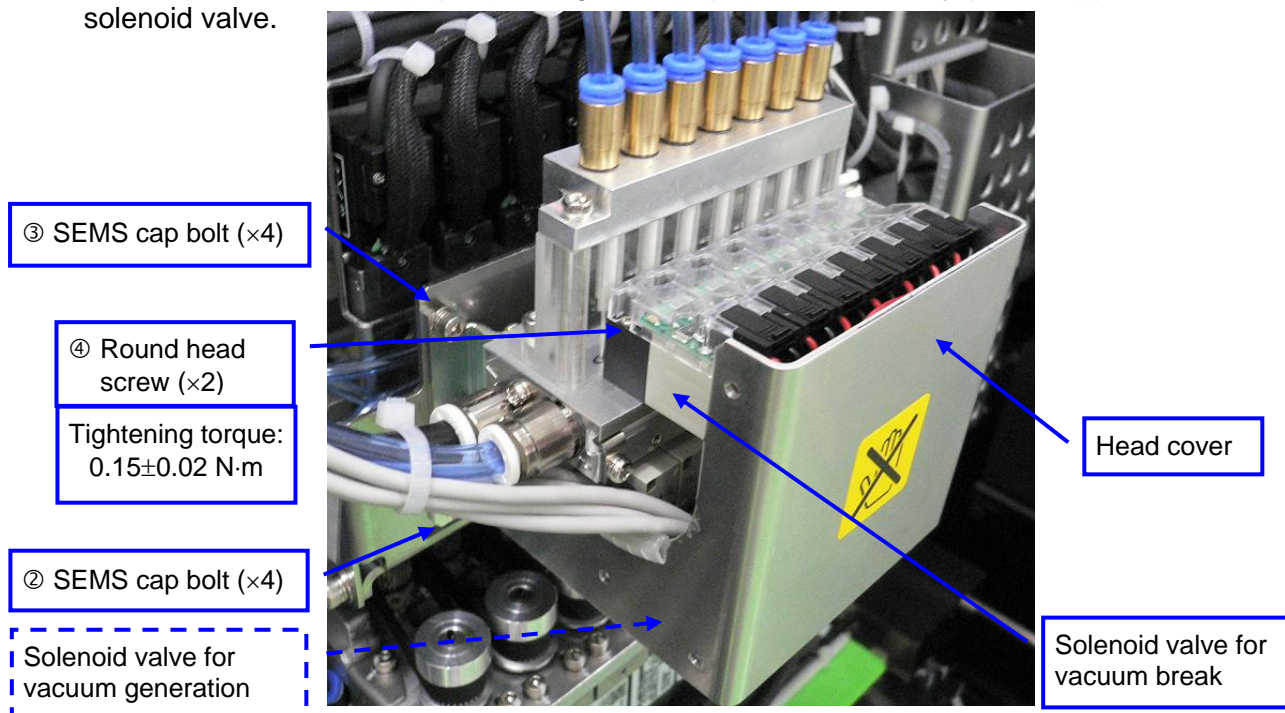
Before replacing the solenoid valves, always shut-down the main compressed air.

3-1-1. Replacing the Solenoid Valves

- 1) Remove the SEMS cap bolts ① (×2) to detach the head left cover.



- 2) Remove the SEMS cap bolts ② (×4) to detach the head cover.
 - 3) Remove the SEMS cap bolts ③ (×4), and disconnect the cables and air tubes to detach the solenoid valve main unit.
 - 4) Remove the round head screws ④ (×2) to detach each solenoid valve. (Great care should be taken so that the gasket on the back of the solenoid valve is not lost.)
 - 5) Reassemble the parts and components in the reverse order of disassembly.
 - 6) After the solenoid valves have been replaced, check the solenoid valves through the head vacuum and the blow ON/OFF of the manual control.
- * Round head screws ④ (2 pcs.) and gasket (1 pc.) are accessory parts supplied with each solenoid valve.



Maintenance Guide

3-1-2. Replacing the Filter

• Replacing the head filter

- 1) Follow step 1) described in section 3-1-1 to detach the head left cover.
- 2) Remove the cap bolts ① (×2) to detach the filter box U.
(O-ring is mounted under the filter box U. Carefully handle this O-ring so that it is not lost.)
- 3) Take out the filter and replace it with a new one.
- 4) Reassemble the parts and components in the reverse order of disassembly.
- 5) After the filter has been replaced, check the filter through the head vacuum and the blow ON/OFF of the manual control.

3-1-3. Replacing the Filter for Release to Atmosphere

- 1) Follow steps 1) and 2) described in section 3-1-1 to detach the head left cover and head cover.
- 2) Loosen the SEMS cap bolts ④ (×2) to detach the filter for release to atmosphere.
(You can detach the filter only by loosening the SEMS cap bolts.)
- 3) Reassemble the parts and components in the reverse order of disassembly.
 - * SEMS cap bolts ③ (2 pcs.) are accessory parts supplied with the solenoid valve.

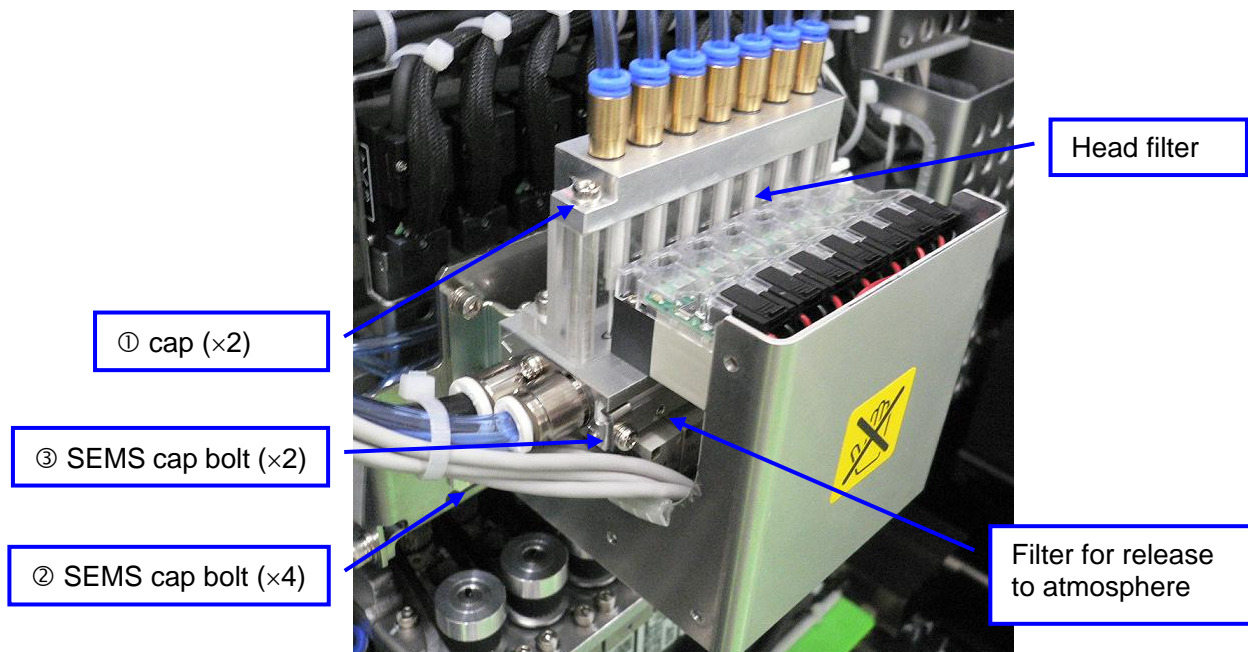


Figure 3-1-3-1 Replacing the Head Filter

Maintenance Guide

3-2. Replacing the Bad Mark Sensor (Optional)

3-2-1. Sensor Assembly

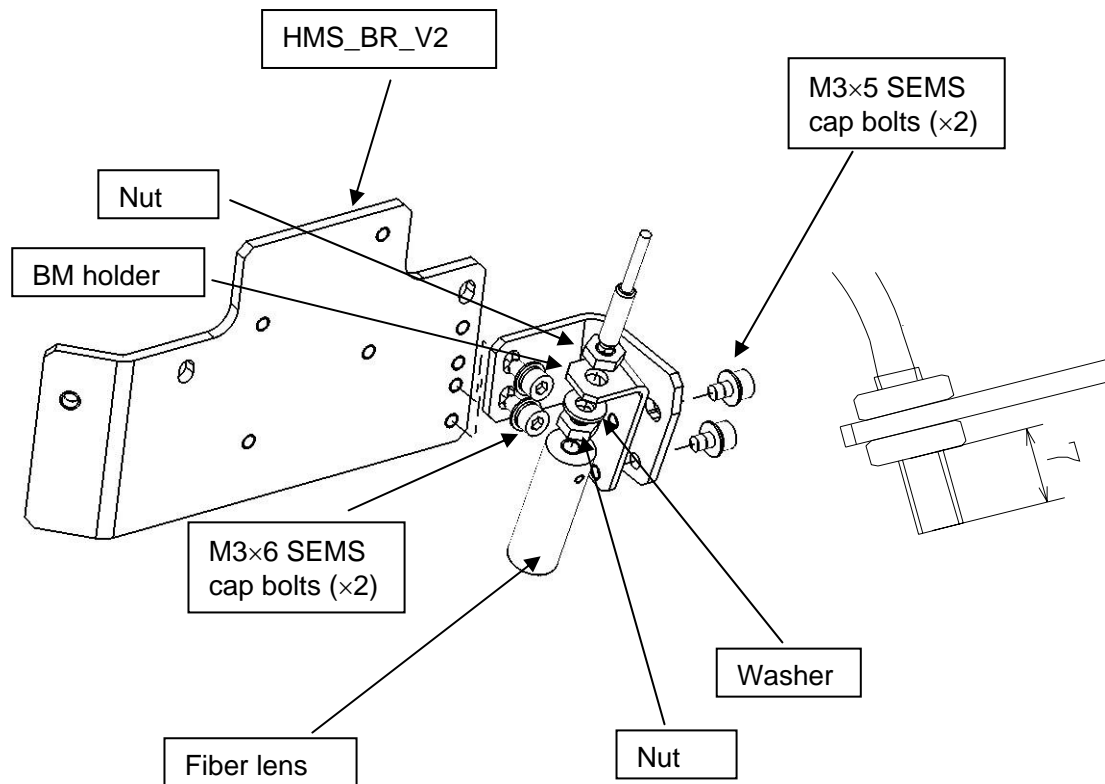


Figure 3-2-1-1 Replacing the Bad Mark Sensor

After the fiber has been mounted at the dimensions shown in the Figure using the attached nuts and washer, mount the lens.

Maintenance Guide

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 BMR lens bracket 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.

After the sensor height has been adjusted, secure the bad mark sensor with SEMS cap bolts.

After the bad mark sensor has been mounted properly, input the bad mark sensor offset of the MS parameters.

(For details about how to input MS parameters, see “MS Parameters”.)

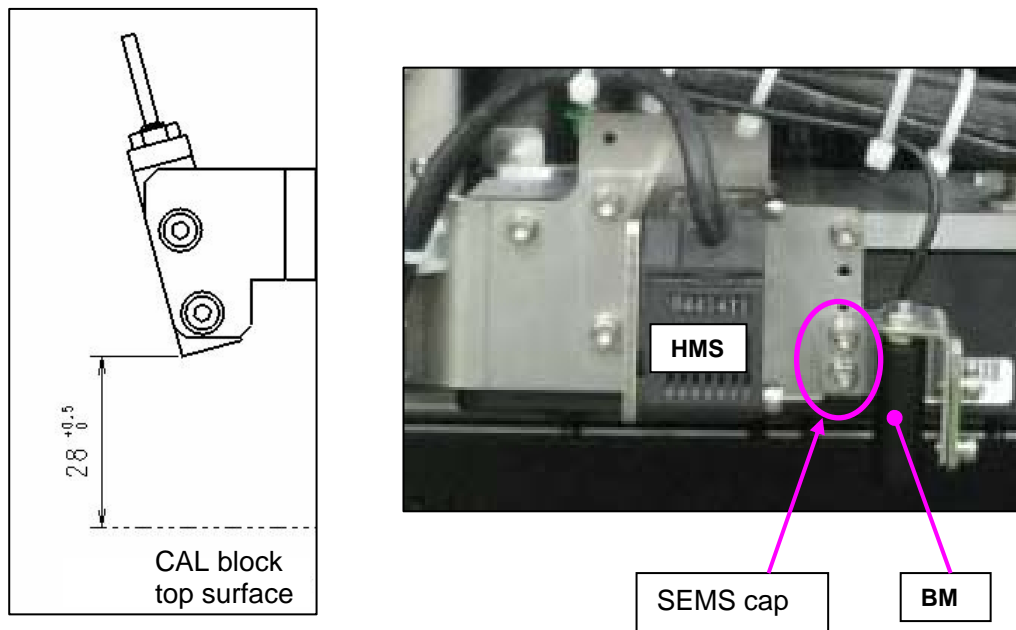



Figure 3-2-2-1 Adjusting the Lens Height

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

3-2-3. Amplifier

Left OCC camera assembly

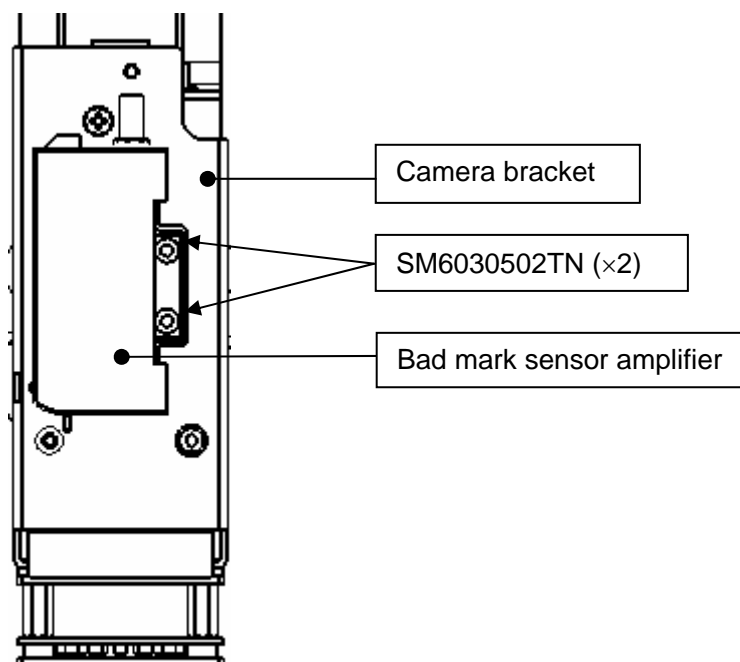


Figure 3-2-3-1 Assembling the Amplifier

3-2-4. Assembling the Fiber Unit to the Amplifier

Make the fiber unit portion having the projection faced toward the amplifier portion without LED, and then insert the fiber unit all the way in. After the fiber unit has been inserted all the way in, turn the connector clockwise to make sure that the fiber unit is not disconnected.

This mark is utilized as a gauge.

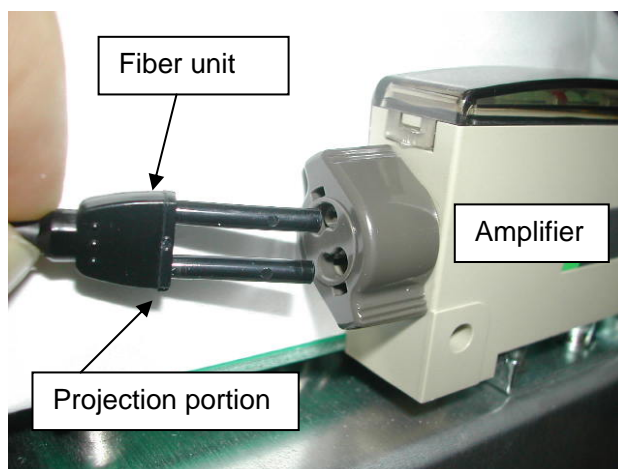


Figure 3-2-4-1 Assembling the Fiber Unit

Maintenance Guide

3-2-5. Setting the Switches on the Bad Mark Sensor Assembly

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

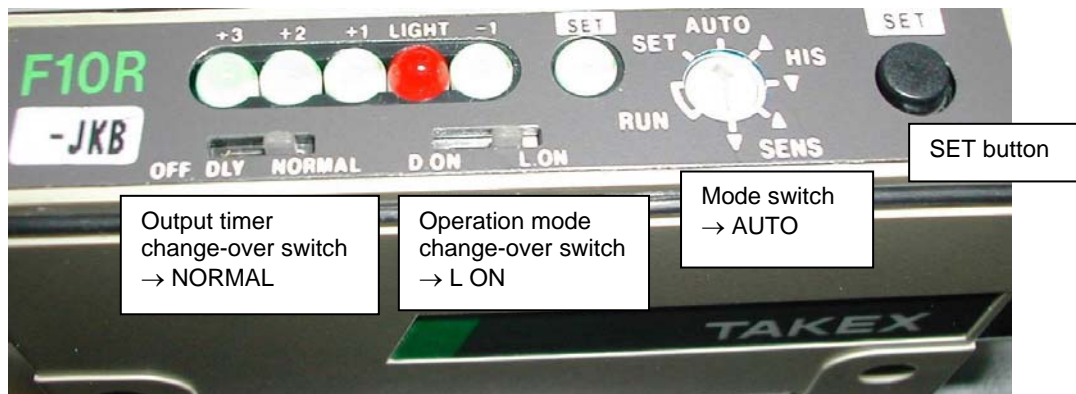


Figure 3-2-5-1 Switch Settings

3-3. Replacing the HMS

3-3-1. Replacing the HMS Head

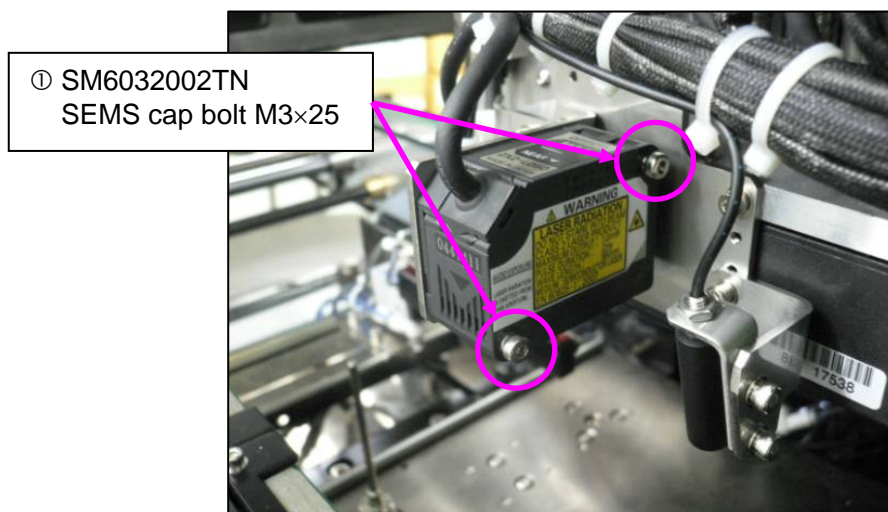


Figure 3-3-1-1 Replacing the HMS Head

Maintenance Guide

3-3-2. Adjusting the HMS Height

Move the HMS sensor to a point above the calibration block. Loosen the SEMS cap bolts ① at two locations and adjust the distance between the bottom surface of the height sensor and the top surface of the calibration block to a specified value of 50 ± 0.2 mm. After the distance has been adjusted to a specified level, secure the height sensor with the SEMS cap bolts ① at two locations.

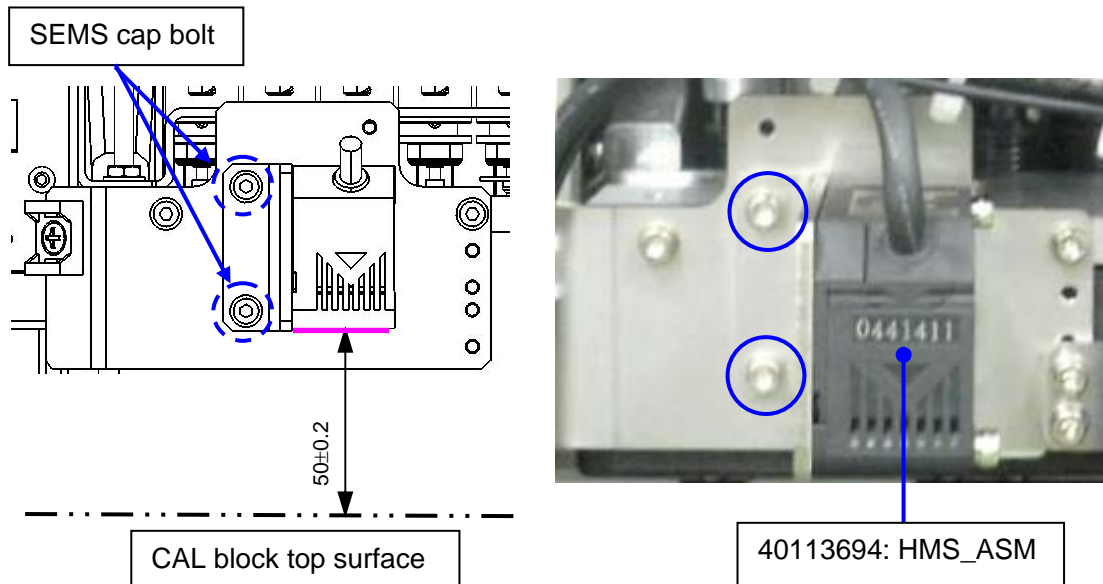



Figure 3-3-2-1 Adjusting the HMS Height

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”.

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

3-4. Replacing the Head Board

3-4-1. Replacing the Head Main Board

- 1) Remove the SL6030892TN (×10) to detach the main cover.
 - 2) Disconnect various connectors and remove the SL4030891SC (×9) to detach the head main board.
 - 3) Reassemble the parts and components in the reverse order of disassembly.
- * Since the head main board is delivered after it has been adjusted correctly, no adjustment work is required.
Follow the steps stated in “Head Vacuum Level and Temperature Sensor Output Level” on page 16-16 for the QA table, only if any fault is found.

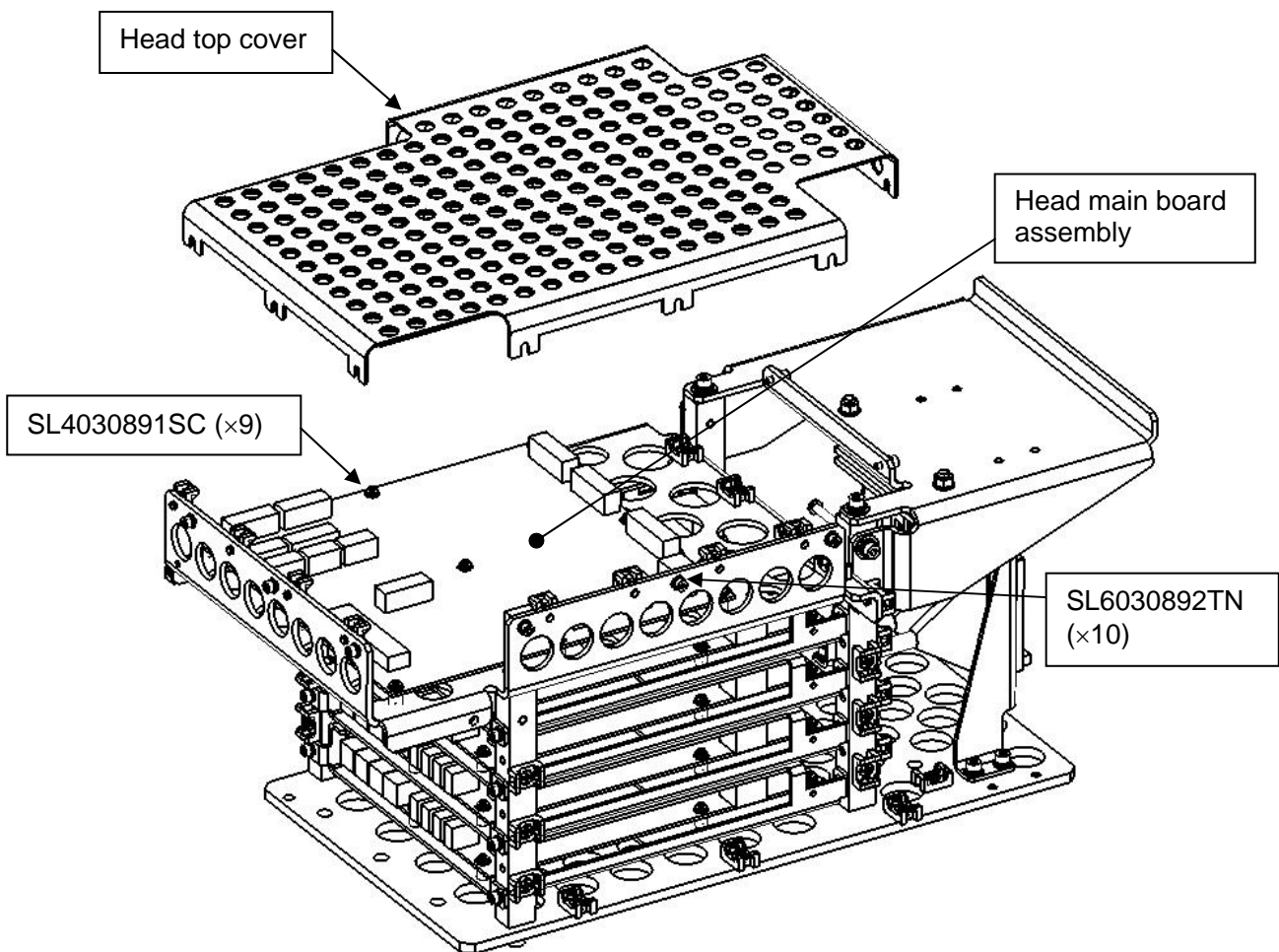


Figure 3-4-1-1 Replacing the Head Main Board

Maintenance Guide

3-4-2. Replacing the Servo Amplifier Board

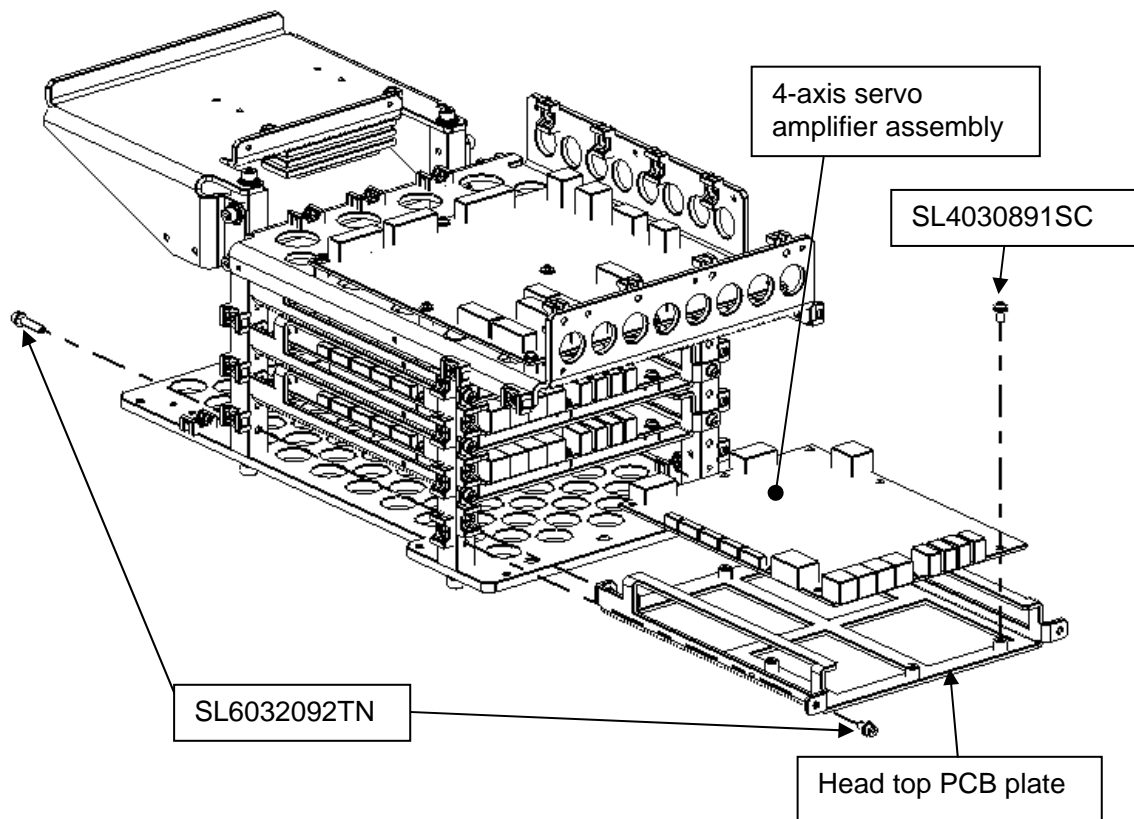


Figure 3-4-2-1 Replacing the Servo Amplifier Board

Note) After the servo amplifier board has been replaced, set the rotary switch.
(For details, see page 16-6 on QA Table 16.Electrical “Axis setting of Z/θ-axis servo amplifier”.)

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 to detach the camera bracket.
- 2) The camera assembly is secured with the SEMS cap bolts ②.
The light assembly is secured with the SEMS cap bolts ③.
Disconnect the connectors and remove the screws, and then replace the OCC assembly.
- 3) Reassemble the components in the reverse order of disassembly. (Apply Loctite 242 to the SEMS cap bolts ② (×2) and M4 SEMS cap bolts ③ (×2).)
- 4) After the camera assembly has been replaced, adjust the focus and input MS parameters.
After the light assembly has been replaced, adjust the OCC light.
(See section 4-7, List of Readjustment Items After Replacement.)

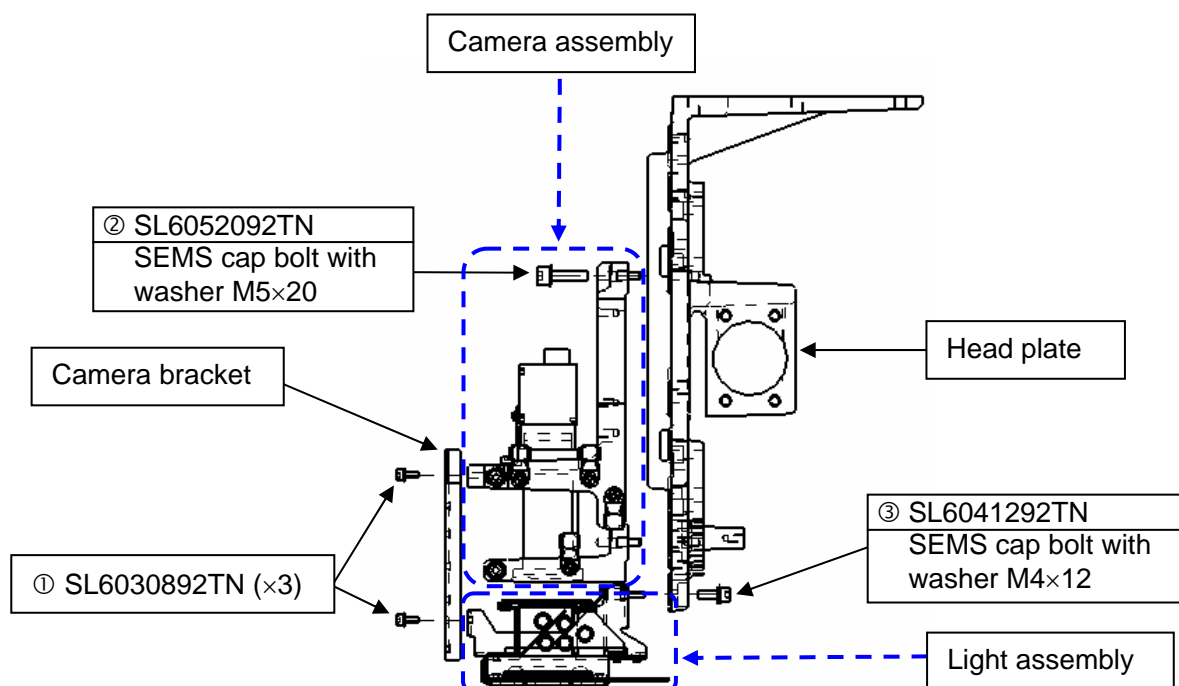


Figure 4-1-1 OCC Assembly

- * The Figure above shows an OCC_R (KE-3020VR) mounting example.
For the OCC_R, as the camera bracket of the KE-3020V is different from that of the KE-3020VR, the fixing bolts ① of the KE-3020V are as follows.
Upper: SM1030501SC (×1), Lower: SL6030892TN (×2)
For the OCC_L, the fixing bolts ① of the KE-3020V are as follows.
Upper: SM1030501SC (×1), Lower: SM3030552TN

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 bolts ① and ② securing the CCD camera and lens to replace the CCD camera and lens.
- 3) Reassemble the components in the reverse order of disassembly.
(Apply Loctite 242 to the SEMS cap bolts ① (×2), and then fix them with a tightening torque of 1.0N·m.)
- 4) After the CCD camera and lens have been replaced, adjust the focus and input the MS parameters. (See 4-7, List of Readjustment Items After Replacement.)

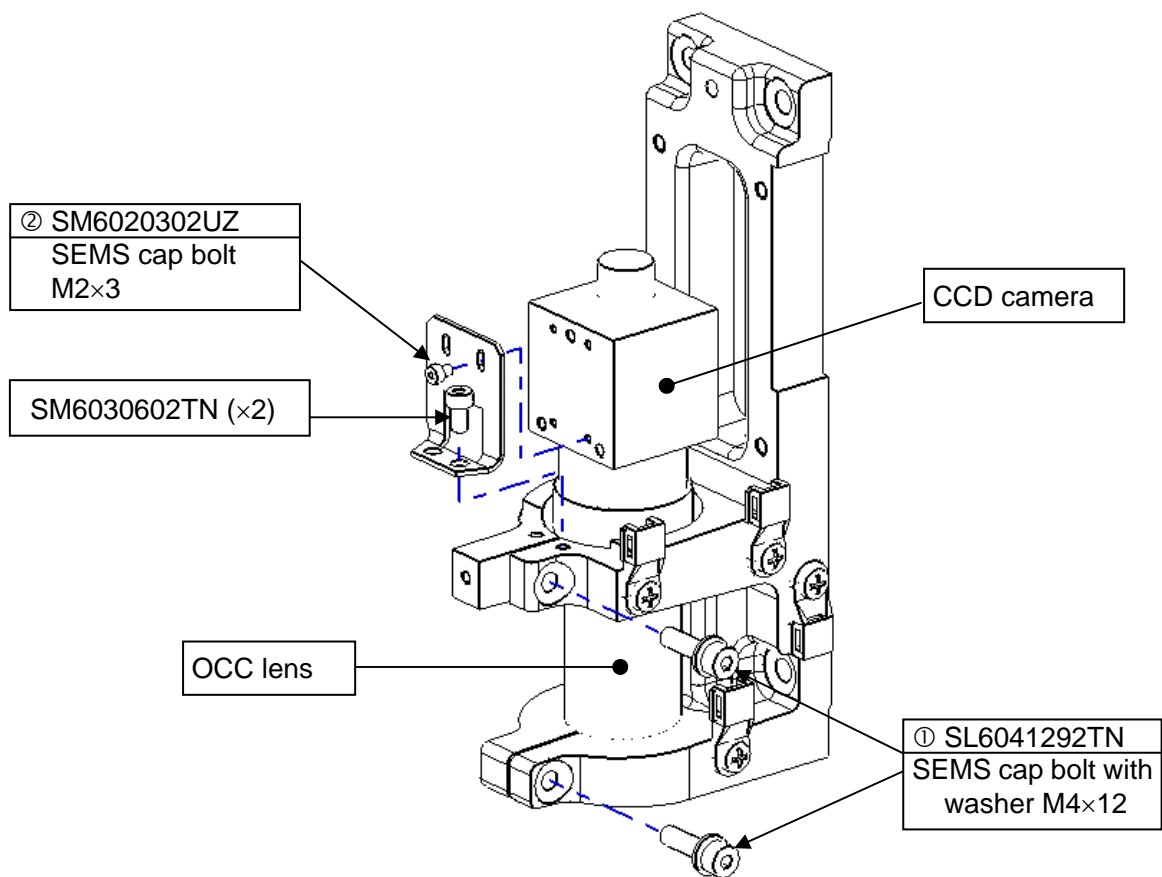


Figure 4-2-1 CCD Camera/Lens

Maintenance Guide

4-3. Replacing the OCC Coaxial/Angle Light Board Assemblies

- 1) Detach the light assembly from the head plate using the procedure described in section 4-1, Replacing the OCC Assembly.
- 2) Remove the SEMS cap bolt ① (×2) to replace the OCC coaxial light board assembly.
- 3) Remove the SEMS cap bolts ② (×4) to replace the OCC angle light board assembly.
- 4) Reassemble the components in the reverse order of disassembly.
- 5) After the OCC light board has been replaced, it is necessary to adjust the light filter U and OCC light. (See 4-7, List of Readjustment Items After Replacement.)

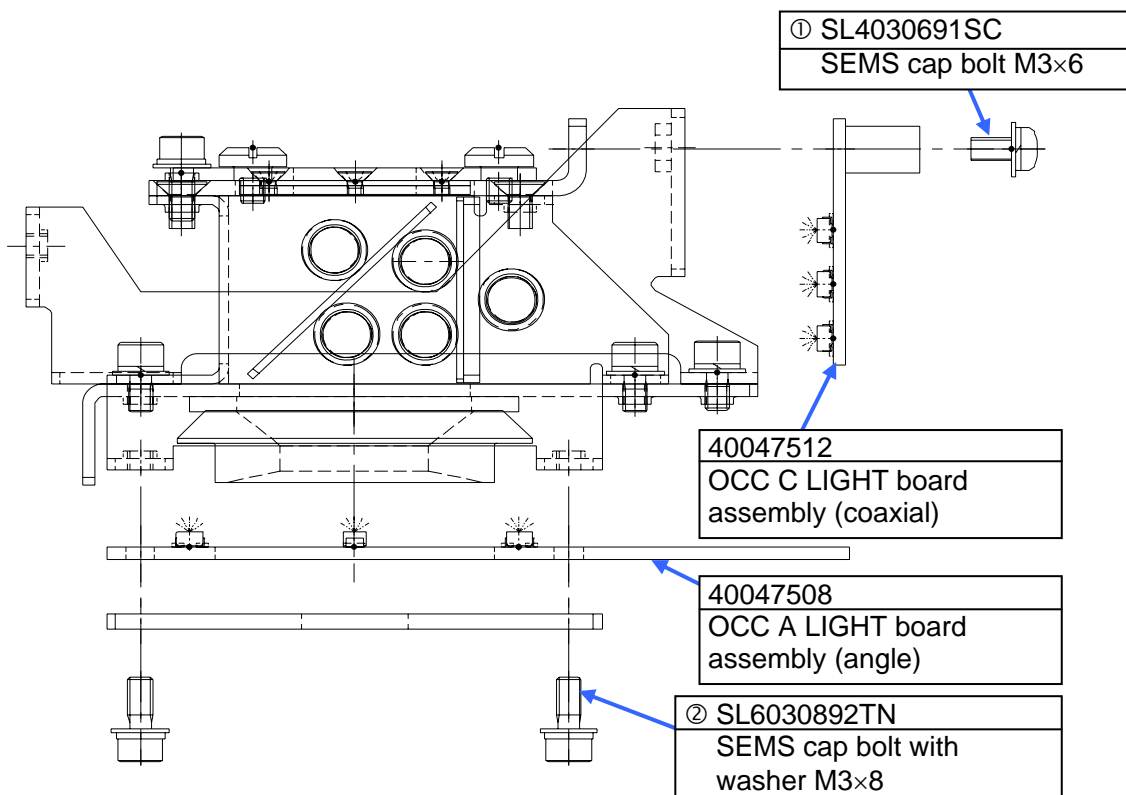


Figure 4-3-1 Replacing the OCC Coaxial/Angle Light Board Assembly

Maintenance Guide

4-4. Replacing the Lens Filter/Light Diffuser

- 1) Detach the light assembly from the head plate using the procedure described in "Replacing the OCC Assembly".
- 2) Remove the SEMS cap bolt ① (×1), collar ② (×1) and shoulder screws ③ (×2) to detach the light filter U support, lens filter and guide plate.
- 3) Remove the countersunk-head screws ④ (×4) 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 4-7, List of Readjustment Items After Replacement.)

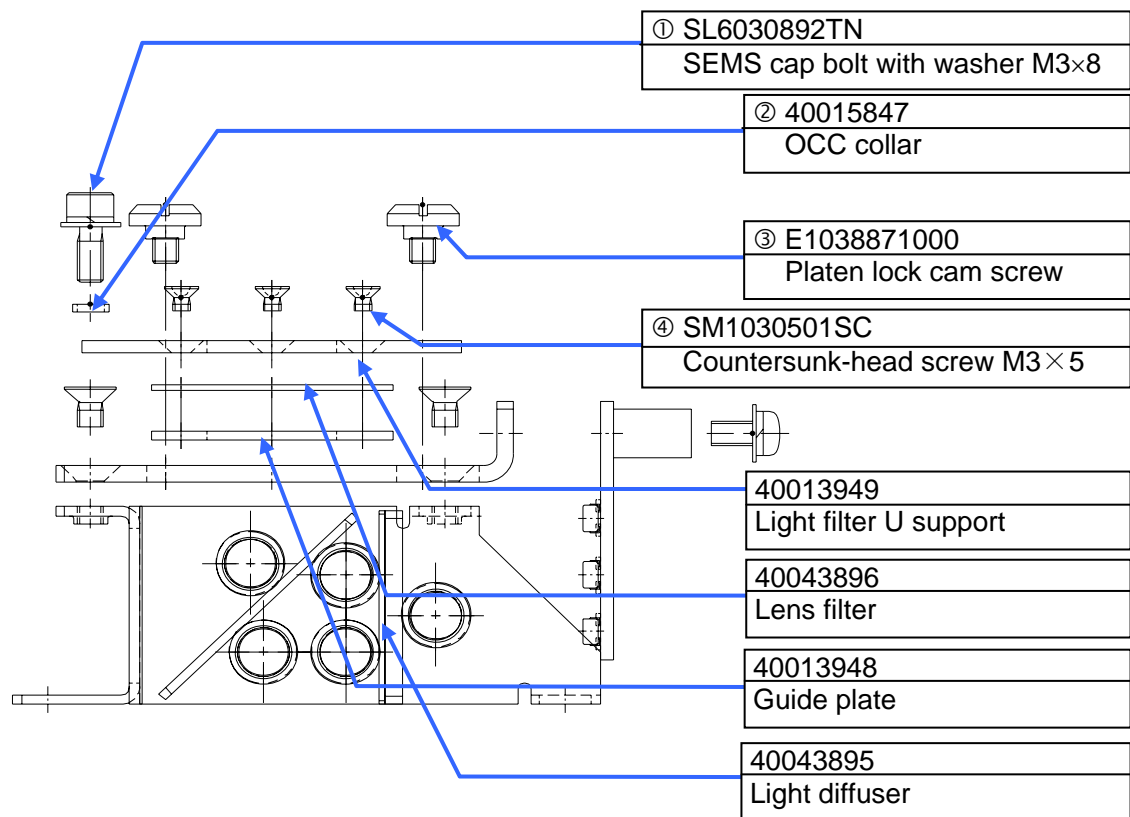


Figure 4-4-1 Replacing the Lens Filter

Maintenance Guide

* Adjusting the Polarizing Filter

- 1) Put a white ceramic board on the calibration block and move the camera above the board.
- 2) Loosen the setscrew. Turn the light filter U support and secure it when the screen is at the brightest level.
- 3) In the brightest status, re-stick the OCC light label as shown in the figure below.

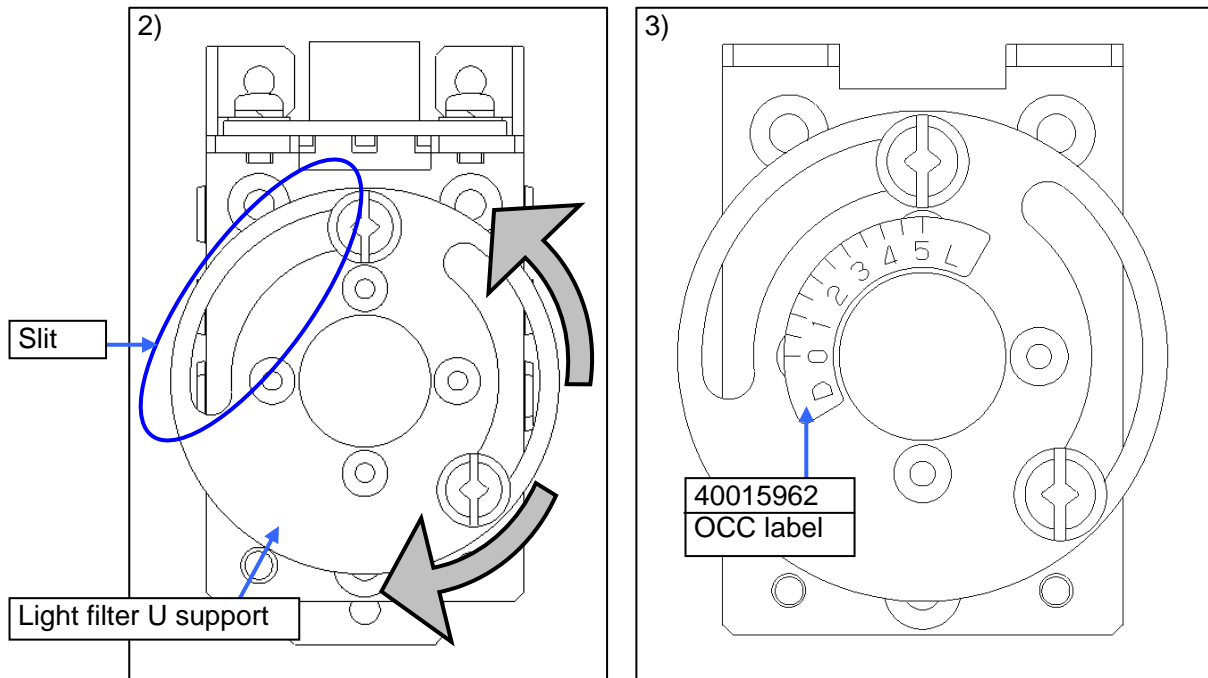


Figure 4-4-2 Filter Adjusting Position and Sticking the Light Label

Note

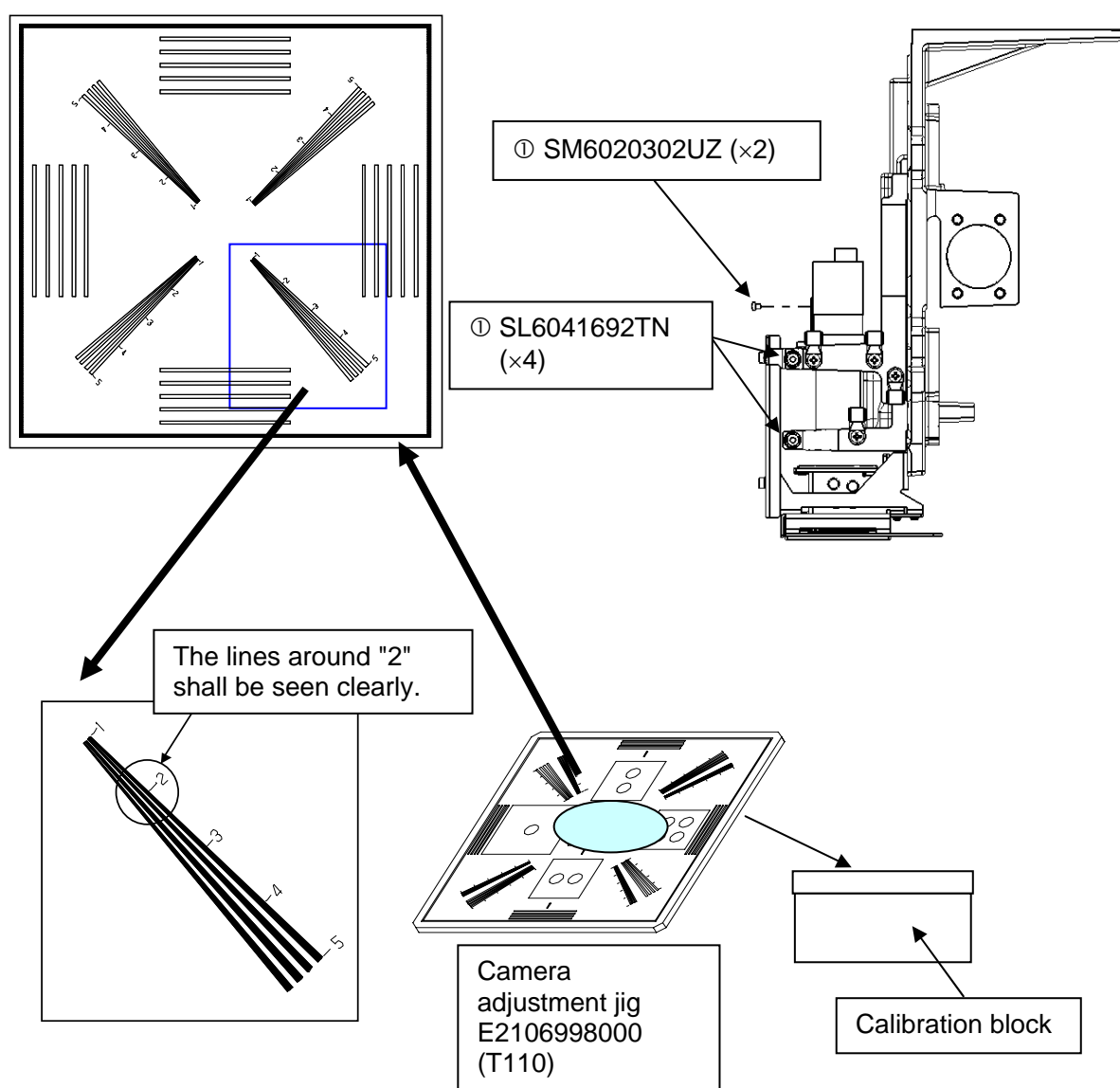
After adjustment, if the slit position of the light filter U support is displaced 90 degrees, rotate the lens filter 90 degrees and readjust the polarizing filter so that the position of the slit is the same as the orientation on Figure 4-4-2.

Maintenance Guide

4-5. Adjusting the Focus

<Procedure>

- 1) Mount the camera adjustment jig on the top of the CAL block so that the etching surface is faced downward.
- 2) Loosen the SEMS cap bolt with washers ① and ② (total of 6 locations) that secure the camera, move the camera up and down, and when lines up to 2 on the etching surface are clearly visible (see the figure below), secure the camera in position.
When the polarizing filter is adjusted to the scale "0" (dark) position, the lines can be seen easily.
After the adjustment has been completed, return the polarizing filter to the scale "5" (bright) position.



Maintenance Guide

4-6. Adjusting the OCC Light Quantity

<Procedure>

- 1) Check that the OCC light goes on with manual control.
- 2) Carry out "Adjustment of OCC Light" in the MS parameters. (See the section related to OCC light quantity adjustment in the specifications for the MS parameter operation.)

4-7. Readjustment After Replacement of OCC Unit

○: Mandatory △: Check - : Unnecessary


*: Optional

Table 4-7-1 List of Readjustment Items after Replacement

	Camera assembly L	Camera assembly R (Note 2)	Light assembly	CCD camera lens left	CCD camera lens right (Note 2)	Light board assembly	Lens filter
Focus adjustment	○	○	—	○	○	—	—
Filter adjustment	△	△	○	△	△	—	○
Adjustment of OCC light quantity (Note 1)	△	△	○	△	△	○	○
OCC offset (Note 1)	○	○	—	○	○	—	—
Sub-OCC offset (Note 1) (Note 2)	○	○	—	○	○	—	—
Coarse adjustment of home position (Note 1)	○	—	—	○	—	—	—
Head offset (Note 1)	○	—	—	○	—	—	—
BMR offset (Note 1) *	○	—	—	○	—	—	—
HMS offset (Note 1)	○	—	—	○	—	—	—
General mounting offset (Note 1)	○	—	—	○	—	—	—
VCS camera offset (Note 1)	○	—	—	△	—	—	—
VCS general offset (Note 1)	△	—	—	△	—	—	—

(Note 1) See the MS parameter.

Input the MS parameters from the top in order.

 CAUTION	To prevent any personal injury, do not put your hand inside the machine or your face or head close to the machine during operation of the touch panel and/or HOD.
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Maintenance Guide

**DANGER**

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

[5] BOARD TRANSPORT UNIT

5-1. Replacing the Transport Belt

- 1) Loosen the transport belt tension adjustment pulley. (Locations indicated by arrows in the figure below)

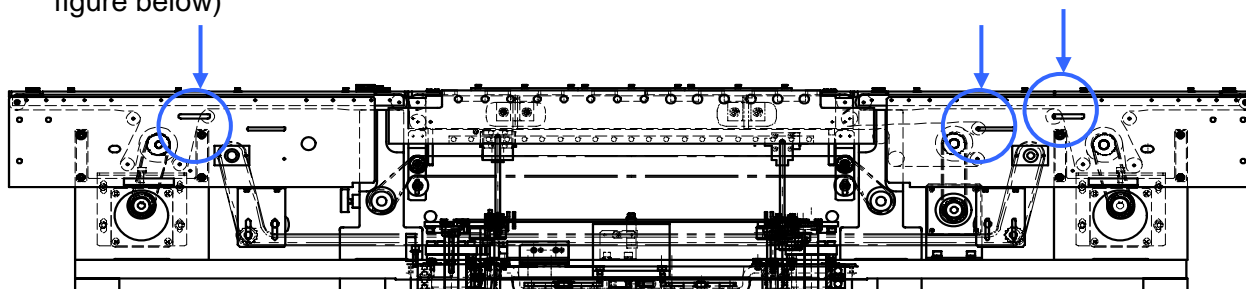


Figure 5-1-1 PWB Transport Block and Transport Belt

- 2) Replace the belt with the one shown in Table 5-1-1.
- 3) To provide appropriate belt tension, measure the length of the belt with no tension exerted, and adjust the position of the transport pulley along the slot so that the belt length increases by 0.5%.

<Adjustment procedure>

Use a pencil or similar tool to put two marks, which are 200mm apart from each other, on the belt. Move the transport pulley to exert tension so that the distance increases to 201 mm.

Take care with the CENTER buffer so that the transport rails FC and RC do not lift as a result of the increased belt tension.

Table 5-1-1 Transport Belt Part No.

[List of Replacement Parts]				
	CENTER	IN/OUT		
		ST	Extended transport	
M PWB specification	40113952	40113953	150 mm	40114731
			250 mm	40114732
L PWB specification	4001070	40000863	150 mm	40011058
			250 mm	40011065
L-wide OP	4001070	40011058	-	
XL PWB specification	40097732	40097731	-	-

Maintenance Guide

5-2. Replacing the Transport Pulley

Two kinds of transport pulleys are available. If the mounting position is changed or the pulley is mounted incorrectly, this may cause incorrect pulley rotation or incorrect alignment of the transport belt, resulting in wear on the belt.

Always refer to relevant mounting procedure when mounting the transport pulley.

5-2-1. Transport Pulley A Assembly: E21117150A0

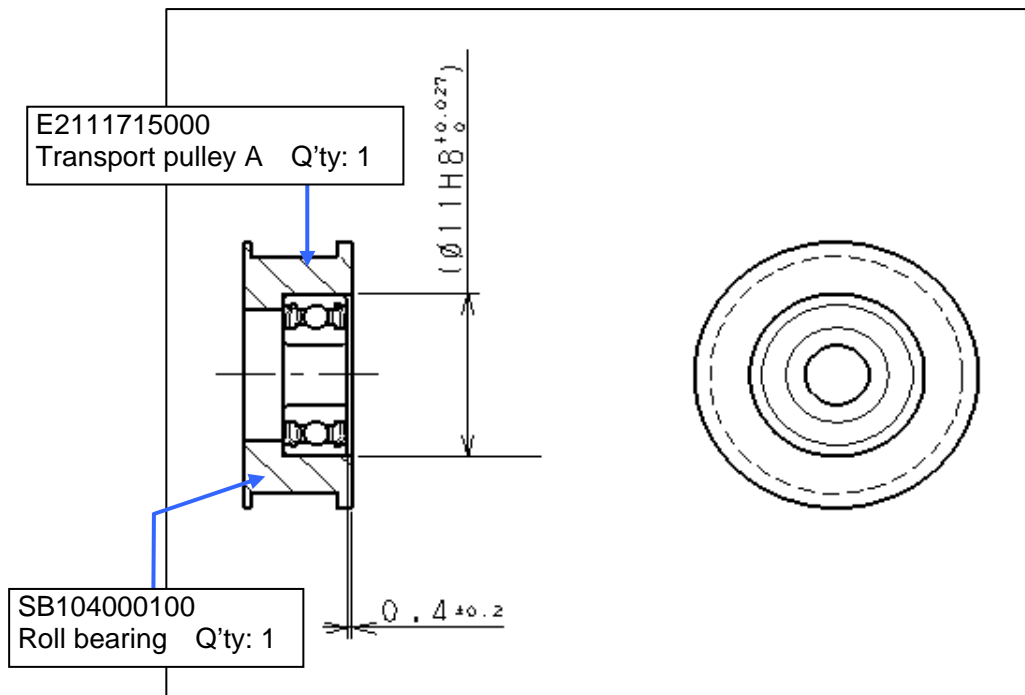


Figure 5-2-1-1 Transport Pulley A Assembly

5-2-2. Transport Pulley B Assembly: E20897210A0

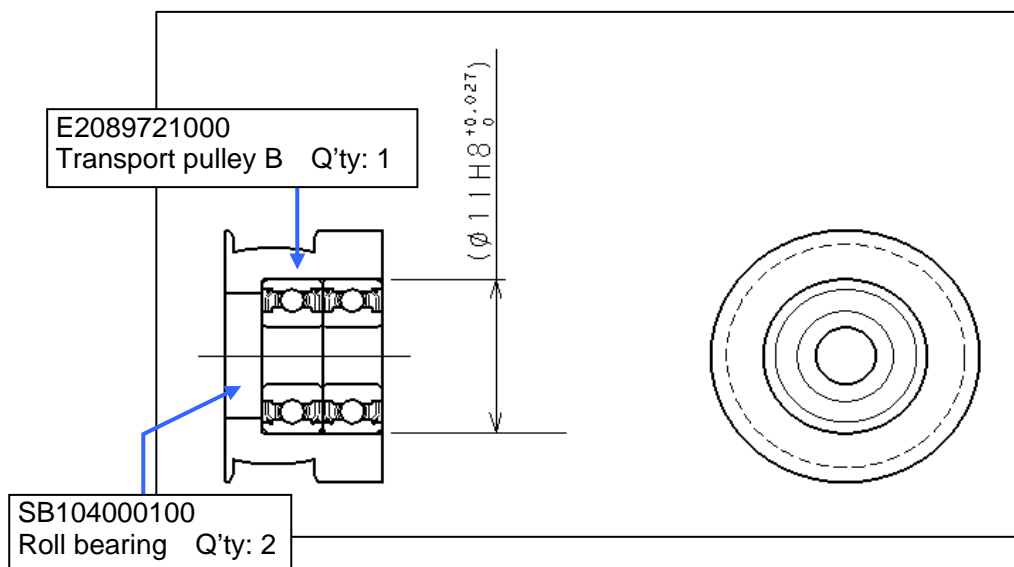


Figure 5-2-2-1 Transport Pulley B Assembly

Maintenance Guide

5-3. Replacing the IN and OUT Motors

- 1) Disconnect the connector of the motor relay cable.
- 2) Loosen the screws fixing the motor bracket A to detach the drive belt from the motor pulley S.
- 3) Loosen the fixing screws ② and detach the motor.
- 4) Make the end face of the motor shaft of a new motor aligned with the motor pulley S ($A=0$) and tighten the fixing screw ②.
- 5) Temporarily tighten the setscrews ① and adjust the tension of the timing belt to 12N to 16N by turning the setscrew ③.
For this adjustment, use UNITTA's acoustic belt tension meter (Weight = 2.5, Width = 6.0, Span = 75).
- 6) After the belt tension has been adjusted, tighten the screws ① to fix the motors to the rail stand.

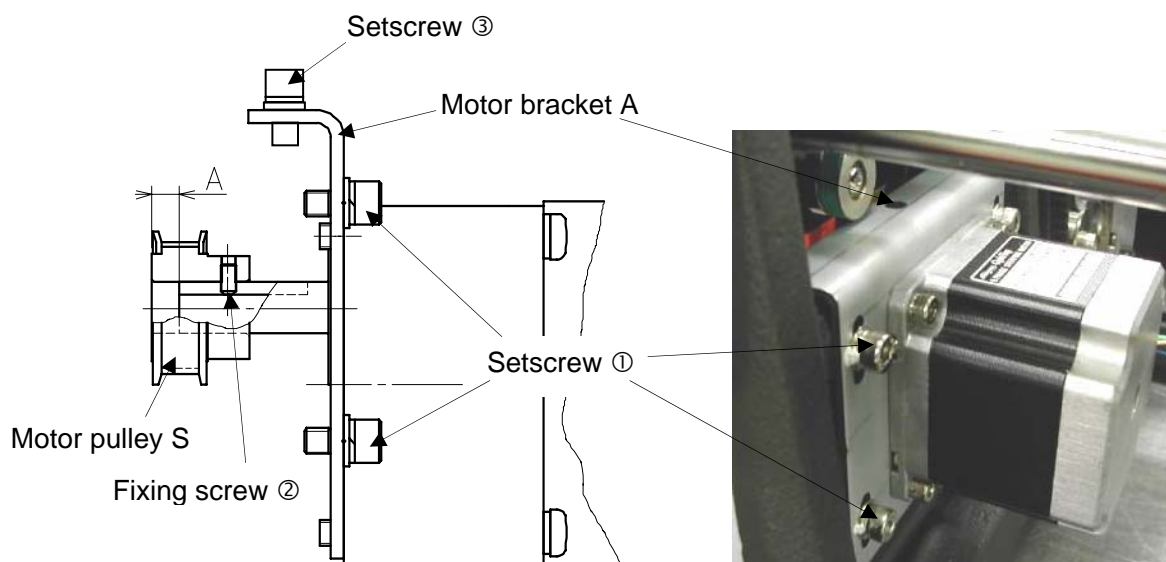


Figure 5-3

Note) Belt (tension) is stretched excessively. → Torque of the drive shaft increases.

Note) Belt (tension) is loosened excessively. → Teeth on the timing pulley are skipped.
(Noise is produced.)

Maintenance Guide

5-4. Replacing the CENTER Motor

- 1) Detach the connector of the motor relay cable.
- 2) Loosen the screw ① of the motor bracket ② to detach the drive belt C from the motor pulley ③.
- 3) Loosen the motor fixing screw ⑤ to detach the motor ④.
- 4) Mount the motor shaft and motor pulley ③ so that the pulley end A is aligned with the motor shaft end B. (See Figure 5-4-1.)
- 5) When installing a new CENTER motor, reassemble the components in the order of steps 3) to 1).
- 6) Adjust the tension of the drive belt C as described below.

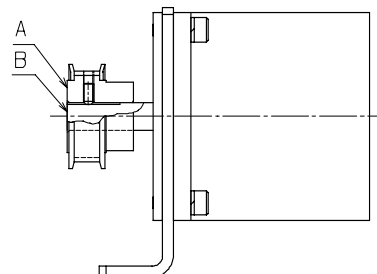


Figure 5-4-1

<Procedure>

- ① Loosen the screw ① of the motor bracket C, and move the motor bracket to the left and right.
- ② Loosen the motor fixing screw ⑤ and move the CENTER motor ④ up and down.
- ③ Adjust the belt tension as described at steps ① and ②. When adjusting, take care not to allow contact with other components.
- ④ Measure the tension using a sonic belt tension meter (manufactured by UNITTA) and adjust it to between 17.6 and 21.6N.
(Weight=2.5, Width=6.0, Span=93)
- ⑤ After the belt tension has been adjusted, tighten the screws ① and ⑤ to fix the motor bracket C and motor, respectively.

Note) Belt (tension) is stretched excessively. → Torque of the drive shaft increases.

Note) Belt (tension) is loosened excessively. → Teeth on the timing pulley are skipped.
(Noise is produced.)

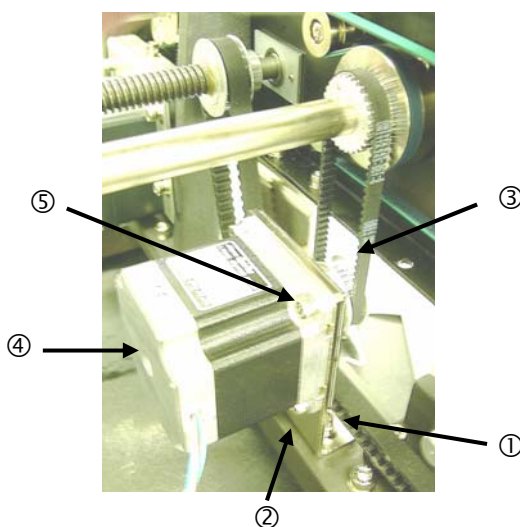


Figure 5-4-2

Maintenance Guide

5-5. Replacing the Timing Belt

5-5-1. Replacing the Timing Belt for Adjustment of the Transport Width

- 1) Loosen the setscrew ② to detach the handle shaft coupling ① from the screw shaft.
- 2) Loosen the tension pulley ③ to detach the timing belt ④.
- 3) Remove the bearing fixing screw ⑤ from the rail stand on the driven side.
 - * Note) Three washers are used for the fixing screw. When removing the bearing fixing screw, pay special attention so that these washers are not fallen down.
- 4) Detach the bearing ⑥.
- 5) Loosen the stopper collar setscrew ⑦ to detach the stopper collar ⑧ from the screw shaft.
- 6) Detach the bearing and stopper collar from another side in the same manner as described above.
- 7) Pull out the screw shaft ⑨ toward the driven side to detach the timing belt ④.
- 8) Pass the screw shaft through a new timing belt and insert it into the reference rail side.
- 9) Insert the stopper collar ⑧, which has been detached in step 5), and secure the bearing ⑥, which has been detached in step 3).
 - * Note) Pass three washers through the bearing fixing screw. (See the Figure.)
- 10) With the screw shaft kept pushed against the reference rail side, push the stopper collar ⑧ against the bearing ⑥ to eliminate any play, and then secure them.
- 11) Adjust the timing belt pulley to apply a tension.
 - * Note) At this time, do not apply a strong tension. A tension, at which two screw shafts rotate at the same time, is accepted.
- 12) Put the rail on the driven side close to the reference side to make the nut ⑩ of the screw shaft in contact with the timing pulley ⑩.

If the left and right screw shafts are not in contact with the timing pulley at the same time, loosen the tension pulley once and rotate only the screw shaft that is not in contact with the timing pulley to make the adjustment. After the adjustment has been completed, adjust the tension. (Do not stretch the belt strongly.)
- 13) Put the rail on the driven side as close to the reference side as possible. Loosen the screw ⑪ and adjust the adjustment plate position.
- 14) Widen the rail on the driven side to its maximum position and check that the screw shaft rotates smoothly.
 - * Note) If the screw shaft does not rotate smoothly, loosen the screw shaft fixing screw ⑫ with the rail on the driven side kept widened as much as possible and secure it again at this position.
- 15) Adjust the belt tension with an acoustic belt tension meter.

(Weight=4.0, Width=9.0, Span=98)

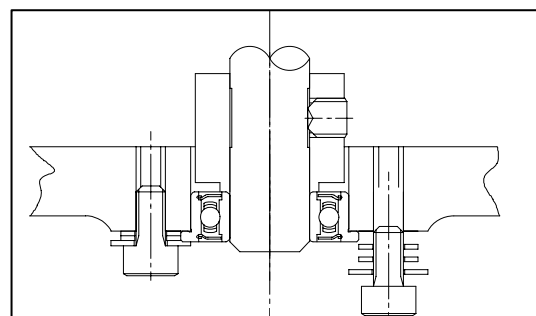
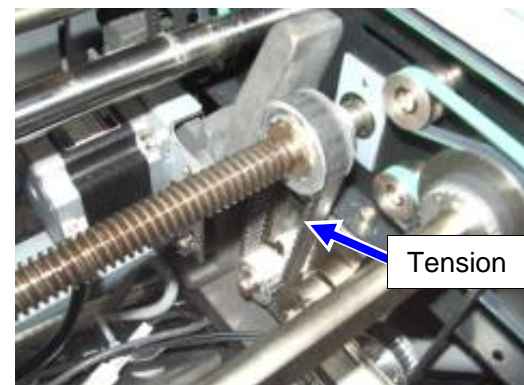
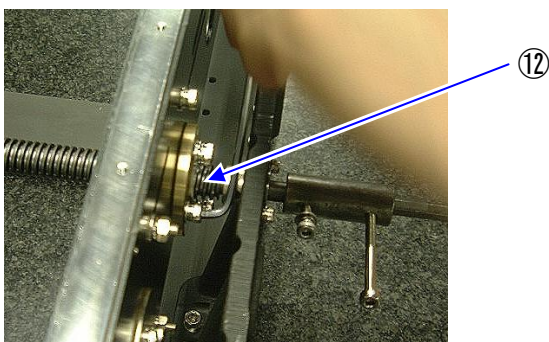
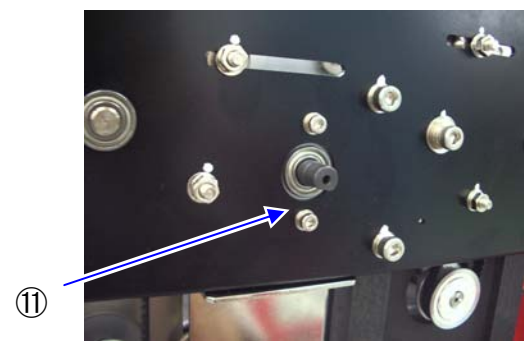
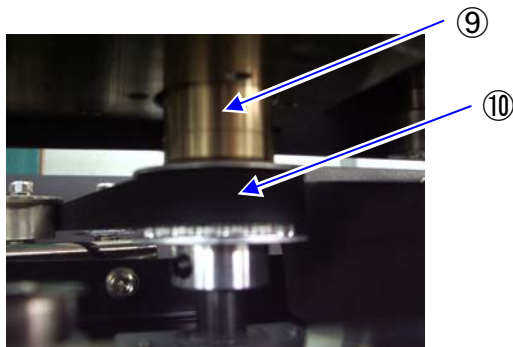
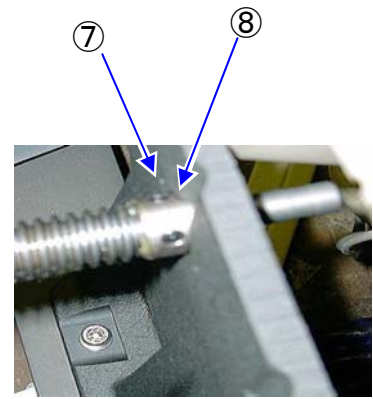
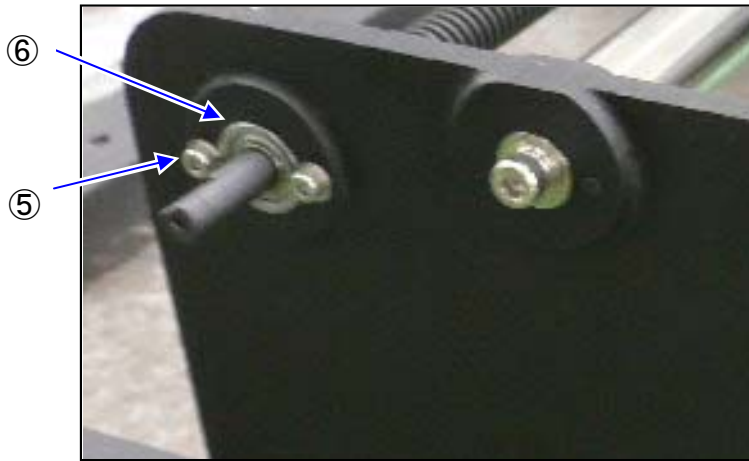
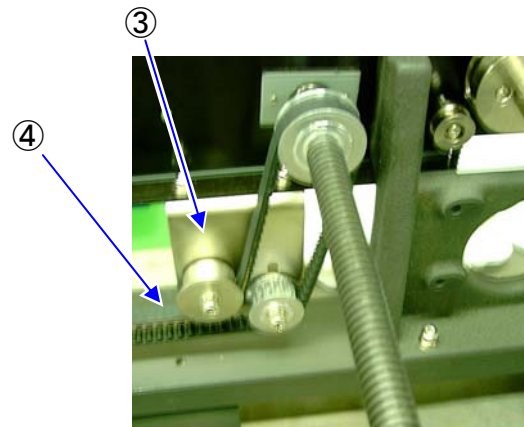
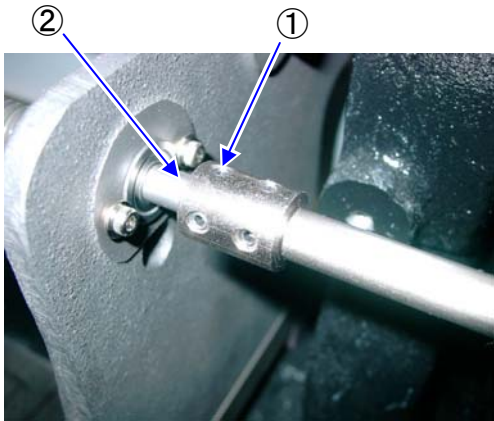


Figure 5-5-1

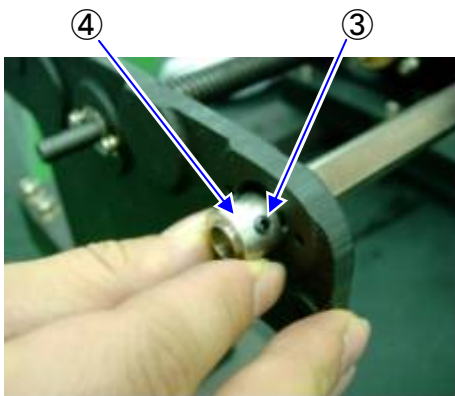
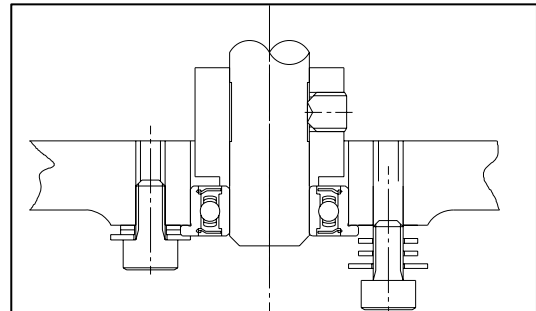
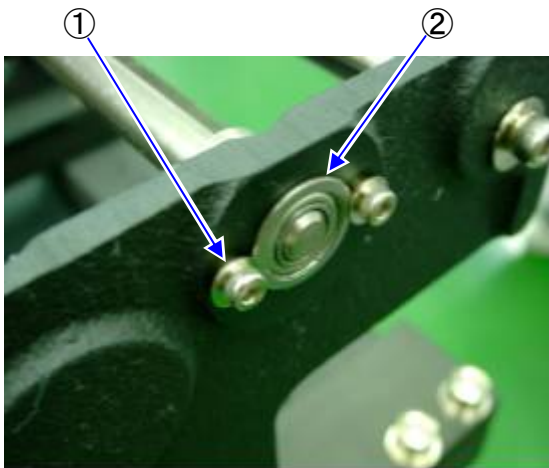
Maintenance Guide



Maintenance Guide

5-5-2. Replacing the Timing Belt for the Transport Motor

- 1) To replace the timing belt of the IN/OUT motor, follow step 2) in section 5-3 to detach the timing belt. Accordingly, to replace the timing belt of the CENTER motor, follow step 2) in section 5-4 to detach the timing belt.
- 2) Remove the bearing fixing screw ① from the rail stand on the driven side to detach the bearing ②.
 - * Note) Three washers are used for the fixing screw. When removing the bearing fixing screw, pay special attention so that these washers are not fallen down.
- 3) Loosen the stopper collar setscrew ③ to detach the stopper collar ④ from the drive shaft.
- 4) Pull out the drive shaft toward the driven rail side and replace the belt.
- 5) Insert the drive shaft into the reference rail side and reassemble the stopper collar and bearing in the reverse order of disassembly.
 - * Note) When assembling the stopper collar, push the stopper collar against the bearing with the shaft kept pushed against the reference rail and secure it firmly.
- 6) When the timing belt of the IN/OUT motor has been replaced, follow steps 2) and 6) in section 5-3 to adjust the belt tension. Accordingly, when the timing belt of the CENTER motor has been replaced, follow step 6) in section 5-4 to adjust the belt tension.



Maintenance Guide

5-6. Replacing the LEFT and RIGHT Sensors

5-6-1. Replacing the LEFT and RIGHT Sensors (M and L Board Specifications)

Bind the cables A and B with binding bands, taking care that they are not pulled or loosened excessively during adjustment of sensor position.

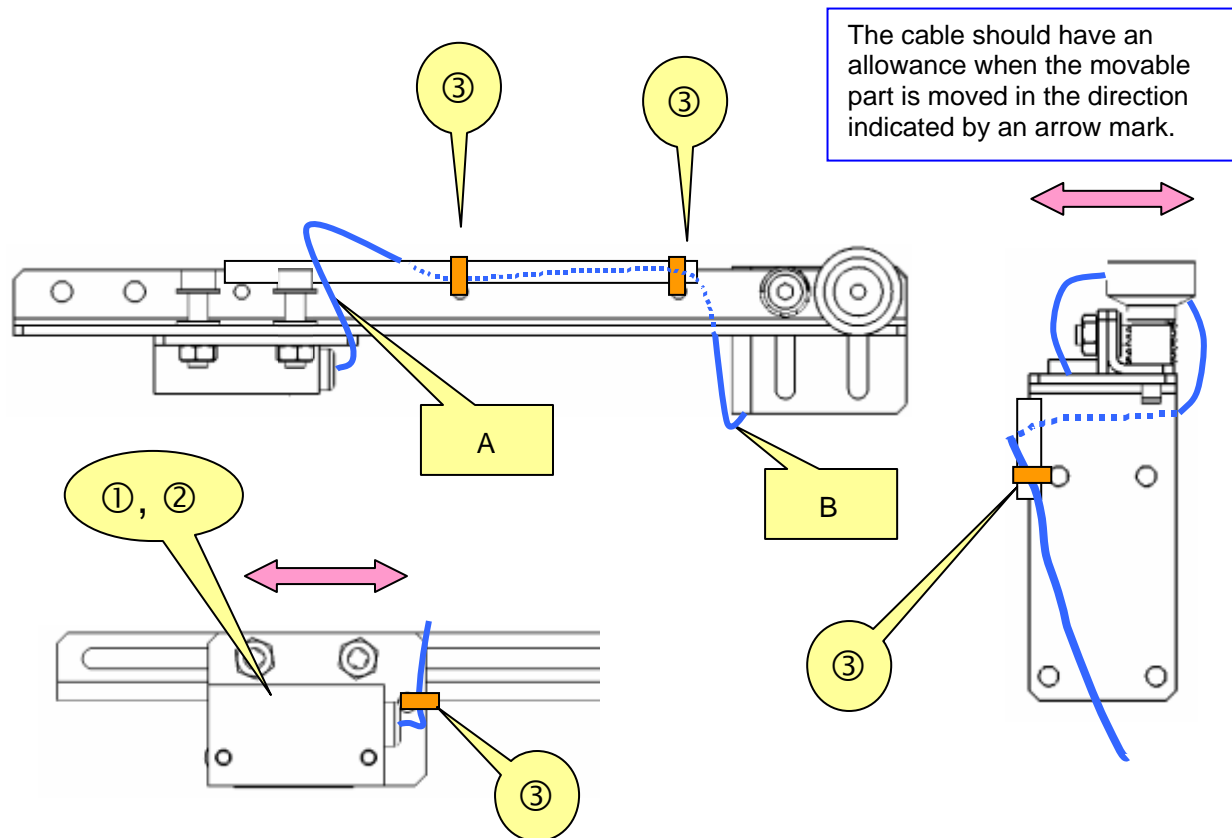


Figure 5-6-1-1 Front Reference: Left Sensor, Rear Reference: Right Sensor

Maintenance Guide

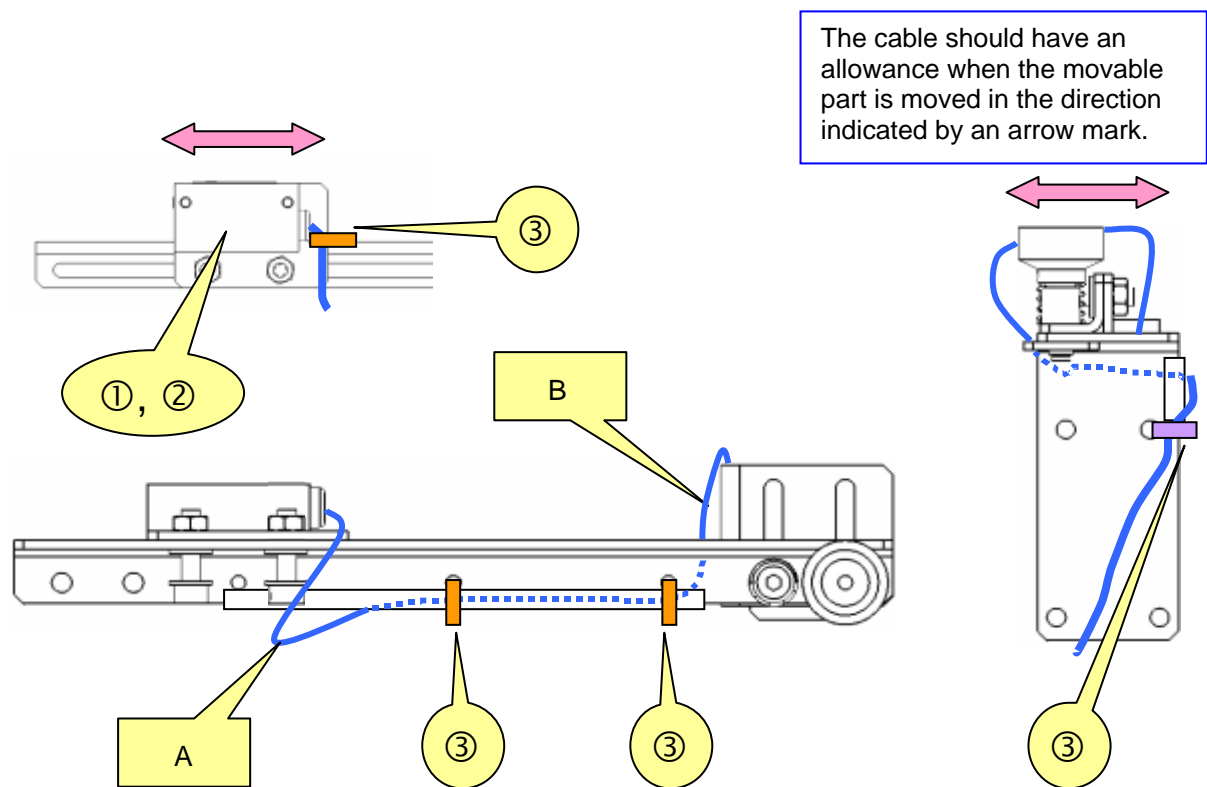


Figure 5-6-1-2 Front Reference: Right Sensor, Rear Reference: Left Sensor

①	40110063	LEFT_SENSOR_ASM
	40110067	RIGHT_SENSOR_ASM
②	SL4031291SC	SCREW M3×L12
③	EA9500B0000	CABLE_BAND

(a) The sensitivity adjustment is not needed.

Maintenance Guide

5-6-2. Replacing the LEFT and RIGHT Sensors (XL Board Specifications)

Bind the cables A and B with binding bands, taking care that they are not pulled or loosened excessively during adjustment of sensor position.

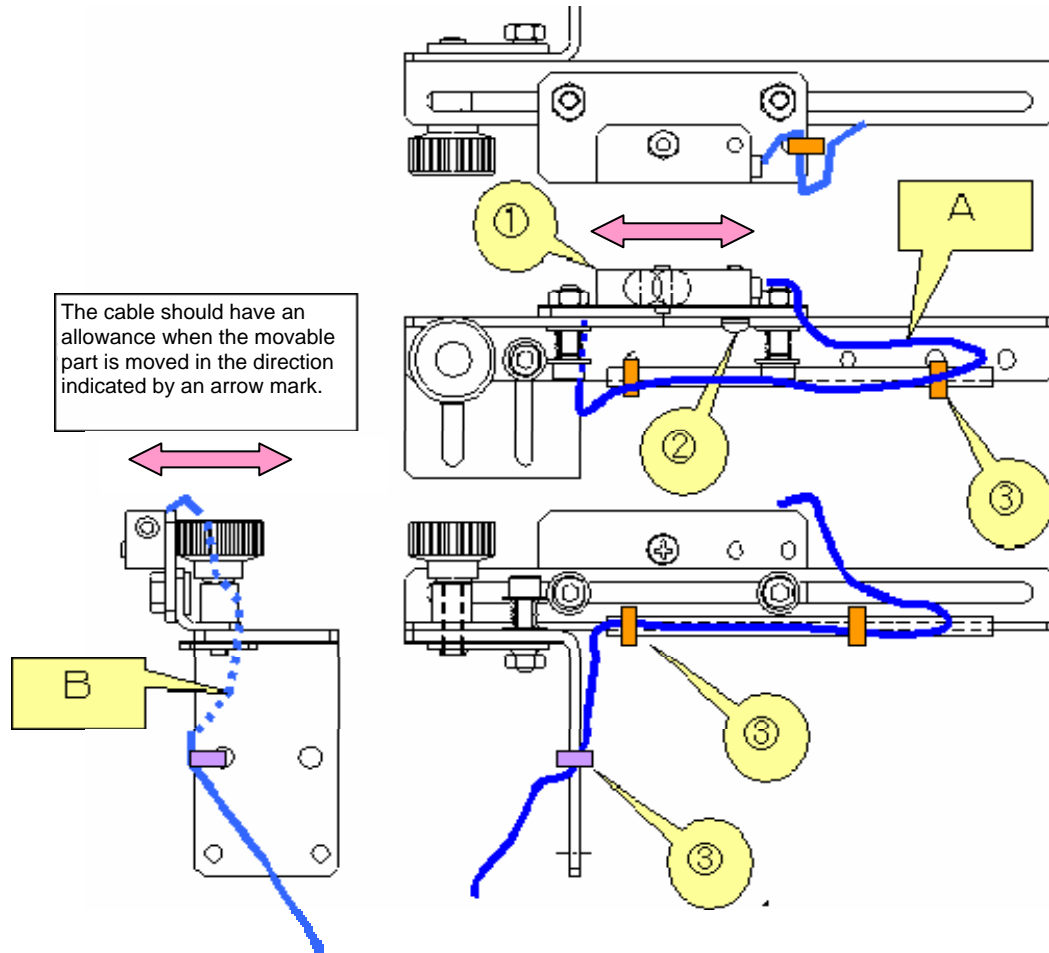


Figure 5-6-2-1 Front Reference: Left Sensor, Rear Reference: Right Sensor

Maintenance Guide

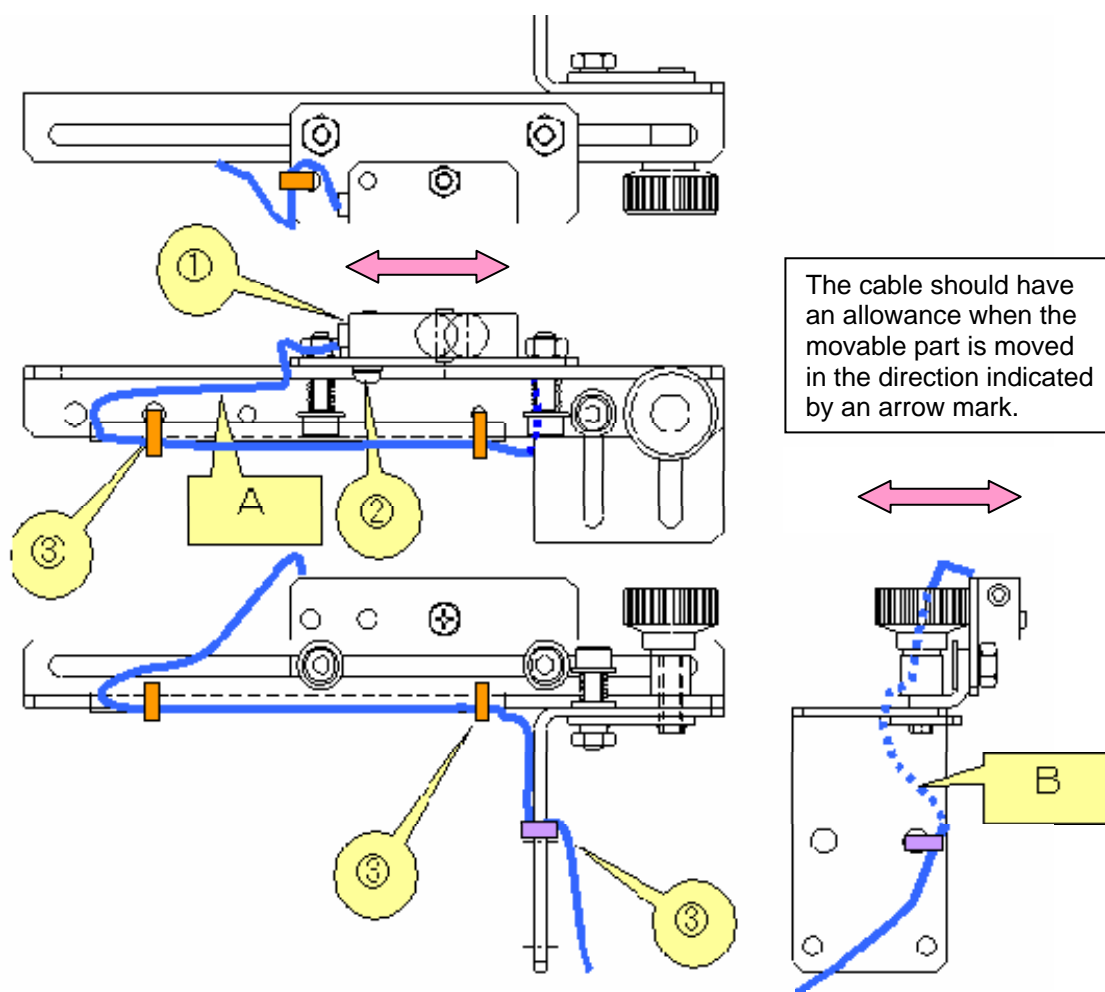


Figure 5-6-2-2 Front Reference: Right Sensor, Rear Reference: Left Sensor

①	40092568	LEFT_SENSOR_ASM
	40092567	RIGHT SENS CABLE ASM
②	SL4031291SC	SCREW M3 × L12
③	EA9500B0000	CABLE_BAND

<Adjusting the sensitivity>

- 1) Make an adjustment so that a (matte) black glass epoxy PWB placed on the transport path can be detected.
- 2) Place a (matte) black glass epoxy PWB under the sensor and rotate the sensitivity adjustment knob of the sensor counterclockwise. Then gradually rotate it clockwise up to the position at which the specified PWB is detected.

* If any black glass epoxy PWB is not available, use the PWB having the darkest color of those to be used.

Maintenance Guide

5-7. Replacing the WAIT/STOP/C-OUT Sensors

5-7-1. Replacing the WAIT Sensor (M and L Board Specifications)

- 1) Assemble the WAIT sensor for the M board specifications as shown in the Figure below according to the flow direction.

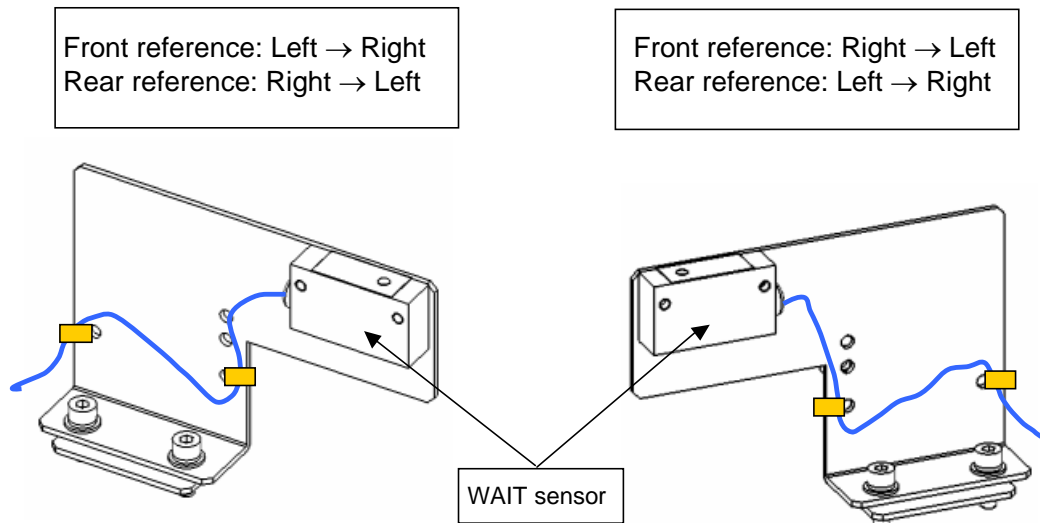


Figure 5-7-1-1 WAIT Sensor (M Board Specifications)

- 2) Assemble the WAIT sensor for the L board specifications as shown in the Figure below according to the flow direction.

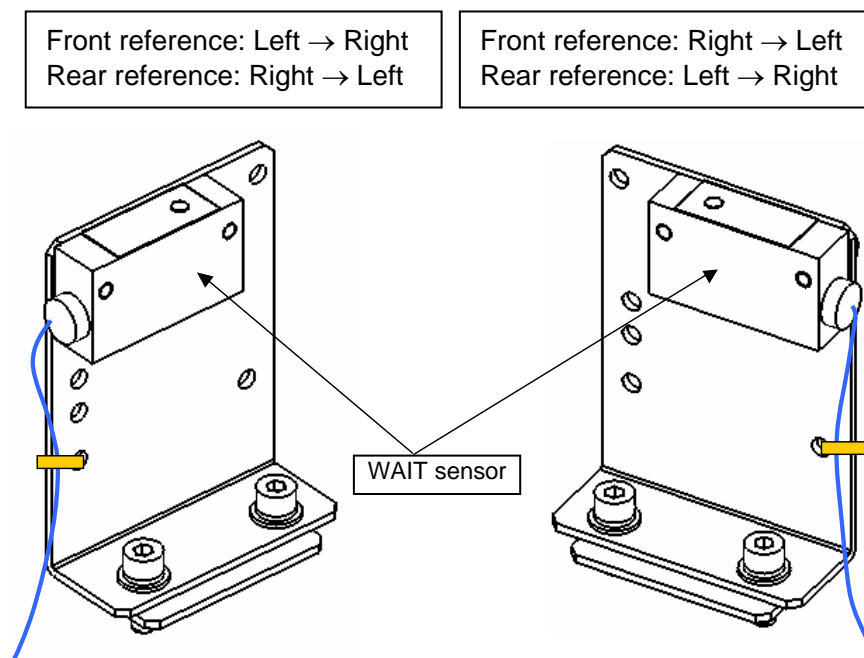


Figure 5-7-1-2 WAIT Sensor (L Board Specifications)

40110064	WAIT SENSOR
SL4031091SC	SCREW M3×L12

Maintenance Guide

5-7-2. Replacing the WAIT Sensor (M and L Board Specifications)

- 1) Remove the screw ① to detach the STOP sensor ②.
- 2) Remove the screw ③ to detach the CO sensor bracket ④.
- 3) Remove the screw ① to detach the C-OUT sensor ⑤ from the CO sensor bracket ④.
- 4) Replace each sensor.

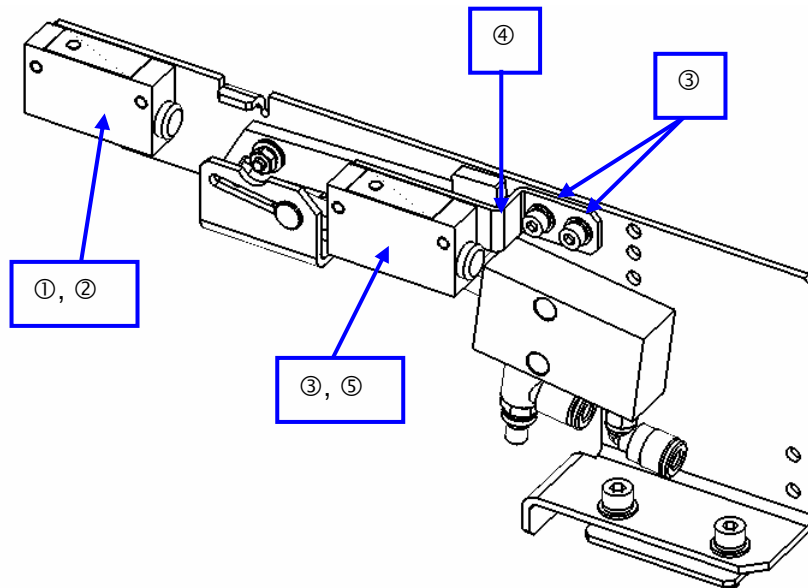
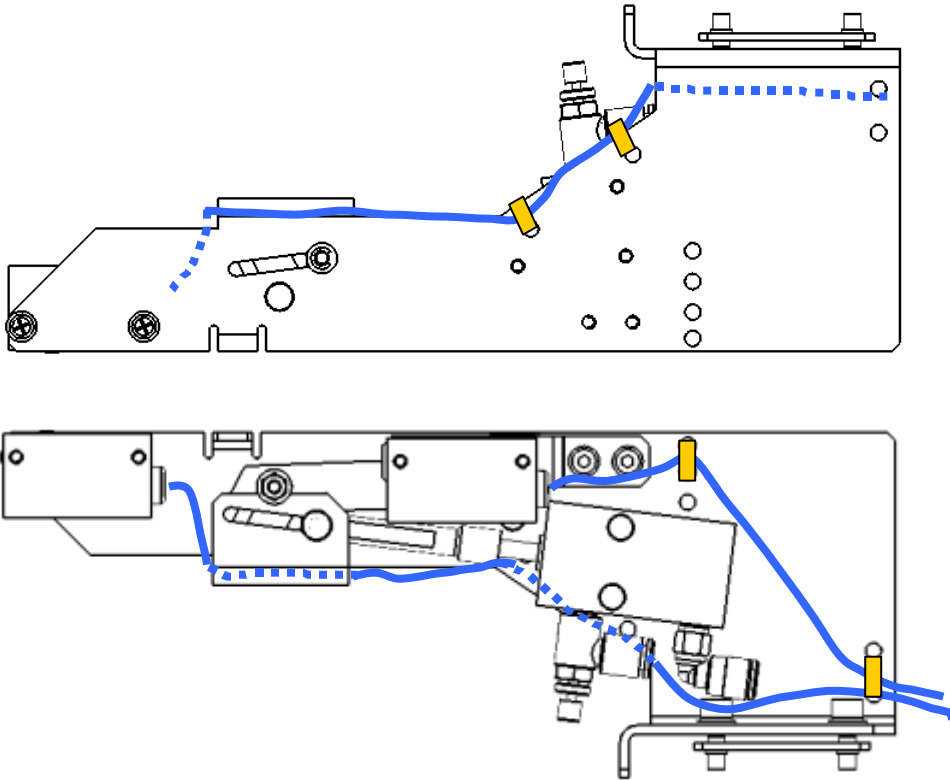


Figure 5-7-2-1

①	SL4031091SC	SCREW M3×L12
②	40110065	STOP SENSOR ASM
③	SL6030692TN	SCREW M3×L6
④	40113940	CO_SENSOR_BR
⑤	40110066	C.OUT SENSOR ASM

Maintenance Guide

- 5) Run the cables as shown in Figure 5-7-2-2.



Maintenance Guide

5-7-3. Replacing the WAIT, STOP and C-OUT Sensors (XL Board Specifications)

5-7-3-1. Replacing the Fiber

- 1) Pull out the fiber from the sensor amplifier.
- 2) To replace the fiber on the light emitting side, detach the light emitting part from the sensor block. To replace the WAIT or STOP sensor, pull out the fiber from the rail guide.
- 3) To replace the fiber on the light receiving side, loosen the fiber nut and rotate the fiber itself to detach it.
- 4) Reassemble the components in the order of 3) → 1).
- 5) When reassembling the components, adjust the project amount A of the top end of the light emitting fiber from the sensor block as follows. (Dimension A)

Project amount: $A = 6 \text{ mm}$

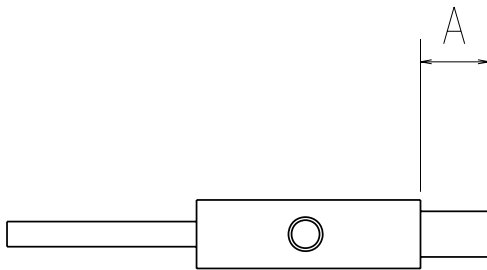


Figure 5-7-3-1-1 STOP/C-OUT
Sensor Block

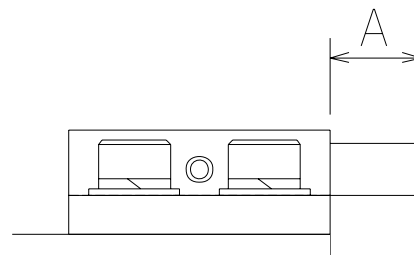


Figure 5-7-3-1-2 WAIT Sensor Bracket

40092512	FIBER
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- 6) After the fibers have been replaced, adjust the amplifier as described in 5-7-3-2-2, Attaching the Amplifier Unit, on the next page.

Maintenance Guide

5-7-3-2. Replacement

5-7-3-2-1. Assembling the Fiber into the Amplifier

- 1) Raise the lever on the top of the amplifier unit.
 - 2) Insert the fiber into the amplifier unit completely until it is in contact with the far position, and then lay down the lever.
- * Assemble the light emitting side and light receiving side correctly without fail.
 - * Cut the top end with the cutter supplied with the fiber and insert the fiber sensor into the amplifier.



Figure 5-7-3-2-1-1

5-7-3-2-2. Detaching and Attaching the Amplifier Unit

- 1) Push in the amplifier unit toward the fiber insertion side.
- 2) Raise the fiber insertion side with the amplifier unit kept pushed. The amplifier is then detached.
- 3) When attaching the amplifier unit, hang the claw on the cable side on the DIN rail and push in the fiber insertion side downward.
- 4) For details about fiber amplifier attaching order, see Figure 5-7-3-2-2-2.



Figure 5-7-3-2-2-1

40092570	WAIT SENSOR ASM
40092571	STOP SENSOR ASM
40092572	C.OUT SENSOR ASM

Maintenance Guide

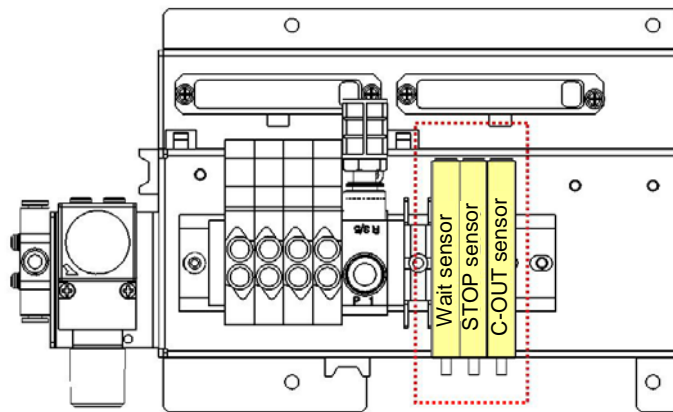


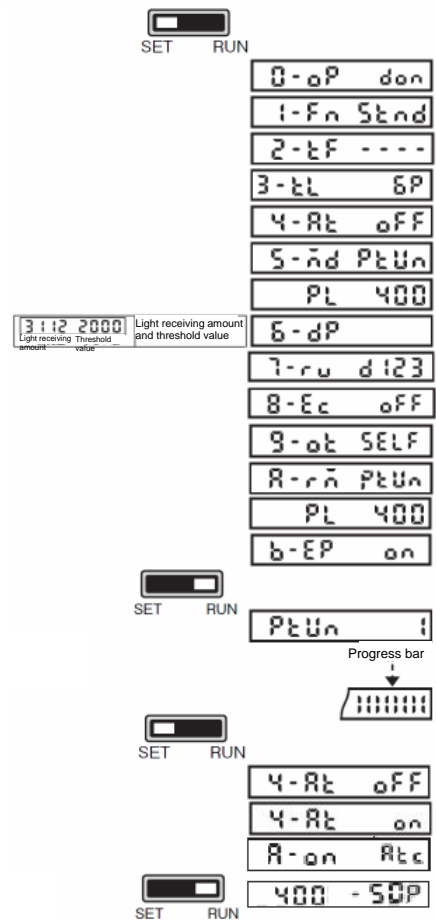
Figure 5-7-3-2-2-2

Maintenance Guide

5-7-3-2-3. Adjusting the Gain of the Amplifier Unit

After the amplifier and fiber have been replaced, follow the steps below to adjust the gain.

- ① Change the switch ⑤ to “SET” and press [MODE].
- ② Press the [UP] or [DOWN] button to indicate the display shown on the right. (Dark ON)
- ③ Check that the display shown on the right is indicated. Press the [MODE] button. (Standard mode)
- ④ Check that the display shown on the right is indicated. Press the [MODE] button. (Timer is disabled.)
- ⑤ Check that the display shown on the right is indicated. Press the [MODE] button. (6%)
- ⑥ Check that the display shown on the right is indicated. Press the [MODE] button. (ATC-OFF)
- ⑦ Press the [UP] or [DOWN] button to indicate the display shown on the right. Press the [MODE] button. (Power tuning)
- ⑧ Press the [UP] or [DOWN] button to indicate the display shown on the right. Press the [MODE] button. (400)
- ⑨ Press the [UP] or [DOWN] button to indicate the display shown on the right. Press the [MODE] button.
- ⑩ Check that the display shown on the right is indicated. Press the [MODE] button. (Normal indication)
Check that the display shown on the right is indicated. Press the [MODE] button. (Eco OFF)
Press the [UP] or [DOWN] button to indicate the display shown on the right. Press the [MODE] button. (Self-diagnosis)
Press the [UP] or [DOWN] button to indicate the display shown on the right. Press the [MODE] button. (Power tuning)
Check that the display shown on the right is indicated. Press the [MODE] button. (400)
Check that the display shown on the right is indicated. Press the [MODE] button. (Writing to EEPROM)
Check the settings (correct them as needed). You can repeat the steps from ① to ⑩ with the [MODE] button.



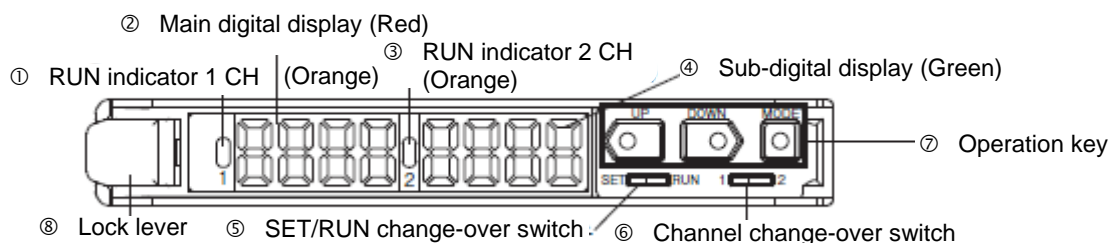
Maintenance Guide

- ⑰ Change to “RUN”. Set the transport width to its maximum level and keep the [MODE] button pressed for 3 sec. or longer.

The progress bar increases as shown on the right. After that, the main digital indicator shows “400”. This value shows a light receiving amount and may include a slight variation.

- ⑱ Change the switch ⑤ to “SET” again. Press [MODE].
 ⑲ Press [MODE] to display the indication shown on the right.
 ⑳ Press the [UP] or [DOWN] button to indicate the display shown on the right. Press the [MODE] button.
 ㉑ Press the [UP] or [DOWN] button to indicate the display shown on the right. Press the [MODE] button.
 ㉒ Change to “RUN”. Press the [UP] or [DOWN] button to set the threshold value (sub-digital indicator) to “-50P”.
 ㉓ Keep [MODE] pressed for 3 sec. or longer.

When the value shown on the sub-digital indicator becomes 50% of the value shown on the main indicator, the setting is then completed.



Maintenance Guide

5-8. Replacing the Stopper Cylinder

- 1) Detach the hexagon nut ④.
- 2) Detach the cylinder fixing screws ②.
- 3) Turn the shaft of the cylinder ① to remove the cylinder from the stopper connector ③.
- 4) When installing a new stopper cylinder, reassemble the components in the order of steps 3) to 1).
 Make sure that the cylinder ① is aligned along the slot on the stopper frame and moves smoothly.
 Also make sure that the distance from the end of the cylinder ① to the end of the stopper connector ③ is as shown in the figure below.
- 5) Adjust the opening of the speed controller.

Open the speed controller on the A side (i.e. that attached to the cylinder) one turn from the fully closed position.
 Open the speed controller on the B side two and a half turns from the fully closed position.
- 6) After the components have been reassembled, supply air (0.50 MPa) to check that the stopper cylinder moves smoothly.

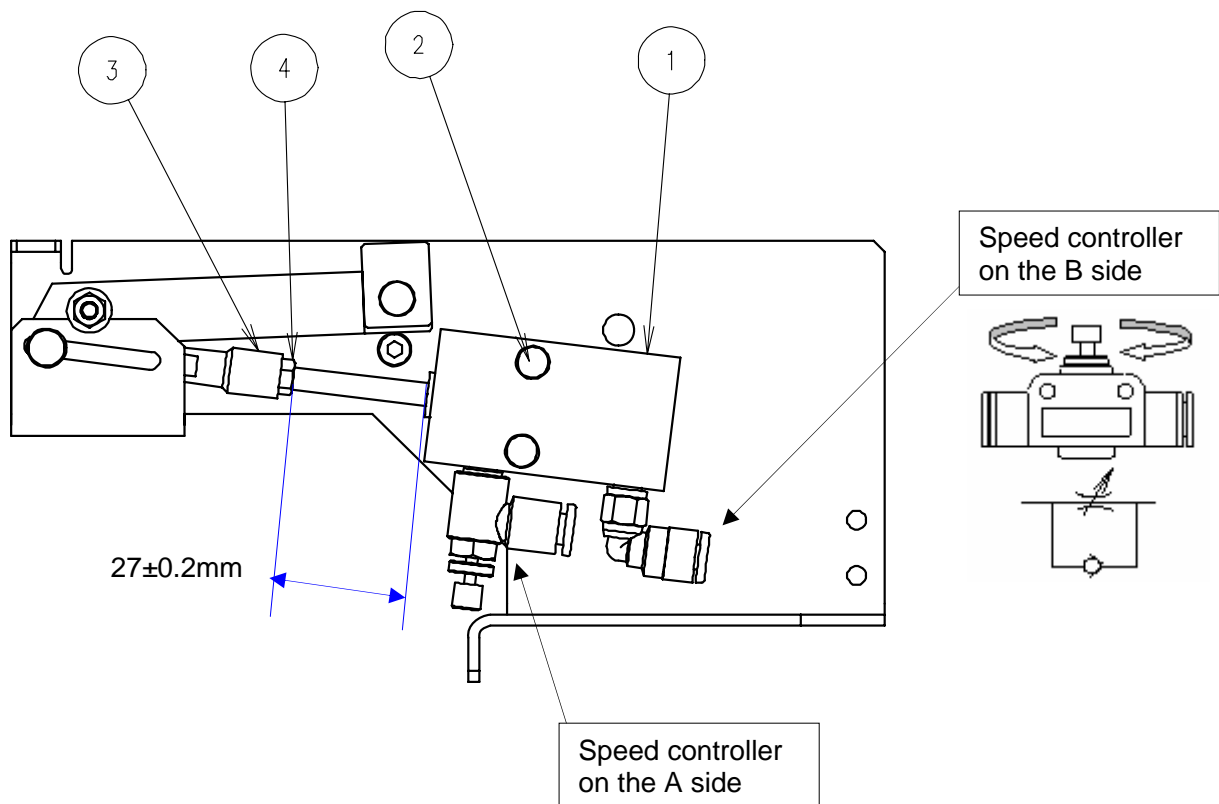


Figure 5-8-1

Maintenance Guide

5-9. Replacing the Support Table Home Position Sensor (BU Home Position Sensor)

- 1) Detach the sensor from the sensor bracket.
- 2) Adjust the distance between the sensor and sensor dog to 1 mm.

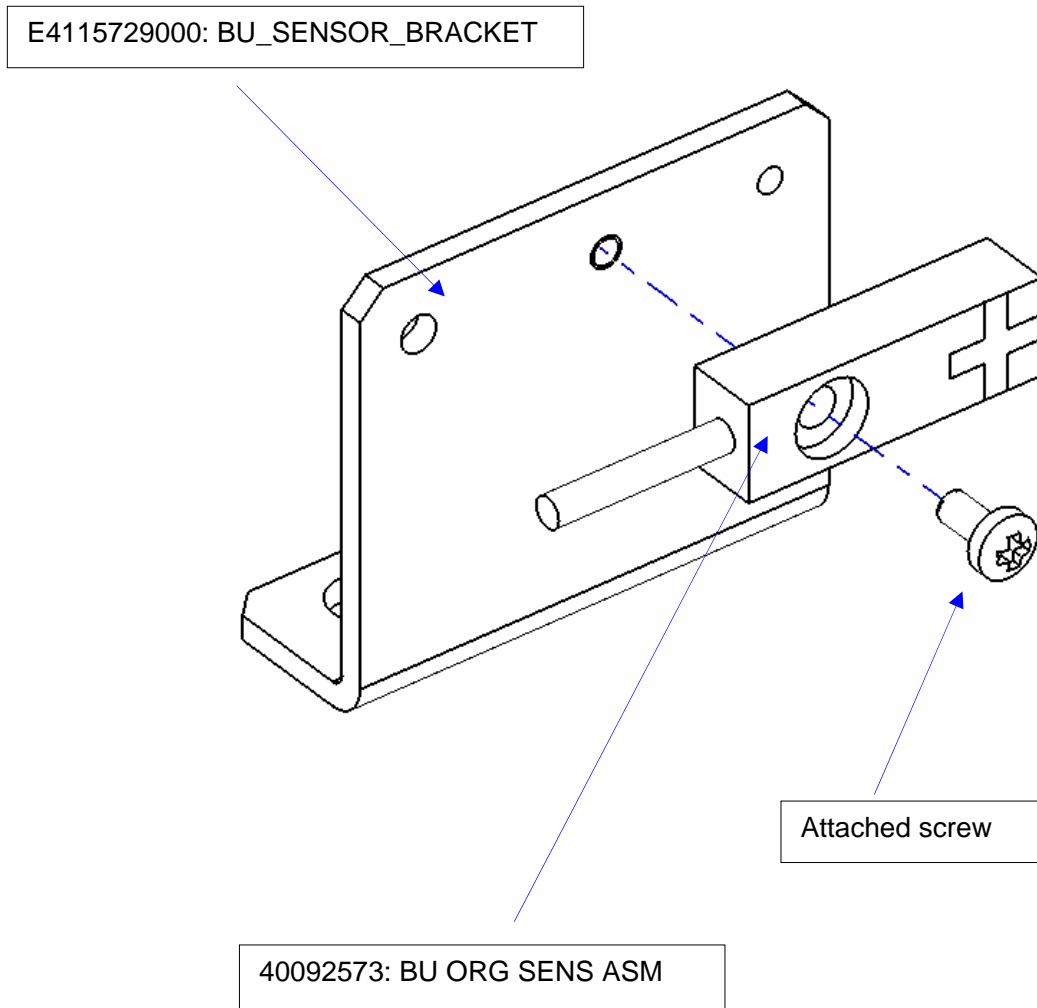


Figure 5-9-1 BU Home Position Sensor

Maintenance Guide

5-10. Replacing the T-PIN Sensor (Optional)

- 1) Remove the adjustment screw to detach the sensor bracket and replace the sensor.
When reassembling the components, adjust the position of the sensor bracket by loosening the adjustment screw and moving the sensor bracket up and down so that the T-PIN sensor is turned ON when the center ring pin is lowered by $1.5_{-0.5}^0$ mm. (Dimension A in the Figure below)
- 2) Carefully handle the cables.

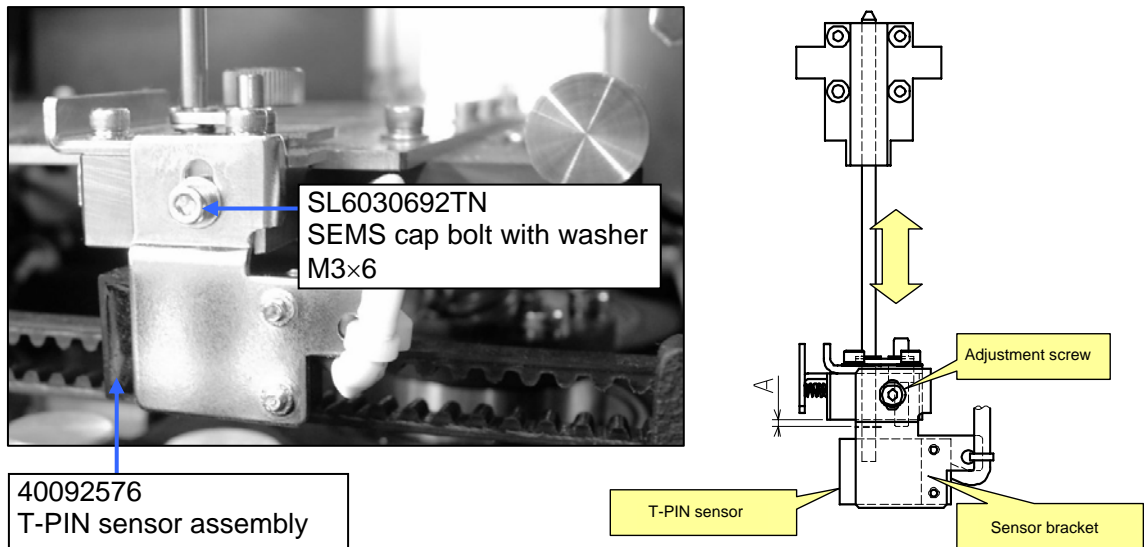


Figure 5-10-1 T-PIN Sensor

Maintenance Guide

5-11. Replacing the Pusher Y Cylinder (Outer Shape Reference)

- 1) Detach the part ② or ③ from the cylinder ①.
- 2) Loosen the nut (accessory) of the cylinder ① to detach it from the part ④.
- 3) Loosen the nut ⑥ (accessory) to detach the pusher B ⑤ from the top of the cylinder ①.

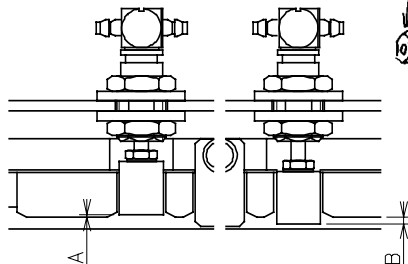
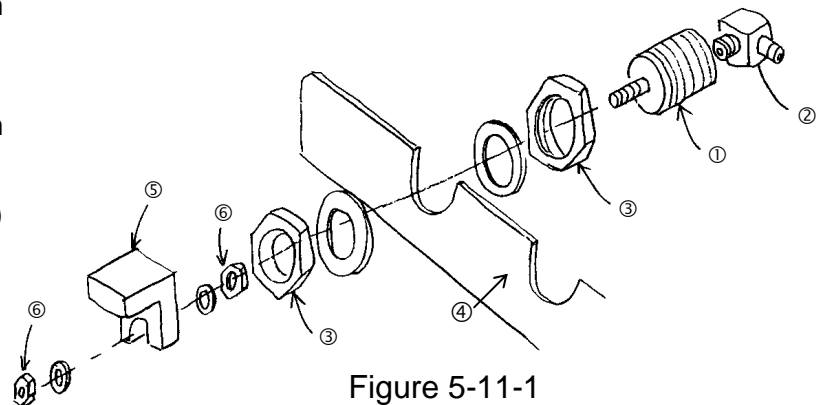


Figure 5-11-2

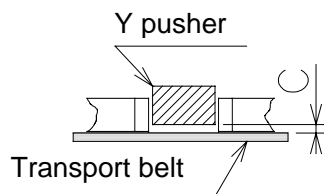


Figure 5-11-3

- 4) Reassemble the components in the reverse order of steps 1) to 3). When installing a new pusher Y cylinder, check and adjust as described below.

- ① Adjust so that the distance B is $1.5 \text{ mm} \pm 0.1 \text{ mm}$ when the Y pusher is ON (extruded) and distance A is $-0.5 \text{ mm} \pm 0.1 \text{ mm}$ when the Y pusher is OFF (not extruded). (See Figure 5-11-2.)
- ② Adjust so that the gap C between the Y pusher and transport belt is 0.2 mm minimum.

After the cylinder components have been assembled, supply the air (0.5 MPa) to check that the cylinder moves smoothly.

- ③ Adjust so that the pressure reducing valve is 0.5 MPa and the speed controller is opened two turns from the fully closed position.

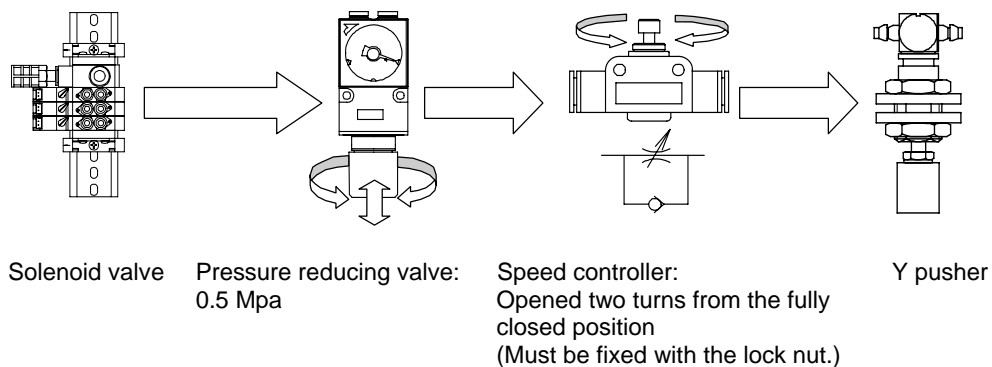


Figure 5-11-4

- ④ After the components have been reassembled, supply air (0.5 MPa) and check that the pusher operates smoothly when the air is turned ON and OFF.

Maintenance Guide

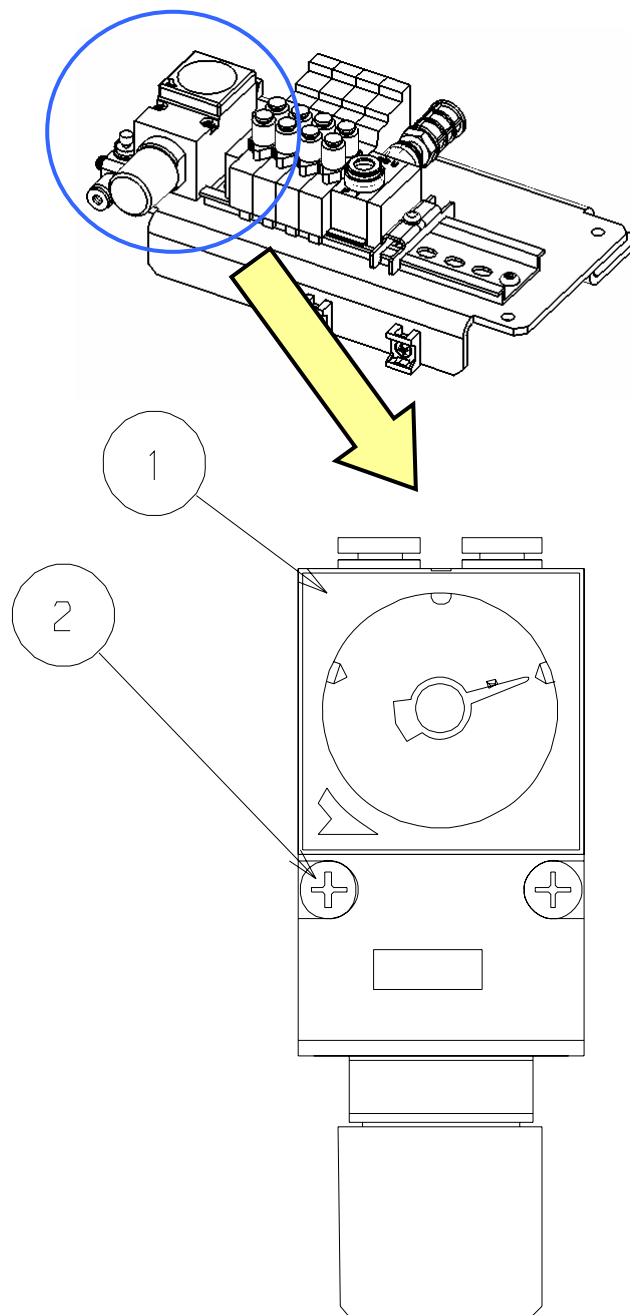
5-12. Replacing the Pressure Reducing Valve

Disconnect the piping tube and remove the mounting screw (SL6041092TN) ② and replace the pressure reducing valve ① with a new one.

Pressure must be adjusted as follow.

Y pusher: 0.50 MPa (± 0.05 MPa)

- * Before starting the production, change and/or adjust the pusher pressure according to the PWB thickness.



Maintenance Guide

5-13. Replacing the Centering Pin (Option)

- 1) Loosen the screws ② and ③ of the guide block A to detach the centering pin together with the guide block.

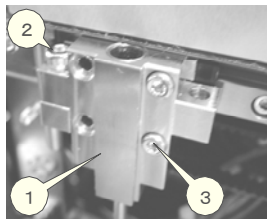


Figure 5-13-1

- 2) At this time, also detach the T-PIN sensor (together with its bracket) from the reference side.

Removing the E ring ⑫ allows you to pull the centering pin ⑰ from the damper block.

Removing the E rings ⑯ (two in total, top and bottom) allows you to remove the centering pin ⑰.

When installing a new centering pin, reassemble the components in the reverse order. The E-rings must also be replaced with new ones.

After the components have been reassembled, adjust the sensor position in the same manner as described in 5-10, Replacing the T-PIN Sensor.

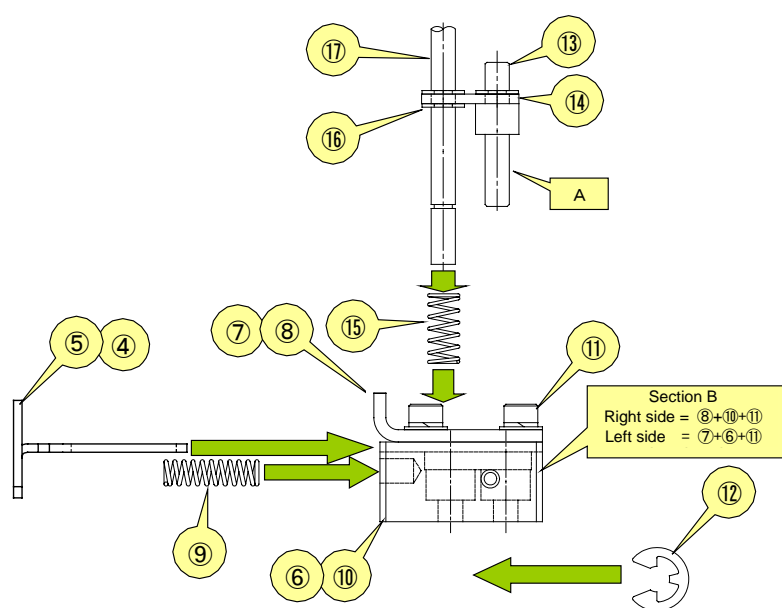


Figure 5-13-2

	Part No.	Part name		Part No.	Part name
1	40000886	GUIDE_BLOCK_ASM	10	L179E721000	DAMPER_BLOCK_R
2	40000887	GUIDE_BLOCK_A_ASM	11	SL6030892TN	SCREW
3	40000889	GUIDE_BLOCK_B_ASM	12	RE0300000K0	E-RING
4	40000891	STOPER_SLIDE_LEVER_L	13	40000896	DAMPER_LOCK_PIN
5	40000897	STOPER_SLIDE_LEVER_R	14	40000978	DAMPER_LOCK_LINK
6	L179E621000	DAMPER_BLOCK_L	15	40000950	DAMPER_SPRING
7	40015791	DAMPER_PLATE_L	16	RE0300000K0	E-RING
8	40015792	DAMPER_PLATE_R	17	—	CENTERING_PIN
9	40015793	LOCK_SPRING	18		

Maintenance Guide

5-14. Replacing the Support Table Motor (BU Motor)

- 1) Remove the support table as described below.
 1. Stretch the transport width as much as possible.
 2. Remove the support table setscrews ② (15 pcs.) to detach the support table ①.

* When handling the ball screw, do not pull out the shaft. Doing so may cause internal balls to fall down and the shaft to be no longer used.

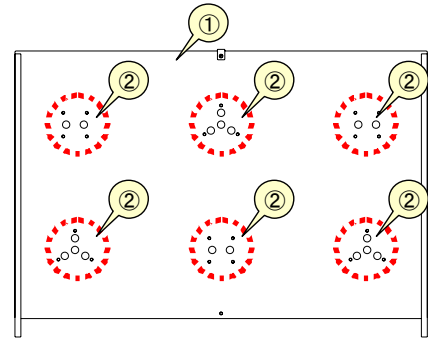


Figure 5-14-1

- 2) Loosen the encoder assembly setscrew ③ and move the encoder assembly in the direction indicated by an arrow mark to loosen the tension of the timing belt for driving of the support table ball screw.

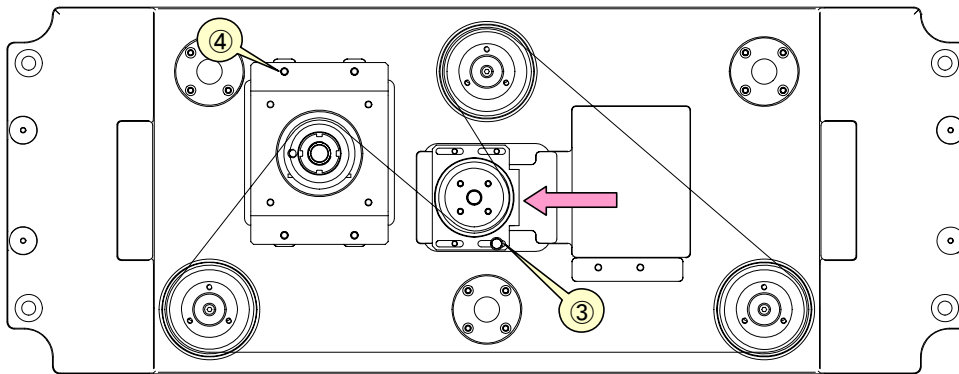


Figure 5-14-2

- 3) Loosen the setscrew ④ to take out the support table assembly together with the torque support assembly.
- 4) Remove the motor fixing screw ⑤ to detach the motor from the bracket.
- 5) Loosen the setscrew ⑥ to detach the torque supporter assembly from the motor shaft.
- 6) When installing a new BU motor, reassemble the components in the order of steps 4) to 1). Perform the following when reassembling.

Adjust the gap between the torque supporter and support table motor.

Adjust the tension of the support table driving timing belt.

Place the support table surface horizontally.

Obtain the support table offset.

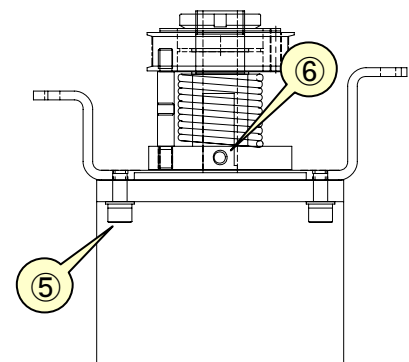


Figure 5-14-3

Maintenance Guide

5-14-1. Adjusting the Gap between Torque Supporter and Support Motor

The gap between the torque supporter and support table motor must be adjusted to 1.1 mm.

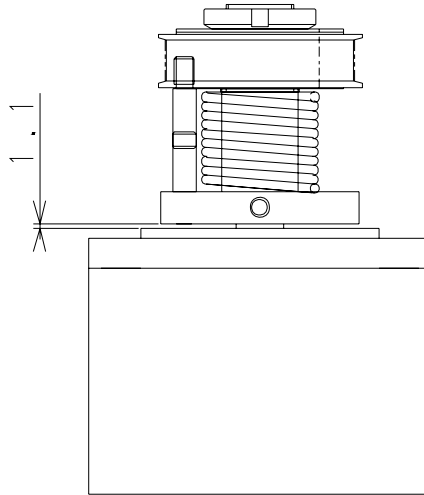


Figure 5-14-1-1 Motor and Torque Supporter

Maintenance Guide

5-14-2. Adjusting the Tension of the Support Table Driving Timing Belt

To adjust the tension of the support table driving timing belt, loosen the fixing screw of the encoder assembly ① and move the assembly in the arrow direction, input the said values to the sonic belt tension meter (manufactured by UNITTA), measure the tension at the locations shown below, and then adjust the tension within the required range.

Values to be input to the sonic belt tension meter	Weight = 2.5
	Width = 9.0
	Span = 261
Required range	45N ± 5N

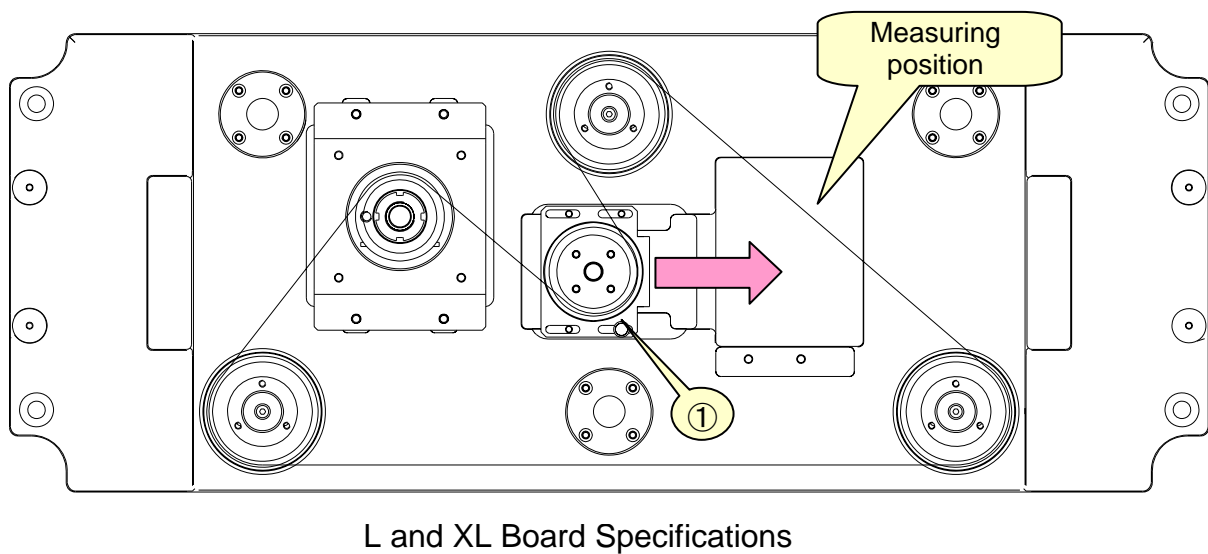
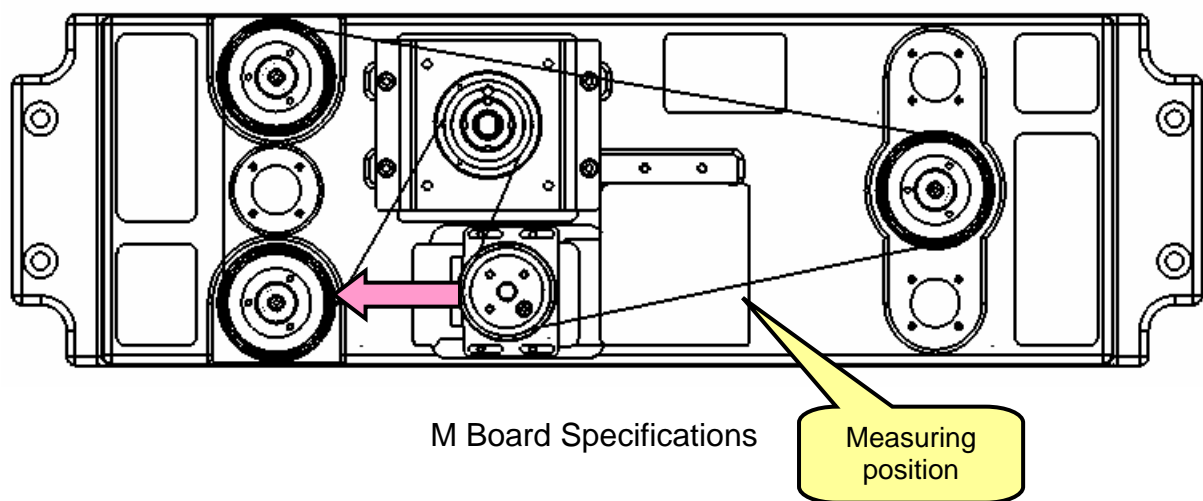


Figure 5-14-2-1

Maintenance Guide

5-14-3. Placing the Support Table Surface Horizontally

To check flatness of the support table, attach a lever dial to the head's OCC camera bracket and measure flatness near the center of each area circled in the figure below. Adjust the height of the table so that the difference in flatness at the three positions is within 0.02 mm.

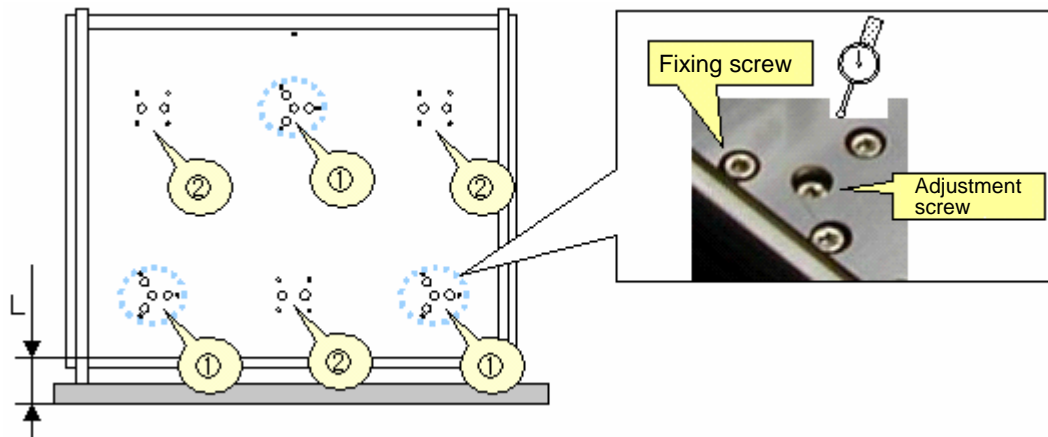


Figure 5-14-3-1 Measurement Locations and Adjustment Screw

<Adjustment Procedure>

- 1) Secure the support table at the part ① temporarily. Tighten the screws so that the ball screw does not rotate as the table is raised. At this time, assemble the support table so that the dimension L is as follows.

Front reference:	27.0 mm ± 0.5 mm
Rear reference:	21.9 mm ± 0.5 mm
 - 2) Select [Manual Control] → [Transport Control] to set the support table to a position of -27mm.
 - 3) Based on the lowest point of three measured points, turn the adjustment screw in the down direction (screw tightening direction) to make the adjustment so that the difference among three measured points is 0.02mm or less.
- * If all of three screws (screws around the adjustment screws) fixing the ball screw are loosened, the table may be lowered. To prevent such trouble, always tighten the screws temporarily after the adjustment with the adjustment screws has been completed.
 - * After the adjustment has been completed, make sure that the center of the rail guide shaft is aligned with that of the side beam. (A-dimension is 1mm±0.5.)

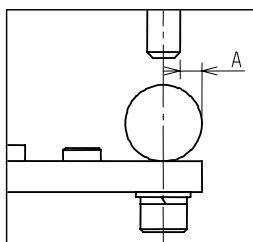


Figure 5-14-3-2 Rail Guide Shaft and Side Beam

Maintenance Guide

5-15. Replacing the Support Table Encoder

- 1) Detach the support table in the same manner as described in section 5-13, Replacing the Support Table Motor.
- 2) Loosen the setscrew ① and move the encoder assembly in the direction indicated by an arrow mark to loosen the tension of the timing belt.
- 3) Detach the timing belt to take out the encoder assembly.
- 4) Loosen the screw supplied with the encoder (hollow setscrew ③) and the setscrew ④ to detach the encoder ⑤.
- 5) Reassemble the components in the order of 3) to 1).

Adjust the flatness of the support table as described in 5-15 “Replacing the Support Table Motor.” After the components have been reassembled, obtain the support table offset from MS parameters.

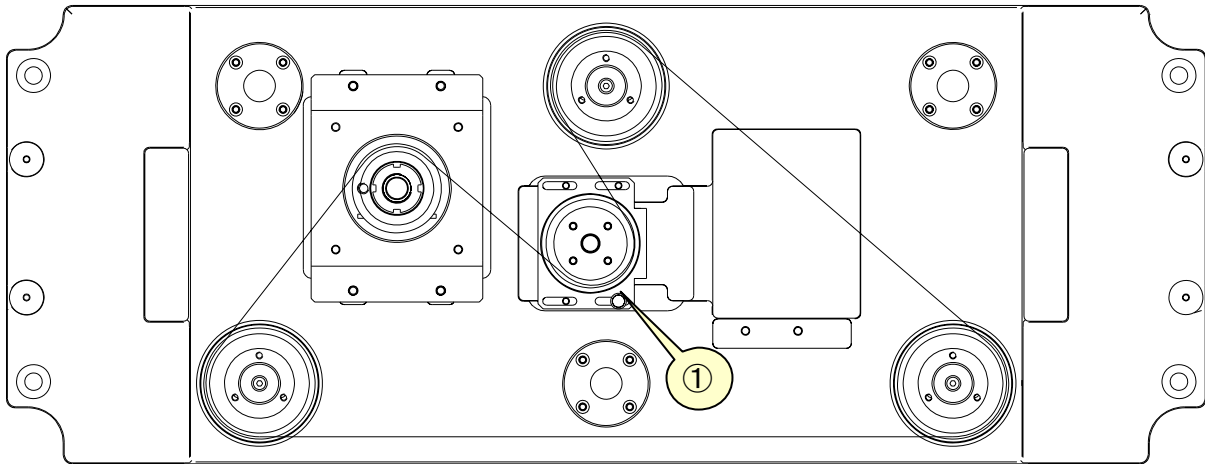


Figure 5-15-1 Conveyor Base Assembly

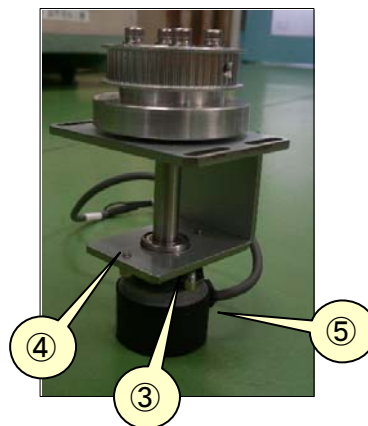


Figure 5-15-2 BU ENC Assembly

Maintenance Guide

5-16. Replacing the Backup Stopper (for EN Type Only)

- 1) Crosswise position of the BU stopper must be adjusted so that the distance A shown in the figure is 5 mm when the air is ON and the BU stopper (rubber area) is in contact with the peripheral surface of the ball screw flange.
- 2) With the cylinder pushed in, move the BU stopper's lock sensor in "B" direction . After the LED lights up, further move the sensor 1 mm and then fix the sensor.
 - * Make sure that the LED lights up as the cylinder moves.
- 3) Adjust the speed controller. Turn the controller three turns back from the fully closed position, and secure it.

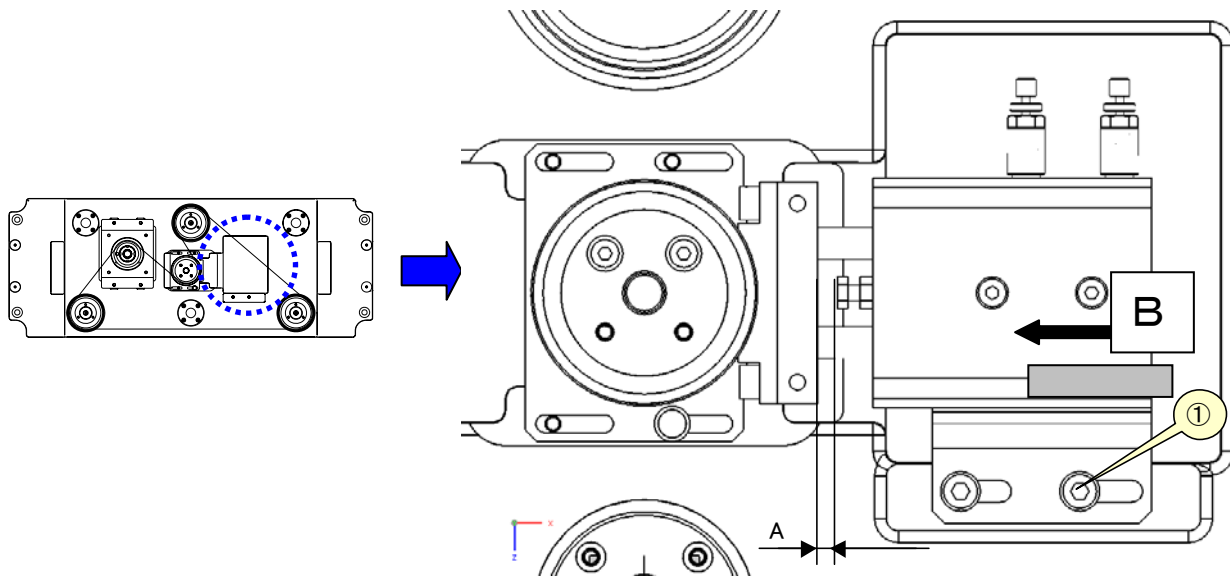


Figure 5-16-1 Backup Stopper

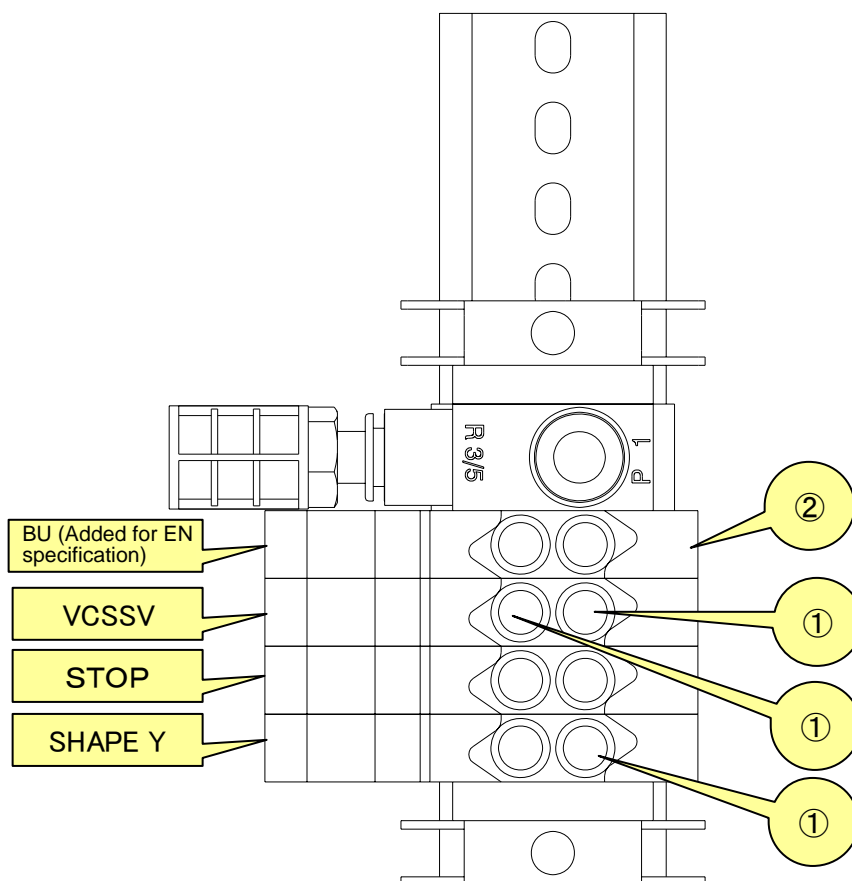
<Adjustment Method>

- 1) With air ON, loosen the screw on the BU stopper bracket ⑥. Loosen the air cylinder fixing screw ④, and adjust the position of the air cylinder so that the BU stopper ① (rubber area) is the same height as the flange's peripheral surface.
- 2) Loosen the BU lock sensor fixing screw ⑦ and adjust the sensor position within the required range.
- 3) Loosen the lock nut of the speed controller ⑧, fully close the controller, turn it back the specified number of turns, and then secure it with the lock nut.

Maintenance Guide

5-17. Solenoid Valve

In the case of EN type, a solenoid valve (PV150209000) is provided in addition to those provided as the standard specifications.



No.	Part No.	Part name
①	PV150209300	5-PORT SOLENOID VALVE
	PV150209000	5-PORT SOLENOID VALVE

Maintenance Guide

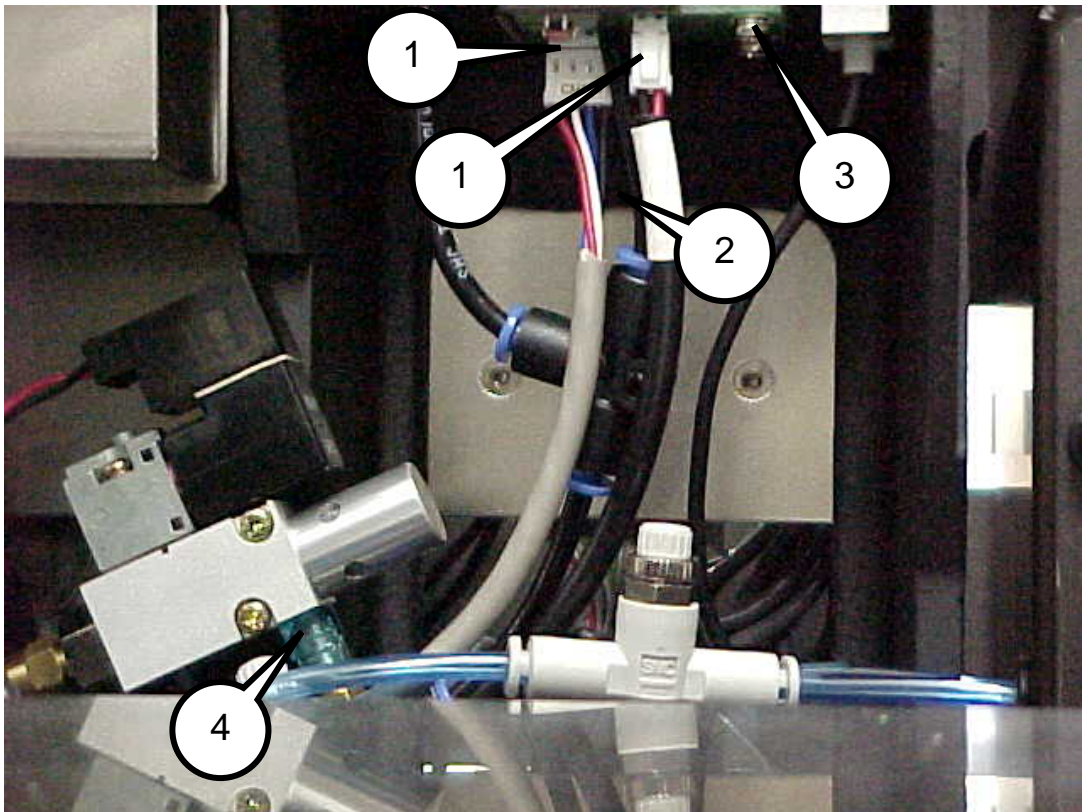
**DANGER**

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

[6] CAL BLOCK

6-1. Replacing the CAL Block Board Assembly

- 1) Disconnect two bounded cables ① from the board.
- 2) Disconnect the $\phi 4$ air tube ② from the elbow union.
- 3) Remove the four M3 SEMS bolts ③, pull the board downward from the CAL side cover, and remove it from the $\phi 4$ air tube. The CAL block board assembly can then be detached.
- 4) After the board has been replaced, reassemble the components in the reverse order.



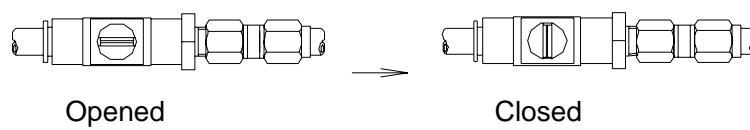
When replacing the filter ④, it is not necessary to turn off the air.

Part No.: 40000641 Part name: Filter

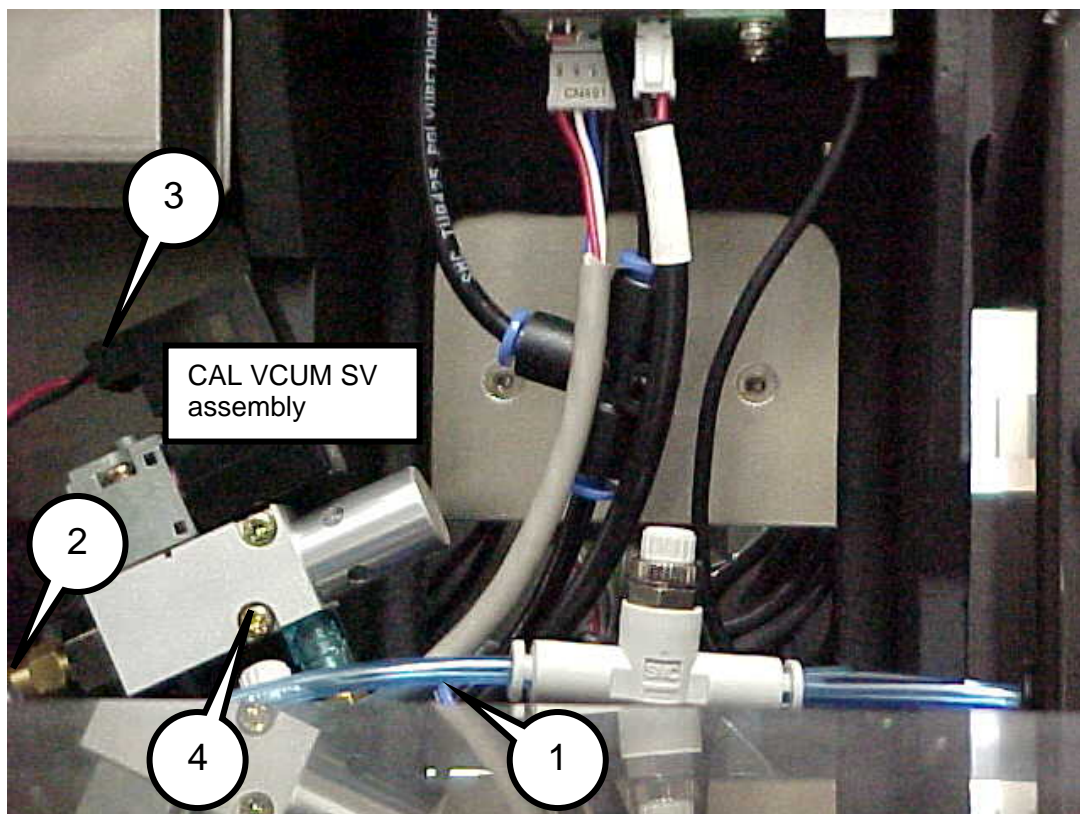
Maintenance Guide

6-2. Replacing the Ejector

- 1) Close the hand valve at the lower left portion of this main unit.
- 2) Disconnect the $\phi 4$ air tube ① and $\phi 6$ air tube ②.
- 3) Disconnect the cable ③ of the CAL VCUM SV assembly.
- 4) Remove the mounting screws ④ (2 pcs.) and replace the CAL VCUM SV assembly.
- 5) Reassemble the components in the reverse order of disassembly.



Shut down the air supply.

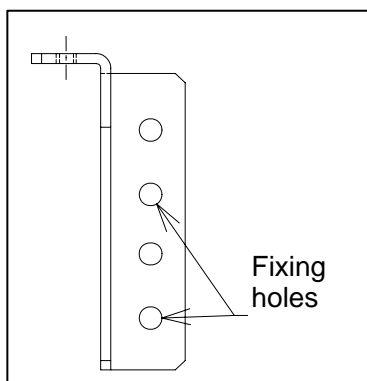
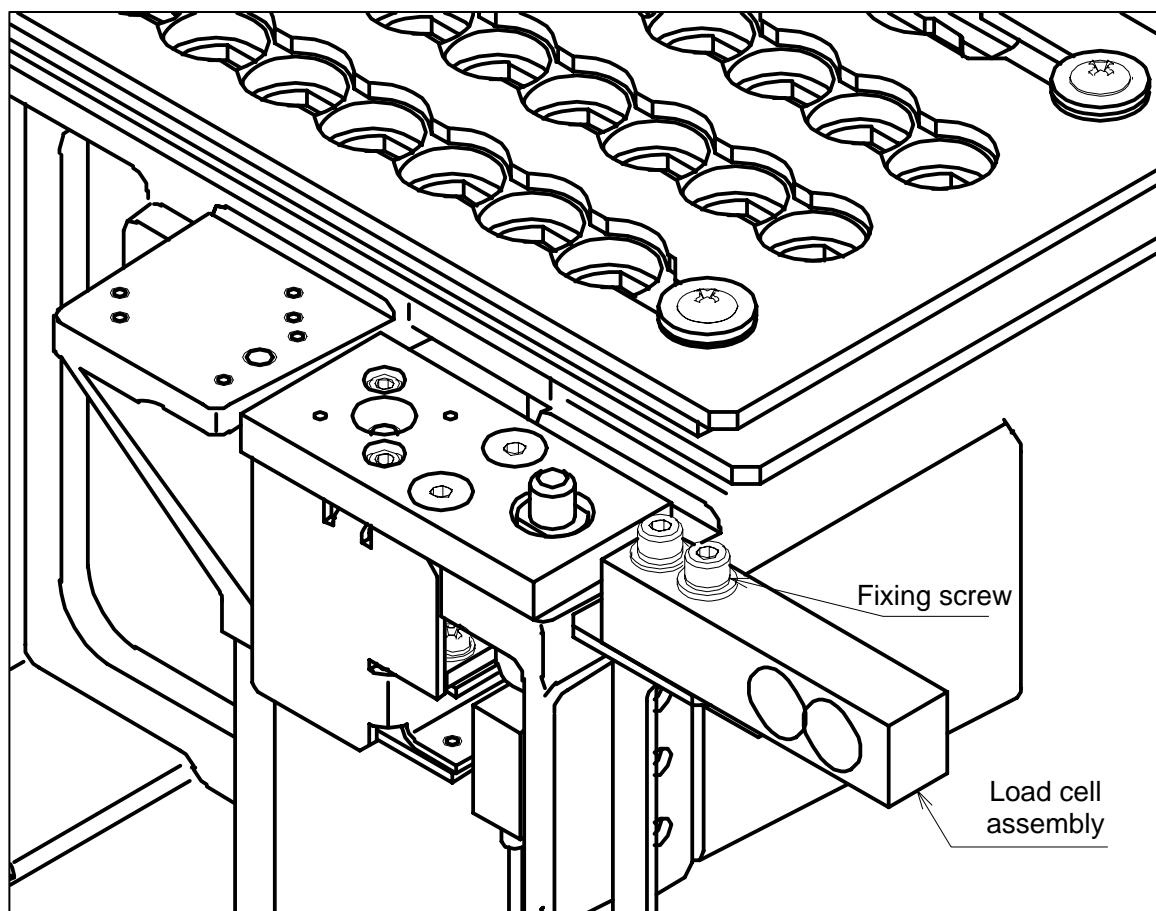


Maintenance Guide

6-3. Replacing the Load Cell

- 1) Disconnect the bundled cables from the load cell amplifier.
- 2) Remove the fixing screws (2 pcs.) to detach the load cell assembly.
- 3) When mounting a new load cell, reassemble the components in the reverse order of disassembly.

* After the load cell has been replaced, obtain the load cell assembling position and height of the MS parameter again.



Maintenance Guide

**DANGER**

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

[7] ATC

After the ATC base has been replaced, it is necessary to obtain "ATC Offset" of the MS parameters again. (See also section 4-7, in MS parameters.)

7-1. Replacing the Air Cylinder

- 1) Close the hand valve at the lower left portion of the main unit.
- 2) Remove the ATC joint and Hexagon socket head cap screw to detach the air cylinder. (At this time, disconnect the $\phi 4$ air tube.)
- 3) Mount the speed controller on a new air cylinder.

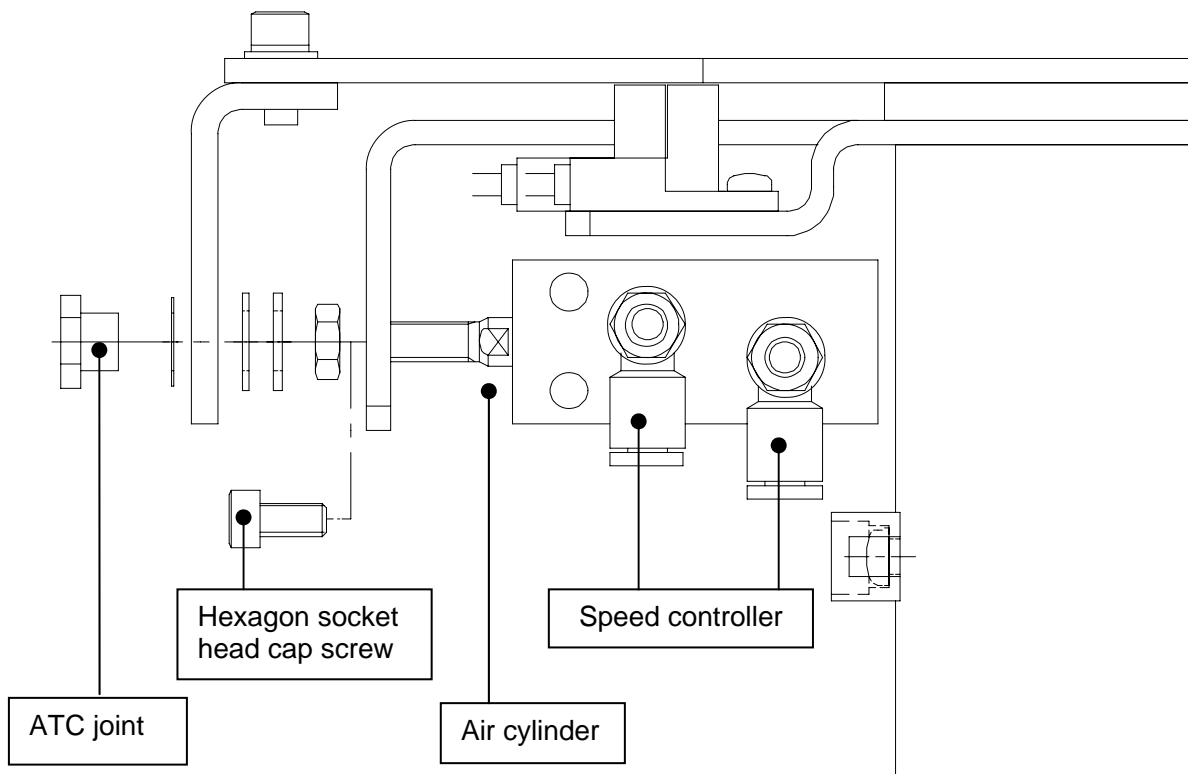


Figure 7-1-1 Replacing the Air Cylinder

Maintenance Guide

- 4) Adjust the air cylinder rod fixing position.
With the slide plate open, visually adjust the position so that the hole on the ATC base matches the center of the arc of the slide plate, then fit the nut supplied with the ATC cylinder to the ATC joint.
At this time, apply Loctite 242 to the screw threads of the ATC joint.

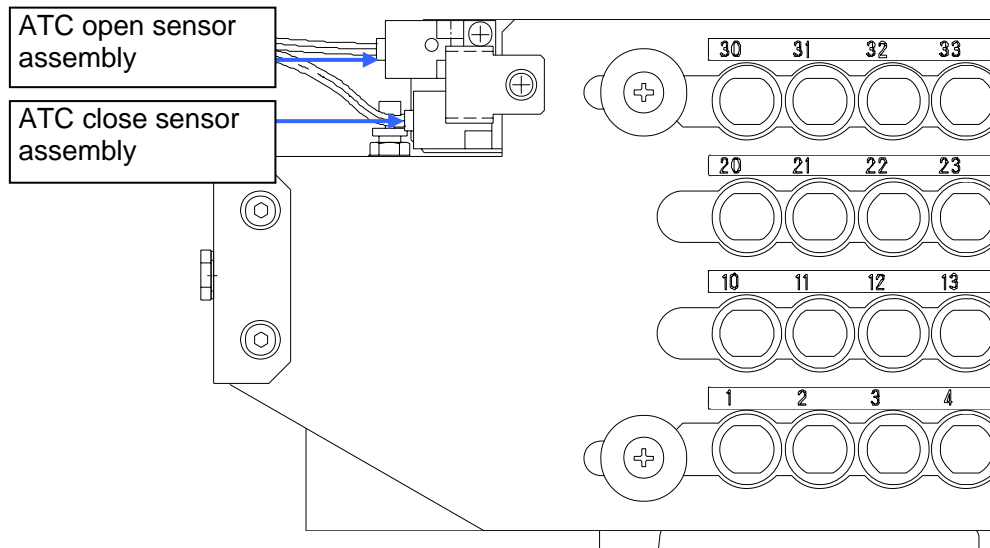


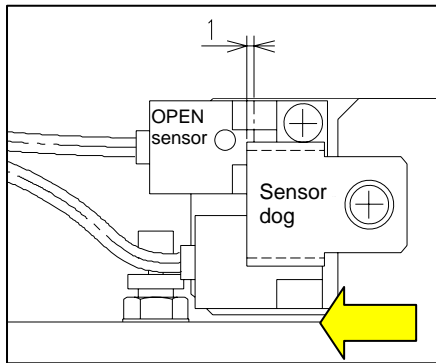
Figure 7-1-2 Adjustment Position when Fixed

Maintenance Guide

5) Adjust the sensor dog position

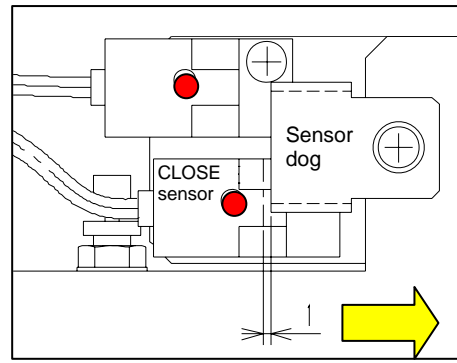
When opened: Open the slide plate and secure the dog at a position where the dog is further moved 1mm after the LED goes off.

When closed: Close the plate. The plate must be stopped at a position where it is further moved 1mm after the LED is lit.



The sensor dog is further moved 1mm left after the LED goes off.

Figure 7-1-3 When Opened



The sensor dog is further moved 1mm right after the LED lights up.

Figure 7-1-4 When Closed

6) Connect a $\phi 4$ air tube.

Refer to the figure below, and connect the speed controller to the solenoid valve with an air tube ($\phi 4$).

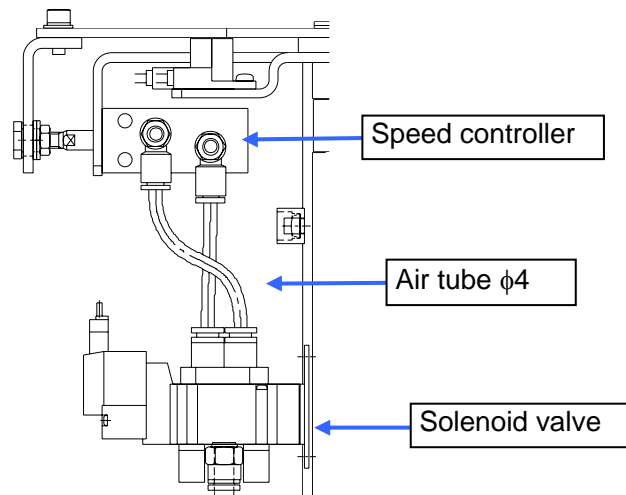


Figure 7-1-5 Air Piping and Speed Controller Positions

Maintenance Guide

7-2. Replacing the ATC OPEN and CLOSE Sensors

- 1) Detach the sensor dog, and cut and remove the tie-up bands from the fixing base on the side of the ATC base.
- 2) Replace the ATC OPEN or CLOSE sensor assembly.
- 3) Secure the cables to the fixing base with the tie-up bands and assemble the sensor dog.

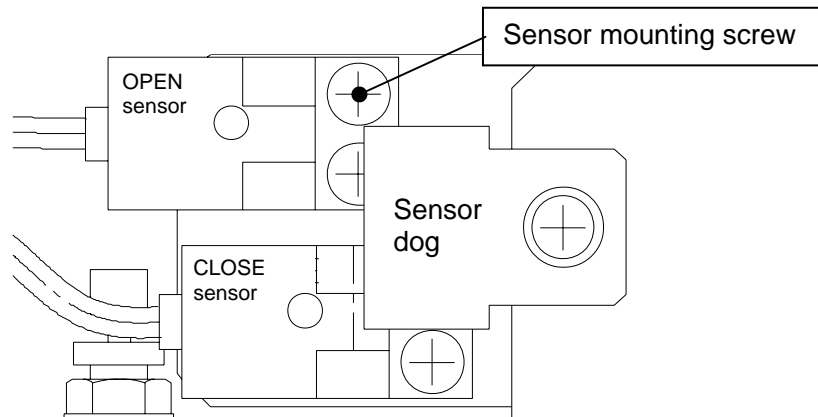


Figure 7-2-1 OPEN/CLOSE Sensors

7-3. Adjusting the Speed Controller

- 1) Rotate the knob of the speed controller to adjust the opening/closing time of the slide plate to the standard adjustment value.
(As a guide, rotate the knob about two and a half turns from the fully closed position.)
- 2) After adjustment, fix the knob.
Check the slide plate opening/closing time on the Manual Control screen.

Standard value: Slide plate opening/closing time 80 ± 5 msec.

Maintenance Guide

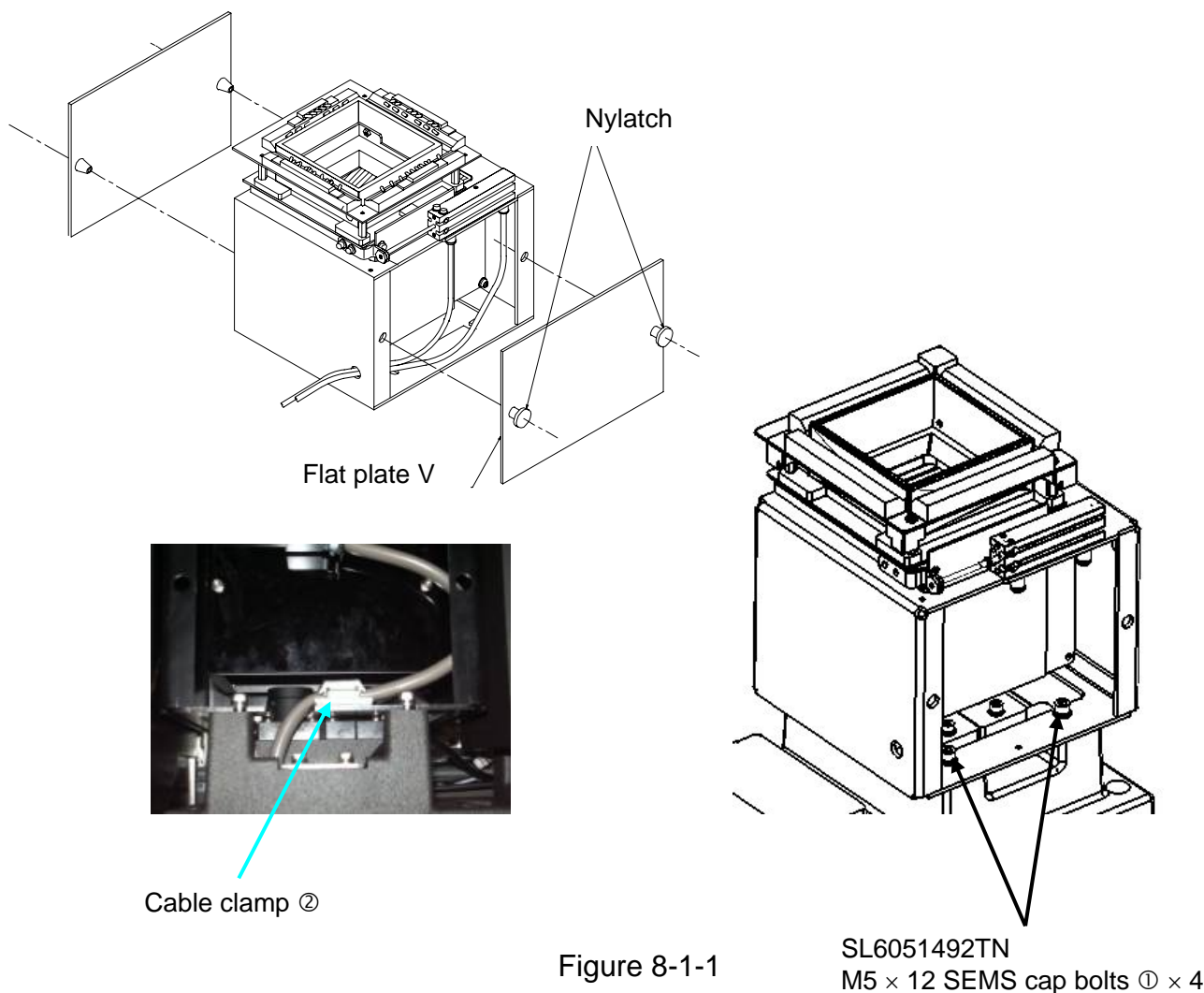
**DANGER**

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

[8] VCS

8-1. Replacing the CCD Camera Lens (Replace the CCD Camera and Lens as S-VCS Camera Assembly.)

- 1) Remove the nylatches of the light unit cover to detach the front and rear flat plate V.
- 2) Remove the cable clamp ② on the rear to disconnect the power cable connector of the light unit.
Additionally, if the machine is equipped with the optional VCS, disconnect the piping of the change-over air cylinder, as well as the connector of the change-over sensor.
- 3) Remove the light unit set bolts ① (4 locations) to detach the light unit.



Maintenance Guide

- 4) When the light unit is detached, the camera can be seen. Remove three M4×20 SEMS cap bolts (SL6042092TN) to detach the camera.

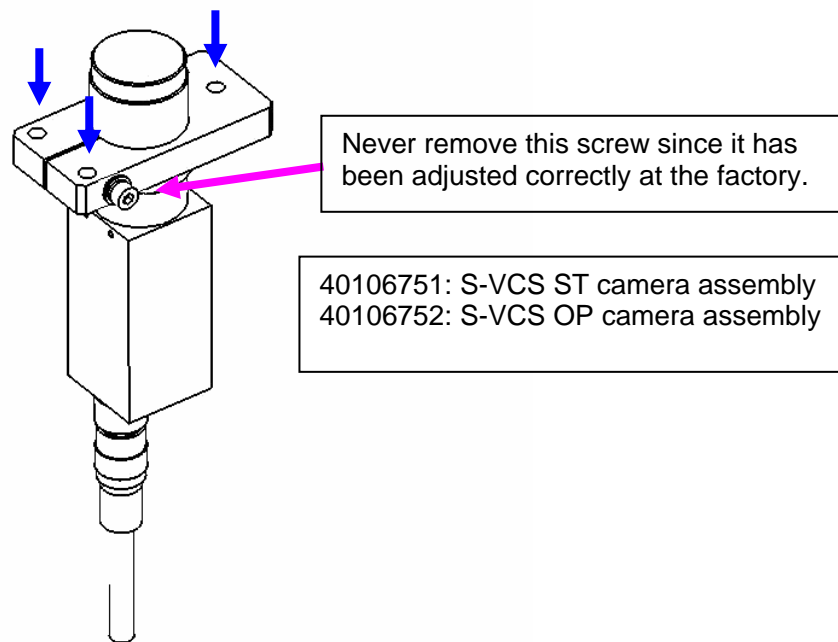


Figure 8-1-2

- 5) Clean the camera mounting surface with alcohol.
- 6) In the reverse order of steps described above, return a new camera and light unit to their original positions.
- 7) When inserting the camera cable, insert it with the \triangle mark on the connector faced toward the front.

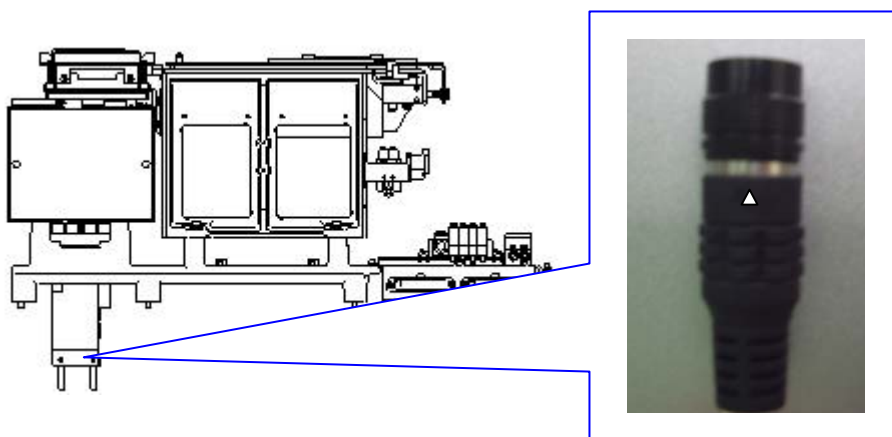


Figure 8-1-3

Maintenance Guide

8-2. Replacing the Standard S-VCS → Optional S-VCS Switching Cylinder

- 1) Close the finger valve to shut down supply of air to the machine.
- 2) Disconnect the air tubes ① and detach the VCS sensor assemblies (see Figure 8-2-1).
- 3) Replace the cylinders with new ones (see Figure 8-2-2). Assemble the components so that there is no tendency for any load to be exerted on the cylinders.

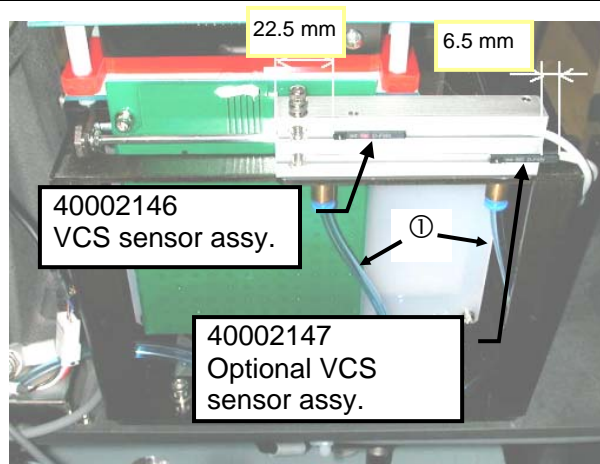


Figure 8-2-1

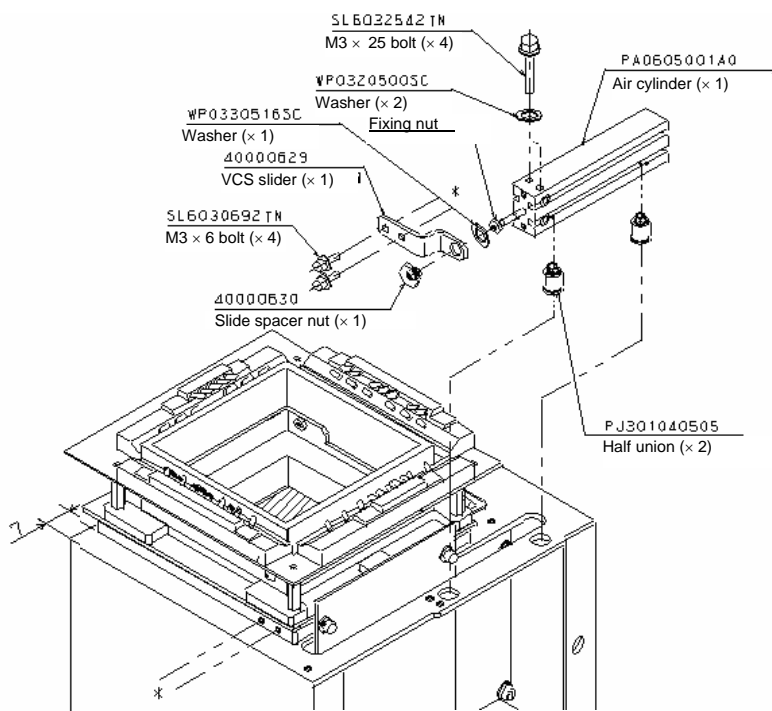


Figure 8-2-2

<How to adjust the air cylinder>

- 1) Assemble the VCS sensor (or the optional VCS sensor) so that the distance between the left end surface of the air cylinder and the front end surface of the sensor is 22.5 mm (or the rear end surface of the sensor protrudes from the right end surface of the air cylinder by 6.5 mm) (see Figure 8-2-1). After assembling, check to make sure that the sensor performs detection correctly.
- 2) Adjust the air cylinder so that the slide unit falls at the position of 7 mm when the cylinder is most stretched. (See Figure 8-2-2.)
After the speed controller has been replaced, make the adjustment so that the VCS is switched at 500 mm/s (reference).

Maintenance Guide

8-3. Replacing the Light Boards

8-3-1. Transmission Light Board, Coaxial Light Board

- 1) In the case of the coaxial light board, detach the cylinder, remove the bolts ① and then replace the board.
 - 2) In the case of the transmission light board, remove the SEMS bolts ② and then replace the board.
- After the board has been replaced, make sure the cables are reconnected.

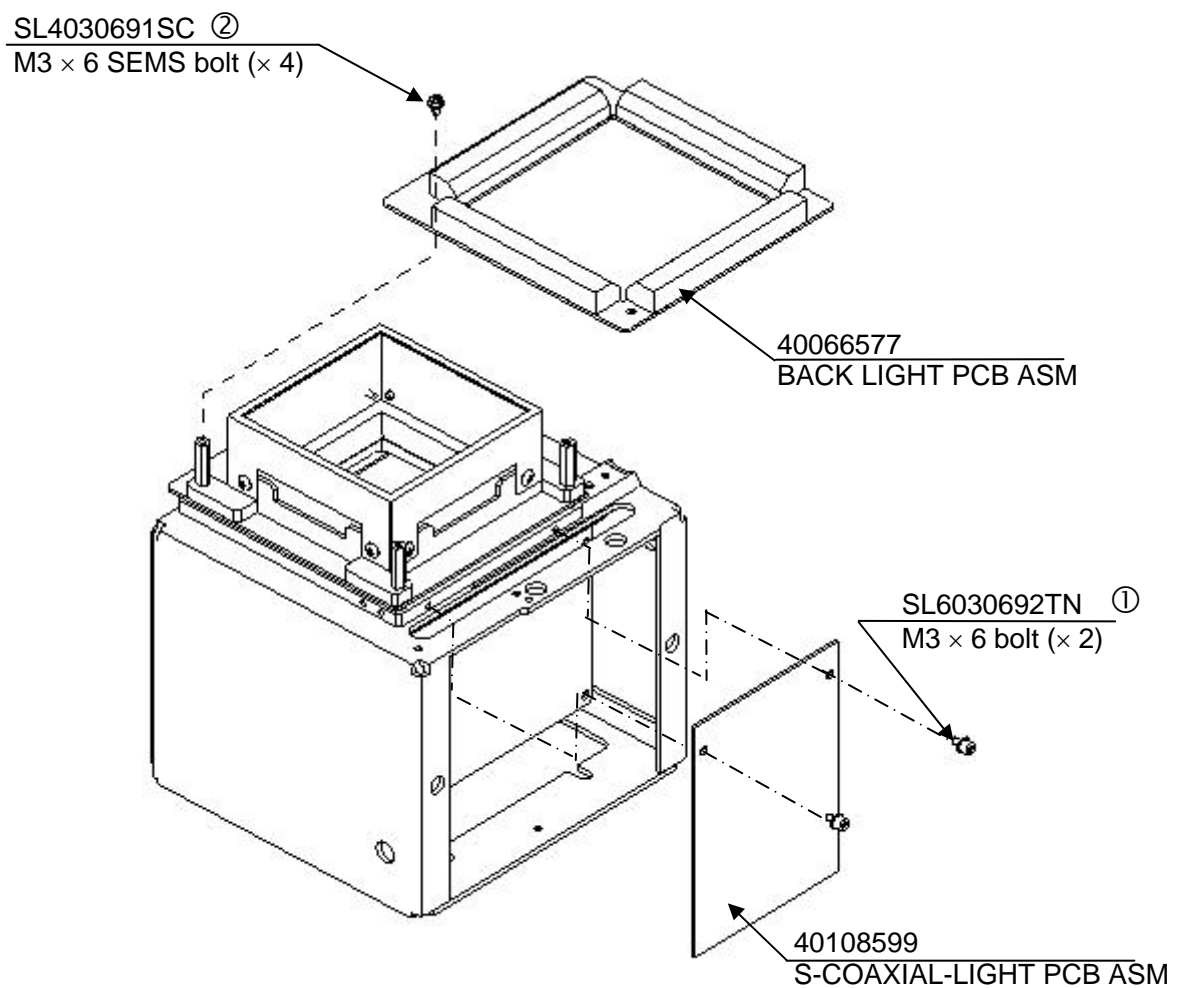


Figure 8-3-1

Maintenance Guide

8-3-2. Downward Light Board, Side Light Board

- 1) In the case of the side light board, remove the SEMS bolts ① and then replace the board.
- 2) In the case of the downward light board, remove the side light board first, detach the light studs ② and then replace the board.

After the board has been replaced, make sure the cables are reconnected.

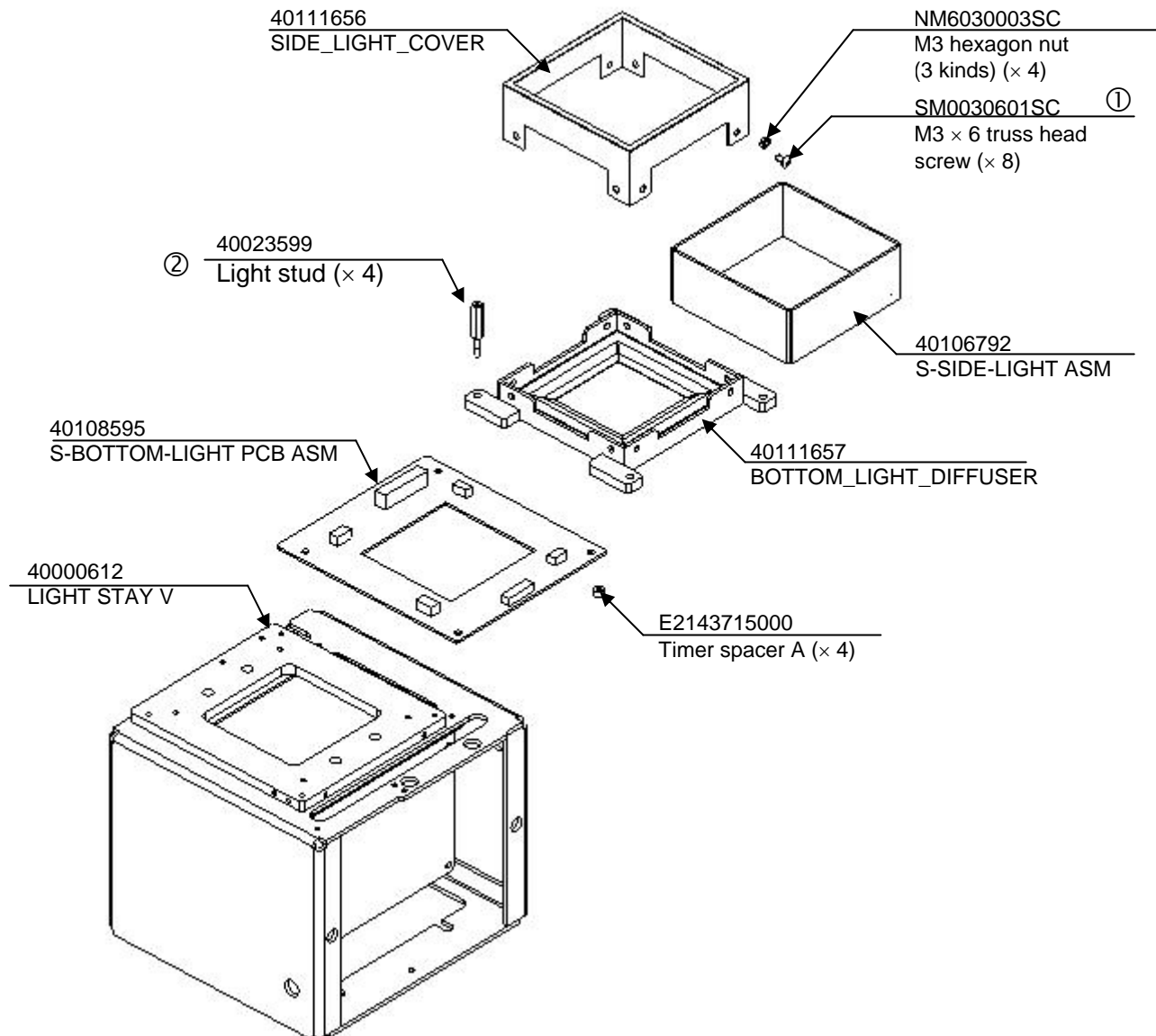


Figure 8-3-2

Maintenance Guide

**DANGER**

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

[9] FEEDER BANK AND REPLACEMENT TABLE (OPTIONAL)

9-1. Common Parts and Units for Mechanical Feeder and Electric Feeder

- Overall Drawing (Electric and Mechanical Replacement Table Specifications) (M and L Specifications)

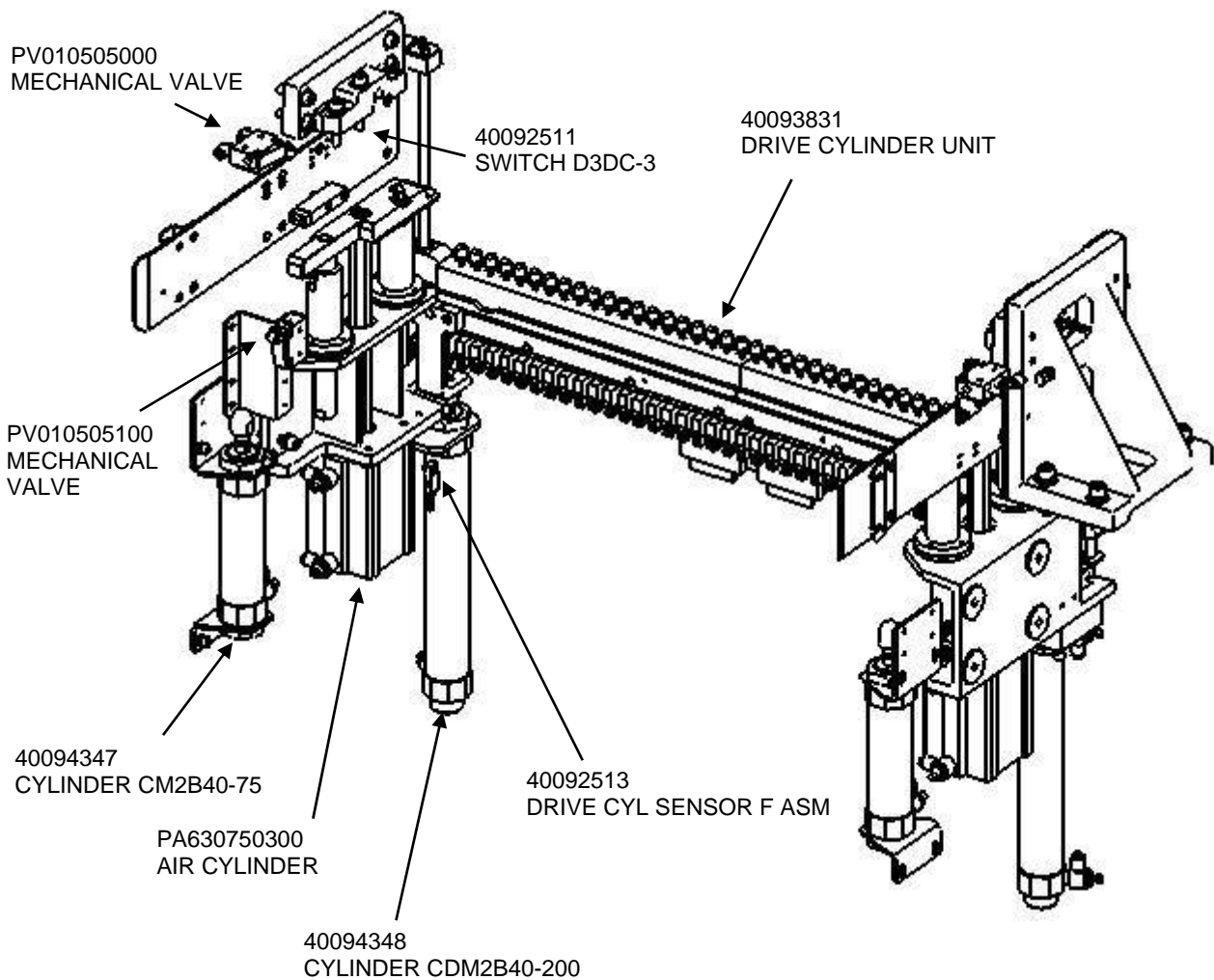


Figure 9-1-1 Bank Support (M, L)

Maintenance Guide

- Overall Drawing (Electric and Mechanical Replacement Table Specifications)
(XL Specifications)

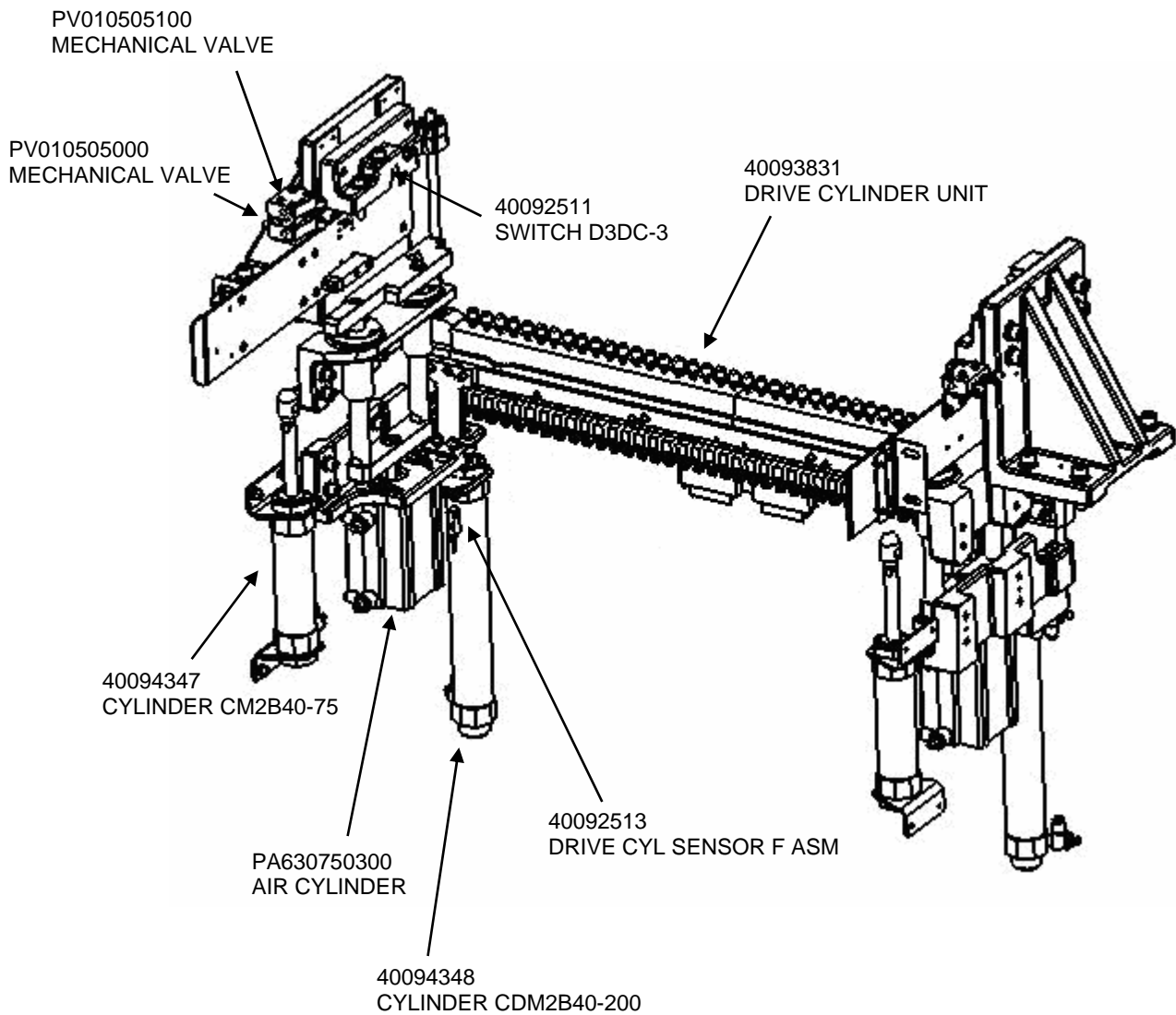


Figure 9-1-2 Bank Support (XL)

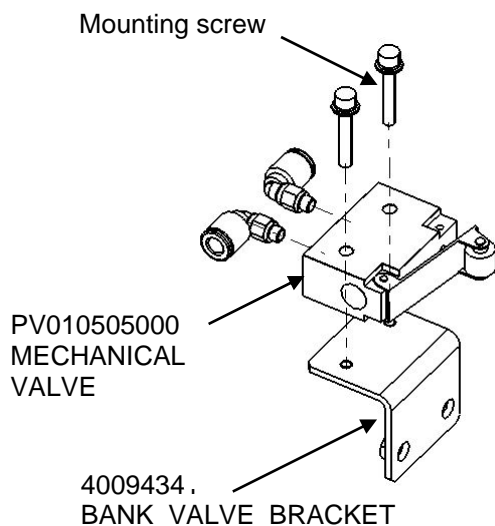
Maintenance Guide

9-1-1. Replacing the Mechanical Valve (Optional Replacement Table)

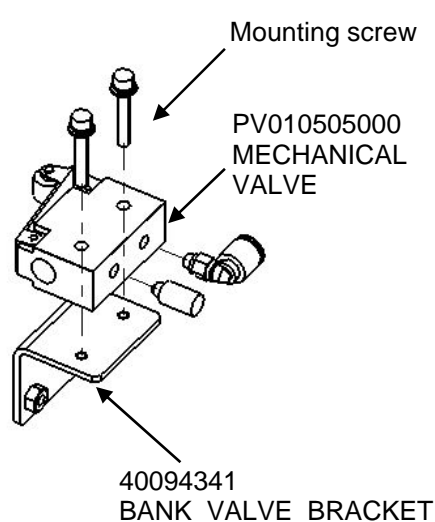
- 1) Turn OFF the compressed air to the machine main unit.
- 2) Disconnect the air tubes from the elbow union.
- 3) Remove the mounting screws to detach the valve from the bracket.
- 4) Attach the elbow union and silencer on a new valve and secure them to the bracket with the mounting screws.
- 5) Turn ON the compressed air to the machine main unit.
- 6) When the mechanical valve for the drive cylinder up/down that is mounted on the support cylinder on the FL and RR sides for the M and L specifications has been replaced, adjust the position so that the lever of the mechanical valve is pushed to move up the drive cylinder as the mechanical cart is set.

<M and L Specifications>

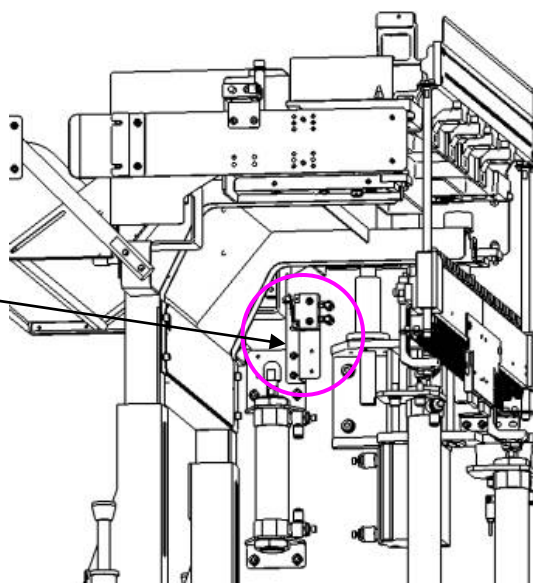
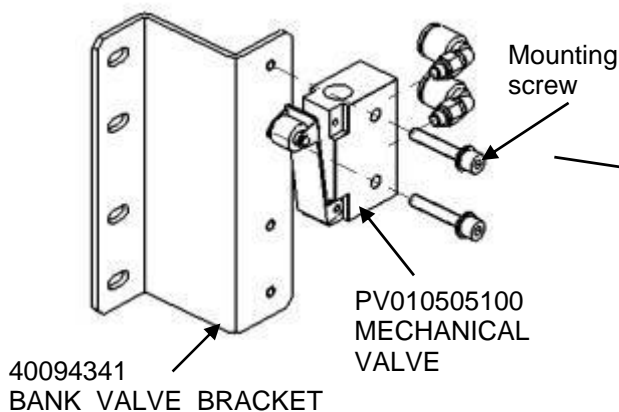
FL side/RR side
(Common specifications)



FL side/RR side
(Common specifications)



FL side/RR Side Support Cylinder
(Mechanical/electric replacement
table specifications)



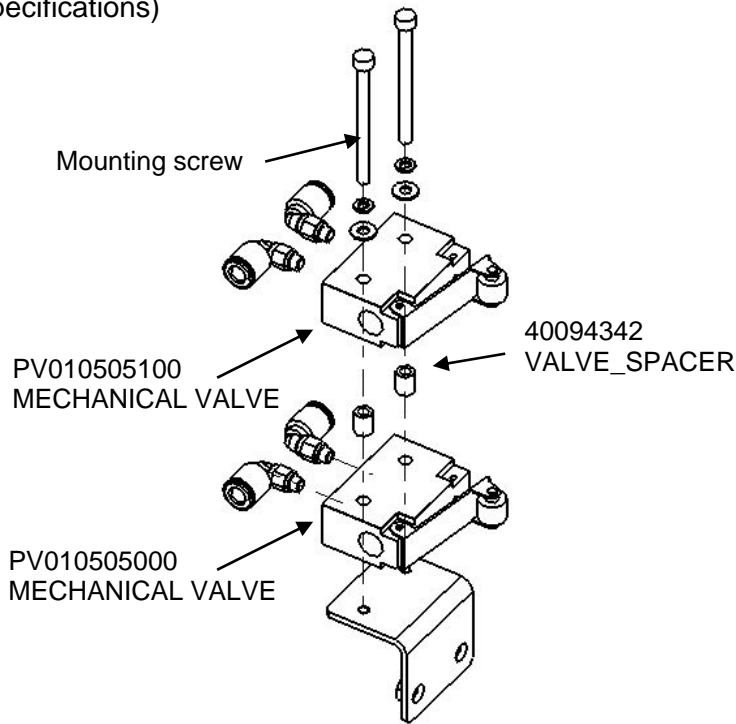
Adjust the mounting position so that the lever is pushed to move up the drive cylinder when the mechanical cart is set.

Figure 9-1-1-1 Roller Lever (M, L)

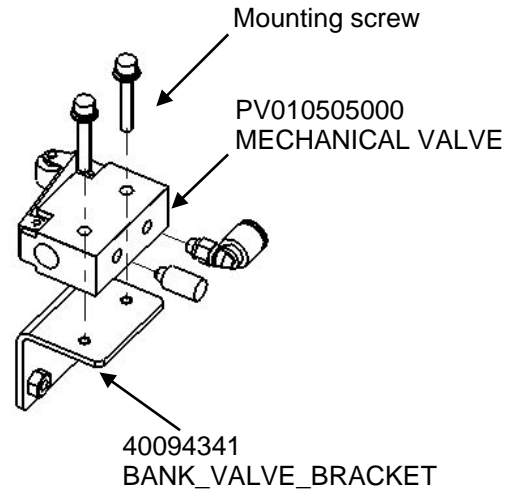
Maintenance Guide

<XL Specifications>

FL side/RR side
(Mechanical/electric replacement table specifications)



FR side/RL side
(Common specifications)



FL side/RR side
(Mechanical replacement table specifications)

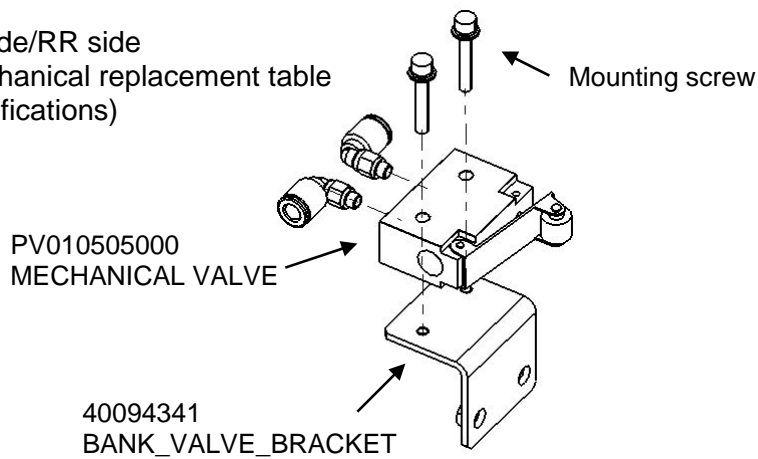


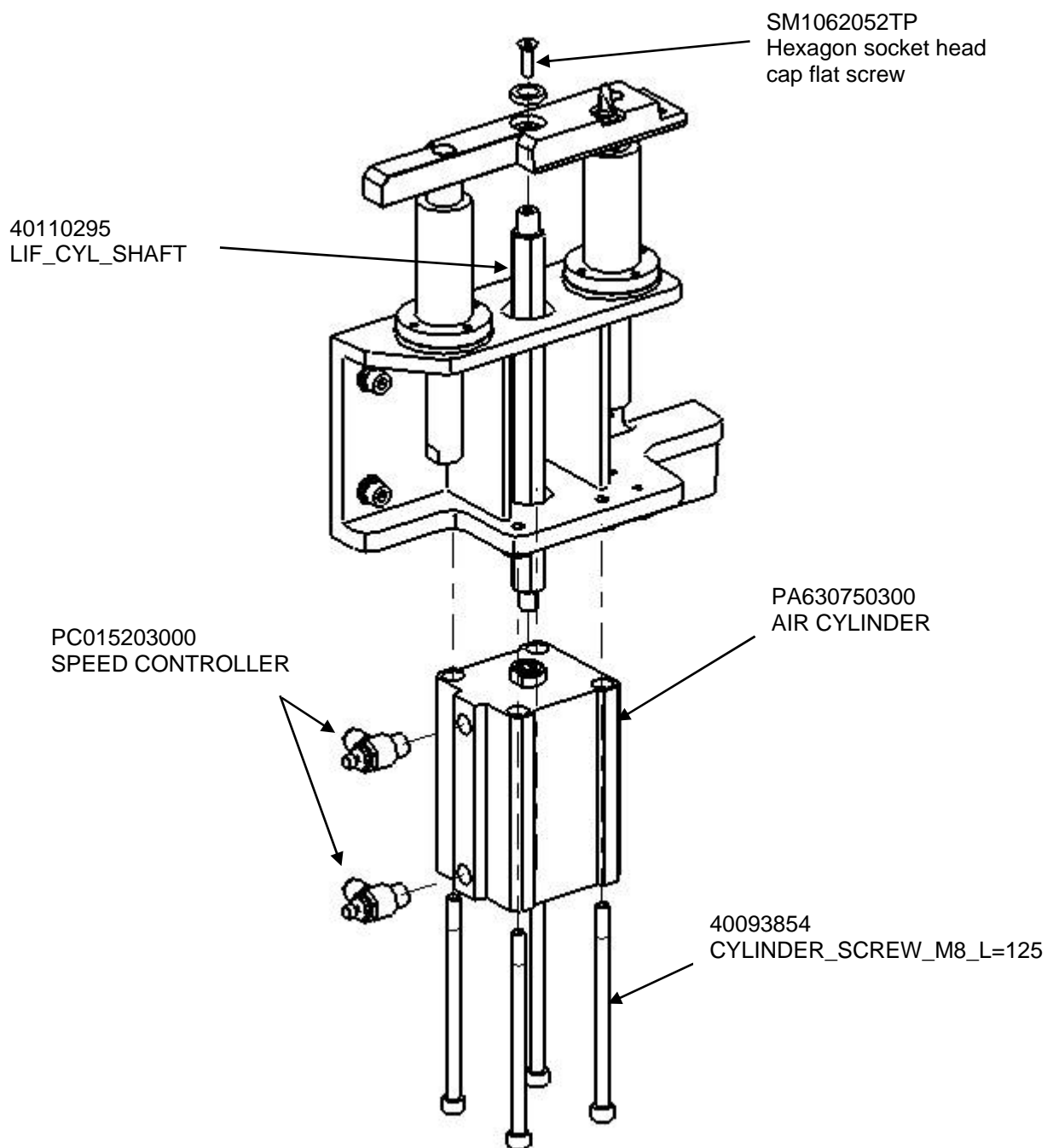
Figure 9-1-1-2 Roller Lever (XL)

Maintenance Guide

9-1-2. Replacing the Bank-up Cylinder (Optional Replacement Table)

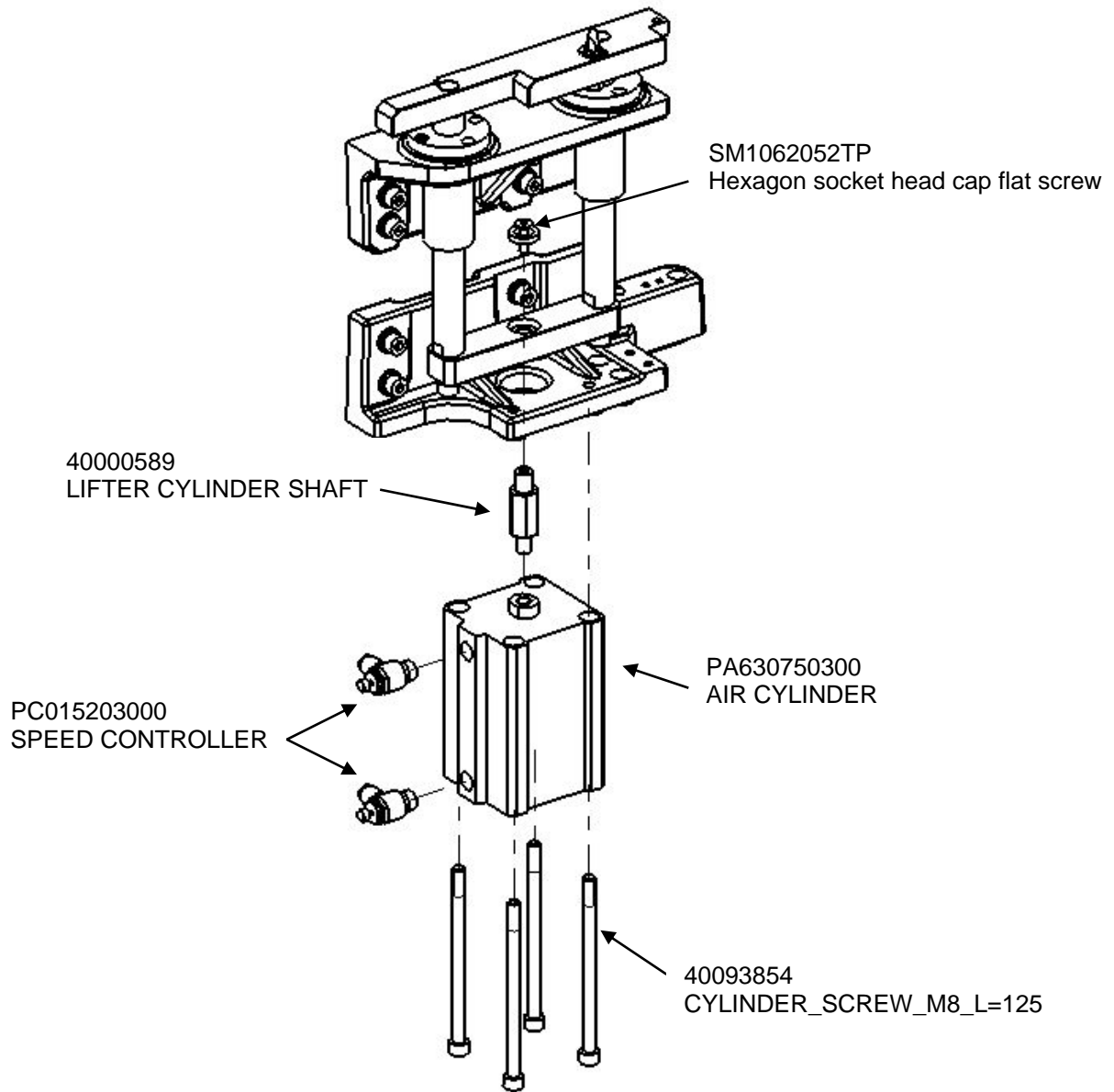
- 1) Turn OFF the compressed air to the machine main unit. (Hand valve)
- 2) Remove the hexagon socket head cap flat screw (M6×20).
- 3) Remove the cylinder mounting screws to detach the cylinder from the supporter.
- 4) Attach the speed controller and shaft to a new cylinder.
- 5) Reassemble the components in the reverse order of disassembly.
- 6) Turn ON the compressed air to the machine main unit and adjust the cylinder speed.

<M and L Specifications>



Maintenance Guide

<XL Specifications>



Maintenance Guide

9-1-3. Adjusting the Speed Controller of the Bank-Up Cylinder (Optional Replacement Table)

- 1) For the speed controllers of the right side cylinder, adjust those of the fixed and left side cylinders.
- 2) The speed controllers have been set so that the bank-up cylinder completes ascent operation in 3.5 to 4.0 seconds, descent operation in 2.5 to 3.0 seconds. (When assembled)
 - **UP speed :** **To be adjusted by the upper speed controller.**
If the up speed of the left cylinder is too fast, turn the speed controller adjustment screw clockwise.
 - **DOWN speed:** **To be adjusted by the lower speed controller.**
If the down speed of the left cylinder is too fast, turn the speed controller adjustment screw clockwise.
- 3) If the up and down speeds of the left and right cylinders are the same, lock the adjustment screws of the speed controllers with the lock screws.
- 4) After the adjustment screws have been locked, recheck the up and down speeds.

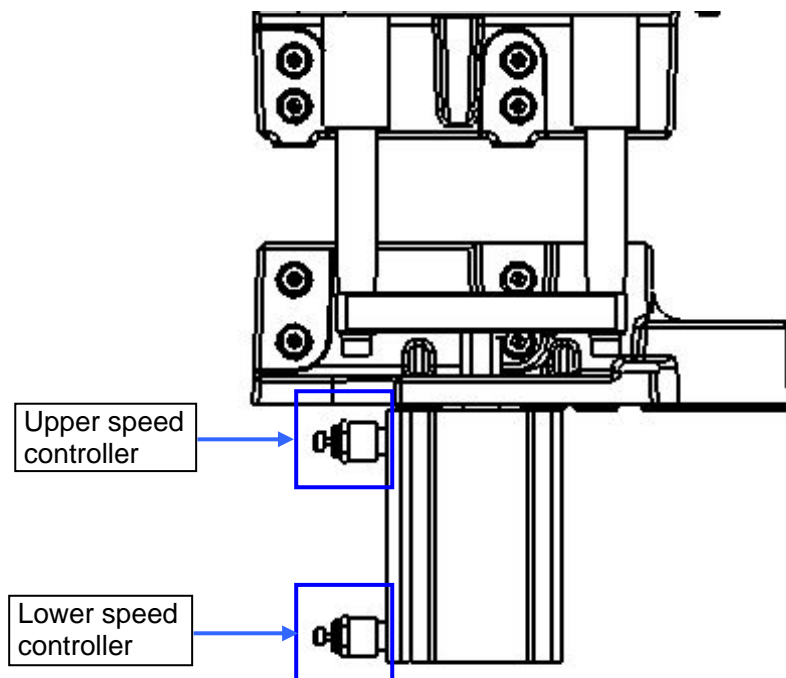


Figure 9-1-3 Back-Up Cylinder Positions

Maintenance Guide

9-1-4. Replacing the Bank-Up Detection Sensor (Optional Replacement Table)

- 1) Turn off the power to the main unit.
- 2) Remove the sensor plate mounting bolts (hexagon socket head cap button bolt, M4×6).
- 3) Disconnect the cables from the bank switch.
- 4) Detach the bank switch from the sensor plate and replace it with a new one.
- 5) Reassemble the components in the reverse order of disassembly.

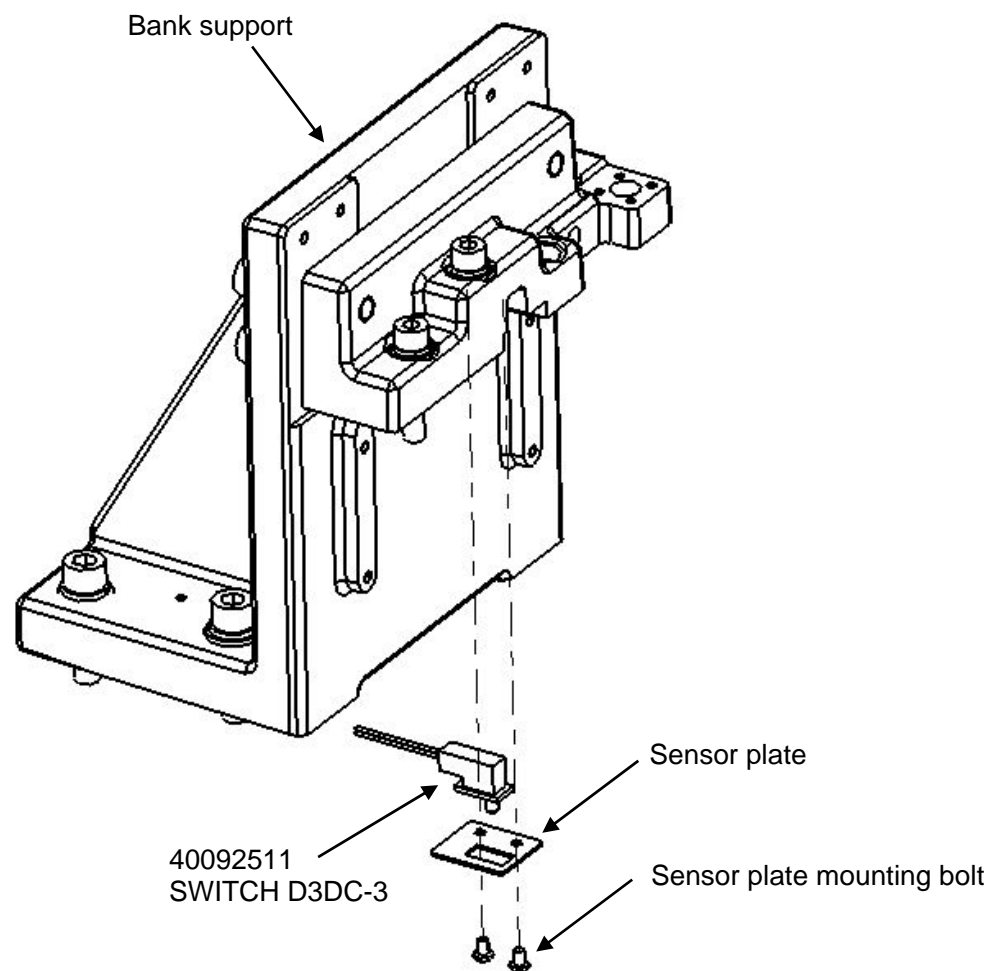


Figure 9-1-4 Back-Up Detection Sensor

Maintenance Guide

9-1-5. Replacing the Selector Switch (Optional Replacement Table)

- 1) Shut-down the main compressed air to the main unit (with the hand valve).
- 2) Turn the selector switch cap counterclockwise to detach the selector switch from the cover.
- 3) Mount the half-union and silencer on a new selector switch and secure the selector switch to the cover with the cap.
- 4) Supply the main compressed air to the main unit.

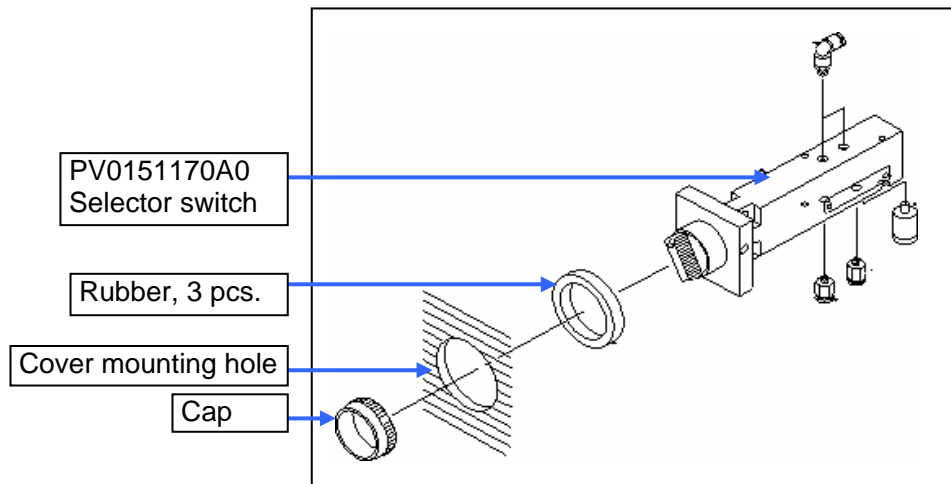
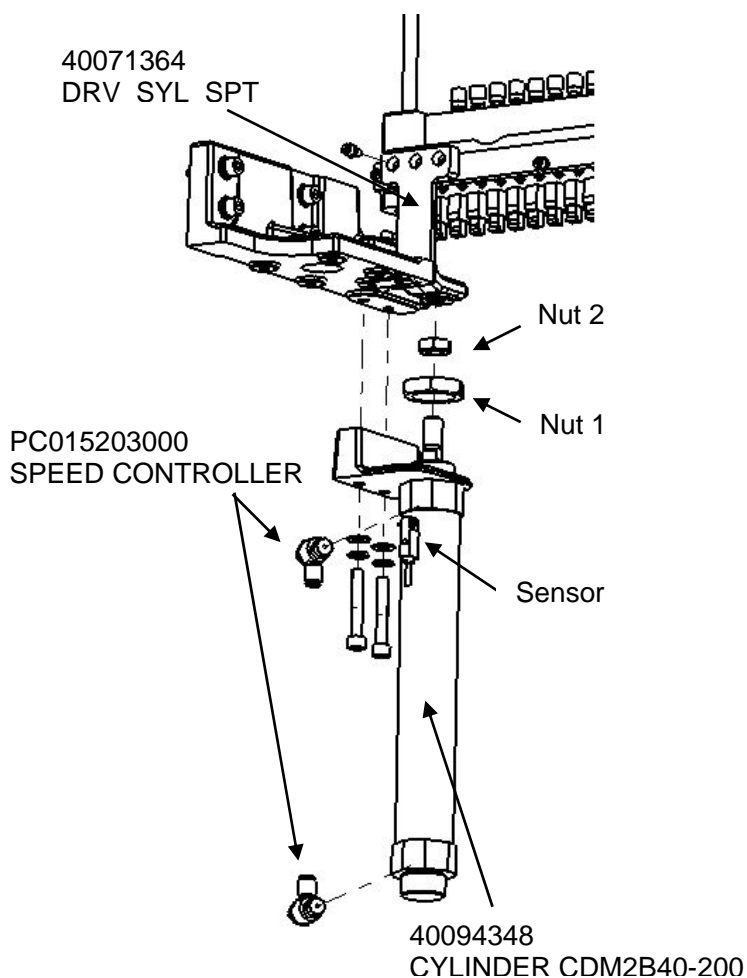


Figure 9-1-5 Selector Switch Assembly (40000585)

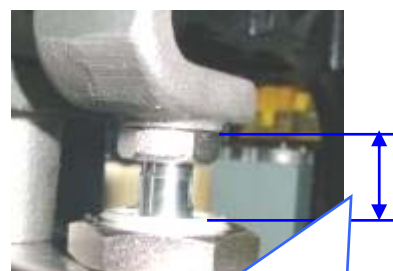
Maintenance Guide

9-1-6. Replacing the Cylinder for Drive Cylinder Unit Up/Down (Specifications Common to Optional Electric and Mechanical Replacement Tables)

- 1) Turn OFF the compressed air to the machine main unit and disconnect the air tubes from the speed controller.
- 2) Raise the driver cylinder unit upward and secure it to the left and right bank supporters with tie-up bands.
- 3) Remove the nuts 1 and 2 to detach the cylinder.
- 4) Attach the speed controller and sensor (FL and RR only) to a new cylinder.
- 5) Turn the knob on the speed controller four rotations from its fully open position toward the “close” side, and then lock it firmly.
- 6) Attach the cylinder with the nuts 1 and 2. For details about nut 2 assembly position, see the Figure below.
- 7) Remove the tie-up bands secured to the bank supporters to check that the drive cylinder unit falls down by its own weight.
- 8) Connect the air tubes to the speed controller and turn ON the compressed air to the machine main unit.
- 9) Adjust the sensor position after the power to the machine has been turned ON. Adjust the sensor position so that the sensor is turned ON when the drive cylinder moves up to its upper limit. (Secure the sensor position at the intermediate position of the sensor ON range.)



Secure the drive cylinder with tie-up bands.

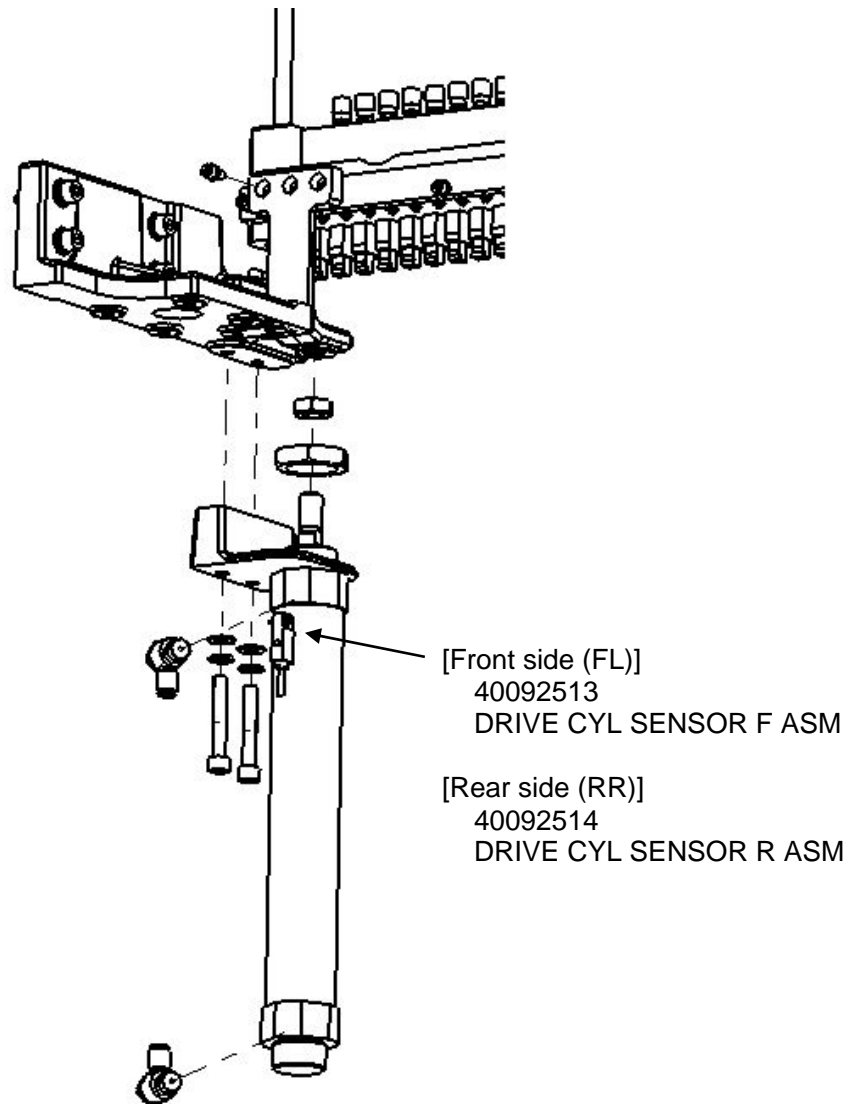


Distance between bottom of DRV_SYL_SPT and top of cylinder bolt: 20 mm

Maintenance Guide

9-1-7. Replacing the Cylinder Sensor for Drive Cylinder Unit Up/Down (Specifications Common to Optional Electric and Mechanical Replacement Tables)

- 1) Disconnect the cables from the sensor assembly.
- 2) Remove the screws for the sensor fixing bands to detach the sensor assembly.
- 3) Reassemble a new sensor assembly in the reverse order of disassembly.
- 4) Adjust the sensor position so that the sensor is turned ON when the drive cylinder moves up to its upper limit.
(Secure the sensor position at the intermediate position of the sensor ON range.)

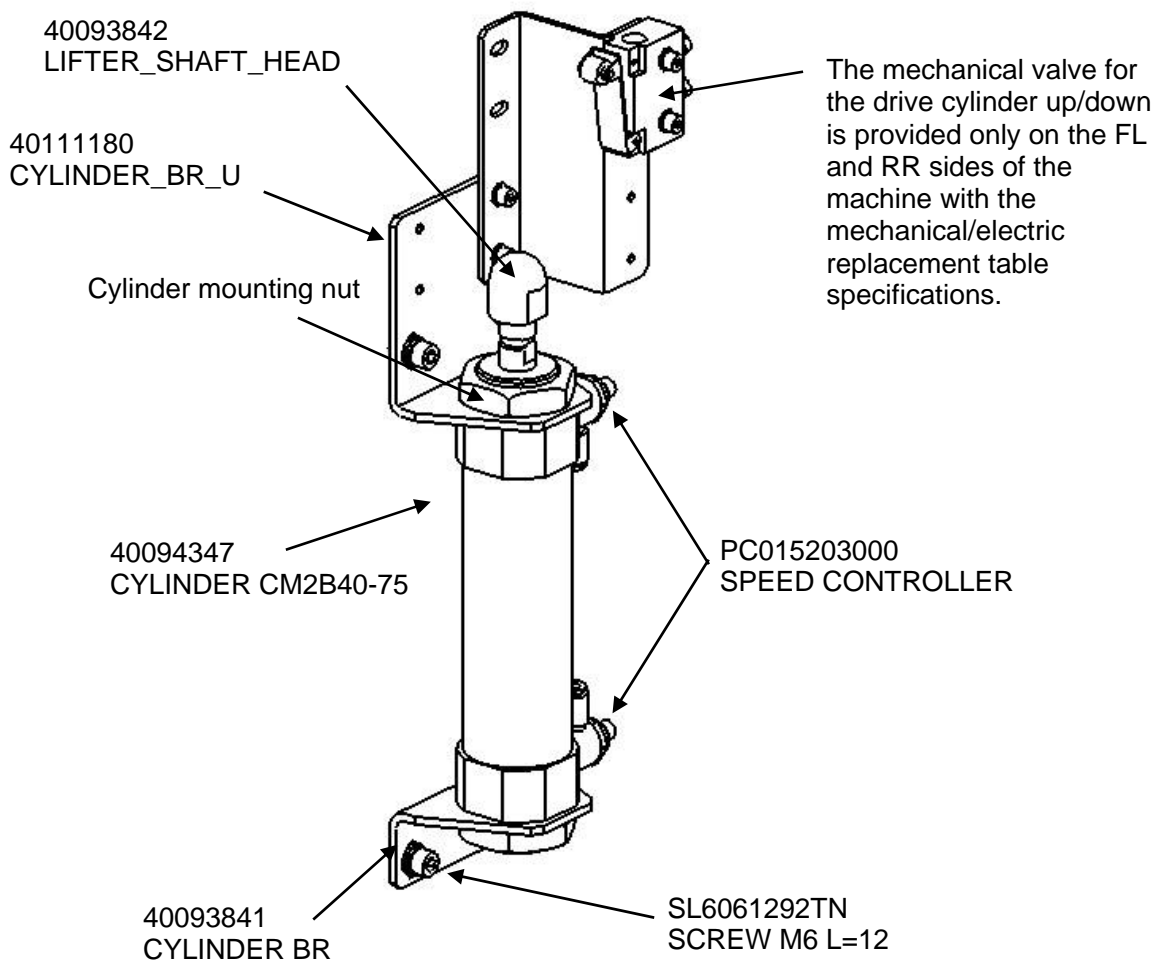


Maintenance Guide

9-1-8. Replacing the Electric Bank Support Cylinder (Optional Replacement Table)

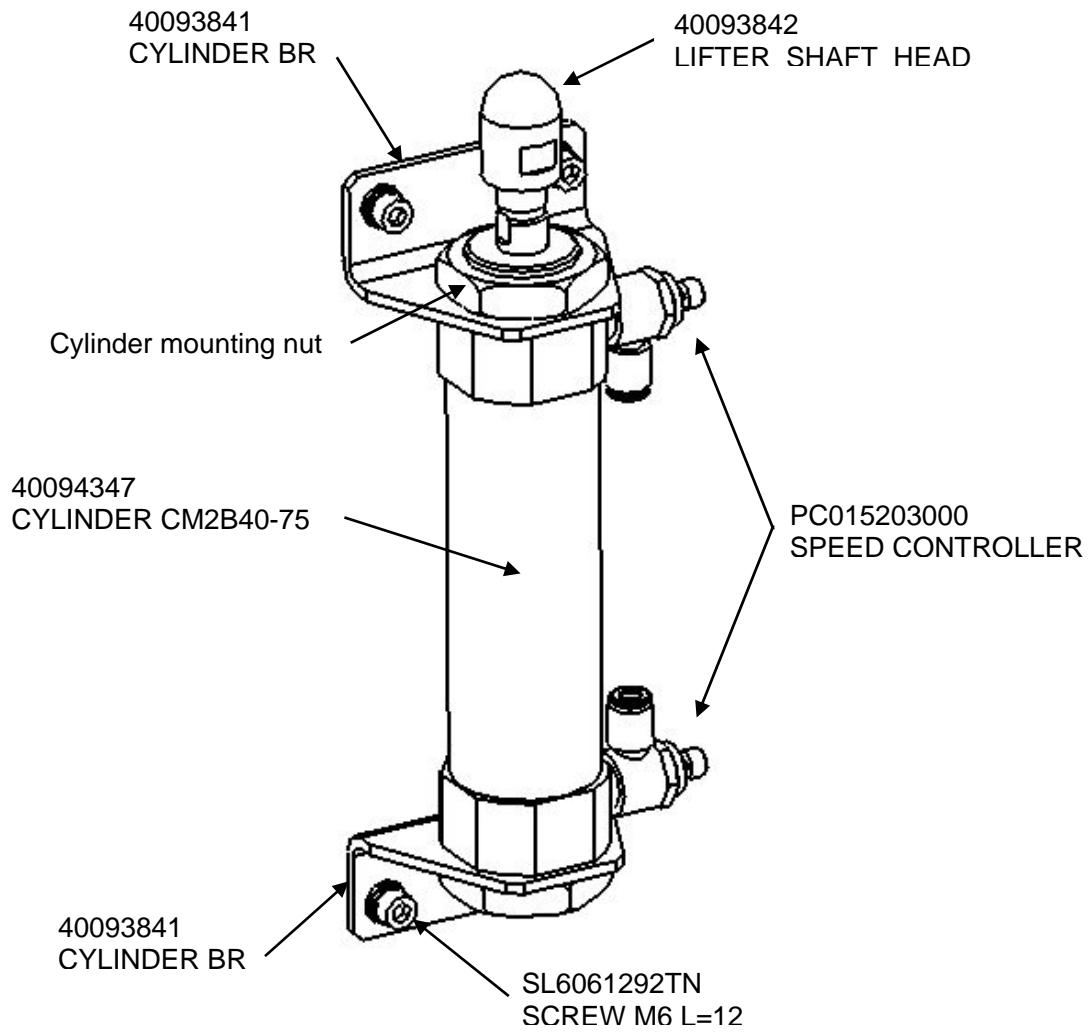
- 1) Turn OFF the compressed air to the machine main unit and disconnect the air tubes from the speed controller.
- 2) Remove the upper and lower cylinder mounting nuts and the lower hexagon socket head cap bolts (M6×12: 2 locations) to detach the cylinder and lower bracket.
- 3) Attach the speed controller and lifter shaft head to a new cylinder.
Tighten the lifter shaft head until the cylinder rod is in contact with the edge of the bolt hole.
- 4) Reassemble the components in the reverse order of disassembly.
- 5) Turn ON the compressed air to the machine main unit and adjust the cylinder speed.
Adjust the cylinder speed to that of the cylinder, which has not been replaced, through visual check.
- 6) When the machine with the L and M specifications has the mechanical/electric replacement table specifications, adjust the mechanical valve position after mounted on the FL and RR sides. (For details about how to adjust the valve position, see section 9-1-1, Replacing the Mechanical Valve.)

<L and M Specifications>



Maintenance Guide

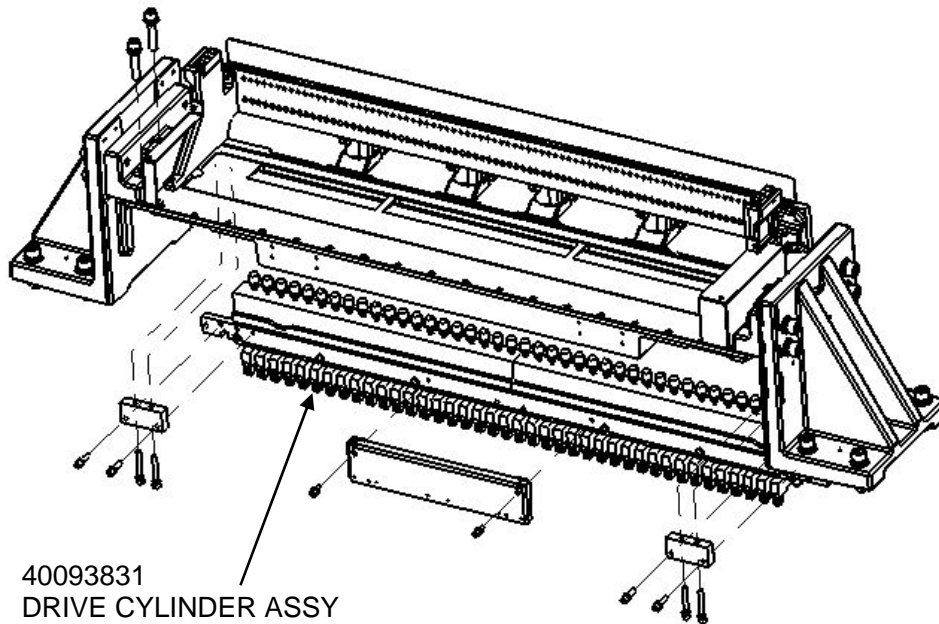
<XL Specifications>



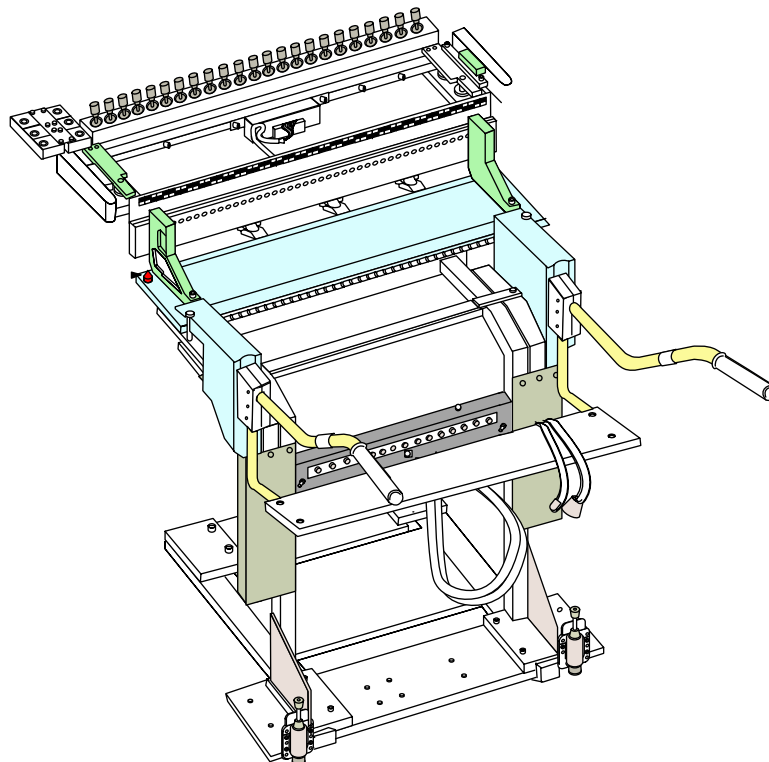
Maintenance Guide

9-2. Bank and Replacement Table for Mechanical Feeder

- Mechanical Fixed Bank



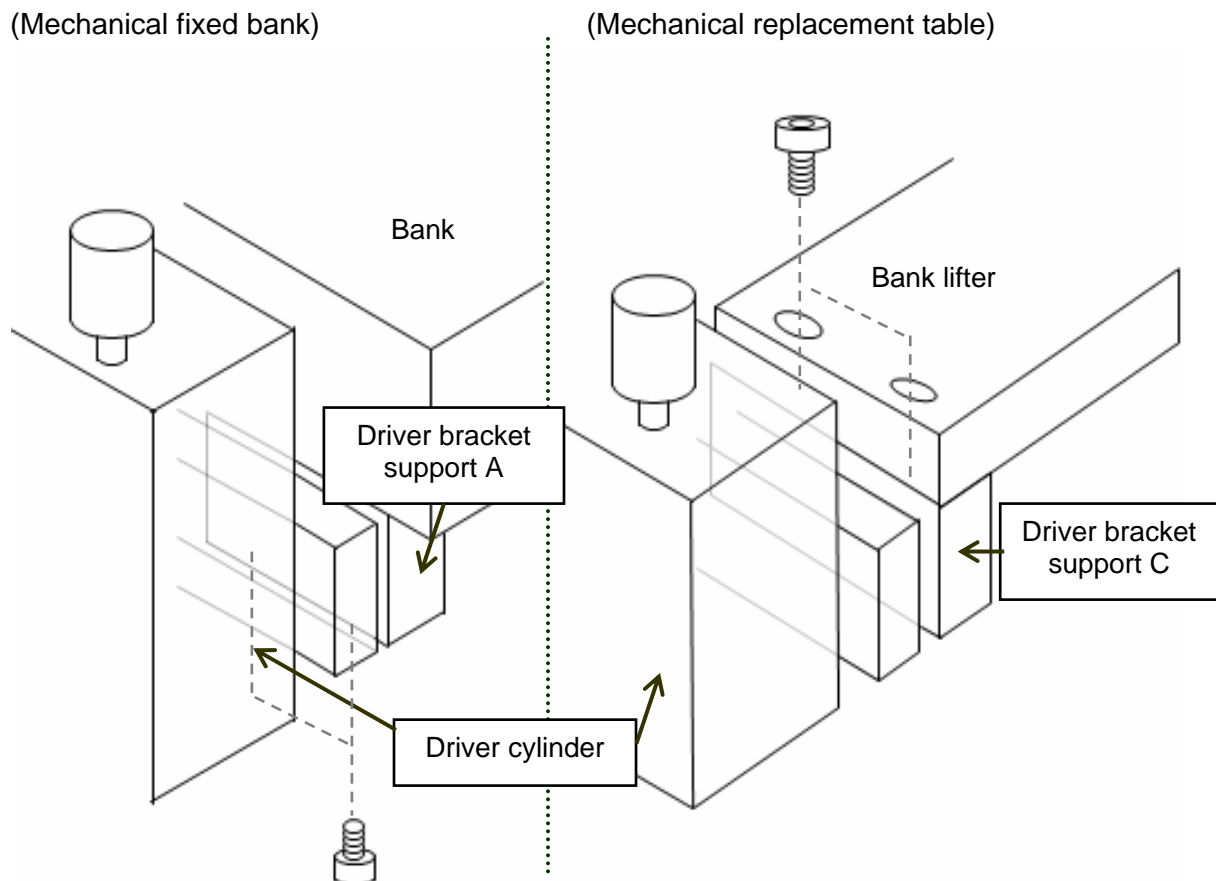
- Mechanical Replacement Table



Maintenance Guide

9-2-1. Replacing the Drive Cylinder (Mechanical Fixed Bank and Mechanical Replacement Table)

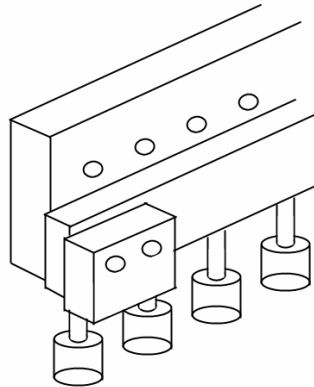
- 1) Turn OFF the compressed air to the machine main unit.
- 2) For the optional replacement table, detach the replacement table from the main unit to take it out from the machine. Turn ON the selector and press the left and right roller levers to move up the lifter. After that, turn OFF the compressed air.)
- 3) Disconnect the left and right air tubes and connectors.
- 4) Remove the driver bracket support mounting screws.
In the mechanical fixed bank, these screws are mounted on the bottom surface of the bank from the lower portion.
In the machine with the mechanical replacement table, these screws are mounted on the bottom surface of the bank lifter from the upper portion.



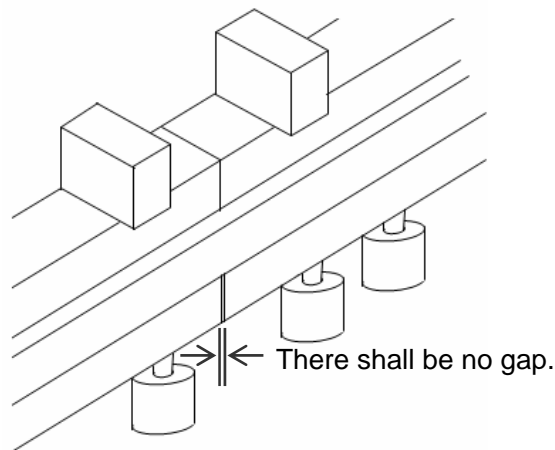
Maintenance Guide

- 5) Replace the drive cylinders with new ones and put them upside down as shown Figure below.

<CAUTION> Carry out this work on the leveled table or the top surface of the bank.

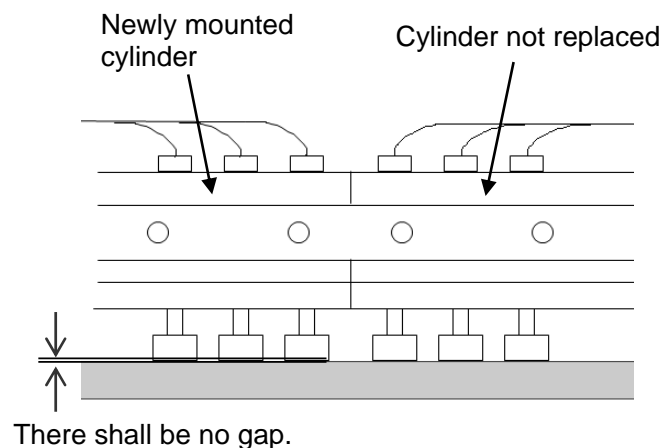


- 6) Carefully mount the drive cylinders in the horizontal direction so that there is no gap between them.



- 7) Carefully mount the drive cylinders in the vertical direction by placing the driver support against the rib of the main unit so that there is no gap between the top surface of the bank (or work table) and the driver cylinder.

<CAUTION> Always replace the left and right drive cylinders one-by-one.



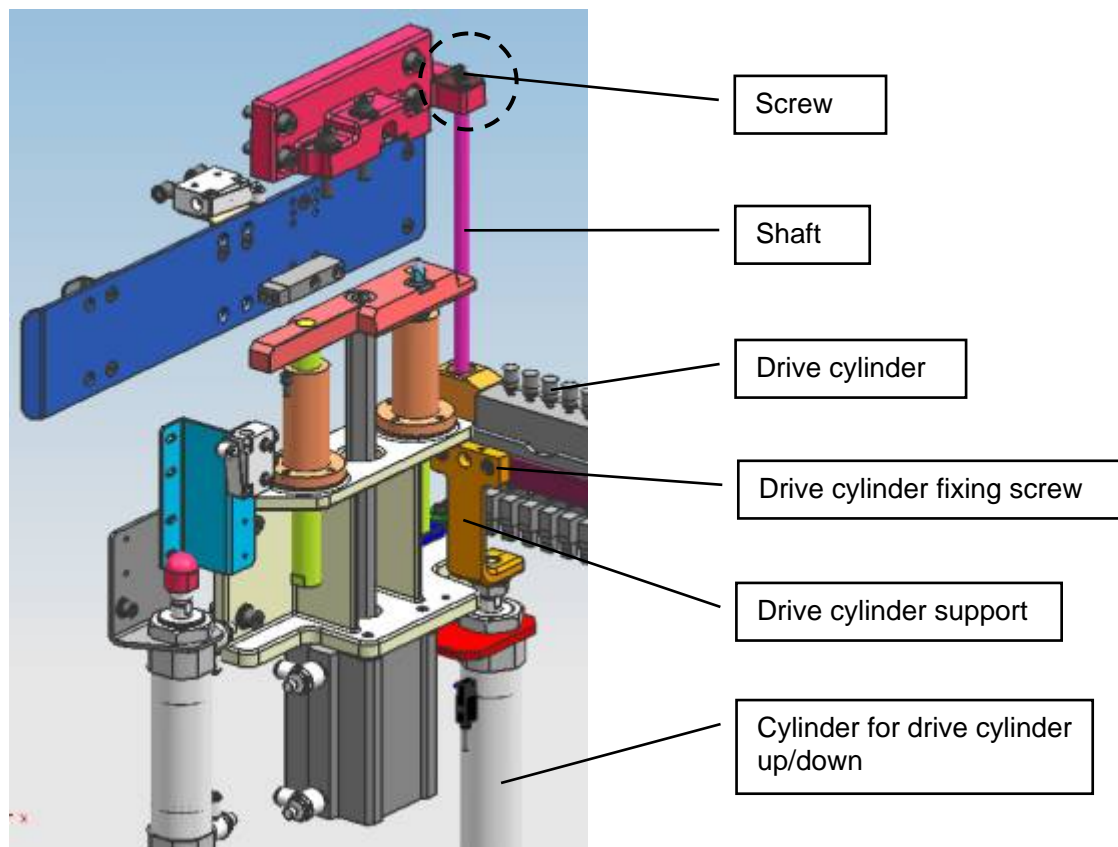
- 8) Reassemble the components in the reverse order of disassembly.

Maintenance Guide

9-2-2. Replacing the Drive Cylinder (Specifications Common to Optional Electric and Mechanical Replacement Tables)

<M and L Specifications>

- 1) Turn OFF the compressed air to the machine main unit.
- 2) Disconnect the air tubes and wiring connectors from the drive cylinder.
- 3) Loosen the screws fixing the shaft for drive cylinder up/down and pull out the shafts (both the left and right shafts).

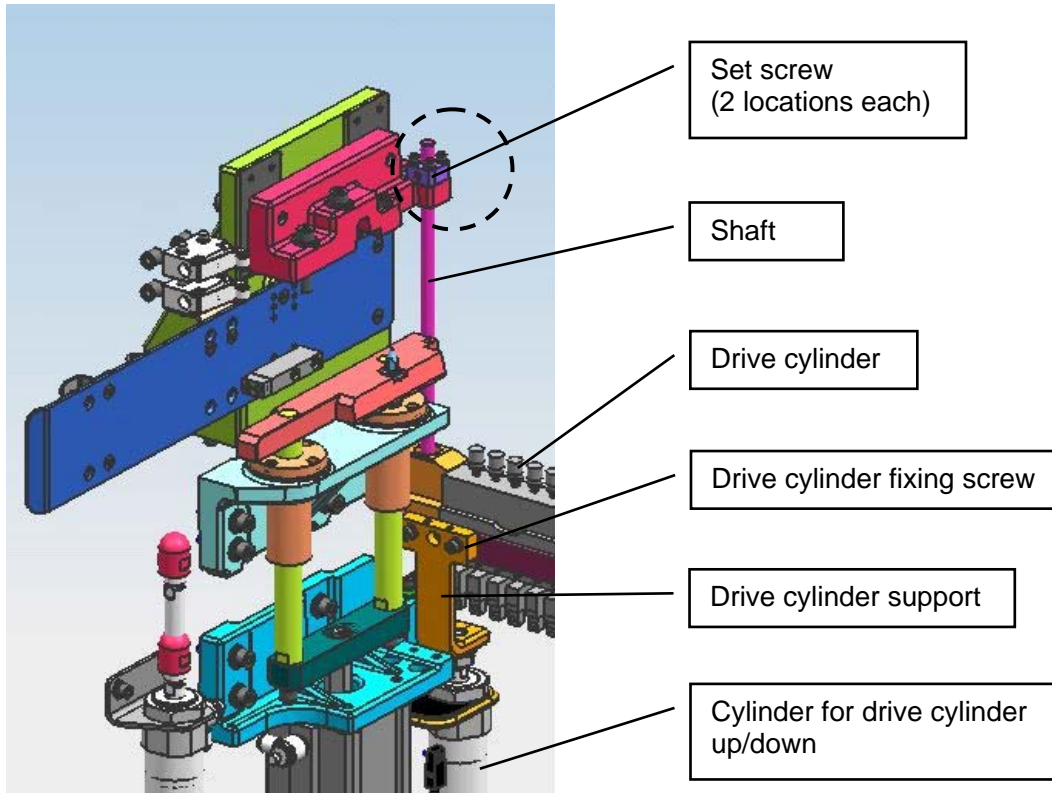


- 4) Remove the screws fixing the drive cylinder and drive cylinder support to detach the drive cylinder from the machine.
- 5) Secure a new drive cylinder for replacement to the drive cylinder support temporarily.
- 6) Insert the shaft again, which has been detached in step 3).
- 7) Raise the drive cylinder by hand and check that it falls down smoothly by its own weight. After that, retighten the screws, which have been temporarily secured in steps 5) and 6). (To move the drive cylinder up or down, disconnect the air tubes from the cylinder for drive cylinder up/down.)
- 8) Connect the air tubes and wiring connectors, which have been disconnected in step 2).
- 9) Turn ON the compressed air to the machine main unit.

Maintenance Guide

<XL Specifications>

- 1) Turn OFF the compressed air to the machine main unit.
- 2) Disconnect the air tubes and wiring connectors from the drive cylinder.
- 3) Loosen the set screws fixing the shaft for drive cylinder up/down and pull out the shafts (both the left and right shafts).



- 4) Remove the screws fixing the drive cylinder and drive cylinder support to detach the drive cylinder from the machine.
- 5) Secure a new drive cylinder for replacement to the drive cylinder support temporarily.
- 6) Insert the shaft again, which has been detached in step 3).
- 7) Raise the drive cylinder by hand and check that it falls down smoothly by its own weight. After that, retighten the set screws, which have been temporarily secured in step 5), and the set screws, which have been loosened in step 3). (To move the drive cylinder up or down, disconnect the air tubes from the cylinder for drive cylinder up/down.)
- 8) Connect the air tubes and wiring connectors, which have been disconnected in step 2).
- 9) Turn ON the compressed air to the machine main unit.

Maintenance Guide

9-2-3. Adjusting the Speed Controller of the Drive Cylinder

The following describes how to adjust the up speed of the drive cylinder.

- 1) Detach the drive cylinders to be adjusted from the driver bracket.
- 2) Connect the air tube and connector.
- 3) Supply the main compressed air and turn on the power.
- 4) Using the manual control, operate all drive cylinders continuously, the speed controller of which needs to be adjusted.
- 5) Adjust the speed controller of the cylinder to be adjusted visually so that the movement of the cylinder is the same as that of other cylinders.
- 6) Tighten the nut of the speed controller firmly. After the nut has been secured, recheck that the cylinder functions correctly.
- 7) Reassemble the components in the reverse order of disassembly.

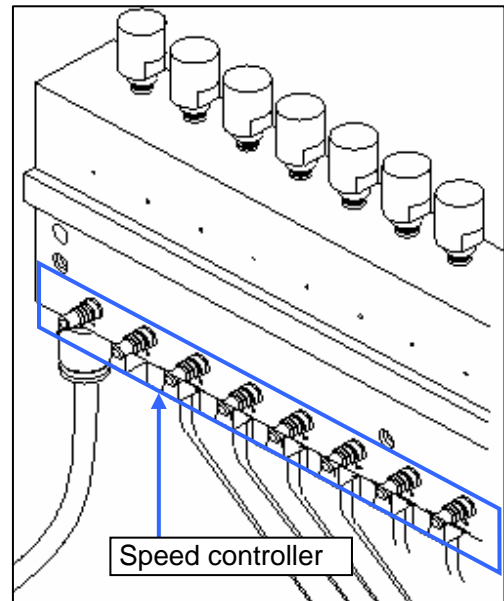


Figure 9-2-3 Speed Controller of Drive Cylinder

9-2-4. Replacing the Feeder Bank Board (Optional)

- 1) Disconnect the connector bracket IF cable, connector bracket PWR cable.
- 2) Remove the mounting screws to detach the connector bracket.
- 3) Disconnect the connectors from the feeder bank board.
- 4) To detach the feeder bank board, remove eight round head screws. After relevant board has been detached, replace it with a new one.
- 5) Reassemble the components in the reverse order of disassembly.

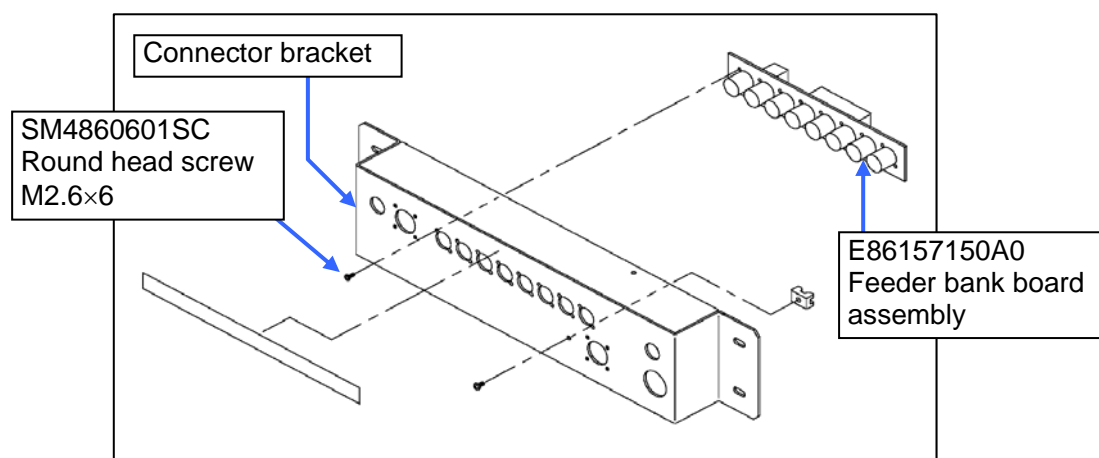
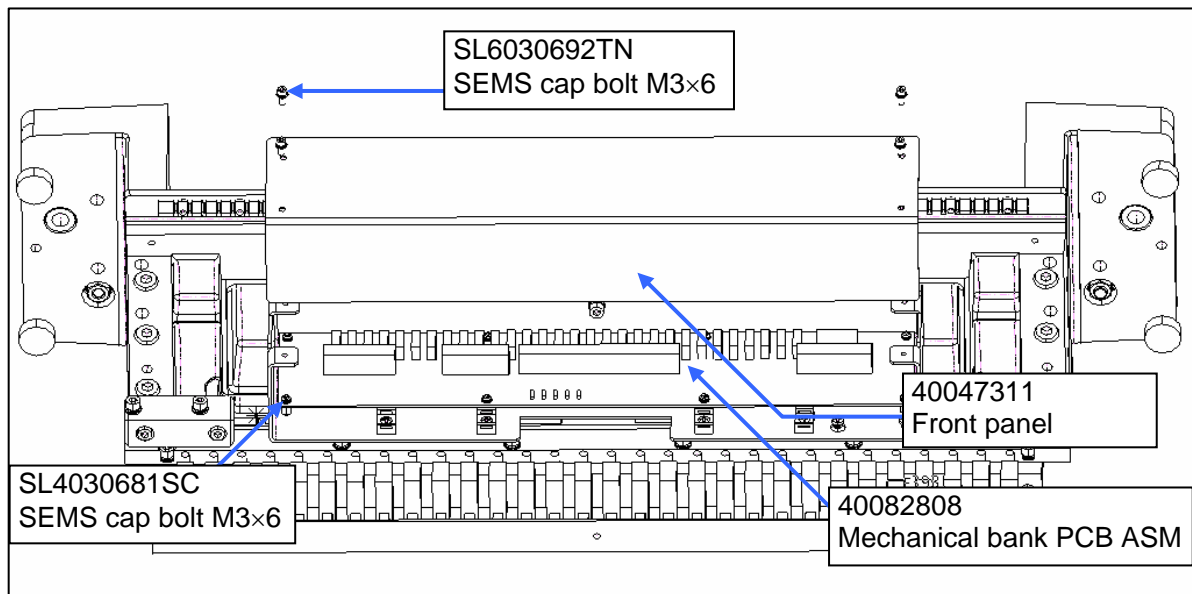


Figure 9-2-4 Feeder Bank Board Related Part Names

Maintenance Guide

9-2-5. Replacing the Bank PCB



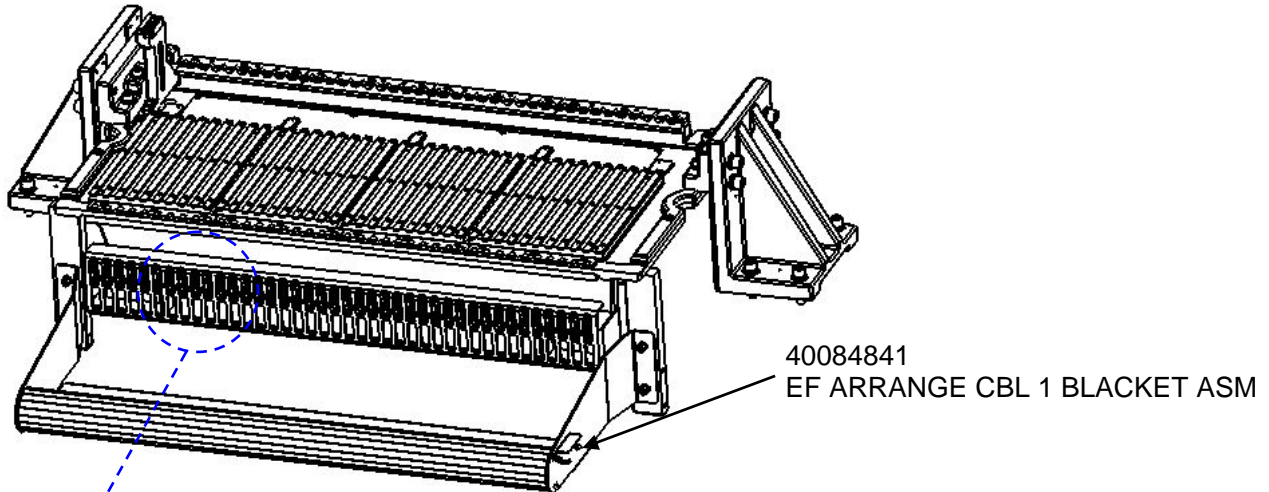
Maintenance Guide

9-3. Bank and Replacement Table for Electric Feeder

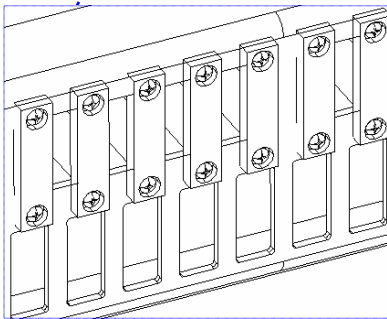
**DANGER**

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

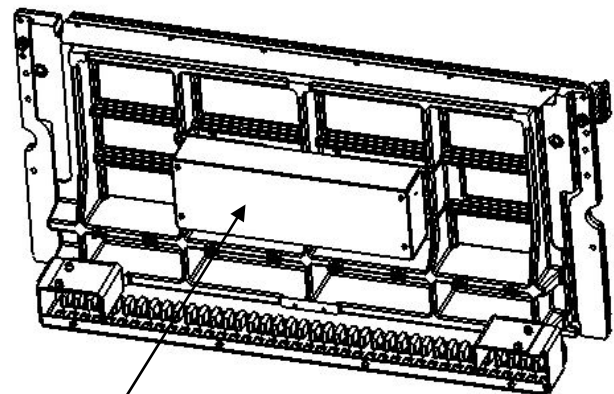
- **Electric Fixed Bank**



40084841
EF ARRANGE CBL 1 BLACKET ASM



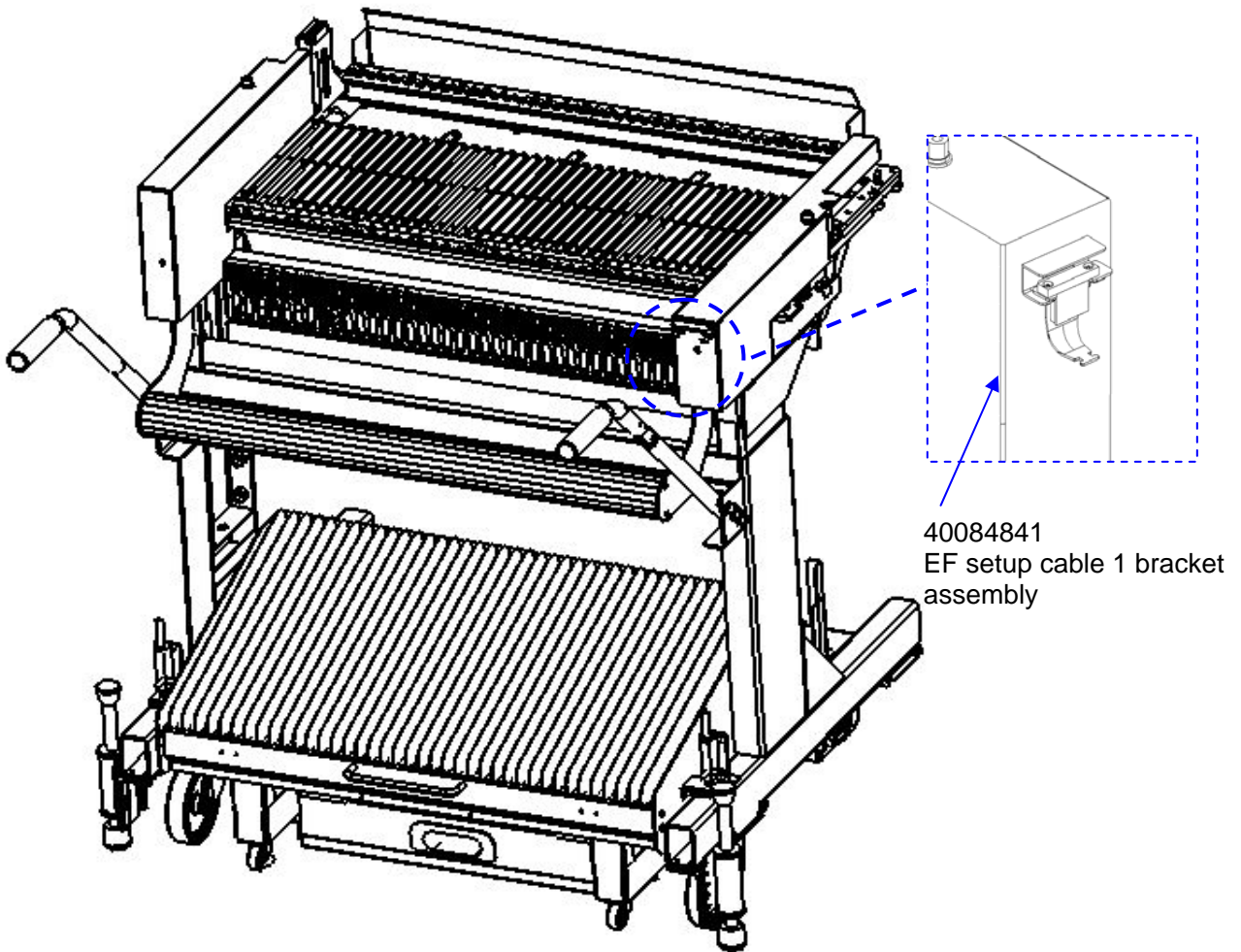
40092647 EF IF CBL 1-5 ASM
40092648 EF IF CBL 6-10 ASM
40092649 EF IF CBL 11-15 ASM
40092650 EF IF CBL 16-20 ASM
40092651 EF IF CBL 21-25 ASM
40092652 EF IF CBL 26-30 ASM
40092653 EF IF CBL 31-35 ASM
40092654 EF IF CBL 36-40 ASM



40084841
ELEC BANK 10 PCB ASM

Maintenance Guide

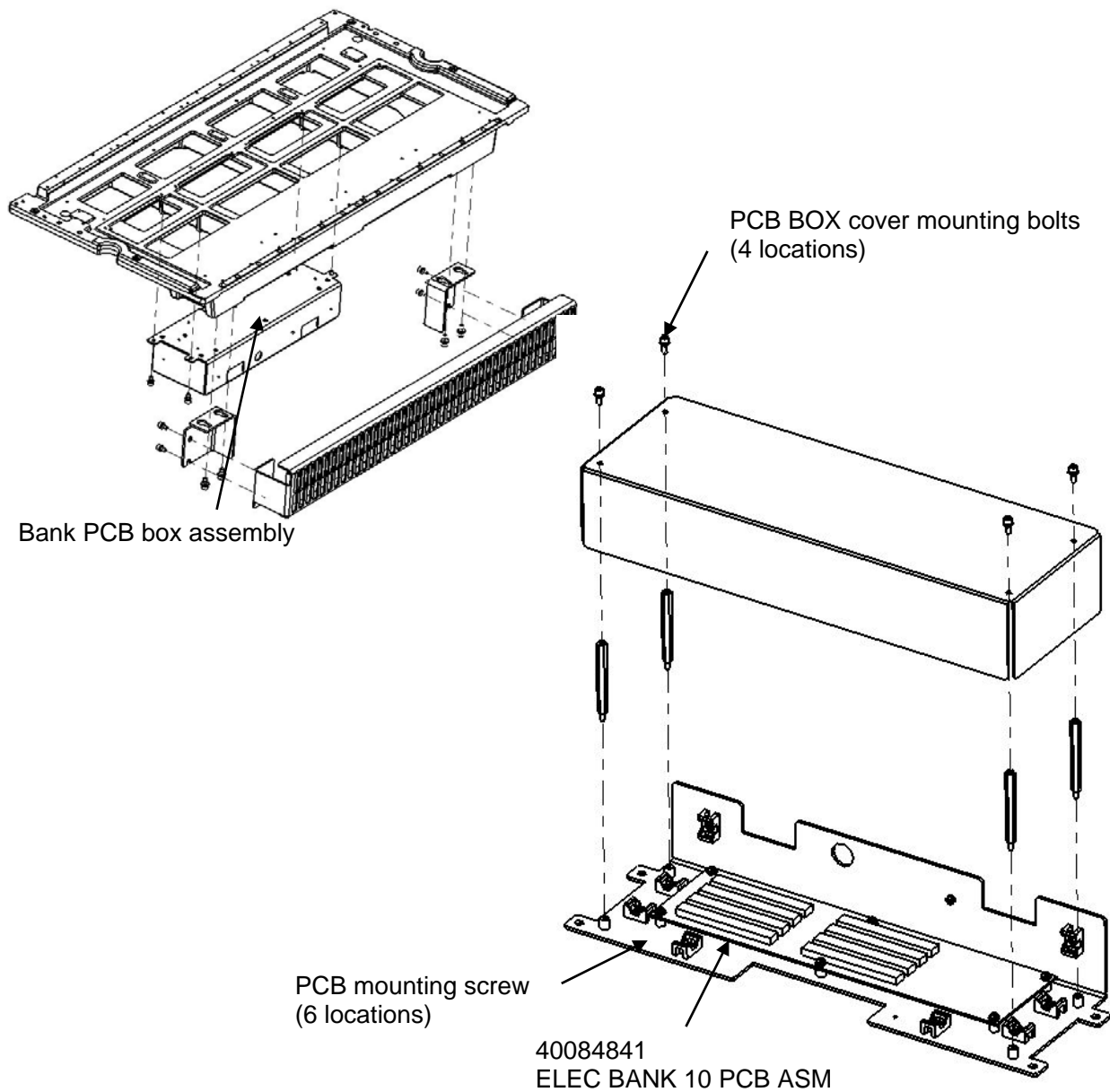
- Electric Replacement Table



Maintenance Guide

9-3-1. Replacing the Bank PCB

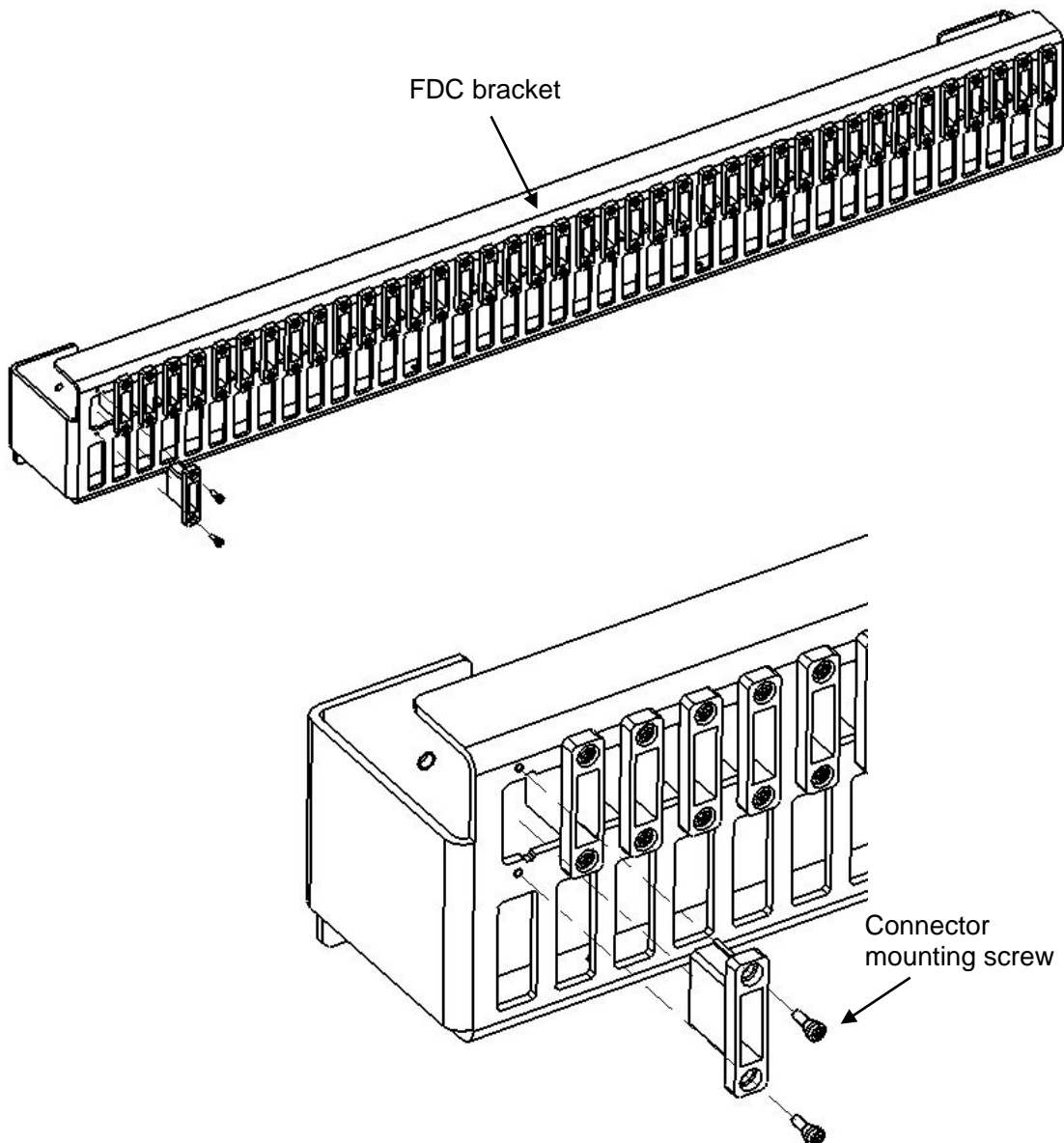
- 1) Remove the mounting bolts (hexagon socket head cap bolt with washer, M3 L=8) to detach the PCB box cover.
- 2) Disconnect the connectors (cables) from the electric bank PCB.
- 3) Remove the PCB mounting screws (round head screw with washer, M3 L=8) to replace the PCB.
- 4) Reassemble the components in the reverse order of disassembly.



Maintenance Guide

9-3-2. Replacing the Connector Cable

- 1) Remove the connector mounting screws to detach the connector from the FDC bracket.
- 2) Detach the front panel. (See Figure 9-3-1.)
- 3) Disconnect the connectors from the electric bank PCB and replace the cables.
- 4) Reassemble the components in the reverse order of disassembly.



Maintenance Guide

9-3-3. Replacing the Connector for Off-Line Setup

- 1) Disconnect the connector for the off-line setup from the E trolley cover R.
- 2) Disconnect the connector connecting the cable of the connector for the off-line setup and the relay cable to the electric bank PCB. After that, replace the connector for the off-line setup.
- 3) Reassemble the components in the reverse order of disassembly.

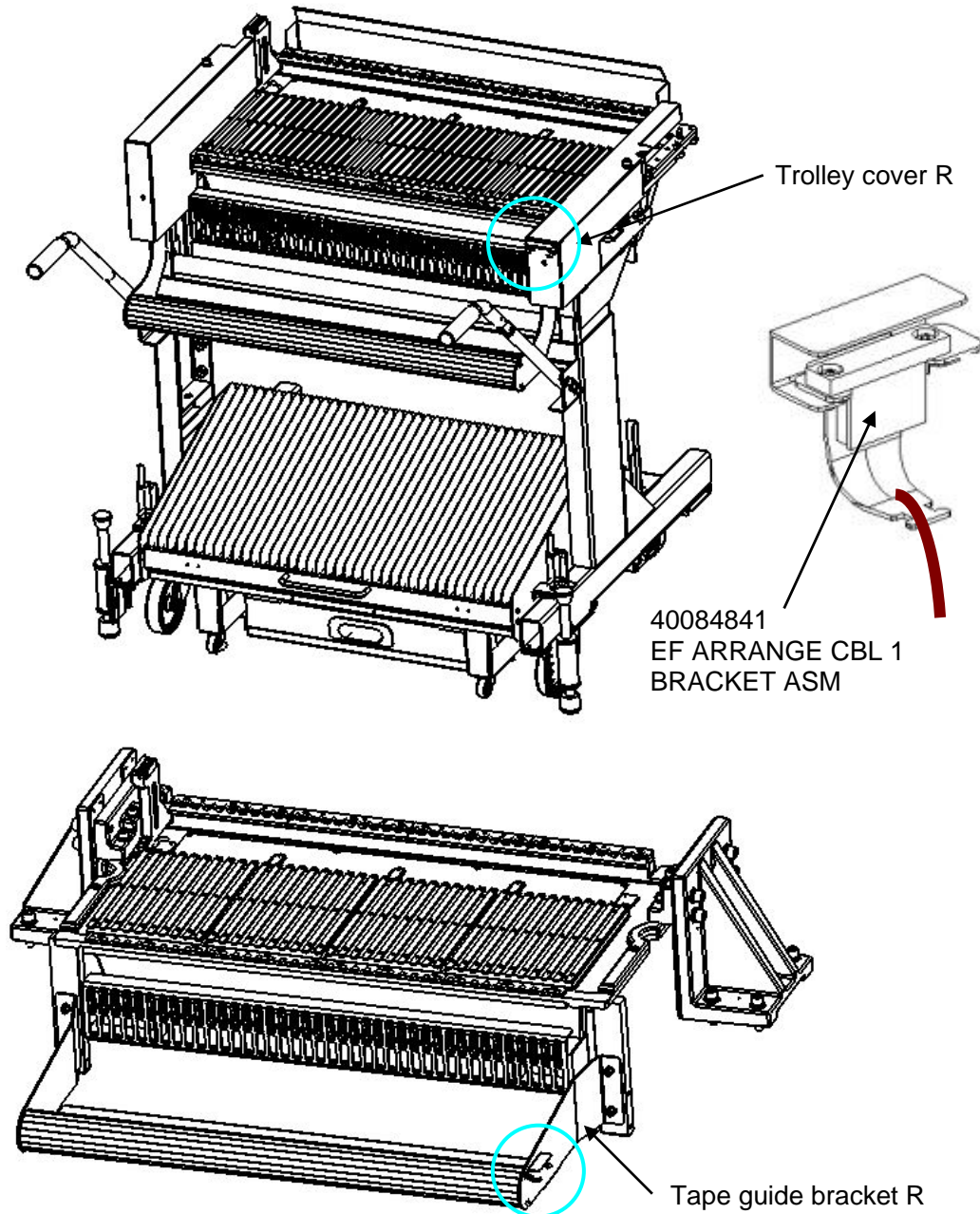


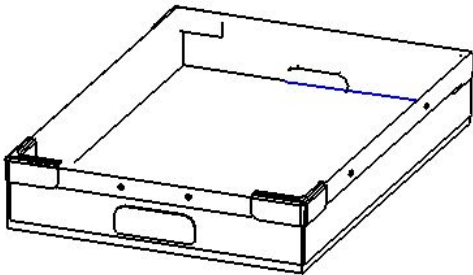
Figure 9-3-1 Replacement of Connector for Off-Line Setup

Maintenance Guide

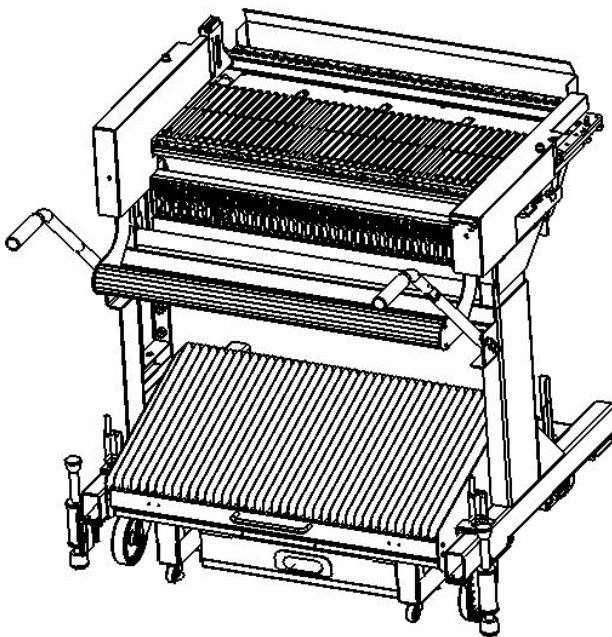
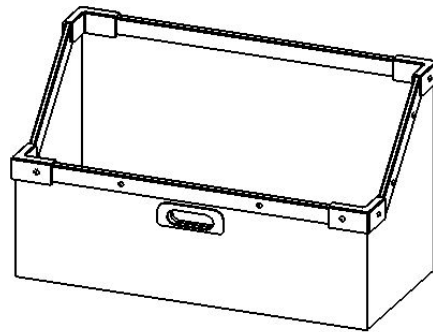
9-4. Trash Box

The shape of the trash box for the electric bank specifications may vary depending on the cutter unit (option) installation status.

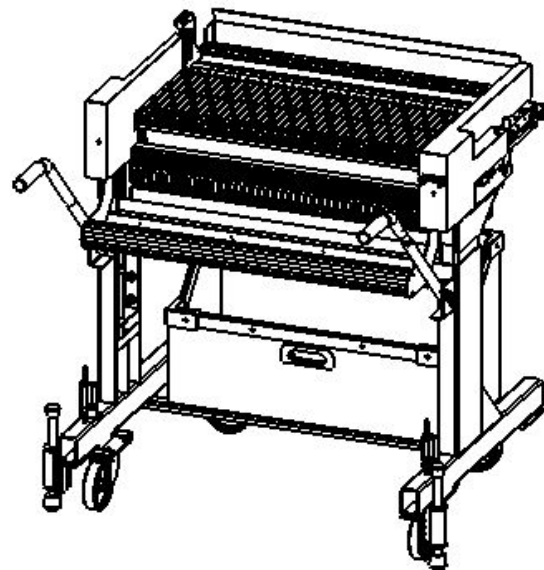
Tape cutter is installed.
40110289 TRASH_BOX (L, M specifications)
40094858 TRASH_BOX (XL specifications)



Tape cutter is not installed.
40094513 TRASH_BOX_L



Place the trash box
under the tape holder.



For the machine with the
replacement table trolley
specifications, place the trash
box on the trolley.
For the machine with the fixed
bank specifications, place the
trash box on the floor.

Maintenance Guide

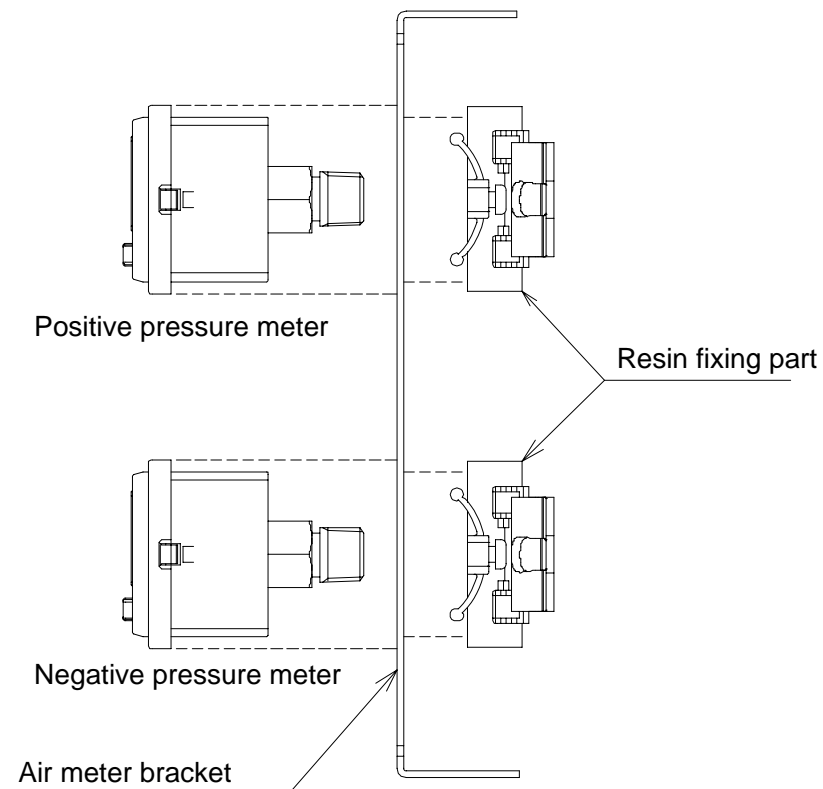
**DANGER**

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

[10] PNEUMATIC UNITS

10-1. Replacing the Digital Pressure Switch

- 1) Close the hand valve at the lower left portion of the main unit.
- 2) Detach the cover FBL.
- 3) Disconnect the $\phi 6$ air tube and connector on the meter back side.
- 4) Detach the meter with the fixing resin on the back of the air meter bracket kept pushed.
- 5) Reassemble the components in the reverse order of disassembly.



Maintenance Guide

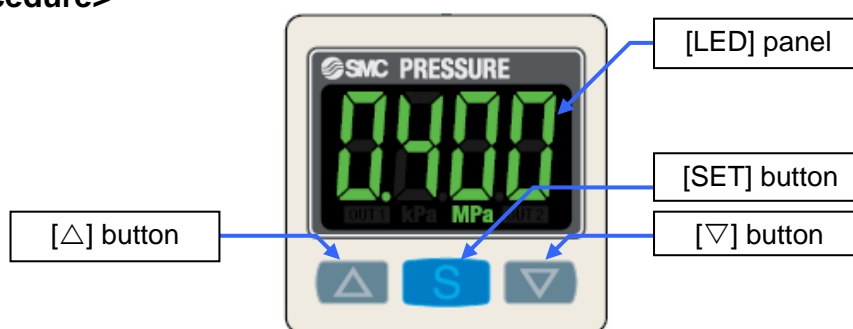
10-1-1. Adjusting the Digital Pressure Switch (Positive Pressure)

After the digital pressure switch has been replaced, make the setting as shown below.

Threshold value of pressure switch:	0.400MPa
Hysteresis:	0.050MPa
Display color mode:	Green when the pressure switch is turned ON.
Operation mode:	Hysteresis mode
Pressure switch output form:	Normally open (Turned ON when the value is the threshold value or more.)
Response time:	2.5ms or less
Auto preset setting:	Manual setting

Follow the steps to make the setting.

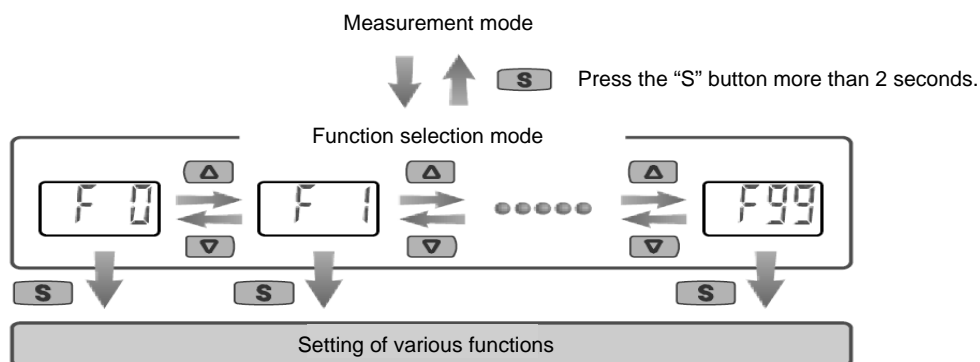
<Setting Procedure>



Digital Pressure Switch, Positive Pressure (MPa)



1. Change to the setting mode

- ① Pressing “S” button more than 2 seconds changes the mode to the function selection mode.









Maintenance Guide



2. Setting of the unit of indication

- ① Press “△” or “▽” button to select [F 0], and press “S” button. 
- ② Press “△” or “▽” button to select the right (indicating Mpa), and press “S” button. (This completes the setting of F0.) 



3. Setting of the output signal OUT1.

- ① Press “△” or “▽” button to select [F 1], and press “S” button. 
- ② Setting of output mode: Press “△” or “▽” button to select [HYS], and press “S” button. 
- ③ Setting of output reverse: Press “△” or “▽” button to select [1_P], and press “S” button. 
- ④ Setting of pressure: Press “△” or “▽” button to select [0.400], and press “S” button. 
- ⑤ Setting of hysteresis: Press “△” or “▽” button to select [0.050], and press “S” button. 
- ⑥ Setting of display color: Press “△” or “▽” button to select [SoG], and press “S” button. (This completes the setting of F1.) 

4. Setting of response time

- ① Press “△” or “▽” button to select [F 3], and press “S” button. 
- ② Press “△” or “▽” button to select [2.5], and press “S” button. (This completes the setting of F3.) 

5. Setting of auto preset function

- ① Press “△” or “▽” button to select [F 5], and press “S” button. 
- ② Press “△” or “▽” button to select [oFF], and press “S” button. (This completes the setting of F5.) 

6. Change to the normal mode (measurement mode)

- ① Pressing “S” button more than 2 seconds to return to the measurement mode.

Maintenance Guide

10-1-2. Adjusting the Digital Pressure Switch (Negative Pressure)

After the digital pressure switch has been replaced, make the setting as shown below.

Threshold value of pressure switch:	-60.0kPa
Hysteresis:	5.00kPa
Display color mode:	Green when the pressure switch is turned OFF.
Operation mode:	Hysteresis mode
Pressure switch output form:	Normally open (Turned ON when the value is the threshold value or more.)
Response time:	2.5ms or less
Auto preset setting:	Manual setting

Follow the steps to make the setting.

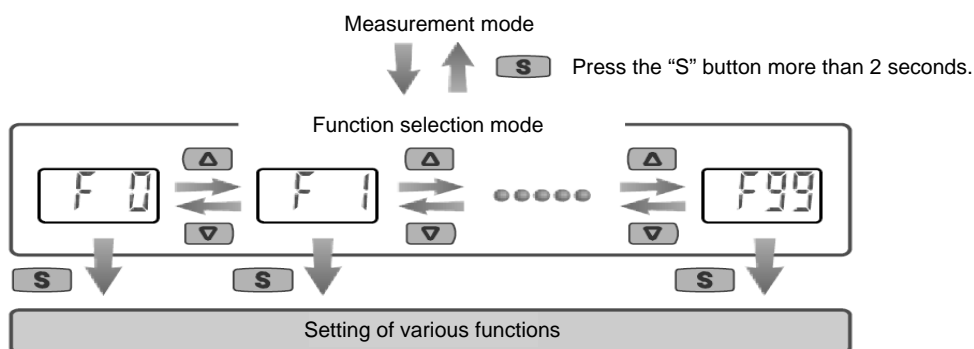
<Setting Procedure>



Digital Pressure Switch, Negative Pressure (kPa)

1. Change to the setting mode

- ① Pressing "S" button more than 2 seconds changes the mode to the function selection mode.



Maintenance Guide

2. Setting of the unit of indication

Press “ ” or “ ” button to select [F 0], and press “ S ” button.

Press “ ” or “ ” button to select the right (indicating Mpa), and press “ S ” button. (This completes the setting of F0.)

3. Setting of the output signal OUT1.

Press “ ” or “ ” button to select [F 1], and press “ S ” button.

Setting of output mode: Press “ ” or “ ” button to select [HYS], and press “ S ” button.

Setting of output reverse: Press “ ” or “ ” button to select [1_P], and press “ S ” button.

Setting of pressure: Press “ ” or “ ” button to select [0.400], and press “ S ” button.

Setting of hysteresis: Press “ ” or “ ” button to select [0.050], and press “ S ” button.

Setting of display color: Press “ ” or “ ” button to select [SoG], and press “ S ” button. (This completes the setting of F1.)

4. Setting of response time

Press “ ” or “ ” button to select [F 3], and press “ S ” button.

Press “ ” or “ ” button to select [2.5], and press “ S ” button.

(This completes the setting of F3.)

5. Setting of auto preset function

Press “ ” or “ ” button to select [F 5], and press “ S ” button.

Press “ ” or “ ” button to select [oFF], and press “ S ” button.

(This completes the setting of F5.)

6. Change to the normal mode (measurement mode)

Pressing “ S ” button more than 2 seconds to return to the measurement mode.

Maintenance Guide

10-2. Replacing the Filter Element

- 1) Put the hand valve located at the lower left portion of the main unit in the close status.
- 2) Turn the filter element main unit 45° clockwise or counterclockwise to pull it out downward while lowering the slide part.
- 3) When replacing the filter element B on the air filter side, turn the resin part fixing the filter element B counterclockwise to detach it.
- 4) When replacing the filter element on the micromist separator side, turn the filter element counterclockwise to detach it.
- 5) Reassemble the components in the reverse order of disassembly.

CAUTION) Before replacing the filter element, always close the knob of the finger valve. The filter element must be replaced when it has been used for two years or when pressure drop reaches 0.1 MPa (1kgf/cm²).

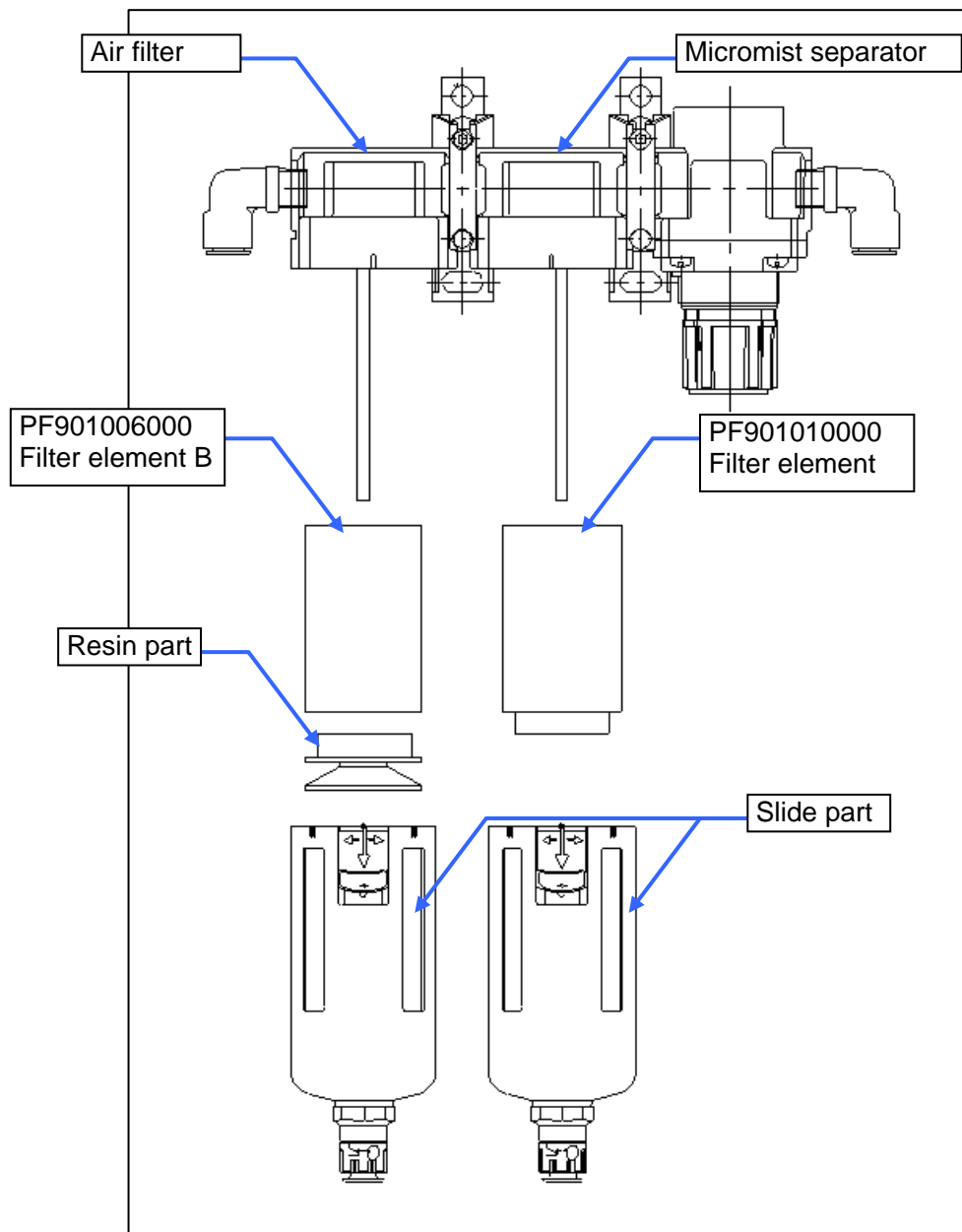


Figure 10-2-1 Filter Element

Maintenance Guide

10-3. Replacement of Vacuum Pump Parts

A pressure drop may have been caused by abrasion of the following parts.

<Table of consumables>

Replacement parts set No.: 40099554

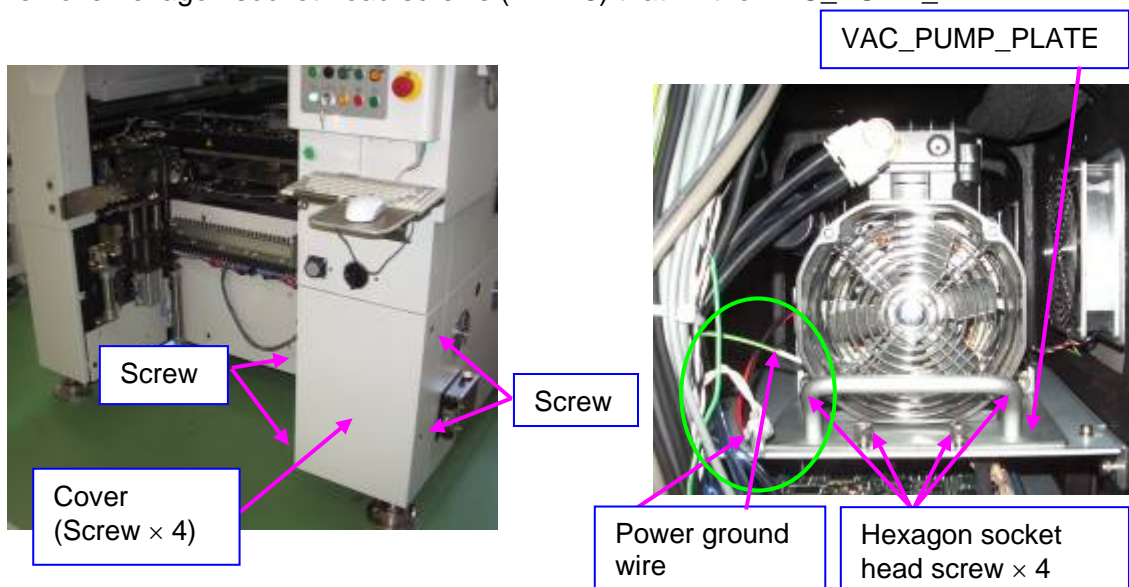
Check	Quantity	Check point	How to check
Cup packing	2	Abnormal abrasion, hardening, and crack	Visual check
Suction valve	2	Deformation, hardening, and nick	Visual check
Exhaust valve	2	Deformation, hardening, and nick	Visual check
O-ring S-67	2	Deformation, abrasion, hardening, crack	Visual check
O-ring P-10	4	Deformation, abrasion, hardening, crack	Visual check
Gasket	2	Deformation, abrasion, crack	Visual check
Suction valve interference-proof rubber	2	Fissure and hardening	Visual check

Regarding the following, purchase them separately if necessary.

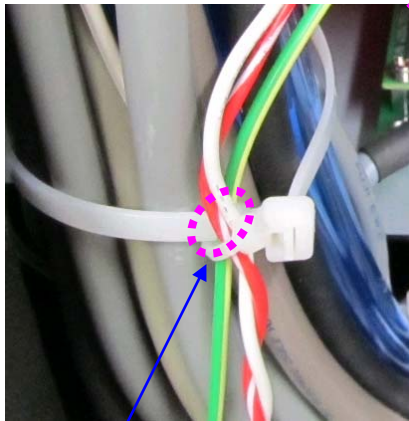
- Vacuum grease Part. No.: 40119551
 Manufacturer: Shin-Etsu Chemical Co., Ltd. Manufacturer's model: HIVAC-G
 This is grease that is applied on O-ring P-10.
- Screw anti-looseness agent NK-4 Part. No.: 40119552
 Manufacturer: Seal End Co., Ltd. Manufacturer's model: NK-4
 This part is required for tightening the retainer (replacing the cup packing and suction valve interference-proof rubber).

<Preparation for making a change for the M, L, L-Wide specification>

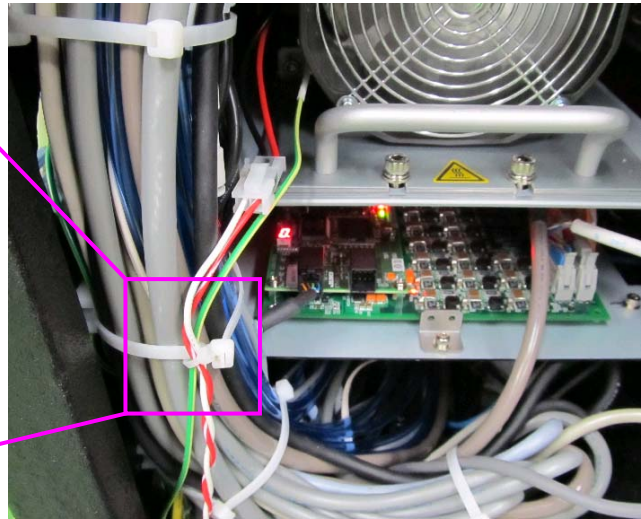
- 1) Turn off the power supply and make sure that the vacuum pump is not in operation.
 (After the pump is operated, its inside is hot. Leave it for about 30 minutes after it is stopped, and then start operations after making sure that the pump is cooled down.)
- 2) Remove the lower right front cover of the machine unit.
- 3) Remove the air tube harness (power ground wire) connected to the vacuum pump and then remove hexagon socket head screws (M4 × 8) that fix the VAC_PUMP_PLATE.



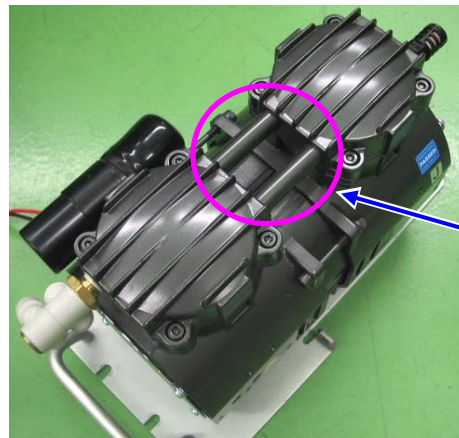
Maintenance Guide



The power ground wire is fixed at one position by binding band (small).



- 4) Take out the vacuum pump from the main unit. (When taking it out, take care about the harness.)
 - * At this time, the vacuum pump bracket may firmly adhere to the rubber sheet. When tearing the bracket from the sheet, take care not to bump your hand against the parts around.
 - * Do not take out the vacuum pump by holding the coupling pipe.



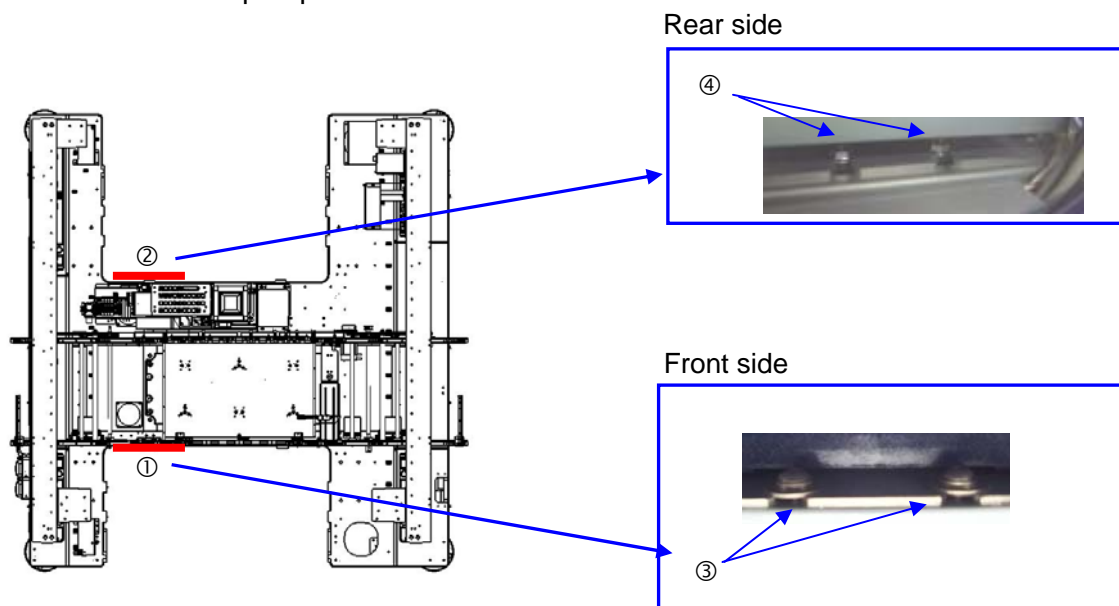
Coupling pipe

Maintenance Guide

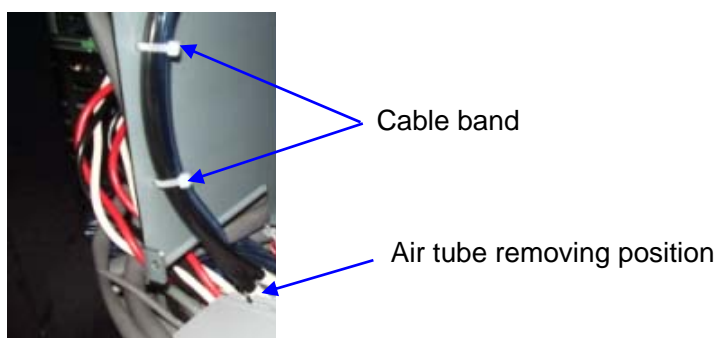
<Preparation for making a change for the XL specification>

* In the case of the electric bank specification, remove the cutter unit according to the previous item "Changing the cutter unit."

- 1) Turn off the power supply and make sure that the vacuum pump is not in operation.
(After the pump is operated, its inside is hot. Leave it for about 30 minutes after it is stopped, and then start operations after making sure that the pump is cooled down.)
- 2) Remove the covers on both front side ① and rear side ②.
- 3) Remove the vacuum pump cover on the front side.

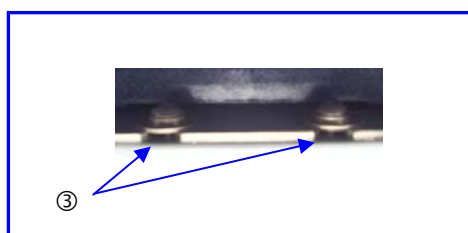


- 4) Remove the air tube harness (power ground wire).

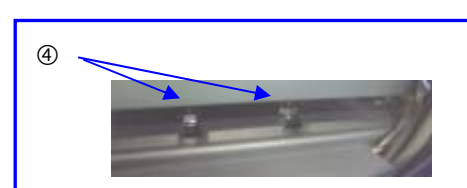


- 5) Remove the circular screws ③ that fix the vacuum pump plate.
- 6) Loosen the flange nuts ④ on the rear side that fix the vacuum pump plate.

Front side



Rear side



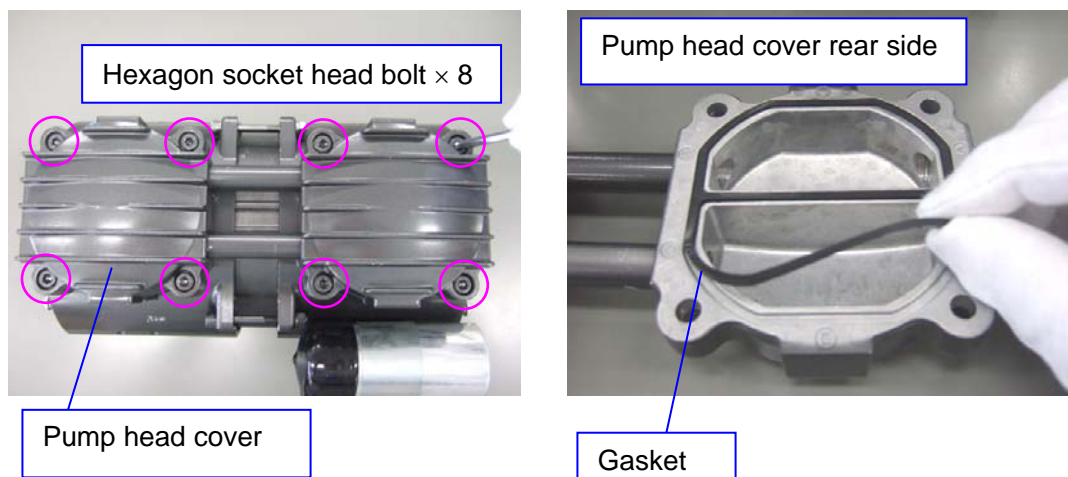
- 7) Pull out the vacuum pump from the front side. (Pay attention to the harness when pulling it out.)

Maintenance Guide

○ Replacing the gasket

- 1) Remove the 4 hexagon socket head bolts (M5 × 20) (8 pieces in total on the left and right sides) of the pump head cover.
- 2) Remove two black gaskets in the pump head cover and replace it with new ones.

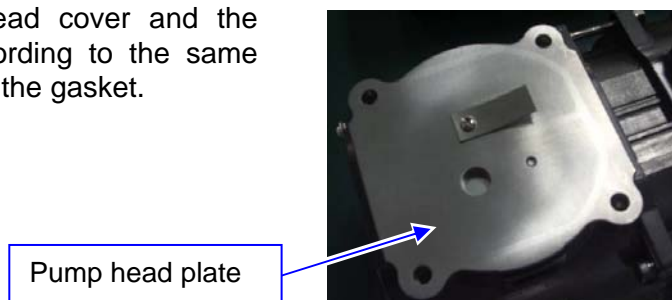
* Make sure that the gasket is put in the gasket groove of the pump head cover and take care not to be caught between the pump head cover and the pump head plate.



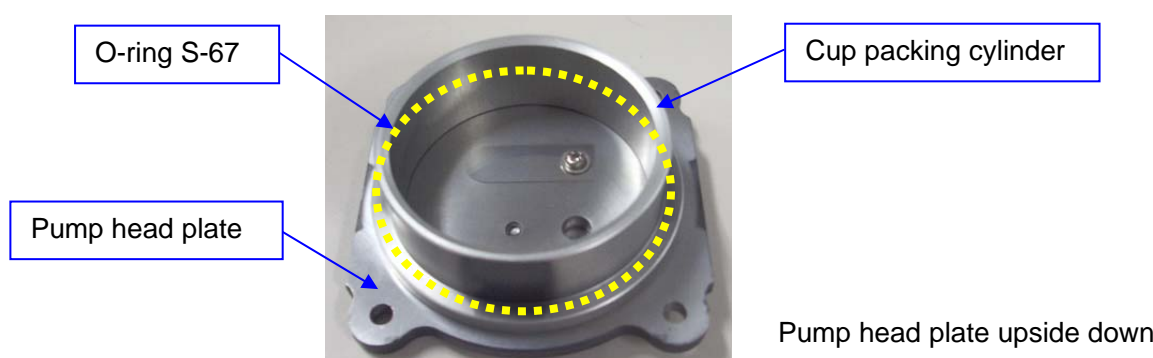
- 3) Tighten the hexagon socket head screws (M5 × 20) for fixing the pump head cover at 50 N·m in a diagonal form. (For replacing other consumables, do not close the cover but refer to the item of replacing process for each portion.)

○ Replacing the O-ring S-67

- 1) Remove the pump head cover and the pump head plate according to the same procedure as replacing the gasket.

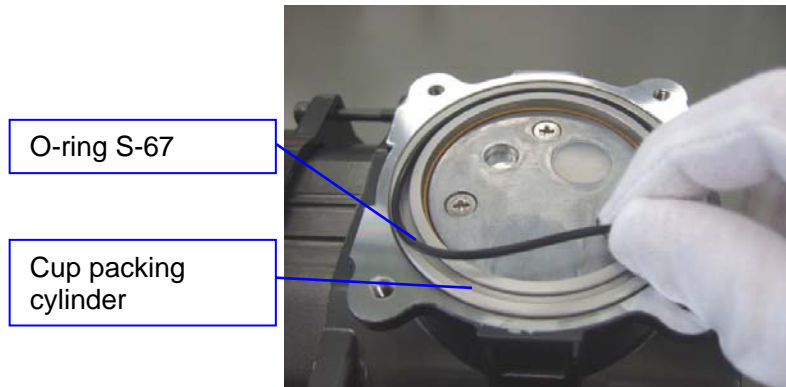


* Sometimes the O-ring S-67 firmly adheres between the pump head plate and the cup packing cylinder. If you get up the pump head plate in this state, the cup packing cylinder will be got up together. If this is the case, tear them from each other and continue the work.



Maintenance Guide

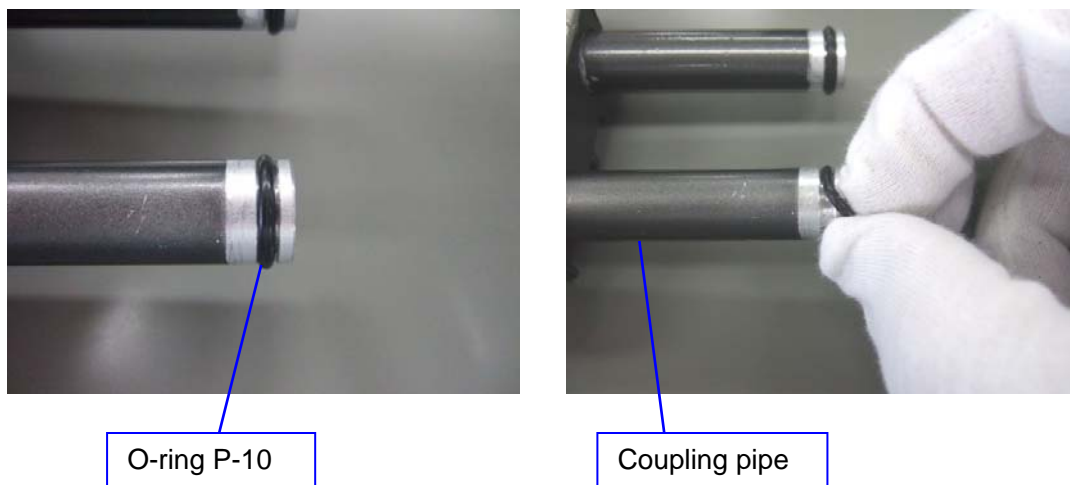
- 2) Replace the O-ring S-67 in the upper part of the cup packing cylinder with a new one.



* Install the cover according to the procedure for replacing the gasket. To replace other consumables, do not close the cover but refer to the item of replacing each portion.

○ Replacing the O-ring P-10

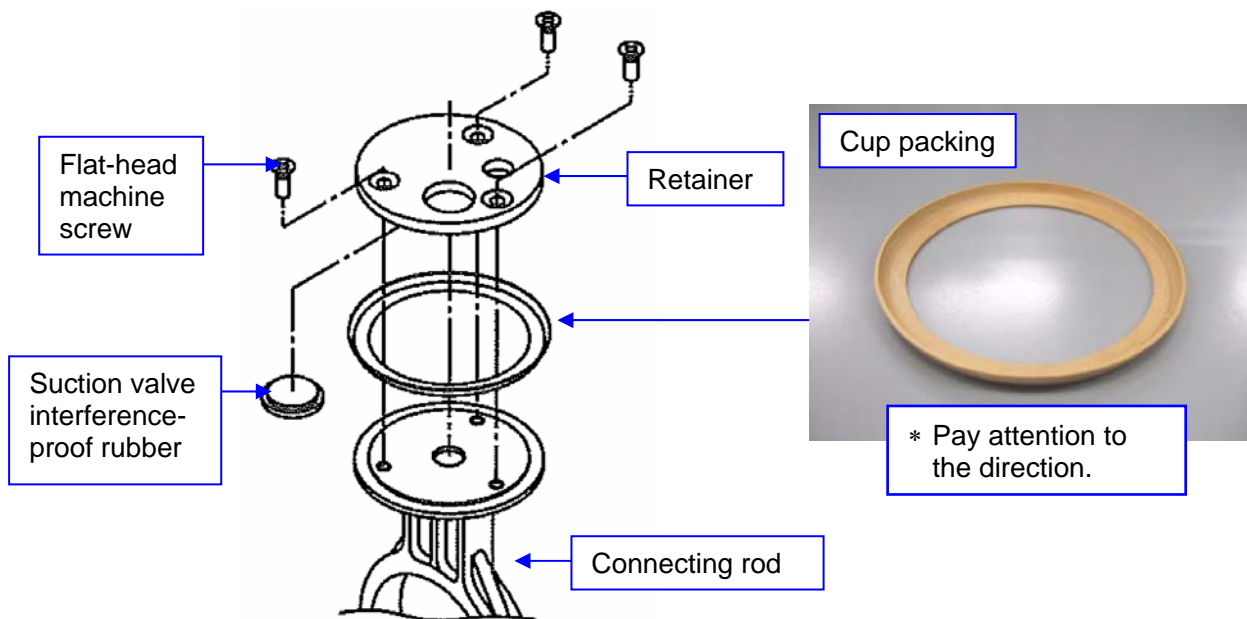
- 1) Remove the pump head cover and the pump head plate according to the same procedure as replacing the gasket.
- 2) Install the O-ring P-10 on the coupling pipe connected with the pump head cover. Make sure in advance that vacuum grease is already applied onto the O-ring to be installed.
- 3) Replace the O-ring taking care not to damage the O-ring when inserting the coupling pipe. (2 positions per pipe)



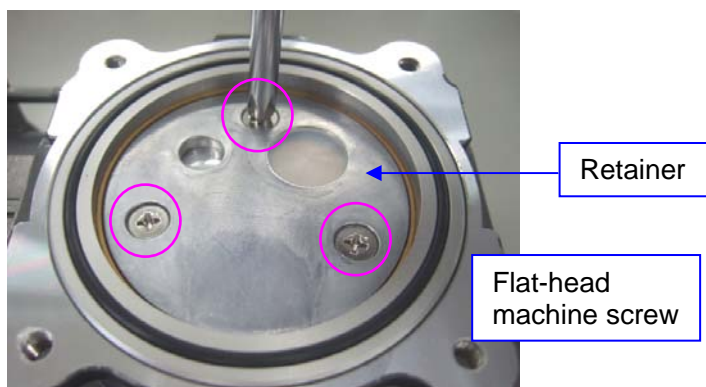
* Install the cover according to the procedure for replacing the gasket. To replace consumables, do not close the cover but refer to the item of replacing each portion.

Maintenance Guide

- Replacing the cup packing and suction valve interference-proof rubber
 - 1) Remove 3 flat-head machine screws (M4 × 8) (6 screws in total) and then remove the retainer, suction valve interference-proof rubber, and cup packing cylinder.
 - 2) Remove dust completely from the cup packing cylinder and the retainer.
 - 3) Set the cleaned cup packing cylinder in the casing and align the center of new cup packing to the center of the cup packing mounting part of the connecting rod, and then thrust it into the cup packing cylinder by hand.



- 4) Tighten the cup packing in which a new suction valve interference-proof rubber is installed on the cup packing with flat-head machine screws (M4 × 8) at 3.0 N·m

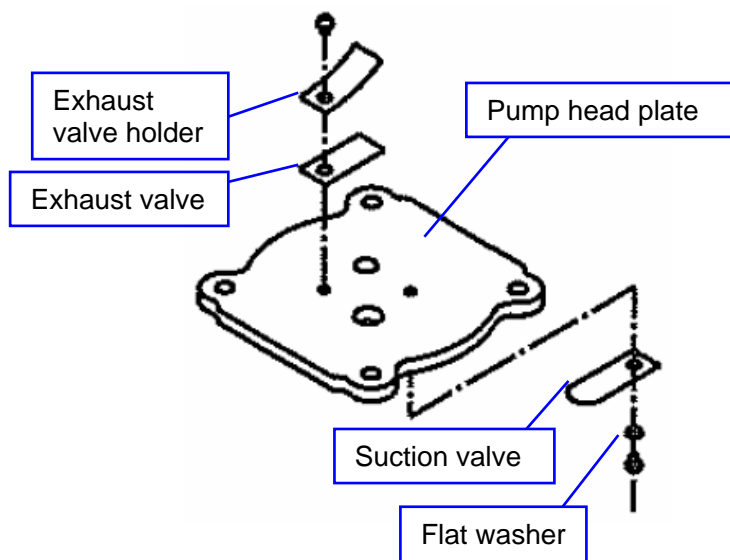


* Install the cover according to the procedure for replacing the gasket. To replace other consumables, do not close the cover but refer to the item of replacing each portion.

Maintenance Guide

○ Replacing the suction valve and exhaust valve

- 1) Loosen the flat-head machine screws (M3 × 5) and remove the exhaust valve holder and exhaust valve.
- 2) Wipe the pump head plate cleanly and replace the exhaust valve with a new one.
- 3) Pile up the pump plate and fix it on the pump head plate with flat-head machine screws (M3 × 5) on which the screw anti-looseness agent (Loctite 242) is applied at 0.8 N·m.



Loctite application amount



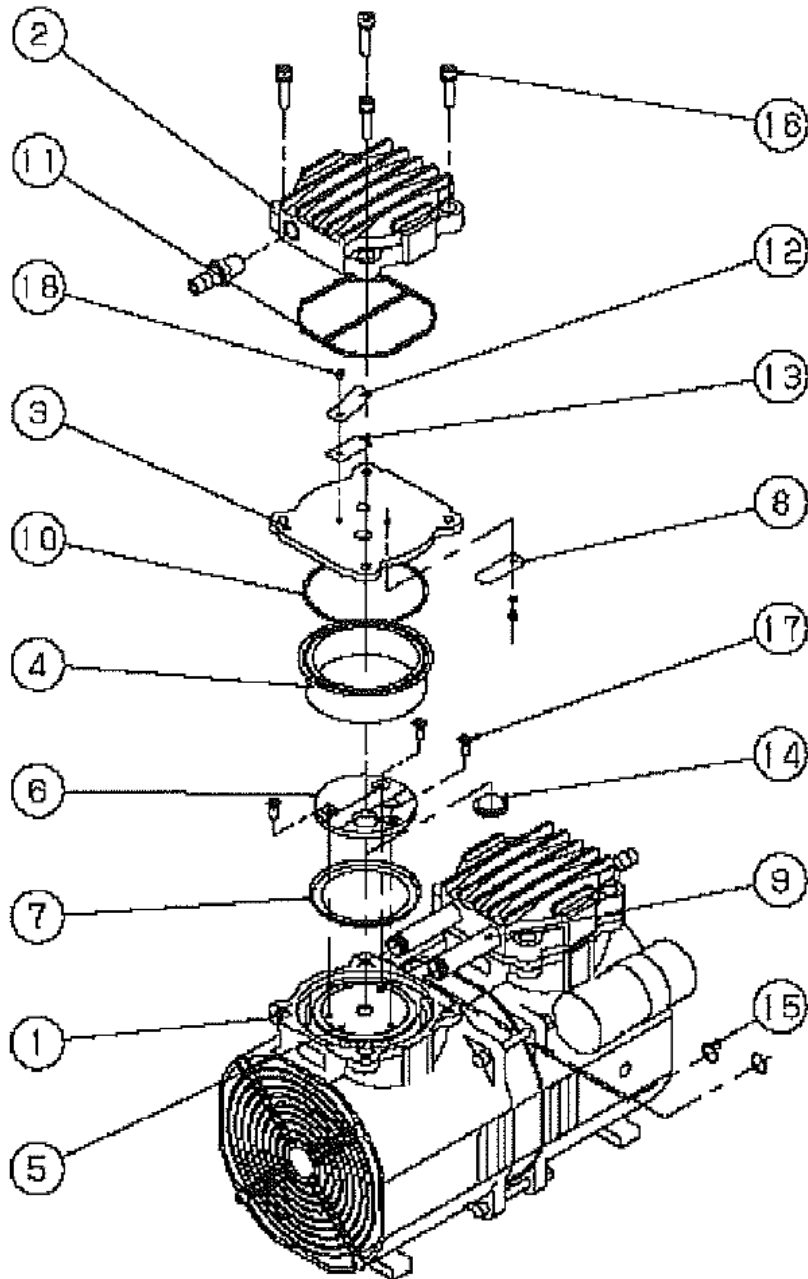
- Apply it onto all the circumferences of 2 or 3 screw peaks at the end.
- Do not apply it onto the end face of the screw.

- 4) Loosen the flat-head machine screws (M3 × 5) fixing the suction valve and remove the suction valve and the flat washer.
- 5) Wipe the pump head cleanly and replace the suction valve with a new one. Install the suction valve and exhaust valve so that each valve may cover the suction hole and exhaust hole completely.
- 6) Pile up the flat washer and fix it on the pump head plate with flat-head machine screws (M3 × 5) on which the screw anti-looseness agent (Loctite 242) is applied at 0.8 N·m.

* Install the cover according to the procedure for replacing the gasket. To replace other consumables, do not close the cover but refer to the item of replacing each portion.

Maintenance Guide

Vacuum pump pressure apartment diagram



No.	Name
1	Casing
2	Pump head cover
3	Pump head plate
4	Cylinder
5	Connecting rod
6	Retainer
7	Cup packing
8	Suction valve
9	Coupling pipe

No.	Name
10	O-ring S-67
11	Gasket
12	Exhaust valve holder
13	Exhaust valve
14	Suction valve interference-proof rubber
15	O-ring P-10
16	Hexagon socket head bolt (M5 × 20)
17	Flat-head machine screw (M4 × 8)
18	Flat-head machine screw (M3 × 5)

Maintenance Guide

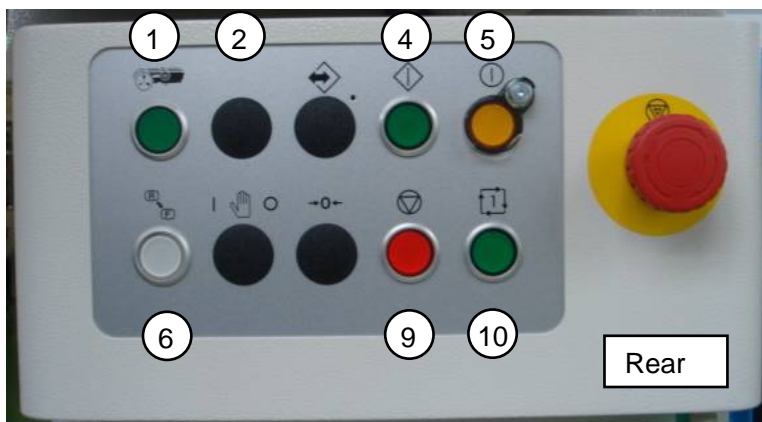
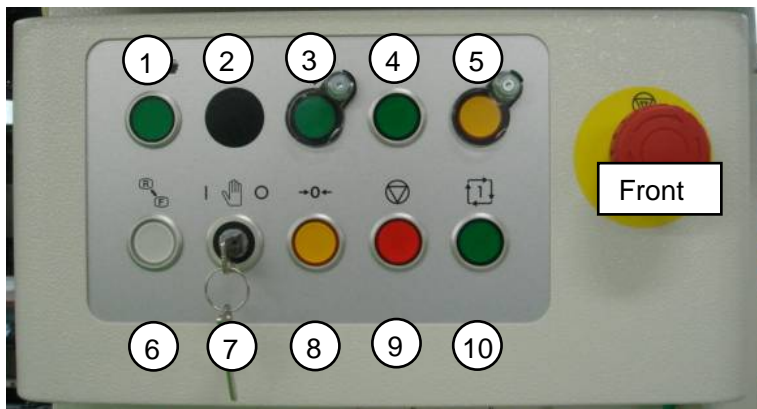
**DANGER**

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

[11] SWITCH AND COVER RELATED

11-1. Replacing the Push-Button Switch

11-1-1. Replacing the Push-Button Switch (Machine with the Standard Specifications)

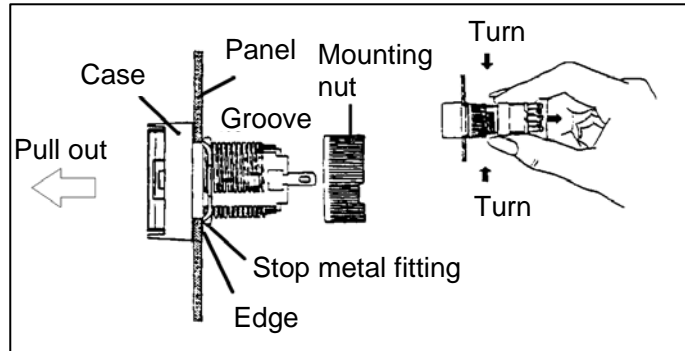


- ① Feeder switch
(Provided when non-stop operation is mounted.)
- ② Laser ON lamp
(Provided when the optional coplanarity is mounted.)
- ③ On-line switch
- ④ Start switch
- ⑤ Servo free switch
- ⑥ Keyboard setting switch
(Provided when rear operation is mounted.)
- ⑦ Key switch
- ⑧ Origin switch
- ⑨ Stop switch
- ⑩ Single cycle switch

* The list of replacement parts is described in section 14-9-3.

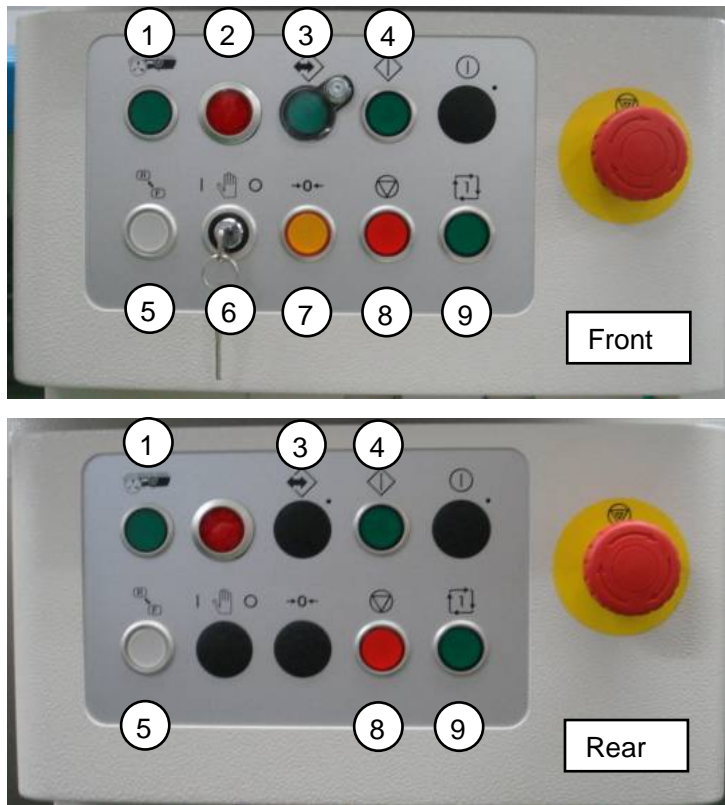
Maintenance Guide

- 1) Detach the whole operation unit from the machine main unit. (M4 hexagon screws at 4 locations)
- 2) Detach the switch panel cover. (M3 hexagon screws at 4 locations)
- 3) Detach the operation board.
- 4) To detach the switch, pull the switch toward you while keeping the metal fittings on the switch pushed by fingers from the back of the cover.
- 5) Reassemble the components in the reverse order of disassembly.



Maintenance Guide

11-1-2. Replacing the Push-Button Switch (Machine with the EN Specifications)

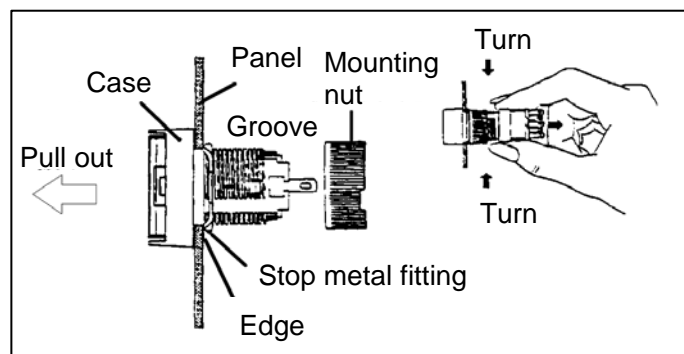


- ① Feeder switch
(Provided when non-stop operation is mounted.)
- ② Laser ON lamp
(Provided when the optional coplanarity is mounted.)
- ③ On-line switch
- ④ Start switch
- ⑤ Keyboard setting switch
(Provided when rear operation is mounted.)
- ⑥ Key switch
- ⑦ Origin switch
- ⑧ Stop switch
- ⑨ Single cycle switch

- 1) Detach the whole operation unit from the machine main unit. (M4 hexagon screws at 4 locations)
- 2) Detach the switch panel cover. (M3 hexagon screws at 4 locations)
- 3) Detach the operation board.
- 4) To detach the switch, remove the base part (mounting nut) of the switch from the rear of the cover and pull out the case from the cover front. Then replace the switch.
- 5) Reassemble the components in the reverse order of disassembly.



Back of Cover



Detachment of Switch

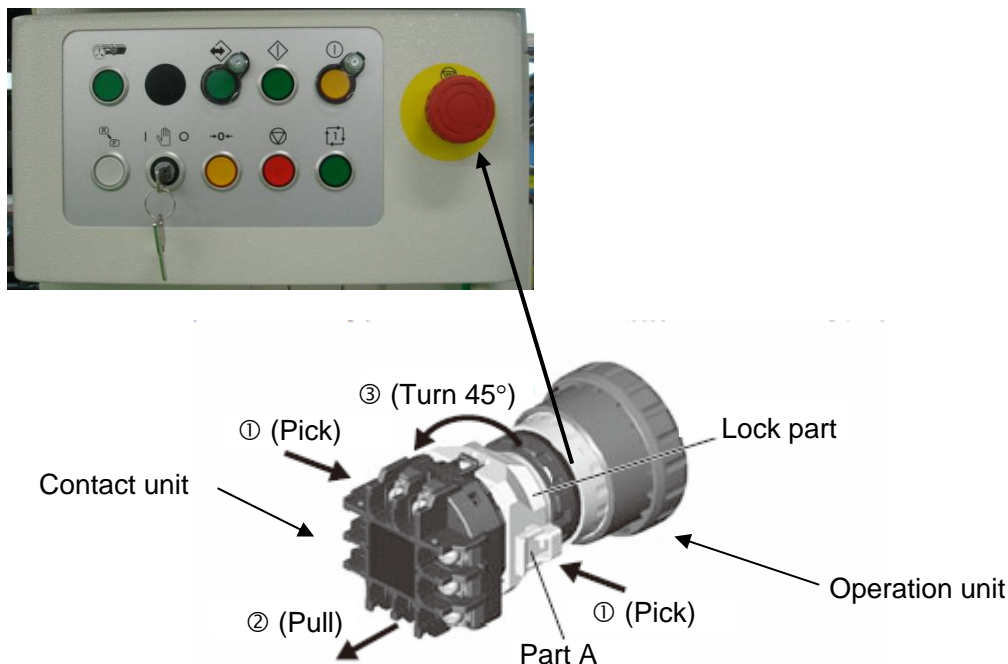
CAUTION

A combination of the switch connector and connector on the operation switch board has a specified orientation. Always pay special attention to the orientation when mounting the switch.

Maintenance Guide

11-2. Replacing the EMERGENCY STOP Switch

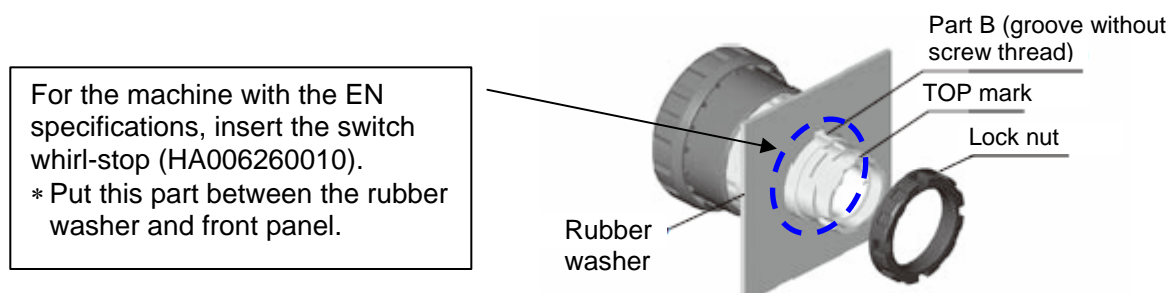
- 1) Detach the switch panel cover. (M3 hexagon screws at 4 locations)
- 2) To replace the EMERGENCY STOP switch, check that any button on the operation unit is not pressed, pick (push down) the part A of the lock part (yellow) of the contact unit in the direction indicated by an arrow mark, pull the lock part toward the terminal, and turn the contact unit 45° counterclockwise. The contact unit is then detached from the operation unit.



- 3) Remove the cable from the operation board to replace the switch.

Replacement location	Part No.	Part name	Q'ty per machine
Front	40092833	EMG SW(F) ASM	1
Front (EN-spec. machine)	40113643	EM SW F CABLE ASM (EN)	1
Rear	40092860	EMG SW(R) ASM	1
Rear (EN-spec. machine)	40113644	EM SW R CABLE ASM (EN)	1

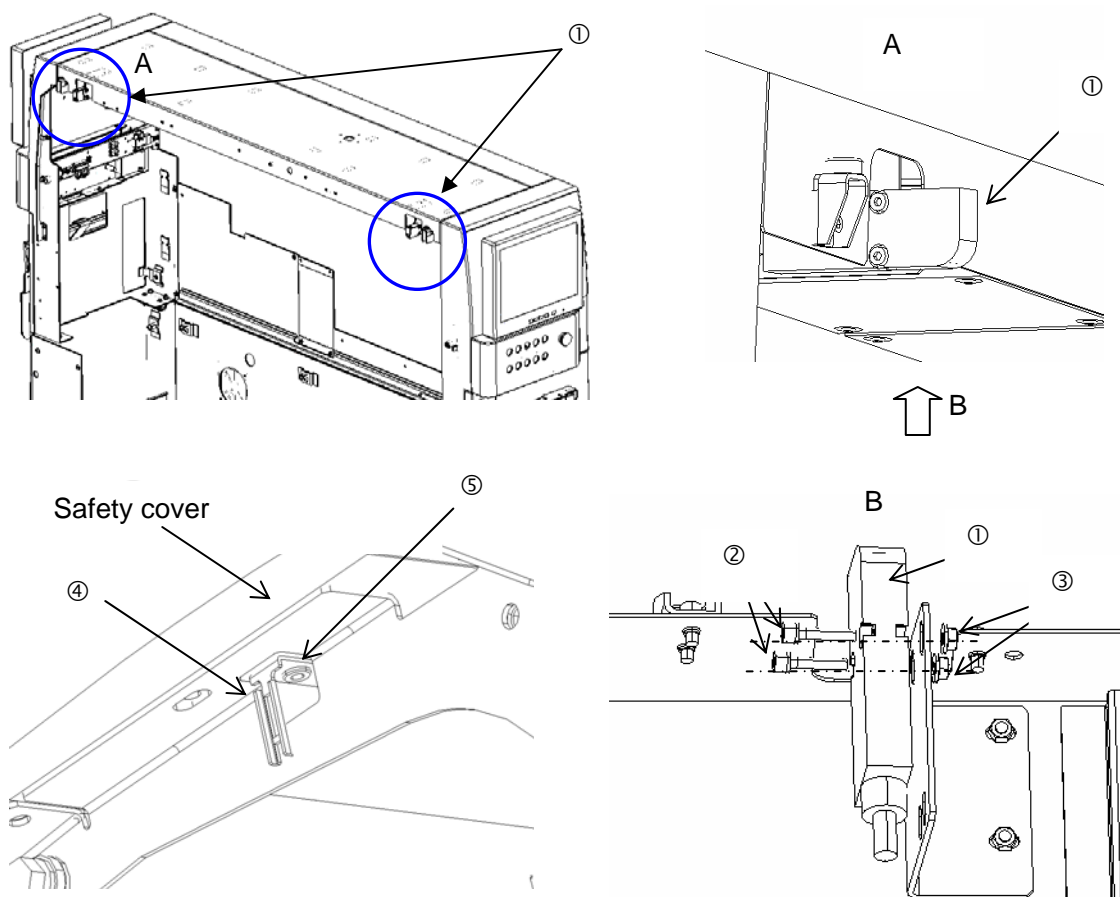
- 4) To attach the EMERGENCY STOP switch, remove the lock nut, check that the rubber washer is mounted correctly, and pass the operation unit through the panel hole from the front of the panel. Tighten the lock nut with the part B (groove without screw thread) on the TOP marking side of the operation unit kept faced upward.



Maintenance Guide

11-3. Replacing the Cover Open Switch

- 1) Disconnect the connector of the cover open switch ① on the front from the operation board (CN8) and that on the rear from the relay connector (CN7).
 - 2) Cut the tie-up band and remove the washer assembled hexagon socket head cap bolt ② to replace the cover open switch main unit ①.
 - 3) Reassemble the components in the reverse order of disassembly.
- * After assembling, check that the safety switch key ④ mounted on the safety cover is inserted into the cover open switch properly.
To ensure the safety, this safety switch key uses the special screw (key screw ⑤) so that it cannot be removed easily. To make the adjustment, the dedicated wrench (Allen wrench (40080491)) is required.



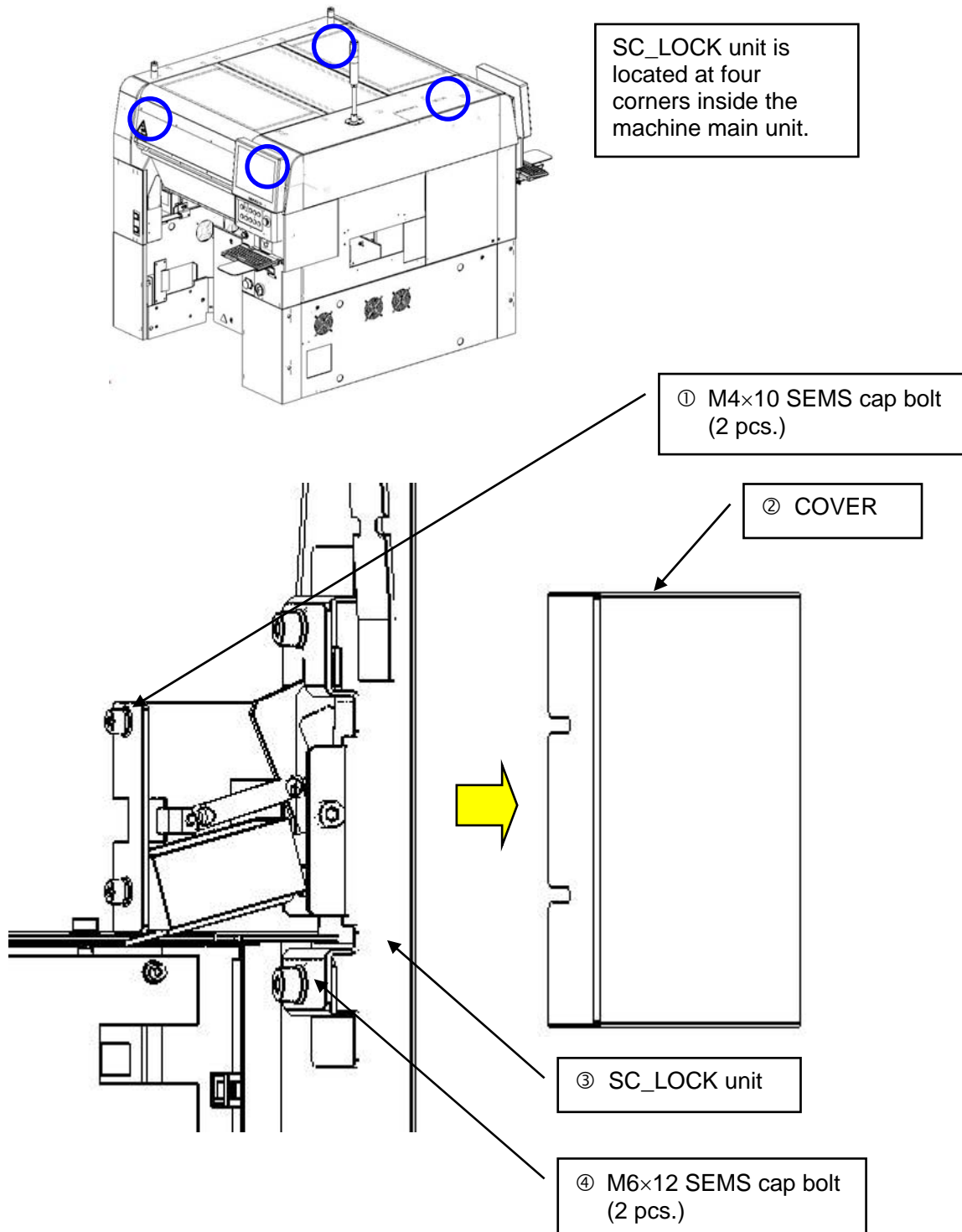
No.	Part No.	Part name	Q'ty per machine
①	40002254	COVER_OPEN_SW_CABLE_ASM	2
②	SL6042042TN	SCREW	4
③	NM3040520SF	FLANGE NUT M4	4
④	HA005280010	SAFETY_SWITCH_KEY	2
⑤	40080490	KEY_SCREW	4

Maintenance Guide

11-4. Replacing the Safety Cover Lock Cylinder

[Removal]

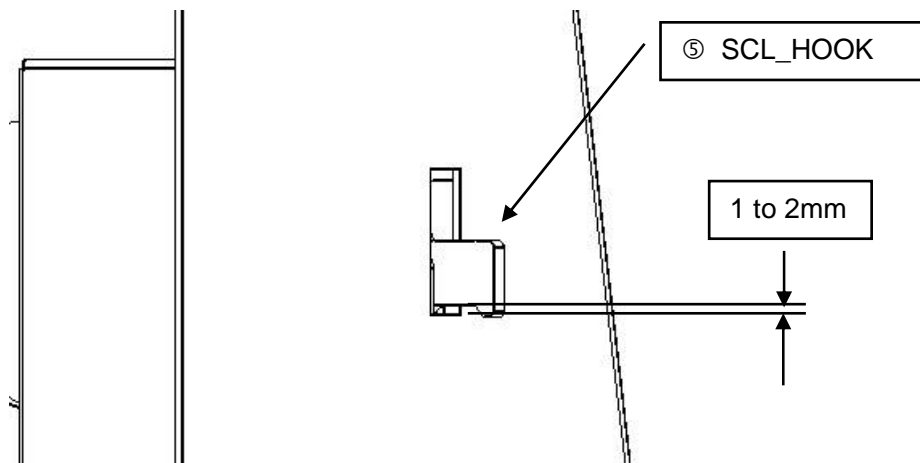
- 1) Loosen the M4×10 SEMS cap bolts ① (2 pcs.) and pull out the COVER ② in the direction indicated by an arrow to detach it.
- 2) Remove the M6×12 SEMS cap bolts ④ (2 pcs.) to detach the SC_LOCK unit ③.



Maintenance Guide

[Assembly]

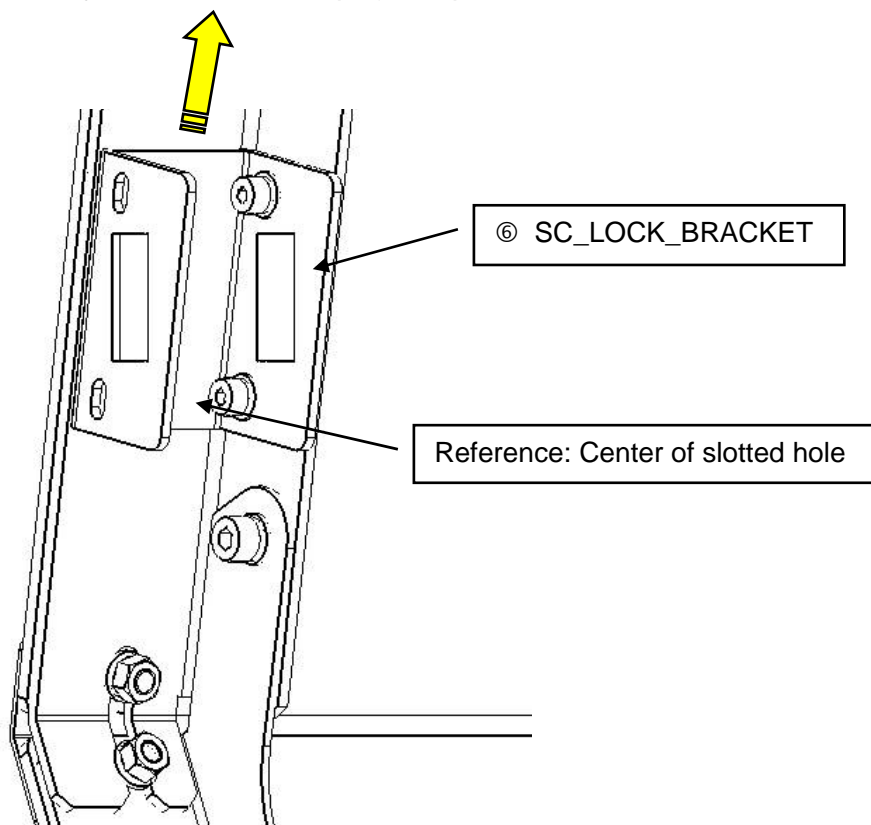
- 1) Assemble the SC_LOCK unit ③ with the M6×12 SEMS cap bolts ④ (2 pcs.).
- 2) At this time, adjust the clearance between the square hole in the main unit cover and the bottom of the SCL_HOOK ⑤ to 1 to 2 mm.



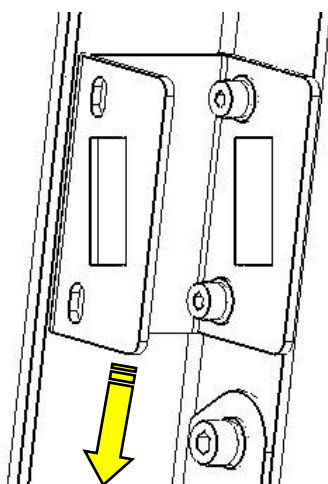
- 3) Close the safety cover and turn ON the power to the machine main unit.
- 4) On the operation screen, select [Manual Control] → [Simple Control] (unit 1_cover lock) to turn ON the lock of the safety cover.
- 5) With the safety cover lock turned ON, raise the safety cover upward twice or three times. According to the conditions shown below, move to relevant step.
 - a) The safety cover is locked and the cover open switch is not detected. → Go to step 6).
 - b) The safety cover is locked, but the cover open switch is detected. → Go to step 8).
 - c) The safety cover is not locked, but the cover open switch is detected. → Go to step 9).
- 6) The adjustment is completed.
Turn OFF the lock of the safety cover through the operation screen.
- 7) Assemble the COVER ② with the M4×10 SEMS cap bolts ① (2 pcs.).

Maintenance Guide


- 8) Turn OFF the lock of the safety cover through the operation screen to release the safety cover and move up the SC_LOCK_BRACKET ⑥.
At this time, be careful not to move up the bracket excessively.
When the bracket is moved up excessively, the conditions may become those stated in 6)_c).
The reference position is the center of the slotted hole.
After the position has been adjusted, return to step 5) and proceed the work.



- 9) Turn OFF the lock of the safety cover through the operation screen to release the safety cover and move down the SC_LOCK_BRACKET ⑥.
At this time, be careful not to move down the bracket excessively.
When the bracket is moved up excessively, the conditions may become those stated in 6)_b).
The reference position is the center of the slotted hole.
After the position has been adjusted, return to step 5) and proceed the work.



Maintenance Guide

 DANGER	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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[12] REPLACING AND ADJUSTING THE FEEDER FLOAT SENSOR

12-1. Replacing the Sensor and Adjusting the Height

- 1) In the KE-3010/3020V/3020VR, the sensors are arranged as shown in the Figure below. If the sensor has been replaced, the height adjustment is needed.

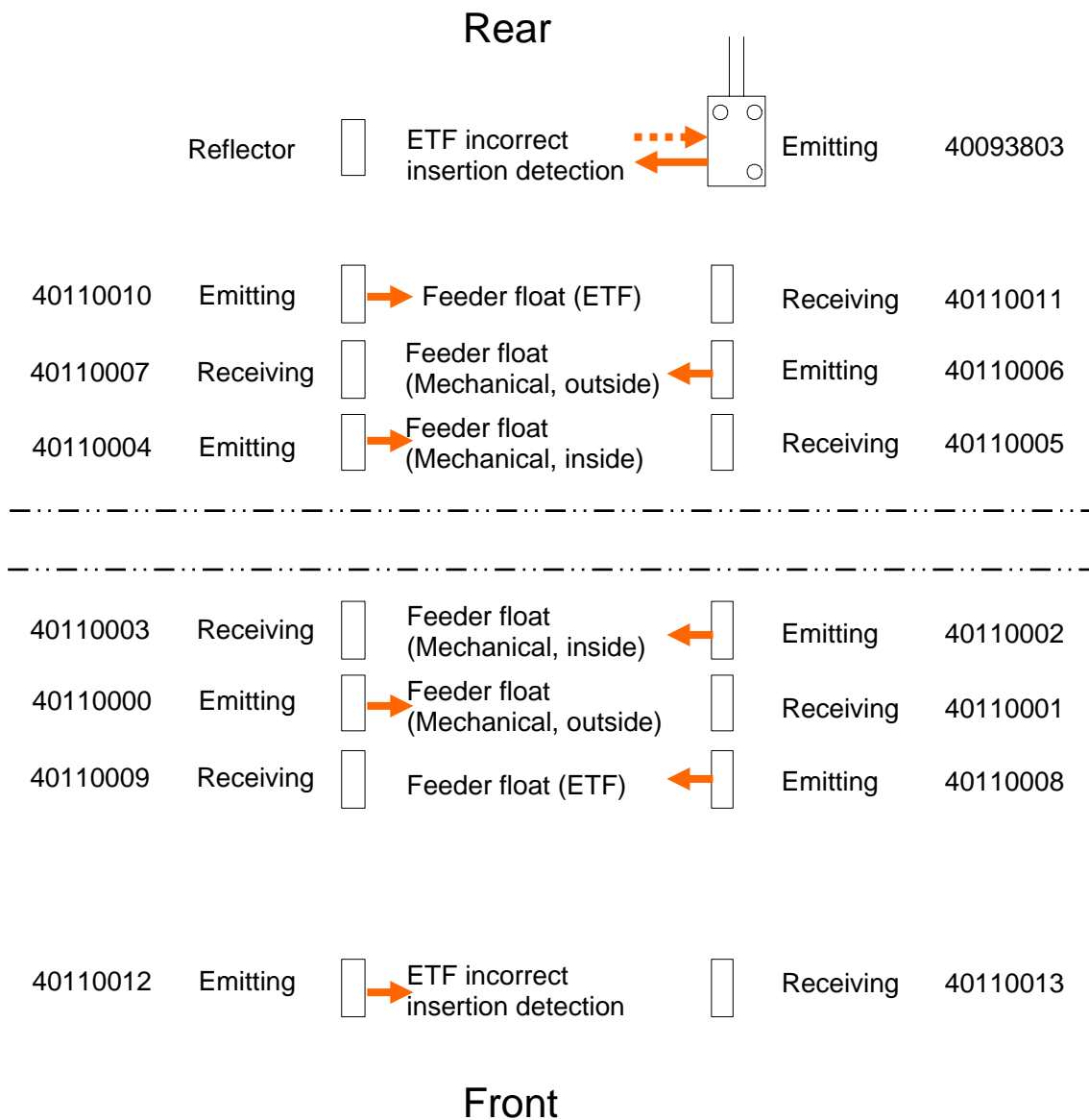


Figure 12-1-1

Maintenance Guide

Light emitting side				Light receiving side			
No.	Part No. of sensor to be used.	Hot marker	Assembly part name	Part No. of sensor to be used.	Hot marker	Assembly part name	
①	40110000	CN412	CN412_ASM	40110001	CN413	CN413_ASM	
②	40110002	CN411	CN411_ASM	40110003	CN410	CN410_ASM	
③	40110004	CN421	CN421_ASM	40110005	CN420	CN420_ASM	
④	40110006	CN422	CN422_ASM	40110007	CN423	CN423_ASM	
⑤	40110008	CN415	CN415_ASM	40110009	CN414	CN414_ASM	
⑥	40110010	CN425	CN425_ASM	40110011	CN424	CN424_ASM	
⑦	40110012	CN416	CN416_ASM	40110013	CN417	CN417_ASM	

2) Assemble the replacement sensor as shown in the Figure below.

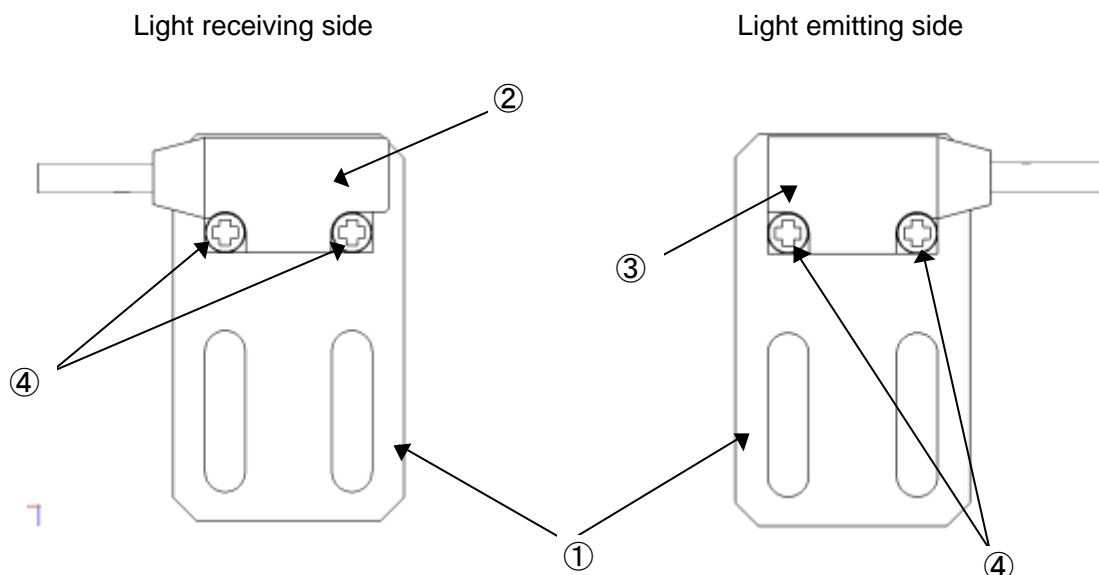


Figure 12-1-2

	Part No.	Part name
①	40110190	FSD_BR
②	—	Light receiving sensor
③	—	Light emitting sensor
④	SM4020501SC	SCREW M2 L=5

Maintenance Guide

- 3) Assemble each sensor at the position shown below. For the part No. of the sensor assembly to be assembled, see the Table shown in step 12-1).

① Front left portion

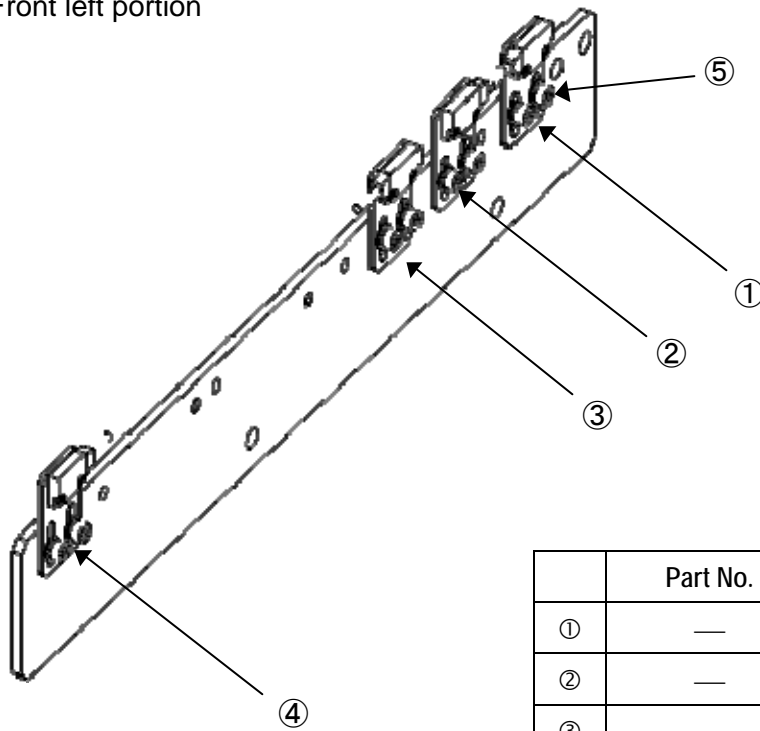


Figure 12-1-3

	Part No.	Part name
①	—	CN410_ASM
②	—	CN412_ASM
③	—	CN414_ASM
④	—	CN416_ASM
⑤	SL6030692TN	SCREW M3 L=6

② Front right portion

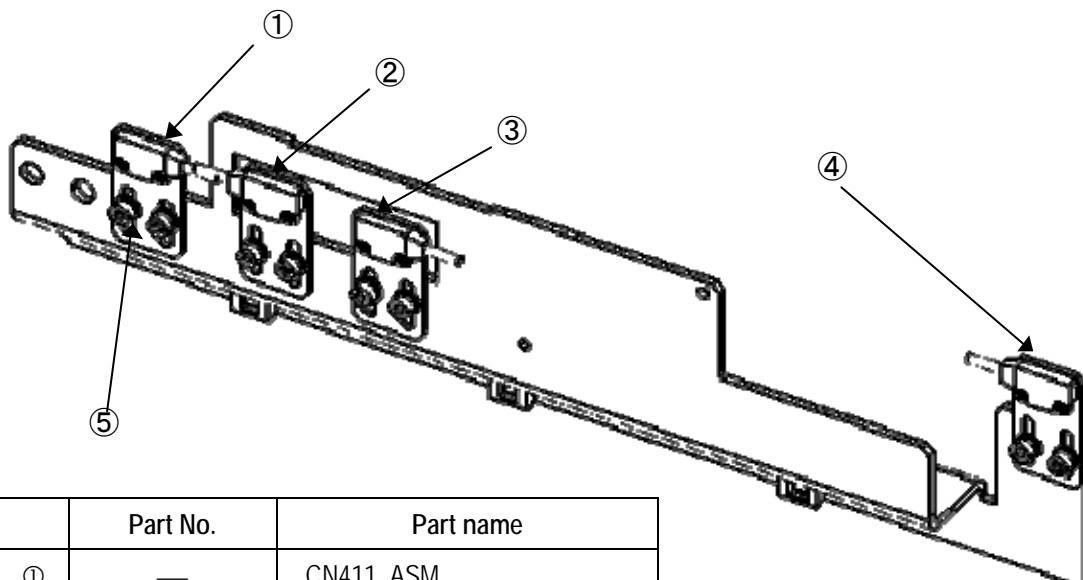


Figure 12-1-4

	Part No.	Part name
①	—	CN411_ASM
②	—	CN413_ASM
③	—	CN415_ASM
④	—	CN417_ASM
⑤	SL6030692TN	SCREW M3 L=6

Maintenance Guide

③ Rear left portion

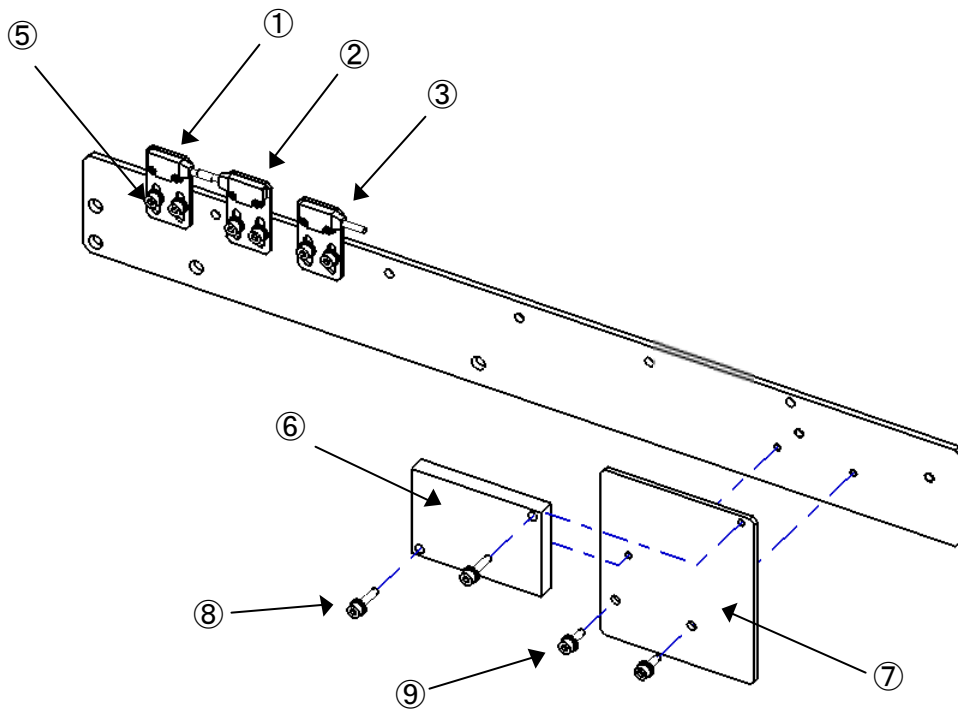


Figure 12-1-5

	Part No.	Part name
①	—	CN421_ASM
②	—	CN423_ASM
③	—	CN425_ASM
④	—	
⑤	SL6030692TN	SCREW M3 L=6
⑥	40093804	REFLECTOR
⑦	40093992	S_BR_C
⑧	SL6031492TN	SCREW M3 L=14
⑨	SL6030892TN	SCREW M3 L=8

Maintenance Guide

④ Rear right portion

Stick a double-sided tape to the ARRAY_SENSOR_BR ⑦. At this time, use a double-sided tape with a width of approx. 25 mm and a length of approx. 80 mm. Adhere the MIRROR ⑩ so that it matches with the end face of the part A.

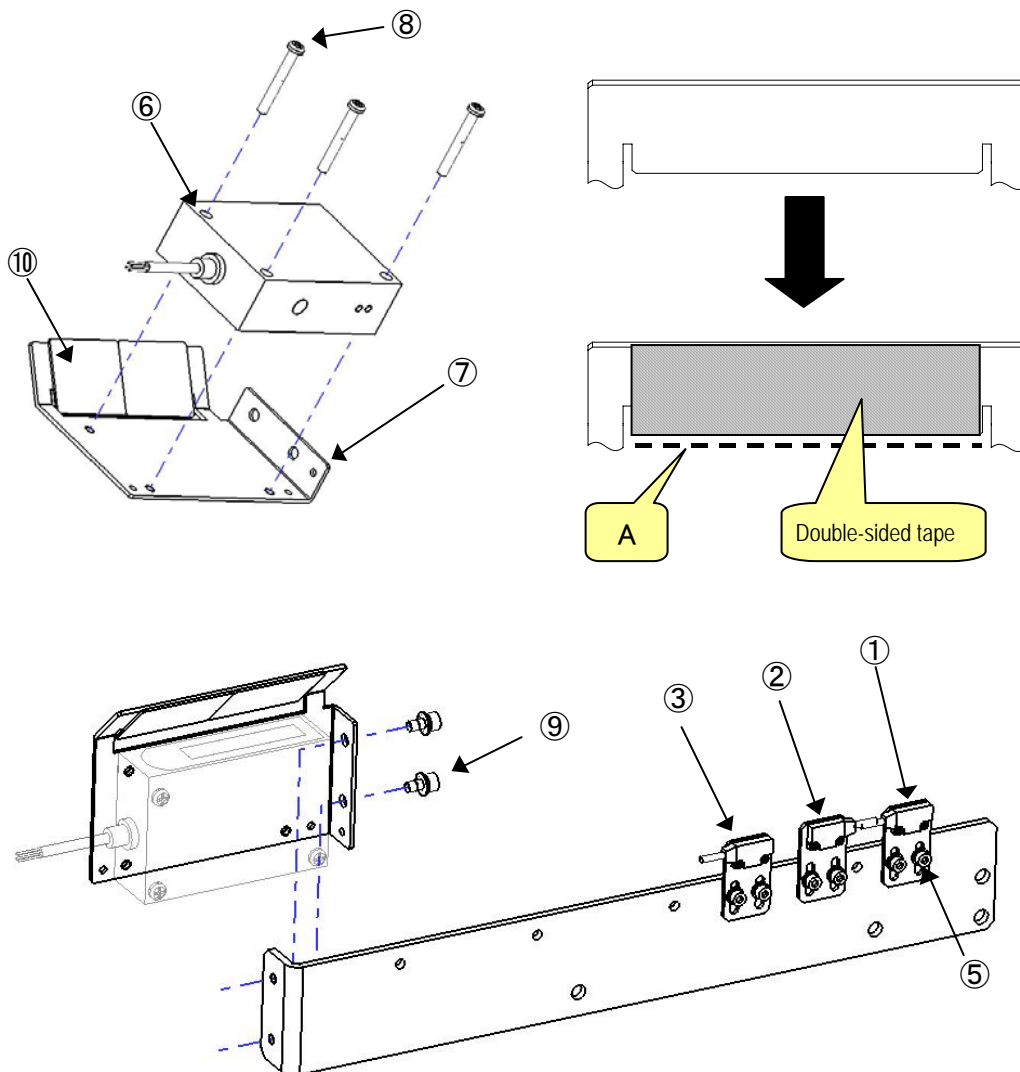


Figure 12-1-6

	Part No.	Part name
①	—	CN420_ASM
②	—	CN422_ASM
③	—	CN424_ASM
④	—	
⑤	SL6030692TN	SCREW M3 L=6

	Part No.	Part name
⑥	40093803	REFLEX_ARRAY_SENSOR
⑦	40114730	ARRAY_SENSOR_BR
⑧	SM4043001SF	SCREW M4×30
⑨	SL6040892TN	SCREW M4 L=8
⑩	40049414	CHIP_BOX_MIRROR

Maintenance Guide

- 4) Adjust the height of a newly mounted sensor. (The difference between the left and right height levels is 0.1 mm or less.)
- Feeder float sensor (Specific mechanical specifications and specifications common to both mechanical/ETF) (Height from the top of the mechanical bank to the top of the sensor)

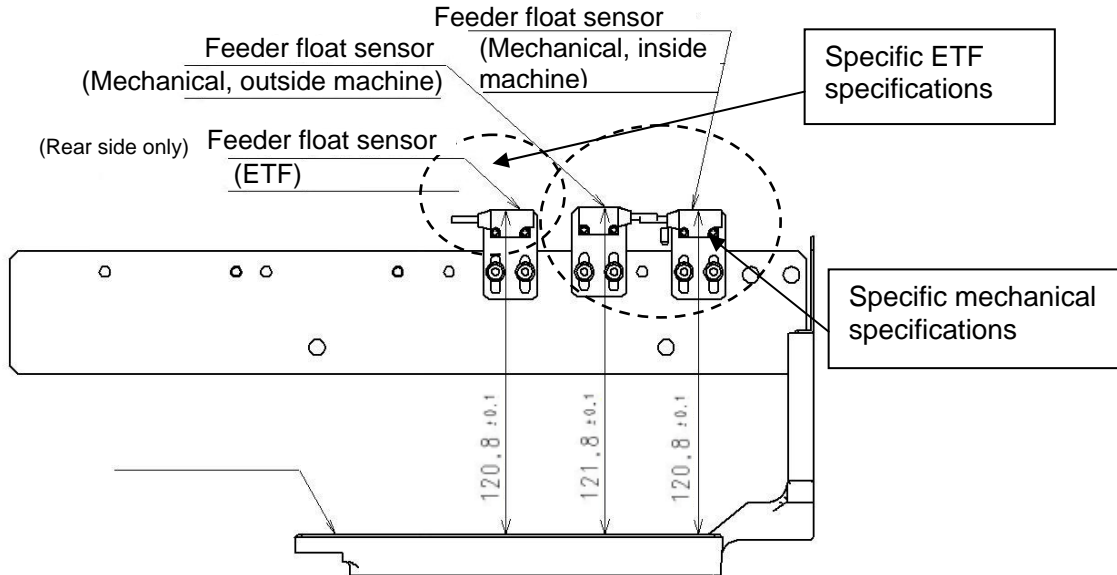


Figure 12-1-7

- Feeder float sensor (Specific ETF specifications) (Height from the top of the electric bank to the top of the sensor)

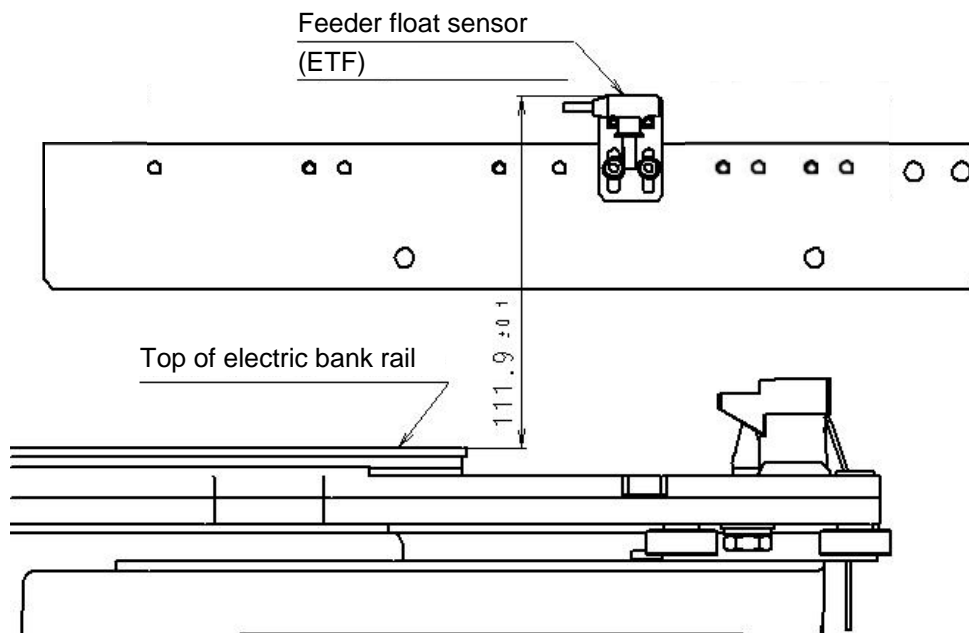


Figure 12-1-8

Maintenance Guide

- ETF incorrect insertion detection sensor (Front) (Height from the top of the electric bank to the top of the sensor)

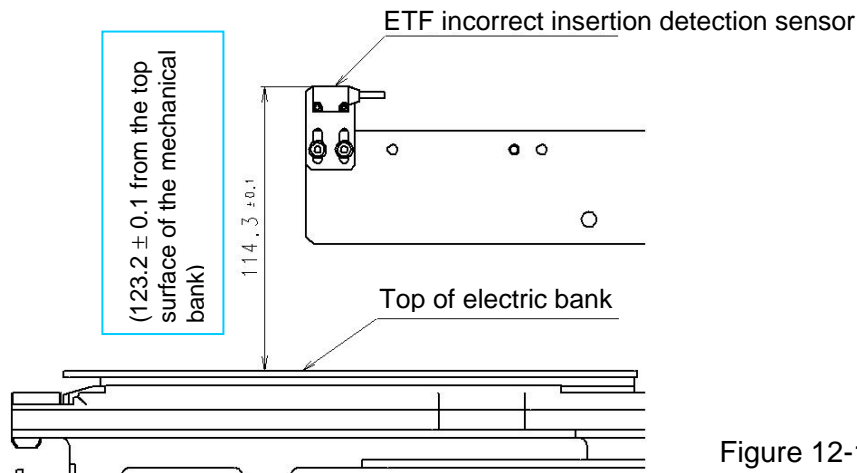


Figure 12-1-9

- ETF incorrect insertion detection sensor (Rear)

[Adjustment procedure for sensor]

- ① Adjust the sensor light height on the left and right of the electric bank (light emitting sensor side and reflection board side).
- ② Loosen the angle adjustment screw to move down the sensor once.
- ③ Set the ETF8S on the light emitting side to emit the light onto the roller. Light emitting amount is 5 ± 1 mm.
- ④ Remove the ETF8S from the light emitting sensor side and set it on the reflection board side. In the same manner, emit the light onto the roller. Light emitting amount is 5 ± 1 mm.
- ⑤ Set the ETF on the light emitting sensor side again to make the check. If the emitted light deviates, repeat steps ② and ③.
- ⑥ With the ETF8S set on the light emitting side and reflection board side, adjust the sensor.
Note: Check that the emitted light is not beyond the reflection board (in the vertical and horizontal directions)

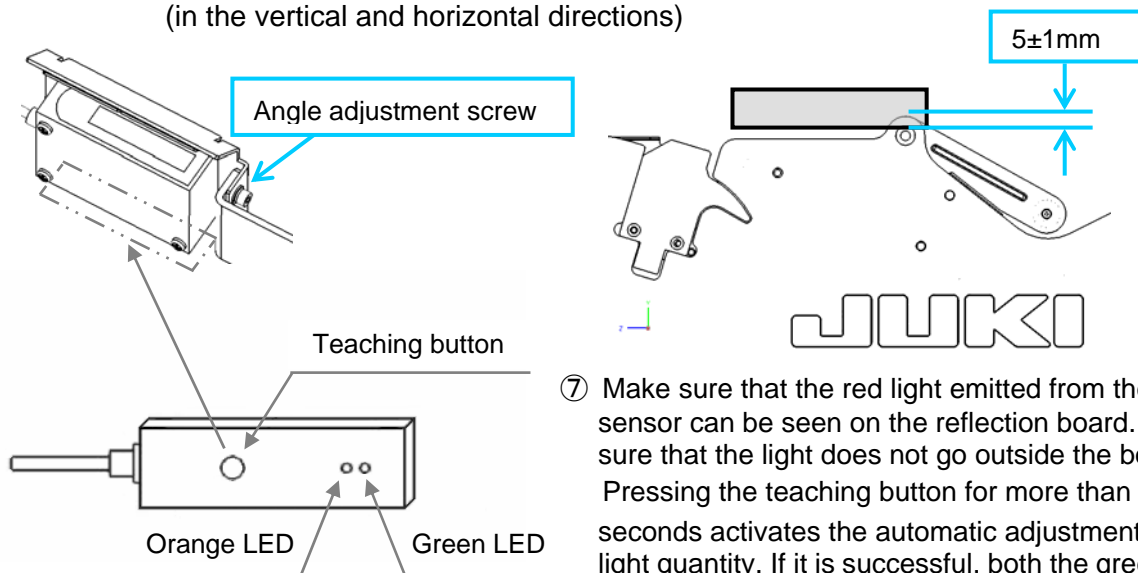


Figure 12-1-10

- ⑦ Make sure that the red light emitted from the sensor can be seen on the reflection board. (Make sure that the light does not go outside the board.) Pressing the teaching button for more than 2 seconds activates the automatic adjustment of light quantity. If it is successful, both the green and orange LEDs light up. If either or both of the LEDs blink slowly after the teaching, the red light might not come to the right position on the reflection board. Adjust the position again in this case.

Maintenance Guide

Insert and remove the ETF8S to/from the left, center, and right of the electric bank, and then move the ETF within a play of the rail to check that the sensor is not turned OFF.

Place the ETF8S on the left, center, and right slide rails of the electric bank to check that the sensor is turned OFF.

12-2. Checking and Adjusting the Sensor Operation

- 1) Before checking and adjusting the operation of each sensor, adjust the light axis.
Move the light emitting and light receiving sensors, the height levels of which have been adjusted, in the Y-direction to adjust the light axis.
When the light axis is adjusted correctly, both the red and green LEDs on the light receiving sensor will light up.
(The red LED is the operation indicator lamp and the green LED is the stability indicator lamp.)
- 2) Follow adjustments step ㉑ to ㉒ for each sensor to adjust the volume.
Adjust the volume after the sensor mounting height, mounting position in the Y-direction (sensor is secured to the center of the oval hole in the sensor bracket), and light-axis have been adjusted.

<Units and tools to be used for adjustment>

- * For adjustment of the feeder float sensor on the transport side
 - NF12 (NF16 or NF24 is also accepted.) → Non-lock type
 - NF16N (NF12N or NF24N is also accepted.)
- * For adjustment of the feeder float sensor outside the machine
 - NF16 (NF12, NF24, NF12N, NF16N, or NF24N is also accepted.)
 - NF32 feeder (NF323S, NF324S, or NF32FS is also accepted.)
 - Bulk feeder (BF10, BF11, or BF12 is also accepted.)
- * For adjustment of the ETF float sensor outside the machine
 - ETF (8S, 12S, 16S, 24S, 32S, 44S, or 56S is also accepted.)

Maintenance Guide

① Adjusting the feeder float sensor inside the mecha/machine

- 1) Set the NF12 at the left, center, and right positions of the bank. Open and close the front cover to check that the sensor is turned OFF.

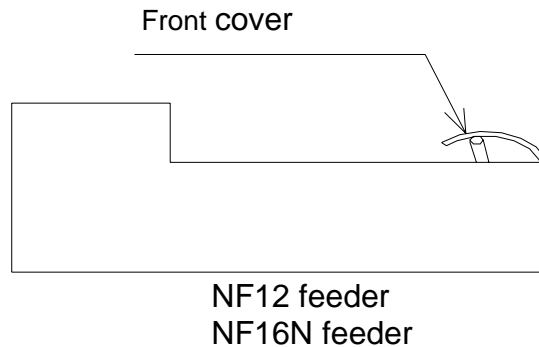


Figure 12-2-1 Adjusting the Feeder Float Sensor

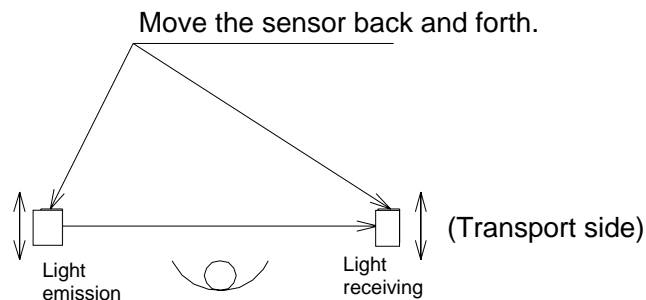


Figure 12-2-2 Adjusting the Feeder Float Sensor

- * If the sensor is not turned OFF even though the front cover is opened, the sensor mounting position may deviate in the Y-direction. If this occurs, loosen the sensor mounting screws and move the sensor back and forth.
- 2) Put the NF16N in the same manner as described for step 1) to check that the sensor is turned OFF.
- * If the sensor is not turned OFF even though the front cover is opened, the sensor mounting position may deviate in the Y-direction. If this occurs, loosen the sensor mounting screws and move the sensor back and forth. (Normally, move the sensor toward the transport side.)

Maintenance Guide

- ② Adjusting the feeder float sensor outside the mecha/machine
- 1) Set the bulk feeder at the left, center, and right positions of the bank to check that the sensor is not turned OFF.
 - 2) Set the NF32 feeder at the same positions as described in step 1) and open the top cover by hand to check that the sensor is turned OFF when the top cover is raised 10 mm or less.

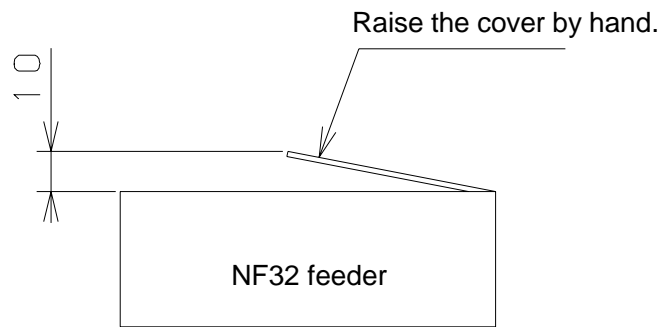


Figure 12-2-3 Adjusting the Feeder Float Sensor

- 3) Set the NF16 feeder at the same positions as described in step 1) and open the top cover using the lever to check that the sensor is turned OFF.

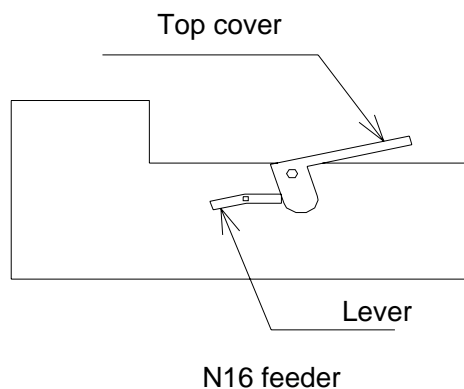


Figure 12-2-4 Adjusting the Feeder Float Sensor

Maintenance Guide

③ Adjusting the ETF feeder float sensor

- 1) Set the bulk feeder at the left, center, and right positions of the bank to check that the sensor is not turned OFF.
- 2) Insert/remove the ETF into/from the left, center, or right of the electric bank and move it within a play of the rail to check whether or not the sensor is turned OFF.
- 3) Set the ETF8S at the same positions as described in step 1) and open the top cover by hand to check that the sensor is turned OFF when the top cover is raised 10 mm or less.

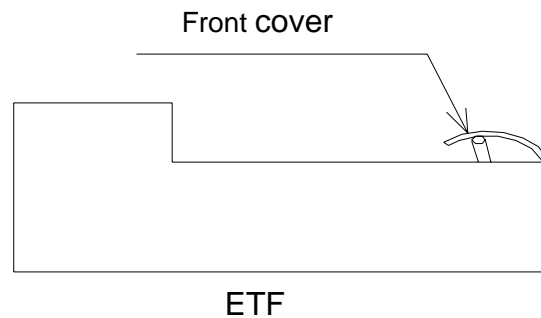


Figure 12-2-5 Adjusting the Feeder Float Sensor

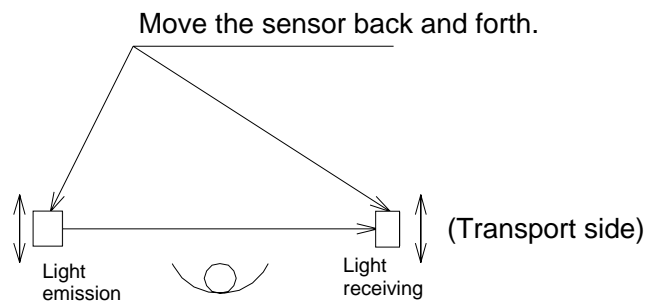


Figure 12-2-6 Adjusting the Feeder Float Sensor

- * If the sensor is not turned OFF even though the front cover is opened, the sensor mounting position may deviate in the Y-direction. If this occurs, loosen the sensor mounting screws and move the sensor back and forth.

Maintenance Guide

④ Adjusting the ETF incorrect insertion detection sensor (Front)

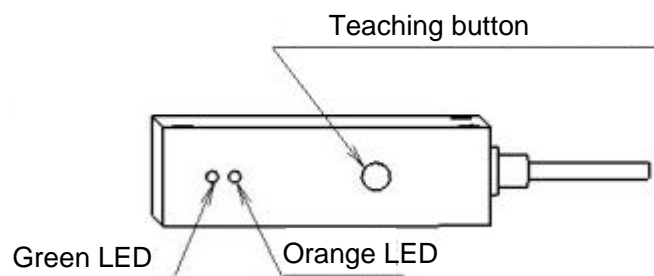
1) Insert/remove the ETF into/from the left, center, or right of the electric bank and move it within a play of the rail to check whether or not the sensor is turned OFF.

* If the sensor is OFF (the green lamp is off), turn the volume to make the green lamp lit.

2) Place the ETF8S on the left, center, or right slide rail of the electric bank to check that the sensor is turned OFF.

⑤ Adjusting the ETF incorrect insertion detection sensor (rear)

1) Check that the red light coming from the sensor is seen on the reflector (the red light does not deviate from the reflector).



2) Keep the Teaching button pressed for 2 sec. or longer. The auto adjustment of the light quantity is then started. When the auto adjustment has been completed successfully, both the green and orange LEDs will light up.

3) If one or both LEDs flash slowly immediately after teaching, it is thought that the red light deviates from the reflector position. If this occurs, adjust the position again.

4) Insert/remove the ETF into/from the left, center, or right of the electric bank and move it within a play of the rail to check whether or not the sensor is turned OFF.

5) Place the ETF8S on the left, center, or right slide rail of the electric bank to check that the sensor is turned OFF.

Maintenance Guide

**DANGER**

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

[13] OTHER UNITS

13-1. LCD Monitor

13-1-1. Replacing the LCD Monitor

- 1) Remove the shoulder screws ④ and thumbscrews ⑤, ⑥ and ⑦ to detach the LCD bracket F ② from the LCD bracket R ③.
- 2) Remove the SEMS cap bolts ⑧ to detach the LCD bracket F ② from the LCD monitor ①.
- 3) Reassemble the components in the reverse order of disassembly.

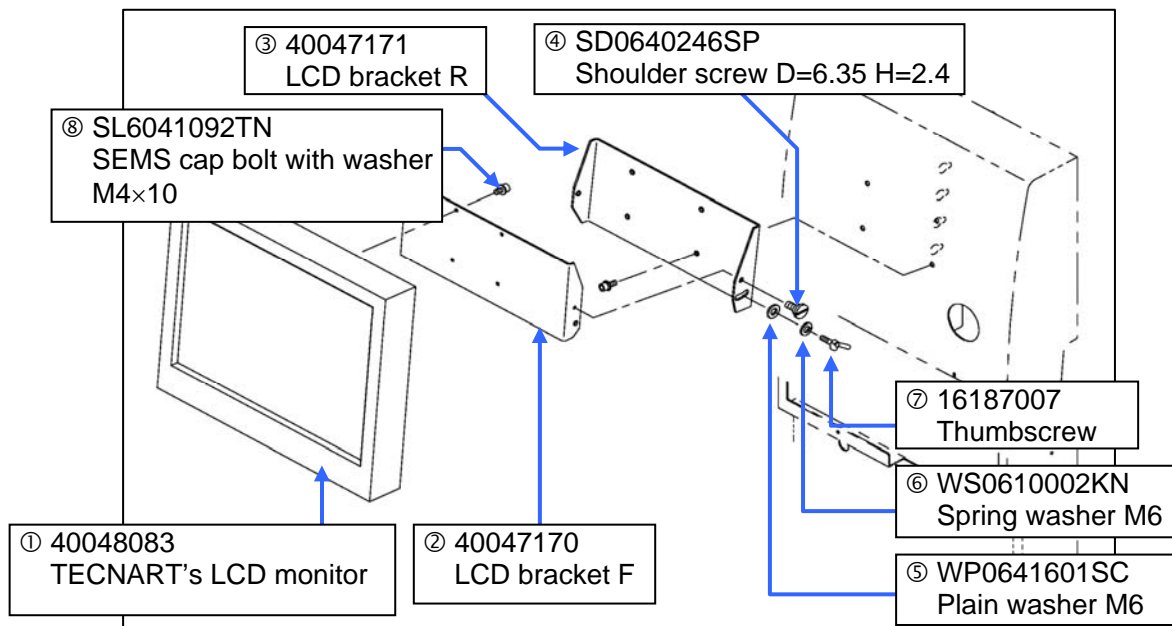


Figure 13-1-1-1 LCD Monitor

Maintenance Guide

13-1-2. Setting Up the Touch Panel

After the LCD monitor has been replaced, it is necessary to set up the touch panel.

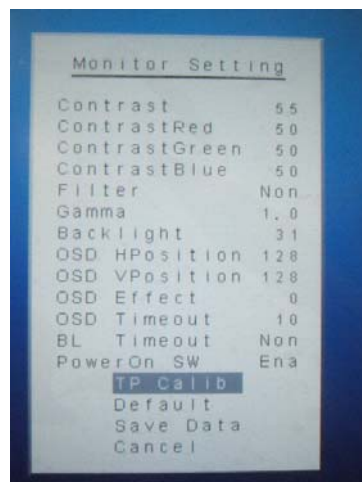
- 1) Check the [MENU] and [-] buttons on the front of the LCD monitor.



- 2) Press the [MENU] button to display the “Monitor Setting” screen.

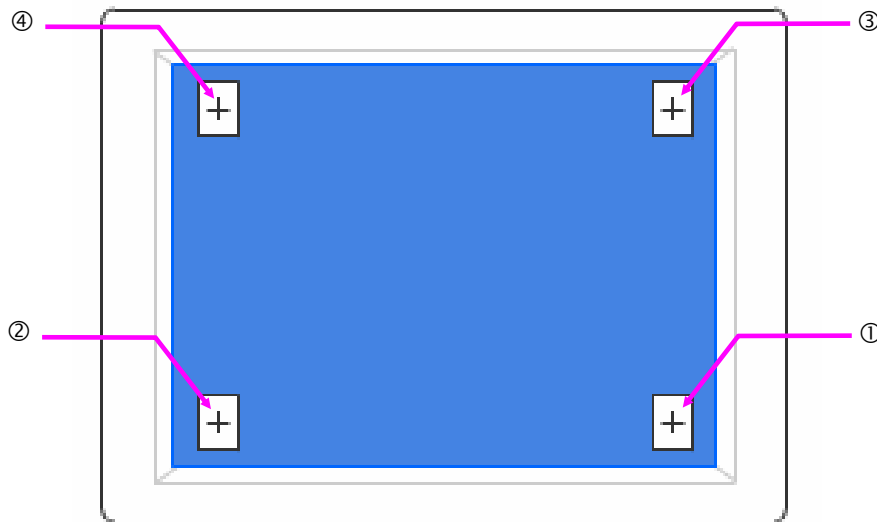


- 3) Press the [-] button to select [TP Calib] on the “Monitor Setting” screen.



Maintenance Guide

- 4) Next, press the [MENU] button. [+] is shown at the lower right corner ① of the screen. Touch its center portion.
- 5) [+] is shown at the lower left corner ② of the screen. Touch its center portion.
- 6) [+] is shown at the upper right corner ③ of the screen. Touch its center portion.
- 7) [+] is shown at the upper left corner ④ of the screen. Touch its center portion.



Touch positions on monitor screen

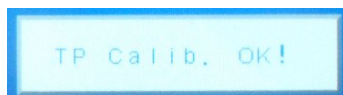
CAUTION

To adjust the touch panel, use finger or touch pen with a round tip.

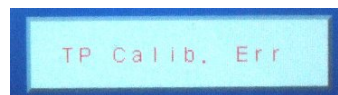
Do not use any propelling pencil or sharp object. Always press the center portion of the calibration point. The target is 1 mm or less.

If a position other than the mark is pressed, ERR appears after approx. 5 sec. have elapsed. At this time, restart the adjustment from work step No. 1.

- 8) Finally, when “TP Calib. OK!” is shown, this means that the setting has been completed successfully.



Completed successfully.



Err display

CAUTION

If “TP Calib. Err” appears during operation or at the end of the operation, restart the adjustment from work step No. 1.

Maintenance Guide

13-2. Replacing the System Disk

In the KE-3010/3020V/3020VR, the system disk configuration is stored into the Solid State Disk (hereafter referred to as “SSD”).

The inside of the SSD is separated into two portions, “C-drive” that contains Windows or operating system, such as RTX, and “D-drive” that contains the system programs, parameters, and production program files.

13-2-1. Replacing the SSD

The SSD is a boot disk of the machine that contains Windows or operating system, such as RTX necessary to operate the KE-3010/3020V/3020VR. Additionally, the SSD is mounted on the CPU board.

To replace the SSD, parameter files necessary to operate the main unit are required in addition to the required components shown below.

When the MS parameters have been updated, select [Manage Control Data] from [File] on the menu bar to back up the data.

Furthermore, back up production program files into USB memory or other media.

You must always follow the instructions described in this manual when replacing the SSD.

13-2-1-1. Required Components

① KE-3010/3020V/3020VR Environment Disk (SSD)

It is absolutely required that the KE-3010/3020V/3020VR contains the Environment Disk for KE-3010/3020V/3020VR only (OS environment, such as Windows or OS RTX necessary to operate the system has already been installed).

Table 13-2-1-1-1 SSD Part No.

Language	OS	Part name	Par No.
Common (Japanese, English, and Chinese)	WindowsXP	ENVIRONMENT SYSTEM DISK 132V	40113004

② KE-3010/3020V/3020VR system program installation disk

The system program installation disk contains the software designed for the KE-3010/3020V/3020VR. All system programs are saved into this disk. When installing the system programs, it is necessary to specify a model (only when installing the system programs newly).

* For details about how to install the main unit software into the SSD for the white list type antivirus software (optional), see section 13-2-6.

Maintenance Guide

13-2-1-2. Replacing the SSD

<M and L board specifications>

- 1) Detach the CPU BOARD ① from the control unit.
- 2) Disconnect the connector of the SSD I/F CABLE ASM ⑦ from the SSD connector ③.
- 3) Remove the screws ⑥ (4 locations) and detach the SSD from the SSD BRACKET ②.
- 4) Reassemble the components in the reverse order of disassembly.

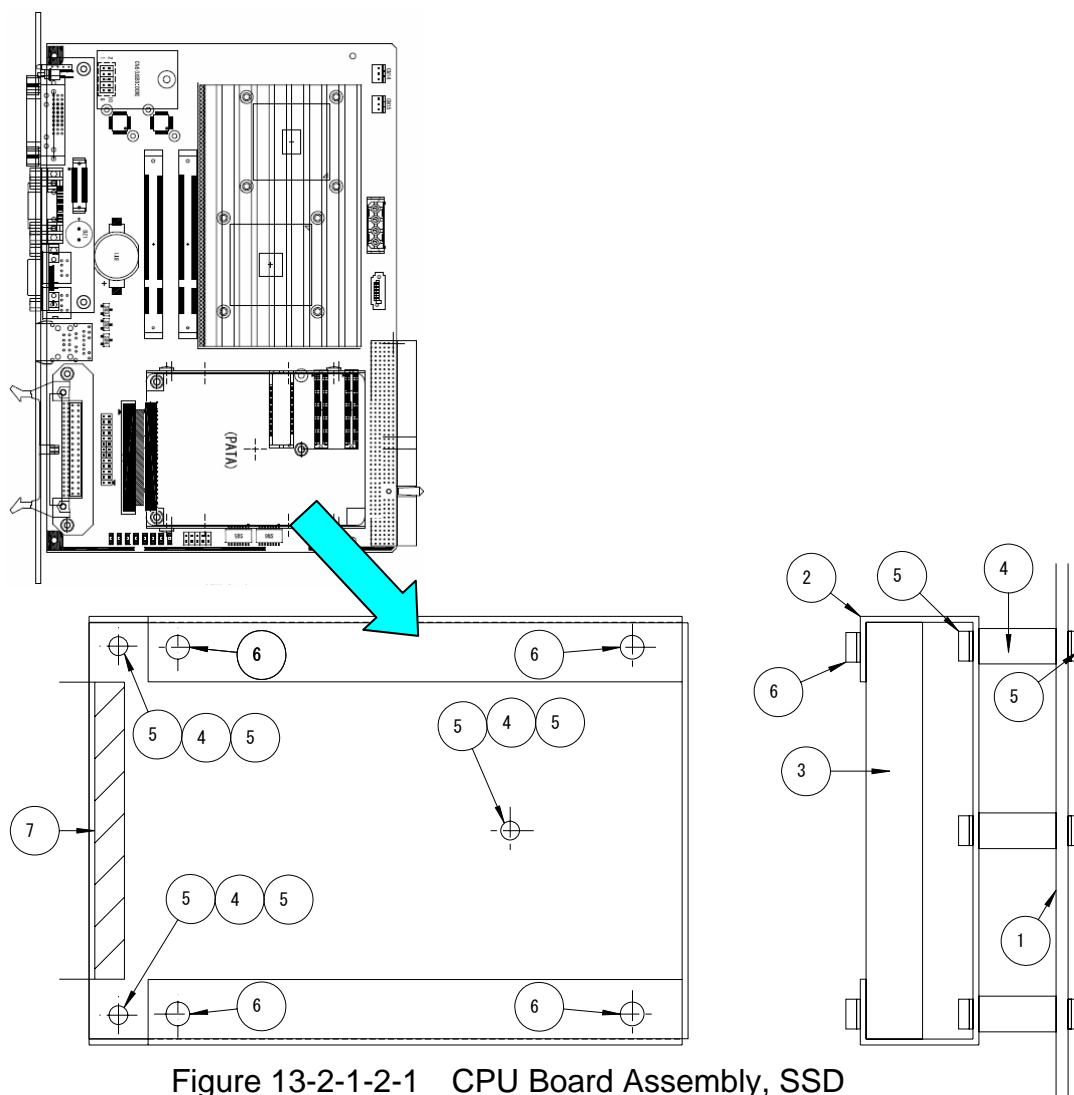


Figure 13-2-1-2-1 CPU Board Assembly, SSD

[List of Replacement Parts]

Table 13-2-1-2-1 SSD Replacement Parts

No.	Part No.	Part name	Q'ty/machine
①	40107372	CPU board	1
②	40114017	SSD bracket	1
③	40113004	ENVIRONMENT SYSTEM DISK 132V	1
④	HX00486000B	PCB stud, M 2.6 L=9	3
⑤	SL4860581SC	SEMS cap bolt, M2.5 × 5	6
⑥	SL4030681SC	SEMS cap bolt, M3 × 6	4
⑦	40045441	SSD I/F cable assembly	1

Maintenance Guide

<XL board specifications>

- 1) Remove the screws ⑤ (2 locations) from the front of the control unit to detach the SILICON_DISK_BR ③.
- 2) Remove ⑤ (4 locations) from the side surface ③ to detach the SSD ① and HDD BRACKET ④.
- 3) Disconnect the HDD I/F CABLE ASM ② from ①, and then replace ①.
- 4) Reassemble the components in the reverse order of disassembly.

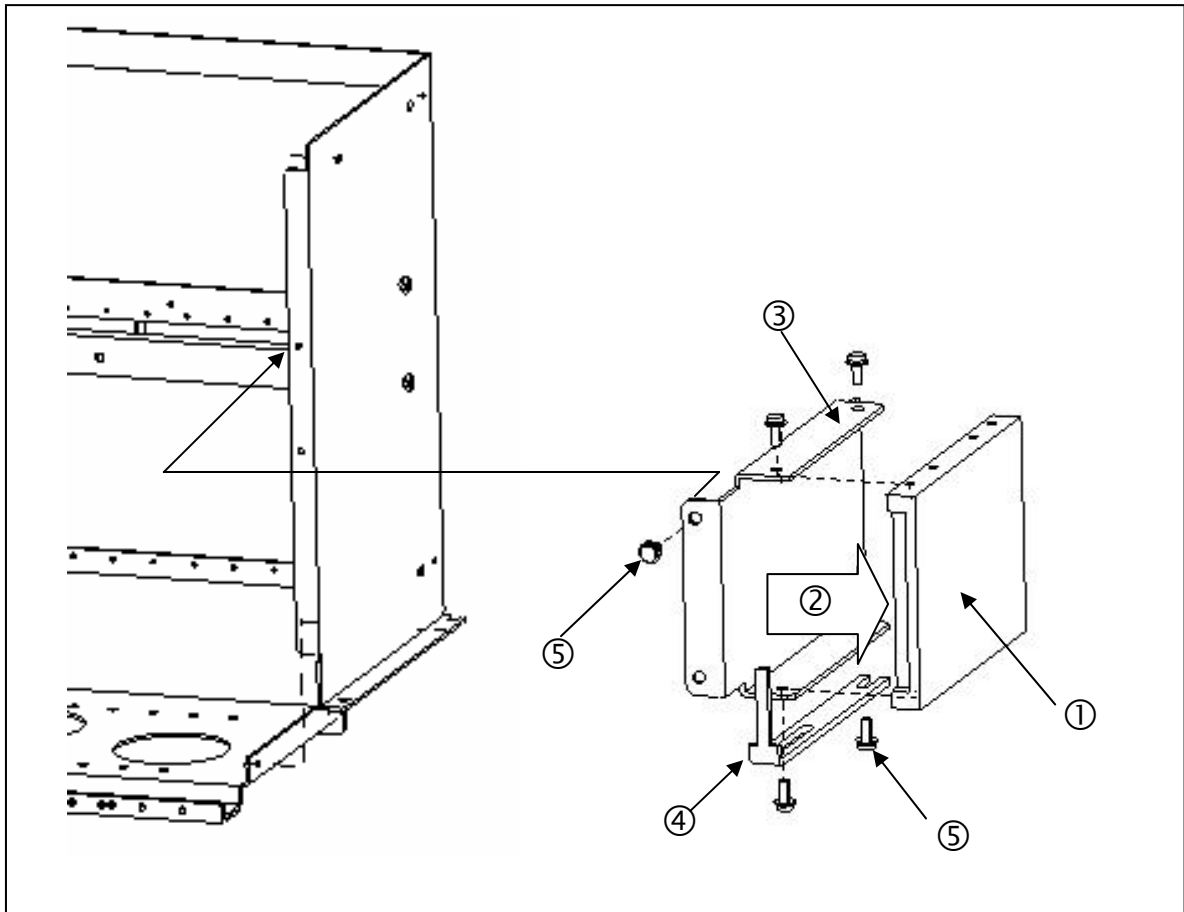


Figure 13-2-1-2-2 CPU Board Assembly, SSD

[List of Replacement Parts]

Table 13-2-1-2-2 SSD Replacement Parts

No.	Part No.	Part name	Q'ty/machine
①	40113004	ENVIRONMENT SYSTEM DISK 132V	1
②	40047492	HDD I/F CABLE ASM	1
③	40094403	SILICON_DISK_BR	1
④	40057003	HDD BRACKET	1
⑤	SL4030891SC	SCREW M3X8	6

Maintenance Guide

13-2-2. Setting Up the BIOS

After the SSD has been replaced, check the BIOS. If the settings are different from those described in <Setting Method>, change the settings appropriately. In addition, if the CPU board is replaced, it is absolutely necessary to change the BIOS.

Caution

Note: About handling of **BIOS (Basic Input Output System)**

The BIOS is an important program necessary to control the data input and output. Therefore, always **carefully operate the BIOS**. Normally, the programs are saved into the flash memory on the CPU board and the setup data is saved into the SRAM backed up by the battery.

13-2-2-1. Checking the Recognition of the SSD

You may check whether or not the BIOS recognizes the SSD correctly. If no startable SSD is found after memory check, a message like the one below will appear.

No bootable device available

R - REBOOT

S - SETUP

You can switch to the BIOS setting screen by pressing the <S> key. (Pressing the <R> key will reset the unit.)

<Setting Method>

- 1) Display the BIOS screen.

Turn on the power, and press the <F2> key during memory check.

A screen like the one shown below will appear. Locate the cursor to the item you want to change (the selected item will be highlighted, for example “Main” in the Figure below), and press the <Enter> key. The current settings for the selected item will appear.

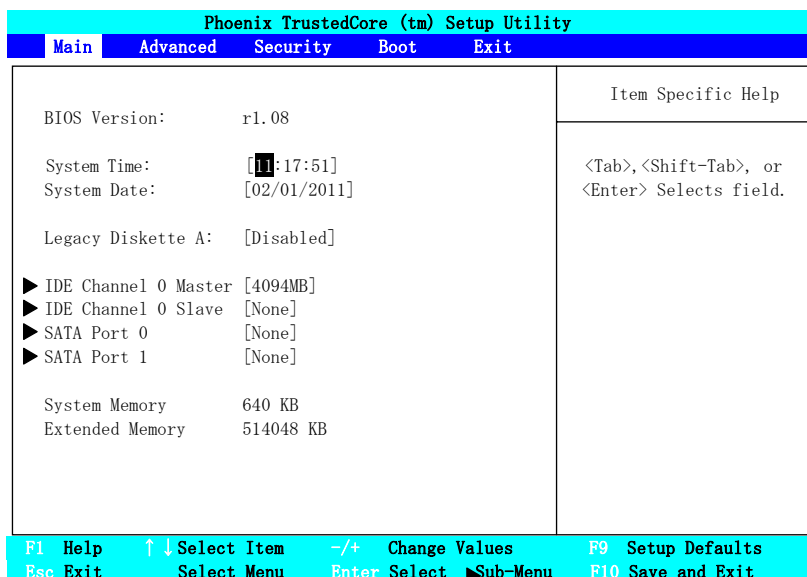


Figure 13-2-2-1-1 BIOS screen

Maintenance Guide

2) “Main” screen

The “Main” screen displays the contents shown below.

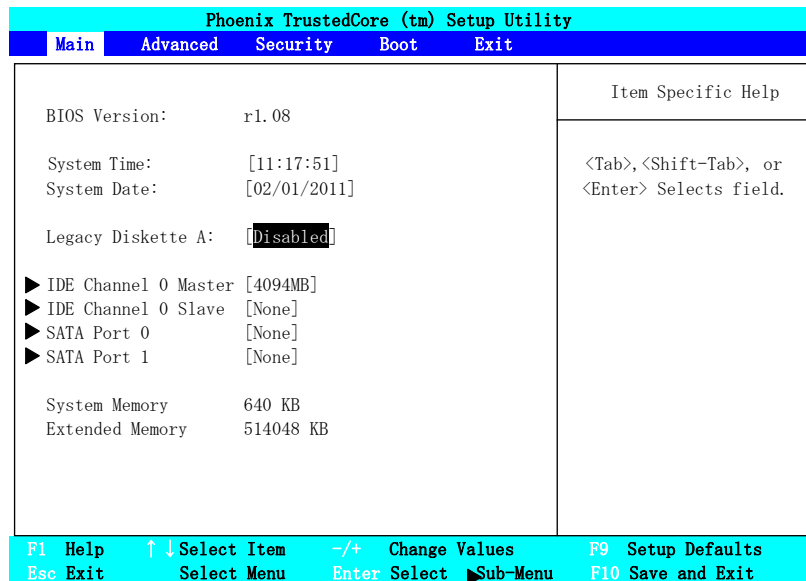


Figure 13-2-2-1-2 BIOS Screen (Main)

3) Changing the “Legacy Diskette A” setting

Change the drive type assignment.

Select “**Disabled**” and press the <ENTER> key.

4) Moving to the “Advanced” screen

Move the cursor to “Advanced” with the <←> or <→> key.

5) “Advanced” screen

The “Advanced” screen displays the contents shown below.

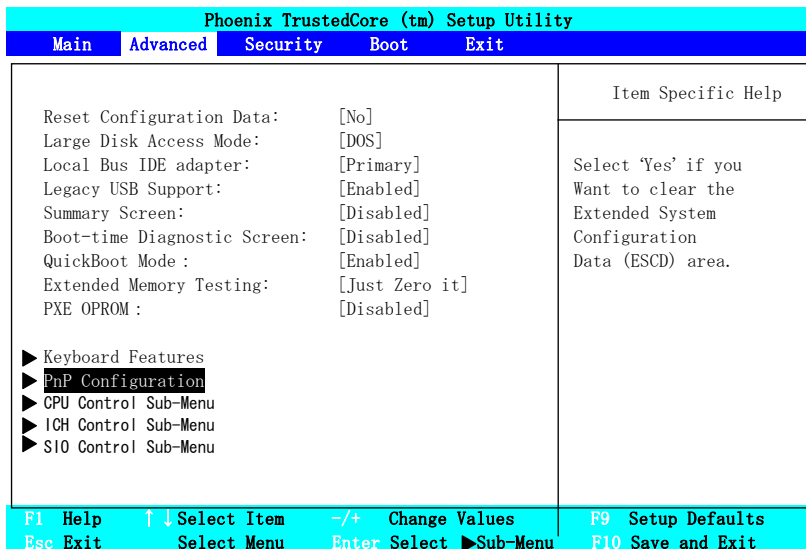


Figure 13-2-2-1-3 BIOS Screen (Advanced)

Maintenance Guide

6) Changing “PnP Configuration”

Move the cursor to “PnP Configuration” with the <↑> or <↓> key and press the <ENTER> key.

7) “PnP Configuration” screen

The “PnP Configuration” screen displays the contents shown below.

Phoenix TrustedCore (tm) Setup Utility	
Advanced	
PnP Configuration	Item Specific Help
Option ROM Scan: [Enabled]	Initialize device expansion ROM (PMC only)
Latency Timer: [Default]	
PCI IRQ A: [5]	
PCI IRQ B: [9]	
PCI IRQ C: [5]	
PCI IRQ D: [5]	
PCI IRQ E: [5]	
PCI IRQ F: [11]	
PCI IRQ G: [10]	
PCI IRQ H: [5]	
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults Esc Exit Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit	

Figure 13-2-2-1-4 BIOS Screen (Advanced: PnP Configuration)

8) Changing “PCI IRQ”

When the screen moves to the “PnP Configuration” screen, move the cursor to each “PCI IRQ” and change the numeric value to that described below. Move the cursor with the <↑> or <↓> key and change the numeric value with the <+> or <-> key.

9) Changing “PCI IRQ A”

Move the cursor to “**PCI IRQ A**” and change the numeric value to “**5**”.

10) Changing “PCI IRQ B”

Move the cursor to “**PCI IRQ B**” and change the numeric value to “**9**”.

11) Changing “PCI IRQ C”

Move the cursor to “**PCI IRQ C**” and change the numeric value to “**5**”.

12) Changing “PCI IRQ D”

Move the cursor to “**PCI IRQ D**” and change the numeric value to “**5**”.

13) Changing “PCI IRQ E”

Move the cursor to “**PCI IRQ E**” and change the numeric value to “**5**”.

14) Changing “PCI IRQ F”

Move the cursor to “**PCI IRQ F**” and change the numeric value to “**11**”.

Maintenance Guide

15) Changing “PCI IRQ G”

Move the cursor to “**PCI IRQ G**” and change the numeric value to “**10**”.

16) Changing “PCI IRQ H”

Move the cursor to “**PCI IRQ H**” and change the numeric value to “**5**”.

17) Exiting the “PnP Configuration” screen

Press the <Esc> key to return to the “Advanced” screen.

18) Changing “Boot”

Move the cursor to “Boot” with the <<-> or <->> key.

19) “Boot” screen

The “Boot” screen displays the contents shown below.

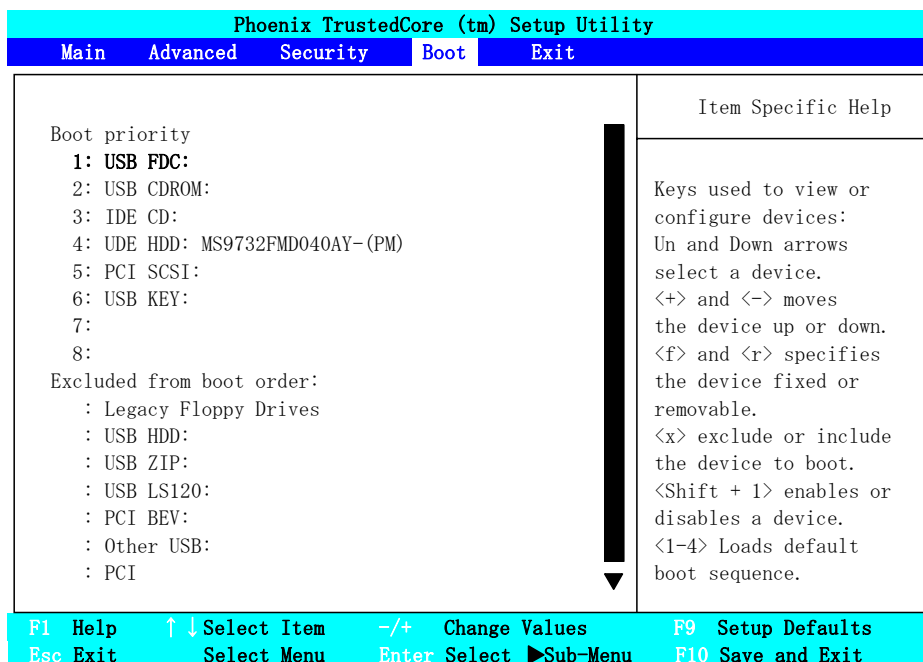


Figure 13-2-2-1-5 BIOS Screen (Boot)

20) Changing “Boot priority” and “Excluded from boot order”

Set “Boot priority” and “Excluded from boot order” as shown in Figure 13-2-2-1-5.

Move the cursor to an item you want to move with the <↑> or <↓> key and press the <+> or <-> key to move the item up or down.

Move the cursor to the item and press the <X> key to move this item between “Boot priority” and “Excluded from boot order”.

21) Changing “Exit”

Move the cursor to “Exit” with the <<-> or <->> key.

Maintenance Guide

22) “Exit” screen

The “Exit” screen displays the contents shown below.

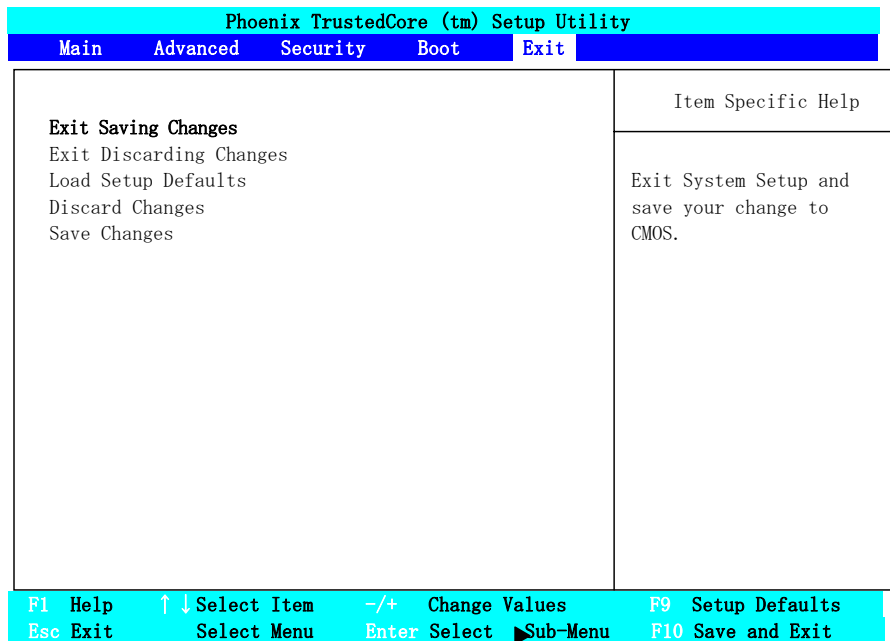


Figure 13-2-2-1-6 BIOS Screen (Exit)

23) Exiting the “BIOS” screen

Move the cursor to “Exit Saving Changes” with the <↑> or <↓> key and press the <ENTER> key.

24) Confirming to exit the “BIOS” screen

Move the cursor to “Yes” with the <←> or <→> key and press the <ENTER> key.

25) When Windows starts up, select “Settings” “Control Panel” from the “Start” menu, and then double-click “System”.

26) When “System Properties” appears, select “Hardware”, and then select “Device Manager (D)”.

27) When the Device Manager screen appears as shown in the Figure below, right-click “OX16PCI95x PCI bridge” under “Multifunction Adapters” to select “Disable”.

Maintenance Guide

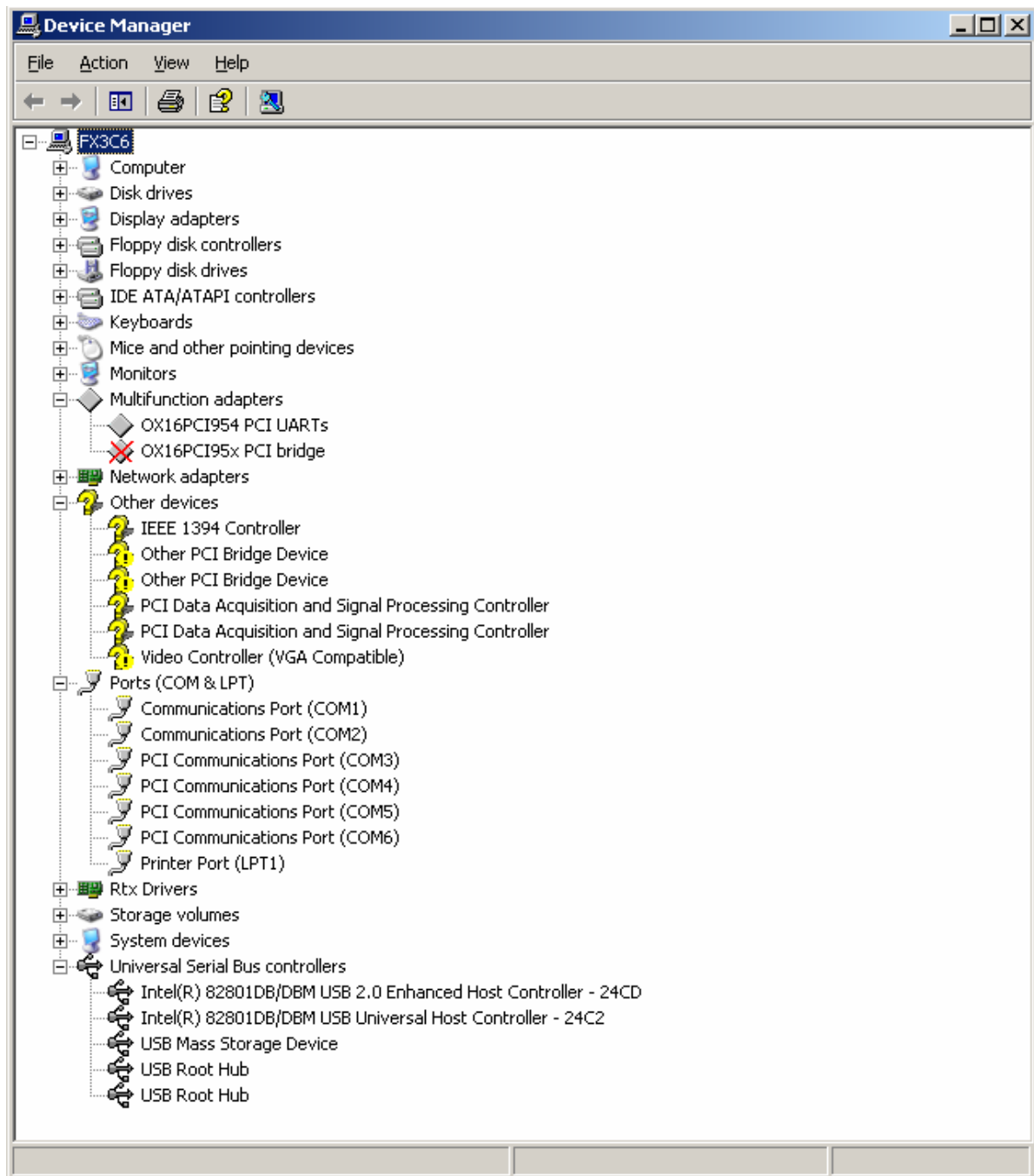


Figure 13-2-2-1-7 Device Manager Screen

28) Click “OK” of “System Properties” to close the screen.

29) Type “ewfmgr C: -commit” at the command prompt, and then shut down Windows.

Maintenance Guide

13-2-3. Setting Up the Network (Setup is required when communicating with the IS.)

To use the communication between the KE-3010/3020V/3020VR and the IS, it is absolutely necessary to set up the network.

<Setting procedures>

- ① Setting up the TCP/IP
- ② Setting up a shared folder
- ③ Registering a user

Cautions on TCP/IP setup

If your company determines the rules about IP address setup, you must follow the instructions given by the network administrator of your company.

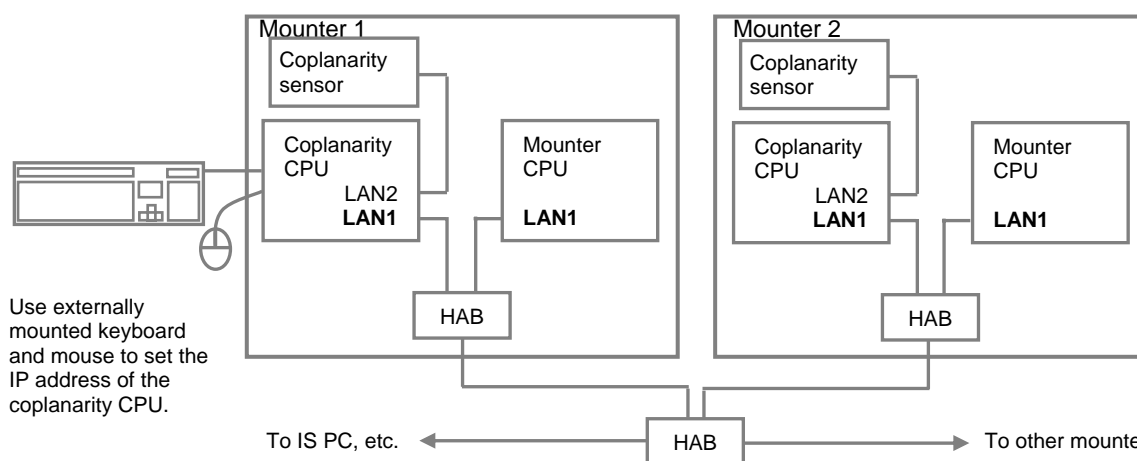
If no rules are specified, **set an IP address, which has not been set in other main unit connected to the IS.**

The IP address has been set at “**192.168.100.100**” and the subnet mask has been set at “**255.255.255. 0**” before shipment from the factory.

When the coplanarity option is set to construct the network of the IS, it is necessary to set an address other than “192.168.0.XXX” for the IP address on the mouter CPU board side. This rule also applies when other KE-3000-series machine equipped with the coplanarity option that makes up the network is already set.

[Reason] The KE-3000-series coplanarity CPU board performs the communication between “mouter CPU board” ↔ “coplanarity CPU board” and that between “coplanarity CPU board” ↔ “coplanarity sensor” through the Ethernet. The IP addresses of the coplanarity sensor and coplanarity CPU board use fixed addresses of the “192.168.0.XXX” group. Therefore, when a network is constructed to connect the IS or others, it is necessary to assign IP addresses of different group to the port (LAN1) of the coplanarity CPU board so that the IP addresses of the coplanarity sensors do not conflict with each other. (Set the IP address shown in the box.)

Default settings	Mouter CPU board (LAN1)	192.168.100.100
	Coplanarity CPU board (LAN1)	192.168.100.101
Fixed settings	Coplanarity CPU board (LAN2)	192.168.0.100
	Coplanarity sensor	192.168.0.XXX

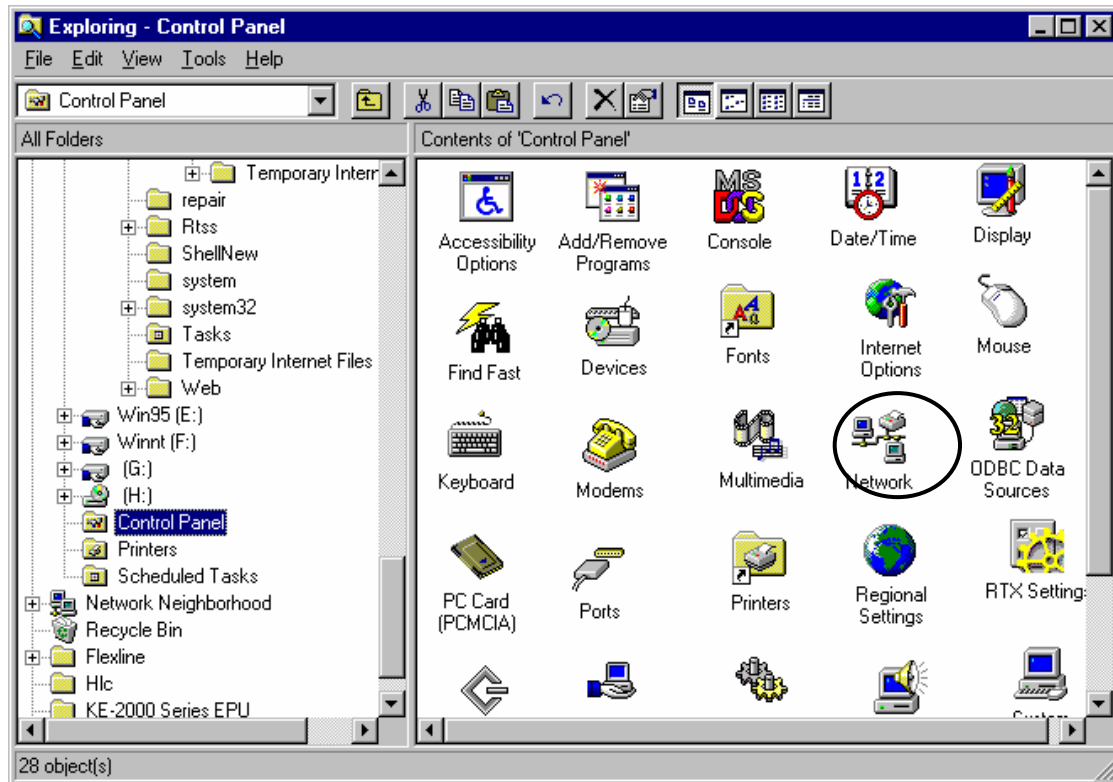


- * For details about how to set the IP address of the coplanarity CPU of the mouter equipped with the coplanarity option, see section 13-4, Coplanarity Sensor (Optional) and section 13-4-2, Changing the IP address of the coplanarity CPU.

Maintenance Guide

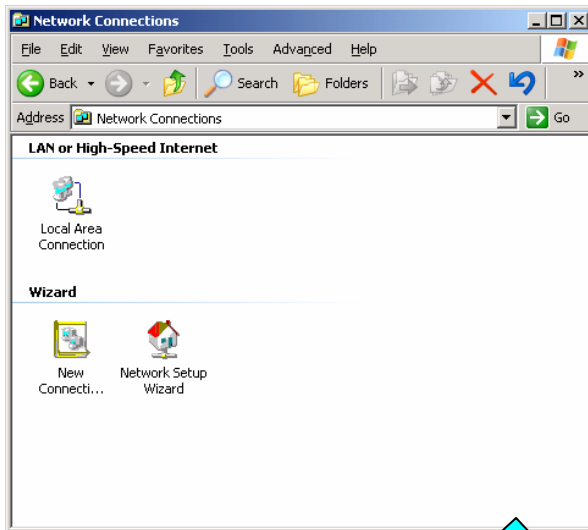
13-2-3-1. Setting Up the TCP/IP

- 1) From the button, select [Settings], and then [Control Panel].
- 2) Select the [Network] icon from the control panel.

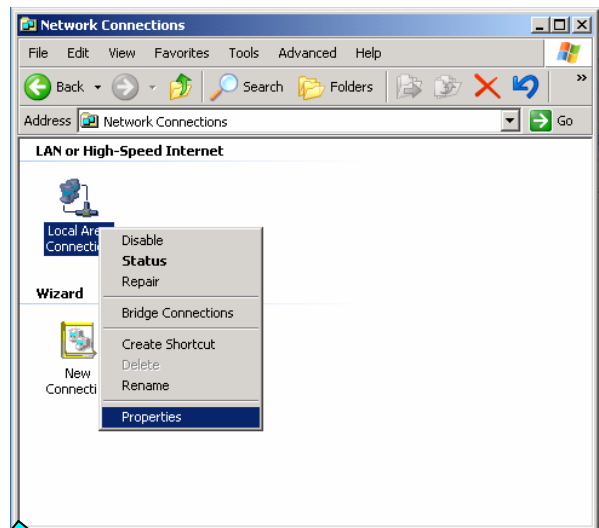


Maintenance Guide

- 3) The “Network connection” dialog box appears on the screen.

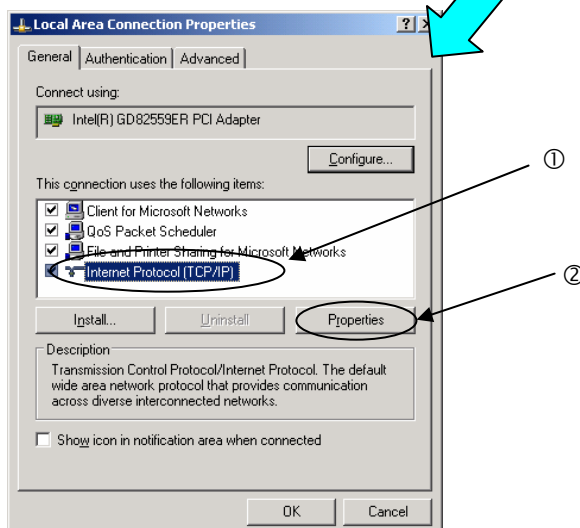


- 4) Select the [Local Area Connection] icon on the dialog box, and then click the [Properties] command with the right button to select it.



- 5) The “LOCAL Area Connection (Properties)” dialog box appears on the screen.

Select the ① [Internet Protocol (TCP/IP)] on this screen, and then click the ② [Properties] button.



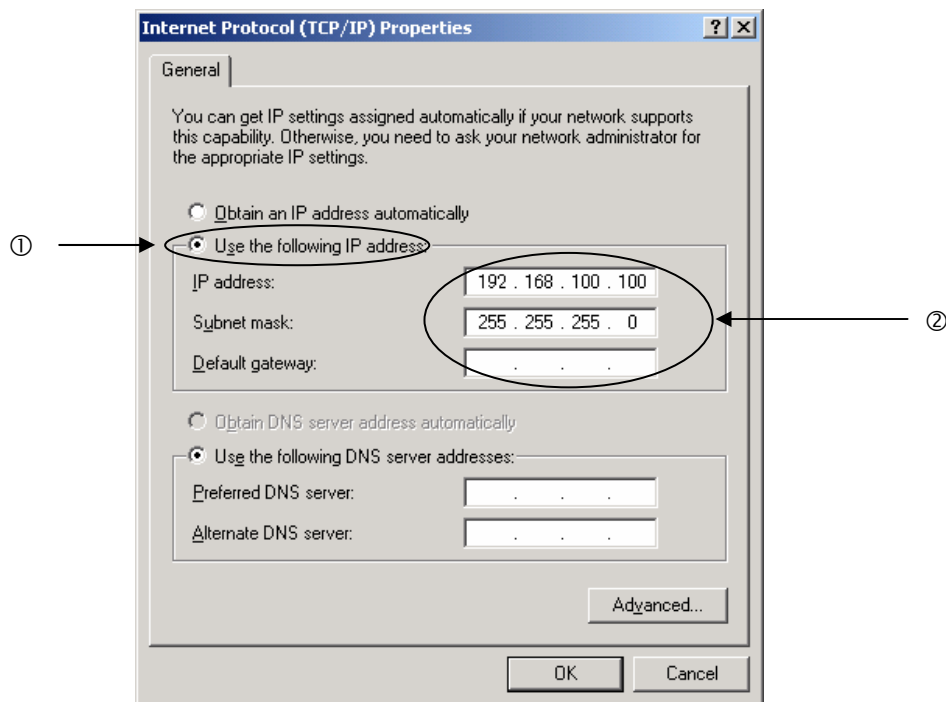
Maintenance Guide

6) The “Internet Protocol (TCP/IP) (Properties)” dialog appears on the screen.

- ① Check the “Use the following IP address” radio button.
- ② Set the “IP address,” “Subnet mask”.

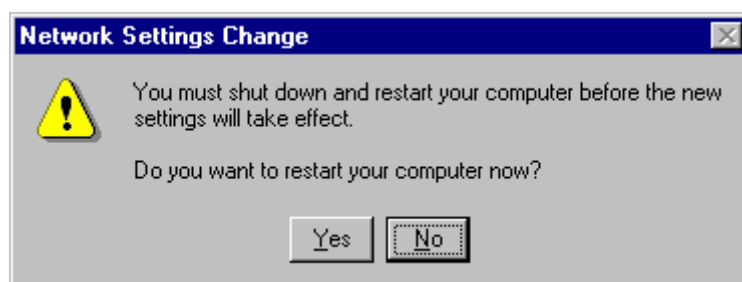
Additionally, input [255.255.255. 0] to [Subnet Mask].

If necessary, set the "Default gateway", "DNS", "WINS address", and other items following the instructions given by the network administrator of your company.



After setting, select the [OK] button.

7) The message prompting you to restart the computer will appear. Select the [No] button to continue the process.



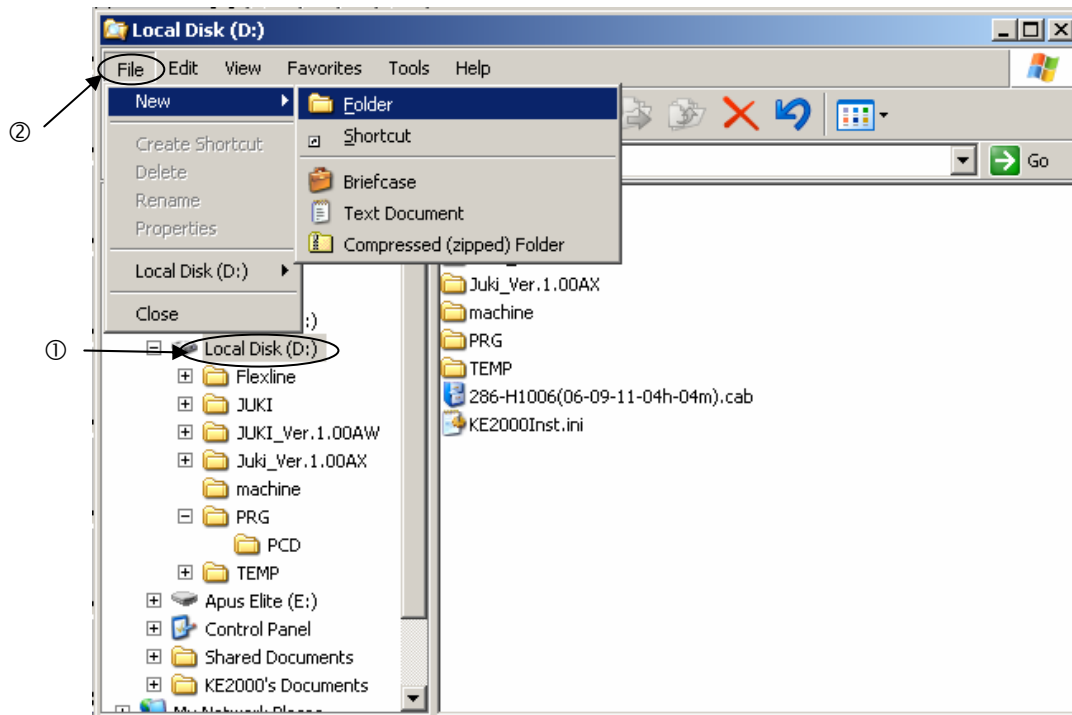
Maintenance Guide

13-2-3-2. Setting Up a Shared Folder

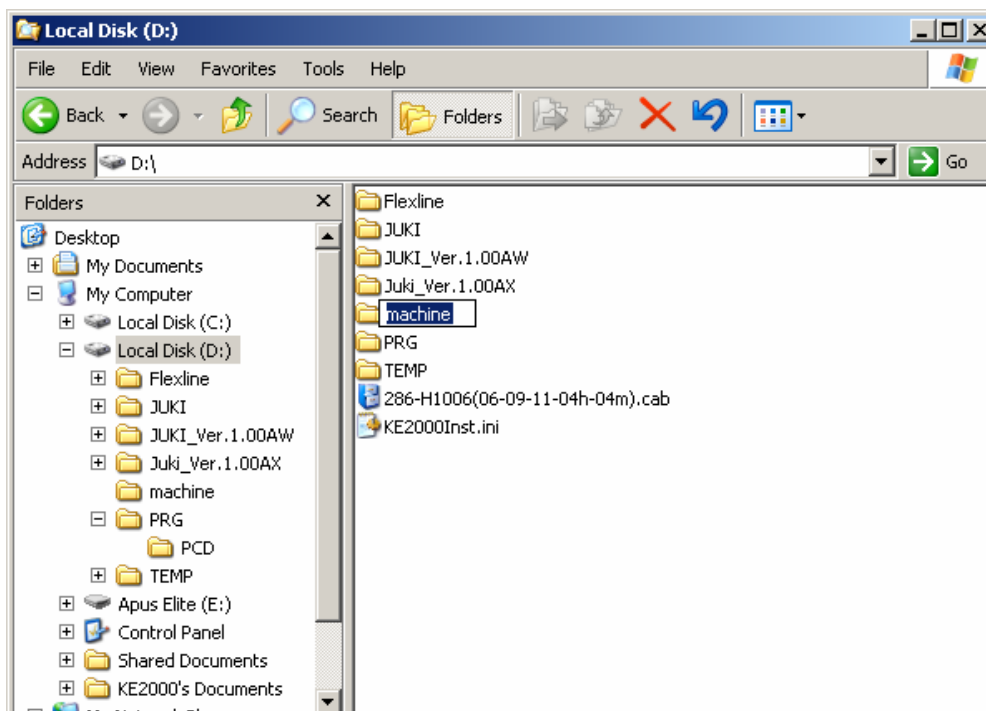
You may set up a shared folder for the network communication.

Create a folder named “D:\machine\Prq” under the D drive and make this **Prq** folder shared.

- 1) Start up Explorer.
- 2) Select the ① [drive D], and select the commands from the menu bar; ② [File], [New] and [Folder] commands.

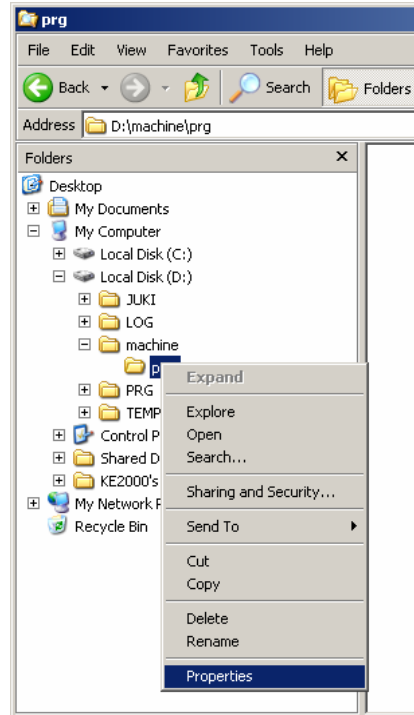


- 3) Enter “machine” as the folder name.

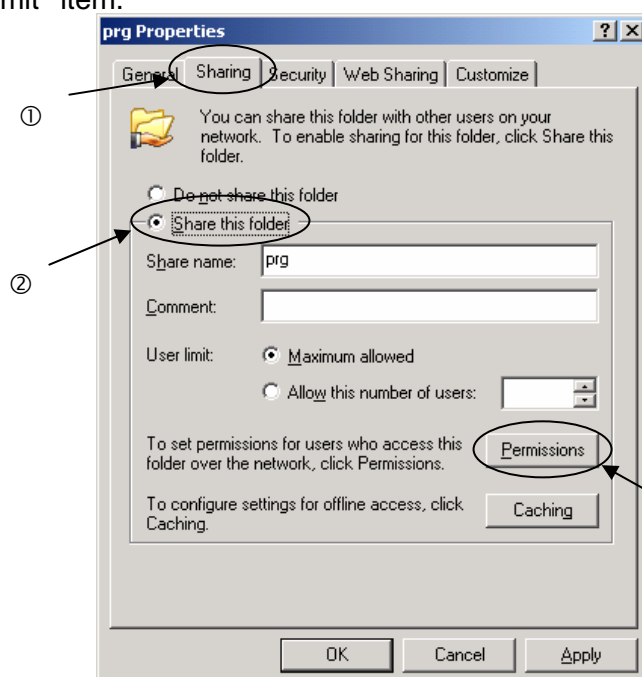


Maintenance Guide

- 4) The folder named “machine” is then created under the D drive. In the same manner as described above, create “Prg” folder under the machine folder.
- 5) Click the created “Prg” folder with the right button, and select the [Sharing and Security] or [Properties] command.



- 6) The “Prg Properties” dialog box appears on the screen. Click the ① “Sharing” tab from this dialog box, and select the ② “Share this folder” radio button to check to see if “Prg” is entered as the “Share Name.”
 - If “Prg” is not entered in the “Shared Name” field, change the entered name to “Prg.”
 - If any name is not entered, select the “Maximum Allowed” radio button for the “User Limit” item.



*Note

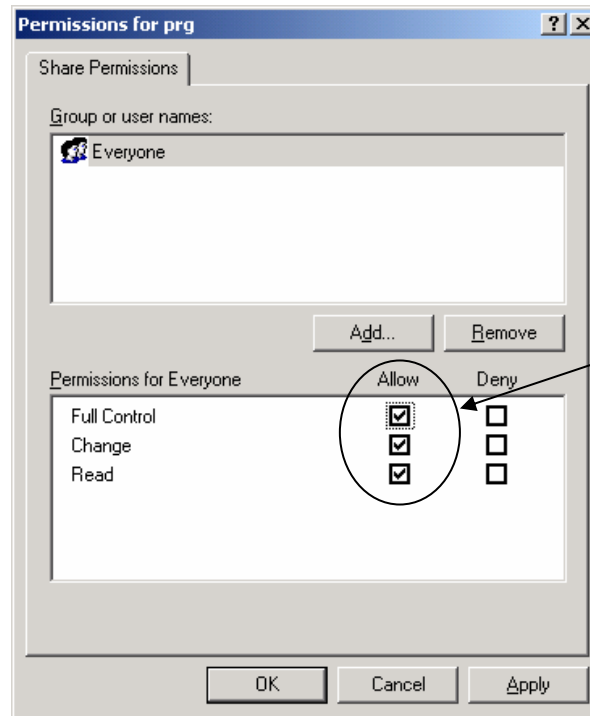
Set up a shared folder so that the shared folder name “prg” is not duplicated in the computer.

If a shared folder named “prg” already exists, change the name of the previously existing folder name to that other than “prg”.

Maintenance Guide

- 7) Click the ③ [Permissions] button on the screen above to display the “Permissions for prg” dialog box. Check to see if “Everyone” is set to “Full Control” by checking its check box.

Note) With the default settings of the access authority, [Full Control] is not allowed. Therefore, always check on [Allow] of [Full Control].

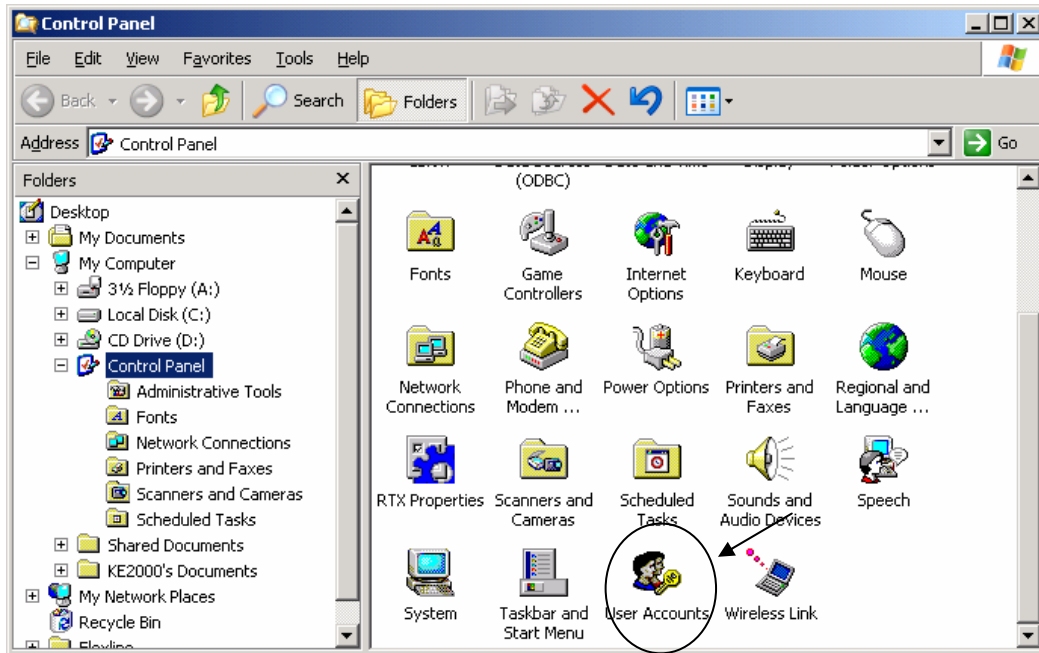


Maintenance Guide

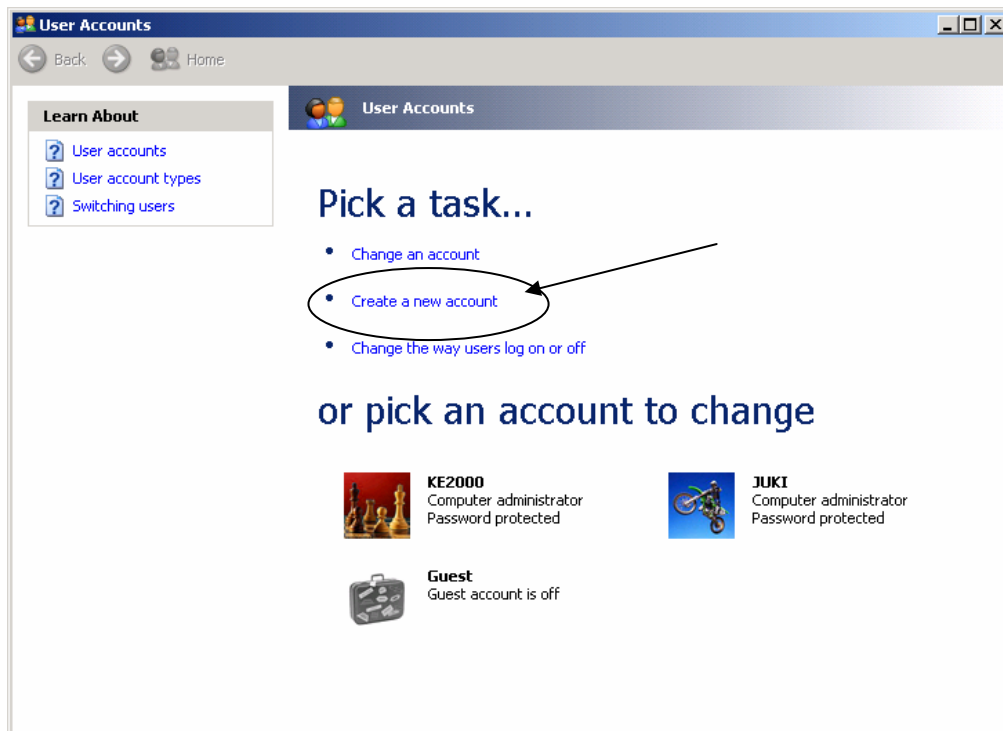
13-2-3-3. Registering a User

You may register a user name and password in the KE-3010/3020V/3020VR, which you must input to start up the PC (personal computer) where the IS has been installed.

- 1) Check the user name and password, which are used to start up the PC.
- 2) Select the “User accounts” icon form the control panel.

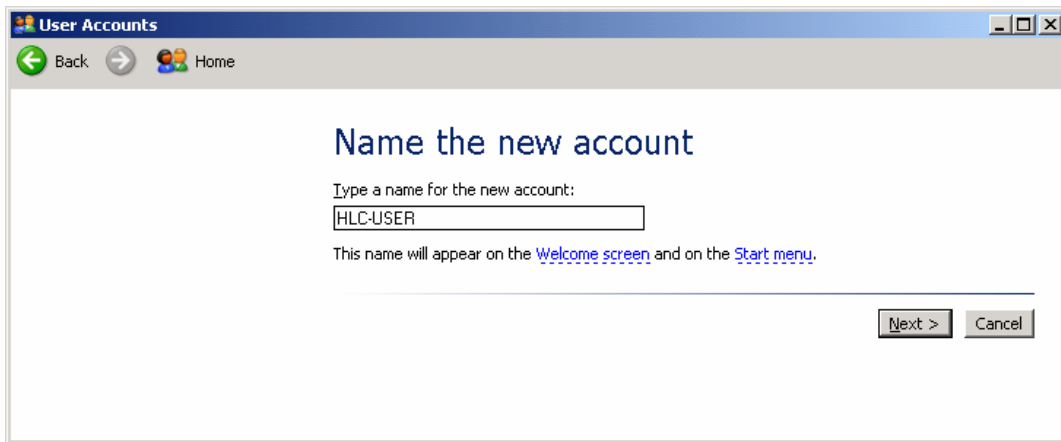


- 3) The “User accounts” dialog box appears on the screen. Select “Create a new account” from the menu.

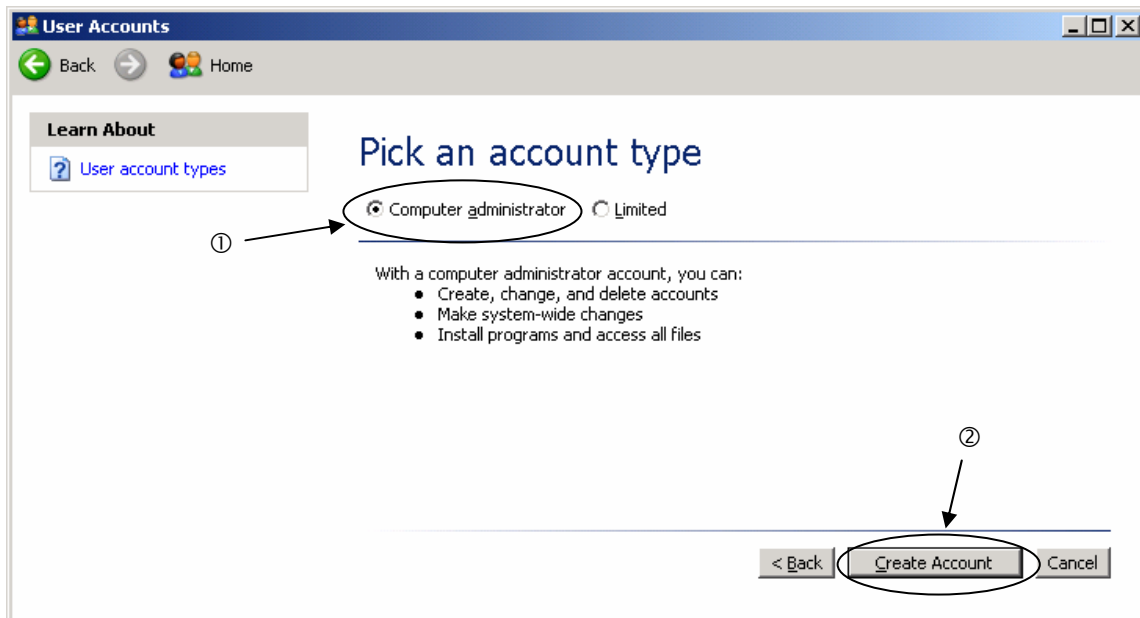


Maintenance Guide

- 4) When you select “Create a new account,” the screen that allows you to set a user name appears on the screen. Enter a user name, and click the [Next] button.

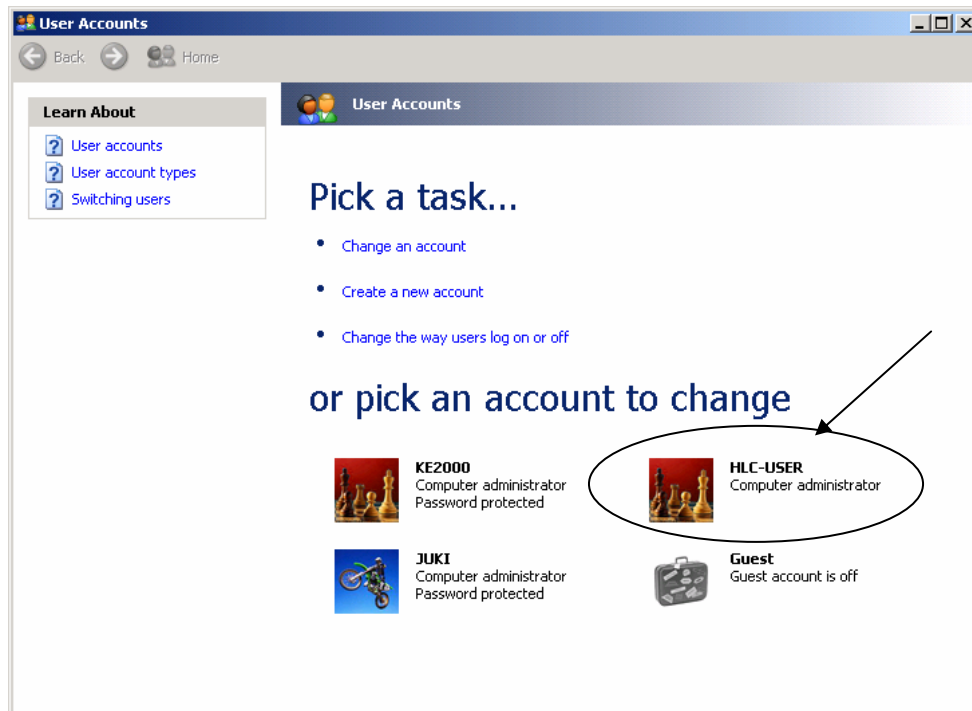


- 5) The screen that allows you to set the user type appears on the screen. Select the ① “Computer administrator” radio button, and click the ② [Create account] button.

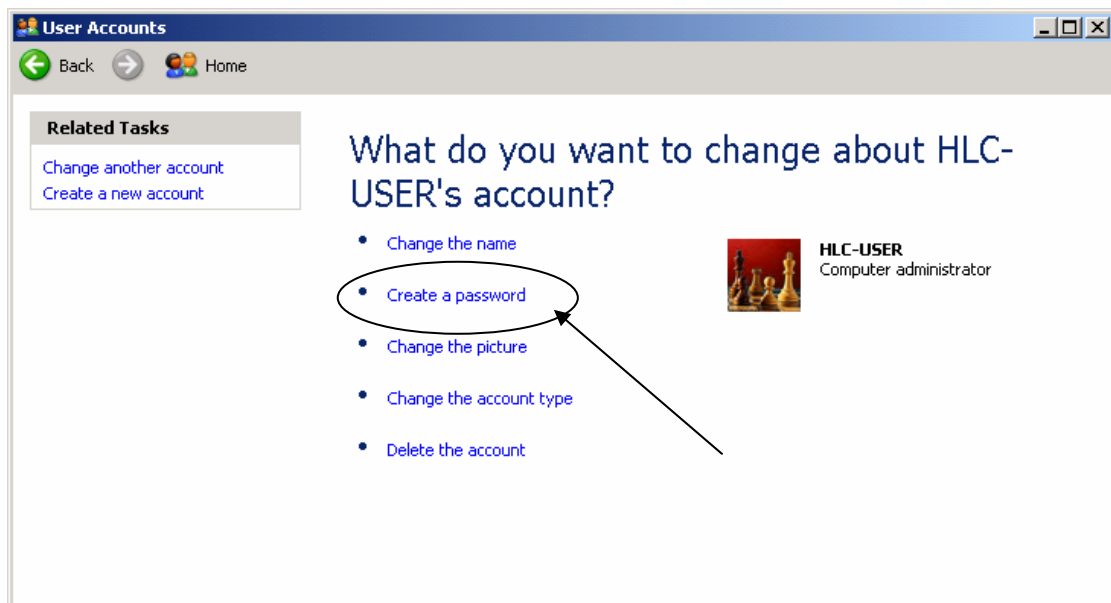


Maintenance Guide

- 6) Select the user account you set.

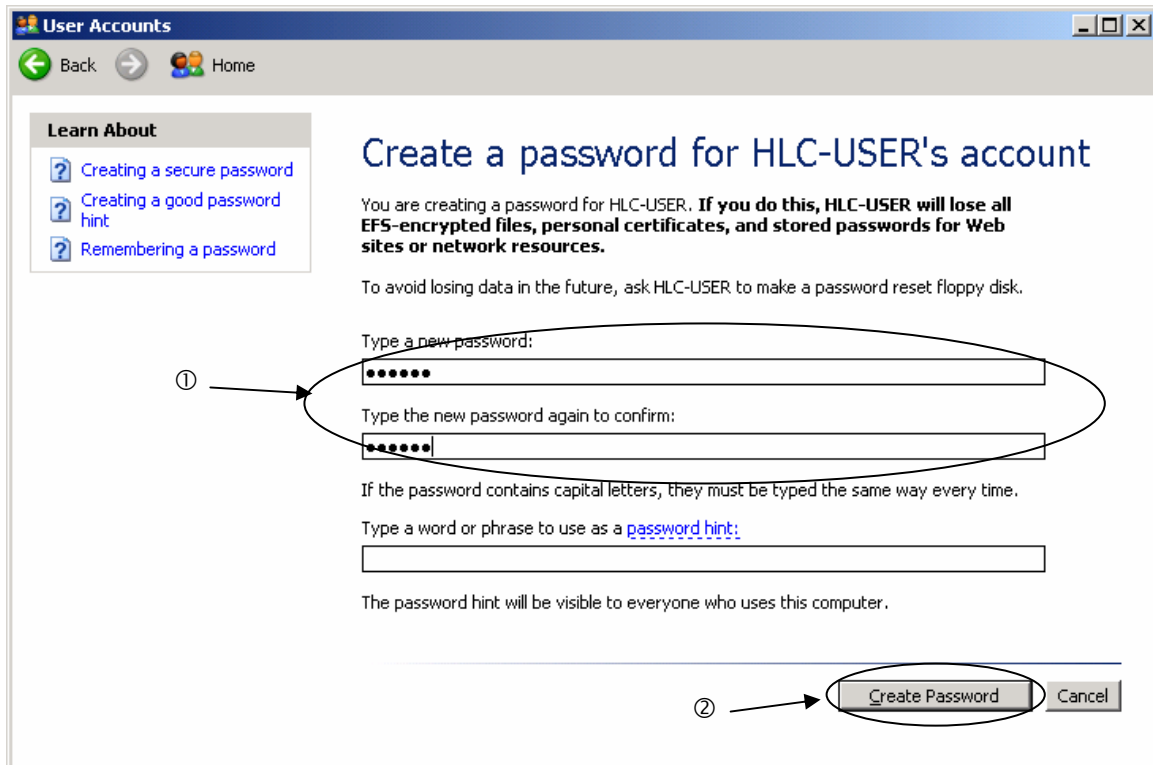


- 7) The screen that allows you to change the account settings appears on the screen. Select the item "Create a password."



Maintenance Guide

- 8) The password-creating screen appears. Be sure to enter the same password in both ① [Type a new Password] and [Type the new Password again to confirm] fields, and click the ② [Create password] button.



After you have finished all necessary settings, perform the update operation of the “C”-drive described in Section 13-2-4-2. After that, restart the main unit.

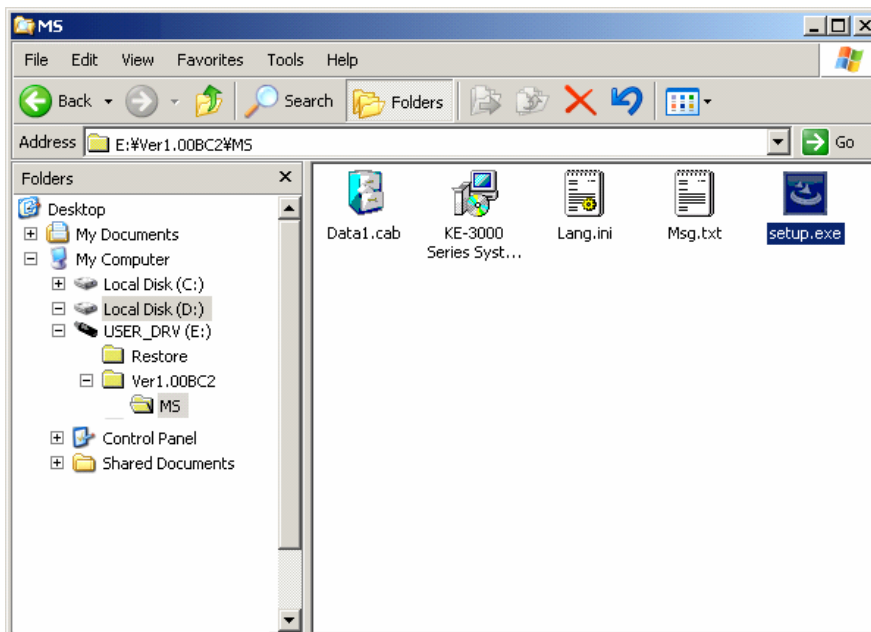
Maintenance Guide

13-2-4. KE-3010/3020V/3020VR System Programs

The KE-3010/3020V/3020VR system disks are composed of KE-3010/3020V/3020VR main unit system disks.

13-2-4-1. Installing the KE-3010/3020V/3020VR System Programs

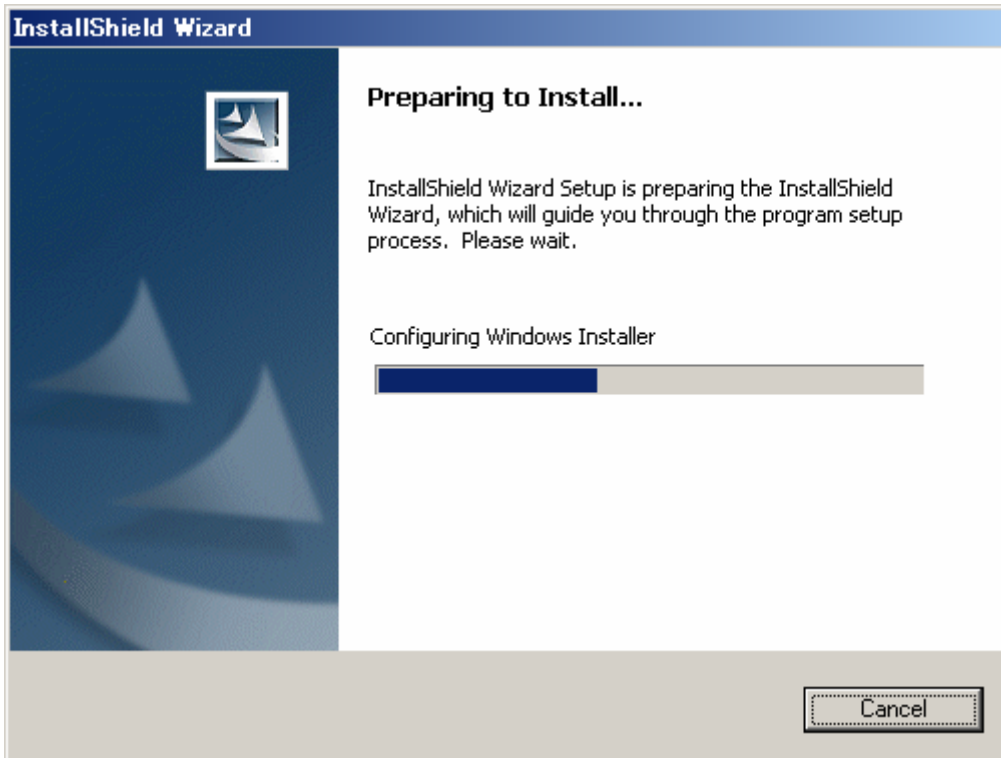
- 1) Prepare the USB memory or other media containing the system program installation files.
- 2) Click the [Start] button of Windows and run Explorer from Programs in the Start menu.
- 3) Select “Setup.exe” from the system program installation disk prepared in step 1).
In the Explorer window, double-click “Setup.exe” you have selected to start the installation.



Maintenance Guide

- 4) When running “Setup.Exe”, the “Preparing to Install...” screen will appear. This screen will disappear quickly and the operation automatically moves to step 5).

* CAUTION All the Installation screens are shown in English regardless of the language specification of the OS.

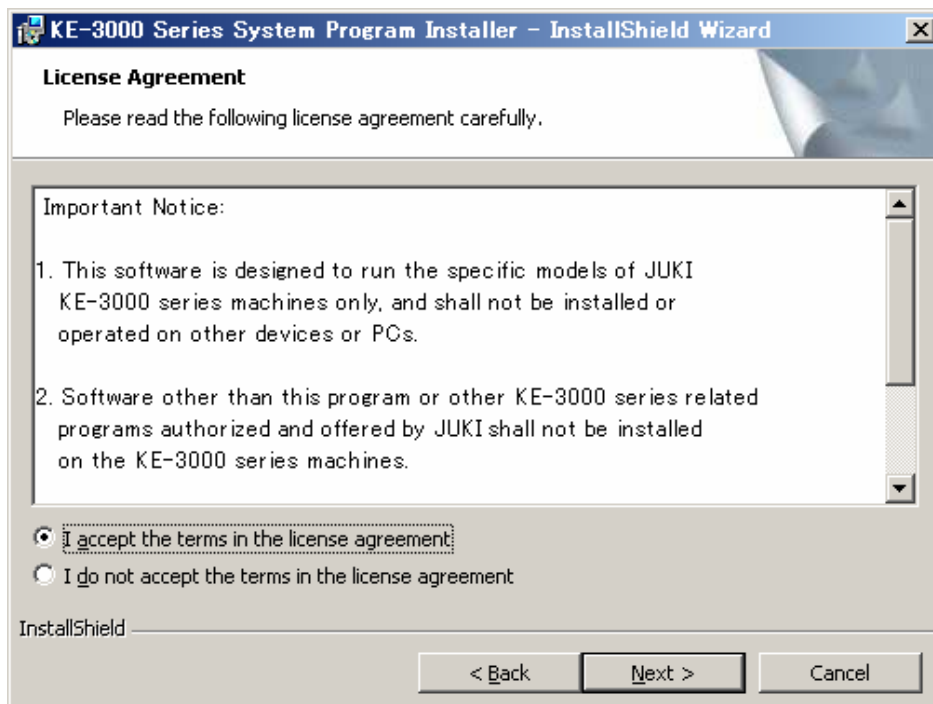


Maintenance Guide

- 5) The “Welcome to the InstallShield Wizard” screen will appear. Clicking the [Next] button will move to step 6).

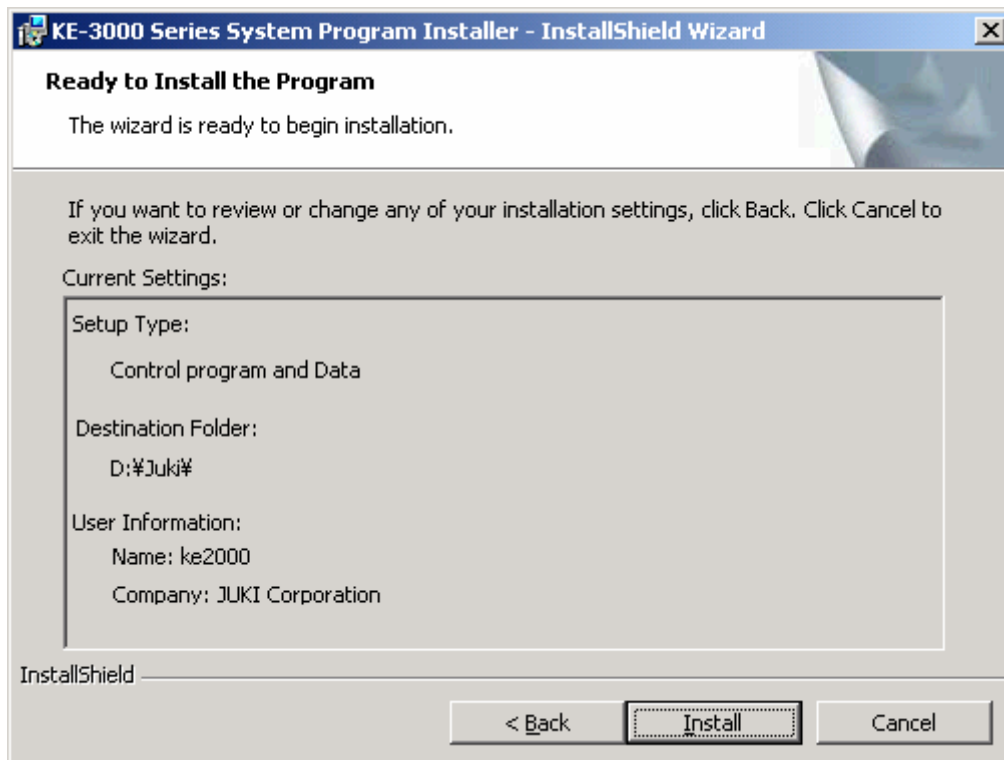


- 6) The “Confirmation” screen for the License Agreement will appear. Check on [I accept the terms in the license agreement] and click the [Next] button to move to step 7). (If you do not agree with the license agreement, you cannot advance the operation further.)

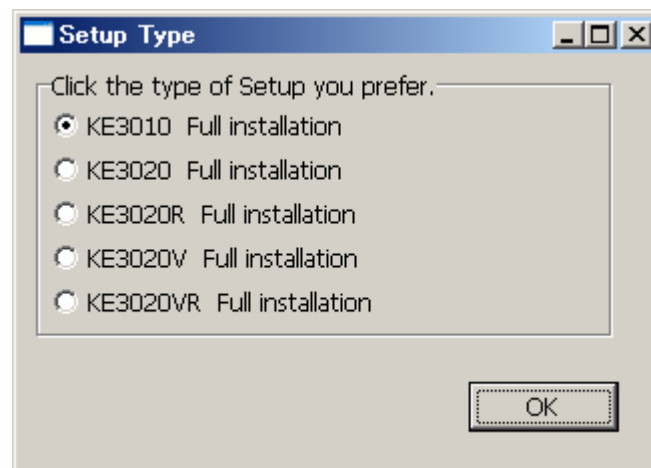


Maintenance Guide

- 7) The Confirmation prior to installation screen will appear.
Click the [Install] button to move to step 8).

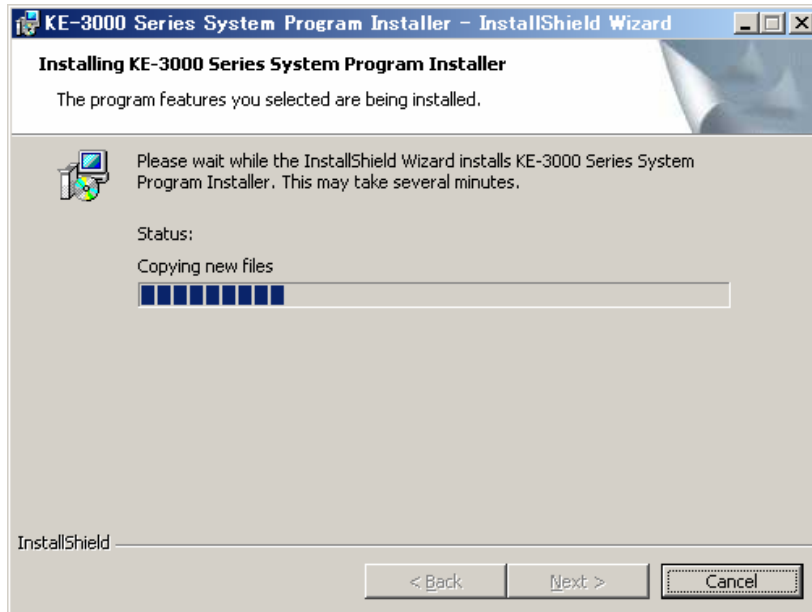


- 8) The “Setup Type” selection screen will appear.
Select a setup type you want to install and click the [OK] button to start the installation.

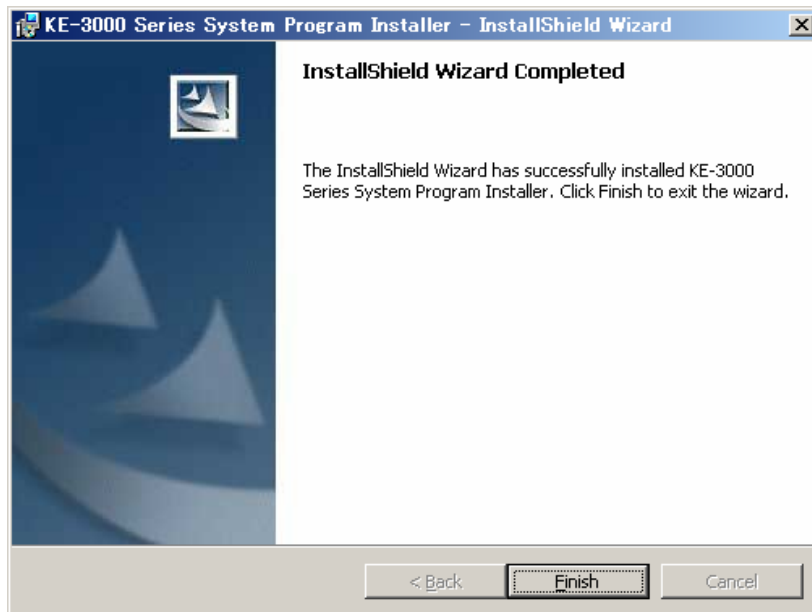


Maintenance Guide

- 9) The progress status is shown using the progress bar during installation.



- 10) When the installation is completed, the "InstallShield Wizard Completed" screen will appear. Click the [Finish] button to complete the installation.

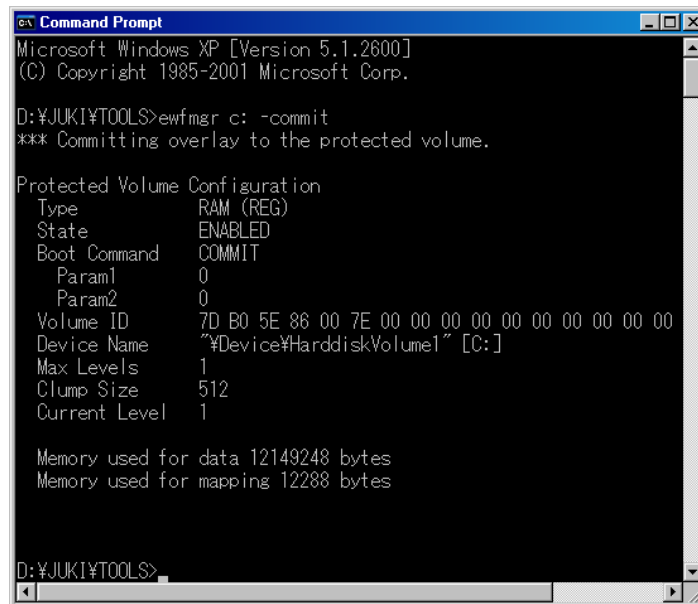


Maintenance Guide

13-2-4-2. Updating the C-drive

This system uses the C-drive write-protect function called “EWF”. If the system is installed or if the setting, such as network setting is changed, it is necessary to update the C-drive.

- 1) Click the [Start] button of Windows and run Command Prompt from Programs in the Start menu.
- 2) In the Console window (DOS screen), type “ewfmgr C: -commit”.
The following screen will appear.



```
Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

D:\JUKI\TOOLS>ewfmgr c: -commit
*** Committing overlay to the protected volume.

Protected Volume Configuration
Type          RAM (REG)
State         ENABLED
Boot Command  COMMIT
  Param1      0
  Param2      0
Volume ID     7D B0 5E 86 00 7E 00 00 00 00 00 00 00 00 00
Device Name   "%Device%\HarddiskVolume1" [C:]
Max Levels    1
Clump Size    512
Current Level 1

Memory used for data 12149248 bytes
Memory used for mapping 12288 bytes

D:\JUKI\TOOLS>
```

- 3) Select [Turn Off Computer] from the Start menu of Windows to restart the system.
The contents of the overlay are then overwritten into the C-drive.

* CAUTION

If the system is started up without updating of the C-drive, the installation information is cleared from the C-drive due to C-drive protect function, causing the system not to be started up correctly.

Maintenance Guide

13-2-4-3. Loading the Backup Data to the Hard Disk Drive (Restoring the backup data)

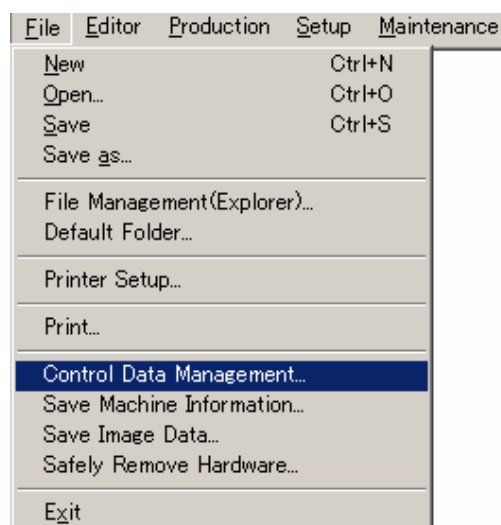


CAUTION

Always start the home position return of the machine after the backup data has been restored. Failure to do so may cause system runaway.

Select [File] and [Control Date Management...] to restore the control data in the SSD.

For the detailed procedure of restoration, see Section 13-3-3, “Restoring the control data from a flash memory” in the “Instruction Manual.”



- * After restoring the backup data, check the machine settings and adjust it if necessary.
- * If there is no backup data for the MS parameters, obtain the MS parameters again.

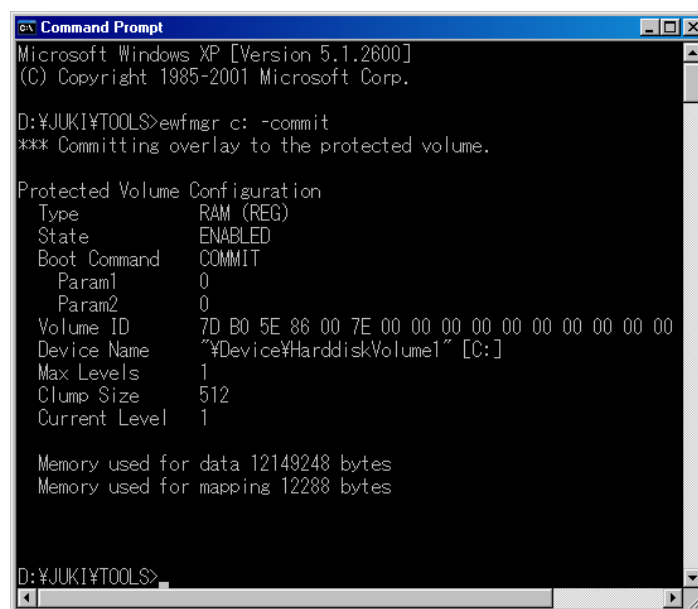
Maintenance Guide

13-2-4-4. Changing the OS Language (Perform this operation only when the language needs to be changed.)

When changing the OS language, the data is written into the C-drive. Therefore, update the C-drive before changing the language.

(The OS language change operation automatically shut down the OS. Therefore, update the C-drive first.)

- 1) Click the [Start] button of Windows and run Command Prompt from Programs in the Start menu.
- 2) In the Console window (DOS screen), type “EWFMgr.exe C: -commit”. The following screen will appear.



```

Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

D:¥JUKI¥TOOLS>ewfmgr c: -commit
*** Committing overlay to the protected volume.

Protected Volume Configuration
Type          RAM (REG)
State         ENABLED
Boot Command  COMMIT
Param1        0
Param2        0
Volume ID     7D B0 5E 86 00 7E 00 00 00 00 00 00 00 00 00
Device Name   "¥Device¥HarddiskVolume1" [C:]
Max Levels    1
Clump Size    512
Current Level 1

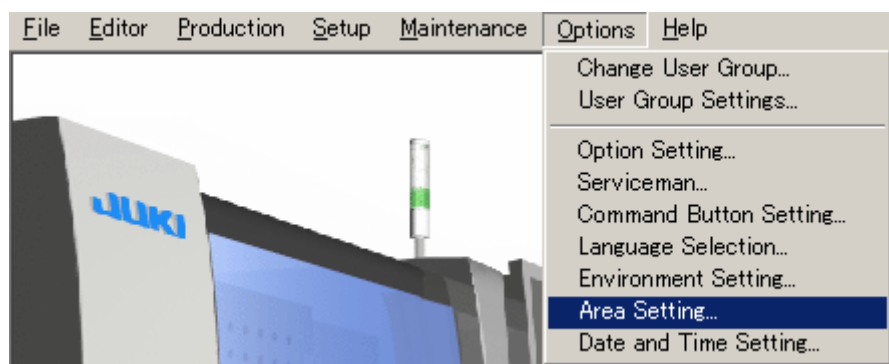
Memory used for data 12149248 bytes
Memory used for mapping 12288 bytes

D:¥JUKI¥TOOLS>
  
```

* CAUTION

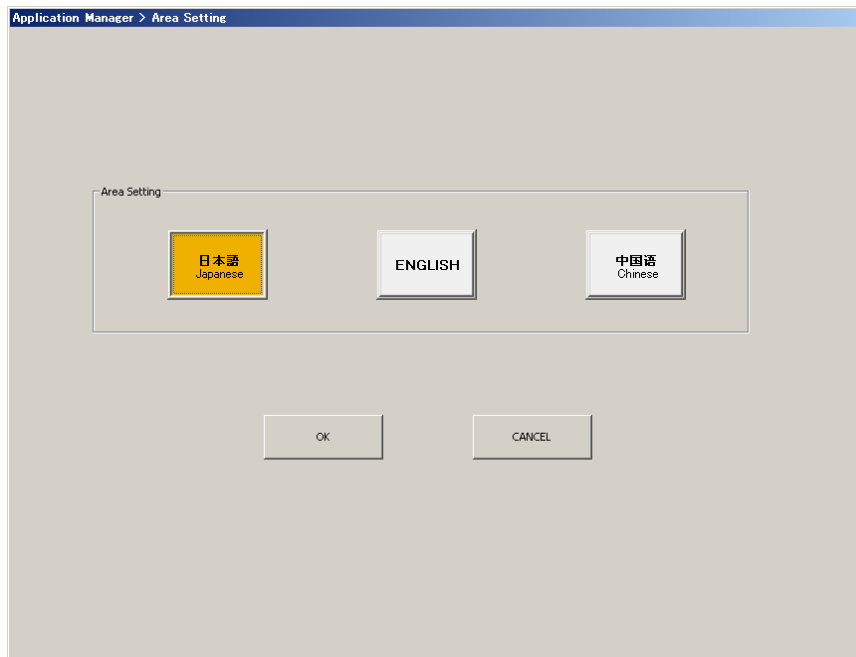
If the C-drive is not updated at this time, the operation status is returned to the previous status when restarting the system even though the OS language is changed.

- 3) In the status that the system is started up, select [Area Setting...] from the [Options] menu.

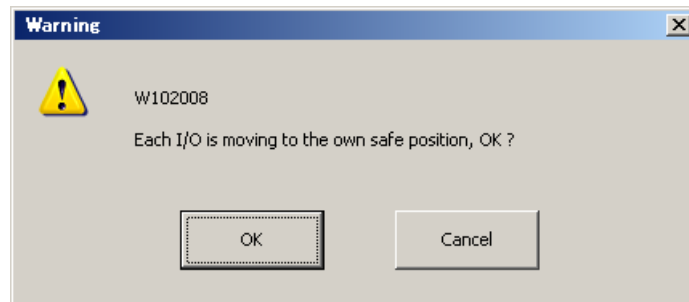


Maintenance Guide

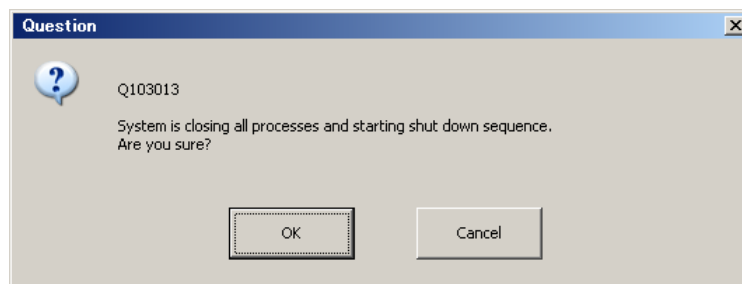
- 4) Select a desired language you want to change and click the [OK] button.



- 5) The “Safe Position” setup dialog box will appear. Click the [OK] button.



- 6) The “System” message dialog box will appear. Click the [OK] button.
(When performing this operation, the OS is then shut down automatically.)



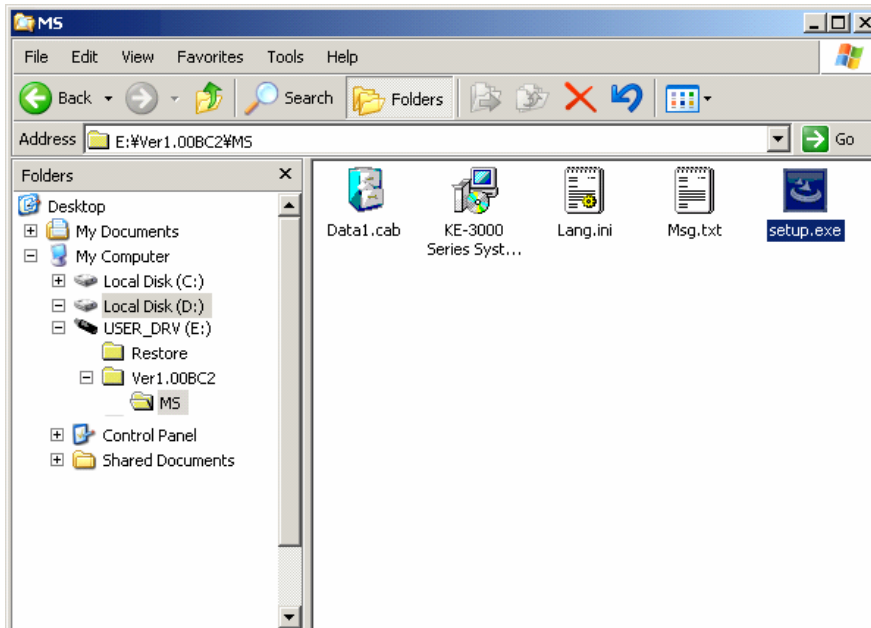
Subsequently, the OS is run with the language you have specified.

Maintenance Guide

13-2-5. Upgrading the System Version

The following describes the upgrading steps to install the KE-3010/3020V/3020VR system with a new version onto the KE-3010/3020V/3020VR system with any existing version.

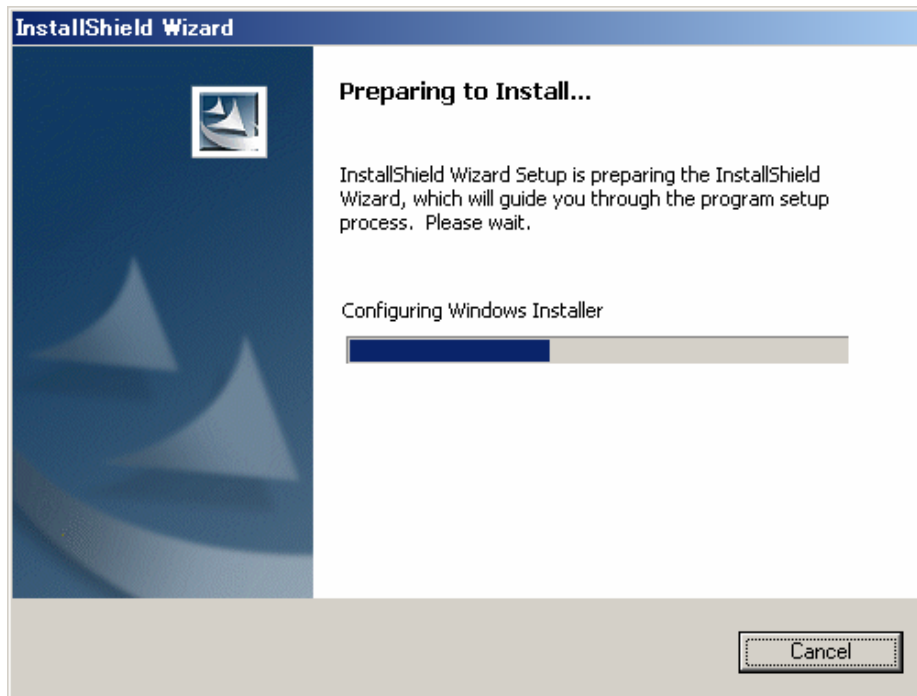
- 1) Prepare the USB memory or other media containing the system program installation files.
- 2) Click the [Start] button of Windows and run Explorer from Programs in the Start menu.
- 3) Select “Setup.exe” from the system program installation disk prepared in step 1).
In the Explorer window, double-click “Setup.exe” you have selected to start the installation.



Maintenance Guide

- 4) When running “Setup.Exe”, the “Preparing to Install...” screen will appear.
This screen will disappear quickly and the operation automatically moves to step 5).

* CAUTION All menus and comments on the Installation screen are shown in English regardless of the language specification of the OS.

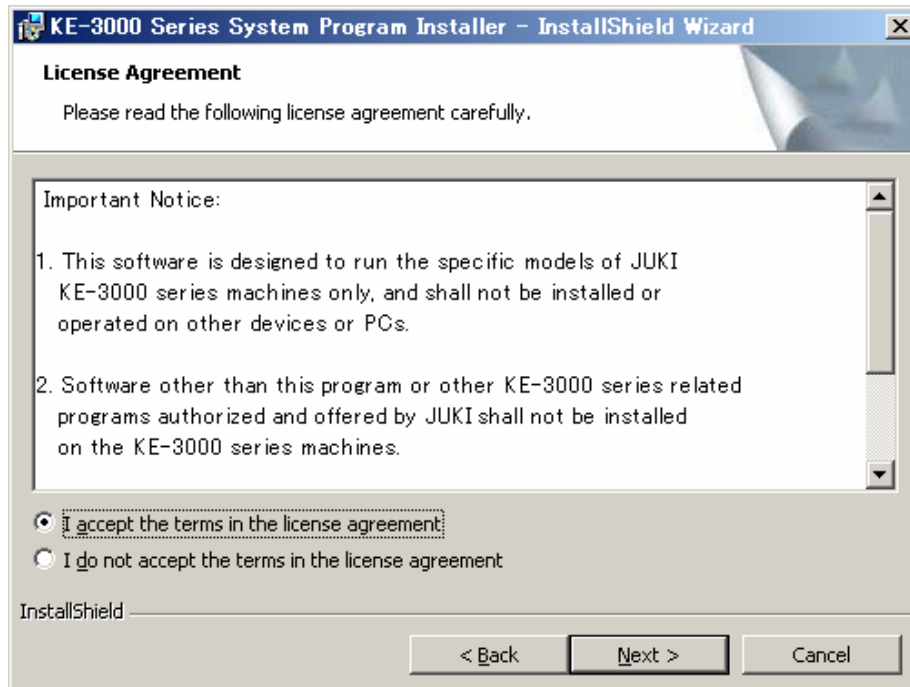


- 5) The “Welcome to the InstallShield Wizard” screen will appear.
Clicking the [Next] button will move to step 6).

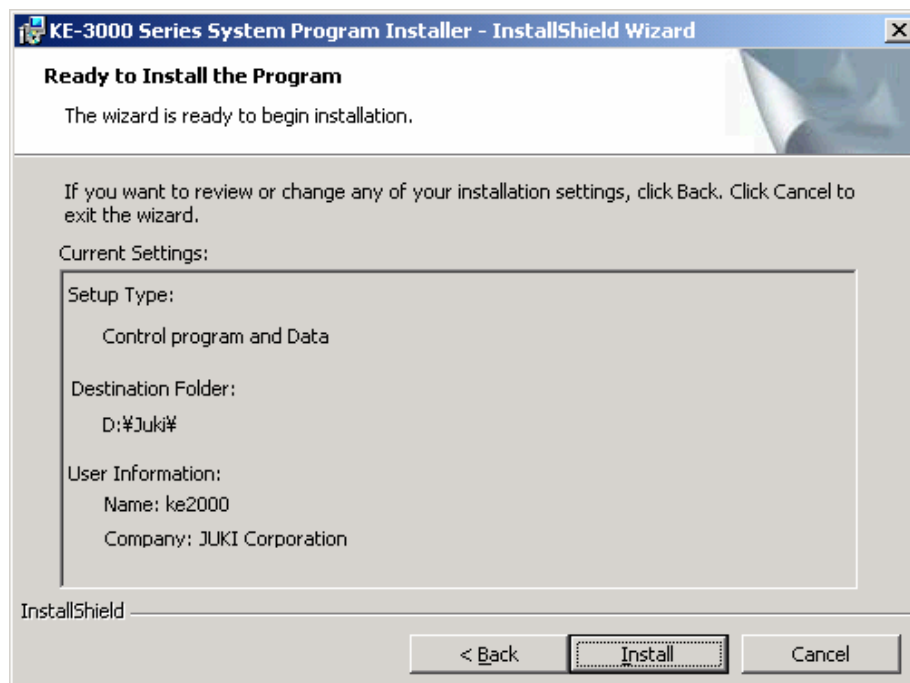


Maintenance Guide

- 6) The “Confirmation” screen for the License Agreement will appear. Check on [I accept the terms in the license agreement] and click the [Next] button to move to step 7). (If you do not agree with the license agreement, you cannot advance the operation further.)

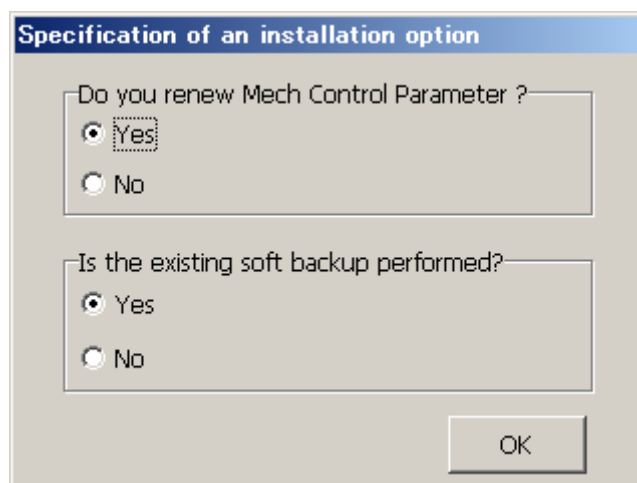


- 7) The Confirmation prior to installation screen will appear. Click the [Install] button to move to step 8).



Maintenance Guide

- 8) The screen will appear that allows you to select the mechanism control parameter initialization and existing software backup.



* CAUTION The button displays may vary depending on the language specification of the OS.

<Mechanism control parameter initialization> (Do you renew Mech Control Parameter?)

Yes	Mechanical control parameters are initialized and the default values are set.
No	Currently set mechanical control parameters are succeeded to a new version. When upgrading the program, newly required data becomes the default values.

<Existing software backup> (Is the existing soft backup performed?)

Yes	The exiting software is backed up.
No	The backup process of the exiting software is skipped.

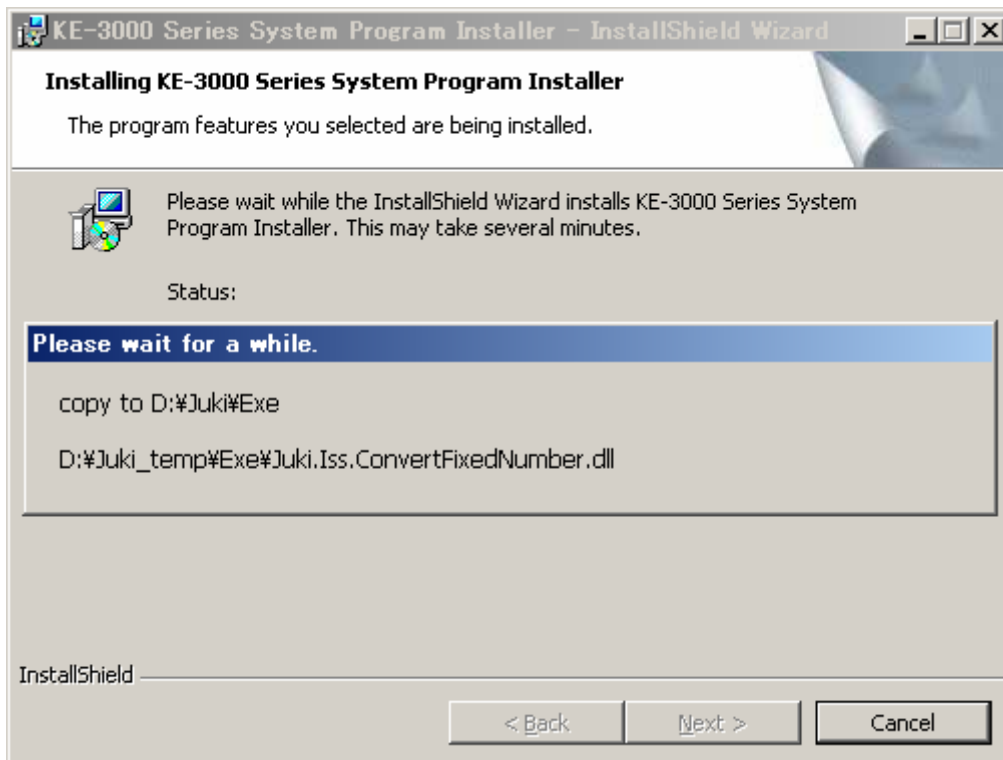
Check on [Yes] or [No] in each area to start the installation.

Appendix: About mechanical control parameters
 The mechanical control parameters are an aggregate of threshold value data.
 The following shows the major setting data ① to ⑤.

- ① Speed data for head operation
- ② Speed data for X/Y-axis operation
- ③ Speed data for support table operation
- ④ R.P.M. of AWC/Center motor
- ⑤ Time data for ATC control

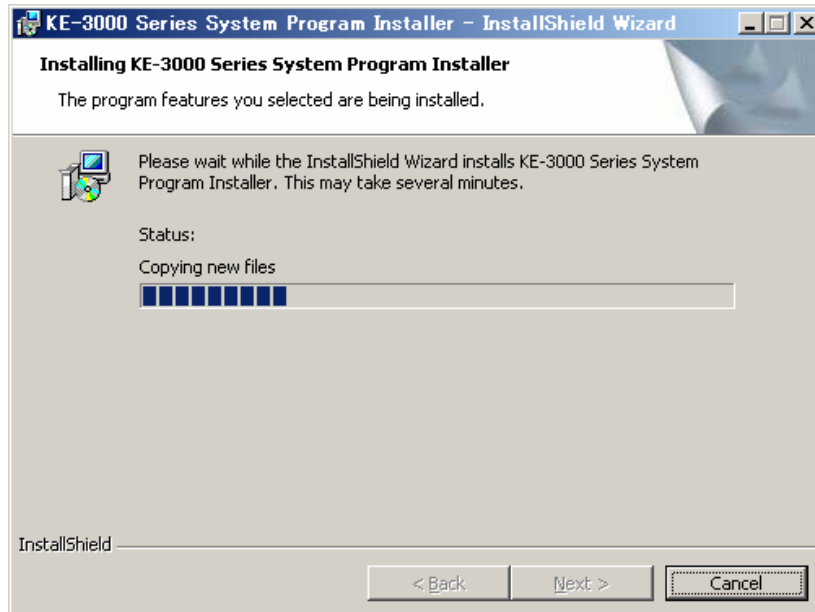
Maintenance Guide

- 9) If you have selected [Yes] in the “Is the existing soft backup performed?” area in step 8), the Existing software backup screen will appear.

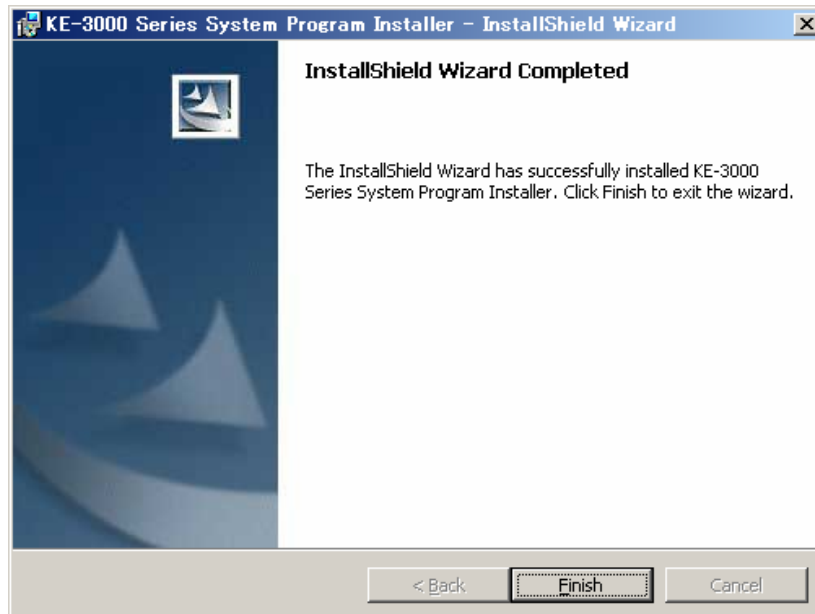


Maintenance Guide

10) The progress status is shown using the progress bar during installation.



11) When the installation is completed, the “InstallShield Wizard Completed” screen will appear. Click the [Finish] button to complete the installation.



12) Follow the steps stated in section 13-2-4-2, Updating the C-drive, to update the C-drive.

* CAUTION

If the system is started up again without updating of the C-drive, the installation information is cleared from the C-drive due to C-drive protect function, causing the system not to be started up correctly.

Maintenance Guide

13-2-6. Installing the Main Unit Software into the SSD for the White List Type Antivirus Software (Optional)

About McAfee Embedded Security

This McAfee Embedded Security (hereafter referred to as “MES”) is a software product that is installed into the mounter to protect the mounter from computer virus.

This MES is McAfee’s software. The software uses an antivirus system commonly called “white list”.

Antivirus software products that are sold for general personal computers utilize a “black list” system that uses a file called “pattern file” containing characteristics of various viruses to detect illegal virus software.

However, this system always needs to update the pattern file to the latest file. So, there are problems when this system is installed into the mounter. In contrast to this, the “white list” system registers the software groups, such as OS that have been installed correctly into the list called “white list” and monitors that any software other than those does not run. So, the “white list” system does not need any virus pattern file and gives the unlimited license. Basically, the antivirus software updating work is not needed.

For this reason, the “white list” system has excellent features for the built-in OS. However, great care should be taken since illegal software, such as computer virus functions if it is included in the white list when registering the currently operating software groups into the white list during new installation. When upgrading the mounter system software, all of software including OS are not registered newly, but only the updated software is registered into the white list in the dedicated update mode. This greatly reduces the computer virus invasion.

As the “white list” system is used, the software cannot be installed into the mounter or the execution file cannot be changed while the MES is running.

When the mounter is protected from the computer virus by the MES, the following operations become impossible due to the white list system.

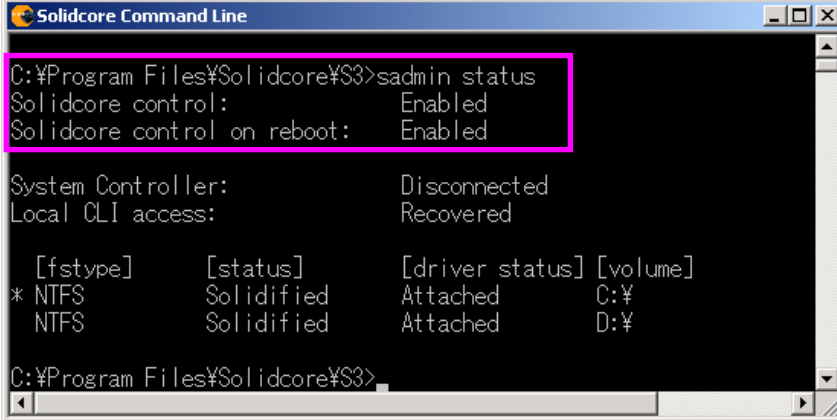
- The name of an EXE file, a DLL file, or an RTSS file cannot be changed.
- An EXE file, a DLL file, or an RTSS file cannot be copied in the overwrite mode.
- A new EXE file, DLL file, or RTSS file cannot be copied into the mounter and it cannot be operated.
- An existing EXE file, DLL file, or RTSS file cannot be copied and operated.
- An existing EXE file, DLL file, or RTSS file cannot be deleted.
- A USB memory with the antivirus function cannot be used.
- New software cannot be installed.

Therefore, to install and operate new software due to upgrading of the mounter software or installing of patch software, follow the steps below to update the white list.

Additionally, since a USB memory with the antivirus function cannot be used, use a normal USB memory.

Maintenance Guide

1. Since the MES does not protect the mounter from the computer virus from the white list update start, disconnect the LAN cable if it is connected.
2. Put the MES in the white list update mode (update mode). From the [Start] menu of Windows, select [Programs] → [S3control] → [Solidifier]→[SolidcoreCommandLine] to display the dedicated command prompt.
After that, type the command “sadmin bu”.
3. Install new software, such as mounter software upgrading or patch software.
4. Perform the EWF commit. Type “ewfmgr C: -commit” at the command prompt.
5. Put the EMS in the white list update completion mode (update mode completion). Type “sadmin eu” at the command prompt.
6. Turn OFF the power to the mounter main unit, and then turn it ON again.
7. After the power has been turned ON again, display “SolidcoreCommandLine” again and type “sadmin status”. After typing, check that “Solidcore control” and “Solidcore control on reboot” are set at “Enable”. (See the Figure below.)



```

Solidcore Command Line
C:\Program Files\Solidcore\S3>sadmin status
Solidcore control:      Enabled
Solidcore control on reboot:  Enabled

System Controller:      Disconnected
Local CLI access:      Recovered

[fstype]    [status]    [driver status] [volume]
* NTFS      Solidified  Attached        C:¥
NTFS        Solidified  Attached        D:¥

C:\Program Files\Solidcore\S3>

```

If the setting is other than “Enable”, type the commands “ewfmgr c: -commit” and “sadmin eu” again. Turn OFF the power to the mounter, and then turn it ON again. After the power has been turned ON again, display “SolidcoreCommandLine” again and type “sadmin status” to check the settings again.

- * When making the network setting, it is not necessary to change the MES to the white list update mode.

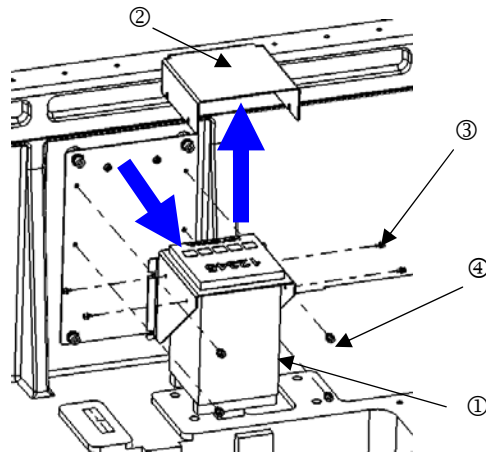
Maintenance Guide

13-3. Load Cell (Optional)

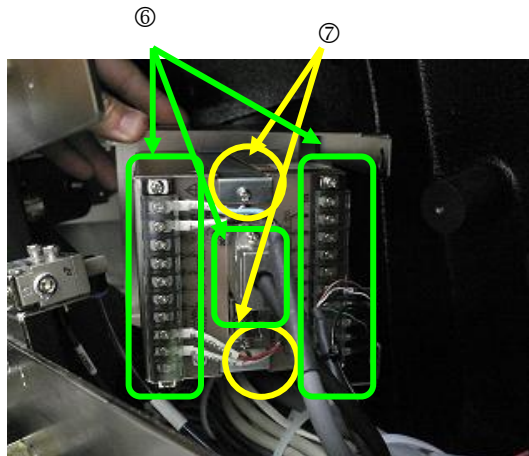
13-3-1. Replacing the Load Cell

<M and L board specifications>

- 1) To replace the load cell ①, remove the load cell cover ② and screws (SL3030692TN M3 × 6) (4 pcs.). After that, remove the screws ④ (SL6040892TN M3 × 10) (4 pcs.) that secure the bracket.



- 2) Disconnect all the cables ⑥. Remove the screws ⑦ (2 pcs.) from the rear of the load cell ① and pull out the load cell amplifier from the bracket.

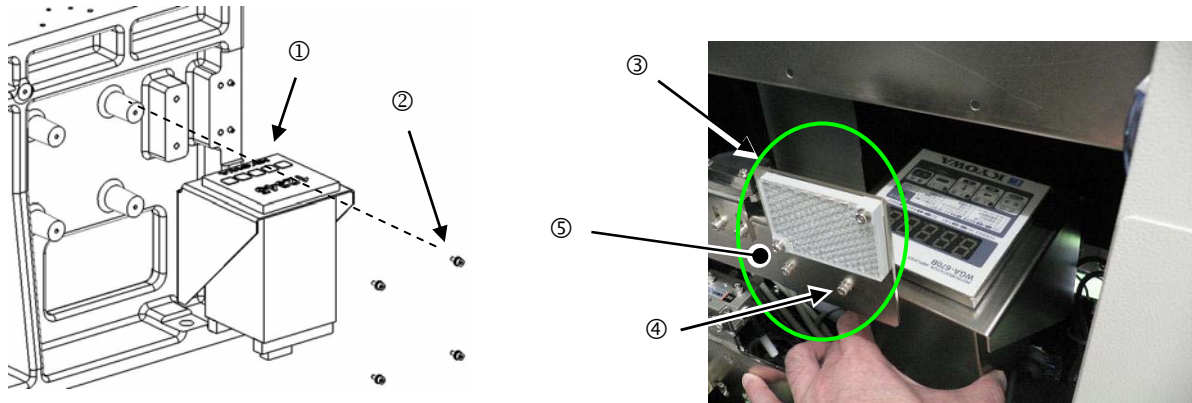


- 3) Reassemble the parts and components in the reverse order of disassembly.

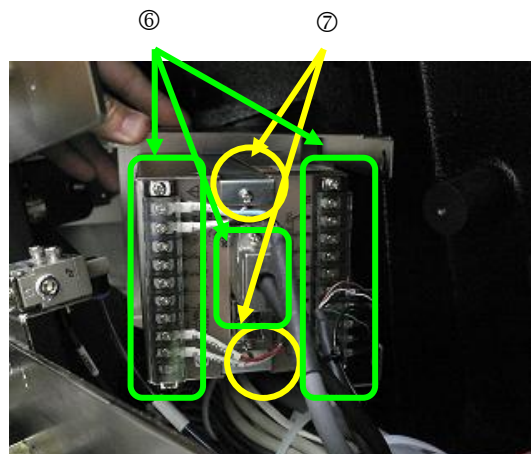
Maintenance Guide

<XL board specifications>

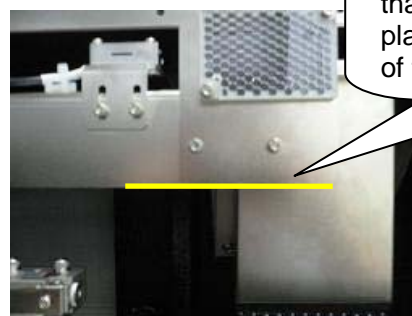
- 1) When replacing the load cell ①, first remove the screws (SL6031092TN M3 × 10) ④ to detach the reflection plate ③ for the electric feeder incorrect detection sensor so as to get access to the load cell mounting screws (SL6041092TN M4 × 10) ②, and then remove these screws. (It is not necessary to detach the feeder float sensor mounting bracket ⑤.)



- 2) Disconnect all the cables ⑥. Remove the screws ⑦ (2 pcs.) from the rear of the load cell ① and pull out the load cell amplifier from the bracket.



- 3) Reassemble the parts and components in the reverse order of disassembly.



Assemble the components so that the bottom of the reflection plate ③ is flush with the bottom of the bracket ⑤.

Maintenance Guide

13-4. Coplanarity Sensor (Optional)

13-4-1. Replacing the Sensor

- 1) Remove the rear cover.

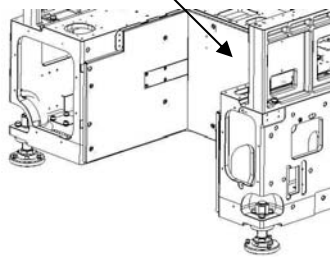
Remove the rear cover.

- * When the tape cutter is installed optionally, detach this cutter unit.

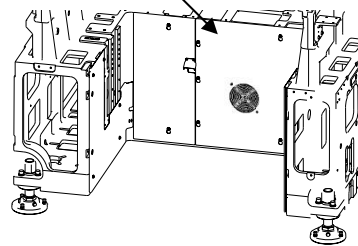
To detach the cutter unit, follow steps (1) to (7) stated in section 18-2, Replacing the Tape Cutter Main Unit, described in the Maintenance Guide. After the work has been completed, reassemble the parts and components in the reverse order of disassembly.

<M and L board specifications>

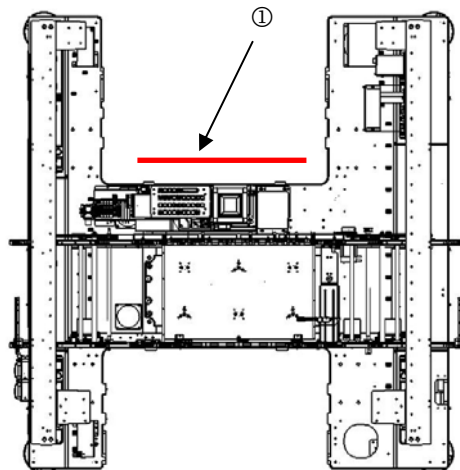
Fixed bank specifications
40110750 BANK_COVER_RC



Replacement table specifications
40110757 T_BANK_COVER_RCL
40110758 T_BANK_COVER_RCR



<XL board specifications>



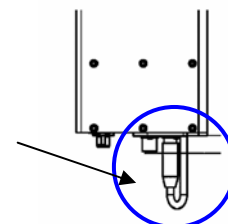
- 2) Disconnect the cables.

Disconnect the cables from the lower portion of the sensor.

- ② Coplanarity power cable
- ③ Coplanarity encoder cable
- ④ Coplanarity LAN cable

This part does not need to be detached.

- * The cables that come from the inside of the sensor do not need to be disconnected.



- 3) Detach the sensor.

Loosen the sensor fixing screws ⑤ to detach the sensor ⑥.

Maintenance Guide

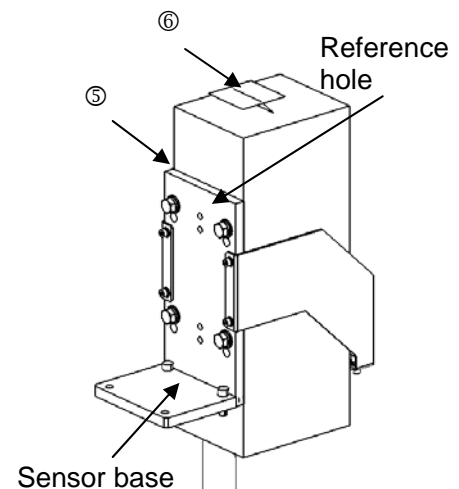
4) Assemble a new sensor.

Secure a new sensor to the sensor base temporarily using the fixing screws ⑤.

Insert the (jig) reference pins ⑦ into the reference hole positions shown in the Fig. to make the positioning of the sensor.

Tighten the fixing screws ⑤ firmly and pull out the (jig) reference pins ⑦.

- * When pulling out the reference pin, cover it with a cloth rag and pull it out with long-nose pliers.
- * For the reference hole, use the KE-3010 (lower portion) or KE-3020V/3020VR (upper portion).



⑤ SL6082092TN × 4

⑥ 40097422 × 1

⑦ PH0600282U0 (jig) × 2

5) Obtain the MS Parameters again.

After the sensor has been replaced, it is absolutely necessary to obtain the MS parameters again. Start up the MS parameter and select [VCS offset setup]-[Coplanarity offset] to obtain [Assembling position] and [Focus height].

Jig to be used: 40098180 Coplanarity adjustment jig

Nozzle to be used: 508-nozzle

Maintenance Guide

13-4-2. Changing the IP Address of the Coplanarity CPU

When setting the IP address of the coplanarity CPU, make the setting while referring to the cautions on TCP/IP setup in section 13-2-3, Setting Up the Network (setup required when communicating with the IS.).

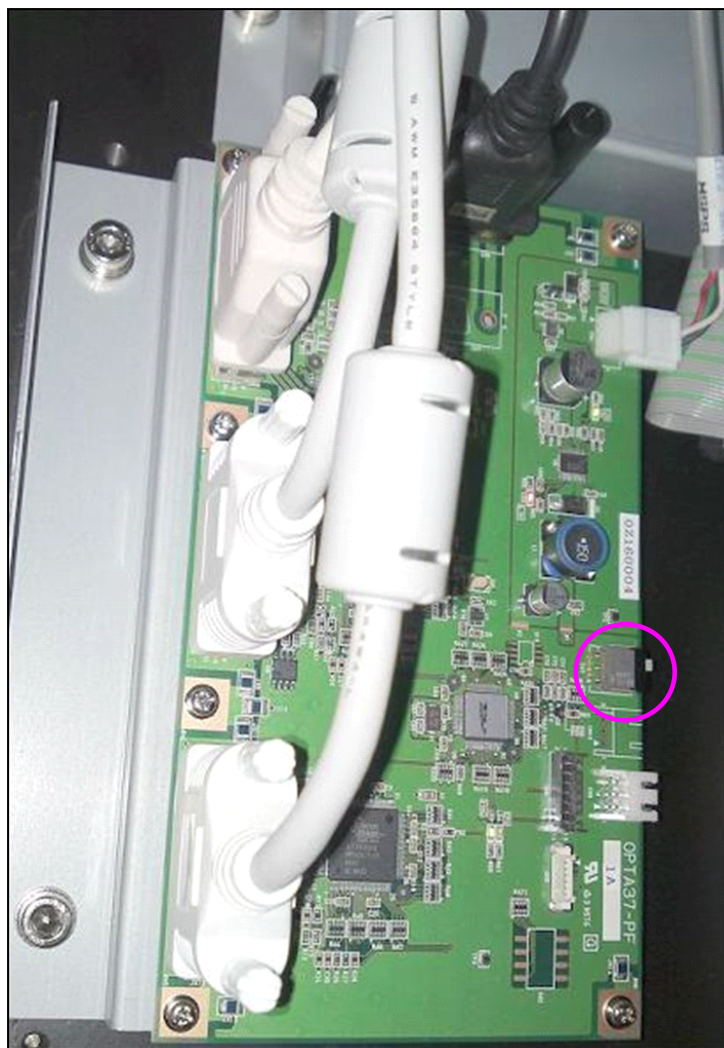
13-4-2-1. Required Components

- ① Mouse and keyboard (PS2)

Another one set of generally available PS2 connection mouse and keyboard or mouse (40080173) and keyboard (40003284) mounted on the mounter is required.

13-4-2-2. Making Preparations for the Setup

- 1) Make sure that the power to the mounter turns OFF, and then connect the mouse and keyboard you have prepared to the coplanarity CPU (40097624) in the control unit.
- 2) Detach the rear cover. Change the change-over switch on the coplanarity monitor change-over PCB (40097434) in the direction indicated by an arrow.

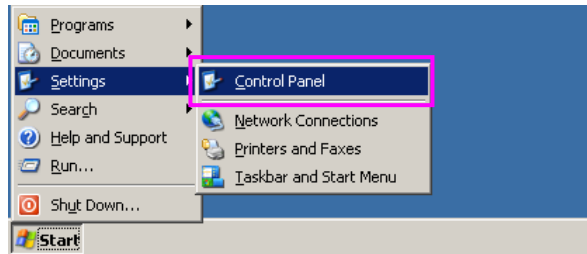


Maintenance Guide

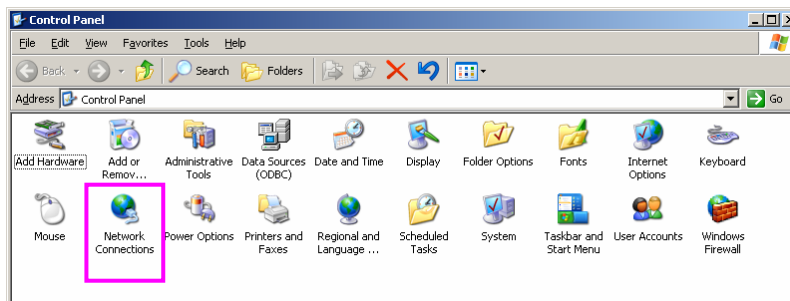
13-4-2-3 Changing the Coplanarity CPU Settings

- 1) Turn ON the power to the mounter.
- 2) Put the mounter in a status that only Windows is running.

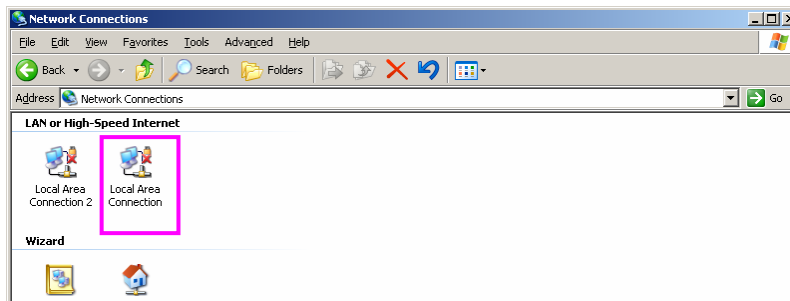
Open [Control Panel] from the [Start] menu.



- 3) Select [Network Connections] in the “Control Panel” dialog box.



- 4) The “Network Connections” dialog box will appear.
Right-click [Local Area Connection] to select [Properties].



Do not change [Local Area Connection 2]. [Local Area Connection 2] is the network settings for the communication between the coplanarity sensor and coplanarity CPU board. If these settings are changed, the coplanarity measurement cannot be performed.

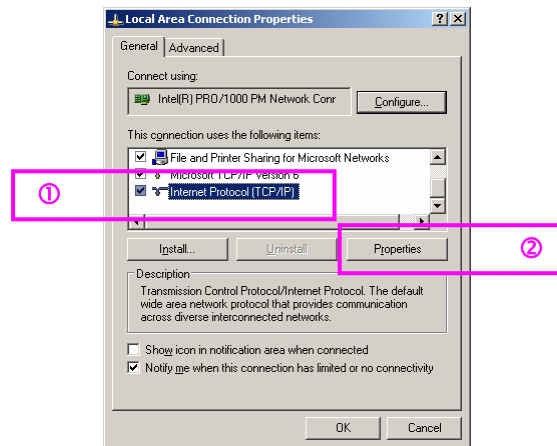
If the settings of [Local Area Connection 2] have been changed, return the settings to the values shown below.

IP address : 192.168.0.100

Subnet mask : 255.255.255.0

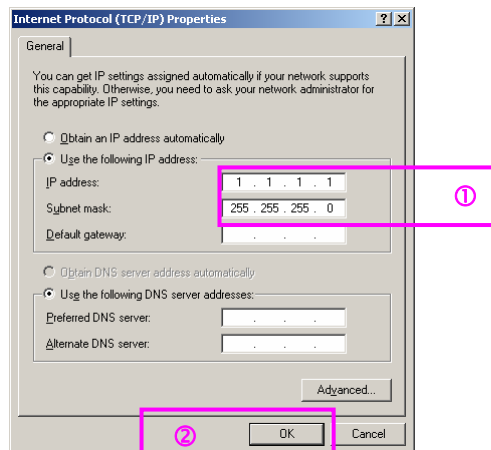
Maintenance Guide

- 5) The “Local Area Connection Properties” dialog box will appear.
Select [Internet Protocol (TCP/IP)] and click the [Properties] button.



- 6) The “Internet Protocol (TCP/IP) Properties” dialog box will appear.

Set the IP address and subnet mask for the coplanarity CPU board you have prepared in the [IP address] and [Subnet mask] fields, and then click the [OK] button to close the “Internet Protocol (TCP/IP) Properties” dialog box.



Maintenance Guide



- 7) Update the C-drive of the coplanarity CPU board.

Run the command prompt and input “ewfmgr _ C: _ -commit (_ expresses a space)”.

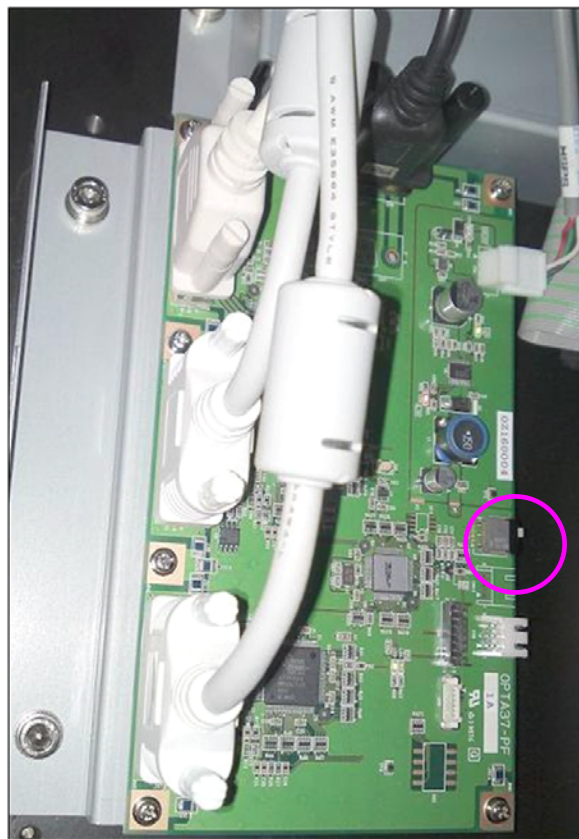
Press the Enter key.

From the [Start] menu, shut down the coplanarity CPU board.

At this time, be careful not to turn OFF the power to the mounter.

 <p>DANGER</p>	<p>The C-drive of the coplanarity CPU board is not updated unless the coplanarity CPU board is shut down. So, be sure to shut down the coplanarity CPU board from the [Start] menu.</p> <p>Be careful not to turn OFF the power to the mounter since the mounter software is running.</p> 
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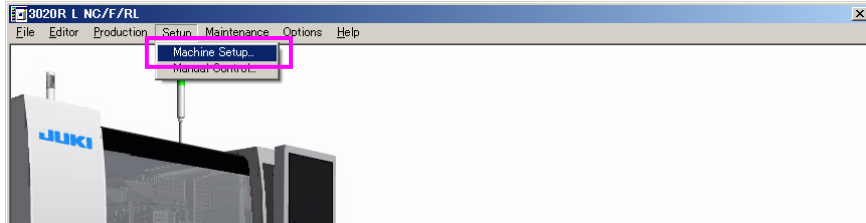
- 8) Change the change-over switch on the coplanarity monitor change-over PCB (40097434) in the direction indicated by an arrow.



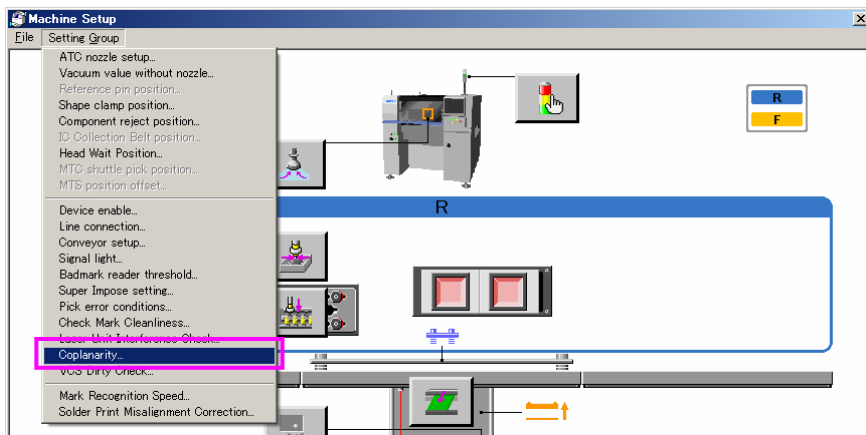
Maintenance Guide

13-4-3. Changing the Mounter Settings

- 1) Set up the coplanarity network from the [Machine Setup] menu.
Select [Setup]-[Machine Setup] on the desk top screen.



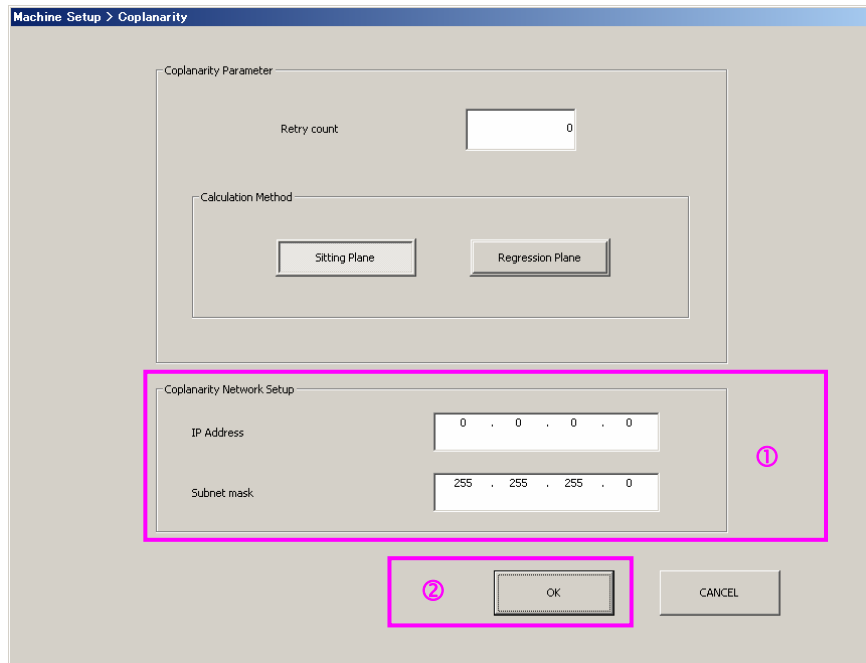
- 2) The machine setup will start up.
From the [Machine Setup] menu, select [Setting Group]-[Coplanarity].



Maintenance Guide

3) The “Coplanarity” dialog box will appear.

Input the IP address and subnet mask for the coplanarity CPU board set on the coplanarity CPU board in the [IP address] and [Subnet mask] fields in the “Coplanarity Network Setup” area. Click the [OK] button to exit the coplanarity setup. Subsequently, save the machine setup to exit the machine setup.

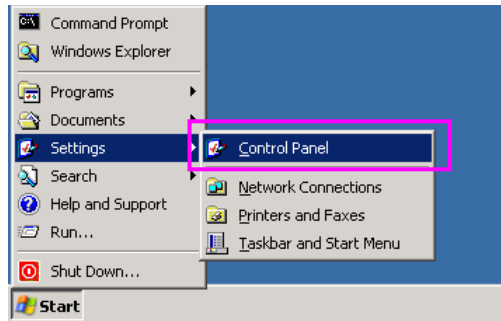


	DANGER	<p>Do not set the IP address and subnet mask prepared for the mounter. Be sure to set the IP address and subnet mask set on the coplanarity CPU board.</p> <p>If incorrect IP address or subnet mask is set, the communication is not established. In this case, when the mounter is started up, the communication error occurs and the coplanarity inspection cannot be performed.</p>
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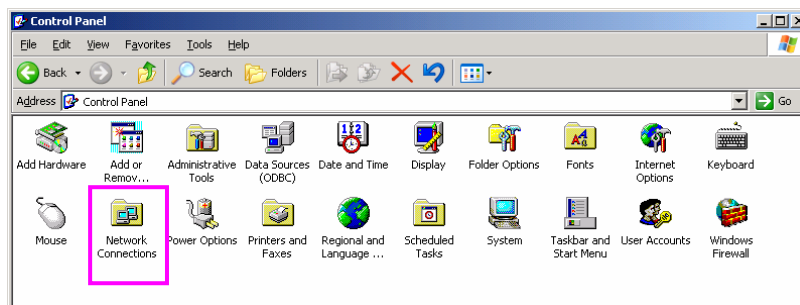
Maintenance Guide

- 4) Put the mounter in a status that the main unit system is terminated and only Windows is running.

Open [Control Panel] from the [Start] menu.

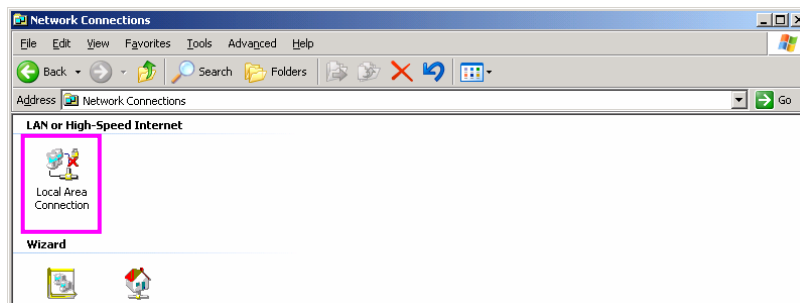


- 5) Select [Network Connections] in the “Control Panel” dialog box.



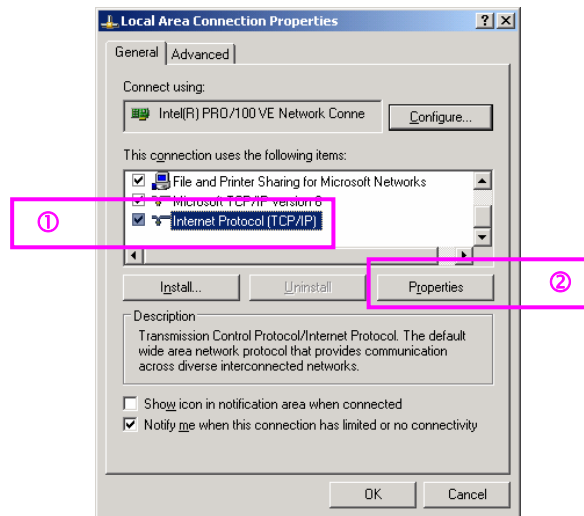
- 6) The “Network Connections” dialog box will appear.

Right-click [Local Area Connection] to select [Properties].

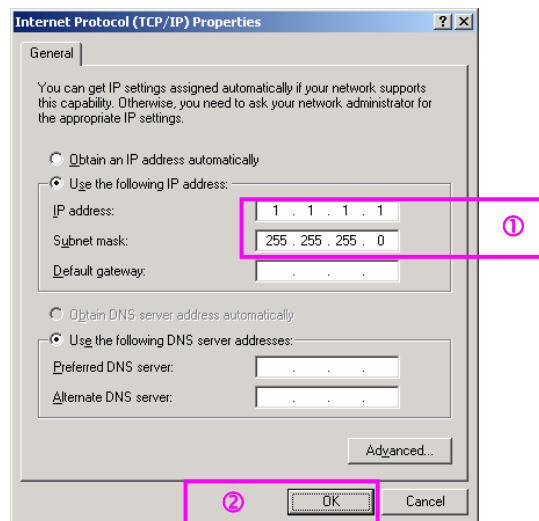


Maintenance Guide

- 7) The “Local Area Connection Properties” dialog box will appear.
Select [Internet Protocol (TCP/IP)] and click the [Properties] button.



- 8) The “Internet Protocol (TCP/IP) Properties” dialog box will appear.
Set the IP address and subnet mask for the mounter you have prepared in the [IP address] and [Subnet mask] fields, and then click the [OK] button to close the “Internet Protocol (TCP/IP) Properties” dialog box.



- 9) When the screen returns to the “Local Area Connection Properties” dialog box, click the [OK] button to close the “Local Area Connection Properties” dialog box.

- 10) Update the C-drive.

Run the command prompt and input “ewfmgr _ C: _ -commit (_ expresses a space)”.

Press the Enter key.

Turn OFF the power to the mounter, and then restart the mounter.

Maintenance Guide

**DANGER**

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

[14] ELECTRICAL COMPONENTS

14-1. Layout of Electrical Components

14-1-1. Layout of Electrical Components (M and L Board Specifications)

No.	Part name
1	Signal tower
2	LCD monitor
3	HOD (Optional)
4	Operation panel [Front: LCD monitor, Operation board F] [Rear: Operation board R]
5	Head unit [S Head main board assembly, Z/θ-axis servo amplifier, HMS point sensor, Bad mark reader (Optional)]
6	OCC camera, Vertical light board (right, left), Angle light board (right, left)
7	Keyboard
8	Mouse
9	Power switch
10	FD/CD drive (Optional USB device)
11	Control unit [CPU board, ETHER MAIN board, POSITION board, IEEE 1394 board, IP-X7 board, COPLA CPU board (Optional), BACK board]
12	X-axis AC servo amplifier
13	Y-axis AC servo amplifier
14	Vacuum pump
15	5-phase stepping driver [For support table motor (Right), For auto transport rail width adjustment motor (Left, Optional)]
16	VCS [BOTTOM LIGHT, BACK LIGHT, SIDE LIGHT, COAXIAL LIGHT]
17	CVS board (Optional)
18	BANK board

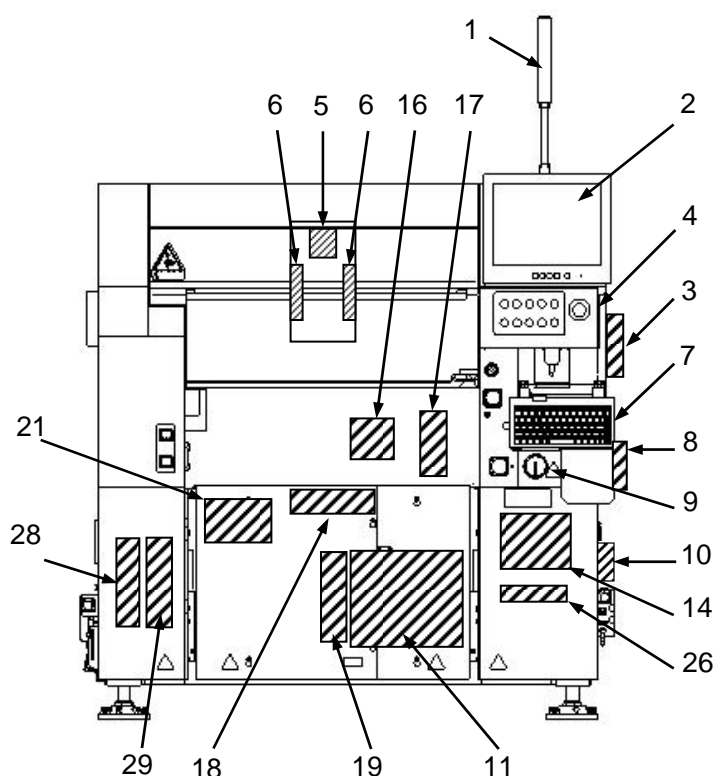


Figure 14-1-1-1 Front View

Maintenance Guide

No.	Part name
19	Driver for IN, CENT, and OUT motors
20	Power supply unit
21	ATX power supply (UPS)
22	Transformer for AC power
23	Circuit breaker
24	AC input unit
25	Load cell amplifier (Optional)
26	S-LIGHT CTRL board (Option for KE-3010)
27	FEEDER board
28	S-XY-relay board
29	BASE IO board
30	SUPERIMPOSE Board
31	Safety unit [EN specifications only]
32	ETF power supply unit (Optional)
33	MOUSE/KEYBOARD Selector (Rear-side operation (Optional))
34	SCM3 board (KE-3020VR Only)
35	Coplanarity power supply assembly (Optional)

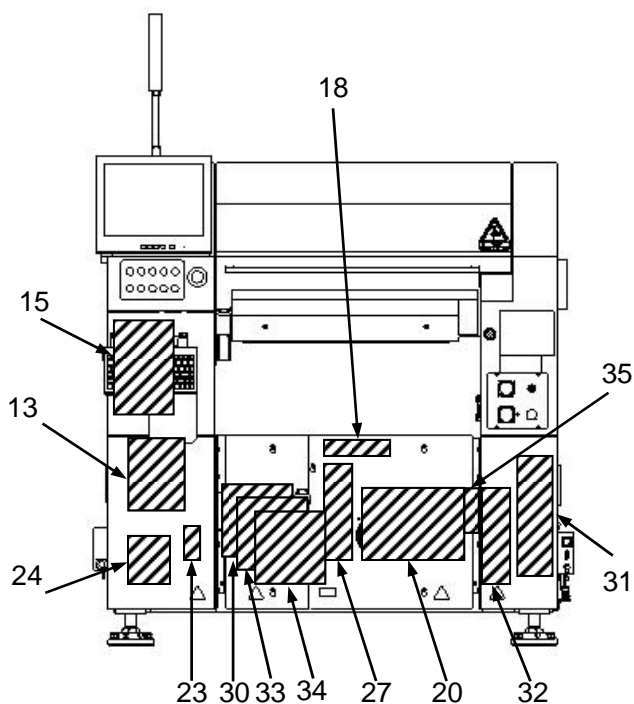


Figure 14-1-1-2 Rear View

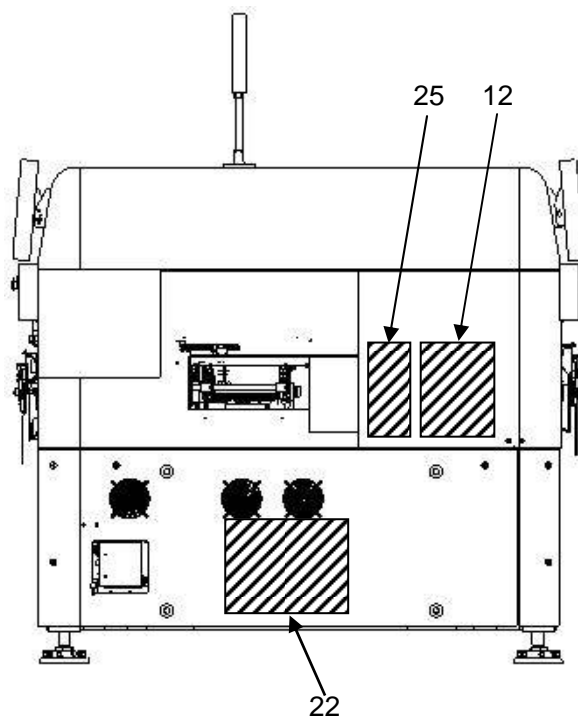


Figure 14-1-1-3 Right Side View

Maintenance Guide

14-1-2. Layout of Electrical Components (XL Board Specifications)

No.	Part name
1	Signal tower
2	LCD monitor
3	HOD (Optional)
4	Operation panel [Front: LCD monitor, Operation board F] [Rear: Operation board R]
5	Head unit [S Head main board assembly, Z/θ-axis servo amplifier, HMS point sensor, Bad mark reader (Optional)]
6	OCC camera, Vertical light board (right, left), Angle light board (right, left)
7	Keyboard
8	Mouse
9	Power switch
10	FD/CD drive (Optional USB device)
11	Silicon disk
12	Control unit [CPU board, Ether Main board, Position board, IEEE 1394 board, IP-X7 board, Copla CPU board (Optional), BACK board]
13	XY-axis AC servo amplifier
14	Vacuum pump
15	5-phase stepping driver [For support table motor (Right), For auto transport rail width adjustment motor (Left, Optional)]
16	VCS [Bottom Light, Back Light, Side Light, Coaxial Light]
17	CVS board (Optional)
18	BANK board

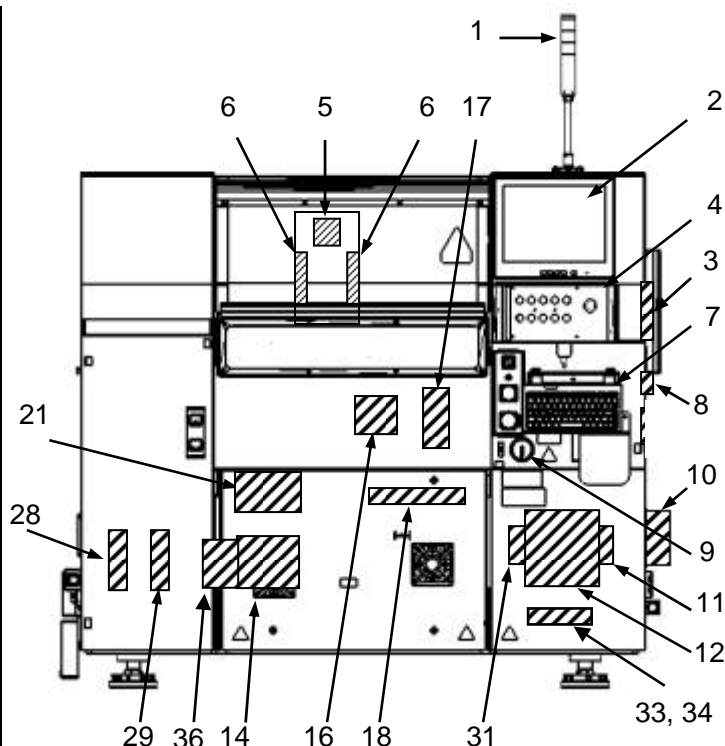


Figure 14-1-2-1 Front View

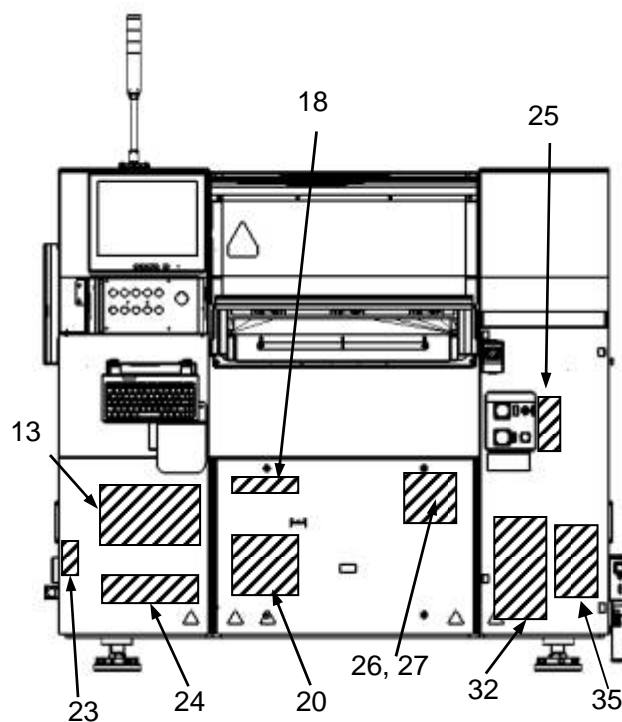


Figure 14-1-2-2 Rear View

Maintenance Guide

No.	Part name
19	Driver for IN, CENT, and OUT motors
20	Power supply unit
21	ATX power supply (UPS)
22	Transformer for AC power
23	Circuit breaker
24	AC input unit
25	Load cell amplifier (Optional)
26	S-LIGHT CTRL board (Option for KE-3010)
27	Feeder board
28	S-XY-relay board
29	Base IO board
30	Magnetic Scale board
31	SCM3 board (KE-3020VR Only)
32	S-VCS power supply unit (if the S-VCS is mounted)
33	Superimpose Board
34	MOUSE/KEYBOARD Selector (Rear-side operation (Optional))
35	Safety unit [EN specifications only]
36	Coplanarity power supply assembly (Optional)

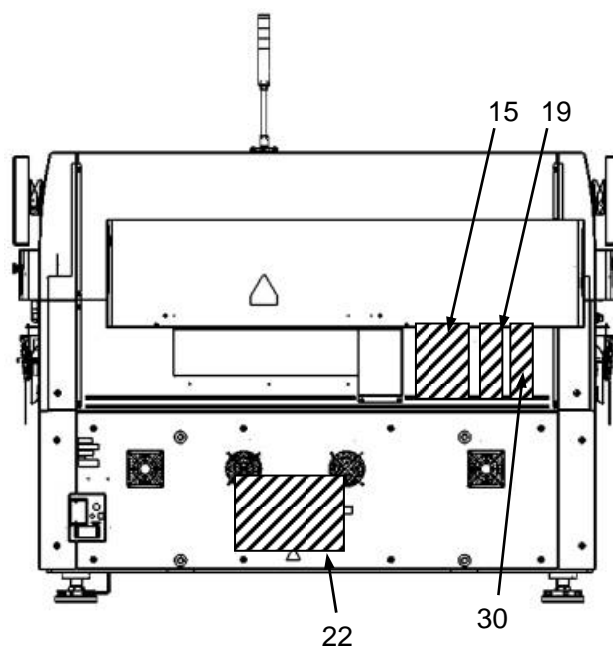


Figure 14-1-2-3 Right Side View

Maintenance Guide

14-2. Power Supply Unit

14-2-1. Structure of Power Supply Unit (M and L Board Specifications)

The power supply unit is mounted on the front of the machine. Figure 14-2-1-2 show the structure drawings of the power supply unit.

The power supply unit is composed of DC power supplies, control relays, and circuit protectors, and designed to supply the AC and DC power to the units (control unit, X-Y unit, Z-θ unit, transport unit, and head unit.)

The following shows the application of each DC power supply.

- +6V (+6.4V± 0.1V, PS1): For controlling of mechanical feeder (stacking, 32mm-paper tape)
- +24VA (+24±0.1V, PS2): General-purpose (For control unit outer board, stepping driver, etc.)
- +24VB (+24±0.1V, PS3): For control of Zθ-servo amplifier
- +12V (+12±0.1V, PS4): For S-VCS LED

14-2-1-1. Adjusting Method of DC Power Source Voltage Level

Table 14-2-1-1-1 DC Power Source Voltage Level Settings

No.	Power specifications	Power symbol	Measurement terminals of power supply unit	Voltage adjustment value
1 (*)	+48V	—	CN 039 Pin No. 1 (+48V) and Pin No. 7 (+48VRTN)	—
2	+6V	PS 1	CN 039 Pin No. 3 (+6V) and Pin No. 9 (+6VRTN)	+6.4V±0.1V
3	+24V	PS 2	CN 039 Pin No. 4 (+24VA) and Pin No. 10 (+24VARTN)	+24V±0.1V
4	+24V	PS 3	CN 039 Pin No. 5 (+24VB) and Pin No. 11 (+24VBRTN)	+24V±0.1V
5	+12V	PS 4	CN 060 Pin No. 1 (+12VC) and Pin No. 3 (+12VRTN)	+12V±0.1V

- The DC power output voltage is to be adjusted on the CN039 and CN60 of the power supply unit. (See Figure 14-2-1-1.)
- No. 1 with an asterisk (*) are power supply lines not needing any adjustment.
- Pull out the power unit bracket, and adjust the output voltage variable change volume knob of each DC power supply so that the output voltage values of the Nos. 2 to 7 DC power supply are the specification values.

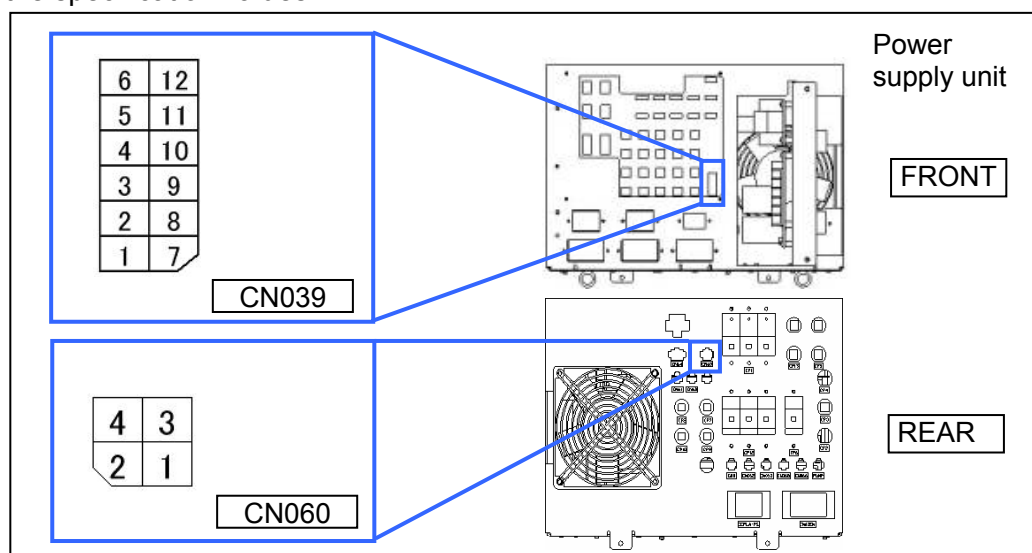


Figure 14-2-1-1-1

Note

- Note 1.** Carefully adjust the variable resistor so that the voltage value does not become beyond the specified adjustment level.
- Note 2.** Never use the GND line of a power supply unit other than that with the adjustment instructed. (Do not connect such GND line.)

Maintenance Guide

14-2-1-2. Block Diagram of the Power Supply Unit (M and L board specifications)

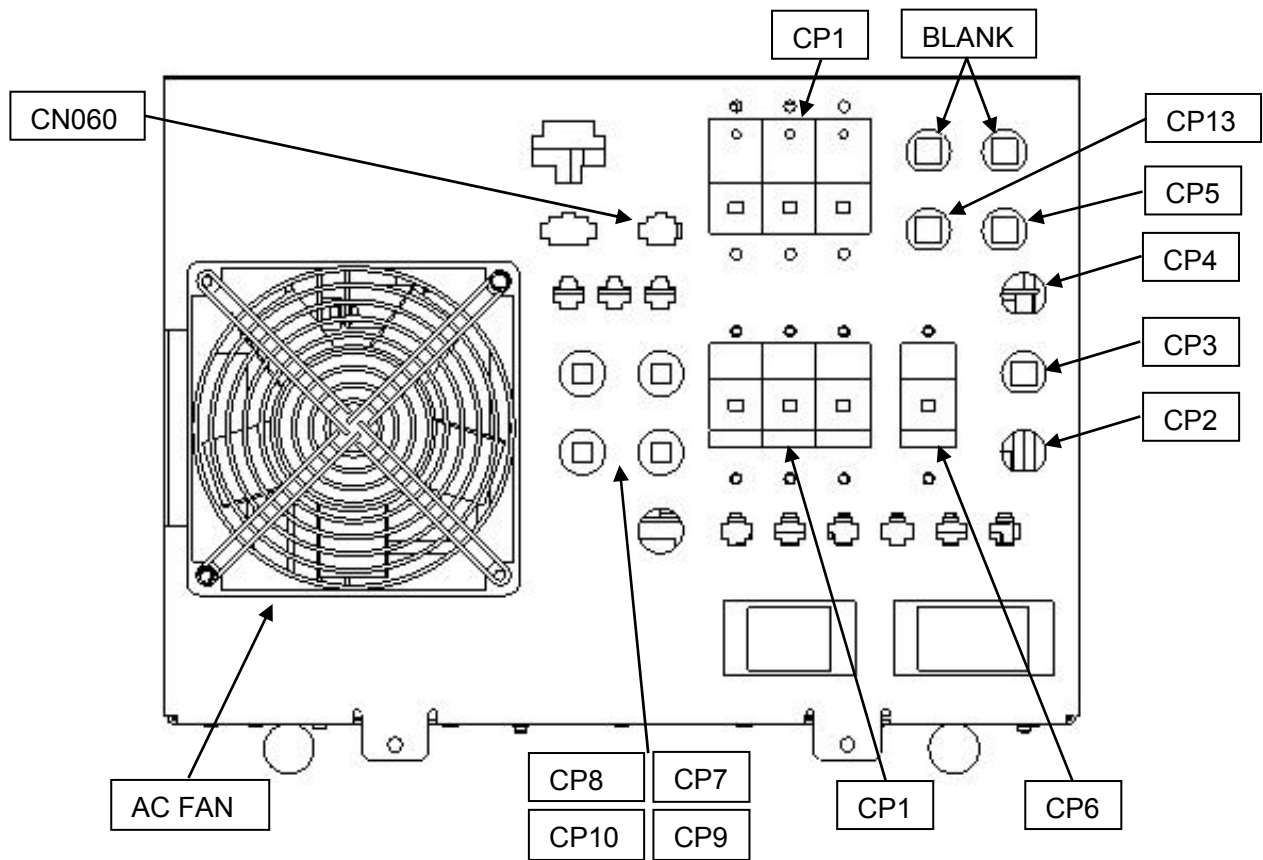


Figure 14-2-1-2-1 Rear View of Power Supply Unit

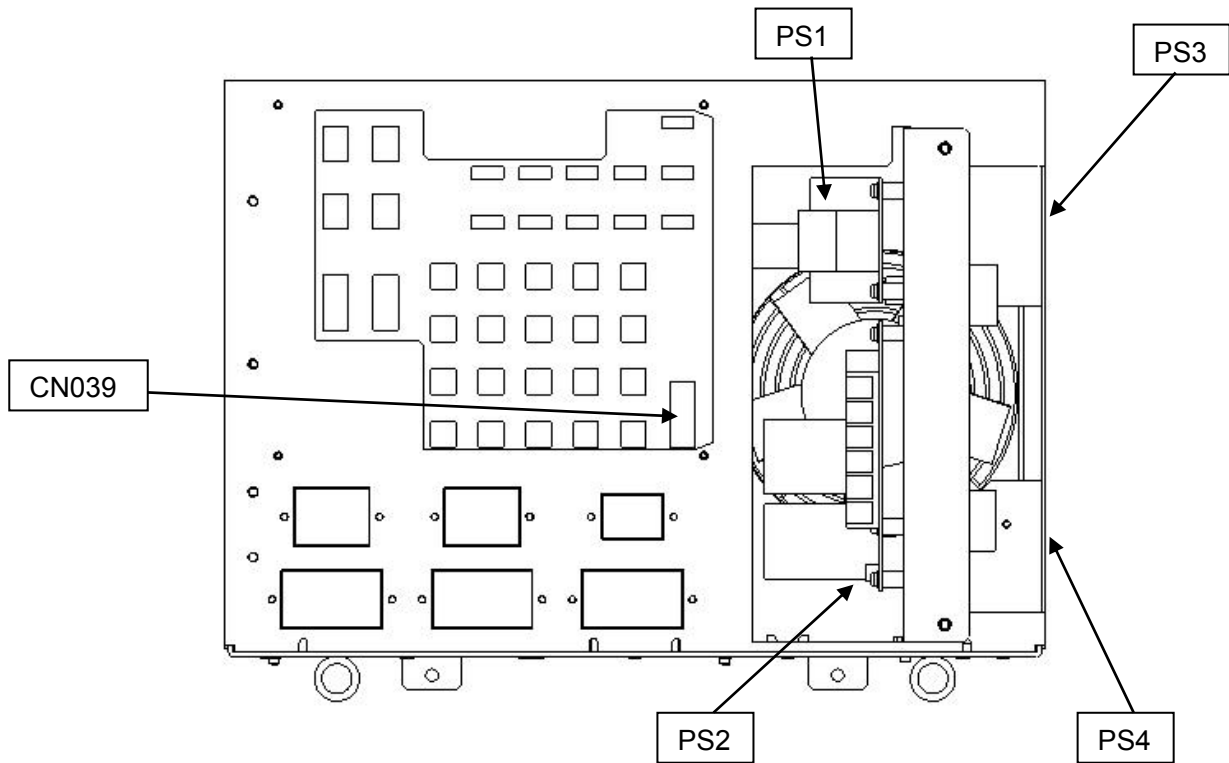


Figure 14-2-1-2-2 Front View of Power Supply Unit

Maintenance Guide

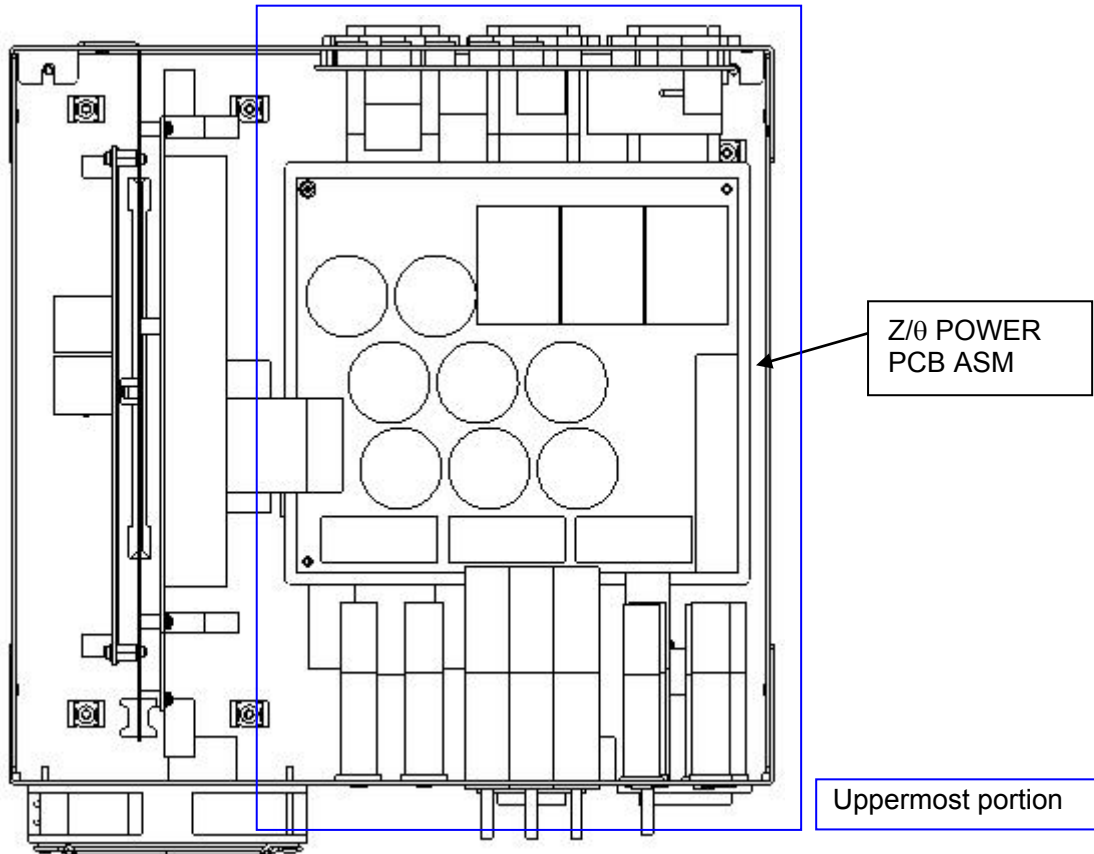


Figure 14-2-1-2-3 Top View of Power Supply Unit 1

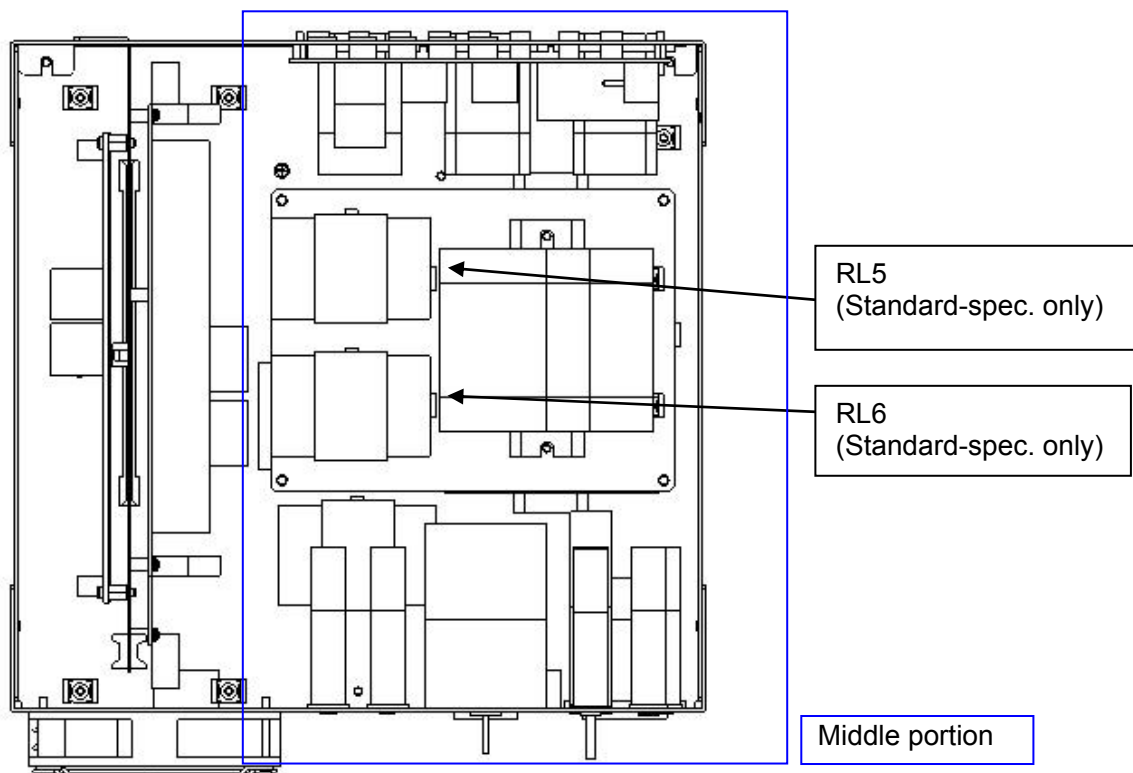


Figure 14-2-1-2-4 Top View of Power Supply Unit 2

Maintenance Guide

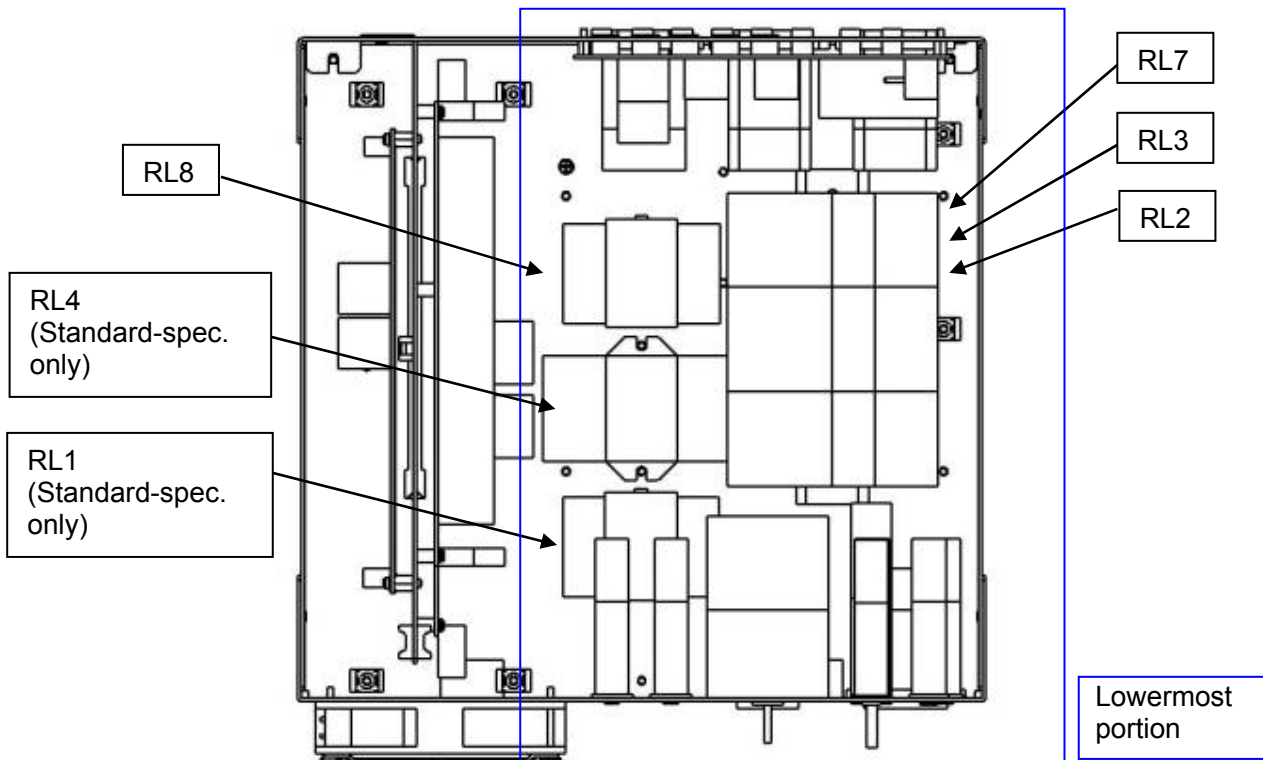


Figure 14-2-1-2-5 Top View of Power Supply Unit 3

Maintenance Guide

Table 14-2-1-2-1 DC Power Supply Unit <Parts List>

No.	JUKI part No.	Part name	Q'ty	Location	Remarks
1	HX005420000	POWER SUPPLY LCA100S-12-Y	1	PS4	
2	HX00542000B	POWER SUPPLY LCA100S-24-Y	1	PS3	
3	HX00543000A	POWER SUPPLY LDA300W-24	1	PS2	
4	KX000000150	POWER SUPPLY LCA75S-6-XJUK	1	PS1	
5	HA005240000	CIRCUIT PROTECTOR W28XQ1A-3	1	CP13	
6	HA00524000B	CIRCUIT PROTECTOR W28XQ1A-8	1	CP4	
7	HA00524000D	CIRCUIT PROTECTOR W28XQ1A-15	2	CP2, 3	
8	HA00524000E	CIRCUIT PROTECTOR W28XQ1A-12	1	CP5	
9	HA00542000A	CIRCUIT PROTECTOR NRW10- 5A	2	CP9, 10	
10	HA00542000C	CIRCUIT PROTECTOR NRW10-10A	2	CP7, 8	
11	HA005590000	CIRCUIT PROTECTOR CP51BM/20DC	1	CP6	
12	HA006460000	CIRCUIT PROTECTOR CP33V/7.5DN	1	CP1	
13	HA00646000A	CIRCUIT PROTECTOR CP33V/15DN	1	CP12	
14	HB001540000	RELAY G2R-2-SD (DC24V)	3	RL2, 3, 7	
15	HB001540010	RELAY P2RF-08	3	RL2, 3, 7	
16	HB00128000C	RELAY G7J-4A-B (DC24V)	4 (1)	RL1, 5, 6, 8	RL8 only for EN
17	HB000580010	RELAY R99-04 FOR G5F	4 (1)	RL1, 5, 6, 8	RL8 only for EN
18	HB001100000	RELAY G7L-2A-BUBJ (DC24V)	1 (0)	RL4	Not used for EN
19	HB001100010	RELAY P7LF-C	1 (0)	RL4	Not used for EN
20	40109881	S-POWER PCB ASM	1	PCB	
21	40109883	S-ZT POWER PCB ASM	1	PCB	

Maintenance Guide

14-2-1-3. Adjusting Method of DC Power Source Voltage Level (Option for M and L board specifications)

- The DC power output voltage is to be adjusted on the MONI of the power supply unit.
(See Figure 14-2-1-4-1.)
- Adjust the output voltage variable change volume knob of each DC power supply so that the output voltage values of the Nos. 1 and 2 DC power supply are the specification values.

Table 14-2-1-3-1 DC Power Source Voltage Level Settings

No.	Power specifications	Power symbol	Measurement terminals of power supply unit	Voltage adjustment value
1	+24V	PS 1	MONI Pin No. 2 (+24VD) and Pin No. 1 (+24VDRTN)	+26V±0.1V
2	+24V	PS 2	MONI Pin No. 4 (+24VD) and Pin No. 3 (+24VERTN)	+26V±0.1V

Note

- Note 1.** Carefully adjust the variable resistor so that the voltage value does not become beyond the specified adjustment level.
- Note 2.** Never connect MONI 1 to 4 pins to the GND line of a power supply unit other than that to be adjusted.
(Do not connect such GND line.)
- Note 3.** Before adjusting the voltage of the PS1 or PS2, disconnect the connectors of the electric bank. (Adjust the voltage in the no-load status.)

14-2-1-4. Block Diagram of the ETF Power Supply Unit (Option for M and L board specifications)

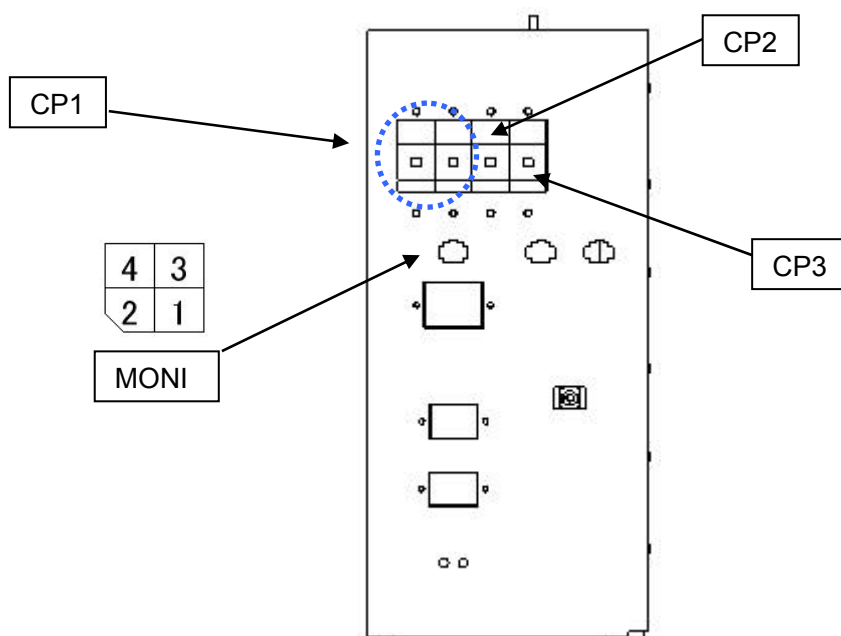


Figure 14-2-1-4-1 Block Diagram of the ETF Power Supply Unit 1

Maintenance Guide

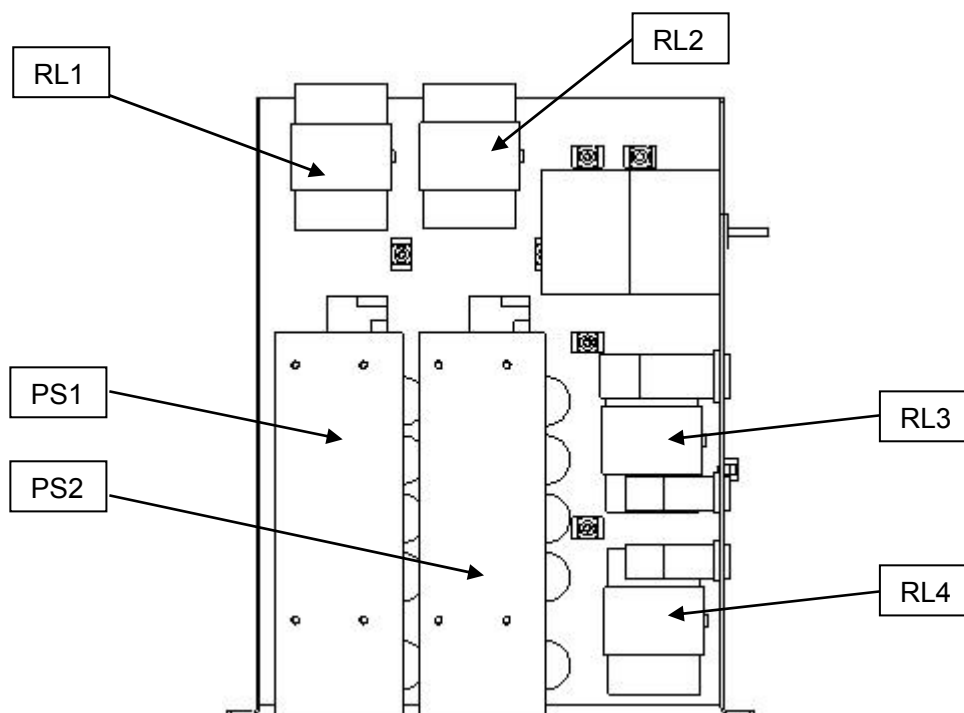


Figure 14-2-1-4-2 Block Diagram of the ETF Power Supply Unit 2

Table 14-2-1-4-1 DC Power Supply Unit <Parts List>

No.	JUKI part No.	Part name	Q'ty	Location	Remarks
1	HX006750000	POWER SUPPLY ADA600F-24	2	PS1, 2	
2	HA00526000B	CIRCUIT PROTECTOR CP52BS/7.5	1	CP1	
3	HA005590000	CIRCUIT PROTECTOR CP51BM/20DC	2	CP2, 3	

Maintenance Guide

14-2-2. Structure of Power Supply Unit (XL Board Specifications)

The power supply unit is mounted on the front of the machine. Figure 14-2-2-2 show the structure drawings of the power supply unit.

The power supply unit is composed of DC power supplies, control relays, and circuit protectors, and designed to supply the AC and DC power to the units (control unit, X-Y unit, Z-θ unit, transport unit, and head unit.)

The following shows the application of each DC power supply.

- +6V (+6.4V± 0.1V, PS1): For controlling of mechanical feeder (stacking, 32mm-paper tape)
- +24VA (+24±0.1V, PS2): General-purpose (For control unit outer board, stepping driver, etc.)
- +24VB (+24±0.1V, PS3): For control of Zθ-servo amplifier
- +24VC (+24±0.1V, PS4): For driving of safety circuit (EN machine only)
- +24V (+24±0.1V, PS5,PS6): For controlling of electric feeder(ETF) (*2)

14-2-2-1. Adjusting Method of DC Power Source Voltage Level

Table 14-2-2-1-1 DC Power Source Voltage Level Settings

No.	Power specifications	Power symbol	Measurement terminals of power supply unit	Voltage adjustment value
1 (*1)	+48V	—	CN 039 Pin No. 1 (+48V) and Pin No. 7 (+48V RTN)	—
2	+6V	PS 1	CN 039 Pin No. 3 (+6V) and Pin No. 9 (+6V RTN)	+6.4V±0.1V
3	+24V	PS 2	CN 039 Pin No. 4 (+24VA) and Pin No. 10 (+24VA RTN)	+24V±0.1V
4	+24V	PS 3	CN 039 Pin No. 5 (+24VB) and Pin No. 11 (+24VB RTN)	+24V±0.1V
5	+12V	PS 4	CN 060 Pin No.6 (+12VC) and Pin No. 12 (+12V RTN)	+12V±0.1V
6 (*2)	+24V	PS5	MONI Pin No. 1 (+24VD) and Pin No. 3 (+24VD RTN)	+26V±0.1V
7 (*2)	+24V	PS6	MONI Pin No. 2 (+24VE) and Pin No. 4 (+24VE RTN)	+26V±0.1V

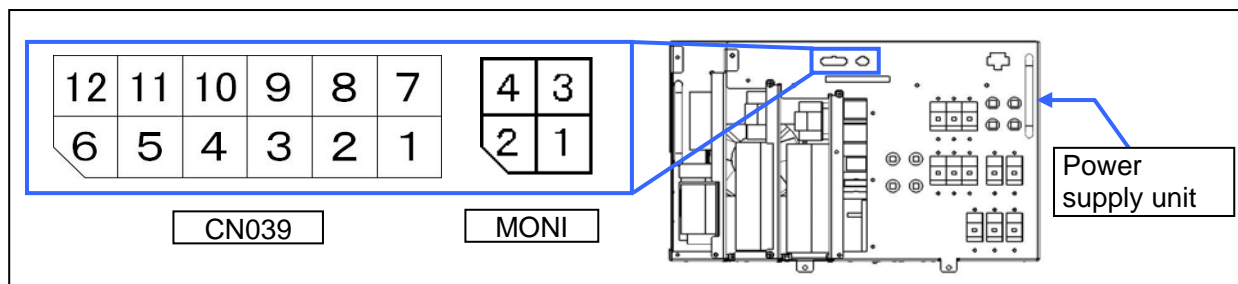


Figure 14-2-2-1-1 Power Supply Unit

- The DC power output voltage is to be adjusted on the CN039 and MONI of the power supply unit.
 - Pull out the power unit bracket, and adjust the output voltage variable change volume knob of each DC power supply so that the output voltage values of the Nos. 2 to 7 DC power supply are the specification values.
 - No. 1 with an asterisk (*1) is power supply lines not needing any adjustment.
- *1 No. 1 with an asterisk (*) is a power supply not needing any adjustment.
- *2 The Table above shows when no machine Rev. is provided. For machine Rev. A or later, only the PS5 is used and the part Nos. are also changed. For details, see section 14-2-2-3, Block Diagram of the Power Supply Unit (XL board specifications, machine Rev. A or later).

Note

- Note 1.** Carefully adjust the variable resistor so that the voltage value does not become beyond the specified adjustment level.
- Note 2.** Never use the GND line of a power supply unit other than that with the adjustment instructed. (Do not connect such GND line.)
- Note 3.** PS4 is a DC power supply for the EN specifications mounted on the POWER UNIT (EN) and is not mounted on the POWER UNIT.
- Note 4.** Before adjusting the voltage of the PS5 or PS6, disconnect the connectors of the electric bank. (Adjust the voltage in the no-load status.)

Maintenance Guide

14-2-2-2. Block Diagram of the Power Supply Unit

(XL board specifications, No machine Rev. is provided.)

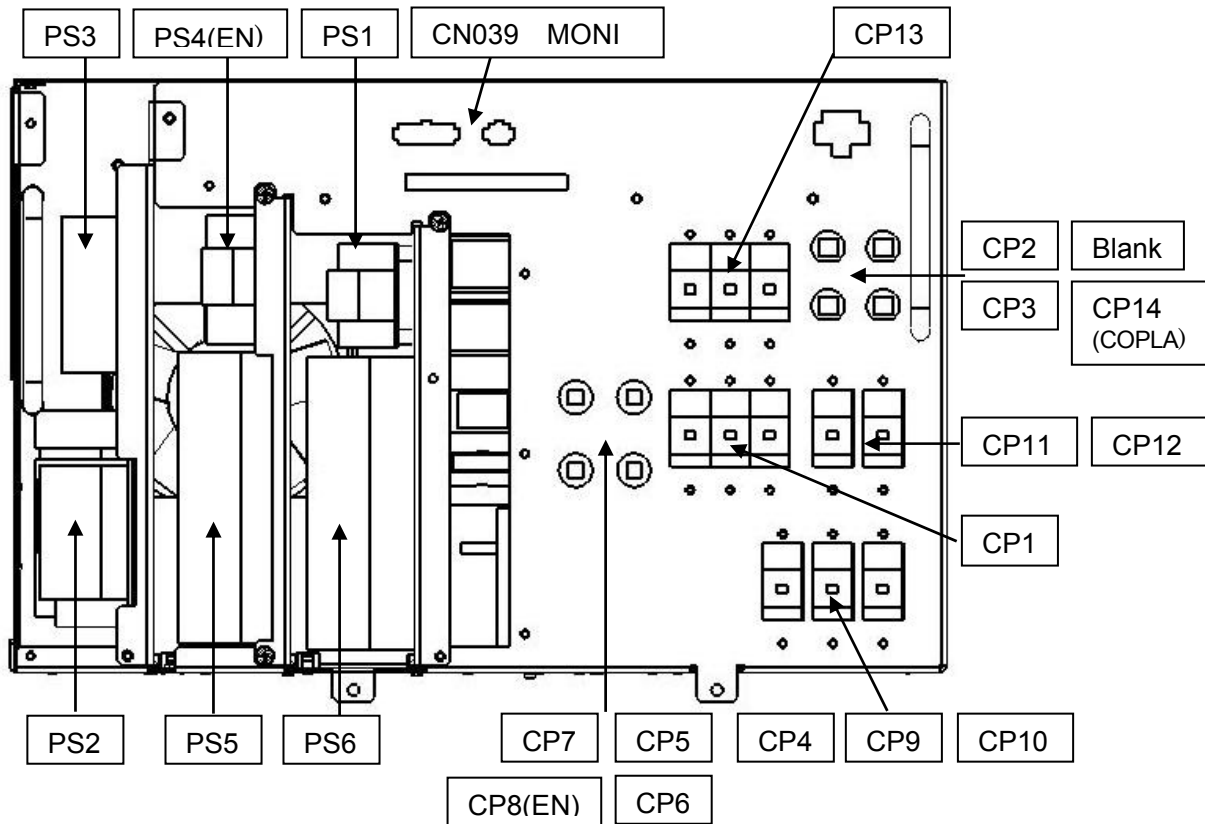


Figure 14-2-2-1 Rear View of Power Supply Unit

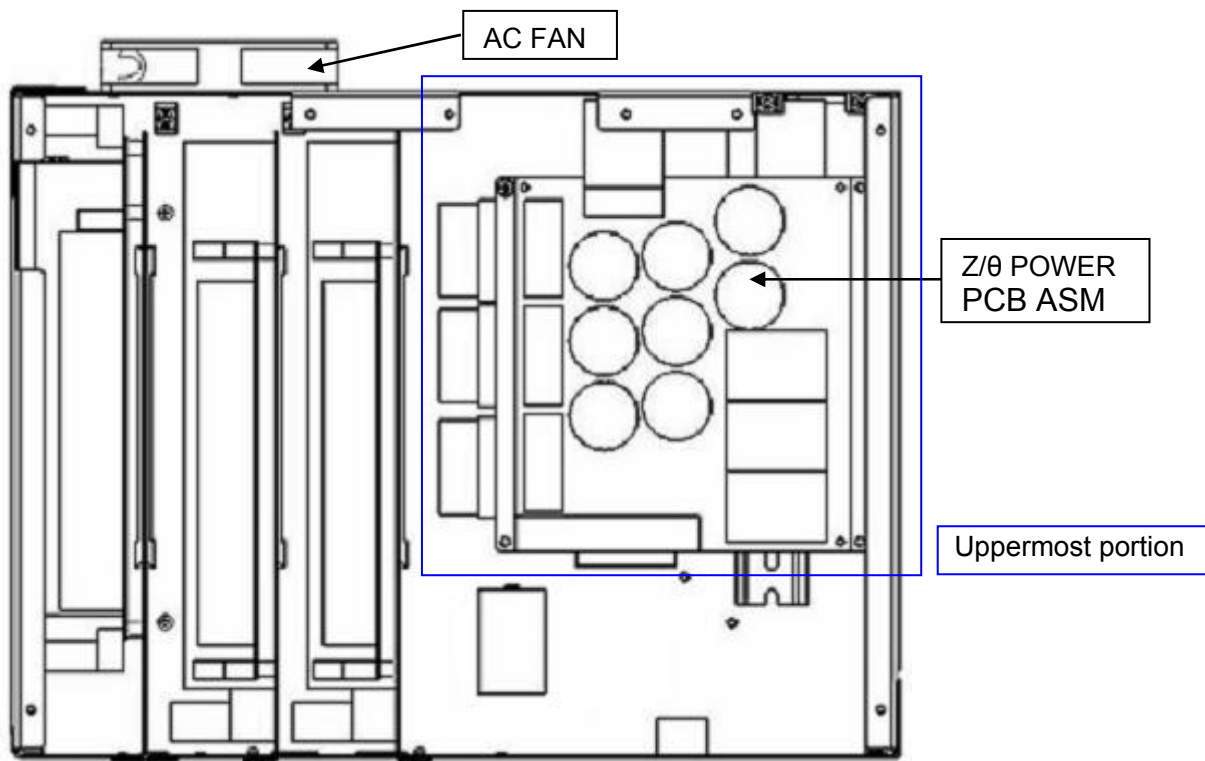


Figure 14-2-2-2 Top View of Power Supply Unit 1

Maintenance Guide

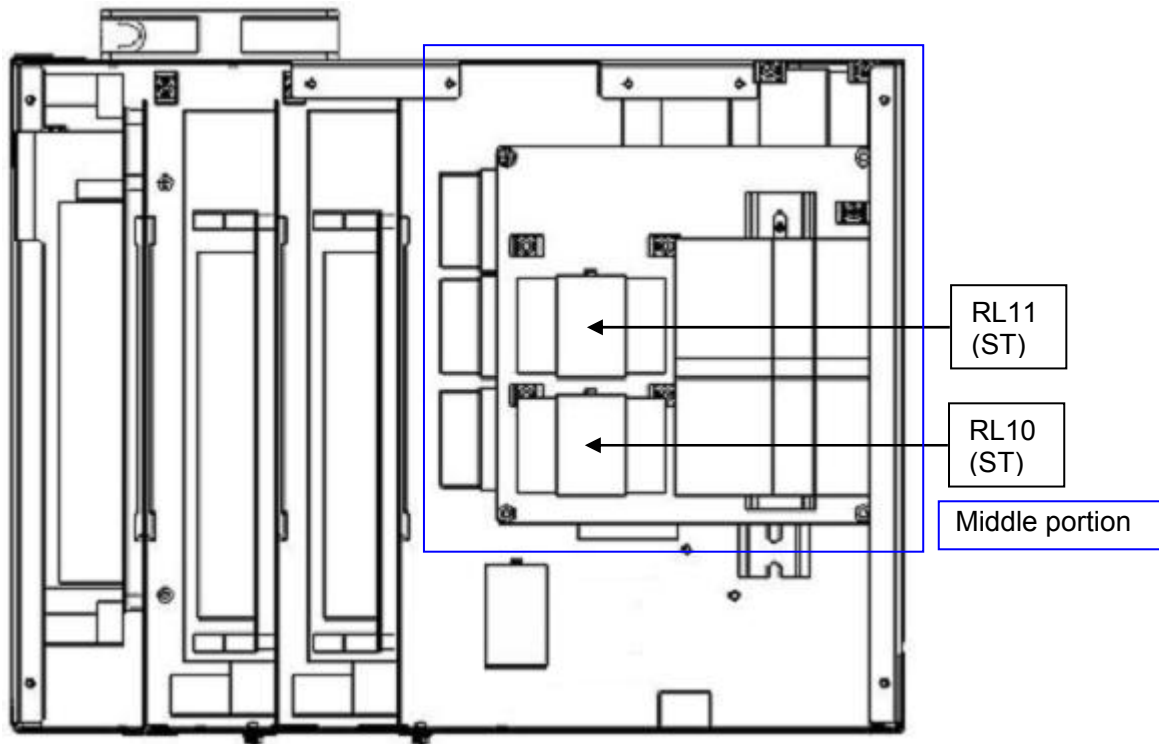


Figure 14-2-2-2-3 Top View of Power Supply Unit 2

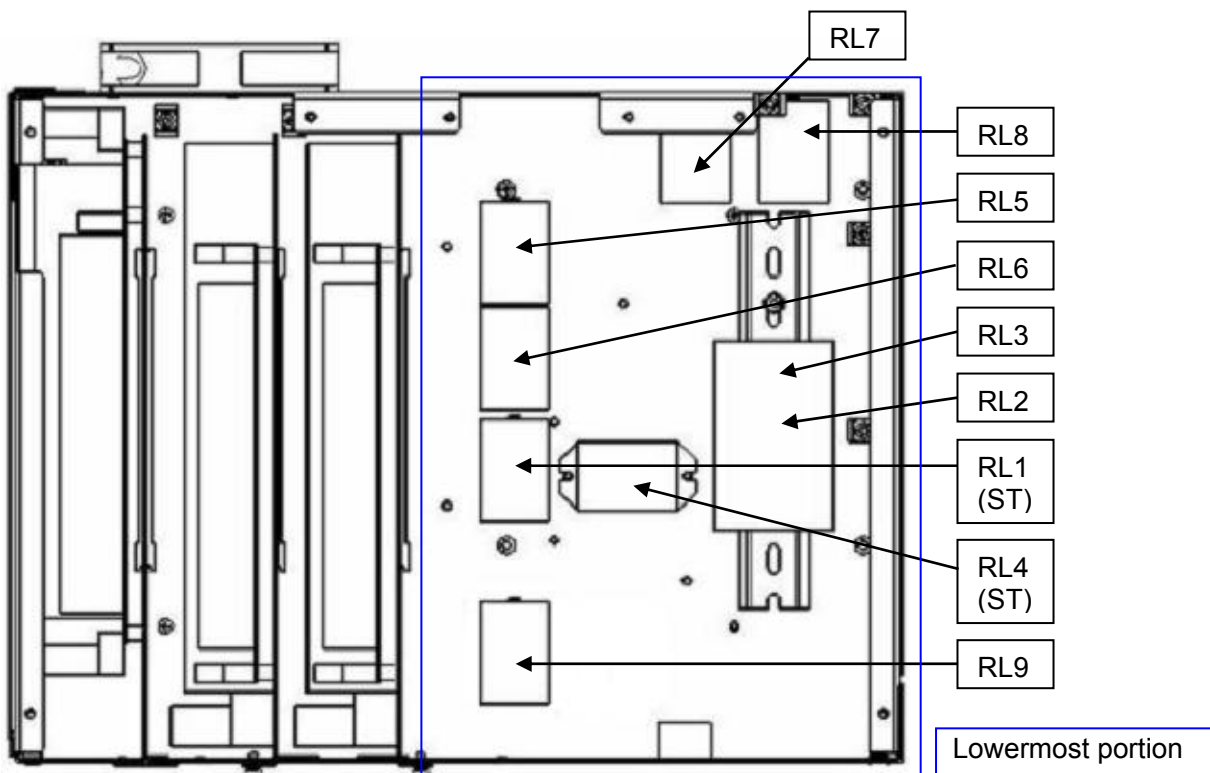


Figure 14-2-2-2-4 Top View of Power Supply Unit 3

Maintenance Guide

Table 14-2-2-2-1 DC Power Supply Unit (XL board specifications,
No machine Rev. is provided.) <Parts List>

No.	JUKI part No.	Part name	Q'ty	Remarks
1	HA005600000	CIRCUIT PROTECTOR	1	CP1
2	HA00524000B	CIRCUIT PROTECTOR	1	CP2
3	HA00524000E	CIRCUIT PROTECTOR	1	CP3
4	HA00527000A	CIRCUIT PROTECTOR	1	CP4
5	HA00542000D	CIRCUIT PROTECTOR	2	CP5, CP6
6	HA00542000A	CIRCUIT PROTECTOR	2	CP7, CP8 (EN)
7	HA00527000B	CIRCUIT PROTECTOR	2	CP9, CP10
8	HA00527000C	CIRCUIT PROTECTOR	2	CP11, CP12
9	HA005250000	CIRCUIT PROTECTOR	1	CP13
10	HA005240000	CIRCUIT PROTECTOR	1	CP14 (COPLA OP)
11	KX000000150	POWER SUPPLY 6V	1	PS1
12	HX00543000A	POWER SUPPLY 24V	1	PS2
13	HX00577000A	POWER SUPPLY 24V	1	PS3
14	HX00542000B	POWER SUPPLY 24V	1	PS4 (EN)
15	HX004820000	POWER SUPPLY 24V	2	PS5, PS6
16	HB00128000C	RELAY	8	RL1 (ST), RL5, RL6, RL7, RL8, RL9, RL10 (ST), RL11 (ST)
17	HB001540000	RELAY	2	RL2, RL3
18	HB001100000	RELAY	1	RL4 (ST)
19	HM00033000A	AC FAN	1	
20	40047522	POWER PCB ASM.	1	
21	40047524	Z/θ POWER PCB ASM.	1	
22	40071224	POWER UNIT CBL 210 ASM	1	FAN

Maintenance Guide

14-2-2-3. Block Diagram of the Power Supply Unit (XL board specifications, machine Rev. A or later)

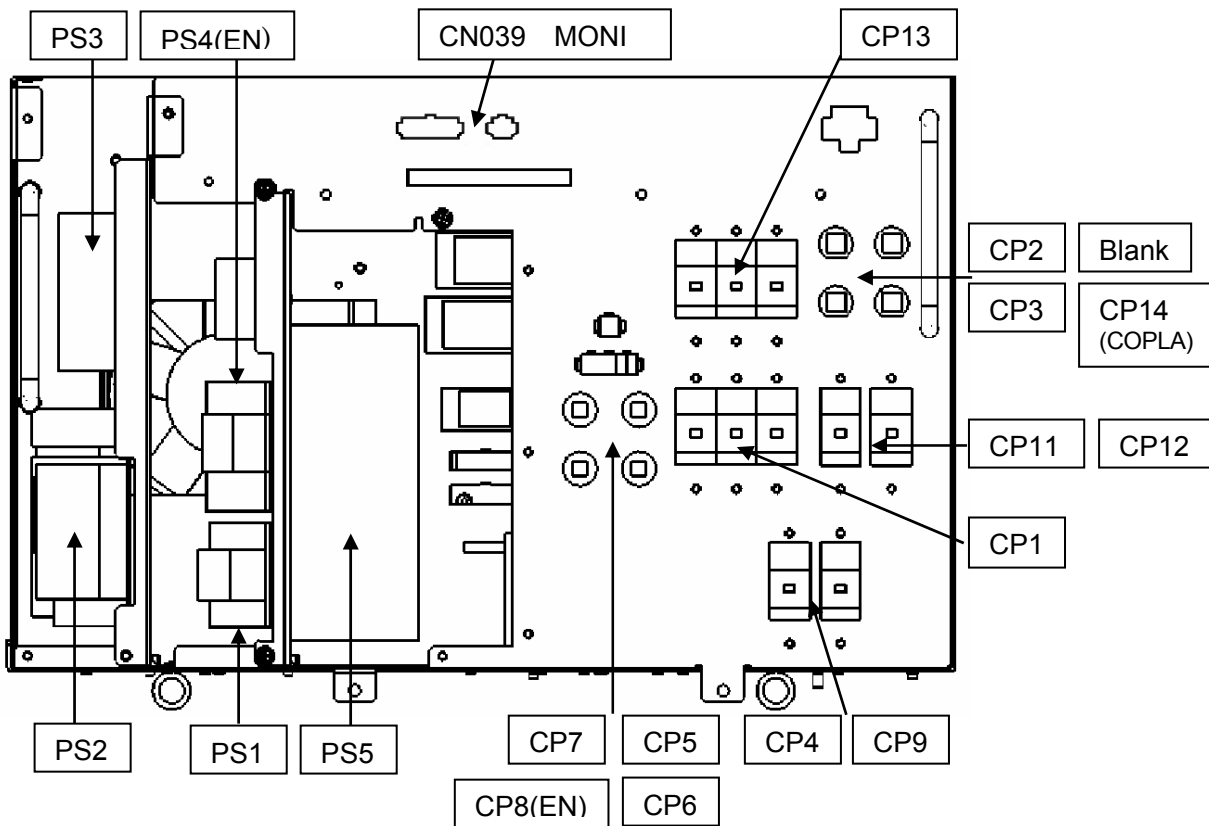


Figure 14-2-2-3-1 Rear View of Power Supply Unit

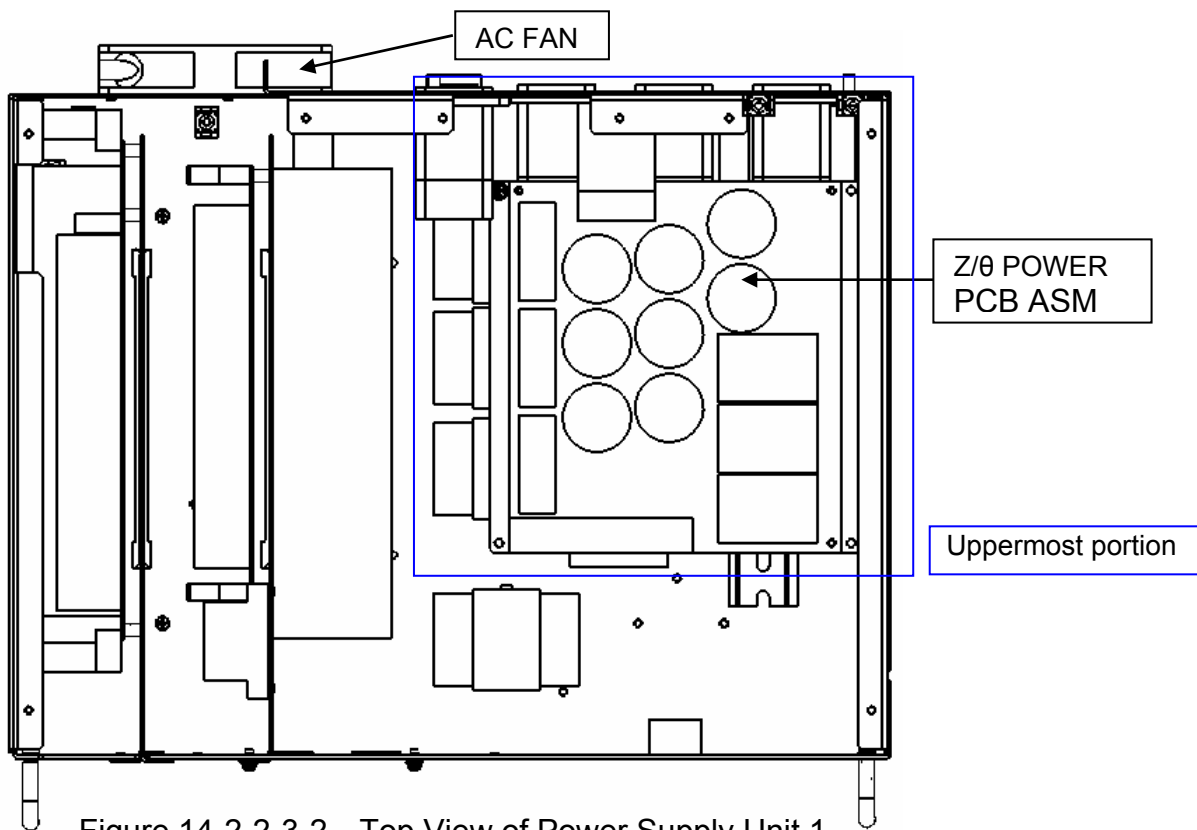


Figure 14-2-2-3-2 Top View of Power Supply Unit 1

Maintenance Guide

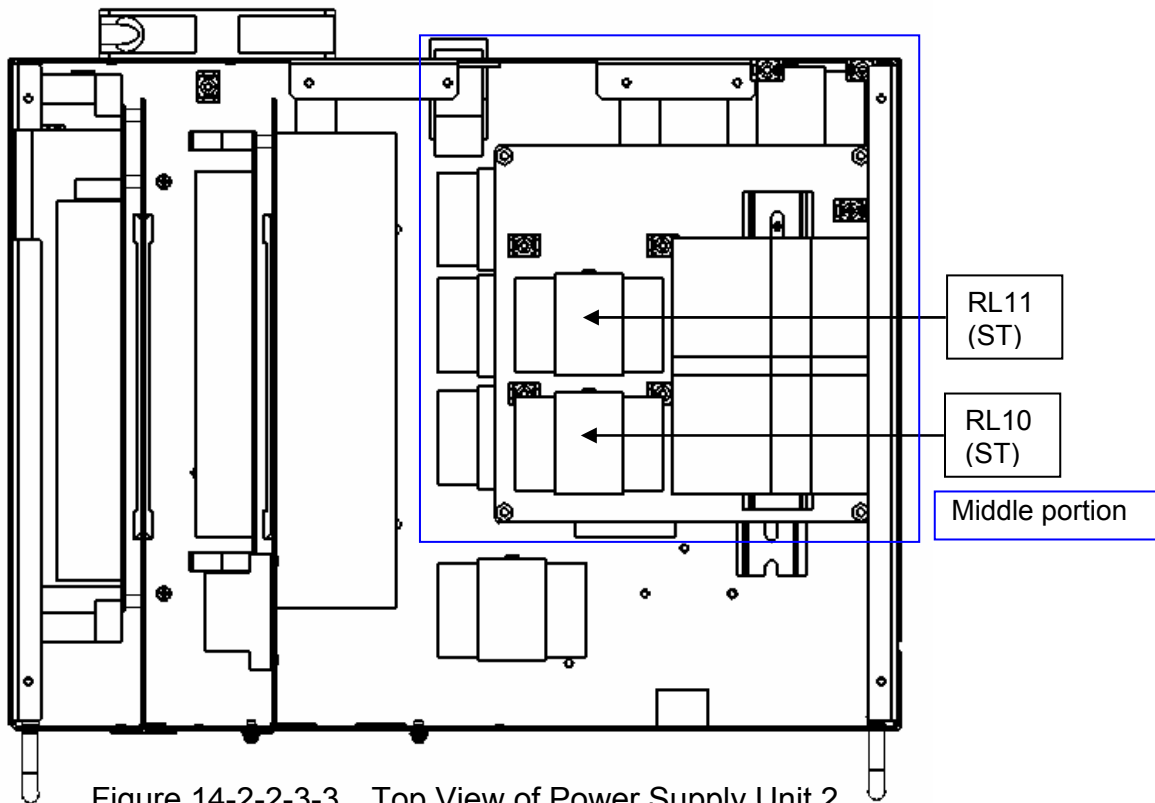


Figure 14-2-2-3-3 Top View of Power Supply Unit 2

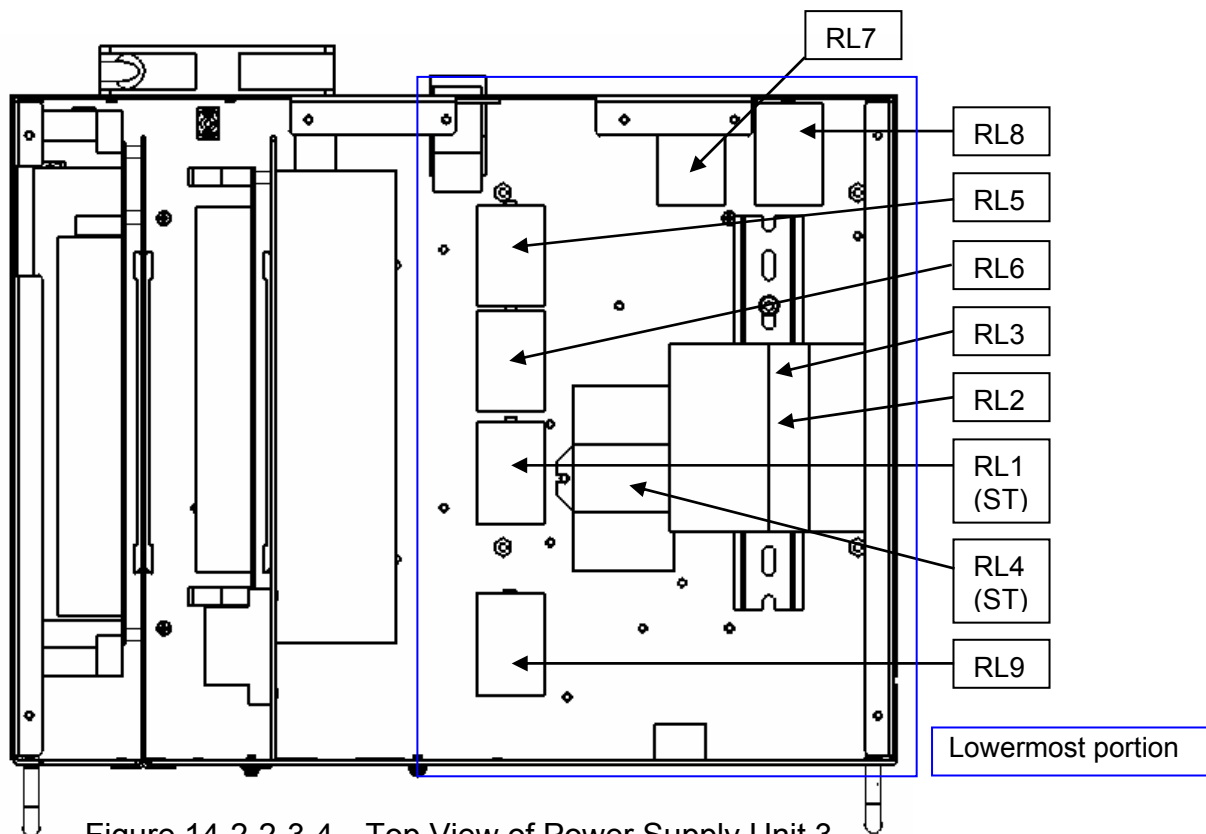


Figure 14-2-2-3-4 Top View of Power Supply Unit 3

Maintenance Guide

Table 14-2-2-3-1 DC Power Supply Unit (XL board specifications, machine Rev. A or later) <Parts List>

No.	JUKI part No.	Part name	Q'ty	Remarks
1	HA005600000	CIRCUIT PROTECTOR	1	CP1
2	HA00524000B	CIRCUIT PROTECTOR	1	CP2
3	HA00524000E	CIRCUIT PROTECTOR	1	CP3
4	HA00527000A	CIRCUIT PROTECTOR	1	CP4
5	HA00542000D	CIRCUIT PROTECTOR	2	CP5, CP6
6	HA00542000A	CIRCUIT PROTECTOR	2	CP7, CP8 (EN)
7	HA00527000E	CIRCUIT PROTECTOR	1	CP9
8	HA00527000C	CIRCUIT PROTECTOR	2	CP11, CP12
9	HA005250000	CIRCUIT PROTECTOR	1	CP13
10	HA005240000	CIRCUIT PROTECTOR	1	CP14 (COPLA OP)
11	KX000000150	POWER SUPPLY 6V	1	PS1
12	HX00543000A	POWER SUPPLY 24V	1	PS2
13	HX00577000A	POWER SUPPLY 24V	1	PS3
14	HX00542000B	POWER SUPPLY 24V	1	PS4 (EN)
15	HX006880000	POWER SUPPLY 24V	1	PS5
16	HB00128000C	RELAY	8	RL1 (ST), RL5, RL6, RL7, RL8, RL9, RL10 (ST), RL11 (ST)
17	HB001540000	RELAY	2	RL2, RL3
18	HB001100000	RELAY	1	RL4 (ST)
19	HM00033000A	AC FAN	1	
20	40047522	POWER PCB ASM.	1	
21	40047524	Z/θ POWER PCB ASM.	1	
22	40071224	POWER UNIT CBL 210 ASM	1	FAN

Maintenance Guide

14-3. Control Unit

14-3-1. Structure of Control Unit

Figure 14-3-1-1 shows the board layout drawing of the control unit. Check that the boards are mounted correctly while referring to these figures.

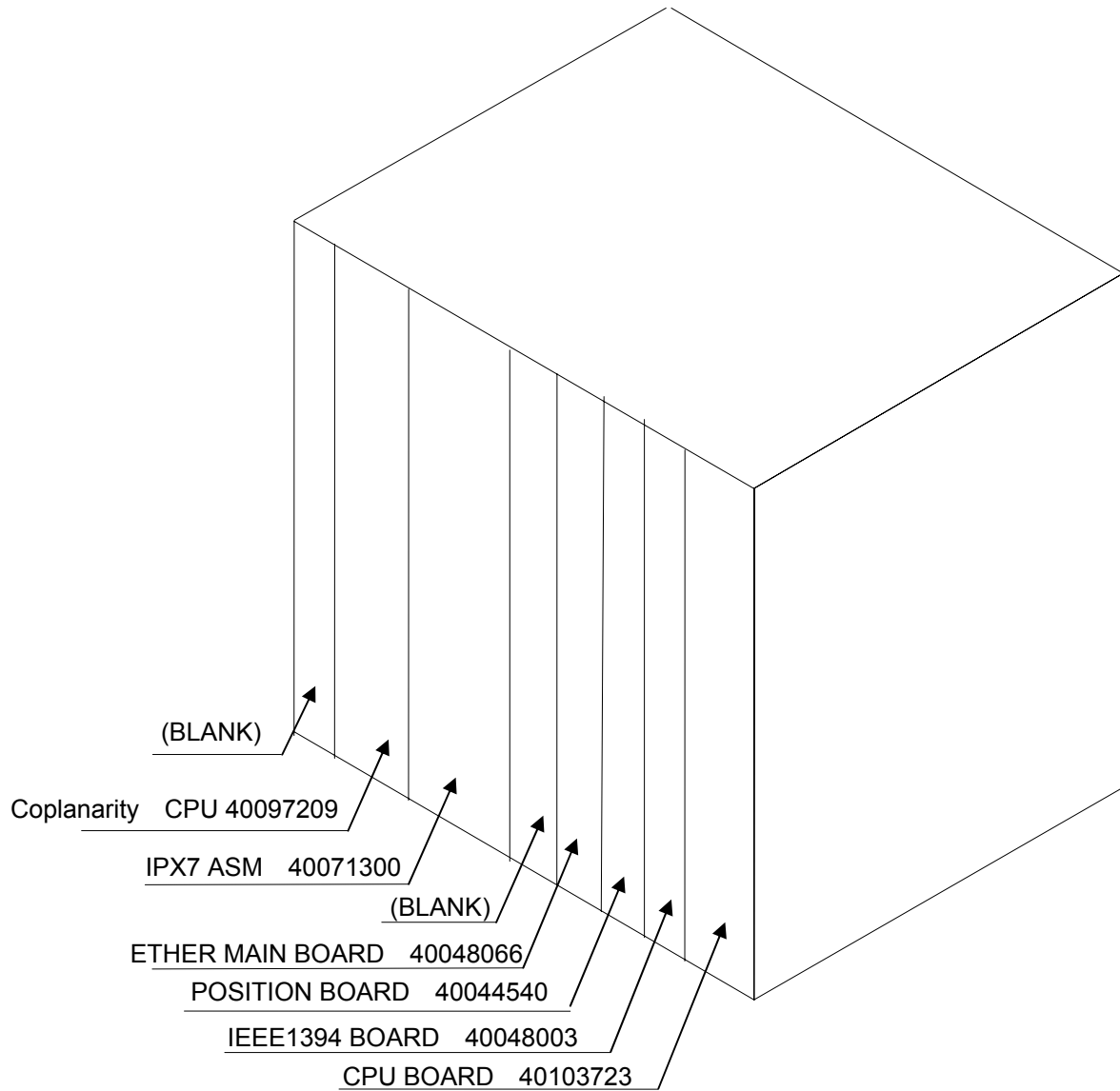


Figure 14-3-1-1 Board Layout Drawing

Maintenance Guide

14-3-2. CPU Board (40103723)

[Functions]

This is a circuit board that controls the equipment totally.

This circuit board is connected to other circuit boards by the Compact PCI (hereafter referred to as “cPCI”) bus.

Additionally, SOLID STATE DRIVE 8GB (hereafter referred to as “SSD”) is mounted on this board (M and L board specifications only). Since the operating system is written into this SSD, the SSD becomes a boot disk. Therefore, when replacing only this board, remove the SSD from the current CPU board and mount it on a new CPU board.



This Photo shows the M and L board specifications.

CAUTION: The part No. of the CPU board (40113723) does not include any SSD. Additionally, the SSD is mounted on the right side of the control box in the machine with the XL board specifications. (For details about replacement procedures by specifications, see section 13-2-1-2, Replacing the SSD.)

[Dip switch settings]

This CPU board is used with the dip switch settings made before shipment.

[Meaning of LED]

PW: Lights up when the power is supplied.

[Replacement of battery]

A backup battery is mounted on the CPU board to save the BIOS settings.

Replace the battery at reference intervals of 5 years.

After the battery has been replaced, it is necessary to set up the BIOS.

[Adjustment items after replacement]

After the CPU board has been replaced, it is necessary to set up the BIOS.

Make the settings while referring to section 13-2-2, Setting Up the BIOS.

Maintenance Guide

14-3-3. Position Board (40044540)

[Functions]

This POSITION board is applicable to the CPCI bus and intended to control servomotors through the SSCNET III, Mitsubishi Electric's high-speed synchronous communication network. The POSITION board can control up to 32-axis servomotors per board.

The POSITION board is connected to the servo amplifier of each axis through daisy chain connections of optical fiber cables.



- ① A command is received from the CPU board software to control the XYZ θ -axis servomotor.
- ② The home position sensor and limit sensor of each axis are detected.
- ③ An alarm is detected that occurs in the servo amplifier or magnescale.
- ④ The emergency stop switch is detected to stop the XY-axis and Z θ -axis.

[Switch settings]

The jumper/switch settings are used in the default setting status before shipment.

[Meaning of LED]

Operation indicator LED (Green): Lights up when the power is turned ON, flashes when the system is started up, goes off when the power is shut-down.

Error indicator LED (Red): Off during normal operation, Lights up if an error occurs.

[Adjustment items after replacement]

There are no particular adjustment items.

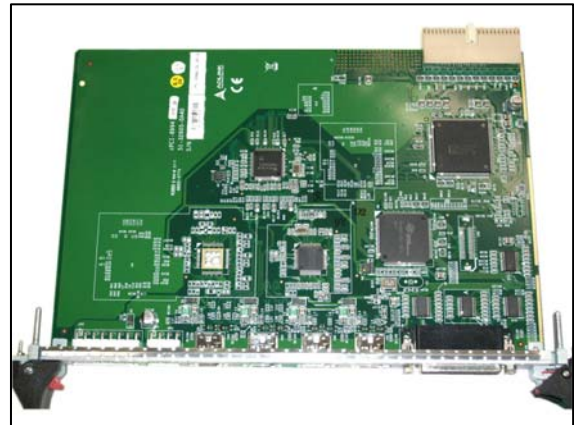
Maintenance Guide

14-3-4. IEEE1394 Board (40048003)

[Functions]

This IEEE1394 board is a communication board with the LNC60, a laser sensor.

The cPCI-8994 board performs the communication between the LNC60 and CPU board through the IEEE1394a-2000 communication standards (also called “FireWire 400”). Additionally, the power (DC+12V) is supplied to the LNC60 through the communication cable.



In addition to four IEEE 1394 ports, this board contains four RS232C ports to perform the communication with the CVS or barcode reader.

[Dip switch settings]

The jumper switches have already been set at delivery. However, check the jumper switch settings when setting the board.

[Meaning of LED]

There are no LEDs on the IEEE1394 board.

[Adjustment items after replacement]

There are no particular adjustment items.

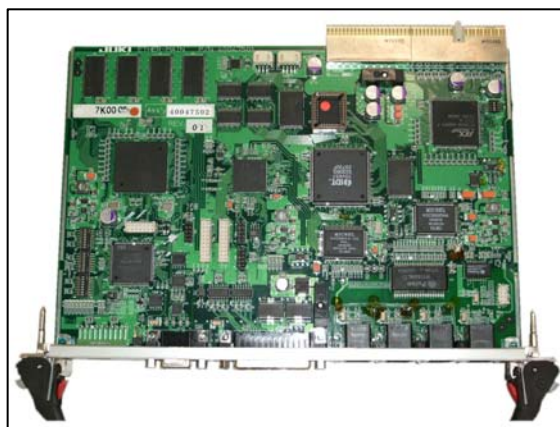
Maintenance Guide

14-3-5. ETHER-MAIN Board (40048066)

[Functions]

This ETHER-MAIN board is a host board used to communicate with the ETHER-SLAVE board through the Ethernet.

The board is connected to the Compact PCI (hereafter referred to as “cPCI”) bus so as to access each peripheral I/O from the CPU board. Additionally, the MS parameter backup data is saved into the FLASH ROM.



[DIP-switch settings]

The DIP-switches have been set properly at the delivery of the machine. When setting the board in the control unit, check the DIP-switch settings. (■ portions show the switch positions.)

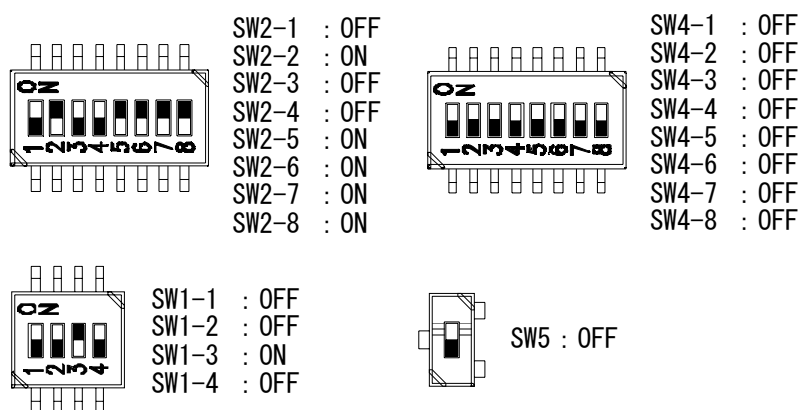


Figure 14-3-5-1 DIP-Switches on ETHER-MAIN Board Assembly

[Meaning of LED]

7-segment LED: Shows the operation status of this board.

RUN LED: Lights up when the power is supplied.

EN1: Shows Link/Act of EN1. EN1 → Left station

EN2: Shows Link/Act of EN2. EN2 → Right station

EN3: Shows Link/Act of EN3. EN3 → S-XY-RELAY board – BASE CARRY board – FEEDER board

EN4: Shows Link/Act of EN4.

[Adjustment items after replacement]

After that, follow the steps below to update the FLASH memory.

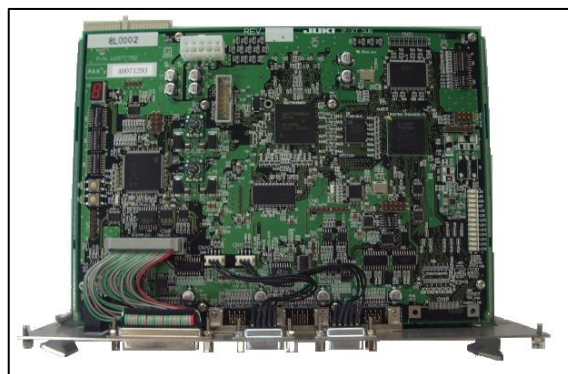
- ① Select [Options] and [Change User Group], and then select [Serviceman].
- ② Select [Maintenance] and [MS Parameter Setup].
- ③ Select [Upgrade] and [Ether Main].
- ④ Clicking [Exec.] will start the upgrading process.

Maintenance Guide

14-3-6. IP-X7 BASE ASM (40071283), IP-X7 SUB ASM (40071293)

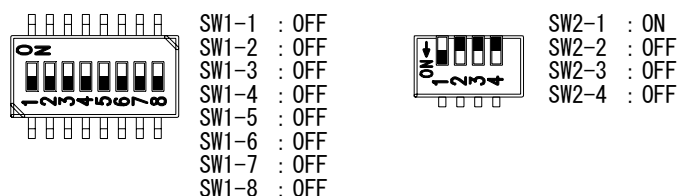
[Functions]

This IP-X7 board is an image processing board that processes image data, such as board mark and IC mark captured by the OCC camera to calculate values necessary for correction of the board position and/or part position.



[DIP-switch settings]

The DIP-switches have been set properly at the delivery of the machine. When setting the board in the control unit, check the DIP-switch settings. (■ portions show the switch positions.)



* SW2 is a piano type switch, which is operated from the front panel.

Figure 14-3-6-1 DIP-Switches on IP-X7 BASE Board Assembly

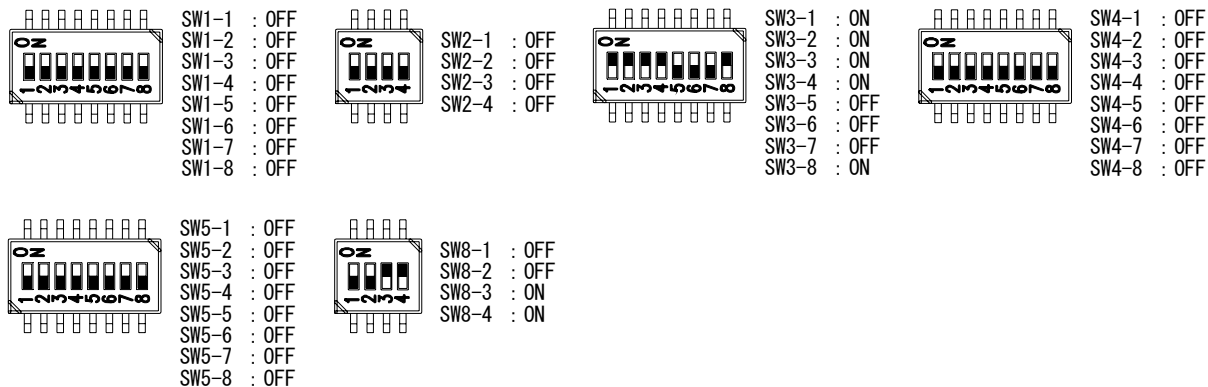


Figure 14-3-6-2 DIP-Switches on IP-X7 SUB Board Assembly

[Front panel switches]

* Basically, do not operate these switches.

RESET SW: Resets this board.

ABORT SW: Issues NMI to the CPU.

DIP-switch: Changes the settings of the board.

[Adjustment items after replacement]

After that, follow the steps below to update the FLASH memory.

- ① Select [Options] and [Change User Group], and then select [Serviceman].
- ② Select [Maintenance] and [MS Parameter Setup].
- ③ Select [Upgrade] and [Display].
- ④ Clicking [Exec.] will start the upgrading process.

Maintenance Guide

14-3-7. MOUSE/KEYBOARD Selector (40003281)

[Functions]

This MOUSE/KEYBOARD selector is intended to switch between the keyboard and mouse console.

[DIP-switch settings]

The DIP-switches have been set properly at the delivery of the machine. When setting the board in the control unit, check the DIP-switch settings.

(■ portions show the switch positions.)

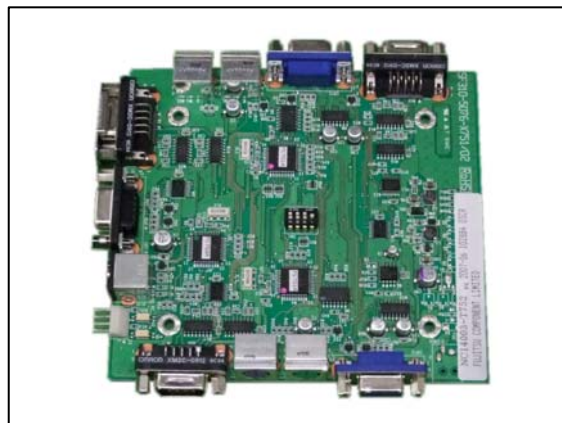
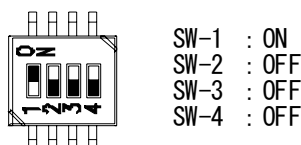


Figure 14-3-7-1 MOUSE/KEYBOARD SELECTOR DIP-SW

[Meaning of LED]

There are no LEDs on the MOUSE/KEYBOARD selector.

[Adjustment items after replacement]

There are no particular adjustment items.

[Replacement procedure]

- ① Before starting the replacement work, always turn OFF the main power, main circuit breaker, and main switch.
- ② Since the MOUSE/KEYBOARD SELECTOR is assembled into the PCB support located at the lower portion of the control box, take out the PCB support and replace it.
- ③ After the PCB support has been taken out, remove SL4030691SC (4 pcs.) to detach the KEYBOARD/MOUSE selector (40003281).
- ④ Replace the detached MOUSE/KEYBOARD selector with a new one and reassemble the parts and components in the reverse order of disassembly.

Maintenance Guide

14-3-8. SUPERIMPOSE Board (40048082)

[Functions]

This SUPERIMPOSE board controls up to two superimpose screens from the CPU board through the RS-232C. Additionally, this board also captures the touch panel signals through the RS-232C.

[DIP-switch settings]

There are no DIP-switches on the SUPERIMPOSE board.

[Meaning of LED]

There are no LEDs on the SUPERIMPOSE board.

[Adjustment items after replacement]

There are no particular adjustment items.

[Replacement procedure]

- ① Before starting the replacement work, always turn OFF the main power, main circuit breaker, and main switch.
- ② Since the SUPERIMPOSE BOARD is assembled into the PCB support located at the lower portion of the control box, take out the PCB support and replace it.
- ③ After the PCB support has been taken out, remove SL4030691SC (4 pcs.) to detach the KEYBOARD/MOUSE selector (40003281).
- ④ Remove SL4030691SC (2 pcs.) and HX003540000 (4 pcs.) to detach the SUPERIMPOSE board.
- ⑤ Replace the detached SUPERIMPOSE board with a new one and reassemble the parts and components in the reverse order of disassembly.



Maintenance Guide

14-3-9. SCM3 Board (40114496) Laser Board for FMLA (KE-3020VR Only)

This board controls and calculates the sensor (FMLA) for centering of the part.

The board interfaces with the host CPU through RS-232C. The sensor is connected with the coaxial cable including the power supply line through the dedicated serial communication.

Furthermore, the encoder signal of the θ -motor necessary to measure the part position is input from the Z θ -driver.

14-3-10. S-Light Control (40108607)

This board turns on or off each light of the VCS unit installed on the base frame and adjusts the light quantity. Additionally, when an optional high-resolution camera is selected, the board drives the light position change air cylinder and reads the position detection sensor.

14-3-11. Feeder Board (40047560)

- (1) Drives the ATC open/close solenoid valves and reads the check sensor.
- (2) Reads the feeder float sensor and feeder detection sensor. (Applicable to the mechanical and electric feeder.)
- (3) Reads the backup sensor and drive cylinder up sensor.
- (4) Controls the LED lighting of the CAL block and vacuum ON/OFF.
- (5) Reads the vacuum calibration sensor.
- (6) Drives the 80-pin mechanical feeder and reads/writes the READY signal, BUSY signal, and disable signal.
- (7) Interfaces with the 80-pin electric feeder through the CAN communication.

14-3-12. S-XY Relay Board (40106795)

- (1) The EMERGENCY STOP switch and limit sensor are detected to shut down the servo power when necessary.
- (2) The EMERGENCY STOP switch, limit sensor, and NEAR-sensor are detected to inform them to the POSITION board.
- (3) Signals to be input to the Operation board are read and signals to be output from the Operation board are sent.
- (4) The positive pressure detection sensor and negative pressure detection sensor signals are read.
- (5) Flash ROM is installed that stores the M/S parameters.

14-3-13. MAGNETIC SCALE Board (40095130) (XL Specifications Only)


This board relays the signals from the X-, YL-, and YR-axis linear sensor units to input them to the servo amplifier for each axis.

14-3-14. BASE IO Board (40071680)

- (1) This board controls the operation of the back up table and auto width adjustment.
- (2) The board controls the driver for the transfer stepping driver motor.
- (3) The board reads out the right sensor, left sensor, WAIT sensor, STOP sensor, and COUT sensor.

Maintenance Guide

14-4. ATX Power Supply (40048006)

 WARNING	<p>To avoid serious personal injury caused by electric shock, always turn OFF the main switch completely.</p> <p>Make sure that the main circuit breaker and main switch of the main unit are turned OFF.</p> <p>The main switch is a power switch mounted inside the building and does not mean a switch on the machine main unit.</p>
--	---

[Functions]

This ATX power supply unit supplies DC+3.3V, DC+5V, DC+12V, DC-12V, and DC+5VSB to the control box.

If a power failure occurs, the board is backed up by the connected battery unit (40048007).

[DIP-switch settings]

There are no DIP-switches on the ATX power supply.

[Meaning of LED]

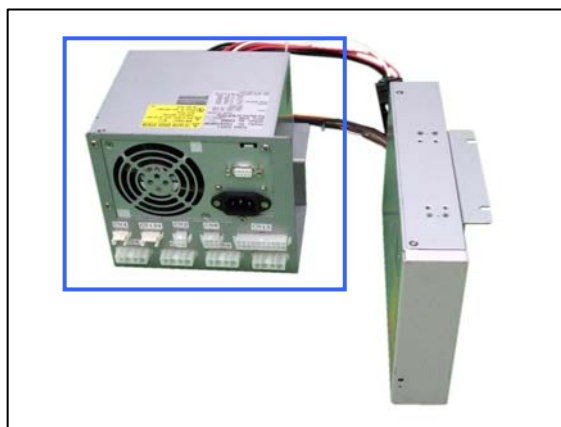
There are no LEDs on the ATX power supply.

[Adjustment items after replacement]

There are no particular adjustment items.


[Replacement procedure]


- ① Before starting the replacement work, always turn OFF the main power, main circuit breaker, and main switch.
- ② Since the ATX power supply is located on the front side of the base frame. Disconnect the cables, such as AC input cable and RS232C cable from the ATX power supply.
- ③ Remove SL4040891SC (2 pcs.) from the front to detach the ATX power supply together with the ATX BRACKET (40094391).
- ④ Remove the SL4030691SC (2 pcs.) and INCH SCREW (40048047) (4 ps.) from the ATX BRACKET.
- ⑤ When disconnecting the connectors from the ATX BRACKET, the ATX power supply can then be detached.
- ⑥ Replace the detached ATX power supply unit with a new one and reassemble the parts and components in the reverse order of disassembly.



Maintenance Guide

14-4-1. Battery Unit (40048007)

 WARNING	<p>To avoid serious personal injury caused by electric shock, always turn OFF the main switch completely.</p> <p>Make sure that the main circuit breaker and main switch of the main unit are turned OFF.</p> <p>The main switch is a power switch mounted inside the building and does not mean a switch on the machine main unit.</p>
--	---

 WARNING	<p>(1) Before starting the work, take off a watch, ring, necklace, or other metallic object.</p> <p>(2) Always use tools with insulated grip.</p> <p>(3) Do not put any tool or metallic part on the battery.</p>
--	---

[Functions]

If a power failure occurs, the control box is backed up by this battery unit through the connected ATX power supply (40048006).

[DIP-switch settings]

There are no DIP-switches on the battery unit.

[Meaning of LED]

The following shows the status of the LED for indication of the battery unit.

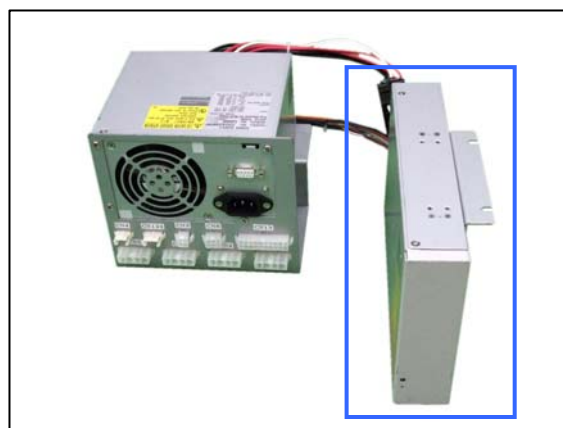


Table 14-4-1-1 LED Status Indications

Power supply status				LED status	Remarks
AC input	DC output	Charger	Battery		
Normal	Stop	Stop	–	Off	Standby
Normal	Normal	Normal	Charging	Orange (Lit)	Power ON
Normal	Normal	Stop	Fully charged (80% or more)	Green (Lit)	Power ON
Power failure	Normal	Stop	Normal (Backup)	Orange (Flashing)	Backup
Normal	Normal	Error	Normal	Green/orange (Lit alternately)	Charger failure
Normal	Normal	Normal	Error	Green/orange (Lit alternately)	Battery error *1
Normal	Stop *2	Normal	Normal	Green/orange (Lit alternately)	DC output error

*1. The battery charging may be stopped if the temperature of the battery built-into the unit is 45°C or more.

*2. DC+5VSB output is excluded.

Maintenance Guide

[Adjustment items after replacement]

There are no particular adjustment items.

[Replacement timing]

The battery is replaced at reference intervals of three years.

[Replacement procedure]

- ① Before starting the replacement work, always turn OFF the main power, main circuit breaker, and main switch.
- ② The battery unit is located in front of the base frame and on the right side of the ATX power supply (40048006). Loosen SL6041092TN (2 pc.) to detach the battery unit together with the ATX_BATTERY BR (40094392).
Additionally, disconnect the cables from the ATX power supply.
- ③ Remove four inch screws (40048047) to detach the battery unit from the ATX_BATTERY BR.
- ④ Replace the battery unit with a new one. Reassemble the parts and components in the reverse order of disassembly.

Maintenance Guide

14-5. X-Y Unit

The X-Y unit is composed of AC servo amplifier that drives the X/Y-axes and a magnescale that detects the movement position.

14-5-1. Structure of X-Y Unit

Three single-axis servo amplifiers are mounted on the AC servo amplifier (two AC servo amplifiers to drive the Y-axis and one servo amplifier to drive the X-axis). Additionally, one X-axis magnescale detector head and two Y-axis magnescale detector heads are mounted on the X-axis frame.

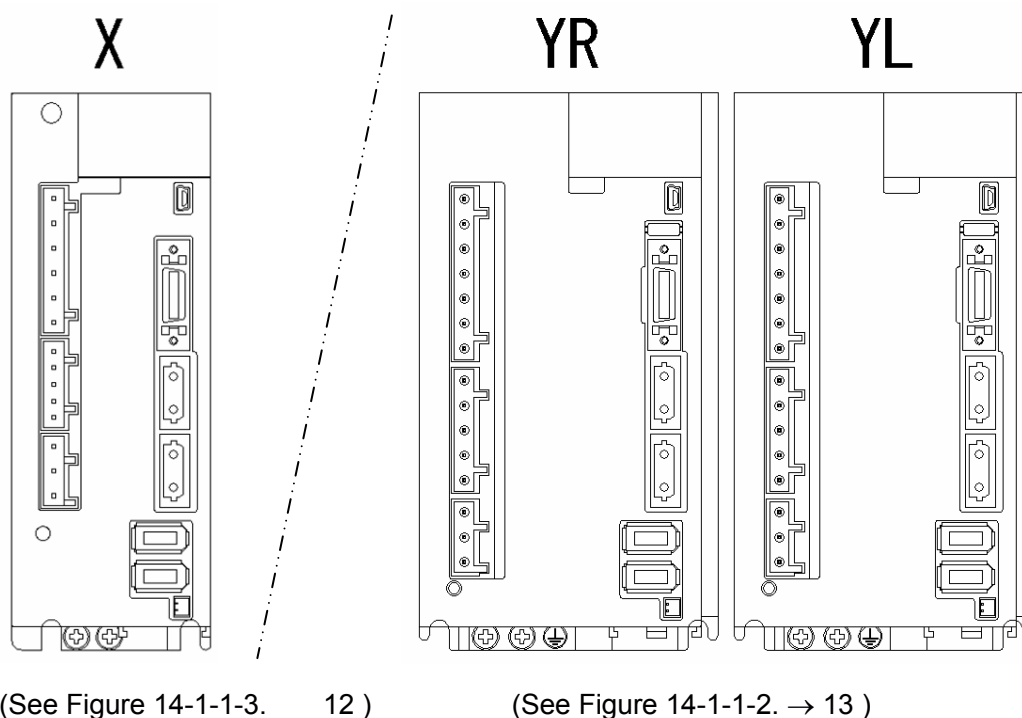


Figure 14-5-1-1 Configuration of XY-Unit<M and L board specifications>

- * XL board specifications X, YR, YL: See Figure 14-1-2-2. → 13

<AC servo amplifier part No.>

Axis	Part No.	Part name
YL-axis and YR-axis	40044539	SERVO AMP 2000W
X-axis	40044538	SERVO AMP 750W

- * Motor output
 YL-axis and YR-axis; 1500W
 XL-axis and XR-axis; 750W

Maintenance Guide

[Adjustment items after replacement]

When replacing the servo amplifier, it is necessary to set the axis selection with the rotary switch (SW1) on the servo amplifier of each axis.

Open the front cover of the servo amplifier and turn the rotary switch (SW1) for the axis selection so that the arrow mark indicates the following set value.

Make sure that the DIP switch (SW2) is OFF.

After the adjustment has been completed, turn ON the power to the main unit and turn it OFF. After that, restart the operation.

Note. When the main unit is started up for the first time after the servo amplifier has been replaced, do not perform the origin return.

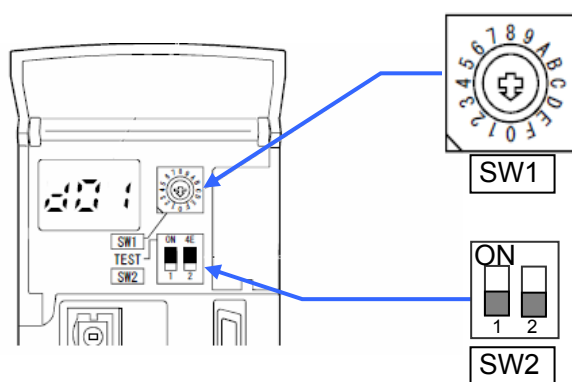


Table 14-5-1-1 Rotary Switch Settings

Servo amplifier	Axis selection switch set values
X	0
YL	2
YR	3

14-5-2. Display Indication of XY Servo Amplifier

A 7-segment LED that indicates the status is mounted on the front of the XY servo amplifier.

Normally, this LED shows the status as described below.

Table 14-5-1-2 7-Segment LED Indication

Indication	Ab	C#	d#
Contents	Initialization is in progress.	Servo OFF	Servo ON

* Axis No. is shown in the “#” portion. (See also the Table below.)

Table 14-5-1-3 7-Segment LED Indication

Axis	Axis No.
X-axis	0
YL-axis	2
YR-axis	3

Maintenance Guide

14-6. Z-θ Unit

The Z-θ unit is composed of an AC servo amplifier that drives the Z/θ-axes.

14-6-1. Structure of Z-θ Unit

The servo amplifier for the Z/θ-axis is a 4-axis integrated servo amplifier that one amplifier board can drive the 4 axes.

The servo amplifier board for the Zθ-axis is mounted in the head unit. Actually, four boards are mounted in the vertical direction.

Three boards are mounted only in the KE-3010 (④ is not mounted).

Figure 14-6-1-1 shows the relationship among each motor and servo amplifier.

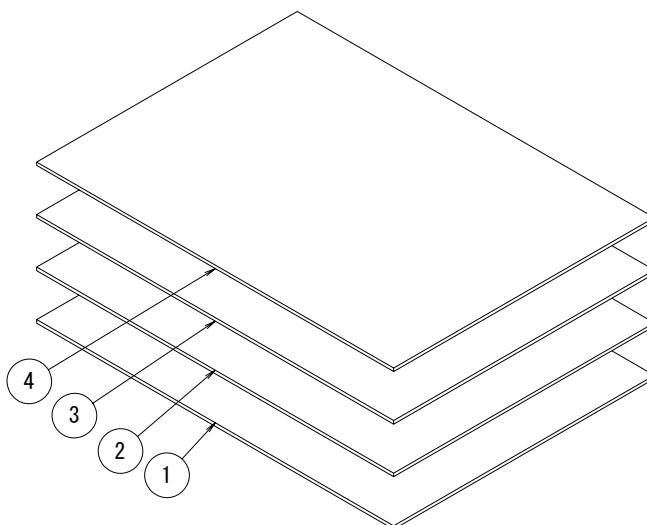


Figure 14-6-1-1 Structure of Z/θ Unit

* Motor outputs

Each Z-axis: 30W

Each θ-axis: 15W

Table 14-6-1-1 Z/θ-Unit Layout Relational Diagram

Symbol	Axis No. on amplifier				Part No.
	Axis No. 1	Axis No. 2	Axis No. 3	Axis No. 4	
①	L2 θ-axis	L2 Z-axis	L1 θ-axis	L1 Z-axis	40044535
②	L4 θ-axis	L4 Z-axis	L3 θ-axis	L3 Z-axis	40044535
③	L6 θ-axis	L6 Z-axis	L5 θ-axis	L5 Z-axis	40044535
④	Not used	Not used	IC θ-axis	IC Z-axis	40044535

← This board is not mounted in the KE-3010.

For the Zθ-servo amplifier, set the rotary switch (CS1) appropriately according to the board.

Table 14-6-1-2 Z/θ-Unit Layout Relational Diagram

Symbol	Servo amplifier	SW set value
①	L1, 2 Z/θ-axis	0
②	L3, 4 Z/θ-axis	1
③	L5, 6 Z/θ-axis	2
④	IC Z/θ-axis	3

← This board is not mounted in the KE-3010.

Maintenance Guide

14-6-2. LED Indications

Nine LEDs are mounted on the Z θ -servo amplifier.

These LEDs show the status of each axis as described below. The following shows the correspondence among each axis and LEDs.

Table 14-6-2-1 Z θ -Driver LEDs

No.	LED name	Indication color	Operation
1	CHARGE		Lights up when any electric charge exists in the main circuit.
2	RD1	Green	Shows the status of axis No. 1 (L2 θ -, L4 θ -, and L6 θ -axis). For details about the status expressed by the combination of RD1 and AL1, see the Table below.
3	AL1	Red	
4	RD2	Green	Shows the status of axis No. 2 (L2Z-, L4Z-, and L6Z-axis). For details about the status expressed by the combination of RD2 and AL2, see the Table below.
5	AL2	Red	
6	RD3	Green	Shows the status of axis No. 3 (L1 θ -, L3 θ -, L5 θ -, and IC θ -axis). For details about the status expressed by the combination of RD3 and AL3, see the Table below.
7	AL3	Red	
8	RD4	Green	Shows the status of axis No. 4 (L1Z-, L3Z-, L5Z-, and ICZ-axis). For details about the status expressed by the combination of RD4 and AL4, see the Table below.
9	AL4	Red	

The following shows the operation status expressed by the combination of RD* and AL*.

Table 14-6-2-2 Combination of Z θ -Driver LED Lighting and Flashing Statuses

RD*	AL*	Status
Flashing	Flashing	Controller is not connected (immediately after the power has been turned ON).
Flashing	Off	Servo is OFF.
Lit	Off	Servo is ON.
Off	Flashing	Warning occurs.
Off	Lit	Alarm occurs.
Lit	Lit	S/W installation status
Off	Off	Control power is OFF.

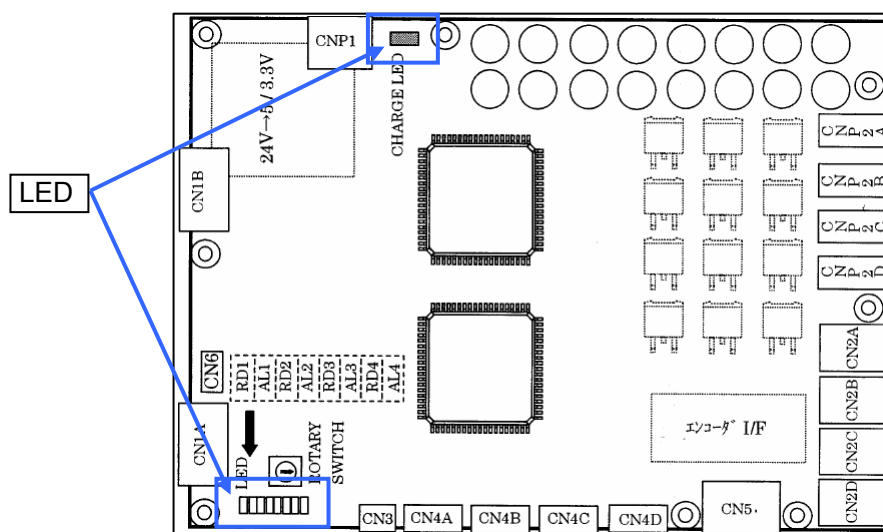


Figure 14-6-2-1 LEDs of the Z θ amplifier

Maintenance Guide

14-7. Transport Unit

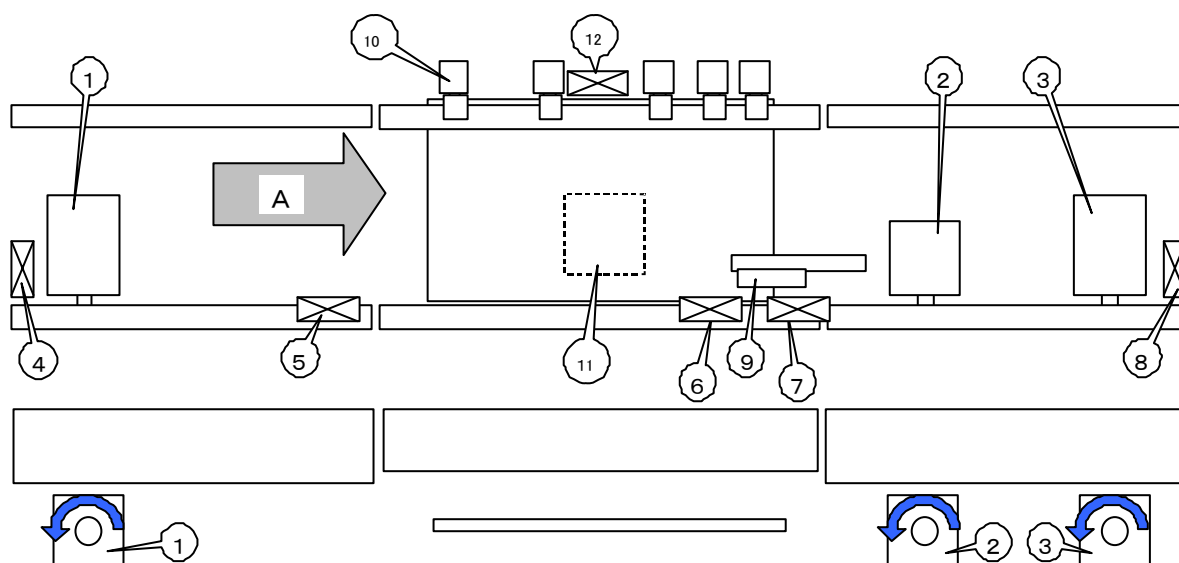
14-7-1. Structure of Transport Unit

Table 14-7-1-1 shows the structure drawing of the transport unit.

Mount the BASE I/O board on the left of the front below the board base frame and the driver for the transport stepping motor and the driver for the support table stepping motor on the right of the rear on the base frame.

The support table is also called “BU (backup table)”.

It is not necessary to change the connection destination boards of the transport L motor, transport R motor, transport L sensor, transport R sensor, and WAIT sensor inside the transport unit according to the reference and flow direction.



- ① Transport L motor (stepping motor)
- ② Transport CENTER motor (stepping motor)
- ③ Transport R motor (stepping motor)
- ④ Transport L sensor
- ⑤ WAIT sensor
- ⑥ STOP sensor
- ⑦ C/OUT sensor
- ⑧ Transport R sensor
- ⑨ Stopper
- ⑩ Y pusher
- ⑪ Support table motor (stepping motor)
- ⑫ BU origin sensor

Figure 14-7-1-1 Transport unit

Maintenance Guide

The cable assemblies shown in the table below are to be added or deleted in EN specification. Connect them as shown in the table.

Table 14-7-1-1

Applicable cable		Connection destination		Add/delete
Part No.	Part name	Name of destination	Connector No.	
40092574	BU LOCK SENS ASM	- - - - -	BU LOCK	Add
40110058	BU LOCK SENS CABLE ASM	SENSOR BLOCK2	CBL2-2	Add
40110046	SV WIRE ASM (EN)	- - - - -	EV	Add
40110045	SV WIRE ASM	- - - - -	EV	Delete

The cable assemblies shown in the table below are to be added in case of auto width adjustment option.

Connect them as shown in the table.

Table 14-7-1-2

Applicable cable		Connection destination		Add/delete
Part No.	Part name	Name of destination	Connector No.	
40048077	AWC MOTOR ASM	- - - - -	CN659/660	Add
40110043	AWC ENC CABLE SAM	BASE I/O board	BASE17	Add
40110037 (40110038)	AWC DRIVE CABLE ASM (AWC DRIVE CABLE ASM (EN))	BASE I/O board	BASE14	Add
40110039 (40110040)	AWC MOTOR CABLE ASM (AWC MOTOR CABLE ASM (EN))	Driver	-	Add
40092577	AWC ORG SENS ASM	- - - - -	AWC ORG	Add
40110061	AWC ORG SENS CABLE ASM	SENSOR BLOCK2	SBL2-5	Add
40092569	BU PIN SENSOR EMISSION ASM	- - - - -	BU EMIS	Add
40110053	BU PIN (EMISSION) CABLE ASM	SENSOR BLOCK1	SBL1-2	Add
40092575	BU PIN SENSOR RECEIVER ASM	- - - - -	BU RCV	Add
40110059	BU PIN (RECEIVING) CABLE ASM	SENSOR BLOCK2	SBL2-3	Add

Maintenance Guide

The connection destination boards of other sensors are shown in Table 14-7-1-3 "Cable Assemblies Connected to the BASE I/O Board" and Table 14-7-1-4 "Cable Assemblies Connected to the Sensor Block ". Connect the sensors while referring to these figure and tables.

Table 14-7-1-3 Cable Assemblies Connected to the BASE I/O Board

Applicable cable			CARRY board connection destination	Remarks
Part No.	Part No.	Part No.		
40110049	MTC MTS I/F CABLE ASM	BASE01	CN1	MTS I/F
40110049	MTC MTS I/F CABLE ASM	BASE02	CN2	MTC I/F
40110047	SMEMA IN CABLE ASM	BASE03	CN3	SMEMA LOWER
40110048	SMEMA OUT CABLE ASM	BASE04	CN4	SMEMA UPPER
40113658	LOAD CELL ANAROG CABLE ASM	BASE05	CN5	LOAD CELL (OP)
- - - -	- - - - - - - - - - - - - - - - - - - -	- - - -	CN6	Not used
- - - -	- - - - - - - - - - - - - - - - - - - -	- - - -	CN7	Not used
40097608	FLUXER RELAY CABLE ASM	BASE08	CN8	FLUXER (OP)
40110051	SB CABLE ASM	BASE09	CN9	SENS POWER
40110051	SB CABLE ASM	BASE10	CN10	SENS SIGNAL
- - - -	- - - - - - - - - - - - - - - - - - - -	- - - -	CN11	Not used
- - - -	- - - - - - - - - - - - - - - - - - - -	- - - -	CN12	Not used
40110044	SV CABLE ASM	BASE13	CN13	SOLENOID VALVE
40110037 (40110038)	AWC DRIVE CABLE ASM (AWC DRIVE CABLE ASM (EN))	BASE14	CN14	AWC (OP)
40110030 (40110031)	BU DRIVE CABLE ASM (BU DRIVE CABLE ASM (EN))	BASE15	CN15	BU PULSE
40110029	MT1-3 PULSE CABLE ASM	BASE16	CN16	IN, CNT, OUT DRIVER
40110043	AWC ENC CABLE ASM	BASE17	CN17	AWC (OP)
40110036	BU ENC CABLE ASM	BASE18	CN18	BU ENC
40110018	BASE-IO PWR CABLE ASM	BC PWR	CN19	PCB POWER

Maintenance Guide

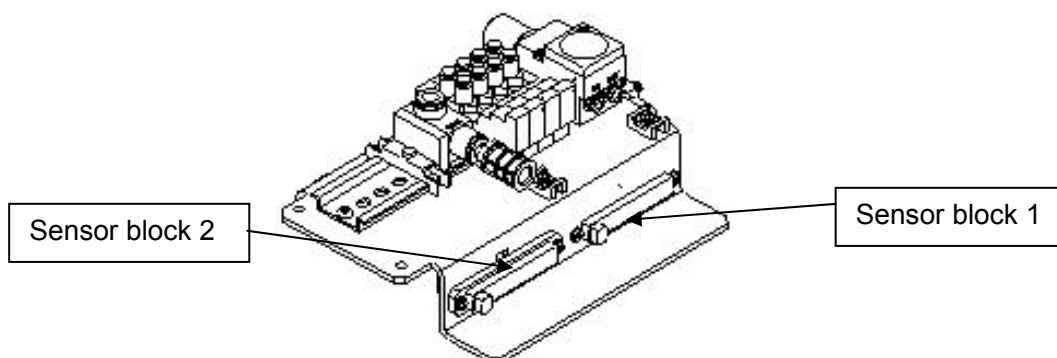


Figure 14-7-1-2 Sensor Block Positions

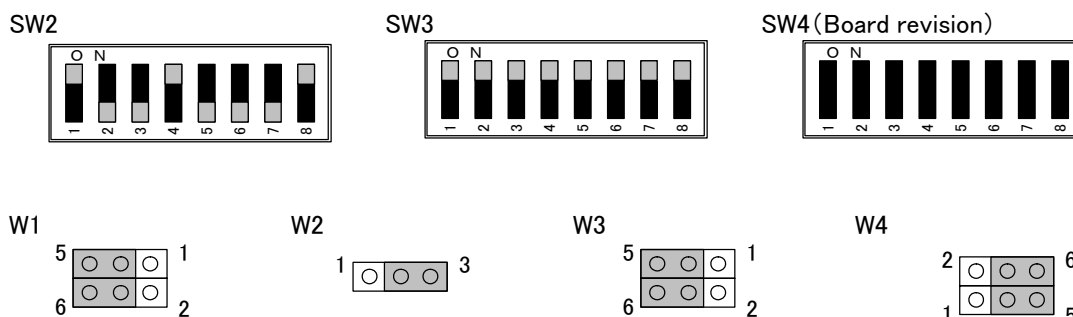
Table 14-6-1-4 Cable Assemblies Connected to the Sensor Block

Applicable cable			Sensor block connection destination	Remarks
Part No.	Part No.	Connector No.		
40110052	LEFT SENS CABLE ASM	SBL1-1	SBL1-1	CONV. L SENS
40110053	BU PIN (EMISSION) CABLE ASM	SBL1-2	SBL1-2	AWC (OP)
40110054	WAIT SENS CABLE ASM	SBL1-3	SBL1-3	WAIT SENS SIG
- - - - -	- - - - -	- - - - -	SBL1-4	Not used
40110055	STOP SENS CABLE ASM	SBL1-5	SBL1-5	STOP SENS SIG
- - - - -	- - - - -	- - - - -	SBL1-6	Not used
40110056	C.OUT SENS CABLE ASM	SBL1-7	SBL1-7	C.OUT SENS SIG
- - - - -	- - - - -	- - - - -	SBL1-8	Not used
40110057	BU ORG SENS CABLE ASM	SBL2-1	SBL2-1	BU ORG SENS
40110058	BU LOCK SENS CABLE ASM	SBL2-2	SBL2-2	EN
40110059	BU PIN (RECEIVING) CABLE ASM	SBL2-3	SBL2-3	AWC (OP)
40110060	TPIN SENS CABLE ASM	SBL2-4	SBL2-4	T-PIN SENS
40110061	AWC ORG SENS CABLE ASM	SBL2-5	SBL2-5	AWC (OP)
40110062	RIGHT SENS CABLE ASM	SBL2-6	SBL2-6	CONV. R SENS
- - - - -	- - - - -	- - - - -	SBL2-7	Not used
- - - - -	- - - - -	- - - - -	SBL2-8	Not used

Maintenance Guide

14-7-2. Adjusting the BASE I/O Board (40071680)

The jumper switches and DIP switches on the BASE I/O board assembly used in the transport unit have already been set at delivery. However, check that they are set as shown below before setting the BASE I/O board assembly in the transport unit.



 portion shows the switch set position and receptacle mounting position.

Figure 14-7-2-1 DIP-Switches on BASE I/O Board Assembly

14-7-3. Adjusting the Stepping Driver

A stepping motor is used for the transport motor and support table/auto width adjustment motor of the transport unit.

To rotate the stepping motor correctly, it is necessary to adjust the 5-phase stepping driver.

- IN, Center, OUT transport motor (Transport stepping motor)
HM001320000 5-phase stepping driver
- Support table/width adjustment motor (non-EN specification)
HX004200000 5-phase stepping driver
- Support table/width adjustment motor (EN specification)
HX005450000 5-phase stepping driver

14-7-3-1. Adjusting the Drive Current of the Transport Stepping Motor

<Adjustment Procedure>

- ① Before starting the adjustment procedure, make sure that the DC power source output voltage has been properly adjusted.
- ② Turn the transport stepping motor and measure the voltage across [CP1] and [CP2] on the five-phase stepping driver with a digital voltmeter.
Connect the positive (+) and negative (-) probes of the digital voltmeter to [CP1] and [CP2], respectively.
- ③ Slowly turn the RUN variable resistor so that the voltage across [CP1] and [CP2] becomes 2.8 ± 0.01 V.
- ④ Set the DIP switches on the step driver as shown in the figure below.

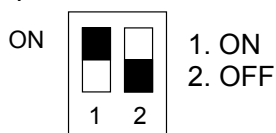


Figure 14-7-3-1-1 DIP Switch Settings

- **Specification value**

Drive current: $1.4 \text{ A} \pm 0.005 \text{ A/phase}$
(Measured with the voltage across CP1 and CP2. $2.8 \text{ V} \pm 0.01 \text{ V}$)

Maintenance Guide

14-7-3-2. Setting the Stepping Motor Driver for Support Table/Auto Width Adjustment

<Adjustment Procedure for Machines not Applicable to EN>

① Set the rotary switches to the values in the table below.

Table 14-7-3-2-1 Setting the Stepping Driver

No.	Switch	Settings
1	STOP(BU)	9
2	STOP(AWC)	5
3	RUN	C
4	M1	0

② Set the DIP switches to the values in the table below.

Table 14-7-3-2-2 Setting the Stepping Driver

No.	Switch	Settings
1	TEST	OFF
2	2/1CK	OFF
3	C.D	OFF
4	L/HV	ON



Switch lever positions
When the switch is flipped down, it is turned ON. On the contrary, when the switch is flipped up, it is turned OFF.

Rotate the rotary switch so that the arrow points to the desired value.

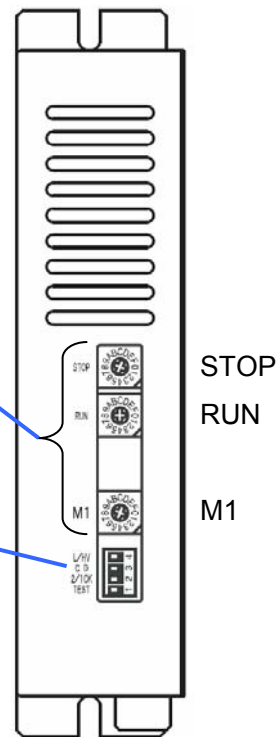
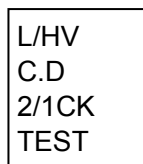


Figure 14-7-3-2-1 DIP-SW

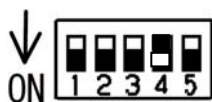
<Adjustment Procedure for Machines Applicable to EN>

① Set the rotary switches to the values in the table below.

Table 14-7-3-2-3 Setting the Stepping Driver

No.	Switch	Settings
1	STOP(BU)	9
2	STOP(AWC)	5
3	RUN	C
4	M2	0
5	M1	0

② Set the DIP switches to the values in the table below.



Switch lever positions
When the switch is flipped down, it is turned ON. On the contrary, when the switch is flipped up, it is turned OFF.

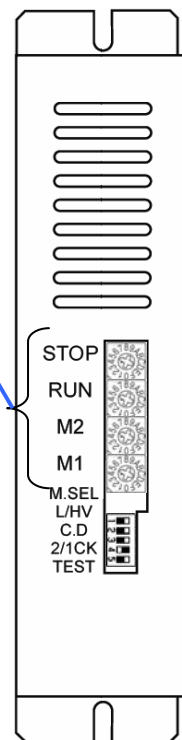


Figure 14-7-3-2-2 DIP-SW

Table 14-7-3-2-4 Setting the Stepping Driver

No.	Switch	Settings
1	TEST	OFF
2	2/1CK	OFF
3	C.D	OFF
4	L/HV	ON
5	M.SEL	OFF

Maintenance Guide

14-8. Head Unit

14-8-1. S-HEAD MAIN PCB ASM (40106799)

14-8-1-1. Outside View of Board

Figure 14-8-1-1 shows the outside view of S-HEAD MAIN PCB ASM.

Use this outside view as reference for the jumper/switch settings and volume adjustment described in the following sections.

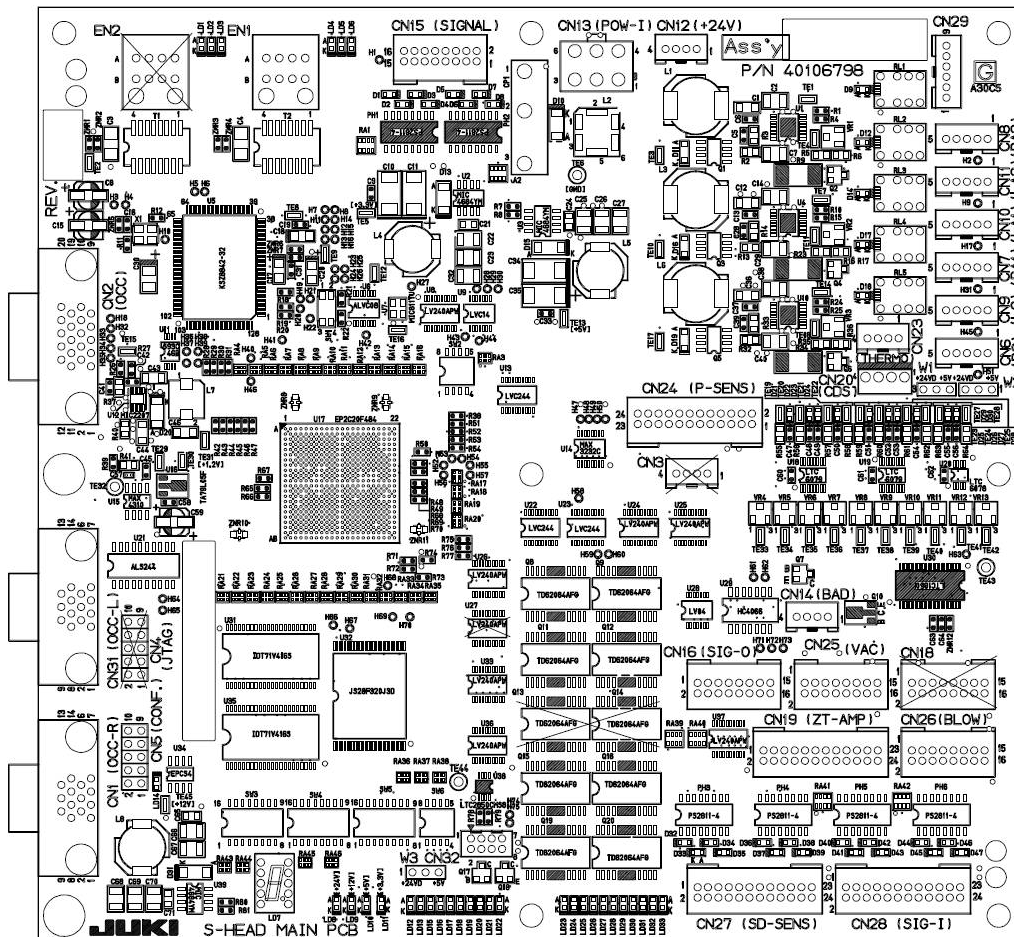
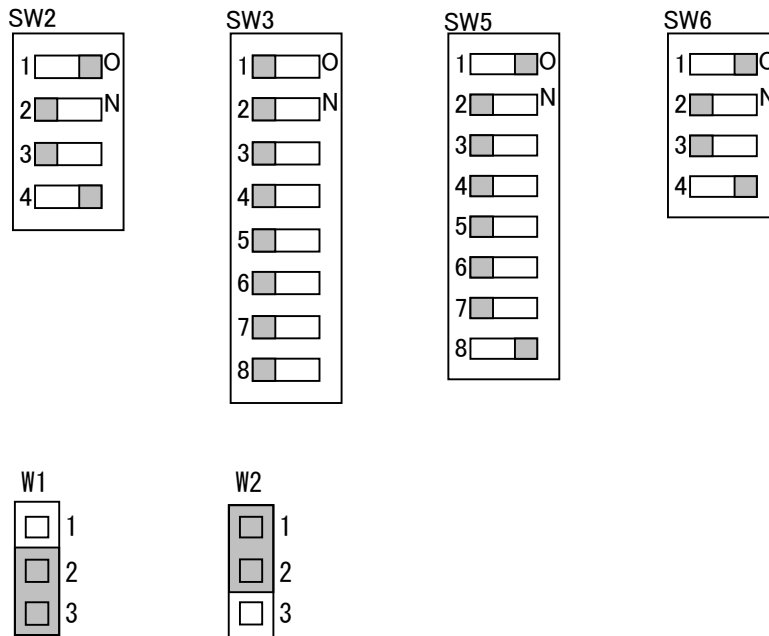


Figure 14-8-1-1-1 Outside View of S-HEAD MAIN PCB ASM

Maintenance Guide

14-8-1-2. Setting the Jumpers/Switches

The jumpers and switches except for SW1 have already been set at the delivery. Before mounting the PCB, check the jumper and switch settings.



 portion shows the switch set position and receptacle mounting position.

14-8-1-3 Adjusting the Volumes

The volumes have already been adjusted at the delivery of the PCB. So, mount the PCB in the machine and check the set voltage values. For details, see “KE-3010/20V/20VR_QA Table, Chapter16._Adjustment of head VAC level and temperature sensor output level”.

Maintenance Guide

14-8-2. Adjusting the Point Sensor

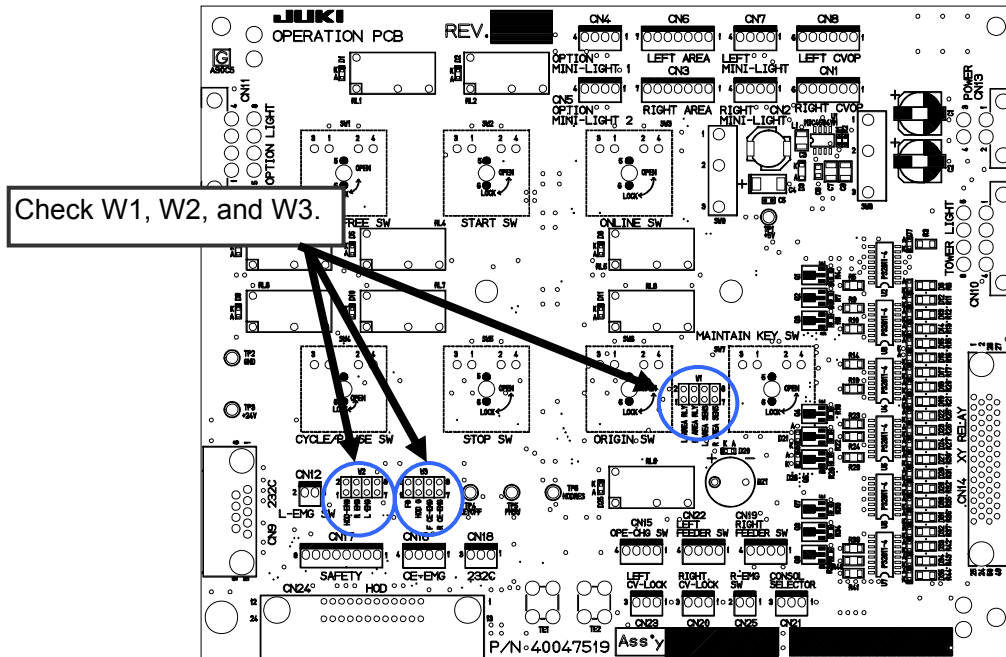
This point sensor is composed of units shown below.

No.	Part No.	Part name
1	40045484	NOZZLE SENSOR AMP ASM
2	HD002600010	FIBER

If any or both units shown above have been replaced, the sensor needs to be adjusted. For details, see “KE-3010/20V/20VR_QA Table, Chapter16._Adjustment of point sensor offset sensitivity”.

Maintenance Guide

② Operation board (EN) jumper switch settings

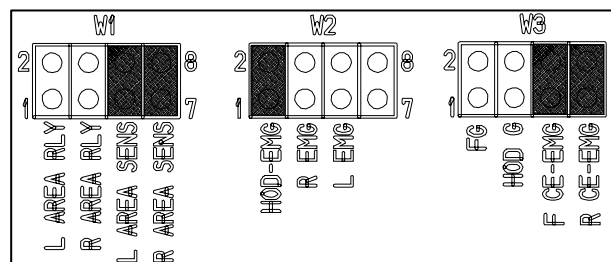


• Jumper switch setting (front)

W1	
1-2	Open
3-4	Open
5-6	Short
7-8	Short

W2	
1-2	Short
3-4	Open
5-6	Open
7-8	Open

W3	
1-2	Open
3-4	Open
5-6	Short
7-8	Short



Mount receptacles at the portions of the straight headers W1, W2, and W3 to make them short-circuited.

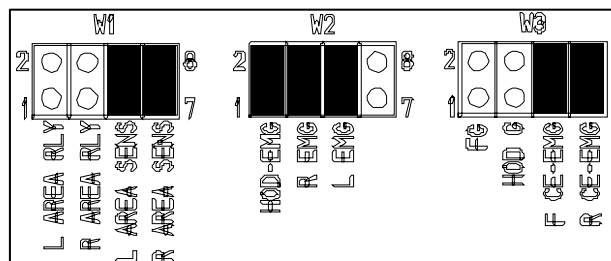
(For the machine with the HOD option specifications, W2 “HOD-EMG” is open.)

• Jumper switch setting (rear)

W1	
1-2	Open
3-4	Open
5-6	Short
7-8	Short

W2	
1-2	Short
3-4	Short
5-6	Short
7-8	Open

W3	
1-2	Open
3-4	Open
5-6	Short
7-8	Short



Mount receptacles at the portions of the straight headers W1, W2, and W3 to make them short-circuited.

Figure 14-9-2-2 Operation board (EN specification) jumper switch settings

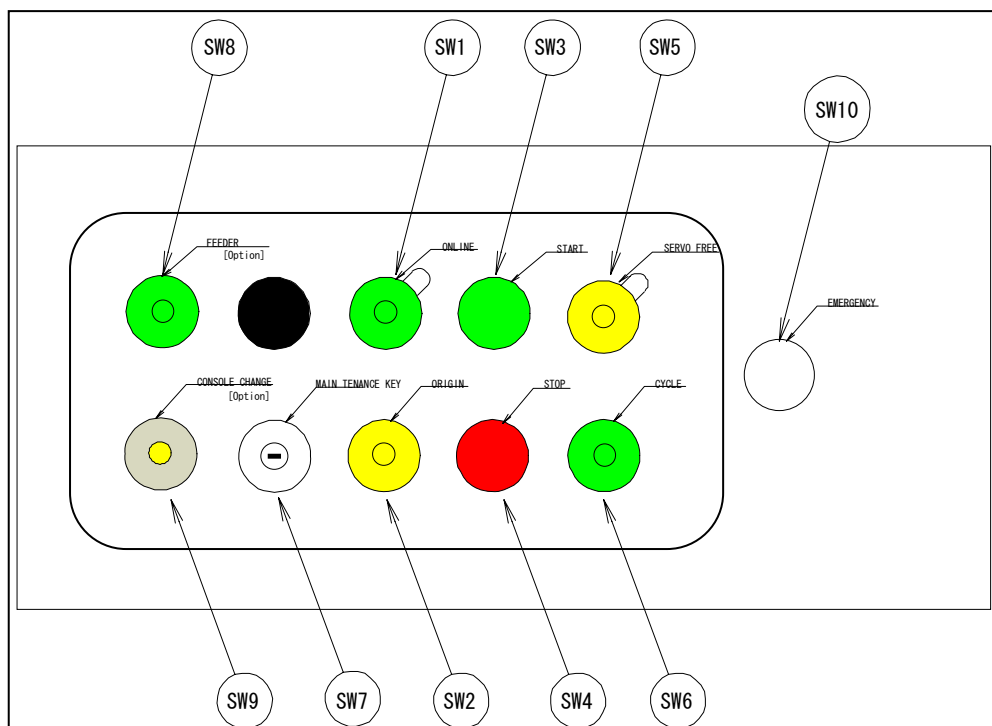
Maintenance Guide

14-9-3. Mounting Switches onto the Operation Switchboard

Mount push-button switches such as start switch or stop switch in the sockets on the operation switchboard as shown below in compliance with the specifications.

1) Configuration

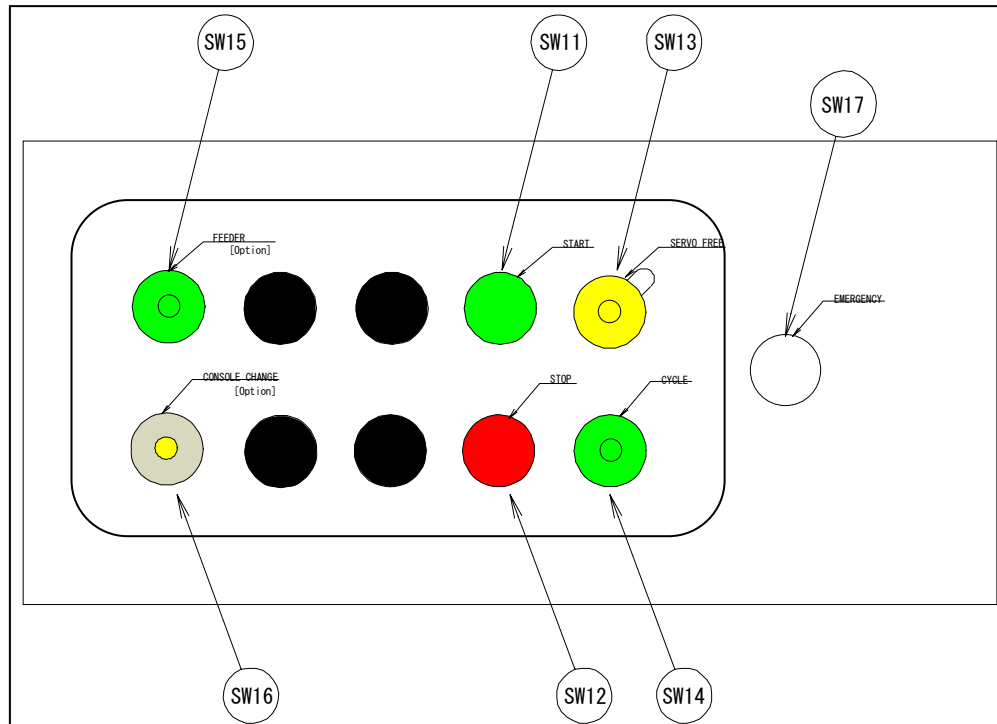
(1) ST front



No.	Switch name	Element	Actuator	LED	Bezel	Lens	Remarks
SW1	ONLINE	HA005340010	HA005340020	HA005340070	HA00534004A	HA00552001B	Bezel is provided with a cover.
SW2	ORIGIN	HA005340010	HA005340020	HA00534007A	HA005520030	HA00552001A	
SW3	START	HA005340010	HA005340020	-	HA005520030	HA00552001B	
SW4	STOP	HA005340010	HA005340020	-	HA005520030	HA005520010	
SW5	SERVO FREE	HA005340010	HA005340020	HA00534007A	HA00534004A	HA00552001A	Bezel is provided with a cover.
SW6	CYCLE	HA005340010	HA005340020	HA005340070	HA005520030	HA00552001B	
SW7	MAINTENANCE KEY	HA005340010	HA005350020	-	HA005520020 HA00535003A	-	
SW8	FEEDER		40048035		HA005530010	HA005530020	OPTION (NON STOP)
SW9	CONSOLE CHANGE		40048036		HA005530010	HA00553002A	OPTION (REAR MONITOR)
SW10	EMERGENCY			40092806 40092646 (EN)			

Maintenance Guide

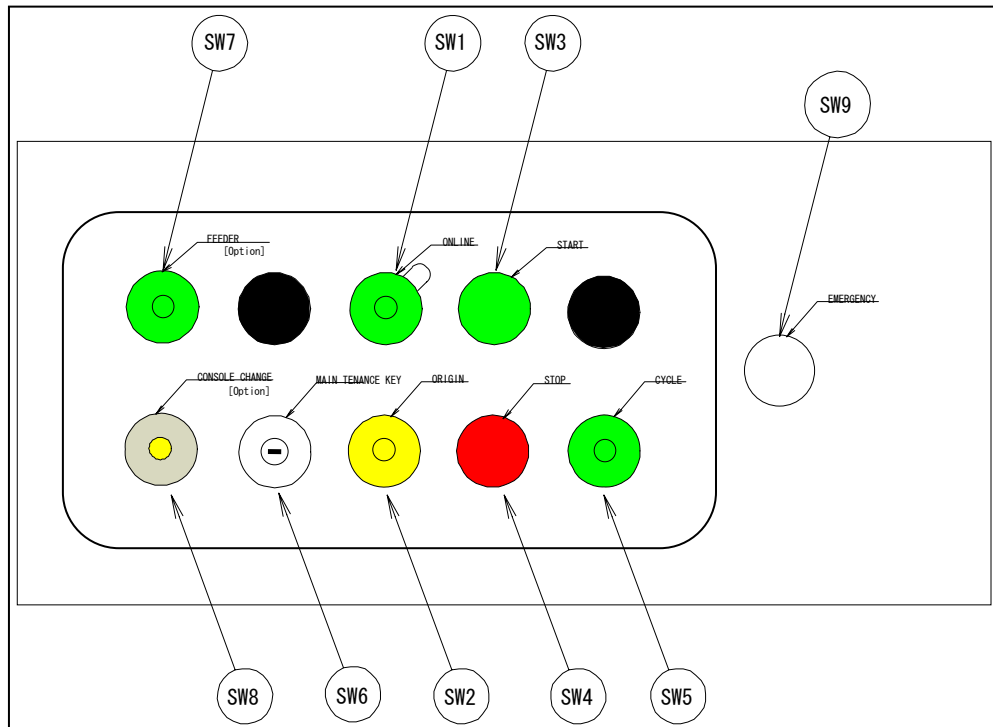
(2) ST rear



No.	Switch name	Element	Actuator	LED	Bezel	Lens	Remarks
SW11	START	HA005340010	HA005340020	-	HA005520030	HA00552001B	
SW12	STOP	HA005340010	HA005340020	-	HA005520030	HA005520010	
SW13	SERVO FREE	HA005340010	HA005340020	HA00534007A	HA00534004A	HA00552001A	Bezel is provided with a cover.
SW14	CYCLE	HA005340010	HA005340020	HA005340070	HA005520030	HA00552001B	
SW15	FEEDER		40048035		HA005530010	HA005530020	OPTION (NON STOP)
SW16	CONSOLE CHANGE		40048036		HA005530010	HA00553002A	OPTION (REAR MONITOR)
SW17	EMERGENCY			40092806 40092646 (EN)			

Maintenance Guide

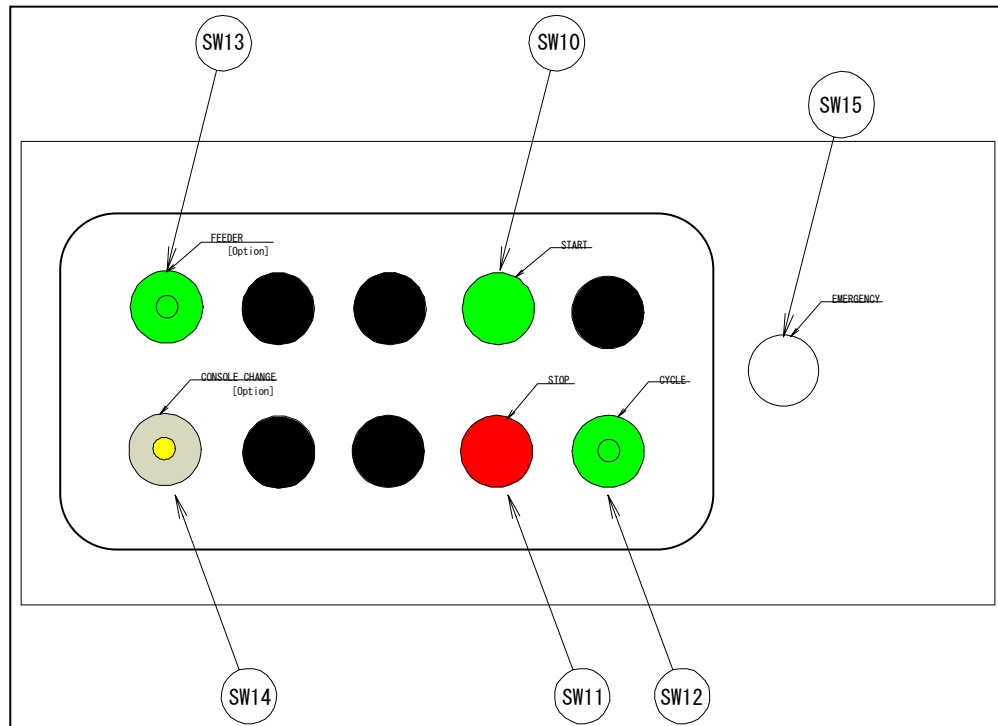
(3) EN front



No.	Switch name	Element	Actuator	LED	Bezel	Lens	Remarks
SW1	ONLINE	HA005340010	HA005340020	HA005340070	HA00534004A	HA00552001B	Bezel is provided with a cover.
SW2	ORIGIN	HA005340010	HA005340020	HA00534007A	HA005520030	HA00552001A	
SW3	START	HA005340010	HA005340020	-	HA005520030	HA00552001B	
SW4	STOP	HA005340010	HA005340020	-	HA005520030	HA005520010	
SW5	CYCLE	HA005340010	HA005340020	HA005340070	HA005520030	HA00552001B	
SW6	MAINTENANCE KEY	HA005340010	HA005350020	-	HA005520020 HA00535003A	-	
SW7	FEEDER		40048035		HA005530010	HA005530020	OPTION (NON STOP)
SW8	CONSOLE CHANGE		40048036		HA005530010	HA00553002A	OPTION (REAR MONITOR)
SW9	EMERGENCY			40092806 40092646 (EN)			

Maintenance Guide

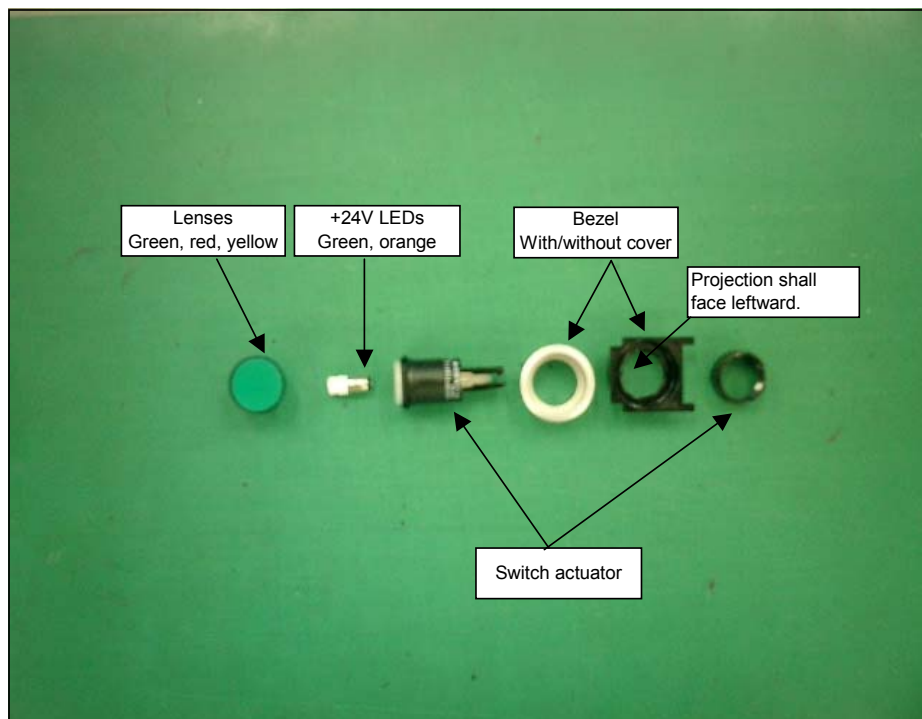
(4) EN rear



No.	Switch name	Element	Actuator	LED	Bezel	Lens	Remarks
SW10	START	HA005340010	HA005340020	-	HA005520030	HA00552001B	
SW11	STOP	HA005340010	HA005340020	-	HA005520030	HA005520010	
SW12	CYCLE	HA005340010	HA005340020	HA005340070	HA005520030	HA00552001B	
SW13	FEEDER		40048035		HA005530010	HA005530020	
SW14	CONSOLE CHANGE		40048036		HA005530010	HA00553002A	OPTION (REAR MONITOR)
SW15	EMERGENCY			40092806 40092646 (EN)			

Maintenance Guide

2) Mounting switches



(1) ONLINE, ORIGIN, START, STOP, SERVOFREE, CYCLE switches

- Parts used

Lens for flat (HA005520010, HA00552001A, HA00552001B)

LED (HA005340070, HA00534007A)

Bezel (HA005520030, HA00534004A)

Switch actuator (HA005340020)

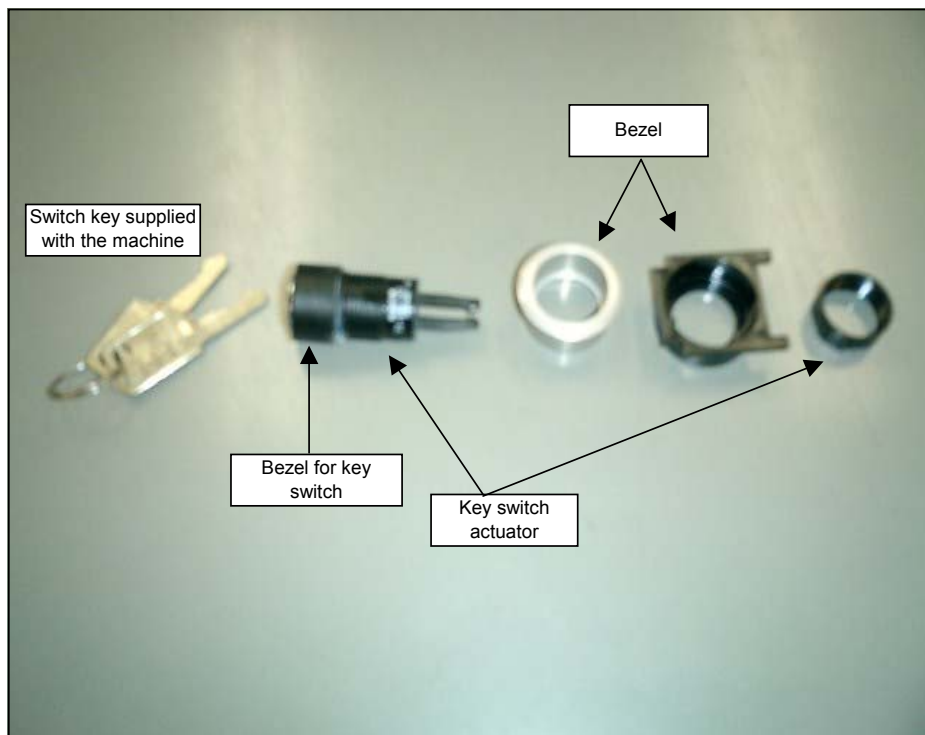
<Procedure>

- ① Fit the bezel (black) into the cover panel.
The bezel has a projection to stop rotation.
Attach the bezel so that the projection faces to the left when viewed from the front.
- ② Insert the LED into the switch actuator, and fit the actuator over the projection of the bezel carefully. There is a nut to be used to fix the bezel, so remove it.
- ③ Insert the bezel (silver) from the back of the panel and secure it with the fixing nut.
- ④ Finally, fit the lens for flat into the switch actuator firmly.

* References are shown on the following page.

Maintenance Guide

(2) Maintenance key switch



- Parts used

Key cover (HA00535003A), Key switch actuator (HA005350020), Bezel (HA005520020)

<Assembly procedure>

- ① Fit the bezel (black) into the cover panel.
- ② Push the key cover into the key switch actuator until a click is heard.
- ③ Insert the actuator (assembled at 3) into the black bezel, insert the bezel (silver) from the back of the panel and secure it with the fixing nut.

(3) LEFT FEEDER, RIGHT FEEDER, CONSOLE CHANGE switches

- Parts used

Use the L_FEEDER SW ASM (40048035), R_FEEDER SW ASM (40048034) or CONSOLE SW ASM (40048036).

Bezel (green) with a lens: bezel (HA005530010), lens (HA005530020); to be used for the LEFT_FEEDER and RIGHT_FEEDER SW

Bezel (white) with a lens: bezel (HA005530010), lens (HA00553002A); to be used for the CONSOLE CHANGE

<Assembly procedure>

- ① Remove the fixing nut of the bezel and fit the bezel. Then tighten the fixing nut.
- ② Finally, fit the switch element (with a cable) from the back of the panel. Direction of the switch element is not important. It can be assembled in either direction.

Maintenance Guide

14-10. Replacing the Fuse of the AC Input Unit

(Note) This work applies only to the XL specifications. The work does not apply to the M and L specifications.

(Note) Before starting the fuse replacement work, always turn OFF the main power of the machine completely.

If the fuse of the transformer (40029567) inside the AC input unit is blown up, follow the steps below to replace the fuse.

Fuse part No.: HF0110025S0

(Time-lag fuse, 250mA. Three fuses are supplied with the machine as accessory parts.)

1. Take out the AC input unit.

(The AC input unit is located at the position shown in Figure 14-10-1.)

<Procedure>

- ① Detach the cover RBR (40093634).
- ② Disconnect the wiring and take out the AC input unit.

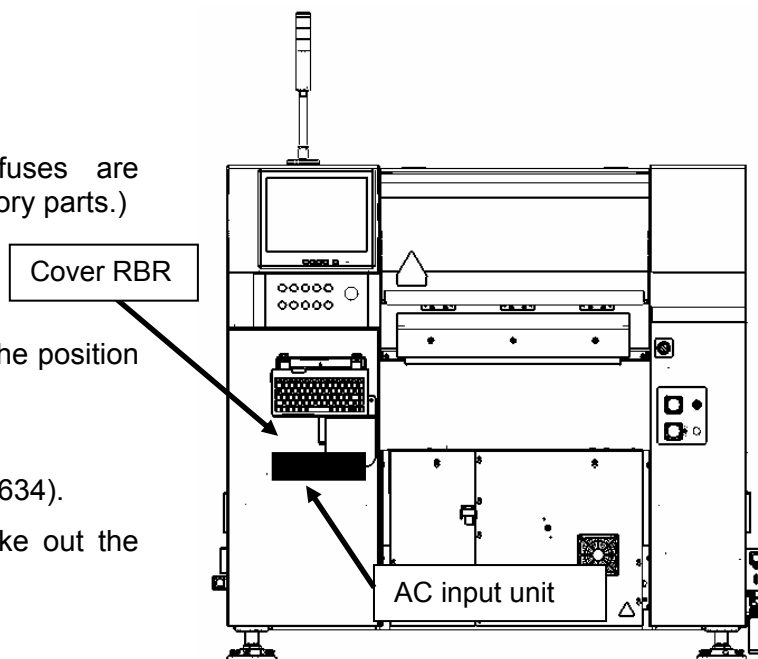


Figure 14-10-1 Rear View of Machine

2. Replace the fuse with a new one. The fuse is mounted at the position shown in Figure 14-10-2.

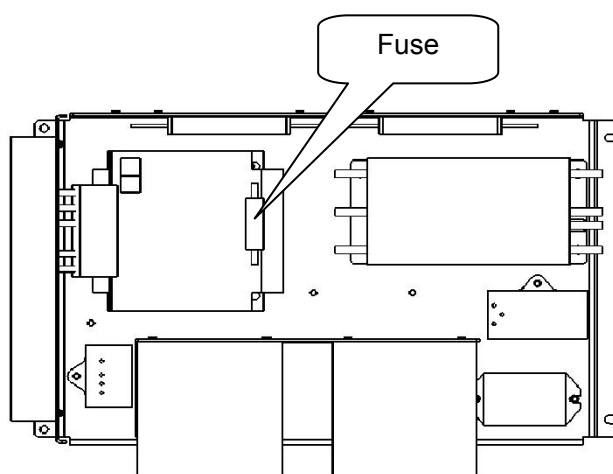


Figure 14-10-2 Top View of AC Input Unit

3. Remount the AC input unit in the reverse order of step 1.

Maintenance Guide

14-11. ETF Power Supply (Option for M and L Board Specifications)

14-11-1. Replacing the ETF Power Supply Unit

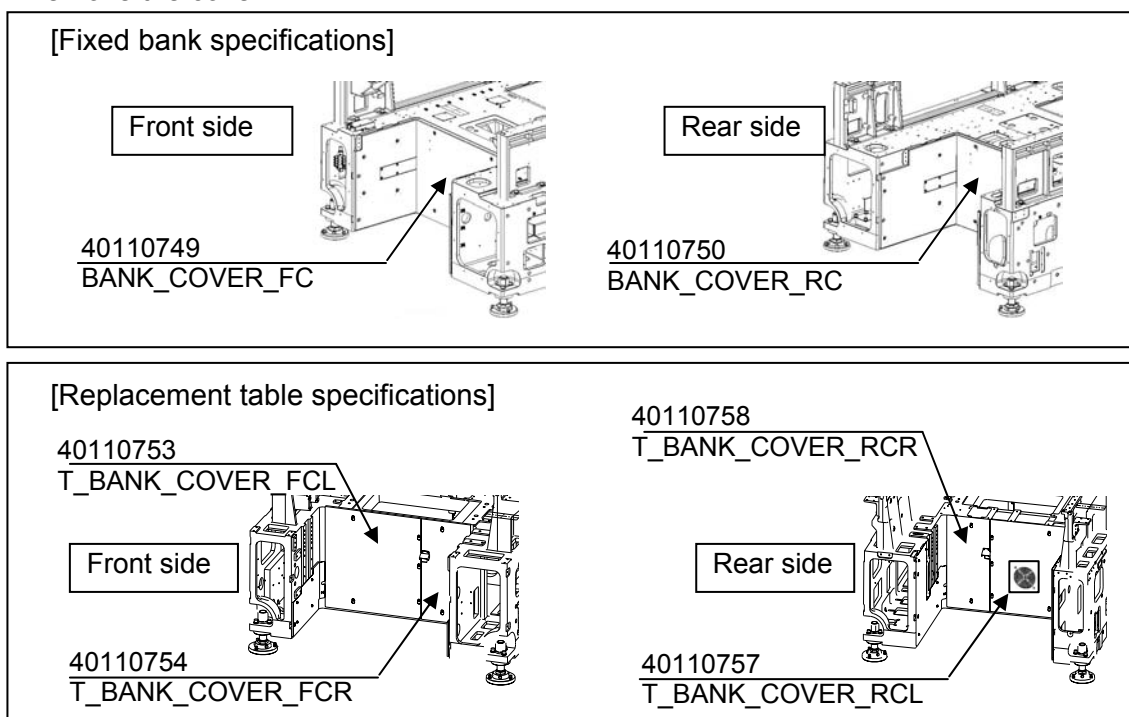
(Note) Before starting this work, be sure to turn OFF the main power of the machine.

When the ETF power supply unit needs to be replaced, follow the steps below to remove the ETF power supply unit from the machine.

14-11-1-1. Detaching the Main Unit Power Supply Unit

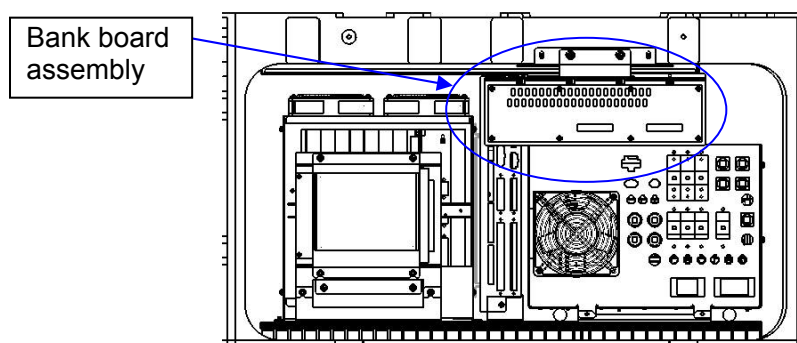
(Work procedure)

- 1) Remove the cover.



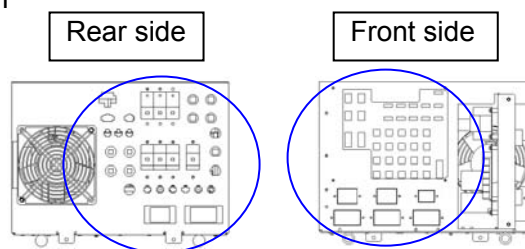
- * When the optional tape cutter is mounted, detach the cutter unit.
To detach the cutter unit, follow steps (1) to (7) described in section 18-2, "Replacing the Tape Cutter Unit", of the MAINTENANCE GUIDE.
After the work has been completed, reassemble the parts and components in the reverse order of disassembly.

- 2) Detach the rear bank board.

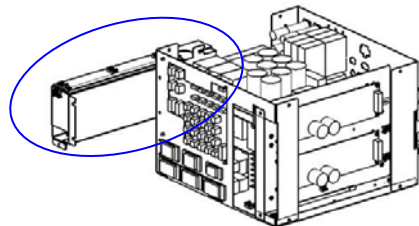


Maintenance Guide

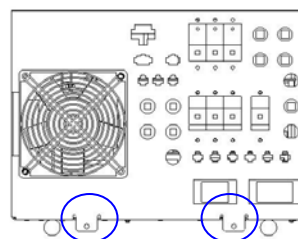
- 3) Disconnect all the connectors from the main unit power supply unit.



- * When the optional coplanarity unit is mounted, also detach the coplanarity power supply assembly mounted next to the main unit power supply unit.



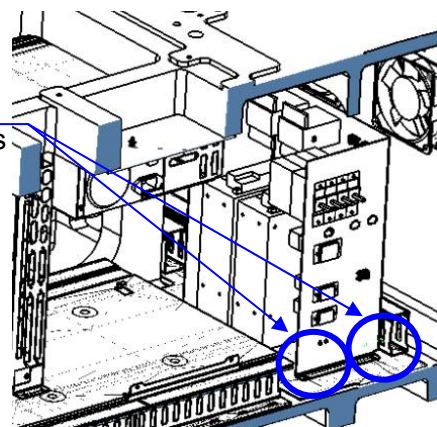
- 4) Remove the round screws that secure the unit and take out the main unit power supply unit through the rear while carefully checking the cables in the duct.



14-11-1-2. Detaching the ETF Power Supply Unit

- 1) Remove the hexagon screws that secure the ETF power supply unit.

SL6040892TN
M4 × 8 SEMS cap bolts
(2 pcs.)



- 2) Disconnect all the connector cables from the ETF power supply unit and take out the unit.

- * Mount the power supply unit in the reverse order of disassembly.

Maintenance Guide



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

[15] AUTO BOARD WIDTH ADJUSTMENT (OPTIONAL)

15-1. Assembling the AWC Bracket

- 1) Assemble the AWC MOTOR ASM ② to the AWC BRACKET E ① with the screws ③.
 - 2) Assemble so that the label B is faced upward.
 - 3) Connect the grounding cable together with the part A.
 - 4) Pass the AWC PULLEY A ④ through the motor shaft and secure it with the screws ⑤.
- * Arrange the end face of the part C.
- * Carefully check the pulley set screw position.

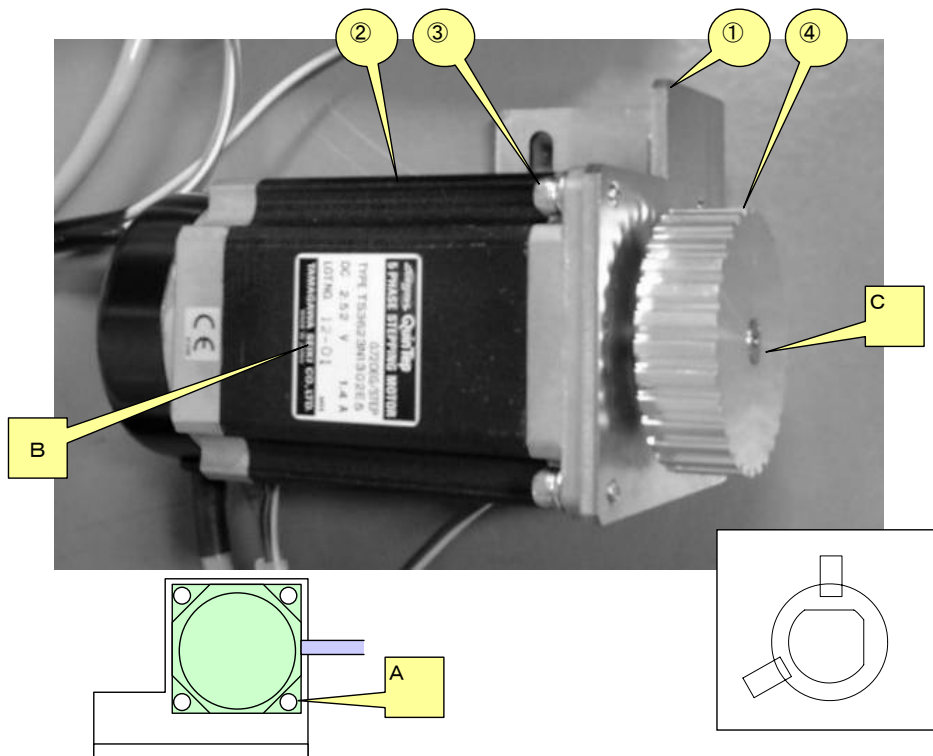


Figure 15-1-1

	Part No.	Part name	Q'ty
①	E2163725000	AWC BRACKET E	1
②	40048077	AWC MOTOR ASM	1
③	SL6041292TN	SCREW M4 L=12	4
④	E2153725000	AWC PULLEY A	1
⑤	SM8040602TP	SCREW M4X0.7 L=6	2

Maintenance Guide

15-2. Assembling to the Machine Main Unit

15-2-1. Mounting the AWC Bracket Assembly

- * When viewed from the front, the PCB transport unit is installed in such a way that the rear reference is replaced by the front reference, so the bracket assembly needs to be mounted in the position shown below.

	Part No.	Part name	Q'ty
①	-	AWC bracket assembly	1
②	SL6051492TN	SCREW M5 L=14	2
③	40000769	AWC PULLEY B ASM	1
④	E2160725000	AWC BELT (E)	1

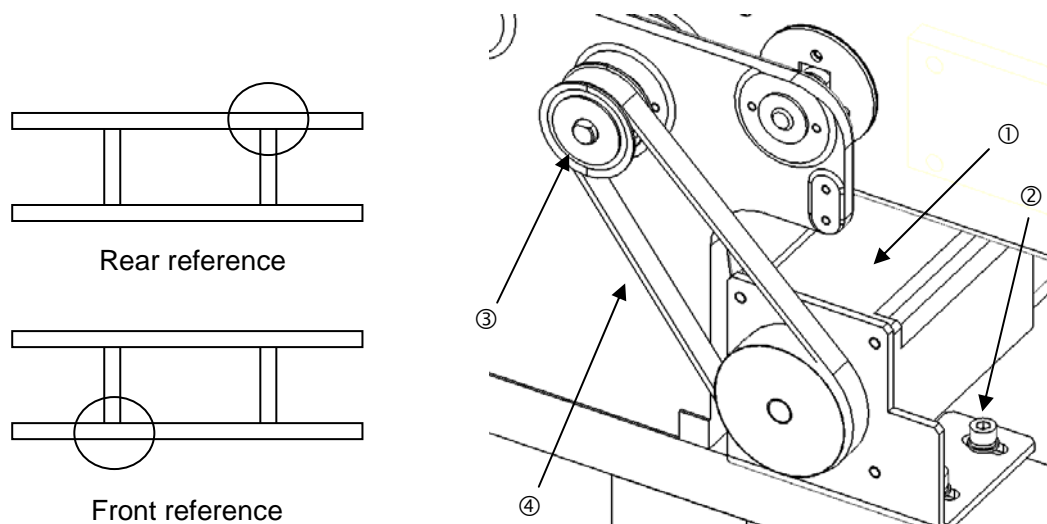


Figure 15-2-1-1

- * Adjust the timing belt tension by moving the motor position to the right and left so that the belt sags 1.63 mm in the case of M-size (1.76 mm in the case of L-size) when the center A on the belt span is pressed with a force of 1.67N.

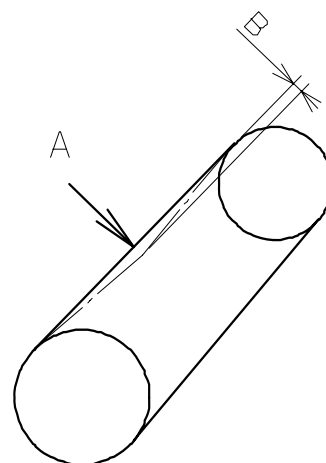


Figure 15-2-1-2

Maintenance Guide

15-2-2. Mounting the Origin Sensor Dog

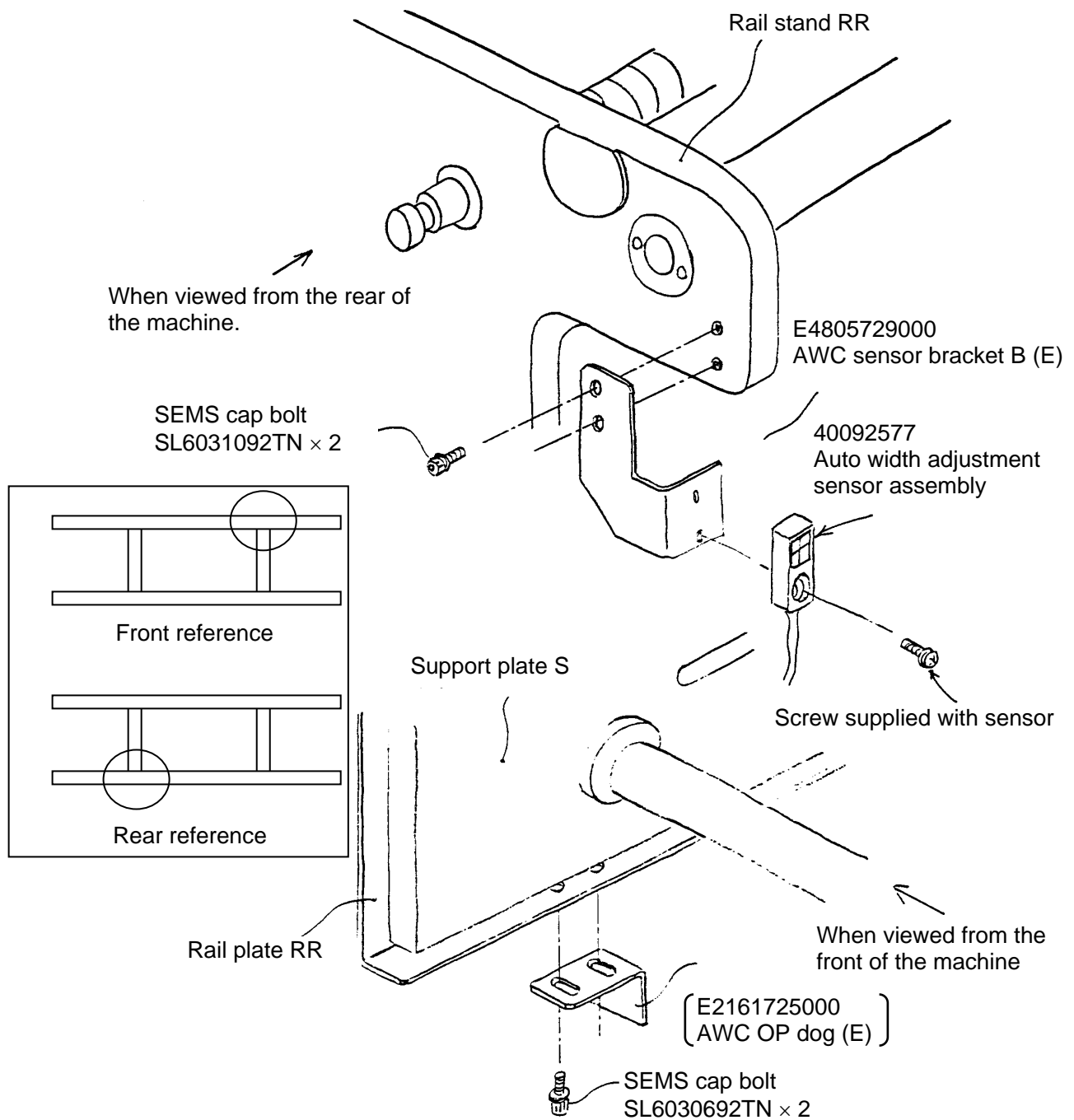


Figure 15-2-2-1

- * After the AWC OP dog has been mounted, change the rail width between the maximum and minimum levels to check that it does not interfere with other objects, such as the air tube.

Maintenance Guide

15-3. Support Pin Detection Sensor

15-3-1. Mounting the Support Pin Detection Sensor

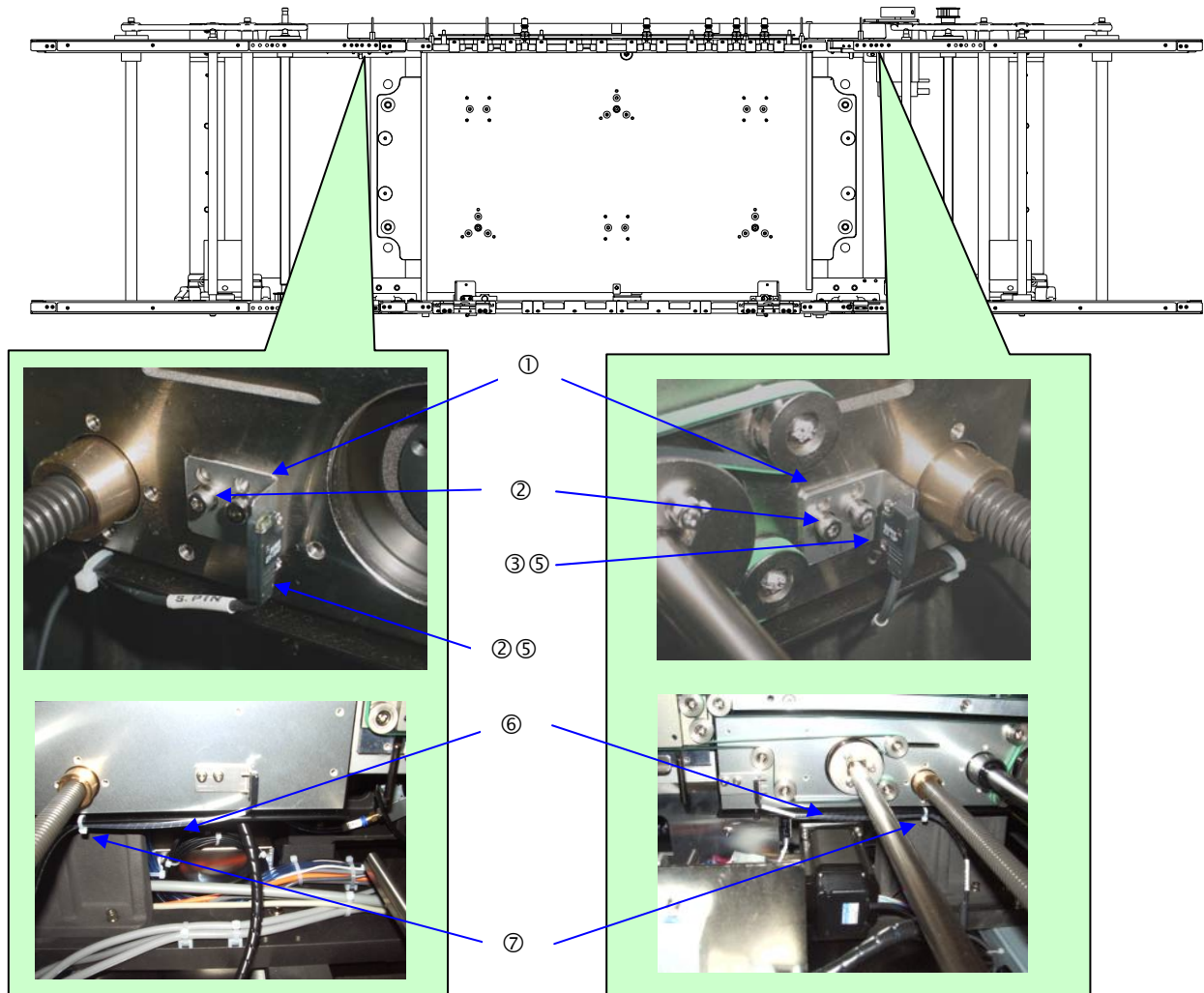


Figure 15-3-1-1

	Part No.	Part Name
①	40094550	SENSOR_BRACKET_AWC
②	SL6031092TN	SCREW
③	40092569	BU PIN SENSOR EMISSION ASM
④	40092575	BU PIN SENSOR RECEIVER ASM
⑤	SL6031092TN	SCREW
⑥	HX005220000	SPILAL_TUBE
⑦	EA9500B0100	CABLE CLAMP

Maintenance Guide

<Procedure>

- 1) Fix the sensor bracket AWC ① at the right and left positions on the movable rail with screws ②.
- 2) Mount the support pin sensor (emission side) ③ and the support pin sensor (receiving side) ④ on the sensor bracket AWC, using screws ⑤. Turn ON the power, and adjust the position of the sensors so that their optical axes are aligned.

The support pin sensors must be mounted on the movable-side rail.

The mount position when viewed from the mouter front differs depending on the machine reference (front reference, rear reference).

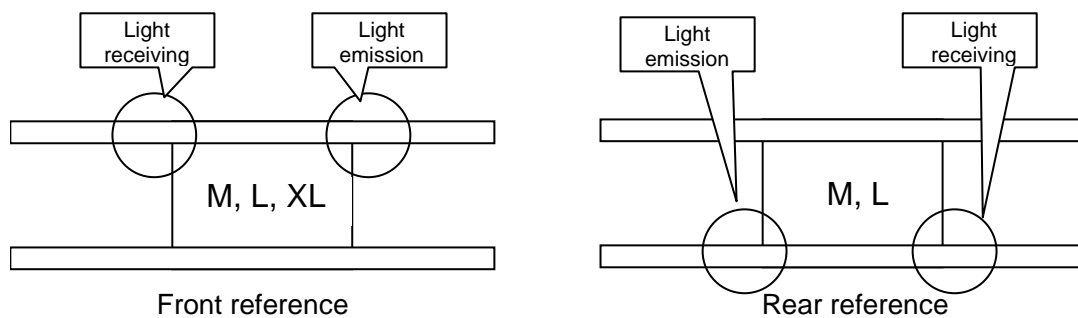
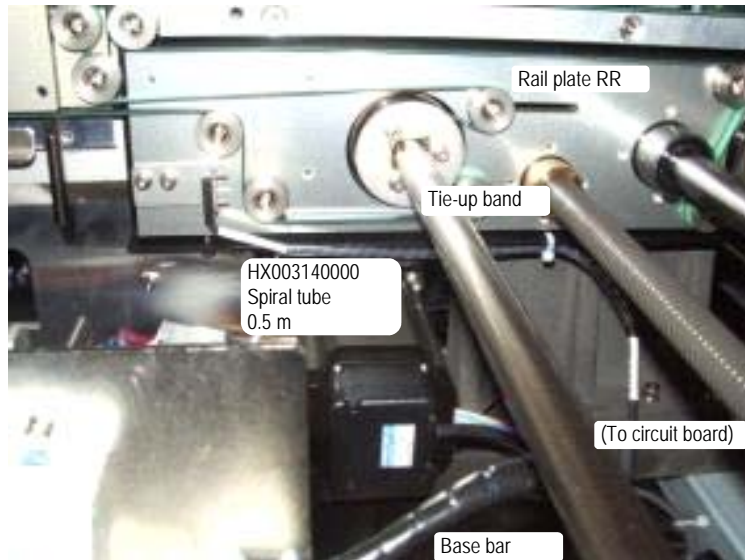


Figure 15-3-1-2

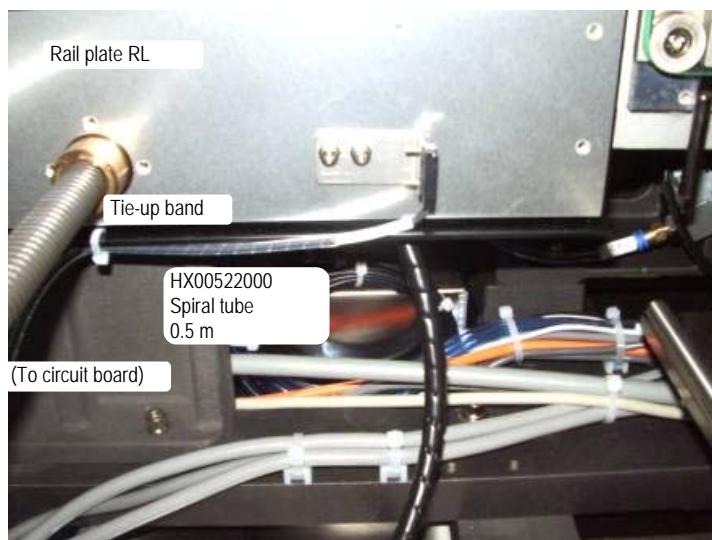
Maintenance Guide

15-4. Bundling the Support Pin Detection Sensor

15-4-1. Mounting the Support Pin Detection Sensor (Bundling the Cables)



Fix the cable with the tie-up band put in holes in the rail plates RR and RL.



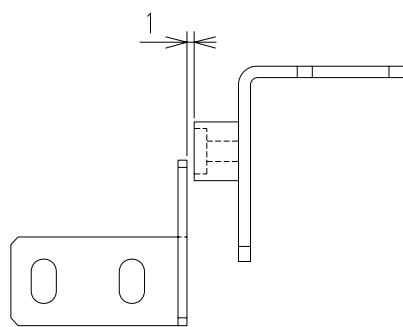
Wind the spiral tube (HX005220000) at the top of the cable fixed by the tie-up band.

Figure 15-4-1-1

Change the rail width between the maximum and minimum levels to check that the cable does not interfere with other objects.

Maintenance Guide

15-5. Adjusting the Sensor



Proximity sensor: 40002120 AWC ORG SENS ASM

Figure 15-5-1

15-6. Mounting the Driver Bracket

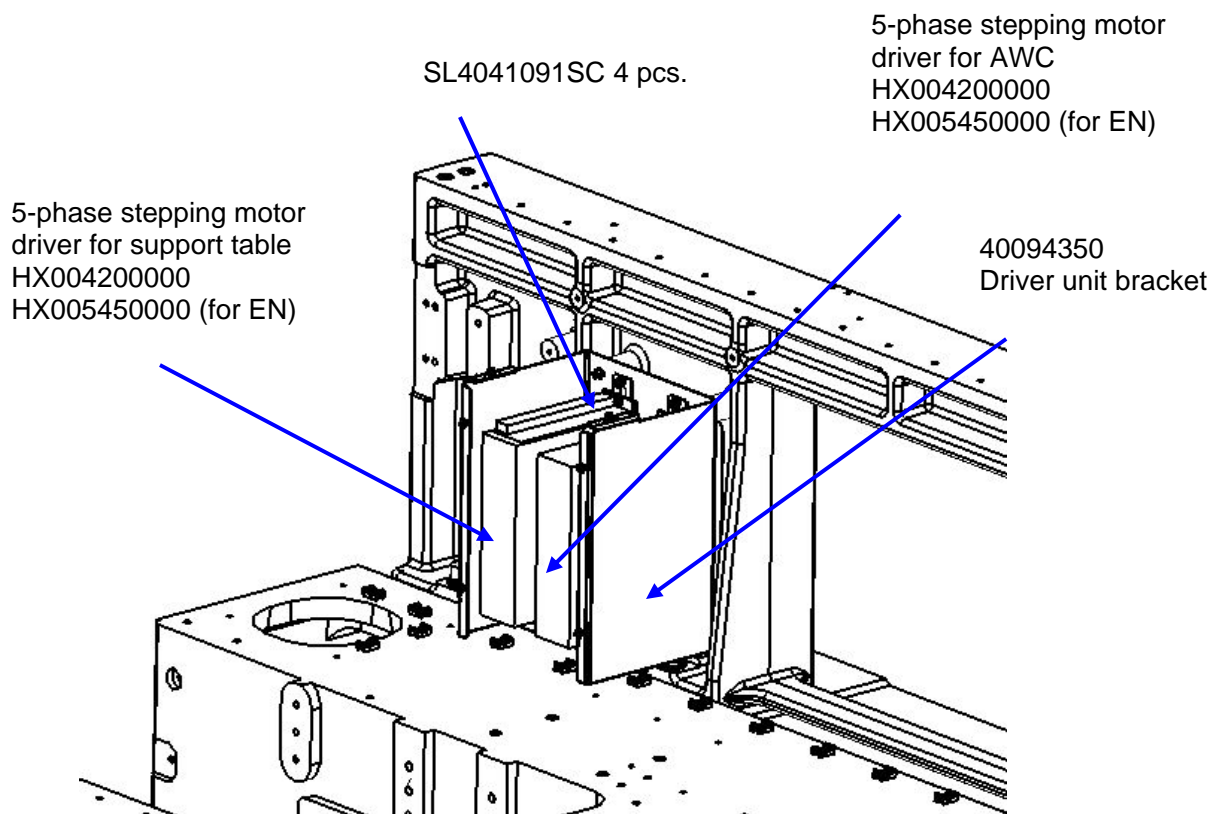


Figure 15-6-1

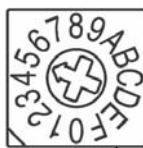
Note) The mounting position is the inside of the Y-axis frame located at the right far position of the machine.

Maintenance Guide

15-7. Setting the Driver

① Setting the rotary switches

Switch	Settings
STOP	5
RUN	C
M2 (EN machines only)	0
M1	0



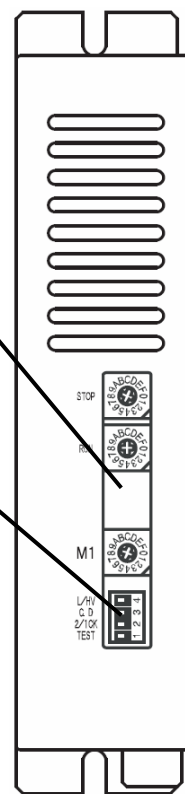
Set the rotary switches to the values in the table below.

② Setting the DIP switches

Switch	Settings
TEST	OFF
2/1CK	OFF
C.D	OFF
L/HV	ON
M.SEL	OFF



Switch lever positions
When the switch is flipped down, it is turned ON. On the contrary, when the switch is flipped up, it is turned OFF.



STOP
RUN
M2 (EN machines only)
M1

* [M. SEL] is provided only on EN machines.

Figure 15-7-1

Maintenance Guide

15-8. Mounting the Support Pin Sensor Dog

Assemble the parts to the stopper assembly following the figure below.

(The Figure below shows the XL board specifications. For the M and L board specifications, also assemble the parts in the same manner.)

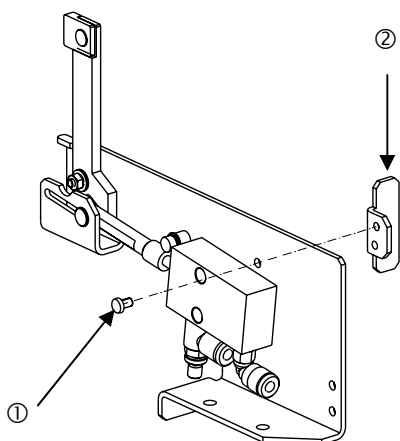


Figure 15-8-1

	Part No.	Part name	Q'ty
①	40065488	BU PIN SENSOR DOG	1
②	SM4030691SC	SCREW M3 L=6	1

Assemble the parts to the WAIT sensor assembly following the figure below.

* The dog is assembled to the WAIT sensor assembly only for the M and L specifications. This assembly work is not needed for the XL specifications.

	Part No.	Part name	Q'ty
①	40065488	BU PIN SENSOR DOG	1
②	SM4030691SC	SCREW M3 L=6	1

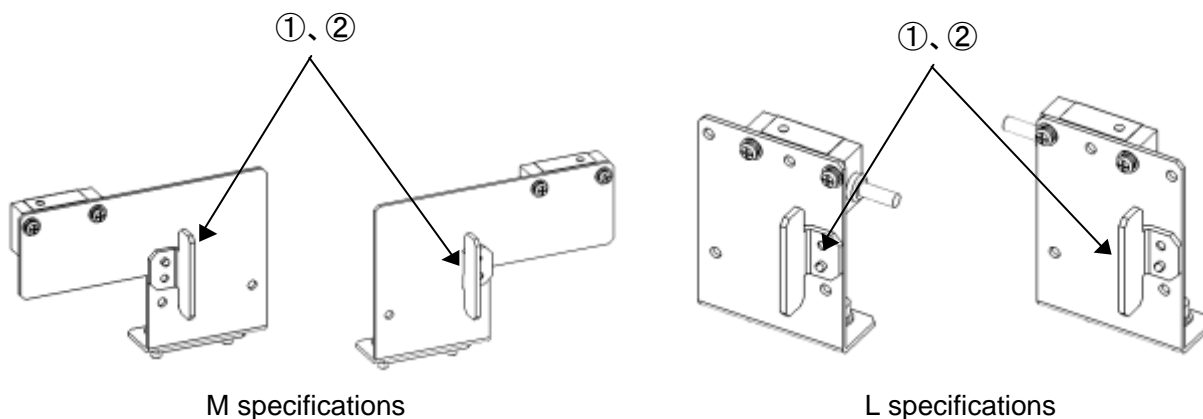


Figure 15-8-2

Maintenance Guide

**DANGER**

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

[16] FEEDER POSITION INDICATOR (FPI) (OPTIONAL)

16-1. Detaching the FPI (Front) (M and L Board Specifications)

As shown in the Figure below, the FPI is secured to the FPI bracket with the SEMS cap bolts (M6 × 12) that is secured to the FPI feeder float sensor bracket.

To detach the FPI, remove two bolts and slide it upward.

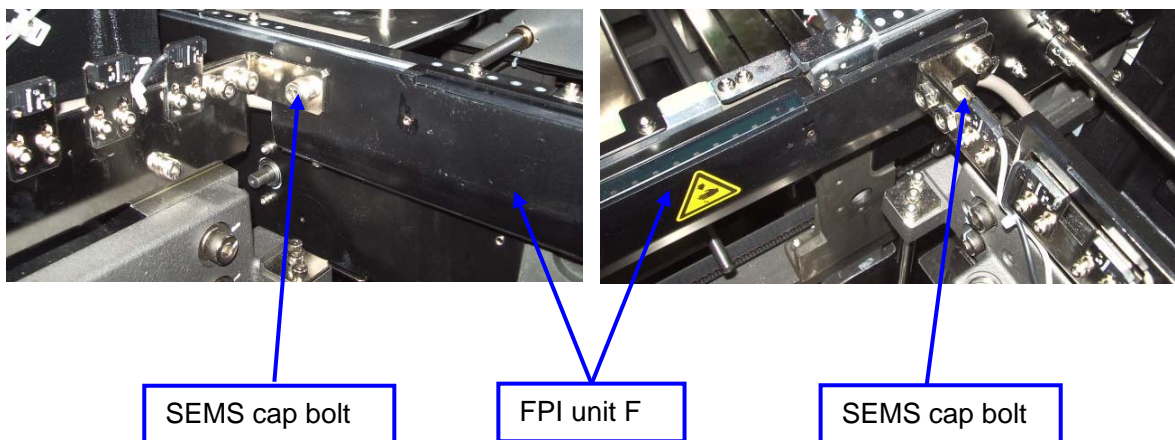


Figure 16-1-1

Maintenance Guide

16-2. Detaching the FPI (Rear) (M and L Board Specifications)

When viewed from the rear of the machine, the FPI (rear) is secured to the FPI bracket with the SEMS cap bolts (M6 × 12) that is secured to the feeder float sensor bracket as shown in the Figure below.

To detach the FPI, remove the two screws and slide it upward.

When reassembling, take care not to select a wrong hole. (See Fig. below.)

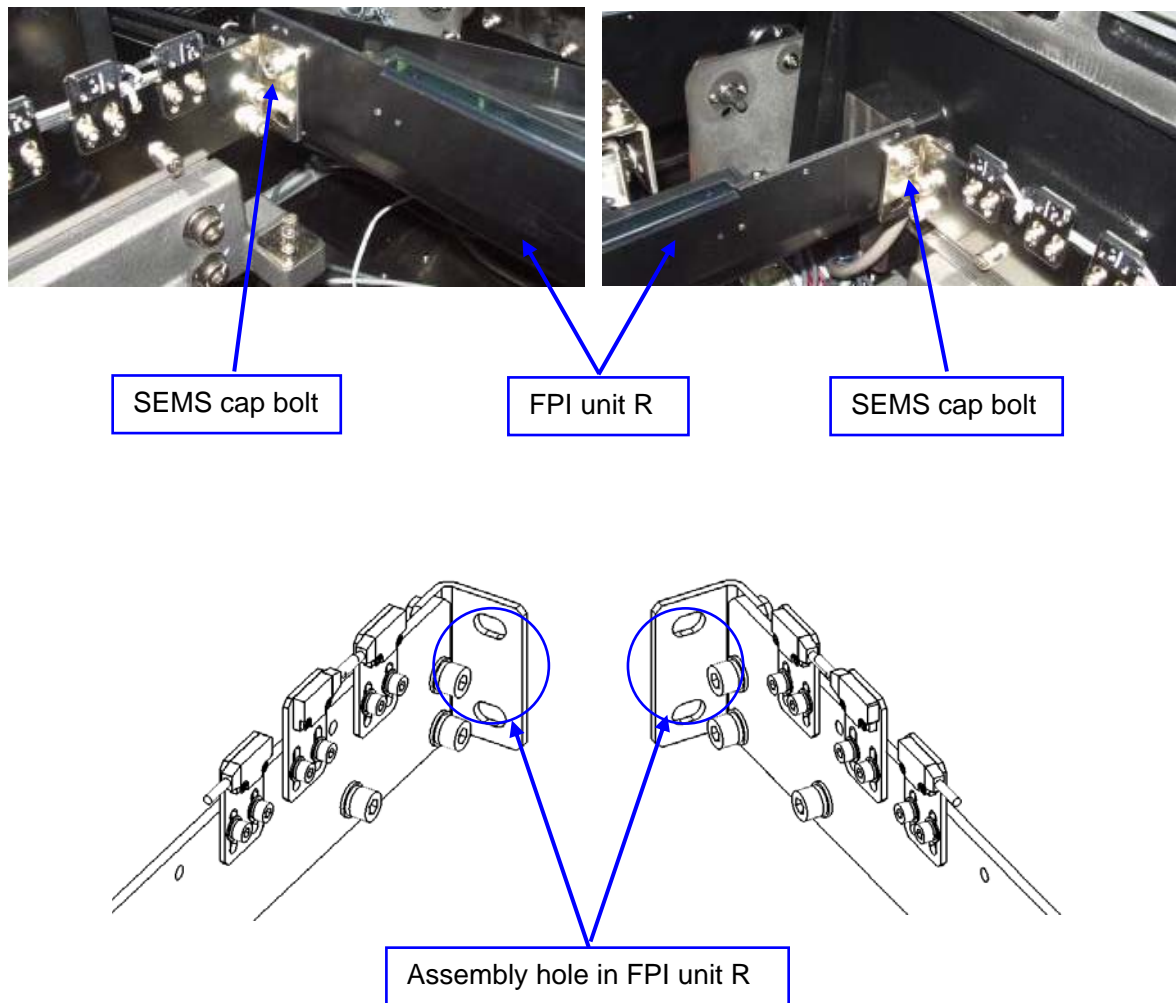


Figure 16-2-1

Maintenance Guide

16-3. Structure of Parts and Components inside FPI (Front) (M and L Board Specifications)

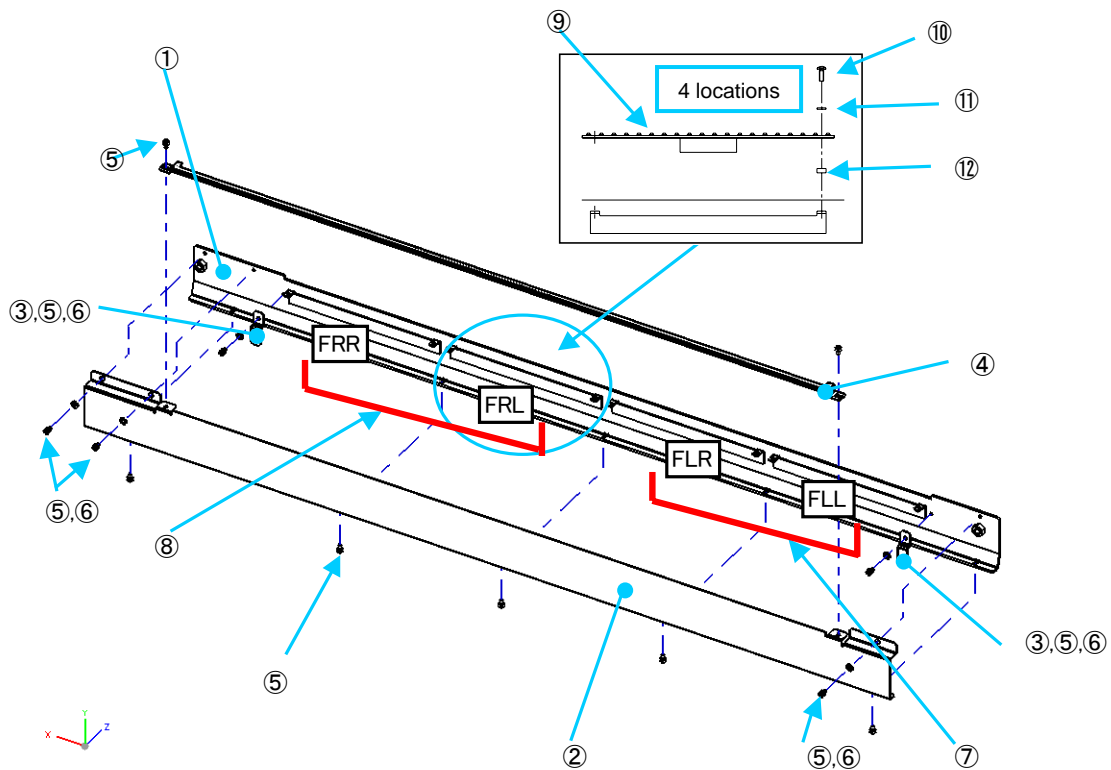


Figure 16-3-1

	Part No.	Part name	Q'ty
①	40110740	FPI_BR_B	1
②	40110741	FPI_COVER_B	1
③	40094870	HARNESS_CLAMP_A	2
④	E60257290A0	FPI_COVER_U_20 assembly	1
⑤	SM6030402TN	SCREW M3X4	13
⑥	WP0320501SC	WASHER M3	6
⑦	40113653	FPI LED CABLE(FL)ASM	1
⑧	40113654	FPI LED CABLE(FR)ASM	1
⑨	E8626729000	FPI LED board	4
⑩	SM5030801SC	SCREW M3X0.5 L=8	8
⑪	E4901760000	POLY SLIDER THRUST WASHER	8
⑫	E2143715000	TIMER SPACER A	8

Maintenance Guide

16-4. Structure of Parts and Components inside FPI (Rear) (M and L Board Specifications)

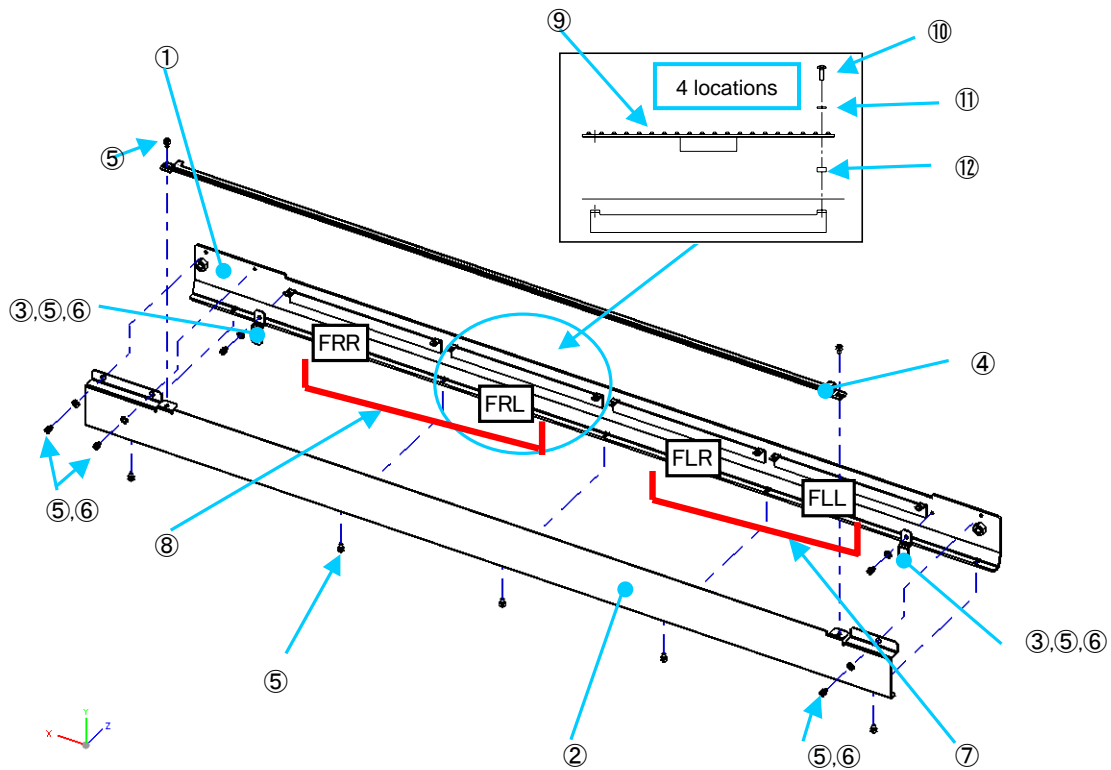


Figure 16-4-1

	Part No.	Part name	Q'ty
①	40110740	FPI_BR_B	1
②	40110741	FPI_COVER_B	1
③	40094870	HARNESS_CLAMP_A	2
④	E60257290A0	FPI_COVER_U_20 assembly	1
⑤	SM6030402TN	SCREW M3X4	13
⑥	WP0320501SC	WASHER M3	6
⑦	40113655	FPI LED CABLE(RR)ASM	1
⑧	40113656	FPI LED CABLE(RL)ASM	1
⑨	E8626729000	FPI LED board	4
⑩	SM5030801SC	SCREW M3X0.5 L=8	8
⑪	E4901760000	POLY SLIDER THRUST WASHER	8
⑫	E2143715000	TIMER SPACER A	8

Maintenance Guide

16-5. Detaching the FPI (Front) (XL Board Specifications)

As shown in the Figure below, the FPI (front) is secured to the mounting holes in the FPI side brackets L and R with the SEMS cap bolts (M6 × 12) that are secured to the base frame.

To detach the FPI, remove two bolts and slide it upward.

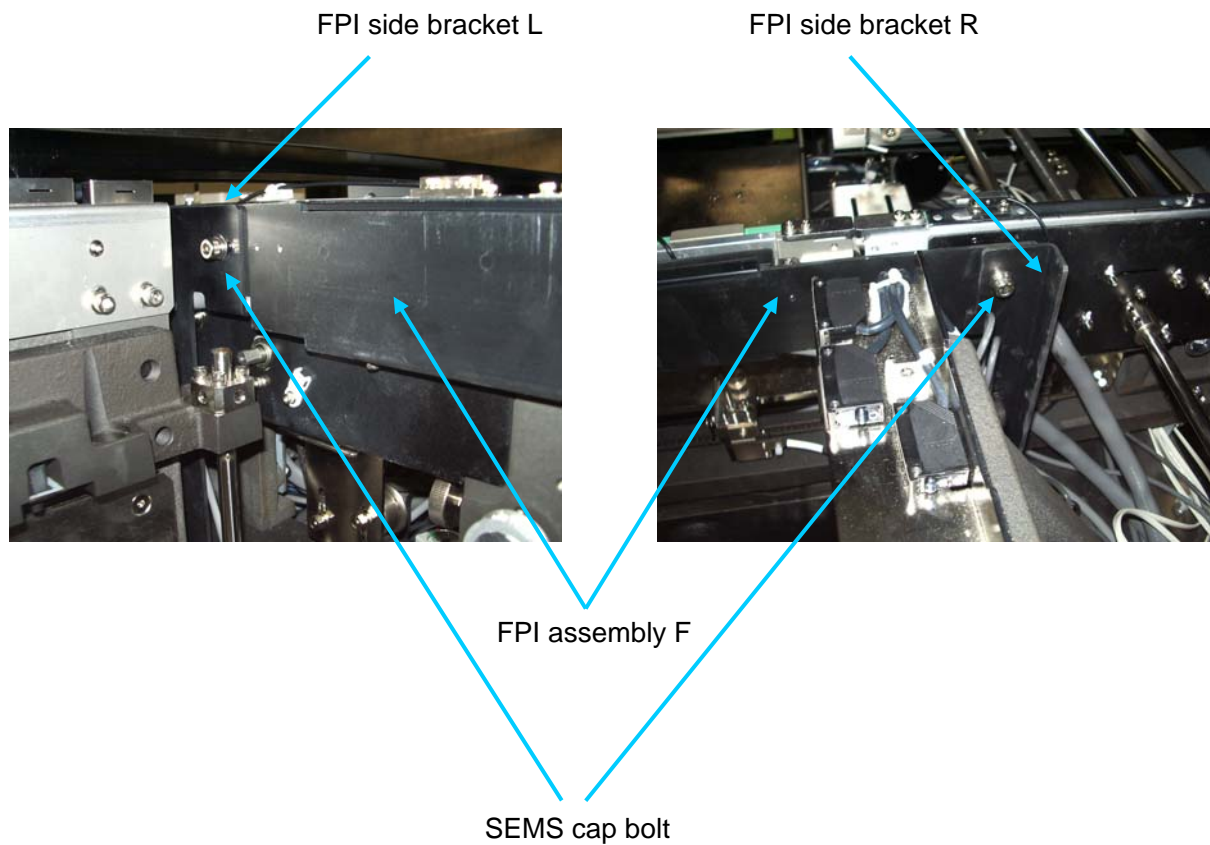


Figure 16-5-1

Maintenance Guide

16-6. Detaching the FPI (Rear) (XL Board Specifications)

When viewed from the rear of the machine, the FPI (rear) is secured to the mounting holes in the FPI side brackets L and R with the SEMS cap bolts (M6 × 12) that are secured to the base frame.

To detach the FPI, remove two bolts and slide it upward.

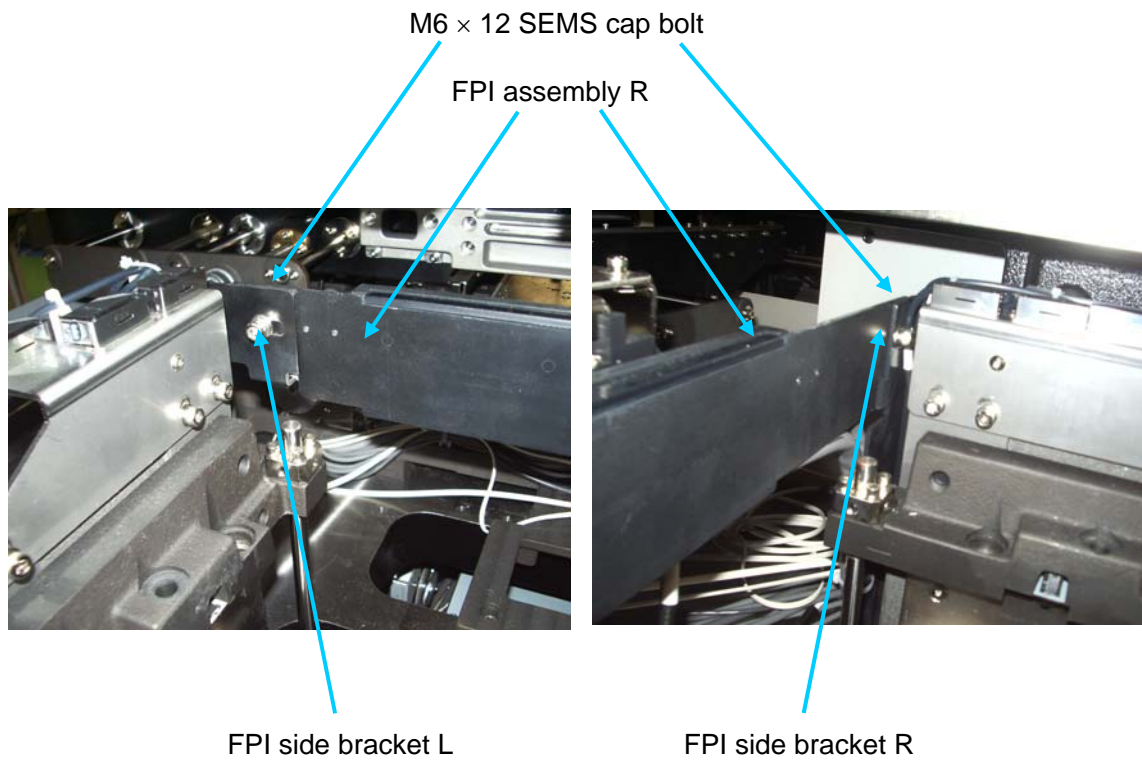


Figure 16-6-1

Maintenance Guide

16-7. Structure of Parts and Components inside FPI (Front) (XL Board Specifications)

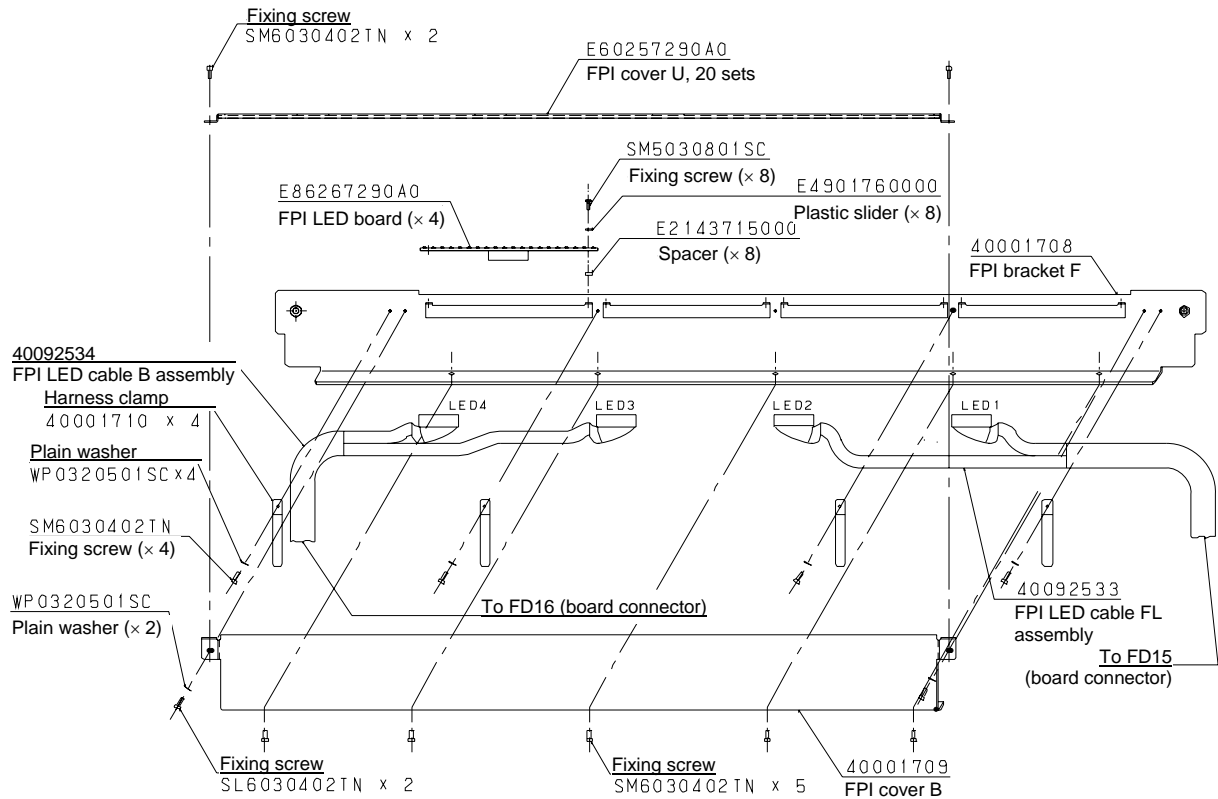


Figure 16-7-1

Maintenance Guide

16-8. Structure of Parts and Components inside FPI (Rear) (XL Board Specifications)

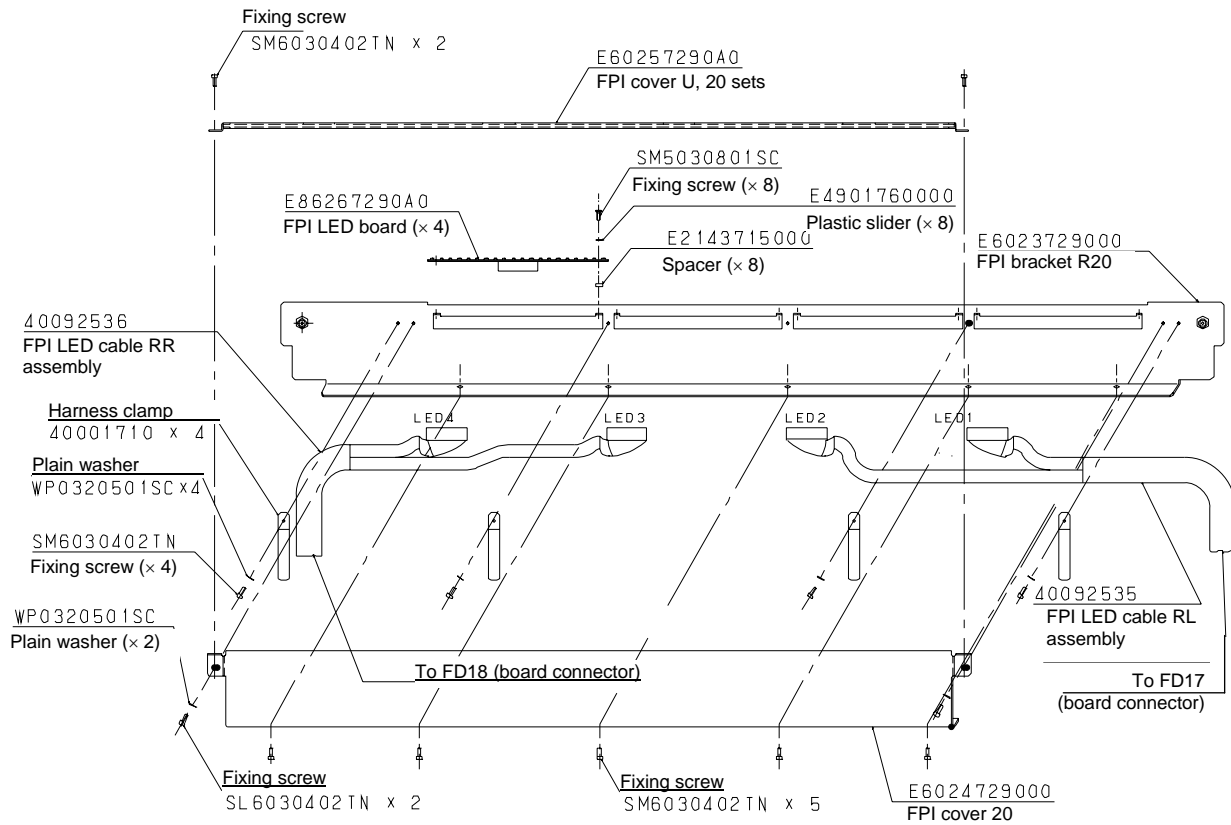


Figure 16-8-1

Maintenance Guide

**DANGER**

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

[17] OFFSET PLACEMENT AFTER SOLDER SCREEN-PRINTING LIGHT (OPTIONAL)

17-1. Replacing the Offset Placement after Solder Screen-Printing Light

- 1) Unscrew the low head cap screws and remove the board spacer, prism base and the OCC angle light board.
- 2) Reassemble the components in reverse order.
- 3) After replacing the Offset Placement After Solder Screen-Printing light with a new one, it is necessary to adjust both the Offset Placement After Solder Screen-Printing light and the OCC light. (See 4-7. "List of Readjustment Items After Replacement".)

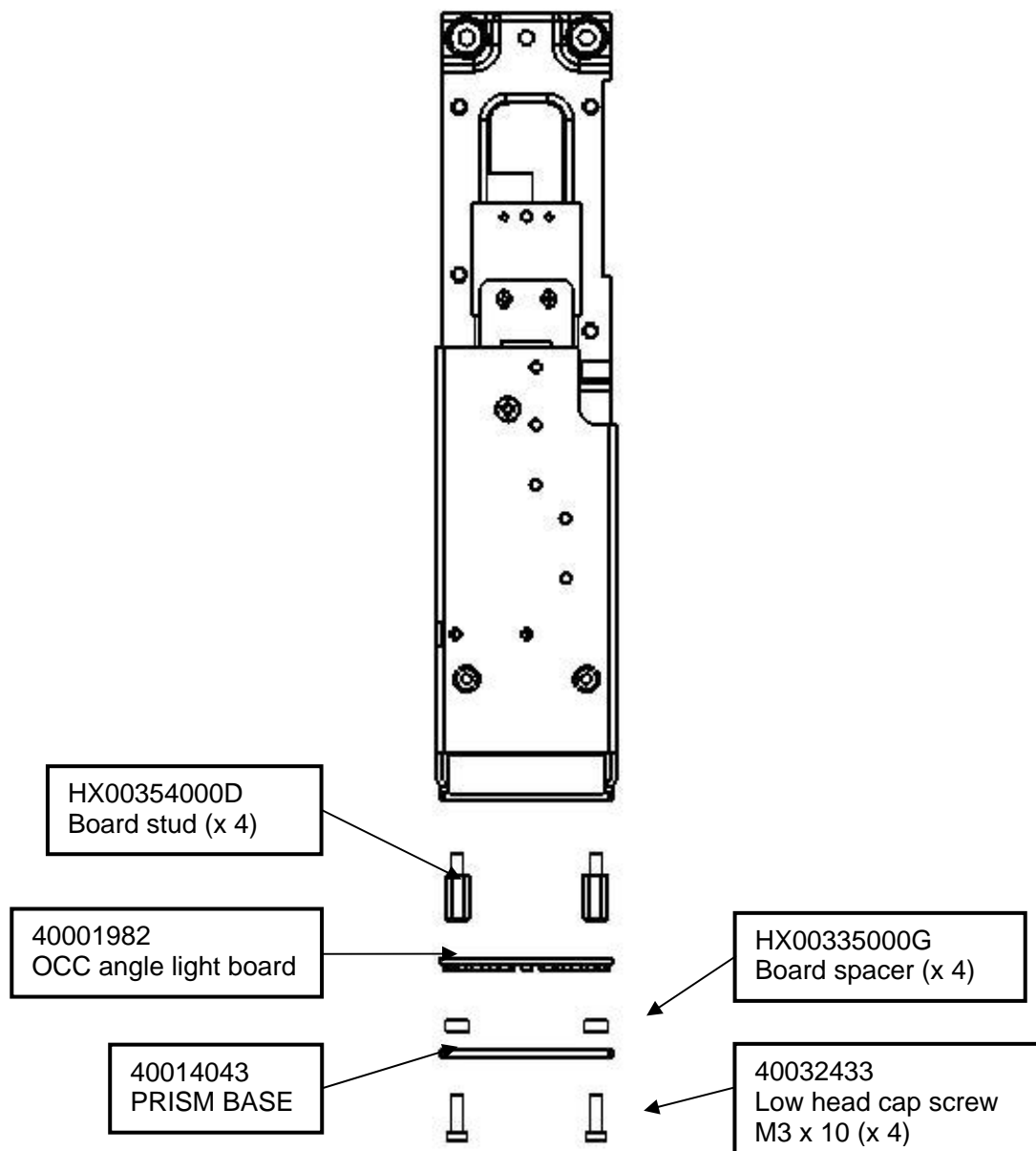


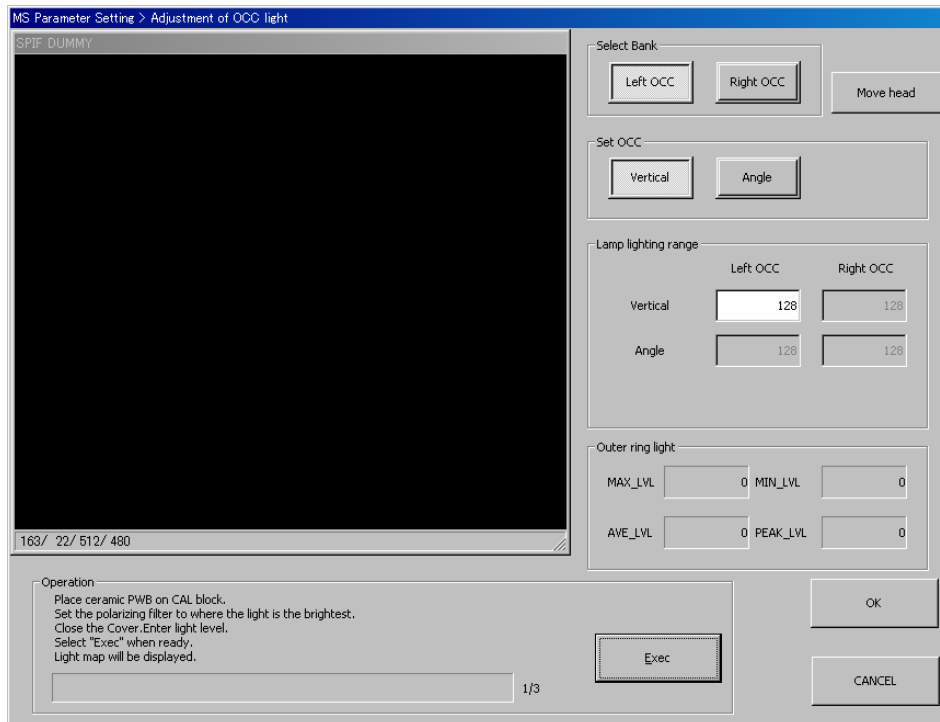
Figure 17-1 Replacing the Offset Placement After Solder Screen-Printing Light

Maintenance Guide

17-2. Adjusting the Light Quantity of the Offset Placement after Solder Screen-Printing Light

<Procedure>

- 1) Manually check to make sure that both the s Offset Placement After Solder Screen-Printing light and the OCC light go on.
- 2) Implement the "OCC light quantity adjustment" of the MS parameter.



- ① When using an optional soldering light, adjust the reference current value so that the LGET output result of (soldering light) AVE_LVL is 210 ± 2 .
- ② Substitute the obtained reference current value into the following formula and save the calculated value to the reference current value.

Calculation formula: Reference current value $\times 2 =$ Value to be saved

- * The jig to be used for adjustment of the soldering light is the same jig which is used for adjustment of the standard angle light and vertical light.

Maintenance Guide

**DANGER**

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

**WARNING**

Only certificated service engineers are allowed to replace the movable cutter blade and fixed cutter blade.

[18] TAPE CUTTER (OPTIONAL)

18-1. Overall Drawing

This tape cutter unit is composed of a cutter main unit and discharge guides (upper discharge guide/lower discharge guide).

For the machine with the fixed bank specifications, the upper discharge guide is connected to the cutter unit. For the machine with the replacement table trolley specifications, the upper discharge guide is mounted on the replacement table trolley. The same tape cutter and lower discharge guide are used for the fixed bank and replacement table trolley specifications. However, the tape cutter guide and upper discharge guide for the fixed bank specifications are different from those for the replacement table trolley specifications.

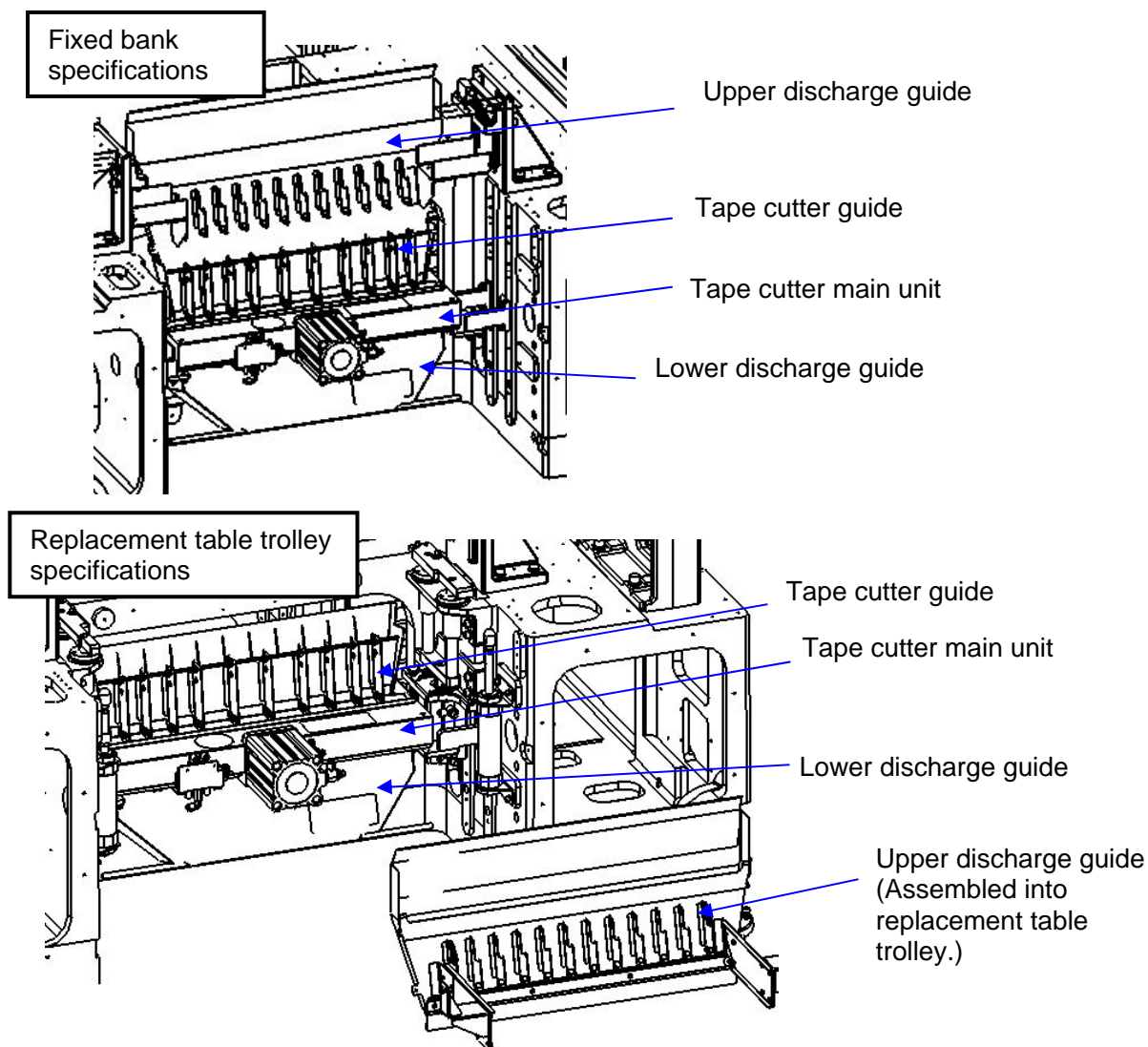


Figure 18-1-1 Overall Drawing of Tape Cutter

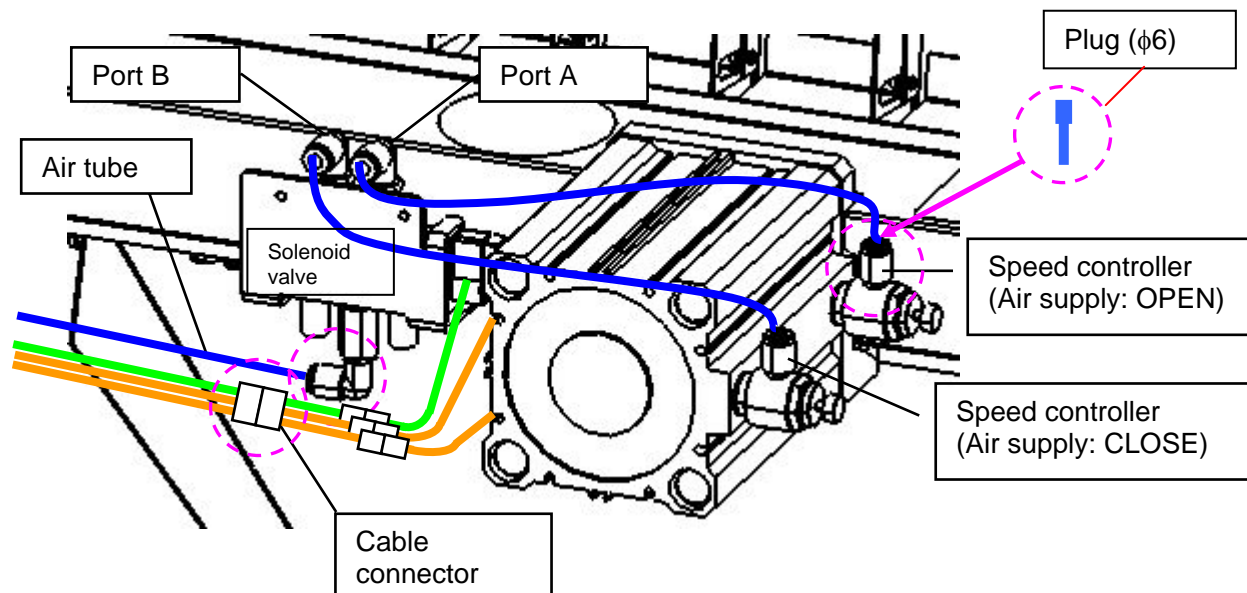
Maintenance Guide

18-2. Replacing the Tape Cutter Main Unit

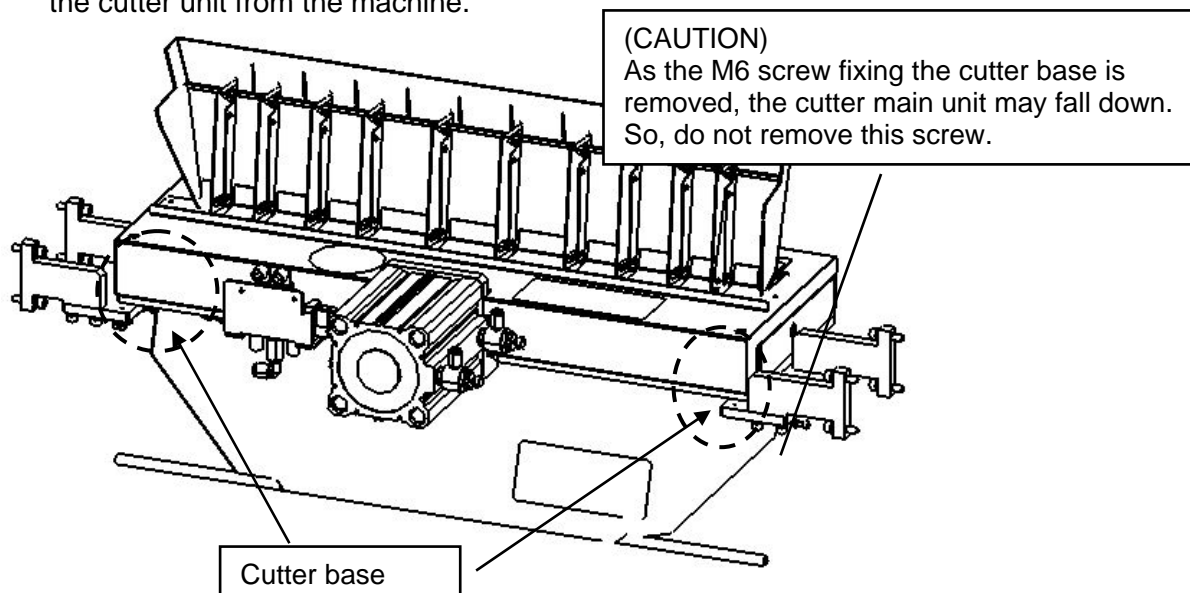
The following describes how to replace the tape cutter main unit.

<XL Board Specifications>

- 1) Shut down the power to the machine main unit.
- 2) For the machine with the fixed bank specifications, detach the upper discharge guide.
- 3) Visually check that the upper guide of the cutter unit is opened and that the cutter blade is closed.
(As the machine is powered OFF, the cutter blade is closed.)
(CAUTION) Never put your hand inside the guide as your hand may be cut by the cutter blade.
- 4) After checking that the cutter blade is closed, close the finger valve to shut down the air to the machine main unit.
- 5) Disconnect the air tube from the speed controller (air supply: OPEN) for the cutter unit air cylinder and insert the plug ($\phi 6$).
- 6) Disconnect the air tubes from the solenoid valve. Additionally, disconnect the cable connector that connects the cutter unit and main unit.

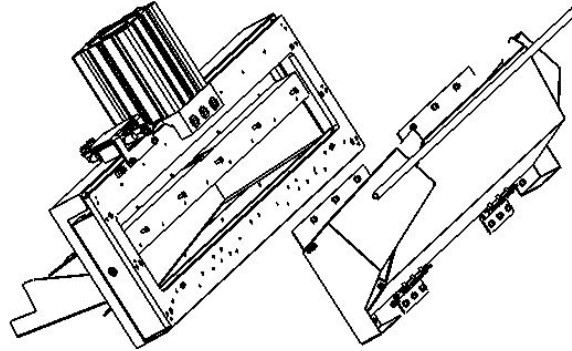


- 7) Remove the M5 screws (4 pcs.) that secure the cutter main unit to the cutter base to detach the cutter unit from the machine.

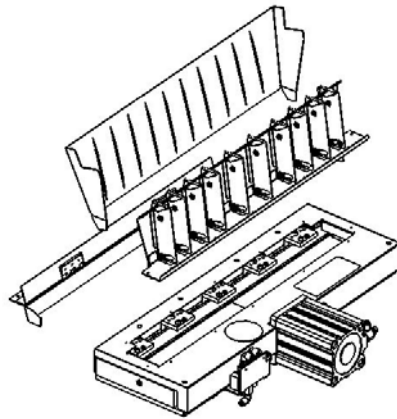


Maintenance Guide

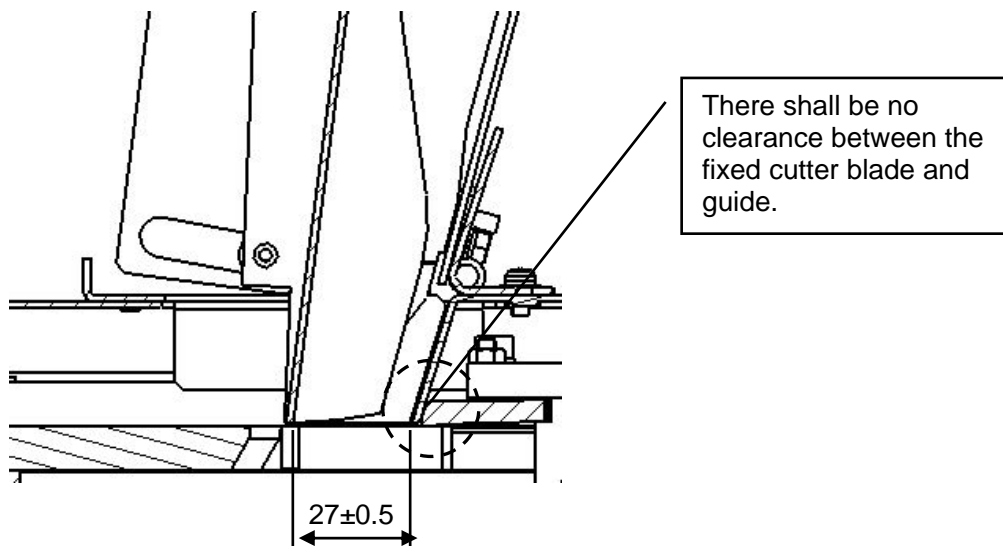
- 8) Detach the lower discharge guide from the cutter main unit.



- 9) Detach the tape cutter guide from the cutter main unit.



- 10) Assemble the cutter guide into a new cutter unit for replacement.



Maintenance Guide

- 11) Assemble the lower discharge guide into the new cutter unit for replacement.
- 12) Assemble the new cutter unit into the machine.
- 13) Remove the air plug inserted into the cylinder and connect the solenoid valve and cylinder. Additionally, connect the table connector coming from the machine to the connector on the cutter unit.
- 14) For the machine with the fixed bank specifications, assemble the upper discharge guide.
- 15) After the new cutter unit has been assembled, insert the remaining air plugs into the speed controller of the cylinder of the removed cutter main unit.

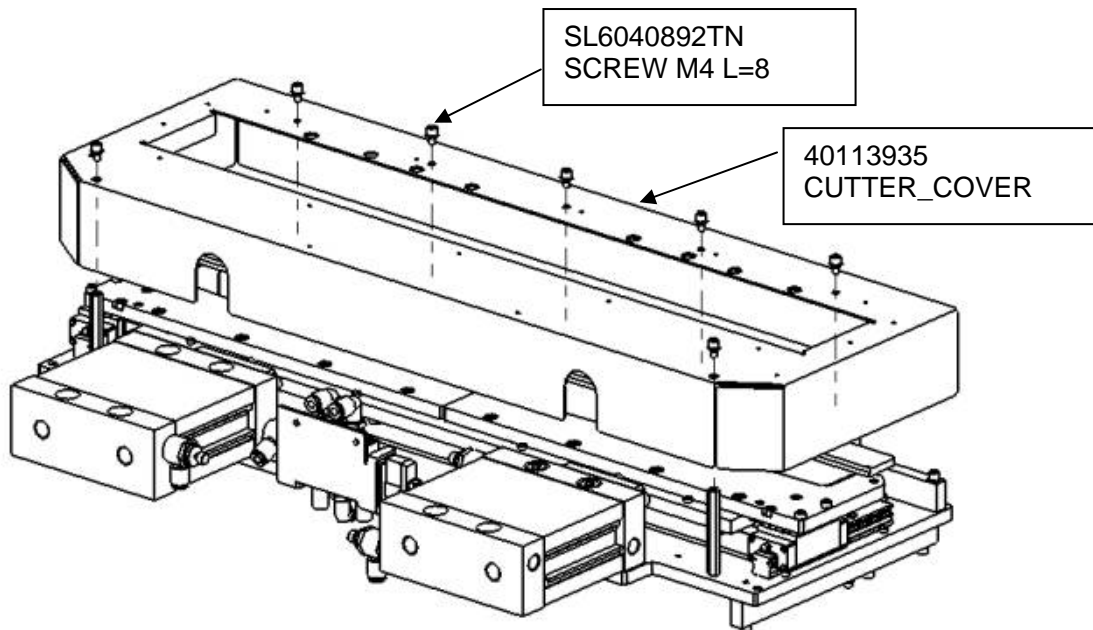
Maintenance Guide

18-3. Replacing the Tape Cutter Blade

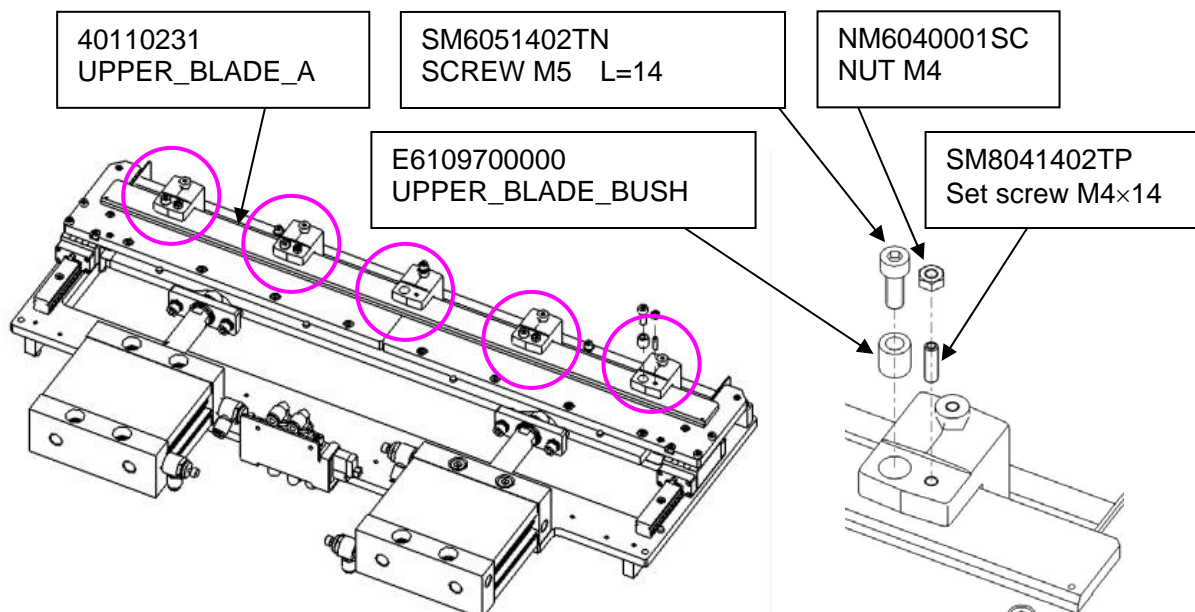
- * Replace the cutter blade with the cutter unit detached from the mounter.
- * For details how to detach the cutter unit from the main unit, see section 18-2.

<L and M Board Specifications>

- 1) Detach the lower discharge guide from the cutter main unit. (See section 18-2.)
- 2) Detach the tape cutter guide from the cutter main unit. (See section 18-2.)
- 3) Remove the cover mounting screws to detach the cover.

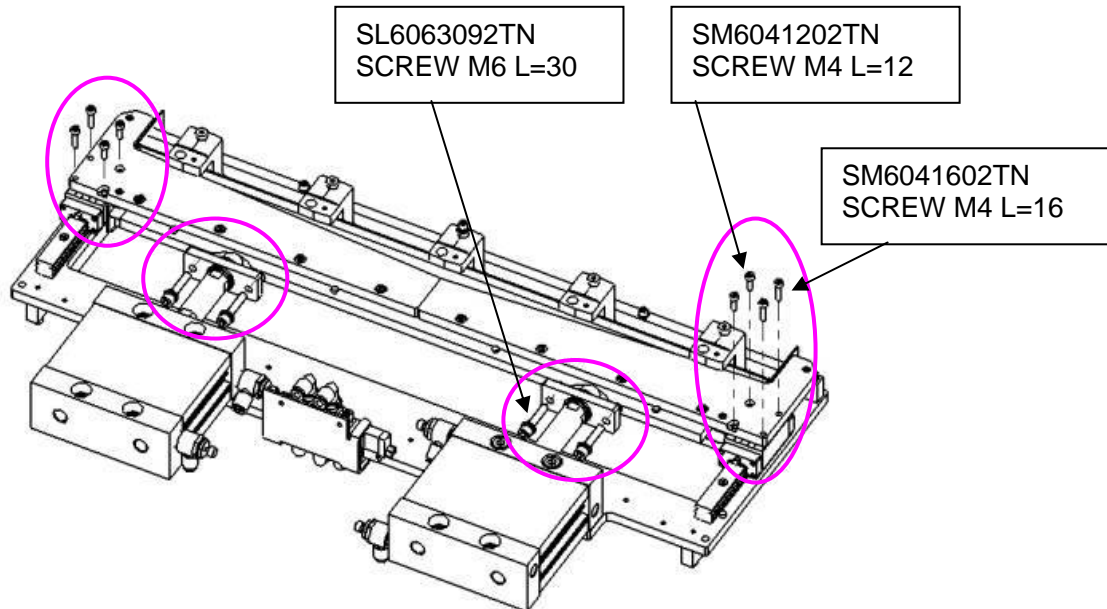


- 4) Close the movable cutter blade, and then remove the set screws for adjustment of the pushing pressure and the fixed cutter blade mounting screws (5 locations). Detach the fixed cutter blade.
When loosening the screw, the cutter blade may turn in the wrench turning direction. So, be careful not to get injured.

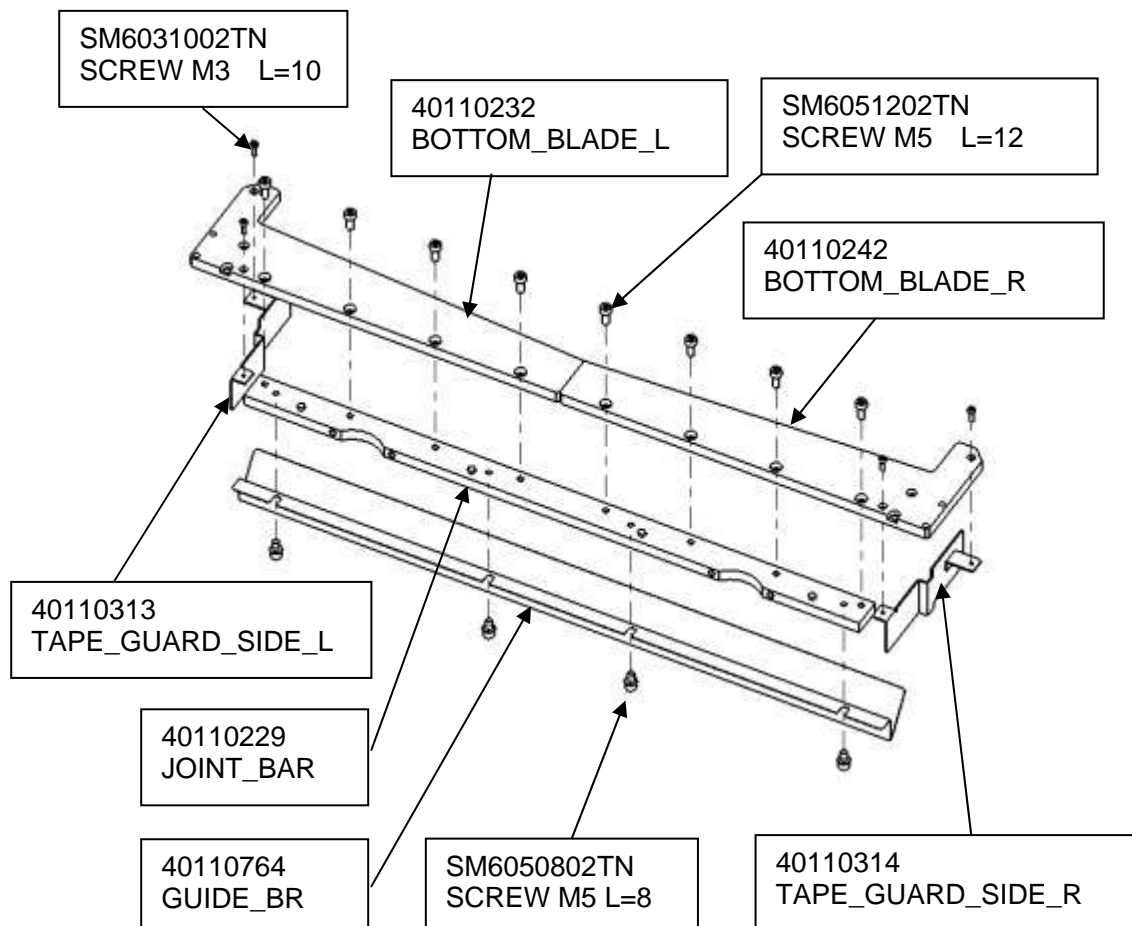


Maintenance Guide

- 5) Remove the screws that secure the linear guide, cylinder, and movable cutter blade to detach the movable cutter blade from the cutter unit.
When loosening the screw, the cutter blade may turn in the wrench turning direction. So, be careful not to get injured.

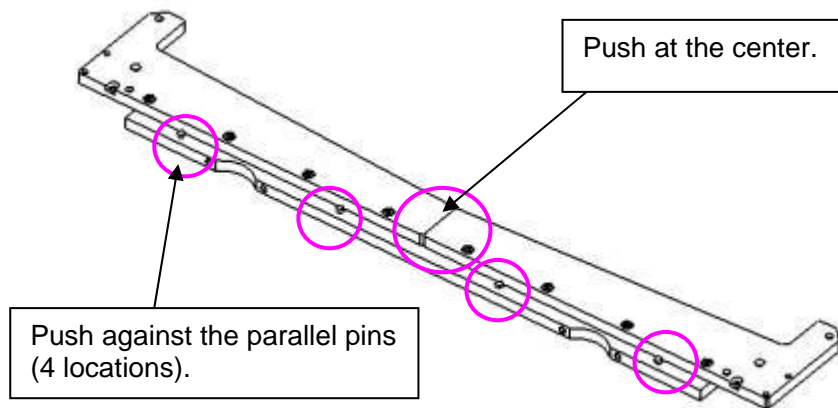


- 6) After the guide parts have been detached, detach the movable cutter blade from the JOINT_BAR.

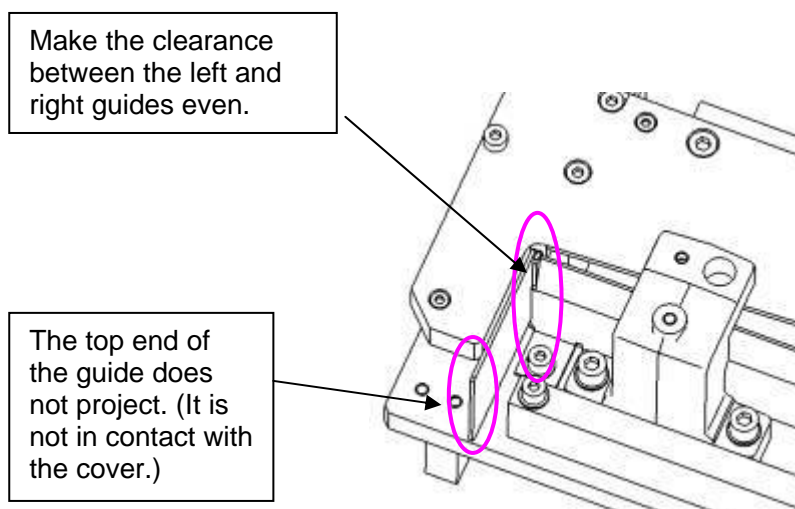


Maintenance Guide

- 7) Assemble the replacement movable cutter blade to the JOINT_BAR.
 Push the cutter blade against the parallel pins and adjust the movable cutter blades by pushing them at the center.
 Degrease the screws and apply Loctite 277. (Tightening torque: 8.0N·m)
 Be careful not to get injured by the cutter blade.



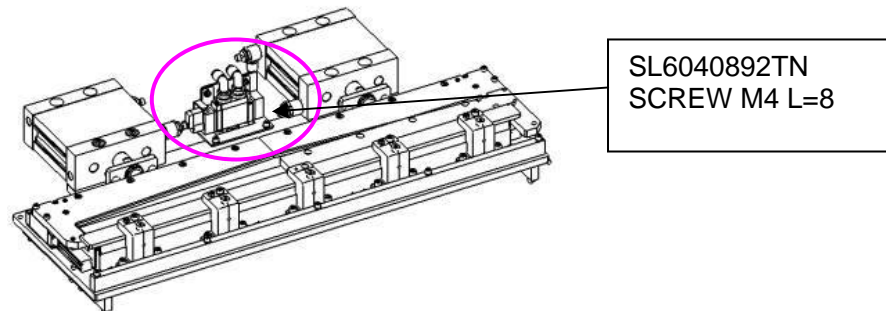
- 8) Assemble the guide that has been detached in step 6) described previously and secure the movable cutter blade to the linear guide and air cylinder with the screws in the reverse order of step 5) described previously.
 Degrease the linear guide mounting screws and apply Loctite 277. (Tightening torque: 3.7N·m)
 Assemble the parts and components so that the clearance between the guide (TAPE_GUARD_SIDE_L, R) on both sides and the guide (GUIDE_BR) at the center is even.
 With the movable part assembled temporarily, reciprocate the cutter blade several times to secure it at a position where it moves smoothly.
 With the movable cutter blades kept pushed to the close side completely, check that the top ends of the guides (TAPE_GUARD_SIDE_L, R) on both sides do not project. (This prevents the interference when the cover is mounted.)
 Degrease the linear guide mounting screws and apply Loctite 277. (Tightening torque: 3.7N·m)



- 9) Mount the fixed cutter blade in the reverse order of step 4) described previously.

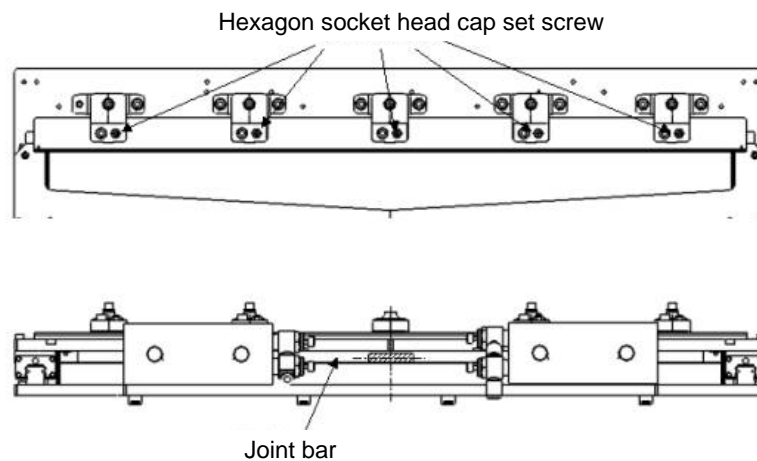
Maintenance Guide

- 10) Adjust the pushing pressure of the fixed cutter blade. (When using the push-pull gauge for the adjustment, it may hinder the solenoid valve. So, remove the solenoid valve temporarily.)

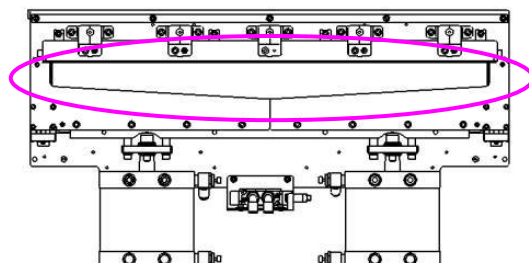


Push the hatched portion of the joint bar shown in the Figure below with the push-pull gauge and adjust the pre-pressure with the hexagon socket head cap set screw so that the peak value is 150 ± 10 (N).

Make the adjustment with the movable cutter blades closed. After the adjustment has been completed, secure with the nuts.



- 11) Apply the alvania grease to the contact surface between the fixed cutter blade and movable cutter blade. Wipe off the grease so that the oil film can be seen, and then open and close the cutter blades several times. Pay special attention so that your hand is not injured when opening or closing the cutter blades.

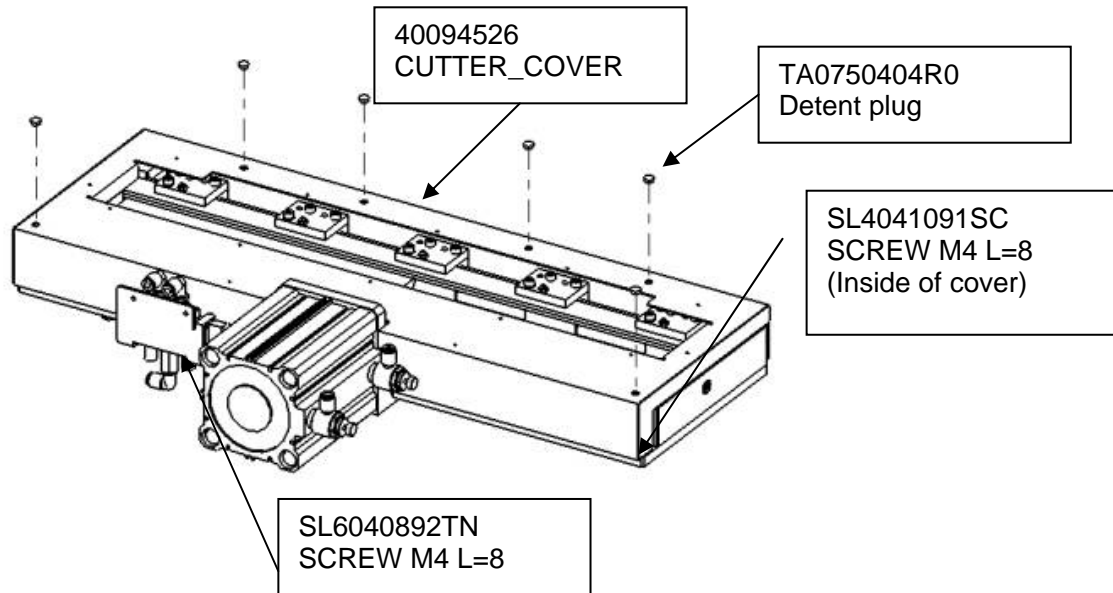


- 12) Mount the cover in the reverse order of step 3) described previously.
Mount the guide in the reverse order of steps 2) and 1) described previously.

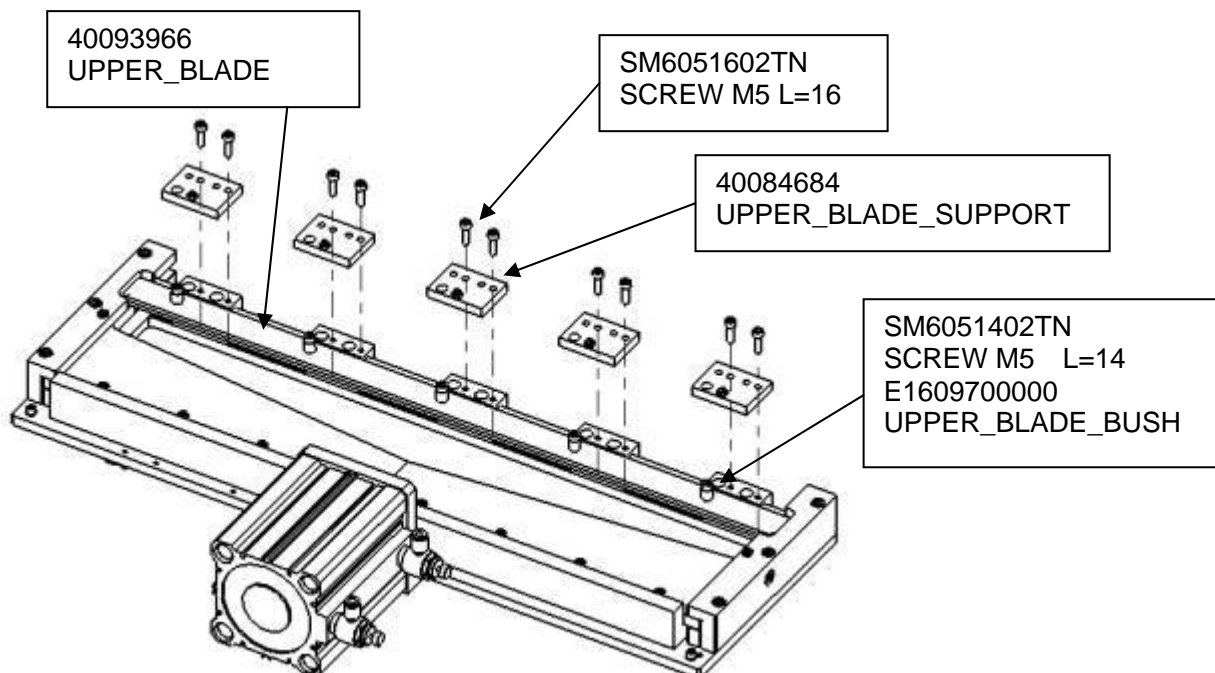
Maintenance Guide

<XL Board Specifications>

- 1) Detach the lower discharge guide from the cutter main unit. (See section 18-2.)
- 2) Detach the tape cutter guide from the cutter main unit. (See section 18-2.)
- 3) Remove the detent plugs from the top of the cutter cover and loosen the mounting screws to detach the cover. Also, detach the solenoid valve.

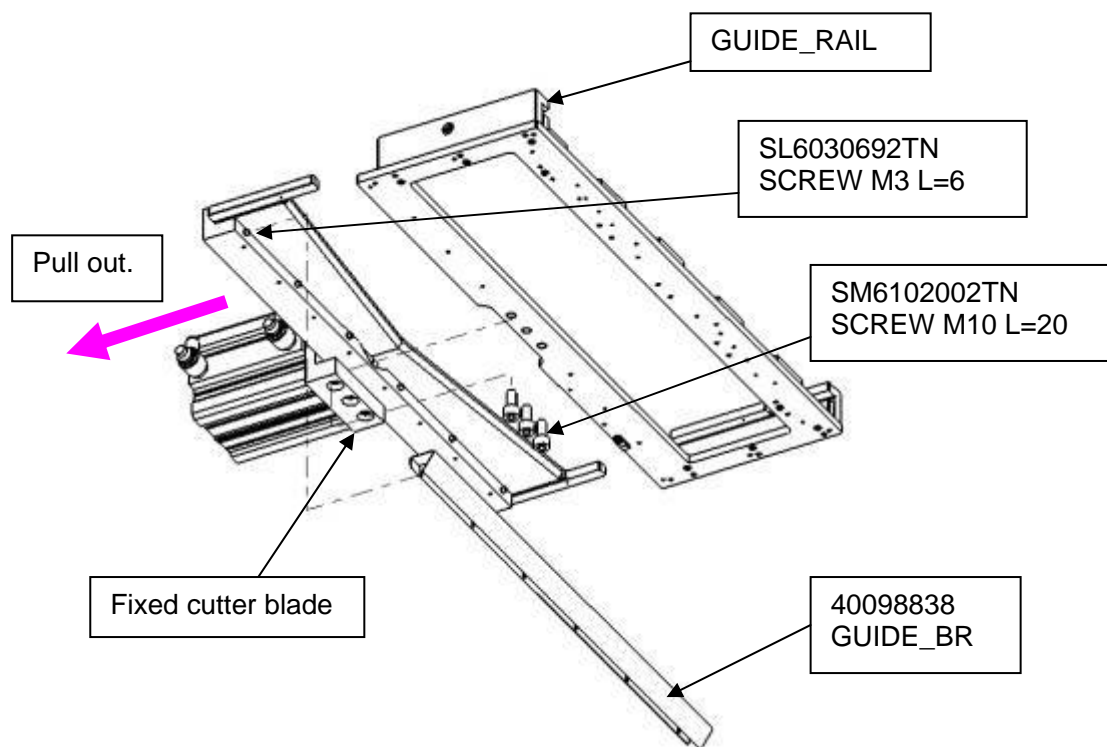


- 4) Detach the UPPER_BLADE_SUPPORT. Detach the UPPER_BLADE, and then detach the UPPER_BLADE_BUSH from the UPPER_BLADE. When loosening the screw, the cutter blade may turn in the wrench turning direction. So, be careful not to get injured.

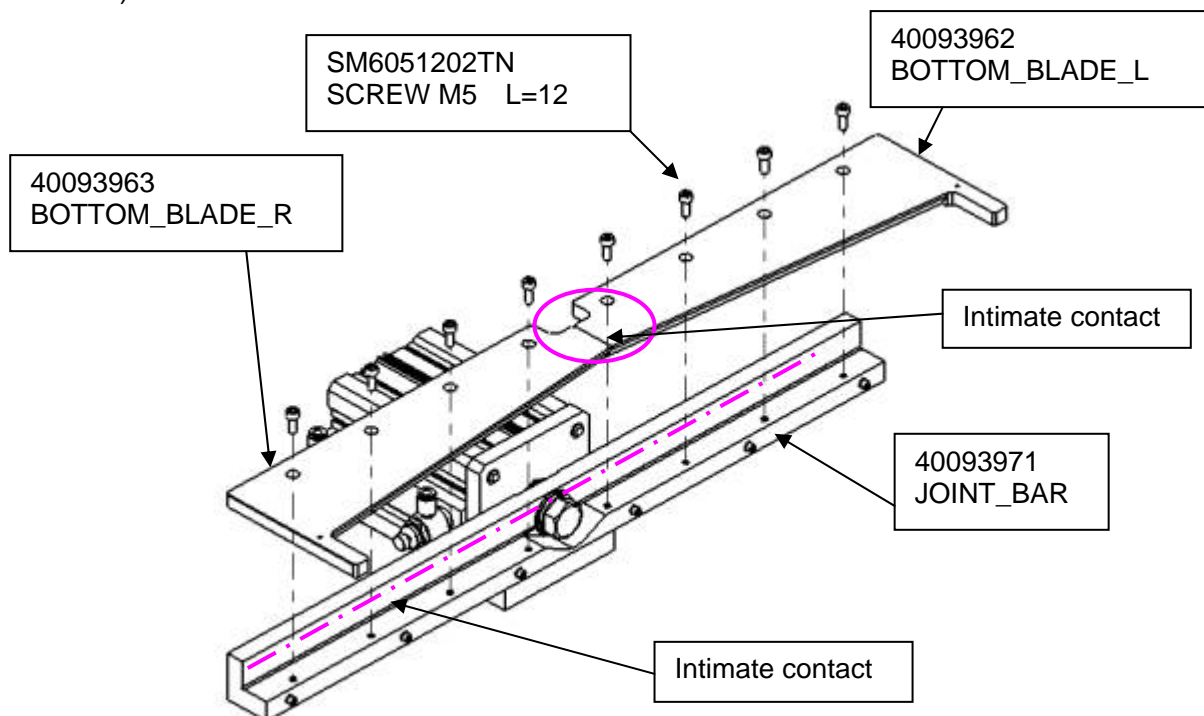


- 5) Loosen the screws to detach the GUIDE_BR. Remove the screws and pull out the fixed cutter blade along the GUIDE_RAIL.

Maintenance Guide



- 6) Detach the movable cutter blade from the JOINT_BAR and mount the replacement movable cutter blade.
 Push the cutter blade against the JOINT_BAR and the movable cutter blade against the center at the same time to adjust them.
 After the mounting screws has been degreased, apply Loctite 277. (Tightening torque: 8.0N·m)



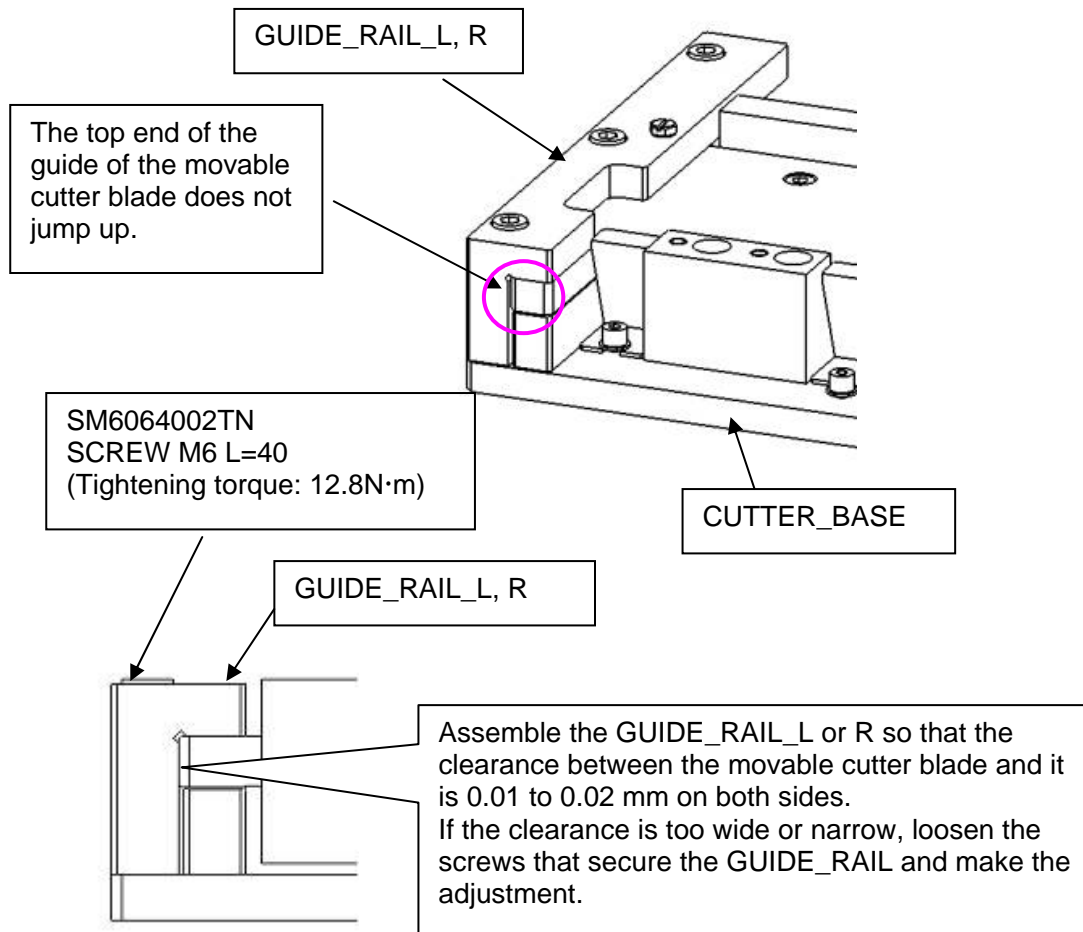
Maintenance Guide

- 7) Insert the cutter unit in the movable cutter blade and mount the GUIDE_BR in the reverse order of step 5) described previously.

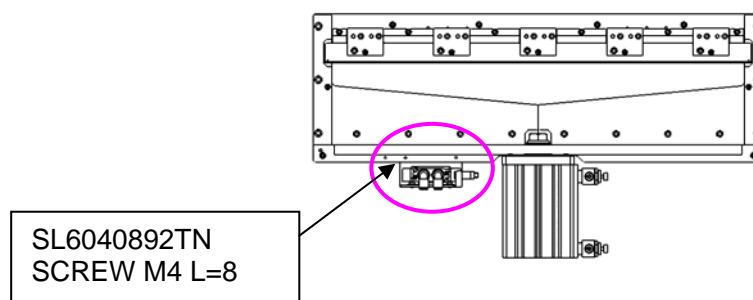
For details about the clearance between the movable cutter blade and GUIDE_RAIL, see the Figure below.

When the movable cutter blade is pushed toward the close side completely, the top end of the guide of the movable cutter blade does not jump up from the CUTTER_BASE. (This eliminates the interference when the cover is mounted.)

Assemble the GUIDE_BR so that the clearance between the CUTTER_BASE and it is even horizontally.



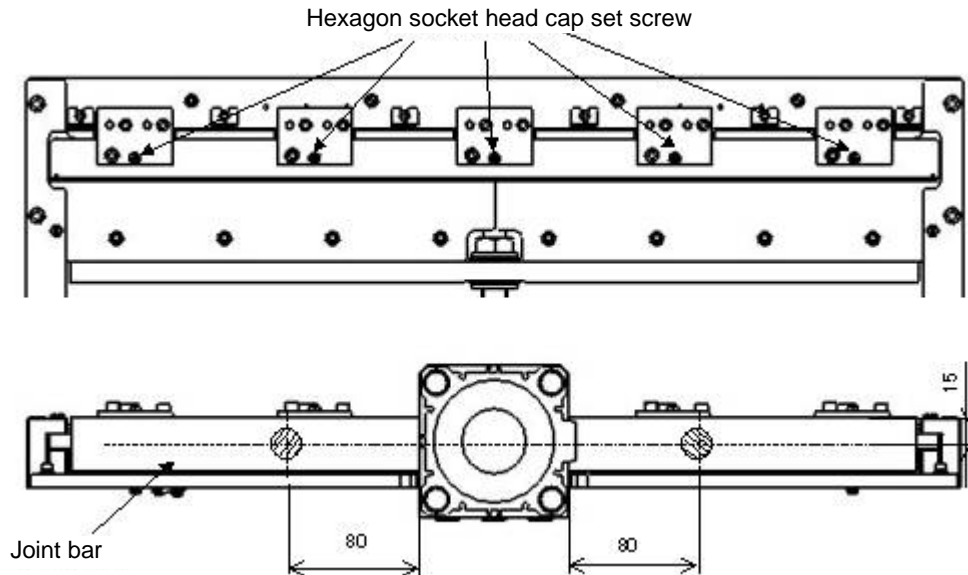
- 8) Mount the fixed cutter blade in the reverse order of step 4) described previously.
- 9) Adjust the pushing pressure of the fixed cutter blade. (When using the push-pull gauge for the adjustment, it may hinder the solenoid valve. So, remove the solenoid valve temporarily.)



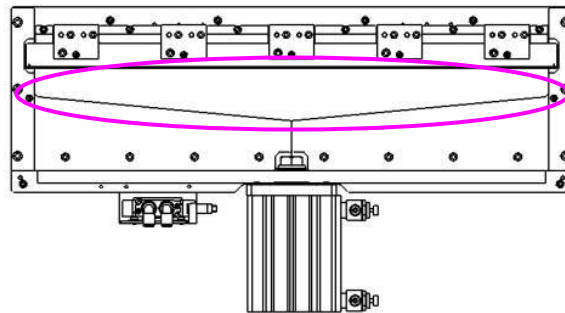
Maintenance Guide

Push each one side of the hatched portion of the joint bar shown in the Figure below with the push-pull gauge and adjust the pre-pressure of the hexagon socket head cap so that the peak values on both sides show 150 ± 10 (N).

Make the adjustment with the movable cutter blades closed. After the adjustment has been completed, secure with the nut




- 10) Apply the alvania grease to the contact surface between the fixed cutter blade and movable cutter blade. Wipe off the grease so that the oil film can be seen, and then open and close the cutter blades several times. Pay special attention so that your hand is not injured when opening or closing the cutter blades.



- 11) Mount the cover in the reverse order of step 3) described previously.
Mount the guide in the reverse order of steps 2) and 1) described previously.

Maintenance Guide

 DANGER	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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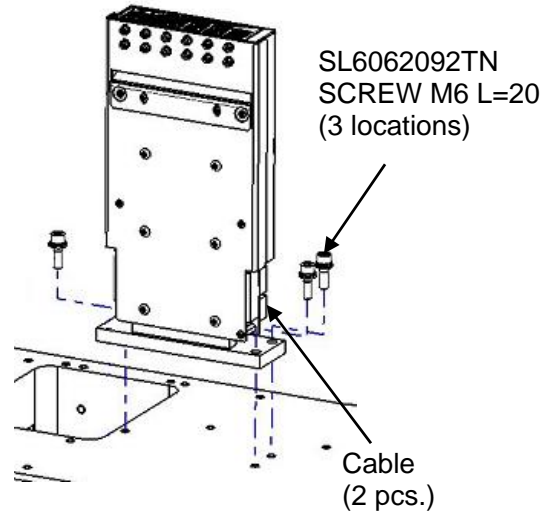
[19] CVS (OPTIONAL)

19-1. Replacing the CONTACT SUB UNIT

- 1) When the mounter has the L-specification rear reference or the mounter is equipped with the fluxer unit or MTC, the CVS unit needs to be detached in order to replace the CONTACT SUB UNIT.

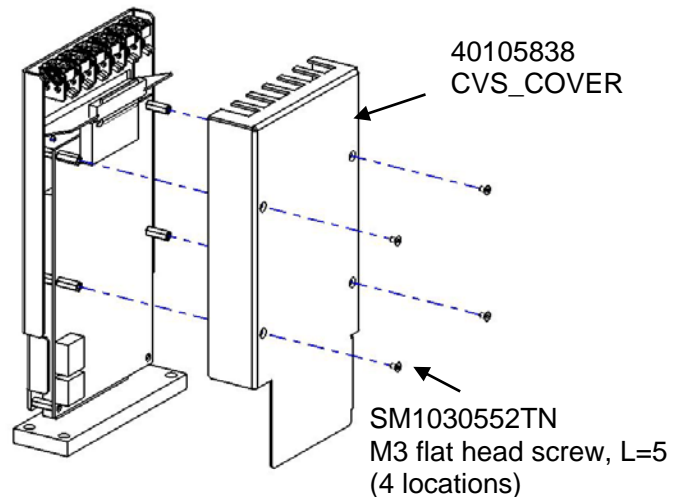
In other cases, replace the CONTACT SUB UNIT without detaching of the CSV unit.

To detach the CVS unit, disconnect the cables (2 pcs.) and remove the M6 screws (3 locations).



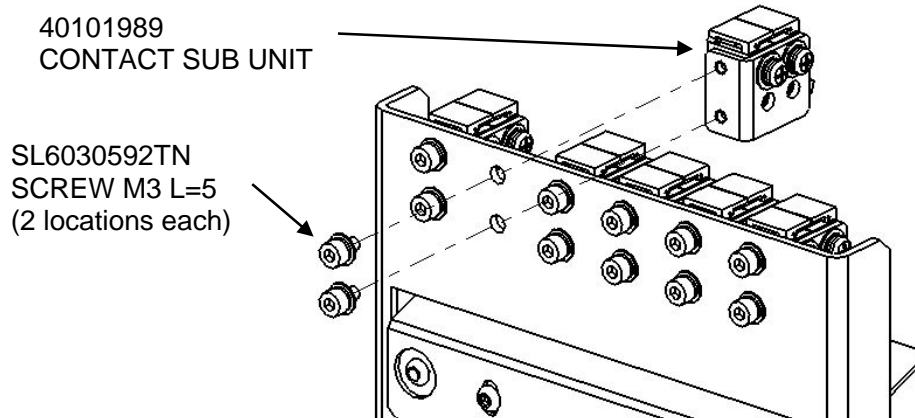
	L reference front	L reference rear	XL reference front	XL reference rear
No options shown below.	-	Detach	-	-
Fluxer unit	Detach	Detach	Detach	Detach
MTC	Detach	Detach	Detach	Detach

- 2) Remove the M3 flat head screws to detach the CVS_COVER.



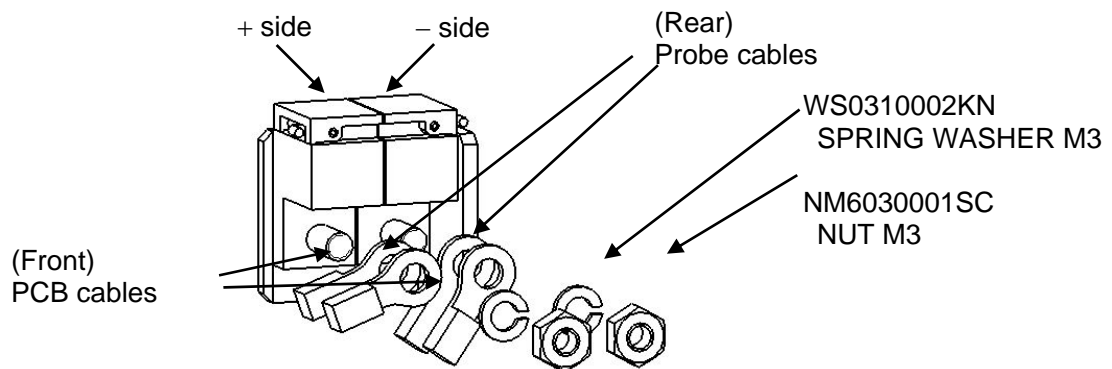
Maintenance Guide

- 3) Detach the CONTACT SUB UNIT to be replaced.

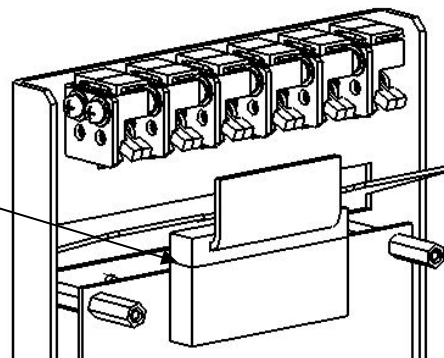


- 4) Disconnect the cables that have been connected to the CONTACT SUB UNIT using the nuts, and then connect them to a new CONTACT SUB UNIT. (Tightening torque, $0.4N \cdot m$)

(Check using a multi-meter that the cable is not in contact with the counter electrode side. The positive (+) side, negative (-) side, and CVS unit need to be insulated.)



Check the insulation status using a multi-meter after the connector that connects the cables and PCB has been disconnected.



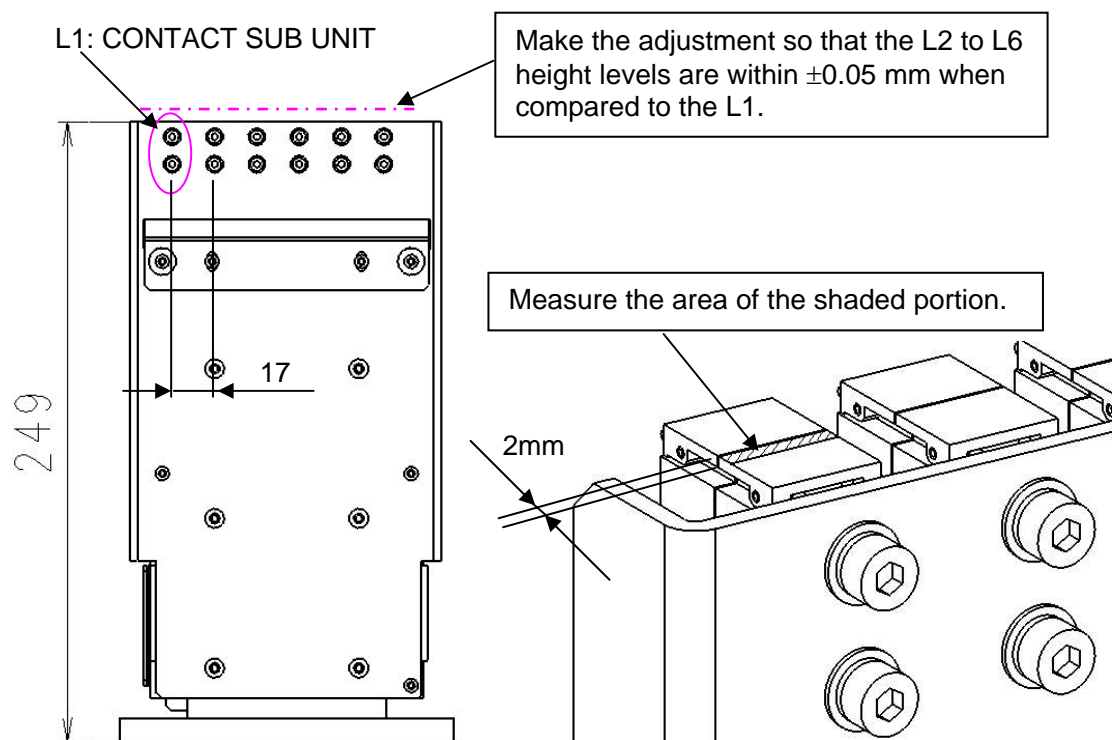
Maintenance Guide

- 5) Reassemble the CONTACT SUB UNIT to the CVS unit. (At this time, assemble the CONTACT SUB UNIT to a position where it is not in contact with the adjacent CONTACT SUB UNIT or the cover that has been detached in previous step 2). CONTACT SUB UNITS are aligned at intervals of 17 mm pitches.)

Mount the dial gauge on the head to adjust the probe height. (When the CVS unit has been detached, place the CVS unit on the reference surface, such as level vial installation position of the base frame to make the adjustment.)

Assemble the CONTACT SUB UNIT so that the L2 to L6 are in a range of ± 0.05 mm based on the L1 probe. (The measurement position is shown on the right of the Fig. below.)

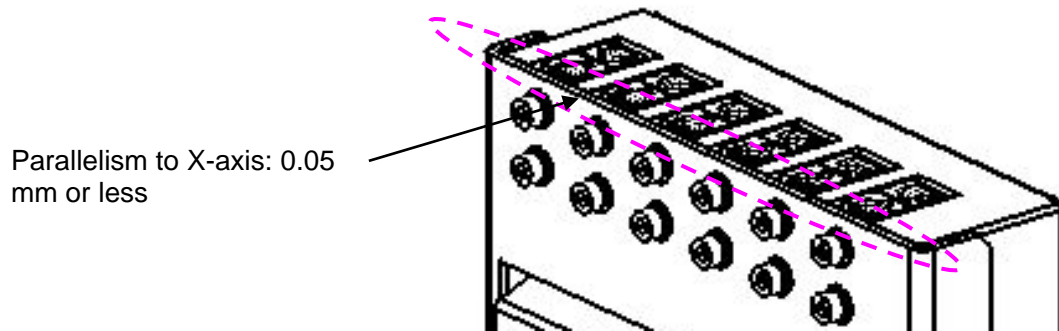
When replacing the L1 probe, assemble the CONTACT SUB UNIT so that the L2 to L6 probes are in a range of ± 0.05 mm based on the median value between the max. and min. values of the L2 to L6 probe height levels.



- 6) Assemble the CVS_COVER that has been detached in previous step 2).
- 7) When the CVS unit has been detached in step 1), reassemble the CVS unit to the main unit and adjust the position.

Mount the dial gauge on the head and make the adjustment so that the parallelism between the upper side surface of the CVS_COVER and the X-axis is 0.05 mm or less. Additionally, reconnect the cables (2 pcs.) that have been disconnected.

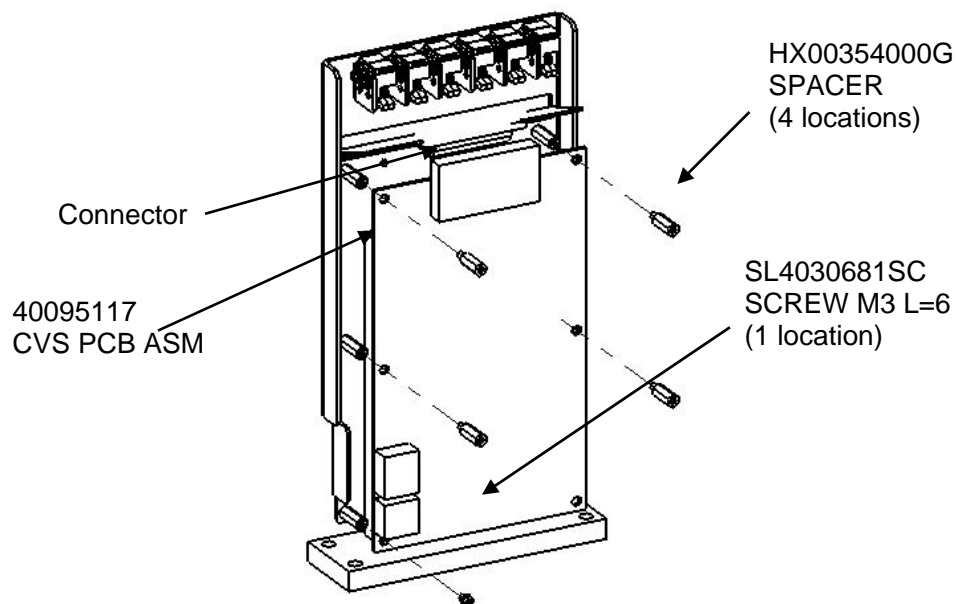
Maintenance Guide



- 8) Turn ON the machine, start up the MS parameter, and select [Offset setup (O)]-[CVS offset (S)] to obtain the CVS offset values again.

19-2. Replacing the PCB

- 1) Follow steps 1) and 2) in previous section 19-1 to detach the CVS_COVER.
- 2) Disconnect the connector and remove the spacers and screw to replace the CVS PCB.



- 3) Reassemble the CVS_COVER that has been detached. When the CVS unit has been detached, perform steps 7) and 8) stated in previous section 19-1.

Maintenance Guide

**DANGER**

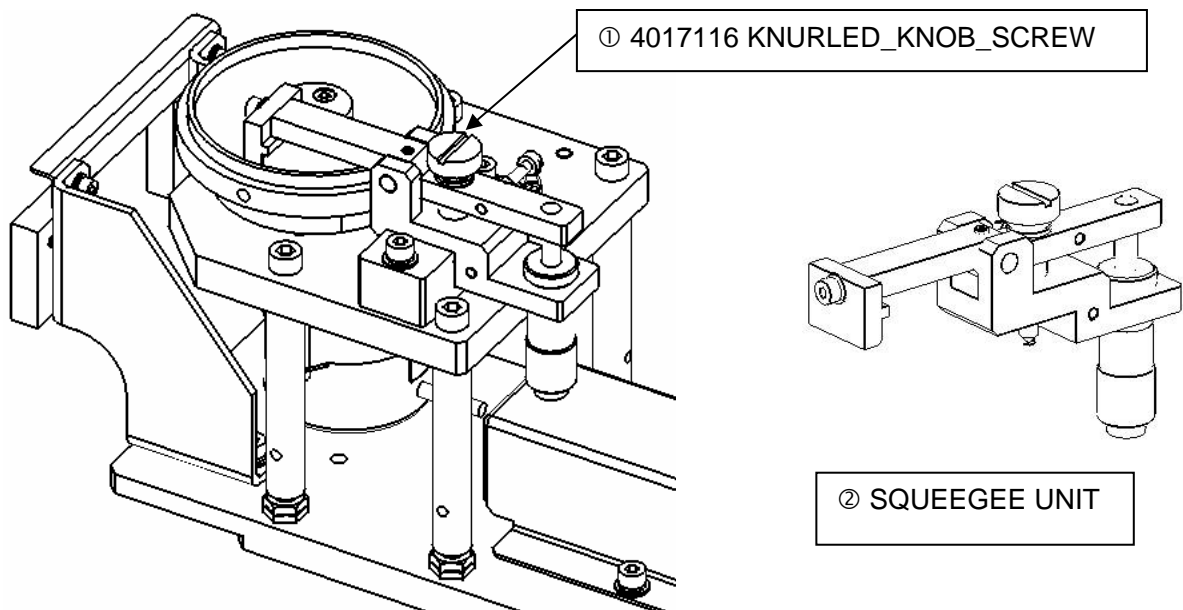
To prevent any trouble caused by accidental machine start, always shut-down the power before starting the maintenance and adjustment work.

[20] ROTARY SOLDER TRANSFER UNIT (OPTIONAL)

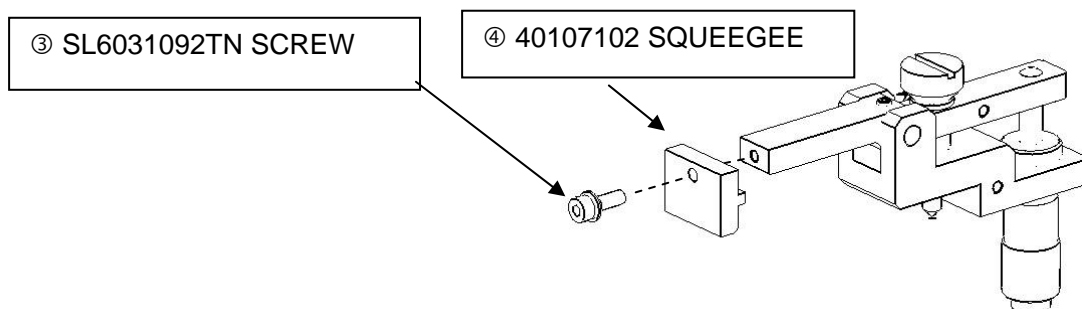
20-1. Replacing the Squeegee

- 1) Check that the power to the main unit is turned OFF.

Remove ① to detach ②.



- 2) Remove ③ to detach ④.

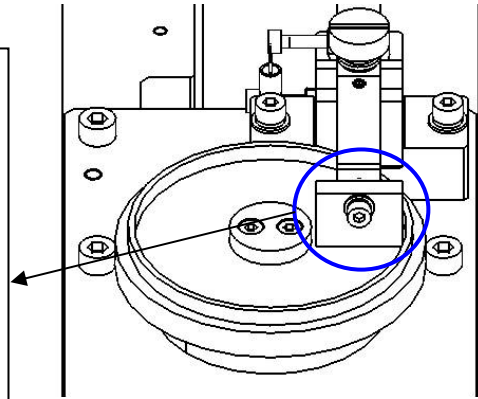


Maintenance Guide

- 3) Replace ④ with a new one.

Reassemble the squeegee so that it is in contact with the pan.
Put a paper sheet between the squeegee and pan to check that there is any catching feeling when pulling the paper sheet during reassembly.

* Do not apply any excessive load to the squeegee when putting it in contact with the pan. Otherwise, the squeegee may break.



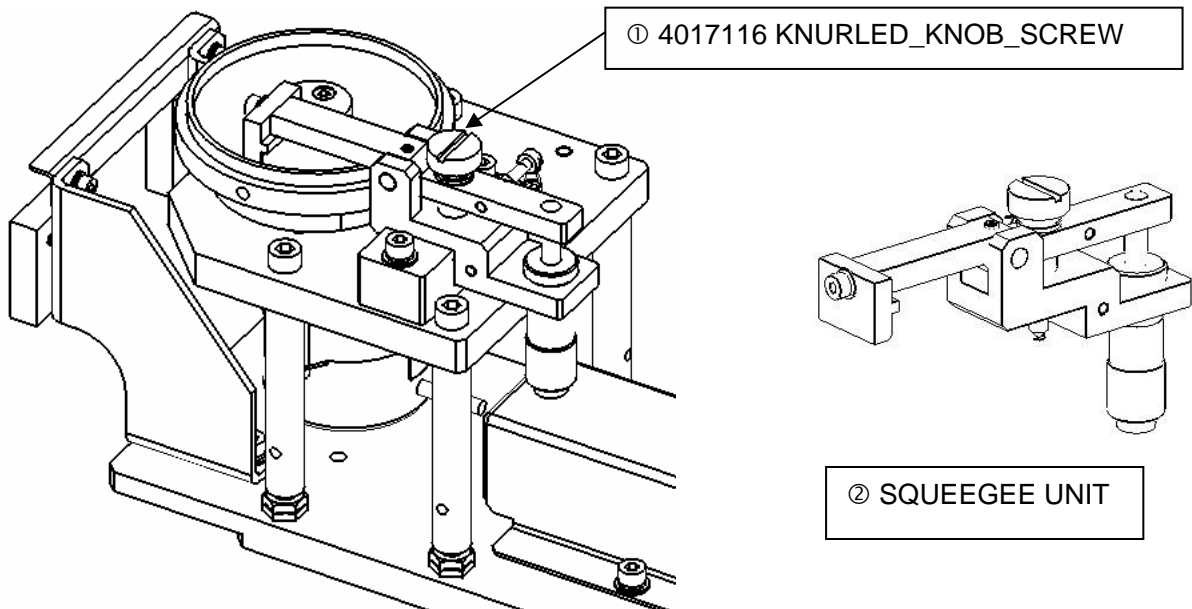
- 4) After the replacement has been completed, mount on the rotary solder transfer unit in the reverse order of disassembly.

Maintenance Guide

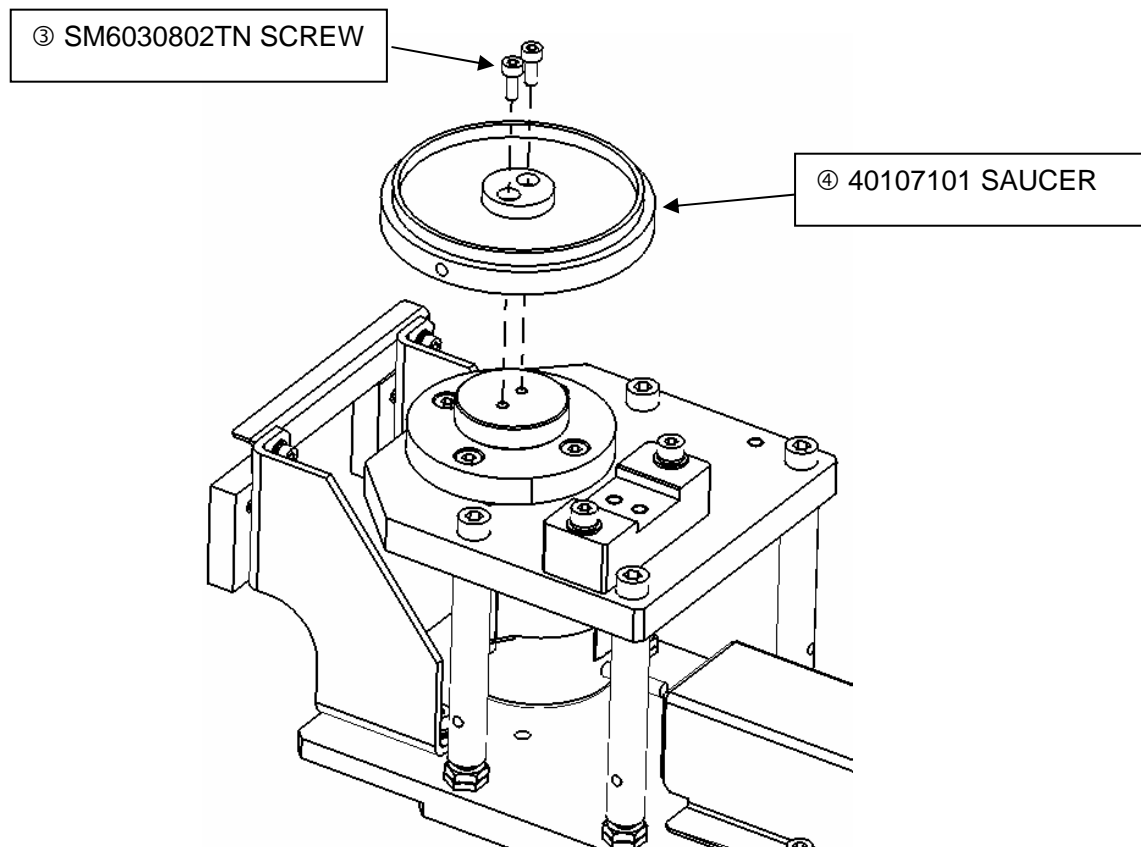
20-2. Replacing the Pan

- 1) Check that the power to the main unit is turned OFF.

Remove ① to detach ②.



- 2) Remove ③ to detach ④.



- 3) After ④ has been replaced with a new one, reassemble ④ to the rotary solder transfer unit in the reverse order of disassembly.

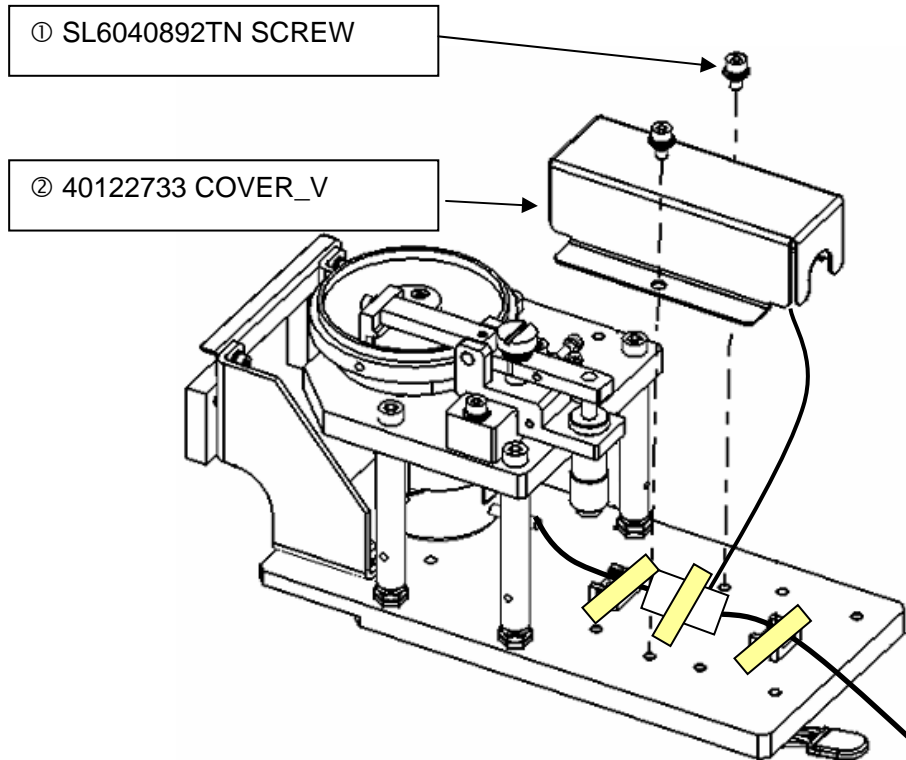
Maintenance Guide

20-3. Replacing the Motor

- 1) Check that the power to the main unit is turned OFF.

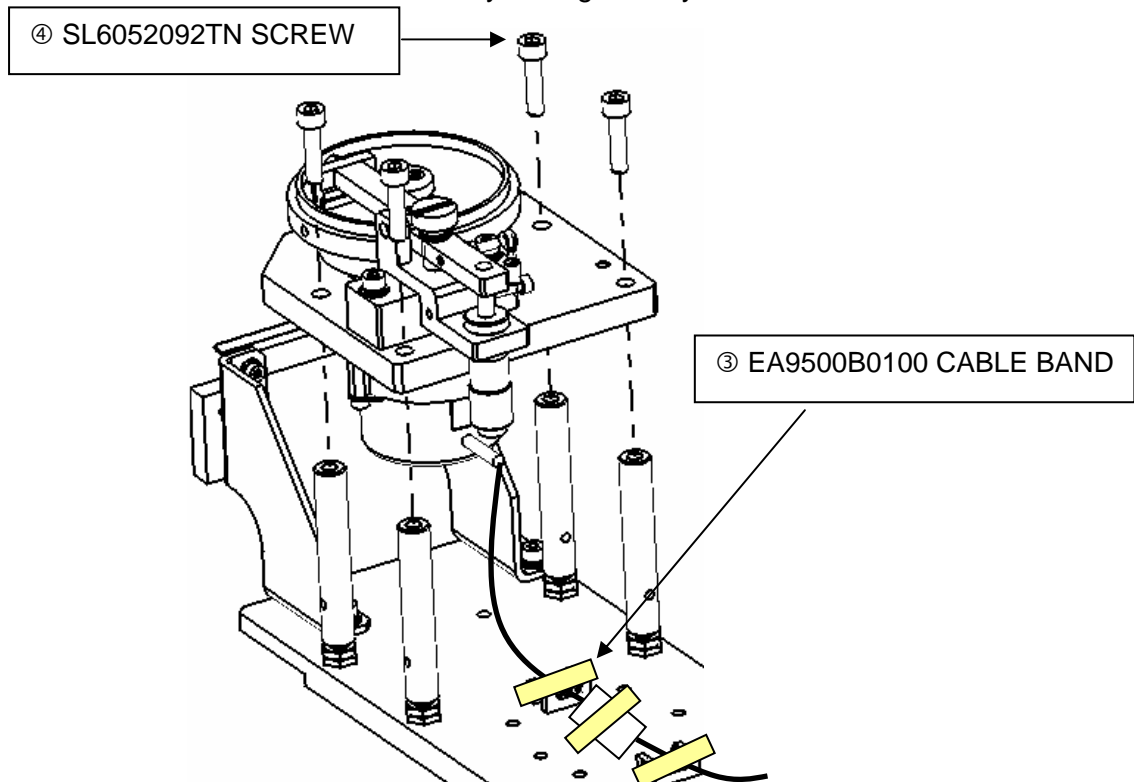
Remove ① (2 pcs.) to detach ②.

* Do not stretch the cord connected to ② excessively. Doing so may cause the cord to break.



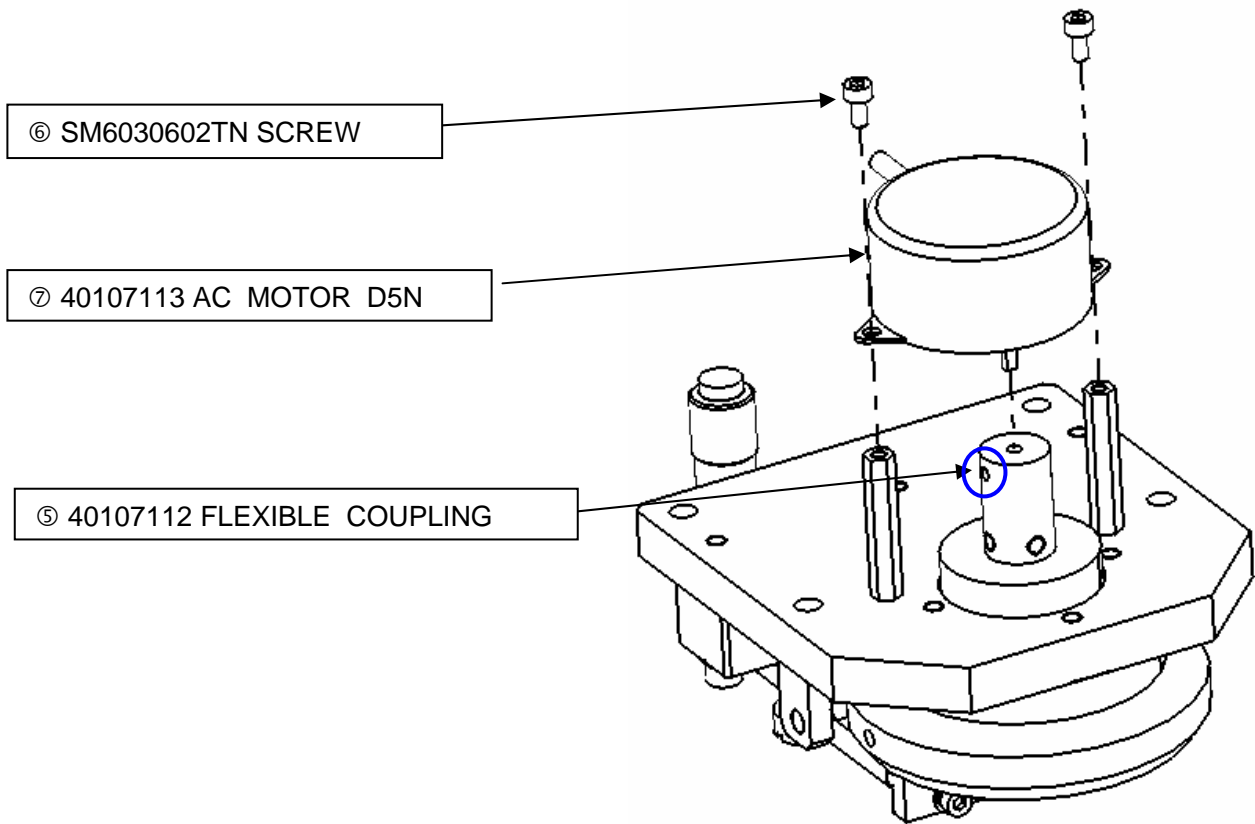
- 2) Cut ③ (2 pcs.) on the motor side and connector, disconnect the connector, and remove ④ (4 pcs.).

* Do not stretch the motor cord excessively. Doing so may cause the cord to break.



Maintenance Guide

- 3) Loosen the set screws of ⑤, and then remove ⑥ (2 pcs.) to detach ⑦.



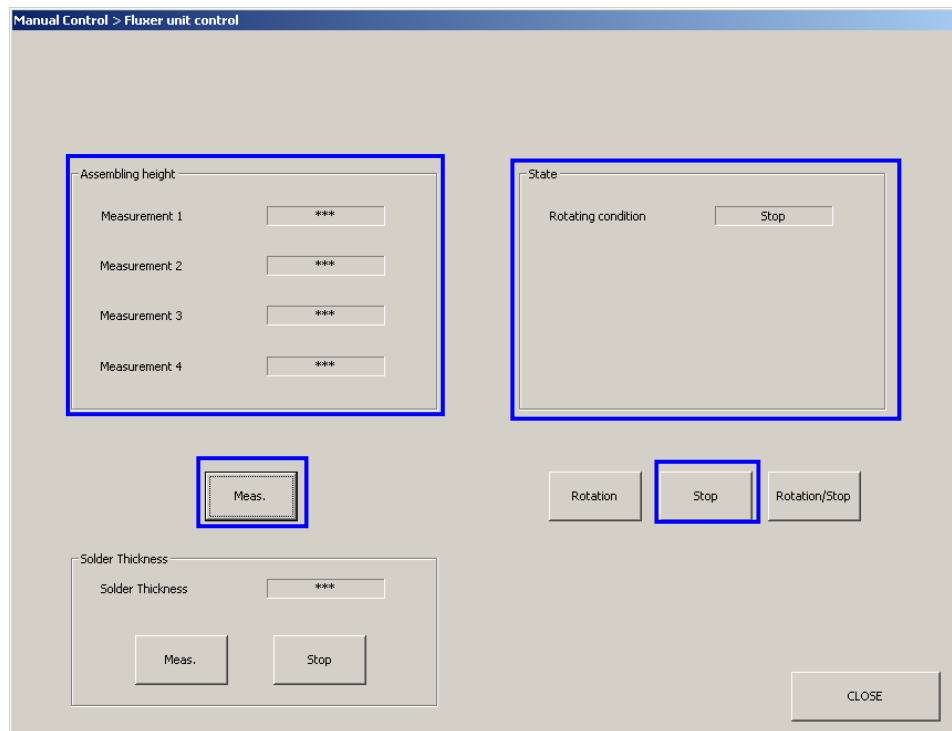
- 4) After ⑦ has been replaced with a new one, reassemble to the rotary solder transfer unit in the reverse order of disassembly.

Maintenance Guide

20-4. Checking the Pan Mounting Status

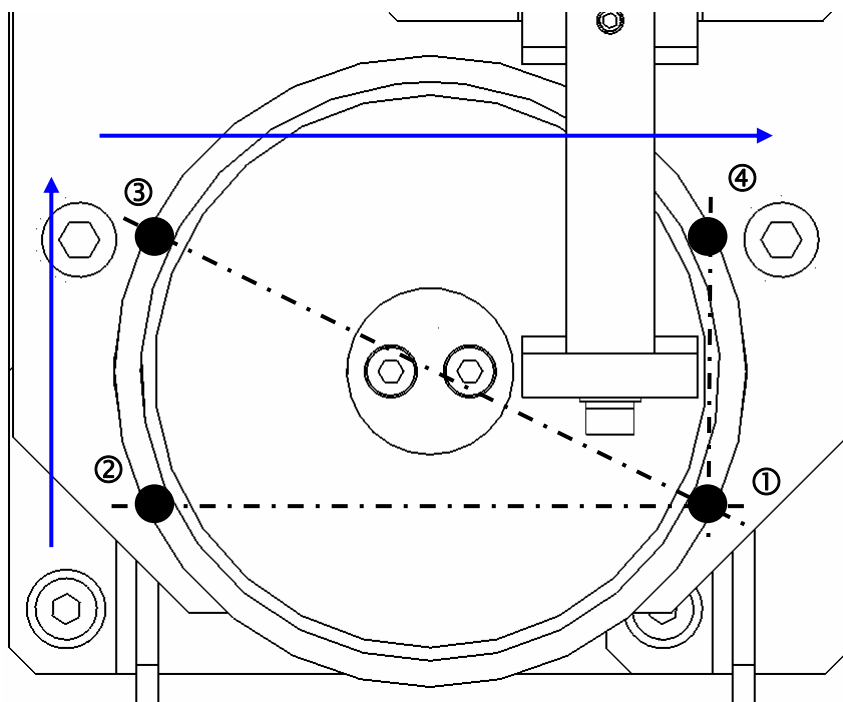
After the pan has been mounted, check variation in height of pan top surface.

- 1) From the manual control, select [Control] - [Others] - [Fluxer Unit Control].
- 2) Check that [Stop] is shown in the rotation status.
 - * When rotated, click the [Stop] button.
- 3) Click the [Meas.] button.



- 4) The HMS automatically measures the height levels of four locations around the cavity (locations indicated by mark).
- 5) The measurement results are displayed at each measurement position in the “Assembly Height” area.
- 6) Check that the relationship among three locations (②, ③, and ④) are within $\pm 100\mu\text{m}$ based on ①.
If the relationship is beyond this range, recheck the mounting status.

Maintenance Guide



Maintenance Guide

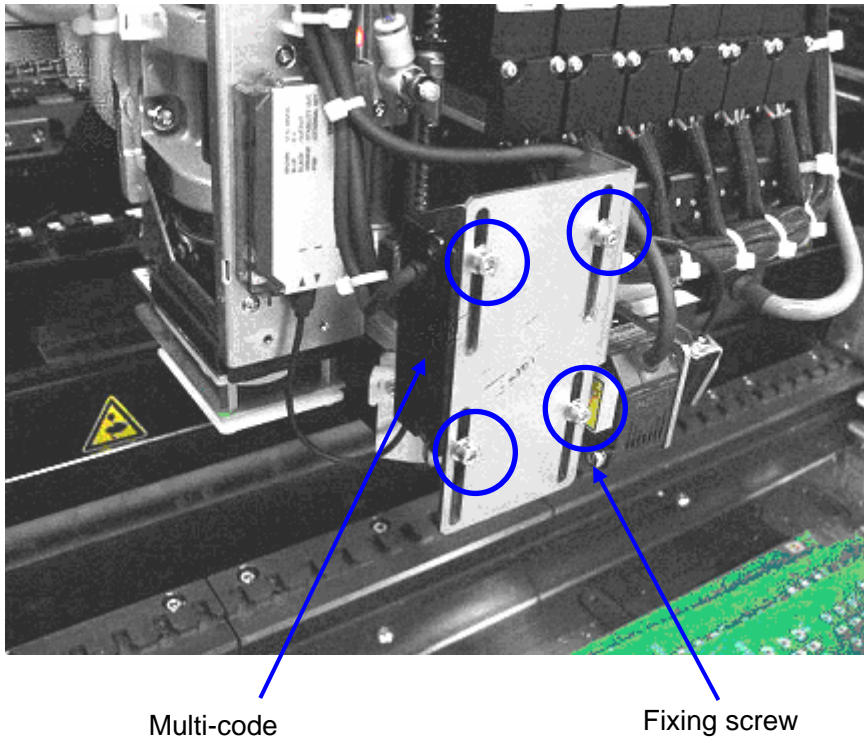
**DANGER**

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

[21] MULTI-CODE READER (OPTIONAL)

21-1. Replacing the Multi-code Reader (Head)

- 1) Remove the fixing screws (SL6030892TN) to detach the Multi-code Reader .
 - 2) Reassemble the components in the reverse order of disassembly.
- * When mounting the Multi-code Reader , adjust its height.
For details, see QA Table_Multi-code Reader .



Multi-code

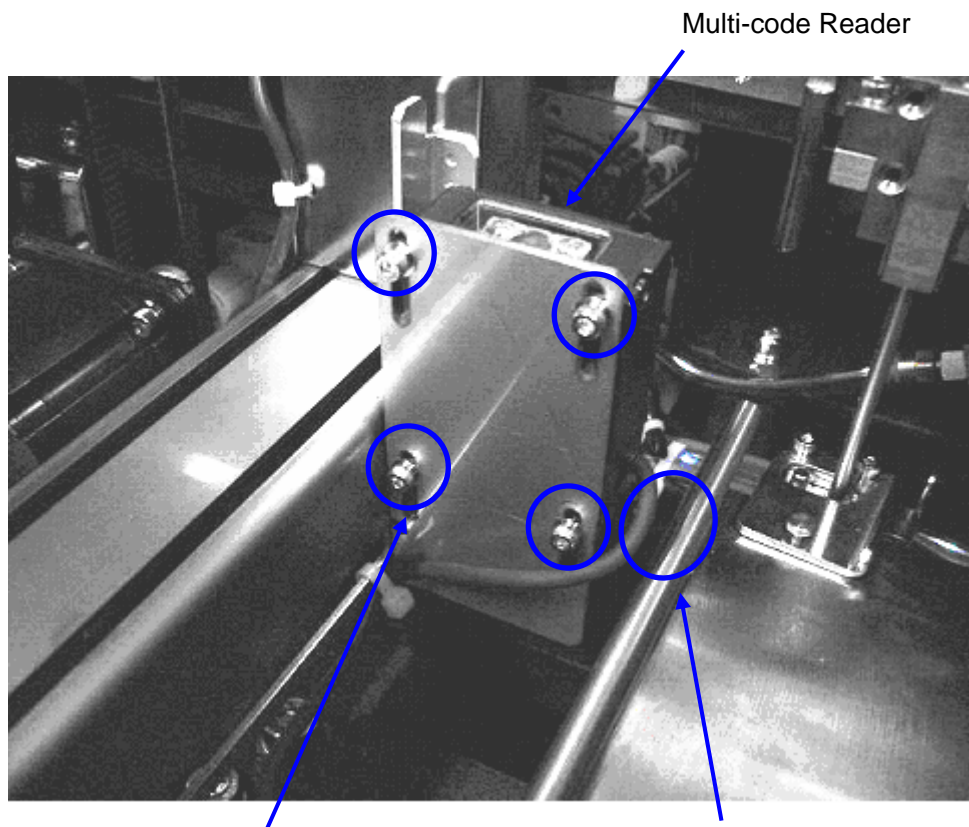
Fixing screw

Figure 21-1-1 Replacement of Multi-code Reader (Head)

Maintenance Guide

21-2. Replacing the Multi-code Reader (Transport)

- 1) Remove the fixing screws (SL6030892TN) to detach the Multi-code Reader .
 - 2) Reassemble the components in the reverse order of disassembly. (Pay special attention so that cable is not in contact with the side beam.)
- * When mounting the Multi-code Reader , adjust its height.
For details, see QA Table_Multi-code Reader .



Fixing screw

* Carefully check that the cable of the Multi-code Reader is not in contact with the side beam during reassembly.

Figure 21-2-1 Replacement of Multi-code Reader (Transport)

Maintenance Guide

**DANGER**

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

[22] PLACEMENT MONITOR (OPTIONAL)

22-1. Replacing the LNC61/62

The LNC61 is used when the optional placement monitor for the KE-3010 is mounted while the LNC62 is used when the placement monitor for the KE-3020V/3020VR is mounted.

When the LNC61/62 has been replaced, it is necessary to input the laser related MS parameters again. (For details, see section 2-7.)

<Procedure>

- 1) Disconnect the connectors (encoder and IEEE1394) and remove the mounting screws ① and ② (3 pcs.) to detach the LCN61.
- 2) Mount a new LCN61 in the reverse order of disassembly.
 - * Before mounting a new LCN61/62, remove the Loctite solidified on the sensor bracket as much as possible.
 - * Before mounting the sensor, put the sensor pin in the positioning hole in the bracket and secure it after positioning.
 - * After the Loctite 242 has been applied to the sensor mounting screws ① and ②, secure them with a tightening torque of 2.6 Nm.
 - * After replaced, clean the laser window of the LNC61/62 with a clean cloth rag.

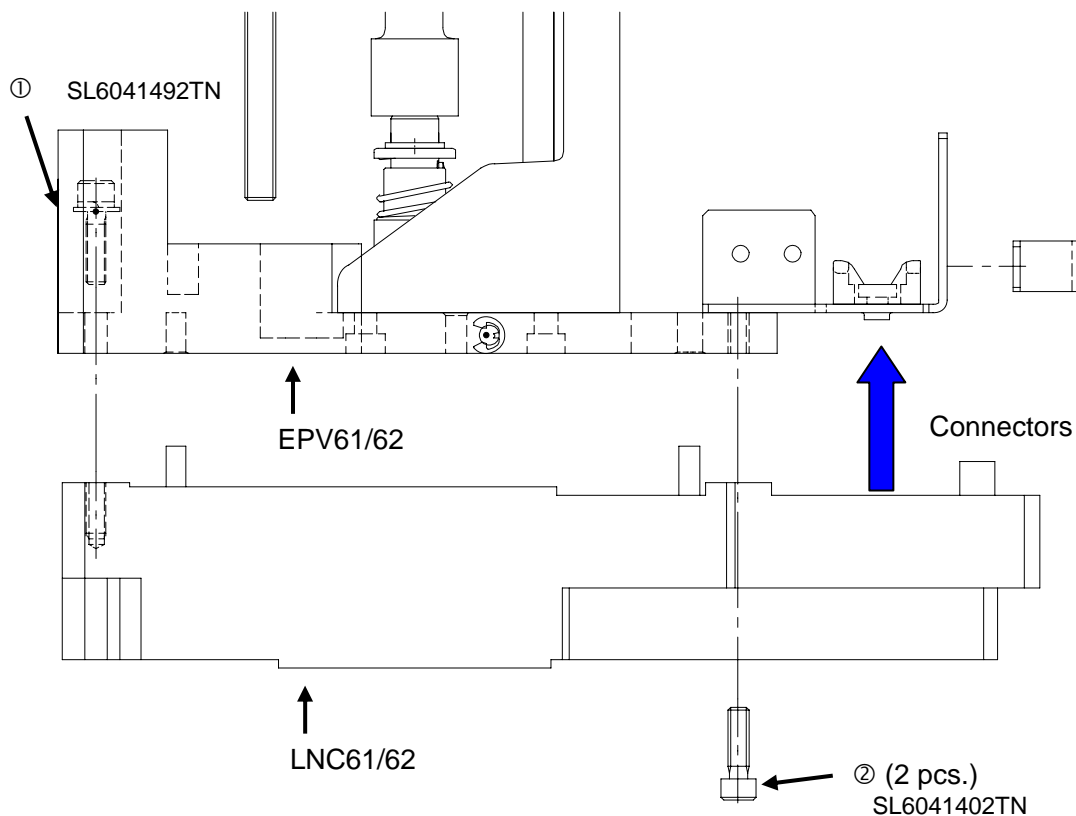


Figure 22-1-1

Maintenance Guide

22-2. Replacing the EPV61/62

The LNC61 is used when the optional placement monitor for the KE-3010 is mounted while the LNC62 is used when the placement monitor for the KE-3020V/3020VR is mounted.

<Procedure>

- 1) After the LNC61/62 has been detached using the procedure stated in section 22-1, disconnect the connectors (encoder and IEEE1394) from the front of the EPV61/62 and remove the mounting screws ① (2 pcs.) to detach the bracket that secures the EPV61/62.
- 2) Remove the mounting screws ② (4 pcs.) that secure the EPV61/62 to detach the EPV61/62.
- 3) Remove the E-ring from the shaft ③ mounted on the EPV61/62 and pull out the shaft.
- 4) Mount a new EPV61/62 in the reverse order of disassembly. At this time, when assembling the shaft ③, use a new E-ring.
- 5) After that, mount the LNC61/62 using the procedure stated in section 22-1.

- * Before mounting a new EPV61/62, remove the Loctite solidified on the sensor bracket as much as possible.
- * Before mounting the sensor, put the sensor pin in the positioning hole in the bracket and secure it after positioning.
- * After the Loctite 242 has been applied to the sensor mounting screws ① and ②, secure them with a tightening torque of 2.6 Nm.
- * After replaced, clean the camera lens and illumination part of the EPV sensor with a clean cloth rag.

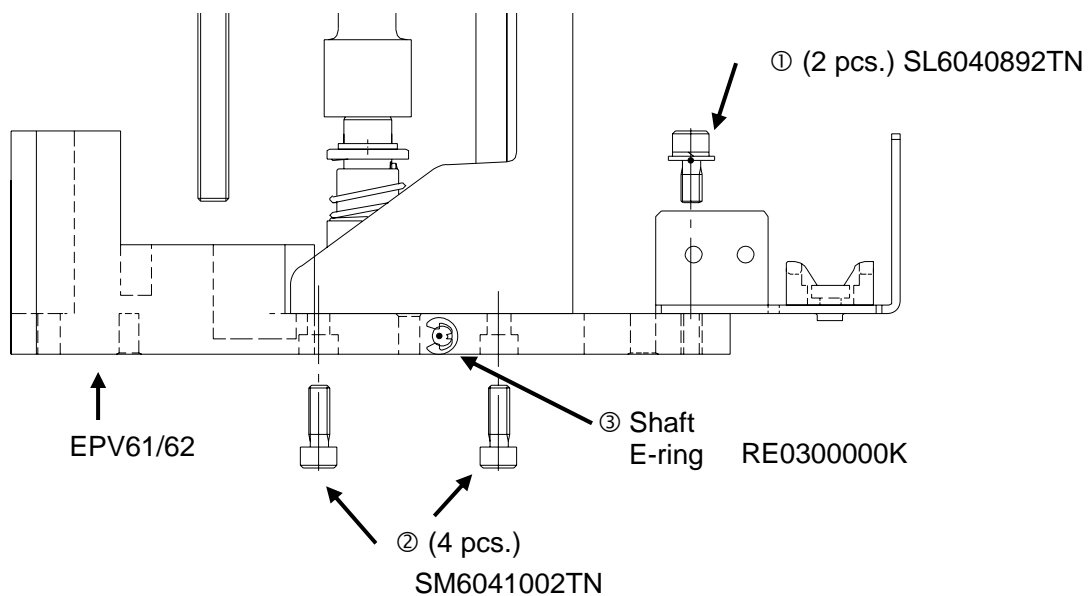


Figure 22-2-1

Maintenance Guide

22-3. Replacing the Head Up Cylinder (KE-3020V/3020VR)

- 1) Shut down the air to the main unit.
- 2) Remove the camera bracket and ZM cable bracket of the L-OCC.
- 3) Disconnect the air tube from the air cylinder.
- 4) Remove the nut from the top end of the air cylinder to detach the release bar.
(Be careful not to lose the wave washer.)
- 5) Loosen the set screw of the auto switch.
- 6) Remove the M4 × 40 cap bolts that secure the air cylinder to detach the air cylinder.
- 7) Mount a new air cylinder so that it is in parallel to the cylinder mount. Assemble the new air cylinder so that the clearance between the cylinder and L1-axis is 0.5 mm and the clearance between the cylinder and L6-axis is 1 mm.
- 8) Mount the auto switch. The mounting position is 20 mm from the lower end of the cylinder.
- 9) Insert the release bar into the rod of the cylinder, put the wave washer, and turn the cylinder nut until it is no longer turned.

Mount the ZM cable bracket, and run the cables.

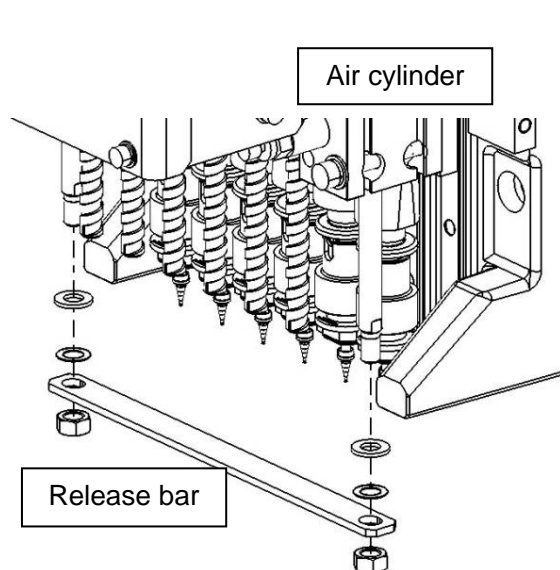


Figure 22-3-2

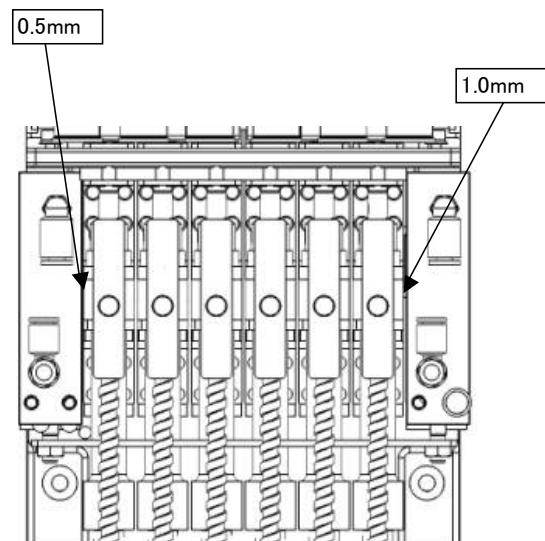


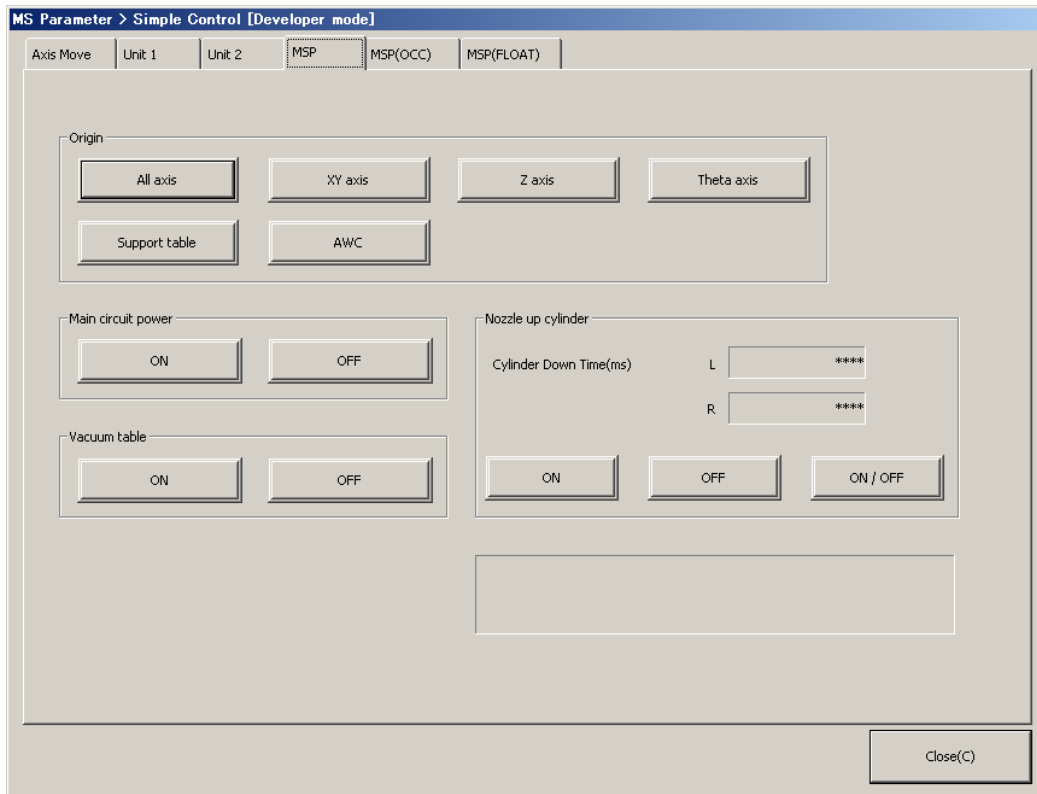
Figure 22-3-3

Maintenance Guide

- 10) If the speed controller has also been replaced, it is necessary to carry out the adjustment before mounting the release bar.

<Procedure>

- ① Enter the MS Parameter and display [Simple Control]-[MSP]. In this status, press the emergency stop button.



- ② Select [nozzle 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.

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

Maintenance Guide

22-4. Obtaining the Offset After Replacement

For details, see section 2-8.

Maintenance Guide

22-5. Checking the Images After Replacement

After the sensor has been replaced, check the images using the calibration application.

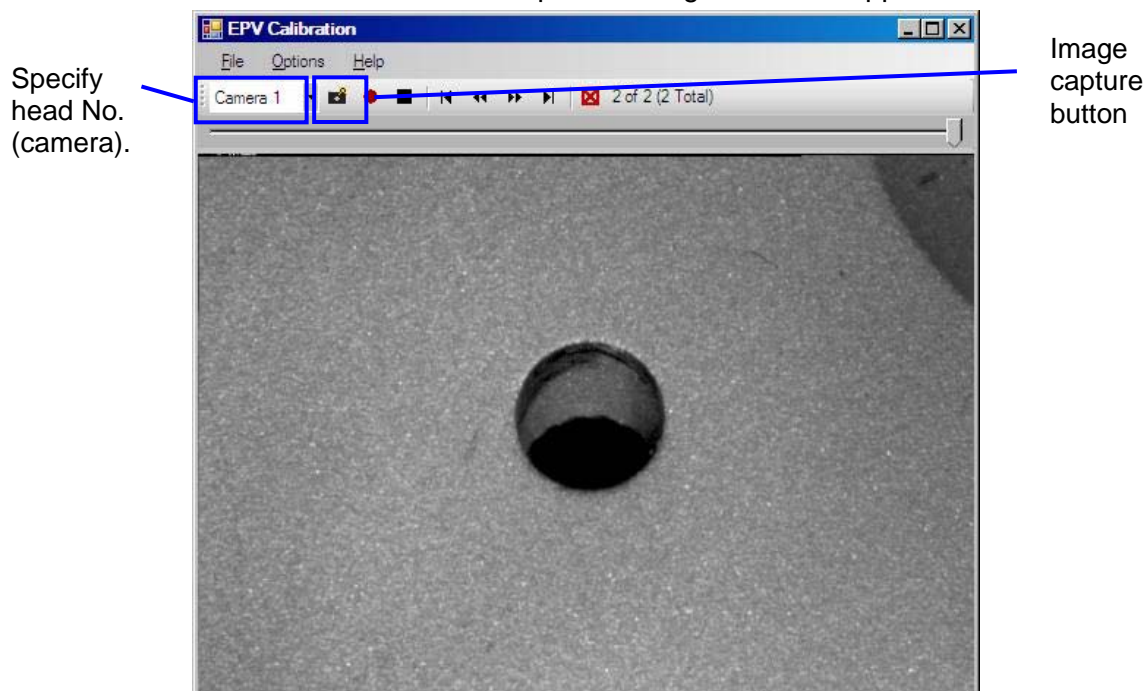
22-5-1. Calibration Application

This calibration application is mainly used for the operation check in the inspection process and on the market.

- ① Start the mounter main unit and perform the origin return.
- ② Turn ON the power to the placement monitor PC.
- ③ From the [Start] menu, select [Placement Monitor]-[Calibration Application] to run the calibration application.
- ④ Open [Manual Control] on the mounter and move the head No. 1 to a portion above the CAL block No. 1 mark.
- ⑤ In the [Camera] (head No.) item, specify the head above the CAL block No. 1 mark and capture the image.
- ⑥ Check that the CAL block No. 1 mark is displayed at the center on the image and that it is clearly seen visually.
- ⑦ Select [File]-[Save Image File], specify a save destination, and save the image.
(Example of save destination: c:\EPVData\EPVImage\date\date_Camera_1.bmp)
- ⑧ Compare the captured image with the previously captured image, and then make the check.
- ⑨ Move the next head to a portion above the CAL block No. 1 mark.
- ⑩ In the same manner as described in step ⑤, specify the head above the CAL block No. 1 mark in the [Camera] (head No.) item and capture the image.
- ⑪ Check the image in the same manner as step ⑥.
- ⑫ Specify a save destination and save the image in the same manner as step ⑦.
- ⑬ Compare the captured image with the previously captured image, and then make the check in the same manner as step ⑧.
- ⑭ Repeat steps ⑨ to ⑬ described above.

* When using this function, do not start up the production application.

CAL block No. 1 mark captured using calibration application

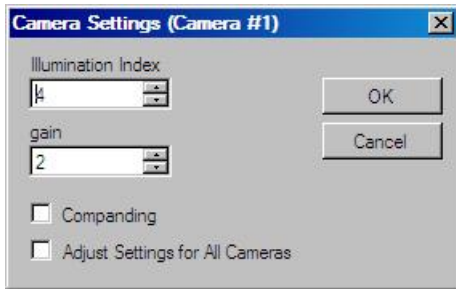


Maintenance Guide

From the toolbar, select [Options]-[Current Camera]-[Settings]. The brightness of the illumination can then be changed. (Illumination Index: 0 to 7)

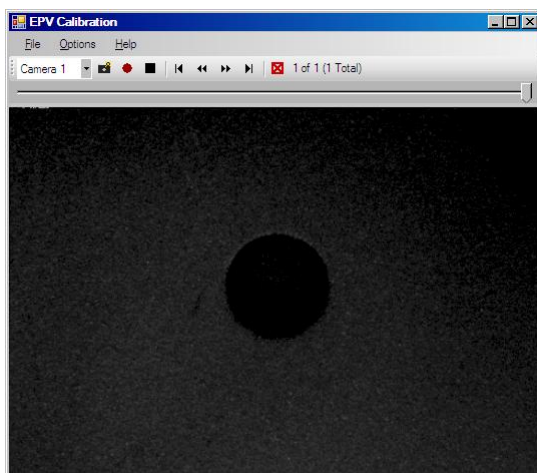
Normally, use “4”.

- * This illumination index can be set for each “Camera” (head No.).
- * The “gain” table is fixed at “2”.

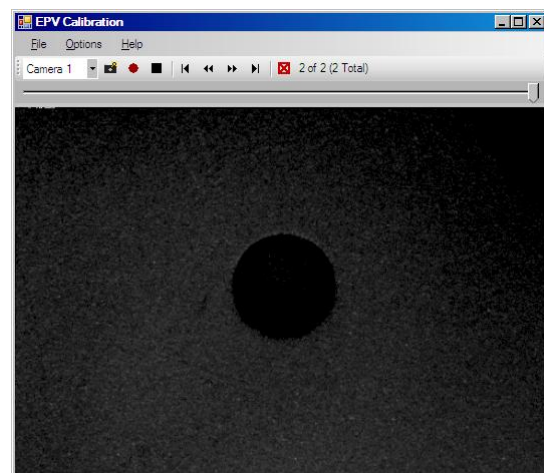


The following shows the different views arising from the different illumination indexes.

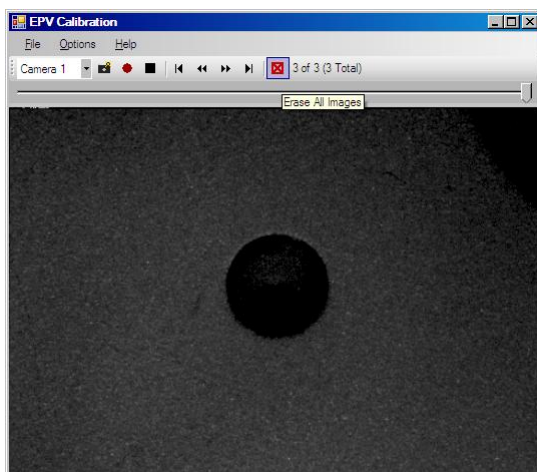
Set value: 0



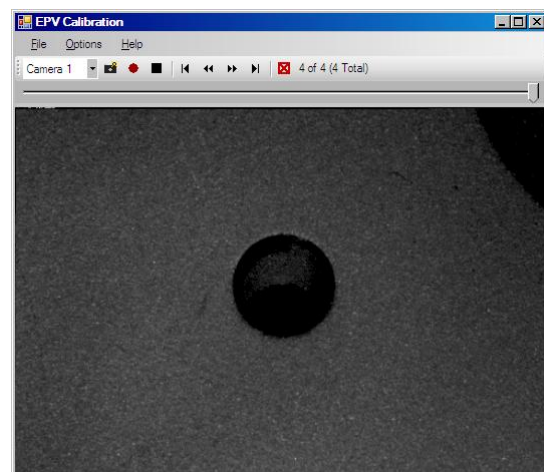
Set value: 1



Set value: 2

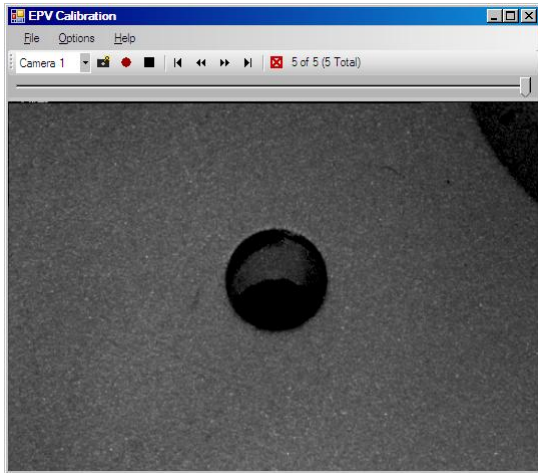


Set value: 3

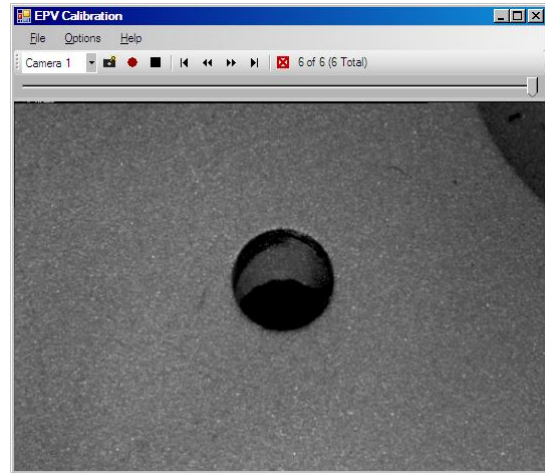


Maintenance Guide

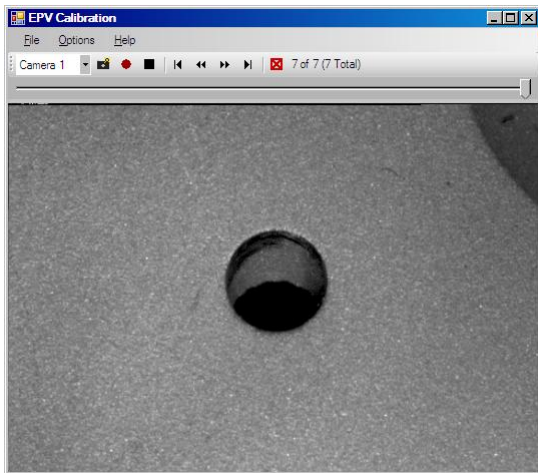
Set value: 4



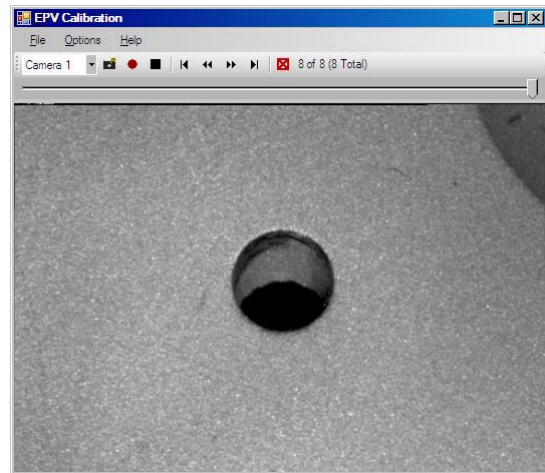
Set value: 5



Set value: 6



Set value: 7



(*) If the captured image is significantly different from the previously obtained image as a result of comparison (for reference, it is seen that the captured image is two steps or more darker), the contaminated lens or illumination or the deterioration of the LED may be the cause. At this time, capture the images and make the check again after cleaning.

If the symptom does not change even after cleaning, replace the sensor. (If the same sensor is used continuously, this may affect the presence judgement component of the placement monitor.)

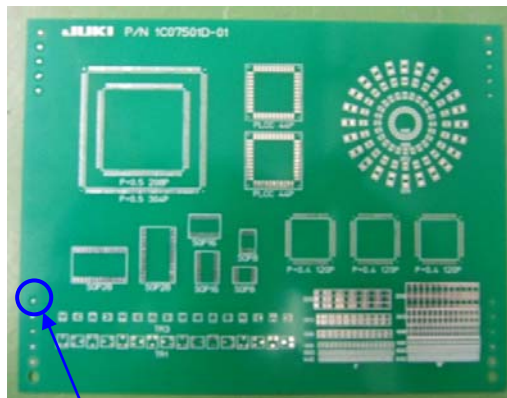
Maintenance Guide

22-5-2. EPV Calibration

Follow the steps below to obtain the placement monitor calibration value.

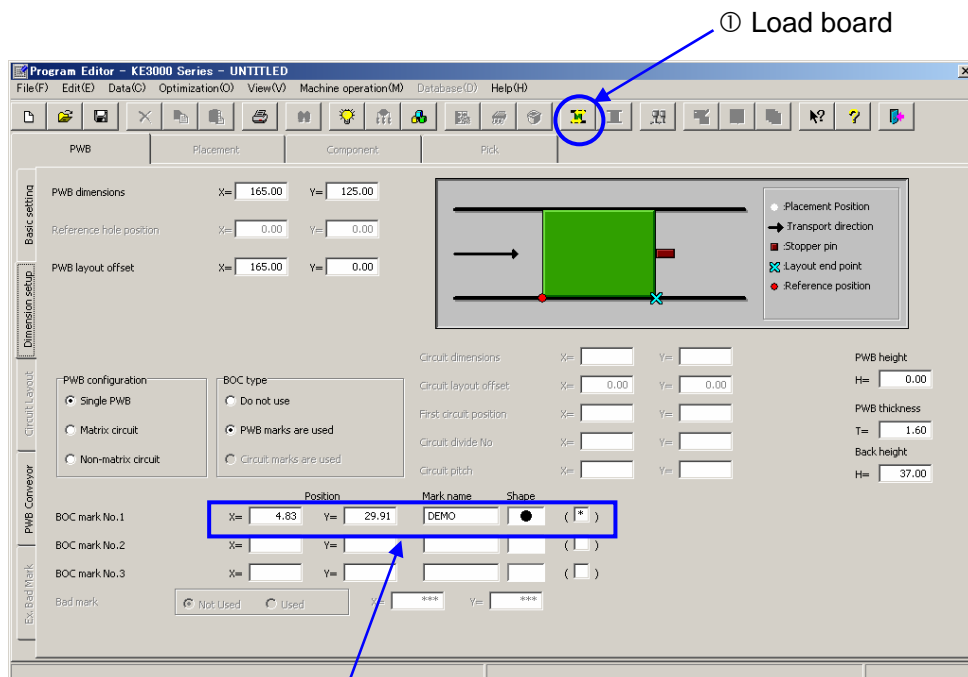
[Outline]

Capture the mark on the jig board using the EPV camera (“+” at the lower left portion of the board) to obtain the offset value.



“Board mark (+)”
JUKI demonstration board (165 × 125 mm)
(P/N 1CD7501D-01, etc.)

- ① Open the “Program Editor” screen and load the jig board.
- ② Teach the coordinates of the “+” mark using the OCC of the mark HOD.

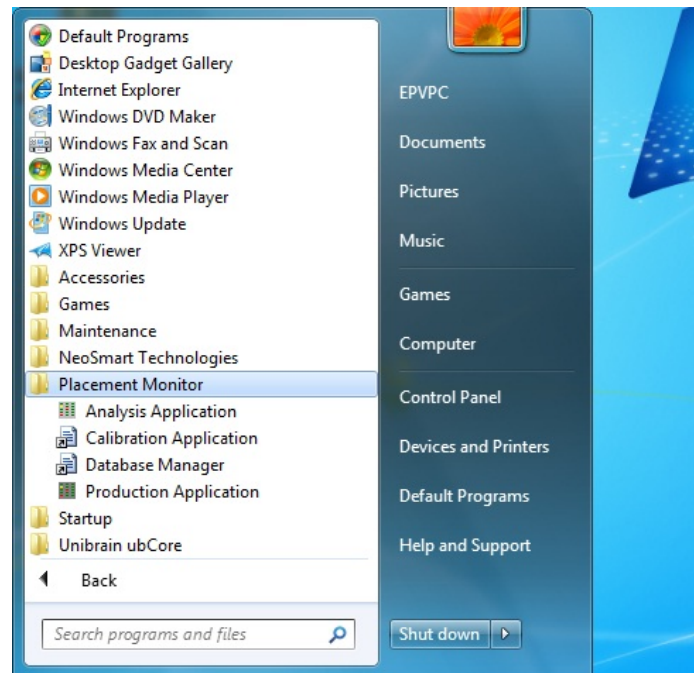


② Teach coordinates

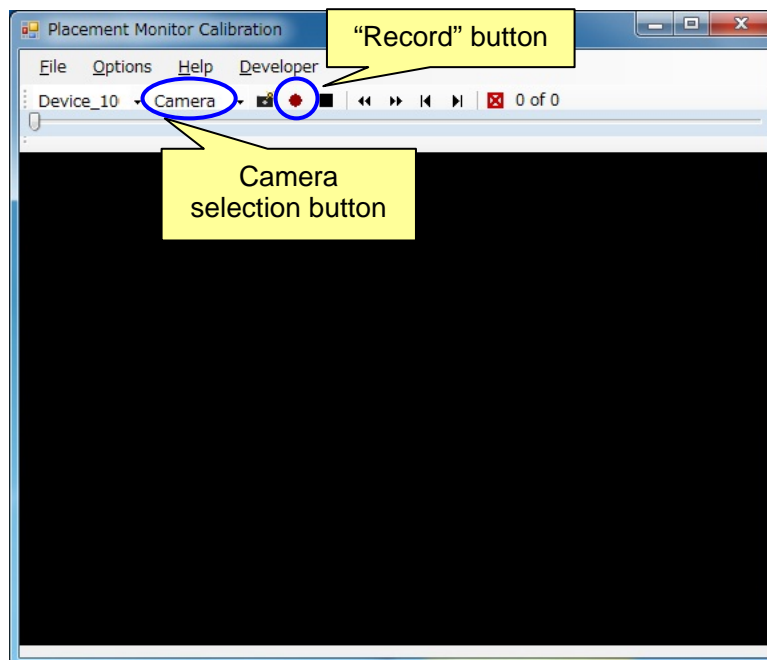
- ③ Using the head selection of the HOD, select ‘L1’ and move the L1 head to the mark coordinate position.

Maintenance Guide

- ④ On the PC for the placement monitor, select [Programs]-[Placement Monitor]-[Calibration Application].



- ⑤ Click the [Camera] button to select “Camera 1”, and then click the [Record images] button.

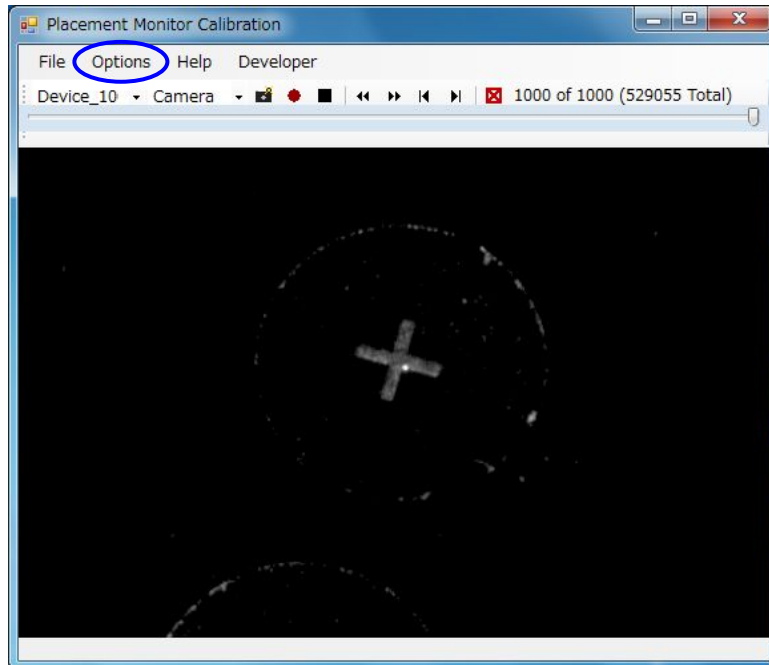


Maintenance Guide

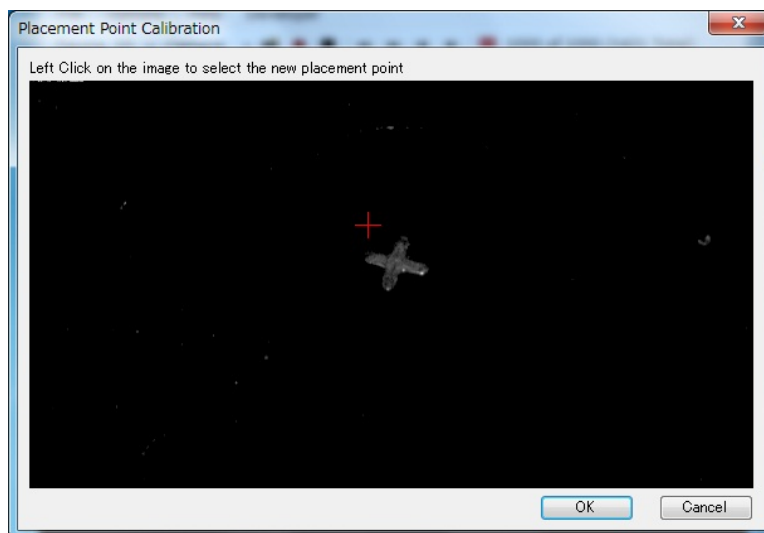
- ⑥ The camera image of the L1 head will appear.

From [Menu], select [Options] -> [Calibrate with current image...].

(If it is difficult to see the images, select [Options] - [Current Camera] - [Settings] to change the brightness of the illumination.)

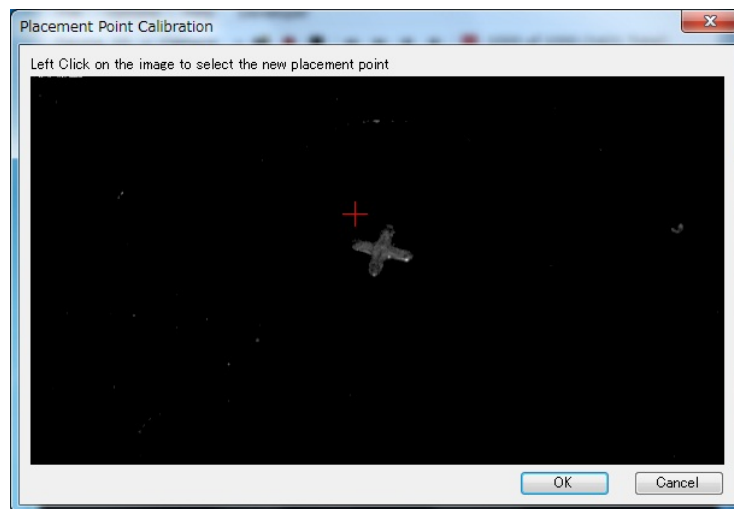


- ⑦ Follow the instructions that appear on the screen to left-click the center of the graphic.



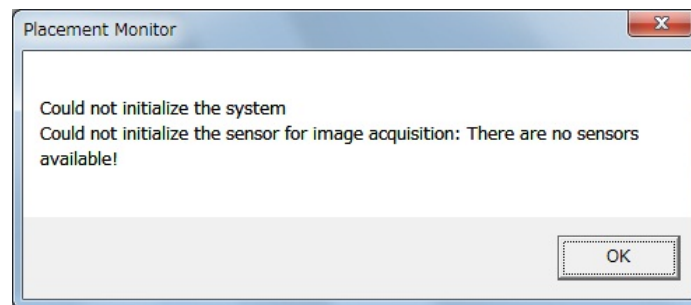
Maintenance Guide

“Left-click”

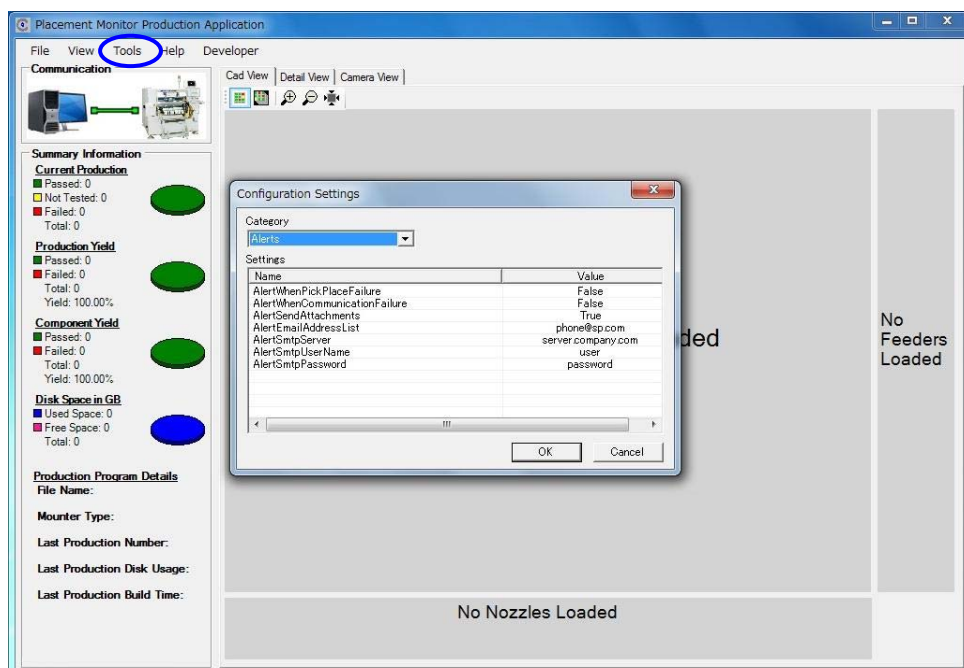


- ⑧ Next, select [Programs]-[Placement Monitor]-[Production Application] on the PC for the placement monitor.

* The following message will appear, but ignore it, and then click [OK].



- ⑨ Select [Tools]-[Configuration Settings].

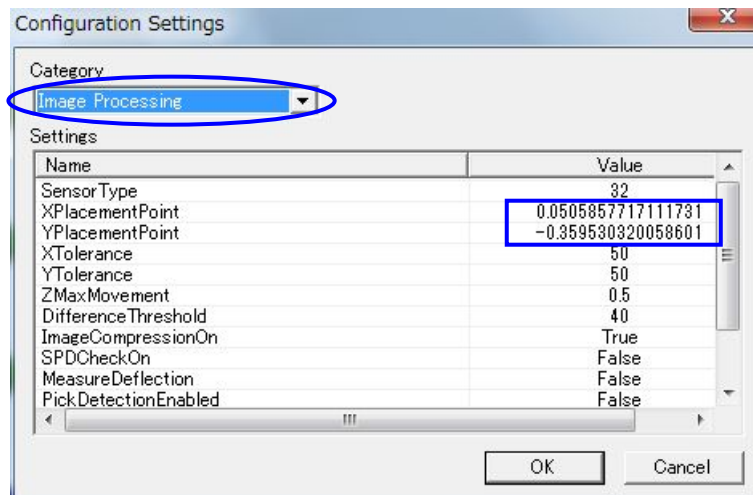


Maintenance Guide

- ⑩ Select [Image Processing] in the “Category” area.

Record the values in “XPlacementPoint” and “YPlacementPoint”.

(4 digits after the decimal point. Round the value at the 5th digit to the 4th digit after the decimal point.)



- ⑪ Close the “Production Application” once.
- ⑫ Using the head selection of the HOD, select ‘L2’ and move the L2 head onto the mark coordinates.
- ⑬ On the “Calibration Application”, click the [Camera] button to select “Camera 2”, and then click the [Record images] button.

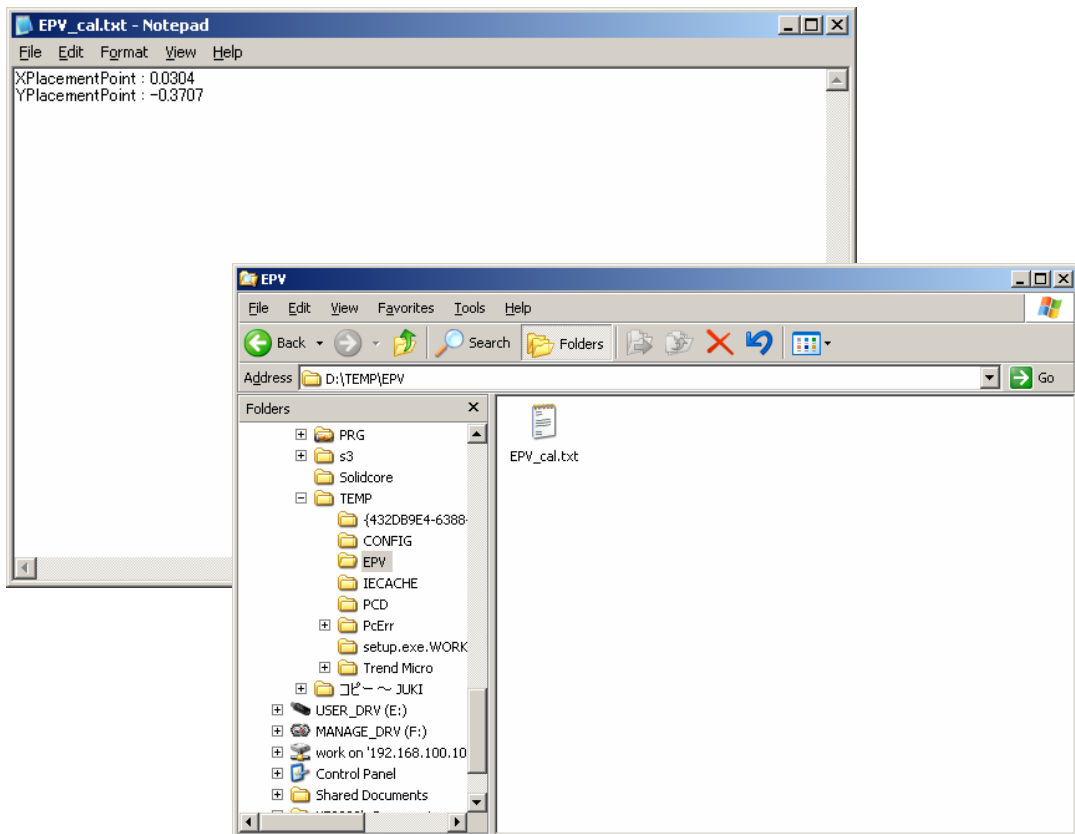
Subsequently, repeat steps ⑤ to ⑪ for L2 to L6.

- ⑭ After the values of L1 to L6 have been recorded, calculate the average values of “XPlacementPoint” and “YPlacementPoint” of L1 to L6 with a calculator.
- ⑮ From the [Programs] menu of the mouter, open a text file and input the average values you have calculated in step ⑭.

Create “EPV” folder in “D:\TEMP” and save the text file you have created. (File name: EPV_cal.txt)

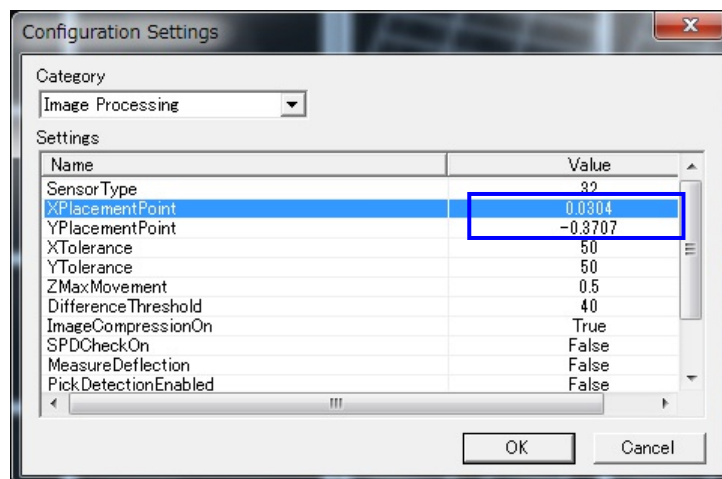


Maintenance Guide



- ⑩ On the PC for the placement monitor, select [Programs]-[Placement Monitor]-[Production Application], and then select [Tools]-[Configuration Settings].

Select [Image Processing] in the “Category” area, and input the average values you have calculated in step ⑩ to “XPlacementPoint” and “YPlacementPoint”.












The work is then completed.

Maintenance Guide







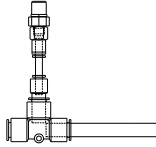

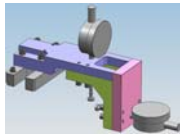
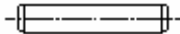
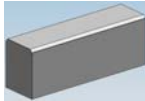
APPENDIX JIG LISTS

Part No.	Part name	Purpose	Figure	Remarks
E2101998000	Jig nozzle A	Laser offset		Common for KE-2000 series For IC head
40046647	JIG NOZZLE LNC	Laser offset		For LNC60
E51907290A0	CAL piece V	VCS camera offset		Common for KE-2000 series
E2106998000	Camera adjustment jig	OCC camera offset		Common for KE-2000 series and KE-700 series
E2107998000	Ceramic board (2 inch)	Adjustment of OCC camera illumination		Common for KE-2000 series
40053310	ATC offset boss 70	ATC offset (assembly position)		Common for KE-2070
40053311	ATC offset boss 80	ATC offset (assembly position)		Common for KE-2080/2080R
40001343	Nozzle assembly 505	CVS height offset		Common for KE-2000 series

Maintenance Guide

Part No.	Part name	Purpose	Figure	Remarks
40001346	Nozzle assembly 508	Laser offset Head offset ATC offset, etc.		Common for KE-2000 series
40097735	VCS HT jig	VCS light quantity adjustment VCS camera scaling VCS camera focus offset		Common for KE-3020/3020R
E21399980A0	VCS jig plate D assembly	<ul style="list-style-type: none"> Reflective illumination and BGA light density adjustment 		Common for KE-2000 series
E21419980A0	VCS jig plate B assembly	VCS camera scaling		For standard VCS Common for KE-2000 series and KE-740/760
E21449980A0	CSP jig plate B assembly	VCS camera scaling		For option VCS Common for KE-2000 series and KE-740/760
E6260705JA0	Master feeder assembly	Pickup reference position offset		Same jig as that used for adjustment of the TF pick position
40094362	X MSL installation jig	X-magnescale affixing jig		Common for KE3020/3020R
40114286	Y MSL installation jig	Y-magnescale affixing jig		Specially designed for KE3020V/3020VR (M and L Board Specifications)
40094363	Y MSL installation jig	Y-magnescale affixing jig		Common for KE3020/3020R (KE3020V/3020VR (XL Board Specifications))

Maintenance Guide

Part No.	Part name	Purpose	Figure	Remarks
40008106	MSC clearance jig	For adjustment of magnescape detector head		T 0.25mm T 0.35mm T 0.45mm
40073350	MSC clearance jig, 0.15	For adjustment of magnescape detector head		t0.15
40098180	Coplanarity adjustment jig	Coplanarity offset		Common for KE3020/3020R
E2155998000	QFP jig 20 (No height difference)			For checking of coplanarity operation
E2157998000	QFP jig VG (height difference)			For checking of coplanarity operation
40035041	WEIGHT 100G	For load control		For checking of load control
40035042	WEIGHT 200G	For load control		For checking of load control
40069372	JUMPER JIG	For adjustment of rotary switch on Z/θ-servo amplifier		
40075695	Dew point checker assembly	For checking of main line filter mounting		
40098187	Magnet stand block jig	Jig		Common for KE3020/3020R
40098190	Y ball screw adjustment jig	Ball screw adjustment jig		Specially designed for KE3020V/3020VR
PH0600282U0	PARALLEL PIN TYPE B 6X28	Coplanarity jig		For assembly of coplanarity
40098185	Y MSL H installation jig	Y-magnescape head adjustment jig		Common for KE3020/3020R

◆ **Revision record**

Rev.	Date	Revised locations	Revision contents	Remarks
1.0	Jan. 2012			First edition
1.1	May 2012	P. 12-7 P. 13-6, 13, 40 to 50 P. 14-3, 4, 5, 12 to 18, 20, 31 P. 19-3	Added XL Specifications	Revised.
2.0	Jun. 2012	P. 1-9, 11, 13, 21, 22, 29 to 33, 68 to 70, 79, 91 to 93 P. 2-3, 4, 16, 21 P. 13-4, 39, 40, 51 P. 14-1 to 4 Chapters 20, 21, 22	Added application to the Rotary solder transfer unit, Multi-code reader and Placement monitor. Erroneous descriptions were corrected.	Revised

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