OLYMPUS ROUTINE MICROSCOPE
MODEL CHK-F/CHL-FM
REPAIR MANUAL

OLYMPUS
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A. OUTLINE OF PRODUCT

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A. OUTLINE OF PRODUCT

<Introduction>

Only the lighting system is different between CHK-F and CHL-FM. For the description of CHL-FM, refer to that of CHK-F except for the base. The CHL-F is the same as CHL-FM with the mechanical stage removed.

1. Outline of Merchandise

An economical microscope for biology provided with the functions and performance required for student education and practice.

2. Features

1. LB objective lens with a parfocal distance of 45mm, which is the same as that of higher grade models.

2. Illumination using a 20W tungsten bulb (CHK-F). Provided with a mirror (CHL-F/CHL-FM)

3. Economical microscope meeting the conditions as a tool for student practice.

3. Restricted Conditions

1. Performance is not guaranteed if the objective lens of EDACH/DAch series is not used.

2. Performance is not guaranteed if the eyepiece CWHK10X-T (for binocular and monocular), H5XLB, H7XLB, P10XLB or P15XLB (for monocular) is not used.

3. Performance is not guaranteed if the observation tube CHB145-T or CH-MO45-T is not used.

4. An intermediate tube can not be used.

5. Do not use the condensers other than the supplied one, the ones for dark field (CH2-DS) and phase difference unit (CH2-RS10/CH2-RS40).
   * CH2-DS can not be used with an objective lens of 4X.
   * CH2-RS10 and CH2-RS40 can not be used except for CHL-F and CHL-FM.

6. Operating temperature 0 ~ 40°C
   Operating humidity 30 ~ 80%
### A. OUTLINE OF PRODUCT

#### 4. Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Mounting of observation tube</td>
<td>Circular dovetail, Rotatable 360°</td>
<td></td>
</tr>
<tr>
<td>2 Revolving nosepiece</td>
<td>Quadruple fixing</td>
<td></td>
</tr>
<tr>
<td>3 Stage</td>
<td>〈CHL-F〉</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Plane stage fixed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>〈CHK-F/CHL-FM〉</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Plane stage fixed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Fixed type mechanical stage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Right downward coaxial knob</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Vertical movement: Rack and pinion</td>
<td></td>
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<tr>
<td></td>
<td>• Roller guide</td>
<td></td>
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<tr>
<td></td>
<td>• Traverse range 40mm</td>
<td></td>
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<tr>
<td></td>
<td>• Horizontal movement: Rack and pinion</td>
<td></td>
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<tr>
<td></td>
<td>• Roller guide</td>
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<tr>
<td></td>
<td>• Traverse range 76mm</td>
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<tr>
<td></td>
<td>• Minimum reading: 0.1mm with a vernier</td>
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<tr>
<td></td>
<td>• Specimen holder: Lever type</td>
<td></td>
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<tr>
<td></td>
<td>• One specimen type</td>
<td></td>
</tr>
<tr>
<td>4 Coarse and fine adjustment knobs</td>
<td>• Coaxial coarse and fine adjustment knobs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Coarse and fine adjustment stroke: 20mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• With fine adjustment scale/1 scale: 2.5μm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Tension adjustment knob is provided.</td>
<td></td>
</tr>
<tr>
<td>5 Condenser mount</td>
<td>• Lead groove moving up/down type, stroke 3mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Sleeve type condenser mount</td>
<td></td>
</tr>
<tr>
<td>6 Condenser</td>
<td>• Number of aperture: NA1.25 (at immersing in oil)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Size of iris: Iris diameter 1.7~29.0</td>
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<tr>
<td>7 Light source</td>
<td>〈CHL-F/CHL-FM〉</td>
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<tr>
<td></td>
<td>• Plug-in type φ50mm Plano-concave mirror</td>
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<td></td>
<td>〈CHL-F〉</td>
<td></td>
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<tr>
<td></td>
<td>• 20W tungsten bulb built-in</td>
<td></td>
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<tr>
<td></td>
<td>• Fuse holder built-in</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lampl name CHK_V20W SB</td>
<td></td>
</tr>
<tr>
<td>8 Filter</td>
<td>• Attach blue filter (32.5C-2) to the supplied filter holder, and insert it into the condenser.</td>
<td></td>
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<tr>
<td></td>
<td>• φ32.5 filter is attachable to the LENS FRAME.</td>
<td></td>
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<tr>
<td>9 Outside dimensions</td>
<td>• 172(W) × 200(D) × 250(H)mm</td>
<td></td>
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<tr>
<td></td>
<td>• Height is 376mm when a monocular tube is mounted.</td>
<td></td>
</tr>
<tr>
<td>10 Weight</td>
<td>• CHL-F: 2.1kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• CHL-FM: 2.5kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• CHK-F: 2.8kg</td>
<td></td>
</tr>
</tbody>
</table>
B. DISASSEMBLING PROCEDURE

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1. DISASSEMBLING CHK-F INTO UNITS

1-1 Loosen the SCREW and turn the condenser counter-clockwise seen from the bottom by hand. The condenser comes off from the stage unit.

MECHANICAL STAGE

1-2 Remove the two SCREWS at the stage bottom. The MECHANICAL STAGE comes off.

1-3 Remove the three SCREWS at the stage bottom. The STAGE comes off. Several washers are sometimes used between the stage and the mounting base. Take care not to lose them.
B. DISASSEMBLING PROCEDURE

1-4 Turn over the microscope. Remove the SCREW. The LOWER COVER comes off.  
* Danger. Be sure power plug must be disconnected.

1-5 Remove the four SCREWS. The LAMP HOUSE comes off.

1-6 Remove the three SCREWS. The BASE comes off.
2. DISASSEMBLING THE ARM

2-1 Loosen sufficiently or remove two SCREWS.
   * When the SCREWS are removed, the WIRE FIXING PIECE comes off.

2-2 Remove the two SCREWS, and take off carefully the METAL BLOCK.
   * The BALL BEARING comes off together. Take care not to lose it.

2-3 Remove the WIRE GUIDE fit in each groove.
B. DISASSEMBLING PROCEDURE

2-4 Remove the two SCREWS, and take off the RACK.

2-5 Remove carefully the PLATEs at both ends of the COARSE AND FINE ADJUSTMENT KNOBs by inserting tweezers end into the NOTCH.

* The PLATE is stuck to the KNOBs. Take care not to bend it.

2-6 Insert the ALLEN WRENCH end into the screws at both ends of the COARSE AND FINE ADJUSTMENT KNOBs, and turn in the arrow direction to remove the screws.

* Apply 2 ~ 3 drops of the ETHER AND ALCOHOL around the screws to facilitate the removal.

* The FINE ADJUSTMENT KNOB and WASHER come off.
2-7 Use the special tool to remove the NUT.
* The NUT is difficult to take off because of the adhesive used between the SHAFT. If it is difficult to remove, turn the NUT once in the tightening direction and then loosen it.

Tool KKAA4665

2-8 Remove the LEFT COARSE ADJUSTMENT KNOB by twisting it by hand.
* The RIGHT COARSE ADJUSTMENT KNOB comes off also with the shaft.

2-9 Insert the tweezers end between the ARM and COVER, and remove the COVER.
B. DISASSEMBLING PROCEDURE

2-10 Loosen sufficiently the two SCREWS, and remove the PINION ASS'Y.

2-11 Remove the RING fixing the REVOLVING NOSEPIECE by using the special tool.

* The REVOLVING NOSEPIECE comes off.

Tool LBOB0015

2-12 Disassemble the PINION ASS'Y.

1. Turn the TENSION KNOB in the arrow direction to remove it.

* The SPRING and WASHER come off.
2. Apply solvent to the NUT thread.

   Solvent RELEASE AGENT O1390

3. Remove the NUT by using the special tool.
   * The NUT is very firmly tightened. Take care not to damage the slot at the nut top.

   Tool KC-2010
   KKAA7828

4. The PINION comes off, and the PINION MOUNT come out of the BEARING.
   * Take care not to lose the PINION MOUNT.
B. DISASSEMBLING PROCEDURE

2-13 Remove the three SCREWS of the RIGHT COARSE ADJUSTMENT KNOB, and take off the PLATE.

* Three GEARS come off.

3. DISASSEMBLING THE MECHANICAL STAGE

3-1 Remove the three SCREWS, and take off the KNOB ASS'Y.

3-2 Remove the two SCREWS, and disassemble the stage into the VERTICAL FEED SECTION and the HORIZONTAL FEED SECTION.
3-3 Separate the VERTICAL FEED SECTION and the HORIZONTAL FEED SECTION. Remove the two SCREWS, and take off the RACK.

3-4 Remove the four SCREWS of the VERTICAL FEED SECTION, and disassemble it.

3-5 Remove the three SCREWS of the HORIZONTAL FEED SECTION, and disassemble it.
B. DISASSEMBLING PROCEDURE

3-6 Remove the three SCREWs, and take off the SPECIMEN HOLDER.
   * The SPACER comes off together.

3-7 Disassemble the KNOB ASS'Y.
   1. Remove the NUT.
   2. Turn the smaller KNOB by hand.
      * Two WASHERs and one SPRING come off together.
      * PINION and WASHER come off, too.
3. Remove the smaller NUT, and then remove the larger NUT.

* The KNOB ASS'Y is assembled as shown in the photograph on left.

4. DISASSEMBLING THE CONDENSER

4-1 Twist the condenser by hand and disassemble it into the UPPER PART and the LOWER PART.

* The upper and lower parts are difficult to separate because of the silicon adhesive (KE45) used in the threads of these parts. Please care to disassemble them without any damage.

4-2 Remove the RING, and take off the LENS.
B. DISASSEMBLING PROCEDURE

4-3 Remove the RING further.
* The RING is sometimes difficult to remove. Take care not to deform the mold FRAME.

4-4 Push and remove the LENS at the CONDENSER end.
* The lens is fixed with silicon adhesive. Take care not to damage the lens when removing it.

4-5 Pull out the FILTER FRAME from the CONDENSER by hand.
B. DISASSEMBLING PROCEDURE

4-6 Remove the three SCREWS, and take off the LOWER FRAME.

4-7 Remove the LEVER by hand.
* The DIAPHRAGM BLADE comes off.

5. DISASSEMBLING THE BASE

5-1 Remove the two SCREWS, and take off the SHADE PLATE.
B. DISASSEMBLING PROCEDURE

5-2 Remove the RING C. The LENS FRAME comes off.

5-3 Remove the LENS FRAME and RING, and disassemble as illustrated at the left.

Disassembling has now been completed. Clean the disassembled metallic parts with the mixed solution to eliminate the adhesive or grease adhered thereto. Clean the mold parts with neutral detergent to wash away the stain.
C. REASSEMBLING AND ADJUSTMENT

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1. REASSEMBLING THE BASE

1-1 Put two lenses and one SPACER into the LENS FRAME, and fix them with a RING.

1-2 Fit the LENS FRAME in the BASE, wind the RING-C (SPRING) around the LENS FRAME to fix it from the rear side of the base.

1-3 Fix the SHADE PLATE with two SCREWS as illustrated at the left.

Screw CUK 3x4SA 2 pcs.
2. REASSEMBLING THE CONDENSER

2-1 Place the DIAPHRAGM BLADES on the UPPER FRAME.

1. Insert the DIAPHRAGM BLADE pins into the UPPER FRAME holes.
   * The DIAPHRAGM BLADE has front and back sides. Take care not to confuse the sides.

2. When the UPPER FRAME holes cannot be seen, four DIAPHRAGM BLADES remain. Place them just like inserting into the clearance between the UPPER FRAME and DIAPHRAGM BLADE.
   * It is easy to insert the remaining DIAPHRAGM BLADES by pushing lightly the up-side of the notch, which notch is inserted in the hole, of the last inserted DIAPHRAGM BLADE.

2-2 Mount the LEVER.

1. Push the DIAPHRAGM BLADE to the outside wall, so that the diaphragm opens fully.
2. Place the ring on the UPPER FRAME so that the LEVER is located at the middle of the notch of the UPPER FRAME.

* Place the RING so that all the pins fit into the ring groove. It is correct, if the LEVER turns smoothly when turning it.

3. Turn the RING to narrow slightly the diaphragm, 2 ~ 3mm smaller than the RING inside diameter.

4. Gently remove the RING without moving the DIAPHRAGM BLADE.
Mount the RING so that the LEVER is set as close to the right side wall of the UPPER FRAME notch as possible.

* Mount the RING carefully so that all the pins fit into the RING groove. It is correct, if the ring turns smoothly when turning it.

2-3 Mount the LOWER FRAME, and fix it with three SCREWS.

SCREW CUTB 3x8SA  3 pcs.

2-4 Insert the filter frame into the condenser.

2-5 Apply an adhesive evenly to the tapered part on the inside of the upper frame of the CONDENSER, and push the tapered part of the LENS thereto. Screw the RING to fix the LENS.

* The adhesive functions also as sealing. It should be applied all around the tapered part so that no clearance is made between the lens and the frame.
* The lens side can not be cleaned after the ring is tightened. So be sure to clean it beforehand.
* Take off the exuded adhesive. (If it remains in very small amount, clean it with the mixed solution.)

Adhesive KE45 black (OT1017)
C. REASSEMBLING AND ADJUSTMENT

2-6 Insert the LENS into the frame of the upper part of the condenser as illustrated at the left, and screw the RING to fix it.

2-7 Apply a thin coat of adhesive all around the thread of the inside of the upper part of the condenser, and screw the lower part of condenser thereinto.

Adhesive KE45 black (OT1017)

Upper part of CONDENSER

Lower part of CONDENSER

3. REASSEMBLING THE MECHANICAL STAGE

3-1 Reassembling the HORIZONTAL FEED SECTION

1 Place two WIRES on the LATERAL GUIDE 1 as illustrated at the left.

* The WIRE is available in two lengths. Use the longer one (105mm).
C. REASSEMBLING AND ADJUSTMENT

2. Set the CASING at the middle of the WIRE.

3. Smear all the ROLLERS slightly with grease.

   Grease Los 72515 (OT2008)

4. Arrange the ROLLERS in the square holes of the CASING by changing the axis direction 90° alternately.

5. Stick two WIRES to the groove with the scale of the LATERAL GUIDE 2 by applying grease to the surface making contact with the groove.

   * Use the longer WIRE (105mm).

   Grease Los 72515 (OT2008)
6. Gently place the LATERAL GUIDE 2 with the wire stuck on the ROLLERS arranged in the groove of the LATERAL GUIDE 1.

* The scale of the LATERAL GUIDE 2 should be located on the opposite side.

Grease Los 72515 (OT2008)

7. Place two wires on the groove of the LATERAL GUIDE 2, and place a casing on to the four ROLLERS.

8. Gently place the LATERAL GUIDE 3 with the wire stuck on the ROLLERS arranged in the groove of the LATERAL GUIDE 2.

* Use the longer WIRE (105mm).

Grease Los 72515 (OT2008)
C. REASSEMBLING AND ADJUSTMENT

9) Fasten the LATERAL GUIDE 3 with three SCREWS.

- Screw 3PUK 2.6x10SA 3 pcs.
- Washer KNW 2.6SA 3 pcs.

* Tighten the SCREWS to the extent that the LATERAL GUIDE 3 can be moved by the finger force.

10) Adjust the LATERAL GUIDE.

1) Move the LATERAL GUIDE 2 to the left side. Hold the LATERAL GUIDE 1 and 3 with fingers so as to tighten the LATERAL GUIDE 2, and tighten the left side SCREW while applying the force.

2) Move the LATERAL GUIDE 2 to the right side, and tighten the right side SCREW in the same manner as in (1).

3) Repeat (9) and (1) and (2) of (10) until rattling friction, roughness and unevenness are not felt by hand movement.

4) Tighten three screws securely, and apply a looseness preventive adhesive between the screw head and LATERAL GUIDE 3.

- Adhesive Shellac (OT1131)

11) Fix the SPECIMEN HOLDER and SPACER to the LATERAL GUIDE 2 with three SCREWS.

- SCREW 3PSK 2x8SA 3 pcs.

12) Fix the RACK tentatively to the LATERAL GUIDE 2 with two SCREWS.
3-2 Assembling the VERTICAL FEED SECTION

1. Place two WIRES and a CASING sequentially on the four ROLLERS in the groove of the VERTICAL GUIDE 1.
   * Use the WIRE (89mm) for the vertical feed section.

2. Gently place the BODY and the VERTICAL GUIDE 2 with the wire stuck on the ROLLERS arranged in the groove of the VERTICAL GUIDE 1.

GREASE Los 72515 (OT2008)

3. Please refer to No. C-9, 1
4. Gently place the VERTICAL GUIDE 3 with the wire stuck on the rollers arranged in the groove of the VERTICAL GUIDE 2.

GREASE Los 72515 (OT2008)

5. Fasten the VERTICAL GUIDE 3 tentatively with four SCREWS from the rear side of the VERTICAL GUIDE 1.

SCREW AB 3x6SA 4 pcs.

6. Adjust the VERTICAL GUIDE.

1. Adjust the VERTICAL GUIDE 3 to the extent that it is moved by finger force.

2. Move the VERTICAL GUIDE 2 to the front. Hold the VERTICAL GUIDE 1 and 3 with fingers so as to tighten the VERTICAL GUIDE 2, and tighten the screw nearest to the front while applying the force.

3. Move the VERTICAL GUIDE 2 to the opposite side, and tighten the screw nearest to the opposite side in the same manner as in (2).

4. Repeat (1) to (3) of until rattling, friction, roughness and unevenness are not felt by hand movement.

5. Tighten four screws securely, and apply a looseness preventive adhesive between the screw head and VERTICAL GUIDE 1.
C. REASSEMBLING AND ADJUSTMENT

3-3 Reassembling the handle

1. Apply a thin coat of grease to the WASHER and a part of the PINION, and insert the PINION into the WASHER and the METAL.

   **GREASE Los 72515 (OT2008)**

   * Take care not to apply the GREASE to the thread of the PINION.

2. Apply a thin coat of grease to the specified part of the METAL, and insert it into the WASHER (⌀10mm) with the grease coated on both sides and KNOB.

   **GREASE Los 72515 (OT2008)**

   * Take care not to apply the GREASE to the thread of the METAL.

3. Hold the SPRING WASHER (⌀12mm) with two WASHERS (⌀14mm) with the grease coated on both sides, and insert the METAL thereonto.

   **GREASE Los 72515 (OT2008)**

   * Take care not to apply the grease to the thread of the METAL.
4. Screw the NUT 1 (φ14mm) onto the METAL.
   * Tighten the nut slightly by hand.

5. Screw the NUT 2 (φ11mm) onto the NUT 1, and tighten it slightly by hand.

6. Hold the SPRING WASHER (φ8mm) with two WASHERS (φ8mm) with the grease coated on both sides, and insert them onto the PINION.

   **GREASE Los 72515 (OT2008)**

7. Screw the KNOB into the thread of the PINION.
   * Tighten it slightly by hand.

8. Tighten the nut firmly on the KNOB.

   **NUT 6N4SA 1 pc.**
3-4 Assembling the units

1. Fix the VERTICAL FEED SECTION to the STAGE with two SCREWS.

   SCREW AB 3x10SA 2 pcs.

VERTICAL FEED SECTION

2. Fasten the HORIZONTAL FEED SECTION tentatively to the VERTICAL FEED SECTION with two SCREWS.

   SCREW AB 3x6SA 2 pcs.

HORIZONTAL FEED SECTION

VERTICAL FEED SECTION

3. Insert a plate with THICKNESS of 0.3 ~ 0.4mm (THICKNESS GAUGE, etc.) under the SPECIMEN HOLDER, push the SPECIMEN HOLDER slightly downward, and tighten two screws alternately.

4. Verify that a plate with THICKNESS of 0.7mm (THICKNESS GAUGE or block gauge) can not be inserted under the specimen holder. Verify also that the SPECIMEN HOLDER does not make contact with the stage.
5. Fix the KNOB ASS'Y to the VERTICAL FEED SECTION with three SCREWS.
   SCREW AB 3x6SA 3 pcs.

6. Fasten the RACK tentatively to the VERTICAL FEED SECTION with two SCREWS.

7. Adjust the RACK of the VERTICAL FEED SECTION.
   (1) Loosen the two SCREW fastening the RACK.
(2) Move the RACK to the left or right against the PINION.

(3) Push the RACK slightly to the PINION, and tighten slightly the screw of the side pushing the RACK.

(4) Move the RACK to the opposite side, and do in the same manner as (3).

(5) Move the rack all strokes and verify that there is no rattling, friction, squeak and unevenness. If such a defect is detected, repeat (1) to (4). If normal, tighten the three screws gradually and alternately.
C. REASSEMBLING AND ADJUSTMENT

8) Adjust the RACK of the HORIZONTAL FEED SECTION.

* Adjustment is in the same manner as 7.

9) Adjust the weight of the Y-KNOB:

(1) Remove the NUT and the X-KNOB. The two WASHERs and SPRING WASHERs come off, too.

(2) Loosen the smaller one of the two NUTs fastening the Y-KNOB. Tighten the LARGER NUT gradually. The Y-KNOB's rotation force becomes heavy. Stop tightening the NUT at an appropriate timing, and tighten the SMALLER NUT so that the larger nut does not turn.

(3) Turn the Y-KNOB and check if the rotation force is too heavy or light.

<table>
<thead>
<tr>
<th>Standard Rotation force at the Y-KNOB around 50 ~ 200g (Tension gauge)</th>
</tr>
</thead>
</table>

* If the rotation force is out of the standard, repeat (2).
C. REASSEMBLING AND ADJUSTMENT

(1) Adjust the weight of the X-KNOB.

(2) Assemble the two WASHERS and SPRING WASHERS which were removed in (3), (1). Screw the X-KNOB gradually. The X-KNOB's rotation force becomes heavy. Stop screwing the X-KNOB at an appropriate timing, and tighten the NUT so that the X-KNOB does not turn.

* At this time, adjust also the Y-KNOB's rotation force slightly.

(2) Turn the X-KNOB and check if the rotation force is too heavy or light.

| Standard Rotation force at the X-KNOB around 20 ~ 100g (Tension gauge) |

* If the rotation force is out of the standard, repeat (1).
4. REASSEMBLING THE ARM

4-1 Reassembling the PINION ASSEMBLY ASSEMBLING

① Secure the PINION MOUNT to the PINION.

(1) Smear GREASE on 60 BALLs.

BALL B1/16 60 pcs.

| GREASE P2MO (OT2012) |

(2) Arrange the 30 BALLs around the PINION.

* Apply GREASE to the PINION beforehand.

| GREASE P2MO (OT2012) |

(3) Put the PINION MOUNT with the GREASE applied to the surface of the PINION.

| GREASE P2MO (OT2012) |

(4) Arrange the 30 BALLs in the groove between the PINION MOUNT and PINION.

* Never touch the GREASE to the thread of the PINION.
C. REASSEMBLING AND ADJUSTMENT

(5) Tighten the NUT so that the PINION turns smoothly when it is moved in the thrust direction.

(6) Apply an adhesive to the NUT thread, and tighten the nut.

Adhesive ALTECO ACE 88 (OT1338)

2 Assemble the right COARSE ADJUSTMENT KNOB.

(1) Insert the SHAFTs of three GEARs into the three holes of the right COARSE ADJUSTMENT KNOB.

* Apply GREASE to the GEAR SHAFT beforehand.

GREASE P2MO (OT20212)
C. REASSEMBLING AND ADJUSTMENT

2. Secure the PLATE to the RIGHT COARSE ADJUSTMENT KNOB with three SCREWS. The gear is also secured by this PLATE.

* After securing the PLATE, verify that the GEAR turns smoothly.

SCREW CSTB 3x10SA 3 pcs.

3. Attach the REVOLVING NOSEPICE to the ARM.

1. Insert the JOINT screwed into the ARM at the specified position.

2. Attach the REVOLVING NOSEPICE to the JOINT, and SCREW the ring into the JOINT to fix the REVOLVING NOSEPICE.

Tool LBOB0015
CHK-F
C. REASSEMBLING AND ADJUSTMENT

4) Secure the METAL BLOCK to the ARM.

(1) Place two WIRES in the ARM groove as illustrated at the left.

* The WIRE is available in two lengths. Use the longer one (82mm) for the ARM groove.

(2) Place the CASING at the middle of the WIRES. Put the six balls smeared with GREASE in the six holes of the CASING.

GREASE Los 20 (OT2010)

(3) Stick the two WIRES to the ARM groove with GREASE so that the WIRES do not drop by their own weights.

GREASE Los 20 (OT2010)
(4) Stick the two WIREs to the METAL BLOCK groove with GREASE so that the WIREs do not drop by their own weights.

(5) Put the two WIREs, the CASING and the ball smeared with GREASE sequentially on the GUIDE.

(6) Fasten two WIRE FIXING PIECES to the METAL BLOCK with two SCREWS.

SCREW AB 3x12SA 2 pcs.
(7) Place the METAL BLOCK on the BALLS arranged in the ARM groove.

(8) Insert the GUIDE as illustrated on the left, and fasten it tentatively to the METAL BLOCK with two SCREWS.

SCREW AB 3x12SA 2 pcs.

(9) Tighten the two SCREWS fastening the WIRE FIXING PIECE. The grooves of the METAL BLOCK and GUIDE are broadened. Adjust the tension with the two A SCREWS so that the METAL BLOCK moves smoothly without rattling.

(10) After the adjustment, tighten securely the two B SCREW fastening the GUIDE.
C. REASSEMBLING AND ADJUSTMENT

5) Secure the PINION ASS'Y to the ARM.

1) SCREW the TENSION KNOB with GREASE applied to the thread into the PINION.

   GREASE 1160C (OT2006)

* The pinion has the left hand screw. Screw the tension knob counter-clockwise.

2) Insert the PINION ASS'Y into the ARM.

* The GEAR should come at the middle of the ARM.

3) Fix the PINION with two screws from the rear side of the ARM. After tightening the screws, apply an adhesive to the SCREWS for prevention of looseness.

   ADHESIVE Shellac (OT1131)

   SCREW ACU 3x6SA 2 pcs.

Rear side of ARM
C. REASSEMBLING AND ADJUSTMENT

6. Assemble the COARSE ADJUSTMENT KNOB.

1. Place the WASHER and the SPRING WASHER coated with GREASE sequentially on the TENSION KNOB.

   GREASE Los 20 (OT2010)

2. Apply GREASE to the SHAFT of the RIGHT COARSE ADJUSTMENT KNOB, and insert it into the PINION.

   GREASE Los 72515 (OT2008)

3. Put the WASHER coated with GREASE on the LEFT COARSE ADJUSTMENT KNOB.

   GREASE Los 72515 (OT2008)

4. SCREW the LEFT COARSE ADJUSTMENT KNOB onto the SHAFT of the RIGHT COARSE ADJUSTMENT KNOB.

   * Screw the TENSION KNOB into the arm beforehand.
C. REASSEMBLING AND ADJUSTMENT

(5) Apply an adhesive to the NUT thread, and SCREW it into the LEFT COARSE ADJUSTMENT KNOB by using a special tool.

<table>
<thead>
<tr>
<th>Adhesive</th>
<th>Perma lock MM (OT1126)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>KKAA4665</td>
</tr>
</tbody>
</table>

(6) Insert the rack between the ARM and the METAL BLOCK, and fix the METAL BLOCK with two SCREWS.

(7) Assemble the FINE ADJUSTMENT KNOB.

(1) Apply GREASE to the SHAFT of the RIGHT FINE ADJUSTMENT KNOB, and insert it into the COARSE ADJUSTMENT KNOB.

| GREASE    | Los 72515 (OT2008)     |
(2) Put the METALLIC WASHER, the SPRING WASHER and the washers coated with GREASE sequentially on the LEFT COARSE ADJUSTMENT KNOB.

![Diagram of washers and screw](image)

**GREASE** Los 72515 (OT2008)

(3) Mount the LEFT FINE ADJUSTMENT KNOB as illustrated at the left, and fix it with a SCREW.

![Diagram of fine adjustment knob](image)

**SCREW** ABS 3x8SA 1 pc.

* Apply an adhesive to the SCREW for prevention of looseness.

![Diagram of adhesive](image)

**Adhesive** Shellac (OT1131)

(4) Stick a PLATE to both ends of left and right FINE ADJUSTMENT KNOBS.

![Diagram of plate attachment](image)
5. ASSEMBLING THE UNITS INTO SINGLE BODY

5-1 Secure the BASE to the ARM with three SCREWS.

* The ARM relative position should not be displaced from the ARM mounting surface of the BASE.

SCREW AB 6x10SA 3 pcs.

5-2 Secure the stage to the METAL BLOCK with three SCREWS.

SCREW AB 3x8SA 1 pc.
SCREW AB 3x12SA 2 pcs.

* Take care not to lose the WASHERs.
C. REASSEMBLING AND ADJUSTMENT

5-3 Loosen a SCREW sufficiently, and mount the CONDENSER. Tighten
the clamp SCREW to fix the CONDENSER.

5-4 Secure the LAMP HOUSE to the BASE
with four SCREWS.

<table>
<thead>
<tr>
<th>SCREW</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUK 3x6SA</td>
<td>1 pc.</td>
<td></td>
</tr>
<tr>
<td>CUJSK 3x6SA</td>
<td>3 pcs.</td>
<td></td>
</tr>
</tbody>
</table>

5-5 Mount the LOWER COVER as illustrated at the left, and
fix it with a KNOB.