

## Four-bar intelligent knee NI-C411 & NI-C421 Instruction Manual

### **【Alignment setting procedure】**

When assembling the above-knee prosthesis using four-bar intelligent knee NI-C411 & NI-C421 the bench alignment can be set by taking the procedure given in the following. (see Fig.1.)

#### 1. Basic alignment setting for frontal plane

As shown in Fig.1 (a), set the alignment so that the load line of body weight passes the center of the knee and reaches the center of heel.

#### 2. Basic alignment setting for sagittal plane

- As shown in Fig.1 (b), set the alignment so that the load line of body weight passes 5mm forward from the center of upper front bar and the midpoint between heel and toe-break. This shall be the basic alignment setting.
- From this basic alignment setting, it is recommended for a highly active person to further adjust the alignment setting backward within the range up to 5mm (0 to 5mm forward from the center of upper front bar), and for a less active person to adjust the alignment setting forward within the range up to 5mm (5 to 10mm forward from the center of upper front).

\* In setting the alignment, pay attention to the particulars mentioned in the following.

- 1) Do not set the alignment beyond basic setting. Otherwise, it will cause unreasonable force to act against the knee and may cause trouble or damage to the knee.
- 2) With the knee joint fully extended, set the alignment.

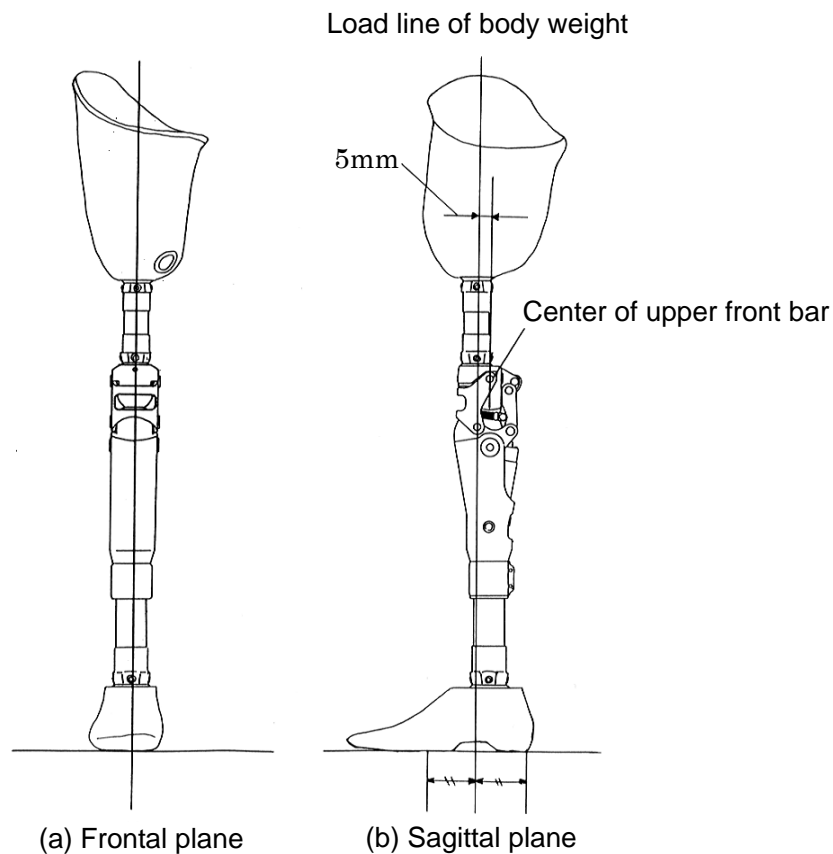


Fig.1 Basic alignment

## 【Adjustment when looseness occurred in the knee axis】

### Adjustment to repair looseness in knee axis

When looseness occurred in the knee axis, it can be corrected by taking the adjustment procedure to tighten the toothed bolts in order A, B then C as shown in Fig.2.

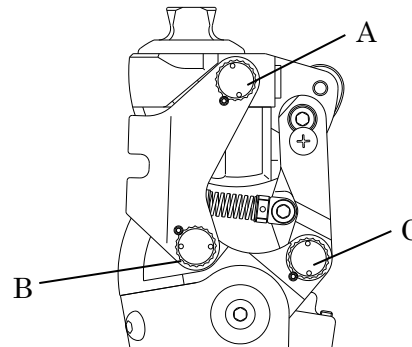


Fig.2

### Adjustment procedure

1. In order to provide a measure for the degree of toothed bolts tightening, apply a mark using magic ink for example

on the root thread of toothed bolt A which is in contact with locking screw.  
(See Fig.3.)

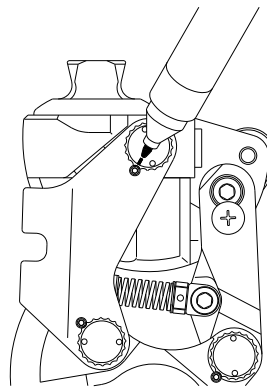


Fig.3

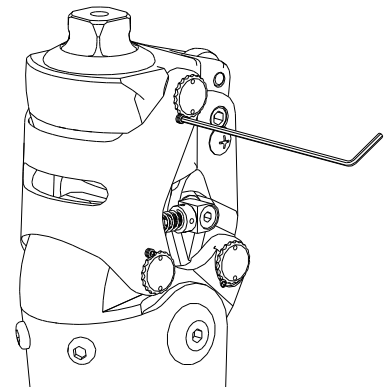


Fig.4

2. Remove the locking screw using a hexagonal wrench (1.5mm).  
(See Fig.4.)

3. Using a specialized tool for tightening the toothed bolts, tighten the toothed bolt A by single thread, then confirm the degree of looseness. If the looseness still present, apply further tightening. However, be aware that an over-tightening will cause an increased resistance to bending and extending motion.  
(See Fig.5)

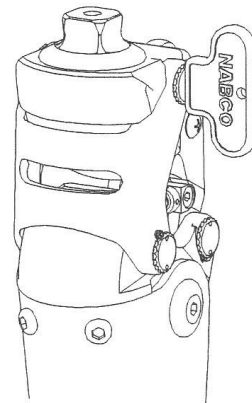


Fig.5

4. If the above mentioned tightening solves the looseness problem, then the adjustment on toothed bolts B and C is not be necessary. If, however, the looseness is still present, use the same procedure to adjust toothed bolt B and C in order.

5. Try bending and extending on the knee to confirm the smoothness, then set the locking screw. (See Fig.6.)

\* If the resistance to bending or extending motion is large, loosen the toothed bolts as required in order C, B, then A.  
\* To each locking screw apply adhesive (LOCTITE® #243 or equivalent) to assure the locking effect.

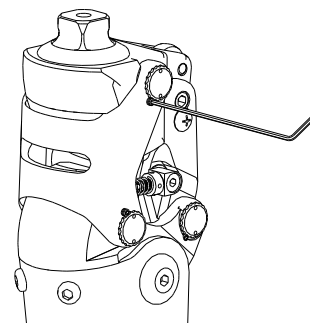


Fig.6

**【Battery replacement procedure】**

Before inserting the battery connector, be sure to eliminate static electricity by, for example, touching a desk.

1. Remove the battery connector off the circuit board.  
(See Fig.7.)
2. Loosen the outer clamp tightening bolt, then pull out the pipe.
3. Remove the outer clamp off the frame, remove the locking screw, then pull out the inner clamp together with battery case. (See Fig.8.)
4. Turn the cap of battery holder using a coin or the like, then remove the battery. (See Fig.9.)
5. Place new battery in the battery holder.  
\* In placing the new battery, have the battery lead wire be in the slit on the inner clamp.  
(Otherwise, the battery will not go fully into depth.)  
(See Fig.10.)
6. Set the cap of battery holder, then fix it.
7. Set the inner clamp in the frame.  
\* In setting the inner clamp, have the battery connector be on the front surface side of the circuit board, as shown in Fig.8.
8. Set the locking screw.  
\* Drive the screw to the extent that the screw head is not projecting out the frame surface.  
Be aware particularly that an over-driving may cause damage to battery case and battery itself.
9. Set the outer clamp in place.
10. Plug the battery connector in the connector on the circuit board.  
\* In plugging in the connector, use of tweezers will make the job easier.

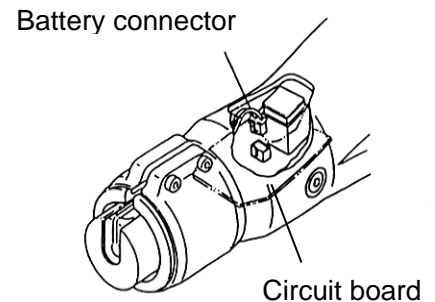


Fig.7 Removing the battery

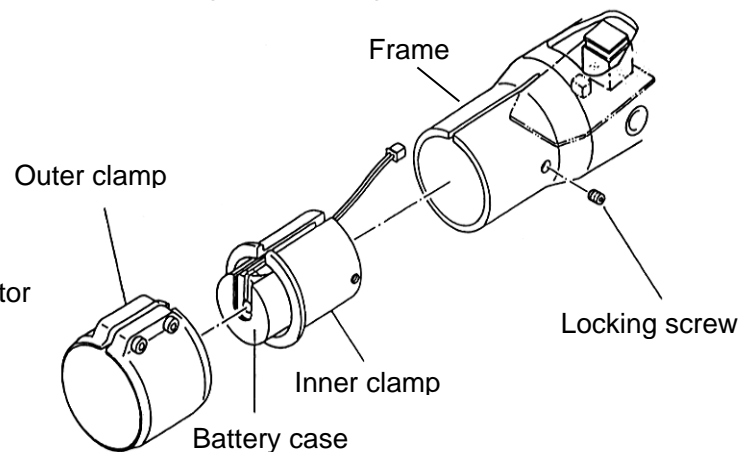


Fig.8 Removing the clamp

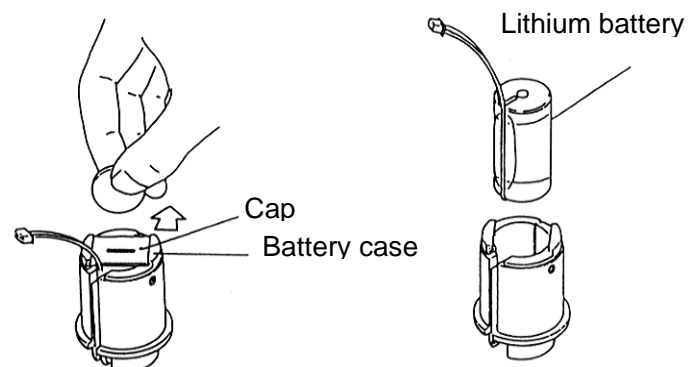


Fig.9 Removing the battery cap

Fig.10 Removing the battery

**【Stopper rubber replacement procedure】**

Stopper rubber is on either side, the expanding side and bending side. The rate of their exhaustion depends on the frequency of use. However, their replacement once every year is recommended. And the replacement can be done by taking the procedure given in the following.

**1. Extension stopper rubber (See Fig.11.)**

1) With the knee bent, use a minus driver or the like to pick up and take out the stopper rubber.

2) Set a new stopper rubber in place.

\* Even if you have difficulty in setting, make sure to set it securely using a minus driver or the like.

**2. Bend stopper rubber (See Fig.12.)**

1) With the knee fully extended, use a minus driver or the like to pick up and take out the stopper rubber.

2) Set a new stopper rubber.

\* Even if you have difficulty in setting, make sure to set it securely using a minus driver or the like.

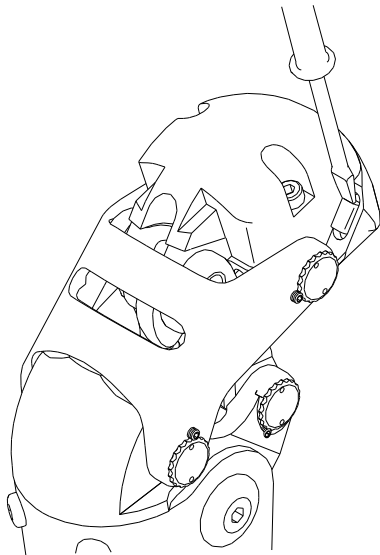


Fig.11

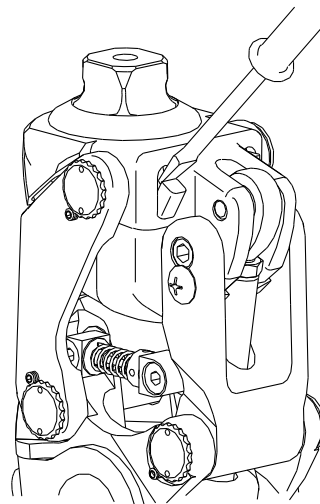
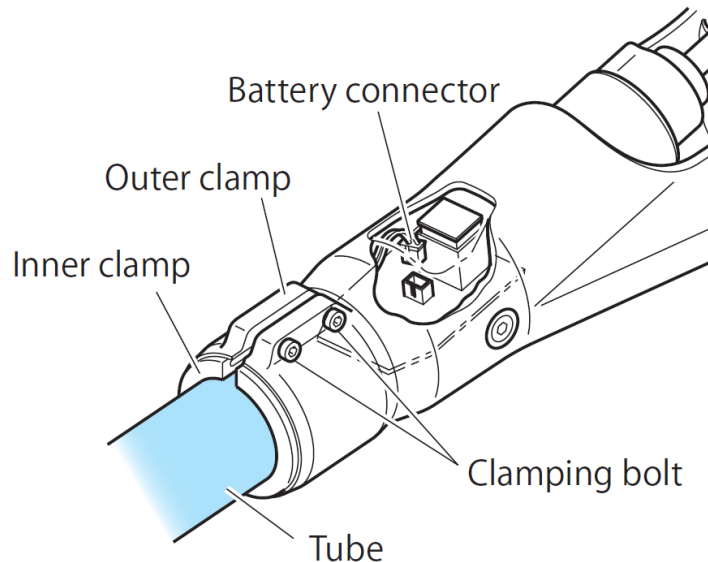


Fig.12

**【Assembling the Tube】**

- 1 Loosening the outer clamp bolts, insert the tube into the inner clamp and push the tube until it hits the stopper of the inner clamp.
- 2 When assembling the tube, be sure to align the split groove of the outer clamp with that of the inner clamp.
- 3 Tighten the bolts to a torque of 4.5 to 5.0 N·m.



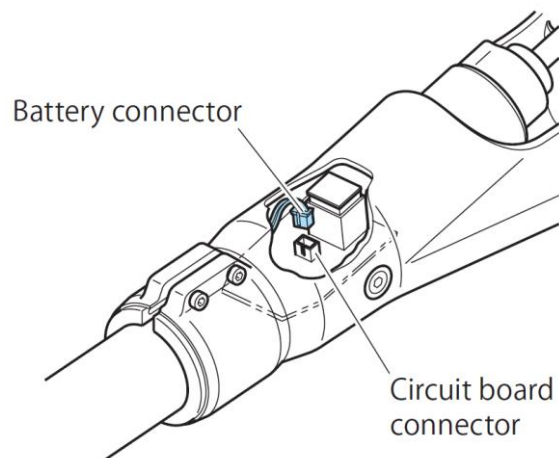
For safe use, you are recommended to use the tube made by Nabtesco. When using one made by any other manufacturer due to unavoidable circumstances, be sure to use one whose outside dimension tolerance is within +/-0.05 mm.

**【Inserting the Battery Connector】**

Before inserting the battery connector, be sure to eliminate static electricity by, for example, touching a desk.

The battery connector has been disconnected for shipment.

To use the Knee Joint, be sure to insert the battery connector into the circuit board connector.



- Connecting the adjustment unit, perform reset.
- Confirm that motor sound is normal.
- \* When the motor continues to run, perform the reset operation. (There is a risk that battery electricity may be abnormally consumed.)