

# CMZ700 OVERHAUL MANUAL 1

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## Chapter 1. Take out the gyro sphere

This manual is used for exchanging the KT005 gyro sphere of the CMZ700,CMZ500-Mod700 type.

### **Danger**

Risk of mercury

- Do not allow mercury to come into contact with skin. If contact does occur , thoroughly wash the affected area with clean water immediately.
- If mercury is accidentally spilled, it should be drawn off with a syringe or the like and kept in a glass bottle.

### **Caution**

#### ■ Precaution in handling the gyro sphere

- Hold the gyro sphere firmly with both hands so as not to subject it to any shock.
- Do not drop the gyro sphere. Dropping the gyro sphere may result in damage to the internal mechanism or lead to personal injury.
- Do not disassemble the gyro sphere.

#### ■ Precaution in handling the container

- Hold the container firmly with both hands.
- Do not drop it. Dropping the gyro sphere may result in damage to the internal mechanism or lead to personal injury.
- Clean the hand before handling the gyro sphere.

## Chapter 1. Take out the gyro sphere

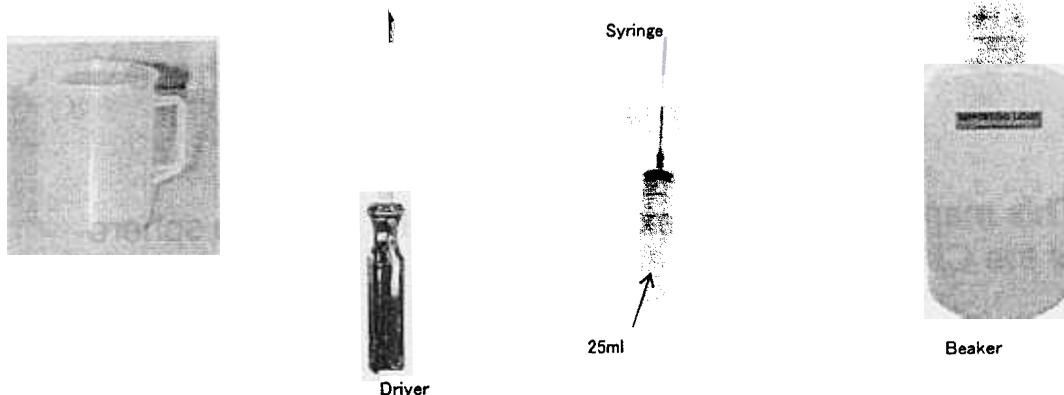
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### 1) Caution

If the gyro sphere is to be removed from the containers, first turn off power and leave it for at least 1.0 hours.

### 2) Equipment and tools to be prepared

Beaker , No2Allen-type screwdriver、 Syringe (Large) and a bottle for waste liquid



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Yokogawa Denshikiki Co.,Ltd.

## Chapter 1. Take out the gyro sphere

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### 3) Removal of the container from the master compass and take out of the gyro sphere

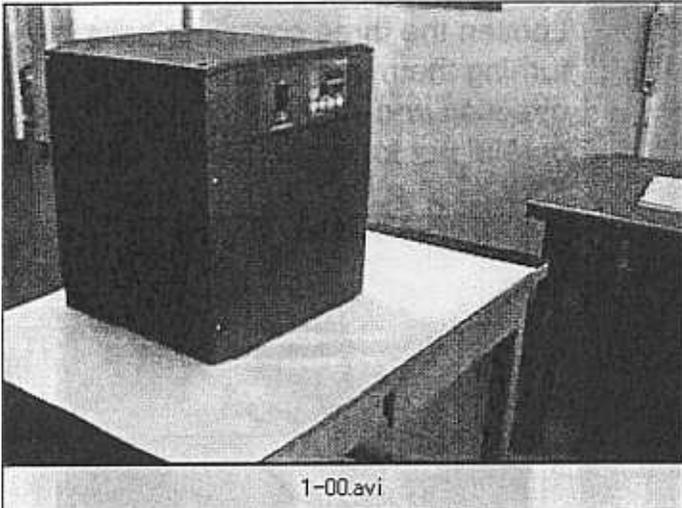
Remove the front cover of the master compass if the master compass is stand alone type.

- ① Remove the connectors connecting the master compass and the container.
- ② Loosen the container bolts and remove the container from the master compass.

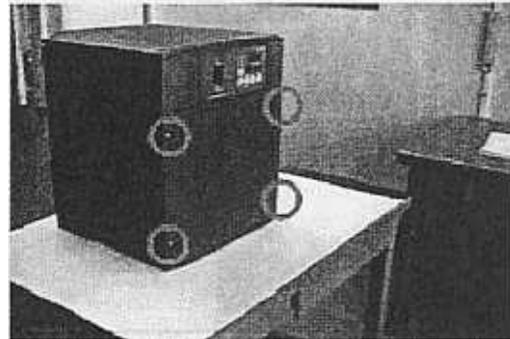
The above describes the procedure for taking out the container from the master compass

- ③ Remove the screw from the vent hole
- ④ Remove the wire connected to the center pin
- ⑤ Remove the cap from the center pin.
- ⑥ Pull out the center pin
- ⑦ Place the beaker under the drain and remove the drain screw
- ⑧ Disengage the connectors that connect the upper and lower containers.
- ⑨ Remove the bolts that fasten the upper and lower containers together
- ⑩ Remove the upper container
- ⑪ Remove the supporting liquid from within the mercury pot
- ⑫ Take out the gyro sphere out of the lower container.

Remove the front cover of the master compass



Remove the 4 screw of the front cover

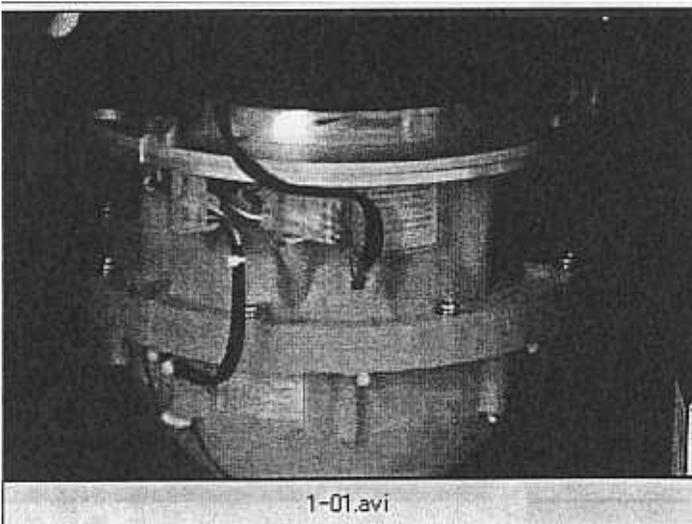


**※Before working**

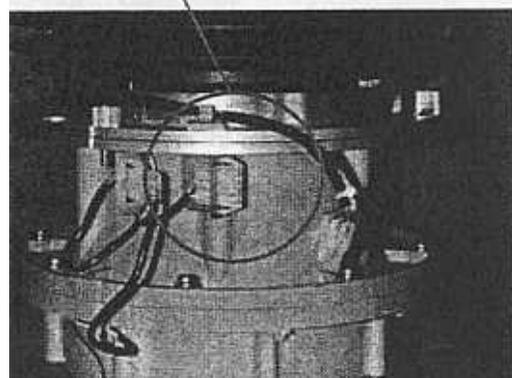
**Gyro sphere is to be removed from the containers, first turn off power and leave it for at least 60 minutes**

Remove the 4 screw of the front cover

**① Remove the connectors connecting the master compass and the container**

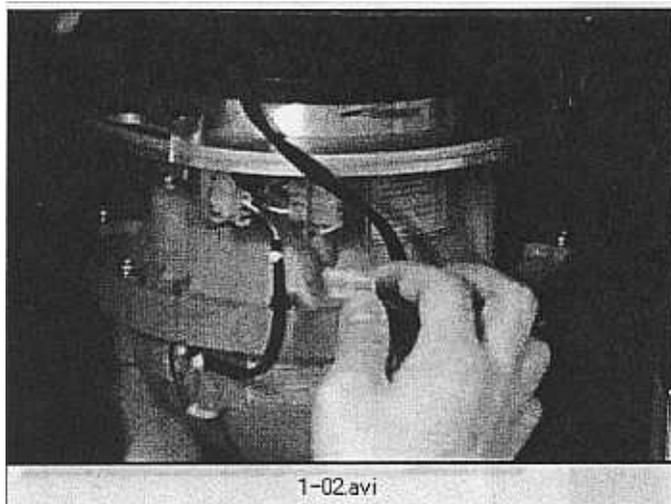


Disengage the connector (4 terminals)

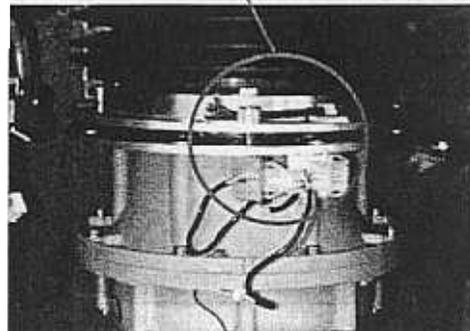


Disengage the connectors (4 terminals)

**② Loosen the container bolts  
and remove the container from the master compass**

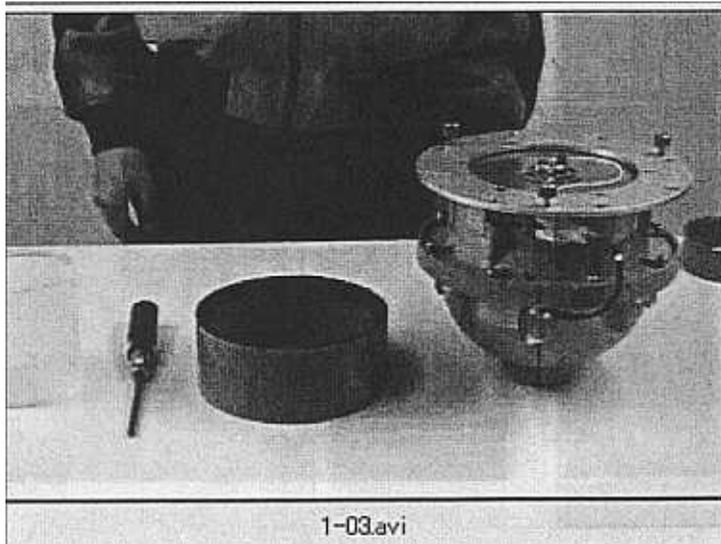


Loosen the three container bolts by turning them in a counterclockwise direction and remove the container. Be careful not to let the container hit the floor.

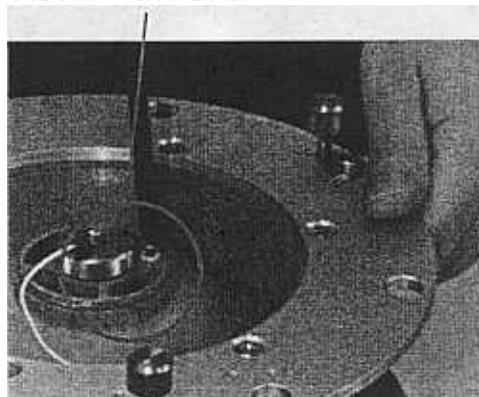


※Take the gyro sphere out of the container.  
When taking the gyro sphere out of the container, work on a flat surface and ensure that the container does not fall over.

**③ Remove the screw from the vent hole**

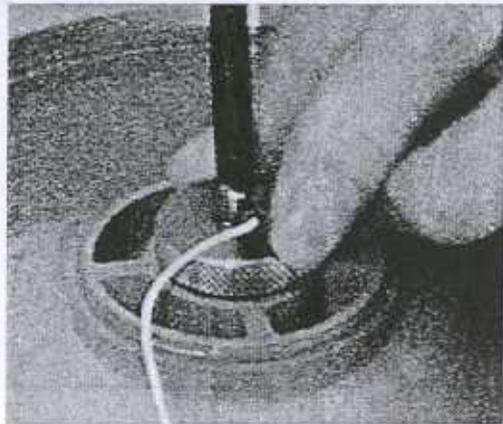
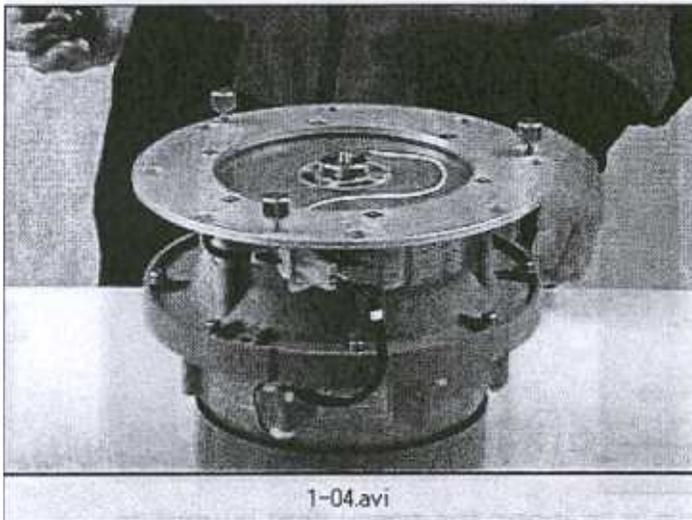


Resin washer and screw



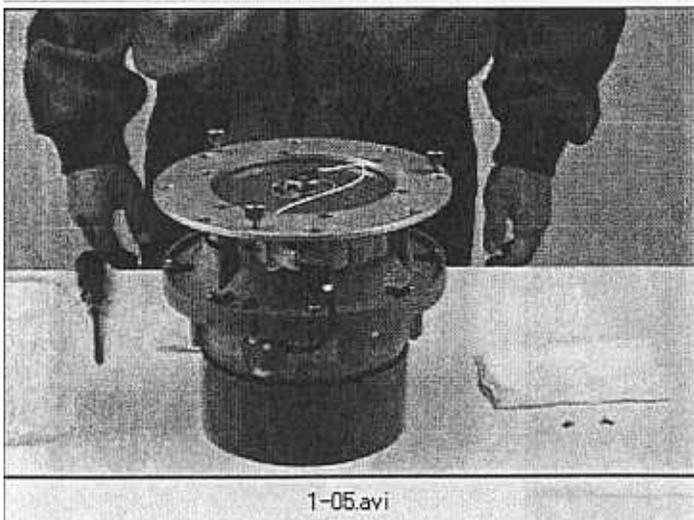
Remove the resin washer and screw for closing the air hole

④ Remove the wire connected to the center pin



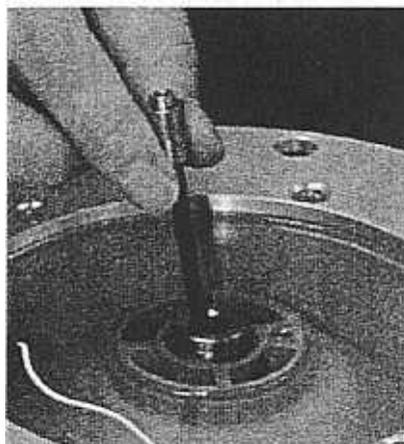
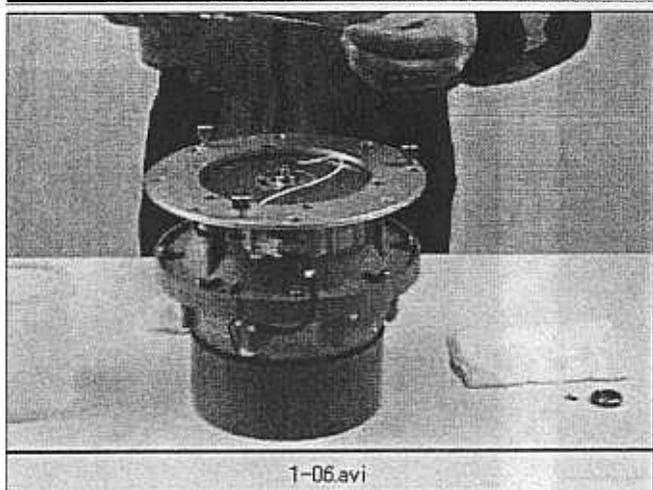
Remove the screw using a screwdriver

⑤ Remove the cap from the center pin



Turn the cap of the center pin to remove it.

## ⑥ Pull out the center pin

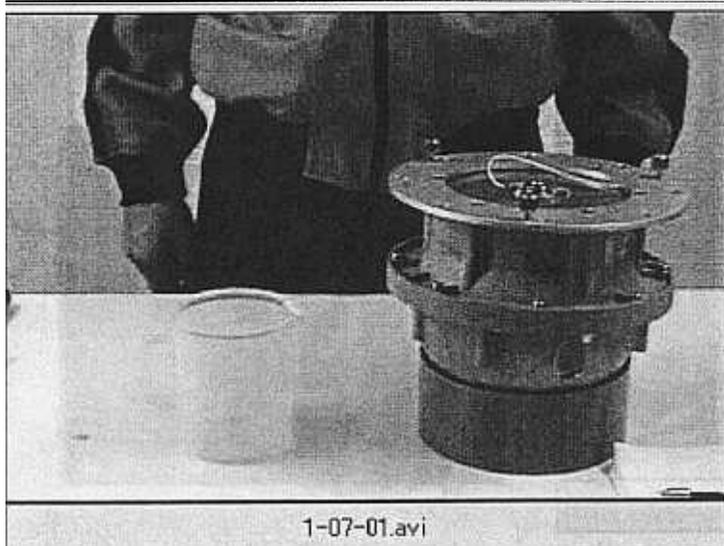


An easy way to pull out the center pin is to insert the screw that is used to connect the wire to the center pin to the pin and use the screw head to draw out the pin.

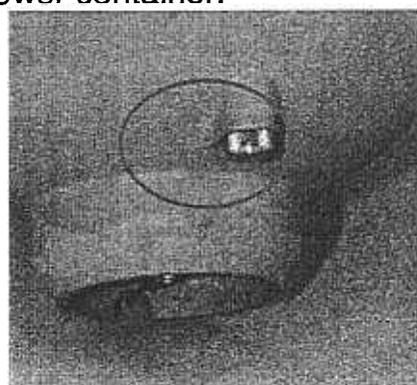
### **※Caution**

**Take care bending or damage the end of the center pin**

## ⑦ Place the beaker under the drain and remove the drain screw



The drain screw is located on the Lower container.



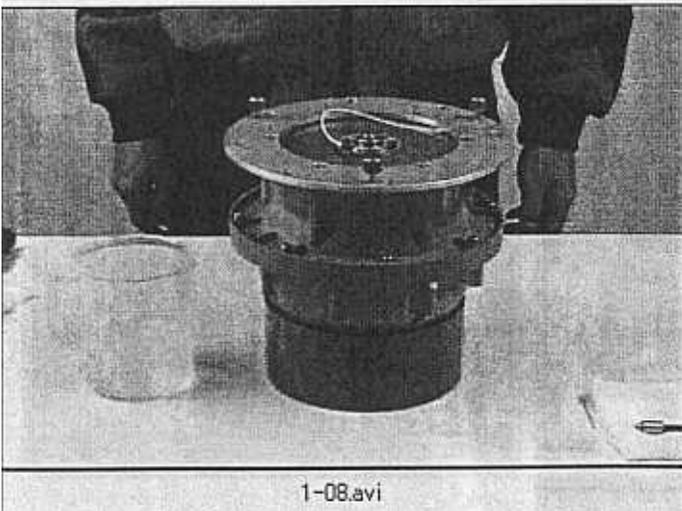
Remove the drain screw of the lower container for discharging the supporting liquid inside the container in the beaker.

**⑦ Place the beaker under the drain and remove the drain screw**

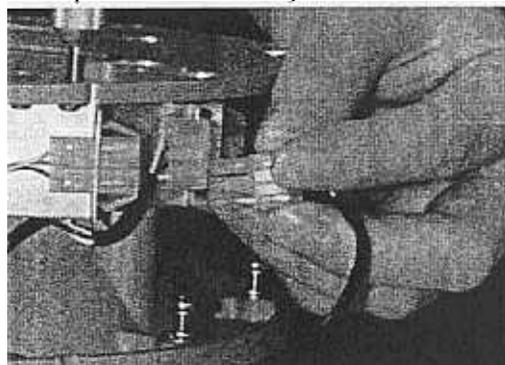


Drain all the supporting liquid from the drain hole while holding the container as horizontally as possible.  
After draining , reinsert the screw in the drain hole.

**⑧ Disengage the connectors that connect the upper and lower containers**

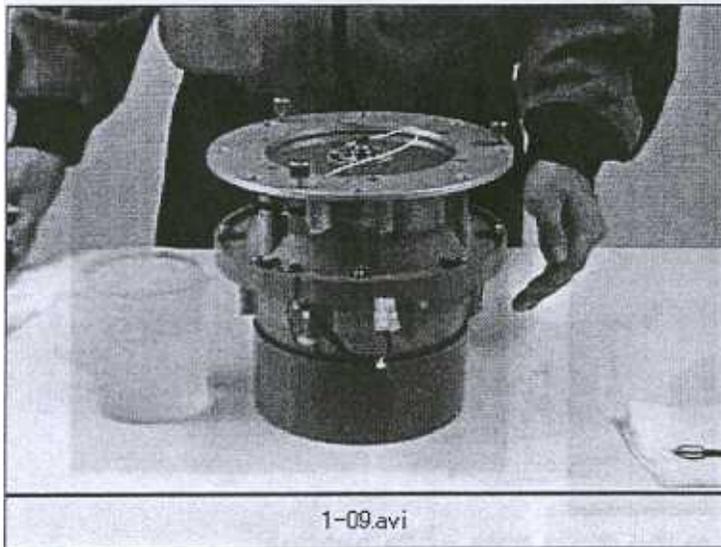


Disengage the connectors  
(three terminal)



Disengage the connector (three terminal) which is connected the upper and lower container.

⑨ Remove the bolts that fasten the upper and lower containers together

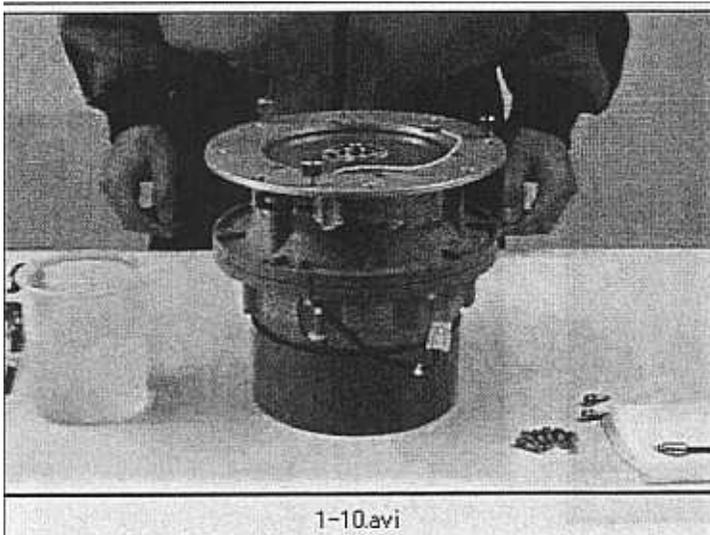


Remove 8 bolts



Remove the 8 bolts which is fixed the upper and lower container.

⑩ Remove the upper container



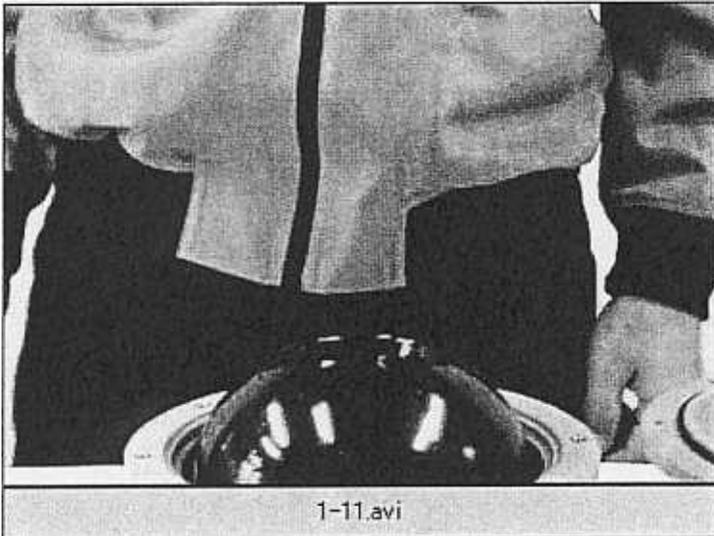
Lift up the upper container



Lift up the upper container to remove it.

**⑪ Remove the supporting liquid from within the mercury pot**

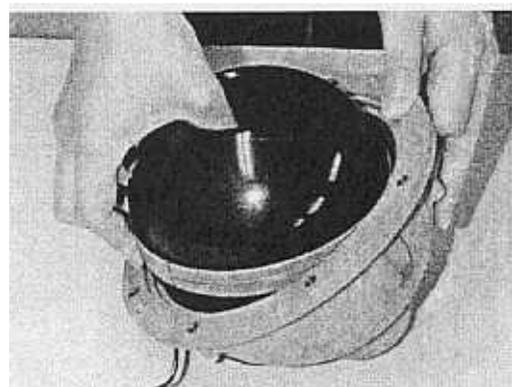
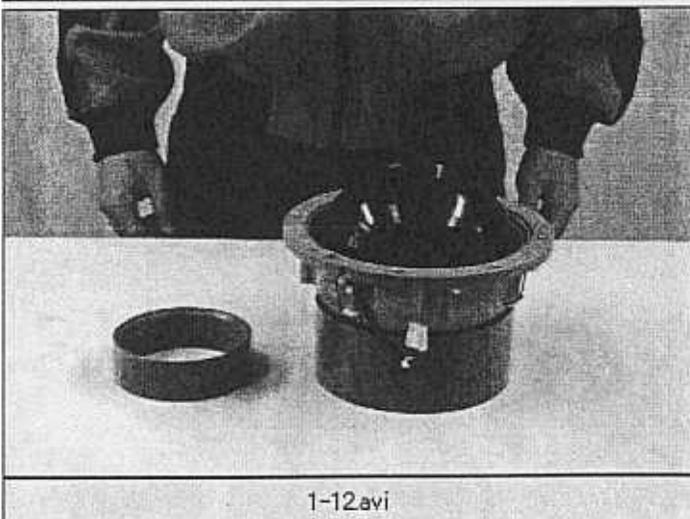
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Remove the supporting liquid , insulator and mercury from the mercury pot with a syringe (large 25ml type) .  
(Remove all supporting liquids)

**⑫ Take out the gyro sphere out of the lower container.**

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When taking out the gyro sphere , hold the side in a location with no gold line on it. Place the removed gyro sphere onto a gyro sphere stand.

**Took out the gyro sphere**

# CMZ700 OVERHAUL MANUAL 2

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## Chapter 2 Cleaning of the gyro sphere and container

This manual is used for exchanging the KT005 gyro sphere of the CMZ700,CMZ500-Mod700 type.

### **Danger**

Risk of mercury

- Do not allow mercury to come into contact with skin. If contact does occur , thoroughly wash the affected area with clean water immediately.
- If mercury is accidentally spilled, it should be drawn off with a syringe or the like and kept in a glass bottle.

### **Caution**

#### ■ Precaution in handling the gyro sphere

- Hold the gyro sphere firmly with both hands so as not to subject it to any shock.
- Do not drop the gyro sphere. Dropping the gyro sphere may result in damage to the internal mechanism or lead to personal injury.
- Do not disassemble the gyro sphere.

#### ■ Precaution in handling the container

- Hold the container firmly with both hands.
- Do not drop it. Dropping the gyro sphere may result in damage to the internal mechanism or lead to personal injury.
- Clean the hand before handling the gyro sphere.

## Chapter 2

### Cleaning of the gyro sphere and container-1

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#### 1) Caution

You have to handle with care the Gyro sphere without any shock during cleaning. When cleaning the gyro sphere, hold the side in a location with no gold line on it.

#### 2) Equipment and tools to be prepared

Gyro sphere, Container, Center pin, Beaker, Supporting liquid, Syringe for DEMNUM solvent, DEMNUM solvent, Melamine foam cleaner, Cotton pin, Gauze,



Beaker



Center pin

Syringe



DEMNUM solvent

For DEMNUM solvent

## Chapter 2

### Cleaning of the gyro sphere and container-2

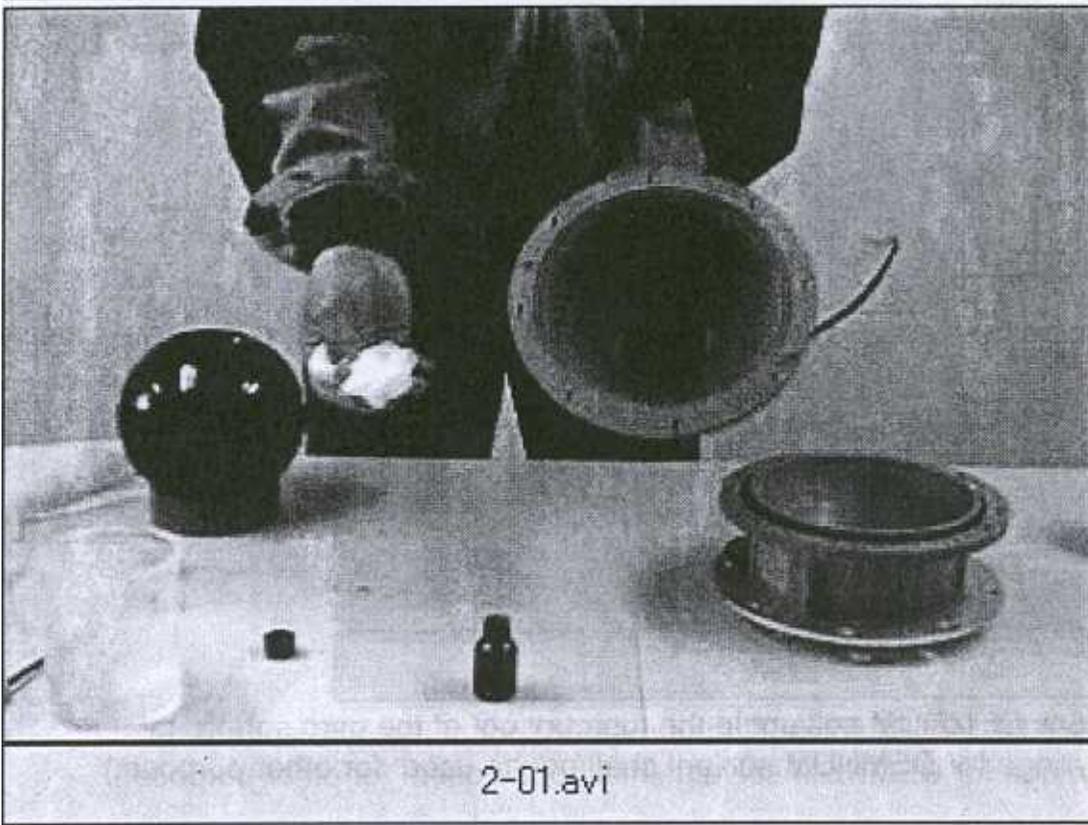
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#### 3) Cleaning of the gyro sphere

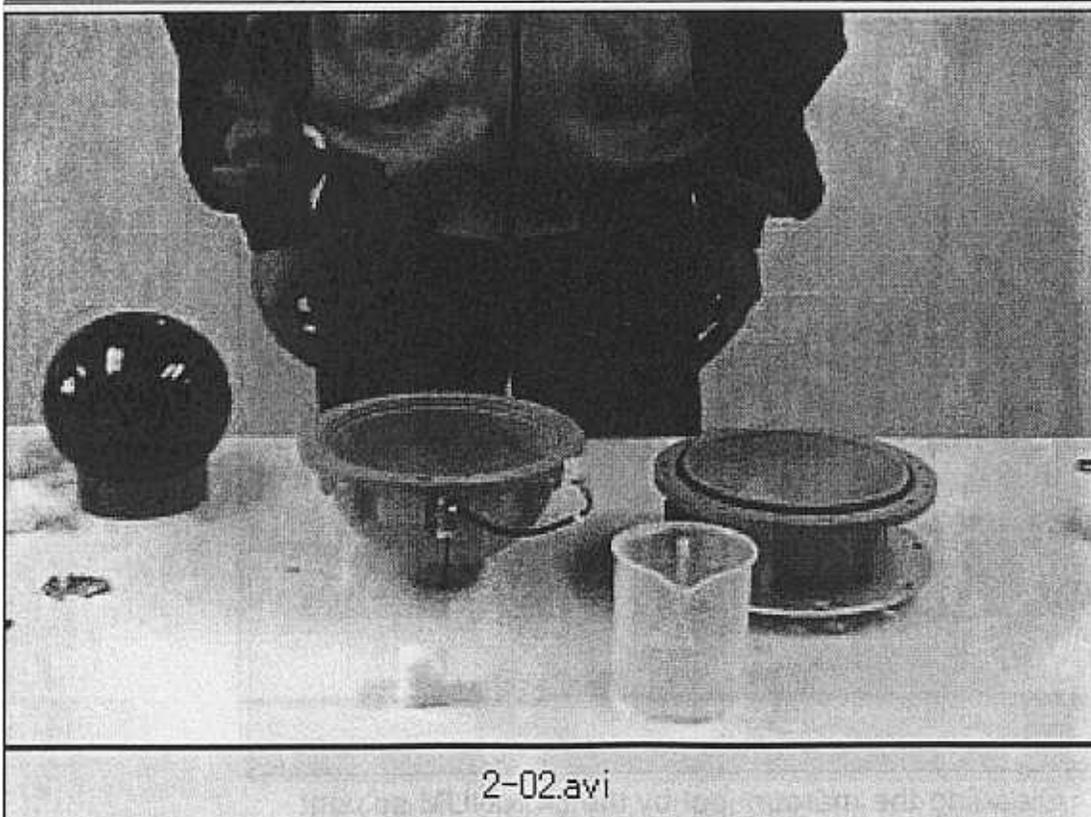
Procedure for cleaning of gyro sphere

- ① Clean the upper and lower container by gauze is soaked with supporting liquid.
- ② Cleaning the gold line of the lower container by melamine foam cleaner is soaked with supporting liquid.
- ③ Cleaning the one phase electrode of the gyro sphere by the DEMNUM solvent
- ④ Cleaning the surface of the gyro sphere by gauze is soaked with supporting liquid.
- ⑤ Cleaning the follow up electrode of the container by using the melamine foam cleaner
- ⑥ Cleaning the center pin by the DEMNUM solvent

① Clean the upper and lower container by gauze is soaked with supporting liquid.



② Cleaning the gold line of the lower container by meranin form cleaner is soaked with supporting liquid.



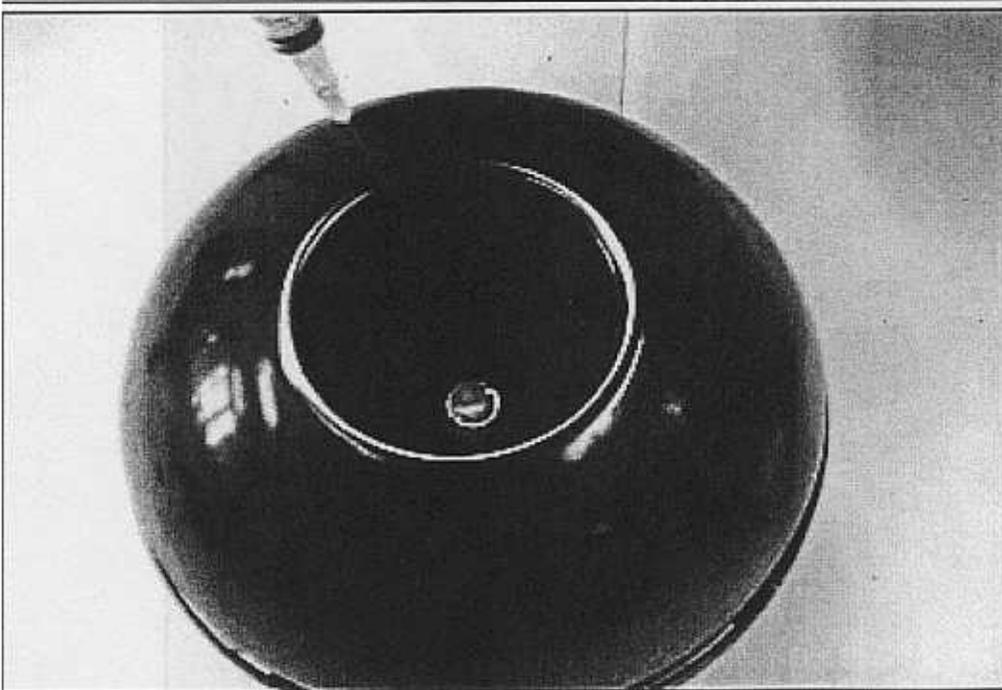
### ③Cleaning the mercury pot of the gyro sphere by the DEMNUM solvent



2-03.avi

Pour the 0.5cc DEMNUM solvent in the mercury pot of the gyro sphere by syringe. (Syringe for DEMNUM solvent shall not be used for other purpose.)

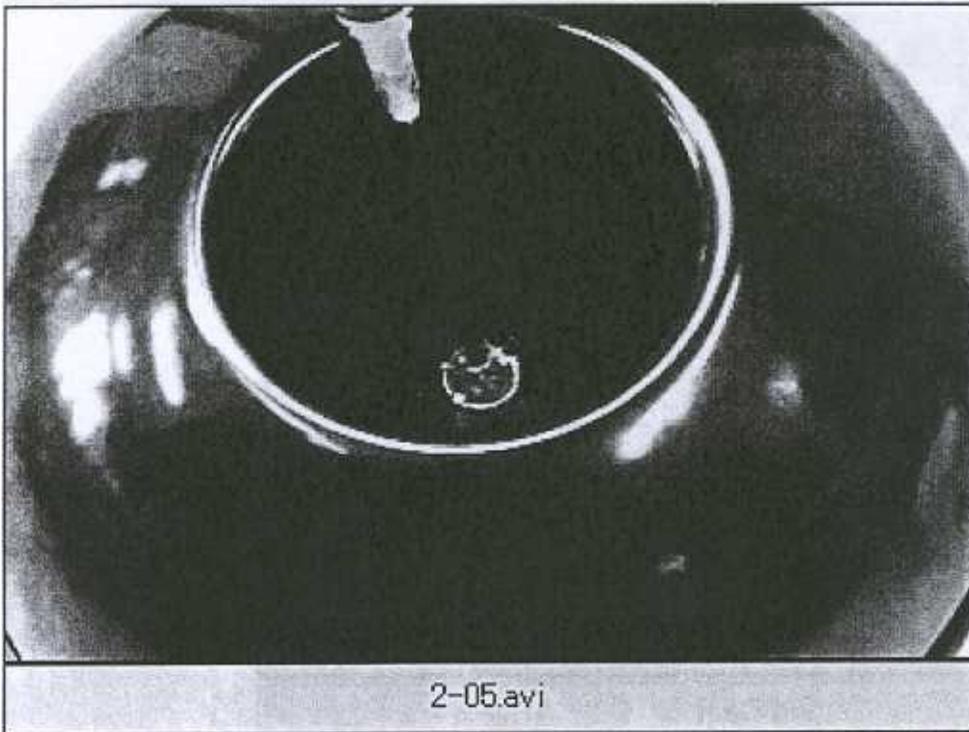
### ③Cleaning the mercury pot of the gyro sphere by the DEMNUM solvent



2-04.avi

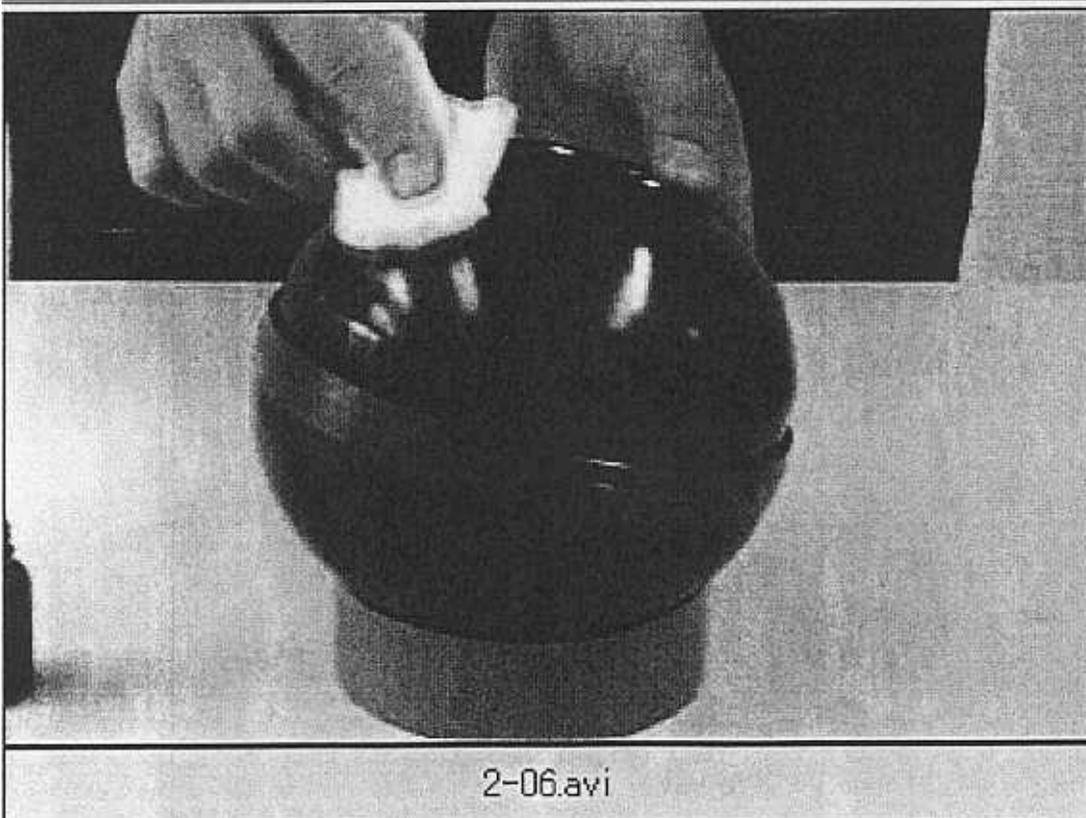
Cleaning the mercury pot by the DEMNUM solvent

**③Cleaning the mercury pot of the gyro sphere by the DEMNUM solvent**

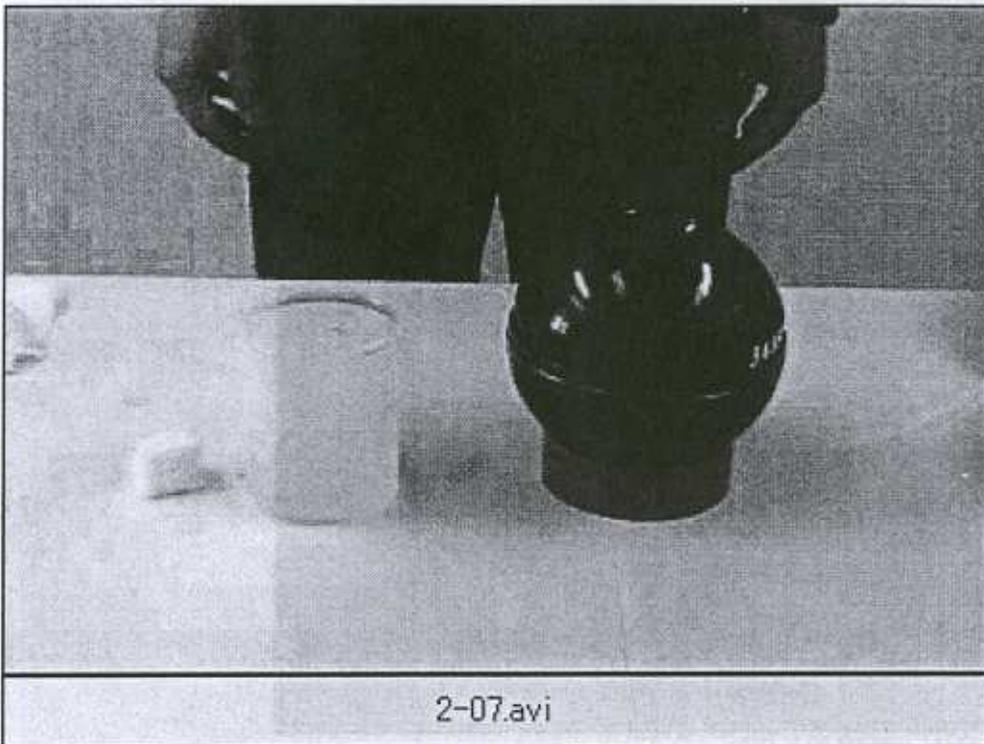


Take off the DEMNUM solvent by syringe.  
Then ,brushing the mercury pot by cotton pin

**④Cleaning the surface of the gyro sphere by gauze is soaked with supporting liquid.**



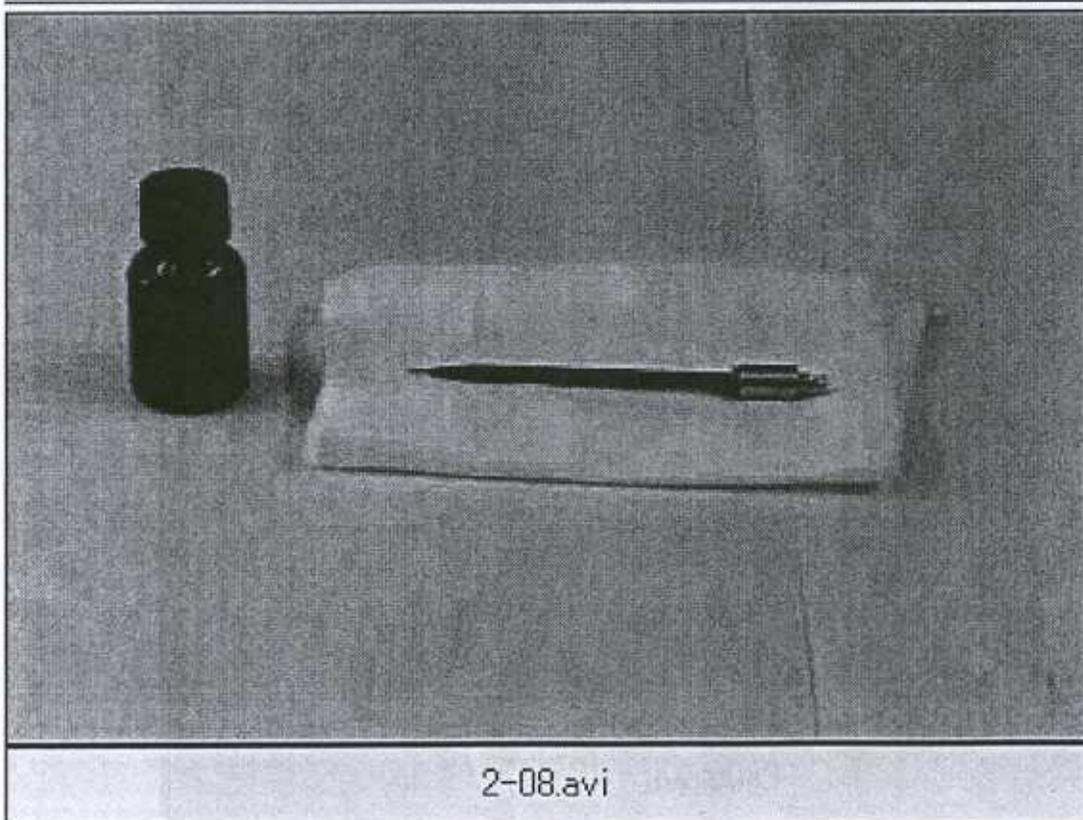
⑤ Cleaning the follow up electrode of the container by using the melamine foam cleaner



2-07.avi

Removal the dirt of the follow up electrode by using the melamine foam cleaner

⑥ Cleaning the center pin by the DEMNUM solvent



2-08.avi

**Cleaned the gyro sphere and supporting liquid**

# CMZ700 OVERHAUL MANUAL 3

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## Chapter 2

### Inspection of the gyro sphere and container

This manual is used for exchanging the KT005 gyro sphere of the CMZ700,CMZ500-Mod700 type.

#### **Danger**

Risk of mercury

- Do not allow mercury to come into contact with skin. If contact does occur , thoroughly wash the affected area with clean water immediately.
- If mercury is accidentally spilled, it should be drawn off with a syringe or the like and kept in a glass bottle.

#### **Caution**

##### ■ Precaution in handling the gyro sphere

- Hold the gyro sphere firmly with both hands so as not to subject it to any shock.
- Do not drop the gyro sphere. Dropping the gyro sphere may result in damage to the internal mechanism or lead to personal injury.
- Do not disassemble the gyro sphere.

##### ■ Precaution in handling the container

- Hold the container firmly with both hands.
- Do not drop it. Dropping the gyro sphere may result in damage to the internal mechanism or lead to personal injury.
- Clean the hand before handling the gyro sphere.

## Chapter 2

### Inspection of the gyro sphere and container-1

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#### 1) Caution

You have to handle with care the Gyro sphere without any shock during cleaning.  
When cleaning the gyro sphere , hold the side in a location with no gold line on it.

#### 2) Equipment and tools to be prepared

Gyro sphere, Container, Center pin, Beaker , Supporting liquid, Syringe for DEMNUM solvent, DEMNUM solvent, Melamine foam cleaner, Cotton pin, Gauze,



Beaker



Center pin

Syringe



DEMNUM solvent

For DEMNUM solvent

## Chapter 2

### Inspection of the gyro sphere and container-2

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#### 1) Caution

You have to handle with care the Gyro sphere without any shock during cleaning.  
When cleaning the gyro sphere , hold the side in a location with no gold line on it.

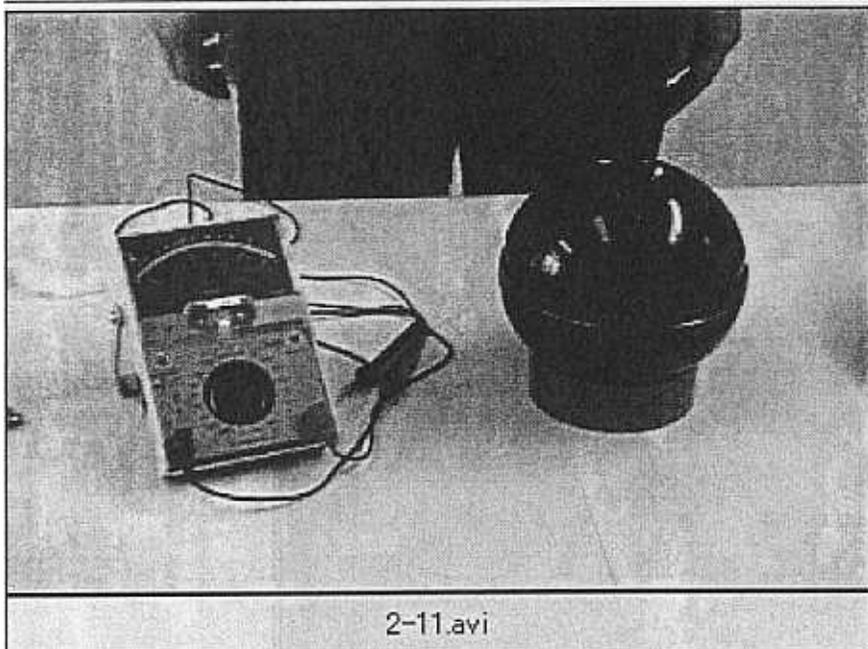
#### 2) Equipment and tools to be prepared

Gyro sphere ,Container, Tester (Digital and analog)

#### 3) Inspection of the gyro sphere and container

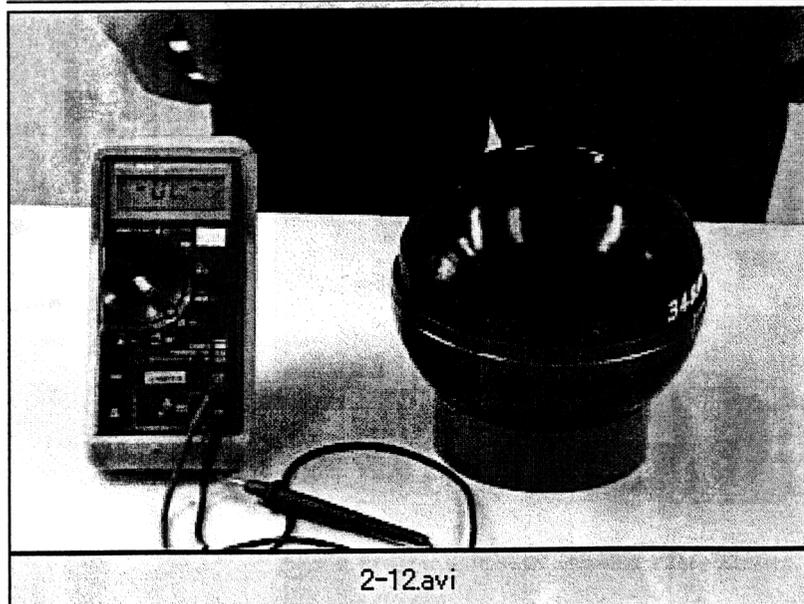
Measure the resistance of the gyro sphere and check the conductor of the container unit

## ① Inspection of the gyro sphere-1



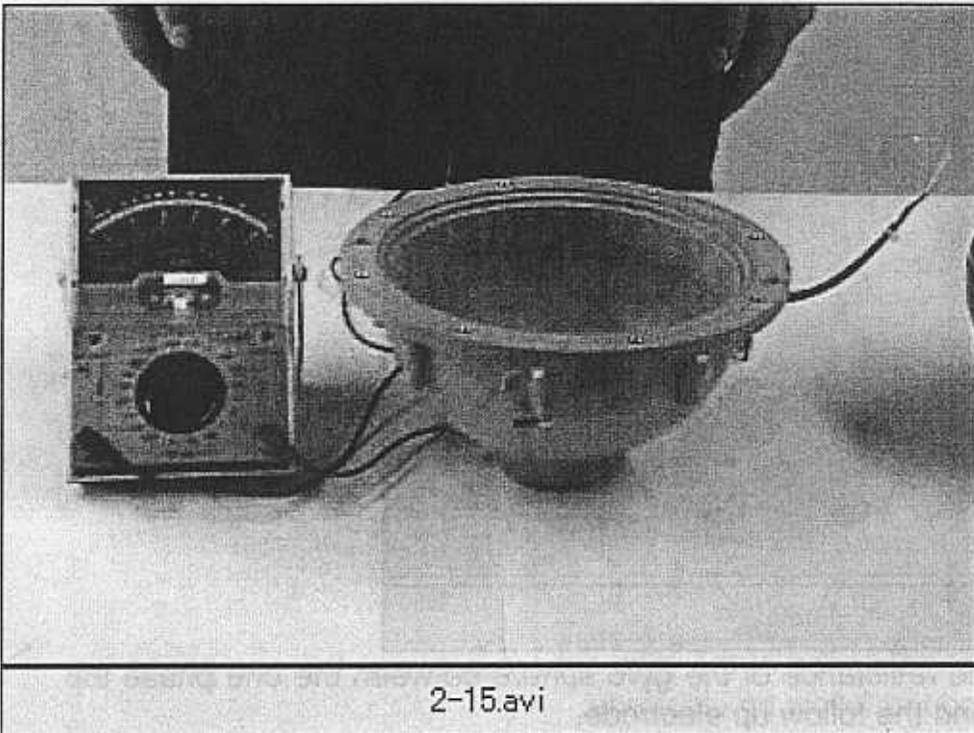
Measure the resistance of the gyro sphere between the one phase top electrode and the follow up electrode.  
Normal resistance is  $45 \pm 5\Omega$

## ① Inspection of the gyro sphere-2



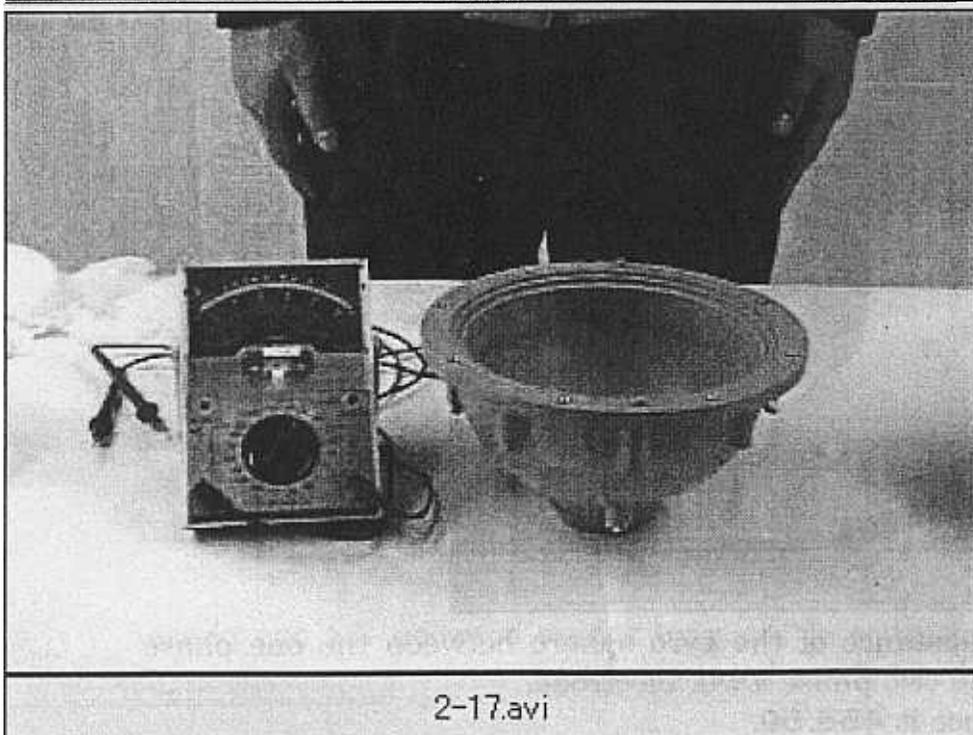
Measure the resistance of the gyro sphere between the one phase top electrode and two phase lower electrode.  
Normal resistance is  $45 \pm 5\Omega$ .  
Do not tilt the gyro sphere beyond the 30 degree and Do not touch the gold line of the gyro sphere.

## ② Inspection of the container-1



Check the conductor between the lower container electrode and connector.

## ② Inspection of the container-1



Check the conductor between the container gold line and connector.

**Inspected the gyro sphere and container**

# CMZ700 OVERHAUL MANUAL 4

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## Chapter 3 Installing the gyro sphere

This manual is used for exchanging the KT005 gyro sphere of the CMZ700,CMZ500-Mod700 type.

### **Danger**

Risk of mercury

- Do not allow mercury to come into contact with skin. If contact does occur , thoroughly wash the affected area with clean water immediately.
- If mercury is accidentally spilled, it should be drawn off with a syringe or the like and kept in a glass bottle.

### **Caution**

#### ■ Precaution in handling the gyro sphere

- Hold the gyro sphere firmly with both hands so as not to subject it to any shock.
- Do not drop the gyro sphere. Dropping the gyro sphere may result in damage to the internal mechanism or lead to personal injury.
- Do not disassemble the gyro sphere.

#### ■ Precaution in handling the container

- Hold the container firmly with both hands.
- Do not drop it. Dropping the gyro sphere may result in damage to the internal mechanism or lead to personal injury.
- Clean the hand before handling the gyro sphere.

## Chapter 3 Installing the gyro sphere-1

### 1) Caution

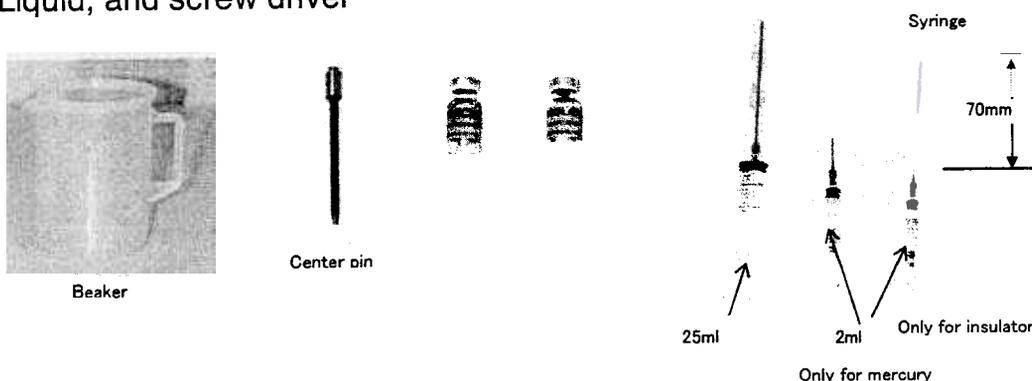
In case of the gyro sphere is to be installed in the container, take care of the handling it without any shock.

Do not touch the gold line of the gyro sphere when handling.

Installation of the gyro sphere in the container should be carried out on a flat surface and care should be taken not to knock the container over.

### 2) Equipment and tools to be prepared

Gyro sphere, center pin, mercury, insulator, syringe, beaker, funnel, Liquid, and screw driver

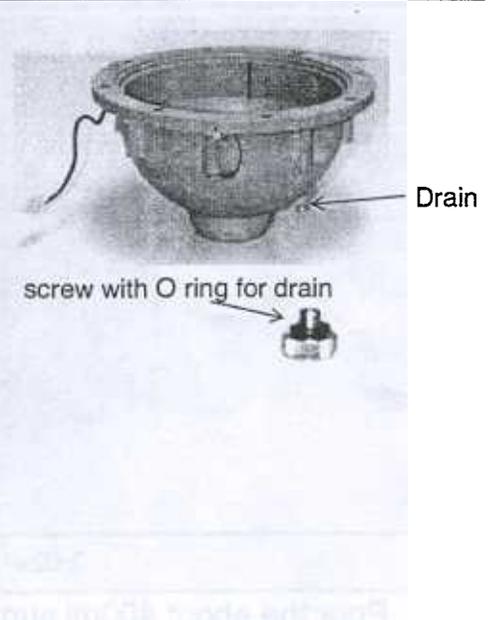
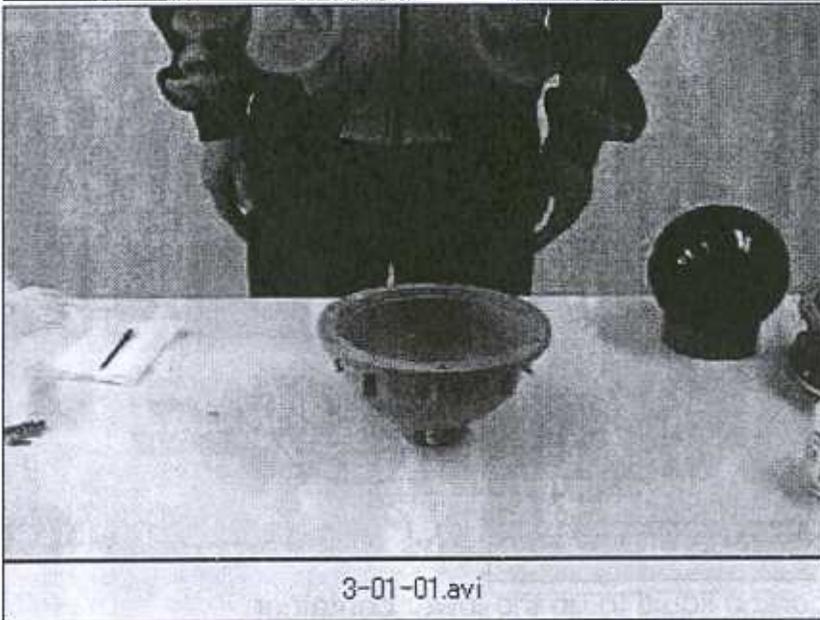


## Chapter 3 Installing the gyro sphere-2

### 3) Installing the gyro sphere and attaching the container to the master compass

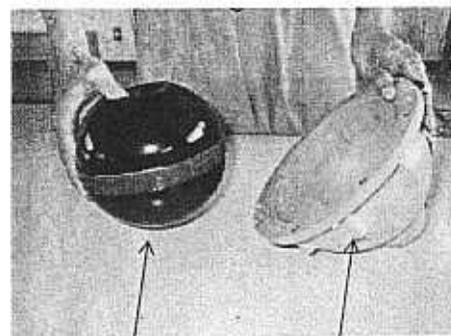
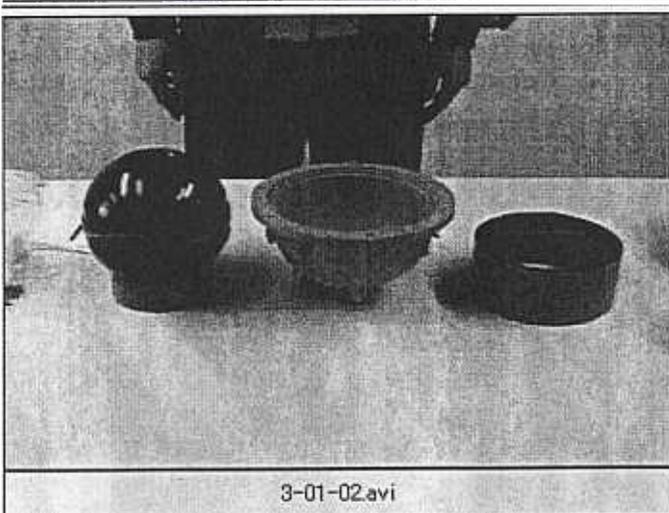
- ① Confirm that the drain screw with o ring in the lower container is tight and then put the gyro sphere in the lower container.
- ② Pour the liquid into the container
- ③ Pour in the mercury
- ④ Attach the upper container to the lower containers
- ⑤ Pour the supporting liquid into the container
- ⑥ Insert the center pin and put the cap on.
- ⑦ Connect the wire to the center pin
- ⑧ Pour in the insulator
- ⑨ Seal the vent hole
- ⑩ Engage the container into position on the master compass and tighten the bolts.
- ⑪ Fasten the connectors that connect the master compass to the container.
- ⑫ Install the front cover of the master compass

**① Confirm that the drain screw with o ring in the lower container is tight and then put the gyro sphere in the lower container.-1**



Check the O ring for drain screw

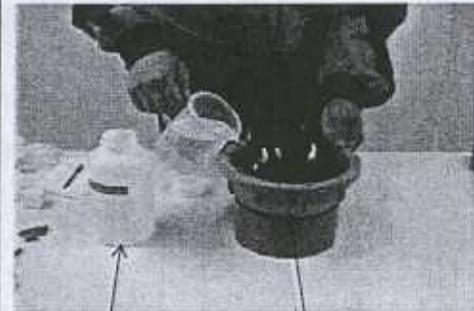
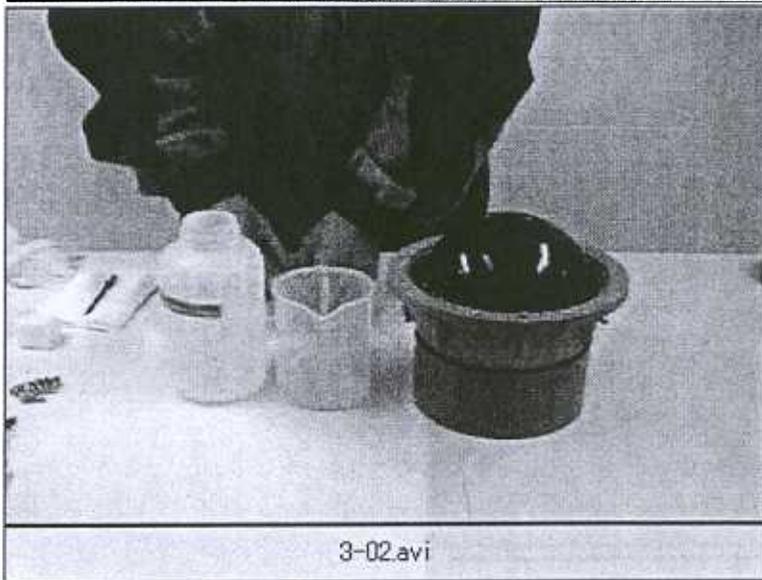
**① Confirm that the drain screw with o ring in the lower container is tight and then put the gyro sphere in the lower container.-2**



Hold the gyro sphere as shown in the photo, and with the container tilted, place it into the container. Hold the gyro sphere on the opposite side of the gold line. Do not tilt the gyro sphere beyond 30 degrees.

After placing the gyro sphere in the container, position the container and gyro sphere horizontally.

## ② Pour the liquid into the container



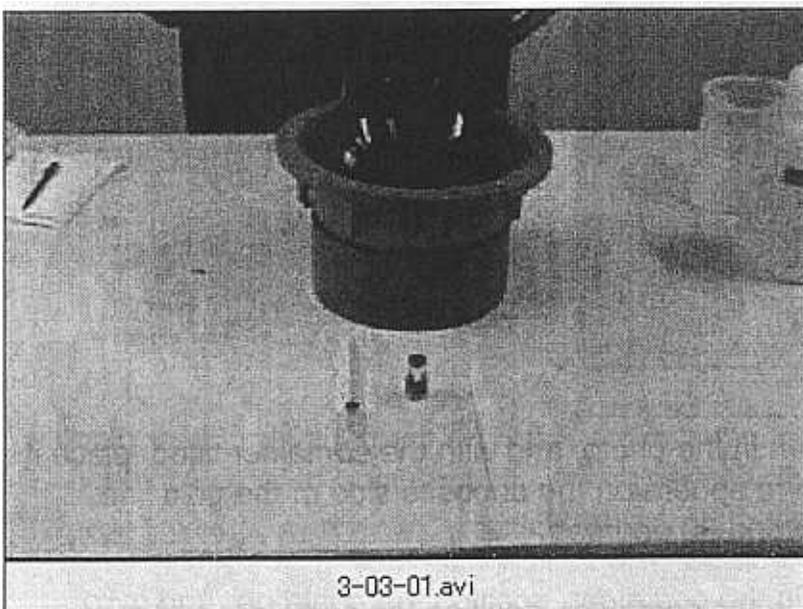
Supporting  
liquid

Lower  
container

Pour the about 400ml supporting liquid to up the lower container  
After pour the supporting liquid , shake the container and gyro sphere slowly to  
discharge the air

## ③ Pour in the mercury-1

Remove the aluminum seal with a pair of long nose  
pliers or a pair of diagonal cutting nippers, or the like.



Mercury



Fill a syringe (small) with mercury (0.3ml). Be very careful not to spill any of the  
mercury. Use separate syringes for mercury and insulator.

### ③Pour in the mercury-2



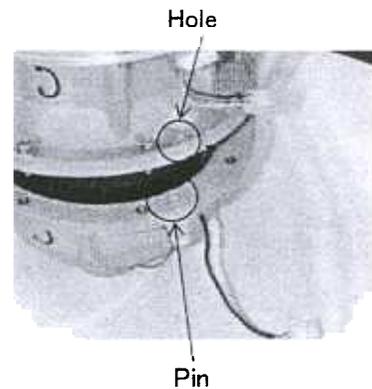
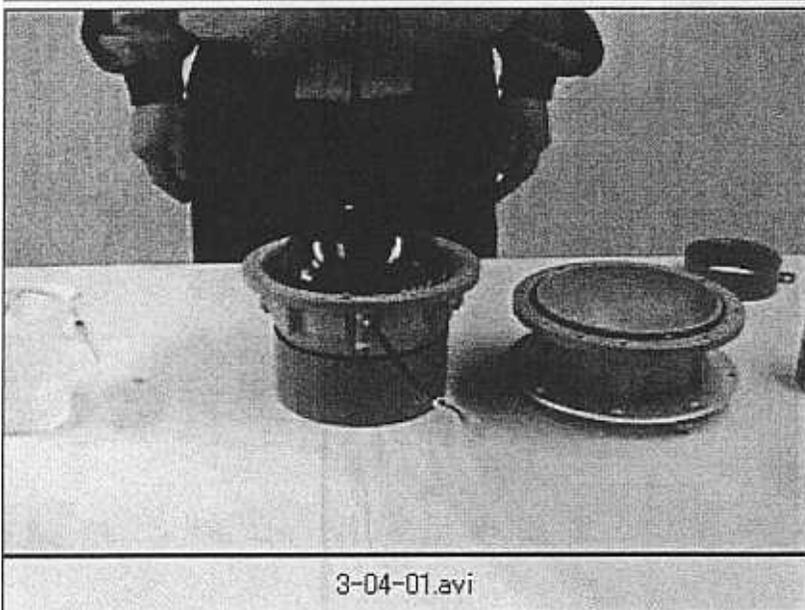
After pour the mercury, mix up the mercury pot by syringe for separating the supporting liquid and mercury.

### ③Pour in the mercury-3



Pour the supporting liquid to the mercury pot .  
In this case ,pour the supporting liquid slowly for preventing the diffusion of the mercury.

#### ④Attach the upper container to the lower containers-1



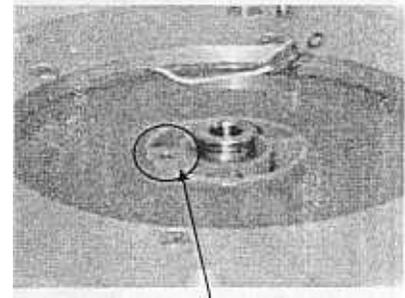
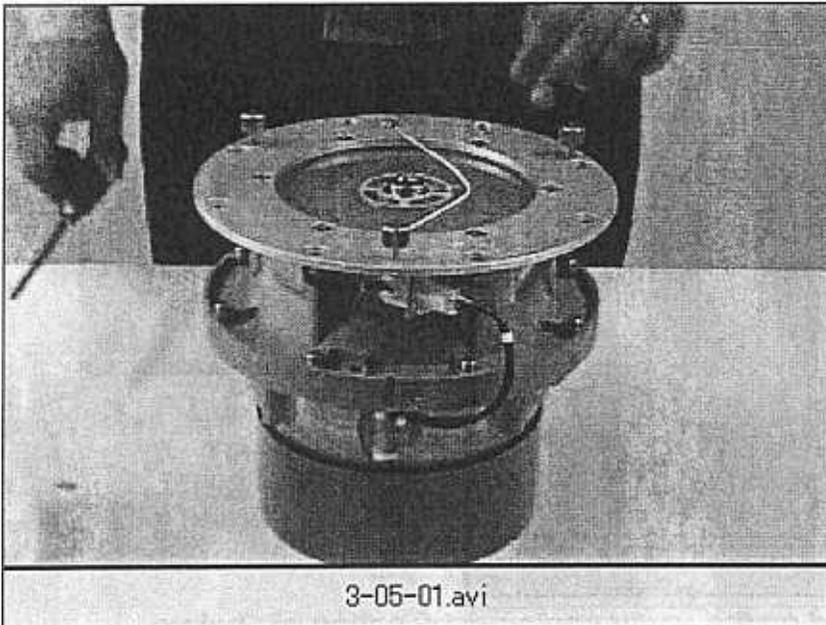
Confirm that there is an O ring the upper container, then align the Knock pin and fit both the upper and lower containers to each other.

#### ④Attach the upper container to the lower containers-2



Fit the upper and lower containers to each other by tightening the bolts (8 peaces). Fasten the connectors (three terminal) that connect the upper and lower containers.

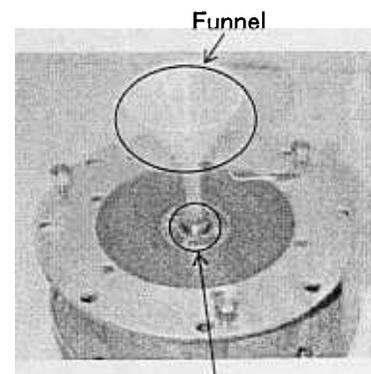
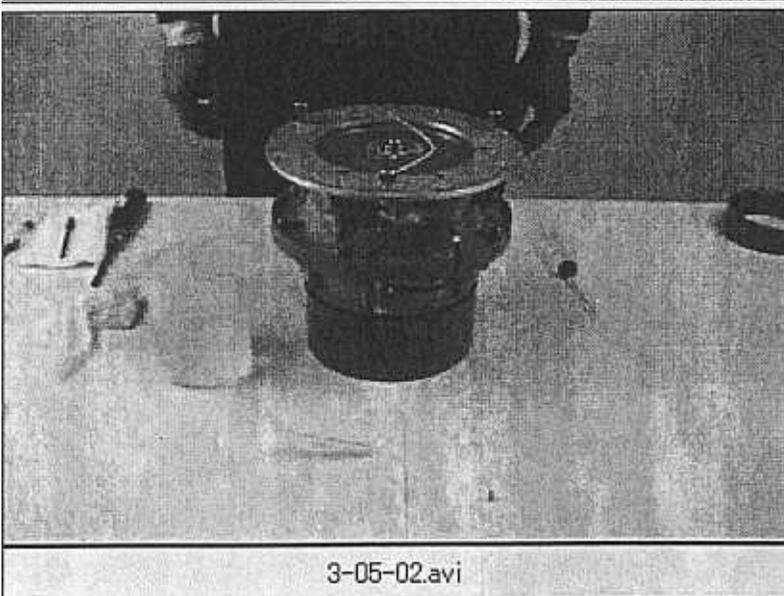
## ⑤Pour the supporting liquid into the container-1



Air vent hole

Remove the resin washier and screw for the vent hole

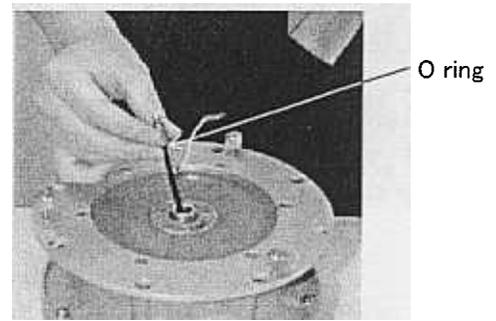
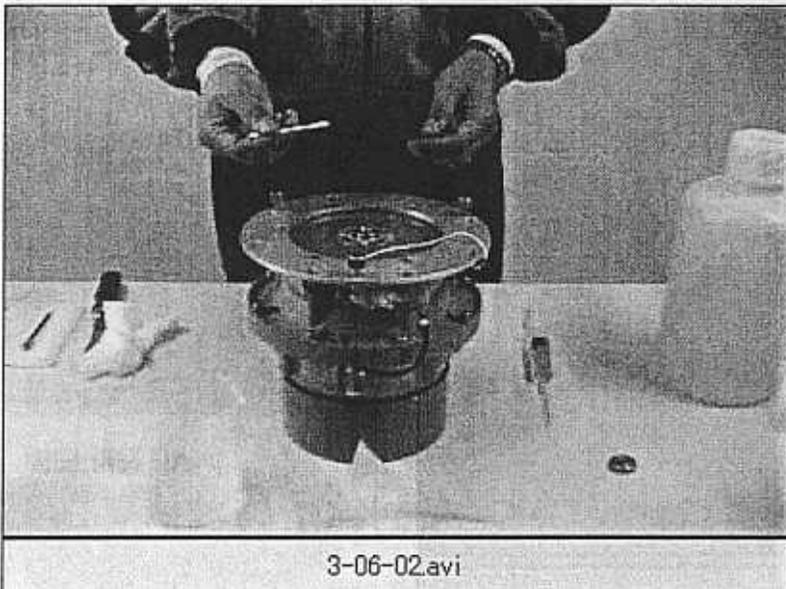
## ⑤Pour the supporting liquid into the container-2



Hole of container

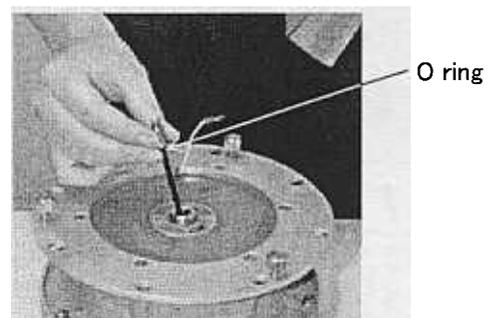
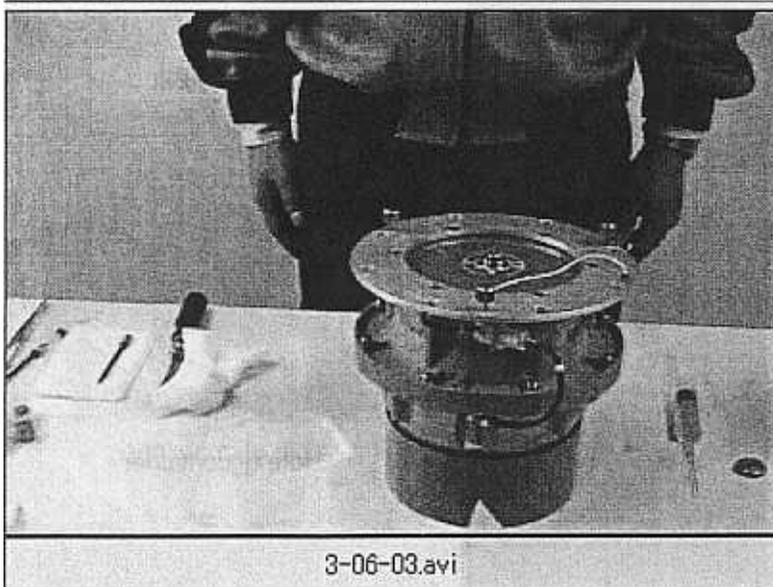
Pour remains supporting liquid into a beaker and then slowly pour in it from the beaker into funnel unit it begins to overflow from the vent hole.

## ⑥Insert the center pin and put the cap on-1



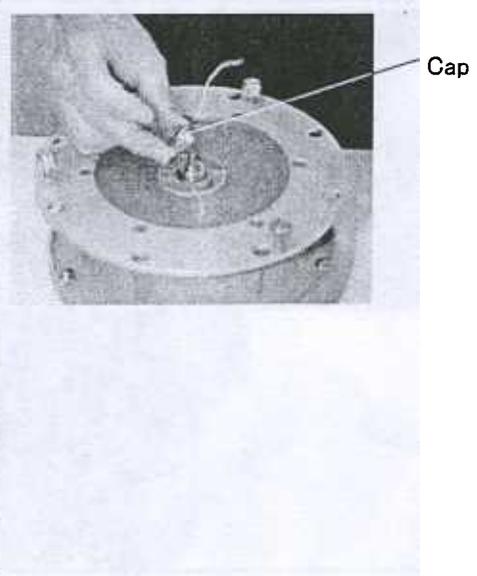
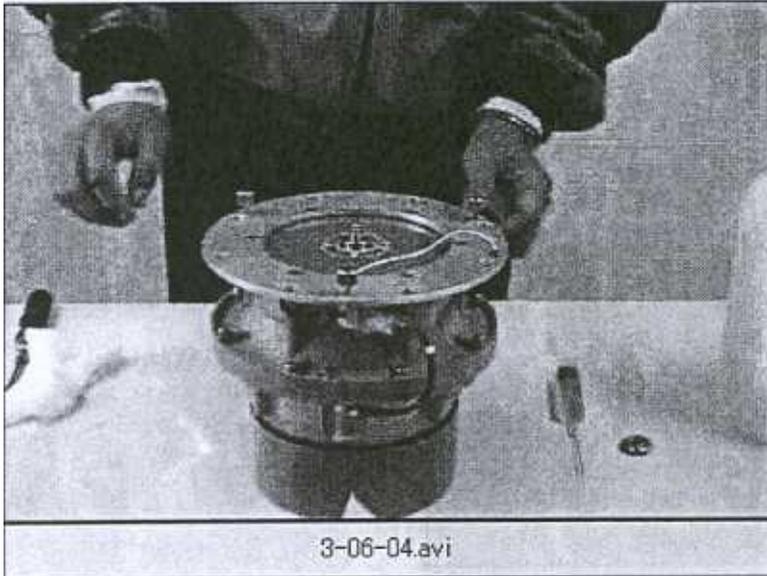
※Wipe off the spilled liquid on the upper container by cotton pin before insert the center pin .  
If remain the supporting liquid on the upper container, it has an effect on the electric insulation.

## ⑥Insert the center pin and put the cap on-2



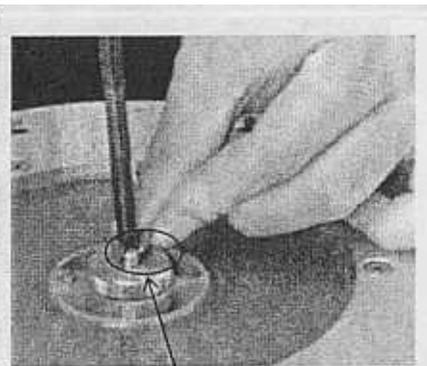
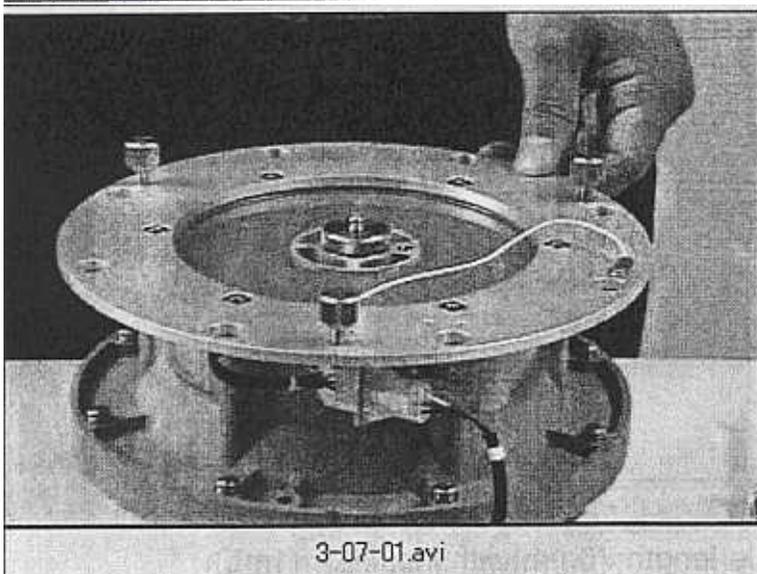
Confirm that there is an O ring with silicone grease on the center pin.  
If there is not silicone grease , spread with the silicone grease on the O ring .

### ⑥ Insert the center pin and put the cap on-3



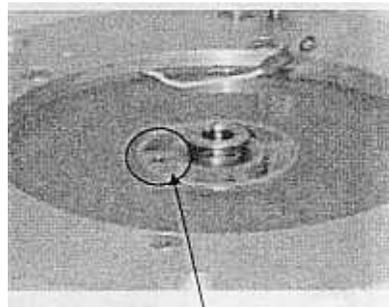
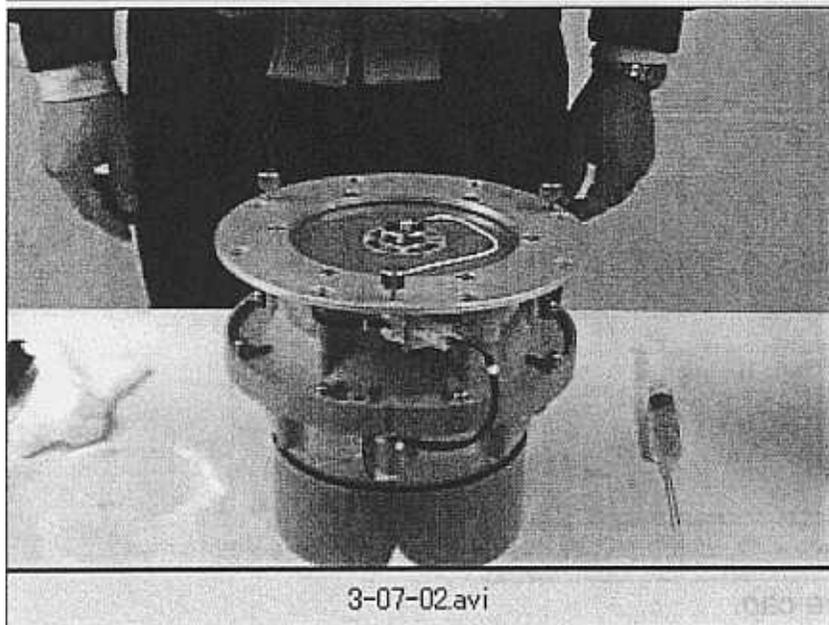
Fixed the center pin by the cap.

### ⑦ Connect the wire to the center pin



Connect this terminal to the top of the center pin.

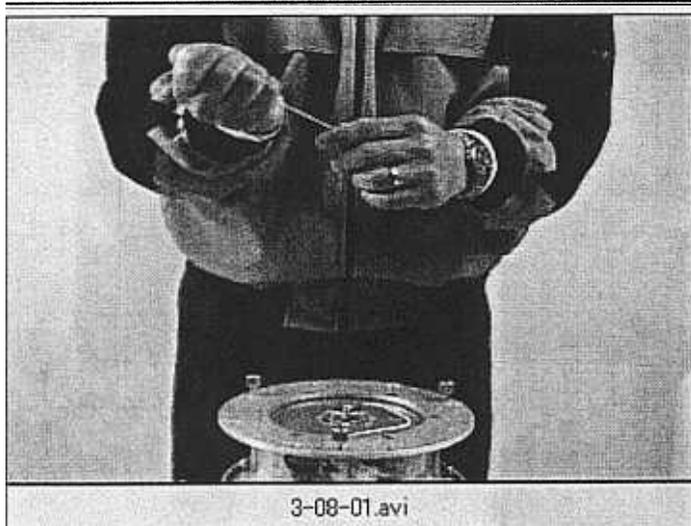
### ⑦ Connect the wire to the center pin



Vent hole

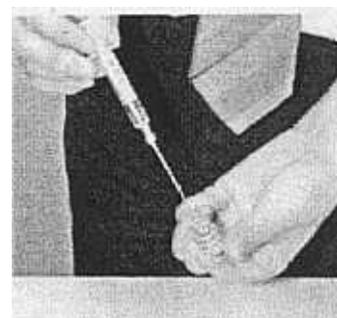
Pour the supporting liquid of 60mL inside the container by using the 25mL type syringe several times. In this case, don't diffuse the mercury.

### ⑧ Pour in the insulator-1



Insulator

Remove the aluminum seal with a pair of long nose pliers or a pair of Diagonal cutting nipper.

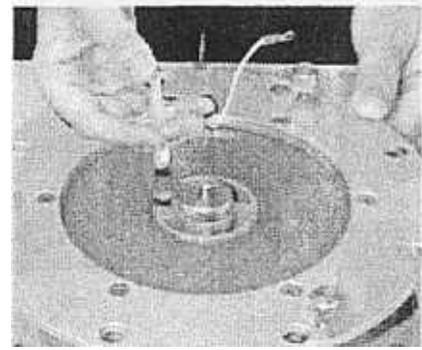
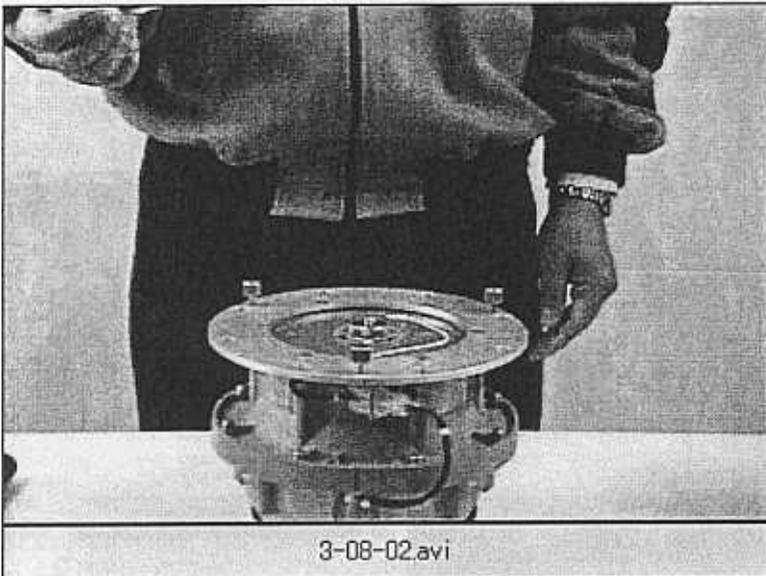


Fill a syringe (Small type, needle length 70mm) with insulator (1mL). Be careful not to spill any of the insulator.

#### **※Caution**

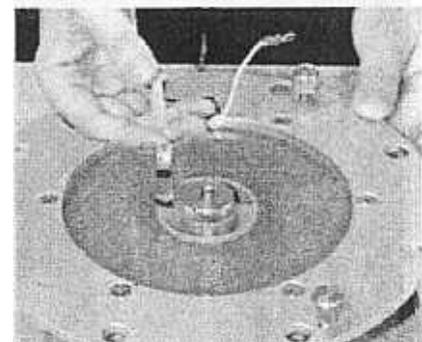
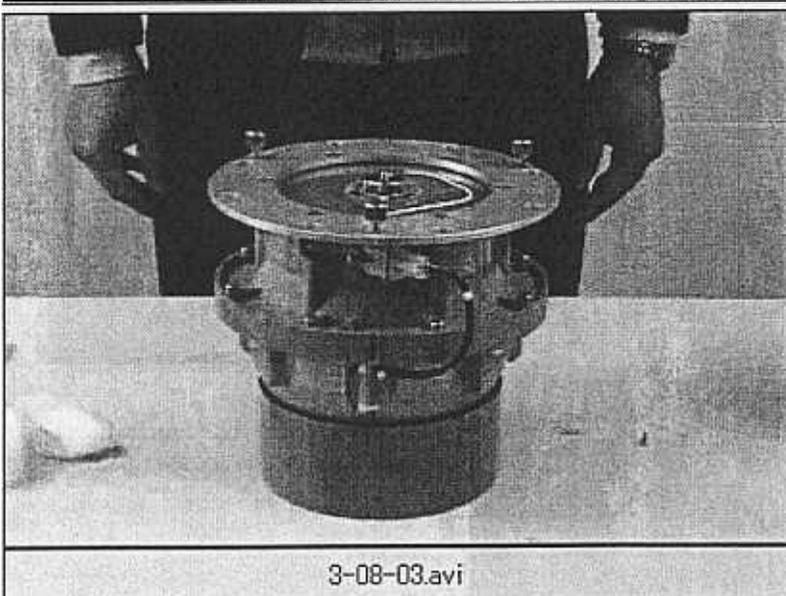
**Use separate syringes for mercury and insulator.**

### ⑧Pour in the insulator-2



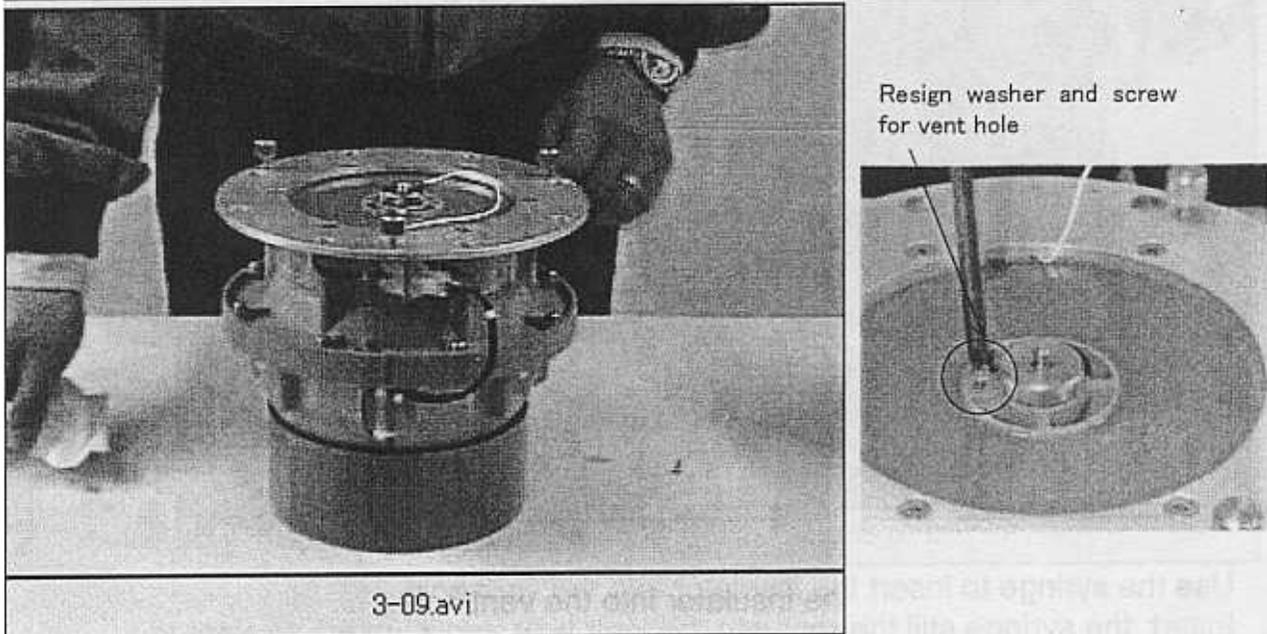
Use the syringe to insert the insulator into the vent hole.  
Insert the syringe still the root into the vent hole and it insert at slant to prevent to attack with the gyro sphere.  
Slowly release the insulator into the vent hole.

### ⑧Pour in the insulator-3



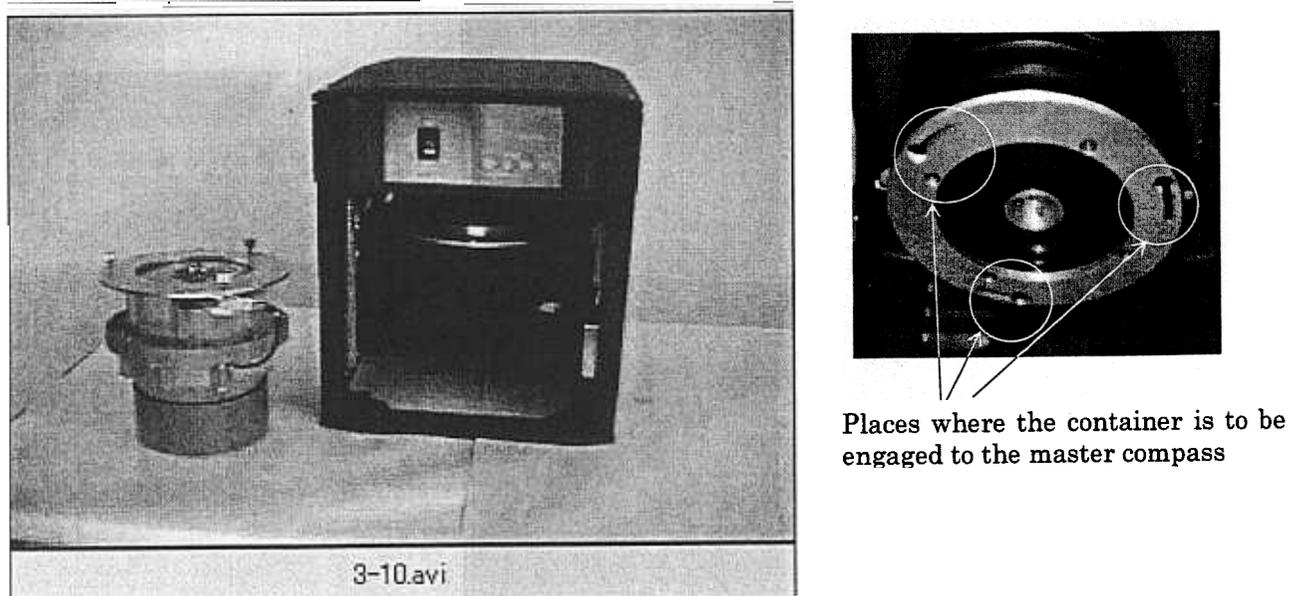
Wipe the overflowed supporting liquid from the vent hole with a rag.  
If the supporting liquid is not overflowed, slowly release the supporting liquid from the 25mL syringe.

## ⑨ Seal the vent hole



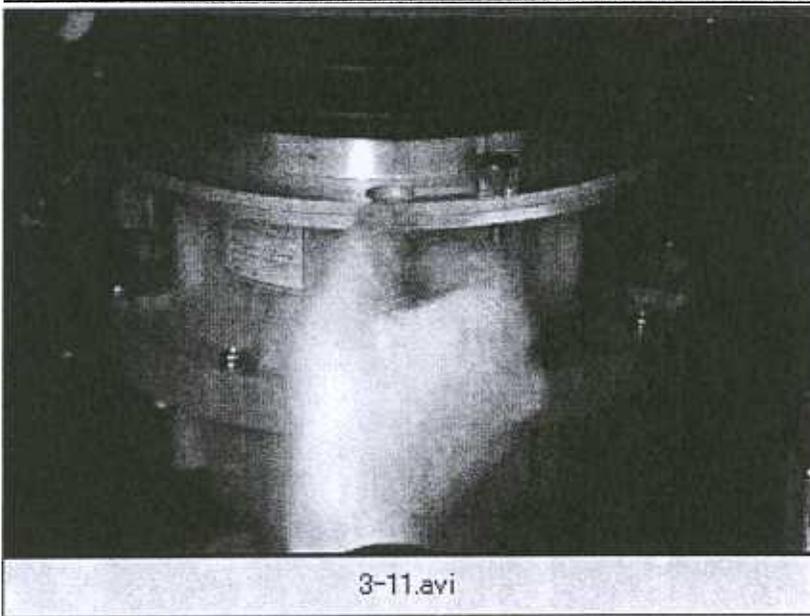
Seal the vent hole with a resin washer and screw.

## ⑩ Engage the container into position on the master compass and tighten the bolts.

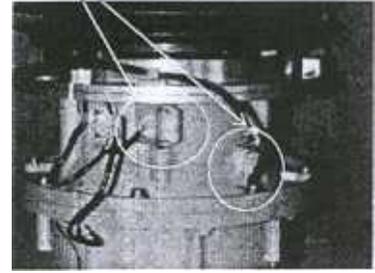


Insert the container bolts from the underside and tighten them in a clockwise direction. Align the matching marks when engaging the container. Then tighten the container bolts.

⑪ Fasten the connectors that connect the master compass to the container.

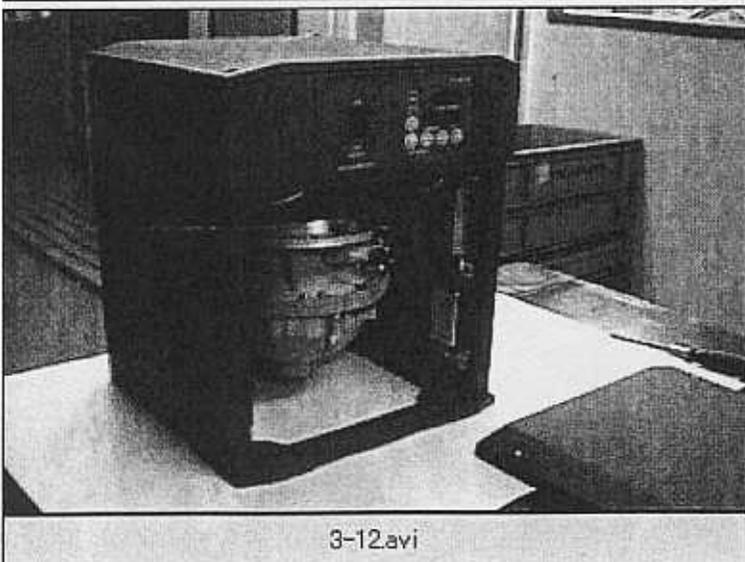


4 terminal connector

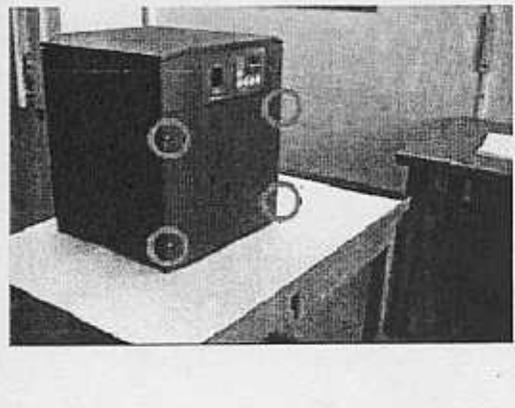


Connect the 4 terminal connector.

⑫ Install the front cover of the master compass



4 screw hole position



Close the front cover with 4 screw