

# Replacing the NPD Bead

## Instruction Guide



**Agilent Technologies**

# Notices

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## Safety Notices

### CAUTION

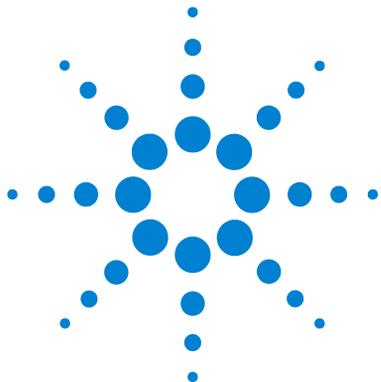
A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

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A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

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## *Replacing the NPD Bead*

### **7890A and 6890 Gas Chromatographs**

This instruction guide reviews the procedure for installing a bead on a nitrogen-phosphorus detector (NPD). Before following this procedure, refer to the safety information on the inside front cover and in your GC user information.

#### **Parts list**

- 1 NPD bead assembly (ceramic or Bloss)
- Cap for the bead
- Test chromatogram

#### **NOTE**

If you used Bloss beads before 2008, you may notice that the current bead has a slightly different shape and color. This is normal.





**Figure 1** BloS bead assembly

### Required tools

- T-10 Torx screwdriver

### GC Firmware

- If using a 7890A Series GC, it is recommended that the firmware version is A.01.09 or higher.
- If using a BloS bead on a 7890A Series GC, make sure the firmware version is A.01.09 or higher.
- If using a 6890 Series GC, make sure the firmware version is A.03.05 or higher.
- If using a BloS bead on a 6890 Series GC, make sure the firmware version is A.03.08 or higher. (Firmware versions earlier than A.03.08 will immediately destroy a BloS bead if you use the Adjust Offset feature.)

## Preparing the GC

- 1 Gather the following:
  - Lint-free gloves
  - T-10 Torx screwdriver

### CAUTION

The bead is delicate. Be careful not to break or crack the bead. When performing maintenance on the NPD, avoid touching the bead with your fingers, and prevent it from coming in contact with other surfaces.

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- 2 Set the NPD bead voltage to **0.0**. (Do not set it to **Off**.)

Agilent data system users: After setting the bead voltage to 0.0, save the data system method and shut down the instrument session. (Note that in some data system versions, you may need to use the GC keypad to set the voltage. To do this, the GC keypad must be unlocked and you must close the GC parameters screen of the data system. Upload the revised setting, then save the method and shut down the instrument session.)

- 3 Set **Adjust Offset** to **Off**.
- 4 Cool the detector to 60 °C or lower. Leave all gas flows on. To cool the detector faster, raise the GC detector cover and open the hinged NPD cover.

### WARNING

**Hazardous voltages are present when the electronics top cover is open.**

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### 5 Remove the necessary GC covers.

- **7890A models:** Raise the GC detector top cover. Loosen the screw on the electronics top cover and lift cover (Figure 2).

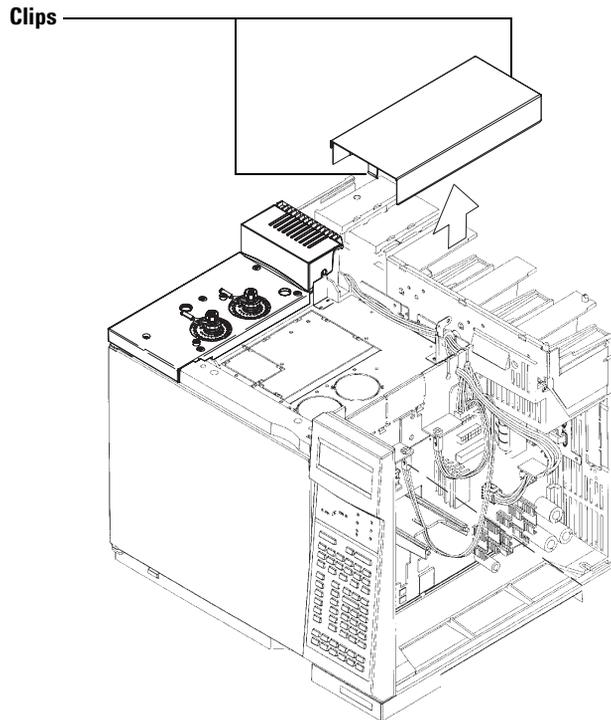


**Figure 2** Lifting the electronics top cover (7890A)

- **6890 models:** Gently lift the gray plastic detector top cover (with the holes and ventilation slots).

**For models with the hinge bracket:** The hinge is a metal bracket attached to the oven top. Pull the clip at its top toward you to release the hinge pin. Push the pin to the left to release the cover. Raise the cover and remove it. Remove the top electronics cover. Push the clips underneath the cover (shown in Figure 3) toward the center to disengage them.

**Other models:** Push the clips underneath the cover toward the center to disengage them.



**Figure 3** Removing the top electronic cover (6890)

## Removing and Installing the Bead

**NOTE**

The illustrations below show a ceramic bead. Blos bead installation is the same.

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- 1 Put on lint-free gloves before touching any of the detector parts.

**WARNING**

**Be careful! The oven or detector fittings may be hot enough to cause burns.**

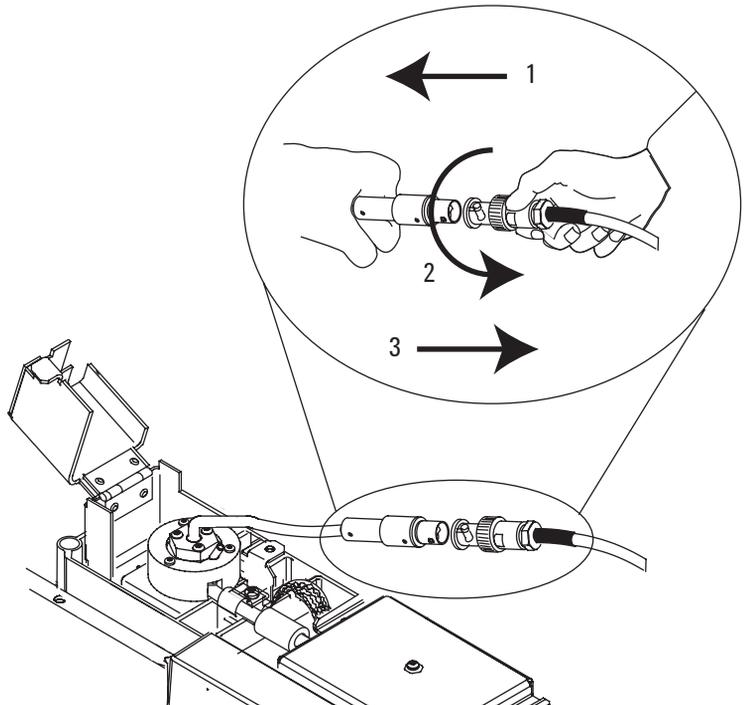
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**CAUTION**

Wear clean, lint-free gloves to prevent contamination of parts with dirt and skin oils.

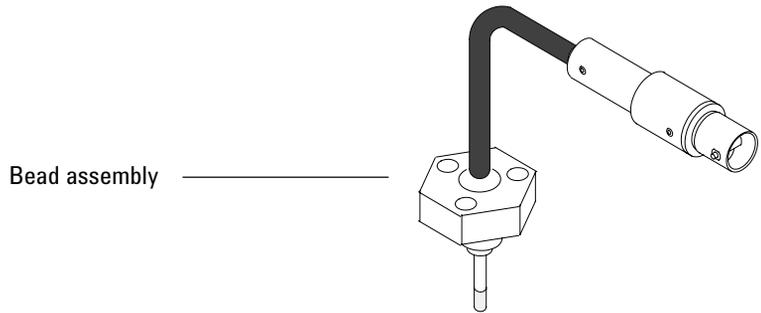
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- 2 Twist the ring to disconnect the bead assembly cable. Push and twist the lock so that the button slides up in the groove, then pull the cable ends apart.

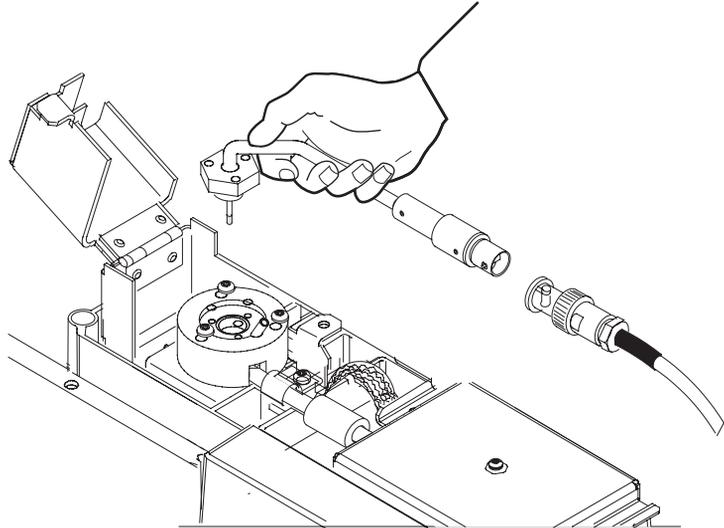


## Replacing the NPD Bead

- 3 Remove the 3 T- 10 Torx screws from the bead assembly.



- 4 Gently lift up and remove the old bead assembly. Avoid bumping the bead on the sides of the collector.

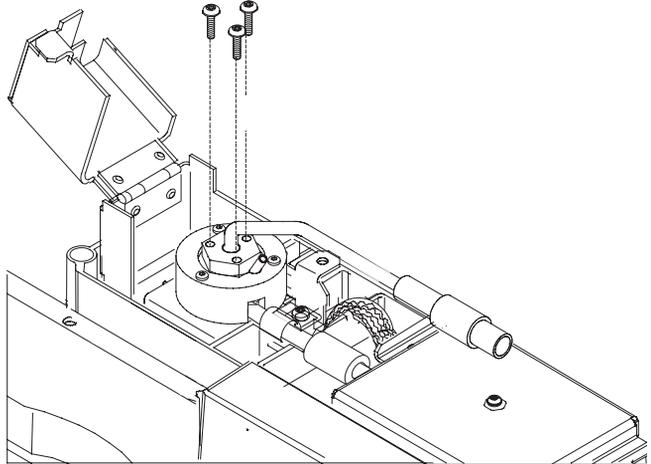


- 5 Remove the protective cap covering the new bead.

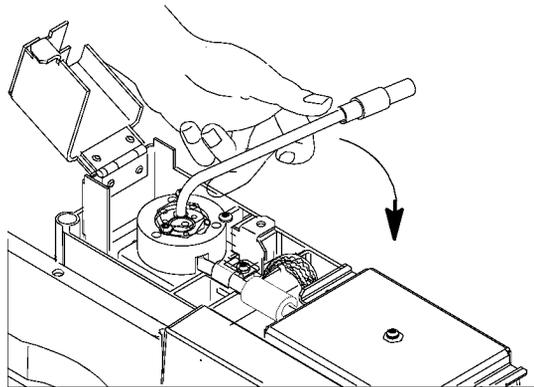
### NOTE

For a new Bloss bead, the bead should be centered as shown in [Figure 1](#). If you notice that the bead assembly does not appear like the assembly shown in [Figure 1](#), carefully center the bead. Be sure to not contaminate the bead during this process.

- 6** Mount the new bead assembly on the NPD lid. Be careful not to bump the bead on the sides of the lid or collector.
- 7** Replace the screws. Finger-tighten the first screw; tighten the remaining screws normally and then completely tighten the first screw. Do not overtighten the screws.

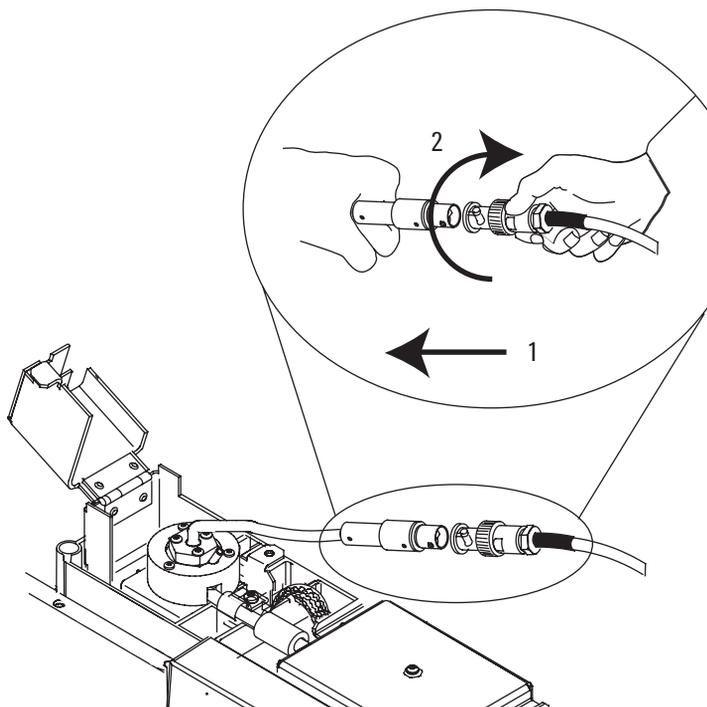


- 8** Carefully bend the bead assembly cable 90 °.



## Replacing the NPD Bead

- 9 Reconnect the bead assembly cable to the NPD cable and twist the ring to lock the connection.



- 10 Close the NPD cover and reinstall all GC covers. All covers must be closed to get a stable NPD baseline.
- 11 For the 7890A GC, configure the new bead.
- Set the bead type.
  - Review the **Maximum Bead Voltage** setting and adjust, if necessary.
  - Review the **Dry Bead** and **Auto Adjust Bead** settings.
- 12 Restore normal NPD operating gas flows.
- 13 With all gases on, heat the detector to 150 °C and hold for about 15 minutes, then increase the temperature to 250 °C and hold for 15 minutes.
- 14 Increase the temperature to operating value (310 to 320 °C recommended). Allow 15 minutes for equilibration.

**15** Check the NPD leakage current.

- a** Display the detector output.
- b** Verify that the output (leakage current) is stable and  $< 2.0 \text{ pA}$ .

If  $> 2.0 \text{ pA}$ , verify bead installation and recheck. If still high, replace the ceramic insulators; inspect/replace the collector.

### Turning On the Bead

Now that the bead is installed, it is turned off but warm, with gases sweeping any evaporating moisture off of the bead and out of the detector. Next you will adjust the bead voltage to achieve the desired response using either the Adjust Offset process (recommended for the 7890A GC with firmware A.01.09 or greater) or manually.

#### Set the Initial Bead Voltage to a Safe Value

Before you turn on the bead for the first time, manually set its voltage to a safe value so that the new bead is not destroyed.

- 1 Make sure **Adjust Offset** is turned **Off**.
- 2 After the temperature stabilizes at setpoint, set the initial Bead Voltage, depending on bead type:
  - Blos bead: 0.0 V to 0.5 V
  - Ceramic bead (white or black): 0.0 V to 2.0 V

#### To Use the Adjust Offset Process to Set Bead Voltage

If you choose to use the GC Adjust Offset process, do the following:

- 1 Set the offset.
  - Blos bead: 20 pA
  - Ceramic bead (white or black): 30 pA
- 2 If your GC has an **Equilibration time**, set it to 0.0.
- 3 If using an Agilent data system, start the online session for the instrument.

For 7890A users: If you changed the bead type, you will need to resolve the current method to match the new bead type.

- 4 When the GC becomes Ready, start **Adjust Offset**.

## To Manually Adjust the Bead Voltage

After the bead reaches the initial voltage, begin to increase the voltage value in 0.05 V increments until the bead ignites. Wait about 10 seconds between each voltage adjustment. Monitor the detector output. When the bead ignites, the output will rise suddenly, then decrease towards a more stable value. It is best to allow the NPD to remain in this state without further adjustment for about 24 hours. Then you may adjust the bead voltage in small increments (0.05 to 0.1 V) until reaching the desired offset. With a clean environment, clean gas supplies, and low bleed column, a typical offset may decrease 6- 12 pA during a 24 hour period.

### Blos Beads

- A new Blos bead typically ignites between 0.5 and 1.1 V.
- A Blos bead typically requires a lower offset than the white and black beads to achieve a similar response.
- A new Blos bead shows an increase in baseline during a temperature programmed analysis. This effect minimizes after a few cycles.

Recommended flow settings (starting values):

Capillary makeup flow:	1 to 20 mL/min
	If using He makeup gas, recommend < 10 mL/min to avoid cooling effects.
Hydrogen flow:	1 to 3 mL/min
Air flow:	120 mL/min

### Ceramic Beads (White or Black)

- A new ceramic bead typically ignites between 2.8 to 3.2 V.

Recommended flow settings (starting values):

Capillary makeup flow:	N <sub>2</sub>	5 to 10 mL/min
	He	< 5 mL/min
Hydrogen flow:		2 to 5 mL/min
Air flow:		60 mL/min

## NPD Cleanliness

Below is an overview of typical NPD leakage currents for a system set to recommended flows and temperature.

<b>pA Leakage Current</b>	<b>System status</b>	<b>Comment</b>
0.3-0.9	CLEAN	
1.0+	Dirty	Decrease in sample response.
10+	Very dirty	Almost no sample response. Cause is usually contaminated ceramic insulators on the collector - usually the upper insulator and seal.

When changing insulators and seals, cool the detector to 75 °C or below. This will minimize the chance of stripping the three T-20 Torx screws.

The installation of traps is recommended for the detector, hydrogen, air, and make-up gas. A moisture trap followed by chemical traps is highly recommended.



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