



**Agilent Technologies**

**Injector Diagnostics**  
**18593A/B or G1513A**

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The information contained herein is intended for use by informed individuals who can and must determine its fitness for their purpose.

## Starting diagnostics

The Injector Diagnostic Mode allows the service engineer to observe the operation of injector motors and sensors during the troubleshooting process.

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**Caution**

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**The diagnostic mode overrides the door and mount safety switches. Be sure to take the syringe out of the injector before operating it in diagnostic mode.**

1. Turn off the controller.
  2. Simultaneously press the STOP and START buttons on the front of the injector. Keep pressing while you turn on the controller.
  3. On the 18593A/B, the red LED on the injector module should start flashing a double flash, indicating the first test in diagnostic mode.
  4. On the G1513A, the red, yellow, and green LEDs will flash in rotation. Press the STOP button once to cycle to the first test of the diagnostics mode that is indicated by a double flash of the red LED.
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## LED diagnostics

Each of the LEDs on the front of the injector has a special function for each of the three tests available in the diagnostic mode.

**Table 420-2. Injector diagnostic LEDs.**

Test	Red LED	Yellow LED	Green LED
Syringe Carriage	Two flashes	On when syringe motor is energized	On when syringe carriage magnet is detected by syringe carriage sensor
Turret, 18593A	Three flashes	On when turret motor is energized	On when turret or bottle insert magnet is detected by the turret sensor
Turret, G1513A	Three flashes	On when turret motor is energized	Toggles On/Off as each encoder position is detected when rotated
Plunger	Four flashes	On when plunger motor is energized	On when plunger magnet is detected by upper or lower plunger sensor.
Injector Alignment	Five flashes	N/A	On when door is closed

### Syringe carriage test

1. Press **START** on the front of the injector. The turret and syringe carriage will move to their home positions. The syringe motor will remain energized for a few moments. The green LED will light whenever the syringe carriage sensor detects the syringe carriage magnet.
  2. Press **START** to drive the syringe motor one step (2 phases energized).
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3. Hold START down to run the syringe motor continuously. Wait about 10 seconds for a response. Note the LEDs on the 18593A/B injector main board. They should light in the following sequence:

**Table 420-3. LED pattern during syringe motor movement.**

<b>DS1</b>	<b>DS2</b>	<b>DS3</b>	<b>DS4</b>
ON	OFF	OFF	ON
ON	OFF	ON	OFF
OFF	ON	ON	OFF
OFF	ON	OFF	ON

Note: These LEDs are not present on the G1513A.

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4. Press STOP to advance to the turret test.

#### **Turret test, 18593A/B**

1. Press START. The turret will go through its homing routine. The motor remains energized for about 10 seconds. The green LED will light when the turret sensor detects the turret magnet.
2. Press START again. The turret will rotate and home on the next magnet. If there is no magnetic bottle insert, the turret will find the original magnet again.
3. Move the turret manually to verify the sensor trips when the magnet goes by.
4. Press STOP to advance to the plunger carrier test.

#### **Turret test, G1513A**

1. Press START. The turret will go through its homing routine and then move to the first sample vial position.
  2. Press START again. The turret will move to the next vial position. The green LED will turn on and off each time it passes through an encoder position. This will appear as a flickering of the LED because the encoder codewheel has 2,000 counts per revolution.
  3. Press START again. The turret will move to the next vial position. Continue to press START until the turret has passed through all the vial positions.
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4. Move the turret manually to verify encoder operation. The green LED will turn on and off each time it goes through an encoder position.
5. Press STOP to advance to the plunger carrier test.

### **Plunger carrier test**

1. Press START. The plunger will go to the top of its movement while energizing the solenoid to catch the plunger carrier at each stop on the way up. The plunger motor then drives the plunger carrier to the bottom of its movement. The green LED will light when the plunger carrier is at the top or bottom of its travel.

Note the LEDs on the injector main board. DS6 lights when the processor is sending a signal to the plunger motor drive to enable the plunger motor.

DS5 is on except when the plunger motor is stalled. The plunger motor stalls briefly at the top and bottom of the plunger carrier travel and during the setting of the sample volume.

2. Manually move the plunger carrier up and down and verify that each sensor trips when the magnet moves by.
3. Press STOP to return to the syringe carriage test if you have an 18593A/B. Pressing STOP on a G1513A advances to the injector alignment procedure.

### **G1513A injector alignment procedure**

The G1513A has the capability of varying the sampling depth when used with a 6890 Series GC system or a ChemStation. To accommodate this parameter, it is necessary to know the exact position of the syringe carriage relative to the base and the turret. This is necessary due to built-in mechanical tolerances and the variability of the components. An alignment procedure has been added to the G1513A injector diagnostic set for this purpose. The procedure is performed at the factory with the original turret but should be performed in the field under the following conditions:

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- Whenever the syringe carriage or turret motor/encoder assembly are replaced.
- When the turret is replaced with a different type (e.g., when the standard turret is replaced with a high density turret or vice versa).
- When the yellow align LED is on. This LED is located inside the door of the injector underneath the rotary switch. It is switched on when the system detects that the turret has been changed to a different type. When the injector is out of alignment causing the align LED to turn on, the system goes into diagnostic mode automatically. If the align LED is on, the injector will not function until the alignment procedure is completed.

The procedure is performed as follows:

1. Turn the controller off.
  2. Remove the syringe if installed.
  3. Remove the needle support rod.
  4. Enter diagnostic mode by simultaneously pressing the START and STOP buttons while turning on the controller. The FAULT, RUN, and READY LEDs (red, yellow, and green) will start lighting in rotation indicating you are in diagnostic mode.
  5. Press the STOP button once. The red LED should start flashing twice indicating you are in the syringe carriage test.
  6. Press the STOP button four more times until the red LED is flashing five times. This is the alignment procedure.
  7. Press the START button to begin the alignment procedure. The injector will go through the following steps:
    - The turret will home and rotate to verify that the needle support rod is removed.
    - The syringe carriage will move up to home and then will move down 240 steps. This will be repeated several times with a motor step added each time it moves down until it hits
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the hard stop on the base assembly. This aligns the syringe carriage in the vertical plane relative to the base. This could take up to 1 minute.

- The syringe carriage will move up slightly above the turret, and the turret will move over the inlet.
  - The syringe carriage will move down a step at a time until the turret stalls on the syringe carriage. This aligns the syringe carriage in the vertical plane relative to the turret.
  - The red LED will return to the beginning of the diagnostic set and flash twice. The yellow ALIGN LED inside the door will go out if it was on indicating that the alignment procedure is complete.
8. Power cycle the controller to exit diagnostic mode, and return to the ready state.