



## Commander 950 Wide-Band Oxygen Sensor Quick Start Guide & Information

PN 534-188 (NTK Sensor Upgrade Kit)  
PN 534-197 (Bosch LSU4 Sensor Upgrade Kit)

**NOTE:** These instructions are meant specifically for the “Pro” Software and ECU Firmware.

**NOTE:** More detailed information, including detailed tuning, is included in instruction manual P/N 199R10149-6/7. This manual is intended to overview the installation and use of the Holley wide-band oxygen sensor.

### Software & Firmware Version:

1. Make sure that your ECU has “Pro” firmware. To confirm this, view the firmware version by going into “About” and “Version” in the software. The ECU must be connected to the laptop with the ignition “on” to view the firmware version. “Pro” firmware is identified as version 3.0 and later. If your ECU does not have “Pro” firmware, you must send it in to Holley to get it updated. If you purchased PN 534-188 or 534-197, a certificate is included to allow you to do so. Systems manufactured in 2004 and later already have “Pro” firmware and software included.
2. Make sure you install the “Pro” software that is included in the 534-188 kit. PN 534-197 does not include the software and manual. Both of these can be downloaded free of charge at [www.holley.com](http://www.holley.com).

### Which Sensor Do I Use?

Both of these sensors will provide an accurate measurement of the air/fuel ratio of an engine, however the Bosch sensor has some limitations. They are:

1. Although neither sensor is recommended for use with leaded fuels, the life of the Bosch sensor is much shorter than that of the NTK sensor. Therefore, it is never recommended to use the Bosch sensor with any type of leaded fuel. The life expectancy varies and is based on the lead content and other additives of a particular fuel.
2. The Bosch sensor should not be used in a high EGT (exhaust gas temperature) environment. The maximum exhaust gas temperature the probe tip should see is 1560°F. The maximum the external case of the sensor should see is 1050°F. Unless the sensor is very close to the cylinder head, or turbo, this should not be an issue for most applications. If the Bosch sensor is used in a turbo application, it is recommended that the sensor is at least 18” downstream of the turbo. It should be a minimum of 18” from the outlet of the exhaust to ensure an accurate reading. For applications above 10 PSI of boost, the NTK sensor is recommended due to typical temperatures seen.

### Sensor & Controller Mounting:

The controller can be mounted inside the vehicle or in the engine compartment. Keep it away from direct heat, direct road debris, or direct water spray. A good place to mount it is on a firewall or fenderwell.

### Sensor Placement & Installation:

The sensor should be mounted in the exhaust system at a point in which it reads at least one bank of cylinders, such as in the header collector or just after it. See the 199R10149-6/7 manual for more information on the proper angle to mount it. The sensor can also be mounted in an individual header tube for engines that have a particular cylinder that is known to be lean, and the air/fuel ratio of that cylinder needs to be monitored.

### Controller & Sensor Wiring:

The controller is designed to be plug-and-play with any existing Commander 950 wiring harness. The controller has an 8-pin connector. The 534-188 kit includes an extension harness that is plugged into the controller and then the sensor. The 534-197 kit does not have this extension cable. The pigtail on the Bosch sensor is long enough so that an extension is not needed in most applications. If an extension cable is needed for either unit, it can be purchased under Holley PN 534-199. There is a 3-pin weatherpack connector that plugs directly into the existing O<sub>2</sub> sensor connector (3 pin male weatherpack) on the main harness (red, black, and purple wires). Plug these connectors together.

There are two more connectors coming out of the wide-band controller. The first connector has two orange wires. This is for C.A.N. (Controller Area Network) communications that is not used on the Commander 950 at this time. The second connector is a two-pin weatherpack with black wires that can be used to connect a gauge. A 2-1/8” gauge can be purchased from Holley under Holley P/N 534-200 (for 3<sup>rd</sup> Gen. controllers).

## Controller Sensor Selection: IMPORTANT!

The unit is designed to work with both NTK and Bosch wide-band oxygen sensors. However, the controller must be configured for the particular sensor. This is simply done with the brown "jumper loop" that is external to the unit. If an NTK sensor is used, the brown wire should not be cut and should "loop" in and out of the box. If a Bosch LSU4 sensor is used, this loop must be cut. The open ends should have heat shrink applied so that they do not touch any ground. If this is not done, the unit will read incorrectly and damage may result.



534-188 kits should have the brown wire intact, not cut. 534-197 kits should come with the brown wire pre-cut and heat-shrunk. Check to make sure this is correct.

## Software Setup:

When using a wide-band controller in closed-loop mode, settings in the "Closed Loop Parameters" must be correct

- 1) The "Wide-Band O<sub>2</sub>" box must be selected.
- 2) The Air/Fuel vs. Voltage table must be properly set. See the 199R10149-6/7 manual (page 39) for the proper settings.
- 3) The Target Air/Fuel ratio table must be properly entered. See page 39 or the 199R10149-6/7 manual.

## System Tuning:

Comprehensive tuning information is contained in the 199R10149-6/7 manual.

## Error Codes:

There is an LED light on the front of the unit. This light gives the status of the unit. It can be read as follows:

LED ON SOLID – Sensor heating normally or is active.

LED SLOWLY BLINKING (once every 2 seconds) – Sensor is too hot, too cold, or slow to heat up.

LED FAST BLINKING (once every half-second) – Sensor is not connected or other error.

## Wide-band Controller/Sensor Versions:

Holley has produced several different versions of controllers and sensors with different compatibilities. This section overviews these. Due to the different connectors, it is not possible to connect a Gen 1 sensor or controller to a Gen II or Gen III sensor or controller. Compatibility is ensured.

This kit comes with a 3<sup>rd</sup> Gen Controller and 2<sup>nd</sup> Gen NTK (534-188) or Bosch (534-197) sensor.

### Controllers

1<sup>st</sup> Gen Controller – 1<sup>st</sup> Gen controllers can quickly be identified by the long O<sub>2</sub> sensor harness that is attached to the controller and is not removable. All of the wires are of various colors as well.

2<sup>nd</sup> Gen Controller – 2<sup>nd</sup> Gen controllers can quickly be identified by the use of a separate O<sub>2</sub> sensor harness. All wires in this unit are black. It has a 3 wire weather pack connector for the C950 connection, a 4 wire weather pack connector for a display, and the 8 pin connector for the O<sub>2</sub> sensor.

3<sup>rd</sup> Gen Controller – The 3<sup>rd</sup> Gen controller is similar to a 2<sup>nd</sup> Gen controller, except that it is much smaller and has some different cabling. It has a 3 wire weather pack connector for the C950 connection, a black 2 wire connector for a gauge, an orange 2 wire connector for a C.A.N. connection (not used at this time), and the 8 pin connector for the O<sub>2</sub> sensor.

### Sensors

1<sup>st</sup> Gen NTK Sensor – The 1<sup>st</sup> Gen NTK sensor has a connector that can only be plugged into a 1<sup>st</sup> Gen Controller

2<sup>nd</sup> Gen NTK Sensor – The 2<sup>nd</sup> Gen NTK sensor has a connector that can only be plugged into a 2<sup>nd</sup> Gen Controller or extension harness.

Bosch Sensor – This sensor can be used with a 2<sup>nd</sup> or 3<sup>rd</sup> Gen Controller (brown jumper wire must be cut).

## Gauges:

A 2-1/8" gauge (Holley P/N 534-200) is available so you can read the air/fuel ratio in the vehicle at all times. This is for 3<sup>rd</sup> Gen. controllers only. 1<sup>st</sup> and 2<sup>nd</sup> Gen controllers can use a gauge or display from FJO Racing Electronics ([www.fjoracing.com](http://www.fjoracing.com)).

## 199R10323-1

Date: 7-31-06