



CAUTION: CAREFULLY READ INSTRUCTIONS BEFORE PROCEEDING

OVERVIEW

The WEGO units can be used with an easily fabricated exhaust sniffer that allows temporary installation on most motorcycles for tuning and diagnostic purposes.

EXHAUST SNIFFER FABRICATION

The exhaust sniffer is shown in Figures 1-3. It is constructed from sections of copper pipe that are soldered together. The sensor mounting section is a 2" length of 1" ID pipe. A 3/4" hole is drilled in the center of the 1" ID pipe and an 18 x 1.5 mm weld nut (our P/N EGO-WELD-NUT) is brazed in place.

Adapters and small sections of 1/2" ID pipe are used at each end to transition down to 1/4" ID pipe. A 2 foot length of 1/4" ID pipe is used for sampling (inserted into the exhaust system). The outlet pipe is

also 2 foot long and 1/4" ID. This greatly reduces reversion effects at part throttle. The outlet pipe is coiled (approximately 3-1/2" diameter) to reduce overall dimensions. The completed sniffer pipe can be painted with black high temperature paint for improved cosmetics. A mounting bracket is fabricated from a 7" length of 1" wide x 1/8" thick aluminum. The bracket is held in place by a hose clamp.

An optional 3/8" OD compression fitting can be installed as shown in Figure 4 to allow changing the sampling pipe. A 3/8" to 1/4" OD compression fitting would allow the use of a smaller sampling pipe.

All the materials, except the exhaust wrap described in the following section, can be readily obtained in the plumbing department of any hardware store.

Figure 1 – Motorcycle Exhaust Sniffer

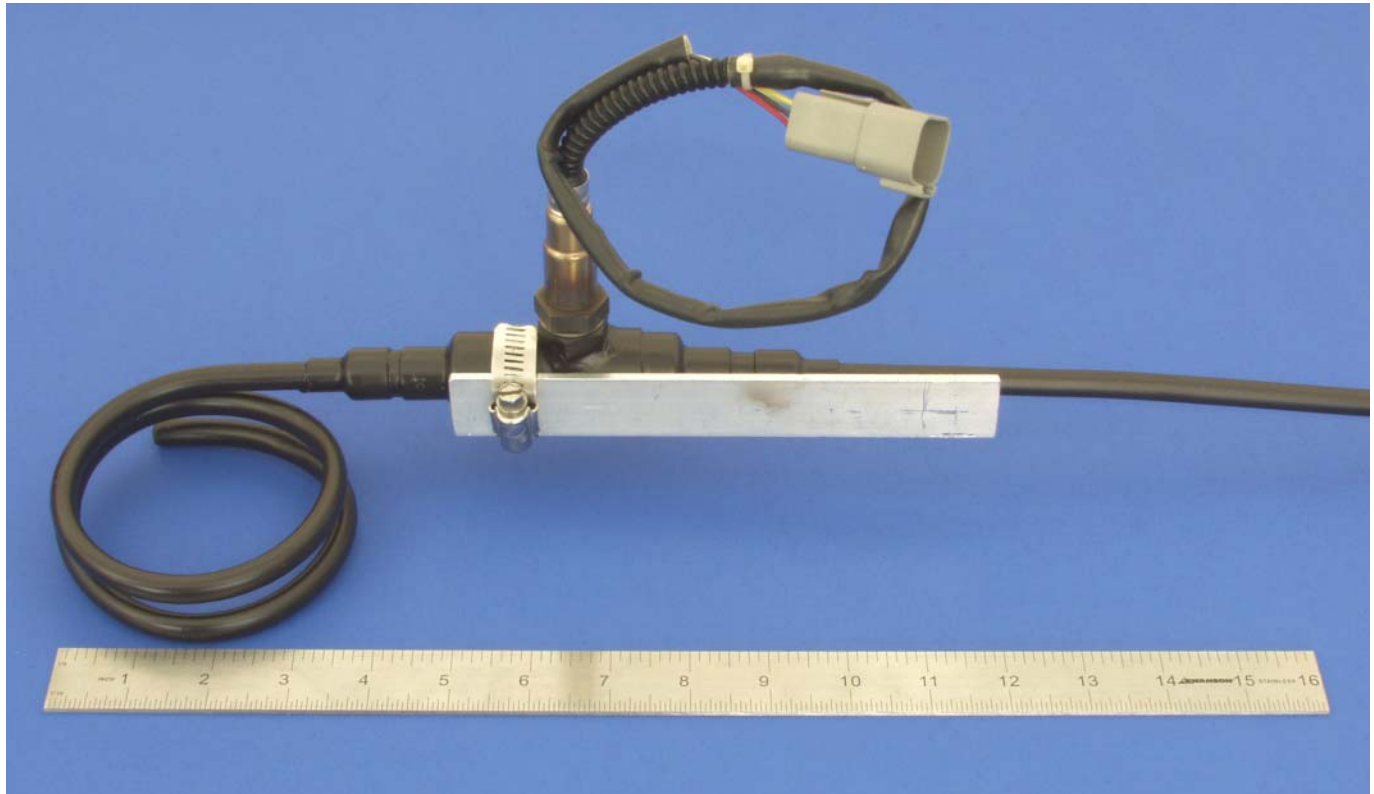


Figure 2 – Motorcycle Exhaust Sniffer

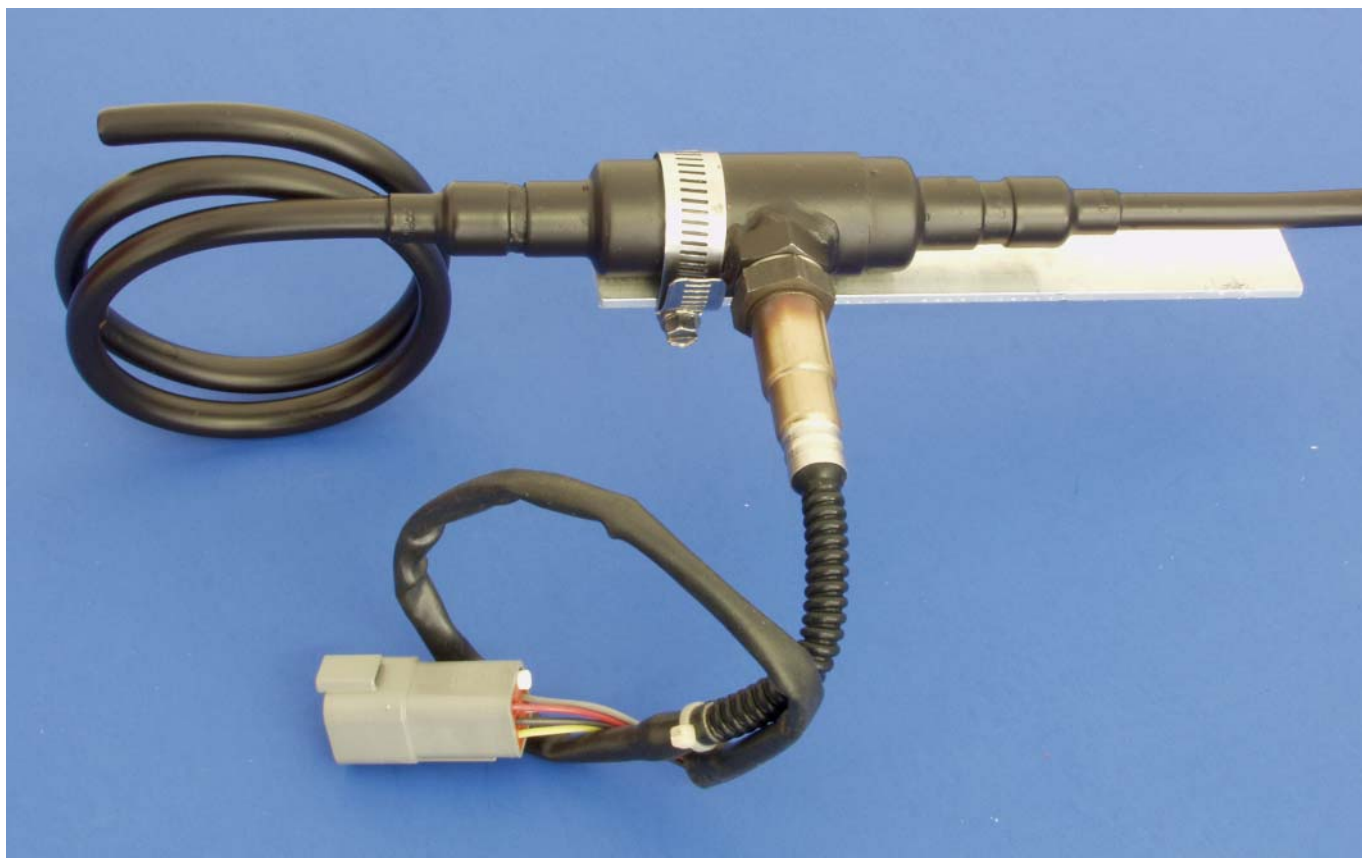


Figure 3 – Motorcycle Exhaust Sniffer



Figure 4 – Optional Compression Fitting



INSTALLATION

The exhaust sniffer is attached to the muffler with a hose clamp as shown in Figure 5. Woven glass high temperature exhaust wrap (available from most automotive parts stores) is used to protect the muffler from scratches.

Figure 5 – Typical Installation



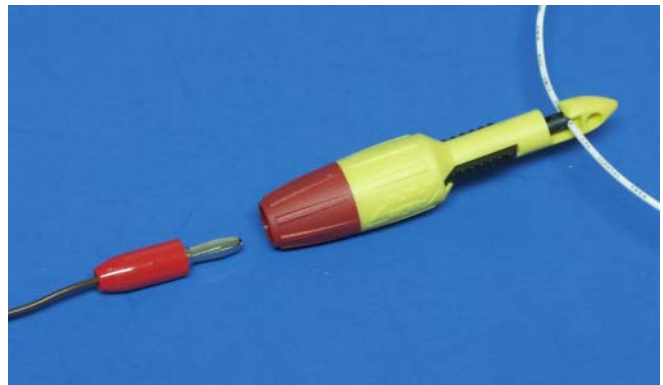
WEGO HOOKUP

For dyno testing, alligator clips (available from Radio-Shack or other electronic parts stores) can be soldered to the WEGO red and black power wires and connected direct to the battery.

Temporary tach and analog signal (such as TPS on fuel injected motorcycles) connections can be made with insulation piercing test clips. Once you use these, you will wonder how you ever got along without them. The best type is the Pomona 6405. These lock onto the wire as shown in Figure 6.

A set of the Pomona test clips is available from Newark as their P/N 23C2020. They also sell extended reach versions (refer to the data sheet available on the Diagnostic Tools and Suppliers Tech FAQ on our website at www.daytona-sensors.com). You will need banana plugs to connect the insulation piercing test clips to the WEGO. These are available from Newark as P/N 39F1531 (red) and 39F1532 (black). The insulation piercing test clips are also very handy for probing signals with a DVM or scopemeter. To use them with a DVM or scopemeter, you will need a set of test leads with banana plugs. These are also available from Newark as P/N 34F850 (36" red) and 34F851 (36" black). The test clips, banana plugs, and test leads together will cost about \$50.00. Newark can be reached at 800-463-9275 or www.newark.com.

Figure 6 – Insulation Piercing Test Clip



SNIFFER LIMITATIONS

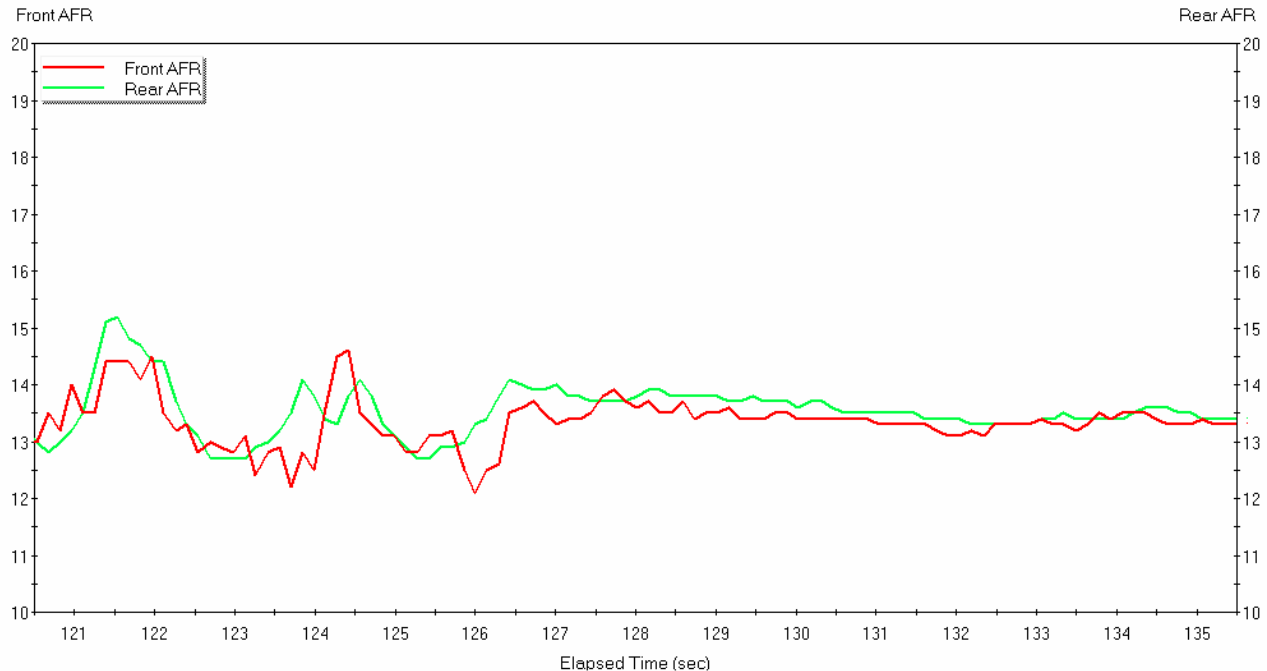
Any exhaust sniffer inserted into the end of a muffler is subject to some limitations. The baffles in some mufflers may not allow inserting the sampling pipe very far. In this case, severe reversion effects will occur at part throttle. Even if the sampling pipe can be fully inserted, reversion effects will limit the accuracy of AFR readings at idle and under decel conditions. Reversion effects will be worse for mufflers with minimal baffling or open drag pipes. Reversion effects will cause a false lean indication with the WEGO AFR reading higher than the actual engine AFR.

Figure 7 shows data logged on a test motorcycle equipped with TCFI IID fuel injection and an exhaust sniffer installation similar to that shown in Figure 5. The test motorcycle had low restriction slip-on mufflers with some reversion. The graph shows the data for the rear cylinder. Front AFR corresponds to the TCFI II wide-band sensor mounted near the cylinder head. Rear AFR corresponds to the exhaust sniffer. The data represents brief acceleration through two gears and then steady cruise. The two peaks in AFR occur at shift

points where the throttle is released. The correspondence between the two sensors is fairly close at part throttle and wide open throttle. Under

decel and idle conditions (not shown), reversion effects cause a substantial error in the exhaust sniffer.

Figure 7 – Motorcycle Exhaust Sniffer AFR Data



OVERCOMING SNIFFER LIMITATIONS

An alternative means of sampling the exhaust gas is shown in Figures 8-9. The sampling system is constructed from an 10 foot length of 3-1/2" OD high temperature rubber exhaust hose and an 2-1/2" x 8" galvanized iron pipe nipple. The exhaust hose is available from McMaster-Carr as P/N 5398K13. McMaster-Carr can be reached at 404-346-7000 or www.mcmaster.com. The pipe nipple can be obtained at most plumbing supply stores.

The 2-1/2" pipe nipple is thick enough that it can be drilled and tapped for the 18 x1.5 mm Bosch wide-band sensor. It can then be painted with black high temperature paint. A 10" long section of the rubber hose is used between the muffler and the pipe nipple. The rubber hose is best cut with a hacksaw. Large diameter hose clamps are used to secure the assembly. The end of the muffler is wrapped with woven glass high temperature exhaust wrap for a good seal and to protect the rubber hose. A 3" long slit in the rubber hose allows it taper down and make a tight seal with the muffler. Care must be taken to avoid air leaks. A generous amount of anti-seize lubricant such as

Permatex 133A should be used on the sensor threads to help prevent leaks in this area.

Figure 8 – Exhaust Sampler



Figure 9 – Exhaust Sampler



Table 1 shows the results of comparison tests conducted at idle on the rear cylinder of a 2007 Fatboy test motorcycle equipped with our TCFI IID system and Cycle Shack slip-on mufflers (no crossover). The wide-band sensor used with the TCFI IID was installed in place of the original equipment narrow-band sensor located near the head flange. The sniffer pipe was inserted about 12" – as far as it would go before hitting the baffle in the muffler. At idle, AFR values measured with the sniffer showed a substantial error caused by reversion, whereas the AFR values measured with the tube sampler were within measurement error of the TCFI IID values.

Please note that the tube sampler does not eliminate reversion. However, instead of ambient air being sucked back into the exhaust, the negative pressure pulse now causes reversion of exhaust gases already within the length of hose. This would cause a delay in obtaining accurate readings during rapid transients, but does not cause any error during steady state. The tube sampler can be used for idle, part throttle, and even wide open throttle testing and tuning.

Table 1 – Comparison Tests

	AFR Measured with WEGO at Muffler Exit	Rear Cylinder AFR from TCFI IID Sensor
Sniffer (Figure 5)	14.5-15.0	13.4-13.5
Tube Sampler (Figure 8)	13.5-13.6	13.4-13.5

The exhaust sampling system shown in Figures 8 and 9 can be used with dual independent and 2-into-1 exhausts. For dual exhausts with a crossover, you can eliminate errors from reversion by installing a second exhaust hose (without the sampling section). However, even this technique will not solve the problem with the factory style exhausts on Harley® touring models where a venturi effect sucks air back into the left tail pipe.

For large diameter mufflers on touring models, you can use a funnel shaped exhaust adapter fabricated from heat resistant rubber available from McMaster-Carr as P/N 5398K17. This adapter threads into the rubber exhaust hose. It is supplied with snap fasteners. These can be drilled out. You can then use a large diameter hose clamp to secure the adapter to the muffler as shown in Figure 10. Remember to wrap the muffler with woven glass high temperature exhaust wrap for a good seal and to protect the rubber adapter.

Figure 10 – Exhaust Adapter

