



## Exhaust Gas Emission Analyser Use

### Introduction:

This Information Sheet introduces the LM-1 Exhaust Gas Emissions Analyser (or air/fuel ratio meter), supplied (or made available) to all LVV Certifiers who are authorised for LVV certification category LV-EX.

During LVVTA's trialling of the LM-1 unit, a number of potential problems were identified, together with the respective remedies for those problems. One of the main purposes of this Information Sheet is to record the details of these problems and remedies for the future reference of LVV Certifiers.

### Application and form-set use:

The exhaust gas emissions check must be carried out on any M or N-class light vehicle that is scratch-built, or has undergone an engine conversion (see LVV Standard 90-10 [Exhaust Gas Emissions] for more detailed information on the scope and application of the LVV exhaust gas emissions testing regime).

In order to certify a vehicle that is scratch-built or has undergone an engine swap, the LVV Certifier will need to hold certifier category LV-EX. If an LVV Certifier does not hold this category, and believes that he possesses the necessary background for this type of work, he should apply via email in the first instance to Linda at [adminlvvta@xtra.co.nz](mailto:adminlvvta@xtra.co.nz), who will forward the application to Land Transport New Zealand together with LVVTA's recommendation.

When carrying out an LVV exhaust gas emissions test, the new *Form-set FS038 – Exhaust Gas Emissions Testing* must be used.

### Fees:

Each time an LVV exhaust gas emissions test is carried out, and Form-set FS038 submitted, a levy of \$20.00 including GST must be forwarded to LVVTA (in addition to the regular LVV certification plate fee). LVVTA has invested heavily to purchase the 30 meters so as to avoid the necessity for LVV Certifiers to purchase the units themselves, and the \$20-00 levy will, over a period of time, go toward the recuperation of the initial purchase costs of the meters, plus on-going maintenance and calibration costs.

This figure of \$20-00 including GST is set so as to include the cost of the (forwarding and return) courier fees for the meters that will be shared between LVV Certifiers, in order to minimise and simplify LVVTA's administration of this process. For those LVV Certifiers who will be using a shared meter supplied by the LVVTA office, a courier bag or ticket for the return

of the meter will be supplied with the meter, and (because this cost is built into the \$20-00 per use levy) there will be no courier costs payable by the LVV Certifier.

### Problems and remedies:

Below is a table that lists a number of problems that may occur with the LM-1 meter, together with the remedies.

LVVTA encourages all LV-EX authorised LVV Certifiers to read through this Information Sheet thoroughly before using the LM-1 meter, as an understanding of these issues should prevent the problems from happening in the first place.

	<b>Problem</b>	<b>Remedy</b>
1	The 12V power supply to the meter is lost during engine start up, requiring the calibration sequence to be carried out again:	Ensure that the vehicle's engine is running so as to provide a good 12 V power supply during exhaust gas emissions analyser start-up.
2	The oxygen sensor calibrates incorrectly:	When performing the initial calibration process, ensure that the oxygen sensor is <u>not</u> installed into the tail-pipe clamp, so that the sensor is able to calibrate using free air.
3	The analyser malfunctions during use; or  The analyser gives erratic readings:	Check for moisture build-up in the tail-pipe clamp or sensor, by removing the sensor from the tail-pipe clamp and allowing the tail-pipe clamp and sensor to dry out, and then re-test the vehicle.  Note that if the heat-sink bung extender is being used, this will also need to be removed from the tail-pipe clamp and dried out.  To prevent this problem from happening:  (a) position the tail-pipe adaptor within the top half of the tailpipe; ie - between the 9 o'clock and 3 o'clock positions; and  (b) ensure that the exhaust gas emission test is performed with the engine at operating temperature. It is strongly recommended that LVV Certifiers fit the test equipment after completion of the road test and brake test (when the engine is up to operating temperature), and perform the exhaust gas emission test on the return trip.
4	The tail-pipe clamp attachment screw does not secure the tail-pipe clamp with enough clamping force:	It is strongly recommended that when LVV Certifiers first receive their exhaust gas emission testing equipment, they remove the attachment screw from the exhaust tail-pipe clamp and grind a point onto the end of it.

5	A fault code '08' comes up on the meter during a test (most likely to occur when testing a diesel-powered and/or turbo charged vehicle):	Fit the supplied heat-sink bung extender, carry out the calibration procedure again, and then re-test the vehicle. (It has been found that diesel engines and turbo-charged engines generate a lot of heat in the exhaust system, which can upset the meter – the heat-sink bung extender is designed to shift the oxygen sensor further back within the tail-pipe clamp, thereby reducing the heat applied directly to the oxygen sensor).
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### Mobile meters:

Due to the cost of the equipment, it is not cost-effective for LVVTA to purchase and issue exhaust gas emissions analysers for those LVV Certifiers who do a very small number of certifications where the vehicle is scratch-built or has undergone an engine swap. 28 of the 30 units have been issued to a specific LV-EX authorised LVV Certifier, and the remaining two will be 'mobile meters', available upon request for any other LV-EX authorised LVV Certifier who does not have an analyser assigned to him.

If an LVV Certifier has been allocated an exhaust gas emission analyser by the LVVTA Wellington office, this analyser is for the use of that LVV Certifier only. Each analyser is issued with its own LVVTA serial number (which is tied to the analyser manufacturer's serial number) and that number is assigned to a specific LVV Certifier. An LVV Certifier entrusted with a unit is responsible for that unit.

If an LVV Certifier is authorised for category LV-EX but has not been issued with his own equipment, he should, whenever he has a certification which requires the use of an analyser, contact the Wellington or Auckland LVVTA office (there is one 'mobile meter' at each office) to arrange for the loan of a 'mobile meter'.

### Care of equipment:

#### While in transit:

LVVTA has gone to considerable lengths to provide this equipment without imposing direct costs on the LVV Certifiers. The equipment – imported from the USA - is expensive and delicate, hence the protective cases that were sourced and set up here in New Zealand by Justin to protect the units. Each Innovate LM-1 exhaust gas emission analyser – including the accessories provided - is worth in the region of \$1000. It is now the responsibility of the LVV Certifiers to take good care of them.

Even while in the protective cases, please do not drop the case, or allow the cases to slide around while in transit.

#### While being used:

The tail-pipe clamp can fall out of the exhaust pipe (even with the tip ground to a point) through vibration, which will damage the oxygen sensor. It is not uncommon for these units to fall out of the exhaust pipe even while on a dynamometer.

When attaching the tail-pipe clamp to the vehicle, the LVV Certifier must use some thin welding wire or something similar to secure the clamp as a secondary form of attachment.

There is always something to attach the other end of the wire to, such as an exhaust hanger bracket or bumper bracket.

If the adaptor does fall out during the road test and the sensor is damaged, the cost to replace the sensor is approximately \$180-00. It is the LVV Certifier's responsibility to pay for a replacement oxygen sensor if it is damaged through insecure clamping.

After use:

After use, the tail-pipe clamp and oxygen sensor will be very hot, and may have a moisture build-up inside it. The oxygen sensor should be removed from the tail-pipe clamp, and both items should be allowed to cool and dry out on a non-flammable surface before being packing away in the protective case.

Storage:

Please store the meters safely to avoid loss or theft. One of Land Transport NZ's objective noise test meters has been stolen because an LVV Certifier carelessly left his vehicle unlocked with a multi-thousand dollar piece of equipment (owned by someone else) in it.

This was embarrassing for LVVTA in the extreme.

Also, please always keep the protective case locked with the supplied padlock.

Calibration:

The exhaust gas emissions analysers will be inspected for calibration and general operation by LVVTA at each LVV Certifier training session. Each LV-EX authorised LVV Certifier who has been assigned a unit is to bring it to the next LVV Certifier training session.

**In summary:**

Should the equipment (or any part of the equipment supplied in the kit) become lost or stolen, or should any damage occur to the equipment for whatever reason, or should the equipment fail to perform accurately and reliably, the LVV Certifier must notify LVVTA immediately.

LVVTA is very interested in how the LVV exhaust gas emission testing programme goes, and we would welcome any feedback – thoughts, comments, ideas, advice – that LVV Certifiers might have to offer. Please talk to either Kendall or Justin.

If you have any queries or require any further clarification relating to this Information Sheet, please feel free to contact Kendall or Justin at the Wellington LVVTA office.

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**Low Volume Vehicle Technical Association, Inc**