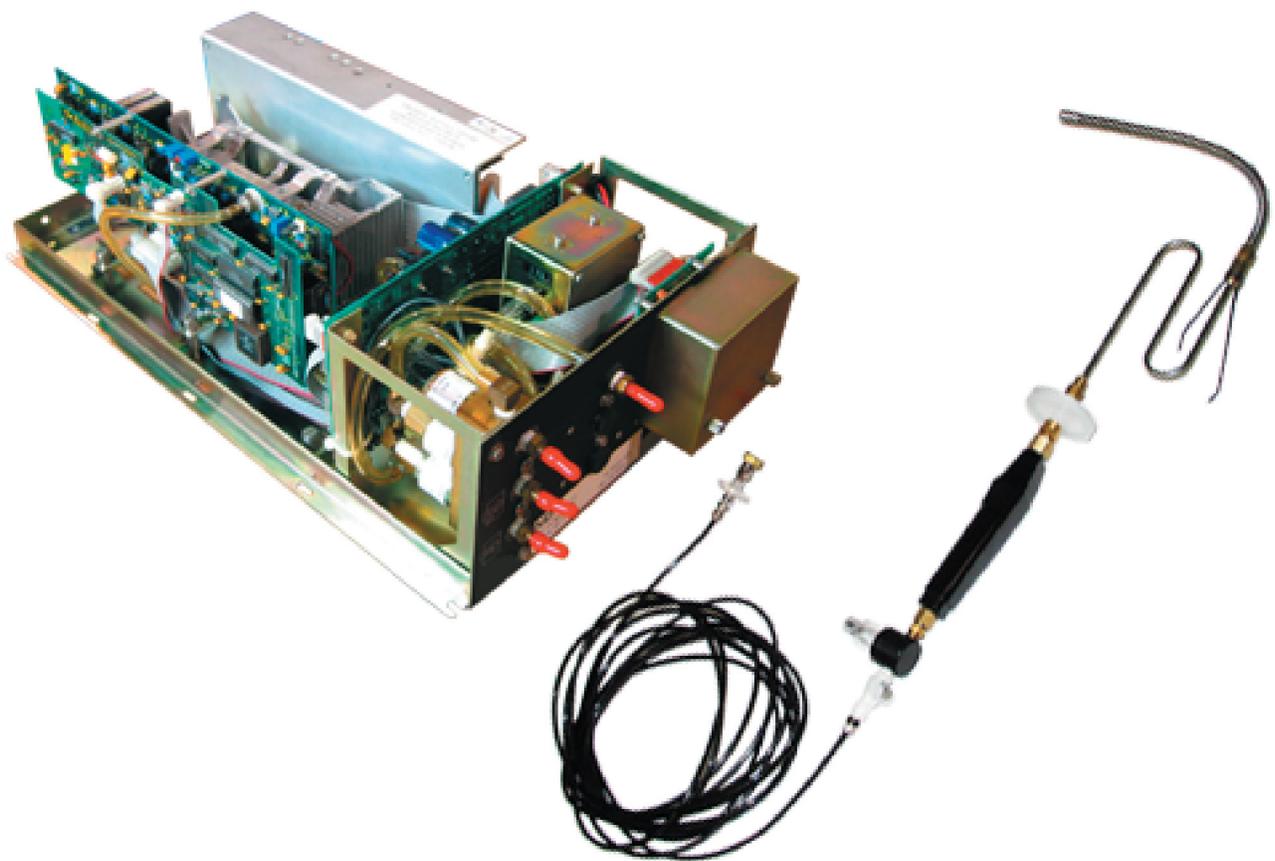


MD[®]

MUSTANG

D Y N A M O M E T E R

5 Gas Analyzer



**Maintenance
And
Service Manual**

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AVIS

Ce manuel a été conçu et écrit pour fournir de l'information utile sur l'équipement et les systèmes Mustang Dynamometer. Toutes les précautions ont été prises pour rendre ce manuel aussi complet que possible, mais aucune garantie d'adaptation ni autre n'est implicite.

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If a problem arises within the applicable warranty period, it is the responsibility of the purchaser to (a) promptly notify Mustang in writing (b) obtain a RMA Number from Mustang (c) return to Mustang the component(s) that are claimed to be defective (transportation charges must be prepaid by the purchaser). RMA Number must be clearly marked on outside of package(s).

Within a reasonable time after such notification, Mustang will correct any defect(s) in component(s). If Mustang is unable to repair the component after a reasonable number of attempts, or if Mustang determines at any time the repair is impracticable, Mustang will provide a replacement with like or similar component(s). The purchaser is responsible for all transportation expenses to and from Mustang and all labor expenses associated with removal and replacement of the component(s) as well as labor involved to repair component(s). Mustang will bear the expense of parts only. These remedies are the Purchaser's sole remedies for breach of warranty.

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GANZCORP INVESTMENTS INC. dba MUSTANG DYNAMOMETER

DANGER

Keep limbs, hair, jewelry and clothing away from the moving rolls. When operating a vehicle on the machine, remain inside vehicle until the rolls have stopped. Cover the rolls when the equipment is not in use.

DANGER

Garder les membres, les cheveux, les bijoux et les vêtements éloignés des rouleaux en mouvement. Lors de l'utilisation d'un véhicule sur l'équipement, rester à l'intérieur du véhicule jusqu'à ce que les rouleaux se soient arrêtés. Couvrir les rouleaux lorsque l'équipement ne sert pas.

DANGER

Do not operate or perform any maintenance on your equipment until you have carefully read this manual in its entirety making sure that you understand all of the material presented in each section.

DANGER

Ne pas utiliser l'équipement ni effectuer son entretien avant d'avoir lu attentivement ce manuel en entier et d'avoir compris tout le matériel présenté dans chaque section.

CAUTION

Unsafe operating practices can lead to potentially dangerous situations when your machine is running.

Only properly trained and responsible personnel should attempt to operate this machine.

ATTENTION

Des pratiques d'utilisation non sûres peuvent conduire à des situations potentiellement dangereuses lors du fonctionnement de l'équipement.

Seul le personnel responsable et correctement instruit doit entreprendre d'utiliser cet équipement.

CAUTION

Removal and disassembly instructions in this manual have been reduced to a minimum for ease of readability.

Only experienced maintenance personnel should attempt to install and/or make repairs to this machine.

ATTENTION

Les instructions de dépose et de démontage données dans ce manuel ont été réduites au minimum pour en faciliter la lecture.

Seul du personnel d'entretien expérimenté doit entreprendre d'installer ou de faire des réparations sur cet équipement.

CONTENTS

1.1	DESCRIPTION	1-3
1.2	KEY FEATURES OF THE MD GAS ANALYZER	1-3
1.3	KEY FEATURES OF THE MD-7000 SOFTWARE	1-3
1.4	ENVIRONMENTAL SPECIFICATIONS	1-4
1.5	GAS CONCENTRATION MEASUREMENT SPECIFICATIONS	1-5

1.1 DESCRIPTION

This manual contains operation and service information for the MD Gas Analyzer.

Major system components include MD Gas Analyzer, and the MD-7000 software, which is used to operate and calibrate the MD Gas Analyzer.

The MD digital automotive exhaust gas analyzer uses a single-beam NDIR (Nondispersive infrared) measurement technology to provide fully corrected HC, CO, and CO₂ gas concentrations. NO (Nitric Oxide) and O₂ concentration measurements are supported via external, user replaceable sensors.

The MD Gas Analyzer is specifically designed to meet or exceed worldwide performance specifications for automotive emissions measurements.

1.2 KEY FEATURES OF THE MD GAS ANALYZER

Meets or exceeds worldwide specifications for HC, CO, CO₂, NO and O₂ measurements.

Microprocessor controlled for higher performance.

Calculates and outputs gas concentration directly as digital data via an RS232C serial interface.

Self-compensating for fast warm-up and greater stability.

Automatically requests zero calibration to ensure maximum gas measurement accuracy.

1.3 KEY FEATURES OF THE MD-7000 SOFTWARE

Mustang Dynamometer has joined many other manufacturers in adopting the Microsoft Windows™ operating system environment for real time machine control. As the end consumer, the user will benefit from a familiar and consistent operating environment, greater flexibility and more functionality. As with most Windows software, our 7000 series software presents the new user with an easily grasped set of commands, allowing quick initial use of a new system, along with enhanced capabilities that become apparent with increased use.

A consistent, mouse driven user interface that functions with either a classic mouse or the I/R remote mouse.

An easily read, multiple value display that can be configured to display exactly the values that the current operator wishes to see.

Built in support for both English and metric units.

1.4 ENVIRONMENTAL SPECIFICATIONS

The MD Gas Analyzer will perform to the specifications in this manual over the full range of ambient environmental specifications listed below.

	Operating Environment		Storage Environment	
	HC, CO, CO ₂ , O ₂	NO	HC, CO, CO ₂ , O ₂	NO
Temperature	+ 15 to + 55° C + 59 to + 131° F	+ 10 to + 45° C + 50 to + 113° F	-29 to + 60° C -20 to + 140° F	-10 to + 45° C +14 to + 113° F See note #1
Humidity	Up to 85% RH (non-condensing)	15 to 85% RH (non-condensing)	Up to 95% RH (non-condensing)	Up to 95% RH (non-condensing) See note #2
Altitude	- 300 to + 2133 Meters - 1,000 to + 7,000 feet		- 305 to 3048 meters -1,000 to 10,000 feet	
<p>Notes:</p> <ol style="list-style-type: none"> Optimal NO Sensor storage temperature range is +5 to +200 C. NO Sensors can be stored or transported outside the specified storage temperature range for periods not to exceed ten days. Optimal NO Sensor storage humidity is 50% RH. The specified NO Sensor humidity applies only to NO Sensor in their original sealed packaging. 				

1.5 GAS CONCENTRATION MEASUREMENT SPECIFICATIONS

Resolution is the smallest increment reported.

Measurement Range is the range over which the following accuracy and noise specifications apply.

Accuracy is the difference between the value and the actual gas concentration as specified by the tag value.

Noise is the equivalent peak-to-peak gas concentration represented by six standard deviations.

GAS / DATA	RESOLUTION	MEASUREMENT RANGE	ACCURACY	NOISE (REPEAT-ABILITY)
HC (N-HEXANE)	1 PPM	0 TO 240 PPM 241 TO 400 PPM 401 TO 2,00 PPM 2,001 TO 10,000 PPM 10,001 TO 30,000 PPM	± 11 PPM ABSOLUTE ± 12 PPM ABSOLUTE ± 3.0% RELATIVE ± 5.0% RELATIVE	5 PPM P-P 5 PPM P-P 5 PPM P-P 5 PPM P-P
CO	0.01%	0.00 TO 1.00% 1.01 TO 2.00% 2.01 TO 3.00% 3.01 TO 5.00% 5.01 TO 7.00% 7.01 TO 10.00%	± 0.05% ABSOLUTE ± 0.06% ABSOLUTE ± 5.00% RELATIVE ± 0.15% ABSOLUTE ± 0.20% ABSOLUTE ± 0.30% ABSOLUTE	0.05% P-P 0.05% P-P 0.05% P-P 0.05% P-P 0.05% P-P 0.05% P-P
CO ₂	0.01%	0.00 TO 16.00% 16.01 TO 20.00%	± 0.40% ABSOLUTE ± 1.00% ABSOLUTE	0.10% P-P 0.10% P-P
NO	1 PPM	0 TO 1000 PPM 1001 TO 2000 PPM 2001 TO 4000 PPM	± 32 PPM ± 60 PPM ± 120 PPM	16 PPM P-P 25 PPM P-P 50 PPM P-P
O ₂	0.01%	0.00 TO 25.00%	± 0.50 ABSOLUTE	± 0.10% ABSOLUTE

CONTENTS

2.1	INTRODUCTION	2-3
2.2	CALIBRATION	2-3
2.3	DISPLAY	2-4



2.1 INTRODUCTION

This section contains information and procedures to calibrate the MD Gas Analyzer. All calibrations are done through the MD-7000 series software.

2.2 CALIBRATION

2.2.1 Inspect Analyzer

Make sure all the hoses are connected properly.

Check to make sure both filter bowls are tightened.

Verify that the RS-232 cable is connected to the serial port on the back of the computer.

Make sure the Cal Gas Bottle is connected and the valve is turned on.

Verify that the NO and O₂ sensors are installed as shown in fig.3.1.5 and 3.1.6.

2.2.2 Boot System

Turn on the main power switch to the roll around cart. Turn on the power switch to the computer. The system will boot up into the MD-7000 software.

Once the system has booted up and the MD-7000 software is showing on the screen, verify that the pump is running.

2.2.3 Using The Software

To begin the bench calibration process, select "Bench Calibration" from the "Calibration" choice on the main menu. Refer to drawing 2.1.5. The calibration screen will pop up, refer to drawing 2.2.6.

On the left hand side of the window there will be a list of gases with a check box beside them they are CO₂, CO, HC, NO, and O₂. Ensure all the gases have a check mark. On the other side of the list of gases there will be a blank box, this is used to enter the calibration gas values. These values can be found on a tag or label on the calibration gas bottle. These values must be entered before the analyzer can be calibrated.

On the lower left hand side of the window there is check box for using Propane for HC, make sure this box is checked if you are using a Propane blend for HC.

On the right hand side of the window there are four buttons, "Zero", "Zero & Span", "Leak Check", and "Exit". To zero the analyzer click on the "Zero" button. When zeroing has completed check the status located in the center of the window. Verify that there is not a check next to "Zero Failed". If there is a check mark next to "Zero Failed" refer to Section 3. Once zeroing has passed proceed to the next step.

To span the analyzer click on the "Zero & Span" button. When spanning has completed check the status and verify that there is not a check mark next to "Span Failed". If there is a check mark next to "Span Failed" refer to Section 3. Once the span has passed proceed to the next step.

First you must cap off the end of the probe with a rubber cap to assure no leaks. Then click on the "Leak Check" button. When the leak check has completed, check the status and verify that there is not a check mark next to "Leak Check Failed". If there is a check mark next to "Leak Check Failed" refer to Section 3.

When all three steps have passed press "Exit" to take you back to the main screen.

2.3 DISPLAY

To display the values of the gases on the main screen, right click on one of the eight boxes and a menu will drop down, refer to drawing 2.3.7. Select the gas value you want to see and left click. This will change the box to show the gas value you have selected.

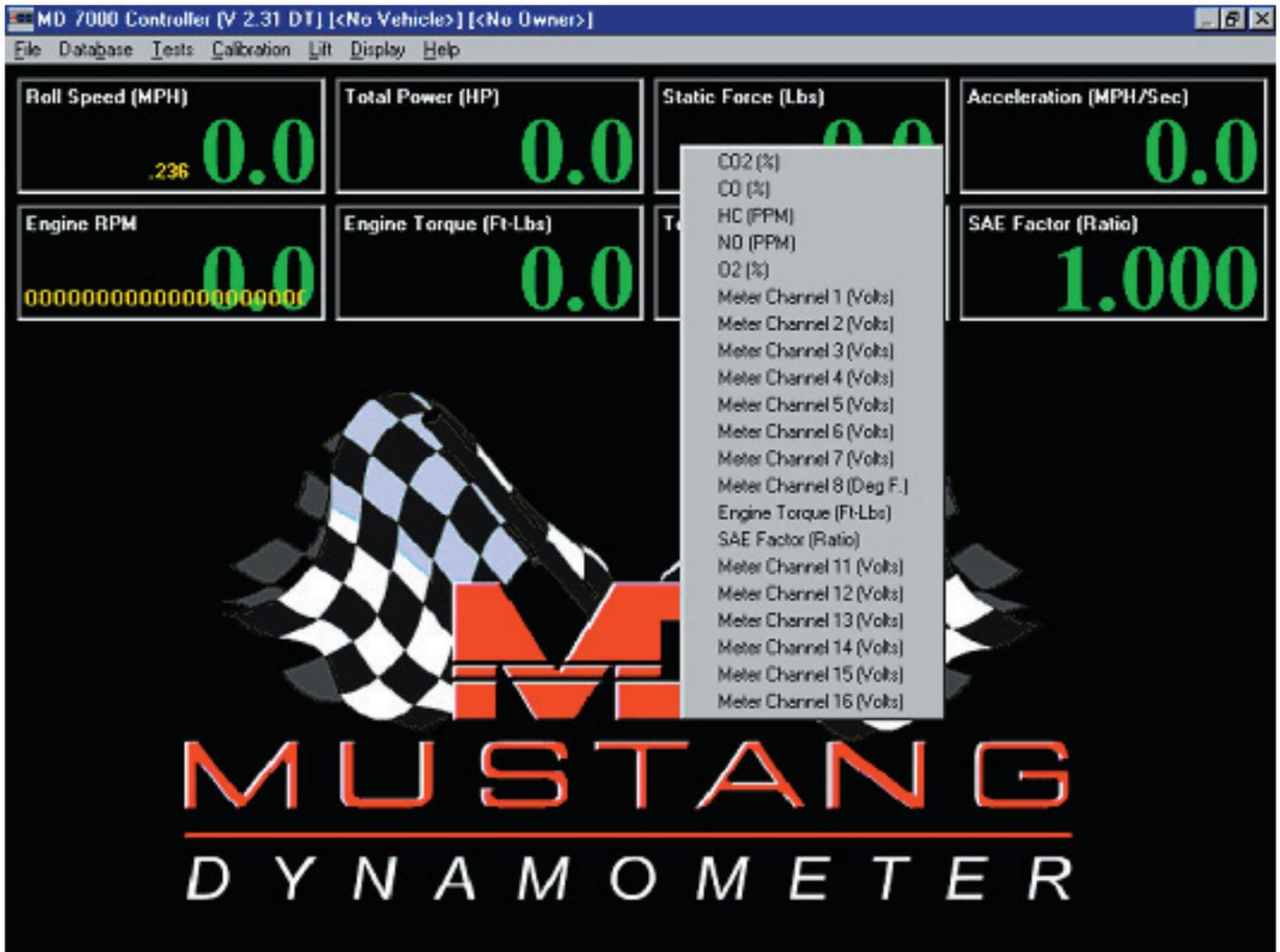
The values displayed are actual readings from the Analyzer. There are no cut off points.



Drawing 2.1.5



Drawing 2.2.6



Drawing 2.3.7

CONTENTS

3.1	INTRODUCTION	3-3
3.2	TROUBLESHOOTING GUIDE	3-3



3.1 INTRODUCTION

This section contains information and procedures for isolating and correcting problems with the MD Gas Analyzer. Table 3.1.2, the Troubleshooting Guide, lists problems, possible causes, and recommended corrections.

3.2 TROUBLESHOOTING GUIDE

Problem	Possible Cause	Correction
Gas Bench Is Not Active	No power to the analyzer	Verify that power is applied to the analyzer.
	The serial cable is not connected	Verify that the serial cable is connected to the Com Port.
Zero Failed	No power to the analyzer	Verify that power is applied to the analyzer.
	One of the two check valves have gone bad	Blow air (low Pressure) through the check valve in the direction of the arrow, if no air blows through replace check valve.
	One or more hoses are blocked	Check all hose lines to assure there is no obstruction of air flow.
Span Failed	The Cal Gas values on the bottle do not match the values entered into the software.	Verify the values on the Cal Gas Bottle match the values in the software.
	There is a leak in the system	Check all hose and fittings and make sure they are tight. Refer to Drawing 3.1.4 for hose connections
	The pump is not running	Verify that the pump has power. Verify that the control wire from the analyzer to the pump is connected.
	NO Sensor needs replaced	Replace NO Sensor Refer to fig.3.1.5 and 3.1.6
Leak Check Failed	Rubber cap was not placed over the tip of the probe	Verify that the rubber cap is placed over the tip of the probe and rerun test.
	There is a leak in the system	Check all hose and fittings and make sure they are tight
	One of the two check valves have gone bad	Verify that there are no cuts in the probe hose. Blow air (low Pressure) through the check valve in the direction of the arrow, if no air blows through replace check valve.

Fig. 3.1.4

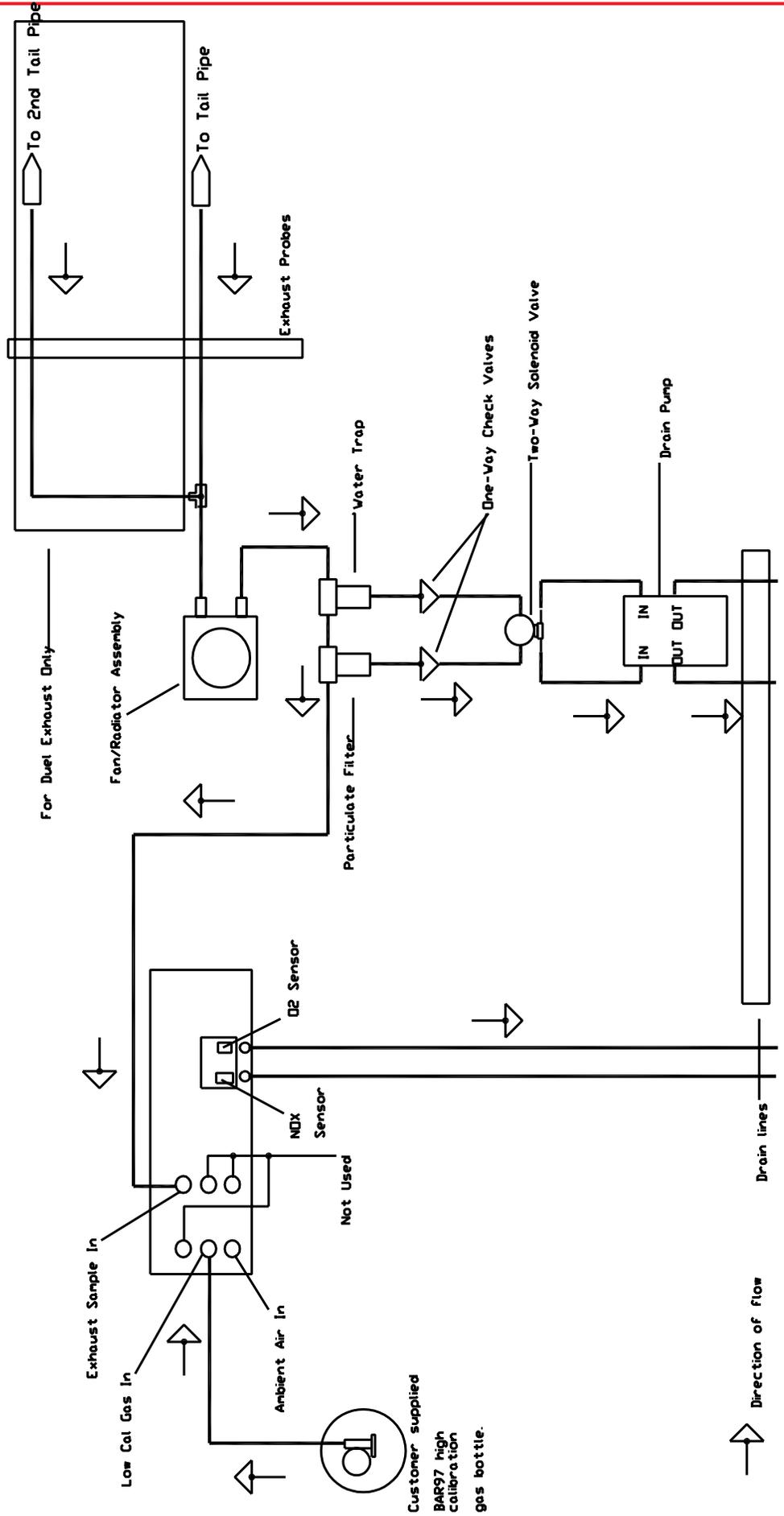
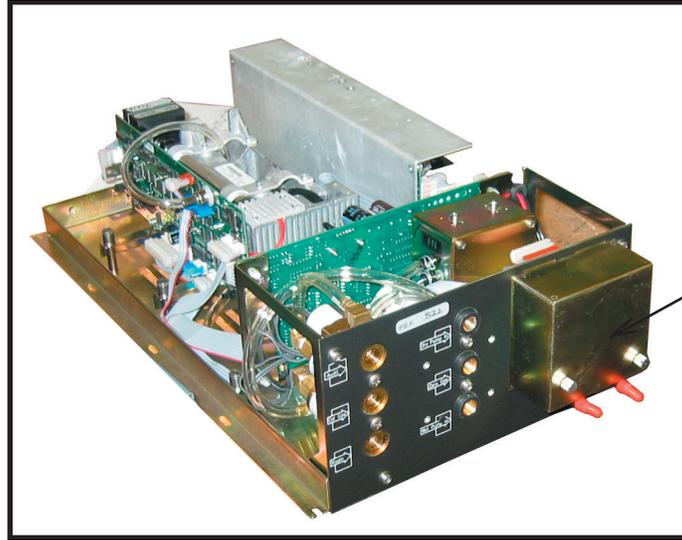


Fig. 3.1.5



Remove cover to gain access to the O₂ sensor and the NOx sensor

Fig. 3.1.6



To remove the O₂ Sensor unplug wires going into the top and turn counter-clockwise

The NOx Sensor just slides into place



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