



290 ND series

EMISSION ANALYSERS

Operating & Maintenance Instructions

TES 1401/C
Sept 2005

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290 series EMISSION ANALYSER

OPERATING INSTRUCTIONS

WARNING:

Do not attempt to operate this equipment unless you have read and understood these instructions.

IMPORTANT

Every reasonable effort has been made to ensure that information within these Operating Instructions is correct at the time of release, but Crypton cannot accept responsibility for any errors that may occur.

The information in these Operating Instructions is subject to change without notice, and does not represent a commitment on the part of Crypton.

Service & Warranty

The reliability of this equipment is fully supported by our service agents, with repair workshops and field service engineers to provide a full range of After-Sales Care, including installation, contract maintenance, factory overhaul and emergency repairs on site. Please refer to the page at the end of this manual for full details.

Note:

If a service engineer is called out under service warranty where, upon inspection and test the equipment is found to be in full working order and no fault found, the user is liable to be charged the cost incurred for this call out. Before calling out an engineer, ensure your equipment is faulty by checking its operation, particularly mains supply and fault codes/self test if applicable.

Software Licence

Further to our general Terms & Conditions of Sale, the software described in these Operating Instructions is furnished under the following Software Licence Agreement:

1. Licence: You may use the program on the machine provided. You may not copy, duplicate or transmit the program in any form, in whole or in part, without the express prior written permission of Crypton.
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3. Crypton does not warrant that the program will meet your requirements or that its operation will be uninterrupted or error free.
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You acknowledge that you have read this Agreement, understand it, and agree to be bound by its provisions.

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HEALTH AND SAFETY

1. The equipment is not weatherproof and should not be used outside in rain or snow.
2. The internal circuits and components of the analyser should not be tampered with. No internal parts are operator serviceable.
3. Operators should exercise due caution with regard to the engine fan and associated belts.
4. Always provide ventilation by using an exhaust gas extraction system or by having an adequate supply of fresh air.

Carbon Monoxide is a highly poisonous gas. If breathed in, it is absorbed by the blood and will result in greatly slowed reactions and if absorbed in sufficient quantity can be fatal. Published figures show that a concentration of 0.3% CO in the air can be fatal if inhaled for 30 minutes.

5. Before starting an engine, ensure that the gear selector is in neutral or park.
6. Care should be taken with regard to scalding from the cooling system, burns from the exhaust system and electric shocks from the ignition HT system.
7. When disconnecting the fuel system of a hot engine beware of the fire hazard caused by petrol spilling onto manifolds, ignition distributor, etc.
8. Position the mains cable and sampler pipe in such a manner that they do not present a hazard to anyone.
9. The earth lead of the mains supply cable **MUST ALWAYS** be connected to a good earth point.

INTRODUCTION

The Crypton 290 series Analyser is a fully microprocessor controlled exhaust gas analyser employing Non-Dispersive Infra-Red (NDIR) Techniques. The unit measures carbon monoxide, carbon dioxide and hydrocarbons. A further channel is provided employing Electrochemical measurement of Oxygen. Zero may be commanded at any time by the operator, and automatically executed by the analyser. An automatic auto zero check is performed every thirty minutes when the analyser is switched on.

The analyser is designed for long term stability. The inbuilt electrical Zero compensation extends the gas calibration period to six monthly intervals, unless local legislation dictates more frequent checks.

Extremes of Weather Conditions

Extremes In weather conditions can give very low temperatures. In such weather conditions and where temperatures are likely to fall below freezing, we recommend that you leave the unit switched on at all times.

This will reduce any effect of Temperature Cycling or dampness and assists in preventing any incidence of ice forming within the collection bowl / filter pipes or pump.

This is particularly beneficial if there is no background heating in your garage, or if there are high levels of cold through draft in low overnight temperatures.

IMPORTANT:

If the ambient temperature is below 0°C the unit will not operate. Under these conditions the internal bleeper will sound. The 290 will operate normally again once the internal temperature rises above 0°C.

Please note that the operating temperature range of this equipment is +5 to +40°C.

RECEPTION

The 290 will operate on an A.C. mains supply voltage of 100 to 250 volts, 50/60 Hz. There is no requirement to adjust the unit for supply voltages within this range.

Note:

The mains connection **MUST** include a good earth bond.

Unpack all items and examine for any damage. Check contents against the packing list enclosed for any loss or discrepancy. Report any breakage, loss or discrepancy to the supplier immediately.

Set up the analyser as follows (refer to Fig. 1).

1. Connect sample probe hose to inlet port 12.
2. Check that the filters are securely connected.
3. If not already fitted, remove the oxygen sensor from its packaging, screw into the housing and fit electrical connector.
4. If required, connect the printer to Printer Port 18 using lead PIL 1.
5. If required, connect printer mains lead to socket 10.
6. If required, the 290 may be connected to a host engine analyser by the appropriate lead:

Using RS485 link	900/800/700 series	GIL4*
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Using RS232 link	CMT/STP series	GIL 7
------------------	----------------	-------

*With optional comms board only.

7. Connect mains supply to socket 9.
8. Connect temperature probe to socket 13.
9. Connect tachometer probe to socket 17.

The 290 is now ready for use. Proceed to page 6 for Operation.

Personalised Header Facility

A personalised header facility is provided by the computer software program.

CONNECTIONS & CONTROLS

External Connections

The external connections are shown below in the diagram of the rear panel of the 290.

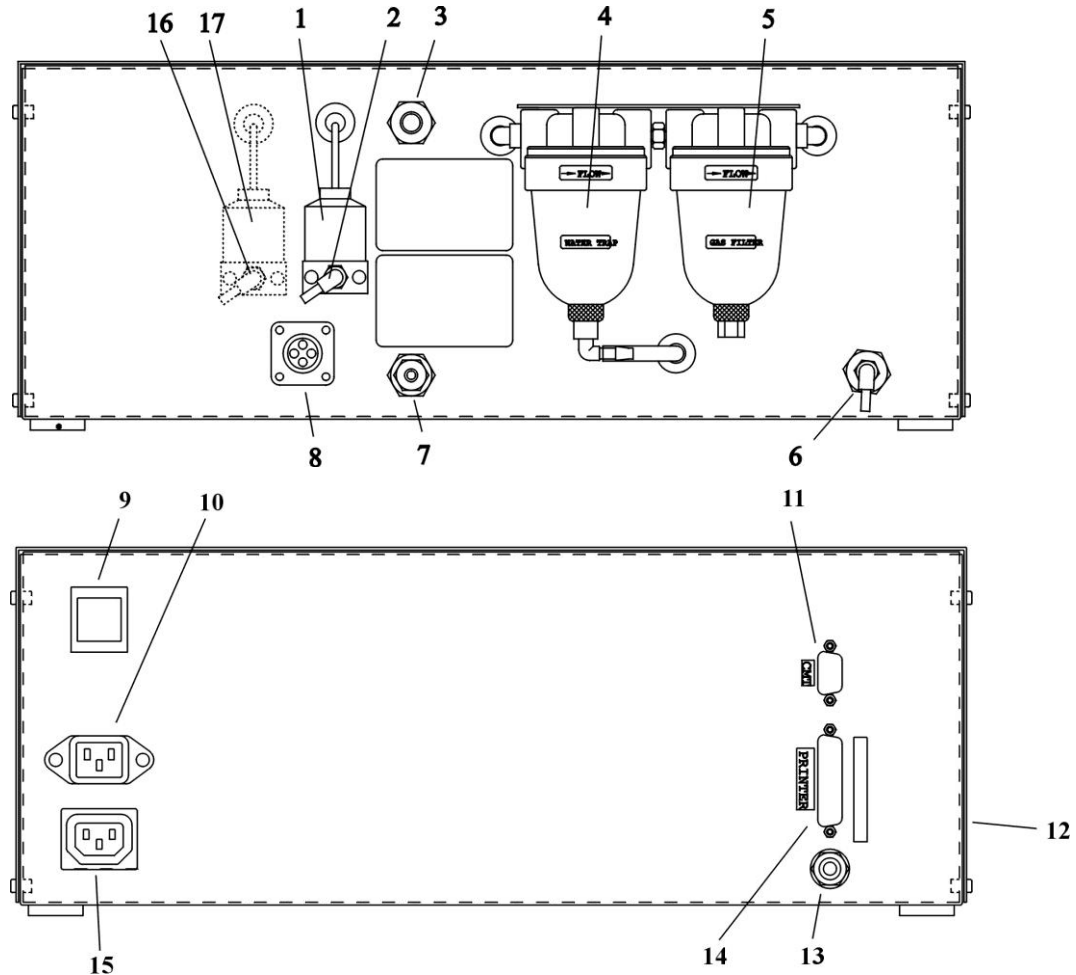


FIG. 1 External Connections

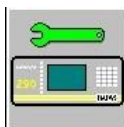
- | | |
|---------------------------------|------------------------------------|
| 1 Oxygen Sensor | 10 Mains Input |
| 2 Sample Exhaust | 11 RS232 Port – CMT Communications |
| 3 Calibration Gas Input | 12 Viewing Slot for status LEDs |
| 4 Water Trap and Primary Filter | 13 Tachometer Probe Input |
| 5 Gas Filter | 14 Printer Port – not used |
| 6 water Output | 15 Mains Auxiliary Output |
| 7 Sample Probe Input | 16 Sample Exhaust - NOx |
| 8 Temperature Probe Input | 17 NOx Sensor – 295 and 297-5 only |
| 9 Mains On/Off | |

WARNING: To ensure correct operation of this equipment, switch off before connecting or disconnecting leads to the 290.

Controls

Use with a Computer System

Selecting the 'Emission Analyser setup' icon



from the host, causes the computer to act as a

remote terminal for the gas analyser, allowing full control through the computer keyboard. A typical display screen is shown below.

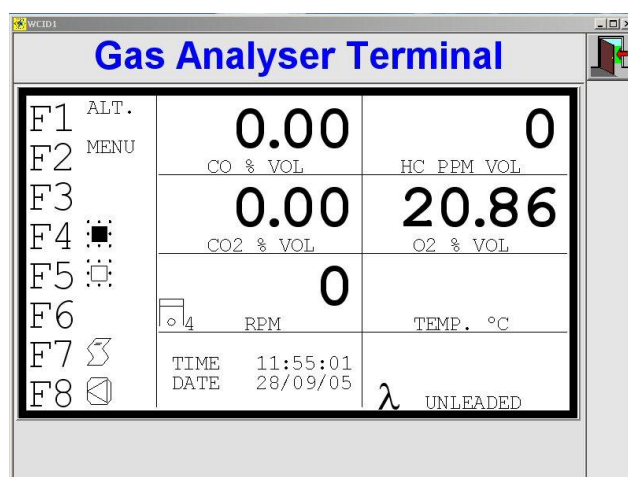
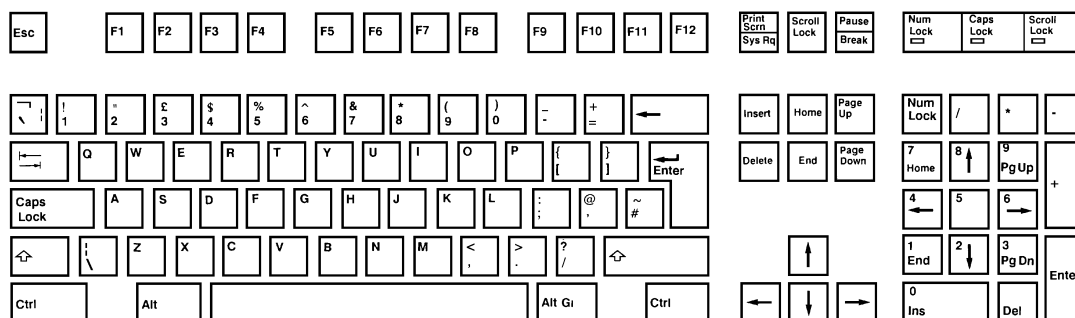


FIG. 2 Typical Analyser Display Screen

The various functions may be selected by pressing the soft Function keys F1 – F8 on the computer keyboard.



ALT. Presents an alternative readings screen

MENU Selects Main Menu

Darkens screen (units with liquid crystal display only)

Lightens screen (units with liquid crystal display only)

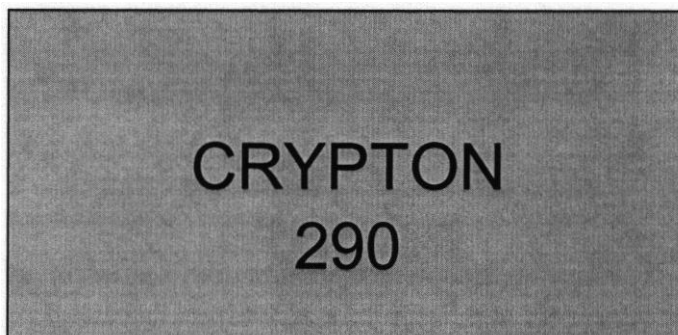
Activates printout (flashes when printing)

Pump ON/OFF

OPERATION

Connect the mains lead to the supply and operate the switch on the rear panel, after a few seconds the following screens will be displayed.

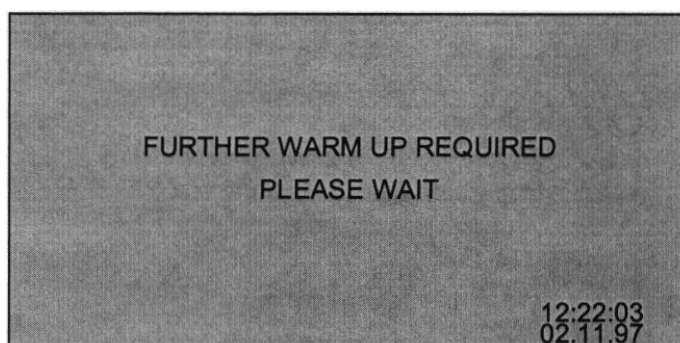
1. Switch on 290.



2. Allow to warm up.
Note: The warm up time is dependent on the particular model of 290.
290EN2 – approx 10 mins
297EN1 – approx 60 seconds

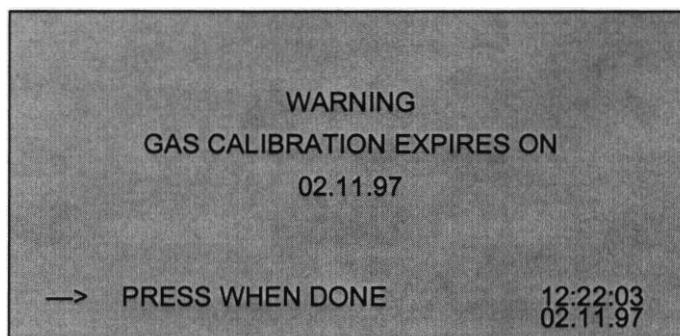


3. If the ambient temperature is low the normal warm up may not be sufficient and this screen will be displayed. The maximum warm up time should never exceed 30minutes.



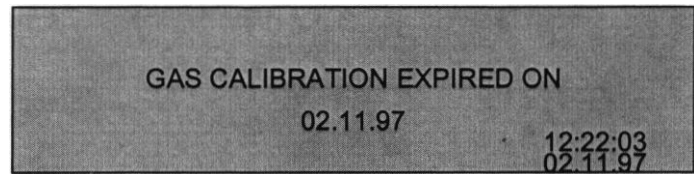
4. If the analyser requires a gas calibration within the next 14 days, a warning screen will inform the operator of the expiry date.

If the expiry date has passed no further use of the analyser will be possible until it has been calibrated. Contact your Authorised Service Agent.



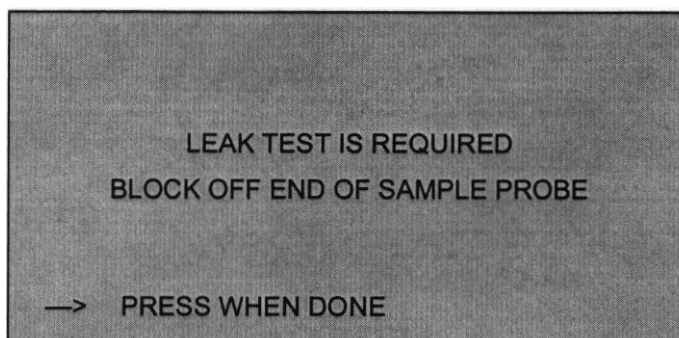
IMPORTANT: There are no user serviceable parts inside the 290. The calibration and warranty are void if the tamper proof seals on

cover screws are broken.

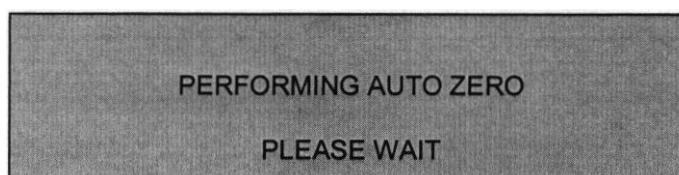


5. If the calibration is within the required time span the analyser skips straight to the leak test screen. Connect the sample probe to the analyser and follow the instructions to ensure that there are no air leaks in the unit. The procedure for this is as described on page 12.

Note: The 290 will not proceed to the next stage until the leak test has passed.



6. The analyser will now perform an Auto Zero to ensure that measurement accuracy is maintained.



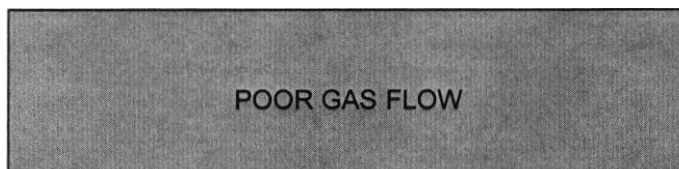
7. The Gas Readings screen is then displayed. This screen is used for normal gas measurements.

ALT. MENU 	CO % VOL	HC PPM VOL
	CO2 % VOL	O2 % VOL
	 4 RPM	TEMP. °C
	TIME 12:22:03	
	DATE 02.11.97	λ UNLEADED

8. By pressing the ALT key on the Gas Readings screen this Alternative Gas Display is presented. The operator may use whichever he prefers.

→	READINGS	
→	MAIN MENU	
	CO Cor % VOL =	0.00
	CO % VOL =	0.00
	HC PPM VOL =	0
	CO2 % VOL =	0.00
	O2 % VOL =	20.81
	RPM =	0
	TEMP. °C =	0
	LAMBDA =	UNLEADED

9. This screen is displayed if the gas flow reduces due to blocked filters and/or blocked sample pipe. Replace filters or unblock sample pipe (see Routine Maintenance on page 14) and then continue with test. NEVER operate the 290 without the correct filters in place.

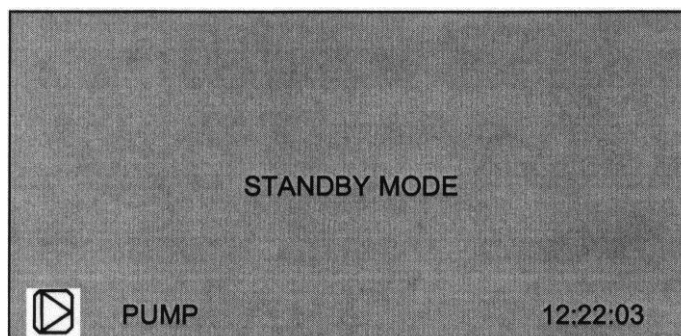


The screen will clear automatically after 5 seconds when the problem has been rectified.

10. After five minutes of inactivity in fresh air the 290 switches to standby mode.

This mode may also be chosen by the operator by selecting the Pump STANDBY mode function.

To return to normal use select the Pump function again.



5-Gas Analysers (295 and 297-5 only)

The 295 and 297 – 5, 5-gas emission analysers are identical in operation to the 290 4-gas.

The fifth gas, NO_x (oxides of nitrogen), is displayed in the bottom left hand box of the display - in place of the time and date as displayed on a 290.

Measurement of NO_x is achieved by means of a chemical sensor fitted next to the oxygen sensor.

ALT. MENU	CO % VOL	HC PPM VOL
	CO ₂ % VOL	O ₂ % VOL
	 RPM	TEMP. °C
	NO _x PPM VOL	λ UNLEADED

The sensor used to measure NO_x concentration is a catalyst and theoretically has an unlimited life. Unfortunately, in day to day usage there are a number of compounds that can 'poison' the cell and gradually stop it reacting to the gas.

If the NO_x channel should stop reading when connected to a vehicle, it may be necessary to replace the cell. Before replacing the cell, first check that the electrical connector on the top of the cell is correctly connected and that the wiring is not damaged. If the connector has become disconnected, refit and proceed to Replacement of NO_x Sensor. Note that in this case it should not be necessary to actually replace the cell. If the wiring has been damaged it will be necessary to contact your local service agent.

To continue to use the analyser without the NO_x channel select MAIN MENU followed by READINGS. The unit will perform an auto-zero and then continue to operate as a 4-gas analyser.

Replacement of NO_x Sensor

From MAIN MENU select SET-UP and then select INSTALL NEW NO_x SENSOR. Follow the instructions given on screen to replace the sensor.

```
--> READINGS
--> MAIN MENU

--> NOx SENSOR FITTED      X

--> INSTALL NEW NOx SENSOR
--> PRESS WHEN DONE
```

Warning:

If the NOx cell has already been installed a tick will be shown beside NOx SENSOR FITTED. Selecting this option will disable the NOx channel and change the tick to a cross. The NOx cell will then need to be reinstalled.

--> READINGS
--> MAIN MENU

REMOVE ELECTRICAL CONNECTOR (NOTING THE ORIENTATION) AND UNSCREW THE SENSOR

FIT NEW SENSOR FINGER – TIGHT - DO NOT OVERTIGHTEN. REPLACE ELECTRICAL CONNECTOR

--> PRESS WHEN DONE

Note that the sensor contains toxic substances. A damaged sensor must be handled with extreme caution and as with all hazardous materials dispose of the sensor in a suitable manner.

New sensors are stored in sealed packets. Ensure that the packet is undamaged before removing and fitting the sensor. Return any sensor in a damaged packet to the supplier.

When fitting is complete select PRESS WHEN DONE.

The analyser will now perform an auto zero. Select READINGS.

--> READINGS
--> MAIN MENU

INSTALLATION SUCCESFUL

--> NOx CALIBRATION

If the auto zero is unsuccessful ensure that the connector is securely fastened, that it is the correct way round and that there is a good seal between the sensor and the housing.

Select PRESS WHEN DONE.

Note:

An unsuccessful installation means that the analyser will not give any NOx readings.

--> READINGS
--> MAIN MENU

**INSTALLATION FAILED
CHECK CONNECTOR AND RETRY**

--> PRESS WHEN DONE

Connections To Vehicle

Sample Probe

Carefully insert the sample probe into the vehicle exhaust noting that it is not necessary to insert the whole length of the flexible section. Do not allow the flexible steel probe end to be kinked. Use the adjustable clip to secure the probe to the exhaust. Do not force the probe into the exhaust - some vehicles have very short tail pipe sections and it is possible to damage the probe and the exhaust itself.

Take care when removing the probe from the exhaust at the end of the test. Do not roll up the sample pipe whilst it is still connected to the analyser as excessive amounts of water may enter the filter unit.

Oil Temperature Probe

CAUTION: Great care must be taken when performing the test to ensure that no damage to the oil temperature probe and/or engine is incurred by contact with moving engine parts.

Remove the dipstick from the engine and check that the oil is at a reasonable level. Compare the temperature probe to the dipstick and adjust the rubber bung so that the length of probe inserted into the engine is 10-15 mm shorter than that of the dipstick. There must, therefore, be sufficient oil to reach the probe. Insert the probe into the engine via the dipstick hole. **DO NOT ALLOW PROBE TO COME INTO CONTACT WITH THE CRANKSHAFT.** The oil temperature will be in steps of one degree.

Tachometer Probe

Attach the tachometer probe to one of the HT leads, taking care to ensure that the lead is kept clear of all moving and excessively hot (e.g. exhaust manifold) parts in the engine. The engine speed will be displayed on the Readings screens.

Important Note:

It is not recommended that the 290 is left for extended periods of non-use. This will result in the battery which supports the internal memory of the unit completely discharging and may lead to operational problems, requiring an expensive service visit. To avoid this, power the unit up for at least 1 hour approximately once a month.

Obtaining Correct Measurement Results

To ensure that exhaust gas test results are correct it is vital that the following points are noted while performing the test.

- a. Before testing a vehicle ensure that:
 - The engine oil is up to normal operating temperature.
 - There are no leaks in the exhaust system.
 - The 290 is set for the vehicle ignition system so that engine speed is correctly displayed, and check that the engine is running at the required speed.
 - The exhaust sample probe is fully inserted.
 - The 290 is set for the correct fuel type for the vehicle under test - this ensures that the lambda calculation is accurate.
- b. The 290 will automatically perform an Auto Zero whilst warming up, and at intervals during use. Any internal errors will also be indicated and testing halted.
- c. The analyser will display error messages if faults are detected. These error messages fall into two categories:
 - Messages such as 'Failed leak test' and 'Poor gas flow' are covered in other sections of this manual and can normally be fixed by the operator.
 - Error messages that indicate an internal fault can only be fixed by an Authorised Service Agent. The screen will explain the particular error.
- d. The measured results are presented on the screen and do not normally need any interpretation. Provided that the correct fuel type is selected the Lambda calculation will be true. The engine should be run in a stable state for at least 20 seconds to allow gas readings to stabilise before results are recorded or printed.
- e. Specific usage conditions are as follows:

Mains voltage supply	100 to 250 volts, 50/60 Hz
Ambient temperature range	+5°C to +40°C
Do not use the 290 in rain or snow	
- f. The 290 can only be used with defined add-on accessories if it is to be used for legislative exhaust gas emission tests. These include the oil temperature probe, the rpm pick-up and a printer.

Other Facilities

From either the Gas Display screen or the Alternative Gas Display screen it is possible, by pressing the MENU function key, to select a display that contains a menu of self test and set-up features as described next.

→ READINGS	MAIN MENU	
→ SET-UP	VERSION	Vx.xx
→ LEAK TEST	ppm	PEF
→ AUTO ZERO	800	0.xxx
→ HC RESIDUE TEST	2000	0.xxx
→ VEHICLE DATA	4000	0.xxx
		12:22:03
		02.11.97

1. SET-UP

Selecting the SET-UP option gives a menu of three items that can be preset.

Press the appropriate function key to select the required item.

→ READINGS	SET UP	
→ MAIN MENU		
→ TIME/DATE		
→ PRINTER		
→ HOST ENGINE ANALYSER	CMT	
→ INSTALL NEW O2 SENSOR		

1.1 TIME/DATE

Note: On units used for legislative purposes (i.e. M.O.T. testing) the ENTER NEW DATE facility is not available.

Select ENTER NEW DATE.

The text will flash until the date has been entered in the correct format. Use the numeric keypad and enter in the format shown. Press  when done. The new date will then appear on the display.

→ READINGS	TIME/DATE	
→ MAIN MENU		
	DATE	02.11.97
	TIME	14:55:33
→ ENTER NEW DATE	(DDMMYY)	
→ ENTER NEW TIME	(HHMMSS)	
→ WINTER TIME CURRENTLY SELECTED		
→ PRESS WHEN DONE		

Select ENTER NEW TIME.

Set time using the same procedure as for setting the date.

Pressing the function key for WINTER TIME or SUMMER TIME will toggle between the two.

Select PRESS WHEN DONE to return to the Set Up menu, or exit to the Main Menu or Readings screen by pressing the appropriate Function key.

1.2 PRINTER

Pressing the PRINTER key displays a screen with an option to turn the personalised header on/off. Note that this is for non-legislative use; the MOT certificate always has a header.

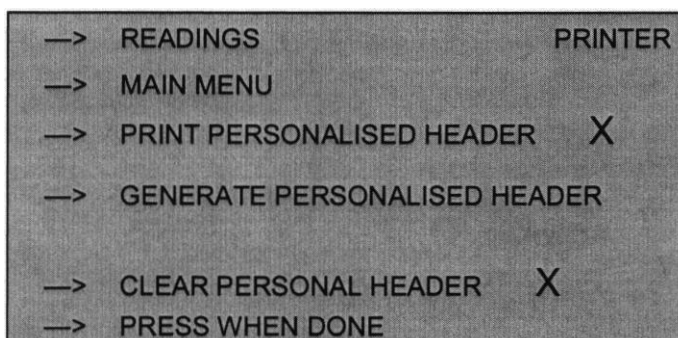
Pressing PRINT PERSONALISED HEADER will alternate between a tick or cross. If a tick is displayed the header will be printed; a cross prevents the header from being printed.

When the header facility is active, pressing the print key will print the header followed by the results. Subsequent print key presses will only print the results. To terminate this sequence, press the  (return) key on the numeric keypad (Fig. 3) to print the footer. The next press of the print key will cause another header to be printed. Pressing the  key at any other time whilst the 'Readings' screen is displayed will produce a printer form feed.

Pressing GENERATE PERSONALISED HEADER allows the operator to generate a new header or edit the existing header on-screen, using a keyboard or HOST computer with ICID 2 or WCID1.

The header consists of seven lines of 76 characters. Since the screen on the 290 is not this wide, each printed line of the header is split into two lines on the display. Use the left and right cursor keys to move around the header for editing.

When finished select PRESS WHEN DONE to return to the Printer menu.



Pressing CLEAR PERSONALISED HEADER will remove the header from the memory of the 290. If a tick is displayed a valid header is present; if a cross is displayed there is no valid header present.

Select PRESS WHEN DONE to return to the Set Up menu, or exit to the Main Menu or Readings screen by pressing the appropriate Function key.

1.3 HOST ENGINE ANALYSER

Pressing the function key for this item cycles through the options of available host analysers. Ensure that the analyser is set for the particular host required.

Note:

Communication with the older type of CUDOS and COMET host analysers is only possible if the optional comms board is fitted.

IMPORTANT: If the 290 is a black box unit (i.e. without a display) and is being operated from a Host analyser, ON NO ACCOUNT SHOULD ANY ATTEMPT BE MADE TO CHANGE THE 'HOST ENGINE ANALYSER' SETTING. Any change may render the 290 unusable and result in a chargeable service visit.

1.4 INSTALL NEW O₂ SENSOR

Please refer to the section 'REPLACEMENT OF OXYGEN SENSOR' on page 14.

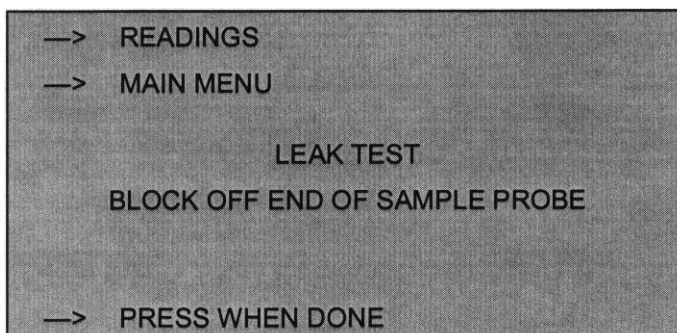
2. LEAK TEST

This test will check the gas sampling system for leaks. If a leak is detected, the problem must be rectified before performing further measurements. It is recommended that a leak test is performed every day before using the analyser.

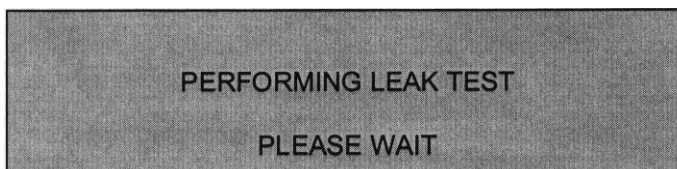
Select LEAK TEST.

Block the sample probe with the length of silicone pipe supplied.

Press when done.



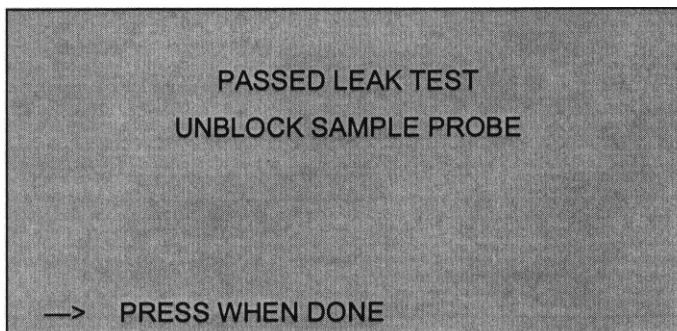
The Leak Test verifies gas-tight connection of sample probe, filtration system and internal connections.



During the leak test the pump will operate for a short time, then a vacuum test will be initiated for a further short period.

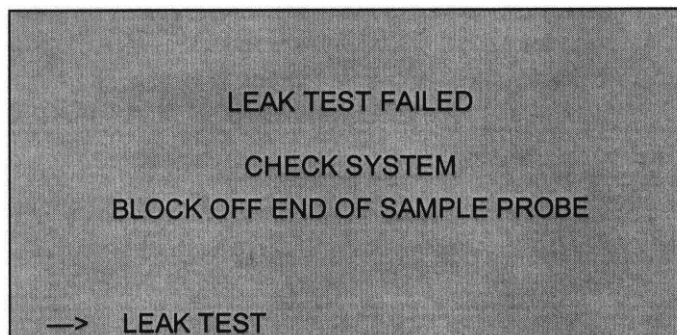
Do Not Remove Pipe Until Test Completed.

Press when done.



If leak test fails, check all joints in sample hose and flexible probe. Ensure also that filter sealing rings are intact and that filter bowls are correctly tightened.

When complete and passed select PRESS WHEN DONE to return to the Main Menu.



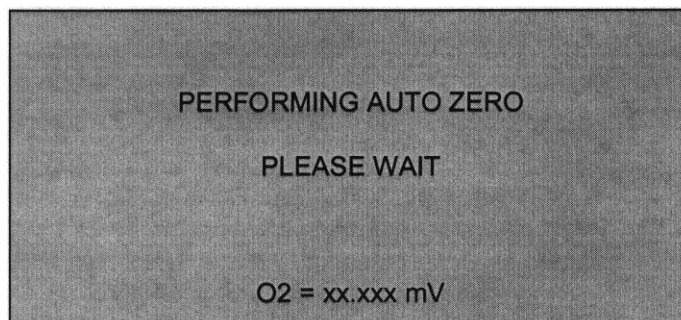
3. AUTO ZERO

The analyser performs a zero check automatically every 30 minutes (this period may be shorter if the analyser is subjected to a sudden change in temperature). To ensure that the analyser does not interrupt an extended period of testing, the operator may force an auto zero. The next auto zero will then be performed 30 minutes later.

Select AUTO ZERO.

The oxygen sensor output is displayed during Auto Zero. If this output falls below 5mV the sensor is exhausted (refer to page 14, 'Replacement of Oxygen Sensor').

Once completed the screen returns to the Main Menu



4. HC RESIDUE TEST

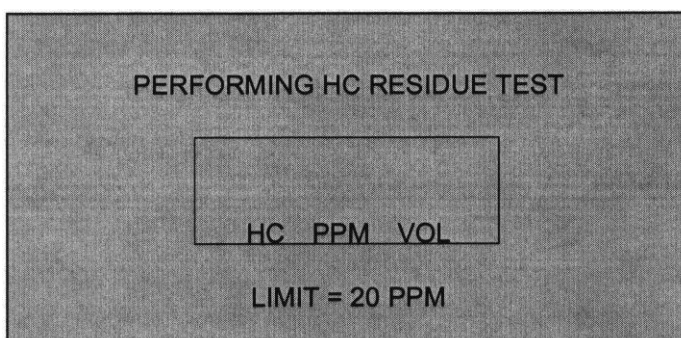
This test monitors the residual hydrocarbons in the gas sampling system. It is not possible to perform any further measurements until the level of HC is lower than the displayed limit. The sample probe must be removed from the vehicle exhaust before carrying out this test. If the level of HC does not drop below the limit, disconnect the sample hose from the analyser and blow out the hose with an air line. Reconnect the hose and repeat the test. If the limit is still not achievable, replace the filter element and repeat the test.

It is recommended that an HC residue test is carried out immediately before each legislative test.

Select HC RESIDUE TEST.

If HC residue is more than 20 ppm, then operator must remedy fault (e.g. blow out probe with air line).

Once completed the screen returns to the Main Menu.



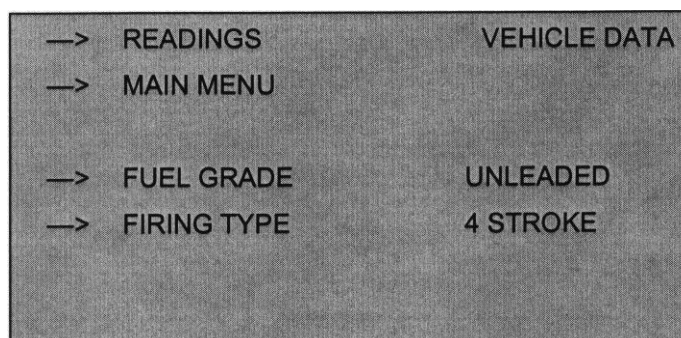
5. VEHICLE DATA

Selecting this option allows the operator to input details about the vehicle under test. The Firing Type must be set correctly to give valid RPM readings. The fuel grade affects the Calculated Lambda reading. The current setting for each of these switches is displayed on the Readings screen.

Select VEHICLE DATA.

Successive operations of the FUEL GRADE key will select LEADED/ UNLEADED/L.P.G./C.N.G.

Successive operations of the FIRING TYPE key will select 4 stroke / 2 stroke - DIS. Select READINGS or MAIN MENU when the correct vehicle details are displayed.



ROUTINE MAINTENANCE

Daily

1. Check filter condition visually and replace as necessary. DO NOT ALLOW TO BECOME BLOCKED (see GAS SAMPLING FILTRATION SYSTEM on page 15).
2. Blow out sample pipe.
3. Perform leak test.

Gas Calibration

Perform as required by local legislation - contact your Authorised Agent.

NOTE:

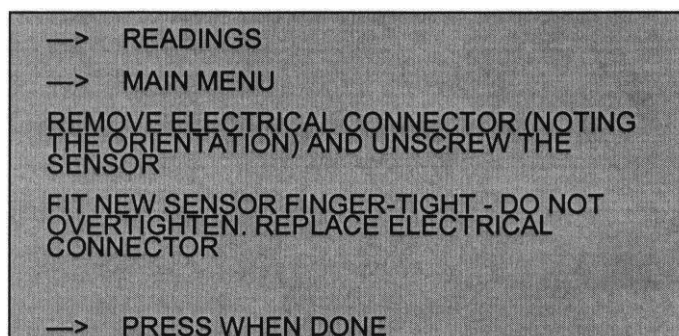
Each time the 290 is used, ensure there is no residual moisture present in sample probe/hose. This will considerably increase the life of the filters.

Replacement of Oxygen Sensor

The sensor used to measure oxygen concentration has a limited life and will need to be replaced after a period of time; the length of time is very much dependent on the usage of the analyser. When the sensor is exhausted, the oxygen reading will no longer be displayed. The oxygen sensor will then need to be replaced. This operation may be carried out by the operator following the procedure below.

From MAIN MENU select SET-UP and then select INSTALL NEW O2 SENSOR. Follow the instructions given on screen to replace the sensor.

Note that the sensor contains caustic which causes severe burns and may fatal if swallowed. A damaged sensor must be handled with extreme caution and as with all hazardous materials dispose of the sensor in a suitable manner.



New sensors are stored in sealed packets. Ensure that the packet is undamaged before removing and fitting the sensor. Return any sensor in a damaged packet to the supplier.

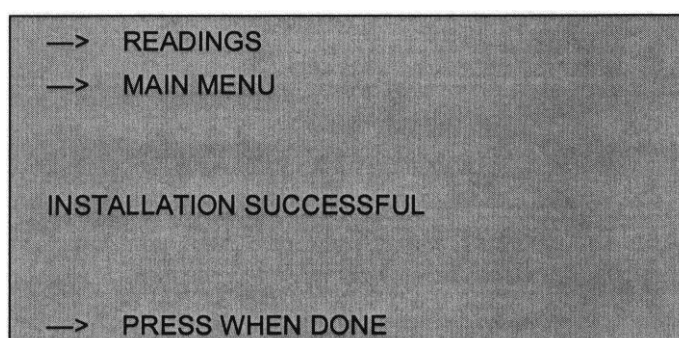
When fitting is complete select PRESS WHEN DONE.

The 290 will now perform an auto zero to calibrate the sensor.

Note:

The oxygen sensor output is displayed during the auto zero. For the installation to be successful this output must be between 7 and 13mV

Select PRESS WHEN DONE.

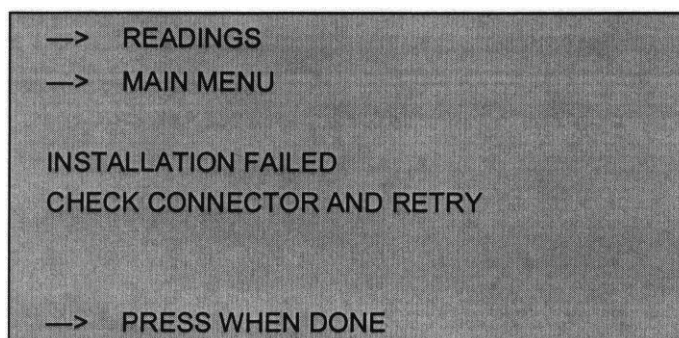


If the auto zero is unsuccessful ensure that the connector is securely fastened, that it is the correct way round and that there is a good seal between the sensor and the housing

Select PRESS WHEN DONE.

Note:

An unsuccessful installation means that the 290 will not give any O₂ readings.



Gas Sampling Filtration System

A Three stage filtration system is employed to remove carbon particles and moisture from the exhaust gases. No regular emptying of the water trap is required as water is automatically expelled from the system during normal use.

The filtration system comprises a disposable paper pre-filter (fitted in the sampling hose), a nylon mesh primary filter and water trap and a disposable gas filter.

The gas filter element should be replaced regularly - it should not be allowed to become heavily sooted.

Important:

A considerable amount of water can accumulate in the sampler pipe during normal use. NEVER roll up the pipe towards the analyser whilst still connected, as this will result in flooding the filters with water blocking the paper filter.

If a blockage occurs in the gas sampling system, the message 'POOR GAS FLOW' will be displayed. To determine the fault follow the procedure below:

Remove the sample hose. If the fault message clears, the blockage is in the hose or probe. Blow out the hose and probe with an air line (with the hose disconnected from the analyser) or replace faulty part. If the message persists, remove and service/replace filters as described below.

Servicing Filters

To change the paper pre-filter in the sampling hose, remove the entire sealed housing it is contained in and replace with new.

The nylon mesh element in the water trap may be removed by disconnecting the water drain pipe at the bottom of the clear plastic bowl (ensure the pipe does not push back inside the analyser) and unscrewing the bowl from the top of the housing. The element can then be removed by unscrewing the thumbwheel at the bottom. It is possible to clean this filter using warm soapy water, do not use solvents. Clean/replace the element as necessary. Do not overtighten. Check the condition of the 'O' ring at the top of the bowl and replace if necessary. Reassemble the water trap and reconnect the water drain pipe. Do not overtighten the bowl

The disposable gas filter element should be discarded if heavily sooted - it is not possible to clean this filter. Replace with a new filter element and check the condition of the 'O-ring before reassembling the bowl. If the 'O' ring is damaged, replace it to prevent the possibility of any leak. Do not over tighten the bowl.

IMPORTANT: Ensure that none of the pipes are kinked or trapped against the rear of the unit.
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CONSUMABLE SPARES

The following parts can be ordered by contacting the Crypton Product Support Heiptine on 01278 436225, quoting the part numbers given below, or through your authorised agent.

Sample Hose and Probe	SP 8
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Sample Probe only (flexible)	SP 8X
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Oxygen Sensor	TRDU 0067
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NOx Sensor	TRDU0103 (295 AND 297-5 ONLY)
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Prefilter	FILT 0043
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Primary Filter	FILT 0041
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Gas Filter	FILT 0040
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ERROR MESSAGES

The 290 can detect fault conditions and indicate the relevant message on the display. These messages fall into two categories:

- Messages such as 'FAILED LEAK TEST' which are covered elsewhere in this manual and can be fixed by the operator.
- Error messages that indicate an internal fault which can only be rectified by a Service call. It is unlikely that one of these will occur, but if one does do not attempt to carry out any repair. Under no circumstances should the unit be dismantled. The cover screws of the 290 are covered in tamper proof labels - if these are broken the calibration is void.

The following table details faults and the required actions for the operator to take.

Fault Message	Required Action
'POOR GAS FLOW'	Clean out sample pipe and/or replace filters. See page 15.
'BLOCKED PUMP EXHAUST'	The gas outlet is blocked.

TECHNICAL SPECIFICATIONS

Measured Gas

HC	Hydrocarbons
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
O ₂	Oxygen

Ranges

CO	0 to 10 %
CO ₂	0 to 20 %
HC	0 to 10000 ppm
O ₂	0 to 25 %

Accuracy / Performance

OIML R99 Class 1

HC	12 ppm HC	} absolute or 5% of reading, whichever is wider.
CO	0.06% CO	
CO ₂	0.50% CO ₂	
O ₂	0.10% O ₂	

Resolution

HC	1 ppm vol.
CO	0.01 % vol.
CO ₂	0.1 % vol.
O ₂	0.01 % vol.

RPM

0 - 10,000 rpm with DIS/Wankel and 4 stroke selection

Oil Temperature

0 – 120 °C

Lambda

Calculated using Brett Schneider formula.

Resolution 0.001

Fuel type selection: Leaded, Unleaded, L.P.G. or C.N.G.

Environmental

Operating temp.	+5 to +40 °C
Storage temp.	-20 to +55 °C

Warm-up Time

Analyser dependent

290 EN2 < 10 minutes (self controlled) at 20°C for OIML R99 Class 1

297 EN1 60 Seconds

Response Time

11 seconds to 95% of final reading with 8 metre sample hose

Flow Rate

290 EN2 - 5 litres/min nominal

297 EN1 - 8 litres/min nominal

Operating Pressure

750 - 1100 mbar
1000 mbar nominal

Power Requirements

100 - 250 volts AC, 50 - 60 Hz

Power Consumption

60 watts maximum

Size

437mm (17.5") W x 362mm (14.5") D x 170mm (7") H

Weight

12.5kg

AFTER SALES SERVICE

Apart from the routine maintenance and adjustments stipulated in this manual the equipment must not be tampered with in any way. All further servicing must be carried out only by an engineer from an Authorised Agent. Failure to observe these conditions will invalidate the Guarantee.

Helplines

On-Site Service / Overhaul / Spare Parts

If you require a Service Engineer to attend ON SITE, either due to an equipment fault, or for machine calibration, or if the equipment covered by this manual requires to be sent back for factory overhaul, or if you need spare parts, please contact our Product Support Helpline at the following number during normal office hours.

Tel: 01278 436225 Fax: 01278 450567

Email: support@CryptonTechnology.com

A fully comprehensive Product Support Contract is also available which provides additional assistance with equipment technical support. Please contact Product Support on the above Helpline no. for further details.

Call Crypton Helpline for details of local service agents.

Overseas

Service abroad is provided by the agent from whom your equipment was purchased.

Crypton provide information and contracts covering:

Car Data, Fault Code Information, Diagnostic Information, Software Support Contracts, Software Updates & Accessories

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