

# **CRYPTON**

## ***290 AU HI-SPEC EMISSION ANALYSER***

---

***Operating & Maintenance Instructions***

---

TES 1205/A  
November 1995

# **290 AU HI-SPEC EMISSION ANALYSER**

## **OPERATING INSTRUCTIONS**

### **WARNING:**

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

The reliability of this equipment is fully supported by Transervice 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 details of your local service area.

### **NOTE:**

Your attention is drawn to our Terms & Conditions of Sale, particularly paragraph 2 (an extract of which can be found at the back of this manual and full Terms & Conditions on our current Price List). 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.

# Table of Contents

---

|                                                             |           |
|-------------------------------------------------------------|-----------|
| <b>HEALTH AND SAFETY</b> . . . . .                          | <b>1</b>  |
| <b>INTRODUCTION</b> . . . . .                               | <b>2</b>  |
| <b>RECEPTION</b> . . . . .                                  | <b>3</b>  |
| Calibration Gas Bottle Facility . . . . .                   | <b>3</b>  |
| Personalised Header Facility . . . . .                      | <b>3</b>  |
| <b>CONNECTIONS &amp; CONTROLS</b> . . . . .                 | <b>4</b>  |
| External Connections . . . . .                              | <b>4</b>  |
| Connection To Vehicle . . . . .                             | <b>5</b>  |
| Controls . . . . .                                          | <b>5</b>  |
| <b>SWITCH ON</b> . . . . .                                  | <b>6</b>  |
| <b>OPERATION</b> . . . . .                                  | <b>9</b>  |
| Other Facilities . . . . .                                  | <b>9</b>  |
| <b>ROUTINE MAINTENANCE</b> . . . . .                        | <b>14</b> |
| Daily . . . . .                                             | <b>14</b> |
| Six Monthly - Or as required by local legislation . . . . . | <b>14</b> |
| Replacement of Oxygen Sensor . . . . .                      | <b>14</b> |
| Gas Sampling Filtration System . . . . .                    | <b>15</b> |
| Servicing Filters . . . . .                                 | <b>15</b> |
| <b>CONSUMABLE SPARES</b> . . . . .                          | <b>16</b> |
| <b>FAULT CODES</b> . . . . .                                | <b>17</b> |
| <b>TECHNICAL SPECIFICATIONS</b> . . . . .                   | <b>18</b> |

## 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 AU Hi-Spec 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 and Gas Calibration (export models only) may be commanded at any time by the operator, and automatically executed by the analyser. A Calibration Gas Cylinder may be permanently connected to the analyser gas port. 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.

The Crypton 290 AU Hi-Spec Emission Analyser has been approved to OIML Class I specification and has a Certificate of Acceptance from the D.Tp for M.O.T. use.

## RECEPTION

The 290 AU Hi-Spec will operate on an A.C. mains supply voltage of 180 to 250 volts, 50/60 Hz (100 to 120 volts A.C. to special order). There is no requirement to adjust the unit for supply voltages within this range.

**Note:**

As with any microprocessor based equipment a good earth connection is needed.

Refer to Fig.1.

1. Connect sample probe hose to inlet port 15.
2. Check that the filters are securely connected.
3. Remove the oxygen sensor from its packaging, screw into the housing and fit electrical connector.
4. If required, connect the printer to Printer Port 2 using lead PIL 1.
5. If required, connect printer mains lead to socket 8.
6. If required, the 290 may be connected to an host engine analyser by the appropriate lead:

|                     |                        |       |
|---------------------|------------------------|-------|
| Using Parallel Port | 400 series             | GIL 2 |
| Using RS485 link    | 900/800/700 series     | GIL 4 |
| Using RS232 link    | CMT/900/800/700 series | GIL 7 |
7. Connect mains supply to socket 7.

The 290 AU Hi-Spec is now ready for use. Proceed to page 6 for Switch On procedure.

## Calibration Gas Bottle Facility (Export models only)

Connect the calibration gas bottle (via a regulator set to 0.8 Bar) to Calibration Gas Port Lo Input (Fig.1-3). **Do not overtighten** but ensure there is a secure leakproof connection.

## Personalised Header Facility

A personalised header facility is available through a programmable header card (PHC 2), available on order from the Technical Publications department at Crypton. The card is inserted into the slot on the front panel with the label on the left and the metal connectors on the right, and the header is printed when the option is selected (see page 9).

# CONNECTIONS & CONTROLS

## External Connections

The external connections are shown below in the diagram of the rear panel of the 290 AU Hi-Spec.

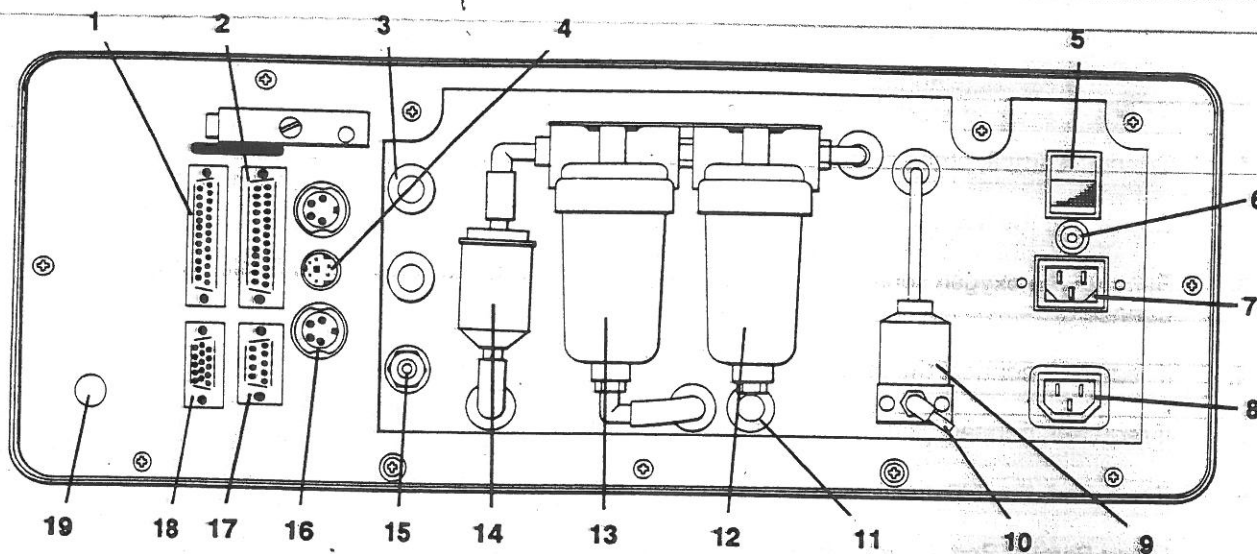


FIG. 1 External Connections

- |    |                                           |    |                                                        |
|----|-------------------------------------------|----|--------------------------------------------------------|
| 1  | Parallel Port - 400 Series Communications | 11 | Water Output                                           |
| 2  | Parallel Port - Printer                   | 12 | Secondary Filter (Gas Filter)                          |
| 3  | Calibration Gas Port Lo Input             | 13 | Primary Filter (Water Trap)                            |
| 4  | No connection                             | 14 | Prefilter                                              |
| 5  | Mains On/Off                              | 15 | Sample Probe Input                                     |
| 6  | Thermal Trip                              | 16 | Temperature Probe Input                                |
| 7  | Mains Input                               | 17 | No connection                                          |
| 8  | Mains Auxiliary Output (for printer)      | 18 | RS485/232 Port - CMT/900/800/700 Series Communications |
| 9  | Oxygen Sensor                             | 19 | Tachometer Probe (Red Probe) Input                     |
| 10 | Sample Exhaust                            |    |                                                        |

## Connection To Vehicle

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

**CAUTION: GREAT CARE MUST BE TAKEN WHEN PERFORMING THIS 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. The oil temperature will be displayed on the Host equipment during carburettor/injection test modes in steps of one degree.

## Controls

All test, calibrate and set-up functions are accessed by the operator from the soft key controls and LCD screen on the front of the 290 AU.

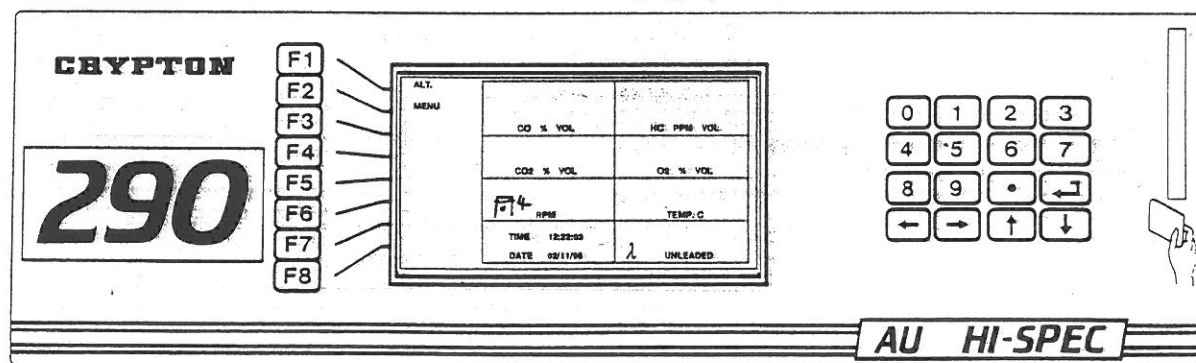


FIG. 2 Controls

The soft keys to the left of the screen allow the operator to select:

-  DARKENS the screen background.
-  LIGHTENS the screen background.
-  Activates PRINTER to print results (flashes when printing).
-  Switches pump ON and OFF.

The keypad is used for keying in the date/time during set-up.

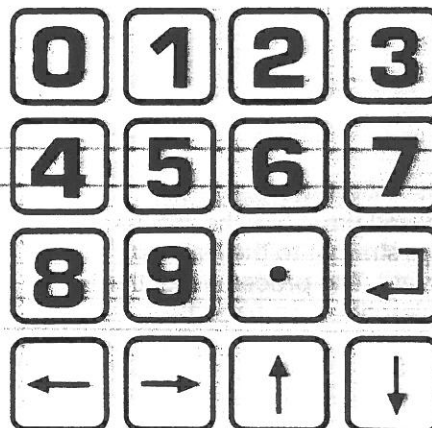
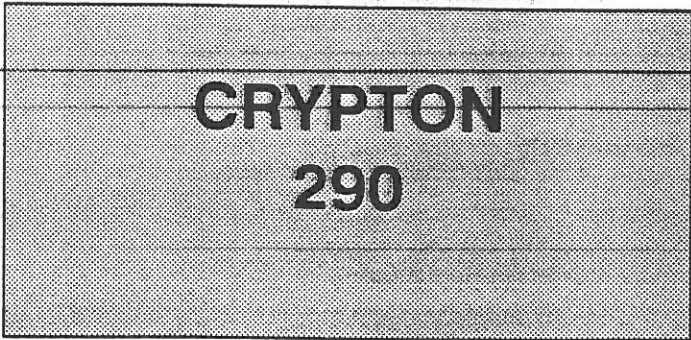


FIG.3 Keypad

## SWITCH ON

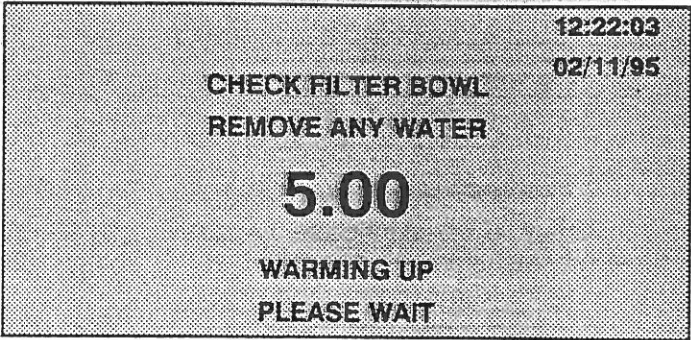
When the 290 AU Hi-Spec is first received, certain parameters should be set by the operator. This is a first time set-up but may be changed at a later date to suit requirements.

1. Switch on 290 AU Hi-Spec.



**CRYPTON  
290**

2. Allow to warm up.



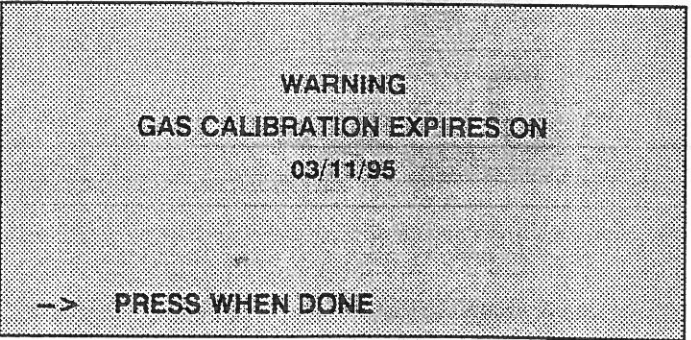
**CHECK FILTER BOWL  
REMOVE ANY WATER**

**5.00**

**WARMING UP  
PLEASE WAIT**

**12:22:03  
02/11/95**

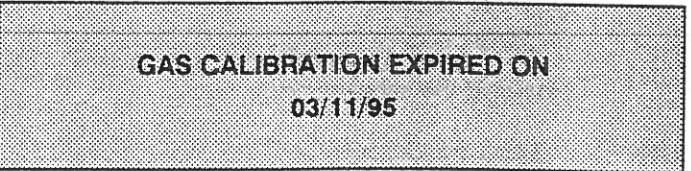
3. If the analyser requires a gas calibration within the next 14 days, a warning screen will inform the operator of the expiry date.



**WARNING  
GAS CALIBRATION EXPIRES ON  
03/11/95**

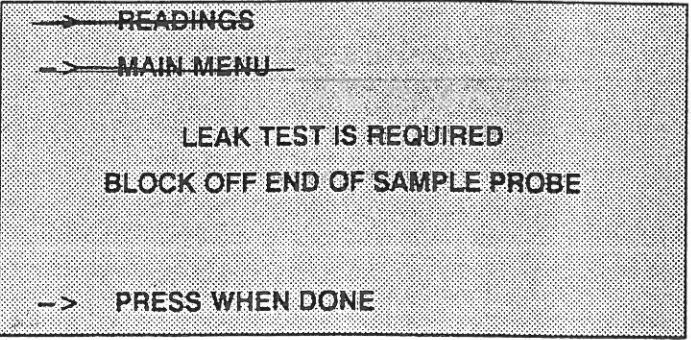
**-> PRESS WHEN DONE**

If the expiry date has passed no further use of the analyser will be possible until it has been calibrated.



**GAS CALIBRATION EXPIRED ON  
03/11/95**

4. If the calibration is within the required timespan the analyser skips straight to the leak test screen. The procedure for this is as described on page 10.



**→ READINGS**

**→ MAIN MENU**

**LEAK TEST IS REQUIRED  
BLOCK OFF END OF SAMPLE PROBE**

**-> PRESS WHEN DONE**

5. 290 AU executing Auto Zero routine.

PERFORMING AUTO ZERO

PLEASE WAIT

4. This is the main display screen.  
Select MENU.

|                                                                                       |           |            |
|---------------------------------------------------------------------------------------|-----------|------------|
| ALT.<br>MENU                                                                          | CO % VOL  | HC PPM VOL |
|                                                                                       | CO2 % VOL | O2 % VOL   |
|  RPM |           | TEMP. C    |
| TIME 12:22:03                                                                         |           |            |
| DATE 02/11/95                                                                         |           | UNLEADED   |

5. From this menu select SET-UP.

**Note:**

The GAS CALIBRATION option will only appear on export models. Current UK legislation requires the calibration to be carried out by an approved service engineer.

```

-> READINGS                      12:22:03
                                02/11/95
-> SET-UP                        VERSION Vx.xx
-> LEAK TEST                     PEF = 0.500
-> AUTO ZERO
-> HC RESIDUE TEST
-> VEHICLE DATA
-> GAS CALIBRATION
  
```

6. Select TIME/DATE.

**Note:**

Due to current UK legislation the DATE option only appears on export models.

```

-> READINGS
-> MAIN MENU

TIME/DATE
PRINTER
HOST ENGINE ANALYSER    700/800/900/CMT

-> INSTALL NEW O2 SENSOR
  
```

7. Select WINTER TIME or SUMMER TIME.

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.

Select ENTER NEW TIME.  
Set time using the same procedure as for setting the date.

Select PRESS WHEN DONE.

NOTE: Exiting by pressing READINGS or MAIN MENU will not save any changes.

8. Select READINGS.

|                                |          |
|--------------------------------|----------|
| -> READINGS                    |          |
| -> MAIN MENU                   |          |
| DATE                           | 02-11-95 |
| TIME                           | 14:55:33 |
| ENTER NEW DATE                 | (DDMMYY) |
| ENTER NEW TIME                 | (HHMMSS) |
| WINTER TIME CURRENTLY SELECTED |          |
| -> PRESS WHEN DONE             |          |

|                          |                 |
|--------------------------|-----------------|
| -> READINGS              |                 |
| -> MAIN MENU             |                 |
| TIME/DATE                |                 |
| PRINTER                  |                 |
| HOST ENGINE ANALYSER     | 700/800/900/CMT |
| -> INSTALL NEW O2 SENSOR |                 |

## OPERATION

Two display formats are available:

### i. READINGS.

This is always selected from power-up and from any menu.

Press ALT for alternative display.

|               |           |            |
|---------------|-----------|------------|
| ALT.<br>MENU  | CO % VOL  | HC PPM VOL |
|               | CO2 % VOL | O2 % VOL   |
| RPM           |           | TEMP. C    |
| TIME 12:22:03 |           |            |
| DATE 02/11/95 |           | UNLEADED   |

### ii. ALTERNATIVE DISPLAY.

|    |                |          |
|----|----------------|----------|
| -> | 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 |

## Other Facilities

### 1. SET-UP

#### 1.1 Time / Date

This is described in the 'Switch On' section of this manual.

#### 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 the non-legislative test; the MOT certificate always has a header.

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

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

Since the screen on the 290 AU is not 76 characters wide, each of the seven lines of the header is split into two lines of 38 characters each. The left and right cursor keys can be used to move around the header for editing.

When finished select PRESS WHEN DONE.

|    |                                  |
|----|----------------------------------|
| -> | READINGS                         |
| -> | MAIN MENU                        |
| X  | PRINT PERSONALISED HEADER (TUNE) |
| -> | GENERATE PERSONALISED HEADER     |
|    | LOAD PERSONAL HEADER             |
| X  | CLEAR PERSONAL HEADER            |
| -> | PRESS WHEN DONE                  |

## 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.

The sample probe must be blocked with the cap attached to the side of the 290 AU.

Press when done.

--> READINGS  
--> MAIN MENU

LEAK TEST  
BLOCK OFF END OF SAMPLE PROBE  
  
--> PRESS WHEN DONE

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

PERFORMING LEAK TEST  
PLEASE WAIT

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 Probe Cap Until Test Completed.**

Press when done.

PASSED LEAK TEST  
UNBLOCK SAMPLE PROBE  
  
--> PRESS WHEN DONE

If leak test fails, it must be repeated after first checking probe cap, probe connection and filter sealing.

LEAK TEST FAILED  
CHECK SYSTEM  
BLOCK OFF END OF SAMPLE PROBE  
  
--> LEAK TEST

## 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.

Performing Auto Zero.

PERFORMING AUTO ZERO  
PLEASE WAIT

#### 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).

**PERFORMING HC RESIDUE TEST**

HC PPM VOL

**LIMIT = 20 PPM**

#### 5. VEHICLE DATA

Selecting this option allows the operator to input details about the vehicle under test. The Firing Type switch must be set correctly to give valid RPM readings. The fuel grade switch 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 UNLEADED/LEADED/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.

--> READINGS

--> MAIN MENU

--> FUEL GRADE                      UNLEADED

--> FIRING TYPE                      4 STROKE

#### 6. GAS CALIBRATION (Export models only)

This feature enables the analyser to be calibrated on a reference gas. The gas bottle must be connected to the Calibration Gas Port 'Lo' Input (see Fig.1) and the bottle outlet pressure must be regulated to within 0.7 - 0.9 bar (10 - 13 psi). The gas concentrations (Tag values) must be entered into the analyser whenever a new gas bottle is used.

Select GAS CALIBRATION.

If the displayed tag values correspond with the values on the gas bottle certificate exactly, press CALIBRATE WITH TAG VALUES SHOWN. If not, see page 12 for changing the tag values.

--> READINGS

--> MAIN MENU

**PRESSURE = 1015 mBAR**

**CHANGE TAG VALUES**

|               |               |                |
|---------------|---------------|----------------|
| <b>CO TAG</b> | <b>HC TAG</b> | <b>CO2 TAG</b> |
| 1.50          | 600           | 10.65          |

**CALIBRATE WITH TAG VALUES SHOWN**

### Procedure For Changing Tag Values

Pressing CHANGE TAG VALUES will cause the 'CO Tag' to flash and the allowable range of CO values will be displayed. Use the numeric keypad to enter the required tag value. The new value will be displayed in the centre of the screen as it is entered. Pressing the → key to change the HC tag value automatically saves the new CO value if it has been entered correctly. If the CO tag was not entered correctly, the 'CO tag' text will still be flashing.

Pressing the ← → keys selects the tag to be changed and displays the allowable range for that tag value.

When all the tag values are correct, press ↵ and check that they correspond exactly to the values on the bottle certificate.

Ensure bottle regulator is set to the correct pressure.

**WARNING:** If calibration is performed without a gas bottle or if the bottle is closed or empty, the analyser will be rendered inoperable. A successful calibration must be performed or a SERVICE CALL will be required. Switching the 290 AU off and on will have no effect.

→ READINGS  
→ MAIN MENU

OPEN GAS BOTTLE

WARNING  
IF GAS BOTTLE IS UNAVAILABLE,  
OR IS EMPTY, DO NOT ATTEMPT  
TO CALIBRATE.

→ GAS CALIBRATION

DO NOT continue if this is the case but instead return to either the READINGS or MAIN MENU.

The 290 AU Hi-Spec will now perform an Auto Zero function and then calibrate according to the gas concentration values previously set.

PERFORMING AUTO ZERO

PLEASE WAIT

(No operator action is required during this function.)

PERFORMING CALIBRATION

PLEASE WAIT

If the bottle is either closed, empty or if the gas concentration contains an incorrect mixture, the 'Calibration Failed' screen will be displayed. The procedure for setting the tag values will then have to be repeated.

CALIBRATION FAILED DUE TO MISMATCH OF  
CAL. GAS AND TAG VALUES

OPEN GAS BOTTLE

→ GAS CALIBRATION

If calibration is successful this will be indicated on the screen. Selecting PRESS WHEN DONE will start the certificate print and then return to the main menu.

If a printer is not connected or is not on-line, the 290 AU will return to the Main Menu after about 10 seconds.

**CALIBRATION SUCCESSFUL**

**CLOSE GAS BOTTLE**

**ENSURE PRINTER ON-LINE FOR CERTIFICATE**  
**(PRINTING CERTIFICATE)**

-> **PRESS WHEN DONE**

### Calibration Certificate

At the end of a successful gas calibration a calibration certificate will be printed out automatically if a printer is connected and on-line. A typical printout is shown below.

|                                                                     |                                                            |                                                                   |         |
|---------------------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------------|---------|
| <b>CRYPTON TRAINING CENTRE</b>                                      |                                                            |                                                                   |         |
| Bristol Road<br>Bridgwater<br>Somerset TA6 4BX<br>Tel: 01278 436224 | Operator Courses<br>Engine Management<br>Exhaust Emissions | Systems Courses<br>On-Site Training<br>Approved Technician Scheme |         |
| ON THE RIGHT COURSE FOR THE FUTURE                                  |                                                            |                                                                   |         |
| DATE : 02/11/95                                                     |                                                            | TIME : 14:52                                                      |         |
| <b>GAS CALIBRATION CERTIFICATE</b>                                  |                                                            |                                                                   |         |
| TAG VALUES                                                          | : CO                                                       | = 5.98 %                                                          | Vol     |
|                                                                     | HC                                                         | = 2400 ppm                                                        | Vol     |
|                                                                     | CO2                                                        | = 14.70 %                                                         | Vol     |
| PEF                                                                 | : 0.507                                                    |                                                                   |         |
| GAS CALIBRATION : PASSED                                            |                                                            | SERIAL NUMBER :                                                   |         |
| RECALIBRATION DUE BEFORE :                                          |                                                            | 02/05/96                                                          |         |
| <b>290 HI-SPEC ANALYSER</b>                                         |                                                            |                                                                   |         |
| Copyright                                                           | Crypton MCMXCV                                             | V 2.00                                                            | *.....* |

FIG.4 Calibration Certificate

## ROUTINE MAINTENANCE

### Daily

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

### Six Monthly - Or as required by local legislation

Perform Gas calibration - see page 11 (export models) or arrange a service visit (UK).

#### NOTE:

Each time the 290 AU Hi-Spec 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. This time is very much dependent on the usage of the analyser. When this is required the analyser will display the message 'REPLACE O2 CELL'. This operation may be carried out by the user (local legislation permitting), **with the mains power off**, using the following procedure:

1. Disconnect the electrical connector at the top of the sensor noting the orientation.
2. Unscrew and discard the sensor. Note that the sensor contains caustic which causes severe burns and may be 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.
3. Screw in a new sensor taking care not to cross-thread it. Also ensure that the 'O' ring makes a good seal between the sensor and the housing. **Do not overtighten.** 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.
4. Reconnect the electrical connector and switch on the unit. The new sensor will be calibrated automatically during the first Auto zero after the warm up period.

These instructions can be followed on the screen of the 290 AU by choosing **INSTALL NEW O2 SENSOR** from the Set-Up menu.

--> 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

## Gas Sampling Filtration System

A two 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 nylon, washable primary filter and a disposable paper secondary filter. A separate disposable pre-filter is used to clean the water before it enters the pump.

**The paper filter 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

The disposable paper element may be removed by unscrewing the clear plastic bowl from the top of the housing. The 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 rubber 'O' sealing ring before reassembling the bowl. If the 'O' ring is damaged, replace it to prevent the possibility of any leak. Do not overtighten the bowl.

The washable nylon gas filter may be removed by removing the hose from the bottom of the clear plastic bowl and unscrewing the bowl from the top of the housing. Wash the filter in a mild detergent solution (NOT SOLVENT) and check the condition of the rubber 'O' ring on the filter bowl before reassembling. If the ring shows signs of damage it must be replaced. Reassemble the filter and bowl. Do not overtighten the bowl. Refit the hose to the bottom of the plastic bowl.

## CONSUMABLE SPARES

The following parts can be ordered from Transervice, quoting the Transervice part numbers given below:

|      |        |
|------|--------|
| Hose | 127176 |
|------|--------|

|                            |       |
|----------------------------|-------|
| Sample Probe<br>(Flexible) | 1SP8X |
|----------------------------|-------|

|               |        |
|---------------|--------|
| Oxygen Sensor | 105126 |
|---------------|--------|

|           |        |
|-----------|--------|
| Prefilter | 113076 |
|-----------|--------|

|                |        |
|----------------|--------|
| Primary Filter | 113081 |
|----------------|--------|

|                  |        |
|------------------|--------|
| Secondary Filter | 113079 |
|------------------|--------|

## FAULT CODES

The 290 AU Hi-Spec can detect fault conditions and indicate the relevant message on the display. Faults with code numbers are internal faults that 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.** Faults without code numbers can be rectified by the user. The following table details the faults and the required actions.

| Fault Message             | Required Action                                                                                                               |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| 'FAULT 01 - CALL SERVICE' | None, call Transervice                                                                                                        |
| 'FAULT 02 - CALL SERVICE' | None, call Transervice                                                                                                        |
| 'FAULT 03 - CALL SERVICE' | None, call Transervice                                                                                                        |
| 'POOR GAS FLOW'           | Clean out sample pipe and/or replace filters.<br>See page 15.                                                                 |
| 'BLOCKED PUMP EXHAUST'    | Either the gas outlet pipe or the water outlet pipe is blocked. Check that these pipes are not trapped or kinked.             |
| 'REPLACE O2 CELL'         | The oxygen cell is exhausted. Replace with new part.<br>See page 14.                                                          |
| 'GAS CAL IS REQUIRED'     | The analyser requires a gas calibration. See page 11 for calibration procedure (export models) or arrange service visit (UK). |

## TECHNICAL SPECIFICATIONS

### CO Channel

Range: 0.0 - 10.0 % Resolution: 0.01 %

Accuracy:

|              |          |                  |
|--------------|----------|------------------|
| 0.0 - 1.0 %  | ± 0.05 % | Absolute         |
| 1.0 - 2.0 %  | ± 0.06 % | Absolute         |
| 2.0 - 3.0 %  | ± 5.00 % | Relative Reading |
| 3.0 - 5.0 %  | ± 0.15 % | Absolute         |
| 5.0 - 7.0 %  | ± 0.20 % | Absolute         |
| 7.0 - 10.0 % | ± 0.30 % | Absolute         |

Repeatability: One half of the Accuracy limits above

Noise: 0.05 %

### HC Channel

Range: 0 - 9999 ppm Resolution: 1 ppm

Accuracy:

|                |          |                  |
|----------------|----------|------------------|
| 0 - 240 ppm    | ± 11 ppm | Absolute         |
| 240 - 400 ppm  | ± 12 ppm | Absolute         |
| 400 - 2000 ppm | ± 3.0 %  | Relative Reading |
| >2000 ppm      | ± 5.0 %  | Relative Reading |

Repeatability: One half of the Accuracy limits above

Noise: 5 ppm

PEF Range: 0.490 to 0.540

### CO<sub>2</sub> Channel

Range: 0.0 - 20.0 % Resolution: 0.01 %

Accuracy:

|               |         |          |
|---------------|---------|----------|
| 0.0 - 16.0 %  | ± 0.4 % | Absolute |
| 16.0 - 20.0 % | ± 1.0 % | Absolute |

Repeatability: One half of the Accuracy limits above

Noise: 0.1 %

### O<sub>2</sub> Channel

Range: 0.0 - 25.0 % Resolution: 0.01 %

|                       |         |          |
|-----------------------|---------|----------|
| Accuracy: 0.0 - 2.0 % | ± 0.1 % | Absolute |
| 2.0 - 25.0 %          | ± 5.0 % | Relative |

Repeatability: One half of the Accuracy limits above

Noise: 0.05 % Absolute

**RPM**

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

**Oil Temperature**

0 - 120 °C

**Lambda**

Calculated using Brett Schneider formula.

Resolution 0.01

Fuel type selection: Petrol, LPG or CNG

**Environmental**

|              |           |     |    |        |
|--------------|-----------|-----|----|--------|
| Temperature: | Operating | +2  | to | +50 °C |
|              | Storage   | -20 | to | +60 °C |
|              | Accuracy  | +15 | to | +55 °C |

Humidity (Non-condensing):

|           |   |    |      |                   |
|-----------|---|----|------|-------------------|
| Operating | 0 | to | 90 % | Relative Humidity |
| Storage   | 0 | to | 85 % | Relative Humidity |
| Accuracy  | 0 | to | 85 % | Relative Humidity |

|           |           |       |    |           |
|-----------|-----------|-------|----|-----------|
| Altitude: | Operating | -1000 | to | +7000 ft  |
|           | Storage   | -1000 | to | +10000 ft |
|           | Accuracy  | -1000 | to | +7000 ft  |

**Warm-up Time**

5 minutes

**Response Time**

10 seconds to 95% of final reading with 6 metre sample hose

**Flow Rate**

Gas Sample Inlet: 7.5 lts/min nominal  
4.0 lts/min minimum

Zero Gas Inlet: 5.0 lts/min nominal

**Calibration Gas Requirement**

Inlet Pressure: 0.8 bar  $\pm$  0.1 bar  
Flow Rate: 0.9 lts/hour

### **Power Requirements**

180 - 250 volts AC, 50 - 60 Hz

### **Power Consumption**

200 watts maximum

### **Size**

495mm (19.5") W x 368mm (14.5") D x 175mm (7") H

### **Weight**

16.5kg (36.3lb)

# CRYPTON

**WELLMAN**  
GARAGE EQUIPMENT



CRYPTON BRADBURY DRIVE, SPRINGWOOD INDUSTRIAL ESTATE, BRAINTREE, ESSEX CM7 7ET ENGLAND. TEL: 01376 555200 FAX: 01376 5500