



**NANO/COM**

DESIGNERS AND MANUFACTURERS OF CUTTING EDGE AUTOMOTIVE DIAGNOSTIC EQUIPMENT.

## FUNCTIONS DESCRIPTION MANUAL

Coverage	<b>Nanocom EVOLUTION</b>
ECU	<b>LUCAS EAS</b>
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## DIAGNOSTIC FUNCTIONS OF THE LUCAS EAS (P38)

The EAS (Electronic Air Suspension) system Manufactured by Lucas. This is a variation of the Classic Air suspension system with some changes and some additional features to specifically suit the P38 Range Rover (1995 to 2002). When working correctly, the system gives the vehicle a level of ride comfort and adjustability that sets it apart, but sadly the system is very prone to problems especially as it ages and large bills at dealerships are not uncommon.

### FAULTS FUNCTIONS

The Air suspension systems can self detect up to 31 faults, ranging from those causing a full system shutdown, to those simply logging slightly abnormal events in the normal course of vehicle usage that don't even create a warning. The most popular of these is that a height sensor has been out of range, usually caused by excessive articulation of a wheel (in a pothole or up a curb). A momentary disconnection of a poor connector could have also caused it. Sometimes multiple faults may be logged which may have been caused by the same fault all pointing to the same guilty party: height sensor out of range, height sensor open circuit. In this instance, replacing the specified sensor will correct the problem, but a recalibration of the system can be tried first as this will sometimes be sufficient to overcome the problem without having to replace any parts. A good road-test is always essential with any air suspension problems including both rough terrain that makes the system operate at the limits of articulation and also some motorway (or similar) driving in order to check the correct responses to specific speeds over the defined timing periods.

### CLEAR FAULTS

This function first reads the fault code memory to ensure that there are faults to clear and if there are completely erases and clears the fault code memory. Failure to clear the fault memory successfully is usually due to the system re-logging the fault the moment the fault memory is clear. This indicates that the fault has not been rectified properly and as far as the system is concerned still exists. The successful clearing of the fault code memory may pass but then the system may re-log the fault shortly after.

### SAVE TEXT

Allows you to save the faults in a text format

### SETTINGS FUNCTIONS

**High profile, Standard height, Low profile, Access height:** This is where the stored value read from the vehicle or the default setting value appears. Values can theoretically be in the range of 0 to 255 but realistically 40 to 220 can be expected. These figures can be made up by manually entering new figures but trying to put in incorrect figures can cause the ECU to record invalid data faults and prevent the system working at all.

If you wish to manually edit the figures use a pen, paper, the relevant manual and a tape measure, adding a few numbers at a time to a given corner and noting the resultant change in height. You may need to re-select the height you are calibrating to see the change. Arch heights can be found in the relevant manuals, from which every other height is derived this.

### HIGH PROFILE

Front left - Stored - Current  
Front Right - Stored - Current  
Rear Left - Stored - Current  
Rear Right - Stored – Current

### STANDARD HEIGHT

Front left - Stored - Current

Front Right - Stored - Current  
Rear Left - Stored - Current  
Rear Right - Stored – Current

#### LOW PROFILE

Front left - Stored - Current  
Front Right - Stored - Current  
Rear Left - Stored - Current  
Rear Right - Stored – Current

#### ACCESS HEIGHT

Front left - Stored - Current  
Front Right - Stored - Current  
Rear Left - Stored - Current  
Rear Right - Stored - Current

### INPUTS FUNCTIONS

Realtime live display of the information the electronic control unit of the selected vehicle system is currently deriving from its input sensors.

#### TARGET HEIGHTS – LIVE

This is the value for the numeric height that the ECU is being instructed to target. If a new user height setting is selected, the target height will change to show the height stored for this corner of the vehicle. When the system goes into self levelling mode it may decide to adjust these heights to compensate and will adjust the actual heights to suit.

Front Left  
Front Right  
Rear Left  
Rear Right

#### ACTUAL HEIGHTS

This is the value currently being obtained from this corner's height sensor. If it is too far away from the target height the system should open the required valves and the vehicle will raise or lower until this figure is closer to the target height.

Front Left  
Front Right  
Rear Left  
Rear Right

#### VALVES STATUS

Shows the state that the ECU is applying to this valve. Assuming that the valve is not faulty or sticking it would be in this state.

Front Left  
Front Right  
Rear Left  
Rear Right

#### Compressor

Shows the present status of the compressor requirement from the ECU. It should be noted that although the compressor may be required to top up air reserves, the ECU uses many other factors in deciding if the output to the compressor should actually be turned on. One such factor is the duty cycle of the compressor, i.e. the ECU will not allow the compressor to run for extended periods of time. This value is

therefore not a true match as to when the compressor is running. Correct operation of the compressor may be best ascertained by forcing the output on and listening for the distinctive noise that the compressor makes.

#### **Exhaust valve**

Shows the present status that the ECU is applying to this valve.

#### **Inhibit switch**

This shows the current state of the input which is used for the user's dashboard mounted air suspension inhibit ride height-changing latching switch. This should be high for normal released operation and then go low when the switch is depressed into its latched low position.

#### **Park/handbrake**

This shows the current status of the input C331 pin 14 which is now wired either directly to the handbrake switch for manual, or on an automatic, to a circuit incorporating a pull down resistor which normally pulls this line low. This is only overridden when the automatic box's selector lever is not in park, making this line high.

#### **Footbrake switch**

This shows the current state of the input that is used for the Brake or Stop lamp switch. With the foot brake depressed this should be high.

#### **Door/disable**

In the case of the Classic C331, pin 34 is used for both the MFU to indicate that a door is open and for the Disable switch.

#### **Inlet valve**

Shows the present status that the ECU is applying to this valve.

#### **Thermal switch**

#### **Press.switch**

#### **Lower switch**

#### **Raise switch**

#### **Battery (V)**

Gives an indication of the current battery status at the ECU, but this is obviously subject to losses which change according to load.

#### **Road speed (mph)**

This value is derived in the case of the Classic Range Rover from a signal given to the Air Suspension ECU (C331 pin 30 ) by the speed transducer, via the speed buffer.

#### **Road speed (Kmh)**

This value is derived in the case of the Classic Range Rover from a signal given to the Air suspension ECU (C331 pin 30) by the speed transducer, via the speed buffer.

#### **Engine speed**

#### **Ride state**

This shows the current ride state that the air suspension ECU has engaged. Options are Extended, High profile, Standard, Low profile, Access, Levelling, ECU wake-up, and Dormant.

## **OUTPUTS TESTS**

Note: more than one valve can be opened at any one time so that any combination of air springs can be inflated or deflated.

#### Valves Test

OPEN FRONT LEFT - This opens the left hand front valve allowing airflow to or from the left hand front air suspension spring.

OPEN FRONT RIGHT - This opens the right hand front valve allowing airflow to or from the right hand front air suspension spring.

OPEN REAR LEFT - This opens the left hand rear valve allowing airflow to or from the left hand rear air suspension spring.

OPEN REAR RIGHT - This opens the right hand rear valve allowing airflow to or from the right hand rear air suspension spring.

CLOSE ALL - This closes any valves which are open

OPEN INLET - This opens the inlet valve allowing airflow to or from the reservoir tank to any air spring with an open valve.

OPEN EXHAUST - This opens the exhaust valve which allows airflow from any open spring to the atmosphere.

AIR PUMP ON

AIR PUMP OFF

This function turns on the system compressor that only operates in certain conditions during normal running. It not only allows you to test the compressor but also to manually put air into an otherwise empty reservoir so that other tests may be performed.

## UTILITY FUNCTIONS

### SEND TO ACCESS

This simulates the selection of the access height setting via the buttons on the dashboard. All doors require to be closed for this to work; the vehicle will return to its previous height once the test is finished. The vehicle will not rise if there is no pressure in the system.

### SEND TO STANDARD

This simulates the selection of the standard height setting via the buttons on the dashboard. All doors require to be closed for this to work and the vehicle will return to its previous height once the test is finished. The vehicle will not rise if there is no pressure in the system.

### SEND TO HIGH

This simulates the selection of the high setting via the buttons on the dashboard. All doors require to be closed for this to work and the vehicle will return to its previous height once the test is finished. The vehicle will not rise if there is no pressure in the system.

### DEFLATE SYSTEM

It fully opens the two front corner valves, both inlet and exhaust valves, and disables the compressor for one minute; it then does the same but with the rear two corner valves. This causes air to be expelled from the system and from each axle and may need to be used repeatedly depending on initial system reserves and suspension heights. No checks for the remaining pressure are performed. It is up to the users to satisfy themselves that no air remains trapped in the system as the result of, for instance, a faulty corner valve that does not open diagnostically, mechanically or for any other reason.

### READ LOCK MODE

**HIGH LOCK - SET - Clear**

**TRANSPORT LOCK - SET - CLEAR**

This function allows checking of current lock mode status and the ability to lock or unlock both Transport and High Lock Modes. This function only exists for the new Range Rover.