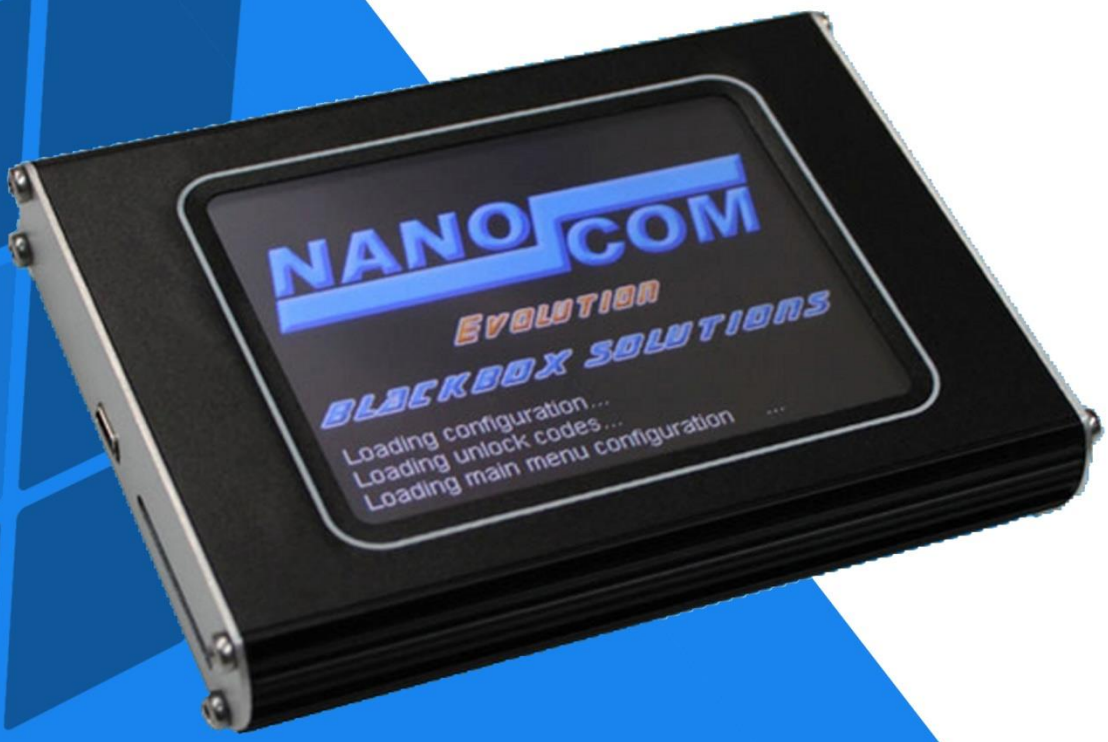
NANO COM

ALM

ALARM LOCKING MODULE



BLACKBOX SOLUTIONS

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ALM Alarm Locking Module - System Overview

The ALM ECU is always housed in a Black enclosure. Besides performing the usual Alarm functions it also forms the intelligent immobilization link to the Puma Engine Management system, and optionally also performs Central Locking control functions. The ALM ECU replaced the previously fitted Lucas 10AS Alarm Module which was discontinued due to the original main Motorola Micro controller used by Lucas to produce the 10AS being no longer available. The ALM ECU is designed to be a mostly functionally compatible and a pin for pin drop in replacement for the Lucas 10AS ECU. As well as being fitted to all later Defenders (VIN EA000001 on), it is also used where a 10AS ECU requires replacing, (LTB00893). This also requires a Lear receiver to be added and the matching Lear Pebble style Key fobs (Plips) to be used which can be used as a determining factor as to if a Defender is fitted with a 10AS or ALM.

As the ALM ECU shares the same connectors and case shape that changes from Green to Black, the ALM ECU is often errantly referred to as the Black 10AS.

Please note that some Settings or Inputs may not be relevant or even functional on the ALM ECU as a lot is assumed to be inherited from the 10AS

LEAR (New) FOB

Lucas (Old) FOB

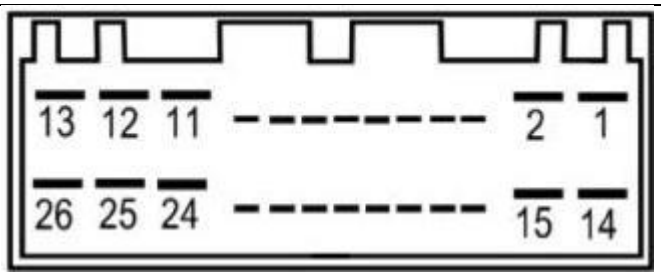
Known Fitments

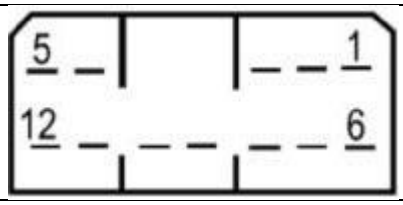
Vehicle make, model and variant known or believed to be using this vehicle ECU, required diagnostic lead and degree of known compatibility.

Vehicle Make	Vehicle Model	Vehicle Variant	Diagnostic lead	Compatibility level
Land Rover	Defender Puma	All with FOB (Plip) as above	Blue OBDII lead	Verified

Pin-Outs

These are the details of the pin usage for the ALM ECU connector(s).

Grey Connector	
1	Interior lights
2	Not used
3	Volumetric signal - input
4	Not used
5	Drivers door – input
6	Not used
7	Drivers sil – input
8	Not used
9	Bonnet open switch - Input
10	Ignition – input
11	Not used
12	Not used
13	Not used
14	Active low immobilizer – output to PCM
15	Not used
16	Passenger's doors / tailgate - input
17	Serial communications for Diagnostics
18	Not used
19	Not used
20	Volumetric power - output
21	Not used
22	LIN Data with Receiver
23	Not used
24	Not used
25	Battery voltage – input
26	Not used

Green Connector	
1	Hazard right - output
2	CDL lock - output
3	CDL unlock - output
4	Security LED - output
5	Sounder drive - output
6	Hazards left - output
7	Transponder drive - output
8	Hazard power - input
9	Not used
10	Crank - output
11	Ground - input
12	Transponder power - output

Diagnostic Capabilities (Events and Clear Events)

This Reads and allows the clearing of the Alarm trigger Event memory that displays the last five events which caused the alarm to trigger in order of last event shown first and allowing sensor faults which cause false triggers to be found.

Diagnostic Capabilities (Settings)

Values, configuration settings, and other stored information can be read from the ECU, edited and then written back. Read settings can also be stored on an SD card page for future reference. These settings can later be reloaded and written back to the ECU. Please note that some values may be read only.

SETTINGS GROUP 1

- **Time Error**: Both the alarm and the plip each have a timer in them which stays in synchronization and can be used as part of the correct key verification sequence every time the key is used. However, it is possible for one of the timers to run marginally faster

or slower than the other. Setting this value to yes, allows the alarm to accept an error rate of up to 9 seconds in every hour between the two as a pass.

- **Comms**: This setting controls communications activity standby control.
- **Interior Light**: This setting controls the level of operation of the interior light.
- **Welcome light**: This function decides if the interior light will come on automatically when the alarm is disarmed.
- **Arm/disarm flash**: These settings determine if the hazard lights will be used to indicate the arming or disarming of the alarm.
- **Arm disarm confirm**: If the alarm is armed or disarmed twice in succession this setting will determine if the hazard lights are used to confirm the status of the alarm or not.
- **Arm on lock**: This setting configures the alarm to not set whenever the vehicle is locked using the plip or the key. Setting this to DISABLED effectively turns off all alarm protection although it does not affect the immobiliser. This can be disabled using the PLIP IMMOBILISE and KEY IMMOBILISE. Turning off all three literally turns the alarm ECU into a central locking controller only.
- **Resync on arm**: When set to ENABLED the alarm and the key will synchronize to each other whenever the alarm is armed.
- **Relock**: This determines if the automatic arming with central door relocking function is ENABLED or DISABLED.
- **Mislock**: In the event of a mislock, which is usually due to a door being open, the alarm will continue to activate the volumetric sensors if this setting is set to ENABLED, or it will omit them from the vehicle's protection if this setting is set to NO.
- **Mislock noise**: This setting determines if the alarm will issue a mislock noise if a mislock condition is detected.
- **Resync on lock**: When set to ENABLED the alarm and the key will synchronize to each other whenever the vehicle is locked.
- **Plip immobilize**: This setting configures the alarm to not immobilize the vehicle whenever the vehicle is locked using the plip. Setting this to NO effectively turn’s off engine immobilization protection when the plip is used to arm the alarm although it does not affect the immobilization when the key is used or the alarm itself. This can be disabled using the KEY IMMOBILISE and the ALARM ARMING. Turning off all three literally turns the alarm ECU into a central locking controller only.
- **Plip relock**: When set to ENABLED the alarm will relock the CDL after a short time if the ignition has not been turned on after it was unlocked using the plip.
- **Key Mobilize**: This determines if the alarm will mobilize the engine if it has been disarmed by using the key in the lock after it was armed using the remote plip. KEY DISARM would obviously have to be set to ALLOWED preventing the alarm from being triggered.
- **Passive immobilize**: This settings configures the alarm to automatically activate the immobiliser a certain period of time after the key is removed.

SETTINGS GROUP 2

- **Key Disarm**: This determines if the alarm can be disarmed by using the key in the lock after it was armed using the plip. The engine would also mobilize if KEY mobilize was set to ALLOWED.
- **C.D.L. when arm**: This determines if the central door locking will still operate when the alarm is armed.
- **Flash on alarm**: This setting determines if the hazard lights will flash when the alarm has been triggered.
- **Alarm sound**: This setting determines if the horn will sound in a continuous tone or if it will be pulsed when the alarm has been triggered.
- **Time Sync**: Both the alarm and the plip each have a timer in them which stays in synchronization and can be used as part of the correct key verification sequence every time the key is used. Setting this value to No turns off this function.
- **Low battery error**: This configures the alarm to notify the user via the Security LED either on the first receipt of a key code in which the low battery flag is set or to wait until it has received a number of them in succession. The exact number is determined by the value stored in the LOW BAT COUNT box.
- **Battery Error**: When set to ENABLED this configures the alarm to notify the user via the security LED that the plip has a low battery in accordance with the other settings which affect this function's operation. When set to NO the function is totally disabled.
- **Tamper Warn:**
- **Cat Overheat**: The 10AS alarm had a function built into it to monitor temperature sensors on the Catalytic converters. This was no doubt to accommodate markets where it is a legal requirement to have a warning indicator in the event of failure of one of the two catalytic converter heaters. The Dynamic inputs screen shows the values derived from the Analogue to Digital converters which are connected to the two input pins reserved for this feature.
- **MEMS failure indicator**: The MEMS, upon receipt of a valid mobilize code, not only mobilizes the engine but sends back a signal via its MIL circuit which indicates its change from immobilised to mobilized status. This setting instructs the alarm that the MEMS failed to mobilize.
- **Immobiliser**: This option allows the verification and configuration of the 10AS alarm's immobiliser function to suit one of the fitted engine options. It is important to select the correct engine management type to ensure that the engine starts afterwards.
  There are 5 options which the immobiliser type can be set to:

· **SPIDER:** this is used on vehicles which use an engine management which has no immobilizer facility built in. It is basically an add-on style immobilizer box which communicates with the alarm. The engine types that use the Smart Spider are 14CUX and non EGR Diesels. The spider has to learn a fixed code which is sent out from the 10AS alarm unit to mobilize. This feature is not supported on the Nanocom Evolution.

· **EDC:** this is selected to configure the alarms immobiliser for the EDC engine management. The alarm sends a code (the EDC code) to the EDC engine management control unit. This code can be read from the EDC control unit using the 'READ EDC CODE' function provided in the EDC diagnostic section. This code can then be entered

into the EDC code box provided. Failure to enter the correct EDC code number will result in the vehicle not starting unless the EDC ECU is was programmed to non robust.

- **DDS:** is selected to configure the alarm immobiliser for DDS. The alarm communicates with DDS control unit which is attached directly to the fuel pump and causes this to stop the engine from running. If either the alarm or DDS ECU has been replaced, the alarm and DDS have to be synchronized with each other to work correctly.
- **GEMS:** this is selected to configure the alarm for GEMS engine management systems. The alarm communicates with GEMS ECU. Should the alarm or engine ECU be changed or the stored GEMS code, the relevant engine ECU will have to learn the new code by using its learning function.
- **TD5/MEMS/PUMA:** this is selected to configure the alarms immobiliser for the TD5, MEMS or PUMA engine management system. The alarm communicates with the TD5 engine management control unit directly. Should the alarm or engine ECU be changed, the relevant engine ECU will have to learn the new code using its learning function.

- **Vehicle type**: This setting configures the alarm for operation in a Defender or a Discovery.

ALARM INFORMATION

- **Serial number**: This is the serial number of the alarm as printed on a label affixed to the lid. Note this is only partial
- **EKA code**: This is a special Emergency Key Access code which can be entered into the alarm using either the door lock or in the case of the Defender the door ajar switch. Exact details of the procedure can be found in the vehicles handbook.
- **Part Number**: This is the part number of the ALM as printed on a label affixed to the lid.

Diagnostic Capabilities (Inputs)

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

- **Driver's sill**: Gives the current status of the drivers door sill switch input. These inputs to the alarm on pin 7 of connector C225 (series I discovery).
- **Passenger's sill**: Gives the current status of the passenger doors sill switch input. This inputs to the alarm on pin 6 of connector C225 (series I discovery). This pin might not be connected.
- **Driver's door:** Gives the current status of the front right hand door ajar switch. This inputs to the alarm on pin 5 of connector C225 (series I discovery).
- **Passenger's door**: Gives the current status of any secondary door's door ajar switch. This inputs to the alarm on pin 16 of connector C225 (series I discovery).
- **Door key**: Gives the current status of the door key switch. This inputs to the alarm on pin 8 of connector C225 (series I discovery).
- **Ignition stage II**: Gives the current status of ignition input to the alarm. This inputs to the alarm on pin 10 of connector C225 (series I discovery).
- **Bonnet**: Gives the current status of the bonnets open / closed switch. This inputs to the alarm on pin 9 of connector C225 (series I discovery).
- **Factory mode**: If the alarm is new it will be delivered in a special factory mode. This shows the 10AS alarm's status in respect of this mode.
- **Mil light**: Gives the current status of the MIL input. This inputs to the alarm on pin 11 of connector C225 (series I discovery) (GEMS only).
- **Mil status**: Gives the current status of the MIL function which is only used when the 10AS alarm is configured for GEMS.
- **Crank Output**: The 10AS alarm has six 8 bit Analogue to Digital (ADC) inputs. These convert a varying voltage fed into the alarm into a number ranging between 0 and 255. The higher the voltage the higher the number. By this method the alarm can read a sensor which works by having a varying resistance which changes due to some stimulus such as temperature or pressure. This is the value for the crank sense Field effect Transistor sensing input.
- **Interior light**: The 10AS alarm has six 8 bit Analogue to Digital (ADC) inputs. These convert a varying voltage fed into the alarm into a number ranging between 0 and 255. The higher the voltage then, the higher the number. By this method the alarm can read a sensor which works by having a varying resistance which changes due to some stimulus such as temperature or pressure. This is the value for the Interior lights Field Effect Transistor input.

Diagnostic Capabilities (Outputs)

This gives a choice of outputs that can be tested. Click on the ON link to start the test and on OFF to end.

- **Lock Door**
- **Unlock Door**
- **Sounder**
- **Alarm LED**
- **Hazard light**
- **Interior light**

Diagnostic Capabilities - (Utility)

- **PLIP learn**: This puts the ALM ECU into PLIP (remote control key fob) learning mode. Up to 4 may be programmed, one after the other, whilst in learn mode. This procedure will erase all previously learned PLIPS that will need to be re learned during this process. Note that some versions of the ALM may not support PLIPS.
  Please note: You cannot learn a LEAR (new) FOB to an ALM that was setup for the LUCAS (old) type of fobs unless the proper coil and wiring is done on the car to support the new fob type. see LR technical bulletin : LTB00893

  Preparations:
  1) Have all previously learned and new, or used, PLIPS to be learned ready and separated from the ignition Key.
  2) Ensure the Ignition is off with the Key in.

  Procedure:
  1) Run the function and confirm that the Ignition is off at the prompt.
  2) Wait while the function initialises the ALM's PLIP Learn, deletes existing PLIPS etc. This may take about 15 Seconds. You will be notified if the ALM ECU does not support PLIPs
  3) When the Prompt changes from Initialising PLIP learn to an instructional type, turn on the Ignition using the key, then holding a PLIP very close to the ignition barrel, press either the Lock or Unlock button on it repeatedly until you get a visual (Indicators Flash) and Audible (Horn sound) confirmation. Then turn off the Ignition with the Key. Repeat this process, including the Ignition key operation with any further PLIPS to be learned.
  4) The PLIP learn function will be automatically ended after 30 seconds with a "Finished prompt after which you should re cycle the Ignition and test all learned PLIPS.

Glossary

Diagnostic Lead	This is a general term for the cable used for connecting diagnostic equipment to the Vehicle / ECU / Communication Bus
ECU	ECU (Electronic Control Unit is a general acronym term used for any embedded control unit / vehicle system that controls one or more of the electrical system or subsystems in a vehicle.
Faults	When an ECU senses a problem or malfunction, it triggers the storage of a specific fault code. ECU fault codes, are also known as diagnostic trouble codes (DTC).
OBDII Socket	OBD or OBDII stands for On-Board Diagnostics. The OBDII socket is a socket located in a vehicle where diagnostic equipment can be connected.
SD Card	A standard type of memory card typically used in digital cameras and many other portable devices.
Members Restricted Area	An on line area of the Nanocom-Diagnostics.com web site that is specificly accessible only to Blackbox Solutions Nanocom customers in which they can find information, Unlock Codes for their nanocoms and available downloads.
Firmware	Firmware is a term used to describe software or Code that is embedded in a piece of hardware.
OBD	On-board diagnostics (OBD) is a generalized automotive term referring to a vehicle's self-diagnostic, fault detecting / storing and information reporting capability.
Unlock Codes	Codes supplied by Blackbox Solutions making the user able connecting his device and communicate with specific vehicle model.
VIN number	The car's vehicle identification number (VIN) is the identifying code for a SPECIFIC vehicle. The VIN serves as the car's unique Identifying Number, as no two vehicles in operation have the same VIN. A VIN can also contain information about vehicles unique features, specifications and manufacturer. The VIN can be used by manufacturers etc to track recalls, registrations, warranty claims, thefts and insurance coverage.
ECU MAP	Most vehicles contain an ECU that controls how the engine works. These ECU's contain a set of data commonly referred to as a MAP that controls the fuelling and other aspects to accommodate the manufacturers supplying vehicles worldwide and having to take into account different climates, laws & restrictions and varying quality of fuels.