

RANGE ROVER

BODY ELECTRICAL CONTROL MODULE (BeCM)

APPLICABILITY	RANGE ROVER
DATE OF REVISION	20 MARCH 1998

O Rover Group



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Description of Functionality

General

The Body electrical Control Module (BeCM) controls, monitors and provides power supply to many of the vehicle's electrical systems. This document identifies which system the BeCM interfaces with and describes the functionality and operation of systems that are not covered within other documents. This document also provides a complete list of BeCM inputs and outputs. This document in not intended as a complete diagnostic guide. The ETM should be referred to where further details of the connector pinouts and wire colours are required. Testbook should be used for diagnosis of the observed failures. The diagram on page 8 identifies the systems that the BeCM interfaces with.

BeCM activation and Sleep modes

The BeCM has two modes of operation, normal operation mode or "activation mode", and a low quiescent current state or "sleep mode". The sleep mode is required to enable the vehicle to be left for extended periods of time without the vehicle's battery being discharged.

Transitions between the two states are controlled by the status of the BeCM activation inputs (see activation input table).

Sleep mode will be entered when all timers have timed out (i.e. courtesy lights are off) and all activation inputs have been inactive for two minutes.

Activation mode will be entered when any of the activation inputs changes state. The quiescent current during sleep mode is approximately 30mA when the vehicle is unlocked and approximately 40mA when the vehicle alarm is armed.

If the BeCM is kept awake for more than two days without the vehicle being started, then this will cause the battery to discharge to a level where starting the engine may be difficult. See sleep mode detection section for diagnosing BeCM sleep mode problems.

Load inhibition during cranking.

In order to maximise battery voltage during cranking, the majority of BeCM outputs will be inhibited when the engine is being cranked (ignition turned to position III). The exceptions to this strategy

Hazards/turn signals
Side lamps
Handbrake/Park signal to air suspension
Door open to air suspension
Alarm audio-visual functions.

Engine running detection

The BeCM has two methods of detecting engine running, namely tacho pulse monitoring and alternator charge input status.

Tacho pulse detection is used for safety related functions (e.g. memory seat one-touch inhibition) and alternator charge status for electrical load control functions (e.g. heated mirrors).



The vehicle system has two horns, left and right, these are operated simultaneously when the horn switch is depressed, irrespective of the ignition position.

The vehicle has one cigar lighter in the front of the vehicle. The cigar lighter can be operated provided that the auxiliary feed has been switched on and the inertia switch is not tripped.

Fuel Level to Engine Management System (GEMS).

The fuel level to the EMS is simply a link from the fuel level input via a series resistor. This signal is used by the EMS for diagnostics.

Auto Transmission Interlock (Shift Interlock).

The gear select lever may only be moved out of the park position when the ignition is on and the brake pedal is depressed. The shift interlock solenoid will be energised continuously whilst the ignition is on and the gear selector lever is in a position other than park.

Key inhibit solenoid.

The key inhibit solenoid will be energised to prevent the removal of the key from the ignition switch at all times when the key is in the ignition unless the gear select lever is in the park position.

Activation of the inertia switch will only be effective when the ignition is on and will have the following effects:

- All doors including tailgate will be unlocked.
- The hazard warning lamps will be activated. 2
- The "Inertia switch"/"Refer handbook" message sequence will be activated on the 3. instrument pack display.
- All external builb failure warning messages will be inhibited. 4.
- Auxiliary controlled outputs will be inhibited to prevent operation of HEVAC blowers.
- The power supply to the fuel pump is inhibited. (Included for information only, the pump is 5. 6. not controlled by the BeCM).



"Limp Home" modes.

The BeCM has a limited ability for self diagnosis in the event of an internal failure. In the event of such a failure the BeCM may continue to function with a reduced level of functionality. The precise functionality available will be dependent upon the nature of the failure, however if one of the two main processors inside the BeCM stops working then the functionality will be as follows:

- Side, tail and dipped beam lamps default to the on state.
- 2. Fully functional external turn signals and hazard lamps excluding bulb failure warning and hazard tell tale lamp.
- Front wiper slow no automatic wiper arm park facility.
- Front screen wash No program wash/wipe facility.
- Horn will operate when the horn switch is pressed.
- 6. Crank will operate normally.
- Shift interlock solenoid activated with brake pedal.
- 8. Ignition and auxiliary feeds.
- Stop lamps when brake pedal is depressed.
- 10. Fuel filler flap release.

All other outputs shall revert to the off state.

A failure of a BeCM is extremely unlikely to result in an engine misfire or the engine cutting out. The ignition signal from the ignition switch is fed through the BeCM and to the underbonnet fuse box then to the Engine ECU. The BeCM monitors the ignition switch signal but does not control it electronically. Even if the power supply (via the 3 maxi fuses) is lost with the engine running the engine will continue to run.

Service Engine Reminder

The "Service Engine" warning lamp will be illuminated as an emission maintenance reminder after the vehicle has covered 50,000 miles or 80,000km (dependent upon selected distance units) whenever the ignition is on. This lamp will have a 3 second bulb check initiated at ignition on. For 951/2 MY (VIN: TA331365) onwards the mileage is changed to 82 500 miles or 132 000km.

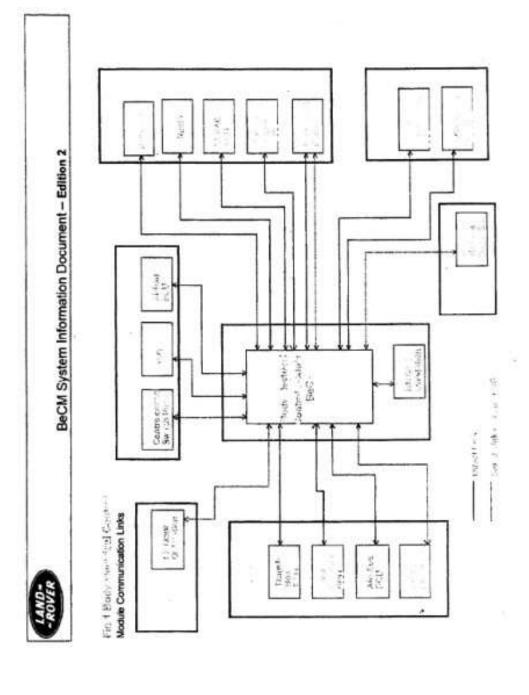


History of Software Changes within the BeCM

Part No	Micro/PAM	Date	Description
AMR 4918	M23	10-94	Diagnostic mode 3 address, R/W and READY flags are swapped.
AMR 4918	M25	12-94	Cranking now only possible on automatic vehicles when park or neutral is selected.
AMR 5406	M27	2-95	Now permits air suspension fault mode messages ayed in kph.
AMR 5406	M30	3-95	Code replaced that was deleted from the service engine block code.
AMR 4916	P28	2-95	Passive immobilisation functionality. Pwake continuously monitored. Passive key coil switched off when vehicle is about to go to sleep. Auto-relock only triggered by an unlock when vehicle was in an armed state. Remote superlock state made accessible using double key superlock (Part of passive immobilisation functionality. Provision for mislocks using battery backed Klaxon. Number plate lamps now turned on with daylight running.
AMR 4916	P30		NAS functionality introduced, affecting operation of foglamps, mainbeam and main auxiliary driving lamps. Police functionality introduced. Alarm inhibited when unlock request is generated. Horn switch input inhibited to stop sounding during crank. S/W mechanism inserted to cancel any alarm audio-visuals when in a disarmed state and during disarming.
AMR 4916	M31	4-95	Sense of fog bulb failure toggled. Gearbox fail message re- displays on each occurrence. Mainbeam failure displayed on ignition off even if beams are not active. Mislock on lazy locking due to open window results in window open message. Traction failure beeps on first occurrence only. Service indicator software change.
AMR 4916	M32	4-95	Gearbox fault inhibited for 1 second on crank, TRACTION FAILURE results in LH turn signal tell-tale to illuminate. This has been rectified.



Part No	Micro/PAM	Date	Description
AMR 4916	M33	4-95	Spurious triple audible warning on repeated cranking inhibited. Slow 55 kph audible warning now sounds on every occurrence.
AMR 4916	M34	9-95	Service indicator extended to 82,500 miles. Park lamp warning messages re-activated after driver's door has been closed following a "lights on" warning. Two timers added to overcome accidental driver lock-out due to dropping sill buttons.
AMR 5145	M35	4-96	Friendly synchronisation implemented. Sunroof anti-boom, Faster power-on-reset, 200mS.
AMR 5628	P31		Passive immobilisation - on re-mobilisation rear doors only unlock if vehicle was in an armed state.
AMR 5630	P32		Accidental sill lock prevented with software. Slam lock now prevented (i.e. function deleted, vehicle now unlocks).
AMR 5999	P34	£	Wiper s/w diagnostics problem solved. Sill drop timer now implemented by PAM to free up code space in micro. Slamlock to continue functioning in limp-home. Sleep mod. allowing sleep when ultrasonics active. Vital functions of moving vehicle enhanced to reduce recovery time. Diagnostics reset between mode changes and log out modified to support fast reset. A s/w crash forces micro to limp home and power on reset. Implementation of daylight running mod for NAS/Canada (tum off DRL in PARK). Modification of NAS key inhibit functionality to prevent "sticking" key. Removal of cancellation of auto-relock via a second remote unlock request.





Description of System Operation

BeCM sleep mode detection

The BeCM will wake up or remain awake (vehicle quiescent current drain approx. 1A) if any of the activation input are active. When all timers have timed out and the activation inputs are not active (see activation input table), the BeCM quiescent current will drop to approx. 30mA after approximately 2 minutes.

There are two ways to check if the BeCM is asleep or not

- Follow the Quiescent current (Iq) drain test (page 14) with an ammeter. If the vehicle passes, then the BeCM is allowed to go into sleep mode. If the vehicle does not pass the Iq test then some vehicle component is keeping the BeCM awake with an activation input (see Table 1). This can be done by either an inductive ammeter or by putting an ammeter/voltmeter in series between the disconnected negative battery cable and the negative post on the battery.
- 2. If an ammeter is not available, then making sure that all doors are closed, wait until 2 minutes and see whether or not the interior lamps extinguish and if the Gearbox H-gate selector dot extinguishes. The selector dot will remain lit at a low intensity if the BeCM is kept awake or completely extinguish after two minutes if the BeCM does not receive any more activation inputs. This may be difficult to observe in highly lighted areas (i.e. you may need to cup your hands around the dot to determine whether or not the dot is still lluminated during lower light drains.

Number 1 is the preferred sleep mode detection procedure, use number 2 only as a last resort if any means of current monitoring can not be found.

Table 1 shows the activation inputs.

The BeCM will recognise an input Low (GND) as anything < 3v and an input High as >5v.



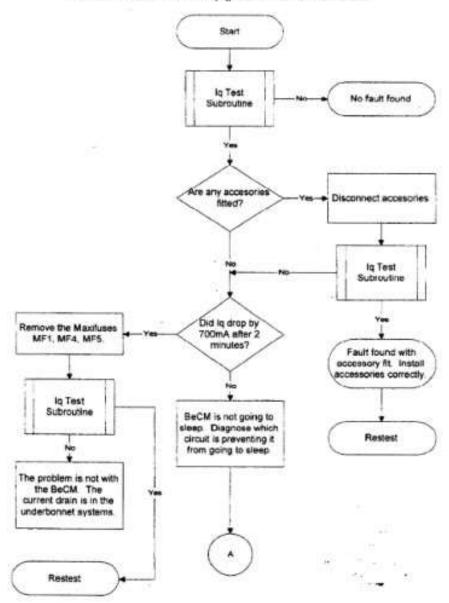
Table 1.	ACTIVATION INPUTS	TO'	THE	BeCM.
Input (BeCM)	Connector	Pin	Wir e Col.	Signal
Bonnet Open Switch	C114 GREEN 20WAY	14	PW	When bonnet is open I/P to BeCM is GNO (edge triggered)
Diagnostic line "K"	C255 WHITE 20WAY	8	KR	Input Short to ground will wake up BeCM
Hazard Switch	C255 WHITE 20WAY	13	PG	When hazards are on - I/P to BeCM is GND
Diagnostic line "L"	C255 WHITE 20WAY	17	LGR	Input Short to ground will wake up BeCM
IGN position I	C256 WHITE 16WAY	13	WK	Ignition 1 on - I/P to BeCM is GND
H/Lamp Flash Switch	C257YELLOW 20WAY	8	บร	Switch Closed - I/P to BeCM is GND (non latching)
Sidelight Switch	C257 YELLOW 20WAY	9	OR	If sidelights are on I/P to BeCM is GND
Horn Switch	C257 YELLOW 20WAY	17	PB	If switch is closed - I/P to BeCM is GND (non latching)
Fuel Flap Release Switch	C257 YELLOW 20WAY	18	LGS	If switch is closed - I/P to BeCM is GND (non latching)
IGN position II	C258 WHITE 10 WAY	8	W	IGN. 2 on - I/P to BeCM is GND
Courtesy Lamp Switch	C326 BLUE 20WAY	2	BP	Switch Closed UP to BeCM is GND (non latching)
Tailgate Open Switch	C326 BLUE 20WAY	3	PY	When taligate is open — I/P to BeCM is GND (edge triggered)
Radio remote I/P	C326 BLUE 20WAY	6	OR	BeCM wakes up when 433MHz / 315MHz received * * An intermittent contact does not activate BeCM
Rear L Door open Switch	C362 BLACK 16WAY	4	PW	If door is open - I/P to BeCM is GND (edge triggered)
Security - Ultrasonic I/P	C362 BLACK 16WAY	6	YK	If active I/P to BeCM is GND
Diagnostic line "K" (Gearbox ECU)	C626 BLACK 20WAY	12	K	Input Short to ground will wake up BeCM

Connector	Pin	Wire Col.	Signal
C758L 20WAY BLACK	7	PW	If door open I/P to Door Outstation is GND (edge triggered)
C758L 20WAY BLACK	5	WP	Switch Closed - I/P to Door Outstation is GND (edge triggered)
C758L 20WAY BLACK	6	UR	Switch Closed – I/P to Door Outstation is GND (edge triggered)
C758R 20WAY BLACK	7	PW	Door open I/P to Door Outstation is GND (edge triggered)
	5	WP	Switch Closed – I/P to Door Outstation is GND (edge triggered)
C758R 20WAY BLACK	6	UR	Switch Closed – I/P to Door Outstation is GND (edge triggered)
	C758L 20WAY BLACK C758L 20WAY BLACK C758L 20WAY BLACK C758R 20WAY BLACK C758R 20WAY BLACK	C758L 20WAY BLACK 7 C758L 20WAY BLACK 5 C758L 20WAY BLACK 6 C758R 20WAY BLACK 7 C758R 20WAY BLACK 5	Col. C758L 20WAY BLACK 7 PW C758L 20WAY BLACK 5 WP C758L 20WAY BLACK 6 UR C758R 20WAY BLACK 7 PW C758R 20WAY BLACK 5 WP

Should a BeCM fail to go to sleep then the diagnostic flowchart on pages 11 -15 should be followed.

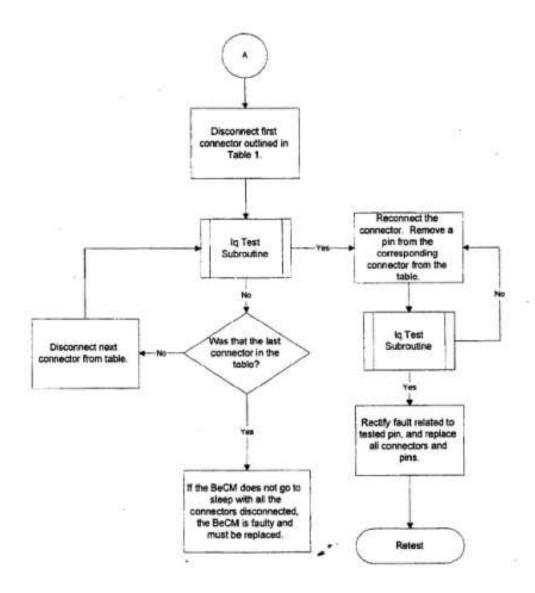


Quiescent current drain (Iq) fault location flowchart



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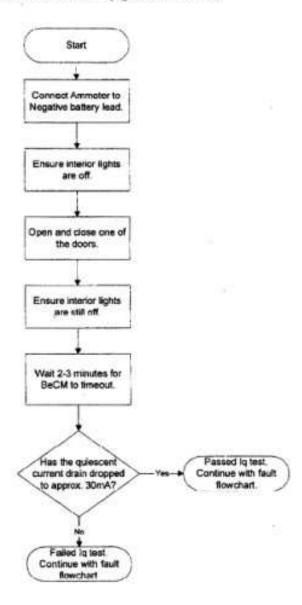
Quiescent current drain (Iq) fault location flowchart, contiuned



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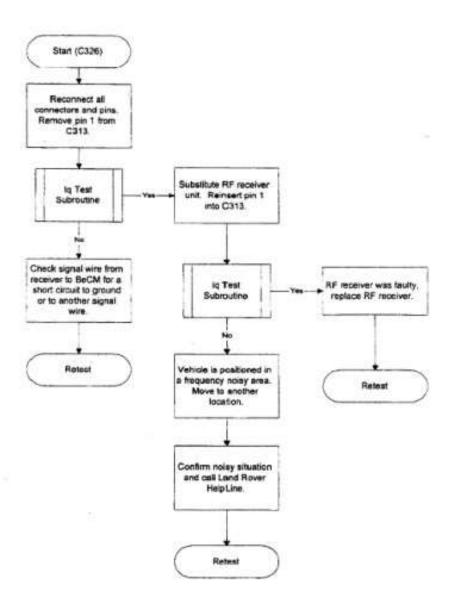
Quiescent current drain (Iq) subroutine test



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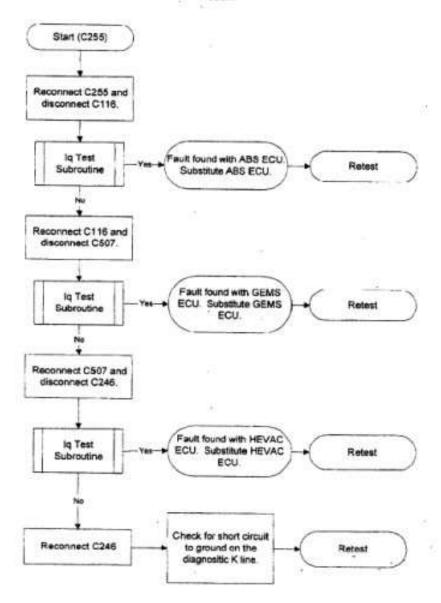


If pin 6 in C328 is found to be the cause for keeping the BeCM awake, tollow the flowchart below.





If pin 8 in C255 is found to be the cause for keeping the BeCM awake, follow the flowchart below.





Engine running signals

The tacho signal is generated by the GEMs ECU, this signal is in the form of a pulse train. The engine rpm thresholds for tacho pulse monitoring will be:

Petrol

180rpm

Horn Signals

The vehicle homs are driven when the horn switch on the steering wheel is pressed. The BeCM sees the hom switch activated when the switch is grounded(0v). The BeCM will output a low (0v) signal to the coil of the horn relay (in the engine compartment fuse box), causing the relay to energise, closing the relay contacts allowing Vbat(12v) to pass through and activate the two homs simultaneously. When the switch is released the input will be high (Vbat), causing the output to be high(Vbat) which in turn de-energises the relay, causing the horns to stop sounding.

Warning Messages

There are a number of components which supply input signals to the BeCM, but are only used for warning messages on the instrument pack. The BeCM may only act as a direct link, passing the information from sensors to the instrument pack. The BeCM is responsible for generating the messages that are then sent to the instrument pack through the serial link for display. The messages are generated when the correct conditions are met.

Flat Battery

If a flat battery is found check for a battery drain of less than 30mA when the BeCM is asleep. If the BeCM is awake it will be approximately 0.8 Amps and the battery will last only 2 to 3 days with this amount of drain. Determine if the problem is underbonnet or BeCM related, by removing the 3 large 60 Amp MaxiFuses from the underbonnet fuse box. If the drain does not reduce to 30mA, then the problem is underbonnet. The alternator has been found to cause a drain of 4 to 10 Amps and the two fuse boxes have a combined drain of 1 Amp.



BeCM and ECU interconnections

Power Distribution

BeCM Multiplexed communications to other ECUs

The multiplexed communication is a method of electronic communication that enables the BeCM to 'talk' to several other Outstations by passing electrical instructions through the same wires (the

Each serial link comprises the following:

Feed wire

Supplies battery voltage

Earth wire

Provides vehicle earth

Clock wire

Provides reference signal

Signal wire

Carries instructions between electronic control units

Direction wire identifies the direction of instruction

The instructions are communicated through the serial link to the relevant outstations, which then processes the signal, to determine the meaning, before carrying out the instruction.

All the voltages relating to the serial link are either Ground(0v) for logic 0, or Vbat(12v) for logic 1. The electronic instructions can not be seen using a multimeter.

Refer to Fig. 1 for serial link ECU connections.

Message generation

The audible sounder is operated by a moving coil transducer mounted in the instrument pack, controlled by the BeCM output. The tone outputs will be in the form of equally spaced pulses . The tone of the 'beep' is determined by the frequency and volume is determined by the voltage of the pulse. Maximum volume is 7volts.

Odometer logging

The BeCM monitors the odometer value received from the instrument pack through the serial link. When the ignition is turned on, the BeCM stored value will be automatically be updated by the distance value held by the instrument pack. A distance unit is defined as either a mile or a kilometer, as applicable to the vehicle configuration. If the BeCM receives five consecutive numbers from the instrument pack that are less than the number already stored in the BeCM memory, then an odometer error condition will be displayed on the instrument pack. This will only occur if a BeCM with a higher stored odometer value has been put into a vehicle with a lower odometer value in the instrument pack, or an instrument pack with a lower odometer value is fitted (i.e. new instrument pack). The error message can be reset through the use of TestBook, by carrying out an odo update. (In TestBook: instrument pack\Toolbox\Odo Update).



WARNING: IF AN ODO UPDATE IS CARRIED OUT THE ODOMETER WILL TAKE UP A HIGHER VALUE THAN IT CURRENTLY HAS, THEREFORE PLEASE MAKE SURE EVERYTHING IS CORRECT BEFORE CARRYING OUT AN ODO UPDATE.

If the odometer value is greater than the value stored by the BeCM, then the BeCM will automatically update the stored value.

WARNING: PLEASE NOTE THAT IF A BECM WITH A LOWER STORED VALUE IS PUT INTO A VEHICLE WITH A HIGHER ODOMETER VALUE, THE BECM WILL STORE THE CURRENT ODO VALUE. THEREFORE DO NOT EXCHANGE OR SUBSTITUTE BECMS TO ELIMINATE FAULTS BETWEEN VEHICLES. IF A BECM HAS TO BE SUBSTITUTED, THEN DISCONNECT ALL THE INSTRUMENT PACK CONNECTORS, BEFORE CONNECTING POWER TO THE VEHICLE.

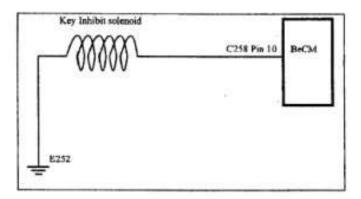
LRNA Technical Support

If a fault free BeCM is locked to a vehicle accidentally, LRNA has the ability to unlock the BeCM from that particular vehicle. LRNA can reset the new fault free BeCM and allow it to be installed into another vehicle as if it were directly from parts stock. It is important that if a BeCM is sent to LRNA to be unlocked that it be fault free. LRNA Service Department will unlock the BeCM and return it for a small fee. If this procedure is needed contact the Technical HelpLine at 1800-562-5824 and inform them of the situation.



Key inhibit solenoid

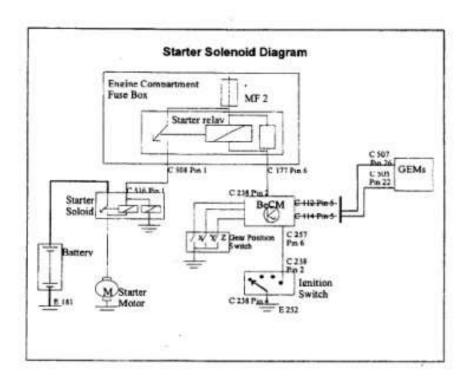
When the gear selector lever is not in park or the ignition is not in the off position, the BeCM will output Vbat(12v) - Connector C258 Pin 10 - to energize the solenoid and prevent the key being removed from the ignition barrel. Once the ignition switch is turned to the off position and the gear lever is moved to the park position, the BeCM output will be GND(0v), the solenoid will be deenergized, allowing the key to be removed. Difficulties maybe experienced if the driver attempts a rapid key removal, this is due to the solenoid not being able to respond quickly enough. To cure this, for 97MY onwards, the solenoid will energize when the gear lever is out of the park position (BeCM output = Vbat(12v)), and the BeCM output will be GND(0v) to de-energise the solenoid, when the gear lever is in the park position, regardless of the position of the ignition switch.





Starter Solenoid

The starter solenoid is controlled by the BeCM through a starter relay in the engine compartment fuse box. Providing the vehicle is disarmed correctly (e.g. MIL\Check Engine lamp is on, when the ignition is on), gear lever in neutral or park, when the key is turned to ignition position 3, the BeCM input (C238 pin 2) will be grounded(0v). The BeCM will output a low(GND) signal to energise the starter relay. The relay contacts will supply the starter solenoid relay with Vbat(12v) through a 30A Maxifuse (MF 2). This in turn will close the starter solenoid relay contacts to allow a direct feed from the battery positive terminal to the starter motor. If the MiL/ Check Engine lamp does not come on the engine is immobilised.





BeCM Replacement and Reprogramming using TestBook.

This is to be used as a guide when replacing a BeCM. It is a step by step guide of how the BeCM programming works. It should be used if the TestBook operator is unsure of how the procedure works.

It is assumed the new BeCM has just been fitted and is awaiting programming.

Please use the latest disk to program the BeCM.

- Connect TestBook to vehicle.
- Power up TestBook and await Welcome Screen.
- 3. Choose DIAGNOSTIC SYSTEM.
- On the Next Screen Select Vehicle Type, Model Year etc. then CONTINUE
- Now Enter the full VIN of the vehicle. Check it before pressing CONTINUE.

(If an invalid VIN has been entered, re entering it will be necessary)

- The next screen confirms the selections that have been made. If they are correct then CONTINUE.
- 7. Next, under SYSTEM SELECTION choose BeCM PROGRAM.

There may be THREE or FOUR choices and EXIT on the BeCM Reprogramming MENU, depending the disk being used.

8. Choose NEW BeCM

Ensure that you are using the blue Diagnostic cable or the Switchable Diagnostic cable is in Position A then CONTINUE.

The next screen will ask whether the necessary vehicle information is available, this is VIN, Lockset Barcode, Build Date.

9. If all the information is available choose YES.

Here, the VIN that was entered earlier will be confirmed. If it is not correct, then press NO and retype the VIN. If it is correct then press YES.

10. The next screen will ask for the Lockset Barcode. It is necessary to type in all 14 characters of the Lockset Barcode. The Lockset Barcode must be the correct one for the HANDSETS. Then press CONTINUE.



 Next, the Build Date will be asked for. It must be entered in this format: DD/MM/YY (Day, Month and Year).

If it is in any other format, it is incorrect and will have to be re entered. Press CONTINUE.

The next selection of icons is the Market Selection. Here TestBook will determine whether the vehicle should have an EKA code or not. It will not actually program the market, that will be done later.

- 12. Choose the correct market for the vehicle.
- The next screen is SELECT VEHICLE TYPE. Press the required tick boxes that conform to the vehicle specification. Press CONTINUE after the correct Vehicle type has been entered.
- 14. Finally, all the data that has been inputted will now be displayed. The operator of TestBook must ensure that all this information is correct at this point. If it is not correct, press NO and the diagnostic will return to the VIN check screen. The vehicle information will have to be re entered. If all of the information is correct press YES.

WARNING: ENTERING INCORRECT INFORMATION WILL IMMOBILISE THE VEHICLE AND THE BECM WILL HAVE TO BE REPLACED AGAIN. ENSURE THIS DOESN'T HAPPEN!

- 15. The next screen is the last chance to change any vehicle information before it is locked into the BeCM. After this point the information can never be changed. If the information is definitely correct then press YES otherwise press NO.
- 16. The following screen is the MODEL YEAR selection. Look at the VIN and select the 10 character from the left. M, S, T or V. Conformation of the Market that was selected earlier will be given.
- The following screen is CUSTOMER OPTIONS PROGRAMMING. Press CONTINUE to change customer options.

Front fogs, Sunroof and Trip computer should be enabled.

18. Select the options that are required by pressing the check boxes. Press CONTINUE when the correct options have been programmed. Conformation of these options will be given followed by conformation that the options have been programmed into the BeCM.

THE BeCM IS NOW PROGRAMMED. IF NEW REMOTE HANDSETS HAVE BEEN SUPPLIED, THE LOCKSET BAR CODE WILL BE DIFFERENT TO THE PREVIOUS ONE AND IT WILL BE NECESSARY TO PUT GEMS INTO LEARN MODE (THROUGH GEMS DIAGNOSTIC).

- RESYNCHRONISE THE HANDSETS AND CRANK THE VEHICLE.
- · SET ALL THE WINDOWS AND SUNROOF.
- . ENTER THE RADIO CODE



BeCM Substitution Process

There is no customer or dealer accessible facility for altering the stored BeCM or instrument pack odometer value either within the vehicle or via TestBook. However if you need to substitute a BeCM into a vehicle for fault diagnosis then follow the procedure below to avoid locking the new BeCM with vehicle information.

- Substitute the BeCM in the problem vehicle.
- Connect all the wire connectors to the BeCM.
- Remove driver's side access panel and Instrument pack surround as per Workshop
 Manual and disconnect the Instrument pack connector (C242). This will allow access to
 vehicle diagnosis without transferring odometer mileage information from the instrument
 pack to the BeCM.
- Re-connect vehicle battery after ensuring instrument pack connector (C242) is disconnected
- Start the BeCM replacement procedure through TestBook as if the BeCM was being replaced with a new unit.
- Enter in all vehicle information (i.e. VIN, Lockset Barcode, Build Date, etc.)
- When the confirmation step is reached, TestBook will ask to confirm the information and warn that if continued the displayed information will be locked into the BeCM. At this time you must ABORT the installation process.

The abortion of the new BeCM installation process will allow use of the vehicle without locking the BeCM to that particular vehicle.

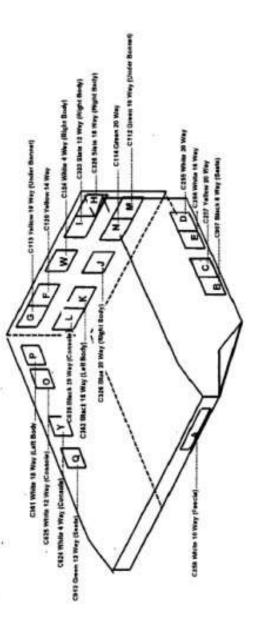
NOTE: When reconnecting C242 support the instrument pack behind connector to ensure that the connection is complete and to avoid damage to the PC board in the instrument pack. C242 MUST NOT be inserted while the substitute BeCM is in place; only when the BeCM that will remain in the vehicle is in situ, can the connector be re-fitted.

In completing this process, diagnosis is inhibited in the areas related to any Instrument pack functions (speedometer, tachometer, fuel gauge, etc.). The vehicle will run but is not road worthy, DO NOT drive vehicle on public roads. If required, only drive vehicle around dealership.

If it is decided to replace the BeCM with the substituted unit the New BeCM installation process needs to be carried out again completely with out aborting. Failure to reprogram and lock the BeCM will compromise vehicle security.



BeCM Connector Identification





Connector Pinouts

BeCM

1 Charle Col. 1/ O Fine No. Charles No	Conn	onnector C112 1		AY AMS	6 WAY AMP 040 FEMALE PLUG (GREEN)		
BK O Port Avactorans on signal to air see, ECV GMD when part in handsolds selected, otherwise believy volts BD 1 Autogrand of temp, input. BB 1 Security corte in Engine control module. BC Table whomen hands in Engine control module. BC Table whomen hand from Engine control module. BC Table whomen hand from Engine control mod. BC Table manner or attach, where the form of the form the f	ANIM	Wire col.	2	Tuse No.	Function	Status	Comments
BK O First Anadosans on signal to air son. ECV GND when part or handsold selected, otherwise battery, with BO Door I balgate open signal to air son. ECV GND when temperature OX otherwise battery, with Autogenotor of temperature open signal to air son. ECV GND when temperature OX otherwise battery, with Security order in Engine control module. WLG O Table whennest have been light, I selected CND when tember but in ECM when testing a selected 6 vehicle not fingers appeal began to the control mod. Square were light from ECM of the control of the control mod. Square were light from ECM of the control o	-						
PO Door / bilgets open styrial is are sins ECU GND when door or usignic open, offerwise battery, with	2	9K	0		Park Aurebase on signal to air sus. ECU	GND when park or handlooks selected, otherwise ballery, volts	
BP 1	m	Pod	0		Door / balgate open signal to air sus. EQU	GND when door or taigute open, offerwise battery, with	
Security code in Engine costs of security code sent to ECM when tyriskin 2 salected & vehicle not innecessary and the contract security code sent to ECM when tyriskin 2 salected & vehicle not innecessary in the contract security of the contract of the contract security of the contract security of the contract of the contract security of the contract of	4	88	E		Aulo gentax of temp, right.	OND whee temperature OK otherwise bullery, volts	Responsible to 'Cearbox Overheaf' mensage
WLG O Talks unformed lace box, YOH, I selected COMD when sprittion teay in either position 1 (ass) on position 2. S 1 Engine speed laguel from Engine contact, most Selected should from Ecklin to 120. BS 1 ABS winning light 8 researce invent. Modulated 0 in lastery, white signal depending on message invent. This injury will be CMO when ABS pump obsessing pressure in Sev. Square wave orders, which should be seen at a 4 engine ECUs. Square wave orders, selecting between GNO 8. When 6000 public soles per mile. Typically 3-5c. BY 1 Colaries overheast (Japan). GNO when seering additions of fermine Vitalit. GNO when stell level fox, otherwise Vitalit.	100	80	0		Security code in Engine control recobile.	Security code sent to ECM when ignition 2 selected & vehicle not provobilised.	(A single burst of 5v palses.
WLG Table unharment lace box, 1014, I selected OND whem spratters say in eather position 1 (aux) on position 2. S	9						
WLG O Table unhanned lace box, fight, I period of the state of the species say in effect position 1 (aux) or position 2. S 1 Engine speed laced from Engine control mod. Selection shall from Engine control mod. Selection shall from ABS pump. Modeland 0 to listeny, what algoes from message input. This issue was each from ABS pump pressure in the ABS pump otherwise battery, with the CMO when ABS pump pressure in the CMO. The state of the ABS pump otherwise battery, with a control of the state & engine ECMs. Square wave ordard, selecting between GNO & What 6000 public period of professional ordards over the state (lapter). GNO when neutring additional offerside Visit. GNO when their level too, otherwise Visit.	7						
S 1 Engine speed legal from Engine contant mod Square were total from ECM D+ 12h. BS 1 ABS winning bifst & reseage input Modeland 0 to listen; with signal depending on message.	100	WLG	0		Talls unformet lase box, IGN, I selected	GMD when ignition tay in either position 1 (aux) or position 2, otherwise ballery, with	
- 0 - 0 BW - 0	0	60	-		Engere speed hyut forn Engine control mod	Square wave input from ECM by - 12v.	Typical everings value is 6v. when engine is running
- 0 - 0 BY - 0	10	88	-		ABS woming light & message input.	Modulated 0 to flattery, wells signal depending on message.	
0 - 0 8M - 0	=	BW	-		Brake pressure hyal from ABS pump	This isgut will be GMD when ABS pump pressure is low, otherwise battery, volts.	
0 - 0 M 4	12						
BY I Coladyst overteast (Japan). GND when werning additional otherwise Visiti. GB O Facilitated to ECM. GND when that level ton, otherwise Visiti.	22	>	0		Road speed output to air exe. & engine ECUTs.	Square wave cutors, switching between GND & Vinit. 8000 publies permits. Typically 5-6s.	Egyal organism form AES ELLI and referred by BeCM. A signed can be seen with a good quell retimeter. The meter will give an personal value.
GB O Free level signed to ECM. GND when fael level law, otherwise /balf.	=	L	-		Calaiysi overheat (Japan).	GND when wanning activated otherwise Visits.	
GB O Fred loyed to ECM. GND when fuel treet low, otherwise Vibility.	15						
	16	-	0		Facilitated signal to ECM.	CND when had level low, otherwise Vsaff.	Sgrue used by ELAL



BeCM System Information Document - Edition 2 Connector C113 10 WAY AMP 070 FEMALE PLUG (YELLOW)

閆	Charles Wiles and D. O. Charles Mr. Errondon	9	The second	Constitution of the second		
	105.81	1	Liber MO	CHANGE SOFT TO LINE NO. LANGING.	Status	Comments
	85	0	F.E.T.	RH. Main beam 1 output (han element).	Walt when main beam selected, otherwise ground,	
	WR	0		Starter motor signal to Ufficenet tuse box.	GND when starter motor request made, otherwise Vitall.	
	on	0	F.E.T.	R.H. Dipped beam output.	what when dipped heam selected, otherwise pround	
	GW.	0	FET.	F.E.T. R.H. Front direction indicator large.	Public horn Ov to Vibalt, when R.M. dendron indicator selected RH turn layered will flesh at helpe normal rate if an orderwise GMD	RH fum signal will flash at twice normal rate if at bulb talk.
	45	0	FET.	HH. Main beam 2 output (timer birrg).	Voat, when main bean selected, otherwise ground.	
	LGR	0		Headlang with won signal to LIE has box.	OND when headamp vanifries request reals, otherwise Uset.	headlang wash wise is sumally operated many other trust screen wash cycle. There will be no headlang wash sign when the washar fluid level in two.
	NI.G ·	0		Front wipers last oxigs/ eignal to URS fase box praisy.	Front wipers test output signal to UNE fase box GND when fourt wiper that speed request made, atherwise Vhait, many.	
	KLG	0		Front wipers slow output agruel to URB hase took	Toris Wisers show on built is take but GMO when front wiper show speed majorest made, otherwise Vitable. Storage will remain on when has sponed in selection.	Signal will remain on when first apped in selection.
	RW	0	FET.	R.H. Front side light.	Vball, when side lights selected, otherwise ground.	
	RY	0	FET	R.M. Frank Rig SpM.	Vhatt when by lights salected, otherwise ground.	Side or head lamps will need to be on tor by lights.





velt spritten on. In Votal, puber signal, Otherwise GND In Votal, puber signal, Otherwise GND In Northwise GND In Springer In Northwise GND In Springer In Springer In Springer In Northwise GND In Springer In Spring	郡	ector C120	14 W	AY AMP	Connector C120 14 WAY AMP 070 FEMALE PLUG (YELLOW)		
GS O 7 At Dee gration feed (Secondary Neck) Batt votte with tynicen on.	2	Wire col.	1/0	Fune No.	Function	Status	Comments
PY O F.E.T. L.H. Finet fig light Output 0 to Vibral pulse and the light pulse a			0	7	Air bag ignition feed. (Secondary feed)	Batt, volts with spritten on.	Failure will result in air long fauft message
RY O F.E.T. L.H. Figure to light.		Ad	0	-	Alarm Klassen.	Output 0 to Visit. pulse signal. Offerwise GMD	
BLG O F.E.T. L.H. Frant side light, Nath when otheride Charmise G P.E.T. L.H. Frant side light, Nath when side light selected side Nath when how side light selected side Nath when how side light selected side Nath when how selected side Nath when how selected side Nath when how selected side Nath when pales selected side Nath when side Nath when selected side Nath when selected side Nath when side Nath	1	RY	0	П	L.H. Frant top light.	Vitall, when log lights selected, otherwise ground.	Sale or hand lamps will need to be on for log lights.
RB O FET. L.H. Frant side light. What when side light selected sit has received sit. PN O FET, L.H. Man beam 2 output (receiver). What when hom selected, sherwest UG O FET, L.H. Man beam 2 output (receiver). What when hom selected, sherwest US O FET, L.H. Man beam 2 output (receiver). What when patient and selected, sherwest UK O FET, L.H. Dispect beam output (hom sement). What when dispect beam selected, UK O FET, L.H. Dispect beam output. What when dispect beam selected, selected or Front Scheen Warn parry motter. What when dispect of bront scheening UND Visit, when scheeled. LGB O FET RH side impeater. What you calculated. What when scheeled. WG O FET RH side impeater. Other when scheeled.	1	81.6	0		Rear Screen Wash pump motor.	Vhatt. when activated. Otherwise GMD	
PG O FET LH state receitar Chate from 3v to Vitatt when PN O FeET LH Main beam 2 output (receitant) Chat when from leakched, afterwise UG O FET LH Main beam 2 output (receitant) Chat when from leakched, afterwise US O FET LH Main beam 2 output (receitant) Chat when from leakched, afterwise US O FET LH Dispet beam output (her sement) Chat when spales and selected, UK O FET LH Dispet beam output (her sement) Chat when spales Chat when the selected of Chat when the selected output (her sement) Chat when spales Chat when the selected output (her sement) Chat when spales Chat when the selected output (her sement) Chat when spales Chat when s	1	RB	0	FET	L.H. Front side light.	Voor), when side lights selected, otherwise ground.	
PN O F.E.T. Lift Main beam 2 output (neer lamp). Wall, when nown selected, utherwise U.G. O F.E.T. Lift Main beam 2 output (neer lamp). Wall, when spaid on oth U.S. O F.E.T. Lift Main beam 2 output (neer lamp). Wall, when spaid on oth U.S. O F.E.T. Lift Dipped beam output. Wall, when spaid on oth G.R. O F.E.T. Lift Dipped beam output. Wall, when spaid beam selected. G.R. O F.E.T. Lift Main beam output. Wall when spaid beam selected. L.G.B. O F.E.T. Lift Main beam output. Wall when spaid beam selected. L.G.B. O F.E.T. Rht side methods output on the selected. Wall when arbuilded. Wall when arbuilded. O F.E.T. Rht side methods output on the selected. Wall when arbuilded.		RG	0	FET	L.H. uide repositer	Fullian from 3v to Vitali, when LH.D.L. selected otherwise ground.	Output will be OND if pircuit is short/open circuits
UG O FET, LH Main hum? author(inner lamp). Vault when main bean selected or W O - lyadion signal to undertorner face loc. GRD when typiden switched on oth UK O FET, LH Main hum? author(innered face loc.) Wast, when rean bean selected, UK O FET, LH Dispect bean colour. What when dispect bean selected, GR O FET, LH Front describe interest lamp, selected, otherwise GND LH Front Screen Wash pump snote; Analt when advanted. LGB O FET RH side measure. Mail when advanted. WG O FET RH side measure. Analt some advanted.	1	Md	0		Hom output to function relay.	GND when hom selected, afterwise Visit.	
W O Tabilities signal to undertherned have box. GRID when typistion switched on the UK. US O F.E.T. L.H. Mann harm? autgood (have sement). Want, when them selected, UK. UK O F.E.T. L.H. Dispect beam codyst. Want! when dispect beam selected. GR O F.E.T. L.H. Front dispection indicates laws. Wattl. selecting) when L.H. selected. LGB O F.E.T. R.H. side mystales. Wattl. when advanted. WG O F.E.T. R.H. side mystales. Master born in to Vhattl. when is Vhattl. when is provide.		on.	0	F.E.T.	L.H. Man bean 2 output (reser lamp).	Visati, when main beam solected, otherwise ground.	
US O FET. LH bigset beam colout. Wath when train beam selected, of FET. LH Digset beam colout. What when digset beam selected. GR O FET. LH front disclaim influent lang. Inside the CH front Street Wash purity motor. Wath when advanted. Cheming GND Front Street Wash purity motor. Wath when advanted. Wath when advanted.	1	×	0	,	lgriffen signel to underhennet hae box.	GND when ignition switched on otherwise Volat.	
UK O F.E.T. L.H. Digges beam colout. Whatt when digged beam selected. GR O F.E.T. L.H. Front discision indicates temp. Indicate discision when L.H. selected, otherwise GNO. LGB O F.E.T. RH. side mysteler. What when advanted. WG O F.E.T. RH. side mysteler. Discision in the brank burn in Vhatt when advanted.		Sn	0	FET.	L.H. Main beam 2 output (Nets element).	Vitati, when man beam selected, offseretse ground.	
GR O F.E.T. L.M. Front dissolitor temp, seeking when L.H. LGB O F.E.T. RH side impeater, Nath years color. WG O F.E.T. RH side impeater, Otherwise Stories or Otherwise ground.	١.	š	0	FET.	L.H. Digged beam output.	Veatt, when disped beam selected, otherwise growns	
LGB O F.E.T RH ide repeater.	1	GR	0	F.E.T.	LH. Front discloss indicates lamp.	E CH	Output will be GND if decut is shot/open circula
WG O F.E.T RH. side repositor,		108	0		Front Screen Wash purry moles.	Wast, when activated.	
	11	MG	0		RH, side repeater,	Page form for to Vhatt when R.H.D.L. selected otherwise ground.	Culput will be GNO if dircuit is short/upon circuit.

Note: F.E.T is Field Effect Transistor, used to drive the outputs instead of the conventional relays.



When date taxamitted votage will change rapidly har GND to Voall, can be seen with nieter. When data transmitted voltage will change rapidly from GND to Vitalf. Can be seen with mater Square wave cutput, metching between GND & Vibat. Typical value = 6.7v value vehicle is in motion. 8000 guides per mile. GMD when healed new screen selected, otherwise Squal comes from HEVAC EDU. hypically 2.5v when vehicle is in rection. Keeps BeCM availse (see Sleep Mode) When key inserted into ignition & verbide This signal can be seen with a mater. When key inserted into ignition is Virtually to the 12x fruits. Dandlet Otherwise this oxigual is at GND OND When hazards exhected otherwise at Vibalt. Keeps the OM awake (see Sleep Mode Signal comes from MEVAC ECU Comments The switch is non-leading type. Signal comes from HEVAC ECU. The switch is a letching type. Soules wave cutput, switching between GND & Vibell. 6000 pulses per mile. Vital when facile cruise enable switch is selected obstructs GND SND when order switch selected otherwise at Youts. OvD when hay in spritten barrel, otherwise Ubatt. OVD when pedel not depressed, otherwise Ubatt. Walf. when hazards selected, otherwise GND ternally Vbalt, unless data bake transmitted. Armady Vibalt unless data being haramitted. OND when switch pressed, otherwise Vitall. GND when switch presend, otherwise Vlad. GRD when twitch pressed, otherwise Viset. GAD when afternator charging. Statiss Cruise ECU, switch leftale & evenier power Connector C255 20 WAY AMP 040 FEMALE PLUG (WHITE) Menator charging signal to HEVING. har schen healer request signal. Road speed signal to Chaine ECU. Key in switch (ignition key) input seales immobilisation coli leed. R.H. Seat heater request vput. Nazard switch tellake. load speed signal to HEVAC. L.H. Soat haster request irgut, Clubb switch input (manuel). 'est book diagnostic line 'K' Cavity With sol, I/O Euse No, Function Rear to light switch road. Test book diagnosite line "L" Cruite enable switch. Want switch input 0 0 0 0 0 2 0 0 NN 979 YG BR ž ž 8 PG BG Š LGR N_O 8 œ 5 4 15 ω 00 a \$ = 12 16 60 8



	Comments			This wire is a deplicate of pin 11				Meier will only give average taken	Males will coly give everage unker					May Kesp BeCM avate (see Table 1)		Voltage level determines the volume of sounder,	Typically 2.5v when vehicle is in motion.
	Statuta	Typical average value is 6rolls	Typical everage value is Groffs	Typical everage value is Grobs	GND when dimmer sellch noved to' increase" position.	GMD ovots	Vbett. when now tog tamps fluminated.	Pulse signal when LED flauling. Ov - 12v	Square wave agnet Ov - 12v.	Typical average value is 6volts	Typical average value is Brollis	Typical average value is 6 odls	GND when denner swith noved to' decrease" position.	GND when ignition key in position I or 8	OND at all times.	Pulses of 0v - 7v. otherwise GND	Square wave output, availating between GAID & Vhatt, Typkadly 2.5v. when vehicle is in militar. 1000 pubes per mile.
Connector C255 16 WAY AMP 040 FEMALE PLUG (WHITE)	Function	Institution pack serial link - direction	Instrument pack serial link - chick	Instituted pack sected into - data (chyticates)	Input from panel langs dimmer switch	Instrument pack serial link - signal GAD(dup.)	Fog lang tear switch teltale flumination.	Security LED.	Tachometer signal to Instiument Pack.	Instrument pack sentil this direction (duplicate)	instrument pack sental link - clock (duplicate)	matrument pack sarial link - data.	hput from purrel lamps dimmer switch.	spriton I sigst from spriton barrel.	Instrument pack serial link - signal GND	Institution bed and be wanted	Speedonwier signal to Instrument Pact.
S WAY AMP	Cavity Wire col. VO Fuse No. Function	0	0	On	-	0	0	0	0	0	0	QI	_	-	0	0	0
or C255 1	Vire col.	90	RG	107	RLG	80	B	SR	so	90	RG	10	RB	WK	86	BK	*
Connec	Cavity W	-	cu	.,	*	40	9	1	10	di	10	=	12	13	*	115	16

All instrument pack serial links are pulsed signals, hence, using a multimeter will only give an average value. Although the meter may display a value, this does not necessary mean the serial link is functioning correctly.





	NIN COL		TOT TOT	NAME AND	THE PART OF THE PA		
Savity	Cavity Wire sel.	2	Fuse No.	I/O Fuse No. Function		Status	Comments
-	NO	0		Guide Pump Supply	Supply	Watt. supply to cruine pump. (See Table 3)	
2	RW	0	8	Clockef acts Auministration	SWittesterfinst Pack/Rit	Pack/Radio/Vhait, when Sicklamp Switch Operated, otherwise DMD	
0	PR	0		Front Footwell	Front Footwell + KGN Key Burnington	West, any time when coursely lights on, otherwise GND	
+	do	-	22	Brake Switch		Viball, when Blake applied, otherwise GND	
6	œ	0		Glovelon Lang	9	Mail, when aldeleny switch operated, otherwise GND	May result in No. Plate taken if a fault occurs in the plove box leave circuit.
9	WK	0	13	Radio (HEVAC Audiery.	IC Audieny.	VitalL, when sustany supply is on (spritten 1).	
7	a.	0	-	Clock / Radio	Clock / Radio / Ind. Pack battery lead	Permanent battery feed.	
60	×	=		Unition 2 Switch	5	GND when ignition 2 selected, Visits, otherwise.	
o	3	0		MEVAC Signal	SwitchPASAN Sus. Switcher	Rober Feed SwitchTASNA Size. Switches & Vitali. when lightles selected otherwise GHD MEVAC Signal.	
10	š	0	2	Key brills I		Vibit when lighton 1 and terminishes in roof in Part. 87MY consects - Transmission is not in part, repartition of lighton switch.	Solemaki energines il quiput is Vbat.
				TABLE 3		Subs	
				Automatic Veh	Automatic Vehicle Craise Available	KDM der, Deutste Einable Siellich uns, Transfer Box in High Pin 1 output = 12v Medis, Gaay = 20.24	Per toubut = 12v



BeCM System Information Document – Edition 2 Page FEMALE PLUG (GREY) States Comments

ourse	Cibr C32	12	MAYAM	Connector C323 12 WAY AMP 9/9 LEMALE PLUG Che L		
Alfr	Carity Mine col.		U.O. Fame No.	Eunsthen	Station	Comments
-	W	0	0	Rear Vers Minor Dip - Ignition	West when lightlen 211.	
2	PG	0	8	Right Front Door Outstation	Permanent Battery Food	Induding ICE ampiller
17	88	0		Left Trainer Tail Lemp	Visit when Lamp On, otherwise GND	
+	a	0	15	Rear Right to Amp	Fernanent Bathery Feed	
10	SO	0		Rear Right Wandow Down	Vibelt when Motor being Driven, Otherwise GND	
8	RP	0		Roar Right Publie / Marker Lamps	Vbalt when Lemps On, otherwise GND	
1	80	0	=	Fuel Filter Flap Unitods	Federy Controlled Land Vosal for face when bullon presides.	
100	YR	0		Hear Right Anti Trap Feed	Control Feed West	
0	WR	0		Sun Roof Ant Trap Feed	Control Feed Viballi	
9	83	0	2	Rear Right Window Up	Vibat when Metor baing Driven, Otherwise GND	Control of the Contro
=	N.	0		Rear Right Door Switch Montralion	Sidelann Costrolled Burneaton Varietie pulsa wellh Mater will display Uni On to Vosif when Sidelangs selected.	Matter will draptay 12%
12	Bd	0	32	Right Royt Door Outstation (Window)	Permanent Bulliary Feed	

semally corrected in BeCM to glave box lamp

Went wen sidelights selected offerwise GND

Vbatt - Permanent feed for outputs

Vbaff, when diving notes.

Front • Right Courtesy Lamps, Talgate CDL, Alarm 66 • Landsgace Lang Sugdy flear Right Door Uniock

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Aght Trafer Directional Indicate At Train Discional Indicator

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G. 3 GR

15 13 Lumber Plate Lamps

Typically Sooms dunston.



Operated either manually or if any door or balgate operand. Lamps will tade out after 15 sec. if all doors segligite are closed. This output is diven by the brake switch. 0.5 second delay for auto transmission vehicles 0.5 second delay for auto transmission vehicles Pulsed square with between Ov - 12v when RH turn. Also true when the Hazard switch is selected signal to schoolsed. Butterly fend when gritism is one. This pulped in dilven by the trains switch Also activates Trailer Tall temps if their taster Fog temps also activates if litted. Typically 800ms duminon. Typicsely doorne duration. spically 800ms durston. BeCM System Information Document - Edition 2 Mast, when skielights / mainbeam selected otherw GND GND to Municiple the familia. Pulse from De to Vitali when L.H.D.I selected othern GND. False from De to Vitali when R.H.D.I selected othern GND. Vbatt, when Rear Fog lamps selected thatt, when fear Fog temps selected visall when reserve selected. Vibali, when revense selected Vitall, when driving motor. Vited, when driving motor. Vhall, when Brake applied Vostt, when Brake applied Vball, when drying motor. war right + Front Courtery Lamp + Loadspace Rear Right Fog Lamp and Trains Fog Lamp Night Tail Langs + Right Trailer Tail Lamp Connector G326 18 WAY AMP 370 FEMALE PLUG (GREY) RH Stop Lamp . Trader Stop Lamp ear Right Directional Indicator High Mounted Stop Lamp war Right Door Superfect Agelad Amplifer auxiliary Rear Right Door Lock Right Revenue Lamp Reprilati Fog Lamp tear Vilper Wire cod, 1/10 Fute No. Eunction 2 z ÷ 4

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Tanasisin Tanas Waper Paris Countersy Lamb M Taligata Open Siv Surroof And Trap Rear Right And Tr Rear Right Ventor Tr	Teast Whee Park Coordeny Lamp N Telgate Open Sin Suncet Ares Trap Rear Right Ares Right Frant Coor Rear Right Ares Trap Rear Right Ares Trap Rear Right Ares Trap	Status	Rear Wper is Parked, Input is GND Otherwise		Algorit is GND when Talgain is Open. May Keep BeCM awate (see Table 1)	1 Pulse Signal when Moor operated. Gv to 12v Pulses	Rep 1 Pulse Signal when Moor operated. Gv to 12v Pulses	When IP detected, aports, 10v., otherwise Approximately 2 votes	rap 1 Place Signal when Motor operated. Ov to 12v Pulses	IN DOWN SWILLS OND When switch is operated, Otherwise Vost.	Serial Link Clock Signal Logic : 0 = V(Low) = OND , 1 = V(Hgh) = Vhoth Meter will depity average value	Right Frent Door Sariel Link Direction Signal Logic : O when harsantiting, I when recenting Market will distainy average value	gout Ingut to GND when Surricel Closest, otherwise V. bettery.	Vollage dependent on position of Mirra Polanticontera. Ov. 5r		Pube Signal when 1 signal by 90").			th UP Saftch GND when switch is operated, Otherwise Vbart.		The second secon
4		LLO Fune No. Function	Heat Wiper Park	Courtery Lamp Man Switch	Taigate Open Switch	Suntool Anti Trap 1	Rear Right And Trep	Radio Remote Input	Front Right And Trap.	Reer Right Window Down Switch	Right Front Door Serial Link Clock	Right Front Door St	Survoor Closed Input	Right Front Door Avelog Output	Resu Right Door Open Switch	Surrood Ant Ting 2	Rear Right And Tree 2	Fepral Right Anti Tray 2	Rear Right Windon UP Switch	Constitution	



CDt. Main sites activated when Moter will display 12x. Pulso from 0v to Vhait when LHDJ selected offerwise GND. Vhait when Superfock tritished. GND when Courtesy Larry is activated, otherwise Vibett Variable pube with tem by to Variable Science/AD with an expected, Otherwise GAID Wat when times applied. Otherwise GAID shall when Motor being Driven, Otherwise GND ubalt when Motor being Driven, Otherwise SMD And after 0.5 seconds when Reverse belacked Vool whee Lamps On, Otherwise GND Viball when latch molor being driven. Vibalt whee bich motor being driven. West When Sidelight Selected Visit when ignition 1 selectors UH Rear C LampfUH Space Lamp & Sub-Battery Supply to these areas. Mooter Leit Dec Outsidor (Wholes) Permanent Vbatt Sathry Supply for Trader. emanent Voets Connector C361 18 WAY AMP 979 FEMALE PLUG (WHITE) Savity Wiresol. 14.0 [Faetho.] Executor hear Lot Door Switch Burnington lear Left Publie / Marker Lamps. nord Left Door Outstation Sear Left Courtsay Lamp Rear Left Door Superfack Seer Left Window Down Sear Lat Door Undook Trader Reverse Lamp lear Left Window Up Trailer Budnery Supply bear Lot her signal Rear Let Door Lock Telephons Aurillary Left Stop Lamp Left Tail Lamp 3 Ħ 3 = 22 z 22 0 00 0 00 0 0 0 0 0 0 0 0 0 0 8 8 8 8 8 288 š S de 80 × 0 문 GR 18 15 13 19 9 12 =



May Keep BeCM awake (see Takes 1) May Keep BeCM awake (see Table 1) Pulse Signal when Motor operated. (Pulse lags Anti Trap 1 (or - 124 Pulses agreed by 02.). Pulse Signal when Motor operated. (Pulse lags Anti Trap 1 (or - 124 Pulses agreed by 02.). Typical 6v Typically Ov Comments Typically 6v Voltage dependent on position of Minor Potensionwhers Ov Supplicate: 0 = V(Low) = G4D, 1 = V(Hegh) =Vball Signal Logic: 0 when transmitting, 1 when receiving. Pulse Train when Ultrasonic Detects movement. GND when switch is operated, Otherwise Vbatz. GAD whee switch is operated, Otherwise Vitals. Cortrol Feet: Vtatt when Ultrasents activated Cortrol Feet: Vtatt. Pube Signal when Mohr operated, (v - 17v Pube Signal when Motor operated Gv - 12v. Appet is GND when Door Open Trans. 1= Vhatt.6=GND Vote shreys Connector 624 4 WAY POWER CONNECTOR (SUMITOMO) (CLEAR.) Centr With sol. | 1/10 | Sum lie. | Sumsten Connector C362 16 WAY AMP 040 FEMALE PLUG (BLACK) Centre ffire see. [LIQ [Just Bo.] Lynciben Front Left Door Senal Link Direction Front Left Door Senal Line Clock Rear Left Window Down Switch Front Link Door Sental Link Data Roar Left VAndow Up Switch Rear Left Door Open Switch Security Utrasonic heed Sear Left Ann Trap Feed Transfer Box Battery Feed Security - Ultrasono Input nord Left Analog Output Front Left Avt Trap 1 Rear Left Arts Trap 2 Rear Left Anti Trap 1 need Latt And hop 2 0 0 0 0 0 0 YR 9 8 Μd × 90 0 8 ※ ※ 3 BG œ 13 7 15 18 2 12



If fase 11 is inserted, vehicle is in it, we reade, transfer box will remain in neutral. Solenoid is everybed when spritten is on and goer wide. In red in park, Meter will druplay 12v. Wast feed to Cigar Lighter when IGH 1 seedled (Ausflary Pernanent battery ked to the centre conscie meth pack Vhat keel to H-Gate when gration is on Vhat keel to Auto Geaffor ECU when gration on Flace 11 is put in, GND Vlast. See to Transfer Box ECU when gridlen on Permanent battery lead to Auto Geanor ECU Visit, when energised Centre Console Burnington : Switches, Gent Indeed, cigal Baller. Hear Footneil Larrye Connector C625 12 WAY AMP 070 FEMALE PLUG (WHITE) Carty Misses | 1/0 | fure No. | Function Centre Console switch pack ballery lead Auto Gearbox ECU - ignition feed Transfer Box Northal Tow Unix Transler Box ECU - loniton feed Auto Gearbox ECU settery leed Front Cigar Lighter - ALIX Shift trientock Solemoid H-Cate - Ignition feet 2 00 0 0 0 0 0 0 0 0 **≩** ≥ 2 Md 18 PR à 3 ≥ 0 2 9 24 60 0 40 00 ø 4



Centre Coursel Serial List Directors States (Centre Coursels Serial List Directors (Centre Coursels Serial List Centre Coursels Serial List Centre (Centre Centre Cent		Cerments	seaf Table 4	Mrg. MES Status Inputs	mine MES 1 MES 2 MODE	v 1 1 Auto	1 0 Sport	0 1 Menual	1.2v S 0 Gearbox Fault	The state of the s	1 - switch S/C to GND 6v 8 - switch O/C Vbat.		v Table 5	Oser Status hyul	han	x 4.5	0006	0 + - 8	N 0 1 0	0011		1 0 1	Z 0 0 0 Fault Condition	The same of the sa
1 5 5		Malen	Pube Train (Meter will display average value) 7 value fiv	Sgrad Logic : 0 when transmitting, 1 when was Typically 0.	If High Hauge Selected Iven voltage = 4 1.fls. Other 12v	If Neutral Saincled Then voltage = < 1.5v. Observine 12	See Table 4	Inguitia GAD when Transfer Box in over temperature.	FLow Range Selected than voltage x < 1.5s. Otherwise	See Table 5	See Table 5	Not Used	Pulse Train (VLos = <15v, V-figh => 6v) Typically 6	Pulse Train. Typically Sv	Signal Legic : 0 = Villani = GND , 1 = Villagii = V Typically 6v	Towns 1= Viban, 0= GND Typically dv		See Titols 4	mout in GND when Handbrake applied	Auto - See Table 3. Manual - Hautral when GND	rigut is GND when Seaffelt lacthed	SND when selected.		
	THE PARTY AND A PARTY IN	Panstien	Gearhox ECU ISOBI41 I, Pin	Centre Console Serial Link Direction			Status 2 from greatford	Transfer Box Over Tamp	Trensfer Box - L	Gear Status X. From generace switches.	Gear Status Y. From gearbox switches.	Cear Setus St	Engine Speed to Auto Gearbox	Geerbox ECU 9141 K Pan	Centre Console Sertal Link Clock	Carrier Console Serial Link Data		Sport status 1.	Pendhrake Suffich	rom gesifica switches.	Seal Bet Switch	Chilch Switch / Neutral Park to Transfer Box. Desai EMS		
	л		63	90	ķ	WW	YR	GB GB	NR	85	dh	NO	so			16		YG	æ	ne	WB	S S		
	2011111	ZEVIE		2	9	4	5	9	1	0	on	10	11	12	13	14	15	16	17	18	19	20		

	KIID
	Ne Commit
Y AMP 940 FEMALE PLUG (BLUE)	une No. Expettee Stat
Connector C907 8 WAY	Cavify Wire cel. 11.0 Eu

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_	The state of the s		No official and an expension ordered the same for
c	Ski Saut Saria Link Clock	Signal Logic 8 - Villow) - GND . 1 - Villight - Viber	The second second second second second
,		Stand Logic : 0 when transmilling. I when receiving	Meter will display average value Typically by
0	CH DEBIT SATA LIFE DIFFERENT		Marker and charles assessment volten Typicashy for
c	LH Saust Serial Link Data	Trans to Wat, to GND	
-	LH Seat Serial Link Analog Signal	Feedback Voltage increases when Front Cushber goes Down, Rolan cushban goes down. Backeral goes up or Headhel goes up. Or to	
		Section in the section of the sectio	Meter will cincialy average value Typically 6v.
c	TH Seat Sarial Link Direction		Total Sandy Ber
0	RH Saet Serial Link Data	Trans. 1= Visit, 0 = GMD	the state of the same of the same of the same
>		Charles on the best and a Wast 1 a Whighla & GND	Meter will display average value 1 process on
0	LH Beat Settal Livit Clock	office control of the	
-	3H Seet Sertel Link Araking Signal	Feedback Vollage increases when Profit Custions goes upons, own Custvon goes down, Backrent goes op at Needback goes up. Dv to	

is Vhalt when RH Seat Haster selected. Otherwise GND is Vhalt when LH Seat Haster selected. Otherwise GND is Vhalt if Vehicle does not have Morrory Seats. Otherwise Feed to LH Seat Lumber Feed to LH Seat Lumber Feed to LH Seat (Flue Rated 30A.) Feed to LH Seat (Flue Rated 30A.) If we'd to RH Seat (Flue Rated 30A.) Feed to RH Seat (Flue Rated 30A.) Feed to RH Seat (Flue Rated 30A.)	Sonn	mector C912 12	2 12		WAY AMP 040 FEMALE PLUG (GREEN)		Comments
NU. 0 2 RH Seat Name Output is Vibalt when UN Seat Name selected. Otherwise OND NNR 0 2 LH Seat Name Output is Vibalt when UN Seat Name selected. Otherwise OND BW 0 Seat Stated OND Output is Vibalt when UN Seat Name selected. Otherwise OND WAG 0 LH Seat Stated OND Output is Vibalt when UN Seat Name selected. Otherwise OND WAG 0 LH Seat Stated OND Output is Vibalt when UN Seat Name selected. Otherwise OND WAG 0 LH Seat Stated OND Battery Feed to LH Seat Name selected. Otherwise OND WAG 0 20 LH Seat Stated OND Battery Feed to LH Seat Name Stated OND WAG 0 20 LH Seat Statery 2 Battery Feed to LH Seat Name Stated OND WA 0 20 LH Seat Statery 3 Battery Feed to LH Seat Name State 30A) WA 0 20 LH Seat Statery 3 Battery Feed to LH Seat Name States 30A) WA 0 20 HH Seat States States 3 Battery Feed to RH State (Flase Rated 30A) WA 0 10 RH Seat States 3 Battery Feed to RH Sta	Aller	Wire cof.	0/1	100	Function	Status	
NIJ. O. 2 RH Seat Heater Output is Vhalt when RH Seat Heater and offer Chromite GND NR. O. 2 Ut Seat Heater Output is Vhalt when Ut Seat Heater and offer Chromite GND BV O. LM Seat Signed GND Output is Vhalt when Ut Seat Heater and offer Chromite GND WA.G. O. LM Seat Signed GND GND WW O. 20 LM Seat Signed GND Battery Feet to LM Seat Lumber GND WA.D. O. 20 LM Seat Battery 2 Battery Feet to LM Seat Lumber Battery Feet to LM Seat Lumber W.D. O. 20 LM Seat Battery 2 Battery Feet to LM Seat Lumber W.D. O. 20 LM Seat Battery 2 Battery Feet to LM Seat (Fuse Rated 30A.) W.D. O. 20 LM Seat Battery 3 Battery Feet to LM Seat (Fuse Rated 30A.) W.D. O. 20 LM Seat Battery 3 Battery Feet to LM Seat (Fuse Rated 30A.) W.D. O. 20 LM Seat Battery 3 Battery Feet to LM Seat (Fuse Rated 30A.) W.D. O. 20 RM Seat Battery 3			1	•		The state of the s	State
NR 0 2 Un Seet Haster Output is Vibalt when Un Seet Heater and Child William BY 0 Seat Enable 2 GND BW 0 Un Seet Signet Onto GND WLG 0 10 RM Seet Lumber GND WM 0 20 LM Seet Ballery 2 Buttery Feet to Ut Seat Lumber WP 0 20 LM Seat Ballery 2 Buttery Feet to Ut Seat Lumber WP 0 20 LM Seat Ballery 2 Buttery Feet to Ut Seat Rated 30A.) W 0 20 LM Seat Ballery 3 Buttery Feet to Ut Seat Rated 30A.) W 0 20 LM Seat Ballery 3 Buttery Feet to Ut Seat Rated 30A.) W 0 20 LM Seat Ballery 3 Buttery Feet to Ut Seat Rated 30A.) W 0 20 LM Seat Ballery 3 Buttery Feet to White does not have Mancey Seats. Otherwise BO 0 RM Seat Enable 1 GND GND GND WO 0 RM Seat Enable 3 GND GND GND Bu	1	2	0	2	NH Seal Health	Output is Vosit when RM Seat Heater selected. Otherwise GND	the is strespective of Institute compare processing
BY O Seat Evable 2 O Seat Evable 2 O Seat Septem GNUD O O O O O O O O O	-	1	1	1	111 Coat Heart	Output is vhatt when Url Seat Heater aniected. Otherwise GND	This is interpocher of Thermal Switch (Occate
BY O Seat Evable 2 O Seat Evable 2 O Seat Evable 2 O O O O O O O O O	17	ž	-			The state of the s	
BW O LH Seat Signet OND O UN Seat Signet OND O 20 LH Seat Lumber O 20 LH Seat Battery 2 W O 20 LH Seat Battery 2 W O 20 LH Seat Battery 2 O 20 LH Seat Battery 3 O 20 LH Seat Battery 3 O 10 RH Seat Battery 1 O 10 RH Seat Battery 2 O O O O O O O O O	0	BY	0		Seal Enable 2	Output is Vibart if Vehicle does not raise aversory seem Children GND	
W.L. G	1	200	19	1	LH Seet Stored GND	CAD alvaira	
WU O 20 CH Seat Lambor WD O 20 CH Seat Lambor WD O 20 LH Seat Battery 2 WD O 20 LH Seat Battery 1 Seat Evalue 1 Seat Evalue 1 Seat Evalue 1 WD O 10 RH Seat Seatery 1 WD O 10 RH Seat Seatery 1 WR O 10 RH Seat Seatery 1		Ma .	1	1	Die Sant Lumber	Battery Veed to RM Seat Lumber	
WU O 20. (M.Seet Lamber) WP O 20. (M.Seet Battery 2 W O 20. (M.Seet Battery 1 BY O 35 said Enable 1 BO O RH Seet Battery 1 WO O 10. RH Seet Battery 1 WR O 10. RH Seet Battery 1 WR O 10. RH Seet Battery 2	0	Wes	0			Commer Conditor 14 Spart Landan	
WP O 20 LH Seat Battery 2 W O 20 LH Seat Battery 1 BY O 3ceat Enable 1 BO O RH Seat Battery 1 WO 10 RH Seat Battery 1 WR 0 10 RH Seat Battery 1 WR 0 10 RH Seat Battery 1	a	100	0	L	CH Seat Lumber	Departy Feed to Life or Lands	
WV O 70 LM Seat Battery 1 BY O 3cut Evalue 1 BO O RM Seat Evalue 1 WO O 10 RM Seat Battery 1 WR O 10 RM Seat Battery 2	0	2	1	1	i M Saul Ballery 2	Battery Feed to LH Sear (Fuse Rated 30A.)	
W 0 20 UH Seet Ballery 1 BY 0 Seet Enable 1 BO 0 RH Seet agree CHD WO 0 10 RH Seet Bellery 1 WR 0 10 RH Seet Bellery 2	-	M)		To come come in the come in th	St. St. Cond. Little Cond. France Galleri 1994 1	
BY O Seat Enable 1 BO O RH Seat signed CHID WO O 16 RH Seat Selliny 1 WR O 16 RH Seat Selliny 1	=	3	0		LH Seat Ballery 1	Daniely retain to the control of the	
BO 0 RH Seat Sprei GHD WO 0 16 RH Seat Sellary 1 WR 0 16 RH Seat Sellary 2	0	ВУ	0		Seat Enable 1	Output is Youth it Vehicle does not have Memory Death. Common GND	
WO 0 16 RH Seet Bellay 1 WR 0 16 RH Seet Bellay 2	4	+	1		RH Sout signel GND	GND shuses	
WR O 16 RH Soat Bellery 2	2	+	1	1	State State Sellier		
WR O 16 RH Sout Bellary 2	=	OM .	2		PATE OFFICE COMPANY	Darte Count to Did Sand (Frame Rolled 20A.)	
	43	H	0		RH Seat Ballery 2	Detail room to the control of the co	

Note: The harmess connector views can be found in the ETM - section 28.

UNLESS STATED OTHERWISE, THE INPUT AND OUTPUT CAN BE MEASURED WITH A VOLTMETER.

When messuring the pulse train outputs, the meter may not display the full voltage, but the average voltage.



Instrument Pack

Connector C242 20		WAY AMP	WAY AMP 040 FEMALE PLUG (BLACK)		-
Wire co	0	Funt. No.	Function	Signa	Committee
SE	- 1		Tre computer switch	Switch grounded to zero vote when switch pressed, 5V observice.	
BG	-		Serial Link - clock	Sautem wave signal. Typically 6V average.	Average when soon on meter when this active.
90	+		Seral Link - direction	Square wave signal. Typically 6V everage.	Average wake seen on meter when link active.
4	=	-	Bottory supply	Vest	
2	>0		Serai Lini - data	Square ware signal. Typically 6V average.	Average value seen on meter whom link address
RW	-		Dimmer (Controls Aumention levels of pack when lighting to on)	Square wave agont godes width modulated. Average value will vary depending on Burnington levelly.	
8	0		Power GND	CHC) 0 volts	
BG	0		Serial Link GND	CHIO 0 volts	
>	-		Speedometer signal	Square wave signal 0-12 velts	
BK	-		Sounder (Driven from BoCM)	Pulses between 0 - 7 volts otherwise ground	
ds	-		Overspeed warming switch	Switch grounded to zero volts when switch pressed, 5V otherwise.	
Ca	-		Serial Link - cleat (thtp)	Square wave signal. Typically 6V evenings.	Average value seen on meter when link active.
8	-		Serial Link - direction (out))	Square wave signal. Typically 6V everage.	Average value seem on mater when link active.
0	+	-	Baltery supply	Vbatt	
2	>0		Serial Link - data (dup)	Square wave signal. Typically 6V somings.	Average value seen on meter when init 40% of
st.	-		Tackeneter aignal	Square wave signal 0 - 12 volts	
0	0		Power GAID	GVD 0 volts	
BG	0		Serial Link - signal GMD	GWD 0 Volts	GND at all times
130	-		Five poline signal	Square wave pulsed signal.	
0	0		External LCD deserver (supplies control of Burnington to HEVAC destiny parent	Square wave agnet	

NOTE: Square wave signess cannot be measured directly with a voltmeter. The voltmeter will give an everage value that may fluctuate depending on the meter used. This signifies the fact that there is not a short circuit to ground or V batt. In this case the part of the serial link tested is probably working but there is still the possibility of a fault.



	COLVE	-	AL OWN	WAT ONLY MADE AND THE PARTY AND THE	The state of the s	Comments
Aga	Wire col.	0/1	O Fame No.	Fanction	SIN IN	the state and the town of the said
1	d	-	-	Battery succely	V batt, permanent ballery feed	Margar, versions and source
					The state of some business or United	Nati active when BeCM goes to sleep.
2	97	2		Serial ink - deta	all other three = GHD. (square white)	
	000	1		Sertal init - drection	Typically 6 volts, during transmitting * GND.	Nati schve when Bech goes to serp.
2	3	•			when receiving a Visit, (Natural wave)	Not action when BeCM goes to sleep.
	0	-		Serbel tok - cDOK	Square wave, typically (IV.	
•	2	-			The same and the same division division when	12 vots is displayed on the voterages
2	æ	-		Numeration	social prose sector reconstruction of social social sectors and sectors are sectors and sectors are sectors and sectors and sectors are sectors and sectors are sectors and sectors are sectors and se	
1	1	1	1	CAND	CAND 9 votes	
0	0	>				
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Contractor C555 16 WAY AMP UTO FEMALE, FLAVO DEACHY Certific White ce. LLO East No Temple, Flavor Charles States		Door Curse	100	divons	COLUMN TO SELECT ACCOUNTS ACCO		
Fase No. Function Anti-ray GND Puckfile / Marker Lamp Feed Anti-ray Banda	Conne	ctor G75	S 16 V	V	NO LEMBLE LEGGISTON	1	Communita
PR O Available OND Tavalis while countrary lamps are on, otherwise feating vallage. Pavolis / Marker Lamp Feet Value permanent battery land Value battery Value battery land Value battery Value battery land Value battery	Cavity	Wire so.	071	Fune No.	Lunction		Anadoles the arrand for the Half Effect Senters in the
PR 0 Puodita / Mariner Lamp Feed Value Value PD 0 Avalitang Feed Vinat permanent battery land PU 0 22 Prower Feed (VAncow, Locking) Vinat permanent battery land B 0 Prower GND Vinat permanent battery land SG 0 Prower GND Vinat permanent battery land B 0 Prower Antip Feed Vinat permanent battery bed B 0 Brand Lank Antip Feed Vinat permanent battery bed B 0 Brand Lank Antip Feed Vinat permanent battery batter B 0 Brand Lank Antip Feed Vinat permanent battery batter B 0 Brand Lank Antip Feed Vinat	-	80	0		And-trap GND	CARD 6 volts	window maker for one-louch operation and authority
PN CO Avakeg Pool of Promer DND Pool o	1	2	1		Proble / Marker I amp Feed	12wills while courtesy lange are on, otherwise feating vollage.	
PO O Availability Fload V hast permanent before; level PU O 22 Power Fload (VAndow, Locking) V hast permanent before; level B O Chower GND CARD 8 vote; B O Power GND CARD 9 vote; B O Power GND CARD 9 vote; B O Power Angle 1 same Ground V batt permanent latter; bed P O Power Angle 1 same Ground V batt permanent latter; bed P O Decide 1 same Ground V batt permanent latter; bed P O Decide 1 same Ground V batt permanent latter; bed P O Decide 1 same Ground V batt permanent latter; bed R I Sental Latter; date; Power Angle 1 same Ground D G Sental Latter; Power Angle 1 same Ground D Sental Latter;	2	¥	0			Navies uction desertant upon sest position, 0-fecits	
YR O Anti-rap Feed Vikedow, Locking) V batt permanent battery feed PU O 22 Power Feed (Vikedow, Locking) V batt permanent battery feed BO O 22 Power OND OWN GARD (AND 4 votes) GARD 8 votes BO O 9 Power OND OND (AND 6 votes) PB O 9 Power Anti-Feed Visedow Onno OND 6 votes BO O 9 Power Anti-Feed V batt permanent lattery feed OND 4 votes of votes PD O 9 Power Anti-Feed V batt permanent lattery feed OND 6 votes BO O 9 Power Anti-Feed V batt permanent lattery feed OND 4 votes of votes LG I/O 5 Sental Link - door V batt permanent lattery feed OND 4 votes of votes R I Sental Link - door V batt permanent lattery feed OND 4 votes of votes CO II Sental Link - door V batt permanent lattery feed OND 4 votes of votes R I Sental Link - door V batt permanent lattery feed OND 4 votes of votes I Sental Link - door V batt permanent lattery feed OND 4 votes of votes I Sental Link - door V battle votes of votes SW O V Wethor votes of votes	3	P0	0		Avaeg		Provides parker for the Hall Effect Services in the
PU 0 22 Power Feed (VAndow, Locking) V best permanent before feed B 0 Power DND Takin 8 votes SG 0 Whedew Down Sign Down Takin selected when window 'som' is selected. GND when selected or them window 'som' is selected. GND when selected or them window 'som' is selected. GND when selected or them window 'som' is selected. GND when selected or them window 'som' is selected. GND when the selected or the selected or the selected. GND when the selected or the	4	YR	0		Anti-trap Foed	V hat permanen sexury mon	window motion for one-bouch operation and authority.
PU_O_O_Z_2 Power Feed (Mindow, Locking) V best permanent latterny feed 8_O_O_Newer DND ONIO 8 votes ONIO 8 votes 8_O_O_S_Power DND Tavola outgool when window short is selected, GND when valence and operating or when window to it is selected. 8_O_O_S_Power DND Tavola outgool when window short is selected. PB_O_O_S_Power DND Tavola outgool when window short is selected. PB_O_O_S_Power DND V batt permanent latterny best PB_O_O_S_Power	1	1	P				To have need unwhere considers.
PU O A Charles (MD)	2		1	1	Grant Famil Mileston Locking)	V bett permanent beforer feed	Provides power for sick and remain
B O Newer David SG O Newer David B O Power DAVD Clouds Child output when whicher both is selected. GND when selected countries and countries and countries and countries of its selected. Child of Serial Left Artip Feed Child output when whether Utbut Child output when whether Utbut Child output child output Child output when whether Utbut Child output Child output when whether Utbut Child output Child output when whether Utbut Child output	9	2	0	-	Charles in the American Committee of the	CAD beds	
SG O Wendow Down selected when selected and countries are selected. B O Power DAD (Wild of Water Peets) Pudday Marker Lang Ground (ND 6 valls) P O B Prover Antip Feet (ND 6 valls) P O B Prover Antip Feet (ND 6 valls) P O B Serial Livit - date (ND 6 va	-	8	0		Power UND	The state of the s	
B O Power GND GND 6 volta PB O 9 Power Feet Octure B O 9 Power Feet Octure C D D Power Artip Feet Ontaria DND 6 volta D D D D D D D D D D D D D D D D D D D	100	SG	0		Window Down	12-yell output when window down is selected, onto when window not operating or when window by it selected.	
B O 9 Power Tests V butt permanent lattery bed	्	ľ	1	1	B Okto	GND 6 volts	
PB O 9 Prover Feet Charle Lang Ground Chick and Chick Charles Charles Chick Ch	6	8	0		China descri	Commissional Indiano based	Provides power for door locks and witterns.
B O Pullate I lang Ground Onto 8 votes P O B Isa Power Anny Feed Valet permanent settery feed LG I/O Serval Link - data Typical energy value is 8 votes R I Serval Link - dools Typical energy value is 8 votes OG I Serval Link - dools Typical energy value is 8 votes National October I Typical energy value is 6 votes Ty	9	Bd	0	6	Power Feed	V Date permanent menery wood	
P C B ba Power Anty Feed V ball pormanent sellery bed C B canal Link - data T Pypical energy value is 6 volta T T T T T T T T T T T T T T T T T T T	1	-	C		Puddle / Marker Lang Ground	ONO 6 vots	and the second s
R 1 Sertal Link - data R 1 Sertal Link - data OG 1 Sertal Link - decide SW 0 Wheles Up	-	9	10	0	Isa Power Amp Feed	V batt permanent battery feed	Provides power for south appears to some
R I Sertal this - docts OG I Sertal this - docts SW O Wheleve Up	*	1	1	1	Seemel Leek - dates	Typical average value is 6 volts	
SW O Whelese Up	2	3	3	1	Total State of the	Public average value is 0 volts	
SW O Vehicle Up	*	*	-			Towns in section visite in 6 volts	
SW O Whitewill	15	90	_		Sertal Link - direction	Spirit Call Man Call	
	16	SW	0		Vikidos Up	Tayof output when window up to seeking. Only many and not operating or when whither them? It sufficied.	



۵			-			Comments
Cavity	Wire col.	071	11.0 Euse No. Cuncton	Eunstlen	Status	Sometiment
	*	0		Minor laif.	(12 volt output when minor left is selected, GND when minor not operating or when minor vight is selected.	
+-	×	0		Wilson light	12 operating or when mirror hight is selected, GND when mirror not operating or when mirror left is selected.	
+-	0	0		Mirror heather	12 voll output when engine is numery or minor to operated.	
-						
-	BR	0		Minus potentismeter OND	GMD 0 volts	
-	0	-		Minor wertical position		
1	60	0		Mirror ap	12 opt output when menor up' is selected, GHD when minor not operating or when releast down'ts selected.	
-	2	0		Merce down	12-red output when mirror down is selected, GND when mirror not operating or when mirror 'sg' is selected.	
-						
-	×	0		Maror potentionwater power feed	Such head for the mirror polantitometer.	
-	d	-		Mirror hastrontal position	Varying vollage, depending upon minut pusition.	
2	a	0		Senator OAD	GND byoths	



	Mire 504. LL	L/O fuse No. Function	Function	Station	Comments
1 08		-	Dior Lock	12 voll output when body is operated, OND when body not operating or when unlock is operated.	
2 KB	3		Door Linkock	12volt output when tunlocit is operated, GND when kick not operating or when kick is operated,	
9	-				
4	1			Control of the Contro	
S	~		CDL Switch	Suplic when polich is open, GND when operated.	
e G	-		Key Switch	Svolla when switch is open, GND when operated.	Only thed to driver's side door.
7 PM	-		Door Open Swith	Svots when switch is open, GND when closed.	
% OK	,	0	Door Superfacts	12-rolls when latch is driven into superfock, offerwise footing violege.	
6					
10	-				
8	0	0	Door Lack Switch GND	GND 6 votes	Ground for all awaithes in door ason
12					
13	-				
4	-				
15	-				
16					
11					
18					
6					
20	-				



	Cavity Mire 60%	101	0 64	an No.	Carty Mrs ool. 1/Q Fune No. Familie	Sister	Comments
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O Memory switch GMD GHD 5 voits 1 Memory store switch 5 voits when switch open, GMD when switch is selected.	ľ	0	-		Memory switch 2	Seetta when switch open. GMD when switch is selected.	
O Memory switch GND GND Switch when switch open, GND when switch is selected.		H	H			4100	
Memory store switch 5vots when awitch open, GMD when switch is selected.			0		Memory switch GND	DND I WOR	
	_	~	-		Memory store switch	Svotts when switch open, GMD when switch is selected.	madely to store memory positions to seen.
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No custion operation without this ground Communica Floating vollage when switch is open, GMD when switch is selected. Switch when switch open, GMD when switch is selected. Floating voltage when switch is open, GHD when switch is emitted. logita when switch open, GND when switch is selected. Suchs when switch open, GND when switch is selected. Svolta when switch open, GND when switch is selected. Svolts when switch open, GND when switch is selected. lyadia when switch open, GND when switch is selected. vicits when switch open, GND when switch is selected. Souls when perich open, GND when exists is selected. Svolts when switch apen, OND when switch is selected byods when switch open, GND when switch is selected Connector C999 (RHy/C999)LHtt 18 WAY AMP 979 FEMALE PLUG (SLATE) Cevity With Col. | LLQ | Expense | Example | Example | CND 6 vots SND 6 volts GMD 8 volts front cushion tower switch front cushion take switch lear cushion lower switch unitial purity down switch Rear Cushion raise switch thinker pury up switch eachest down switch Sackrest fower switch Backrest switch GND lactored rate switch Cushion switch GND Lumbar switch GND Seat forward sellch teachest up switch Sent back switch Spare pin Spare pm 0 o a BVPW BYAUS V/GY OWS PW/B GY/Y 8/8 z Z 9/8 UPAP MIN N/A PAUP × È œ 15 16 2 7 10 12 un ch



Comments	GND with switch	GHD with switch	Sen 0-Scotts	ion 0-Scale		CALD with twetch		GMD with switch				ton 0-5volts	rearthack	to raise Appear	on sitesfower		OND with switch	CND with awalch
Status	Tayofts when switch is delected, otherwise GND with switch speri.	12volls when switch is selected, observice GMD with switch open.	Varying vollage, depended upon seat position, 0-5softs	Varying voltage, dependent upon seat position, 0-5xells		Gersts when switch is selected, otherwise GAID with switch open.		12/olb whee switch is selected, otherwise GMD with switch open.	Permanent ground, 0 volts	Permanent ground, 8 volts	Permanent ground, 6 volts	Varying voltage, dependent upon sout position, 0-5volts	Could lead for the backrist and outston knownthest potentionerships.	(2xe) head for the backrast and food coshion missificate potentiameter.	12-vol lised for the backrest and near custion satisflower potentionwist.		12volls when switch is poleched, officients OND with switch open.	Challe when switch is selected, otherwise CND with awildth
	Front custion up	Front Cushion down	Front custion rase/fower potentionnater	Forwardback potentioneter		Rear cushion down		Sout toward motor	Forwardhack polenifornetiar GND	Frost cushan raise/lower potentiameter GND Permanent ground, 8 volts	Rear cushion rahe/lever petention noter GND Permanent ground, 0 volts	Rear custion rates from potentioneter	Forwardback potentionerin food	Front cushkin talseflower potentiamiter head	Roar cushion raise/bwer potentionaler ted		Pear cushen up	Seat back motor
1/Q Fine No. Function																		
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Cavity Why.co., LLQ Fune No. Eunction	-	2	3	4	9	9	7	80	6	90	=	2	13	7	45	16	17	:



Appendix A

Glossary **BeCM**

Body electrical Control Module. This unit controls, monitors and provides

power supply to many other vehicle's electrical systems.

Sleep Mode

When all timers time out and activation inputs are inactive for two minutes.

Current drain should be approx. 30mA.

Tacho pulse monitoring

Square wave pulses from the engine when it is running.

Key Inhibit solenoid

This solenoid is energised to prevent the gear lever being move out of the

park position.

Inertia switch

A switch that is used to switch off the engine fuelling and unlock the doors should the vehicle be involved in an impact.

Limp Home Mode

This is when the BeCM has an internal failure and default to safety critical

operations only.

Quiescent Drain

This is the current taken by the vehicle when all timers have timed out and

activation inputs are inactive.

Level switched

The BeCM will recognise this activation input as a high or a low value.

Edge triggered

The BeCM will only recognise this input as an activation input when the input

voltage is changing between high and low or visa versa.

Diagnostic 'K' & 'L' lines

These are communication lines used by the BeCM to 'talk' to Testbook.

Serial Link

This is a method of electron communication that enables the BeCM to 'talk' to

several other outstations using the same wires.

Data - This line carries the information between the BeCM and the outstation.

It is a bi-directional line and information can travel either way.

Clock - This signal is controlled by the BeCM to ensure that both microchips between the BeCM and outstation are synchronized with each other.

Direction - This signal is controlled by the BeCM to ensure both microchips, either in the BeCM or outstation, are not trying to communicate at the same time. This signal determines which component is sending data and which

component is receiving the data.

Odometer Logging

The BeCM and the instrument pack both store the mileage the vehicle has done. The instrument pack updates the BeCM with the latest mileage.



Appendix B

Battery Feed 1

Wire colour - NLG Supply fuse = Maxifuse 1 Feeds F1, F2, F3, F4 and FETs

Connector C171	Fuse
Components supply by this battery feed	1400
Left tail lamp	
Rear left puddle lamp	
Rear left direction indicator	F2
Left seal heater	F2
Right heater	1.5
Left sidelight	_
Front left direction indicator	
Left direction indicator repeater	_
Left doped beam	_
Front let fog lamp	_
Left main beam 1	
Left main beam 2	
Left trailer tail lamp	
Left trailer direction indicator	
Rear left fog lamp	_
Left reverse lamp	F2
Rear right window up	F2
Rear right window down	FI
Centre console battery	Fi
Clock/Radio/Instrument pack	F3
Auto gearbox ECU	
Transfer box ECU	F4



Battery Feed 2

Wire color - N Supply fuse = Maxifuse 4 Feeds F6, F7, F12, F13, F14, F15, F17 and FETs Connector C170

Components supply by this battery feed sar left door look sailer reverse lamp fit rear couriesy lamp, sub-woofer amp & left rear ice amp sar left window up sar left window up sar left window down sailer my left window l	Fuse
aller reverse lamp fit rear courtesy lamp, sub-woofer amp & left rear ice amp ser left window up ser left window down plier battery ght sidelight arm Klason ont right direction indicator ght side direction indicator repeater ght dipped beam ont right fog lamp ght dipped beam ont right fog lamp ght main beam 1 ght main beam 2 r bag ignition feed ser right puddle lamps ovebox lamps ovebox lamps ovebox lamps ovebox lamps ovebox lamps	F14
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umber plate lamps ovebox lamps ght tail lamp & trailer tail lamp	F7
ovebox lamps ght tail lamp & trailer tail lamp	
ght tail lamp & trailer tail lamp	1000
ear right direction indicator	
ear view mirror dip (IGN)	F6
ont & Right courtesy lamps, loadspace lamp, alarm RF & Tailgate CDL	F15
ear right ice amp	F15
ear right fog lamp	7
aller fog lamp	
ght reverse lamp	
un-visor illumination	F6
ear right door lock	F14
ear right door unlock	F14
ear wiper	F15
unroof back	F13
unroof forward	F13
ear screen heater	F12
uel flap release	F14
pare IGN	F6
hift interlock solenoid	F13
uto gearbox IGN	FB
ey inhibit solenoid	F13
reak switch feed	F17
EVAC IGN feed & Air suspension ECU	F17
ransfer box ECU IGN	F6



Battery Feed 3

Wire color - NK Supply fuse = Maxifuse 5 Feeds F8, F9, F10, F20, F22 and FETs

Connector C169 Components supply by this battery feed	Fuse
Front left & right battery 1 (window & locking)	F22
Front left & right battery 2 (inc. LH & RPI front ICE amp)	F9
Rear left door switch illumination	
Rear left door superlock	FB
Car phone Aux	F20
Left seat battery 1	F20
Left seat battery 2	F10
Right seat battery 1	F10
Right seat battery 2	F20
Left seat lumber	F10
Right seat lumbar	FIV
Front screen wash	F8
Aenal amplifier (Aux)	Fo
Rear right door superlock	
Rear right door flumination	
Audible warning (instrument pack)	_
Cruise Pump	
Spare (S1)	
Spare (53)	F 5P2
Spare (Y4)	The second secon
Front cigar lighter	F8
Radio	F8
HEVAC Fascia controls/ Inst. pack/ radio/ HEVAC/ Clock	P8

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