

TECHNICAL INFORMATION



KV6 Variable Intake Manifold System (VIS) Motor Diagnostic Aid

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AFFECTED VEHICLE RANGE:

Freelander (LN)

All

SITUATION:

VIS MOTOR DTC, MANIFOLD RATTLE NOISE AND ENGINE PERFORMANCE DIAGNOSIS

This 'information only' bulletin has been issued to aid diagnosis and resolution of Diagnostic Trouble Codes (DTCs) related to valve actuator motors assembled to the air intake manifold of the KV6 engine. A noticeable change in engine performance or a 'rattle' noise coming from the intake manifold area during idle may be reported.

The Variable Intake Manifold System (VIS) on the KV6 engine incorporates two actuator motors ('VIS Motors') that control the positions of internal flaps and butterfly valves which alter the volume and rate of air induction.

RESOLUTION:

RESOLVE VIS MOTOR DTC, NOISE AND PERFORMANCE CONCERNS

This bulletin details procedures to determine that the VIS motors and internals of the intake manifold assembly are functioning correctly.

Should a customer report a concern of a rattle noise heard from the intake manifold area during idle or a noticeable change in engine performance, refer to the Repair Procedure detailed in this bulletin to diagnose and resolve VIS motor DTCs and performance concerns.

TOOLS:

RDS disc 30 (or later)

TestBook/T4 diagnostic equipment

WARRANTY CLAIMS:

Information only. Normal Warranty policies and procedures apply.

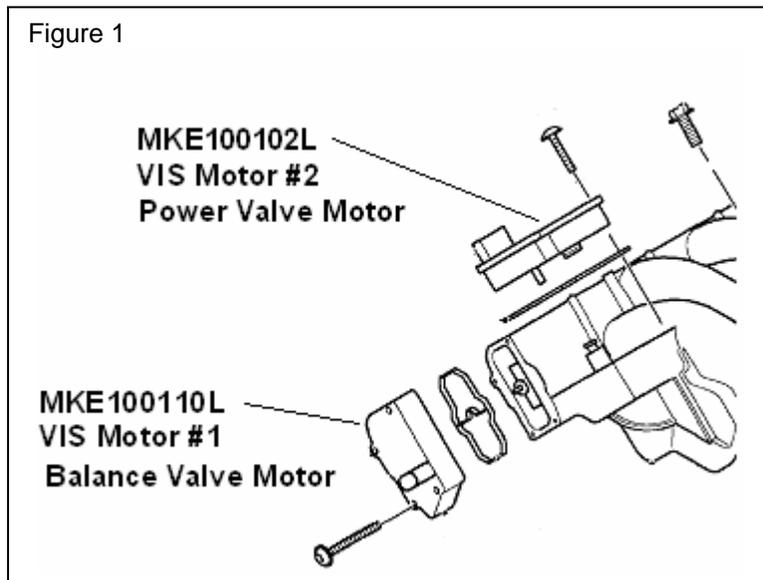
NOTE: The information in Technical Information bulletins is intended for use by trained, professional technicians with the knowledge, tools, and equipment required to do the job properly and safely. It informs these technicians of conditions that may occur on some vehicles, or provides information that could assist in proper vehicle service. The procedures should not be performed by "do-it-yourselfers." If you are not a Retailer, do not assume that a condition described affects your vehicle. Contact an authorized Land Rover service facility to determine whether the bulletin applies to a specific vehicle.

TIB	CIRCULATE:	Service Mgr	Warranty	Workshop	Body Shop	Parts
19/01/06/NAS	TO	X	X	X	X	X

PART REFERENCE INFORMATION:

△ **NOTE:** Land Rover service and parts literature, including MicroCat and TestBook/T4, use a range of descriptions for the two Variable Intake Manifold System (VIS) motors installed on the Freelander KV6 engine intake manifold. The part numbers and descriptions listed below and in Figure 1 should be cross-referenced with T4 and Table 1 for correct DTC diagnosis.

- MKE100110L....."Balance Valve Motor" (VIS Motor #1) Qty 1 (if required)
- MKE100102L....."Power/Butterfly Valve Motor" (VIS Motor #2) Qty 1 (if required)
- LKB000120.....Upper intake manifold assembly Qty 1 (if required)



△ **NOTE:** Table 1 lists T4 Diagnostic Trouble Codes and descriptions that may be logged against VIS Motors 1 and 2, using RDS disc 30 or later.

Table 1

VIS Motor	T4 Diagnostic Trouble Code Descriptions			
VIS Motor # 1 "Balance Valve Motor"	P2070 Intake Manifold Tuning (IMT) Valve Stuck Open: Short Circuit to Ground	P2071 Intake Manifold Tuning (IMT) Valve Stuck Closed: Short Circuit to V Battery	P0662 Intake Manifold Tuning Valve Control Circuit High Bank 1: Short Circuit to V Battery	P0661 Intake Manifold Tuning Valve Control Circuit Low Bank 1: Short Circuit to Ground
VIS Motor # 2 "Power Valve Motor"	P1472 Variable Intake Manifold Actuator 2 - Valve Always Open: Short Circuit to Ground	P1473 Variable Intake Manifold Actuator 2 - Valve Always Closed: Short Circuit to V Battery	P1476 Variable Intake Manifold Actuator 2 -Circuit High Voltage: Short Circuit to V Battery	P1477 Variable Intake Manifold Actuator 2 -Circuit Low Voltage: Short Circuit to Ground/Open Circuit or No Signal

REPAIR PROCEDURE



NOTE: A VIS motor DTC will not set a Malfunction Indicator Lamp (MIL) illumination. Any MIL illumination will be due to the presence of other DTC faults.

A VIS motor DTC can be stored by the Engine Control Module (ECM) for any single occurrence of non-response from a VIS motor.

The presence of a VIS DTC does not necessarily mean that a VIS motor is permanently disabled. The motor has self-protection circuitry that is able to re-set automatically from a single event.

The presence of oil in the intake manifold/VIS motor is not a reason to replace the VIS motor. VIS motors have been tested with extreme levels of oil contamination and continued to function as intended.

DIAGNOSE AND RESOLVE VIS MOTOR DTC



CAUTION: Freelander vehicles must have the ignition switch placed in position "II" BEFORE TestBook/T4 diagnostic equipment is connected to the vehicle. Failure to adhere to this step may result in uncorrectable corruption of the SRS ECU.

A Midtronics PSC-550 Vehicle Power Supply must be connected to the vehicle battery during diagnostic sessions.



NOTE: A VIS motor fault is defined as either 'historic' or 'current' as follows:

- An 'historic' VIS motor fault has 'self-healed' after the original DTC was flagged. A 'historic' DTC has not repeated and does not require a VIS motor replacement. 'Historic' faults need only be investigated if a customer complains of a rare intermittent problem associated with the DTC and no other current faults are stored.
- A 'current' VIS motor fault may return after the DTC had been cleared. A 'current' DTC that reappears during the Drive Cycle road test will require a VIS motor replacement.

1. Connect T4 diagnostic equipment to the vehicle and begin a diagnostic session.
2. Record VIS DTCs logged into the Engine Control Module (ECM).
3. If a VIS motor #2 DTC (P1472, P1473, P1476, or P1477) is logged or a rattle noise is heard coming from the intake manifold area during idle, proceed to **INSPECT INTAKE MANIFOLD AND RESOLVE ENGINE NOISE AND PERFORMANCE CONCERNS** section of this bulletin.
4. Refer to Table 1 and resolve all DTCs not listed as a VIS DTC.
5. Clear all DTCs.



NOTE: GTR lookup sequence is as follows:

GTR Home > NAS > Service Information/ LN – Freelander > Workshop Manuals > Freelander 2001 MY on – Workshop Manual – Service Procedures > Bookmark "17-1 Emission Control" Link "96.10.02 Drive Cycle 'B'"

6. Refer to GTR Section 17-1 operation 96.10.02 and complete Freelander OBD Drive Cycle 'B'.
7. Begin a diagnostic session and record VIS DTCs logged into the ECM.
8. If no VIS DTC has been flagged, release the vehicle.
9. If a new VIS DTC is logged, different from those recorded in Step 2, and there is no detectable change in engine performance, clear the VIS DTC and release the vehicle.



NOTE: GTR lookup sequence is as follows:

GTR Home > NAS > Service Information/ LN – Freelande r > Workshop Manuals > Freelande r 2001 MY on – Workshop Manual – Service Procedures > Bookmark "19-2 – Fuel Delivery System – Petrol" Link "19.22.64/65 Variable induction system (VIS) balance/power motor - KV6"

10. If an identical VIS DTC is logged, to one recorded in Step 2, refer to GTR section 19-2 operation 19.22.64/65 and replace the associated VIS motor prior to releasing vehicle.
11. If the customer has reported a noticeable change in engine performance without a 'Service Engine' amber MIL lamp illuminated and a VIS DTC is logged after the Drive Cycle road test, refer to GTR section 19-2 operation 19.22.64/65 and replace the associated VIS motor and release the vehicle.

INSPECT INTAKE MANIFOLD AND RESOLVE ENGINE NOISE AND PERFORMANCE CONCERNS

1. Disconnect the battery ground lead.



NOTE: GTR lookup sequence is as follows:

GTR Home > NAS > Service Information/ LN – Freelande r > Workshop Manuals > Freelande r 2001 MY on – Workshop Manual – Service Procedures > Bookmark "12-3 – Engine – K Series KV6" Link "12.30.50 Cover – engine acoustic"

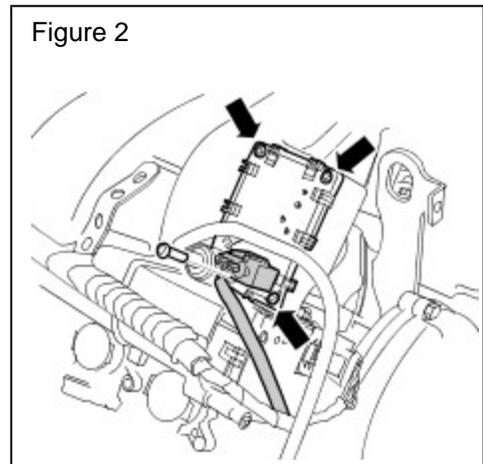
2. Refer to GTR operation 12.30.50 and remove the engine acoustic cover.
3. Disconnect the electrical connector from VIS motor #2 "power valve motor".



CAUTION: Care must be taken in removing the VIS motor seal. If undamaged, the VIS motor seal is to be reused. If a new seal is required, refer to Technical Bulletin 19/03/03/NAS for VIS Motor Gasket Replacement Guidelines and associated part numbers.

4. Remove the four retaining screws securing VIS motor #2 to the intake manifold assembly. (Figure 2)
5. Carefully remove VIS motor #2 from the intake manifold.

Figure 2



 **NOTE:** The VIS "power valve motor" operates a control arm that adjusts the butterfly valve positions. The butterflies are not spring-loaded. (Figure 3)

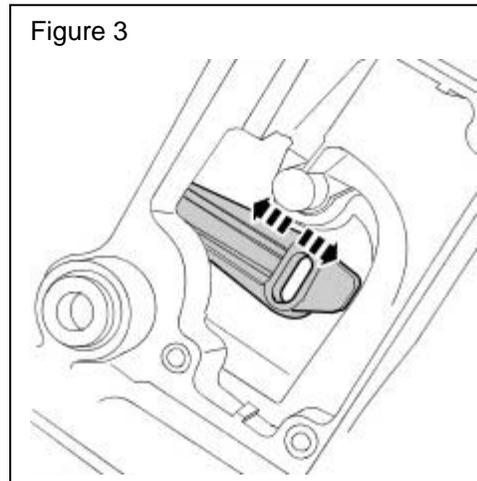
If the VIS intake flap control arm operates correctly, the intake manifold assembly is not to be replaced. Further investigation is required to determine the cause of a reported engine noise.

6. Verify that the VIS intake flap control arm is operating correctly by completing the following checks:
 - Move the control arm through the full range of lateral movement (Arrowed in Figure 3).

 **NOTE:** When gently pressed down toward the engine and released, the intake flap control arm is operating correctly if some resistance is felt when depressing and springs back to its original position without any rattles, clicks or loose feeling after releasing.

- Move the control arm laterally to the full right position.
- Gently press the control arm down toward the engine and release.

 **NOTE:** GTR lookup sequence is as follows:
GTR Home > NAS > Service Information/ LN – Freelander > Workshop Manuals > Freelander 2001 MY on – Workshop Manual – Service Procedures > Bookmark > "30-3 – Manifolds & Exhaust Systems – K Series KV6" Link "30.15.37 Seals – inlet manifold chamber"



7. If the checks reveal either of the following conditions, refer to GTR section 30-3 operation 30.15.37 and replace the intake manifold assembly (LKB000120):
 - The lateral operation of the control arm is stiff, notchy, jams or feels loose.
 - After depressing and releasing, the control arm does not spring back to the original position, feels loose, rattles or clicks.
8. If the control arm operates correctly, investigate another cause for an engine noise.

 **CAUTION:** The slot of the intake flap control arm must be positioned to line-up with the VIS motor drive peg before installing the VIS motor.

9. Install VIS motor #2 as follows:
 - Clean the mating surfaces of the VIS motor and the manifold chamber.
 - Clean and inspect the VIS motor seal.
 - If the seal is damaged, refer to Technical Bulletin 19/03/03/NAS "VIS Motor Gasket Replacement Guidelines" and replace the seal.
 - If no damage to the seal is evident, install the original seal to the VIS motor.
 - Carefully position control arm to line-up with the VIS motor drive peg and install the VIS motor.
 - Install the four VIS motor retention screws and tighten to **1.7 Nm (1.25 lbf ft)**.
 - Connect the electrical connector to the VIS motor.
10. Refer to GTR operation 12.30.50 and install the engine acoustic cover.
11. Connect the battery ground lead.



12. If VIS 2 DTCs had been recorded and the manifold assembly was not replaced, complete **DIAGNOSE AND RESOLVE VIS MOTOR DTC** section of this bulletin.



NOTE: After replacing an intake manifold assembly (LKB000120), it is unlikely that a VIS DTC will re-occur since the manifold assembly is supplied with new VIS motors.

13. If the intake manifold assembly (LKB000120) was replaced, proceed as follows:

- Clear all DTCs
- Repeat Freelander OBD Drive Cycle B test-drive.
- Begin a diagnostic session and record VIS DTCs logged into the ECM.
- If no VIS DTC has been flagged, release the vehicle.
- If a VIS DTC is logged and there is no detectable change in engine performance, clear the VIS DTC and release the vehicle.