



**SERVICE MANUAL
FUEL INJECTION
NIVA 4 X 4**

PLEASE NOTE

Throughout this book, reference is frequently made to the use of a "TECH I SCAN" tool as a diagnostic aid. Wherever this requirement occurs you should instead use the "LADASCAN" and its related test equipment as supplied in your dealer toolkit.

AAA-973

August 1995

<http://www.daniva.co.uk>

ENGINE MANAGEMENT SYSTEMS

1.7L THROTTLE BODY INJECTION

TABLE OF CONTENTS

Ref. Subject	Page	Ref. Subject	Page
1 GENERAL DESCRIPTION AND SYSTEM OPERATION.....	1-1	Starting Mode.....	1-29
GLOSSARY OF TERMS.....	1-4	Clear Flood Mode.....	1-29
1.1 ELECTRONIC CONTROL MODULE AND SENSORS.....	1-8	Run Open Loop Mode.....	1-29
Electronic Control Module.....	1-8	Run Closed Loop Mode.....	1-29
Electronic Control Module Function.....	1-8	Acceleration Enrichment Mode.....	1-29
Engine Calibrator.....	1-9	Power Enrichment Mode.....	1-29
Memory.....	1-9	Deceleration Enleanment.....	1-30
Read Only Memory.....	1-9	Decel Fuel Cut Mode.....	1-30
Random Access Memory.....	1-9	Battery Voltage Correction Mode.....	1-30
Programmable Read Only Memory.....	1-9	Fuel Cutoff Mode.....	1-30
Information Sensors.....	1-10	Adaptive Adjustment Fuel Injector Pulswidth.....	1-31
Coolant Temperature Sensor.....	1-10	Closed Loop Fuel Adjustment.....	1-31
Intake Air Temperature Sensor.....	1-11	Memory Fuel Adjustment.....	1-32
Manifold Absolute Pressure Sensor.....	1-12	Memory Fuel Adjustment Cell.....	1-33
Throttle Position Sensor.....	1-14	1.3 EVAPORATIVE EMISSION CONTROL SYSTEM.....	1-35
Oxygen Sensor (Electrically Heated).....	1-15	General Description.....	1-35
Crankshaft Position Reference Signal.....	1-18	Purpose.....	1-35
Vehicle Speed Sensor.....	1-18	Evaporative System.....	1-35
Octane Adjustment.....	1-19	Operation.....	1-35
Air Conditioning Request Signal.....	1-19	Results of Incorrect Operation.....	1-35
1.2 FUEL CONTROL SYSTEM.....	1-20	Visual Check of Canister.....	1-35
General Description.....	1-20	1.4 DIRECT IGNITION SYSTEM.....	1-37
Components.....	1-20	General Description.....	1-37
Fuel Pump.....	1-21	Electronic Spark Timing.....	1-37
Fuel Filter.....	1-21	System Components.....	1-38
Fuel System Electrical Circuits.....	1-21	Diagnosis.....	1-39
Throttle Body Injection Unit.....	1-22	Symptom Diagnosis.....	1-39
Fuel Pressure Diagnostic Fitting.....	1-22	1.9 ELECTRONIC CONTROL MODULE CONTROLLED INTAKE MANIFOLD ELECTRIC HEATER.....	1-41
Fuel Injector.....	1-23	General Description.....	1-41
Fuel Pressure Regulator.....	1-23	Operation.....	1-41
Fuel Metering.....	1-24	1.10 ELECTRONIC CONTROL MODULE CONTROLLED AIR CONDITIONING.....	1-42
Throttle Position Sensor.....	1-24	General Description.....	1-42
Idle Air Control Valve.....	1-25		
Speed-Density Fuel Control.....	1-26		
Speed-Density Calculation.....	1-27		
Modes of Fuel Control Operation.....	1-28		

2 - ENGINE MANAGEMENT SYSTEMS 1.7L THROTTLE BODY INJECTION

Ref. Subject	Page	Ref. Subject	Page
1.13 CRANKCASE VENTILATION SYSTEM	1-43	Throttle Position	2-11
General Description	1-43	Throttle Angle	2-11
Results of Incorrect Operation	1-43	Manifold Absolute Pressure	2-11
1.14 THERMOSTATIC AIR CLEANER	1-44	Barometric Pressure	2-11
General Description	1-44	Oxygen Sensor Voltage	2-11
Purpose	1-44	Exhaust Gases (Rich/Lean)	2-11
Operation	1-44	Oxygen Sensor Ready (Yes/No)	2-11
Results of Incorrect Operation	1-44	"Open/Closed Loop" Fuel Control	2-11
Thermostatic Air Cleaner Functional Check	1-44	"Closed Loop" Fuel Adjustment	2-12
2 DIAGNOSIS	2-1	Memory Fuel Adjustment	2-12
Introduction	2-1	Memory Fuel Adjustment Cell	2-12
Diagnosis Procedure	2-2	Air Fuel Ratio	2-12
2.1 DIAGNOSTIC PRECAUTIONS	2-3	Power Enrichment Mode Active? (Yes/No)	2-12
2.2 DIAGNOSTIC GENERAL DESCRIPTION	2-4	Decel Fuel Cut Mode in Effect? (Yes/No)	2-12
"Check Engine" Light	2-4	Evaporative Emission Canister	
Intermittent "Check Engine" Light	2-4	Purge Duty Cycle	2-12
Reading Codes	2-5	Fuel Injector Pulse Width	2-12
Clearing Codes	2-5	Spark Advance	2-12
Diagnostic Display Mode	2-5	Octane Adjust	2-12
Field Service Mode	2-6	Idle Air Control Position (0-255)	2-12
Electronic Control Module		Vehicle Speed	2-12
Adaptive Learning Ability	2-6	Radiator Fan	2-12
Diagnosis Procedure	2-7	Intake Manifold Heater ("ON/OFF") Clutch	2-12
Diagnostic Circuit Check	2-7	System Voltage	2-12
2.3 TECH 1 "SCAN" TOOL DESCRIPTION	2-8	Air Conditioning Request (Yes/No)	2-13
Tech 1 "Scan" Tool	2-8	Air Conditioning ("ON/OFF") Clutch	2-13
Tech 1 "Scan" Tool Explanation	2-8	Fuel Pump Circuit ("ON/OFF")	2-13
Tech 1 "Scan" Tool Uses	2-8	Calibration Identification	2-13
Tech 1 "Scan" Tool Use With Intermittents	2-8	Time From Start	2-13
Additional Tech 1 Functions	2-8	2.4 UNDERHOOD LOCATION VIEWS	2-14
Tech 1 "Scan" Tool Limitations	2-9	2.5 FUSE BLOCK VIEWS	2-15
Diagnostic Modes	2-10	2.6 RELAY CALLOUT AND LOCATION VIEW	2-16
Diagnostic Display Mode	2-10	ENGINE MANAGEMENT SYSTEMS	
Field Service Mode	2-10	WIRING DIAGRAMS	2-17
Tech 1 "F0: Data List" Parameters	2-10	2.7 ELECTRONIC CONTROL MODULE CONNECTOR	
Tech 1 "F0: Data List"	2-10	IDENTIFICATION CHARTS	2-22
Engine Speed	2-10	2.8 ELECTRONIC CONTROL MODULE	
Desired Idle	2-11	TERMINALS DEFINED	2-24
Coolant Temperature	2-11	Electronic Control Module Connector	
Intake Air Temperature	2-11	Voltages With Explanations	2-24

ENGINE MANAGEMENT SYSTEMS 1.7L THROTTLE BODY INJECTION - 3

Ref. Subject	Page	Ref. Subject	Page
2.9A DIAGNOSTIC CHARTS	2-29	2.9B SYMPTOM CHARTS	2-95
Diagnostic Charts Defined	2-30	Important Preliminary Checks	2-96
Tech 1 "Scan" Tool Typical Data Value	2-32	Before Starting	2-96
Tech 1 "Scan" Data	2-33	Intermittents	2-97
Electronic Control Module Diagnostic Codes	2-35	Hard Start	2-99
Chart A - Diagnostic Circuit Check	2-36	Surges and/or Chuggles	2-101
Chart A-1 - No "Check Engine" Light	2-38	Lack of Power, Sluggish, or Spongy	2-102
Chart A-2 - No Assembly Line Data Link Serial Data Or Will Not Flash Code 12 ("Check Engine" Light "ON" Steady)	2-40	Detonation/Spark Knock	2-104
Chart A-3 - Engine Cranks But Will Not Run	2-42	Hesitation, Sag, Stumble	2-106
Chart A-4 - Ignition Relay and Power Circuits Check	2-48	Cuts Out, Misses	2-107
Chart A-5 - Fuel System Electrical Circuit Check	2-52	Poor Fuel Economy	2-108
Chart A-7 - Fuel System Diagnosis	2-54	Stalling, Rough, Unstable or Incorrect Idle	2-109
Code 13 - No Oxygen Sensor Signal	2-58	Excessive Exhaust Emissions or Odors	2-111
Code 14 - Coolant Temperature Sensor (Signal Voltage Too Low)	2-60	Dieseling, Run-On	2-112
Code 15 - Coolant Temperature Sensor (Signal Voltage Too High)	2-62	Backfire	2-113
Code 21 - Throttle Position (Signal Voltage Too High)	2-64	Chart B-1 Restricted Exhaust System Check	2-114
Code 22 - Throttle Position (Signal Voltage Too Low)	2-66	Electronic Control Module Pin Connector "A" Symptom Chart	2-115
Code 23 - Intake Air Temperature (Signal Voltage Too High)	2-68	Electronic Control Module Pin Connector "B" Symptom Chart	2-116
Code 24 - No Vehicle Speed Signal	2-70	Electronic Control Module Pin Connector "C" Symptom Chart	2-117
Code 25 - Intake Air Temperature (Signal Voltage Too Low)	2-72	Electronic Control Module Pin Connector "D" Symptom Chart	2-118
Code 33 - Manifold Absolute Pressure (Signal Voltage Too High)	2-74	2.9C COMPONENT SYSTEM CHARTS	2-119
Code 34 - Manifold Absolute Pressure (Signal Voltage Too Low)	2-76	Chart C-1D Manifold Absolute Pressure Output Check	2-120
Code 35 - Idle Speed Error	2-78	Chart C-1H Throttle Position Sensor Output Check	2-122
Code 42 - Electronic Spark Timing Control Circuit Problem	2-80	Chart C-2C Idle Air Control Circuit Check	2-124
Code 44 - Lean Exhaust Indication	2-82	Chart C-3 Canister Purge Valve Check	2-126
Code 45 - Rich Exhaust Indication	2-84	Chart C-4 Ignition System Check (No Spark) (1 of 2)	2-128
Code 51 - Calibrator Error	2-86	Chart C-4B Direct Ignition System Misfire <u>At Idle</u>	2-132
Code 53 - System Voltage Too High	2-88	Chart C-4C Direct Ignition System Misfire <u>Under Load</u>	2-136
Code 54 - Octane Adjustment (Signal Voltage Too High or Too Low)	2-90	Chart C-9 Intake Manifold Electric Heater	2-138
Code 55 - Electronic Control Module Error	2-94	Chart C-10 Air Conditioning Compressor Clutch Control	2-142
		Chart C-13 Crankcase Ventilation System Check	2-144
		Chart C-15 Octane Adjustment Potentiometer Check	2-146

4 - ENGINE MANAGEMENT SYSTEMS 1.7L THROTTLE BODY INJECTION

Ref.	Subject	Page	Ref.	Subject	Page
3	SERVICE OPERATIONS	3-1	3.2	FUEL CONTROL SYSTEM	3-26
	Service Precautions.....	3-1		Fuel Control.....	3-26
	Driveability and Emissions Control.....	3-1		On-Vehicle Service.....	3-26
	Maintenance Schedule.....	3-1		General Service Information.....	3-26
	Blocking Drive Wheels.....	3-1		Service Identification.....	3-27
	What This Section Contains.....	3-1		Fuel Pressure Relief Procedure.....	3-28
	Visual/Physical Underhood Inspection.....	3-1		Fuel System Pressure Test.....	3-28
	Service Precautions.....	3-1		Throttle Body Injection Unit.....	3-30
	Electrostatic Discharge Damage.....	3-2		Fuel Injector Assembly.....	3-33
	Repair Procedures.....	3-2		Pressure Regulator Assembly.....	3-34
	Electrical Repairs.....	3-2		Fuel Meter Assembly.....	3-35
	Circuit Protection.....	3-3		Throttle Position Sensor.....	3-36
	Circuit Protection Devices.....	3-3		Idle Air Control Valve.....	3-36
	Fuses.....	3-3		Tube Module Assembly.....	3-37
	Typical Electrical Repairs.....	3-5		Throttle Body Assembly.....	3-37
	Short Circuits Caused by Damaged Wire- Insulation.....	3-5		Fuel Pump.....	3-38
	Replacing Terminals on Unsealed Components.....	3-5		Fuel Pump Electrical Circuit.....	3-39
	Replacing Pigtails on Sealed Components.....	3-5		Fuel System Relay.....	3-39
	Replacing Connector Housings On Unsealed Components.....	3-6		Fuel Filter.....	3-40
	Splicing Copper Wire Using Splice Clips, Shrink Tube and Hot Melt.....	3-8	3.3	EVAPORATIVE EMISSION CONTROL SYSTEM	3-41
	Splicing Twisted/Shielded Cable.....	3-10		On-Vehicle Service.....	3-41
	Repairing Connectors.....	3-11		Visual Check of Canister.....	3-41
	Push-To-Seat and Pull-To-Seat.....	3-11		Fuel Vapor Canister.....	3-41
	Weather Pack.....	3-12		Fuel Vapor Canister Hoses.....	3-41
	Terminal Repair.....	3-12	3.4	DIRECT IGNITION SYSTEM	3-43
	Wiring Connector Service.....	3-13		On-Vehicle Service.....	3-43
	Tools Needed to Service the System.....	3-14		Direct Ignition System Assembly.....	3-43
	Wiring Harness Service.....	3-15		Ignition Coil.....	3-43
	Checking Terminal Contact.....	3-15		Ignition Module.....	3-43
				Crankshaft Sensor.....	3-44
3.1	ELECTRONIC CONTROL MODULE AND SENSORS	3-18	3.9	INTAKE MANIFOLD HEATER	3-45
	Electronic Control Module.....	3-18		On-Vehicle Service.....	3-45
	Engine Calibrator.....	3-20	4	SPECIFICATIONS	4-1
	Functional Check.....	3-20		1.7L Throttle Body Injection.....	4-1
	Coolant Temperature Sensor.....	3-21	5	TORQUE SPECIFICATIONS	5-1
	Octane Adjustment Potentiometer.....	3-22		1.7L Throttle Body Injection.....	5-1
	Manifold Absolute Pressure Sensor.....	3-22	6	SPECIAL TOOLS	6-1
	Throttle Position Sensor.....	3-23		1.7L Throttle Body Injection.....	6-1
	Vehicle Speed Sensor.....	3-23			
	Oxygen Sensor.....	3-24			
	Intake Air Temperature Sensor.....	3-25			