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WORKSHOP HANDBOOK

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INDEX

1. DIAGNOSTIC GUIDE

SEQUENT PARAMETERS KEY

Here's the summary table of the parameters displayed by Sequent program.

Parameter of Sequent Handheld pc	Parameter extended definition	Physical meaning	Measure unit
SupplySt	Supply state	It shows if vehicle is in petrol or gas mode or if it's in changeover	
P1	P1 Pressure	Absolute pressure at injectors rail	mbar
P.Man - Map	Manifold Pressure	Absolute pressure in the intake manifold	mbar
GAS Temperature	GAS Temperature	Temperature read by the sensor situated on the injectors rail	°C
GAS Level	GAS Level	Signal coming from the level sensor situated on the multivalve	mV
T.P.S.	Throttle Position Sensor	Throttle potentiometer signal	%
Lambda Pre Cat 1	Pre-catalyst 1 Lambda oxigen sensor	Pre-catalyst 1 Lambda oxigen sensor signal	mV
Lambda Pre Cat 2	Pre-catalyst 2 Lambda oxigen sensor	Pre-catalyst 2 Lambda oxigen sensor signal	mV
RPM	RPM	Engine rotation speed	RPM
D.C. Inj. Petrol	Duty Cycle petrol injectors	Proportion between injection time calculated from the petrol ECU and engine cycle time	%
D.C. Inj. Gas	Duty Cycle Gas injectors	Proportion between injection time calculated from the Gas ECU and engine cycle time	%
T.on Petrol	Injection time of petrol injectors	Injection time calculated from the Petrol ECU	ms
T.on Gas	Injection time of gas injectors	Injection time calculated from the Gas ECU	ms
Flow	Reference flow	Gas flow to supply at the engine, calculated from the Gas ECU	
Water temperature	Engine water temperature	Temperature read by the sensor situated at water inlet of Genius reducer	°C
P1 Bis	P1 Pressure	Absolute pressure at inlet to second injectors rail (in case of two rails and two Genius)	mbar
Lambda Post Cat	Post-catalyst lambda oxigen sensor	Post-catalyst lambda oxigen sensor signal	mV
D.C. Ref	Reference Duty Cycle	Reference Duty Cycle	%
Error %	Instant Correction	Instant Correction	%
Delta P	Delta pressure (P1-MAP)	Difference between rail pressure and manifold pressure	mbar
Delta P bis	Delta pressure bis (P1bis – MAP)	Difference between second rail pressure and manifold pressure	mbar

2. RANGE OF VALUES DISPLAYED WITH HANDHELD COMPUTER

In this table are reported minimum, maximum and typical value of some signals you can display with Sequent program, useful to diagnose possible working problems.

SIGNAL	MINIMUM VALUE	MAXIMUM VALUE	TYPICAL VALUE	MEASURE UNIT
P1 Pressure	600	3000	At idle: 1800-2000 In O.L.: 2500	mbar
MAP manifold pressure	200	1000	At idle: 300 - 450 In O.L.: 1000	mbar
GAS Temperature	Ambient temperature	80 - 90	from10 to 90	°C
GAS Level	20	1200	It changes according to the tank gas level	mV
T.P.S.	0	100	Percentage values that increase according to the throttle opening rise	%
RPM	0	7000	It changes in accordance with vehicle	RPM
Duty Cycle petrol injectors	0	100	In O.L. ≤ 100	%
Duty Cycle gas injctors	0	100	In O.L. ≤ 100	%
Petrol injection time	0	200	It changes in accordance with vehicle	ms
Gas injection time	0	200	At idle > 3 ms	ms
Engine water temperature	Ambient temperature	90 - 100	From Ambient T - 100	°C
Delta pressure (P1-MAP)	1000	2500	At idle: 1450 – 1550 In O.L.: 1450 – 1550	mbar

ATTENTION:
All pressures are noticed as absolute pressures, that's to say:
- 0 mbar meansabsolute vacuum;
- atmospheric pressure is roughly 1000 mbar (at sea level) so, for instance:

P1 = 1800 mbar means a pressure of roughly 800 mbar over the atmospheric pressure;
P1 = 700 mbar means a depressure of roughly 300 mbar compared to the atmospheric pressure

3. LIST OF THE PINS OF SEQUENT ECU

In the following tables there is the Sequent ECU list of pins, showing if signal are at inlet or outlet.

1° Connector from Pin 1 to Pin 28

PIN	DESCRIPTION	SIGNAL	TYPICAL VALUES	COLOUR
1	Engine Water Temperature	◀	In accordance with Engine Water Sensor	White/Red
2	Sensors Supply	▶	+ 5 V	Red
3	P1 Pressure Sensor Signal	◀	From 0,5 V A 3,5 V	Green
4	Gas Temperature	◀	From 0,5 V A 2,5 V	Yellow
5	Bank1 Lambda Oxygen Sensor	◀	In accordance with Sensor Type	Yellow
6	Bank2 Lambda Oxygen Sensor	◀	In accordance with Sensor Type	Yellow
7	Gas Level	◀	20 mV - 1200 mV	White/Black
8	Bank1 Lambda Oxygen Sensor Emulation	▶	In accordance with Sensor Type	Light Blue
9	Diagnostic	◀▶	----------	White
10	N.C.	----------	----------	----------
11	Crankshaft Low Signal Inlet	◀	Signal In Crankshaft L	Blue
12	N.C.	----------	----------	----------
13	Changeover switch	▶	Ground	Purple
14	Led 1/4 changeover switch	▶	+ 5 V	Red
15	Led Gas Changeover switch	▶	+ 12 V	Pink
16	Back Sv Control	▶	Ground	Green/Black
17	Front Sv Control	▶	Ground	Green/Black
18	Gas Injector 1 Control	▶	G Injector Control	Green/White
19	Battery	◀	Ground	Black
20	Gas Injector 2 Control	▶	G Injector Control	Green/White
21	Gas Injector 3 Control	▶	G Injector Control	Green/White
22	Gas Injector 4 Control	▶	G Injector Control	Green/White
23	Petrol Injector 1 Inj Side	▶	P Injector to Inj Control	Orange
24	Petrol Injector 2 Inj Side	▶	P Injector to Inj Control	Orange
25	Petrol Injector 3 Inj Side	▶	P Injector to Inj Control	Orange
26	Petrol Injector 4 Inj Side	▶	P Injector to Inj Control	Orange
27	Fuse 5a Communication	◀	+ 12 V	Red
28	Positive Relay/Positive Back Sv/Positive Front Sv/ Positive Gas Injectors/Modular Supply Ld	◀	+ 12 V	Green

2° Connector from Pin 29 to Pin 56

PIN	DESCRIPTION	SIGNAL	TYPICAL VALUES	COLOUR
29	Crankshaft low signal Outlet	▶	Crankshaft L Out Signal	Blue/Black
30	Crankshaft high signal Outlet	▶	Crankshaft H Out Signal	Pink/Black
31	Ground Sens Pts On Rail Ground Level	▶	Ground	Black
32	Manifold Pressure Sensor	◀	In accordance with MAP sensor	White
33	N.C.	----------	----------	----------
34	Temperature 2	◀	----------	Black
35	Bank2 Lambda Oxigen Sensor Emulation	▶	In accordance with Sensor Type	Light Blue
36	Throttle Position Sensor	◀	According to TPS sensor 0 - 5 V or 0 -12 V	White/Purple
37	Shielding collection	Shield	Ground	----------
38	N.C.	----------	----------	----------
39	Crankshaft high signal Inlet - Revolution counter	◀	Signal In Crankshaft L	Pink/Grey Soldered
40	N.C.	----------	----------	----------
41	Changeover switch G	◀	Ground with Gas Changeover switch	Grey
42	Led 2/4 changeover switch	▶	+ 5 V	Blue
43	Led 3/4 changeover switch	▶	+ 5 V	White
44	Led 4/4 changeover switch	▶	+ 5 V	Brown
45	N.C.	----------	----------	----------
46	Actuators Relay Control	▶	Ground	White/Green
47	Buzzer Changeover Switch	▶	+ 5 V	Green
48	Led Petrol Changeover Switch	▶	+ 5 V	Yellow
49	N.C.	----------	----------	----------
50	+12v Under Key	◀	+ 12 V	Brown
51	Petrol Injector 1 Ecu Side	◀	P Injector Control From Ecu	Purple
52	Petrol Injector 2 Ecu Side	◀	P Injector Control From Ecu	Purple
53	Petrol Injector 3 Ecu Side	◀	P Injector Control From Ecu	Purple
54	Petrol Injector 4 Ecu Side	◀	P Injector Control From Ecu	Purple
55	Inner Modular Supply	▶	+ 12 V	White/Green
56	Battery Ground, Changeover Switch Ground, Communication Ground	▶	Ground	Black

3.2 SEQUENT 24 ECU

PIN	DESCRIPTION	SIGNAL	TYPICAL VALUES	COLOUR
A1	ECU supply from battery/ injectors re-circulation	◀	+12V	Red
B1	Gas injectors Ground	▶	Ground	Black
C1	Solenoid Valve piloting Outlet	▶	Ground	Green/ Black
A2	Gas injector 1 piloting Outlet	▶	G Injector control	White/ Green
B2	Petrol injector 1 Inlet	◀	P Injector Control From ECU	Purple
C2	Water Temperature	◀	From 0,5V to 3,5V	Yellow
A3	Gas injector 2 piloting Outlet	▶	G Injector control	White/ Green
B3	Petrol injector 2 Inlet	◀	P Injector Control From ECU	Purple
C3	K-Line - Serial Communication	◀▶	----------	White
A4	Gas injector 3 piloting Outlet	▶	G Injector control	White/ Green
B4	Petrol injector 3 Inlet	◀	P Injector Control From ECU	Purple
C4	Changeover Switch and Sensors Serial Communication	◀▶	----------	Green
A5	Gas injector 4 piloting Outlet	▶	G Injector control	White/ Green
B5	Petrol injector 4 Inlet	◀	P Injector Control From ECU	Purple
C5	Sensors supply +5V	▶	+5V	Red
A6	Common positive petrol injectors, injectors side	▶	+12V	White/ Brown
B6	Lambda Oxygen Sensor Analogic Inlet	◀	In accordance with Sensor Type	Yellow
C6	Lambda Oxygen Sensor Analogic Outlet	▶	In accordance with Sensor Type	Light Blue
A7	Common positive petrol injectors, ECU side	◀	+12V	White/ Green
B7	MAP Pressure Analogic Inlet	◀	Da 0,5V a 4,5 V	White
C7	Water Temperature from Reducer Analogic Inlet	◀	Da 0,5V a 2,5 V	White
A8	RPM Inlet	◀	Revolution counter IN signal	Grey
B8	Gas Pressure Analogic Inlet	◀	From 0,5V to 3,5V	Green
C8	ECU and Sensors Ground	▶	Ground	Black

3.3 SEQUENT 56 ECU

1° Connector from Pin 1 to Pin 28

PIN	DESCRIPTION	SIGNAL	TYPICAL VALUES	COLOUR
1	Engine water temperature	◀	From 0,5V to 3,5V	Yellow
2	Pressure sensor supply+5V	▶	+5V	Red
3	Pressure sensor Analogical input	◀	From 0,5V to 3,5 V	Green
4	Pressure sensor 2 Analogical input - Optional	◀	----------	----------
5	Lambda Oxygen Sensor PRECAT 1 Signal Analogical input	◀	In accordance with Sensor Type	Yellow
6	Lambda Oxygen Sensor PRECAT 2 Signal Analogical input	◀	In accordance with Sensor Type	Yellow
7	----------	----------	----------	----------
8	Actuators external relay control	▶	+12V	White/ Green
9	K-line – Serial communication	◀▶	----------	White
10	----------	----------	----------	----------
11	Input from Crankshaft or Revolution counter	◀	Crankshaft or Revolution counter IN signal	Grey
12	ECU SUPPLY +12V Vehicle battery	◀	+12V	Red
13	Signal TTL input from Changeover switch (COM)	◀▶	----------	Green
14	Gas solenoid valve n°1 control	▶	Ground	Green/ Black
15	Gas Injector 1 Control	▶	G Injector control	White/ Green
16	Gas Injector 2 Control	▶	G Injector control	White/ Green
17	Gas Injector 3 Control	▶	G Injector control	White/ Green
18	Gas Injector 4 Control	▶	G Injector control	White/ Green
19	Gas injectors ground	▶	Ground	Black
20	Actuators re-circulation	◀	+12V	Green
21	Gas Injector 5 Control	▶	G Injector control	White/ Green
22	Gas Injector 6 Control	▶	G Injector control	White/ Green
23	Gas Injector 7 Control	▶	G Injector control	White/ Green
24	Gas Injector 8 Control	▶	G Injector control	White/ Green
25	Petrol injector 5 (injectors side)	▶	P Injector Control to Inj	Orange
26	Petrol injector 6 (injectors side)	▶	P Injector Control to Inj	Orange
27	Petrol injector 7 (injectors side)	▶	P Injector Control to Inj	Orange
28	Petrol injector 8 (injectors side)	▶	P Injector Control to Inj	Orange

2° Connector from Pin 29 to Pin 56

PIN	DESCRIPTION	SIGNAL	TYPICAL VALUES	COLOUR
29	MAP analogical input	◀	From 0,5V to 4,5 V	White
30	Temperature sensor analogical input	◀	From 0,5V to 2,5 V	White
31	Inertial switch inlet	◀	----------	----------
32	Temperature sensor 2 analogical input – PTS Optional	◀	----------	----------
33	Lambda Oxygen Sensor PRECAT1 Emulation Output	▶	In accordance with Sensor Type	Light Blue
34	Lambda Oxygen Sensor PRECAT2 Emulation Output	▶	In accordance with Sensor Type	Light Blue
35	----------	----------	----------	----------
36	TPS analogical input	◀	According to TPS sensor 0 - 5 V o 0 -12 V	White/ Purple
37	Screening for analogical signals shield / body	◀	Ground	----------
38	----------	----------	----------	----------
39	Ground from battery	◀	Ground	Black
40	----------	----------	----------	----------
41	Voltage +12V under key	◀	+12V	Brown
42	Gas solenoid valve 2 control	▶	Ground	Green/ Black
43	Petrol injector n°1 (ECU side)	◀	P Injector Control From ECU	Purple
44	Petrol injector n°1 (injectors side)	▶	P Injector Control to Inj	Orange
45	Petrol injector n°2 (ECU side)	◀	P Injector Control From ECU	Purple
46	Petrol injector n°2 (injectors side)	▶	P Injector Control to Inj	Orange
47	Gas injectors ground 2	▶	Ground	Black
48	Actuators re-circulation 2	◀	+12V	Green
49	Petrol injector n°3 (ECU side)	◀	P Injector Control From ECU	Purple
50	Petrol injector n°3 (injectors side)	▶	P Injector Control to Inj	Orange
51	Petrol injector n°4 (ECU side)	◀	P Injector Control From ECU	Purple
52	Petrol injector n°4 (injectors side)	▶	P Injector Control to Inj	Orange
53	Petrol injector n°5 (ECU side)	◀	P Injector Control From ECU	Purple
54	Petrol injector n°6 (ECU side)	▶	P Injector Control From ECU	Purple
55	Petrol injector n°7 (ECU side)	◀	P Injector Control From ECU	Purple
56	Petrol injector n°8 (ECU side)	◀	P Injector Control From ECU	Purple

3.4 SEQUENT 24 MY07 ECU

PIN	DESCRIPTION	SIGNAL	TYPICAL VALUES	COLOUR
A1	Actuators Positive	▶	+12V	Green
B1	Gas Injectors Ground	▶	Ground	Black
C1	Supply +12V from Battery Positive	◀	+12V	Red
A2	Gas Injector 1 Piloting Outlet	▶	G Injector control	White/ Green
B2	Petrol Injector 1 Inlet	◀	P Injector Control From ECU	Purple
C2	Petrol Injector 1 Outlet	▶	P Injector Control to Inj	Orange
A3	Gas Injector 2 Piloting Outlet	▶	G Injector control	White/ Green
B3	Petrol Injector 2 Inlet	◀	P Injector Control From ECU	Purple
C3	Petrol Injector 2 Outlet	▶	P Injector Control to Inj	Orange
A4	Gas Injector 3 Piloting Outlet	▶	G Injector control	White/ Green
B4	Petrol Injector 3 Inlet	◀	P Injector Control From ECU	Purple
C4	Petrol Injector 3 Outlet	▶	P Injector Control to Inj	Orange
A5	Gas Injector 4 Piloting Outlet	▶	G Injector control	White/ Green
B5	Petrol Injector 4 Outlet	◀	P Injector Control From ECU	Purple
C5	Petrol Injector 4 Outlet	▶	P Injector Control to Inj	Orange
A6	K-Line – Serial Communication	◀▶	----------	White
B6	Lambda Oxygen Sensor Analogical Inlet	◀	In accordance with Sensor Type	Yellow
C6	Sensors Supply +5V	▶	+5V	Red
A7	Gas Pressure Analogical Inlet	◀	From 0,5 to 4,5 V	Green
B7	Map Pressure Analogical Inlet	◀	From 0,5V to 4,5 V	White
C7	Water Temperature from Reducer Analogical Inlet	◀	From 0,5V to 2,5 V	White
A8	RPM Inlet	◀	Revolution counter IN signal	Grey
B8	Voltage +12V Under Key	◀	+12V	Brown
C8	Battery Ground	▶	Ground	Black

3.5 SEQUENT SDI ECU

1° Connector from Pin 1 to Pin 28

PIN	DESCRIPTION	SIGNAL	TYPICAL VALUES	COLOUR
1	Engine water temperature	◀	From 0,5V to 3,5V	Yellow
2	Pressure sensor supply +5V	▶	+5V	Red
3	Pressure sensor analogical input	◀	From 0,5V to 3,5 V	Green
4	Pressure sensor 2 analogical input -Optional	◀	----------	----------
5	Lambda Oxygen Sensor PRECAT 1 Signal Analogical input	◀	In accordance with Sensor Type	Yellow
6	Lambda Oxygen Sensor PRECAT 2 signal Analogical input	◀	In accordance with Sensor Type	Yellow
7	Lambda Oxygen Sensor POSTCAT signal Analogical input	◀	----------	----------
8	Actuators external relay control	▶	+12V	White/ Green
9	K-line – Serial communication	◀▶	----------	White
10	Can Bus Line	◀▶	----------	
11	Input from Crankshaft or Revolution counter	◀	Crankshaft or Revolution counter IN signal	Grey
12	ECU Supply +12V Vehicle battery	◀	+12V	Red
13	Signal TTL input from Changeover switch (COM)	◀▶	----------	Green
14	Gas solenoid valve n°1 control	▶	+12V	Green
15	Gas Injector 1 Control	▶	G Injector control	White/ Green
16	Gas Injector 2 Control	▶	G Injector control	White/ Green
17	Gas Injector 3 Control	▶	G Injector control	White/ Green
18	Gas Injector 4 Control	▶	G Injector control	White/ Green
19	Gas injectors ground	▶	Ground	Black
20	Actuators re-circulation	◀	+12V	Green
21	Gas Injector 5 control	▶	G Injector control	White/ Green
22	Gas Injector 6 control	▶	G Injector control	White/ Green
23	Petrol injectors 5 positive	◀	P Injector positive	White
24	Petrol injectors 6 positive	◀	P Injector positive	White
25	Petrol injector n°2(injectors side)	▶	P Injector Control to Inj	Orange
26	Petrol injector n°5(injectors side)	▶	P Injector Control to Inj	Orange
27	Petrol injector n°6(injectors side)	▶	P Injector Control to Inj	Orange
28	Petrol injector n°3 (injectors side)	▶	P Injector Control to Inj	Orange

2° Connector from Pin 29 to Pin 56

PIN	DESCRIPTION	SIGNAL	TYPICAL VALUES	COLOUR
29	MAP Analogical Input	◀	From 0,5V to 4,5 V	White
30	Temperature sensor Analogical Input	◀	From 0,5V to 2,5 V	White
31	----------	----------	----------	----------
32	----------	----------	----------	----------
33	Lambda Oxygen Sensor PRECAT1 Emulation Output	▶	In accordance with Sensor Type	Light Blue
34	Lambda Oxygen Sensor PRECAT2 Emulation Output	▶	In accordance with Sensor Type	Light Blue
35	----------	----------	----------	----------
36	TPS Analogical Input	◀	According to TPS sensor 0 - 5 V or 0 -12 V	White/ Purple
37	----------	----------	----------	----------
38	Can Bus Line	◀▶	----------	Yellow/ Black
39	Ground from battery	◀	Ground	Black
40	----------	----------	----------	----------
41	Voltage +12V under key	◀	+12V	Brown
42	Gas solenoid valve 2 control	▶	Ground	Green/ Black
43	Petrol injector n°1 (ECU side)	◀	P Injector Control From ECU	Purple
44	Petrol injector n°1 (injectors side)	▶	P Injector Control to Inj	Orange
45	Petrol injectors 1 positive	◀	P Injector positive	White
46	Petrol injector n°5 (ECU side)	◀	P Injector Control From ECU	Purple
47	Gas injectors ground 2	▶	Ground	Black
48	Actuators re-circulation 2	◀	+12V	Green
49	Petrol injectors 4 positive	◀	P Injector positive	White
50	Petrol injector n°6 (ECU side)	◀	P Injector Control From ECU	Purple
51	Petrol injector n°4 (ECU side)	◀	P Injector Control From ECU	Purple
52	Petrol injector n°4 (injectors side)	▶	P Injector Control to Inj	Orange
53	Petrol injector n°2 (ECU side)	◀	P Injector Control From ECU	Purple
54	Petrol injectors 2 positive	◀	P Injector positive	White
55	Petrol injectors 3 positive	◀	P Injector positive	White
56	Petrol injector n°3 (ECU side)	◀	P Injector Control From ECU	Purple

3.6 SEQUENT PLUG & DRIVE ECU

1° Connector from Pin 1 to Pin 28

PIN	DESCRIPTION	SIGNAL	TYPICAL VALUES	COLOUR
1	Engine water temperature	◀	From 0,5V to 3,5V	Yellow
2	Pressure sensor supply +5V	▶	+5V	Red
3	PTS Pressure sensor analogical input	◀	From 0,5V to 3,5 V	Green
4	----------	----------	----------	----------
5	Lambda Oxygen Sensor PRECAT 1 Signal Analogical input	◀	In accordance with Sensor Type	Yellow
6	Lambda Oxygen Sensor PRECAT 2 signal Analogical input	◀	In accordance with Sensor Type	Yellow
7	----------	----------	----------	----------
8	Actuators external relay control	▶	+12V	White/ Green
9	K-line – Serial communication	◀▶	----------	White
10	Can BUS – Socket OBD connection	◀	----------	Yellow
11	Input from Crankshaft or Revolution counter	◀	Crankshaft or Revolution counter IN signal	Grey
12	ECU Supply +12V Vehicle battery	◀	+12V	Red
13	Socket OBD connection – K-line	◀	----------	White
14	Gas solenoid valve n°1 control	▶	Ground	Green/ Black
15	Gas Injector 1 Control	▶	G Injector control	White/ Green
16	Gas Injector 2 Control	▶	G Injector control	White/ Green
17	Gas Injector 3 Control	▶	G Injector control	White/ Green
18	Gas Injector 4 Control	▶	G Injector control	White/ Green
19	Gas injectors ground	▶	Ground	Black
20	Actuators re-circulation	◀	+12V	Green
21	Gas Injector 5 control	▶	G Injector control	White/ Green
22	Gas Injector 6 control	▶	G Injector control	White/ Green
23	Gas Injector 7 control	▶	G Injector control	White/ Green
24	Gas Injector 8 control	▶	G Injector control	White/ Green
25	Petrol injector n°5 (injectors side)	▶	P Injector Control to Inj	Orange
26	Petrol injector n°6 (injectors side)	▶	P Injector Control to Inj	Orange
27	Petrol injector n°7 (injectors side)	▶	P Injector Control to Inj	Orange
28	Petrol injector n°8 (injectors side)	▶	P Injector Control to Inj	Orange

2° Connector from Pin 29 to Pin 56

PIN	DESCRIPTION	SIGNAL	TYPICAL VALUES	COLOUR
29	MAP Analogical Input	◀	From 0,5V to 4,5 V	White
30	PTS Temperature sensor Analogical Input	◀	From 0,5V to 2,5 V	White
31	----------	----------	----------	----------
32	----------	----------	----------	----------
33	Lambda Oxygen Sensor PRECAT1 Emulation Output	▶	In accordance with Sensor Type	Light Blue
34	Lambda Oxygen Sensor PRECAT2 Emulation Output	▶	In accordance with Sensor Type	Light Blue
35	----------	----------	----------	----------
36	----------	----------	----------	----------
37	External spark advancer control	▶	+12V	Green
38	Can BUS – Socket OBD connection	◀	----------	Yellow/ Black
39	Ground from battery	◀	Ground	Black
40	Inner modular supply	◀	----------	White/ Black
41	Voltage +12V under key	◀	+12V	Brown
42	Gas solenoid valve 2 control	▶	Ground	Green/ Black
43	Petrol injector n°1 (ECU side)	◀	P Injector Control From ECU	Purple
44	Petrol injector n°1 (injectors side)	▶	P Injector Control to Inj	Orange
45	Petrol injector n°2 (ECU side)	◀	P Injector Control From ECU	Purple
46	Petrol injector n°2 (injectors side)	▶	P Injector Control to Inj	Orange
47	Gas injectors ground 2	▶	Ground	Black
48	Actuators re-circulation 2	◀	+12V	Green
49	Petrol injector n°3 (ECU side)	◀	P Injector Control From ECU	Purple
50	Petrol injector n°3 (injectors side)	▶	P Injector Control to Inj	Orange
51	Petrol injector n°4 (ECU side)	◀	P Injector Control From ECU	Purple
52	Petrol injector n°4 (injectors side)	▶	P Injector Control to Inj	Orange
53	Petrol injector n°5 (ECU side)	◀	P Injector Control From ECU	Purple
54	Petrol injector n°6 (ECU side)	◀	P Injector Control From ECU	Purple
55	Petrol injector n°7 (ECU side)	◀	P Injector Control From ECU	Purple
56	Petrol injector n°8 (ECU side)	◀	P Injector Control From ECU	Purple

4. COMPONENTS DIAGNOSTIC

4.1 GAS INJECTOR

Coil resistance check

VERIFICATION	METHODOLOGY	INSTRUMENT	TYPICAL VALUES	WAVE SHAPES
Disconnected Injector Connector	Check resistance between the two injector clamps	Tester, Multimeter.	2 Ω	----------

Signals check

VERIFICATION	METHODOLOGY	INSTRUMENT	TYPICAL VALUES	WAVE SHAPES
Engine switched on in LPG mode	Check signals fromthe injector clamps	Tester, Oscilloscope.	Green: 11-14V White\Green: injector signal as sideways	

Working check

Entering the Actuators Test section of Sequent program you can check the gas injectors good working.
If you run this test on gas injector 1 for instance, you can pilot it, checking in this way its good working.
If nothing happens after you send the control, then there is a problem on the injector controlled (gas injector 1, in the example) and it is necessary to check and eventually to replace the gas injector, the wiring or the gas ECU.

4.2 GAS/PETROL INJECTORS TIMING

For the good working of the system, it's necessary to have a perfect parallelism between injectors, so that the petrol injector 1 signal is the one that guides the gas injector1 and so on. A timing not correct involves problems during the changeover and in all tip-in situations.
Correction procedure for injectors wiring errors:

Entering the Diagnostic > Actuators Test section of Sequent program, proceed as following:
1. Deselect all the injectors cells. Now, the engine will run completely in petrol mode.
2. Select the injector 1 cell.
3. If gas injector 1 inject in the right cylinder (the one corresponding to the petrol injector named 1), engine will run in the right way. In this case, repeat the procedure from step 1 for the next injector. If instead there is a problem, proceed with step 4.
4. Selectioned gas injector must be moved: you have just to move its connector on another gas injector, until the right working of the engine.
5. Repeat procedure from step 1 with all the others injectors, until find the right position for all the gas injectors connectors.

You can apply this procedure with the following systems: Sequent standard, Sequent Fast, Sequent FastNess, Sequent 56, Sequent Direct Injection, Sequent Plug&Drive.
For Sequent 24 MY07 system, it is more difficult to recognize the injectors sequence because of its semi-sequential injectors changeover, so that injectors break will take two injectors a time (1 and 4, 2 and 3).
For Sequent 24 system you cannot use this diagnostic because the petrol injectors cut has made by the common positive wire of injectors control.

4.3 BACK AND FRONT GAS SOLENOID VALVE

Coil resistance check

VERIFICATION	METHODOLOGY	INSTRUMENT	TYPICAL VALUES	WAVE SHAPES
Disconnected coil connector	Check resistance between the two solenoid valve clamps	Tester, Multimeter.	Front (red): 9,5-10 Ω Back: 11,8 – 12,2 Ω	----------

Signals check

VERIFICATION	METHODOLOGY	INSTRUMENT	TYPICAL VALUES	WAVE SHAPES
Engine switched on in LPG mode	Check signals fromthe solenoid valve injector clamps	Tester, Oscilloscope.	Tester, Green: 11-14V Green/Black: Ground supplied by the ECU	----------

Working check

In order to verify the good working of front and back solenoid valve you can use two strategies.

1° PROCEDURE:

Back SV: after disconnecting the front solenoid valve inlet pipe, by using the Actuators Test section of Sequent program you can excite the back solenoid valve coil. Now you should hear the back Sv clickand you should also have a gas leakage from the exhaust pipe previously deconnected. If this doesn't happen, it is necessary to check and eventually to replace the electric coil, the wiring or the Gas ECU.

Warning: After the test connect again the exhaust pipe and check if there are leakages by means of the "Effe 91" spray

Front Sv: after disconnecting the front solenoid valve outlet pipe, by using the Actuators Test section of Sequent program, you can excite the front solenoid valve coil and, in this way, open it. Now you should hear the front Sv click and you should also have a gas leakage from the Sv outlet. If this doesn't happen, it is necessary to check and eventually to replace the front solenoid valve, the wiring or the Gas ECU.

Warning: After the test connect again the exhaust pipe and check if there are leakages by means of the "Effe 91" spray

2° PROCEDURE: Close the tap situated on the multivalve gas outlet and after switching the vehicle on and changing over to LPG, consume all the unburnt gas present in the tank. Switch the vehicle off and let the control board turned on. On the handheld PC, in Diagnostic/Data Visualization section, P1 pressure value will be decreased at about 1000 mbar, that's to say at the atmospheric pressure value. This should mean gas absence in the pipes.
Now you can open again the multivalve tap.

Through the Actuators Test, by acting first on back solenoid valve control and then on the front one, you should see the P1 pressure increase (that you can display in Diagnostic-Data Display). If this doesn't happen, it is necessary to check and eventually to replace the front or back solenoid valve, the wiring or the Gas ECU.

4.4 PRESSURE SENSOR

Signals check

VERIFICATION	METHODOLOGY	INSTRUMENT	TYPICAL VALUES	WAVE SHAPES
Connected sensor connector+Car switched on in gas mode	Check signals from Sensor clamps	Tester, Oscilloscope.	Red: 5 V Black: Ground Green: 2 V – 2,5V White: 0,6 V – 2,5 V	----------

Working check

PTS measures pressure and LPG temperature inside the rail. You can check the right working by means of Sequent program.

P1 Pressure: in Diagnostic\Data Visualization section you can display P1 Pressure value of the LPG in the rail. Pressure value at idle in LPG mode should amount at about 1800-2000 mbar, that's to say the MAP value (300-450 mbar) + Genius reducer Delta-P (1450-1550 mbar). You can obtain a further control on PTS sensor by reading the pressure value with empty Gas loop.
Close the tap situated on the multivalve gas outlet and after switching the vehicle on and changing to LPG, consume all the unburnt gas present in the tank.
Switch the vehicle off and let the control board turned on.
In Diagnostic/Data Visualization section, P1 pressure value will be decreased at about 1000 mbar, that's to say at the atmospheric pressure value. If this doesn't happen, it is necessary to check and eventually to replace the PTS sensor, the wiring or the Gas ECU.

4.5 LEVEL SENSOR (LITTLE WINDOW SITUATED ON THE MULTIVALVE)

Little Window Resistance Check

VERIFICATION	METHODOLOGY	INSTRUMENT	TYPICAL VALUES	WAVE SHAPES
Disconnected Little Window Connector	Check resistance between the two clamps of wiring coming from the tank	Tester, Multimeter.	Full tank: 0 Ω Tank 80%: 90 Ω	----------

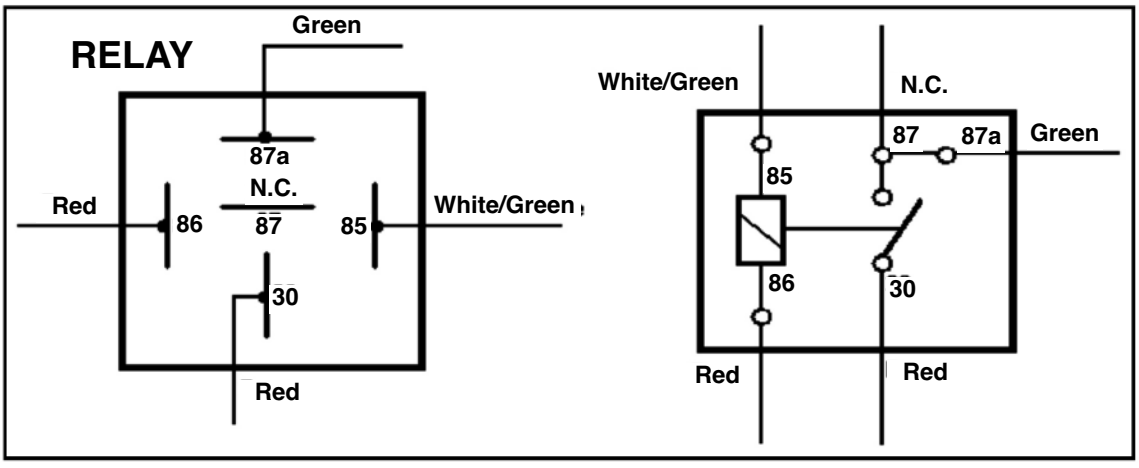
Signals check

VERIFICATION	METHODOLOGY	INSTRUMENT	TYPICAL VALUES	WAVE SHAPES
Connected Little Window Connect.+Car turned on in gas mode	Check signals on wiring coming from the tank	Tester, Oscilloscope.	Tester, Full tank: 45 mV Tank 80%: 990 mV	----------

Working check

Entering the *Setting up\Level Calibration* section of Sequent program you can set up at your discretion level indication on the 4 LEDs.

4.6 ACTUATORS RELAY



Actuators Relay provides supply (Green) at all the system actuators when vehicle change to LPG. White\Green control is a ground and comes directly from the Sequent ECU when you change to LPG.

Check signals at rest (Petrol mode)

VERIFICATION	METHODOLOGY	INSTRUMENT	TYPICAL VALUES	WAVE SHAPES
Vehicle in petrol mode	Check signals on Relay terminals	Tester, Oscilloscope.	Red (86-30): 11-14V green: no signal White\Green: 12 V	----------

Check signals in LPG mode

VERIFICATION	METHODOLOGY	INSTRUMENT	TYPICAL VALUES	WAVE SHAPES
Vehicle in LPG mode	Check signals on Relay terminals	Tester, Oscilloscope.	Red (86-30): 11-14V Green: 11-14V White\Green: Ground supplied from the ECU	----------

Working check

Entering the Actuators Test section of Sequent program you can checkthe actuators relay good working. Running this test you can pilot the actuators relay in an intermittent way and check its good working.
If nothing happens after you send the control, then there is a problem on the actuators relay control and it is necessary to check and eventually to replace the actuators relay, the wiring or the gas ECU.

5. PROBLEMS AND SOLUTIONS

PROBLEMS	SOLUTIONS
1 Vehicle doesn't change over	• Changeover switch is in Petrol forced mode (Red LED turned on) • This changeover conditions are not valid: - Engine water temperature - Time since the starting • Verify pressures • Verify Gas Solenoid valve working
2 Vehicle stalls while changing over to gas	• Verify the 15A fuse • Verify connections on the actuators relay • Replace the relay • Verify gas injectors working • Verify Gas ECU
3 Vehicle doesn't start up or works wrongly in petrol	• Verify injectors cut wiring • Verify Gas ECU
4 Changeover switch doesn't switch on	• Verify changeover switch wiring continuity • Replace the 5A fuse • Replace the changeover switch • Verify the ECU working
5 A/More level LED/LEDs doesn't/don't work	• Verify changeover switch wiring or replace indicator LEDs • In these cases, the cause could also be the ECU, therefore verify that it communicates with PC interface and eventually try to replace it
6 Vehicle works wrongly at idle	• One or more injectors don't work correctly; check its working with Actuators Test • Verify wirings of Gas injectors controls • Verify pressures and signals by means of Sequent program

7 Computer doesn't communicate	• Turn the vehicle control board on • Check the 5A - 15A fuse • Replace the communication wire • Replace Gas ECU • Check Communication section on PC
8 Changeover swtich doesn't display GAS level	• LEDs don't work • Verify ECU • Verify level wiring
9 There's smell of gas	• Check leakages with spray "**Effe 91**"
10 Vehicle starts up wrongly in petrol mode	• Verify possible gas leakages inside the manifold: with the Computer verify P1 pressure value before starting up the vehicle. If it was 1000 mbar (Atmosferic Pressure) you could have a gas leakage inside the manifold. • Verify gas injectors good working • Verify Gas reducer: check possible gas leakage thanks to the feedback inside the manifold
11 Vehicle changes over in petrol mode during tip-in (Enabled Buzzer)	• Verify with the Computer Delta-P and P1 Pressure trend • Verify gas quantity and pressure inside the tank • Verify possibles narrowings in gas pipes • Verify System filter choking
12 Fuse 5A burns out	• Verify fuses position 5A on red wires sect. 1.5 15A on red wires sect. 2.5 • Verify short-circuits
13 Vehicle changes over in petrol mode (Disabled Buzzer)	• Verify RPM signal • Verify Gas Temperature signal • Verify continuity of RPM taking signal grey wire. • Verify temperature sensor working • Replace Temperature sensor • Replace gas ECU • Verify system supplies

6. ERRORS CODES SEQUENT DIAGNOSTIC

1. DTC P1105 MAP (Manifold Absolute Pressure) Sensor
It is possible to diagnose the following failures:

Signal value under minimum threshold

Possible causes:
1 - MAP signal wire is in short-circuit with negative supply;
2 - MAP signal wire is not connected;
3 - MAP sensor is faulty;
4 - Sequent ECU is faulty.

Repairing procedure:
1 - Check MAP sensor connector;
2 - Verify the absence of short-circuit between MAP signal wire and negative supply;
3 - Check MAP signal wire continuity from sensor connector (or taking point signal) up to gas ECU connector;
4 - Replace MAp sensor;
5 - Replace Sequent ECU.

Operation check:
1 - Erase the error;
2 - Start the engine, change over to gas mode and verify credibility of read values;
3 - Check errors memory.

Signal value over maximum threshold

Possible causes:
1 - MAP signal wire is in short-circuit with positive supply;
2 - MAP sensor is faulty;
3 - Sequent ECU is faulty.

Repairing procedure:
1 - Check MAP sensor connector;
2 - Verify the absence of short-circuit between MAP signal wire and positive supply;
3 - Replace MAp sensor;
4 - Replace Sequent ECU.

Operation check:
1 - Erase the error;
2 - Start the engine, change over to gas mode and verify credibility of read values;
3 - Check errors memory.

Not reasonable signal

Possible causes:
1 - Sensor setting is not correct;
2 - The sensor installed is different from the one set up by the software;
3 - MAP sensor is faulty;
4 - Sequent ECU is faulty;
5 - Error due to another device failure (see Repairing procedure).

Repairing procedure:
1 - Verify MAP sensor setting;
2 - If you have a not-reasonable error on P1 pressure sensor too, follow same indications suitable for error P1190;
3 - If you have an error on TPS too, follow same indications suitable for error P1120;
4 - If you have an error on sensors supply tension, follow the same indications suitable for error P1608;
5 - Replace MAp sensor;
6 - Replace Sequent ECU.

Operation check:
1 - Erase the error;
2 - Start the engine, change over to gas mode and verify credibility of read values;
3 - Check errors memory.

2. DTC P1115 Water temperature sensor (T_{H_2O})

It is possible to diagnose the following failures:

Signal value under minimum threshold	Signal value over maximum threshold	Not reasonable signal
Possible causes: 1 - TH2O signal wire is not connected; 2 - Sequent ECU is faulty; 3 - Water temperature sensor is faulty; 4 - TH2O signal wire is in short-circuit with positive supply. **Repairing procedure:** 1 - Check the welding in the taking point of the TH2O signal; 2 - Check absence of short-circuit between TH2O signal wire and negative supply; 3 - Check the TH20 signal wire continuity from the sensor connector (or signal taking point) to gas ECU connector.; 4 - Replace Sequent ECU. **Operation check:** 1 - Erase the error; 2 - Start the engine, change over to gas mode and verify credibility of read values; 3 - Check errors memory; 4 - Repet this operation after some minutes in idle conditions or after driving at least for 5 km.	**Possible causes:** 1 - TH2O signal wire is in short-circuit with negative supply; 2 - Sequent ECU is faulty; 3 - Water temperature sensor is faulty. **Repairing procedure:** 1 - Check absence of short-circuit between the TH2O signal wire and the negative supply; 2 - Replace Sequent ECU. **Operation check:** 1 - Erase the error; 2 - Start the engine, change over to gas mode and verify credibility of read values; 3 - Check errors memory; 4 - Repet this operation after some minutes in idle conditions or after driving at least for 5 km.	**Possible causes::** 1 - Sensor setting is not correct; 2 - Sequent ECU is faulty; 3 - Water temperature sensor is faulty; 4 - Error due to another device failure (see Repairing procedure). **Repairing procedure:** 1 - Check the TH2O sensor setting; 2 - If you have a not-reasonable error on gas temperature sensor too, follow the same indications suitable for error P1180; 3 - If you have an error on sensor supply tension, follow the same indications suitable for error P1608; 4 - Replace Sequent ECU. **Operation check:** 1 - Erase the error; 2 - Start the engine, change over to gas mode and verify credibility of read values; 3 - Check errors memory; 4 - Repet this operation after some minutes in idle conditions or after driving at least for 5 km.

3. DTC P1120 TPS Throttle Potentiometer (Throttle Position Sensor)
It is possible to diagnose the following failures:

Signal value under minimum threshold

Possible causes:
1 - TPS signal wire is in short-circuit with negative supply;
2 - PS signal wire is not connected;
3 - Sequent ECU is faulty;
4 - TPS potentiometer is faulty.

Repairing procedure:
1 - Check the right connection of the TPS signal wire;
2 - Check the absence of short-circuit between TPS signal wire and negative supply;
3 - Check the TPS signal wire continuity from the sensor connector (or signal taking point) to the gas ECU connector;
4 - Replace Sequent ECU.

Operation check:
1 - Erase the error;
2 - Start the engine, change over to gas mode and verify credibility of read values;
3 - Check errors memory.

Signal value over maximum threshold

Possible causes:
1 - TPS signal wire is in short-circuit with positive supply;
2 - Sequent ECU is faulty;
3 - TPS potentiometer is faulty.

Repairing procedure:
1 - Check the absence of short-circuit between TPS signal wire and positive supply;
2 - Replace Sequent ECU.

Operation check:
1 - Erase the error;
2 - Start the engine, change over to gas mode and verify credibility of read values;
3 - Check errors memory.

Not reasonable signal

Possible causes:
1 - Sensor setting is not correct;
2 - Error due to another device failure (see Repairing procedure);
3 - Sequent ECU is faulty.

Repairing procedure:
1 - Check the TPS sensor setting;
2 - If you have an error on sensor supply tension, follow the same indications suitable for error P1608;
3 - Replace Sequent ECU.

Operation check:
1 - Erase the error;
2 - Start the engine, change over to gas mode and verify credibility of read values;
3 - Check errors memory.

4. DTC P1130 e P1150 PRECAT 1 Lambda Oxigen Sensor (signal) and PRECAT 2 Lambda Oxigen Sensor (signal)

It is possible to diagnose the following failures:

Signal value over maximum threshold

Possible causes:

1 - PRECAT 1 (or PRECAT 2) signal wire is in short-circuit with positive supply;
2 - Sequent ECU is faulty;
3 - PRECAT 1 (or PRECAT 2) lambda oxigen sensor is faulty.

Repairing procedure:

1 - Check that Lambda oxigen sensor signal had been correctly taken;
2 - Check the absence of short-circuit between PRECAT1 (or PRECAT 2) signal wire and positive supply;
3 - Replace Sequent ECU;
4 - Replace PRECAT 1 (or PRECAT 2) lambda oxigen sensor.

Operation check:

1 - Erase the error;
2 - Start the engine and change over from petrol to gas mode;
3 - Verify the credibility of read values;
4 - Driving in gas mode at least for 10 km with medium load;
5 - Check errors memory.

Not reasonable signal

Possible causes:

1 - PRECAT 1 (or PRECAT 2) signal wire is not connected;
2 - Sensor setting is not correct;
3 - Sequent ECU is faulty;
4 - PRECAT 1 (or PRECAT 2) lambda oxigen sensor is faulty.

Repairing procedure:

1 - Check that Lambda oxigen sensor signal had been correctly taken;
2 - Check the PRECAT 1 (or PRECAT 2) signal wire continuity from the sensor (or signal taking point) to the gas ECU connector;
3 - Check the absence of short-circuit between PRECAT1 (or PRECAT 2) signal wire and negative supply;
4 - Check the sensor setting;
5 - Replace Sequent ECU;
6 - Replace PRECAT 1 (or PRECAT 2) lambda oxigen sensor.

Operation check:

1 - Erase the error;
2 - Start the engine and change over from petrol to gas mode;
3 - Verify the credibility of read values;
4 - Driving in gas mode at least for 10 km with medium load;
5 - Check errors memory.

5. DTC P1131 e P1151 PRECAT 1 Lambda Oxigen Sensor (ground) and PRECAT 2 Lambda Oxigen Sensor (ground)

It is possible to diagnose the following failures:

Not reasonable signal

Possible causes:

1 - PRECAT 1 (or PRECAT 2) signal wire is in short-circuit with supply wires;
2 - PRECAT 1 (or PRECAT 2) signal wire is not connected;
3 - Sensor setting is not correct;
4 - PRECAT 1 (or PRECAT 2) lambda oxigen sensor is faulty.

Repairing procedure:

1 - Check that PRECAT1 (or PRECAT 2) ground had been correctly taken;
2 - Check the absence of short-circuit between the PRECAT1 (or PRECAT 2) ground wire and the supply wires.
3 - Check the PRECAT 1 (or PRECAT 2) ground wire continuity from the sensor (or signal taking point) to the gas ECU connector;
4 - Check the sensor setting;
5 - Replace PRECAT 1 (or PRECAT 2) lambda oxigen sensor.

Operation check:

1 - Erase the error;
2 - Start the engine and change over from petrol to gas mode;
3 - Verify the credibility of read values;
4 - Driving in gas mode at least for 10 km with medium load;
5 - Check errors memory.

6. DTC P1180 Gas temperature sensor (TGAS)

It is possible to diagnose the following failures:

Signal value under minimum threshold	Signal value over maximum threshold	Not reasonable signal
Possible causes: 1 - TGAS signal wire is not connected; 2 - TGAS sensor is faulty; 3 - Sequent ECU is faulty; 4 - TGAS signal wire is in short-circuit with positive supply. **Repairing procedure:** 1 - Check the TGAS connector; 2 - Check the absence of short-circuit between TGAS signal wire and positive supply; 3 - Check TGAS signal wire continuity from the sensor (or signal taking point) to the gas ECU connector; 4 - Replace TGAS sensor; 5 - Replace Sequent ECU. **Operation check:** 1 - Erase the error; 2 - Start the engine, change over to gas mode and verify credibility of read values; 3 - Check errors memory; 4 - Repet this operation after some minutes in idle conditions (about 10/15 min) or after driving at least for 5 km.	**Possible causes:** 1 - TGAS signal wire is in short-circuit with negative supply; 2 - TGAS sensor is faulty; 3 - Sequent ECU is faulty. **Repairing procedure:** 1 - Check the TGAS connector; 2 - Check the absence of short-circuit between TGAS signal wire and negative supply; 3 - Replace TGAS sensor; 4 - Replace Sequent ECU. **Operation check:** 1 - Erase the error; 2 - Start the engine, change over to gas mode and verify credibility of read values; 3 - Check errors memory; 4 - Repet this operation after some minutes in idle conditions (about 10/15 min) or after driving at least for 5 km.	**Possible causes:** 1 - Sensor setting is not correct; 2 - Error due to another device failure (see Repairing procedure); 3 - TGAS sensor is faulty; 4 - Sequent ECU is faulty. **Repairing procedure:** 1 - Check TGAS sensor setting; 2 - Check the installed sensor be the suitable one; 3 - If you have a not-reasonable error on TGAS sensor too, follow the same indications suitable for error P1115; 4 - If you have an error on the sensors supply tension, follow the same indications suitable for error P1608; 5 - Replace TGAS sensor; 6 - Replace Sequent ECU. **Operation check:** 1 - Erase the error; 2 - Start the engine, change over to gas mode and verify credibility of read values; 3 - Check errors memory; 4 - Repet this operation after some minutes in idle conditions (about 10/15 min) or after driving at least for 5 km.

7. DTC P1190 (1191) P1 Pressure Sensor

It is possible to diagnose the following failures:

Signal value under minimum threshold	Signal value over maximum threshold	Not reasonable signal
Possible causes: 1 - P1 signal wire is in short-circuit with negative supply; 2 - P1 signal wire is not conneced; 3 - P1 pressure sensor is faulty; 4 - Sequent ECU is faulty. **Repairing procedure:** 1 - Check P1 sensor connector; 2 - Check the absence of short-circuit between P1 signal wire and negative supply; 3 - Check P1 signal wire continuity from the sensor to the gas ECU connector; 4 - Replace P1 sensor; 5 - Replace Sequent ECU. **Operation check:** 1 - Erase the error; 2 - Start the engine, change over to gas mode and verify credibility of read values; 3 - Check errors memory.	**Possible causes:** 1 - P1 signal wire is in short-circuit with positive supply; 2 - P1 pressure sensor is faulty; 3 - Sequent ECU is faulty. **Repairing procedure:** 1 - Check P1 sensor connector; 2 - Check the absence of short-circuit between P1 signal wire and positive supply; 3 - Replace P1 sensor; 4 - Replace Sequent ECU. **Operation check:** 1 - Erase the error; 2 - Start the engine, change over to gas mode and verify credibility of read values; 3 - Check errors memory.	**Possible causes:** 1 - Sensor setting is not correct; 2 - Error due to another device failure (see Repairing procedure); 3 - P1 pressure sensor is faulty; 4 - Sequent ECU is faulty. **Repairing procedure:** 1 - Check P1 sensor setting; 2 - Check the installed sensor be the suitable one; 3 - If you have a not-reasonable error on MAP pressure sensor too, follow the same indications suitable for P1105 error; 4 - If you have an error on the TPS sensor too, follow the same indications suitable for P1120 error; 5 - If you have an error on the sensors supply tension too, follow the same indications suitable for P1608 error; 6 - Replace P1 sensor (and/or P1bis); 7 - Replace Sequent ECU. **Operation check:** 1 - Erase the error; 2 - Start the engine, change over to gas mode and verify credibility of read values; 3 - Check errors memory.

8. DTC P1201 P1202 P1203 P1204 P1205 P1206 P1207 P1208 GAS cylinder injector controls from 1 to 8

It is possible to diagnose the following failures:

Signal value under minimum threshold

Possible causes:

1 - Injectors wiring is in short-circuit with negative supply;
2 - Injectors wiring is not connected;
3 - Sequent ECU is faulty;
4 - Injectors are faulty.

Repairing procedure:

1 - Check injectors connectors;
2 - Check the absence of short-circuit between injectors wiring and negative supply;
3 - Check injectors wiring continuity from the injector connector to the gas ECU connector;
4 - Check injectors impedance (between 1 and 2 Ohm);
5 - Replace Sequent ECU;
6 - Replace injectors.

Operation check:

1 - Erase the errors;
2 - Take engine at steady condition until the petrol/gas changeover temperature;
3 - Drive in gas mode with differents load conditions and with RPM < 4000 rpm;
4 - Check errors memory.

Signal value over maximum threshold

Possible causes:

1 - Injectors wiring is in short-circuit with positive supply;
2 - Sequent ECU is faulty;
3 - Injectors are faulty.

Repairing procedure:

1 - Check injectors connectors;
2 - Check the absence of short-circuit between injectors wiring and positive supply;
3 - Check injectors impedance (between 1 and 2 Ohm).;
4 - Replace Sequent ECU;
5 - Replace injectors.

Operation check:

1 - Erase the errors;
2 - Take engine at steady condition until the petrol/gas changeover temperature;
3 - Drive in gas mode with differents load conditions and with RPM < 4000 rpm;
4 - Check errors memory.

9. DTC P1230 Actuators relay control

It is possible to diagnose the following failures:

Signal value under minimum threshold	Signal value over maximum threshold	Not reasonable signal
Possible causes: 1 - Actuators relay wiring is in short-circuit with negative supply; 2 - Actuators relay wiring is not connected; 3 - Relay is faulty; 4 - Sequent ECU is faulty. **Repairing procedure:** 1 - Check actuators relay wiring; 2 - Check the absence of short-circuit between actuators relay wiring and negative supply; 3 - Check actuators relay wiring continuity from its connector to the gas ECU one; 4 - Replace actuators relay; 5 - Replace Sequent ECU. **Operation check:** 1 - Erase the errors; 2 - Start the engine and change over to gas mode; 3 - Check errors memory.	**Possible causes:** 1 - Actuators relay wiring is in short-circuit with positive supply; 2 - Relay is faulty; 3 - Sequent ECU is faulty. **Repairing procedure:** 1 - Check actuators relay wiring; 2 - Check the absence of short-circuit between actuators relay wiring and positive supply; 3 - Replace actuators relay; 4 - Replace Sequent ECU. **Operation check:** 1 - Erase the errors; 2 - Start the engine and change over to gas mode; 3 - Check errors memory.	**Possible causes:** 1 - Actuators relay wiring is in short-circuit with negative supply; 2 - Actuators relay wiring is not connected; 3 - Relay is faulty; 4 - Sequent ECU is faulty. **Repairing procedure:** 1 - Check actuators relay wiring; 2 - Check the absence of short-circuit between actuators relay wiring and positive supply or GND (ground); 3 - Check injectors and solenoid valves connectors; 4 - Replace actuators relay; 5 - Replace Sequent ECU. **Operation check:** 1 - Erase the errors; 2 - Start the engine and change over to gas mode; 3 - Check errors memory.

10. DTC P1231 P1232 P1233 P1234 GAS Solenoid valves [1..4]

It is possible to diagnose the following failures:

Signal value under minimum threshold	Signal value over maximum threshold
Possible causes: 1 - GAS solenoid valves wiring is in short-circuit with negative supply; 2 - GAS solenoid valves wiring is not connected; 3 - Solenoid valves are faulty; 4 - Sequent ECU is faulty. **Repairing procedure:** 1 - Check GAS solenoid valves wiring; 2 - Check the absence of short-circuit between GAS solenoid valves wiring and negative supply; 3 - Check GAS solenoid valves wiring continuity from their connector to the gas ECU one; 4 - Replace GAS solenoid valves wiring; 5 - Replace GAS solenoid valve; 6 - Replace Sequent ECU. **Operation check:** 1 - Erase the errors; 2 - Start the engine and change over to gas mode; 3 - Check errors memory.	**Possible causes:** 1 - GAS solenoid valves wiring is in short-circuit with positive supply; 2 - Solenoid valves are faulty; 3 - Sequent ECU is faulty. **Repairing procedure:** 1 - Check GAS solenoid valves wiring; 2 - Check the absence of short-circuit between GAS solenoid valves wiring and positive supply; 3 - Check GAS solenoid valves wiring continuity from their connector to the gas ECU one; 4 - Replace GAS solenoid valves wiring; 5 - Replace Sequent ECU. **Operation check:** 1 - Erase the errors; 2 - Start the engine and change over to gas mode; 3 - Check errors memory.

11. DTC P1335 RPM or cranckshaft signal

It is possible to diagnose the following failures:

Signal not present

Possible causes:

1 - RPM or crankshaft signal wire is interrupted;
2 - Sequent ECU is faulty;
3 - Short circuit towards positive or negative;
4 - RPM or crankshaft signal wiring is in short-circuit with the supplies.

Repairing procedure:

1 - Check that signal taking point is correct;
2 - Check RPM or crankshaft signal wiring continuity from the connector (or taking point) to the gas ECU connector;
3 - Replace Sequent ECU.

Operation check:

1 - Erase the errors;
2 - Start the engine, change over to gas mode and verify credibility of read values;
3 - Check errors memory.

Signal value over maximum threshold

Possible causes:

1 - Sensor setting is not correct;
2 - Sequent ECU is faulty.

Repairing procedure:

1 - Check setting parameters and correct connection for the RPM signal;
2 - Check RPM wire/wires continuity from the signal or taking point to the gas ECU connector;
3 - Replace Sequent ECU.

Operation check:

1 - Erase the errors;
2 - Start the engine, change over to gas mode and verify credibility of read values;
3 - Check errors memory.

Not reasonable signal

Possible causes:

1 - Sensor setting is not correct;
2 - RPM or crankshaft signal wiring is in short-circuit with the supplies;
3 - Sequent ECU is faulty.

Repairing procedure:

1 - Check that signal taking point is correct;
2 - Check the RPM or crankshaft signal setting;
3 - Check the absence of short-circuit between RPM or cranckshaft signal wiring and the supplies;
4 - Replace Sequent ECU.

Operation check:

1 - Erase the errors;
2 - Start the engine, change over to gas mode and verify credibility of read values;
3 - Check errors memory.

12. DTC P1420 POSTCAT lambda oxigen sensor (signal)

It is possible to diagnose the following failures:

Signal value over maximum threshold

Possible causes:

1 - POSTCAT signal wire is in short with positive supply;
2 - Sequent ECU is faulty;
3 - POSTCAT sensor is faulty.

Repairing procedure:

1 - Check lambda oxygen sensor signal had been correctly taken;
2 - Check the absence of short-circuit between POSTCAT signal wire and positive supply;
3 - Replace Sequent ECU;
4 - Replace POSTCAT sensor.

Operation check:

1 - Erase the error;
2 - Start the engine and change over from petrol to gas mode;
3 - Verify the credibility of read values;
4 - Driving in gas mode at least for 10 km with medium load;
5 - Check errors memory.

Not reasonable signal

Possible causes:

1 - POSTCAT signal wire is not connected;
2 - Sensor setting is not correct;
3 - Sequent ECU is faulty;
4 - POSTCAT sensor is faulty.

Repairing procedure:

1 - Check lambda oxygen sensor signal had been correctly taken;
2 - Check POSTCAT signal wire continuity from its connector (or signal taking point) to gas ECU collector;
3 - Check sensor setting;
4 - Replace Sequent ECU;
5 - Replace POSTCAT sensor.

Operation check:

1 - Erase the error;
2 - Start the engine and change over from petrol to gas mode;
3 - Verify the credibility of read values;
4 - Driving in gas mode at least for 10 km with medium load;
5 - Check errors memory.

13. DTC P1460 Gas level sensor

It is possible to diagnose the following failures:

Signal value over maximum threshold

Possible causes:

1 - Level sensor wiring is interrupted;
2 - Level sensor wiring is in short-circuit with positive supply;
3 - Sensor setting is not correct;
4 - Level sensor is faulty;
5 - Error due to another device failure (see Repairing procedure);
6 - Sequent ECU is faulty.

Repairing procedure:

1 - Check level sensor connector;
2 - Check the absence of short-circuit between level sensor wiring and positive battery;
3 - Check level sensor wiring continuity up to the gas ECU connector;
4 - Check level sensor setting;
5 - Check BRC sensor installed be the suitable one;
6 - If you have an error on the sensor supply tension, follow the same indications suitable for error P1608;
7 - Replace level sensor.
8 - Replace Sequent ECU.

Operation check:

1 - Erase the errors;
2 - Start the engine, change over to gas mode and verify credibility of read values;
3 - Check errors memory.

Signal value under minimum threshold

Possible causes:

1 - Level sensor wiring is in short-circuit with the ground;
2 - Sensor setting is not correct;
3 - Level sensor is faulty;
4 - Error due to another device failure (see Repairing procedure);
5 - Sequent ECU is faulty.

Repairing procedure:

1 - Check level sensor connector;
2 - Check the absence of short-circuit between level sensor wiring and ground;
3 - Check level sensor wiring continuity up to the gas ECU connector;
4 - Check level sensor setting;
5 - Check BRC sensor installed be the suitable one;
6 - If you have an error on the sensor supply tension, follow the same indications suitable for error P1608;
7 - Replace level sensor.
8 - Replace Sequent ECU.

Operation check:

1 - Erase the errors;
2 - Start the engine, change over to gas mode and verify credibility of read values;
3 - Check errors memory.

14. DTC P1560 Battery voltage

It is possible to diagnose the following failures:

Signal value over maximum threshold	Signal value under minimum threshold
Possible causes: 1 - Battery voltage is too high (> 16V); 2 - Battery voltage has been taken in a wrong point; 3 - Ground reference has been taken in a wrong point; 4 - Sequent ECU is faulty. **Repairing procedure:** 1 - Check battery supply wiring; 2 - Check supply wiring continuity (positive battery and ground) from the taking point to the gas ECU connector; 3 - Check battery voltage with a voltmeter; 4 - Replace Sequent ECU. **Operation check:** 1 - Erase the errors; 2 - Start the engine, change over to gas mode and verify credibility of read values; 3 - Check errors memory.	**Possible causes:** 1 - Battery voltage is too low (< 6V); 2 - Battery voltage has been taken in a wrong point; 3 - Ground reference has been taken in a wrong point; 4 - Sequent ECU is faulty. **Repairing procedure:** 1 - Check battery supply wiring; 2 - Check supply wiring continuity (positive battery and ground) from the taking point to the gas ECU connector; 3 - Check battery voltage with a voltmeter;; 4 - Replace Sequent ECU. **Operation check:** 1 - Erase the errors; 2 - Start the engine, change over to gas mode and verify credibility of read values; 3 - Check errors memory.

15. DTC P1608 Sensors supply tension

It is possible to diagnose the following failures:

Signal value over maximum threshold	Signal value under minimum threshold
Possible causes: 1 - Sensors supply tension is too high (> 6V); 2 - Sensors supply wiring is in short-circuit with positive battery (it involves an error recording on every sensor); 3 - Sequent ECU is faulty (it involves an error recording on every sensor). **Repairing procedure:** 1 - Check sensors supply tension wiring; 2 - Check sensors supply tension wiring from gas ECU to the different sensors connectors; 3 - Check gas ECU fuses continuity; 4 - Check sensors supply tension coming out from the gas ECU with a voltmeter; 5 - Replace Sequent ECU. **Operation check:** 1 - Erase the errors; 2 - Start the engine, change over to gas mode and verify credibility of read values; 3 - Check errors memory.	**Possible causes:** 1 - Sensors supply tension is too low (< 4V); 2 - Sensors supply wiring is in short-circuit with ground (it involves an error recording on every sensor); 3 - Sequent ECU is faulty (it involves an error recording on every sensor). **Repairing procedure:** 1 - Check sensors supply tension wiring; 2 - Check sensors supply tension wiring from gas ECU to the different sensors connectors; 3 - Check gas ECU fuses continuity; 4 - Check sensors supply tension coming out from the gas ECU with a voltmeter; 5 - Replace Sequent ECU. **Operation check:** 1 - Erase the errors; 2 - Start the engine, change over to gas mode and verify credibility of read values; 3 - Check errors memory.

16. DTC P1650 Gas/petrol changeover switch signal
It is possible to diagnose the following failures:

Signal value over maximum threshold

Possible causes:
1 - Changeover switch signal wire is in short-circuit with negative supply;
2 - Changeover switch signal wire is not connected;
3 - Gas/Petrol changeover switch is faulty;
4 - Sequent ECU is faulty;
5 - Error due to another device failure (see Repairing procedure).

Repairing procedure:
1 - Check gas/petrol changeover switch connector.
2 - Check the absence of short-circuits between changeover switch wire and supply wires;
3 - Check changeover switch wire continuity from its connector up to the gas ECU connector;
4 - If you have an error on the sensor supply tension, follow the same indications suitable for error P1608;
5 - Replace gas/petrol changeover switch.
6 - Replace Sequent ECU.

Operation check:
1 - Erase the error;
2 - Start the engine and change over to gas mode;
3 - Check errors memory.

Not reasonable signal

Possible causes:
1 - Changeover switch signal wire is in short-circuit with supply;
2 - Changeover switch signal wire is not connected;
3 - Gas/Petrol changeover switch is faulty;
4 - Sequent ECU is faulty;
5 - Error due to another device failure (see Repairing procedure).

Repairing procedure:
1 - Check the absence of short-circuit between changeover switch wiring and supply;
2 - Check changeover switch wiring continuity;
3 - Check changeover switch wiring connector;
4 - Replace changeover switch.

Operation check:
1 - Erase the error;
2 - Start the engine and change over to gas mode;
3 - Check errors memory.

7. NOMENCLATURE

Absolute pressure: Pressure measured with reference (value=0) to the perfect vacuum.
Battery positive: The pole with higher electric potential of the vehicle battery. Normally it has a voltage between 8 and 16V compared to the ground (see "**Ground**").
Bottom Feed: See "Top Feed". Particular type of injector, in which path fuel only involves the injector bottom part.
CAN Bus: Communication system between ECUs and devices installed on a vehicle.
Cartography: See "**Mapping**"
Catalyst: Device installed on the exhaust duct in order to reduce the polluting emissions.
Changeover switch: It is the device situated in the passenger compartment which allows to choose the fuel type (gas or petrol).
Changeover to Petrol at idle: Strategy which allows the vehicle re-changeover from Gas to Petrol under a predefined RPM threshold. Petrol stay is not definitive but it has two outlet threshold, one on the time and one on the RPM, that you can both set up from interface.
Changeover to Petrol in Cut-Off: Strategy that allows to make petrol injections every time it go out from the Cut-Off condition, both for return to idle and for a tip-in. From the program you can set up the RPM threshold useful to have a valid changeover condition, and the numbers of petrol injections made by the system before the automatic re-changeover to gas.
Close-Loop: Engine working condition where petrol ECU modifies the carburation according to the signal read by the Lambda oxigen sensor. In this condition ECU searches for the stoichiometry and, because of a not correct gas mapping, it should modify the self-mapping parameters and therefore turns the CHECK indicator on.
Cold strategy: Strategy which allows the gas calibration correction when the vehicle is still cold. You can modify from interface both the Flow correction and the temperature spread in which you can correct the calibration.
Connector: Device which connects wirings parts with other wiring parts or with electric devices.
Crankshaft (sensor): Sensor installed near a gearwheel supportive with the drive shaft; it produces an electric signal that represents the drive shaft position.
Cut-Off: Particular engine working condition where injectors don't supply fuel to the cylinder, so that they intake pure air. Normally, you are in cut-off during a tip-out, with possible vehicle deceleration (engine brake), starting from rpm not too low.
Delta-P: Value calculated from the difference between the P1 (pressure inside gas rail) and the MAP (pressure inside the manifold). This parameter allows to recognize the failed supply condition. If Delta-P value decreases under the Delta-P Minimum set up in Changeover, vehicle re-changes over to petrol for end of gas.
Diagnostic: Identification process of cause or nature of a problem, a failure, or of a particular condition /situation to find and indicate as wrong working.
Duty Cycle: In a rectangular wave-shape is the proportion between the high level duration and the wave-shape period. In formulas, if Ton is the high level duration and Toff is the low level duration, then Tp = Ton + Toff is the period and DC = Ton / Tp = Ton / (Ton+Toff) is the Duty Cycle.
ECU: It is the Electronic Control Unit of the engine or of the gas carburation.
EOBD: See "OBD". European On Board Diagnostics. European implementation of OBD systems, regulated from institutions as ISO.
Flow: Physical measure that defines the fluid quantity passing through a specific section in a time unit. Mass flow defines, for instance, how many grams of a fluid pass through a specific section in a second.
Fuel Injectors: See "Rail" It is the element on which injectors are installed; thanks to this element, the gas at the required pressure can be opportunely supplied at every injector inlet.

Gas Injection Strategy in Cut-Off: Only for Sequent24. Strategy which allows the gas injectors advance opening while vehicle is still in Cut-Off condition. You can set up RPM threshold and Gas Injection Time from interface. Ex. 3 ms under the 2000 rpm.
Ground: Reference electric potential (relative tension amounting to zero Volt). It is also the mass of wires and electric conductor connected to this potential. Ground potential is on the negative pole (that's to say at the lower electric potential) of the vehicle battery, so that it's called battery ground too.
Injector: Device which supplies accurate measured quantities of fuel in pressure, injecting them in the intake manifold.
K line: Communication line of engine ECU towards the external diagnostic instrument, according to ISO 9141 e ISO 14230 regulations.
Lambda Oxigen Sensor: Sensor measuring the oxigen concentration in the exhaust gas. Thanks to this sensor the ECU determines if air/fuel mix is too rich or too poor in fuel, permitting the system closed loop working.
LED: Light Emitting Diode. Semiconductor electronic device that can glow if crossed by electric current.
LPG: Liquefied Petroleum Gas. It is a fuel coming from petroleum distillation, essentially made up of Butane and Propane in variable proportions. You can find it in gaseous state at ambient temperature and pressure, whereas it is liquid inside the tank.
Magnetic loop: Magnetic flow path, usually made of iron or other iron-magnetic material. It is part of an electromagnetic device (solenoid valve, injector, electric engine, and so on).
Mapping/Map: It is the mass of data that defines fuel quantity to dose in accordance with the engine working conditions.
MAP: (Manifold Absolute Pressure) Absolute pressure of the engine intake manifold (see Absolute pressure). It indicates the relative sensor too.
Multivalve: Device situated on the tank that performs different functions, controlling the tank filling, the fuel level, the security protection,and so on.
OBD (On Board Diagnostics): See also "**Diagnostic**". Monitoring system of all or some inlet and ECU signal control. If it finds one or more signals over the predefined threshold, it informs and records the system/systems bad working.
Open-Loop: Engine working condition where petrol ECU doesn't consider anymore the signal read by Lambda oxigen sensor. You normally have this condition when you ask to the engine a complete power. ECU enriches carburation in full load searching for the better performance and in order to decrease temperature inside the catalyst.
OR: (O-Ring) Gasket made up of a rubber ring.
PC: Personal Computer
Peak & Hold (piloting): See also "**Piloting**". Particular injectors piloting that supplies to the coil early a bigger current in the opening phase, so that it can reduces the injector opening time (peak); then current goes down to a value enough to maintain the injector open (hold).
Piloting: It shows action and way with which electric actuators are controlled by the ECU or other electric device, through power electric signals.
Positive under key: Tension or electric knot situated before the switch activated by the vehicle ignition key. Normally it has a low potential; it reaches the battery positive potential when you turn the key off.
POSTCAT Lambda Oxigen Sensor: Lambda Oxigen Sensor situated after the catalyst.
PRECAT Lambda Oxigen Sensor: Lambda Oxigen Sensor situated before the catalyst.
Pressure differential: Pressure difference between two zones, for instance between the intake manifold and the atmospheric pressure.
Relative pressure: Pressure measured with reference (value=0) to the atmospheric pressure.
Relay: Electromechanic device that can open or close one or more electric contact after appropriate electric piloting.
RPM: Acronym for revolutions per minute. It usually indicates drive shaft rotation speed.
RPM Decrease Strategy: Strategy which allows to modify the mapping in condition of return to idle. You can set up Flow correction and strategy work time from interface.

Sensor: Device measuring a physical quantity value as temperature, pressure, speed, and it converts it in electric signal useful to the ECU or to another electric device.
Sequential injection: Injection management system of a modern vehicle with fuel electronic injection; here the injection phase of every cylinder starts and ends according to indipendent times for everyone of them. The engine ECU verifies these times and correlates them with the cylinder phase and position.
Solenoid valve: Electromechanic device that stops a fluid flow. In our case, this device stops gas flow when it's not supplied, otherwise it lets the gas flow.
Three-way catalyst: Catalyst that reduces the HC, CO and NOx values.
Throttle Valve: Valve that regulates the air flow intook from the engine. Normally is controlled from the accelerator pedal but nowadays it is controlled directly from the petrol ECU more and more.
TonG: Gas Injection Time. It shows how long the gas injector stays open in order to supply the required gas flow..
TonMinGas: Parameter situated in Map Refinement/Other. It shows the TonP at idle in gas mode. The system considers this value in order to recognize its work mode during the map control: at idle (TonP = TonMinGas) or running (TonP > TonMinGas). Value is calculated automatically during the self-mapping, but you can correct it after checking the mapping at idle.
TonP: Petrol Injection Time. It shows how long the petrol injector stays open in order to supply the right calibration.
Top Feed: See "Bottom Feed". Particular type of injector, in which path fuel passes through the whole lenght of the injector in an axial way, arriving from the top and being injected in the low part of the device.
TPS: Throttle Valve Position Sensor. It supplies an electric signal that shows the throttle valve opening (see "**Throttle Valve**").
Wiring: It is the mass of wires going from the ECU connector to all the other system wiring points.