Service Manual

Repairs and maintenance

Section 3 (34)

Ignition systems

240, 260
1975–

VOLVO

Volvos are sold in versions adapted for different markets. These adaptations depend on many factors including legal, taxation and market requirements.

This manual may therefore show illustrations and text which do not apply to cars in your country.

Group 34 Ignition system

Contents

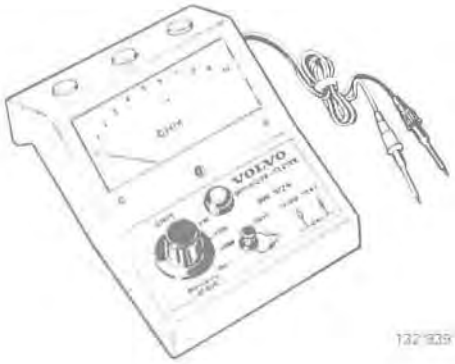
Index page 79

Indicates revised information: |

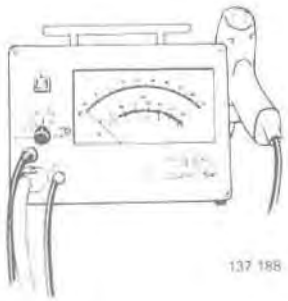
Order number: TP 30432/2

Special tools

999	Description—Use
9724	**Ohm-Diode Tester**
9921	**Monotester** – Dwell angle, ignition setting
9940	**Stroboscope** – Ignition setting
5275	**Flywheel Adapter** – Ignition setting MY 1984–



132 939



137 188

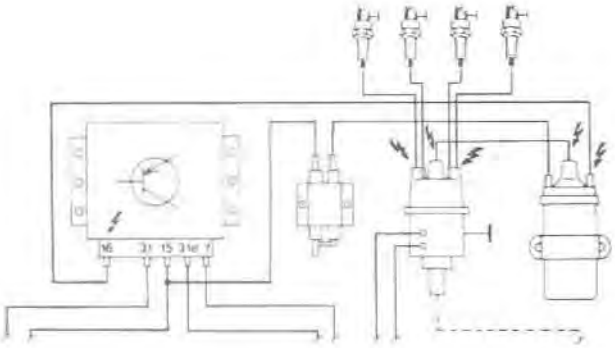
Ignition system – general instructions

137 524

Measuring resistance

Before measuring the resistance of a component make sure that all leads have been disconnected from it.

Resistance values specified in this manual apply at 20°C (68°F).


136 453

Electronic ignition systems

Electronic ignition systems operate at very high voltages – often in excess of 30 000 V. Such high voltages are a danger to life and special precautions must be taken when working on vehicles so fitted.

The ϟ symbol used throughout this manual indicates terminals where dangerous high voltages can be expected.


137 190

USA/Canada

-1980: VC 244 45 L 1000000

1981-: YV1 AX 45 4X B 1000000

Other markets

-1980: 245 45 L 1000000

1981-: YV1 244 46 1B 1000000

137 189

Engine type and model year designation

11 = B 317 (B 20 1975–76)

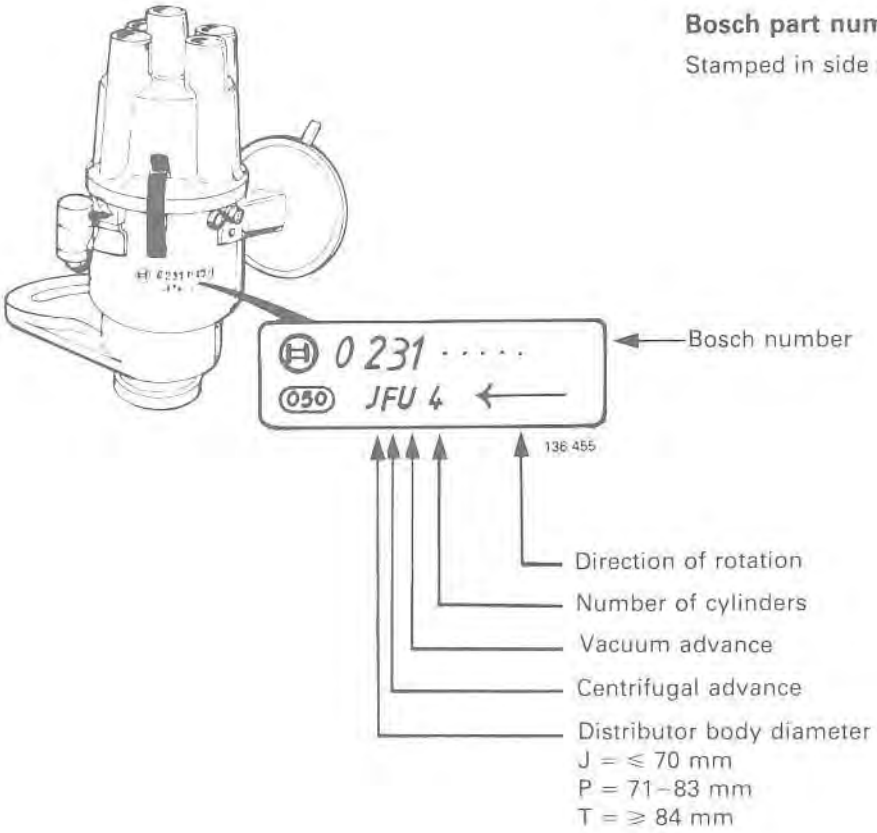
2 = B 19
21 = A
24 = E
26 = E-Turbo

4 = B 21
41 = A
44 = E
45 = F (5)
46 = E-Turbo
47 = F-Turbo
48 = F (8)
49 = F (9)

6 = B 27 (1975–79)
61 = A
64 = E (–1980)
65 = F

6 = B 28 (1980–)
62 = A
68 = E (1981–)
69 = F

8 = B23/B230
81 = A
84 = E
88 = F

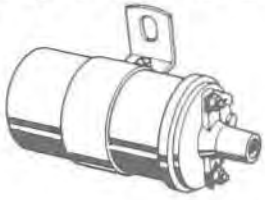


Bosch part numbers

Stamped in side of distributor body.

Specifications
Ignition system with contact breaker
B 20 A, B 17–B 23 A

Ignition coil



131 753

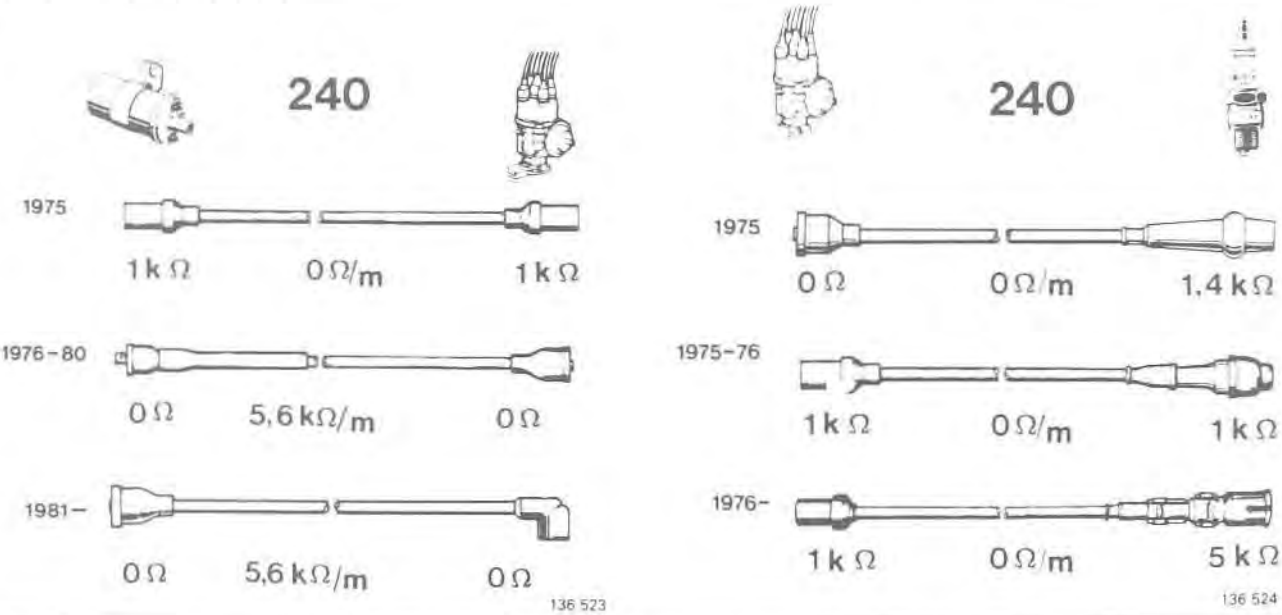
	A-engines –1978	A-engines 1979–
Resistance of primary coil (across terminals 1(–) and 15(+))	2.85±0.15 Ω	1.9±0.1 Ω
Resistance of secondary coil (across terminals 1(–) and HT terminal)	9.5±2.5 kΩ	9.5±1.5 kΩ
Ballast resistor	–	1.3±0.1 Ω (0.9±0.1 Ω early 79)

Spark plugs

137 530

B 20	Bosch W 7 B
B 17–B 23	Bosch W 7 DC
Electrode gap	0.7–0.8 mm
Tightening torque (unoiled plug)	25±5 Nm (18±3.5 ft.lbs)

High tension leads*



136 523 136 524

*Note: *Resistance values are given in K Ω -per-meter of length. (Measure lead in order to compute correct value.) All values have a permissable tolerance of ± 20%.*

Rotor

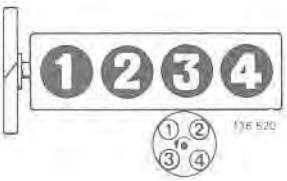
Resistance ..... 5±1 kΩ

134 578

Firing order

B 20

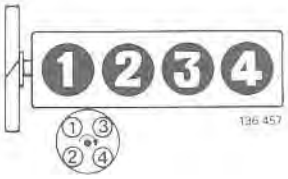
1-3-4-2



136 520

B 17–B 23

1-3-4-2



136 457

Ignition setting

With effect from 1976, vehicles for Sweden, Australia, USA and Canada (also Switzerland 1983-models) have details of ignition setting stamped on a plate to left of engine compartment.

Ignition setting (before T.D.C., vacuum control unit disconnected)				
Engine type	**Model year/Market**		**11.7–13.3 r/s** 700–800 r/min	**41.7 r/s** 2500 r/min
B 17 A	1979–84		12°	28–32°
B 19 A	1977[1]		15°	32–36°
	1978	Italy	15°	32–36°
	1978–80	Other markets	12°	28–32°
	1981–84		10°	26–30°
B 19 K			7°	17–23°
B 20 A	1975–76		10°	23–27°
B 21 A	1975		12°	24–28°
	1976–77[1]		15°	32–36°
	1978	Sweden[3]	12°	28–32°
		Other markets	15°	32–36°
	1979–80[2]		12°	28–32°
	1981	Scandinavia, Australia	10°	26–32°
		Other markets	12°	28–32°
	1982–83	Scandinavia, Australia	10°	26–32°
		Canada	7°	24–30°
		Other markets	12°	28–32°
	1984	Scandinavia, Switzerland	10°	20–26°
		Australia	10°	26–32°
		Europe	7°	17–23°
		Canada	7°	24–30°
B 23 A	1981–82	Scandinavia[4]	7°	21–26°
	1982	Other markets	5°	19–24°
	1983–84	Europe	7°	17–22°
		Overseas	5°	19–24°

Special vehicles

[1] Sweden: 245 with BW 35, BW 55, M 46 and special vehicles ..... 10°

[2] 1979–80: Sweden, Overseas with engine types 498 755 and 498 811 and special vehicles with manual gearbox ..... 10°
Special vehicles with automatic gearbox ..... 8°

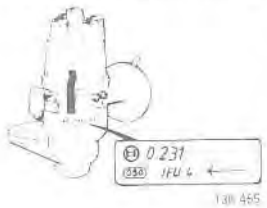
[3] 240 with engine type 498 528 ..... 15° and 32–36°

[4] Ignition setting can be retarded to 5° if, despite using 98 octane fuel, engine is prone to pre-ignition (knocking).
Special vehicle refers to heavy vehicle types such as 245 GL with automatic transmission.

Distributor

Engine type	Model year	Market (Applies to all markets unless otherwise stated)	Bosch No.	Volvo No.
B 17 A	1979–80		0 231 176 103	1 266 478
	1981–84		0 185	1 219 661
B 19 A	1977		0 185	1 219 661
	1978	Italy	0 185	1 219 661
		Other markets	6 103	1 266 478
	1979		6 103	1 266 478
	1980	Thailand, Malaysia, Indonesia	0 185	1 219 661
		Other markets	6 103	1 266 478
	1981–84		0 185	1 219 661
B 19 K	1984		0 302	1 332 410
B 20 A	1975–76		0 085	462 657
B 21 A	1975		0 134	463 692
			0 173	1 219 625
	1976–77		0 185	1 219 661
	1978	Sweden, Canada	6 103	1 266 478
		Other markets	0 185	1 219 661
	1979	Sweden, Australia, Canada, Overseas	6 103	1 266 478
		Other markets (incl. Thailand, Indonesia)	0 185	1 219 661
	1980	Sweden, Australia, Canada, Overseas	6 103	1 266 478
		Other markets (incl. Malaysia, Thailand, Indonesia)	0 185	1 219 661
	1981–83	Canada	6 103	1 266 478
		Sweden, Australia (1982– also Switzerland, Canada)	0 284	1 306 792
		Other markets	0 185	1 219 661
	1984	Europe	0 302	1 332 410
		Australia, Canada	0 284	1 306 792
B 23 A	1981–82		0 287	1 306 872
	1983–84	Europe	0 302	1 332 410
		Other markets	0 287	1 306 872

Ignition setting

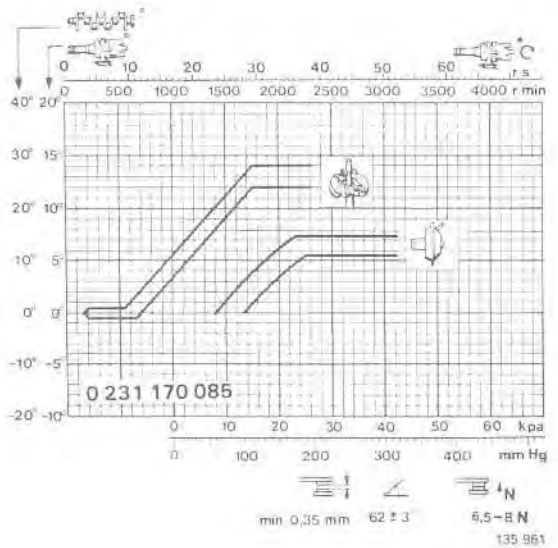


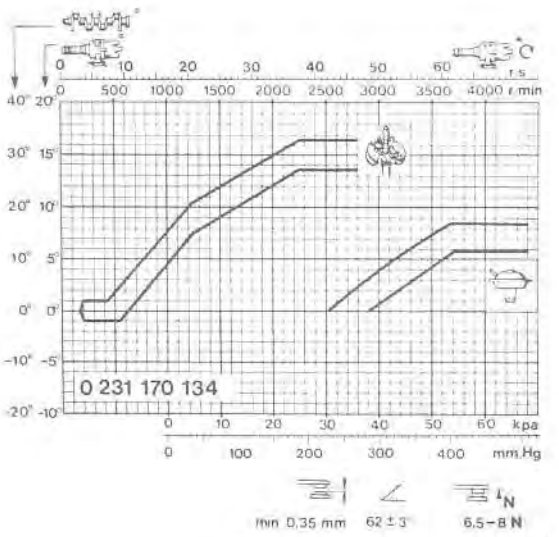
Bosch number at bottom left of diagrams is stamped in distributor body.

Diagram key:

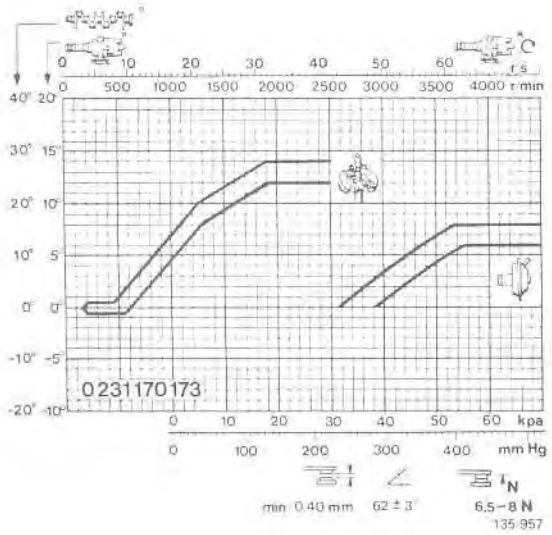
Variation of ignition setting with vacuum

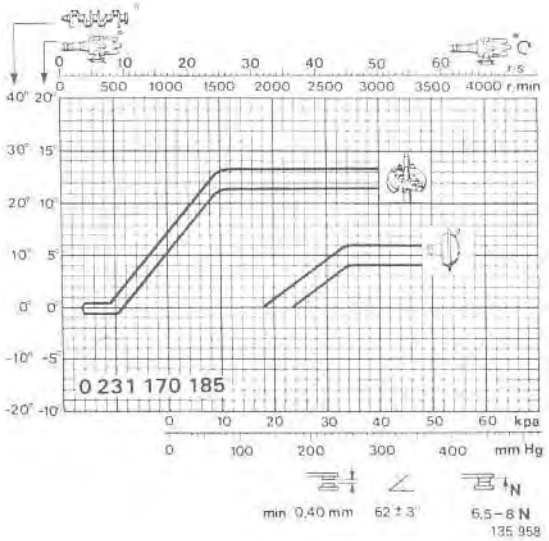
Variation of ignition setting with engine rpm

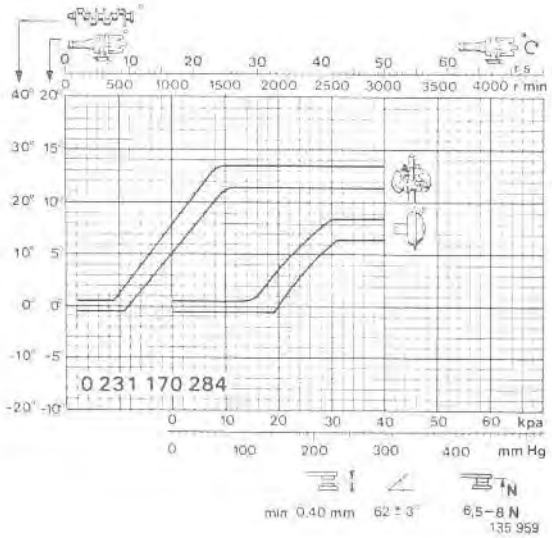


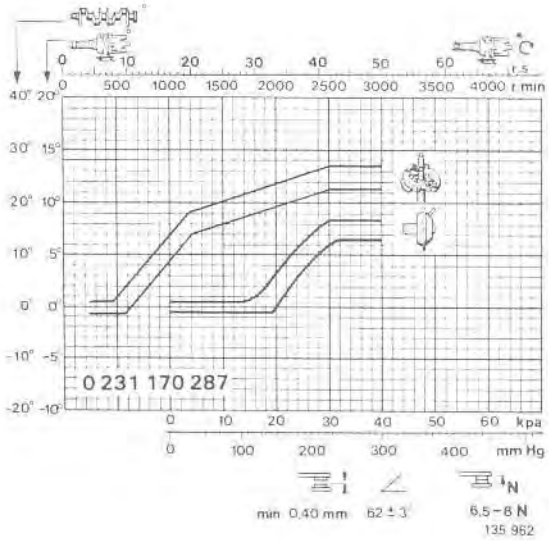


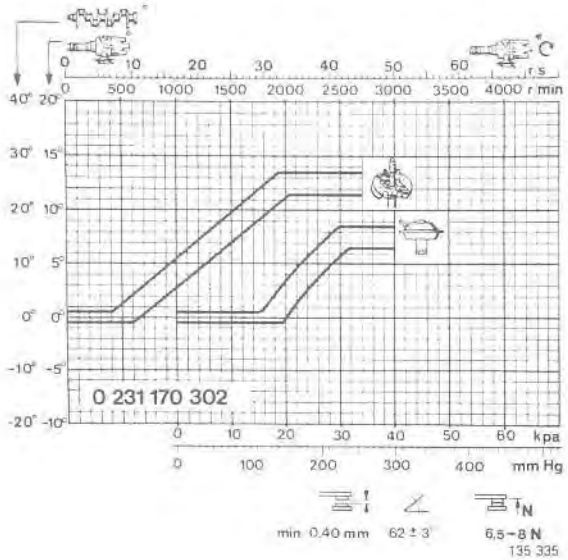
Ignition setting graphs

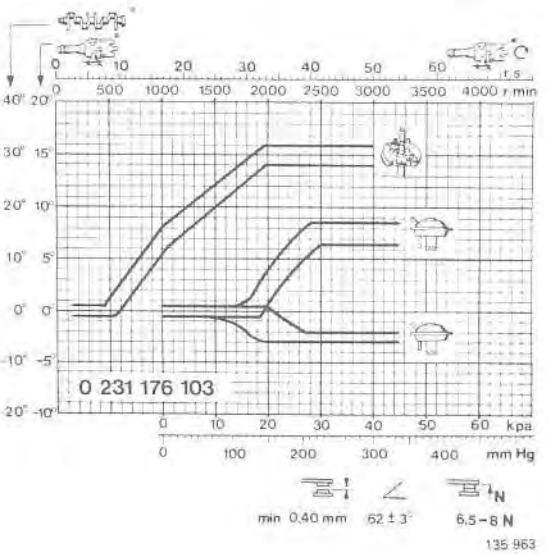












Bosch no.	0231 170 085	0231 170 134	0231 170 173	0231 170 185	0231 176 103	0231 170 284	0231 170 287	0231 170 302
Volvo no.	462 657	463 692	1219 625	1219 661	1 266 478	1 306 792	1 306 872	1 332 410
Direction of rotation	Anti-clockwise	Clockwise	Clockwise	Clockwise	Clockwise	Clockwise	Clockwise	Clockwise
Contact breaker gap, mm	min. 0.35	min. 0.40	min. 0.40	min. 0.40	min. 0.40	min. 0.40	min. 0.40	min. 0.40
Dwell angle at 8.3 r/s (500 r/min)	62±3°	62±3°	62±3°	62±3°	62±3°	62±3°	62±3°	62±3°
Contact pressure, N	*6.5–8	*6.5–8	*6.5–8	*6.5–8	*6.5–8	6.5–8.0	6.5–8.0	6.5–8.0
(kp)	(0.65–0.80)	(0.65–0.80)	(0.65–0.80)	(0.65–0.80)	(0.65–0.80)	(0.65–0.80)	(0.65–0.80)	(0.65–0.80)

*1978: B 19 A Italy, B 21 A excluding Sweden.

Centrifugal governor

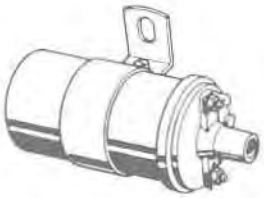
Total advance, distrib. degrees	13±1	15±1	13±1	12,5±1	15±1	12.5±1	12.5±1	12.5±1
Advance begins at distrib. r/s	9.2–10.8	7.1–9.6	7.5–9.2	7.5–9.2	6.7–10	7.5–9.2	7.7–9.6	6.7–10
(distrib. r/min)	(550–650)	(425–575)	(450–550)	(450–550)	(400–600)	(450–550)	(460–575)	(400–600)
DATA								
5° at distrib. r/s	15.8–19	13.8–16.7	14.2–17.5	13.3–16.3	13–14.3	13.0–16.5	13.8–17.3	15.8–20.8
(distrib. r/min)	(950–1 140)	(830–1 000)	(850–1 050)	(800–975)	(780–860)	(780–990)	(825–1 040)	(950–1 250)
10° at distrib. r/s	23.2–26.3	20.8–28.0	20.8–26.7	20–22.9	20.8–25.2	19.3–22.8	24.0–35.5	25.8–30.8
(distrib. r/min)	(1 390–1 580)	(1 250–1 680)	(1 250–1 600)	(1 200–1 375	(1 250–1 510)	(1 160–1 370)	(1 440–2 130)	(1 550–1 850)
Max. advance at distrib. r/s	29.2	37.5	31.7	25.8	33.3	25	41.6	33.3
(distrib. r/min:	(1 750)	(2 250)	(1 900)	(1 550)	(2 000)	(1 500)	(2 500)	(2 000)

Vacuum control

Direction of control	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive
Total control, distrib. degrees	6.5±1	7±1	7±1	5±1	7.5±1	7.5±1	7.5±1	7.5±1
Control begins at mm Hg	60–100	230–300	235–290	135–180	110–145	110–150	110–145	110–150
Data:								
2° at mm Hg	85–130	–	275–320	175–215	130–170	130–170	135–170	135–170
5° at mm Hg	130–180	320–400	335–390	–	165–210	165–210	165–215	170–210
Max. control at mm Hg	175–185	400	400–410	255–265	220	220–230	230–240	220–240
Direction of control	–	–	–	–	Negative	–	–	–
Total control, distrib. degrees	–	–	–	–	2,5±0,5	–	–	–
Control starts at mm Hg	–	–	–	–	80–160	–	–	–
Data:								
1° at mm Hg	–	–	–	–	95–180	–	–	–
Max. control at mm Hg	–	–	–	–	200	–	–	–

Specifications
Breakerless ignition system
B 20 F, B 19 E, ET, B 21 E, ET, F, FT, B 23 E, B 27 A, E, F, B 28 A, E, F

Ignition coil



131 753

	B 20, B 19–B 23	B 27/B 28
Resistance of primary coil across terminals 1(−) and 15(+)	1.9±0.1 Ω	0.5±0.1 Ω
Resistance of secondary coil terminal (across terminals 1(−) and HT)	9.5±1.5 kΩ	9.5±1.5 kΩ
Ballast resistor	0.9±0.1 Ω	1±0.1 Ω

Spark plugs

4-cyl engines

B 20 F	–1976	Bosch W 6 B
B 19 E, B 21 E	1975–84	Bosch W 6 DC
B 19 ET, B 21 ET		Bosch W 6 DC
B 21 F	1976–79	Bosch W 7 DC
	1980–82 USA	Bosch WR 7 DS
	1980–84 Others	Bosch W 7 DC
B 21 FT	1981–85	Bosch WR 7 DS
B 23 E	1979–80	Bosch W 5 DC
	1981–84	Bosch W 6 DC

137 530

Electrode gap	0.7–0.8 mm
Tightening torque (unoiled plug)	25±5 Nm (18±3.5 ft.lbs)

6-cyl engines

B 27 A	1975–79	Bosch H 6 D
B 27 E	1975–78	Bosch H 6 D
	1979–80	Bosch H 5 D
B 27 F	1976–79	Bosch H 6 D
B 28 A and E	1980–84	Bosch H 6 D
B 28 F	1980–84 USA	Bosch HR 6 DS
	1980–84 Others	Bosch H 6 D

137 529

Electrode gap	0.6-0.7 mm
Tightening torque (unoiled plug)	12±2 Nm (8.7±1.5 ft.lbs)

Rotor

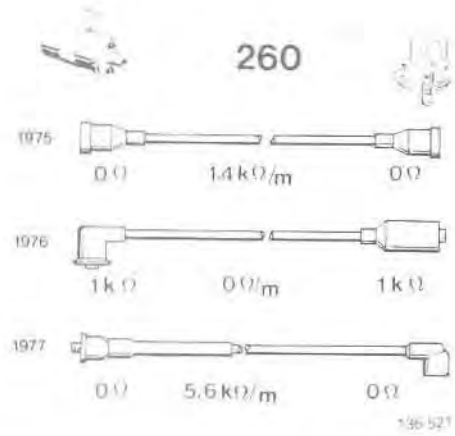
Resistance ..... 5±1 kΩ

134 578

High tension leads*

136 523

136 524



136 521

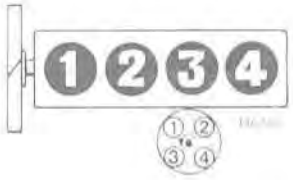
136 522

*Note: *Resistance values are given in K Ω -per-meter of length. (Measure lead in order to compute correct value.) All values have a permissable tolerance of ± 20%.*

Firing order

B 20

1-3-4-2

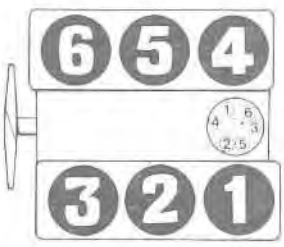


B 19–B 23

1-3-4-2

B 27, B 28

1-6-3-5-2-4



Ignition setting (before T.D.C. with vacuum control unit disconnected)

With effect from 1976, vehicles for Sweden, Australia, USA and Canada (also Switzerland 1983-models) have details of ignition setting stamped on a plate to left of engine compartment.

4-cyl E-engines

Engine type	Model year/market	Notes	11.7–13.3 r/s 700–800 r/min	41.7 r/s 2 500 r/min
B 19 E	1977–83 1984		8° 10°	28–33° 24–28°
B 19 ET	1982–84		15°	21–26°
B 21 E	1975–82 [1]		8°	28–33°
B 21 ET	1981–84		15°	21–26°
B 23 E	1979–82 1983 Canada Other markets 1984		5° 10° 5° 10°	25–30° 25–29° 25–30° 25–29°

[1] 1976 - 80: Australia, Sweden Special vehicles 5

4-cyl F-engines

B 20 F	1975		5°	20–25°
B 21 F	1976 1977 USA Other markets 1978 1979 California, Japan Other markets 1980 Canada Other markets 1981–84 Japan 1981 USA	Adjust at 15 r/s (900 r/min)	15° 12° 15° 12° 8° 10° 10° 8° 8° 8°	25–30° 28–32° 25–30° 28–32° 22–26° 26–30° 24–28° 22–26° 22–26°
B 21 FT	1981–85	Adjust at 15 r/s (900 r/min)	12°	26–30°

6-cyl A and E-engines

B 27 A	1975–79		10°	22–25°
B 28 A	1980–84		10°	22–25°
B 27 E	1975 1976 Sweden, Australia Other markets 1977–78 1979–80		10° 10° 10° 10° 10°	30–34° 22–26° 30–34° 30–34° 25–29°
B 28 E	1981–82 1983–84		10° 12°	25–29° 27–31°

[1] 1978: Sweden, Australia, Special vehicles 8

6-cyl F-engines

B 27 F	–1976 1977 California Other markets 1979		10° 7° 10° 10°	27–32° 20–24° 27–32° 20–24°
B 28 F	1980–82	Adjust at 15 r/s (900 r/min) Applies to: 1981: California, Japan 1982: All	10°	20–24°

Distributor

4-cyl E-engines

Engine type	Model year	Description	Bosch P/N 0 237 00. . . .	Volvo P/N
B 19 E	1977–83		2 017	1 219 957
	1984		2 039	1 276 403
B 19 ET	1982–84		3 027	1 276 701
B 21 E	1975		2 001	463 832
	1976	Sweden, Australia	2 010	1 219 662
		Other markets	2 001	463 832
	1977–80	Sweden, Australia (Overseas 1979–)	2 010	1 219 662
		Other markets (incl. Thailand 1979–)	2 017	1 219 957
	1981–82		2 017	1 219 957
B 21 ET	1981–84		3 027	1 276 701
B 23 E	1979–82		2 017	1 219 957
	1983	Canada	2 039	1 276 403
		Other markets	2 017	1 219 957
	1984		2 039	1 276 403

4-cyl F-engines

B 20 F	1975	BW 35 (California: to engine no. 500)	2 003	462 762
		M 40/M 41 (California: to engine no. 500)	2 002	462 896
		California BW 35 (engine no. 501-)	2 009	1 218 672
		California M 40/M 41 (engine no. 501-)	2 008	1 218 671
B 21 F	1976	USA	2 007	463 694
			3 003	1 219 848
	1977	Canada, Japan	2 007	463 694
	1978	California, Canada, Japan	3 009	1 266 466
		Other markets	3 003	1 219 848
	1979	California, Japan (Canada –1980)	2 039	1 276 403
		Other markets	2 038	1 266 904
	1980–81	USA (Canada 1981–82)	2 039	1 276 403
	1980–84	Japan	2 039	1 276 403
B 21 FT	1981–84		3 024	1 276 703

6-cyl A and E-engines

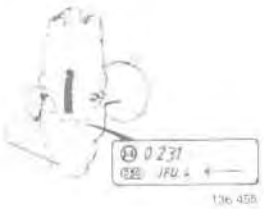
Engine type	Model year	Description	Bosch P/N 0 237 40. . . .	Volvo P/N
B 27 A	1975–79		2 006	269 995
B 27 E	1975		2 001	269 323
	1976	Sweden, Australia	2 005	269 565
		Other markets	2 001	269 323
	1977–78	Sweden, Australia	2 005	269 565
		Other markets	2 007	269 733
	1979–80		2 013	1 269 191
B 28 A	1980–84		2 006	269 995
B 28 E	1981–84		2 013	1 269 191

6-cyl F-engines

B 27 F	–1976		2 004	269 134
	1977–78	Japan, Canada	2 004	269 134
		USA	6 001	269 739
	1979		6 004	1 269 291
B 28 F	1980–84		2 017	1 269 380

Ignition setting graphs

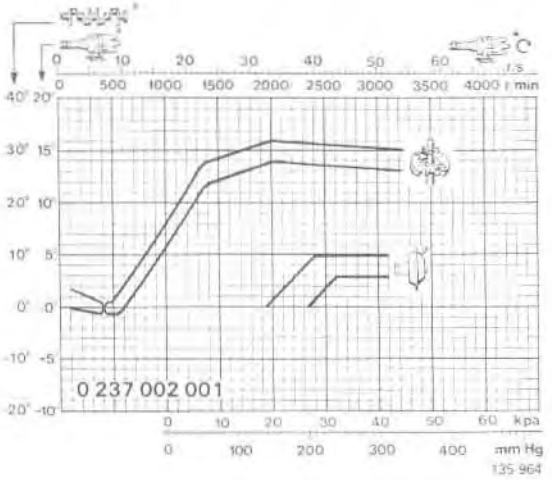
Bosch number at bottom left of diagrams is stamped in distributor body.

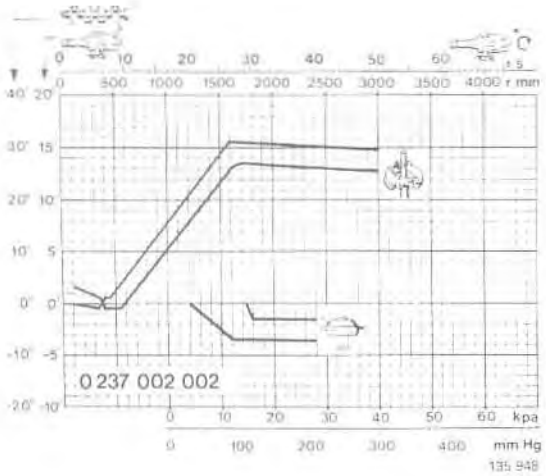


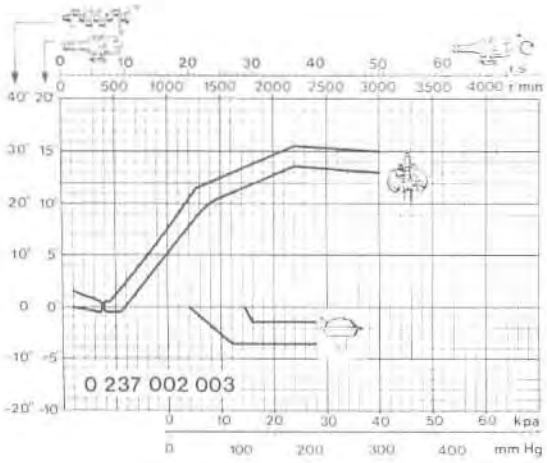
Legend

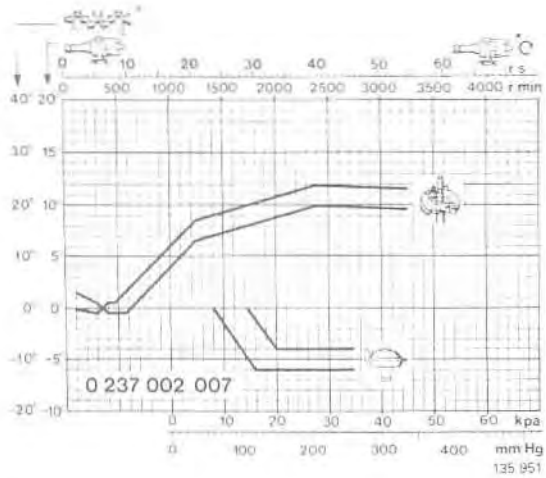
Variation of ignition setting with vacuum

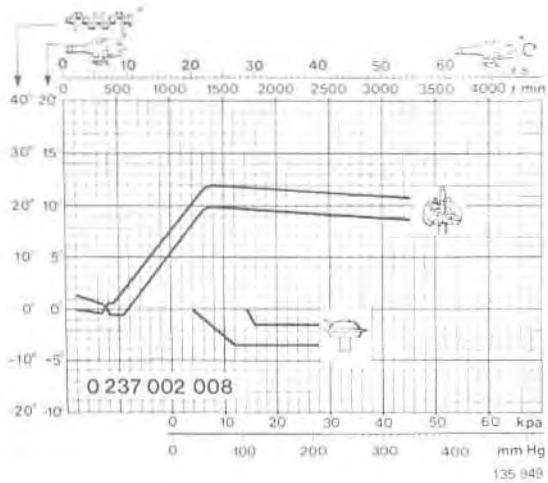
Variation of ignition setting with engine rpm

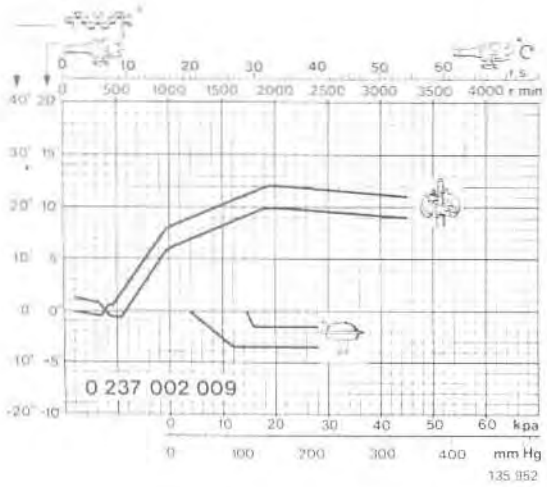


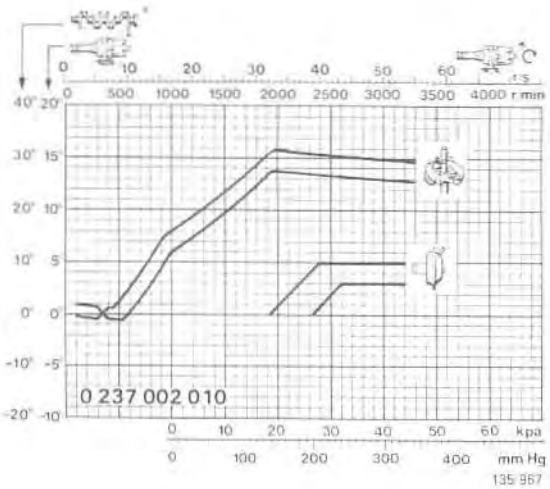


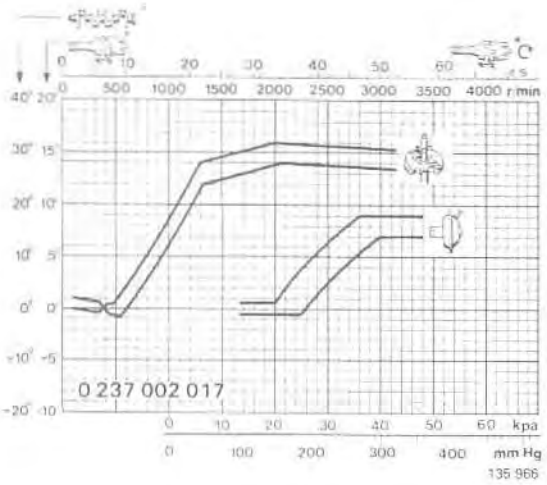







0 237 002 009
0 10 20 30 40 50 60 °C
0 500 1000 1500 2000 2500 3000 3500 4000 r min
40° 20° 30° 15° 20° 10° 10° 5° 0° 0° -10° -5° -20° -10°
0 10 20 30 40 50 60 kpa
0 100 200 300 400 mm Hg
135 952


0 237 002 010
0 10 20 30 40 50 60 °C
0 500 1000 1500 2000 2500 3000 3500 4000 r min
40° 20° 30° 15° 20° 10° 10° 5° 0° 0° -10° -5° -20° -10°
0 10 20 30 40 50 60 kpa
0 100 200 300 400 mm Hg
135 967


0 237 002 017
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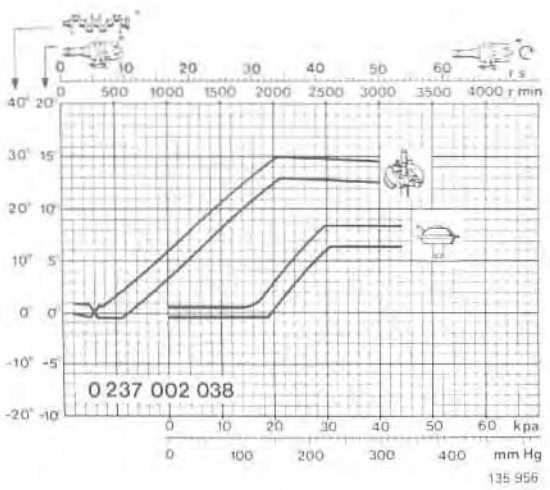
0 500 1000 1500 2000 2500 3000 3500 4000 r min
40° 20° 30° 15° 20° 10° 10° 5° 0° 0° -10° -5° -20° -10°
0 10 20 30 40 50 60 kpa
0 100 200 300 400 mm Hg
135 966


0 237 002 038
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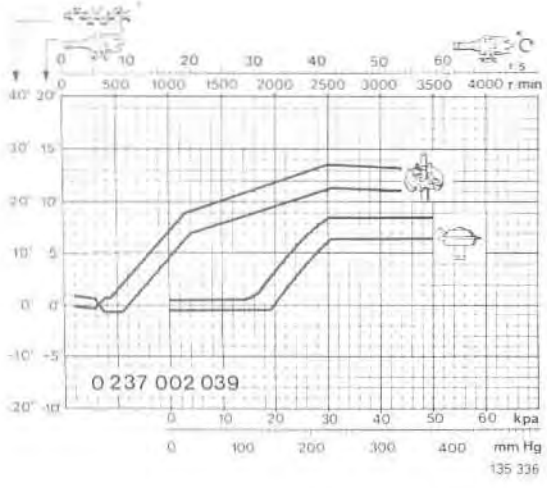
0 500 1000 1500 2000 2500 3000 3500 4000 r min
40° 20° 30° 15° 20° 10° 10° 5° 0° 0° -10° -5° -20° -10°
0 10 20 30 40 50 60 kpa
0 100 200 300 400 mm Hg
135 956


0 237 002 039
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0 500 1000 1500 2000 2500 3000 3500 4000 r min
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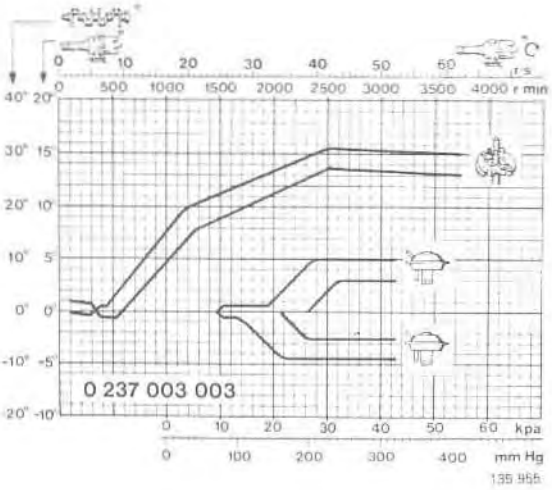
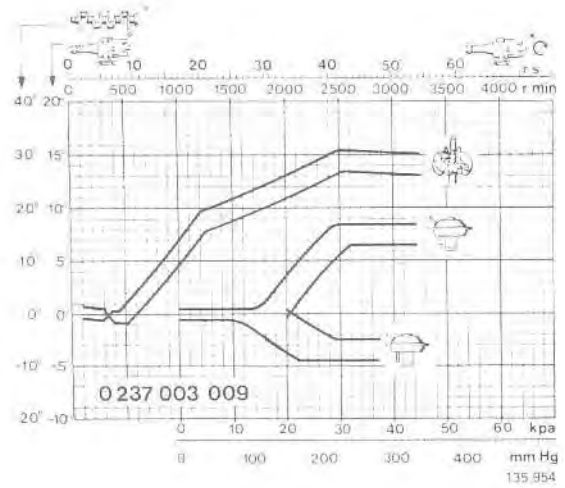
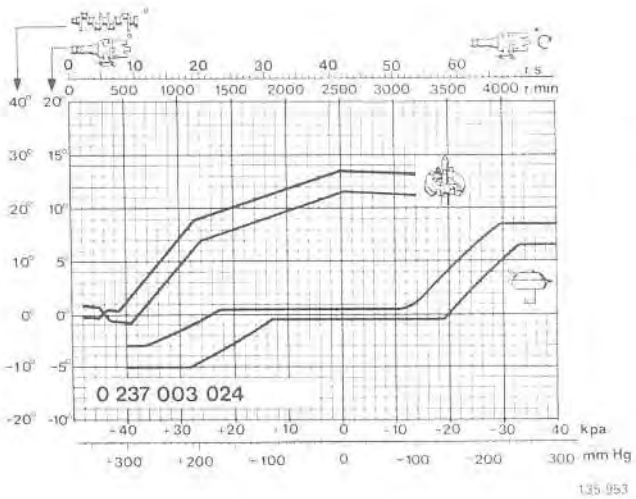
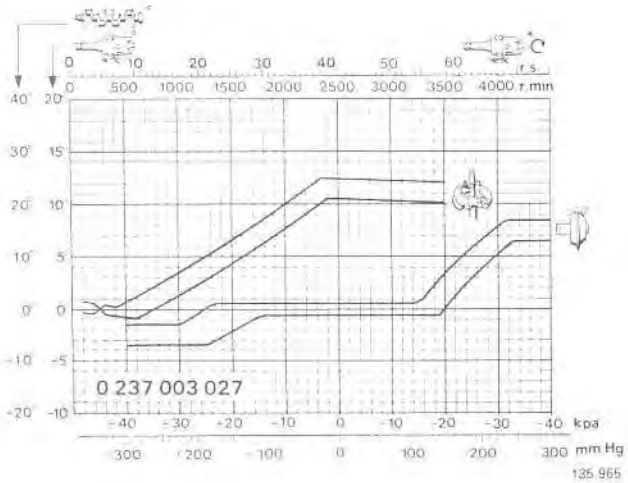
0 10 20 30 40 50 60 kpa
0 100 200 300 400 mm Hg
135 336

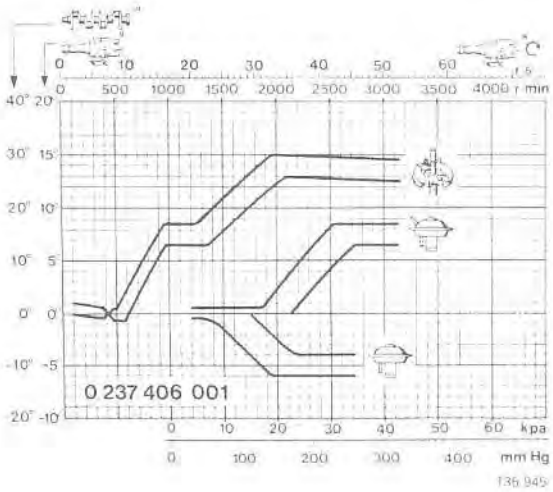

0 237 003 003
0 10 20 30 40 50 60 °C
0 500 1000 1500 2000 2500 3000 3500 4000 r min
40° 20° 30° 15° 20° 10° 10° 5° 0° 0° -10° -5° -20° -10°
0 10 20 30 40 50 60 kpa
0 100 200 300 400 mm Hg
135 955

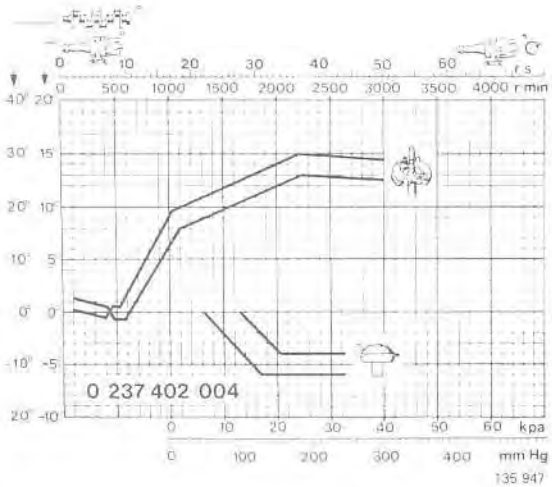
Breakerless ignition system

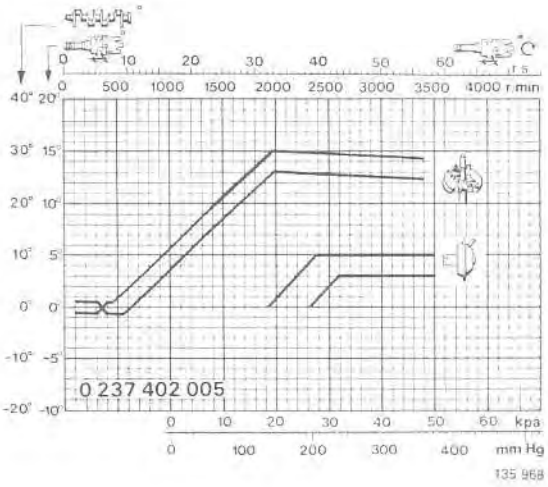


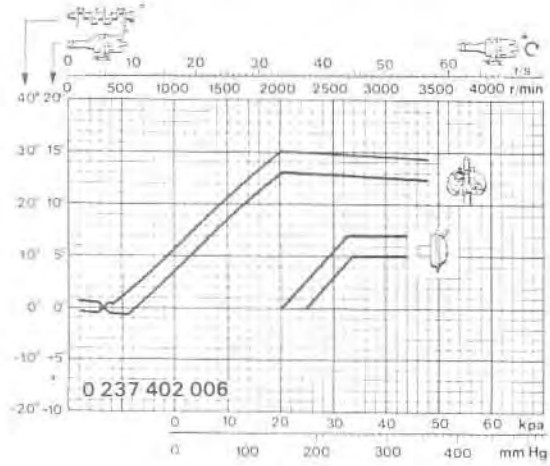








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0 10 20 30 40 50 60 °C
0 500 1000 1500 2000 2500 3000 3500 4000 r/min
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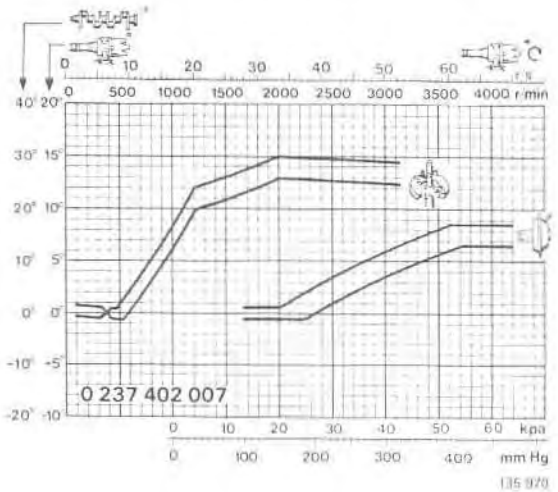
0 10 20 30 40 50 60 kpa
0 100 200 300 400 mm Hg
135 972


0 237 402 007
0 10 20 30 40 50 60 °C
0 500 1000 1500 2000 2500 3000 3500 4000 r/min
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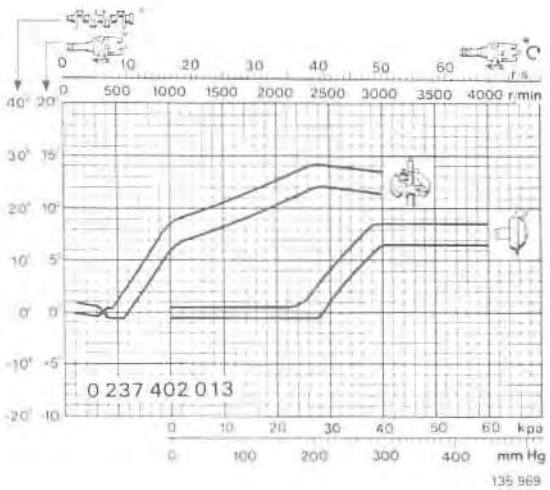
0 10 20 30 40 50 60 kpa
0 100 200 300 400 mm Hg
135 970


0 237 402 013
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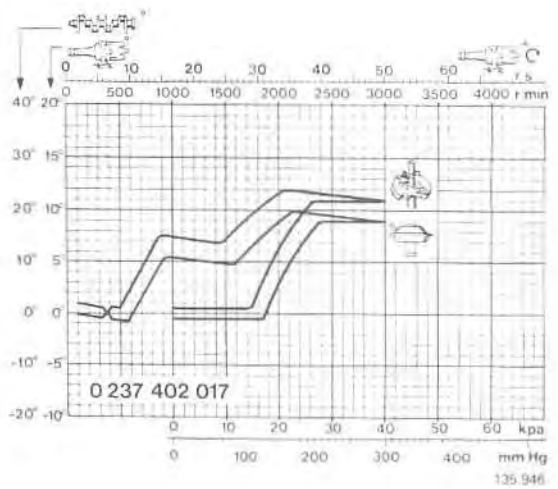
0 500 1000 1500 2000 2500 3000 3500 4000 r/min
40° 20° 30° 15° 20° 10° 10° 5° 0° 0° -10° -5° -20° -10°
0 10 20 30 40 50 60 kpa
0 100 200 300 400 mm Hg
135 969


0 237 402 017
0 10 20 30 40 50 60 °C
0 500 1000 1500 2000 2500 3000 3500 4000 r/min
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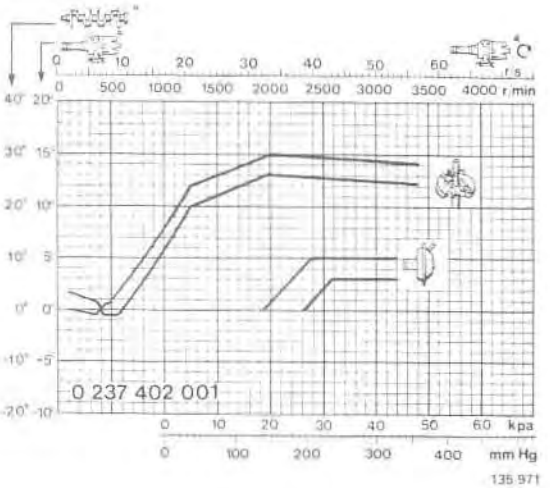
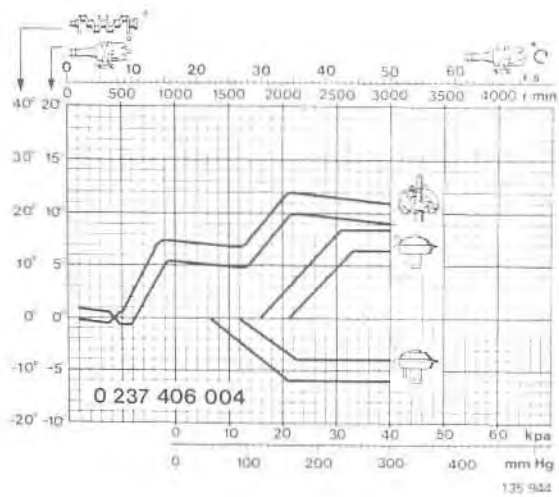
0 10 20 30 40 50 60 kpa
0 100 200 300 400 mm Hg
135 946


0 237 402 001
0 10 20 30 40 50 60 °C
0 500 1000 1500 2000 2500 3000 3500 4000 r/min
40° 20° 30° 15° 20° 10° 10° 5° 0° 0° -10° -5° -20° -10°
0 10 20 30 40 50 60 kpa
0 100 200 300 400 mm Hg
135 971


0 237 406 004
0 10 20 30 40 50 60 °C
0 500 1000 1500 2000 2500 3000 3500 4000 r/min
40° 20° 30° 15° 20° 10° 10° 5° 0° 0° -10° -5° -20° -10°
0 10 20 30 40 50 60 kpa
0 100 200 300 400 mm Hg
135 944

4-cyl

Bosch no.	0237 002 001	0237 002 002	0237 002 003	0237 002 007	0237 002 008	0237 002 009	0237 002 010	0237 002 017
Volvo	463 832	462 896	462 762	463 694	1 218 671	1 218 672	1 219 662	1 219 957
Direction of rotation	Clockwise	Anti-clockwise	Anti-clockwise	Anti-clockwise	Anti-clockwise	Anti-clockwise	Clockwise	Clockwise
Resistance of impulse sender pole kΩ	0.95–1.25	0.95–1.25	0.95–1.25	0.95–1.25	0.95–1.25	0.95–1.25	0.95–1.25	0.95–1.25

Centrifugal governor

Total advance, distrib. degrees	15±1	14.5±1	14.5±1	11±1	11±1	11±1	15±1	15±1
Advance begins at distrib. r/s	7.7–9.2	7.5–9.2	7.2–9.2	7.8–9.5	7.5–9.2	7.5–9.2	7.7–9.2	7.7–9.2
(distrib. r/min)	(460–550)	(450–550)	(430–550)	(470–570)	(450–550)	(450–550)	(460–550)	(460–550)
DATA								
5° at distrib. r/s	13.2–15.7	13.8–16.8	13.8–16.8	15–18.3	13.3–16.2	12.5–15.3	13.2–15.7	13.2–15.7
(distrib. r/min)	(790–940)	(830–1 010)	(830–1 010)	(900–1 100)	(800–970)	(750–920)	(790–940)	(790–940)
10° at distrib. r/s	19–20.8	20.5–23.3	20–23.3	29.2–40	19.7–22.5	25–32.5	20.8–25.8	18.2–20.7
(distrib. r/min)	(1 140–1 250)	(1 230–1 400)	(1 200–1 400)	(1 750–2 400)	(1 180–1 350)	(1 500–1 950)	(1 250–1 550)	(1 090–1 240)
Max. advance at distrib. r/s	33.3	26.7	36.7	40	22.5	32.5	33.3	33.3
(distrib. r/min)	(2 000)	(1 600)	(2 200)	(2 400)	(1 350)	(1 950)	(2 000)	(2 000)

Vacuum control

Direction of control	Positive	–	–	–	–	–	Positive	Positive
Total control, distrib. degrees	4±1	–	–	–	–	–	4±1	8±1
Control begins at mm Hg	140–200	–	–	–	–	–	140–200	140–190
Data:								
2° at mm Hg	170–230	–	–	–	–	–	170–230	165–220
5° at mm Hg	–	–	–	–	–	–	–	205–270
Max. control at mm Hg	210–240	–	–	–	–	–	210–240	270–300
Direction of control	–	Negative	Negative	Negative	Negative	Negative	–	–
Total control, distrib. degrees	–	2.5±1	2.5±1	5±1	2.5±1	2.5±1	–	–
Control begins at mm Hg	–	30–110	30–110	60–110	30–110	30–110	–	–
Data:								
1° at mm Hg	–	45–115	45–115	65–120	45–115	45–115	–	–
Max. control at mm Hg	–	90–120	90–120	120–150	90–120	90–120	–	–

4-cyl

Bosch no.	0237 002 038	0237 002 039	0237 003 003	0237 003 009	0237 003 024	0237 003 027
Volvo	1 266 904	1 276 403	1 219 848	1 266 466	1 276 703	1 276 701
Direction of rotation	Clockwise	Clockwise	Clockwise	Clockwise	Clockwise	Clockwise
Resistance of impulse sender pole kΩ	0.95–1.25	0.95–1.25	0.95–1.25	0.95–1.25	0.95–1.25	0.95–1.25

Centrifugal governor

Total advance, distrib. degrees	14±1	12.5±1	14.5±1	14.5±1	12.5±1	11.5±1
Advance begins at distrib. r/s	7.5–9.2	7.5–9.2	7.5–9.2	7.5–9.2	7.5–9.2	6.7–10.0
(distrib. r/min)	(450–550)	(450–550)	(450–550)	(450–550)	(450–550)	(400–600)

DATA

5° at distrib. r/s	15–19.2	13.7–17.5	14.2–17.5	14.2–17.5	14.2–17.5	20.5–26.3
(distrib. r/min)	(900–1 150)	(820–1 050)	(850–1 050)	(850–1 050)	(850–1 050)	(1 250–1 575)
10° at distrib. r/s	24.2–28.3	25–35.8	20.8–29.2	20.8–30.3	25–35.8	32.5–38.3
(distrib. r/min)	(1 450–1 700)	(1 500–2 150)	(1 250–1 750)	(1 250–1 820)	(1 500–2 150)	(1 950–2 300)
Max. advance at distrib. r/s	33.3	41.7	42.5	41.7	41.7	40
(distrib. r/min)	(2 000)	(2 500)	(2 550)	(2 500)	(2 500)	(2 400)

Vacuum control

Direction of control	Positive	Positive	Positive	Positive	Positive	Positive
Total control, distrib. degrees	7.5±1	7.5±1	4±1	7.5±1	7.5±1	7.5±1
Control begins at mm Hg	120–145	110–140	145–200	105–155	95–140	110–140
Data:						
2° at mm Hg	130–170	130–170	165–225	125–175	120–170	135–170
5° at mm Hg	170–210	170–210	–	165–220	155–215	170–220
Max. control at mm Hg	220–230	220–230	215–245	215–245	225–245	230–245
Direction of control	–	–	Negative	Negative	–	–
Total control, distrib. degrees	–	–	3.5±1	3.5±1	–	–
Control begins at mm Hg	–	–	105–160	95–160	–	–
Data:						
2° at mm Hg	–	–	125–190	125–190	–	–
Max. control at mm Hg	–	–	170–200	170–215	–	–

Pressure control

Direction of control	–	–	–	–	Negative	Negative
Total control, distr. degrees	–	–	–	–	5±1	2.5±1
Control begins at mm Hg	–	–	–	–	95–170	110–180
Data:						
1° at mm Hg	–	–	–	–	110–210	125–210
Max control at mm Hg	–	–	–	–	225–275	185–230

6-cyl

Bosch no.	0237 402 001	0237 402 004	0237 402 005	0237 402 006	0237 402 007	0237 402 013	0237 402 017	0237 406 001	0237 406 004
Volvo	269 323	269 134	269 565	269 995	269 733	1 269 191	1 269 380	269 739	1 269 291
Direction of rotation	Clockwise	Clockwise	Clockwise	Clockwise	Clockwise	Clockwise	Clockwise	Clockwise	Clockwise
Resistance of impulse sender pole kΩ	540–660	540–660	540–660	540–660	540–660	540–660	540–660	540–660	540–660

Centrifugal governor

Total advance, distrib. degrees	14±1	14±1	14±1	14±1	14±1	13±1	11±1	14±1	11±1
Advance begins at distrib. r/s	7.9–9.6	7.9–9.6	7.9–9.6	7.9–9.6	7.9–9.6	7.5–9.2	8.3–9.6	8.3–10.0	8.3–10.0
(distrib. r/min)	(475–575)	(475–575)	(475–575)	(475–575)	(475–575)	(450–550)	(500–575)	(500–600)	(500–600)
DATA									
5° at distrib. r/s	13.3–15.8	12.9–15.4	15.8–19.2	15.8–18.8	12.9–15.4	12.5–15.4	12.5–15	12.5–15	12.5–15
(distrib. r/min)	(800–950)	(775–925)	(950–1 150)	(950–1 125)	(775–925)	(750–925)	(750–900)	(750–900)	(750–900)
10° at distrib. r/s	19–20.8	18.3–25.8	24.2–27.5	24.2–27.5	18.3–20.8	23.3–31.7	30–35.8	23.3–28.3	31.3–34.6
(distrib. r/min)	(1 140–1 250)	(1 100–1 550)	(1 450–1 650)	(1 450–1 650)	(1 100–1 250)	(1 400–1 900)	(1 800–2 150)	(1 400–1 700)	(1 875–2 075)
Max. advance at distrib. r/s	33.3	36.7	33.3	33.3	33.3	40	35.8	34.2	35
(distrib. r/min)	(2 000)	(2 200)	(2 000)	(2 000)	(2 000)	(2 400)	(2 150)	(2 050)	(2 100)

Vacuum control

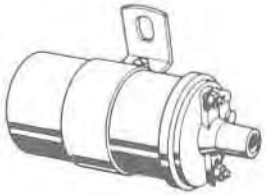
Direction of control	Positive	–	Positive	Positive	Positive	Positive	Positive	Positive	Positive
Total control, distrib. degrees	4±1	–	4±1	6±1	7.5±1	7.5±1	10±1	7.5±1	7.5±1
Control begins at mm Hg	140–200	–	140–200	150–190	140–200	170–210	105–140	125–170	120–140
Data:									
2° at mm Hg	170–230	–	170–230	180–215	200–260	200–240	120–145	140–195	150–190
5° at mm Hg	–	–	–	220–250	290–350	240–275	140–165	180–235	190–230
Max. control at mm Hg	210–240	–	210–240	245–255	400	290–310	200–210	230–260	230–250
Direction of control	–	Negative	–	–	–	–	–	Negative	Negative
Total control, distrib. degrees	–	5±1	–	–	–	–	–	5±1	5±1
Control begins at mm Hg	–	50–100	–	–	–	–	–	50–115	50–90
Data:									
2° at mm Hg	–	75–125	–	–	–	–	–	85–145	90–130
Max. control at mm Hg	–	130–155	–	–	–	–	–	145–180	160–170

Specifications

Computerized ignition systems

B 21 F–MPG 1981, B 21 F–CI 1982, B 21 F–LH 1982, B 23 F 1983–1984
B 230 F 1985–

Ignition coil



131 753

	Essex	Bosch
Resistance of primary coil (across terminals 1(−) and 15(+)	1.2±0.1 Ω	1.2±0.1 Ω
Resistance of secondary coil (across terminals 1(−) and HT terminal	10.6±1.0 kΩ	8.5±0.8 kΩ
Capacitor, terminal 1(−)	50–250 nF	

Spark plugs

137 530

B 21 F, B 23 F	Bosch WR 7 DS
B 230 F	Bosch WR 7 DC
Electrode gap	0.7–0.8 mm
Tightening torque (unoiled plug)	25 ± 5 Nm (18 ± 3.5 ft.lbs)

High tension leads

Resistance of lead between ignition coil and distributor	5.6 kΩ/m
Resistance of spark plug suppressor	5 kΩ
Resistance of distributor suppressor	1 kΩ

Firing order

1-3-4-2

136 457

Ignition setting (vacuum governor on control unit disconnected); see instructions on page 65.

Engine type	Model year		**11.7–13.3 r/s** 700–800 r/min	**41.7 r/s** 2 500 r/min
B 21 F	1981–82		12°	22–30°
B 23 F, B 230 F	1983–		12°	16–24°

Distributor

Engine type	Model year	Remarks	Volvo P/N
B 21 F	1981–82		1 306 059
B 23 F	1983 1984		1 332 684 1 336 737
B 230 F	1985–		1 332 587

Ignition advance graphs, control unit

Legend:

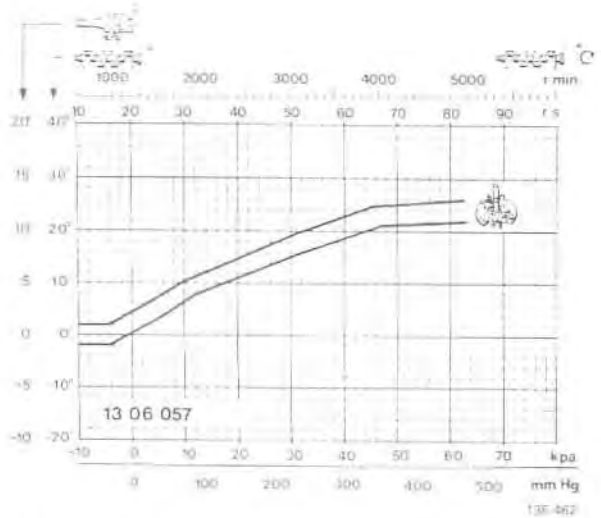
Variation of ignition setting with vacuum

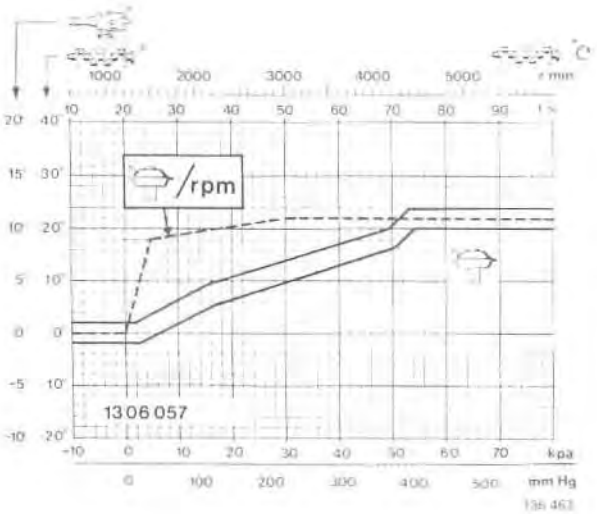
Variation of ignition setting with engine rpm

Max vacuum advance in relation to engine rpm.

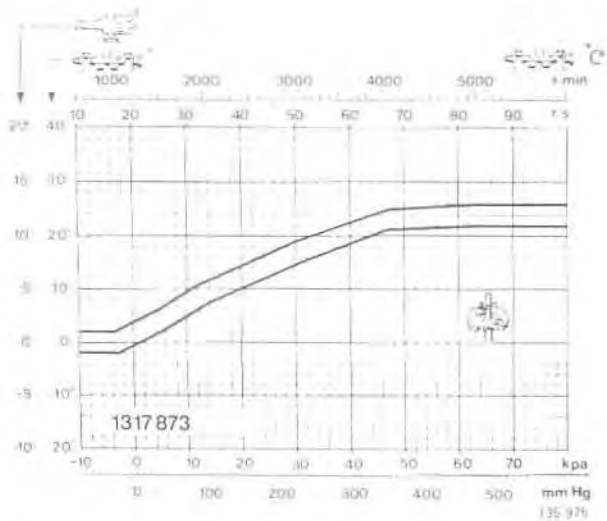
Example control unit P/N 1306057: at 30 r/s (1 800 r/min) vacuum advance cannot be more than 90° regardless of extent of depression.

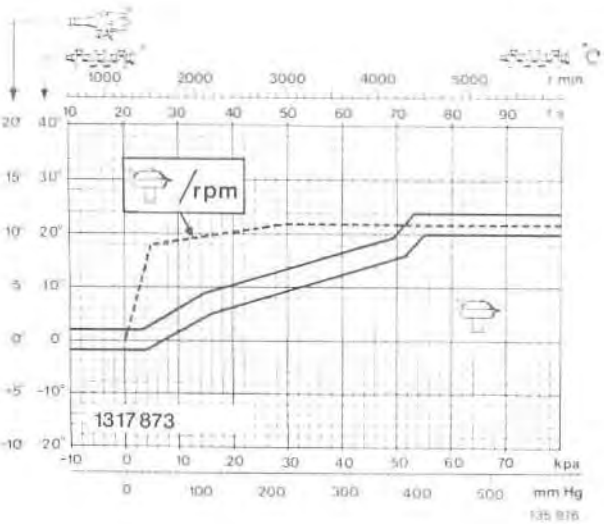
B 21 F–MPG 1981



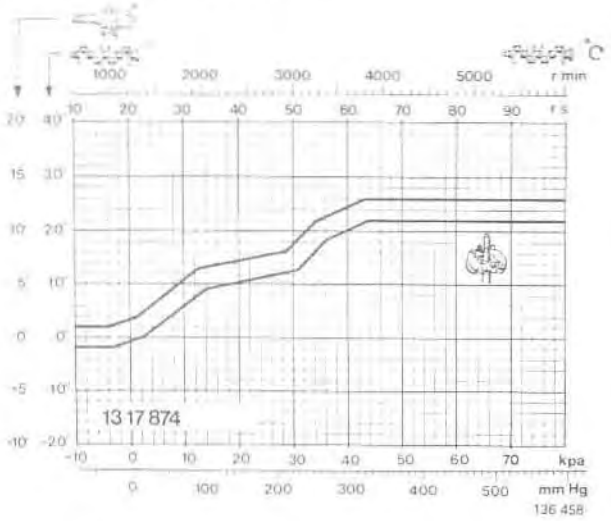


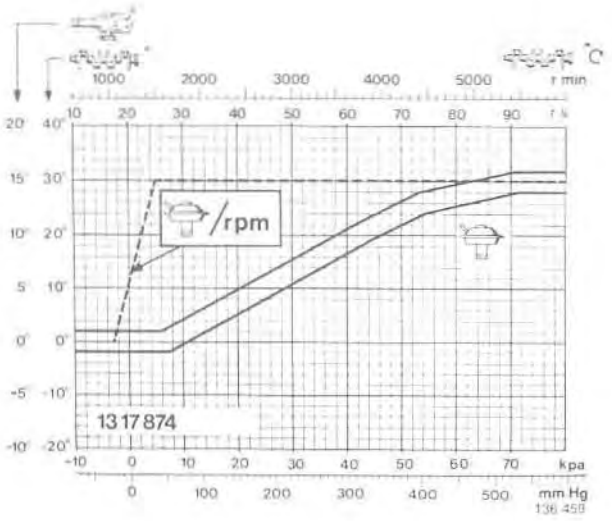
B 21 F–CI 1982





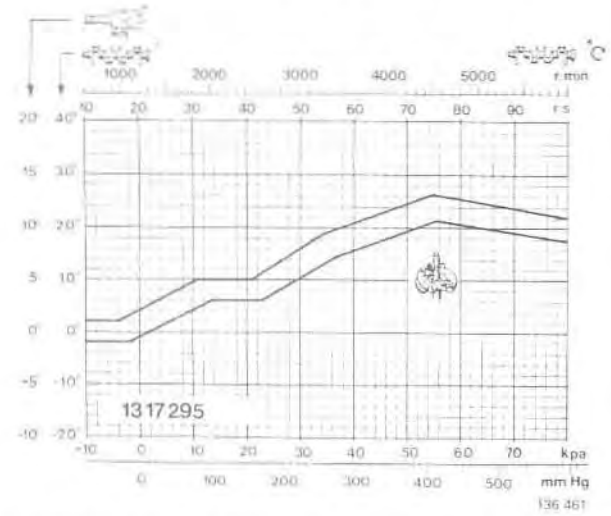
B 21 F–LH 1982

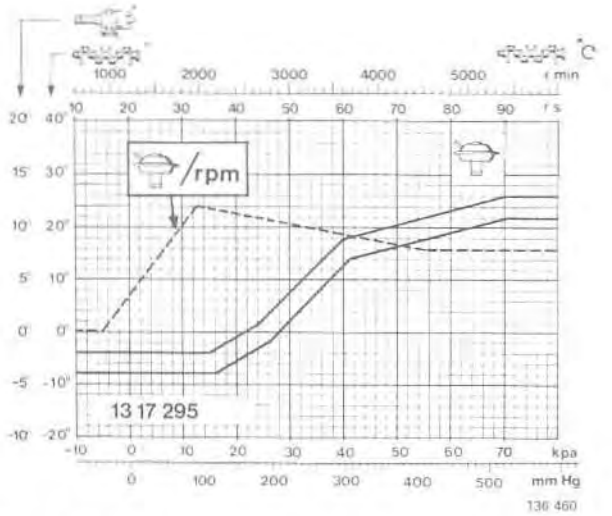




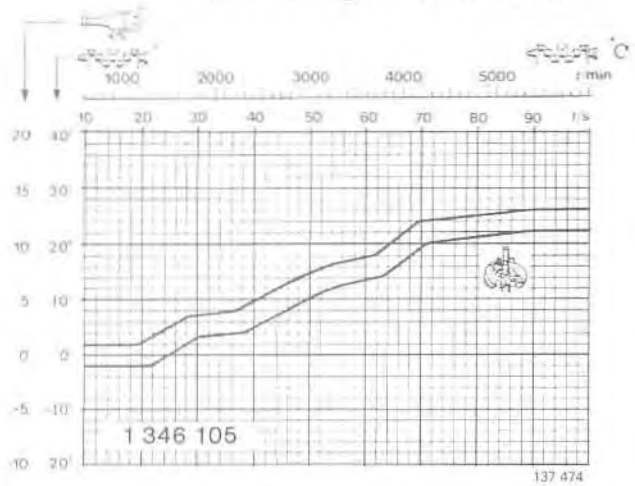
B 23 F–LH Auto transmission 1983–84
Manual gearbox 1983 engine P/N 499802

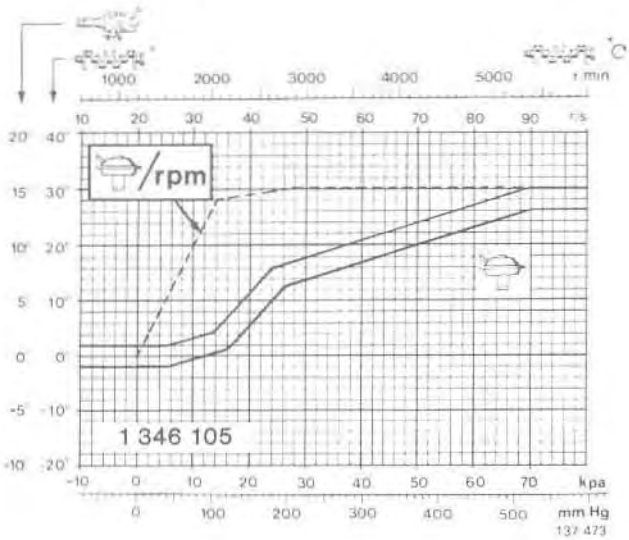
(Changed engine version 1983)



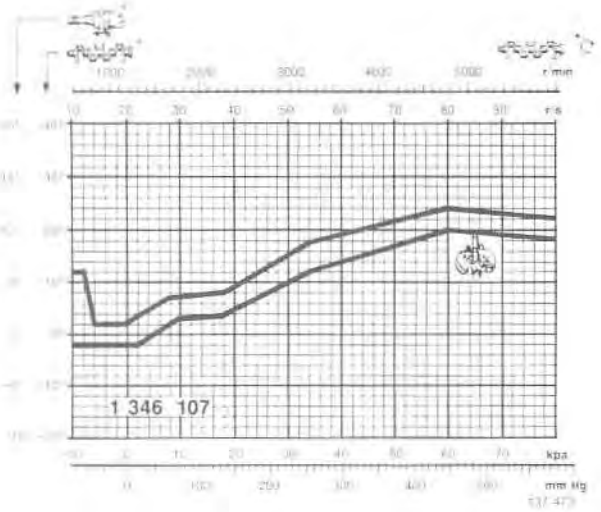


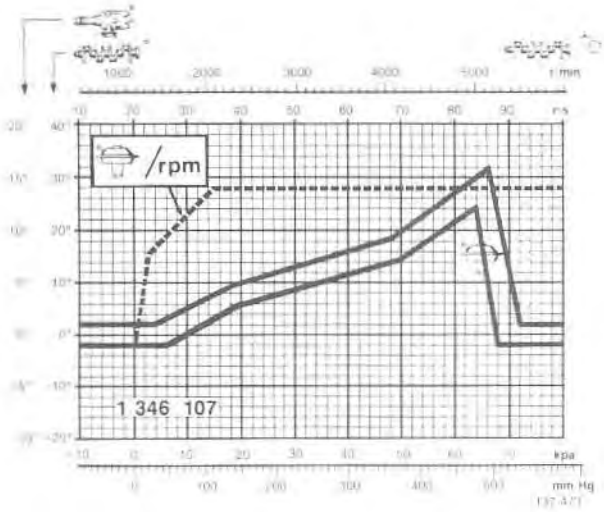
B 23 F–LH Manual gearbox 1983 engine P/N 499890
Manual gearbox 1984





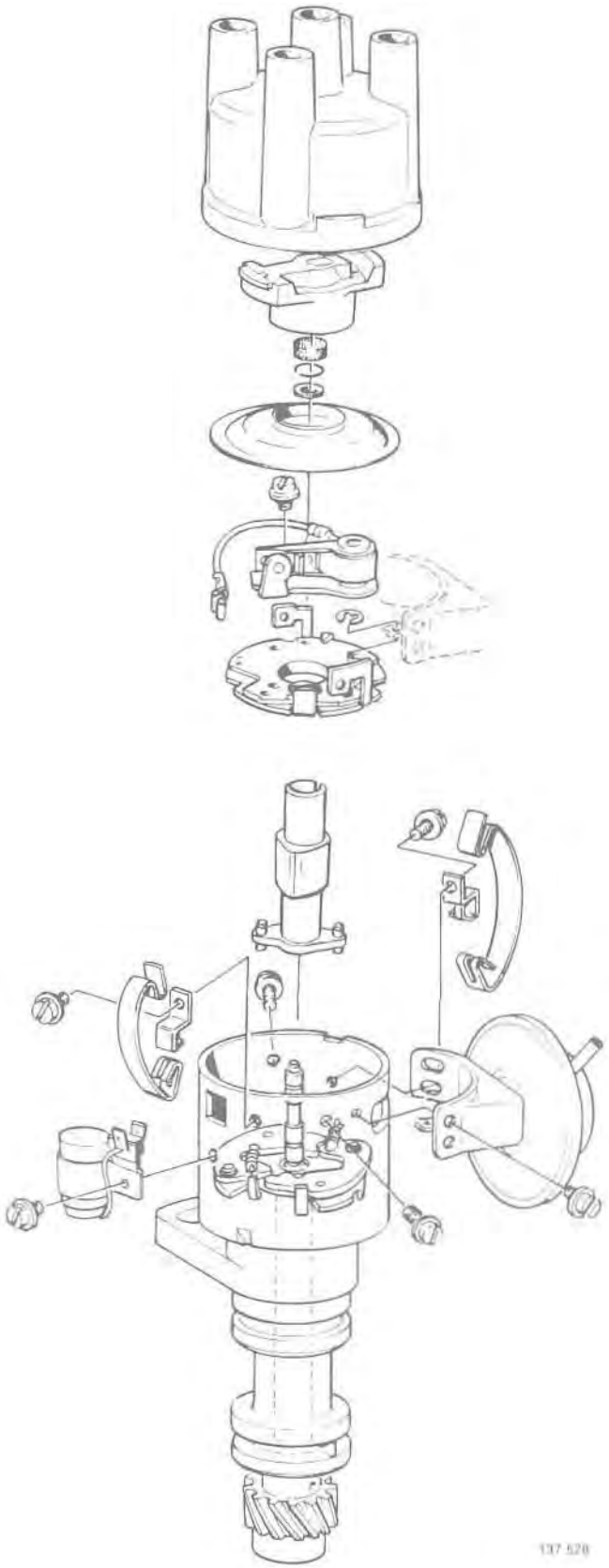
B 230 F-LH 1985-





Ignition system with contact breaker assembly

Contents


137 528

A. Ignition coil and HT leads

136 464

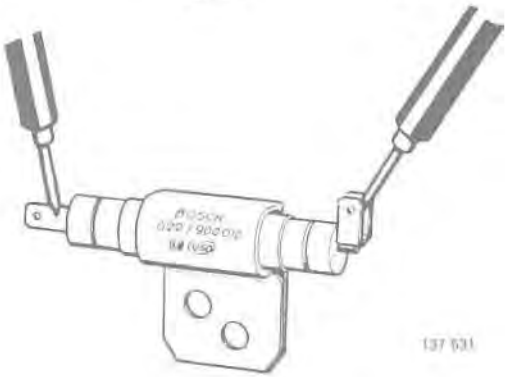
A1

Testing ignition coil, ballast resistor and HT leads

Test conditions:

Components should be at a temperature of about 20 °C (68°F).

All leads must be disconnected from the components when taking measurements.



137 631

A2

Measuring resistance of ballast resistor

Ballast resistor fitted to 1979 models onwards:

Resistance: **0.9** Ω (early 79)
1.3 Ω (others)

137 524

A3

Checking ignition coil:

- check outer casing of ignition coil for cracks etc.
- measure resistance across terminals 1(−) and 15 (+).

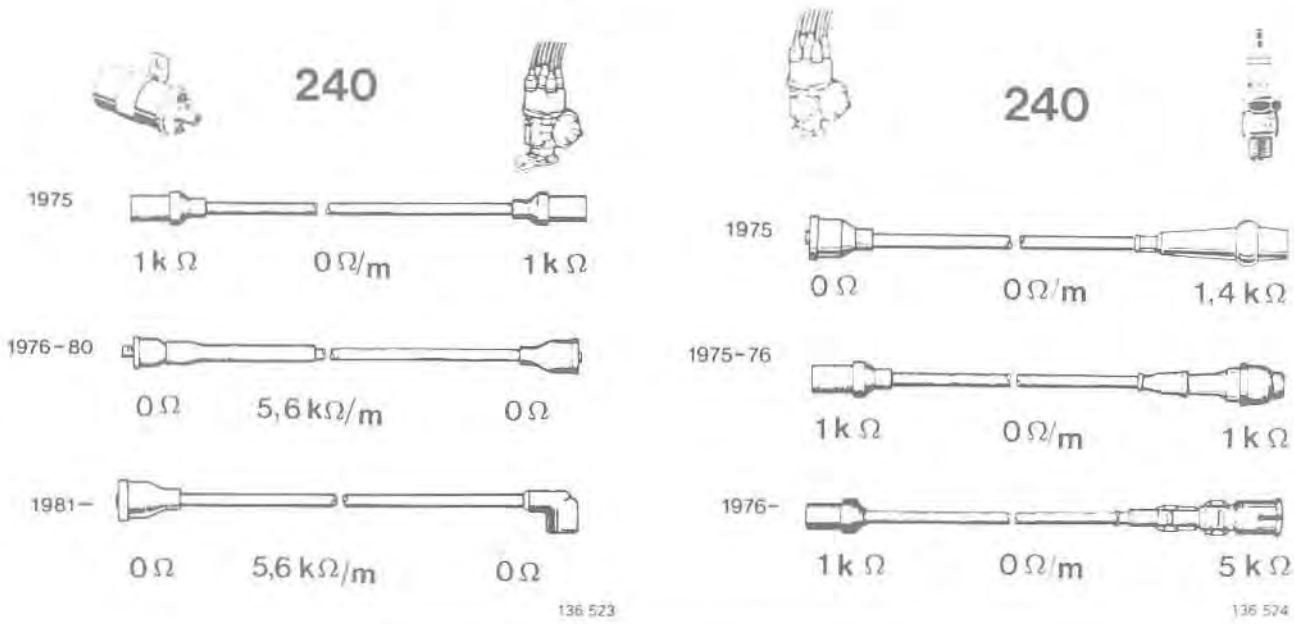
Resistance: **2.7–3.0** Ω –1978
1.8–2.0 Ω 1979–84

137 525

- measure resistance across terminal 1(−) and high tension terminal.

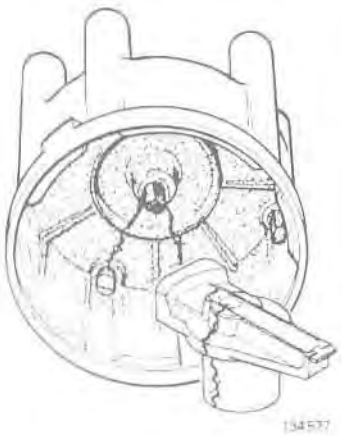
Resistance: **7.0–12.0** Ω –1978
8.0–11.0 Ω 1979–84

Checking resistance* of HT leads



*Note: *Resistance values are given in K Ω -per-meter of length. (Measure lead in order to compute correct value.) All values have a permissable tolerance of ± 20%.*

B. Distributor



B1

Distributor cap

Check for:

- dirt
- cracks
- burnt terminals, tracking
- worn rotor.

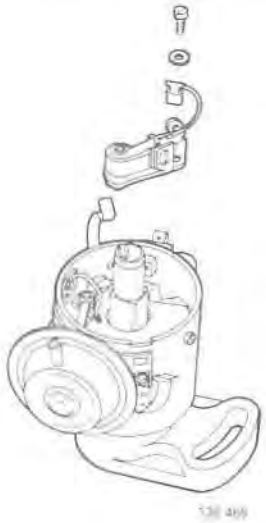
B2

Checking rotor

Replace rotor if cracked or excessively burnt.

Resistance = **5±1** kΩ.

B3



136 466

Replacing contact breaker points

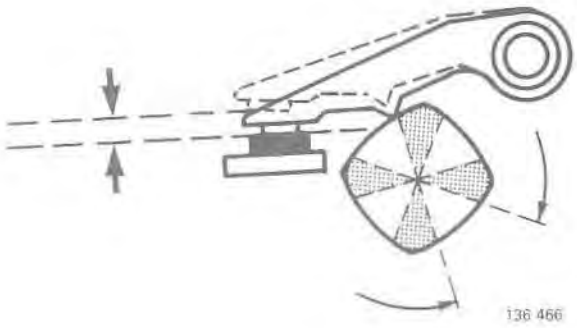
Grease cams after installing new points.

Turn crankshaft until fibre heel on contact breaker is on top of cam.

Adjust gap to **0.40** mm on B 17 – B 23.
0.35 mm on B 20

Apply 1–2 drops of engine oil to spindle wick.

B4



136 466

Adjust dwell to 59–65°

Volvo Monotester or dwell meter.

Reduce points gap to decrease dwell angle and increase gap to increase angle.

Refit rotor and distributor cap.

B5

Check dwell angle at 42 r/s (2 500 r/min)

If dwell angle differs by more than 2° from reading at idle, check distributor for wear.

B6

Adjust ignition setting at 11.7–13.3 r/s (700–800 r/min)

Disconnect hose from vacuum unit on distributor.

Adjust ignition timing to value indicated in table below.

B7

Check centrifugal advance at 42 r/s (2 500 r/min)

Check that ignition advance is according to specification, see table below. If advance is not according to specification, check advance weight assembly.

Ignition setting

With effect from 1976, vehicles for Sweden, Australia, USA and Canada (also Switzerland 1983-models) have details of ignition setting stamped on a plate to left of engine compartment.

Ignition setting (before T.D.C., vacuum control unit disconnected)				
Engine type	**Model year/Market**		**11.7–13.3 r/s** (700–800 r/min)	**41.7 r/s** (2 500 r/min)
B 17 A	1979–84		12°	28–32°
B 19 A	1977[1]		15°	32–36°
	1978	Italy	15°	32–36°
	1978–80	Other markets	12°	28–32°
	1981–84		10°	26–32°
B 19 K	1984		7°	17–22°
B 20 A	1975–76		10°	23–27°
B 21 A	1975		12°	24–28°
	1976–77[1]		15°	32–36°
	1978	Sweden[3]	12°	28–32°
		Other markets	15°	32–36°
	1979–80[2]		12°	28–32°
	1981	Scandinavia, Australia	10°	26–32°
		Other markets	12°	28–32°
	1982–83	Scandinavia, Australia	10°	26–32°
		Canada	7°	24–30°
		Other markets	12°	28–32°
	1984	Scandinavia, Switzerland	10°	20–26°
		Australia	10°	27–33°
		Europe	7°	17–23°
		Canada	7°	24–30°
B 23 A	1981–82	Scandinavia[4]	7°	21–26°
	1982	Other markets	5°	19–24°
	1983–84	Europe	7°	17–22°
		Overseas	5°	19–24°

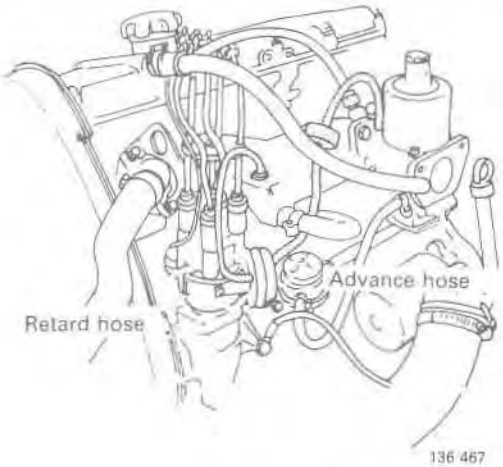
Special vehicles

[1] Sweden: 245 with BW 35, BW 55, M 46 and special vehicles ..... 10°

[2] 1979–80: Sweden, Overseas with engine type 498 755 and 498 811 and special vehicles with manual gearbox ..... 10°

[3] 240 with engine type 498 528 ..... 15° and 32–36°

[4] Ignition setting can be retarded of 5° if, despite using 98 octane fuel, engine is prone to pre-ignition (knocking). Special vehicle refers to heavy vehicle types such as 245 GLE with automatic transmission.



136 467

B8

Vacuum advance/retard

Some distributors are equipped with a vacuum control unit with two vacuum hoses. In such cases the control unit regulates both vacuum advance and retard.

136 468

B9

Delay valve

Because of exhaust emission laws some vehicles are equipped with a delay valve connected between the inlet manifold and vacuum control unit.

Several different types of valves are in use. On all types "DIST" must face distributor.

Check that it is possible to suck air throught "DIST" side of valve and that it is very difficult to blow air through same side.

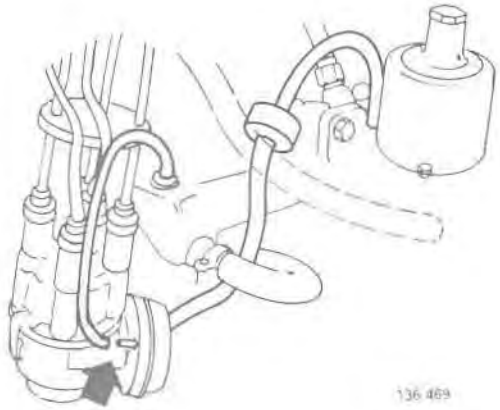
134 452

B10

Checking vacuum advance

Connect a vacuum pump to vacuum control unit. Run engine at idle speed and record ignition advance. Increase vacuum and check that ignition advance increases.

If ignition advance does not increase check vacuum control unit.



136 469

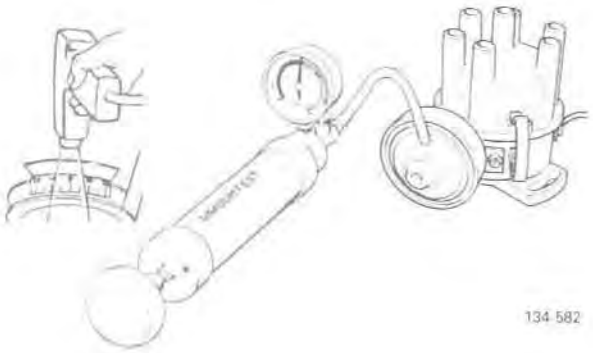
B11

Checking vacuum retard

Run engine at idle speed.

Check that ignition is retarded when vacuum hose is connected.

If not, check condition of hose. If hose is in good condition check vacuum control unit.



134 582

B12

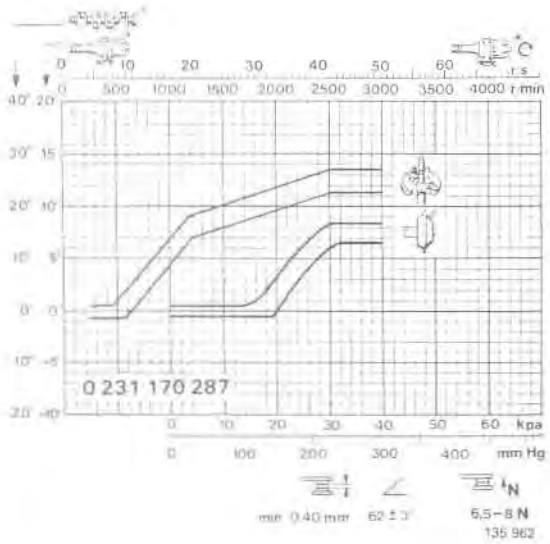
Check vacuum advance with a vacuum pump

Check distributor number and find correct ignition advance graph on pages 7 and 8.

Select a pressure from graph and pump up vacuum pump to this value.

Record ignition advance.

Subtract basic ignition setting from recorded ignition advance and check that value conforms to graph.



135 962

B13

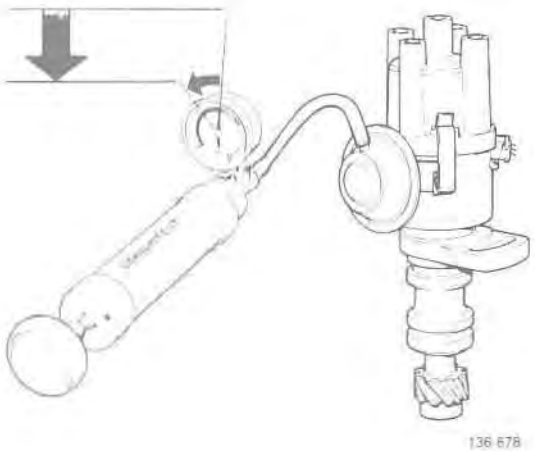
Example: Bosch number 0 231 170 287 on B 23 A 1981–82 Sweden

You decide to check vacuum advance at 200 mm Hg.

Recorded advance at this pressure is found to be 16–21°.

Basic ignition setting = 7°.

Difference = 9 – 14° which is as specified.



136 678

B14

Check vacuum unit for leakage

Connect a vacuum pump. Increase vacuum to **500** mm Hg (67 kPa).

Record pressure for 1 minute. Pressure must not drop by more than **100** mm Hg (13.5 kPa).

135 321

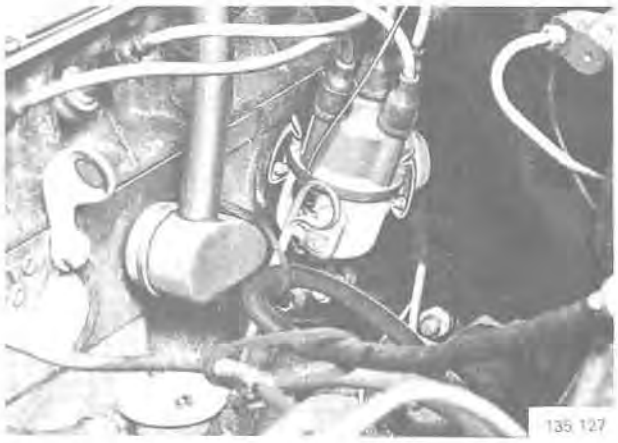
B15

Pre-ignition – B 23 A Sweden 1981–82

If, despite use of 98 octane fuel, engine is prone to pre-ignition (knocking), ignition can be retarded to 5°.

Ignition setting can also be retarded to 2° before T.D.C. if vehicle is required for towing purposes. Note that fuel consumption will increase and that ignition should be reset to specification during normal usage.

C. Reconditioning distributor


135 127

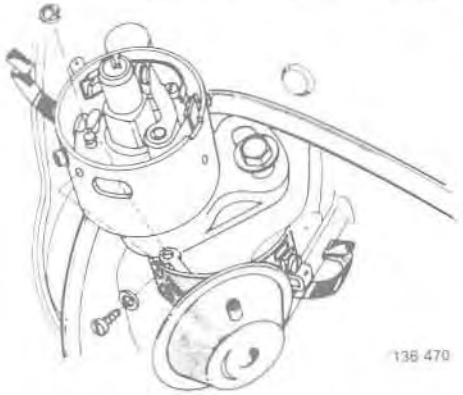
C1

Replacing vacuum control unit

(B 20: distributor must be removed from engine before vacuum unit can be replaced. See operation C3.)

Remove:

- distributor cap
- rotor
- condensation trap
- vacuum hose.


136 470

C2

Mark position of distributor

Turn distributor to obtain access to vacuum unit retaining screws.

Replace vacuum unit.

Turn distributor back to mark.

Fit:

- condensation trap
- rotor
- distributor cap
- vacuum hose.

Check/adjust ignition setting.


134 488

C3

Replacing distributor

Remove:

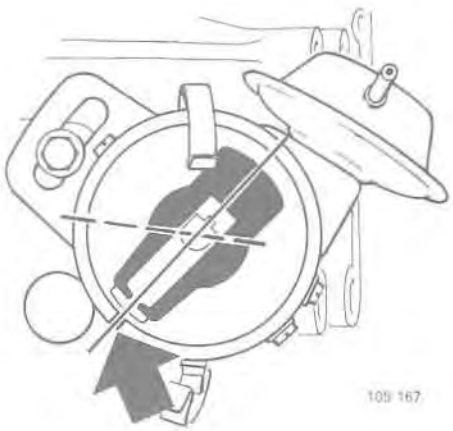
- distributor cap
- condensation trap.

Disconnect:

- wire
- vacuum hose.

Turn crankshaft until rotor points towards scribed line in distributor body.

Remove retaining screw and lift away distributor.


105 167

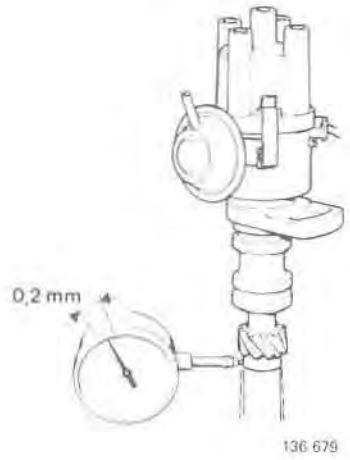
C4

To install:

- turn rotor approx. 60° clockwise away from line in distributor body. (Does not apply to B 20)
- fit distributor
- rotor should now point towards line. Reconnect vacuum hose and wire. Fit condensation trap and reclamp distributor cap.

Check/adjust ignition timing.

C5

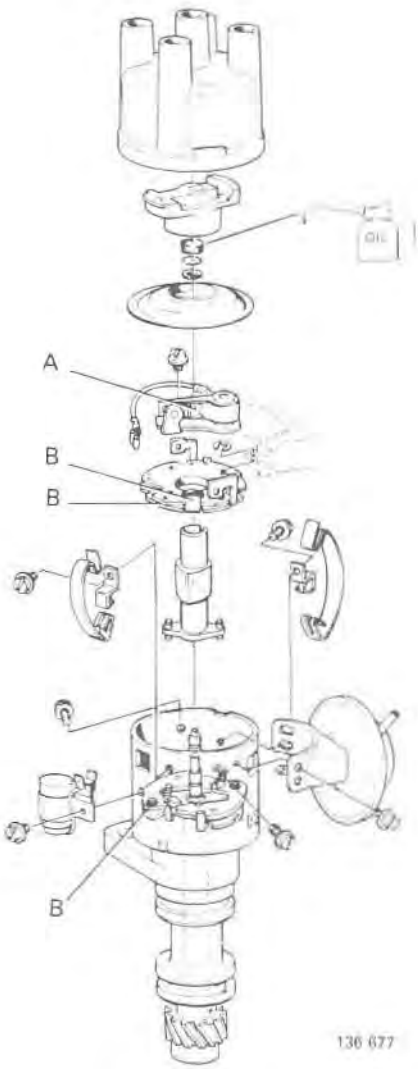


Checking side play of distributor shaft

Max side play = **0.2 mm** (0.079 in). Fit a new distributor if side play is greater than 0.2 mm.

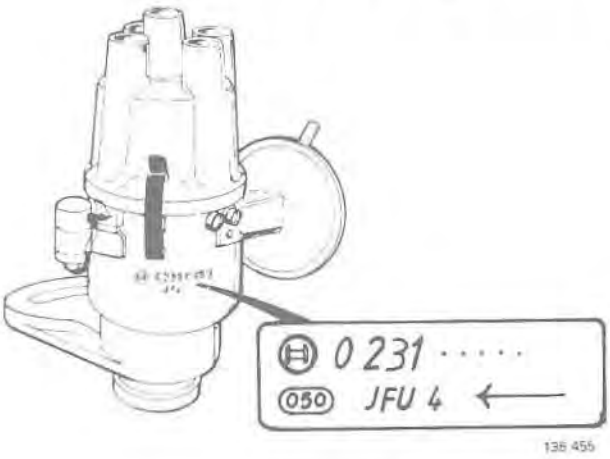
C6

Lubrication



A = distributor grease P/N 116 1136-7 or Bosch Ft1v4
B = distributor grease P/N 116 1136-7 or Bosch Ft1v26

D. Testing distributor on a test bench



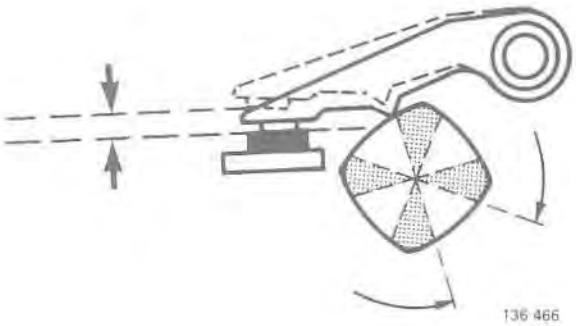
136 455

Refer to the manufacturer's instructions at all times when testing distributors on a test bench.

The number on the side of the distributor is the Bosch part number.

D1

Checking dwell angle


136 466

Condition: New contact breaker points.

Run distributor at **3.5–4.2** revs/sec (200–250 r/min).

Adjust dwell angle to **59–65°**. (It is advisable to set dwell angle to 59° as angle increases as cam wears.)

Increase speed to **25 r/s** (1 500 r/min).

Read off dwell angle.

Dwell angle must not vary by more than 2° from previous setting.

Check distributor for wear, damage etc if deviation is too great.

D2

Checking firing


136 472

Run distributor at 3–5 revs/sec (200–300 r/min) on test bench.

Set distributor "0" to position which corresponds to firing of cylinder 1.

Firing should be 0–90–180–270°.

Increase speed.

Check shape of arrows (or equivalent symbol depending on test unit).

If deviation is more than 2° this indicates that side play is too large or cam is worn.


137 191

D3

Checking mechanical advance

Run distributor at **3.5 r/s** (200 r/min). Calibrate meter. Increase speed and check that mechanical advance conforms to specification.

If not, check that balance weights are lubricated and do not bind.

Also check springs.

137 192

Checking vacuum advance

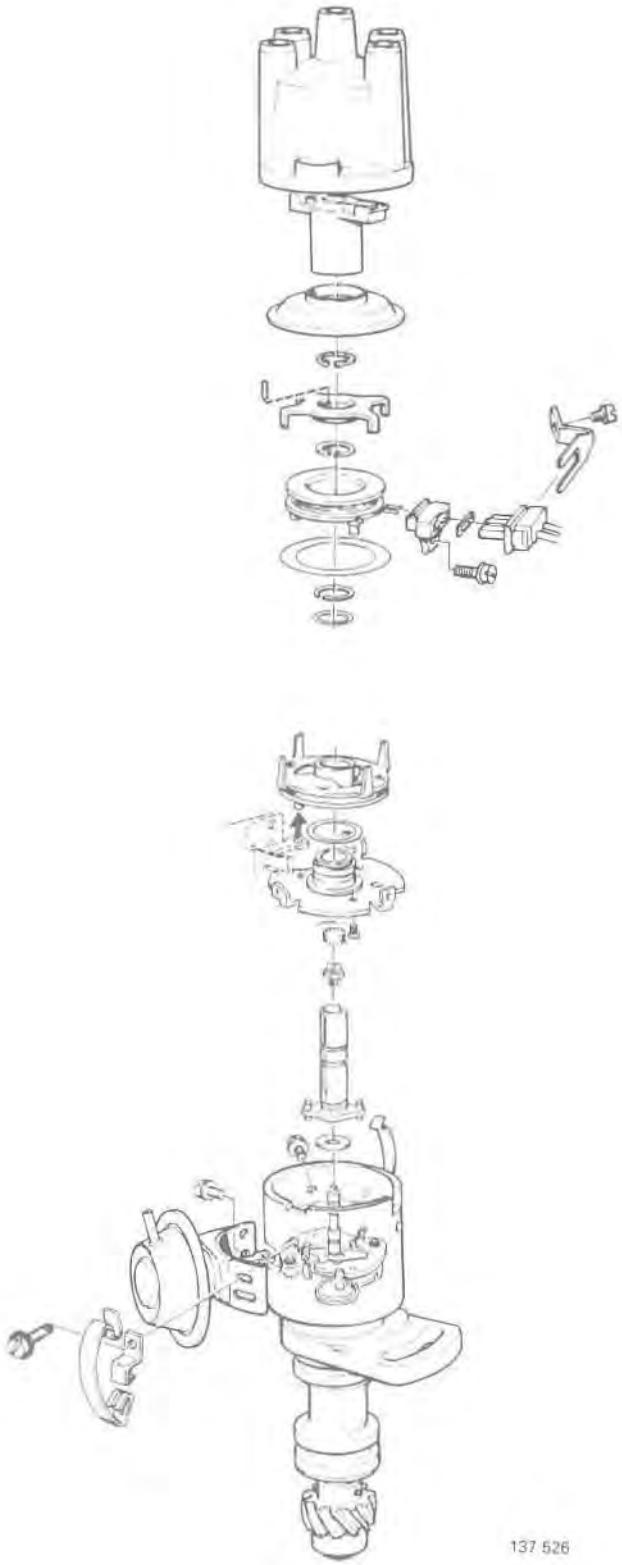
Run distributor at **10 r/s** (600 r/min).

Calibrate meter.

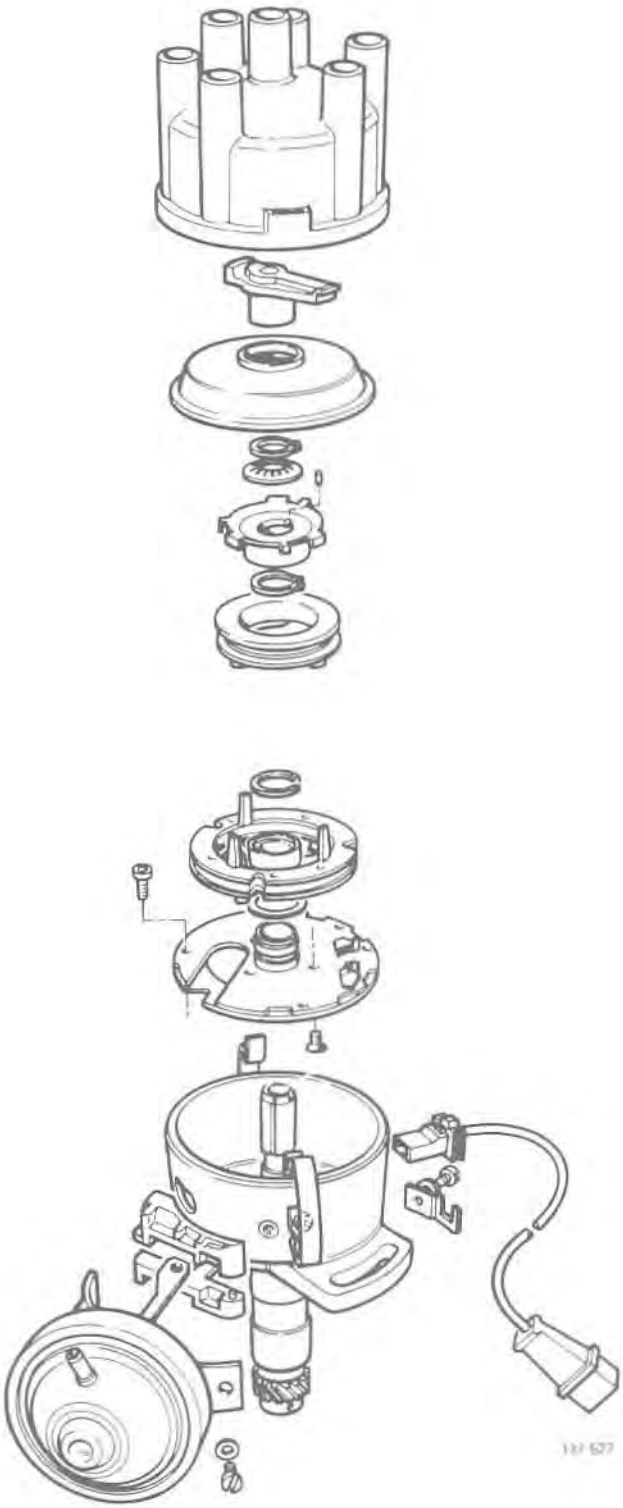
Increase vacuum and compare value to specification.

Breakerless ignition system

Contents



137 526



137 527

E. Ignition coil and HT leads

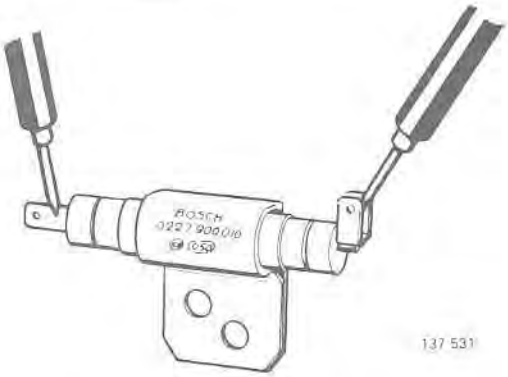
136 464

E1

Testing ignition coil, ballast resistor and HT leads

Test conditions:

- Ignition coil and ballast resistor at approximately 20°C (68°F)
- All leads disconnected from components under test.



137 531

E2

Measuring resistance of ballast resistor

B 20, B 19–B 23 ..... **0.9±0.1 Ω**
B 27, B 28 ..... **1.0±0.1 Ω**
(Both resistors are connected in series)

137 524

E3

Checking ignition coil

- check outer casing for cracks
- measure resistance across terminals 1(–) and 15(+).

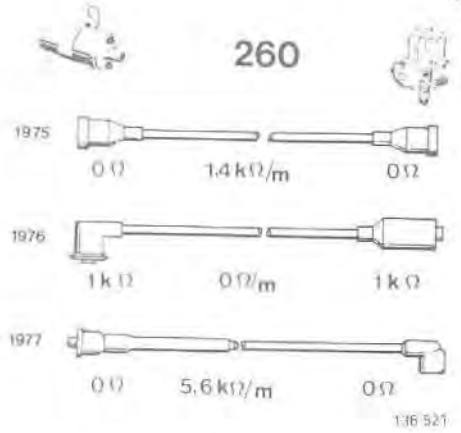
B 20, B 19–B 23 ..... **1.9±0.1 Ω**
B 27, B 28 ..... **0.5±0.1 Ω**

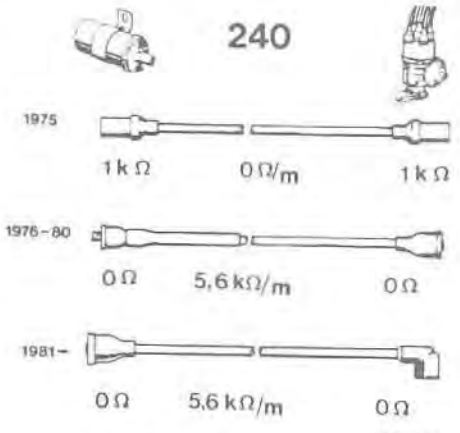
137 525

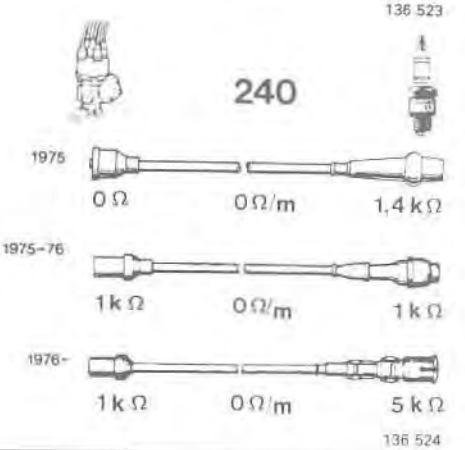
- measure resistance across terminal 1(–) and HT terminal.

All models: **9.5±1.5 kΩ.**

Checking HT leads*

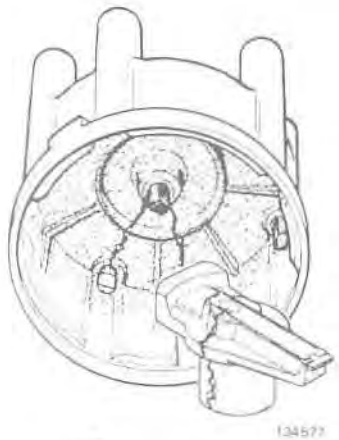






*Note: *Resistance values are given in K Ω -per-meter of length. (Measure lead in order to compute correct value.) All values have a permissable tolerance of ± 20%.*

F. Distributor



F1

Checking distributor cap

Check for:

- cracks
- burnt electrodes, tracking
- carbon brush for wear or damage

Important! To prevent retaining springs from damaging rotor do not crank engine when distributor cap is off.

F2

Checking rotor

Rotor should be free from cracks and electrode should not be burnt.

Measure resistance. Resistance = **5±1** kΩ.

F3

Checking impulse sender

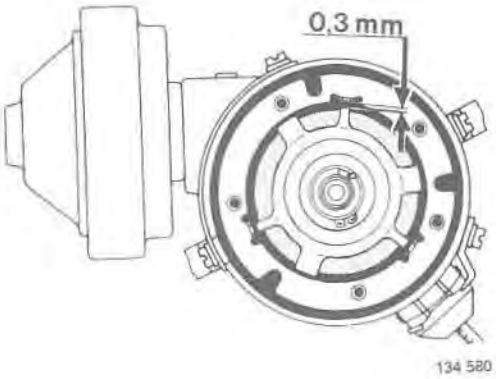
Measure resistance of sender.

B 20, B 19–B 23 ..... **0.95–1.25 kΩ**
B 27, B 28 ..... **0.54–0.66 kΩ**

Check that no arcing to earth occurs.

If meter pointer swings to far right (i.e. open circuit) remove impulse sender and check if sender or lead is defective.

F4



Checking air gap

Set rotor and stator tips opposite each other and measure air gap with feeler gauge.

6 cyl engines: **min 0.3 mm** (0.012 in)
4 cyl engines: **min 0.25 mm** (0.010 in).

Adjust if necessary.

F5

Checking/adjusting basic setting at 11.7–13.3 r/s (700–800 r/min)

Disconnect hose from vacuum control unit.

Adjust ignition setting to specification. See next page.

F6

Checking centrifugal advance at 42 r/s (2500 r/min)

Check that ignition advance is according to specification. See next page.

If not, examine centrifugal advance mechanism.

Ignition setting (before T.D.C., disconnected vacuum control unit)

With effect from 1976, vehicles for Sweden, Australia, USA and Canada (also Switzerland 1983-models) have details of ignition setting stamped on a plate to left of engine compartment.

4-cyl E-engines

Engine type	Model year/Market	Description	11.7–13.3 r/s (700–800 r/min)	41.7 r/s (2 500 r/min)
B 19 E	1977–83		8°	28–33°
	1984		10°	24–28°
B 19 ET	1982–84		15°	21–26°
B 21 E	1975–82 [1]		8°	28–33°
B 21 ET	1981–84		15°	21–26°
B 23 E	1979–82		5°	25–30°
	1983 Canada		10°	25–29°
	Other markets		5°	25–30°
	1984		10°	25–30°

[1] 1976–80: Australia, Sweden Special vehicles ..... 5°

4-cyl F-engines

B 20 F	1975		5°	20–25°
B 21 F	1976		15°	25–30°
	1977 USA, California		12°	28–32°
	Other markets		15°	25–30°
	1978		12°	28–32°
	1979 California, Japan		8°	22–26°
	Other markets		10°	26–30°
	1980 Canada		10°	24–28°
	Other markets		8°	22–26°
	1981–84		8°	22–26°
B 21 FT	1981–85	Adjust at 15 r/s (900 r/min)	12°	26–30°

6-cyl A and E-engines

B 27 A	1977–79		10°	22–25°
B 28 A	1980–84		10°	22–25°
B 27 E	1975		10°	30–34°
	1976 Sweden, Australia		10°	22–26°
	Other markets		10°	30–34°
	1977–78[1]		10°	30–34°
	1979–80		10°	25–29°
B 28 E	1980–82		10°	25–29°
	1983–84		12°	27–31°

[1] 1978: Sweden, Australia Special vehicles ..... 8°

6-cyl F-engines

B 27 F	–1976		10°	27–32°
	1977 California		7°	20–24°
	Other markets		10°	27–32°
	1979		10°	20–24°
B 28 F	1980–82	Adjust at 15 r/s (900 r/min) for 1981 – California	10°	20–24°


134 492

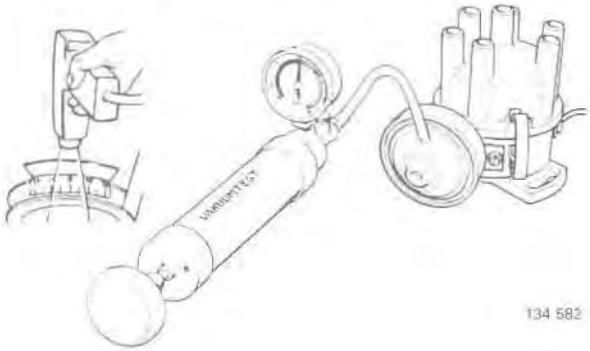
F7

Checking vacuum advance

Connect a vacuum pump to vacuum unit.

Run engine at idle speed and record ignition advance. Pump vacuum pump and check that ignition setting advances.

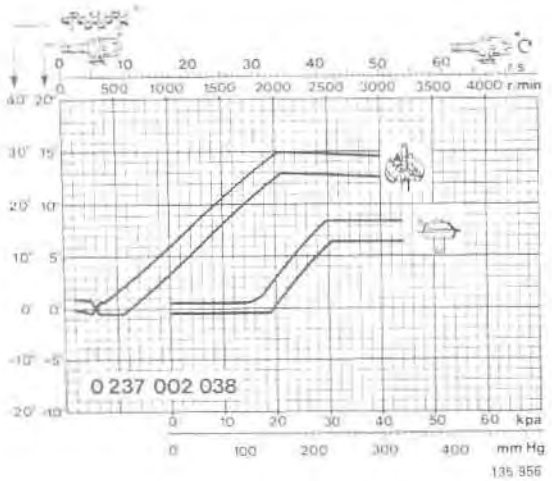
If ignition setting does not advance check vacuum control unit.


134 582

F8

Check Bosch number on distributor and turn to appropriate graph on pages 16–20

Select pressure from graph and pump up vacuum pump to this value. Record ignition setting. Subtract basic ignition setting and check that value conforms to graph.



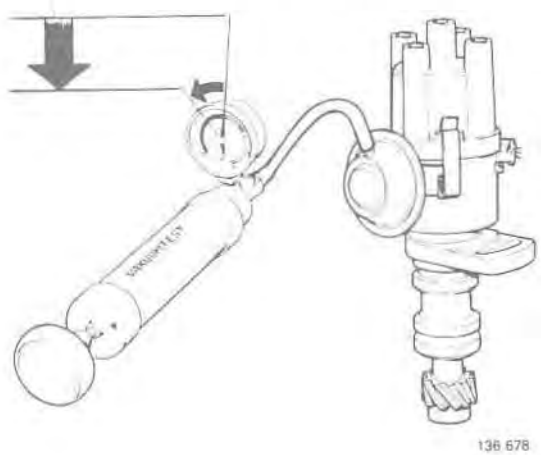
135 956

Example: Bosch number 0 237 002 038

F9

B 21 F 1979– (Excl. California and Japan)

You select a pressure of 200 mm Hg. Crankshaft degrees at this pressure = **9–14°**. Basic ignition setting is 10° which means that 19–24° should be recorded at timing test.


136 678

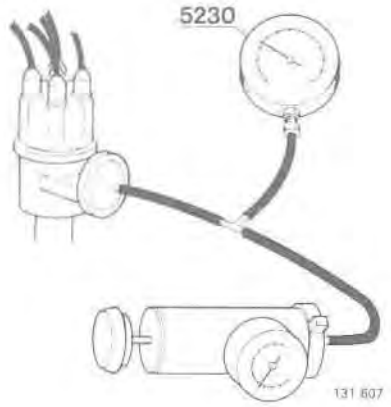
F10

Check vacuum control unit for leakage

Connect a vacuum pump and increase vacuum to **67 kPa** (500 mm Hg).

Pressure should not drop by more than **13.5 kPm** (100 mm Hg) during one minute.

F11



Checking ignition retard

Applies to B 19/21 E and F-Turbo engines.

Connect pressure gauge **5230** and pump 5496 to vacuum control unit.

Start engine and run at idle.

Record ignition advance. Increase pressure to **30** kPa and read off ignition setting.

Ignition setting should drop **3–7°**.

Disconnect pump and pressure gauge. Reconnect hose.

G. Distributor – reconditioning

G1

Replacing vacuum control unit

B 20: Remove distributor from engine prior to removing vacuum unit.

Remove:

- distributor cap
- rotor
- dust cover
- vacuum hose.

Mark position of distributor.

Turn distributor to obtain access to vacuum unit retaining screws.

Remove vacuum unit.

G2

Hook on vacuum unit

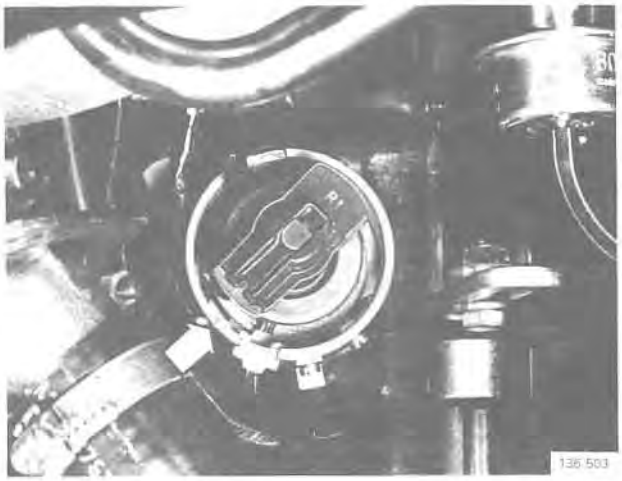
Tighten screws.

Return distributor to original position.

Fit:

- vacuum hose
- dust cover
- rotor
- distributor cap.

Check ignition setting.



G3

Replacing distributor on B 19–B 23

Removing

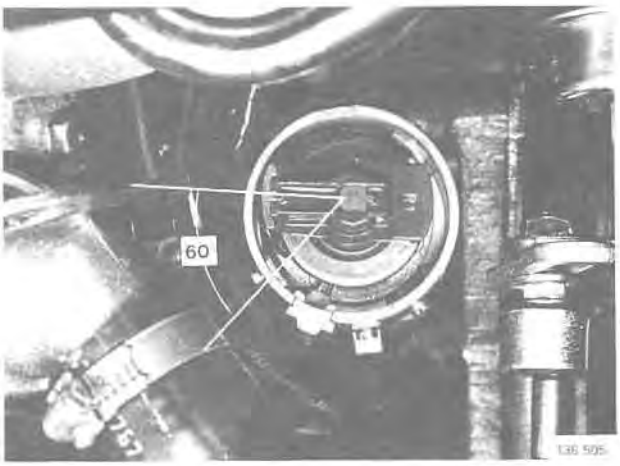
Unclip distributor cap and remove dust cover.

Turn crankshaft until rotor points towards mark in distributor body, see fig.

Disconnect:

- wire
- vacuum hose.

Remove distributor retaining screw and lift away distributor.



G4

Installing

Turn rotor approx. 60° clockwise from mark in distributor body.

(Does not apply to B 20.)

Place distributor in position and fit screw loosely.

Check that rotor points towards mark.

Connect:

- wire
- vacuum hose.

Refit distributor cap.

Check/adjust basic ignition timing.

G5

Replacing impulse sender on B 19–B 23

Removing

Remove distributor as described in G3.

Remove/disconnect:

- retaining clips
- vacuum unit
- wire
- impulse sender screw.

G6

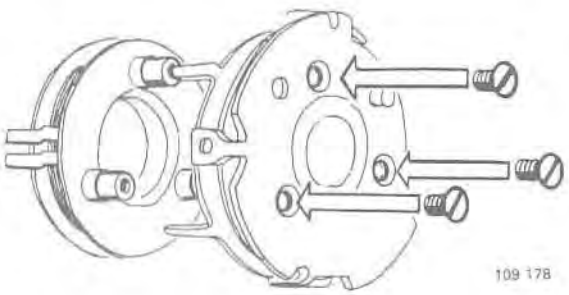
Unclip lock ring and remove shims as applicable
Remove rotor and lock pin

Use two screwdrivers to pry rotor off shaft.

Remove lock ring and lift out impulse sender.

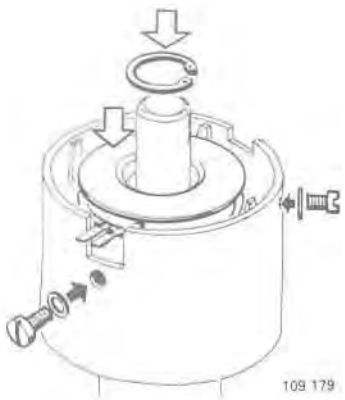
G7

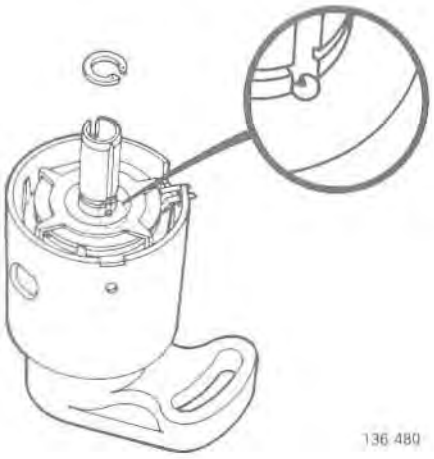
Fit new impulse sender



G8

Attach lock ring




136 480

G9

Fit rotor and lock pin

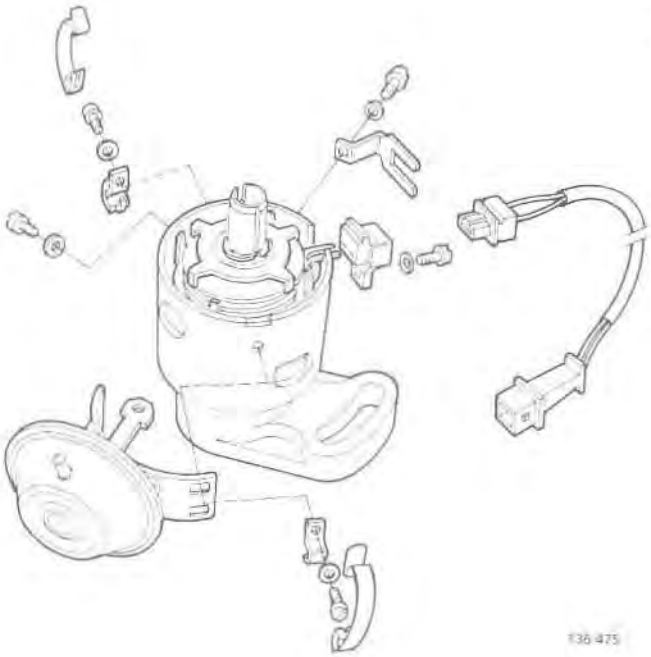
If lock pin has a groove turn it to face centre shaft.

Fit shims and lock ring.

G10

Fit/connect:

- impulse sender screw
- wire
- vacuum unit
- retaining clips.


136 475


109 252

G11

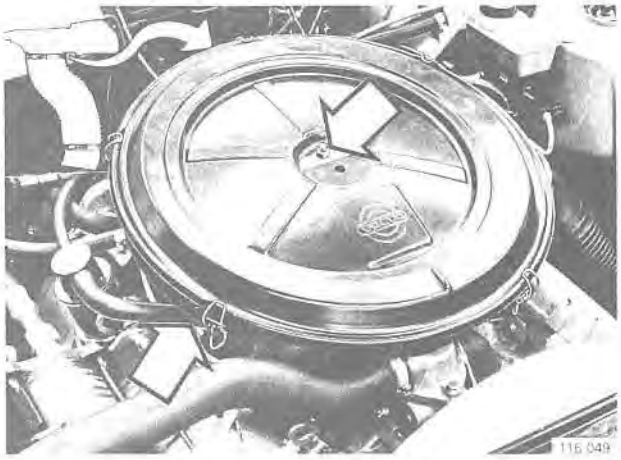
Turn shaft and check for grinding etc

Magnets will give slight resistance to turning action.

Refit distributor. See G14.

Check/adjust basic ignition setting.

Replacing distributor on B 27, B 28



G12

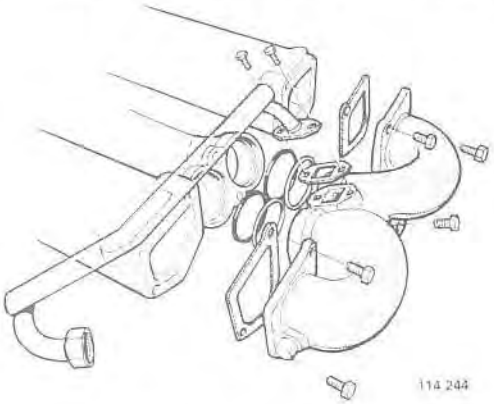
B 27 A, B 28 A start at operation G15

Other engine types:

Remove air filter.

B 27 E 1975–78

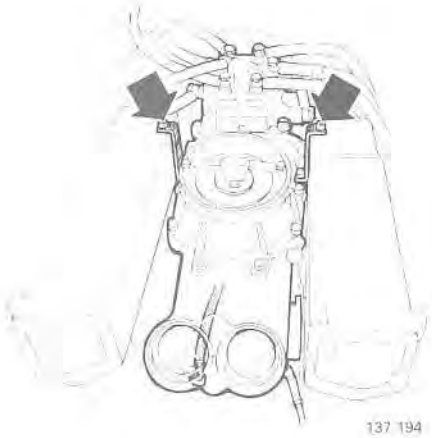
Proceed to G15.



G13

Remove front part of inlet manifold

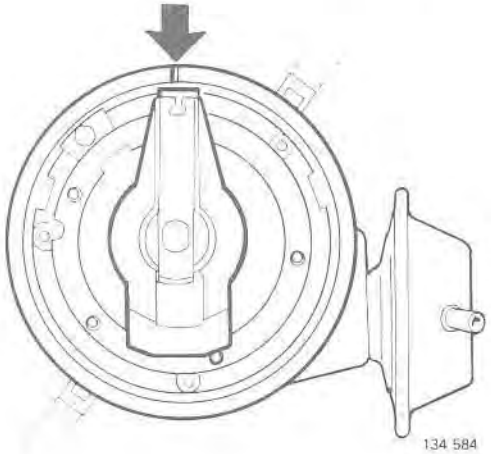
Disconnect link rod from throttle pullev.



G14

Remove air-fuel control unit retaining screws

Lift unit up slightly.



G15

All B 27, B 28 models

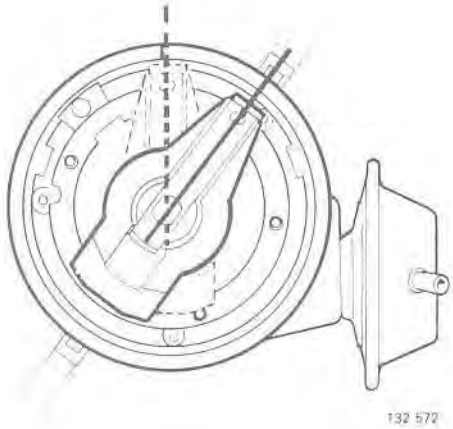
Unclip distributor cap and lift out dust cover.

Turn crankshaft until rotor points towards mark in distributor body.

Remove/disconnect:

- vacuum hose
- wire
- screw.

Remove distributor.

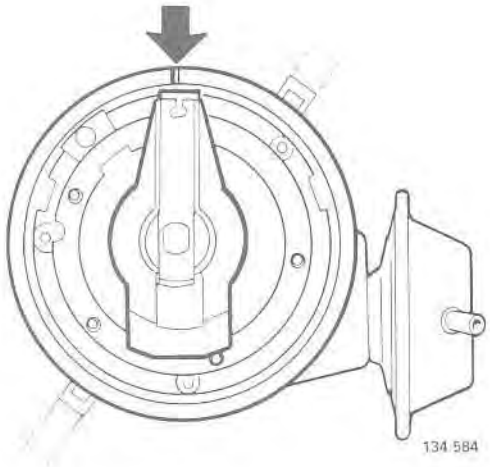


G16

Installing distributor

Turn rotor to point towards clip.

Fit distributor.



G17

Check setting

Rotor should point towards mark in distributor body.

Fit retaining screw loosely.

Fit/connect:

- wire
- vacuum hose
- dust cover
- distributor cap.

G18

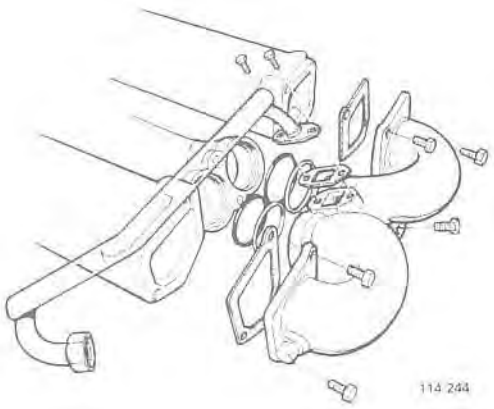
B 27 A, B 28 A proceed to G21

B 27 E 1975–78 proceed to G20

Other B 27 E models and B 27 F, B 28 E and B 28 F

Install air-fuel control unit

Reconnect link rod to throttle pulley. Tighten air-fuel control unit screw.

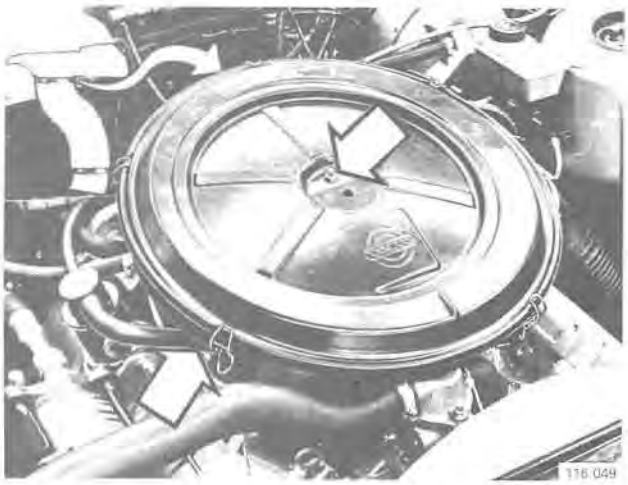


G19

Refit inlet manifold

Tightening torque 10–15 Nm (7–11 ft.lbs.).

G20



Fit air filter

G21

All B 27, B 28

Check/adjust basic ignition setting.

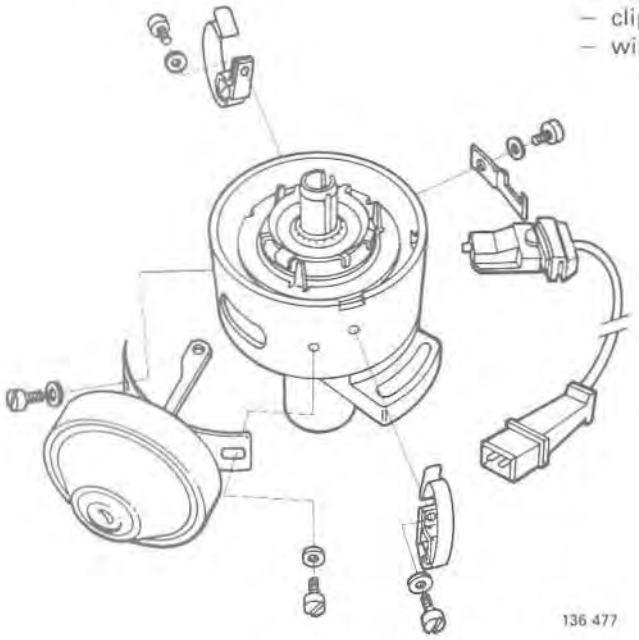
G22

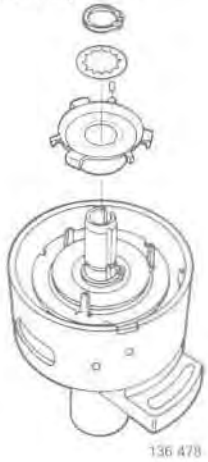
Replacing impulse sender on B 27/B 28

Remove distributor according to G12–G15.

Remove:

- vacuum unit
- clips
- wire.





136 478

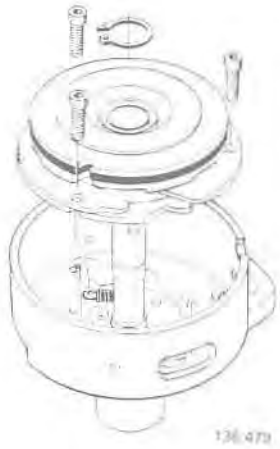
G23

Lift off rotor

Unclip lock ring and remove washer.

Lift off rotor. (Pry rotor off shaft with two screwdrivers if necessary.)

Take care not to drop lock pin into distributor.



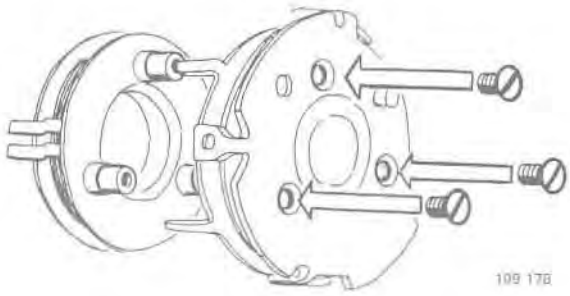
136 479

G24

Remove impulse sender

Remove screws and lock ring.

Lift up sender.



199 178

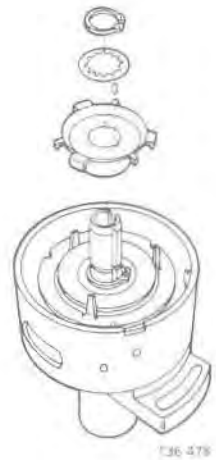
Install new impulse sender

Remove screws from inpulse sender.

Place base plate section on shaft.

Make sure that pins are opposite lug in distributor body.

Fit screws and lock ring.



136 479

G25

Refit rotor

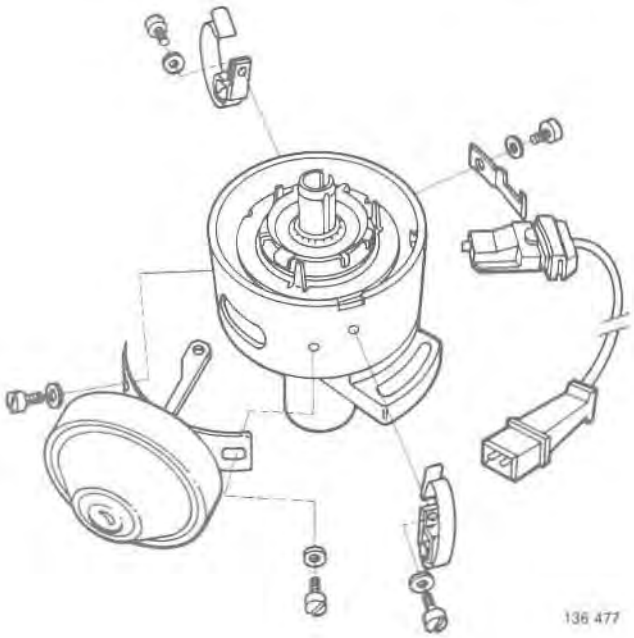
If lock pin has a groove turn it to face centre shaft.

Fit shims and lock ring.

Refit:

- vacuum unit
- clips.

Reconnect wire.

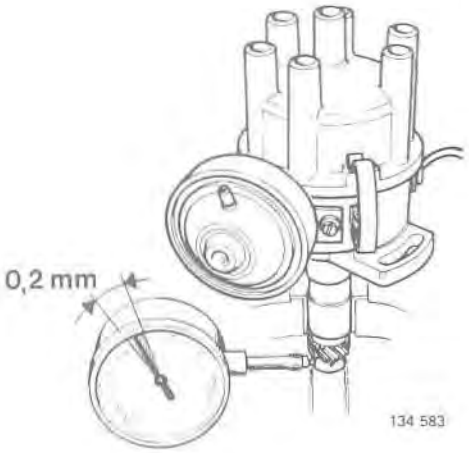


G27

Turn shaft and check for grinding etc

Magnets will offer slight resistance to turning action.

Refit distributor. See G16–G21.



G28

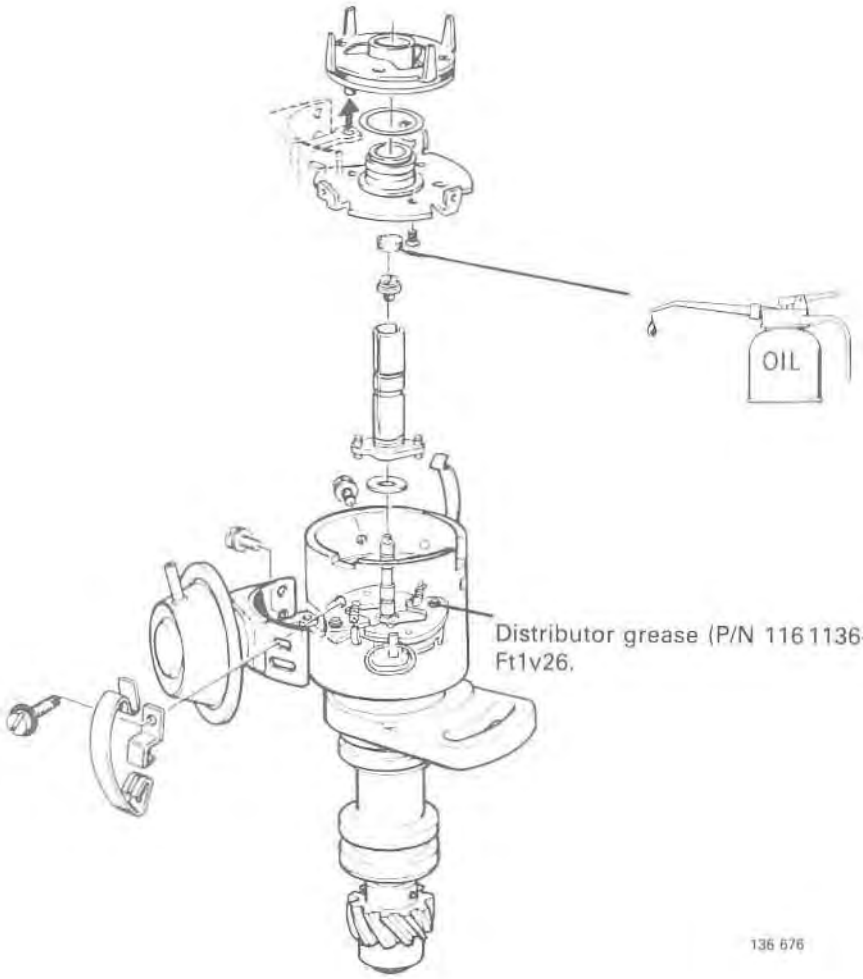
Check distributor shaft side play

Max. side play = 0.2 mm (0.008 in).

If side play is greater than specified, replace distributor.

G29

Lubrication



Distributor grease (P/N 116 1136-7) or Bosch lubricant Ft1v26.

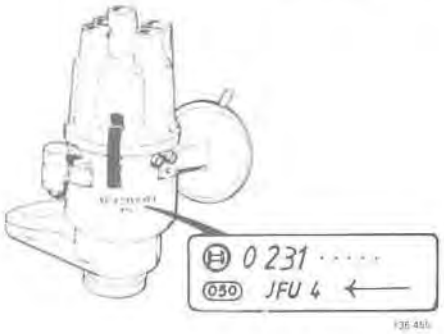
136 676

G30

Replacing control unit

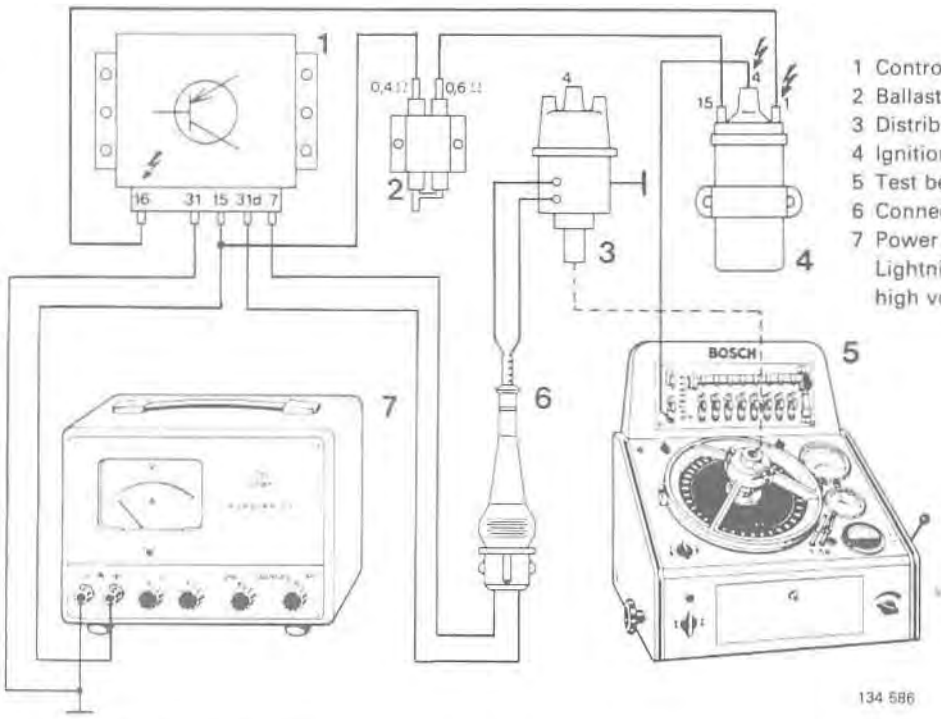
Make sure that rubber seal remains in bottom of connector when disconnecting control unit.

Testing distributor on a test bench

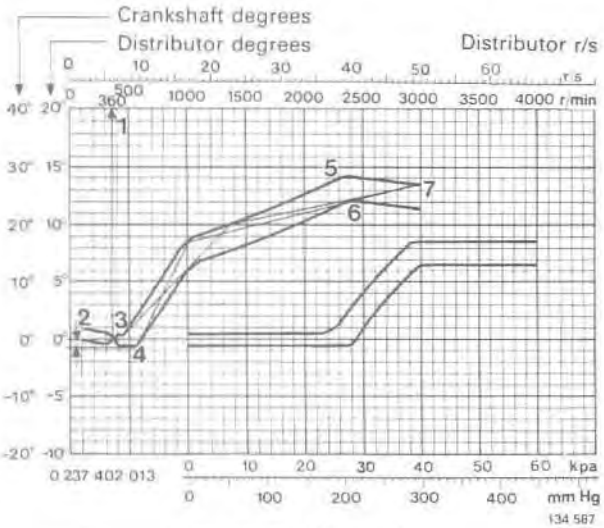


Refer to the manufacturer's instruction at all times when testing distributors on a test bench.

The number on the side of the distributor is the Bosch part number.



1 Control unit
2 Ballast resistor
3 Distributor
4 Ignition coil
5 Test bench
6 Connecting lead to distributor
7 Power supply (14 V)
Lightning (ϟ) symbols indicate dangerous high voltage terminals



1	Zero set at (360 r/min)
2	Electronic advance
3 and 4	Centrifugal advance begins
5 and 6	Centrifugal advance ends
7	Absolute limit of ignition advance

G31

Calibrate test bench

Set zero at distributor shaft speed corresponding to zero advance. See diagrams on pages 15–17. This compensates for the electronic advance from the impulse sender.

136 472

G32

Checking firing

Set distributor "0" to position which corresponds to firing of cyl 1.

Firing should be:

4 cyl: 0–90–180–270
6-cyl: 0–75–120–195–240–315–360

Max. deviation = ±1.5°.

Increase speed.

Check shape of arrows (or equivalent symbol depending on test unit).

If deviation is more than 2° this indicates that side play is too large.

137 191

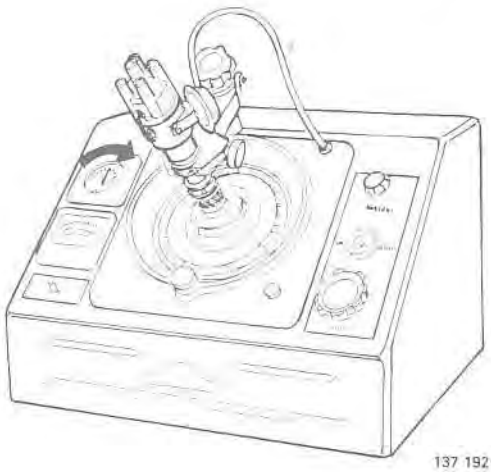
G33

Checking centrifugal advance

Run distributor at **3.5 r/s** (200 r/min). Calibrate meter. Increase speed and check that centrifugal advance conforms to specification.

If not, check that balance weights are lubricated and do not bind.

Also check springs.



137 192

G34

Checking vacuum advance

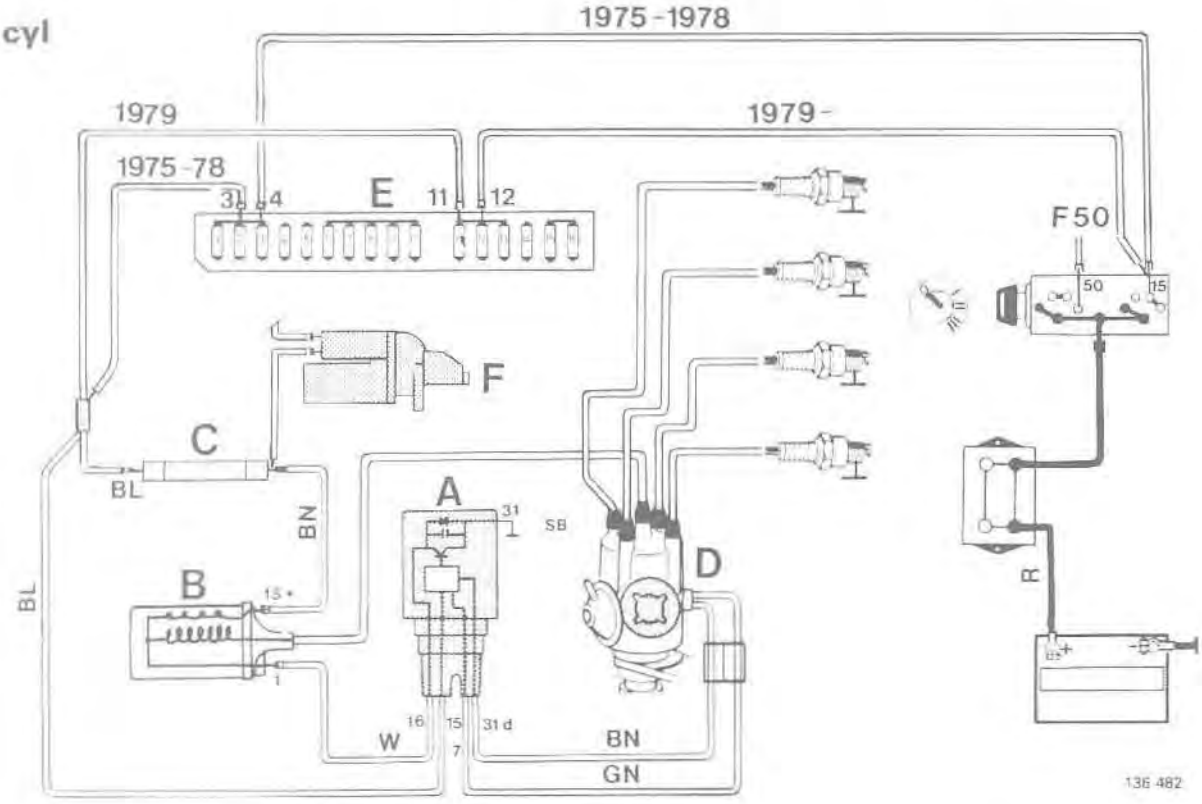
Run distributor at **10 r/s** (600 r/min).

Calibrate meter.

Increase vacuum and compare value to specification.

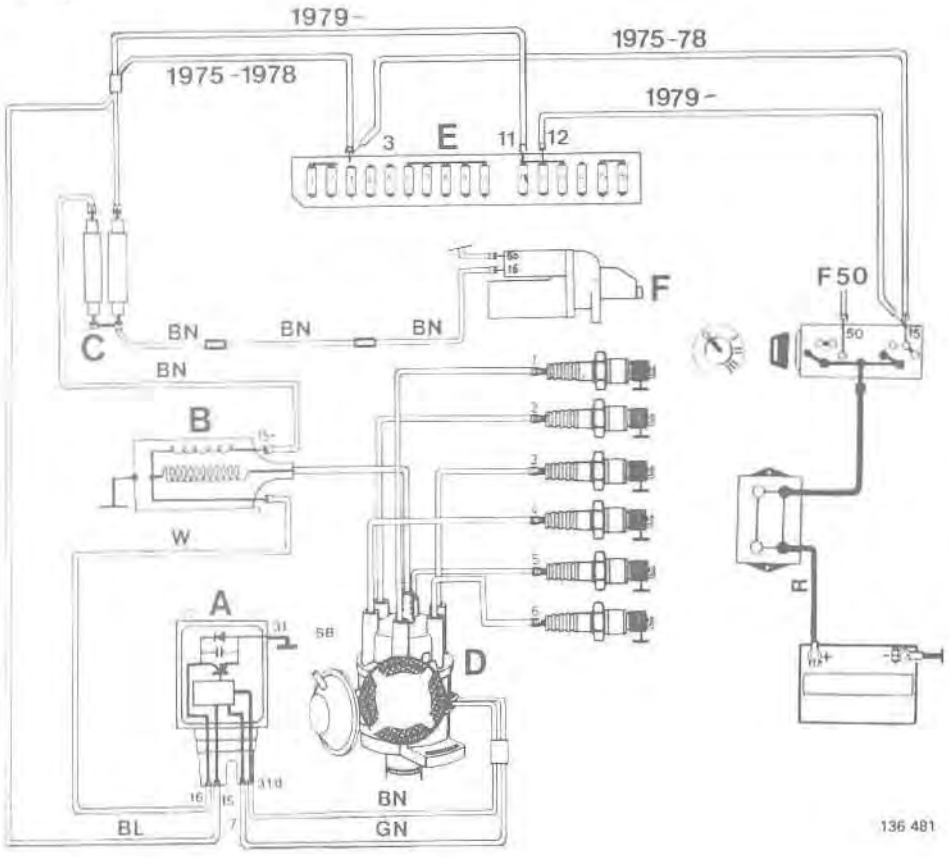
Wiring diagram, breakerless ignition system

4 cyl



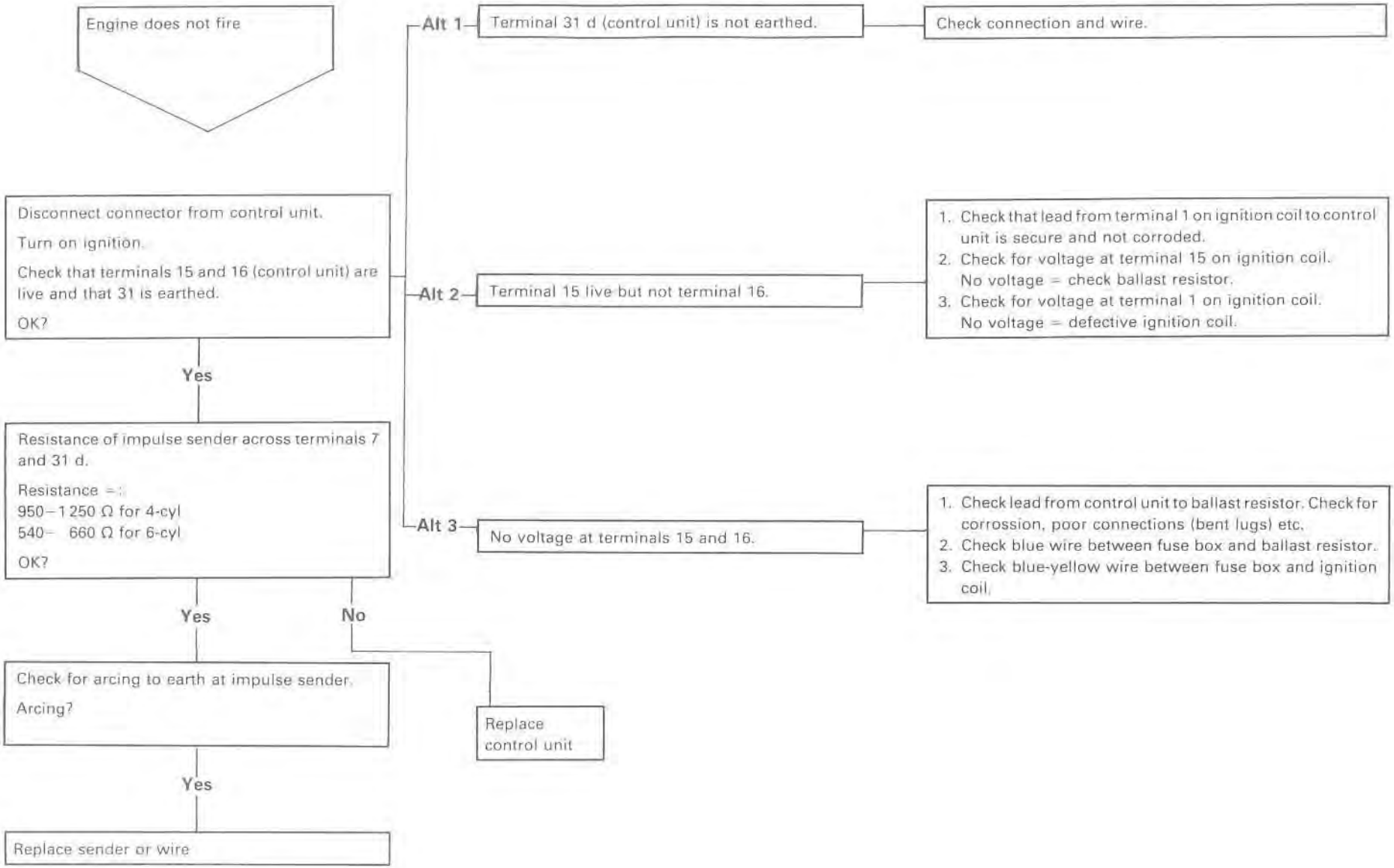
A = Control unit
B = Ignition coil
C = Ballast resistor
D = Distributor
E = Fuse box
F = Starter motor

6 cyl



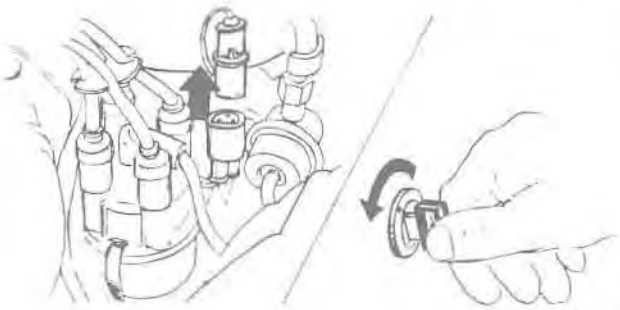
Colour code:

BL = blue
GN = green
BN = brown
SB = black
OR = orange
R = red
Y = yellow
W = white


Engine does not fire
Alt 1
Terminal 31 d (control unit) is not earthed.
Check connection and wire.
Disconnect connector from control unit.
Turn on ignition.
Check that terminals 15 and 16 (control unit) are live and that 31 is earthed.
OK?
Alt 2
Terminal 15 live but not terminal 16.
1. Check that lead from terminal 1 on ignition coil to control unit is secure and not corroded.
2. Check for voltage at terminal 15 on ignition coil. No voltage = check ballast resistor.
3. Check for voltage at terminal 1 on ignition coil. No voltage = defective ignition coil.
Yes
Resistance of impulse sender across terminals 7 and 31 d.
Resistance =:
950–1 250 Ω for 4-cyl
540– 660 Ω for 6-cyl
OK?
Alt 3
No voltage at terminals 15 and 16.
1. Check lead from control unit to ballast resistor. Check for corrossion, poor connections (bent lugs) etc.
2. Check blue wire between fuse box and ballast resistor.
3. Check blue-yellow wire between fuse box and ignition coil.
Yes
No
Check for arcing to earth at impulse sender.
Arcing?
Replace control unit
Yes
Replace sender or wire

Computerized ignition system

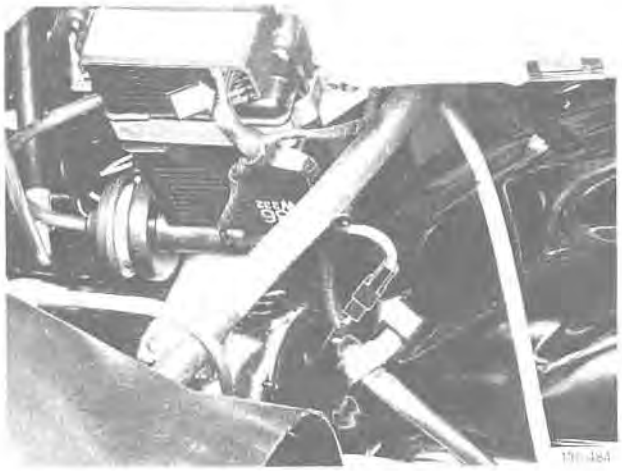
H. General instructions



136.483

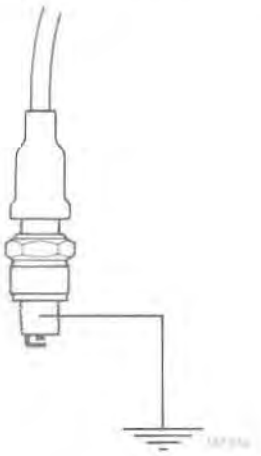
H1

Always switch off the ignition when disconnecting/connecting ignition system terminals.



H2

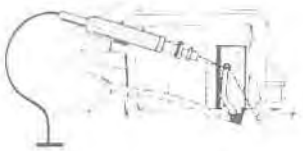
Begin by checking all relevant terminals and connectors before carrying out extensive fault tracing procedures.

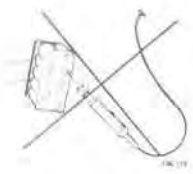


H3

Never let spark length exceed 5 mm when checking ignition system circuits or control unit may be damaged.

Consequently, connect spark plug to HT lead and earth plug via engine.



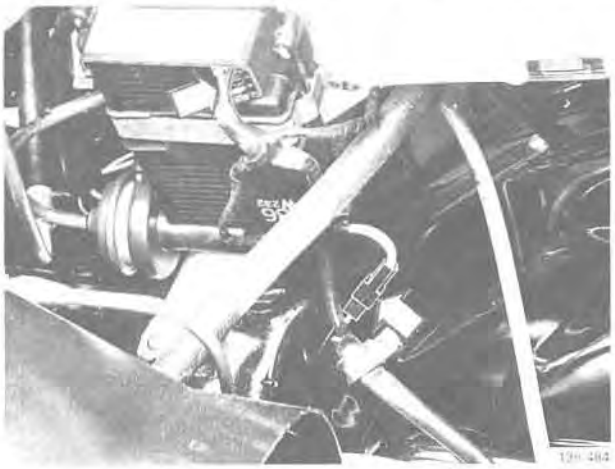


H4

CAUTION:

To avoid damaging the connector sleeves DO NOT DISCONNECT CONNECTOR from control unit when checking voltage. The volt-/ohm-meter should be connected directly to the wires.

J. Connectors and earth points

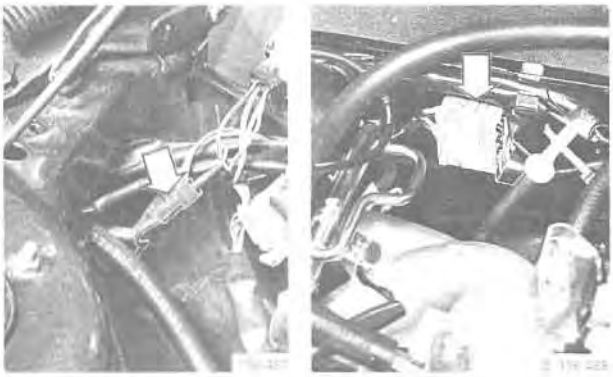


J1

Control unit

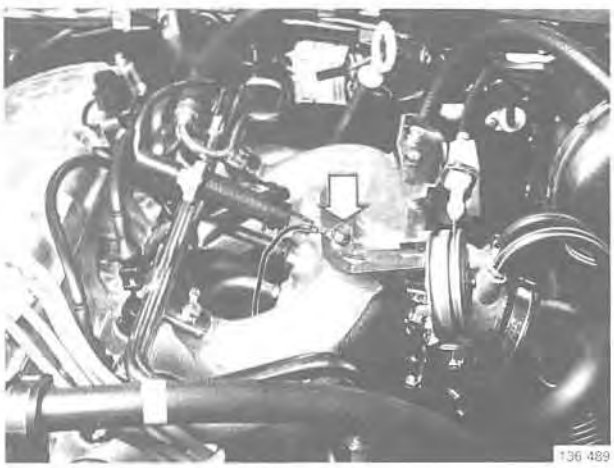
J2

Distributor



J3

Bulkhead



J4

Control unit earth

K. Modifications

Connecting guide sleeves

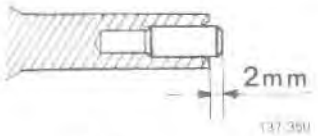
K1

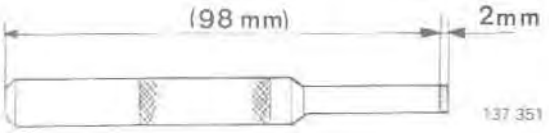
With effect from 1983 models the distributor connector is equipped with guide sleeves. These sleeves can also be fitted to earlier models and to the control unit connector.

Guide sleeves P/N 1 324 909-9.

Note: From model-year 1984, the guide sleeves are installed in the control unit at the factory.

Note: The wiring harness for the control unit must be replaced if the connector has been disconnected or when replacing the control unit.





K2

Drift for connecting guide sleeves

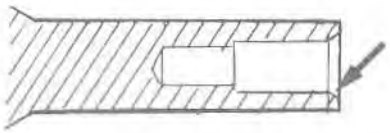
P/N 999 5268-1.

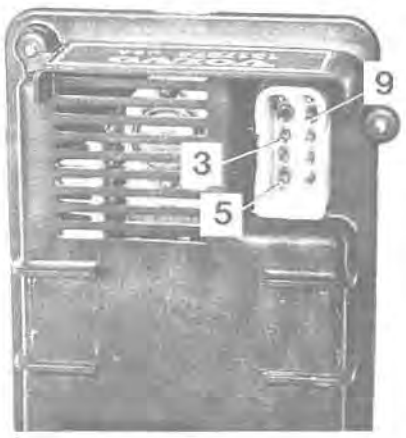
To install guide sleeve, place sleeve in the drift and check that it protrudes 2 mm (0.08 in.).

If not, shorten tool to dimension shown adacent.

Countersink tool.

Easier to insert guide sleeve if opening is countersunk.





K3

Carefully clean connector on distributor and control unit

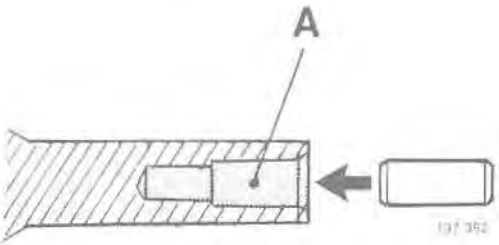
Withdraw connector from distributor. Scrape off PVC and oxide deposits from all three pins.

Use tool 9549.

Apply grease to pin.

Clean female connector with a tapered file.

Withdraw connector from control unit. Scrape off oxide from around pins 3, 5 and 9.

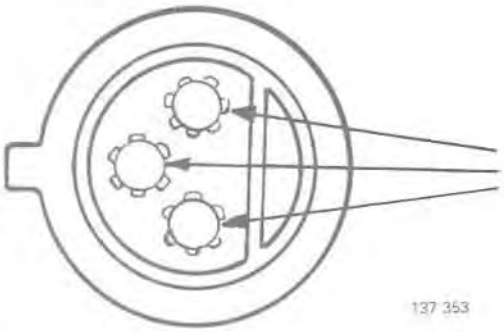


K4

Place guide sleeve in tool 5268

Pack (A) with grease. Repeat for each sleve.

Insert sleeve in tool.



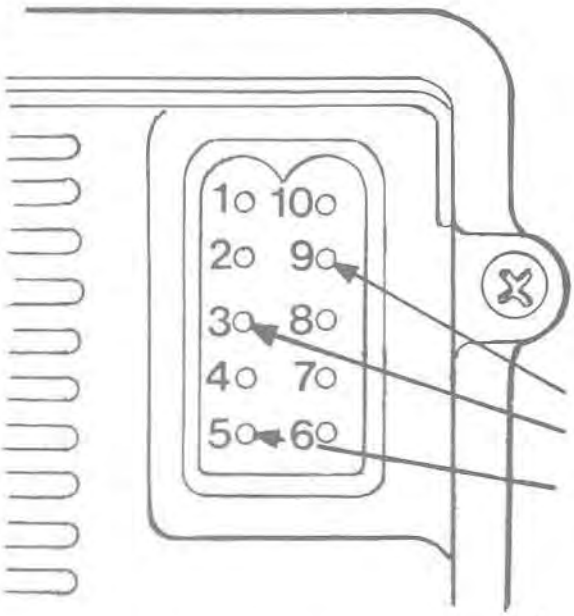
137 353

K5

Install guide sleeves on connectors

Distributor:

On all pins.

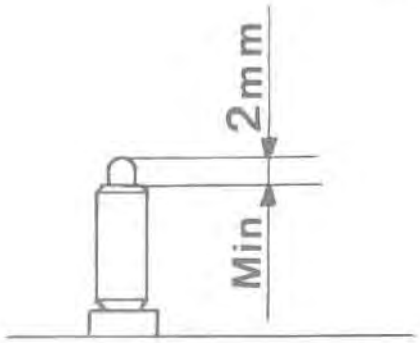


137 354

K6

Control unit

On pins 3, 5 and 9.



137 355

K7

Check

Press on guide sleeves so that at least 2 mm (0.08 in) of pin is visible above sleeves.

Reconnect terminals and check function.

Replacing sleeve insulators

186 493

K8

Withdraw connector

Detach rubber cover and remove insulator.

Fit new insulator P/N 949597-9.

Reconnect connector.

L. Ignition coil and HT leads

L1

Test conditions:

- Ignition coil and leads should be at a temperature of about 20°C (68°F).
- All leads must be disconnected from components when taking measurements.

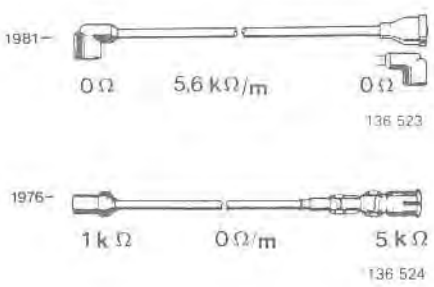
L2

Checking ignition coil

- check outer casing for cracks etc
- measure resistance across terminals 1(−) and 15(+). Resistance = **1.1–1.3 Ω**.

L3

- measure resistance across terminal 1(−) and the high tension terminal. Resistance = **9.6–11.6 kΩ**.



L4

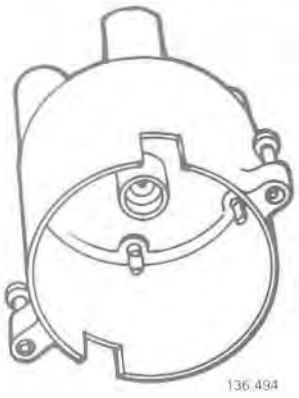
Checking HT leads

Resistance of HT lead between distributor and ignition coil should be 2–3.5 kohms which is equivalent to 5.6 kohms per metre.

Spark plugs suppressor resistance = 5 kohms.

Resistance of cable connector on distributor cap = 1 kohm (each lead).

M. Distributor, general


136 494

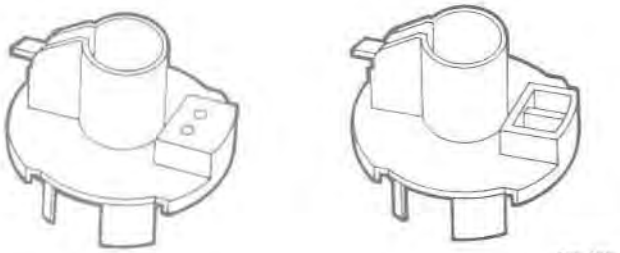
M1

Checking distributor cap

Check for:

- dirt, cracks
- tracking, burnt terminals.

Note: Centre terminal is not spring loaded.


136 496

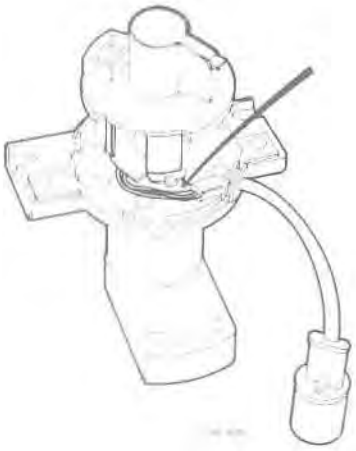
Early type

Late type

M2

Checking rotor

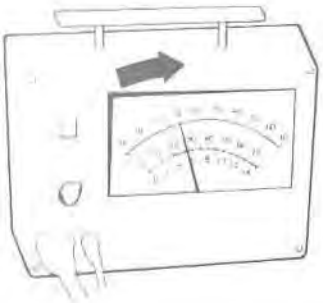
Two types of rotor are in use. Use only new type for replacement.



M3

Checking Hall pick-up wire

Make sure that the wires cannot be damaged by the rotor.

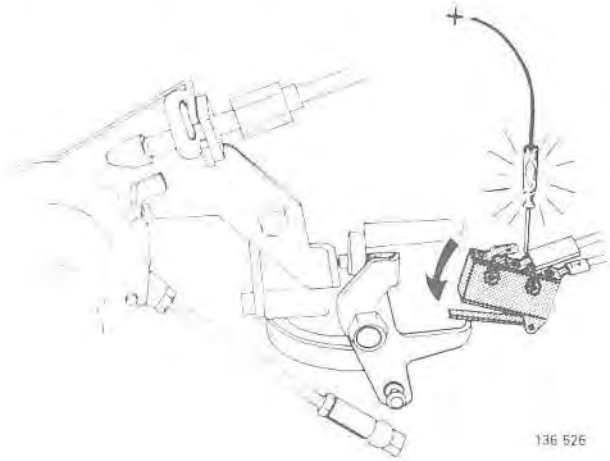


M4

Checking/adjusting basic ignition setting

Before checking ignition setting check function of microswitch.

Note: See page 65 for correct adjustment procedure.



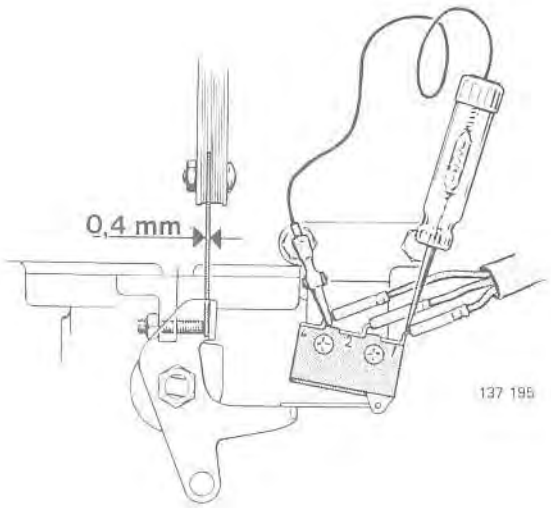
M5

Checking microswitch on B 21 F–MPG 1981 and B 21 F–CI 1982

Connect a test lamp between battery (+) and terminal 2 (yellow wire) on microswitch.

Lamp should be off when engine is idling. If lamp is on, adjust microswitch as described below.

Turn throttle pulley and check that lamp lights.



M6

Adjusting microswitch

Place a **0.4** mm feeler gauge between adjustment screw and lever.

Unscrew microswitch retaining screws and turn switch until lamp lights.

Retighten screws.

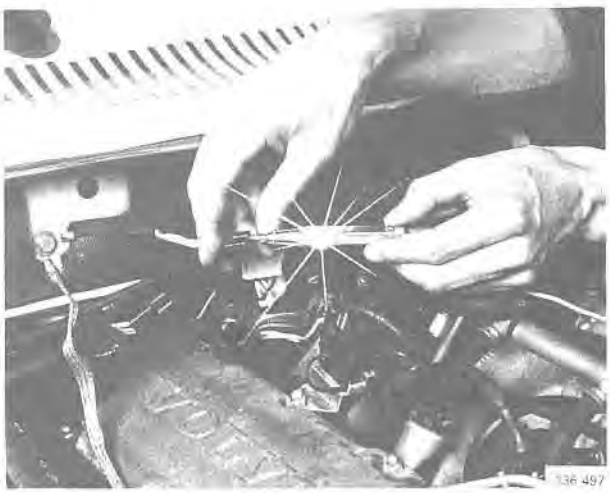
Checking

Place a **0,2** mm feeler gauge between adjustment screw and lever.

Lamp should light.

Remove feeler gauge and insert a **0.4** mm feeler gauge.

Lamp should be off.



M7

Checking microswitch on B 21 F–LH 1982

Disconnect connector from vacuum switch. Connect a test lämp between battery (+) and orange wire on switch.

Start engine.

Test lamp should light with engine idling.

Increase engine rpm and check that light goes out.

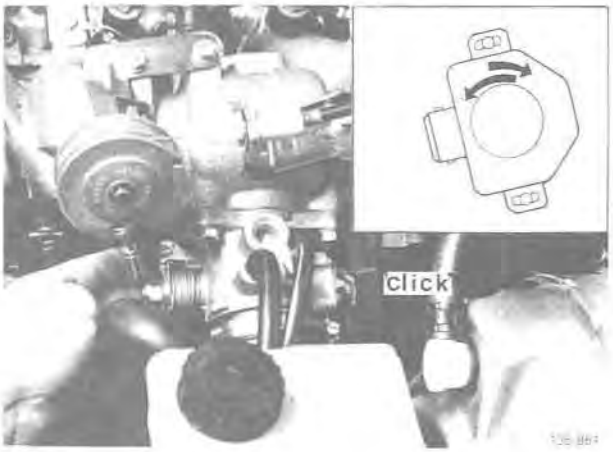
If not, check hose to vacuum switch. If intact, replace vacuum switch.

M8

Checking microswitch on B 23F-LH 1983–1984; B 230 F-LH 1985–

With engine off, turn throttle pulley slowly and listen to microswitch. A click should be heard when throttle valve moves.

M9



Adjusting microswitch

Unscrew retaining screws.

Turn switch clockwise slightly. Then turn switch back until it contacts stop, but no further as throttle valve will start to open.

Tighten retaining screws.

Check function.

M10

Check that basic signition setting is 12° ± 2° at 12.5 r/s (750 r/min)

Warm engine.

Air conditioning disconnected as applicable.

Adjust ignition setting by turning distributor.

Increase engine speed to 2000 rpm for 5 seconds.

Let the engine idle and check idle quality.

Make sure the idle is stable and within specifications as variations could affect the timing.

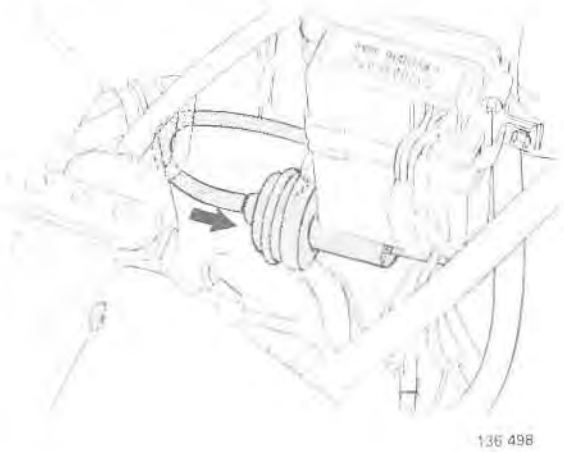
M11

Check centrifugal advance

Disconnect vacuum hose from distributor.

Run engine at 42 r/s (2 500 r/min) and check that ignition advance is **16–24°** before T.D.C. for B 23 F, B 230 F and **22–30°** before T.D.C. for other models.

If incorrect, replace control unit.



136 498

M12

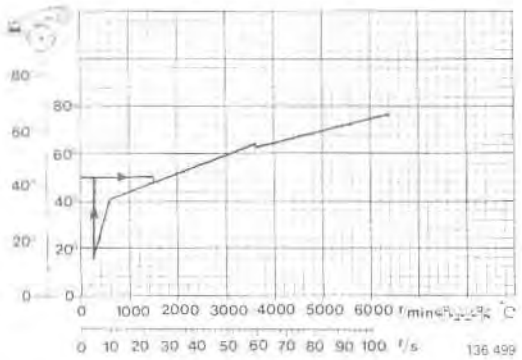
Check vacuum advance

Run engine at **25** r/s (1 500 r/min).

Disconnect vacuum hose. Record ignition advance. Reconnect hose and check that advance alters.

If not, check for vacuum at control unit (check suction at hose).

If vacuum, but no advance, replace control unit.



136 499

M13

Check dwell angle

Read off dwell angle at idle.

Dwell angle = **36–38°**.

Increase engine rpm and check that dwell angle increases. if no increase is recorded, replace control unit.

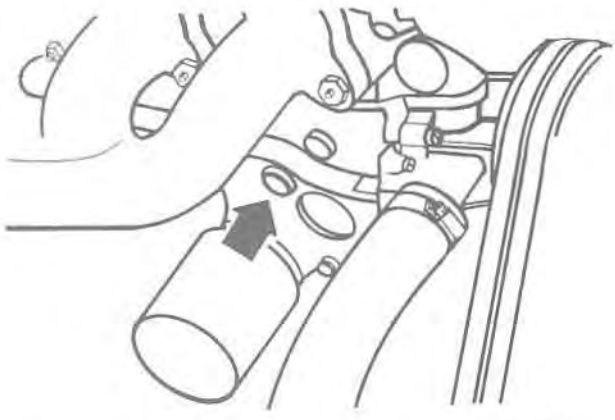
136 500

B 23 F *M14*

Checking knock sensor

Connect a Volvo Monotester or equivalent test meter. Start engine (AC disconnected).

Increase engine speed and maintain at set level by e.g. placing screwdriver across throttle pulley.



136 527

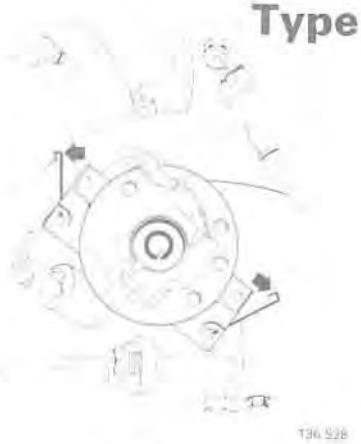
M15

Tap plug on right side on cylinder block with a hammer.

Ignition should retard by max 6° and return automatically to normal.

N. Distributor (Chrysler), reconditioning

Type 1 (P/N 1306059)

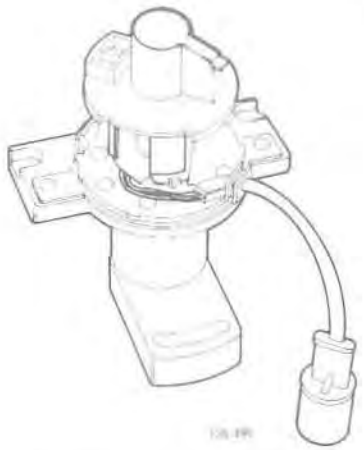


N1

Replacing Hall pick-up

Remove:

- distributor cap
- rotor arm/rotor
- springs retaining Hall pick-up
- disconnect connector
- remove Hall pick-up.



N2

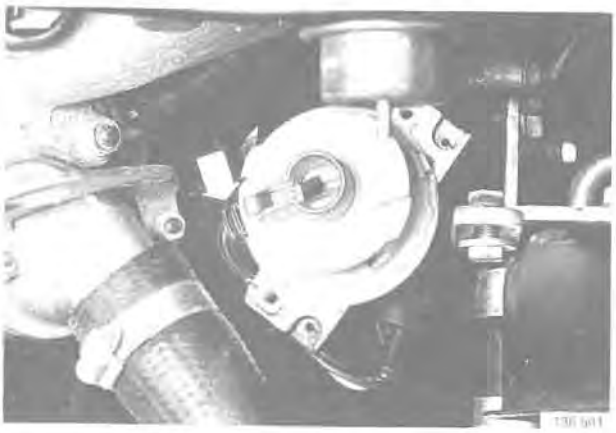
Install:

- Hall pick-up
- springs
- rotor arm/rotor.

Check that wires cannot be damaged by rotor.

Refit distributor cap and reconnect connector.

See pages 60–61 for installing guide sleeves on connectors.



N3

Replacing distributor

Remove:

- HT leads from distributor cap
- distributor cap.

Turn crankshaft until rotor points towards rubber grommet.

Disconnect connector.

Remove distributor.

N4

Install distributor

Tubular pin protrudes more on one side than the other. Turn shaft until pin is opposite groove in distributor body.

Fit distributor.

Fit:

- rotor
- distributor cap and reconnect HT leads.

Reconnect connector.

Check/adjust basic ignition timing. See operation M4.

See pages 60–61 for installing guide sleeves on connectors.

Distributor (Bosch), reconditioning
Type 2 (P/N 1332684, 1336737, 1332587)

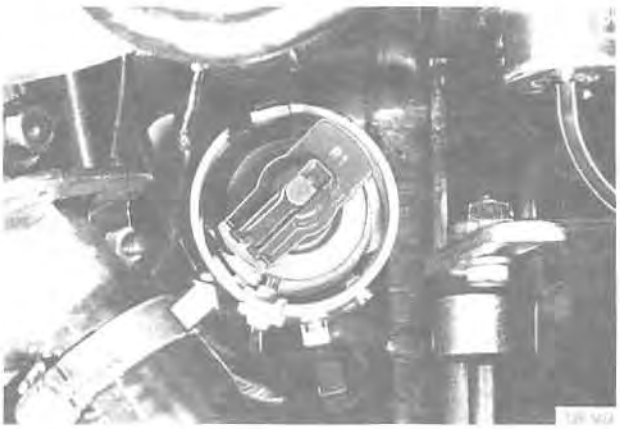
N5

Replacing distributor

Remove/disconnect

- HT leads from cap
- distributor cap
- dust cover.

Refit rotor.



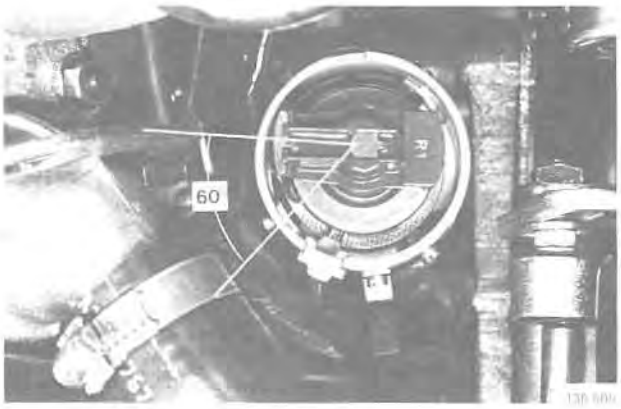
N6

Set cyl 1 to T.D.C.

Turn crankshaft until rotor points towards mark in distributor body.

Disconnect connector.

Remove distributor.



N7

Install distributor

Check that cyl 1 is at T.D.C.

Turn rotor approx. 60° clockwise from mark in distributor body.

Refit distributor.

Rotor should now point towards mark in distributor body.

N8

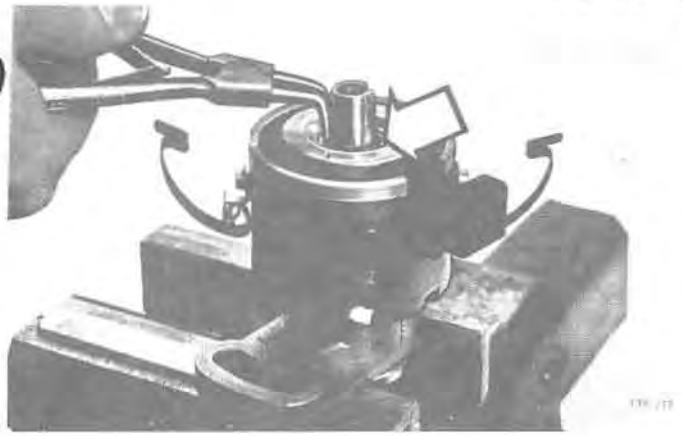
Fit/connect:

- dust cover
- rotor
- distributor cap
- HT leads.

Check/adjust basic ignition timing. See M4.

See pages 60–61 for installing guide sleeves on connectors.

Replacing Hall pick-up



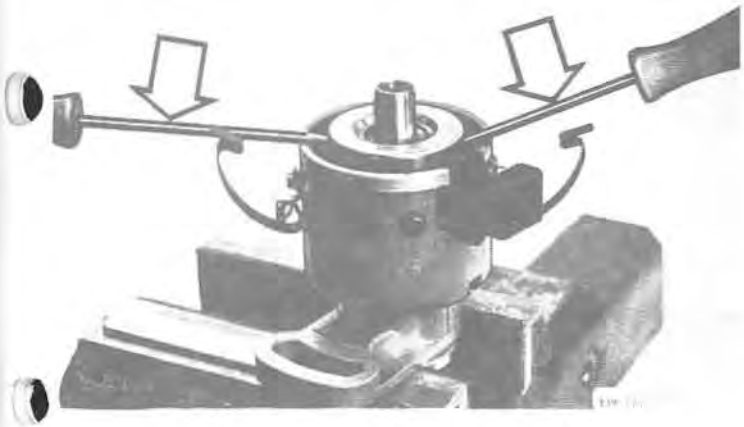
N9

Note: The Hall Switch should not be replaced on distributors within the first year of warranty. The complete distributor must be replaced.

Remove distributor according to operations N5–N6.

Mount distributor in a vise (NOT SOFT VICE JAWS TO PREVENT DAMAGE).

Release circlip retaining trigger wheel.

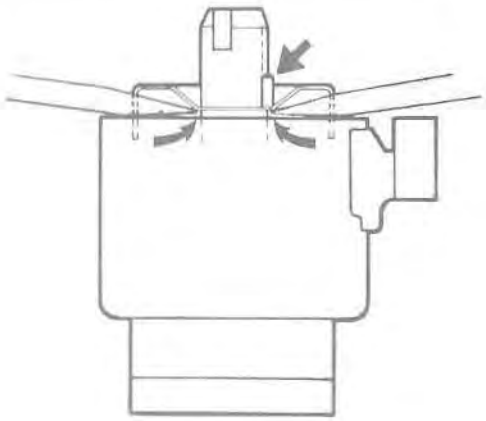


N10

Pry off trigger wheel with two screwdrivers (use round-shaft screwdrivers, 5mm diameter).

Place tips of screwdrivers on steel hub, as shown.

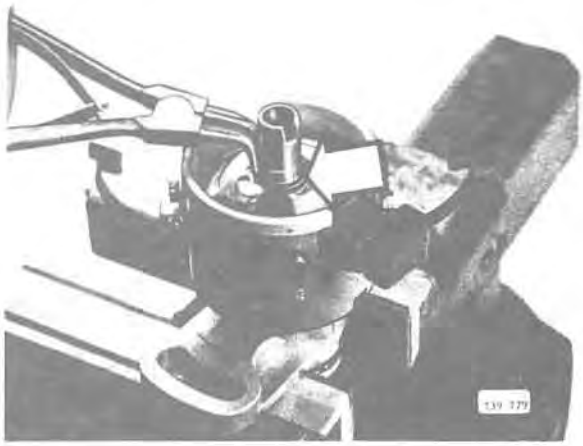
Take care not to damage trigger wheel.



N11

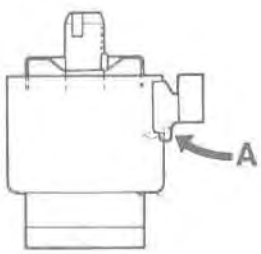
Note: If trigger wheel is bent during removal, it must be replaced.

Take care not to lose lock pin.

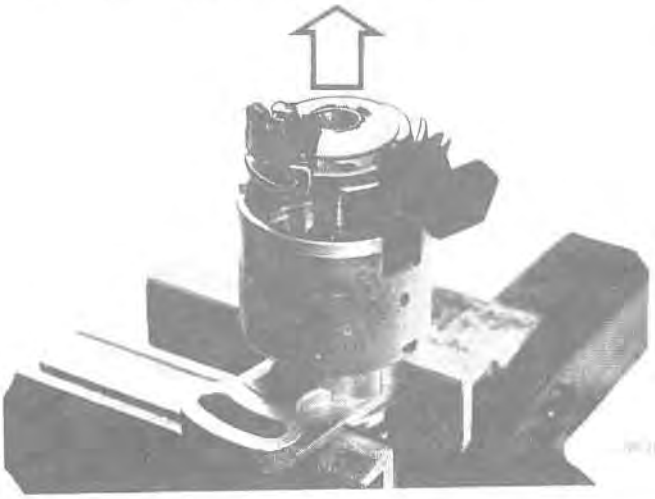


N12

Remove
- circlip
- Hall pick-up retaining screws
- plastic pin (A) for connector



N13

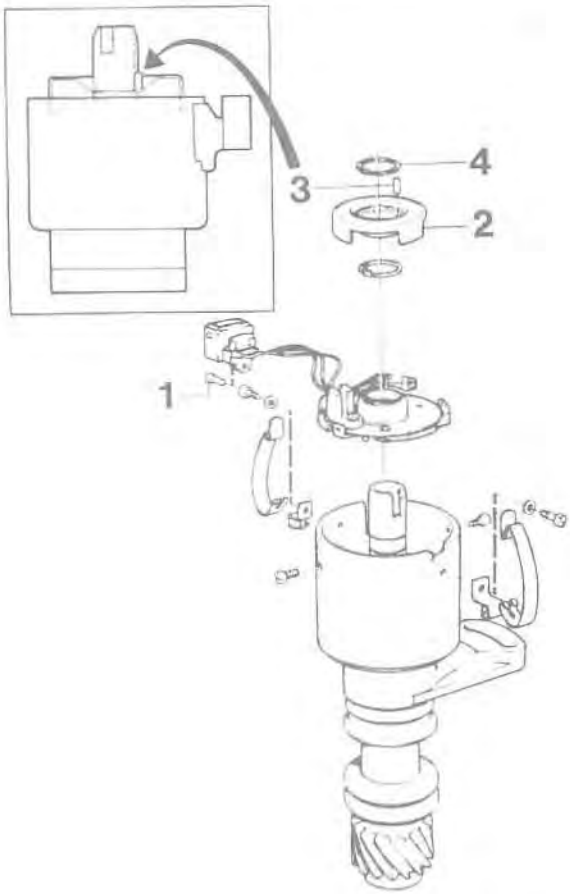


Remove Hall switch and connector.

N14

Install:

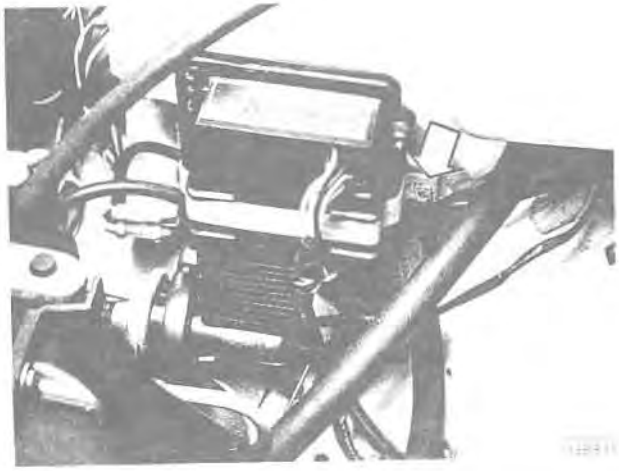
- New Hall switch and connector
- circlip
- retaining screws and plastic pin (1)



Install:

- trigger wheel (2)
- lockpin (3)
- circlip (4)
- condensation trap
- rotor arm

Install distributor according to operations N7–N8.



Control unit

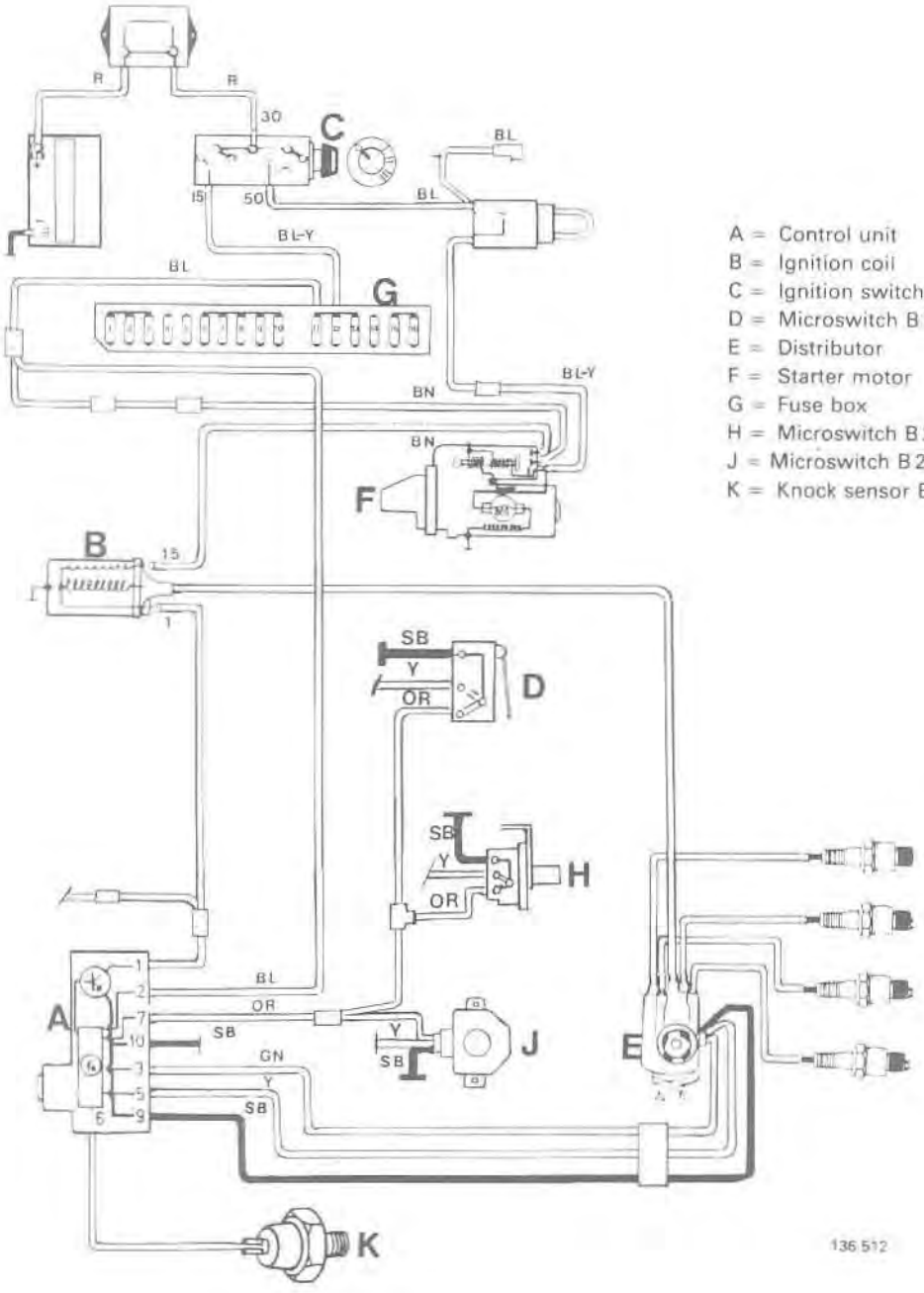
N15

Replacing control unit

Check centrifugal and vacuum advance according to operations M11–M13 after installing control unit.

See pages 60–61 for installing guide sleeves on connectors.

Wiring diagram, computerized ignition systems
B 21 F-LH, B 23 F-LH

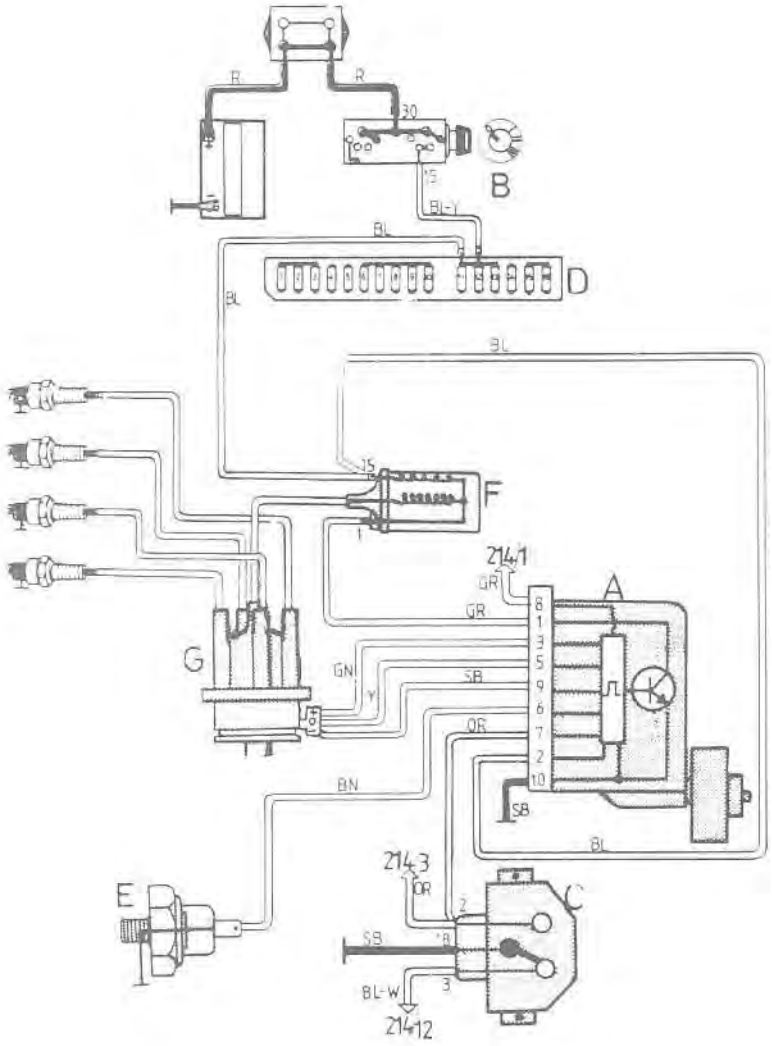


A = Control unit
B = Ignition coil
C = Ignition switch
D = Microswitch B 21 F-9
E = Distributor
F = Starter motor
G = Fuse box
H = Microswitch B 21 F LH-Jetronic
J = Microswitch B 23 F
K = Knock sensor B 23 F

Colour code

BL = blue
GN = green
BN = brown
SB = black
OR = orange
R = red
Y = yellow
W = white

Wiring diagram, computerized ignition system B 230 F–LH, 1985–



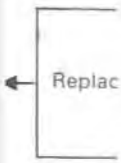
A Control unit
B Ignition switch
C Breaker unit
D Fusebox
E Knock sensor
F Ignition coil
G Distributor
214 Control Unit LH Jetronic

Fuse No. 11

Heated rear window
Overdrive

Colour code

BL = blue
GN = green
BN = brown
SB = black
OR = orange
R = red
Y = yellow
W = white



Fault tracing chart
B 21 F-MPG/LH B 23 F-LH

Engine operates.

Yes

No

Check that ignition advance is 12° at 12.5 r/s (750 r/min).

No

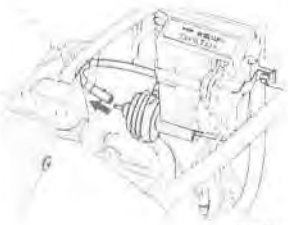
Adjust advance by turning distributor.

OK

Yes

Disconnect vacuum hose.

Increase engine rpm and check that ignition advances?



136 513

No

Replace control unit.

Yes

Maintain engine speed at 25 r/s (1 500 r/min).

Check for suction at hose. No suction = check hose and connections.

Connect vacuum hose. Check that ignition alters.

Ignition advances?

136 498

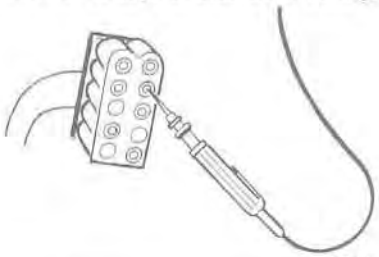
No

Yes

OK

Turn off ignition. Disconnect connector at control unit.

Check for voltage at blue wire. Voltage?



136 516

Ja

Yes

Check control unit earth.

136 514

No

Turn off ignition.

Disconnect 3-pole from distributor.

Switch on ignition.

Bridge pins B and C of wire.

Spark?

136 515

Engine operates.

s No

Disconnect HT leads from distributor.

Crank engine.

Spark?

Yes → Check that each plug sparks.

No → Check distributor

No

Turn off ignition.

Disconnect 3-pole connector from distributor.

Switch on ignition.

Bridge pins B and C with piece of wire.

Spark?

136 515

Yes → Check for voltage at terminal A on 3-pole connector.

136 517

Note: Not 12 V. Lamp dim.

Ignition should be off when disconnecting connectors.

Yes → Replace Hall pick-up in distributor.

nnector

oltage?

136 516

No

Ja ← Check for voltage at terminal 15(+) on ignition coil.

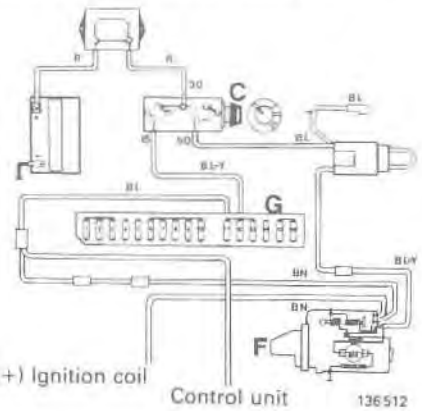
No

No

Check wire to distributor.

OK

Check wires between ignition switch and control unit.



OK → Replace control unit

Fault tracing chart

B 230 F–LH

Engine starts and runs

Yes

No

Check that ignition advance is 12° at 12.5 r/s (750 rpm).

Refer to SB 34:105 for setting instructions.

No

Adjust ignition advance by turning distributor

OK

Yes

Disconnect vacuum hose.

Increase engine RPM and check that ignition advances.

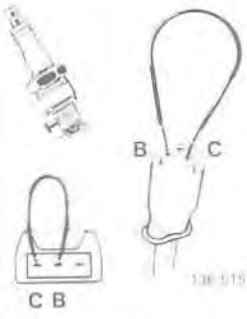
Advance?

136 513

No

Replace control unit

Yes



136 515

Turn off ignition.

Disconnect 3-pole
from distributor.

Note: Check type of d
Bosch (1), Chrysler (

Switch onignition.

Connect a bridge wir
and C.

Spark?

136 488

Maintain engine speed at 25 r/s (1500 rpm).

Check for suction at hose. No suction = check hose and connection.

Connect vacuum hose. Check that ignition changes.

Ignition changes?

No

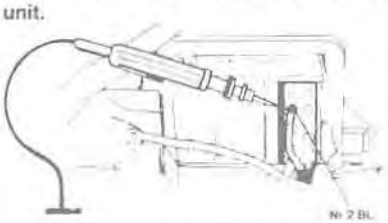
Yes

OK

Push test lamp probe through blue wire cover on control unit. Check for voltage.

Voltage?

Note: Do not disconnect connector from control unit.



Yes

Yes

No

Check control unit ground connection.

136 514

Check wires c

Engine starts and runs

es — No

Disconnect HT lead from distributor.

Crank engine.

Spark?

Yes → Check that each plug sparks.

No → Check distributor.

No

C

136 515

Turn off ignition.

Disconnect 3-pole connector from distributor.

Note: Check type of connector. Bosch (1). Chrysler (2).

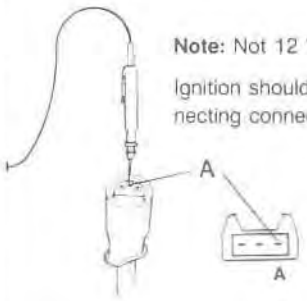
Switch onignition.

Connect a bridge wire across B and C.

Spark?

Yes →

Check for voltage at terminal A on 3-pole connector.



136 517

Note: Not 12 V. Lamp dim.

Ignition should be off when disconnecting connector.

12V?

Yes →

Replace Hall pick-up.

No

e wire cover on

ctor from con-

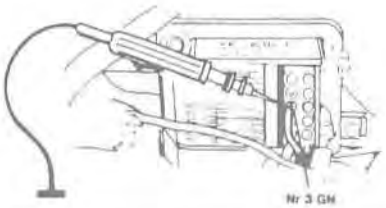
Yes ← Check for voltage at terminal 15(+) on ignition coil

12V?

No

Push test lamp probe through green wire cover on connector.

Voltage?



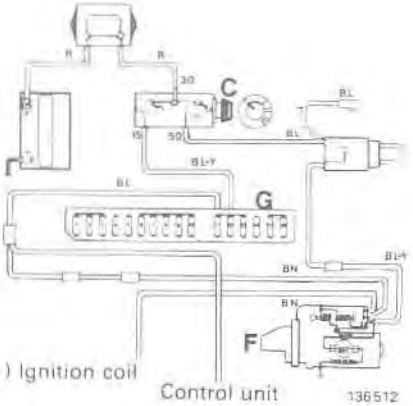
Yes → Replace cable harness.

No

No

No

Check wires connected between ignition switch and control unit.



OK → Replace control unit.

Note: Also replace cable harnes.

Check control unit connector sleeves on new control unit.

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