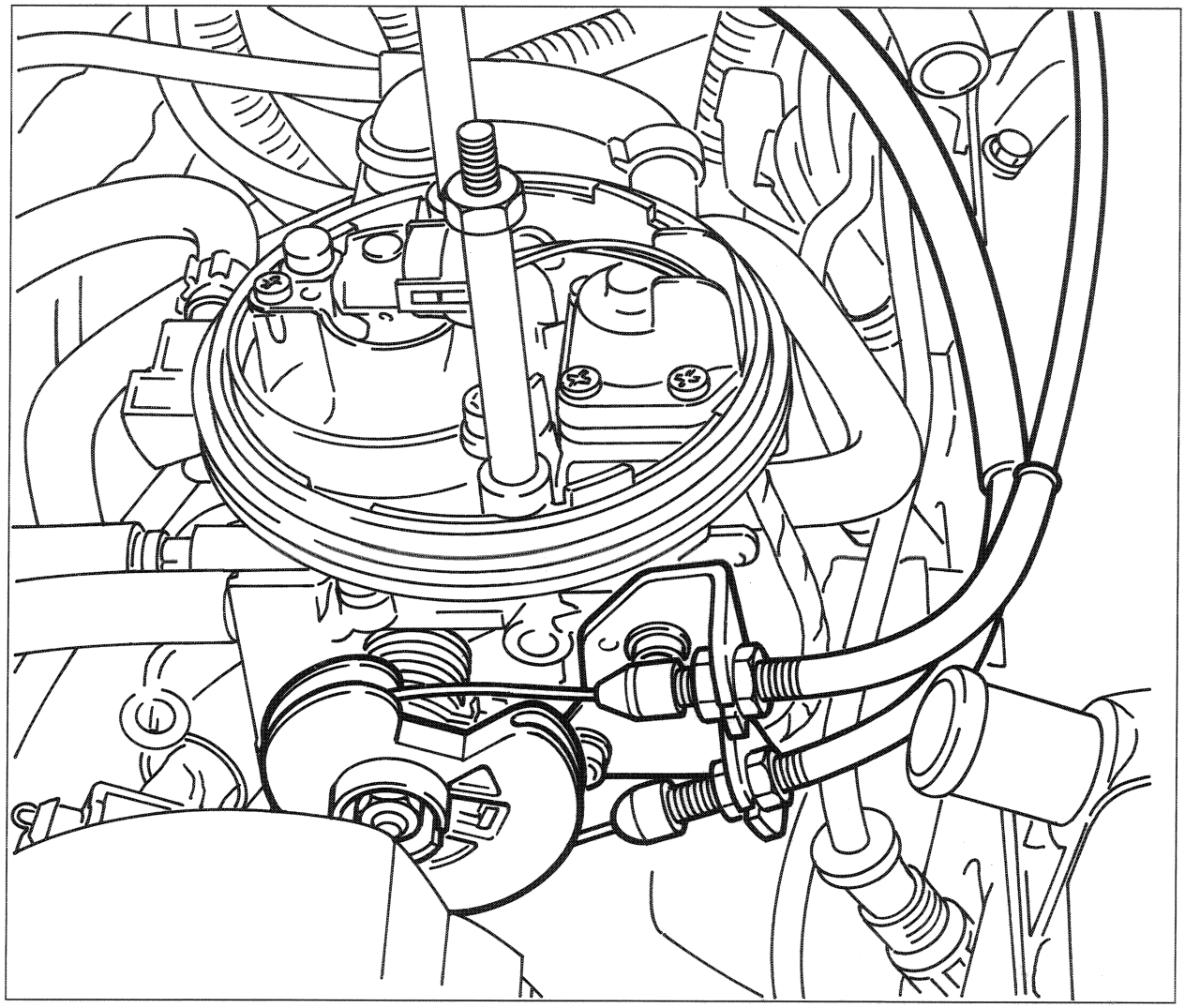
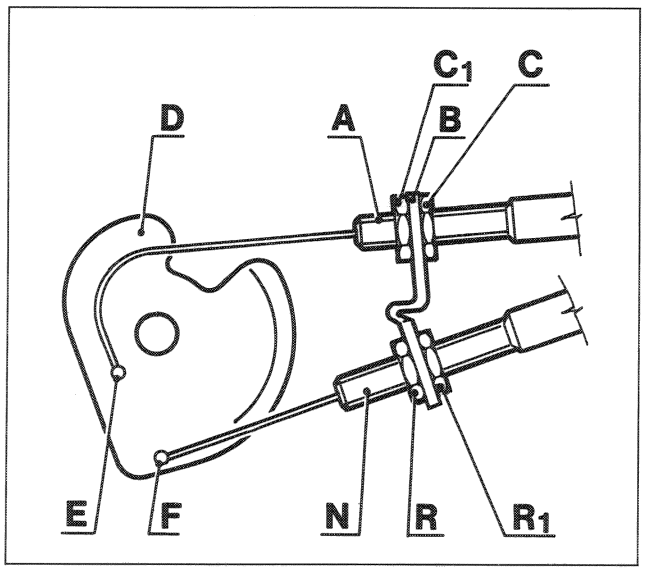
ADJUSTING KICK-DOWN CONTROL CABLE



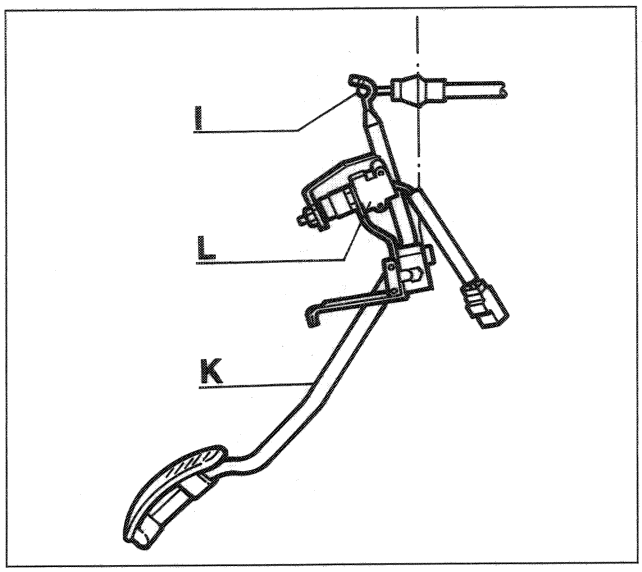
P3M01BB01



P3M01BB02

Before connecting the kick-down control cable, remove the air cleaner and intake pipe.

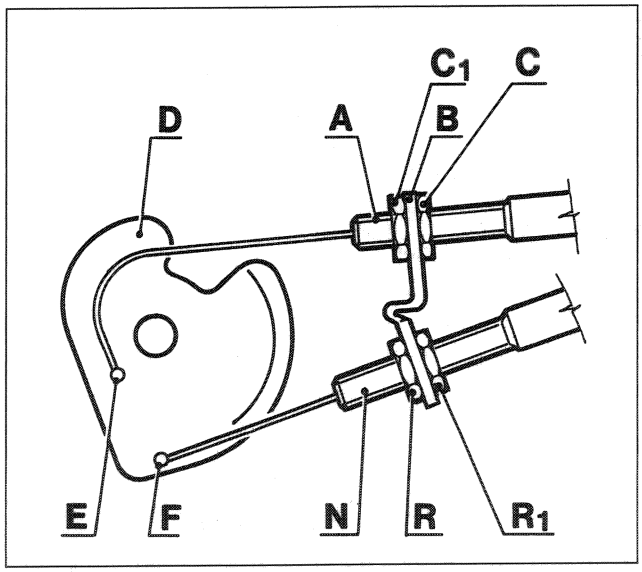
1. Fit bowden cable N into its seat on bracket B.
2. Wind bowden cable N onto pulley D and fit dowel F into its seat.
3. Turn pulley D as far as possible (full throttle opening plus extra Kick-Down travel), then adjust bowden cable N by means of nuts R and R1. Check that the cable remains slightly taut.



P3M02BB01

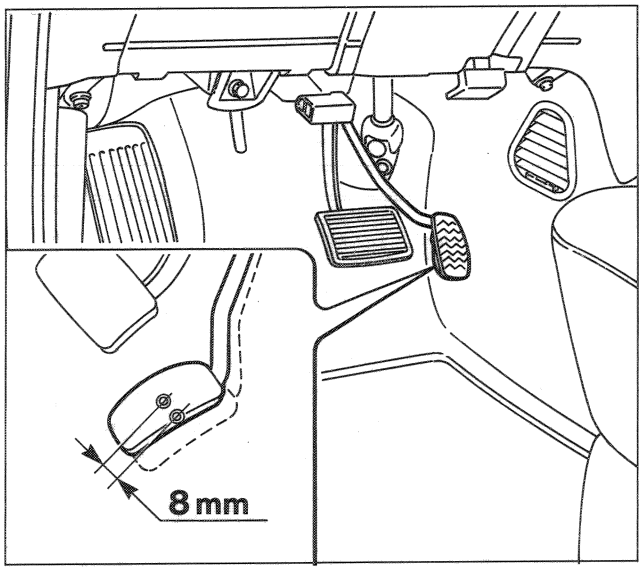
ADJUSTING ACCELERATOR CABLE

- Connect accelerator cable I to pedal K;



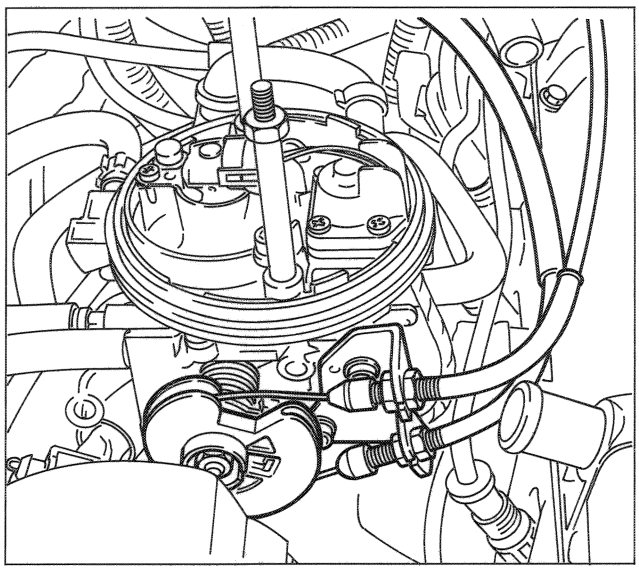
P3M01BB02

- fit bowden cable A into the seat on bracket B;
- wind bowden cable A onto pulley D and fit dowel E into its seat;
- ensure that butterfly valve case pulley D is in its natural rest position;
- adjust accelerator cable by means of nuts C and C1 until they are slightly taut;



P3M02BB02

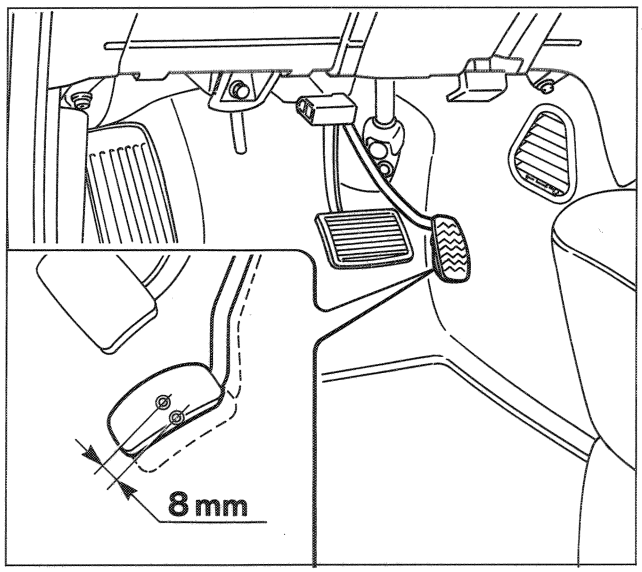
- under these conditions, check that the accelerator pedal moves through free travel of 8 mm before the throttle begins to open: microswitch L should open during this free travel.



P3M03BB01

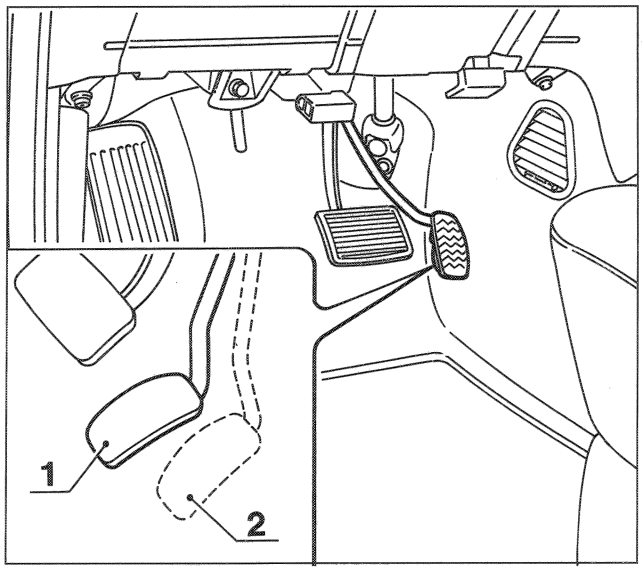
CHECKING CORRECT ADJUSTMENT OF ACCELERATOR AND KICK-DOWN CABLES

- Ensure that the butterfly valve case is in its natural rest position;



P3M02BB02

- check that accelerator pedal free travel is 8 mm;

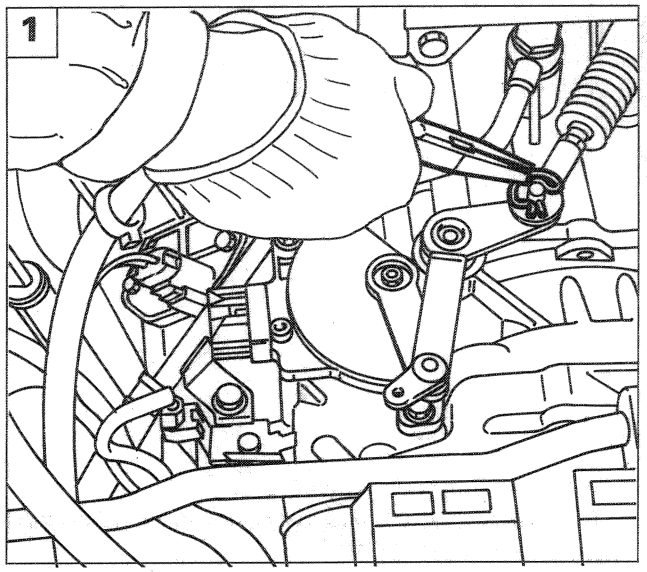


P3M03BB02

- ensure that the Kick-Down cable residual travel is 0.5-1 mm with the accelerator pedal fully pressed down and the throttle fully open.

1. Accelerator pedal in rest position
2. Accelerator pedal fully pressed down

21-27.

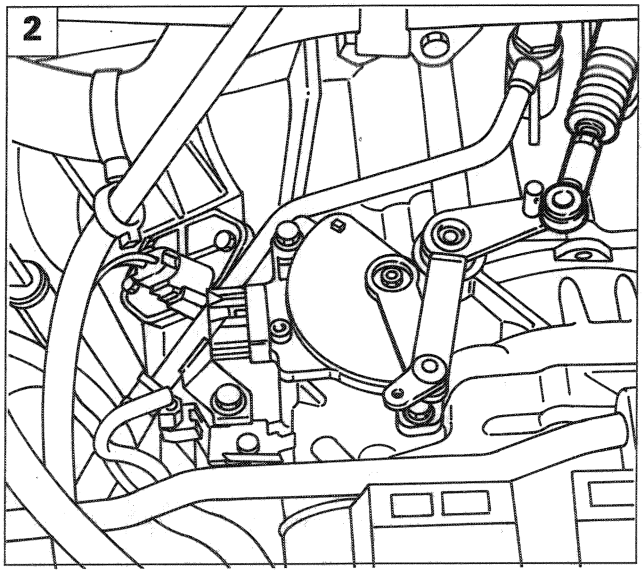


P3M04BB01

SPEED SELECTION CABLE

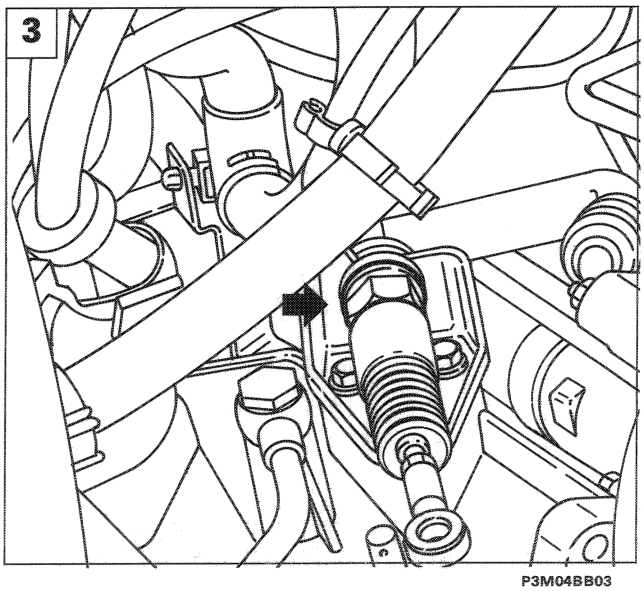
Removing-refitting

Remove battery and battery cradle from the engine bay, then:
1. remove the retaining pin;

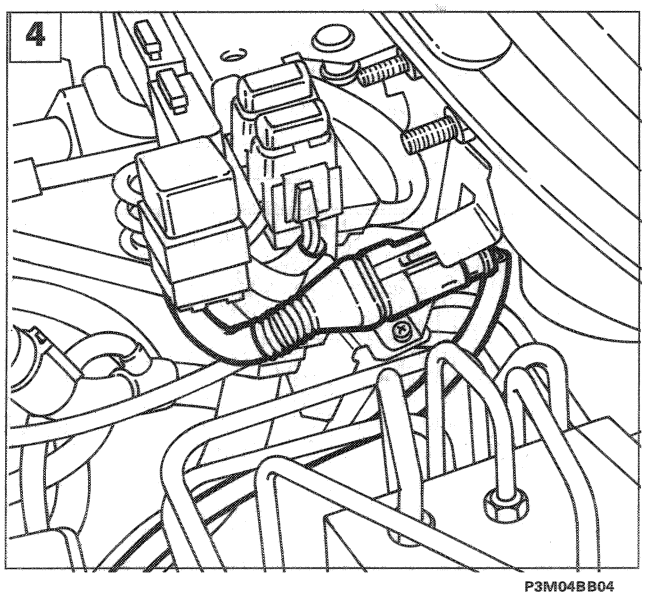


P3M04BB02

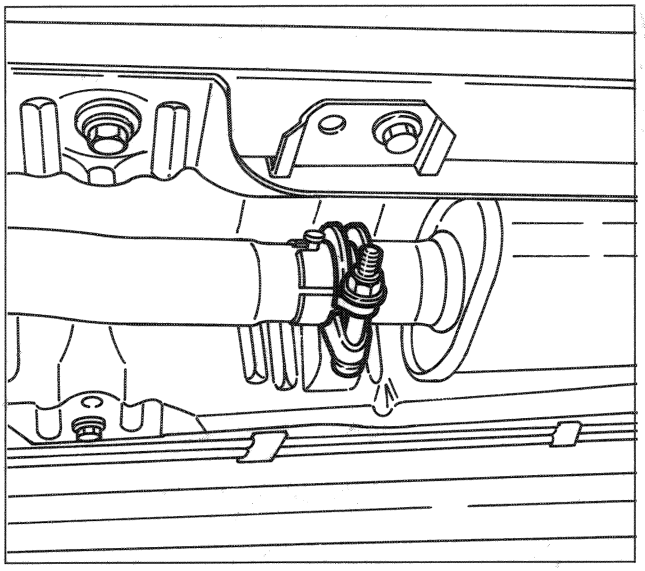
2. withdraw the cable head from the transmission control lever pin;
3. loosen the nut shown (arrowed) and withdraw the cable from the bracket;
4. disconnect connector from probe I, then withdraw the cable from the clips.



P3M04BB03

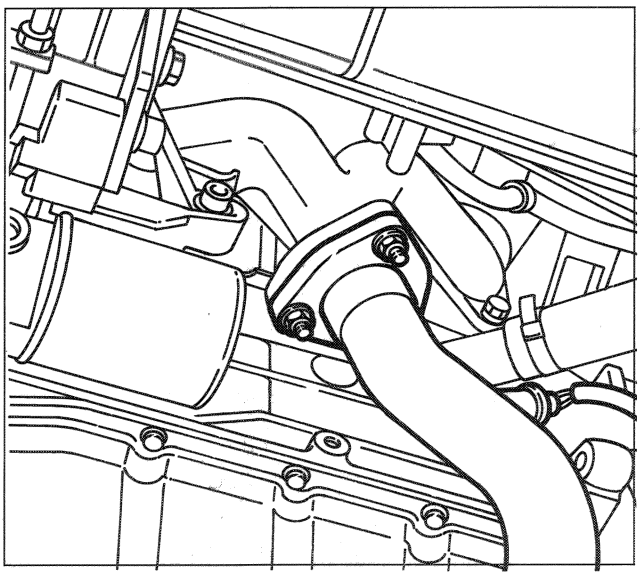


P3M04BB04



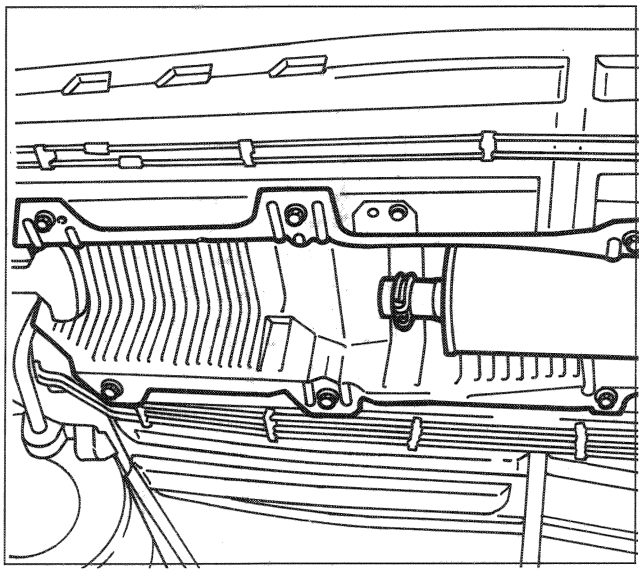
P3M05BB01

Raise the vehicle, then:
- loosen the bolt fastening the exhaust pipe with central silencer;



P3M05BB02

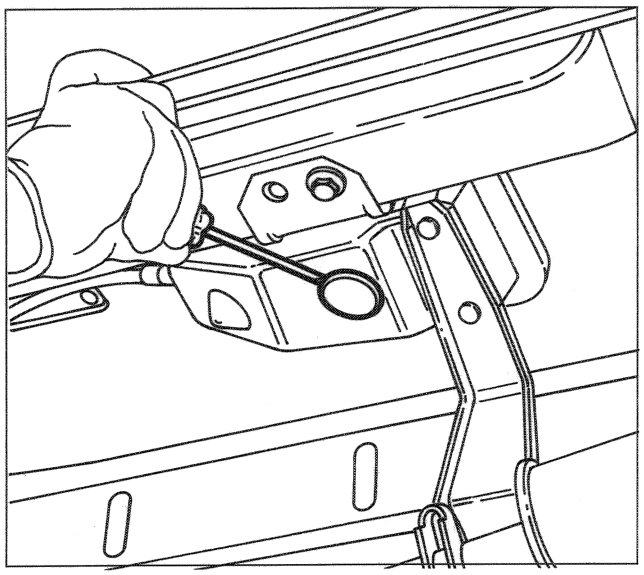
- unscrew the three nuts retaining pipe to exhaust manifold and remove the pipe;



P3M05BB03

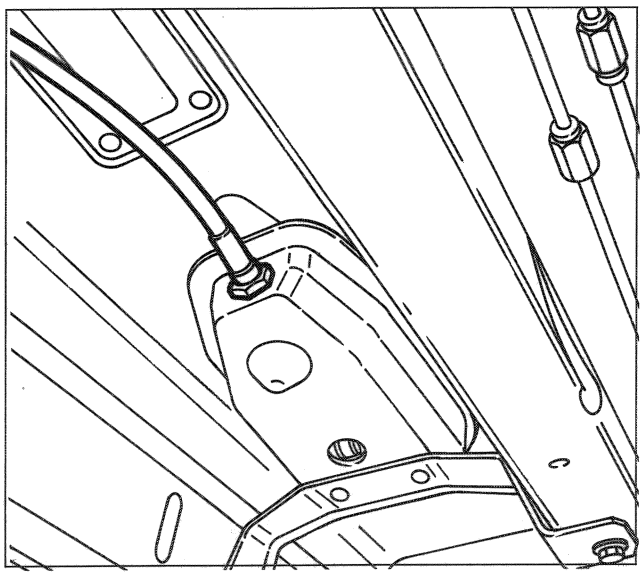
- unscrew the four bolts and two nuts indicated and remove the heat shield;

21-27.



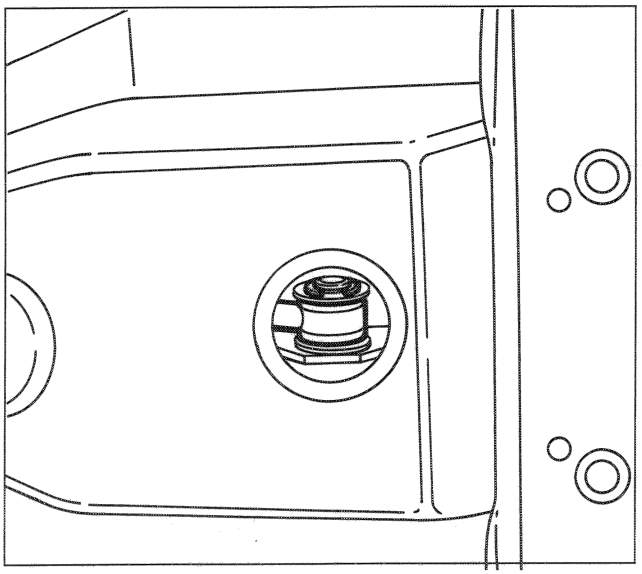
P3M06BB01

- prise off the rubber pad with a screwdriver;



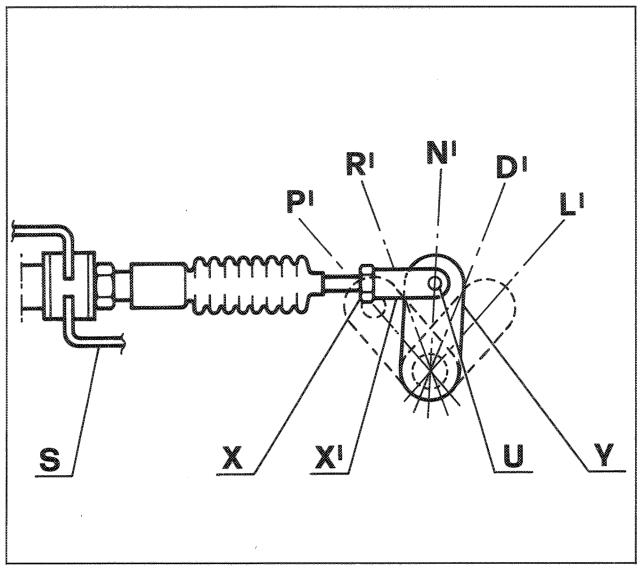
P3M06BB02

- unscrew nut by turning the entire sheath;



P3M06BB03

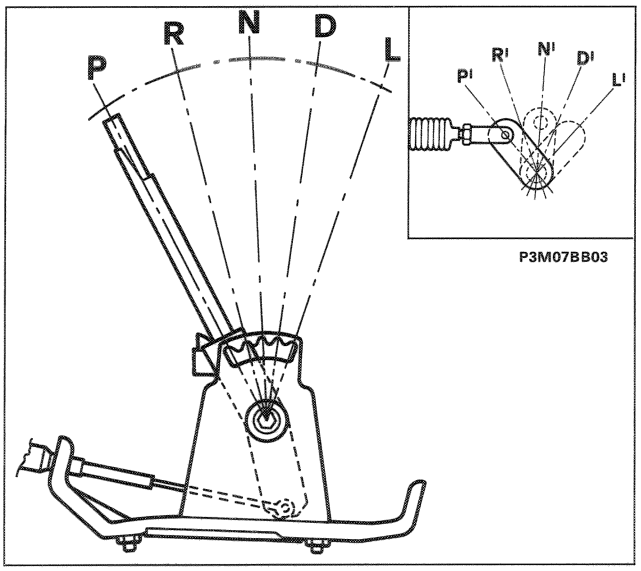
- remove the retaining ring and then prise the cable head off the selector lever pin and withdraw the cable.



P3M07BB01

Adjusting gear selector cable (transmission end)

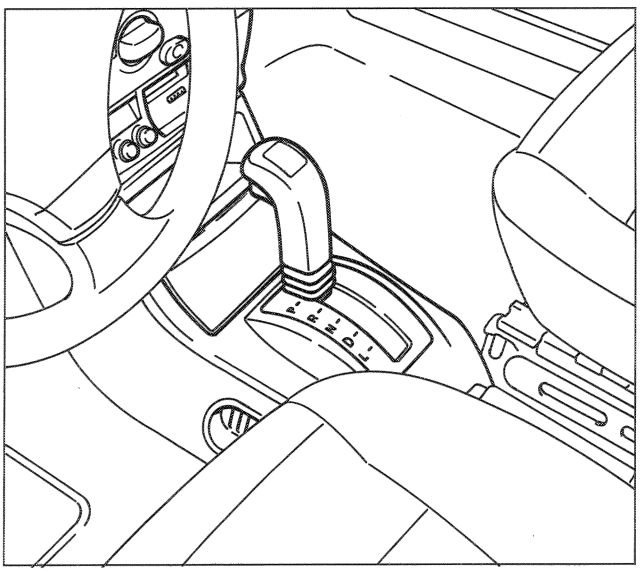
- Fasten the other end of the bowden cable to bracket S using an appropriate nut;
- move lever Y to position N';
- adjust cable length by means of head X so that the end eye is aligned with pin U on lever Y;
- fit the eye into its seat;



P3M07BB03

P3M07BB02

- move the gear selector lever into position P;
- check that position P of the gear selector lever corresponds to equivalent position P' of the transmission lever (see box);
- if not, repeat the above procedure;



P3M07BB04

- fit transmission lever trim console;
- after fitting, when the transmission control lever is moved, check that transmission lever clicks properly into each individual selection position.

ROAD TEST

Before carrying out the road tests, some preliminary checks must be carried out:

- check automatic transmission fluid level;
- check and adjust accelerator and gear selection cable control cables.

After carrying out preliminary checks, operate the transmission in such a way as to check all functions, as follows:
- operation of transmission;
- operation of Kick-Down;
- that the exhaust brake cuts in correctly during the transfer from "D" (Drive) to "L" (Low);
- clutch condition (stall test).

Check gearbox operation

To carry out this check, perform a road test as follows:

- start the engine, allow to warm up and carry out manoevures "N"-"R" and "N"-"D". The vehicle should not lag during idling and "D" and "R" should engage without knocking or noise;
- with selector lever set to "D", carry out a series of accelerations to 25%, 50% and 100% of the accelerator pedal travel respectively. Check that speeds change from short to long ratios by accelerating to 50, 80 and 100 Km/h. Speed changes should occur without vibrations, knocks or particular noise.

Checking Kick-Down operation

In order to carry out this check, perform a road test as follows:

- with the selector lever set to "D", accelerate the vehicle to 90 Km/h, then release the accelerator pedal completely and when the vehicle decelerates to a speed of 80 Km/h, press the accelerator pedal fully down (through the Kick-Down travel). Under these conditions the engine rpm should reach 4600 ± 250 rpm with a response time of less than 2 seconds. The speed change should be immediate, without knocks or vibrations;
- carry out a further check starting at 120 Km/h: under these conditions, press the accelerator pedal fully down when the engine rotation speed should reach 5100 ± 250 rpm with a response time of less than 2 seconds.

Checking the engine brake cuts in correctly when changing from "D" to "L"

To carry out this check, perform a road test as follows:

- with the selector lever set to "D", accelerate the vehicle to about 110 Km/h, then release the accelerator pedal fully. When the vehicle decelerates to a speed of 100 km/h, move the selector lever to "L". Under these conditions, with a response time of less than 2 seconds, the engine rpm should reach 4300 ± 250 rpm. The speed change should be immediate and without knocks or vibrations;
- carry out a further check starting at 60 Km/h: under these conditions, when the accelerator pedal is fully depressed , engine rpm should reach 3700 ± 250 rpm with a response time of less than 2 seconds.

Clutch check (stall test)

This test provides a guide to clutch condition and the condition of the hydraulic circuit and engine in general.

Carry out this check within a maximum time of 3-5 seconds. If the test is repeated, leave the engine to idle with the selector lever set to "P" or "N" for a few minutes to allow the relevant parts to cool down.

Proceed as follows to carry out this check:
- allow the engine and transmission to warm up to the normal service temperature;
- hold the vehicle in position with the parking brake and operate the brake pedal;
- position the selector lever on "D";
- press the accelerator pedal fully down and hold it there until engine speed stabilises (for a maximum time of 3-5 seconds).

Engine speed reading on the rev counter should be 1900 - 2500 rpm.

After carrying out the stall test, move the selector lever from position "N" to position "R" with the vehicle at a standstill and the engine idling. Accelerate to about 30% and check that reverse is engaged without knocks or vibrations.

Stop the vehicle on a gradient and check that the vehicle does not move with the selector lever set to "P". If faults are noted, proceed as follows:
- check secondary line pressure and adjust if necessary;
- check the electromagnetic clutch and connecting components (Microswitches on pedal unit, supply brushes).

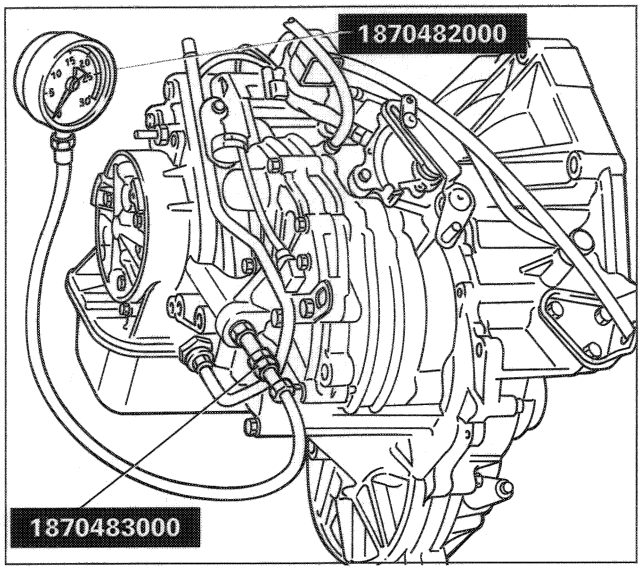
Check operation of Shift-lock and Key-lock

Shift-lock

- Insert the key in the ignition, turn to "MAR" and move the transmission lever to position "P";
- ensure that the manoeuvre is possible only with the brake pedal pressed down and the acoustic signal comes on for at least 10 seconds;
- otherwise, check the electrical connections between the stop switch on the brake pedal, the automatic transmission safety control unit and the solenoid on the transmission control lever.

Key-lock

- Check that the key cannot be removed from the ignition when the transmission control lever is not in position "P";
- otherwise, check the electrical connection between ignition switch and automatic transmission safety control unit and operation of the magnet on the steering column.



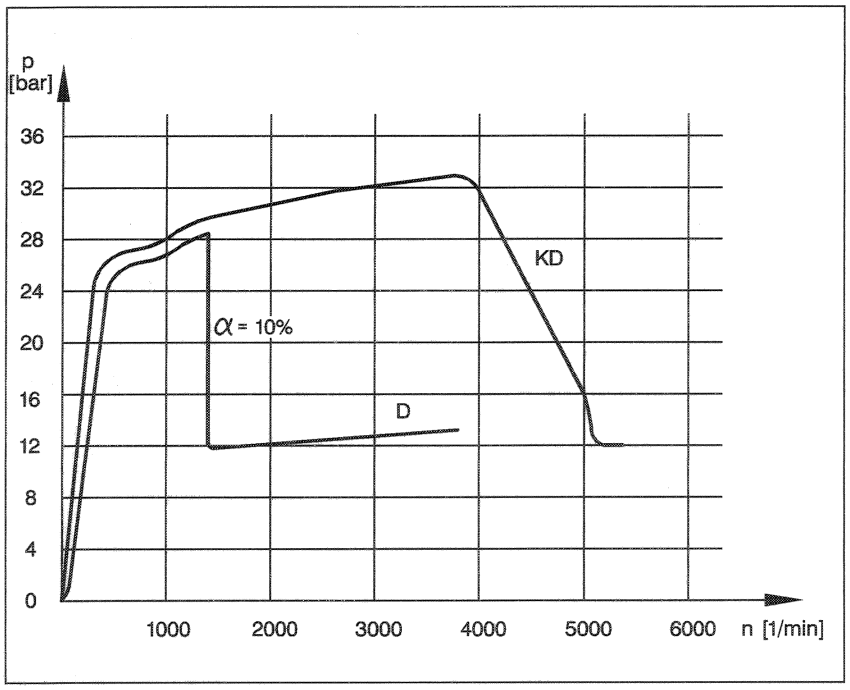
P3M10BB01

CHECKING LINE OR SECONDARY PRESSURE

Check the line or secondary pressure with the drive wheels raised, fluid cold and Kick-Down cable released and kept under tension.

To carry out this check, connect pressure gauge 1870482000 (full scale deflection 35 bar) to the transmission using fitting 1870483000 as shown in the figure.

Connecting pressure gauge to automatic transmission to measure line or secondary pressure



P3M10BB02

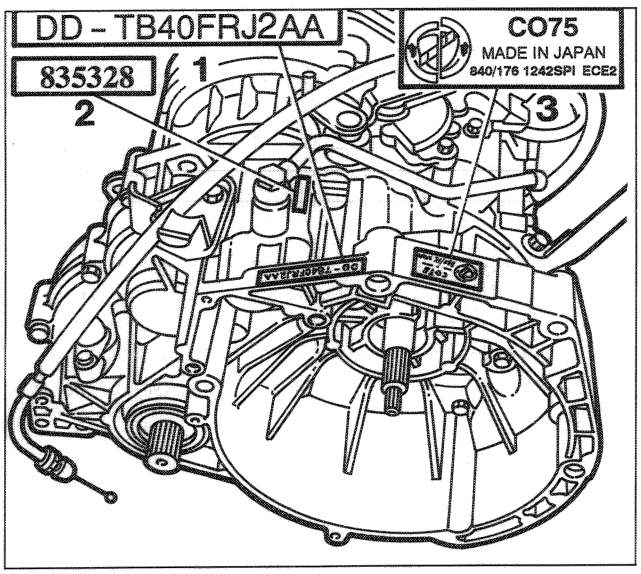
Line pressure graph

FAULT DIAGNOSIS

Fault detected	Causes and corrective actions
Parking device does not operate with vehicle on a gradient	1) Check transmission lever position corresponds to switch 2) Replace the transmission if the fault persists
Oil leaks	1) Main points to check and adjust if necessary: - Oil sump - Oil drain plug - Kick-down cable sealing ring - Heat exchanger and lines - Right and left hand outlet fitting - Secondary pressure outlet sealing ring - Transmission intake fitting 2) Change transmission if fluid leaks occur from other points or cannot be mended
Vehicle will start with the selector lever in any position	1) Check multifunction switch adjustment 2) Check electrical connections 3) Check transmission cable adjustment
Vehicle moves forward or backward during start-up with lever on "N" or "P""	1) Check and adjust transmission control cable 2) Change the transmission if the defect persists
Engine cannot be started with the selector lever on "P" or "N""	1) Check transmission cable adjustment 2) Check electrical connections 3) Check multifunction switch
Gear selection system does not work properly	1) Check and adjust the gear cable 2) Check condition of electromagnetic clutch supply brushes and connections 3) Check setting of both microswitches on the accelerator pedal 4) Replace the transmission and clutch if the defect persists
No pulling power in "D", "L" or "R" with the accelerator pedal depressed	1) Check fluid level in transmission 2) Check and adjust the gear selector lever 3) Check clutch closure using a Fiat-Lancia Tester 4) Check transmission position with multifunction switch 5) Check setting of both microswitches on the accelerator pedal 7) Check transmission fluid pressure 8) Replace the electronic control unit if the defect persists 9) Replace the transmission and clutch if the defect persists 6) Check condition of electromagnetic clutch supply brushes and connections

21-27.

Fault detected	Causes and corrective actions
Poor vehicle acceleration with accelerator pedal fully depressed	1) Check fluid level in transmission 2) Check and adjust the accelerator cable and kick-down cable 3) Check transmission fluid pressure 4) Use a Fiat-Lancia Tester to check the clutch and sensors are working properly 5) Change the transmission if the defect persists
Ratio does not change	1) Check and adjust the kick-down cable and selector cable 2) Check transmission fluid level is correct 3) Use a Fiat-Lancia Tester to check the speed sensor 4) Change the transmission if the defect persists
Engine rpm increases during normal running	1) Check transmission fluid level is correct 2) Check transmission fluid pressure 3) Check and adjust the gear cable 4) Check the multifunction switch 5) Check the electrical system using a Fiat-Lancia Tester 6) Check the speed sensor on the transmission is working properly 7) Replace the transmission and clutch if the defect persists
Dragging when idling	1) Check the accelerator pedal and electrical system microswitches are working 2) Use a Fiat-Lancia Tester to check the sensors and electronic control unit 3) Check the electromagnetic clutch supply brushes 4) Change the electronic control unit 5) Change the transmission if the defect persists



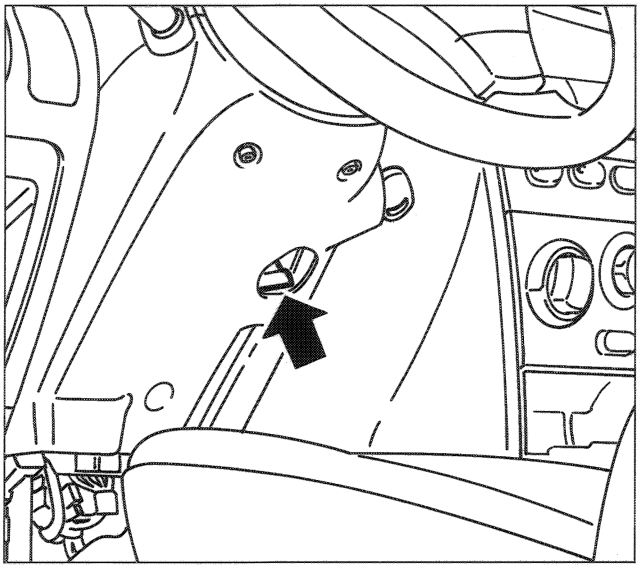
P3M12BB01

AUTOMATIC TRANSMISSION IDENTIFICATION PLATES

Self-adhesive plates applied to the automatic transmission provide useful information for servicing or changing the transmission.

1. Transmission identification plate
2. Transmission serial number
3. Identification plate of model to which the transmission is fitted

176 = Punto 1242

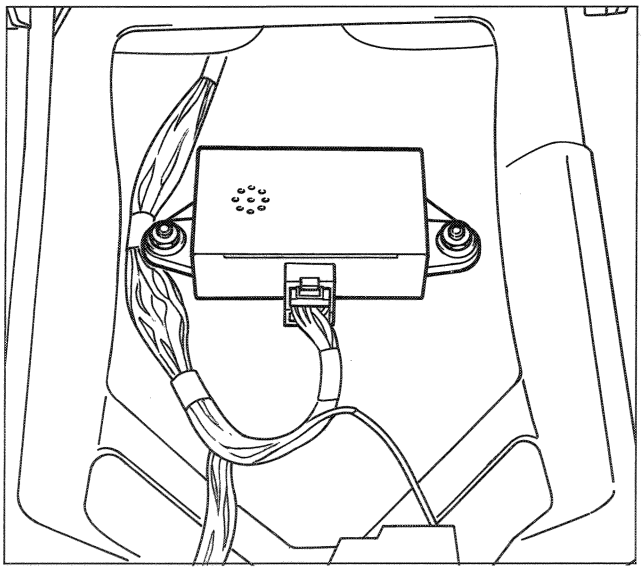


P3M13BB01

SAFETY DEVICES

Safety device for removing key from ignition

In emergencies, the key may be removed from the ignition even when the selector lever is not in position "P". In this case, simply push the lever shown in the figure to release the key from the ignition switch.



P3M13BB02

Safety control unit

This control unit, fitted on the tunnel beneath the central console, warns the driver (by means of an acoustic signal) that the selector lever is incorrectly positioned and intervenes in the following cases:
- with engine running and selector lever set to "R"";
- with engine running and left front door open with selector lever in all positions except "P";
- if engine is turned off with selector lever in all positions except "P".

Location of safety control unit

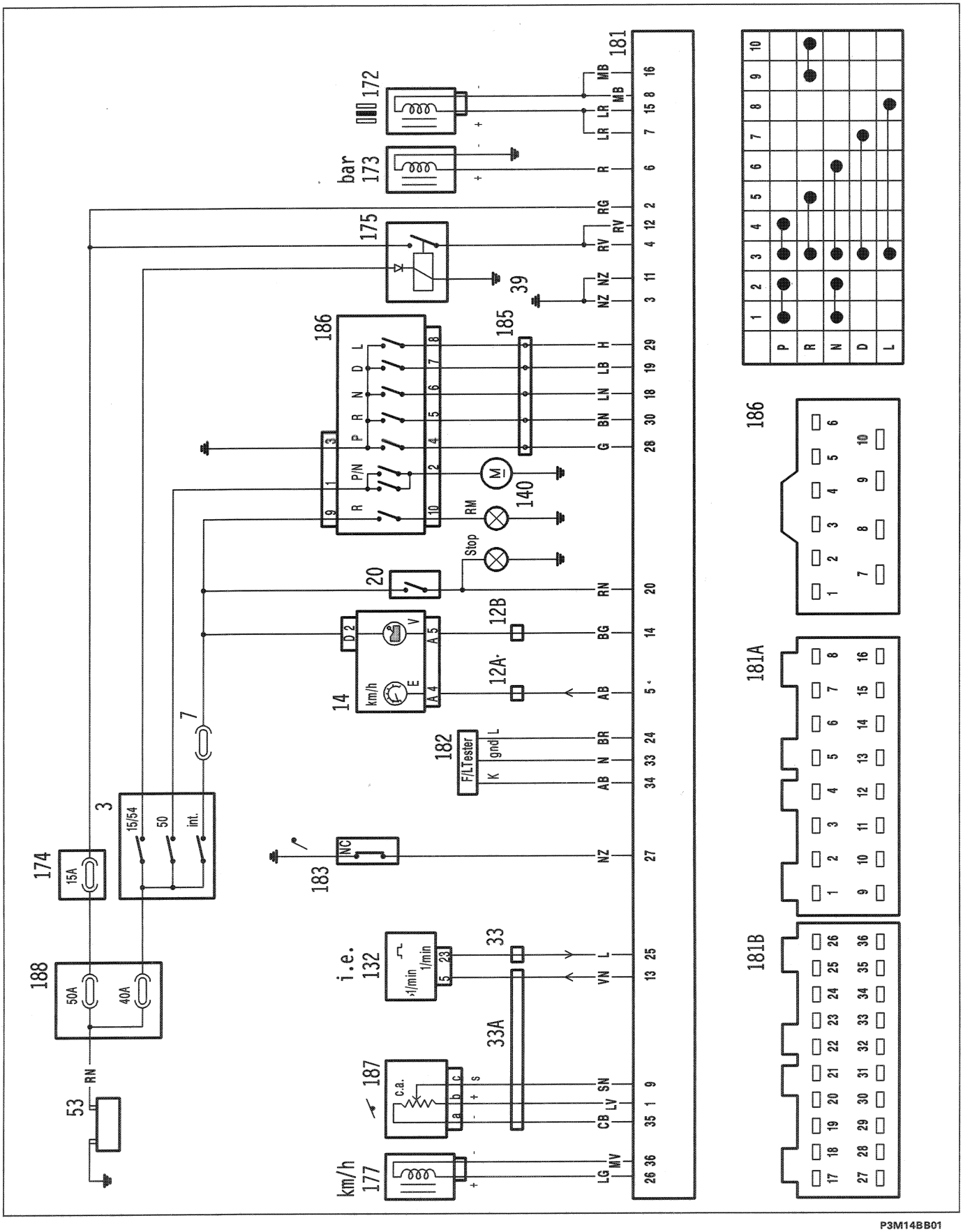
Towing the vehicle

The vehicle may be towed with the selector lever set to "N" up to a maximum distance of 25 km at a speed of less than 30 Km/h.
If the distance is greater than 25 Km, the speed is higher than 30 Km/h or the transmission is faulty, the vehicle must be towed with the front wheels raised because the rotating parts of the transmission will not be lubricated with the engine off.

The engine cannot be started by pushing or towing because the fluid pressure required to engage the servo mechanism is created by the oil pump housed inside the transmission and turned by the engine.

21-27.

WIRING DIAGRAM OF ECVT AUTOMATIC TRANSMISSION

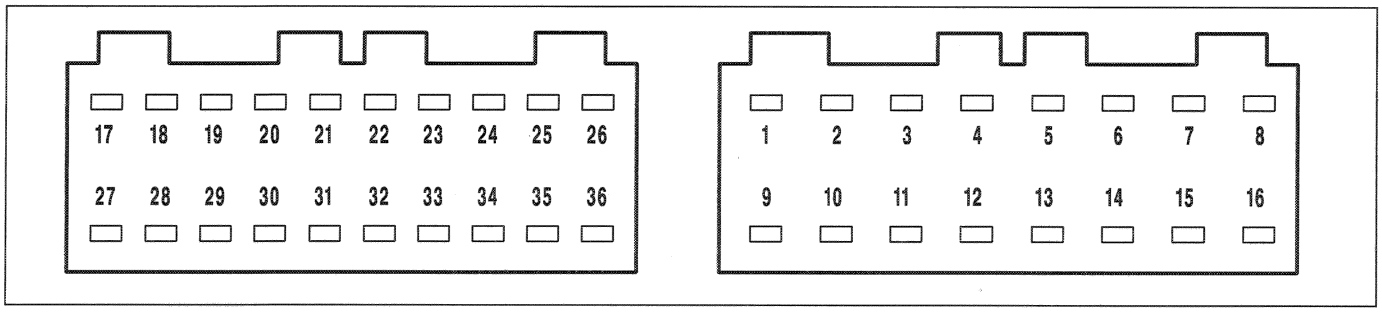


P3M14BB01

Key to wiring diagrams

3. Ignition switch
7. Junction unit
12. Connection between facia wires and front wires
14. Instrument panel
    E. Speedometer
    V. Automatic transmission warning light
20. Switch on brake pedal
33. Front wiring connection with engine leads
33A. Front wiring connection for automatic transmission
39. Left front earth
53. Battery
132. Electronic injection-ignition control unit
140. Starter motor
172. Electromagnetic clutch
173. Oil pressure control solenoid
174. 15 A fuse protecting automatic transmission system
175. Automatic transmission relay
177. Vehicle speed sensor
181. ECVT control unit
182. Automatic transmission tester socket
183. Switch on accelerator pedal
185. Wiring connection for multiple bridges
186. Selector lever position sensor
187. Throttle position sensor
188. Connector block-fuse block

Automatic transmission control unit pin-out



P3M15BB01

1. Throttle position sensor (+)
2. Battery positive (+30)
3. Earth
4. Key-operated positive (+15)
5. Vehicle speed signal at speedometer
6. Oil pressure control solenoid
7. Electromagnetic clutch (+)
8. Electromagnetic clutch (-)
9. Throttle position sensor (S)
10. Vehicle speed sensor shielding
11. Earth
12. Key-operated positive (+15)
13. Fast idle command to injection-ignition control unit
14. Automatic transmission warning light
15. Electromagnetic clutch (+)
16. Electromagnetic clutch (-)
17. N.C.
18. Selector lever signal in position N
19. Selector lever signal in position D
20. Switch on brake pedal
21. N.C.
22. N.C.
23. ABS signal on
24. Tester socket for F/L Tester (Line K)
25. Engine rpm signal from injection-ignition ECU
26. Vehicle speed sensor (+)
27. Switch on accelerator pedal
28. Selector lever signal in position P
29. Selector lever signal in position L
30. Selector lever signal in position R
31. N.C.
32. N.C.
33. Tester socket for F/L Tester (Line G)
34. Tester socket for F/L Tester (Line L)
35. Throttle position sensor (-)
36. Vehicle speed sensor (-)

OUTPUT SIGNAL MODE

The signal modes shown in the table ensure regular clutch operation.

Engine rpm	Selector lever position	Accelerator pedal	Vehicle speed (km/h) 7 8 12 16 18.5 20 22.5 30 35
< 200 rpm	-	-	1
-	N/P		
> 200 rpm	D	Released	5, 4, 3
	L/R		
	D	Depressed	2
	L/R		

P3M16BB01

1. Reverse excitation mode
2. Set-off mode
3. Direct coupling mode
4. Zero mode
5. Stop and take-off mode

P3M16BB02

NOTE *Due to magnetic hysteresis effects, the clutch switches from one mode to another at different speeds according to whether the vehicle is accelerating or decelerating.*

1. Reverse excitation mode

The ECVT control unit uses the reverse excitation mode to demagnetise the clutch in the following cases:

a. with transmission lever in position N or P and engine running, reverse excitation mode is implemented to release the clutch;
b. with engine rpm less than or equal to 200 rpm, reverse excitation mode is implemented to prevent dragging during start-up. The engine cannot therefore be started by pushing or towing the vehicle;
c. Reverse excitation mode is activated to facilitate manoevres for 0.4 - 0.8 when the selector lever is set to D or P;
d. Reverse excitation mode is activated for about 1 second when the accelerator is released with the car running at low speed (< 7 km/h) and selector lever set to D-L-R to remove residual magnetism and thus ensure the vehicle pulls up smoothly and in a straight line.

2. Take-off mode

This operating mode governs clutch torque to ensure a smooth take-off under all service conditions. When the accelerator pedal is depressed, the ECVT control unit increases supply current intensity in direct proportion to engine speed.
If the accelerator pedal is released and pressed when vehicle speeed is 20 km/h or less immediately after take-off, the impact is absorbed by the clutch until output rpm (at pulley drive shaft) as equal to engine rpm.

3. Direct coupling mode

In this operating mode, the clutch is coupled directly by applying the rated current when vehicle speed exceeds certain thresholds, which depend on selector lever and accelerator pedal position.
The rated current is divided into three levels according to the degree to which the accelerator pedal is depressed:

accelerator pedal released	0.6-1.8 A	
accelerator pedal slightly pressed	3.2 A	(only accelerator switch cuts in)
accelerator pedal fully depressed	4.0 A	(accelerator switch and throttle position sensor cut in)

4. Zero mode

To allow linear deceleration, without jolts or noise, the current falls gradually as the vehicle speed drops until it is cancelled out altogether.
The clutch is not activated at vehicle speeds between 18.5 and 7 km/h with selector lever in D position and at vehicle speeds between 8 and 7 km/h with selector lever set to L or R.
With lever set to D, the field is extended to ensure greater comfort

5. Stop and take-off mode

At the end of transitory stage 4, when the clutch is not activated and then completely demagnetised at 7 km/h (1. Reverse supply for about 1 second), the halt and take-off mode becomes operational.
With the selector lever set to D-L-R, accelerator pedal released and vehicle speed < 7 km/h, the clutch is supplied with a current of about 0.2 A, in order to ensure the vehicle stops in a straight line and improve acceleration from a standstill or at low speed.

6. Controlling response to switching (switching mode)

This mode controls clutch response to make direct coupling more gradual, when the transmission lever is set to L and when the vehicle accelerates or decelerates at very low speeds, as follows:

- clutch current is temporarily reduced when the lever is switched from D to L;
- clutch current is temporarily reduced when the accelerator pedal is depressed or released;
- when the clutch is switched from *start-up mode* to *direct coupling mode* the current change is controlled to reduce the locking impact by engaging the clutch gradually.

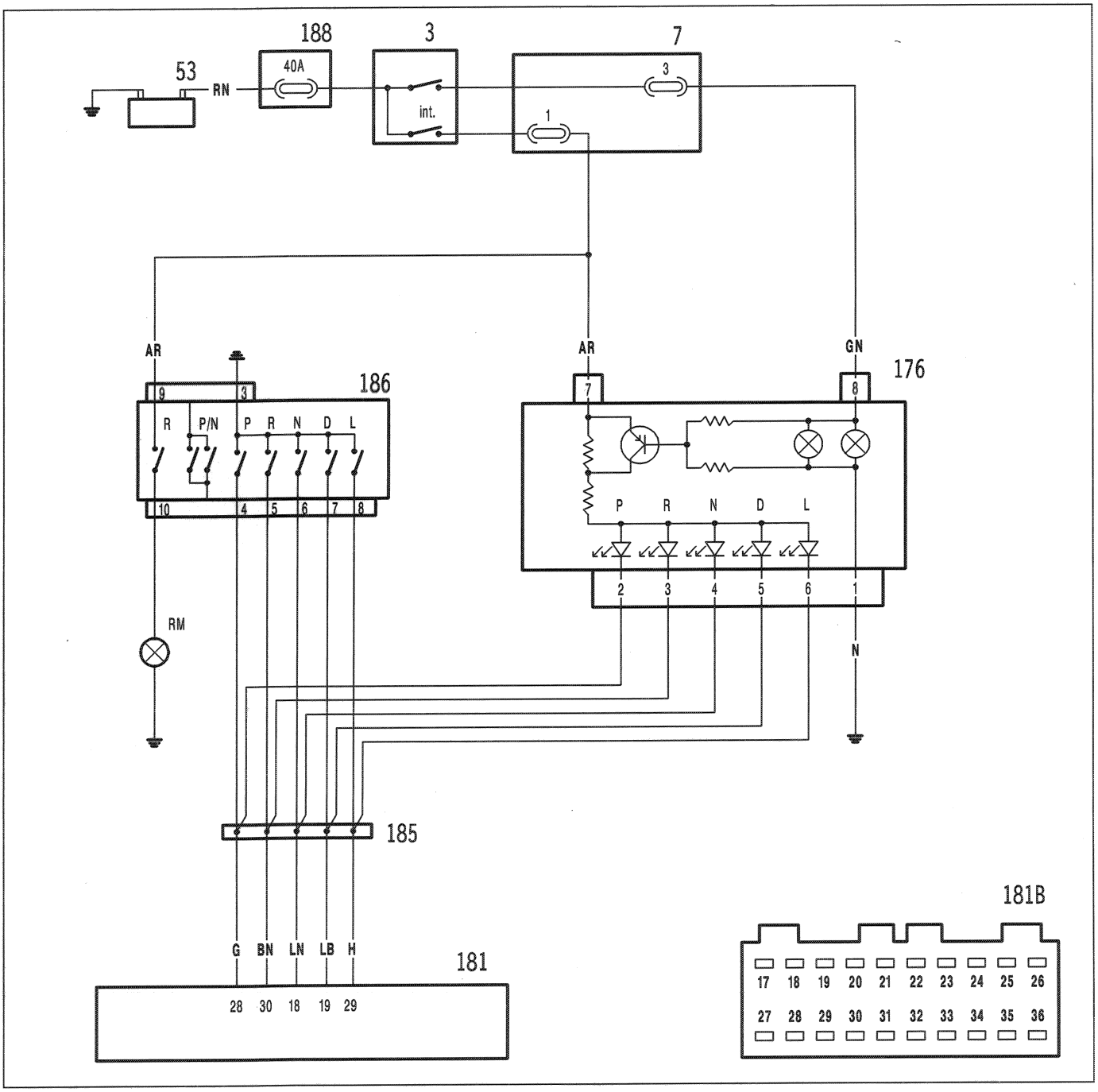
SELF-DIAGNOSIS AND FAIL SAFE FUNCTION

The ECVT is equipped with a self-diagnostic function. If signal transmission is faulty, a fault warning light on the instrument panel lights up.
In any case, if a fault occurs in an electrical system, the vehicle is able to continue working due to a fail-safe mechanism *(LIMP-HOME)*.

21-27.

SELECTOR LEVER POSITION DISPLAY

When the selector lever is moved, leds on a display situated beside the lever come on to indicate position.
It is possible to check that actual position corresponds to displayed position by starting the engine, which will be possible only in positions P and N.



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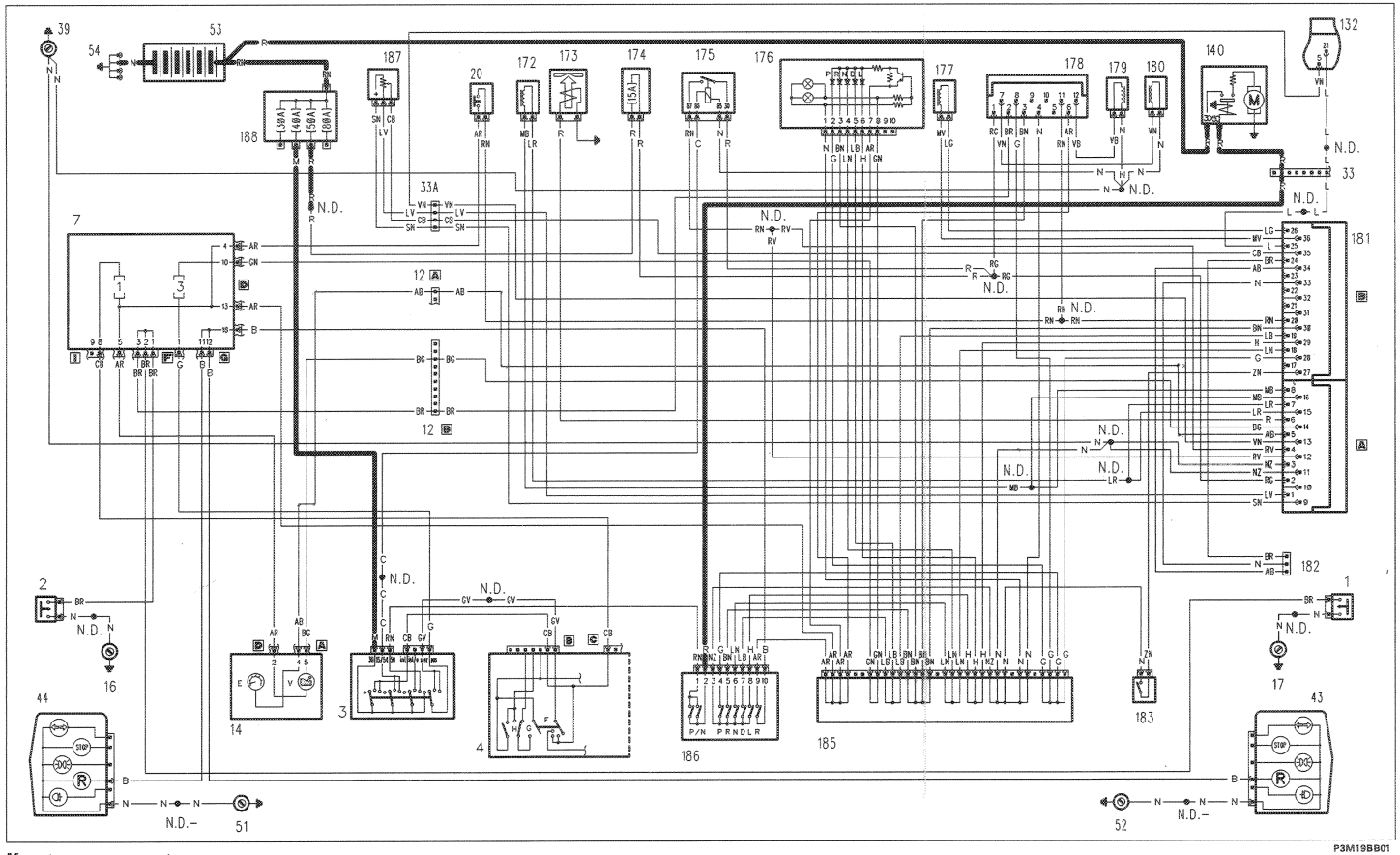
3. Ignition switch
7. Junction unit
53. Battery
176. Selector lever position display and gear engaged indicator
181. Automatic transmission control unit
185. Wiring connection for multiple bridges
186. Selector lever position sensor
188. Connector block-fuse block

WIRING DIAGRAM



Key to components

1. Front right-hand control button for courtesy light and door open w/l
2. Front right-hand control button for courtesy light and door open w/l
3. Ignition switch
4. Stalk unit
   - F. Side light/dipped headlamp stalk
   - G. Dipped headlamp/main beam control stalk
   - H. Main beam button
7. Junction unit
12. Connection between facia wires and front wires
14. Instrument panel
    - E. Speedometer
    - V. Automatic transmission warning light
16. Left hand facia earth
17. Right hand facia earth
20. Switch on brake pedal
33. Front wiring connection with engine leads
33A. Front wiring connection for automatic transmission
39. Left front earth
43. Right tail-light cluster
44. Left tail-light cluster
51. Left rear earth
52. Right rear earth
53. Battery
54. Battery earth
132. Electronic injection-ignition control unit
140. Starter motor
172. Electromagnetic clutch
173. Oil pressure control solenoid
174. 15 A automatic transmission fuse
175. Automatic transmission relay
176. Gear selector and speed engaged indicator lighted display
177. Vehicle speed sensor
178. Safety ECU for automatic transmission
179. Shift-lock solenoid
180. Ignition switch solenoids
181. Automatic transmission ECU
182. Automatic transmission tester socket
183. Switch on accelerator pedal
185. Wiring connection for multiple bridges
186. Selector lever position sensor
187. Throttle position sensor
188. Connector block-fuse block