



# **TECHNICAL TRAINING**

## **SYSTEM DIAGNOSIS**

NSD 15-5





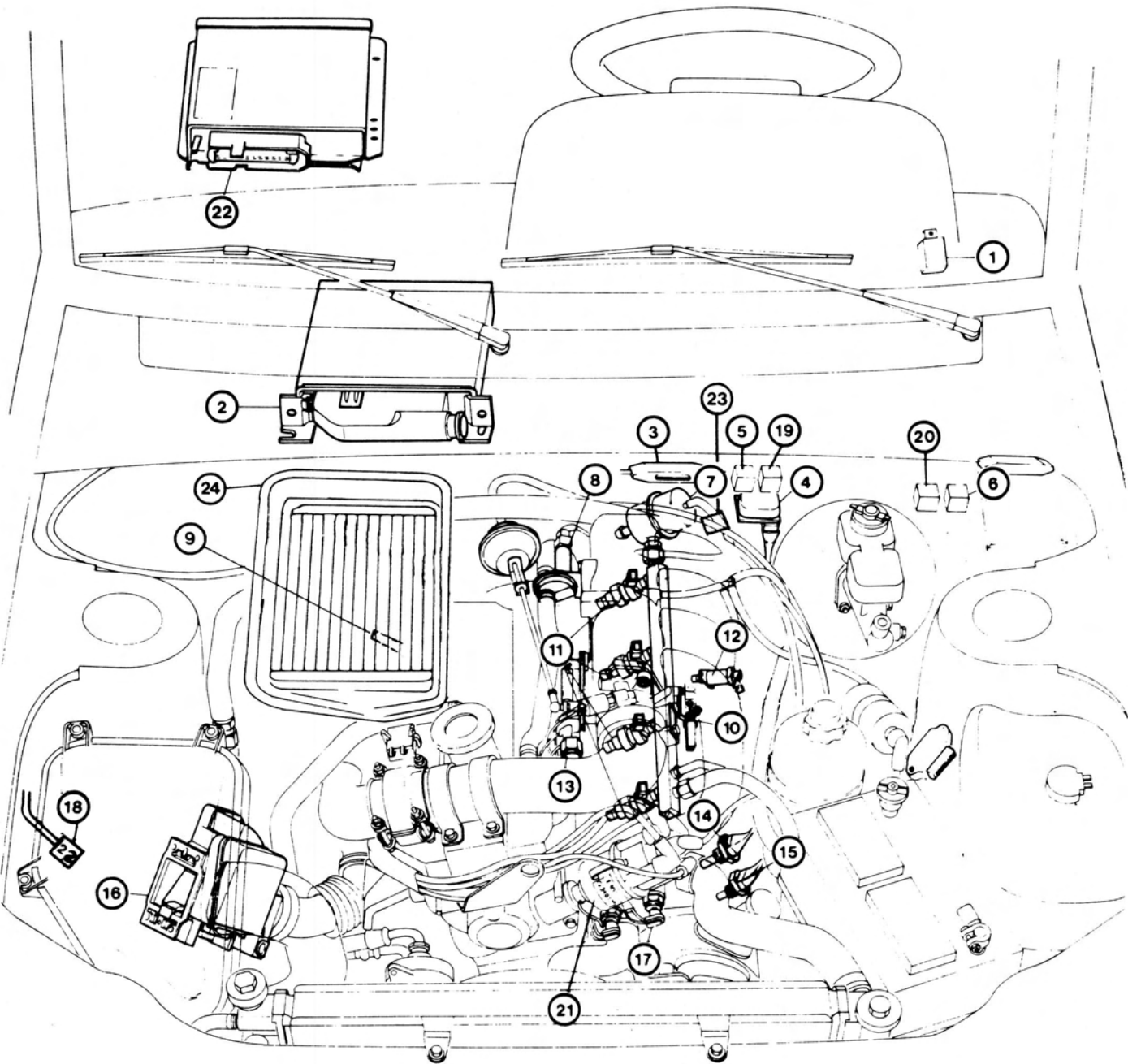
## TABLE OF CONTENTS

| DESCRIPTION                                      | PAGE NOS.  |
|--------------------------------------------------|------------|
| LU Test Section<br>N9T/N9TE                      | 2 to 18    |
| LU2 Test Section<br>ZDJL                         | 20 to 28   |
| LH Test Section<br>ZN3J                          | 30 to 44   |
| Motronic Test Section<br>XU9J2 - XU9J4           | 46 to 62   |
| Climate Control<br>505 Vehicles                  | 64 to 74   |
| Climate Control<br>405 Vehicles                  | 76 to 84   |
| 505 Anti-Lock Braking System<br>Teves ABS System | 86 to 96   |
| 405 Anti-Lock Braking System<br>Bosch ABS System | 98 to 134  |
| 505 Variable Ratio<br>Power Steering             | 136 to 142 |



**LU TEST SECTION**

**N9T - N9TE**



## LEGEND

1. Tachymetric relay
2. Fuel injection E.C.U. (moved to firewall behind glove box on N9TE)
3. Injection cut-out on deceleration diode
4. Altitude sensor
5. Emissions relay (fuel evaporation) \*1985 only
6. Injection relay
7. Fuel pressure regulator
8. Auxiliary air device
9. Oxygen sensor (Lambda sensor)
10. Throttle flap microswitch
11. Injectors
12. Cold start injector
13. Overboost pressure switch (moved to outside of elbow on N9TE/A)
14. Engine temperature sensor (NTC)
15. Thermotime switch
16. Air flow sensor
17. 60°C thermocontact
18. Integrator voltage signal for adjusting richness at idle
19. Cruise control relay
20. Ignition relay
21. Distributor
22. Ignition E.C.U. (moved to behind RH footrest on N9TE/A)
23. Preresistors N9TE/A (moved to RH fender, below coil on 87 N9TE/A)
24. Intercooler N9TE/A

## DETONATION INDICATOR LED DECODING GRAPH (N9T-N9TE)

| FAULT NO.* |  | SPARK ADVANCE CORRECTION                                    |  | CAUSES                                                                                         | CHECKS TO PERFORM                                      |                                                                               |                                                                                                                                                                        |
|------------|--|-------------------------------------------------------------|--|------------------------------------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1          |  | -22°                                                        |  | Continued detonation<br>Maximum correction reached                                             | Cooling system<br>Distributor timing<br>Boost pressure |                                                                               |                                                                                                                                                                        |
| 2          |  | **                                                          |  | Battery voltage is < 10.5 Volts                                                                | Battery<br>Charging circuit                            |                                                                               |                                                                                                                                                                        |
| 3          |  | ** non-reversible<br>until ignition switch<br>is turned off |  | Detonation correction circuit in<br>the ignition ECU defective                                 | Try with a new ignition ECU                            |                                                                               |                                                                                                                                                                        |
| 4          |  |                                                             |  | Erroneous signal received from<br>detonation sensor (check for<br>engine speed above 3200 RPM) | Detonation sensor<br>Electrical circuit continuity     |                                                                               |                                                                                                                                                                        |
| 5          |  |                                                             |  | Signal from potentiometer is<br>greater than 4.3 Volts                                         | Try with new throttle shaft<br>potentiometer           |                                                                               |                                                                                                                                                                        |
| 6          |  |                                                             |  | A                                                                                              |                                                        | Connections and wiring<br>between ignition ECU and<br>potentiometer defective | Continuity of potentiometer's<br>electrical circuit                                                                                                                    |
|            |  | B                                                           |  | Micro-switch                                                                                   | Advance                                                | No load signal emanating from<br>the injection ECU                            | Electrical circuit continuity<br>between Pin 8 of ignition ECU &<br>Pin 6 of injection ECU (wire 6)<br>Check with a new ignition ECU<br>Check with a new injection ECU |
|            |  |                                                             |  | Open                                                                                           | Full Load                                              |                                                                               |                                                                                                                                                                        |
|            |  |                                                             |  | Closed                                                                                         | Idle                                                   |                                                                               |                                                                                                                                                                        |

\* The FAULT number represents the number of blinks per cycle of the LED on the instrument cluster

Note: For the "irreversible" faults (3,4,5,6A), it is necessary to turn ignition key "OFF" to "erase" the fault entered in memory

\*\* 1985 N9T: -20°  
1986 & On: -15°

## SYSTEM CHECK

A simple way of checking that the system is intact is to disconnect the throttle shaft potentiometer wire connector (3 pin Cannon)

This will give us fault (6A) in the above chart, and the LED will blink 6 times per cycle; timing will be retarded (-20°) until ignition is switched off and the memory is cleared

## DETONATION INDICATOR LED DECODING GRAPH (N9TEA)

| DEFECT CODE | CAUSES                                                                         | CHECKS TO PERFORM                                                                                                              |
|-------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| 1-1         | Maximum correction reached (retard), Continued detonation                      | Boost pressure electrovalve                                                                                                    |
| 1-2         | Battery voltage < 9.4 Volts                                                    | Battery<br>Charging circuit                                                                                                    |
| 2-1<br>2-2  | Erroneous signal received from detonation sensor                               | Continuity of electrical circuit<br>Try with a new detonation sensor                                                           |
| 2-3         | Detonation correction circuit within the ECU is defective                      | Continuity of electrical circuit between the injection ECU (pin 6) and the ignition ECU (pin 8)<br>Boost pressure electrovalve |
| 3-1<br>3-2  | Basic injection duration input                                                 | Potentiometer and its electrical circuit<br>Try again with a new injection ECU                                                 |
| 4-1<br>4-2  | No load signal emanating from injection ECU                                    | Try again with a new ignition ECU                                                                                              |
| 5-1         | Defective NTC sensor (no effect on advance, no cancelling of Turbo monitoring) | Continuity of electrical circuit<br>Replace the NTC sensor                                                                     |

The different codes are transmitted by two series of blinks on the instrument cluster LED:

- 1st series of blinks = tens digit
- 2nd series of blinks = units digit

EXAMPLE: Defect Code 2-3: LED ...X.X... X.X.X. ... X.X... X.X.X. ...

## OPERATION OF THE LED:

- Ignition key ON -- LED ON
  - Engine started --- LED OFF
- } normal operation

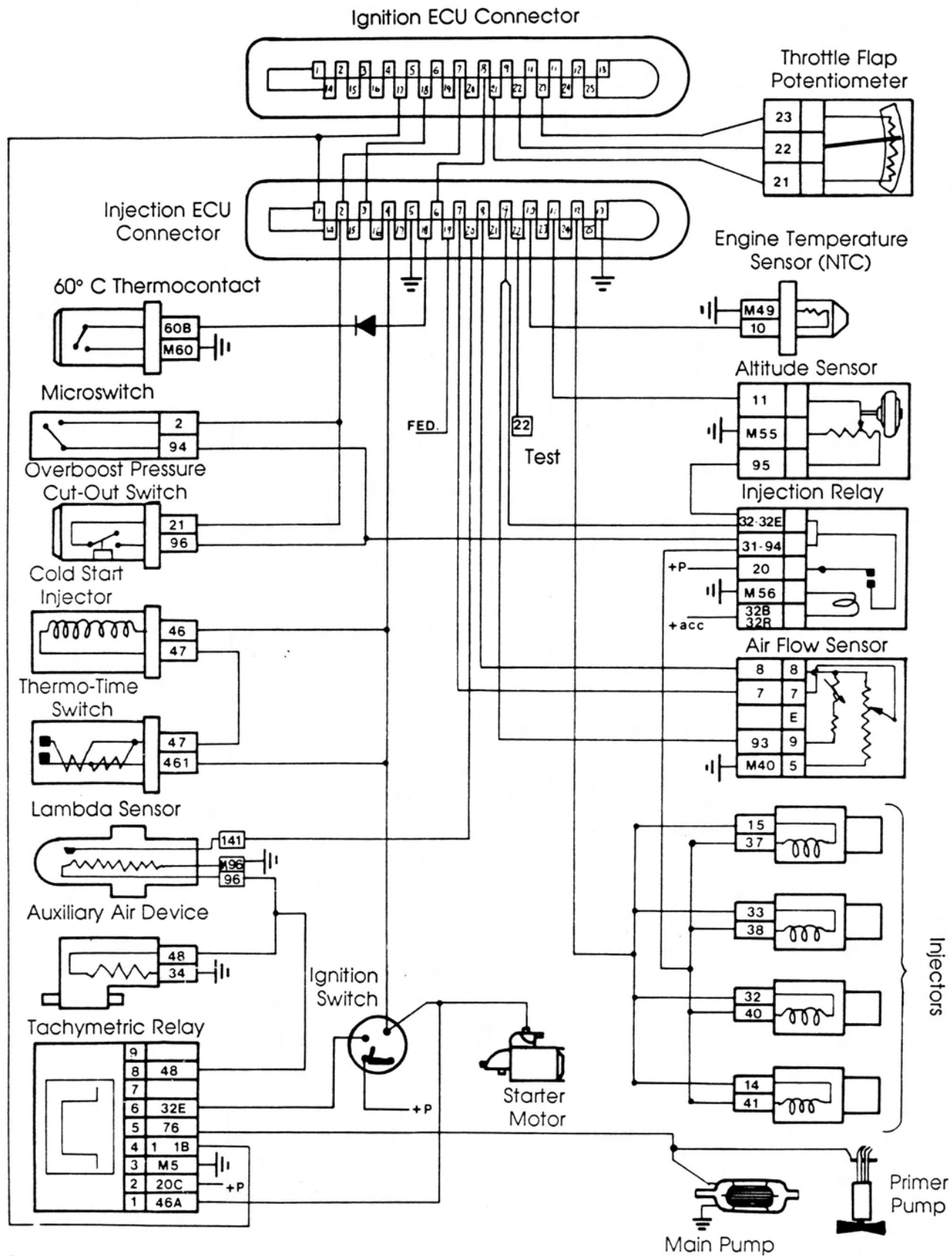
If the LED remains ON or OFF, check its power supply and its ground

When the ECU registers a defect, the LED (L32) comes on at the instrument cluster:

It will stay on permanently if the engine speed is above 1550 RPM; it will flash the code corresponding to the defect registered if the engine speed is below 1550 RPM

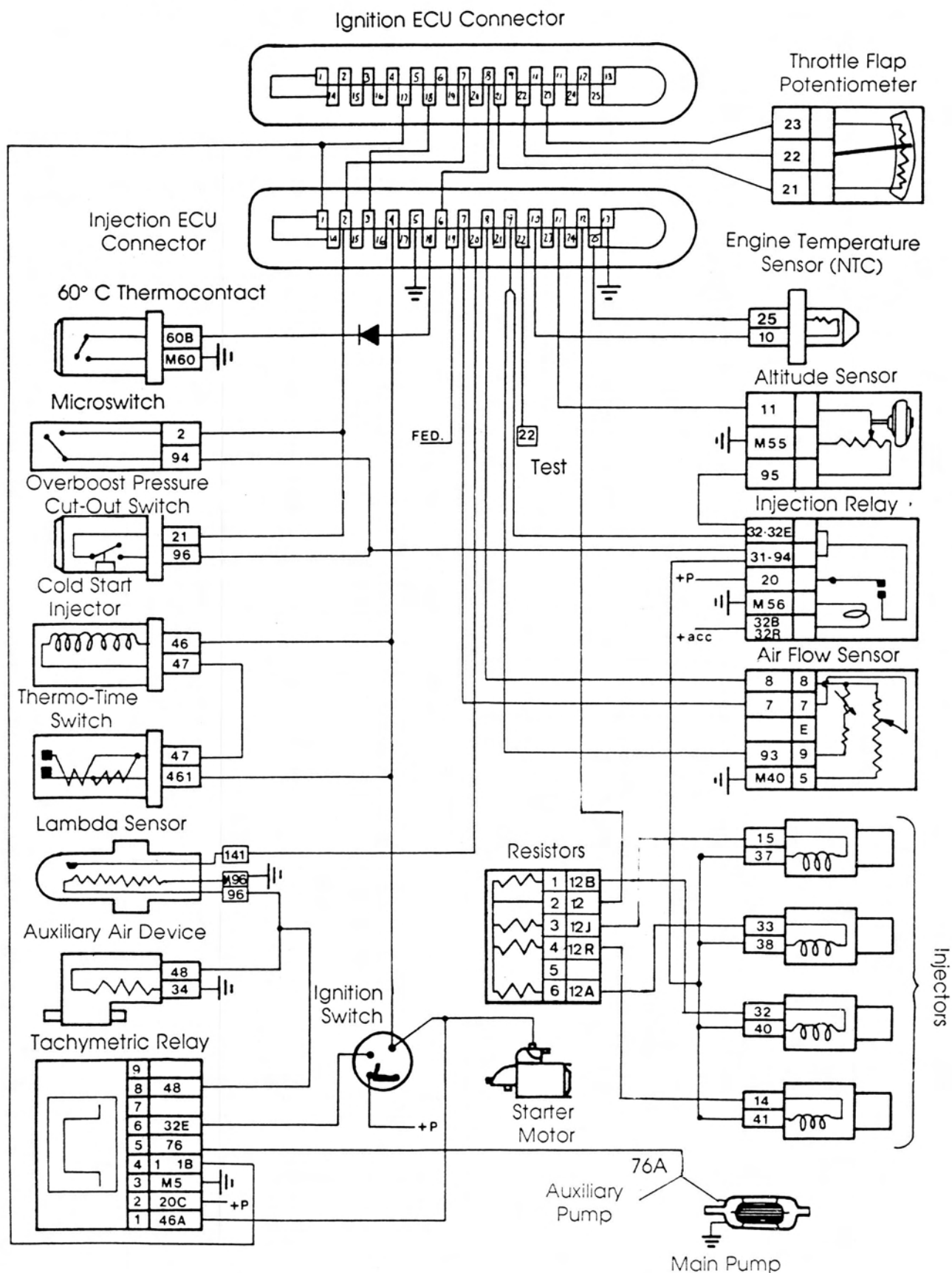
The engine must be at idle in order to interpret the defect code

## INJECTION WIRING - 1985

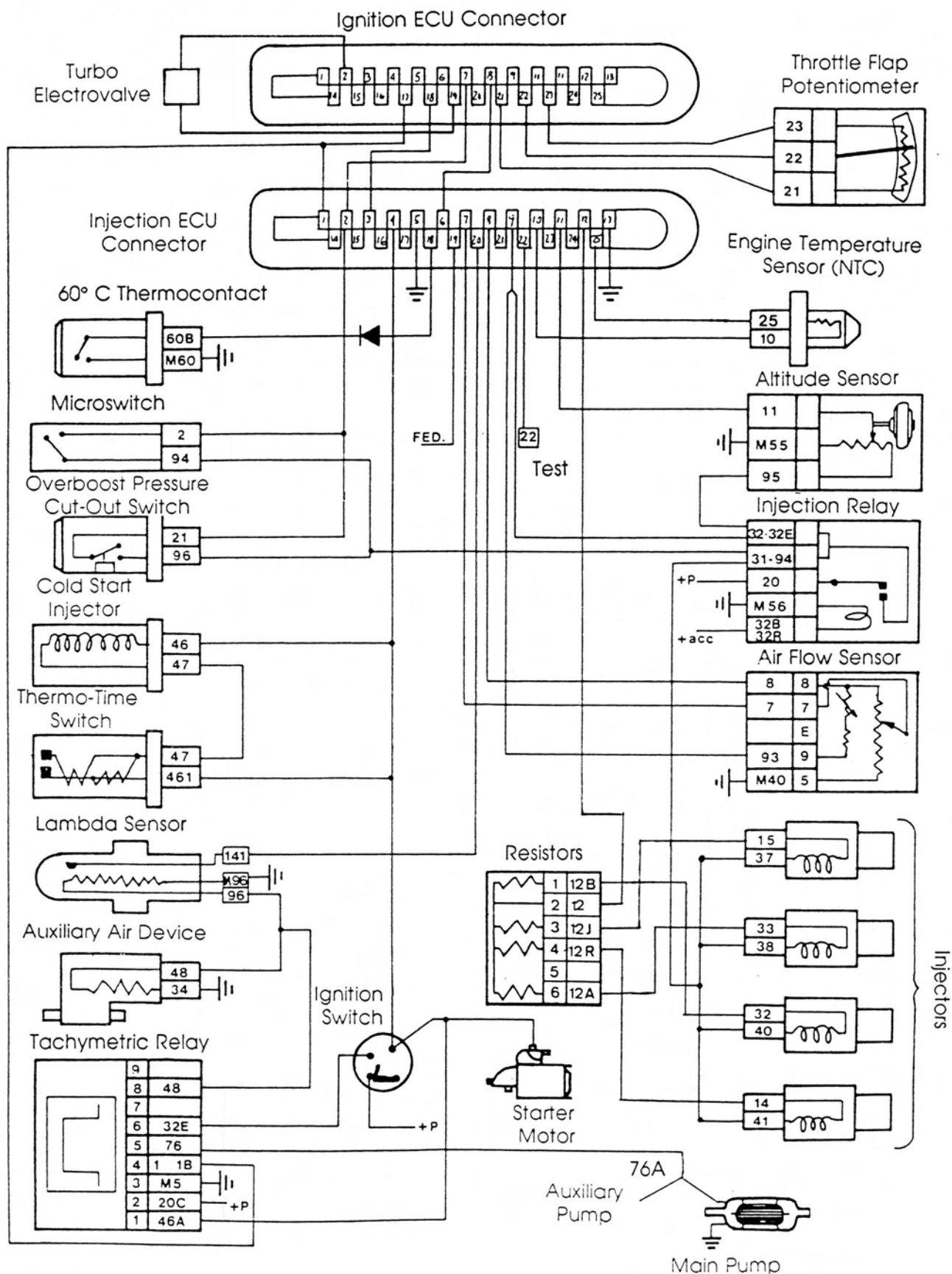




INJECTION WIRING - 1986 to 1987



## INJECTION WIRING - 1988 to 1990



**PIN OUT BOX TESTING - Voltage Checks**

Check battery voltage first before proceeding to any pin out box voltage checks (for correct voltage drop readings)

Remove connector (25-pin) from injection ECU and connect it to the male end of the 25-pin pin out box connector

Battery fully charged

All tests are done by connecting the appropriate meter between the pin numbers as indicated in the pin no. column

NOTE: Injection ECU must NOT be connected to test harness

| CHECK                          | TESTER    | PIN NOS.                    | TEST CONDITION                                                                   | READINGS                                                                         | IF READINGS INCORRECT, CHECK:                                          |
|--------------------------------|-----------|-----------------------------|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------|------------------------------------------------------------------------|
| Injection ECU Power Supply     | Voltmeter | 9 & Grnd<br>9 & 5<br>9 & 13 | Ignition on                                                                      | > 12 Volts                                                                       | Electrical circuit continuity<br>Ignition ECU relay<br>Injection relay |
| Start Buss                     | Voltmeter | 4 & 13                      | Energize starter                                                                 | > 9 Volts                                                                        | Electrical circuit continuity<br>Ignition switch<br>Starter            |
| Altitude Sensor                | Voltmeter | 11 & 13                     | Ignition on                                                                      | 2-3 Volts at sea level (for altitude other than sea level see component section) | Electrical circuit continuity<br>Altitude sensor                       |
| Ignition Input                 | Voltmeter | 1 & 13                      | Ignition on, remove dist. cap rotor & dust cover. Align slot with hall generator | < 1 Volt                                                                         | Electrical circuit continuity                                          |
|                                |           | 1 & 13                      | Insert 0.5mm steel feeler gauge between slot & hall generator                    | > 8 Volts                                                                        | Hall generator                                                         |
|                                |           | Assemble distributor        |                                                                                  |                                                                                  |                                                                        |
| Air Flow Sensor/Air Flow Input | Voltmeter | 7 & 13                      | Ignition on                                                                      | 1-2 Volts                                                                        | Electrical circuit continuity                                          |
| Air Flow Sensor/Air Temp Input | Voltmeter | 8 & 13                      | Ignition on                                                                      | 7-8 Volts                                                                        | Air flow sensor                                                        |

## PIN OUT BOX TESTING - Ohmmeter Checks

NOTE: Disconnect battery

## CHECKING THE INJECTION ECU CONNECTOR PINS

| CHECK                     | TESTER   | PIN NOS.              | TEST CONDITION                                                                                                                    | READINGS                                                                                         | IF READINGS INCORRECT, CHECK:                                                       |
|---------------------------|----------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Grounds                   | Ohmmeter | 5 & Grnd<br>13 & Grnd | Battery disconnected                                                                                                              | Resistance < 1 Ohm                                                                               | Electrical circuit continuity                                                       |
| Throttle Switch Unit      | Ohmmeter | 2 & 9                 | Disconnect:<br>ignition ECU,<br>overboost sw.,<br>altitude sensor, air<br>flow sensor<br><br>Throttle closed<br><br>Throttle open | Resistance < 1 Ohm<br><br>Resistance = ∞                                                         | Electrical circuit continuity,<br>Throttle switch,<br>Adjustment of throttle switch |
| Injectors                 | Ohmmeter | 9 & 12                | N9T 1985<br><br>N9TE/A 1986 & on<br>Injector Resistance:<br>N9T - 16 Ohms<br>N9TE/A - 2.5 to 3.5 Ohms                             | Resistance = 3.5 - 5 Ohms<br>Resistance = 2.2 - 2.6 Ohms                                         | Electrical circuit continuity<br><br>Injectors                                      |
| NTC Temp Sensor           | Ohmmeter | 10 & 13               | -10°C (14°F)<br><br>+20°C (68°F)<br><br>+80°C (176°F)                                                                             | Resistance = 8200 - 11,000 Ohms<br>Resistance = 2280 - 2720 Ohms<br>Resistance = 290 to 370 Ohms | Electrical circuit continuity<br><br>NTC Temp Sensor                                |
| Overboost Pressure Switch | Ohmmeter | 2 & 9                 | Disconnect:<br>throttle switch,<br>altitude sensor, air<br>flow sensor<br><br>Bridge wires at overboost pressure switch           | Resistance = ∞<br><br>Resistance < 1 Ohm                                                         | Electrical circuit continuity<br><br>Overboost pressure switch                      |
| Air Flow Sensor           | Ohmmeter | 5 & 8                 | Disconnect:<br>auxiliary air device, altitude sensor<br><br>Note: connect air flow sensor                                         | Resistance = 340 to 450 Ohms                                                                     | Electrical circuit continuity, Air flow sensor                                      |
|                           |          | 8 & 9                 | As above                                                                                                                          | Resistance = 160 to 300 Ohms                                                                     |                                                                                     |
|                           |          | 5 & 7                 | As above (vary the position of air plate using a screwdriver)<br><br>Note: air cleaner removed                                    | Resistance = 60 - 1300 Ohms                                                                      |                                                                                     |

DIODE TEST

NOTE: Disconnect battery

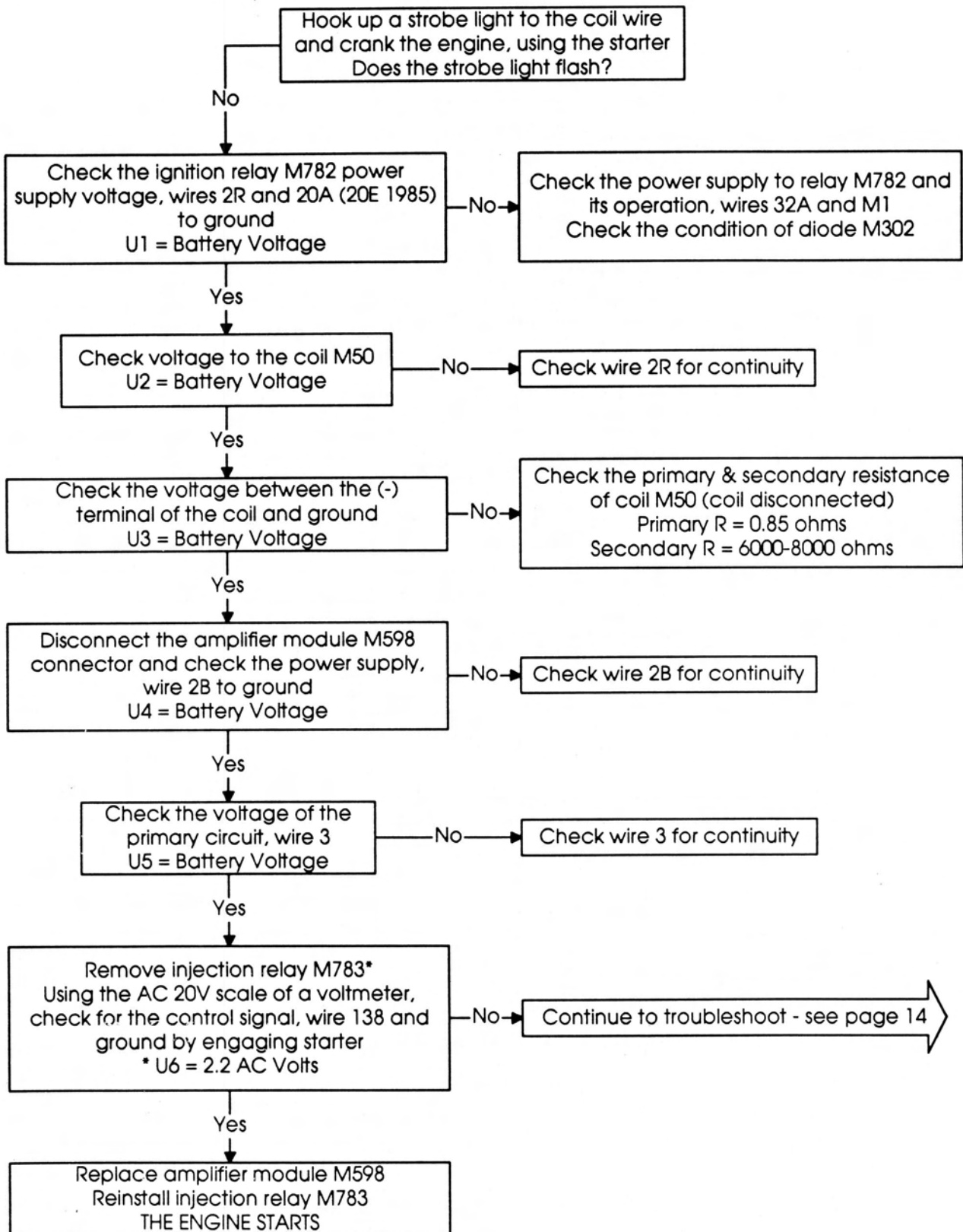
CHECKING THE INJECTION ECU CONNECTOR PINS

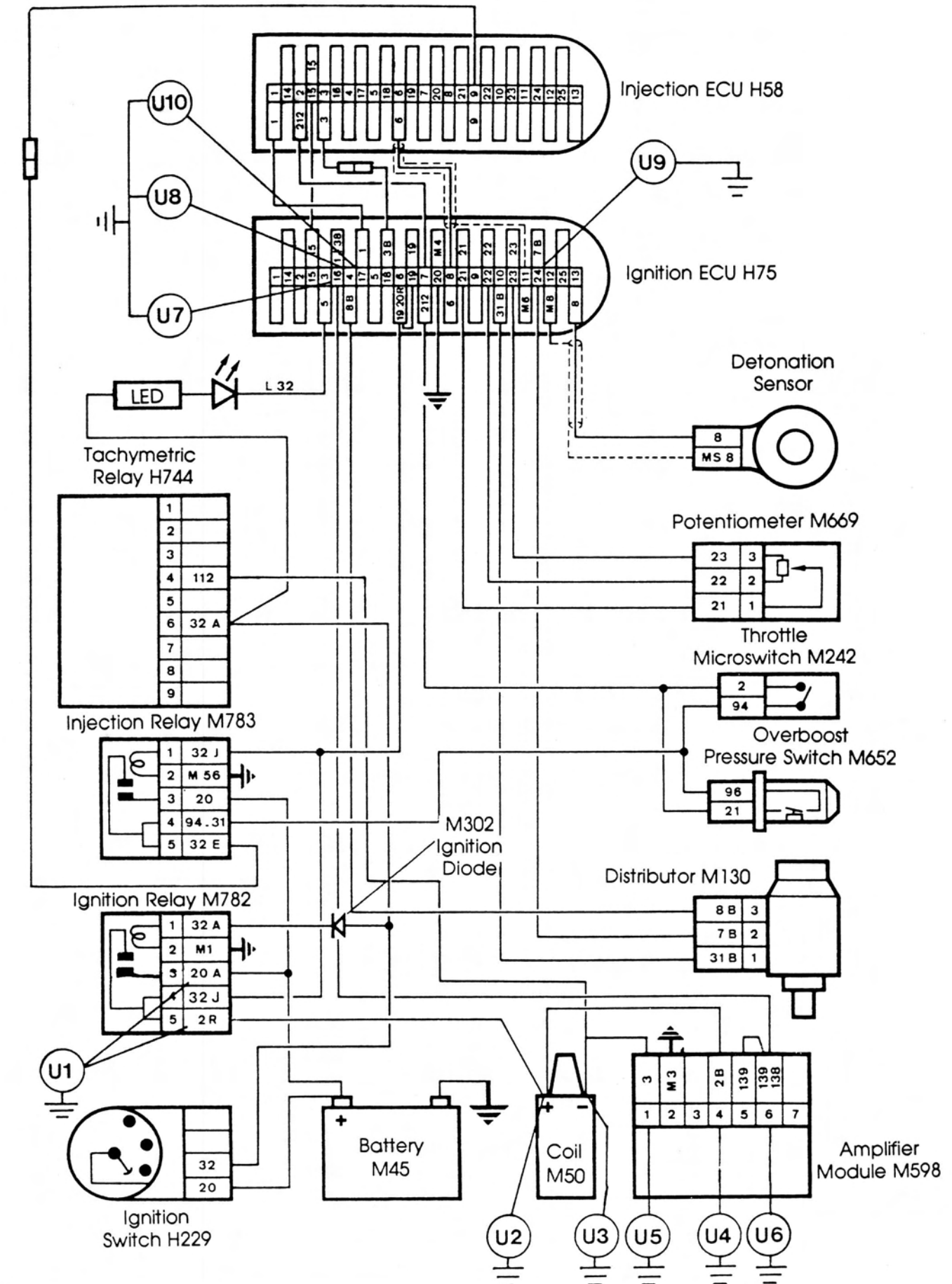
| CHECK              | TESTER     | PIN NOS.                        | TEST CONDITION                                                                                                                                                                               | READINGS                        | IF READINGS INCORRECT, CHECK:                  |
|--------------------|------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|------------------------------------------------|
| 60° Thermo-Contact | Diode Test | 18 & 13<br>(see Test Condition) | Battery disconnected<br>Bridge wires at 60° thermo-contact wires M60 & 60B<br>Remove emissions relay (1985 N9T, 1986 only N9TE; ID nos. 60B & 32B; relay at firewall)<br>VOM to "diode test" |                                 | Electrical circuit continuity, Injection diode |
|                    |            |                                 | VOM ohm lead to pin 18                                                                                                                                                                       |                                 |                                                |
|                    |            |                                 | Com lead to pin 13                                                                                                                                                                           | = 0.500 and/or an audible sound |                                                |
|                    |            |                                 | Reverse leads                                                                                                                                                                                | ∞                               |                                                |

Connect:

- Auxiliary Air Device
- Altitude Sensor
- Throttle Microswitch
- Overboost Pressure Switch
- 60°C Thermoswitch
- Battery

## THE ENGINE DOES NOT START - IGNITION ON





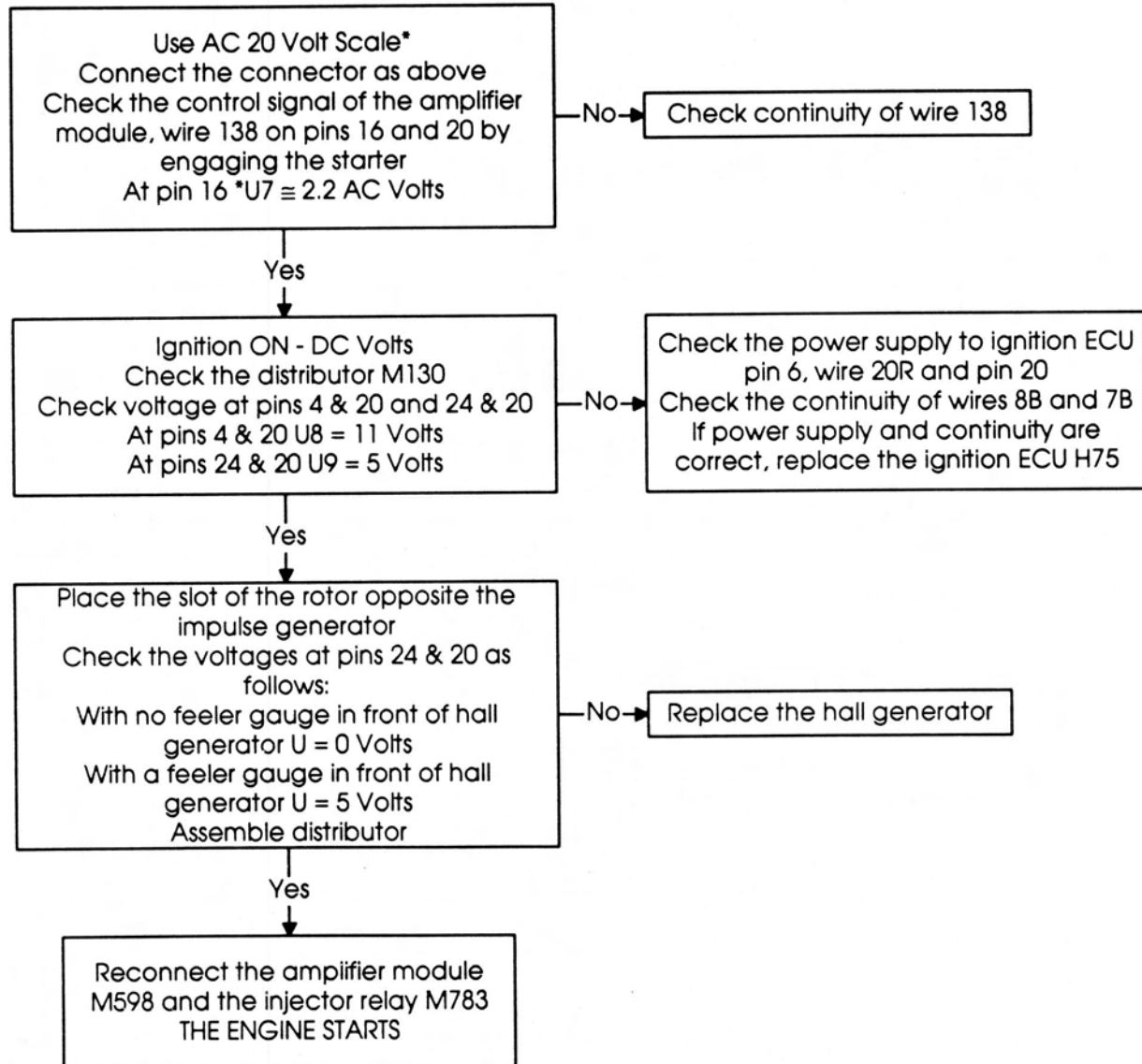
## THE ENGINE DOES NOT START - DYNAMIC TEST

For these tests:

The female connector of the pin out box must be connected to the ignition ECU of the vehicle (ignition ECU behind right side footrest)

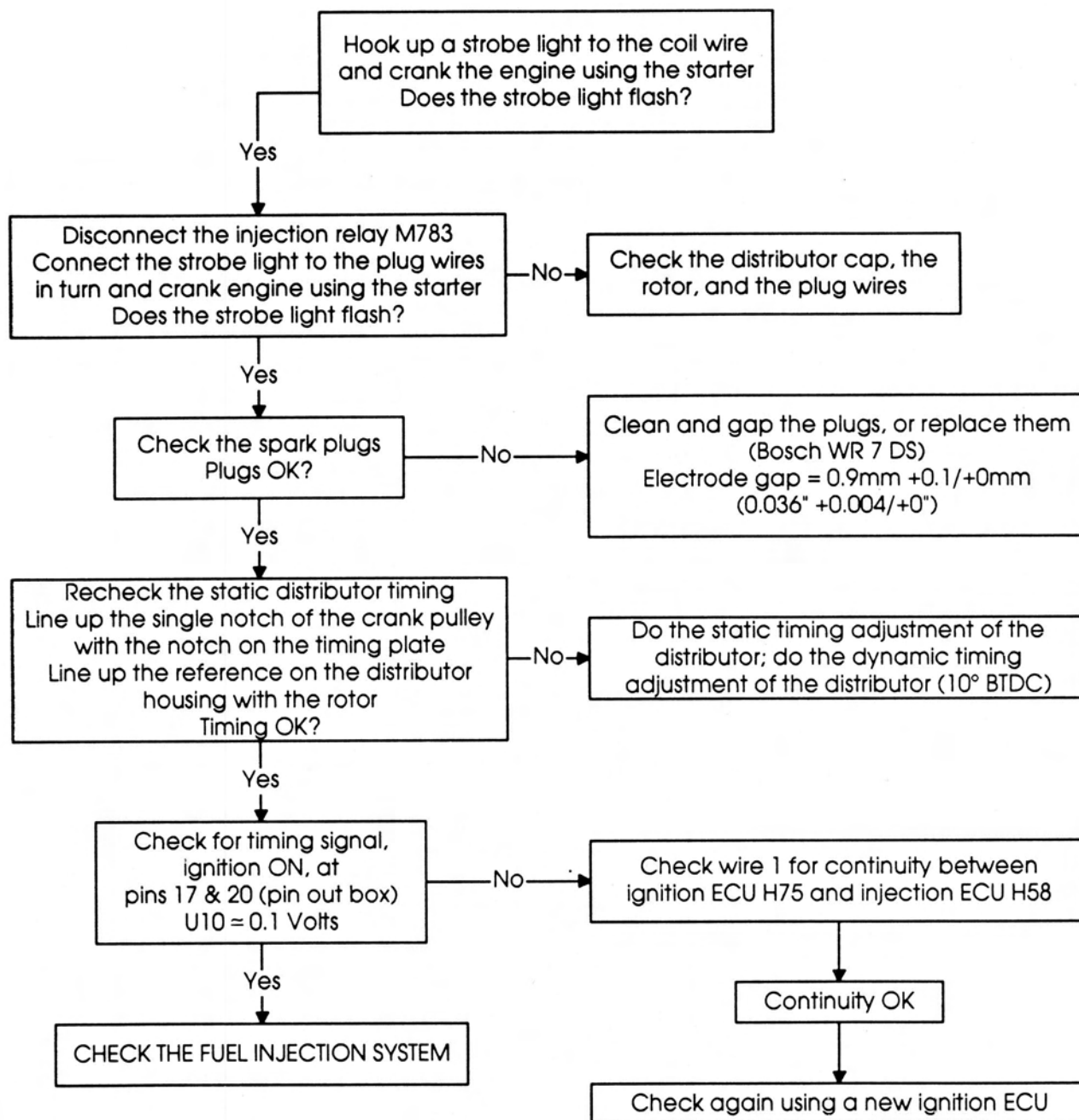
The male connector of the pin out box must be connected to the wiring harness of the vehicle

Continued from page 12





THE ENGINE DOES NOT START



## TROUBLESHOOTING

Prior to performing any troubleshooting on the LU-JETRONIC Injection system, it is imperative that the conditions below be met.

### Starting circuit

- Battery is adequately charged
- Starter drives engine normally

### Ignition

- Ensure that there is spark
- Spark timing is properly set
- Spark plugs are in good condition and the gap is correctly set

### Air filter

- Air filter element is in good condition

### DEFECT NOTED

The engine does not start or is hard to start (cold or hot engine)

The engine starts then stalls

Erratic idle

Misfiring in all load ranges

Lack of power

Excessive fuel consumption

CO concentration is too low

CO concentration is too high

Impossible to adjust idle speed (rpm too high)

### CHECKS TO BE PERFORMED

|   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|
|   |   |   | ● |   |   |   |   |   |   |
| ● | ● | ● |   | ● |   | ● | ● |   |   |
| ● | ● |   |   |   | ● |   |   |   |   |
| ● | ● | ● | ● | ● | ● | ● | ● |   |   |
|   |   |   | ● | ● |   |   |   |   |   |
|   |   | ● |   |   | ● |   |   |   |   |
| ● | ● | ● | ● |   | ● |   | ● |   |   |
| ● | ● |   |   |   | ● |   | ● |   |   |
| ● | ● | ● |   |   | ● | ● | ● | ● |   |
| ● |   | ● | ● | ● | ● | ● | ● | ● |   |
| ● |   | ● | ● | ● | ● | ● |   |   |   |
|   |   | ● |   | ● |   |   |   |   | ● |
| ● | ● | ● |   | ● |   | ● |   |   |   |
|   |   |   |   | ● |   |   |   |   |   |
| ● | ● | ● | ● | ● |   |   |   |   |   |
|   |   | ● |   |   |   |   |   |   |   |
|   |   | ● |   |   |   |   |   |   | ● |
|   |   |   |   | ● |   |   |   |   |   |
| ● | ● | ● | ● | ● |   |   |   |   |   |
| ● | ● | ● | ● | ● | ● |   |   |   |   |
|   |   |   |   |   |   |   | ● |   |   |

- Check the charging circuit
- Visually check all air and fuel hoses and connections
- Check the supply voltage of fuel pumps
- Check the fuel pressure
- Check the fuel flow (output volume)
- Check the mixture and idle speed adjustment
- Check the cold start injector
- Check the thermo-time switch
- Check the auxiliary air device
- Check the temperature sensor (NTC)
- Check the air flow sensor
- Check the injectors and their resistors
- Check the accelerator control adjustment
- Check the air induction system under pressure
- Check the boost pressure
- Check the injection ECU multipin connector
- Check that the throttle flap housing is clean
- Check the initial opening throttle flap angle
- Check the microswitch adjustment on throttle flap housing
- Check the valve clearance adjustment and compression
- Retest vehicle with a new injection ECU
- Defective Lambda sensor

## NOTES

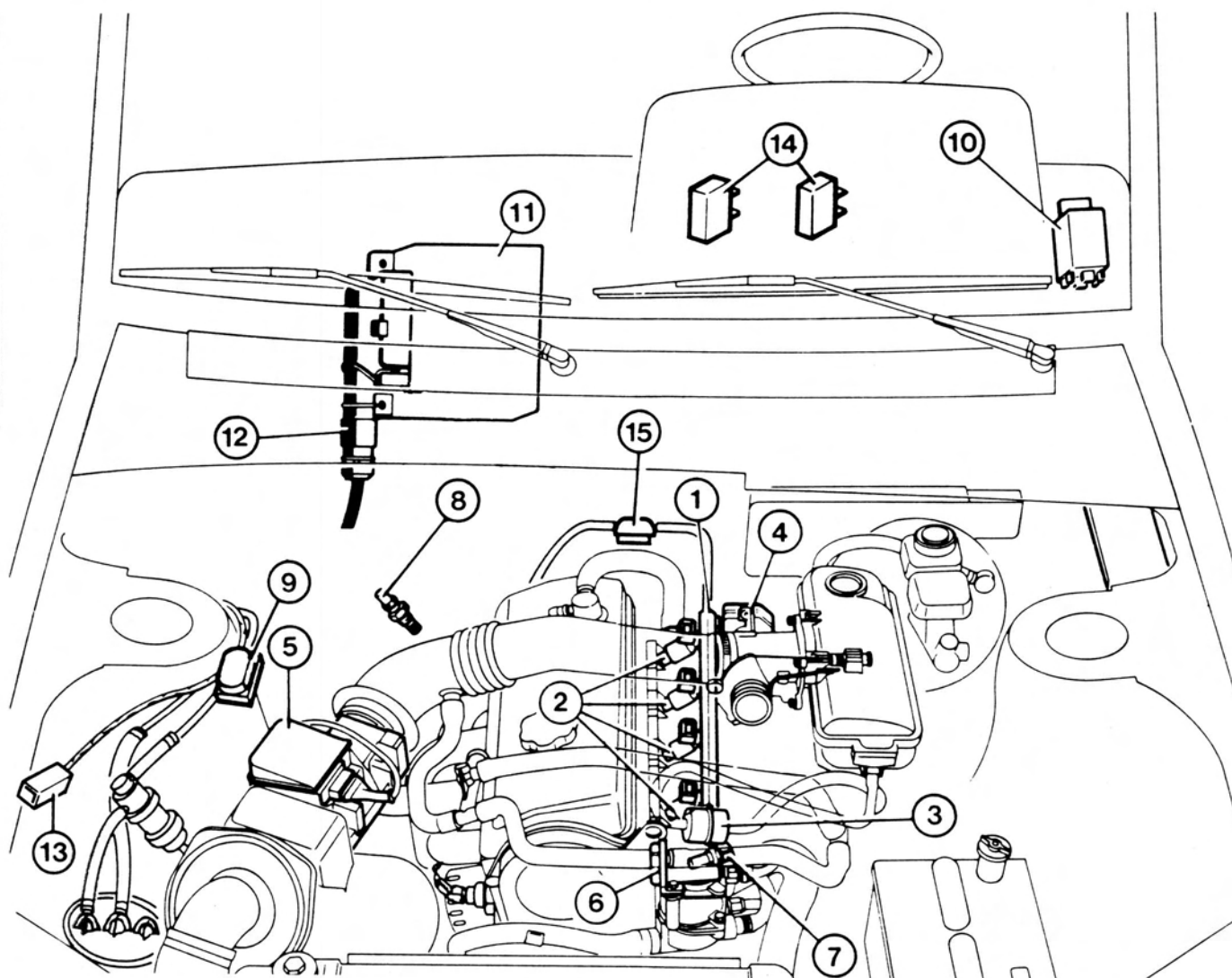
[illegible]

## NOTES

This image shows a full page of a worksheet designed for handwriting practice. It features 18 horizontal dashed lines spaced evenly across the page, providing a guide for letter height and placement. The lines are light gray and extend from the left margin to the right edge of the page. There is no text or other markings on the page.

# **LU2 TEST SECTION**

**ZDJL**



- |                              |                                                                                        |
|------------------------------|----------------------------------------------------------------------------------------|
| 1 Injector distribution pipe | 9 Altitude sensor                                                                      |
| 2 Injectors                  | 10 Tachymetric relay                                                                   |
| 3 Fuel pressure regulator    | 11 Injection ECU (mounted on firewall behind glove box)                                |
| 4 Throttle switch unit       | 12 Injection ECU connector                                                             |
| 5 Air flow sensor            | 13 Test wire for checking richness at idle (wire 22 from injection ECU)                |
| 6 Auxiliary air device       | 14 15 amp fuse for fuel pump(s), 10 amp fuse for Lambda sensor, located behind ashtray |
| 7 Temperature sensor (NTC)   | 15 Damper                                                                              |
| 8 Lambda sensor              |                                                                                        |

## FUEL PUMP TESTING

Voltage Checks:

1. At main pump (under left rear floor)  
No. 76 wire and ground - 12 volts
2. Ground at main pump (under left rear floor)  
No. 76 wire and No. M76 wire - 12 volts
3. At primer pump (at fuel tank in trunk)  
No. 76A and ground - 12 volts

Amperage Checks:

1. Remove 15 amp fuel pump fuse (behind ashtray)
2. Install ampmeter - series connection in place of fuse
3. Crank engine
4. Observe reading - should be = 10 amps
  - if more, defective pump
  - if less, resistance in pump electrical circuit too high  
(refer to Class 12 Electrical Manual)

## LEGEND

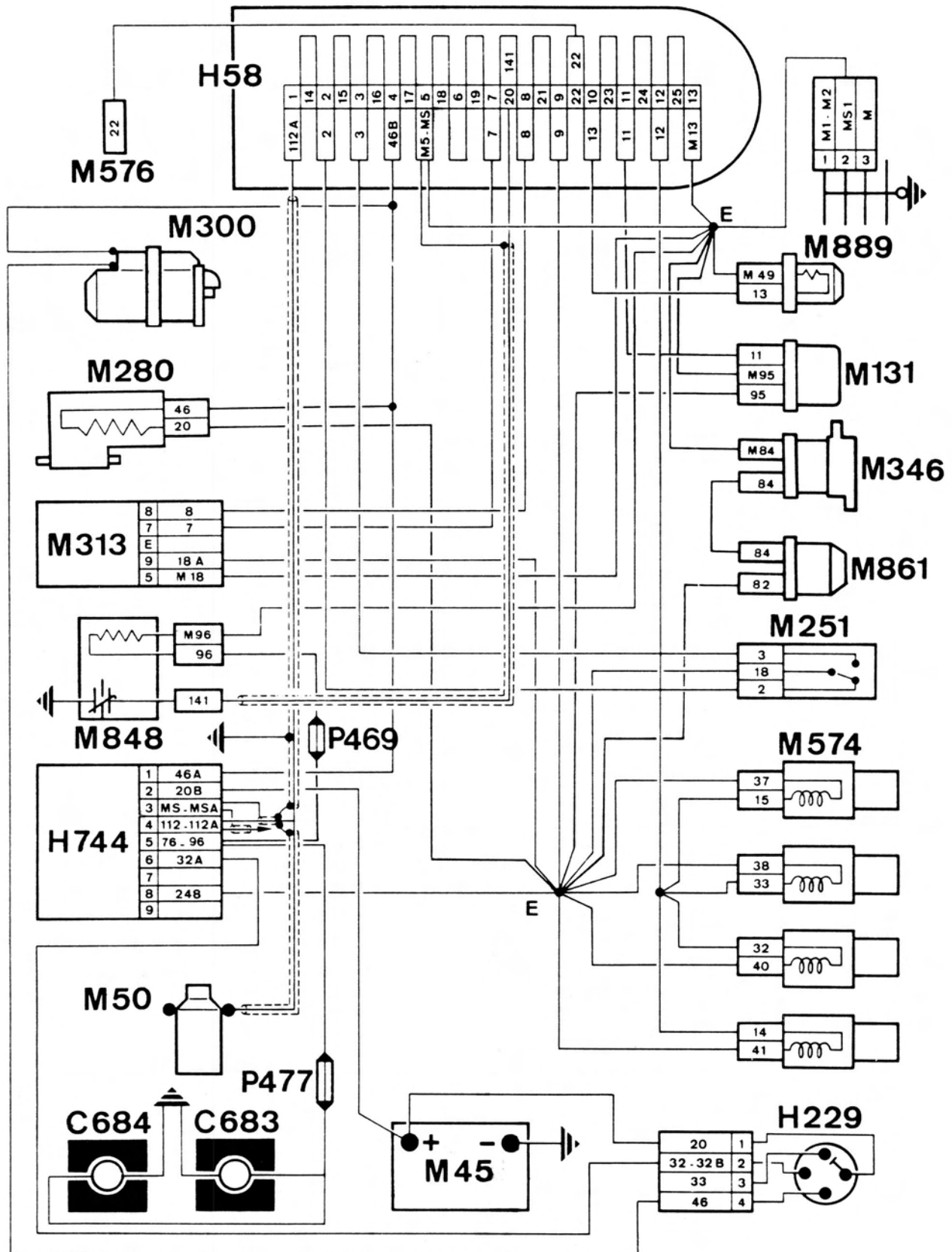
|                                   |      |
|-----------------------------------|------|
| Battery                           | M45  |
| Ignition Coil                     | M50  |
| Altitude Sensor                   | M131 |
| Throttle Switch Unit              | M251 |
| Auxiliary Air Device              | M280 |
| Starter Motor                     | M300 |
| Air Flow Sensor                   | M313 |
| Fuel Vapor Recovery Electrovalve  | M346 |
| Injectors                         | M574 |
| Test Lead for Richness Adjustment | M576 |
|                                   |      |
| Lambda Sensor                     | M848 |
| 30°C Thermocontact                | M861 |
| Engine Temperature Sensor (NTC)   | M889 |
|                                   |      |
| Injection ECU                     | H58  |
| Ignition/Key Switch Lock          | H229 |
| Tachymetric Relay                 | H744 |
|                                   |      |
| Lambda Sensor Heater Fuse (10A)   | P469 |
| Fuel Pump Fuse (15A)              | P477 |
|                                   |      |
| Main Fuel Pump                    | C683 |
| Primer Fuel Pump                  | C684 |

## IDENTIFICATION OF LETTERS M - P - H - C - L:

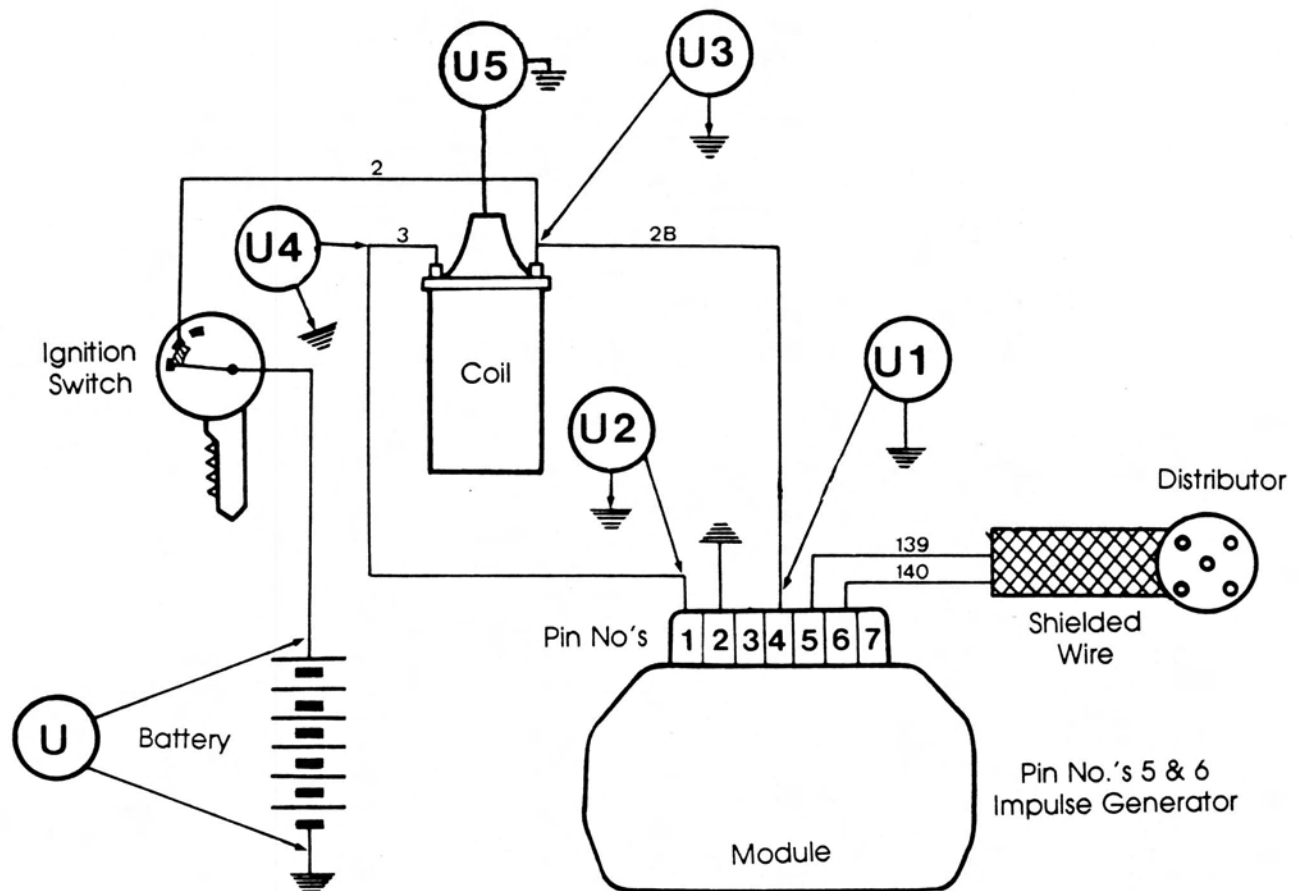
The vehicle is divided into four compartments by letters placed before the component number reference, according to the geographic location of said component

M = Engine  
P = Dashboard  
H = Passenger Compartment  
C = Trunk  
L = Lamp





## IGNITION CHECKS



## VOLTMETER CHECKS - Ignition On

|    |                      |
|----|----------------------|
| U  | B + MINIMUM 12 VOLTS |
| U1 | B + MINIMUM 12 VOLTS |
| U2 | B + MINIMUM 12 VOLTS |
| U3 | B + MINIMUM 12 VOLTS |
| U4 | B + MINIMUM 12 VOLTS |
| U5 | B + MINIMUM 12 VOLTS |

If no voltage at U1, check U3

If no voltage at U2, check U4

TROUBLESHOOTING

Prior to performing any troubleshooting on the LU2-JETRONIC injection system, it is imperative that the conditions below be met.

**Starting circuit**

- Battery adequately charged
- Starter drives engine normally

**Ignition**

- Ensure that there is spark
- Spark timing is properly set
- Spark plugs are in good condition and the gap is correctly set

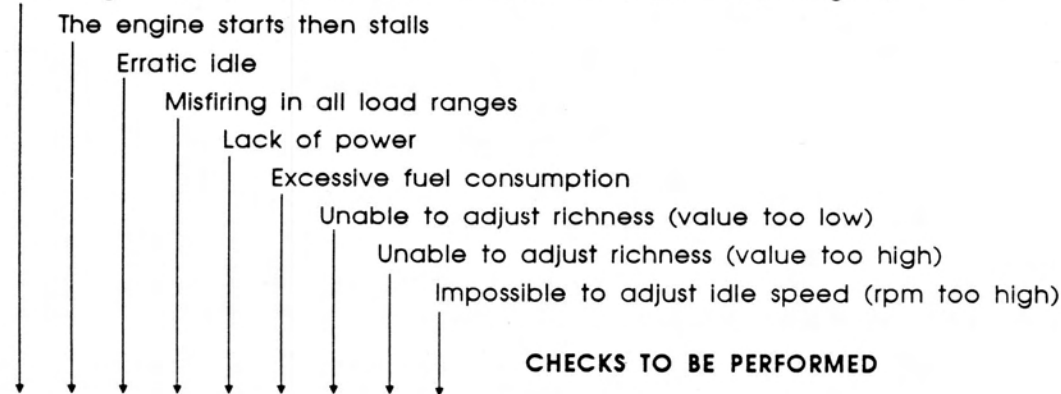
**Air filter**

- Air filter element is in good condition

**DEFECT NOTED**

For each defect, proceed by elimination: 1, 2, 3 etc... from top to bottom

The engine does not start or is hard to start (cold or hot engine)



|    |   |    |   |    |   |   |   |   |                                                         |
|----|---|----|---|----|---|---|---|---|---------------------------------------------------------|
|    |   |    | 1 |    |   |   |   |   | → Check the charging circuit                            |
| 1  | 1 | 3  |   | 2  |   | 2 | 2 |   | → Visually check all air and fuel hoses and connections |
| 2  | 2 |    |   | 3  | 1 |   |   |   | → Check the supply voltage of fuel pumps                |
| 5  | 3 | 5  | 3 | 4  | 2 | 1 | 1 |   | → Check the fuel pressure                               |
|    |   |    | 4 | 5  |   |   |   |   | → Check the fuel flow (output volume)                   |
|    |   | 1  |   |    | 6 |   |   |   | → Check the mixture and idle speed adjustment           |
| 3  | 4 | 4  |   |    |   | 4 |   | 1 | → Check the auxiliary air device                        |
| 4  |   | 7  | 5 |    | 5 | 3 | 3 |   | → Check the temperature sensor (NTC)                    |
| 6  |   | 8  | 6 | 6  | 4 | 6 | 4 |   | → Check the air flow sensor                             |
|    |   | 6  | 7 | 7  | 3 |   | 5 |   | → Check the injectors                                   |
|    |   | 2  |   | 1  |   |   |   | 2 | → Check the accelerator control adjustment              |
| 8  | 5 | 9  |   | 8  |   | 5 |   |   | → Check the air induction system under pressure         |
| 7  | 6 | 11 | 2 | 9  | 7 | 7 | 6 |   | → Check the injection ECU multipin connector            |
|    |   | 10 |   |    |   |   |   |   | → Check that the throttle flap housing is clean         |
|    |   | 12 |   |    |   |   |   | 3 | → Check the initial opening throttle flap angle         |
|    |   | 13 |   |    |   |   |   |   | → Check the adjustment of throttle switch unit          |
| 9  | 7 | 14 | 8 | 10 | 8 |   |   |   | → Check the valve adjustment and compression            |
| 10 | 8 | 15 | 9 | 11 | 9 |   |   |   | → Retest vehicle with a new injection ECU               |
|    |   |    |   |    |   |   | 7 |   | → Retest with a new Lambda sensor                       |

## PIN OUT BOX TESTING - Voltage Checks

Check battery voltage first before proceeding to any pin out box voltage checks (for correct voltage drop readings)

Remove connector (25-pin) from injection ECU and connect it to the male end of the 25-pin pin out box connector

Battery fully charged

All tests are done by connecting the appropriate meter between the pin numbers as indicated in the pin no. column

| CHECK                                                                      | TESTER    | PIN NOS. | TEST CONDITION    | READINGS                                                                         | IF READINGS INCORRECT, CHECK:                                                    |
|----------------------------------------------------------------------------|-----------|----------|-------------------|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Injection ECU Power Supply                                                 | Voltmeter | 9 & Grnd | Energize starter  | > 9 Volts                                                                        | Electrical circuit continuity; Tachymetric relay and supply                      |
| Cranking Voltage                                                           | Voltmeter | 4 & Grnd | Energize starter  | > 9 Volts                                                                        | Electrical circuit continuity; Ignition switch; Starter motor                    |
| INSTALL TACHYMETRIC BYPASS HARNESS (P/N 0091.94) BETWEEN WIRES 20R AND 248 |           |          |                   |                                                                                  |                                                                                  |
| Ignition Signal & Grounds                                                  | Voltmeter | 1 & Grnd | Harness switch on | > 12 Volts                                                                       | Electrical circuit continuity; Primary circuit of coil (12V at terminal, key on) |
|                                                                            |           | 1 & 5    | Ignition on       |                                                                                  |                                                                                  |
|                                                                            |           | 1 & 13   |                   |                                                                                  |                                                                                  |
| Air Flow Sensor<br>Air Flow Input<br>Temperature Input                     | Voltmeter | 7 & 13   | Harness switch on | 1 - 2 Volts                                                                      | Electrical circuit continuity; Air flow sensor                                   |
|                                                                            |           | 8 & 13   |                   | 7 - 8 Volts                                                                      |                                                                                  |
| Altitude Sensor                                                            | Voltmeter | 11 & 13  | Harness switch on | 2-3 Volts at sea level (for altitude other than sea level see component section) | Electrical circuit continuity; Altitude sensor                                   |

**PIN OUT BOX TESTING - Ohmmeter Checks**

NOTE: Disconnect battery, remove tachymetric relay or bypass harness

| CHECK                | TESTER   | PIN NOS.              | TEST CONDITION                                                                               | READINGS                                                                                         | IF READINGS INCORRECT, CHECK:                                                       |
|----------------------|----------|-----------------------|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Grounds              | Ohmmeter | 5 & Grnd<br>13 & Grnd | Battery disconnected                                                                         | Resistance < 1 Ohm                                                                               | Electrical circuit continuity                                                       |
| Throttle Switch Unit | Ohmmeter | 2 & 9                 | Accelerator pedal at rest<br>Accelerator pedal all the way down                              | Resistance < 1 Ohm<br>Resistance = ∞                                                             | Electrical circuit continuity;<br>Throttle switch;<br>Adjustment of throttle switch |
|                      |          | 3 & 9                 | Accelerator pedal at rest<br>Accelerator pedal all the way down;<br>reconnect after checking | Resistance = ∞<br>Resistance < 1 Ohm                                                             |                                                                                     |
| Injectors            | Ohmmeter | 9 & 12                | Injectors are wired in parallel, each injector has 16 ohms resistance                        | Resistance = 3.5 - 5 Ohms                                                                        |                                                                                     |
| NTC Temp Sensor      | Ohmmeter | 10 & 13               | -10°C (14°F)<br>+20°C (68°F)<br>+80°C (176°F)                                                | Resistance = 8200 - 11,000 Ohms<br>Resistance = 2280 - 2720 Ohms<br>Resistance = 290 to 370 Ohms | Electrical circuit continuity; NTC Temperature Sensor                               |
| Air Flow Sensor      | Ohmmeter | 5 & 8                 | Disconnect: 30°C switch, tach. relay, auxiliary air device, altitude sensor                  | Resistance = 340 to 450 Ohms                                                                     | Electrical circuit continuity; Air flow sensor                                      |
|                      |          | 8 & 9                 | As above                                                                                     | Resistance = 160 to 300 Ohms                                                                     |                                                                                     |
|                      |          | 5 & 7                 | As above (vary the position of air plate using a screwdriver)<br>Note: air cleaner removed   | Resistance = 60 to 1300 Ohms                                                                     |                                                                                     |

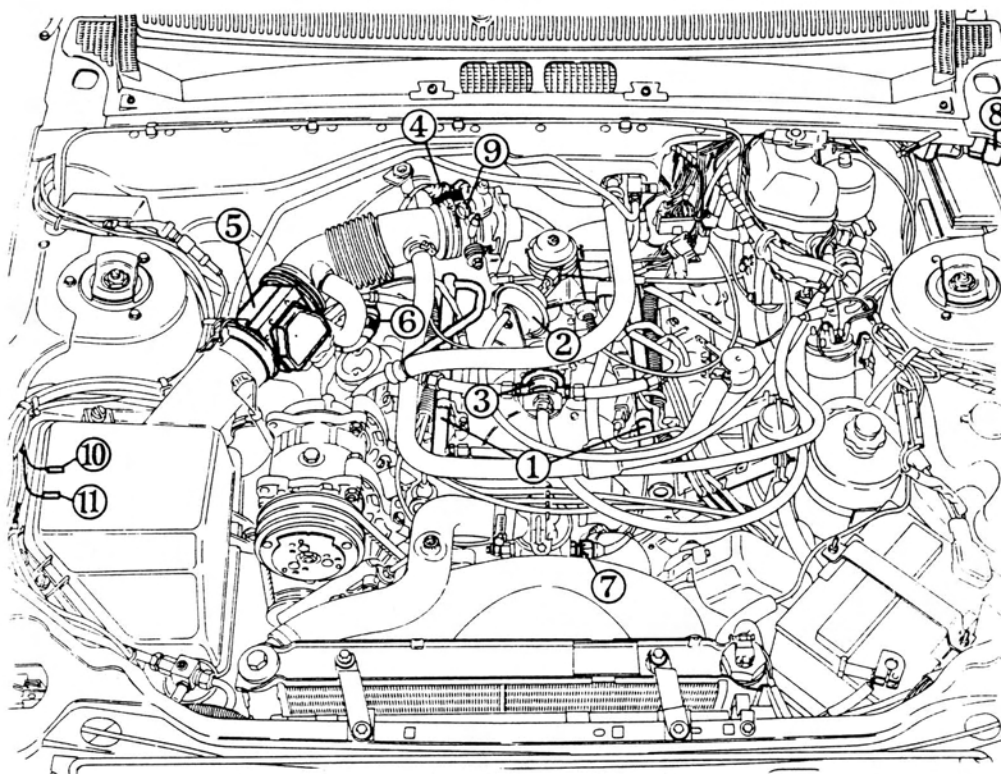
Connect:  
 - 30°C Switch  
 - Tachymetric Relay  
 - Auxiliary Air Device  
 - Altitude Sensor  
 - Battery

## NOTES

[illegible]

**LH TEST SECTION**

**ZN3J**



- |                                |                                   |
|--------------------------------|-----------------------------------|
| 1 Fuel rails                   | 7 Engine temperature sender (NTC) |
| 2 Cruise control (Servo)       | 8 Relay board                     |
| 3 Fuel pressure regulator      | 9 Idle speed screw                |
| 4 Throttle switch unit         | 10 Wire no. 12 idle preset        |
| 5 Hot wire air flow sensor     | 11 Wire no. 22 mixture            |
| 6 Auxiliary speed electrovalve |                                   |

## IGNITION LED

Location - Instrument cluster

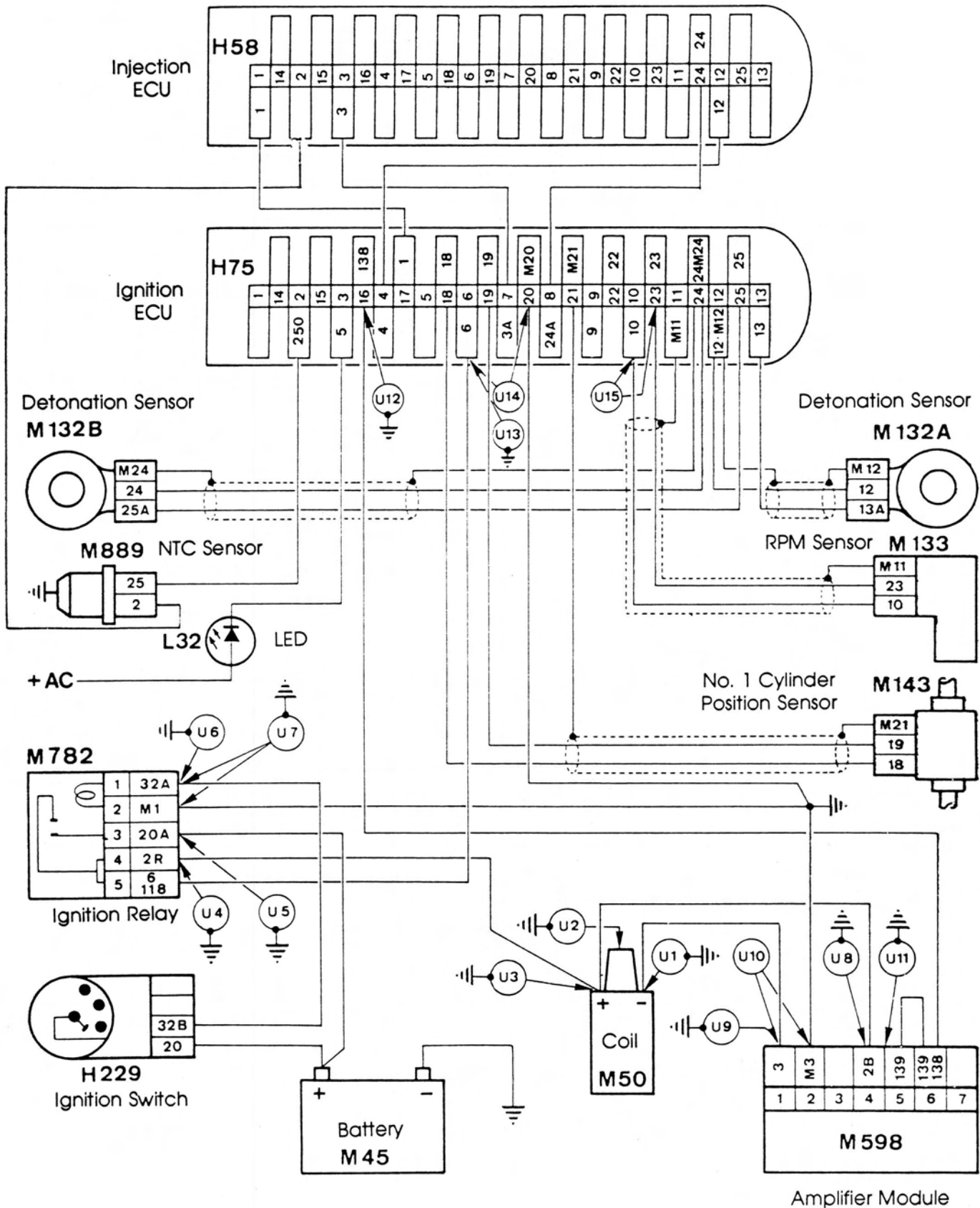
Warning Flash Codes:

|    |                                |                                                                 |
|----|--------------------------------|-----------------------------------------------------------------|
|    | Ignition on - LED light on     | Normal conditions                                               |
|    | Engine running - LED light off |                                                                 |
| X1 | Maximum retard 13°             | Overheating, fuel problem, ECU                                  |
| X2 | NTC sensor                     | Check sensor and wiring                                         |
| X4 | Knock sensor                   | Check both sensors and wiring                                   |
| X5 | Load problem                   | Check ignition ECU to injection ECU wiring; check injection ECU |
| X6 | #1 Cylinder HT sensor          | Check sensor and wiring                                         |

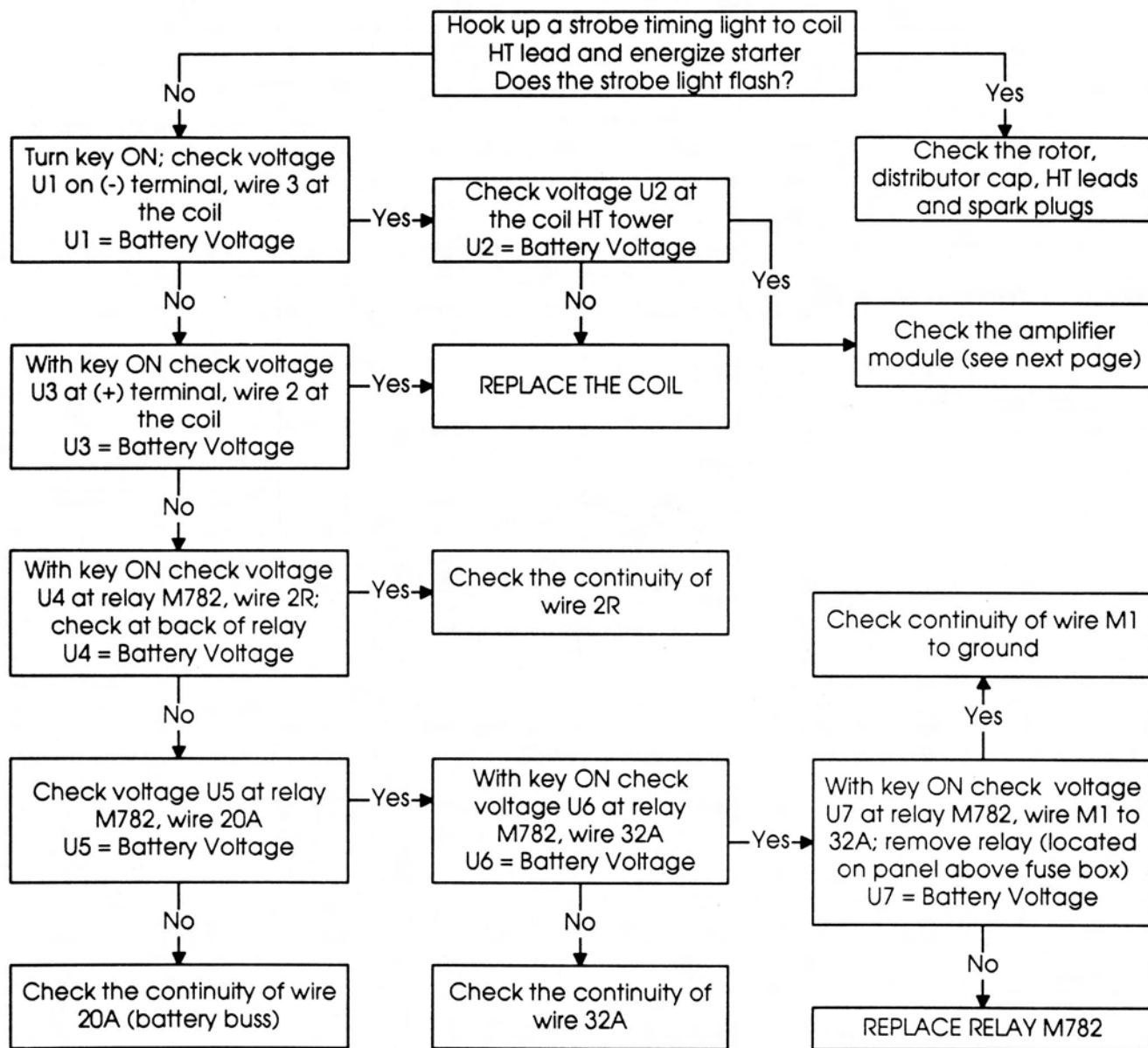
NOTE: There is **NO** 3-flash warning code



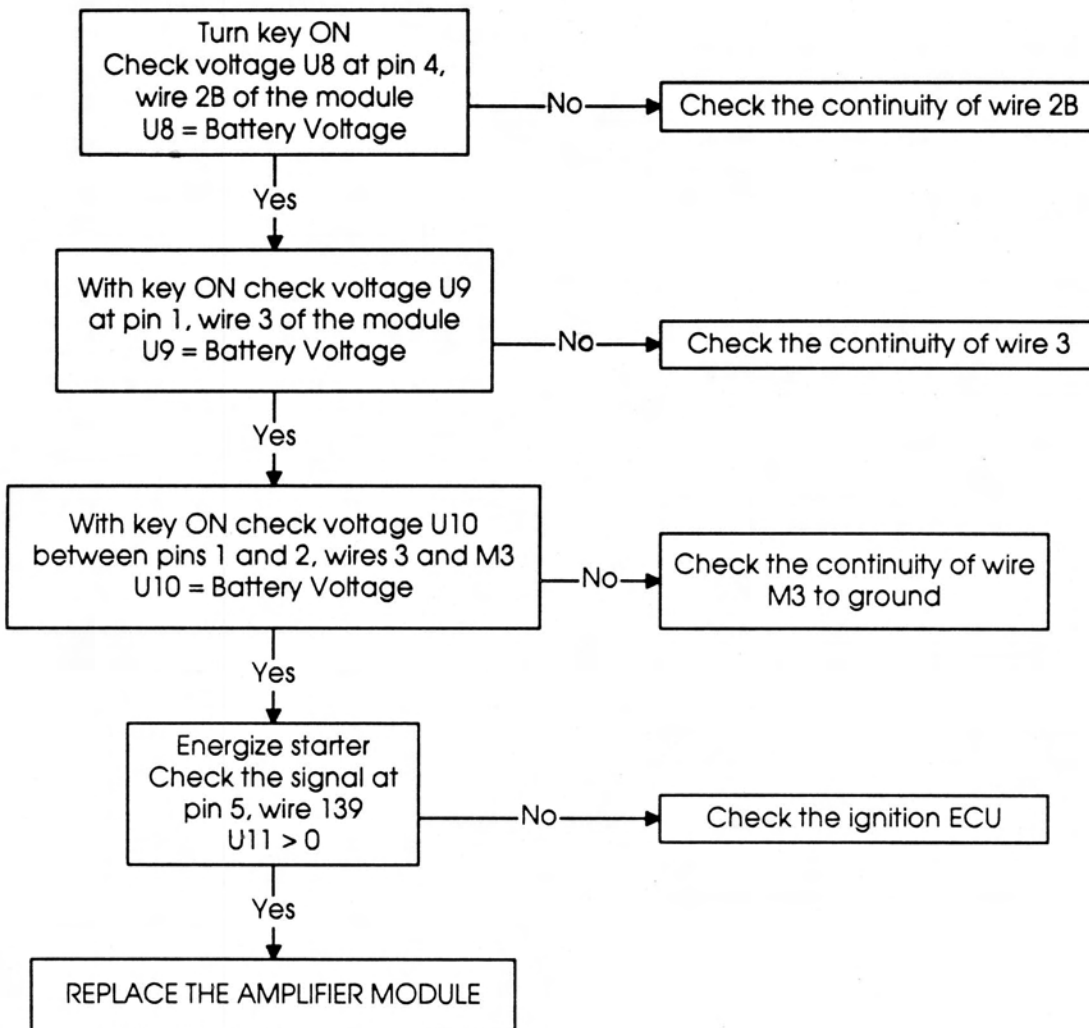
IGNITION SCHEMATIC



## IGNITION TROUBLESHOOTING



IGNITION TROUBLESHOOTING - Checking the Amplifier Module



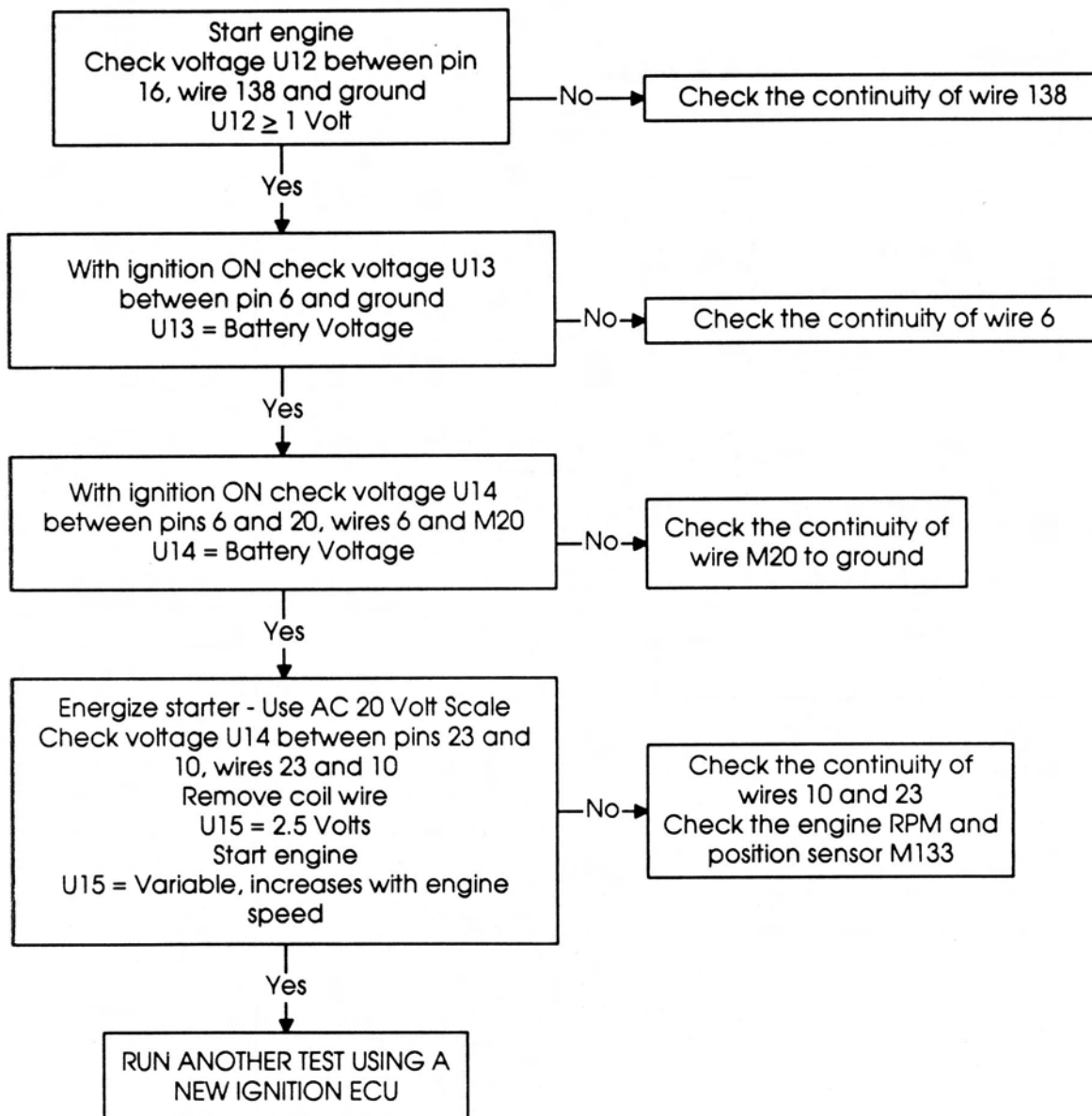
## IGNITION TROUBLESHOOTING - Dynamic Test

For these tests:

The female connector of the pin out box must be connected to the ignition ECU of the vehicle (ignition ECU behind right side footrest)

The male connector of the pin out box must be connected to the wiring harness of the vehicle

## CHECKING THE IGNITION ECU WITH THE PIN OUT BOX



## TROUBLESHOOTING

Prior to performing any troubleshooting on the LU2.2-JETRONIC Injection system, it is imperative that the conditions below be met.

### Starting circuit

- Battery adequately charged
- Starter drives engine normally

### Ignition

- Ensure that there is spark
- Spark timing is properly set
- Spark plugs are in good condition and the gap is correctly set

### Air filter

- Air filter element is in good condition

## DEFECT NOTED

For each defect, proceed by elimination: 1, 2, 3 etc... from top to bottom

The engine does not start or is hard to start (cold or hot engine)

The engine starts then stalls

Erratic idle

Misfiring in all load ranges

Lack of power

Excessive fuel consumption

CO concentration is too low

CO concentration is too high

Impossible to adjust idle speed (rpm too high)

## CHECKS TO BE PERFORMED

|    |   |    |   |    |   |   |   |   |                                                             |
|----|---|----|---|----|---|---|---|---|-------------------------------------------------------------|
|    |   |    | 1 |    |   |   |   |   | → Check the charging circuit                                |
| 1  | 1 | 3  |   | 2  |   | 2 | 2 |   | → Visually check all air and fuel hoses and connections     |
| 2  | 2 |    |   | 3  | 1 |   |   |   | → Check the supply voltage of fuel pumps                    |
| 5  | 3 | 5  | 3 | 4  | 2 | 1 | 1 |   | → Check the fuel pressure                                   |
|    |   |    | 4 | 5  |   |   |   |   | → Check the fuel flow (output volume)                       |
|    |   | 1  |   |    | 6 |   |   |   | → Check the mixture and idle speed adjustment               |
| 3  | 4 | 4  |   |    |   |   |   | 1 | → Check the idle regulation electrovalve                    |
| 4  |   | 7  | 5 |    | 5 | 3 | 3 |   | → Check the temperature sensor (NTC)                        |
| 6  |   | 8  | 6 | 6  | 4 | 6 | 4 |   | → Check the air flow sensor                                 |
|    |   | 6  | 7 | 7  | 3 |   | 5 |   | → Check the injectors                                       |
|    |   | 2  |   | 1  |   |   |   | 2 | → Check the accelerator control adjustment                  |
| 8  | 5 | 9  |   | 8  |   | 5 |   |   | → Check the air induction system under pressure             |
| 7  | 6 | 11 | 2 | 9  | 7 | 7 | 6 |   | → Check the Injection ECU multipin connector                |
|    |   | 10 |   |    |   |   |   |   | → Check that the throttle flap housing is clean             |
|    |   | 12 |   |    |   |   |   | 3 | → Check the initial opening throttle flap angle             |
|    |   | 13 |   |    |   |   |   |   | → Check the microswitch adjustment on throttle flap housing |
| 9  | 7 | 14 | 8 | 10 | 8 |   |   |   | → Check the valve clearance adjustment and compression      |
| 10 | 8 | 15 | 9 | 11 | 9 |   |   |   | → Retest vehicle with a new Injection ECU                   |
|    |   |    |   |    |   | 8 | 7 |   | → Defective Lambda sensor                                   |

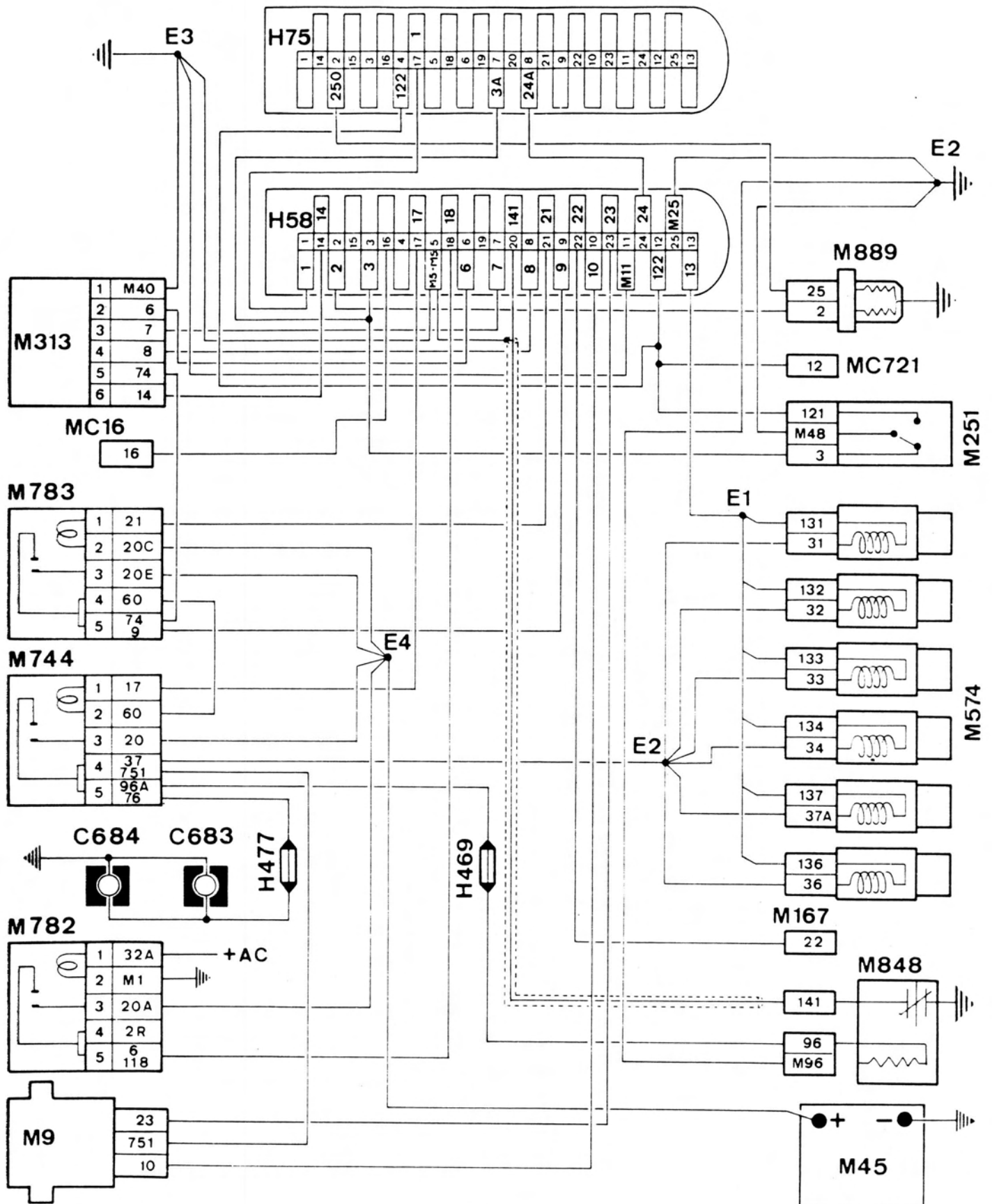
## LEGEND - 1987-88 Model Year

|                                                                        |       |
|------------------------------------------------------------------------|-------|
| Idle Regulation Electrovalve (Idle Actuator)                           | M9    |
| Battery                                                                | M45   |
| Integrator Voltage Signal for adjusting richness at idle (wire no. 22) | M167  |
| Throttle Switch Unit                                                   | M251  |
| Air Flow Sensor                                                        | M313  |
| Injectors                                                              | M574  |
| Fuel Pump Relay                                                        | M744  |
| Ignition Relay                                                         | M782  |
| Main Relay                                                             | M783  |
| Lambda Sensor                                                          | M848  |
| Engine NTC Temperature Sensor                                          | M889  |
| A/C (Load Input for Idle Compensation through ECU)                     | MC16  |
| Test Lead (wire no. 12) for Idle Preset Adjustment                     | MC721 |
| Injection ECU                                                          | H58   |
| Ignition ECU                                                           | H75   |
| Fuel Pump Fuse (15A)                                                   | H477  |
| Lambda Sensor Heater Fuse (15A)                                        | H469  |
| Main Fuel Pump                                                         | C683  |
| Primer Fuel Pump                                                       | C684  |

## IDENTIFICATION OF LETTERS M - P - H - C - L:

The vehicle is divided into four compartments by letters placed before the component number reference, according to the geographic location of said component

M = Engine  
 P = Dashboard  
 H = Passenger Compartment  
 C = Trunk  
 L = Lamp



## LEGEND - 1989 Model Year

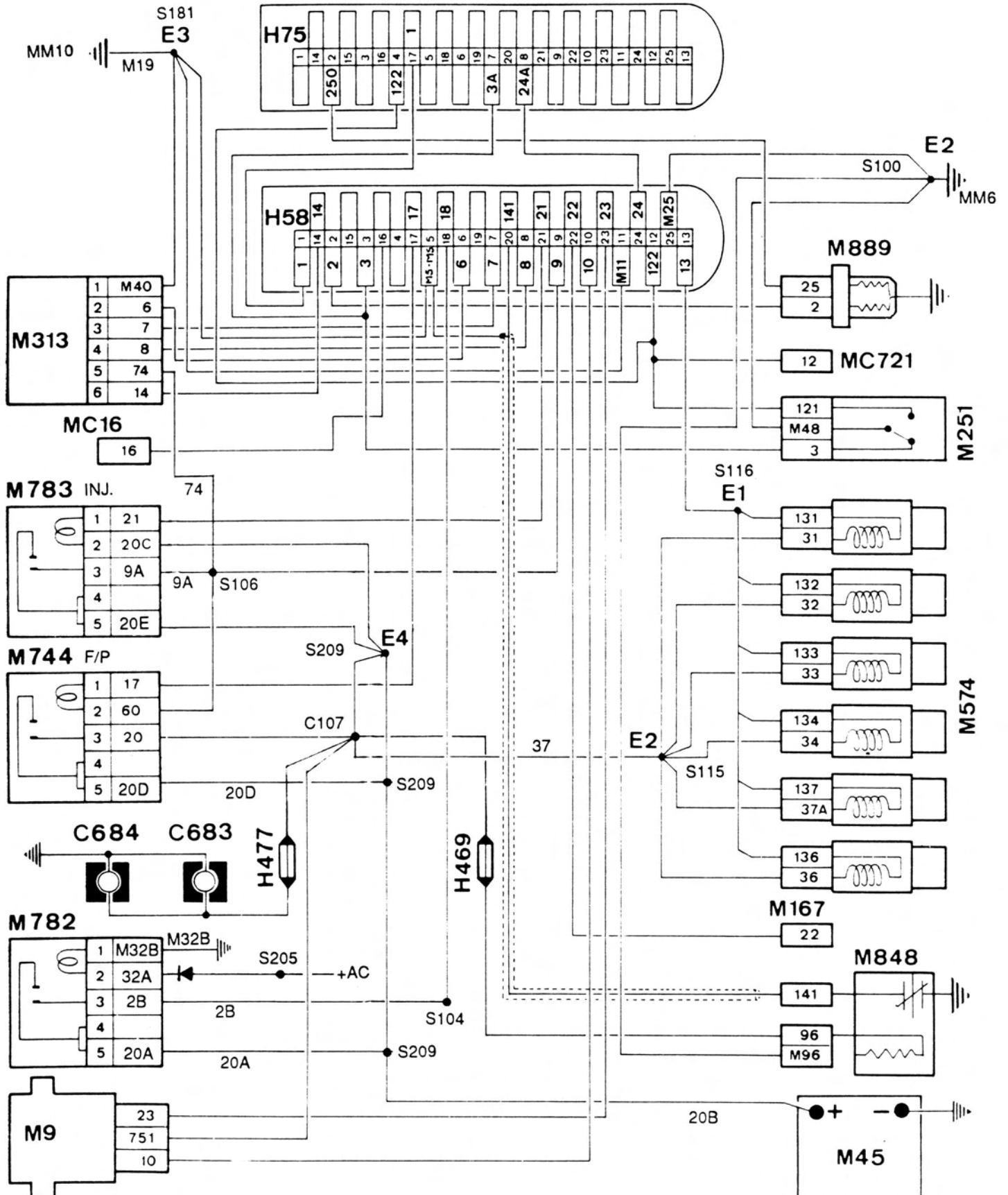
|                                                                        |       |
|------------------------------------------------------------------------|-------|
| Idle Regulation Electrovalve (Idle Actuator)                           | M9    |
| Battery                                                                | M45   |
| Integrator Voltage Signal for adjusting richness at idle (wire no. 22) | M167  |
| Throttle Switch Unit                                                   | M251  |
| Air Flow Sensor                                                        | M313  |
| Injectors                                                              | M574  |
| Fuel Pump Relay                                                        | M744  |
| Ignition Relay                                                         | M782  |
| Main Relay                                                             | M783  |
| Lambda Sensor                                                          | M848  |
| Engine NTC Temperature Sensor                                          | M889  |
| A/C (Load Input for Idle Compensation through ECU)                     | MC16  |
| Test Lead (wire no. 12) for Idle Preset Adjustment                     | MC721 |
| Injection ECU                                                          | H58   |
| Ignition ECU                                                           | H75   |
| Fuel Pump Fuse (15A)                                                   | H477  |
| Lambda Sensor Heater Fuse (15A)                                        | H469  |
| Main Fuel Pump                                                         | C683  |
| Primer Fuel Pump                                                       | C684  |

## IDENTIFICATION OF LETTERS M - P - H - C - L:

The vehicle is divided into four compartments by letters placed before the component number reference, according to the geographic location of said component

M = Engine  
 P = Dashboard  
 H = Passenger Compartment  
 C = Trunk  
 L = Lamp





## PIN OUT BOX TESTING - Voltage Checks

Check battery voltage first before proceeding to any pin out box voltage checks (for correct voltage drop readings)

The checking of these different pins must be made with the connector removed from the injection ECU and connected to the male end of the pin out box (25-pin harness)

Preliminary conditions: voltage checks, battery charged

## CHECKING THE INJECTION ECU CONNECTOR PINS

| CHECK                                     | TESTER    | PIN NOS.                              | TEST CONDITION                                                                                                        | READINGS     | IF READINGS INCORRECT, CHECK:                                                                     |
|-------------------------------------------|-----------|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------|---------------------------------------------------------------------------------------------------|
| Injection ECU Power Supply and Grounds    | Voltmeter | 9 & 11<br>9 & 5<br>9 & 25<br>9 & Grnd | Jump pin 21 to pin 25 (ground), completing main relay circuit<br><br>M783, M782, M744 located on panel above fuse box | U > 12 Volts | Electrical circuit continuity<br>Relay M783 (Injection relay)<br>Identify by wire nos. 20E and 60 |
| Ignition Signal                           | Voltmeter | 1 & 11                                | Remove jumper; Energize starter                                                                                       | U > 5 Volts  | Electrical circuit continuity<br>Ignition ECU H75                                                 |
| Trigger Circuit of Relay M744 (Fuel Pump) | Voltmeter | 17 & 11                               | Jump pin 21 to pin 25 (ground), completing main relay circuit<br><br>Remove jumper                                    | U > 12 Volts | Electrical circuit continuity<br>Relay M744 (fuel pump)<br>Identify by wire nos. 76 and 751       |
| Power Supply to Injection ECU             | Voltmeter | 18 & 11                               | Ignition on                                                                                                           | U > 12 Volts | Electrical circuit continuity<br>Relay M782 (ign. ECU)<br>Identify by wire nos. 2R and 118        |
| Trigger Circuit of Relay M783 (Injection) | Voltmeter | 21 & 11                               | Ignition on                                                                                                           | U > 12 Volts | Electrical circuit continuity<br>Relay M783 (inj.)<br>Identify by wire nos. 20E and 60            |

## PIN OUT BOX TESTING - Ohmmeter Checks

NOTE: Disconnect battery

| CHECK                             | TESTER   | PIN NOS.                                                                   | TEST CONDITION                                                                                                                                      | READINGS                                                                                      | IF READINGS INCORRECT, CHECK:                                                          |
|-----------------------------------|----------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| NTC Temp Sensor (M889)            | Ohmmeter | 2 & 11                                                                     | -10°C (14°F)<br>+20°C (68°F)<br>+80°C (176°F)                                                                                                       | Resistance = 8100-10770 Ohms<br>Resistance = 2280 - 2720 Ohms<br>Resistance = 292 to 362 Ohms | NTC Temp Sensor (M889)                                                                 |
| Throttle Switch Unit (M251)       | Ohmmeter | 3 & 25                                                                     | Disconnect ignition ECU, Accelerator pedal at rest                                                                                                  | Resistance < 1 Ohm                                                                            | Electrical circuit continuity; Throttle switch unit (M251); Throttle switch adjustment |
|                                   |          | 12 & 25                                                                    | Accelerator pedal all the way down<br>Accelerator pedal at rest<br>Accelerator pedal all the way down<br>After checking, reconnect the ignition ECU | Resistance = ∞<br>Resistance = ∞<br>Resistance < 1 Ohm                                        |                                                                                        |
| Idle Regulation Electrovalve (M9) | Ohmmeter | MY87-88, 23 & wire 751/fuel pump relay; MY89, 23 & wire 20/fuel pump relay | Disconnect fuel pump relay (M744) located above fuse box; identify by wire nos. 751 and 37 spliced at pin 4; connect jumper to wire 751             | Resistance = 19 to 25 Ohms                                                                    | Electrical circuit continuity; Idle regulation electrovalve (M9)                       |
|                                   |          | MY87-88, 10 & wire 751/fuel pump relay; MY89, 10 & wire 20/fuel pump relay | As above                                                                                                                                            | Resistance = 17 to 22.5 Ohms                                                                  |                                                                                        |
| Injectors (M574)                  | Ohmmeter | 13 & Wire 37                                                               | Wire 37 is spliced to 751 as above<br>After test reconnect relay (M744)                                                                             | Resistance = 2.5 to 3 Ohms                                                                    | Electrical circuit continuity; Injectors (M574)                                        |
| Grounds                           | Ohmmeter | 5 & Grnd<br>11 & Grnd<br>25 & Grnd                                         | After test reconnect battery                                                                                                                        | Resistance < 1 Ohm                                                                            | Electrical circuit continuity                                                          |

## LH ELECTRICAL CHECKS

NOTE: Battery connected, ignition ECU connected

For these tests:

The female connector of the pin out box harness must be connected to the injection ECU of the vehicle

The male connector of the pin out box remains connected to the wiring harness of the vehicle

## DYNAMIC TESTING - VOLTAGE CHECKS

| CHECK                                                | TESTER    | PIN NOS. | TEST CONDITION                                                                                                                                                   | READINGS                                                  | IF READINGS INCORRECT, CHECK:                       |
|------------------------------------------------------|-----------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------|
| Air Flow Sensor Output Signal                        | Voltmeter | 6 & 7    | Engine running                                                                                                                                                   | U = 2 to 5 Volts                                          | Electrical circuit continuity; Air flow sensor M313 |
| Air Flow Sensor (self-cleaning) Wire heats to 1000°C | Voltmeter | 8 & 11   | 5 seconds after stopping the engine, provided that the engine temp has reached >65°C (149°F) and the engine RPM has reached >1500 (can also be checked visually) | Voltage increases with RPM; U = 2 to 5 Volts for 1 second | Electrical circuit continuity; Air flow sensor      |

## NOTES

[illegible]

## NOTES

[illegible]

# **MOTRONIC TEST SECTION**

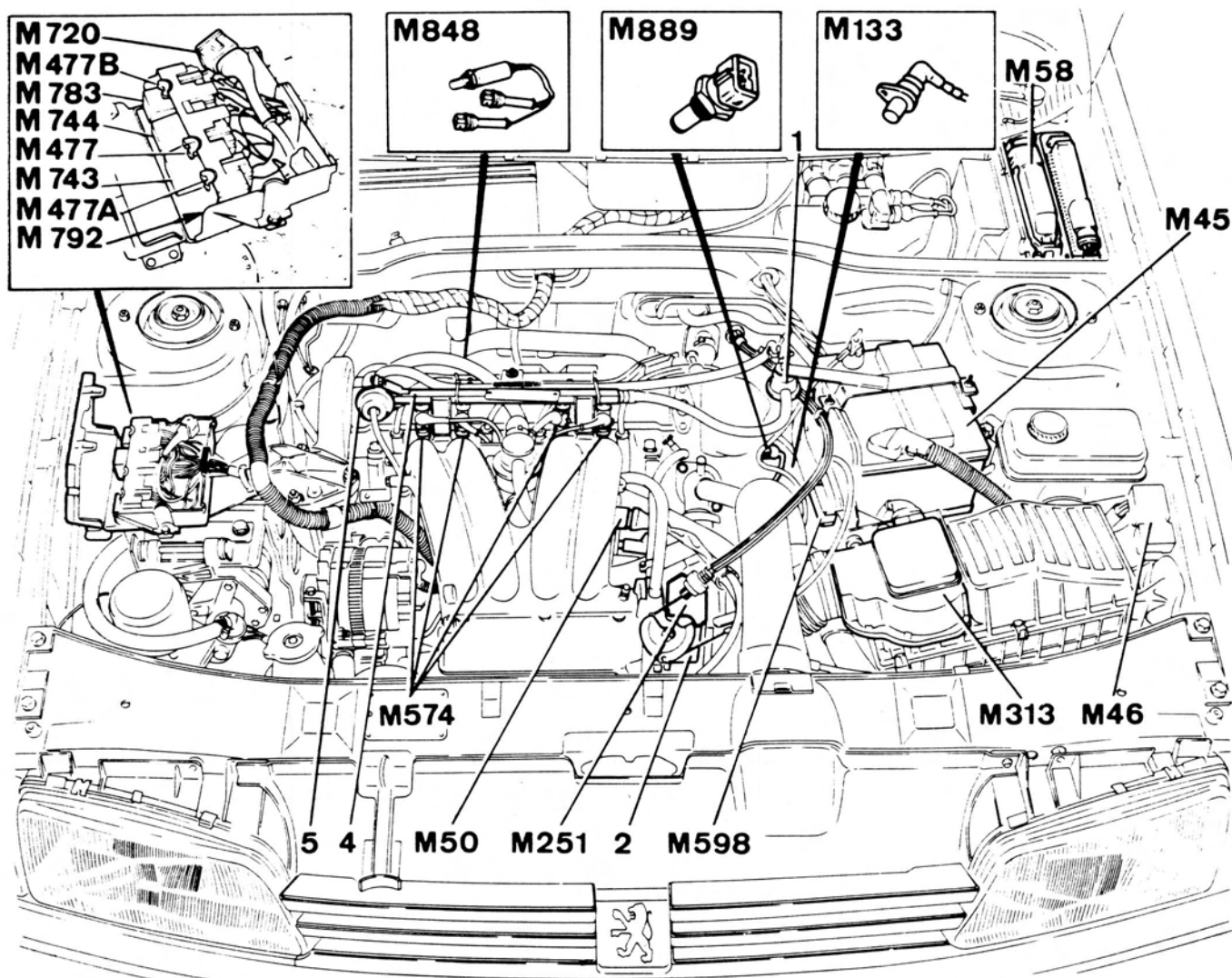
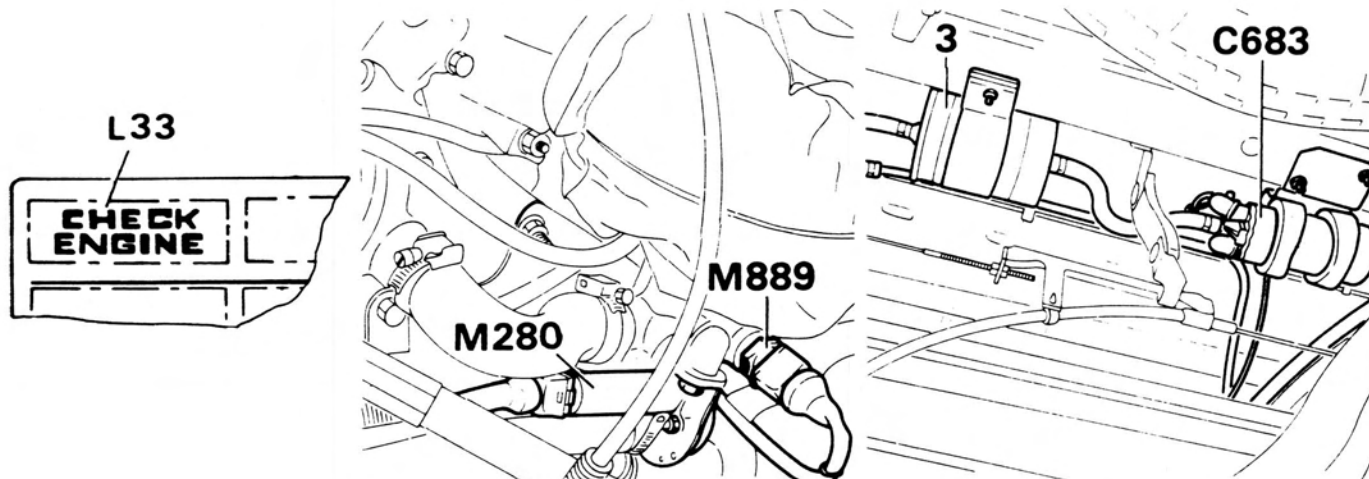
**XU9J2 - XU9J4**

## LEGEND - XU9J2

| REFERENCE | DESCRIPTION                                 | MANUFACTURER'S<br>REFERENCE |
|-----------|---------------------------------------------|-----------------------------|
| L33       | Check Engine Indicator                      |                             |
| M45       | Battery                                     |                             |
| M46       | Battery Power Connector (junction block)    |                             |
| M50       | Ignition Coil                               | Ducellier 256 009 A         |
| M58       | Motronic ECU - 49 States                    | Bosch 0261 200 159          |
|           | Motronic ECU - California                   | Bosch 0261 200 177          |
| M280      | Auxiliary Air Device                        | Bosch 0280 140 183          |
| M133      | Engine RPM Sensor                           | Bosch 0261 210 043          |
| M215      | Neutral Safety Switch (auto trans vehicles) |                             |
| M251      | Throttle Switch Unit (idle-full load)       | Bosch 0280 120 327          |
| M295      | Air Conditioning Compressor                 |                             |
| M300      | Starter Motor                               |                             |
| M313      | Air Flow Sensor                             | Bosch 0280 202 202          |
| M346      | Canister Purge Electrovalve                 | Bosch 0280 142 157          |
| M477      | Fuel Pump Fuse (10A)                        |                             |
| M477A     | ECU Fuse (10A)                              |                             |
| M477B     | Lambda Sensor Heater Fuse (10A)             |                             |
| M574      | Injectors                                   | Bosch 0280 150 762          |
| M598      | Ignition Amplifier Module                   | Bosch 0227 100 123          |
| C683      | Main Fuel Pump                              | Bosch 0580 464 038          |
| M720      | Diagnostic Plug                             |                             |
| M743      | Compressor Cut-out Relay                    | Cartier 03501               |
| M744      | Fuel Pump Relay                             | Cartier 03601               |
| M783      | Main Relay                                  | Cartier 02009               |
| M792      | Starter Relay (auto trans vehicles)         | Cartier 03501               |
| M848      | Lambda Sensor                               | Bosch 0258 003 074          |
| M889      | Engine Temperature Sensor (NTC)             | Bosch 0280 130 026          |
| 1         | Pulsation Damper                            | Bosch 0280 161 030          |
| 2         | Throttle Body                               |                             |
| 3         | Fuel Filter                                 | Bosch 0450 905 095          |
| 4         | Injector Supply Ramp (distribution pipe)    |                             |
| 5         | Fuel Pressure Regulator                     | Bosch 0280 160 258          |

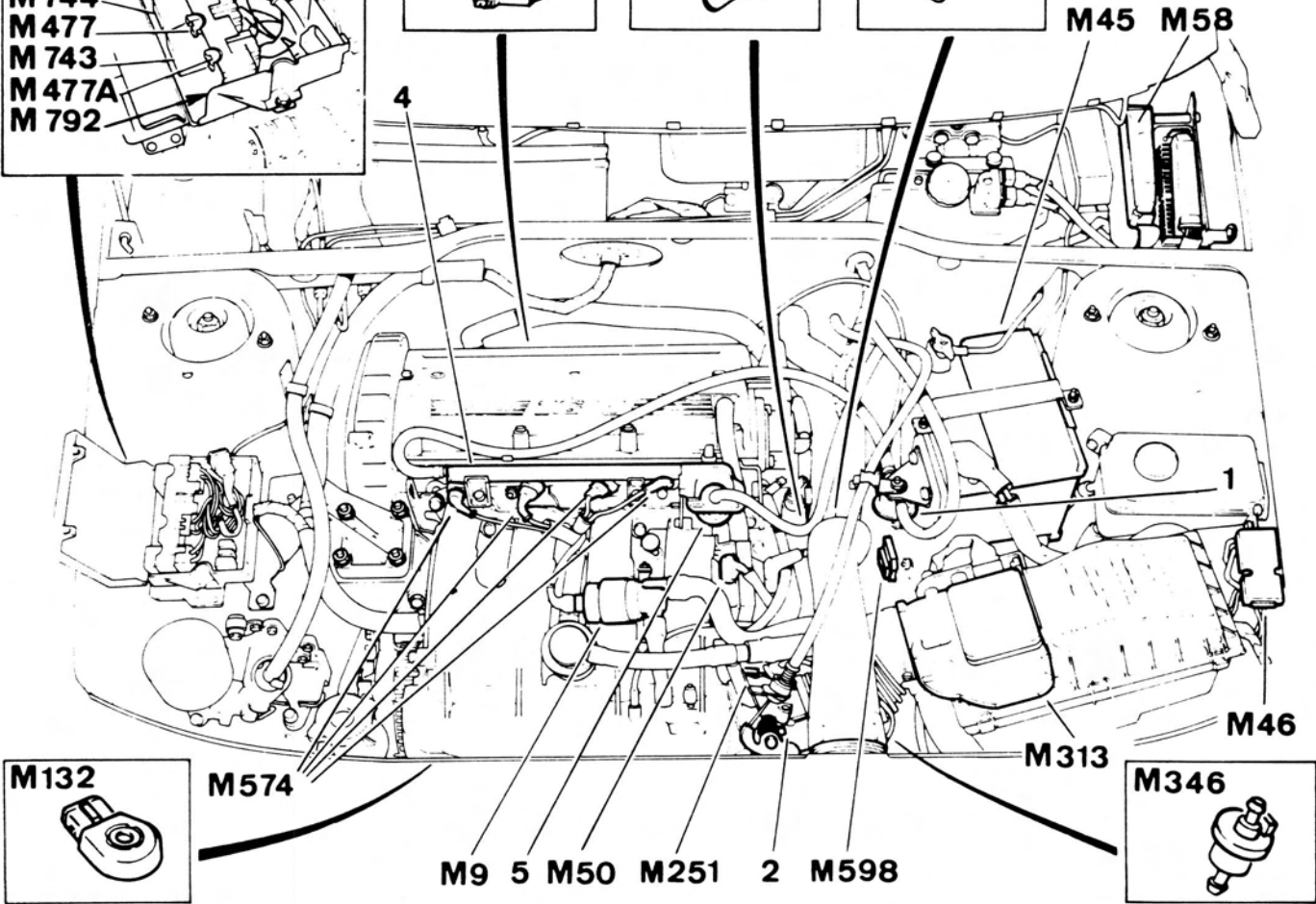
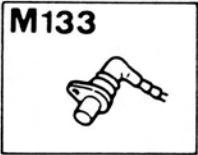
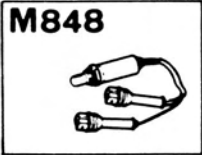
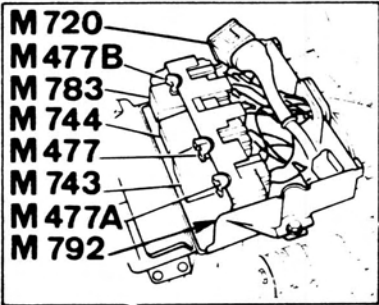
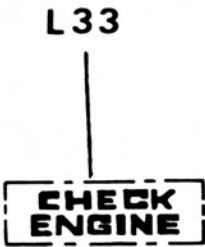
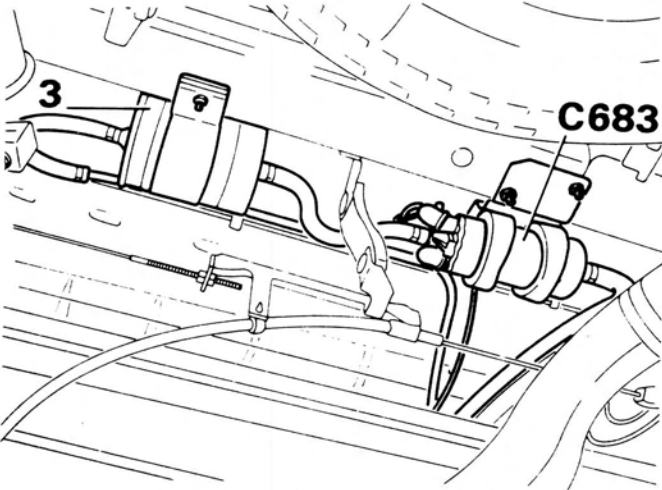
NOTE: Model year 1991 and 1992 J2 systems have an idle electrovalve instead of the auxiliary air device and a/c idle compensator; model year 1992 J2 systems have a PCV system heater installed in the hose





## LEGEND - XU9J4

| REFERENCE | DESCRIPTION                                 | MANUFACTURER'S<br>REFERENCE |
|-----------|---------------------------------------------|-----------------------------|
| M9        | Idle Regulation Electrovalve                | Bosch 0280 140 516          |
| L33       | Check Engine Indicator                      |                             |
| M45       | Battery                                     |                             |
| M46       | Battery Power Connector (junction block)    |                             |
| M50       | Ignition Coil                               | Ducellier 256 009 A         |
| M58       | Motronic ECU - 49 States                    | Bosch 0261 200 161          |
|           | Motronic ECU - California                   | Bosch 0261 200 176          |
| M132      | Detonation Sensor                           | Bosch 0261 231 006          |
| M133      | Engine RPM Sensor                           | Bosch 0261 210 043          |
| M215      | Neutral Safety Switch (auto trans vehicles) |                             |
| M251      | Throttle Switch Unit (idle-full load)       | Bosch 0280 120 327          |
| M295      | Air Conditioning Compressor                 |                             |
| M300      | Starter Motor                               |                             |
| M313      | Air Flow Sensor                             | Bosch 0280 202 202          |
| M346      | Canister Purge Electrovalve                 | Bosch 0280 142 157          |
| M477      | Fuel Pump Fuse (10A)                        |                             |
| M477A     | ECU Fuse (10A)                              |                             |
| M477B     | Lambda Sensor Heater Fuse (10A)             |                             |
| M574      | Injectors                                   | Bosch 0280 150 762          |
| M598      | Ignition Amplifier Module                   | Bosch 0227 100 123          |
| C683      | Main Fuel Pump                              | Bosch 0580 464 038          |
| M720      | Diagnostic Plug                             |                             |
| M743      | Compressor Cut-out Relay                    | Cartier 03501               |
| M744      | Fuel Pump Relay                             | Cartier 03601               |
| M783      | Main Relay                                  | Cartier 02009               |
| M792      | Starter Relay (auto trans vehicles)         | Cartier 03501               |
| M848      | Lambda Sensor                               | Bosch 0258 003 074          |
| M889      | Engine Temperature Sensor (NTC)             | Bosch 0280 130 026          |
| 1         | Pulsation Damper                            | Bosch 0280 161 030          |
| 2         | Throttle Body                               |                             |
| 3         | Fuel Filter                                 | Bosch 0450 905 095          |
| 4         | Injector Supply Ramp (distribution pipe)    |                             |
| 5         | Fuel Pressure Regulator                     | Bosch 0280 160 258          |



## SELF TEST OF THE MOTRONIC SYSTEM - XU9J2

The different malfunctions, which can be detected during the SELF TEST (start mode) or during normal operation, are identified by coded signals during the TEST sequence

## IDENTIFICATION OF THE CODED SIGNALS

\* Major fault (causes CHECK ENGINE indicator to come on)

WHEN ENCOUNTERING MULTIPLE CODES, THE FIRST CODE TO APPEAR ON THE T.A.D. 99 TESTER IS MOST LIKELY TO BE THE CAUSE OF THE CONDITION

| DEFECT CODE      |                 |                 | MALFUNCTION                                  | CHECKS                                                                                                                                  |
|------------------|-----------------|-----------------|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Up to VIN 515000 | From VIN 515001 | From VIN 517001 |                                              |                                                                                                                                         |
| 11               | 11              | 11              | End of Test sequence                         | Check the defective component and its electrical circuit (see ECU connector terminal checks)                                            |
| 12               | 12              | 12              | Beginning of Test sequence                   |                                                                                                                                         |
| 13               | 13              | 13              | Air Temperature Sensor                       |                                                                                                                                         |
| 14*              | 14*             | 14*             | Injection NTC Sensor                         |                                                                                                                                         |
| 21*              | 21*             | 21*             | Throttle Switch (idle position)              |                                                                                                                                         |
|                  |                 | 22*             | Idle Regulation Electrovalve                 |                                                                                                                                         |
| 33*              | 33*             | 33*             | Air Flow Sensor                              |                                                                                                                                         |
| 34*              | 34*             | 34*             | Canister Purge Electrovalve                  |                                                                                                                                         |
| 35               | 35              | 35              | Throttle Switch Unit (full load)             |                                                                                                                                         |
|                  | 41              | 41              | Engine RPM Sensor                            |                                                                                                                                         |
| 42*              | 42*             | 42*             | Injectors                                    | Fuel pump controls                                                                                                                      |
| 15*              | 15*             | 15*             | Fuel Pump(s) Relay                           |                                                                                                                                         |
| 31               | 31              | 31              | Self-correction richness regulation function | Air leak at intake; Exhaust leak; Check lambda sensor electrical circuit; Try again with a new lambda sensor; Try again with a test ECU |
| 32               | 32              | 32              |                                              |                                                                                                                                         |
| 51*              | 51*             | 51*             |                                              |                                                                                                                                         |
| 52*              | 52*             | 52*             |                                              |                                                                                                                                         |
| 53               | 53              | 53              | Battery voltage                              | Charging system                                                                                                                         |
| 54*              | 54*             | 54*             | ECU                                          | Try again with a test ECU                                                                                                               |

Defect codes that are detected by the ECU autodiagnostic system cannot accurately locate the exact origin of the defect; the code indicates that a function or circuit of the Motronic system is defective - the failure can be at the component, its connection wiring, or in the computer

# SELF TEST OF THE MOTRONIC SYSTEM - XU9J4

The different malfunctions, which can be detected during the SELF TEST (start mode) or during normal operation, are identified by coded signals during the TEST sequence

## IDENTIFICATION OF THE CODED SIGNALS

\* Major fault (causes CHECK ENGINE indicator to come on)

WHEN ENCOUNTERING MULTIPLE CODES, THE FIRST CODE TO APPEAR ON THE T.A.D. 99 TESTER IS MOST LIKELY TO BE THE CAUSE OF THE CONDITION

| DEFECT CODE     |                 | MALFUNCTION                                  | CHECKS                                                                                                                                  |
|-----------------|-----------------|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| From VIN 500001 | From VIN 515001 |                                              |                                                                                                                                         |
| 11              | 11              | End of Test sequence                         | Check the defective component and its electrical circuit (see ECU connector terminal checks)                                            |
| 12              | 12              | Beginning of Test sequence                   |                                                                                                                                         |
| 13              | 13              | Air Temperature Sensor                       |                                                                                                                                         |
| 14*             | 14*             | Injection NTC Sensor                         |                                                                                                                                         |
| 21*             | 21*             | Throttle Switch (idle position)              |                                                                                                                                         |
| 22*             | 22*             | Idle Regulation Electrovalve                 |                                                                                                                                         |
| 33*             | 33*             | Air Flow Sensor                              |                                                                                                                                         |
| 34*             | 34*             | Canister Purge Electrovalve                  |                                                                                                                                         |
| 35              | 35              | Throttle Switch Unit (full load)             |                                                                                                                                         |
|                 | 41              | Engine RPM Sensor                            |                                                                                                                                         |
| 42*             | 42*             | Injectors                                    | Fuel pump controls                                                                                                                      |
| 15*             | 15*             | Fuel Pump(s) Relay                           |                                                                                                                                         |
| 43*             | 43*             | Detonation Correction Regulation (at max)    | Detonation sensor; Operation of engine (temp, spark plugs, etc.)                                                                        |
| 44*             | 44*             | Detonation Sensor                            | Detonation sensor                                                                                                                       |
| 31              | 31              | Self-correction richness regulation function | Air leak at intake; Exhaust leak; Check lambda sensor electrical circuit; Try again with a new lambda sensor; Try again with a test ECU |
| 32              | 32              |                                              |                                                                                                                                         |
| 51*             | 51*             |                                              |                                                                                                                                         |
| 52*             | 52*             |                                              |                                                                                                                                         |
| 53              | 53              | Battery voltage                              | Charging system                                                                                                                         |
| 54*             | 54*             | ECU                                          | Try again with a test ECU                                                                                                               |

Defect codes that are detected by the ECU autodiagnostic system cannot accurately locate the exact origin of the defect; the code indicates that a function or circuit of the Motronic system is defective - the failure can be at the component, its connection wiring, or in the computer

## ALTERNATE TEST PROCEDURE WITHOUT TAD 99 TESTER

Hook Up

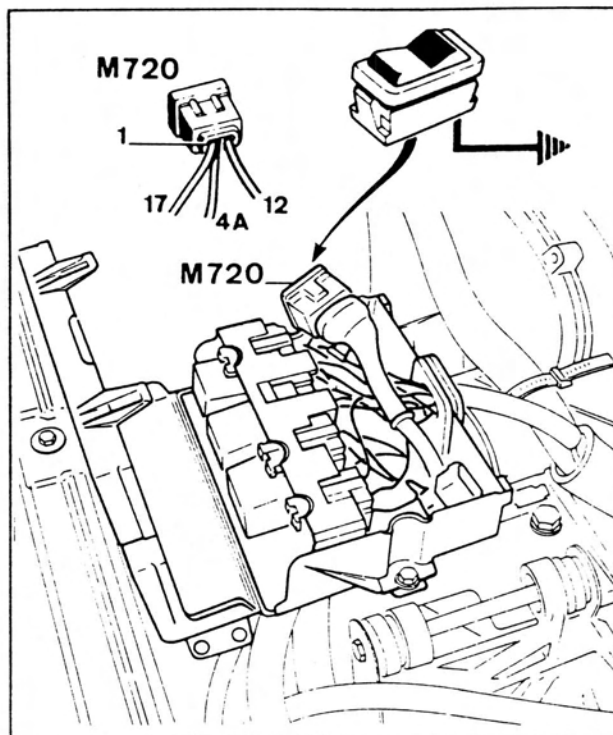
Connect a switched jumper to pin (1) of connector M720 (wires 4A, 17) (2-pin green connector); the other side of the switch should be connected to a good ground

Reading

The different defect codes will be identified by the flashing of the CHECK ENGINE indicator L33 on the instrument cluster

First set of flashes (blinks) = the tens

Second set of flashes (blinks) = the units

Test Procedure

Turn key "ON"

Depress switch for 3 seconds (indicator "ON")

When the switch is released:

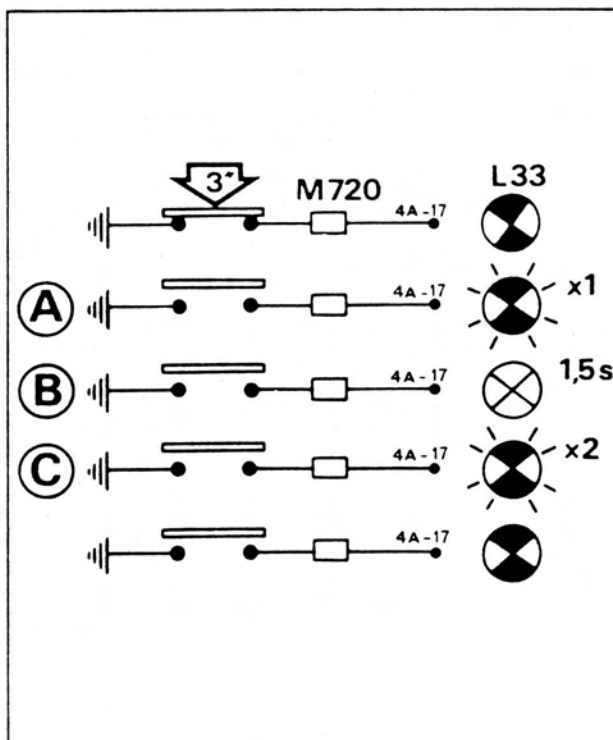
The CHECK ENGINE indicator will blink once: 1\_ (tens)

The CHECK ENGINE indicator will remain "OFF" for 1.5 seconds

The CHECK ENGINE indicator will blink twice: \_2 (units)

Thus, 12 is the code displayed, 12 = Beginning of Test

Await the illumination of the CHECK ENGINE indicator





### Test Procedure (cont.)

Depress switch for 3 seconds  
(indicator "ON")

When the switch is released:

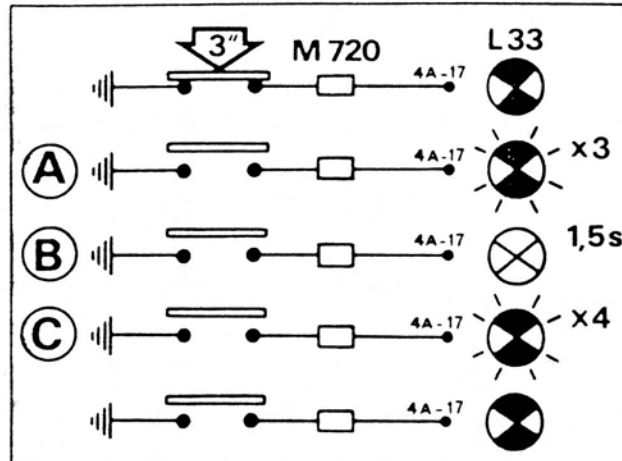
Indicator blinks 3 times  
example: 3\_ (tens)

Indicator "OFF" for 1.5 seconds

Indicator blinks 4 times  
example: \_4 (units)

34 = Defect No. 34 (see chart  
Identification of Coded Defects)

Await the illumination of the  
CHECK ENGINE indicator



Proceed to a new test as before

If several defects are detected, they  
will be displayed after each test

The 11 code indicates that all the  
detected defects have been  
reported

11 = End of Test

After code 11, it is possible to run a  
new TEST (See Test Procedure)

For the definition of all the defect  
codes and the repairs to correct  
them, refer to the corresponding  
section

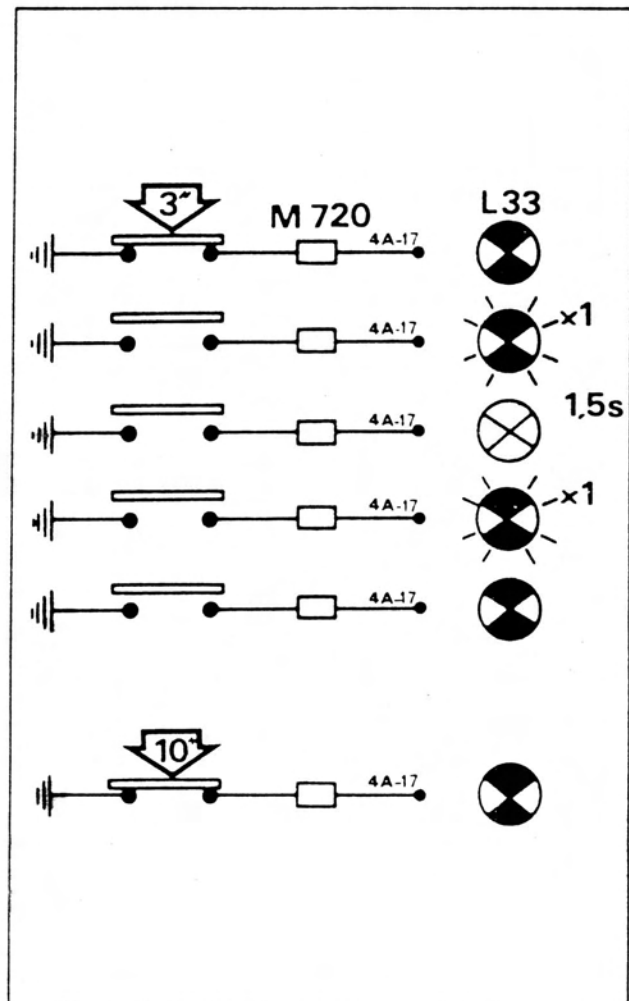
Erasing the memorized defects (to  
be done after performing repairs):

Turn key "ON"

Perform a test up to Code 11

Depress the switch for more than 10  
seconds

The indicator should be "ON"



LEGEND - UP TO VIN 517001

| REFERENCE | DESCRIPTION                                 | MANUFACTURER'S REFERENCE              |
|-----------|---------------------------------------------|---------------------------------------|
| L33       | Check Engine Indicator                      |                                       |
| M45       | Battery                                     |                                       |
| M46       | Battery Power Connector (junction block)    |                                       |
| M50       | Ignition Coil                               |                                       |
| M58       | Motronic ECU - 49 States                    | Bosch 0261 200 388                    |
|           | Motronic ECU - California                   | Bosch 0261 200 389                    |
| M280      | Auxiliary Air Device                        |                                       |
| M133      | Engine RPM Sensor                           | Bosch 0261 210 043                    |
| M215      | Neutral Safety Switch (auto trans vehicles) |                                       |
| P229      | Key Switch/Steering Wheel Lock              |                                       |
| M251      | Throttle Switch Unit (idle/full-load)       | Bosch 0280 120 327                    |
| M295      | Air Conditioning Compressor                 |                                       |
| M300      | Starter Motor                               |                                       |
| M313      | Air Flow Sensor                             | Bosch 0280 202 202                    |
| M346      | Canister Purge Electrovalve                 | Bosch 0280 142 157 or<br>0280 142 150 |
| M477      | Fuel Pump Fuse (10A)                        |                                       |
| M477B     | Lambda Sensor Heater Fuse (10A)             |                                       |
| M574      | Injectors                                   | Bosch 0280 150 762                    |
| M598      | Ignition Amplifier Module                   | Bosch 0227 100 123                    |
| C683      | Main Fuel Pump                              | Bosch 0580 464 038                    |
| C684      | Primer Pump                                 |                                       |
| M720      | Diagnostic Plug                             |                                       |
| M744      | Fuel Pump Relay                             |                                       |
| M783      | Main Relay                                  |                                       |
| M792      | Automatic Transmission Input Relay          | Cartier 02009                         |
| M848      | Lambda Sensor                               | Bosch 0258 003 078                    |
| M889      | Engine Temperature Sensor (NTC)             | Bosch 0280 130 026                    |

NOTE: For manual transmission, delete M215 and M792 and associated wiring

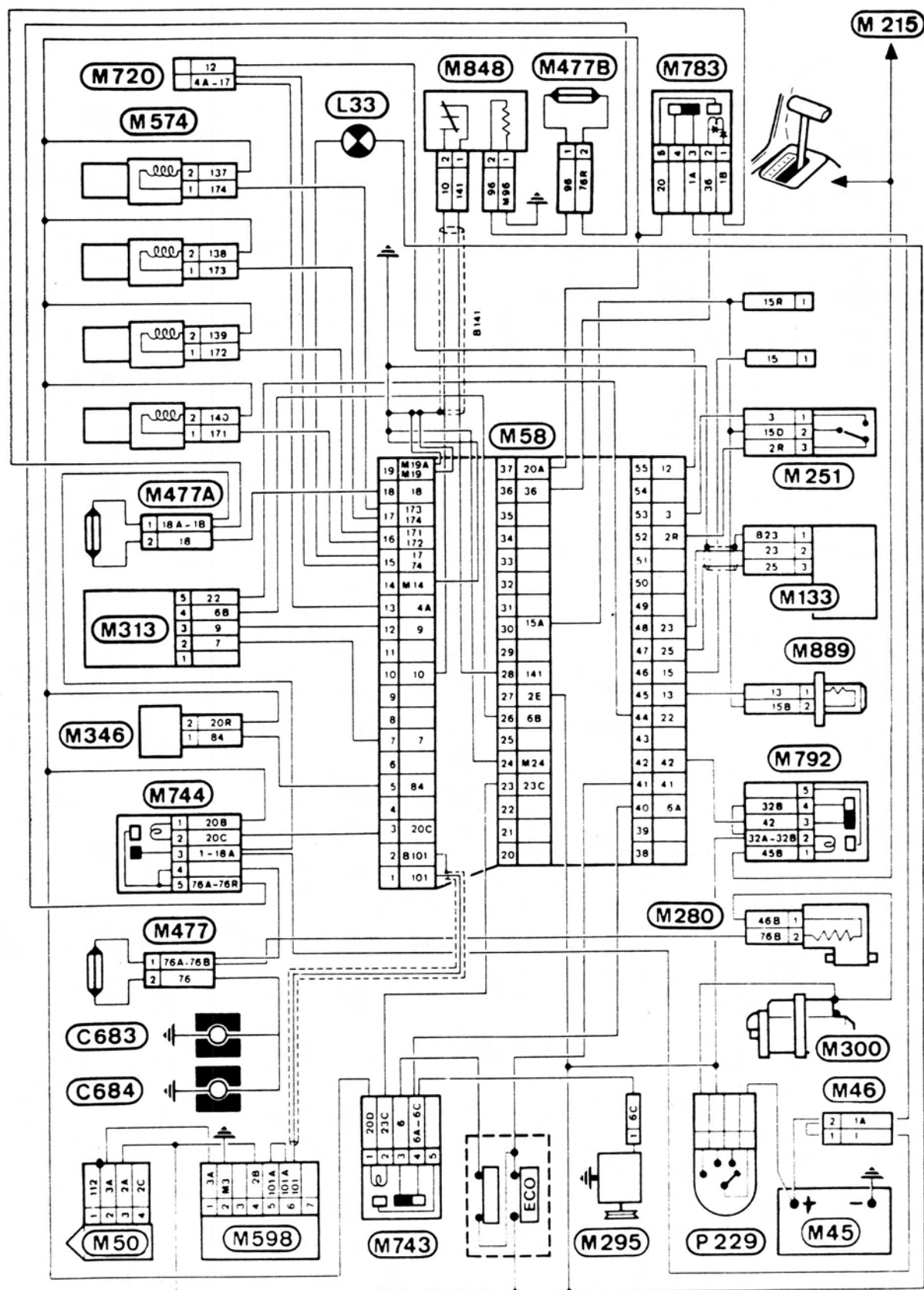
IDENTIFICATION OF LETTERS M - P - H - C - L:

The vehicle is divided into four compartments by letters placed before the component number reference, according to the geographic location of said component

M = Engine  
 P = Dashboard  
 H = Passenger Compartment  
 C = Trunk  
 L = Lamp



AUTOMATIC TRANSMISSION - UP TO VIN 517001



LEGEND - From VIN 517001 MY1991

| REFERENCE | DESCRIPTION                                 | MANUFACTURER'S REFERENCE              |
|-----------|---------------------------------------------|---------------------------------------|
| L33       | Check Engine Indicator                      |                                       |
| M45       | Battery                                     |                                       |
| M46       | Battery Power Connector (junction block)    |                                       |
| M50       | Ignition Coil                               |                                       |
| M58       | Motronic ECU - 49 States                    | Bosch 0261 200 388                    |
|           | Motronic ECU - California                   | Bosch 0261 200 389                    |
| M9        | Idle Regulation Electrovalve                | Bosch 0280 140 516                    |
| M133      | Engine RPM Sensor                           | Bosch 0261 210 043                    |
| M215      | Neutral Safety Switch (auto trans vehicles) |                                       |
| P229      | Key Switch/Steering Wheel Lock              |                                       |
| M251      | Throttle Switch Unit (idle/full-load)       | Bosch 0280 120 327                    |
| M295      | Air Conditioning Compressor                 |                                       |
| M300      | Starter Motor                               |                                       |
| M313      | Air Flow Sensor                             | Bosch 0280 202 202                    |
| M346      | Canister Purge Electrovalve                 | Bosch 0280 142 157 or<br>0280 142 150 |
| M310      | A/C Compressor Diode                        |                                       |
| M302      | Diode-Relay Protection                      |                                       |
| M477      | Fuel Pump Fuse (10A)                        |                                       |
| M477B     | Lambda Sensor Heater Fuse (10A)             |                                       |
| M574      | Injectors                                   | Bosch 0280 150 762                    |
| M598      | Ignition Amplifier Module                   | Bosch 0227 100 123                    |
| C683      | Main Fuel Pump                              | Bosch 0580 464 038                    |
| C684      | Primer Pump                                 |                                       |
| M720      | Diagnostic Plug                             |                                       |
| M752      | A/C Compressor Cut-out Relay                |                                       |
| M744      | Fuel Pump Relay                             |                                       |
| M783      | Main Relay                                  |                                       |
| M792      | Automatic Transmission Input Relay          | Cartier 02009                         |
| M848      | Lambda Sensor                               | Bosch 0258 003 078                    |
| M889      | Engine Temperature Sensor (NTC)             | Bosch 0280 130 026                    |

\* Detonation Sensor (J4 only - not shown)

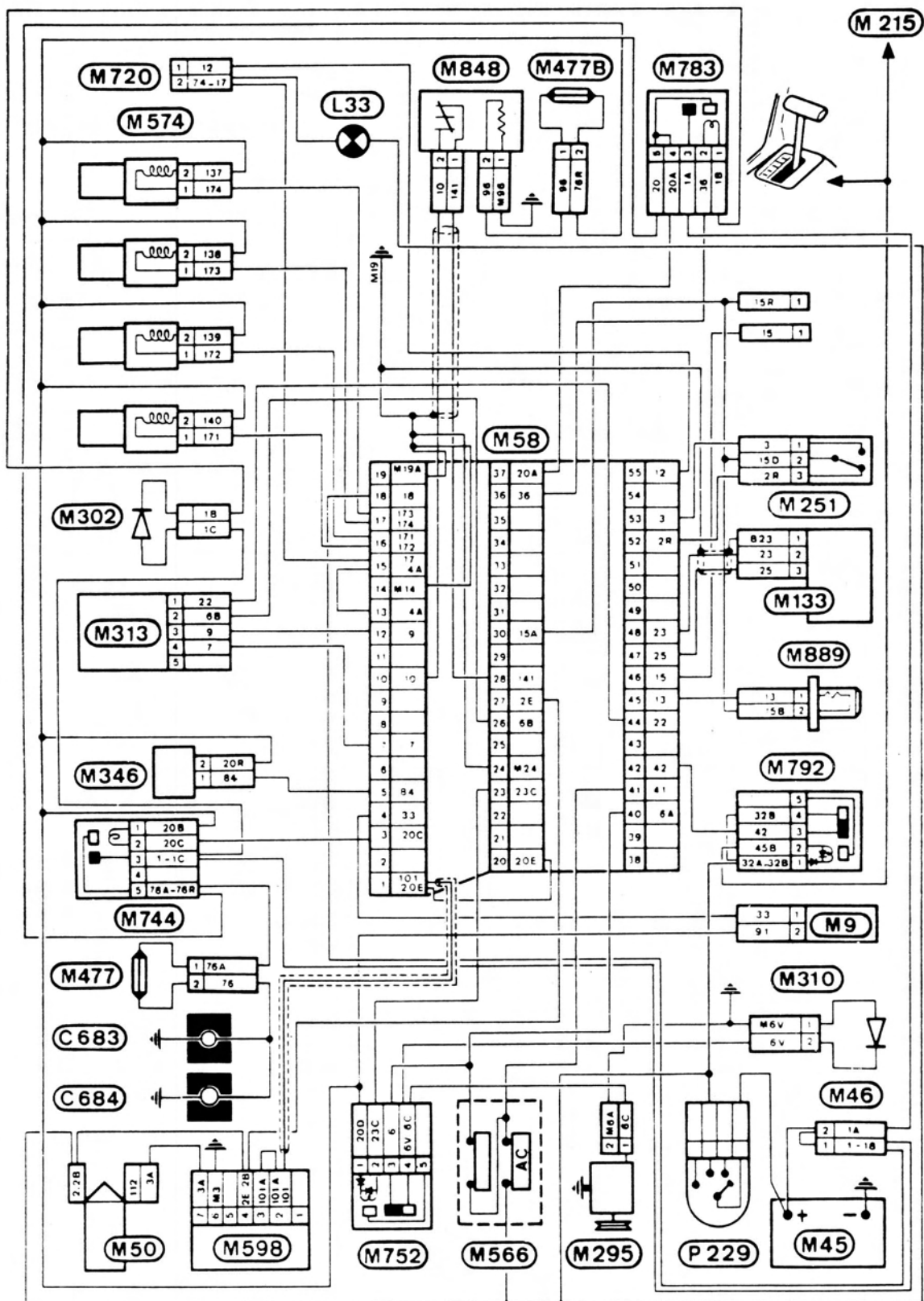
NOTE: For manual transmission, delete M215 and M792 and associated wiring

IDENTIFICATION OF LETTERS M - P - H - C - L:

The vehicle is divided into four compartments by letters placed before the component number reference, according to the geographic location of said component

M = Engine  
 P = Dashboard  
 H = Passenger Compartment  
 C = Trunk  
 L = Lamp

AUTOMATIC TRANSMISSION - FROM VIN 517001 MY1991



**PIN OUT BOX TESTING - Voltage and Continuity checks**

Check battery voltage first before proceeding to any pin out box voltage checks (for correct voltage drop readings)

Remove 55-pin connector from the Motronic ECU and connect it to the male end of the 55-pin connector for the pin out box

NOTE: Battery fully charged, ECU must be disconnected from harness when performing static checks

| CHECK                                                                                                                                                                                         | TESTER    | PIN NOS.                      | TEST CONDITION                                                          | READINGS              | IF READINGS INCORRECT, CHECK:                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------------------------|-------------------------------------------------------------------------|-----------------------|-----------------------------------------------------------------------------|
| ECU Battery Buss                                                                                                                                                                              | Voltmeter | 15 & Grnd                     | Ignition off                                                            | > 12 Volts            | Fuse M477A; Continuity of wires 18 and 18A                                  |
| ECU Injection Relay Control                                                                                                                                                                   | Voltmeter | 23 & 11                       | Ignition off                                                            | > 12 Volts            | Continuity of wire 36; if correct try new relay M783                        |
| Power Distribution from Injection Relay thru:<br>Injectors 1 & 2<br>Injectors 3 & 4<br>Canister EV<br>Idle EV<br>ECU Power from Wire 20A<br>Power Supply to Fuel Pump Relay Wires 20B and 20C | Voltmeter | 13 & 18                       | Ignition off; Install jumper wire between pins 23 and 11 on pin-out box |                       | Continuity of wires:                                                        |
|                                                                                                                                                                                               |           | 14 & 18                       |                                                                         |                       | 140, 171, 139, 172                                                          |
|                                                                                                                                                                                               |           | 5 & 18                        |                                                                         |                       | 138, 173, 137, 174                                                          |
|                                                                                                                                                                                               |           | 4 & 18                        |                                                                         |                       | 20R, 84                                                                     |
|                                                                                                                                                                                               |           | 24 & 18                       |                                                                         | > 12 Volts            | 91, 33                                                                      |
|                                                                                                                                                                                               |           | 3 & 18                        |                                                                         |                       | 20A                                                                         |
|                                                                                                                                                                                               |           |                               | Remove jumper wire                                                      |                       | 20B, 20C                                                                    |
| ECU Grounds                                                                                                                                                                                   | Voltmeter | 15 & 11<br>15 & 16<br>15 & 18 | Ignition off                                                            | > 12 Volts            | Splice ME5; If OK check power supply to wire 1A; Try new injection relay.   |
| Ignition Power Supply to ECU                                                                                                                                                                  | Voltmeter | 24 & 11                       | Ignition on                                                             | > 12 Volts            | Continuity of wires 32, 2 & 24; Splice PE6 and operation of ignition switch |
| Check Engine Light                                                                                                                                                                            | Voltmeter | 12 & 11                       | Ignition on                                                             | > 12 Volts            | Continuity of wires 74 & 2E; Splice PE6; Check engine bulb.                 |
| Automatic Transmission Position Switch                                                                                                                                                        | Voltmeter | 27 & 11                       | Ignition on<br>Position 1-2-3-D-R<br>Position P or N                    | 0 Volts<br>> 12 Volts | Continuity of wire 42 and park/neutral relay                                |

**PIN OUT BOX TESTING - Voltage and Continuity Checks (cont.)**

| CHECK                                          | TESTER    | PIN NOS. | TEST CONDITION                                                                                                          | READINGS                                                                    | IF READINGS INCORRECT, CHECK:                                                                                                       |
|------------------------------------------------|-----------|----------|-------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Lambda                                         | Voltmeter | 7 & 21   | Ignition on,<br>engine off<br><br>Connect ECU,<br>start engine;<br>Engine running,<br>Test completed,<br>Disconnect ECU | 0.45 Volts<br><br>Voltage<br>alternates<br>between 0.07<br>Volts and 1 Volt | Continuity of<br>wires 10 and 141<br>Continuity of<br>wires 10 and 141;<br>Voltage to<br>lambda heater;<br>Replace lambda<br>sensor |
| Ignition Run<br>Buss +AC<br>from Key<br>Switch | Voltmeter | 11 & 20  | Ignition on                                                                                                             | > 12 Volts                                                                  | Continuity of<br>wire 2E;<br>Operation of<br>ignition switch                                                                        |
| Ignition<br>Module<br>Trigger                  | Voltmeter | 1 & 11   | Engage starter                                                                                                          | > 0 Volts                                                                   | Continuity of<br>circuit; RPM/TDC<br>sensor signal                                                                                  |
| Fuel Pump<br>Relay Control                     | Voltmeter | 3 & 11   | Ignition off; Jump<br>pins 23 and 11                                                                                    | > 12 Volts                                                                  | Continuity of<br>electrical circuit;<br>Ignition relay;<br>Fuel pump relay                                                          |

## PIN OUT BOX TESTING - Ohmmeter Checks

| CHECK                                        | TESTER   | PIN NOS.                            | TEST CONDITION                                                         | READINGS                                                                                         | IF READINGS INCORRECT, CHECK:                                                          |
|----------------------------------------------|----------|-------------------------------------|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| ECU Grounds                                  | Ohmmeter | 11 & Grnd<br>16 & Grnd<br>18 & Grnd | Ignition off                                                           | Resistance < 1 Ohm                                                                               | Continuity of wires M14, M19, M19A and M24                                             |
| Throttle Switch Unit                         | Ohmmeter | 33 & 22                             | Accelerator pedal at rest<br>Accelerator pedal all the way down        | Resistance < 1 Ohm<br>Resistance = ∞                                                             | Adjustment of throttle switch; Throttle switch unit; Continuity of wires 2R, 3 and 15D |
|                                              |          | 34 & 22                             | Accelerator pedal at rest<br>Accelerator pedal all the way down        | Resistance = ∞<br>Resistance ≤ 1 Ohm                                                             |                                                                                        |
| Injectors                                    | Ohmmeter | 13 & 24                             | Ignition off                                                           | Resistance = 8 to 8.5 Ohms                                                                       | Injectors (for 1 inj. R = 16 Ohms)                                                     |
|                                              |          | 14 & 24                             | Ignition off                                                           | Resistance = 8 to 8.5 Ohms                                                                       | Continuity of wires 20A, 137, 138, 139, 140, 171, 172, 173, 174                        |
| Idle Regulator Electrovalve (J4, J2 from 91) | Ohmmeter | 4 & 24                              | Ignition off                                                           | Resistance = 7.5 to 8.5 Ohms                                                                     | Electrovalve; Continuity of wires 20A, 91 and 33                                       |
| Air Flow Meter                               | Ohmmeter | 9 & 19                              | Ignition off                                                           | Resistance = 300 to 550 Ohms                                                                     | Air flow sensor; Continuity of wires 6B, 7, 9 and 22                                   |
|                                              |          | 6 & 19                              | Flap at rest                                                           | Resistance = 10 to 220 Ohms                                                                      |                                                                                        |
|                                              |          | 6 & 9                               | Remove air bellows and move flap with screwdriver                      | Should be no opens                                                                               |                                                                                        |
| Air Flow Meter Temperature Sensor            | Ohmmeter | 19 & 28                             | -10°C (14°F)<br>+20°C (68°F)<br>+50°C (122°F)<br>Reconnect air bellows | Resistance = 8260 - 10,560 Ohms<br>Resistance = 2280 - 2720 Ohms<br>Resistance = 760 to 910 Ohms | Continuity of wires 6B and 22; Air flow meter                                          |
| NTC Sensor                                   | Ohmmeter | 22 & 29                             | -10°C (14°F)<br>+20°C (68°F)<br>+80°C (122°F)                          | Resistance = 8200 - 11,000 Ohms<br>Resistance = 2280 - 2720 Ohms<br>Resistance = 290 to 370 Ohms | NTC sensor and continuity of wires 13, 15A and 15B                                     |
| Canister Purge Electrovalve                  | Ohmmeter | 5 & 24                              | Ignition off                                                           | Resistance ≥ 40 Ohms                                                                             | Continuity of wire 84; Electrovalve                                                    |
| Engine RPM and Position Sensor               | Ohmmeter | 31 & 32                             | Ignition off                                                           | Resistance = 490 to 625 Ohms                                                                     | Continuity of wires 23 and 25; RPM sensor                                              |
|                                              | Vacuum   | 31 & 32                             | Crank engine                                                           | V ≥ 2.5V A/C                                                                                     |                                                                                        |

If a pin out box is not available, the preceding electrical checks can be performed directly from the ECU connector once the following points are observed:

Remove 55-pin connector from ECU; remove protector back cover from ECU connector; make all electrical checks from the rear of the terminals; DO NOT perform electrical checks on the front (mating end) of the terminals, as they are very sensitive and could be damaged by the meter's probe

Since there are 55 pins on the ECU connector and 35 on the pin out box, you must refer to the cross-reference chart below for the correct pin number when performing tests directly on the ECU connector:

| Pin Out Box<br>Pin Number | ECU Pin<br>Number |
|---------------------------|-------------------|
| 1                         | 1                 |
| 2                         | 2                 |
| 3                         | 3                 |
| 4                         | 4                 |
| 5                         | 5                 |
| 6                         | 7                 |
| 7                         | 10                |
| 8                         | 11                |
| 9                         | 12                |
| 10                        | 13                |
| 11                        | 14                |
| 12                        | 15                |
| 13                        | 16                |
| 14                        | 17                |
| 15                        | 18                |
| 16                        | 19                |
| 17                        | 23                |
| 18                        | 24                |
| 19                        | 26                |
| 20                        | 27                |
| 21                        | 28                |
| 22                        | 30                |
| 23                        | 36                |
| 24                        | 37                |
| 25                        | 40                |
| 26                        | 41                |
| 27                        | 42                |
| 28                        | 44                |
| 29                        | 45                |
| 30                        | 46                |
| 31                        | 47                |
| 32                        | 48                |
| 33                        | 52                |
| 34                        | 53                |
| 35                        | 55                |

## NOTES

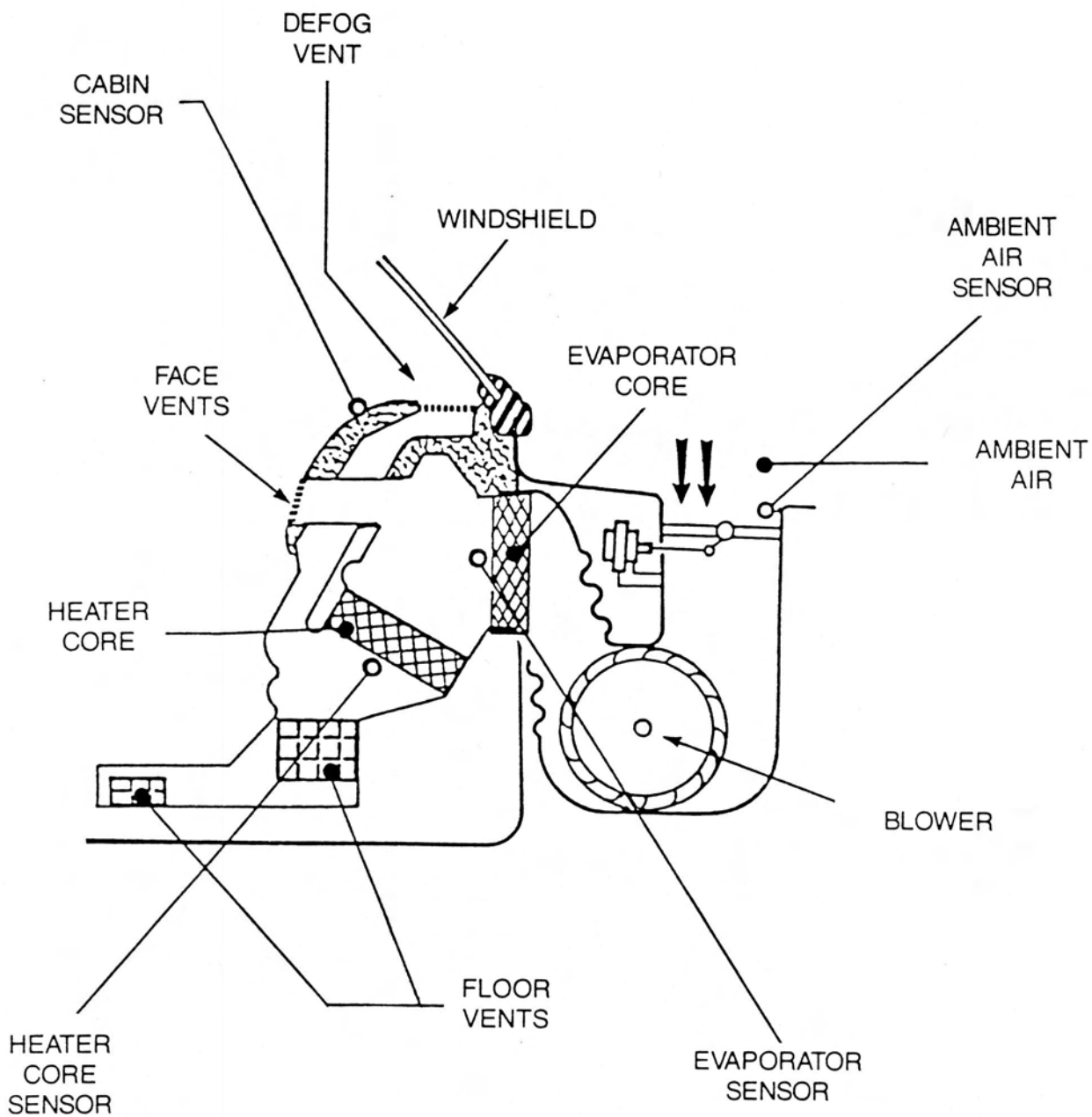
[illegible]



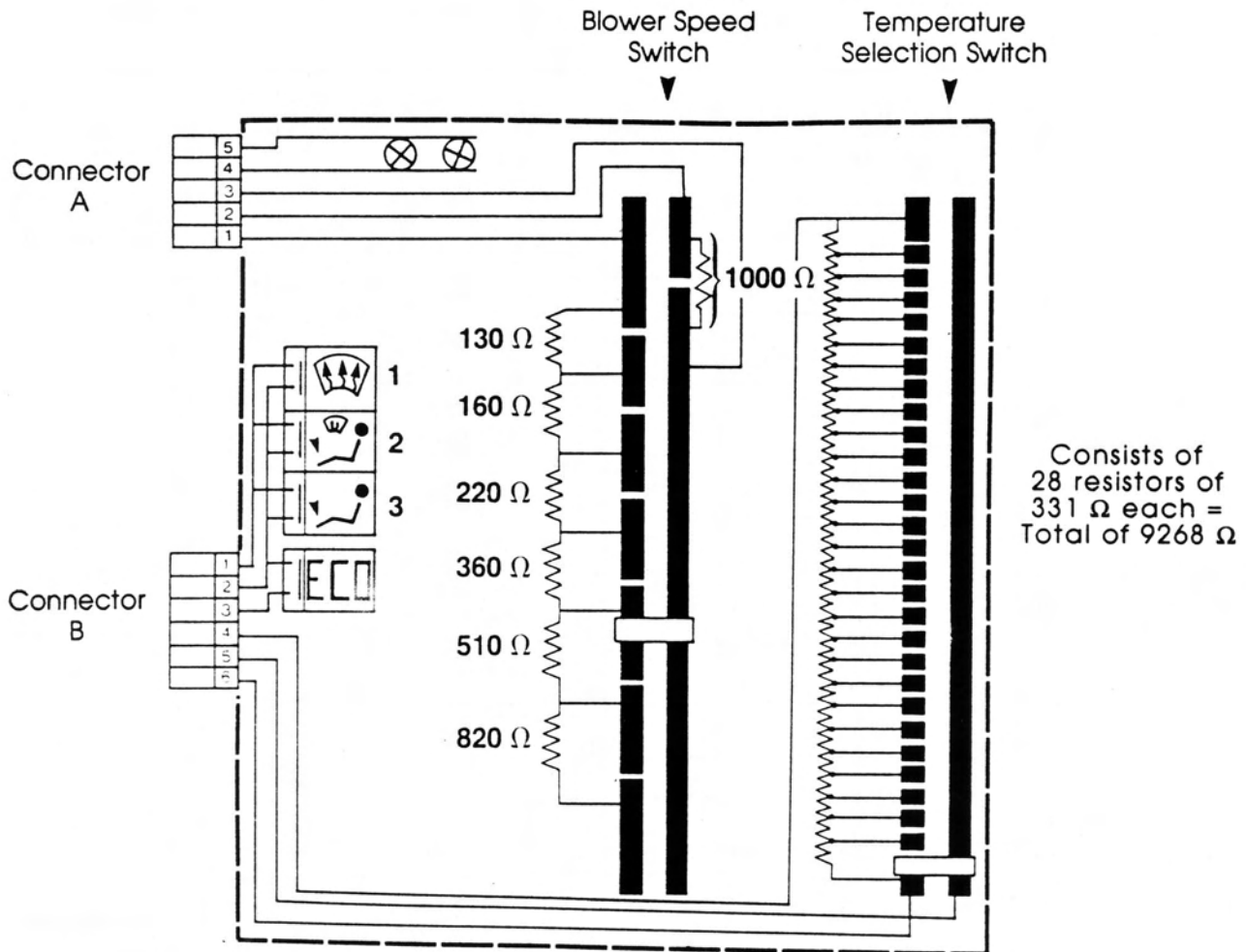
**CLIMATE CONTROL**

**505 VEHICLES**

## SENSOR LOCATIONS



# MAIN SWITCH PANEL ELECTRICAL DETAILS



## ELECTRICAL CHECKS

### Connector A

Between Pins 1 and 2:

Low Speed = 3200 Ohms  
 First Quadrant = 2380 Ohms  
 Second Quadrant = 1870 Ohms  
 Third Quadrant = 1510 Ohms  
 Fourth Quadrant = 1290 Ohms  
 Fifth Quadrant = 1130 Ohms  
 High Speed = 3 Ohms

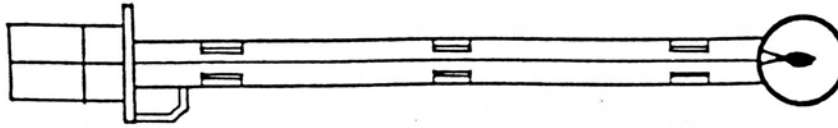
### Connector B

Between Pins 1 & 2 = 0 Ohms in positions 1, 2 or 3  
 Between Pins 4 & 6 = 9268 Ohms  
 Between Pins 4 & 5 → Check for open circuit

The reason the other 3 switches are not shown is that they are not electrical switches, they control vacuum only

## Heater Core Sensor - Fast Reacting Sensor

Location - clips to air distribution housing at heater core (downstream)

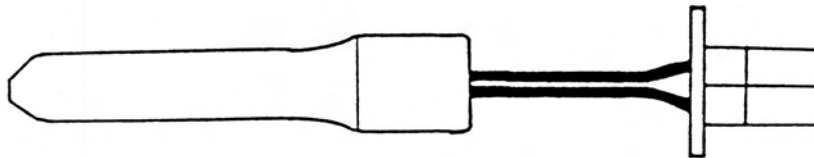


## Electrical Checks

| °F  | (°C)  | Resistance $\Omega$ |
|-----|-------|---------------------|
| 14  | (-10) | From 48580 to 62080 |
| 23  | (-5)  | From 37165 to 47495 |
| 32  | (0)   | From 28895 to 36405 |
| 41  | (5)   | From 22470 to 28310 |
| 50  | (10)  | From 17750 to 22050 |
| 59  | (15)  | From 14010 to 17405 |
| 68  | (20)  | From 11215 to 13765 |
| 77  | (25)  | From 9000 to 11000  |
| 86  | (30)  | From 7215 to 8895   |
| 95  | (35)  | From 5810 to 7250   |
| 105 | (40)  | From 4740 to 5915   |
| 113 | (45)  | From 3865 to 4875   |
| 122 | (50)  | From 3185 to 4020   |

## Evaporator Sensor - Fast Reacting Sensor

Location - fins of evaporator core



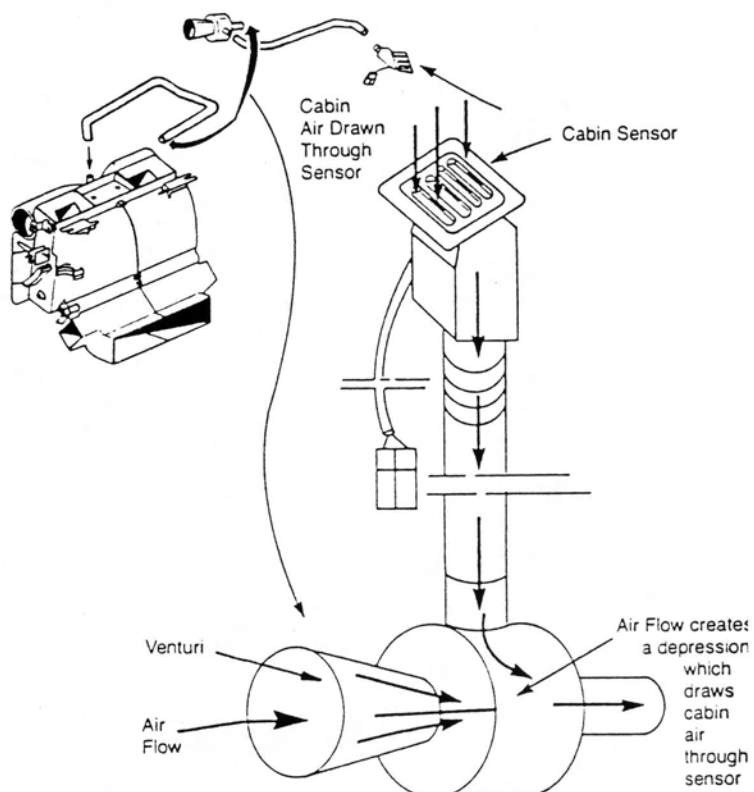
## Electrical Checks

| °F | (°C) | Resistance $\Omega$ |
|----|------|---------------------|
| 22 | (-5) | From 19820 to 22450 |
| 32 | (0)  | From 15300 to 17300 |
| 41 | (5)  | From 11850 to 13500 |
| 50 | (10) | From 9250 to 10600  |
| 59 | (15) | From 7300 to 8400   |
| 68 | (20) | From 5750 to 6700   |
| 77 | (25) | From 4600 to 5400   |

# Cabin Temperature Sensor - Slow Reacting Sensor

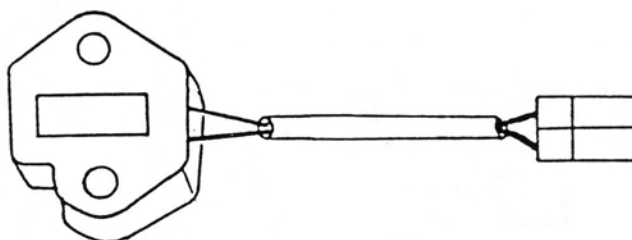
## Electrical Checks

| °F  | (°C) | Resistance $\Omega$ |
|-----|------|---------------------|
| 32  | (0)  | From 32470 to 37740 |
| 41  | (5)  | From 24890 to 28930 |
| 50  | (10) | From 19450 to 22120 |
| 59  | (15) | From 15140 to 17210 |
| 68  | (20) | From 12000 to 13350 |
| 77  | (25) | From 9500 to 10500  |
| 86  | (30) | From 7500 to 8400   |
| 95  | (35) | From 5900 to 6770   |
| 104 | (40) | From 4770 to 5440   |



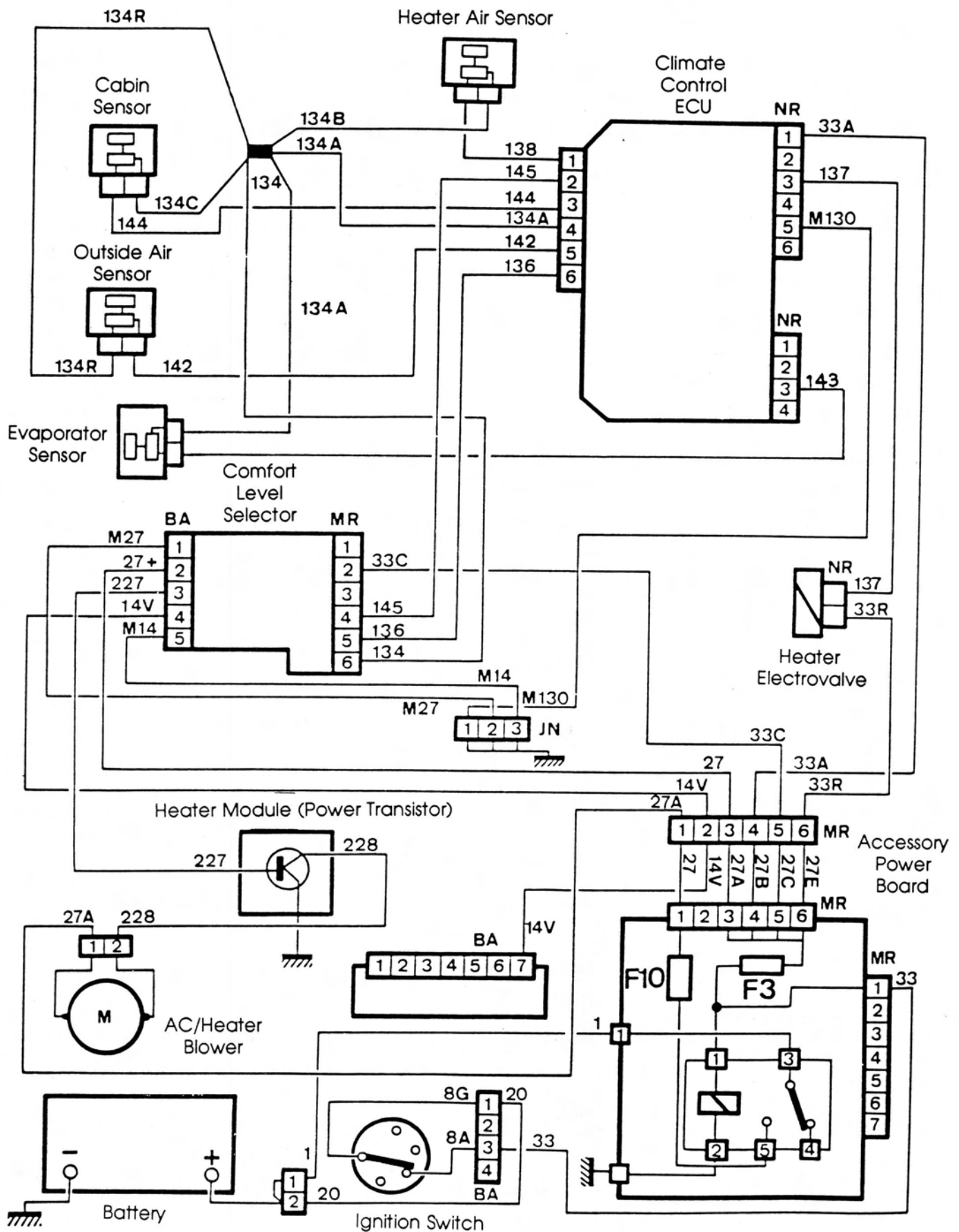
# Ambient Air Sensor - Bosch Slow Reacting Sensor

Location - air intake housing upstream of air intake flap



## Electrical Checks

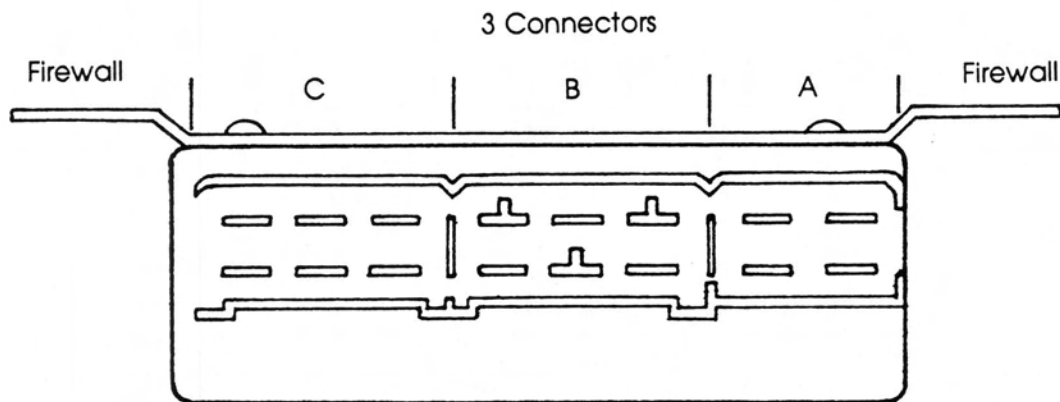
| °F  | (°C) | Resistance $\Omega$ |
|-----|------|---------------------|
| 32  | (0)  | From 32470 to 37740 |
| 41  | (5)  | From 24890 to 28930 |
| 50  | (10) | From 19450 to 22120 |
| 59  | (15) | From 15140 to 17210 |
| 68  | (20) | From 12000 to 13350 |
| 77  | (25) | From 9500 to 10500  |
| 86  | (30) | From 7500 to 8400   |
| 95  | (35) | From 5900 to 6770   |
| 104 | (40) | From 4770 to 5440   |



# ELECTRICAL CHECKS

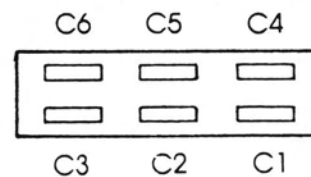
Climate Control ECU - located behind glove box

3 connectors on ECU



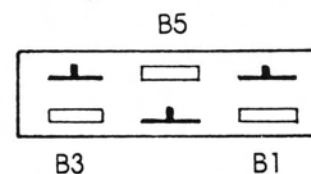
## Connector C - 6-Pin

|       |           |                  |
|-------|-----------|------------------|
| Pin 1 | Wire 138  | Heater Sensor    |
| Pin 2 | Wire 145  | Climate Control  |
| Pin 3 | Wire 144  | Cabin Sensor     |
| Pin 4 | Wire 134A | Splice Connector |
| Pin 5 | Wire 142  | Ambient Sensor   |
| Pin 6 | Wire 136  | Temp Selector    |



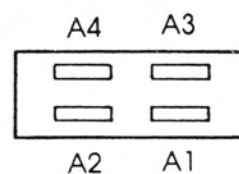
## Connector B - 3-Pin (3 not used)

|       |           |             |
|-------|-----------|-------------|
| Pin 1 | Wire 33A  | Fuse F3     |
| Pin 3 | Wire 137  | Water Valve |
| Pin 5 | Wire M130 | Ground      |



## Connector A - 4-Pin

|       |          |              |
|-------|----------|--------------|
| Pin 1 | Wire 6   | Compressor   |
| Pin 2 | Wire 133 | Def/Switch   |
| Pin 3 | Wire 143 | Evap. Sensor |
| Pin 4 | Wire 132 | ECO Switch   |



## PIN OUT BOX TESTING - Ohmmeter Checks

Check battery voltage first before proceeding to any pin out box voltage checks (for correct voltage drop readings)

All resistance tests are performed with ignition off and ECU disconnected; since the ECU has three connectors, all pin numbers are shown with corresponding connector A, B, or C

| CHECK                          | TESTER   | CONN. & PIN NOS. | WIRE NOS.     | TEST CONDITION | READINGS *F/OHMS*                                                 | IF READINGS INCORRECT, CHECK:                               |
|--------------------------------|----------|------------------|---------------|----------------|-------------------------------------------------------------------|-------------------------------------------------------------|
| Cabin Sensor                   | Ohmmeter | 3C & 4C          | 144 & 134A    | Ignition off   | 32°/32470 $\Omega$<br>68°/9500 $\Omega$<br>95°/5900 $\Omega$      | Continuity of wires 144, 134A and 134C; Splice S103; Sensor |
| Evaporator Sensor              | Ohmmeter | 3A & 4C          | 143 & 134A    | Ignition off   | 32°/15300 $\Omega$<br>68°/5750 $\Omega$                           | Continuity of wires 143, 134J and 134A; Splice S103; Sensor |
| Heater Core Sensor             | Ohmmeter | 1C & 4C          | 138 & 124A    | Ignition off   | 32°/28895 $\Omega$<br>68°/11215 $\Omega$<br>95°/5810 $\Omega$     | Continuity of wires 138, 134B and 134A; Splice S103; Sensor |
| Ambient Air Temperature Sensor | Ohmmeter | 4C & 5C          | 134A & 142    | Ignition off   | 32°/32470 $\Omega$<br>68°/9500 $\Omega$<br>95°/5900 $\Omega$      | Continuity of wires 142, 134R and 134A; Splice S103; Sensor |
| ECU Ground                     | Ohmmeter | 5B & Ground      | M130 & Ground | Ignition off   | Resistance < 1 Ohm                                                | Continuity of wire M30; Ground HM1                          |
| Heater Core Electrovalve       | Ohmmeter | 3A & Ground      | 137 & Ground  | Ignition off   | 20 to 25 Ohms<br><br>Note: resistance obtained at valve = 11 Ohms | Continuity of wires 137, 33R & 27E; Connector HC18; Valve   |

\* For more complete range of values, refer to Component Location section



## PIN OUT BOX TESTING - Voltage Checks

All voltage tests are performed with ECU disconnected

| CHECK                                 | TESTER    | CONN. & PIN NOS. | WIRE NOS.  | TEST CONDITION                                                                                                              | READINGS                                                          | IF READINGS INCORRECT, CHECK:                                                                                                           |
|---------------------------------------|-----------|------------------|------------|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| ECU Power Supply                      | Voltmeter | 1B & 5B          | 33A & M130 | Ignition off<br>Ignition on                                                                                                 | 0 Volts<br>V = Battery                                            | Fuse F3;<br>Continuity of wires 27B & 33A;<br>Connector HC18                                                                            |
| Heater Core Electrovalve Power Supply | Voltmeter | 3B & 5B          | 137 & M130 | Ignition off<br>Ignition on                                                                                                 | 0 Volts<br>V = Battery                                            | Fuse F3;<br>Continuity of wires 27E, 33R & 137; Resistance of heater valve;<br>Connector HC18                                           |
| Control Panel                         | Voltmeter | 2A & 5B          | 133 & M130 | Ignition on, Defrost button in<br>Defrost/heat button<br>Heater button<br>Heat/vent button<br>Vent button<br>Recirc. button | 12 Volts<br>12 Volts<br>12 Volts<br>0 Volts<br>0 Volts<br>0 Volts | Before 10/86 production Fuse F3; after 10/86 production Fuse F10; Continuity of wires 27, 33C and 132; Control panel;<br>Connector HC18 |
|                                       |           | 4A & 5B          | 132 & M130 | ECO button in<br>ECO button out                                                                                             | 12 Volts<br>0 Volts                                               |                                                                                                                                         |

## PIN OUT BOX TESTING - Amperage Checks

All amperage tests are performed with ECU disconnected. Ensure that battery is fully charged

| CHECK                                   | TESTER | CONN. & PIN NOS. | WIRE NOS.  | TEST CONDITION | READINGS                                                              | IF READINGS INCORRECT, CHECK:                                                                                                                                                                                                                                              |
|-----------------------------------------|--------|------------------|------------|----------------|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Compressor/<br>Auxiliary Fan<br>Circuit | Amps   | 1A & 1B          | 69 & 33A   | Ignition on    | 2.5-3.5 Amps,<br>with<br>compressor<br>and auxiliary<br>fan activated | Draw too high: check for short in diode A; A/C compressor valve; compressor clutch; auxiliary fan; relays; related wiring<br>Draw too low - check for opens in A/C compressor clutch; auxiliary fan; relays; trinary switch; low freon; poor connections on related wiring |
| Heater Valve<br>Circuit                 | Amps   | 3B & 5B          | 137 & M130 | Ignition on    | 0.8-1.2 Amps,<br>heater valve<br>closes (clicks)                      | Draw too high - short in coolant valve or wires 137, 33R, 27E<br>Draw too low - open in coolant valve; open or poor connection in wires; fuse F3                                                                                                                           |

## NOTES

[illegible]

NOTES

-----

-----

-----

-----

-----

-----

-----

-----

-----

-----

-----

-----

-----

-----

-----

-----

-----

-----

-----

**CLIMATE CONTROL**

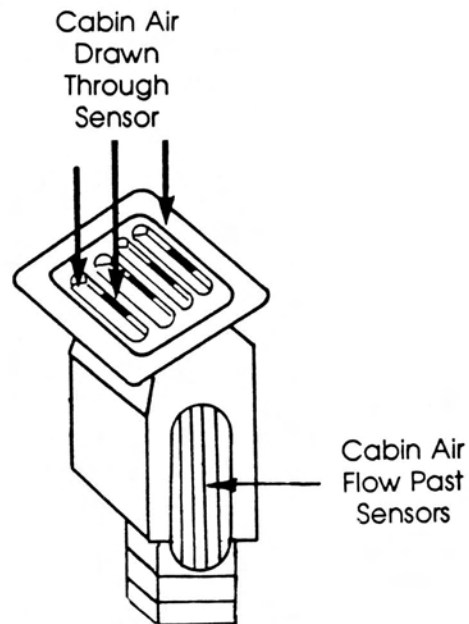
**405 VEHICLES**

## Cabin Temperature Sensor - Slow Reacting Sensor

Location - top of dash

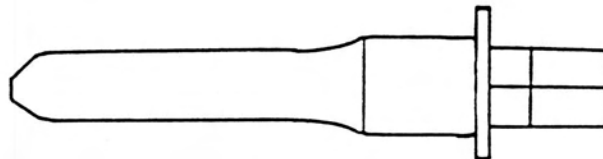
## Electrical Checks

| °F  | (°C) | Resistance $\Omega$ |
|-----|------|---------------------|
| 32  | (0)  | From 32470 to 37740 |
| 41  | (5)  | From 24890 to 28930 |
| 50  | (10) | From 19450 to 22120 |
| 59  | (15) | From 15140 to 17210 |
| 68  | (20) | From 12000 to 13350 |
| 77  | (25) | From 9500 to 10500  |
| 86  | (30) | From 7500 to 8400   |
| 95  | (35) | From 5900 to 6770   |
| 104 | (40) | From 4770 to 5440   |



## Ambient Air Sensor - Slow Reacting Sensor

Location - air intake housing upstream of air intake flap



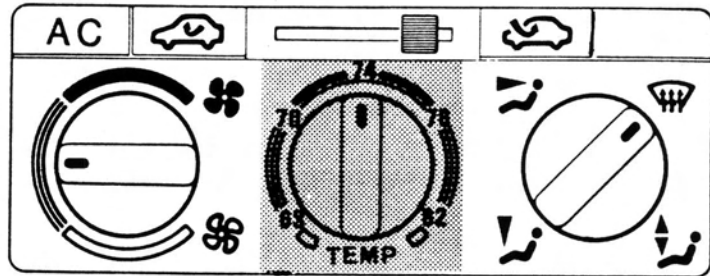
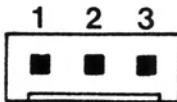
## Electrical Checks

| °F  | (°C) | Resistance $\Omega$ |
|-----|------|---------------------|
| 32  | (0)  | From 32470 to 37740 |
| 41  | (5)  | From 24890 to 28930 |
| 50  | (10) | From 19450 to 22120 |
| 59  | (15) | From 15140 to 17210 |
| 68  | (20) | From 12000 to 13350 |
| 77  | (25) | From 9500 to 10500  |
| 86  | (30) | From 7500 to 8400   |
| 95  | (35) | From 5900 to 6770   |
| 104 | (40) | From 4770 to 5440   |

## Temperature Control

Location - front of dash

Connect ohmmeter to wires  
27F & 27V (pins 12 & 5)  
at the climate control ECU to check



## Electrical Checks

| Temp. | Position | Resistance    | Temp.                                  | Position | Resistance |
|-------|----------|---------------|----------------------------------------|----------|------------|
|       | 1        | .5 - 1.0 Ohms |                                        | 11       | 5030 Ohms  |
| 68°F  | 2        | .5 - 1.0 Ohms |                                        | 12       | 6150 Ohms  |
|       | 3        | 540 Ohms      |                                        | 13       | 6710 Ohms  |
|       | 4        | 1110 Ohms     | 78°F                                   | 14       | 7270 Ohms  |
|       | 5        | 1670 Ohms     |                                        | 15       | 7840 Ohms  |
| 70°F  | 6        | 2220 Ohms     |                                        | 16       | 8400 Ohms  |
|       | 7        | 2790 Ohms     |                                        | 17       | 8960 Ohms  |
|       | 8        | 3350 Ohms     | 82°F                                   | 18       | 9530 Ohms  |
|       | 9        | 4470 Ohms     |                                        | 19       | 9530 Ohms  |
| 74°F  | 10       | 4470 Ohms     | All resistance values at $\pm 25$ Ohms |          |            |

## Evaporator Sensor - Fast Reacting Sensor

Location - fins of evaporator core



## Electrical Checks

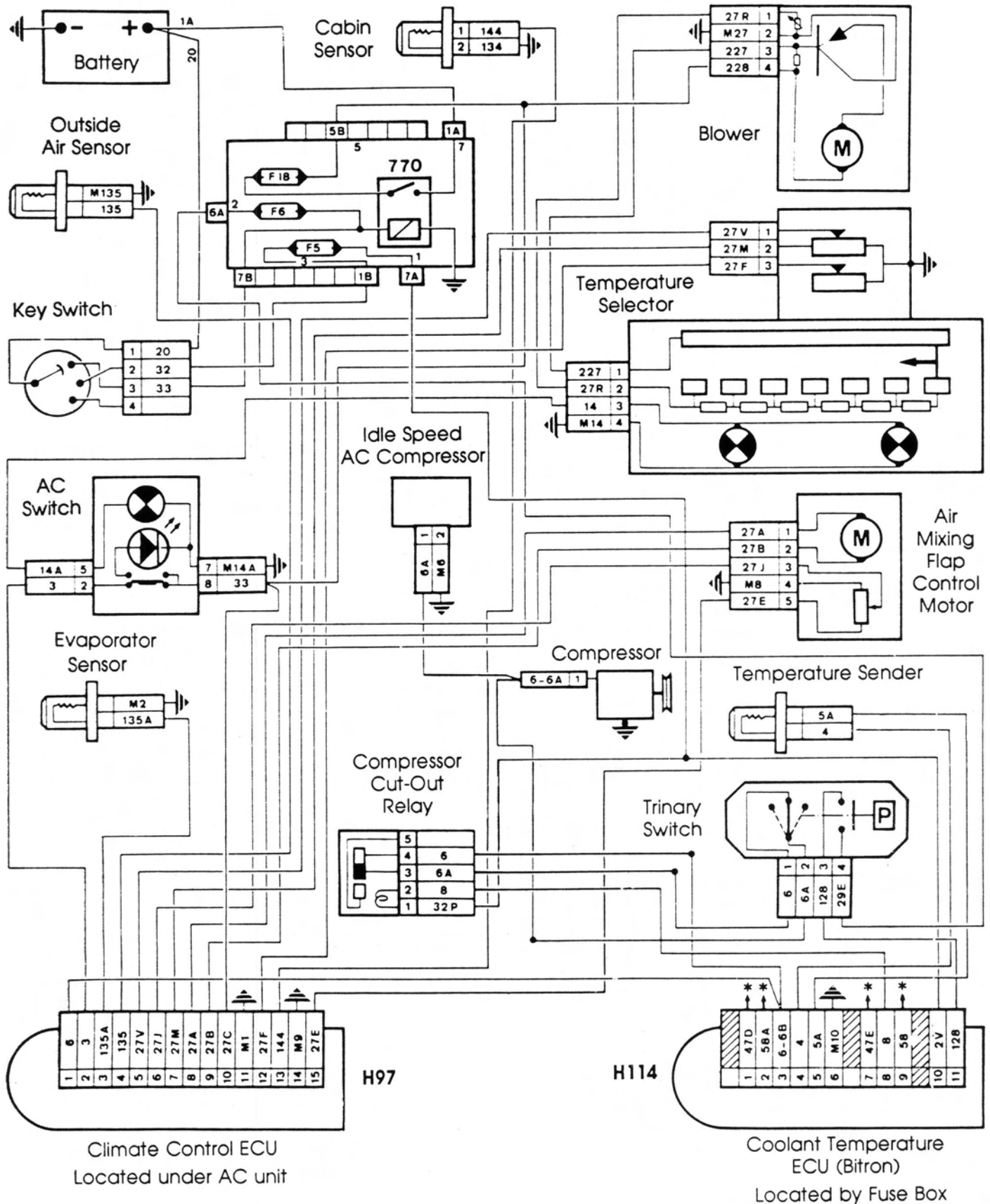
| °F | (°C) | Resistance $\Omega$ |
|----|------|---------------------|
| 22 | (-5) | From 19820 to 22450 |
| 32 | (0)  | From 15300 to 17300 |
| 41 | (5)  | From 11850 to 13500 |
| 50 | (10) | From 9250 to 10600  |
| 59 | (15) | From 7300 to 8400   |
| 68 | (20) | From 5750 to 6700   |
| 77 | (25) | From 4600 to 5400   |

## SYMPTOMS

### CHECKS TO BE MADE

[illegible]





## PIN OUT BOX TESTS

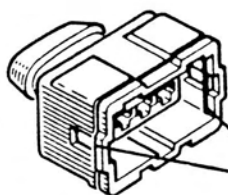
Check battery voltage first before proceeding to any pin out box voltage checks (for correct voltage drop readings)

To gain access to the climate control ECU:

Remove ashtray and storage compartment located just under the ashtray

ECU is located under the heater plenum to right of center (access through right side console panel by removing trim panel)

To remove ECU connector (Bosch 15-pin), spread lower corners of spring clip with fingers and pull on connector



Unlock clips with fingers  
to remove ECU connector

## VOLTAGE TESTS

Connect 15-terminal pin out box harness to climate control harness and ECU (dynamic mode); turn ignition ON

| TEST                                           | PIN NOS. | TEST CONDITION                                              | READINGS                   | IF READINGS INCORRECT, CHECK:                                                                         |
|------------------------------------------------|----------|-------------------------------------------------------------|----------------------------|-------------------------------------------------------------------------------------------------------|
| ECU Power from A/C Switch                      | 2 & 14   | A/C switch on<br><br>AC switch off                          | V = Battery<br><br>0 Volts | Fuse F18;<br>Continuity of<br>wires 27, 27A, 33<br>& 3; Splice HE25;<br>Connector<br>HC20; A/C switch |
| A/C Compressor Power Supply                    | 1 & 14   | A/C switch on maximum cold<br><br>A/C switch on maximum hot | V = Battery<br><br>0 Volts | A/C switch; Fuse F18; Wires 27A, 27 & 27B; Splice HE25/M9; Splice HE26/M14; Climate control ECU       |
| ECU Power Supply                               | 9 & 11   |                                                             | V = Battery                | Fuse F18; Wires 27A, 27 & 27B; Splice HE25/M1; Ground PM1; Connector HC20                             |
| Blend Air Door Position Feedback Potentiometer | 6 & 14   | A/C switch on maximum cold<br><br>A/C switch on maximum hot | 1.0 Volts<br><br>5.6 Volts | Continuity of wires 27J, M8 & 27E; Blend air motor                                                    |

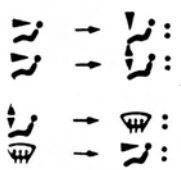
## RESISTANCE TESTS

Turn ignition off

Pin-out box harness is connected to climate control harness only, not ECU (static mode)

| TEST                              | PIN NOS.  | TEST CONDITION                                                                         | READINGS                                                                                                                                                                       | IF READINGS INCORRECT, CHECK:                                                                                        |
|-----------------------------------|-----------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| ECU Ground                        | 11 & Grnd |                                                                                        | Resistance < 0.5 Ohms                                                                                                                                                          | Continuity of wires M9, M14, M14A, M1 and M27; Connector HC20; Ground PM1; Splice HE26; A/C switch illumination bulb |
| Climate Control Ground            | 14 & Grnd |                                                                                        | Resistance = 8.2 to 8.5 Ohms                                                                                                                                                   |                                                                                                                      |
| Blend Air Door Motor              | 8 & 10    |                                                                                        | Resistance = 35 Ohms                                                                                                                                                           | Continuity of wires 27A and 27C; Blend air door motor                                                                |
| Cabin Temperature Sensor          | 13 & 14   | Temp 14°F/-10°C<br>Temp 32°F/0°C<br>Temp 50°F/10°C<br>Temp 68°F/20°C<br>Temp 86°F/30°C | Resistance = 51440 to 57100 Ohms<br>Resistance = 30650 to 33500 Ohms<br>Resistance = 18980 to 20400 Ohms<br>Resistance = 12100 to 12850 Ohms<br>Resistance = 7850 to 8350 Ohms | Continuity of wires 144, 134, M3 & M9; Splice HE26; Temperature sensor                                               |
| Ambient Air Temperature Sensor    | 4 & 14    | Temp 14°F/-10°C<br>Temp 32°F/0°C<br>Temp 50°F/10°C<br>Temp 68°F/20°C<br>Temp 86°F/30°C | Resistance = 50090 to 58450 Ohms<br>Resistance = 29865 to 34260 Ohms<br>Resistance = 18485 to 20870 Ohms<br>Resistance = 11820 to 13155 Ohms<br>Resistance = 7675 to 8545 Ohms | Continuity of wires 135, M135 and M9; Splice HE26; Sensor                                                            |
| Evaporator Sensor                 | 3 & 14    | Temp 14°F/-10°C<br>Temp 32°F/0°C<br>Temp 50°F/10°C<br>Temp 68°F/20°C<br>Temp 86°F/30°C | Resistance = 26910 to 28430 Ohms<br>Resistance = 15910 to 16750 Ohms<br>Resistance = 9710 to 10190 Ohms<br>Resistance = 6110 to 6390 Ohms<br>Resistance = 3940 to 4120 Ohms    | Continuity of wires 135A, M2 and M9; Splice HE26; Sensor                                                             |
| Blend Door Position Potentiometer | 15 & 14   |                                                                                        | Resistance = 10000 Ohms                                                                                                                                                        | Continuity of wires 27E, M8 and M4; Splice HE26; Blend door motor                                                    |

## RESISTANCE TESTS (cont.)

| TEST                           | PIN NOS. | TEST CONDITION                                                                                                                      | READINGS                                                                                                                         | IF READINGS INCORRECT, CHECK:                                            |
|--------------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Temperature Selector Control   | 7 & 14   |                                                                                                                                     | Resistance = 10000 Ohms                                                                                                          | Continuity of wires 27M and M9; Climate control module                   |
|                                | 12 & 14  | Maximum cold<br>Maximum heat<br>74° Position<br><br>Note: Ohms should rise in 560 Ohm steps every click from cold to warm           | Resistance ≤ 1 Ohm<br>Resistance = 10000 Ohms<br>Resistance = 5000 Ohms                                                          | Continuity of wires 27F and M9; Climate control module                   |
| Air Distribution Potentiometer | 5 & 14   | Turn selector in clockwise direction from:<br><br> | Resistance = 100 Ohms<br>Resistance = 100-75 - 50 - 25 - 0 Ohms<br>Resistance = 0 Ohms<br>Resistance = 100-75 - 50 - 25 - 0 Ohms | Continuity of wires 27V, M14 and M9; Splice HE26; Climate control module |

## NOTES

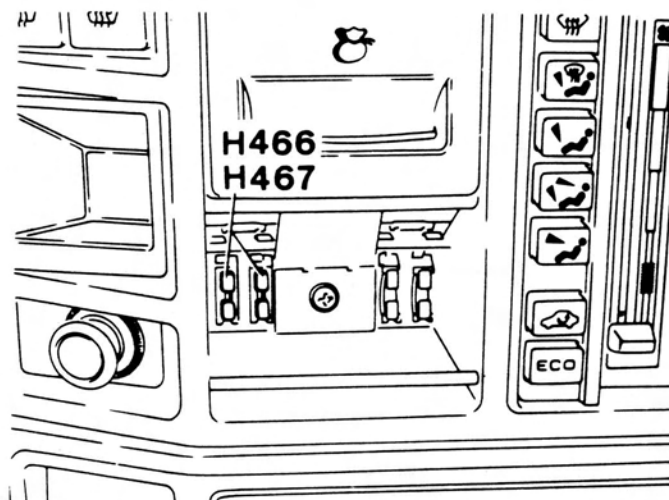
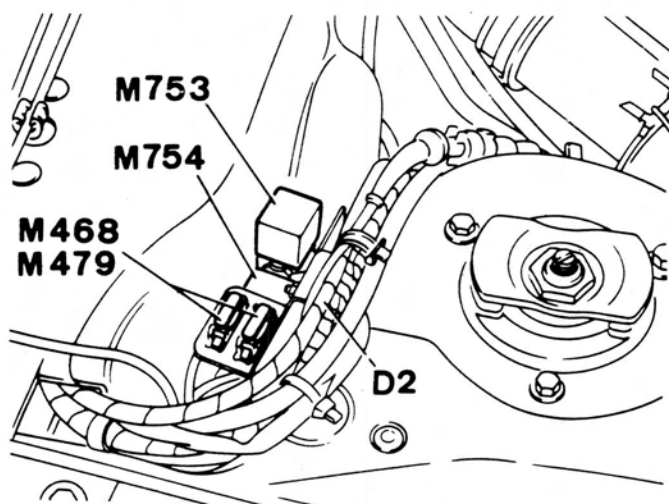
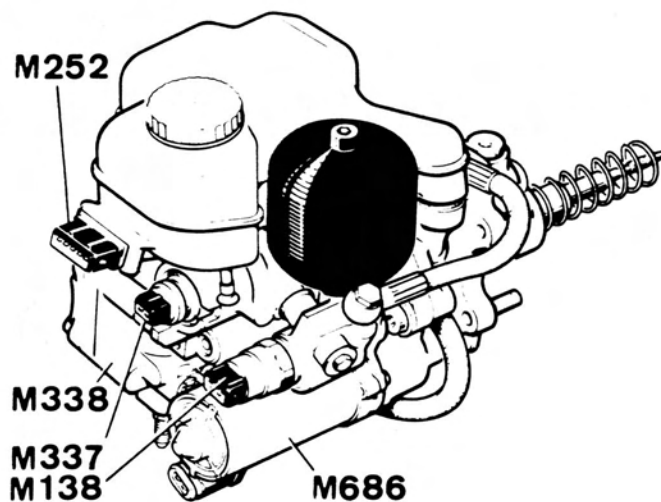
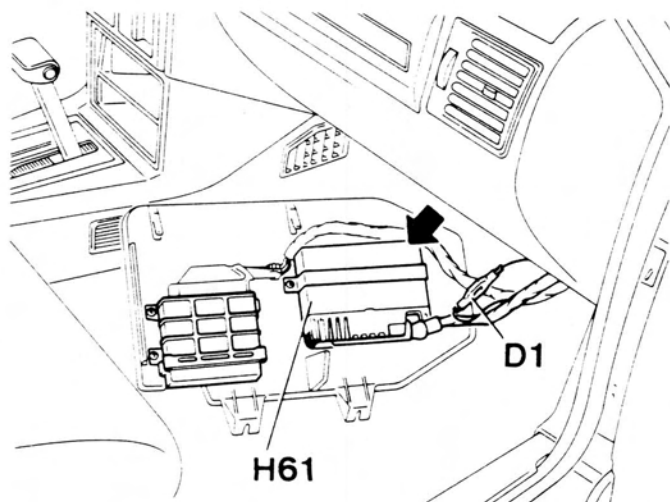
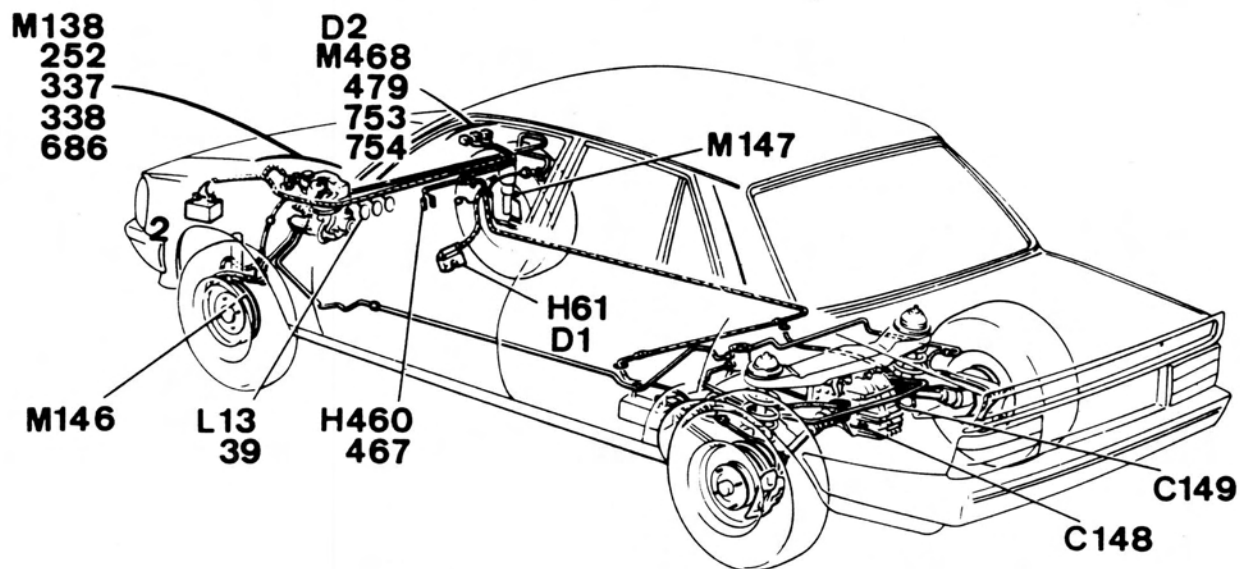
This image shows a full page of handwriting practice paper. It features multiple sets of horizontal dashed lines spaced evenly down the page, providing a guide for letter height and placement. The background is white, and there are no other markings or text present.

## NOTES

[illegible]

**505 ANTI-LOCK BRAKING SYSTEM**

**TEVES ABS SYSTEM**

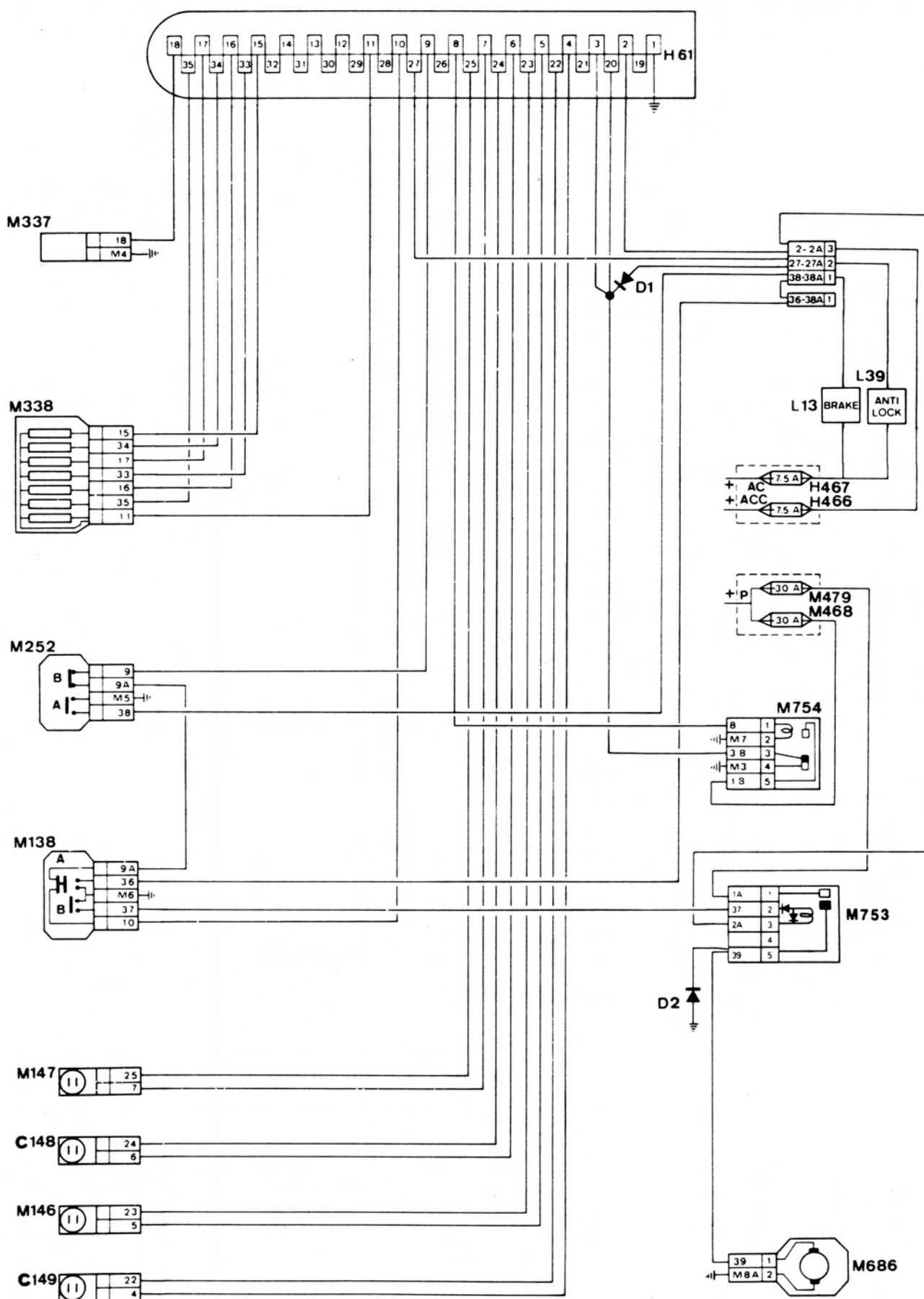




LEGEND

|                                                                    |      |
|--------------------------------------------------------------------|------|
| ABS Electronic Control Unit ECU                                    | H61  |
| Fuse Holder (Accessory Buss Power for ABS,<br>behind ashtray)      | H466 |
| Fuse Holder (for ANTILOCK and BRAKE<br>indicators, behind ashtray) | H467 |
| Left Front Wheel Sensor                                            | M146 |
| Right Front Wheel Sensor                                           | M147 |
| Left Rear Wheel Sensor                                             | C148 |
| Right Rear Wheel Sensor                                            | C149 |
| Brake Fluid Level Switch                                           |      |
| A - Low Fluid Level Warning                                        | M252 |
| B - ABS System Warning                                             |      |
| ABS Pressure Sensor                                                |      |
| C - ABS Hydraulic System Pressure Drop<br>Warning                  | M138 |
| D - Hydraulic Pump Relay Control                                   |      |
| ABS Main Electrovalve                                              | M337 |
| ABS Control Electrovalve                                           | M338 |
| Fuse Holder (ABS Power Circuit, on right<br>front inner fender)    | M468 |
| Fuse Holder (ABS Pump, on right front inner<br>fender)             | M479 |
| ABS Hydraulic Pump                                                 | M686 |
| ABS Pump Relay (Siemens V23134)                                    | M753 |
| ABS Main Relay                                                     | M754 |
| Brake Indicator Lamp                                               | L13  |
| Antilock Indicator Lamp                                            | L39  |
| Diode                                                              | D1   |
| Hydraulic Pump Protection Diode (M686)                             | D2   |

IMPORTANT: IT IS IMPERATIVE to install a relay (M753) of the indicated type - not doing so will cause the destruction of the pressure sensor (M138)



LEGEND

|                                                                    |      |
|--------------------------------------------------------------------|------|
| ABS Electronic Control Unit ECU                                    | H61  |
| Fuse Holder (Accessory Buss Power for ABS,<br>behind ashtray)      | H466 |
| Fuse Holder (for ANTILOCK and BRAKE<br>indicators, behind ashtray) | H467 |
| Left Front Wheel Sensor                                            | M146 |
| Right Front Wheel Sensor                                           | M147 |
| Left Rear Wheel Sensor                                             | C148 |
| Right Rear Wheel Sensor                                            | C149 |
| Brake Fluid Level Switch                                           |      |
| A - Low Fluid Level Warning                                        | M252 |
| B - ABS System Warning                                             |      |
| ABS Pressure Sensor                                                |      |
| C - ABS Hydraulic System Pressure Drop<br>Warning                  | M138 |
| D - Hydraulic Pump Relay Control                                   |      |
| ABS Main Electrovalve                                              | M337 |
| ABS Control Electrovalve                                           | M338 |
| Fuse Holder (ABS Power Circuit, on right<br>front inner fender)    | M468 |
| Fuse Holder (ABS Pump, on right front inner<br>fender)             | M479 |
| ABS Hydraulic Pump                                                 | M686 |
| ABS Pump Relay (Siemens V23134)                                    | M753 |
| ABS Main Relay                                                     | M754 |
| Brake Indicator Lamp                                               | L13  |
| Antilock Indicator Lamp                                            | L39  |
| Diode                                                              | D1   |
| Hydraulic Pump Protection Diode (M686)                             | D2   |

IMPORTANT: IT IS IMPERATIVE to install a relay (M753) of the indicated type - not doing so will cause the destruction of the pressure sensor (M138)

IDENTIFICATION OF LETTERS M - P - H - C - L:

The vehicle is divided into four compartments by letters placed before the component number reference, according to the geographic location of said component

M = Engine  
P = Dashboard  
H = Passenger Compartment  
C = Trunk  
L = Lamp

**PIN OUT BOX TESTING**

Check battery voltage first before proceeding to any pin out box voltage checks (for correct voltage drop readings)

Remove 35-pin connector from ABS ECU (located behind passenger foot rest), and connect it to the male end of the 35-pin pin out box connector

Battery fully charged

All tests are done by connecting the appropriate meter between the pin numbers as indicated

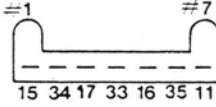
**Voltage Checks:**

| CHECK             | TESTER    | PIN NOS.                   | TEST CONDITION                                               | READINGS   | IF READINGS INCORRECT, CHECK:                  |
|-------------------|-----------|----------------------------|--------------------------------------------------------------|------------|------------------------------------------------|
| Power and Grounds | Voltmeter | 1 & 2<br>2 & 3<br>2 & Grnd | Ignition on                                                  | > 12 Volts | Electrical circuit continuity                  |
| Power and Grounds | Voltmeter | 1 & 3                      | Ignition on; connect jumper between pins 2 & 8 (pin out box) | > 12 Volts | Electrical circuit continuity; Main relay M751 |

**Ohmmeter Checks:**

| CHECK             | TESTER   | PIN NOS.                      | TEST CONDITION | READINGS                    | IF READINGS INCORRECT, CHECK:                  |
|-------------------|----------|-------------------------------|----------------|-----------------------------|------------------------------------------------|
| Grounds           | Ohmmeter | 1 & 3<br>1 & Grnd<br>3 & Grnd | Ignition off   | < 1.0 Ohms                  | Electrical circuit continuity; Main relay      |
| Power and Grounds | Ohmmeter | 1 & 20                        | Ignition off   | < 1.0 Ohms                  | Electrical circuit continuity                  |
| Power and Grounds | Ohmmeter | 1 & 8                         | Ignition off   | Resistance = 50 to 100 Ohms | Electrical circuit continuity; Main relay M754 |

FRONT AND REAR SENSOR CHECKS - Ohmmeter Tests

| CHECK                                                                            | TESTER   | PIN NOS.                             | TEST CONDITION | READINGS         | IF READINGS INCORRECT, CHECK:                                                                         |
|----------------------------------------------------------------------------------|----------|--------------------------------------|----------------|------------------|-------------------------------------------------------------------------------------------------------|
| Right Rear Sensor<br>Left Rear Sensor<br>Right Front Sensor<br>Left Front Sensor | Ohmmeter | 4 & 22<br>6 & 24<br>7 & 25<br>5 & 23 | Ignition off   | 800 to 1400 Ohms | Connect ohmmeter to corresponding sensor connector; if value is correct, perform test with new sensor |
| CABLE SHIELDING                                                                  |          |                                      |                |                  |                                                                                                       |
| Right Rear Sensor<br>Left Rear Sensor<br>Right Front Sensor<br>Left Front Sensor | Ohmmeter | 1 & 4<br>1 & 6<br>1 & 7<br>1 & 5     | Ignition off   | $\infty$         | Insulation of cable shielding to body ground                                                          |
| CONTROL ELECTROVALVES (INLET AND OUTLET)                                         |          |                                      |                |                  |                                                                                                       |
| Hydraulic Block Electrovalves                                                    | Ohmmeter | 1 & 11                               | Ignition off   | < 1 Ohm          | Electrical circuit continuity                                                                         |
|                                                                                  |          | 11 & 15                              | Ignition off   | 3 to 7 Ohms      | See below (*)                                                                                         |
|                                                                                  |          | 11 & 17                              |                |                  |                  |
|                                                                                  |          | 11 & 35                              |                |                  |                                                                                                       |
|                                                                                  |          | 11 & 33                              |                |                  |                                                                                                       |
|                                                                                  |          | 11 & 16                              |                |                  |                                                                                                       |
|                                                                                  |          | 11 & 34                              |                |                  |                                                                                                       |

\* On control electrovalve connector, under reservoir, electrovalve resistance between terminal 7 (lead 11) and terminal corresponding to ECU lead being tested, i.e.:

|                      |                      |
|----------------------|----------------------|
| Terminal 1 - Wire 15 | Terminal 3 - Wire 17 |
| Terminal 6 - Wire 35 | Terminal 4 - Wire 33 |
| Terminal 5 - Wire 16 | Terminal 2 - Wire 34 |

If one of the values is incorrect, test with a new electrovalve/master cylinder assembly.

If the values are correct, test electrical circuit continuity between control electrovalve connector and ECU.

## MAIN ELECTROVALVE TESTS

| CHECK                                 | TESTER   | PIN NOS.      | TEST CONDITION                                                                                                           | READINGS                                                        | IF READINGS INCORRECT, CHECK:                                                                                                                                                                                  |
|---------------------------------------|----------|---------------|--------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Main Electrovalve                     | Ohmmeter | 11 & 18       | Ignition off                                                                                                             | 2 to 5 Ohms                                                     | Connect ohmmeter on main electrovalve; if value is correct, check electrical circuit continuity between electrovalve connector and ECU; if not correct, check with a new electrovalve/master cylinder assembly |
|                                       | Jumper   | 2 & 18        | Ignition on, wait for pump to stop running; ignition off, connect jumper; depress brake pedal 1/2 way; ignition on again | Brake pedal should be felt forcing against foot and become hard | Test to be made with a new electrovalve/master cylinder assembly                                                                                                                                               |
| Antilock Indicator Electrical Circuit | Ohmmeter | 9 & 10        | Ignition on; wait for pump to stop; ignition off                                                                         | < 1 Ohm                                                         | See below (*)                                                                                                                                                                                                  |
| Insulation                            | Ohmmeter | 9 & 10 Ground | Ignition off                                                                                                             | $\infty$                                                        | See below (**)                                                                                                                                                                                                 |

\* Check pressure accumulator and continuity of level switch between pins 1 and 2. Check pressure sensor between pins 2 and 5. In case of test failure, REPLACE the defective component. Check electrical circuit continuity between ECU pin 9 and level switch pin 1, wire 9. Check between ECU pin 10 and pressure sensor pin 5, wire 10. Check between pressure sensor pin 3 and level switch pin 2, wire 9A.

\*\* Check insulation with respect to the ground (of pins 1 and 2 on level switch, on pins 3 and 5 on pressure sensor of electrical circuit). Check between ECU pin 9 and level switch pin 1, wire 9. Check between ECU pin 10 and pressure sensor pin 5, wire 10. Check between pressure sensor pin 3 and level switch pin 2, wire 9A.

WHEELS UP TESTING

NOTE: 3 jumpers are required

| CHECK                               | TESTER | PIN NOS.                   | TEST CONDITION                                                                                                                                                                        | READINGS                               | IF READINGS INCORRECT, CHECK:                                                    |
|-------------------------------------|--------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|----------------------------------------------------------------------------------|
| Main Electrovalve Cylinder Assembly | Jumper | 2 & 8, then 16 to 35, then | Raise wheels off ground; ignition on; wait for pump to stop; ignition off; DO NOT run pump for more than 60 seconds; connect jumper between pins 2 and 8; depress brake pedal 1/2 way | Left front wheel locked                | If any check is incorrect, test with a new electrovalve/master cylinder assembly |
|                                     |        | 35 to 3                    | Ignition on                                                                                                                                                                           | Left front wheel free                  |                                                                                  |
|                                     |        | 2 & 8, then 15 to 34, then | Repeat above using pins as indicated; connect jumper; depress brake pedal 1/2 way                                                                                                     | Right front wheel locked               |                                                                                  |
|                                     |        | 34 to 3                    | Ignition on                                                                                                                                                                           | Right front wheel free                 |                                                                                  |
|                                     |        | 2 & 8, then 17 to 33, then | Repeat above; connect jumper; depress brake pedal 1/2 way                                                                                                                             | Right rear and left rear wheels locked |                                                                                  |
|                                     |        | 33 to 3                    | Ignition on                                                                                                                                                                           | Right rear and left rear wheels free   |                                                                                  |

SENSOR TESTING

Raise wheels off ground and rotate wheel at 1 revolution per second when doing these tests

| CHECK              | TESTER   | PIN NOS. | TEST CONDITION      | READINGS      | IF READINGS INCORRECT, CHECK:                                    |
|--------------------|----------|----------|---------------------|---------------|------------------------------------------------------------------|
| Right Rear Sensor  | AC Volts | 4 & 22   | Rotate 1 per second | 100 to 570 MV | Sensor installation; Air gap; Condition of toothed ring (damage) |
| Left Rear Sensor   |          | 6 & 24   |                     |               |                                                                  |
| Right Front Sensor |          | 7 & 25   |                     |               |                                                                  |
| Left Front Sensor  |          | 5 & 23   |                     |               |                                                                  |

## PRESSURE ACCUMULATOR AND PRESSURE SENSOR CHECKS

Gauge Installation:

**IMPORTANT:** Before any servicing of the hydraulic system relieve system pressure by pumping the brake pedal at least 25 times (until hard)

Relieve pressure in the hydraulic system as indicated above - Remove screw - Screw in gauge (P/N 0091.60) - Tightening torque 0.8 mdaN (6 ft.lbs.)

| CHECKS                                                                                                        | CORRECT VALUES                                                                                       | IF VALUES INCORRECT, CHECK:                                         |
|---------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| ECU connected, ignition on, zero pressure                                                                     | Minimum 7000 Kpa (1000 psi) in 2 seconds<br>Run pump until it stops                                  | Test with new pressure accumulator                                  |
| Check pump running time                                                                                       | Run time 60 seconds maximum                                                                          | Hydraulic pump operation; condition of brake fluid reservoir filler |
| Check pump pressure when it stops                                                                             | 16,000 to 19,000 Kpa (2,320 to 2,755 psi)                                                            | Test with new pressure accumulator                                  |
| Pump pedal; check pedal when pump restarts                                                                    | 13,000 to 15,000 Kpa (1,885 to 2,175 psi)                                                            | Test with new pressure accumulator                                  |
| Wait until pump stops; disconnect pressure pump plug (2-pin); pump brake pedal; antilock light should come on | 9,500 to 11,500 Kpa (1,375 to 1,660 psi)                                                             |                                                                     |
| Reconnect pump plug; wait until pump stops; check residual pressure                                           | Wait 3 minutes for pressure to stabilize; pressure drop after 5 minutes; maximum 1,000 Kpa (145 psi) | External leaks; test with new electrovalve/master cylinder assembly |



HYDRAULIC PUMP - Electrical Checks

Pressure gauge fitted

| CHECKS                                                                                                                                                                                                                                                                                                                             | CORRECT VALUES                                                                                                                                                      | IF VALUES INCORRECT, CHECK:                                                                                                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Ignition off<br>Pump pedal 25 times until hard<br>Disconnect hydraulic pump plug (2-pin)<br>Connect voltmeter to 2-pin connector terminals<br>Reconnect 2-pin connector to hydraulic pump<br>Ignition on<br>Wait until pump stops<br>Disconnect 2-pin connector<br>Connect voltmeter to 2-pin connector<br>Pump pedal 4 to 6 times | > 12 Volts Zero Pressure<br><br><br><br><br><br><br><br>0 Volts; 16,000 to 19,000 Kpa (2,320 to 2,755 psi)<br>> 12 Volts; 13,000 to 15,000 Kpa (1,885 to 2,175 psi) | Electrical circuit continuity between pressure gauge and wire 39; Pump relay; Continuity of relay electrical circuit; Pressure sensor |

## NOTES

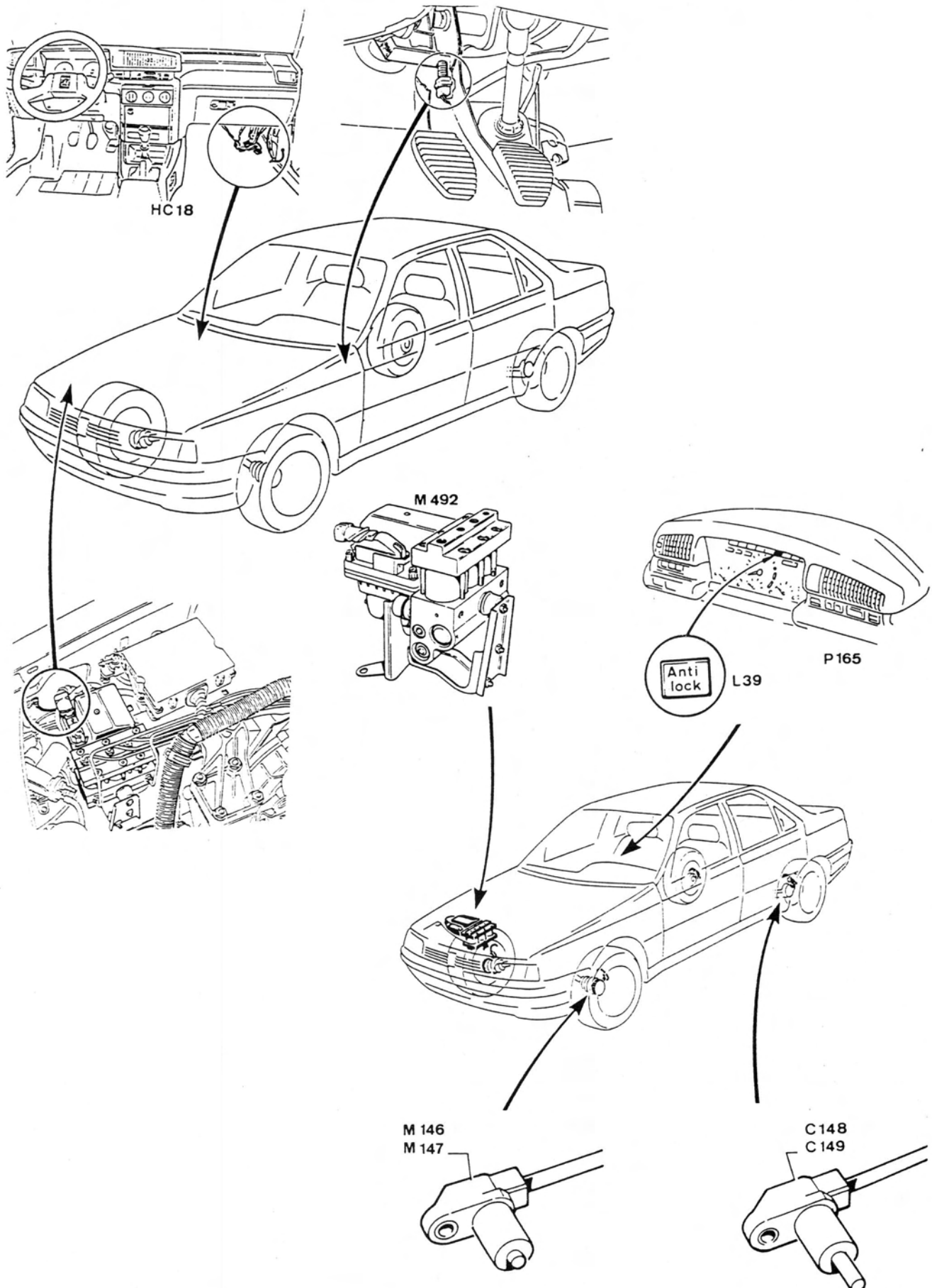
This image shows a full page of a worksheet designed for handwriting practice. It features a series of evenly spaced, horizontal dashed lines that run across the entire width of the page. The background is plain white, providing a clear contrast for the grey dashed lines. There are no margins, text, or other markings present on the page.

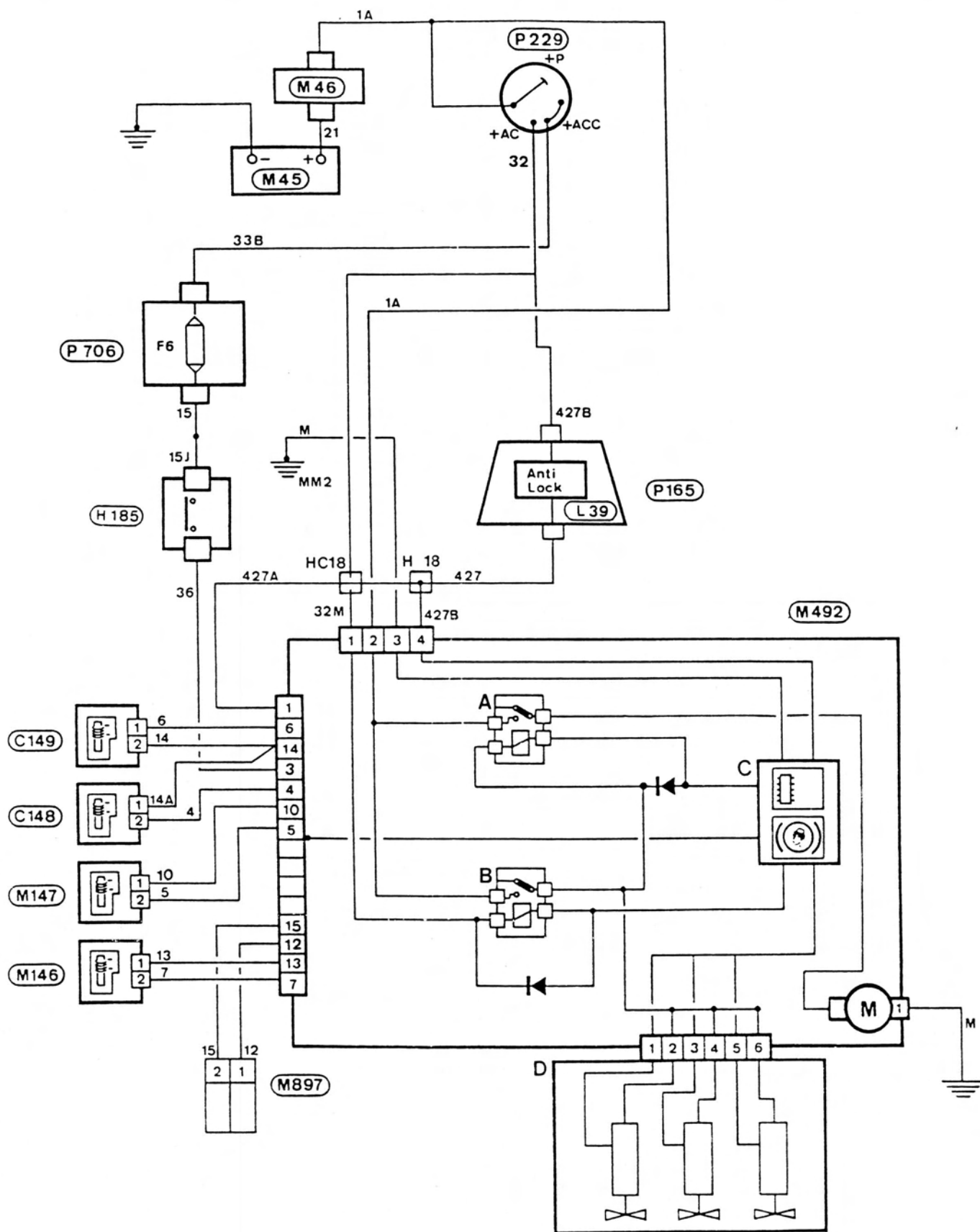
**405 ANTI-LOCK BRAKING SYSTEM**

**BOSCH ABS SYSTEM**

## LEGEND

|                                      |      |
|--------------------------------------|------|
| Left Rear Anti-Lock Wheel Sensor     | C148 |
| Right Rear Anti-Lock Wheel Sensor    | C149 |
| Stop Light Switch                    | H195 |
| Anti-Lock Wheel Warning Indicator    | L39  |
| Battery                              | M45  |
| 30 Amp Fuse & Housing (near battery) | M46  |
| Left Front Anti-Lock Wheel Sensor    | M146 |
| Right Front Anti-Lock Wheel Sensor   | M147 |
| ABS Additional Control Unit          | M492 |
| A - Pump Relay                       |      |
| B - Main Relay                       |      |
| C - Integrated ECU/Dash Fuse Box     |      |
| D - Electrovalves/Supply Pump        |      |
| Anti-Lock Test Connector             | M897 |
| Instrument Cluster                   | P165 |
| Ignition Switch                      | P229 |
| Dash Fuse Box (F6 15 Amp Fuse)       | P706 |





LEGEND

| HARNESSES                  |               |
|----------------------------|---------------|
| Anti-Locking Wheel Harness | FSC 5A/BLCJRO |
| Dashboard Harness          | FSC 100 P/B   |
| Main Harness               | FSC 120 PRSP  |

| INTER-HARNESS CONNECTIONS                            |      |
|------------------------------------------------------|------|
| Black 1-pin Connector (left side door hinge pillar)  | HC4  |
| White 3-pin Connector (right side door hinge pillar) | HC18 |

| MAIN GROUND                               | +   |
|-------------------------------------------|-----|
| Right Front Wheel Well Inner Panel Ground | MM2 |

| CONNECTOR COLOR CODES | +  |
|-----------------------|----|
| White                 | BA |
| Grey                  | GR |
| Black                 | NR |
| Green                 | VE |

IDENTIFICATION OF LETTERS M - P - H - C - L:

The vehicle is divided into four compartments by letters placed before the component number reference, according to the geographic location of said component

M = Engine  
P = Dashboard  
H = Passenger Compartment  
C = Trunk  
L = Lamp

**READING DEFECT CODES**

**NOTE: Vehicle must be driven over 5 MPH to register defects in ECU memory**

Ground wire 12, pin 1 of grey test connector M897 (located in relay box on right front inner fender)

Maintain this ground for the duration of the code readout

Turn ignition key to "ON" position (+AC)

The different numbered codes and those reflected by the blinking anti-lock warning indicator L39 are always repeated 3 times

Three possibilities may exist:

Absence of any code (should always have Code 1-2/Start of Test)

NOTE: The fourth 1-2 code indicates End of Test/No Fault Found

Check:

- the continuity of wire 12 of grey test connector M897
- the continuity of the indicator bulb and warning bulb circuits
- the voltage supply to the ECU

If the above are correct, test again using a new ECU

Code 1-2 alone - no defect in computer memory

Presence of defect code

- Note each code that appears
- For analysis and diagnosis, see the following pages

NOTE: Defect codes that are detected by the ECU autodiagnostic system cannot accurately locate the exact origin of the defect; the code indicates that a **function or circuit of the ABS System is defective**; the failure can be at the component, its connection wiring, or in the computer itself

**ELECTRICAL CHECKS - PRECAUTIONS TO TAKE**

Do not disconnect:

- the battery while the engine is running
- the ECU while ignition is on

The voltage source must be higher than 12 Volts

Before reconnecting a connector, verify:

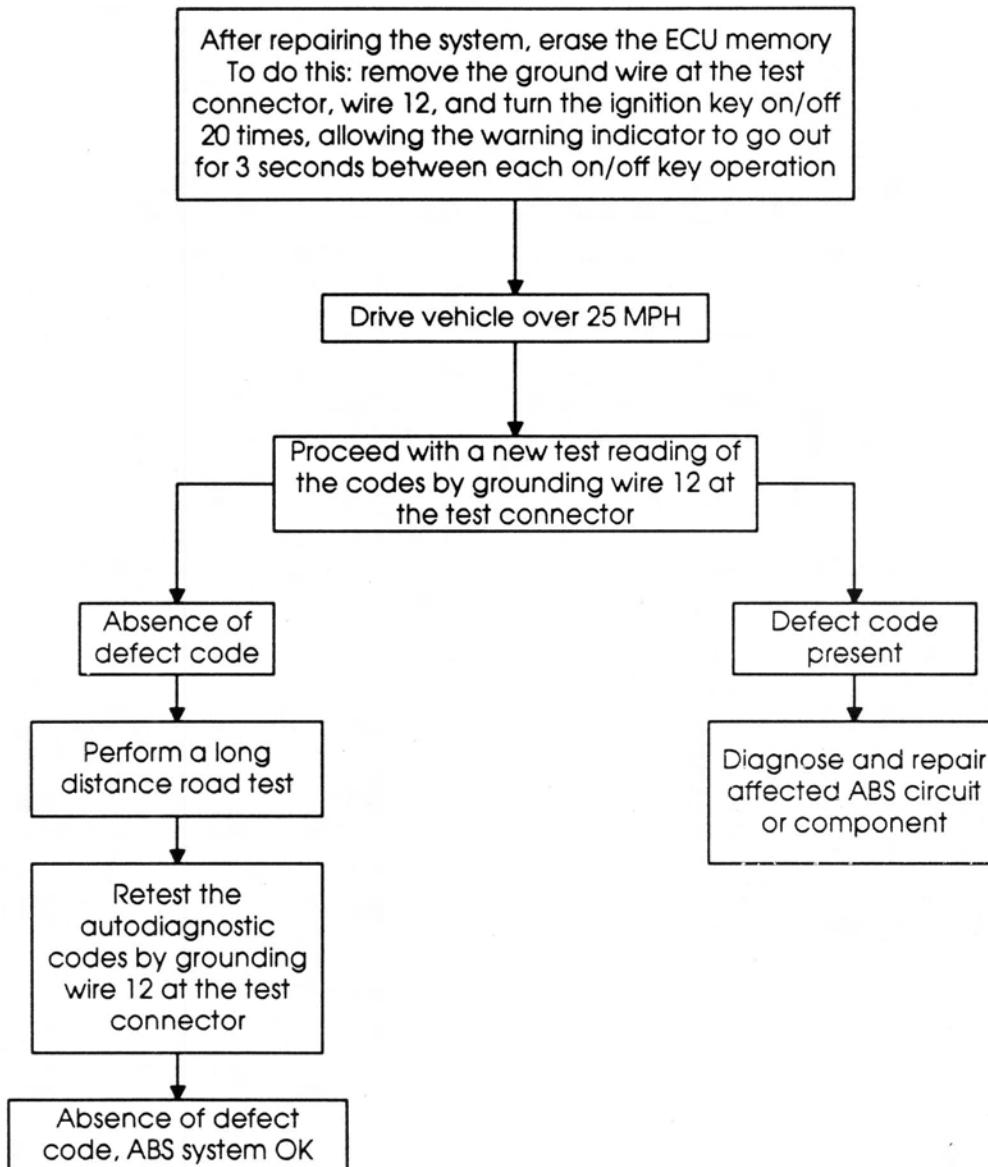
- the condition of the different plugs (deformation, oxidation, etc.)
- the presence of a gasket
- the presence and condition of the connector lock

Do not use a 12V test light and do not produce an electric arc to check the conductivity of a circuit

When checking voltage, the battery should be properly charged



Operations that must be performed after analysis, diagnosis and repair of ABS problems:



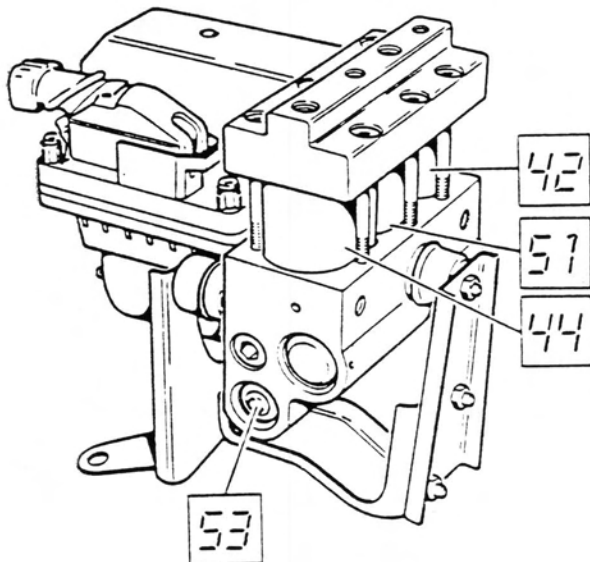
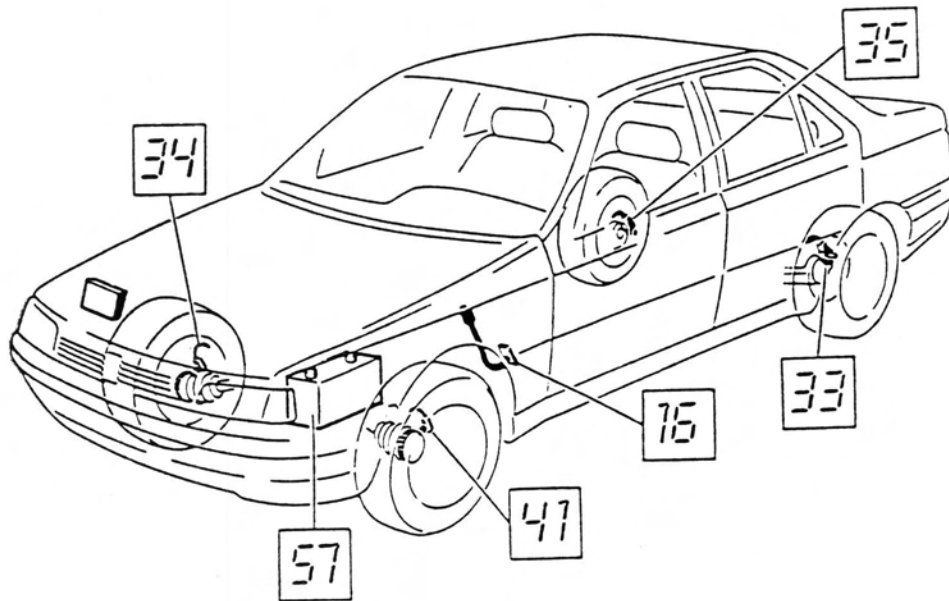
## ANALYSIS AND DIAGNOSIS OF DEFECTS

NOTE: There is no "End of Test" code; the fourth 1-2 code indicates test cycle is complete

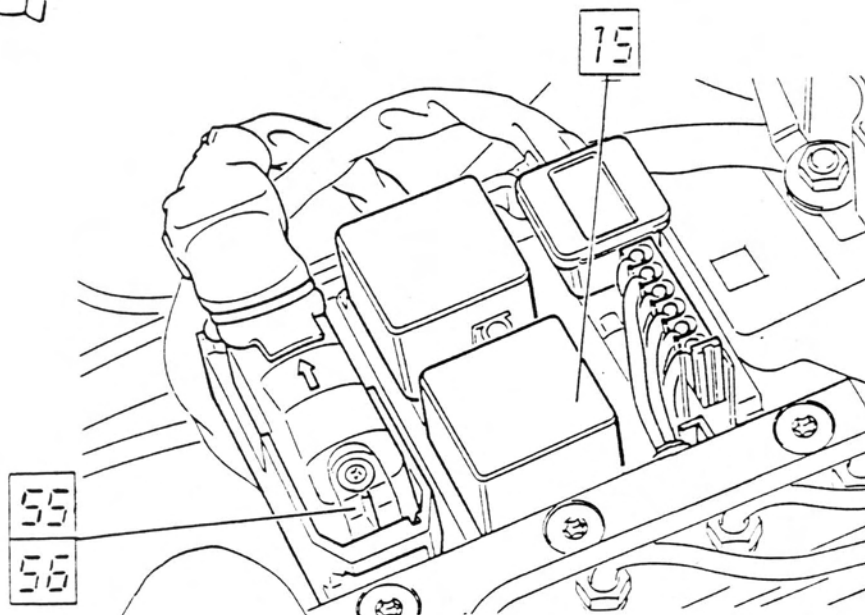
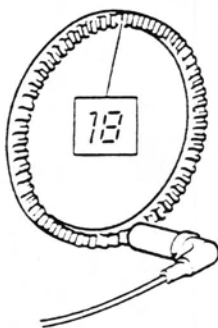
| CODE (All codes flash 3 times)           | CIRCUIT                              |
|------------------------------------------|--------------------------------------|
| 1-2                                      | Beginning of Test                    |
| 1-5                                      | Safety Relay/Pump Relay              |
| 1-6                                      | Stop Light Switch                    |
| 1-8                                      | Number of Teeth in Axle Sector Wheel |
| 3-3                                      | Left Rear Wheel Sensor               |
| 3-4                                      | Right Front Wheel Sensor             |
| 3-5                                      | Right Rear Wheel Sensor              |
| 4-1                                      | Left Front Wheel Sensor              |
| 4-2                                      | Right Front Wheel Electrovalve       |
| 4-4                                      | Left Front Wheel Electrovalve        |
| 5-1                                      | Electrovalves for Rear Wheels        |
| 5-3                                      | Pump Motor                           |
| 5-5                                      | ECU (Computer)                       |
| 5-6                                      | Auto-Diagnostic Interruption         |
| 5-7                                      | Battery Voltage (after Safety Relay) |
| <b>ADDITIONAL CIRCUITS TO BE CHECKED</b> |                                      |
| NO CODE                                  | CIRCUIT                              |
|                                          | Checking Pump Relay                  |
|                                          | Checking Supply (+P) and (+AC)       |
|                                          | Checking ABS Warning Indicator       |

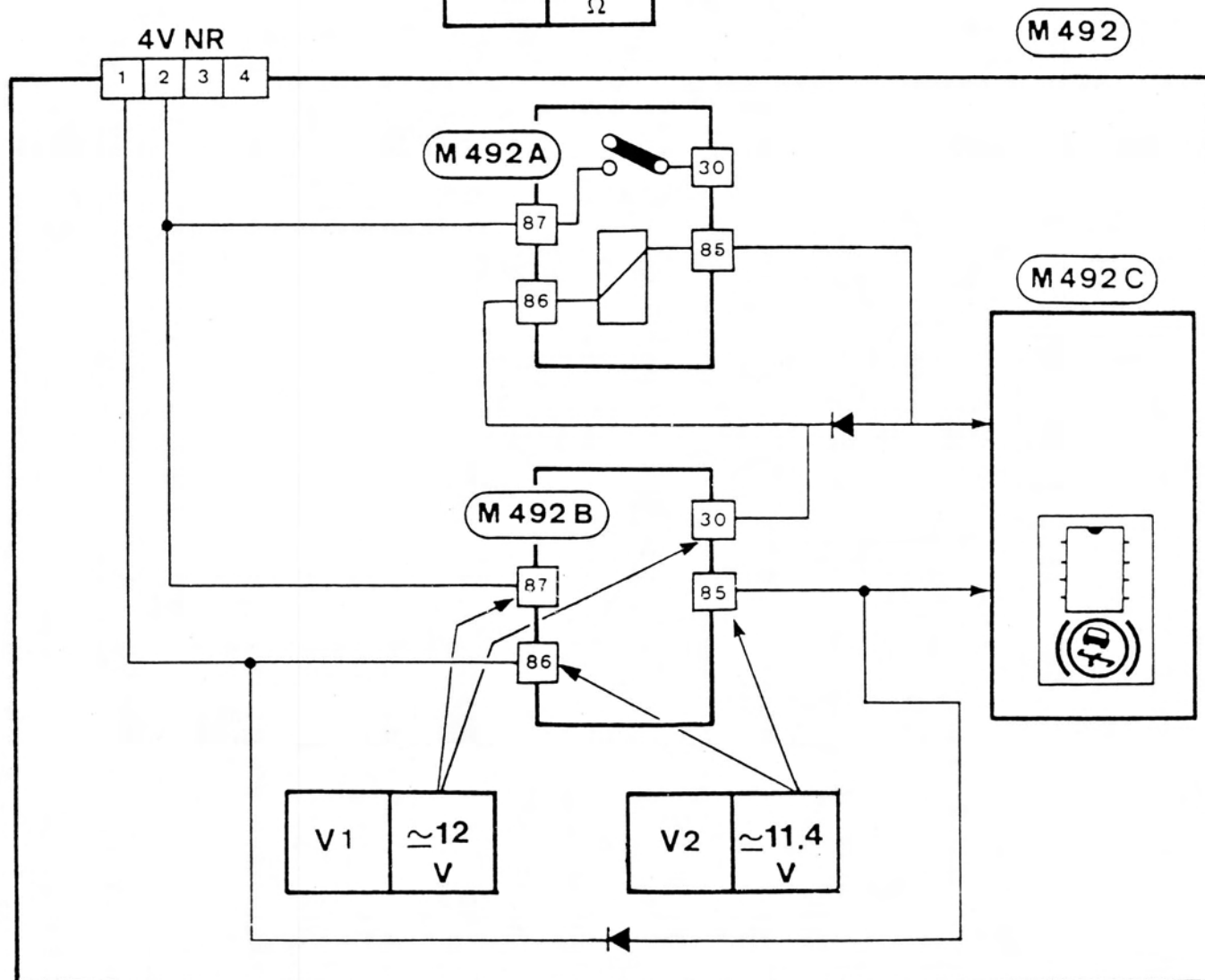
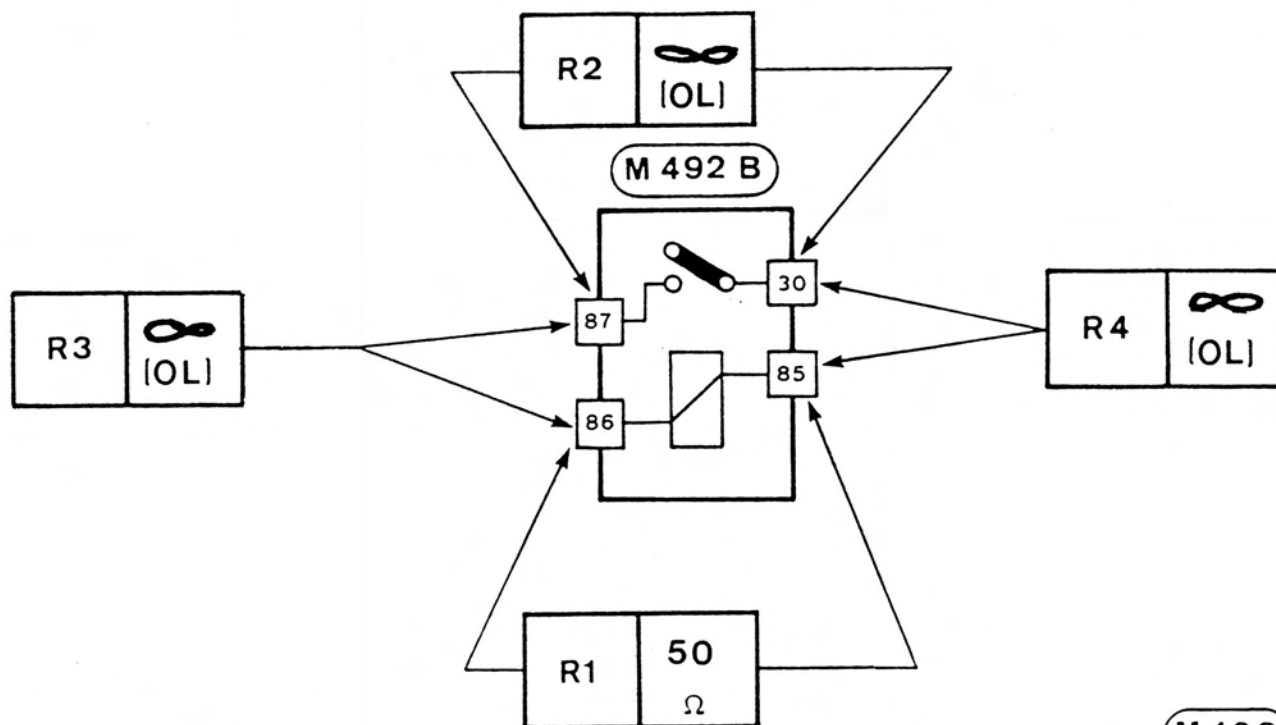
NOTE: The M492C ECU has a permanent memory which memorizes intermittent defects; these are held in memory even if key is turned off up to 20 times or if the ECU connector is disconnected

Maximum of 3 faults in memory; however only 1 fault can be retrieved at a time

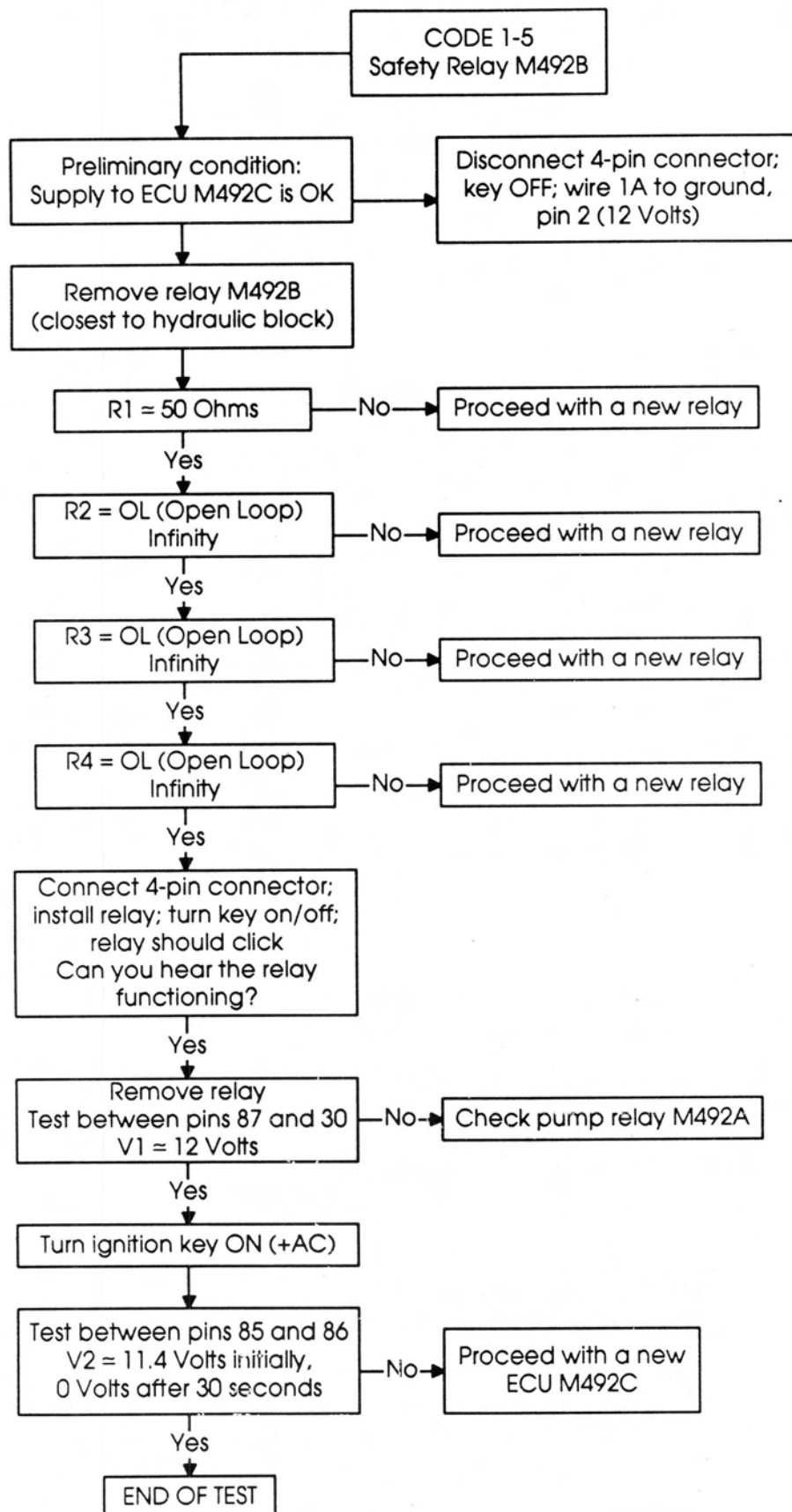


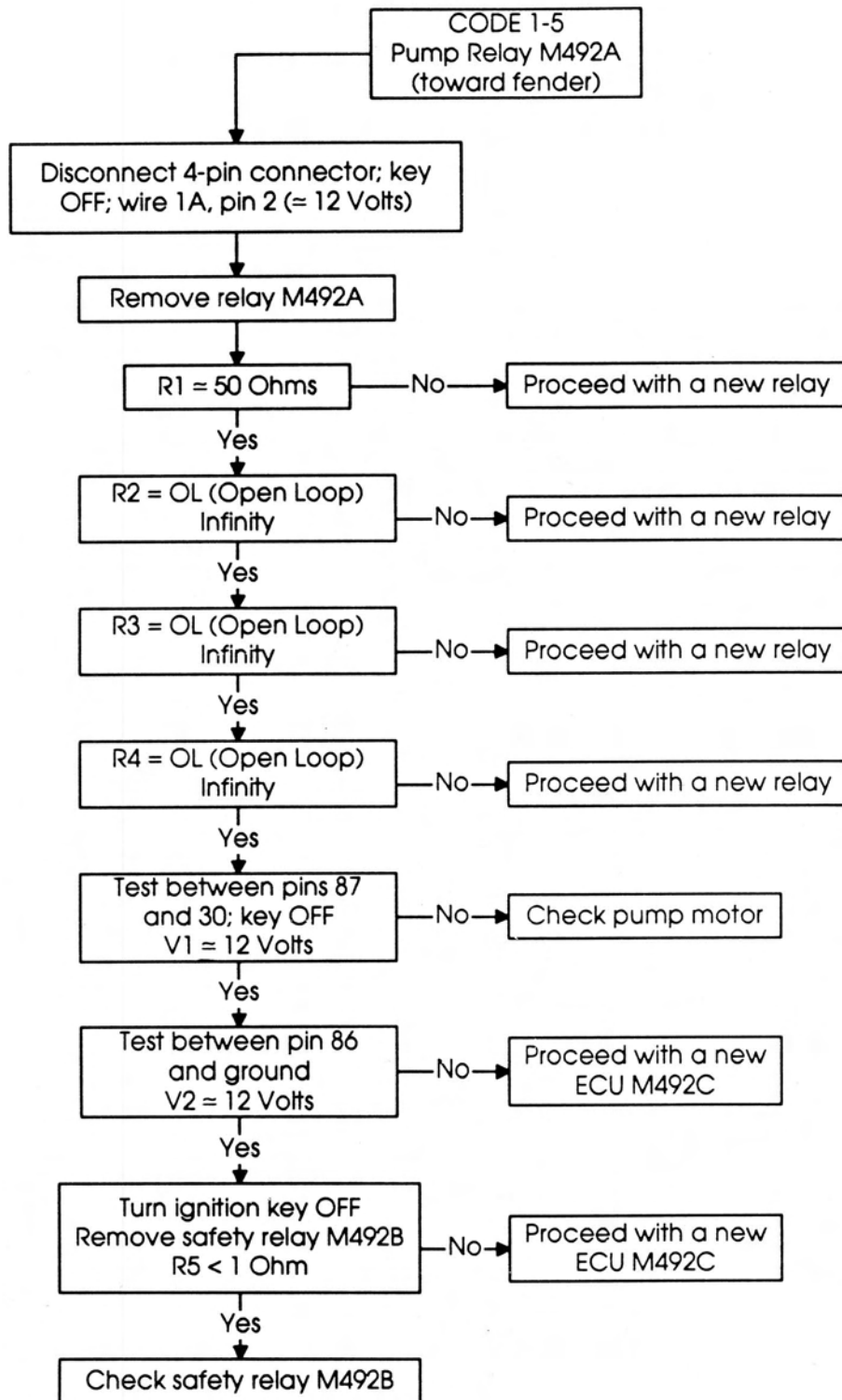
**NOTE:**  
The only individual components of the ABS Unit that are available as spare parts are the safety and pump relays. If a defect is found in other components (i.e. Hydraulic Pump, Electrovalves, ECU) the complete ABS Unit must be replaced.

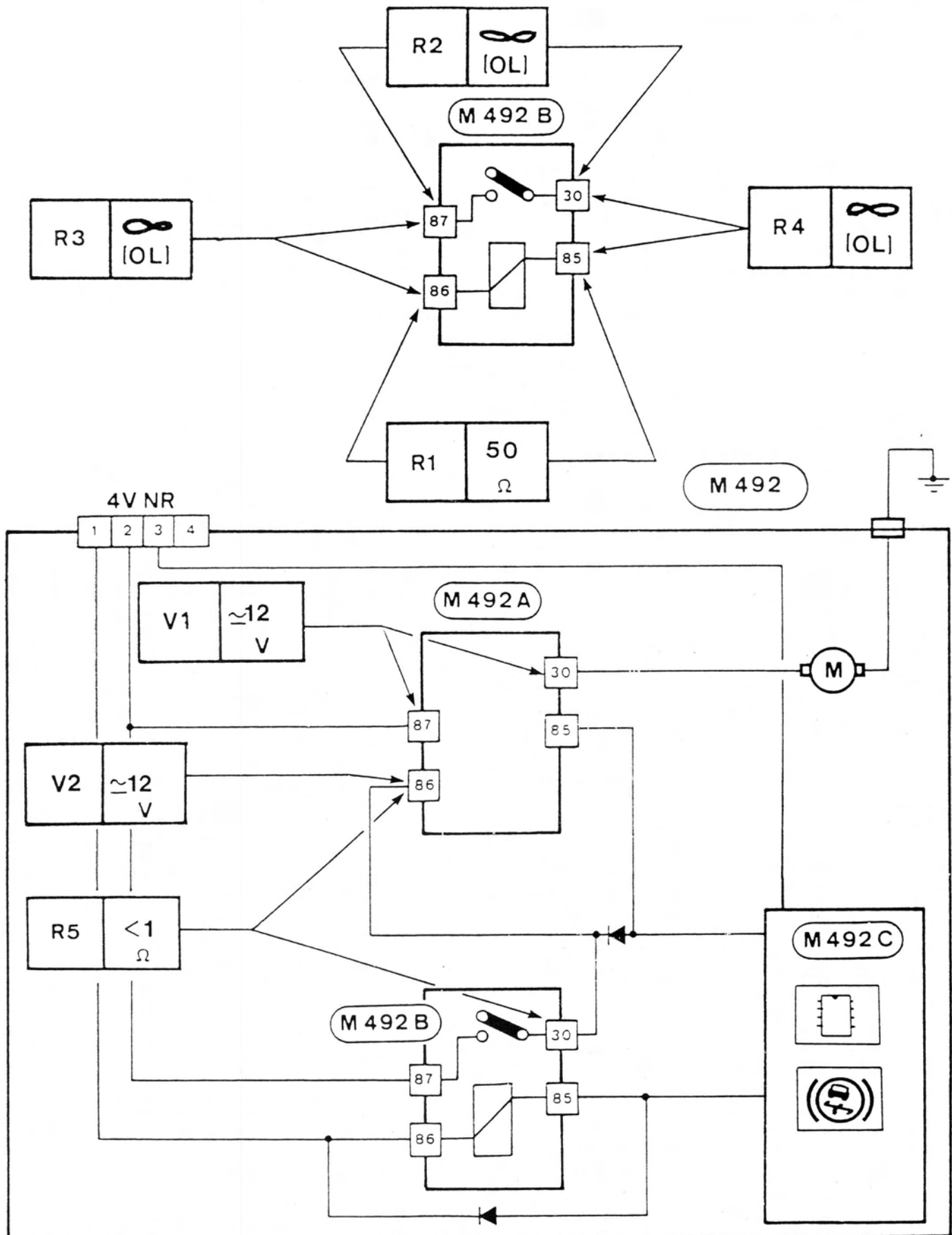


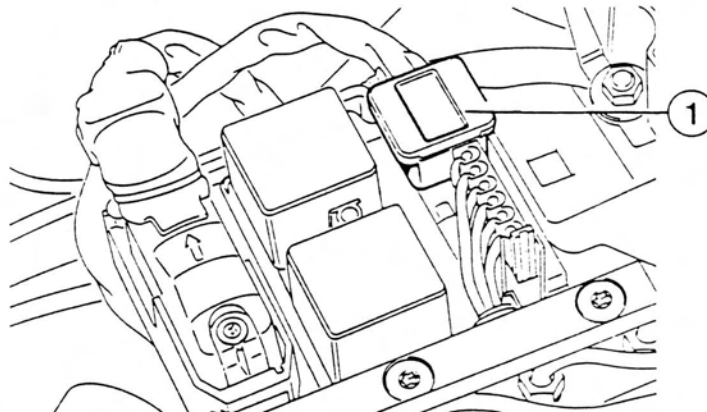
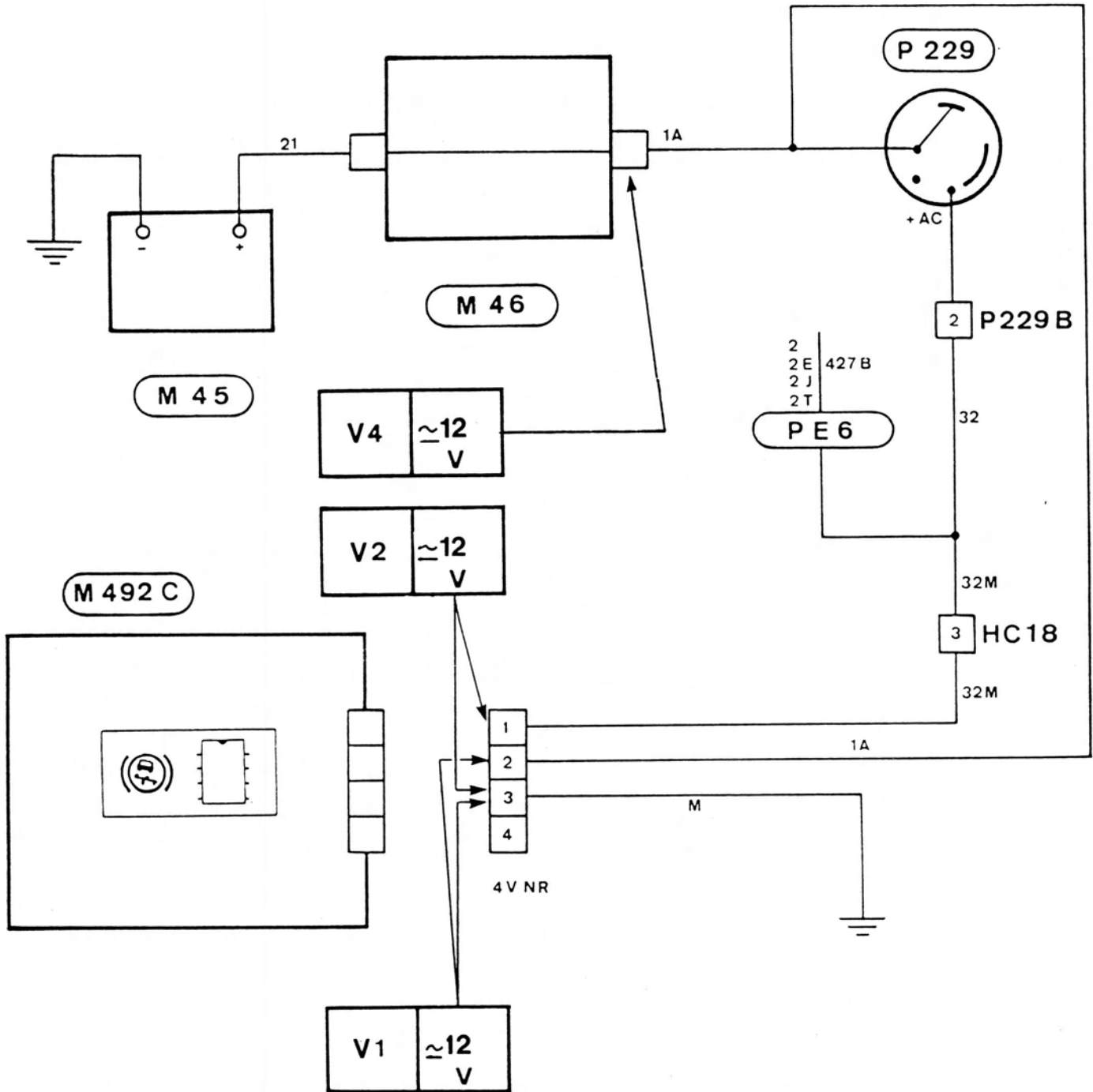


Cover must be removed to perform any of the following tests (#15 Torx)

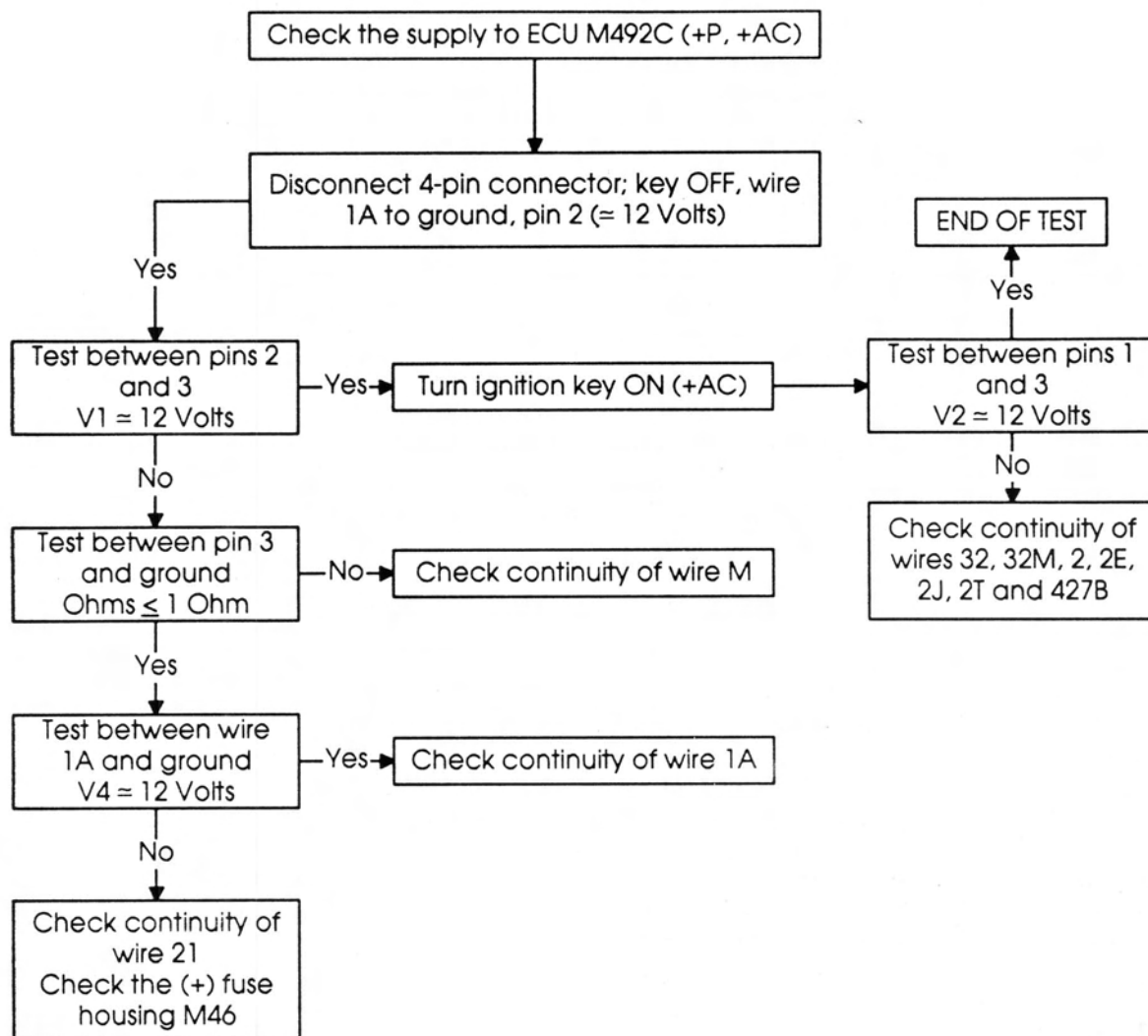




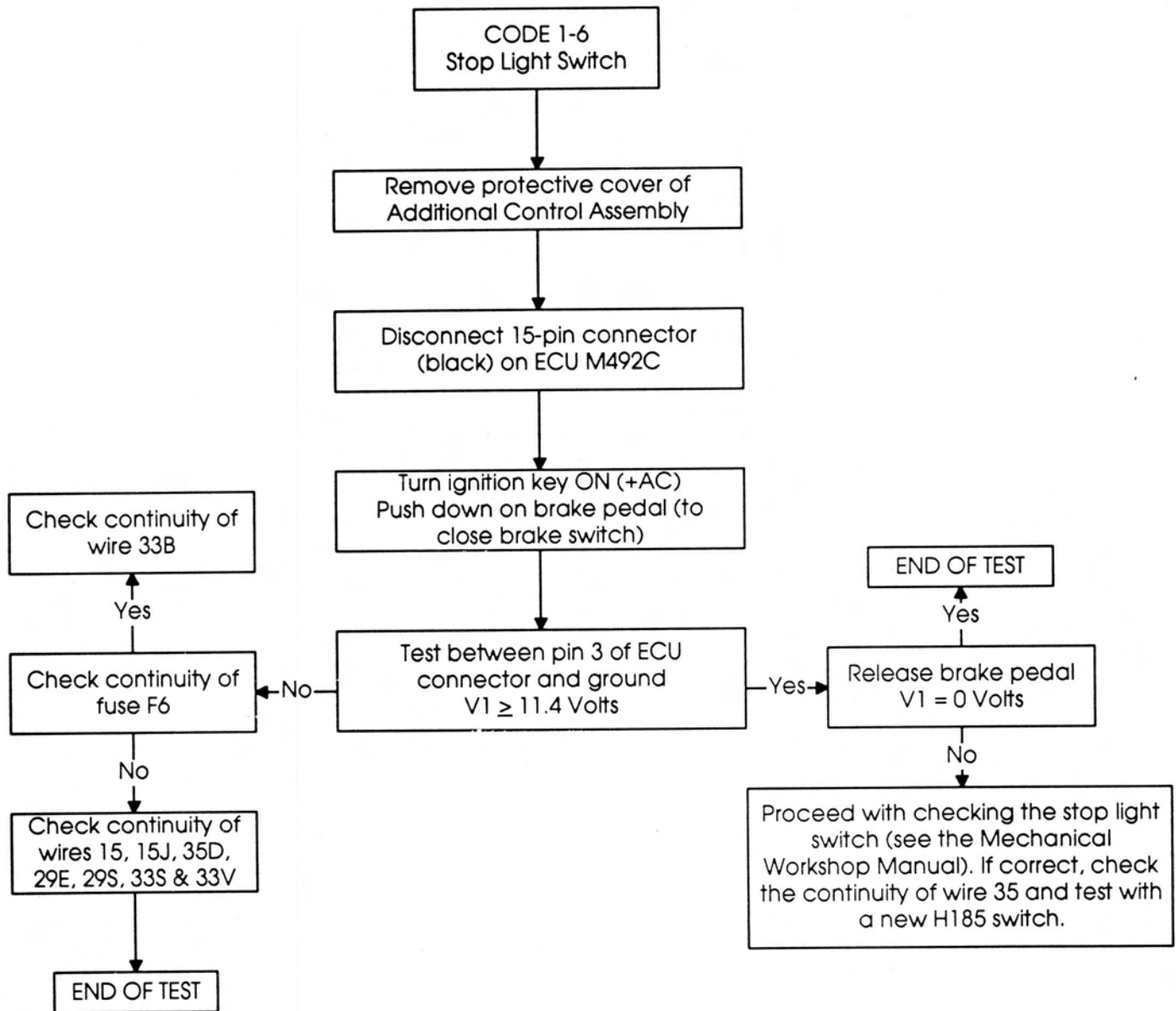


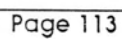


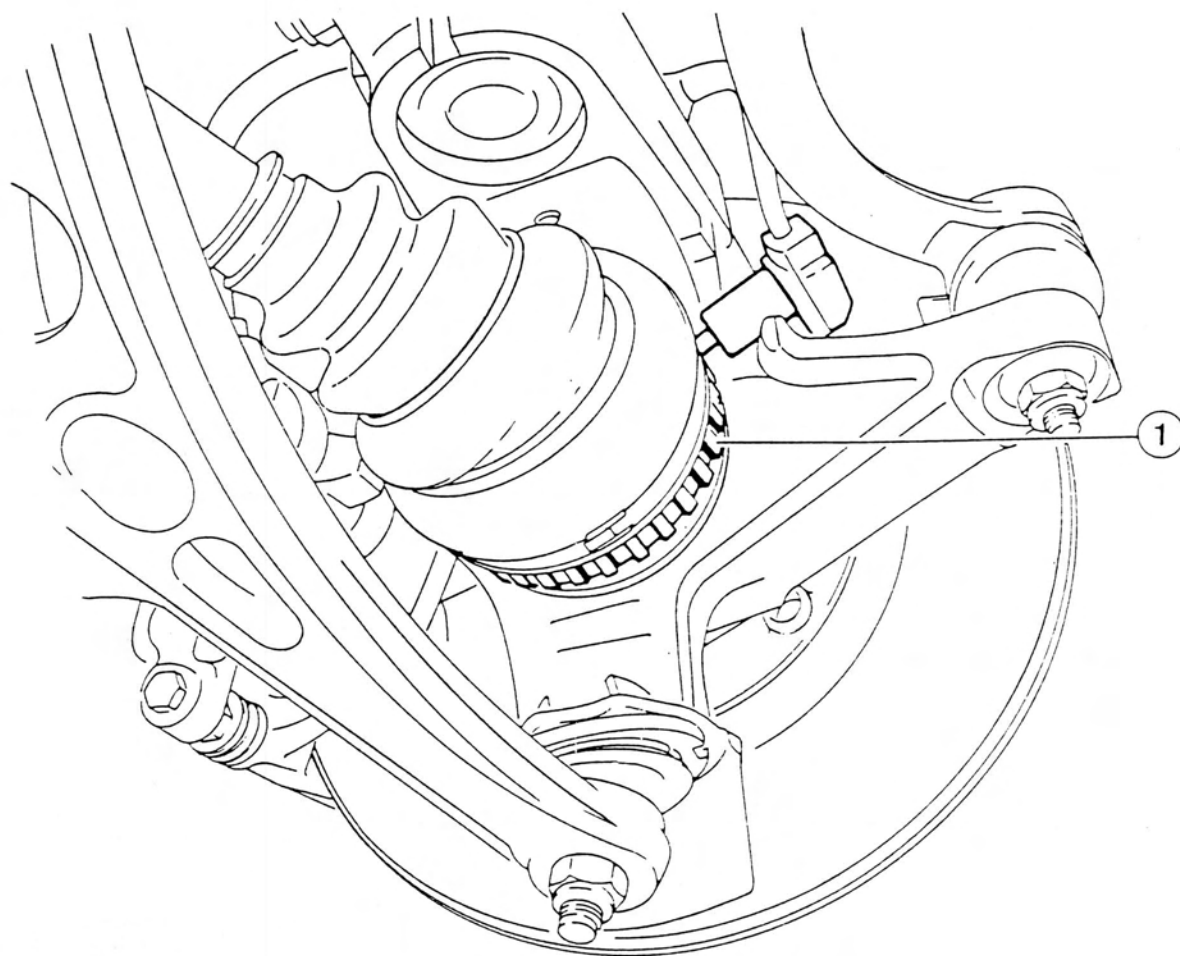


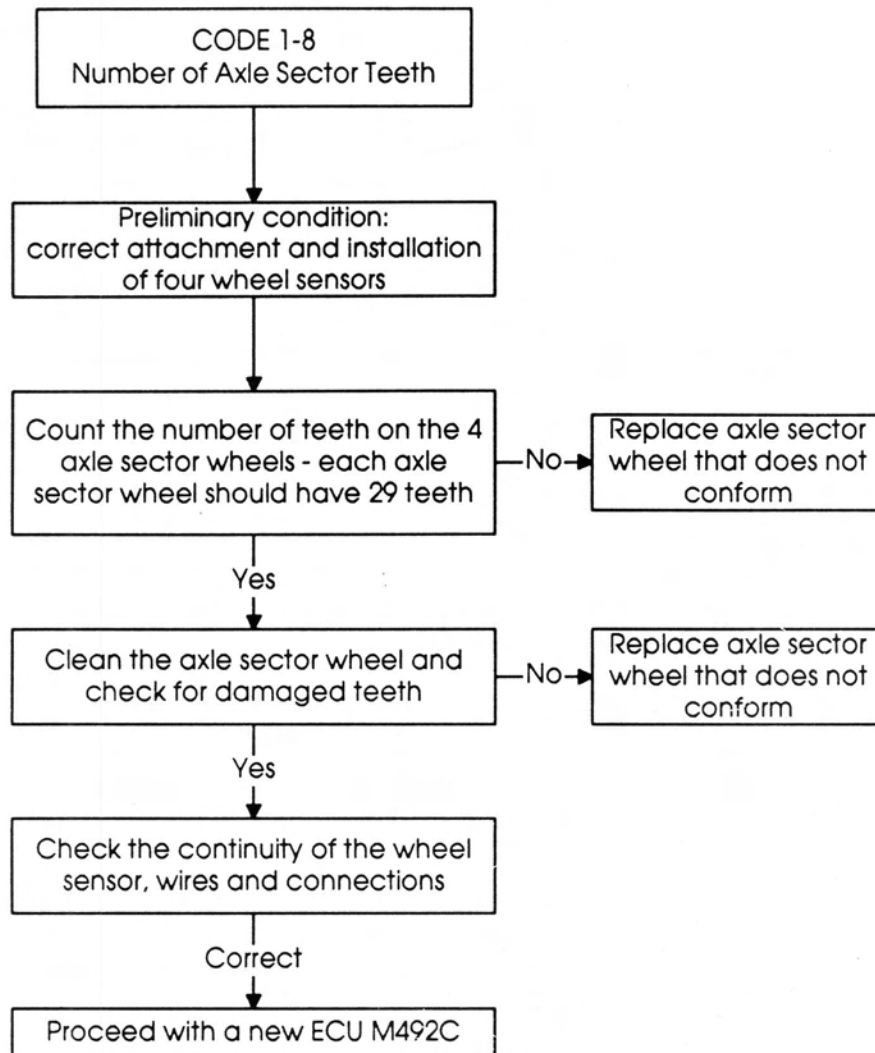


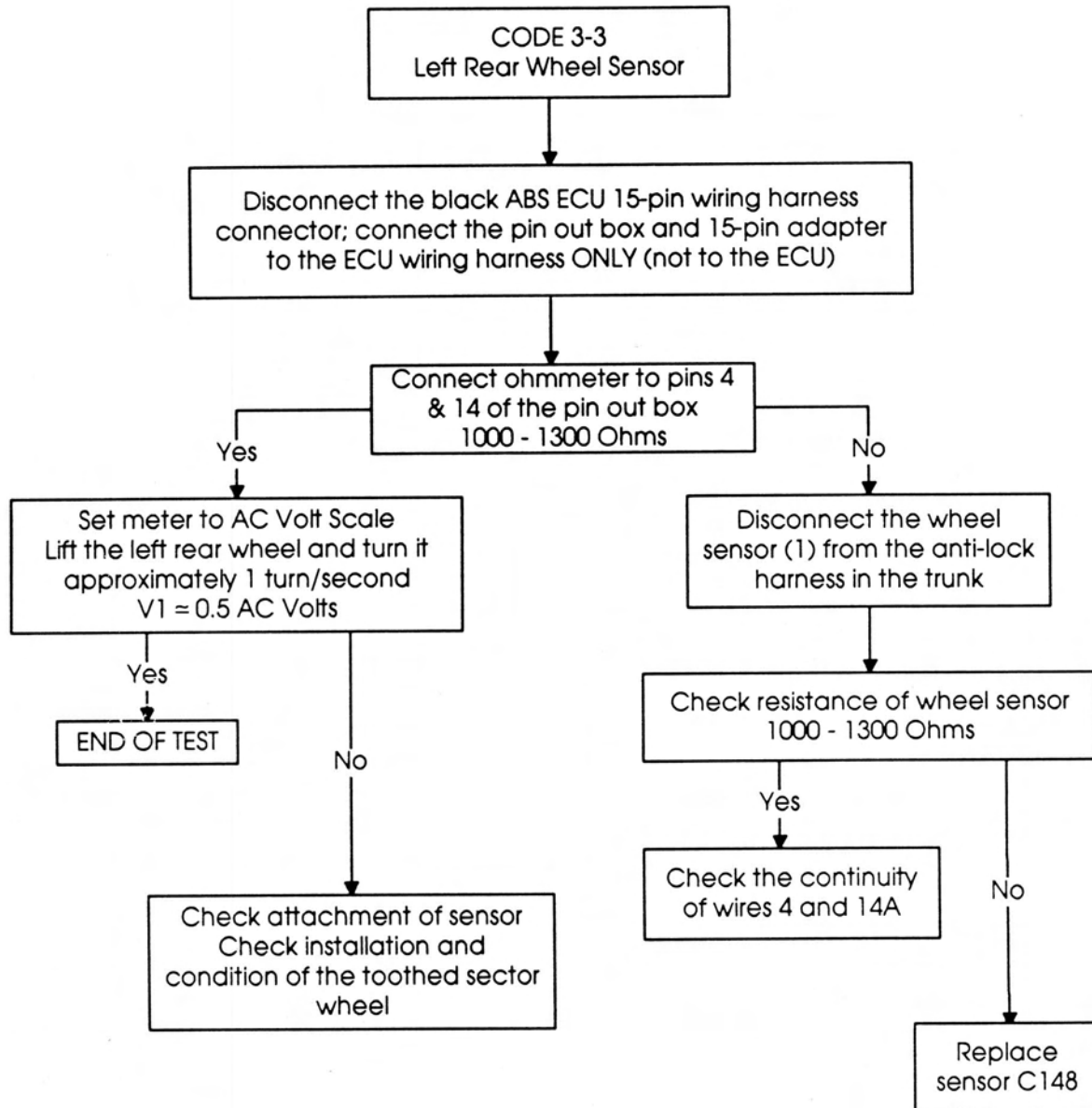
Everything connected:

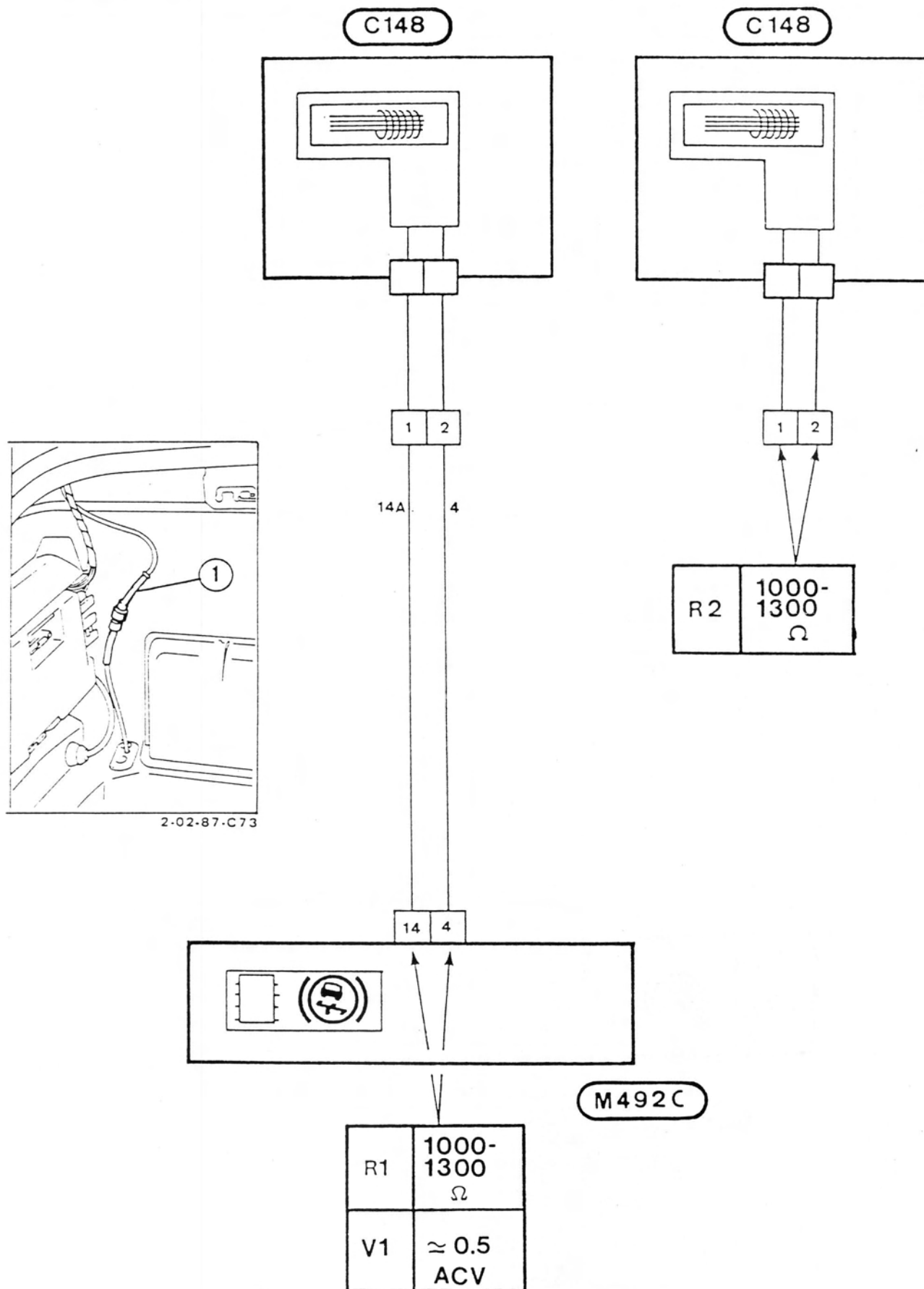


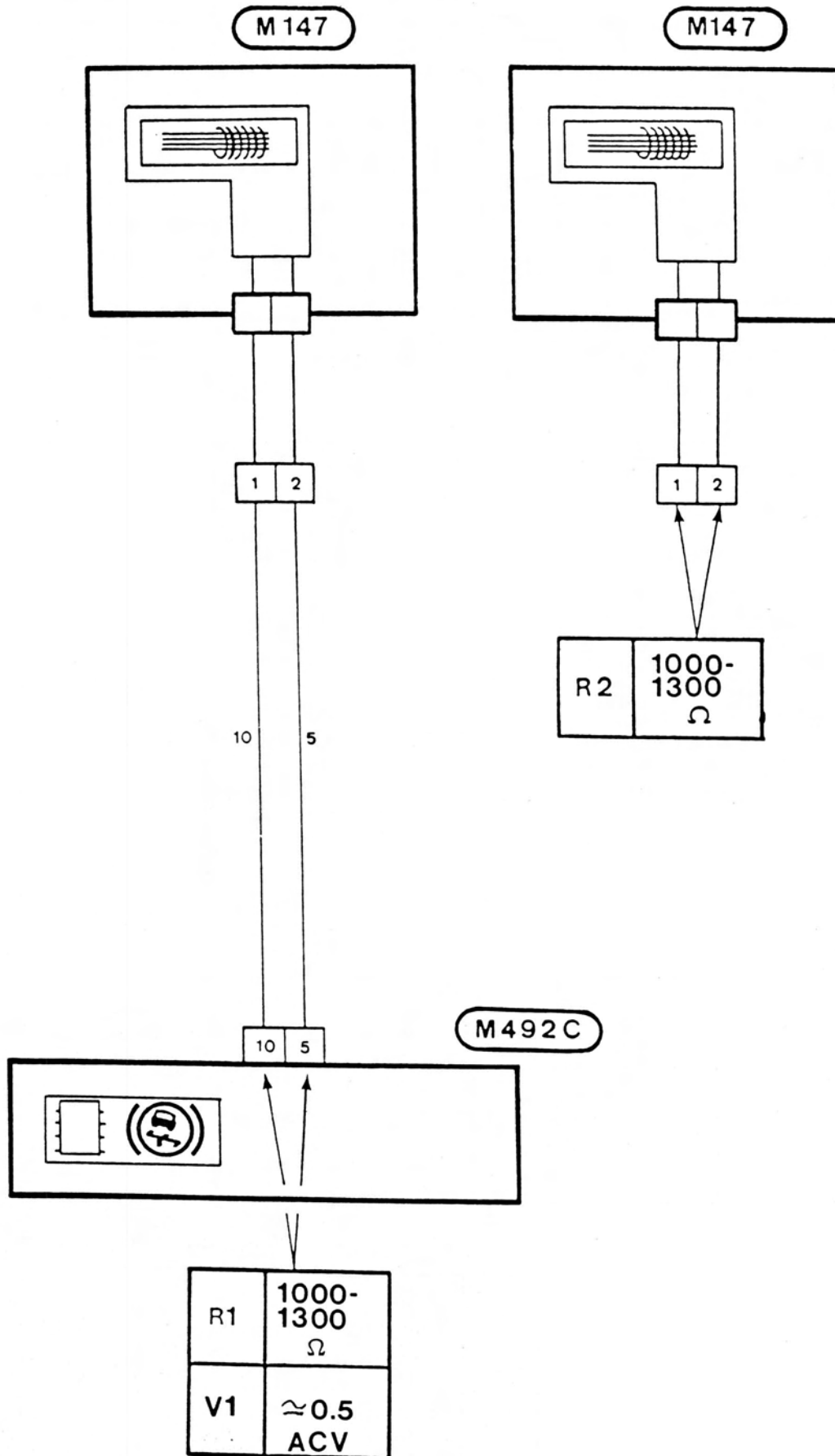




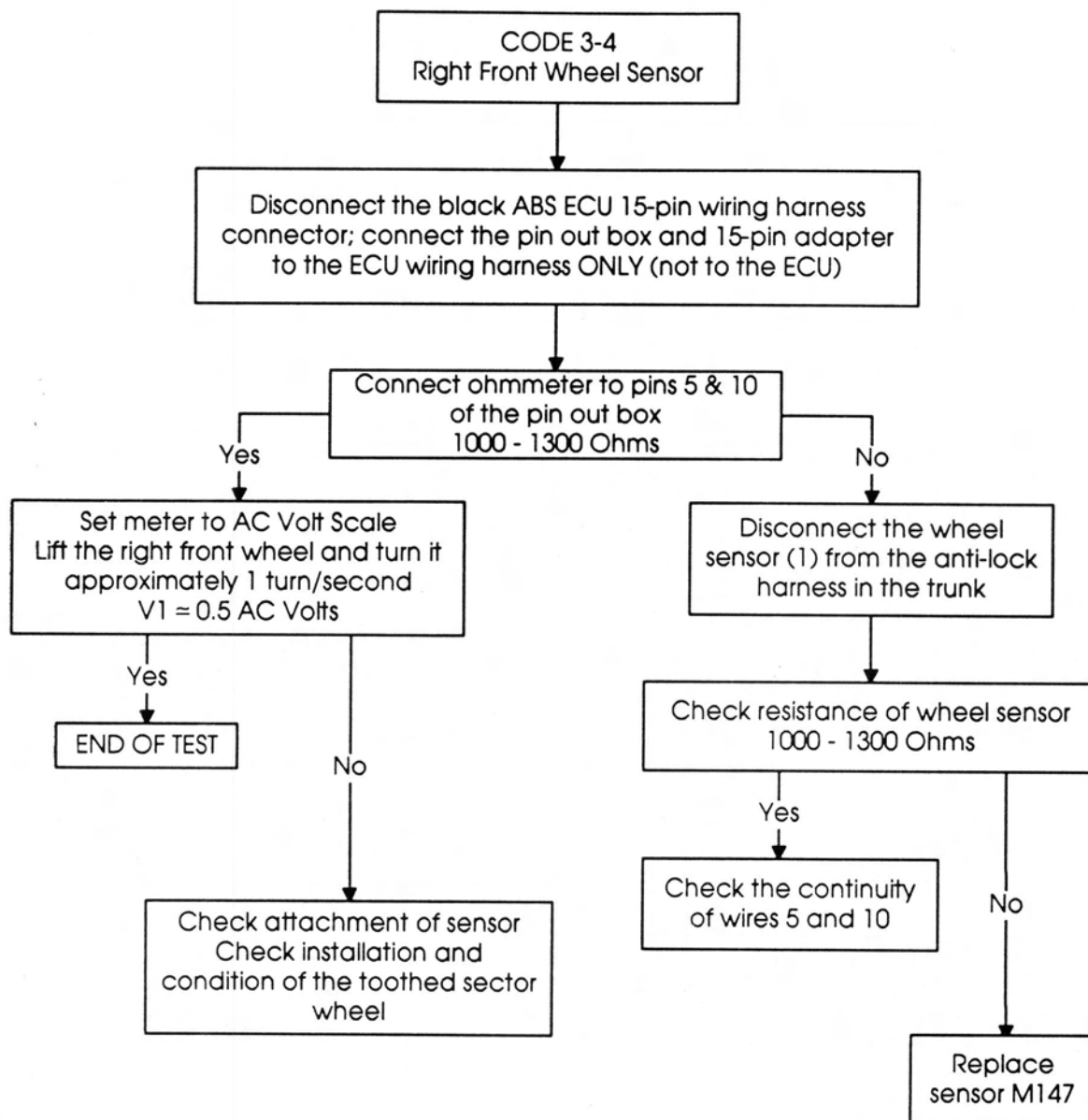


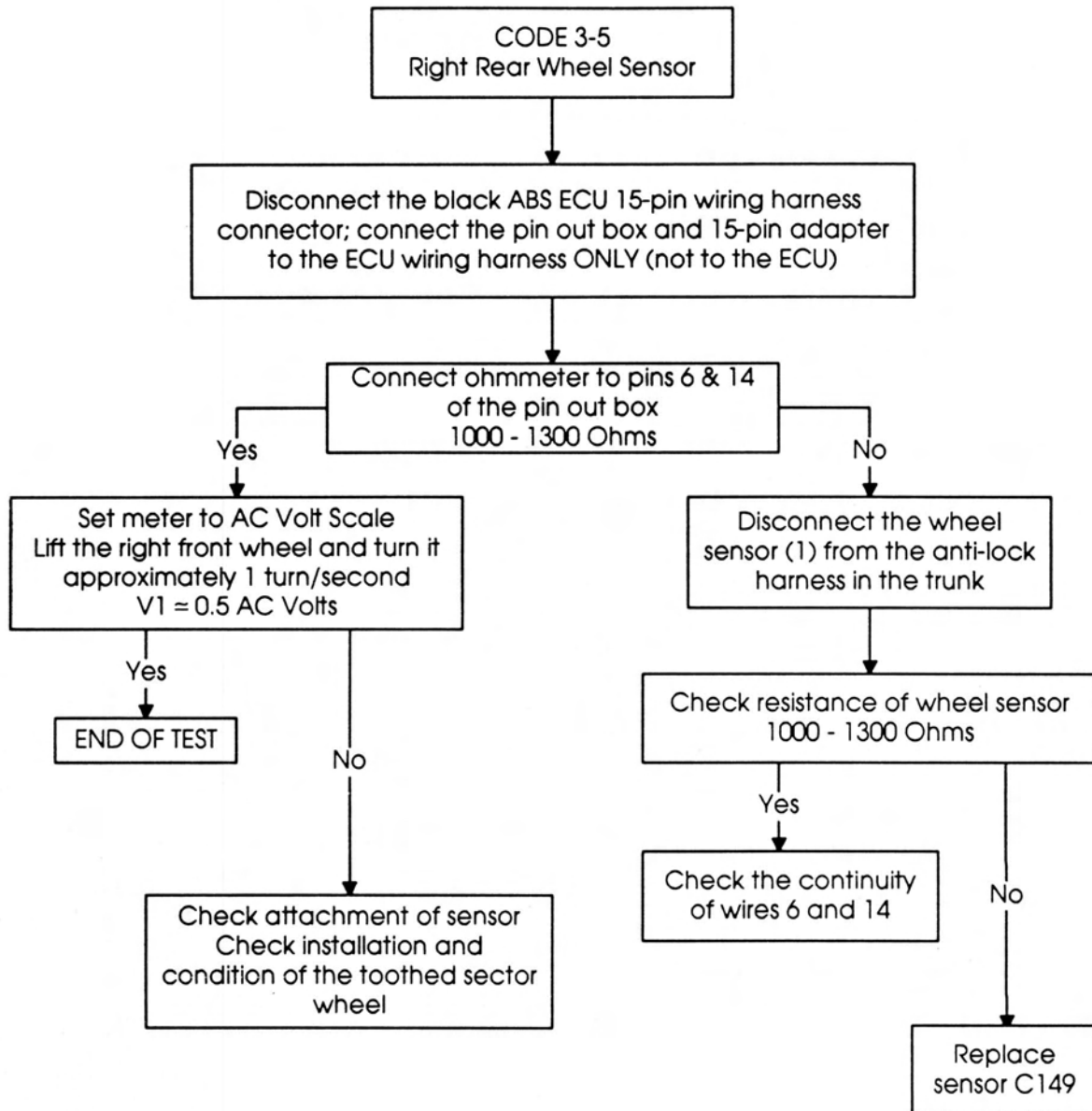


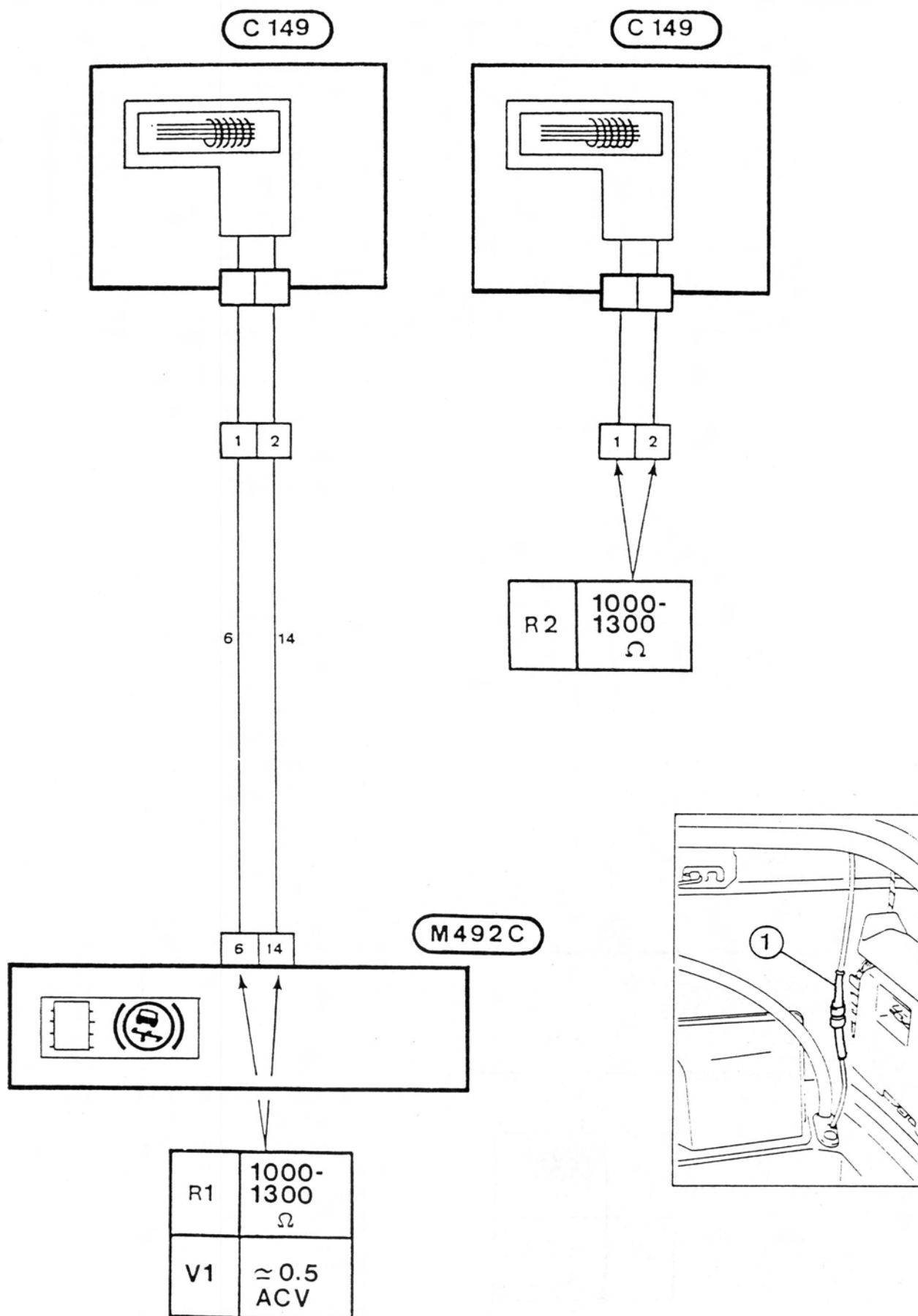


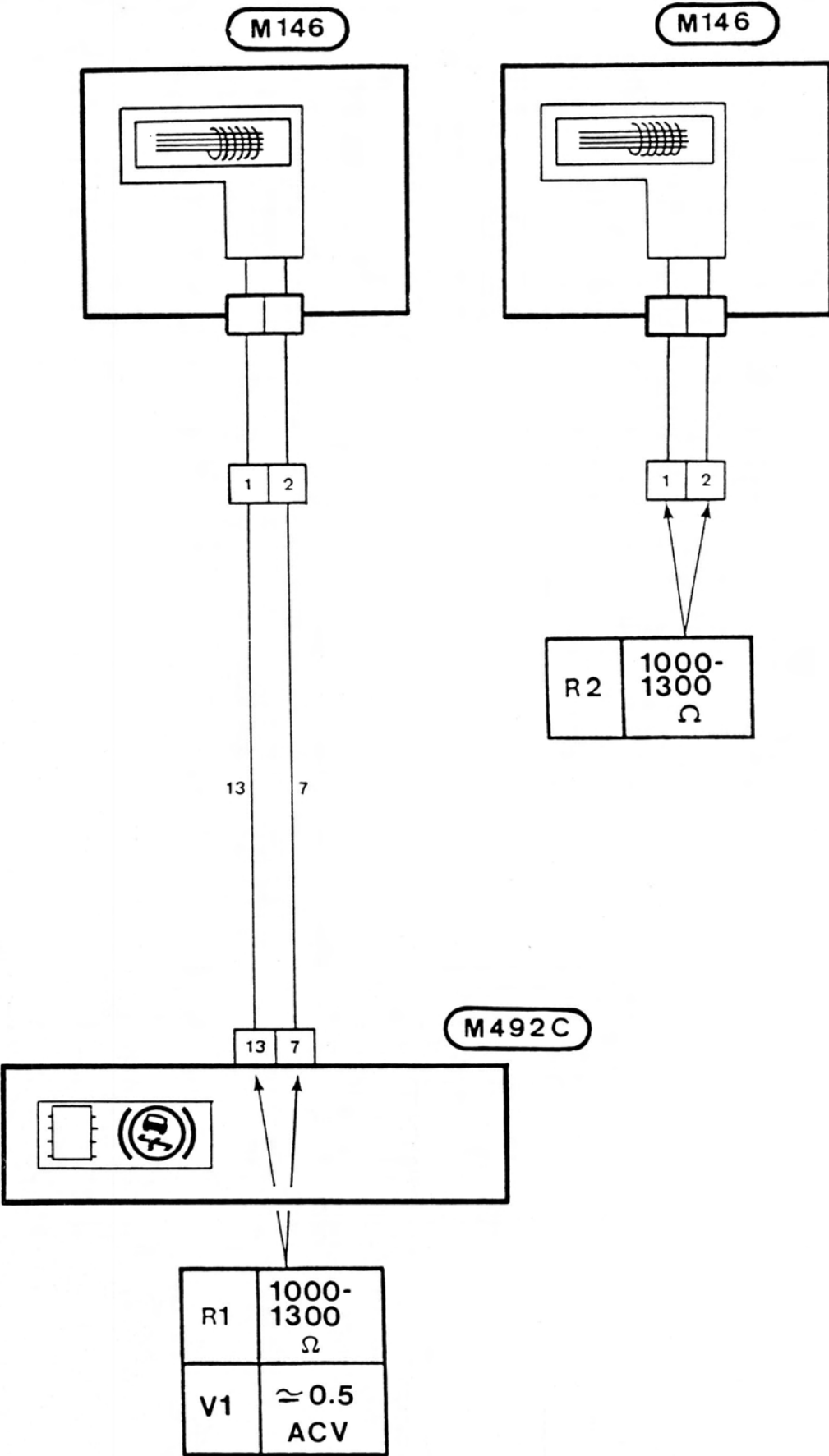


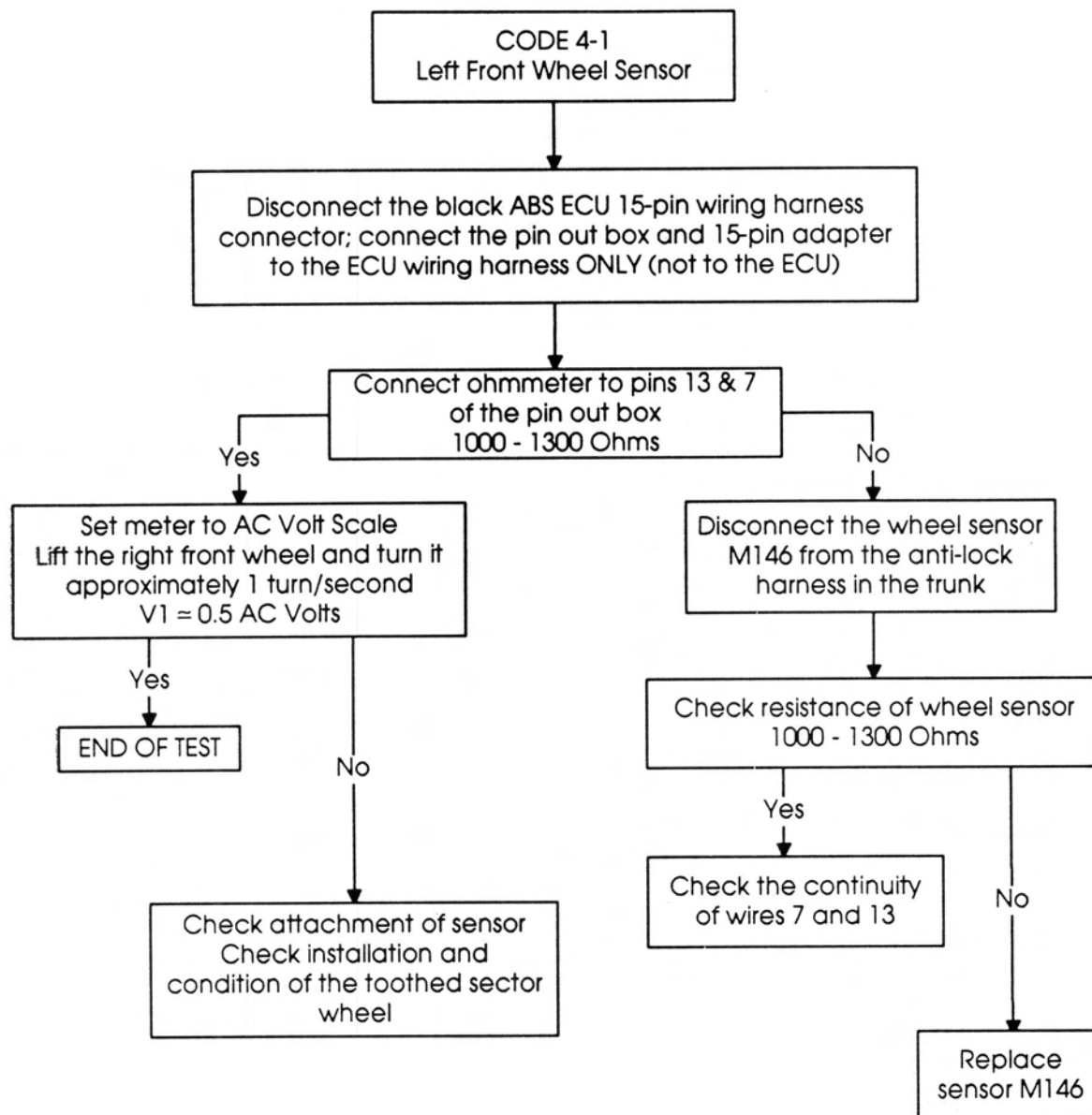


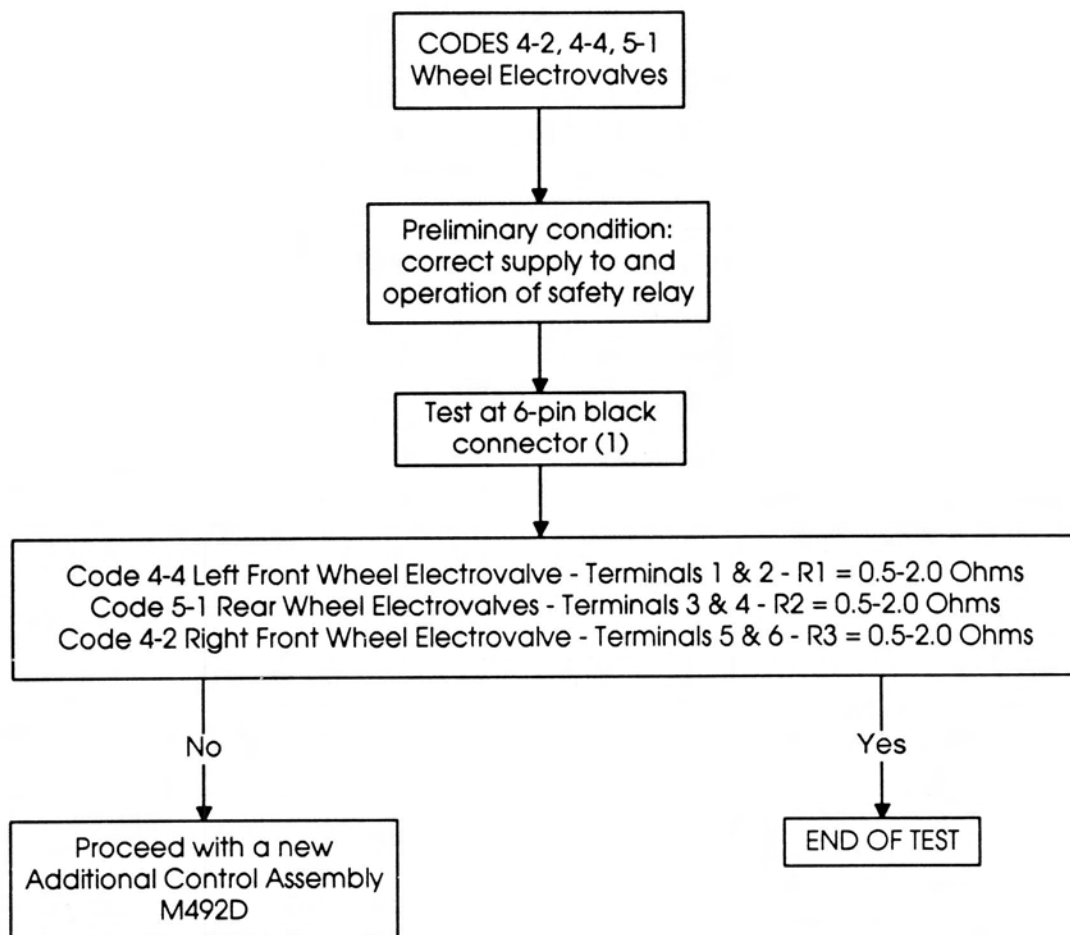


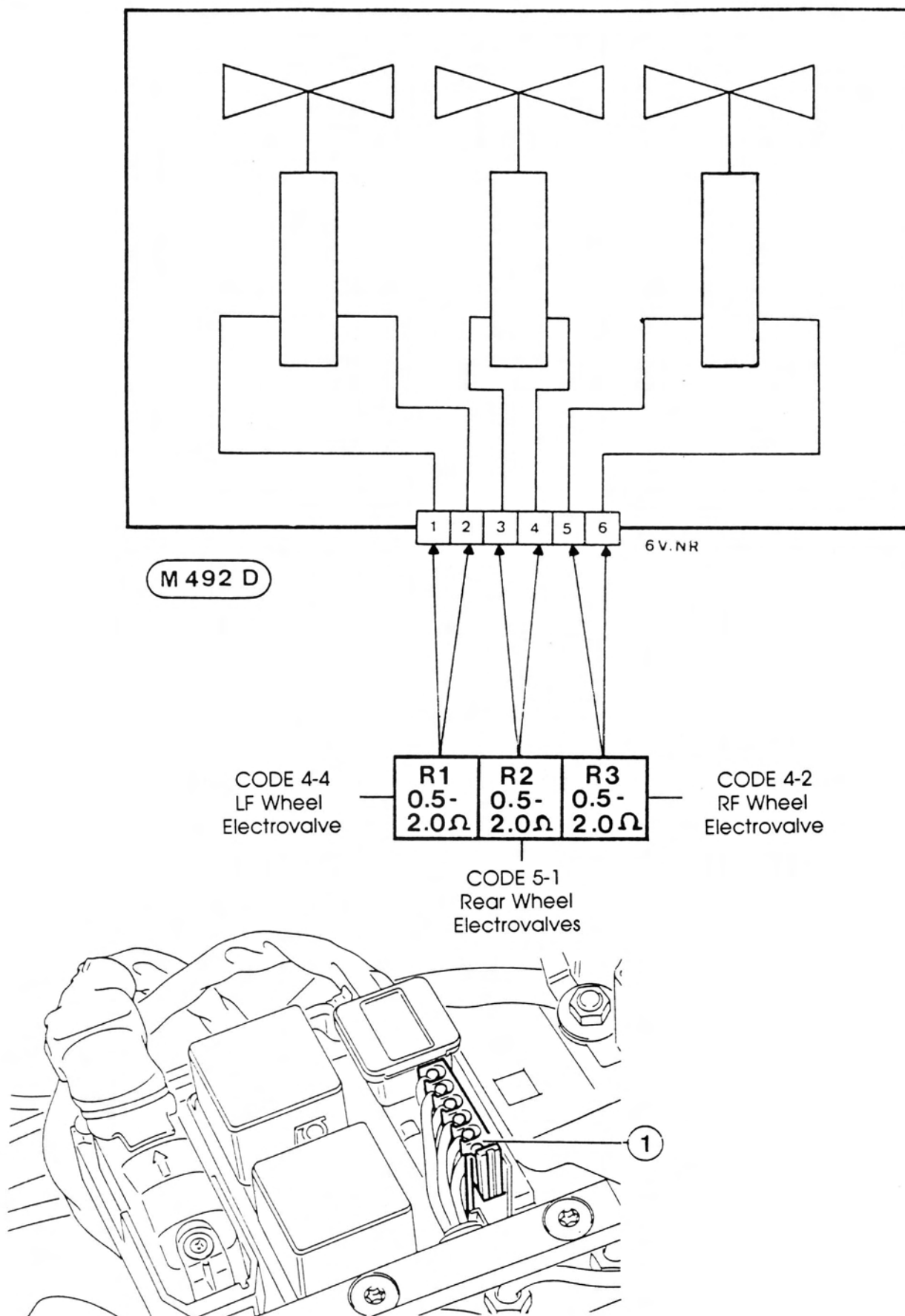


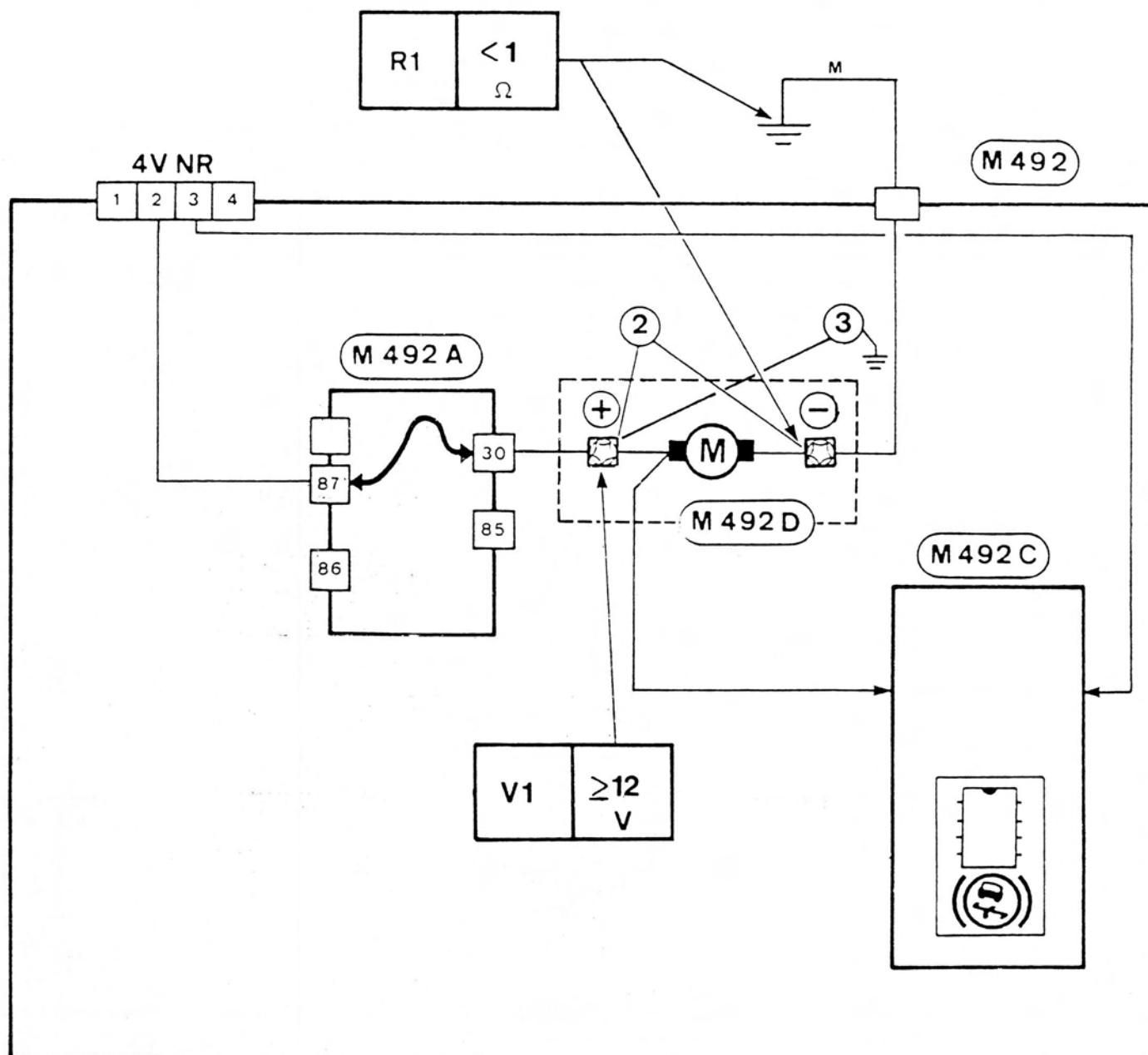
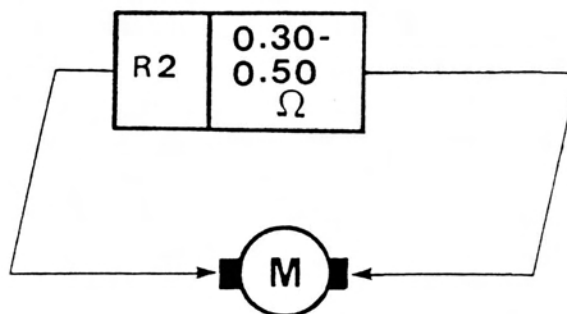
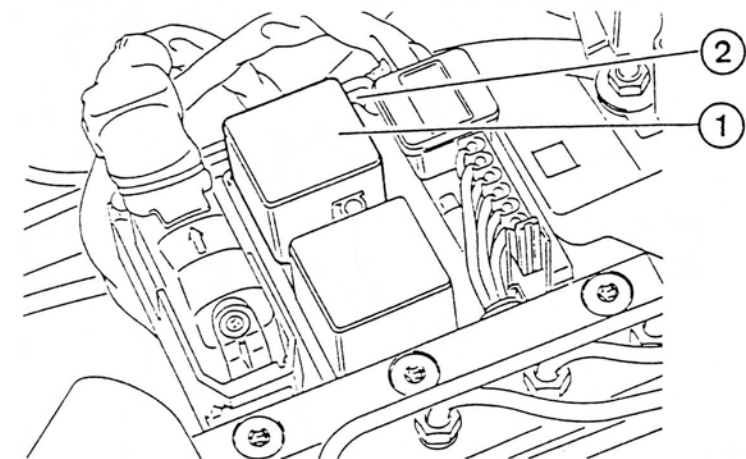




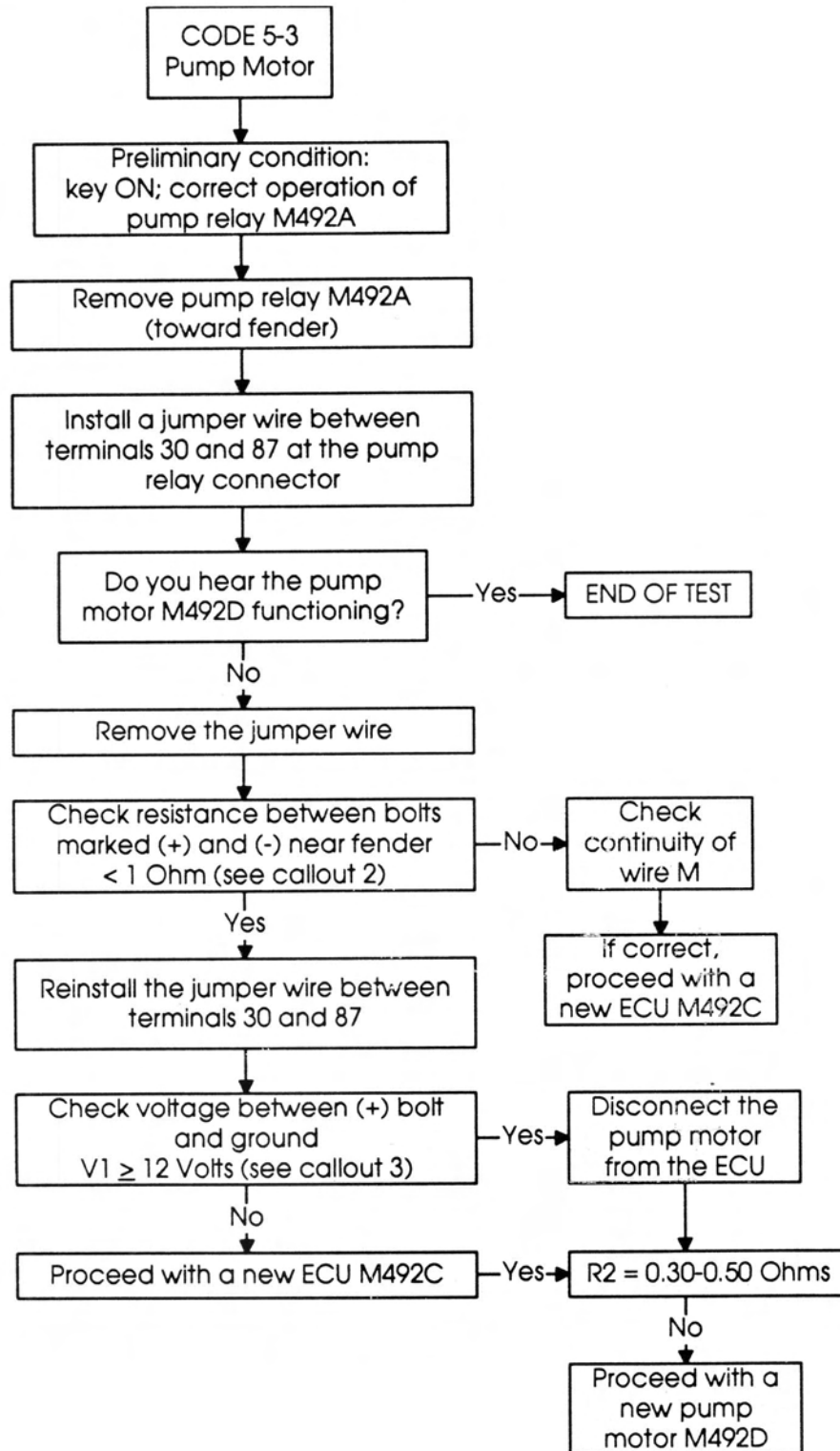


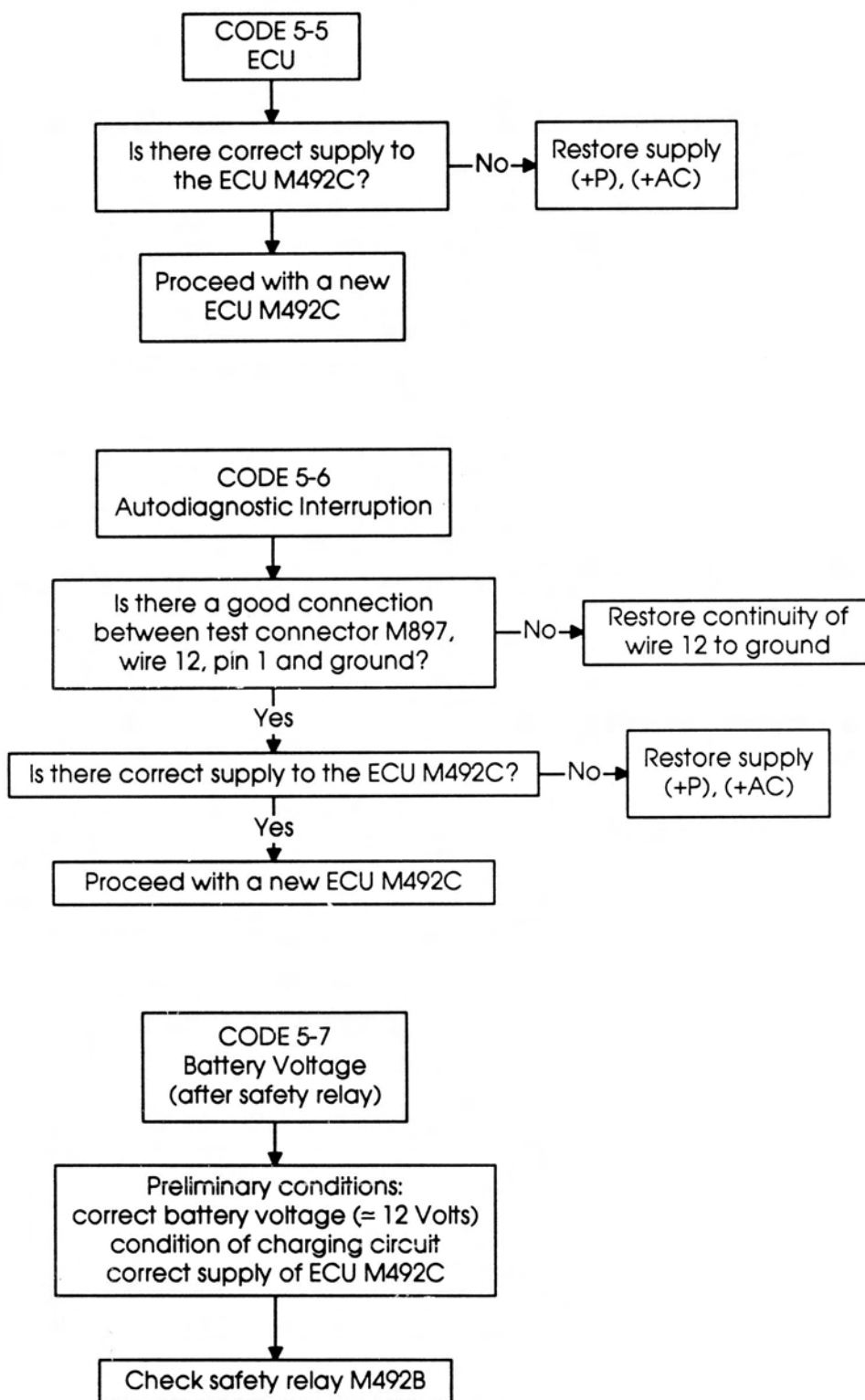


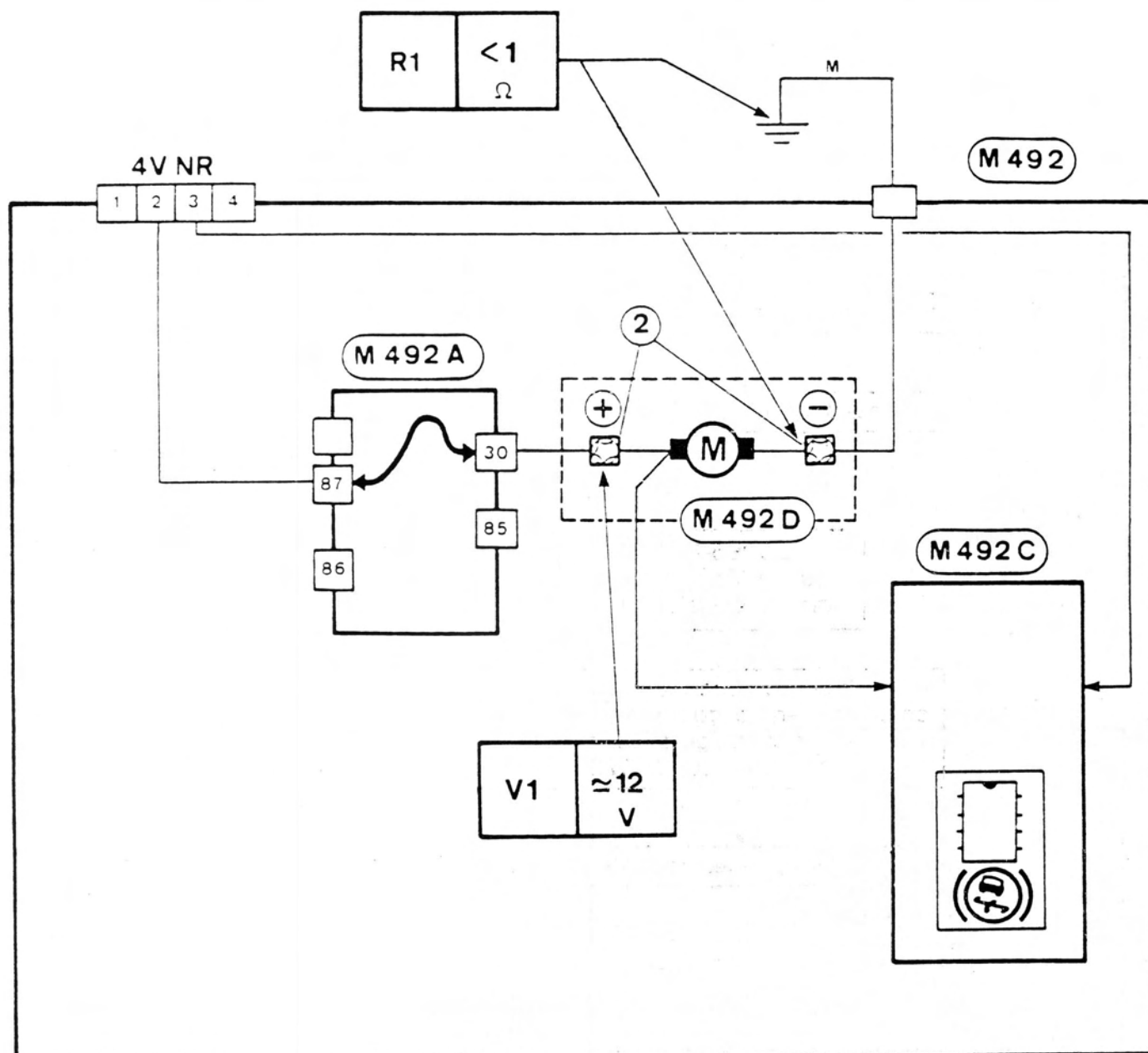
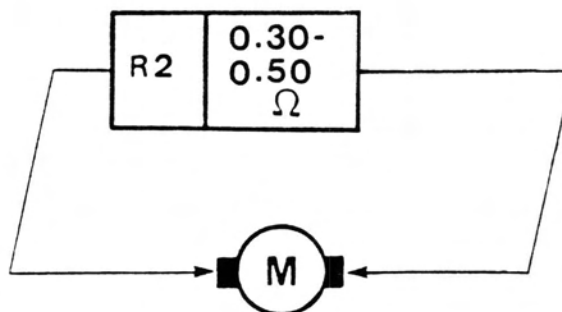
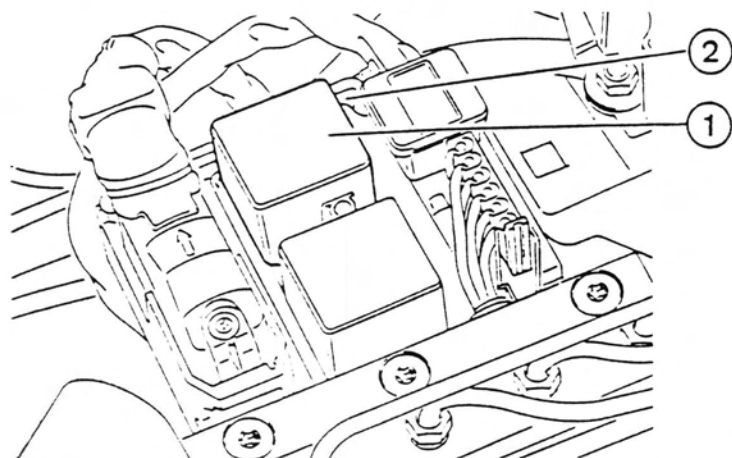


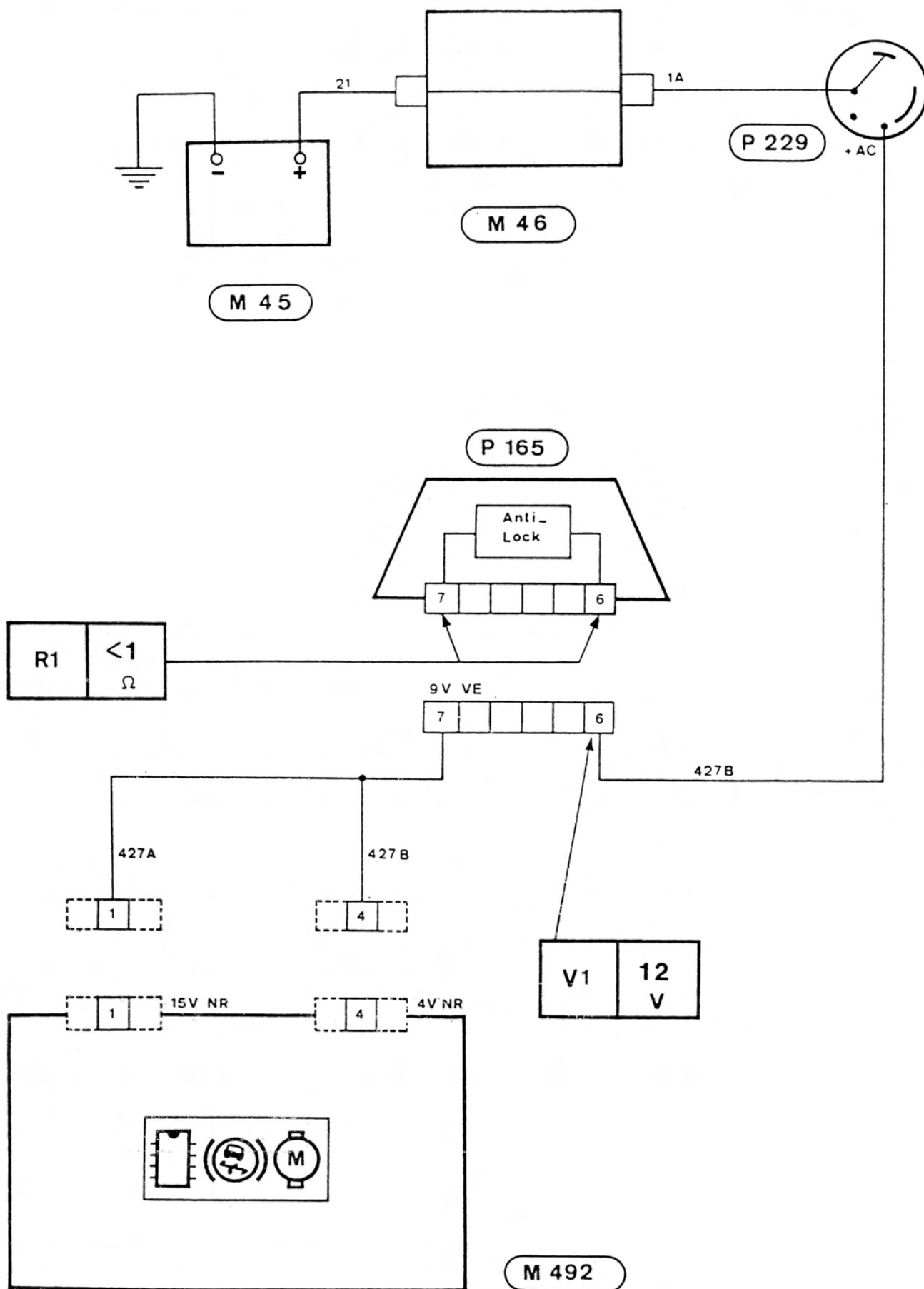


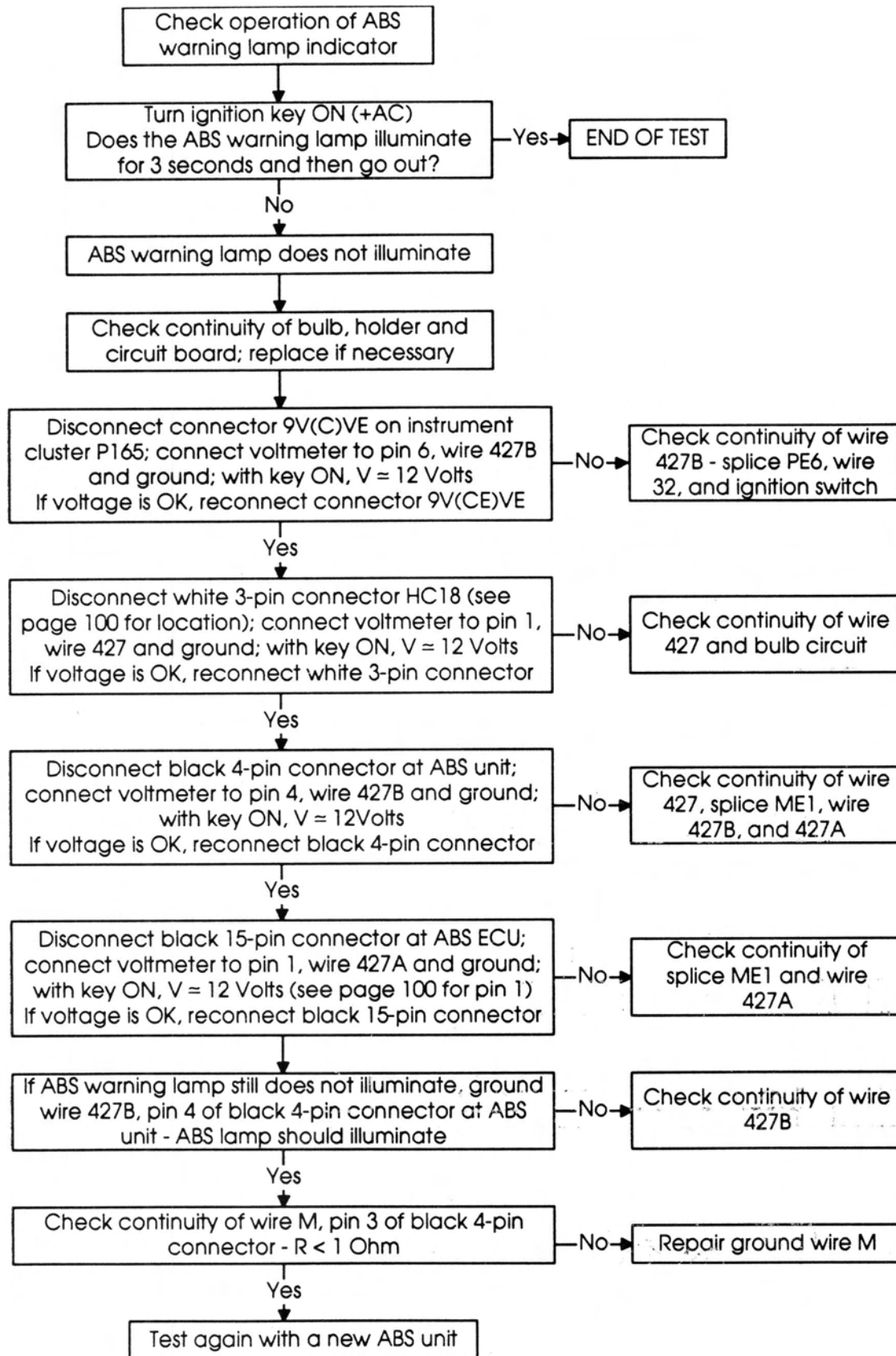


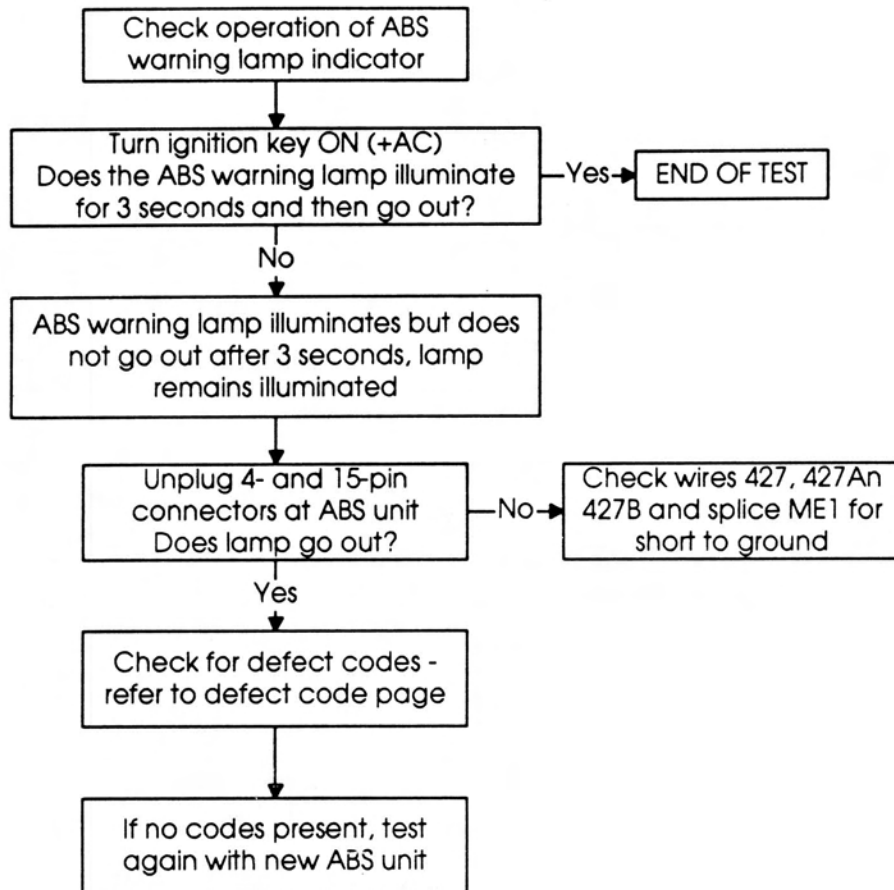


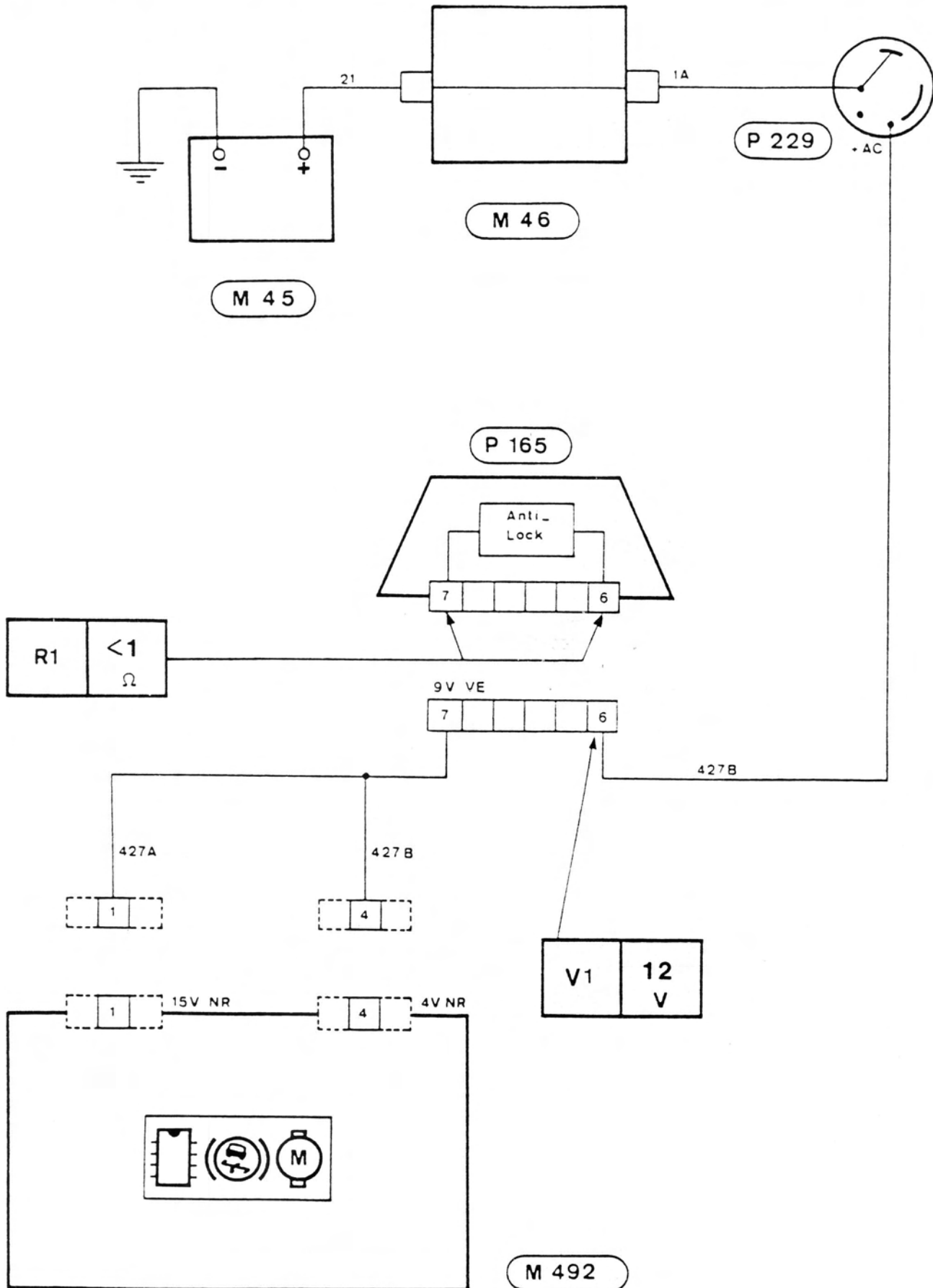












## NOTES

[illegible]

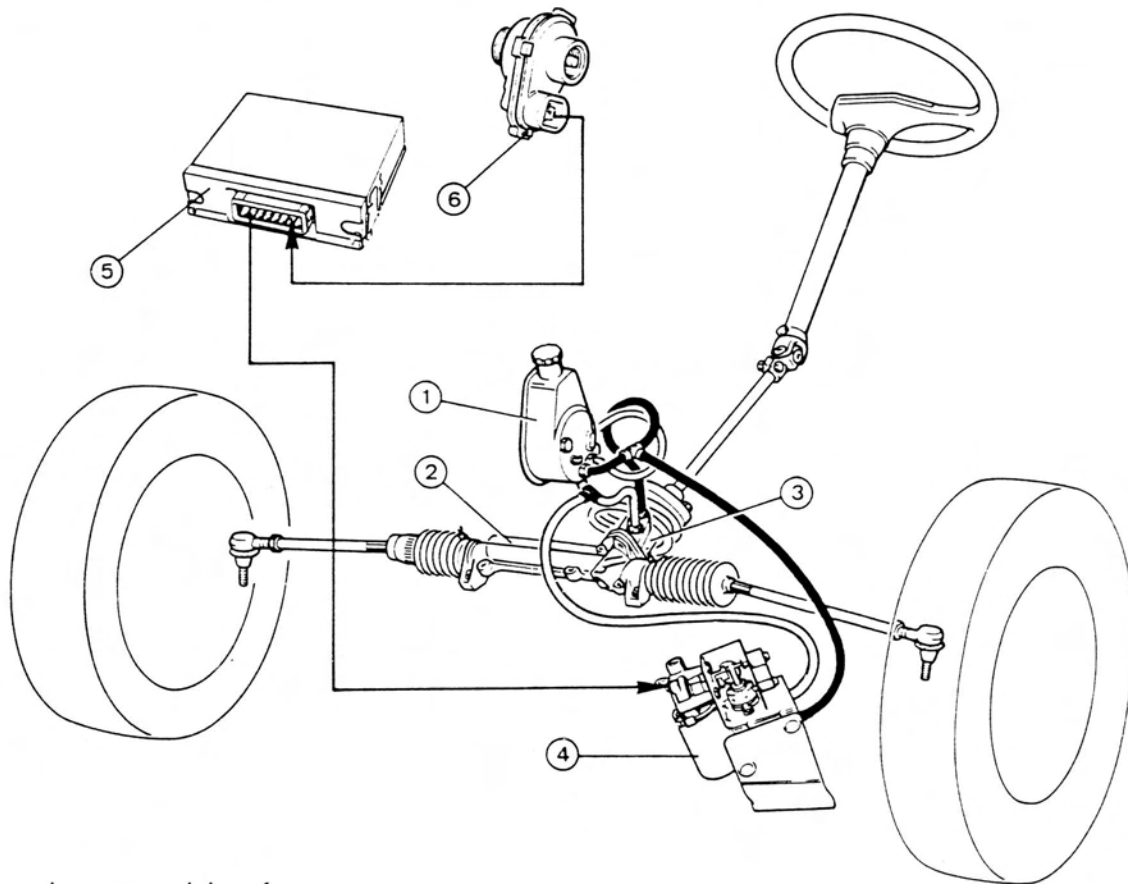


**505 VARIABLE RATIO  
POWER STEERING**

## VARIABLE RATIO POWER STEERING

Fitted on:

From 1987 505 V6 STX, standard  
From 1987 505 V6 STI, optional  
From 1987 505 Turbo S, optional



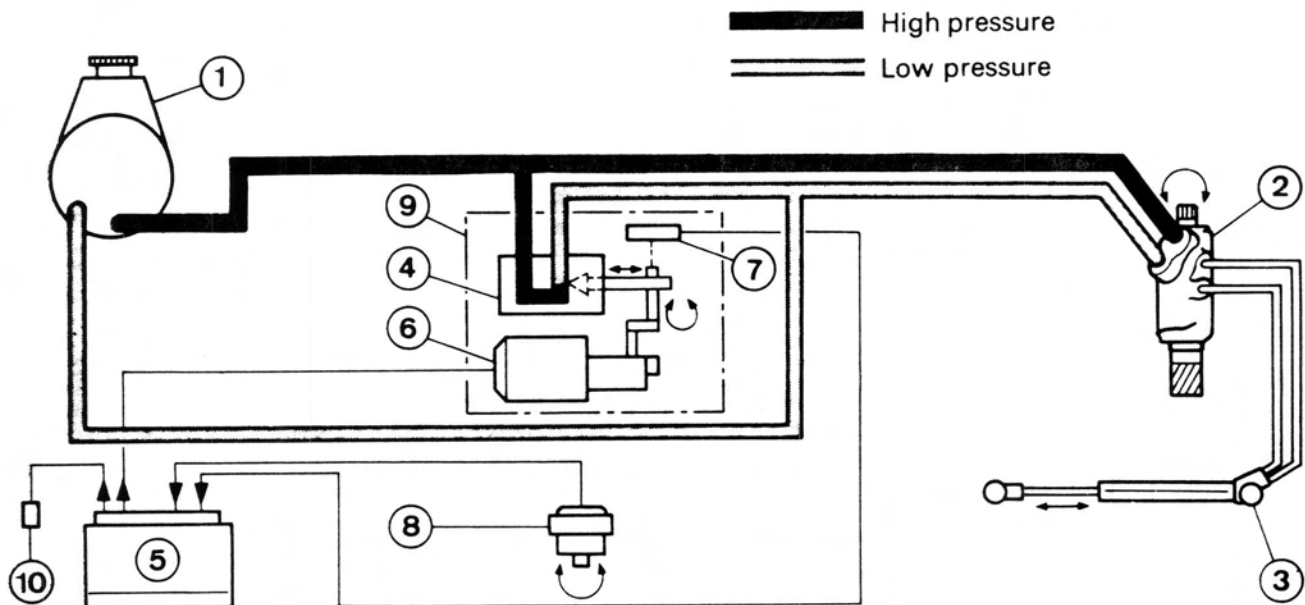
The system consists of:

Some already known components of power steering with new specifications:

- high pressure pump (1) (higher pressure and output)
- ram (2) (ram stroke shorter)
- control valve (3) (modified logic) identified by a green dust cap

Some new components to modulate the assistance effort:

- servo-regulator (4) located under the battery
- ECU (5) located behind the upper glove compartment
- speed sensor (6) located in line on the speedometer cable



#### POWER STEERING OPERATING PRINCIPLE

A pump (1) which is driven by the engine supplies the hydraulic pressure required for the steering assistance

A control valve (2) directly linked to the steering column distributes the pressure to the power steering ram (3)

The ram (3) acts on the steering rack in such a way as to diminish the steering effort at the steering wheel

Modulating the amount of assistance:

A valve (4) mounted in the high pressure circuit between the pump (1) and control valve (2) provides the means to modulate the amount of assistance by reducing the output or the pressure delivered to the ram (3)

The ECU (5) determines the position of the valve (4) and controls its movement through an electric motor (6)

A potentiometer (7) informs the ECU (5) by a speed sensor (8) located on the speedometer cable

The valve (4), the electric motor (6), and the potentiometer (7), are grouped as an assembly (9) called a servo-regulator, located under the battery

With this system the proportioning of assistance in relation to road speed varies as follows:

- vehicle at a standstill = maximum assistance
- vehicle at moderate speed = moderate assistance
- vehicle at high speed = minimum assistance

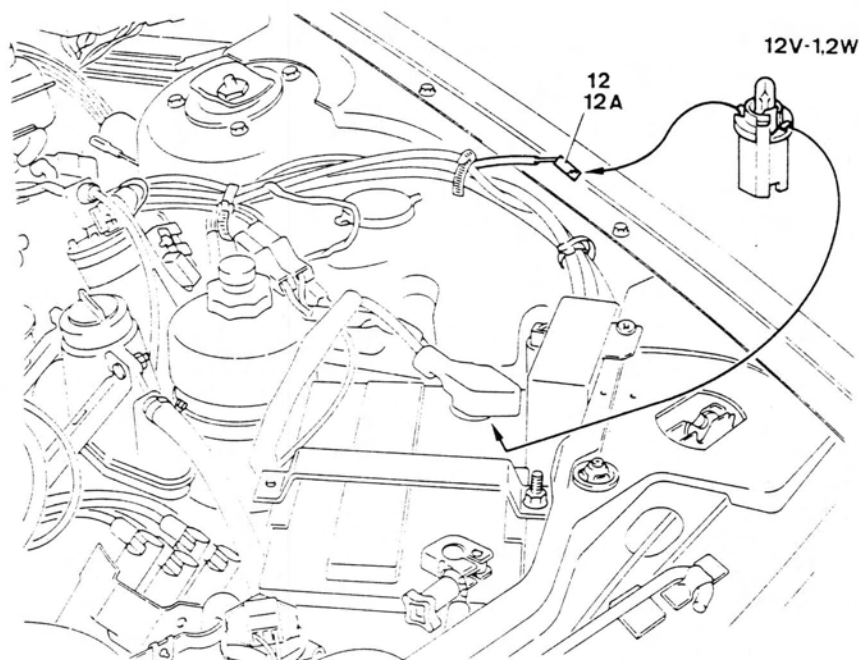
## DIAGNOSIS CHART

### Steering rack slap

[illegible]

- Page 138

# CHECKING SYSTEM



Bulb must be  
12 Volt 1.2 Watt  
Bulb P/N 6371.30  
Holder P/N 6112.22  
Early vehicles wire 12  
Later vehicles wire 12A

## To check system

Connect test lead from wire 12 or 12A to battery +  
Ignition on  
Bulb should flash 3 times  
If not, see chart below or see pin out box testing

| Light On<br> | Light Off<br> | ECU     | SPEED SENSOR                            | SERVO<br>REGULATOR                                  |
|--------------|---------------|---------|-----------------------------------------|-----------------------------------------------------|
|              |               | OK      | OK                                      | OK                                                  |
|              |               | OK      | OK                                      | Problem                                             |
|              |               | OK      | Problem                                 | Unknown.<br>Correct speed<br>sensor; Check<br>again |
|              |               | Problem | Unknown.<br>Correct ECU;<br>Check again | Unknown.<br>Correct speed<br>sensor; Check<br>again |

## PIN-OUT BOX TESTING

Check battery voltage first before proceeding to any pin out box voltage checks (for correct voltage drop readings)

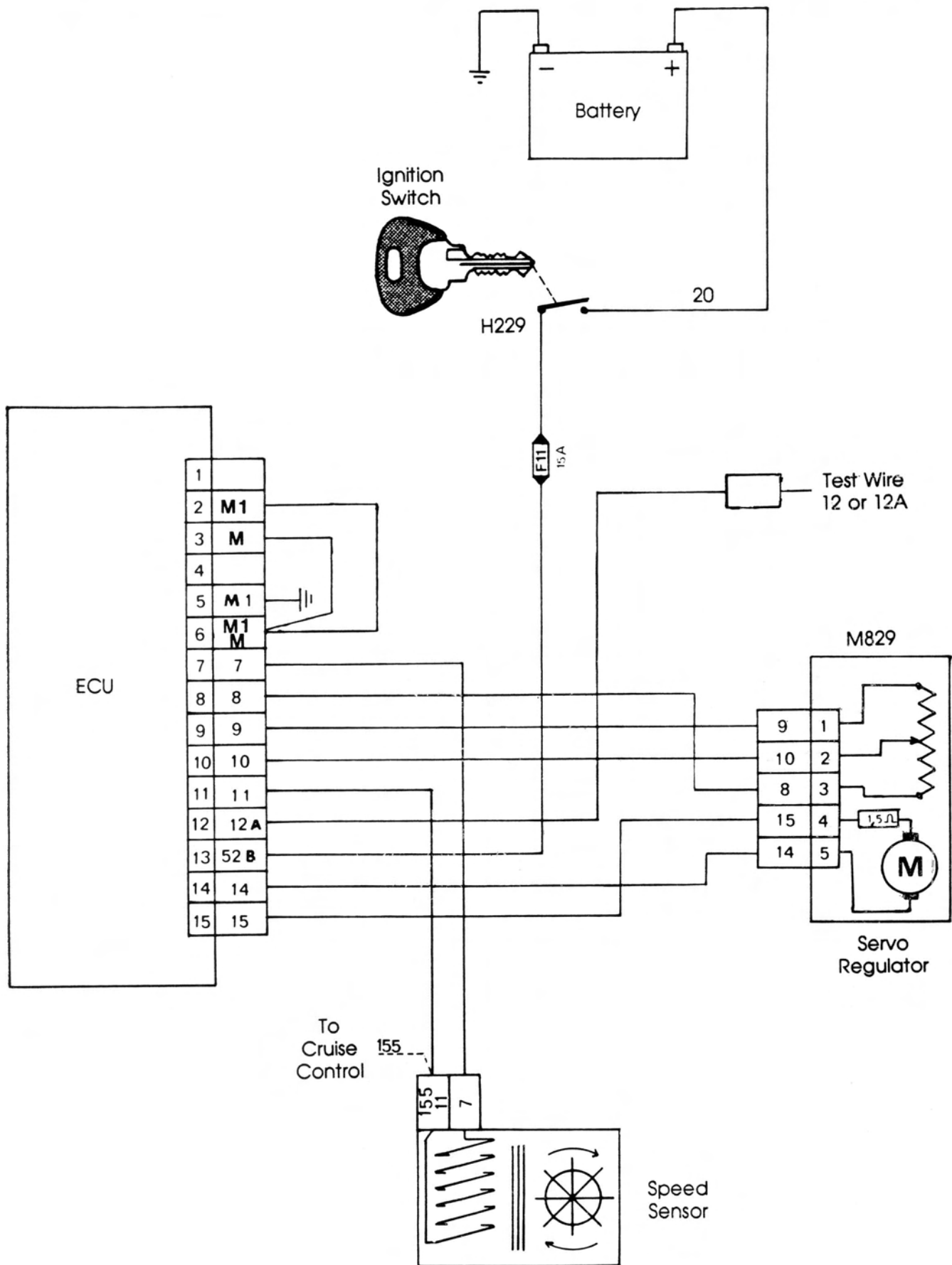
Remove 15-pin connector from power steering ECU (located behind upper glove box) and connect it to the male end of the 15-pin pin out box connector

Battery fully charged

All tests are done by connecting the appropriate meter between the pin numbers as indicated

## CHECKING THE INJECTION ECU CONNECTING PINS

| CHECK                               | TESTER    | PIN NOS.                | TEST CONDITION                                                                                            | READINGS                       | IF READINGS INCORRECT, CHECK:            |
|-------------------------------------|-----------|-------------------------|-----------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------------|
| Power and Grounds                   | Voltmeter | 13 & 5<br>13 & Grnd     | Ignition on                                                                                               | > 12 Volts                     | Fuse F11; Circuit continuity             |
| Grounds                             | Ohmmeter  | 5 & Grnd                | Ignition off                                                                                              | > 1 Ohm                        | Circuit continuity                       |
| Servo Motor                         | Ohmmeter  | 14 & 15                 | Ignition off                                                                                              | 6-12 Ohms                      | Servo valve assembly; Circuit continuity |
| Servo Rheostat                      | Ohmmeter  | 8 & 9                   | Ignition off; checking for continuity                                                                     | 1500 to 4000 Ohms              | Servo valve assembly; Circuit continuity |
| Vehicle Speed Transducer            | Ohmmeter  | 7 & 11                  | Ignition off                                                                                              | 300 Ohms                       | Speed transducer; Circuit continuity     |
| Continuity of USA Version Circuitry | Ohmmeter  | 2 & 3<br>2 & 6<br>3 & 6 | Ignition off                                                                                              | < 1 Ohm                        | Circuit continuity                       |
|                                     |           | 1 & 4                   | Ignition off                                                                                              | $\infty$                       |                                          |
| Servo Rheostat                      | Voltmeter | 8 & 10                  | Ignition key in lock; turn steering wheel a 1/2 turn; ignition on; voltage should be a rapid step reading | 0.5 Volts jumping to 1.3 Volts | Servo valve assembly; Circuit continuity |



## NOTES

[illegible]