

## INDEX

|  |    |
|--|----|
| Overview .....   | 2  |
| DS23 EFI ECU Main PCB schematic sheet 1 .....          | 4  |
| DS23 EFI ECU Main PCB schematic sheet 2 .....          | 5  |
| DS23 EFI ECU Sub-PCB schematic sheet .....             | 6  |
| DS23 EFI ECU Main PCB schematic sheet 1 annotated..... | 7  |
| DS23 EFI ECU Main PCB schematic sheet 2 annotated..... | 8  |
| DS23 EFI ECU Sub-PCB schematic sheet annotated.....    | 9  |
| DS23 EFI ECU Main PCB map .....                        | 10 |
| DS23 EFI ECU Sub-PCB map .....                         | 11 |
| DS21/23 EFI ECU replacement chart.....                 | 12 |

## BOSCH D-JETRONIC

The Bosch D-Jetronic fuel injection system fitted to the DS was first introduced by VW in the VW1600 and later adopted by other manufacturers including Citroen, Renault, Volvo, Saab, Mercedes, BMW, Porsche and Jaguar. The ECU (Electronic Control Unit) is the same basic design for all applications with the electronics and some peripheral components tuned to suit each application.

### THE D-JETRONIC ECU

The D-Jetronic ECU is an analogue computer that uses information read from sensors in the engine bay to calculate a precise volume of fuel to inject into the inlet manifold.

Bosch made two significant design changes to the ECU in the life of the D-Jetronic system. In this document these are referred to as Mark 1, Mark 2 and Mark 3. The DS21 was first produced with the Mark 1 ECU, then from April 1971 the Mark 2. The DS23 used only the Mark 2 design. The Mark 3 ECU was not used in the DS.

The most significant differences between the different generations are briefly as follows –

- The Mark 1 ECU included a circuit to switch off the fuel injectors on over-run. When engine revs exceeded approx 1800rpm and the throttle is closed (decelerating), drive to the fuel injectors is cut. Injector drive is re-instated as engine revs drop below approx 1800rpm.
- For the Mark 2 ECU, the over-run fuel cut-off circuit was removed. An additional sensor was added to read the temperature of air entering the air cleaner. An idle mixture calibration control was added that switches in when the throttle is closed.
- The writer has no experience of the Mark 3 used in other cars, but understands that the air temperature sensor and idle mixture control from the Mark 2 were retained and an improved over-run fuel cut-off circuit was added.

### OVERVIEW OF THE DS23 EFI ECU SCHEMATICS

The following pages include a full set of schematic diagrams for the Bosch D-Jetronic ECU used in the DS23 EFI application. The schematics are primarily intended to assist an electronic engineer fault-finding a suspect DS23 ECU, though they may also be useful to an engineer ambitious to re-align the performance of the ECU.

I found it necessary to trace the schematic after attempting to repair an ECU using the VW/Porsche 914 ECU schematic, traced by Paul Anders. This was the only ECU schematic available at the time. The DS23 ECU is different enough to this schematic to warrant a full trace. I began the trace using the same general layout as Paul, but it became clear that with the benefit of schematic CAD the circuit blocks could be re-arranged to make them easier to navigate.

There are two schematic sets included in this document. The first set is the schematic diagram of the ECU, the second 'annotated' set adds colour blocks and labels to indicate the function of each circuit section within the schematics. After the two schematic sets there are PCB 'map' photos of the Main PCB and the Sub-PCB that indicate where each circuit section resides on the PCBs.

Important note:- The schematic diagrams, and the values and component references within them have been traced by eye from an assembled DS23 ECU PCB. Detail accuracy cannot therefore be guaranteed.

## EXTERNAL COMPONENTS OF THE EFI SYSTEM

The schematic diagrams of the ECU include the symbols for some (but not all) external system components such as sensors, relays etc. These are included to better illustrate the interface between the ECU and the rest of the EFI system. For a full schematic of the complete EFI system layout with all external components, refer to the Fuel Injection wiring diagrams in the Electricity section of the Citroen repair manual 814 volume 1.

## A FEW NOTES ON SERVICING THE ECU

The D-Jetronic ECU is inherently extremely reliable. It is a good mechanical design - the PCB and components are under no undue mechanical stress, and mounted in the car interior. Components are running well within their ratings and the soldering quality is good. Thankfully, the ECU does not include any aluminium electrolytic capacitors which are a common cause of failure in electronic equipment of advancing years.

Most faults with the D-Jetronic system can be attributed to vacuum leaks, fuel pressure or under-bonnet components, rather than the ECU. Even so, it is still possible for an ECU to fail, particularly if there has been a wiring error under the bonnet (the EFI relays are very easy to wire incorrectly as they do not use polarised connectors).

As will be clear from the schematics, the ECU does not include a microcomputer nor a memory to store engine tuning parameters. Anyone claiming that they can 're-program' a D-Jetronic ECU should therefore be regarded with suspicion.

## ECU REPLACEMENT

There were several changes made to the ECU in the life of the DS EFI, particularly for the DS21. Citroen also provided updated replacement ECUs for the early designs, including some that may have been reconditioned.

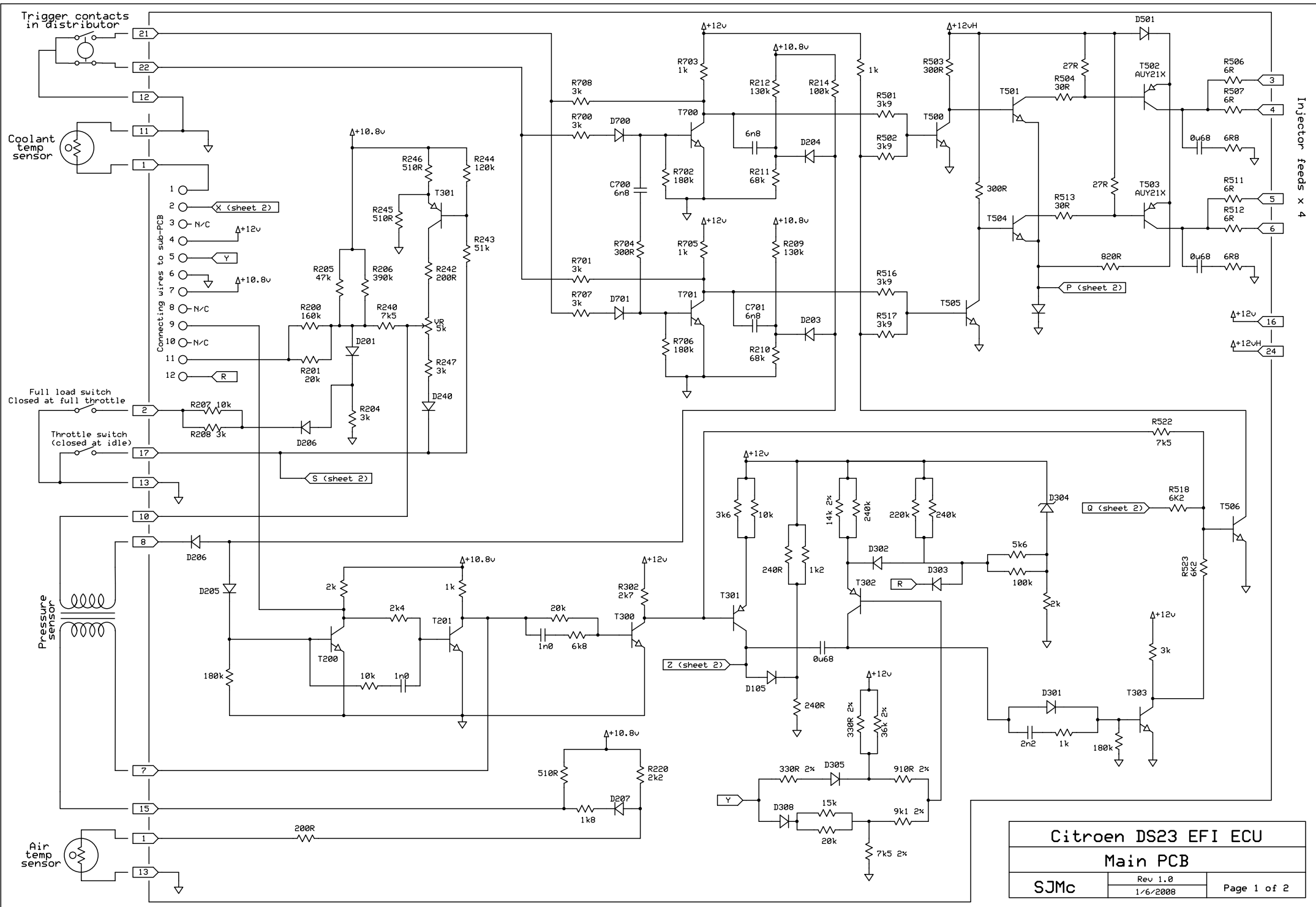
The last page of this document condenses all the information provided by Citroen for the DS ECU into a single chart that identifies by part number the original fitted ECU types, also new replacement and reconditioned ECUs. Using the chart it is possible to identify a particular ECU and determine whether it is a suitable replacement for a particular application.

Stuart McGregor

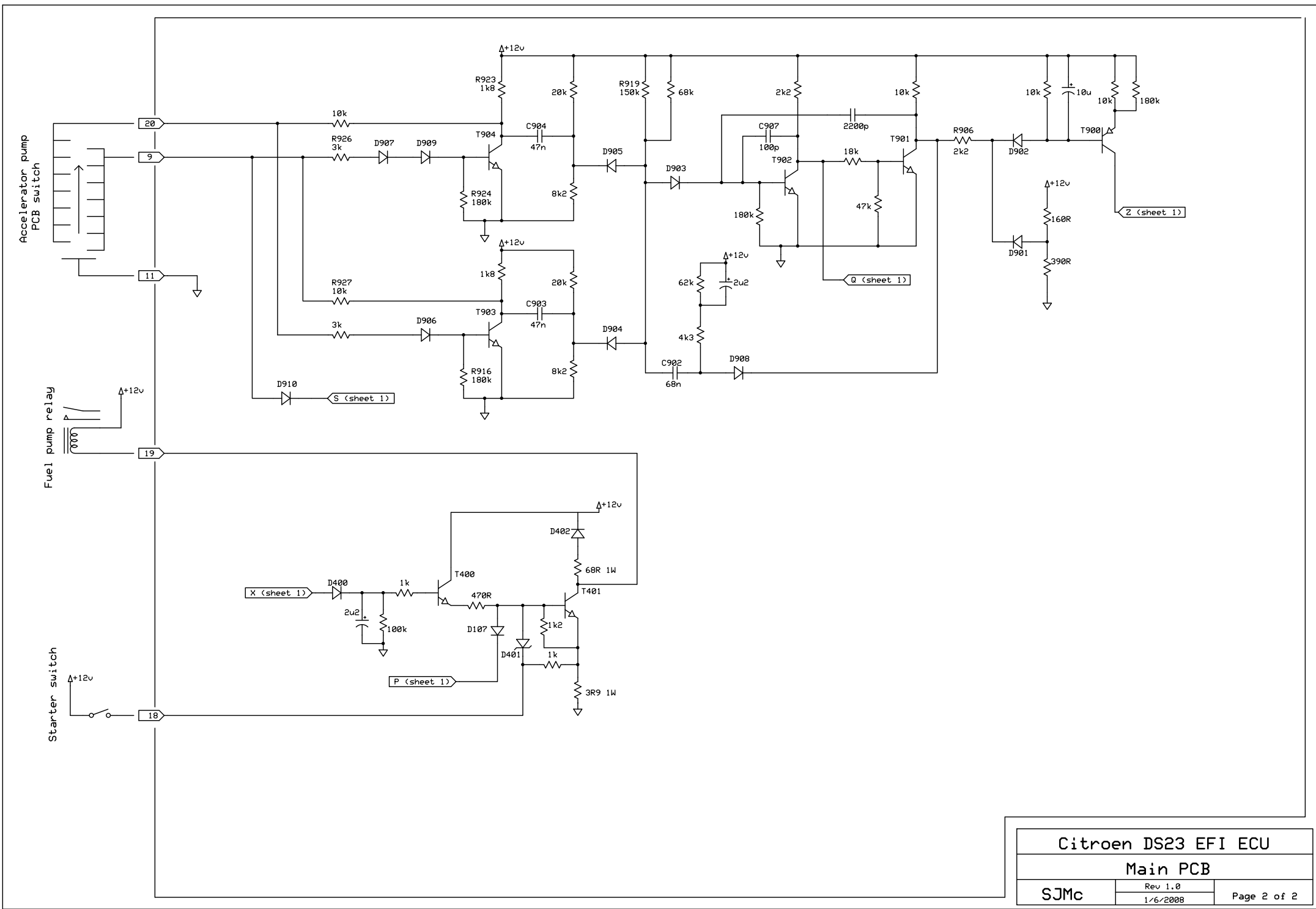
V1 Released October 2009

V2 Revised Feb 2011 (corrected pin number)

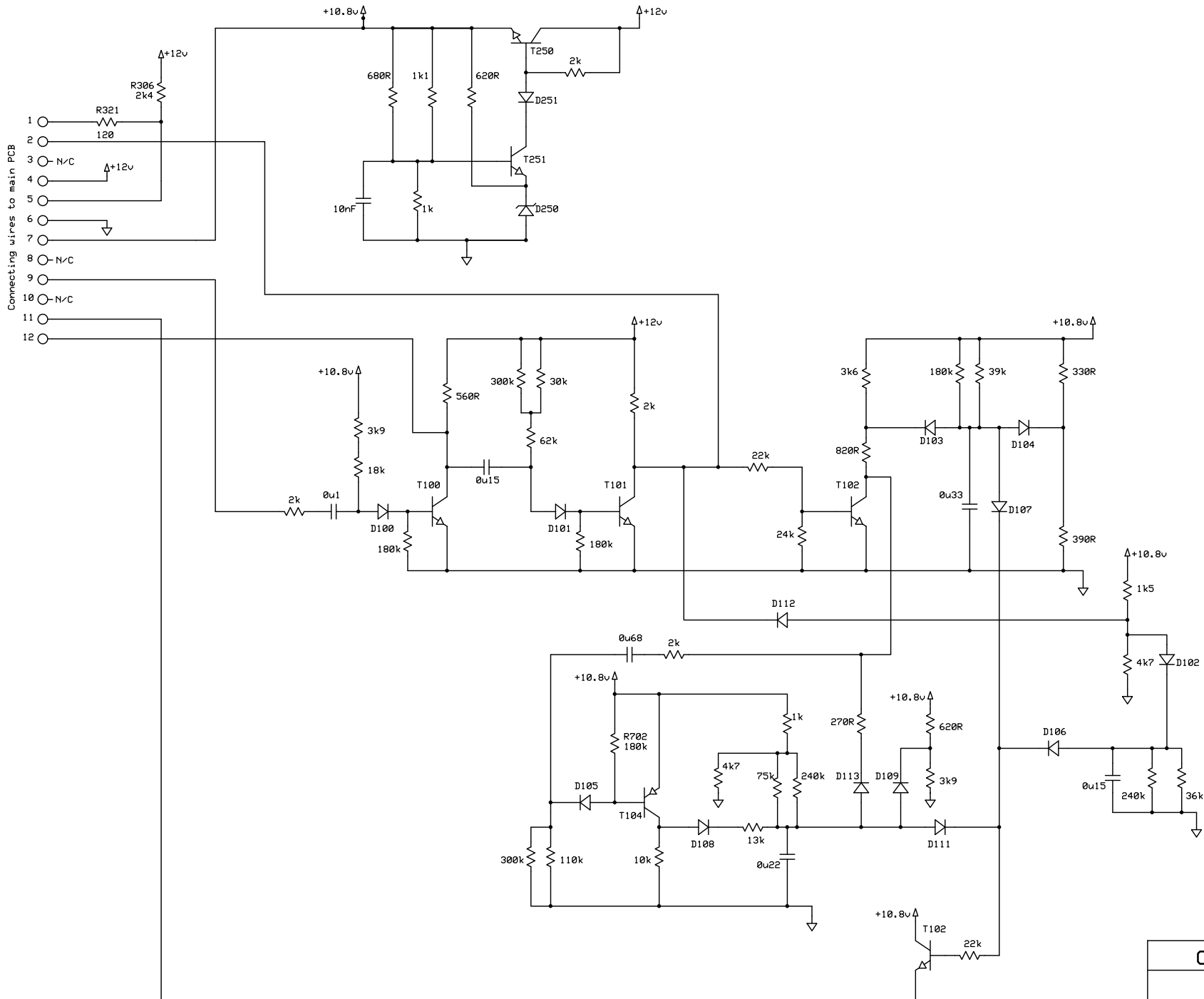
V3 Revised March 2011 (header re-written, added ECU chart)



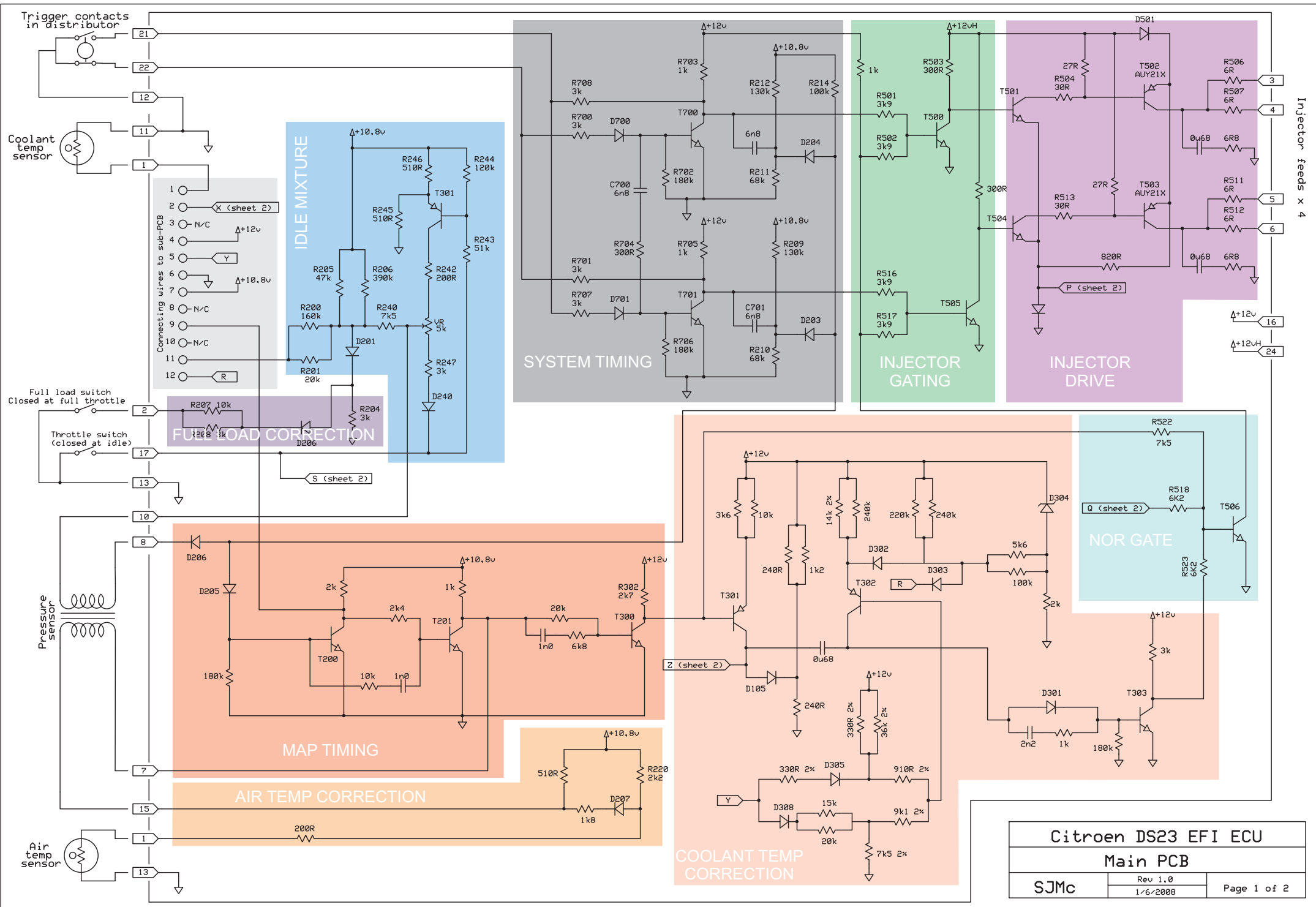
|                             |          |             |
|-----------------------------|----------|-------------|
| <b>Citroen DS23 EFI ECU</b> |          |             |
| <b>Main PCB</b>             |          |             |
| <b>SJMc</b>                 | Rev 1.0  | Page 1 of 2 |
|                             | 1/6/2008 |             |



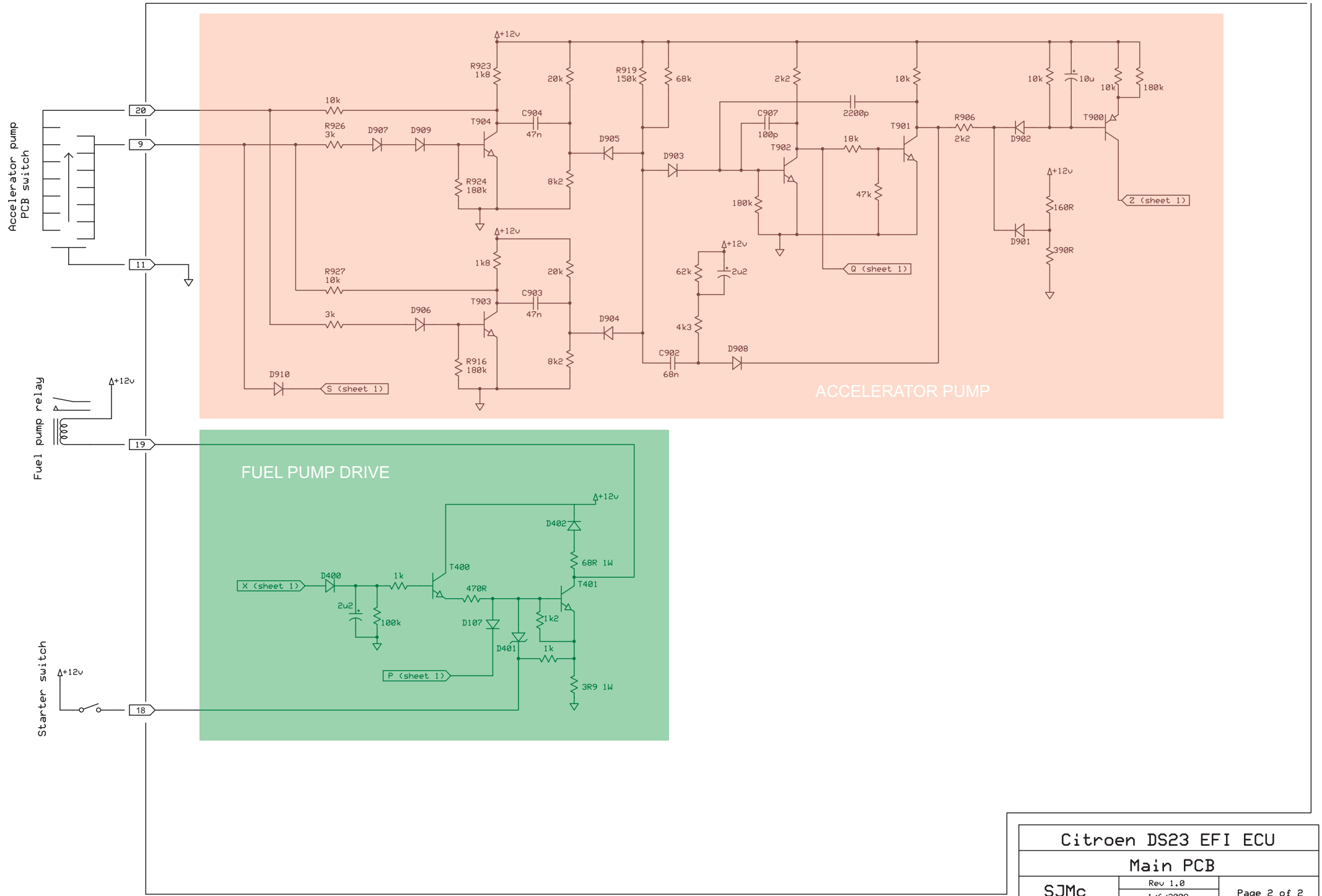
|                             |          |             |
|-----------------------------|----------|-------------|
| <b>Citroen DS23 EFI ECU</b> |          |             |
| <b>Main PCB</b>             |          |             |
| <b>SJMc</b>                 | Rev 1.0  | Page 2 of 2 |
|                             | 1/6/2008 |             |



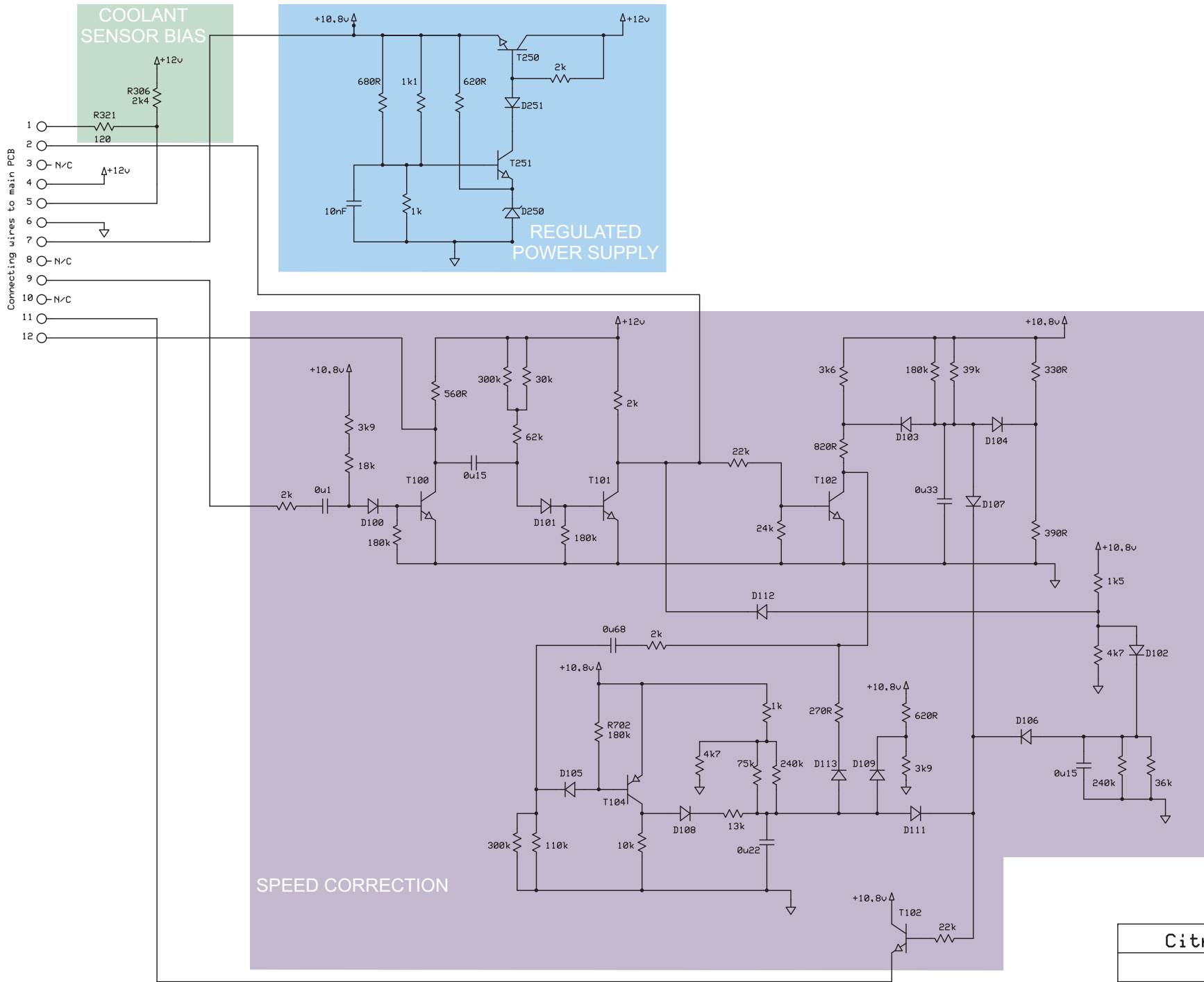
|                             |            |             |
|-----------------------------|------------|-------------|
| <b>Citroen DS23 EFI ECU</b> |            |             |
| Sub-PCB                     |            |             |
| <b>SJMc</b>                 | Rev 1.0    | Page 1 of 1 |
|                             | 25/05/2008 |             |



|                      |          |             |
|----------------------|----------|-------------|
| Citroen DS23 EFI ECU |          |             |
| Main PCB             |          |             |
| SJMc                 | Rev 1.0  | Page 1 of 2 |
|                      | 1/6/2008 |             |



|                      |          |             |
|----------------------|----------|-------------|
| Citroen DS23 EFI ECU |          |             |
| Main PCB             |          |             |
| SJMc                 | Rev 1.0  | Page 2 of 2 |
|                      | 1/6/2008 |             |



|                             |            |             |
|-----------------------------|------------|-------------|
| <b>Citroen DS23 EFI ECU</b> |            |             |
| Sub-PCB                     |            |             |
| <b>SJMc</b>                 | Rev 1.0    | Page 1 of 1 |
|                             | 25/05/2008 |             |





## ORIGINAL ECU

This table lists details of the series of Bosch ECUs fitted as original equipment to the DS21EFI and DS23EFI.

The correct pressure sensor to match each ECU is shown in the tables below

| MODEL                                    | DS21                                |  |  | DS23   |   |
|--|-------------------------------------|--|--|--|---|
| YEAR                                     | Sep 1969 to July 1970               | July 1970 to Dec 1970                                  | Jan 1971 to April 1971                               | April 1971 to July 1972                          | July 1972 to end                                |
| ECU Bosch part number                    | 0.280.000.011                       |  |  | 0.280.000.022                                    | 0.280.000.047                                   |
| Identification on case                   | 0.280.000.011 stamped into the case | 0.280.000.011 stamped into the case, single yellow dot | 0.280.000.011 stamped into the case, two yellow dots | 0.280.000.022 on a black label, has control knob | 0.280.000.047 on a blue label, has control knob |
| Citroen part number                      | DX.144.906 A                        |  | 5.402.234 K*   | DX.144.906 B                                     | 5.429.447 D*                                    |
| ECU design revision                      | Mark 1                              |  |  | Mark 2   |   |
| Air temperature sensor                   | No                                  |  |  | Yes  |   |
| Idle mixture pot                         | No                                  |  |  | Yes  |   |
| Over-run fuel shutoff circuit in the ECU | Yes                                 |  |  | No   |   |
| Air bypass valve                         | No                                  |  |  |  | Yes   |

## ORIGINAL PRESSURE SENSOR

|                        |               |               |               |               |
|------------------------|---------------|---------------|---------------|---------------|
| Bosch part number      | 0.280.100.011 | 0.280.100.023 | 0.280.100.011 | 0.280.100.048 |
| Identification on case | None          | Black dot     | None          | Blue dot      |
| Citroen part number    | DX.144.263 A  | DX.144.263 B  | DX.144.263 A  | 5.429.448 P*  |

\*These part numbers may be listed in some documents with a 2D prefix.

## REPLACEMENT ECU (NEW)

This table lists details of the series of Bosch ECUs, supplied by Citroen as new replacement parts.

Note that all replacement ECUs have a control knob, and cars manufactured between July 1970 and April 1971 required a replacement pressure sensor when fitting a new replacement ECU.

| MODEL                                    | DS21  |                       |                        | DS23   |   |
|--|---|-----------------------|------------------------|--|---|
| YEAR                                     | Sep 1969 to July 1970   | July 1970 to Dec 1970 | Jan 1971 to April 1971 | April 1971 to July 1972                          | July 1972 to end                                |
| ECU Bosch part number                    | 0.280.000.042   |                       |                        | Original ECU supplied as replacement             |   |
| Identification on case                   | 0.280.000.042 on a label (colour unconfirmed), has control knob |                       |                        | 0.280.000.022 on a black label, has control knob | 0.280.000.047 on a blue label, has control knob |
| Citroen part number                      | ZC 9.851.101 U  |                       |                        |  |   |
| ECU design revision                      | Mark 2  |                       |                        |  |   |
| Air temperature sensor                   | No  |                       |                        |  |   |
| Idle mixture pot                         | Yes   |                       |                        |  |   |
| Over-run fuel shutoff circuit in the ECU | No  |                       |                        |  |   |
| Air bypass valve                         | No  |                       |                        |  |   |

## PRESSURE SENSOR FOR REPLACEMENT ECU

|                        |               |
|------------------------|---------------|
| Bosch part number      | 0.280.100.011 |
| Identification on case | None          |
| Citroen part number    | DX.144.263 A  |

**REPLACEMENT ECU (RECONDITIONED)\*\***

This table lists details of ECUs, believed to have been supplied by Citroen as reconditioned units (and with unique Citroen part numbers).

They would have possibly made a more cost-effective repair, due to the reduced cost of the reconditioned unit and the use of the original fitted pressure sensor for all applications.

| MODEL                                    | DS21   |                       |                        |                         | DS23             |
|--|--|-----------------------|------------------------|-------------------------|------------------|
| YEAR                                     | Sep 1969 to July 1970                                  | July 1970 to Dec 1970 | Jan 1971 to April 1971 | April 1971 to July 1972 | July 1972 to end |
| ECU Bosch part number                    | Unknown, probably 0.280.000.011                        |                       |                        | 0.280.000.022           | 0.280.000.047    |
| Identification on case                   | Unknown, probably the same marking as the original ECU |                       |                        |                         |                  |
| Citroen part number                      | 5.417.266 B*   | 5.439.822 A*          |                        | 5.417.265 R*            | 5.436.493 R*     |
| ECU design revision                      | Mark 1   |                       |                        | Mark 2                  |                  |
| Air temperature sensor                   | No   |                       |                        | Yes                     |                  |
| Idle mixture pot                         | No   |                       |                        | Yes                     |                  |
| Over-run fuel shutoff circuit in the ECU | Yes  |                       |                        | No                      |                  |
| Air bypass valve                         | No   |                       |                        |                         | Yes              |

**PRESSURE SENSOR FOR RECONDITIONED ECU**

|                        |               |               |               |               |
|------------------------|---------------|---------------|---------------|---------------|
| Bosch part number      | 0.280.100.011 | 0.280.100.023 | 0.280.100.011 | 0.280.100.048 |
| Identification on case | None          | Black dot     | None          | Blue dot      |
| Citroen part number    | DX.144.263 A  | DX.144.263 B  | DX.144.263 A  | 5.429.448 P*  |

\*These part numbers may be listed in some documents with a 2D prefix.

\*\* Ref for reconditioned table - 814-1, D.Ie - 144-0a Page 2