HC11 Modes, cont.

```
─────────○─  RESET

───────────  MODB

───────────  MODA
```
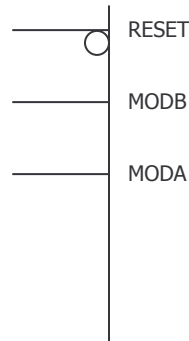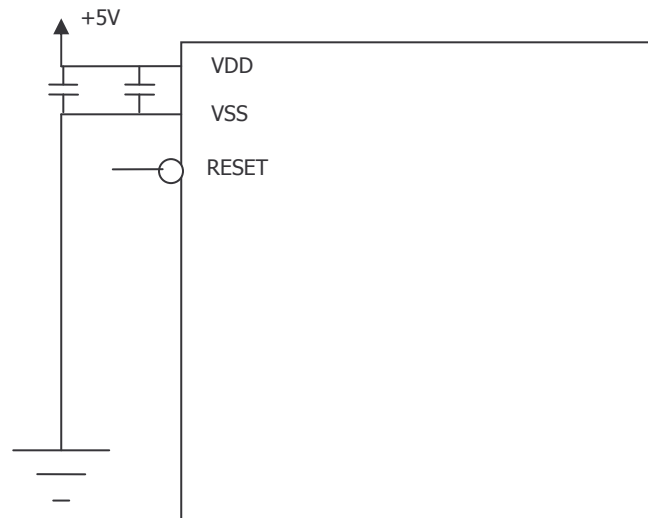
The special mode was never intended by Motorola to be used. Because of the extra control (privileged access to registers) it allows over the processor, though, it gained popularity and is used quite commonly. Engineers like control.

```
  +5V
       ┌──┬──┐  VDD
       │  │  │
       ┴  ┴  │  VSS
       │  │  │
       │  │ ○─  RESET
       │
      ─┴─
       ─
```

Snubbing capacitors – high frequency (snub) filter - removes the effect of any high frequency noise on the power supply signals so that it remains stable.

Power supply bypass capacitors – provides charge (and therefore, current) when needed by the chip to create fast voltage edges.

Every high speed CMOS chip should have a bypass capacitor alongside it. This is a standard practice in the design of CMOS chips and results in a better powering system and enhanced speed behavior. They should be well designed, not made out of tantalum to optimize this speed.

Reset
On the robot, the DS1233 Econo-reset is attached to the reset pin. When power is stable, it places reset at +5V. We have not included it yet because turning the motors on would cause a spike in power supply voltage that results in reset behavior. It is likely, though, that it will work

When reset goes to +5V, the processor begins operation. State machines inside it begin to function and it begins configuration.

The first thing the controller does is sample the MODA and MODB pins and enters one of the four operating modes. On our board, MODB is grounded. This means that our robot will always be in one of the two modes that Motorola didn't initially want us to use. When the stop button is pushed, MODA is pulled to ground and the processor will enter special bootstrap mode.

Special bootstrap mode
The processor wants to be booted. Using software mapped to BF40 – BFFF in an on chip ROM, it initializes the serial port and sends a break signal down the serial port. On the other side, software sends a 256-byte program over the serial cable to the HC11. This is placed in 0000 to 00FF. The PC is set to 0 and the HC11 starts executing that program.

There is virtually no limitation placed on this initial program, with the exception of its size.

In the laboratory environment, JBUG does this for us. The initial program is the JBUG monitor OS, a very simple OS that allows you to interact with the HC11 through the serial cable.

Pull up resistor
Is used to drag a pin to a voltage by Ohm's law behavior. The +5 V and ground cannot be connected directly because this creates a short.