ELECTRONIC CONTROL UNIT (ECU)

The increased functions of the engine control system require increased ROM and RAM capacities and higher-speed processing capability of the ECU. In addition, improvement of the ECU in terms of weight, size, cost and reliability is always in demand. The increased variety of engine control systems demands flexible construction of the LSI in order to render the ECU suitable for application in any engine control system.

An effective response to these demands is the reduction in the number of LSIs and the use of a single-chip microcomputer equipped with an 8K-byte ROM, a 256-byte RAM, powerful high-speed I/O (Input/Output), interrupt controller, and general purpose I/O ports. The construction of this powerful single-chip microcomputer has been made possible with the incorporation of CMOS technology which is characterized by lower power consumption. This low power requirement has eliminated the darlington connection of the transistors in 5V DC power supply circuit, simplifying the circuit.

The CMOS technology adopted has lowered the minimum operating voltage of the microcomputer, which in turn has lowered the minimum operating voltage of the ECU along with the lowered voltage drop of the simplified power supply circuit. It is possible to raise the threshold voltage compared to NMOS and thus to simplify the ECU input signal interface. The '83 model TCCS (Toyota Computer Controlled System) was equipped with an ECU consisting of multi-chip LSIs which included a 12 bit micro-processor. The '85 model TCCS is the new system equipped with an additional knock control function. With the adoption of the CMOS single-chip microcomputer, however, the reliability has been improved with a reduced number of LSIs, while the size and the cost of the ECU has remained identical to those of the conventional one, as shown in Figures 4, 5 and 6.

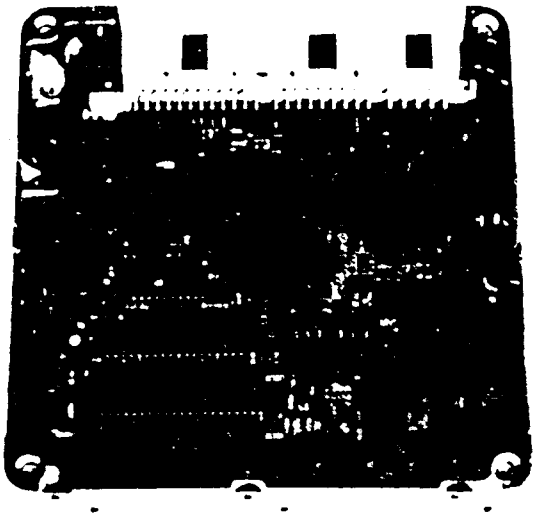

Fig. 5 - 1983 model year TCCS ECU

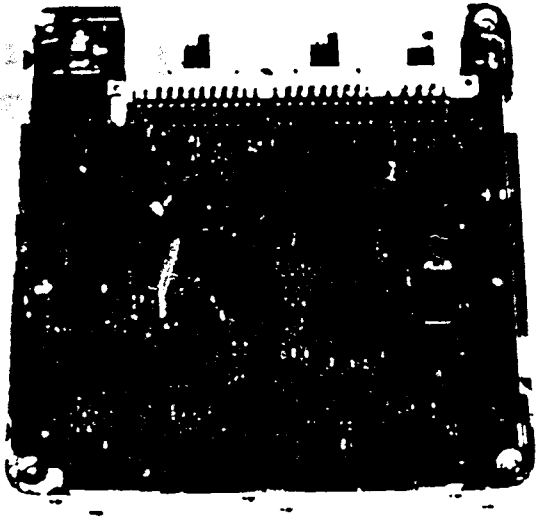

Fig. 6 - 1985 model year TCCS ECU