

desirable from the point of view of on-vehicle evaluation. The memory interface chip, consisting of the port A and B functions and address latch and chip select circuits, has been simultaneously developed in order to overcome this difficulty. This interface chip comprises a 64-pin CMOS gate array with approximately 2000 gates. The use of this interface chip has made it possible to directly connect the CPU with up to three 8K-byte PROMs, to expand the RAM and I/O easily, and to develop an ECU whose size and electric characteristics are similar to those of mass-produced ECUs. In addition, a CPU for evaluation, called "Piggy Back", equipped with this interface chip, the CPU, and a socket for mounting the PROM has been developed in order to expedite the development of a sophisticated engine and transmission control system.

CONCLUSION

A sophisticated engine and transmission control system has been successfully developed with a new single-chip micro-computer. By adding a knock control function to the conventional system, the performance and the driveability of the vehicles have been considerably improved. With the use of this microcomputer, the number of LSIs has been reduced, improving the reliability of the ECU without enlarging it. The new microcomputer is flexible and sophisticated, quite suitable for automobiles, and is adaptable to various kinds of automotive systems.

In the future, it will be necessary to design a CPU in serial form and to empty the latest semiconductor technology in order to realize miniaturization, cost reduction, and an improvement in the reliability of the ECU. To facilitate the realization of such an ECU, it will be mandatory for the automobile manufacturer and parts vendors to co-operate more closely in the future.