

- Increase of internal memory capacity up to 16 kilobytes (KB) ROM
- Addition of a serial I/O with direct memory access function to facilitate high-speed data communication between single-chip microcomputers
- Addition of a built-in analog-to-digital (A/D) converter
- Applying 1.5 μ design rules

The 2nd generation microcomputers fully satisfy all functional requirements for the combined engine and transmission control systems that are currently in mass production.

However, requirements are expected to increase sharply, with respect to the variety of functions to be provided by the combined engine and transmission control system, and this will create the need for a new microcomputer, functioning at an even higher level than the 2nd generation 8-bit microcomputers. In order for this new microcomputer to accomplish both current and future requirements, a number of functions must be enhanced, including significant

Table 1 Comparison between 8bit CPU and New 16bit CPU

Items	8bit		New 16bit
	1st Generation (T7433)	2nd Generation (T5A41)	
Word Length(bit)	8	8	16/32
Min. Inst. Exec. Time(nsec)	500(12 μ Hz)	375(16 μ Hz)	250(16 μ Hz)
16 \times 16 Exec. Time(μ sec)	55(*)	41(*)	1.5
32/16 Exec. Time(μ sec)	100-200(*)	75-150(*)	1.6
ROM	12KB	16KB	48KB
RAM	384 B	768 B	2KB
Bit Operation	()	()	()
Bit Test & Branch	()	()	()
Serial I/O	8bit 2ch	8bit 2ch	16/8bit 2ch
SPI		8bit 1ch	16/8bit 1ch
Fast Pulse Input	4ch	5ch	8ch
Fast Pulse Output	8ch	8ch	16ch
DMAc		2ch	3ch
Interrupt Requests	16	16	31
Context Switch			()
Voltage(V)	4.5-5.5	4.5-5.5	4.0-5.5
Temperature(Deg. C)	-40-105	-40-105	-40-125

*: subroutines

- Increased CPU speed
- Development of intelligent functions for high-speed I/O ports
- Improvement of data communication between microcomputers
- Large memory on chip
- Wide operational temperature and voltage range
- To adopt single-chip architecture
- High reliability

It was assumed that this microcomputer, satisfying the above requirements, would continue to represent state-of-the-art technology for even 3 to 5 years after its development in real-time control systems in automobiles.

Table 1 compares the 8-bit microcomputer in current use with the new 16-bit microcomputer.

4. Features of the New 16-bit Microcomputer

A block diagram of the new 16-bit microcomputer is shown in Fig.2.

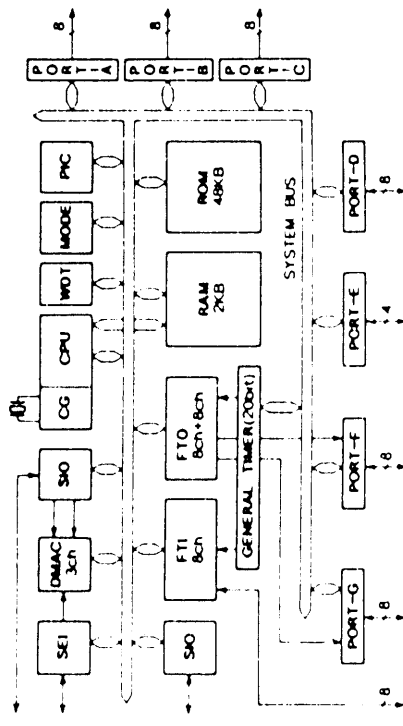


Fig.2 Block Diagram of New 16bit Microcomputer