

Fig. 2. System component parts layout.

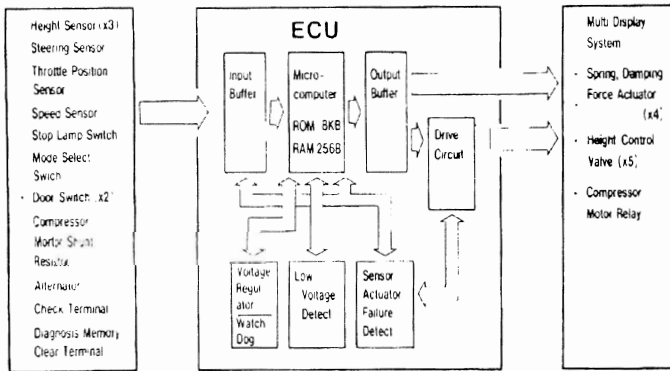


Fig. 3. ECU block diagram.

developed for use in vehicles, which has an 8K-byte ROM, 256-byte RAM, high-speed I/O, and timer and interrupt controllers. A 32-byte area in the 256-byte RAM is used as the standby RAM, where diagnosis codes are registered with low power consumption. A 12-MHz crystal is used as the clock to attain a minimum instruction execution time of 500 ns, thus making possible high-speed processing.

To achieve compactness and high reliability in the micro-computer's peripheral circuits, the circuits and I.C.'s used feature the following points:

1) Three custom-hybrid parallel/serial conversion I.C.'s are used as input buffer to receive a number of input signals.

2) A watchdog circuit, integrated into a hybrid IC with the voltage regulator, is provided to detect program failure of the microcomputer.

3) A power module has been newly developed, in which complementary transistors for driving a motor forward and in reverse are arranged in a single package together with flywheel diodes. The system uses two power modules to drive actuators that control the spring rate and the damping force. The power module has the feature that a large current transistor is used with high H_{fe} and low V_{ce} . Since transistors and heat sinks are insulated from each other, installation to the ECU is facilitated. The equivalent circuit is shown in Fig. 4 and the characteristics are shown in Table 1.

4) Hardware timers independent of the microcomputer are

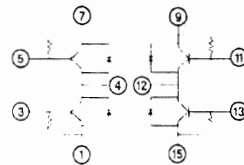


Fig. 4. Power module equivalent circuit.

TABLE 1
POWER MODULE CHARACTERISTICS

Device	Maximum Ratings			Electrical Characteristics ($T_a = 25^\circ\text{C}$)					
	V_{CE} (V)	V_{EB0} (V)	I_C (A)	H_{FE}		$V_{CE}(\text{sat})$			
				min	V_{CE} (V)	I_C (A)	V_{CE} (V)	I_C (A)	I_B (A)
NPN	60	10	15	90	2	8	0.5	5	0.15
PNP	-60	10	-15	40	-2	-8	0.5	-5	-0.15

provided to monitor energizing time of actuators for spring rate and damping force control and the height control valves.

The ECU is shown in Fig. 5.

B. Height Sensors

Height sensors detect suspension stroke, i.e., vehicle height, at three positions—right and left front suspensions and left rear suspension.