Regulation of Fuel Consumption

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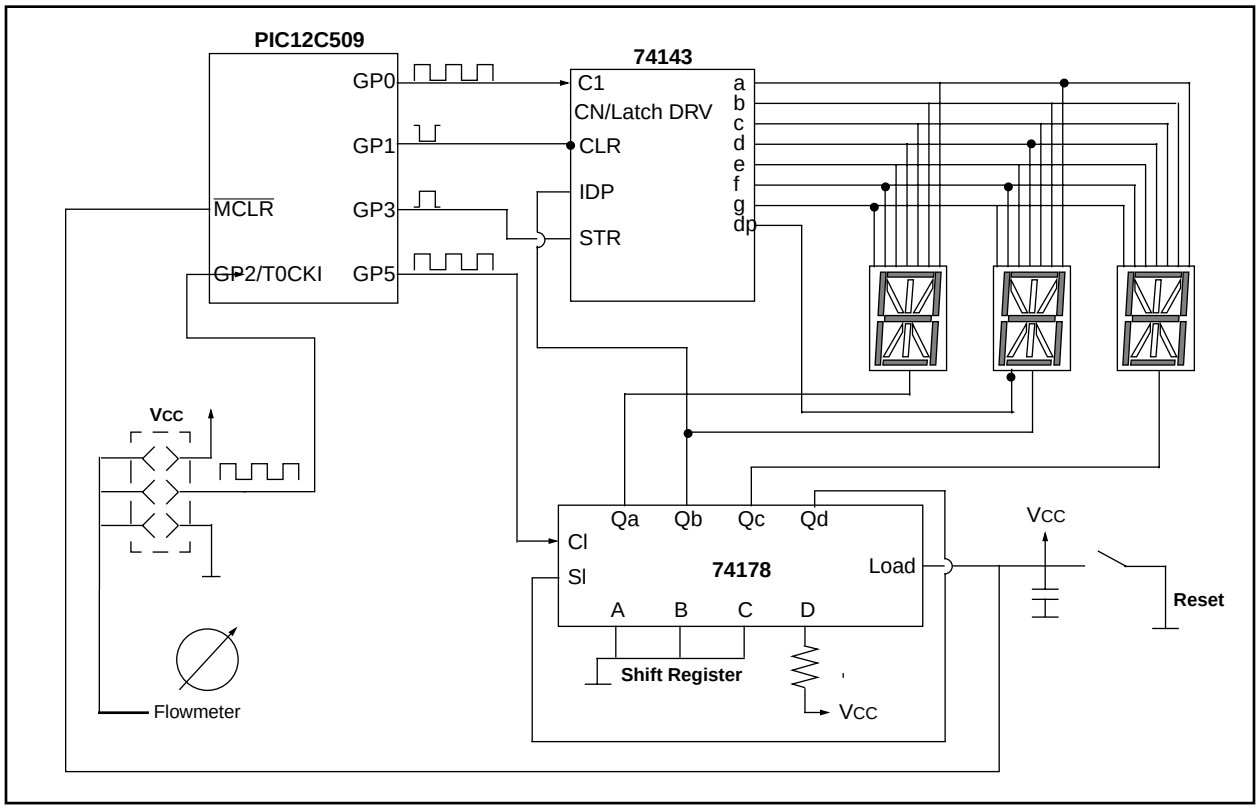
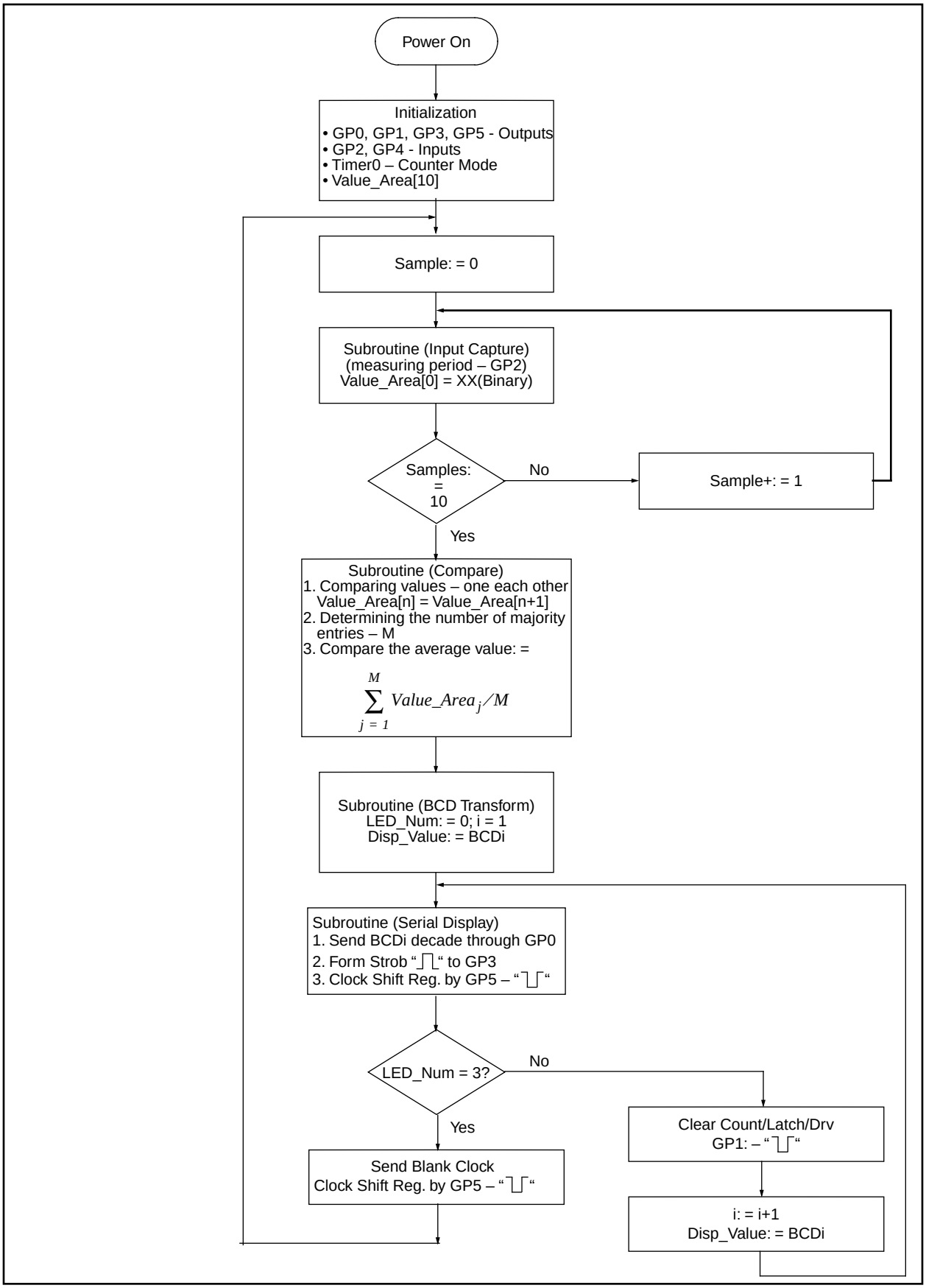
INTRODUCTION

This description is intended to explore one idea in implementing the PIC12C509 in cars. The real time consummation of fuel while driving has always been an important feature in the most efficient use of cars. The presented controller is the main subject of one project, which is intended for creating a low-cost consumer product. For countries such as Bulgaria, with a Currency Board(Council), similar devices are in use, therefore the project is named “The Hand of Board.”

CIRCUIT DIAGRAM



FLOWCHART



SYSTEM ANALYSIS

The device, presented on circuit diagram below is made up of four main parts as shown in the circuit diagram.

Input sensor

The input sensor isa paddle-wheel flowmeter manufactured by Kobold Messing Gmbd, models DPL 005 - 250. The sensor's output frequency is directly proportional to the flow velocity. The manufacturer had considered sensor's characteristics with environment in the car - size, aggressive gases, EMI, temperature etc.

Microcontroller

The microcontroller PIC12C509 receives (by pin GP2/TOCKI) the sensor's signal and performs permanent measuring of frequency, using the "lookup-table" techniques. TIMER0 is working as a counter and with one additional software counter realizes the input-capture function. Although the instruction set does not have a divide instruction, the high performance of execution cycle (1μs) and as well as the low input frequency of signal (max. 273 Hz) allowed the realization of more sophisticated algorithms of average approximation and one sample form of majority filtration. Well-suited bit-orientation instructions allowed the control of the dynamic display being realized by four output pins (GP0, GP1, GP3, GP5).

Control Block of Display

This part of the device controls Dynamic Display. It consists of one Counter-Latch-Driver (74143-TI) and 4-bit shift register with parallel load (74178-TI).

CN/Latch/Drv forms the 7-segment codes as it receives them from GP0 using serial clocks corresponding to BCD format of the current character.

GP3 writes counter's content into a 4 bit latch. By replacing the current character, pin GP1 clears in advance the counter.

GP5 clocks the shift register assuring consecutive firing of LED's. By power-on, or pressing a RESET button in Register loads "marching one's," which is shifted to the right on every clock from GP5.

Dynamic Display

Dynamic Display is realized by three 7-segment LED's with common anode.

BILL OF MATERIALS

Part Number	Manufacturer
Flowmeter sensor DPL 005	Kobold Estimated
PIC12C509	Microchip Technology Inc.
74143	TI
74178	TI
3xLED Displays	MAN
4-lead Connector	AUGAT
Supply Connector	AUGAT
5 Volt regulator Supply circuit	Motorola
PCB board(4x6 cm)	
metal BOX	