PoelControl – Circuit Design

1.Status

- 2006-05-21: First draft

2.Intro

PoelControl is a project aimed at the development of a flexible and powerful microcontroller based solutions for the control of an installation for vegetable fuel (poel) as installed here in my vehicle.

The objective of this document is to describe the circuit design. Information about solutions for power supply, connections for input and output are given.

3.Connectivity

For interaction of the microcontroller with the environmnet the I/O pins are used. The following table gives an overview over the assignments of pins to functions. This table uses the I/O definitions given in *I/O & Peripherals*.

Italic function designations are bound to this ports. For other other function designations the pin / port is arbitrarily chosen.

Function	Pin / Port		Function
	PB0	PA0	Sensor – Exhaust Temperature
	PB1	PA1	Sensor – Fuel Pressure
	PB2	PA2	Sensor – Boost Pressure
	PB3	PA3	Sensor – Tank Level
	PB4	PA4	
	PB5	PA5	
	PB6	PA6	
	PB7	PA7	
	RESET	AREF	
+5 Volt	VCC	GND	*Ground*
Ground	GND	AVCC	
	XTAL1	PC7	
	XTAL2	PC6	Buzzer
USART - RXD	PD0	PC5	Display (4-Wire)
USART - TXD	PD1	PC4	Display (4-Wire)
Key 1	PD2	PC3	Display (4-Wire)
Key 2	PD3	PC2	Display (4-Wire)
Key 3	PD4	PC1	*I2C - SDA*
Key 4	PD5	PC0	*I2C - SCL*

Function	Pin / Port		Function
12 V Ignition On	*PD6*	*PD7*	

XXX Missing XXX

12 V Engine Running

Engine Speed

Vehicle Speed

LEDs -> I2C?

UART, Quartz

4.Boards

With only a single board the size of the PoelControl system would lead to a difficult installation. The distance from the board to the peripherals would be long; cable routing might be difficult. Therefore, the system is split into the the following circuit boards that are described in more detail in the following subsections::

– control unit

– io board

5.Modules

The system design is comprised of different blocks of functionality, called modules. In this chapter some modules are described in more detail. Information about why a certain solution was chosen is given. The complete design can be found in the schemata and layout files.

Power Supply

The power supply is required to convert the 12 volt power supply from the vehicle to 5 volt needed for the microcontroller. The voltage conversion needs to be designed in a way to provide a stable, fault tolerant solution. Voltage peaks etc. need to be prevented. Below see the solution used (taken from the 78S05 documentation)

Storage

PoelControl uses an external EEPROM of type 24AA256P for data storage connected to the microcontroller via the I2C bus. Below see the design used.

Output Ports

Peripherals like valves, feed pumps are controlled via I2C-Bus. A PCF8574T chip provides 8 analog on/off ports. The address of the chip is configured via 3 jumpers or DIL-switches. The output signal of these ports is amplified using a ULN2803A and then feed into an array of relays. The peripherals are then connected to the relays via clamps.

Relais: RE-Printrelais 6A, 1 * AK, Typ: RE030006, Conrad: 503998-93

Input Ports inkl. Pull-Up-Resistors

XXX What else???? Missing XXX

XXX Sleep mode XXX