Switcher

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- 1 Introduction
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- 3.1 Peripherals

3.1.1 Analogue to Digital Convertors (ADCs)

A single ADC is multiplexed to measure three voltages on the board.

3.1.2 Universal Asyncronhouse/Syncronhous Transceiver (UART)

The UART is configure to run at 115200 baud with no control flow with a ring buffer interface. Trasmission from the microcontroller happens through **uartLoadOut** which adds to the **8 byte** buffer and is then unloaded from a timer. The input is not interrupt driven and is handled in the main control loop using a **5 byte** buffer that is enough to contain the longest command.

3.1.3 Programmable Counter Array (PCA)

The Pulse Width Modulation (PWM) is controlled from the counter array. The output runs at approximatly 96KHz with 8 bits to control the duty cycle. A high resolution for control would be favourable for this application but the frequency achieved in 16-bit mode is far too low for this application.

3.1.4 Timers

Timer 0 is used as baud rate generagiion for the UART. **Timer 2** is used to trigger an Interrupt Service Routine (ISR) which runs at 4KHz. The ISR control the UART transmission, sampling of the ADC, running the controller and finally setting the PWM.

3.2 Operation

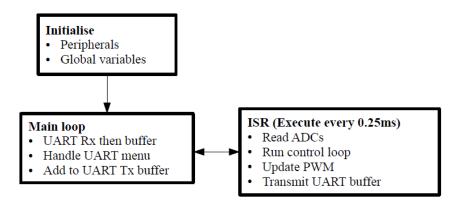


Figure 1: Software overview.

3.3 UART Menu

Command	Char	Send	Return	Notes
		numbers	numbers	
Enable	g	0	0	0
Disable	s	0	0	0
Read ADC1	X	0	4	Result in mV
Read ADC2	У	0	4	Result in mV
Read ADC3	Z	0	4	Result in mV
Read output current	j	0	4	Result in mA
Set output voltage	v	4	0	Send value in mV
Set otuput current	c	4	0	Send value in mA
Set controller P	р	4	0	Value is divide by 10
Set controller I	i	4	0	Value is divide by 10
Set input voltage up-	u	4	0	Send value in mV
per limit				
Set input voltage	1	4	0	Send value in mV
lower limit				

Table 1: UART menu

3.4 Assembly analysis

The following sections of code are library function inserted by the compilier implict to facilite some more complex operations.

3.4.1 ADC scaling

Listing 1 is a line of code operating on a 32 bit signed integer and invokes listing 2 and 3. The purpose of this operation is to cast the voltage recorded by the ADC to a representation in mV. It is possible for the target voltage to be translated instead but this would still require the same piece of code. The 12 bit oputput but the ADC must be multiplied 5.926 as to

represent the voltage at the top of the potential divider. Fixed but multiplication followed by a shift operation removes the need for a floating point operation but yeilds the same result.

Listing 1: LIMUL
return (((U32)ADC0)*SCALE_MUL) >> 10;

	Lis	ting 2: LIN	MUL	
	C,	?LIMUL:		
C:0x0ACC	EC	MOV	A, R4	
C:0x0ACD	8EF0	MOV	0xF0,R6	
C:0x0ACF	A4	MUL	AB	
C:0x0AD0	CC	XCH	A, R4	
C:0x0AD1	C5F0	XCH	A,0xF0	
C:0x0AD3	CC	XCH	A, R4	
C:0x0AD4	CD	XCH	A,R5	
C:0x0AD5	F8	MOV	$\mathrm{R0},\mathrm{A}$	
C:0x0AD6	\mathbf{EF}	MOV	A, R7	
C:0x0AD7	A4	MUL	AB	
C:0x0AD8	CE	XCH	A,R6	
C:0x0AD9	C5F0	XCH	A,0xF0	
C:0x0ADB	2D	ADD	A,R5	
C:0x0ADC	FD	MOV	R5,A	
C:0x0ADD	E4	CLR	A	
C:0x0ADE	3C	ADDC	A,R4	
C:0x0ADF	FC	MOV	$\mathrm{R4}\mathrm{,A}$	
C:0x0AE0	E8	MOV	A, R0	
C:0x0AE1	A4	MUL	AB	
C:0x0AE2	$2\mathrm{E}$	ADD	A,R6	
C:0x0AE3	C8	XCH	A, R0	
C:0x0AE4	C5F0	XCH	A,0xF0	
C:0x0AE6	3D	ADDC	A,R5	
C:0x0AE7	FD	MOV	R5,A	
C:0x0AE8	E4	CLR	A	
C:0x0AE9	3C	ADDC	A,R4	
C:0x0AEA	FC	MOV	$\mathrm{R4}\mathrm{,A}$	
C:0x0AEB	\mathbf{EF}	MOV	A,R7	
C:0x0AEC	A4	MUL	AB	
C:0x0AED	FF	MOV	m R7, A	
C:0x0AEE	E5F0	MOV	A, 0 xF0	
C:0x0AF0	28	ADD	A, R0	
C:0x0AF1	FE	MOV	R6,A	
C:0x0AF2	E4	CLR	A	
C:0x0AF3	3D	ADDC	A,R5	
C:0x0AF4	FD	MOV	R5,A	
C:0x0AF5	E4	CLR	A	
C:0x0AF6	3C	ADDC	A, R4	
C:0x0AF7	FC	MOV	R4,A	
C:0x0AF8	22	RET		

Listing 3: ULSHR				
	C?ULSHR:			
$C:0 \times 0A93$	E8	MOV	A, R0	
$C:0 \times 0A94$	600F	JZ	C:0AA5	
$C:0 \times 0A96$	EC	MOV	A,R4	
$C:0 \times 0A97$	C3	CLR	\mathbf{C}	
C:0x0A98	13	RRC	A	

$C:0 \times 0A99$	FC	MOV	$\mathrm{R4},\mathrm{A}$	
C:0x0A9A	ED	MOV	A,R5	
C:0x0A9B	13	RRC	A	
C:0x0A9C	FD	MOV	R5,A	
C:0x0A9D	${ m EE}$	MOV	A,R6	
C:0x0A9E	13	RRC	A	
C:0x0A9F	FE	MOV	R6,A	
C:0x0AA0	EF	MOV	A, R7	
C:0x0AA1	13	RRC	A	
C:0x0AA2	FF	MOV	m R7, A	
C:0x0AA3	D8F1	DJNZ	R0, C: 0A96	
C:0x0AA5	22	RET		

3.4.2 ADC scaling

T	4	TAT	TTT
Listing	/ •	1 1 /1	
1 /181/1119	4	IIVI	
	т.	TILL	\sim \perp

	C	?IMUL:	
C:0x0A2C	\mathbf{EF}	MOV	A,R7
C:0x0A2D	8DF0	MOV	0xF0,R5
C:0x0A2F	A4	MUL	AB
$C:0 \times 0A30$	A8F0	MOV	R0,0 xF0
$C:0 \times 0A32$	CF	XCH	A, R7
C:0x0A33	8CF0	MOV	0xF0,R4
$C:0 \times 0A35$	A4	MUL	AB
$C:0 \times 0A36$	28	ADD	A, R0
$C:0 \times 0A37$	CE	XCH	A, R6
C:0x0A38	8DF0	MOV	0xF0, R5
C:0x0A3A	A4	MUL	AB
C:0x0A3B	$2\mathrm{E}$	ADD	A, R6
C:0x0A3C	FE	MOV	R6,A
C:0x0A3D	22	RET	

3.4.3 Division

Division and modulus operations are contained in 5 invoke the functions contained in 6.

Listing 5: Division

```
scale /= 10;
num = out / scale;
out %= scale;
```

Listing	U		

	шь	ung o. o	DIV
	C?	UIDIV:	
C:0x0A3E	BC000B	CJNE	R4, #0x00, C: 0A4C
C:0x0A41	BE0029	CJNE	R6, #0x00, C: 0A6D
C:0x0A44	EF	MOV	A, R7
C:0x0A45	8DF0	MOV	0xF0,R5
C:0x0A47	84	DIV	AB
C:0x0A48	FF	MOV	R7,A
C:0x0A49	ADF0	MOV	R5,0xF0
C:0x0A4B	22	RET	
C:0x0A4C	$\mathrm{E}4$	CLR	A

C:0x0A4B CC XCH A, R4 C:0x0A4F 75 F008 MOV 0xF0,#0x08 C:0x0A52 EF MOV A, R7 C:0x0A53 2F ADD A, R7 C:0x0A55 EE MOV A, R6 C:0x0A56 33 RLC A C:0x0A57 FE MOV A, R4 C:0x0A58 EC MOV A, R4 C:0x0A59 33 RLC A C:0x0A58 EC MOV A, R4 C:0x0A54 FC MOV R4, A C:0x0A55 33 RLC A C:0x0A59 33 RLC A C:0x0A55 BE MOV A, R6 C:0x0A55 BE MOV A, R6 C:0x0A55 9D SUBB A, R5 C:0x0A56 9S SUBB A, R0 C:0x0A61 FC MOV A, R6 C:0x0A62 EE MOV <				
C: 0 x 0 A 5 2 EF MOV A, R7 C: 0 x 0 A 5 3 2F ADD A, R7 C: 0 x 0 A 5 3 2F ADD A, R7 C: 0 x 0 A 5 4 FF MOV R7, A C: 0 x 0 A 5 5 EE MOV A, R6 C: 0 x 0 A 5 6 33 RLC A C: 0 x 0 A 5 7 FE MOV A, R4 C: 0 x 0 A 5 8 EC MOV A, R4 C: 0 x 0 A 5 9 33 RLC A C: 0 x 0 A 5 9 SUBB A, R6 C: 0 x 0 A 5 B EE MOV A, R6 C: 0 x 0 A 5 B EE MOV A, R6 C: 0 x 0 A 5 B EE MOV A, R6 C: 0 x 0 A 5 B EE MOV A, R6 C: 0 x 0 A 5 B EE MOV A, R6 C: 0 x 0 A 5 B EC MOV A, R6 C: 0 x 0 A 5 B EC MOV A, R6 C: 0 x 0 A 6 B FC MOV A, R6				
C:0x0A52 EF MOV A, R7 C:0x0A53 2F ADD A, R7 C:0x0A55 FE MOV R7, A C:0x0A55 EE MOV A, R6 C:0x0A56 33 RLC A C:0x0A57 FE MOV A, R4 C:0x0A59 33 RLC A C:0x0A5A FC MOV A, R6 C:0x0A5B EE MOV A, R6 C:0x0A5B EE MOV A, R6 C:0x0A5B EE MOV A, R6 C:0x0A5C 9D SUBB A, R5 C:0x0A5E 98 SUBB A, R0 C:0x0A5E 98 SUBB A, R6 C:0x0A5E 98 SUBB A, R6 C:0x0A61 FC MOV A, R6 C:0x0A62 EE MOV A, R6 C:0x0A63 9D SUBB A, R5 C:0x0A66 D5F0E9 DJNZ				R0,A
C:0x0A53 2F ADD A,R7 C:0x0A54 FF MOV R7,A C:0x0A55 EE MOV A,R6 C:0x0A56 33 RLC A C:0x0A58 EC MOV A,R4 C:0x0A59 33 RLC A C:0x0A5B EC MOV A,R4 C:0x0A5B EE MOV A,R6 C:0x0A5B EE MOV A,R6 C:0x0A5C 9D SUBB A,R5 C:0x0A5D EC MOV A,R4 C:0x0A5B EE MOV A,R4 C:0x0A5D EC MOV A,R4 C:0x0A5E 98 SUBB A,R5 C:0x0A6E P8 SUBB A,R6 C:0x0A61 FC MOV R4,A C:0x0A62 EE MOV A,R6 C:0x0A63 9D SUBB A,R5 C:0x0A66 D5F0E9 DJNZ 0xF0,C:0A	C:0x0A4F	75 F008	MOV	0xF0,#0x08
C:0x0A54 FF MOV A, R6 C:0x0A55 EE MOV A, R6 C:0x0A56 33 RLC A C:0x0A57 FE MOV R6, A C:0x0A58 EC MOV A, R4 C:0x0A59 33 RLC A C:0x0A59 33 RLC A C:0x0A5A FC MOV R4, A C:0x0A5B EE MOV A, R6 C:0x0A5B EE MOV A, R6 C:0x0A5C 9D SUBB A, R5 C:0x0A5D EC MOV A, R4 C:0x0A5E 98 SUBB A, R0 C:0x0A5F 4005 JC C:0x66 C:0x0A5F 4005 JC C:0x66 C:0x0A61 FC MOV R4, A C:0x0A62 EE MOV A, R6 C:0x0A63 9D SUBB A, R5 C:0x0A64 FE MOV R6, A C:0x0A65 OF INC R7 C:0x0A66 D5F0E9 DJNZ 0xF0, C:0x52 C:0x0A66 CE XCH A, R6 C:0x0A66 FD MOV R5, A C:0x0A66 FF MOV R5, A C:0x0A66 FF MOV R6, A C:0x0A66 FF MOV R5, A C:0x0A66 FF MOV R5, A C:0x0A67 EE MOV A, R6 C:0x0A68 FD MOV R5, A C:0x0A68 FD MOV R5, A C:0x0A69 E4 CLR A C:0x0A66 FF MOV R6, A C:0x0A66 FF MOV R6, A C:0x0A66 FF MOV R5, A C:0x0A67 FF MOV R6, A C:0x0A67 FF MOV R7, A C:0x0A67 FF MOV R7, A C:0x0A67 FF MOV R7, A C:0x0A67 ADFO MOV R5, OxFO C:0x0A77 ADFO MOV R5, OxFO C:0x0A78 FF MOV A, R7 C:0x0A79 FF MOV A, R5 C:0x0A70 FF MOV R5, A C:0x0A71 EE MOV A, R7 C:0x0A71 FD MOV R5, A C:0x0A72 EF MOV A, R7 C:0x0A74 ADFO MOV R5, A C:0x0A75 FF MOV A, R7 C:0x0A76 FF MOV A, R5 C:0x0A77 ADFO MOV R5, A C:0x0A78 FF MOV R5, A C:0x0A88 FD MOV R5, A C:0x0A88 C3 CLR C C:0x0A88 C3 CLR C C:0x0A88 C3 CLR C C:0x0A88 FD MOV R5, A C:0x0A86 FD MOV R5, A C:0x0A86 FD MOV R5, A C:0x0A86 FD MOV R5, A C:0x0A88 FD MOV R5, A C:0x0A88 FD MOV R5, A C:0x0A86 FD MOV R5,	$C:0 \times 0A52$	EF	MOV	A, R7
C:0x0A55 EE MOV A, R6 C:0x0A56 33 RLC A C:0x0A57 FE MOV R6, A C:0x0A58 EC MOV A, R4 C:0x0A58 EC MOV A, R4 C:0x0A58 EC MOV A, R4 C:0x0A5A FC MOV R4, A C:0x0A5B EE MOV A, R6 C:0x0A5B EE MOV A, R6 C:0x0A5B EE MOV A, R6 C:0x0A5D EC MOV A, R4 C:0x0A5D EC MOV A, R4 C:0x0A5D EC MOV A, R4 C:0x0A5E 98 SUBB A, R0 C:0x0A5F 4005 JC C:0xA66 C:0x0A61 FC MOV R4, A C:0x0A62 EE MOV A, R6 C:0x0A63 9D SUBB A, R5 C:0x0A64 FE MOV R6, A C:0x0A66 D5F0E9 DJNZ 0xF0, C:0x52 C:0x0A66 D5F0E9 DJNZ 0xF0, C:0x52 C:0x0A66 CE XCH A, R6 C:0x0A66 CE XCH A, R6 C:0x0A66 FD MOV R5, A C:0x0A66 FF MOV R5, A C:0x0A66 FF MOV R6, A C:0x0A66 FF MOV R5, A C:0x0A66 FF MOV R5, A C:0x0A67 EE MOV A, R6 C:0x0A68 FO MOV R5, A C:0x0A68 FSF0 MOV R5, A C:0x0A69 EA DIV AB C:0x0A67 FF MOV R5, A C:0x0A68 FF MOV R5,	C:0x0A53	2F	ADD	A, R7
C:0x0A55 EE MOV A, R6 C:0x0A56 33 RLC A C:0x0A57 FE MOV R6, A C:0x0A58 EC MOV A, R4 C:0x0A58 EC MOV A, R4 C:0x0A58 EC MOV A, R4 C:0x0A5A FC MOV R4, A C:0x0A5B EE MOV A, R6 C:0x0A5B EE MOV A, R6 C:0x0A5B EE MOV A, R6 C:0x0A5D EC MOV A, R4 C:0x0A5D EC MOV A, R4 C:0x0A5D EC MOV A, R4 C:0x0A5E 98 SUBB A, R0 C:0x0A5F 4005 JC C:0xA66 C:0x0A61 FC MOV R4, A C:0x0A62 EE MOV A, R6 C:0x0A63 9D SUBB A, R5 C:0x0A64 FE MOV R6, A C:0x0A66 D5F0E9 DJNZ 0xF0, C:0x52 C:0x0A66 D5F0E9 DJNZ 0xF0, C:0x52 C:0x0A66 CE XCH A, R6 C:0x0A66 CE XCH A, R6 C:0x0A66 FD MOV R5, A C:0x0A66 FF MOV R5, A C:0x0A66 FF MOV R6, A C:0x0A66 FF MOV R5, A C:0x0A66 FF MOV R5, A C:0x0A67 EE MOV A, R6 C:0x0A68 FO MOV R5, A C:0x0A68 FSF0 MOV R5, A C:0x0A69 EA DIV AB C:0x0A67 FF MOV R5, A C:0x0A68 FF MOV R5,	$C:0 \times 0A54$	FF	MOV	
C:0x0A56 33 RLC A C:0x0A57 FE MOV R6, A C:0x0A58 EC MOV A, R4 C:0x0A59 33 RLC A C:0x0A5B EE MOV A, R6 C:0x0A5C 9D SUBB A, R5 C:0x0A5D EC MOV A, R4 C:0x0A5E 98 SUBB A, R0 C:0x0A5F 4005 JC C:0A66 C:0x0A61 FC MOV R4, A C:0x0A63 9D SUBB A, R6 C:0x0A63 9D SUBB A, R6 C:0x0A63 9D SUBB A, R5 C:0x0A64 FE MOV R6, A C:0x0A65 OF INC R7 C:0x0A66 D5F0E9 DJNZ 0xF0, C:0A52 C:0x0A6B FD MOV R5, A C:0x0A6B FD MOV R5, A C:0x0A6B FD MOV <td>C:0x0A55</td> <td>$\rm EE$</td> <td>MOV</td> <td></td>	C:0x0A55	$\rm EE$	MOV	
C:0x0A57 FE MOV R6, A C:0x0A58 EC MOV A, R4 C:0x0A59 33 RLC A C:0x0A5A FC MOV R4, A C:0x0A5B EE MOV A, R6 C:0x0A5C 9D SUBB A, R5 C:0x0A5D EC MOV A, R4 C:0x0A5B 98 SUBB A, R0 C:0x0A5F 4005 JC C:0 A66 C:0x0A61 FC MOV R4, A C:0x0A61 FC MOV R4, A C:0x0A63 9D SUBB A, R6 C:0x0A63 9D SUBB A, R5 C:0x0A64 FE MOV R6, A C:0x0A65 OF INC R7 C:0x0A66 D5F0E9 DJNZ OxF0, C:0 A52 C:0x0A6B FD MOV R5, A C:0x0A6B FD MOV R5, A C:0x0A6B FB MO	C:0x0A56	33		
C:0x0A58 EC MOV A, R4 C:0x0A59 33 RLC A C:0x0A5B FC MOV R4, A C:0x0A5B EE MOV A, R6 C:0x0A5C 9D SUBB A, R5 C:0x0A5E 98 SUBB A, R0 C:0x0A5F 4005 JC C:0A66 C:0x0A61 FC MOV R4, A C:0x0A62 EE MOV A, R6 C:0x0A63 9D SUBB A, R5 C:0x0A63 9D SUBB A, R5 C:0x0A64 FE MOV R6, A C:0x0A65 0F INC R7 C:0x0A66 D5F0E9 DJNZ 0xF0, C:0A52 C:0x0A69 E4 CLR A C:0x0A6B FD MOV R5, A C:0x0A6B FD MOV R7, A C:0x0A6E F8 MOV R0, A C:0x0A6F F5F0 MOV </td <td></td> <td></td> <td></td> <td>R6.A</td>				R6.A
C:0x0A59 33 RLC A C:0x0A5B EE MOV R4,A C:0x0A5C 9D SUBB A,R5 C:0x0A5D EC MOV A,R4 C:0x0A5E 98 SUBB A,R0 C:0x0A5F 4005 JC C:0A66 C:0x0A61 FC MOV R4,A C:0x0A62 EE MOV A,R6 C:0x0A63 9D SUBB A,R5 C:0x0A63 9D SUBB A,R5 C:0x0A64 FE MOV R6,A C:0x0A65 OF INC R7 C:0x0A66 D5F0E9 DJNZ 0xF0,C:0A52 C:0x0A66 D5F0E9 DJNZ 0xF0,C:0A52 C:0x0A68 FD MOV R5,A C:0x0A6B FD MOV R5,A C:0x0A6B FD MOV A,R5 C:0x0A6E F8 MOV 0xF0,A C:0x0A71 EE MOV </td <td></td> <td></td> <td></td> <td></td>				
C:0x0A5A FC MOV R4, A C:0x0A5B EE MOV A, R6 C:0x0A5C 9D SUBB A, R5 C:0x0A5D EC MOV A, R4 C:0x0A5E 98 SUBB A, R0 C:0x0A5F 4005 JC C:0 A66 C:0x0A61 FC MOV R4, A C:0x0A62 EE MOV A, R6 C:0x0A63 9D SUBB A, R5 C:0x0A64 FE MOV R6, A C:0x0A65 0F INC R7 C:0x0A66 D5F0E9 DJNZ OxF0, C:0 A52 C:0x0A69 E4 CLR A C:0x0A6B FD MOV R5, A C:0x0A6B FD MOV R5, A C:0x0A6E F8 MOV A, R5 C:0x0A6E F8 MOV A, R6 C:0x0A71 EE MOV A, R6 C:0x0A72 84 DIV				
C:0x0A5B EE MOV A, R6 C:0x0A5C 9D SUBB A, R5 C:0x0A5D EC MOV A, R4 C:0x0A5E 98 SUBB A, R0 C:0x0A5F 4005 JC C:0 A66 C:0x0A61 FC MOV R4, A C:0x0A62 EE MOV A, R6 C:0x0A63 9D SUBB A, R5 C:0x0A64 FE MOV R6, A C:0x0A65 OF INC R7 C:0x0A66 D5F0E9 DJNZ OxF0, C:0 A52 C:0x0A66 D5F0E9 DJNZ OxF0, C:0 A52 C:0x0A68 FD MOV R5, A C:0x0A6B FD MOV R5, A C:0x0A6B FD MOV A, R5 C:0x0A6E F8 MOV R0, A C:0x0A6F F5F0 MOV 0xF0, A C:0x0A71 EE MOV A, R6 C:0x0A72 84				
C:0x0A5C 9D SUBB A, R5 C:0x0A5D EC MOV A, R4 C:0x0A5E 98 SUBB A, R0 C:0x0A5F 4005 JC C:0 A66 C:0x0A61 FC MOV R4, A C:0x0A62 EE MOV A, R6 C:0x0A63 9D SUBB A, R5 C:0x0A64 FE MOV R6, A C:0x0A65 0F INC R7 C:0x0A66 D5F0E9 DJNZ 0xF0,C:0A52 C:0x0A69 E4 CLR A C:0x0A6B FD MOV R5,A C:0x0A6B FD MOV R5,A C:0x0A6C 22 RET C:0x0A6B FD MOV A,R5 C:0x0A6C 22 RET C:0x0A6E F8 MOV R0,A C:0x0A71 EE MOV A,R6 C:0x0A72 84 DIV AB				
C:0x0A5D EC MOV A, R4 C:0x0A5E 98 SUBB A, R0 C:0x0A5F 4005 JC C:0x0A66 C:0x0A61 FC MOV R4, A C:0x0A62 EE MOV A, R6 C:0x0A63 9D SUBB A, R5 C:0x0A64 FE MOV R6, A C:0x0A65 0F INC R7 C:0x0A66 D5F0E9 DJNZ 0xF0, C:0 A52 C:0x0A69 E4 CLR A C:0x0A69 E4 CLR A C:0x0A6B FD MOV R5, A C:0x0A6B FD MOV A, R5 C:0x0A6C 22 RET C:0x0A6E F8 MOV A, R5 C:0x0A6F F5F0 MOV A, R6 A C:0x0A7 AR6 C:0x0A72 84 DIV AB OxD0.2, C:0A92 C:0x0A92 C:0x0A7E FE MOV R6, A				
C:0x0A5E 98 SUBB A, R0 C:0x0A5F 4005 JC C:0A66 C:0x0A61 FC MOV R4, A C:0x0A62 EE MOV A, R6 C:0x0A63 9D SUBB A, R5 C:0x0A64 FE MOV R6, A C:0x0A65 OF INC R7 C:0x0A66 D5F0E9 DJNZ 0xF0, C:0A52 C:0x0A66 D5F0E9 DJNZ 0xF0, C:0A52 C:0x0A66 E4 CLR A C:0x0A6B FD MOV R5, A C:0x0A6B FD MOV R5, A C:0x0A6C 22 RET C:0x0A6E F8 MOV 0xF0, A C:0x0A6E F8 MOV A, R6 C:0x0A71 EE MOV A, R6 C:0x0A71 EE MOV A, R6 A C:0x0A72 84 DIV AB C:0x0A77 ADF0 MOV R5, 0xF0 C:0x0A7				
C:0x0A5F 4005 JC C:0x0A66 C:0x0A61 FC MOV R4,A C:0x0A62 EE MOV A,R6 C:0x0A63 9D SUBB A,R5 C:0x0A64 FE MOV R6,A C:0x0A65 0F INC R7 C:0x0A66 D5F0E9 DJNZ 0xF0,C:0A52 C:0x0A69 E4 CLR A C:0x0A6B FD MOV R5,A C:0x0A6B FD MOV R5,A C:0x0A6C 22 RET C:0x0A6B FD MOV A,R5 C:0x0A6B FB MOV A,R5 C:0x0A6B FB MOV A,R6 C:0x0A6B FB MOV A,R6 C:0x0A6B F8 MOV A,R6 C:0x0A6B FS MOV A,R6 C:0x0A71 EE MOV A,R6 C:0x0A77 ADF0 MOV R5,0xF0 </td <td></td> <td></td> <td></td> <td></td>				
C:0x0A61 FC MOV R4,A C:0x0A62 EE MOV A,R6 C:0x0A63 9D SUBB A,R5 C:0x0A64 FE MOV R6,A C:0x0A65 0F INC R7 C:0x0A66 D5F0E9 DJNZ 0xF0,C:0A52 C:0x0A66 D5F0E9 DJNZ 0xF0,C:0A52 C:0x0A66 EXCH A,R6 A C:0x0A6B FD MOV R5,A C:0x0A6B FD MOV R5,A C:0x0A6B FD MOV A,R5 C:0x0A6B FD MOV A,R5 C:0x0A6B FB MOV A,R5 C:0x0A6B FB MOV A,R6 C:0x0A6B FB MOV A,R6 C:0x0A6E F8 MOV A,R6 C:0x0A71 EE MOV A,R6 C:0x0A72 84 DIV AB C:0x0A77 ADF0 MOV				
C:0x0A62 EE MOV A,R6 C:0x0A63 9D SUBB A,R5 C:0x0A64 FE MOV R6,A C:0x0A65 0F INC R7 C:0x0A66 D5F0E9 DJNZ 0xF0,C:0A52 C:0x0A69 E4 CLR A C:0x0A6B ED MOV R5,A C:0x0A6B FD MOV R5,A C:0x0A6C 22 RET C:0x0A6D ED MOV A,R5 C:0x0A6B F8 MOV R0,A C:0x0A6D ED MOV A,R6 C:0x0A6E F8 MOV A,R6 C:0x0A71 EE MOV A,R6 C:0x0A72 84 DIV AB C:0x0A76 FE MOV R5,0xF0 C:0x0A77 ADF0 MOV R5,0xF0 C:0x0A7C EF MOV A,R7 C:0x0A7E FF MOV A,R7				
C:0x0A63 9D SUBB A,R5 C:0x0A64 FE MOV R6,A C:0x0A65 OF INC R7 C:0x0A66 D5F0E9 DJNZ 0xF0,C:0A52 C:0x0A69 E4 CLR A C:0x0A6A CE XCH A,R6 C:0x0A6B FD MOV R5,A C:0x0A6C 22 RET C:0x0A6D ED MOV A,R5 C:0x0A6E F8 MOV R0,A C:0x0A6F F5F0 MOV 0xF0,A C:0x0A71 EE MOV A,R6 C:0x0A72 84 DIV AB C:0x0A76 FE MOV R6,A C:0x0A77 ADF0 MOV 0xF0,#0x08 C:0x0A7B 75F008 MOV 0xF0,#0x08 C:0x0A7E FF MOV A,R7 C:0x0A7F ED MOV A,R7 C:0x0A80 33 RLC A				
C:0x0A64 FE MOV R6, A C:0x0A65 0F INC R7 C:0x0A66 D5F0E9 DJNZ 0xF0, C:0A52 C:0x0A69 E4 CLR A C:0x0A6A CE XCH A, R6 C:0x0A6B FD MOV R5, A C:0x0A6C 22 RET C:0x0A6B FB MOV A, R5 C:0x0A6B FB MOV R6, A C:0x0A6B FB MOV A, R5 C:0x0A6B FB MOV A, R6 C:0x0A6B FB MOV A, R6 C:0x0A71 EE MOV A, R6 C:0x0A72 84 DIV AB C:0x0A76 FE MOV R6, A C:0x0A77 ADF0 MOV R5,0xF0 C:0x0A7C EF MOV A, R7 C:0x0A7E FF MOV A, R7 C:0x0A81 FD MOV A, R5				
C:0x0A66 D5F0E9 DJNZ 0xF0,C:0A52 C:0x0A66 D5F0E9 DJNZ 0xF0,C:0A52 C:0x0A69 E4 CLR A C:0x0A6A CE XCH A, R6 C:0x0A6B FD MOV R5, A C:0x0A6C 22 RET C:0x0A6E F8 MOV R0, A C:0x0A6F F5F0 MOV 0xF0, A C:0x0A71 EE MOV A, R6 C:0x0A72 84 DIV AB C:0x0A73 20D21C JB 0xD0.2, C:0A92 C:0x0A76 FE MOV R6, A C:0x0A77 ADF0 MOV R5,0xF0 C:0x0A7C EF MOV A,R7 C:0x0A7C EF MOV A,R7 C:0x0A7E FF MOV A,R5 C:0x0A80 33 RLC A C:0x0A81 FD MOV R5,A C:0x0A84 98 SUBB				
C:0x0A66 D5F0E9 DJNZ 0xF0,C:0A52 C:0x0A69 E4 CLR A C:0x0A6A CE XCH A, R6 C:0x0A6B FD MOV R5, A C:0x0A6C 22 RET C:0x0A6D ED MOV A, R5 C:0x0A6E F8 MOV 0xF0, A C:0x0A6F F5F0 MOV 0xF0, A C:0x0A71 EE MOV A, R6 C:0x0A72 84 DIV AB C:0x0A73 20D21C JB 0xD0.2, C:0A92 C:0x0A76 FE MOV R6, A C:0x0A77 ADF0 MOV R5,0xF0 C:0x0A7C EF MOV 0xF0,#0x08 C:0x0A7C EF MOV A,R7 C:0x0A7F ED MOV R7,A C:0x0A80 33 RLC A C:0x0A81 FD MOV R5,A C:0x0A82 4007 JC				
C:0x0A669 E4 CLR A C:0x0A6A CE XCH A, R6 C:0x0A6B FD MOV R5, A C:0x0A6C 22 RET C:0x0A6D ED MOV A, R5 C:0x0A6E F8 MOV R0, A C:0x0A6F F5F0 MOV 0xF0, A C:0x0A71 EE MOV A, R6 C:0x0A72 84 DIV AB C:0x0A73 20D21C JB 0xD0.2, C:0A92 C:0x0A76 FE MOV R6, A C:0x0A77 ADF0 MOV R5, 0xF0 C:0x0A7P 75F008 MOV 0xF0,#0x08 C:0x0A7C EF MOV A, R7 C:0x0A7E FF MOV A, R7 C:0x0A7E FF MOV A, R5 C:0x0A81 FD MOV R5, A C:0x0A82 4007 JC C:0A8B C:0x0A85 5006 JNC				
C:0x0A6A CE XCH A, R6 C:0x0A6B FD MOV R5, A C:0x0A6C 22 RET C:0x0A6D ED MOV A, R5 C:0x0A6E F8 MOV R0, A C:0x0A6F F5F0 MOV 0xF0, A C:0x0A71 EE MOV A, R6 C:0x0A72 84 DIV AB C:0x0A73 20D21C JB 0xD0.2, C:0A92 C:0x0A76 FE MOV R6, A C:0x0A77 ADF0 MOV R5,0xF0 C:0x0A79 75F008 MOV 0xF0,#0x08 C:0x0A7C EF MOV A,R7 C:0x0A7D 2F ADD A,R7 C:0x0A7E FF MOV R7,A C:0x0A80 33 RLC A C:0x0A81 FD MOV R5,A C:0x0A82 4007 JC C:0A8B C:0x0A85 5006 JNC				
C:0x0A6B FD MOV R5,A C:0x0A6C 22 RET C:0x0A6B ED MOV A,R5 C:0x0A6E F8 MOV R0,A C:0x0A6F F5F0 MOV 0xF0,A C:0x0A71 EE MOV A,R6 C:0x0A72 84 DIV AB C:0x0A73 20D21C JB 0xD0.2,C:0A92 C:0x0A76 FE MOV R6,A C:0x0A77 ADF0 MOV R5,0xF0 C:0x0A79 75F008 MOV 0xF0,#0x08 C:0x0A7C EF MOV A,R7 C:0x0A7E FF MOV R7,A C:0x0A7E FF MOV R7,A C:0x0A80 33 RLC A C:0x0A81 FD MOV R5,A C:0x0A82 4007 JC C:0A8B C:0x0A84 98 SUBB A,R0 C:0x0A87 D5F0F2 DJNZ <td< td=""><td></td><td></td><td></td><td></td></td<>				
C:0x0A6C 22 RET C:0x0A6D ED MOV A, R5 C:0x0A6E F8 MOV R0, A C:0x0A6F F5F0 MOV 0xF0, A C:0x0A71 EE MOV A, R6 C:0x0A72 84 DIV AB C:0x0A73 20D21C JB 0xD0.2,C:0A92 C:0x0A76 FE MOV R6,A C:0x0A77 ADF0 MOV R5,0xF0 C:0x0A79 75F008 MOV 0xF0,#0x08 C:0x0A7C EF MOV A,R7 C:0x0A7D 2F ADD A,R7 C:0x0A7E FF MOV R7,A C:0x0A80 33 RLC A C:0x0A81 FD MOV R5,A C:0x0A82 4007 JC C:0A8B C:0x0A84 98 SUBB A,R0 C:0x0A8A 22 RET C C:0x0A8B C3 CLR C </td <td>C:0x0A6A</td> <td></td> <td></td> <td></td>	C:0x0A6A			
C:0x0A6D ED MOV A, R5 C:0x0A6E F8 MOV R0, A C:0x0A6F F5F0 MOV 0xF0, A C:0x0A71 EE MOV A, R6 C:0x0A72 84 DIV AB C:0x0A73 20D21C JB 0xD0.2,C:0A92 C:0x0A76 FE MOV R6, A C:0x0A77 ADF0 MOV R5,0xF0 C:0x0A79 75F008 MOV 0xF0,#0x08 C:0x0A7C EF MOV A,R7 C:0x0A7E FF MOV R7,A C:0x0A7F ED MOV A,R5 C:0x0A80 33 RLC A C:0x0A81 FD MOV R5,A C:0x0A82 4007 JC C:0A8B C:0x0A84 98 SUBB A,R0 C:0x0A8A 22 RET C:0x0A8C C:0x0A8B C3 CLR C C:0x0A8B OF <			MOV	$\mathrm{R5},\mathrm{A}$
C:0x0A6E F8 MOV R0,A C:0x0A6F F5F0 MOV 0xF0,A C:0x0A71 EE MOV A,R6 C:0x0A72 84 DIV AB C:0x0A73 20D21C JB 0xD0.2,C:0A92 C:0x0A76 FE MOV R6,A C:0x0A77 ADF0 MOV R5,0xF0 C:0x0A79 75F008 MOV 0xF0,#0x08 C:0x0A7C EF MOV A,R7 C:0x0A7D 2F ADD A,R7 C:0x0A7E FF MOV R7,A C:0x0A81 FD MOV R5,A C:0x0A82 4007 JC C:0A8B C:0x0A84 98 SUBB A,R0 C:0x0A85 5006 JNC C:0A8D C:0x0A8B C3 CLR C C:0x0A8B C3 CLR C C:0x0A8D FD MOV R5,A C:0x0A8E OF IN			RET	
C:0x0A6F F5F0 MOV 0xF0, A C:0x0A71 EE MOV A, R6 C:0x0A72 84 DIV AB C:0x0A73 20D21C JB 0xD0.2, C:0A92 C:0x0A76 FE MOV R6, A C:0x0A77 ADF0 MOV R5,0xF0 C:0x0A79 75F008 MOV 0xF0,#0x08 C:0x0A7C EF MOV A,R7 C:0x0A7D 2F ADD A,R7 C:0x0A7E FF MOV R7,A C:0x0A80 33 RLC A C:0x0A81 FD MOV R5,A C:0x0A82 4007 JC C:0A8B C:0x0A84 98 SUBB A,R0 C:0x0A87 D5F0F2 DJNZ 0xF0,C:0A7C C:0x0A8B C3 CLR C C:0x0A8D FD MOV R5,A C:0x0A8E 0F INC R7 C:0x0A8F D5F0EA	C:0x0A6D	ED	MOV	A,R5
C:0x0A71 EE MOV A, R6 C:0x0A72 84 DIV AB C:0x0A73 20D21C JB 0xD0.2,C:0A92 C:0x0A76 FE MOV R6,A C:0x0A77 ADF0 MOV R5,0xF0 C:0x0A79 75F008 MOV 0xF0,#0x08 C:0x0A7C EF MOV A,R7 C:0x0A7D 2F ADD A,R7 C:0x0A7E FF MOV R7,A C:0x0A7F ED MOV A,R5 C:0x0A80 33 RLC A C:0x0A81 FD MOV R5,A C:0x0A82 4007 JC C:0A8B C:0x0A84 98 SUBB A,R0 C:0x0A85 5006 JNC C:0A8D C:0x0A8A 22 RET C:0x0A8B C3 CLR C C:0x0A8D FD MOV R5,A C:0x0A8E 0F INC R7 <td>C:0x0A6E</td> <td>F8</td> <td>MOV</td> <td>$\mathrm{R0},\mathrm{A}$</td>	C:0x0A6E	F8	MOV	$\mathrm{R0},\mathrm{A}$
C:0x0A72 84 DIV AB C:0x0A73 20D21C JB 0xD0.2,C:0A92 C:0x0A76 FE MOV R6,A C:0x0A77 ADF0 MOV R5,0xF0 C:0x0A79 75F008 MOV 0xF0,#0x08 C:0x0A7C EF MOV A,R7 C:0x0A7D 2F ADD A,R7 C:0x0A7E FF MOV R7,A C:0x0A7F ED MOV A,R5 C:0x0A80 33 RLC A C:0x0A81 FD MOV R5,A C:0x0A82 4007 JC C:0A8B C:0x0A84 98 SUBB A,R0 C:0x0A85 5006 JNC C:0A8D C:0x0A8A 22 RET C:0x0A8B C3 CLR C C:0x0A8C 98 SUBB A,R0 C:0x0A8E OF INC R7 C:0x0A8F D5F0EA DJNZ 0xF	C:0x0A6F	F5F0	MOV	0xF0, A
C:0x0A73 20D21C JB 0xD0.2,C:0A92 C:0x0A76 FE MOV R6,A C:0x0A77 ADF0 MOV R5,0xF0 C:0x0A79 75F008 MOV 0xF0,#0x08 C:0x0A7C EF MOV A,R7 C:0x0A7D 2F ADD A,R7 C:0x0A7E FF MOV R7,A C:0x0A7F ED MOV A,R5 C:0x0A80 33 RLC A C:0x0A81 FD MOV R5,A C:0x0A82 4007 JC C:0A8B C:0x0A84 98 SUBB A,R0 C:0x0A85 5006 JNC C:0A8D C:0x0A8A 22 RET C:0x0A8B C3 CLR C C:0x0A8C 98 SUBB A,R0 C:0x0A8E OF INC R7 C:0x0A8F D5F0EA DJNZ 0xF0,C:0A7C	$C:0 \times 0A71$	EE	MOV	A,R6
C:0x0A76 FE MOV R6,A C:0x0A77 ADF0 MOV R5,0xF0 C:0x0A79 75F008 MOV 0xF0,#0x08 C:0x0A7C EF MOV A,R7 C:0x0A7D 2F ADD A,R7 C:0x0A7E FF MOV R7,A C:0x0A7F ED MOV A,R5 C:0x0A80 33 RLC A C:0x0A81 FD MOV R5,A C:0x0A82 4007 JC C:0A8B C:0x0A84 98 SUBB A,R0 C:0x0A85 5006 JNC C:0A8D C:0x0A8A 22 RET C:0x0A8B C3 CLR C C:0x0A8C 98 SUBB A,R0 C:0x0A8D FD MOV R5,A C:0x0A8E 0F INC R7 C:0x0A8F D5F0EA DJNZ 0xF0,C:0A7C	$C:0 \times 0A72$	84	DIV	AB
C:0x0A77 ADF0 MOV R5,0xF0 C:0x0A79 75F008 MOV 0xF0,#0x08 C:0x0A7C EF MOV A,R7 C:0x0A7D 2F ADD A,R7 C:0x0A7E FF MOV R7,A C:0x0A7F ED MOV A,R5 C:0x0A80 33 RLC A C:0x0A81 FD MOV R5,A C:0x0A82 4007 JC C:0A8B C:0x0A84 98 SUBB A,R0 C:0x0A85 5006 JNC C:0A8D C:0x0A87 D5F0F2 DJNZ 0xF0,C:0A7C C:0x0A8B C3 CLR C C:0x0A8C 98 SUBB A,R0 C:0x0A8D FD MOV R5,A C:0x0A8E 0F INC R7 C:0x0A8F D5F0EA DJNZ 0xF0,C:0A7C	$C:0 \times 0A73$	20D21C	$_{ m JB}$	0xD0.2, C: 0A92
C:0x0A79 75F008 MOV 0xF0,#0x08 C:0x0A7C EF MOV A,R7 C:0x0A7D 2F ADD A,R7 C:0x0A7E FF MOV R7,A C:0x0A8F ED MOV A,R5 C:0x0A80 33 RLC A C:0x0A81 FD MOV R5,A C:0x0A82 4007 JC C:0A8B C:0x0A84 98 SUBB A,R0 C:0x0A85 5006 JNC C:0A8D C:0x0A87 D5F0F2 DJNZ 0xF0,C:0A7C C:0x0A8B C3 CLR C C:0x0A8C 98 SUBB A,R0 C:0x0A8D FD MOV R5,A C:0x0A8E 0F INC R7 C:0x0A8F D5F0EA DJNZ 0xF0,C:0A7C	$C:0 \times 0A76$	FE	MOV	R6,A
C:0x0A79	$C:0 \times 0A77$	ADF0	MOV	R5,0xF0
C:0x0A7C EF MOV A,R7 C:0x0A7D 2F ADD A,R7 C:0x0A7E FF MOV R7,A C:0x0A7F ED MOV A,R5 C:0x0A80 33 RLC A C:0x0A81 FD MOV R5,A C:0x0A82 4007 JC C:0A8B C:0x0A84 98 SUBB A,R0 C:0x0A85 5006 JNC C:0A8D C:0x0A87 D5F0F2 DJNZ 0xF0,C:0A7C C:0x0A8A 22 RET C C:0x0A8B C3 CLR C C:0x0A8C 98 SUBB A,R0 C:0x0A8D FD MOV R5,A C:0x0A8E 0F INC R7 C:0x0A8F D5F0EA DJNZ 0xF0,C:0A7C	C:0x0A79	75 F008	MOV	
C:0x0A7E FF MOV R7,A C:0x0A7F ED MOV A,R5 C:0x0A80 33 RLC A C:0x0A81 FD MOV R5,A C:0x0A82 4007 JC C:0A8B C:0x0A84 98 SUBB A,R0 C:0x0A85 5006 JNC C:0A8D C:0x0A87 D5F0F2 DJNZ 0xF0,C:0A7C C:0x0A8A 22 RET C C:0x0A8B C3 CLR C C:0x0A8C 98 SUBB A,R0 C:0x0A8B FD MOV R5,A C:0x0A8E 0F INC R7 C:0x0A8F D5F0EA DJNZ 0xF0,C:0A7C	C:0x0A7C	EF		
C:0x0A7E FF MOV R7,A C:0x0A7F ED MOV A,R5 C:0x0A80 33 RLC A C:0x0A81 FD MOV R5,A C:0x0A82 4007 JC C:0A8B C:0x0A84 98 SUBB A,R0 C:0x0A85 5006 JNC C:0A8D C:0x0A87 D5F0F2 DJNZ 0xF0,C:0A7C C:0x0A8A 22 RET C C:0x0A8B C3 CLR C C:0x0A8C 98 SUBB A,R0 C:0x0A8B FD MOV R5,A C:0x0A8E 0F INC R7 C:0x0A8F D5F0EA DJNZ 0xF0,C:0A7C	C:0x0A7D	2F	ADD	A, R7
C:0x0A7F ED MOV A,R5 C:0x0A80 33 RLC A C:0x0A81 FD MOV R5,A C:0x0A82 4007 JC C:0A8B C:0x0A84 98 SUBB A,R0 C:0x0A85 5006 JNC C:0A8D C:0x0A87 D5F0F2 DJNZ 0xF0,C:0A7C C:0x0A8A 22 RET C C:0x0A8B C3 CLR C C:0x0A8C 98 SUBB A,R0 C:0x0A8D FD MOV R5,A C:0x0A8E 0F INC R7 C:0x0A8F D5F0EA DJNZ 0xF0,C:0A7C		FF		
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C:0x0A81 FD MOV R5,A C:0x0A82 4007 JC C:0A8B C:0x0A84 98 SUBB A,R0 C:0x0A85 5006 JNC C:0A8D C:0x0A87 D5F0F2 DJNZ 0xF0,C:0A7C C:0x0A8A 22 RET C:0x0A8B C3 CLR C C:0x0A8C 98 SUBB A,R0 C:0x0A8D FD MOV R5,A C:0x0A8E 0F INC R7 C:0x0A8F D5F0EA DJNZ 0xF0,C:0A7C				
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C:0x0A8A 22 RET C:0x0A8B C3 CLR C C:0x0A8C 98 SUBB A,R0 C:0x0A8D FD MOV R5,A C:0x0A8E 0F INC R7 C:0x0A8F D5F0EA DJNZ 0xF0,C:0A7C				
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C:0x0A8D FD MOV R5,A C:0x0A8E 0F INC R7 C:0x0A8F D5F0EA DJNZ 0xF0,C:0A7C				
C:0x0A8E 0F INC R7 C:0x0A8F D5F0EA DJNZ 0xF0,C:0A7C				
$C:0 \times 0A8F$ $D5F0EA$ $DJNZ$ $0 \times F0$, $C:0A7C$				
U:UXUA92 22 KEI				UXFU,C:UA/C
	U.UXUA92	44	בעוב	

3.4.4 Switch

This library function is generated to control large switch statements??

Listing 7: CCASE

		0	
C?CCASE:			
C:0x0AA6	D083	POP	0x83
C:0x0AA8	D082	POP	0x82
C:0x0AAA	F8	MOV	R0,A
C:0x0AAB	E4	CLR	A
C:0x0AAC	93	MOVC	A, @A+DPTR
C:0x0AAD	7012	JNZ	C:0AC1
C:0x0AAF	7401	MOV	A, #0x01
C:0x0AB1	93	MOVC	A,@A+DPTR
C:0x0AB2	700D	JNZ	C:0AC1
C:0x0AB4	A3	INC	DPTR
C:0x0AB5	A3	INC	DPTR
C:0x0AB6	93	MOVC	A,@A+DPTR
C:0x0AB7	F8	MOV	R0,A
C:0x0AB8	7401	MOV	A, #0x01
C:0x0ABA	93	MOVC	A, @A+DPTR
C:0x0ABB	F582	MOV	0x82, A
C:0x0ABD	8883	MOV	0x83,R0
C:0x0ABF	E4	CLR	A
C:0x0AC0	73	JMP	@A+DPTR
C:0x0AC1	7402	MOV	A, #0x02
C:0x0AC3	93	MOVC	A, @A+DPTR
C:0x0AC4	68	XRL	A, R0
C:0x0AC5	$60\mathrm{EF}$	JZ	C:0AB6
C:0x0AC7	A3	INC	DPTR
C:0x0AC8	A3	INC	DPTR
C:0x0AC9	A3	INC	DPTR
C:0x0ACA	$80\mathrm{DF}$	SJMP	C:0AAB