

# AN534

## Saving and Restoring Status on Interrupt (Implementing a Parameter Stack)

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## INTRODUCTION

The PIC17C42 has a 16 level deep hardware stack. The program counter is pushed into this stack on interrupts and subroutine calls. However, other key registers are not saved to the stack. Registers such as WREG, ALUSTA (which has carry, zero and other flag bits) and the bank select register (BSR) must be saved in an interrupt service routine. The following macros, PUSH and POP implement a parameter stack in data memory to save these register values.

The indirect addressing register, FSR0, is used to implement this parameter stack. It is assumed that FSR0 and its control bits are not used or modified elsewhere. The stack pointer (FSR0) is initialized at the highest RAM location (FFh).

SETF BCF BCF •	FSRO ALUSTA,FSO ALUSTA,FS1	;Initialize and dedicate FSR0 as stack pointer ; ;Set-up FSR0 for auto-dec
MACRO BCF MOVFP MOVFP MOVFP MOVFP MOVFP ENDM	ALUSTA,FS0 ALUSTA,IND0 BSR,IND0 W,IND0 RAM_x, IND0 RAM_y, IND0	;Set-up FSR0 for auto-dec ;Save ALUSTA first ; ; ;Now save general ;Purpose registers
MACRO BSF INCF MOVPF MOVPF MOVPF MOVFP DECF ENDM •	ALUSTA,FS0 FSR0 IND0, RAM_y IND0, RAM_x IND0,W IND0,BSR IND0,ALUSTA FSR0	;Set-up for auto-inc ; ; ; ; ; ; ;restore ALUSTA last ;Adjust stack pointer
PUSH •		;save registers
POP RETFIE	vice	;restore status ;return
	SETF BCF BCF MACRO BCF MOVFP MOVFP MOVFP MOVFP MOVFP MOVFP MOVPF MOVPF MOVPF MOVPF MOVPF MOVPF MOVFP DECF ENDM • • • • • • • • • • • • • •	SETF FSR0 BCF ALUSTA,FS0 BCF ALUSTA,FS1 • • MACRO BCF ALUSTA,FS0 MOVFP ALUSTA,IND0 MOVFP BSR,IND0 MOVFP W,IND0 MOVFP RAM_x, IND0 MOVFP RAM_x, IND0 MOVFP RAM_y, IND0 ENDM MACRO BSF ALUSTA,FS0 INCF FSR0 MOVPF IND0, RAM_Y MOVPF IND0, RAM_Y MOVPF IND0, RAM_X MOVPF IND0, BSR MOVFP IND0, BSR MOVFP IND0, BSR MOVFP IND0, ALUSTA DECF FSR0 ENDM • • PUSH • POP RETFIE

While the macros are quite self-explanatory, the user should note a few subtle points.

- MOVFP instruction does not affect status flags while MOVPF does.
- MOVFP and MOVPF are used such that any register can be saved and restored. Note that the register being saved or restored has address 'f' (which can be anywhere from 00h to FFh) and the other address, IND0 (indirect), therefore, can be any address.
- FSR auto-increments or auto-decrements after the operation ('post'). Therefore, in the POP macro pre-increment is simulated.
- All interrupts should be disabled when executing the PUSH and POP macros. While PUSH will have the GIE bit disabled, POP may not necessarily have the GIE bit disabled. The user should disable the GIE bit when executing the POP.

Using this scheme, interrupts and subroutine calls can be nested, since the stack will grow and shrink. The stack can be used to pass parameters to subroutines.

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