



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

### 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 in the stack. Registers such as W, 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 accomplish this.

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).

```

Main_prog      SETF      FSR0              ;Initialize and dedicate FSR0 as stack pointer
               BCF      ALUSTA,FS0      ;
               BCF      ALUSTA,FS1      ;Set-up FSR0 for auto-dec
               .
               .
               .
PUSH           MACRO
               BCF      ALUSTA,FS0      ;Set-up FSR0 for auto-dec
               MOVFP   ALUSTA,IND0      ;Save ALUSTA first
               MOVFP   BSR,IND0        ;
               MOVFP   W,IND0          ;
               MOVFP   RAM_x, IND0      ;Now save general
               MOVFP   RAM_y, IND0      ;Purpose registers
               ENDM
POP            MACRO
               BSF      ALUSTA,FS0      ;Set-up for auto-inc
               INCF    FSR0            ;
               MOVFP   IND0, RAM_y     ;
               MOVFP   IND0, RAM_x     ;
               MOVFP   IND0,W         ;
               MOVFP   IND0,BSR       ;
               MOVFP   IND0,ALUSTA     ;restore ALUSTA last
               DECF    FSR0            ;Adjust stack pointer
               ENDM
               .
               .
               .
interrupt_routine
               PUSH     ;save registers
               .
               .
               .
;main body of interrupt service
               .
               .
               .
               POP     ;restore status
               RETFIE  ;return

```

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

1. `MOVFP` instruction does not affect status flags while `MOVFF` does.
2. `MOVFP` and `MOVFF` are used such that any register can be saved and restored. Note that register being saved or restored has address `f` (which can be 00h to FFh) and other address, `IND0` (indirect), therefore, can be any address.
3. `FSR` auto-increments or auto-decrements after the operation ('post'). Therefore, in the `POP` macro pre-increment is simulated.
4. All interrupts should be disabled when executing the `PUSH` and `POP` instructions. 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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9/22/95

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