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).

```
Main_prog       SETF     FSR0     ;Initialize and dedicate FSR0 as stack pointer
                BCF      ALUSTA,FS0
                BCF      ALUSTA,FS1

PUSH            MACRO
                BCF      ALUSTA,FS0
                MOVFP    ALUSTA,IND0
                MOVFP    BSR,IND0
                MOVFP    W,IND0
                MOVFP    RAM_x,IND0
                MOVFP    RAM_y,IND0
                ENDM

interrupt_routine
                PUSH      ;save registers

;main body of interrupt service

POP             ;restore status
RETFIE         ;return
```
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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