Externally interrupting the Timing Board

The timing board can be interupted by an external signal, causing program execution to jump to an interrupt service routine. The external signal is brought into the board through the DB-15 connector mounted on the front of the board near the fiber optic connectors. The discussion below assumes that the timing board EEPROM will not be modified, although this makes the code a little more cumbersome. Following are the steps required for this implementation:

(1) Connect the signal source to pin #4 of the DB-15 connector of the ARC-22 timing board. Install a 200 ohm through-the-hole pull-up resistor in R51. The external signal will interrupt the DSP execution as soon as it is held to a low level.

(2) Room needs to be made in the file “timboot.asm” for the interrupt service routine handling the IRQA* interrupt line, located at the memory location P:$10. Insert the line of code marked “-->”

```
        IF      @SCP("DOWNLOAD","HOST")
        ORG     P:0,P:0
        JMP     <INIT
        NOP
        ENDIF

-->     DC      0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0

;  This ISR receives serial words a byte at a time over the asynchronous
;    serial link (SCI) and squashes them into a single 24-bit word
SCI_RCV     MOVE    R0,X:<SAVE_R0           ; Save R0
```

(3) To compensate, reduce the number of 0's in the “DC 0,0...,0,0” line at the end of the CLR_ERR routine by 16 by deleting the second or third line. As a check, inspect the “tim.ls” listing file (after assembling), to make sure that the “JSR SCI_RCV” instruction begins at P:000050.

(4) Insert your desired interrupt code at the bottom of the "timCCDmisc.asm" file, or wherever the end of the program code is located. Here the insturrupt service routine executes a power off command.

```
CNTR            EQU             *
                ORG             P:$10,P:$10
                JSR             ISR_POWER_POFF

                ORG             P:CNTR,P:CNTR
ISR_POWER_POFF
                JSR             <CLEAR_SWITCHES_AND_DACS
                BSET            #LVEN,X:HDR
                BSET            #HVEN,X:HDR
                RTI
```

(5) Insert this line of code somewhere in the POWER_ON routine. This instructs the DSP to respond to the IRQA* interrupt:

```
MOVEP       #>$000002,X:IPRC          ; IRQA* enabled, IPR = 2, level
```

The files should be assembled in the normal way to generate the file “tim.lod” to be downloaded to the controller. Once downloaded, the contents of the EEPROM that were written to DSP memory and executed there on boot-up are overwritten, but not executed. Once the POWER_ON instruction is executed during controller setup the IRQA* interrrupt is enabled and execution will jump to the IRQA* interrupt service routine if the IRQA* line is held low. Alternatively, if new EEPROMs are being generated, the code could be simplified by inserting the “JSR ISR_POWER_OFF” instruction directly at the P:$10 location in the file “timboot.asm” and placing the routine being called anywhere in the code. The “JSR SCI_RCV” call still needs to be located at P:$50.