Activity #27 (due end of class)

Last Name	First Name	Student ID Number	Section

27.1	Total	Grader Signature
100 points	100 points	

Activity 27.1 (First hour)

A. (100 pts) Exploring the 6811 Hardware Evaluation Board (EVB)

a. (20 points) Study the attached circuit diagram for the EVB, and identify each of the following items by their identifying number. The first one has been done for you.

Item Name	Part Number	Item	Part Number
6811 chip	U10	User RAM starting at $C000	
Latch for address de-multiplexing		Asynchronous Communications Interface Adapter (ACIA)	
ROM chip with BUFFALO monitor		Address Decoder	
Port Replacement Unit		Schmitt trigger Inverters for clock circuit for the communications interface. **Note**: A Schmitt trigger is a special kind of gate that converts a not quite digital signal into one that is (i.e., 0 or 5V only).	
Schmitt trigger inverter for the reset circuit		Voltage converting NAND gate for sending data to the host computer	
Voltage converting NAND gate for receiving data from the host computer		Voltage converting NAND gate for sending data to the data terminal	
Voltage converting NAND gate for receiving data from the data terminal		Quarts crystal that sets the 68HC11's clock speed.	

b. (15 points) List all the inputs to & outputs of the port replacement unit. What is the purpose of this chip?

c. (15 points) If you didn't initialize the stack on the EVB, how much stack space would your program get? Where is it located? What's the initial stack pointer?

d. (20 points) How many control registers does the 68HC11 have? What addresses are the located at? What are they for?

e. (30 points) Write down logic equations for $\overline{G}$, $\overline{W}$, and $\overline{E}$ for the memory chip U5. Describe in words what these signals accomplish.

6.4 DIAGRAMS

Figure 6-2 is the EVB schematic diagram.

NOTES:

1. UNLESS OTHERWISE SPECIFIED:

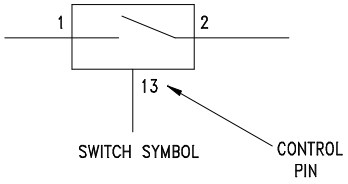
   ALL RESISTORS ARE IN OHMS, ±5%, 1/4W.
   ALL CAPACITORS ARE IN uF.
   ALL VOLTAGES ARE DC.

2. DEVICE TYPE NUMBERS LISTED BELOW ARE FOR REFERENCE ONLY. DEVICE TYPE NUMBER VARIES WITH MANUFACTURER.

REF DES	DEVICE TYPE	NOTES	GND	+5V	+12V	−12V
U1	MC68HC24	PRU	29	17		
U2	MC74HC373	TRANSPARENT LATCH	10	20		
U3	2764	8K EPROM (250ns)	14	28		
U4	(USER SUPPLIED)	8K RAM (250ns)	14	28		
U5	MCM6164	8K RAM (250ns)	14	28		
U6	MC74HC138	DECODER/DEMUX	8	16		
U7	MC74HC4066	DIGITAL SWITCH	7	14		
U8	MC1488P	RS−232C DRIVER	7		14	1
U9	MC68B50P	ACIA	1	12		
U10	MC68HC11A1	MCU	1	26		
U11	MC74HC74	D−TYPE FLIP−FLOP	7	14		
U12	MC74HC14	INVERTER	7	14		
U13	MC74HC4040	RIPPLE COUNTER	8	16		
U14	MC1489P	RS−232C RECEIVER	7			

3 DIGITAL SWITH U7 OPERATES AS FOLLOWS:

CONTROL PINS (5, 6, 12, OR 13)	SWITCH OPERATION
LOGIC ZERO (0)	OFF/OPEN
LOGIC ONE (1)	ON/CLOSED



4. NOT USED DEVICE.

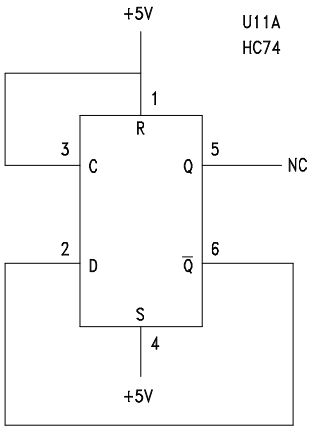


Figure 6-2. EVB Schematic Diagram (Sheet 1 of 2)

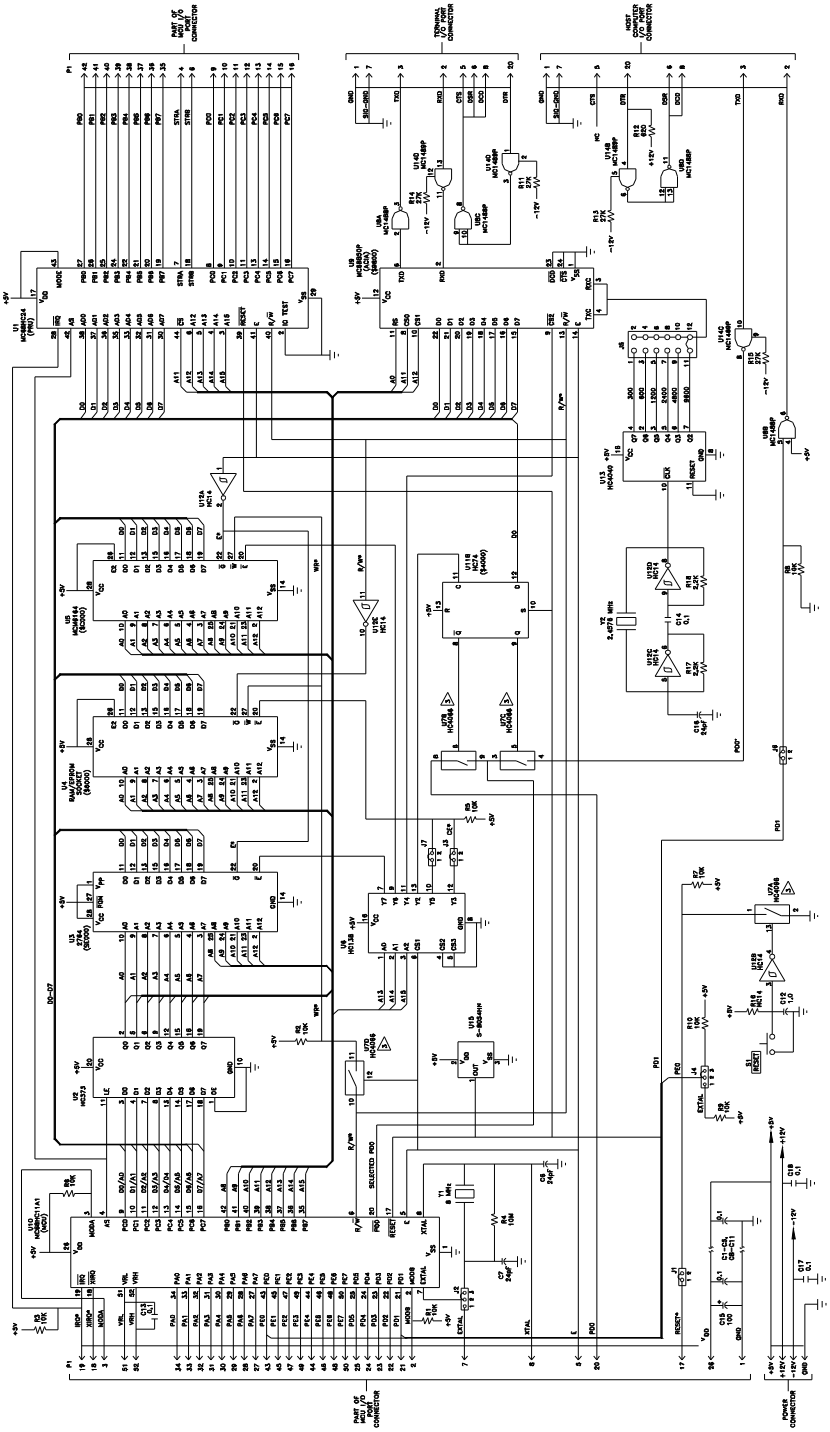
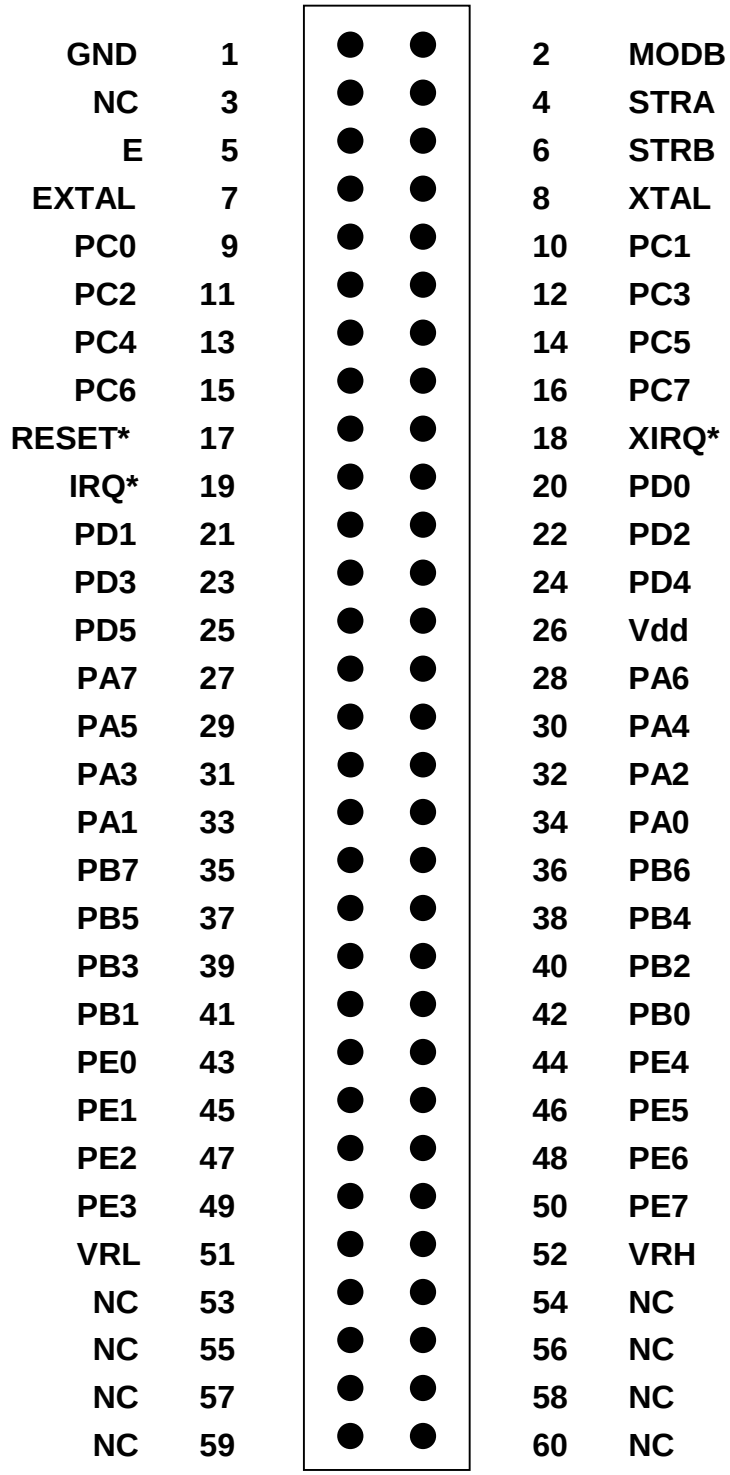


Figure 6-3. EVB Schematic Diagram (Sheet 2 of 2)

P1



GND	1		2	MODB
NC	3		4	STRA
E	5		6	STRB
EXTAL	7		8	XTAL
PC0	9		10	PC1
PC2	11		12	PC3
PC4	13		14	PC5
PC6	15		16	PC7
RESET*	17		18	XIRQ*
IRQ*	19		20	PD0
PD1	21		22	PD2
PD3	23		24	PD4
PD5	25		26	Vdd
PA7	27		28	PA6
PA5	29		30	PA4
PA3	31		32	PA2
PA1	33		34	PA0
PB7	35		36	PB6
PB5	37		38	PB4
PB3	39		40	PB2
PB1	41		42	PB0
PE0	43		44	PE4
PE1	45		46	PE5
PE2	47		48	PE6
PE3	49		50	PE7
VRL	51		52	VRH
NC	53		54	NC
NC	55		56	NC
NC	57		58	NC
NC	59		60	NC

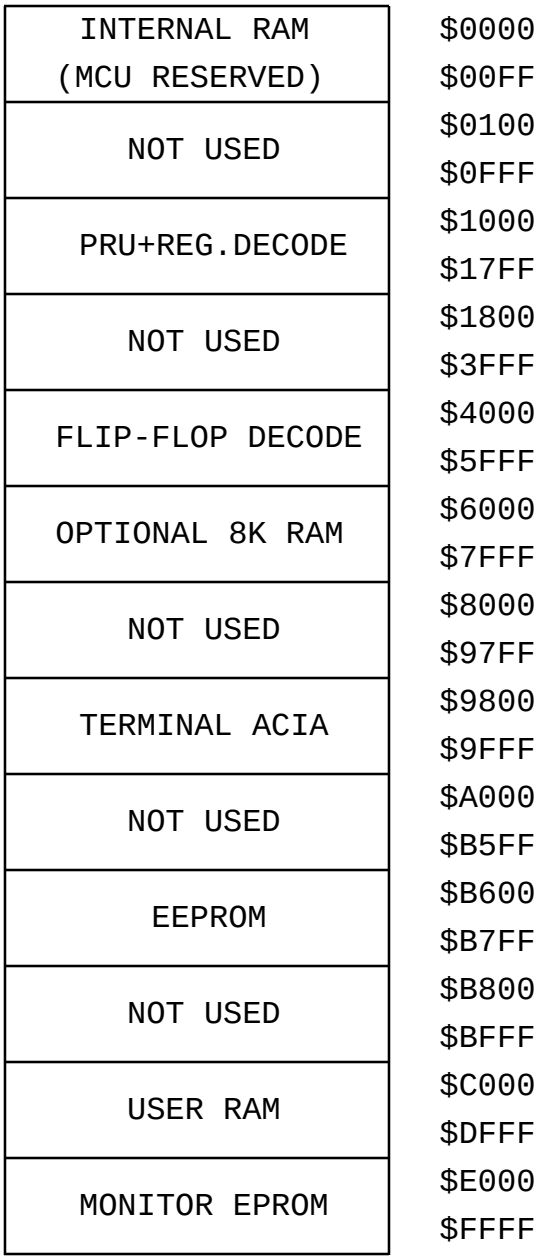
MCU I/O PORT

The EVB allows the user to use all the features of the BUFFALO evaluation software, however it should be noted (when designing code) that the BUFFALO uses the MCU on-chip RAM locations $0048-$00FF leaving only 72 bytes for the user (i.e., $0000-$0047).

The user must be aware of the BUFFALO monitor address location restrictions. Table 4-1 lists the monitor memory map limitations.

Table 4-1. Monitor Memory Map Limitations

Address	Restrictions
$0000-$0047	Available to user. (BUFFALO sets default value of the user stack pointer at location $0047.)
$0048-$0065	BUFFALO monitor stack area.
$0066-$00C3	BUFFALO variables.
$00C4-$00FF	Interrupt pseudo vectors (jumps).
$0100-$01FF	User available.
$1000-$103F	MCU control registers. Although RAM and registers can be moved in the memory map, BUFFALO expects RAM at $0000 (actually requires $0048-$00FF) and registers at $1000-$103F.
$4000	Some versions of EVBs have a D flip-flop addressed at this location. During initialization, BUFFALO 3.2 writes $00 to location $4000 and various monitor operations cause $00 or $01 to be written to $4000. (Refer to the buf25.asm file on the EVB diskette for the definitions of DFLOP, TARGCO, and HOSTCO for additional information). Since the EVB has no memory or peripherals located at $4000, these writes should not concern most EVB users.
$D000-$D00F	BUFFALO supports serial I/O to a terminal and/or host via a DUART (external IC) located at $D000 in the memory map. During initialization, BUFFALO 3.2 reads and writes to location $D00C to see if a DUART is present in the system. Refer to the buf25.asm file on the EVB diskette.



$0000-$0032 USER RAM
$0033-$0047 USER STACK POINTER
$0048-$00C3 MONITOR VARIABLES
$00C4-$00FF VECTOR JUMP TABLE

Figure 5-2. EVB Memory Map Diagram