

(Preliminary - to be followed with actual sources, part numbers, and prices.)

LCS II

### Main Encoder Board

Bill of Materials

6/23/2002, jsdemar@syr.edu

Count	Ref Des	Description	Pattern
2	Q33, Q34	2N3904 NPN Transistor	TO-92(EBC)
4	C1, C2, C5, C36	0.1uf Capacitor	CAP100 / CAP200
1	C37	2.2uf Capacitor	CAP100
1	C10	300pf Capacitor	CAP100
1	PE1	PIEZO Element	(Off board)
1	U1	CD4049A Hex Inverting Bfr	DIP16
1	U2	PIC16HV540 Microcontroller	DIP18
1	Z1	15V Zener Diode !!!	DO-35
1	R108	1K Resistor	RES300
2	R106, R107	10K Resistor	RES300
4	R1, R2, R105, R109	22K Resistor	RES300
1	R5	100K Resistor	RES300
3	J7B, J10B, J10C	Power, GND, Vlaunch	0.25" centers
1	P1	Rotary Encoder (3pins used)	0.1" centers
1	P2(14) + J8ABC, J9	2 x 9-pin Dual Row Hdr (To all driver/cont. boxes)	0.1" centers
1	S1	Push Button, Launch	(Off board), 0.2"
1	S2	Push Button, Cont.	(Off board), 0.2"

Capacitors are >=16V

Resistors are 1/8W

Off-board components in the Main Console Assembly

1		Enclosure	
1		DB25 connector / cable	
1		Dual Binding Posts	(12V power in)
1		Key Switch	
1		Fuse Holder & 1A fuse	

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## 16-Pad Driver Card

Bill of Materials

6/23/2002, jsdemar@syr.edu

Count	Ref Des	Description	Pattern
16	Q1 - Q16	2N2907A PNP Transistor	TO-18
16	C15 - C30	0.001uf Capacitor	CAP100
4	C11 - C14	0.1uf Capacitor	CAP100
1	U7	CD4012A Dual 4-Input NAND	DIP14
3	U6, U8, U10	CD4049A Hex Inverting Bfr	DIP16
1	U9	CD4514B 4:16 Decoder/Latch	DIP24
16	R6, R15-R19, R28- R31, R40-R44, R53	1K Resistor	RES300
16	R7-R14, R32-R39	10 ohm Resistor	RES300
16	R20-R27, R45-R52	10K Resistor	RES300
4	R57-R60	100K Resistor	RES300
8	S1-S8	Shorting Jumpers	RES300
1	JX1(8)	Connector	TPAD
1	P4(14) + J2(4)	2 x 9-pin Dual Row Hdr (from main/encoder brd)	0.1" centers
1	P5(16) + JX1_(1-5)	21-pin Single Row Hdr (to display/cont board)	0.1" centers
1	P6T (top)	2 x 8-pin (0.3" space) (to display/cont board)	0.1" centers
1	P6B (bottom)	2 x 8-pin Dual Row Hdr (outputs to pad boxes)	0.1" centers
2	JX1_7, JX1_8	Power, GND	0.25" centers
3	JX1_6	Continuity feedthrough	TPAD

Capacitors are >=16V

Resistors are 1/8W

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## 16-Pad Continuity/Display Card

Bill of Materials

6/23/2002, jsdemar@syr.edu

Count	Ref Des	Description	Pattern
16	Q17 - Q32	2N3904 NPN Transistor	TO-98
4	C31 - C34	0.1uf Capacitor	CAP100
1	C35	2.2uf Capacitor	CAP100
1	U11	CD4067BE 16-Channel Analog Mux	DIP24
16	D1 - D16	Green Light Emitting	LED100
16	D17 - D32	Red Light Emitting	LED100
4	U12 - U15	LM339NA Quad Comparator	DIP14
1	R95	10K Resistor	RES300
17	R70, R87 - R103	22K Resistor	RES300
1	R104	100 Resistor	RES300
32	R54 - R86	560 Resistor	RES300
1	P9(16) + JX1(1-4), J5	21-pin Single Row Hdr (from driver board)	0.1" centers
1	P8 (on bottom)	2 x 8-pin (0.3" space) (from driver board)	0.1" centers
2	J6A J6B	Power, GND	0.25" centers
1	J4	Continuity feedthrough	TPAD

Capacitors are  $\geq 16V$

Resistors are 1/8W

Off-board components in the Main Console Assembly

1		Enclosure	
1		Dual Binding Posts	(12V Pwr In)
1		DB25 connector / cable	(outputs)
1		DB25 connector / cable	(from Encoder box)

Optional LED mounting board for front panel. Wire from LED connections.

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**Pad Box**

Bill of Materials  
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Count	Ref Des	Description	Pattern
3	C1 - C3	0.1uf Capacitor	CAP100
1	C5	2.2uf Capacitor	CAP100RP
1	C2	100uf Capacitor	CAP100RP
2	D1, D2	1N4148 Diode	DO-35
1	U3	LM358AM Low Power Dual	SO8
1	U1	LM2931Z-5 5V regulator	TO-92
1	U2	PIC12C672 microcontroller	SO8
2	R9, R11	1K Resistor	RES300
1	R17	1K Resistor - 1/4W	RES300
2	R10, R14	10K Resistor	RES300
1	R15	12K Resistor	RES300
1	R8	22K Resistor	RES300
5	R2, R6, R7, R12, R13	100K Resistor	RES300
4	R1, R3, R3, R5	200K Resistor	RES300
1	R16	560 Resistor	RES300
2	P2	(from igniter)	0.1" centers
2	P3	Piezo element	0.1" centers
1	P1	5-pin hdr, PWR, GND, Relay	0.1" centers

Capacitors are >=16V  
Resistors are 1/8W

Off-board components in the Pad Box Assembly

1	K1	40A SPDT 12V Relay	
1	CB1	20A Autoreset Circuit Breaker	
1	SW1	DPDT ON-OFF-ON 20A Toggle Sw.	
1	D3	Schottky Diode, 0.1A	(from i/o to coil +)
1	D4	1N4934 Diode	(across relay coil)
1	J1A, J1B, J2A	AC power cord (male w/gnd) (to distribution box)	
1	J3	Banana Jack (2-pin) (to igniter leads)	
1		Enclosure	
1		Strain-relief for pwr cord	