

32-Pad Launch Control System

PARTS LIST and COST ESTIMATE

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QTY	Description	Source	Part #	Each	Cost
	MAIN CONTROLLER				
1	Main Enclosure	Ed Norris			0
1	Red Launch Button (mntry)	(surplus)			0
1	Black Cont. Button (mntry)	(surplus)			0
1	Keyswitch	(surplus)			0
1	Fuseholder	(surplus)			0
1	1A Fuse	?			0
9	2.2UF, 16V tantulum	jd			0
1	100 ohm, 1/8W resistor	jd			0
65	560 ohm, 1/8W resistor	jd			0
33	1K ohm, 1/8W resistor	jd			0
34	10K ohm, 1/8W resistor	jd			0
38	22K ohm, 1/8W resistor	jd			0
1	100K ohm, 1/8W resistor	jd			0
32	0.001uF, 50V capacitor	HF	15-819	0.07	2.24
4	0.1uF, 50V capacitor	HF	15-862	0.08	0.32
32	10 ohm, 1/4W resistor	HF	1/4W-10	0.03 (*200)	0.96
33	2N3904	HF	2N3904	0.06	1.98
32	2N2907 (TO-18) [sub for 2N4403]	HF	2N2907	0.25	8.00
64	1N4001 diode	HF	1N4001	0.04	2.56
1	1N4744A, 15V zener	HF	1N4744A	0.12	0.12
32	LED - RED, non-diffused	HF	25-304	0.39	12.48
32	LED - GREEN, non-diffused	HF	25-306	0.39	12.48
1	CD4013, Dual D flipflop	HF	CD4013	0.35	0.35
6	CD4049, hex inverting bfr	HF	CD4049	0.25	1.50
2	CD4067, 16b analog mux	HF	CD4067	1.35	2.70
2	CD4514, 4:16 decoder	HF	CD4514	1.02	2.04
1	CD4516, 4b up/down ctr	HF	CD4516	0.65	0.65
1	CD4538, dual multivibrator	HF	CD4538	0.69	0.69
1	CD4011, quad NAND [*see note]	HF	CD4011	0.24	0.24
8	LM339N, quad comparator	HF	LM339N	0.39	3.12
1	Piezo element	HF	13-144	0.69	0.69
1	Rotary Encoder	DK	P80695-ND	3.24	3.24
1	50pin centronics female conn	DK	1050F-ND	3.83	3.83
1	Black binding post	MECI	240-2142	0.30 (10+)	0.30
1	Red binding post	MECI	240-2145	0.30 (10+)	0.30
2	Dual binding post mount	MECI	240-2140	0.05 (10+)	0.10
1	Main Circuit Board	jd			60.00
					120.89

*NOTE:

CD4011 is an additional IC retrofitted to the Main Controller to fix a timing problem.

CUT: U2-7 to U1-11

ADD: CD4011 (UX) piggybacked on U1, connecting only power and ground (p14 and p7).

JMPR: U2-7 to UX-1&2. JMPR: UX-3 to UX-8. JMPR: UX-4 to UX-9. JMPR: U3-7 to UX-5&6.

JMPR: UX-10 to U1-11

PAD RELAY BOX (each)					
1	8/32 x 1/2" flathead bolt/nut	?			0
1	33K	?			0
8	100K ohm, 1/8W resistor	jd			0
1	10K ohm, 1/8W resistor	jd			0
3	1K ohm, 1/8W resistor	jd			0
2	2.2UF, >15V	jd			0
2	22K, 1/8W	jd			0
1	560, 1/8W	jd			0
1	20K ohm trim pot, type 3386P	HF	138-159	0.75	0.75
1	0.01uF, 50V capacitor	HF	15-861	0.06	0.06
2	0.1uF, 50V capacitor	HF	15-862	0.08	0.16
2	2N3904	HF	2N3904	0.06	0.12
2	1N4001 diode	HF	1N4001	0.04	0.08
1	LM358N, dual opamp	HF	LM358N	0.39	0.39
1	NE556	HF	NE556	0.39	0.39
1	Piezo element	HF	13-144	0.69	0.69
2	1N4744A, 15V zener	HF	1N4744A	0.12	0.24
1	Relay, 12V, 40A	HF	45-287	3.50	3.50
1	20A Auto reset breaker	HF	12-151	0.99	0.99
1	Line cord - 1ft, 18AWG	HF	60-166	0.45	0.45
10	(*) #6 ring terminals	HF	74-312	4.50/100	0.45
5	(*) 1/4" QD female terminals	HF	74-281	4.50/100	0.23
2	(*) 0.187 QD female terminals	HF	74-284	2.75/50	0.11
1	Toggle Switch, on-off-on, 10A	CS	10TE008	1.45	1.45
1	Diecase Aluminum case	CS	03-125B	3.69	3.69
1	10 ohm, 10W resistor	CS	PW10-10	0.45	0.45
3	Black binding post	MECI	240-2142	0.30	0.90
1	Red binding post	MECI	240-2145	0.30	0.30
4	Dual binding post mount	MECI	240-2140	0.05	0.20
1	Circuit board	(make)			0
					15.60
12	QUANTITY OF PAD BOXES			TOTAL =	187.20

(*) = or other types of internal wiring interconnects

DISTRIBUTION BOX					
6	5-pin panelmount MIC skt	HF	5PMCS	1.50	9.00
1	2-pin panelmount MIC skt	HF	2PMCS	1.75	1.75
1	Enclosure - 10x 2 x 6	CS	PS-2B	10.98	10.98
1	50pin centronics female conn	DK	1050F-ND	3.83	3.83
1	Black binding post	MECI	240-2142	0.30 (10+)	0.30
1	Red binding post	MECI	240-2145	0.30 (10+)	0.30
2	Dual binding post mount	MECI	240-2140	0.05 (10+)	0.10
1	50-cond SCSI Cable	MECI	630-0721	18.95	18.95
10	AC Receptacle	MECI	280-0268	1.35	13.50
					58.71

CLUSTER BOX (for >12 pads)					
1	Enclosure	(surplus)			0
1	Keyswitch (if desired)	(surplus)			0
1	Black binding post	MECI	240-2142	0.30 (10+)	0.30
1	Red binding post	MECI	240-2145	0.30 (10+)	0.30
2	Dual binding post mount	MECI	240-2140	0.05 (10+)	0.10
10	AC Receptacle	MECI	280-0268	1.35	13.50
500ft	24AWG x 6-cond stranded cable	MECI	630-2389	0.035/ft	17.50
2	5-pin panelmount MIC skt	HF	5PMCS	1.50	3.00
4	5-pin cablemount MIC plgs	HF	MC5P	1.75	7.00
					41.70

2-Pad "AWAY CELL" CLUSTER BOX					
1	Enclosure	(surplus)			0
1	Black binding post	MECI	240-2142	0.30 (10+)	0.30
1	Red binding post	MECI	240-2145	0.30 (10+)	0.30
2	Dual binding post mount	MECI	240-2140	0.05 (10+)	0.10
2	AC Receptacle	MECI	280-0268	1.35	2.70
500ft	24AWG x 6-cond stranded cable	MECI	630-2389	0.035/ft	17.50
1	2-pin panelmount MIC skt	HF	2PMCS	1.75	1.75
2	2-pin cablemount MIC plgs	HF	MC2P	1.75	3.50
					26.15

TOTAL COST		12-pad	22-pad	32-pad
MAIN CONTROLLER		120.89	120.89	120.89
DISTRIBUTION BOX		58.71	58.71	58.71
PAD BOXES	15.60ea	187.20	343.20	499.20
CLUSTER BOX	41.70ea	0	41.70	83.40
AWAY CELL BOX		26.15	26.15	26.15
TOTAL		392.95	590.65	788.35

PLUS cost of orange AC outdoor power cords (buy locally on sale).

PLUS cost of Batteries (at least two):

12V, 9AH, sealed lead-acid battery, 7.5lb: MECI 140-0130 \$14.95 each

SUPPLIERS QUOTED IN THIS ESTIMATE:

CS::

Circuit Specialists
P.O. Box 3047
Scottsdale, Arizona 85271-3047
800-528-1417
602-464-5824 fax
<http://www.cir.com>

Die-cast aluminum cases.
Toggle switches.

DK::

Digi-Key Corporation
701 Brooks Ave. South
Thief River Falls, MN 56701-0677
1-800-DIGIKEY

50-pin centronics connector
Rotary encoder

MECI ::

Mendelson Electronics Co. Inc.
340 E. First St.
Dayton, OH 45402
Phone: 1-800-344-4465
Fax: 1-800-344-6324
<http://www.meci.com>

Cable, and batteries.

HF::

Hosfelt Electronics, Inc.
2700 Sunset Blvd.
Steubenvill, OH 43952-1158
800-524-6464
800-524-5414 fax

Bulk of electronic components.
Relays, and circuit breakers.

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MAIN CONTROLLER CIRCUIT BOARD CHECK LIST

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QTY	PART	DESIGNATOR
32	0.001UF	C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24 C25 C26 C27 C28 C29 C30 C31 C32 C33 C34 C35 C36 C37 C38 C39 C40 C41 C42
4	0.1UF	C2 C43 C44 C45
9	2.2UF	C1 C3 C4 C5 C6 C7 C8 C9 C10
32	10 OHM, 1/4W	R37 R39 R41 R43 R45 R47 R49 R51 R53 R55 R57 R59 R61 R63 R65 R67 R69 R71 R73 R75 R77 R79 R81 R83 R85 R87 R89 R91 R93 R95 R97 R99
1	100	R102
65	560	R103 R104 R105 R106 R107 R108 R109 R110 R111 R112 R113 R114 R115 R116 R117 R118 R119 R120 R121 R122 R123 R124 R125 R126 R127 R128 R129 R130 R131 R132 R133 R134 R135 R136 R137 R138 R139 R140 R141 R142 R143 R144 R145 R146 R147 R148 R149 R150 R151 R152 R153 R154 R155 R156 R157 R158 R159 R160 R161 R162 R163 R164 R165 R166 R200
33	1K	R5 R6 R7 R8 R9 R10 R11 R12 R13 R14 R15 R16 R17 R18 R19 R20 R206 R21 R22 R23 R24 R25 R26 R27 R28 R29 R30 R31 R32 R33 R34 R35 R36
34	10K	R38 R40 R42 R44 R46 R48 R50 R52 R54 R56 R58 R60 R62 R64 R66 R68 R70 R72 R74 R76 R78 R80 R82 R84 R86 R88 R90 R92 R94 R96 R98 R100 R101 R199
38	22K	R1 R3 R4 R167 R168 R169 R170 R171 R172 R173 R174 R175 R176 R177 R178 R179 R180 R181 R182 R183 R184 R185 R186 R187 R188 R189 R190 R191 R192 R193 R194 R195 R196 R197 R198 R2 R204 R205
1	100K	R201
33	2N3904	Q33 Q34 Q35 Q36 Q37 Q38 Q39 Q40 Q41 Q42 Q43 Q44 Q45 Q46 Q47 Q48 Q49 Q50 Q51 Q52 Q53 Q54 Q55 Q56 Q57 Q58 Q59 Q60 Q61 Q62 Q63 Q64 Q65
32	2N4403	Q1 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16 Q17 Q18 Q19 Q2 Q20 Q21 Q22 Q23 Q24 Q25 Q26 Q27 Q28 Q29 Q3 Q30 Q31 Q32
1	CD4013	U1
6	CD4049	U6 U7 U8 U9 U10 U11
2	CD4067	U20 U21
2	CD4514	U4 U5
1	CD4516	U2
1	CD4538	U3
64	1N4001 DIODE	D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12 D13 D14 D15 D16 D17 D18 D19 D20 D21 D22 D23 D24 D25 D26 D27 D28 D29 D30 D31 D32 D33 D34 D35 D36 D37 D38 D39 D40 D41 D42 D43 D44 D45 D46 D47 D48 D49 D50 D51 D52 D53 D54 D55 D56 D57 D58 D59 D60 D61 D62 D63 D64

32	GREEN LED	D97 D98 D99 D100 D101 D102 D103 D104 D105 D106 D107 D108 D109 D110 D111 D112 D113 D114 D115 D116 D117 D118 D119 D120 D121 D122 D123 D124 D125 D126 D127 D128
32	RED LED	D65 D66 D67 D68 D69 D70 D71 D72 D73 D74 D75 D76 D77 D78 D79 D80 D81 D82 D83 D84 D85 D86 D87 D88 D89 D90 D91 D92 D93 D94 D95 D96
8	LM339	U12 U13 U14 U15 U16 U17 U18 U19
2	PUSHBUTTON	S2 S3
1	1N4744A, 15Vz	Z1

1	ROTARY ENCODER	(H1)
1	PIEZO ELEMENT	(H2)
1	KEYSWITCH	(H3)

PAD BOX CIRCUIT BOARD CHECK LIST

QTY	PART	DESIGNATOR

1	0.01UF	C1
2	0.1UF	C3 C4
2	2.2UF	C2 C5
1	10, 10W	R18
1	560	R10
3	1K	R3 R7 R9
1	10K	R12
1	15K	R16
2	22K	R2 R17
1	33K	R8
8	100K	R1 R4 R5 R6 R11 R13 R14 R15
2	2N3904	Q1 Q2
1	LM358N	U1
1	LM556	U3
2	1N4001	D1 D2
2	1N4744A, 15Vz	Z1 Z2
1	SPDT RELAY	K1
1	SW_DPTT SWITCH	S1
1	PIEZO ELEMENT	P1

1	20A autoreset circuit breaker	
1	Enclosure	
2	Dual binding posts	
1	AC line cord	
1	Circuit Board	
	Terminals & wire as needed	
	Igniter lead assembly	
