
CRIBBAGE BOARD #10: The Wedding Board

Circuit Cellar, AVR Design Contest 2004: Entry #A3666

Since its invention in the early 1600's, Cribbage has become a popular 2 - 4 person card game the world over. Recognizable by multiple arrays of holes, a standard cribbage board is an example of functional elegance. Each player moves a pair of pegs around the board, with the front/rear pegs showing the current/previous scores--thereby making miscounts and cheating quite obvious. Cribbage boards often serve as counting aids for other games (i.e. "Magic").

In contrast to a board's humble requirements, there is much pride and craftsmanship put into the construction of cribbage boards (kings have even signed their abdication on cribbage boards). There exist superb historical examples of metal, ivory, stone, and exotic wood cribbage boards.

I have been constructing unique cribbage boards for nearly a decade. When I sketched my first concept for an LED pegged cribbage board, I had never worked with microcontrollers. At that time I could not have imagined the final result of years of design and iteration.

"Cribbage Board #10: The Wedding Board" (my 10th board *started*, and a wedding present) is unlike any other cribbage board in the world. On the surface, the Wedding Board is a functional 3-track, 61-hole cribbage board including a game-counter section and room for cards and peg storage. However, beneath the surface is another story.

Enabled by the smallest Atmel AVR of its time (8-SOIC ATTiny12) each of the Wedding Board's Pegs is a stand-alone embedded device fit within the confines of an "RCA" plug. Using the AVR's on-board oscillator proved essential to miniaturization and cost reduction. Additionally, each Peg contains an RGB LED, four MOSFETS and an ISP connector for uploading firmware.

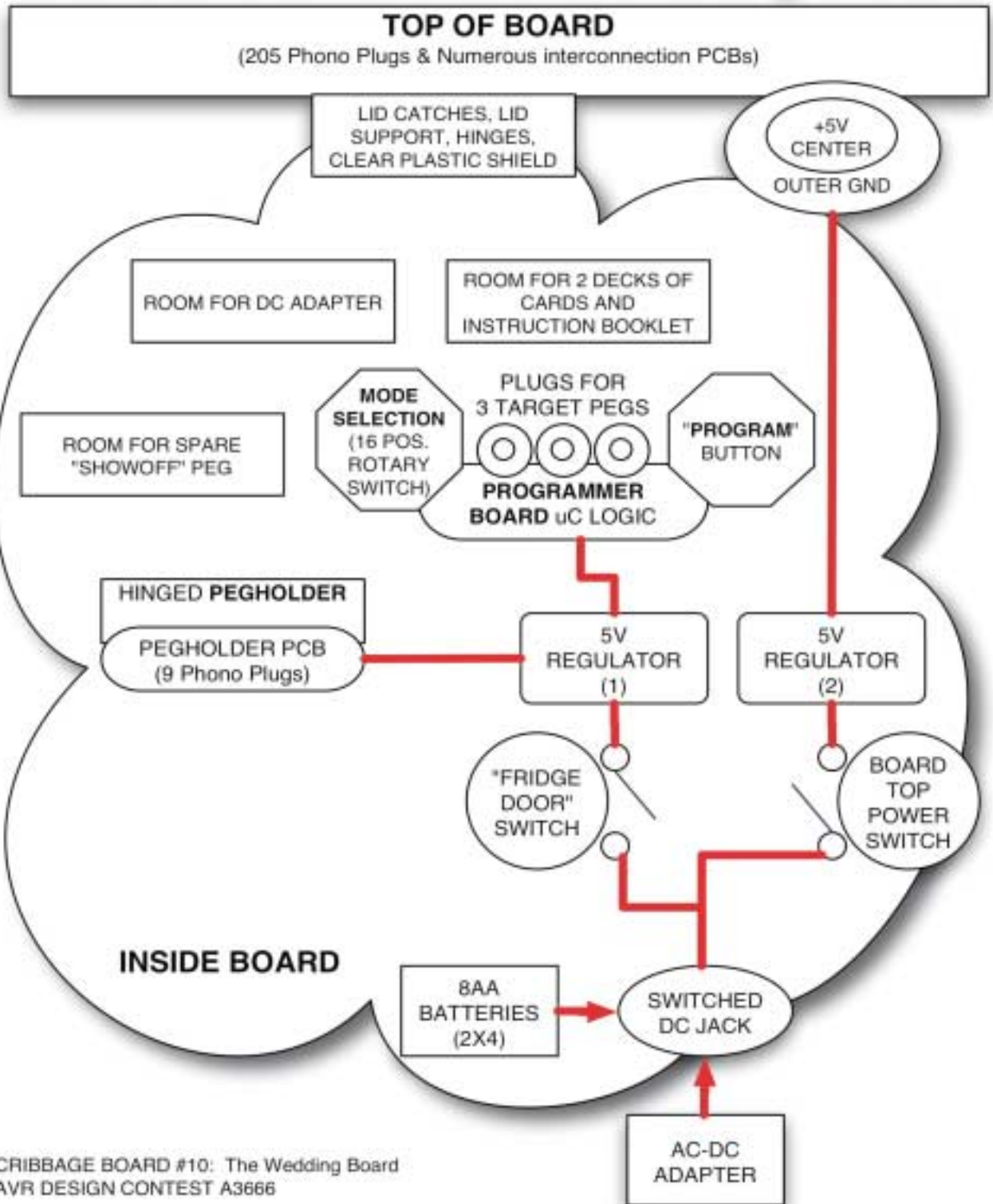
By designing each Peg to work independently and selecting standard phono connectors, the challenge of connecting >180 jacks was readily (+5/GND) solved. More importantly, standard phono plugs/jacks allowed the human interface (the action of "pegging") to remain a pleasant experience.

With a dual circular buffer, the firmware inside each Peg uses the on-board EEPROM for counting power cycles and storing mode information. A Peg can be placed into any one of 70 unique display modes (10 basic modes + (10 basic * 6 overlay modes), and modes may be "reprogrammed" by applying a number of timed power-cycles. The Peg firmware makes efficient use of the EEPROM, ensuring a long life for each Peg (corrupt pegs default to a preset mode).

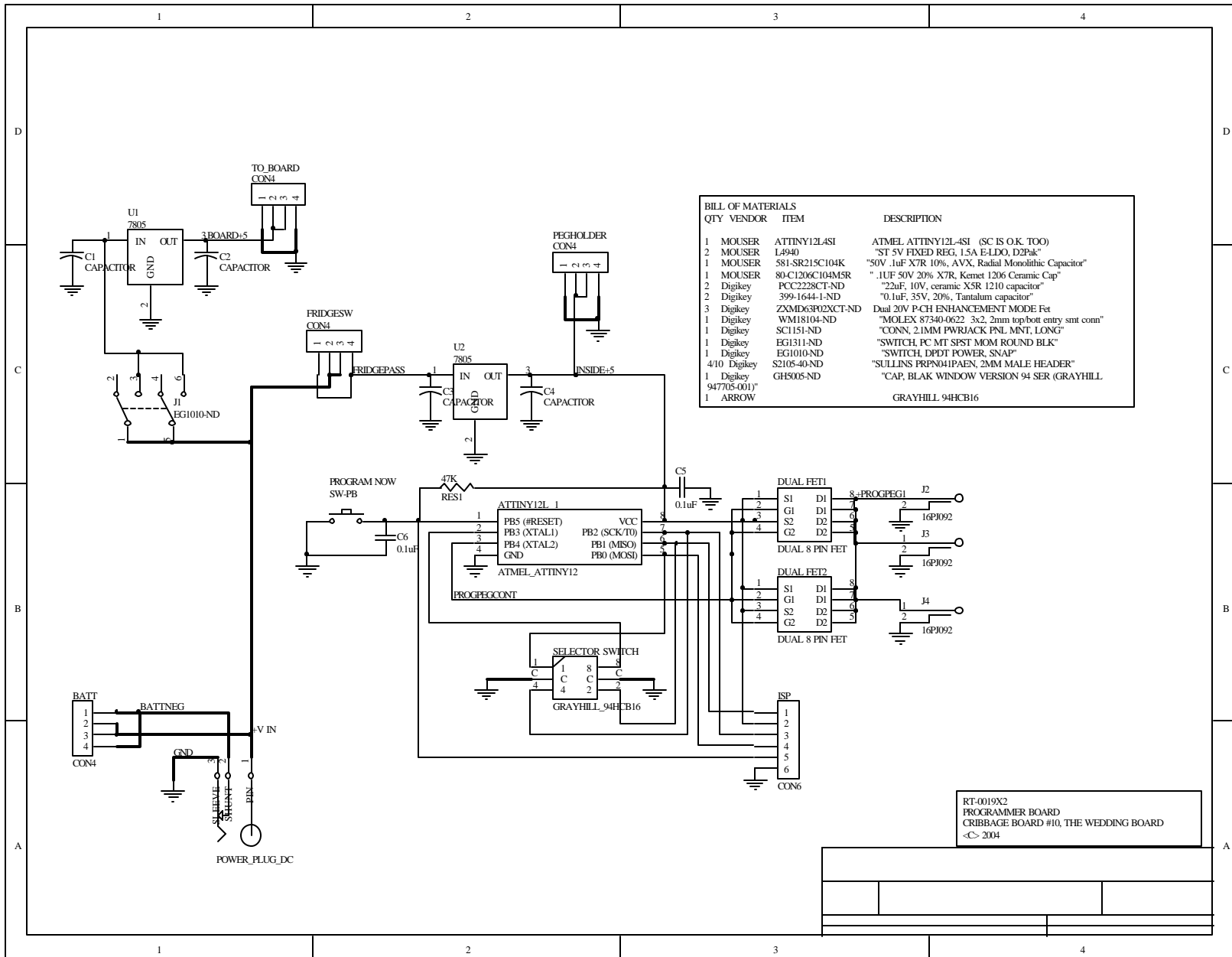
The Wedding Board includes a "Programming Board" to aid in Peg mode "programming". Due to pin count restrictions, the reset-driven Programmer software recognizes the source of the reset and, if appropriate, outputs the required number of timed power cycles.

To this date, over 100 Pegs (in various configurations) have been constructed. Their miniature size, ISP sockets and simplicity make them excellent as low-cost development boards and ideal for low-power miniaturized hacks. Beyond their use in the Wedding Board, Pegs have been embedded into car-lighter sockets, Tickle-Me-Elmo's and TiVo remotes to name a few.



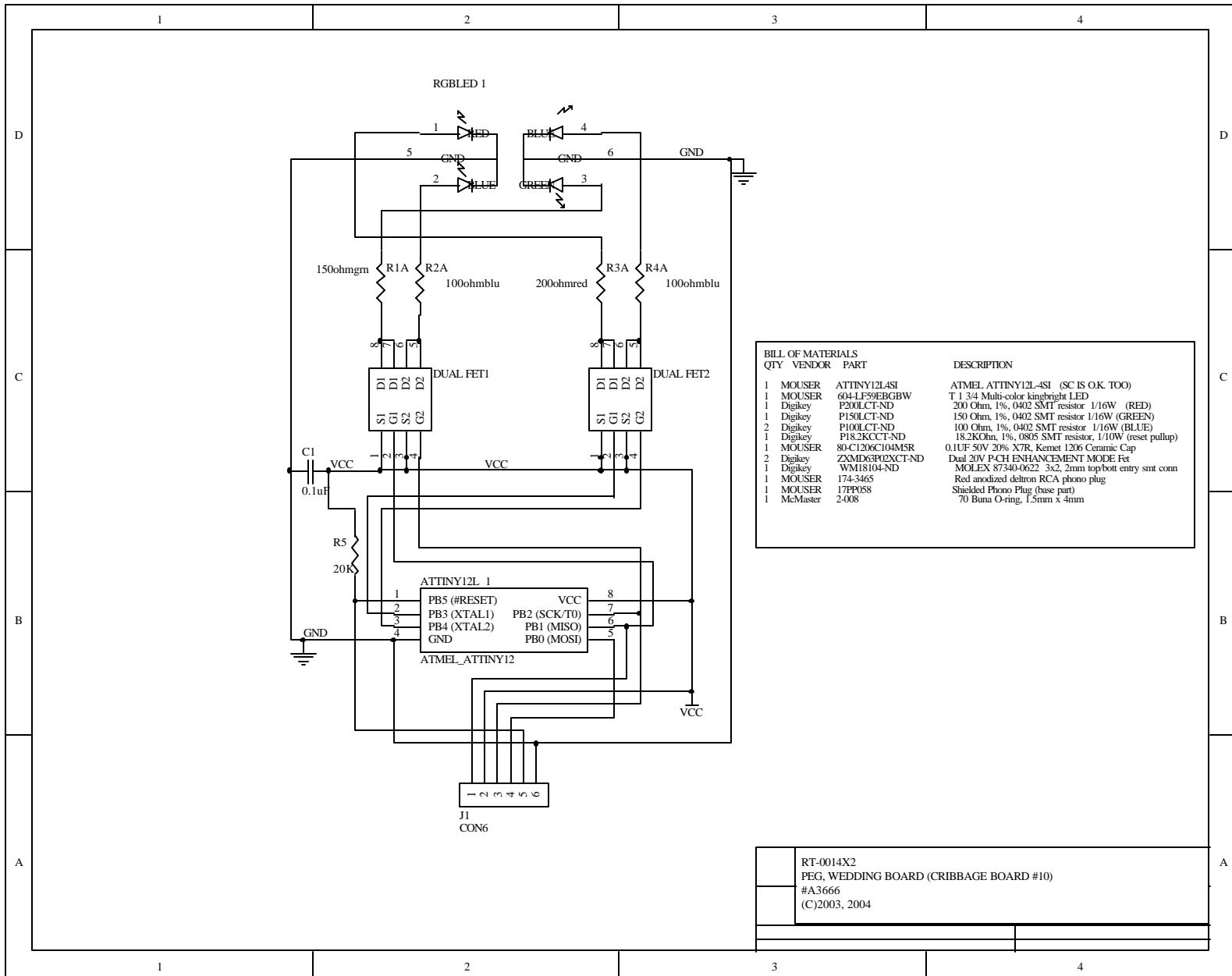


CRIBBAGE BOARD #10: The Wedding Board
AVR DESIGN CONTEST A3666



QTY	VENDOR	ITEM	DESCRIPTION
1	MOUSER	ATTINY12L4SI	ATMEL ATTINY12L-4SI (SC IS O.K. TOO)
2	MOUSER	L4940	"ST 5V FIXED REG, 1.5A E-LDO, D2Pak"
1	MOUSER	581-SR215C104K	"50V .1uF X7R 10%, AVX, Radial Monolithic Capacitor"
1	MOUSER	80-C1206C104M5R	".1UF 50V 20% X7R, Kemet 1206 Ceramic Cap"
2	Digikey	PC2228CT-ND	"22uF, 10V, ceramic X5R 1210 capacitor"
2	Digikey	399-1644-1-ND	"0.1uF, 35V, 20%, Tantalum capacitor"
3	Digikey	ZXMD63P02XCT-ND	Dual 20V P-CH ENHANCEMENT MODE Fet
1	Digikey	WM18104-ND	"MOLEX 87340-0622 3x2, 2mm top/bott entry smt conn"
1	Digikey	SC1151-ND	"CONN, 2.1MM PWRIACK PNL MNT, LONG"
1	Digikey	EG1311-ND	"SWITCH, PC MT SPST MOM ROUND BLK"
1	Digikey	EG1010-ND	"SWITCH, DPDT POWER, SNAP"
4/10	Digikey	S2105-40-ND	"SULLINS PRPN04IPAEN, 2MM MALE HEADER"
1	Digikey	GHS005-ND	"CAP, BLAK WINDOW VERSION 94 SER (GRAYHILL 947705-001)"
1	ARROW		GRAYHILL 94HCB16

RT-0019X2
 PROGRAMMER BOARD
 CRIBBAGE BOARD #10, THE WEDDING BOARD
 <C> 2004



QTY	VENDOR	PART	DESCRIPTION
1	MOUSER	ATTINY12L4SI	ATMEL ATTINY12L-4SI (SC IS O.K. TOO)
1	MOUSER	604-LF59EBGBW	T 1 3/4 Multi-color kingbright LED
1	Digikey	P20MLCT-ND	200 Ohm, 1%, 0402 SMT resistor 1/16W (RED)
1	Digikey	P151LCT-ND	150 Ohm, 1%, 0402 SMT resistor 1/16W (GREEN)
2	Digikey	P100LCT-ND	100 Ohm, 1%, 0402 SMT resistor 1/16W (BLUE)
1	Digikey	P182KCCT-ND	18.2KOhm, 1%, 0805 SMT resistor, 1/10W (reset pullup)
1	MOUSER	80-C1206C104MSR	0.1UF 50V 20% X7R, Kemet 1206 Ceramic Cap
2	Digikey	ZXMD63P02XCT-ND	Dual 20V P-CH ENHANCEMENT MODE Fet
1	Digikey	WM18104-ND	MOLEX 87340-0622 3x2, 2mm top/bott entry smt conn
1	MOUSER	174-3465	Red anodized deltron RCA phono plug
1	MOUSER	17PP058	Shielded Phono Plug (base part)
1	McMaster	2-008	70 Buna O-ring, 1.5mm x 4mm

RT-0014X2
 PEG, WEDDING BOARD (CRIBBAGE BOARD #10)
 #A3666
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