ABSTRACT

A disk-operated electronic gaming device for playing a simulated game of blackjack is disclosed. The device includes operating controls for a player to control his play of the game; a display panel to show the progress of the game and its result; disk-handling equipment for receiving metallic disks and returning an appropriate number of disks to the player based on the results of the play; a solid state, fixed logic, digital computer to automatically determine the play of the game and to compute the results of this play; and a power supply to provide power necessary for operation of the computer, the display panel and the disk-handling equipment. The apparatus is housed in a compact, attractive, utilitarian cabinet.

14 Claims, 8 Drawing Figures
ELECTRONIC GAMING DEVICE SIMULATING THE GAME OF BLACKJACK

This invention relates to amusement devices, and more particularly to a device for playing a simulated game of blackjack or twenty-one.

Blackjack, also sometimes known as twenty-one, is a card game in which one or more players play separately against dealer which can be a house dealer, i.e., a dealer employed by a gaming house to run the game. A standard deck of 52 cards is used. The cards have no rank, but have numerical value as follows: any ace counts one or 11 at the option of the holder, any face card or 10 counts 10, and any other card counts its index number. The object of the game is for each player to acquire cards whose numerical values total 21, or as close to 21 as possible without exceeding 21.

In the course of play, each player places a bet and the dealer deals one card face down to every player in rotation, beginning with the player on his left and including himself. He then deals one card face up to each other player and himself, in the same rotation. When each player, including the dealer, has two cards, each player in turn, beginning with the player on the left of the dealer, has the right to draw additional cards one at a time. If a player’s first two cards count exactly 21, that is they are face card or 10 and an ace, he has a natural or blackjack and wins the amount of his bet immedi-ately, unless the dealer also has a blackjack. The dealer may not look at his face-down or hole card until his turn to play unless his face-up card is an ace, face card or 10. If the dealer does not have a blackjack, and when all bets on blackjacks have been settled, each player in turn, beginning with the player on the dealer’s left, may request additional cards, i.e., be “hit” by saying to the dealer “hit me,” whereupon the dealer gives him one card face up. There is no limit to the number of cards a player may so draw, except that he may not draw a card after his count equals or passes 21. The player may continue to receive cards, one at a time, until he chooses to stand, which means that he has a count of 21 or less and does not desire any more cards; or until he “busts,” which means that he has a count of more than 21. In the latter case, he pays the amount of his bet to the dealer immediately. The players play in this manner, one at a time, until all players finish play.

When all other players have finished play, dealer turns up his face-down card. A dealer must stand if his count is 17 or more, and he must hit himself if and so long as his count is 16 or less. When the dealer’s hand totals 17 or more, or if he has busted, he then settles the bets. If the dealer’s total exceeds 21, he pays the amount of any bet not previously settled. If the dealer stands at a total of 21 or less, he settles with each player who has stood by paying any higher count and collect-ing from any lower count. The dealer is at a standoff with a player having the same count, which is called a “push.” The handling of pushes or ties varies. In some games pushes are collected by the dealer, and in some cases pushes are considered stand-offs. One popular mode of play is for blackjacks by the dealer and any one or more players to be considered a standoff, and for the dealer to take all other pushes.

In another variation of the game sometimes played, after a player has received his first two cards, but prior to receiving any additional cards, the player is allowed to double the amount of his original bet. The player is then dealt one more card, and cannot receive additional cards.

There has long been a demand for coin-operated games of chance and/or skill which permit a single player to play against the machine. These games may be purely games of chance, such as typified by the so-called “slot machines,” or they may simulate some well known game of chance or skill such as those played with cards. The card game of blackjack has long been a favorite with gamblers, but efforts to produce a me-chanical device to simulate this game have not been successful because of the mechanical complexity of the device and the inordinate size of such machines. Thus, a demand exists for a reliable, compact, device which simulates play of the card game known as blackjack or twenty-one.

Accordingly, a principal object of the invention is to provide apparatus by means of which a person may play a simulated game of blackjack.

Another object of the invention is to provide a device by means of which a player can utilize his skill and luck against a simulated dealer in playing a game of black-jack.

Still another object of the invention is to provide a player-controlled device by means of which a person can play a simulated game of blackjack against the de-vice acting as the dealer.

Yet another object of the invention is to provide a de-vise by means of which a person can utilize his skill and luck in playing a game against a simulated dealer sub-stantially in accordance with the rules of the card game known as blackjack or twenty-one.

A further object of the invention is to provide a com- pact, reliable, player-controlled, self-contained device by means of which a person may play a simulated game of blackjack.

An even further object of the invention is to provide a machine that simulates for a player play-action simi-lar to that in the card game known as blackjack.

The manner in which the foregoing and other objects of this invention are realized will be apparent to those skilled in the art from the following description considered together with the accompanying drawings, in which:

FIG. 1 is a front elevation view of the apparatus of the invention illustrating the playing board;

FIG. 2 is a perspective view of the apparatus showing the interior arrangement;

FIG. 3 is a vertical cross-section of the door of the de-vise taken along the line 3—3 of FIG. 2;

FIG. 4 is a front elevation view illustrating the layout of the display panel;

FIGS. 5a and 5b are block diagrams illustrating the computer logic flow and control circuitry of the device;

FIG. 6 is a schematic electrical diagram of the ran-dom card generator; and

FIG. 7 is a schematic electrical diagram of the power supply unit.

Briefly, the gaming device of this invention is an electric apparatus including control means for a player to control his play of the game; a display panel to show the progress of the game and its result; disk-handling equipment for receiving metallic disks and returning an appropriate number of disks to the player based on the results of this play; a solid state, fixed logic, digital com-puter to automatically determine the play of the game
and to compute the results of this play; and a power supply to provide power necessary for operation of the computer, the display panel and the disk-handling equipment. The apparatus is housed in a compact, attractive, utilitarian cabinet.

Referring now to FIGS. 1, 2 and 3, the apparatus is comprised of a box-like cabinet or housing 10 adapted for placement upon a table or other supporting structure, not shown, that maintains the device at a convenient playing height, Cabinet 10 has a door or front panel 12 pivotly secured thereto by hinge 14. Door 12 can be locked in a closed position by means of latch 16 and lock 18. Cabinet 10 and door 12 provide a closed dust and moisture proof container for the operating components of the device and prevent tampering by unauthorized persons. Cabinet 10 can be provided with a vertical interior partition 20 that divides the cabinet into separate compartments for housing the electronic components and the disk-handling equipment. The computer and electronic control circuitry is of the solid state, printed circuit type mounted on a number of plugboards 22, seven such plugboards being employed in the illustrated embodiment.

The disk-handling equipment is a coin receiver of conventional design and is located within cabinet 10. This equipment includes a standard coin acceptor 30 having a coin return button 32, a coin storage tube 34 to provide a reservoir of disks available for pay-offs, coin overflow tube 36 and coin return tube 38. The disk-handling equipment can be adapted to handle metallic disks of any size into the bottom members of proper denomination is inserted into the slot in coin acceptor 30 and is tested for thickness, diameter, weight and metallurgy. If the disk is found unacceptable, or if the device is not in a proper mode of play to accept disks, the disk is rejected through coin return tube 38 and coin return chute 40 into coin return tray 42 on the front of door 12. The discharge end of coin return chute 40 mates with the aperture 44 through which the disks pass into coin return tray 42. A coin lockout unit in coin acceptor 30, not shown, is activated at various modes of play to prevent acceptance of a disk during that mode. However, if the device is in the proper mode to accept a disk and if a proper disk is inserted, coin acceptor 30 discharges the disk into chute 46 which passes over the top of coin storage tube 34 and is in communication with the coin storage tube. Disks passing downwardly through chute 46 enter coin storage tube 34 until it is full, then slide across the top of the filled tube and into coin overflow tube 36, from which the disks are discharged into a suitable receptacle, not shown, or into the bottom of cabinet 10. The disk-handling equipment is supported within cabinet 10 by a suitable bracket 48.

Disks are discharged from the bottom of coin storage tube 34 by means of solenoid operated payoff unit 50 that on command passes the disks one by one into coin return chute 40, through which they are discharged into coin return tray 42.

Door 12 is constructed with an upper recessed vertical display panel 60 upon which the progress and results of the game are displayed, an inclined control panel 62 located immediately below display panel 60, and a lower front panel 64 below which coin-return tray 42 is located. The display and control panels can be conveniently enclosed by the top and side members of the door which provide some privacy for the player and tend to isolate the display and control panels from adjacent machines.

The progress of the game and its result is depicted on display panel 60. The embodiment illustrated in FIG. 4 include dealer card display 70 upon which the dealer's cards are indicated, and player card display 72 upon which the player's cards are indicated in a manner which will be hereinafter more fully described; a game-over indicator 74a and winner-paid indicator 74b; a disks-played indicator 76 including separate indicators 78a, 78b, 78c and 78d that indicate the number of disks played, and separate indicators 80a, 80b, 80c and 80d that indicate the number of disks in play in doubling the bet; a dealer display section 82 that includes a dealer's numerical total display 84, dealer blackjack indicator 86 and dealer bust indicator 88; a player display section 90 that includes a player's numerical total display 92, player blackjack indicator 94 and player bust indicator 96; push indicator 98 and legend 100 explaining the basis upon which pushes are paid.

Dealer card display 70 and player card display 72 are each comprised of fifty-two separate indicators which each represent one specific card of a standard card deck. In the play of this simulated game of blackjack, the dealer and the player each play with a separate simulated card deck containing 52 cards. In the dealer card display layout illustrated, a row of 13 separate indicators 102 numbered 2 through 10, inclusive, J, Q, K and A represent the heart suit; a row of 13 separate indicators 104 numbered 2 through 10, inclusive, J, Q, K and A represent the spade suit; a row of thirteen separate indicators 106 numbered 2 through 10, inclusive, J, Q, K and A represent the diamond suit; and a row of 13 separate indicators 108 numbered 2 through 10, inclusive J, Q, K and A represent the club suit. Four similar rows of 13 separate indicators 110, 112, 114 and 116 in player card display 72 represent cards of each suit in the simulated player's deck.

Each of the card indicators in dealer card display 70 and player card display 72, and the special condition indicators are each separately illuminated by lamps placed behind the indicators to vividly indicate the play of a particular card or the existence of a particular condition. These lamps and the attendant electrical circuitry are located in an enclosed box 66 in the upper section of door 12. While FIG. 4 illustrates one preferred arrangement, it is to be recognized that this arrangement may be modified and that other display panel layouts can be employed without materially altering the game described herein.

As illustrated in FIG. 1, control panel 62 includes deal pushbutton 120, hit pushbutton 122, double pushbutton 124 and stand pushbutton 126 and printed instructions describing the manner in which the game is played. The pushbuttons are separately illuminated to indicate to the player which of the buttons he may select at various stages of the game to direct his play. Deal pushbutton 120 is illuminated by lamp 130, not shown, hit push-button 122 is illuminated by lamp 132, not shown, double pushbutton 124 is illuminated by lamp 134, not shown, and stand pushbutton 126 is illuminated by lamp 136, not shown. These lamps and the attendant wiring are contained in box 68 mounted on the back of control panel 62.

As illustrated in FIGS. 5a and 5b, the solid state, fixed logic, digital computer is comprised of the following components: disk counter 200, master reset 202, player
mode control logic 204, dealer mode control logic 206, random card generator 208, card selector 210, card counter 212, master counter 214, dealer card memory 216, dealer card memory 218, player card decoder 220, dealer card decoder 222, player register 224, player accumulator 226, player blackjack detector 228, player bust detector 230, player adder-subtractor 232, dealer register 234, dealer accumulator 236, dealer blackjack detector 238, dealer bust detector 240, dealer adder-subtractor 242, player-dealer comparator 244, payoff and end of game logic 246, disk-out counter 248 and dealer and player ace present logic 250. These logic components are constructed of solid state, plug in, integrated circuits of the type conventionally employed in developing digital computer logic networks.

FIGS. 5a and 5b are block diagrams illustrating the logic flow of the computer and control systems. Prior to the start of play the card display from the previous game and the special condition lamps resulting from the previous play are lit, and the solenoid in the coin lockout unit is energized to permit coin acceptor 30 to accept disks. The first disk deposited extinguishes the card display and special condition lamps, and energizes master reset 202 to reset all memory units and clear the arithmetic and accumulator units. Also, indicator 78a in disks-played indicator 76 is energized to display the numeral "1" and deal lamp 130 is energized to light deal pushbutton 120. Deposit of additional disks in coin acceptor 30 successively energizes disks played indicators 78b, 78c and 78d to display the numerals "2", "3" and "4", respectively, to indicate the number of disks played. Deal pushbutton 120 can be enabled at any point after deposit of the first disk. Deposit of the fourth disk or enabling deal pushbutton 120 de-energizes the solenoid in the coin lock-out unit to prevent additional disks from being accepted. If additional disks are deposited, they are returned to the player. While the illustrated device is capable of accepting from one to four metallic disks, by simple alteration the apparatus can be modified to accept more than four disks, or to accept coins of various denominations, or to accept coins of other than United States currency.

Depressing deal pushbutton 120 also extinguishes deal lamp 130 and enables random generator 208 to cause eight cards to be randomly selected from the dealer deck by card selector 210 and card counter 212. Each card is stored in dealer card memory 218 in the order of selection. At the count of eight a dealer/player card select flip-flop in card selector 210 changes state and eight cards are selected randomly from the dealer deck and stored in player card memory 216. At the count of 16, random generator 208, card selector 210 and card counter 212 are disabled and master counter 214 is enabled. Cards are dealt from the dealer and player memories one at a time. When the card is dealt, the corresponding lamp in dealer card display 70 or player card display 72 is lit and the card value is added to dealer accumulator 236 or player accumulator 226, respectively. This takes place for two cards for the player, both of which are displayed, and two cards for the dealer, of which only the first is displayed. The second card dealt to the dealer is held in dealer card memory 218 as the "hole" card.

After the dealer and player have been dealt two cards each, both dealer accumulator 236 and player accumulator 226 are checked by dealer blackjack detector 228 and player blackjack detector 228 for a card total value of "21." If "21" is sensed in dealer accumulator 236 and not in player accumulator 226, master counter 214 is reset and disabled and game over indicator 74a and dealer blackjack indicator 86 are lit and the dealer hole card displayed. If "21" is sensed in player accumulator 226 and not in dealer accumulator 236, a payoff of two times the initial bet is set and the computer goes into the payoff cycle, at the conclusion of which winner paid indicator 74b is lit. If "21" is sensed in both dealer and player accumulators, push indicator 98, dealer blackjack indicator 86 and player blackjack indicator 94 are lit, master counter 214 is reset and disabled, game over indicator 74a is lit and a payoff equal to the amount of the initial bet is set and the computer goes into the payoff cycle, at the conclusion of which winner paid indicator 74b is lit. If no "21" is sensed, hit pushbutton 122, double pushbutton 124 and stand pushbutton 126 are enabled and lamps 132, 134 and 136 are lit to indicate that these pushbuttons are enabled.

If double pushbutton 124 is depressed, double lamp 134 will remain lit and hit lamp 132 and stand lamp 136 will be extinguished. The coin lock-out unit in coin acceptor 30 is energized to permit additional disks to be accepted. The device will not start play until an amount of disks equal to the initial bet is deposited. As the coins are deposited, "1 Double" indicator 80a, "2 Double" indicator 80b, "3 Double" indicator 80c and "4 Double" indicator 80d in coins played indicator 76 are successively lit until the necessary number of disks are deposited. When the initial bet is matched, one card is dealt from player card memory 216. The card is displayed on layer card display 72 and its numerical value is added to player accumulator 226 and the total point count displayed on player numerical total display 92. After scoring and displaying the card, the computer will automatically switch to the player stand condition. The dealer second card is displayed on dealer card display 70 and added to dealer numerical total display 84. The player accumulator is checked for a bust condition by player bust detector 230. If a bust is sensed, player bust indicator 96 and game over indicator 74a are lit. If no bust is sensed, cards are automatically dealt to the dealer until a point total of 17 or greater is sensed by the computer. Dealer accumulator 236 is checked for a bust condition by player-dealer comparator 244. If a push is sensed, push indicator 98 is lit, master counter 214 is reset and disabled, and game over indicator 74a is lit. If no push is sensed player-dealer comparator 244 compares player accumulator 226 and dealer accumulator 236. If the dealer score is greater than the player score, master counter 214 is reset and disabled, and game over indicator 74a is lit. If the player score is greater than the dealer score, a payoff of two times the doubled bet is set, the computer goes into the payoff cycle, and winner paid indicator 74b is lit.

If, after the initial deal, instead of depressing double pushbutton 124 and doubling his bet, the player elects to depress hit pushbutton 122, hit lamp 132, double lamp 134 and stand lamp 136 are extinguished to indicate that hit pushbutton 122, double pushbutton 124 and stand pushbutton 126 are disabled. One card is
dealt from player card memory 216, added to player accumulator 226, displayed on player card display 72 and the total score indicated on numeral total display 92. Player accumulator 226 is checked for a bust condition by player bust detector 230. If a bust is sensed, player bust indicator 96 and game over indicator 74a are lit, and master counter 214 is reset and disabled. If a bust condition is not sensed, hit pushbutton 122 and stand pushbutton 126 are enabled, and the corresponding lamps are lit to indicate the enabled pushbuttons. The player may continue to play the hit pushbutton until a bust condition is sensed or the player elects to stand by depressing stand pushbutton 126.

If stand pushbutton 126 is depressed, hit pushbutton 122, double pushbutton 124 and stand pushbutton 126 are disabled and corresponding lamps 132, 134 and 136 are extinguished and the dealer hole card is displayed on dealer card display 70 and its numerical total added to dealer numerical total display 84. Cards are automatically dealt one at a time from dealer card memory 218 and displayed on dealer card display 70, and their point value added to dealer accumulator 236 and displayed on dealer numerical total display 84 until a total of 17 or greater is sensed in the dealer accumulator. When the total reaches 17 or more, dealer accumulator 236 is checked for a bust condition by dealer bust detector 240. If a bust is sensed, dealer bust indicator 88 is lit, a payoff of two times the bet is set, the computer goes into the payoff cycle, and at the conclusion of the payoff winner paid indicator 74b is lit. If no bust exists, dealer accumulator 236 is checked for a push by player-dealer comparator 244. If a push is sensed, push indicator 98 is lit, master counter 214 is reset and disabled, and game over indicator 74a is lit. If no push is sensed, player accumulator 226 and dealer accumulator 236 are compared by player-dealer comparator 244 and the winner determined. If the dealer score is greater than the player score, master counter 214 is reset and disabled, and game over indicator 74a is lit. If the player score is greater than the dealer score, a payoff of two times the bet is set, and the computer goes into the payoff cycle. At the end of payoff cycle, winner paid indicator 74b is lit and the device is left with the cards showing on the card display panels and the appropriate special condition indicators remain lit.

Since an ace counts a point value of either 1 or 11, a special handling mode for aces is provided. The first ace that is dealt to the player or dealer is assigned 9 point value of 11. The remaining aces that may be dealt in the same hand have a point count of 1. When the first ace is dealt, it is also stored in an ace memory section of dealer and player ace present logic unit 250 for use in case the player or dealer point value is over 21 and the ace needs to have a point value of 1 rather than 11. If the player or dealer should have an ace with a count value of 11 and the next card dealt puts the player or dealer count value over 21, ace present unit 250 will automatically subtract 10 from the count value, thereby attributing a point value of 1 to the ace and preventing a bust condition.

Random card-generator 208 simultaneously generates a series of separate suit and card values identifying eight cards and stores these cards in dealer card memory 218. After eight cards are selected, the output is switched to player card memory 216 and a second series of suit and card values are generated identifying an additional eight cards which are stored in the player card memory. At the count of 16, the random card generator is disabled. The dealer and player cards are selected independently. Each hand can contain any of the 52 cards, but a card once selected cannot be selected again in that hand during any one game. However, the same card can be selected in both the dealer and player hands.

FIG. 6 schematically illustrates random generator 208, which is comprised of low purity oscillator 260 having a frequency of 1 megahertz ± 20 percent, low purity oscillator 262 having a frequency of 500 kilohertz ± 20 percent, and low purity oscillator 264 having a frequency of 170 hertz ± 20 percent. By "low purity" it is meant that the output frequency of each oscillator will independently drift during successive short sampling periods. The outputs of oscillators 260 and 262 are connected through gates 266 and 268, respectively, to counters 272 and 274. Counter 272 counts to 13 and repeats, with each count representing a card value. Counter 274 counts to 4 and repeats with each count representing a suit. The output of oscillator 264 is passed through three stage counter 276 which reduces the frequency to approximately 21 hertz. The most significant bit output signal from counter 276 enables gates 266 and 268 and allows the oscillator outputs to pass to counters 272 and 274 for half of each cycle. During each enabled period approximately 22,000 ± 4,400 pulses are passed to counter 272 and 11,000 ± 2,200 pulses are passed to counter 274. Counters 272 and 274 continuously count these input pulses during the enabled period. During alternate half cycles the output of gate 278 causes the counter to be read and the suit card value transferred to the respective dealer or player card memory. Since each output from gate 278 will cause one signal representing a suit and one signal representing a card value to be transferred to the dealer or player card memory. Card selection is enabled by latch flip-flop 280 which is activated by a deal signal generated by depressing deal pushbutton 120 and is disabled at the count of 16 cards transferred to memory.

Randomness in card selection is obtained by variability of the time in the count cycle at which deal button 120 is depressed; by the variations in the frequencies of the outputs of oscillators 260, 262 and 264; by the fact that the outputs of the high frequency clocks are sampled at a low frequency, i.e., frequencies of nominally 1 megahertz and 500 kilohertz are sampled at a frequency of about 21 hertz; and by the fact that a large number of pulses are counted by a repeating count to 4 or count to 13 counter.

The power required for operation of the device is 5 volt d.c. for the computer components, approximately 6 volt a.c. for the disk-in and disk-out counters, and approximately 6 volt d.c. for the indicator lights, and 115 volt a.c. for the payoff solenoid. A conventional power supply unit capable of converting a 115 volt a.c. supply to a relatively constant 5 volt d.c., 6.3 volt a.c. and 6.3 volt d.c. output is illustrated in FIG. 7. The 115 volt a.c. power supply is connected across the primary coil of constant voltage transformer 300, which is provided with capacitive reactance compensation. Full wave rectifier 302 is connected across the secondary winding of the transformer, and the ground is connected to the center tap of this winding. The rectified current is filtered by capacitive input filter 304. Bleeder resistor
306 provides a small d.c. current flow to stabilize the unit under no-load conditions. Transformer 308 reduces the 115 volt a.c. supply to a 6.3 volt a.c. output, and diode 310 provides the unfiltered 6.3 volt d.c. output.

The timing sequences for the various play actions are summarized as follows:

WHEN THE FIRST DISK IS DEPOSITED:
A. Master reset is generated and all registers, accumulators and displays from the previous game are reset.
B. Deal pushbutton 120 is enabled.

WHEN DEAL PUSHDOWN IS DEPRESSED:
A. Card selector 210 and random generator 208 are enabled.
B. Eight cards are selected randomly from the dealer deck and stored in card deck memory 218.
C. At the count of eight, flip-flop in card selector 210 changes state and eight cards are selected randomly from the dealer deck and stored in player card memory 218.
D. At the count of 16, card selector 210 and random generator 208 are disabled and master counter 214 is enabled.
E. Master counter 214 generates the following timing during the deal cycle:

1. Preset player and dealer adder-subtractors 232 and 242.
2. Fill player and dealer registers 224 and 234.
3. . . . .Enable load 11 in player and dealer registers 224 and 234.
4. Add player and dealer registers to zero and store in player and dealer accumulators 226 and 236.
5. Update dealer card decoder 222.
6. Display player and dealer first card. Update player and dealer accumulator display.
8. Shift next cards out of player and dealer memories.
9. Store dealer second card.
10. Fill player and dealer registers 224 and 234.
11. . . . .Sample for player and dealer ace.
12. Enable load 11 in player and dealer registers 224 and 234.
13. Add player and dealer registers to zero and store in player and dealer accumulators 226 and 236.
15. Sample for dealer and player blackjack.
16. Light dealer or player blackjack indicators 86 or 94, if present.

WHEN STAND PUSHDOWN IS DEPRESSED:
A. Disable hit and double pushbuttons.
B. Enable master counter 214 generating the following timing during the stand cycle:

1. Generate dealer hit enable.
2. Update dealer card decoder 222.
3. Display dealer second card. Update dealer accumulator display 84.
4. If dealer cards total less than 17, set dealer hit flip-flop. If dealer cards total 17 or greater, set dealer stand flip-flop.
5. Reset less than 17 flip-flop.
6. Reset master counter 214 and go into dealer hit cycle or dealer stand cycle.

WHEN DOUBLE PUSHDOWN IS DEPRESSED:
A. Disable hit and stand pushbuttons.
B. Enable coin acceptor 30.
C. Upon deposit of correct amount of disks, enable master counter 214 generating the following timing during the double cycle:

2. Shift card out of player card memory 216.
3. Update player card decoder 220.
4. Fill player register 224.
5. Display dealer second card. Update dealer accumulator display 84. Sample for ace.
7. Add player register to accumulator 226 and store in accumulator.

If Player Has An Ace and Greater Than 21 Count

T12-T17 . . . Subtract player register from accumulator 226 and store in accumulator.

If Player Has No Ace

T12-T17 . . . Add player accumulator 226 to zero and store in accumulator.
T17 . . . Reset player ace flip-flop.
T18 . . . Sample for player bust. If bust present, light player bust indicator 96.

If Player Busted

T19 . . . Light game over indicator 74a. Reset and disable master counter 214.

If Player Does Not Bust

T26 . . . If dealer cards total less than 17, set dealer hit flip-flop.
T27 . . . Reset 17 flip-flop.
T28 . . . Reset double flip-flop. Reset master counter 214 and go into dealer hit cycle or dealer stand cycle.

DEALER HIT CYCLE:

T1 . . . Shift card out of dealer memory 218. Pre-set dealer adder-subtractor 242.
T2 . . . Fill dealer register 234.
T3 . . . Sample for dealer ace.
T4 . . . Enable load 11 in dealer register 234.
T5-T10 . . . Add dealer register to accumulator 236 and store in accumulator.
T1I-T17 . . . Generate dealer subtract 10.

If Dealer Has An Ace and Greater Than 21 Count

T12-T17 . . . Subtract dealer register from accumulator 236 and store in accumulator.

If Dealer Has No Ace

T12-T17 . . . Add dealer accumulator 236 to zero and store in accumulator.
T17-T19 . . . Update dealer card decoder 222.
T18 . . . Display dealer card. Update dealer accumulator display 84.
T19 . . . Reset dealer ace flip-flop.
T20 . . . Disable dealer subtract 10 circuitry. Sample for dealer bust.

If Dealer Busted

Light dealer bust indicator 88, reset dealer hit cycle and generate payoff cycle.

If Dealer Does Not Bust

T22 . . . If dealer cards total less than 17, set dealer hit flip-flop. If dealer cards total 17 or greater, set dealer stand flip-flop.
T23 . . . Reset 17 flip-flop.
T24 . . . Reset master counter 214 and stay in dealer hit cycle or go into dealer stand cycle.

DEALER STAND CYCLE:

T1 . . . Generate player-dealer comparator 244 preset.
T2-T7 . . . Compare dealer and player accumulator count totals.
T7 . . . Sample for push:

a. If push exists, light push indicator 98, and game over indicator 74a.

b. If player total is greater than dealer total, go into payoff cycle and light winner paid indicator 74b.

T8 . . . If dealer total is greater than player total, light game over indicator 74a and disable master counter 214.

To play a simulated game of blackjack with the device of this invention, a player deposits one to four disks in coin acceptor 30. Upon acceptance of the first disk, all card and special condition indicators from the previous game are reset and deal pushbutton 120 is illuminated. Hit pushbutton 122, double pushbutton 124 and stand pushbutton 126 are disabled at this time.

To start play, the player depresses deal pushbutton 120 which initiates the random selection of eight cards from the dealer deck and eight cards from the player deck. These cards are stored respectively in dealer card memory 218 and player card memory 216. Upon completion of the card selection and storage in the memory units, the master timing and arithmetic units are enabled and the card selector disabled. The master timer deals two cards each from the player and dealer memories. Both of the player’s cards are displayed on player card display section 72 and their total numerical value is displayed in player numerical total display 92. One of the dealer's two cards is not displayed, but is stored in a memory unit to check for a blackjack.

Upon dealing these four cards, a search for a total of 21 is made. If 21 is sensed in the player accumulator, but not in the dealer accumulator, player blackjack indicator 94 is lit and the device goes into a payoff cycle. If 21 is sensed in the dealer accumulator, but not in the player accumulator, the dealer’s second card is displayed and dealer blackjack indicator 86 and game over indicator 74a and lit and the device is ready for the next game. If both the dealer and player have 21, push indicator 98, player blackjack indicator 94, and dealer blackjack indicator 86 are lit and a payoff equal to the amount of the bet is made and winner paid indicator 74b lit.

If neither the player nor the dealer has a blackjack, hit pushbutton 122, double pushbutton 124 and stand pushbutton 126 are enabled and illuminated to indicate to the player that he has choice of these selections. If double pushbutton 124 is depressed, double indicator 134 remains lit, and the hit and stand buttons are disabled. The player must now deposit disks equal in number to those deposited in the initial bet. When the initial bet is matched, one card is automatically dealt from the player memory and displayed, the dealer’s hole card is displayed, and the player’s total point count is checked for a “bust.” If the player busts, player bust indicator 96 and game over indicator 74a are lit. The device is now ready for the next game.

If the player does not bust, the dealer’s total point count is checked for the numerical value of the two cards. If the value is 17 or greater, the computer compares the dealer and player numerical values. If the dealer total is greater than the player total, game over indicator 74a is lit and the device is ready for the next game. If the player total is greater than the dealer total point count, a payoff of twice the bet is returned. If the dealer total is 16 or less, the computer will automatically deal another card from the dealer card memory. The dealer’s total point count is checked for a bust. If a bust is detected, the computer goes into the payoff cycle. If the dealer has 17 or greater, the dealer total and the player total are compared and the winner de-
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terminated. If the dealer still has a point count of 16 or less, the dealer hit cycle is repeated until the dealer busts or has a point count of 17 or greater.

If instead of selecting the double pushbutton, the player elects to depress hit pushbutton 122, a card is dealt from the player memory and displayed. The player's total point count is checked for a bust. If a bust is detected, player bust indicator 96 and game over indicator 74a are lit. If no bust is detected, the hit button is enabled again allowing the player a choice of hit or stand. The player may play the hit pushbutton as many times as he wants until he busts or decides to stand. When the player desires no more cards, i.e., he elects to stand, he depletes stand pushbutton 126. The dealer's hole card is displayed and the computer goes through the dealer hit and dealer stand cycles and the winner determined.

Thus, from a player's viewpoint, a simulated game of black-jack is played with the device of this invention by inserting the desired number of disks into coin acceptor 30 and depressing the deal pushbutton. When the dealer's card and player's cards and numerical point count are displayed, the player need only decide whether to double his bet and receive one additional card, or to be hit with as many cards as he may desire, or to stand. These plays are controlled by the player's selection of the double, hit and stand pushbuttons.

While various embodiments of the invention have been described, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications, which are considered within the spirit and scope of the invention as defined by the attached claims.

Having now described the invention, we claim:

1. A gaming device for playing a simulated game of black-jack by a player against a simulated dealer, which comprises:

   a solid state, fixed logic, digital computer to automatically determine the play of the game including (1) means to randomly generate card and suit values representing simulated cards, said means including means to simultaneously generate first and second low purity, high frequency signals, means to generate a low purity, low frequency clock signal, first counter means to repetitively count said first signals to a count of 13 during half of each cycle of said low frequency clock signal to determine a random value from 1 to 13 representative of a card value, second counter means to repetitively count said second signals to a count of 4 during each of said half cycles to determine a random value from 1 to 4 representative of a suit value, and means to read said first and second counters during each alternate half cycle of said clock signal, each combination of card and suit values representing a different simulated card, (2) means to simulate the dealing of two of said simulated cards to the player and two of said simulated cards to the dealer, (3) means responsive to a player's control means to permit the player to initiate the play of the game and to selectively control the dealing of additional cards to the player, (4) means to simulate the dealing of additional cards to the dealer until a prescribed total card value count is equalled or exceeded, and means to determine the winner as between the player and the dealer;

player control means electrically connected to said computer for a player to initiate the play of the game, to direct the dealing of an additional card to the player, and to terminate the dealing of additional cards to the player;

a display panel electrically connected to said computer to show the progress of the game and the result;

disk-handling equipment electrically connected to said computer for receiving metallic disks deposited by the player and returning an appropriate number of disks to the player in the case of a player win; and a power supply to provide the power necessary for operation of the device.

2. The device defined in claim 1 wherein said computer includes a dealer card memory and a player card memory and also includes means to store a first series of said randomly generated card values representing dealer's cards in said dealer card memory and to store a second series of randomly generated card values representing player's cards in said player card memory, said dealer's cards being dealt from said dealer card memory and said player's cards being dealt from said player card memory.

3. The device defined in claim 2 wherein said computer also includes means to display both of the player's cards dealt to the player and only one of the dealer's cards dealt to the dealer, means to ascertain if the player's total card value is equalled or exceeded, and means to determine the winner between the player and the dealer;

4. The device defined in claim 1 wherein said display panel includes a dealer card display section for displaying the simulated cards dealt to the dealer and a player card display section for displaying the simulated cards dealt to the player.

5. The device defined in claim 4 wherein said display panel also includes a disks-played indicator, a dealer numerical total display, a dealer blackjack indicator, a dealer bust indicator, a player numerical total display, a player blackjack indicator, a player bust indicator, a push indicator and a game over-winner paid indicator electrically connected to said computer to indicate respectively the occurrence of the various play modes.

6. The device defined in claim 1 wherein said control means includes a deal pushbutton to initiate play of the game, a hit pushbutton to initiate the dealing of an additional card to the player on each operation of the pushbutton, and a stand pushbutton to terminate the dealing of additional cards to the player and to initiate the dealing of said additional cards to the dealer;

7. The device defined in claim 6 wherein said control means includes a double pushbutton operative only after the initial deal and wherein said computer includes means to permit a player to double the number of disks initially received by said disk handling equipment and to then receive only one additional card.
8. The device defined in claim 1 wherein said power supply includes means to convert 115 volt a.c. power to substantially constant 5 volt d.c., approximately 6 volt a.c. and approximately 6 volt d.c. power to operate the components of the device.

9. An electronic gaming device for playing a simulated game of blackjack by a player against a simulated dealer, which comprises:

- an enclosed cabinet for housing the operating components of the device;
- a solid state, fixed logic digital computer including
  (1) means to randomly select simulated cards for the player and for a simulated dealer including first and second low purity, high frequency oscillators, means for generating a low purity, low frequency clock signal, a repeating count to 13 counter, a repeating count to 4 counter, means to conduct the output of said first oscillator to said count to 13 counter and the output of said second oscillator to said count to 4 counter during half of each cycle of said clock signal with each count of said count to 13 counter determining a different respective card value and each count of said count to 4 counter determining a different respective card suit, means to read said count to 13 and said count to 4 counters during each alternate half cycle of said clock signal, and means to enable said counters upon the receipt of a deal signal and to disable said counters upon the production of sixteen card and suit values representing eight dealer's cards and eight player's cards, (2) means to simulate the deal of two of said randomly selected player's cards to the player and two of said randomly selected dealer's cards to the dealer and to display both of the player's cards and only one of the dealer's cards, (3) means to ascertain if the player or dealer has a point count totaling 21, (4) means responsive to a player's control means to permit the player to initiate play of the game and to selectively control the dealing of additional cards to the player, (5) means to determine if the player total point count exceeds 21, (6) means to automatically simulate the deal of cards to the dealer as long as the dealer total point count is less than 17, (7) means to determine if the dealer total point count exceeds 21, (8) means to determine the winner as between the player and the dealer, and (9) means to end the game in the case of a dealer win or push, or to end the game and return two times the number of disks received by disk handling equipment in the case of a player win;
- a display panel electrically connected to said computer to show the progress of the game and its result;
- player control means electrically connected to said computer for the player to initiate the start of play, to initiate the dealing of one or more additional cards to the player and to terminate the dealing of additional cards to the player;
- disk-handling equipment electrically connected to said computer for receiving metallic disks deposited by the player and returning an appropriate number of disks to the player in the case of a player win, said equipment including a disk acceptor having a solenoid actuated disk lockout to permit acceptance of disks only during prescribed modes and disk payout means to return a prescribed number of disks to the player on command; and
- a power supply to provide a source of constant voltage 5 volt d.c., 6 volt a.c., and 6 volt d.c. power to operate the components of said device.

10. The device defined in claim 9 wherein said display panel includes dealer and player card display sections for displaying the simulated cards respectively dealt to the dealer and the player, a disks-played indicator, a dealer numerical total display, a dealer blackjack indicator, a dealer bust indicator, a player numerical total display, a player blackjack indicator, a player bust indicator, a push indicator and a game winner paid indicator electrically connected to said computer to indicate respectively the occurrence of the various play modes.

11. The device defined in claim 9 wherein said player control means includes a control panel having a deal pushbutton to initiate play of the game, a hit pushbutton to initiate the dealing of an additional card to the player on each operation of the pushbutton, and a stand pushbutton to terminate the dealing of additional cards to the player.

12. The device defined in claim 11 wherein said control panel also includes a double pushbutton operative only after the initial deal and wherein said computer includes means to permit a player to double the number of disks initially received by said disk handling equipment and to then receive only one additional card.

13. An electronic gaming device for playing a simulated game of blackjack by a player against a simulated dealer, which comprises:

- an enclosed cabinet for housing the operating components of the device;
- a solid state, fixed logic, digital computer including
  (1) means to randomly select simulated cards for the player and for the simulated dealer including first and second low purity, high frequency oscillators, means for generating a low purity, low frequency clock signal, a repeating count to 13 counter, a repeating count to 4 counter, means to conduct the output of said first oscillator to said count to 13 counter and the output of said second oscillator to said count to 4 counter during half of each cycle of said clock signal with each count of said count to 13 counter determining a different respective card value and each count of said count to 4 counter determining a different respective card suit, means to read said count to 13 and said count to 4 counters during each alternate half cycle of said clock signal, and means to enable said counters upon the receipt of a deal signal and to disable said counters upon the production of sixteen card and suit values representing eight dealer's cards and eight player's cards, (2) means to simulate the deal of two of said randomly selected player's cards to the player and two of said randomly selected dealer's cards to the dealer and to display both of the player's cards and only one of the dealer's cards, (3) means to ascertain if the player or dealer has a point count totaling 21, (4) means responsive to a player's control means to permit the player to initiate play of the game and to selectively control the dealing of additional cards to the player, (5) means to determine if the player total point count exceeds 21, (6) means to automatically simulate the deal of cards to the dealer as long as the dealer total point count is less than 17, (7) means to determine if the dealer total point count exceeds 21, (8) means to determine the winner as between the player and the dealer, and (9) means to end the game in the case of a dealer win or push, or to end the game and return two times the number of disks received by disk handling equipment in the case of a player win;
- a display panel electrically connected to said computer to show the progress of the game and its result;
- player control means electrically connected to said computer for the player to initiate the start of play, to initiate the dealing of one or more additional cards to the player and to terminate the dealing of additional cards to the player;
- disk-handling equipment electrically connected to said computer for receiving metallic disks deposited by the player and returning an appropriate number of disks to the player in the case of a player win, said equipment including a disk acceptor having a solenoid actuated disk lockout to permit acceptance of disks only during prescribed modes and disk payout means to return a prescribed number of disks to the player on command; and
- a power supply to provide a source of constant voltage 5 volt d.c., 6 volt a.c., and 6 volt d.c. power to operate the components of said device.
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to the dealer so long as the dealer point count is
less than 17, (7) means to determine if the dealer
total point count exceeds 21, (8) means to deter-
mine the winner as between the player and the
dealer, and (9) means to end the game in case of
a dealer win or push, or to end the game and return
two times the number of disks deposited in the case
of a player win;
disk-handling equipment electrically connected to
said computer for receiving metallic disks and re-
turning an appropriate number of disks to the
player in the case of a player win, and equipment
including a disk acceptor having a solenoid actu-
ated disk lockout to permit acceptance of disks
only during prescribed modes, a disk storage tube,
a disk return tube, a solenoid operated disk payout
unit, and a disk return tray;
a display panel located at the front of said cabinet
and electrically connected to said computer, said
display panel including dealer and player card dis-
play sections for displaying simulated cards respec-
tively dealt to the dealer and the player, disks
played indicator, dealer numerical total display,
dealer blackjack indicator, dealer bust indicator
player numerical total display, player blackjack in-
dicator, player bust indicator, a push indicator and
a game over-winner paid indicator to indicate re-
spectively the occurrence of the various play
modes;
a control panel located at the front of said cabinet
and electrically connected to said computer, said
control panel including a deal pushbutton to initi-
ate play of the game, a double pushbutton to per-
mit the player to double the number of disks depos-
ited and to receive one more card, a hit pushbutton
to initiate the dealing of an additional card to the
player on each operation of the pushbutton, and a
stand pushbutton to terminate the dealing of addi-
tional cards to the player; and
a power supply to provide a source of constant 5 volt
d.c., 6 volt a.c. and 6 volt d.c. power to provide the
power necessary for operation of the device.
14. The device defined in claim 13 wherein said first
oscillator develops an output signal having a frequency
of about 1 megahertz ± 20 percent, said second oscilla-
tor develops an output signal having a frequency of
about 500 kilohertz ± 20 percent; and said means for
generating a low frequency clock signal includes an os-
cillator having an output frequency of about 170 hertz
± 20 percent and a three-stage counter to reduce said
output to a frequency of about 21 hertz.

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