A transmission line of a control signal to be transmitted from a main board to a peripheral board is trailed long inside a machine and thereby twisted to form a helically wound portion, so that L occurs in some cases.

A microcomputer of a main board sends a control signal to a relay terminal board via a communication port. The relay terminal board provides a connection between a transmission line of the control signal from the main board and a transmission line from a peripheral board, thus transmitting to the peripheral board the control signal from the main board. Consequently, the transmission line of the control signal extended from the main board to the peripheral board is divided by the relay terminal board. Accordingly, the transmission line extended from the main board to the relay terminal board and the transmission line extended from the relay terminal board to the peripheral board are each made shorter than the related art transmission line connected from the main board to the peripheral board. Therefore, the transmission line of the control signal becomes difficult to twist when wired inside a machine, so that a helically wound portion becomes difficult to form, thus making it difficult for inductance to occur.
<table>
<thead>
<tr>
<th>SYMBOL COMBINATION SHOWING ESTABLISHMENT OF WINNING COMBINATION AND NUMBER OF PAYOUTS</th>
<th>BB ORDINARY GAMING STATE</th>
<th>RB ORDINARY GAMING STATE</th>
<th>RB GAMING STATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRIZE</td>
<td>ORDINARY GAMING STATE OR INTERNAL WINNING STATE</td>
<td>7 - 7 - 7</td>
<td>BAR - BAR - BAR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15 MEDALS</td>
<td>15 MEDALS</td>
</tr>
<tr>
<td></td>
<td>REPLAY - REPLAY - REPLAY OR REPLAY - REPLAY OR REPLAY - REPLAY</td>
<td>WATERMELON - WATERMELON - WATERMELON</td>
<td>WATERMELON - WATERMELON - WATERMELON</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NO MEDAL</td>
<td>1 MEDAL</td>
</tr>
<tr>
<td></td>
<td>SMALL PRIZE OF WATERMELON</td>
<td>SMALL PRIZE OF WATERMELON</td>
<td>SMALL PRIZE OF WATERMELON</td>
</tr>
<tr>
<td></td>
<td>SMALL PRIZE OF BELL - BELL - BELL</td>
<td>SMALL PRIZE OF BELL - BELL - BELL</td>
<td>SMALL PRIZE OF BELL - BELL - BELL</td>
</tr>
<tr>
<td></td>
<td>SMALL PRIZE OF CORNER CHERRY - O - O</td>
<td>SMALL PRIZE OF CORNER CHERRY - O - O</td>
<td>SMALL PRIZE OF CORNER CHERRY - O - O</td>
</tr>
<tr>
<td></td>
<td>SMALL PRIZE OF CENTER CHERRY - O - O</td>
<td>SMALL PRIZE OF CENTER CHERRY - O - O</td>
<td>SMALL PRIZE OF CENTER CHERRY - O - O</td>
</tr>
<tr>
<td></td>
<td>REPLAY - REPLAY - REPLAY OR REPLAY - BAR - BAR - REPLAY</td>
<td>REPLAY - REPLAY - REPLAY OR REPLAY - BAR - BAR - REPLAY</td>
<td>REPLAY - REPLAY - REPLAY OR REPLAY - BAR - BAR - REPLAY</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRIZE</td>
<td>RANDOM NUMBER RANGE</td>
<td>WINNING PROBABILITY</td>
<td>WINNING PROBABILITY (NUMERATOR = 1)</td>
</tr>
<tr>
<td>------------------------------</td>
<td>---------------------</td>
<td>---------------------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>SMALL PRIZE OF CENTER CHERRY</td>
<td>0-19</td>
<td>20/16384</td>
<td>1/819.2</td>
</tr>
<tr>
<td>SMALL PRIZE OF CORNER CHERRY</td>
<td>20-219</td>
<td>200/16384</td>
<td>1/81.92</td>
</tr>
<tr>
<td>SMALL PRIZE OF BELL</td>
<td>220-2252</td>
<td>2033/16384</td>
<td>1/8.059</td>
</tr>
<tr>
<td>SMALL PRIZE OF WATERMELON</td>
<td>2253-2380</td>
<td>128/16384</td>
<td>1/128</td>
</tr>
<tr>
<td>REPLAY</td>
<td>2381-4625</td>
<td>2245/16384</td>
<td>1/7.298</td>
</tr>
<tr>
<td>RB</td>
<td>4626-4693</td>
<td>68/16384</td>
<td>1/240,941</td>
</tr>
<tr>
<td>BB</td>
<td>4694-4807</td>
<td>114/16384</td>
<td>1/143,719</td>
</tr>
<tr>
<td>BLANK</td>
<td>4808-16383</td>
<td>11576/16384</td>
<td>1/1,415</td>
</tr>
</tbody>
</table>
Fig. 9

1. MAIN PROCESS
   - INITIALIZATION PROCESS FOR GAME START
   - RAM CLEARING FOR GAME END
   - 30 SECONDS HAVE ELAPSED AFTER PRECEDING GAME END?
     - Yes: STANDBY SCREEN COMMAND TRANSMISSION PROCESS
     - No: THERE IS AUTOMATIC INSERTION REQUEST?
       - Yes: NUMBER OF GAME MEDALS EQUIVALENT TO INSERTION REQUEST ARE AUTOMATICALLY INSERTED
       - No: GAME MEDAL INSERTION?
         - Yes: BET COMMAND IS TRANSMITTED
         - No: START SWITCH TURNS ON?
           - Yes: SET TIME HAS ELAPSED AFTER PRECEDING GAME START?
             - Yes: CONSUMPTION OF GAME START WAIT TIME
             - No: BASED ON OUTPUT
           - No: BASED ON OUTPUT
Fig. 10

A

112

113

RANDOM NUMBER SELECTION

114

GAMING STATE MONITORING PROCESS

115

PROBABILITY LOTTERY PROCESS

116

DETERMINATION OF STOP WINNING PRIZE

118

STOP TABLE SELECTION PROCESS

119

SETTING OF 1-GAME MONITORING TIMER

120

TRANSMISSION OF START COMMAND

REEL ROTATION PROCESS

C

121

Yes

STOP BUTTON TURNS ON?

122

No

AUTOMATIC STOP TIMER IS SET TO 0?

123

Yes

No

124

NUMBER OF PARTITIONS SLID IS DETERMINED FROM WINNING REQUEST, SYMBOL POSITION, ETC

125

REEL IS ROTATED BY AMOUNT EQUIVALENT TO NUMBER OF PARTITIONS SLID AND THEN STOPPED

126

ALL REELS ARE STOPPED?

Yes

No

C

D
Fig. 11

D

TRANSMISSION OF ALL-REELS STOP COMMAND

127

WINNING COMBINATION SEARCH

Yes

WINNING FLAG IS NORMAL?

No

DISPLAY OF ILLEGAL ERROR

130

GAME MEDAL IS CREDITED, PAID OUT ACCORDING TO STATE

131

WIN LAMP LIGHTING PROCESS

No

BB, BB IS IN OPERATION?

Yes

NUMBER-OF-BB/BB-GAMES CHECK PROCESS

132

It is time for BB to come to end?

No

Yes

RAM CLEARING FOR BB END

B
Fig. 12

(INTERRUPT PROCESS)

START

1 IS ADDED TO PRECEDING RANDOM NUMBER VALUE

RANDOM NUMBER VALUE IS SET

戻る

Fig. 13

SUB-FLOW

COMMAND ANALYSIS

RETURN
BACKGROUND OF THE INVENTION

[0001] 1. Technical Field

[0002] The present invention relates to a gaming machine including a main board that performs a game process that influences a game result and a peripheral board that performs an auxiliary process of the game process upon receipt of a control signal from the main board.

[0003] 2. Related Art

[0004] Conventionally, as such a gaming machine, for example, there is a slot machine. In a slot machine disclosed in Related Art 1 described below, a main board including a main control circuit performs a probability lottery process that influences a game result, and determines an internal winning prize. And, the main board performs reel stop control so that a winning symbol combination of the internally won prize is established in a display window. Besides, upon receipt of a control signal from the main board, a peripheral board including a sub-control circuit performs a game effect process as an auxiliary process of a game process that is performed by the main board. The game effect is performed by displaying animation on a liquid crystal display device and outputting a sound from a speaker, and an effect pattern thereof is determined by the peripheral board.

[0005] Generally, transmission of the control signal from the main board to the peripheral board is performed by serial communication, and the peripheral board converts the control signal received in serial form into a parallel signal, thus performing a control process. Besides, during this communication, an error of communication data is checked by the peripheral board, using a communication check command BCC (Block Check Character), etc. Besides, the main board and the peripheral board are separately supplied with operation power from a power supply.


[0007] However, in the related art slot machine, a transmission line of the control signal to be transmitted from the main board to the peripheral board is trailed long inside the machine and thereby twisted to form a helically wound portion, so that inductance (L) occurs in some cases. In such a case, this inductance causes an error in the time required for the control signal to reach the peripheral board from the main board. Thus, there is the risk that the timing of executing the effect process, etc. performed by the peripheral board falls out of the original timing.

[0008] In such a slot machine as aforesaid, generally, only one-way communication from the main board to the peripheral board is performed, and the main board sends the control signal to the peripheral board, estimating a process time required by the peripheral board without receiving a reply signal from the peripheral board. Accordingly, in the related art slot machine where bidirectional communication is not performed between the main board and the peripheral board, such a gap in timing as aforesaid is difficult to prevent, and the effectiveness of the effect process, etc. performed by the peripheral board is reduced when there occurs the phenomenon in which the timing is off.

SUMMARY

[0009] The invention has been made to address such problems and, according to an aspect of the invention, a gaming machine comprises: a main board that performs a game process that influences a game result; a peripheral board that performs an auxiliary process of the game process upon receipt of a control signal from the main board; and a relay unit that, disposed between the main board and the peripheral board, relays the control signal to be transmitted from the main board to the peripheral board (e.g., a relay terminal board that connects wirings in the gaming machine to each other and a specific peripheral board that performs, as an auxiliary process, the process of relaying the control signal to be transmitted from the main board to the peripheral board).

[0010] According to this configuration, a transmission line of the control signal extended from the main board to the peripheral board is divided by the relay unit. Accordingly, the transmission line extended from the main board to the relay unit and the transmission line extended from the relay unit to the peripheral board are each made shorter than the related art transmission line connected from the main board to the peripheral board. Therefore, the transmission line of the control signal becomes difficult to twist when wired inside the machine, so that a helically wound portion becomes difficult to form, thus making it difficult for inductance to occur. This eliminates the following risk: as is conventional, an error occurs in the time required for the control signal to reach the peripheral board from the main board, and the timing of executing the effect process, etc. performed by the peripheral board falls out of the original timing. Resultingly, the effect process, etc. of the peripheral board are performed with proper timing, thus eliminating a decrease in the effectiveness of the processes.

[0011] According to another aspect of the invention, the peripheral board has the function of inputting a signal from the external in addition to the function of inputting the control signal from the relay unit.

[0012] According to this configuration, the peripheral board is configured to perform the signal input from the external, whereas the relay unit, which inputs the control signal from the main board, is configured not to perform the signal input from the external. Thereby, security is improved, thus providing the sound gaming machine.

[0013] According to a further aspect of the invention, the peripheral board has the function of outputting a signal to a peripheral board that is other than itself.

[0014] According to this configuration, it becomes possible to make up a circuit configuration for outputting the signal from the peripheral board, which receives the control signal from the relay unit, further to another peripheral board.

[0015] According to a still further aspect of the invention, the relay unit has a predetermined additional function in addition to the function of relaying the control signal to be transmitted from the main board to the peripheral board.

[0016] According to this configuration, the relay unit is allowed to have the predetermined additional function, thereby increasing the added value of the relay unit.
According to a still further aspect of the invention, the predetermined additional function is the function of determining the pattern of a game effect to be performed by the peripheral board.

According to this configuration, the process of determining the pattern of the game effect is performed by the relay unit. Therefore, a process load on the peripheral board is reduced and the functions are placed at dispersed locations. The process load on the peripheral board is reduced, thereby increasing the process speed of the peripheral board, so that an image display process, etc. are rapidly performed, thus enhancing the effectiveness of the displayed game effect. Besides, the process load on the peripheral board is reduced, thereby reducing the manufacturing cost of the peripheral board.

According to a still further aspect of the invention, the predetermined additional function is the function of checking an error of the control signal to be transmitted to the peripheral board.

According to this configuration, the process of checking an error of the control signal to be transmitted to the peripheral board is performed by the relay unit. Therefore, the process load on the peripheral board is reduced and the functions are placed at dispersed locations. Besides, according to this configuration as well, the process load on the peripheral board is reduced, thereby increasing the process speed of the peripheral board and also reducing the manufacturing cost of the peripheral board.

According to a still further aspect of the invention, the predetermined additional function is the function of converting a serial control signal received from the main board into a parallel control signal and transmitting the parallel control signal to the peripheral board.

According to this configuration, the process of converting a serial control signal received from the main board into a parallel control signal is performed by the relay unit. Therefore, the process load on the peripheral board is reduced and the functions are placed at dispersed locations. Besides, according to this configuration as well, the process load on the peripheral board is reduced, thereby increasing the process speed of the peripheral board and also reducing the manufacturing cost of the peripheral board.

According to a still further aspect of the invention, the predetermined additional function is the function of supplying the peripheral board with its operation power.

According to this configuration, the need to connect a power supply line from a power supply to the peripheral board is eliminated.

According to a still further aspect of the invention, the predetermined additional function is the function of concentrating transmission lines that provide connections between the main board and the peripheral board.

For example, a plurality of the transmission lines extended from the main board are concentrated into one transmission line. Thereby, the number of connectors, which are disposed in the peripheral board and to which the transmission lines are connected, can be reduced, for example, from a plurality of the connectors to one. According to this configuration, it can be expected to reduce the risk of pulling out the transmission line connected to the peripheral board and connecting a fraudulent board, which is used in conducting a fraudulent act, to, for example, one of the connectors of the peripheral board.

According to a still further aspect of the invention, the predetermined additional function is the function of amplifying the control signal sent from the main board to the peripheral board.

According to this configuration, it becomes possible to cope with attenuation of the voltage, etc. of the control signal which occurs during communication between the main board and the peripheral board, thus enabling an increase in the accuracy, appropriateness, etc. of the communication between the main board and the peripheral board.

According to such a gaming machine of the invention, as aforesaid, the transmission line of the control signal becomes difficult to twist when wired inside the machine, thus making it difficult for inductance to occur. This eliminates the risk that an error occurs in the time required for the control signal to reach the peripheral board from the main board and that the timing of executing the effect process, etc. performed by the peripheral board falls out of the original timing.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described with reference to the accompanying drawings, wherein like numbers references like elements, and wherein:

FIG. 1 is a perspective view showing the exterior of a Pachi-Slot machine according to one embodiment of the invention;

FIG. 2 is a perspective view showing the exterior of a reel unit configuring the Pachi-Slot machine according to one embodiment of the invention;

FIGS. 3A and 3B are exploded perspective views showing the configuration of each of reels configuring the reel unit shown in FIG. 2;

FIG. 4 is a diagram showing symbol rows depicted on the outer peripheries of the reels shown in FIG. 3A;

FIG. 5 is a diagram showing the relationship among a prize, a symbol combination, and the number of payouts in the Pachi-Slot machine according to one embodiment of the invention;

FIG. 6 is a block diagram showing a circuit configuration configured on a main board of the Pachi-Slot machine according to one embodiment of the invention;

FIG. 7 is a block diagram showing a circuit configuration configured on a peripheral board of the Pachi-Slot machine according to one embodiment of the invention;

FIG. 8 is a diagram conceptually showing a probability lottery table used in one embodiment of the invention;

FIG. 9 is a first flowchart showing the outline of a game process performed by a main CPU of the Pachi-Slot machine according to one embodiment of the invention;

FIG. 10 is a second flowchart showing the outline of the game process performed by the main CPU of the Pachi-Slot machine according to one embodiment of the invention;
FIG. 11 is a third flowchart showing the outline of the game process performed by the main CPU of the Pachi-Slot machine according to one embodiment of the invention;

FIG. 12 is a flowchart showing the outline of an interrupt process performed by the main CPU of the Pachi-Slot machine according to one embodiment of the invention;

FIG. 13 is a flowchart showing the outline of a game process performed by an image control microcomputer of the Pachi-Slot machine according to one embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

A best mode embodiment of the invention will now be described.

FIG. 1 is a perspective view showing the exterior of a Pachi-Slot machine 1 according to this best mode embodiment.

Three reels 2, 3, and 4 are rotatably disposed inside a cabinet located in a central portion of the main body of the Pachi-Slot machine 1. A plurality of kinds of symbols are displayed on the outer periphery of each of these reels 2, 3, and 4. Display windows 5, 6, and 7 are formed on a machine front panel 38 of the cabinet, and three symbols displayed on each of the reels 2, 3, and 4 can be observed through each of these respective display windows 5, 6, and 7. A total of five winning lines L1, L2A, L2B, L3, and L3B, consisting of three transverse lines and two oblique lines, are provided on the display windows 5, 6, and 7. Besides, an insertion slot 8 for a player to insert medals serving as game media is provided on the lower right side of the display windows 5 to 7.

When the player inserts one medal through the medal insertion slot 8 prior to starting a game, one central transverse winning line L1 is validated. Besides, when the player inserts two medals, three transverse winning lines L1, L2A, and L2B are validated. Furthermore, when the player inserts three medals, all the winning lines L1, L2A, L2B, L3A, and L3B are validated.

Besides, from the top to down, four game operation indicators 9 to 12, three BET lamps 13 to 15, a number-of-deposits indicator 16, and a start lamp 17 are disposed on the machine front panel 38 to the left of the display windows 5 to 7. The game operation indicators 9 to 12 and the BET lamps 13 to 15 are controlled as to lighting in response to a gaming state, thus notifying the player of the current gaming state. The number-of-deposits indicator 16, made up of a 3-digit 7-segment LED (Light Emitting Diode), displays the number of medals now being credited inside the machine. The start lamp 17 turns on when the reels 2 to 4 are ready to operate.

Besides, from the top to down, a bonus count indicator 18, a WIN lamp 19, a number-of-payouts indicator 20, and an insertion lamp 21 are disposed on the machine front panel 38 to the right of the display windows 5 to 7. The bonus count indicator 18, made up of a 3-digit 7-segment LED, digitally displays the remaining number of possibilities to win an RB game and a JAC game, when a bonus game is won. Besides, the WIN lamp 19 turns on when a big bonus (BB) or a regular bonus (RB) is elected as an internal winning. The number-of-payouts indicator 20, made up of a 3-digit 7-segment LED, displays the number of medals to be paid out for a prize winning. The insertion lamp 21 flashes when the insertion slot 8 is ready to accept the medal insertion.

Besides, a liquid crystal display device 22 is disposed on the machine front panel 38 below the display windows 5 to 7. Game effect images and various information are displayed on a display screen of the liquid crystal display device 22.

Besides, an cross key 23, a “o” button 24, a “x” button 25, a 1-deposited-medal insertion switch 26, a 2-deposited-medal insertion switch 27, and a 3-deposited-medal insertion switch 28 are disposed on the left side of the liquid crystal display device 22. The cross key 23, switchably operable in four directions: up, down, left, and right, is used in selecting information to be displayed on the liquid crystal display device 22, by being operated together with the “o” button 24 and the “x” button 25. Besides, when the number of medals is displayed on the number-of-deposits indicator 16, indicating that the medals are credited, the deposited medal insertion switches 26 to 28 are used to bet one to three medals on one game (unit game) in lieu of inserting the corresponding number of medals into the medal insertion slot 8.

Besides, from left to right, a deposited medal liquidating switch 29, a start lever 30, and stop buttons 31, 32, and 33 are disposed below the machine front panel 38. The deposited medal liquidating switch 29 is used to liquidate medals credited inside the machine. Besides, the start lever 30 is operated to thereby start rotation of all the reels 2 to 4 in unison. The start lever 30 configures an operating section that is operated by the player. The stop buttons 31 to 33 are disposed in response to the respective reels 2 to 4 and, when the rotation of the reels 2 to 4 reaches a predetermined speed, the operation of the stop buttons 31 to 33 is validated, and the rotation of each of the reels 2 to 4 is stopped in response to the operation of each of the stop buttons 31 to 33 by the player.

Besides, a medal receiving tray 34 is disposed in a front lower portion of the Pachi-Slot machine 1. This medal receiving tray 34 is for accumulating medals paid out from a medal payout opening 35. Besides, a payouts display unit 36 indicating how many medals are to be paid out for prize winnings is disposed in a front upper portion of the Pachi-Slot machine 1. A pair of coverings 37a and 37b are disposed on both sides of this payouts display unit 36, and a decoration display device 38 is disposed above the payouts display unit 36. A pair of speakers 98 and 98 that output game effect sounds, etc. are disposed on the backsides of the pair of coverings 37a and 37b. Besides, LED’s and lamps that emit light to perform game effects are disposed inside these coverings 37a, 37b and decoration display device 38. These LED’s and lamps configure an LED group 101 and a lamp group 102, respectively, which are controlled by a to-be-described sound/lamp control circuit (see FIG. 7) configured on a second peripheral board 60b. The speakers 98 and 98 are also controlled by the to-be-described sound/lamp control circuit.

The reels 2 to 4, configured as a rotating reel unit shown in FIG. 2, are attached to a frame 41 via brackets 42.
The reels 2 to 4 are each configured by adhering a reel band 44 to the outer periphery of a reel drum 43. Symbol rows are depicted on an outer peripheral face of the reel band 44. Besides, the brackets 42 are each provided with a stepping motor 45, and these motors 45 are driven to rotate the reels 2 to 4.

[0055] FIG. 3A shows the structure of each of the reels 2 to 4, wherein the same portions as those of FIG. 2 are indicated by like reference numerals and thus omitted from the description. As shown in FIG. 3A, a lamp casing 46 is disposed inside the reel drum 43 on the back of the reel band 44, and reel back lamps 47a, 47b, and 47c are attached to three respective chambers of this lamp casing 46. As shown in FIG. 3B, these back lamps 47a to 47c are configured by attaching to a substrate 48 LED’s 47 that emit a plurality of different colors, and the substrate 48 is attached to the back of the lamp casing 46. Besides, a photosensor 49 is attached to the bracket 42. This photosensor 49 detects that a shield plate 50 disposed on the reel drum 43 passes through the photosensor 49 as the reel drum 43 rotates.

[0056] The back lamps 47a to 47c configure the lamp group 102 that is controlled as to lighting by the to-be-described sound/lamp control circuit. As the back lamps 47a to 47c turn on, out of symbols depicted on the reel band 44, three symbols positioned at the front of the respective back lamps 47 are individually illuminated from behind, so that the three symbols are displayed on each of the display windows 5 to 7.

[0057] FIG. 4 shows symbol rows in which a plurality of kinds of symbols depicted on the reel bands 44 of the left, center, and right reels 2, 3, and 4 are arrayed with 21 symbols. Code numbers ranging from “00” to “20” are assigned to the symbols, which information is stored as a data table in a to-be-described program ROM 65 (see FIG. 6). A symbol row including symbols “7”, “BAR”, “WATERMELON”, “BELL”, “REPLAY”, and “CHERRY” is indicated on each of the reels 2, 3, and 4. The reels 2, 3, 4 are rotationally driven so that the symbol rows move in the arrowed direction shown in FIG. 4.

[0058] FIG. 5 shows prizes and the numbers of payouts corresponding to winning symbol combinations in each gaming state.

[0059] The gaming state of the Pachi-Slot machine 1 according to this embodiment comprises an “ordinary gaming state”, a “BB internal winning state”, an “RB internal winning state”, a “BB ordinary gaming state”, and an “RB gaming state”. These five kinds of gaming states are distinguished basically according to the kind of a prize having the possibility of internal winning and to the kind of a bonus having a possibility to realize the establishment of a prize winning.

[0060] A bonus winning flag of a BB prize or a RB prize is carried over to the next game and held as an internal winning prize until a bonus winning combination is actually established after the bonus is internally won. Winning flags of the other prizes are valid only at the unit game where the internal winning has been achieved and are not carried over to the next game.

[0061] The gaming state, which occurs in the wake of the establishment of the BB winning combination and includes the “BB ordinary gaming state” and the “RB gaming state”, is hereinafter referred to collectively as a “BB gaming state”. Besides, the “BB internal winning state” and “RB internal winning state”, which refer to the state in which the bonus is internally won, are hereinafter referred to collectively as an “internal winning state”. In the “internal winning state”, the state is that at least one of the two bonus winning flags is carried over.

[0062] As shown in FIG. 5, the BB winning combination is established as “7, 7, 7” are aligned along a validation winning line in the internal winning state. After the BB winning combination is established, the gaming state turns to the BB ordinary gaming state.

[0063] An RB winning combination is established as “BAR, BAR, BAR” are aligned along a validation winning line in the internal winning state, or as “REPLAY, REPLAY, REPLAY” or “BAR, REPLAY, REPLAY” are aligned in the BB ordinary gaming state. The establishment of the RB winning combination in the BB ordinary gaming state is generally called “JACIN”. After the RB winning combination is established, the gaming state turns to the RB state.

[0064] A REPLAY winning combination is established as “REPLAY, REPLAY, REPLAY” or “BAR, REPLAY, REPLAY” are aligned in the ordinary gaming state or the internal winning state. When the REPLAY winning combination is established, a number of medals equal to the number of medals inserted are automatically inserted, so that the player can play the next game without consuming any medals carried with the player.

[0065] Besides, in the ordinary gaming state, internal winning state, and BB ordinary gaming state, it is possible to realize the establishment of winning combinations: a “small prize of center CHERRY”, a “small prize of corner CHERRY”, a “small prize of BELL”, and a “small prize of WATERMELON”. The number of payouts for each of the winning combinations is as shown in FIG. 5.

[0066] A JAC winning combination is established as “REPLAY, REPLAY, REPLAY” or “BAR, REPLAY, REPLAY” are aligned in the RB gaming state. The gaming state changes when the number of times of establishment of the JAC winning combination reaches “eight times”. Here, a game in the RB gaming state which has a possibility to establish the JAC winning combination is generally called a “JAC GAME”.

[0067] FIGS. 6 and 7 show circuit configurations configured on a main board 61 and a peripheral board 60 which control the game process operation of the Pachi-Slot machine 1.

[0068] A main control circuit that performs a game process that influences a game result is configured on the main board 61 shown in FIG. 6. A controller of this main board 61 is configured by having a microcomputer 63 which serves as a main component and adding thereto a circuit for random number sampling. The microcomputer 63 includes a main CPU (Central Processing Unit) 64 that performs a control operation in accordance with a pre-set program, a program ROM (Read Only Memory) 65 serving as a program storage unit, and a backed-up control RAM (Random Access Memory) 66.

[0069] Connected to the main CPU 64 are a clock pulse generator circuit 67 that generates a reference clock pulse, a
frequency divider 68, a random number generator 69 that generates random numbers in a predetermined range, and a random number sampling circuit 70 that specifies one of the generated random numbers. Furthermore, an I/O port (input/output port) 71 that exchanges signals with to-be-described peripheral devices (actuators) is connected to the main CPU 64. The random number generator 69 configures a random number update unit. The random number update unit periodically updates random numbers in a predetermined numerical value range (a range of 0 to 16383 in this embodiment) in a predetermined order (in increasing order of numerical value in this embodiment), and updates random number values every 250 usec as described later. Besides, the random number sampling circuit 70 configures a random number selection unit that, when the start lever 30 is operated within a predetermined set time after the start of the preceding unit game, selects the random numbers updated by the random number generator 69 when the set time has elapsed.

[0070] The program ROM 65 is divided into storage sections so as to store various tables including the probability lottery table shown in FIG. 8, a sequence program, etc. The main CPU 64 performs the game process in accordance with this sequence program.

[0071] FIG. 8 conceptually shows the probability lottery table.

[0072] This probability lottery table is used to draw the internal winning prize during the ordinary gaming state in a to-be-described probability lottery process (step 114 in FIG. 10) of a main flowchart. The probability lottery table stores data for classifying the random numbers, which have been generated by the random number generator 69 and selected by the random number sampling circuit 70, into prizes. A predetermined numerical value group in the predetermined range of 0 to 16383 is assigned to each of the prizes as a random number range. A random number range of lower limit 0 to upper limit 19 is assigned to the small probability of “center CHERRY”, and a “center CHERRY” winning requirement flag stands when a selected random number value falls into the range of 0 to 19. The probability of winning the small prize of “center CHERRY” is 20/16384 (=1/819.2). A random number range of lower limit 20 to upper limit 219 is assigned to the small prize of “corner CHERRY”, and a “corner CHERRY” winning requirement flag stands when a selected random number value falls into the range of 20 to 219. The probability of winning the small prize of “corner CHERRY” is 200/16384 (=1/81.92). A random number range of lower limit 220 to upper limit 2252 is assigned to the small prize of “BELLS”, and a “BELLS” winning requirement flag stands when a selected random number value falls into the range of 220 to 2252. The probability of winning the small prize of “BELLS” is 2033/16384 (=1.8059). A random number range of lower limit 2253 to upper limit 2380 is assigned to the small prize of “WATERMELON”, and a “WATERMELON” winning requirement flag stands when a selected random number value falls into the range of 2253 to 2380. The probability of winning the small prize of “WATERMELON” is 128/16384 (=1/128). A random number range of lower limit 2381 to upper limit 4625 is assigned to “REPLAY”, and a “REPLAY” winning requirement flag stands when a selected random number value falls into the range of 2381 to 4625. The probability of winning “REPLAY” is 2245/16384 (=1.7298). A random number range of lower limit 4626 to upper limit 4693 is assigned to “RB”, and a “RB” winning requirement flag stands when a selected random number value falls into the range of 4626 to 4693. The probability of winning “RB” is 68/16384 (=1/240.941). A random number range of lower limit 4694 to upper limit 4807 is assigned to “BB”, and a “BB” winning requirement flag stands when a selected random number value falls into the range of 4694 to 4807. The probability of winning “BB” is 114/16384 (=1/143.719). A random number range of lower limit 4808 to upper limit 16383 is assigned to “BLANK”, and the probability of winning “BLANK” is 11576/16384 (=1/1.415).

[0073] The main CPU 64 and program ROM 65 of the main board 61 shown in FIG. 6 configure an internal winning prize determination unit. The internal winning prize determination unit assigns the kind of a prize for each of the random number ranges shown in the table of FIG. 8 and determines the prize, which has been assigned to a random number range into which a random number selected by the random number sampling circuit 70 falls, to be the internal winning prize. That is, the internal winning prize is determined by which random number range one sampled random number value falls into and is represented by the winning requirement flag of the determined prize. The bonus winning requirement flag of “BB” or “RB” is carried over to a game after the flag stands and, when the symbol combination of “BB” or “RB” is displayed stopped on a validation winning line and thus a bonus winning combination occurs actually, the bonus winning requirement flag is cleared. Besides, any flag other than the bonus winning requirement flag is valid only at a game where the any flag stands and is cleared when the game ends and not carried over to the subsequent games.

[0074] Besides, the main CPU 64 configures a game start unit that starts a unit game as the start lever 30 is operated. The unit game is started when the start lever 30 is operated. To be exact, however, the unit game is started when a 1-game monitoring timer is set (see step 118 in FIG. 10) after the start lever 30 is operated. Besides, the main CPU 64 configures a game start standby unit that, when the start lever 30 is operated before the predetermined set time (4.096 sec in this embodiment) elapses after the start of the preceding unit game, causes the game start unit to wait to start the unit game until this set time has elapsed.

[0075] As the major actuators whose operations are controlled based on a control signal from the microcomputer 63, there are the stepping motors 45 that rotationally drive the reels 2, 3, and 4, various lamps (the BET lamps 13 to 15, start lamp 17, WIN lamp 19, and insertion lamp 21), various indicators (the game operation indicators 9, 12, number-of-deposits indicator 16, bonus count indicator 18, and number-of-payouts indicator 20), and a hopper 72 for storing medals. These are driven by a motor drive circuit 73, a lamp drive circuit 74, an indicator drive circuit 75, and a hopper drive circuit 76, respectively. These drive circuits 73 to 76 are connected to the main CPU 64 via the I/O port 71 of the microcomputer 63.

[0076] Besides, as a main input signal generation unit that generates an input signal required for the microcomputer 63 to generate the control signal, there is an inserted medal sensor 85 that detects a medal inserted from the medal insertion slot 8, a start switch 30S that detects the operation
of the start lever 30, the deposited medal insertion switches 26 to 28, and the deposited medal liquidating switch 29. Furthermore, as the input signal generation unit, there is a reel position detection circuit 77 that detects the rotational position of the reels 2, 3, and 4 upon receipt of an output pulse signal from the photosensor 49. The photosensor 49 is included in the drive mechanism of the reels 2 to 4 and is not shown in FIG. 6.

[0077] After the reels 2 to 4 are started to rotate, the reel position detection circuit 77 measures the number of drive pulses supplied to each of the stepping motors 45 and writes this measurement into a predetermined area of the control RAM 66. Accordingly, the measurements corresponding to the rotational positions of the respective reels 2 to 4 in a range of one revolution are stored in the control RAM 66. Besides, the photosensor 49 generates a reset pulse each time the reels 2 to 4 each rotate through one revolution. This reset pulse is given to the main CPU 64 via the reel position detection circuit 77, and the measurement of a drive pulse being measured by the control RAM 66 is cleared to “0”. The lag occurring between the moving display of each symbol and the rotation of each of the stepping motors 45 is eliminated per revolution by this clearing process.

[0078] Furthermore, as the input signal generation unit, there are a reel stop signal circuit 78 that, when the stop button 31, 32, 33 is pressed, generates a signal for stopping the corresponding reel 2, 3, 4, a medal detector 725 that measures the number of medals paid out by the hopper 72, and a payout completion signal generator circuit 79. These are also connected to the main CPU 64 via the I/O port 71. When the measured number of medals actually paid out which has been inputted from the medal detector 725 reaches number-of-payouts data that is represented by a measurement signal inputted from the indicator drive circuit 75, the payout completion signal generator circuit 79 generates a signal for detecting medal payout completion.

[0079] Besides, a communication port 80 is connected to the I/O port 71, and the microcomputer 63 sends the control signal to a relay terminal board 62 shown in FIG. 7 via this communication port 80. The relay terminal board 62, which connects wirings in the gaming machine to each other, provides a connection between a transmission line of the control signal from the main board 61 and a transmission line from the peripheral board 60. Thus, transmitting the control signal from the main board 61 to the peripheral board 60, the peripheral board 60 configures a relay unit that relays the control signal to be transmitted from the main board 61 to the peripheral board 60.

[0080] Communication from the main board 16 to the peripheral board 60 via the relay terminal board 62 is performed only in one direction from the main board 16 to the peripheral board 60. In this embodiment, the control signal is transmitted from the main board 61 to the peripheral board 60 includes a command class whose command class is represented by a 7-bit length and a parameter whose command content is represented by a maximum 24-bit length.

[0081] The peripheral board 60 is made up of a first peripheral board 60a having configured thereon an image control circuit (gsub) and a second peripheral board 60b having configured thereon the sound/lamp control circuit (mSub). Thus, the peripheral board 60 performs a predetermined effect process as an auxiliary process of the game process performed by the main board 61, based on the control signal from the main board 61.

[0082] The first peripheral board 60a includes an image control microcomputer 81, a serial port 82, a program ROM 83, a work RAM 84, a calendar IC 85, an image control IC 86, a control RAM 87, an image ROM (character ROM) 88, and a video RAM 89.

[0083] The image control microcomputer 81 includes a CPU, an interrupt controller, and an input/output port. Based on the control signal received from the main board 61, the CPU included in the image control microcomputer 81 performs various processes in accordance with a control program stored in the program ROM 83. Additionally, the image control microcomputer 81, although not including a clock pulse generator circuit, a frequency divider, a random number generator, or a sampling circuit, is configured to execute random number sampling on an operation program of the image control microcomputer 81.

[0084] The serial port 82 receives the control signal transmitted from the main board 61 via the relay terminal board 62. The program ROM 83 stores the control program, various tables, etc. that are executed by the image control microcomputer 81. The work RAM 84 is used as a working temporary storage unit for the image control microcomputer 81 to execute the control program. Besides, various information is stored in the work RAM 84.

[0085] The calendar IC 85 stores date data. The cross key 23, “o” button 24, and “x” button 25 are connected to the image control microcomputer 81. Date setting, etc. are performed by operating these key and buttons, and the image control microcomputer 81 stores the set date information into the calendar IC 85. The configuration is such that the information stored in the work RAM 84 and the calendar IC 85 is backed up during power outage, etc., so that the stored information is not lost even though operation power supplied to the first peripheral board 60a is cut off.

[0086] The image control IC 86 generates an image responsive to the effect content of a pattern determined by the image control microcomputer 81 and outputs the image to the liquid crystal display device 22. The image control microcomputer 81 takes in information, such as the current gaming state and kinds of winning flag, from the main board 61 via the relay terminal board 62 and, based on the taken-in gaming state, winning flag, etc., determines an effect content to be displayed on the liquid crystal display device 22.

[0087] The control RAM 87 is included in the image control IC 86, and the image control microcomputer 81 writes and reads information, etc. from this control RAM 87. Besides, a register, sprite attribute table, color pallet table of the image control IC 86 are developed in the control RAM 87. The image control microcomputer 81 updates the register and sprite attribute table of the image control IC 86 at each predetermined moment.

[0088] The liquid crystal display device 22, image ROM 88, and video RAM 89 are connected to the image control IC 86. Additionally, the configuration may be such that the image ROM 88 is connected to the image control microcomputer 81. This sometimes provides an effective configuration for processing a large mass of image data such as 3-D image data. The image ROM 88 stores image data, dot data,
etc. for creating an image. The video RAM 89 is used as a temporary storage unit for the image control IC 86 to create an image. Besides, the image control IC 86 transmits a signal to the image control microcomputer 81 each time it finishes transferring data of the video RAM 89 to the liquid crystal display device 22.

[0089] Besides, in the first peripheral board 60a, the image control microcomputer 81 performs even control of sound/lamp effects. The image control microcomputer 81 determines even a sound output pattern and a lamp lighting pattern, based on the gaming state, winning flag, etc. taken in from the main board 61. And, based on the determined effect patterns, the image control microcomputer 81 determines the kind of a sound/lamp and the output timing thereof. Then, the image control microcomputer 81 transmits the control signal to the second peripheral board 60b via the serial port 82 at each predetermined moment. In the second peripheral board 60b, only sound/lamp output, exclusive of to-be-described volume control, is performed mainly in response to the control signal received from the first peripheral board 60a.

[0090] The second peripheral board 60b includes a sound/lamp control microcomputer 91, a serial port 92, a program ROM 93, a work RAM 94, a sound source IC 95, a power amplifier 96, and a sound source ROM 97.

[0091] The sound/lamp control microcomputer 91 includes a CPU, an interrupt controller, an input/output port. Based on the control signal received from the first peripheral board 60a, the CPU included in the sound/lamp control microcomputer 91 performs a sound/lamp output process in accordance with a control program stored in the program ROM 93. The LED group 101 and lamp group 102 are connected to the sound/lamp control microcomputer 91. The sound/lamp control microcomputer 91 transmits an output signal to these LED group 101 and lamp group 102 in response to the control signal transmitted with predetermined timing from the first peripheral board 60a. Thereby, the LED group 101 and lamp group 102 emit light in a predetermined mode responsive to the game effect.

[0092] The serial port 92 receives the control signal transmitted from the first peripheral board 60a. The program ROM 93 stores a control program, etc. to be executed by the sound/lamp control microcomputer 91. The work RAM 94 is used as a working temporary storage unit for the sound/lamp control microcomputer 91 to execute the control program.

[0093] The sound source IC 95 generates a sound source, based on the control signal transmitted from the first peripheral board 60a, and outputs the sound source to the power amplifier 96. The speakers 98 and 99 are connected to this power amplifier 96. The power amplifier 96 amplifies the sound source outputted from the sound source IC 95 and outputs the amplified sound source from the speakers 98 and 99. The sound source ROM 97 stores sound source data (a phrase, etc.) for generating the sound source.

[0094] Besides, a volume controller 103 is connected to the sound/lamp control microcomputer 91. The volume controller 103, which is made operable by a game hall employee or the like, performs control of a sound tone outputted from the speakers 98 and 99. Based on an input signal transmitted from the volume controller 103, the sound/lamp control microcomputer 91 performs control such that a sound outputted from the speakers 98 and 99 is adjusted to the inputted volume.

[0095] The control operation of the main CPU 64 of the main board 61 will now be described with reference to the main flowcharts shown in FIGS. 9 to 11.

[0096] First, the main CPU 64 performs initialization for game start (see step 101 in FIG. 9). Specifically, the main CPU 64 performs initialization of memory contents of the control RAM 66, initialization of communication data, etc. Subsequently, the main CPU 64 clears a predetermined memory content of the control RAM 66 obtained at game end (step 102). Specifically, the main CPU 64 performs erasing of data, in a writable area of the control RAM 66, used at the preceding game, writing of a parameter required for the next game into the writable area of the control RAM 66, designation of a start address of a sequence program of the next game, etc. Next, the main CPU 64 determines whether or not “30 seconds” has elapsed after the end of the preceding game, i.e., after all the reels 2, 3, and 4 stop (step 103). If this determination is “YES”, the main CPU 64 transmits a standby screen command to the peripheral board 60 via the relay terminal board 62 (step 104). The standby screen command is a command to request the liquid crystal display device 22 to display a “demonstration image”.

[0097] Next, the main CPU 64 determines whether or not there is an automatic medal insertion request, i.e., whether or not the REPLAY winning combination has been established at the preceding game (step 105). If this determination is “YES”, the main CPU 64 automatically inserts a number of medals equivalent to the insertion request (step 106). If the determination at step 105 is “NO”, the main CPU 64 determines whether there is the medal insertion or not (step 107). Specifically, the main CPU 64 determines whether or not there is input from the inserted medal sensor 85 or the deposited medal insertion switches 26, 27, and 28. If this determination is “YES”, the process moves to step 108, whereas, if the determination is “NO”, the process returns to step 103, thus repeating the aforesaid process steps. The main CPU 64 automatically inserts medals or, when there is input based on the medal insertion, transmits a BET command to the peripheral board 60 side via the relay terminal board 62 (step 108).

[0098] Next, the main CPU 64 determines whether or not there is input from the start switch 305 based on the operation of the start lever 30 (step 109). If this determination is “YES”, next, the main CPU 64 determines whether or not the predetermined time has elapsed after the start of the preceding game (step 110). This set time is set to 4.1 seconds. If the set time has not elapsed, a wait time command is transmitted to the peripheral board 60 side via the relay terminal board 62 and, at the same time, a game start wait time required until the set time has elapsed after a wait function operates is consumed (step 111). When the start lever 30 is operated before this elapse of the set time, a sound indicative of non-rotatability of the reels is outputted from the speakers 98 and 99, thus notifying the player that the wait function has operated. When the set time elapses after the start of the preceding game, next, the main CPU 64 causes the random number sampling circuit 79 to select a lottery random number generated by the random number generator 69 (see step 112 in FIG. 10).
The random numbers generated by the random number generator 69 are updated by an interrupt process performed every 250 μsec, which process is shown in FIG. 12. In this interrupt process, when an interrupt pulse is inputted every 250 μsec from the frequency divider 68, the main CPU 64 adds “1” to the preceding random number value generated by the random number generator 69 (see step 201 in FIG. 12) and sets a random number value obtained by the addition into the random number generator 69 (step 202). This process is repeated each time the interrupt pulse is inputted, so that the random number value is counted up in the range of “0” to “16383”, and when reaching “16383”, the random number value is set to “0” again, thus performing update of a random number of the next period.

After the random number selection is performed, the main CPU 64 performs a gaming state monitoring process (step 113 in FIG. 10). In the gaming state monitoring process, referring to the winning requirement flags including the bonus winning requirement flag, the main CPU 64 sets the gaming state to a gaming state corresponding to a winning requirement flag. Subsequently, the main CPU 64 performs the probability lottery process (step 114). In the probability lottery process, the main CPU 64 determines the random number range of which prize in the probability lottery table (see FIG. 8) the random number selected at aforesaid step 112 falls into, using the probability lottery table in response to the gaming state. And furthermore, the main CPU 64 determines the internal winning prize, based on the value of the bonus winning requirement flag.

Next, the main CPU 64 determines a prize (stop winning prize) capable of establishing a winning combination of the internal winning prize corresponding to the winning requirement flag set in the control RAM 66 (step 115). Next, the main CPU 64 performs a stop table selection process (step 116). That is, the main CPU 64 determines a stop table corresponding to the stop winning prize determined at step 115, from within a stop table selection table.

Next, the main CPU 64 sets the 1-game monitoring timer (step 118). This 1-game monitoring timer is a timer for monitoring the set time that is a shortest time interval between unit games. Next, the main CPU 64 performs a start command transmission process for game start (step 119). Specifically, the main CPU 64 performs the process of transmitting a command including information, such as of the internal winning prize drawn in the probability lottery process at step 114, to the peripheral board 60 via the relay terminal board 62. Subsequently, the main CPU 64 performs a reel rotation process (step 120).

Next, the main CPU 64 determines whether the stop buttons 31 to 33 have been operated to turn “ON” or not (step 121). If none of the stop buttons 31 to 33 are operated and this determination is “NO”, next, the main CPU 64 determines whether the value of an automatic stop timer is “0” or not (step 122). If this determination is “NO”, the process returns to step 121, thus repeating the aforesaid process steps.

If any one of the stop buttons 31 to 33 is operated and the determination at step 121 becomes “YES” or the value of the automatic stop timer becomes “0”, next, the main CPU 64 performs a number-of-partitions slid determination process (step 123). In this number-of-partitions slid determination process, the main CPU 64 determines the number of partitions slid, based on the following items: the kinds of symbols displayed on the reels 2, 3, 4 that are made visible to the player through the display windows 5, 6, 7 in time with a player’s stop operation, the internal winning prize determined by the internal winning prize determination unit, and like item. Subsequently, the main CPU 64 rotates a reel corresponding to a stop button operated so as to stop the reel, by an amount equivalent to the number of partitions slid, and thereafter stops the reel (step 124). Here, the “number of partitions slid” refers to the number of symbols moved until the reels 2 to 4 stop after the stop buttons 31 to 33 are operated, and is called the “number of pull-ins” in some cases.

On this occasion, the main CPU 64 transmits a reel stop command from the main board 61 to the peripheral board 60. The reel stop command includes information capable of identifying the stopped reel 2, 3, 4, information capable of identifying the kinds of symbols displayed by the stopped reel on a predetermined validation winning line, and like information. Subsequently, the main CPU 64 determines whether all the reels have stopped or not (step 125) and, if this determination is “NO”, the process returns to step 121, thus repeating the aforesaid process steps.

On the contrary, when all the reels 2 to 4 stop and the determination at step 125 becomes “YES”, the main CPU 64 transmits an all-reels stop command to the peripheral board 60 via the relay terminal board 62 (see step 126 in FIG. 11) and subsequently performs a winning combination search process (step 127). This winning combination search process provides a match between the kind of a combination of symbols actually aligned on a validation winning line and the kind of the winning prize determined by the probability lottery process. And, next, it is determined whether the winning flag of this combination is normal or not (step 128). When this determination result is not normal, an illegal error is displayed on the number-of-payouts indicator 20 and the liquid crystal display device 22 (step 129).

On the contrary, when the determination result is normal, the main CPU 64 performs a game medal deposit or payout process according to the then state (step 130). That is, if the state is that the game is played on credit, the number of deposits displayed on the number-of-deposits indicator 16 is increased by an amount equivalent to the number of medals won by establishing the winning combination. Besides, if the state is that the game is played by inserting medals into the medal insertion slot 8, a number of medals won by establishing the winning combination are paid out onto the medal receiving tray 34.

Subsequently, the main CPU 64 performs a WIN lamp lighting process for lighting the WIN lamp 19, thus notifying the player of occurrence of a winning combination (step 131). Next, the main CPU 64 determines whether or not the current gaming state is that a BB game or an RB game is in operation (step 132). If the BB or RB game is in operation, next, the main CPU 64 checks the number of rounds of the BB or RB game (step 133). Subsequently, the main CPU 64 determines whether or not the current gaming state is that it is time for the BB game to come to an end (step 134). If it is time for the BB game to come to an end, a BB end command is transmitted to the peripheral board 60 via
the relay terminal board 62. This BB end command includes a 3-bit parameter representing an end operation. When the BB end command is transmitted, subsequently, a RAM clearing process for BB game end is performed to the control RAM 66 (step 135). If the determination at step 132 is not that the BB or RB game is in operation, if the determination at step 134 is not that it is time for the BB game to come to an end, or if the process at step 135 comes to an end, the process returns to step 102, thus starting the next new game.

[0109] FIG. 13 is a flowchart showing the outline of a game process controlled by the image control microcomputer 81 of the peripheral board 60. In the peripheral board 60, various commands (control signal) received from the main board 61 side via the relay terminal board 62 are constantly analyzed by the image control microcomputer 81, thus appropriately performing various game processes based on these commands (see step 200 in FIG. 13).

[0110] According to such a Pachi-Slot machine 1 of this embodiment, the transmission line of the control signal extended from the main board 61 to the peripheral board 60 is divided by the relay terminal board 62. Accordingly, the transmission line extended from the main board 61 to the relay terminal board 62 and the transmission line extended from the relay terminal board 62 to the peripheral board 60 are each made shorter than the related art transmission line connected from the main board 61 to the peripheral board 60. Therefore, the transmission line of the control signal becomes difficult to twist when wired inside the machine, so that a helically wound portion becomes difficult to form, thus making it difficult for inductance to occur. This eliminates the following risk: as is conventional, an error occurs in the time required for the control signal to reach the peripheral board 60 from the main board 61, and the timing of executing the effect process, etc. performed by the peripheral board 60, using the liquid crystal display device 22, LED group 101, lamp group 102, and speakers 98, 98, falls out of the original timing. Resultingly, the effect process, etc. of the peripheral board 60 are performed with proper timing, thus eliminating a decrease in the effectiveness of the processes.

[0111] Besides, in the Pachi-Slot machine 1 according to this embodiment, the first peripheral board 60a has the function of inputting external signals from the cross key 23, “o” button 24, and “x” button 25, in addition to the function of inputting the control signal from the relay terminal board 62. Accordingly, the peripheral board 60 is configured to perform the input of signals from the external, whereas the relay terminal board 62, which inputs the control signal directly from the main board 60, is configured not to perform the input of signals from the external. Therefore, security is improved, thus providing the sound gaming machine.

[0112] Furthermore, in the Pachi-Slot machine 1 according to this embodiment, the first peripheral board 60a has the function of outputting a signal to the second peripheral board 60b that is other than itself, using the serial ports 82 and 92. Accordingly, as shown in FIG. 7, it is possible to make up a circuit configuration for outputting a signal from the first peripheral board 60a, which receives the control signal from the relay terminal board 62, further to the separate second peripheral board 60b.

[0113] Additionally, the aforesaid embodiment has described the case in which the peripheral board 60 includes two boards: the first peripheral board 60a and the second peripheral board 60b. Alternatively, the peripheral board 60 may be configured of one board or of three boards or more. Besides, the mode of connection thereof may be the mode in which the individual peripheral boards are connected in series from the relay terminal board 62, or the mode in which the individual peripheral boards are connected directly to the relay terminal board 62.

[0114] Furthermore, when a panel opening/closing monitoring unit that monitors opening/closing of the machine front panel 38 is provided to display on the liquid crystal display device 22, for example, an image indicating that the machine front panel 38 is in an open state, the peripheral board 60 is connected to the panel opening/closing monitoring unit via the transmission line. Thus, the configuration may be such that the peripheral board 60 receives a signal from the panel opening/closing monitoring unit, or such that the signal is transmitted and received between the peripheral board 60 and the panel opening/closing monitoring unit.

[0115] Besides, the aforesaid embodiment has described the case in which the relay terminal board 62 is used as the relay unit that, disposed between the main board 61 and the peripheral board 60, relays the control signal to be transmitted from the main board 61 to the peripheral board 60. Alternatively, the relay unit may be a specific peripheral board that performs the process of relaying the control signal to be transmitted from the main board 61 to the peripheral board 60, as an auxiliary process of the game process performed by the main board 61.

[0116] Furthermore, the relay terminal board 62, configuring the relay unit, and the specific peripheral board may be configured to have a predetermined additional function in addition to the function of relaying the control signal to be transmitted from the main board 61 to the peripheral board 60. The relay unit is allowed to have the predetermined additional function, thereby increasing the added value of the relay unit such as the relay terminal board 62 and the specific peripheral board.

[0117] In this case, the function of determining the pattern of the game effect performed by the image control microcomputer 81 of the peripheral board 60 may be adopted as the predetermined additional function. According to this configuration, the process of determining the pattern of the game effect is performed by the relay unit such as the relay terminal board 62 and the specific peripheral board. Therefore, a process load on the peripheral board 60 is reduced and the functions are placed at dispersed locations. The process load on the peripheral board 60 is reduced, thereby increasing the process speed of the peripheral board 60, so that an image display process, etc. are rapidly performed to the liquid crystal display device 22, thus enhancing the effectiveness of the displayed game effect. Moreover, the process load on the peripheral board 60 is reduced, thereby reducing the manufacturing cost of the peripheral board 60.

[0118] Besides, the function of checking an error of the control signal transmitted from the main board 61 to the peripheral board 60, using a communication check command BCC (Block Check Character), etc., may be adopted as the predetermined additional function. According to this configuration, the process of checking an error of the control signal transmitted to the peripheral board 60 is performed by the relay unit such as the relay terminal board 62 and the
Specific peripheral board. Therefore, the process load on the peripheral board 60 is reduced and the functions are placed at dispersed locations. Moreover, according to this configuration as well, the process load on the peripheral board 60 is reduced, thereby increasing the process speed of the peripheral board 60 and also reducing the manufacturing cost of the peripheral board 60.

[0119] Furthermore, the function of converting a serial control signal received from the main board 61 into a parallel control signal and transmitting the parallel control signal to the peripheral board 60 may be adopted as the predetermined additional function. According to this configuration, the process of converting the serial control signal received from the main board 61 into the parallel control signal is performed by the relay unit such as the relay terminal board 62 and the specific peripheral board. Therefore, the process load on the peripheral board 60 is reduced and the functions are placed at dispersed locations. Moreover, according to this configuration as well, the process load on the peripheral board 60 is reduced, thereby increasing the process speed of the peripheral board 60 and also reducing the manufacturing cost of the peripheral board 60.

[0120] Still furthermore, the function of supplying the peripheral board 60 with its operation power may be adopted as the predetermined additional function. According to this configuration, the need to connect a power supply line from a power supply to the peripheral board 60 is eliminated.

[0121] Still furthermore, the function of concentrating the transmission lines that provide connections between the main board 61 and the peripheral board 60 may be adopted as the predetermined additional function. For example, a plurality of the transmission lines extended from the main board 61 are concentrated into one transmission line. Thereby, the number of connectors, which are disposed in the peripheral board 60 and to which the transmission lines are connected, can be reduced, for example, from a plurality of the connectors to one. According to this configuration, it can be expected to reduce the risk of pulling out the transmission line connected to the peripheral board 60 and connecting a fraudulent board, which is used in conducting a fraudulent act, to, for example, one of the connectors of the peripheral board 60.

[0122] Still furthermore, the function of amplifying a voltage, etc. of the control signal sent from the main board 61 to the peripheral board 60 may be adopted as the predetermined additional function. According to this configuration, it becomes possible to cope with attenuation of the voltage, etc. of the control signal which occurs during communication between the main board 61 and the peripheral board 60, thus enabling an increase in the accuracy, appropriateness, etc. of the communication between the main board 61 and the peripheral board 60.

[0123] Still furthermore, the function of guaranteeing that the communication between the main board 61 and the peripheral board 60 is unidirectional (i.e., one-way communication from the main board 61 to the peripheral board 60) may be adopted as the predetermined additional function. According to this configuration, the need to cause the main board 61 to have the guarantee function is eliminated, thus making it possible to reduce the manufacturing cost of the main board 61.

[0124] Even when the Pachi-Slot machine 1 is configured with such individual configurations, the same effects as those of the aforesaid embodiment are yielded.

[0125] The aforesaid embodiment has described the case in which the gaming machine according to the invention is applied to the Pachi-Slot machine. However, similar to the aforesaid embodiment, the invention can also be applied even to another gaming machine including a main board that performs a game process that influences a game result and a peripheral board that performs an auxiliary process of the game process upon receipt of a control signal from this main board. Besides, the aforesaid embodiment has described the case in which the gaming machine according to the invention is applied to a medal insertion type Pachi-Slot machine. However, the invention can also be applied to a CR (card reader) type Pachi-Slot machine. The same effects as those of the aforesaid embodiment are yielded even when the invention is applied to such gaming machines.

[0126] Although the present invention has been explained in reference to the embodiments, it is apparent for those skilled in the art that many changes and modifications can be made without departing from the spirit and scope of the invention, as clear from the following claims.

What is claimed is:

1. A gaming machine comprising:
   a main board that performs a game process that influences a game result;
   a peripheral board that performs an auxiliary process of the game process upon receipt of a control signal from the main board; and
   a relay unit that, disposed between the main board and the peripheral board, relays the control signal to be transmitted from the main board to the peripheral board.

2. A gaming machine according to claim 1, wherein the relay unit is a relay terminal board that connects wirings in the gaming machine to each other.

3. A gaming machine according to claim 1, wherein the relay unit has a predetermined additional function in addition to the function of relaying the control signal to be transmitted from the main board to the peripheral board.

4. A gaming machine according to claim 3, wherein the predetermined additional function is the function of determining the pattern of a game effect to be performed by the peripheral board.

5. A gaming machine according to claim 3, wherein the predetermined additional function is the function of checking an error of the control signal to be transmitted to the peripheral board.

6. A gaming machine according to claim 3, wherein the predetermined additional function is the function of converting a serial control signal received from the main board into a parallel control signal and transmitting the parallel control signal to the peripheral board.

7. A gaming machine according to claim 3, wherein the predetermined additional function is the function of supplying the peripheral board with its operation power.

8. A gaming machine according to claim 3, wherein the predetermined additional function is the function of concentrating transmission lines that provide connections between the main board and the peripheral board.
9. A gaming machine according to claim 3, wherein the predetermined additional function is the function of amplifying the control signal sent from the main board to the peripheral board.

10. A gaming machine according to claim 1, wherein the relay unit is a specific peripheral board that performs, as an auxiliary process, the process of relaying the control signal to be transmitted from the main board to the peripheral board.

11. A gaming machine according to claim 10, wherein the relay unit has a predetermined additional function in addition to the function of relaying the control signal to be transmitted from the main board to the peripheral board.

12. A gaming machine according to claim 11, wherein the predetermined additional function is the function of determining the pattern of a game effect to be performed by the peripheral board.

13. A gaming machine according to claim 11, wherein the predetermined additional function is the function of checking an error of the control signal to be transmitted to the peripheral board.

14. A gaming machine according to claim 11, wherein the predetermined additional function is the function of converting a serial control signal received from the main board into a parallel control signal and transmitting the parallel control signal to the peripheral board.

15. A gaming machine according to claim 11, wherein the predetermined additional function is the function of supplying the peripheral board with its operation power.

16. A gaming machine according to claim 11, wherein the predetermined additional function is the function of concentrating transmission lines that provide connections between the main board and the peripheral board.

17. A gaming machine according to claim 11, wherein the predetermined additional function is the function of amplifying the control signal sent from the main board to the peripheral board.

18. A gaming machine according to claim 17, wherein the peripheral board has the function of inputting a signal from the external in addition to the function of inputting the control signal from the relay unit.

19. A gaming machine according to claim 17, wherein the peripheral board has the function of outputting a signal to the peripheral board that is other than itself.