

[54] GOLF COMPUTER

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[51] Int. Cl. G05b 1/00, G06f 7/38, G06k 1/02

[58] Field of Search 235/151, 61.1, 92 GA, 156; 273/32, 62, 162 A, 77 R, 54 C; 340/323, 323 X; 92/26

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[57] ABSTRACT

The unit computes the handicap of a golfer from information corresponding to golf score and course rating entered on a punchcard. The machine performs its function by reading the information stored on the card and by using solid-state and electro mechanical devices to derive the handicap defined by the United States Golf Association. This handicap may then be permanently recorded on the punchcard and may additionally actuate a display panel. One embodiment of the invention provides the handicap by direct computation, while a second embodiment establishes the handicap by comparison with a memory table. Each arrangement, however, affords the advantages of almost instant computation, and with equal accuracy to that obtainable through pencil and paper computation.

8 Claims, 3 Drawing Figures

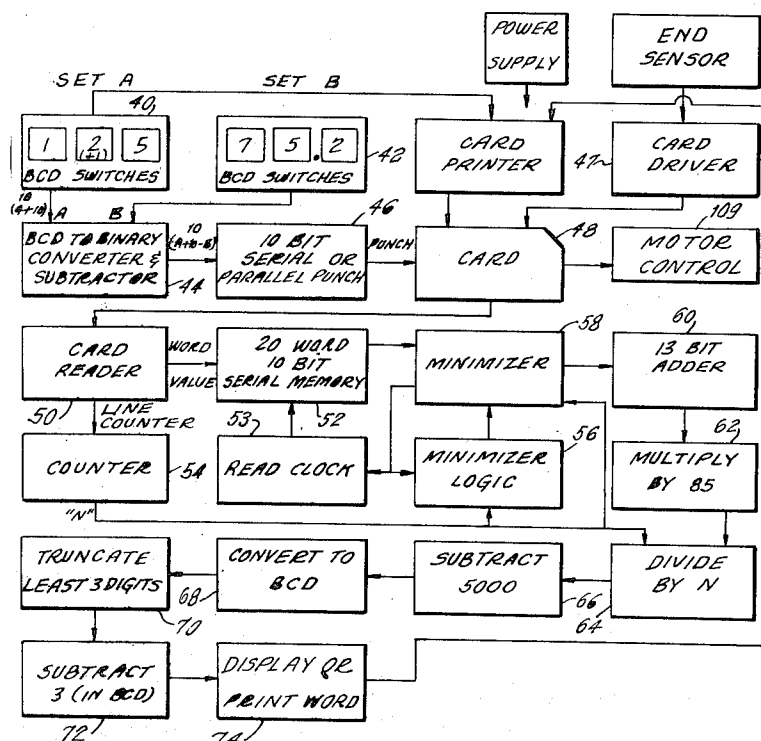
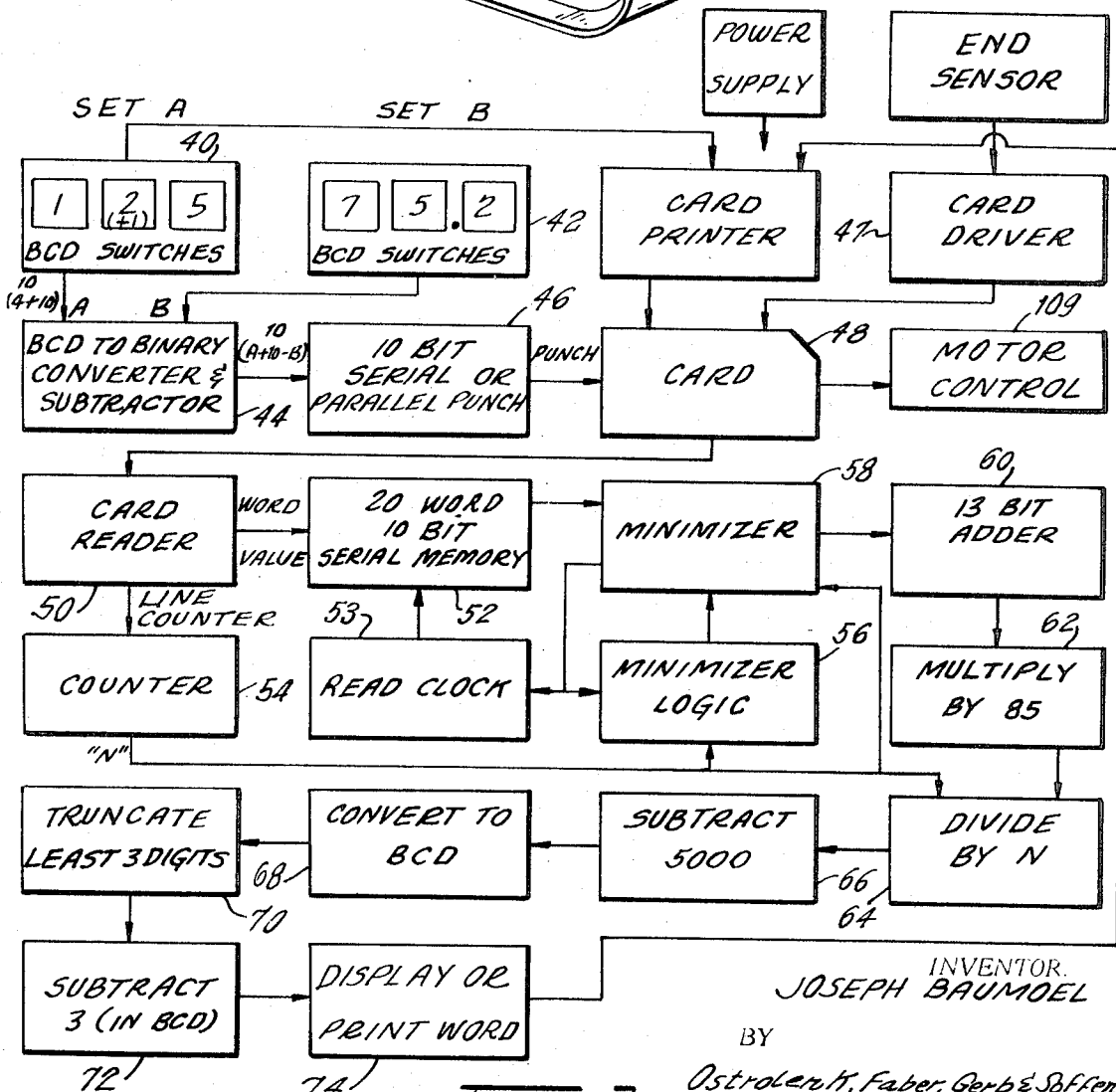
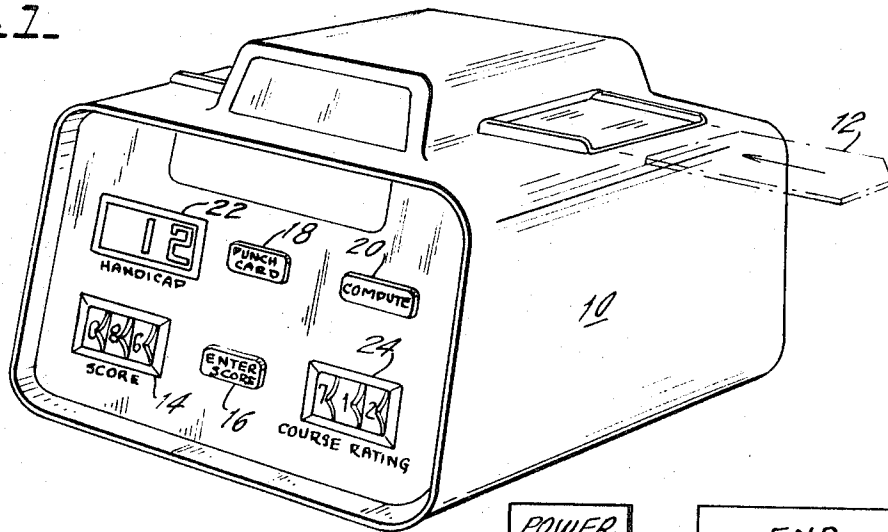


FIG. 1.



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FIG. 3.

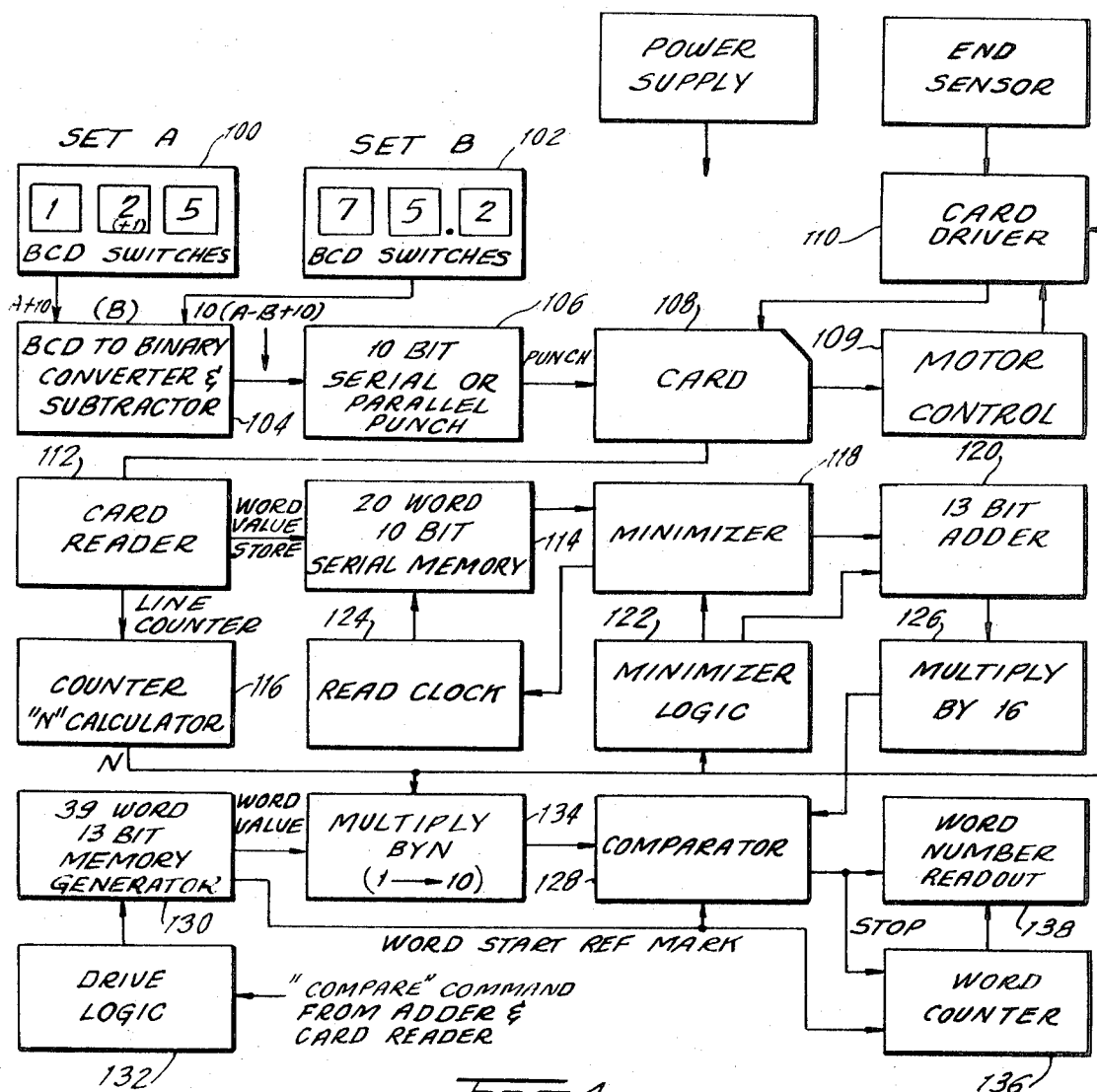
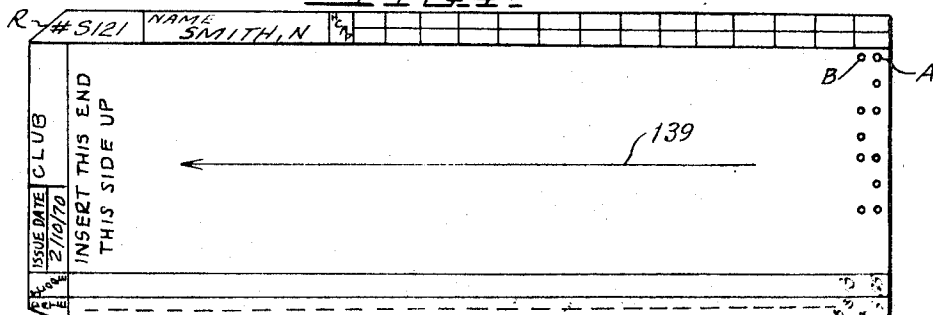


FIG. 4.



GOLF COMPUTER

The present invention relates to digital computers, in general, and to such a device for computing the handicap of a golfer, in particular.

It is well known that in computing a golf handicap, it is first necessary to determine the difference between gross score over the course in question and a rating depending on course difficulty (called a "differential"). To determine the handicap as defined by the United States Golf Association (USGA) for example it is then necessary to multiply the average of a certain number of differentials (determined by the number of rounds played) by a factor of 0.85. A player's handicap is then this result adjusted to the nearest whole number.

As more and more rounds are played, a more accurate representation of a golfer's handicap can be obtained, as his good and bad rounds tend to offset one another. Low handicap golfers are more proficient at the sport than high handicap golfers, and produce gross scores closer to par. These handicaps are generally used in match play competition as compared to medal play competition, where the winner of an event is determined not by the number of strokes taken, but by the total number of holes won. For example, in match play between a golfer having a handicap of 10 and another having a handicap of 18, the first would have to spot or give away to the second, 8 strokes for the round, usually divided up as 1 stroke for each of the eight most difficult holes on the course. The 18 handicap player would then "win" one of these eight holes if his gross score there equalled or bettered that of his 10 handicap opponent. The 18 handicap player, however, would only "win" the remaining 10 holes in an 18 hole match if his gross score on each of the holes bettered that of his opponent. As is known, the typical golf scorecard indicates the order of difficulty of the various holes in numbers ranging from 1 to 18 (for an 18 hole course) or from 1 to 9 (for a nine hole course), with the more difficult holes having the lower numbers, the number 1 representing the toughest hole on the course to par.

The practice prior to the development of the present invention has been for the secretary of the golf club to which a member belongs to sit down with pencil and paper and compute each member's handicap. Not only is such computation time consuming (as it must take into consideration the golfer's scores over a number of rounds), but oftentimes is subject to human error. Thus, it is not uncommon for the secretary to use wrong scores in his computation, or to make mathematical errors in the subtraction, division, and multiplication steps which follow before the actual handicap is determined. The computed handicaps are then posted in an accessible place (e.g., on a bulletin board adjacent to the locker room) for all golfers to see.

It is an object of the present invention to provide a digital computer for determining a golfer's handicap, and for providing such determination in less time and with accuracy at least equal to that which accompanies present computation methods.

It is also an object of the invention to provide such a computer which will produce a permanent record of differentials employed in computing the handicap and in indicating the handicap after each round played during the golfing season.

As will subsequently become clear, two embodiments of such computer devices are herein disclosed. The first arrangement computes the handicap by a direct method, comparable to that employed in pencil and paper techniques. The second arrangement determines the handicap by comparing computed quantities with a memory table. Each of these computer devices can be made of a small size and limited cost so as to permit its location at all golf courses, to enable immediate computation of new handicaps by players just completing a round of golf.

These and other objects of the invention will be more clearly understood from a consideration of the following description, taken in connection with the drawings in which:

FIG. 1 is a representational view of the digital computer unit of the present invention;

FIG. 2 is a block diagram of the digital computer of FIG. 1 for calculating golf handicap by a direct computation method;

FIG. 3 is a block diagram of the digital computer of FIG. 1 for calculating golf handicap by means of comparing calculated quantities with a memory table; and

FIG. 4 shows an illustrative punchcard arrangement for permanently recording golf differentials and the computed handicap.

DESCRIPTION OF THE COMPUTER OF FIG. 1

The golf computer 10 of FIG. 1 is an electronic unit using the same types of digital integrated circuit components as used in United States aerospace programs. The computer may be located in the "pro shop" or adjacent the locker room at a golf club or local golf course but, alternatively, may be utilized at a centralized computer station to which the golf scores are mailed. A punchcard 12 is shown in FIG. 1, being a permanent record of all differentials of an individual subscribing golfer from which his handicap is computed.

After completing a round of golf, the subscribing golfer simply inserts the card 12 into the computer 10 and sets the dial 14 to the score, and dial 24 to the course rating, for the round just completed. An input data button 16 is then depressed to enter the data into the computer 10, and a second button 18 is pressed to permanently record the data on the punchcard 12 in representational form, typically by a pattern of holes and spaces. A third button 20 is then depressed to instruct the unit 10 to compute the player's handicap according to USGA rules and to display it on the screen 22. The course rating setting 24 is usually set for the course at which the computer unit is located, but is adjustable so that the handicap can be computed for a game played at another course. Such ratings indicate the degree of difficulty of the course in question with increasing ratings being indicative of increasing course difficulty, based on course length, number of hazards, etc.

FIG. 1 shows the computer readout for a golfer who has just shot a round of 86 on an 18 hole course having a difficulty rating of 71.2. As noted, the handicap is 12, based not only on this round, but on others previously played and recorded on the punchcard.

DESCRIPTION OF THE COMPUTER OF FIG. 2

With the embodiment of FIG. 2, the entry of score and course rating data into the computer 10 results in the imprintation of a binary coded word, representative of the differential (score minus course rating) for each individual round of golf. The computer then computes the handicap therefrom according to the expression:

$$X = 0.85 (\sum N D / N) \quad (1)$$

where X equals the handicap, N the number of differentials according to Table I below, and $\sum N D$ equals the sum of the lowest differentials for a predetermined number of games played. As will become clear, this computation will be to the nearest integer, (i.e., the nearest whole number).

The number of differentials utilized in any computation is in accordance with the following table:

TABLE I

Rounds Completed	Differentials Used	
5	lowest	1
6	lowest	2
7	lowest	3
8 or 9	lowest	4
10 or 11	lowest	5
12 or 13	lowest	6
14 or 15	lowest	7
16 or 17	lowest	8
18 or 19	lowest	9
20 or more	lowest	10

Because it would be undesirable for the computer unit to deal with negative quantities in its computation, and because the possibility exists that the score of the round may be less

than the quantity representing the course rating, the computer unit of FIG. 2 is controlled to add 10 to the score. In addition, to prevent sign reversal of the handicap X (which is limited from +3 to -36), the decimal number 3 is added to the handicap and the handicap taken as positive. Furthermore, in order to simplify the machine's recognition of the correct handicap, the value 0.5 is added so that the handicap may be obtained by dropping all digits to the right of the decimal point, rather than by determining the integer to which the computed value is closest. These modifications lead to the formulation of a new expression for computing handicap, namely:

$$X + 3.5 = 0.85 \sum N \frac{(A + 10 - B)}{N} - 5 \text{ or} \quad (2)$$

$$1000 (X + 3.5) = 85 \sum N \frac{10(A + 10 - B)}{N} - 5000 \quad (3)$$

where A equals the score for the round, B equals the course rating and N equals the appropriate number of minimum differentials.

The following table shows the usefulness of this second equation where the 10 minimum differentials are as indicated, for a golf course having a difficulty rating of 75.1:

TABLE 2

Score	Course Rating	$A-B$	$\sum_{10} \frac{10(A+10-B)}{N}$	$X+3.5$	X
120	75.1	44.9	54.9		
120	75.1	44.9	54.9		
119	75.1	43.9	53.9		
121	75.1	45.9	55.9		
118	75.1	42.9	52.9		
117	75.1	41.9	51.9		
122	75.1	46.9	56.9		
113	75.1	37.9	47.9		
114	75.1	38.9	48.9		
115	75.1	39.9	49.9		
		428	528	39.88	36

Multiplying the total of column 3 of Table 2 by the number 0.85 according to expression (1) and dividing by the 10 differentials employed gives a computed handicap equal to 36.38. For a digital computer to perform the calculations of expression (1) to the nearest integer (i.e., nearest whole number), it would be necessary to include various comparator circuits to determine whether the decimal should be dropped or whether the result should be raised to the next higher number. Similar calculation according to expression (3), on the other hand, does not require such circuitry, but only requires multiplying the total of column 4 of Table 2 by 85, subtracting the number 5,000, and dividing by 1,000. After subtracting the number 3.5 from this result and dropping all digits to the right of the decimal point, it will be seen that the handicap also is 36. However, as will become clear below, these latter computations can be obtained in a simpler manner than could be obtained using comparator circuitry to find the nearest integer.

The following table is arranged similar to Table 2, and points out the usefulness of adding the number 3 so as to prevent sign reversal:

TABLE 3

Score	Course Rating	$A-B$	$\sum_{10} \frac{10(A+10-B)}{N}$	$X+3.5$	X
72	75.1	-3.1	+6.9		
70	75.1	-5.1	+4.9		
71	75.1	-4.1	+5.9		
78	75.1	+2.9	+12.9		
78	75.1	+2.9	+12.9		
73	75.1	-2.1	+7.9		
74	75.1	-1.1	+8.9		
75	75.1	-0.1	+9.9		
80	75.1	+4.9	+14.9		
69	75.1	-6.1	+3.9		
		-11.0	+89.0	2.565	0

As for multiplying the total in the third column of Table 3 by the 0.85 multiplication factor according to expression (1) above, it will be seen that the resulting handicap is -0.935. A more readily understandable handicap is determined according to expression (3), where after subtraction and dropping the digits to the right of the decimal point, it will be seen that the resulting number is the understandable number 0, or zero handicap. It will be apparent that a golfer having the scores of Table 3 and a zero handicap is a far superior golfer than the one having the scores of Table 2 and a 36 handicap. If these two golfers were engaged in a match over 18 holes, it would be readily apparent that the better golfer would have the give the poorer golfer two strokes on every one of the 18 holes. As will now be described, the block diagram shown in FIG. 2 represents that portion of the computer which processes the information in accordance with the third expression as given above.

DESCRIPTION OF THE COMPUTER OF FIG. 2

The score for the round (for example 125) is set on a three position binary coded decimal switch 40 (see also switch 14 of FIG. 1), corresponding in FIG. 2 to set A . The course rating (for example, 75.2) is similarly set into a second binary coded decimal switch 42 (see also switch 24 of FIG. 1), corresponding to set B in FIG. 2. The "data enter" button 16 of FIG. 1 is depressed to enter the score and rating in the computer unit, whereby one digit is added to the tens position of the A value (or subtracted from the B value) by appropriate switch construction, and both the A and B values are multiplied by 10 in order to clear the decimal point from the B value. These informations are then fed to a binary coded decimal-to-binary converter and subtractor unit of typical design 44 which provides a binary output of the form $10(A+10-B)$. This binary word output is coupled to a 10 bit serial or parallel punch 46, which records (i.e., punches) the binary word on a punchcard 48 by means of an appropriate pattern of holes and spaces. Such card punching is controlled by the button 18 on the unit of FIG. 1, which is made effective only if the enter data button 16 has been previously depressed.

In order to compute the golf handicap, the "compute" button 20 of FIG. 1 is then depressed. The machine traverses (by means of a motor control 109 and card driver 47) and passes the punchcard 48 under an optical card reader 50 so that the pattern of holes and spaces representing scores for the last 20 games is read and stored in a 20 word, 10 bit serial memory bank 52. The machine also notes the number of scores entered in a counter device 54, which scores, as was previously noted, may number less than 20 and, for that case, the counter 54 instructs the minimizer logic 56 (to be described below) as to the appropriate number of differentials which should be selected for computation from those words stored in the 200 bit capacity memory bank 52. Thus if only 10 or 11 scores have been entered in punchcard 48, the appropriate number of words selected for analysis by the logic circuit 56 would be 5. (See Table 1). A minimizer unit 58 then processes the words in the memory bank 52 so as to select the appropriate number of minimum words (i.e. lowest differentials) for transfer to an adder 60 of 13 bit capacity.

The output of the adder 60 is multiplied by 85 in an appropriate multiplier unit 62, with the output being fed to a divider stage 64, where division by N , the number of words transferred, is performed. The output of the divider stage 64 is then coupled to a subtractor stage 66 where the output is reduced by 5,000 in binary form before being converted back to a binary coded decimal format in unit 68. Since, in accordance with expression 3 above, it is necessary to divide by 1,000 and to drop the remainder of an integer, the output of the binary coded decimal unit 68 is coupled to a truncate-by-3 digit component 70. The output from this unit 70 is then reduced by 3 in a subtractor stage 72, with the stage 72 then directing a word printer 74 to automatically print its own output on the punchcard 48 or to alternatively drive a numerical

display, as shown in FIG. 1. This print out or display information represents the calculated handicap.

A golf computer constructed in accordance with the foregoing arrangement may take up approximately one-fourth cubic feet of space. Solid state computer circuitry, binary coded decimal and decimal operative devices may be employed, and will be capable of recording sufficient information to establish permanent verification of handicap. Such an arrangement as described can provide computation in less than 5 seconds with great accuracy, and will operate on ordinary 115 volt, 60 cycle power.

Before considering the minimizer logic circuitry 56 of FIG. 2, the memory table type of computer will be described as it employs a similar type logic construction.

DESCRIPTION OF THE COMPUTER OF FIG. 3

As was previously noted, the basic equation to be solved in determining a player's handicap is:

$$X = 0.85 (\sum N D/N) \quad (1)$$

This expression states the proposition that handicap is computed by summing the appropriate number of differentials (N) of game score A minus course rating B , averaging this sum over the number of rounds summed and multiplying the results by 0.85 in accordance with United States Golf Association rules. The result of this computation x , is then examined to determine the nearest integer X , which will be the handicap. Performing these steps for a golfer having the scores as listed in Table 2 above, it will be seen that x is 36.38 while the nearest integer X represents a handicap of 36.

To best use the memory table computation technique, it has been found that rearrangement of the basic equation is desirable. After rearranging terms, and noting that the score for a round could be less than the course rating—an undesirable feature for the previous computation, but one which could be overcome by adding the number 10 to each value of A minus B —expression (1) can be altered to:

$$\frac{X}{0.85} + 10 = \sum N \frac{(D+10)}{N} \quad (4)$$

or

$$\frac{XN}{0.85} + 10N = \sum N(A-B+10)$$

Since course rating will usually be given in tenths, (e.g., 75.2) expression (4) can be modified still further so as to eliminate the decimal, thusly:

$$\left[\frac{XN}{0.85} + 10N \right] 10 = \sum N 10(A-B+10) \quad (5)$$

However, it will be recognized that there exists a value of x which is associated with the transition point of the handicap X from one value to the next higher value—such as from $X=1$ to $X=2$, or $X=3$ to $X=4$, etc. This value is $x_t = X_H - 0.5$, where X_H is the higher value of X . (In the first example given above, the transition point x_t for the handicap $X=37$ represents the number 36.5). It will be appreciated, therefore, that a table may be established for all transition points, merely by setting x to all anticipated transition values (0.5, 1.5, 2.5, etc.) along one side of the table and by setting the sums of the differentials A minus B —together with the increased value of 10 to cover instances where course rating exceeds game score—along the other side of the table.

It has been found for convenience to establish just such a table for the value $N=10$ and to then modify the solution by multiplying the resulting table by the fraction $N/10$ where N , the number of minimum rounds analyzed, are less than 10. A general solution might then be given as:

$$Nt/10 = AM_N 10(A-B+10) \quad (6)$$

where

$$t = (100x/0.85) + 1,000 \quad (7)$$

Rearranging these terms, expression (6) may be reformulated as:

$$Nt = 10 \sum_N 10(A-B+10) \quad (8)$$

Because the computation is here envisioned as being accom-

plished on a digital computer where 10 represents an inconvenient binary multiplying number, both sides of expression (8) immediately above can be multiplied by 1.6 to give the following expression:

$$N(1.6t) = NT = 16 \sum_N 10(A-B+10) \quad (9)$$

(where T is the table value) which is more easily workable by the computer units.

This equation (9) can be interpreted as follows: given a sum $\sum_N$, a knowledge of the number of minimum words (i.e., rounds taken into consideration), and a table T for all possible sums corresponding to transition points of X based on $N=10$, it becomes possible to compute the handicap X , merely by determining between which table values the sum $16 \sum_N 10(A-B+10)$ lies. The handicap X is the table value just below this sum. Thus, establishing a table according to the above where the number Y represents the transition point where the handicap X goes from say 34 to 35 and the number Z where the transition point goes from the handicap 35 to 36, it will be apparent that any value falling between these two, provides the handicap by comparison with this memory. As will be seen, the handicap corresponds to the address value of the table which corresponds to the lower transition point sum, namely Y .

Review of expression (9) points out the need for storing number value $10(A-B+10)$ for each round of golf on the player's permanent card. After each round, therefore, the card will be inserted by the player or other score keeper into the computer unit and the A and B switches 100, 102 (see FIG. 3) appropriately set to represent the score and course rating respectively. Setting the A and B switches in this manner provides binary coded decimal inputs of $A+10$ and B , (or A and $B-10$) respectively to a binary coded decimal to binary converter and subtractor unit 104, which converts these information inputs to binary form representing the value $10(A-B+10)$. An output signal representing this value is developed by the converter and subtractor block 104 and is then coupled to a 10 bit serial or parallel punch 106. Punch 106 may include, for example, 10 solenoid operated punches, which on command, form a hole and space pattern in a punchcard 108 to occupy a line approximately one-eighth inch in height across the width of the card. Subsequent scores can be entered adjacent to the last line entered until the card is filled. As will be apparent, by depressing the button 18 of FIG. 1, the command to cut the hole pattern is given.

Assume, now, that the punch card 108 has received at least five entries, corresponding to five rounds of golf being played, so that, according to Table I, a handicap can be computed. In response to depression of the compute button 20 of FIG. 1, a card driver unit 110 is activated to advance the card 108 under a card reader element 112, which reads and stores in a 20 word 10 bit serial memory unit 114, the patterns of holes and spaces for each line of punches starting with the most recently entered line. These holes and spaces in the punch card 108 respectively represent the binary values 1 and 0 of the binary word value for $10(A-B+10)$ and are stored in the serial memory 114, which is selected to have a 20 word capacity so as to be capable of storing a total of 200 bits. The card reader 112 also reads the number of words available on the card (the number of lines of punch information) and, in conjunction with a counter unit 116, provides an output representing the appropriate number of minimum words according to the Table I set forth above. This minimum number of words is represented by the letter notation (N) of the expression $NT=16 \sum_N 10(A-B+10)$.

Once the card reader 112 recognizes that either 20 words have been read and stored in the serial memory 114 or that the end of the card has been reached, the unit 112 is disabled and the minimizing process begins. Assume, for example, that 20 words have been read by the unit 112 and have been stored in the serial memory 114. According to Table I above, the minimizer 118 requires that the 10 minimum words (i.e., the 10 minimum $(A-B+10)$ differentials) be selected and forwarded to an adder module 120. In operation, the minimizer logic unit 112 supplies a 10 bit word of value 1 to the

minimizer block 118, to which a read clock 114 sequentially feeds the 20 10 bit words from the serial memory 114 where each is in turn compared to the value 1. If any of the 20 words are of value 1, a comparator included in the minimizer unit 118 is rendered operative to cause the value 1 to be transferred to the 13 bit adder 120. After processing each of the 20 words, in turn, the minimizer logic unit 112 is arranged to present the value 2 as a 10 bit word to the minimizer 118.

The read clock unit 124 then repeats its previous function of sequentially presenting the 20 words stored in the memory 114 to the minimizer circuitry 118, which again transfers any word of value 2 to the 13 bit adder 120. If no word of that value is stored in the memory, no transfer to the adder 120 will be made, but if two or more words have the same value, all will similarly be transferred to the unit 120. This process continues with ever increasing word value being supplied to the minimizer 118, and continues until as many words have been transferred to the adder 120 as correspond to the number N computed by counting the number of available words. As noted above, for 20 words received and stored in the serial memory 114, 10 minimum words will be generated corresponding to the 20 available memorized words. In this manner, the 10 differentials of lowest value representing game score less course rating will be supplied to the 13 bit adder unit 120.

The 13 bit adder 120 is conditioned to add in binary form the total number of minimum words transferred to it. The output of the adder 120 is coupled to a multiplier type unit 126, which multiplies the binary sum by 16, and provides an output representative of the product to a 17 bit comparator 128. For ease of discussion, it will be assumed that handicaps of +3 to -36 are obtainable as a printout (and/or display) for the computer unit in question. A 39 word 13 bit memory or table generator 130 is therefore provided, with each word corresponding to the 39 levels of transition applicable, corresponding to the 40 permissible values for the handicap.

The output of the memory generator 130 is controlled by table logic circuitry 132 to develop these words in response to depression of the "compute" button 20 of FIG. 1, and to provide these words to a multiplier unit 134. This unit 134 also has as an input, the signal developed by counter 116 representative of the number of minimum words N used in the computation. Each 13 bit word developed by the memory generator 130 is therefore multiplied by N in the unit 134 to be provided as the second input to the comparator 128, noting that after multiplication by N , a 17 bit word is developed. The first transition word generated by the unit 130 corresponds to the handicap +3 and is multiplied by N for comparison with the multiplied input from adder 120. At the same time, the word counter 136 indicates the total to correspond to that +3 value. If the left-hand input to comparator 128 exceeds the right-hand input, the memory unit 130 provides a second transitional word corresponding to the handicap +2 for a new comparison to be made. In response, the word counter 136 advances to +2. This process continues until the left-hand input to the comparator 128 exceeds the right-hand input from multiplier 126, at which time the word counter 136 is stopped by an output signal from comparator 128. This indicates that the proper value of handicap has been reached in that the transitional word from generator 130 multiplied by N exceeds the adder output multiplied by 16. The comparator signal simultaneously opens a readout gate in a word number readout unit 138, to permit the value of the handicap developed by the word counter unit 136 to be displayed on word number readout 138 (and/or printed if desired).

As will be readily apparent, the golf computer above described may be fabricated using integrated circuit components, such as transistor-transistor logic, diode-transistor logic or MOS circuit chips. With such units, the cost of the device can be kept low and the unit can be of compact design. With these units, in addition, handicap computations can be made fast, simple and accurate. In this manner, the golf computer described greatly increases the number of players and

golf clubs who can benefit from application of United States Golf Association handicap rules.

FIG. 4 illustrates the form of a punchcard may take for use with the computer device of FIGS. 2 or 3. As indicated, the punchcard is intended for insertion into the device in the direction shown by arrow 139, with the clipped corner R serving as a guide to assure proper orientation on insertion. The card is so arranged that information as to the score of the round completed can appear along the bottom margin, with handicap information being obtainable along the top margin and with various indentifying matters being located at the left-hand edge.

Also shown in the punchcard of FIG. 4 is a pattern of holes and spaces providing indication of the sum $10(A+10-B)$ in binary form for each round played being arranged vertically. Thus, binary hole patterns for rounds of 125 and 118 played on a course of 75.2 difficulty rating are indicated, with column A showing the pattern for a March 15 round and Column B showing the pattern for a March 18 round. The motor control unit 109 of FIGS. 2 and 3 operates to automatically control advancement of the card so that each new line of data is punched in proper position. One way of accomplishing this is by using an optical sensor to find the previous line of data (or the end of the card for the first line) to command the stop action. In one construction of the punchcard of FIG. 4 the back side of the card was constructed of a black plastic material to insure its opaqueness.

Although there has been described a preferred embodiment of this novel invention, many variations and modifications will now be apparent to those skilled in the art. Therefore, this invention is to be limited, not by the specific disclosure herein, but only by the appending claims.

I claim:

1. A digital computer for determining a golfer's handicap with respect to a selected standard of proficiency, comprising:
 - first settable means for generating electrical signals representative of the gross score A posted by a player over a completed round of golf in accordance with the setting of said first means;
 - second settable means for generating electrical signals representative of the course rating B for the golf course at which the completed round of golf has been played, in accordance with the setting of said second means;
 - third means coupled to first and second means for generating intermediate signals representative of the value $10(A+10-B)$ which represents a differential value;
 - card means for storing binary coded representations of differential scores;
 - means for receiving said card means;
 - means coupled to said third means for punching the differential value generated by said third means into said card means;
 - fourth means for generating first output signals representing the sum of selected ones of the differential values contained in said card means, said fourth means including means for generating a second output signal representative of the number N of differential values summed, with N being an integer at least equal to 1;
 - and fifth means coupled to said fourth means for generating an output representing the golf handicap to the nearest whole number.
2. The digital computer of claim 1 wherein said second means generates the signal information B in binary coded decimal fashion to the nearest tenths and wherein said third means includes means for multiplying the signals representing the expression $(A+10-B)$ by a decimal factor of 10 to provide intermediate signal information in whole numbers only.
3. The digital computer of claim 2 wherein said first and second means each provide signal information in binary form and wherein one of said first and second means includes means for adding a decimal factor of 10 to its set value to provide intermediate signal information of a positive quantity only.

4. The digital computer of claim 3 wherein said fourth means includes logic circuitry for counting the total number of differential values stored in said card means and for directing the summation of the *N* lowest values of 10 (*A*+10−*B*) in response thereto according to the following table:

Total Number of Rounds Completed	<i>N</i> Lowest Values Summed
6	1
6	2
7	3
8 or 9	4
10 or 11	5
12 or 13	6
14 or 15	7
16 or 17	8
18 or 19	9
20 and above	10

5. The digital computer of claim 4 wherein said fifth means includes: first logic circuitry for generating signals which represent the multiplication of said first output signal by a predetermined factor *C*; second logical circuitry for generating signals which represent a division of the output of said first logic circuitry by *N*; third logic circuitry for generating signals representing a modification of the output of said second logic circuitry in accordance with the expression:

$$1000 (X + 3.5) = C \sum N \frac{10(A + 10 - B)}{N} - 500$$

where *X* = the golf handicap indication to the nearest whole number; *C* = a factor established by golf association rules, and is 85 when handicap is to be determined in accordance with United States Golf Association standards where handicap is based on 85 percent of a player's golf average over a minimum number of five rounds; 3.5 = an added sum to prevent sign reversal of the handicap in the computation and to enable the obtaining of handicap by dropping the least significant decimals of the computation; and $\sum_N 10(A+10-B)$ = the total of the *N* lowest values of 10 (*A*+10−*B*) summed by direction of said fourth means.

6. The digital computer of claim 4 wherein said fifth means includes logic circuitry for storing a plurality of values each being of a magnitude so as to lie between successive whole number sums of differential values over the range of possible differential values, and means for sequentially comparing said stored values against the output of said fifth means for generating a golf handicap indication as soon as the output of one of said stored values exceeds the output of said fifth means.

7. The digital computer of claim 1 wherein there is also included sixth means responsive to said fifth means to provide a visually readable indication of the handicap so computed.

8. The digital computer of claim 7 wherein said card means includes a punchcard having a punched pattern representative of the player's differentials and wherein said punching means is responsive to the entry of the last golf score and course rating indications to provide a punched pattern in said punchcard representative of the player's differential as of completion of his latest round of golf.

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