Consistency - The SFMS Solution

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Consistency is the most important word in a golfer's vocabulary. Of course, positive consistency being preferred; negative consistency being avoided. The focus of this work will be directed to accomplishing positive consistency via the equipment route, namely by citing the benefits of the Single Frequency Matching System (SFMS). The plan is to clarify the definition of frequency, touch on some history, take a look at the two frequency concepts, comparisons of these concepts, SFMS testing of golfers, telephone survey data, and a conclusion.

Frequency Definitions

In order to verify that author and reader are on the same page, let us take a look at some definitions of "frequency."

The *New Webster's Encyclopedia Dictionary* defines frequency as "the state of being frequent," i.e. often happening, repeating or occurring at short intervals.[1]

The *Encyclopedic Britannica Library 2003* has the following definitions: "the number of repetitions of a periodic process in a unit of time; the number of times that a periodic function repeats the same sequence of values during a unit variation of the independent variable; in matters of physics, the number of waves that pass a fixed point in unit time, i.e. the number of cycles or vibrations undergone during one unit of time in periodic motion. A body in periodic motion is said to have undergone one cycle or one vibration after passing through a series of events or positions and returning to its original state."[2] It is this physics-related definition that effectively allows frequency to be an accurate measurement by which to calibrate golf club stiffness, or flexural rigidity.

The definition used by Iso-Vibe Inc. in reference to their concept of single frequency matching golf clubs to the golfer (SFMS) is "..... Frequency is a dynamic (in motion) measurement of shaft flex stated in terms of cycles per minute (CPM) of vibration when the butt end of the shaft is held firmly in a clamp. The higher the frequency, the stiffer the shaft."[3]

Historical Background of Frequency Matching Concepts

"The search for the perfectly matched set of golf clubs has been going on for many years, probably in fact since the first time anyone considered a golf club."[4]

Although the process was not identified as the "frequency matching" of golf clubs, the early custom golf club makers who basically "whittled" golf club shafts out of hickory twigs were so doing. By scrapping and shaving the hickory shafts, little by little, and "feeling the effects" of the minor changes in the flex they were making as the process continued, a preferred "feel" was approached for the player. Often, the point of "best feel" was exceeded using this approach because the "best" may not yet have been achieved. This was a long, arduous task.

The intention of being able to manufacture golf clubs that both feel and respond the same for the player has been around for many years. This has been the ultimate search. This next section will be devoted to briefly examining the approaches of some pertinent patents which influenced the evolvement of the frequency concept:

> Prentiss: "It will be nearly always found that a player will have one club in his set of which he is particularly fond and in which he reposes the greatest confidence for the reason that he can consistently play that club successfully. According to one method in which I apply my invention, this club is taken as the base club and the physical characteristics of the other clubs are adjusted to this club as a standard so that all of the clubs may be played with the same facility as the base club."[5] Although this does not directly relate to frequency matching, there is an underlying hint that may implicate the concept.

> Stackpole: "Harmonizing" a set of golf clubs by taking the player's favorite wood and iron, plotting the coordinates of the "favorites" on a graph, and joining these coordinates to find out where all the other clubs in the set should fall.[6]

> Brandon: Claimed a correlation and coordination of shafts for matched sets of

golf clubs were relative to head weights and shaft stiffness; head weight was not included in formula.[7]

Murdoch: Clubs are "matched" by selecting for a given shaft length and club head weight, shafts of an appropriate frequency. Theory good; but doesn't allow for shaft inconsistencies.[8]

Marciniak: Clubs matched by moment of inertia.[9]

Kilshaw: The flexural rigidity of any club is not more than that of any longer club respectively.[10]

Kilshaw: American equivalent of the above London patent.[11]

Braly: Matching via gradient; gradient increases substantially equal.[12]

Braly: Method of producing a variety of golf club shafts from universal blank shafts of given length includes steps of determining actual natural frequency of blank shaft.[13]

Malloy, D.G. and Cook, E.H.: "A method of providing a golfer with a set of golf clubs .... having a preselected resonant frequency matched with the golfer ....."[14]

Cook, E.H.; Atkinson, M.A.: "To maintain a constant frequency, the flexural rigidity of the completed club must remain constant. Accordingly, within each set of clubs, the frequency must be the same. Hence, each club in the set of irons will have the same flexural rigidity and each club in a set of woods will have the same flexural rigidity. However, the flexural rigidity between the irons and the woods may not necessarily be the same."[15]

A major player in golf shaft production and concepts was Union Hardware (Royal Precision). They were the first company in the U.S. to manufacture steel golf shafts in 1924. In 1976, they became Brunswick Golf (Royal Precision) and launched the Chrome Vanadium shaft; Dr. J. Braly (Figure 1) begins the developing and patent process pointed at Frequency Matching by electronic calibration, straightens out the 'slope." In 1988, Brunswick (Royal Precision) produces the first filament wound composite shaft in the U.S. and patents Frequency Matched composite shafts. The late 1980's also saw Brunswick take True Temper to court for patent infringement of their FM Precision Matching System. Brunswick claimed that the True Temper Dynamic Gold matching system was basically their FM Precision matching system, and True

Temper had only changed the calibration of the system to make it different (Figure 2 and 3). True Temper ended up settling out of court with Brunswick to continue using the system. In 1996, an investment group purchases Brunswick Golf and rename it FM Precision Golf. 1997 saw FM Precision merge with Royal Grip to form Royal Precision, Inc.

Frequency Matching Concepts

From the information that was found in examining the patents, it may be concluded that there are two theories of frequency matching:

The Slope Method (SM): this method basically refines the traditional method of building golf clubs whereby the "frequency," or stiffness, of a golf club, when going from the longer clubs to the shorter clubs gets stiffer with the incremental stiffness between clubs attempting to be the same. This promotes a sloped straight line graph (Figure 4).

The Single Frequency Matching System (SFMS): this method proposes that **all** irons in the set be of the **same** frequency, and **all** of the woods be at a different, but related, **single frequency** matched to the individual golfer. This promotes a horizontal straight line graph (Figure 4).

Measuring Frequency

To accurately measure the frequency of a golf club, the butt end of the golf club, minus the grip, is clamped into a stationary device such as a vice. The clubhead end of the golf club is then "plucked" (oscillated). A stroboscope-like device reads, or measures, the number of "cycles" (oscillations) over a period of time, e.g. 300 cycles per minute (CPM). The higher the number of CPM, the stiffer, or more rigid, the flexibility of the golf club.

Slope Method and SFMS Comparisons

Ball position: The SM requires that the ball position for each club be changed to accommodate the differing frequencies involved, while the SFMS ball position remains consistent with the target heel for all clubs (Figure 5).

Body alignment: the SM requires that the "aiming line" point more and more to the left (for right-handers) of the "target line" as the clubs get stiffer, while the SFMS requires that the "aiming line" remains parallel to the "target line" for all clubs.

Ball striking: from the above information, the SM requires that the golfer must learn how to hit each individual club in the set, while the SFMS suggests that learning to hit any club in the set and you have learned how to hit them all equally well.

Matching what?: SM frequency batches golf shafts, whereas SFMS frequency matches a complete golf club.

Sameness: the only sameness in the SM appears to be the differences.

A familiar scenario: How many occasions can a golfer remember mishitting a shot, after the preceding shot with a different golf club was successful, being confident that the last swing they had made was close to being identical as the previous one? They are probably right. "To the contrary, good swing or bad, all golfers have a repeating swing."[16] The successful shot is a perfect example of an "in sync," "tuned in," or "matched" golf club responding to the dynamics of the player's swing, but the next "same" swing with the "unmatched" golf club didn't respond. Being creatures of habit, the last swing probably was close to being identical as the previous one, but .... the "unmatched" slope-line manufactured golf club was unable to respond the same as the previous swing. This scenario concludes that there is a very high chance that a large number of golfers blame themselves for mishits when, in fact, the equipment they are using doesn't allow repetition to be consistent with their swing dynamics. It becomes obvious that this is going to cause swing problems, i.e. attempting to fix a non-existent swing problems rather than an existing equipment problem.

For this same reason, golfers have a "favorite" golf club in their bag, a club that they are never afraid to use. This particular club is, or very close to, being the proper frequency required for their individual swing dynamics; all others being too soft or too stiff. Likewise, these "too soft or too stiff" golf clubs in their bag will intentionally be avoided because of the unsuccessful attempts to use them in the past.

"When shaft frequency is matched to the individual using the test clubs, it becomes quite obvious when the individual being tested reaches the frequency that suits his or her swing and no pattern related to age, size, or sex has so far developed."[17]

Two notes of interest: Over the years since Iso-Vibe Inc. Began (1982), it has been noted that the golfer's frequency will not change. However, what may change as the golfer ages is the weighting of the golf club or the distribution of the weight within the golf club.[18] Iso-Vibe Inc. have also experienced on several occasions that a child tested to the identical frequency of a parent.[19]

How does frequency relate to the golf swing? The human body has a built-in clock. If we take a moment to think about it, each of us will talk at the same tempo, walk at the same speed, write our name at the same pace, etc. unless there is an outside influence of stress and/or tension. There is a definite correlation between this "built-in clock" and golf swing "frequency;" both are time sensitive. It appears both reasonable and logical that if golf clubs were "in tune" with the "natural rhythm of the being" that the golfer's life on the golf course would be much more enjoyable.

Production Controls

Production control of the manufacture of golf shafts, of any material, to the tolerances demanded by the SFMS would be prohibitively cost-effective. Control of the shaft walls of a steel shaft when it is extruded, or rolled and welded, and the control of the chrome plating on the same shaft, or the control of the fibers and the epoxies in producing a graphite shaft, would be cost exorbitant. But the SFMS allows that shafts as presently produced can be readily matched cost-effectively to a plus or minus tolerance of one CPM, which relates to one-third of 1 percent when matching a golf club to 300 CPM. The tolerance range of standard production golf clubs (Figure 6) that are mass produced using the "slope" matching system is from 20-50 CPM using the Braly system, and 18-30 CPM using the Kilshaw system. A random testing of one case of blank "S" steel iron shafts (300) had a frequency difference range of 30-35 CPM, while a case of blank "S" steel wood shafts (100) had a frequency difference range of 25-30 CPM. These shafts, all with the same label, are assumed to be the same, but as we can see, they are far being such.

The above scenario also applies to the production of golf club heads; costs would be exceptionally high to produce golf club heads to the tolerances required by the SFMS, but SFMS can work cost-effectively to their required tolerances with heads as they are presently produced.

With the above information taken into consideration, and from the information in the pertinent patents, the SM, in most cases, is assuming that shaft and club head tolerances in production are not important variables. Scientific validation of the SM is non-existent. The only feedback in favor of the concept that golf clubs get stiffer as they get shorter is that golf clubs have been made this way for so long that it must be right, and this sure does not appear to be a scientific conclusion.

Test Clubs and Testing

"The most essential ingredient of the Swing-Sync System (SFMS) is the set of preset test clubs ...."[20] This set of test golf clubs is able to quickly and efficiently determine the precise golf club frequency required by the player. The set is composed of six seven irons (numbered 1 - 6), six five irons (numbered 7 - 12), and eight drivers (#1 woods numbered 13 - 20). The characteristics of the clubs, such as length, swing weight, appearance, etc. are identical, with the only difference being shaft flexibility. The flexibility of the shafts within the seven iron, five iron and driver groupings are five CPM apart and are random labeled so the player is not able to predetermine the stiffness of the golf club that they are testing. It must be noted that, without the test set, it is virtually impossible to determine the required frequency for the player to the tolerance the SFMS demands.

The testing process is suggested as follows:

Start by having the player hit 2 - 3 balls with each of the seven irons.

By the process of elimination, the player's feedback will identify the ones that "feel" best, or better than the previous one, to eventually arrive at the "best one."

Repeat this procedure for the five irons. When the "best" five iron is found, the player will have identified the seven and five irons within five CPM, or less, 80 - 90 percent of the time; 65 - 70 percent of the time, the frequency of the seven and five irons selected will be identical.

Repeat the above procedure for the woods.

The experience of the testing process is an education in itself. This simple testing exercise quickly concludes that everyone, regardless of ability, who was able to swing a golf club could tell the difference between the effects and feel of golf clubs that were only five CPM apart, or less, in flexibility. In most cases, players have a larger range of frequencies in their golf bag (Figure 6) than the SFMS has in their entire test set.

SFMS User Survey

A telephone survey was conducted to acquire feedback from SFMS users. The criteria for candidate selection was as follows:

- a candidate must have purchased a complete set of irons and woods using the SFMS concept.
- an alphabetical/user ratio was used to determine a reasonable cross-section of candidates
- .the candidate resides in the Ottawa area for ease of contact for the survey.

Based on the above criteria, a total of 117 purchasers were attempted to be contacted, with 82 actually being contacted and completing the questionnaire. There were 17 that no contact was made, 5 who failed to return messages or voice mail, 10 phone numbers no longer existed, 2 had moved away, and 1 who hadn't used the clubs as yet.

A ten question survey (Figure 7) was formatted to take advantage of scoring the survey via the computer. Each question was designed to be answered with one of the following answers: Much Improved, Slightly Improved, No Change, Slightly Worse and Much Worse. A score of five was assigned to Much Improved, and descended to a score of one for Much Worse.

Some interesting survey data:

The survey scoring had a potential range from 10 to 50. The lowest score recorded was 30. This represented a female golfer who had never swung a golf club prior to having SFMS clubs made for her and had only used them twice; she had nothing to use as a comparison, and answered all questions as No Change (a score of 3).

There were eleven others who scored 36 - 39 (13.4%). Seventy golfers scored 40 or better (85.4%). The average score was 42.7 per candidate, or 4.27 per question (higher than Slightly Improved). There was not one question answered with a score of 1 (Much Worse) or 2 (Slightly Worse). The candidates tested ranged in skill ability from two golf professionals (score 47 and 48) to nine 40+

handicap golfers (scoring range: one at 30 as noted above, other eight at 38 to 44).

The distribution and ratios (Figure 8) for the combined Much Improved and Slightly Improved categories for questions 4 (76.9%), 8 (75.6%) and 9 (67.1%) were the lowest as the tested golfers felt new ball technology, lessons, and golf club head design and materials also contributed. The other seven questions ranged from 90.3% to 98.8% with an average of 95.8%. A combined overall average for all ten questions for the two combined categories was 89%.

As evidenced by the distribution and ratio data, the telephone survey concluded that the recorded results are overwhelming in favor of SFMS golf clubs benefiting the golfer's ability to play more consistent enjoyable golf. When golf clubs are allowed to respond consistently to the golfer's swing, motivation is stimulated and, therefore, confidence peaks (question #6 96.4%). As a result, confidence and consistency are now feeding off each other. No claim is made that everyone playing SFMS golf clubs will soon be on tour, but there is now the opportunity for the golfers to play to their potential.

The following are quotes from a promotional pamphlet used by Iso-Vibe Inc. about the SFMS:

"Make every golf club your favorite with the Swing-Sync Single Frequency Matching System that guarantees to improve your golf game."[21]

"The Iso-Vibe Inc. Guarantee. If, after playing a minimum of 30 rounds of golf

> in a period of not more than five months, using a new set of golf clubs that have been frequency matched to your swing using the Swing-Sync Frequency Matching System, you and your professional can verify that your game has not improved, Iso-Vibe Inc. will rebuild or replace your golf clubs as required to provide the originally guaranteed performance at no cost to you."[22]

Since 1982, when Iso-Vibe Inc. was formed, this guarantee has only been asked to be honored twice. The first time was by a gentleman who just wanted to try a "stiffer" set of clubs for ego reasons and he paid to have them rebuilt. He soon had them changed back to his tested frequency at his own cost.

The second person was a different story. After rebuilding his golf clubs three times because he was not satisfied with the results, Iso-Vibe Inc. found out from the three fellows that he played with on a regular bases that he was indeed playing better than he ever had. In fact, one of these fellows asked that we take the clubs away from him as he was continually emptying their wallets. This just happened to be a person that anything that was done would not be done to their satisfaction.

Conclusion

The ultimate goal: to achieve "positive sameness identified through feel" by having all golf clubs respond consistently for the player at the same time in the same location or position in the circumference of the swing arc with the same body alignment in relation to the target line and the aiming line.

If the golfer's golf clubs respond consistently to the dynamics of his/her swing, confidence becomes a" high" as was experienced in canvassing the candidates for the telephone survey. It was also noted in the body of this work that confidence and consistency feed off each other. The SFMS solution to responding to consistency and achieving the ultimate goal are accomplished with flying colors.

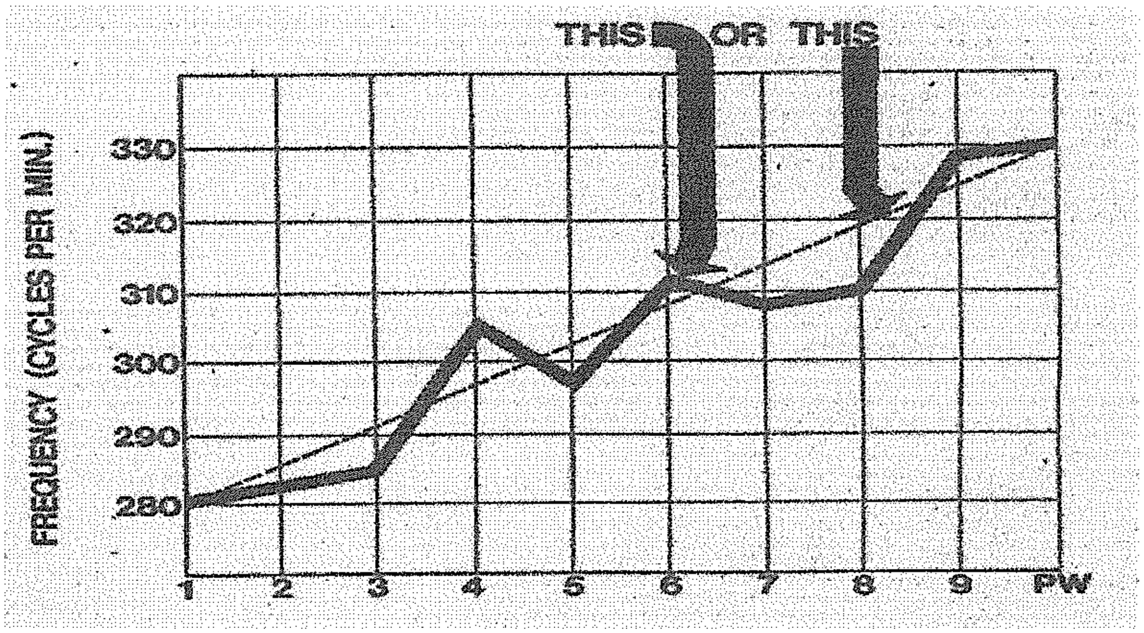

Figure 1

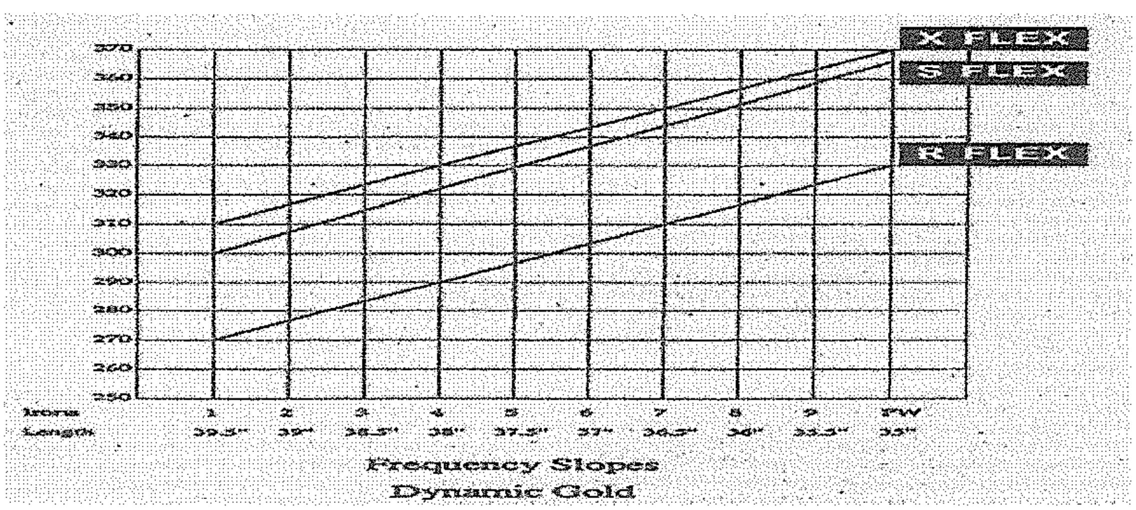

Figure 2

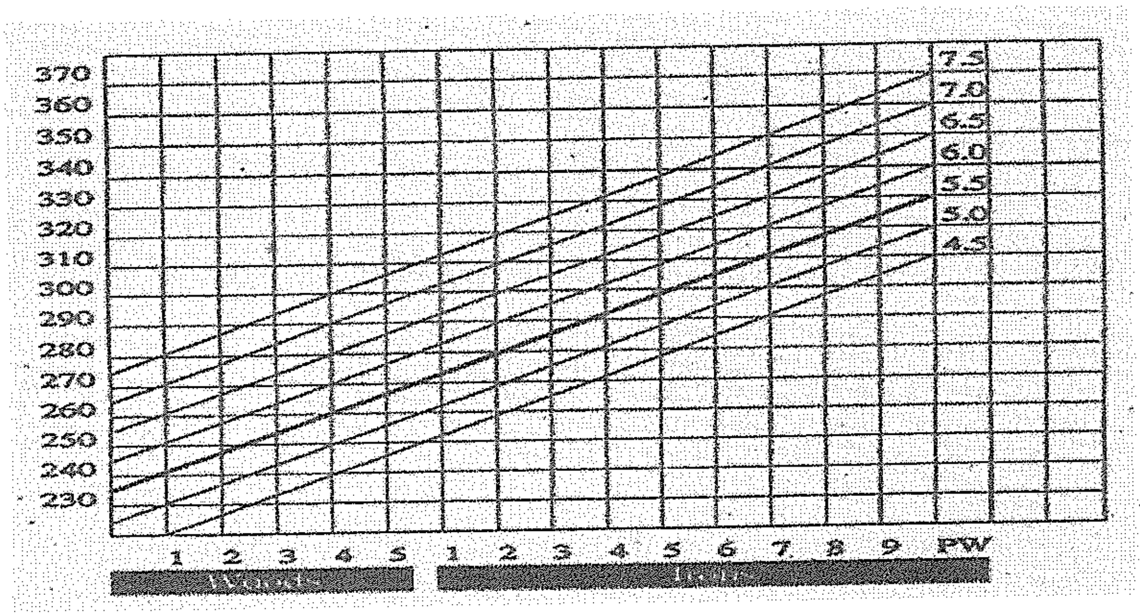

Figure 3

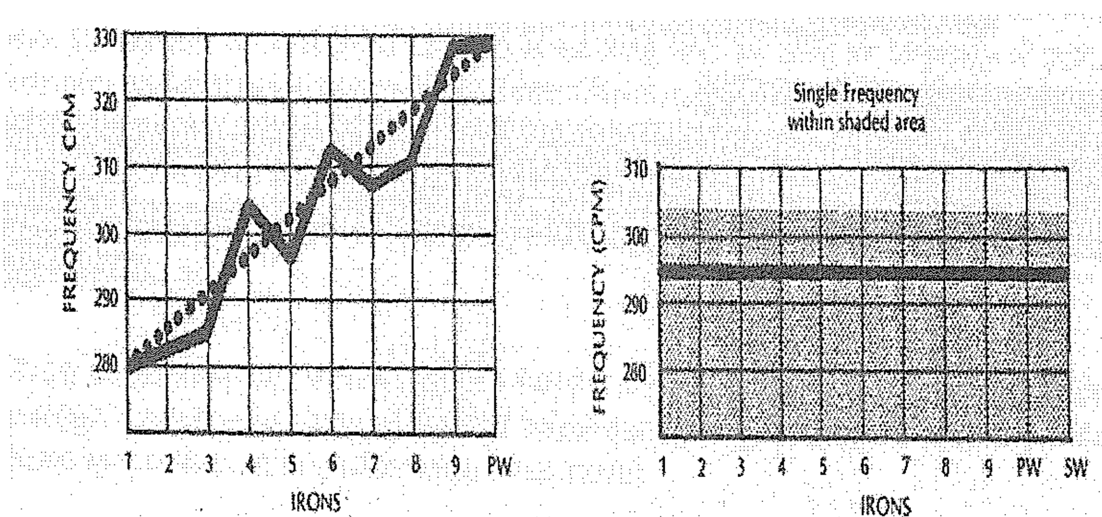

Figure 4

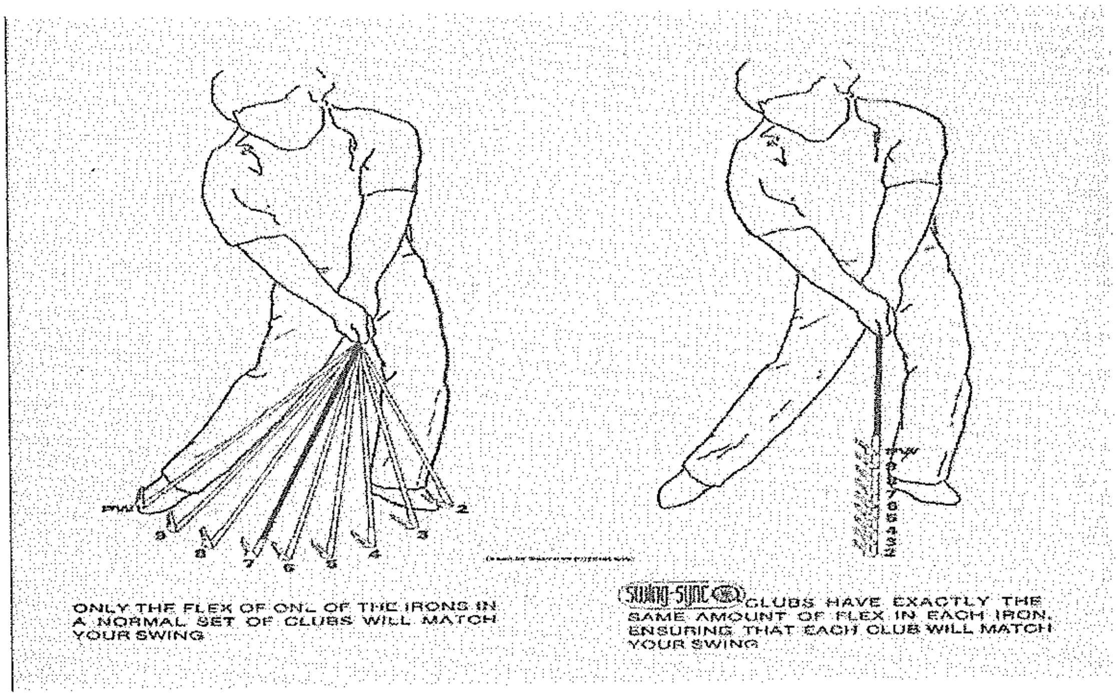

Figure 5

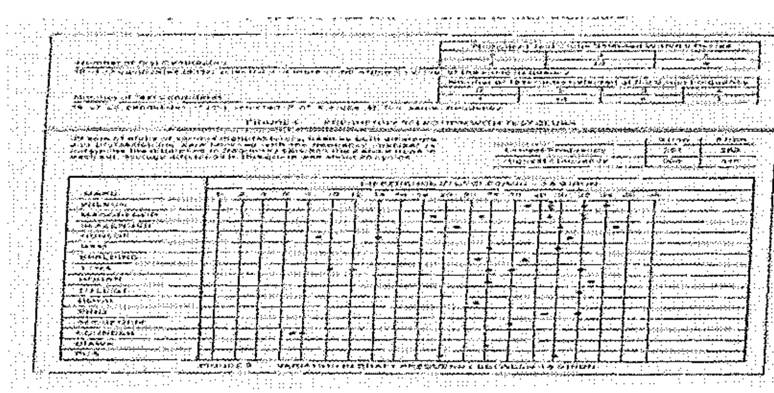

Figure 6

CPGA Masters Thesis Data

Telephone Survey Questionaire

Date Name

Hdcp Phone

In respect of the single frequency matching system ...	MUCH IMPROVED	SLIGHTLY IMPROVED	NO CHANGE	SLIGHTLY WORSE	MUCH WORSE
After the testing process, has your concept of the system improved?	☐	☐	☐	☐	☐
Has your ball striking improved?	☐	☐	☐	☐	☐
Has your accuracy improved?	☐	☐	☐	☐	☐
Has your distance improved?	☐	☐	☐	☐	☐
Has distance consistancy between clubs improved?	☐	☐	☐	☐	☐
Has your shot-making confidence improved?	☐	☐	☐	☐	☐
Has your ability to score better improved?	☐	☐	☐	☐	☐
Have your swing mechanics improved?	☐	☐	☐	☐	☐
Has your ability for swing-error correction improved?	☐	☐	☐	☐	☐
Generally, is the playability of SFM clubs improved over non-SFM clubs?	☐	☐	☐	☐	☐

Figure 7

Distribution	Much Improved	39	39	39	19	20	49	30	16	5	53
	Slightly Improved	41	42	41	44	54	30	47	46	50	26
	No Change	2	1	2	19	8	3	5	20	27	3
	Slightly Worse	0	0	0	0	0	0	0	0	0	0
	Much Worse	0	0	0	0	0	0	0	0	0	0
	Total	**82**	**82**	**82**	**82**	**82**	**82**	**82**	**82**	**82**	**82**
Ratio	Much Improved	47.6%	47.6%	47.6%	23.2%	24.4%	59.8%	36.6%	19.5%	6.1%	64.6%
	Slightly Improved	50.0%	51.2%	50.0%	53.7%	65.9%	36.6%	57.3%	56.1%	61.0%	31.7%
	No Change	2.4%	1.2%	2.4%	23.2%	9.8%	3.7%	6.1%	24.4%	32.9%	3.7%
	Slightly Worse	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Much Worse	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Figure 8

ENDNOTES

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7 Brandon, T.O. US Patent #2,822,174 February 4, 1958.

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