Hello *********,

Hope all is well. As we discussed, I have spoken with the chief engineer of Scientific Games in regards to the operation and integrity of the I-Deal Shuffle Machine. NOTE the entries highlighted in Green.

Extract From the I-Deal Plus Shuffle Manual

2.0 Principles of Operation:

The I-Deal Plus Single Deck Shuffler forms and delivers sets of random cards to be used in poker game variations such as Let It Ride®, Three Card Poker®, Four Card Poker®, Pai Gow Poker, Caribbean Stud Poker®, etc. Two decks of cards are required (usually with different-color backs) to utilize the shuffler most effectively for game play; while one deck of cards is in play, the other is being shuffled. Cards from a deck are randomly placed into compartments to form poker hands for the players and the dealer. Discards are placed in separate compartments to be unloaded after the player and dealer hands. At the beginning of each cycle, the random number generator (RNG) assigns a compartment number for each card of the first un-shuffled deck. The shuffler then places the corresponding card into the assigned compartment, producing random sets of cards based on the number of cards per hand. Discards are placed in separate compartments. The dealer places the second deck into the Input Tray and then presses the green button. The hands of the first deck are randomly unloaded. Discard slots are always unloaded last. The decks are not intermixed within the shuffler. Shuffling of the next deck does not begin until all of the cards of the previous deck are delivered into the Output tray. Cards are counted as they are shuffled in. The shuffle is aborted when the proper number of cards are not present. The I-Deal Plus Single Deck Shuffler includes a Front Display that presents game-specific animation, pay tables and the configurable minimum and maximum bet limits for the selected game and table.

IDEAL SHUFFLE MACHINE

They always read the playing cards first, then shuffle afterwards. These are two distinct and separate processes. The playing cards cannot be viewed while shuffling or assigning to shelfs or while dealing. The machine does not know the playing cards dealt to any player.

- **FIRST:** They read the cards to verify that all the cards that are required for the game being dealt are present. In this way they can verify that there are no extra, missing or unknown cards.
- The cards individually pass over the camera and are verified against a known image library of the casinos' actual cards.
- If any cards are missing, extra or unknown, the shuffler will **"Red Light"** and not allow the game to be played.
- If this occurs, the shuffler will only allow you to empty it so that the cards can be physically checked
- After the cards have passed over the camera – they are then randomly shuffled with no reference to the actual value of the card
- In the I-Deal plus there is a wheel where cards are randomly distributed around the wheel on shelfs to create hands which are then randomly dealt out…No connection to the camera.
- In this way they can guarantee that prior to any card being dealt they do not know any cards' location or hands composition
- It is impossible to change the random order or to specify the order of the cards in the shuffling process
- This is by intentional design and verified by regulation to satisfy Regulatory Approvals…Because;

All our shufflers have a **"Checksum Feature"** on start up where the first thing the shuffle machine does is to verify the software's integrity. If it detects even a single byte of information that is different to its' approved software it will go into a 'Seed RNG Mode' which disables the shuffler completely and it cannot be used.

********, the "Checksum Feature" mentioned above is what protects the software from being tampered with. However, it is highly unlikely (next to impossible) that anyone could tamper with the program in an I-Deal Shuffle machine without being detected.

UPDATE:

In regards to a YouTube video which shows a Rigged Shuffle Machine…It is correct, meaning that it is possible for someone to build a shuffle machine which could assign specific cards to specific hands.

Pictured below is a card shuffler designed to allow any "Called For" cards to be dealt in any Called For Hand in any game…(One Function is Legal – No Function Is Not)
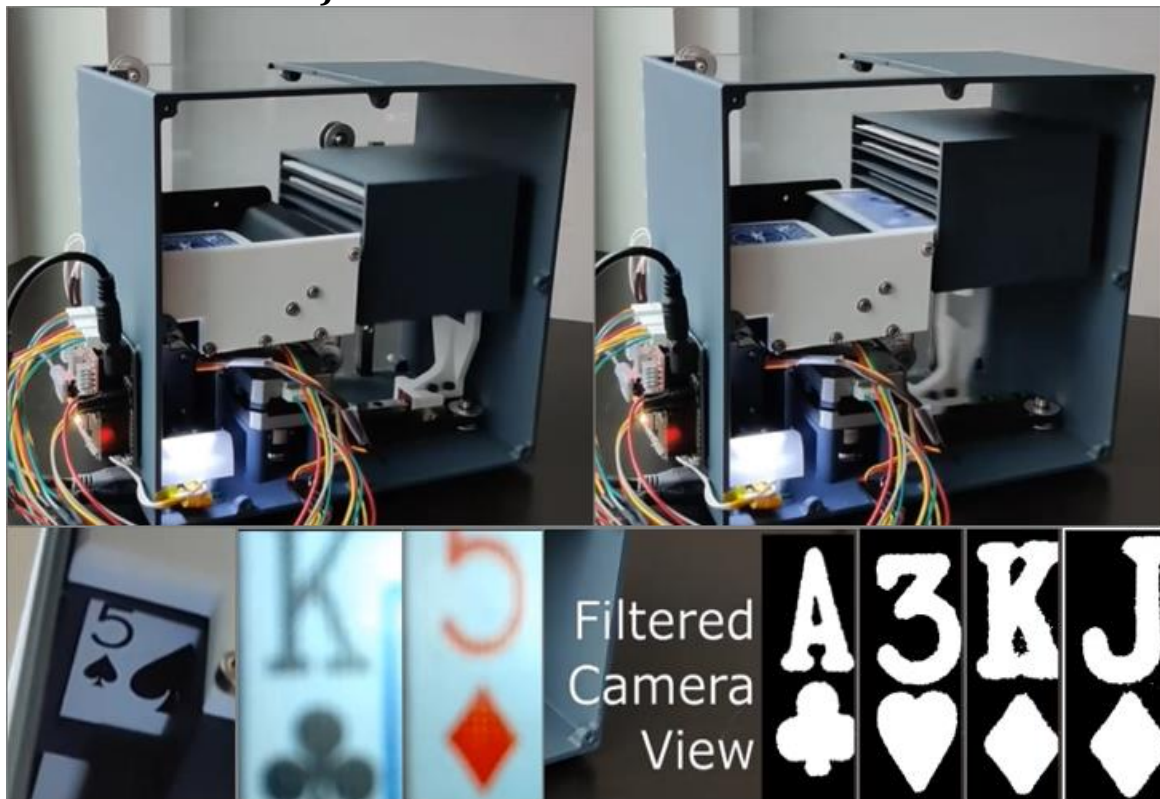
One application of the above shuffler is that predetermined cards can be assigned in advance to any position for a known outcome. Additionally, playing cards could be read during the shuffle and values and sequences could be transmitted. The above machine could be used to cheat, or for use in Duplicate Bridge Tournament Play.
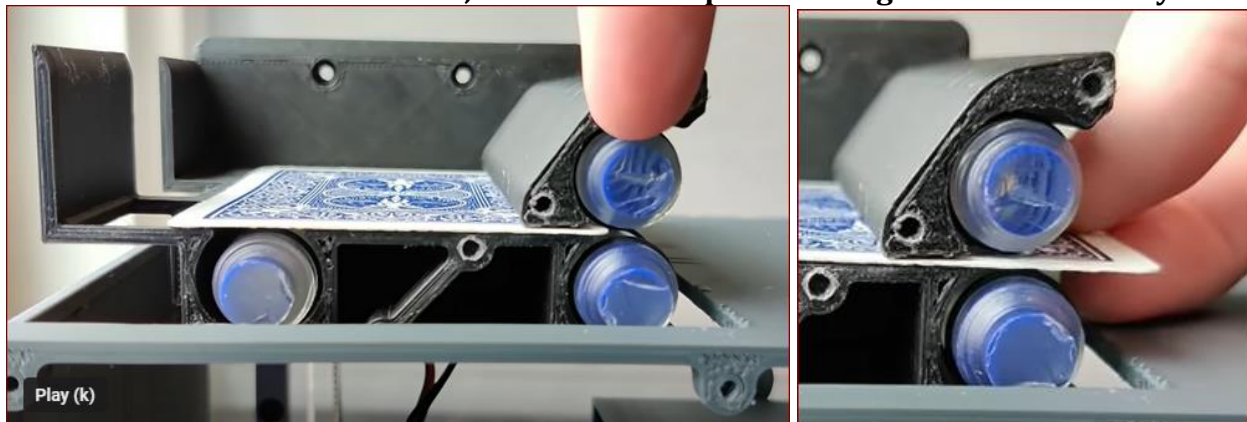
A series of rubber roller ensure that only one card is dispensed at a time.

As compared to the Ideal Shuffler, this device identifies card before being dispensed.

The video shows a called for Full House (Aces Full) to be dealt to the dealer position in Texas Hold Em'.

What this inventor did not consider in his demonstration is the Poker Dealer Cut. (He does not perform the required dealer cut after the machine shuffle when doing his demonstration.) (In addition, his shuffle machine requires nearly two minutes to complete a single deck shuffle-up...As opposed to 27 seconds for a Deckmate 2.)

The Deckmate 2 hack is much more realistic. The cheaters (hackers) would have to contend with the poker dealer cut. They would have to bet Pre-Flop and wait for the Three Flop Cards to be dealt to determine a key location.

IMPORTANT TO NOTE:

If any shuffle machine has the capacity to suit & sort and/or verify deck completeness and/or record initial hand composition, then it is academic that a technology is employed (camera or barcode scanner) to record the card index values. If what was reported is true...It appears this is the operation (of the Deckmate 2) into which these security investigators have hacked. The hackers utilized a Raspberry Pi (mini computer) attached via an exposed USB port and proprietary software.

They know the order of the machine shuffled deck...Top to Bottom.

They did however consider the dealer cut. They had to wait until the Board Cards were dealt to "Pick Up" the order in the sequence. The cheat would have to, bet Pre-Flop before the Board Cards were dealt. Once the Board Cards are dealt, they simple find those values in the sequence and "Back Up" to determine all players Hole Cards, the Turn Card & River Card. As an example;

Suppose this was the random order after the machine shuffle...

Suppose the poker dealer randomly cut the playing cards at this point...

The new random order after the dealer cut would now be as pictured...

With 7 Players on the game - 14 Hole Cards will be dealt + 1 Burn & 3 Flop - 18 Total

The first exposed card would be the 1st Board Card...The 7 of Clubs, then 8H 4S

1 2 3 4 5 6 7   1 2 3 4 5 6 7   B Flop B T B R

1st Board Card

The security investigators who undertook this Deckmate 2 Hack, have a flaw in their thinking in regards to when the known information could be used by the "Bad Guys". They made the assumption (described above) that the cheaters needed to see the 1st Board Card to then back into the known sequence...Meaning they would have to bet Pre-Flop.

Pictured below are playing cards laid out in the sequence described above...

Study the above Poker Hand and you can quickly determine that player three (3) will win the Pot with two pair (Aces & 4s' Queen Kicker). The player(s) in league with the hackers would not stay in the hand if they were not seated in the 3 Spot.

NOTE: It is very important to understand a fundamental difference between known cards in Poker versus known cards in Blackjack or Baccarat. Known cards in Blackjack or Baccarat help you win the hand, (the cheater knows when to Hit or Stand or Take Insurance in Blackjack ...Or which Side, Player or Banker to wager on in Baccarat). In Poker, known (or marked cards) help you not lose...or not lose as much. Consider the hand above...The Pair of 9s' in the 7 Spot has nothing to fear based on the Flop Cards, so he should continue to bet all the way to the River. (The cheaters know they will win with the Ace on the River if they are in the 3 Spot) However, if the cheater was in the 7 Spot he would know the Pair of 9s' would lose to Two Pair and would Fold Pre-Flop. Spot 7 would not invest in a losing hand.

The flaw I'm speaking of that the security investigators missed is that the player accomplice on the table need only transmit or tell or signal the value of the 1st Card dealt to them (the 1st Hole Card) and the computer can access the sequence from that card backwards. They would gain the same complete Hand & Board knowledge Pre-Flop.

Spot 7s' 1st Hole Card is the 9 of Clubs...The computer can sequence the playing card order backwards and forwards and know all player Hole Cards and the Board Cards.


Pushing The Envelope: If the Poker Dealer was part of the scheme, he need only Flash or Peek the Top Card or Flash the Bottom Card during the Cut and the sequence could be accessed from that card forward or back.

DYNAMIC. REVEALING. PROVEN.

GEORGE JOSEPH

VERY IMPORTANT:

The cheating methods described in my Deckmate 2 memo, Leo Weeks video poker slot device (pictured below), the Russian Slot Hack, Ron Harris & Reid McNeal's hack of a Keno Game in Atlantic City, have one thing in common...**
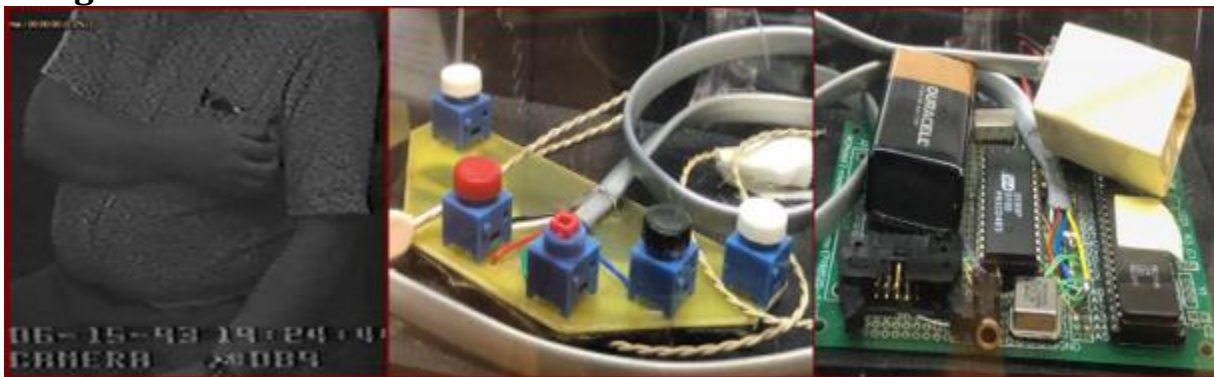
RUSSIAN SLOT MACHINE HACK Using a cell phone hidden on their body, 15 to 20 spin outcomes are recorded. Those outcomes are sent via cell phone to a mega computer in Saint Petersburgh Russia (?) which has reverse engineered the slot algorithm. The recorded outcomes are cycled at extreme speed through all possible outcomes to determine a start point that determines when larger slot wins are likely...Texted back to the cheats.
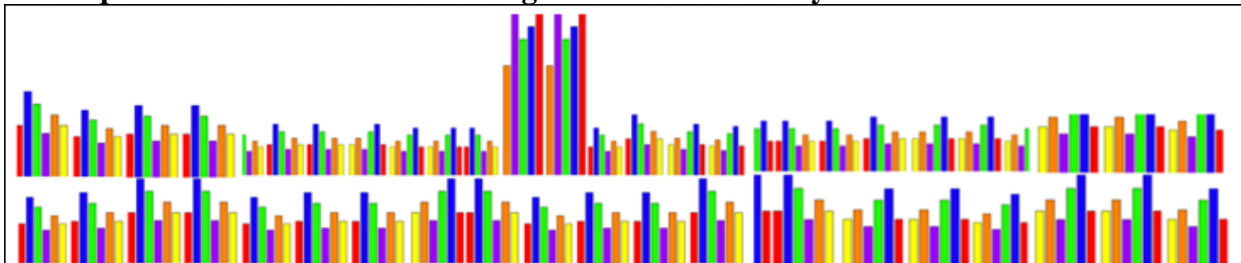
Having Hacked & Cracked the PRNG Allows Their Computer to Identify the High Payback Windows of Advantage

Ron Harris & Reid McNeal reverse engineered electronic Keno

**These devices were operated from the outside with no direct connection to the slot machine or shuffle machine. The Deckmate 2 hack described in a previous memo required a Raspberry Zero microprocessor to be hardwired and secretly attached to the USB port underneath the shuffle machine.

I believe we all have to concede (including shuffle machine manufacturers) that if the Bad Guys gain access to any shuffle machine (Deckmate 2 or IDeal) capable of reading card values, they can surreptitiously record and/or transmit that information. As we have discussed, the new IDeal Shuffler has an On-Board Printer function;

This function is used to verify the initial playing card order dealt to each player and is most often accessed as part of the integrity review of jackpot payoffs. (This also indicates that there is a point at which playing card order can be known after the shuffle-up. But keep in mind, this function is internal.)

Also keep in mind that in a Baccarat or Blackjack setting the resulting corrupt play will be much easier to uncover and investigate because all playing cards will eventually be faced and the resulting strategy of play examined. In Poker however, folded hands are not faced and most often the secret knowledge gained will remain a secret hidden in the Mucked Cards. <mark>Very Important:</mark> The hidden camera (or shuffle machine camera) can only read card values, but cannot assign any known card to a known shelf in the shuffle machine or to a predetermined starting position.

The Deckmate 2 Hack seems like a very simple fix, disable that USB port and/or move the port to a location that cannot be accessed from the outside.

UPDATE:

I was in on the weekend and examined and took these pictures of an Ideal Plus Shuffler with ******************.

There are two (2) USB ports on the backside of the machine underneath the On-Board Printer. I would assume therefore that a hack, similar to the Deckmate 2 could be attempted. FYI: There are other mini-processors compatible with shuffle machine technology…Arduino Uno pictured below.
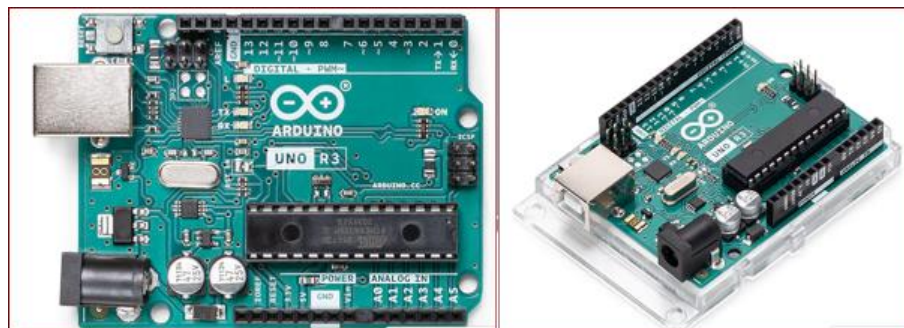
FYI: I have heard that in response to reports of the Deckmate 2 hack several Poker Rooms in Texas and Reno and California have begun to add a riffle shuffle (then cut) after taking the cards from the shuffler or have disabled the USB port on the Deckmate 2.

Let's put this issue into perspective. Any shuffle machine which requires a foreign device to be physically attached to the machine via the USB port should obviously be easy to detect.

If a casino tech was corrupted and installed a hacking device and live stream transmitter internally, it would require a physical inspection of the shuffle machine.

I believe the ultimate solution to these shuffle machine hacking attempts should rest on the desk of the manufacturer. I am reminded of the slot machine cheat, Dennis Nikrasch who used a device he created to download an "Easter Egg" program to the software of progressive slot machines. This corruption allowed Nikrasch to manufacture progressive slot jackpots and then erase the Easter Egg leaving no evidence. The solution was to "Scribble" or erase the excess space on the computer chip of the slot machine. This prevented any additional information from being loaded.

Digital surveillance systems employ a technology for video authentication. If even one pixel of the eight million pixels in a video frame is corrupted or altered there can be no authentication. A similar technology could be employed in shuffle machine software.

BTW:

I was pleased to note the UTH game is equipped with the new shuffle machine cut card game protection. As you know, the playing cards for the House Hand and the Board Cards are now delivered with a cut card on the bottom to protect the cards from being flashed.

If Advantage Players know one or more of the Dealer Hole Cards and/or Board Cards they would enjoy the advantages listed below;

Hole Card Advantages for UTH

Knowing both of the dealer's Hole Cards before the 4X's wager = 35.0%

Knowing one of the dealer's Hole Cards before the 4X's wager = 12.5%

Knowing one of the Flop Cards after the 4X's wager before the 2X's wager = 3.62%

Knowing one of the dealer's Hole Cards & one Flop Card before the 4X's wager = 20.74%

Knowing one of the dealer's Hole Cards & one River Card before the 4X's wager = 24.10%

Contact me if you have questions.

I will keep you updated

Respectfully Submitted,

George D. Joseph
Worldwide Casino Consulting, Inc.   **GJ/ccj**