

March 2007

# SLOT TECH MAGAZINE

Slot Machine Technology for the International Gaming Industry



Oasis - Chapter 9  
System Overview

Quick Simple  
Repairs # 23

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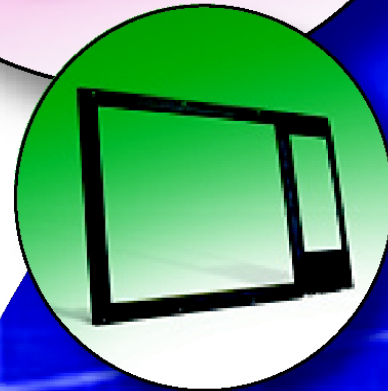
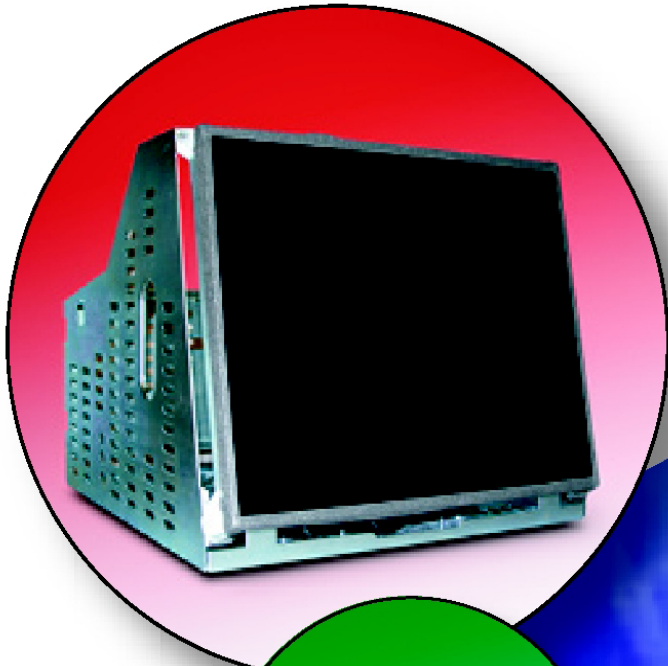
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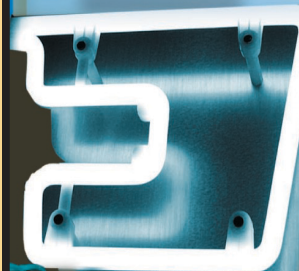
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## Slot Tech Editorial

This month's Slot Tech Magazine leads off with the conclusion, part nine of Jason Czito's outstanding presentation on Oasis. If you have missed part of the series, printed back issues are still available for everything except Chapter One in the October 2006 issue. Of course, all issues are always available online in the Slot Tech Magazine archives. This was really an outstanding effort on Jason's part and he deserves a great deal of credit

for putting together a training manual in a format that is easy to read and understand. Great job, Jason. I hope we will see more from you in the future.

Pat Porath presents us with number 23 in his ongoing series of "Quick & Simple Repairs." This month, Pat tackles a variety of interesting repairs such as an IGT S2000 Pixel Board Error, an IGT S2000 VFD problem, an IGT AVP "Millionaire" Upper LCD Error and the case of the missing stacker box.



first reaction was to do what comes naturally and pass the buck to someone else, namely Ted. Ted did the research and reported back to me. His report begins on page 30.

### Randy Fromm's Slot Tech Magazine

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Some of you may have been scratching your heads while reading Ted Befus' article on door switch wiring last month. Ed Morgan of Harrah's Louisiana Downs sure was. I received a telephone call from Ed shortly after February's issue of Slot Tech Magazine hit the stands. The first thing he asked was "Are you getting a lot of phone calls about Ted's article?"

I replied in the negative and asked him why. He responded by informing me that his casino has the door switches wired in the exact opposite manner, connecting to the normally open contacts so the loop is CLOSED when the door is shut. Ed knows his stuff and I had no reason to doubt him. Naturally, my

I have a really tough training mission this month. I have made a commitment to spend the entire month of March training the slot techs of the Marriott Aruba Resort & Stellaris Casino as well as the techs from other members of the local casino operators association. It's a dirty job but somebody has to do it! I'll be keeping in touch through e-mail and returning calls via Skype (I love technology. Oh, yes! I love technology). If you need to reach me in a hurry, you can send a text message to my mobile. 619.838.7111.

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*Randy Fromm*





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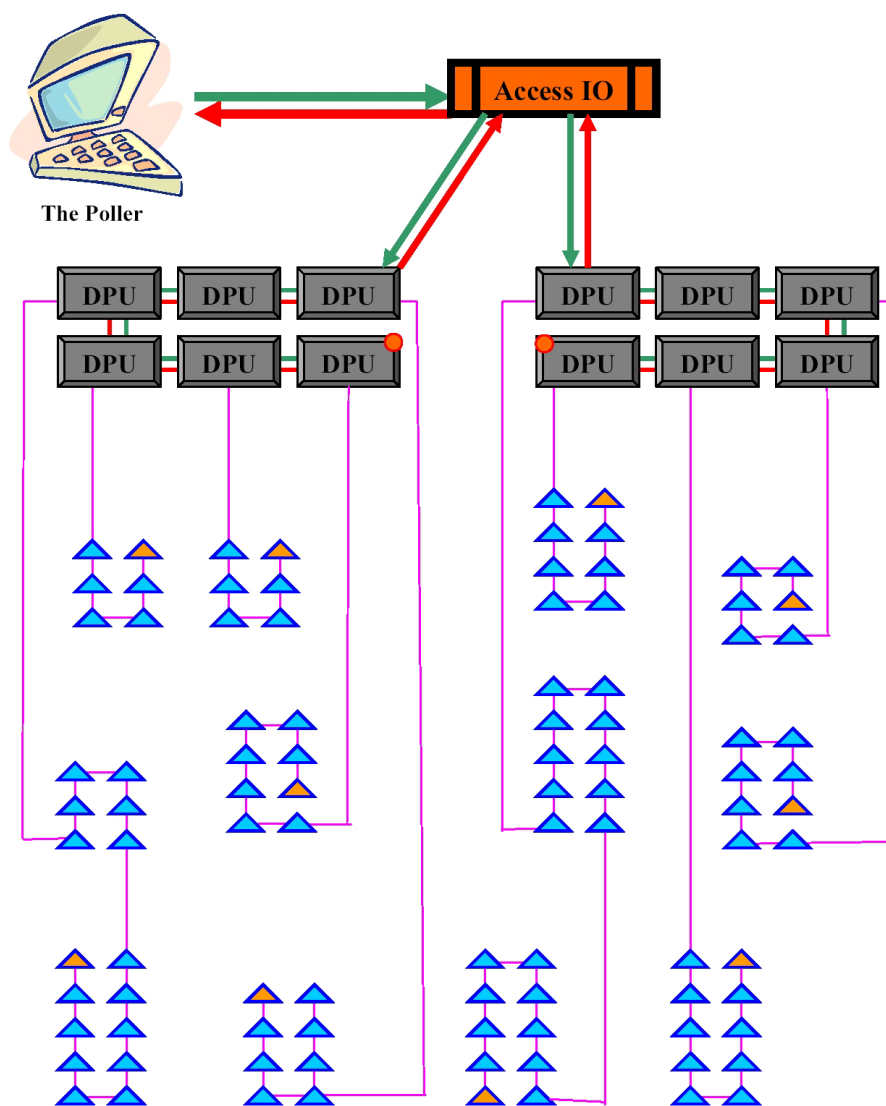


By Jason Czito

## Chapter 9 - System Overview

The system is basically a rudimentary network. As has been mentioned before, the ONC is only necessary depending on what kind of com port the Poller is using. Slot machines give their information to the Sentinels. DPUs funnel the information from many Sentinels into the Poller. A casino may elect to have more than one Poller. This is typically done to lighten the workload on each Poller. DPUs may be located in one central location or out on the casino floor.

The Sentinels are connected in a daisy chain, where one is simply linked to the next in line. The last Sentinel in line should be terminated. DPUs are also connected in a daisy chain and the last DPU in the chain should be terminated as well. Note that the lack of a terminator will not cause the system to malfunction during normal





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operation. If a Sentinel is a long distance from its DPU or it will be flashed, it needs a terminator.

When doing a machine conversion or move, the effected machines' Sentinels need to be disconnected from the system, but only after the Drop has occurred. If it is removed from the system before the Drop, the Poller will not receive the signal from the Currency card or the Drop Door, causing a Variance. Only after the machines have been emptied by the Drop Team may they be disconnected from the system. To do this, simply unplug the Home Run wires from the beginning of the Sentinel's daisy chain. Every Sentinel after that point in the network will be offline (see figure 2) but be wary of taking unnecessary machines offline.

Note that disconnecting the machine from the Sentinel will not work. The Sentinel itself needs to be disconnected from the system. To disconnect an individual Sentinel, remove the Bank In and Bank Out

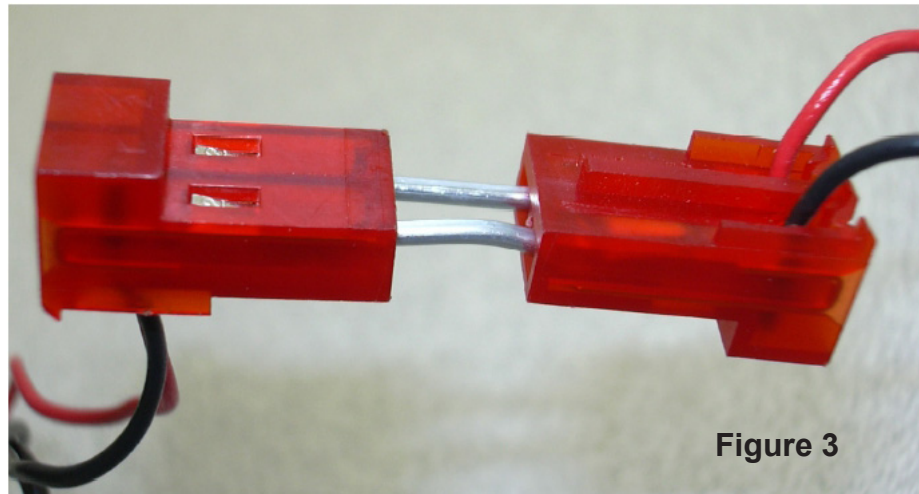


Figure 3

cables. Using short pieces of a paper clip (about an inch long), connect the red wires of the cables together and the black wires together through the plugs (see figure 3). This will allow the daisy chain to continue past the machine uninterrupted.

You can also power down the Sentinel in question, and it won't be seen by the system.

Figure 4 shows the daisy chain below the machines going through the bases. Each machine will have two Home Run wires hanging down: its Bank In and Bank Out. To keep things standardized, we only move the male ends (Bank Out) into the next cabinet to connect with the female end

(Bank In) from the machine next to it, but any standard practice will work.

The standard we use is to have the male ends go to the machine on their left (see figure 5). If you were looking down on the bank, the chain would run clockwise. The blue arrows are the male Bank Out lines and the pink objects are the female Bank In lines.

One of these machines will be the first in the daisy chain for this bank. Its female Bank In will connect with the male Bank Out coming up from the floor (from either a DPU or another bank) and its male Bank Out will either be terminated (if it is the last

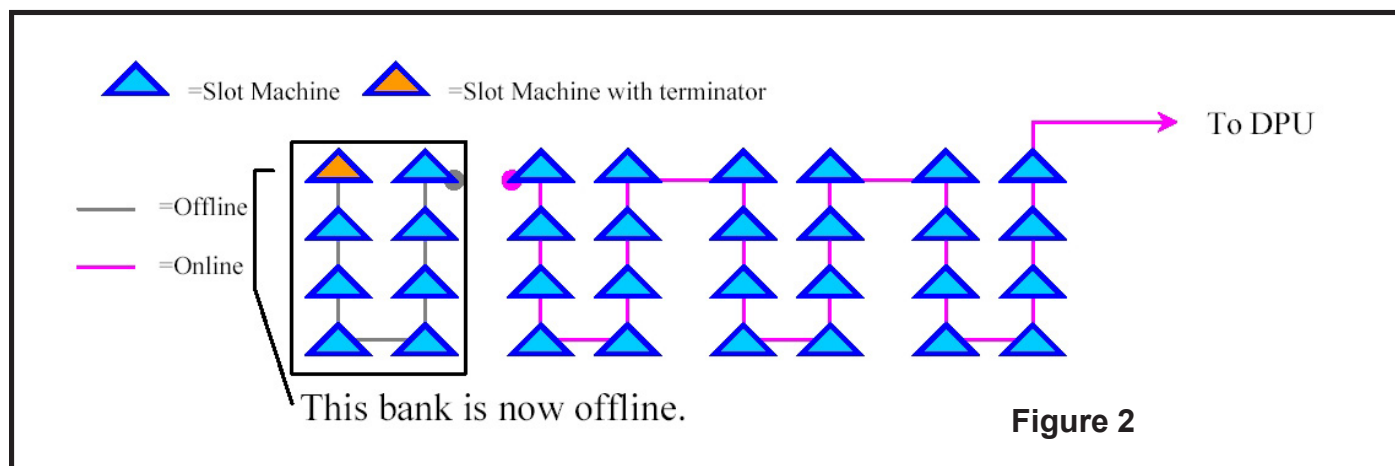


Figure 2



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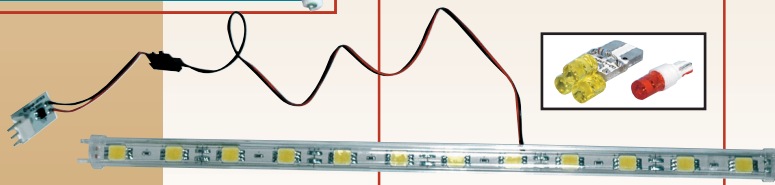
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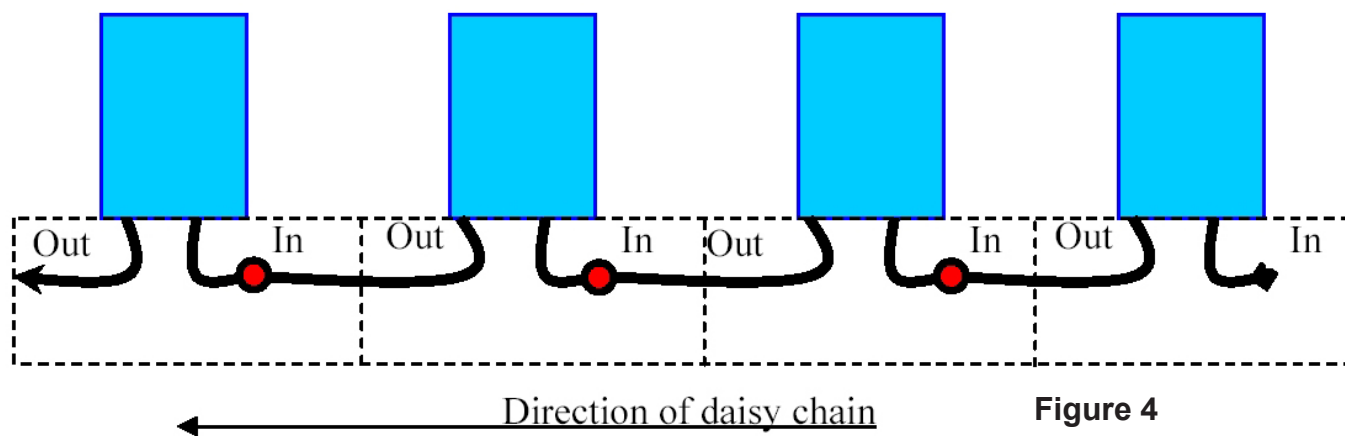


Figure 4

machine in the daisy chain) or will connect to the female connector coming up from the floor. The female connectors coming out of the floor are the Bank In of the next bank in that daisy chain. Note that if you want to take this bank offline but leave the others online, just connect the two cables from the floor together. This will bypass the bank for conversion purposes.

When the machine has been converted, it is imperative to make sure the IT department has their end of the conversion finished before reconnecting the Sentinels to the system. Connecting them

at the wrong time may cause a Variance.

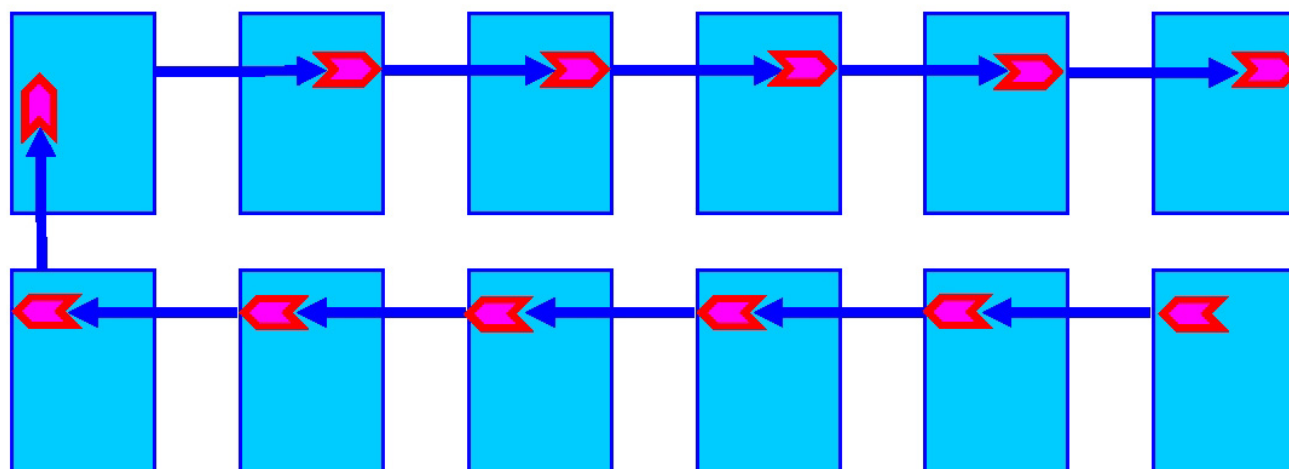
Occasionally, it will be necessary to RAM clear a Sentinel or a DPU. Here is how CDS recommends that this be done...

- 1) Remove power from the Sentinel or DPU.
- 2) Remove the Watchdog chip. (U20 on a DPU and U6 on a Sentinel.)
- 3) Wait five to ten seconds.
- 4) Replace the Watchdog chip.
- 5) Restore power.

“Even with the power source disconnected from the DPUII, the battery on the DPU or Sentinel board will provide enough voltage to maintain RAM. This voltage must travel through the Watchdog chip. By removing this chip for a moment, the circuit is broken, and the Ram chips cannot hold memory without a constant source of power, therefore RAM will be cleared.”\*

I find that this doesn't work. To truly clear the RAM, leave the Watchdog chip in place and remove the RAM chip(s). Using a screwdriver or other straight piece of metal, connect the pins in on the corners of the RAM chip to

Figure 5







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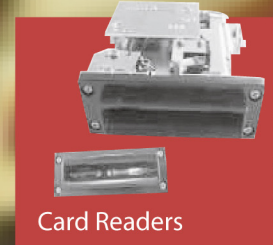
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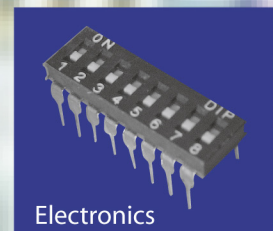
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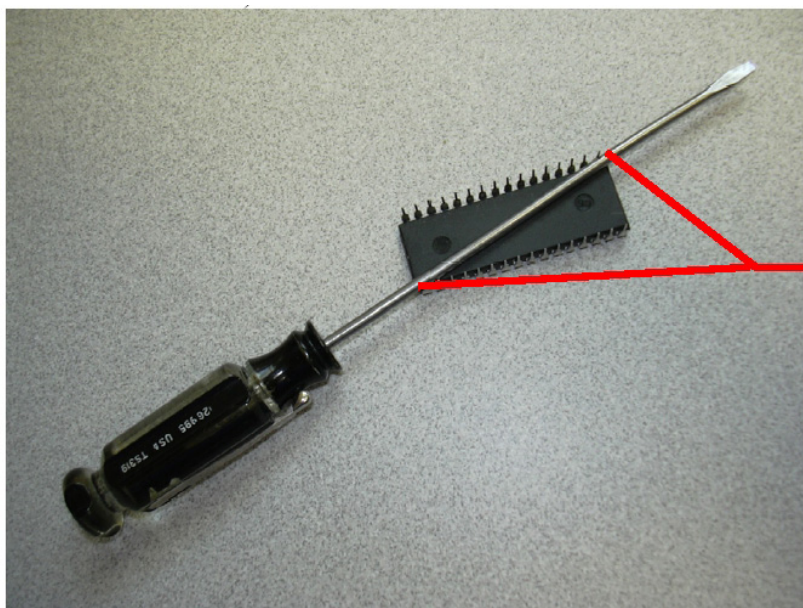
the pins in the opposite corner (1 to 17 and 32 to 16) (see figure 6).

Data from the slot machine overwrites whatever meters are held in the Sentinel with its own values. If a Sentinel is RAM cleared, it will upload fresh data from the machine as soon as communication is established between the two. If a slot machine is RAM cleared, the Sentinel will receive zero-value meters from that slot machine. Note that the Sentinel only writes to meters that it receives from the slot machine. For example, a non-ticketing machine will not increment or decrement ticket meters, even if it is RAM cleared. If a ticketing machine is replaced with a non-ticketing one, the ticket meters will remain on the Sentinel because the non-ticketing machine won't send any zero-value ticket meters.

Data held in the Sentinel and DPU are redundant. If a Sentinel is RAM cleared, the DPU will restore the meters to the Sentinel. If a DPU is RAM cleared, the Sentinels will restore their meters to the DPU. RAM clears on these items individually should be used to restore their functionality (unfreeze them, for example). If there are meters that need to be removed from both of them, they must be RAM cleared simultaneously. For example, a ticketing machine is replaced with a non-ticketing machine. If you want to get rid of the ticket-related meters in the Sentinel, you must RAM clear the Sentinel and its DPU at the same time.

This concludes the series on Oasis. If you have any questions, please do not hesitate to contact me.

**- Jason Czito**  
**jczito@slot-techs.com**



Screwdriver connecting the corner pins on a RAM chip, clearing any residual memory. When clearing RAM, connect both pairs of corner pins.

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# Quick Simple Repairs # 23

By Pat Porath

## IGT S2000 Pixel Board Error

In my opinion, pixel board errors are pretty rare on an IGT S2000. I have only run into a couple of them. This specific game indicated that the pixel board needed to be replaced. On the screen it displayed "Replace Pixel Board" so it wasn't too difficult to figure out what to do next.

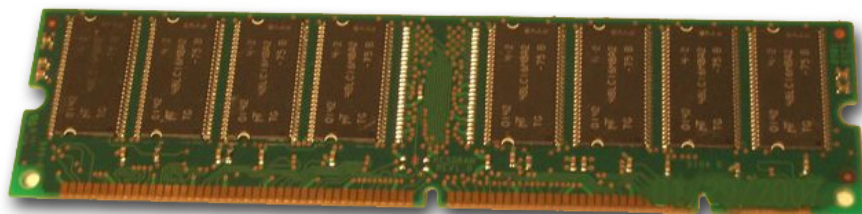
This error was pretty wild. The board, which is located on the main processor board, looks very similar to the memory expansion boards or "SIMMs" that are in personal computers. Some people call them "memory sticks" when associating terms to computers. One of the first things that came to mind was to take a look at the board to see if I could visually determine what the problem was without necessarily running up to the shop and grabbing a replacement right away. Sometimes, cleaning the contacts on the board with a pencil eraser can fix the problem. You simply use the eraser to

clean the contact area so it is nice and shiny, and then reinsert the board back into the main processor.

This time however, the "pixel board" error that was in front of me was obvious. It so happened that some how, some way, the board was pushed out of its socket. Luckily there wasn't any serious damage. The two boards were inspected and the pixel board was reseated back into its place. The game was powered back up and sure enough, no errors. It was back online.

How did the board get out of its socket though? Theory one: The gaming commission was on the floor and was tapping games. This means that there were work orders sent to them in which games needed security tape over the chips. The overall slot machine "law" per gaming commission at the casino I work

at varies from other casinos, even other casinos in Michigan. It depends on which state you live in and what the specific property laws are. One "law" or rule is that on any in-house games that have a potential of \$100,000 jackpot or more, the main processor needs to be locked up. I won't get into the rest of it. Most of us techs know that the slot laws vary from state to state. Back to my hypothesis... Theory one was that the gaming commission may have pulled the board on the game and improperly reseated it, bumping the pixel board. Theory two: a slot attendant may have removed the board to check it out, and improperly installed the board. Some may think, what in the world is a slot attendant doing pulling a board for? Well the fact is, at the casino I work at, a lot of the slot attendants are quite advanced. Some have moved up



This is the Pixel board



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from slot attendant to tech or floor supervisor. If I think a slot attendant does well at their work, I will ask for their help in swapping boards and what not. Of course, they can't take a board to the shop or anything like that but they help us sometimes. Theory three on what happened to the pixel board: Aliens. Naw, just kidding. I only had the two theories. The main thing is, the problem was simple and the game was back in play.

### **IGT S2000 VFD Problem**

Trying to figure out what in fact the problem was with this game, it ended up that it was a bad VFD. The term stands for vacuum florescent display. The last time that a game had this similar problem, it was actually a bill validator problem. Once the unit was removed, the game came right back to life. This time it was the VFD. Of course, it said there was a display problem but which one was it, the seven-segment type or the V.F.D? The first thing I did was disconnect all of the displays but the problem remained. I tried one at a time, and still the game would not come back to life. All of the display connections, the ticket printer, and the bill validator were disconnected. Still nothing. Time to talk to the "big dogs", which are the IGT techs. One tech told me he had run into a similar problem and it was a bad bill acceptor power supply (tried that and it didn't work this time). The other tech asked

if I had swapped out the VFD. This had me thinking. If the unit was totally disconnected, why would it matter if it was swapped out? What would the difference be? Later on, I found out what the deal was. One word, IGT NETPLEX. The VFD was swapped out with the one next door, (same exact game) and it came up right away. I didn't have one in stock but what just happened? The unit was disconnected and the game wouldn't come to life, but with a replacement, the game came up right away. THE VFD IS PART OF THE NETPLEX. Back in the September 2005 issue, I wrote an article, which was in Quick, Simple Repairs #6 about NETPLEX. More or less, it is communication of complex devices such as the ticket printer, touch screen, VFD, and bill validator. With a bad display, it took down the whole game, even when it was unplugged. As soon as the replacement was installed the game came up perfectly. So, if the game spells out "n-o-d-i-s-p-l-a-y" first remove the bill validator and power up the game. If that doesn't do it, replace the VFD. Bally Aux. Power Switch

On a new "Bally Alfa" stepper, with the upper LCD, there is a very small horizontal toggle switch. On the game I worked on, the symptoms were similar to a bad LCD. It was totally black. In addition, the reels wouldn't quit spinning and no matter what I did, only the number

8s were in the machine display.

After reseating boards and rebooting the game, I noticed during power up that "no signal" was on the LCD. This told me I definitely had power at the unit but no graphics were being sent. Now this is getting weird. Is it a main processor problem, a bad CF card, did RAM need to be cleared? Before getting too serious, I remembered a short phrase from a fellow tech. He stated that a lot of the time the problem is right in front of you; all you have to do is look. Well, why not check it out? Like stated earlier, boards were reseated, the CF cards were reseated, power supplies were reseated, nothing helped though. Then, like a wolf peering at his prey, I noticed there were not any lights lit up on the main processor board. There should be SOMETHING lit up on it. Upon further investigation, I noticed a tiny switch. It is similar in size to a DIP switch. Located near the front and center part of the main processor, it read "aux power." With nothing to lose (the game isn't working already) the switch was thrown to the opposite position. PRESTO...the game came back to life. As sure as it snows every winter in Michigan, the game came up PERFECTLY.

How did the switch get flipped in the first place? Only internal surveillance knows. I didn't think it was



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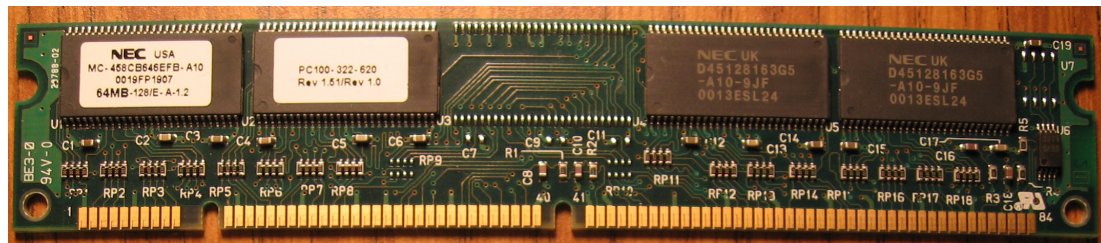
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worth the time or effort to know. All I was concerned with is the game was running again. I think it is pretty interesting what Bally has done with the "little switch" over the years. On the 6000 series it was used as a "game disable" switch, which was uncovered. On occasion, when someone would fill the hopper with coin, the fill bag would bump the switch and the game wouldn't accept coin or bills. Later on, Bally put a cover over the switch so it couldn't get bumped which was an awesome idea. Now they made the switch very small, near impossible to bump and yet some how, some way, it happened. Now I know what it does and I know what to look for next time if the same symptoms arise. Older Aristocrat Not Accepting Bills? At the casino in which I am employed, in the Aristocrat games there have three different types of bill validators: The WBA, UBA, and CBV. WBA and UBA are made by JCM (Japan Cash Machine) and CBV was made by GPT (Global Payment Technologies).

The game that had the problem happened to have a CBV. A customer stated that the game would not accept her \$10.00 bill. Being that the bill head wasn't upgradeable (to my knowledge) I knew that it wouldn't accept a new \$10.00. This bill that she had was an old one, so why





"online." Atronic Emotion Upper LCD While making a round on the floor I came upon an Atronic e-motion game that didn't have the upper LCD lit up. One of the first things I thought was a bad LCD. The game was powered down and rebooted but the problem still existed. On the e-motion game, above the power supply, you will see two large cables with video type connectors on them. These are for each of the LCDs in the game. One is for the upper LCD and one for the lower. One of the cables was a bit loose. Hopefully this was the problem. With power off, the cable was snugged up in its socket and the game was once again powered up. This time they both came up awesome. One thing to remember is that both cables WILL fit in each other's socket which means if they are not plugged in correctly, the graphics for the top will show up on the bottom. Of course the bottom graphics will end up on the top. In conclusion, an e-motion didn't have an upper display and the only problem was a loose connection on the motherboard.

### The Case of the Missing Stacker Box

I received a call from a slot attendant that a stacker box was MISSING on an Aristocrat game. This was a first. How in the world can a box be missing? Maybe the hard count team forgot to put it in? I had to see it to believe it. Sure enough, it was missing. There was an investigation, and later found out that the box was removed to install a bad lock and it wasn't put back in. At the time, I replaced the box with a spare just to get the machine back in operation. It was a coinless game and that means if the bill acceptor isn't working, the game is down. Pretty wild. A missing stacker box in a game. What next?

- Pat Porath  
pporath@slot-techs.com

March 2007

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Yet another game with dead SENET. Another lesson in troubleshooting SENET. You have an older and simpler S2000 reel game (five or six button player panel). You do the obvious and swap out the Door I/O and Cabinet I/O and you are asking yourself if you have time left in the day to do the paperwork and deal with the headaches associated with pulling the MPU board out and starting troubleshooting. Then you remember an article in Slot Tech magazine about the 7-segment display board also being the long forgotten member of the SENET group. You look at the 7-segment display and sure enough, it is dead. The Denom lamp is on so you know you have +13 Volts up. Just to consider all options, you leave the Door and Cabinet I/O boards in and disconnect the SENET connector to the 7-segment display and power up again. The denom

### 751-179-0x 7-segment 5-5-2 Display

By Herschel Peeler

lamp is out as expected, your hopes stretch for a few seconds then the game comes up. The 7-segment display is dead but that is expected. The game will come up without it. The game doesn't have any way of knowing if the display is working or not.

The 7511790x 7-segment display is a SENET device used on older S2000 games. It addresses and operates like any other SENET device with a few features added. The

MPU must send it a constant stream of signals for it to display information. This is the single in-line 5-5-2 display. The three-row 5-5-2 display works the same way.

The MPU sends out an address that is seven bits long. The lower four are the usual SENET address and must match jumpers E2, E3, E4 and E5 on the board. The data shifted out the TxB line become segment information in the 7-segment displays.

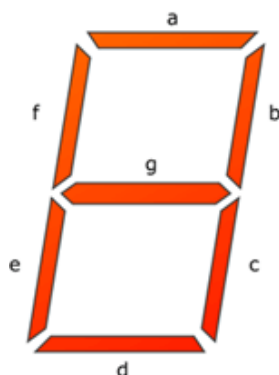
Bit 0 – "A" segment of DS1, DS4, DS0 R, DS2 R, DS3, R DS5 R and DS6 R  
Bit 1 – "B" segment of DS1, DS4, DS0 R, DS2 R, DS3, R DS5 R and DS6 R  
Bit 2 – "C" segment of DS1, DS4, DS0 R, DS2 R, DS3, R DS5 R and DS6 R  
Bit 3 – "D" segment of DS1, DS4, DS0 R, DS2 R, DS3, R DS5 R and DS6 R  
Bit 4 – "E" segment of DS1, DS4, DS0 R, DS2 R, DS3, R DS5 R and DS6 R  
Bit 5 – "F" segment of DS1, DS4, DS0 R, DS2 R, DS3, R DS5 R and DS6 R  
Bit 6 – "G" segment of DS1, DS4, DS0 R, DS2 R, DS3, R DS5 R and DS6 R  
Bit 7 – "DP" segment of DS1, DS4, DS0 R, DS2 R, DS3, R DS5 R and DS6 R  
Bit 8 – "A" segment of DS1, DS4, DS0 L, DS2 L, DS3, L DS5 L and DS6 L  
Bit 9 – "B" segment of DS1, DS4, DS0 L, DS2 L, DS3, L DS5 L and DS6 L  
Bit 10 – "C" segment of DS1, DS4, DS0 L, DS2 L, DS3, L DS5 L and DS6 L  
Bit 11 – "D" segment of DS1, DS4, DS0 L, DS2 L, DS3, L DS5 L and DS6 L  
Bit 12 – "E" segment of DS1, DS4, DS0 L, DS2 L, DS3, L DS5 L and DS6 L  
Bit 13 – "F" segment of DS1, DS4, DS0 L, DS2 L, DS3, L DS5 L and DS6 L  
Bit 14 – "G" segment of DS1, DS4, DS0 L, DS2 L, DS3, L DS5 L and DS6 L  
Bit 15 – "DP" segment of DS1, DS4, DS0 L, DS2 L, DS3, L DS5 L and DS6 L

Q7, Q6, Q5 = 0 0 0 - DS0  
Q7, Q6, Q5 = 0 0 1 - DS1  
Q7, Q6, Q5 = 0 1 0 - DS2  
Q7, Q6, Q5 = 0 1 1 - DS3  
Q7, Q6, Q5 = 1 0 0 - DS4  
Q7, Q6, Q5 = 1 0 1 - DS5  
Q7, Q6, Q5 = 1 1 0 - DS6  
Q7, Q6, Q5 = 1 1 1 - (not used)



The next three bits (Q5, Q6 and Q7 of U12) select the digits.

A word about 7-segment displays. The seven segments that make up each digit are referred to by letter designations. Segment "A" is at the top. Going around the display



clockwise, looking at the front of the display the segments are "B" through "F". Segment "G" is the center horizontal segment. This is pretty much an industrial standard. The "DP" is the Decimal Point that is usually on the bottom-right of the digit. This is not an industry standard. The displays used on this board are Common-Cathode types. Each segment is usually a pair of LEDs in series with the cathode end of each segment tied together and the anode end going to the other pins.

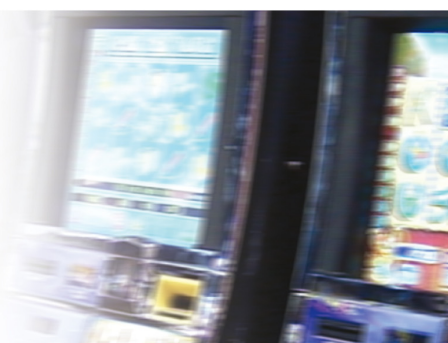
Only the TxB side of SENET is used. The TxA and RxA signals are not used. Like all SENET operations, the MPU sends out an 8-bit address in serial bits, each bit accompanied by a Clock Pulse. In this case, the eighth bit is not used if it is sent at all. Then the MPU sends out a Strobe pulse, latching the address in U12 and making it available

at the U12 outputs. U13 compares the lower four bits of U12 against the jumpers E2 through E5. If they are equal, the "A=B" output of U13 goes high and the board is selected. The MPU then sends out 16 bits of serial data, each accompanied by a clock pulse and this information is shifted into U9 and U11. The 16 bits of data are followed by a Strobe pulse

which latches the information into U9 and U11 making the information available at the outputs. This becomes our segment information. This strobe also latches the information on Q5, Q6 and Q7 of U12 into U15B, U16A and U16B. The outputs of these latches feed the "A" "B" and "C" inputs of U2. This selects which output (X0 through X7) will be selected.

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U2 is a one-of-eight selector. The "X" input line is tied high so the selected X0 to X7 line goes high. Only one output should go high at a time. These outputs drive U3, U4, U5 and U6 that are N-MOSFET transistors (Si9959DY). A high in makes the output low, selecting one of the digits, or pairs of digits. The segment outputs feed to U1 and U10 (UDN2982) which drive the outputs high. The displays are common Cathode. The cathodes are driven low by digit select lines. The segments are driven high by the segment drivers and the selected segments light.

One digit is referenced at a time. It takes seven write operations to light the whole display. The MPU is constantly sending information out to the display any time is wants the display to show meaningful contents.

There is a lamp socket built into the board that powers the Denom Lamp on a constant basis. No denom lamp lit likely means no +13 Volt in the game.

Troubleshooting LEDs don't often burn out but the sockets do get oxidized. If one digit or one segment of one digit does not light, try re-seating that LED before calling the LED display bad. Not that it can't happen. It just isn't likely that the LED display itself will fail.

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**“One digit not lit.”**

DS0 – U5 or U2.  
DS1 – U5 or U2.  
DS2 – U6 or U2.  
DS3 – U6 or U2.  
DS4 – U4 or U2.  
DS5 – U4 or U2.  
DS6 – U3 or U2.

**“Totally dead, no excessive current, no input lines held down.”**

Way too many possibilities to list. See if any chip is warmer than it should get and start troubleshooting from there.

**“Multiple digits dead, but others work.”**

U12, U15, U16, U2

**“Totally dead, excessive current, no input lines held down.”**

Check for a shorted and damaged IC.

**“Totally dead, input line held down.”**

U8, U14 or U15. Worth noting here. This is a common failure. The SENET RESET\ line is not buffered by the usual U8 buffer (CD4106). Normally R41 and R42 isolate the circuits of U14 and U15 from harm, but not always. I suspect the damage is done by hot-swapping the boards on SENET, but I couldn't prove it to anyone (even myself).

J51 (the 12-pin SENET connector) is pinned the same as the first 12 pins on a standard 14-pin SENET connector.

**“Kills +13 Volt line”**

Look for a damaged IC or one that gets hot. Paint the board white with freeze spray and see which IC heats up faster than others when you apply power. C6, or one of the other caps is a possibility. Denom lamp shorted.

“Kills +25 Volt line” Nothing on this board uses +25 Volts but there are still traces on the board going from J51 pin 10 to C7 and C8.

“Dim displays, +13 Volts looks okay.” U7 (CD4098 or CD4528)

**- Herschel Peeler**  
**[hpeeler@slot-techs.com](mailto:hpeeler@slot-techs.com)**

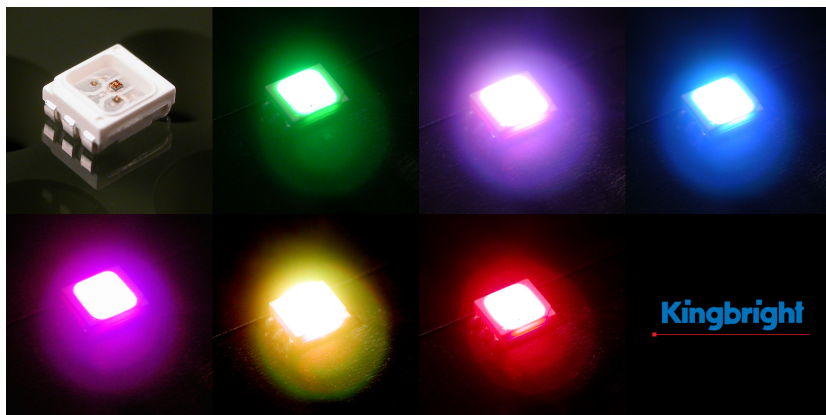
**“One segment bad in multiple displays.”**

"A" segment of DS1, DS4, DS0 R, DS2 R, DS3, R DS5 R and DS6 R, U9 or U10.  
"B" segment of DS1, DS4, DS0 R, DS2 R, DS3, R DS5 R and DS6 R, U9 or U10.  
"C" segment of DS1, DS4, DS0 R, DS2 R, DS3, R DS5 R and DS6 R, U9 or U10.  
"D" segment of DS1, DS4, DS0 R, DS2 R, DS3, R DS5 R and DS6 R, U9 or U10.  
"E" segment of DS1, DS4, DS0 R, DS2 R, DS3, R DS5 R and DS6 R, U9 or U10.  
"F" segment of DS1, DS4, DS0 R, DS2 R, DS3, R DS5 R and DS6 R, U9 or U10.  
"G" segment of DS1, DS4, DS0 R, DS2 R, DS3, R DS5 R and DS6 R, U9 or U10.  
"DP" segment of DS1, DS4, DS0 R, DS2 R, DS3, R DS5 R and DS6 R, U9 or U10.  
"A" segment of DS1, DS4, DS0 L, DS2 L, DS3, L DS5 L and DS6 L, U1 or U11.  
"B" segment of DS1, DS4, DS0 L, DS2 L, DS3, L DS5 L and DS6 L, U1 or U11.  
"C" segment of DS1, DS4, DS0 L, DS2 L, DS3, L DS5 L and DS6 L, U1 or U11.  
"D" segment of DS1, DS4, DS0 L, DS2 L, DS3, L DS5 L and DS6 L, U1 or U11.  
"E" segment of DS1, DS4, DS0 L, DS2 L, DS3, L DS5 L and DS6 L, U1 or U11.  
"F" segment of DS1, DS4, DS0 L, DS2 L, DS3, L DS5 L and DS6 L, U1 or U11.  
"G" segment of DS1, DS4, DS0 L, DS2 L, DS3, L DS5 L and DS6 L, U1 or U11.  
"DP" segment of DS1, DS4, DS0 L, DS2 L, DS3, L DS5 L and DS6 L, U1 or U11.



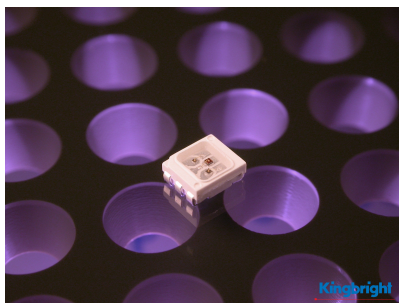
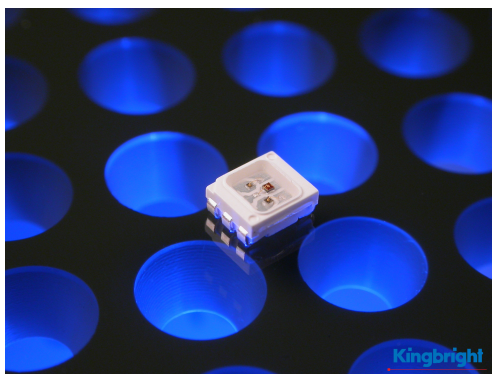
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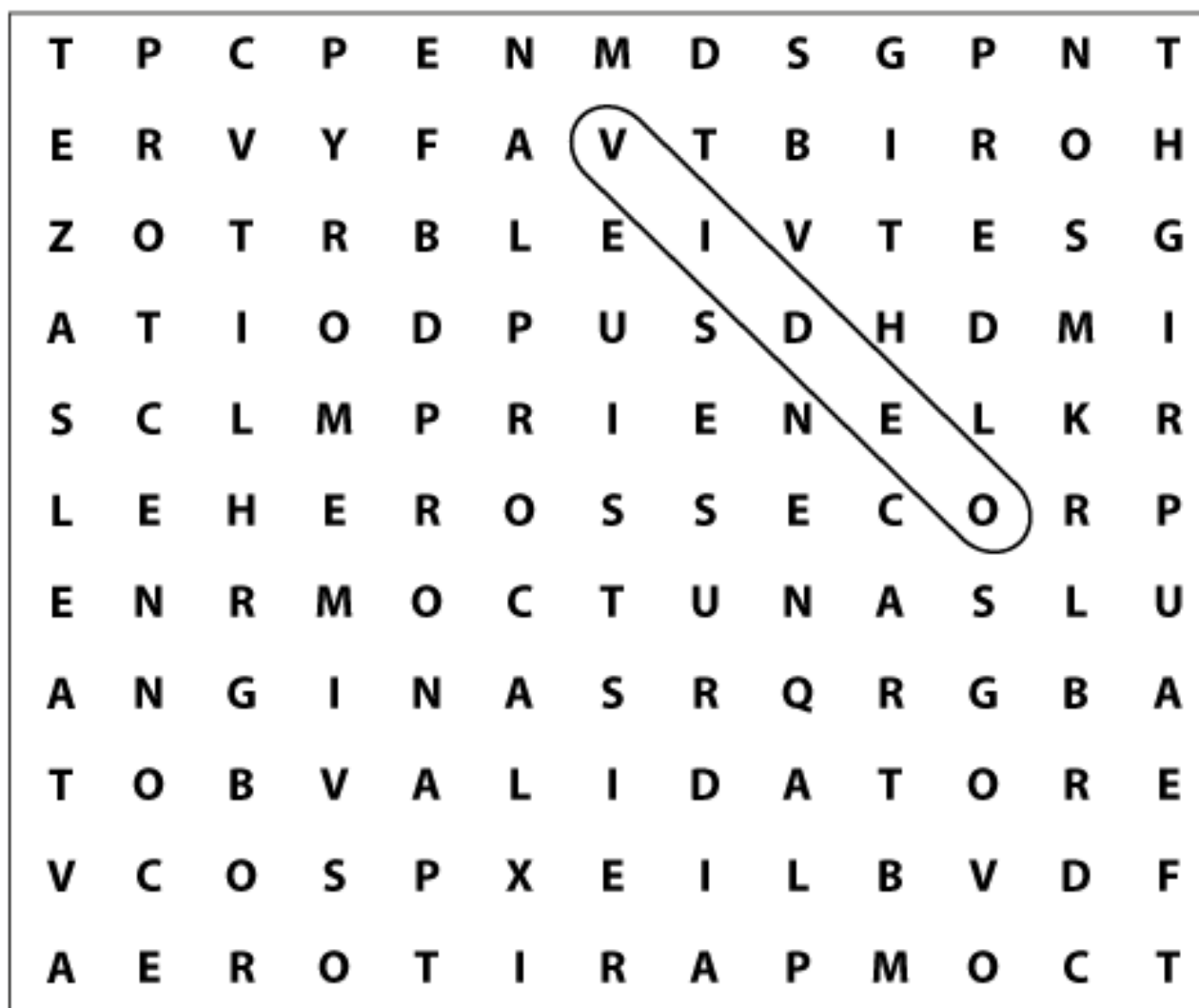
The answers to each topic below  
are hidden in the grid. Find them.

4 Types, styles & kinds of slot machines...

~~Video~~

2 Industry terms a spell-checker would reject...

5 Things found on a PCB...





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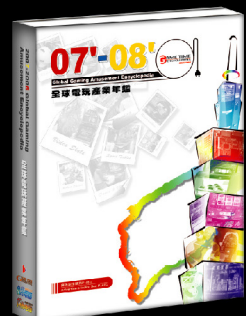
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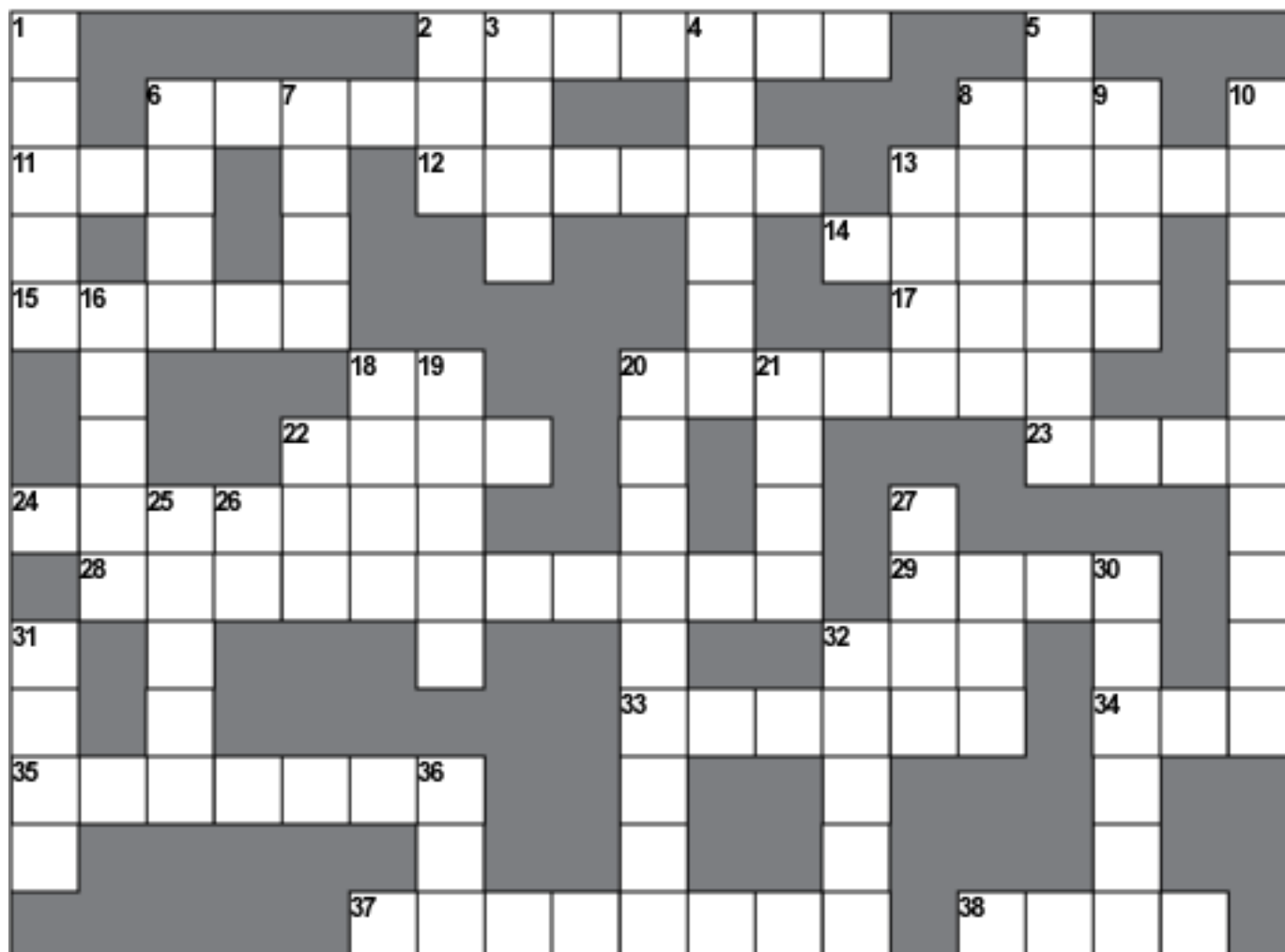
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# CROSSWORD

Fill out the puzzle.



## ACROSS

- |  |   |
|--|---|
| 2. "Charge pump" for flourescents      | 22. It spins  |
| 6. Character or mark on a reel         | 23. Term for a truck                                  |
| 8. Bella___ Hotel & Casino             | 24. Slot machine box (or President's advisors)        |
| 11. Prefix meaning three               | 28. Type of jackpot and insurance company             |
| 12. Press here                         | 29. To initially set-up, briefly                      |
| 13. Light atop a slot machine          | 32. Fixed rate  |
| 14. Tone                               | 33. The green or yellow wire                          |
| 15. Some pronounce it "axxed"          | 34. Japanese hoppers would be full of these           |
| 17. Rock of _____                      | 35. Hit this button when you're done playing          |
| 18. Short for preventative maintenance | 37. Two "erect" slot machines                         |
| 20. A type of winning combination pay  | 38. Jackson family member most likely to get a ticket |



## DOWN

1. Additional
2. GSA's SAS protocol (abbr.)
3. Short for a graduate
4. A chocolate addict is a choc-\_\_\_\_\_
5. Opposite of losers
6. Heat & kitchen
7. "A \_\_\_\_\_ is a terrible thing to waste"
8. Diameter of wire
9. Chances of winning
10. Who reads this magazine?
13. Jacket
16. Wasted material
18. Member of equal standing
19. 3.28 feet
20. How to cheat a slot machine with a coin
21. Having the required skills
25. Comically-named Colorado casino: \_\_\_\_\_ Ass
26. On/off or in/out
27. Door switch state
29. Square, Sox, & Skelton
30. The amount of cash dispensed
31. \_\_\_\_\_ pot
32. Available cash
36. Spinning toy

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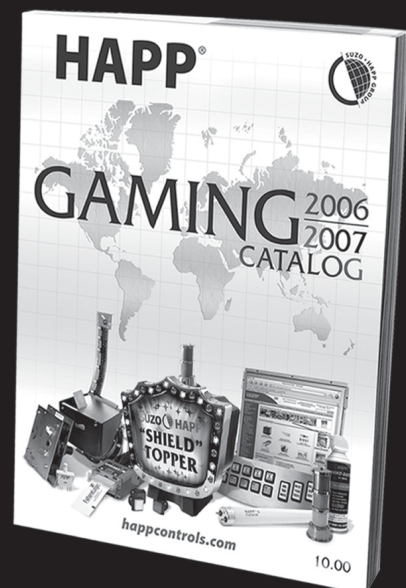
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## SDS Door Switches - Another View

By Ted Befus

nections on the cherry switch so that when a door is closed and the switch plunger is depressed the MC250 sees continuity. I found out from Bally that there is an option in the software that allows you to specify whether the MC250 sees continuity as door open or door closed.

- From a security standpoint, having a MC250 see an open circuit

as a door closed condition is the least reliable arrangement. It's least reliable because a disconnected or broken wire can give you a false door closed signal and will not detect an illegal door entry.

Edward Morgan  
Bench Technician  
Harrah's Louisiana Downs

I don't know if any of you will recall my last article on SDS reports, but for those who do I'd like to add another point of view to the function of the door inputs to the Mastercom 250.

I received an email from Ed Morgan, a bench tech for Harrah's Louisiana Downs. He informed me that the SDS system in his casino is running its door switches in the exact opposite fashion that I reported in my article.

Here is his email:

From: Ed Morgan

Hey Ted,

Just wanted to make a couple comments about your article in the February issue of Slot Tech Magazine.

- The switch wiring that you described is exactly the opposite at our casino and opposite of every other SDS-running casino I've been to. We have our switches wired to the normally open con-

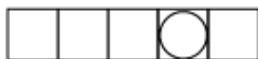
## JAMBLE

Unscramble the words below.

HAMT



DARAW



MOLSBY



PEMORE

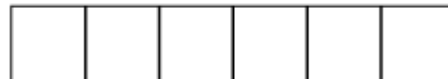


KPABLENCA



Arrange the circled letters to solve the question:

The ex-basketball player who was a member of the drop team was an expert...





Needless to say this intrigued me. So, after placing a call to my contact at Bally Systems I put the question to him.

How can someone change from normally open lines to normally closed lines? After all, when we did our install a little over a year ago nobody from Bally mentioned anything about being able to use those lines in a normally closed fashion.

After speaking to Bally it turns out that you can request that feature be included in your GMU code before they burn your ECO chips. For those of you who are running normally open leads and may want to change them to normally closed, be sure to keep this in the front of your mind (as opposed to the back of your mind where it can get pushed to the side).

Ed's email made a lot of sense. In our case, if you're running the doors normally open and a wire breaks, you won't see a door open status when the door opens (since the GMU leads will never see closure). To be honest, the thought never crossed my mind.

What helped compound that scenario was a recent conversation with Randy (editor of this magazine) in regards to this very query. He compared this setup to the setups of an older home alarm system where the entire system is closed, any break in the line sets off an alarm.

Now I really had something to think about so back to my contact at Bally systems I went, armed with the question of WHY. Why does Bally run the door inputs in this fashion? Wouldn't it make more sense to run them normally closed?

It turns out that before any software is created, the client must fill out a customer information sheet that contains the parameters for your ECO chip. This is one of the parameters on that customer information sheet. Bally has left it in the hands of the customer to decide how they want those features incorporated. I guess when our casino filled in the

sheet, they must have decided to leave the switches normally open.

Hopefully this will clear up any confusion anyone may have regarding these door switch inputs.

- Ted Befus  
tbefus@slot-techs.com

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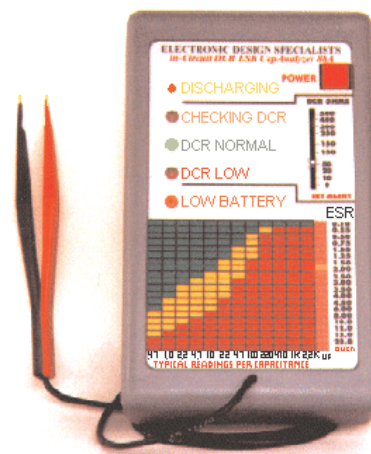
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# Third Party Develops New S2S Protocol Tool Kit

## S2SConnect Now Available

Since its announcement last year to allow and encourage independent third-party development of protocol tool kits, companies have been progressing steadily on test suites for Gaming Standards Association protocols. Now GSA is proud to announce the release of a tool kit for its System-to-System (S2S) protocol.

Illinois-based technology company Digital Dynamics has developed and released S2SConnect, which enables gaming manufacturers to quickly add S2S to their gaming products. S2SConnect contains a number of value-add features, including synchronous and asynchronous support, client and host support, automatic communication retries, message validation, a pluggable network transport layer and type safety.

GSA President Peter De Raedt said, "Our goal is to encourage third-party companies to develop tool kits for our protocols to drive the speed of implementation. We are very pleased that Digital Dynamics answered that call. We believe that the industry will be excited about their S2SConnect tool."

Digital Dynamics has been working with GSA for several years towards gaming protocols standardization. More information about the new S2SConnect tool kit is available on the company's website, [www.digdyn.com](http://www.digdyn.com).

Tool kits are development suites that accompany standards and allow game manufacturers to implement and test the standard on their equipment. Casino operators can use the tool kits to improve their operational efficiency.

GSA's S2S protocol provides the foundation for multi-system management of casino floors, allowing player tracking, ticket-in-ticket-out (TITO) and accounting systems from multiple manufacturers to co-exist on a single casino floor.

About the Gaming Standards Association (GSA): The Gaming Standards Association (GSA) is an international trade association that creates benefits for gaming manufacturers, suppliers, operators and regulators. We facilitate the identification, definition, development, promotion, and implementation of open standards to enable innovation, education, and communica-

tion for the benefit of the entire industry.

Since its incorporation on May 6, 1998, GSA has members representing a wide cross section of the global gaming industry. Platinum members include Aristocrat Technologies Inc.; Atronic Americas LLC; Bally Technologies, Inc. (BYI); E-Genting Holdings Sdn Bhd; FutureLogic, Inc; Harrah's Entertainment (HET); International Game Technology (IGT); Konami Gaming Inc.; Mars Electronics International; MGM Mirage (MGM); Multimedia Games, Inc. (MGAM); Progressive Gaming International Corporation (PGIC); Rocket Gaming Systems; Seminole Tribe of Florida; and WMS Gaming Inc. (WMS).

Other members include: 3M Touch Systems (MMM); AGMMA – Australasian Gaming Machine Manufacturers Association; Alliance Gaming Services; American Gaming Systems; Aruze Gaming America, Inc.; Atronic Systems; Austrian Gaming Industries GmbH; Belatra Co., Ltd.; BMM North America; Bounty Limited; British Columbia Lottery Corporation; Cadillac Jack; CashCode Company Inc.; Casino Tech-



nology; Cummins-Allison Corporation; Cyberview Technology (CYBS); Cyberdyne Systems, Inc.; Dakota Nation Gaming Enterprise; Digital Dynamics Software, Inc.; DigiTech Systems Co., Ltd.; Euro Games Technology; Flint & K, Inc.; Foxwoods Resort Casino; GameLogic, Inc.; Gaming Consultants International; Gaming Laboratories International, Inc.; Giesecke & Devrient; GGS-US LTD; Global Payment Technologies Inc. (GPTX); GTECH Corporation (GTK); Himecs Co, Ltd.; Hotel Technology Next Generation; Hyatt Gaming Services, LLC; Incredible Technologies, Inc.; Intralot S.A. (INLr.AT); JCM American Corporation; Jofemar, S.A.; Money Controls; MotorCity Casino; Multi-State Lottery Association (MUSL); Nick Farley & Associates; Nidec Sankyo Corporation; NRT Technology Corporation; Ontario Lottery & Gaming Corporation; Penn National Gaming, Inc.; Radical Blue Gaming, Inc.; R. Franco USA; Scientific Games (SGMS); Shuffle Master, Inc.(SHFL); Summit Amusement & Distributing, Ltd.; Transact Technologies (TACT); Unidesa Gaming & Systems; UNLV International Gaming Institute; Video Gaming Technologies, Inc; Viejas Casino and Western Money Systems.

For more information, visit [www.gamingstandards.com](http://www.gamingstandards.com).

## Harrah's Selects JCM

JCM American Corporation has announced that Harrah's Operating Company, Inc., has selected JCM as a preferred bill validator vendor for its properties. The decision was made after Harrah's conducted a technical evaluation of JCM's award-winning Universal Bill Acceptor (UBA®) validator software and hardware.

"JCM and Harrah's have had a long beneficial relationship for both companies, and we are happy to see that continue through a preferred vendor relationship." Ken Weil, Senior Vice President of Gaming at Harrah's commented.

JCM President, Aki Isoi, said, "Having Harrah's validate our technology speaks volumes, and we appreciate and value our relationship with them."

JCM American Corporation provides products, software and services to the amusement, gaming, kiosk, retail, transportation and vending industries. JCM's manufactures products such as the Universal Bill Acceptor (UBA®), Intelligent Cash Box (ICB®), Trident® Table Safe System, Optipay® cash recycling system and DMV Self-service Kiosk. JCM is a subsidiary of Osaka-based Japan Cash Machine, with subsidiaries in Düsseldorf, Hong Kong, London, Macau, and Sydney.

For more information, visit [www.jcm-american.com](http://www.jcm-american.com).

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### FOR IMMEDIATE RELEASE



### **NANOPTIX INC. LAUNCHES *PAYCHECK™ SLIM* GAMING PRINTER DESIGNED FOR VERY SLIM CABINETS**

Nanoptix Inc., manufacturer of the world's fastest and most reliable line of gaming printers has added a new printer to its existing line of Paycheck products called the *Paycheck™ Slim* printer. Designed specifically for SLANT and SLIM cabinets, the Paycheck Slim printer has 50% less depth than a regular printer making it the slimmest vertical printer on the market. The printer can easily fit in any space restricted cabinet. Its innovative design enables easy access to the paper tray allowing slot attendants and floor personnel to complete loading paper within seconds. The Paycheck Slim printer offers the same industry-leading features as the Nanoptix Paycheck™ 3 gaming printer such as: hot-swappable, jam-resistant bezels and high speed printing. The printer has a standard 14-pin Molex latching connector compatible interface making it a drop-in replacement printer.

#### **About Nanoptix**

Nanoptix Inc. is a global thermal printer solutions provider for the Gaming, Lottery, Amusement, Kiosk and Point-of-Sale markets. Nanoptix has earned a reputation for excellent value as well as outstanding customer service and support.



#### **Contact Information:**

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Marketing Manager  
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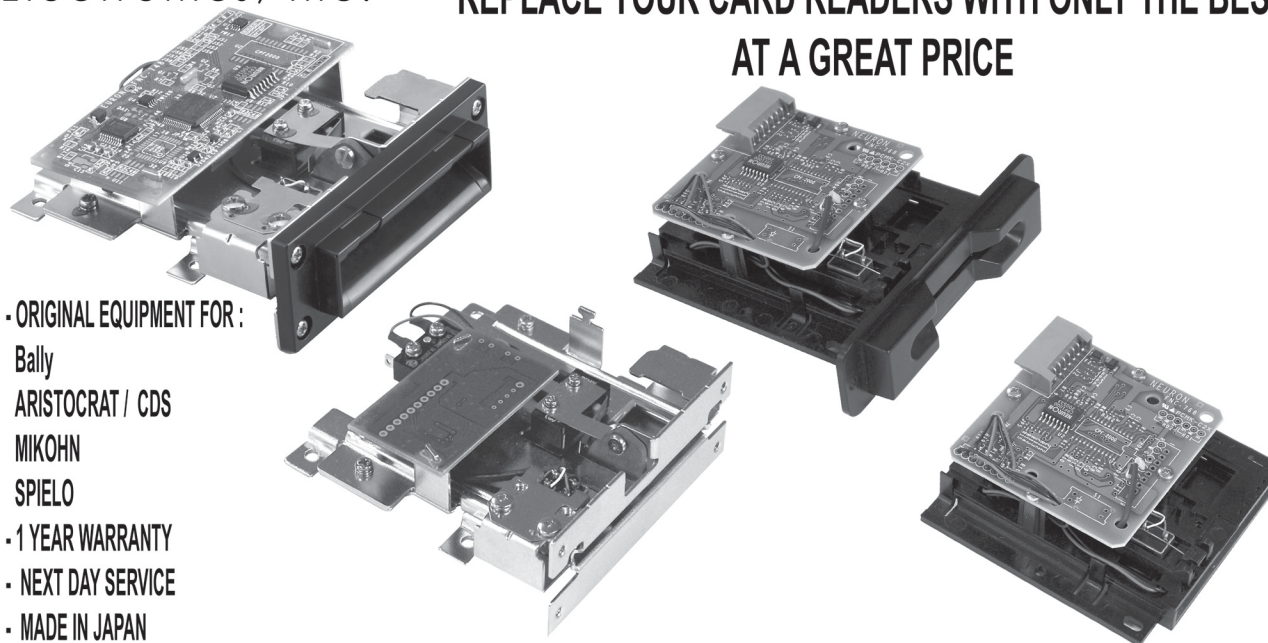
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## Slot Tech Facility Upgrade

### HVT Showcases Upgraded LCD Panel Services Facility

ESD-Controlled Workspace Ideal for LCD Panel Remanufacturing in North America

**H**ong Video Technology, Inc. (HVT), a leading provider of custom services for LCD panel displays and digital light engines, has announced that it has remodeled and upgraded its services facility, including the addition of a showcase class 10,000 clean room.

The new, custom built clean room expands HVT's clean environment capacity ten-fold. The 1700 sq. ft. class 10,000 clean room, equipped with the latest custom filtration systems available, is ideal for LCD polarizer replacement on the many LCD products repaired and remanufactured by HVT.

In addition to the clean room, HVT's remodeled facility contains 14,000 square feet of ESD-controlled workspace, including specialized ESD floor grids and complete temperature and humidity control. Services such as LCD bonding, integration and rework are completed to higher standards in the new environment, which includes use of class 100 workstations for protection of ultra-sensitive display components.

HVT also refurbishes digital light processing (DLP) light engines, and built a custom darkroom to triple its capac-

ity for DLP light engine alignment and testing.

"Having a newly remodeled facility, with a sizable clean room and other new facility features, establishes HVT as the ideal partner for manufacturers and OEMs seeking to repair and remanufacture LCD panels and other display products," said Chris Fabian, an independent Consumer Electronics consultant for Hong Video Technology, Inc. Mr. Fabian explains: "In today's display market, every manufacturer is continually adding new features and performance into a smaller, thinner package. To do this, they must rely on partnering with companies that can support high technology integration, product enhancement and repair or rework of increasingly complex devices."

"The investment made by HVT to completely remodel its entire re-manufacturing facility demonstrates HVT's continuing commitment to its LCD panel, board rework and DLP light engine service niche," Fabian added.

Located in Norcross, Georgia, HVT's facility is by far the largest of its kind in the southeastern United States.

#### About Hong Video Technology, Inc. (HVT)

HVT is the leading outsource supplier of electronic display repair and remanufacturing for LCD panels, DLP light engines, and other progressive electronic display technologies. For LCD panels, HVT performs a wide range of custom services, including integration, optical enhancement, rework, ACF bonding, quick-turn prototypes and end-of-life support. Customers include manufacturers, OEMs and dealers in the consumer electronics, retail, gaming, auto, marine, computer and other industries. HVT has specialized in electronic display services since 1994.

For more information:  
[www.HVTnet.com](http://www.HVTnet.com)  
[inquire@HVTnet.com](mailto:inquire@HVTnet.com)  
tel.770.495.4881



**HVT's newly renovated LCD panel repair and remanufacturing workspace is fully ESD- and climate-controlled.**





"On behalf of Table Mountain Casino I just wanted to express our thanks to you and your team. I couldn't have asked for anything better."

- Slot Technical Manager

## On-Site Slot Tech Training Customized Classes Available

**Randy Fromm's Casino School** is a no-nonsense look at how gaming machines work and how to repair them when they don't. **No previous knowledge of electronics is required** to get the most out of the school. The Casino School is geared for those who want to learn how to fix gaming devices without having to learn complex electronic theory or purchase expensive test equipment.

Be prepared for six hours of accelerated learning each day. Class begins at 9:00 am sharp each day and continues until 4:00 pm. The Casino School provides each student with reference materials and troubleshooting guides that will be valuable aids for repairing equipment on location and in the shop.

**Students learn how to work with:**



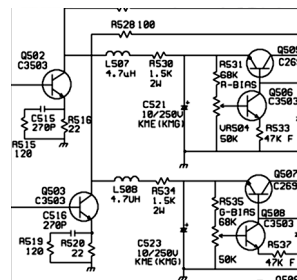
### THE DIGITAL MULTIMETER

This relatively inexpensive piece of test equipment is easy to operate. Casino School students learn to use the digital multimeter to perform tests and measurements that will pinpoint the cause of a failure down to a single component.

### ELECTRONIC COMPONENTS

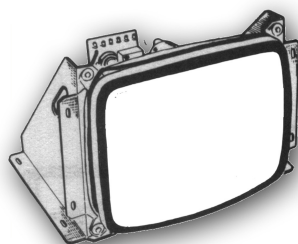
The individual components used in games are introduced. Parts such as resistors, capacitors, diodes, potentiometers and transistors are covered individually. Students learn how the components work and how to test them using the meter.

Schematic diagrams are the "blueprints" for electronics. Learning to read schematics is easy once you know how the parts work!



### POWER SUPPLIES

Power supply failure is a common complaint in many different types of systems. Power supply failures are discussed during the class, along with shortcuts for troubleshooting and repairing them.



### MONITOR REPAIR

The monitors used in video slots are designed for quick, easy, and safe repair. Students will learn the theory of operation of all types of monitors and how to repair monitors down to the component level. Of course, monitor safety will also be discussed.

**You do not have to send your slot techs to Las Vegas or Atlantic City for training. The Casino School brings the training to you. Contact Randy Fromm's Casino School today to reserve a date for your tech school**

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Slot Tech Magazine is strictly technical. As such, the magazine's contents are not time critical. The repair information and technical data contained in past issues is just as valid today as it was the day it was published.

Additionally, current and future articles more-or-less assume that readers are already familiar with what has been covered in past issues. This editorial policy assures that Slot Tech Magazine's contributing writers are not limited to "writing down" to the level of a novice technician but are free to continue to produce the most comprehensive technical articles in the gaming industry.



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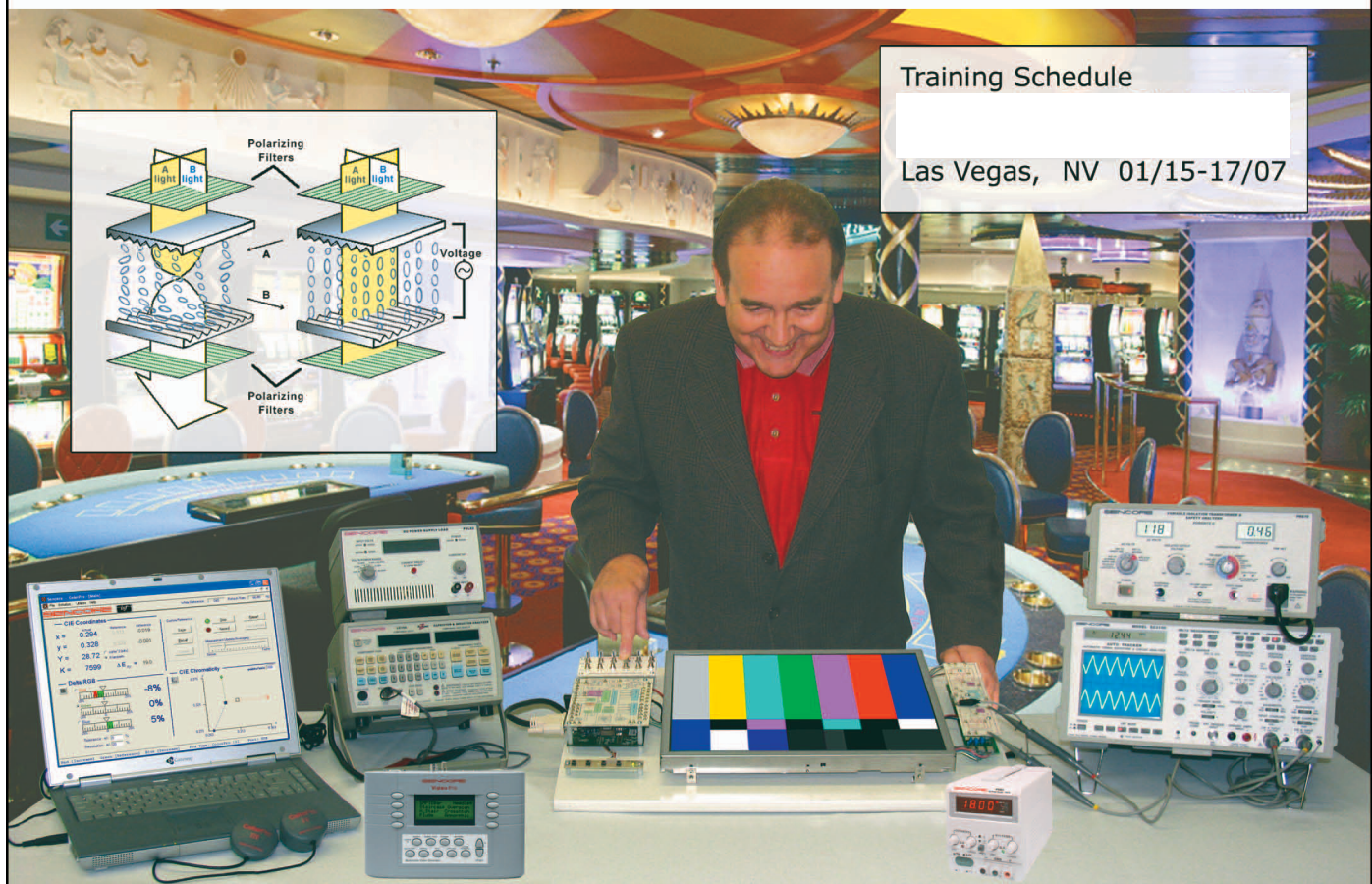
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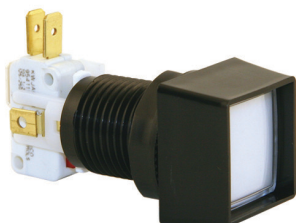
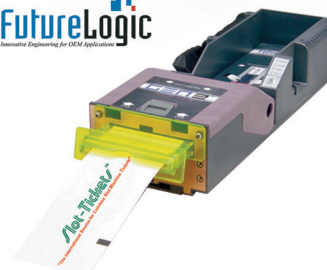
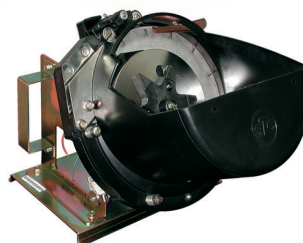
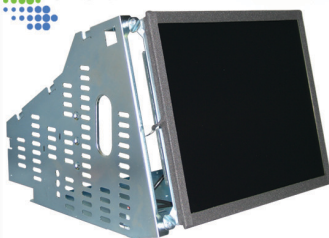
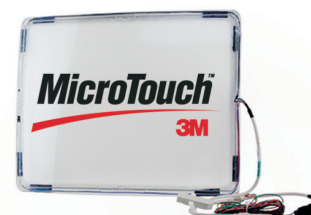
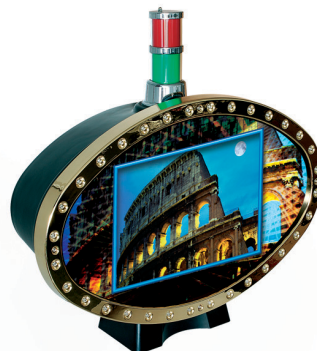
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