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# January 2007

Page 4 - Editorial

Page 6 - Quick &amp; Simple Repairs #21

## Page 12 - New Slot Resolutions

## Page 18 - TechFest 14 Review

## Page 22 -SDS Yet Again

## Page 28 - Oasis - Parts 5 & 6

## Page 34 - The Weakest Link

## Page 38 - Subscriptions and Order Form



## Ceronix's Troy Nofziger was all smiles at TechFest 14

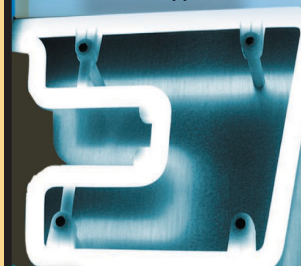
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On the day of the Winter solstice, a solitary beam of light penetrates the small window of the Slot Tech Lab and lands precisely on the centered crosshairs of my Sencore SC3100 Waveform Analyzer oscilloscope. So it is this morning as I write this and we celebrate the end

of another year. I want to thank you all for spending it (our fifth!) with Slot Tech Magazine. This past year, we were able to present some extraordinary service information to you, our readers and, if you don't mind, I'd like to take just a moment to thank all of our contributing writers for their outstanding efforts. To Herschel Peeler, Pat Porath, Michael Brennan, Ray Holdren, Robert Jewell, Penny Rounce, Ted Befus, Jason Czito, Russ Wigé, Jesus Garcia, David Spence, Jr., John Wilson and Paul Cornish I say thank you and congratulations on helping me put together this wonderful magazine. I certainly couldn't have done it without you.

I'd also like to thank our advertisers. You see their advertisements every month here in Slot Tech Magazine. This month, as you thumb through the magazine (sorry . . .



as you are pouring over every word and scrutinizing each page in the magazine) please take a moment to reflect on the fact that THESE are the companies that support you, the slot techs. Oh sure, they may be trying to sell you something (something you need) but all of them are actually showing their support by advertising in Slot Tech Magazine. Most have been with me since day one and I couldn't continue publishing without them. Thank you, thank you, thank you.

Happy new year. I'll see you at the casino.

*Randy Fromm*

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Page 5



# Quick & Simple Repairs #21

By Pat Porath



What kind of game is that? This game in particular is pretty cool looking. When they were unloaded and unpacked off of the truck, I had to ask, “What kind of game is that?” The response was a “Bally Cinevision.” The player panel is totally flat and the upper half of the game is pretty much flat. Unusual if I may say for a video slot machine. Once the game was powered up and setup, it was seen right away where the name “Cinevision” came from. While sitting at the game, it is BAM, RIGHT THERE. A massive 24 inch corner to corner “wide screen” effect, 16.9 aspect ratio found in theaters. Pretty darn cool. The other features are CF card technology, no EPROMS to bend legs on, RAM clear procedure with a CF card, and a trademarked “Privacy Zone.” This is to eliminate distractions and give the illusion of a private gaming area. Another cool feature is the “surround sound” effect. Do you think that with a wide screen and surround sound,

that is where Bally came up with the name “Cinevision?” There are even blue lights that shine on the built in foot-rest of the game. The bill acceptor, the player tracking panel, and the printer are all on the same “horizontal line” which would make this game extra customer friendly. I had to take a second look at how the “GEN 2” ticket printer was installed. It is VERTICAL. With 12 years in the slot department, this is the first time I have ever seen a vertically mounted ticket printer in a slot machine. To prevent the paper from falling out of the paper tray, it has a neat cover on it. All in all, these are really cool games.

### IGT I-game Monitor Problem

We (the slot techs) have been working on our expansion project quite heavily lately, and I thought I had best spend a day working on games on the current floor. I noticed that an IGT I-game was shut down, and I didn't know why. The game was powered up and right away the problem was quite obvious; black monitor. I knew this because there wasn't a picture (duh) and the main processor lights were lit up. The shop was checked for a spare and there was one, but



it had a tag on it “needs touch screen.” Did it need a touch screen controller or was the sensor bad? I wasn't sure at this point. The monitor was inspected and sure enough, the touch screen controller was missing. Ok, I have two monitor assemblies that aren't working, one game down; why not make one good one? I simply installed the original touch screen controller on the replacement monitor assembly and fired up the game. YES! I had a picture! But, what about the touch screen? Was it only the board that was missing or was it not? The touch screen was calibrated and a “figure 8” pattern was made



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on the screen to check all of the areas of it and all was perfect. The only problem with the replacement WAS only the missing board. The game was back "online."

### **IGT S2000 - No Display**

This situation was a new one on me, very weird, and didn't make much sense. This particular game is an IGT S2000 that had an error that caused the seven-segment display to read "no display" (It was spelled out "n-o-d-i-s-p-l-a-y"). At the casino where I work, we have at least a few of hundred S2000s and this specific error is very unusual. I had messed with the game a week earlier with no luck. The main processor was reseated, so were the IO cards. The problem still remained. I thought about a RAM clear but the bill acceptor was flashing and so I thought why not remove it and try to fire up the game without it? With the bill acceptor removed, the game was powered up. What was this? The game had fully booted up to NORMAL. Was the UBA preventing the game from booting up properly? At this stage, it sure looked like it. The bill acceptor was installed "hot" and there were obvious errors right away, such as "no display." I went up to our shop and sitting pretty as could be was a perfect UBA with IDO 24 sitting pretty. The replacement was installed in the game (with the power off so the NETPLEX could see it) and WHAMO, the game came up perfect. A

bad UBA took down the whole game. It was replaced with a spare and the game was back online.

### **WMS Bluebird and Rare UBA Problem**

While setting up and testing games "live" on our newly expanded gaming floor, we ran into an unusual problem with a Bluebird and a JCM UBA 10SS. Before we could test this particular game, it had a bill acceptor problem. Did it happen to get swapped out with one on our current floor, it was it simply bad? We weren't sure at this point yet. First, of all the connections and dipswitches were checked. The stacker was seated properly. It "cycled" perfectly fine but in idle game mode, it would turn itself off. The bill acceptor even worked in diagnostic mode. It would take a dollar bill, read it, and reject it. What was going on? We took a KNOWN good BV, and swapped it with the game next door. It STILL didn't work. At this point I was stumped. Then the WMS tech clued me in. If a known good UBA shuts itself down in game mode but works perfectly in diagnostic mode, the game needs a RAM clear to cure the problem. I had never heard of such a thing. The game was powered down, RAM clear card 1350 was installed, and "RAM CLEAR COMPLETE" was displayed. We inserted the game card (which was a Reels O'Dublin) and once everything was loaded. The BV light was bright as could be. A dollar

bill was tested and it worked great. One minor problem and one minor cure, once you know what to do.

These new WMS games are cool. Our customers will love them. One awesome feature is the player selectable volume control. I don't walk the gaming floor a whole lot but it happens one in a great while that a customer requests the volume to be turned up or down on a game. Only a few weeks ago, a customer asked if the game volume could be lowered on a WMS "Jackpot Party Progressive" game. I showed her that she could do it herself. She was very happy that the feature was available. She stated she loved the game but the sound was almost overwhelming. I turned it down. Another happy customer.

### **The Nightmare of The CDS Data Line**

As if we didn't have enough going on at the time, two banks of machines weren't communicating with the tracking system. We had a ton of things happening so this was definitely NOT a good time for two banks to do down. To give a bit of perspective to those who don't know, slot attendants and slot floor supervisors have to do "overrides" on all the payouts done in that area because a jackpot signal isn't sent from the game. Instead of paying out tickets, it will lockup for a jackpot. On some of the games, it will print out a ticket but the sys-





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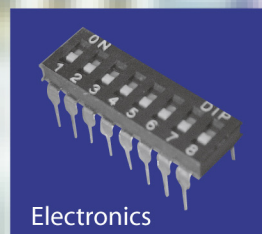
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tem won't recognize it once it is scanned at the cashier cage. So, a floor supervisor has to verify, and sign the ticket. Overall, a "reel" pain. Why weren't these two banks communicating? I looked at the "poller" screen (the computer that the data port and machines are connected to) and it was only some of the games were down. This told me that the data line wasn't disconnected and the Data Port unit should be ok. (One data port unit can hold up to 24 games)

The two banks were located and troubleshooting techniques were started. A "terminator" (which is a two-pin jumper that is connected to the COM out) was put on the last game in bank one and the problem still existed. This told me that it almost had to be in the bank somewhere. COM chips were replaced in some of the Sentinel boards, one sentinel board was replaced, the "terminator" was moved to only have the first six games connected, and NOTHING seemed to help. What was up with this? Why not try disconnecting the game interface cable and see what happens? Instantly the green communication light started to flicker like crazy, which meant great communication was established. I tried it on a few more games...SAME THING!

I had to have help with this ordeal. I had gotten some help, and first we thought it was a game grounding issue,

but it turned out it wasn't. It was then decided, it looked like a bad data line. I found a box of cable and opened the sub floor up and located it. The cable was cut and a new line was tied and taped up to try to pull the bad out and a new one through. While in the Data Port room, I started to pull on the line and after six feet, the problem was found. Somehow, some way, the cable was mangled and chewed. FINALLY, an embarrassing six hours later, the problem was found. Bare wires were exposed, touching each other, shorting it out. Luckily there was enough slack to put on a new Molex connector. I went back to the area which was cut earlier and redid that connection. A Molex male and female with

a little help from electrical tape to make sure it was a good connection and it wouldn't get pulled apart. The connection was made at the Data Port and it looked pretty good but I had to put everything back together that had been torn apart at the bank of machines. Once it all was intact, the sentinel lights were flickering strong and the poller screen was checked. This time it looked PERFECT. All 24 of the games on the bank were communicating perfectly. Finally, the two banks were back online. How did the line get chewed up? Who knows? More unusual things have happened in the past. The main thing is, it is working.

- Pat Porath  
[pporath@slot-techs.com](mailto:pporath@slot-techs.com)

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# New Slot Resolutions

By Michael Brennan



It's that time of year again--the time when people see the calendar flip and get motivated. They pledge to eat a healthier diet, stop beating the kids, lay off the smokes, and finally pull that \$29.95 abdominal do-hickey out from under the bed in order to start sculpting those six-pack abs.

Yes, January is when seemingly everyone trots out a list of resolutions--commitments that are lucky to see the light of February day.

I've always been leery of and a bit annoyed by New Year's resolutions. Why January first? Are we that wowed by the last digit at the end of the date that it inspires us to make massive changes to our lives, lives that are already firmly based on years of ingrained habits?

"Why not begin a healthier lifestyle on, say, May 12," I've often thought. I guess a May 12 resolution doesn't have the same ring.

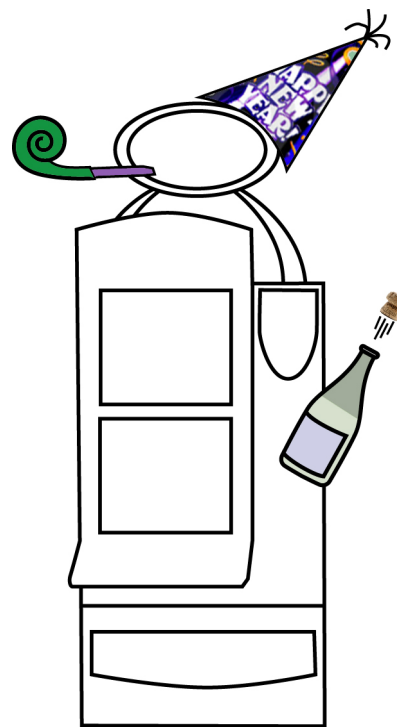
Or why not get off the couch tomorrow, for that matter, since tomorrow could be the first day of the rest of your life (Motivational message sponsored by Atronic!).

Despite all my issues with New Year's resolutions, I will hypocritically embrace the concept, since I am using it for this article's theme.

With that resounding introduction, we'll move on like the Times Square New Year's ball. So, the New Year is upon us and we all have to sign checks with a new final digit. But before you push that Ab Roller back under the bed and search frantically for a pack of anything (even Virginia Slims) here are some New Year's resolutions to remember when working on Atronic e-motion machines:

"I will always make sure the machine is plugged in." Believe it or not, it has happened.

"I will never again take a shortcut and hot-swap any components." The temptation to hot swap may be there in order to avoid waiting for our prolonged power cycle



time. But realize that when you plug a printer in hot, you're dealing with 24 volts. Plus, re-seating a logic box board while the game is on will require a game restart anyway.

"Before I begin trouble-shooting any component, I will check the e-motion fuses." A quick check on the fuse LEDs on the signal filter board will show you if a fuse is out. It's an easy thing to do, and could save hours.

"When dealing with peripherals, before I do anything I will make sure they are completely seated." Push these puppies into their ports before you get into any more



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complex procedures.

"I will not forget to check plug connections." Replacing a TFT can be an arduous process. Make sure its cable connectors have not shaken loose before stripping down the playfield to change out a monitor. Plus, a quick check of the connectors on circuit boards, the power supply, and other components should be the first step in trouble-shooting the item.

"I will not forget to make sure circuit boards and chips are fully and properly seated." It's repetitive, but not only can peripherals and plugs loosen and cause issues, circuit boards can come unseated. A blank or malfunctioning monitor may be caused by a loose graphics card. Plus, you know the problems that can arise from a misaligned EPROM pin.

"I will double-check my inventory before a service call." For traveling technicians, preparation is key--not having a part on-hand can be frustrating.

"Before I stomp my feet about a ticket not being accepted by a game, I will be sure to try a couple things..." There are three easy items to inspect before delving into the TITO peripheral/game/system quagmire. First, if a validator won't accept a ticket, make sure a TITO dongle commkey is present on the Atronic commboard at P5 (and its solder legs are unbroken). Second, make sure

the machine is connected to an accounting system. The machine needs the system to accept/print a ticket, because the ticket bar code is associated with a dollar amount but the funds exist in the accounting system. Finally, look at the configuration portion of the software and make sure "voucher redemption" is enabled.

"I will not get sloppy with circuit boards. Although I know the consequences, I often forget that carpet floors and cloth chairs can cause static that can hurt circuit boards. I will not lay a removed board directly onto a casino chair. Also, to avoid shorting out a board, I pledge to handle boards by their edges and I will constantly wear my snappy anti-static grounding work boots."

"I will keep my bill validator neat and clean." Some bill validator issues are caused by a "dirty" head. If a ticket is slow-moving, before you pull out the BV and check harnesses and systems, give it a cleaning first.

"I will not go blaming software until I have checked voltage levels." Our TTL board components are specified to function from 4.75 to 5.25 Volts. If the voltage is significantly less, the software will probably misbehave. If the voltage is much higher, you've got other problems. The e-motion power supply is adjustable.

"When performing a conver-

sion, I will not forget to swap the TINY." TINYS are security devices tied to game titles. When you convert a title, you must also convert the TINY, which is located on the main board.

"When returning merchandise like signs parts, I will place all components in the proper containers, secured properly to prevent damage." Packaging and shipping is often overlooked. Improper packaging can cause damage and definitely causes headaches in manufacturers' receiving facilities.

"I will not be so quick to perform a RAM reset." RAM resets effectively resolve some issues, but they are probably utilized too frequently. Since this procedure effectively erases memory, it shouldn't be used hastily. Try narrowing the problem, perhaps using a wiring diagram to trace and pinpoint the issue, before performing a RAM reset or commboard clear.

"If I must perform a RAM reset, I will capture important information like meters beforehand." When a problem arises that does require a RAM reset, there is a window of opportunity to capture critical information. This data could help resolve the issue at hand. If you quickly execute a RAM reset without capturing information, there will be less data available to analyze, which means there may be a greater chance of the problem occurring again. Capture that data.





"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.

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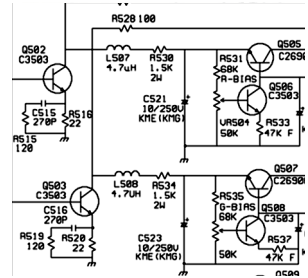
### THE DIGITAL MULTIMETER

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

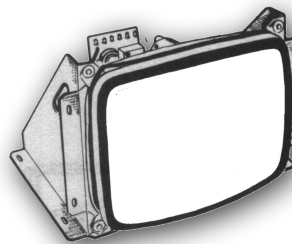
The individual components used in games are introduced. Parts such as resistors, capacitors, diodes, potentiometers and transistors are covered individually. Students learn how the components work and how to test them using the meter.

Schematic diagrams are the "blueprints" for electronics. Learning to read schematics is easy once you



### 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.



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"Since it's a RAM-a-rama, I will be careful with non-volatile RAM when trouble-shooting a main board." Accidentally placing removed non-volatile memory on a metal surface can ruin the RAM.

"Don't forget about the DVD drive." The DVD drive deals with moving components and is inherently more prone to failure than something like a multimedia board. If the game is having trouble starting, check the DVD drive. Maybe the multimedia CD is simply dirty. If you do need to replace the DVD drive, it's accomplished fairly easily; a replacement drive is a part that is available everywhere.

"Before trashing and replacing a sign video loop computer, I will make sure the power is always on, auto-

matic updates are off, the screen-saver is disabled, the FIFO buffers are disabled, the BIOS is tailored, and the virtual memory is properly set." When that video loop is misbehaving and/or the screen goes black or resets, the solution could be one of the items listed above. Specifically, BIOS settings should be set up to boot to hard drive and halt on no errors, and the virtual memory should be custom, the maximum value set to 4GB.

"Speaking of merchandising signs, I will never rotate the sign by hand and I will make sure a rotating sign is completely level." When working on a bank of games, the rotating sign may be in the way, but physically pushing the sign will cause damage to the rotator. Always let the sign

turn on its own. Plus, an unbalanced sign will cause damage as it spins.

"I will make it explicitly known to the drop team (or to anyone accessing the bill validator or hopper) that the sliding coin door latch mechanism is not a slam latch." Although the bottom coin door (which is used to access the cash box as well) slides into place, slamming it shut will not engage the lock. It will only damage the lock.

"I will religiously read Slot Tech Magazine and stop using the Atronic article pages to line my birdcage."

Happy New Year.

**Michael Brennen**  
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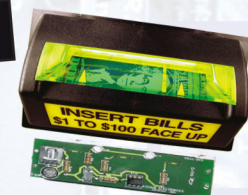
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# TECHFEST 14



AESI's David Oldham addressed the slot techs at TechFest 14.



Ray Holdren presents LCD monitor repair at TechFest 14.

TechFest 14 was held December 5-7, 2006 at the Pechanga Resort & Casino in Temecula, California.

Left and below: David Oldham of AESI presented both FutureLogic printers and MEI's CashFlow bill validator. As head of AESI's technical services, David is more familiar with these two products than almost anyone else in the world.



This TechFest was notable for the inclusion of a full day of hands-on LCD monitor repair presented by Sencore. The full day "bonus session" was presented by Ray Holdren of Kristel, Nevada (left).



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Above: This time, Ceronix sent along their REAL technician, Troy Nofziger, to show us how to REALLY troubleshoot the Ceronix monitor. He showed us how to troubleshoot quickly using just a digital multimeter. He showed us a number of little tricks that help pinpoint problems, sometimes with just a quick, power-off resistance test. This was Troy's first presentation at TechFest. I hope it won't be his last.



Rodney Sevene, Temecula, CA, Greg McKee, Betty Greenwood, Chris Lamberton, Black Oak Casino, Dan Bourque, Eric Carroll, Harrah's Lake Charles Casino, Michael Loftis, Feather Falls Casino, Dinah Gonzalez, Joaquin Fune, Bill Harris, Pechanga Resort & Casino, Tom Thompson, Michael Brennan, Atronic Americas, LLC, Matt Brittian, Chewelah Casino, Prudence Miller, Steven Whitehead, Bluewater Resort & Casino, Phillip Jacquez, Apache Nugget Corp., James Bayton, Casino Pauma, Gregory Fisher, Kevin Broga, Squamish Clearwater Casino Resort, Ben Edwards, James Tobler, Citizen Potawatami Nation, Joseph Levielle, Conrad Bointy, Fort Sill Apache Casino, Hugh Hamilton, Guy Turcotte, Gold Eagle Casino, Mike Winter, Painted Hand Casino, Kelley Boyko, Northern Lights Casino, Beverly Orr, Wes Hedlund, San Felipe's Casino Hollywood, Rudy Madrid, Roy Joven, Manuel Ogden, Eagle Mountain Casino, Juan Rosado, Sky Ute Casino



Right: Actual, genuine engineers from 3M Touch Systems were on hand at TechFest 14 to discuss touchscreen operation, construction, calibration and repair. Mark Roberts (l) and Paul Hatin also came loaded for Bear with technical hand-outs, T-shirts and even some custom, TechFest 14 glass cleaner! A few lucky attendees also received a nice 3M padded bag for a laptop (computer not included).



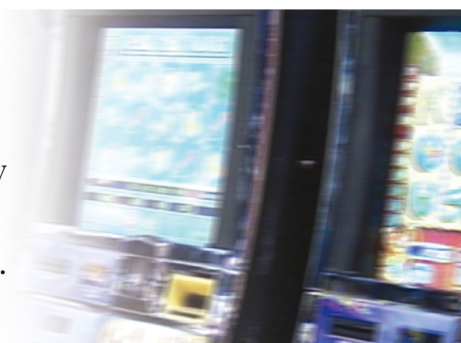
Left: Why can't I seem to take a good picture of JCM's Jack Geller? Once again, I managed a "grab shot" of Jack in action, with his eyes closed. Through my skillful use of Photoshop, I have superimposed a Jack Geller head (eyes wide open) from a previous TechFest. You can't even tell, can you?

Below: Same goes for Ithaca's Russ Wigé. This looked like such a great photograph when I looked at it on the camers's display. It's not but Russ' presentation was. In addition to discussing troubleshooting and repair of Ithaca printers, he also brought a bag of TOF reset chips. Thanks, Russ.



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## SDS Yet Again

By Ted Befus

Let me start by giving you some suggested reading. Please go to the Slot Tech Magazine archive and read both SDS reporting articles by Mike

Thomas (see July and August 2001 issues). These will give you some insight into using SDS spec files to create some very helpful reports.

We're going to discuss the use of some of the other useful diagnostic tools built into the SDS user menus. In this article, we will discuss the use of the MLIST, GMU exception code count report (CODERP) and Slots not communicating report (NOCOMM). All of these re-

ports can be saved to report files (.RPT) or displayed on your SDS terminal. To print .RPT files you need to go into the Print a report menu. From there simply type in the name of the .RPT file (I.E. NOCOMM) and direct the system where to print it.

There's a lot to cover so lets get started.

The MLIST is one of the most useful tools at the technician's disposal; it will

```
$Revision: 82.27.2.4.2.4 $ REQENT.BAS UNIVERSAL (00)

Enter Report Name, "HELP" for report names, or <RETURN> to exit? mlist

Sort by (S)lot Number, (L)ocation <S>?

(S)tandard, (E)xt, (J)ackpot, (U)alidator Report <S> ?
Do you have a file of Machine Numbers (Y/N) <N> ?
Save the entered list of Machine Numbers (Y/N) <N> ?

Slot Machine Number, Line-Address, or /Stand (or <RETURN> if no more) ? 6501
Slot Machine Number, Line-Address, or /Stand (or <RETURN> if no more) ?
Include Ticket Transactions (Y/N) <Y> ? y

Please Enter Dates/Times As: dd-mon-yy HH:MM:SS
From Date/Time ? 05-dec-06 09:00
To Date/Time ?
%Date defaulting to current date
%Time defaulting to current time

Output to this Terminal (Y/N) <N> ? y

Searching TRANS.DAT...
16 records found out of 8982

3 ticket records found
Creating report...

HIT <RETURN> KEY TO DISPLAY REPORT:
```

```

Saskatchewan Gaming Corporation
TRANSACTION REPORT
PAGE 1

FROM: 09:00:00 ON 05-Dec-06 MLIST
TO: 11:04:28 ON 05-Dec-06
MACHINE: 6501 EXCEPTION CODE: ANY
STATUS: ON GAME/GMU DEN: .02/.01 MFR: B GMU EPROM ID: 5RP0953 GMU DOC ID:
TYPE DESCRIPTION: OCEAN DREAMS

* = Slot Door Open
~ = Continued Exception Code

TIME SLOT STAND CARD EMPLOYEE NAME LINE EXC EXCEPTION CODE COINS COINS COINS HANDL D LAST BP FILL CB MSG
NUMBR NUMBER ID PLAYER ID +BONUS+OPT ADDR COD DESCRIPTION IN OUT DROP PULLS F BET JPID HPJP MSG SQ

09:08:31 6501 A6501 8 8-2F 61 PERIODIC REPORT 588043 803906 000000 195756 0 50 12
09:53:38 6501 A6501 8 8-2F 61 PERIODIC REPORT 588043 803906 000000 195756 0 50 12
10:38:44 6501 A6501 8 8-2F 61 PERIODIC REPORT 588043 803906 000000 195756 0 50 12
10:40:54 6501 A6501 1000026656 0000 74 8-2F 39 PLAYER CARD IN (220 588043 803906 000000 195756 0 50 7 13
10:47:48 6501 A6501 1000026656 8-2F 185 Tkt Created Tkt:53620650108352***2 Amt: 69.52 Err: 0 0 5
```



give you complete list of what's been happening with the machine to date. The MLIST can run with or without ticketing transactions, be sorted by slot number or stand location (the default is slot number) and can be set to look for groups of machines or a single slot.

To get started, we will log into SDS. When the main user screen appears, we will select the MLIST option number (this number will vary depending on the configuration of your menu screen). After choosing that option, SDS will prompt you to select the report you want to run (since you can run different reports from that option, MLIST, CLIST etc.) To run the MLIST, simply type mlist and press return. This is where it will ask you to sort by slot number <S> or by location number <L>. The default is <S>. Make your selection and hit return. It will then prompt you to choose exactly which type of MLIST you would like to run. The options are Standard (S), Ext (E) or Validator (V). The standard list is the default. It contains information on coin in, coin out, coin drop, handle and jackpot/fill information. The extended (EXT) contains all that information plus coins collected, coins purchased and player tracking information. The validator option shows bill meters.

For this article, we will choose the standard version. After choosing the format of the report, the system will

January 2007

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ask if you have a file of machine numbers. The default answer is no. If you want to run groups of games on a regular basis this option can come in handy. To do this, you will need a spec (.SPC) file. If you don't have one, don't worry. Keep reading and you'll see why.

Next, it will ask if you wish to save the entered list of machine numbers. This is where you can have the system create a spec file for you. If you choose yes, it will prompt you to enter a file name. It will save it as a spec file for the next time you want to run it. Next it will ask you to enter the machine num-

bers that will make up this report. Enter one machine each time and press return. When there are no more machines to enter, press the return key again.

The system will then ask you if you want to include ticket information. To include this information, answer yes (Y). Lastly, the system asks for the date and time stamps for the beginning and end of the report. This is done in a specific format dd-mon-yy HH:MM:SS. The month must be entered as the 3 letter abbreviation. If you enter the number for the month, the report will have an error and will not run. Time can be sim-

ply entered as hours. There is no need for minutes or seconds unless you need to be that precise.

See the screen shots for an example of how this all works.

From this example we can see a few things of interest. We can see the activity of the machine including ticket transactions, whether or not there was a player's card in the game at the time of the report, all the necessary coin meters, a list of exception codes as well as the meaning of that code as well as the GMU EPROM version.

(CODERP.ADR)

Saskatchewan Gaming Corporation

Page 65

GMU EXCEPTION CODE COUNT REPORT

FROM 04-Dec-06 04:00

TO 05-Dec-06 04:00

EXCEPTION CODE COUNT BY HOUR

HOUR	EXCP	PERIODICS	DUPLICATES	GOOD BOX	BAD BOX	STX	TOTAL
00:00	2,703	917	0	0	0	0	3,620
01:00	2,231	1,027	0	0	0	0	3,258
02:00	1,183	1,165	0	0	0	0	2,348
03:00	806	1,200	0	0	0	0	2,006
04:00	154	1,328	0	0	0	0	1,482
05:00	18	1,314	0	0	0	0	1,332
06:00	870	1,338	0	0	0	0	2,208
07:00	1,245	1,228	0	0	0	0	2,473
08:00	1,383	1,124	1	0	0	0	2,507
09:00	2,130	1,152	0	0	0	0	3,282
10:00	4,961	828	0	0	0	0	5,789
11:00	6,048	625	0	0	0	0	6,673
12:00	7,033	530	0	0	0	0	7,563
13:00	8,375	490	0	0	0	0	8,865
14:00	10,363	355	0	0	0	0	10,718
15:00	8,688	366	2	0	0	0	9,054
16:00	7,595	463	0	0	0	0	8,058
17:00	5,907	539	0	0	0	0	6,446
18:00	5,557	585	0	0	0	0	6,142
19:00	6,504	540	0	0	0	0	7,044
20:00	5,601	607	0	0	0	0	6,208
21:00	5,185	617	0	0	0	0	5,802
22:00	4,145	705	0	0	0	0	4,850
23:00	4,067	761	0	0	0	0	4,828

=====

TOTAL	102,752	19,804	3	0	0	0	122,556
-------	---------	--------	---	---	---	---	---------

(CODERP.ADR)

Saskatchewan Gaming Corporation

Page 66

GMU EXCEPTION CODE COUNT REPORT

FROM 04-Dec-06 04:00

TO 05-Dec-06 04:00

EXCEPTION CODE COUNT BY MACHINE

1 1 1 1 1 1 1 1 1 1 1

0 0 0 0 7 7 7 7 8 9 0

SM	STAND	LINE	8	12	29	37	38	39	78	55	56	60	61	62	71	72	80	89	94	96	97	98	5	6	8	9	1	2	3	6	9	0	10	0	0	TOTAL
4005	A4005	1A-DE	12	0	0	0	0	12	12	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	7	0	0	71



Notice the creation of the ticket at the end of the MLIST. If there had been errors during the creation of this ticket, there would have been a corresponding error code on the far right column of the report under the CB MSG column.

On the extreme right of the column you will find the message sequence (MSG SQ). Notice how on periodic polls the MSG SQ number has not changed (it stays at 12). Our system is setup to poll games every 45 minutes if SDS has had no messages received from that game (since we aren't open 24 hours this happens a lot after we close). Since the game has no updated meters or exception code information to send, the MSG number does not change.

You may be asking yourself "what exactly does this report have to do with diagnostics?" It's simple. This report shows you EVERYTHING that's happening in relation to that machine for ANY GIVEN time period. This report is the first report we run when we're investigating problems of any nature that are system related.

One thing to note that isn't displayed on this MLIST: If the machine's door is open, the machine number will have an asterisk (\*) beside it. In the event that you have machines that aren't reporting jackpots to the system, run this report and look for that asterisk. You may won-

der how a machine can be played with the door open (it can't) but I'll explain it quickly here. The GMU uses a parallel interface to monitor all door switches (just in case machine power drops and there is no serial comms). We had some machines go to our floor with these wires installed incorrectly. When this happened, the GMU interpreted the

EXCEPTION CODE COUNT SUMMARY		
DUPLICATES	3	
1 **NOT USED**	966	
4 SERVICE REQUESTED	234	
8 HOT PLAYER	7,865	
10 HAND PAID JACKPOT	76	
12 ABANDONED CARD	102	
15 ACCEPTOR LARGE BUY-IN	703	
22 BEVERAGE REQUEST	3	
29 DMK FILL REQUEST	7	
35 AUX FILL DOOR OPENED	10	
36 AUX FILL DOOR CLOSED	10	
37 EMPLOYEE CARD IN	493	
38 EMPLOYEE CARD OUT	510	
39 PLAYER CARD IN (220+)	19,446	
43 BAD SPIN REEL #3	1	
46 BACK IN PLAY	97	
48 EXTRA COINS PAID OUT	1	
51 GMU WARM REBOOT	1	
52 JACKPOT END	49	
54 COIN-OUT JAM	6	
55 GMU MALFUNCTION	6	
56 GMU POWER UP	25	
59 HOPPER CAN'T PAY	12	
60 FORCED PERIODIC RPT	244	
61 PERIODIC REPORT	19,804	
62 B L A C K O U T	13	
64 SLOT MACHINE TILT	133	
67 BILL CASSETTE FULL	3	
68 BILL CASSETTE JAMMED	12	
71 SLOT DOOR OPEN	957	
72 SLOT DOOR CLOSED	943	
73 DROP DOOR OPEN	152	
74 DROP DOOR CLOSED	153	
75 ACCEPTOR DOOR OPEN	301	
76 ACCEPTOR DOOR CLOSED	318	
78 PLAYER CARD REMOVED	19,445	
79 BILL CASSETTE REMOVED	317	
80 BILL CASSETTE REPLACE	311	
86 TOO MANY BILLS REJECT	573	
88 CAN'T READ CARD	158	
89 VEND TO CREDIT METER	11,129	
90 COIN-IN JAM	77	
92 ACCEPTOR MECH JAMMED	128	
94 GAME METERS CLEARED	1	
96 BILL CASSETTE DOOR/OP	311	
97 BILL CASSETTE DOOR/CL	314	
100 JACKPOT POSTED	77	
101 FILL POSTED	7	
109 GMU NOT RESPONDING	5	
120 CUSTOMER BEEF POSTED	2	
167 MPU COMPARTMENT OPEN	2	
168 MPU COMPARTMENT CLOSE	2	
171 GAME POWER UP	50	
172 GAME COMM LOST	42	
173 GAME COMM RESTORED	51	
176 SLOT PRINTER FAULT	2,470	
186 ACCEPTOR SW CHANGED	2	
187 ACCEPTOR SW ACK	2	
189 TICKET PRINT	18,052	
190 GAME ACCEPTS TICKET	15,286	
TOTAL .....	122,473	



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doors as being opened when they weren't. Believe it or not, the system is smart enough to know that you can't have a jackpot with the door open, so it does not send the jackpot to the bank.

The next report we're going to look at is the GMU exception code count report. I mentioned this report briefly in my article on SDS troubleshooting (Unlocking the Mysteries of the Mastercom 250 part 1). This report will give us an hour by hour breakdown of system activity, in-

cluding the number of hourly periodic reports and duplicate exception codes as well as a machine by machine breakdown on exception code numbers based on another spec (.SPC) file.

To run this report, go to your SDS screen and find the GMU exception code count report. Depending on the version of SDS you are running, it may be titled code report or exception code report. If you have more than one site on your system, it may request you to specify which lo-

cation you want to report. We have two sites running on SDS that I monitor, so I run the report for both.

SDS will then ask you to specify the file name where the exception codes for the report are listed. This is another spec file, SDS defaults to their created file CODERP.SPC. If you want you can modify this file or simply create your own spec file for this report. The CODERP file contains the specific exception codes you want to report on for each machine. If you want to use this file simply hit enter. The system will create 3 separate CODERP files for you to choose from. They are C O D E R P . N U M , CODERP.ADR and CODERP.LOC. The difference between each is the way the reports are laid out. CODERP.ADR lists the games by their slot addresses, CODERP.NUM is sorted by machine number and CODERP.LOC is sorted by slot location.

Again, see the accompanying screen shots of this report.

There are a few things to look at here. Firstly, we're going to pay particular attention to the duplicate code numbers. We like to see that number at less than 50 for the entire day. If you look towards the bottom of the screen, you will see a list of commands that you can use to navigate through the entire file (they don't show up on the screenshots I took, so you'll

```
$Revision: 82.3 $ NOCOMM.BAS UNIVERSAL (00)

1. Casino Regina
2. Casino Moose Jaw

Which Area To Report On (1-2) <ALL> ? 1

Reporting On: Casino Regina

Check last 1, 2, or 3 hours (1,2,3) ? 1

Output to (T)erminal or (R)eport <R> ? t

WORKING...

(NOCOMM.RPT)          Casino Regina          Page: 1
05-Dec-06 12:47    GMUs Not Communicating in Past 1 Hours

  STAND  SLOT  LINE
  NUMBER NUMBER ADDR          DATE    TIME
  -----
WORKING...(COMPRO)
WORKING...(COMPR1)
WORKING...(COMPR2)
WORKING...(COMPR3)
WORKING...(COMPR4)

0 machines found.

HIT <RETURN> KEY TO EXIT
```



have to take my word for it.) If you advance through the file, you will come to a game by game breakdown of all the exception codes that are laid out in the CODERP.SPC file. These codes are listed in a header at the top of each page. The codes are laid out in the exact order that they appear in the SPC file. The second to last column on the right of the page is for all other exception codes (OT). We want to look for games with very low or very high exception codes (that will vary depending on how busy your floor is, obviously if a game reports 0 exception codes that's a problem that needs investigating. As far as how many codes are acceptable is up to you to figure out.) You need to pay attention to certain things. Exception codes for opening and closing doors should be a close match. Exception code 86 (too many bills rejected) can be a sign of validator problems. Exception code 51 (GMU warm reboot) is a sign of a failing GMU power supply. Keep a close eye on these things. They'll save you troubleshooting headaches in the long run.

The next report is a real no-brainer, the Slots not communicating report. This is simple to run. When run, the first thing SDS will ask is if you want to create a new copy or use the existing one (warning: creating a new copy will overwrite the old one). It just makes sense to create a new one as it will give you an updated status of your floor.

Again, just like the Exception code count report, if you are running multiple sites it will ask you which site you want to report on. The system will ask you if you wish to report on the last one, two or three hours. I'm not sure why they do this. If the machine has been offline for the last three hours, you're going to find it if you ask for the last hours activity. The report will show any games not currently communicating.

See the screen shot of this

report

This is really simple, if there is a machine that hasn't communicated, the report will give you the game number as well as GMU line address and the last time the game communicated.

I think that is enough for now, since my brain is starting to melt. We'll continue this in another issue.

**Ted Befus**

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By Jason Czito

## Chapter 5 The ONC and Poller

ONC stands for Oasis Network Controller. All the ONC does is convert RS-485 to RS-232 and vice versa. It does not buffer data. Some Poller configurations require this protocol conversion, and the ONC provides this service. Power applied to the ONC will light the red light circled in red. Note that it is a light, not an LED, and may be prone to burning out.

Power applied to the ONC will also light the red “En” (enable) LEDs. If these LEDs don’t light when power is applied, there is a problem on the internal boards. When the Poller is communicating through the ONC, the yellow “Tx” LEDs will light. When the DPUs are communicating through the ONC, the green “Rx” LEDs will light.

The ONC handles eight channels of communication. Each channel’s status is indicated by the LEDs: Enabled, Poller communication, and DPU communication. Each of the eight channels has one port

that connects to the Poller (outlined in green) and two ports for incoming traffic from the DPUs (outlined in yellow). A single channel has been outlined in blue: note the two incoming ports and the one outgoing port.

Each of the sixteen incoming ports may have its own line of DPUs. It is not necessary to have both incoming ports in use. With a theoretical maximum of 31 DPUs per line, the ONC could potentially handle 496 DPUs, although CDS only recommends a little over 400 as the maximum (26/port = 416).

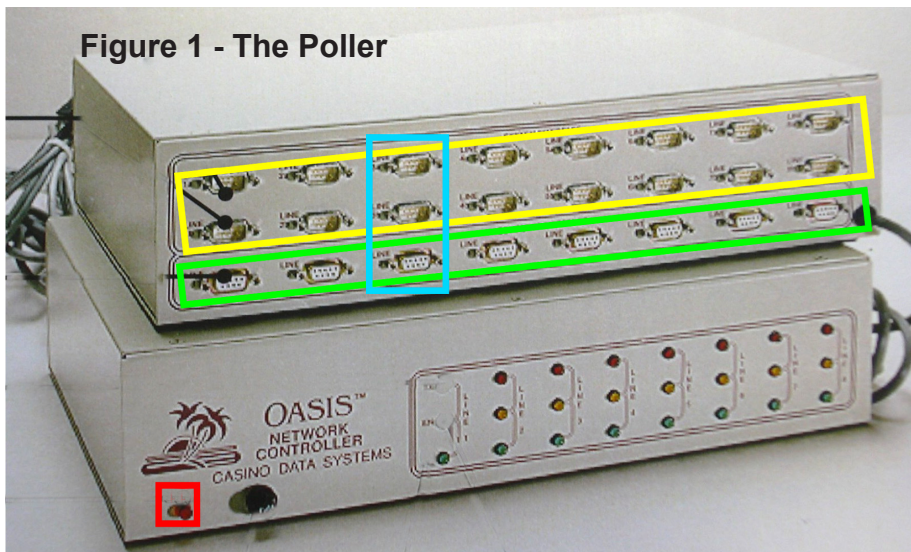


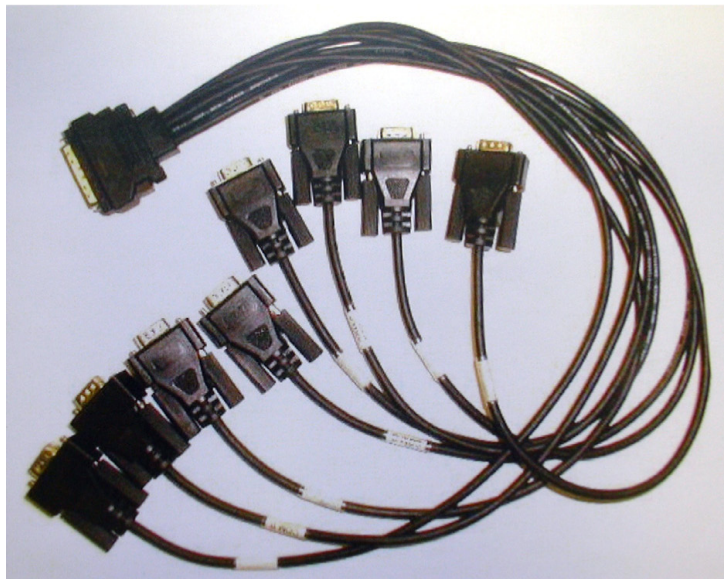
Figure 1 - The Poller

A functioning ONC will have all three LEDs flickering on those communication channels that are communicating correctly.

### The Poller

The Poller is a workstation that runs the Poller software. If its interface card communicates in RS-485, it will connect directly to the DPUs using the Spider Cable. If it communicates in RS-232, it will use an ONC to



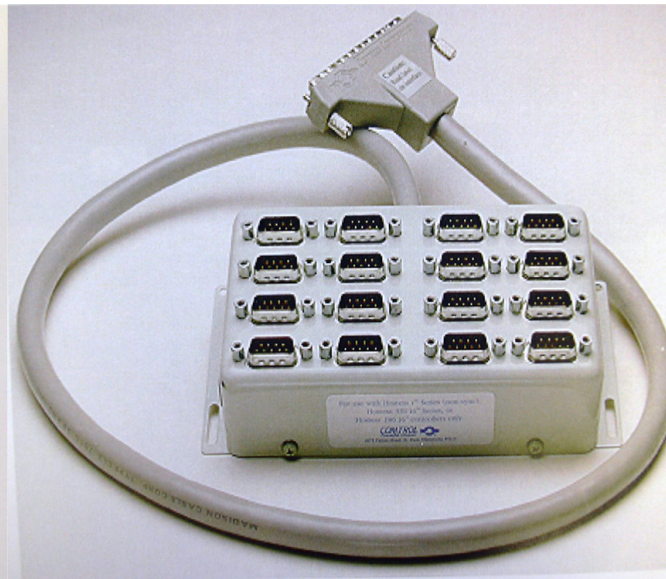


### Spider Cable

translate the RS-485 from the DPUs to RS-232, using the Pigtail cable on the right to connect to the ONC. While the Pigtail pictured has 9-pin serial ports, some use 25-pin parallel ports, and have cables to match.

An "Access IO" board may be used in the Poller. It is a 32-bit PCI card and handles RS-485 directly. The Spider Cable connects it to the DPUs.

A "Hostess" board also may be used in the Poller. It is a



### Pigtail

16-bit ISA card and handles RS-232 directly. The use of this card requires an ONC to translate RS-485 to RS-232. It connects to the ONC via the Pigtail.

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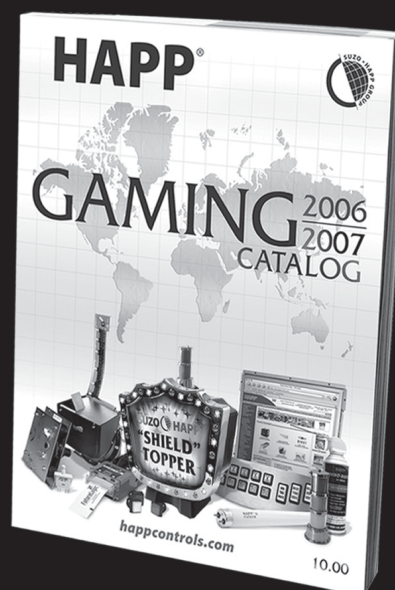
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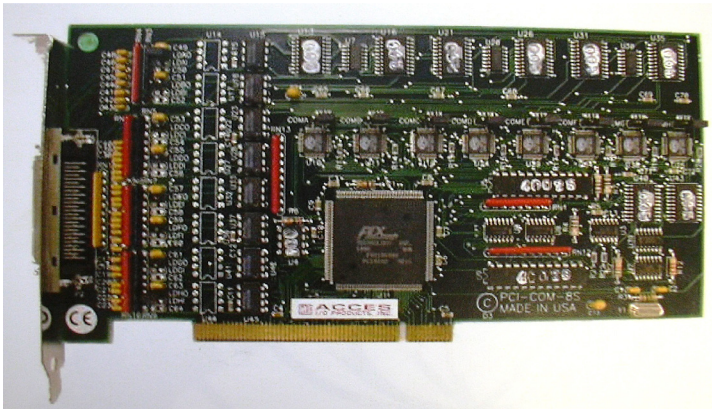
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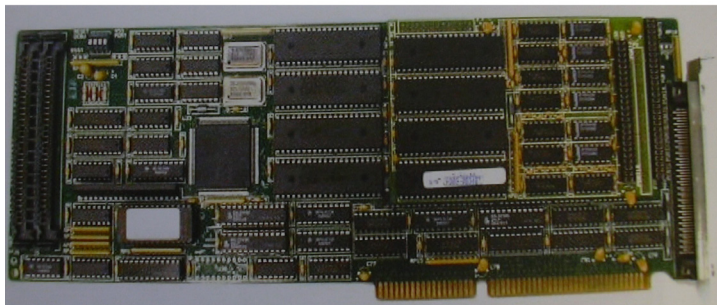


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This is an “Access IO” board that may be used in the Poller. It is a 32-bit PCI card and handles RS-485 directly. The Spider Cable connects it to the DPUs.



A “Hostess” board also may be used in the Poller. It is a 16-bit ISA card and handles RS-232 directly. The use of this card requires an ONC to translate RS-485 to RS-232. It connects to the ONC via the Pigtail.



For those cards with menu options, the up and down arrows let you select the different options, the enter key chooses the selected option, and the clear key backs you out. For some menu options you use the enter key to scroll through options.

## Chapter 6 – CDS Cards

CDS cards are used to interact with the Oasis system on the Sentinel side. The only information the cards really contain is an account number that the system will use to recognize the card and look up other relevant information, as well as the card type. Appendix A shows the menu structure for Sentinel version 11.53j for Floor, Mechanic, and Setup cards. The following will

explain the basic functionality of the cards. There are seven different types of CDS cards that we might use:

- Global Cards (also known as Setup cards)
- Meter Cards
- Mechanic Cards (also known as “Tech” cards)
- Floor Cards
- Currency Cards (also known as “Drop” cards)
- Player Cards

Player cards are used by Guests to allow the casino to track their play. The idea is that by tracking how much people are playing, we can reward more active players. When AFT gets approved, Player cards will be used for those transactions as well.

Currency cards are used by the drop crew. They let the Poller know when that machine is actually being dropped so the money is tracked to the correct day. Later, we will cover this in more detail.



Meter Cards function like Floor cards but will take a snapshot of the machine meters for use in the Meter Comparison module, which will be explained later.

Floor cards have several functions. Floor cards are specific to each team member. Even temporary cards have a pseudo-account number. When a user puts a Floor Card into a machine, the system knows what machine that person has entered. In this way, when the user performs some action, the system can track them.

Floor cards allow users to send jackpot, hopper fill information, and failure codes to be sent to the system. When the floor card is first inserted it will show an Info window which will show the Sentinel program version, the DPU that the Sentinel is communicating with, the ID number of the Sentinel, and the status of the main door (D=DPU# and ID=Sentinel ID). The P is for the Poller number, but this feature doesn't work.

v11.53j-0 ID: 2  
Shut P:0 D: 3

Floor cards also have a "Witness" message that can be used with jackpot/fill kiosks as well as a "Coins Played" option which will show you the last coins played.

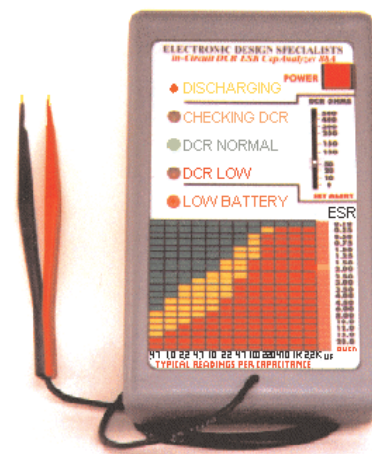
Mechanic cards are primarily used to view information useful to maintaining a machine, the most important of which are the various game meters. Like Floor cards, Mechanic cards have the users' names attached to them. This function is important for security reasons. If the system detects a slot machine main door opening, the only way it knows if it is an authorized user opening that door is if a Floor or Mechanic card is properly inserted in the card reader. If the system detects a slot machine door opening without the person having identified him- or herself by way of their card, an Illegal Entry signal is generated. This notifies anyone monitoring the system that a potentially unauthorized person has opened a slot machine (which is a pretty big deal). For this reason it is imperative that users properly insert their Floor or Mechanic cards in the card

reader before opening the door. Inserting the card after the door is opened will not prevent the signal. Other cards will also not work since they do not have user-specific information tied to them.

The Info selection shows the same information as the Floor card when it is first inserted (DPU, Sentinel ID, Sentinel version and main door status). However, if you press Enter you will be shown the DPU ID, the DPU EPROM version and the checksum of the DPU EPROM. If the Sentinel is not communicating with the DPU, you will see "com down". If you see "NA", the DPU is still calculating its checksum. Try again in a few minutes.

D: 1 v11.3e-6  
ChkSum: 009754AC

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Meters lets you see various machine meters broken down by Pins, Bills, Game Meters and (all) Meters. The Pins selection will show you what the pin pairs (on the SMI4) have been assigned to, and their current value (you must press Enter to scroll through the pin assignments. If there is no pin assignment, the Pins option will be unavailable. Bills shows only the meters for the different denomination of bills. Game Meters shows only those bills relevant to game play. Meters shows all the meters. The reason Pins, Bills, and Game Meters are available is because they provide shortcuts to the most often used meters so you don't have to scroll to get to them.

All the meters are numbered, and if you know the number of the meter that you are looking for, press any number and the display will prompt you for the number of the meter. Type in the number of the meter you want to see and press Enter, and you will be brought directly to that meter. Make sure you are in the (all) Meters menu when you do this. If you go to this prompt while in a shortcut menu (Bills or Game Meters), you will only have the option of going to one of those meters.



Enter 1..250

Global cards are functionally the same as Setup cards. (Note: we call Global cards "Global Global" and Setup cards "Global" here). The only difference between these two cards (for Oasis version 11.4.1) is that when a Sentinel is brand new (its EEPROM is blank), the Global Global card must be used to get the machine communicating with the Poller. Global cards will not work in the card readers until this communication has been established. Once it has been established, and Sentinel configuration information is written to the EEPROM from the Poller, Global cards will work, and the Global Global is not necessary.

Global cards require a password to proceed into the menu if this option has been enabled by the I.T. department.

The first setting available to change is the type of display the Sentinel uses. There are three options: one for the LCD and two types of VFD. Once the password has been entered you are presented with the "Display Type" option. Press Enter. If you press the arrow buttons the Sentinel will change output formats to the different display types. Only the correct output will show legible text. If you accidentally press an arrow key, just keep pressing it to scroll through the available display types until you get to the correct one. If the Sentinel loses power while

the display is set to the incorrect display type, you will see a window that looks like this:



If this happens, you must enter the password and change the display type without seeing what you are doing. Bad displays may also show the above symptoms, but try changing the display type first.

Appendix A will explain the menu options for this card in detail but here are some highlights. To set a Sentinel up to communicate with a machine, set the following options:

- > Set the Sentinel ID.
- > Set the Machine Type.
- > Set "Ticketing" according to whether or not the machine handles tickets or not.

Setting the machine type will automatically program the correct pin pairs and set the correct serial protocol. Once the machine communicates with the Poller, "Slot Num" under "DPU" will automatically show the slot machine number. It may take several minutes for the number to come across. Setting this number has no effect on the communication of the Sentinel – whatever is typed in will be written over by the Poller.

The pin pair assignments are fully customizable. Insert your Global card and select



Pins. Interface will allow you to select the meter that you want the pin pairs will be monitoring. Active States lets you choose either [H] or [L].

The Sentinel display will convey some information even without a card inserted in the card reader. If the letters are in capital letters, this indicates that the Sentinel is in communication with the DPU. If a period appears at the end of the display message, this indicates that the DPU is not communicating with the Poller. You will see the period when the Poller is being bounced, for example. If you see an asterisk, call Aristocrat, there is an issue with the firmware. The image below shows both the period and the asterisk.



The message displayed by the Sentinel display during normal operation is set by the IT department in Oasis. The Poller periodically downloads the message so if there has been a change, it may be a few minutes before it shows up on the displays. It cannot be changed at the Sentinel level. The default message is, "PLEASE INSERT PLAYER CARD".

Failure codes are used as flags in Diagnostic Monitor to track recurring problems. Thresholds are set for the

Failure codes that, when reached, will generate a work order. For example, a threshold for coin-in errors might be five in an hour, any single occurrence, twice in a day, etc. The thresholds are fully customizable in Oasis Administrator by an authorized user. Once these are set, Diagnostic Monitor will generate a work order to fix the recurring problem. A work order simply states that the particular failure met the threshold that we set, and needs attention.

When a tech goes to fix one of these problems, a Repair code will be entered once the problem has been taken care of. Repair codes tell Diagnostic Monitor that the problem has been repaired and will change the status of the work order to "Not Verified" so a supervisor can go and check the work before clearing the work order. Only an authorized user can verify a work order, which simply entails entering a name and password, which will clear the work order from the system.

Meter cards send a signal to the Poller to record the meters for that machine. They otherwise function as Floor cards with a generic name. This "snapshot" of the meters may be used by the Revenue department for their records or for comparison with meters taken by hand at the machine. This comparison allows the user to know if there are any discrepancies between the

information the machine contains and what Oasis receives.

With Sentinel version 11.53j, an option is included that allows one to look up ticket transaction history. Go to "View - Last Tickets". It will display a list of the last 9 ticket transactions (printed and redeemed). You'll see them organized by time and the last four digits of the validation number like this...

13:22	-6859
23:45	-7878

Scroll to the ticket you want information on and press the enter button on the keypad. It'll give you the entire validation number, date, time, amount, and status. If the ticket was printed at the machine, it'll also give you the ticket number.

**Jason Czito**  
[jczito@slot-techs.com](mailto:jczito@slot-techs.com)

**Happy  
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# The Weakest Link

By Herschel Peeler

I recently had the privilege of traveling to Gary, Indiana to give a class on slot machines to a group of very capable techs. What a challenge that was to try to bring these techs up a notch from an already advanced level. After covering a topic in class we would go out on the floor and find a down game with a problem in the area we just covered. This proved to be an even bigger challenge. The Majestic Star has about 3,000 games on the floors of two boats moored at Buffington Harbor. I was hard pressed to find a down game at all, much less one with a problem in a specific area. Did I mention these guys and gals were good?

One of the areas we tried to concentrate on was SENET and NETPLEX on IGT games. We found a few games with problems, but few of these problems actually downed the game. One game in

particular was a surprise and justified some serious troubleshooting. The symptom was a blacked out Denom Touch Panel on a multi-denom S2000 IGT Reel game with a nine line 2-digit display. Normal you can touch one of the four panels and select one of four denominations to wager. The one you touch should light up. In this case, none lit up. (Okay it wasn't really a down game, but I told you down games were hard to find at the Majestic Star.

First approach is to replace the obvious assemblies. Not having a lot of spare parts we resorted to the less desirable act of swapping the touch panel assembly with the game next to it. The result was the same. The display was still dead. Not having a schematic at hand we followed cables to discover that the touch panel assembly was powered from the 7-segment 6-6-3 display assembly. The display was working, but that only tells us SENET was alive, in general. We could still have a problem with the interface going to the touch panel. After swapping out the 6-6-3 display we concluded that

that wasn't the problem either.

Okay, now we get to one of those few times we actually have to pull out a meter and troubleshoot. For training purposes this couldn't have been better. Earlier we had gone over what the SENET signals are like and how SENET works. Now we get to apply that learning to troubleshoot a game. Being without a schematic was a handicap but not terminal. Looking at voltages on the connector between the 6-6-3 display and the touch panel, I found the voltage that would drive the LEDs. We compared voltages on the game next to this one and found +25 V on pin 1 that was not present on the bad game. Counting LEDs and following the board traces, I found that the five white LEDs that make up each of the lighting segments were all wired in series. Yep, sounds like we need to drive these with 25 Volts. (About 4 Volts per LED, five LEDs in the string, comes to too much to drive from +13 Volts). We got our first real symptom to follow. Going back to the SENET connector, we find no +25 Volts there either. Since the 6-6-3 display does not



use 25 Volts for anything, its absence did not bother the 6-6-3 display board.

We keep following the cables back. The SENET cable to the 6-6-3 display comes from the 9-line, 2-digit per line, pay table display assembly. Sure enough, no 25 Volts coming out of it either. Following more cables we discovered that the 9-line board gets its SENET signals from the Door I/O board. There we find 25 Volts. We are closing in on the problem.

We will leave a few steps out here, but I left the class to go back down to the shop and get what little we had for schematics so I could confirm our findings. In the meantime, young master Donnell had taken over the

meter leads and double traced my steps. This young man was new to gaming but certainly not new to electronics or troubleshooting. Did I mention that these guys were good?

In my absence Donnell had finished the troubleshooting steps with no schematic available to him and concluded that the 25 Volts was certainly being lost on the 9-line display board. Upon removing the assembly we could see the hints of burned traces on the board between the connectors. The 9-line board itself also does not use the 25 Volts for anything. The line simply passes through the board from connector to connector and on down the SENET bus.

Not having a spare to replace the board, we had to leave the process at this point but it made a good class in troubleshooting SENET in some of the more modern S2000 style games. We had to assume that we were following somebody else's footsteps and that at some time in the past, the touch panel had been removed. Somehow the touch panel display got exposed and shorted to ground resulting in an over current condition to the 25 Volt line. (A logical leap and not a conclusion, I admit.) This line runs from the touch panel LED board, through the 6-6-3 display, through the 9-line display, through the Door I/O board and to the motherboard, all following SENET wiring.

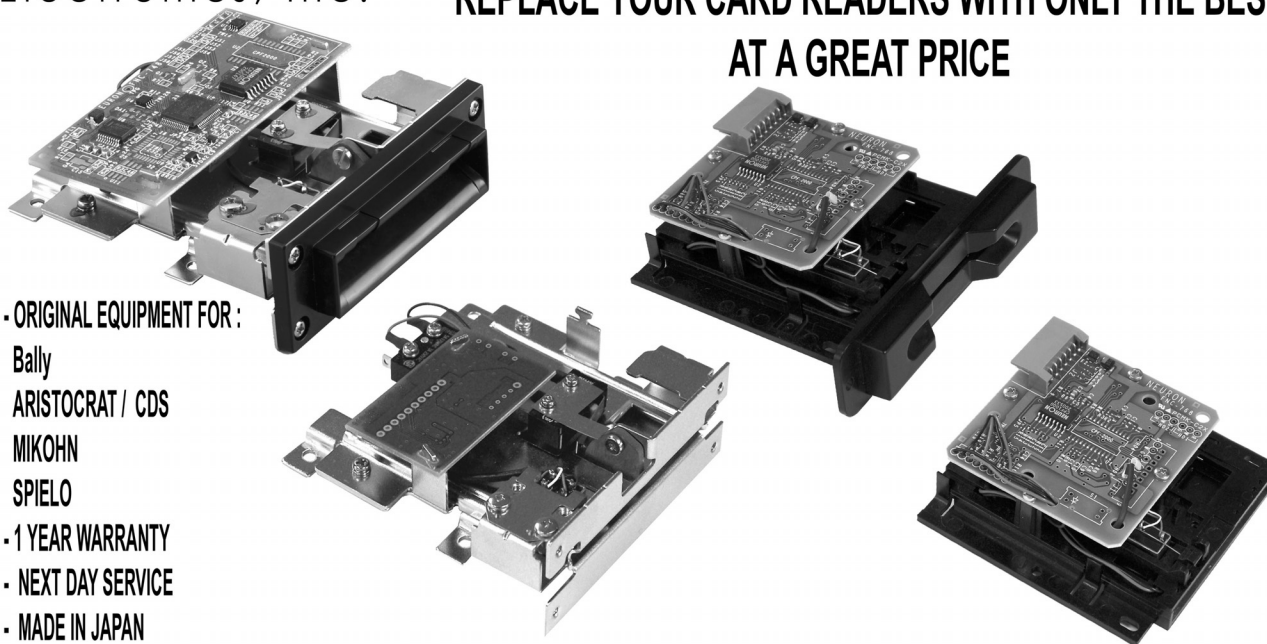
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When the over current condition was experienced, the weakest link in this chain appears to be the run between the connectors on the 9-line board and it blew out. SENET is wonderful in the aspect that we can have about 16 SENET devices, each with 16 I/O lines, for a total of 256 inputs and 256 outputs. All of these devices daisy chained together as we

find in the design of the Door and Cabinet I/O boards. The not so good aspect of this is that the earlier boards must carry the current for all the devices down line. Perhaps a better idea would have been for the SENET bus to only carry signal information and deliver power to the boards through a DC Distribution board such as that used in the top box. But IGT didn't

ask us for our input on this design so I guess it is the way they wanted it to be.

Take the part numbers below with a grain of salt. I do not have the proper schematic of the design we were troubleshooting available to me.)

**Herschel Peeler**  
**hpeeler@slot-techs.com**

76300600 PCB, touch panel denom sensor board

75142600 Touch Panel denom assembly

- 1 - P4 out
- 2 - P1 out
- 3 - +5 VDC
- 4 - GND
- 5 - P2 out
- 6 - P3 out

60799802 Cable, TP sensor to TP display

75142610 Denom LED Board

- 1 - +25 VDC
- 2 - +5 VDC
- 3 - Denom Sw 1
- 4 - Denom Sw 2
- 5 - Denom Sw 3
- 6 - Denom Sw 4
- 7 - Denom LED 1
- 8 - Denom LED 2
- 9 - Denom LED 3
- 10 - Denom LED 4
- 11 - GND

7512840x Display, 7-Segment, 3 reel, with touch panel interface, 6-6-3 display in three rows.

A typical SENET connector:

- 1 - SEN GND
- 2 - SEN CLK
- 3 - SDATA ADR
- 4 - SDATA RxA
- 5 - SDATA TxA
- 6 - SDTAT TxB
- 7 - SEN STB
- 8 - SEN RST\
- 9 - +13 VDC
- 10 - +25 VDC (orange wire)
- 11 - BGND (black with orange stripe)
- 12 - AGND
- 13 - (NC)
- 14 - (NC)

6079980x Cable, TP denom LED board to 7-segment display

7692700x SENET board for 9-line, 2-digit per line display (75123900)

75427801 Door I/O, B0 and B2 jumpers.





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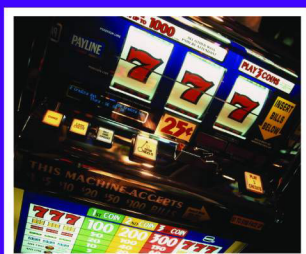
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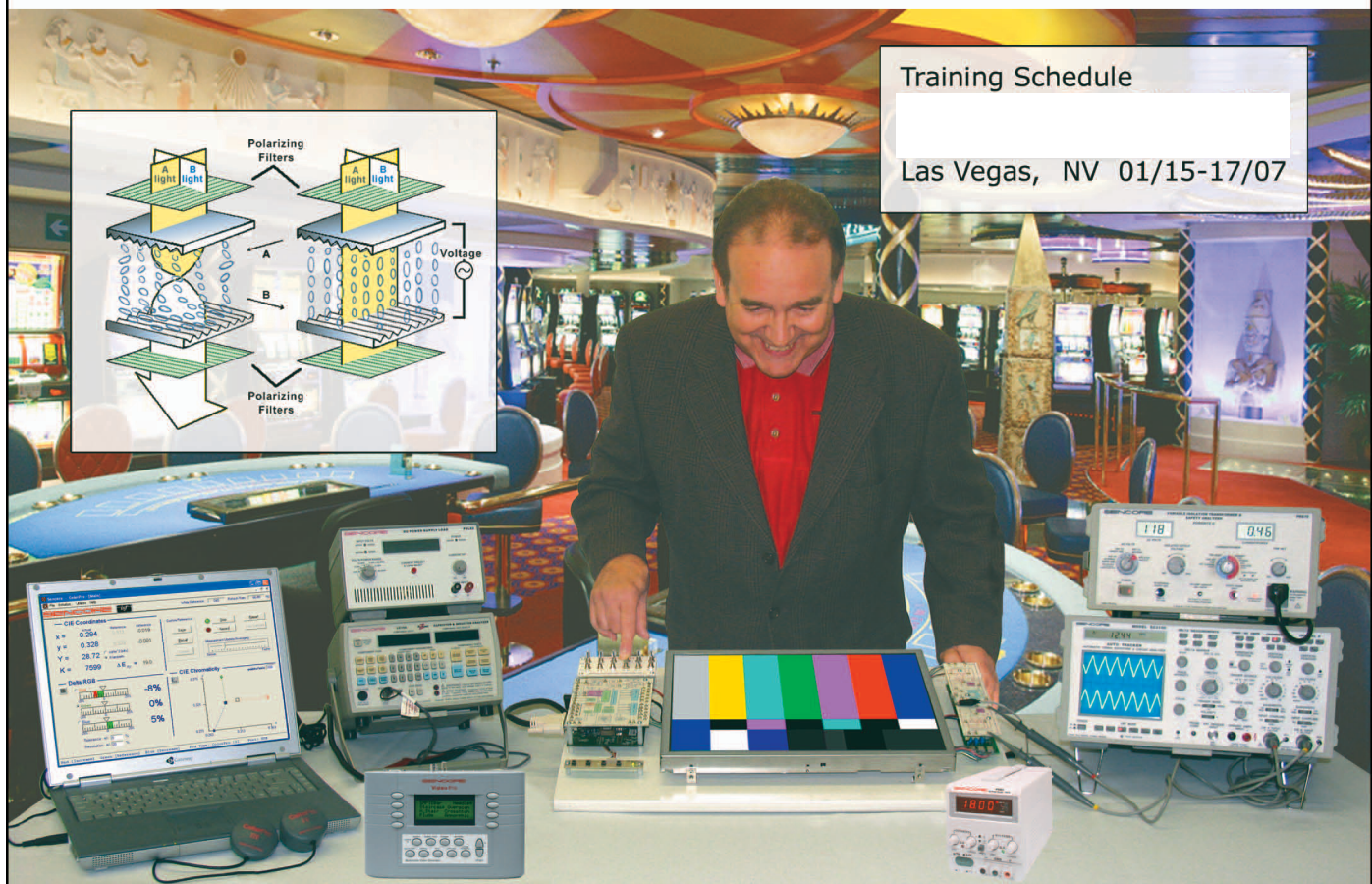
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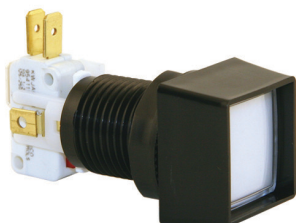
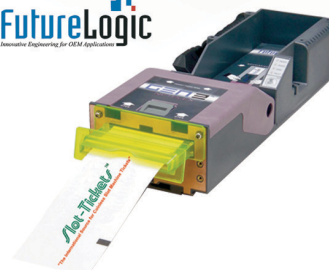
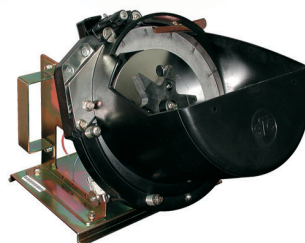
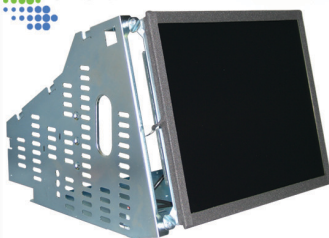
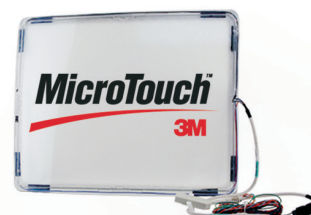
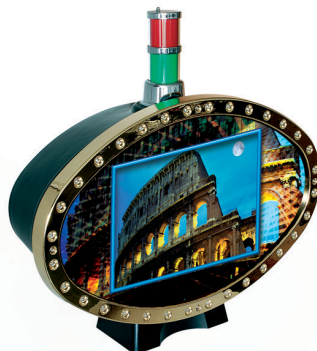
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