September 2007

Slot Tech Magazine

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Inside Slot Tech Magazine

September 2007

Peace

Slot Tech Editorial

Dear Readers,

One of my responsibilities as editor of Slot Tech Magazine is to double-check and correct factual information as well as typographical, punctuation and grammatical errors before we go to press. These are completely objective evaluations. There is, generally speaking, just one way to do things correctly and I strive to make it so (that's not to say that some Gremlins don't slip by from time-to-time).

However, another side of editing is establishing and maintaining a sort of sense of style for the magazine. I'm not talking about graphics and fancy artwork. What I mean is that regardless of the fact that Slot Tech Magazine is a technical journal full of schematic diagrams and circuit descriptions, I try to keep things friendly and personal. Electronics and slot machine repair doesn't have to be stuffy and impersonal. It's fun and exciting and challenging and rewarding and so I sometimes make small changes to reflect that attitude toward the subject at hand.

This, by definition then, is completely subjective. This type of editing isn't really supposed to change anything as far as the facts are concerned, just change the style. However, in Bill Mikulski's recent article on the Atronic e-motion LCD monitor failure, I made a slight change that has come back to bite me (just a little nip, really) and so I want to fess up because in this case, the author was actually 100% correct in his original submission and I changed it to make it slightly less so.

Regarding inverter failure, Bill's original submission read "Some of the techs were telling me that they actually jumper the fuse. I would not recommend this. For the $22.20 it's simply not worth the risk."

Randy Fromm

I changed it to read "Some of the techs were telling me that they actually jumper the fuse. I can't recommend this but if it works for you, it's hard to argue against it. However, for $22.20, is it worth the risk?"

See, I was trying to be "chummy!" It was supposed to be a kind of "Hey, buddy, if it works for you, who are we at Slot Tech Magazine to argue with success?" sort of thing.

Only the practice is actually not successful (contrary to field reports) and is, in fact, causing problems down the line (as one might expect when one bypasses a protection device like a fuse). I guess I just assumed that any real short in the inverter with a bypassed fuse would either cause the power supply to go into OCP (over-current protection) and shut down or open a series resistor (or even blow open a trace).

I say this now because I received the following submis-

Randy Fromm's
Slot Tech Magazine

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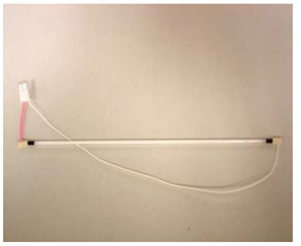

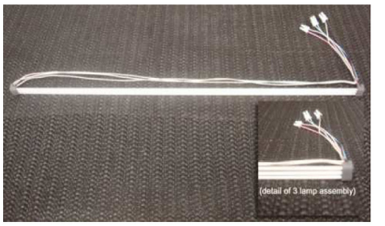

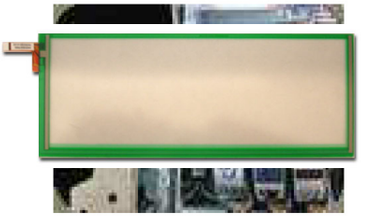

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sion from Atronic's Michael Brennan:

Important Note on Atronic LCDs

It's been a while since we (as in Atronic) contributed to Slot Tech Magazine, and we've missed the outlet and opportunity, but a recent development has given us a perfect time to chime in again. So, we have written a mini-article in a response to the July 2007 Slot Tech Magazine feature article "LCDs and Fans Need PMs Too" by Bill Mikulski, which primarily dealt with our e-motion cabinet.

Let me begin by saying how well-explained and helpful this article proved to be. Preventative maintenance is crucial to extending the life of any machine, and the author provided great insight regarding tips and ideas for prolonging the life of e-motion monitors.

In fact, we agree and support pretty much everything outlined in the article. However, we wanted to call special attention to one paragraph near the end of the article, in the middle of page 10. Here is the portion of the article that we want to discuss:

"There is a three amp surface mount fuse that blows on this inverter board.... Some of the techs were telling me that the actually jumper the fuse. I can't recommend this but if it works for you, it's hard to argue against it. However, for $22.20, is it worth the risk? Changing this inverter board is quite simple."

The author is very wise when he asks, "Is it worth the risk?" Our response: "No, it is not." Slot technicians, please do not modify this inverter board. Repairing / modifying the inverter board as a whole or "jumping" this fuse is definitely not worth the risk.

A few arguments against this modification include: 1) this modification may cause critical component failure elsewhere in the cabinet; 2) this alteration may lead to safety risks; 3) this home-made adjustment to the fuse will void warranties.

We have heard through the grapevine that a failure of inverter board three-amp fuses is not uncommon-- across multiple vendors and LCDs. But we strongly recommend that you play it safe and replace the entire inverter board if this fuse fails. Even though jumping a fuse seems like a small modification, keep in mind that when you do this, you are removing an inherent safety feature within the machine. Once this fuse is disabled or bypassed, any component that runs on 12 volts has the potential to be negatively affected.

Again, if you determine that your e-motion inverter board has failed, replace the entire board. You can order one through us, part number 65040176 for $22.00. Furthermore, the timing on this whole thing is pretty uncanny, since we recently addressed inverter board repairs (as in, "do not perform them") in a technical document (TD AA 07-019). You can refer to that bulletin for more information.

In conclusion, we want to thank the author and Slot Tech Magazine for publishing a perceptive and helpful article about our e-motion cabinet. Thanks for listening, and we hope we can find the time to contribute again in the near future.

And just to drive the point home, we have published the official CN on the following page in the magazine, if you're keeping a binder of CNs somewhere in the shop.

See you at the casino.

Randy Fromm

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Technical Bulletin
TD AA 07-019

Do Not Repair or Modify Inverter Boards
July 27, 2007

PRODUCT: *e-motion*

PART AFFECTED: *Inverter board (PN **65040176**)*

JURISDICTION: *All*

REF: *TD AA 07-017 (Reiterating Safety Concerns)*

REASON: *Always replace the entire TFT inverter board if any of its components fail-- never repair or modify the inverter board.*

EXPLANATION: *This document elaborates on the safety recommendations specified in TD AA 07-017.*

*If a TFT monitor in your e-motion cabinet fails, you may trace the root of the issue to the inverter board (PN **65040176**). This could be due to something as basic as a blown 3A fuse. However, no matter how basic an issue is uncovered, always replace the entire board.*

*Repairs and/or modifications to the inverter board or this fuse are absolutely **not** recommended. Unauthorized inverter board repairs can lead to critical failures in other components within the e-motion cabinet. In addition, this will void warranties and could pose safety risks.*

*Again, the recommended course of action is to **always replace the entire inverter board**. To order a new board, send an email to parts@atronic.com requesting part number 65040176.*

ADDITIONAL: *If you have any further questions, contact your local salesperson or call our 24-hour service hotline at 1-800-559-1391.*

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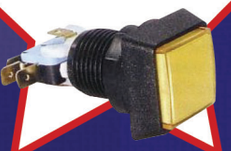

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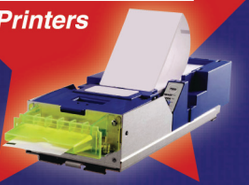

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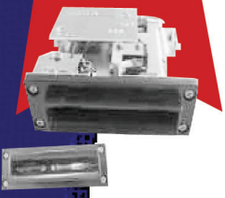

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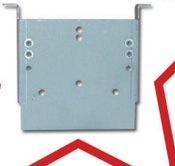

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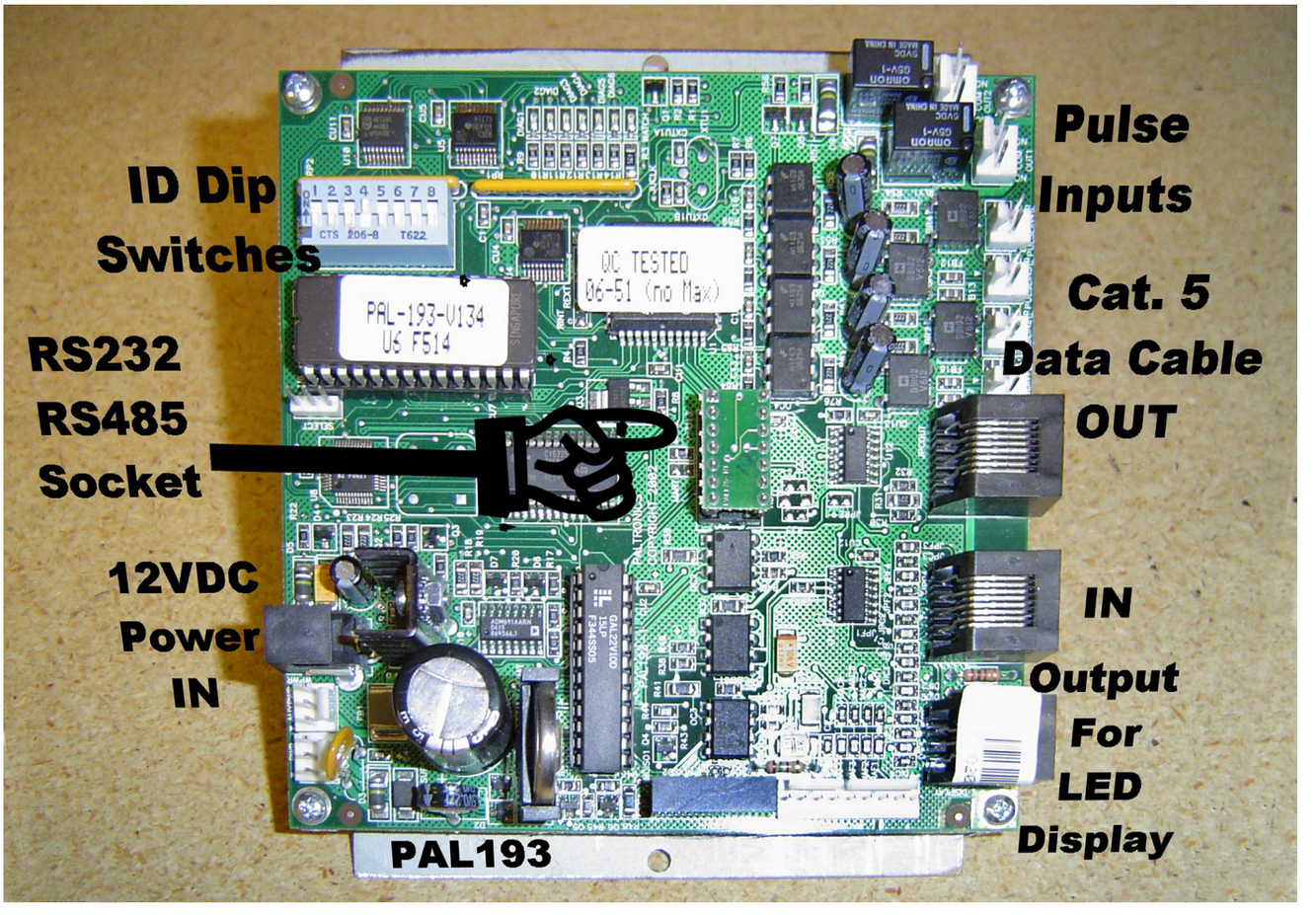
Paltronics Progressive

By Vic Fortenbach

Progressive systems have been around for some time. Some have had strange quirks while others were rock solid when it came to performance but were way too complicated with the hardware and software set up. Some of the companies that manufactured progressive systems have stopped making systems, were purchased and merged into a new company or have just plain disappeared.

However, one company that has been around and still going strong is Paltronics. Paltronics does not just make progressive systems but systems for the entire casino. Their line up of products includes the progressive systems, as well as casino media and table game systems. Paltronics markets their systems to casinos under the One Link brand but what is exactly is the One Link system from Paltronics? Maybe a better question would be "What or who is Paltronics?"



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Paltronics Inc. was founded by Angelo Palmisano, hence the Pal in Paltronics. Their headquarters is located in Crystal Lake, which is near Chicago, Illinois. Paltronics also has offices Las Vegas as well as an affiliate office in Australia. In the past 15 years, they have grown into one of the industry innovators for, as the company website proclaims, "Creating increasingly compelling system solutions for the Casino gaming market." Now that is a mouthful!

The One Link System actually encompasses three different systems: the One Link Slot System, One Link Media and One Link Table System.

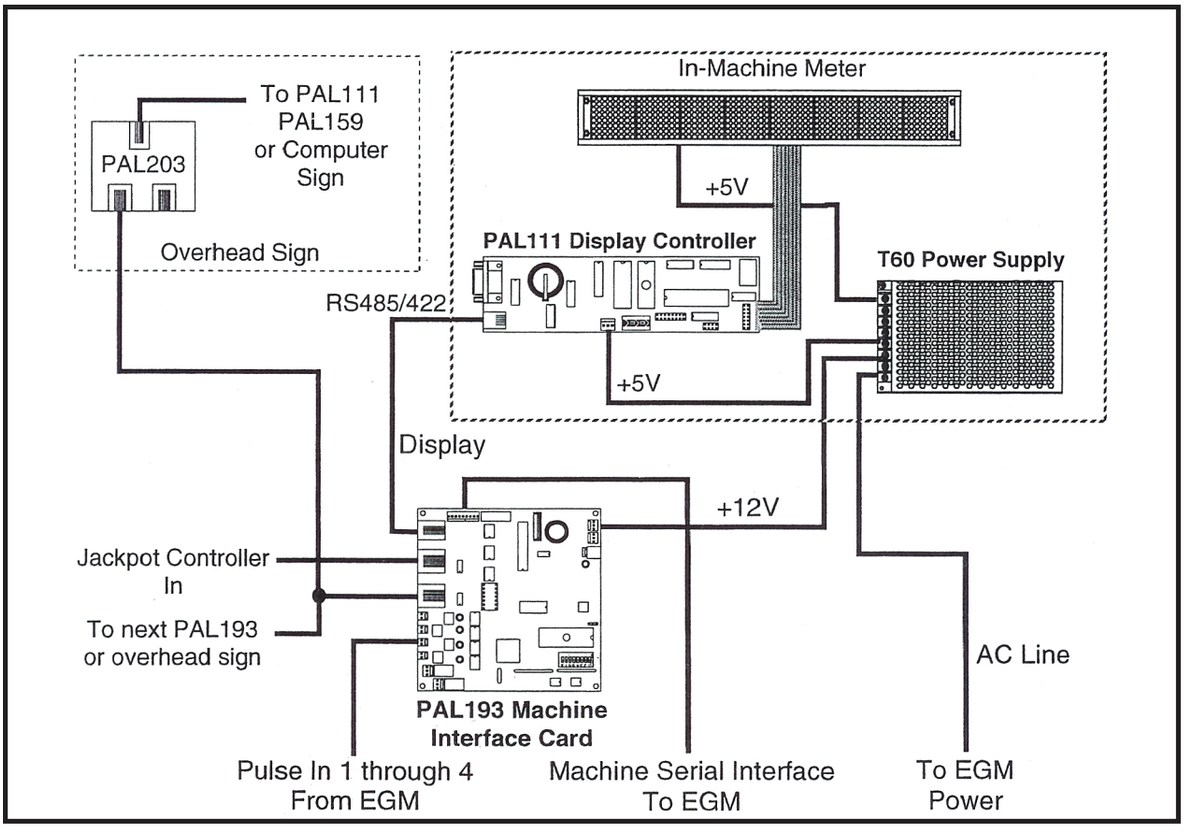
The One Link Slot System is the name for the slot machine progressive function, which includes all of the hardware and the software required for a slot machine's progressive system. The One Link Slot system includes the in-machine LED progressive displays, as well as progressive display data above the slot bank displayed on a plasma screen and everything in-between.

The One link media system combines with the progressive system to display progressive meters and casino advertising on an LCD or plasma screen.

The One Link Table Games System includes table bonusing games for Blackjack and Baccarat tables, exclusively. If you would like additional information on the One Link Media or One Link Table Systems, check out Paltronics web site at: www.paltronics.com

The One link Slot System is not your ordinary progressive and display system. This system is very elaborate and expandable. Gone is the simple standalone progressive board with power supply and LED display mounted in the display glass. With the Paltronics system, a single interface board (the PAL193 Machine Interface Card or MIC as it's called) is installed into each machine. The PAL193 MIC is easily configured for many different types and manufacturers of slot machines.

One interesting feature about the One Link Slot system is its use of already standard computer cables and connectors. I can remember one progressive bank that had constant problems with one very long custom progressive cable that was con-



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For further information regarding Ceronix's products or services, please contact Sandi Viscuso at (530) 886-6404 – sandi@ceronix.com or check the website at: www.ceronix.com.

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nected to each slot machine. Somehow, that long cable did not connect properly to the controller and was always giving us problems. The One link Slot progressive system uses computer style Category 5 (CAT5) cables for the progressive link. The CAT5 cable is daisy chained to each PAL193 board in each machine and then connected to a jackpot controller.

The jackpot controller is the brain of the Paltronics progressive system, there are several jackpot controllers available depending on your own progressive configuration (more on the progressive controllers later). The One Link Slot System is expandable and versatile. You can use the slot machines themselves for the progressive display (if they have the capability of displaying the progressive amount on the screen) or you can use a Paltronics LED in-machine meter to display progressive amounts. The addition of in-machine LED progressive meters requires some additional parts. In addition to the actual LED display, a Paltronics board (named the PAL111 Display Controller) is required. This board plugs into the PAL193 board with a standard 4 pin phone style cable and to the LED display with a ribbon cable.

Using an in-machine meter and its interface board will increase the power requirements. You will have to upgrade the Paltronics power supply from the standard 2-25-12 to a higher output T60 power supply. If you choose to use an LED in-machine meter, you may want to consider a new Paltronics LED meter. This new meter has the brilliance of over 65,000 colors. This new meter display sure beats the look of the standard red, yellow, green displays that have been so common since progressive displays first appeared. If you want to go big for your progressive display, a large LED meter that is over three feet long and made to be installed in a casino sign is also available.

The whole One Link Slot System may be overwhelming at first glance but when it's broken down into the basic parts, everything comes together. The PAL193 board is installed in each machine that will be participating in the progressive amount pool.

The Paltronics PAL193 board is compatible with many slot manufacturers' systems. Like any multiple game progressive system, there are some basic configurations required. In the center area of the PAL 193 board, there is a 14 pin communications chip socket called the PAL175. This socket is for a chip that configures the PAL193 board for either RS232 or RS485 slot machine communications. These are standard communication protocols. IGT uses RS232 for its progressive communication while Bally uses RS485. Other slot manufacturers use one or the other protocol.

The RS232 configuration device is a single 14 pin chip, while the RS485 configuration is a small header board with a surface mount chip mounted on the underside of the PAL175 that plugs into the socket. Some PAL193 MIC boards do not have a socket, so they must be ordered specifically for the type of machine participating on the slot progressive bank.

Once you have selected and installed the correct communications chip, the PAL193 MIC must now be assigned an Identification number. This number is used to identify the machine on the bank. It must be unique. The DIP switches on the PAL193 board are used to set the board/machine's ID. This ID number will tell the jackpot controller which machine is which. The ID number can be any number between one and thirty-two.

The PAL193 board has an eight position switch DIP switch bank. Only switches one though six are used to set the game's ID. To set the DIP switches correctly, you must know how to count using the binary system. The PAL193 board gets its unique ID from the way the DIP switches are set. A switch that is in the "on" position is equal to a one. A switch in the "off" position is equal to a zero. The DIP switches are labeled 1-6 on the plastic body. Each of the switches has a different binary value. DIP switch one is the "one's bit." DIP switch number two is the "two's bit."

SlotFest

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Number three has a value of four. DIP switches four, five and six each have a value of eight, 16 and 32, respectively. One way I remember how to count in the binary system, is that each number doubles the last number. The first switch is one, the second switch is two, the third switch is four, the fourth switch is eight, the fifth switch is sixteen and the sixth switch is thirty-two.

To exercise your brain a bit more, here are a few examples on how to set the ID switches on the PAL193 board. To set a game's ID for number three, you would need to slide DIP switch number one and number two to on, leaving the other four switches off. To set the ID for machine number nine, set DIP switches number one and number four on, switches two, three, five and six would be off. The last example for an ID of thirty would be all switches on except number two. Refer to the chart for the correct settings of the DIP switches. If you're a little fuzzy on the binary system, there is an excellent web site at: http://tinyurl.com/yo652g.

The PAL193 board has one bank of eight DIP switches. Six are used to set the progressive machine's ID number. The other two DIP switches serve a special function not associated with the game's ID number. DIP switch number seven is used to set the pulse polarity for the coin-in and jackpot signals. These pulse signals originate in the machine and are the coin-in and the hit or progressive jackpot signals for the PAL193 board. The numerical data from the progressive jackpot hit is transferred from the PAL193 MIC board to the machine through the PAL193 communication port. This port is an eight pin connector on the edge of the PAL193 board. Depending on the slot game manufacturer, the pulse polarity could be positive or negative. DIP switch number seven sets the option.

DIP switch eight is for a RAM clear of the PAL193 board. Like the RAM on a slot machine that sometimes gets corrupted, the PAL193 on board RAM also sometimes gets corrupted, the main difference with the PAL193 board is that you do not need any special clear chips to clear the RAM. If you need to RAM clear the PAL193 board, just move DIP switch eight to the "on" position, remove and reconnect the power to the PAL193 board and move the number eight switch back to the "off" position.

When you do a new installation of the PAL193 board into a machine, the RAM clear DIP switch will be shipped in the on position. Rarely will you have to do a RAM clear on the PAL193 board.

One example of a RAM clear I had to do over two years ago was on a Bally ProSlot 6000. The machine's red LED display displayed the 91 code which indicated no communication from the progressive unit, in this case, the PAL193 board. It looked like a RAM clear on

Dip Switch Settings For PAL193 Game ID

Game ID	Sw. 1	Sw.2	Sw.3	Sw.4	Sw.5	Sw.6
1	**On**	Off	Off	Off	Off	Off
2	Off	**On**	Off	Off	Off	Off
3	**On**	**On**	Off	Off	Off	Off
4	Off	Off	**On**	Off	Off	Off
5	**On**	Off	**On**	Off	Off	Off
6	Off	**On**	**On**	Off	Off	Off
7	**On**	**On**	**On**	Off	Off	Off
8	Off	Off	Off	**On**	Off	Off
9	**On**	Off	Off	**On**	Off	Off
10	Off	**On**	Off	**On**	Off	Off
11	**On**	**On**	Off	**On**	Off	Off
12	Off	Off	**On**	**On**	Off	Off
13	**On**	Off	**On**	**On**	Off	Off
14	Off	**On**	**On**	**On**	Off	Off
15	**On**	**On**	**On**	**On**	Off	Off
16	Off	Off	Off	Off	**On**	Off
17	**On**	Off	Off	Off	**On**	Off
18	Off	**On**	Off	Off	**On**	Off
19	**On**	**On**	Off	Off	**On**	Off
20	Off	Off	**On**	Off	**On**	Off
21	**On**	Off	**On**	Off	**On**	Off
22	Off	**On**	**On**	Off	**On**	Off
23	**On**	**On**	**On**	Off	**On**	Off
24	Off	Off	Off	**On**	**On**	Off
25	**On**	Off	Off	**On**	**On**	Off
26	Off	**On**	Off	**On**	**On**	Off
27	**On**	**On**	Off	**On**	**On**	Off
28	Off	Off	**On**	**On**	**On**	Off
29	**On**	Off	**On**	**On**	**On**	Off
30	Off	**On**	**On**	**On**	**On**	Off
31	**On**	**On**	**On**	**On**	**On**	Off
32	Off	Off	Off	Off	**On**	**On**

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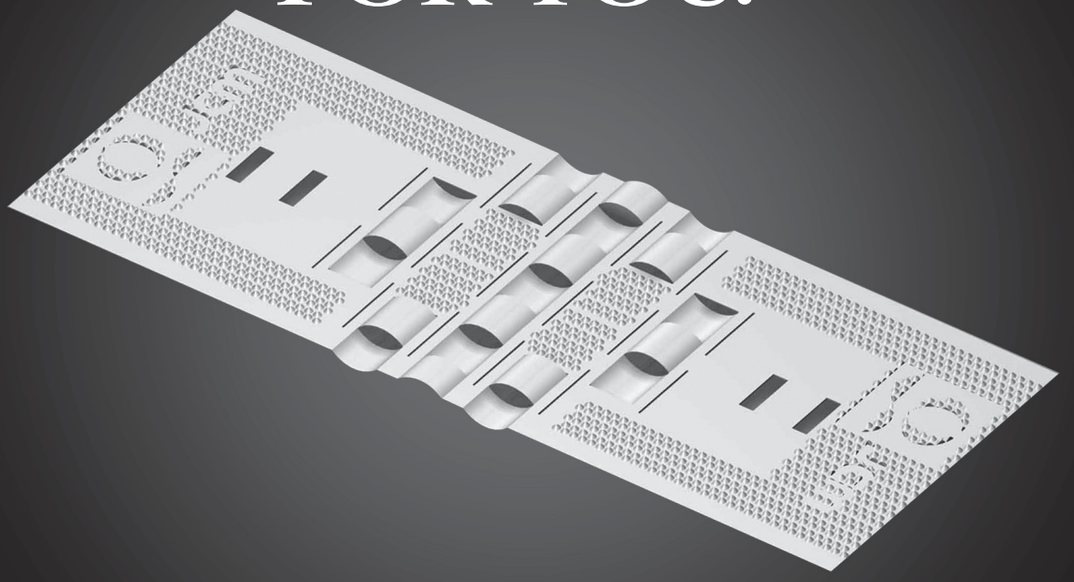

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the machine's RAM using the special clear chips would be in order. But it turned out a simple RAM clear on the PAL193 board cleared the error and the machine was online.

The PAL193 board has several LED indicators to show the status of the progressive system. Looking at these LEDs is a good visual indication of what is going on with the system and can make troubleshooting easier. On the PAL193 board, there are seven LEDs. The LEDs are labeled on the board. LEDs one and two flash to show communication between the PAL193 board and the slot machine. Obviously if one of these LEDs is not flashing then the link between the machine's progressive port and the PAL193 is broken.

If you have a LED sign connected to the PAL193 board, then LEDs three and four will flash when transmitting and receiving data to and from the sign. LEDs five and six are the network LEDs. They flash to show the daisy chain link between the PAL193 boards in each machine. The last LED, number seven, is the most important LED. It's the "heartbeat" or CPU status of the PAL193 board. It's appropriate that this LED is the color red. If this LED is just on or off and not flashing, then something is wrong with the board's CPU chip or associated circuitry. The LED heartbeat should be flashing whenever the PAL193 board is powered on.

- Vic Fortenbach
vfortenbach@slot-techs.com

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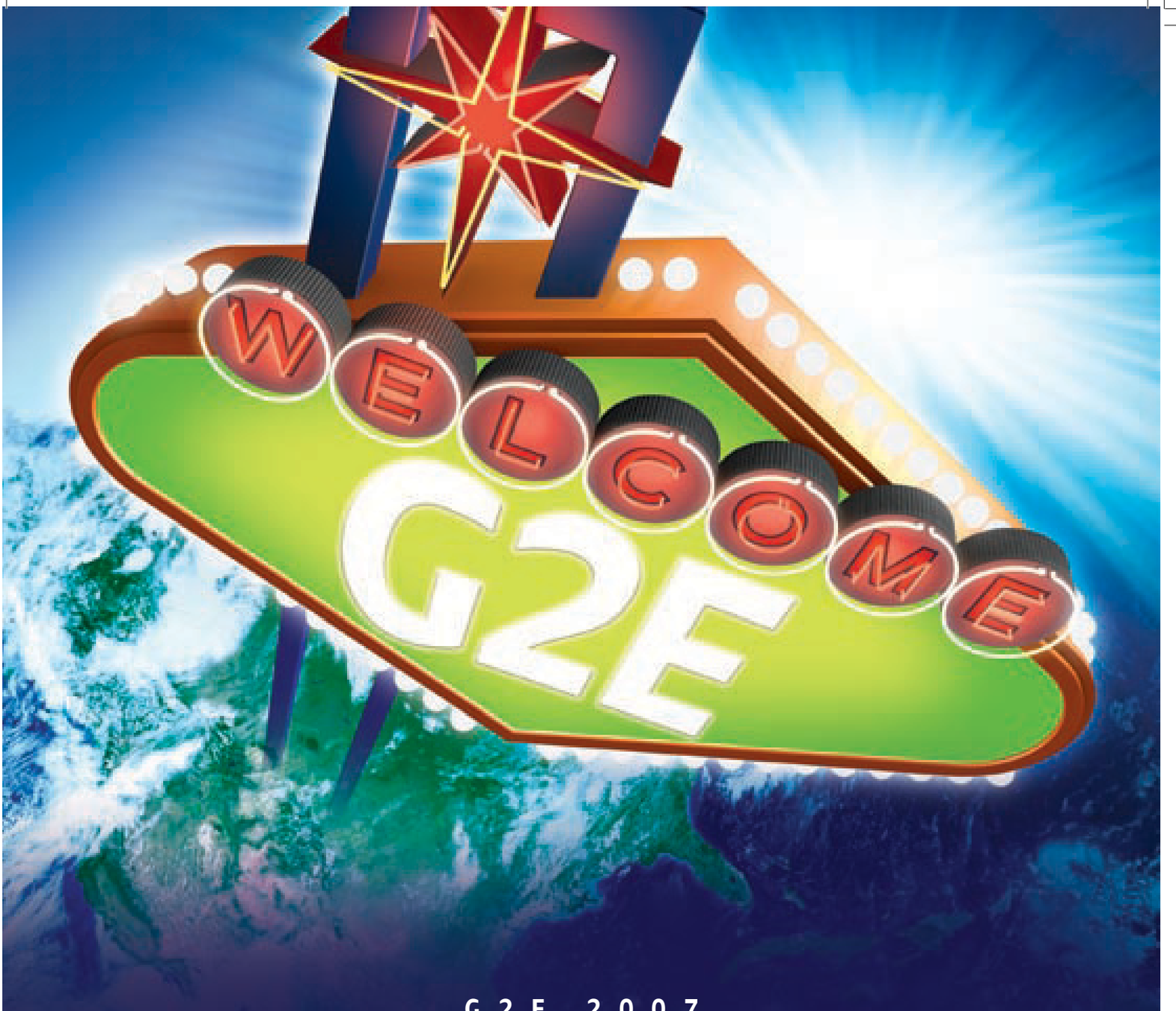

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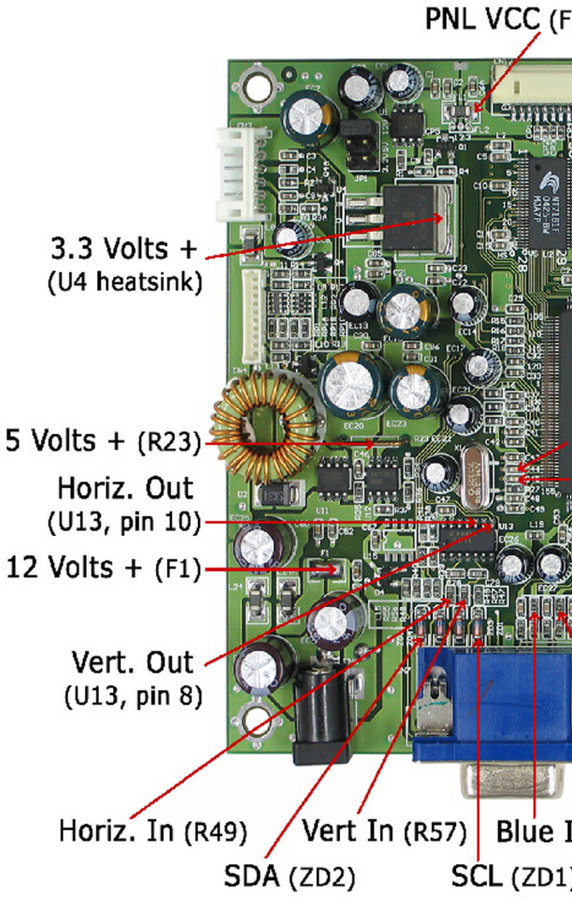
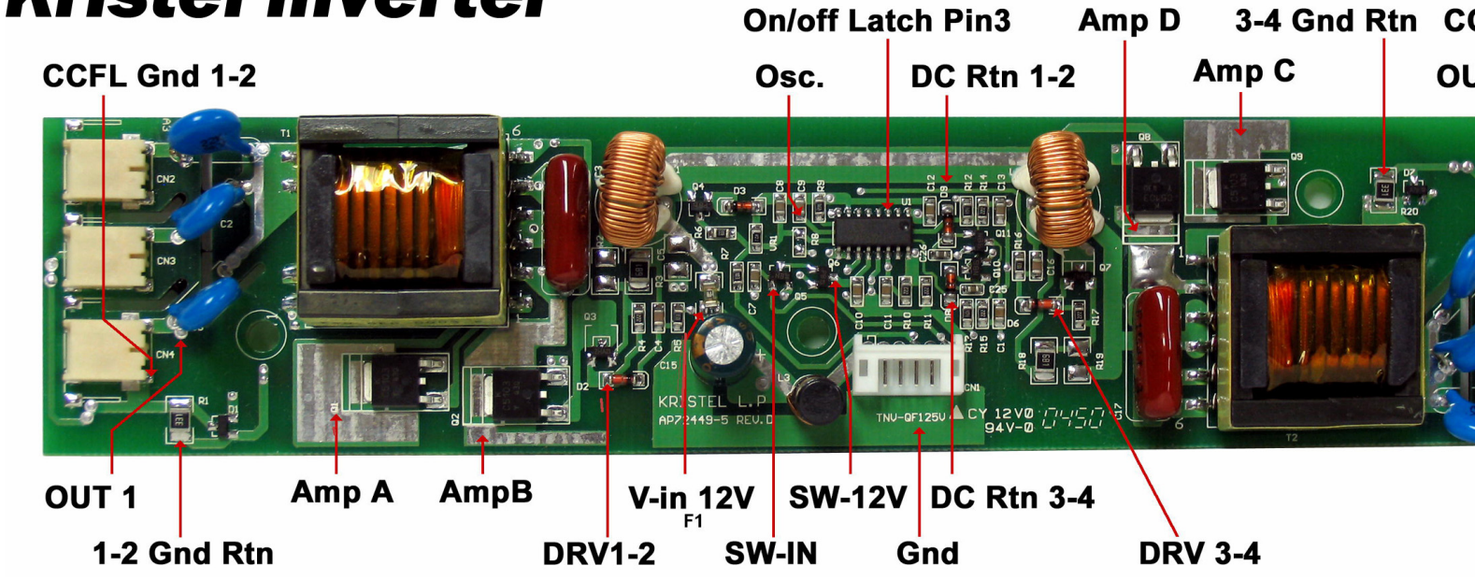
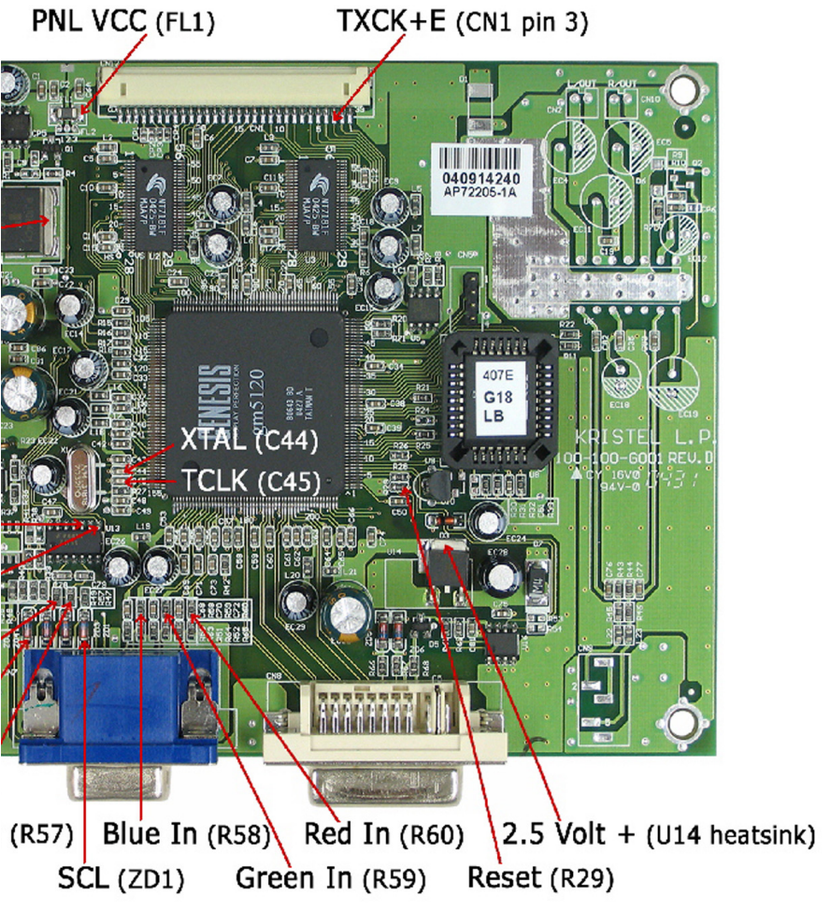
Kristel Microcontroller

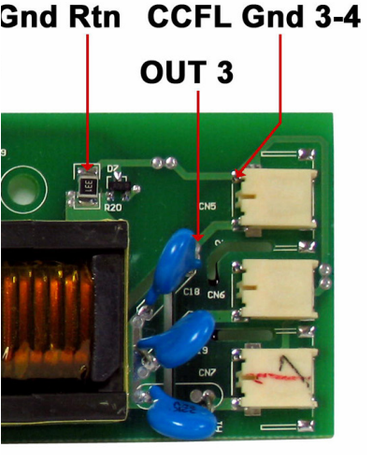
Sometimes, finding test points can be half the battle. Here are the common test points for these two boards



Kristel Inverter







September 2007

Slot Tech Press Releases

MCM Electronics Announces Interactive Online Flyers

MCM Electronics has announced the addition of Interactive Online Flyers to their website. The new interactive flyers can be viewed at http://mcmelectronics.dirxion.com/Main.asp.

The user-friendly, interactive flyers feature easy navigation via a scroll bar, Table of Contents or dynamic keyword search. All products are linked to the MCM website and can be added directly to the shopping cart.

Automated page flips bring the pages to life. Pages can be viewed as facing pages or single sheets. There are five zoom levels. Single pages or the entire flyer can be emailed to a friend. There are even index cards for personal notes.

The interactive flyers are designed to enhance the customer's shopping experience. The MCM internet team continues their drive to improve the website and is thrilled to offer this latest feature.

About MCM Electronics

MCM is a leading distributor of electronic equipment, parts and accessories used in the repair, maintenance and installation of consumer electronics and related products. MCM's product lines include computer hardware and peripherals, security and surveillance, wire and cable, audio and video equipment, tools and test equipment. MCM has been supporting the electronics industry for over 31 years and is a part of the global corporation Premier Farnell plc.

For more information on MCM visit www.mcmelectronics.com or call 1-800-543-4330.

Multitron: The Decade's Sensation From Unicum Gaming!

SmartGames Group of Companies is proud to announce the release of its first multigame, Multitron. Nowadays, multigames are the primary trend and a driving element of gambling industry development worldwide. This is the most fast-moving and lucrative industry segment, bringing steadily high income for operators.

Prior to Multitron creation, Unicum Gaming specialists carried out a number of research projects where the customer preferences were discovered and the progress of the world gambling industry of late was taken into account. Such work resulted in the Unicum Gaming multigame designed to satisfy the gaming and marketing needs of present-day players and operators.

Multitron is based on the newest "Sapphire" gaming platform. Now all the new and old company's games with this platform are available in Multitron and in single-game configurations as well. Specially for Multitron, several sets of games are completed; among them a general one (non-customized for certain area set) and special set for CIS and Latin American countries designed in respect to this region's gambling specific.

The first set with no area restrictions contains games "Big five", "Cash fish", "Tam-tam", "Cash tracker", "Papyrus", "Guns`n`mushrooms". The second set also without limitation by region includes "Street racer", "The bachelor", "Black gold", "Red hot hockey peppers", "Asian delights", "Cash tracker". The CIS set consists of "Wolf' n' rabbit money chase (Rabbit), «Komo», "Ice maze", "Platinum pyramid" and already familiar from 2 previous sets "Cash tracker" game. The set designed especially for CIS countries is completed with "Guns' n' mushrooms", "War & kiss, "Queen of spades", "Samba-mamba", "Golden fleece", "Tam-tam", "Gold of Slavs". The last set currently completed contains game themes for Latin America countries "Street racer", "The bachelor", "Cash tracker", "Papyrus" and "Guns`n`mushrooms". Don't miss a chance to join the achievements and innovative solutions of gambling industry. Enquire for Multitron at Unicum Gaming offices and representative offices!

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Oasis Questions and Answers

By Jason Czito

Hi Jason,

We recently installed the Oasis system in our casino. Up until this time we had no system at all. I have a few questions I hope you may be able to answer. After reading your articles in Slot Tech Magazine, you seem very knowledgeable on this system.

1-What exactly does the meter card do and when would you use it?

2-How and when would you clear ram on the DPU and or Sentinel?

3-Steps to do a floor move from one DPU to another DPU?

4-How to remove a Fiber DPU that's already on the floor and convert to a regular DPU?

Thanks,

Gerry

From: Jason Czito

First and foremost - are you using Oasis Prime (11.61 or higher)? If so, you'll need to call Aristocrat and have them walk you through it. We're using 11.51 and I'm guessing you are using 11.52?

1 - The meter card sends a signal to the Poller to take a snapshot of the current machine meters, which it places in a separate table in the database. This table can be viewed by way of the Meter Comparison program or a Crystal Report if you know your way around the database structure.

If, for example, you're going to clear the memory on a machine that malfunctioned during the day but don't want to lose the meter information from this first half of the day, simply put the meter card in and take it back out. This way, when the audit department gets the meters for the day, they can add the meters from the snapshot you took with the meter card for the actual revenue for the day.

The meter card is likewise used when a new machine is added to the system, especially if the starting meters are not zero. This only happened to us once, where we added a leased game to the floor that had pre-existing meters on it but didn't have the software to clear it. The meter snapshot told us what the starting meters were, so the audit department would know the actual daily revenue and what was leftover from the starting day.

Seriously though, I'm still working with Aristocrat to get to the bottom of exactly how the meter card works with the poller but this is basically it.

2 - We've only needed to clear RAM on a DPU once, which I'll explain in a bit. We clear RAM on a Sentinel on occasion to rectify the occasional communication error. For example, Konami games with older communication firmware (and somewhat old Sen-

tinel firmware: 11.53j) will stop taking tickets after some time (but will otherwise be functioning normally). Clearing the RAM on these Sentinel boards would restore the ticketing functions for a week or so. For the record, the latest communication software from Konami along with Sentinel firmware 11.61 or better has eliminated this problem for us.

The only time we cleared RAM on a DPU was the rare occasion that we converted a coinless game to take coin (non TITO). The Sentinel basically reads whatever meters the game has. If the game meters are zero, the Sentinel meters are zero. This meter information is redundant between the DPU and the Sentinel - if one 'forgets,' the other will 'remind.'

This game started as a ticketing machine and therefore, had some ticketing-related meters (in, out, values, etc.) When it was converted to non-ticketing, the new machine configuration had no ticketing meters. When the Sentinel read the meters from the machine, all the values were set to zero (as the machine had been cleared) except the ticketing meters - there was no machine meter to tell them to be zero! So the audit department now has ticketing meters on this game - they're not incrementing but they don't belong to this machine. Clearing the Sentinel or the DPU separately wouldn't clear this meter - they had to be cleared simultaneously. This worked, but I think this is a rare case.

3- Who maintains your slot file (the game configuration in Bart)? I think most casinos have the IT department handle this but our audit department does it here. If you're just moving a machine (or bank of machines) from one DPU to another, you'll need to coordinate with this department.

First, figure out which Sentinel IDs the games that are moving will have on the new DPU - you don't want duplicates as this'll definitely cause problems.

Second, take these machines offline (as in: disconnected from the DPU). The Sentinel display should be in lower case. Reprogram the Sentinels with the new IDs and keep them offline.

Now have whichever department maintains the slot file give the machines their new Oasis ID. When they're done, 'bounce' the poller (stop polling, exit the program, restart it, and start polling).

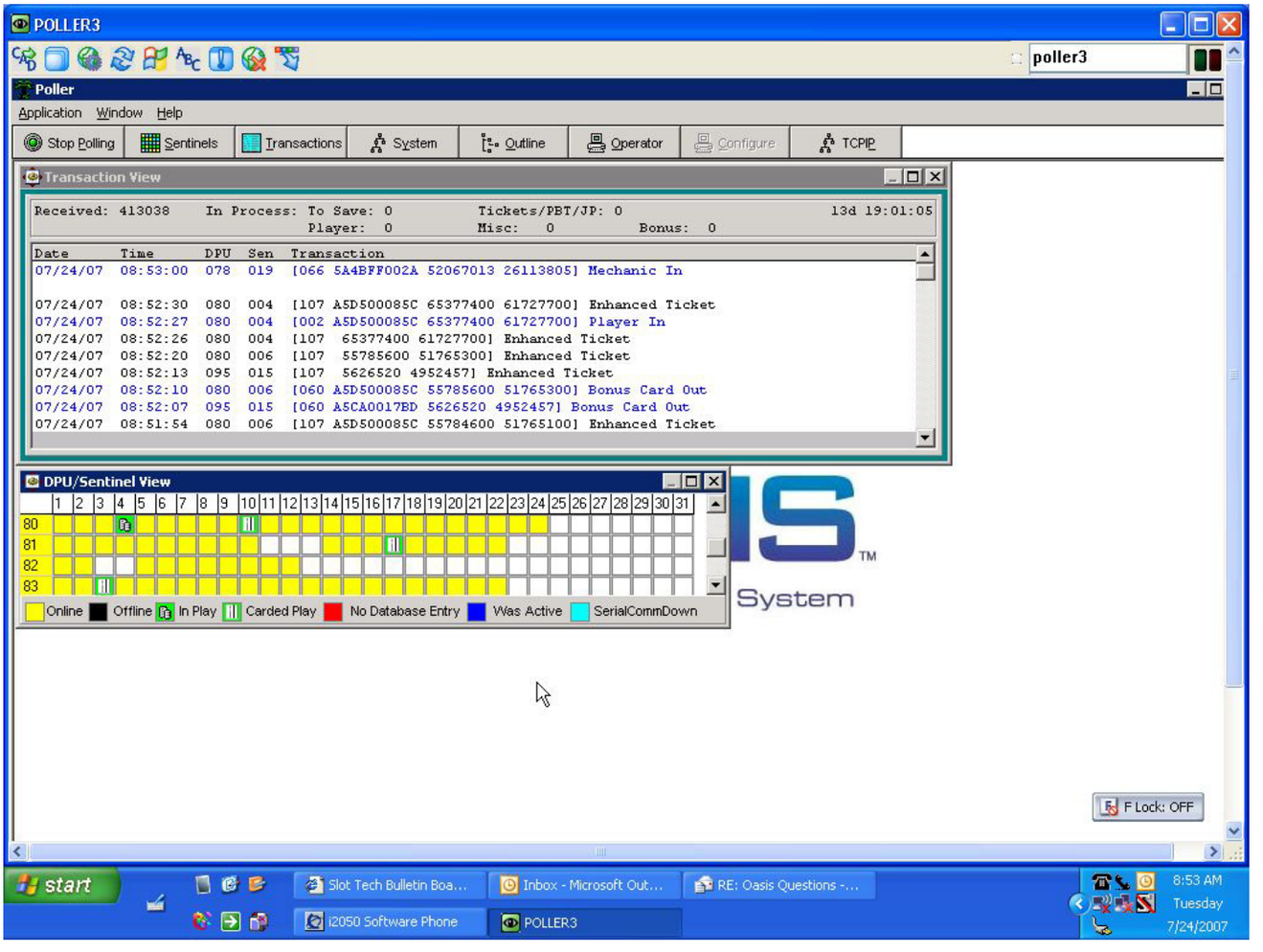
Now connect the machine (or bank of machines) to the new DPU and run some tests to make sure things are communicating correctly.

The screenshot is from one of our pollers if you haven't dealt with it much. DPU numbers are on the left-hand side, the Sentinel IDs for that DPU are along the top.

Note that, for example, on DPU 81, there's a gap of three in the series of used Sentinel IDs (11-13). If you were going to move three machines from a different DPU to this DPU, you'd need to make sure that their IDs aren't any that are currently being used (11, 12, 13 or even 23, 24, 25 would work, for example).

It's not mandatory that they be in order, but this makes things smoother on the floor. The poller only checks which games are assigned to which Oasis ID in the slot file when it's first started up. This is why it's necessary to restart it after making these changes - it'll re-check the slot file and begin tracking the machines on their new DPU/Sentinel ID correctly. You don't need to restart the entire computer, just the program. Be aware that any machines on this poller will be unavailable for ticketing while it's not polling. Bouncing the poller usually takes less than 10 seconds, so nobody typically notices.

4- To convert a fiber DPU to a regular DPU, open the DPU (remove the two screws in the top and take the lid off) and you'll find a small PCB where the fiber optic ports are, and a 4-wire cable connecting it to the DPU. Simply disconnect this cable from the DPU (or from the back of this board) and the DPU will com-



municate via the RS485 port normally.

To convert a fiber Sentinel to a non fiber one, similarly disconnect the fiber optic board from the Sentinel (it's a 5-wire cable) and it'll communicate on the "Bank IN" and "Bank OUT" pins normally.

We remove this hardware completely from our DPUs and Sentinels when we do this but it's not necessary as long as they're disconnected.

If you're removing some games that previously required fiber optic cabling and want to change these to normal wiring, disconnect (and optionally remove) the fiber optic hardware as explained above and add cabling similar to the other non-fiber machines (the daisy chain from one Sentinel to the next on the "Bank In" and "Bank Out" pins on the Sentinels).

I don't know how familiar you are with the cabling scheme you're using, how familiar you are with editing the slot file in Bart, managing the Oasis IDs on the poller, etc. so if you need more information, let me know.

- Jason Czito
jczito@slot-techs.com

Quick & Simple Repairs #29

By Pat Porath

BV Board Problem on an Older WMS Upright

I needed to check some of the game options and do "paperwork" on this game (how we love paperwork). When the bill validator was reinserted back into the game, the screen went black for a few seconds and it started booting up. What just happened here? The game is an upright video WMS with a "CPU Next" main board and a WBA IDO 003 bill acceptor in it. But why did the game just reboot? I reseated the bill acceptor again, and another reboot started. The stacker box was pulled out like "normal" and again, a blank screen and a reboot. Next I was very careful not to make any sudden shocks or "light impacts" on the game and it came up fine (I thought that was interesting). I closed the main slot door gently and the same ordeal. Earlier I had performed a RAM clear on the game, not noticing that it had the "CPU Next" main processor (the newer ones with the game and operating flash cards in them) and had accidentally pulled the BIOS EPROM. Maybe I had bent a leg on the chip and it wasn't making good contact? No such luck there. The main board was removed and inspected, nothing out of the ordinary there. On the backplane board (some call it the motherboard) all of the connections were nice and snug. Nothing weird in that area either.

So, now what? The bill acceptor had been removed and the game was restarted without any problems until the unit was put back in or until the complete bill acceptor assembly was moved around or slightly shaken (not stirred). I removed and reseated the stacker box a few more times and concluded that practically any movement of the assembly would cause the game to have a black screen for a few seconds and start booting up.

Somewhere somehow it appeared that there was a short circuit but not all of the time and not severe enough to blow a fuse. I wanted to remove the bill acceptor assembly but didn't have much luck with the screwdriver I had. I needed a different Phillips tip than what I had and already made one trip to the shop to get the larger screwdriver in the first place. While looking at the back area of the bill acceptor housing, there is a bill acceptor and stacker box "interface board." It is small and rectangular with some connectors on it. The bill acceptor connecter cable located at the top left of the bill acceptor housing connects to this board, along with a few other connections. Once I noticed that the board WAS LOOSE and with a good chance of shorting out, the problem was obvious. The missing small bolt was even sitting quietly on the power transformer. As stated earlier, the plan was to remove the complete bill acceptor assembly but that didn't happen so I had to stick my head as far into the game as I could to see where the bolt needed to go (wish I had an inspection mirror in my tool pouch at the time). Finally I could somewhat see where the bolt needed to be installed. Luckily, it was on the left side because if it had been on the right, no doubt the complete assembly would have to have been pulled. Carefully, the small bolt was put into place, the game powered up, and no problems. The stacker box was removed and installed, the main slot door closed and opened a few times and the

game was fine. Finally I could perform my tests that needed to be completed. Everything passed A-ok. The touch screen, bill acceptor, printer, it accepted tickets, and so on. It took a little time but the game was back online.

Atronic Emotion that Wouldn't Take a Ticket

We had a call to an Atronic e-motion "Deal or No Deal" game that wouldn't accept a ticket. One of my first thoughts that came to mind was the bill acceptor may be dirty and it would need to be cleaned and calibrated. Then the slot attendant stated there was a voucher error on the screen when the ticket was inserted. This indication told me it was a game software issue. While checking out the software, and comparing game options with the one next door, we found what the problem was. In the options, under the bill acceptor settings, the "voucher redemption" was set to "off" instead of "on." The working game had the option set to "on." It makes sense. "Voucher redemption" set to "on" more or less translates to "redeem voucher" when inserted into the bill acceptor. A simple press of the touchscreen to turn on the option and it was fine; the game would now accept tickets. With the experienced slot attendant noticing an error when the ticket was inserted, that made my job a lot easier to troubleshoot what exactly was going on. If the attendant had only said that the game wouldn't take tickets (and nothing further) it could have been a variety of things such as a system communication problem, a game communication problem, a dirty bill acceptor, an invalid ticket or like we found, an incorrect game option.

WMS Stepper Bluebird Reel Problem

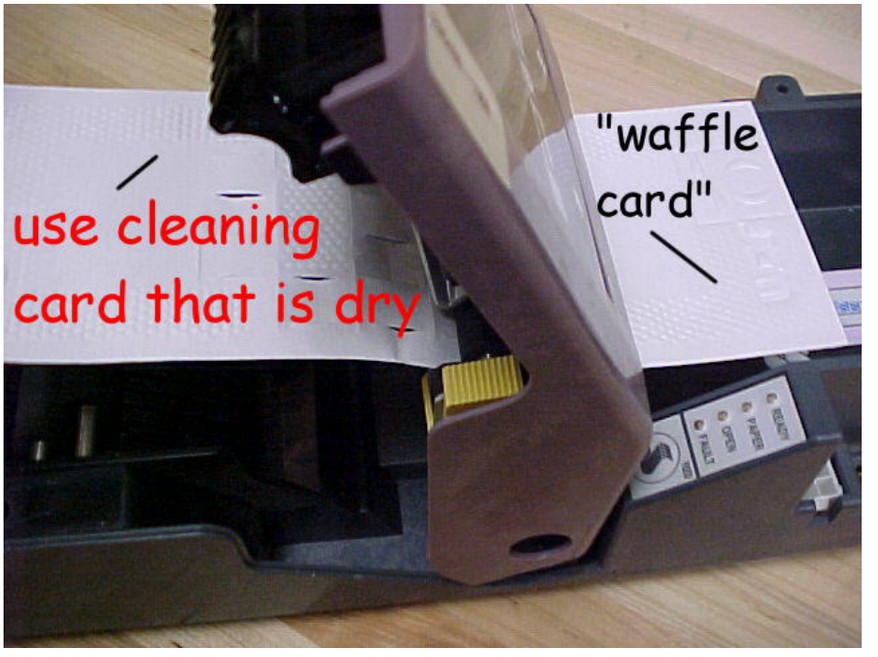
We had a problem on a WMS stepper Bluebird where the number two reel would have periodic reel tilt errors. The problem wasn't all the time but it was getting more and more frequent as the day went on. A different shift had replaced the "O rings" on the reel assembly, which made sense because it did have a bit of a "bounce" to it when it stopped. Does anyone remember the Bally 5000 series games? I remember when, after time, a reel would start to "bounce" when it stopped and when bad enough it would make the game go into a reel tilt. To repair this, the reel basket needed to be taken off and

the six small rubber O rings needed to be replaced. After time, accelerated by the internal heat of the game, the rubber would harden and cause reel tilts. So with a different shift having replaced the O rings in the reel, I thought the game would be fine. It turned out, not so lucky. Later in the afternoon, the game started acting up again and I had to shut the game down and look for parts. We have quite a few banks of the five reel WMS stepper games and only two banks with the three reels and so far the reels run very well so I wasn't sure what to look for first. To start, the reel optic was checked for an obstruction. The reel encoder looked fine too. The connection pins looked OK (none were pushed in) and nothing was obstructing the reel basket. Now, was the problem in the reel itself or in the game? Back to good old "swaptronics." I tried the reel assembly from the game next to it and the tilt cleared right away. I preformed a reel test and that passed too (with the diagnostic button, press until there is a number 5 in the coins played display and use the spin button to test). This told me that the problem was no doubt in the reel assembly. Up in the shop I found a motor and a "reel control board." The motor was marked "may be good" and the board was on the "good parts" shelf. The motor was installed in the game and it didn't work very well at all (For those that don't know, a reel motor is a small two phase stepper motor that has X volts to hold the reel in place and X volts to roll it. An example would be 12vdc keep it in place and 24vdc to spin it.). Since the spare motor didn't work properly, it was time to try the "reel control board." While installing the board onto the assembly, the connectors were also checked and I made sure that all of the wires were snug in their place. Was the game fixed for "REEL" this time or was it going to be "back to the drawing board?" With the number two reel back in the game, it was time for the test. Bingo! The problem had been resolved; it indeed ended up being a bad "reel control board." This is the first one that I had replaced in a WMS Bluebird stepper so in the rare occurrence a reel does start tilting, it may be the board. It was it this case. I haven't heard of any reel tilts on it since.

A Unique Way to Clean Ticket Printers

The following is an unusual way to clean a ticket printer. I'm sure I'm not the only one that has come up with the idea but I came up with the idea here at the Island Resort Casino. The idea started when I, "Pat the Printer Guy," had a pile of printers to repair. Some needed a good cleaning, some needed a board, some needed to be flashed, etc. You know the drill. On this particular day, I had a few printers where I had tried the so called "normal" things with no luck. They were DOA (dead on arrival). Everything I tried ended up with the same result which was nothing.

Then I had a FutureLogic Gen 1 (a.k.a. Seiko) printer hooked up to the computer and thought of a different way to clean it. The idea is to use a DRY JCM Bill Validator Cleaning Card and a DRY



Magnetic Head Cleaning Card credit card reader cleaner. Allow the liquid to evaporate or use a paper towel and soak up the liquid on the bill acceptor card and the magnetic cleaning card. Use the "platen" lever on the printer to allow the dried cards into the printer heads. Simply move them into and out of the print head. Then engage the platen lever to put pressure on the BV cleaning card. Slowly slide it into and out of the printer. More than likely, you'll see dirt on the card. Only engage the platen lever while using the BV card, not the magstripe cleaning card because the mag card is too thick once the platen lever is engaged and damage may occur. Once the printer was cleaned with a Q-Tip and the cleaning cards, and the "clear status" button was pressed in the "FutureLogic" troubleshooting mode, the printer came to life. It was installed into a game, and printed three test tickets great. With the combination of compressed air, Q-Tips, a DRY JCM BV cleaning card, and a DRY magnetic reader card, maybe you can get a few more ticket printers from the non-working pile to the "Ready for Installation" shelf.

The JCM part number for the BV cleaning card is KWJCM-B1B15M. The "head cleaning card" (credit card reader cleaner) can be purchased through Happ Controls. See www.jcmwaffletechnology.com or www.jcm-american.com. Happ Controls' website is www.happcontrols.com

- Pat Porath
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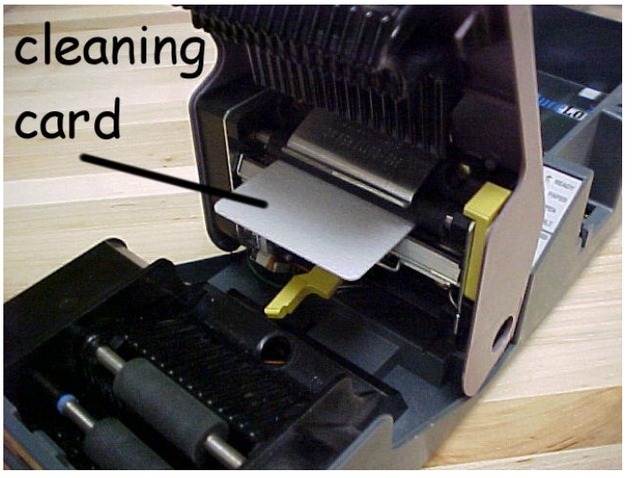

Power-On Troubleshooting Part 2

Note: Refer to the August 2007 issue for the schematic digram that goes along with this discussion.

Wells-Gardner D9300
Black Screen – No Raster Visible

OK, here we go again. Here is the same symptom as we studied in part one of this article but with a totally different cause. However, troubleshooting will proceed in more or less the same manner as before. In this case, power-on troubleshooting is essentially the only way we're going to find this without a lot of guesswork.

This monitor seemed totally dead. There was no EHT "static buildup" sound and the missing EHT was confirmed by the NE-2 lamp. It did not glow when held against the core of the flyback transformer. It didn't flash at all.

You know the drill by now. The next step is to hop over to the power supply and check all of the output voltages, using the cathodes of the secondary output rectifiers as convenient test points. In this case, all of the outputs were good. We had 57 VDC at the cathode of D110, 24 VDC at D112 and 80 VDC at D113. There are a couple of +12 VDC supplies as well. One of them is switched (controlled by the microprocessor); the other (+12V_A) is not. We measured the voltage at the cathode of D114 at +12 VDC. Perfect. We also had a good +5 VDC power supply at pin 2 (the output pin) of +5 volt regulator IC102.

So the power supply itself was good. Was the monitor actually asleep? We discussed this in part one where we found that a bad microprocessor was the actual culprit. Maybe we have the same problem here? Time to check the switched outputs of the power supply. In this case, there are two.

Under microprocessor control, the monitor can turn off the +24 VDC power supply. Since the +24 VDC is used in the primary of both the horizontal drive and the EHT generation circuits, killing the +24 VDC power supply will shut down both the EHT and the horizontal output circuits, the two circuits in the monitor that consume the most power.

We checked the voltage at the collector of Q103. It was perfect at +24 VDC. Of course, this also told us that the "suspend" signal from the microprocessor was good and that Q104 must be working properly as well. We don't actually need to check the condition of the suspend signal nor the voltages at Q104 and quite frankly, the fewer power-on tests we can make, the better off we are. We can perform our troubleshooting as quickly as possible while minimizing the risk of slipping with our meter probes and shorting something out.

But the +12 VDC circuit was another thing altogether. At the collector of Q105 we had zero volts (actually, there were a few millivolts or something, but it was, for all intents and purposes, zero volts).

Now we're getting somewhere! Power-on troubleshooting has led us to the point where we know what's wrong. We may not know which component is bad at this point but we know why the monitor is dead. The switched output of the +12 VDC power supply is used to power a few ICs in the monitor, as well as a host of other circuits. It provides power for the TDA 9109A horizontal

oscillator/EHT IC (IC302), the KA2500 video amplifier (IC401) and IC402, the LM2407 video output IC. This is the device that contains the three video output transistors (and some other stuff) in a single package. It lives on the heat sink on the video PCB (the neck board) along with IC401, the video amplifier. If this +12 VDC supply is missing, it's no surprise that the monitor has a black screen. We won't have horizontal deflection, EHT or video.

Here again is where it is helpful to have a good grasp of REAL electronics theory as opposed to simply poking around looking for bad components. Let's figure out WHY there is no +12 VDC output at the collector of transistor Q105. There are a few possibilities at this point. We have already checked the +12 VDC at the cathode of D114 and found it to be good. Perhaps it's not getting to the emitter of Q105. We could have a broken trace somewhere or perhaps coil L101 is broken. That would prevent the +12 VDC from reaching the emitter of Q105. A quick voltage measurement at the emitter verified that was all good. The emitter of Q105 read +12 VDC.

Just one measurement to go. Let's look at the base of Q105. Since this is a PNP transistor, we know that the voltage at the base needs to be .7v LOWER than the emitter voltage in order for the transistor to be turned on. In this case, the base voltage was around 11 volts so the transistor should be turned on. It has the proper base voltage.

So what's going on here? We have the proper voltages at the emitter and base of Q105 but nothing's coming out of the collector. There are now just two possibilities and because I am an electronics genius, I know both of 'em. One possibility is that the series-pass switching transistor, Q105, is bad. For some reason, despite the fact that it has a good input at the emitter and the proper control voltage on the base, it is simply not turning on the way it

should. Time to turn off the power (hooray!) and test the transistor itself with a DMM.

Or is it? The other possibility is that something on the switched +12 VDC buss is shorted and that Q105 is actually working properly but the output at the collector is being sucked to ground by the short circuit. Testing the transistor (with the distinct possibility that we might have to unsolder and remove it from the circuit in order to test it properly) might require five minutes of work and entail a bit of risk of damage to the PCB. Let's check for the short first because it's easier and faster. With the power still turned off, we measured the resistance between the collector of Q105 and ground. It should have been thousands and thousands of ohms. Instead, it was around five ohms.

Now we're cookin' with gas. We still don't know which part is bad but we're closing in on the problem. Since we can clearly see the short circuit with the power turned off, we can finish the job without applying power until the repair is complete. We just have to figure out which part is bad.

Since the switched +12 VDC runs to so many places in the monitor, we need to find a quick, non-destructive way to locate the short (some techs start cutting up the +12 VDC trace with a razor blade at this point, looking to see which side of the cut still shows the short. This technique makes me shudder).

Since the switched +12 VDC goes to the neck PCB, and since the neck board contains the only high-current output device that uses the switched +12 VDC in the monitor (the vertical output IC uses +12V_A, the unswitched +12 volt power supply that we have already verified as good) why not "divide and conquer" the easy way by disconnecting the neck board from the chassis? With the neck board disconnected, the short disappeared from the collector of Q105. We could still see the short at the +12 volt input power pin of the neck board, proving that the short was in the neck board itself. Taking an educated guess (electronics genius, remember?) we lifted one end of resistor R425, isolating IC402 from the rest of the +12 volt circuitry and verified the short at pin 10 of IC402, the video output device. In this case, we didn't actually replace the device because we had a mess of spare neck boards, generously provided by Wells-Gardner as part of our soldering lab. We just tossed in a new neck board and left it at that.

That having been said, I suppose that in this particular case, a novice tech that knows only how to swap boards might actually have been able to fix it faster. Since the neck PCB is, more-or-less, the only swappable board in the monitor, the novice tech might have actually gotten lucky and been in and out in five minutes. But it wouldn't have been nearly so much fun to troubleshoot!

And finally . . .
Wells-Gardner D9300
Black Screen – No Raster Visible

Will the madness never end?

Please pay attention to this one because you may learn a cool (and simple) little power-on troubleshooting trick here. In this case, the power supply was going into OCP, the over-current protection mode. Normally, when the SMPS goes into OCP mode, you can hear a faint ticking or chirping sound coming from the power supply but that is not always the case. Sometimes, the environment is too loud and you cannot hear the ticking. In other cases, the sound is too faint or even not audible at all. It sort of depends on the design of the power supply and/or the amount of current being drawn by short circuit that is causing the OCP to kick in. If it is a high current short caused by a shorted horizontal output transistor in a traditional monitor, it's usually pretty loud.

In a modern, digital monitor however, there are a number of things that can cause OCP to engage. In addition to the horizontal output transistor, there is an EHT output transistor (drives the primary of the flyback transformer) as well as a couple of buck or

boost regulator circuits that are also a part of the horizontal output and EHT circuits. In some monitors, a shorted vertical output IC will also trigger the power supply's OCP. These circuit failures can trigger OCP but it may not produce the ticking that you're used to hearing.

However, your DMM will tell you what's going on if you know what you're looking for. What at first might seem to be a really confusing set of readings, is actually telling you exactly what's wrong with the monitor. We know (from this entire discussion) that measuring the output voltages of the power supply provides us with some very important clues about what is (or is not) wrong with the monitor. In this case, when we started measuring the voltages at the cathodes of the power supply diodes, we saw some crazy readings. They were all at about half of their normal voltages and they were fluctuating like crazy. All except one, that is and that one wasn't fluctuating much at all. In fact, it was stuck at pretty close to zero volts.

The fluctuating voltages at the outputs were an almost sure-fire indication that the SMPS was going into OCP, even though we could not hear any ticking or chirping sound. Now, all we need to do is locate the shorted component. One way to approach this would be to turn off the monitor and measure the resistance at the cathodes of the diodes. As we discussed earlier, this should be thousands and thousands of ohms. However, in this case, we actually already know which power supply output is shorted because its output was close to zero volts while all of the other power supply outputs had some voltage on them as their secondary filter capacitors would charge up during the momentary pulses produced by the power supply as it comes on for a split second, recognizes the over-current situation and shuts itself down about once every second. Our bad boy was the +55 VDC output.

Power off now while we consult the schematic diagram. The +55 VDC doesn't go to

the neck board so that sort of eliminates that as a possibility. No sense in disconnecting it to see if the short goes away. The +55 VDC only goes to one circuit and it's just the sort of high current circuit I would expect to cause a problem like this, it's the "boost" power supply circuit that drives the primary of the flyback transformer. There's really just one part of interest here, the MOSFET Q313. The +55 VDC goes right to it, through energy-storage coil L304. We have discussed the operation of this circuit previously in Slot Tech Magazine. Anyway, we don't really care how it works. On the schematic diagram, we can clearly see the +55 VDC connected to the MOSFET. Since it's a big, three-legged part mounted on a heat sink (back to the simplified approach!) why not test it? Yep! Shorted.

So in this case, the power-on voltage measurement tells us which power buss has the short. It's the one with the lowest voltage. Don't be freaked out by all the voltages that are incorrect and fluctuating. Look for the output with the lowest voltage (it will be significantly lower. Close to zero) and follow that path to success. This technique works for all switching power supplies with multiple outputs and sure beats the technique used by some technicians of unsoldering and lifting the cathodes of the output diodes in order to isolate the shorted buss.

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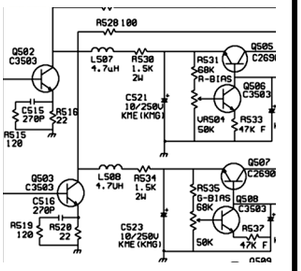

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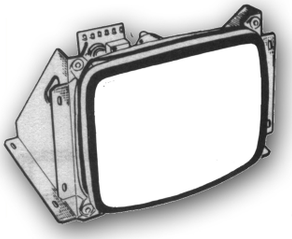

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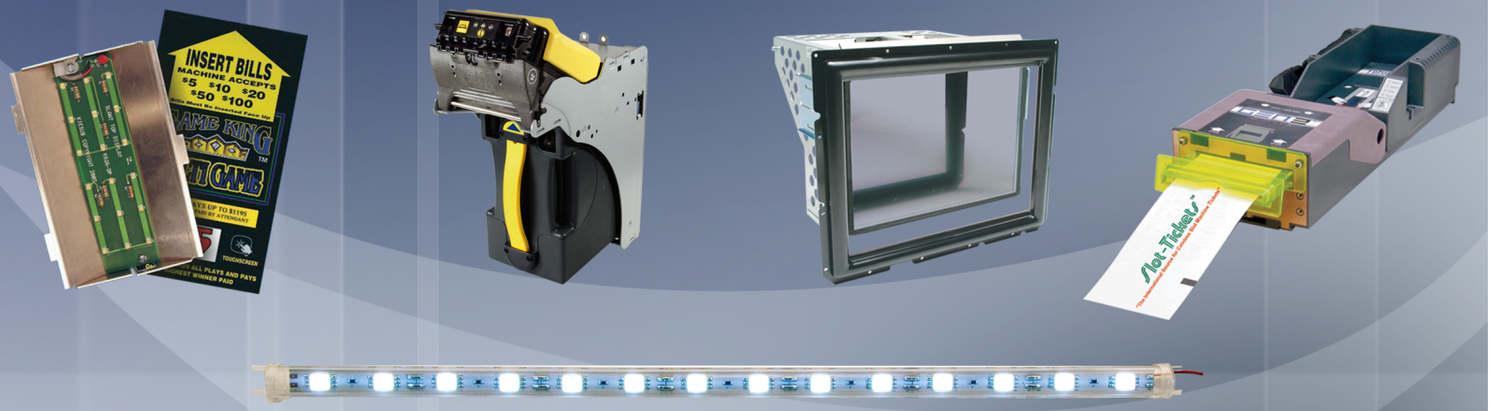

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