

SLOT TECH

MAGAZINE

Slot Machine Technology for the International Casino & Gaming Industry

We Made It!

10th Anniversary

Issue

10



Slot Tech Magazine

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April 2011

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Wow! We made it! This is our tenth anniversary issue. The first Slot Tech Magazine was published April 2001 and we have published an issue each and every month since, without fail. I know I've said it before but I just can't leave it unsaid (especially for THIS issue) that none of this would be possible without contributions from the field (a super-big thank you to writers past and present, Herschel Peeler, Pat Porath, Kevin Noble, James Borg, Ted Befus, Chuck Lentine, Craig Nelson et al) as well as the outstanding support of our advertisers, most of whom have been with us since the beginning, all of whom offer their support each and every month. Thank you all.

Also, just a reminder that the "Earlybird Special" \$100 discount for TechFest expires on April 24th so please sign up as soon as you can in order to obtain the discount. Enrollment forms are available on the website at slot-techs.com.

Thanks for being a friend of Slot Tech Magazine. Let me know if I can help you in any way.

Randy Fromm
Randy Fromm - Publisher



Randy Fromm

**Randy Fromm's
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Preventative Maintenance on your Slot Floor

Presented by your friends at:

Treasure Island Resort & Casino
Slot Technician Department

Whether your Casino has 500 or 5000 slot machines, a good preventative maintenance plan can make or break your Slot Floor. All too often this fairly simple job is either overlooked or not a priority. It is not because someone has not considered the importance of it or tried to create a plan but staffing costs and other critical projects put preventative maintenance plans lower on the priority list. Another common problem with a preventative maintenance plan can be a lack of consistency and scheduling of the way the preventative maintenance is done.

For preventative maintenance to be successful, it's important the management team supports the idea, and then allows the supervisors and front line staff create a routine that will balance out all facets of your slot department. This will not happen overnight. It will take a well thought-out plan and then some trial and error to find out

what works best for your slot floor. Keep in mind that your specific process and plan for maintenance will be tailored to your slot floor needs. Basic principles will be covered in this article and you may find you need to either add or change these guidelines.

For most casino properties, finding an absolute value or return on the time and investment is difficult to quantify. It does make good business sense to maintain the assets of the property and a well thought out preventative maintenance plan will ensure that you do all you can to prolong the life of the slot machines.

The first thing you need to do is clearly define the direction you intend to go with your preventative maintenance program. Look at your current staffing capabilities and determine how to develop a consistent routine. Depending on the staff available, you may want to consider adding a staff position

solely dedicated to doing maintenance. The optimal situation is to have a dedicated preventative maintenance crew that would focus on routine maintenance and cleaning but would also be available for bigger projects if needed. An example of a maintenance schedule would be having the crew work Monday through Thursday from 12am-10am or a similar 3rd shift option. The best case scenario would be to have one maintenance position for every 500 machines the slot floor. This position would be part of the Slot Technician department, just below an entry level floor tech and would focus on preventative maintenance with the intent to internally develop them for future floor tech positions should they choose to go that route.

Let's go through the basics of what you are going to need to create a solid preventative maintenance program. For the purpose of this article we are going to use a strictly video slot

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machine floor with 2500 machines as a reference point and the maintenance should be done on the slot floor during business hours on some form of a 3rd shift option.

Staff is going to be the biggest variable for each property, whether or not you have a dedicated position or if you use your floor people for preventative maintenance it is imperative that you be consistent and start the project with a clear plan.

Shown below are the basic tools needed to complete the job:

Over the course of time you can add tools to this list but these are going to be the most expensive and most crucial to the job. It is advised not to purchase lower quality equipment when buying these essential items as they will get a lot of use.

Get a transportable air compressor that has good capacity, fast regenerating time and that is quiet. We recommend the Flexzilla™ air hose in a 50ft length; this hose will not kink and is very light and maneuverable. The air nozzle you choose doesn't matter if the compressor has an air pressure regulator on it. If

it doesn't, you are going to want an air nozzle that you can change the air pressure for various procedures. We use a section of copper to extend the nozzle so it can reach into tight spots and behind things within the slot machine.

You will need a Shop Vac™. These have proven to be the most durable, have the most power, and are the quietest to use. Also, if not included, you will need to order an accessory package; the circular brush attachment will work great for fans and screens on the outside of the cabinet. Remember to order dust masks for team members to

Air compressor



Air Nozzle



Dust Mask



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wear while they are blowing and vacuuming as the dust will really affect their breathing if they are not protected.

Using these tools, you are going to want to start at one end of your casino slot floor and work your way to the other end. The machines should be blown and vacuumed out first, followed by an in depth review of all machine components. For best results, you should put a whole area of your slot floor out of service so you do not bother any guests with excessive noise or dust. You could bag the whole machine and vacuum while blowing it out to avoid dust in the air. This has been found to be very time consuming and is not realistic if you want to get through your floor in a reasonable amount of time, but it is an option if minor dust in the air is an issue. If you vacuum the slot machine out well first then hold the vacuum in the machine while you are blowing it out, you will almost eliminate the chance of dust blowing around the room.

Once the machines are blown and vacuumed out, you can now begin your maintenance process. Each cabinet type should be done the same way and a standard for which this is accomplished should be created and maintained by your supervisory staff with the input from the front line team members.

The maintenance process for each cabinet type will vary and a standard will need to be created for each one. Various specific types will be covered in future publications but here are is a checklist that will cover the basics on most machine platforms-**STM**

GAME PREVENTATIVE MAINTENANCE CHECK-LIST

<u>CHECKPOINT</u>		<u>DESCRIPTIONS / CONCERNS</u>
Check & Initial Boxes as Confirmed		
<input type="checkbox"/>	BLOW OUT/VACUUM MACHINE	Blow out and vacuum the machine before performing any other work, pay close attention to the fans and vents.
<input type="checkbox"/>	MACHINE LOCKS	Check all locks for functionality, Lube all locks Replace locks if necessary.
<input type="checkbox"/>	DOOR HARDWARE	Check door latches for proper functions. Lube if necessary. Tighten all screws and mounting hardware. Check doors for proper alignment.
<input type="checkbox"/>	PLAYER TRACKING	Verify that the game is communicating correctly. This can be done by inserting a test ticket into the bill acceptor. Replace any displays, key pads and mag readers if necessary.
<input type="checkbox"/>	SOUND	Check to make sure the sound is working properly. Adjust sound to a normal level. Check the option sheets for correct levels.
<input type="checkbox"/>	BUTTON FUNCTION	Check all button functions including button lights. This includes removing & cleaning buttons if applicable. (slant tops are worse)
<input type="checkbox"/>	CABINET COOLING	Verify the cooling fans are spinning and working properly. This includes power supplies and monitor fans. Replace as needed. If a fan is not working properly, it can cause machine lock ups and disrupt guest play. Vacuum and blow out any dust build up on fans. In addition vacuum out all exhaust and intake vents.
<input type="checkbox"/>	SLOT CHAIRS	Check the chair to make sure it sits properly on the floor so it does not rock, that the chair back is secure. Check for large cigarette burns, stains. Replace if necessary.
<input type="checkbox"/>	BASES	Clean ALL BASES, Use Black touch up paint if bases are scuffed up or scratched.
<input type="checkbox"/>	TOPPERS	Clean ALL TOPPERS and CANDLE LIGHTS
<input type="checkbox"/>	BILL ACCEPTORS	Verify all bezel and bill acceptor lights are functional. Insert a test ticket to test bill acceptor.
<input type="checkbox"/>	MONITORS	Check for scratches on touch screen. CALIBRATE TOUCH SCREENS. Adjust monitor size so it fits on the screen. DO NOT ADJUST THE BRIGHTNESS OR CONTRAST ON MONITORS.
<input type="checkbox"/>	PRINTERS	Verify all bezel and printer lights are functional. Insert a test ticket and cash it out to verify printer functionality.
<input type="checkbox"/>	MACHINE LIGHTING	Verify all lights are functional and replace and lights or ballasts as needed.
<input type="checkbox"/>	EXTERIOR	Remove any tape, glue, or double faced tape; then do a final wipe down and polish any chrome if applicable.

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I'll Drink to That!

By Chuck Lentine

When I first started in electronics way back in the early 80s, it was the dawn of the arcade video game boom. It was in a small seashore town in southern New Jersey called Wildwood. I was a teenager and got to work and play with roller coasters and arcades. In addition to the piers, we had five arcades on the boardwalk and numerous game rooms in small motels on the island. Pac Man had been just released and everyone just had to have one in their place of business. My high school guidance counselor said video games are nothing but toys and won't last enough to make a career out of! Well, it did pay the bills!

Most of the popular machines we had in the motels were known as cocktail tables. These are

where two people could sit and look down at the screen built into what looked like a table, and we all know what goes on tables. Drinks! And lots of them! Most of the machines were built without any liquid protection and this is where I first witnessed drinks vs. electronics. My first service call was for a drink spill. The company we worked for bought us a small dishwasher we put in the back of an arcade. It worked quite well back in the day but I wouldn't recommend it now on the same boards which are now 25+ years old.

Fast forward now to the modern casino industry where slot machine manufacturers have made improvements in their designs against liquids from getting into our new machines, right? Well, sort of. Read on, oh brave slot tech.

Even today, all of us are still fighting drink spills. It wouldn't be so bad if the ooze just stayed on the outside of the machine but it really likes to sneak inside and always in the places that are the hardest to reach. Sometimes it does

a nasty amount of damage. Sticky buttons, doors, locks, printers and bill validators are usually where the liquid finds its way first. Here, we are going to look at some successful methods of ridding ourselves of the spill after the fact.

One of the most difficult situations to clean up is the bill validator. If it is a JCM UBA, they act like a funnel for whatever gets spilled in it and it gets in the optics, rollers, belts, and always lands in a pool on the CPU in the bottom. JCM has come out with a spill cover kit which stops liquid from splashing on your CPU board. They also sell a dust protection kit is great to install while you have the unit apart. Every BV we refurbish is now installed with these enhancements.

I usually have to deal with at least one drink spill per day. Depending on its severity, the CPU board may be able to be cleaned up locally on the bench with a foaming multi-surface cleaner and a soft brush. We then rinse with bottled water and blow dry with an air compressor turned down to its lowest output setting. Take your

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time with this step and make sure to get air under the chips on both sides of the board. The rest of the belts, gears, and optics still have to be taken apart the old fashioned way and examined and cleaned if necessary. Heck, since you're in there anyway, give the optics a quick cleaning as well. This is now a good time to let any residual moisture dry out, take a break, and go get your favorite beverage (just don't spill it into whatever you are working on).

Being able to see what you are doing is very important. Depending on what type of liquid was spilled, some fluids are more difficult to clean than others. For example, water and coffee are easier to clean up rather than soda or some cocktails with hard liquor. Don't worry about trying to identify what liquid you have in front of you, the smell will usually give it away! After we try to be nice to the spill by using a soft brush and non abrasive cleaner to remove it, there are times when the brush just can't get in between the legs of the components on the board. This is where we bring out some of our more interesting equipment.

If we can't see how we are doing with the brush, out comes a nifty microscope digital camera called the Midas Inspection System by Luxo. It is a small self



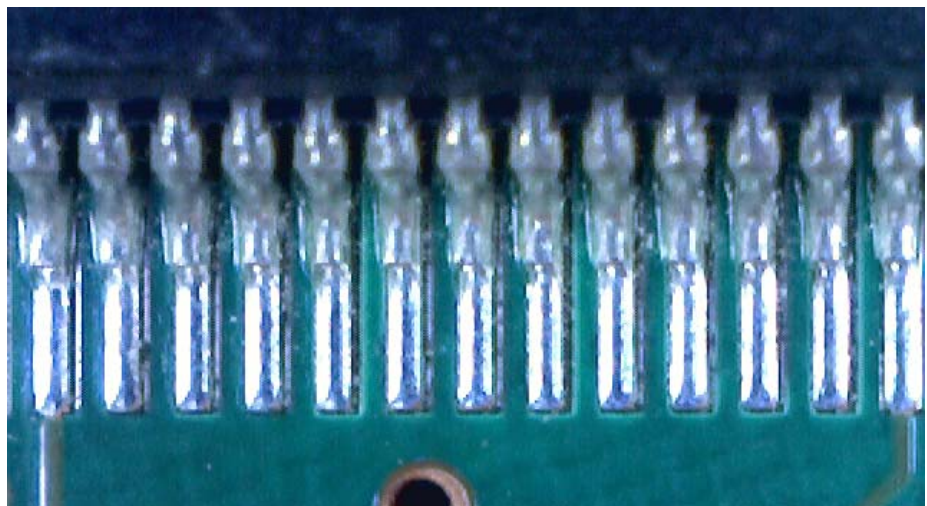
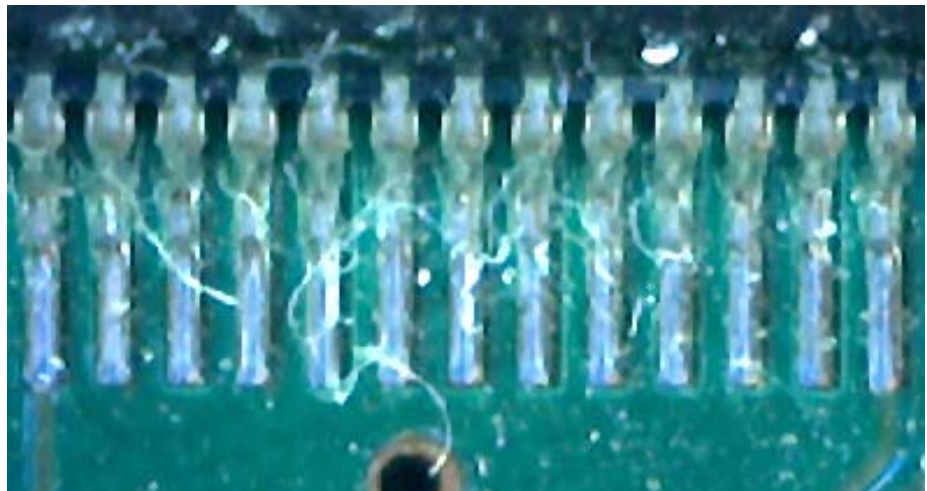
contained USB digital only camera that can be purchased by itself or with a boom or gooseneck mounting system. It's in the \$400 price range. This 1.3 megapixel camera features a wide range magnification

from 10X to 200X, six built in white LEDs and a high quality polarizing lens for true, undistorted color images. These images are viewed on our shop



computer and can be saved. The camera also shoots video.

The following photos were taken by the Luxo camera. In the first image below,



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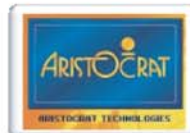
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- 1110 Single raw cold cathode lamp for 22 inch LCD monitor in Aristocrat games

ATRONIC

- 8690 Dual cold cathode lamp assembly for Atronic slot machine with 17" LCD monitor
- 9500 Single raw cold cathode lamp for 15 inch LCD monitor in Atronic games
- 9520 Single raw cold cathode lamp for 17 inch LCD monitor in Atronic games
- 9260 Single raw cold cathode lamp for 19 inch LCD monitor in Atronic games

BALLY

- 1240 Used 6.2" Hitachi LCD #TX16D11VM2CCA with attached 5 wire touch screen for Bally Iview
- 8460 NEW 6.2" Hitachi LCD #TX16D11VM2CCA with attached 5 wire touch screen for Bally I-View
- 8650 Single cold cathode lamp assembly for Bally I-View 6.2 inch "IDW" LCD
- 8680 Single cold cathode lamp assembly for Bally I-View 6.2" Hitachi LCD #TX16D11VM2CCA
- 8950 NEW 5 wire touch screen kit for Bally Iview 6.2 inch "IDW" LCD, includes metal base & copper foam grommet
- 8980 NEW 5 wire touch screen for Bally Iview 6.2" Hitachi LCD #TX16D11VM2CCA, DOES NOT include metal base or copper foam grommet
- 1060 NEW 5 wire touch screen for Bally Iview 6.2" "IDW" brand LCD, DOES NOT include metal base or copper foam grommet
- 8320 Metal housing for Bally Iview "IDW" touch screen
- 1200 Copper foam grommet for the touch screen on Bally Iview 6.2" "IDW" brand LCD
- 9800 Single output cold cathode lamp inverter for Bally Iview 6.2" "IDW" brand LCD
- 1040 Single output cold cathode lamp inverter for Bally Iview 6.2" Hitachi LCD #TX16D11VM2CCA
- 9190 Protective Mylar sheet for Bally Iview 6.2 inch "IDW" LCD
- 9200 Protective Mylar sheet for Bally Iview 6.2" Hitachi LCD #TX16D11VM2CCA
- 1090 Power supply for Bally Iview player tracking system that use the 6.2" "IDW" brand LCD
- 9250 Single raw cold cathode lamp for 15 inch LCD monitor in Bally games
- 9080 Single raw cold cathode lamp for 19 inch LCD monitor in Bally games
- 8770 Single raw cold cathode lamp for 20 inch LCD monitor in Bally games
- 1130 Single raw cold cathode lamp for 22 inch LCD monitor in Bally games
- 1140 Single raw cold cathode lamp for 26 inch LCD monitor in Bally games

IGT

- 8500 Single cold cathode lamp assembly for IGT NexGen 6.2" Hitachi LCD #TX16D11VM2CAA
- 1430 Single raw cold cathode lamp for IGT NexGen 6.2" Hitachi LCD #TX16D11VM2CAA
- 8610 Protective Mylar sheet for IGT NexGen 6.2 inch Hitachi LCD #TX16D11VM2CAA
- 1400 Single output 5 volt cold cathode lamp inverter for 6.2" IGT NexGen Hitachi LCD #TX16D11VM2CAA
- 8570 NEW 6.2" Hitachi LCD #TX16D11VM2CAA with 4 wire touch screen for IGT NexGen
- 1310 Used 6.2" Hitachi LCD #TX16D11VM2CAA with attached 4 wire touch screen for IGT NexGen
- 9090 Single raw cold cathode lamp for 6.2 inch Hitachi LCD #SX16H005-AZA in 1st generation IGT NexGen
- 9030 Protective Mylar sheet for IGT 1st generation NexGen 6.2" Hitachi LCD #SX16H005-AZA
- 8480 Single raw cold cathode lamp for IGT game with 10" LCD monitor
- 8920 Single raw cold cathode lamp for 15 inch LCD monitor in IGT games
- 9670 Single raw cold cathode lamp for 17 inch LCD monitor in IGT games
- 9290 Single raw cold cathode lamp for 19 inch LCD monitor in IGT games
- 1150 Single raw cold cathode lamp for 20 inch LCD monitor in IGT games
- 1160 Single raw cold cathode lamp for 22 inch LCD monitor in IGT games

KONAMI

- 8700 Dual cold cathode lamp assembly & 12 volt inverter for Konami belly glass that is edge-lit with cold cathode lamps
- 9870 12 volt dual output cold cathode lamp inverter for Konami belly glass that is edge-lit
- 1260 Dual cold cathode lamp assembly for Konami edge-lit belly glass
- 9240 LED edge- lit panel for belly glass in Konami K2V cabinet
- 8670 Single RAW cold cathode lamp for Konami belly glass that is back-lit with cold cathode lamps
- 9780 "L" shaped cold cathode lamp assembly for Konami 7 inch bonus screen LCD
- 1050 Single raw cold cathode lamp for 15 inch LCD monitor in Konami games
- 8600 Dual cold cathode lamp assembly for Konami slot machine with 17" LCD monitor
- 9680 Single raw cold cathode lamp for 17 inch LCD monitor in Konami games
- 9070 Single raw cold cathode lamp for 19 inch LCD monitor in Konami games
- 1100 Single raw cold cathode lamp for 22 inch LCD monitor in Konami games
- 1010 7 inch AU Optronics LCD #070VW01 for Konami bonus screen
- 1080 Cold cathode lamp inverter for 7" AU Optronics LCD #A070VW01 in Konami bonus screen
- 8550 Single "U" shaped cold cathode lamp assembly for Konami 7" LCD bonus screen
- 8590 Single cold cathode lamp assembly for Konami 1.5 video upright denomination back-lit panel

MULTIMEDIA

- 9700 Single raw cold cathode lamp for 15 inch LCD monitor in Multimedia games
- 9710 Single raw cold cathode lamp for 17 inch LCD monitor in Multimedia games
- 9720 Single raw cold cathode lamp for 19 inch LCD monitor in Multimedia games
- 9850 Single raw cold cathode lamp for 23 inch LCD monitor in Multi Media games

SPIELO

- 9740 Single raw cold cathode lamp for 15 inch LCD monitor in Spielo games
- 9750 Single raw cold cathode lamp for 17 inch LCD monitor in Spielo games
- 9760 Single raw cold cathode lamp for 19 inch LCD monitor in Spielo games

WMS

- 8490 NEW 6.4" LG LCD #LB064V02 (TD)(01) for WMS Bluebird bonus screen (**does NOT come with touch screen**)
- 8470 Single cold cathode lamp assembly for 6.4" LG LCD #LB064V02 (TD)(01) in WMS Bluebird bonus screen
- 8510 Triple cold cathode lamp assembly for WMS Bluebird 17" LCD monitor
- 8520 Triple cold cathode lamp assembly for WMS Bluebird 18" LCD monitor
- 9300 Single raw cold cathode lamp for 19 inch LCD monitor in WMS games
- 9830 Single raw cold cathode lamp for 22 inch LCD monitor in WMS games

Lamp Testers

- 9220 Bench top cold cathode lamp tester (**includes A/C adapter & power strip with ON/OFF switch**)
- 9840 Bench top dual ccfl inverter & lamp tester

Miscellaneous

- 1280 Raw cold cathode lamp 2.0mm X 250mm
- 1320 Single raw cold cathode lamp 2.4mm X 245mm
- 1420 Raw cold cathode lamp 2.6mm X 294mm
- 1290 Raw cold cathode lamp 2.0mm X 300mm
- 9910 Raw cold cathode lamp 2.0mm X 310mm
- 9970 Raw cold cathode lamp 2.6mm X 316mm
- 1190 Single raw cold cathode lamp 2.6mm X 342mm
- 8420 Raw cold cathode lamp, color white, size 2.4mm x 381mm
- 1330 Single raw cold cathode lamp 2.6mm X 385mm
- 1340 Raw cold cathode lamp, color white, size 2.6mm x 390mm
- 8400 Raw cold cathode lamp, color white, size 2.4mm x 394mm
- 1350 Single raw cold cathode lamp 2.6mm X 420mm
- 1020 Single raw cold cathode lamp, **purple color**, 4.0mm X 580mmRaw
- 1070 Single raw cold cathode lamp for Wells Gardner 6.4" LCD
- 8450 Single raw cold cathode lamp for 15" LCD in Touchtunes Maestro Monitor
- 9920 Single raw cold cathode lamp for 15 inch LCD in Touchtunes Genesis General Touch monitor
- 9960 Single raw cold cathode lamp for 17 inch ELO LCD
- 8440 Single raw cold cathode lamp for 19" LCD in MackVision LCD Monitor
- 1210 Silicone end cap for 2.6mm cold cathode lamp
- 1220 Single "O" ring for 2.6mm cold cathode lamp
- 1230 Figure 8 "O" ring for 2.6mm cold cathode lamp
- 9980 24v single output ccfl inverter for Aristocrat Viridian belly light
- 1250 Sharp 7" LCD #LQ070T3AG02
- 1380 One set of touch screen tape for 6.2 inch LCD Includes 2 long pieces and 2 short pieces of tape
- 8620 24 volt single output cold cathode lamp Piezo inverter

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this is a board hand cleaned with a brush and rinsed. The next image is close up of the same area that is difficult to see with the human eye. Notice all the funk the brush didn't pick up? Now after we see what we have missed, we can go back to that specific area and go back over it usually getting all of the mess.

There will be occasions that no matter what you do to clean the board, it's just not cutting the amount of ooze or the liquid has turned so hard you can chisel it off with a flat blade screwdriver. This method is not recommended due to the micro sized traces on the circuit boards. The next step for us is to bring out the ultrasonic cleaner. We use model 3510 from Branson Ultrasonics that holds 1.5 gallons of their

electronics cleaner solution. It's in the \$900 price range. It features a heater (very important for loosening stubborn particles) and a digital timer. I would also recommend the optional stainless steel French fry basket around \$75. The cleaners are available in different sizes depending on your application.

After a good rinsing with bottled water, try to dry the board as quickly as possible. About 90% of the boards that do not work before the bath are once again productive members of the casino society. Remember, there will also be that CPU that was powered on usually doing a routine when it got spilled on that will never come back to life. It's OK if you have to put it out of its misery. The money you will

save by cleaning the boards should be enough to buy you a few spares.

My high school guidance counselor also said Randy Fromm's technician school in the 80s (specializing at the time in arcade game repair) wasn't going to teach me much. Was he way wrong! Have fun and be safe!

- **Chuck Lentine**

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IGT Game King, Multi-Game, Touch Screen Problem

This particular game pretty much had me stuck for hours. When the bill acceptor was seated in the game, the touch screen would display an error on the LCD and not work. As soon as the bill acceptor (JCM WBA 12) was removed, the error would disappear and the touch screen would work just fine. What in the world was going on? In my 16 years of working on slots I had never seen or heard of this before. I also talked to a few other technicians that had years of experience and they never heard of a game acting like that before either. After the drop team went through the bank of games is when I guess the first error appeared. They change the cashbox, so logically thinking, it should be some type of bill acceptor problem. Bill acceptor problem? Swap the bill acceptors with the game next door. This was

Quick & Simple Repairs #73

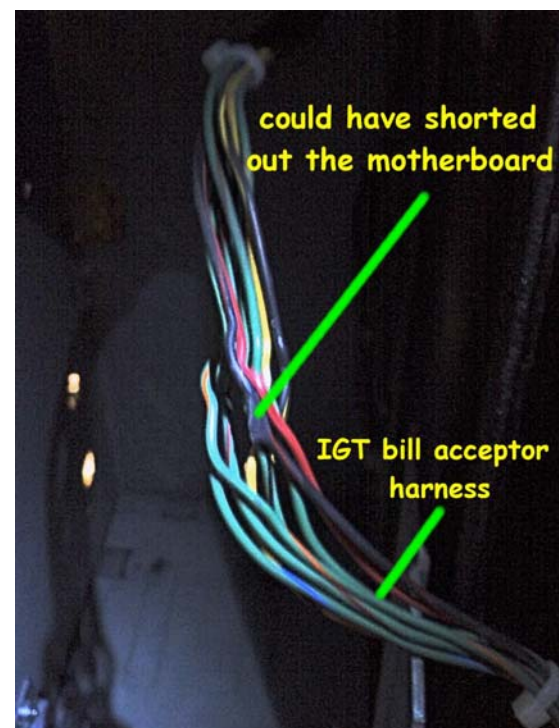
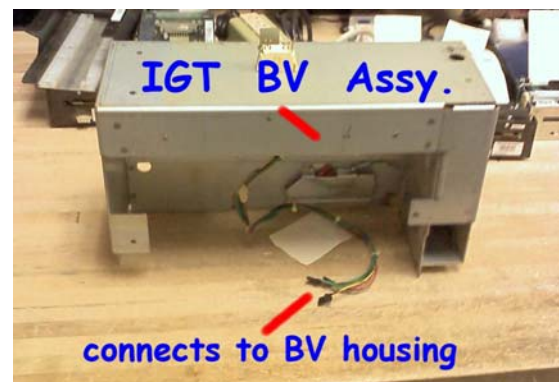
By Pat Porath

done yet the problem remained. Next, the LCD monitor was swapped it didn't help either. I started looking at the bill acceptor harness from the "blind connector" behind the bill acceptor right to the motherboard. Since the cable is kind of hidden within the whole assembly, the TR stand (aka BV housing) was removed and the framework was taken out. There are some games that we have off of the floor so I took the whole assembly, which included the cable, out of one of those games and tried it in the problem game. No such luck changing that out either, the game still was acting up. I looked at changing out the cable from the motherboard that went to the main bill acceptor cable but it looked very involved so I didn't.

It was time for a break from this game, so I made a phone call for any ideas what could be causing the problem. The advisor stated maybe a bad I/O card could be to blame. On this particular upright model, there is one card located in the

slot door and two cards located in the left hand side of the game. All three were swapped, still no success. While swapping main boards with the game next door, all of the connections on the motherboard were checked and none appeared to be loose; everything on it looked to be normal.

After the game done loading, once again the bill acceptor was put in and another



touch screen error. What if the main power supply was weak? That was swapped too, without success. Numerous cables were disconnected (one at a time) from the motherboard, to see if anything was shorted. When the connector marked "COM" was disconnected, the game was fine. Part of this cable did in fact go to the bill acceptor. My shift ended. After my two scheduled days off, I return and the game is running. Awesome, it's fixed. What the world was the problem? The answer: a bad game motherboard. After it was swapped, RAM cleared and optioned, the game worked.

Bally Alpha V23 "Fatal Error"

A call was received to look at a Bally Alpha V32 game that was showing a "fatal error" on the screen. It also had a "game manager" error and the screen showed instructions to use a key to

reboot the game. I did a key reset on the game, it rebooted and the same error appeared. I keyed the game once again with the same results. Next, I removed the "brain box" (CPU) from the game to see if I could find anything unusual. Everything that I could see looked good and in place. Since the backplane board was now exposed, why not check the connections out to see if any are loose? Unfortunately they all looked good and I didn't see a problem in that area at all. I tried another reboot of the game which didn't help either so now it was time to see if it needed a RAM clear. It did. After that, options were set and the game was back online.

Ticket Printer Repair Tips

At the casino where I'm employed, we currently have around 1360 games. Of the 1360, only three of them accept coins, the others have

ticket printers installed. Currently we have a variety of makes and models of printers on the floor too. We have Transact Technologies' Ithaca 750, 850, and the Epic 950. We have some JCM types and three different models of FutureLogic devices: the GEN 1 (aka "Seiko"), GEN 2, and the GEN 2 U. One of the main issues of printers is dust in the optics, with mis-matched software running a close second place. Numerous times, I've run into problems where once a printer was taken apart for cleaning, the dust build up on the optics were obviously a problem. If the optic can't see the paper and or the index marks, then there is a problem.

For example, the GEN 1, GEN 2 and GEN 2 U need to be taken apart to expose an internal optic that needs cleaned. On the JCM printer, the print head needs to be opened up all the way to expose all of the optics. I

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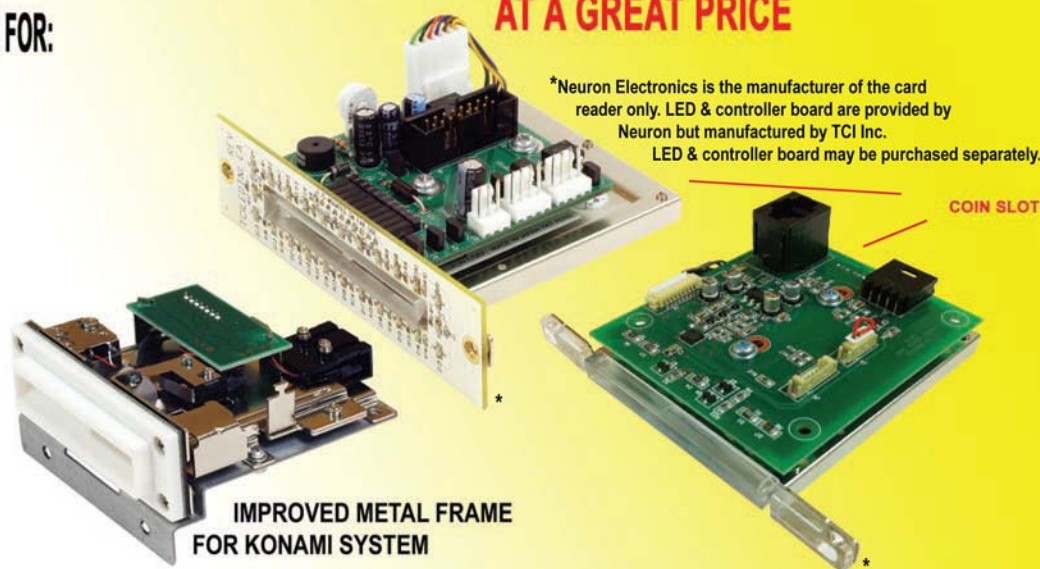
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haven't taken one of these apart yet for cleaning. It appears all of the optics are accessible without disassembly. The Ithaca 850 doesn't need disassembly for cleaning either as pretty much everything is right there. I haven't run into any major problems with the Epic 950 printer thus far. All I've done with them when problems occur is to blow them out with compressed air and they work.

As far as general cleaning of all printers, I use compressed air to blow the majority of the dust out, dry Q-tips for cleaning the optics and external machine cleaner such as glass cleaner and a cloth rag to clean the rollers. Be sure to allow the rollers to dry completely before testing.

Things that I've done to fix printers other than cleaning: Ithaca 750 and 850-replaced the software PLCC chip on the motherboard, replaced the motherboard, replaced bad ribbon cables, replaced the power board, (aka COM board) and replaced bad printer heads. On the GEN 1, GEN 2, and GEN 2 U I've replaced motherboards, re-flashed the software for the printer (downloaded software to printer), replaced print heads and replaced print head parts.

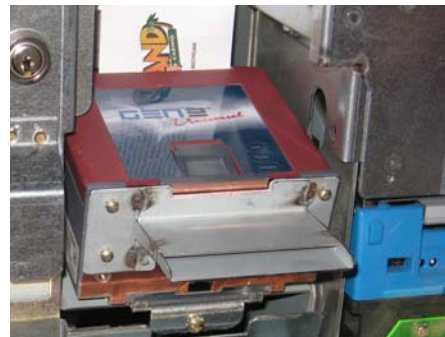
On the JCM units thus far I have only replaced a couple of bad ribbon cables. As far as the Epic 950s go, we haven't had them on the floor for a really long time yet and so far so good. I haven't done any repairs to them yet. Cleaning them has kept them going so far. One thing I did have to check for on them is the correct software. I received what were supposed to be spares that were R.F.I. (ready for installation) but they didn't work. As I found out later, they had the incorrect software. The units will work in a different slot manufacturer, just not the one I had hoped. That is another thing to keep an eye on. Is the correct printer software for the correct slot manufacturer installed?

IGT AVP 2.5-No Communication With Oasis

A complaint was received that an IGT AVP on our prize bank was locking up for hand pays. Normally, the game would print out tickets. One quick way to tell if the game is communicating with the Oasis system is to insert your mechanic card and see if the display shows an OPEN and CLOSED door when the main slot door is physically opened and closed. In this case the display showed a constant door CLOSED. This

told me that the game wasn't talking to the system. On newer IGT games they have a COM board that the system interface cable plugs into. The game talks to the system through the cable. On the COM board, IGT put on two small handy lights to tell if the game is talking to the system. One of them is red and the other is green. If I recall correctly the red is for sending data and the green light is for receiving. When I took a look at the two lights, only the red one was flashing. This indicated a problem that the game wasn't communicating with the system or the Sentinel wasn't receiving data.

Both the game and Sentinel were rebooted, sometimes this works with WMS Bluebird games, but it did not work this time. RAM was cleared on the Sentinel, and the interface cable was checked to make sure both ends of the cable had a nice snug connection. Game options were checked too. When I noticed that the game was set on SAS channel one and not channel three, I thought I may have the problem resolved. The game next door was opened and options were brought up to compare. That game which is working just fine was set on COM channel one also, so that



wasn't the problem. All of the settings were the same.

Maybe the COM board had failed? It was swapped with the game next door but the problem still remained. A co-worker took a look and found that a small interface board that is located between the progressive board didn't have power. Somehow the power cable came a bit loose. Once it was plugged in, both lights started flashing on the game COM board and the game was fixed. I didn't know, with this particular setup, that the progressive board and the Sentinel were tied together. When the progressive board or small interface board has a failure, it could cause a game COM failure. Now I know.

Bally "Dual Vision?"

No, not double vision and its not a "Cinevision" or a "Cinereel," it's a Bally "Dual Vision" slot machine. It's one large cabinet and two people can play at the same time. It looks like a really neat game. One of my questions, being a tech, is how much does it weigh? Well, right around 530 pounds. Another question of mine is the amperage draw per game. That would be 1.7 amps without play, and 2.3 peak. The game is

about 60 inches wide and 36 inches deep. The cabinet has one ticket printer, one bill acceptor, one large LCD with

April 2011



game one and game two displaying on it. It has one player tracking area. What appears to make it a "Dual Vision" is the two different games displayed on one large screen along with a total eleven player buttons. The standard five buttons for each player, and one large repeat bet button. Of course it has only one CPU "brain box" too. I must say that the game does look very cool and it looks like it would be fun to play. More info can be found at ballytech.com.

Aristocrat Mark IV Bill Acceptor Door Switch Problem

When walking up to the game a "bill acceptor door open" display was on the screen. The bill door was physically opened and closed

but the game didn't respond at all. I used my small screwdriver and manually pressed on the door switch to see if it worked that way, which it did not. Behind the whole bill acceptor unit, towards the bottom, there is a two pin Molex connector. This goes to the switch. When I checked to see if the connection was secure, it wasn't. I disconnected it, then reconnected it and the game was ok. Now when the door was opened, it showed open on the screen. After it was closed, it now showed closed like it was supposed to. Simply a loose connection behind the bill acceptor assembly.

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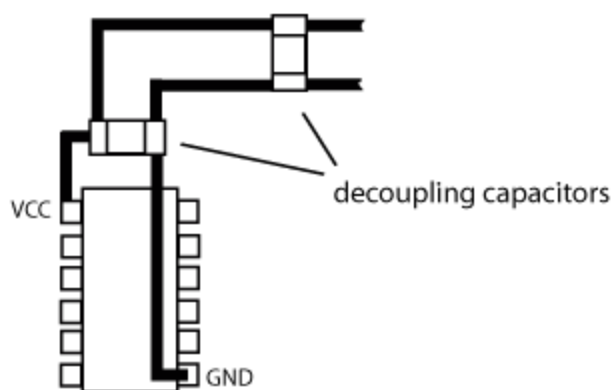
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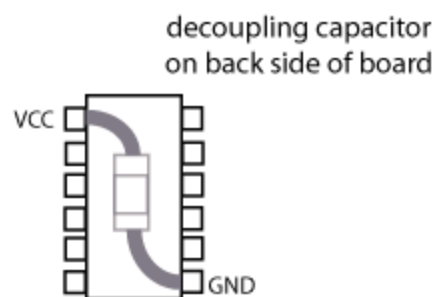
Locating Shorts on a Buss

ICs are noisy suckers. No, I don't mean that you need earplugs to operate your computer. This is noise you cannot hear. This is EMI or "electromagnet interference." As digital ICs operate, they naturally generate a substantial quantity of EMI. This interference can, well,

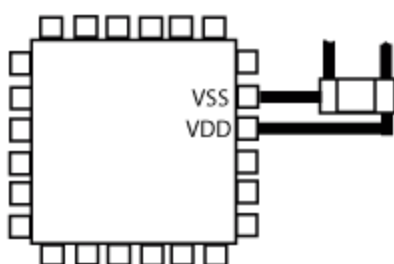
interfere with the operation of just about everything in the system. To prevent this from happening, all digital systems incorporate something known as



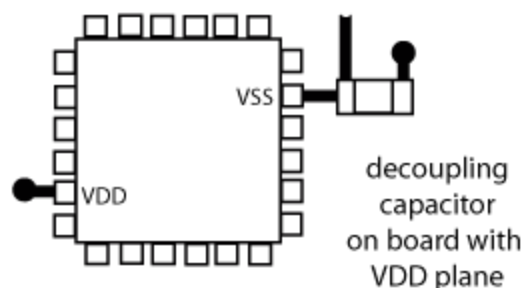
(a)



(b)



(c)



(d)

Figure 1 shows various examples of good local decoupling capacitor connections to boards without power planes.

“bypass capacitors.” They are also known as “decoupling capacitors.” These small capacitors (typically .1 microfarad) are connected directly across the power supply lines, in close proximity to the devices themselves. The capacitors appear to EMI as if they have a very low impedance to ground. This essentially “absorbs” the EMI, mitigating its effects.

Typically, there are dozens or even hundreds of bypass capacitors in a system and, unfortunately, in modern systems that utilize Tantalum capacitors, one of these capacitors will occasionally short circuit.

This can be a giant bummer when it comes to troubleshooting because, while it’s pretty easy to determine that you actually do have a short on the power buss (the voltage is way too low and/or the power supply itself may be shut down due to its internal OCP, the over-current protection circuit that prevents the power supply from self-destructing in case of a shorted load), it’s often not so easy to determine exactly which of the dozens of bypass capacitors is at fault. Using a conventional digital multimeter simply will not locate the shorted component as the resolution is too low. Most DMMs are good down to a tenth of an ohm. Offhand, that seems pretty good but

for locating a shorted component on a buss, we need something that’s much more sensitive. It would be nice to have something that’s ten times more sensitive or even 50 times more sensitive if we’re going to locate a single, shorted component out of dozens connected to the exact same circuit.


How about an instrument that’s sensitive down to 20 milliohms? Now we’re talkin’! If you’re an experienced electronic technician, you’ve probably heard of the “Leak Seeker.” I have known about it for a long time but until recently, we have never had a reason to cover the unit in Slot Tech Magazine because we haven’t had any sort of common failures that would require the use of the unit. In my previous incarnation as an amusements technician

(coin-operated video games, pinball, jukeboxes, etc.), shorted bypass capacitors happened from time-to-time. Some of the early Atari games were notorious for having shorted bypass caps that would bring down the +5 vdc Vcc.

In the past, I have used a “trick” to locate these shorted bypass capacitors. Using a normal DMM, it is pointless to use the “resistance” setting of the meter in an attempt to locate the shorted component. All of the bypass capacitors are connected in parallel so if one is shorted, they ALL appear to be shorted when tested in-circuit. It is impractical to disconnect each bypass capacitor, one-at-a-time, in an attempt to locate the shorted component. There are dozens (sometimes, hundreds) of them.

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Instead of measuring resistance, I used a low-voltage, DC source to force current into the shorted buss. A DMM has a much higher resolution when measuring voltage than it does resistance. I can measure microvolts but my maximum resolution for ohms is 100 milliohms. That's a huge difference and I can exploit that by looking for the IR drop along the PCB traces themselves. Since the traces have a small amount of resistance (R), any current (I) that I force through them will generate a voltage drop. Of course, that's Ohm's Law, $V=IR$ (something I desperately DO NOT want to discuss in the pages of Slot Tech Magazine, thank you very much). With the black meter lead connected to ground somewhere (it doesn't matter where), I simply measured the voltage (it will be in millivolts) at various points

along the shorted trace (the buss) using the red meter probe. As I approach the shorted component, the voltage drops (we are talking microvolts and millivolts here). If I stray further from the defective component with my red meter probe, the voltage rises and I have to reverse direction. It's as simple as that! You can view a little video of the process on my youtube channel, [randyfromm. http://bit.ly/findshorts](http://bit.ly/findshorts) is the link.

Unfortunately, while that works well for components that are dead shorted, an electrolytic or tantalum capacitor (or just about any other component, I suppose) with a 30-100 ohm short circuit can be another story altogether. There is sometimes just not enough IR drop across the traces to obtain a meaningful, definite path to follow.

Leak Seeker

Enter the Leak Seeker. This is not an instrument that you will use very often but when you do, you will praise its existence. The Leak Seeker is a sort of self-calibrating, audible bar-graph milli-ohmmeter that allows you quickly to locate the short circuit, anywhere along a buss or PCB trace. Firstly, you must realize that you have a shorted buss. It's almost always pretty obvious. With the power safely turned off, you simply use your meter set to read resistance and measure the resistance of the bus(ses). Although there are some exceptions, in general you will measure thousands or tens of thousands of ohms on any power buss. A shorted buss will read, well, shorted. It is typical to measure tens or hundreds of ohms, indicating that we have a shorted component across the buss. Typically, this will



be a shorted integrated circuit with an internal short from Vcc to ground or a shorted bypass capacitor.

Next, you drag out the LeekSeeker, connect the ground and use the probe to follow the shorted trace on the PCB from node to node. As the probe gets closer to the shorted component, it emits a tone that rises in pitch. Move away from the short and the frequency falls, indicating that you should reverse direction. There is also an LED bar graph as well.

The unit is self-calibrating, maintaining a window of sensitivity as you approach the short-circuit. In a nutshell, the highest pitch indicates the location of the shorted component. It's that simple.

The reason I mention this unit to you now is reports from the field that indicate an increasing number of bypass capacitor failures in LCD monitors' scalar PCBs. I haven't even bothered to research this at all because, quite frankly, I have been waiting for the first glimpse of an opportunity to introduce you to this interesting and useful unit. And now I have done so.

For a nice set of instructional videos, see <http://www.youtube.com/user/davemiga> If the name "Dave Miga" sounds familiar, he is the genius

behind what you know is my favorite piece of test equipment, the CapAnalyzer 88a. - **STM**

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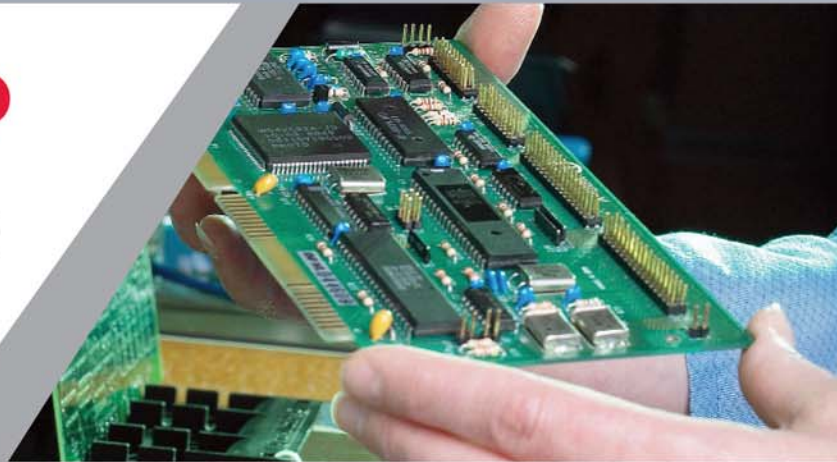
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