April 2010

Slot Tech Magazine

Slot Machine Technology for the International Casino & Gaming Industry

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The Heat's On!

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Slot Machine Repair Tips

(you were expecting chopped liver?)

Slot Tech Magazine

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President

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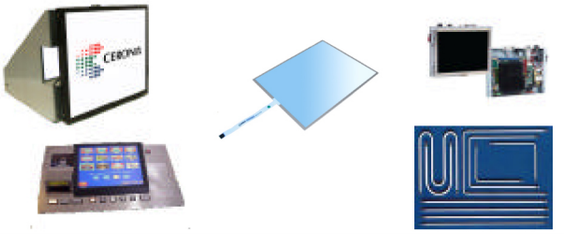

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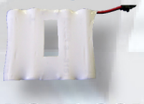

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Randy Fromm

Tip of the month:It's OK to be Short

I have been doing a lot of CCFL replacement recently. Thanks to my buddy Harry Iverson of Pacific Illumination (formerly known as CI Innovations) for providing a big box of sample lamps. You can now buy CCFL replacements at all of our industry's major suppliers. Here's a tip:If your CCFL is too long, there's nothing you can do about it. You can't shorten them and they don't bend. But if the lamp is a few millimeters shorter than the original, it won't make a bit of difference. You'll never see the difference behind all the diffusion films and light guides and the inverter can handle to small difference in length.

CCFLs are like fan belts. Just because it has a Chevy part number, that doesn't mean it won't fit a Ford. Harry intimated that although a casino might order the CCFLs under two or more different part numbers (say for Bally, IGT, WMS), they will actually receive the exact same lamps, based on the length of the tube.

This issue marks the start of our tenth year of publication and it still hasn't "all been written." If you have something that you'd like to contribute to the mix, please drop me a line and send it in. I pay! A nice article with a few illustrations can net you a fast two hundred dollars and you'll be famous too! I'll even send you an extra copy of the magazine for your mother.

Randy Fromm

Randy Fromm - Publisher

Randy Fromm's
Slot Tech Magazine

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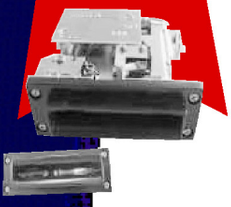

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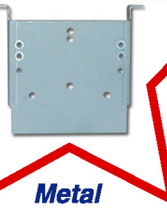

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Cost Saving Bench Repairs #2
Resolving Excessive Heat Buildup

By Dean Auger

One of the most important jobs on the casino slot is preventive maintenance. Catching the problem before The Crash saves money and makes good sense. One of the preventive maintenance issues we take seriously is heat build up. How we resolve this costly, damaging issue varies from machine to machine. We have also addressed this issue in the cabinets that house our in-house progressive controller equipment and computers.

As many of you already know, there was a major problem with heat build up in the Atronic e-motion games. When the new, C Level conversion was completed, the temperature inside these games increased by as much as 30 degrees Fahrenheit. Some of this was initially resolved by the installation of the heat tube off of the processor and by reversing the lower fan to exhaust the heat in unison with the heat dissipation fan on the processor. The heat sink was also increased in size for better heat dissipation. This is located in and behind the Logic Box cover, just below and to the left of the Logic Box door.

The temperature in the Logic Box easily reached 130 degrees (and often higher) which kept the cabinet's internal temperature above 110 degrees. If one of the fans fails, your game will begin to experience problems such as freeze ups or going into an auto re-boot. More costly is when the Multimedia Board and/or the Graphic Board fails. This is more apparent when customers are playing (often in the bonus round) but it can happen when the machine is sitting at idle (actually, it's called the "attract mode." Naturally, the system is never actually "idle") if the inside temperature is high due to a fan failure. Not only is this an inconvenience to your customers, it's a repair that can be avoided by preventive maintenance and checking the fans during this process. Of course, you're really doing much more than preventative maintenance of the fans themselves. The increased temperature will also be working on the other components (such as electrolytic capacitors) decreasing their life span as well.

The quick fix to keep the heat down was to remove the Logic Box cover that housed the Multimedia board. We began to investigate this issue a little further by monitoring the heat in several of our banks of Atronic e-motion games. The failure rate was not excessive but we felt there was a better way to dissipate the heat build up in the machines.

The machine is designed to dissipate the heat to the left side of the machine, drawing outside air through the bottom. After studying the

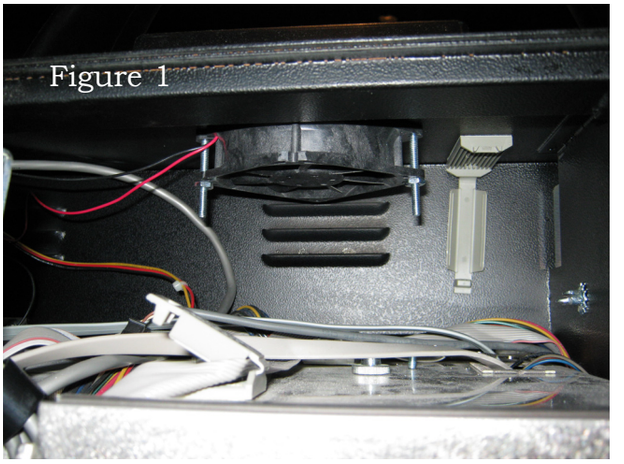
Figure 1

Figure 2

The New Las Vegas Strip.

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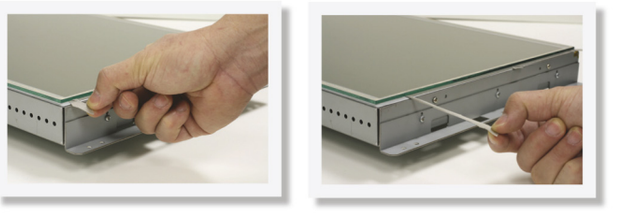

1 Pull Tab at 90 Degrees

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game and taking some test readings, we developed another fan assembly to be installed on the top of the cabinet. When installing the fans, we created a center point from side to side for the fan exhaust hole and then a mounting hole on either side of that. We mounted it at an offset from the front to the back in order to avoid a plate that is installed inside. As noted in the template, from right to center is 17 ½" and 6 ½" from back to center. The two mounting holes are located 2" to the right and left. This allowed us to mount the fan inside the machine, flush to the underside of the cabinet top. The wire run for power was less than 12 inches using a low voltage strip that is located in the machine just below the top and to the left side. We exhaust the heat up and out of the cabinet.

We were able to get the fans and grills through Suzo-Happ at a very reasonable cost. We then adapted the angle boot from an old IGT candle top. Figure 1 shows this very simple assembly and its parts. This modification removes the heat where it gathers at the inside top. As we all know, heated air rises.

This very simple assembly gives us the heat dissipation we need as well as fewer fan replacements, a great cost savings and the obvious added bonus that we were able to significantly decrease the heat build up inside the machine, giving a much more tolerable temperature to all internal parts and components. The average temperature inside the CPU box was around 132 degrees Fahrenheit and the average cabinet temperature was around 118 degrees. After installing the fans, we decreased the CPU box to an average of 108 degrees and the cabinet to an average of 86 degrees. We have had a noticeable decrease in down time and replacement parts with the introduction of this simple modification.

We took this scheme a step further to add heat dissipation fans to our cabinets and bases that housed controllers and PCs for progressive games. As you see in the illustration, we installed the fans in the two opposing doors. With the PC and a Controller both installed in this cabinet, the temperature was around 115 to 120 degrees. After the fans were installed, the temperature hovers around 76 degrees. For our In-house Progressive, we installed the fans in the end machine base close to the floor but above the reach of any carpet cleaning equipment so as to lessen the possibility of damage. The temperature was around 120 to 125 degrees and after installation, it remains around 72 degrees.

When we install them in the progressive games, we install one fan pulling air into the cabinet and the other fan directing air out of the cabinet.

Heat has been an increasing issue with the performance of Slot Machines as technology keeps leaping forward with new, innovative games. Although gaming manufacturing companies put a lot of research and development into their games, they don't always get it right. Small adjustments and/or modifications to the machines deployed on the slot floor can greatly decrease your repair costs and, more importantly, your down time.

- Dean Auger
dauger@slot-techs.com

Heat dissipation fans are added to cabinets and bases that hous controllers and PCs for progressive games.

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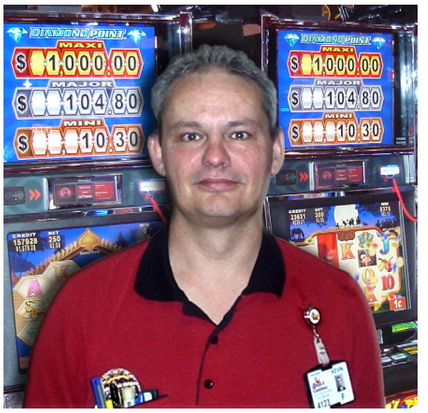

Great Timing for Games Going Down

By Kevin Noble

We recently had to beat the deadline on discontinued software with the threat of games being placed out of service if we didn't convert the machines before the end of the licensing agreement with the OEM. With projects scheduled every Tuesday and Thursday and a maxed out number of games for each project (so they could be back in service before the next scheduled project begins), the laws of average catch up to you. Games started going down left and right adding to our already stressful situation. In a two week period, on top of weekly projects, the Cash Fever spilled over into the next week's scheduled two projects plus these added bonus games needed attention. These are the problems we ran into along with the Bally Alpha Jurisdictional upgrades scheduled twice a week for the entire month.

IGT ReelTouch (Bucks Ahoy) Freezing in the Bonus Round

Every time this one game went into bonus round, the game would not allow you to select a pile of coins or pick a path. Depending on which bonus you got into, you had to power off the game and power it back on before you were allowed to select your choice. We ordered a new MCB 2 monitor, placed it into the game and tried to insert the three Bucks Ahoy discs into the top box monitor but nothing would happen. The monitor was a faint blank screen and the CD Drive was flickering so we knew the unit was getting power but no visible graphics on the screen. Reggie and I decide to start swapping parts between both monitors to see if we could come up with one that would work properly. We decided to start with the complete touchscreen assembly in the known freezing one. We swapped the parts and placed the new and improved monitor back in the game, signed out a float and started to play games to get into the top bonus round. After about ten minutes trying to get "Xs" or pirates, I finally got into the bonus round and the game allowed me to select piles of coin. Just to verify it was working correctly, I tried for the other bonus and after some time, it also worked. So check you MCB2 touchscreen assembly if your games are starting to freeze in bonus rounds.

IGT I-GAME Mikohn Reporting 5X More Than the Jackpot

During one of our credit anomaly projects in upgrading the software on our games we discovered from Auditing that this one quarter game was reporting the Jackpots as five times the amount won. After checking and rechecking the options, lowering the limits to force a jackpot to the cage, we saw that this was true. We went back to verify the options again. The soft meters and the Mikohn meters were aligned correctly. I was looking for the Mikohn to be five times more then the soft but I was wrong. They were aligned one for one. We did some more investigating and noticed a new option in the new denomination window in this new

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#8920- Single RAW cold cathode lamp for 15 inch LCD monitor in IGT games

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#9290- Single RAW cold cathode lamp for 19 inch LCD monitor in IGT games

FOR BALLY GAMES

#8650- Single cold cathode lamp assembly for **Bally IView player tracking system** 6.2 inch "IDW" LCD

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software. It said "SAS Credit Value Equals One Cent." We asked to have the seals broken to see if we could re-key the game and change it to say that the value equals 25 cents. After seals were broken we had a chance to re-key the game and check all the options available to us. We decided to settle on the "SAS credit equals the game denomination" option. To verify this option was working correctly we had to sign out a float and lower the Jackpot limit so the machine would lock up. Once we got the game to lockout, we bolted to the Cage and asked if the correct amount was being reported, which it was. Problem solved.

Atronic e-motion Conversions

Our once popular "Cash Fever" link progressive lost its luster so it was time for the Slot Operations Manager to change this up again. This project was to convert the bank of progressive games to single theme games. It was unbelievable, the amount of wiring for the two 42" monitors, the sign and the wiring between games that was removed and packed up. Converting these games also involved extra boards being removed but also upgrading the Multimedia boards, adding expansion boards, fans and of course, new software. And we did not forget about resetting the DIP SW settings on the board. We kind of experienced the same scenario about six months ago, upgrading a bank of e-motions along the wall.

We had a few problems to troubleshoot with this upgrade. We had one expansion board that had the U10 and U11 sockets mounted in two different directions when they should have been pointing to the security PAL, so when the technician inserted the EPROMS in the incorrectly mounted socket, the EPROM did not do too well and did not survive the power up. We also encountered the "Battery Low error, check expansion board." We replaced the battery but that did not help so we ordered new ones and that seemed to solve the problem. We also had a machine where the bottom monitor was working fine and then all of a sudden it went blank. We found that the multimedia board went bad and it was replaced. We had both blank screens on another game and that was also the multimedia board and graphic boards that were bad from the original converted games. It seems that they don't like change but once they get going they tend to last. Good luck with your future conversions.

Atronic e-motion
No Power

This game was passed on to us in the morning when we first arrived. The message was "no power" to the game and the power supply was changed out. Once getting all settled in, we made our way down to the game and discovered it was powered off. There was the smell of something fried with that distinct aroma to which we have all grown accustomed. We turned the power on and watched the BV bezel light flicker for about a second. We knew it was getting power and figured something was bringing it down. I decided to start unplugging stuff to see what I could to eliminate. Finally, I unplugged the side display colored lights that were adjacent to both monitors and the power came back on. Just to confirm this was the problem, I plugged the lights back in and the display lights remained on along with the power. The only thing was the bottom monitor remained down. We started troubleshooting this game and found not only the monitor was bad the graphic board was also bad.

IGT I-Game
Frozen in Bonus Round

This is becoming all too familiar lately with these new software upgrades of games freezing in bonus rounds. This happened to a Cleopatra game while she was in the bonus round and the only way we could do is a RAM clear to clear the tilt.

Subject: TechFest 20
Date of Event: May 4-6, 2010
Location: Mystic Lake Casino Hotel

Schedule of Events

Events subject to change

Tuesday, May 4, 2010
9:00 am - 12:00pm
Power Supply Repair - Presented by Randy Fromm - Let's face it, we have a lot of power supply failures in slot machines. Some power supplies are more-or-less disposible due to their cheap replacement cost but many of the supplies we find in slot machines are custom-built units costing hundreds of dollars. For example, the ability to repair Aristocrat and IGT power supplies (actually manufactured by Setec and Win-Tact respectively) in-house will save your casino hundreds or even thousands of dollars in a year. We will cover the operation and repair of power supplies in detail during this session.

1:15pm - 3:15pm MEI - BV troubleshooting and repair - Suzo-Happ's Director of Training and Service David Oldham will discuss BV operation and service. Troubleshooting guides and handouts will be presented to help speed through troubleshooting in the shop.

3:30pm - 5:30pm FutureLogic Ticket Printers - Suzo-Happ's Director of Training and Service David Oldham will discuss FutureLogic printer operation and service.

Wednesday, May 5, 2010
9:00 am - 12:00pm CRT & LCD Monitor Repair - Presented by Randy Fromm - Video slot monitors are a lot easier to fix once you know how they work. Some understanding of electronic components will be helpful as this session will be somewhat more advanced than at previous TechFests.

1:15pm - 3:15pm 3M Touchsystems Touch Screens - Touchscreen Technology Presented by Paul Hatin and Mark Roberts - 3M Touch Systems Field Application Engineers - It is really amazing how touchscreens actually operate. During this session, touchscreen theory of operation will be presented along with diagnostic and repair techniques.

3:30pm - 5:30pm Incredible Technologies Slot Machines - Incredible Technologies has been credited by many operators as one of the most important and innovative manufacturers of video games in the world. Their "Golden Tee Golf" game revolutionized the online game tournament. Now, IT brings their team of manufacturing and design experts to the casino industry and to TechFest 20 with a close look at their IT slot machine. You will not want to miss this presentation.

Thursday, May 6, 2010
9:00 am - 12:00pm Ceronix CRT and LCD Monitor Repair - Presented by Troy Nofziger - Ceronix
Armed with a general knowledge of how monitors work (and how to fix them when they don't) it's time to look at Ceronix. The Ceronix design is unique in the entire world and requires a bit of specialized knowledge in order to be successful at repair. LCD Monitor repair will also be covered. Ceronix's most experienced bench tech, Troy Nofziger will instruct.

1:15pm - 3:15pm Transact Technologies Ticket Printers - Transact Technologies' Russ Wigé presents servicing and troubleshooting Transact brand, thermal ticket printers. These units are simple to understand and troubleshoot, once you know how they're put together.

3:30pm - 5:30pm JCM Bill Validators - This is arguably the best seminar of its kind in the gaming industry so we've saved the best for last. This presentation will be given by JCM's Jack Geller. This is your chance to ask the world's #1 expert about your JCM "issues."

To sign up for TechFest 20, visit the website at Slot-Techs.com
Earlybird tuition is $495 per person before April 4, 2010

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IGT S2000
Progressive Reset to $0.01

We were called to this machine by the Slot Attendant Supervisor. He was asking why the machine had reset its base limit to one cent. After paying out the jackpot, we went into the options, checked the progressive setting and noticed that the progressive base amount was at $0.00. We had the game key chipped and reset the base amount back to the correct figure, tested it and had the game back in service. We don't know if it was set incorrectly or an error happened over time and it was reset.

IGT AVP
Bottom Blank Screen

Reggie was called to this game because the bottom screen was blank. He also noticed that the game would occasionally reboot itself. Once he rebooted the game, it would come up with a bunch of wording and mumbo jumbo. He did notice the "Watch Dog error" in all the wording. He next called "Old Faithful" Wendell from IGT and described his problem to him. Wendell suggested replacing the interface card or the batteries on the interface card. We ordered the part and received the interface card the next day. Wendell also stated that we would have to reconfigure all the options if the interface card was to be replaced. I took the easy way out first and replaced each battery one by one not to lose any information. I powered the game back up and the bottom monitor worked. I checked all the options but noticed that the game was missing or not enabled. I went back to the shop and got the E-Key 5 to enable the game and the correct percentage.

Konami KonXion
Ram Error

During our morning floor sweeps, we noticed this one game displaying a RAM error. Checking the MEAL book there was no history of resetting any errors or problem associated with the game in some time. Usually a simple rebooting of the game clears some of these tilts we have encountered here but not this time. Once the game was verifying its setting when "RAM failed" appeared in bright red lettering on the screen. We had AGCO come in and break the seals and we cleared the RAM and reset the options and not had a problem with it so far.

Aristocrat Video
Machine Not Reporting the Drops to Auditing

Every day we canvass the floor for any Soft Count team problems like BVs not resetting, doors hard to open and close, burned out lights and games off line. This morning we were told by the Count Supervisor that this one game never reports the drops when they poll the machine after the soft drops are completed. We asked about how long this was happening and they stated "for a while now." The first thing we did was to verify all the doors were reporting properly on the Mikohn system and the TPE log. We did notice looking back at the records on the TPE log the poll number was missing. All other poll numbers were present except for poll #22. Reggie went out to the gaming floor and verified that all the Mikohn doors and machine doors were working. On his end everything looked fine but back in the shop, they were not being logged by the system. Reggie noticed that the BV cashbox wire was unplugged thus not allowing the game to dump its meters when the cashbox was removed. Once we got that solved, we also had to change out the I/O card and we started to notice the door alarms were starting to be logged on the TPE log.

Manual Jackpots on One CVT
Bally S6000

It was reported over the radio that one of the CVTs out on the gaming floor had manual jackpots on it. We went into the CVT room to check if any games were still responding. After printing out the report, we found machine loop down on all games. We decided to physically check the signal out in the games and found

a really weak signal. With four banks affected, we had to start to eliminate banks to see what was bringing the signal down. After looping out banks, we pinpointed it down to one bank of Bally S6000 machines. Two games before the troubled game, displayed the famous "chirping" on the printed paper from the CVT report. We went to the game and started to troubleshoot the problem. We first looped out the game and the errors went away. We replaced the fiber board and the problem still came back. Tracing the wires to see what was powering up the fiber board we noticed it received the power straight from the game's power supply. After replacing the power supply, the errors went away, the signal was back to normal and the manual jackpots went away too.

- Kevin Noble
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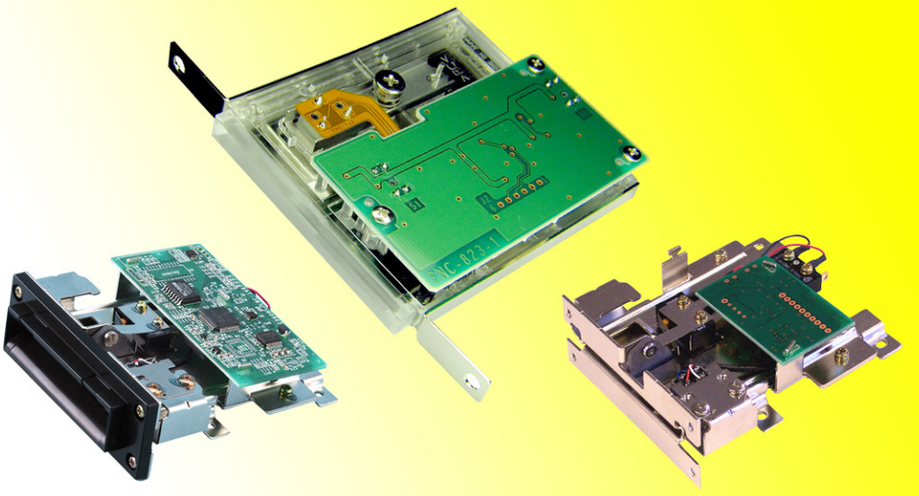

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Quick $ Simple Repairs #61

By Pat Porath

No Text on the Oasis Display

A call was received that a game didn't pay out a ticket and the Oasis display was blank. The "back round" was lit, but no text was displayed. When I opened up the game to look at the Sentinel, a couple of things were obvious. The only sign of life was one red LED. Many of us that work with the Oasis tracking system and Sentinel IIs know that one lit LED is not a good thing. It is supposed to have three lights lit up. Red indicates power, green indicates COM, and the color amber indicates that the "watchdog" is working, meaning that the Sentinel program is running properly.) Since only the red LED was lit, I knew we had a problem. The power was reset a few times on the Sentinel, RAM was cleared, and the Sentinel EPROM was removed to check for any bent pins. All of the other socketed chips were checked to see if they were nice and snug, which they were. I guessed either the Sentinel itself went bad or the EPROM or maybe even both. Spare parts were retrieved and for the heck of it the EPROM was replaced first. AWESOME! On the first repair attempt everything looked good. The three LEDs looked good and so did the display. Just to make sure that no "global settings" were lost or messed up, they were checked and everything looked fine. With my "tech card" (a.k.a. mechanic card) inserted, the main door was closed and opened a few times just to make sure communication wasn't lost between the game and the Sentinel. Everything looked great. It was simply an EPROM that needed to be replaced.

Bally EVO Wouldn't Boot

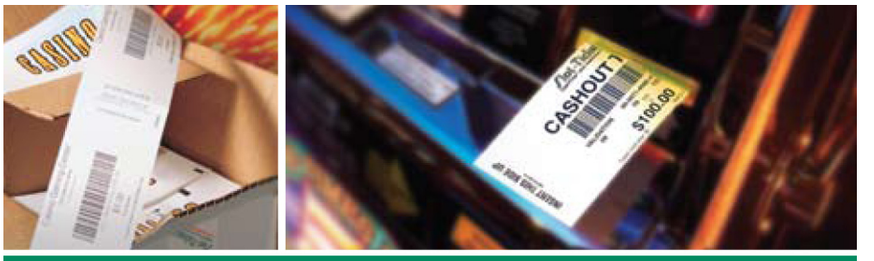
I was told a Bally EVO video game needed a RAM clear and needed to be optioned because the "suitcase" (also known as the "brain box") was replaced. No problem at all, I checked my notes and the RAM clear chip goes into socket U76, turn on DIP switches seven and eight on the main processor board, then RAM should be cleared. Set the options on the game and it should be good to go.

Boy was I wrong! I tried three times and near the end of the boot up process, the game LCD would be dark. What the . . . ? I did not like the CD drive that was in the "brain box" because the EVO doesn't seem to like the DVD drives, so I put in a regular CD drive. After it was installed, I took a quick look inside of the "brain box" area to see if anything was unusual. One of the memory sticks wasn't snapped into its socket and a connector wasn't plugged in all the way. Hmm . . . That could be part of the problem. It was time for another attempt at a RAM clear. Once again, it did not work. A co-worker looked up the correct procedure and told me that I only needed to turn on DIP switch eight, not seven and eight. I don't know why it didn't work because with both of them in the ON position, the game should have fully RAM cleared. With only DIP switch eight in the ON position, it is a

partial clear. Once again the game was turned back on and booting up with only DIP 8 ON. Finally RAM was cleared. The screen displayed "power down game, remove the clear chip, and reset DIP switch." This was a very good sign. Once AGAIN the game was power cycled and it booted up correctly. It took me some time to set all of the game options, especially since it was a progressive game. I had to refer to the game next door for some of the settings. Since there was a total of six progressive games in the bank, I needed to make sure it had the correct identification number. The game was checked to the left of it and to the right, just to make sure that the number was correct. Otherwise when someone hit the progressive jackpot there would be problems. Something that I almost always forget when setting options on Bally games, is entering the game serial number and V.G.D. (Video Gaming Device) address number. According to how we set our game options, it is to be set at the number "1" but I have trouble remembering how to get the curser down to where you enter the serial number. I press "1" then "down" and that doesn't work. I press the "select" button and that doesn't work either. The correct one to press is "CR," then the game will let you key in the serial number. Don't know why but that area of setting game options gets me almost every time. FINALLY after comparing and setting all of the game options, it was time to see if there were any errors when the door was closed. And would it be ready for play? Yes! Everything appeared to be fine. With my "tech card" in the game, Oasis did show an OPEN and CLOSED door when the main slot door was indeed physically open and closed. This showed all of the COM options should be set correctly and I did have COM between the game and the Sentinel. Now it was time for the progressive jackpot test. Will the progressive meter increment when the game is played? "Promo Cash" was downloaded onto the credit meter and game play started. Within a minute the progressive meter incremented. A ticket was printed and accepted, so that looked good too. Finally the game was back online.

IGT Video Slot i-Game, Coin Out Error

At the casino I work at, we are just about all TITO (ticket-in, ticket-out). We have a couple of banks of games that still actually have coins. This particular game was totally coinless so how could it have a "coin out" error? I've seen some "coin in" errors on IGTs,



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where one of the I/O cards that are located in the main door have been loose or bad. A "coin out" error? How is it even possible, the game doesn't even have a hopper in it? Power was turned off to the game and all of the I/O cards and the main processor board were reseated. With the power switch turned back on, after boot up, the "coin out" error remained.

At this point it doesn't look like a hardware problem to me, maybe it is a software issue. After the test button was pressed, I started checking out "setup" options. Sure enough, the hopper was ENABLED, the coin acceptor ENABLED, and the ticket printer DISABLED. It was not quite the correct settings for this specific game. How can these options be changed so they are correct? Only a "key chip" can be used. Once a key chip is installed, the game will go into key chip mode. Only when in key chip mode, certain game options can be set, such as turning off and on specific games on a multi-game machine, enabling or disabling the coin acceptor, hopper, and printer and other game options. I had other things going on at the moment so I notified a co-worker what was happening and the individual said it would be taken care of. A bit later on in the day, the game was back online. How did the options get changed? The game next to it had a bad "flash-board" (a small board that sits on top of the main processor board). I would guess the "coin out error" game was used for trouble-shooting and not brought back up and running. No big deal though, I passed the "test."

Oasis Display Read "System Not Available"

We recently upgraded the Oasis system to a newer version and of course with a newer version, there are new things to learn. I had what appeared to be a bad Sentinel and it looked as it needed to be replaced. A few power cycles were done without any luck, the "e-square" chip was replaced and all of the connections were checked. A Sentinel RAM clear was even done; it didn't do any good either. I still didn't have any text on the Oasis display so the Sentinel was replaced. After replacement and after setting what I thought the "global" settings should be, a "system not available" error appeared on the display. What in the heck was this? I've never seen that error before. I've never even heard of it. Well, no time to learn like the present. With the upgrade, I was told that the "slot mast I.D." was very important and had to be keyed in. I tried, but in the area of "global" that I was in, it wouldn't allow me to do it. The "poller" was checked to make sure that I was entering the correct number but it just would not work. I had to ask for help.

Here is how it went, along with what my mistakes were. (This is on Sentinel IIs.) First insert your "global card," then scroll down to "utility." Next, go to "mechanic card" and scroll down to "put game offline," then press the "enter" key. The display should read that it is getting the meters. Once that part is complete, simply remove the card. Insert the global card again and go to the same area. Instead of selecting "game offline" select "put game online" and press the "enter" key. If this works correctly thus far, it should ask for a "slot mast I.D." four digit number. This can be found at a computer workstation that has the "poller" program on it. When the program is open,

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simply select “machine search,” then enter the slot machine number. A screen will appear with lots of information along with the specific “slot mast I.D.” number. Back at the game, the number was keyed in the global card removed. Presto! The Sentinel came alive. Capital letters appeared on the display along with a beautiful green COM LED light that was flashing rapidly. Everything looked great and the game was back online.

Here is one of the things that I was doing wrong: I was in the wrong “area” of global setup. I needed to have the global card in (mechanic card a.k.a. tech card should work too but I didn’t try it) and select the “mechanic card” area, not the normal global area that I was in. When trying to key in the “slot mast I.D. number, it just would not work. You must be in the “mechanic card” area with the global card. I also mispinned the display cable on the Sentinel during the replacement process. That was the reason I didn’t have any text on the Oasis display one time after applying power. After it was put on properly, at least I had text again. The ordeal was no doubt a learning experience for me.

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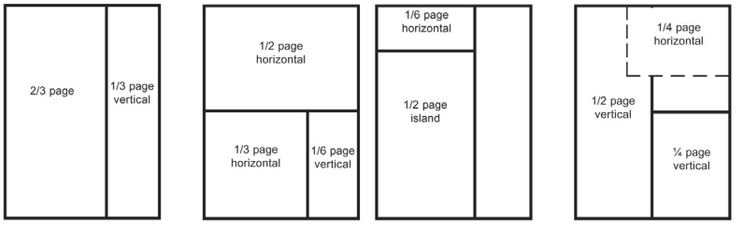

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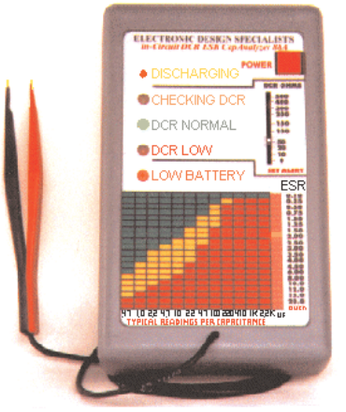

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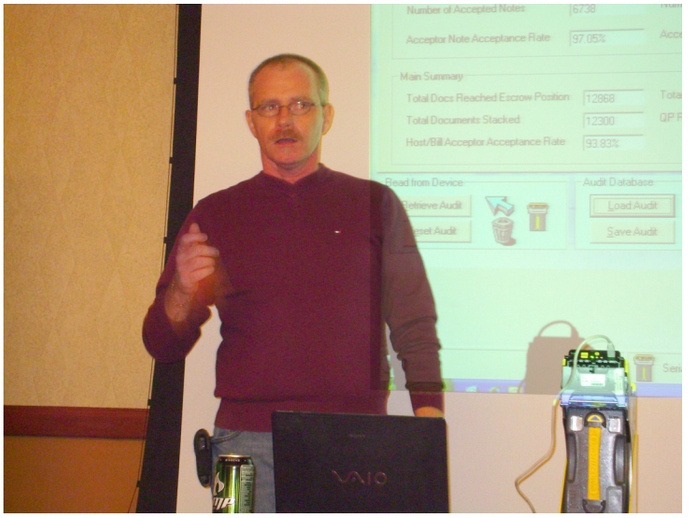
Slot Tech Training at Meskwaki

February is cold in Iowa but the slot techs at Meskwaki Bingo & Casino made Slot Tech Magazine's training team feel right at home at their fabulous casino in Tama, Iowa. The week-long class featured LCD monitor repair as well as MEI bill validators and FutureLogic printers (presented by Suzo-Happ's David Oldham, below) and JCM bill validators, presented Jack Geller (right). **- STM**



Wide, Wide Screen

By James Borg

Having a nice wide TV to watch while you're sitting comfortably on your sofa is fine. Having a nice wide garage to put in your brand new car is great. Having a nice wide bed to stretch out on and feel like you're the King of the Castle is brilliant. However, having a wide picture on a screen, wide enough to overlap considerably and go over the actual physical size of the tube, isn't fine at all. When an unsuspecting client on a slot machine is trying to see which lines are being played, or if there are any credits left to play off in the game, this only brings with it a problem or two and the possibility of some extra hassle. It can be quite frustrating, to say the least, when this vital information is not visible to the user.

The matter would also seem somewhat amplified if the unfortunate client playing on that particular game happens to be a dear old lady, whose eyesight isn't what it used to be in days gone by. This would be evident, amongst other things, by the use of a thick pair of glasses and the possibility of a cane in the vicinity. Normally, such a client might have difficulty seeing the screen properly in the first place, let alone with half of the information missing from view.

Under usual circumstances, these little problems can be immediately rectified by adjusting the suitable 'size' or position settings on the monitor itself accordingly. All it takes to calm down the dear old lady, who thinks she has lost all her money because her credits aren't showing, are a few nice words and the assurance that all will be well in no time at all. With that very positive attitude, and not forgetting to include the nice words, I got busy gaining access to the monitor and look for these miracle settings to make everything and everybody better again. Depending on the date of manufacture, these can be either digital settings, buttons that is, or the good old fashioned potentiometers. In this particular case, the monitor was a Kortek KT-1703, so it was potentiometers.

After a few moments of fiddling around in the dark confines of uncertainty, I come across the H-Size setting and the picture started to shrink as expected. Steady as she goes…It's looking good and all systems are green. I smiled broadly, whilst informing the client that the screen on her game will be fine shortly. However, I found myself eating those words in horror, not to mention the fact that my heart had also missed a beat or two at what followed. The Horizontal Size adjustment did in fact shrink the picture, but still not enough for the information to be seen.

On the other hand, the H-POSI potentiometer moved the picture sideways with out any problem, but that's not what I was really looking for. I felt the broad smile I had turn a bit sour at that point, and so did the looks I got from the client. I quickly started to wreck my brains for something amusing to tell her before some form of verbal abuse is hurled in my direction, not to mention being hit on the head with a cane, but unfortunately, none come to mind, and neither did the cane. I kept my fingers crossed, held my breath and started praying quickly, in the hope that by some form of miracle or even magic, the potentiometer in question starts to do its job properly…but I guess I was asking too much as it didn't. Oh crap…How was I supposed to tell the client that she can't play on her machine any longer? The smile I was so happy with vanished completely when I realized that there were no spare monitors to put in the machine at the time. In other words, I was in trouble, and at the deep end. I wondered if this setting was going transform itself into a scene from Dr. Jekyll and

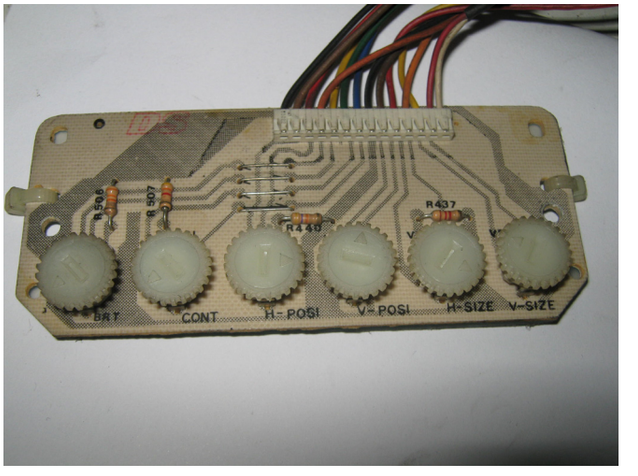


Fig. 1 Remote Potentiometer PCB

Mister Hyde, where I'm not any of those two memorable characters. Another scene that came to mind was that the nice old lady, turned out not to be a very nice old lady at all, and would reach into her handbag while producing a doll looking just like me. My hair started standing on end at thoughts of her putting her hand in her handbag, and pulling out a bunch of huge, sharp needles…

There was no other alternative, no other option left, but to pull out the screen and nip it to the workshop, in the hope that nothing really major was wrong with it. The other options were too painful to think about. The situation was very bleak as the client couldn't play and frustration reigned supreme. The monitor wasn't healthy and it wasn't going to get repaired by my just looking at it. I saw the 'dear old lady' go for her handbag and I was not enjoying this at all, not even remotely. Was I going to become not very healthy pretty soon, like the monitor? Thank goodness, she only produced a tissue to blow her nose. This time I was lucky. Will I be so lucky the next time her hand goes in?

Working under pressure is no main issue as one gets used to it. The thing that gets me down is the fact that clients expect me to perform a miracle in five minutes flat. I came to this conclusion by the client saying "I'll just go and have a coffee at the bar in the meantime." It takes more than that just for me to go to the workshop; for the computer to boot up so I can study the schematic; and for the soldering iron to heat up. To make matters worse, I also had to find some space where to work, as even though space should be abundant, it's amazing how much 'rubbish' can be accumulated in such a short time, leaving the work-top slightly full of useless crap, and little available space.

Once settled down comfortably in the workshop, I lit up a ciggie and fed the monitor with a signal from my computer to see if it was doing the same as when it was in the slot machine. Those few seconds till the picture came up seemed to last a long time. I kept picturing the client sipping away the coffee at a fast rate, with the bottom of the cup starting to show. An image of her poking needles into a doll, smiling and sniggering quietly in an evil sort of way, also flashed through my mind. I put these horrible images aside as the heaters warmed up nicely and the display indeed was showing a wide picture. At least it was confirmed that the fault was actually from the monitor itself. I was pretty sure it was, but there's always a first time for everything, within reason of course.

The adjusting of the H-Size potentiometer, VR402, on the remote printed circuit board did have some sort of effect, although far from the desired type. It easily made the picture go wider, but when turned the opposite way, the picture started to shrink, but then along the way, it stopped getting smaller while the pot still hadn't reached its limit yet. It was like there was a 'dead zone' present where the pot had not effect at all.

Faults in the width size of the picture are almost all the time related to a fault in the high tension circuit of the monitor. However, it's not always the case. It can be the potentiometer itself having a part of its carbon track defective. This is quite a remote situation, but still a possibility. It can be the result of a problem on a supply line, inhibiting the proper operation of the H-Size. It can be a defective set of scanning coils. It can be an electrolytic capacitor going dry. It can be

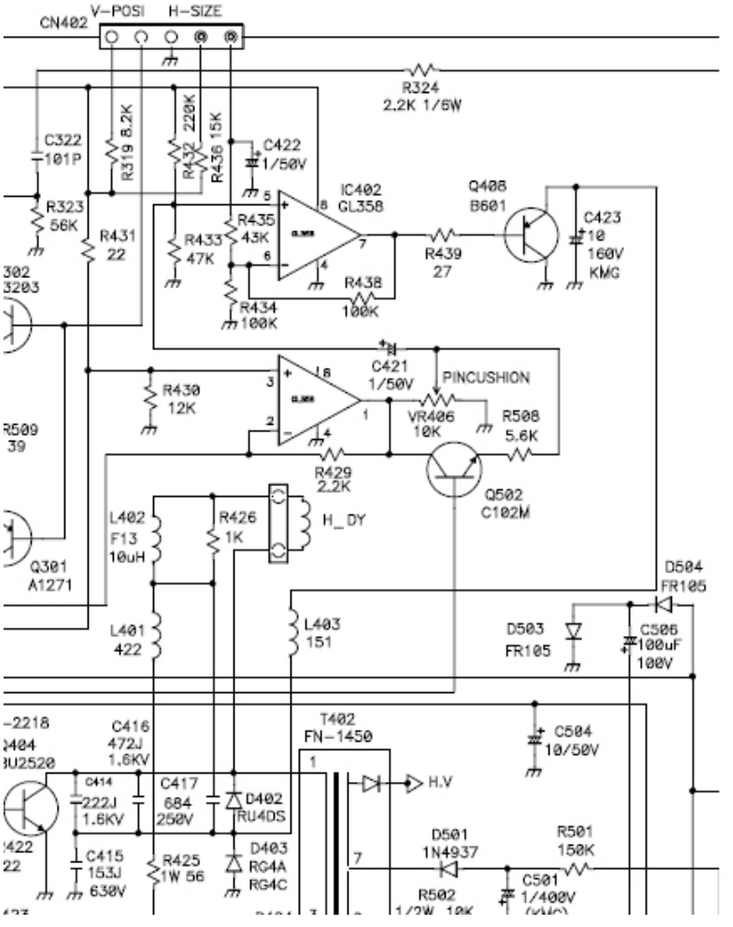


Fig. 2 Horizontal Size Circuit

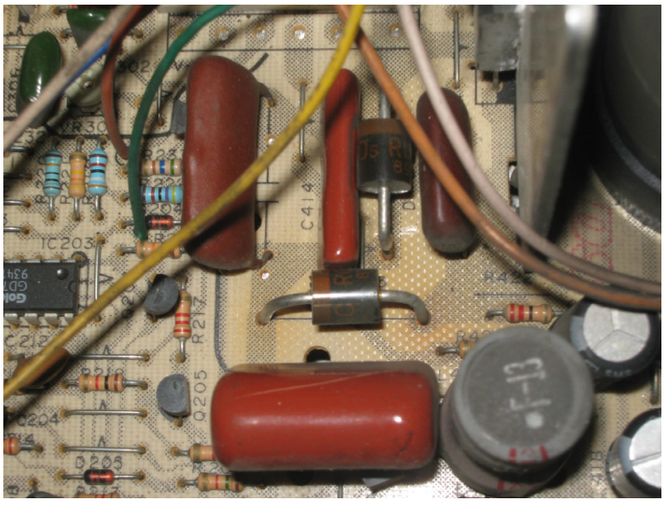


Fig. 3 Damper Diode

a host of many things, all resulting to the size not responding as it should. Usually, the most common factor is the breakdown of a semiconductor in the vicinity of the flyback, like a damper diode for example. The HOT collector current is shared between the horizontal scanning coils and the flyback transformer. Both of these paths tend to share the damper diode.

In the schematic, the damper diode is designated as D402 and it's a RU4DS.

Most times, it makes sense just to perform checks quickly with a multimeter, however, this doesn't always solve the problem. The reason behind this is that semiconductors might give you a good reading out of circuit, but tend to breakdown on voltage, only to seem fine again once the potential is removed from across them. If there is any kind of doubt, even remote, the safest way to go about it would be to replace the component in question. So many hairs have been pulled out when falling into a popular trap called 'Assumption".

A good place to start off from would be to go directly to transistor Q408 (B601) as shown in Fig. 2. Using my multi meter on its base while rotating the H-Size pot, would give an indication if all is well, up to there in any case. With so many factors that could be contributing to this type of fault, it's imperative that one eliminates, or at least attempts to, as many sections of the circuit as possible. There was a swing from approx 1v dc, starting with the pot fully anti-clockwise, and going up nicely to just over 12v dc when the pot was fully rotated clockwise. The rise in voltage was responsive all the way to the gradual rotation of the pot. The emitter was monitored next, since its collector was going to ground. With the pot fully anticlockwise, the voltage read 2.2v dc. With the pot fully clockwise, the voltage went up to 6v dc. The rise in voltage wasn't linear with the rotation of the potentiometer. This could have been something worth going into further detail, as my left eyebrow did a Mr. Spock.

Scope checks showed there was a ripple on the emitter of the transistor. More Mr. Spock actions occurred. The way the circuit was wired up, no ripple at all should be present, but only a dc level. If there was some kind of pulsations coming from the HOT, these would have been filtered by the capacitors in the circuit. If these didn't cope well enough, then L403 would have seen to filtering any spurious alternating signal there. At this stage, the most obvious component to go for would be the one connected directly to the emitter of Q408 itself, namely capacitor C423, 10u/160v. This was pulled out and found to be open circuit and replaced. High hopes followed soon after and I felt a smile coming back gradually.

Relief was in the air. Visions of the client asking for a second helping of coffee came to mind, but with any luck, there won't be the need for a third helping. When power was applied to the monitor, there was the initial start up noises, but then it all went quiet again. Hmmmmm..... that definitely was not quite what was expected. What happened ? What did I do ? It started up every time for me with C423 in

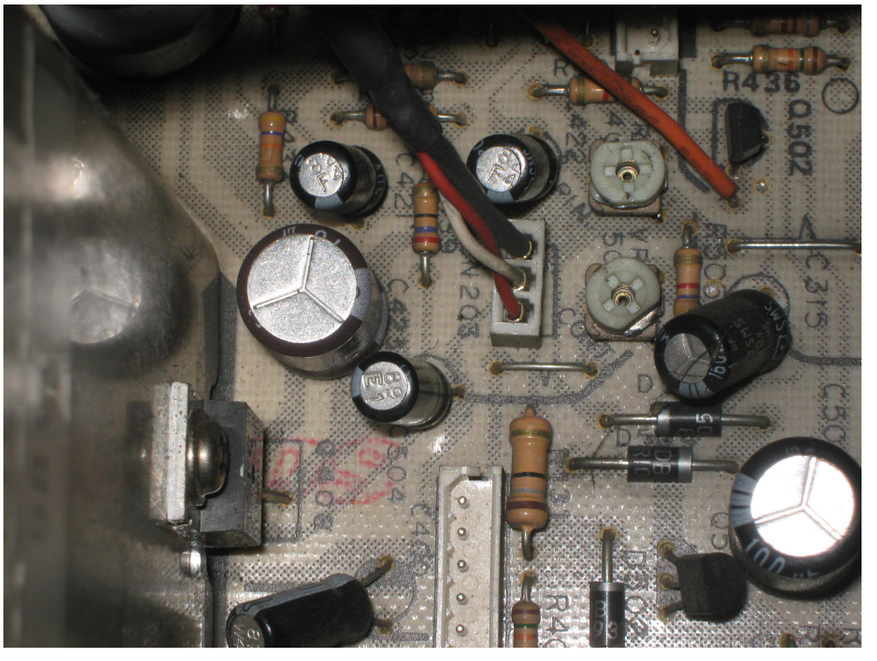


Fig. 4 Location of C423 Next to Q408

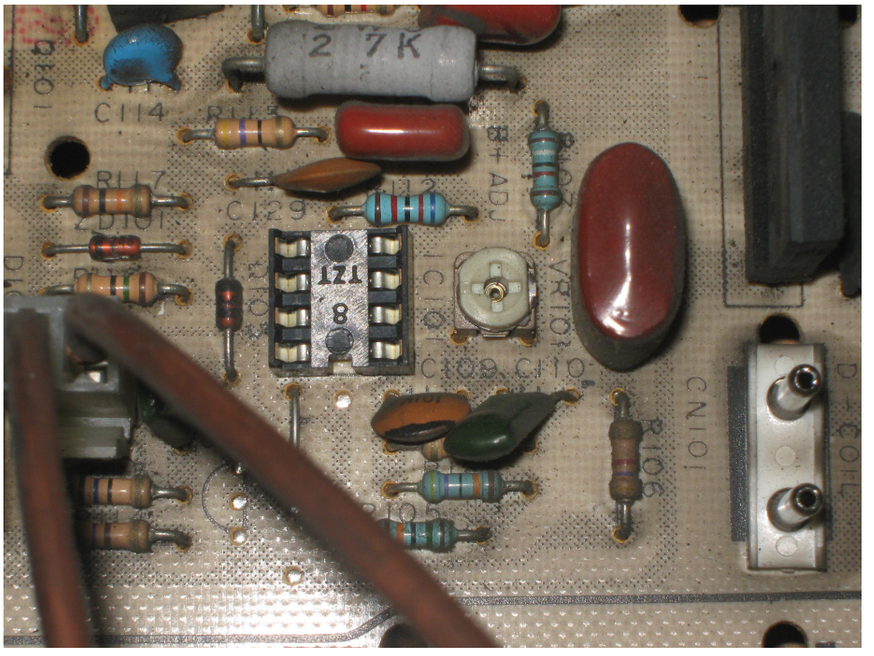


Fig. 5 Power Supply Adjustment Pot

its FUBAR condition, so why wasn't it starting up now after having replaced it? Help!!! Did I miss something? Did I put in the capacitor the wrong way round, or used the wrong value as a replacement? Double and triple checking my last moves didn't bring anything to surface, apart from a couple of beads of sweat. All was well, which threw me even farther into the deep end.

Gathering my thoughts over some hot chocolate while the room filled up nicely with smoke, I concluded that since the conditions of the high tension circuit were altered, it could have in some form or another, had an effect on the power supply circuit. Was the supply overloading perhaps? With that train of thoughts still very clear, and not forgetting the frustrating ones as well, I thought I'd go straight to the source. From previous experience, I rotated VR101, on the switched mode power supply chip, IC101. This time I wasn't so lucky. Exactly the same thing happened when I applied juice to the monitor, that is, no high tension built up and obviously no picture. I would have been quite happy with a wide picture...anything...but it wasn't the case. Just for the sake of it, I quickly replaced IC101, the SMPSU controller chip, as this was on an IC socket. Nada...Zilch...

The supply could be overloading somehow after all, but I wasn't totally convinced. A look at this section of the monitor was called for, starting with the straightforward ones, like the heater juice on D111. This showed 6v, which was fine.

Across D112 there was barely 11v DC... hmmmm....that was a bit too low for my liking. On checking it again, but this time using my 'scope, it didn't show a clean DC level at all. Was this another faulty capacitor perhaps? Definitely was a likely possibility. Was C126 (100u/25v) not doing its job properly? Just for the sake of it, I checked across C127 (220u/16v) and the DC level wasn't very clean, but it looked acceptable. However, the voltage across this read only 11v. Replacing C126 increased the voltage to 12v.

Going on the 25v rail, on D110 showed 21v. A bit low as well. D109 showed 97v DC on the cathode. It wasn't a cause for alarm as there was no substantial ripple present on both these points.

The high tension still wasn't coming up though, apart from the initial kick, and then dying off soon after. It looked like I had to concentrate on that section. Connecting the 'scope to the base of the HOT , Q404 (BU2520) showed that on applying juice,

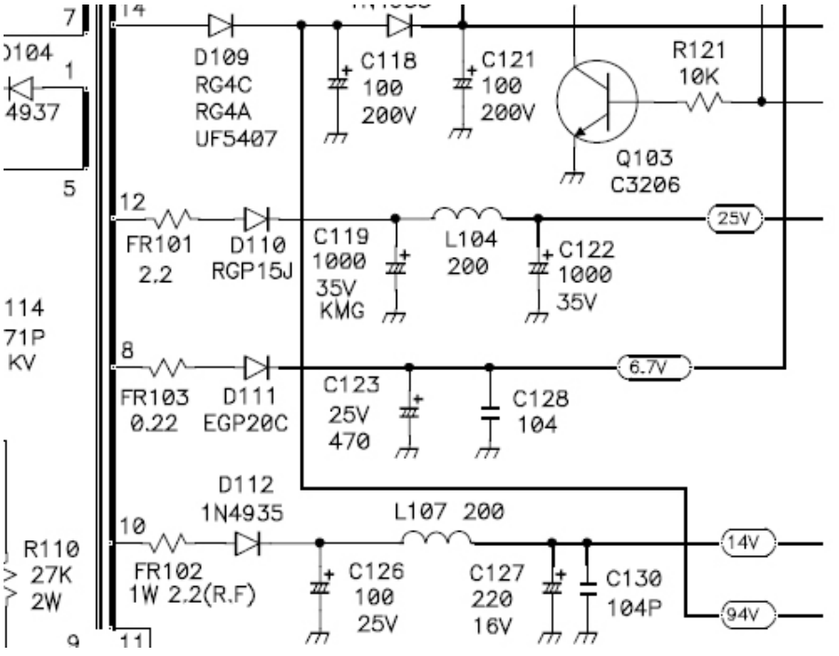


Fig. 6 Power Supply Section

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About Randy Fromm: I am the publisher of Slot Tech Magazine. First published in 2001, Slot Tech Magazine is a monthly trade journal focusing on casino slot machine repair. I have been repairing electronics for the gaming industry since 1972. I really enjoy what I do and I love showing others how easy it can be. ***No previous knowledge of electronics is required.***

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the base drive rose properly, but instantaneously dropped below the required level to continue switching the transistor.

It seemed like another power supply problem here…or was it? For some reason, I had a sensation of Déjà vu here. It didn't seem like there was a condition that was causing some form of overload anywhere. A check around the components in the high tension area didn't result in anything positive either. So why was this happening? Why indeed…. It all seemed to have stemmed off from the time I changed C423. What doesn't make any sense is that if there was something terribly wrong with the high tension circuit, then the base drive on the HOT would most likely be terminated totally, and not drop just enough to it turn off. All this had left me slightly confused. I had to time out before losing the plot altogether.

Thinking deeply and accompanied by a room full of smoke, I decided to try my hand again at VR101. I hadn't tried it again after replacing C126, when the voltage went up to 12v instead of the 11v originally present. I adjusted VR101 and the 21v rail started increasing gradually. There wasn't the high tension noise building up like in another case I had, so I stopped turning the pot as soon as it reached 25v. Just for the kick of it, I turned off the monitor and once I applied the juice. The beautiful, soothing and familiar noises came up, and so did my eye brow. Even better was the fact that the width had in fact shrunk, and was adjusting nicely to VR 402, the H-Size pot, on the remote board. With that, I breathed a sigh of huge relief and my smile was coming back gradually. The nice old lady should be pleased pretty soon. I wondered how many cups of coffee had been downed in the meantime. I left it on to go grab a bite to eat as I was famished, apart from being a bit put off by this fault.

Coming back with a tummy full of a ham and cheese sandwich, and washed down with some juicy hot chocolate, I was overjoyed since the monitor was still fine…brilliant, not to mention beautiful. Turning it off and on a couple of times just for luck, kept the monitor working fine. A quick unplugging job and a quick zoom with it back to its machine, while looking for the coffee-sipping client was successfully done in no time. I put the unit back in the machine, held my breath till the picture came on…and had to breathe another sigh of relief as the picture was just great. Actually I think it looked even better than before.

The client came round and I greeted her while pointing to her machine all excited, like I had just found the 'X' that marks the spot. My face dropped as she didn't come back to play though, but only to collect her coat saying "You took your time, so I found another machine to play on. I'm not so keen on coffee either." Aaaarrrggghhhh!!!! When this sort of thing happens I end up getting a wee bit annoyed, cheesed off and frustrated. I begin to doubt myself and my abilities as a technician and wish with all my heart that I had taken up something else in life as a career, something easy, not complicated and traightforward … something like art or selling doughnuts.

- James Borg
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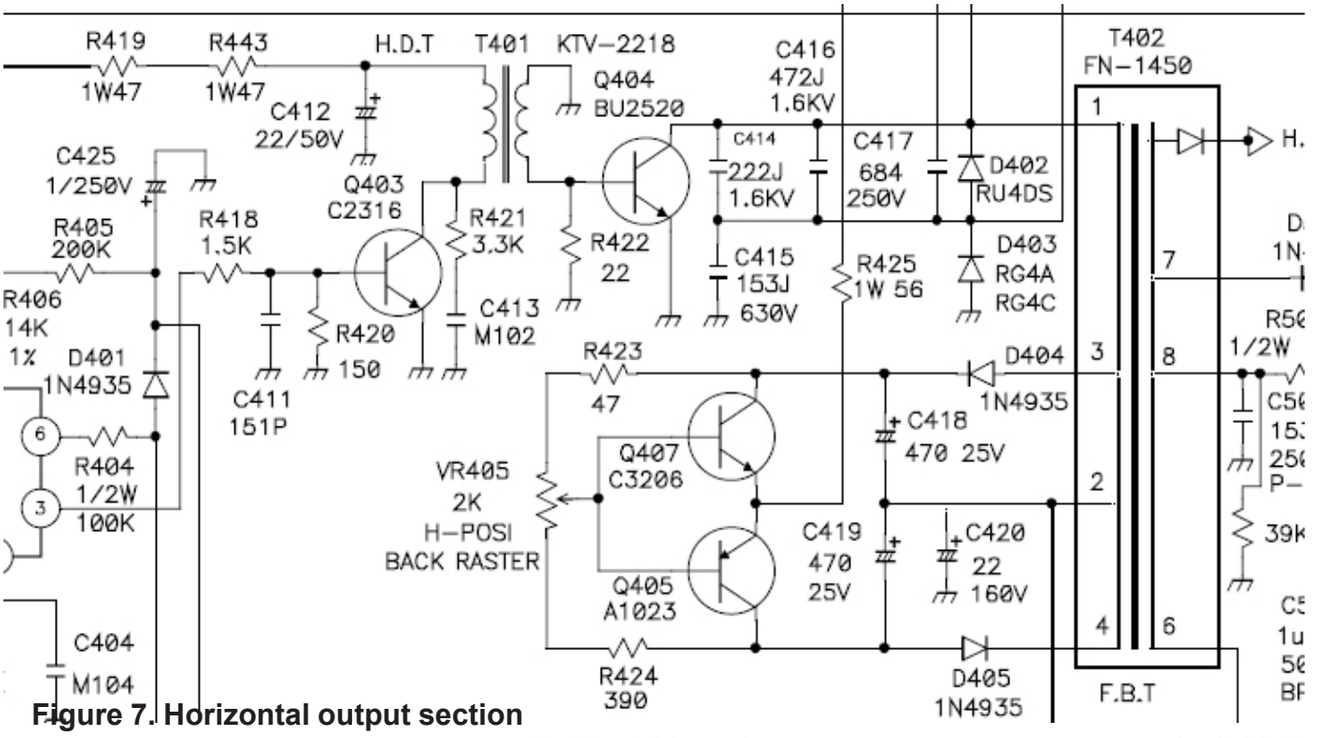

Figure 7. Horizontal output section

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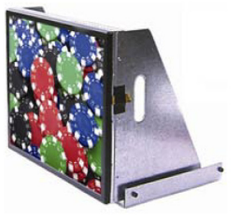

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