

January 2008

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Slot Machine Technology for the International Gaming Industry

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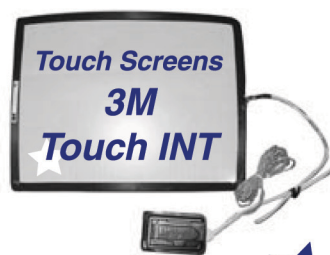
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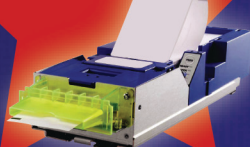


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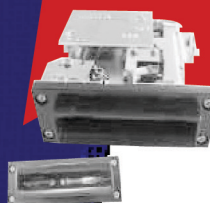
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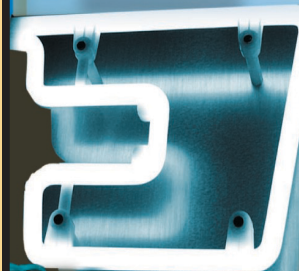
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Slot Tech Editorial

Happy new year! I hope everyone had a nice holiday season and that you are all feeling renewed and recharged for the fabulous new year ahead. I am most pleased to announce that Slot Tech Magazine's new year begins with a bang. In fact, it's a sort of "shot heard 'round the world" as it is my pleasure to announce a new, international edition called, appropriately, Slot Tech International Magazine. The actual debut will be at the ICE show in London later

this month. Slot Tech International will follow the same format as the magazine you're reading now but will feature the products and services found outside of North America with contributors from Europe and Down Under. The new magazine will have its headquarters in London, England. David Corfield will be the European Editor. You can reach him at editor@slot-tech.co.uk. For the international edition, I have taken the role of Technical Editor.

If you are outside the United States and Canada and you're interested in a subscription to the new magazine, drop me an e-mail and I'll sign you up for a trial subscription. If you like it, you can convert to the new edition or get them both!

This month Pat Porath has been busy at his casino but not so busy that he hasn't taken the time to share his experiences with us. Quick & Simple Repairs #34 leads off on page six. I think this is one of the best ones yet.

Now that Ticket-In Ticket-out has been around long enough to have some history, it's time to take a look back at the origins of this



revolutionary (maybe evolutionary) development with a close look at the Slot Tickets themselves. Slot-Tickets. Page 18.

How often have you been asked the question: "Where can I learn to become a slot tech?" Open this magazine to page 24, slap it on the copy machine and hand him or her a copy of the Slot Tech Feature Article entitled "Introduction to Slot Technology Course Offered at CSN."

There's some coverage of SlotFest as well as a detailed pictorial of LCD power supply replacement inside as well. Enjoy.

That's all for this month. See you at the casino.

Randy Fromm
Randy Fromm

Randy Fromm's Slot Tech Magazine

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CPA4049L	17" IGT AVP Upright	17" LCD AVP Upright 3M T/S	\$792
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CPA4067L	17" Bally Upright	LCD for Bally	\$733
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CPA4077L	17" Atronic Cashline w/o T/S	Atronic 65018825	\$517
CPA4085L	17" Aristocrat Slant	LCD for Aristocrat p/n L30700	\$744
CPA4089L	17" Konami Upright	LCD for Konami p/n 530002	\$728
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CPA4064L	19V / 20" WMS Slant	LCD for WMS	\$849
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CPA4079L	19" SDG Upright 25 Pin	SDG 25 pin	\$835
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CPA4088L	19" Aristocrat Upright	LCD for Aristocrat USA	\$837
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IGT Reel #3 Problem

A call was received to look at the reel on an S2000. At first it appeared to be a voltage problem. When the main slot door was closed and the reels would try to re-spin to the last game, the #3 reel wouldn't spin properly. It would rotate inconsistently. I gave the reel a spin manually and did the same with reel #2 (simply give the reel a spin with your fingers). A difference in resistance was felt between the two. The third reel didn't seem to have as much voltage on it to hold it in place when compared to the second reel. The pins were checked behind it to make sure none had been pushed out of place or bent. They all looked good. The main processor board was removed to see if anything was loose or out of place but that looked good too. Maybe there is a poor connection at the motherboard? All of the connections were checked on the motherboard but they looked good as well.

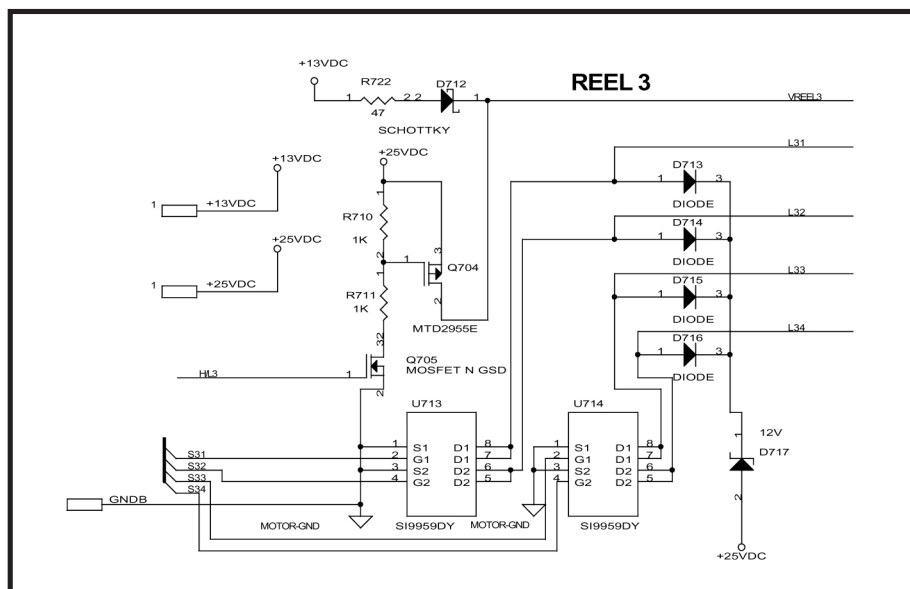
Quick & Simple Repairs # 34

By Pat Porath

Next, the reel was pulled out again to inspect it a bit closer. The optic and the optic encoder looked fine too. They were free of cracks and obstructions. I needed a second opinion on this one, so a co-worker checked it out. He decided to swap the main processor boards and the problem followed the board. A spare was later installed and the game works awesome. Pretty weird though, a bad main board would cause a reel problem. Not a fake problem either, a REEL problem! Of course, a quick glance at the schematic diagram for the main board reveals the driver circuitry for reel #3 but this column

is reserved for the Quick and Simple things that are performed on the slot floor and that doesn't include component level PCB repair.

I've seen strange things before though, such as a quarter sitting JUST RIGHT on a diverter solenoid that would not allow a game to power up properly. Power supplies were changed, wiring and fuses checked, and all along it was the quarter causing problems. Not shorting out bad enough to blow a fuse or "let the smoke out" but enough to cause the game to malfunction. Once the quarter was removed, the game was fine.



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Wow, was this an ordeal to diagnose! The trouble: poor CDS COM in select games in a bank of machines. The cure: a loose connection on a Molex 3 pin plug that is in the drop area of the games.

How did we detect that there was a problem? There were two tickets that the cashier cage called about

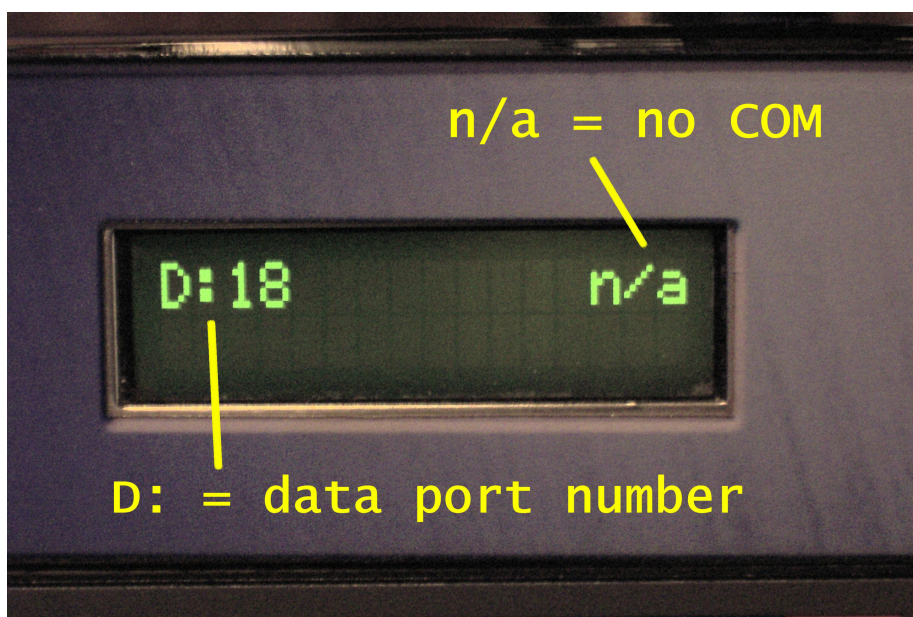
that scanned as "do not exist." As we know, the slot machine printed it and it had the "watermark" on it so the ticket does indeed exist. With the use of "diagnostic monitor" and a few clicks of the mouse, I could see that a select few games were not communicating with the system. Was the problem on the game side, the system side, or the Sentinel side? Could it be "COM chips," one bad "Sen-

tinel" taking down a few machines, or a wiring issue? At this point we weren't sure.

Let the troubleshooting begin! I could see that no doubt there was an issue with a specific bank of games. One bank of machines only included four games but the other included 12, which totals 16. With all of the equipment, games, and wiring, what could be the problem? We started out by looking at the bank of four games that appeared to be the worst. The letters on the CDS display were flashing from upper case text to lower case which usually indicates a poor COM problem within the bank.

I removed a Sentinel from a game that didn't have any COM at all, thinking it might be the problem. With the replacement installed, there wasn't much of a change. The green LED on the Sentinel board is supposed to flash rapidly to show communication is good. In this case, the green LED flashed very slowly meaning that it had poor communication.

How about changing another Sentinel in a game in the bank that is showing poor communication and why not toss in some new COM chips in Sentinels in the bank? This was completed without positive results. Hmmm. Getting a bit tricky now. The problem





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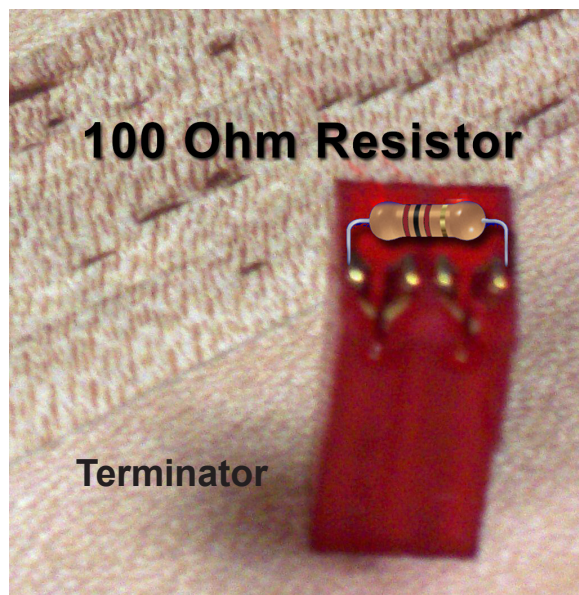
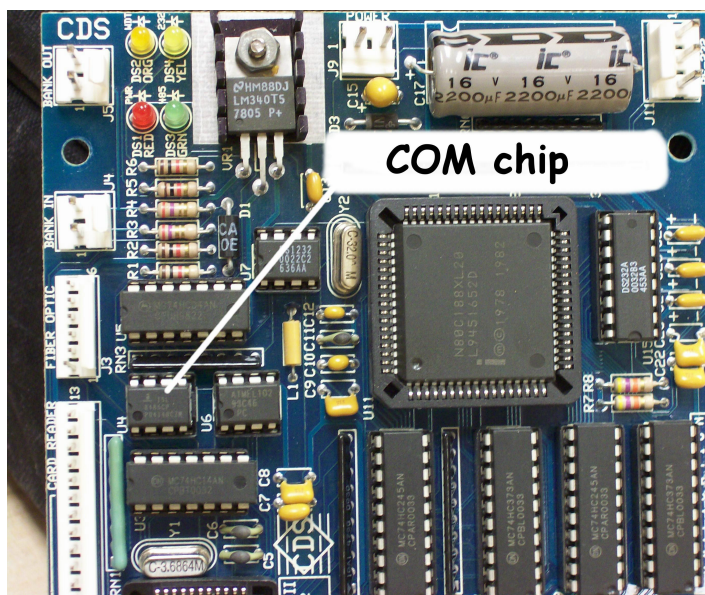
must be somewhere in the bank of 12 games. With the use of a "tech card" aka "mechanic card" a slot tech can see all kinds of items. For example: COM errors, the current Data Port that the machine is connected to, the current time and date, among many other things. In this case we wanted to observe the COM errors. One game in the bank showed 80 errors, yet another game would show 170 COM errors.

One way to troubleshoot is with a "terminator." A terminator is a small, two-pin connector that is commonly found on the SMI board which is located right next to the Sentinel board. The red (don't know why, but always red) two pin connector can't be classified as a terminator yet though. It needs one small common item found in most slot tech shops, a 100 ohm resistor. There have been times where techs have worked on banks of machines

where a terminator did not exist. In the system that we are running, a terminator MUST be in place at the end game at the end of the line of the loop. Another way to put it, if you have a total of 20 games on a DPU (not to exceed 24) the last game in the last bank, Sentinel identification number 20, must have a terminator on the "COM OUT" section of the Sentinel. If a terminator is NOT in place, we have experienced COM problems throughout a bank. It can be difficult to narrow down the problem. In some cases we will identify the last game that is located in a bank and make sure it has one on it. In the long run, this saves time.

Another use for the terminator is for troubleshooting reasons. How? Well, since it has to be at the END of the bank of games, a tech can put it in the middle of the bank. Once this is in place and the COM problem goes away, the main problem

must be in the last half that isn't currently connected to a DPU. If the COM problem still exists once the bank is split in half (with the use of a terminator) then the problem must be in the first half. One may split the bank in half again (1/4 of the original) and install the terminator. Once again, if the problem goes away then the problem looks like it will be in the second half which isn't connected. If the problem stays, more than likely there is a problem within the first 1/4th of games. Another perspective: I like to think that electricity and CDS data flow like water through a pipe so if you "shut the data valve off" to half of the bank of games and the problem goes away, the problem is in the second half. If the problem stays, it is somewhere in the location of the first half. Shut the valve off to more games to narrow down the problem. If it is down to four games within a bank, start checking out every-





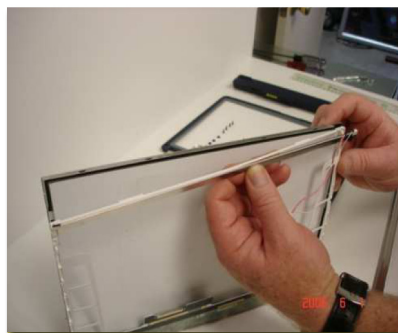
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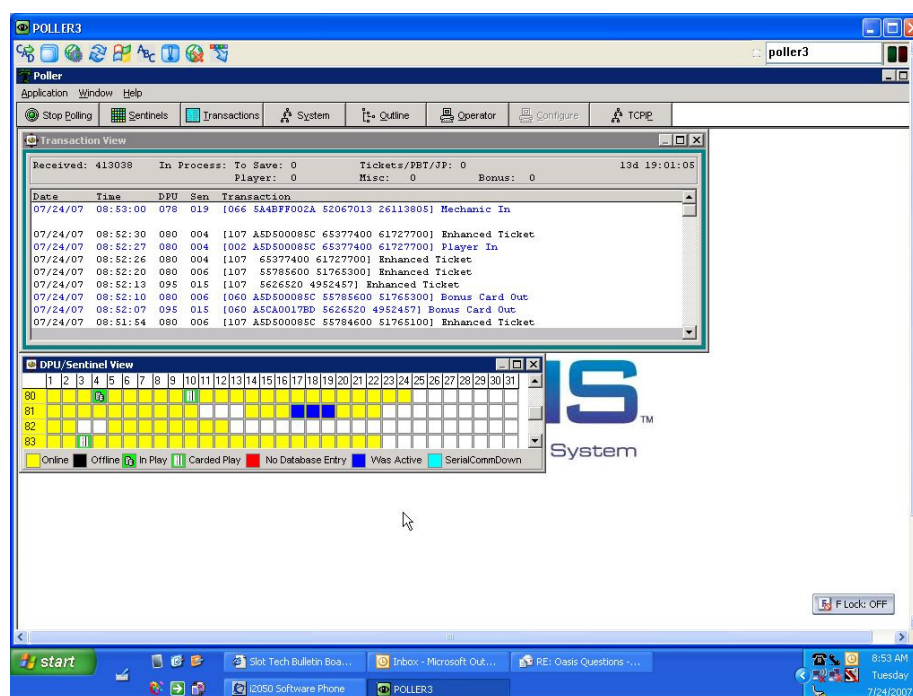
thing such as the CDS wiring under the games that are "looped" from one to the other. Replace COM chips, and Sentinels if necessary. Sometimes (it seems) COM chip replacement will do the trick. Other times, a bad Sentinel will "take down" the communication of games too. Is a data line a bit exposed and may have happened to get unplugged?

Narrowing down which game or games in a bank is the hard part. Another useful tool to use is a CDS "jumper cable." This item is made up of two of the red two-pin connectors (one on each end) and a two-conductor cable between them. We always have some of these on hand. You can easily make a long jumper cable by using the items mentioned above or, if you only need to make a connection within a few games, a "COM IN" or "COM OUT" cable off of a spare Sentinel assembly may be used. However, if you borrow a cable off of a good spare Sentinel BE SURE to put it back on when you are completed with it. We have several of all three kinds in stock and ready to use. In fact we have a large shelf assembly with storage bins all marked with spare CDS items that include some of the following: COM IN cables, COM OUT cables, Sentinels, SMI boards, IGT interface cables, WMS interface cables, Bally, CDS power supplies, and many

other items. The point being, if you don't have spare COM IN, COM OUT cables and a terminator, you should! It will help you out a lot in troubleshooting the CDS/Oasis system. Alright? Back to our regularly scheduled program (LOL). With the use of a terminator, some COM chips, two spare Sentinels, a spare COM out cable, duct tape (Naw! Just kidding) and a "tech card," the problem was FINALLY located between two machines. It came down to seeing how the replacement parts worked in the games. If two machines still wouldn't communicate (even with replacement Sentinels) and they worked error free with a jumper cable in place, the problem points toward the cables that are run between the games. You know, the ones that run from the Sentinel through the game, through the slot base to the game next to it,

and so on. This specific case involved a bad connection that is located in the slot base area. Some way, some how, the Molex connector was loose and had created the numerous COM errors on the CDS displays of the games themselves. It also showed up as "was active" on the diagnostic monitor. If you have access to looking at the "Pollers" (the computers that process and poll the slot information) the games will display an unusual color. Ours is setup to show YELLOW as a normal, active, "online" game. BLUE = bad. This color means the game and or Sentinel lost communication.

I'm sorry but I'm not permitted to take any photographs of our Poller screens or our diagnostic monitor screens. As an example of a typical diagnostic report, we have reprinted Jason Czito's "Poller 3" photo-



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Touchscreen

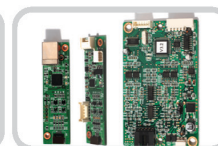
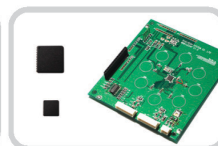
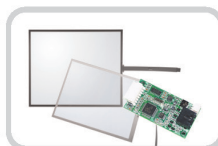
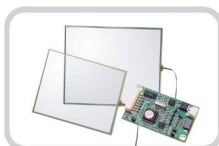
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graph from page 26 in the September 2007 issue of Slot Tech Magazine so you can get an idea what one looks like. This is a totally fake report. I used Photoshop to add some colored squares.

Notice the yellow squares? They indicate that these games are "normal". Blue would mean a game is in a "was active" (was online) state. Black = "offline" meaning the game is totally offline and may have been removed from the system, in which case a game has been taken off of the floor and put in the warehouse.

In conclusion, the problem was a poor Molex connection which is located in the slot base. With the connection and the total of 6 pins all snug and in place, the COM errors depleted.

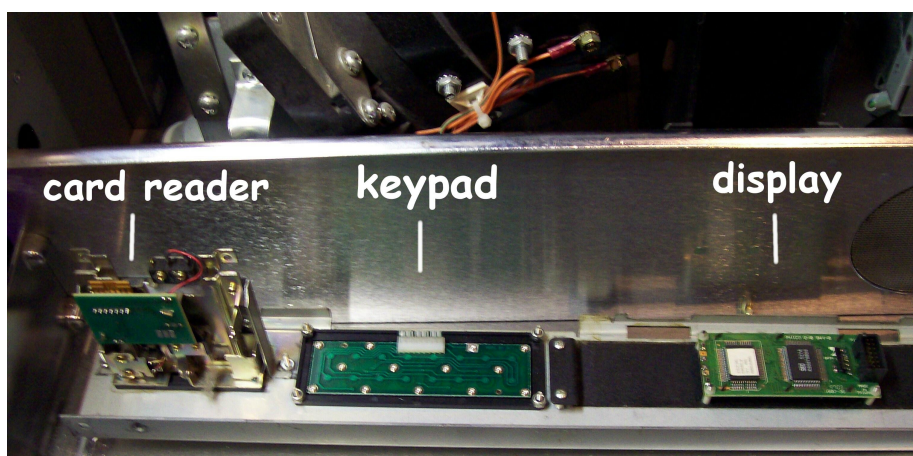
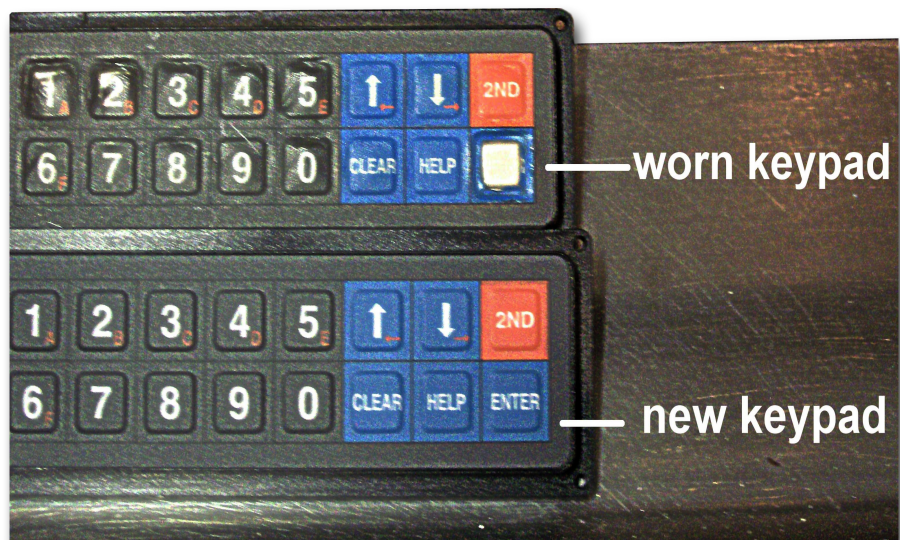
Replacement of Worn CDS Keypads

While thinking of some "busywork" that would pass the day away, I thought "why not replace some of the worn CDS keypads that are on the floor?" On some of them, the "enter" button is completely worn off. There were plenty on hand and in stock, so why not? I had selected a bank in which many of them were worn out when I started to notice something. Not only were the keypads worn, there were other problems too. On this bank of games, there were some loose CDS

displays. In one case, a bolt had come out of a bracket. On a few other games, the card reader was starting to come loose. More than likely this would have been caused by vibrations such as customers using the handle of the game. After months and months of vibration, something is bound to loosen up. Even a couple of the main door locks were a bit loose.

The plan was to replace worn keypads, even though it turned out (in a few cases) to be "preventive maintenance" which is a good thing. Why not take an extra minute to quickly

inspect a game? If you are in it to replace a part and a customer isn't waiting to play it, take the time to check it out. If I hadn't tightened the card readers and displays, a tech would have been called to it later anyway, probably on a "concert weekend" which means (at our casino) 1,325 people are in to watch a show. Also, when a game is booting up and it takes a few minutes, this can allow for a quick inspection of a game too (if time allows). Does the game have good communication with the tracking system? Are the locks tight? Etc., etc.



An Ithaca 750 and Drinking Don't Mix

I received a call on this game, a very popular older slant top WMS game. A drink had spilled on the game. The cup had to be almost full of Coke, root beer, or whatever it was because there was a lot of liquid all over. The slot attendant said he could smell "something burning" and when I opened up the printer door area, no doubt the liquid was shorting out a printer board which is located just to the right of the printer head.

Right away, the 120 VAC power cable was disconnected and the game was shut off. The security podium was nearby so I borrowed some paper towels from them to soak up the mess. Spare parts weren't a

problem for the game. We have two or three print heads for it as well as a couple of the interface boards, power supplies and such. I tried a replacement printer head in it a half hour later but the interface board was definitely cooked. I thought it was best not to work on it anymore on my shift in order to let it completely dry out. Later, a different shift replaced the interface board and the game was good to go. Luckily nothing too serious shorted out. With a little "drying time" and a couple of replacement parts, the game was back online.

Aristocrat Power Problem

We had an Aristocrat upright game with a power problem. The game was shut down, the main pro-

reinstalled. When the power was reapplied to the game but it was dead. It didn't have the infamous Aristocrat "door alarm," no high voltage on the monitor, and the bill acceptor didn't even make a noise. Since the main processor had just been reseated, I thought I had best check to make sure that it had been seated properly. As most of us know, if the main board isn't seated the game will be dead. I made sure that both the main and the I.O. boards were in place and tried another power cycle. Nothing changed, still absolutely no response from the game.

The symptoms appeared to point to a power issue so the main power connections were checked; they all looked good. Why not try a "hard boot" on the game?

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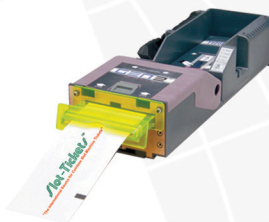


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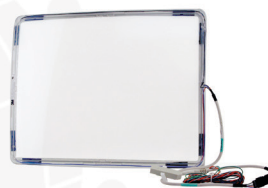
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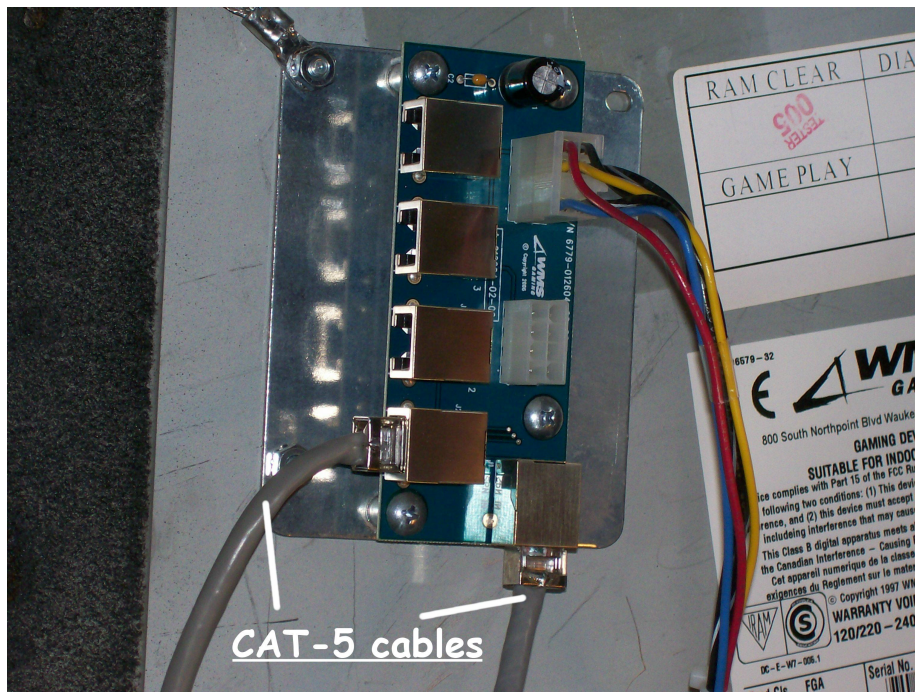
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cessor board pulled and



Even though many times I would like to give a game an actual "hard boot in the eye" in this case a hard boot is when the main power plug is disconnected from the power supply and the game does not have any 120 VAC supplied to it at all. On some types of upright Aristocrat games (Mark IV?) there are two power cables going into two power supplies. The upper cable, once disconnected, will shut down the auxiliary outlet for the game. The lower power cable (located in the lower right hand side of the game behind the bill acceptor assembly) is the main. Simply unplug the main power cable and this will result in what I call a game "hard boot." It only works some of the time and I don't have a scientific technical explanation but the main point is that sometimes it works! In this specific case of a more or less "dead" game, a hard

boot brought it back to life. I simply unplugged the main power cable for 20 seconds and plugged it back in. When the main power switch was turned on it was alive. "It's alive! It's alive!" The game came up perfectly and I haven't heard a peep out of it since. Now for the tricky part, why did the game react the way it did? My only conclusion is that the main power supply may be getting weak OR something in the software was slightly corrupt. Main objective: (in my personal opinion) the game is up, running well, and online.

Bally "Hot Shot" Progressive Symbol Issue

If a "Bally Alpha Hot Shot" progressive game is setup for "Legacy Bonusing" there may be an issue in which a symbol improperly remains on the screen through the next game. As an example

which may occur, a "Bar" symbol lands on a line and it stays on the line throughout the following spin of the machine. All of the payouts are correct, which are included the last game recall. If the situation does occur with the symbol remaining, it may cause confusion to a customer. This specific ordeal may only happen if the machine is setup for "Legacy Bonusing."

The part numbers and specific games affected are as follows. All are "Hot Shot Progressive" "All About Money" part number 20321A and part number 20321B "Winning Times" part number 20330A "Blazing 7's" part number 20392A Contact your Bally Technologies for a replacement "Personality Program" if need be.

WMS Goldfish Fish Button Problem

The error on the game was "single row universal animator command timeout." What in the world was this? Single row universal what? "Command timeout" Somewhat sounds like a software issue. Maybe. A fellow tech had swapped out both of the CF cards and there wasn't a change in the error at all. Next, the main processor was changed out. There wasn't a change there either. If the problem wasn't in the main board and not in the CF cards, where could the problem be? I had

to call our WMS tech for the answer. If anyone has heard of it, he would have. The call was placed and he had the answer right away. He said that it is a "Fish Button" problem! Ok, I was totally lost here (once again). What could the Fish Button have to do with a "single row universal animator command timeout" error?

First of all the Fish Button is the oval illuminated button on the game that connects with a small board in the main door (on an upright game). Next, there is a CAT-5 cable that connects between the small board and another board that is located in the upper left hand side of the game. This board has multiple CAT-5 cables connected to it. The WMS tech said when this error occurs, it is usually a bad button board or a bad cable. In this case, the cable was replaced from the small board to the upper left board and the unusual error cleared right away. When the cable was inspected closely, you could see that the green wire inside the connector hadn't been seated properly when it was crimped. I suppose it was making just enough of a connection to work for a while, then all of the sudden it didn't.

- Pat Porath
- pporath@slot-techs.com

January 2008

Slot Tech Press Release

FOR IMMEDIATE RELEASE

NANOPTIX INC. DESIGNS *PAYCHECK™* INVERTED TITO PRINTER FOR SPACE RESTRICTED CABINETS



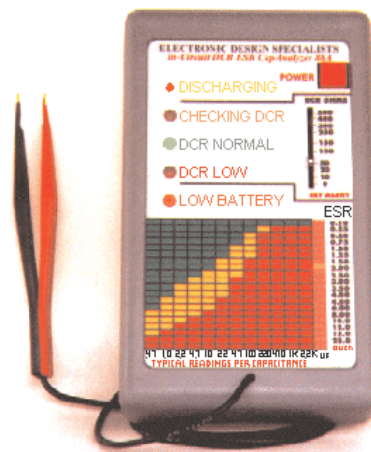
Nanoptix Inc., manufacturer of the world's fastest and most reliable line of TITO printers has added another printer to its existing line of Paycheck™ products: The Paycheck™ Inverted printer. This printer's unique form factor and variable mounting positions allow it to fit where current horizontal and vertical TITO printers on the market cannot, giving manufacturers of new cabinets or refurbished slot machines more design flexibility. The Paycheck™ Inverted printer offers the same industry-leading features as the Nanoptix Paycheck™ 3 and Paycheck™ Slim printers such as: Print Head Life of 62 Miles (roughly half a million printed tickets), Jam-Resistant Bezel Design, HOT Swappable, High Speed Printing and a very user-friendly design. The Paycheck™ Inverted printer has standard connectivity and protocols.

About Nanoptix

Nanoptix Inc. is a global thermal printer solutions provider for the Gaming, Lottery, Kiosk and Point-of-Sale markets. With over 50,000 printers installed Worldwide, Nanoptix has earned a reputation for excellent value as well as outstanding customer service and support. For further information, visit our website at www.nanoptix.com.



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Thermal imaging, fan-folded paper tickets are now the backbone of many coinless slot systems such as IGT's EZ-Pay, Aristocrat's OSAIS and Bally's SMS. It may come as a surprise but these tickets as they are known today and their manufacturing technology did not exist when printer manufacturer FutureLogic first knocked on the door of thermal printing expert Tom Mitchell, inquiring how to make the slips of paper that would eventually replace coins and tokens in almost all slots worldwide. Mitchell formed a company and called it Slot-Tickets. This is the company that developed the world standard for the ubiquitous folded packs of tickets and this is the story of the slot machine's switch from metal to paper.

In the Beginning

Three United States patents later and several billions of tickets sold, it looks simple but that was far from the case back on March 15, 2000 when the first tickets

for the Fiesta Casino in Las Vegas sprang to life on the slot floor. The ticket had to be produced to almost impossible standards in order to outperform existing coin handling devices, perfected over the past century. No jams, no tilts and above all very low maintenance by floor personnel. Anyone can make a few hundred or a thousand tickets but making billions, all custom printed and with zero defects, was a huge challenge.

The special part was the fan-folded packs. These

special packs had to be burst—torn apart at the perforation—without jamming in the slot machines. The tolerances were incredibly tight and the perforation so fragile that production at first seemed impossible. There is no paper cutter in the slot printer so it is only this fragile perforation that keeps the wheels of every slot machine running smoothly, unnoticed, by the millions of players and thousands of slot operators everyday, worldwide.



Eric Meyerhofer
Slot Tech Magazine



Tom Mitchell



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It Was a Good Invention and They Did It

How did all this come about? The beginning of Slot-Tickets was marked by a phone call in the late fall of 1998 from Eric Meyerhofer, today's President of FutureLogic, Inc. inquiring if Mitchell could make thermal paper stock in US dollar bill size that could be fan-folded. The concept of using thermal tickets in place of coins and tokens in slots had been initiated by IGT. Mitchell became interested when Meyerhofer said they needed a few million of these a year. Needless to say, they were both surprised when the number turned out to be one thousand times larger.

Meyerhofer knew that Mitchell had spent many years developing unique thermal media products for FedEx and explained that his printer requirement was to have no paper cutter and no serrated cutting edges. In fact, the paper literally had to "pop out" with no effort. Mitchell couldn't resist the challenge.

"I knew thermal paper technology and grabbed my trusty Kanzaki Paper Specification book and looked for a paper that was high speed, because Eric said this thing had to be fast," said Mitchell. "I decided it had to feel like United States currency. Right there on page 19, Kanzaki TO-



381N appeared to fit the bill. Today it accounts for most of the billions of tickets produced worldwide."

It looked like they were set to go but Mitchell's enthusiasm was soon cooled when he went to his converting partners at the printing facility in Algoma, Wisconsin. They put the test roll, kindly provided by Kanzaki, up on the press and their first attempt to make this ridiculously fragile perforation failed. So did several more as they learned to perfect the art, which is what it turned out to be.

FutureLogic had provided them with an early beta printer version using the Seiko print engine so they could test their perforation bursting characteristics. Everything they made was so tight (a printing term for strong) that at first they could pull the entire stack of tickets out of the printer

without any of the perforations "bursting" the term used for breaking a single ticket.

"Converting" is an industry term that describes taking a large roll of paper and printing ink onto the surface. The presses—they have a couple hundred—are known as narrow web presses. Huge paper "logs" from Kanzaki are slit into smaller press master rolls onto which the casino logos are printed as well as the Top of Form registration marks and anti-counterfeit measures. At the end of the press, engraved die cutting drums fold the ticket stream at the perforations and Bingo! You have packs of tickets. Sounds easy, right? No!

Those huge presses run at hundreds of feet per minute and many streams wide. After all, they have to make millions of these a year at

low cost. The problem was that speed and fragile perforations don't mix. It took several months to fine tune, invent and get control of this beast so they could finally make what were to become the first tickets for the Fiesta in Las Vegas.

IGT's EZ Pay concept was first shown in Las Vegas in September 1999 at the World Gaming Conference and Expo. By December of 1999, EZ-Pay was being installed at the Fiesta and gaming history was made. Arguably, the introduction of TITO ranks right up there with the incorporation of video displays and bill acceptors as one of the most notable modern developments of the industry.

Today, Slot-Tickets produces tickets in two WS Packaging Group, Inc. facilities: One in Algoma, Wisconsin and the other in Phoenix, Arizona. They are produced at extremely high speed and the Slot-Tickets group is proud to hold the Sigma Six best record for the highest quality product out of 15 WSPG facilities. Their ten billionth ticket will soon come off the presses.

Their sales and marketing strategy, facilitated by Susan Mitchell, President of Slot-Tickets, is focused primarily on direct sales in the US and through several distributors worldwide. In Europe, the Mediterranean and North Africa they are

January 2008

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represented by Eurocoin, in Asia they have Cointech, in Australia Methodical Services, SEAC does South America, John Fucile the Caribbean, as well as Suzo-Happ.

Editor's Note: In a technical publication like Slot Tech Magazine, we would be remiss if we did not cover the basics of thermal imaging paper technology. They in the trade call this "direct thermal" paper.

The Paper Maker:

The base substrate is very important because it is the backbone of the product. Normally they do not specify the paper mill to be used. That is left to the Coater but the importance of a flat, white smooth sheet is critical to the end result. They want the ticket to print, with ink, the logos and anything else the casino management may want with good color rendition, exceptional smudge resistance, and strength.

The Coater:

Kanzaki Specialty Papers supplies the vast majority of the ticket stock. Appleton and Nashua are also certified thermal coaters. What these companies do is apply the thermal chemistry on huge rolls of paper that comes from the paper mill. The equipment is massive; the rolls are up to 2.7 meters wide x 12,000 meters long with a 1.3 meter Outside Diameter. A coater can easily cover a

football field and be several stories tall.

The Converter:

This is the job of Slot-Tickets. They receive rolls of paper from the coater that have been slit and rewound to fit their presses. They are the "printers" of the group taking your order and customizing it for your property. They print on their presses the property's multicolored logo on the non-thermal side along with the TOF (top of form) registration marks required for the thermal printers. Often, they include a counterfeit deterrent known as "White Phantom". We could tell you more about this but we'd have to kill you.

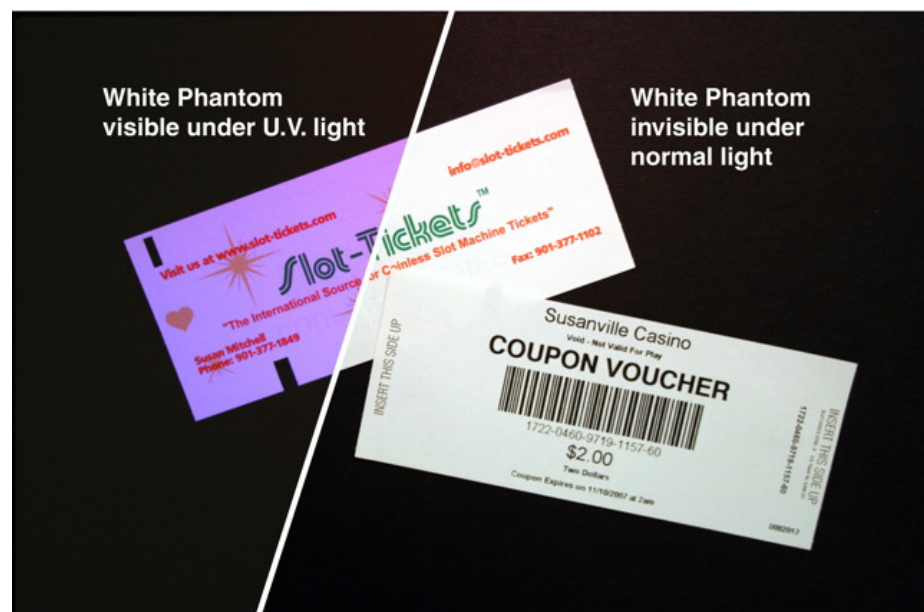
The thermal side is mostly left blank for the thermal images of the bar code and specific ticket information. The resulting converted printed packs of tickets are available in a wide number of per pack requirements,

as well as Jumbo Packs of 1,000 always banded for protection and packed in a solid box to keep them safe and clean. A cartridge for special applications contains 1,200 tickets ready to drop into the printer's paper hopper.

Thermal Coating and Direct Thermal Printing:

For chemistry buffs, Slot-Tickets uses a leuco dye system. Microencapsulated leuco dye ink is an aqueous-based ink product that is nearly colorless as supplied but turns to color when the capsules are ruptured in the presence of a suitable activator. It is the same material used for gas pump receipts and EKG strip charts. Of course, those papers are not all equal in print and durability quality but they are all related.

Direct thermal paper is essentially a self-contained printing system; no external



inks or ribbons are needed. The original Coater applies coatings to a base paper with a chemical formula that includes colorless dyes and developers. When the paper goes through a thermal printer, heat (thermal energy) from the thermal print head causes the dye and developer to activate and form a high definition image. The thermal print head consists of a multitude of pixels (miniature resistive heating elements) distributed along its printing width. Each pixel is electronically controlled to deliver the correct amount of energy to an exact location for an exact amount of time. Those individual points of energy together form the final image - text, graphics, and bar codes. Direct thermal paper is environmentally safe and fully recyclable.

The approved papers used for slot ticket production have a long and durable image life and resistance to many environmental hazards such as water, oil and excessive light. However, they still must be stored according to the warnings printed on the side of the shipping box.

Slot-Tickets is a wholly owned member of the WS Packaging Group, Inc. and are based in Memphis, Tennessee. For further information, contact: Tom.Mitchell@slot-tickets.com or visit the website at www.slot-tickets.com.



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Introduction to Slot Technology

Course Offered at CSN



Written by: Joe Miller Instructor of "Introduction to Slot Technology" course at College of Southern Nevada (CSN)

First, I must thank the publisher of this magazine for including this article on CSN programs and the "Introduction to Slot Technology" course in his magazine. This is the second such article he has published on our program; the first article was by Ray Holdren about the new CSN class on CRT/LCD theory, troubleshooting, and repairs.

The course is an introductory course for those interested in slot machines. The interest can be derived from a desire to become a slot technician, floor attendant, students pursuing a slot technology degree/certificate from the college, and always from those that want to beat the machines.

The Class is held in the school's Slot Lab, which has

an assortment of testers, test equipment, and slot machines (including WMS Bluebird and Bally's M9000). When we cover subjects like "Bill Validators" the students have an assortment of validators to look at, handle, and perform some maintenance tasks. Some of the other Hands•]On classes involved touch screens, disassembly/assembly of push buttons, identification of defective switches using on•]board diagnostics, removing and reinstalling reel strips and assemblies, and many other maintenance/troubleshooting tasks.

Since the course is introductory there are no prerequisites except a desire to learn. After taking the course students should have and understanding of:

- The history of gaming machines
- Types of gaming machines such as Slant tops, Uprights, Round tops, and Bar tops

- Location of each major subassembly
- The major manufacturers of gaming devices
- The theory of operation and modes of operation of electronic slot machines
- The use of microprocessors in gaming machines
- The use of Peripherals such as bill validator, coin acceptors, hoppers, CRTs, reels, LCDs, and stepper motors
- Reel strips, virtual reels, pseudo random number generators, pay tables, and PAR sheets
- Hard and Soft meters
- Machine Theme Conversions
- Program Summary Reports (PSR)
- Key maintenance tasks dealing with Bill and coin jams, Player disputes concerning Coin in, Coin out, bill validator, game and Statistical recall, troubleshooting, etc

For a floor attendant or an apprentice slot technician this course provides introductory information on how the gaming machines work, however individual casino rules, policies and procedures are beyond the scope of the course. These same subjects are covered in much more depth in the School's two slot principles classes which require a sound grounding in analog and digital electronics.

This course is offered every semester at CSN. There are two sections offered during the coming Spring Semester (22 January – 17 May 2007); one



on Saturday morning and an online version. If you live in Las Vegas and can attend the Saturday class is recommended. Registration ends 18 January, however late registration ends on 25 January.

- Saturday 9:00AM – 11:50 AM, Cheyenne Campus Room 2739, Course Name: ET 138B Section 001, Call # 25632
- On-Line Class (aka Distance Education – DE), Course Name: ET 138B Section DED01, Call # 56760

In addition to the Introduction to Slot Technology courses, we will be offering General Electronics I and Digital Logic I. General Electronics I is the basic concepts of passive circuits. Components and test equipment are used in practical experiments during the class. General Electronics I requires a math prerequisite. Digital Logic I is a course which covers numbering systems, logic gates, Boolean algebra, K-maps, combinational circuits, and Flip-flops. Like General Electronics I, students will be performing practical experiments to understand the function and operation of digital circuits.

Signing up to become a student is easy. Normally, you would apply/register which can be done online. Then you can attend a student orienta-

tion, either live or online. If you are considering a degree program, you would complete financial aid forms, visit a counselor and take placement tests. Finally, you would register for the class and pay tuition and any fees.

For more information on our two-year Associate of Applied Science degree with Slot Repair Emphasis or one-year Certification of Achievement programs, contact our department office at 702-651-4127, Joe Miller at joseph.miller@csn.edu, or the program director, Jim Jennings at jim.jennings@csn.edu.



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OTHERS SHOW YOU HOW, WE TEACH YOU WHY

SlotFest TechFest 16 UNR Teams With Slot Tech Magazine



King of the cold cathodes, CI Innovations' Harry Iverson gave a brief presentation about replacement lamps for LCD monitors. Dang! Those things are bright! He also bought lunch for the class on Wednesday! Thanks, Harry.



David Oldham of AESI presented a technical look at the MEI bill acceptor and the FutureLogic ticket printer.



"Wait! I gotta put on my jacket!" Ray Holdren's presentation on using Sencore test equipment to repair LCD monitors was fast-paced and highly informative. Don't let the jacket fool you. The day before he was spotted wearing his motorcycle colors.



Alice Begay, Christina A. Cadue, Steven Wesley-Apache Gold Casino, Ric Cooper, Cordis Gilliam-Aqua Caliente Casino, Angela Rivera, Jesse Reeves-Bear River Casino, Steven Whitehead-Bluewater Resort & Casino, Charlie Wilson, James Alexander, Darren Frenzen-Cache Creek Casino Resort, Ben Benigas-Cannery Casino, Al Kapacinkas, Paul Martinez-Casino at the Downs, Dan Doctor, Tim Foster-Casino Rama, Marco Fuentes, Mike Glaser, Pryor Nabis-Casino Regina, Billy Spradlin-Cherokee Nation Enterprises, Matt Brittain-Cheweloh Casino, Boe Woonsook, Ron Hendricks-Fort Hall Casino, Jayson Strong, Rick Anderson, Casey Valley, Joe Zaitz-Fortune Bay Resort Casino, Donald Tolhert, Rickey Alexander-Fortune Valley Hotel & Casino, Larry Hodgson, Len Smikun-Incredible Technologies, Karin Stewart, Maria Bookout, Norma Murillo-Inn of the Mountain Gods, Mike Green-KLA-MO-YA Casino, Bernard Dust Jr., Brian Big Man, Howard Hogan, John E. Wilson IV-Little Big Horn Casino, Lorrain Horn, Susan Buckingham, Sharon Gallentine, Tamara Carey-Little River Casino Resort, Michael Richardson, Sharon Thomas-Mazatzal Casino, Michelle Dedmon-Motor City Casino, Belinda Armitage-Northern Quest Casino, Henry George Jr., Raylene Fawn Swan-Okanogan Bingo-Casino, Marlon Olliuerre-Seaport Casino Aruba, Jaime Barriga, Victor Fortenbach-Spa Resort Casino, Robert Sult-Treasure Island, Christopher Hardwick-Two Rivers Casino, Bentley Watts, Gabriel Leight, Nathaniel Buck-Ute Mountain Casino, Brian Zelner- Pinnacle Entertainment, Inc.



This Year I made it to TechFest. All I can say is WOW.

I would like to thank Randy Fromm for making this unbelievable training event available to Slot Technicians, bringing the best of the best, knowledgeable instructors together to one place. In short, this event was incredible (truly excellent). This was one of the best lifelong learning courses I've taken. If you have not been to a TechFest you should plan to attend the next one. If you have been, go again. For myself a lot of it was review, but I did learn a lot.

Thank you to all of the instructors. Randy, is funny, energetic and has an enthusiastic way of teaching that consistently kept the class alive. I had just sat down and it felt like just minutes later we were taking a break. Where did the time go? He made the class very enjoyable and much easier to absorb the information. His enthusiasm is phenomenal.

Ray Holdren loves teaching. It is immediately evident from the enthusiastic way he talks about his profession, he is very knowledgeable.

David Oldham, Paul Hatin & Mark Roberts, Troy Nofziger, Russ Wige and Jack Geller were all excellent instructors, had great tips and advice and were all very knowledgeable. Lectures were clear, loaded with information and enthusiastically presented.

- Robert Sult
Treasure Island Casino, Las Vegas
January 2008

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Mark Roberts (l) and Paul Hatin from 3M Touch Systems introduced us to a couple of new items at TechFest 16. One was new software to replace their DOS-Based "Microcal" program, another was a brand new way to attach touchscreens to monitors without using that adhesive foam tape that is so difficult to remove when the sensor needs to be replaced. Based on the Command adhesive, touchscreen removal now takes only seconds and requires no tools.



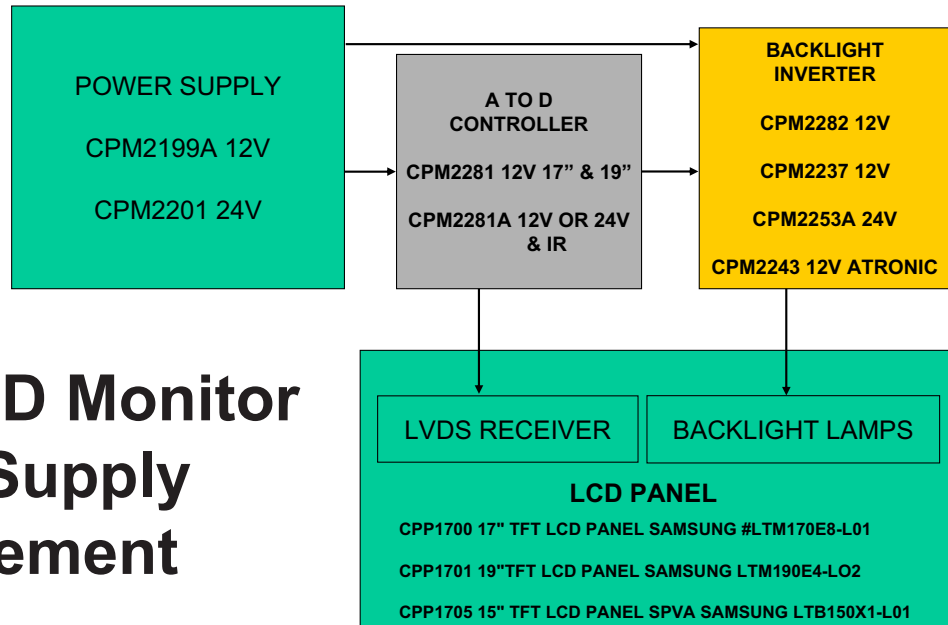
At TechFest 16, Ceronix's Troy Nofziger(above) took us through a detailed look at troubleshooting their legacy CRT monitors as well as their newest LCD monitors. He presented some important information about LCD design that we have reprinted in the following pages. The entire Powerpoint presentation is available online as well. Just visit the Slot Technical Department at slot-tech.com



The University of Nevada, Reno conducted a parallel training session at the same time as TechFest 16. The SlotFest gaming management seminar faculty consisted of Ken Moberly (l) and David Chavez. I sat in on some of their presentations. Awesome stuff. They have been invited for a repeat performance at the next "Fest" in May at Mystic Lake Casino in Minneapolis, Minnesota.

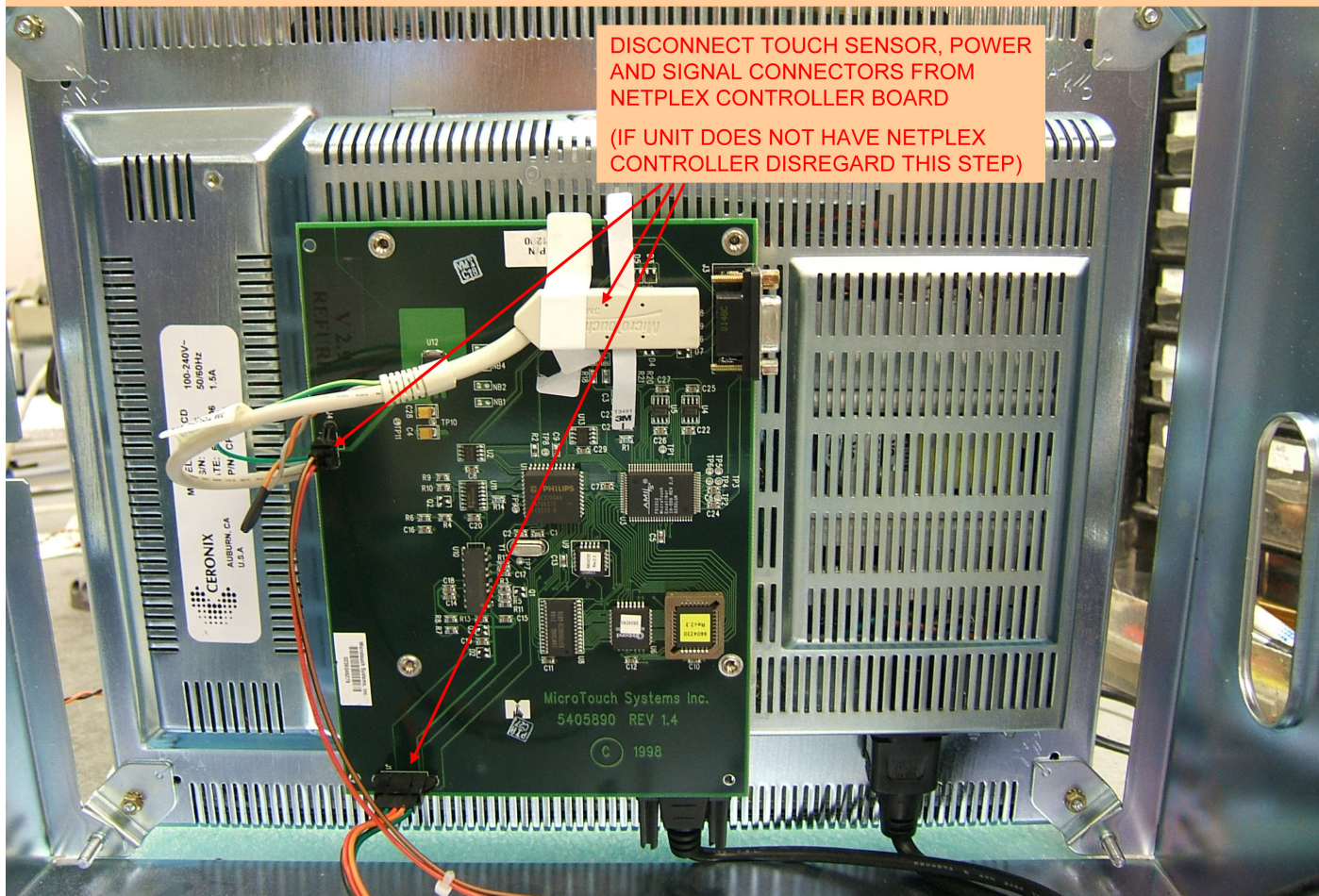


LCD BLOCK DIAGRAM

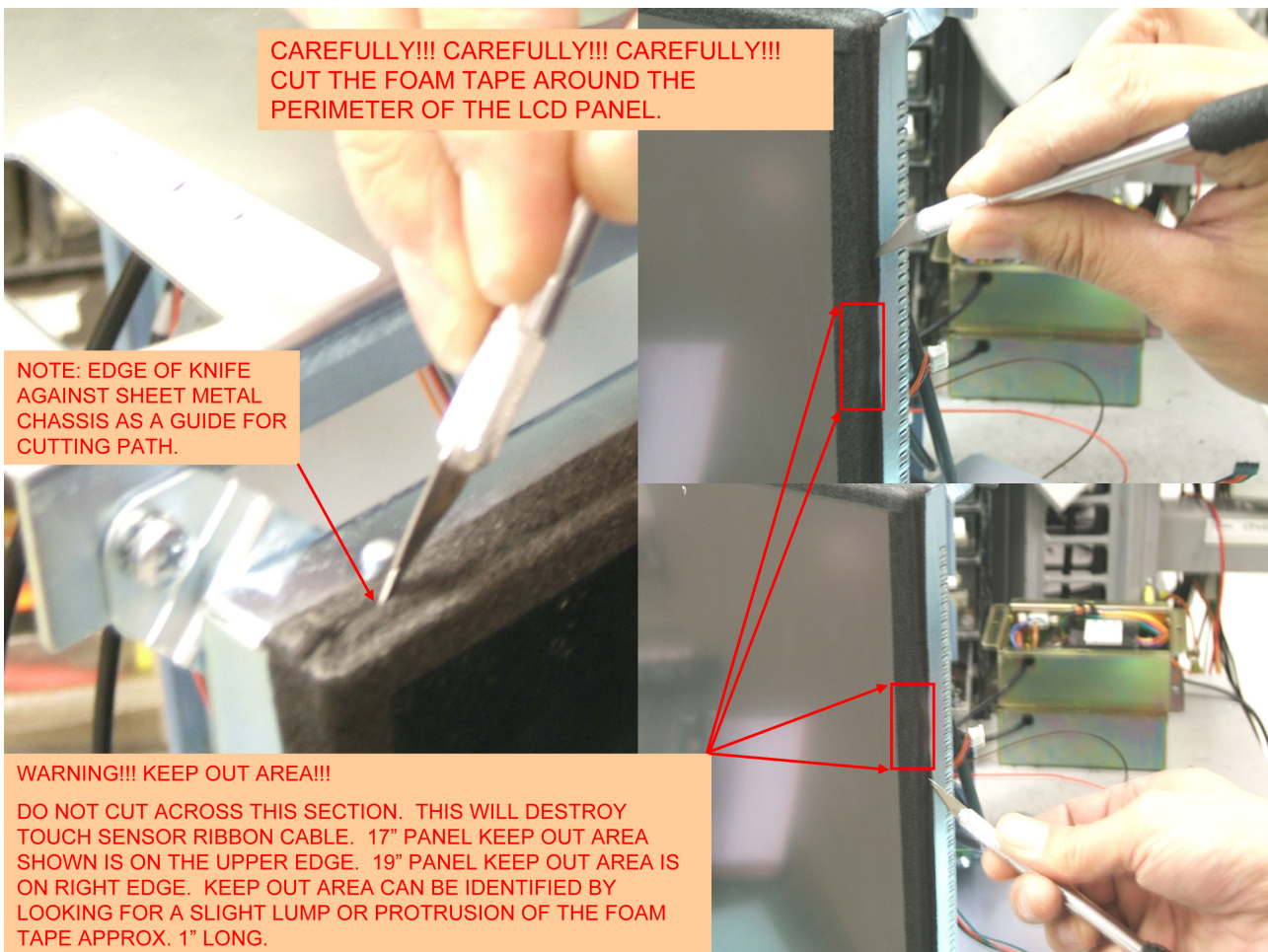
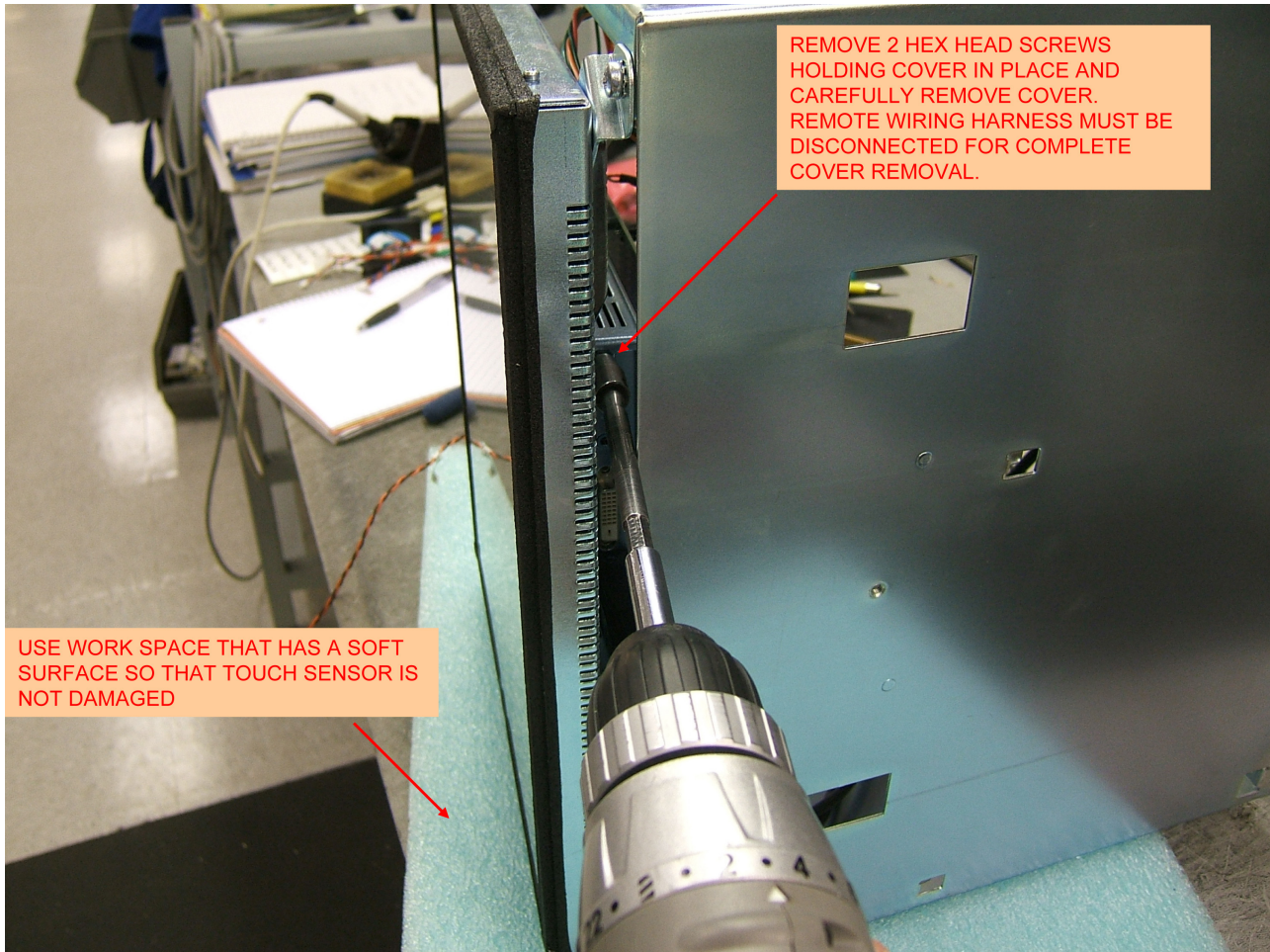


Ceronix LCD Monitor Power Supply Replacement

LCD POWER SUPPLY REPLACEMENT

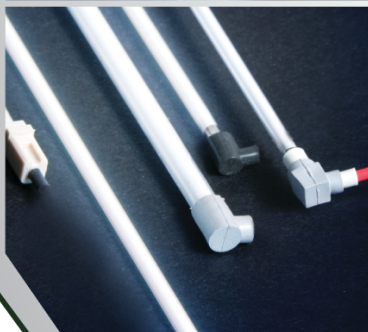
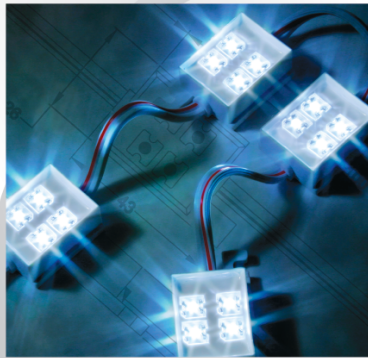


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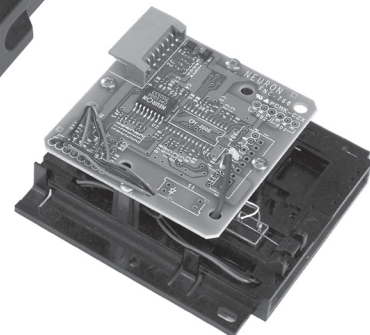
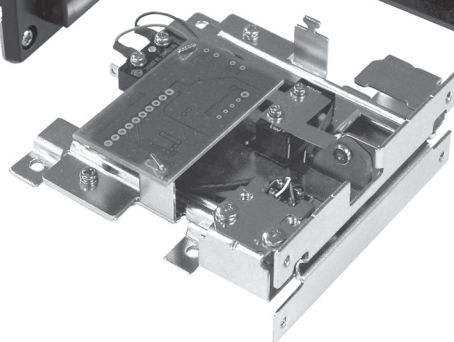
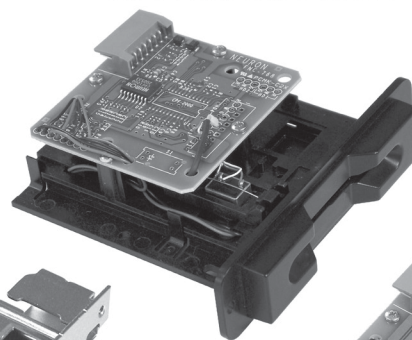
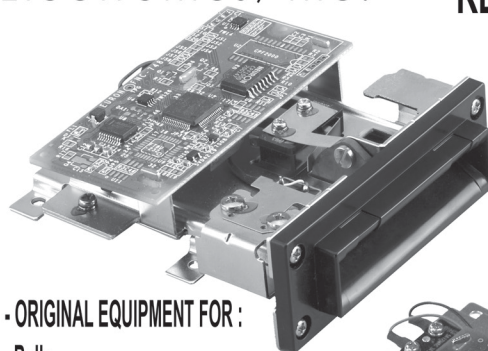
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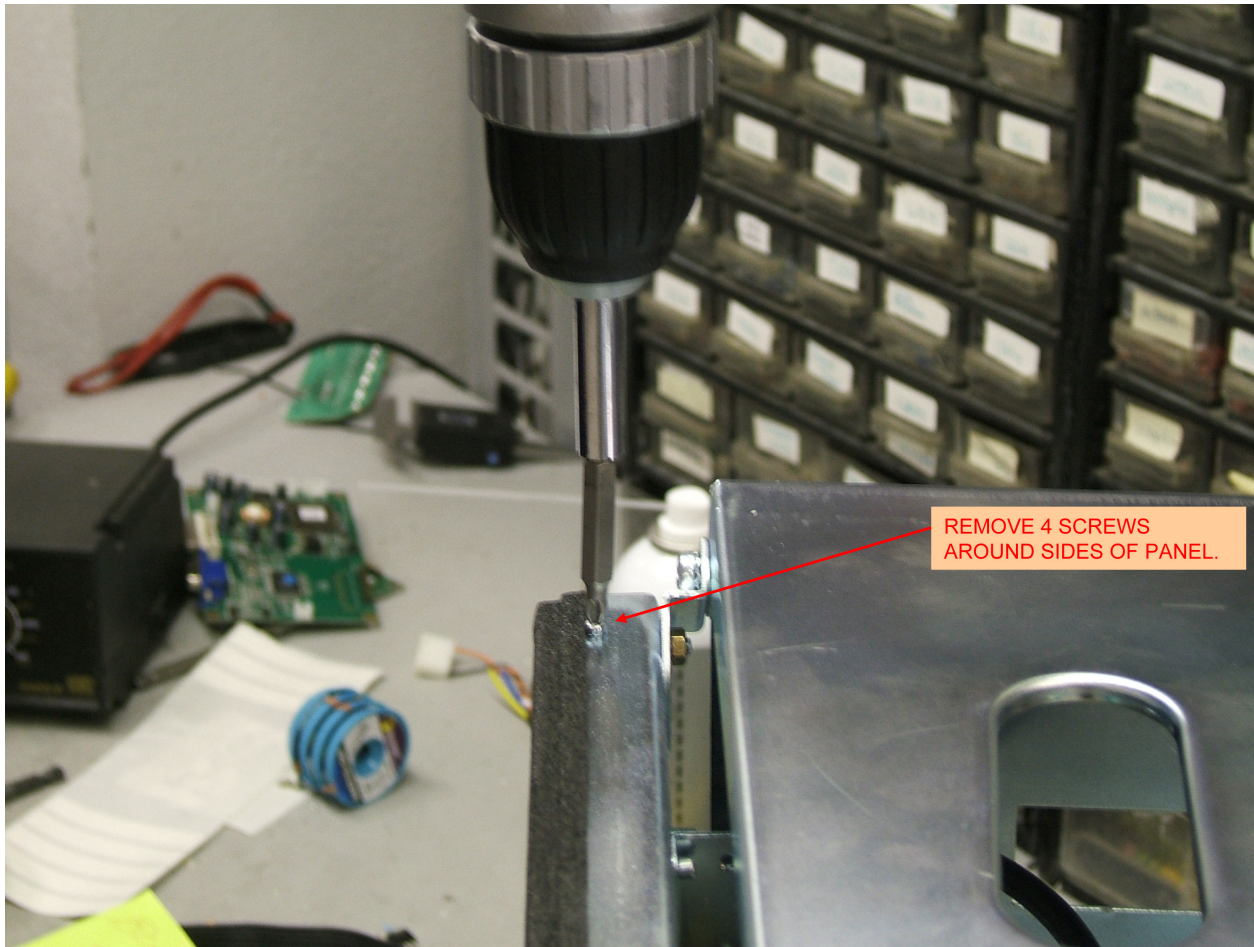
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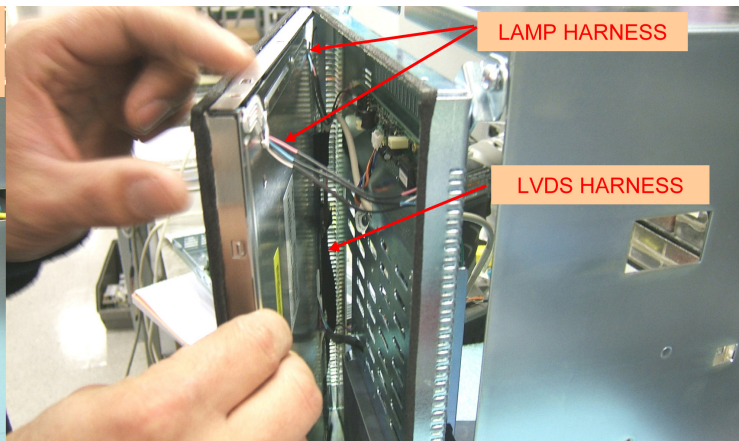
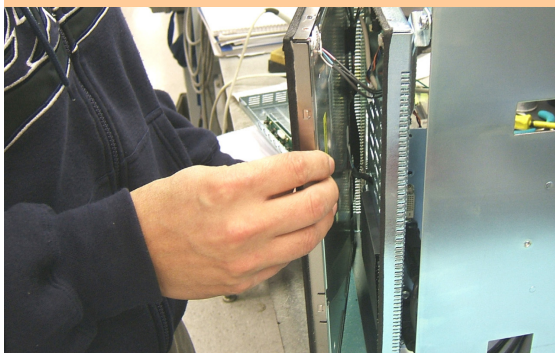
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REMOVE 4 SCREWS
AROUND SIDES OF PANEL.

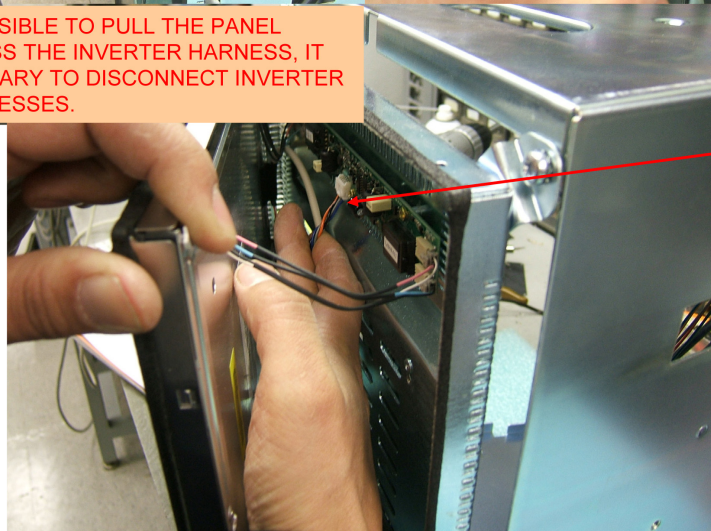
CAREFULLY PULL BOTTOM EDGE OF PANEL
AWAY FROM CHASSIS. LAMP AND LVDS
HARNESSES ARE STILL CONNECTED.



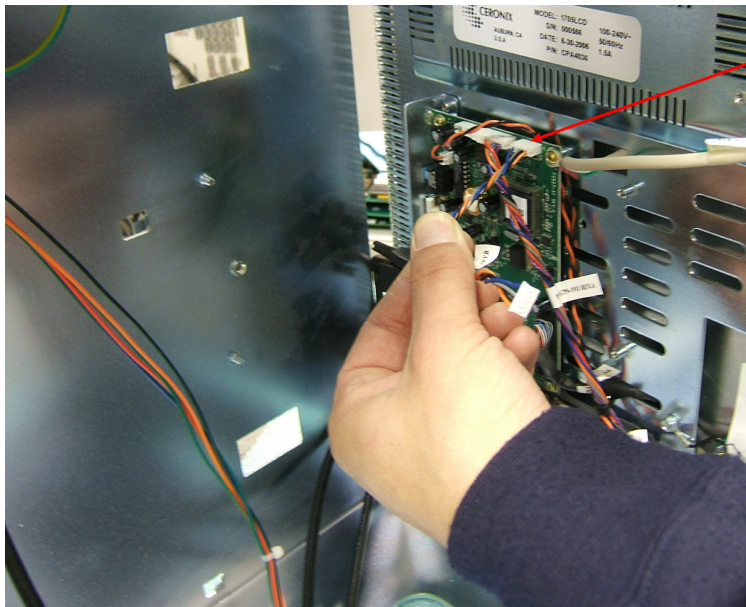
LAMP HARNESS

LVDS HARNESS

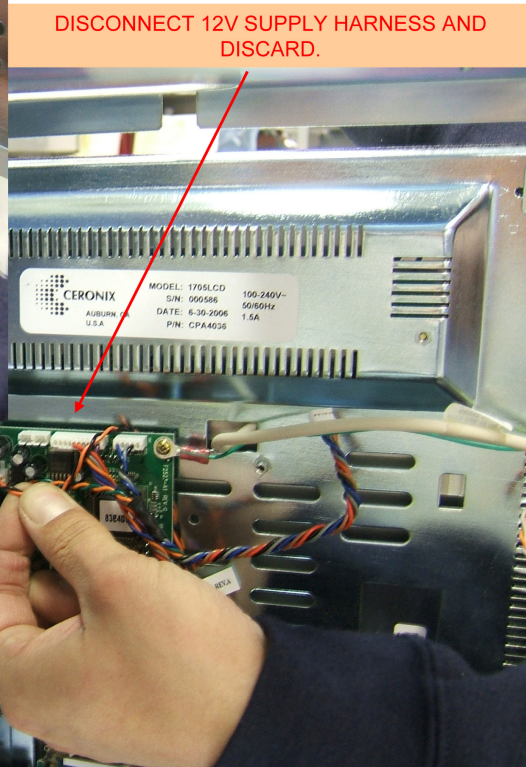
IF IT IS NOT POSSIBLE TO PULL THE PANEL
AWAY TO ACCESS THE INVERTER HARNESS, IT
MAY BE NECESSARY TO DISCONNECT INVERTER
AND LVDS HARNESSES.



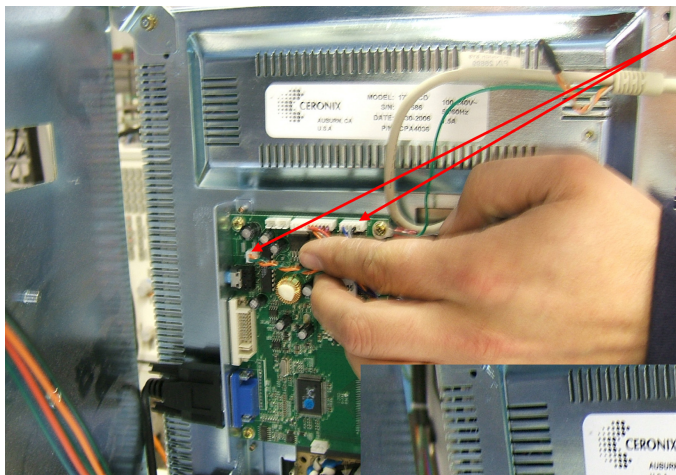
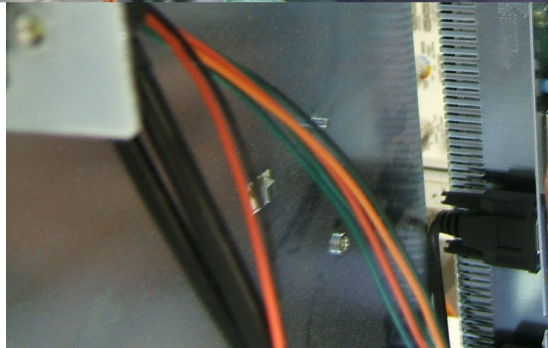
DISCONNECT INVERTER
HARNESS AND FEED HARNESS
BACK THROUGH OPENING IN
CHASSIS.



DISCONNECT OTHER END OF INVERTER HARNESS AND DISCARD.

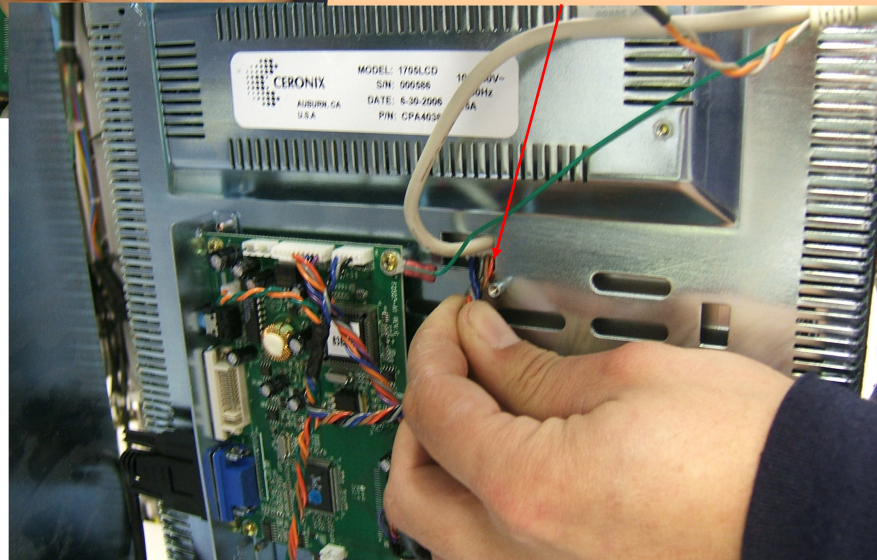


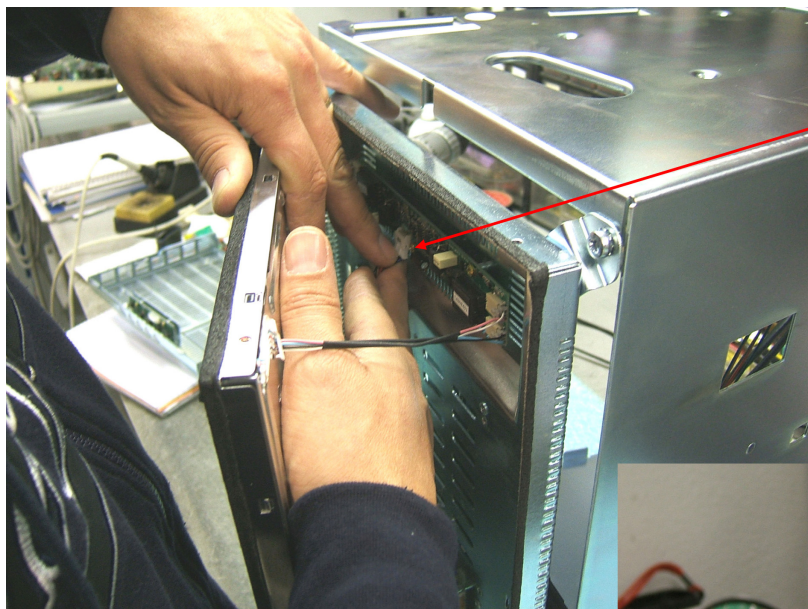
DISCONNECT 12V SUPPLY HARNESS AND DISCARD.



CONNECT NEW HARNESS (CPS1917) WHICH IS A COMBINED 12V SUPPLY AND INVERTER HARNESS.

FEED OTHER END OF HARNEES THROUGH FOR CONNECTION TO INVERTER

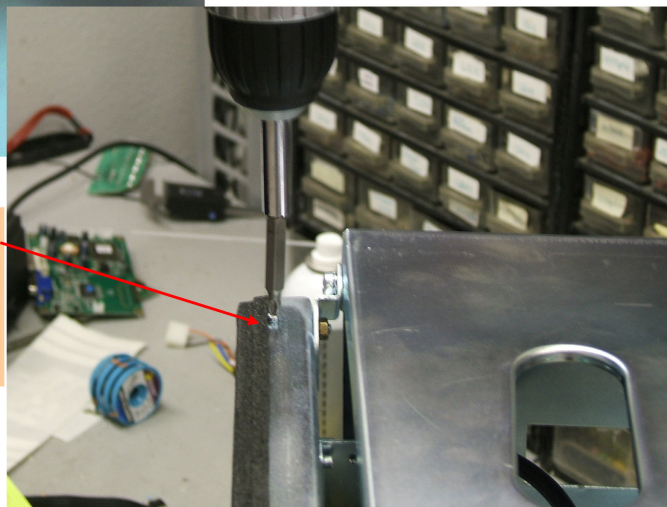




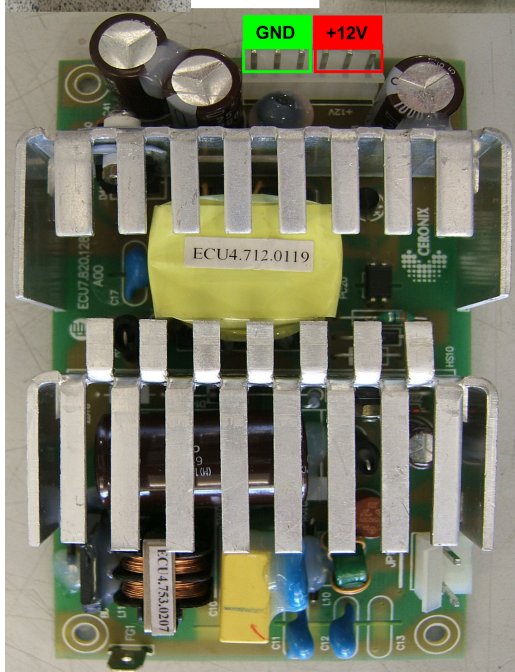
CONNECT NEW HARNESS TO INVERTER

PLACE PANEL BACK INTO CHASSIS AND SECURE WITH FOUR SCREWS.

FOAM TAPES SHOULD MATE ALONG CUT LINE. IF THERE ARE ANY VOIDS IN TAPE IT MAY BE NECESSARY TO ADD OR REPLACE.

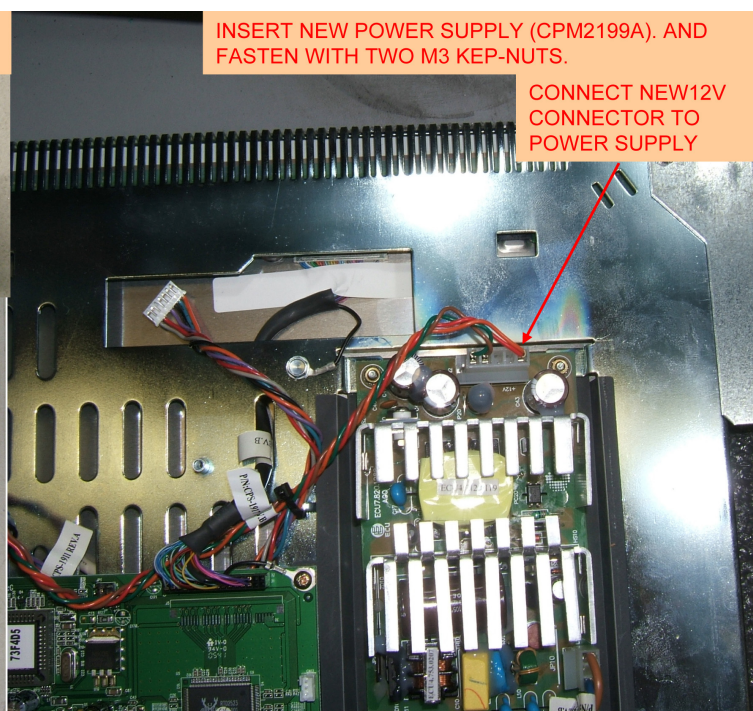


NOTE: CHECK POLARITY OF HARNESS. IF NOT CORRECT, CHANGE AS SHOWN BELOW RIGHT.



INSERT NEW POWER SUPPLY (CPM2199A). AND FASTEN WITH TWO M3 KEP-NUTS.

CONNECT NEW 12V CONNECTOR TO POWER SUPPLY



CONNECT AC CONNECTOR AND GROUND TERMINAL

HARNESS MODIFICATION FOR CPS1853L, CPS1861L, AND CPS1896
 USED IN CPA4090L, 4064L, 4078L, 4085L, 4088L. THIS PAGE FOR UNITS THAT
 HAVE THE STANDARD 3M CONTROL BOARD (NOT NETPLEX)

EXAMPLE: CPS1853L

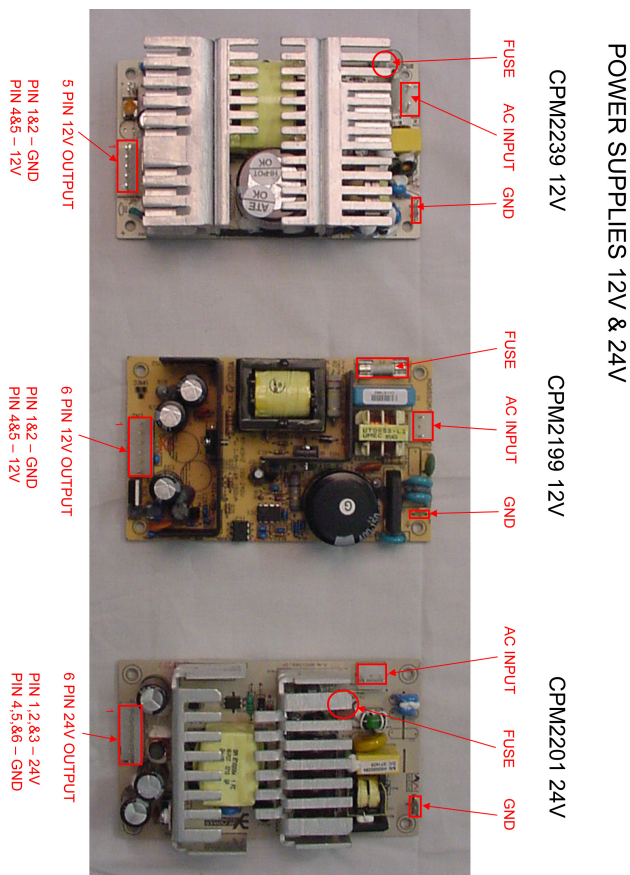
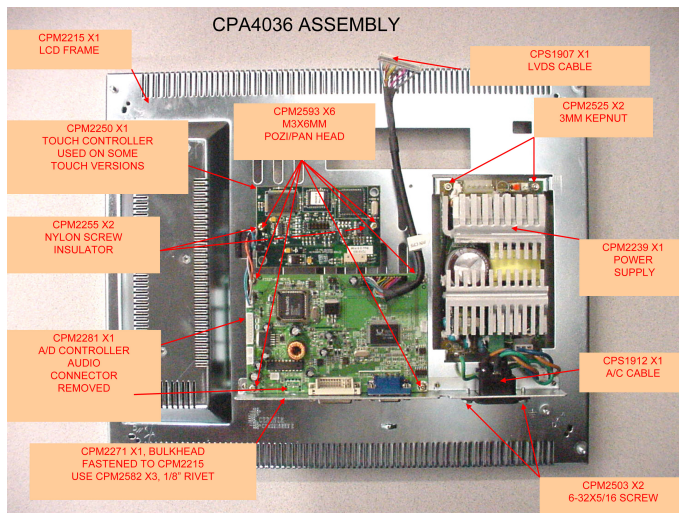
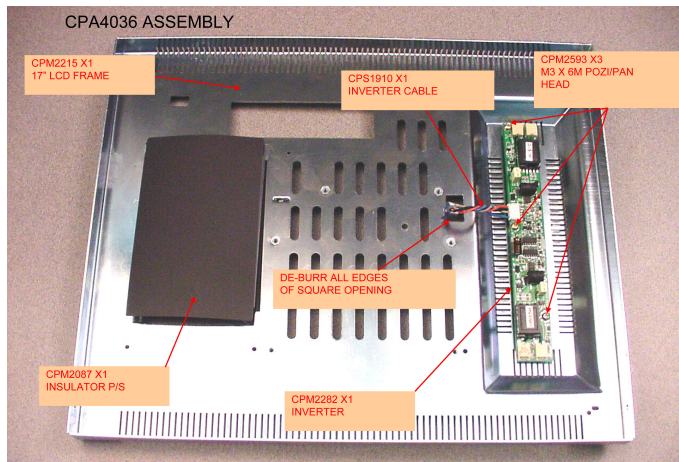
1. DISCONNECT 7-PIN CONNECTOR FROM TOUCH CONTROLLER. CAREFULLY EXTRACT PINS CONNECTED TO BLACK AND WHITE WIRE FROM CONNECTOR T4. AN OBJECT WITH A FINE POINT SUCH AS AN XACTO KNIFE CAN BE USED TO LIFT UP ON THE PLASTIC PIN RETAINER TO RELEASE PINS. DISCARD WIRES CONNECTED WITH T2 AND T3.

2. INSERT BLACK AND ORANGE WIRES OF NEW HARNESS (CPS1862) INTO CONNECTOR T4 AS SHOWN BELOW

3. THIS NEW HARNESS CAN BE PLUGGED BACK INTO THE TOUCH CONTROLLER AND INTO THE A/D BOARD CN13 AS SHOWN BELOW.

CONNECT TOUCH SENSOR, POWER AND SIGNAL CONNECTORS TO NETPLEX CONTROLLER BOARD
 (IF UNIT DOES NOT HAVE NETPLEX CONTROLLER DISREGARD THIS STEP)

SECURE COVER WITH 2 HEX HEAD SCREWS.



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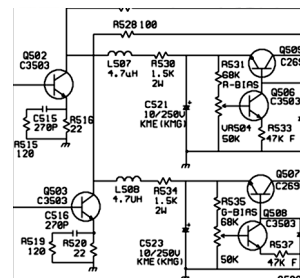
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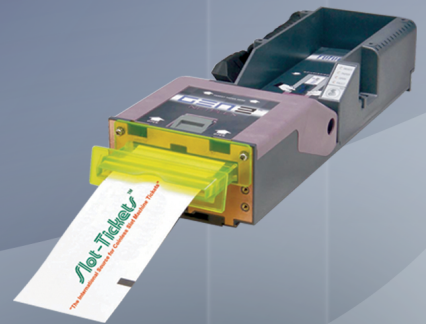
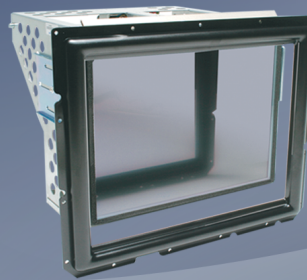
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