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Slot Tech Editorial

Hello to the 3000 of you that picked up this magazine at the Global Gaming Expo. That's how many copies of Slot Tech Magazine are slated for distribution at the show, anyway. We didn't do anything special for this "show" issue. It's really pretty typical of what Slot Tech Magazines brings to our readers each month. It's sort of a mix of new products, service updates, slot systems and slot repair, the raison d'être of Slot Tech Magazine. We are dedicated to techni-

cal education and training for slot machine technicians, from the novice floor tech to the experienced bench tech who is looking to pick up on a few new techniques.

Some of those experienced and talented slot techs are our contributing writers. Our technical articles are penned by working technicians and engineers in the gaming industry. Some work in casinos from across the globe. Others work for slot machine manufacturers or the makers of peripheral devices such as bill validators, ticket printers, coin validators and monitors. Readers are guaranteed to stay informed with accurate technical information.

Does your casino suffer from embarrassing Progressive creep? You've seen it before. Due to some combination of incrementation rates, patron bet patterns, and/or base value settings, a lower-level meter creeps upwards until it gets higher than the value of the meter just above it. If a lower progressive jackpot rarely hits while a higher level hits often, eventually the lower level will surpass its neighbor. This month, Atronic's Michael Brennan presents us with APL2™, the Top Innovation. It's a neat solution to creepy progressives and it begins on page six.



Regular readers of this magazine know that when Ted Befus blesses Slot Tech Magazine with an article, he always tells us exactly what the problem is, exactly what needs to be done to correct the problem and exactly how to do it. This month, Mr. Befus shows us exactly how to use an oscilloscope to examine the signal quality of the slot lines in Bally's SDS system. The article begins exactly on page 12.

There is much more, of course, including chapter two of Jason Czito's series on the OASIS system, a look at Kingbright's fabulously fabulous Chameleon RGB LED array (dazzling!) and perennial favorite Pat Porath with his "Quick & Simple Repairs" now in its 18th iteration.

Enjoy the Expo. See you at the casino.

Randy Fromm

Randy Fromm's Slot Tech Magazine

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You are no doubt familiar with the sight of King Kong climbing up the Empire State Building, whether you've seen the classic movie, the newer Peter Jackson film, or neither. The image of a giant gorilla scaling a landmark building is familiar, and it serves as a nice framing device for this article.

The theme of climbing is central to Atronic's newest innovation, unveiled in a new slot machine involving King Kong. This innovation prevents progressive meters from climbing too high, lest they be shot down not by hovering planes but by casino patrons unnerved by meter overrun.

Atronic's King Kong Cash™ will be revealed at G2E this year, and with it upgraded software featuring progressive meters that will never overrun.

APL2™ and King Kong Cash™

By Michael Brennan

With this development, the days of a lower meter creeping past its upper neighbor are over. No matter what led to this scenario, meter overrun is an unfortunate occurrence associated with multi-level progressives that can create an ugly scenario. This is resolved in King Kong Cash™ (and subsequent themed progressives) via APL2™, which is described later.

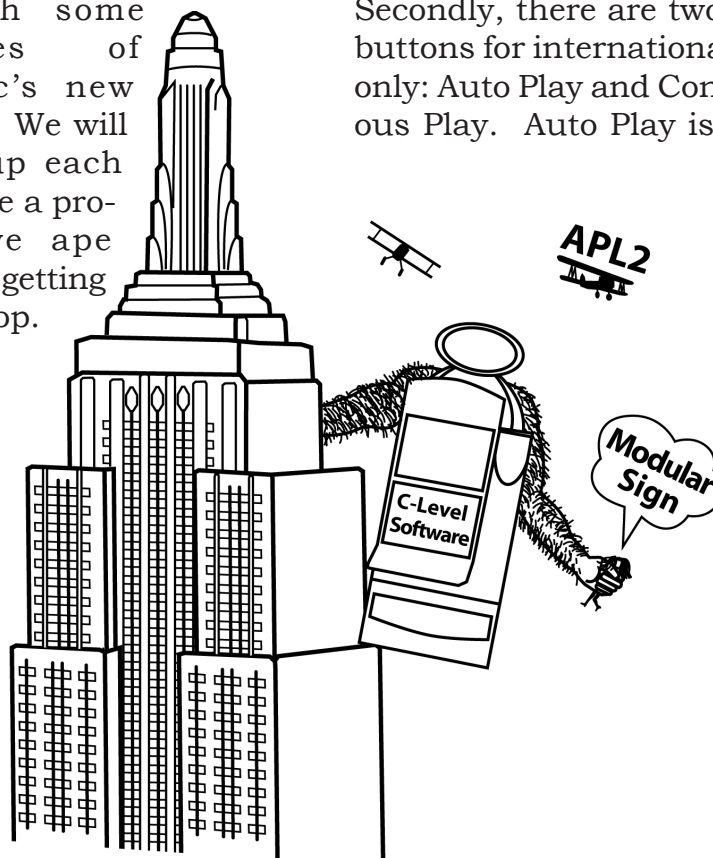
So, with a blonde token grasped firmly in one hairy hand, we begin our climb through some features of Atronic's new games. We will scale up each level like a progressive ape bent on getting to the top.

LEVEL 1: Stepping Up the Software

Before the climb, at the base of the game is the building block of any game, the base software.

King Kong Cash™ is one of the first Atronic games to showcase "C-Level" software, which is full of new features. First, Atronic's old curved video reels (that blurred during each spin) have been replaced by sleeker, cleaner flat reels.

Secondly, there are two new buttons for international use only: Auto Play and Continuous Play. Auto Play is acti-



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vated by a player when he/she has credits on a machine. When the player selects Auto Play, an actual bet is placed and repeated for as long as there are enough credits on the game. Pressing any other button on the game will disengage this feature. Think of it as cruise control for your slot machine.

Continuous Play is achieved by holding down a credit button after the number of lines is selected. Here, the machine will play the specified bet for as long as the player holds down the button. It's like holding your finger on an organ key. It emits a sound for as long as you hold it down. Again, these capabilities are not currently allowed in the US market.

Lastly, C-Level games implement certain industry demands, like more SAS functionality and multi-denomination capabilities. These features give the machine a solid foothold.

LEVEL 2: The Lofty Modular Sign

Merchandising builds upon the game itself. In fact, physically perched upon a group of machines is Atronic's modular sign, the next stop on our theoretical climb of building innovation.

Modular, in this case, means that each specific game theme utilizes the same forty-two inch plasma monitors, skeletal frame, sign pc, and mounting holes accentuated

by detachable hardware pieces.

Distinct accents called "addon cans" are affixed to the frame, making each bank stand out. Plasma monitors broadcast tailored video loops. Customized hardware like wing cans, top cans, star tubes, capitols, metal finishes, colors and overall artwork make each theme stand out, all while using the same mounting footprint.

The idea of the modular sign takes into account consistency and strives to incorporate a lofty philosophy of reuse and recycle. We aim to recycle ninety percent of sign merchandising, while scrapping only ten percent.

Most large signs are cumbersome to install and remove. Atronic's modular sign and its components were designed to be set up by two people in around four hours. This reduces installation time and makes future conversions easier.

LEVEL 3: APL2™, the Top Innovation

The top level of our ascent is Atronic's biggest innovation revealed at the Global Gaming Expo: APL2™.

APL™, or Atronic Progressive Link, allowed a bank of games to be linked together without an external controller. APL2™ builds upon this premise and adds an industry first: progressive meters that will never overrun in a

multi-level progressive application.

You've seen it before: Due to some combination of incrementation rates, patron bet patterns, and/or base value settings, a lower-level meter creeps upwards until it gets higher than the value of the meter just above it. If a lower progressive jackpot rarely hits while a higher level hits often, eventually the lower level will surpass its neighbor.

This creates an uncomfortable situation where the customer would actually prefer to earn less credits in a bonus round in order to win a lower progressive, since it is paying out more money. Why? Because of meter overrun.

And it's not easy to hide this progressive level anomaly. Usually, meter overrun is projected on a big shiny brass sign, announcing to all within range, "We have exceeded the critical mass of a meter, things are upside down. We have a meter overrun."

APL2™ eliminates this problem by creating dynamic, intuitive meters. A meter is not allowed to surpass the base value of the progressive meter above it. Furthermore, a meter's current value plus its hidden jackpot value are not allowed to surpass the base value of the next meter.

If an overrun scenario does occur, the increment percentage of the lower meter



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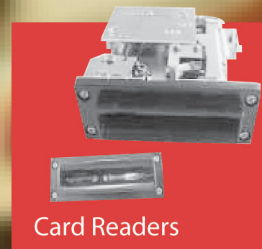
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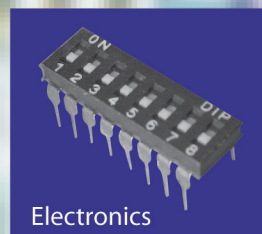
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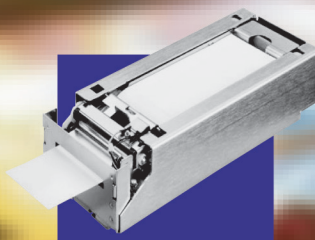
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that is approaching overrun is allocated to the increment percentage of the lowest possible level that has not yet reached its limit. This leaves the lower, fast-climbing meter with a "dynamic" increment rate that comes close to zero.

For example, let's say level 1 (the lowest progressive amount) of a game starts at \$100 (its base value), but has not been won in a while. So, level 1 reaches \$198, nearing the base value of the meter directly above it, \$200.

If the level 2 jackpot were to hit, there would be a problem. But with APL2™, level 1 will dynamically slow its incrementation when it reaches \$200. Its "usual" incrementation is then added to the lowest available "non-overrunning" meter, which would be level 2. What results is a slowly-ticking first level and a fast-scrolling second level.

APL2™ software uses a split table to calculate all the possibilities and divides the incrementing values appropriately. There are all sorts of tables, formulas and algorithms used, but, basically, when a meter gets too high, it significantly slows down until it is hit.

If all progressive levels reach their maximum limits (which are the base values of the next-highest meter), funds are sent to an overpaid meter. The maximum limit of the top

meter is defined when you configure the jackpot.

APL2™ can be used in applications with as many as eight progressive levels, but will be mainly used in Atronic games that are four or five level progressives.

Additionally, data detailing all the splits and increment transfers are available in the Service Menu. Specific statistics include the credits wagered during the split, the increment percentage for each level, the money paid into each level, overpaid

meter statistics, and more.

Overall, APL2™ increases communication between the master game and its slaves, and curbs potentially overtaking meters. This innovation, in conjunction with merchandising and a new software level, aims to avoid King Kong's plummet and keep performance for future Atronic games high.

- **Michael Brennan**
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Slot Tech Feature Article

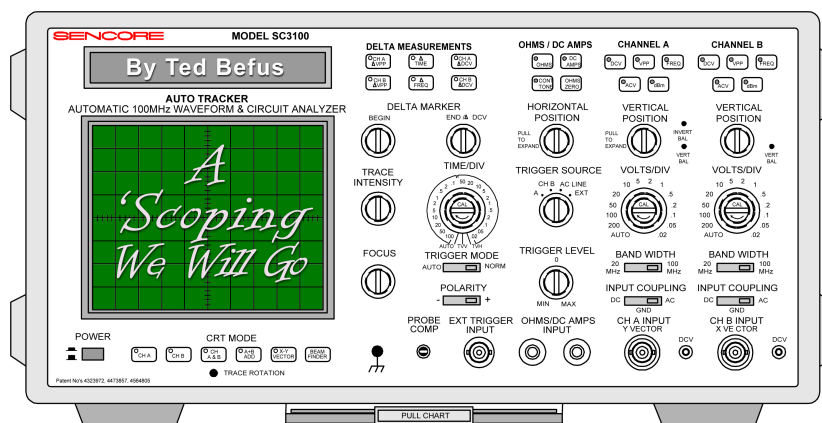


Ok, all of you that have a slot system that you're responsible for raise your hand. Ok, hands down. Those of you who REGULARLY 'scope slot lines raise your hand. If your hand is raised you can pass this article by. Just kidding, don't you dare pass this article by! That would hurt my feelings.

We're going to discuss, you guessed it, 'scoping slot lines.

Why is it important to check the quality of your slot lines? How often should you check your slot line signal quality? What do you do if the quality of your signal is degraded or noisy?

The importance should be obvious. You need to make certain that your communication lines are working effectively (this becomes very important if you're running TITO games). We check lines every few months, although we constantly monitor our



reports looking for weird instances that may have us 'scoping lines looking for problems. You need to know what to look for as far as correct signal is concerned and how to troubleshoot those problems.

Before we installed our new system, the idea of 'scoping slot lines never crossed our minds. We weren't using shielded cables or taking any kind of precautions towards

line noise. It never occurred to us that a lot of the strange meter corruptions that our old system had could have been related to line noise. Knowing what we know now, it makes sense. Had we known this (or at least researched it) earlier, we probably could have saved some troubles.

I'm going to concern myself with the Bally SDS system because if you've been read-

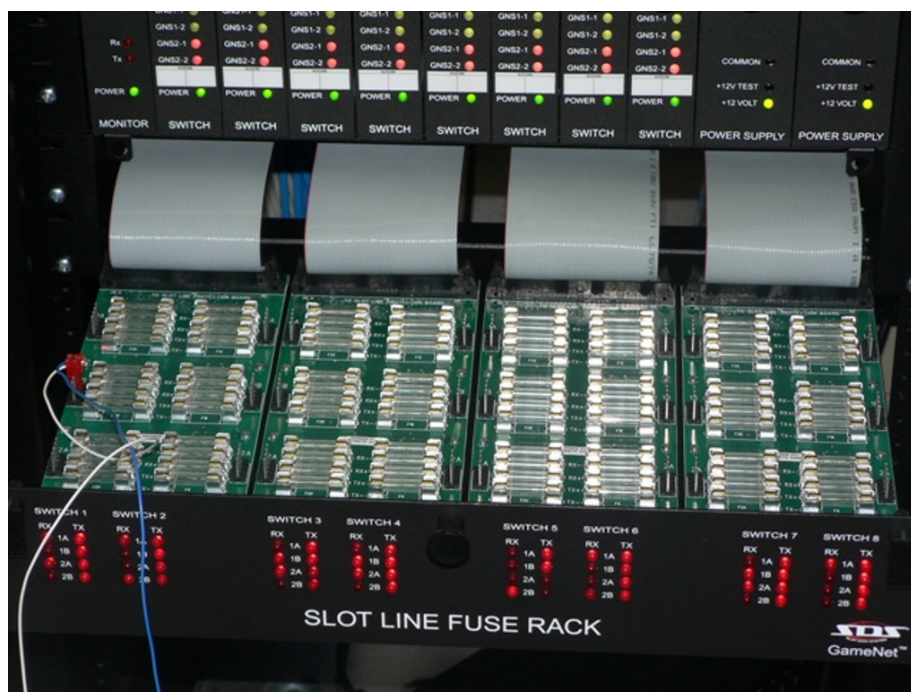


Figure 1 - Each line going out to the slot floor has its transmit and receive lines fused to protect the Gamenet Server from accidents that may occur on the slot lines.

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ing this magazine for the last few months you must know that is the system we have.

We aren't responsible for the entire system. We are only responsible for the fuserack and cabling heading out to our slot floor. For those of you who aren't familiar with SDS and may be wondering what exactly a fuserack is, I'll fill you in. Each line going out to the slot floor has its transmit and receive lines fused to protect the Gamenet Server from accidents that may occur on the slot lines. For a good look at the fuserack, see figure #1. All slot lines enter the rear of the fuserack and are run through the fuses and sent out to the GNS (GameNet Server). See figure #2. On the left hand side of the rear of the fuserack, there is a grounding wire that is connected to a Telco Grounding busbar. This ensures that all our cables are properly grounded (assuming that the drain wire or shield aren't damaged).

Also located on the fuserack is a 4 pin AMP header for each physical line. This is where we will do the first slot line check of our process. From here we can check the signal quality of the GNS Tx signal (going out to the GMU). We can also view the GMU Tx line quality as it is sent down our slot lines as it enters the GNS.

To connect to the 4 pin header, we'll take a two pin connector and punch two wires in for our scope to con-

nect to (if you look closely at figure #1 you'll see the two pin header attached to one of the fuserack headers).

The header uses pins 1 and 2 for the GNS Tx+ and Tx-. Pins 3 and 4 are for the GMU Tx+ and Tx- (depending on how you look at the connector, the header is not polarized).

One thing worthy of mentioning and that is very important is this: Since SDS (or a lot of slot systems for that matter) is using RS485 you CANNOT use a grounded scope. RS485 is a balanced line. Plugging in a grounded device can cause an imbalance and can possibly damage your system. To be safe, plug your scope into an isolation transformer.

I quickly check each line's GNS Tx line for cleanliness, making sure that the signal

out of the GNS is clean. If your fuserack is properly grounded, this signal should always be clean. We'll check this signal again at the end of each slot line to see if it's degraded or noisy.

Our second check is to check the GMU Tx lines coming into the GNS. This check will be at the fuserack also. From here we will check each line for cleanliness, making notes on which lines are noisy or lacking in signal amplitude (the signal for the GNS Tx should be approximately 7 to 8 Vpp, while the GMU Tx can be approximately 6 to 7.5 Vpp). See figure #3a for an example of the GNS Tx signal and figure #3b for an example of the GMU Tx signal.

Troubled lines will be checked at the beginning of each slot bank where our homerun is connected. The primary troubleshooting

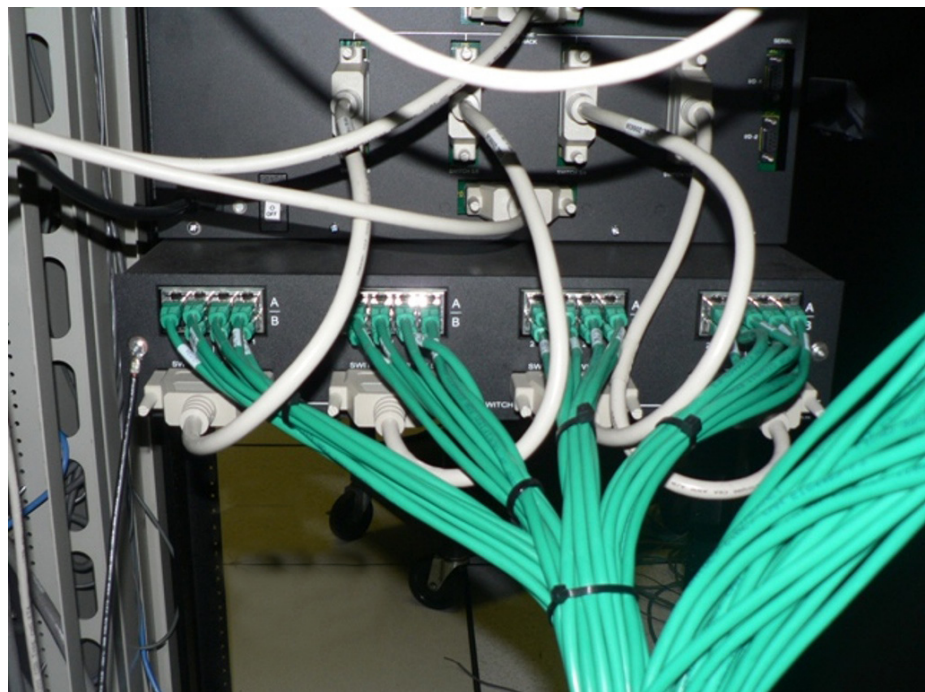


Figure 2 - All slot lines enter the rear of the fuserack and are run through the fuses and sent out to the GNS (GameNet Server).

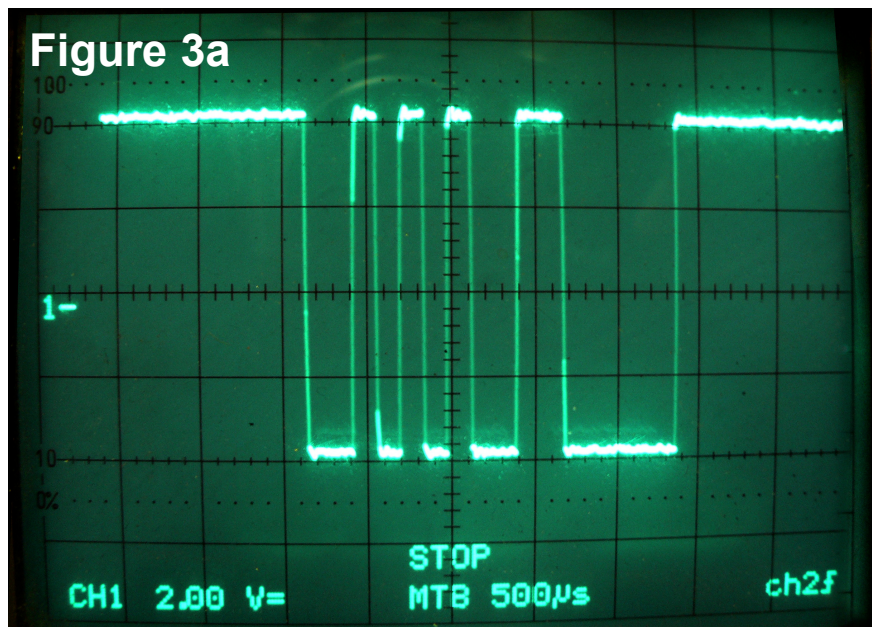


Figure 3a - An example of the GNS Tx signal

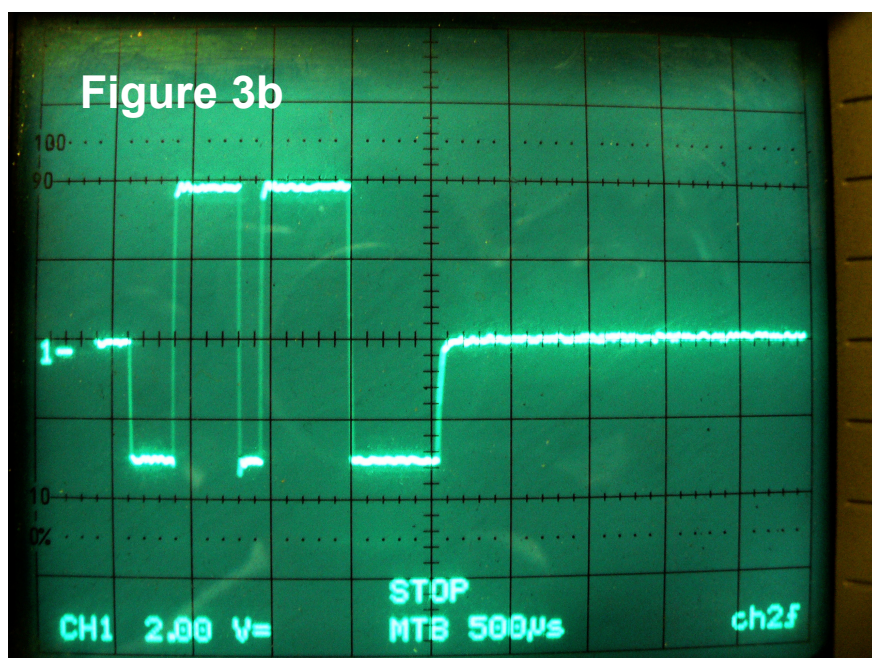


Figure 3b - An example of the GMU Tx signal.

technique we use is termed bracketing, meaning that we will separate the slot line approximately in the middle (or close to it) looking for improvement in signal quality.

Let's use figure #4 as an example. Here we have homerun line #1A. By checking the signal quality at the GNS, we know that there is noise being generated on the slot line heading back to the system. We're going to go to our floor wiring map (did I mention that you need a precise map of where your cables go?) and we're going to locate where line 1A begins and what is linked to it. We see by our floor map that we have four banks on this particular line. We're going to look for the half way point and separate the second half of the bank.

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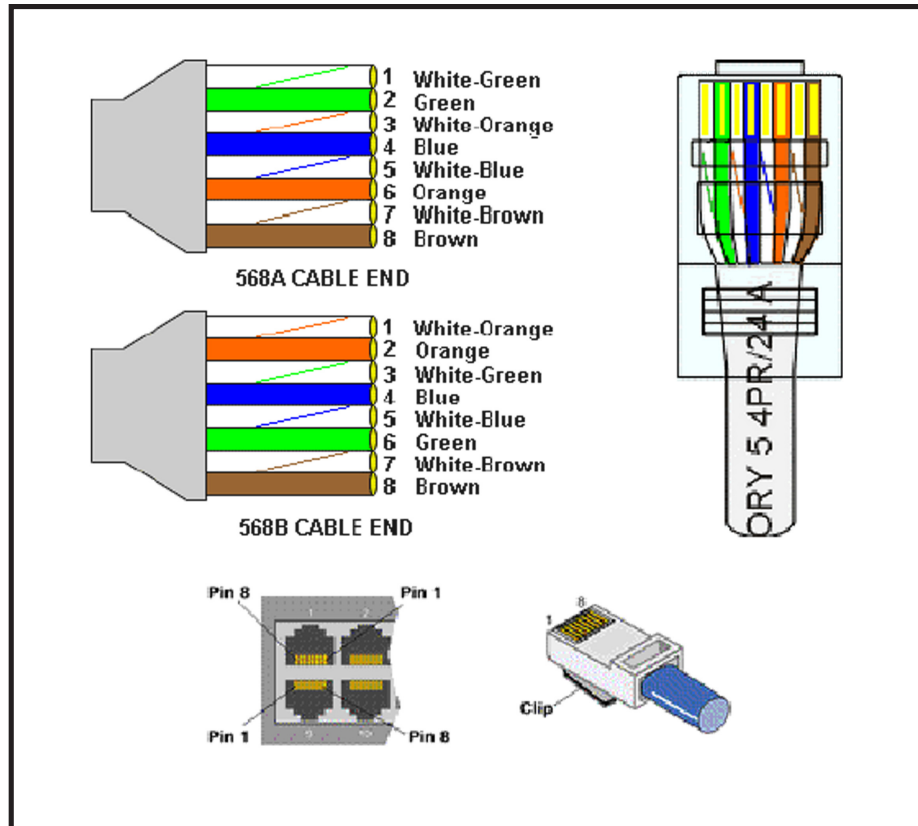
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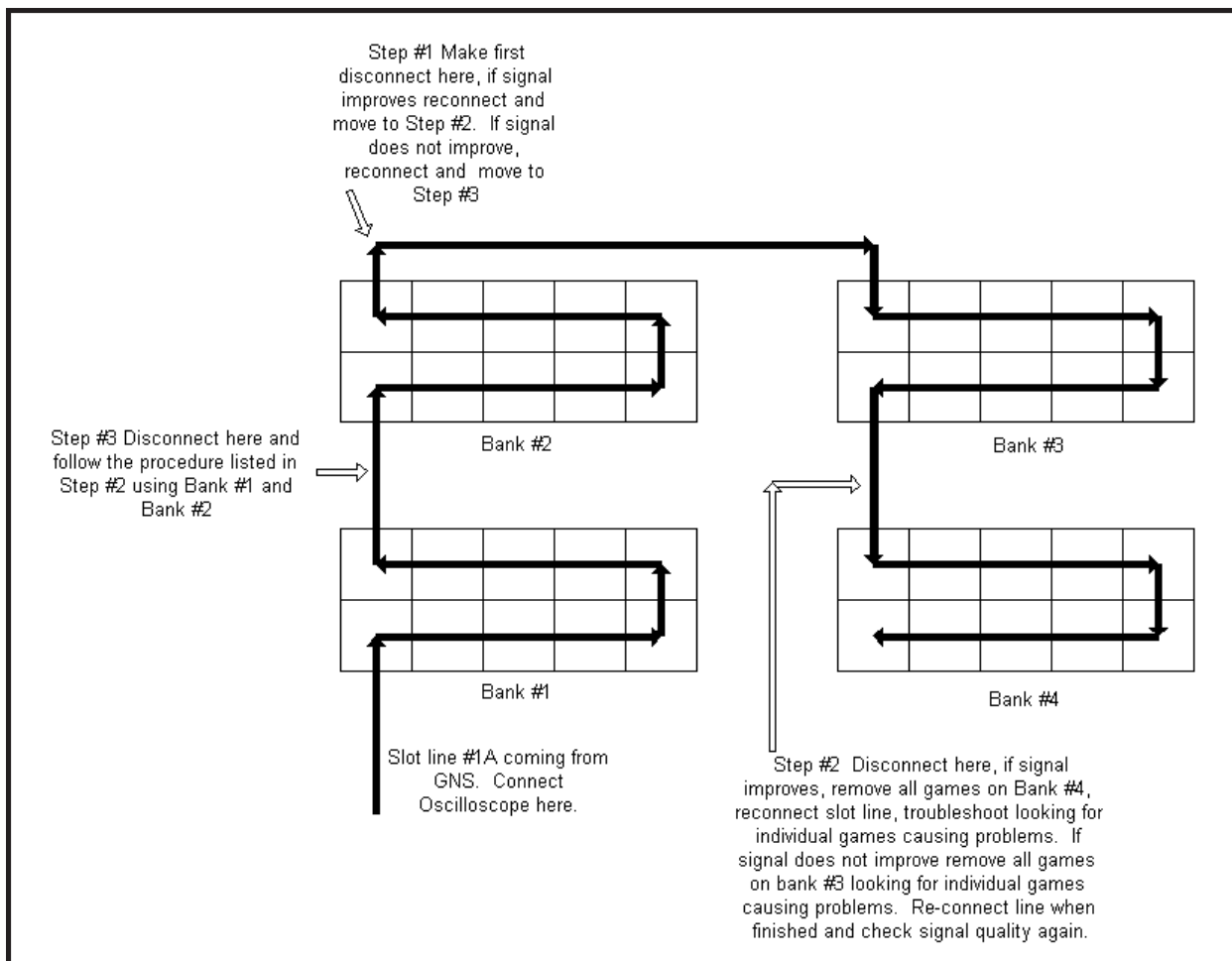
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We're going to connect at the first available feedthrough board in Bank #1. To do this, you'll need a spare RJ45 cable with one end cut off. Strip the casing back exposing the 8 wires. SDS is a Full Duplex system (meaning that the GMU and the GNS DO NOT have to share the same transmission lines). If you're using the Cat5E patch cables supplied by Bally, the wires for the GMU Tx+ and Tx- are Blue and Blue/White. The GNS Tx+ and Tx- are Orange and Orange/White. The white wire is always Tx-/Rx. Once your scope is isolated, connect the ground lead to this wire and your scope to the solid color wire.



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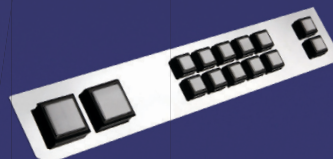
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for Telecommunications Industry Association). If you're not sure if your cable is built to TIA standards, look at Figure #5. It shows the pair configuration and standard color codes for Cat5E and Cat6 cables. If your colors don't match, just remember that GMU Tx is pair #1, GNS Tx is pair #2.

Does the signal improve? If it does, you now know that the problem lies in the last two banks on this line. Now we can reconnect the first break we made and disconnect between the middle of the last 2 banks. If the signal is still clean, the problem lies in bank #4. If it remains noisy, the problem is in bank #3.

If the signal from the first disconnect doesn't improve, we have a problem in the first

two banks. Use the same procedure, only disconnect between bank #1 and bank #2 looking for improvement.

But what do we do if our signal is clean at the start of the homerun? It was noisy at the GNS wasn't it? One possibility is that the homerun is damaged. Grab your cable tester, disconnect both ends of the homerun and hook your cable tester to it (hopefully your cable tester can check continuity of the shield or drain wire also). If you don't have a cable tester, you've got a couple of options. First, hopefully you have a redundancy line that you can use in case the first line fails. We had two cables pulled for each home run, just in case one fails. You can always connect your spare line and check again. If you don't have a redundancy line,

you'd better hope your IT guys have a cable tester or you'll most likely be calling an electrician to check it out for you.

Hopefully this will help those of you who have wanted to check your lines but weren't aware of where to check or what to look for. If you don't have SDS, you can still apply what you've learned here to your system. You will need to check with the manufacturer of your system for the appropriate signal amplitudes to look for. As far as noise goes, noise is pretty discernible. Refer back to the July 2006 edition of Slot Tech magazine for some examples of what line noise may look like.

- **Ted Befus**
tbefus@slot-techs.com



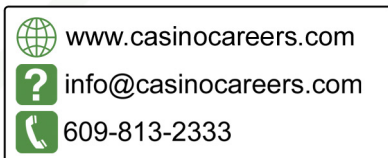
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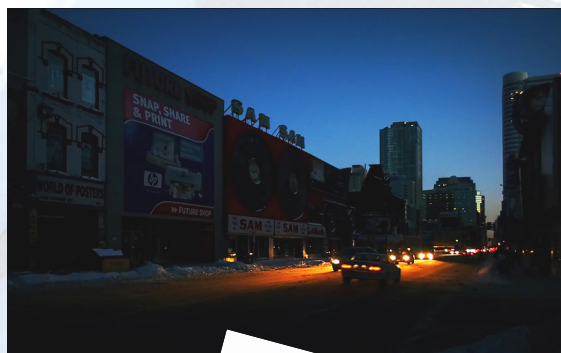
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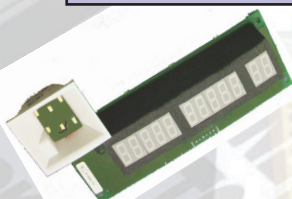
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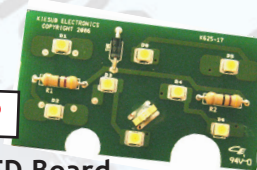
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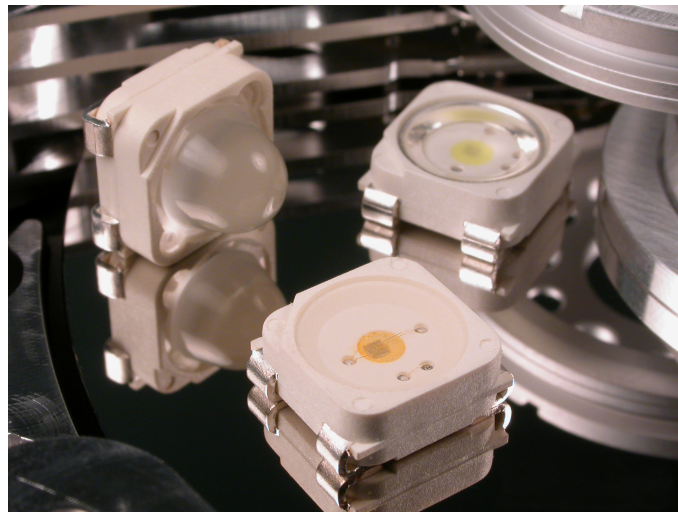
Slot Tech Magazine

Page 19

Kingbright LEDs Make Slot Machines Shine

Manufacturers of Full-Spectrum LED Arrays

By Randy Fromm



Just as there are hundreds, perhaps thousands of different hobbies and interests for people around the world, the world of electronics has its own points of interest for enthusiasts. For me, electric illumination has always held a special place. As a kid, I had fun wiring my entire bedroom with a series string of 40 flashlight bulbs that I had found discarded behind an industrial complex. I laboriously soldered them all together and tucked them away behind my bedroom furniture, giving my entire room a futuristic glow (futuristic for 1962, that is). In junior high school “electric shop” (as we called it back then) I made a Neon lamp flash by building a relaxation oscillator. In high school, it was fluorescent lamps and Tesla Coils. I have visited museums dedicated to Thomas Edison (inventor of the incandescent

electric light, in case you’ve forgotten) in New Jersey and Florida as well as the Philips Lamp Museum in Eindhoven, Netherlands. It’s really fascinating to see how electric lamps were made in the past and how they’re manufactured today.

Of course, incandescent lamps (especially miniature incandescent lamps) with their glowing, white-hot Tungsten filaments are a thing of the past, destined to take their place in history next to the steam engine and the typewriter. Today’s miniature lamp of choice is the solid-state lamp, namely the

Light Emitting Diode or LED. Although its practical invention occurred in 1962, it took a decade of research and development for LEDs to reach into the visible spectrum and another thirty years to achieve the “Holy Grail” of blue and, finally, white light that is sufficiently powerful to be useful for general purpose illumination and not just as indicator lights.

Today’s LEDs offer a dazzling array of output spectra, including those capable of spectral modulation that runs the gamut of visible light. In a word, “pretty.”



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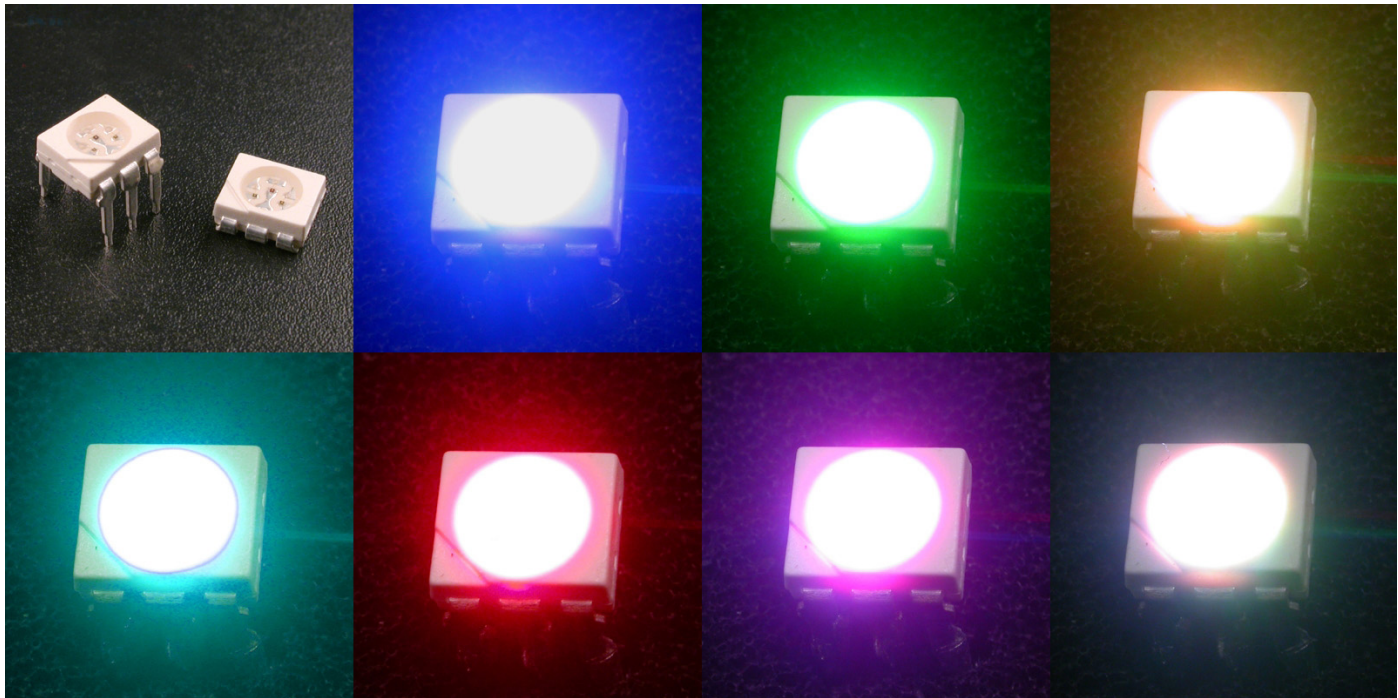
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The Chameleon RGB Full Color LEDs contain three, ultra bright LED chips (RGB) within one package, producing various colors in the visible spectrum such as red (621nm), green (525nm) and blue (470nm).

The gaming industry is no stranger to bright lights. When slot machine manufacturers discovered the new white LEDs, some of them went absolutely nuts, ringing their machines with a phalanx of scintillating white LEDs that, while noticeable from across the casino, were painful to look at. Today, the engineers at the OEMs are more subtle, designing machines like Atronic's e-motion cabinet that uses a combination of computer-controlled, colored LEDs behind diffusers to provide colorful effects that are esthetically pleasing.

What was once an engineering challenge is now a walk in the park thanks to the latest in LED designs that just knock your socks off in terms of versatility, output spectra and brilliance. For a look at what's inside these luminescent miracles of modern technology, Slot Tech Magazine

turns to Asia and Kingbright Corporation.

Founded in 1980, Kingbright Corporation is a leading component manufacturer of LED Lamps, SMD Lamps, SMD Displays, RGB Full Color LEDs, High Brightness XPower LEDs, Blue & White LEDs, and other LED related

products with various color selections including pink, purple, and a color the company refers to as "Blue Lagoon" (CIE: $x=0.20$ & $y=0.40$). With over 25 years of LED expertise, Kingbright is a well-recognized industrial powerhouse in the international LED market. In addition to its Taipei headquarter-

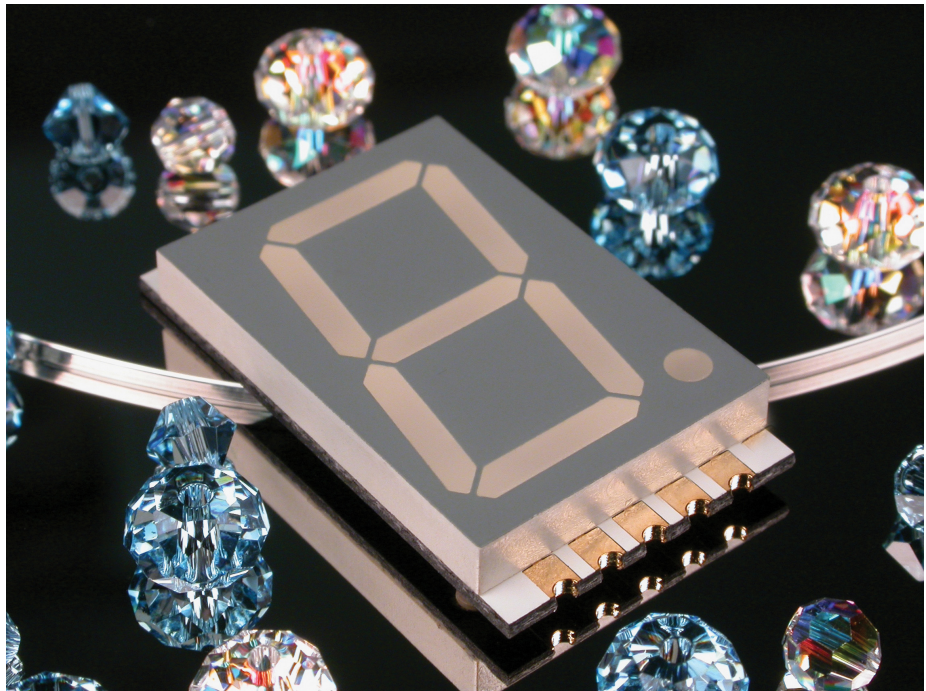


ters, Kingbright has worldwide branches in Japan, Hong Kong, Malaysia, China, Korea, France, Germany, and the United States. The company operates four manufacturing plants in Shenzhen, China, all accredited with TS 16949, ISO 9001, ISO 14001 certification and produces more than 300 million SMD Lamps, 200 million through-hole LED Lamps, and 10 million LED displays every month. Whew! That's a lot of LEDs!

Chameleon RGB Full Color LEDs

Kingbright produces some of the industry's most efficient and cost-effective RGB Full Color LEDs. These LEDs offer the ultimate solution for engineers and designers in slot machine applications such as illuminated toppers, buttons, coin trays, display bezels and general illumination.

The state-of-the-art design contains three, ultra bright LED chips (RGB) within one package, producing various colors in the visible spectrum such as red (621nm), green (525nm) and blue (470nm) with a wide viewing angle of 100 degrees and operating current as high as 150mA. Naturally, the output of each LED can be modulated to produce any color, including white. Engineers can achieve the full color spectrum by monitoring the driving current of each individual LED die. Available in 6-pin Dip and surface mount, the de-



Kingbright ultra-thin SMD display - Diamonds not included

vice is specially designed for automatic pick-and-place mounting process to increase productivity while reducing assembly cost.

Ultra-Thin SMD Displays

In addition to LEDs for general illumination and as indicators, reel slots often use alphanumeric displays as well. With space at a premium inside a slot machine, Kingbright has developed ultra-thin SMD Displays with the robust reliability required by the gaming industry. In fact, the company has developed an ultra-thin display with a 0.8" character height that's just as 0.12" (3mm) thin! This remarkable characteristic enhances design flexibility and readout clarity for engineers and designers in various gaming applications.

The company offers an exten-

sive selection of SMD Displays including sizes in 0.2", 0.3", 0.4", 0.56", 0.8" and colors such as blue (470nm), green (570nm), red (635nm), yellow (590nm), and orange (601nm).

This item is also available as a single/dual digit as well as alphanumeric. The SMD Display's automation-friendly tape and reel package and robust design reduce assembly cost and eliminate product deterioration during harsh assembly environment.

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Ticket Problems on an IGT S2000

We ran into an interesting problem with a new bank of machines that were installed recently. The problem was that the games would not accept tickets. With the vast majority of the gaming floor ticket in ticket out, games must accept tickets. So, what was the deal? During the test procedure, the bill acceptor was working A-OK. No problems there. Could it be a communication problem with the tracking system? It's possible. We as technicians know just about anything is possible. EVERYTHING was checked. I mean everything. The game option "coinless mode" was set to "enabled" and the CDS Sentinel was working just fine. The system recognized that the games indeed were communicating just fine as they properly registered coin in, bills in, and such. So, what was going on with this bank of machines? I even made sure the ticket printers were upgraded. It was a

Quick & Simple Repairs #18

By Pat Porath

FutureLogic (also known as a Gen 1) that had version 2.1.0 that had been upgraded to version 6.1.1. However, the printer wasn't the problem either.

Finally, a plan of attack came about. We ran into the same problem some months back with a bank of dollar games that wouldn't accept tickets. The game option "coinless mode" can be either enabled or disabled. It sounds simple, right? Logic tells us that if a slot machine does not have a hopper, and does not accept coins, the option would be set at "coinless mode enabled." It may be interpreted as "no coins ok." NOT in this case. For some oddball reason, on this specific bank of S2000s, the game option "coinless mode" had to be set at "disabled." One game was optioned this way and it accepted a ticket right away, so the rest were optioned this way and they now run great.

S2000 Reel Tilts? This May be the Cure

If you have some S2000 games that have periodic reel tilts, check the mounting bracket (part number 19600101). If it is very close

to the reels, it may be causing the tilt. It makes sense. If the bracket is too close, it may touch the reels and we know how sensitive the reels are. This is part of the slot machine's anti-cheating system. If anything interferes with the reel, the software sees it as an attempt to manipulate the machine through external influence and declares a reel tilt.

The cure is to replace the mounting bracket. If the number on it is 19600101, replace it with the "updated" bracket. The part number is 19660001. If the bracket has part number 19600100, simply replace it with part number 19660001. I have seen this problem a couple of times on the S2000 five reel games, where the fourth or fifth reel would tilt once in a while. Reset the game and a while later, it would tilt again. By looking into the reel glass, you can see if the vacuum fluorescent display assembly is very close to the reels. If you do have periodic reel tilts, this may be the cure.

Another thing to check is to see if the reel basket (The part the reel strip goes on) is cracked at all. I have seen a

couple of these crack in the center of the basket, especially if it is a nudge game (where the reel steps one symbol toward the pay line). The reel motors themselves are pretty rare to go. They are very durable.

**More Funny Stories
from the Gaming Floor
*The Skunk Lady***

Working on the gaming floor, after a few years, there are many situations that will arise. I have 12 years in the slot department and for me this was a first. Living in the Midwest all of my life, skunk critters are not uncommon at all. They have a very distinct odor when they spray their scent. I noticed a slight odor while walking the gaming floor and thought maybe one had been near the building but this was actually a customer! A slot attendant asked if I noticed it, and oh yes I had. While talking to a different co-worker I asked if she had run into the Skunk Lady. With a startled reply she asked "That is a customer?" Yes, it is. I'm sure it will be talked about in the employee dining area for a while.

Summit Gaming

Have you ever heard of a slot machine manufacturer called Summit? This company recently celebrated its tenth anniversary. Summit gaming derived from Dynamo Ltd. out of Texas and set up shop in Billings, Montana. Believe it or not they started with a

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total of only four guys! Currently there are 17,264 gaming devices in Montana, and Summit built 5355 of them. That equals close to 30%. Pretty good numbers, I would say. The standard games include Jacks or Better, Joker Poker, and Classic Keno. Other cool games include Lucky Bonus Keno and Treasure 7s, which includes a bonus round of two free plays. The Hot Flush game sends a customer to one of seven bonus rounds when one hits a flush.

Some of the spare parts and part numbers are:

S-RAM Card

part # 45-SRAM

VLC COMM board

part # 45-SMO333

Main logic board

part # 45-ZXE-486

D.C. power supply

part # 46-980036

Power harness, Com board

part # 60-SM0338

Printer chassis harness

part # 60-980028

Their newest game is called Megaplex. It was three years in development. It has an upper and lower large LCD. The upright model is SG-3000 and the slant top is model SDG-4000. We know how customers love dual LCDs, they have great graphics, and they can be interactive.

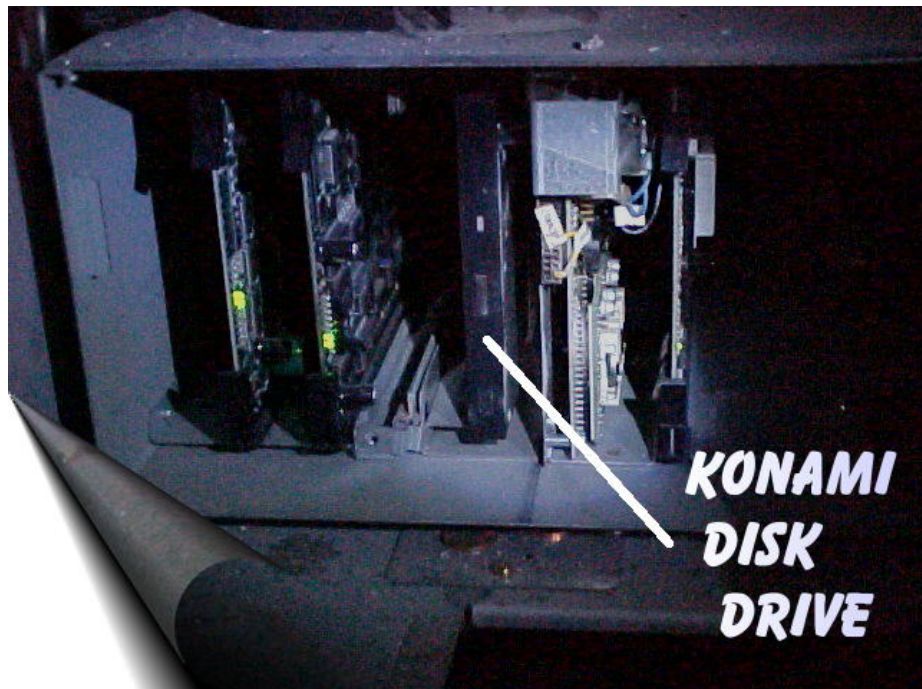
We have a total of eight Summit games and they run very well. I don't think it has quite been a year and there have only been minor problems: A printer paper

jam or a touch screen lockup. That is about it. Simply remove the paper jam or reboot the game if the screen locks up. They are pretty cool games. More information can be found on their website at www.summitgaming.com

Atronic - System Down

This specific game was a "Cash Fever" video slot. A "System Down" message was on the screen. Was it our CDS tracking system, was it the game itself, or was it the link between the game and the "Cash Fever" system? I was hoping luck was on my side but it wasn't. A simple key reset didn't do the trick. The game was also rebooted as it was possible that one little thing locked it up. No dice there either.

Time to see definitely what WAS working. Once the game came back from the reboot, it took a minute for the progressive meters to catch up to the rest of the games (individual meters on each game). This told me that that the progressive aspect more than likely was working. No "door open" signal on the CDS display? Hmm this could be the problem. The main door was closed and reopened, and the display hadn't changed. The game was not talking to the tracking system. The Sentinel was rebooted but that didn't fix the problem either. I looked at the Sentinel interface connections and they looked okay. The back plane board connections appeared to be okay too. Everything looks snug and in place. Looking at the Sentinel once again, I



During the bonus round a Konami game gets its information from a CD. On upright games, it is located in the top box area and on slant top games, it is in the bottom of the game.

found that the interface cable from the game to the board wasn't snug. The board was powered down and the cable was unplugged and put back in place. Power was applied and the main door was closed and reopened. Bingo! The door now showed open and closed, which means that the game and the tracking system are now communicating. The game was back online.

Konami CD Error

During the bonus round a Konami game gets its information from a CD. On upright games, it is located in the top box area and on slant top games, it is in the bottom of the game. This happened to be a slant top game and under the hopper is the logic door. This is where you'll find the main

board, the CD driver and the communication boards. Simply press the eject button and it pops right out. As soon as I turned the disk over, the problem was right in front of me. One of the most common problems that occur in the slot machine industry is dust and dirt. They cause printer problems, cooling fan problems, hopper optic problems, and so on. This was the case here too. The disk was really dusty. It was cleaned, wiping from the middle outward, put back in the game and it worked fine. If that hadn't worked, a disk drive cleaner would have been used. In a nutshell, it is a disk with two tiny brushes on it that clean off the laser lens while it spins. The game finished the bonus round and the customer was happy.

CDS Promotional Cash Problems

At the casino where I work, we have the CDS tracking system. We used to have "Quick Silver" slot machines, which only accepted promotional quarter tokens. These games would accept only the quarter token but all of the coin-in would go to the drop; the hopper would pay out real quarters. As an example, a customer would ride in on a bus and receive \$20.00 in "Quick Silver" coins.

It was somewhat of a pain though. Towards the end, we only had twenty machines that were used for this and of course customers would try the token in regular games. The coins would sometimes jam up the game



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and needed to be cleared by a slot attendant. If a few coins would happen to get into an escalator type hopper, it would jam up every time.

Now "Promo Cash" is used. A customer comes in on a bus or accumulates a certain amount of points on their player card and they receive Promo Cash. This "money" can be downloaded on numerous machines and the customers can play. The manufacturers include IGT, Bally, and Aristocrat. To the best of my knowledge, WMS is working on the software and it should be out soon. A customer receives Promo Cash credit on their player card when they come in and select a machine with a green sticker on it that says "Promo Cash Accepted." The customer then inserts their card, presses the enter button and punches in their specific four digit PIN. Then they select the number 2 to go to the game, number 1 for promo then the amount they would like to put on that game. The least amount that can be put in is one dollar. All that is left is to press the buttons to download the promo, such as only the number 5, and "enter" to download \$5. If the customer selects the number 5 and two zeros, it will come up as \$500. When the enter button is pressed, the credits go right onto the credit meter.

Once an amount has been downloaded, the promotional credits HAVE TO be played off. Customers CANNOT cash out promo money. They can definitely cash out any and all winnings but not the promo credits. For example, a customer downloads \$1 into a nickel game, which is 20 credits. They win 50 credits with a bet of three, the 50 credits will be paid in a ticket or coin and there will be 17 credits remaining after the cash out.

Once in a while there will be a situation where a customer will say they cannot cash out their credits and that it must be a button problem. We always ask if they recently downloaded any promo cash and 99% of the time, the game is actually fine. There isn't a cash-out button problem at all.

Where does the slot tech play into this? The answer is in the system and game promo cash failure codes. This is when a game is supposed to accept promo and it doesn't. One rule of thumb is that the game HAS to be in a total idle state. The game and the system cannot see any open doors, any soft or hard tilts and the machine cannot be in the middle of a game. The game and the system also must have communication. If there are communication problems, an error will arise

such as "feature unavailable" on the CDS display. Another failure that is displayed is "account locked." This means that the customer has entered in their PIN incorrectly three times. They would then have to go to the players club and get their PIN reset. The following error codes give an idea where to look for problems when a customer can't download promo cash. The ones that are "S" codes pertain to system. The codes that have to do with the game are the "G" codes.

- G-02 door open (such as a belly door switch)
- G-03 transfer limit too low
- G-04 transfer limit too high
- G-05 SAS problem (game communication)
- G-06 credit switch
- G-07 tilt condition
- G-08 SAS problem
- G-09 game in progress
- G-10 SAS problem
- G-11 also a SAS problem
- G-12 disabled by SAS
- G-13 game is out of service
- G-14 busy SAS problem
- G-22 a time out problem (reboot the Sentinel)
- G-23 a Bart problem (game may be in system incorrectly)
- S-22 a time out problem
- S-23 a denomination error

- Pat Porath
pporath@slot-techs.com

Slot Tech Feature Article

The Other Side of the Slot Tech World

The Office Girls By Melissa Grzyb & Penny Rounce

We would like to introduce ourselves – Penny and Melissa, the office girls. We are behind the scenes, but work closely with all the slot technicians at the Island Resort & Casino. Whenever anything happens on the gaming floor, whether it is installs, conversions, chip changes, whatever it may be, we try our hardest to keep communication going. Now, all you slot techs out there, you have to remember there are other departments that need information from you. It is very important that we (the office girls) get the correct information so we can relay it correctly to the other departments. It has come to a point that whenever there is an install, something is bound to go wrong.

Initially, when we know machines are arriving, we coordinate with our slot director to find out where he would like the games to be placed on the floor. After that, all the fun begins. Memos are sent out to the various departments and we fill out machine forms that are then sent to accounting. Location tags for the games are made up. These tags consist of the machine's house number and location on our gaming floor. Once the tags are on the games, the slot techs can take the machines and set them on the floor according to the location on the tag.

Now, that sounds pretty easy doesn't it? Unfortunately, it never goes that smoothly! We

November 2006

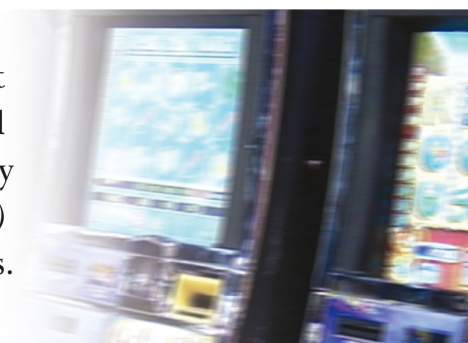
will get a call from a tech early to mid-afternoon saying, "Don't be mad at me, but I put the games in the wrong spot." This means now we have to notify all the departments that this move affects



Penny Rounce

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(Seven to be exact). A new memo has to be sent out listing the machines and the new locations. A new location tag has to be made for every game and all the paperwork for the machine file needs to be changed! This all takes a lot of time.

One time (and we have to laugh now) the technicians were not paying attention. We had to move games for carpeting and we installed a bank of new games at the same time in the same section. We received a call early afternoon one day to come out to the floor. When they were putting the games back on the floor, they missed a bank! When they realized it, they already had two or three banks set up – in the wrong spot. So we had four banks of machines that required new location numbers and DPU numbers. That was fun explaining to accounting!

Now, we don't want you to think we don't appreciate our slot techs; these are just instances that we all have to deal with. When all the frustration is over, we can laugh about it. Our techs are a great bunch of guys and gals. They truly work very hard and put in a lot of overtime when needed. As mentioned before, sometimes communication lacks. They must hear in their sleep, "Don't forget the paperwork!" We are always on their case for documentation of just about everything they do. Once in a while (especially when they are really busy) we do let them slide a bit. But, just a little bit. You know the old saying, "Give em' an inch and

they'll take mile." We can't let that happen now. It would be pure chaos! As a technician their, main frame of mind is to get the machine up and running. Don't get me wrong, that is the right frame of mind but they just need to add something to that. Get the machine up and running and do paperwork at the same time! Because after all, the office girls are here for a reason and that is to do our job.

We have an expansion on the horizon. Even though Melissa hasn't had the privilege of being here through an expansion, I have. Trust me (Penny) it was much more than paperwork. I was out there moving machines (not the really tall ones), setting bases in place, drilling bases, running wire and just about everything else I could help with. The techs were pulling double shifts. They did a wonderful job! Needless to say, the paperwork went on

the wayside a little but still needed to be completed at some point. We will have to see what the future has in store for us in the new building!

So, next time you hear, "Where is my paperwork?" don't complain too much. It is just part of the job. It has to be done for all the accountability. Remember it is just the office girls doing their job by the standards set by a higher authority. Whether it is the Gaming Commission, MICS, or even a higher authority! This ensures all the other departments such as Gaming Commission, Audit Revenue, Surveillance and many more departments have the correct information to do their jobs.

(We had Pat Porath, one of our wonderful slot techs, proofread this for us to make sure we weren't too harsh.)

- Penny Rounce
penny@chipincasino.com



Melissa Grzyb

Epic 850 Printer Top-of Form Sensor Calibration

By Russ Wigé



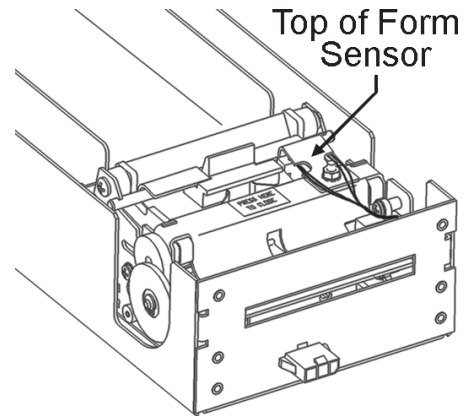
About TOF Sensor & Ticket Alignment Mark

The Top-of-Form (TOF) sensor is used to detect the black mark on the ticket to properly align the start position of each ticket.

Due to variations in ticket media and sensor degradation, the TOF sensor and its electronics were designed so that the sensor could be calibrated to compensate for

these variations by biasing the sensor's LED in 8 brightness levels from 0 (dim) through 7 (brightest).

When the 850 printers are manufactured, they are factory calibrated using what we consider to be the most average ticket media available and should work with any ticket media that is designed within the ticket specifications. Testing has shown that sensors that calibrate to a 7 (brightest) can be affected by both heat and light and should be replaced.



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TOF Sensor Calibration Issues

A properly calibrated TOF sensor can easily distinguish the difference between the white surface and the black alignment mark on the ticket.

A sensor that is biased too bright might not be able to see the black mark because it will appear washed out causing ticket alignment issues when loading tickets. An extra ticket or more may feed out or possibly printer jam errors will occur if, after the cashout ticket is dispensed, the next ticket fails to align properly.

A sensor calibrated too dim might make the white surface appear dark gray, causing the printer to misinterpret the white surface as the black mark at any random position. This can cause a single cashout to dispense two tickets with portions of the information printed on each.

There are three methods available to calibrate the TOF sensor; swapping firmware birthmarks, using a TOF calibration chip and using the TOF calibration utility. This article will focus primarily on the first two calibration methods.

About Firmware-Based TOF Calibration Routine & Birthmark Numbers

All 850 printer firmware released has a TOF sensor calibration routine in it that runs at power-up if the printer detects that its firmware has changed birthmarks (a number that is unique to a given range of firmware versions). Different birthmarks are most commonly encountered when switching between the firmware used by different slot manufacturers.

This has proven to cause confusion in a casino environment, as when a bad printer is swapped out of a game the tendency is to transfer the original chip to the good printer that might have had a chip with another birthmark in it when it was last powered up.

For the calibration to be successful with this routine, a ticket must be pre-inserted into the print-head so that the sensor is referencing white prior to powering on the printer. Failure to do so can make a known good printer bad due to miscalibration. To trigger the routine again if you forgot to inset a ticket requires reversing the process two times i.e. swap firmware birthmark A to B and power on, then swap firmware birthmark B to A and power on with a ticket pre-inserted.

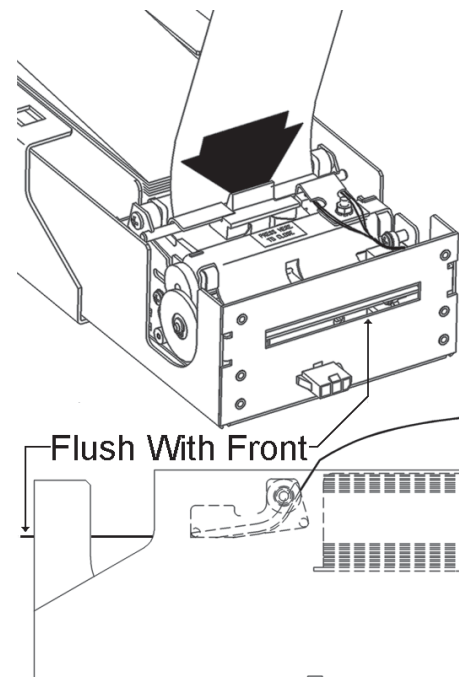
Calibrating this way can be cumbersome and is the least accurate calibration method.



Unable to see black dot



Detected gray as black dot



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Using the PP8921 TOF Calibration Chip

To make the TOF sensor calibration easier in a casino environment TransAct developed a calibration chip (PP8921) with an improved calibration algorithm and compatibility with all birthmarks. This chip is meant to be temporarily installed in the printer for the purpose of calibrating the TOF sensor and bench testing a printer.

Serial Number:	QA00xxxxxx
Initial Calibration	= 7
New Calibration	= 2
White Level	= 00.21
Black Level	= 05.01
Printer Passes	

1. Power off
2. Remove original firmware chip
3. Install PP8921 Top-of-Form calibration chip
4. Power on
5. Load tickets as normal Note: It may not be possible to load tickets if the calibration is too far out of adjustment. If this is the case, open the cover/platen assembly, manually load the tickets so the leading edge of the ticket is flush with the front of the printer, then close the cover/platen assembly.
6. Hold FEED button until you hear a beep (3sec)
7. The calibration routine will advance the ticket 1/2" and start sampling
8. When done, two tickets should dispense
9. Verify that the second ticket a. Passed the calibration b. Reports a new calibration number between 0 and 6. If the new calibration number is 7 the TOF sensor should be replaced.
10. You can repeat steps 6 through 9 as many times as you like Note: the numbers may oscillate slightly i.e. 2-3-3-2-3 but should not have a larger range such as 2-4-2-6 if the sensor is working properly.
11. Power down
12. Install original firmware
13. Power on
14. Load paper
15. Test by printing test ticket from game

Unlike the standard printer firmware, the calibration chip (PP8921) will not alter the birthmark number stored in NVRAM. It is recommended that the original firmware be placed back in the printer to avoid re-triggering the calibration routine once the TOF sensor has been calibrated. This firmware also includes our Generic communication protocol that is compatible with our software utilities for bench testing printers. To insure that this firmware won't function in a game, the baud rate has been changed from 9600bps to 19,200bps.

As an alternate method of calibrating the TOF sensor, TransAct has developed a software utility that is equivalent to the calibration chip. Note, all printer software utilities require additional hardware for powering, connecting and communicating with the printer.

Remember these techniques when swapping firmware or troubleshooting your printers and you should see reliable results every time.

- Russ Wigé

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By JasonCzito

Chapter 2 - User Interface

Users interact with the Sentinel through devices attached to the slot machines. Most modern slot machines that expect to have some sort of player tracking system installed in them have a dedicated bay for the necessary components. On older machines that don't have this bay, there are bolt-on interface housings that attach to the side of the machine. Bar top machines and player tracking kiosks may use the calculator style housing.

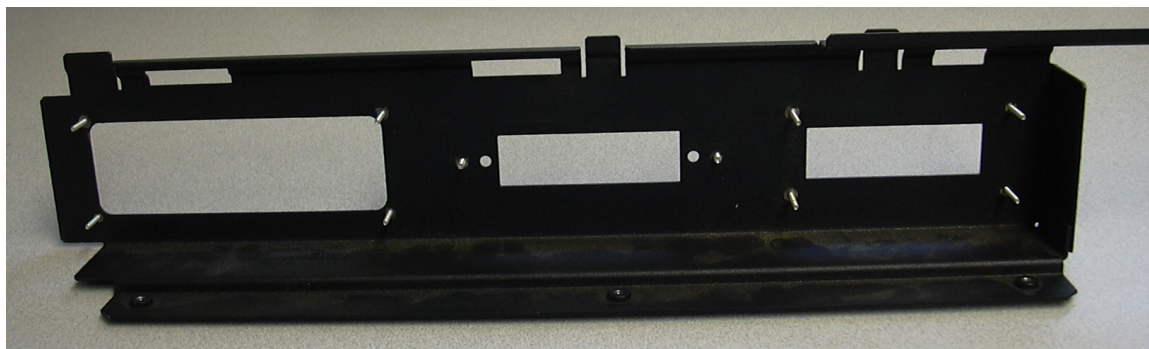
“Bolt On”



“Calculator”



Users interface with the system by way of three devices: a keypad, a card reader, and a display. For the dedicated player tracking bay, there are typically three parts: a bracket for mounting the interface devices, a face plate to cover the bracket, and a Lexan overlay for aesthetic purposes. Some slot machine manufacturers and types will have a single bracket that doesn't use a face plate or Lexan overlay (i.e., WMS games or slant tops).



This is a typical bracket. The openings are where the interface devices poke through and the mounting bolts are visible. Brackets are bolted to the machine chassis.



This is the face plate for the bracket above. This particular one has a nice finish and does not necessarily need the Lexan overlay. (The number is our own house sticker). Face plates snap into place over the brackets and are typically secured by the slot machine door (which will close over a lip on the bottom of the face plate).



The Lexan overlay is basically a fancy sticker that goes over the face plate. They are primarily decorative, as a casino can have custom overlays made with their logo on them, and they keep the look of the slot machines uniform. Some brackets require extra hardware to mount the interface devices, like these...



Some brackets don't have bolts that match the hole-pattern on the keypads. This bar is used to hold the keypad in place.

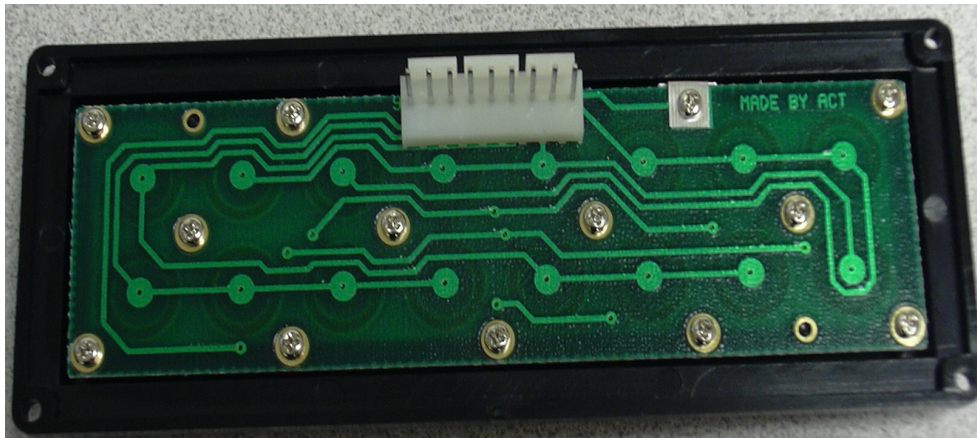


Card readers don't have mounting holes built into them so they will all need a bracket to mount them. This is the most common bracket for mounting the card readers.



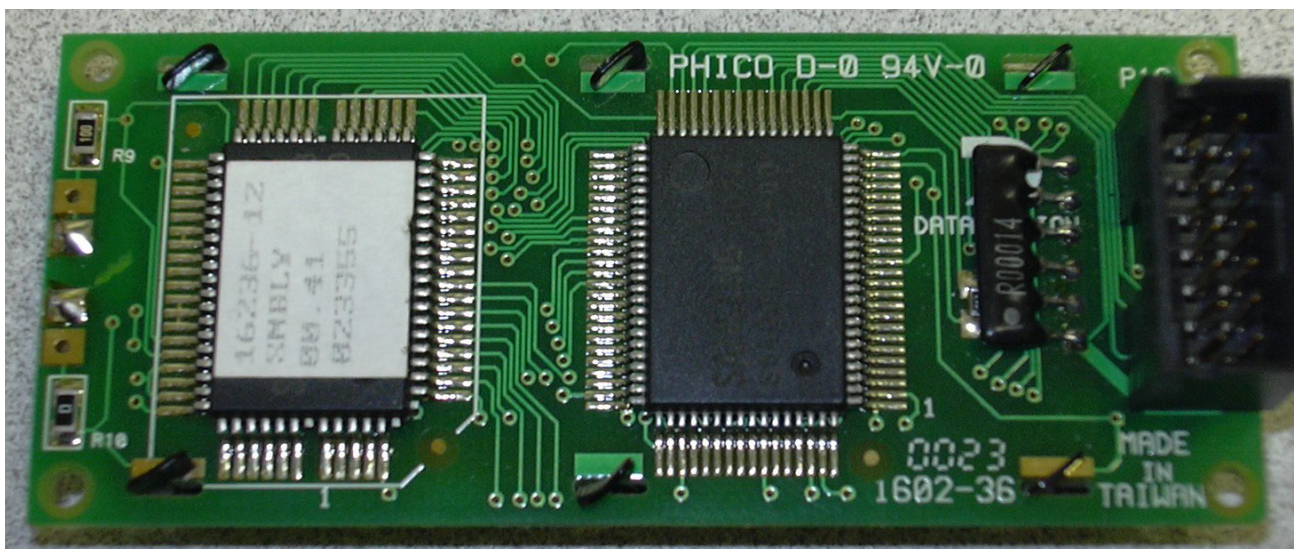
Brackets that come with a hole punched out for a VFD require an insert (in black here) that allows the smaller LCD display to be held in place.

The Keypad



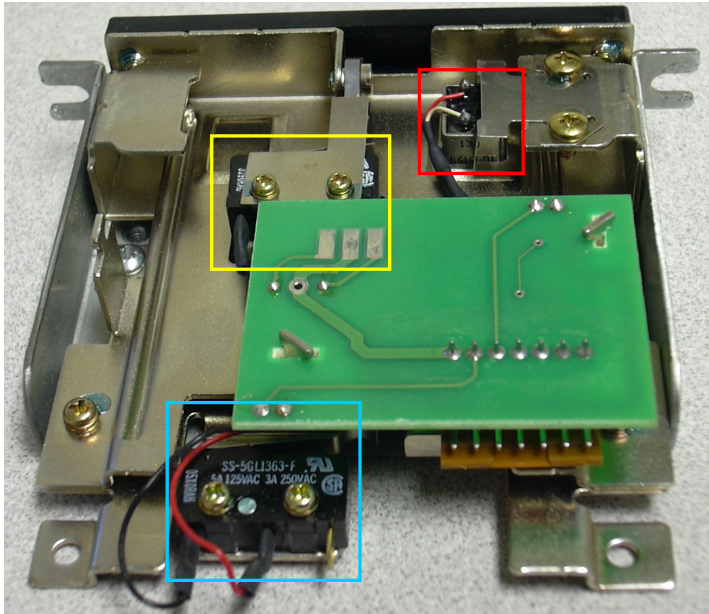
This is the back of the 2X16 keypad (there is also a square 4X4 “Calculator” style keypad.) The cable connects to the only connector on the back.

The Display



This is the back of the display. It's a 2X16 LCD (as opposed to some larger VFD displays available). Like the keypad, there is only one connector for the cable. When you are installing these, you can tell which way is right side up by the lettering on the back, or by remembering that the plug is located on the right side of the display when looking at the back.

The Card Reader



The card reader also has only one place for the cable to connect. The card reader has two switches and a sensor head. The sensor head (in the red rectangle) reads the information on the magnetic strip. The switch in the blue rectangle tells the card reader that the card is fully inserted. The switch in the yellow rectangle tells the card reader that a card has been inserted in the reader, and enables the magnetic sensor. Damage to the switch in the yellow will typically not cause any problems, but damage to the switch in the blue rectangle will cause the card reader to malfunction. It is also possible for enough dirt to build up on the sensor head to prevent cards from being read. It can be removed from the back of the card reader and cleaned off.

There are three kinds of cards that CDS may use: Magnetic Track 1, Magnetic Track 2, and Optical. Newer card readers compatible with the system are built slightly differently, but still have the two switches and head.

- Jason Czito
jczito@slot-techs.com

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IGT Games - Logic Board

Okay, let's start with the IGT, GAME KING or I-game logic board. I read in a recent issue of Slot Tech Magazine of a "coin-in jam, meter disconnected" error that wouldn't clear. The problem was in the logic board. This error is actually common, at least here at Sycuan Casino. This happens when an I/O board shakes loose and is reconnected while the game is turned on. After you have done your troubleshooting (isolating

When I/O Goes Bad

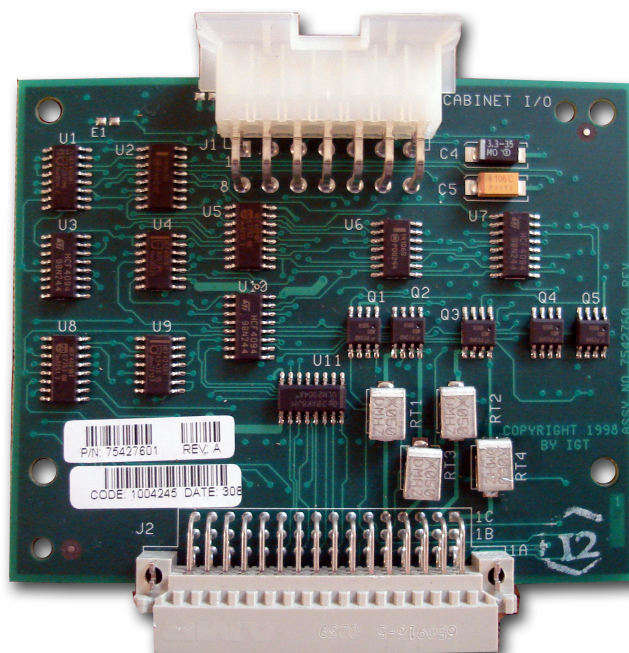
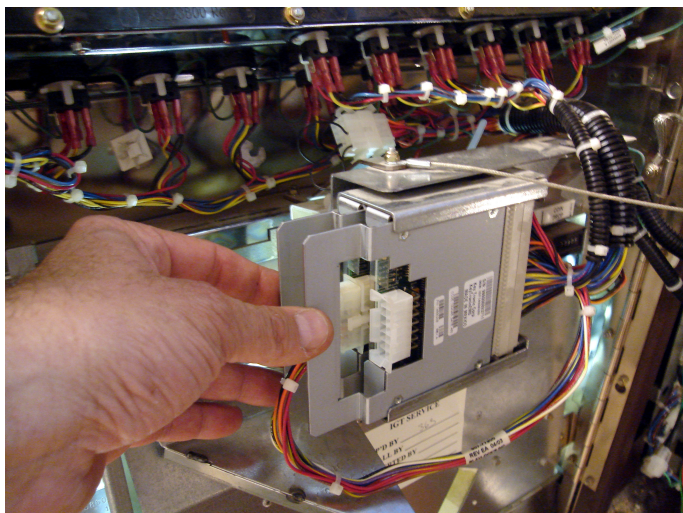
By Jesus Garcia

I/O Boards

the problem down to the board) look closely at chip, U74 on the logic board (located in the upper right hand next to the multimedia sockets). Normally, when it fails it will get so hot that it comes apart or it develops some bumps or marks on top of the chip. We use QUICK CHIP to remove the chip. It only takes a couple of minutes and it is very easy and clean to do this. Next we replace it with IC part number MM74C240WM. This is a common integrated circuit so it shouldn't be hard to find. This will fix your coin-in jams most of the time.

This problem is also a fast fix. Let's work on the I/O board that is located on the door. It will be I/O board P/N 75427802. It should be the same as the outside I/O in the cabinet. We often get "meter disconnected" errors on these and normally it's chip U7. If your bottom button panel isn't working and it's the same I/O, try changing U6. This will work most of the time. Same goes for coin-in jam.

I have seen people send boards out for these two easy problems. They are very fast fixes.

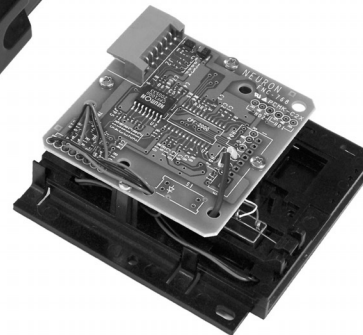
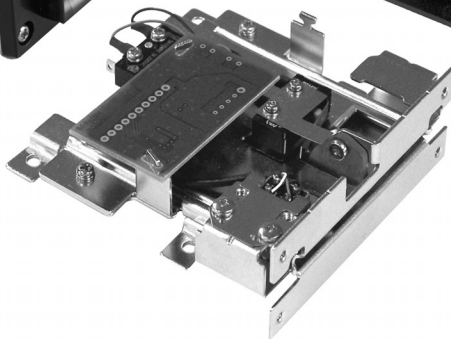
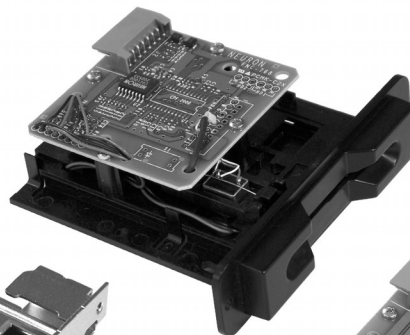
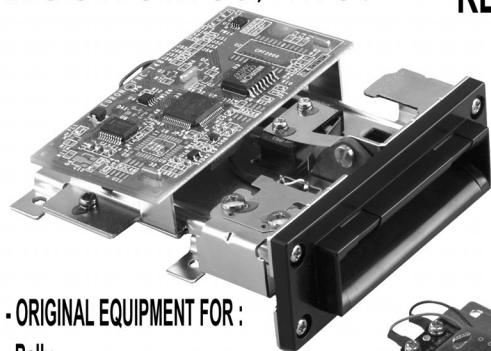


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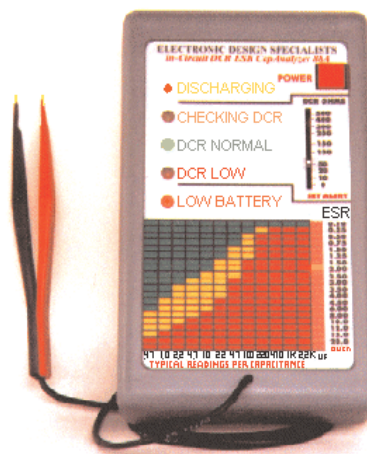
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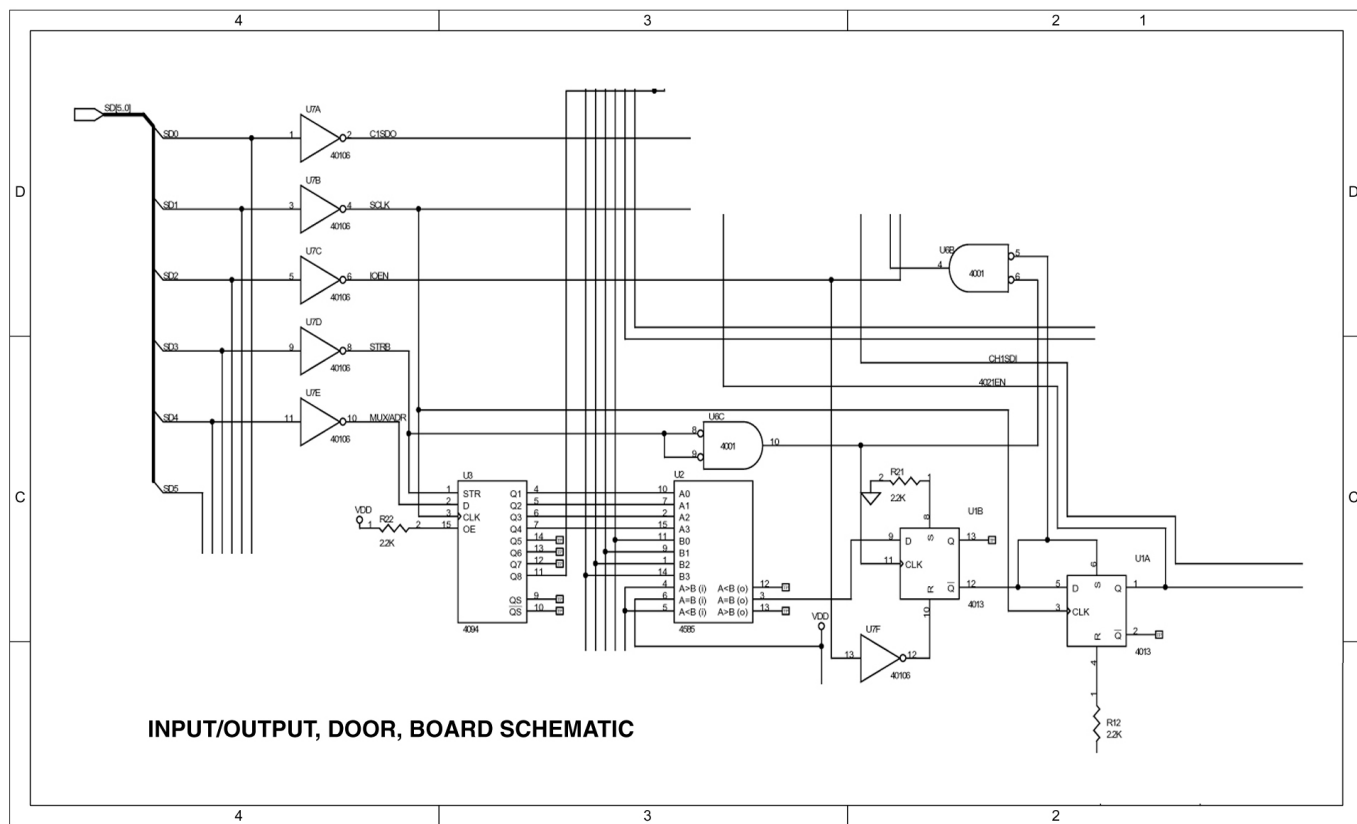
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Little wonder that U7 blows in the door I/O circuit. It's the input! Inputs and outputs are the most common failures in all types of electronics and this board has 'em both!

FutureLogic Printer Daughter Board

This fix is for the FutureLogic (Seiko) Netplex printer used in some of the IGT games, mostly the older ones like I-game and Game King. I have fixes for the RS232 daughter board used in the Bally and other games but that's for next time. These two boards look the same but one has dip switches and the other doesn't. We are going to be working with the Netplex daughter board; the one with no dip switches.

After you inspect your

printer for the common problems and determine that your daughter board is the culprit, remove it from the chassis. Next, plug your tester back in, like you were running the printer test again. Don't forget to block the optic on the daughter board with tape or something. Next, you will run your Netplex program. Once it starts, check to see if it has found the printer. If it says "no printer load in-active" put your finger on top of IC4 located on the daughter board. It is probably really HOT. If it is, you have found the problem. Usually this

chip goes first. Eight out of ten times it will. Now just remove IC4, once again using QUICK CHIP. Replace it with an HC125. These chips are easy to find and inexpensive. Once you are finished, run another test and the first thing you will see is that now the daughter board finds your printer. Let it finish downloading your files and that's it, ready for the floor. This is a very common problem that's easy and quick to fix. It should be a five minute fix once you get good at it.



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Be prepared for six hours of accelerated learning each day. Class begins at 9:00 am sharp each day and continues until 4:00 pm. The Casino School provides each student with reference materials and troubleshooting guides that will be valuable aids for repairing equipment on location and in the shop.

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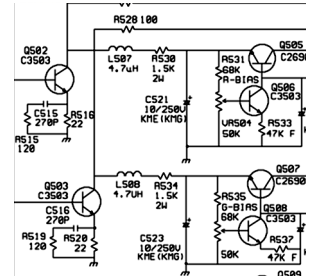
This relatively inexpensive piece of test equipment is easy to operate. Casino School students learn to use the digital multimeter to perform tests and measurements that will pinpoint the cause of a failure down to a single component.

ELECTRONIC COMPONENTS

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

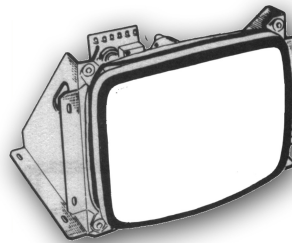
SCHEMATIC DIAGRAMS

Schematic diagrams are the "blueprints" for electronics. Learning to read schematics is easy once you know how the parts work!



POWER SUPPLIES

Power supply failure is a common complaint in many different types of systems. Power supply failures are discussed during the class, along with shortcuts for troubleshooting and repairing them.



MONITOR REPAIR

The monitors used in video slots are designed for quick, easy, and safe repair. Students will learn the theory of operation of all types of monitors and how to repair monitors down to the component level. Of course, monitor safety will also be discussed.

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Beware of Breaking Traces

Another error that happens occasionally is when a technician uses a staple remover to remove a socketed IC from the board and by accident, digs in too hard and scratches the traces under the chip. Most of the time it's under the base or game chips. When you power up the game you will see scrambled graphics. After you power the game down and remove the game chips, look closely under the chips for a scratched trace.

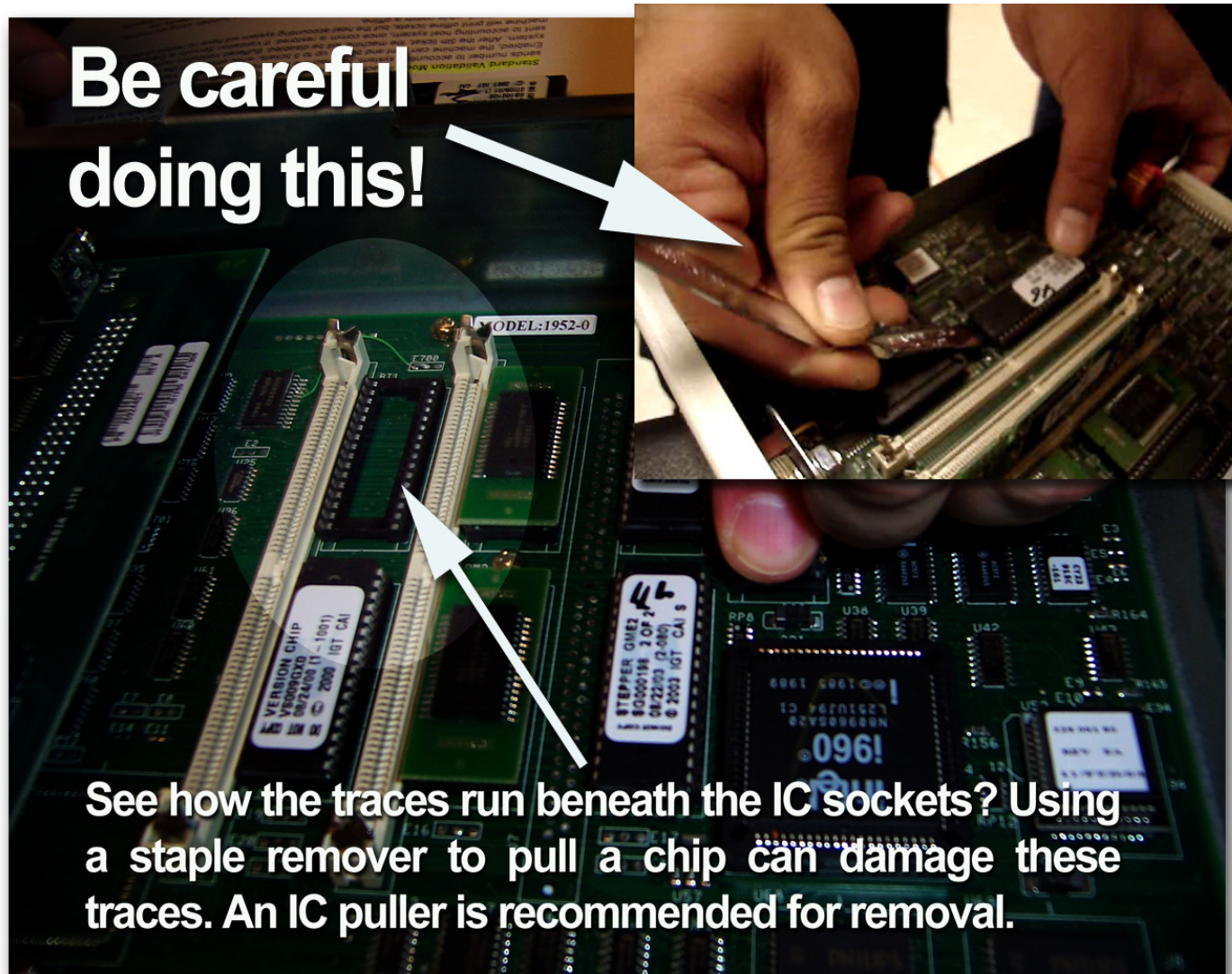
To repair the broken traces, you will need to remove the chip socket that has the broken traces under it. Then remove the solder mask (the green coating that prevents solder from stick-

ing in places it shouldn't during the manufacturing process) from the trace or the solder will not bond to the new circuit track. Carefully, use an Exacto Knife to scrape away the green coating. We have a circuit track repair kit; it has many different trace sizes. We just scratch the green off, tin our new track and that's it.

Ok man, that's it for today. Hopefully this is helpful.

Jesus Garcia
Sycuan Casino
Bench Tech Supervisor

Editor's note: Yeah, Man! Thank you, Jesus (that's hay-SOOS for all you Anglos out there).





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ProMax

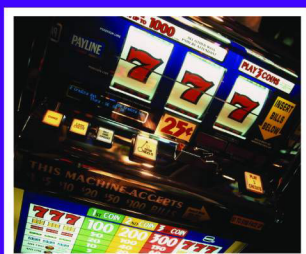
Concurrent Programming System

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- Gang Program Mode allows programmers up to 8 units as concurrent programming system. (START ALL key enable to program the programmers simultaneously)
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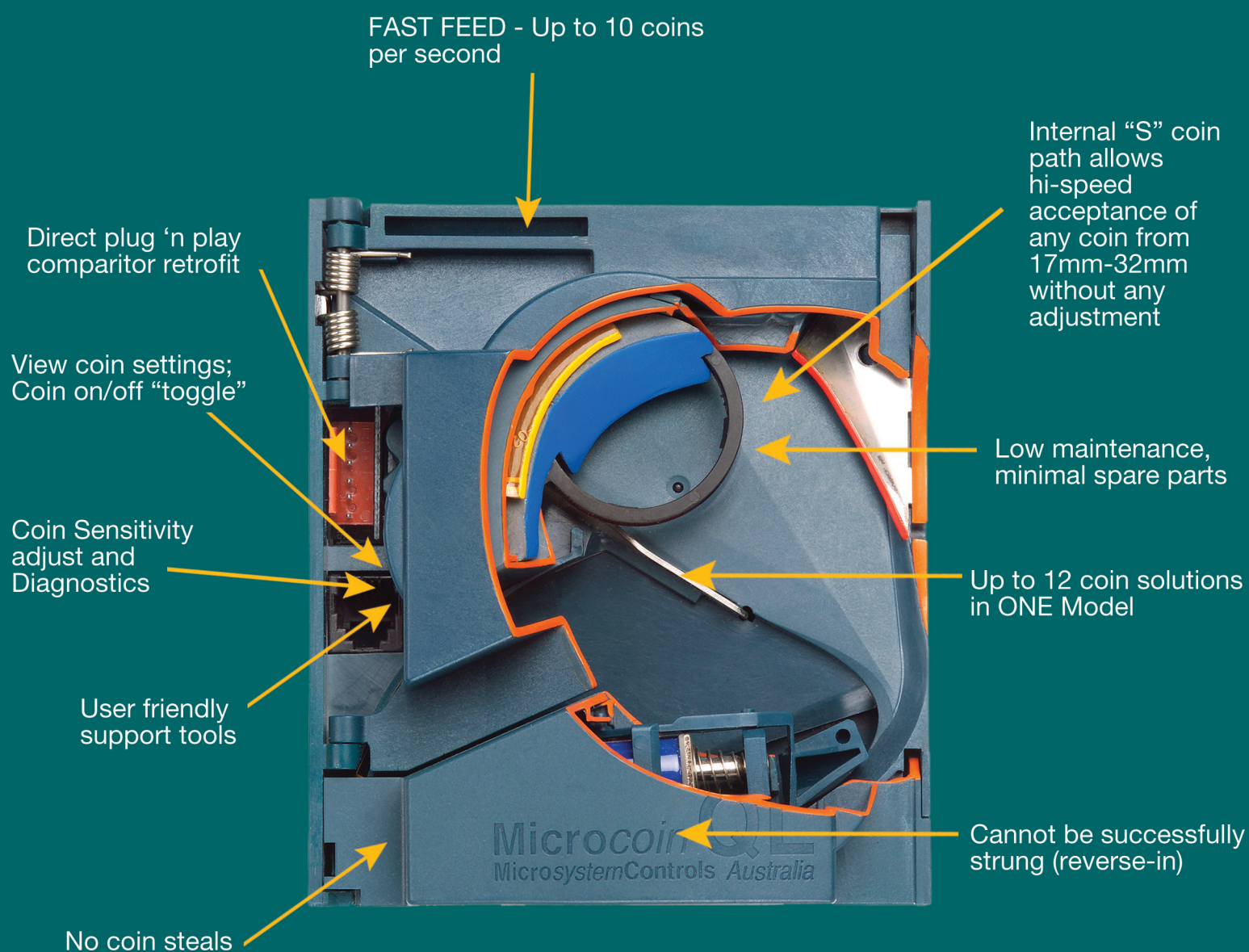
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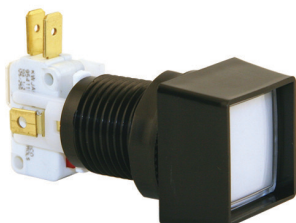
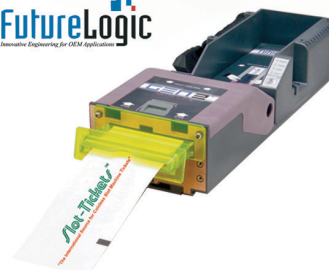
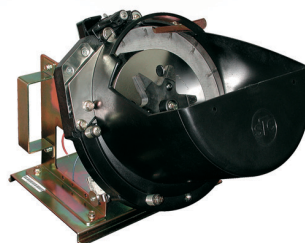
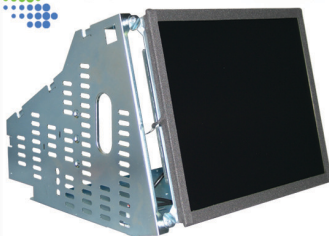
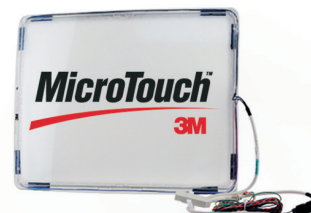
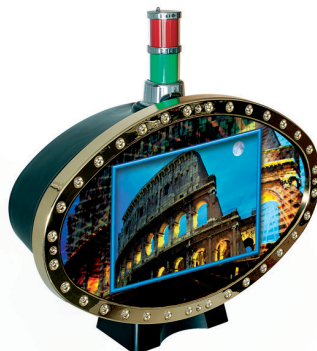
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