

May 2006

SLOT TECH MAGAZINE

Slot Machine Technology for the International Gaming Industry



APL™ Atronic Progressive Link
Quick Simple Repairs #13
Monitor Harness Mayhem
IGT AVP Trimline Games
Thunder Valley Redux

GPB 930 "Fireball" Pushbutton



The Whys and Why-Nots of Slot Math

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May 2006

Slot Tech Magazine



How many \$\$ does it take to change a light bulb?

If you're still using fluorescent tube sets in your slots, you're spending too much...for maintenance to change them, for energy to light them, and for air conditioning to cool them off.

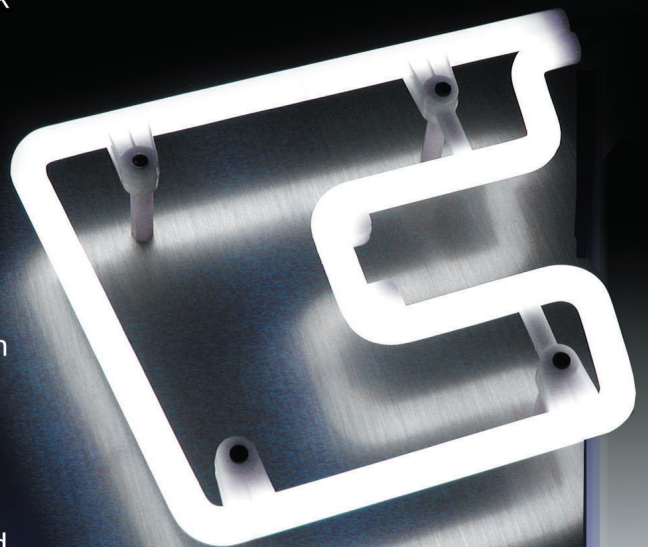
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Slot Tech Magazine publisher Randy Fromm (bottom, left) concludes four weeks of slot tech training at Thunder Valley Casino in Sacramento, California. (Right) Ted Kernan holds an ad hoc class on configuration issues for IGT machines. (bottom, right) Vue Chu assists Thomas Manz during the hands-on troubleshooting lab.

Below: The long and short of being a slot tech. That's Belinda Spencer (on her way to the floor with a BV under her arm) with James Lancaster.



Slot Tech Editorial

This month, Atronic's Michael Brennan introduces us to APL, the Atronic Progressive Link. Atronic is using the APL™ linking system to link their progressive and participation products, including Cash Fever™, Deal or No Deal™ and Miami Vice™. We'll take a look at the comm board and how to establish links between games. We'll also take a look at configuration issues and how the whole thing works together to create exciting jackpots without requiring a separate, dedicated jackpot controller. That's right! In the Atronic Progressive Link system, all you have to do is to select any one of the machines' comm boards as the master blaster and it then becomes the jackpot controller. Sweet. Atronic leads off on page six.

In keeping with the Atronic Theme, Pat Porath presents lucky number 13 in his "Quick Simple Repairs." This month, it's "Operation e-motion" as Pat works his way through a mysterious "hopper disconnected" problem, a bad CD drive and a handful of other problems on various machines. He also introduces us to his casino's new Pocket PC system for slot techs. A pocket PC can be your best friend in a hundred different ways or more. When I lost mine in a New York taxicab, it contained a database of every casino in the United States (with their addresses and telephone numbers) schematic diagrams for dozens of monitors and power supplies, a variety of games and even the complete text of dozens of e-books. I still miss it but I haven't punished myself enough for losing it in the first place to purchase a replacement. Pat's article begins on page 12.

I hope you all enjoyed Ted Befus' premier article in last month's Slot Tech Magazine (Ted, I apologize for referring to you as Ted Bevis in last month's editorial). His giant EPROM eraser project has practical applications for casinos worldwide. Ted confessed to me that he enjoyed writing his very first technical article and that if he could just come up with a good topic, he'd like to try his hand at another one. I suggested that he write about testing monitors on the bench and, specifically, how to hook up a monitor on the bench so that it doesn't have to be dragged out to the slot floor in order to test it in a machine. He has put together a complete list of connectors and pin numbers for all the common monitors and machines, including sources and part numbers. Monitor Harness Mayhem begins on page 20.

Chip In's Island Resort Casino recently took delivery of some IGT AVP Trimline machines. Island Resort's Slot Repair Manager, Robert Jewell, brings us up to speed with some caveats regarding e-keys that are not in any other documentation. When you're setting up these new machines, you



have to know this stuff. Robert's AVP Trimline primer begins on page 24.

Why do you care about slot math? Maybe you don't. Slot Tech Magazine is sort of in your face with articles about slot math almost every month. If you are the one person that has been skipping them, please take the time to read "The Whys and Why-Nots of Slot Math" and allow our resident Slot Mathemagician, John Wilson, to give you some good reasons to dig through your back issues and bone up. Turn to page 27.

Finally, I want to thank Thunder Valley Casino for a fun, four week gig in Sacramento, California. In total, 22 slot techs went through a customized, one week program that included some basic electronics, soldering, slot machine configuration, slot machine troubleshooting and bill validator (WBA) calibration and troubleshooting. Although the rain rarely let up the entire time I was there (and Hertz had upgraded me to a convertible Chrysler Sebring) I had a swell time with some really great slot techs. The final class pictures are on page 36. My thanks to Don Jennings for the gig.

That's all for this month. I'll see you at the casino.

Randy Fromm's Slot Tech Magazine

Editor

Randy Fromm

Technical Writers

Ted Befus

Michael Brennan

Herschel W. Peeler

Pat Porath

John Wilson

International Contributor

Martin Dempsey

Advertising Manager

Dennis Sable

Slot Tech Magazine is published monthly by Slot Tech Magazine
1944 Falmouth Dr.
El Cajon, CA 92020-2827
tel.619.593.6131
fax.619.593.6132
e-mail

editor@slot-techs.com
Visit the website at
slot-techs.com

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With the increasing popularity of progressive games, most Atronic game titles that run in an e-motion™ cabinet were created with the inherent ability to be configured as stand-alone or local area progressives. This feature is accomplished by utilizing the Atronic Progressive Link (APL™).

What makes APL™ unique is that the machines participating in the progressive bank operate without an external controller. Not only does the exclusion of an external controller make a progressive bank more affordable, it also eliminates the potential for additional communication problems due to multiple manufacturers and makes trouble-shooting less convoluted.

In APL™ the communication board (commboard) in one designated game functions as the dedicated jackpot controller. Other commboards in the link are “daisy-chained” to one another, with a power supply

APL™

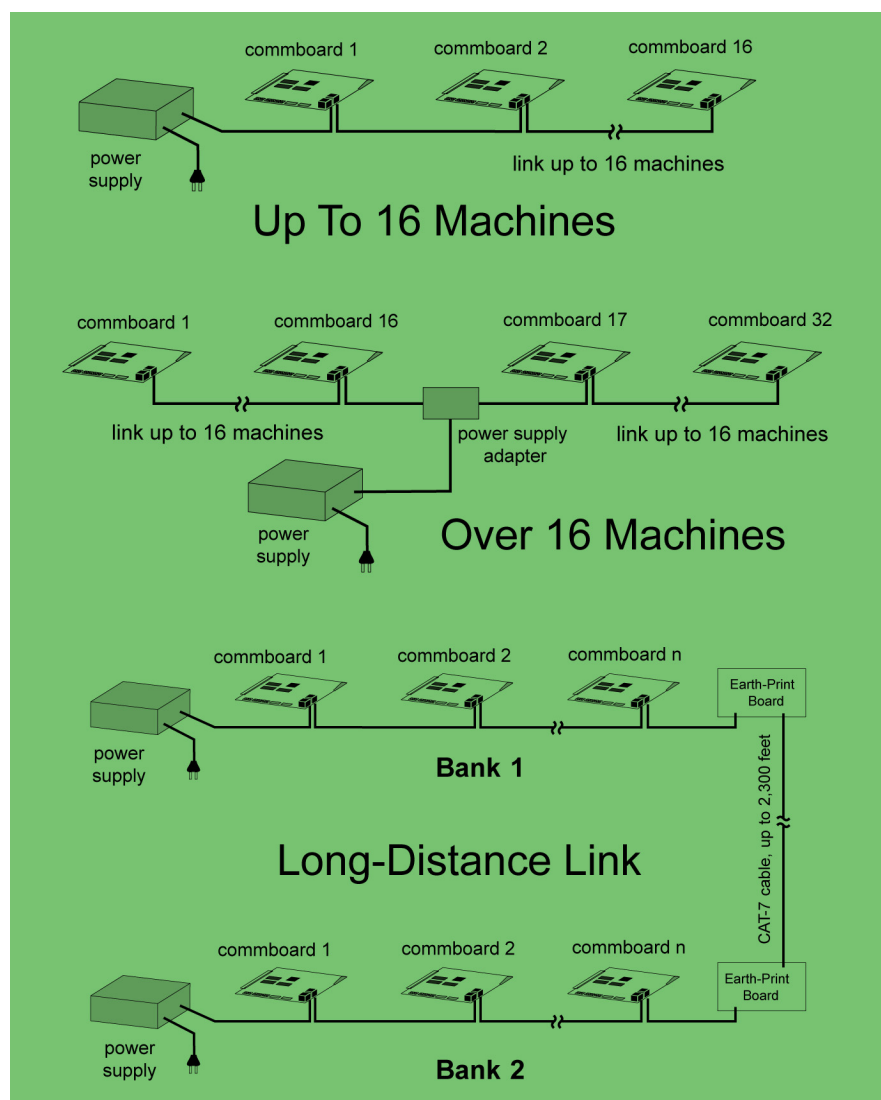
Atronic Progressive Link

By Michael Brennan

at one end. You can also program a message and show an in-machine meter display on the screen with APL™. Currently, we are using the APL™ linking system to create many varied progressive and participation products, from Cash Fever™ to Deal or No Deal™ to Miami Vice™.

Connections

The commboard that acts as jackpot controller is called the master. The master commboard is housed in the master game. It is connected to the other commboards, the slaves, through an RS485 half-duplex bus interface. Connections are made at P10





Ceronix LCD Monitors

CERONIX, INC., the company you have relied upon to provide you with the highest quality video display monitors for over 20 years, now offers exceptional LCD Displays!

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| • CPA4064L | '19V'/20" WMS Slant |
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and P11 on the commboard, using standard CAT-5 cable. The wiring is in parallel, so it doesn't matter which connector is used. In addition, you aren't necessary "stuck" with the same master throughout the life of the APL™ bank. Jackpot data is stored on every commboard in the link, so you can change which game is the master at any time.

For a moderately-sized APL™ bank (under sixteen machines), a power supply is connected to the end of the daisy-chain to help power the communication signal. If the progressive bank is larger (from sixteen to thirty-two games), a power supply must be connected to the middle of the link, with the inclusion of an adapter.

In some casinos there are multiple banks of APL™ progressive games that share the same jackpot, but are spread out geographically. For APL™ configurations where there is a great deal of distance between games and banks, there are other specifications and requirements, including an earth print grounding device. Refer to the illustration for an outline.

Settings

How does the system know which game is the master, which games are the slaves, and what order they are linked? The answer lies in old-school circuit board switch settings.

Each commboard is assigned a progressive system address

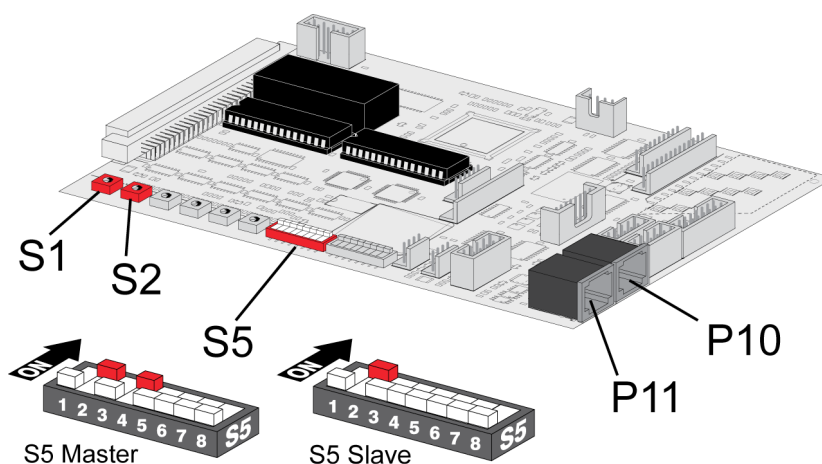
through the board's rotary switches, S1 and S2. S1 programs the tens column of the address, while S2 designates the ones column. For example, since we strongly recommend assigning an address of "01" to the master, you would address a master commboard by leaving S1 at zero and setting S2 to one. Other games in the bank must have unique addresses, and their addresses should increment by one all the way up to the last game (with "32" being the limit). In addition, "00" is not a valid address.

Setting board switches is an opportunity to use that tiny little screwdriver, and the tool isn't done working yet, because you need to flip a couple dipswitches on each commboard. In an APL™ bank of games, you must activate APL™ mode on every game and "mark" one commboard as the master. These tasks are accomplished by flipping dipswitches at switch S5. Dipswitches should resemble those in the illustration. Switch S2 should be "on" for every game and S4 should be "on" for the master only.

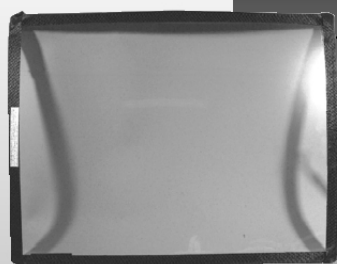
Configuring the Jackpot

If you ever need to reset the master game in a bank of APL™ games, you will have to reconfigure the jackpot after the game is RAM cleared. To set up a jackpot, you need a lap top equipped with a program called A-Link Config. Connect the lap top directly to the master game main board's serial port (J2). A security dongle must be installed on the lap top's "com1" serial port.

When the computer is cabled to the master game, select "Download" from the "Alink" menu on the lap top. On the e-motion™ game, enter the Service Menu, select "Settings / Jackpot Configuration" and press "Start Configuration" on the screen. When this portion of the process is complete, you will be prompted to choose the operation mode (stand-alone or multiple). After that, you can set the "Progressive General Settings" (denomination, currency, display, etc.) and the "Progressive Parameters" (values, limits, increment percentage, etc.).



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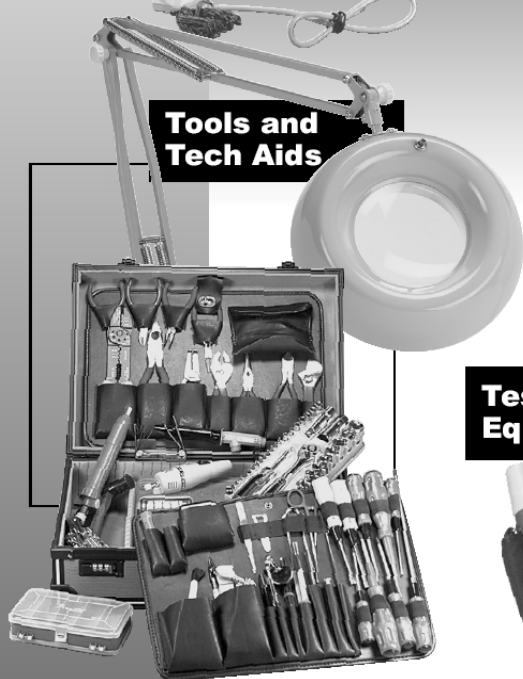


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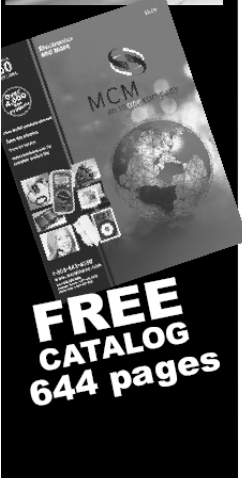
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When you are satisfied with the settings, save them and then click "upload" to complete the jackpot configuration. Make sure the settings are correct, because once the data has uploaded, you must execute a RAM clear to change the jackpot again. After the jackpot configuration information is uploaded to the master game, it will send the data to all the other games in the link.

APL™ Game Applications

The Atronic Progressive Link is the basis behind many of our most popular and prevalent themed banks and game concepts. If you understand APL™ and become comfortable with it, you already know most of the operation behind a long list of current and up-coming Atronic products. Although the titles and appearance may vary between these products, APL™ is the building block for highly-promoted games and themes like Cash Fever™ Miami Vice™ Deal or No Deal™ Game of Life™ Lady Orleans™ Hot Link™ and Mystery Magic™

Cash Fever™ is a four-level local progressive that has been in the field for a while. Cash Fever™ games use APL™ to communicate with each other. The concept is a little unique in the fact that the progressive base values and return to player percentages are pre-configured and optimized for factors such as the number of games in a bank, the

frequency of bonus games, the size of the bonuses, adherence to certain jurisdictional rules, and more. This payable and progressive information is contained within a "configuration code," which you enter during the Initial Setup procedure. We give suggestions for specifics regarding other data, like incrementation rates, which the operator can customize.

Cash Fever™ also utilizes a rotating plasma sign package, which is available for all APL™ concepts. Most merchandising signs in the industry are stationary, because rotation would cause wrapped and tangled cords. But our sign uses wireless technology to relay jackpot information from the commboard to the spinning sign. This wireless communication is highly secure and corresponds to the sign from P7 on the master commboard.

For other recent and upcoming linked concepts, APL™ is the basis for a one-level progressive that is designed to hit frequently, Miami Vice™ Yes, this is the same Miami Vice™ as the TV crime drama that popularized pastel shirts, white suits and no socks. And regarding television shows, the new game show Deal or No Deal™ is the basis of another one of our APL™ products. We are soon releasing Deal or No Deal™ a bank of games featuring a one-level progressive,

reached by either a symbol or mystery hit.

There are even more upcoming products that illustrate how fundamental APL™ is to Atronic's library of games. We have developed two unique rapid hit progressive concepts, symbol-driven (Hot Link™ and mystery-driven (Mystery Magic™. Coupled with progressive meters that are incorporated in the second screen, these two rapid hit payable concepts will give operators endless progressive bank options. Coming later this year, all our new core titles will be Hot Link™ or Mystery Magic™ capable. This gives the operator complete flexibility in building their own progressive links, which, as time evolves and rapid hit payable titles compose our entire library, will be an industry first.

Just from the long list of upcoming games and themes, it is easy to see how Atronic's present and future are strongly tied to the letters "A," "P," and "L." Consequently, present and future service and maintenance of Atronic games will no doubt involve APL™ in some capacity. Understanding the fundamentals of the Atronic Progressive Link is a huge advantage for a technician now, and might become a necessity in the near future.

- Michael Brennan
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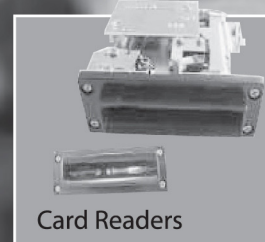
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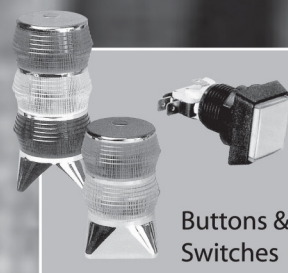
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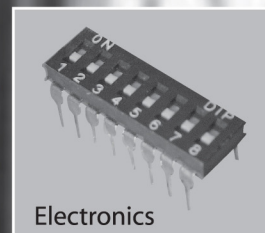
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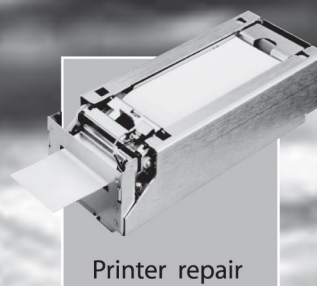
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Atronic e-motion Game

I spent a little over two days, off and on, getting this puppy up and running. Oh, how fun it was. It is a popular two-cent Atronic e-motion game. You know, the kind with the height adjustable playfield. They are very popular at the Island Resort Casino. Our bank of "Cash Fever" multi-progressive Atronic games are the same as this rascal I worked on.

It was no doubt adventurous. One of the first problems it had was a "hopper disconnected" error. This game doesn't even have a hopper installed in it, so a RAM clear procedure was started. The clear chip was put into socket U9 and the communication board chips were put into sockets U34 and U35. Time to boot the game up and this is when the problems started. It wouldn't boot up at all. What was I doing wrong? I called and talked to an Atronic tech. I was using the correct clear chips. The game had a picture before so what happened? The game was

Quick Simple Repairs #13

By Pat Porath

booted with the service button pushed in, the reset button pushed in, combinations of both and nothing worked.

One error that displayed was "cannot boot system halted." This was not good. In order for an e-motion game to boot properly, there are many items that **MUST** work properly. The game CD-ROM must be clean and have no major scratches on it (we have a disk cleaning kit right in our shop). The CD-ROM drive must be working properly and everything must be communicating with each other.

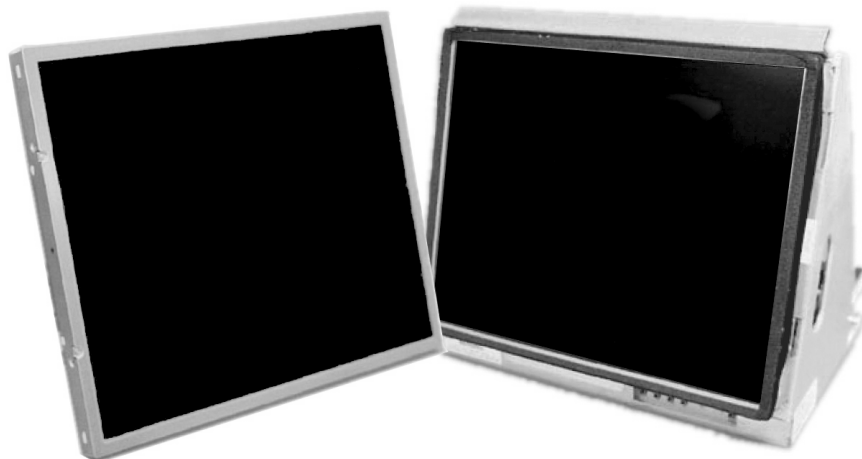
Could it be that the CD went bad? The disk was taken to the shop and put through the cleaner. The drive also was cleaned with a special disk (it has two small brushes on the bottom to clean the laser lens). Still no go. The disk was swapped with a game close to it with the same theme, and nothing. Time to call the Atronic tech AGAIN. I told him what was going on and he stated that it may be the main board or a small chance it may be the CD driver. He had me thinking on this one. I had noticed that the driver flashed only

11 times and then quit. If a game is loading graphics from the CD, the light should keep blinking; it should not stop. The connections were checked on the back plane board. All seemed to be in place. The chips on the main, comm and back plane boards were snug.

Maybe it was the CD drive itself? I grabbed one off the shelf and put it in the game. With the replacement installed, the game was booted up. Presto! It all looked good. The CD light started flashing -- it didn't stop -- and the game started to load. Finally, the display said "loading."

I waited, and waited. What in the world is going on now? It's finally loading but it is very slow, way slower than normal. By this time, I was beginning to get angry. What is going on now? I told myself "I'm not going to get mad; I'm going to get even with this game." I did have a theory. The CD light was flashing very fast, but loading the game very slow; could the CD-ROM drive be an older one? Sure as the sun comes up in the morning, the driver was manufactured in 1998! We are talking about eight years of technology here!

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Back to the shop to look for a newer drive. Only one other was found, and it was unmarked in the slot manager's office. I gave him a call and he said it was a good unit, and the manufacture date was 2002. It was installed in the game and it booted up awesome. The CD light was flashing beautifully; the bars on the bottom of the screen were coming up great and the signal was given: "Press reset button to format RAM."

This was great to see, no doubt. The reset button was pressed and the original chips were put back in. It loaded awesome and the option menu was there.

SUCCESS! Well, almost.

All of the game options were set and I was ready to test the game. However, all of the player buttons were lit up! Every single one. What now? Maybe a bad button panel board? I swapped it out with the one next to it and sure enough, the board was bad. After much time into the game, it was concluded the CD-ROM drive and the button panel board were, in fact, bad. Finally, the game was back "online."

Yes, Another Atronic e-motion

This beast had unusual problems too. The problem? Power. After finding out where one of the power test blocks was, I used the trusty multimeter (the power block is located to the left of the main and communication

board cage). The voltages were marked 24 volts, 12 volts, and 5 volts. The 24 volts was ok; it read fine. The 5 volts tests ok too. However, the 12 volt output was fluctuating between 0 and 2 volts.

What could be causing this? Well, one way to determine what is going on is to start disconnecting sub-assemblies. With the coin comparator, the printer, the communication board, the main board, and the button panel board disconnected (almost everything) I only read 8 volts! There was another thing that was unusual; the lower fuse indicator light would vary in brightness. On the "power filter board" (which is located to the left of the main board) there are two fuses. Each has a small light that indicates power. It makes sense if the voltage is reduced, the light goes dim. When everything was connected, it would flicker with really dim glow. With the majority of components disconnected, it was brighter. The fuse never did blow, but there was enough of a short to drop the voltage in the 12-volt section. At one point, EVERYTHING was disconnected from the power filter board, except the incoming power and still the problem remained.

What was left? Just the power filter board itself. I love swaptronics, but I was a little nervous. It was swapped out with the game next to it, and BINGO. It came right to life.

Both of the fuse indicator lights were nice and bright. PROBLEM SOLVED.

Slot Tech Mailbag

Thank you for the info on CDS displays, Jason (See Slot Tech Magazine, April 2006). CDS repair can be very complex and I'll definitely admit I am not a rocket scientist at it. Sometimes I have to ask myself "Is it plugged in?" before changing chips and boards. I have learned the hard way a few times. I know that our older displays didn't have the plastic connector on it, there were only the pins sticking out. Some of the slot attendants would put the cable on upside down. Hopefully they are all off of the floor by now. Recently one of my co-workers had trouble with a sentinel communicating, and the display. After a couple of COM chips and three different sentinels, it was discovered that the EPROM was bad. I have run into the "Japanese" display before during "global setup." Simply press the up or down arrow key and it will go back to normal. Thanks once again Jason.

Bally 6000 Code 55.21

To start off, an error code 55 on a Bally 6000 means "stacker removed." I could not get this error of 55.21 to clear at all. The stacker box was in place and reseated a few times. The bill acceptor was in place and reseated a few times. The main board

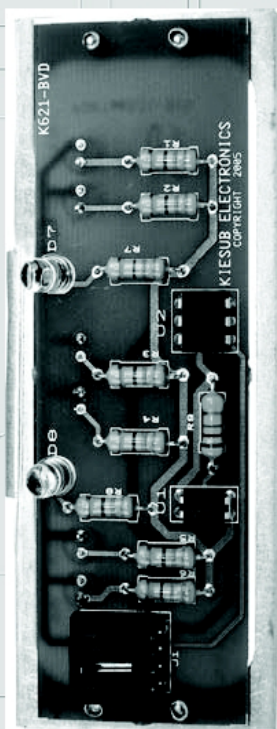


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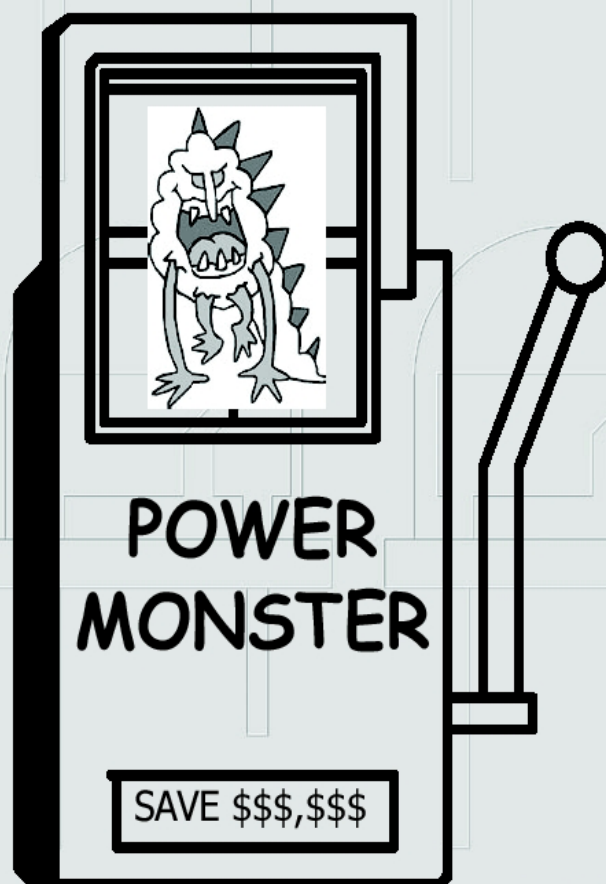
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was even reseated. I also tried swapping bill accepters. That didn't work either. Nothing would fix the problem.

So, time to "blow the brains" also known as a RAM clear. The game chips were removed and the clear chips were installed (U28 and U43). The display read: CLC, and then CLP, which meant the clear was complete. The game chips were reinstalled and during power up the reels will jump up and down a little. This is normal. Next, the display will show the date and time. The trick is to press the "service" button and then it will go into regular game mode. However, options need to be checked. Simply compare it to the game next to it (as long as it isn't a progressive). If the game options are EXACTLY the same on a progressive, the wrong machine number will appear on the sign. Not good.

Once the options are set, a quick way to tell if the game is communicating is an indication of the main door open and closed on the C.D.S. display. If you are not getting the info, the machine isn't communicating. On this particular game, the RAM clear fixed the problem, the options were verified and the game was playable again.

Visit the
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Schematics, manuals,
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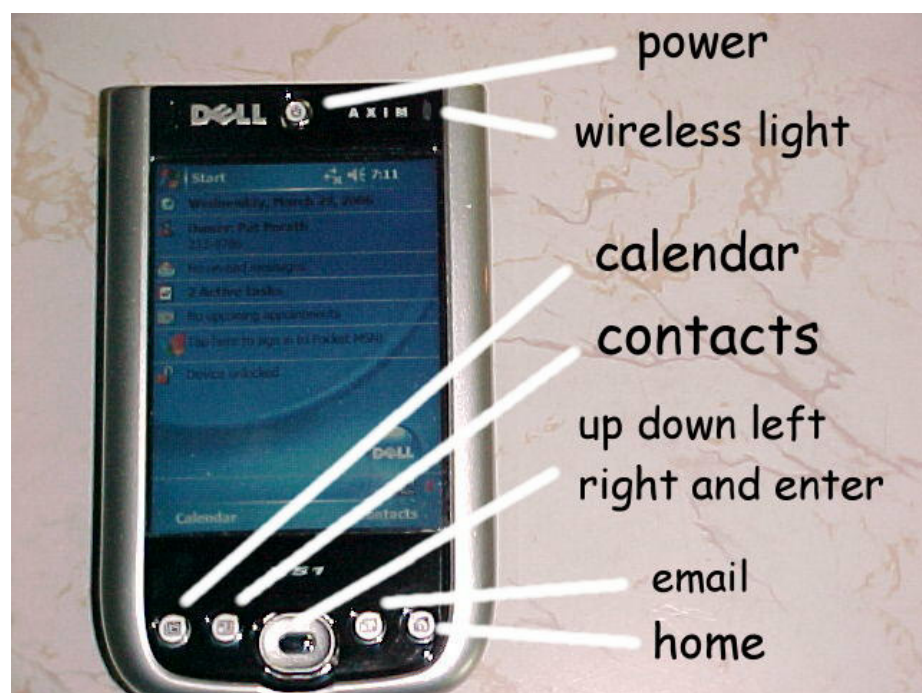
Technology: The Slot Tech and the Pocket P.C.

A pocket PC (personal computer that fits in your pocket) is an amazing piece of equipment. Our slot repair manager recently purchased some for the "veteran" techs at our casino and I was one of the fortunate ones. What exactly is a Pocket PC and how can a slot tech use it? In the very near future, at least one per casino property will be needed because for the recently released JCM UBA bill acceptor, a pocket PC is needed to upload the software. The new ten dollar bills are already in circulation. Other new bills will follow along at regular intervals as the US Treasury strives to stay at least one step ahead of the counterfeiters.

We have the Dell Axim X51 and this is where it starts to get cool. Here are the specs:

An Intel PXA270 processor 520 MHz processor speed 64 MB RAM size (currently. It is expandable) 128 MB ROM size Wireless Bluetooth technology Two memory card slots: the Compact Flash and the postage stamp-sized SD card Touchscreen Lithium-Ion rechargeable 3.7v 1100mAh battery 11 function buttons, which include power, calendar, contacts, email, home, up down left right, enter, record, lock, wireless, and battery cover lock. Charging indicator light Wireless enabled light Desktop PC Sync software Retail price at Dell.com is \$399

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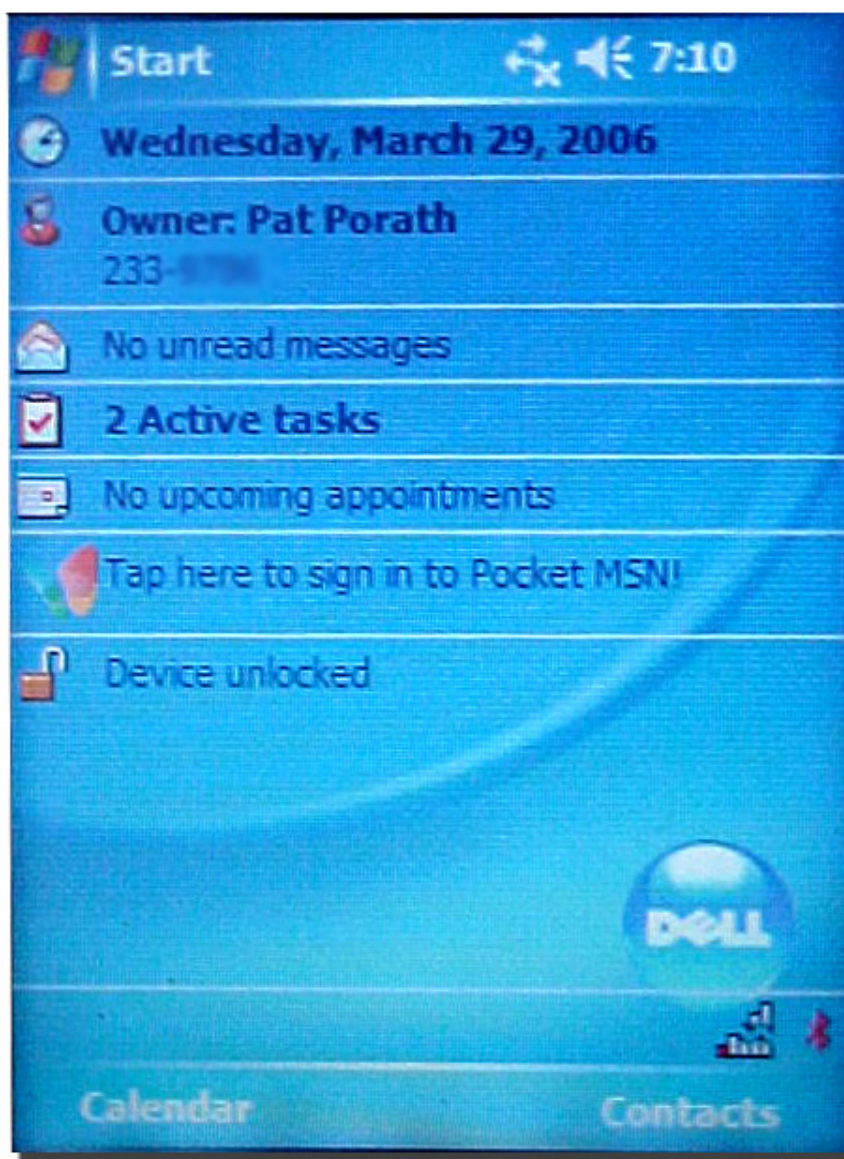
Bluetooth, Dell WLAN, Beam, and more. "Beam?" you may ask. With the use of the infrared signal/receiver, you can "beam" information from one pocket PC to another.

For example, recently, I wrote down all of the game options for an IGT S2000 because we were doing conversions. If a fellow tech wanted the info, I could "beam" it from my pocket PC to his. For future reference on the options, they are right at my disposal with a few clicks. The "Notes" program is pretty cool too. You can actually write on the touch screen and it will recognize it, as long as it isn't really sloppy handwriting. With the expandable memory cards, you can have four gigabytes of memory. Yes, four gigs, two gigs per card. Ok, a pretty wild product but how is it applied to the slot tech world? For starters, our slot manager emails us info, such as machine moves, game conversions, and when games are scheduled to arrive. After being in "sync" with the desktop computer and opening my business email, it will automatically download info onto the pocket PC. A week later, a reminder will appear "games due to arrive from I.G.T at 8:00am tomorrow". Another reminder that would appear is "new carousel to be installed at 3:00 am." No excuses for forgetting about a project. The "contacts" feature is also very handy. Names, numbers, addresses, email address, cell numbers.

The wireless technology is very cool too. In the near future we will be able to use the pocket PC for our CDS tracking system. If a customer cashes out a ticket on a game and it isn't readable, simply enter into the wireless network and retrieve the voucher number. Is this game communicating with the system? A few clicks on the touch screen, and bingo, there is the program. There is actually a ton of things that the Dell Axim X51 is capable

of, and a pile of accessories. The unit can even be used with GPS. The program and equipment is around \$199. I was surfing the net and a "remote control" program was available for purchase. It was \$29 and if I bought it, the pocket PC could even be used as a TV, DVD, and VCR wireless remote control. Wow, what a unit.

- Pat Porath
pporath@slot-techs.com



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Monitor Harness Mayhem

By Ted Befus

Ahhh, where to begin, you ever have one of those nights where you just can't sleep so you turn on the tube only to find infomercials on every channel. Well, you're in luck this is one of those times.....Here we go.

Are your monitor test harnesses a complete mess!!! Are you tired of digging through harness after harness looking for "THE ONE". If you are then this article is for you. I'm about to introduce you to the Ted Befus monitor connecting and storage system! That's right, now you can have drawers that look just like mine! (as I laugh out loud). We'll go through making test harnesses for a few of the CRT's found in the games out there. For those of you who are switching from CRT to LCD don't just skip by this article, these

harnesses can be made to be compatible to what your replacement LCD's you'll be using. We'll be looking at the harnesses for the Aristocrat MK5 and MK6, the IGT Gameking (both the 19 and 25 pin connections) and last but not least the Bally EVO.

Ok, lets get started, the first thing we need is a Bill of Materials (BOM). I'm very partial to buying parts from Digi-Key. Hopefully I didn't offend anyone. I know that everyone has their "favorite" companies to buy from, so I've also included part numbers

Bill of Materials (BOM)

12 pin AMP Metrimate Plug	p/n# 211758-1-ND	MCM# 27-4524
12 pin AMP Metrimate Receptacle	p/n# 211759-1-ND	MCM# 27-4526
19 pin AMP Metrimate Plug	p/n# 208210-2-ND	MCM# 27-4528
19 pin AMP Metrimate Receptacle	p/n# 208209-2-ND	MCM# 27-4530
25 pin AMP Metrimate Plug	p/n# 211150-1-ND	MCM# 27-4532
25 pin AMP Metrimate Receptacle	p/n# 211149-1-ND	MCM# 27-4534
Pin (crimp), 20-24, Metrimate	p/n# A1322-ND	MCM# 27-2565
Socket (crimp), 20-24, Metrimate	p/n# A1323-ND	MCM# 27-4532
Extraction Tool	p/n# A1329-ND	MCM# 27-2600
Crimp Tool* (See below)		
15 Pin D-subminiature plug	(sorry no p/n# for this one)	

(Note: The pin and socket are crimp style units. There are solderable pins available if needed).

*There are an awful lot of crimp tools on the market, I didn't specify one particular one because of this. Also, the tooling made by AMP can be somewhat pricey. If you want bang for your buck, my choice of crimper is Sargeants Crimping tool available at HAPP Controls (p/n#92-0032-00).

Table #1

Signal	Aristocrat	IGT (19 Pin)	IGT (25 Pin)	Bally EVO	CM2125	HD15
Red	Pin 1	Pin 2	Pin 1	Pin 2	Pin 1	Pin 1
Green	Pin 2	Pin 4	Pin 3	Pin 3	Pin 2	Pin 2
Blue	Pin 3	Pin 3	Pin 5	Pin 1	Pin 3	Pin 3
Signal Ground	Pin 4	Pin 7	Pins 2,4,6	Pin 5	Pin 8	Pin 5
V Sync	Pin 5	Pin 6	Pin 9	Pin 9	Pin 14	Pin 14
H Sync	Pin 6	Pin 5	Pin 8	Pin 4	Pin 6	Pin 13
AC (hot)	Pin 10	Pin 14	Pin 24	Pin 19	N/A	N/A
AC (neutral)	Pin 12	Pin 13	Pin 25	Pin 18	N/A	N/A
Ground	Pin 11	Pin 15	Pin 23	Chassis	N/A	N/A

from MCM as well. If you don't like Digi-Key or MCM you might want to look at Newark Electronics or HAPP controls.

My main connection to my Sencore units always stays the same. The Sencore CM2125 computer monitor analyzer has a 15 pin d-sub-miniature connector at its

output, off of it I built in a 12 pin Metrimate connector which will be used to mate to every brand of monitor I repair (see figure #1 or a close up in figure #2). Why a 12 pin metrimate you ask, because the first monitors I ever repaired were Aristocrat and that is the connector they use. It just made sense to me to use it as a base. From

that I make an adaptor cable to mate with most of the monitors I repair. It's easy to make adaptor harnesses once you have the correct connection information for each manufacturer and the CM2125, so here it is for you (see table #1, above)

If you take a close look at my harness in figure #2 you



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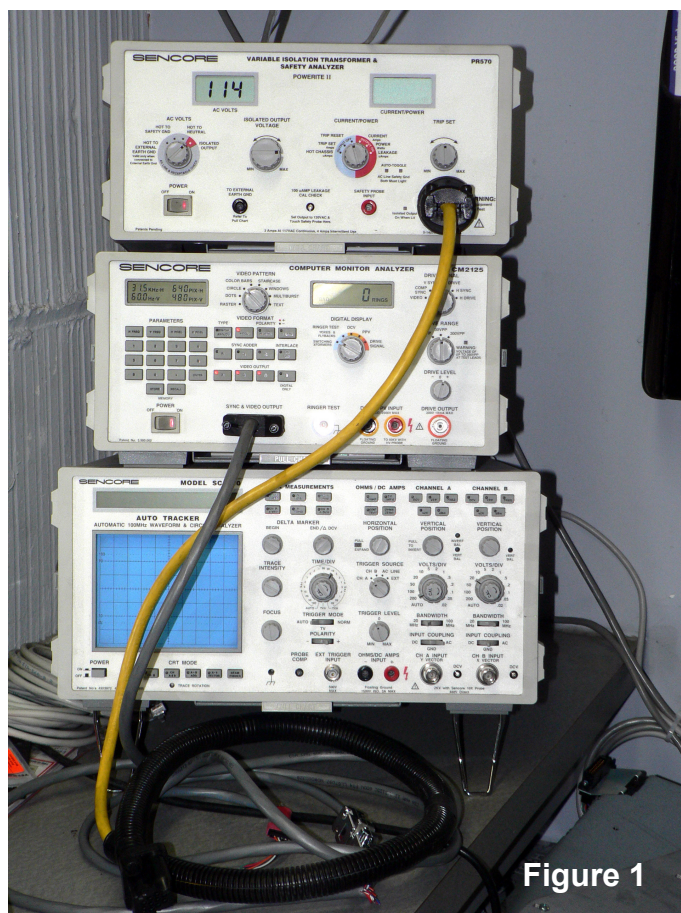


Figure 1



Figure 2

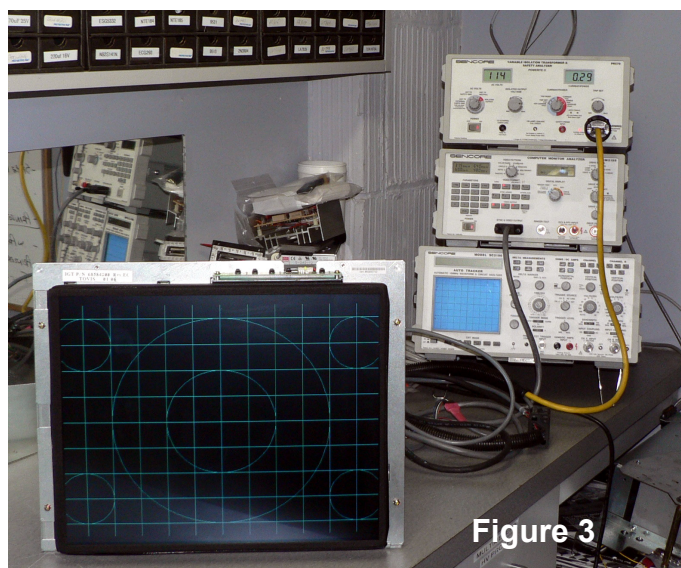
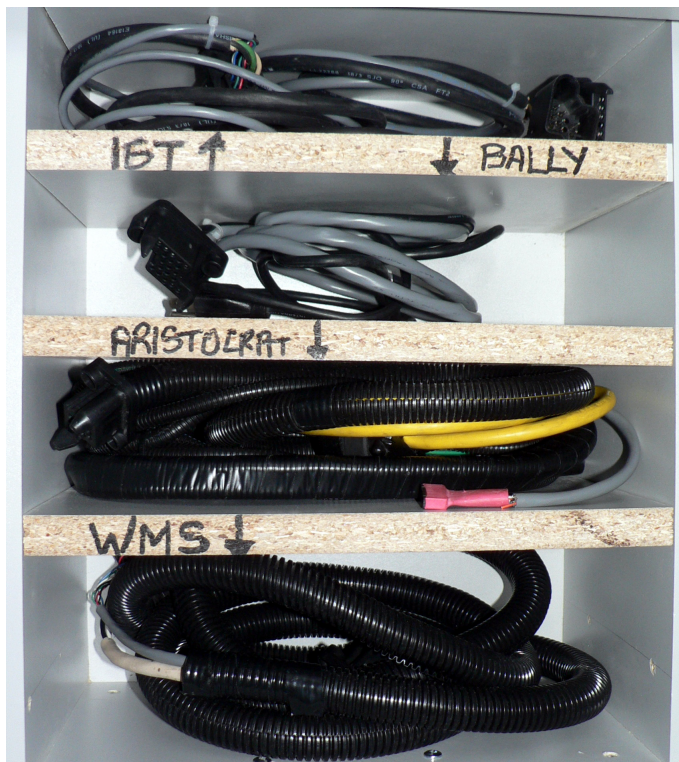


Figure 3

should notice a couple of things. First, the DB15 connection (coming from the CM2125) isn't connected directly to the 12 pin metrimate, there is an HD15 connector and a 6 pin C-Grid connector in there as well. The reasoning behind those extra connections is simple. Some chassis' do not use a blind mating connector such as the metrimate for connection, some of the games (like the older Atronic Cashline platform) used an HD15 cable just like the cable on your home computer. The WMS bluebird and Konami games also use this configuration with their LCDs. So, in the event that I need to test them I can use that end of the cable for video signal. The reason behind the C-Grid connector is in case I need to hook a Ceronix monitor direct to my CM2125 without any cables in between.

Here's the setup in action (see figure #3) using my IGT 25 pin adaptor harness hooked to a TOVIS LCD. If you look really closely at figure #3 you should notice a few things about it. Firstly, my bench is equipped with a full length mirror across the back of the bench. I had this installed so I can see what happens to the picture if I'm working it from the back where I don't have an easy view of the picture. One thing you can't see is behind that LCD is a variable DC supply. I'm in the progression of setting up testing for touchscreens, so a variable DC supply can come in handy when testing them. Not all of the manufacturers pull a DC supply for the touchscreen from the monitor chassis. I know IGT generates the 13VDC for the Netplex from the game. Also, if I'm not mistaken the WMS game LCD runs off of a DC voltage not an AC voltage making the DC supply handy to have.

Alright, in the beginning of this article I posed a question to all. Does anyone remember what it was. Now, who wouldn't want drawers like mine (as I again laugh out loud....maybe a bit too loud the folks in the shop heard me this time.) I like to keep things as uncluttered (is that a word, can we get someone to check that one) as pos-



sible. I used to just throw all my harnesses in a drawer and then pull them all out in one big tangled mess until I found the one I wanted. Then I'd throw them all back in the drawer after I was done, and carry on. Finally I'd had enough and decided it was time to get organized, that spawned the beginning of the Ted Befus monitor connection and storage system. I've now organized all my test harnesses into convenient bins for easy finding (see figures #4 and #5). You too can have all of this with no cash outlay (aside from your Slot Tech magazine subscription).

- Ted Befus
tbefus@slot-techs.com

**Meet Slot Tech Magazine
writers Ted Befus, Pat
Porath and John Wilson
(The Slot Mathemagician) at
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A peek inside Ted's drawers. You are looking DOWN into compartmentalized (compartmentalised?) drawers - ed.

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IGT AVP Trimline Games

By Robert Jewell

IGT has brought out the AVP (Advanced Video Platform) Trimline video slot. The AVP Trimline is a shallower upright cabinet that will bring more machines to the future gaming floor. The game is less than 20 inches deep from the tray to the back of the cabinet. The Trimline slot has two LCD displays. No top or belly glass will need to be changed when converted. These machines do have some concerns for the slot technician. When the machines are ordered, make sure that the eKey000005 System Setup and eKey000004 are ordered with the machines. You will need them.

When IGT delivers the games to your site, the game is in Key Chip mode. There are two BIOS EEPROMS to install in the processor brain box (Suitcase). The game program is pre-loaded to the hard drive of the processor. Casinos will not be allowed to have the "installation disk." With this in mind, you do not want to inadvertently wipe the hard drive clean. The key chip mode is the same setup configuration as

the Game King Plus programs. Once you have made all the settings and exit from the Key Chip mode, you cannot reenter the Key Chip mode without an eKey (electronic key). The eKey you will need to re-enter the

Key Chip mode is eKey000005 System Setup. The eKey looks like a USB memory stick, it will be blue in color with a green LED on the side. The eKey will only work in the USB port on the front of the suitcase just

TrimLine Features



above the suitcase release handle. Insert the eKey after the game is completely booted up, with the green LED facing out. Inserting the eKey prior to powering on the machine will get you nowhere.

Most of the major parts are easy to get to and can easily be found. All but one, that is. If you look for the location of the RS232 board for player tracking or the Fiber Board for any WAP connections, look behind the printer. The RS232 board is physically installed in COMM 3 socket. When you set up the SAS channel, enable the port 2.

Once you have the machine running, you are not done with the eKey000005. This eKey will need to be used to clear system tilts. One of the tilts we have experienced is a timer issue. The machine will tilt out with a blue screen. The machine will show system error, open door. After you open the door you will need to use the reset key to clear the second level of the tilt. The second screen will be red in color. After you use the reset key, the screen will go to a white screen displaying



the message "No Game Specified. Please insert eKey and select a game." Do not power down the game. Insert the eKey000005, just as you would for Key Chip mode. The screen will display several boxes to the top of the screen and other touch boxes. Touch the upper left box to where the name of the program is. Then press load. The screen will change to set top display graphics. Again touch the name of the program. Press the preview box just to make sure the graphics will load. Then press the load touch box.

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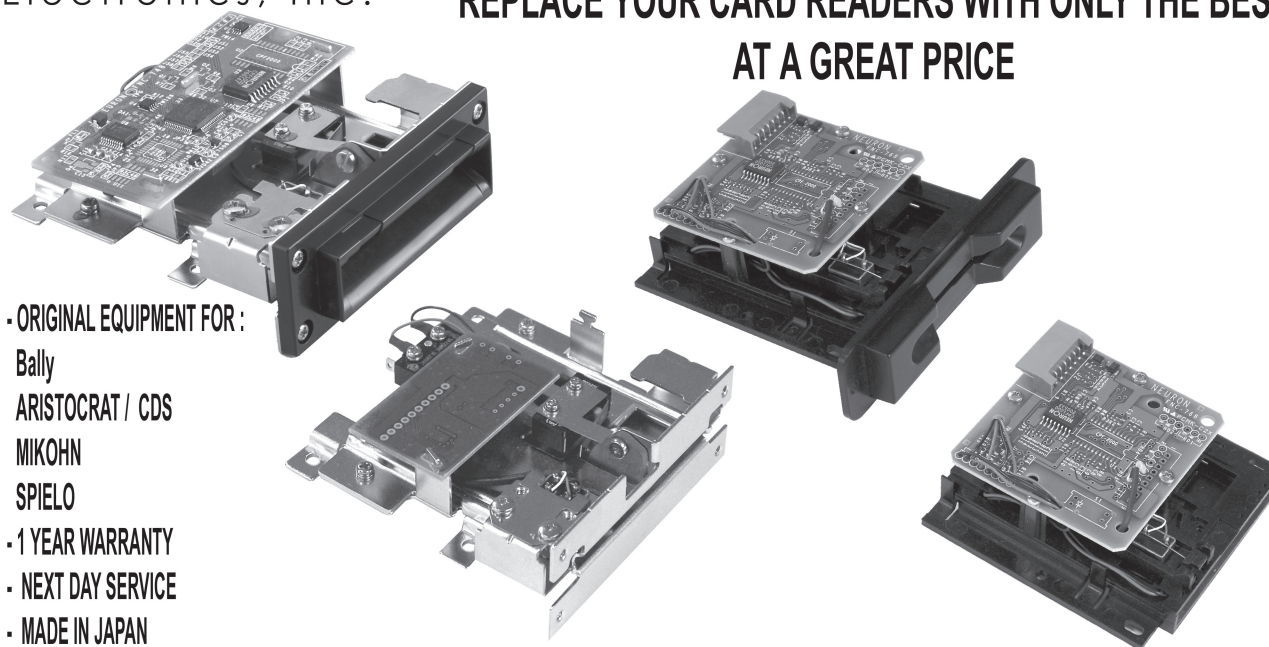
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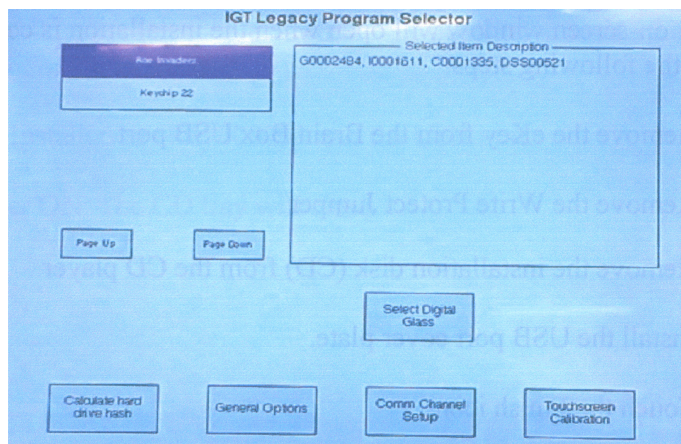
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The game will display a “remove the eKey” message. Now just wait for the program to initialize and load the graphics. The games will start back up from where the tilt happened.

To get into and out of the Key Chip mode is somewhat confusing at first if you have not done it. With the game completely loaded, insert the eKey000005. The same white screen will come up as when you did the tilt clearing. This time, touch the Key 28 in the upper left touch box. Then push the load program. You will now be in the familiar Game King Plus Key Chip menu. At this time you can select RAM Clear, Mother Board EEPROM Clear and/or Perform Key Chip. Once you select the functions you want, the Game King Plus program will normally tell you to power down and replace the machine program. The AVP will not tell you to do anything. Remove the eKey, power cycle the machine and, after the machine returns to the Key Chip menu, reinsert the eKey. The machine will return to the white screen, ready for you to select the program, followed by the top graphics, just like the system tilt reset. When the soft reboot completes, the machine will be in the Key Chip menu just as it was when you received the machine.

The second eKey you will need is the eKey000004 “Advanced Diagnostic eKey.” The Advanced Diagnostic will perform many

major tests with the machine peripherals, I.E. Bill Validator, Printer, Cabinet Memory, Hopper, Coin-In, Input/Output, Bezels and Hard drive. This eKey also allows video, Netplex Download, Speakers and Spectrum. The screen menus make it easy to use the diagnostics. However it also allows a technician to wipe the memory and the hard drive clean. Both entail the possibility of having to wait for IGT to bring the Installation CD of the game that was loaded.

Inside the suitcase you will notice the AVP has a very large heat sink on the processor. It is highly recommended to keep this clean. As we all know, dust and heat sinks like each other but the semiconductor devices do not like the heat that the dust will hold.

The last bit of information you will need to keep in mind is HOLD ON TO THE eKEYs. If you have to buy one, it will run you over \$1800.00. Good Luck with the New Technology the AVP Trimline will bring. At the time of this writing, IGT does not yet have the service or operation manuals available for download.

Robert Jewell
Slot Repair Manager
Island Resort and Casino
Harris, Michigan
rjewell@chipincasino.com

The Whys and Why-Nots of Slot Math

By John Wilson

Traditionally, slot math has been a rather secretive, taboo subject. Players have no idea how the slot machines actually work and myths and folklore prevail. For the slot technician however, math is often overlooked, simply because of time and resource restrictions coupled with a lack of accurate information. Does a slot technician really need to understand slot math? Is there a real reason why this knowledge will help our hard working technician? Certainly there is! The fact that you're reading this illustrates that deep down inside, you know that you should understand this stuff.

What is Your Job?

Some slot technicians have an actual job description that outlines their duties and responsibilities. For these people, most of the job descriptions are likely outdated and don't reflect the duties relating to the current technology on the casino floor. Does your job description mention adjusting levers in the machine? Perhaps it still talks about token handling, even though you've gone completely TITO. (Sounds like you've lost it, doesn't it? "Oh, my! He went TITO on us!" Is that the casino equivalent of a disgruntled postal worker?) I would guess that most slot technicians don't have a job description or anything written that describes the aspects of the techs' job. Nobody needs to tell you how

varied your job is or how quickly your job changes. With TITO, downloadable games, conversions, moves, updates, upgrades and all of the other tasks you're assigned, can you really justify the time required to learn some of this funky math stuff? There are a number of compelling reasons why you should (or must).



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One of the best reasons for any training that you do has to be “what’s in it for me?” If an employee (in any company or service industry, not just a slot tech) can’t see the value in training, it’s just not going to work. Training and education has to be desired by the student. You can’t force a person to learn something they don’t want. And, if the topic doesn’t interest the student, the retention and ability to use the information is very low. Looking at slot math, first consider what this can do for you. How will it make you more valuable or vital?

The Top Ten

- 10 - It really is pretty neat stuff to learn!
- 9 - Shows self-motivation and a desire to learn and grow
- 8 - Tool to do your job better by understanding how the machine works (not just hardware and software but math)
- 7 - Ability to deal with your customers (players) better
- 6 - Ability to help your boss (answer questions, become an information resource)
- 5 - Gain visibility of your superiors (upper management sees you as the go-to guy or gal)
- 4 - Gain respect of your peers (as a helpful resource for them)
- 3 - Advancement possibilities
- 2 - Wage increase possibilities
- 1 - Looks good on a resume

Before we get too excited about this, we do have to understand the environment in which you work. In some cases your boss just won’t appreciate what you do. If he or she has a cranial-rectal inversion, it won’t matter what you do to impress the ogre. However, you can’t let people like this hold you down; you must take steps

to improve yourself even while you’re in this situation. Advancement possibilities may be limited in a small casino but if the time for promotion does present itself, it’s one more item that separates you from the rest of the pack. And while you don’t want to be seen as the “boss’s pet” to your peers, working in a co-operative manner with them and using your knowledge for good (instead of evil) might just find you in good favour with your co-workers. In short, every little thing you can do to improve your resume is only going to help you in the long run. And since you didn’t pick this week’s PowerBall numbers, it looks like you’re going to be working for a while longer anyway.

Self Training

The one positive aspect of self-training is that you have a good teacher! It allows you to work at your own pace and to learn things that you find interesting. It sharpens your mind, broadens your horizon and gives you something new to think about. There’s no deadline or pressure put on you. Just take things at your own pace and learn what you can.

Courses, Seminars

Attending courses and seminars can also be beneficial. You gain from the knowledge and experience of others. This doesn’t just include the instructor, either. Fellow students will have different experience and knowledge and interaction with some people in your class can shed light on many topics and give you a different point of view that might help to explain something you’ve been struggling with. A credit course

(where you get some form of certificate of completion) will give you a credible line on your resume stating that you’ve learned some aspect of a particular subject. You don’t have to explain how you know how to repair bill validators since you’ve been doing it for a year. You can show the certificate and use that as a source of credibility. Classes also allow you to ask questions and get an explanation for things that haven’t quite made it completely into your grey matter. As well, you have the ability to learn from an instructor who knows the subject. While self-learning may be good, sometimes you just need someone else to explain things to you.

Confidence

This is perhaps the biggest item to help you get ahead in your chosen career. Gaining confidence in your job allows you to present your capabilities to your supervisors without speaking a word. If you know your job and know how to handle the various situations that normally (or rarely) arise in your job, your whole manner reflects this. Whether you are in an interview or just working on the casino floor, your confidence in your abilities may come across louder than anything you can say or do.

What’s Your Job, Anyway?

Today you’re faced with more information, more advanced and complicated systems and more stress than ever before. You need to know your casino’s security (on a machine level and on a systems-wide level), system software (slot machine operating system, networking software, slot management software,

inventory and repair software, etc.), hardware (from the slot machine components such as CRTs, LCDs, BVs, ticket printers, hoppers, network hubs, processor boards, etc.), accounting (from hard meters to accounting software), diagnostics, repairs, PM, installation, upgrades, moves, progressives, linked progressives, wide-area systems, etc.) and the list continues to grow daily! Phew!

Let's face it, the old Bally 5500s were quite different from the new Alpha platform. The older machines had fewer options (and fewer capabilities) but the learning-curve was lower. A simple 'cheat sheet card' could jog your memory and identify the common parameters that you had to ensure were set. Now with multi-level menus and networking configurations, there's a lot more involved in setting up a machine that there was a few years ago. What operating system was used in an IGT S+ machine? It was a proprietary program on an EPROM that you didn't need to worry about. Now systems have embedded Windows operating systems, Linux, etc. and things just get a little bit more complicated for you. As the hardware and software has become more complicated, so have the games running on your slot machines.

Paytables have grown, bonus rounds have been introduced, mystery payouts are featured on some games, free-games and various other characteristics of the games offer great appeal and entertainment value to the players. However, some of these are confusing. There are more paylines than ever before and some machines let

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you buy various combinations of symbols or reels, rather than a traditional payline. As a tech, you're called upon when other people don't understand what's happening with the machine. A slot attendant who can't answer a player's concern is going to call on you. Is the machine malfunctioning or is there some aspect of the game that the player doesn't understand?

The term "slot math" could even be a little too limiting in our description of what you need to know. Slot math includes the game configuration, true mathematics (probability, etc.) and the various individual attributes of the particular slot game that make the game what it is. If you can find it on a PAR sheet, it will eventually filter down to a mathematical equation.

The more features and capabilities that are added to the game, the more your job involves understanding them and being able to work with them. While it might not be something that you can actually touch or remove from the game (like a ticket printer), how much of your job actually involves physical devices that need physical repair? Do you spend a great amount of time setting software options, configuring network communications and working on "soft" items that you can't actually touch? Certainly more of your job involves 'soft'ware as opposed to 'hard'ware. Game software, including slot math, falls right into this category.

Many casino employees, managers and regulators are seeing the benefits derived from understanding slot mathematics. It is becoming

a valuable part of a slot employee's job, and will continue to be in the future. While many techs only use PAR sheets to ensure that reel strips and game settings are correct, video slots have increasingly detailed PAR sheets. Just because there's no payglass and reel strips to install in the machine, the PAR sheet doesn't become unnecessary. In fact, it becomes even more important.

When a casino purchases or leases a slot machine, they need to have some prediction of how that game is going to play on the floor. Game play relates to revenue in the mind of the bean counters. This depends upon a number of factors, including:

- size of casino - how busy it is (typical seat and handle time) - denomination, payout percent - appeal of the game (graphics, features, brand recognition, etc.) - participation or licensing fees - demographics of your typical player (age, time to play, amount of money to 'spend', etc.)

In essence, most of these values can be determined or estimated mathematically. Without a crystal ball, it's difficult to predict the success of a game but with some mathematical knowledge, you can have a better chance of success.

Once the game is on the floor, one of the most frequently asked questions is "Can you tell me if this game is working? We're paying (too much, too little) when I compare it to what the theoretical hold is supposed to be."

Here we come to a very important subject of variance (and volatility) that helps ex-

plain why the game is paying what it is and how you can determine if it's working properly. Wouldn't it be nice to be able to get accounting (or your supervisor) to understand that a game is functioning properly and be able to explain to them why this is the case? Once again, we get into the subject of mathematics. While variances can become complex, you don't need a degree in mathematics to use get the requisite knowledge. You can take the mathematics that you will actually use in your job.

And this leads us to the mathematical knowledge in particular. How do you get it? We mentioned self-learning and courses and seminars earlier in the article and these are great ways. Whether you attend a conference session or read an article in Slot Tech Magazine, you have some very powerful tools at your disposal. We'll continue to give you information on slot math and all kinds of wonderful particulars about your slot games - video, stepper reel and hybrids. In the mean time, consider the advantages of studying these topics. Perhaps I've given you some information that you can use to convince your boss to send you to a course or make sure you attend a conference like G2E. If your casino's budget (or your place in the hierarchy) doesn't allow this, take some time to keep reading Slot Tech. Don't dismiss your own capabilities and what you can learn by yourself. And, feel free to ask questions. If you have any questions that I can help you out with, please be sure to send me an email.

- John Wilson
jwilson@slot-techs.com

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Brian Rankin - Slot Technical Manager

On-Site Slot Tech Training Customized Classes Available

Randy Fromm's Casino School is a practical, no-nonsense look at how gaming machines work and how to repair them when they don't. **No previous knowledge of electronics is required** to get the most out of the school. The Casino School is geared for those who want to learn how to fix gaming devices without having to learn complex electronic theory or purchase expensive test equipment.

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.

Students learn how to work with:



THE DIGITAL MULTIMETER

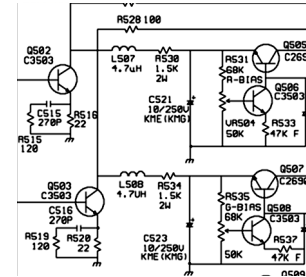
This relatively inexpensive piece of test equipment is easy to operate. Casino School students learn to use the digital multimeter to perform tests and measurements that will pinpoint the cause of a failure down to a single component.

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.

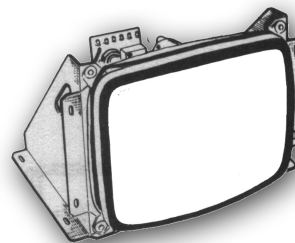
SCHEMATIC DIAGRAMS

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.

You do not have to send your slot techs to Las Vegas or Atlantic City for training. The Casino School brings the training to you. Contact Randy Fromm's Casino School today to reserve a date for your tech school

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SPECIFICATIONS

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- Bills – up to 50 notes, four ways, face up & down
- Barcode Coupons – two way face up

Transaction Speed

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Escrow

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Interfaces

- Multiple serial protocols

SC Series Cash- box Capacity

- Greater than 500 notes

Power Source & Consumption

- 12V – 28VDC
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- Accepting: 30 Watts
- Stacking: 70 Watts

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- SC Series 4kg (9 lbs.)
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MEI CASHFLOW SC Series Models

- SC66XX X " " Flash unit
- "P" Prom unit
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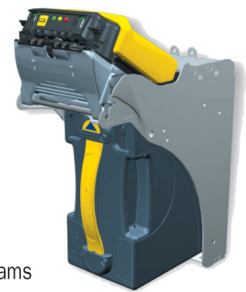


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Slot Tech New Product

Gamesman Brand Products by Coin Mechanisms Inc. Gamesman GPB 930 “Fireball” Pushbutton



Coin Mechanisms Inc. announces the release of the Gamesman Brand Model GPB 930 “Fireball” pushbutton. The GPB 930 “Fireball” button takes game interaction to a new level in pushbutton technology.

It features an LED based *Smart Display* in its center, capable of storing up to 8 different user programmable messages in lengths of 256 bits per message. The display can be programmed to flash, blink and scroll messages in any font, and in any language, from rolling text to progressive jackpot amounts.

Communication to the “Fireball” button is performed through an RS485 interface which has ESD protection devices on the bus. Programming and reprogramming are performed via an RS232 interface serial port which utilizes hyperterminal software found on most PCs.

Cont’.

A TRADITION OF INNOVATIVE IDEAS



5mm Wedge Base L.E.D.



Universal Topper



Type 4 Cold Cathode

Straight Tube 400mm CCFL

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For instance:

- Our wedge-based L.E.D. replacement bulbs reduce power consumption by 80% or more over incandescent lights, and can last for 2 years between replacements.
- Our universal topper signs provide user programmable lighting effects to attract players to your games.
- Our straight tube CCFL fluorescent lamp replacements deliver longer life, lower power consumption and a more attractive light spectrum.

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Another feature is the "Fireball" button's outer bezel. It comprises a circuit board made up of 28 RGB (red/green/blue) addressable LEDs that can be programmed by game designers to flash, change color and spin, either during game play or in attract mode.

The "Fireball" offers many options to change the function of the pushbutton during game play and introduce key game features directly to the players' attention.

For more information on this and all of Coin Mechanisms latest products, visit the website www.coinmech.com, or call toll free 800-323-6498

Contact:

Michael K. Meisinger
Coin Mechanisms, Inc.
400 Regency Drive
Glendale Heights, IL 60139
Toll Free 800-323-6498
Tel. 630-924-7070
Fax 630-924-7088
Email:
mikem@coinmech.com

For schematic diagrams, service manuals, drivers, software, etc. visit the Slot Technical Department FTP server

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May 2006

Replacing Gaming Monitors Have You Frustrated?

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Slot Tech Event

Thunder Valley Redux



Does this scene sort of look familiar to you? Slot Tech Magazine returned April 3 - 14, 2006 to finish up four weeks of slot tech training at Thunder Valley Casino in Sacramento, California. Everyone had a splendid time and a piece of graduation cake.

Right: James Lancaster, Vance, Vue Chu and Thomas Manz

Below: Martel Mendoza, Charles Philipp, Belinda Spence, Jeff Stephens, Shaun Wilkinson and Terry Ellis





MultiMax

High Speed Stand-alone Device Programming System

EE Tools introduces the most cost effective high-performance Programming System to program leading high-density Flash memory and other programmable devices (such as Samsung's NAND parts) at near theoretical minimum programming times. MultiMax is a complete, stand-alone programming system, featuring a fully embedded operating system, a simple operator interface, and an ergonomic user-friendly design that minimizes process steps and maximizes performance. The MultiMax is designed to program even faster, so when Flash memories get bigger and faster, so will the MultiMax.

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MultiMax-8G	\$5,950
MultiMax-16G	\$9,950
TopMaxII	\$995
ChipMax2	\$475



ProMax

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ProMax is the state-of-art universal programmer offers you the most advanced programming facilities for high-speed USB 2.0 PC-interface. It programs a 64Mbit flash memory in 42 seconds. ProMax supports the latest device technologies, regardless of package type.

The Gang Program Mode (Concurrent Programming Mode) can program any device and the fault-tolerant architecture allows the programmer to continue production even if one of the sockets should fail. As many as eight sockets ProMax can be controlled by a single PC with no loss of programming speed, reliability, or performance. Each programming site is completely independent of the rest and the system will completely program the first device by the time the operator has inserted the last device.

- Universal device support includes the latest NAND Flash Memory, Standard Flash Memory, EPROM, EEPROM, Serial PROM, and Microcontrollers
- Supports Windows 98/Me/2000/NT/XP
- Distribution of 16- and 32-bit data into 8-bit portions
- External START key allows production programming mode.
- Gang Program Mode allows programmers up to 8 units as concurrent programming system. (START ALL key enable to program the programmers simultaneously)
- Supports Windows 98/Me/2000/NT/XP

ProMax-4G	\$2,450
ProMax-8G	\$4,450



Other products from EE Tools: EPROM Emulator, EPROM Eraser, Single Socket Universal Programmers for USB 2.0 PC-interface (TopMaxII, UniMax, ChipMax2)

EE Tools offers customized programming algorithms at free of charge for gaming industry.

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Slot Tech Magazine is strictly technical. As such, the magazine's contents are not time critical. The repair information and technical data contained in past issues is just as valid today as it was the day it was published.

Additionally, current and future articles more-or-less assume that readers are already familiar with what has been covered in past issues. This editorial policy assures that Slot Tech Magazine's contributing writers are not limited to "writing down" to the level of a novice technician but are free to continue to produce the most comprehensive technical articles in the gaming industry.



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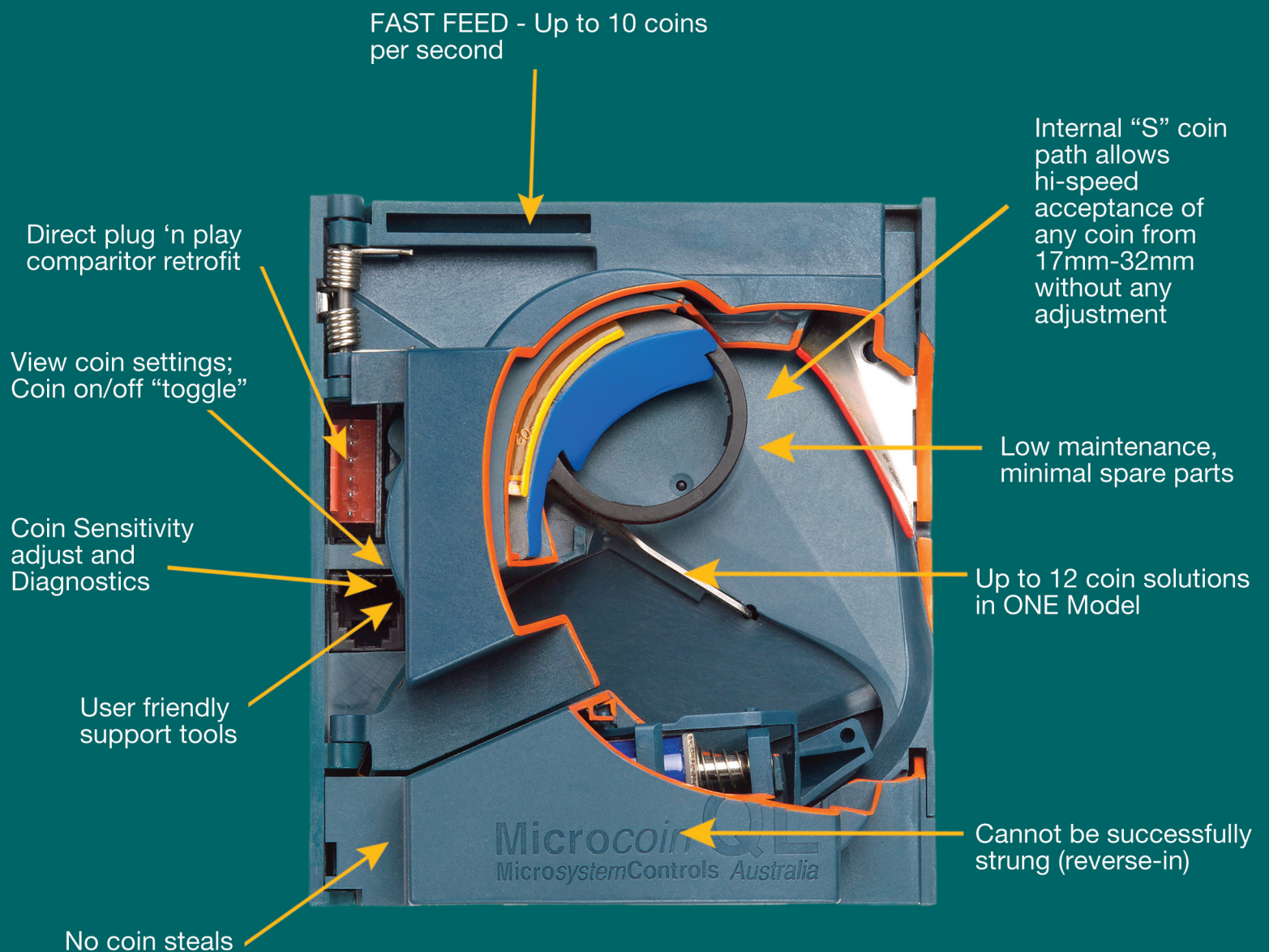
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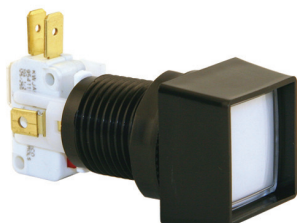
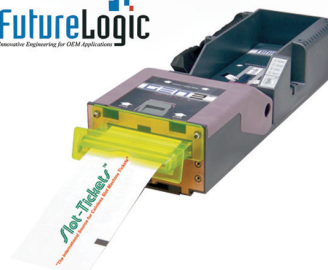
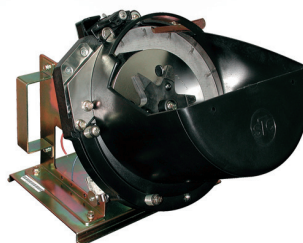
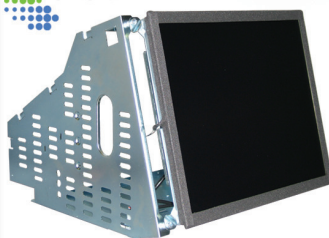
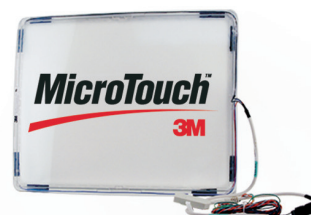
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