March 2012

Slot Tech Magazine

Slot Machine Technology for the International Casino & Gaming Industry

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Bally Alpha Weirdness
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Slot Tech Magazine

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Slot Tech Magazine is published monthly by
Slot Tech Magazine
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El Cajon, CA 92020-2827
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e-mail editor@slot-techs.com
Visit the website at slot-techs.com

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March 2012

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When is a slot tech more than a slot tech? Pretty much always, it seems. As a group, slot techs seem to have a wide and varied set of interests outside the casino. Many are musicians (I play a few instruments but I can't call myself a musician). Check out "Party Like a Slot Tech" by George "G-Man" Slade (Google it. It's a free music download. Very funny). Hot Rods seem to be a popular pastime as well. And of course, there are the electronics geeks such as myself that enjoy building things like radio transmitters and electronic bongos.

While training in New Mexico recently, I had the distinct pleasure of meeting Glenn Gomez. Glenn is a slot tech at the Buffalo Thunder Resort. He is also a master artisan potter, specializing in working with the micaceous clay that is found in the area. That is his work you see on the cover this month. **-rf**

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WMS BB1 Errors
Bally Alpha Weirdness

By Chuck Lentine

WMS BB1 Errors

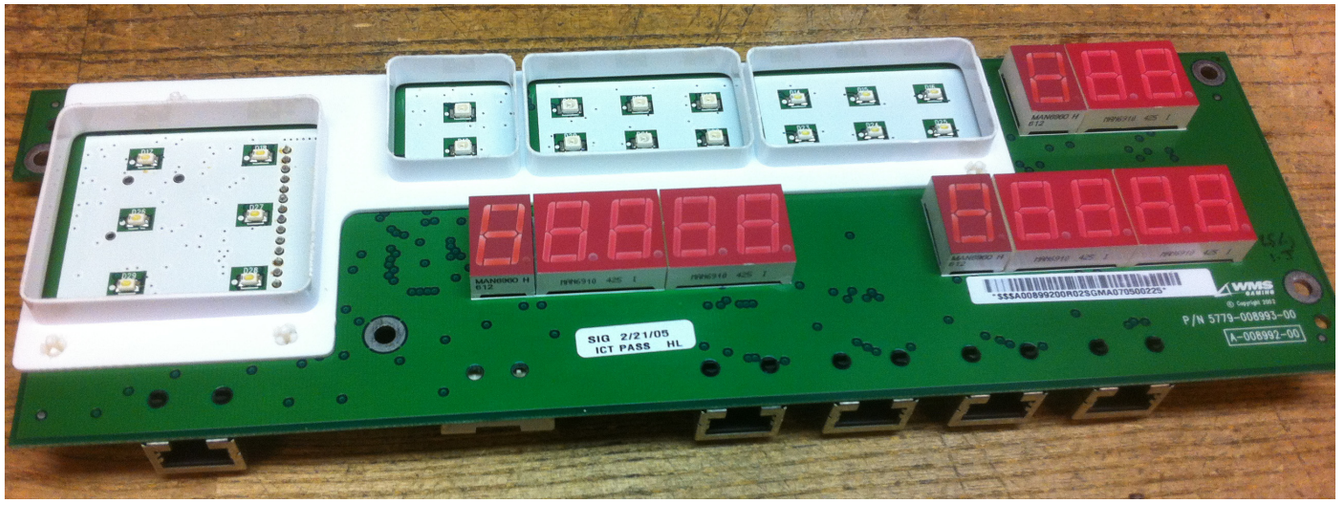
This little story came from a WMS BB1 5-reel machine. This is the type of machine with the LED panels on the pay-lines and a small monitor on the door. It started with one problem and led to another after the first was corrected or could it have been the other way around? See what you think.

One of the nice things about BB1's is the ability of the machine to tell you just about everything that is wrong with it on the monitor, provided the power supply, logic and monitor work. This particular game was showing "Pay-line 20 error."

The Pay-line 20 error comes from one of the two LED panels (photo1) on the door or the cat-5 cables that interconnect them. Most of the time we just replace all the cat-5 cables and go on our way. This game wanted to be little more stubborn. I found cold solder on of the connectors on the main LED board. I took it back to the shop to reflow the connector and did the rest of them while I had it out. (photo 2)

After installing the panel it booted up and the pay-line error was gone. However, a new one showed up: Universal Animator Command Timeout. This error is usually the large oval button with the LEDs under it on the player control panel. It usually functions as the max bet with bonus button found on the "Hot Hot Penny" games.

While the button itself may not be bad, it is usually the associated hardware that throws this particular error. (photo 3) Because this hardware is mounted on the belly/drop door, it gets a lot of abuse and gets pinched or just falls out. Not shown is a Cat-5 cable that connects to the universal animator board and the backplane (video



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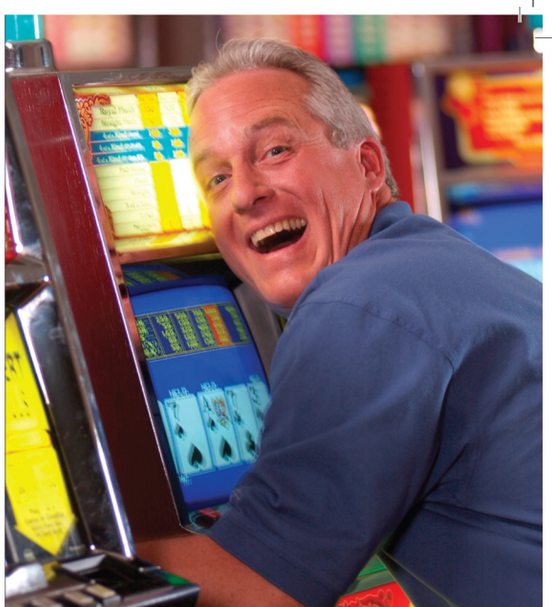

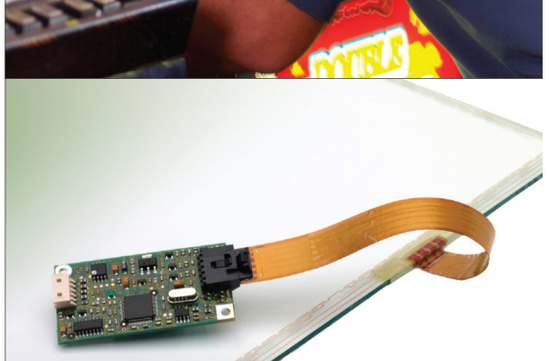

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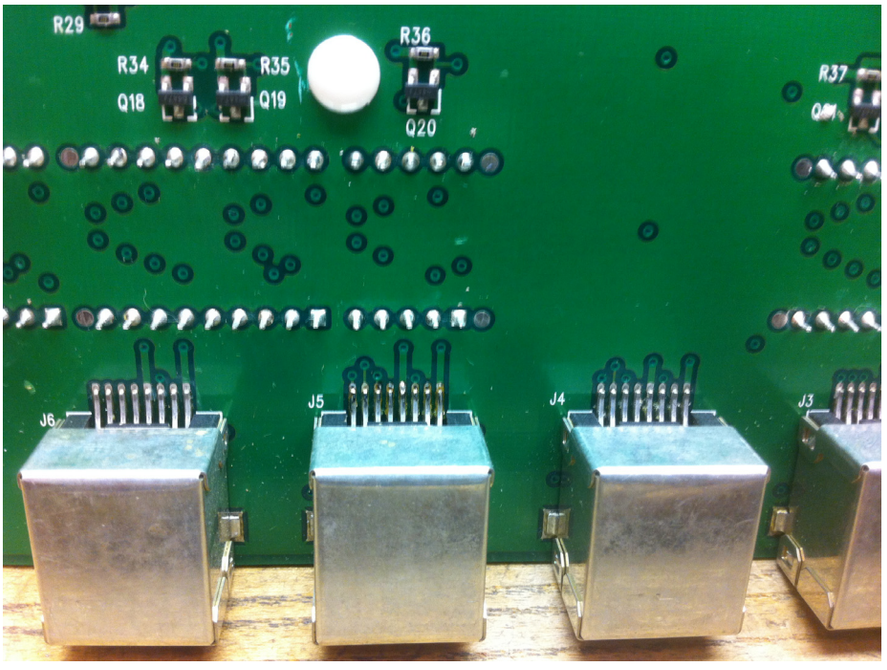
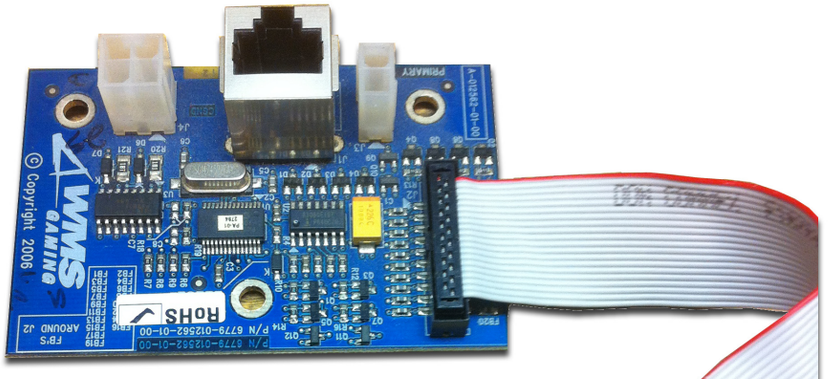
slot) or the SPN matrix board (photo 4) (reel slot) or the LED pay-line board (see above).

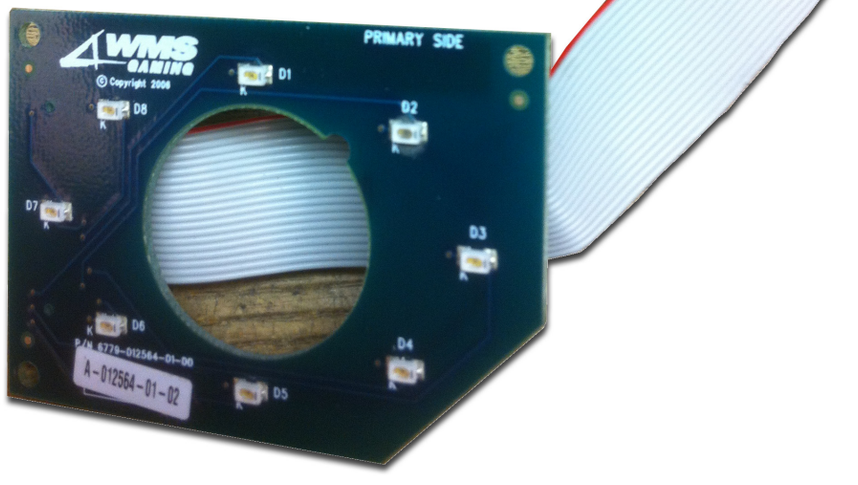
I started by taking out all the animator hardware and laid it in my lap still connected. The game booted up fine and no errors existed. I could bring up the animator button up in test mode (SPN Diagnostics) and it worked perfectly. I put everything back in the game (with the power off) and fired it up. It came back with the animator error. I replaced all three animator parts with new ones and installed them in the machine. Same thing, animator error popped up again.

Saying a few choice words to the machine I went off and got a new Cat-5 cable. Waited for it to boot up again (which is six minutes BTW). Same thing happened, animator error still coming up. Just for the fun of it, I pulled everything out again and laid it in my lap and fired it up. When it finally came up the error was gone. Just to humor myself I placed everything back in the machine one more time. Sure enough, the error came back.

Now it's time to carefully inspect every inch of the animator hardware and parts of the door where this thing is mounted. To rule out any of this new hardware, I swapped it with







the game next to it and it all worked. **-Cont. pg. 8**

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Back to the problem machine, I wanted to see how well the LED board was sitting against the underside of the animator button. If it's not flush, it can short out on the metal panel. All lined up correctly. I took all of the button parts off of the control panel and looked on both sides. Nothing looked out of place. I placed just the button through the panel and held it underneath with my fingers. While lining it up, I felt a sharp pain in one finger. Saying a few more choice words to the machine I had a thin-as-a-hair metal sliver in my finger! This piece of metal was sticking down through one of the LED holes shorting out the animator feature when it was placed in the machine. It was very thin and flexible so I couldn't see it or feel and resistance while mounting the LED board. I filed down the rest of the control panel, placed everything back where it should be and the machine worked!

WMS Parts Listing:

A-008992-00 LED Credit / Bet panel
A-011697-02-00 SPN interface board
A-012564-0102 LED animator
A-012562-01 Universal Animator Interface
HS-012597-00-00 Universal Animator Ribbon Cable 8"

Bally Alpha Weirdness

We had a bank of Bally Alpha reel games keep tripping the main circuit breaker that ran power to the entire bank. The power would last for 15 minutes before it tripped again. The first thing we check is the main power conduits for loose wires and short circuits. The power lines to each game were inspected

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Thank you, thank you, thank you.

The positive reponse to TechFest has made it difficult to hold just two events this year. I have been invited to bring the event to Motor City Casino (that will be TechFest 26 in November) but since TechFest 23 sold out, I have planned another event in Las Vegas to cover the folks that were turned away. In addition, I have been invited by Hard Rock, Tulsa to hold an event there (they actually will be sending many techs from many of their properties in Oklahoma but the event is open to all slot techs from all properties). That makes four TechFest events this year. There are no plans to make this a regular schedule.

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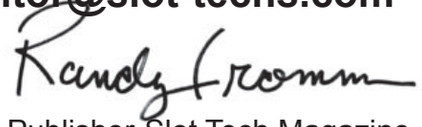

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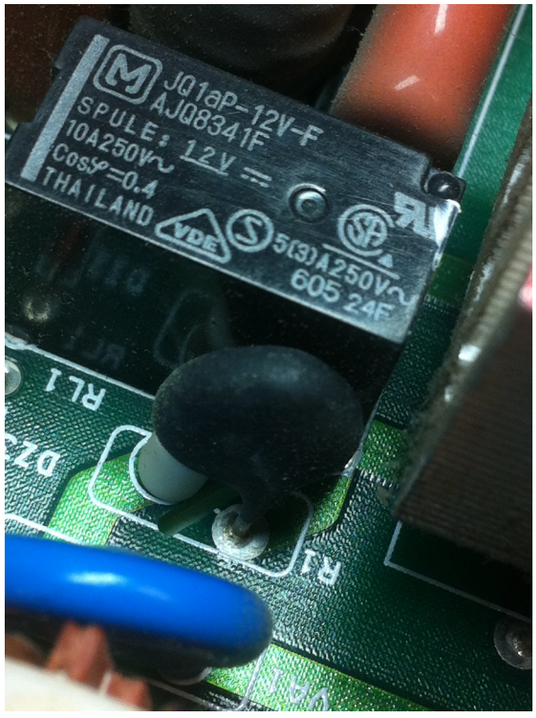
also. All was good and tight. The breaker or conduits did not even feel warm, so we didn't believe anything was overloaded. The bank has been in place for 5 years with nothing new added to it.

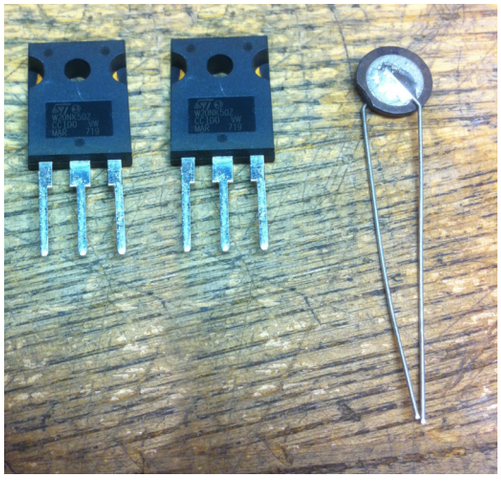
The last time it tripped, it was reset and tripped again immediately. We unplugged all the machines and tried the breaker again with no load on it. The power stayed on, so nothing in the conduits was doing it. One machine at a time was plugged back in until we came to the next to the last one. As soon as it was plugged in, a BIG spark shot out from the plug! We have found our culprit.

Having the game narrowed down, a quick inspection of the 110VAC areas and everything connected via the switched and un-switched outlets were removed. Nothing looked or smelled fried so we plugged it in, and the breaker tripped again. It's easy enough to slide out the two power supplies, so they were removed. One supplies 12 and 5VDC and the other runs the 24VDC stuff. With them removed, power was once again supplied to the machine and it came on. The 12/5 VDC unit was then connected (with the power off) and the game came up. So this one must be ok. The 24VDC unit was then installed and sure enough tripped the breaker. So now we have isolated the problem to the 24VDC power supply, and took it back to the bench. (photo1a)

Tri-Mag model DZ300-12EUFV3 15A +24VDC and 2A +5VDC Power Supply

I'm starting to think one of the power lines in the unit is shorting out or maybe the bridge rectifier is shorted? All of that was intact and checked out good. The main fuse (6.3A) was good. The main power supply input lines were not shorted on the board. After poking around in the unit I noticed R1 had a burnt crack going down the side of it. Tapping it gently, it crumbled off like a piece of charcoal. (photo 2a) Why did this happen? From R1 I started to do a continuity check on everything versus ground. All was well until I hit Q3 and Q4. Both 24V Mosfet transistors were dead shorted. They were removed and checked out of circuit, still dead shorted. Both were replaced as well as R1 and the power supply came to life. The dual cooling fans on the front of the unit sounded very noisy so they were replaced also. It turned that out R1 was acting like a fuse.





Parts Listing: (Photo 3a)

Q3, Q4 K2837 (NTE 2970) Mouser # 511-STW20NK50Z N-CH 500 Volt 17 Amp

R1 Thermistor NTC 5 ohm @ 25c Digikey # KC024N-ND

Cooling Fans Sunon KDE0505PFV2 5VDC Digikey# 259-1345-ND

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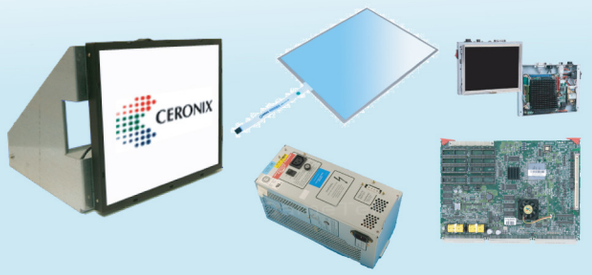

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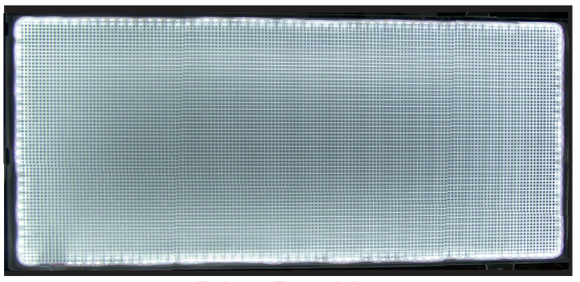

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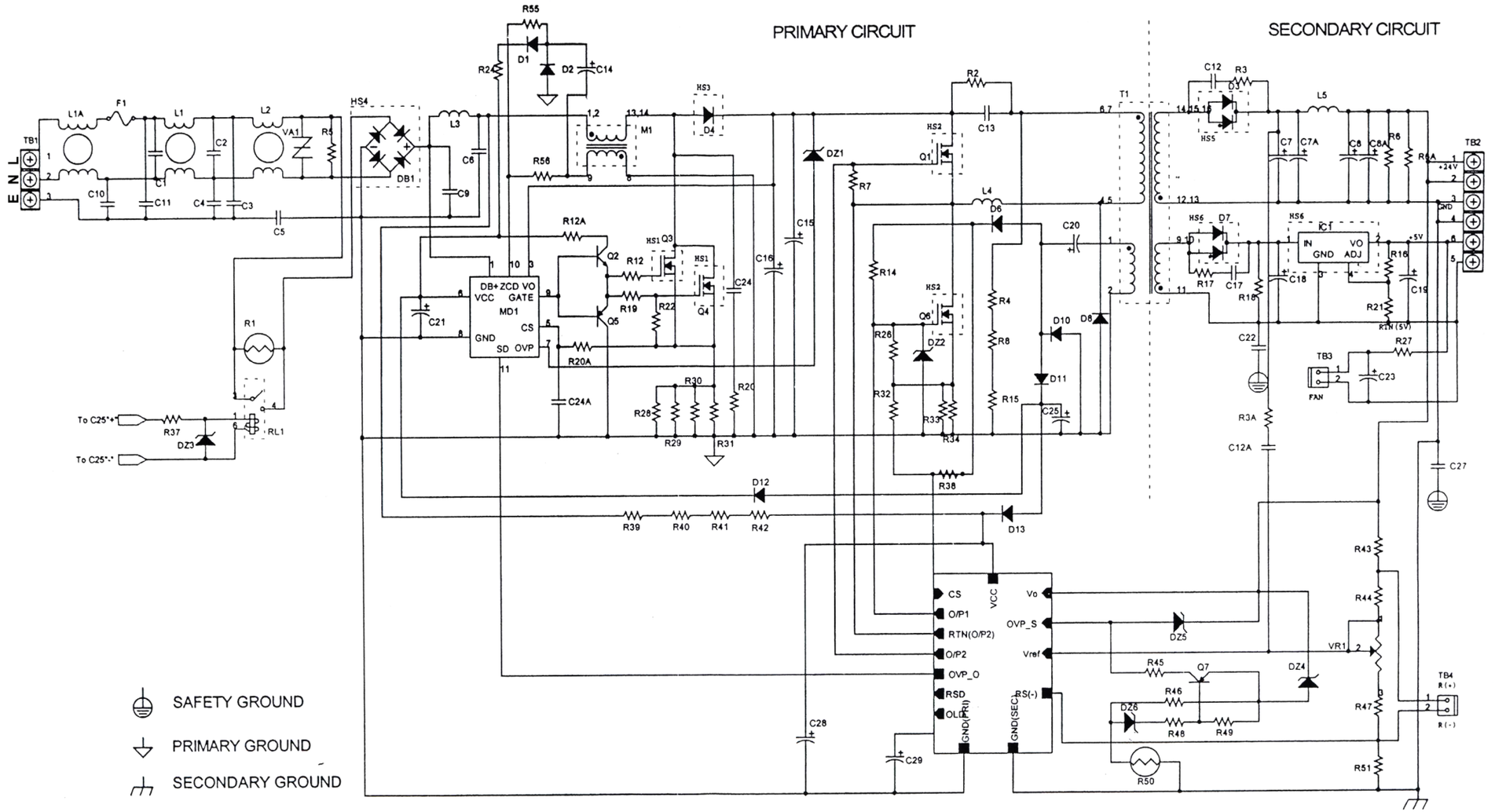

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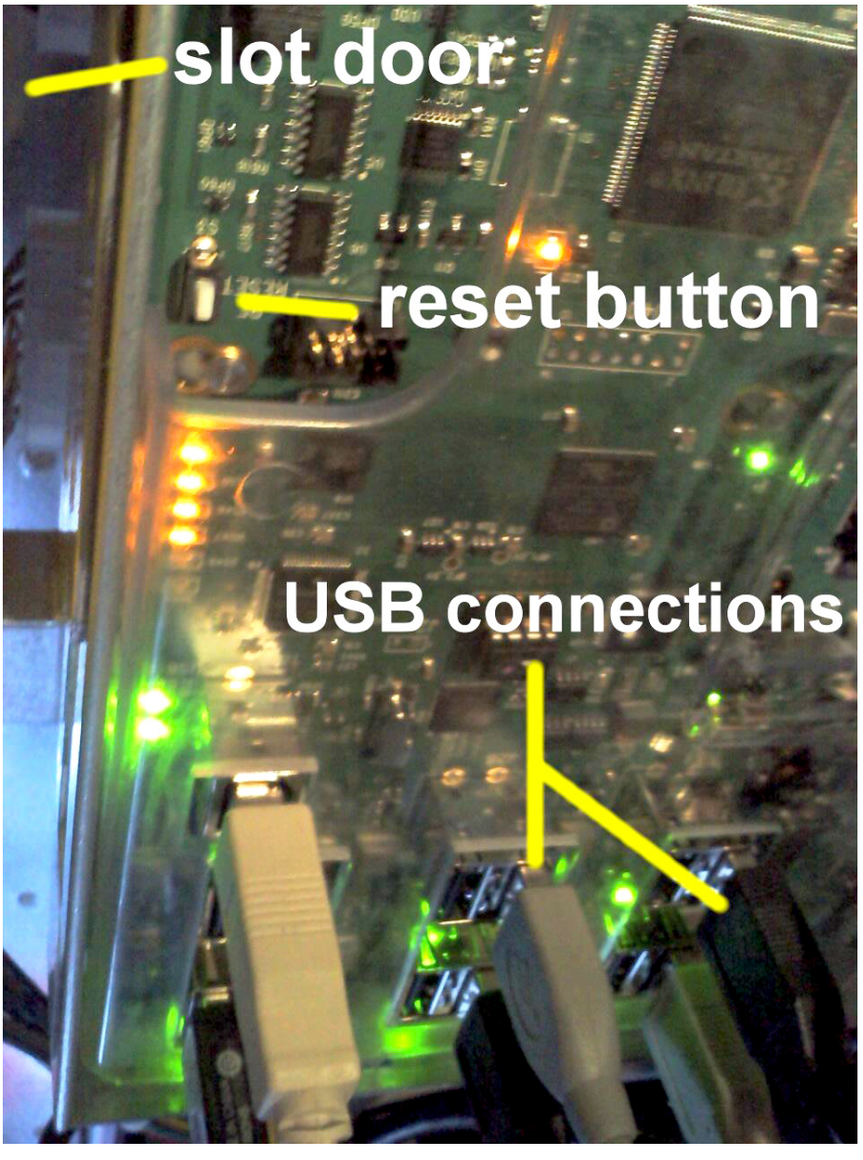
Quick & Simple Repairs #83

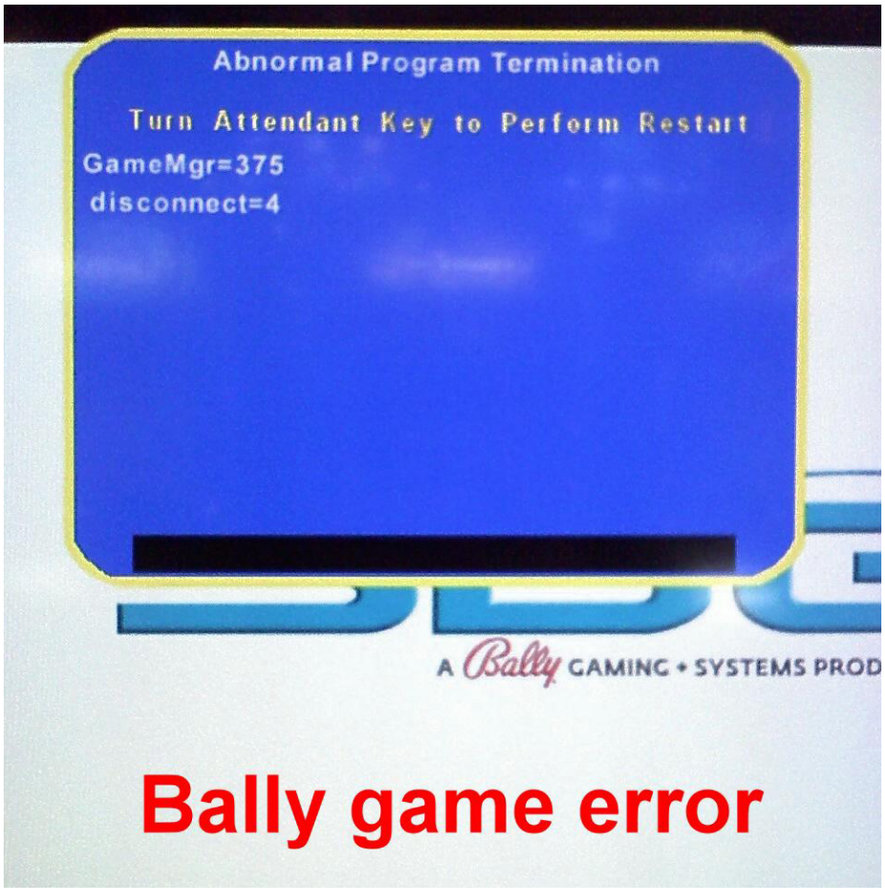
By Pat Porath

IGT Player Button Panel Reset

On an IGT MLD AVP 3.5 game, if a "button panel error" displays, there is a small white button that will reset it without rebooting the game. Located on the motherboard (about in the middle, closest to the outside of the game) is the small white button. As an example: a slot attendant calls you to a game that has a button panel tilt, the main door is opened, the small button is pressed for a few seconds, close the door and the error clears. On the motherboard, near the reset button, it is marked "BF Reset." I needed to make a phone call to see what in the world "BF" stood for. From what I was told, it is short for "Black Fin" which is a type of IGT NETPLEX communication with the button panel and the "halo rings." In case you are wondering what a "halo ring" is, no not the video game, but the multi color RINGS that are around the cash out button, game bezel, and around the bill acceptor bezel. It may also be called a multi color bezel? Anyway, it is a type of communication that is used so the game "talks" to the devices. What if pressing the reset button doesn't work? Well, press it again for a few seconds and close the main slot door. If that doesn't work, then I would try a reboot of the game. If both do not work, then you probably have something that



needs attention such as inspecting the button ribbon cable, reseating the ribbon cable, disassembling the button to check for a loose connection with the small ribbon cable, or the button may need to be replaced. As a reminder: DO NOT disconnect and reconnect the OLED type buttons with power on. There is a very good chance if it is done, that it will take out a board. Other things to check if a button or buttons aren't working on a newer IGT are: loose USB connections, does the "Dynamic button control board" have power? Are all of the connections on the buttons and button boards snug? Hope this bit of info helps you as it has helped me as a slot tech.



Bally Alpha Wouldn't Boot Up All The Way

The game would start to normally boot up, then all of the sudden it would stop. Then an "abnormal program termination" error appeared on the LCD. I had never heard of this error before. When the game was starting to boot up, I checked the cooling fans on both of the power supplies that are located on the left side of the game. On the Bally Alpha upright, one is 5/12VDC the other 24VDC. All of the fans were spinning at what appeared to be an average speed so it didn't look like one of the power supplies would be overheating. After another reboot of the game, the error appeared again. This time the game was shut off and the "brain box" was reseated. That didn't help either. First the OS card was swapped with the game next door (same game, same program) and the error appeared again. Of course power is OFF when swapping cards. Next, the

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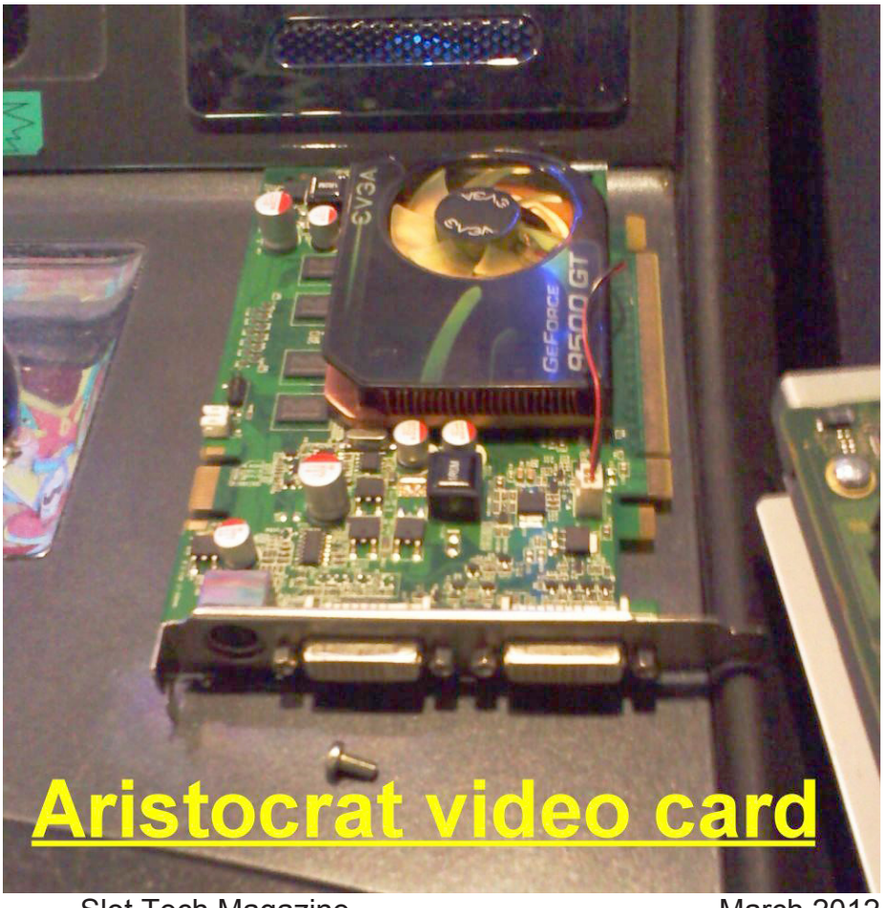
game card was swapped. Now the "problem game" booted up on the first try, and the game next door had the error. This failure proved to be a bad game CF card. The cards were put back to the original games and I passed on the info for a replacement to be ordered. I'm quite sure when the replacement is installed, after a RAM clear and game options, it will be back online. Good old simple swaptronics to the rescue once again.

WMS Bluebird Not Booting Up

During an OS upgrade on some WMS Bluebird 1 games (the early Bluebirds that don't have a hard drive in the main processor board area) one of them wouldn't boot up all the way. When it finally did a couple of times, the screen froze. I was told both the power supply and the LCD had already been replaced in the game. How about going back to the original OS card? I tried that too, along with a RAM clear with a version 1810 RAM card. Neither one worked, the clear or the original OS. Luckily a co-worker stopped by to see what was up. For starters, the individual stated that an 1810 RAM card wouldn't work in an older Bluebird, so a 1310 was handed to me. That didn't work either. It seemed like nothing was working with this game. So, a replacement main processor board was installed and it already had the BIOS and jurisdiction chip in it. Finally the game had some life to it. RAM card 1350 was used, then the OS 1943 was installed without any issues at all. After setting the game options, along with testing the game, it was finally back up and running. I wasn't really sure what else to do besides replace the processor board. It sure did the trick to get this game repaired.

Aristocrat Slant Top Viridian

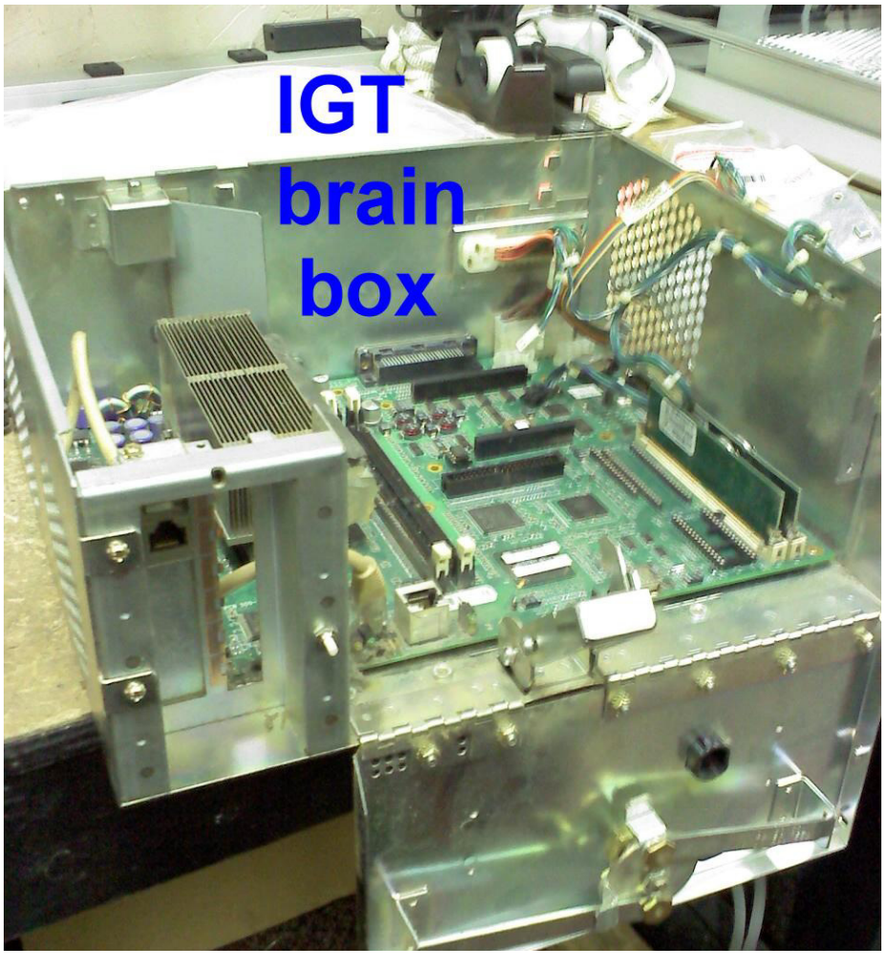
Upon arriving to start my shift there were a few games shut down. One was an Aristocrat slant top Viridian. I was told it had not one but two problems, number one being the game would randomly reboot itself and number two, once in a while both the upper and lower LCDs would scramble. Could one or both problems be a heat issue? When I first arrived at the game, it booted up normally and was in play but it didn't last very long. At most, it lasted maybe a half hour. I turned the game off for a few minutes then turned it back on. This time, the logic door was opened up to take a closer look at the cooling fan located on the video card. After a quick inspection, it appeared to be fine. If I remember correctly, the Viridian may even give a "slow fan speed" error on the game screen. Since I was told the game had a video problem, the video card (video board ass'y) was swapped with a game next door. About 20 minutes after the swap, the game



with the possible bad card failed. This failure indicated that the video card was bad. Even though I didn't see any scrambled graphics on either LCD, the card was bad causing the game to reboot itself. After a replacement video card was installed, the game was OK.

IGT AVP 2.5 Rebooting Itself

Complaints were received every so often that an IGT slant top AVP 2.5 game would reboot itself or the screen would freeze up. The brain box (main processor board) was reseated on it a few times and it would seem to be OK for a while, then it would act up again. This time, I removed the brain box for an inspection. Everything appeared to be OK. The cooling fan on the video card spun very easily, none of the capacitors looked to be domed, all of the chips on the main board were snug in place, none of the chips had any bent pins, and so on. Here is the tricky part, even though the video card looked good, I was told to replace it anyway. Well, what did I have to lose? So, a replacement was installed. Ever since then I have not heard of a complaint at all about the game. Definitely something to keep in mind, if all looks well, try replacing the video card. It sure worked with this one. - **Pat Porath pporath@slot-techs.com**



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SMD Component Guide
Introduction to SMDs

By Colin O'Flynn

As a slot tech at a modern casino, you will probably find yourself needing to work with SMD (Surface Mount Device) packages. Not to worry though, its a lot easier than it looks! Soon enough you'll be happy when a repair needs a surface mount part and groan when you have to solder *another* through-hole part.

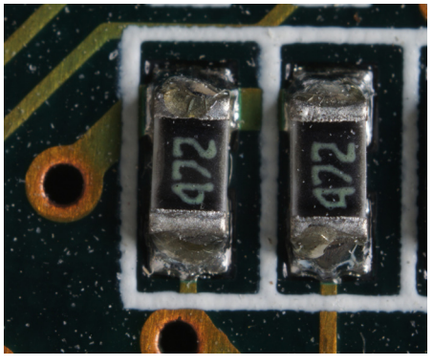
This article will take you through the process of soldering these surface mount parts, from simple two-pin parts to more complex TQFP. And don't worry, the equipment required is fairly simple, chances are you already have some of it in the slot shop (like a soldering station).

Packages

There are many different types of packages. Here are some of them:

Packages - Two-pin SMD

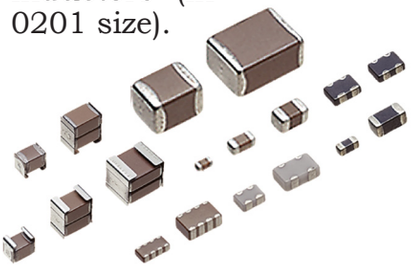
Resistors Resistors have a pretty standard package. They will normally be a small rectangle, with solder connections at the ends. They are normally marked with their resistance. For example, it might say 472, which is 4700 ohms. To get this simply add as many zeros as the final digit on the package. Here are some examples:



472=4700 ohms (as above)
221=220 ohms
4991=4990 ohms
4021=4020 ohms
1002=10,000 ohms
100=10 ohms (Don't get confused here. This is not 100 ohms. A 100 ohm resistor would be marked "101")

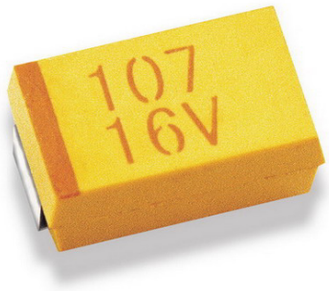
Note that the 1% parts have four digits on the part itself, as the resistance is known to a higher number of significant digits. Almost all resistor packages have their resistance marked on them (unlike capacitors). The resistor package is normally specified as something like 1206, 0603, 0805 or a whole host of other ones. The relationship between package size and number is straightforward. It's the length (in inches) by the width (in inches).
0603=0.06 in X 0.03 in.
0805=0.08 in X 0.05 in.
1206=0.12 in. X 0.06 in.

The 0805 is pretty easy to solder and 0603 is not too bad but getting pretty small and difficult. Anything below 0603 size is going to be hard to solder (mostly because it is hard to hold). It would be almost impossible to hand solder a 0201 size device. For example an ad for one particular line of inductors has a picture of some large and small specks, captioned "The big ones are pepper flakes. The small ones are high performance, high frequency inductors" (in 0201 size).



Capacitors

Capacitors have nowhere near a standard package. For small ones, they normally have the same package size (IE: ceramic capacitors normally come in these sizes) as resistors. Unlike resistors, often these capacitors have no markings on them. If you lack a capacitance meter, you won't be able to figure out what some of your capacitors are. The lesson here is keep SMD capacitors in their marked packages. This is probably a good idea for all your SMD parts but most important with SMD capacitors.



If you are using SMD tantalum capacitors you are in better luck. These are almost always marked with capacitance and working voltage. They don't have as consistent a marking scheme as resistors though. You often have to do a bit of deductive work or a bit of guessing. Here are some examples:

10u 25=10 uF@25 volts
476 25 K=47 uF@25 volts
226 20 K=22 uF@20 volts
10 15v=10 uF@15 volts

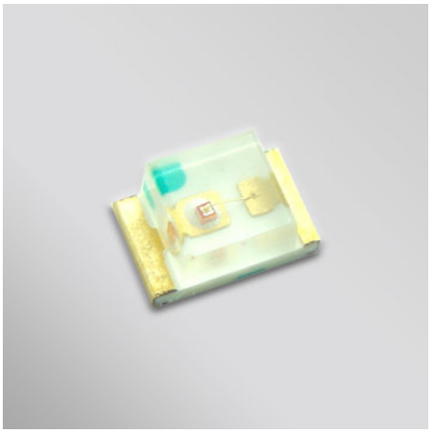
The capacitors with a K are from Kemet (the K has lines above and below it), and Kemet seems to use the notation instead of writing the capacitance on them. Note that the stripe on the capacitor indicates the positive side of it.

Electrolytic surface mount capacitors are fairly constant. They are marked in a similar way to normal radial electrolytic capacitors with their voltage, capacitance, and polarity marked. The black mark on the case indicates the negative side. There will normally be two numbers (plus sometimes a combination of numbers and letters, which is the series number). The capacitance is on top of the voltage so if a capacitor has 220 6.3V marked on it that is 220uF with a 6.3 volt

rating. Sometimes the capacitors don't have a voltage marked though. I have some SMD electrolytic capacitors without a working voltage marked on them.

Other Parts

There are many other small two-pin SMD parts around such as diodes, inductors, LEDs, etc. The easiest method is to check the data-sheet for your specific part. Many of these use the same packaging numbers as resistors. Here are a few general pointers, check the data-sheet for your specific part though first: LEDs mark their cathode with two green marks on it Diodes often have a band that indicates ANODE, like a



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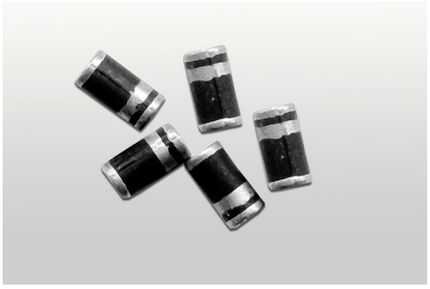


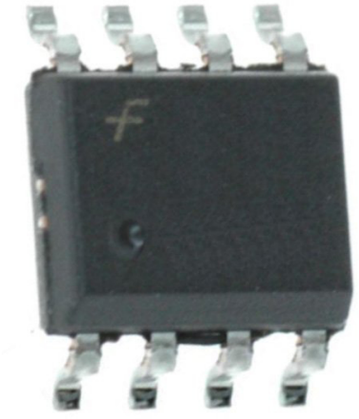
tantalum capacitor. With through-hole diodes though, this strip often means CATHODE, so be careful! It is highly recommend to look at your data-sheet, just to be sure.

Packages - ICs

The only information that you can normally get off an IC package is the part number and, in some cases, the date code, speed grade and temperature rating. The part number is normally the 'main' number on an IC and in some cases ,the only number. Here are examples of some part numbers: AT90S2313-4SC The core part number is AT90S2313, the -4 means 4 MHz while the SC means SOIC package with Commercial temperature grade. As well there will often be a number on the package that looks like 9923. This means the chip was made in 1999, week 23 of the year. Here is another example: ATMEGA128-16AI 0212 Again, the core part number is AtMega128, the -16 means 16 MHz, AI means TQFP package (that's what the A stands for) with Industrial temperature grade. The chip was made 2002 week 12.

If you need to look up part numbers there are a number of resources for you:
www.icmaster.com
www.freetradezone.com
www.google.com (a general search engine, but you would be surprised sometimes) www.findchips.com (will only find current chips that distributors stock, but still might be useful).

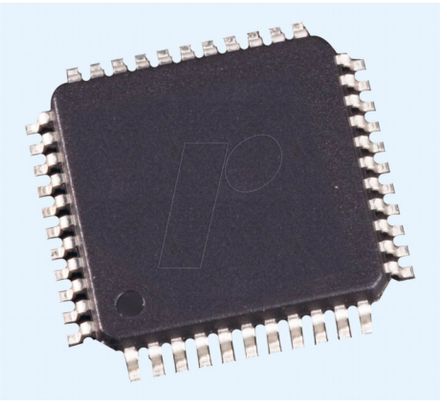
Two Rows of Pins



There are many packages that look like very small DIP packages with the leads bent out. They have two rows of pins. An example is the SOIC package, which is very popular. However unlike DIP packages which are fairly standard in pin pitch, pin type and width, the SOIC packages have many different dimensions. You must check the data-sheet for the exact part you will be using to get the dimensions of the part.

Likely two of the common variants of the SOIC are the lead types, either bent under the device (J type leads) or the more 'normal' S type where the leads simply go away from the device. As well, the SSOP package is common. It is similar to the SOIC but at a smaller pin spacing.

Four Rows of Pins



As device pin count goes up, and package size goes down, the simpler two rows of pins becomes insufficient. Many of the integrated circuits come in some sort of square package for SMD, such as TQFP or MLF. The PLCC package is also very popular for large ICs. We often see these in sockets for gaming such as in bill validators. PLCC has a pretty big pin spacing, but the pins are bent under the chip which can make things slightly harder in some cases. TQFP isn't too hard to solder for some of the larger pin pitches. MLF is hard to solder though, it is really designed for wave soldering or a similar process. It is very small, but it IS possible to solder it by hand.

Continued next month.

Colin O'Flynn
coflynn@slot-techs.com

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Randy Fromm

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Slot Tech Magazine is published monthly by:
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1944 Falmouth Dr.
El Cajon, CA 92020-2827
tel.619.838.7111
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About Randy Fromm: I am the publisher of Slot Tech Magazine. First published in 2001, Slot Tech Magazine is a monthly trade journal focusing on casino slot machine repair. I have been repairing electronics for the gaming industry since 1972. I really enjoy what I do and I love showing others how easy it can be. *No previous knowledge of electronics is required.*

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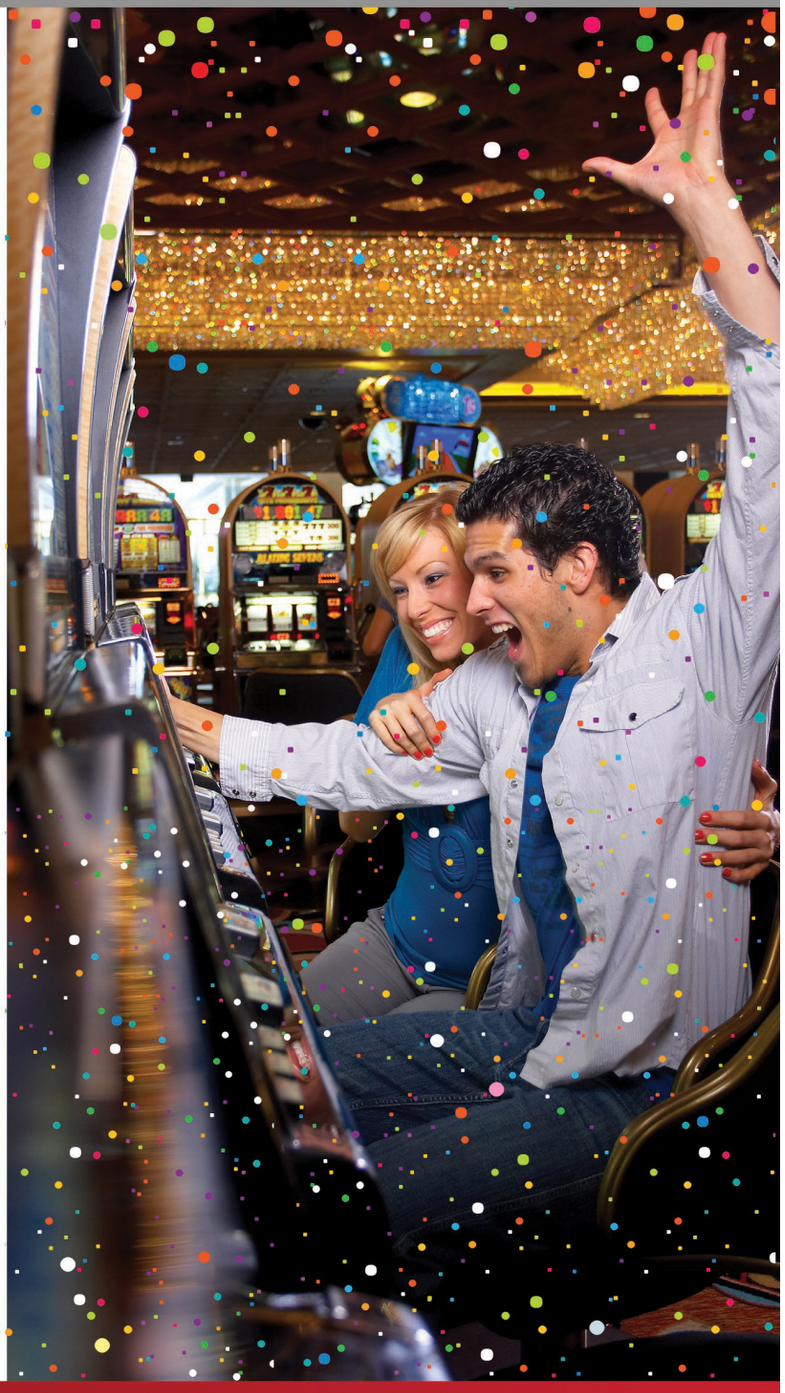

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