

October 2010

SLOT TECH MAGAZINE

Slot Machine Technology for the International Casino & Gaming Industry

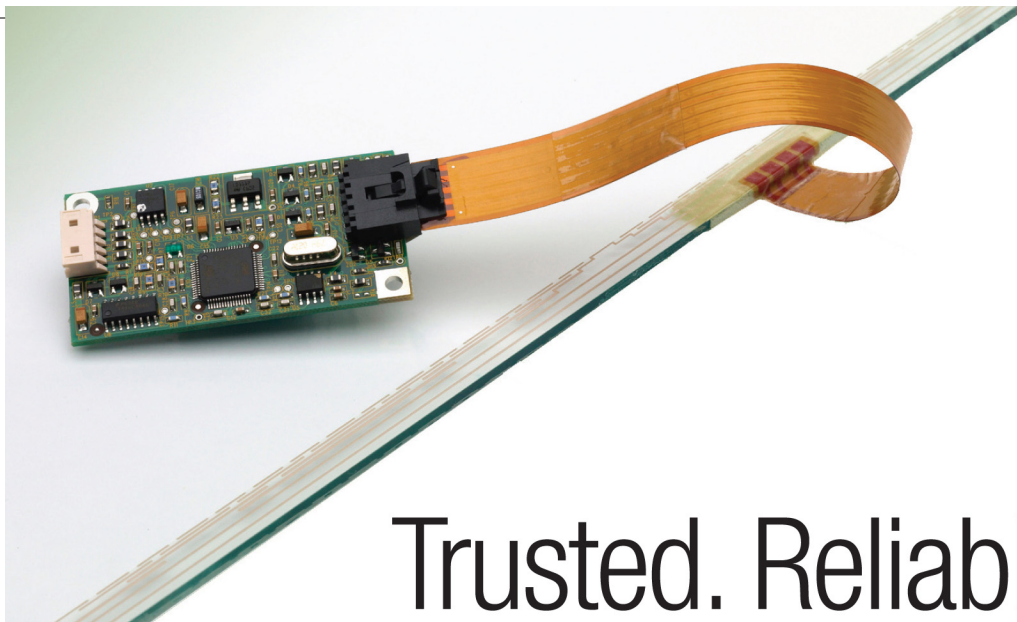
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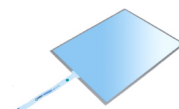
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Although we modern persons tend to take our electric lights, radios, mixers, etc. for granted, hundreds of years ago people did not have any of these things, which is just as well because there was no place to plug them in. Then along came the first Electrical Pioneer, Benjamin Franklin, who flew a kite in a lightning storm and received a serious electrical shock. This proved that lightning was powered by the same force as carpets, but it also damaged Franklin's brain so severely that he started speaking only in incomprehensible maxims, such as, "A penny saved is a penny earned." Eventually he had to be given a job running the post office.

After Franklin came a herd of Electrical Pioneers whose names have become part of our electrical terminology: Myron Volt, Mary Louise Amp, James Watt, Bob Transformer, etc. These pioneers conducted many important electrical experiments. Among them, Galvani discovered (this is the truth) that when he attached two different kinds of metal to the leg of a frog, an electrical current developed and the frog's leg kicked, even though it was no longer attached to the frog, which was dead anyway. Galvani's discovery led to enormous advances in the field of amphibian medicine. Today, skilled veterinary surgeons can take a frog that has been seriously injured or killed, implant pieces of metal in its muscles, and watch it hop back into the pond — almost.

But the greatest Electrical Pioneer of them all was Thomas Edison, who was a brilliant inventor despite the fact that he had little formal education and lived in New Jersey. Edison's first major invention in 1877 was the phonograph, which could soon be found in thousand of American homes, where it basically sat until 1923, when the record was invented. But Edison's greatest achievement came in 1879 when he invented the electric company. Edison's design was a brilliant adaptation of the simple electrical circuit: the electric company sends electricity through a wire to a customer, then immediately gets the electricity back through another wire, then (this is the brilliant part) sends it right back to the customer again. This means that an electric company can sell a customer the same batch of electricity thousands of times a day and never get caught, since very few customers take the time to examine their electricity closely. In fact, the last year any new electricity was generated was 1937. Today, thanks to men like Edison and Franklin, and frogs like Galvani's, we receive almost unlimited benefits from electricity. For example, in the past decade scientists have developed the laser, an electronic appliance so powerful that it can vaporize a bulldozer 2000 yards away, yet so precise that doctors can use it to perform delicate operations to the human eyeball, provided they remember to change the power setting from "Bulldozer" to "Eyeball." - From a Dave Barry column.

Randy Fromm
Randy Fromm - Publisher



Randy Fromm

Randy Fromm's Slot Tech Magazine

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Bob Yabroff
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“I have always supported Slot Tech Magazine”

“But to tell you the truth, the content of this magazine is gobbledygook to a seating guy like me.”



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Muammar al-Gaddafi, leader of the Great Socialist People's Libyan Arab Jamahiriya

The Libyan Trick

By Wael Fathe

in Libya. The collection included lots of educational material on things like power supplies, CRT monitors and LCD monitors (not to mention networking, mobile phones and a host of other, non-gaming-related material) so I uploaded it to the “Slot Technical Department” server at slot-tech.com. It’s in the “interesting stuff” sub-dir. You can’t miss it.

over to the Internet Café but I have a feeling it’s not a whole lot better than that for him, especially when it comes to obtaining replacement components. Often, there is simply no easy way for him to obtain parts. Although Libyan leader Muammar al-Gaddafi has renounced terrorism and remains the longest ruling and most fabulously well-dressed world leader in modern times, many US companies will not deal with Libya out of an abundance of caution.

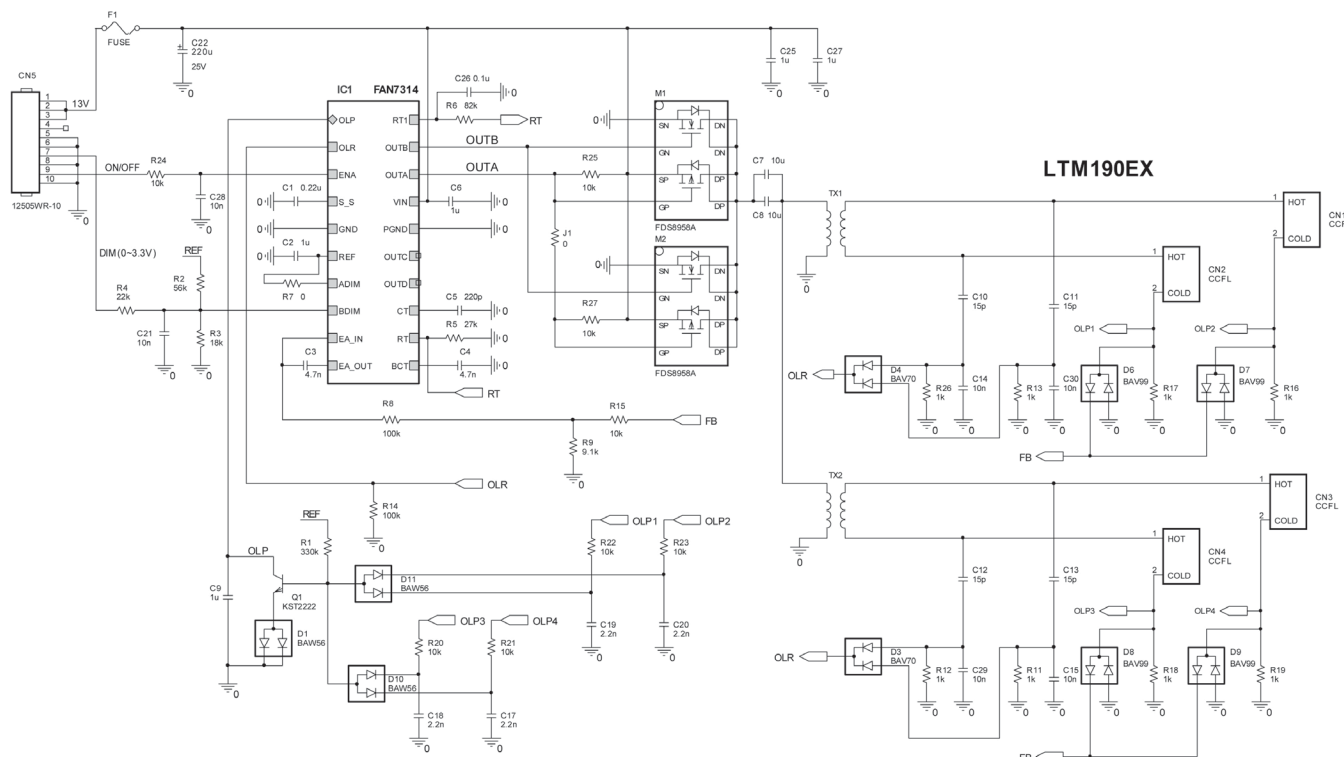
This often leaves Wael in a position familiar to many slot techs who are working

Dear Readers,

Regular readers of Slot Tech Magazine are aware of a somewhat mysterious collection of electronics-related files I received from a technician

The gentleman’s name is Wael Fathe (he said it was OK to identify the source) and he is working in a difficult environment to say the least. I kid him about having to ride his camel

1. Schematic



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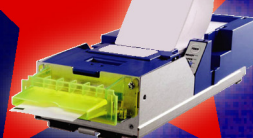


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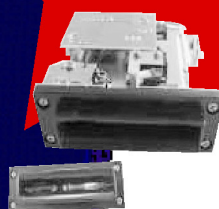
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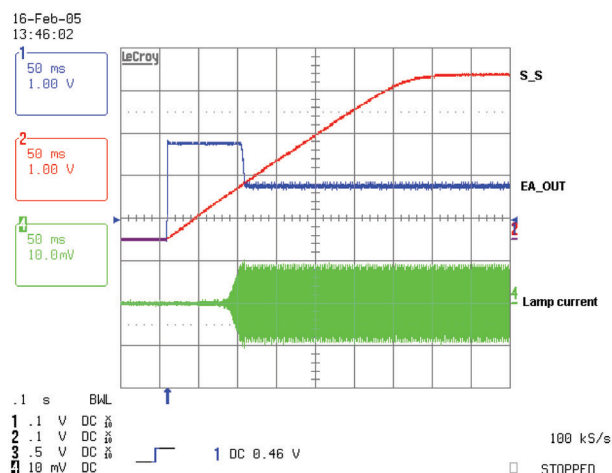
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Function Description

UVLO: The under voltage lockout circuit guarantees stable operation of the IC's control circuit by stopping and starting operation as a function of the Vin value. The UVLO circuit turns on the control circuit when Vin exceeds 5V. When Vin is lower than 5V, the IC's standby current is less than 200µA.

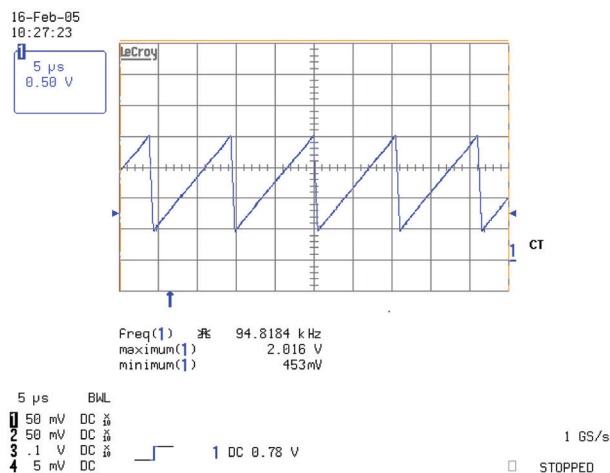
ENA: Applying voltage higher than 2V to the ENA pin enables the operation of the IC. Applying voltage lower than 0.7V to the ENA pin will disable the operation of the inverter.

Soft start: The soft start function requires that the S_S pin is connected through a capacitor to GND. A soft start circuit ensures a gradual increase in the input and output power. The capacitor value connected to the S_S pin determines the rate at which the duty ratio rises. It is charged by a 6µA current source.



Main oscillator: The timing capacitors (CTs) are charged by the reference current source. The current source is formed by the timing resistor (R_T). The timing resistor's voltage is regulated at 1.25V. The sawtooth waveform (see top of next column) charges up to 2V. Once this voltage is reached, the capacitors begin discharging down to 0.5V. Next, the timing capacitors start charging again and a new switching cycle begins. The main frequency can be programmed by adjusting the R_T and C_T values. The main frequency can be calculated as shown below:

$$f_{op} = \frac{19}{32 R_T C_T}$$

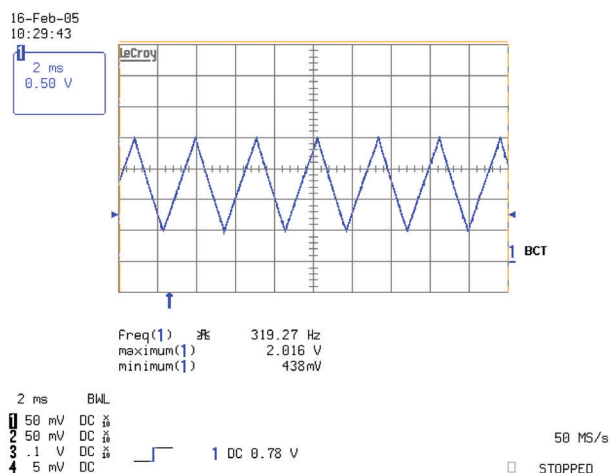


Burst oscillator & burst dimming: The timing capacitors (BCTs) are charged by the reference current source, which is formed by the timing resistor (R_T). The timing resistor's voltage is regulated at 1.25V. The sawtooth waveform charges up to 2V. Once this voltage is reached, the capacitors begin discharging down to 0.5V. Next the timing capacitors start charging again and a new switching cycle begins. The burst dimming frequency can be programmed by adjusting the R_T and BC_T values. The burst dimming frequency can be calculated as shown below:

$$f_{burst} = \frac{3.75}{96 R_T BC_T}$$

To avoid visible flicker, the burst dimming frequency should be greater than 120Hz.

By comparing the input of BDIM pin with the 0.5 to 2V triangular wave of the burst oscillator, the PWM pulses for burst dimming. The PWM pulse controls EA_OUT's voltage by summing 85µA into the EA_IN pin.



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at properties in the boon-docks, the lack of immediately available spare parts. Of course, here in the USA we can always order the parts and get them in just a few days, no matter how remote the location. In Wael's case, he often must resort to cannibalization but where even that option is unavailable to him, cleverness can be substituted for a component. This is the story of an LCD monitor repair that Wael performed, wrote up and submitted to me as an example of performing an LCD repair, Libyan-style, when the replacement part is simply unavailable.

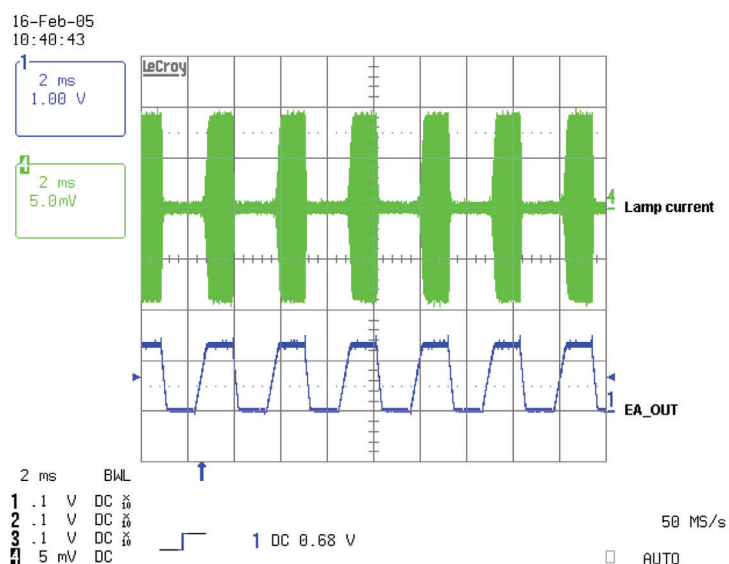
I present it to you because it illustrates how the inverter and CCFL work together to light up the display. Yes, you can do this yourself if necessary. No, you probably do not want to do this if the monitor is in a bank of identical machines as you will be operating with half the luminous flux and there will be a difference in the visible brightness of the display (but far less than you likely imagine).

Enjoy Wael's story-*rf*

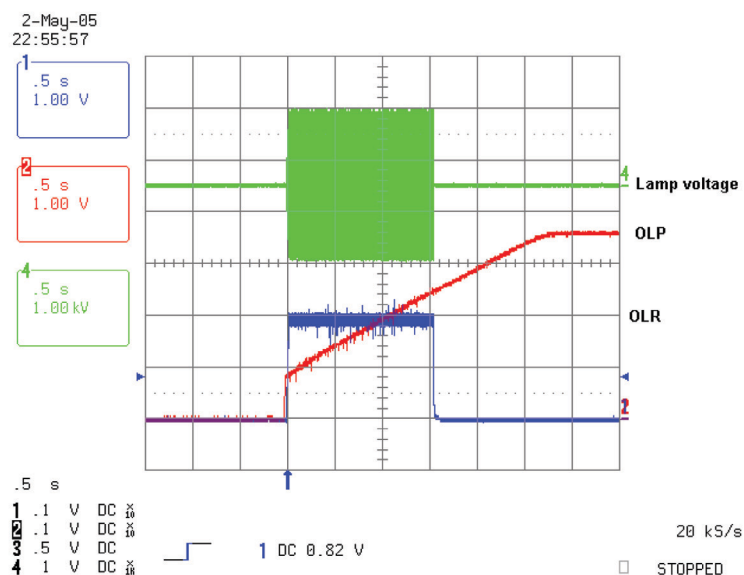
Hi Randy. How are you? I just wanted to share with you my repair story and this one is not conventional so listen.

The Symptom

A customer had brought me an LCD monitor that would only briefly show some display and then shutdown.



Open lamp regulation & open lamp protection: It is necessary to suspend power stage operation if an open lamp occurs, because the power stage has high gain. When a voltage higher than 2V is applied to the OLR pin, the part enters regulation mode and controls the EA_OUT voltage. This limits the lamp voltage by summing 105 μ A into the feedback node. At the same time, the OLP capacitor, connected to the OLP pin, is charged by the 1.4 μ A internal current source. Once it reaches 2.5V, the IC enters shut down where all the output is high.



Output Drives: The four output drives are designed so that switches A and B, C and D never turn on simultaneously. The OUTA-OUTB pair is intended to drive one half-bridge in the external power stage. The OUTC-OUTD pair will drive the other half-bridge.

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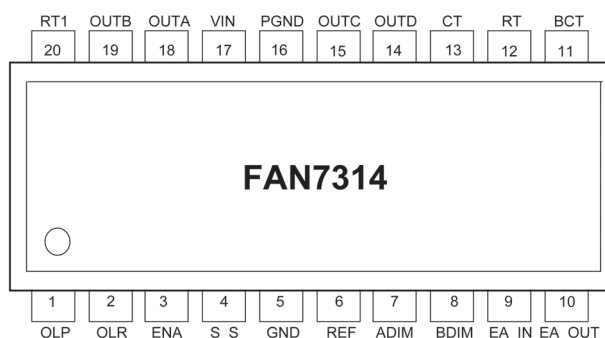


The power LED is still lit, only the display is dark. First, I opened it and checked for bad connections (I found none) and then an ESR check (I bought an ESR meter from Russia! Ha ha). The ESR check of the electrolytic capacitors revealed nothing, the power supply tested OK as well so it is an inverter problem.

I have some spare lamps and so I told myself if just one or two lamps are bad, maybe when I replace them, the inverter will work. When I connect the lamps to the upper side, they glow briefly and then they shutdown. This is the same as the original problem so I haven't found the problem yet. When I tried to put them on the other side (this monitor has two transformers, each one is powering two CCFLs) they refused to work at all, not even one second not even one bit of glow. There is one transformer that does not produce the high-voltage AC at the output. Why? I compared between them and true enough, the offending transformer has an open primary winding.

Now this is not the end, I know. The transformer is almost impossible to get but I know another technique to fool the inverter IC is to give it the feedback signals from the good transformer/lamps and feed them to the other side. The IC thinks that the transformer is working and it never shuts down the monitor. The monitor will work

Pin Assignments



Pin Definitions

Pin Number	Pin Name	Pin Function Description
1	OLP	Open Lamp Protection
2	OLR	Open Lamp Regulation
3	ENA	Enable Input
4	S_S	Soft Start
5	GND	Analog Ground
6	REF	2.5V Reference Voltage
7	ADIM	Analog Dimming Input
8	BDIM	Burst Dimming Input
9	EA_IN	Error Amplifier Input
10	EA_OUT	Error Amplifier Output
11	BCT	Burst Dimming Timing Capacitor
12	RT	Timing Resistor
13	CT	Timing Capacitor
14	OUTD	NMOSFET Drive Output D
15	OUTC	PMOSFET Drive Output C
16	PGND	Power Ground
17	VIN	Supply Voltage
18	OUTA	PMOSFET Drive Output A
19	OUTB	NMOSFET Drive Output B
20	RT1	Striking Frequency Resistor

perfectly well with only two lamps in operation. The amazing thing is that the LCD is still very bright and the other thing is that we have still two lamps for future use, the lamps that one day lost their transformer!

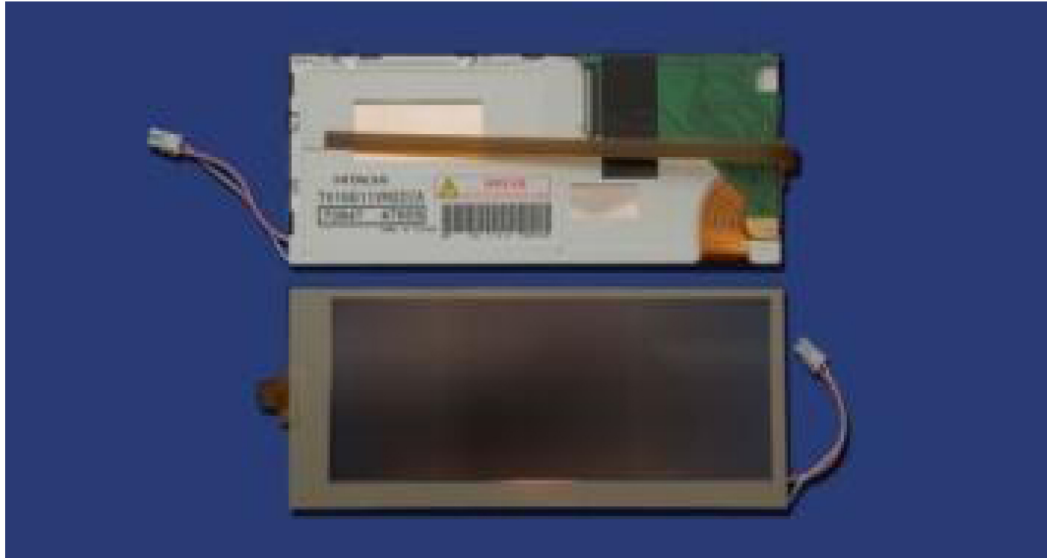
How it is Done

First, I sucked the solder off the pins of the transformer so it is no longer attached to the circuit as sort of a safety step. Referring to the schematic diagram, in my case, transformer TX1 is the one that has an open winding. Then, I connected the "Open Lamp Protection" circuits together. I con-

nected OLP1 to OLP3 and OLP2 to OLP4. I also connected the two "Open Lamp Regulation" (OLR) nodes together. OLR was not easy to find in the board as it is not marked. One should follow carefully the circuit until he reaches D4, which is a dual-diode in the same package as a small, surface-mount transistor. Once the OLR points are found we just have to connect them to each other. Feedback (FB) was ignored because if we connect the two OLP nodes, FB will be taken as a result.

**- Wael Fathe
Tripoli, Libya**

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Pacific Illumination Replacement Parts List

ARISTOCRAT

- 9440 Single raw cold cathode lamp for 15 inch LCD monitor in Aristocrat games
- 9470 Single raw cold cathode lamp for 17 inch LCD monitor in Aristocrat games
- 9690 Single raw cold cathode lamp for 19 inch LCD monitor in Aristocrat games
- 1110 Single raw cold cathode lamp for 22 inch LCD monitor in Aristocrat games

ATRONIC

- 8690 Dual cold cathode lamp assembly for Atronic slot machine with 17" LCD monitor
- 9500 Single raw cold cathode lamp for 15 inch LCD monitor in Atronic games
- 9520 Single raw cold cathode lamp for 17 inch LCD monitor in Atronic games
- 9260 Single raw cold cathode lamp for 19 inch LCD monitor in Atronic games

BALLY

- 1240 Used 6.2" Hitachi LCD #TX16D11VM2CCA with attached 5 wire touch screen for Bally Iview
- 8460 NEW 6.2" Hitachi LCD #TX16D11VM2CCA with attached 5 wire touch screen for Bally I-View
- 8650 Single cold cathode lamp assembly for Bally I-View 6.2 inch "IDW" LCD
- 8680 Single cold cathode lamp assembly for Bally I-View 6.2" Hitachi LCD #TX16D11VM2CCA
- 8950 NEW 5 wire touch screen kit for Bally IView 6.2 inch "IDW" LCD, includes metal base & copper foam grommet
- 9890 NEW 5 wire touch screen for Bally IView 6.2" Hitachi LCD #TX16D11VM2CCA, DOES NOT include metal base or copper foam grommet
- 1060 NEW 5 wire touch screen for Bally IView 6.2" "IDW" brand LCD, DOES NOT include metal base or copper foam grommet
- 8320 Metal housing for Bally Iview "IDW" touch screen
- 1200 Copper foam grommet for the touch screen on Bally IView 6.2" "IDW" brand LCD
- 9800 Single output cold cathode lamp inverter for Bally IView 6.2" "IDW" brand LCD
- 1040 Single output cold cathode lamp inverter for Bally Iview 6.2" Hitachi LCD #TX16D11VM2CCA
- 9190 Protective Mylar sheet for Bally Iview 6.2 inch "IDW" LCD
- 9200 Protective Mylar sheet for Bally IView 6.2" Hitachi LCD #TX16D11VM2CCA
- 1090 Power supply for Bally Iview player tracking system that use the 6.2" "IDW" brand LCD
- 9250 Single raw cold cathode lamp for 15 inch LCD monitor in Bally games
- 9080 Single raw cold cathode lamp for 19 inch LCD monitor in Bally games
- 8770 Single raw cold cathode lamp for 20 inch LCD monitor in Bally games
- 1130 Single raw cold cathode lamp for 22 inch LCD monitor in Bally games
- 1140 Single raw cold cathode lamp for 26 inch LCD monitor in Bally games

IGT

- 8500 Single cold cathode lamp assembly for IGT NexGen 6.2" Hitachi LCD #TX16D11VM2CAA
- 1430 Single raw cold cathode lamp for IGT NexGen 6.2" Hitachi LCD #TX16D11VM2CAA
- 8610 Protective Mylar sheet for IGT NexGen 6.2 inch Hitachi LCD #TX16D11VM2CAA
- 1400 Single output 5 volt cold cathode lamp inverter for 6.2" IGT NexGen Hitachi LCD #TX16D11VM2CAA
- 8570 NEW 6.2" Hitachi LCD #TX16D11VM2CAA with 4 wire touch screen for IGT NexGen
- 1310 Used 6.2" Hitachi LCD #TX16D11VM2CAA with attached 4 wire touch screen for IGT NexGen
- 9090 Single raw cold cathode lamp for 6.2 inch Hitachi LCD #SX16H005-AZA in 1st generation IGT NexGen
- 9030 Protective Mylar sheet for IGT 1st generation NexGen 6.2" Hitachi LCD #SX16H005-AZA
- 8480 Single raw cold cathode lamp for IGT game with 10" LCD monitor
- 8920 Single raw cold cathode lamp for 15 inch LCD monitor in IGT games
- 9670 Single raw cold cathode lamp for 17 inch LCD monitor in IGT games
- 9290 Single raw cold cathode lamp for 19 inch LCD monitor in IGT games
- 1150 Single raw cold cathode lamp for 20 inch LCD monitor in IGT games
- 1160 Single raw cold cathode lamp for 22 inch LCD monitor in IGT games

KONAMI

- 8700 Dual cold cathode lamp assembly & 12 volt inverter for Konami belly glass that is edge-lit with cold cathode lamps
- 9870 12 volt dual output cold cathode lamp inverter for Konami belly glass that is edge-lit
- 1260 Dual cold cathode lamp assembly for Konami edge-lit belly glass
- 9240 LED edge- lit panel for belly glass in Konami K2V cabinet
- 8670 Single RAW cold cathode lamp for Konami belly glass that is back-lit with cold cathode lamps
- 9780 "L" shaped cold cathode lamp assembly for Konami 7 inch bonus screen LCD
- 1050 Single raw cold cathode lamp for 15 inch LCD monitor in Konami games
- 8600 Dual cold cathode lamp assembly for Konami slot machine with 17" LCD monitor
- 9680 Single raw cold cathode lamp for 17 inch LCD monitor in Konami games
- 9070 Single raw cold cathode lamp for 19 inch LCD monitor in Konami games
- 1100 Single raw cold cathode lamp for 22 inch LCD monitor in Konami games
- 1010 7 inch AU Optronics LCD #070VW01 for Konami bonus screen
- 1080 Cold cathode lamp inverter for 7" AU Optronics LCD #A070VW01 in Konami bonus screen
- 8550 Single "U" shaped cold cathode lamp assembly for Konami 7" LCD bonus screen
- 8590 Single cold cathode lamp assembly for Konami 1.5 video upright denomination back-lit panel

Pacific Illumination Replacement Parts List

MULTIMEDIA

- 9700 Single raw cold cathode lamp for 15 inch LCD monitor in Multimedia games
- 9710 Single raw cold cathode lamp for 17 inch LCD monitor in Multimedia games
- 9720 Single raw cold cathode lamp for 19 inch LCD monitor in Multimedia games
- 9850 Single raw cold cathode lamp for 23 inch LCD monitor in Multi Media games

SPIELO

- 9740 Single raw cold cathode lamp for 15 inch LCD monitor in Spielo games
- 9750 Single raw cold cathode lamp for 17 inch LCD monitor in Spielo games
- 9760 Single raw cold cathode lamp for 19 inch LCD monitor in Spielo games

WMS

- 8490 NEW 6.4" LG LCD #LB064V02 (TD)(01) for WMS Bluebird bonus screen (**does NOT come with touch screen**)
- 8470 Single cold cathode lamp assembly for 6.4" LG LCD #LB064V02 (TD)(01) in WMS Bluebird bonus screen
- 8510 Triple cold cathode lamp assembly for WMS Bluebird 17" LCD monitor
- 8520 Triple cold cathode lamp assembly for WMS Bluebird 18" LCD monitor
- 9300 Single raw cold cathode lamp for 19 inch LCD monitor in WMS games
- 9830 Single raw cold cathode lamp for 22 inch LCD monitor in WMS games

Lamp Testers

- 9220 Bench top cold cathode lamp tester (**includes A/C adapter & power strip with ON/OFF switch**)
- 9840 Bench top dual ccfl inverter & lamp tester

Miscellaneous

- 1280 Raw cold cathode lamp 2.0mm X 250mm
- 1320 Single raw cold cathode lamp 2.4mm X 245mm
- 1420 Raw cold cathode lamp 2.6mm X 294mm
- 1290 Raw cold cathode lamp 2.0mm X 300mm
- 9910 Raw cold cathode lamp 2.0mm X 310mm
- 9970 Raw cold cathode lamp 2.6mm X 316mm
- 1190 Single raw cold cathode lamp 2.6mm X 342mm
- 8420 Raw cold cathode lamp, color white, size 2.4mm x 381mm
- 1330 Single raw cold cathode lamp 2.6mm X 385mm
- 1340 Raw cold cathode lamp, color white, size 2.6mm x 390mm
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- 1350 Single raw cold cathode lamp 2.6mm X 420mm
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- 8450 Single raw cold cathode lamp for 15" LCD in Touchtunes Maestro Monitor
- 9920 Single raw cold cathode lamp for 15 inch LCD in Touchtunes Genesis General Touch monitor
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- 1210 Silicone end cap for 2.6mm cold cathode lamp
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WMS upright 550-Meter #4 Error

On an older WMS upright 550, it had a “meter #4 error” displayed on the screen. If the game was an older upright IGT, say an S2000, I-game, or Game King, the problem may be a loose I/O card in the door. I haven’t seen very many WMS games with “meter errors” over the years so I wasn’t exactly sure where to look first. A customer was trying to cash out his credits when the error occurred so I tried a little trick to allow a cash out and it worked. Here is what I did: within a half second of the main door closed I pressed the cash out switch on the game. BEFORE the it went into another “meter tilt,” the credits did in fact cash out of the game. Once the door was closed, within five seconds, the error would appear again, so I pressed the button before the error

Quick & Simple Repairs #67

By Pat Porath

came back. Yes it did go back to the error once again but like stated above, the game did allow a cash out and the customer could go on his way. Back to the meter error, I tried rebooting the game with no change in the error. The game was turned off and after the monitor was removed, the mechanical meter board was looked at. Now the problem was obvious. A connector was pulled halfway off of the board (I couldn’t even guess how this happened!). The pins were straightened out and the connector was put back on the board. With the power turned on once again and after it booted up, the error cleared and it didn’t come back.

Atronic e-motion Main Power Problems

A call was received that an Atronic e-motion game had a power problem so I checked it out. While giving the game a once over inspection, it did not have any sign of power at all. Everything in it was lifeless. All of the light bulbs, all of the cooling fans, the Oasis Sentinel board and even the monitors were all dead. My first thought was a bad

power supply. My second was a blown fuse because if the game power supply was bad, I still should have had power to the Sentinel. No power to that meant the problem should be in the “main incoming power” area. What about a blown fuse? The three fuses were checked and they were good; power connections were checked too. Everything seemed to be OK so what was the problem? Just to eliminate a bad power supply, it was changed. Still no difference in the problem. I thought I checked darn near every possible main power area and still didn’t see a problem but I had forgotten about one thing; the hopper area. The main game incoming power comes from an outlet and goes to a small power filter, then to the upper part of the game. When the power cable was checked, it was loose. As soon as it was plugged in all the way, the Oasis display came on which meant the Sentinel now had power. A few seconds later, the game started booting up. Simply put, the main incoming power cable was loose and another game was back online.



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Another e-motion game that I worked on at a later date had a main power problem too. This time the Oasis Sentinel had power but the rest of the game didn't. To me, this indicated a bad game power supply which is very easy to change. With only the removal of two nuts and four connectors, the power supply can be removed from the game. After a replacement was installed and I had power to the game, the darn thing didn't want to boot up all the way. I cleaned the CD that is located in the main processor and COM board area but it didn't help. A new CD drive was needed. Off to the shop for another part for this game. With the

game power supply and a new CD drive installed, it was time to turn the game on once again. I could tell this time that the game was in fact reading the CD because the light on the driver was flashing very fast. This is a very good indication that it is reading it. When the game wasn't reading it, the light flashed very slowly. Finally the game booted up properly and it was ready for a customer to play.

Bally Reel Vision Reel Light Problem

I was told by two different slot attendants that the "reel light was broke" on a Bally Reel Vision slant top game. One even said that



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the “neon for the reels was broke.” I don’t know if the attendant was kidding or serious, the individual ad seen me working with neon lighting earlier in the week on a sign. Anyway, this specific problem was a first for me, a Reel Vision game with a reel lighting problem. Why were all of the LEDs out (Not the lights inside of the reels, but the ones that are located on the reel glass.)? Connections were checked at different locations on the LED boards but they looked OK. The 5/12v and 24v power supplies were quickly looked at too. Both were checked to see if they were hot to the touch, along with the cooling fans in them. They appeared to be ok, temperature was normal and the fan speeds were normal. For some odd reason “USB port” came to mind. As soon as I removed the USB cable from the “brain box” of the game, the reel LEDs came on. The cable was plugged back into the same port and I pressed both the main door and the bill acceptor door “cherry switches” to simulate all doors closed. As to my surprise, the reel LEDs stayed lit and the game was ready for play. I don’t have an explanation but it worked in this situation.

Bank of Games With Absolutely No Oasis COM

We had a bank of 12 games that had lost all Oasis communication. Not even one

game had capital letters on the Oasis display (Capital letters on the display, with one period at the end means more than likely game, DPU, and poller communication are good. Lower case letters and or two periods at the end of the display indicate a problem). First I checked the COM in connections on the Sentinel side and they looked good. Next I checked out the DPU itself. For some reason the “Sentinel receive” light wasn’t flashing. I replaced the COM chips in the DPU but that didn’t resolve the problem. Maybe the problem is in fact at the bank of games. It took me a bit but I found the fiber optic converter for the bank and noticed that the “receive” light was out on that too. How about the good ‘ole reboot trick? Well, in this situation it only would last about an hour then go out again. After a few times of this ordeal I decided to replace the fiber optic converter box. It was very easy to swap out, only a total of six connections, along with making sure the DIP switches are set the same as the original. Two of the connections are the fiber optic “send” and “receive” one is power, and the other three are the Oasis “copper wire” connections. A red wire, a black wire and a ground. That is all there is too it. After the “fiber optic converter box” was replaced, we haven’t had a problem with communica-

tion on that bank of games since.

IGT “Trimline” Scrambled upper LCD

I noticed a game that was shut off and I wasn’t sure why, so I checked it out. I powered up the game and noticed that the upper LCD had vertical color lines on it. No actual picture, only lines. My thoughts were a bad video card that is located in the “brain box” of the game, a bad upper LCD or a loose video connection. The top box area of the game was opened up to reveal the upper LCD connections and they looked and felt ok. Next I cycled power on the LCD to see what happened, still only vertical lines appeared. Looks like it may either be a bad video card or bad LCD now, therefore, the brain box was removed and a new video card was installed. After it was put back into the game and power was turned on once again, the lines still appeared. Before grabbing a replacement LCD, I cycled power on the upper LCD again. This time the game graphics appeared! That part of the game was fixed, now onto the next problem with it. The Oasis display didn’t have any text on it and the “watchdog” light on the Sentinel wasn’t flashing. These two failures told me one of three different things that was (or wasn’t) going on with the Sentinel board. Either the Sentinel

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Tuesday, October 12, 2010

9:00 am - 12:00pm

Electronic Component Testing Presented by Randy Fromm

Electronics repair is actually pretty easy, once you know how to test the components. It often doesn't matter if you know how something actually works in order to fix it. You just look for bad parts and replace them. This seminar covers all of the discrete components that commonly fail in slots. We'll look at how they work, how they fail, and how to test them fast and easy.

1:15pm - 3:15pm

MEI - BV troubleshooting and repair

3:30pm - 5:30pm

FutureLogic Printers-Suzo-Happ's Director of Training and Service David Oldham will discuss MEI and FutureLogic operation and service.

Wednesday, October 13th, 2010

9:00 am - 12:00pm

Power Supply Repair Presented by Randy Fromm

Let's face it, we have a lot of power supply failures in slot machines. Some power supplies are more-or-less disposable due to their cheap replacement cost but many of the supplies we find in slot machines are custom-built units costing hundreds of dollars. We will cover the operation and repair of power supplies in detail during this session.

1:15pm - 3:15pm

LCD Monitor Repair Presented by Randy Fromm

LCD monitor repair is easy. This is the first of two presentations on LCD monitor repair at TechFest 21. During this seminar, we will cover the theory of operation of LCD monitors and you'll see just how simple they really are. We will also cover circuit analysis of the electronics with an emphasis on what fails and how it can be repaired in any casino's tech shop.

3:30pm - 5:30pm

Component Removal and Replacement Techniques Including SMD Rework- It doesn't do you any good to identify a bad component if you can't replace it without damaging the printed circuit board. The final hour of the day includes a chance to play with some rework equipment as well.

Thursday, October 14th, 2010

9:00 am - 12:00pm

Ceronix LCD Monitor Repair-Although it can be argued that all LCD monitors are more-or-less the same, it's nice to get the inside track on specific monitors from the manufacturers themselves. Ceronix's Head Technician Troy Nofziger will present.

1:15pm - 3:15pm

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

3:30pm - 5:30pm

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

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itself was bad, the EPROM, or the EEPROM (E-square) chip was bad. I went to the shop and grabbed a replacement Sentinel and a replacement EEPROM. How about replacing the EEPROM first? In my personal opinion it is definitely possible that it very well could be bad and it is very simple to replace. You only have to make sure that the Sentinel does not have power applied to it when installing it, the EEPROM “notch” is in the correct position, and make sure that none of the pins on it get bent when putting it in. After I removed the original and installed the replacement, it was time to apply the power. Yes it worked! The original was definitely bad. Text now appeared on the Oasis display and the “watch dog” light was flashing on the Sentinel board. With my “tech card” (AKA mechanic’s card) inserted into the card reader and the “info” item selected, I could now see if the slot door showed an OPEN and CLOSED state on the Oasis display. If the display shows both open and closed when the slot door is physically open and closed, the game has communication with the Sentinel. The display did in fact show correctly and now I knew the game was ready for play. Once again, another game online.

- Pat Porath
pporath@slot-techs.com

Slot Tech Event

Slot Tech Training at Fortune Bay Casino

Geography Flash! Canada is south of the USA! I hadn’t given it much thought until Canadian Super-Tech Kevin Noble joined me for a couple of weeks of slot tech training at Fortune Bay Casino, which is located in upstate Minnesota, just 30 miles or so from the Canadian border with the USA. Kevin had mentioned that it was colder there because it was north of where he lives. Since he lives near Detroit, he actually had to fly north to get there!

This was the first of a new training series we are offering for beginning slot techs. Generally speaking, we have concentrated on bench tech training for things like power supply repair and monitor repair (LCD and CRT) but Fortune Bay had a new crew of inexperienced slot techs that needed training on everything except sub-assembly repair so Kevin Noble was there to bring his 15 years of experience to the class. For five days, just about every possible scenario was presented to each class with a combination of classroom lecture and abundant, hands-on labs.

If you’re interested in slot tech training at your property, please contact Randy Fromm at 619.593.6131 or e-mail training@slot-techs.com



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Brad Anderson, Dean Sandberg, Gary Nelson, Sue Setter, Troy Davidson, Lawrence Irving, Dustin Swanson, Jim Hopper, Paxton Goodsky, Aaron Villebrun, Mike Ranum, Rob Nyman, Holly Croteau, Alicia Dahl, Alex Cook.

Repair Log

By Kevin Noble



IGT Video Video Comm Failure (MCB2)

One of the guys was called to this machine for a printer problem but when he powered the machine back up, it all of a sudden went into Video Communication

error. The top box monitor for the Denver Duck had power but would not boot up. The power supply behind the reels was swapped out allowing us to insert one of the three discs needed to reload the MCB2 when the error message RFA corrupt put everything to a screeching halt. Luckily our friendly neighborhood IGT rep was in town and stopped by to help us troubleshoot this problem. After swapping the MCB2 with a known good one, we quickly found out we had two problems on our hands.

The MCB2 was bad but unexpectedly, the CPU was also hampering communication between the top box monitor and the CPU. Once the CPU was replaced and RAM cleared, the little yellow LED light on the CPU that is supposed to flicker while communicating with the top box monitor (or MCB2) came alive.

IGT SAVP Recoverable Errors

This problem all started with BV jam. I don't know what the attendant did but

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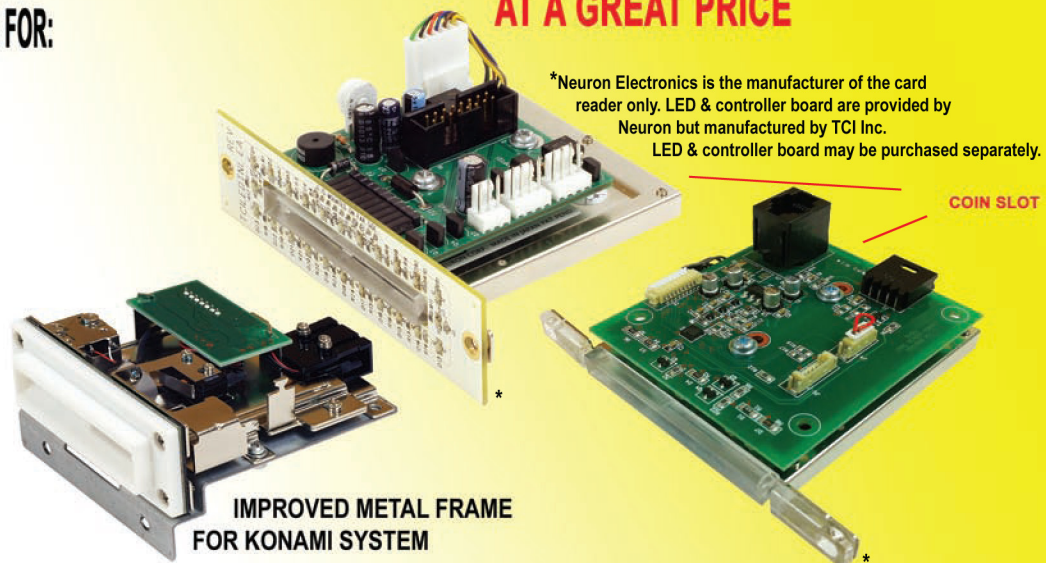
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the BV would suck in the bill and just hold on to it. I would go to the game and watch Patrons insert bills and tickets without a problem. Later on in the day I was getting calls for the reels just spinning ever so slowly until you opened the main door and reset the error. I checked the Molex connector that runs from the CPU to the power supply and made sure all the pins were housed in the harness securely. The next day the reel problem turned into recoverable errors on the game that had to be reset. Finally coming in off my days off I found out that the video card had been replaced and the machine placed back in service with no problems since then.

Atronic CASHLINE Different Game Family

According the MEAL book entries, the problem was recorded and a RAM clear was needed to clear this message but more problem started happening. When I was called to this machine, I paged through the book documenting all the problems. I did notice that the CPU was rebooting, the power supply was replaced, COMM board not detected messages, and Config CRC error until someone finally decide to swap out the CPU, installing a new one. The original problem I was called to was that the game just froze. The game acted and looked like it was ready for the patron to press a button to start the next

game but the buttons would not work. I could not put the game out of service because the buttons would not allow me to scroll down or up. I replaced another power supply when the game allowed me to cashout the patron's ticket. I thought well this was fine and dandy and I went on my way. About five minutes had passed when I walked past the game and noticed that the monitor was blank. I thought to myself that somebody had to have powered off the game. I opened the game and noticed that the power button was still on. I proceeded to check all the fuses on the motherboard but that did not help. I went to the shop and grabbed another power supply and swapped that to see what was going on. It also came up but I was a little leery of what just happened. Half way through the day I received another call to this location regarding the game being frozen again. This time I e-mailed the Atronic rep and he asked me to try a couple of thing like performing a soft reset by holding the reset and test button when I powered up until I heard beep. I tried this because I ran out of options and it worked. I have not had an issue with this game so far (knock on wood).

Bally Alpha Will Not Boot

I was told about this one Bally Alpha progressive game that would get stuck on the Sierra Design logo

when booting up. We had the Bally Rep come in to help troubleshoot this game because it is a leased game. The CPU was swapped out and the problem still existed and the game continued to freeze at that exact same point. Another CPU was tried just in case, but the problem continued to freeze at that same spot. Many other experiments were performed to troubleshoot this game by unplugging different devices until the SMIB board was looped out of the game and the game seemed to pass that point and complete its boot up sequence. The SMIB (Slot Machine Interface Board) was replaced and the game eventually placed back in service. It just goes to show that anything is possible.

IGT AVP 2.5 Freezing

The AVP platform is fairly new at our site and I had been somewhat reluctant to tackle these games. It took awhile to get familiar with the S2000 platform and when I got used to the clears, setting of the options, and the overall operation and functions of the game and the different parts associated with the S2000, the AVP came along. Being used to the old style of doing things this was quite the challenge and at first I admit that I was a little nervous when being called to any problems that might arise. I always had the IGT Rep just a phone call away and for

not-as-important-problems, the e-mail always worked.

This one AVP went full circle when I was trying to troubleshoot this one problem of the game freezing. The only way to unfreeze it was to power cycle the game. From there, it progressed into a blue screen asking you to turn the reset key. Once the reset key was turned, the red screen appeared and the game rebooted. This is where I started getting a little braver and not as nervous. The hard drive was the first suggestion to replace and when we did that it did not work so the CPU was next. The problem changed, the BV would fall asleep and/or the bills would get stuck in the transport or it would just hold on to them. The BV was replaced and now the game would go back to the blue and red screens. We replaced the back power distribution board and the eventually the same problem arose again. We decided to try a brand new, never used before CPU (using the hard drive so I did not have to RAM clear the game) and the problem now was that it was freezing. You went into the pay table test and while selecting different symbols on the reels, the game went back to freezing. I decided to try a new video board right from the sealed package (never before used) and swapped it out in the game. I went to the reel test again and the problem went away. I next played over 100 games and got into

three bonus rounds without any problem. This game has been up ever since. I think it was multiple problems that caused this problem plus the fact I was using used boards and devices.

Aristocrat MKV Mikohn Bill Meter Did Not Clear

Right after a percentage upgrade, we were taking meters when we noticed that all the soft meters and Mikohn meters went to zero except for the Bill 5 meters that read 53243. So basically the \$20.00 soft meter had zeroed and the Mikohn meter did not but all other meters zeroed out also. We decided to RAM clear the

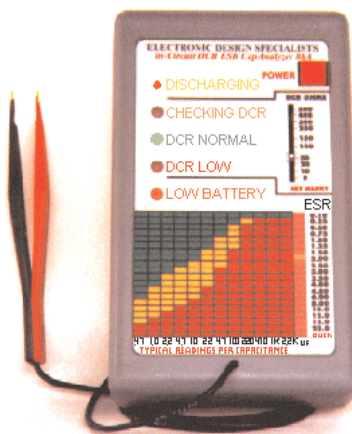
SMIB but the problem did not go away. We thought that this was rather strange. We went into the game and next tried clearing the SPC board through the game options. We had to open the CPU door. We then waited to see if the meter cleared and it did not. We removed the top glass and by the time the Bill5 meter scrolled around again it had zeroed itself. I had never seen that before.

Aristocrat No Power to Game

This was a project game that turned into a troubleshoot lesson. The game was powered off and looped out of the system. When we first went to the game to

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RAM clear it, we powered on and nothing. You could hear a sound like a relay switching on but nothing. No machine functions were present. The same "Y" cable that powered the game was also powering the Mikohn system so we knew we had power coming from the base. We scanned the MEAL book and it stated the game power supply had been swapped out. We started reseating wires going to the power supply when we noticed that when we removed the top harness on the power supply, the game would boot up. We followed the harness straight to the motherboard. This is where we figured that something was bringing the game down. We unplugged every harness that plugged into the motherboard and one-by-one, we plugged each connector onto the board and powered up. We did this about 15 times before we finally found the harness that was bringing the game down. We followed it up through the game until it made its way to the front door panel. We opened the belly glass door and followed the wire right to the solenoid on the coin mech. When we looked further into the harness, we found that the harness eventually made its way between the door frame and the bracket that housed the coin mech solenoid, exposing bare wire to the housing. After repairing this wire and securing it so it will not happen again, we were able to complete the Ram clear

and carry on with the project.

Editor's note: Sometimes it's faster to jump around, poking, pulling and examining all the obvious stuff so it's hard to argue against such *modi operandi* however, it is classic troubleshooting techniques such as the one just described (disconnecting things one-at-a-time and noting the result and/or measuring continuity on EVERY wire and/or checking EVERY wire for a short to ground, etc.) that ALWAYS lead you to the source of the problem. It's highly unlikely that this issue would ever be resolved through random inspection. Would you look

behind the coin mechanism in order to resolve a problem like this? Not likely. However, through proper troubleshooting procedures, the cause of the problem was located. The actual repair, as usual, was simple.

I would point out to you as well that as is often the case in the business of being a professional slot tech, no actual knowledge of electronics was required. This game was repaired through a good, general knowledge of "How Slot Machines Work" and logical deduction.

- Kevin Noble
knoble@slot-techs.com



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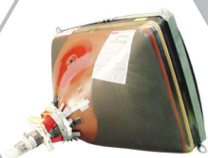
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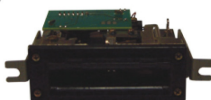


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In truth, most electronic repairs are pretty easy. Often, it's just a matter of testing and replacing a small handful of inexpensive, off-the-shelf electronic components. Sometimes, it's just one. For example, it costs less than 25 cents in parts to repair the most common failure in Bally power supplies. The entire process takes about five minutes.

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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.***

For more information, including course offerings and complete pricing information, please visit the website at slot-techs.com

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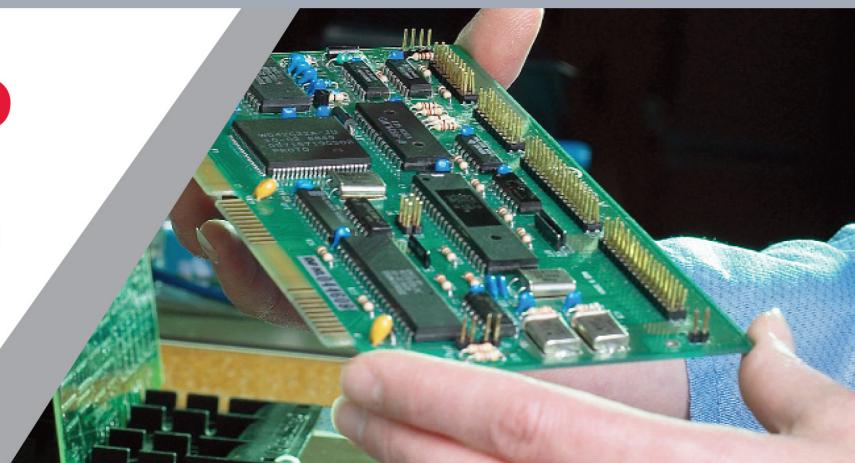
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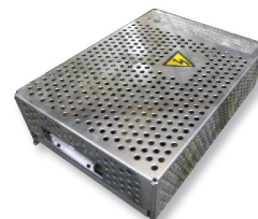
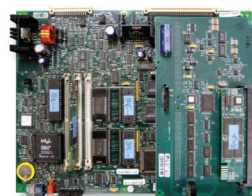
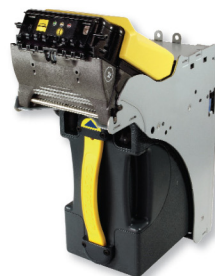
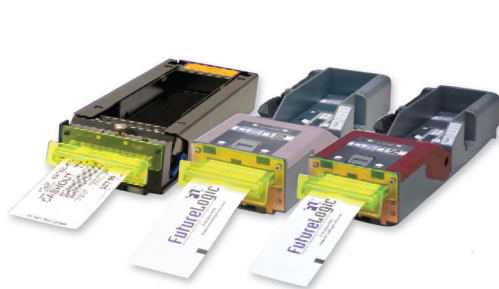
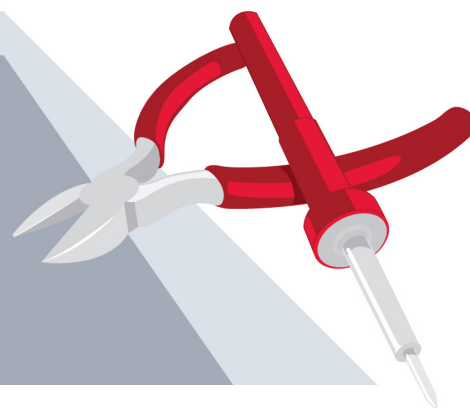
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