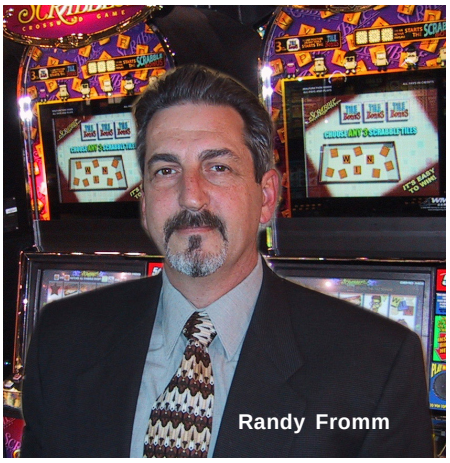
November, 2002

Slot Tech Editorial


Randy Fromm

What is the job description of the "slot machine technician?" In addition to his review of "Clear and Set" procedures for video slots, contributing writer Kevin Noble ponders this question and puts it to the slot tech forum as well. The responses may surprise you.

Like Lazarus from the grave, Ed Morgan shows us how to resurrect an inoperative touchscreen sensor in "Bringing Touchscreens Back From the Dead."

Last month, we touched on the subject of cold cathode fluorescent lamps (CCFLs). This month, Slot Tech Magazine presents a closer look at a fabulous new CCFL product from CI Innovations that can not only make your reel slots look brighter but will reduce bulb replacement, eliminate ballasts and starters, lower the temperature inside the machine and even save you some money on electricity. The fun begins on page 30.

This month marks the introduction of a new and important feature for Slot Tech Magazine. As you are aware, in addition to industry veterans Ceronix and Wells-Gardner, Kortek is now supplying monitors to the gaming industry. Kortek is far from being a newcomer to monitor manufacturing. They have been a contract manufacturer of monitors for many years. Their monitors feature straightforward designs that are easy to understand and easy to repair.

Kortek's official service center, Casinotech (Las Vegas) has chosen Slot Tech Magazine as its vehicle of choice for releasing customer notifications, repair updates and other technical information about its products. I couldn't be more pleased as this is exactly what Slot Tech Magazine is all about – news and information for the gaming industry's technical community. I hope that other manufacturers will follow suit.

In their premier offering this month, Casinotech has released a bulletin regarding a problem with an opto coupler that causes monitor blooming and/or blackout. Read about it on page 22.

Not content to leave it at that, on the following pages, read all about how the circuit functions and why failure of the opto coupler causes the symptoms that it does.

You say that you don't even know what an opto coupler (also called an "opto-isolator") is? Don't worry, you're covered. A detailed explanation of opto-isolators is presented in this month's "Slot Tech Electronics 101" starting on page 32.

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

Randy Fromm

Randy Fromm - Publisher

Randy Fromm's
Slot Tech Magazine

Editor
Randy Fromm

Technical Writers
Dion Anderson
Bart Holden
Olson Jake
Ken Locke
Gordon Lowe
Ed Morgan
Kevin Noble
Herschel W. Peeler

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

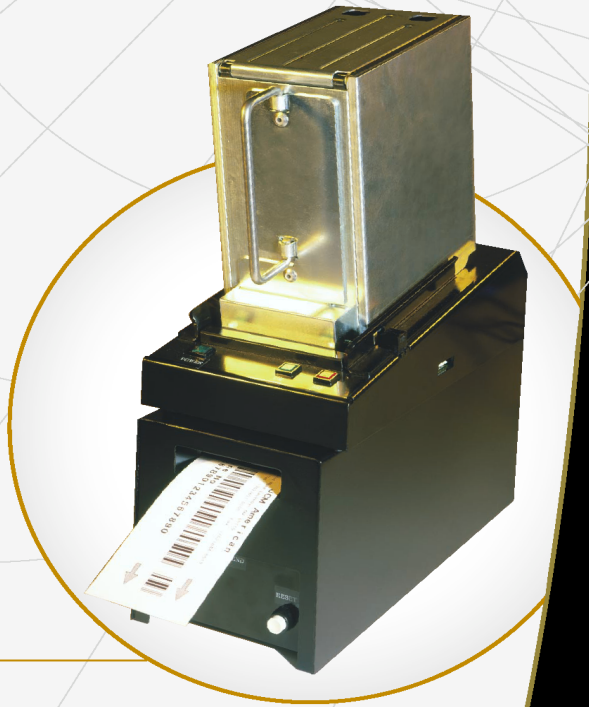
SUBSCRIPTIONS
Domestic (USA)
1 year - $60.00
2 years - $120.00
International
1 year - $120.00
2 years - $240.00

YOU ASKED... WE LISTENED.

JCM offers new solutions to your currency handling needs.

SENTRY,™ JCM's Smart Entry

JCM's SENTRY displays acceptable bill denominations and coupons, faults, errors and cashbox status using easily identified colored LED icons. SENTRY's function and appearance enhance game appeal to the players, and maintenance for the operators.



Intelligent Cashbox System

JCM's new cash-handling system uses a memory module, reader, and printer to efficiently eliminate errors in the conventional soft count process.

SECURITY. TECHNOLOGY. SOLUTIONS.

USA
JCM American Corporation
925 Pilot Road Las Vegas, Nevada 89119
Tel: 702.651.0000 **Fax:** 702.644.5512
www.jcm-american.com
email: sales@jcm-american.com

Europe
JCM Germany GmbH,
Büttgenbachstraße 5, D–40549 Düsseldorf
Tel: +49.211.5306450 **Fax:** +49.211.53064565
www.jcm-germany.com
email: info@jcm-germany.com

JCM® AMERICAN CORPORATION

Understanding the Video Clear/Set Procedures

-plus-

What is Your Job Description?

By Kevin Noble

Last month, Kevin Noble presented us with a list of procedures for clearing reel slots. This month, it's video slots. In addition, Kevin makes some interesting observations about the job description of "slot tech." When he threw out the topic at the Slot Tech Forum, he received some interesting responses, reprinted here. How about you? What do YOU do?

WILLIAMS VIDEO

- REMOVE XU3
- INSTALL RAM CLEAR CHIP (CHECK FOR CORRECT DENOMINATION)
- RESEAT BOARD AND POWER UP
- FOLLOWING MESSAGE APPEARS
  OUT OF SERVICE
  RAM CLEARED
  (COIN DENOMINATION)
- TOUCH SCREEN AND WAIT FOR:
  RAM CLEARED
  POWER DOWN VLT
- REPEAT THESE STEPS AT LEAST 2 OR 3 TIMES
- INSERT DESIRED XU3 EPROM
- REPLACE BOARD AND POWER UP
- MAKE SURE THE RED LED (I/O BOARD) WILL COME ON AND SHUT OFF
- THIS ENSURE COMMUNICATION ON THE I/O BOARD
- MESSAGE: *"MEMORY CLEARED"* APPEARS
- TURN THE RESET KEY AND GAME RESETS.
- SET ALL OPTIONS SUCH AS :
  1. GENERAL TOGGLE (ON)
  2. PROTOCOL (SAS+)
  3. TERMINAL ADDRESS (1)
  4. LIMITS (DEPENDING ON DENOMINATION)
  5. BV (ENABLE THE BILL DENOMINATIONS)
  6. SLOT TOGGLES – SPEECH (N0) – HOLD DOWN (OFF)
  7. METER LAMP (2 AND 4 BUTTON)
  8. TIME / DATE

GAME PERCENTAGE

- INSERT GAME %AGE CHIP AT XU27
- POWER UP AND GAME %AGE WINDOW OPENS
- PRESS BUTTON TO SELECT THE % FOR ONE OR MORE GAMES.
- POWER DOWN AND REMOVE XU27.
- POWER UP AND THE MESSAGE

"SECURE MEMORY OPTIONS UPDATED"

- REVIEW YOUR CHANGES.

BALLY VIDEO CLEAR

- DIP SW #1 SET 7 & 8 ON FOR COMPLETE CLEAR AND/OR
- DIP SW #1 SET 8 ON FOR PARTIAL CLEAR
- INSERT CLEAR-02 EPROM INTO THE RIGHT SIDE OF P10 SOCKET.
- POWER UP AND THE MESSAGE

"SAFERAM CLEAR ENABLED"

ALOW IT TO GO THROUGH ITS STEPS AND FOLLOW INSTRUCTIONS

- TURN THE RESET KEY
- POWER GAME OFF, REMOVE CLEAR, RESET DIPS AND POWER BACK UP.
- SET THE FOLLOWING OPTIONS:

1. CURRENT JURISDICTION (1)
2. CABINET TYPE (S/T OR TRADITIONAL)
3. COIN ACCEPTOR (COIN ACCEPTOR AND C.O.D. BOARD)
4. BILL ACCEPTOR (JCM WBA)
5. BILL HOPPER (DISABLED)
6. DOOR TYPE (PULSED OPTIC)
7. DOUBLE DOWN (OFF)
8. TOURNAMENT (OFF)

- After the SafeRam clear has been performed correctly The game will now enter CAL TOUCH SCREEN menu, This allows you to calibrate the touch screen.

SETTING EEPROM OPTIONS AND MACHINE OPTIONS

- SCROLL THROUGH AND SELECT THE DENOMINATION, AND MAX BET OPTIONS FOR EVERY GAME SELECTED AND LOCK IN THE VALUE WITH THE RESET KEY. SETTING THE MACHINE OPTIONS SUCH AS TIME/DATE, TERMINAL ID, AND HOPPER/CREDITS LIMITS ARE THE LAST STEPS.

IGT VIDEO

- Remove U13 and U36 (game chip #1 and #2)
- Use clear chip 56 for full clear
- Use clear chip 55 for partial clear
- When menu appear
- push test button until you reach "clear EPROM and all RAM"
- turn reset key
- All lights on CPU board should turn yellow
- Power down and remove clear chips
- Replace with selected U13 and U36
- Remove U39 (base chip) and replace it with key chip (00017)
- Replace CPU and power up, allow screen to turn a purplish color
- Power down, remove key chip and replace with desired base EPROM
- "RAM error" will appear, turn reset key two times
- When prompted, hold the test button for 2 to 3 seconds
- "EPROM error" will appear, turn reset key 2 times
- "KEYCHIP" menu will appear
- Set all options in the key chip menu (denomination, max bet, game select and percentage)
- When finished, exit the key chip menu by pressing the yellow box
- Press the test button to enter set-up mode
- Set all game and machine options to your desired location.

KONAMI VIDEO

1. Remove the "KEY 1" chip and install the "KEY 0" chip (or EL chip)
2. Power up
3. Push "SPIN" button to reset when prompted, message execute appears, select type of clear you want to perform.
4. Set the time and date, and save changes
5. The message "STANDARD "and "QUICK" appears select type of clear.
   - "STANDARD – partial clear, allows you to keep options and clear meters.
   - "QUICK" – full clear, clears all meters and sets the options to default.
6. Options page appears, please set the following:
   - ATTENDANT FULL LOCK – ON
   - DENOMINATION – 5 cents
   - AUTO CASH – OFF
   - CREDIT INTERVENTION – ON
   - PARTIAL COINS – 2000 (same as hopper limit)
   - MAX CREDIT – 4000
   - ULTIMATE FULL LOCK - $100 (same as hopper lock-up in dollars)
   - MACHINE # - 00000001 (this is to communicate the game's communication chip)
7. Power down
8. Remove "KEY 0" chip
9. Install original "KEY 1" chip
10. After game loads turn the reset key to allow Game to re-enable.

mei | cashflow™

Let The Games... Begin!

MEI keeps the money in motion!

Introducing the revolutionary new MEI CASHFLOW™ SC66 bill acceptor for optimal performance and reliability in a ticket in/ticket out environment.

Engineered for better performance.

Any bill acceptor can handle new, pristine bills. But in the real world, many bills are tattered, torn and crumpled. The MEI CASHFLOW™ SC66 handles old and new bills better than the competition.

First, we process ALL bills and bar codes so there's no frustration from your customers. Then, we put our advanced algorithms and 100Mhz processor speed to work, scanning up to 300% more of each bill than other models - accepting legitimate bills and bar codes faster, with fewer jams. This adds up to dramatically improved customer satisfaction, measurably increased cashflow and significantly reduced operating costs.

It's not just more sophisticated, it's tougher too.

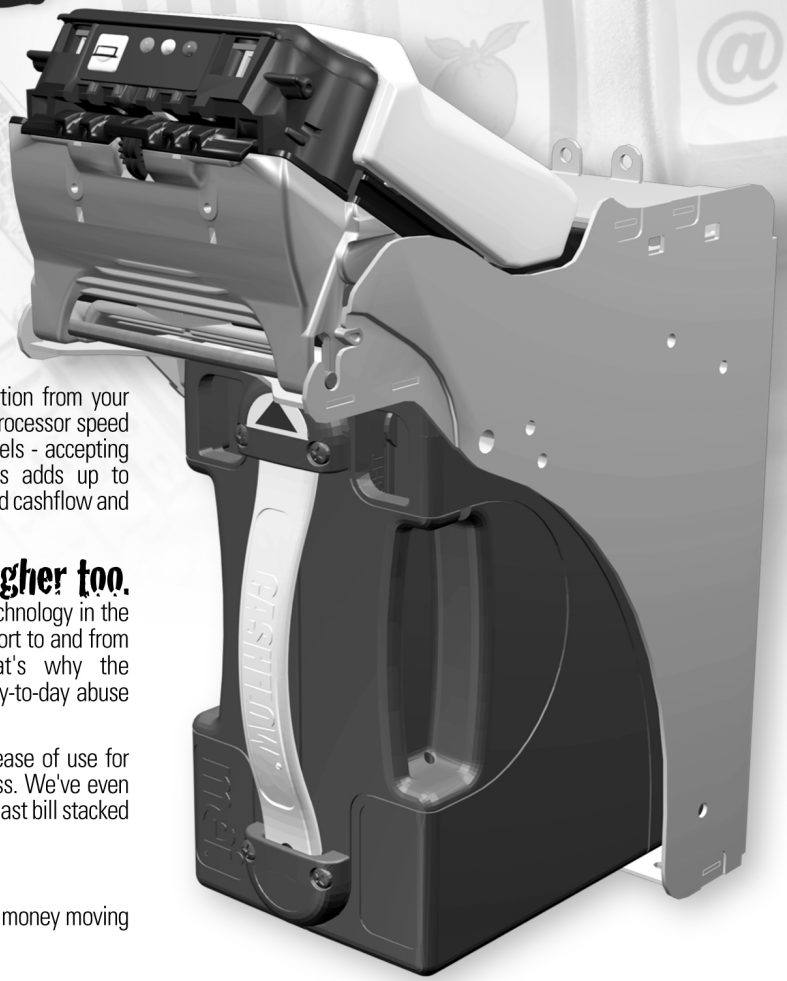
It doesn't help to have the latest, most advanced bill acceptor technology in the world, if the cash-box is damaged in handling. And during transport to and from your cash room, that's exactly what can happen. That's why the MEI CASHFLOW™ SC66 is built rugged, to survive the worst day-to-day abuse and stay reliable.

Everything about the MEI CASHFLOW™ SC66 design provides ease of use for operators, improves your cashflow and your customers' happiness. We've even incorporated the first Dispute Window in the industry to show the last bill stacked without removing the cashbox.

Call us today!

We'll demonstrate the revolutionary new features that keep your money moving and your games playing!

800-345-8215
702-597-4836 (Las Vegas)
www.meiglobal.com



mei | cashflow™ sc66

Job Description: Slot Tech

Introduction:

The other day I threw out the question: "What is your job description?" on the Slot Tech Forum and also to a couple of technicians that I have met on the Internet. One thing that was common was the fact that really nobody knew. In general, they all said that it was basically "everything."

Their answers ranged from repairing filing cabinets to repairing surveillance cameras. Nobody did ever complain about all the extra duties that they have done, but they also have said that they have never have seen a description of what their job consists of.

After chatting with many technicians on the net, it was funny to see how so many places are run differently and how the policies, tasks, and procedures differ. There are different classifications of technicians as well. This brings me to the question, "What is the responsibility of the slot technician?"

Our job responsibility:

Where I work, we currently have 2 classifications of slot technicians: The Senior Technician and the Site Technician. Currently, we all do the exact same job except for a couple of minor things: The Senior has permission to enter the cage or main bank to repair equipment without a security escort. The Senior also has an extra key, which allows him into the "sensitive parts" room to sign out CPU boards, IDXs and motherboards to name a few. The other responsibility of the senior technician is to hand out job assignments, at the same time determining what task is most important and what should be completed first.

We currently have three Senior Technicians and eight Site Technicians on board. We are responsible for all the cage and coin equipment, machines, bases, Mikohn signage, inventory, technical shift jackpot inspections and the MIS room to name a few. This is a list of other duties we perform as technicians at our site:

- Receive, unpack, assemble, and test all gaming equipment.
- Ordering of parts from the warehouse and suppliers.
- Install all necessary software, cables, machines, and equipment
- Maintain, repair, move, swap, and upgrade such units on site.
- Label all failed components on site.
- Packaging all failed parts for shipment to various manufacturers, sites, or the warehouse.
- Perform all game changes, themes, and denomination conversions.
- Monitoring and repairing the Mikohn system and MIS room.
- Preventive maintenance on all gaming equipment including hard count and soft count equipment.
- Writing reports, proposals, solutions, requests, and improvements.
- Repair and maintenance of change machines.
- Completing service reports, coin and bill testing, month-end variance reports.
- AGCO random inspections, site technical shift jackpots, and AGCO jackpots.
- Repair of all the bases and chairs.
- Repair and programming of the progressive signs.
- Help and set up of promotional equipment like signs, computers, and tournaments.
- Programming of the IDX coin comparators.

- Check for M00 codes and Sigma meter miss match
- General floor repair
- Training of new slot technicians coming into the department
- Training slot attendants and supervisors on all new games on last bill and last game recalls, including error codes, resets, paytables and game functions.

The Warehouse

This is a centrally located site from which all of our gaming parts are ordered or where they are sent for repair. It is also where we are trained on the latest games and manufacturers, and where we can prep our games with the SMIB boards and card readers and where we install all the slot, drop and cashbox door wires. There are many classifications of technicians there also to help us maintain our inventory and prepare machines for shipment. The technicians at the warehouse are trained on all the newest information. They are a great bunch of guys that would do anything to help us out, and they are usually a phone call away if needed.

The Extras

We at the Slot Technical Department have been involved in everything. We are currently a small site with no maintenance department employed by the racetrack, but contracted out. What this means is that we have the basic departments such as Slots, Finance, Security, Valet, and Marketing, but we have to write out work orders for some of the services such as electrical, plumbing, carpentry, and painting to the track side to be performed. This leaves all the other stuff in the hands of our department. We have been known to repair the following equipment:

- Vacuums
- Shampooers
- Calculators
- Copy machines
- Assemble desks, shelves
- Hang pictures, corkboards, display cases
- Move furniture, offices, install office dividers
- Unclog toilets
- Install soap dispenser stations
- Repair cage and coin drawers
- Installing drawer locks, rails, slides

The Job Posting

The job posting says you need an electronic repair certificate, or Electronic Technician Diploma and/or experience. Duties include mechanical, electric, and electronic repairs to gaming equipment. Heavy lifting involved, work all shifts, and be able to effectively to communicate.

Working to Achieve a Common Goal

At one point in time, there was a fine line as to what

each person could or could not do. The extra chores were very important; this meant you had responsibility. The Senior Technician was on hand 24 hours a day, seven days a week. Eventually, the coverage of the Senior Technician was not there anymore. The Site Technicians then got pressed into service, and they had to be trained on everything. This expanded their knowledge of the gaming floor, but most importantly, they were relied upon more often to make decisions, lay out game plans, and become more up-to-date with the technology.

Overview

Being in the Slot Department is never a dull moment. There are many things to do, even when it seems there aren't. Usually, the days are never the same and the technology changes all the time. New manufacturers are entering the market all the time, and the existing ones are staying competitive. One thing that stays consistent is that we really do not have a job description. When the vacuum needs repairing, or the brand new office desk needs assembling, the slot technicians will be the first to be called, but when the floor is up, the machines are all running, and the wrappers in the back room are purring like a kitten, nobody ever thinks of the guys or girls in the department. That's our duty. We are not front line customer service people that management thinks of. I am not complaining and have never refused any work that was asked of me, but I feel that the Technical Department is much underrated in the casino's eyes. We are a small group of workers, rarely noticed, but if a machine is down and not making any money, the call over the radio first beckons "can I have a tech to..."

- Kevin Noble
knoble@slot-techs.com

More on Job Descriptions from the Slot Tech Forum at: http://forums.delphiforums.com/slottech

From: SBENCHTECH

I work at a small casino in MN. We are responsible for all slot machines and their signs. We use CDS but anything from the poller up (Basically anything with computers) is left to the MIS Dept. there is a maintenance department here that takes care of all facilities. They do anything a normal maintenance dept would plus some. We are slot techs therefore we do anything slot related not maintenance or MIS related. We do fix boards, Monitors, and anything else we can figure out. Moving machines, fills if nothing else is going on and making the customers happy. Occasionally we do fix surveillance monitors and unjam printers.

From: MICMAC654

We all (Technicians and Bench) only work on slot machine related problems. The only cleaning we do is in our own shops, not other departments

From: SAXON98

I work on the Las Vegas strip. We have 2500 machines and on my shift at times we have only 2 or 3 guys on the casino floor. Some of the things that I have been asked to do by my managers include hanging pictures in the slot directors office, fixing staplers and even removing a nail from a customer's shoe. I also recall being asked by a blackjack supervisor to wipe up ice spilled by a customer on the floor.

For a large casino such as the one I work in, I favor the system of employing slot tech laborers for machine moves instead of paying highly qualified techs $20 plus per hour to move and lift slot machines or to clean glass and monitors.

From: BLUESMAN33

Hey Kevin, Come on down to the SUN and try working in a casino with over 6200 slots. As bench techs, we are responsible for ALL the electronic components and equipment. There are currently about 25 bench techs and maybe 175 floor techs, divided by 3 shifts. So as you can see, the bench gets

stretched pretty thin especially during upgrades and changes.

From: TMORRIS9

Our casino has 2000 slots and 15 techs. The nice thing about our department is that we do nothing that is not directly related to slot machines. We don't fix office equipment, do plumbing and such. Those that know how (about 4-5 of us) take turns at bench work.

From: HRENZ

I work in a casino in Minnesota. We have 1750 games on the floor, soon to add on another 500 in our next remodel. We have four techs on our install team. I supervisor and I lead per shift, four floor techs per shift, four bench techs, a director and manager along with a parts person. We don't fix anything that is not on the gaming floor. Yes, we do help out keep our casino clean, along with guest services.

Our job requirements are: electronics degree preferred, one year of slot experience, being able to lift and carry up to 50 lbs. without a dolly. We perform daily preventative maintenance on the games, fix down machines, sweeps for the install crew for machine removal, some removing and installing games, conversations, and we also verify for our slot people when they are short handed and we are not busy.

We have the wonderful SDS system with "ticket in ticket out." We work together as a team and have fun at our jobs. We don't, however, use the title of slot techs. We go by "video techs." We have Aristocrat, IGT, CDS, Atronic, Williams, and Bally games on our floor. We use Mikohn for our progressive signs.

From: RESULT1

The following is just my opinion:

Mechanic or Technician

A slot mechanic is a mechanic – When the slot machines were mechanical and or electromechanical

A slot technician is what you need today. Someone with both mechanical and electronics background. I would have to say over 90% of any games made today are electronic.

Even the hoppers (about the last mechanical part left) will also have electronic hopper boards – which are controlled by the game electronics (Main MPU – I/O boards). Many hoppers are being replaced with printers.

The slot technician should be able to walk up to any machine on the casino floor and have it working in a matter of minutes.

When a slot tech walks up to a game, the tech should be able to read the game. Knowing what the game should be doing, and what the game is not doing, should tell the slot tech where the problem is.

The slot tech should be able to troubleshoot the problem down to the bad unit and be able to replace it (Call it board swapping or what ever you want). He doesn't have time to troubleshoot it down to the components, even if he can or wanted to.

The bench tech does all the repairs on the boards, monitors, etc., insuring the slot techs have plenty of good parts in case they need them. When time permits, the bench tech also helps out on the floor.

Is there any bench Tech out there that can say he knows every game on the casino floor? Meaning, last game recall – Last Bills (Easy) Ok what about all the other tests? (ON EVERY GAME?) Can you do it without the book? Can you do it from memory?

The slot department should only work on the things in the department.

1) Meaning – Slot Tech / Bench should PM games (Yes – clean them correctly) So many think wiping down the monitor and cleaning out coins is a good PM. Leaving the dirt inside the monitors and boards will shorten the life of the components.

2) Machine Moves – Conversions – Installation

3) Progressive

4) Player Tracking (Our case SDS)

5) Floor calls

6) Parts orders, etc.

Many other things - just about anything dealing with the machines.

Moving machines and or stands – call the labors
Stand going in or out – call the carpenters
Power or SDS going in or out – call the electrician

When the slot techs are busy working on (non-slot department) projects, the slot department will fall behind. We could have an EMPTY CASINO – and the slot techs would have plenty of work to do.

If the location employed slot tech laborers for machine moves instead of paying highly qualified techs $20 plus per hour to move and lift slot machines or to clean glass and monitors, what would the slot tech do? You can be sure that the machines would be set up correctly.

As far as slot techs doing hopper fills, I know of some casinos here in Vegas that do it. If you are going to do that, why don't you count the money also? The old rule was "don't let the ones that make the money count it." (It may come up short). No, doing hopper fills falls under the

"taking a Slot Tech away from the job of the department." If they are short handed, that's the problem of management.

Editor's Note: Here is a variety of job descriptions for "slot Tech" from Casino Careers, a prominent employment service for the gaming industry. These job descriptions are not meant to be solicitations. They're just examples of various descriptions for the job of "slot tech."

Title: Slot Tech

Description: Responsible for the floor repair and proper preventative maintenance of all slot machines, including cleaning machines, overhauls, etc. Responsible for the repair, overhaul, and proper preventative maintenance of all electrical and mechanical slot machines in accordance with gaming regulations. Handles the initial set-up and check out of new slot machines. Assists in the break down, relocation and reset up of machines and stands to be relocated. Assists in ensuring machine integrity when jackpots occur and at other times requested.

Knowledge of local jurisdiction gaming laws (federal, state, etc.) and attendant regulations as well as the Company's internal controls, policies and procedures. Promotes positive Guest Relations through prompt, courteous and efficient service.

Requirements: Qualified candidate will have 3 to 5 years technical experience maintaining, setting up, relocating and troubleshooting electronic and mechanical slot machines. High School diploma or GED required. Electronics training preferred

Title: SLOT TECHNICIAN

Description: Maintains and repairs all slot related equipment. Safeguards all assigned assets. Exhibits a friendly, helpful and courteous manner when dealing with customers and fellow employees.

Requirements: High School diploma or GED. Cash experience preferred. Must be at least 21 years of age. Elec-

tronics background. Minimum two years Slot experience (Slot, video machines and associated signage). Must be able to lift 70 lbs. repeatedly. Must have good oral and written communication skills. Must be able to perform physical aspects of the job as noted in policies and procedures.

Title: Slot Technician

Description: Responsible for the day to day maintenance of all Slot machines.

Requirements: High School Diploma or G.E.D. One or more years casino electronics experience and/or training or equivalent combination of education and experience.

Title: Slot Tech

Description: Repair and maintain slot machines. Promotes positive patron relations. Other Duties as assigned Requirements: Previous slot, mechanical or electronic experience preferred. Must be able to lift 50 lbs.

Title: Slot Technician

Description: Repairs & Maintains slot machines in accordance with the regulations of the Casino Control Commission, Company Internal Controls, Policies & Procedures. Promotes positive customer relations. May perform other duties as assigned

Requirements: High School Diploma or equivalent experience preferred. Equivalent of 2 yrs schooling in electronics. Knowledgeable to board level repair of all company slot machines including any accessory device used by the slot machines. Minimum 3 yrs previous experience in the electronics industry, preferably in digital electronics. Regular attendance required. Must possess the five diamond/star qualities. Knowledgeable of the Casino Control Act & Attendant Regulations, as well as company internal controls, policies & procedures

Title: Slot Technician

Description: Maintains and repairs all electronic slot related equipment. Installs, moves, removes, and modifies all related stands, signage and machines. Solves guest disputes, troubleshoots games to board level. Complies with company standards and gaming regulations.

Requirements: Associate's degree (A. A.) or equivalent from two-year college or technical school; or six months to one year related experience and/or training; or equivalent combination of education and experience. Must regularly lift and/or move up to 25 pounds, occasionally lift and/or move up to 100 pounds and occasionally over 100 pounds. Must have a minimum of three years experience as a slot technician.

Title: SLOT TECH APPRENTICE

Description: Maintains accurate and sufficient parts inventory. Provides shop with all the parts and items needed to conduct daily activities. Orders all parts and maintains spare parts inventory. Performs PM as scheduled. Assists in handling related paper work and reports. Daily contact with sales representatives, technical department and vendors. Must exhibit a friendly courteous manner when dealing with customers and fellow employees.

Requirements: High School diploma or GED. Must be at least 21 years of age. Electronics background. Exposure to highly intricate internal slot machine parts. Knowledge of machines internal components and functions. Must be able to lift 70 lbs. Must have good oral and written communication skills. Must be able to perform physical aspects of the job as noted in policies and procedures. Good customer relations skills.

Title: Lead Slot Tech

Description: Management of daily operations of slot technical functions. Supervise the repairs and maintenance of the slot machines and peripheral devices. Supervise and train Slot Technicians. Promotes positive patron relations. May perform other duties as assigned.

QUALIFICATIONS: Knowledgeable of the Indiana Gaming regulations as well as Casinos internal controls, policies and procedures. High School diploma or equivalent experience. Operational background in the Slot department. Working knowledge of slot machines. Formal electronics training preferred.

Title: Slot Technician/Lead

Description: To provide training, technical direction and guidance to co-workers in installing, servicing, adjusting and repairing of slot and other coin operated machines. To perform responsibilities in compliance with the State of Colorado Limited Gaming Act and other applicable municipal, state and federal laws or regulations. To consistently and diplomatically maintain good public relations with casino GUESTS and STAFF MEMBER. To maintain and comply with safety and security standards.

QUALIFICATIONS: Graduation from High School or equivalent, with course work in electronics; or graduation from trade or technical school with an emphasis in electronics. Four (4) or more years of recent and related experience installing, servicing, adjusting and repairing slot and other coin operated machines, preferably within a gaming environment. Demonstrated experience installing, servicing, adjusting and repairing slot and other coin operated machines. Demonstrated experience providing training, technical direction and guidance to co-workers. Demonstrated experience performing "bench level" electronic work.

Title: Slot Tech

Description: Repair and maintain slot machines. Promotes positive patron relations. May perform other duties as assigned. Reports to Lead Slot Technician. QUALIFICATIONS: High School Diploma or equivalent. Previous slot, mechanical or electronic experience preferred. Must be able to lift 50 lbs.

Title: Slot Technician

POSITION SUMMARY: Installs, services, adjusts and repairs coin-operated slot machines, currency changers, video arcade games and currency and coin-handling equipment located in the shipboard Casino by performing the following duties and responsibilities. The position is also responsible for maintaining and repairing signage and the computerized gym equipment.

Requirements: Adjusts slot machines, video games, coin-handling, card shuffling and all other machines and equipment following manufacturer's specifications, using hand and power tools. Conducts general maintenance and/or service on all machines and equipment. Prepares requisitions for parts, tools equipment, etc. and forwards to Casino management for approval. Fills machines with coins and tests electrical and coin-handling systems. Examines defective machines to determine causes of malfunctions.· Adjusts and repairs machines, replacing worn or defective electrical or mechanical parts, using hand tools, such as screwdrivers and pliers. Collects coins and currency from change machines and makes settlements with cashier cage to balance assets and cash retrieved from the machines. Prepares written authorization for jackpot payouts and presents to Cashier and/or Casino management based on established Casino Operations policies. Conducts daily inspections of the Arcade machines and equipment.

Language Requirements: Ability to speak English clearly, distinctly and cordially with guests. Ability to read and write English in order to understand and interpret written. Ability to speak additional languages such as Spanish, French or German preferred.

QUALIFICATIONS: Formal training in the repair and troubleshooting of a variety of electrical, mechanical and/or electronic equipment. Previous slot technician work experience in live casinos preferred. Proven ability to read safety rules, instructions in the use and maintenance of tools and equipment, and methods and procedures in mechanical drawings.

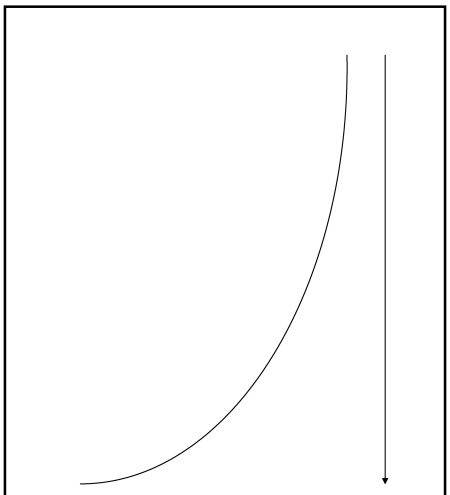
- Slot Tech Magazine

Bringing Touchscreens Back From the Dead

By Ed Morgan

All of us, at one time or another, have gotten this call; " Can you come check out the touchscreen at this machine? The guest is trying to pick one thing, and the game is picking something different."

You get to the machine, certain that all it needs is a touchscreen calibration. You go through the steps and touch the dots in the corners and enter the touchscreen test. You drag your finger in a straight line down the right side of the screen, and the further down you get, the more offset to the left the trace becomes.



You drag your finger in a straight line down the right side of the screen, and the further down you get, the more offset to the left the trace becomes.

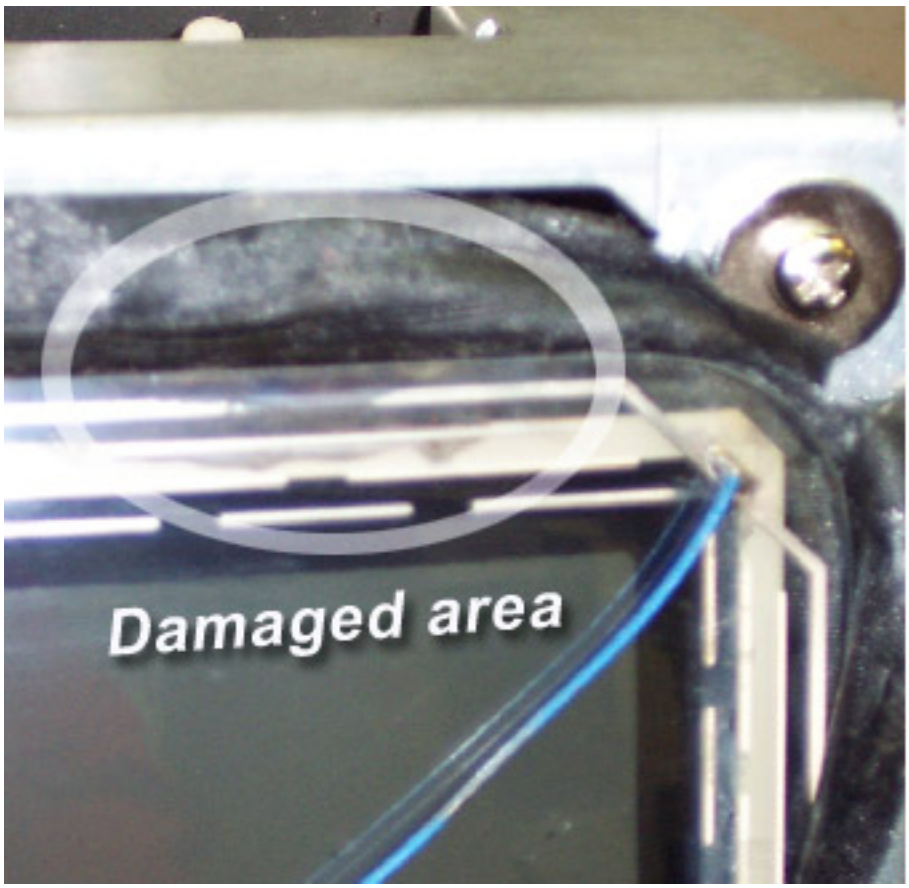
You perform another calibration only to get the same results.

What can cause this is corrosion of the traces on the surface of the touchscreen, resulting in loss of continuity from the corner pad to the end of the trace. The problem appears to occur on the bottom corners; I assume, due to drink spills and gravity.

The following procedure can be used to restore proper function to this type of failed touchscreen.

Equipment required: Isopropyl alcohol, acid brush, towel, masking tape, Exacto knife or razor blade, heat gun, Polyken 510 tape, and silver epoxy (Mouser Electronics Part Number 5168-2400)

Carefully lift up the touchscreen tape covering the bottom corners. You'll notice right away that the traces have been nearly eaten through. (See circled area in photo 1)



Clean the affected area with Isopropyl, brush, and towel. Use the tape to mask off the repair area. (See photo 2)

Mix a small quantity of the epoxy and let it thicken slightly. Use the edge of the exacto or razor blade like a putty knife and apply the epoxy to the repair area. Heat the repair area with the heat gun until the epoxy has hardened. Remove the masking tape and continuity check the trace from the end to the corner pad. You may have to apply additional heat to the repair area to achieve the desired level of continuity (1 or 2 ohms). Finished product should look like Photo 3.

Occasionally, you will break (or find broken) the wire from the controller that attaches to the corner pad.

I have found it difficult to resolder the wire to the pad, but the epoxy will fix this in a snap. To prepare the pad, simply remove the solder and clean with isopropyl. Apply a generous amount of epoxy to the pad, and hold the end of the wire in the epoxy while you harden it with the heat gun.

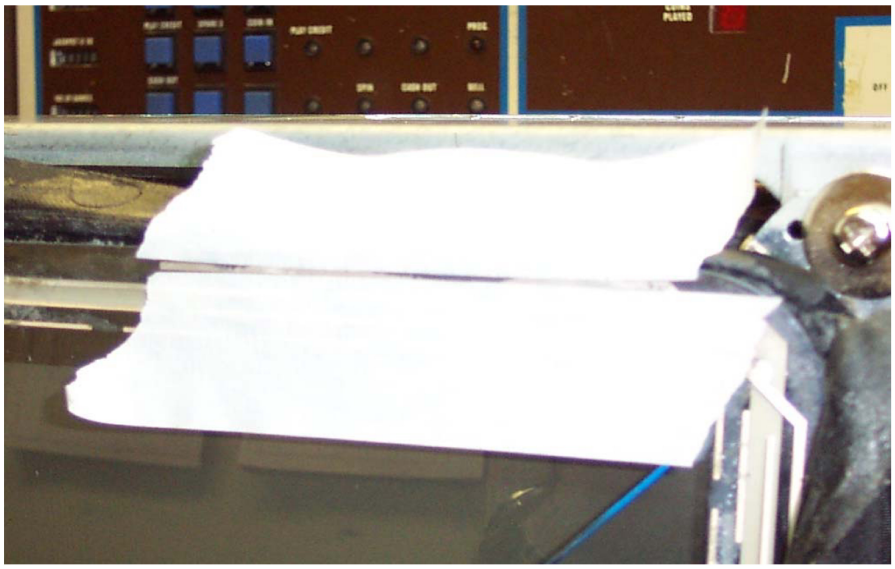


Photo 2

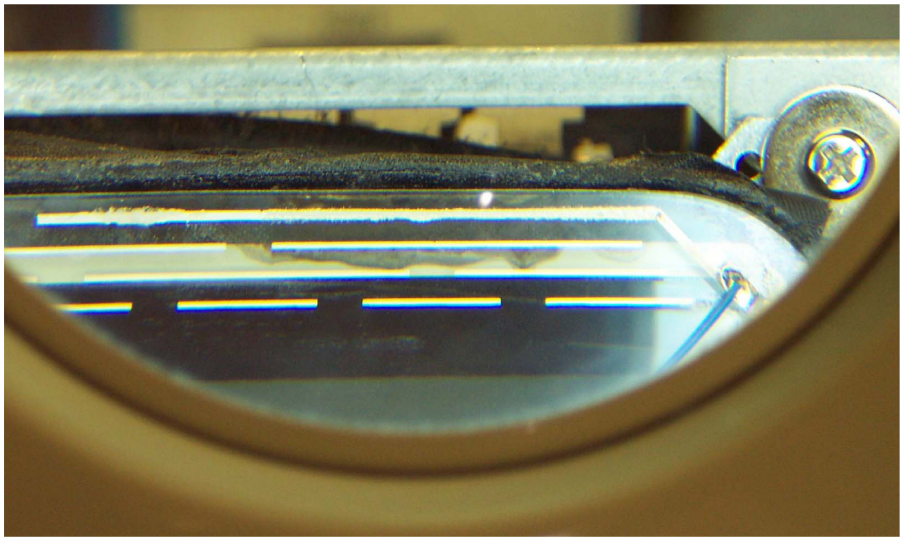


Photo 3

Once you're done, carefully replace the touchscreen tape you peeled up earlier, and cover with a fresh piece of Polyken 510 tape.

Total investment: About a dollar's worth of epoxy, a few cents worth of tape, and 30-45 minutes. Not bad considering new touchscreens go for around $300.

- Ed Morgan
emorgan@slot-techs.com

TechFest 4 Sold-Out!

Thank you to our host, Grand Casino Mille Lacs

Full coverage next month in Slot Tech Magazine

Atronic Technical Services Hit the Road in Europe

A new and unique era in mobility and customer support has emerged for Atronic's committed Technical Services in Europe. Two well-equipped service cars are now on the roads of Europe, providing even more focused, rapid and flexible technical service to Atronic's customers.

One of the cars was added to the pool being used by the technical service team based in Lubbecke, enabling them to provide a quick and speedy service to customers in Germany, Sweden, Holland, Luxembourg, Great Britain, Austria, Switzerland, Italy, Croatia and Slovenia. The other service car is being manned by Atronic service technician Ari Kofas who will use the car for visits to Greece and neighbouring countries. Easily identifiable, the two vehicles are decorated and highlighted with vibrant and colourful game character artwork and the Atronic logo.

This measure allows for increased flexibility as Atronic's technical service now depends even less on flight schedules. Furthermore, all necessary spare parts and equipment can be transported direct to the customer. Operators will ultimately benefit from this new service by improved and reduced machine downtime as well as minimized lead times and costs for spare parts. Proving once again, Atronics determined promise to redefine outstanding customer support and service.

Atronic International and sister companies Atronic Americas and Atronic Australia are members of the family-owned and operated Gauselmann Group, which has sold more than 1.7 million machines since inception, and 97,000 gaming devices in the year 2001 alone. Atronic is headquartered in Germany and has offices in Australia, Austria, Great Britain, Peru, South Africa and the United States of America. Atronic is dedicated to producing only the highest quality of entertaining games and products, which are being operated in 74 countries worldwide. Atronic holds a total of 143 worldwide gaming licenses including the United States of America, where it is licensed to sell machines in 21 states and to 115 tribes. To find out more information about Atronic, please visit the website at www.atronic.com

Seiko Instruments Introduces Industry-First Vertical Printer for Cashless Gaming Machines

At this year's Global Gaming Exposition in Las Vegas, Seiko Instruments USA Inc., Micro Printer Division introduced its new vertical-profile cashless ticket printer PSA-66VST as the latest addition to its extensive line of print mechanisms, print subassemblies and stand-alone printers. An industry-first, the design of the PSA-66VST allows it to fit into many gaming machines that cannot accommodate standard horizontal type printer configurations. The PSA-66VST incorporates the proven technology of the Seiko Instruments PSA-66 ticket/coupon printer subassembly.

Machine manufacturers will no longer be required to disassemble and reassemble a standard printer to fit the vertically oriented space configurations imposed by some machines. By fitting directly into the machine, the new PSA-66VST thermal printer eliminates the time, expenses and inconvenience associated with rebuilding standard printers and reduces the time to market for manufacturers.

"To our knowledge, this is the first printer of its kind to be offered from a printer manufacturer," said Nick Micalizzi, Senior Sales Manager, Seiko Instruments Micro Printer Division. "It allows all cashless gaming manufacturers to take advantage of our quality and reliability, regardless of the machine configuration."

The new PSA-66VST offers an exceptional level of operational reliability and consistent print quality, particularly compared to impact printers that require ribbons, plus fanfold/perforated ticket stock to avoid paper jams. In addition, the paper can be preprinted with promotional information, logos and graphics in full-color on the non-thermal side. The printer delivers print speeds of up to 75 mm/sec. with a high print resolution of 8 dots/mm for quality printing of graphics and characters. It offers easy drop-in paper loading for 400 tickets in standard U.S. currency size, minimizing paper replenishment and associated labor costs. Additional features of the printer include paper replenishment indicators, and ticket-jam and ticket-in-chute sensors.

The PSA-66VST is provided with an RS-232C communications port, has a two-year factory warranty and is backed by the "Seiko Secure" customer support commitment, which includes application engineering assistance, software development and customization, comprehensive technical documentation, customer training, and technical and service support.

PSA-66-2N - Increased Functionality, Ease of Use and Cost Economies

In response to specific market demands, Seiko Instruments USA Inc., Micro Printer Division has also introduced its new PSA-66-2N ticket printer. Key new features include presentation of the ticket only after it has been completely printed; high-visibility, high-speed, ticket reveal; increased ticket capacity; and features that significantly streamline maintenance requirements. The new printer is the next generation in thermal cashless gaming printing and builds on the success of the Seiko Instruments PSA-66 ticket printer.

"The PSA-66-2N takes another step in supporting the gaming industry with the best print solution possible," said Nick Micalizzi, "We were the first to market with a direct thermal printer pro-

ducing dollar-bill-sized vouchers and will continue to add valuable features to solidify our position as the thermal printer supplier of choice for cashless gaming."

The PSA-66-2N offers a large ticket capacity of up to 800, significantly minimizing machine downtime and labor costs associated with paper replenishment. Tickets are completely printed, then cut off automatically for presentation to the player. This new functionality eliminates paper jamming and illegible printing caused by players pulling on the ticket before printing is complete. High-visibility, high-speed ticket presentation ensures that the player can easily see the ticket.

Designed in a lightweight, high-impact plastic housing, the new printer contains all electronics in the main unit for easy service. An anti-crimp flexible cable replaces previous ribbon-type cables to prevent bending or crimping. Hot swappable capabilities and an easily accessible port for firmware downloads directly from a PC combine for easy upgrades to future technological developments or replacement of the printer.

The PSA-66-2N printer measures 114 mm x 305 mm x 65 mm (W x D x H), delivers print speeds of up to 75 mm/sec., and ticket capacity options of 350, 550 and 800. A high print resolution of 8 dots/mm provides quality printing of characters and graphics, such as logos, promotions and graphics. Ticket stock can also be pre-printed in color on the non-thermal side. The printer utilizes fanfold, perforated vouchers in standard U.S. currency size, and comes equipped with an interchangeable ticket tray. Paper replenishment indicators and ticket-jam and ticket-in-chute sensors eliminate problems associated with improper paper loading and jamming.

The PSA-66-2N thermal printing subassembly offers a choice of either RS-232C or Netplex data communications (a specification of International Game Technology) for an added degree of user flexibility, and it can be built into both new and existing gaming machines. The PSA-66-2N has a two-year factory warranty and is backed by the "Seiko Secure" customer support commitment.

For more information about the entire line of Seiko Instruments thermal printers, subassemblies and mechanisms, contact:
Seiko Instruments USA Inc.,
2990 West Lomita Boulevard
Torrance, CA 90505
Tel.800.553.6570
Fax.310.517.8154
E-mail
siumpd.id@salessupport.com
www.seikoprinters.com.

Bad Opto-Isolator Causes Blooming, Blackouts

FLASH TRAFFIC - Tech Bulletin from Casinotech - Your official Kortek service center

This notification is to alert IGT distributors, service centers and IGT casino-customers of monitor problem on all IGT 17" Upright Game King models.

The problem is related to improper driving of an optocoupler causing initial video blooming problem which progressively worsen and finally causes video black out as the high voltage shuts down.

This is the result of a bad lot of optocouplers in which 5% were out of tolerance. This affects only monitors (IGT PN# 69919001 and 69929401) produced in March through May 2002 with date codes of 3/02 - 5/02 and serial number ranges 020300001 thru 020404000.

While around 3000 monitors were produced at that time, only around 5% of these monitors will generate this problem. The initial video blooming problem can be seen soon after game installation and will progress to video blackout within 45 days.

This CN is advisory in nature and not mandatory. It states that any location having monitors with this problem contact Casinotech, the Kortek authorized service center, for board or monitor repair/replacment. IGT's CN can be found on IGT's website, or through Casinotech.

Kortek's response has been to fully gear up Casinotech to support this field. Casinotech is stocked up with necessary componentry to turnaround a repair within a day or so.

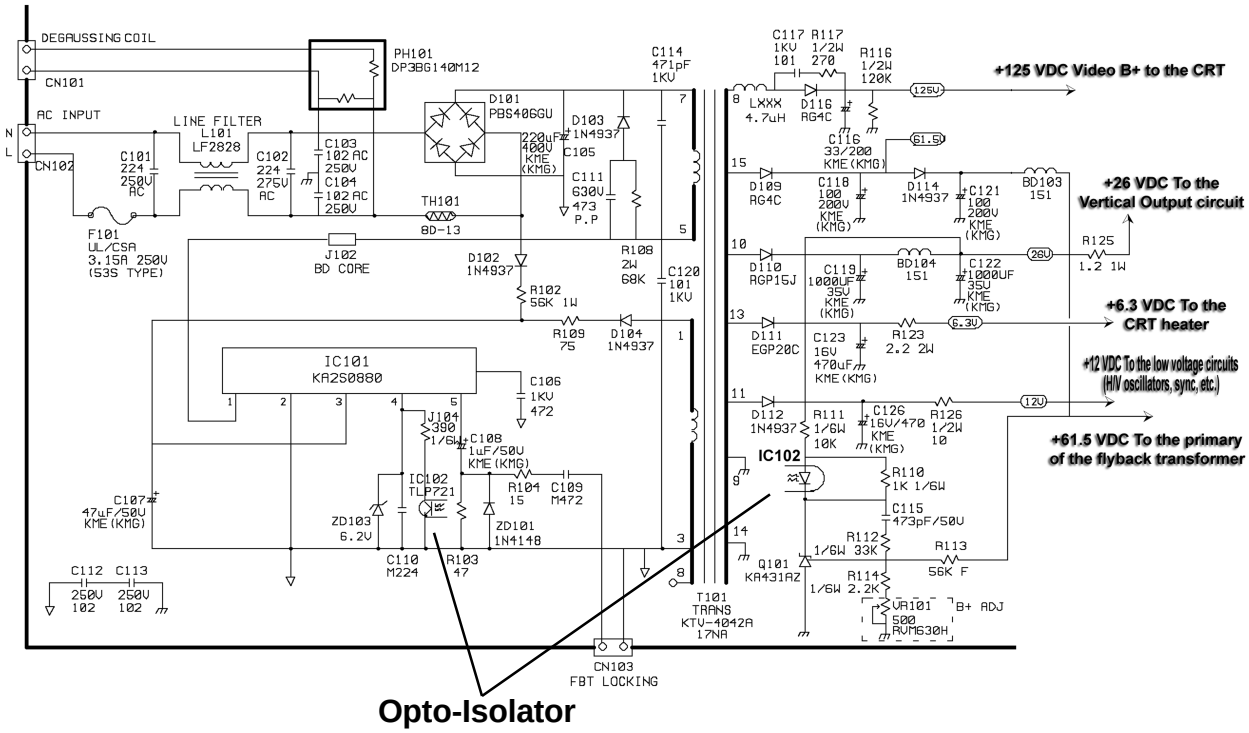
Where they are unable, they are stocked up with board sets to replace. This will ensure that the casino suffers minimal downtime. Where necessary, Casinotech can advance ship a board set such that the board swap is done at the casino and the game can be up in running in just the time to swap boards.

Casinotech and Kortek highly suggest that the contact be made to fulfill this CN early in the stage of this problem, while the monitor is experiencing the blooming problem. If the casino waits until it blacks out, the turnaround time may be longer, depending on the backlog.

This same alert appears as IGT CN# CN3502A

Casinotech can be reached at 702-736-8472 or at CASINOTECH@LVCM.COM

Editors note: A more detailed explanation follows on the next page:



What's Really Happening Here?

This monitor uses a classic SMPS design to create most of the DC voltages needed to run the monitor circuitry. These include the B+ (+61.5 VDC) that feeds the primary winding of the flyback transformer, the Video B+ (+125 VDC) that goes to the video output stage on the neck board, +24 VDC for the vertical output stage, +12 VDC for the low-voltage circuits such as the horizontal/vertical oscillators, video amplifiers and the sync amplifiers, and the 6.3 VDC that powers the CRT heaters.

In an SMPS design, something has to tell the PWM controller (in this case, it's IC101, a KA2S0880) what is happening at the B+ output. The PWM controller needs to know this so that it can regulate the output voltage. If the B+ output rises for some reason, the PWM controller responds instantly by narrowing the pulse width (the "on" time of the FET that switches the unregulated DC voltage across the primary winding of the SMPS power transformer). By narrowing the pulse width, the output voltage of the B+ is brought back down to normal (in this case, 61.5 VDC).

Just the opposite happens if the output voltage of the B+ supply drops for some reason. Say, for example, the 120 VAC (or 240 VAC "mains") voltage was to drop, due to a power fluctuation. You might have a compressor kick-in somewhere, causing a momentary drop in line voltage. In this case, the PWM controller IC will respond by increasing the pulse width, bringing the B+ back up to normal. This all happens as fast as 60kHz to 100kHz so the B+ actually remains perfectly stable, regardless of changes in input voltage or load.

The question here is this: "How does it know?"

How does the PWM controller know what's going on at the B+ output of the SMPS? Obviously, there must be some sort of feedback involved here; something that tells the PWM controller IC what's going on so it can compensate for changes. Here's where it gets just a little bit hairy, so bear with me . . .

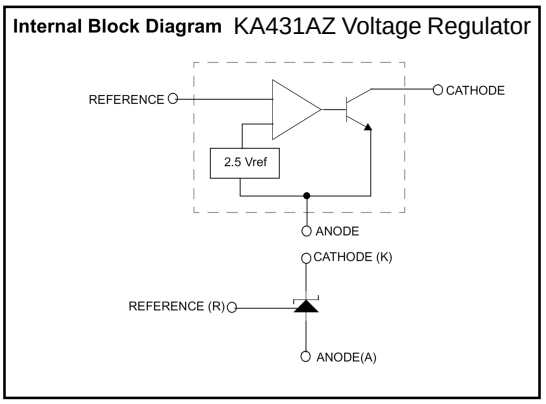
At first blush, the answer seems simple enough: connect the "feedback" pin of the PWM controller IC (Pin 4, in

this case) to the B+ output and see what's going on there. Naturally, you would incorporate some sort of resistor voltage divider network in there to cut the B+ voltage down from +61.5 VDC to the low voltage that the KA2S0880 is looking for at that pin. In this case however, the feedback sense pin is actually a current sense, not voltage. It's really looking for a current "sink" of about 1ma (milliamp) during typical operation.

Add to that one VERY IMPORTANT thing to know about a typical SMPS such as this one: the primary side of the SMPS is completely isolated from the secondary and all other monitor circuitry. That is to say, there is absolutely no metallic nor resistive connection between the two sides. Notice that the ground symbols are different on the primary and secondary windings. Without this isolation, there would be all kinds of shock hazards and/or fireworks.

So how then, can we obtain feedback from the secondary to the primary without losing isolation? One method is to use a separate winding on the SMPS power transformer. This technique was covered in the July, 2001 issue of Slot Tech Magazine (back issues are available for purchase on the website at slot-techs.com).

In this case, however, Kortek opted to utilize "opto-isolation." The component that is the focus of this Customer Notification is called an "opto coupler" (also known as a photo coupler or opto-isolator) and it's IC102. The part number is TLP721. This is an absolutely typical opto-isolator (For more on the subject of opto-isolators, please refer to page 32 in this issue of Slot Tech Magazine).



Let's look at the LED half of the opto-isolator first. The LED in the opto-isolator obtains its power from the +26 volt supply. Of course, +26 VDC is way too high for an LED. A 10k ohm resistor, R111, cuts down the voltage.

Here's where it gets sort of interesting. Instead of grounding the cathode of the LED as you might expect, it is connected instead to the cathode of Q101. Q101 is not a transistor (as the designator "Q" would suggest) nor is it a zener diode as implied by the schematic symbol. That third lead that you see (on the right side of the device) is a "reference" input. Q101 is actually a voltage regulator.

A pair of resistors determines the output voltage, which can be anything from VREF (approximately 2.5 volts) to 36 volts DC. In this case, it is resistor R113 (56 k ohms) and resistor R114 (2.2 k ohms) along with the B+ voltage adjustment potentiometer, VR101. The entire circuit becomes a sort of "programmable zener diode" with one MAJOR exception. Because the voltage divider circuit made from R113, R114 and VR101 is fed from the B+ line, the voltage at the cathode of Q101 will vary in direct proportion to the B+ voltage.

Here's where it comes together. Since the cathode of the LED in the opto-isolator is connected to the cathode of the voltage regulator, any change in voltage at the regulator's cathode will translate into a change of the brightness of the LED inside the opto-isolator. In other words, as the B+ changes voltage, the LED changes brightness.

Now let's turn our attention to the other half of the opto-isolator, the phototransistor. Notice that the phototransistor half of the opto-isolator is connected through a 390 ohm resistor to the feedback pin (again, pin 4) of the PWM controller IC.

When the LED in the other half of the opto-isolator turns on this phototransistor, it will begin to conduct, sinking current to ground. The KA2S0880 responds by changing the pulse width. Naturally, when you first turn on the monitor, this transistor will be off. The KA2S0880 begins to increase the pulse width, raising the output voltage of the secondary. Once again, the longer period of time the transistor is turned

on, the higher the B+ voltage will be. The pulse width is increased until it reaches (in this case) 61.5 VDC. If the B+ voltage were to rise, the LED in the opto-isolator will get brighter. This will cause the transistor to conduct harder to ground. The KA2S0880 will respond by decreasing the pulse width, lowering the B+ down to where it should be. Of course, all of this happens in a tiny fraction of a second.

And now to the failure . . .

Kortek received a bad batch of the opto-isolators. The nature of the failure is that the LED is dimming out. When you plug that symptom into the forgoing theory of operation, you soon realize that the dimming LED fools the SMPS into thinking that the B+ output voltage is too low. Naturally, the PWM controller IC responds by raising the B+ voltage. As the B+ rises, the current in deflection circuits increases, resulting in a picture that is "overscanned." The edges of the raster extend beyond the edges of the CRT. The picture appears "overscanned" in all dimensions. As the entire picture becomes intermittently larger, this symptom may be referred to as "blooming" as the raster seems to bloom outwards from the center of the CRT.

FYI, this type of failure is by no means limited to this monitor. Opto feedback is common in switched-mode power supplies. You'll see it in both monitor SMPS and low-voltage supplies as well.

- Slot Tech Magazine

KORTEK CORPORATION

Technical Notice

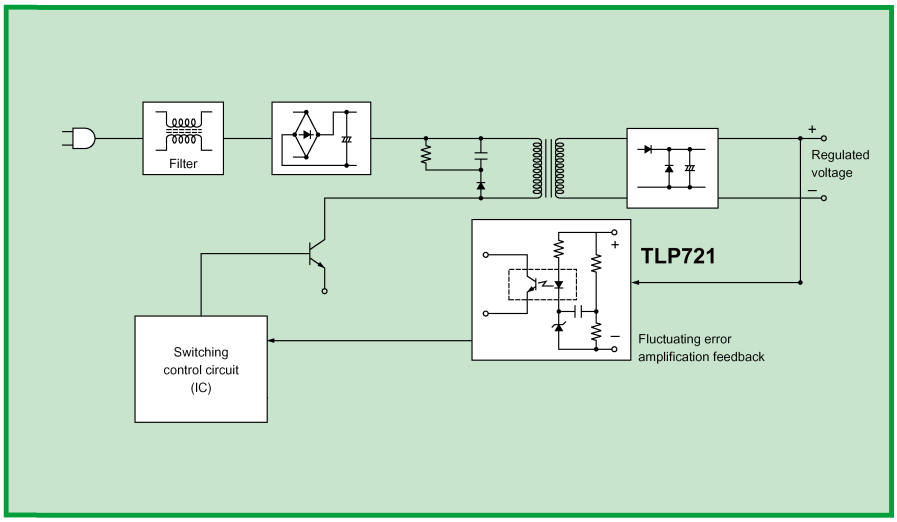
1. Topic	FINAL REPORT ON PROBLEM ANALYSIS AND PROPOSED CORRECTIVE ACTIONS
2. IGT Part # Affected:	69919401, 69919001
3. Kortek Part# Affected:	KT1703N-A02
4. Kortek Serial# Affected:	020300001 – 020404000; DATE CODE: 3/02 THRU 5/02.
5. Symptom of Problem:	PICTURE BLOOMING DURING CHANGED GAME SCREENS OCCURING IN THE FIRST TWO WEEKS OF USE. THIS IS FOLLOWED BY BLACK-OUT OF MONITOR OCCURING APPROX TWO WEEKS LATER.
8. Cause of Failure	THE CAUSE OF BOTH INITIAL (BLOOMING) AND FINAL (BLACK-OUT) FAILURE MODES IS THE OPTO COUPLER, IC102. THE PROBLEM OPTOS SHOWED A PROGRESSIVLY WORSE CURRENT TRANSFER RATIO AS THE RESULT OF NOT ENOUGH CURRENT APPLIED TO PIN 4 (STABLIZING FEEDBACK CIRCUIT). THIS RESULTS IN VIDEO BLOOMING. THIS CON-DITION ALSO RESULTS IN THE B+ VOLTAGE SUPPLIED TO THE FLYBACK TRANSFORMER (T402) PROGRESSIVLY INCREASEING FROM 20% TO 30%. THIS APPLIES TOO MUCH STRESS AND EVENTUALLY CAUSING IT TO FAIL, RESULTING IN VIDEO BLACK OUT.
17. Solution to Problem:	INCREASE DRIVE CURRENT TO OPTO COUPLER THEREBY RESTORING PROPER B+ VOLTAGE TO FLYBACK AND REMOVING STRESS. REPLACE IC102 WITH SAME SPEC OPTO AND CHANGE RESISTOR R111 FROM 10K TO 4.7K OHM TO BRING OPTO WITHIN TOLERANCE SPEC, WHILE DRIVING IT HARDER FOR INCREASED TRANSFER/PERFORMANCE. SHOULD MONITOR EXPERIENCE BLACKOUT, FBT T402, SHOULD ALSO BE REPLACED.
23. Corrective Action Plan (Field Solution)	IMMEDIATELY SUPPLY CORRECTED REPLACEMENT BOARD SETS TO THE FIELD VIA KEY DISTRIBUTORS AND CASINO SERVICE LOCATIONS. THIS WILL RESOLVE IMMEDIATE FAILURES, NEW INSTALLATION REQUIREMENTS AND IMMEDIATE TERM FAILURES. STOCK UP KORTEK SERVICE CENTER WITH NECESSARY PARTS AND REPLACEMENT PCBS. **PER IGT CN# CN3502A, ALL CASINOS SHOULD CONTACT CASINOTECH, KORTEK AUTHORIZED SERVICE, FOR REPAIR AND/OR REPLACEMENT.**
29. (Production Solution)	UPON APPROVAL BY IGT, IMMEDIATELY IMPLEMENT 4.7K RESISTOR AND OPTO CHANGE ON ALL FUTURE PRODUCTION.

Kortek Authorization: M.B. KIM – KORTEK ENGINEERING **Date:** 10/02/02
RICHARD LANDRY – KORTEK USA 10/02/02
CC: CASINOTECH, DAVID COPRAN

kortek corporation
www.kortek.co.kr

KORTEK USA, SPARKS, NEVADA: 775-359-2204
CASINOTECH / KORTEK AUTHORIZED SERVICE CENTER, LAS VEGAS, NV: 702-736-8472

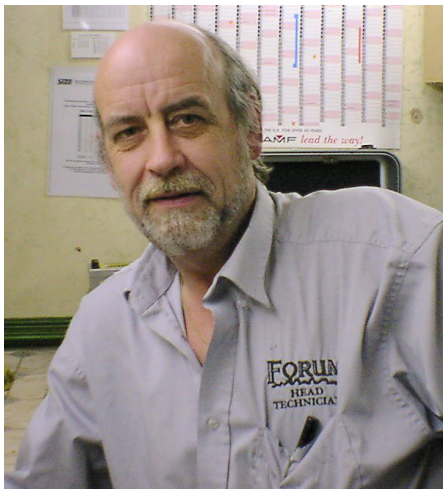
Here is the official notice regarding the solution



Here is a sort of simplified version of the power supply.

A Plumber's Guide to Fruit Machines - Part 8

By Gordon Lowe



Section 5a. Reel Assemblies

What is known as the reel assembly is made up of between 3 and 5 individual units. Each unit comprises a stepper motor, an optical switch, and a reel drum fitted with the reel band appropriate for that particular reel, usually identified as reel A, B, C, etc. or 1, 2, 3, etc. Each reel unit is identical except for the band, which is usually marked with the above identification lettering or numbering.

Section 5b. Stepper Motor

The stepper motor is totally different to the conventional motor of the type found driving gearboxes, as in pushers, fans, turntables and so on. If you examine the motor closely you will find numerous wires supplying it; directional movement is controlled by switching between 12 & 24 volt (dependant on the stepper motor fitted by the manufacturer) onto two separate windings.

A typical example of one used would be the 48 step stepper motor, this has the capability of 48 different positions per revolution, both forwards and reverse, this is achieved by drive transistors on the MPU switching the 12/24 volt on and off at very high rates.

From this comparatively high control of the position of the spindle, it can be seen that given the necessary circuitry, we can stop the reel wherever we want it. This is done by the MPU operating on information it gets back on the reel position from the opto sensor mounted on each individual reel unit.

Stepper motors can and do fail, sometimes with age. I would however point out that this is unusual. If you suspect a motor, try a known working unit in place of it first before ordering and replacing with a new one. More commonly, a suspect fault with the reel motor will be the result of poor electrical connection to the reel assembly.

Positioning of the motor (the actual motor mounting bolts) is adjustable in some, but not all cases. This can effect the correct operation of the reels resulting in win lines not being aligned in the correct position. Take note of the original position of the motor when replacing, a couple of centimetres out can result in large discrepancies. If in doubt, refer to individual service manuals applicable to the machine.

Section 5c. Opto Sensors

Opto sensors supply a logic pulse to the MPU every time the reel does one complete rotation. This is achieved by a sensor tab fitted directly onto the reel drum. As this tab passes though the opto sensor, it blocks the light passing from one side of the sensor to the other. This light is infrared and is not visible to the naked eye. Some manufacturers have added an LED (Light Emitting Diode) to their circuit boards on which the opto sensor is fitted. This gives the bonus of being able to see the sensor working. In some cases, it lights up when the sensor is blocked by the tab, in others it goes off. This is dependent on the particular manufacturer. When fitted,

this does give an indication as to whether or not an opto sensor is working. Failure is not uncommon and replacement is straightforward.

What is even more likely should a problem show up in this area, look to see if the reel tab is still there. They break, drop off and disappear, never to be seen again.

Summary

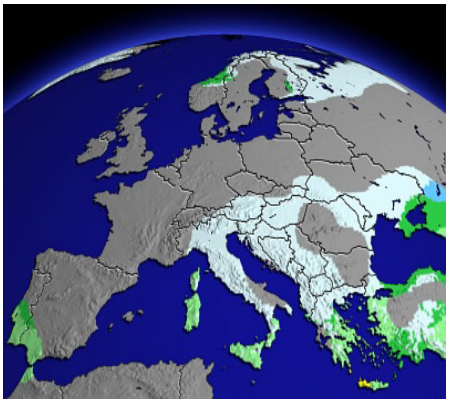
The vast majority of suspected reel assembly faults do not lie with the reels themselves. More commonly, check that the reels are clear of any obstacles, for example, wiring or vac forming that is coming adrift from the glass or reel tabs that are hitting the opto on each rotation. Are the reel bands secured in position or are slipping on the drum? Have you checked the power supply?

As I have stated repeatedly, it is all too easy to look for involved or complicated reasons behind a problem. Think simple.

- Gordon Lowe
glowe@slot-techs.com

International View

By Martin Dempsey



2 Revolutionary Concepts From STELLA International At FER Interazar 2002

In the last few months, the Stella crew has developed two revolutionary game concepts for the Spanish market. The two innovations were shown at the FER Interazar in Madrid, on the stand of Stella's exclusive distributor Sente S.A. The revolutionary DICE MASTER is a game under category 'B' machines for Spain! DICE MASTER uses a special dice feature in the club game: Play a dice, then follow a path containing different fields with a chance to win, lose and discover mysteries.

The mystery fields and the possibility of high winnings will excite the players! And of course players will be fascinated by hidden features of this game! DICE MASTER will be an attraction in each operation! To find out more information about Stella International, please visit the website at http://www.stella-international.de or contact Susanne Wesemann. Phone: +49-5741-273 515. Email:swesemann@stella-international.de

ODREX At Entertainment Industry Exhibition

At the recent Entertainment Industry exhibition in Kiev, Ukraine ODREX presented a wide variety of equipment including Electrocoin machines - Russian Roulette, Cleopatra and their latest model Double Dollar. Also, electronic roulette of Spanish - Hungarian production "Casino Nevada"; from their own production "Richelieu" and "Southern Star"; a video game "VAMPIRES" - the start of a new project with IAMC - a company of the CIRSA Group; and equipment produced by NRI & Innovative Technology, for whom they act as distributors and service centres.

The general opinion, from both foreign guests and domestic companies was that the level of the trade show was higher compared to last year and that the level of equipment presented had also improved. The show was well organised and reflected the active development of the Ukrainian market. For further information email:oshymko@odrex.sky.od.ua

London Shows Look To The Future

ATE, organiser of the annual Amusement Trades Exhibition International (ATEI) and the co-located International Casino Exhibition (ICE), has announced that both of the leading business-to-business events will remain at their current Earls Court venue until at least the year 2010. With the original contract signed in 1991, this new agreement will extend ATE's tenancy at Earls Court to two decades.

Nigel Nathan, commercial director of the Earls Court and Olympia Group, said: "ATEI and ICE are two of the most impressive business-to-business exhibitions in the calendar and we are delighted to have these successful and well established events with us for the next seven years. We look forward to working with the organising team to ensure that the exhibitions continue to go from strength to strength." For further information email : af@sjc.co.uk

Say 'Cheese!'

The Big Cheese, the latest £25 AWP launch from Barcrest Games has been a big hit, down at Sunhill Police Station! The cast got a taste for The Big Cheese when it was provided as an action prop in a forthcoming episode of the Bill, to be aired in November.

The brightly coloured stylish game was chosen for its '15 minutes of fame' for two days, filming on location for Thames television. The innovative team at Barcrest Games wrote special software, allowing the game to function in line with the script and play its starring role to perfection!

Players however, must rely on their skill to earn big money on The Big Cheese. As well as a normal feature trail and hi lo gamble option, The Big Cheese also has an additional supertrail with extra feature positions and super cash shots, opening up a whole new pool of values and exciting ways to win. Industry test results have been very strong, with The Big Cheese receiving early approval from the majority of retailers, thanks to its refreshing style and game format. For further details please contact: Clare McMillan / Sam Drakeford @ MediaWorks. Tel: + 44 (0)113 234 5600. Fax: + 44 (0)113 234 5601.
Email::pr@mediaworksccl.com

A "Tempting" Game From ACG

Astra Casino Gaming will be exhibiting the first in a series of new casino games designed for the new "TOPSPIN Series" product range at Preview 2003. A fully flexible casino machine, "Temptation" is a true casino style random slot game dressed in a prestige casino standard cabinet, incorporating dual stake, 25p / 50p, and full jackpot flexibility. The game has been received extremely positively after initial testing and offers something different to the industry. Housed in a full European specification Casino cabinet, the game has an immediate impact due to its impressive visual appeal, enhanced by a "3D Reel" top game.

For further information contact Richard Barr, Product Support & Marketing Co-ordinator. Tel: + 44 (0)1656 672804.
E-mail:rbarr@astra-games.com
Website: http://www.acg.uk.com

Sphinx AWP From Stella
SPHINX is the latest AWP from Stella International for the Czech Republic, Russia, Ukraine and Kazakhstan. It comes in a standard upright cabinet, using Gauselmann technology, with 3 reels in the basic game and 3 reels in the club game.

Additional features include a dynamic no-lose risk ladder up to the top win of 750 credits; the possibility of risking a half win or the Flame-Jackpot with the possibility of winning up to 5 "x-tra" games in Criss Cross or 750 credits.

Also, an improved club game with 4 different stakes (2+4, 2+10, 2+24, 2+48), 5 winlines and Pharao as a special "wild"-symbol; exciting basic game with 5 different stakes (1 up to 5) and corresponding 1 up to 5 winlines and attractive features like Repeat, Respin, Auto-hold and Mystery win.

For further information email SWesemann@stella-international.de

CI Innovations, Inc. has developed a new and innovative lighting system for the casino gaming market. This design is intended as a simple and direct replacement of the standard fluorescent lighting systems currently used in casino slot and video poker machines. A revolutionary new design was developed to significantly decrease energy consumption, eliminate replacement parts, reduce maintenance and ultimately provide the machine operators with substantial cost savings.

Specifically unique is the design of the patented solid-state power module which combines with specially designed cold cathode fluorescent lamps (CCFLs) to create the what CI Innovations refers to as their "CI-3" lighting system.

Advantages and Features

Extremely Efficient. This new system is nearly 400% more energy efficient than the standard fluorescent lighting systems currently used in casino slot and video poker machines, resulting in significant energy savings to the casino operator.

Minimal Heat Generation. We all know how hot it gets inside a slot machine. Heat is a bad thing for electronic components. The CI-3 lighting system produces significantly less energy loss due to heat generation than standard fluorescent lighting. As a result, internal machine temperatures are about 15-20 degrees cooler than those of the standard fluorescent system.

The bulbs (tubes) are highly resistant to shock and vibration. CCFLs do not rely on the same, fragile, internal heating element required to ignite a standard fluorescent bulb. As a result, The lifespan of CCFL bulbs is unaffected by the slamming of slot machine doors due to routine maintenance. Bulbs are available in sizes from 2 inches up to 24 inches in length and are also available in various shapes such as circles and U shaped bulbs.

Extended life. The bulbs used in the CI-3 lighting system will last a minimum of 1 year, which will provide significant cost savings in maintenance time. The solid state power module was designed to last 10+ years and completely eliminates the need for starter or ballast.

Self-Monitoring Power Module. The CI-3 power module is completely self-monitoring and will adjust to the optimal output voltage required to drive the tubes at the maximum efficiency and brightness levels throughout their life. At the end of the bulb life, the CI-3 power module will temporarily discontinue the power to the specific bulb until that bulb is replaced. Unlike standard fluorescent lighting, the CI-3 will not continuously attempt to re-light the exhausted bulb causing unwanted flickering and harmonic disturbances.

No Harmonic Disturbances. The CI-3 lighting system is filtered to ensure no disruptive harmonics are present. Test results show significantly lower levels than are found in standard fluorescent systems.

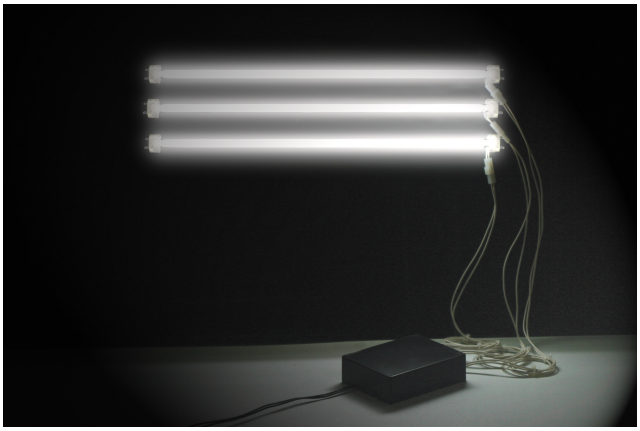
Runs on a wide voltage range. The system will operate on voltage ranges of 90-135 volts. The CI-3 is also self-protected against voltage spikes and brownout conditions.

No Capacitive Loading Problems. This one is for you engineers: The CI-3 power module can be located in one central location while powering up to 3 bulbs of any size from 2 inches to 24 inches.

Easy Installation Without Modification. The CI-3 lighting system is very quickly installed utilizing the existing brackets and 117 VAC power. Additionally, it is very easily transferred to a new machine should the existing one be removed from service.

Unit Can Strobe. Also of interest to our readers who are game designers: The CI-3 lighting system is well suited for bonus or jackpot situations as it can be easily flashed at high rates by interrupting the power supply, without effecting the life of the power unit or bulb. Additional sequencing and cascading effects can be achieved through the use of logic that can be added to any of the power modules.

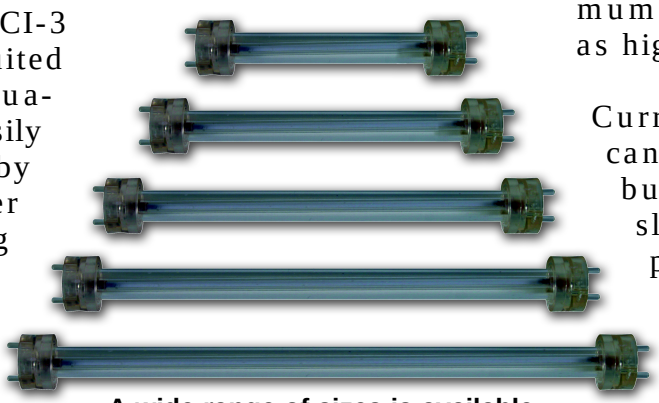
Pleasing Light Spectrum. The bulbs are extremely bright and deliver a perfect, full-spectrum, soft white light, which gives a brilliant appearance to all colors on the slot machine glass. The availability of colored bulbs lends the possibilities of new creative designs never before available with standard fluorescent lighting. In addition to white, the other available colors are blue, red, yellow, purple, black and green.



The power module can drive up to three lamps

Unique Power Module

Loading problems often plague designers when using conventional CCFL inverters. Since there are no loading problems in this new design, CCFLs can be powered up to several feet away from the power module. This power module is a new technology that allows CCFLs to be driven or run at optimal efficiency, with no heat generation problems. The CCFL bulbs used with the power modules are specifically made for it. CI Innovations has designed their CCFLs to be produced anywhere from 2 inches to 24 inches in length and still powered from the same power module. You don't need a different power module for every length and if needed, you can run different size bulbs at the same time from the same power module.



A wide range of sizes is available

CI Innovations stresses the point that their power module is free of the electro-magnetic interference (EMI), found in all virtually all other CCFL inverters. This is an important consideration when passing FCC inspection.

The projected life expectancy of the CCFL bulbs is a minimum of one year and may be as high as 18 months.

Currently, CI Innovations can replace any fluorescent bulb currently in use in a slot machine or video poker machine, with capability to make custom lengths and shapes of CCFL bulbs for specific projects.

For further information, contact:
CI Innovations, Inc.
22445 E. La Palma Ave., unit A
Yorba Linda, CA 92887
714-692-5548

Understanding Opto-Isolators

We have lots of light operated devices in slot machines. There are optics used in some types of hoppers to count coins. There are optics used in some coin acceptors for the same purpose. Optics tell us when a door is open on a slot machine. Still others are used in bill validators to let the BV know that a bill has been inserted and that it's time to start the motor and suck it in.

The device is often known as an "optical coupler." The concept is a simple one: Set up a beam of light between an emitter and a detector. As long as the detector sees the beam of light, it knows there is nothing blocking it (duh) and when the beam disappears, it knows the beam has been blocked (also, duh). There are optical couplers inside your computer mouse as well.

But let's look at this scheme in a slightly different way. Let's take this optical coupler (which consists of the infrared LED and the phototransistor) and mount it inside a hollow box made of totally opaque plastic. No light of any type can get into or out of this box. The only things going into or out of the box are four wires, two for the LED and two for the phototransistor.

"What the heck good is that thing?" you might ask. "If nothing can get to the beam in order to break it, I won't be able to detect anything with this device."

Well, that's true. This device will no longer be able to detect anything passing through its beam. Despite the fact that it is made of the exact same two components, putting the optical coupler inside the box has turned it into a different device with a totally different function. It is now known as an "opto-isolator" or a "photo-coupler." Some refer to this same device as an "opto coupler." Sometimes electronics is not te exact science it should be.

We can no longer control the phototransistor by breaking the light beam but we can control the phototransistor by turning the LED on or off. If the LED is on, the light beam shoots across the gap, turning the phototransistor on as well. Of course, when the LED is off, the phototransistor is off too. In other words, what this new device allows us to do is to use one circuit to control another one, without having any direct electrical connection between the two. The only connection is through a beam of light. The two sides are totally isolated from one another in the manner defined by the name of the thingy, "opto-isolator."

Typical Opto-isolator Specifications

Take a look at the specifications of this device on the following page. Specifically, look at the *Isolation Voltage* specification of this baby. It's 5000 volts! No. That's not a misprint and of course, you now see the real beauty and the real function of the opto-isolator. It's a protection device. If we have some kind of component failure or short-circuit, no matter what happens on one side of the opto-isolator, it cannot have any effect on the other side (unless, of course, the 5000 volt isolation maximum has been exceeded. If that's the case, you probably have bigger things to worry about than your opto-isolators.).

Opto-isolators are also made with detectors other than phototransistors. In many cases, the photodetector is a photodarlington, photoSCR or even a phototriac.

Let's take a look at a common use for an opto-isolator, using an output from a computer to drive an AC load such as a lamp, solenoid or motor. First, let's look at a way to control the load that

Figure 1

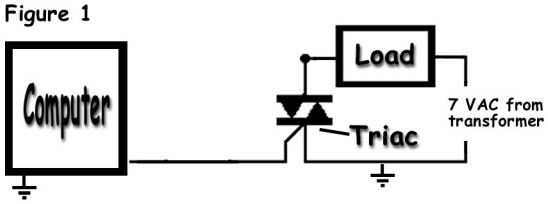
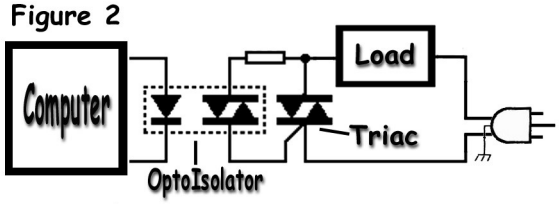
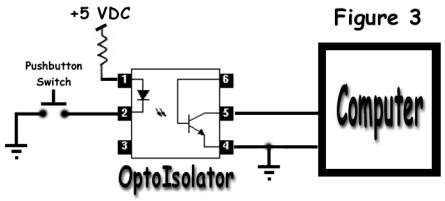


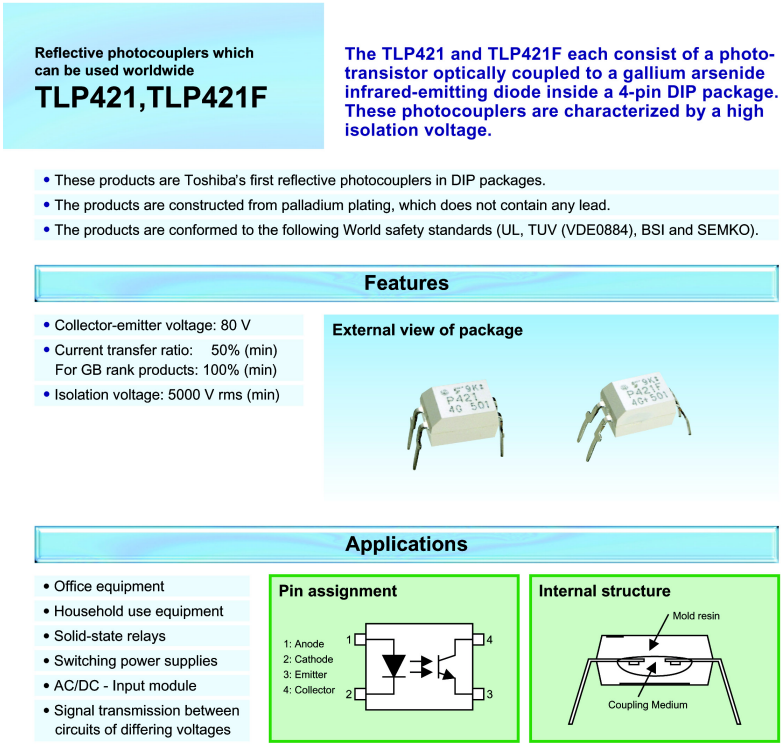
Figure 2



The OptoIsolator isolates the low voltage computer from the 120 volt AC circuit.

Figure 3





Typical Opto-Isolator

works well for low voltage AC loads but would not be a good idea for high voltage AC loads (see fig.1). The way this circuit works is simple: When the output of the computer is low, the gate voltage of the triac is zero volts and the triac is off. When the output of the computer goes high, it gates the triac, turning it on. This completes the AC circuit, energizing the load.

In the case of a triac failure, the very worst that would happen is that the 7 volts AC would be coupled through the current-limiting gate resistor to the output device of the computer. The low voltage and limited current mean that at the very worst, damage will be limited to a burned resistor, the output device and, of course, the bad triac itself.

Notice that in this case, we are using a 5 volt device (the computer) to control a 7 VAC load. But you can imagine what would happen if this was a 120 volt AC circuit and if the triac was to fail with a short circuit between the gate and main terminal 2 (MT2)? This would shoot 120 volts AC into the low voltage circuit, likely destroying the entire computer board.

Opto-Isolator to the Rescue

What a shame, that failure of a twenty-five cent part might destroy a thousand dollar computer board. Obviously we need some sort of protection circuit here. Enter the opto-isolator. The opto-isolator is connected to the circuit as shown in figure 2. The circuit now functions as follows: When the output of the computer is low, the LED in the opto-isolator is on. Of course, the phototransistor (or phototriac, etc.) is on as well. This shorts the gate of the triac to MT1, keeping it turned off. When the output of the computer goes high, the LED turns off, the phototransistor turns off and the gate of the triac is pulled up through the resistor. This turns on the triac, which completes the AC circuit, energizing the load.

In this case, even if the triac short circuits, the worst thing that can happen is that it will take out the opto. The high voltage short circuit in the output device cannot cross the air gap in the opto-isolator and cannot damage anything on the low voltage side of the system. Pretty neat, huh?

Protected Inputs

Another use of an opto-isola-

tor is on the input side of a system. Low voltage systems such as computers must be hardened against discharges of static electricity. In most systems, this is accomplished by the use of filter circuits on the inputs. Resistors, capacitors and coils are combined together to filter out static discharges before they can reach the inputs of the integrated circuits in the computer, possibly damaging them.

In some cases, filters are not adequate to insure that inputs might not be damaged or otherwise fooled by static electricity. You certainly wouldn't want a game that could be fooled into thinking that a coin has been deposited when hit by a static discharge. In this case, an opto-isolator is connected to the input as shown in figure 3.

Pushing the button does nothing except complete the ground circuit that energizes the LED in the opto-isolator. It is the phototransistor that grounds the input device of the computer. Even a direct hit from a static discharge can't get to anything past the opto-isolator.

Testing the Opto-isolator

Testing an opto-isolator is generally pretty easy. First, you set up the condition that's supposed to turn on the opto-isolator (push a button, use a self-test feature, whatever it takes to satisfy the condition that's supposed to turn it on). Look at the voltages on both ends of the LED. If the voltage at the anode is a volt and a half or so higher than the voltage at the cathode, the LED should be turned on. Remember, you can't actually see the LED. It's inside the opaque package. Even if you could see the LED itself, you still couldn't perceive the light because it's infrared.

Typically, the cathode will be grounded and the anode will be at +1.5 volt but this is by no means the only way to drive the LED. The LED might be pulsed. In this case, your meter will read something but it won't necessarily tell you exactly what's going on as it will when you use an oscilloscope to make the same measurement.

If the input conditions are satisfactory, check the output. Here, things can vary greatly between designs. Sometimes, you'll get a full 5 volt swing when the output of the opto-isolator is connected as a simple ground switch such as it might in an input circuit. In other cases, the voltage output of the opto-isolator might vary only by millivolts. How can you tell what's supposed to be there? There are a couple of obvious ways. One is to test the same circuit on a good board and see what's normal. The other is that there is often more than one opto-isolator circuit in a system. If you find identical circuits for other inputs or outputs, you can compare to those as well.

Of course, when testing the output, you want to "toggle" the input back and forth while watching for a change on the output. If you can't toggle the input by pressing a button or through a test routine, you can usually do it by simply shorting across the two leads of the LED. That will turn it off of course, as you rob it of the voltage it needs to operate. You won't damage anything because there is always a current limiting resistor in series with the LED.

Naturally, you can always use the sure fire method of determining if your problem lies in the optical coupler. You can try replacing the thing. They often come packaged in 4 or 6 pin, dual, in-line packages that are easy to remove and replace with even the most basic of soldering and solder removal tools.

For the less experienced technician, this is often the best approach. If the symptom seems to point to a bad opto-isolator (such as a bad input or output) simply replace the suspected part and see if the problem goes away. If you have good tools and soldering skills, you will not damage the original component and, if the replacement fails to fix the problem, the original part can be saved as a spare. A technician's most vital skill lies in soldering and component removal and replacement. Troubleshooting skills can take a backseat and you will still be highly successful at fixing things.

- Slot Tech Magazine

ADVERTISEMENT

Randy Fromm's Casino School

On-Site Technician training

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

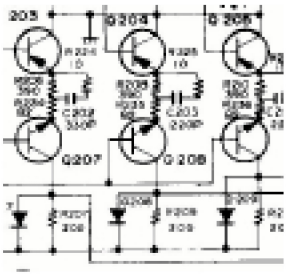
This relatively inexpensive piece of test equipment is easy to operate. Casino School students learn to use the digital multimeter to perform tests and measurements that will pinpoint the cause of a failure down to a single component.

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.

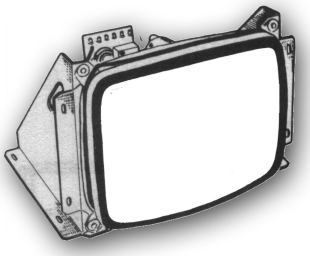
SCHEMATIC DIAGRAMS

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

Randy Fromm's Casino School 1944 Falmouth Dr. El Cajon, CA 92020-2827
tel.619.593.6131 fax.619.593.6132 e-mail CasinoSchool@slot-techs.com
For a complete brochure, visit the website at: slot-techs.com

Subscriptions & Back Issues

Why back issues of Slot Tech Magazine are important to own . . .

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.

Randy Fromm's
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

Subscription rates:

Domestic (USA)
1 year - $60.00
2 years - $120.00

International
1 year - $120.00
2 years - $240.00

Back Issues

All single issues of Slot Tech Magazine are $10.00/ea. For further details on the contents of each issue, please refer to the website at slot-techs.com

- ☐ May, 2001
- ☐ June, 2001
- ☐ July, 2001
- ☐ August, 2001
- ☐ September, 2001
- ☐ October, 2001
- ☐ November, 2001
- ☐ December, 2001
- ☐ January, 2002
- ☐ February, 2002
- ☐ March, 2002
- ☐ April, 2002
- ☐ May, 2002
- ☐ June, 2002
- ☐ July, 2002
- ☐ August, 2002
- ☐ September, 2002
- ☐ October, 2002

Company Name _____

Contact _____

Address _____

Address _____

City _____ **State/Prov.** _____

Country _____ **Zip/Postal Code** _____

Telephone _____ **Fax** _____

E-mail _____

Type of card: [ ] American Express
[ ] Discover
[ ] MasterCard
[ ] Visa

Account Number: _____

Expiration Date: _____

[ ] 1 year subscription, domestic
[ ] 1 year subscription, international
[ ] 2 year subscription, domestic
[ ] 2 year subscription, international