

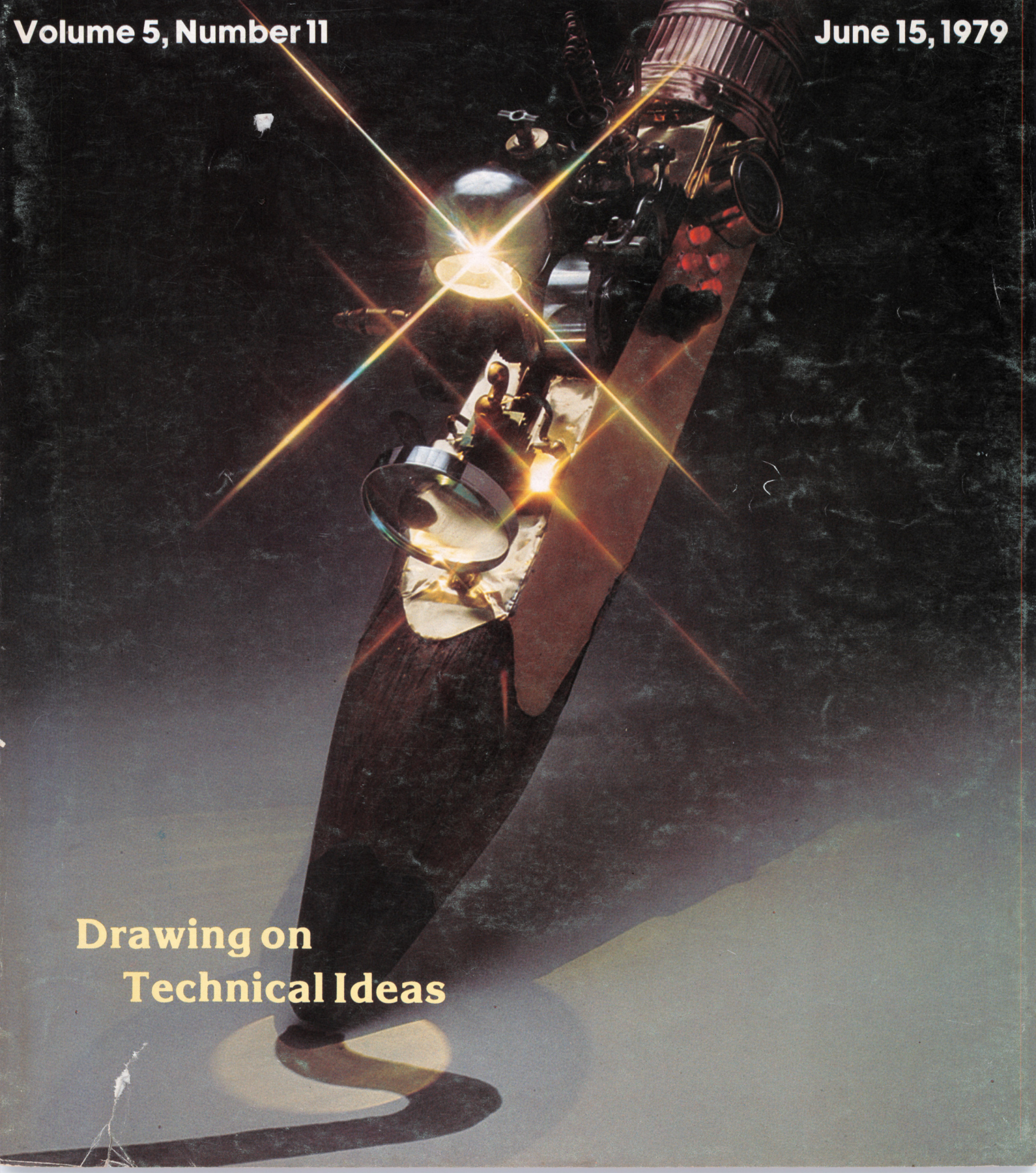
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Volume 5, Number 11

June 15, 1979



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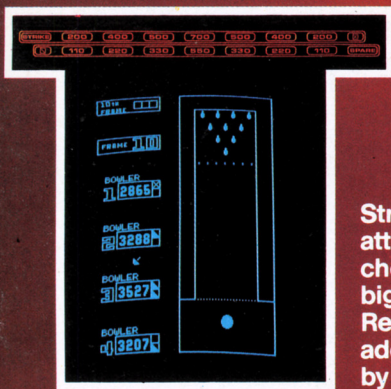
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PLAY METER

Vol. 5, No. 11
June 15, 1979

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PLAY METER, June 15, 1979. Volume 5, No. 11. Copyright 1979 by Skybird Publishing Company. PLAY METER (ISSN 0162-1343) is published twice monthly on the 1st and 15th of the month. Publishing offices: 112 North Roadway, New Orleans, La. 70124, P. O. Box: 24170, New Orleans, 70184. Tel.: 504/282-0261. Subscription rates: U. S. and Canada—\$25; Europe and Japan—\$45; elsewhere—\$50. One order subscription: 2-9, \$20 each; 10-24, \$17 each; 25 or more, \$15 each. Advertising rates available on request. No part of this magazine may be reproduced without expressed permission. The editors are not responsible for unsolicited manuscripts. Second-class postage paid at New Orleans 70113 and additional mailing offices. Postmaster: Send Form 3579 to PLAY METER, P. O. Box: 24170, New Orleans, La. 70184.

European office: PLAY METER Promotions, "Harescombe" Watford Road, Northwood Midd.: England, Northwood 29244.

Western Regional Office: P. O. Box: 692, Chatsworth, Ca., 91311. Tel.: 213/882-4005.

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COVER CREDIT:

David Council of the Albright Council in Dallas, Texas designed this laser-beam pencil called "The Force."

From the Editor

Is it fair for the government to force you to give them a list of your locations? Of course not.

What a disadvantage it is for such a competitive industry to have its customer lists a matter of public record. That's all the "rip-off" artists need to completely squash the vibrancy of our industry. With location lists available to them, the "blue suede shoe" boys will have handy reference charts for sticking unsuspecting locations with sub-standard cocktail table videos and pinballs to the tune of three and four thousand dollars a shot.

We are well aware of the adverse effects direct location selling has on the industry. An operator who is ousted from a location by a direct sale not only loses weekly income but also finds himself with excess equipment that either has to be relocated, sold, or stored away.

The location owner, who thinks he has made a great deal, ends up paying \$8,000 or so for a couple of machines. When these pieces break down, and he discovers that the people who sold them are "out of business," he begins, belatedly, to see the light, and the inherent problems of the "100 percent take" myth. He has been rudely awakened to the fact that 100 percent of nothing is zero.

He further realizes that his regular customers are cheated by this scheme. Where once sat a shining new Bally *Playboy* and a Midway *Space Invaders* now sits two XYZ cocktail table games, broken. Even if the machines keep working they will never gross enough to compare with the revenues generated by *Playboy* and *Space Invaders*. The play appeal just isn't there.

To worsen the situation, the baffled location owner will keep these games until the termites devour them.

In the end, the players who were once accustomed to playing the machines in that location become disenchanted with the whole idea of coin-op entertainment, and the location owner, operator, and manufacturer all share in the loss.

There is little doubt that location selling is one of the biggest threats facing the industry. It hurts the legitimate manufacturer, the reputable distributor, the hard-working operator, the unsuspecting location owner, and the dedicated player.

The Amusement and Music Operators of America has now sent its legal force to grapple with the Copyright Royalty Tribunal over these required location listings. As is all too common within this industry, a few are fighting a battle for all. That battle, which will be decided in the U. S. Supreme Court, will cost more than \$100,000—that is the cost of fighting the federal government.

It has never been more imperative for the industry to unite itself and concert its support for the AMOA in its legal effort against this grossly unfair copyright law. On behalf of the entire industry I urge each of you to send a contribution to the AMOA Legal Action Fund; 35 East Wacker Drive; Suite 1940; Chicago, Illinois 60601.

Remember, this is not the AMOA's problem. It is your problem. And you must do something about it.



Ralph C. Lally II
Editor and Publisher



Amusement and Music Operators Association

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Dear Music and Games Operator:

During the past 30 years, the Amusement and Music Operators Association (formerly MOA) has saved the operators millions of dollars by fighting jukebox copyright legislation. Since the new law went into effect in 1978 requiring operators to pay \$8 per box per year, the fight has intensified and moved to a new arena - the federal court room. AMOA has always fought our industry's national legislative battles in Washington and will continue to do so. But it was not foreseen nor intended that AMOA would have the costly burden of taking legal action against the Copyright Royalty Tribunal and the Federal Government in order to protect the vital interests of the music and games operator.

Since last November we have been in court fighting a regulation of the Copyright Royalty Tribunal requiring operators to submit location lists. We may have to go all the way to the U.S. Supreme Court, which could cost in excess of \$100,000.00 We would like to continue this fight and we expect other problems to arise in connection with laws and regulations affecting the industry. We will fight these problems as they arise.

We now need financial assistance from the entire industry of music and games operators. Note: The submission of a list of locations affects all of your business from the point of view of confidentiality - music, games, any coin-operated equipment in your locations. We are now asking you and all operators for a substantial contribution for a special Legal Action Fund to help us defray the heavy expense of carrying on the fight in behalf of the nation's operators.

We ask you to base your contribution on the approximate number of music and games you have on location at \$1.00 per machine. We have established six contribution categories: \$100.00, \$250.00, \$500.00, \$750.00 and \$1,000.00. Simply select the category that comes closest to the number of machines you have (at \$1.00 per machine). If you would like to make a larger contribution, it will greatly help our cause. Make out your check to AMOA Legal Action Fund and mail it to AMOA today. Every contribution will be acknowledged.

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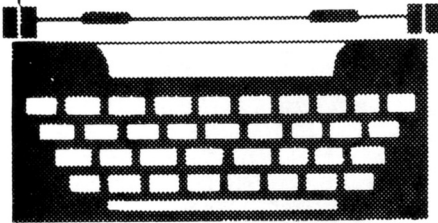
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Mailbox



Wants list

I enjoy your magazine very much. It is by far the most authoritative in the industry. I thought I would offer a suggestion that would be very helpful to operators.

In each issue list the top ten grossing games—flippers, videos, etc. The information would help to increase the profits of the operator and also drive the manufacturers to strive to have the number one game.

C.R. Ingram
Southern Carousels Corp.
Greenville,
South Carolina

[Ed—Voila! Check our listings.]

Needs info

I have been reading your magazine for nine months, and like it very much. I am nineteen years old and live near New York City. I would like to learn how to fix, troubleshoot, and generally understand solid state pinball and video games. Could you send me any information on schools near me?

Todd Townsend
Oyster Bay,
New York

[Ed.—The New York State Coin

Machine Association is conducting a series of Saturday morning classes on solid state games in Newburgh. The next series of classes is scheduled to begin sometime in the fall. However, to attend you must be working for an NYSCMA member. However, it is exactly your need which PLAY METER addresses in this month's lead article.]

Comprehensive

I would like to congratulate you on your April 15, 1979 issue

which was devoted to arcades and peripheral issues. I consider this to be one of the most comprehensive treatments of the subject matter to date. Several sensitive matters were handled forthrightly and with complete candor and I have recommended this issue to many who are involved in our industry and wish additional information on the specific subject matter.

Ronald A. Gold
Cleveland Coin International
Ohio



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Coinman of the Month

JIM CALORE



Jim Calore, our Coinman of the Month, manages the electronics department of Active Amusement Company in Philadelphia. But, in addition to that, he's embarking into the publishing field as well. In March he published his first issue of a new technical journal for the coin machine industry. It's called "Star-Tech Journal." It's a monthly publication which addresses itself solely and specifically to the demand of disseminating technical information to the people within this industry.

According to Calore's plans, the material in the twelve- to sixteen-page journal will follow a format which includes theory, circuit analysis, checklists, troubleshooting tips, etc. The technical articles, written by technicians both within and without the industry, is written for technicians with differing levels of experience.

Prior to serving as Active Amusement Company's electronics department manager, Jim worked a year for Atari, helping the Sunnyvale, California firm set up its customer and field service department for its east coast office.

Jim is thirty years old. His wife's name is Linda. And his two children, Danielle and Kristen, are aged three and one respectively. He got his baptism into electronics back when he was in the U.S. Air Force and, after returning to civilian life, went to a technical school before going to work for a time with a computer terminal manufacturer.

His viewpoint is that of a technician at the distributor level who sees everyday problems which pester operators. His responses, we think, are typical of the response distributor-level technicians would give if afforded the opportunity to give their suggestions on how operators could combat their technical woes.

“You’ve got to look, see what the symptoms are.

If nothing else, it’ll help your distributor when you call him.”

PLAY METER: As a mechanic in the industry, you must have a number of pet peeves. What’s your biggest one?

CALORE: One of my pet peeves concerns the manufacturers’ claims that, once a machine goes out in full production, they need feedback from the field. They say they need this feedback to make their products better. Yet, even though a manufacturer may get real valuable operator feedback, it seems he gets so involved in production, and his games are so far down the line, that these ideas can’t be incorporated for maybe three or four models afterwards. So when a problem is found, that problem may exist with the manufacturer’s games for three to six months, and that could include three or four products. So at the operator level, it becomes a standard practice to say: “Oh, that’s X’s game, make sure you check this out on it.” Now, I understand the manufacturers can’t incorporate modifications overnight, but sometimes they get so involved in the paperwork and the bureaucracy that they don’t get the information out in time. This is true even with the hot lines. By the time the information gets from the person receiving the information to when it gets incorporated into the electronics or into the playfield or wherever, it’s quite an extended period of time.

PLAY METER: Why do you suppose this problem exists?

CALORE: It seems to me that the people who design the machines don’t have any access to what is happening in the real world. The manufacturers’ engineering departments are isolated, and their people come up with all these great theories, but they don’t take into account everyday problems that happen in the field—like the guy who spills a Coke on the machine. Things like that just don’t enter into the theory in the engineering department. So when operators out there respond with feedback, saying things like “You can’t put these vent holes on the outside where the guys can put Coke down them,” the engineering departments have difficulty relating to that.

PLAY METER: Do you have any trouble getting schematics for games?

CALORE: Some manufacturers are real good as far as technical support goes. They’ll put out a whole package with the machine. Some manufacturers don’t put out the packet until after the machine is out. And some manufacturers—and this is especially true of the electronics end of it—will code the signals. This little practice really makes troubleshooting difficult because you have to keep going back to a reference chart to find out, for example, what a “5TC03” is.

PLAY METER: What are your feelings about warranty programs in the industry?

CALORE: I think a six-month warranty for pingames is fair. Some manufacturers recently have begun a policy that I think is very good for the industry. They’re giving their distributors a warranty discount per game so that the distributors can handle the warranty themselves. If the discount is worked out right, then it doesn’t hurt anyone because the distributor gets his discount and can use that money for service. This way the distributor doesn’t have to take that six-month warranty on the chin. Plus he can gear up for it. As I said, I think a six-month warranty for pingames is fair. But what I don’t understand is why a majority of video manufacturers have warranties that are only ninety days. I don’t understand why there exists this big difference between pins and video.

PLAY METER: What about the parts situation? Are there more replacement parts available today?

CALORE: That varies from manufacturer to manufacturer. Basically, I think most distributors and operators are buying the devices that come from the manufacturer only—ROMS, PROMS, hard-to-get RAMS. With these things, there’s only one place to get them, from the manufacturer; so they’re buying those parts there. But then what they’re doing is looking for parts houses and electronics shops to buy their everyday 7400 chips and so on. As far as the playfield parts, the cabinet



“The operator should be able to make any repair up to where it gets to the main processor unit, and then he may not be outfitted for that.”

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parts, and all the other parts you need to run the games (and these are the things that are the most broken), there are some companies that are very good. They'll put out products lists and parts books with complete price lists. On the other hand, sometimes you can get an authentic part number and call up some manufacturers, and they won't even know what you're talking about.

PLAY METER: How much board repair should the average operator be doing?

CALORE: A lot more than he's doing now. The distributors can't be expected to repair everything that goes wrong with the game. There are a lot of things the operator could handle himself. I think he should be able to repair most of his board problems, except for, with a pingame, the locked-up processor or, with videos, the screen with nothing but garbage on it. Of course, this supposes there is no voltage problem. If he's missing a switch closure in a video game or none of the solenoids work in a pingame, he should be able to repair that himself. In fact, he should be able to make any repair up to where it gets to be the main processor unit, and then he may not be outfitted for that. He doesn't have to have an oscilloscope on location with him. That's why the distributor is set up as he is. It's not necessary for the operator to invest ten or fifteen thousand dollars in an electronics shop set-up. He can let the distributor provide those services for him. That's why the distributor is set up as he is. He has the test equipment, the support equipment, but still the operator can do a lot more for himself than he's doing right now.

PLAY METER: Then what kinds of testing and diagnostic equipment do you recommend operators should have?

CALORE: It depends upon the size of the operator. The operator/mechanic/technician should never go out on a job without a multi-meter. Something I hear nearly every day, yet I still can't believe, is that some operators go out every time expecting a fuse to be blown, and they walk away after putting one in. What these people don't understand is that a lot of their problems are playfield-related. A lot of the problems are still the same as they were twenty years ago—they're electro-mechanical. But as soon as they see those boards sitting up there in the head, they say, "Geez, it must be up in there." They panic. Ideally, they could have a 'scope, but I don't think it's required. Now, I know some operators are setting up bench equipment back at their shops the same as their distributors have. If your operation supports this, great. And if you can get technical people who understand it to run it for you, great, too, because although it's going to be a big initial investment, you're going to save yourself some problems. But it's not necessary.

PLAY METER: But if the operator has the capability to support such a set-up, you think it would be worth the investment?

CALORE: Let's put it this way. It would save everybody problems all the way up the line. The distributor would be helping his people more



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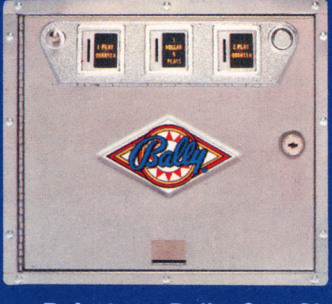
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Each time the ball goes into the top right Paragon Saucer, the letter that is lit there is spotted at the center of the playfield and the player's total score and bonus score advance *before* the ball is ejected. Spotting all the letters in the center of the playfield lites the Paragon Saucer Special Lite. A ball entering the saucer then scores 25,000 points, a special, and resets the P-A-R-A-G-O-N letters to allow a repeat of the sequence.

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because he wouldn't be dealing with 400 minor problems. Instead, he'd be helping out with the real problems. And it's not like the distributor is going to miss out on those board repairs because it would be a better selling tool for him if he can say that the games he sells are easily serviced. But really the most important thing is that the servicemen at the operator level should have a good working knowledge of each manufacturer's system. Most manufacturers don't change much. Once they start their electronics systems, they stay with it from game to game. So if you know one you basically know them all for that manufacturer. And, as far as videos, if you know one, you know just about everyone of the manufacturers because they are all basically the same. Now, I'm talking specifically about the logic board. But getting back to my main point here, if the small operator could do the basic service work himself, everybody would benefit. That doesn't mean, as I've said, that he has to buy an oscilloscope because right away that's a \$2500 outlay. And to have a 'scope, you have to have a technician who knows how to operate it. But if you can go out there with just a multi-meter, and you know what you're doing—if you're familiar with the equipment and you've got the experience—then I think you can get just as much accomplished.

PLAY METER: Then a volt meter would be the single most important tool?

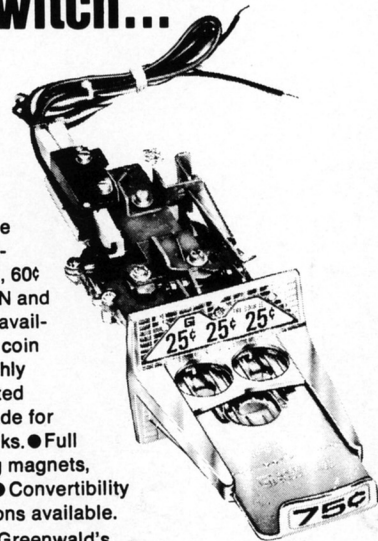
CALORE: No, I think perhaps the best troubleshooting tool is your eyes. Before you start pulling boards or jumping wires, take a look around. In the case of a pinball game, for instance, it could be the solenoids or maybe a switch is stuck. So you should take some time to see how the game works. Try to play it. Insert a coin. Does it put up credits properly? Check the score display. All these things that you can see (and hear) will lead you in the direction of the area where you should troubleshoot. Too often servicemen will find that the game is not putting up the proper score and rush to the wrong conclusion. They won't even bother to go through with the self-test where maybe they'll find out, that all it was, was a stuck switch. So you've got to gather all the information you can before you start on your course of action. It's the same thing with video games and your big arcade pieces. So many times people will come in and say that a board is destroyed, that it's nothing but garbage. And we'll put it on a tester and find that the board works fine, that the problem was the voltage. So you've got to look, see what the symptoms are. If nothing else, it'll help your distributor when you call him. If you have to call him for advice and you have a real good summary of the symptoms, then he's in a better position to tell you what your problem is—and what the solution is. Too many times I get people who say "There's no score up there." And, as we get further into it, I find out the whole game is dead, sometimes because it wasn't even plugged in!

PLAY METER: So you feel operators are many times intimidated by the electronics?

CALORE: Yes, they give up too easily. What they don't realize about this technology is that it's not a

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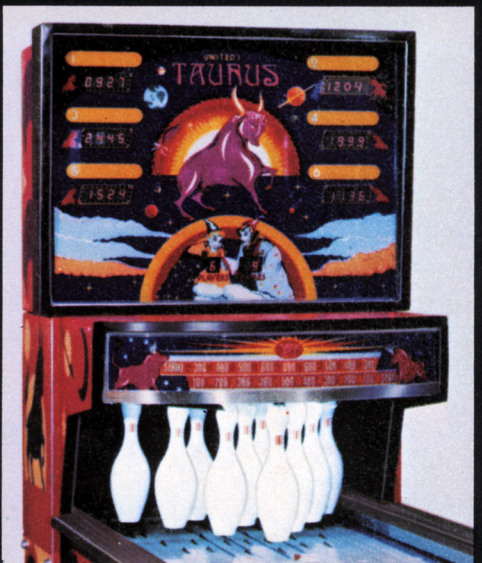
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“The operator should get to the point where he’s as confident in himself as a technician as he was in himself as a mechanic.”

question of catching up. Once you get the basics, you’re right there with the rest of them. I can tell you that technicians at the manufacturing and distributing levels pray for something to come in that’s difficult, just so they don’t have to go through the same routine. So, yes, I would say they are intimidated. Maybe it’s because they don’t feel they have an outlet where they can get the information, I don’t know. But that’s one of the reasons we started *Star-Tech Journal*. The operator should get to the point where he’s as confident in himself as a technician as he was in himself as a mechanic.

PLAY METER: Do you have some recommendations as far as where a beginner could turn for understanding electronics?

CALORE: There is so much printed matter, so many courses available, day or night, on digital electronics, on microprocessors, around which all of our electronics is built, that it’s really up to the individual. Digital electronics appears complicated to the inexperienced, but really it’s not. It’s the simplest of all because it’s logic. It’s either there, or it’s not there. This is something that once you begin to think this way, it comes really fast. The basics of digital electronics are the building blocks. After that you go to the basics of the microprocessors. And from there you go to the different systems. Now, as far as whether you recommend a school or

a home correspondence course, that depends upon the individual.

PLAY METER: Do you think operators can compete for experienced technicians in the job market today?

CALORE: I think operators could be competitive with other industries in attracting experienced technicians. There are a lot of technicians out there who are working for huge manufacturers and who are totally lost in the numbers thing. They’re not really doing anything creative and would probably be attracted to this industry because the type of job they would be doing for an operator would be far more challenging than testing 500 of the same boards every day. In my own case, for example, I answered an ad in a newspaper and ended up with a distributor and couldn’t believe my luck. I went from processing data to “flying airplanes and driving race cars,” and I was being paid just as well to do something that to me was far more appealing. Whether it would be appealing to the next guy, I don’t know, but I would think so. And I think, too, that an operator could be competitive in the price range for an experienced technician. And, of course, he might also check into the technical schools in his area. That would be an ideal place to look. I’m sure money is a big factor, but I don’t see where this industry is out of the ballgame.



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What's available as far as educating your technicians

By Mike Shaw

Today's service technicians are younger and smarter than their predecessors, but often they have little or no understanding of the basics of solid state technology, knowledge that is an absolute necessity if they are to keep the new machines in good repair.

A great deal of every operator's budget, and maybe the majority of his reputation, rests in the hands of his service technicians. Some operators pamper their technical staffs like NFL running backs, while others rage in anger at mistakes that cost them profit through wasted labor, machine downtime, and outright ruined equipment.

The fact is, neither coddling nor rampaging will accomplish much. Only education will provide the technician with the means to be more effective.

And there are a wealth of ways an operator can get his service people to the point where they are consistently making correct decisions.

"Initially," suggests Don Miller, instructor for the AMOA mechanics schools, "you should only hire someone with a background in electronics." But the unfortunate fact is that many pinball mechanics come to the field with little or no experience.

Since solid state electronics is the basis of almost every game now in action, it only follows that every technician should have a good working knowledge of the way things function in the world of solid state.

"A good first step for the beginner is *Understanding Solid State Electronics*, published by Texas Instruments and available at your local Radio Shack," Miller says.

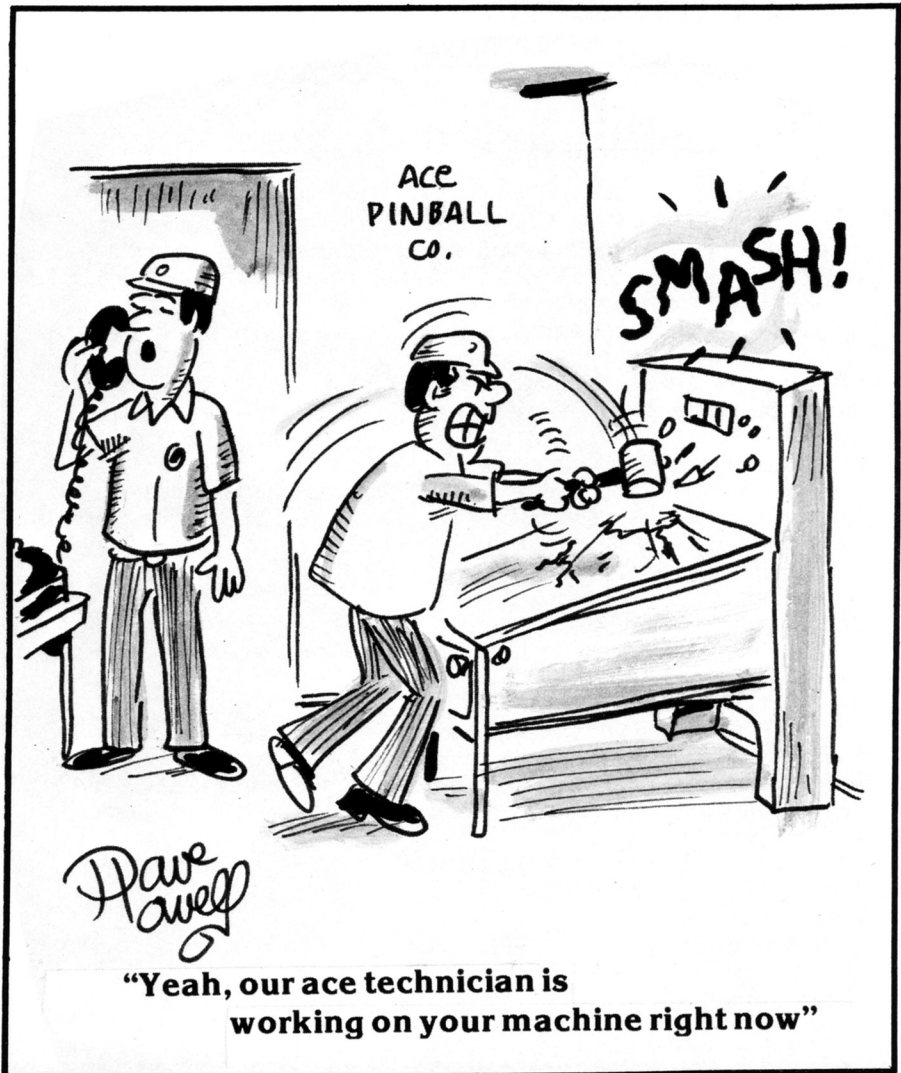
"The trouble with most materials is that they are written in electricians' language, but the Texas Instruments text is easy to understand and presupposes no electrical know-

how."

The text is soft-bound and features 250 easily readable pages on the basics of digital electronics. The book is also advantageous in that it sells for a mere two and a half bucks.

Jim Sneed, who oversees the Kurz-Kasch Center for Technical Development agrees the Texas Instruments text is the best source for "basic basics," and offers these

additional sources available through most bookstores: *A Beginner's Guide to Microprocessors* by Charles Gilmore, published by Tab Books, \$6.95; and *An Introduction to Microcomputers* by Adam Osborne, \$7.50. Another guide to a good general knowledge of solid state is the *8080 Systems Users Manual* which is obtainable from most large distributors.



Major American manufacturers offer service and parts assistance over these customer service phone lines:

Allied Leisure	800	327-5830
Atari, California	800	538-1611
Atari, New Jersey	800	631-5374
Bally	800	621-0108
Cinematronics	714	440-2933
Exidy	415	968-7670
Gottlieb	800	323-9121
Gremlin	714	277-8700
Meadows	800	538-1606
Midway	800	323-7182
Ramtek	408	738-4422
Stern	800	621-6424
Vectorbeam	415	489-2000
Williams	800	621-4765

The transition to the more complex solid state technology, combined with the tremendous overall growth of the industry, has led to the development of a number of pinball schools, and whenever possible it is suggested that the operator take advantage of these classroom situations to educate his technical staff.

A common source of learning is offered by the manufacturers who, through their distributors, conduct free travelling school sessions lasting usually from one to three days.

These lessons concentrate on the manufacturers products—common problems are treated and innovations in the product line are thoroughly discussed.

But this instruction comes under the classification "band-aid" technology, and though it is extremely useful for troubleshooting specific problems and machines, it should only be viewed as an extension of a good working knowledge of the basics.

More thorough approaches to understanding solid state (or digital circuitry, if you will) can be found at a number of fine technical or vocational schools around the country. Some schools, which we will investigate in the following paragraphs, are geared specifically to the industry.

"Just change the boards."

This kind of service approach is what led Don Miller and the AMOA to sponsor a travelling classroom designed to help service technicians across the country understand the intricacies of the digital machines.

"About fifty to sixty percent of the boards returned to manufacturers for repair or replacement are not defective at all. But it is the only way many technicians can think of to treat digital problems."

The need for this type classroom approach became apparent as the demand for the sessions increased. What started as a handful of appointments last year has led to current scheduling of about two ten day sessions a month for Don Miller.

Twenty students are accepted for each class and the ten days run consecutively including Saturday and Sunday, from 9 a.m. to 5 p.m.

"Four or five of the twenty know nothing about electronics," says Miller. "But by the time the course is over, they're not afraid to dig into any machine."

Miller starts with the basics of digital electronics and progresses to proper "shopping" procedures, troubleshooting techniques, and preventive maintenance. Reading and understanding schematics is stressed. Using the schematics—to which Miller adamantly refers as the keys to fixing any machine—the sequence of operation is covered to determine how the machines operate. All circuits are followed and explained many times over.

The final three days of each session are spent troubleshooting problems in machines from all the major manufacturers.

AMOA Mechanics School tuition is \$200 per session and operators who wish to enroll technicians in the classes are urged to do so as early as possible in light of the popularity of the schools.

Currently scheduled sessions for the AMOA mechanics school include:

Richmond. July 9-18. Sponsored by AMOA in co-operation with the Amusement and Music Association of Virginia. Contact Vic Rye—312-726-2810.

Chicago. July 23-August 1. Sponsored by the Illinois Coin Machine Operators Association. Contact Kem Thom—312-463-5300.

Located in the heart of Nicoma Park, Oklahoma and operated solely by Cal Clifford and his wife Bea, Cal's Coin College has been a respected technician training site for nine years.

Cal conducts a two week program for instruction. The first week is used to discuss electromechanical machines; students are taught to read the schematics for the machines and trained on the machines themselves.

The second week is devoted to microprocessors. Again, students learn to read and use the schematics, isolate problems, and successfully repair malfunctioning equipment.

The two weeks can be taken either separately or jointly.

In both courses Cal Clifford stresses working on the actual machines. He uses Bally pieces as

A reading list for technicians

Technical Editor's Note: The process of troubleshooting coin operated equipment, just like any other type of equipment, requires knowledge of a field (e.g. electronics, electro-mechanics, hydraulics, optics, etc.), a familiarity with componentry and systems, and a good dose of common sense. In the fields of electro-mechanics, electronics, etc., plenty of literature is available. I have compiled the following list of books keeping in mind those of you who are new in the field and are seeking various general and more specific technical information.

- Introduction to Flipper Games* (Bally)
- Tilt The Pinball Book* (Candice Ford Tolbert & Jim Alan Tolbert)
- Electronic Pinball Electronics for Pinball Mechanics, Vol. I* (Bob Hornick)
- Instruction and Trouble Shooting Manuals* (Bally)
- Solid State Service Manual* (Gottlieb)
- Instruction and Service Manual* (Atari)
- The Textbook Series* (Kush & Stuff)
- General Information and Trouble Shooting Procedures, Micro-Processor, Video Games* (Midway)
- The 8080A Bug Book* (Sams 21447)
- TTL & CMO's Cookbook* (Don Lancaster, Sams 21035, 21398)
- Using the 6800 Micro-Processor* (Elmer Poe)
- Micro-Computer Prime* (Mitchell Waite and Michael Pardee, Sams 21404)
- Trouble Shooting Solid State Electronic Power Supplies* (Ben Gaddis, Tab Books 619)
- The Complete Motorola Micro-Computer Data Library* (Motorola)
- Rockwell PPS/4 Manual* (Rockwell)
- Data Books* (Fairchild)
- Data Books* (National)
- Data Books* (RCA)
- Data Books* (Intel)
- Data Books* (Sylvania)

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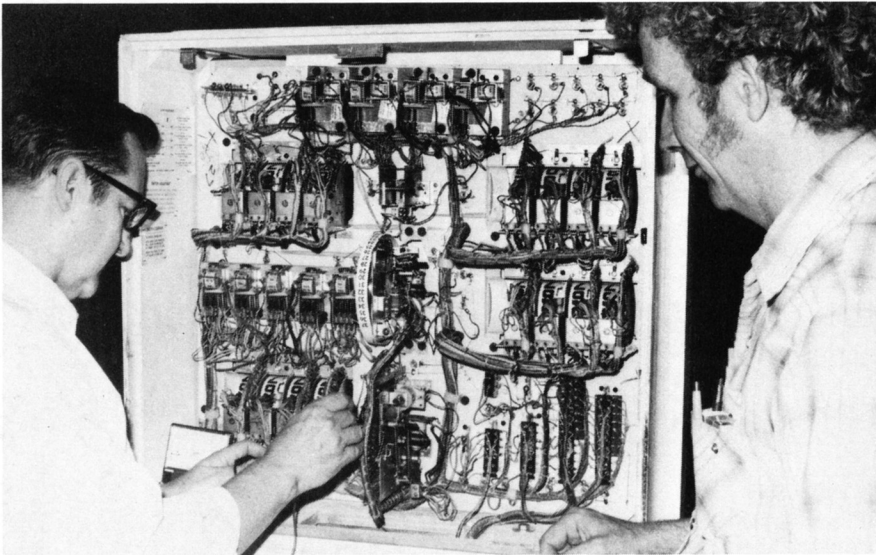
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After a varying period of inactivity, Mystic will randomly select and play a complimentary record.

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And Mystic 478 is crafted to uphold Rock-Ola's world recognized reputation for trouble-free operation. Put Mystic's power to work increasing profits. It's one machine you can really bank on.



Students dig into the guts of a machine at the Nevada Gaming School. Practical application of maintenance and repair techniques is stressed.



Cal and Bea Clifford (center) pose with some recent graduates of Cal's Coin College. Cal's has been a highly respected technician training site for nine years.



A piece of malfunctioning equipment gets lots of special attention during classes at the Nevada Gaming School, Bally's officially certified training center.

standard, then discusses other manufacturers' machines in so far as they differ from the Bally types.

Cal's Coin College has been a popular training ground for technicians who can afford the high tuition. The fee per weekly course is a stiff \$325. A discount is applied when both weeks are taken in succession; the package price: \$600.

Add to that amount the cost of travel, lodging, and meals, and it is easy to see why Cal's Coin College has a reputation for exclusivity in this industry.

"Many of our students are sons of operators to whom money is not the principal consideration. Others are highly intelligent young men who show a lot of promise."

The cost of Cal's course is partially justified by the special attention inherent in the set-up. Only five students are enrolled in each class, leaving time for Cal's intensive personal instruction.

The Nevada Gaming School is offered as an alternative to a pursuit of a college degree and, as such, offers extensive training for coin machine technicians.

The school is Bally's officially certified training center and utilizes the latest Bally equipment for training purposes.

The institution also boasts accreditation from the National Association of Trade and Technical Schools.

In-depth instruction is given in the area of electronics as related to the proper maintenance and repair of all electronic amusement machines. Areas from the basic structure of matter through logic circuits are taught with the intention of thoroughly preparing the student to comprehend the more complex and advanced lesson materials.

Upon graduation the student is considered an apprentice electronic/video coin machine technician.

As an accredited educational institution, the Nevada Gaming School can offer, to eligible students, participation in government loan and grant programs, including the Veterans Educational Benefits Program.

Courses for coin technicians are offered under two separate headings. The slot machines program takes about three months to complete and offers 325 hours of instruction, while the course in electromechanical machines and electronic video games incorporates 375 classroom hours.

Prior education or experience is taken into consideration by Stan Braaten, the school's director, and an appropriate number of hours is subtracted from the student's schedule to reflect his knowledge in the field.

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“There are a wealth of ways an operator can get his service people to the point where they are consistently making the correct decisions”

Tuition charges come to \$4.40 per instruction hour.

Additionally, the school offers a placement service which has assisted many graduates in finding satisfactory employment since the school opened in 1972.

Oh, by the way, bring some extra cash. Your increased technical agilities are certain to convince you that you can beat those machines just down the street, on the famous Las Vegas “strip.”

“While other schools in the industry deal with application, we teach theory,” says Jim Sneed, director of the Center for Technical Development and general manager of the electronics division of Kurz-Kasch, Inc.

Although the school bills itself “an institution totally dedicated to the teaching of advanced topics in electronic circuit design,” Sneed insists the correspondence school approaches digital electronics from a “basics” point of view.

A student aspiring to take the home study course from Kurz-Kasch

should have some background in electronics. Sneed screens applicants and counsels them, helping them to determine if they are sufficiently prepared to handle the course material.

“If they get into the course and find they can’t handle the work, I ask them if they’ve damaged the books. If not, they can return the books and we’ll refund their money.” It is partially this attitude that has led to a better than ninety percent completion rate for those who attempt the Center course.

Although the Center avoids applying its theoretical approach to any particular industry needs, Jim Sneed has been bent on selling the course to pinball folk, a task he has accomplished to the tune of a thousand graduates into the game machine industry over the four years of the school’s operation.

For the pinball technician, the Center suggests a two course format.

The Digital Circuit Design program covers the entire family of digital circuits: gates, flip-flops, and trigger

circuits. The format used in the text has the student designing complex circuits from basic building blocks. An emphasis is placed on wave-forms and how they are generated by each circuit.

When he is finished with this course, the student should be able to design or troubleshoot any digital circuit using transistors or I.C.’s.

The I.C. Logic Design program is for technicians who are beginning to design, test, or repair equipment using I.C.’s. The course is based on working with standard I.C. logic devices as they are offered by manufacturers.

The Center provides the only correspondence course endorsed by the AMOA and in appreciation of that, special rates have been offered to AMOA members. The regular price for the two sessions listed above including all course materials is \$389.75. The AMOA member discount price is \$288.85.

A hint: Look for even better price breaks at AMOA shows.

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Now performers want a piece of the action

Two bills which would alter present jukebox copyright legislation to include royalty payments to performing artists, are currently being looked at by a federal judiciary subcommittee.

HR 237 and HR 997, both introduced by California congressman George Danielson, are being considered by the aforementioned subcommittee.

HR 237 would award performers royalty rights to a part of the current eight dollar per jukebox annual fee, while HR 997 would increase the copyright fee to nine dollars, awarding one of those dollars to the performing artists. The remaining eight dollars would continue to be dispersed through ASCAP, BMI, and SESAC.

AMOA Washington attorney Nicholas Allen addressed a California hearing in March of 1978 when the

bill was first proposed by Danielson. The proponents of the issue were the Record Industries Association, the Musicians' Union (AFM), and performing artists as represented by the Federation of Endowment for the Arts and Humanities.

Opposition to the bill was based on two grounds—grounds of principle, and grounds of the unfair economic burden on jukebox operators that was implicit in the proposed legislation.

The principle with which AMOA attorney Allen took issue was whether manufacturers who stand to benefit from the bill furnish a copyrightable element to the musical product simply by producing it.

As to grounds of economic burden, Allen insisted that to add to the eight dollar annual fee was to destroy the point of compromise

which was essential in the agreement, a point that already burden a depressed industry.

"We will continue to pursue a separate course of action in relationship to these proposed bills," Fred Granger of the AMOA contends. "These bills bring up the question that rests at the base of operators' fears: 'Where will it all end?'"

In order to continue the battle against copyright interests, the AMOA is pledging a stepped up campaign to raise funds. Ads have been placed in the trade magazines and a drive to enlist record manufacturers' contributions has been inaugurated.

"To go all the way to the Supreme Court," says Granger, "could cost in excess of \$100,000. So far, operators have contributed nearly \$45,000 but the pace of contributions has slowed severely."



South Dakota's 13th annual pool tournament

Paul Gerni, the reigning four-time consecutive world champion trick shooter, presented the "A" class victor's plaque to Stan Scheurer of Black Hawk at the conclusion of the 13th Annual South Dakota 8-Ball Pool Tournament.

This year's tournament attracted 416 participants who earned their way to the state tournament by

winning local championships.

Rick Muir of Rapid City claimed the "B" class award and Loren Johnson, Belle Fourche, took the honors in the "C" Class. Of the 70 women contestants, Helen Woods of Clark came out on top.

The tournament was sanctioned by U.S. Billiards who built twenty-five special red and white pool tables for the event.

Pinball vendetta in Ohio

All this pinball news in just a few days time—

While the rest of the nation hails the upsurge in pinball mania as a renaissance of respectability, Small Minds in Small Towns, Ohio have lashed out at the inherent evils of the games.

The city council of Lockland, in an attempt to save its citizens from possible obsessions with gambling, has made it illegal for anyone in Lockland to possess a pinball machine. A similarly astute group of concerned council members in Madeira has expressed its opposition to the machines on the basis that minors might enjoy themselves by testing their skills at the games.

But all this voting and citizen projecting is hardly as silly as the words of a newspaper columnist somewhere in the wilds of Hamilton County, Ohio: "A Sheriff (not the Hamilton County sheriff) has confided that he was offered \$50,000 to permit pinball machines to operate in his county. He says he refused the offer."

Such moral fiber these Ohioans possess!!

Ocean City arcade owners unite

Ten arcade owners on and off the boardwalk in Ocean City, Maryland have banded together as the Ocean City Arcade Owners Association. Under the ambitious leadership of 27-year-old Jim Mathias (Jim's Place Arcade), the owners met May 18 to elect officers and begin plans to "improve earnings without exploiting customers."

President Mathias wants the group to be of significant strength to lobby against harmful legislation, such as zoning laws which currently affect the Ocean City arcade business.

Pursuing an idea that started three years ago with a letter requesting assistance from Fred Granger of the AMOA, Mathias hopes the arcade association can have far-reaching effects on the arcade business, even nationally. "The small operator is struggling because of a barrage of equipment coming from the manufacturers. Turnover is so quick and the resulting rapid depreciation is disastrous."

Robbins wins Texas Air Hockey tournament

Twenty-six of the top Texas Air Hockey players gathered in Houston for the Superflea \$500 State Tourney on March 31 and April 1, 1979. The event had the same format as the 1978 Nationals.

On Saturday the top five players from the three tables in use plus one wildcard player qualified to return for the four of seven double elimination finals on Sunday. Phil Arnold was top seed on Sunday with a Saturday record of 22 wins and 2 losses. Returning to the sport and taking second seed was George Ray of Waco who posted a 18 and 3 record on Saturday. But when the action ceased and the tables were silent, visiting player Mark Robbins emerged the winner with a terrific afternoon.

Robbins took the finals against Arnold 4 games to 2 to win the Superflea first prize of \$175, first place trophy, and the Texas State Tournament ring presented by Superflea. Arnold received \$125 plus trophy and continued his ranking as the top player in Texas.

Sci-fi magazine sponsors pinball art contest

As a tie-in with Paramount's forthcoming science-fiction motion picture, *Star Trek: The Motion Picture*, Starlog Magazine is sponsoring a contest among readers to design backglass art for an imaginary future pinball game, Bally's *Starlog*. First prize will be a new Bally *Star Trek* solid state, four-player pinball machine, worth \$1,800, due to premiere in arcades and game places mid-summer.

In addition to the first prize, Starlog has assembled 210 other prizes—including Pocket Books calendars and special publications, Bradley watches, A.M.T./Lesney model kits, and Bantam paperbacks—all official *Star Trek* mer-

chandise—with a total value of over \$3,000.

Young non-professional artists are invited to design a practical pinball backglass using an explosion of colors and their best imagination—since a *Starlog* pinball game should include spaceships, aliens, future cities, and virtually anything in the world of science fiction. The *Starlog* staff will select finalists, and the Bally art department will select top winners.

Information, tips, and rules for the contest appear in two issues of *Starlog*, on sale during July and August, and the contest will deadline on August 31, 1979.

ARA executive to be awarded Israel Prime Minister's Medal

A National Automatic Merchandising Industry Dinner in honor of William S. Fishman, Chairman and Chief Executive Officer of ARA Services, Inc., on the occasion of the presentation of the Israel Prime Minister's Medal to him, has been announced for Wednesday evening, October 24, at the Hyatt Regency Hotel in Chicago.

The national dinner, which will be held in cooperation with the Israel Bond Organization, is on the eve of the 1979 National Automatic Merchandising Association show.

The industry-wide tribute to Fishman is in recognition of "his service to the automatic merchandising

industry, his support of Israel and his efforts in behalf of public service and humanitarian causes."

Israel Ambassador to the United States Ephraim Evron will address the dinner and will bestow the Prime Minister's Medal, his country's highest public service award, on Fishman.

A nationwide tribute committee, consisting of outstanding leaders in the automatic merchandising industry, is being formed to plan and participate in the tribute.

Fishman, during his recent visit to Israel, was received by Prime Minister Menachem Begin and other Government and industry leaders.

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Somebody in Ohio is doing something right

By David Pierson



Jim Sneed, who conducted a technical seminar at the OMAA show, points out some of the features of Kurz-Kasch's Signature II.

We often hear about the "new breed of operators," about how they are better educated and sharper than their predecessors. But it's not until you find yourself in the midst of them that you find out exactly how sharp some of them are.

The Ohio Music and Amusement Association's fifth annual convention and trade show May 11-12 in Columbus, Ohio offered just that opportunity.

For the record, the show featured 17 exhibitors in 36 booths. Sixty-one operating firms were registered for the two-day affair, some even coming from out of state (West Virginia, Pennsylvania, Illinois, Indiana, Michigan, Maryland, and Kentucky). Total registration (not counting exhibitors and their staffs) was 264.

Of course, it should go without saying that those are all new records for the Ohio show—it's to be expected. But sometimes in all the statistical debris that usually comes out of a trade show, a really significant fact can get lost. And, as for the Ohio association, there is a significant fact—and that is the phenomenal growth of this young association.

Over the past year the Ohio association has experienced a 211 percent increase in membership. Last year at this time the OMAA had 38 members; today there are 80 members, and some more membership applications are still pending.

Somebody must be doing something right.

One of the good things about the Ohio convention and trade show is the emphasis the OMAA puts on its seminar series. For those operators who attended, there was useful information for them.

The program began with an address by AMOA's executive vice

president, Fred Granger, who reported on the national association's plans to move the international Expo to a new site in 1982.

Granger said the AMOA has already committed itself to the Conrad Hilton Hotel through 1981 and that in 1982 it had been planning to switch to the Hilton's new hotel in Chicago, which is presently under construction. However, he reported, the facility will not open in 1982, as the AMOA had anticipated, but rather in 1983.

This leaves the national association without a confirmed site for the 1982 show, though the AMOA still has an option to hold its 1982 exhibit at the Conrad Hilton in Chicago. But Granger said, there have been a number of complaints about the accommodations about the hotel and about the fact that the show is too large for the hotel to accommodate.

Although the AMOA can still hold its show at the Conrad Hilton in 1982, he said, the AMOA board of directors is considering moving the Expo to a different site for that one year—maybe even out of the city. Granger told PLAY METER afterwards that Las Vegas and New Orleans were being considered as possibilities for 1982, although there are no definite plans at this time.

Turning to another controversial topic surrounding the AMOA's annual trade show, Granger reported that gaming equipment displays at the show this past year were "successful." He scotched rumors that the FBI was dissatisfied with the display of gaming equipment but added that exhibitors of the equipment can probably expect more AMOA-enforced regulations this coming year.

The AMOA spokesman then touched on the national association's

most volatile issue—its battle with the Copyright Royalty Tribunal (CRT). Granger said the AMOA's attempts to raise funds to fight the federal agency has generated \$42,050; but, of that total, he reported, \$30,000 has already been spent.

He then said it would cost the association more than \$100,000 to fight the federal agency's regulation all the way to the U.S. Supreme Court (which has been the stated purpose of AMOA leaders).

Granger said he was disappointed with the response so far, but said that he expected an improvement in collections soon. The goal for the Legal Action Fund, he stated, was \$250,000. Of those who have already contributed, Granger said, the average donation is \$183.

Granger then sounded a note of urgency to the whole problem of collecting the monies—"This isn't just to fight the location listings. Soon the CRT will be reviewing the rate, and we've got to gear up to fight that too."

The next day at the Saturday afternoon luncheon, Wayne Hesch, AMOA's president addressed the Ohio operators on the status of "Our Fight With the CRT."

He said that although the federal agency promises to keep the location lists confidential—for the time being—the track record of federal agencies to keep anything confidential is not worth the chance.

He then pointed out that the location list requirement, which the CRT has decreed, has put operators in the position where they are being required by law to make it easier for competitors to drive them out of business. Said Hesch: "When we supply location lists, we're not only revealing which locations are interested in having amusement equipment, we're also showing which locations are not interested."

He said that according to his estimates about one-third of the potential locations in his area of operation have amusement equipment in them. "We had to spend a lot of time and money finding out which locations are interested in having amusement equipment and which locations are not interested. And now the government wants us to reveal our findings so that everyone can profit from our own hard work."

Continued Hesch, "It would cut down the amount of time it would take for someone to run you out of business."

Hesch then said the AMOA's chances in the circuit court of appeals, where the AMOA's case is presently pending, are excellent. "With a three-judge panel hearing



Dick Daddis shows off Coffee-Mat's entry into the cocktail pingame market, Star Battle.



The pins were almost always being played by the overflow crowd.



Bob Prinzing of Williams explains to an operator the unusual appeal of Flash.

our case," he said, "I feel we have better chances of getting a fair hearing for our case."

He continued by saying, "The reason we're fighting this thing so hard is because we feel we're right."

During the question-and-answer session that followed his speech, Hesch said BMI's siding with AMOA over the location list requirement could be attributed to the fact that the music charts would give BMI, Hesch continued, a better share of the jukebox royalties.

It was ASCAP's contention in the CRT hearings last summer that it owned the rights to most of the oldies; and these oldies, which are in jukeboxes, are not reflected on the record charts. At the Ohio meeting, however, Hesch countered this argument by saying that the "oldies" on the jukeboxes, are not ancient hits, as ASCAP suggests. "Some songs are maybe five years old, but there aren't too many records that go back before that, and the difference would not change the royalty distribution significantly."

Hesch conceded, however, that perhaps the CRT was not apprised of this fact. In fact, Thomas Brennan, chairman of the CRT, in an interview with PLAY METER last October, said the music chart requirement was overturned because it did not allow ASCAP the ability to collect royalties for its old songs. Brennan used at that time songs that were over twenty years old.

Hesch also informed the Ohio operators of a new development on the copyright royalty horizon—and that is the performers' plans to collect a share of the royalties themselves. Hesch said there are two bills being considered right now. One of them, he reported, would increase the per-jukebox assessment for operators by one dollar and earmark that money for the performer, and the other would allow the performers to share in the present royalty collections.

This looming possibility could create havoc for the AMOA which this summer will be arguing for a reduction or a small increase in the



From left, Fred Granger, Wayne Hesch, and Dennis Hilligan review the activities for the OMAA Show.

eight-dollar per-jukebox fee. This new development could mean the CRT would require a higher jukebox fee to satisfy all concerned parties.

In other seminars, Richard Malloy, the area director of the U.S. Department of Labor's Wage and Hour Division informed operators of their responsibilities under federal minimum wage regulations. He said that businesses which gross \$275,000 or more are required to abide by the statute which presently sets the minimum wage pay scale at \$2.90 an hour. Malloy said that in January the minimum wage provision will increase to \$3.10, and in 1982 it will climb to \$3.25.

He then brought out an interesting and little-known regulation which could require operators who have amusement machines in government installations to provide additional employee benefits.

As far as child labor, Malloy said that children 15 years old and younger cannot work before 7 a.m. nor after 7 p.m. nor can they work more than three hours a day.

In the other seminar presentation, Terry Lyons and Roger Farmer of R.J. Reynolds Tobacco Company made a presentation on "Merchandising Your Cigarettes."

In an attempt to show operators of

cigarette machines how they can increase their profits on cigarettes, Lyons and Farmer gave a slide presentation which gave a demographic breakdown of cigarette smokers and their preferences for cigarettes in the nine categories of cigarettes now available.

After that, R.J. Reynolds then presented a short film entitled "What's Going On Here?" which documented the anti-smoking ordinances and regulations which are cropping up all around the country.

The show itself was well-attended, and all the major manufacturers were either represented in the distributor booths or else in booths of their own.

Among those with exhibit booths at the show were Cleveland Coin, Shaffer Distributing, Monroe Distributing, Royal Distributing, Tournament Soccer, Coffee-Mat, Gremlin, Kurz-Kasch, Poland Manufacturing, Abloy Security Locks, J-S Sales Company, and Coin Acceptors.

Among the new games on display were Bally's *Star Trek* and its soon-to-be-released pin *Kiss*, which is molded after the popular rock singing group.

Williams' new wide body game, *Stellar Wars*, and another new game, *Tri-Zone*, were also there, as were Gottlieb's new *Pinball Pool* and Stern's *Hot Hand*. Game Plan had two of its new cocktail pins, *Family Fun* and *Star Trip* on display, and from Allied Leisure, there was *Disco '79*.

In addition to the current models from companies such as Vectorbeam, Cinematronics, and Exidy, there were also some new videos on display for the Ohio operators. Midway's sitdown version of its hit game *Space Invaders* was given some special attention as were Atari's newest video offerings which include *Subs*, *Video Pinball*, and (picking up where *Football* left off) *Basketball*.

Coffee-Mat, trying to break into the sitdown pingame market, was showing its new game, *Star Battle*. And Gremlin was showing two new upright videos of its own, *Head-On* and *Gee Bee*.

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AMOV completes convention plans

The Amusement and Music Operators of Virginia held their April quarterly meeting at the Holiday Inn in Richmond with president C.H. Hudson presiding.

Plans were completed for the twenty-first annual AMOV convention and trade show to be held at the John Marshall Hotel in Richmond, October 4, 5, and 6, 1979. Dot Cameron, of Newport News, will serve as chairman of this year's convention.

Special recognition was given to Robert Minor, of Minor Music Corporation, who helped to sponsor a children's television special called "Jack and the Jukebox" on station WWBT in Richmond. This award winning show presented a brief history of the jukebox and brought great praise from the members of AMOV who had seen it. Dan Collins of Sefco Distributing Company starred in the show as Mr. "Nickelodeon." Collins advised the association they are now in the process of putting together a show on the history of pinball.

Free Herculean parts kits available

Atari is offering a special spare parts package at no charge to operators purchasing the world's largest pinball game, *Hercules*. This package of key parts for the game has an estimated retail value of approximately \$150. It includes solenoids, coil assembly, fuses, lamps, targets, flipper parts, and more.

Fred McCord, Atari field service manager, noted, "This bonus offer includes many of the parts that are not common to other pinball games. It will certainly help to facilitate service on this unique game." Atari has added this parts package as a special offer with the *Hercules* pinball to assure that the parts will be readily available for operators.

Washington's loss is Oregon's gain

"Shuffleboards and taverns are as symbiotic as politics and fools."

So says Jim Hinterberger of the Seattle Times in treating the political hassle that has led to the loss of an estimated \$250,000 in revenue to the businessmen of Longview, Washington.

After a confrontation with the Washington State Liquor Control Board, the 13th Annual Northwest Regional Shuffleboard Tournament shuffled off to Oregon, leaving Longview locals unhappy at the loss of a great party and distraught at the loss of the partyers' capital.

The board ruled the two-weekend tourney ineligible to qualify for a

temporary beer and wine license as a special event. In order to qualify for such a special qualification, the tournament would have had to attract the public as participants, rather than as mere onlookers intent on guzzling beer.

Atari school

Atari will conduct an engineering seminar on all Gottlieb games July 16 and 17 at New Orleans Novelty Company. Each session will be from 9 a.m. to 5 p.m. All operators in Louisiana and southern Mississippi are invited to attend.

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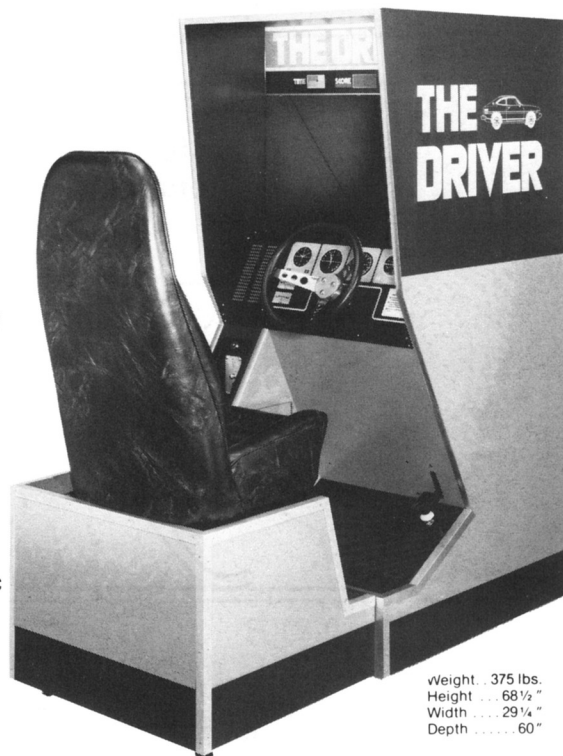
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Shooting down connector problems

By Douglas McCallum

Editor's note: As head technician for Music Systems of Lansing, Michigan, Douglas McCallum runs a training program for the company's service personnel. In teaching relatively unskilled trainees, McCallum uses a "how-to" approach based on a composite of informative and delightfully written "service bulletins" such as the one that follows.

Connectors are everywhere—they're in every piece of electrical equipment we own. Often they don't even show up in the schematics, so it pays to keep them in mind. They are one of the weaker links in our systems. So now let's cover types

of connectors and their uses as well as procedures for servicing them.

In a broad sense, we use three types of connectors in our machines: cable connectors (like monitor inputs or coin door harnesses), printed circuit board edge connectors, and

in-line wafer connectors (as in Bally electronic pin PC boards).

Almost all of these are made by two manufacturers: Molex and AMP. These brands are not necessarily interchangeable, so here's how to tell them apart. Sometimes you have to look really close, but both the connector pins and the plastic housings are identified by the manufacturer's mark. Molex puts either their name or an MX on each housing and a little MX on the back of each pin. AMP pins and housings all say so. As a point of reference, most AMP connectors have the little springy catches a la monitor input, and so far all the in-line connectors on electronic pins are from Molex.

Now that we know who made 'em, let's look at how they work. Regardless of which kind of connector we consider, they all work about the same: the pins will have a springy part to make contact with their mates (or a PC board trace), and they all have a lock-in tab that functions rather like the barb on a fish hook—it keeps the pin in the housing once it's inserted.

Just exactly when you don't want it to, one of these little devils will burn out, get mangled, or simply have its wire broken off so that you have to replace it. (Please don't try to solder something down in there; I still get nightmares.) All you have to do is depress the lock-in tab, tug on the wire gently, and there she is...

Not so easy, you think. Well, there is a trick to it after all. For those hard to reach lock-in tabs the folks who make the connectors also make **EXTRACTOR TOOLS**. These tools are especially important for the round pin cable connectors, 'cause I don't know any other way to remove them.

Molex makes a nice simple little extractor for less than two and a half

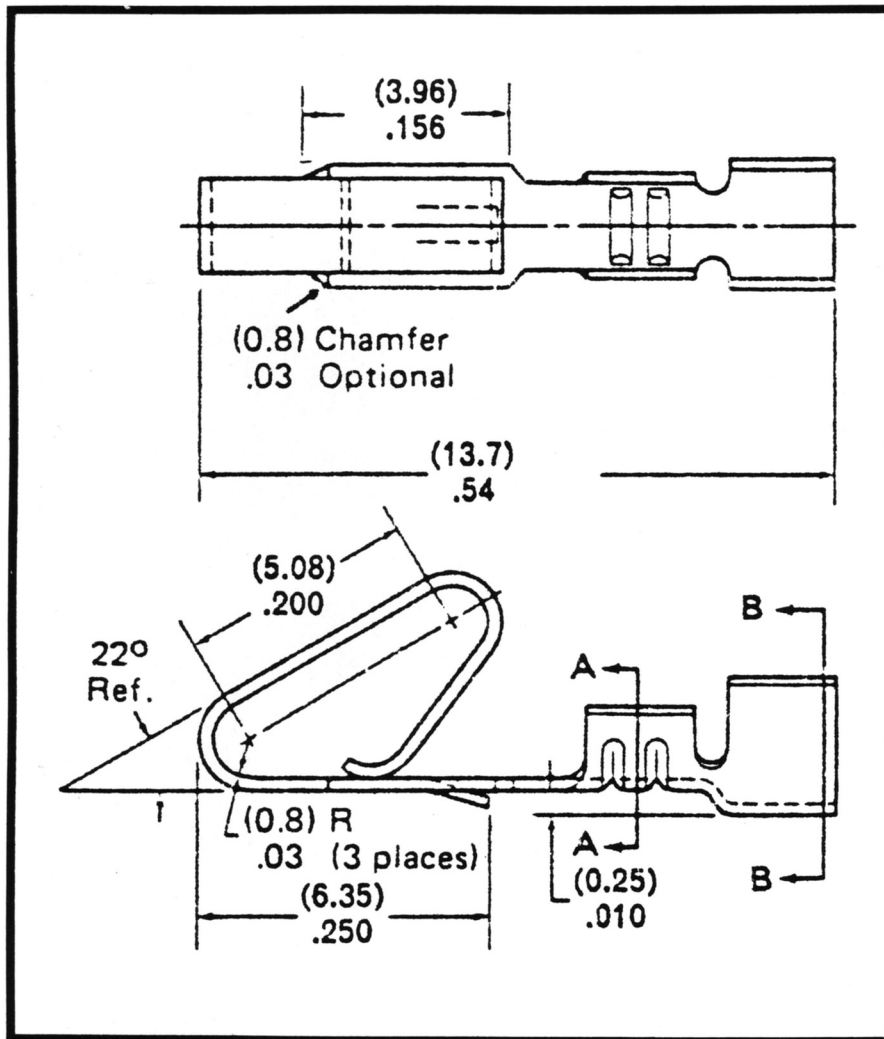


Figure 1

bucks that'll work fine on AMP products too (part #11-03-0015 for large pins and #11-03-0009 for small pins; you'll need both.).

Round pin extractors are little more than a thin tube sized to fit around the pins and flatten out the lock-in tabs. Run a little rod down the center to push the pin out and you've got it. You could make one by dropping in at the local hobby shop for a piece of proper sized thin-wall brass tubing.

For in-line and edge connectors it's simple, too. The extractor is essentially a thin flat prod that you shove down an access hole or slot to depress the lock-in and free the pin.

OK. So far we've removed the old pin. Now, let's install the new one.

First, strip 1/16 of an inch or so of insulation off the wire. Next step is to crimp on the new pin. The best way is to use a crimping tool—about \$8.00—which usually has strippers and wire cutter on it (Molex HT-1921 or similar). If you don't have a crimper, use needle nose pliers. It's a good idea to use a *small* amount of solder with the needle nose method to insure a strong and lasting connection.

Figure 1 shows a typical crimp on connector pin—a Molex type as used on a Bally solenoid board. Section AA is to be crimped around the wire conductor itself, while section BB is crimped around the insulation for strength. Note the lock-in tab underneath.

Once the wire is crimped into the pin, insert the pin into the plastic housing until the tab snaps into place. You're done! The playfield lights have returned!

If connectors sound like your idea of fun, here's how to get some: write to AMP Special Industries, Harrisburg, Penn. 17105 or Molex, Inc., 2222 Wellington Court, Lisle, Ill. 60532 for names of distributors, product info, etc. AMP deals factory direct but may require a minimum purchase. Your games distributor can help also.

Most of the hand tools are fairly universal, so you needn't be too brand conscious there. However, the contact pins are a different story—stick to the right brand and the proper pin or your connectors will not fit correctly and they'll be unreliable.

Some trade names and brands of connectors:

Molex—KK series—in-line connectors as used in Bally electronic pin games. Standard Nylon series—white rectangular cable connectors, large pin. Miniature Nylon series—white rectangular cable connectors, small pins. Dualcon and Edgecon—two sided PC board edge connectors

used in TV games.

AMP—Duotyne—right angle PC board edge connector used in Midway TV games. Amp-leaf—two sided PC board edge connector used in TV games. MR series—black rectangular cable connectors, small pins. Universal MM series—rectangular cable connector, large pin, as used in TV monitors.

Some uses for connectors other than replacement and repair:

Test Rigs—some repair jobs are better done on the work bench than in the game, like Atari steering boards or most TV logic boards. Use

of the proper mating connector makes the job much easier.

Saving burnt PC boards—ever have to write directly onto a logic board because the edge traces burnt up? Sprint II's favorite trick. Running your soldered-on wires through a small separate cable connector makes it a *whole* lot easier to service the board later.

Custom Installations—when a location just HAS to have some odd addition to the jukebox, it's simple to add a connector so you can get the whatever-it-is out of the way for service.

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Operators sponsor exhibit of old jukeboxes at Akron Art Institute

By Marjorie Harvey and Paul A. Corey

An exhibition of first-rate vintage jukeboxes was sponsored by the Ohio Music and Amusement Association (OMAA) and Akron's Bell Music Co. at the Akron Art Institute recently.

The exhibition included nineteen jukeboxes from the extensive collection of Thomas Graef, a Massillon engineer, and a special display of the Seeburg Model 1979, courtesy of Bell Music Co. The display, viewed by over 10,000 people, featured working models by AMI, Rock-Ola, Seeburg and Wurlitzer. The classic Wurlitzer 1015, made in 1946, considered the world's most famous and loved jukebox mainly because of

its colorful styling, was a special attraction. Everyone wanted to put a nickel in the jukebox that bubbled and danced with the popular music of the day.

Jukebox design flourished through at least three decades, the 1930s through the 1950s. Pieces from that era are full of visual fantasy: Art Deco shapes, flashing lights, gleaming metal, a fantasy world of sight and sound in one object.

Their beginnings date almost from the time of Edison's invention of the talking machine in 1877.

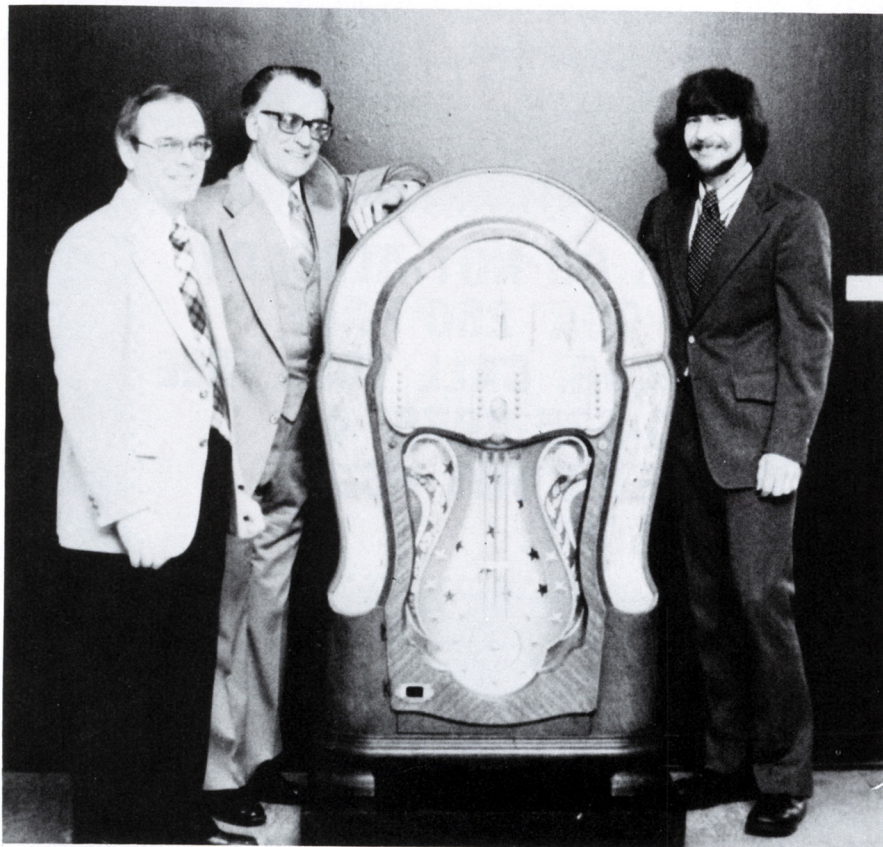
In 1889, Louis Glass took one of these machines, put it in a cabinet and made it operate for a nickel

deposited into a coin slot. Because people liked what they heard and saw, the machine earned up to \$2,000 a year as it played in the Palais Royal Saloon in San Francisco. In 1890 an automatic version was shown at the first phonograph convention in Chicago. One year later, sixteen companies were exhibiting coin-operated machines.

With the repeal of prohibition in 1933, the market for automated music became wide open and the Wurlitzer Co. of North Tonawanda, N.Y., led in jukebox production, especially during the '30s and '40s. It was not the only company which designed and marketed jukeboxes. Some of the other notable firms during this era were: J.P. Seeburg, Chicago; Rock-Ola Mfg. Co., Chicago; AMI (Automatic Instrument Co.), Grand Rapids; and John Cabel Mfg. Co., Chicago.

The heyday of the jukebox (1933) coincided with the high point of Art Deco, and the jukebox became a streamlined machine, modern and flashy, broadcasting a fantasy world of popular music. Such extremely ornate materials as unusually curved plastics, straight bold pilasters with elaborate horizontal metal parts, parallel pieces of glass, all on massive wooden frames, could easily be mass-produced and were systematically used.

In the '40s and '50s attempts to update the design of the jukebox failed because the form had become so closely associated with the Art Deco designs of the '30s. In other words, the jukebox design has already arrived at its own classical state of perfection.



Shown with the stylish 1946 Wurlitzer 1080 are (from left) Dennis Hilligan, OMAA president; Paul Corey, OMAA executive vice president; and Thomas Graef, a jukebox collector.

The Akron Art Institute, as a result of the great success of this jukebox exhibit, is exploring the possibility of beginning an archives on jukeboxes. The archives would include such things as historical information on the designers, original designs and drawings, posters and other advertising materials for jukeboxes.

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Distributing

Williams introduces warranty program

Williams Electronics, Inc. has announced a new warranty program on its pinball and shuffle alley product lines.

"The warranty program consists of three packages," explained Williams president Michael Stroll. "First we warrant the entire game for a period of 60 days from date of shipment, and we warrant socketed electronics components for 180 days from date of shipment. Second, we provide an allowance to the distributor for each game purchased for any local warranty work that may be necessary. And third, we provide substantial discounts to our distributors on complete electronic parts kits for quantity purchases."

"As an added bonus," Stroll continued, "we will provide a free

attache-style carrying case to any operator who purchases an electronics parts kit through his Williams factory authorized distributor."

The new warranty program is currently offered on *Flash* and Williams new wide body game *Stellar Wars*. The program will be expanded to the shuffle alley starting with the production of *Taurus*.

ESD authorizes charge account sales

Equipment Systems and Devices, Inc. announces a new MasterCard/Visa service on all ESD products including coin slides, locks, money boxes, conversion kits, and lubricant penetrant.

Participating ESD distributors will be authorized to make charge account sales on the spot after credit confirmation with ESD through its toll free 800 number.

ESD believes the new service will make it easier for the ESD distributor's customer to use his established credit to purchase all the ESD products he needs now without cash or check.

Oregon distributor moves to new location

Ability Games Distributing of Portland, Oregon has moved to a new location at 6803 S.E. Foster Road.

The move reflects a growth in the company's operations which has enabled them to invest in their own building. "We've tripled our inventory in the last three months," says Ability president Todd Levy.

"We're having tremendous success with what we believe is a new concept for distributors: buying back old games from operators and reconditioning them for retail sales. The activity now accounts for more than half of our business revenues."

Ability plans to renovate the building in an antique motif, providing an attractive showroom for their machines.

Williams adds foreign distributors

Williams Electronics, Inc. has added two new distributors: Video Electronic Games in Carasco, Italy and Goddard Novelty in Sydney, Australia.

These distributors join two other

recent appointments in Europe: Ruffler & Deith, London and Salmon S.A., Paris. The firms will represent the full Williams line of pinball games, wide body pinball games and the United shuffle alley.

Manufacturing

Repeat Performance:

Robert Anderson and Robert Runte have apparently flopped again in their efforts to formulate a vibrant manufacturing concern.

May 16, in the U.S. District Court for the northern district of Illinois, Judge McCormick adjudicated the manufacturers of *Black Sheep Squadron*, bankrupt. A trustee has been appointed, and attempts will be made to recover Astro assets, enough to pay bills estimated at nearly \$200,000.

The bankruptcy comes on the heels of another failure for Anderson and Runte, as recent as August of 1978, when their Fascination Ltd. fell.

In fact, the present court action was taken with an eye of reflection on Anderson and Runte's track record. A group of Astro creditors, namely Able Calbe Division, Nax Products, Inc., Bell Industries, Inc., Coin Mechanisms, Inc., Imperial, Inc., Jarco Manufacturing, and Lenco Electronics, Inc. jointly filed the action claiming Astro Games owed them congregately a bit less than \$46,000.

The creditors' attorney, Nickolas Dozoryst, entered three separate requests in district court: a petition for bankruptcy was filed April 24,

Bally's income hits new high

Bally Manufacturing has announced record revenues, net income, and earnings per share of the first quarter, 1979. Revenues were \$91,361,000, up 23 percent over the first quarter of last year. Meanwhile the company's net income, \$10,015,000, rose 34 percent over last year's, and earnings per share were up 24 percent to 77 cents.

Revenues and net income were the highest for any quarter in Bally's history.

The company has also announced a two-for-one common stock split to stockholders of record on May 10th.

Additionally, Bally has been extremely active among investors on the New York Stock Exchange. Bally's Park Place, Inc., the company's Atlantic City subsidiary, has brought Bally to light as one of the hot "casino" issues.

Runte and Anderson's Astro Games flops

followed closely by a motion for a temporary restraining order and an application for appointment of a receiver.

These motions reportedly stemmed from these companies' belief that Astro chiefs Anderson and Runte were preparing to abandon the unsuccessful venture by clearing out their inventory to places unknown in preparation to clear themselves out, leaving their creditors with a greatly depleted inventory to liquidate in attempt to recover some of the owed moneys.

One of the charges against Anderson and Runte suggested they had done just that last August when they terminated the activities of their Fascination Ltd.

According to Runte, Fascination's creditors were paid in full, and the panicked actions of the creditors this time around were a result of the organizing efforts of a disgruntled former employee, Leo Hansman, who was fired by Runte and Anderson.

Hansman's account is markedly different.

He offers at least three creditors who were reportedly "burned" by Fascination. Two of those are on the list of current complainers against

Astro, Jarco Mfg. and Lenco Electronics. Pen Ray International of Pennsylvania is the third, and Hansman suggests that this list is by no means complete.

Hansman, who is currently at Viza Mfg., was employed as vice president and general manager at Fascination, and also received employee checks from Anderson and Runte's subsequent enterprises, Ram, Inc. and Astro Games.

Hansman was the significant material witness at a May 9 hearing, the initial try to get the court to force bankruptcy on Astro Games. Despite two hours of Hansman testimony, Judge McCormick did not award the petitioners their claim that day, and Hansman contends that only the petitioners' lawyer's unpreparedness cost them that day in court.

McCormick did set a hearing for May 15, however, to pursue the matter, and although Runte had previously said he hoped to keep the company alive, the Astro answer submitted by attorney Louis Levit stated that, without admitting or denying the petitioners' allegations, Astro Games would consent to being adjudged a bankrupt.

Perhaps some of the most damaging evidence Hansman offered in

filling out the backdrop of Runte and Anderson's business practices came when he told of 167 lawsuits pending against Fascination at the time of its decline, lawsuits brought by those who had purchased games from the company and were unhappy because they could not obtain warranty service.

Efforts to stay afloat in the manufacturing sector tie in elsewhere in a look at Anderson and Runte's career in the business. Their contract with Allied Leisure of Hialeah, Florida to distribute the table game *The Entertainer* provided that company with the necessary cash flow to escape the throes of a Chapter 11 bankruptcy and return to normal business operations (See PLAY METER, December, 1977).

Anderson and Runte remain in the business now as Ram, Inc., a company which purchased most of the Fascination Ltd. assets when it folded and then later funneled them to Astro Games.

Bob & Bob have been somewhat less than accessible since the adjudication, and attorney Levit offered to field questions about the reasons for accepting the bankruptcy in their stead. His answer: "No comment."

Sega Enterprises reports record earnings

More good earnings news occupies the manufacturing spotlight.

Sega Enterprises of Redondo Beach, California reports record earnings for the fiscal 1979 third quarter. Sega's stats show \$2,740,000 in net earnings for the quarter as compared to \$597,000 for the comparable quarter of 1978.

Total revenues for the same period were up from \$9,002,000 to \$24,382,000.

These figures include the operations of two companies that Sega has acquired during fiscal 1979. The operations of Gremlin Industries has been included since October 1, 1978 and those of Esco Trading are being

figured in from March 1, 1979.

The favorable earnings report comes on the heels of the first Gremlin-Sega distributor meeting, held April 20-23 at Gremlin Headquarters in San Diego. There, company officials heralded the production of their first multiphase game, *Head On* (See PLAY METER, May '79).

Physics prof hooked: next he'll want it in the classroom

A physics professor from West Virginia University has become intrigued enough by Exidy's *Starfire* to leave his campus duties behind several hours a week in order to spend time with his favorite video game.

Robert L. West, Jr. ambles to the Mountaineer Mall in Morgantown where he can be found waiting in line to challenge the machine. West even brings a colleague along to analyze

the action and discuss "intriguing extensions" to the game.

"I have given some thought to how I would go about setting up 8080 software to process a world model handler to emulate the conditions of a *Starfire*-type game," professes West.

"I have been playing this game for a few months now rather regularly... and have become somewhat proficient at it. As a standard for

competition, some friends and I run 1200 fuel units since it is the compromise in cost and economy that allows us to play as often as we do.

"My high game at this level is 4536 points, and my average is around 4100... The next high score is not over 4000 (I believe 3990 or so). For the period I have been playing and observing other playing, nobody has surpassed this."

To catch a big mouse you need a big mousetrap

In a guest editorial written by Louis Boasberg in the June 1978 issue of *PLAY METER* under the title "Give us more thrills and more gimmicks," Louis states, "Any deviation from the standard size of a flipper game whether it be larger or smaller always brings momentary novelty play."

This statement was verified by a showing of a giant pingame engineered by Bally for a television show. The game called *Big Foot* was exhibited at the 1977 AMOA Show, and the crowds around the Bally booth to see and play this game were remarkable.

Many wanted to see Bally go in production on *Big Foot*, but Bally declined with regrets stating that the price would have been prohibitive, but at last November's AMOA Show, Atari exhibited a giant pingame called *Hercules*, and as usual with such a great deviation in size, the game drew crowds galore to play it, and see it being played. So, Atari jumped in and went into production on *Hercules* in May of this year.

When we learned from an ad on the amusement page of the *New Orleans Times-Picayune* that the largest pingame in the world had

been installed at the Fun Arcade (a drive-in arcade here in New Orleans), we jumped at the chance to see *Hercules* in action on a regular commercial location; so we set out for the Fun Arcade on a Saturday afternoon to see what *Hercules* would be like being played for 50-cents per game rather than being played for free at a coin machine show.

When we walked into the Fun Arcade, we immediately noticed a large crowd gathered around the giant pinball game. Apparently the players enjoyed playing the game as there was a line of three or four people waiting their turns. And the large gallery of spectators seemed to be just as entranced with the game as the players were.

We thought that because of the great amount of interest in the game by spectators that it would detract from the other games in the arcade, but arcade manager Bobby Daix stated that *Hercules* had been such an attraction in the arcade so far that it had drawn many people to see the game who after watching for a while became interested in the other games and immediately became customers. In fact, he stated that the game was

the biggest single attraction he had ever had in the Fun Arcade.

The Achilles' heel of the giant pingame is that, because of its size, it can only be operated in certain locations; but this may be a plus for the drawing power of *Hercules* would be greatly diminished if the game could be operated everywhere.

We are certain that a few locations in every city and community will derive plenty of business, especially new business, from the drawing power of *Hercules*. In fact, we wouldn't be surprised to see Atari build a follow-up model sometime in the future and call it *Goliath*, *Big Bertha*, *Big Ben*, *Godzilla*, or some other name denoting size and power.

Games like *Hercules*, to our way of thinking, seem to be perfect for an amusement park. In fact, we believe that such large amusement enterprises as Disneyland and Disney World could perhaps have separate buildings for six or ten of the giants.

I guess it only goes to prove that you not only have to build a better mousetrap these days, but also a much bigger one if you want the whole world at your feet.

—By David Pierson

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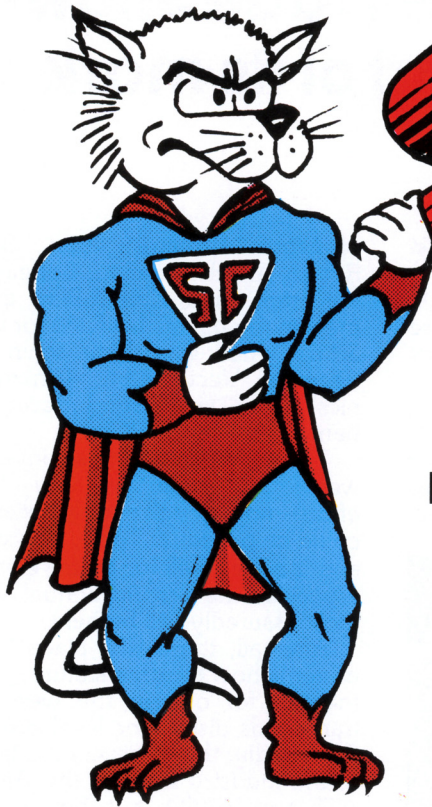
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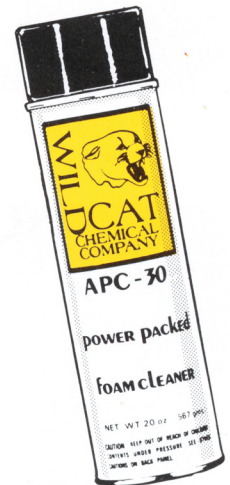


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International Coin Machine Trade Show-- nicely billed, but it fell short of its mark

By Roger C. Sharpe

The Ben Chicofsky show took place over the May 4th weekend and in attendance were a host of distributors and manufacturers hoping to find interested customers. The setting, New York City's Statler Hilton Hotel, proved to be more than worthy of the three-day traffic that moved from booth to booth.

The show is difficult to categorize since it wasn't a full-fledged industry

affair and yet it was more than just the usual state show.

Nicely billed as the International Coin Machine Trade Show, there were indeed visitors and exhibitors from both sides, of the Atlantic. But the impact fell far short from what it could have been. Conspicuous by its absence was the handiwork of either Bally or Gottlieb, although this was amply compensated for by the likes

of Stern, Williams, Atari, Sonic, Recel, Allied Leisure, Coffee-Mat, Playmatic, and Game Plan equipment in the pinball field. As for video action, Atari was there again with Gremlin, Vectorbeam, Cinematronics, Exidy, and Elcon Industries, to name just a few.

The problems with this convention were the same as any "first" effort—not enough people believed it could be pulled off. Well, Ben did it, and it bodes well for future editions, especially the *second* annual which most assuredly will be held.

After all, there is a place for an eastern show of some stature, just as there is for one in the west, that transcends distributor level displays. Admittedly, there are still the biggies of the industry such as the AMOA, ATE and IAAPA, but there is more than enough room for more as the industry expands its influence over the world.

This time around the ICMTS set the precedent of being able to gather together an impressive array of people and equipment. Highlights included the likes of Atari's two new track ball efforts—a baseball and basketball theme—as well as its exciting *Superman* pinball machine. From Gremlin came an interesting one-player video game called *Head-On* that garnered much attention.

Williams showed that it is tackling the wide-body pinball market with all guns blazing by showing off its sensational *Stellar Wars*, while a signature effort from Harry Williams of Stern, *Hot Hand*, showed yet some newer wrinkles to what is possible on a pinball machine board (read the reviews of these last two pins in this month's "Critic's Corner").

Allied Leisure had a nice sit down pin called *Disco* that attracted some interesting action. And Cinematronics showed why it's not a one-machine company with their very popular *Star Hawk*, a follow up to *Space Wars*. Vectorbeam had a new black and white screen driving game, *Speed Freak*, that had some nice touches; and Game Plan showed off a new conventional pin for the first time on these shores, *Sharpshooter*, and that managed to raise a few eyebrows.



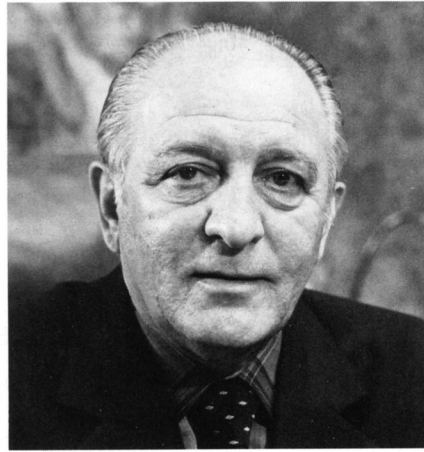
Lenny Dean and Barry Feinblatt of Universe Affiliated stand by Playmatic's most recent pin offerings.



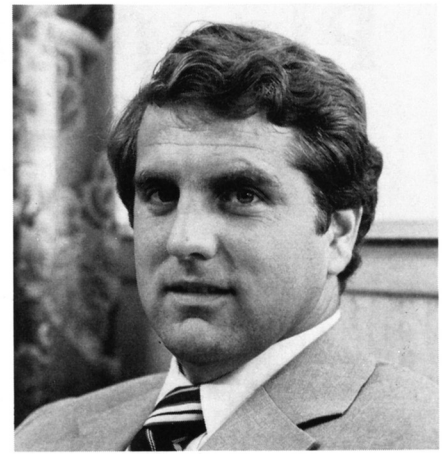
Irving Morris, Ken Anderson, Phil and Ron Colucci check out Game Plan's Sharpshooter.



Tom Nieman



Paul Calamari



William T. O'Donnell, Jr.

Bally establishes pinball division

On the heels of the introduction of its solid state line of pinball equipment, and on the wings of its increased share of the market over the past two years, Bally has established the Bally Pinball Division.

William T. O'Donnell, Jr. has been appointed president of the new division, and he, in turn, has made two significant appointments: Tom Nieman has been named to the position of Director of Marketing for the new Bally branch and Paul

Calamari will direct sales.

Nieman had been Promotional Sales and Advertising Manager for Bally, while Calamari, who recently celebrated his 42nd year with the company, had been managing sales of novelty games.

O'Donnell, Jr. expressed the belief that the new division would increase flexibility and manufacturing effectiveness. "The division's mandate will be to intensify and streamline Bally's effort to maintain the market

leadership position that we have established through superior technology, game design, and innovative marketing techniques," he said.

A new manufacturing facility is currently under construction to house the Bally Pinball Division as well as the divisional staff personnel. The building is approximately 185,000 square feet and located in Bensenville, Illinois, immediately adjacent to O'Hare International Airport.

Klopp International purchases Klopp Engineering

John B. Lanagan, president, and Richard D. Munro, vice president, have announced the formation of Klopp International, Inc., and the purchase of the assets of Klopp Engineering, Inc. of Livonia, Michigan. A leading manufacturer of coin counting and sorting equipment since 1930, Klopp has been headed by Peter R. Klopp, Jr., president.

"Under the supervision of Dick Munro, Klopp International has assumed the Livonia sales and manufacturing facilities formerly used

by Klopp Engineering. Marketing and engineering offices of the company will be located in Indianapolis under my direction," Lanagan explained.

Lanagan, 46, was the president and a principal owner of Standard Change-makers, Inc. from 1955 to 1970. During this same period he was also vice president and an owner of the Nik-O-Lok Company, a nationwide lessor of coin operated restroom locks. In 1971 he and Hy H. Schwartz purchased Coin Laun-

derer & Cleaner Magazine and built it into the coin laundry industry's leading trade publication.

Dick Munro attended the Boeing School of Aeronautics and has served as a director of quality control both with the R.A.F. Transport Command and for the Fairchild Aircraft Corporation. He is the former head of a Bendix Sales and Service Company in the greater Detroit area where he also owned a number of coin operated laundry stores.



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Play Meter Equipment Poll

Here are the results of PLAY METER's subscriber survey ranking pinball and video games. Only arcade responses are listed. Total points are computed by assigning 5 points for a first place vote, 4 points for second, etc. First place votes are in parenthesis:

Top Pins

1. PLAYBOY/Bally (21).....	261	12. CHARLIE'S ANGELS/Gottlieb (1).....	37
2. FLASH/Williams (36).....	227	13. DISCO FEVER/Williams (1).....	35
3. LOST WORLD/Bally (5).....	87	14. POKERINO/Williams.....	31
4. EIGHT BALL/Bally (2).....	66	15. COUNT-DOWN/Gottlieb (1).....	29
5. MATA HARI/Bally (2).....	55	16. (tie) CLOSE ENCOUNTERS/Gottlieb (2)....	27
6. SINBAD/Gottlieb (4).....	52	(tie) THE SIX MILLION DOLLAR MAN/ Bally (2).....	27
7. SUPERSONIC/Bally (3).....	50	18. SOLAR RIDE/Gottlieb (2).....	24
8. SUPERMAN/Atari (4).....	43	19. DRACULA/Stern (1).....	22
9. PHOENIX/Williams (2).....	41	20. CONTACT/Williams (1).....	21
10. (tie) MIDDLE EARTH/Atari (2).....	40		
(tie) SPACE RIDER/Atari (3).....	40		

Top Videos

1. SPACE INVADERS/Midway (65).....	380	9. NIGHT DRIVER/Atari (1).....	29
2. FOOTBALL/Atari (10).....	244	10. SEA WOLF II/Midway.....	19
3. SPACE WARS/Cinematronics (2).....	126	11. (tie) SUPER BUG/Atari.....	16
4. STAR FIRE/Exidy (8).....	120	(tie) SUPER BREAKOUT/Atari.....	16
5. SPRINT II/Atari (2).....	107	13. FIRE TRUCK/Atari.....	12
6. STAR HAWK/Cinematronics (4).....	62	14. (tie) INDY 4/Atari (1).....	11
7. SPRINT/Atari (1).....	42	14. (tie) SPEED FREAK/Vectorbeam.....	11
8. SEA WOLF/Midway (1).....	34		

The PLAY METER subscriber survey of pinball and video games will be a regular feature in subsequent PLAY METER publications. If you would like to join readers currently participating in the survey, simply fill out the coupon below and return it to PLAY METER.

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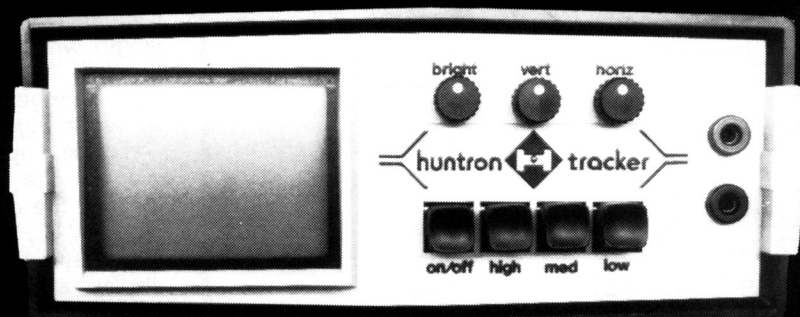
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The theory of operation behind the Bally/Stern display module

The purpose of the unit is to show a number of up to six digits as directed by an outside source. Though all digits appear on at the same time, only one at a time is actually lit. Then it goes out and the

next one goes on and off, and so on down the line. The lighted position moves from left to right and then repeats so fast that all digits seem always on.

This scanning method allows

simpler wiring, simpler construction and less power than if all digits were on at once.

1. Forming the digit pattern

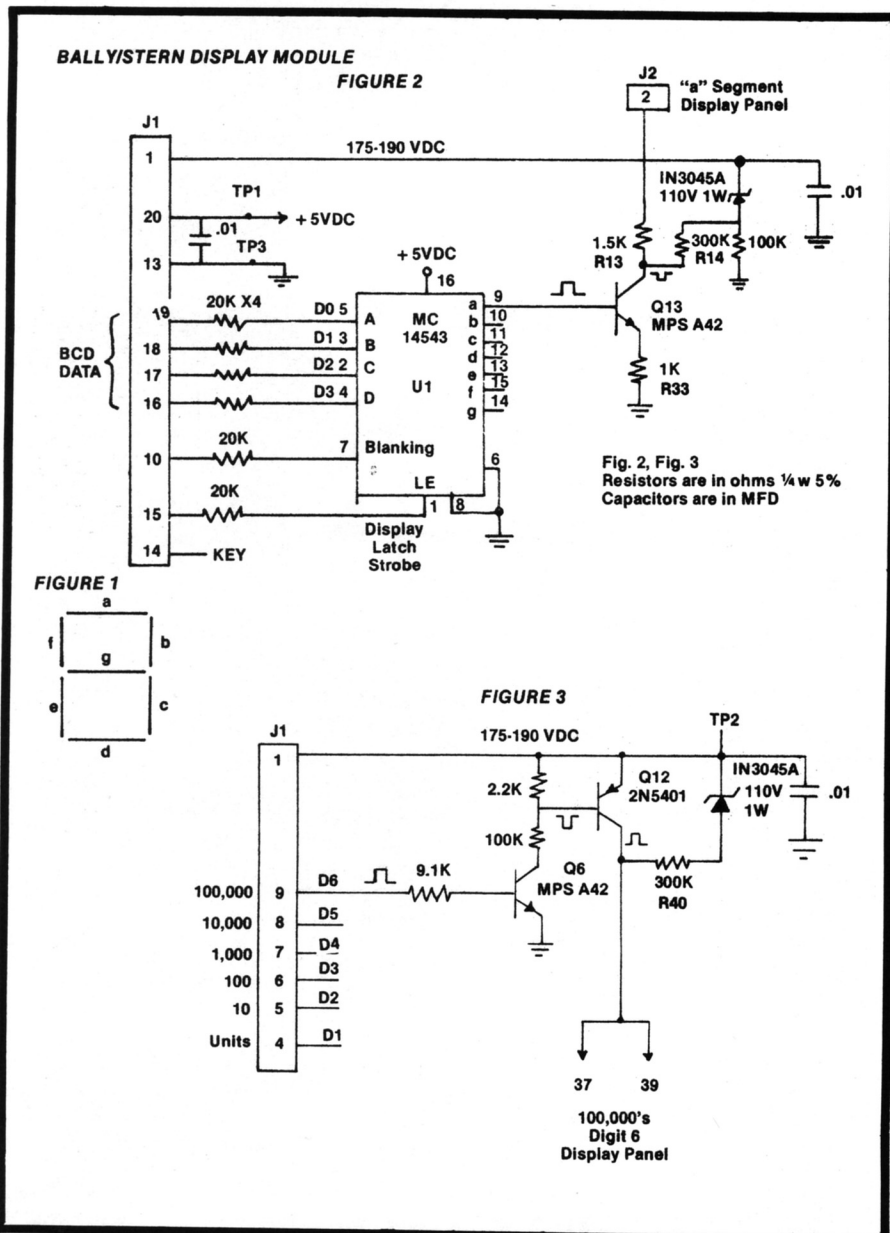
Consider first a display of only one digit. This will have for its main structure one anode and seven cathodes. Each cathode forms a line segment which lights up all along its length when segments are designated "a", "b", "c", "d", "e", "f" and "g", arranged to form the pattern shown in Fig. 1.

To set up a digit for display, ground the segments (cathodes) forming the desired digit, for example "a", "b", "c", "d" and "g" for "3" to be displayed. Then to turn on the display apply +190 volts to the anode and the "3" will light up. Remove the +190 volts to turn off the "3." (In actual practice, a series resistor is used in each cathode line to prevent damage due to excessive current.)

II. Six digit display

In the complete display panel, there are six digits constructed alike. Separate anode leads are brought out, but all the cathodes with the same letter designation have a common lead brought out, thus, for instance, grounding the "a" segment line will set up the "a" segment in all digits. Only one anode at a time can be enabled, that is, can have +190 volts applied to it. The way the display as a whole operates is as follows:

1. The #6 (extreme left digit) anode is energized.
2. The proper segments are grounded. The digit then lights.
3. All segments ungrounded. The digit turns off.
4. The #5 anode is energized.
5. The proper segments for the next digit are grounded. #5 digit then shows up.



6. The same sequence is repeated for remaining digits and then starts over at step 1 and keeps repeating.

III. Digit scan and control

There are twelve signal lines coming in to control the display Module. Six of these are digit select lines. Only one at a time is allowed to be pulsed, enabling a particular digit only. One signal line is used for blanking. When this line is pulsed, all cathode segments go positive, disabling the entire display by forcing the decoder chip U1 to the "no segments on" state. Another signal line provides a latch strobe pulse, which in effect causes U1 to read the data present on the four data lines D0, D1, D2 and D3, and to store them internally. When the strobe pulse is not present, U1 ignores the data lines. The data to be stored comes in as a four-bit binary number restricted so as to include only codes for 0 through 9 in decimal notation and represents one of the six digits to be displayed. The seven output lines of U1 represent the same digit recoded to form the correct segment pattern for display.

IV. Circuit principles

1. Segment Enable (Fig. 2)

Q13 is the segment enable transistor for "a" and typical of all other segments. When Q13 is cut off, the "a" segments return through R13, R14 to about +80 Volts. Even if an anode is at +190 Volts, the anode to cathode voltage is too low to maintain a glow. The "a" cathodes are thus disabled. If the signal at the base is +5 volts, the transistor conducts, effectively grounding the collector through R13 and R33, and enabling all "a" segments.

2. Digit Enable (Fig. 3)

Q6 and Q12 are the Digit Enable transistors for Digit #6 and typical of all digits. The Q6 base operates near ground, so that the input at pin 9 through a 9.1 K current limiting resistor can swing from near ground to turn Q6 off (cutoff) to +5 volts to bring Q6 to full conduction.

The Q6 collector will swing from near ground in conduction to a cut-off state in which it will not supply enough current to the Q12 base to cause conduction in Q12. Q12 in conduction pulls up the display anode to +190 Volts. When cut-off, it allows the anode to drop to the +80 volt return through R40. Thus a +5 V pulse at pin 9, U1, will put +190 volts on the display anode and enable the digit.

In the absence of a pulse at pin 9, Q6 is cut off, causing Q12 to cut-off and disable the digit.

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Williams' front-end programming

The latest technical innovation from Williams has been unveiled. It is "total front-end programming! Starting with *Flash*, all game adjustments can be made from the front door without removing the back glass.

"The new system will allow quick and easy adjustment of all game settings and features" stated Ron Crouse, Williams Marketing Manager. "In addition, we have incorporated many more game adjustments to provide the optimum setting from each location."

The new programming technique is as "easy as 1,2,3" Ron explained. First put the game in programming mode by pushing one button; second, select the feature you wish to change and third, set the adjustment using the credit pushbutton. All information is displayed to the operator at all times on the score displays.

The audit information has also been greatly expanded to provide operators with all the information they need to maximize earnings. Not only are the number of coins totalled, but also the number of high scores, extra balls, and even *ball time* are now computed and displayed at the touch of a button.

The new system, which has been widely acclaimed in *Flash* has been incorporated in Williams' latest wide body game *Stellar Wars* which is now in production.

Atari service schools slated

There's still time for technicians in the southeast to get in on one of two Atari June service schools.

Atari's field service team will conduct two-day seminars on video and pinball troubleshooting and repair in Atlanta on June 18 & 19 and in Orlando on June 21 and 22.

In Atlanta, contact Greater Southern Distributing for information and reservations. For the same in Orlando, Florida, contact Southern Music Distributing.

ERRATA: PLAY METER, January, p.56, Figure One, Number One should read: "Power Transistors—B2V-2N3055 and LM323-78HO5, etc."

Some modifications and service tips worth a look-see

By Jim Calore

The following modifications and service tips are reprinted courtesy of Jim Calore and "Star-Tech Journal." Calore, who is interviewed as *PLAY METER's* Coinman of the Month in this issue, also authored another article, on the theory of operation behind the Bally/Stern display module.

Gottlieb Memory Modification

The following modification will prevent changes in replay levels and high score to date during power-up. Bookkeeping errors and erratic credit accumulation will be eliminated also.

The control board produces a glitch which enables the battery-backed ram, during power-up, exposing it to unstable and undetermined information on its control lines thereby rewriting its contents.

Protecting this memory device insures correct and accurate game parameters.

Gottlieb Control Board Modification—

Remove R160

Change R161 to 43K

Change R162 to 2K

Change R163 to 6.8K

Change R159 to 3.9M

Change Q6 to MPS-A70

All resistors are 1/4 watt 5%

Williams "Disco Fever" ROM Modification

SYMPTOMS: MPU occasionally fails to power-up; Solenoids randomly energizing; Constant driver board failures; Switch and scoring problems

SOLUTION: Change ROM "1D" to modified "DISCO FEVER" ROM "1E"

Stern "Wild Fyre" Operator's Manual Addition

Omitted from the manual are the MPU switch settings that determine the award for hitting a special.

SPECIAL AWARD

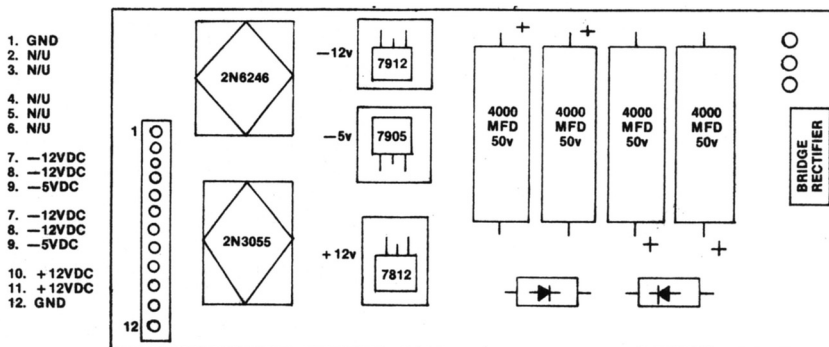
	SW 31	SW32
Free Ball	on	off
Free Game	off	on
100,000 Points	off	off
Free Ball and	on	on
Free Game		

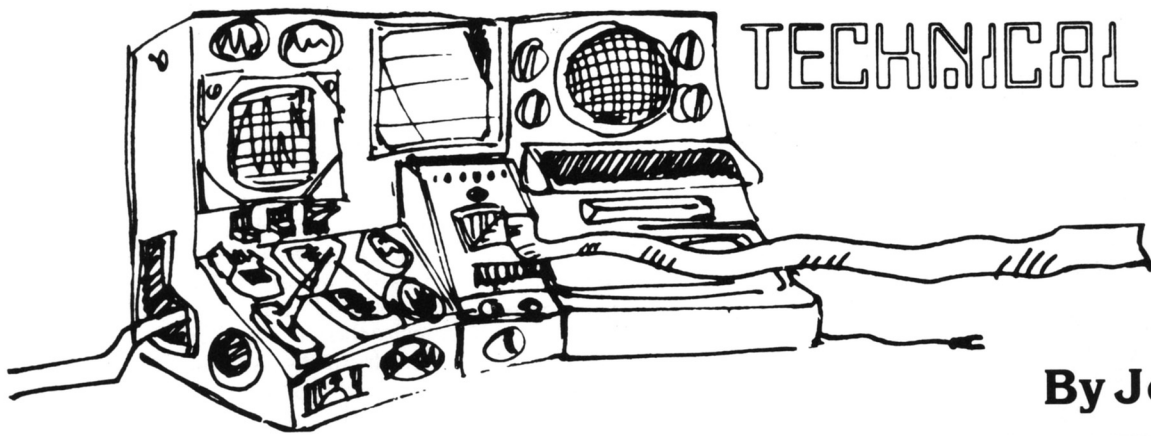
Exidy "Star Fire" Output Voltages

With the lack of information and electronic prints on this game, test points should help determine power supply failures.

The +5VDC power supply is external to this PCB, and is similar to the supplies used on other EXIDY video games.

EXIDY STAR FIRE POWER SUPPLY PCB





By Joe O'Hara

Understanding processors

Introduction

Today more and more electronic games use microprocessors as their control element. This is because they make sophisticated functions much cheaper and much easier to design into the systems. Many service technicians are puzzled about where to begin when these games fail, plus the fact that getting information from the manufacturers on how they work is often difficult if not impossible. In this series, we will look at one of the most popular micro's, the Motorola 6800, and its family of parts. With a minimum of technical jargon, we will examine how processors work and how they are used to perform dozens of different jobs in electronic games.

What is a microprocessor?

Most simply, a microprocessor is a logic device whose function is determined by digital codes (instructions) stored in a memory. A sequence of these codes that does a certain task is a program. The processor alternately fetches instructions from memory and executes them. Each instruction performs some simple task, such as:

- Add two numbers
- Store data to memory
- Read data from memory
- Logical "AND" two data words
- Branch to a different program

By stepping through a sequence of these commands, any desired function can be performed. The programs for various games are stored in Read-Only memories.

Maybe you are wondering how the processor knows which instruction to perform next. The answer is a 16-bit binary counter in the chip, called the program counter. Each time an instruction is read from

memory, the counter is incremented. In this way, the micro never gets lost, but proceeds sequentially through the memory. (The 6800 also has Jump and Branch instructions which can make it move forward or backward in the program more than one instruction. We will discuss these later when we talk about how the processor makes decisions.)

The keys to how the 6800, and any other micro, communicates with the outside world are the Address Bus and the Data Bus. In the 6800, the Address Bus is the set of 16 leads labeled A0 through A15. These, at any one time, contain a binary number from 0 to 65,535. That means the 6800 can recognize up to 65,536 different memory locations by putting out the number of the location it needs on the Address Bus. The 6800 also has another pin, Valid Memory Address (VMA), which acts like a strobe to indicate that the Address Bus contains good data.

The Data Bus is somewhat different. For one thing, it is bi-directional, which means that data travels in to the processor when it reads memory, and out of the processor when it writes memory, over the same wires. The R/W (read/write) line indicates which way the data is going at any time.

We keep talking about "memory," but it is obvious that processor-controlled games have to have more than just memories to be able to do anything that you can see or hear. The fact is that the 6800 communicates with switches, lights, sound generators, and what-have-you just as if those devices were locations in memory. All that is required is that each device have a unique address that selects only it when the processor reads or writes to it. Figure

* / denotes null set

2 shows a typical way that the MPU might be interfaced to a set of L. E. D.'s. When the address decode, "Lamps," is present with R/W and the $/2$ clock, the data on the Data Bus is latched into the 7475's. Wherever there is a high, the lamp will light and stay lit until the program rewrites that location with a low.

Another signal was mentioned in the above example, the $/2$ clock. In the 6800 processor, all data transfers are referenced to $/2$. Data coming from memory or peripheral switches, etc.) must be present during $/2$, and when the processor writes, the data being outputted is valid during $/2$. The $/1$ clock is also essential for the internal operation of the chip. Clock driver circuits rarely fail, but in any case the clocks must reach at least 4.7V for a high, and at least down to +.3V for a low, for reliable operation.

With the introduction you have now, we can proceed to the other control lines of the MPU:

RESET—Used to initialize the processor from a powered-down state. When Reset goes away, the MPU automatically reads the data in the two highest memory locations, FFFE and FFFF. (Throughout this series we will use "hexadecimal" and notation for data and addresses. This is simply a shorthand method of binary notation in which the bits are grouped by fours starting at the least significant, DO or AO, and assigned a digit corresponding to the 4-bit value. Hence, ??? is hex ?, 1000 hex 8, etc. The letters A through F are used for the patterns 1010 through 1111). This data is loaded into the Program Counter to provide the starting address for the program. In this way, the programmer can make the program start anywhere in memory by setting the values in FFFE and FFFF.

Halt—The Halt line is used to stop program execution. While Halt is low, the Address, Data, and R/W lines are in a high impedance state (that is, electrically disconnected). In this way, the Halt can be used to allow some other device to use the MPU's buses, or to single-step the program. The BA (Bus Available) is an acknowledged output that indicates that the MPU is halted.

TSC—The Three-State Control line is also used to electrically disconnect the buses from the MPU. However, it does not stop the program from running unless the /1 and /2 clocks are stopped.

BA—Bus Available is high when the processor is halted to indicate that the Address Bus is available for use by some other device.

DBE—Data Bus Enable is normally driven by the /2 clock to turn on the Data Bus of the MPU when a data transfer is taking place.

IRQ, NMI—Interrupt Request and Non-Maskable Interrupt are inputs which are used to synchronize the processor to external events. When one of these lines is pulled low, the MPU stops what it was doing and goes to a special program which is designed by the programmer to take care of whatever caused the interrupt. For example, an interrupt line could be tied into a coin circuit to start a game when coins are inserted. In this way, the processor can be doing something else most of the time and still respond to outside events as soon as they happen. The main difference between NMI and IRQ is that IRQ can be masked, or disabled, by programmed instructions, whereas NMI cannot. This allows more flexibility in designing systems which use interrupts to

control program execution.

With this background, now we can look in more detail at how systems are built using the 6800 and at some strategies which can be used to isolate faults when they occur.

So, let us turn away for a moment from the theory of micro systems, to the "how-to" of getting a handle on a system that is inoperative.

It's broken!

You are given a processor game to repair, with no documentation but the schematic and a manual on the game. Where to begin? We will assume the module is really at fault. First, do what you would for any failed board—check for burned or broken parts, shorts, dirty contacts and so on. Check the schematic for voltage regulators—are they working? If these tests do not turn up the problem, you will have to look closer.

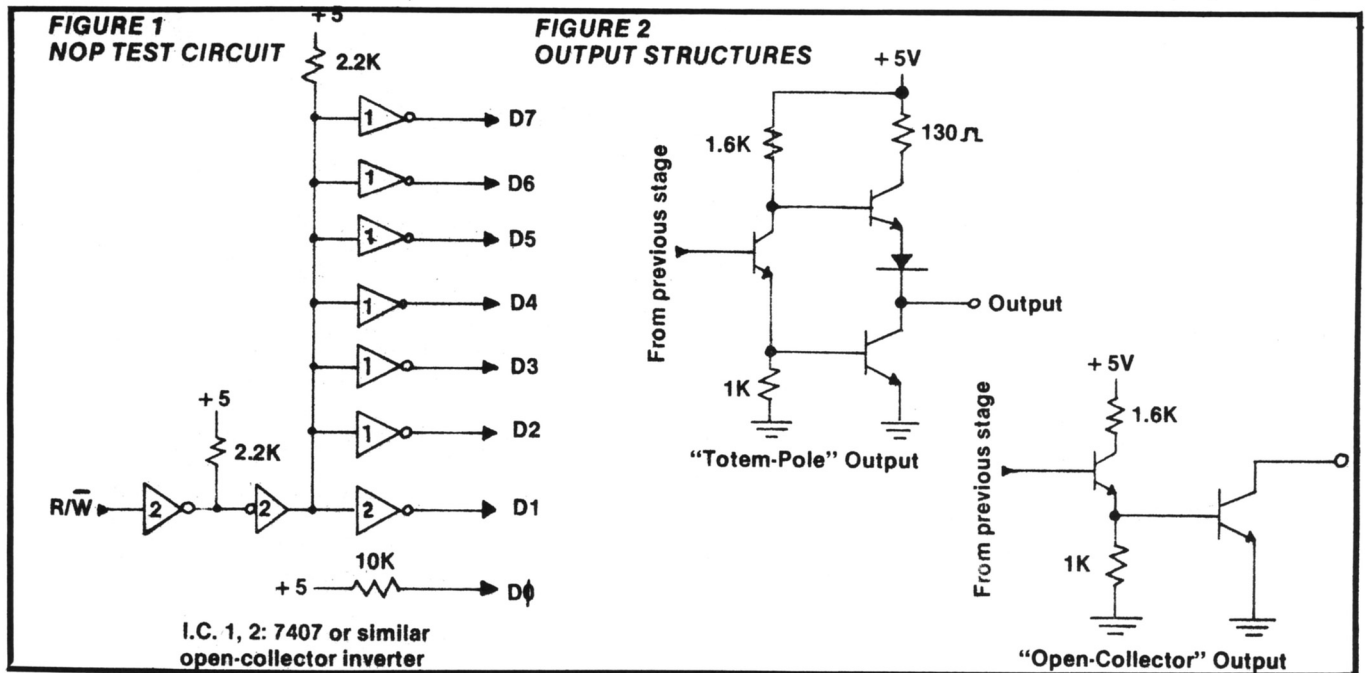
Is the game completely dead, or is the problem with just one part of it? Often, systems which are totally out of it are the easiest to fix. The ROM's are always a good place to start, if you have spares you can swap. If not, you are kind of stuck with a brute force approach—triggering your scope off the ROM's chip enable and looking for "funny" levels on the data lines. Remember, the MPU does not latch the data from memory until the trailing edge of /2 during the read cycle. But to work reliably, it has to be solid at least 100 ns before then. If the data is still "camping" up or down 100 ns before the /2 training edge, the MPU could read it one way one time, and another way the next time. The /1 and /2 clocks

are another thing to check in totally dead systems.

Check if the Halt line is grounded. This would hang up the system indefinitely—so would a low on the Reset input. Check the BA (Bus Available) output. During normal operation, it should be low. There are only two ways that BA can be raised: either Halt is grounded, or the MPU has executed a Wait instruction (Hex 3E). The MPU can exit from the waiting state only if it receives a Reset or an interrupt. If it misreads an instruction as a Wait, the system could hang up—so this could indicate there is a problem elsewhere. However, if the system uses one or both interrupts, this could be a valid condition. Ground the interrupt input to check if the MPU starts running again.

Figure 1 shows a quick-and-dirty test jig which might prove useful. The principle is to jimmy the circuit so that the processor repeatedly executes NOP instructions—a "do nothing" code used for testing and for "fill" in programs. The only thing the MPU does when it encounters this instruction is to read the next instruction. So by removing or disabling the ROM's from a system, and tying in this circuit, the MPU will encounter a NOP at every address. Hit the Reset and you can watch the Address Bus run through all 65,536 states in about 130 ms, for a 1MHz clock. This is handy to check not only the MPU, but also the address decoding circuitry on the board. Just be sure that the only device which can respond to a Read command is the test circuit. You can ensure that by disabling the enable line to the various devices on the board.

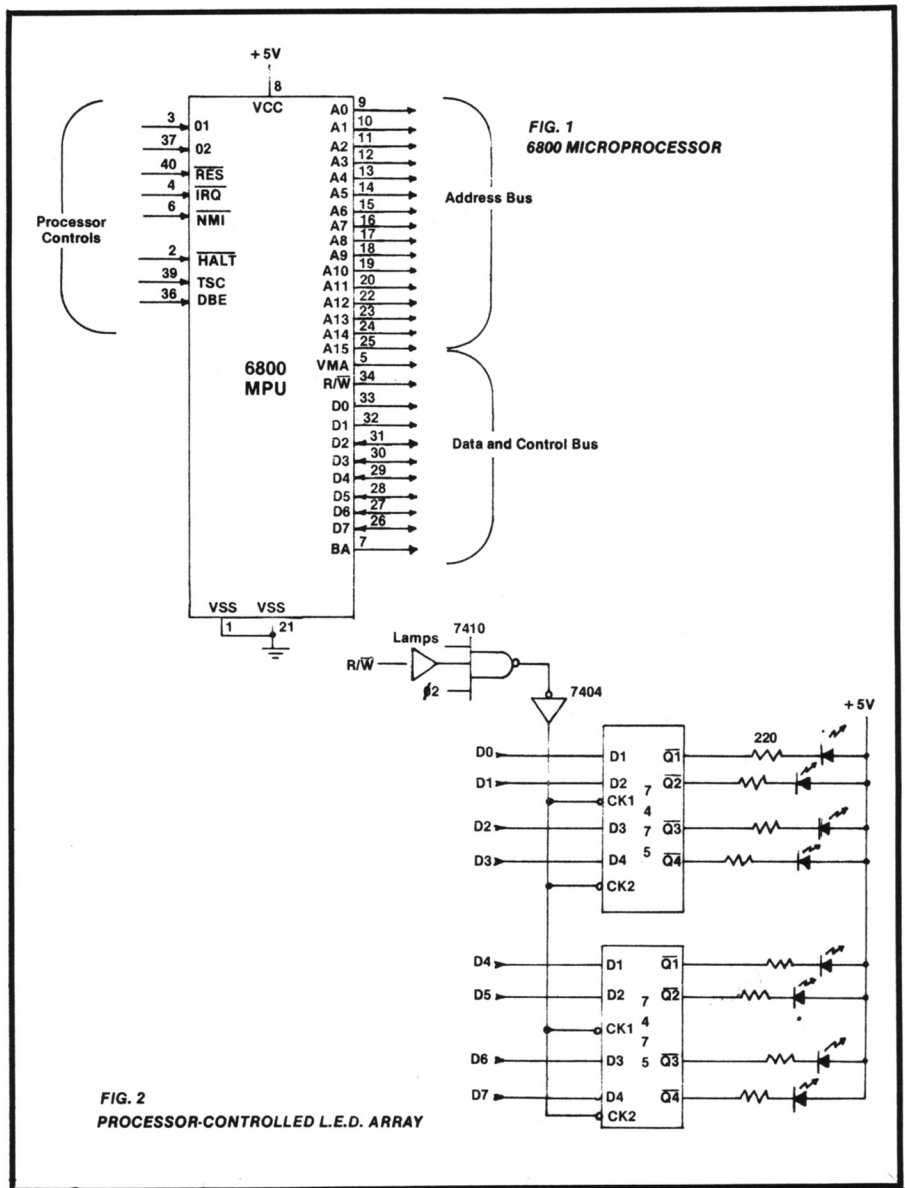
In the case where only a small part



of the game seems to be bad, you have to concentrate on the devices associated with it. Keep in mind that it is not too informative to look directly at the system buses—you will just see everything flying past. You need a sync point, and usually this becomes the address decode of a device. These are usually generated from the Address Bus, VMA, and sometimes /2. Make sure that whenever the output goes active, the inputs are valid. An address decoding circuit that responds to more than one code can place more than one device on the bus at a time, with unpredictable results. Of course, you are only interested in what happens during the VMA interval. When VMA is low, the Address Bus can have anything on it.

Let us say the processor has to sense a switch closure. You can check if it is getting onto the bus by triggering your scope off the enable signal, and looking at the bit on the Data Bus. When you operate the switch, you should see the bit moving.

If you have not worked on any processor type systems before, you may be confused by the way in which the outputs of many devices are tied together. This is made possible by the use of "Tri-State" outputs. Normal TTL (series 74, 74LS, 8800, etc) outputs have what is called a "totem pole" structure (see Fig.2). This refers to the two transistors stacked one on top of the other. When the output is high, the top transistor is on and is capable of supplying current into a load. When the output is low, the situation is reversed: the top transistor is off and the bottom one is on—so the output can "sink" or draw current from a load. Clearly, if you tie two of these outputs together, and they go to opposite states, you will have the transistor of the high output shorted to ground through the low output, resulting in (at least) a very hot I. C. Tri-State outputs avoid this situation by giving an additional logic control which turns off both transistors when the device is not active. In effect, the output pin is electrically disconnected from the chip. It presents a very high impedance to both ground and the supply. Hence, if all the outputs tied to a line are Tri-States, the line will actually float—there being nowhere for any charge on it to go. So before jumping to conclusions about such a circuit, make sure that somebody's output is turned on before assuming that the intermediate voltage you are seeing is the result of an output being "loaded down." Besides TTL, most CMOS (4000, 4500, 14000, etc.) parts also have a totem-pole output. However, some are Tri-State and



you should check the data book if you are confronted with an unfamiliar part. (Some TTL parts have "open collector" outputs—this means they resemble Fig. 2B. Such outputs need a load resistor connected to them to give a high output. These can also be tied together but differ from Tri-State in the need for the resistor, the lack of a separate logic control for the output, and generally higher "leakage" current into the output when it is turned off.)

Intermittant problems are certainly the worst you will come across. They can be especially aggravating with processors because you usually have no way of knowing exactly how the program is being disturbed. Here are some hints which may prove helpful: *Temperature Sensitivity*—Try heating the card with a hair dryer or heat gun. Remember that inside a cabinet, with the CRT's and power supplies, that the board will be a lot warmer than when it is sitting on the bench. *P.C. defects*—Try twisting and bending the card while it is running. This

will often show up a poor solder connection or a short.

Noise Hit—When the current is turned off through an inductive load, such as a relay, solenoid, or motor, a large voltage transient is generated. Check that these loads have some suppression across them, and if it is a reverse-biased diode, check that it is not open!

Coupled Noise—Cards which refuse to fail on the bench may be suffering from noise introduced through wiring in the cabinet. If possible, try testing the board in the cabinet. Check to see if wiring to inductive loads is bundled in the same harnesses as processor signals.

By now the micro games have probably lost some of their strangeness for you. Next issue, we will look at some details of actual game circuits and how they work.

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Signature II-- how it works and how it applies

Understanding its operation

ROMs, RAMs, CPU's, data buses, all have one thing in common—they are difficult for the average technician to troubleshoot. Kurz-Kasch, Electronic Division, developed the Signature II system to solve this problem.

Understanding how it works is essential before using the Signature II system.

Main Logic Unit

The main logic unit contains the power supplies; on-off switch, 5V power LED, hexadecimal readouts, gate LED, error LED, self test button, glitch switch, and hold switch (model A only).

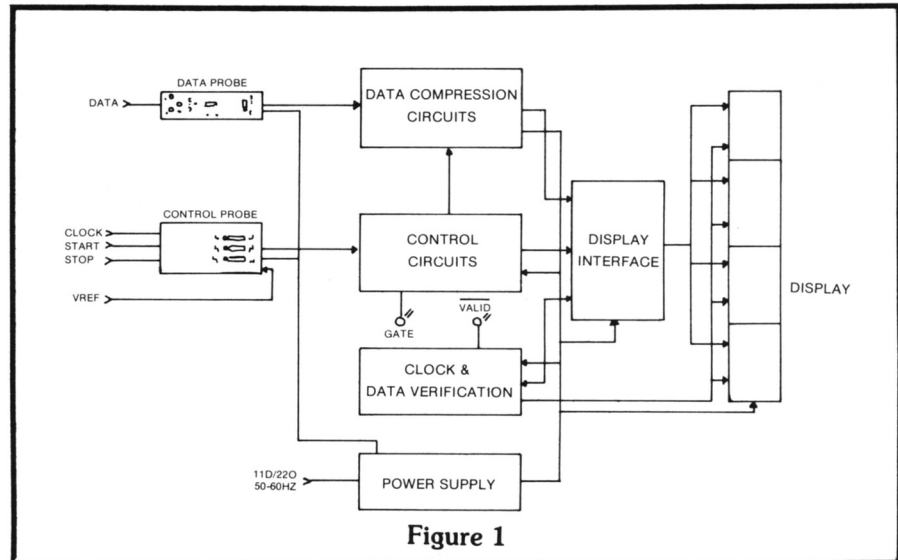
Let's assume the start/stop control allows 15 clock pulses to be accepted. (In reality the system can operate with from 1 to in excess of 1 megabits of clock).

These 15 clock pulses allow 15 data bits to be clocked into the compression circuits. The compression circuits only accept data between the start/stop pulses. This being the case it can be said that 1 data bit or as many as a megabit can be clocked in. These are compressed to 16 bits. These 16 bits are further compressed to 4 bits. The bits are used to address a decoder ROM. The ROM Data output is further decoded to give 4 four-bit hexadecimal words. The 4 words address a decoder ROM. The ROM Data output is further decoded to give 4 four-bit hexadecimal words. The 4 words have no significance as to the date words clocked in. In other words, no displayed word is the computer word or word the Signature II system saw.

The modified hexadecimal words used by the Signature II are: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, C, F, H, P, & U.

There are a couple of other circuits which are interesting. One is the Gate. The Gate circuit LED indicates that clock and start/stop pulses are valid.

The second circuit is the Data



Signature indications and what they can mean

A 0000 Signature at a logic node means a short to ground or a stuck at "0" device.

A VCC Signature at a logic node means a short to VCC or a stuck at "1" device.

Two address or data buses with the same but incorrect Signature indicates these two lines are shorted together.

Unstable Signature where they should be stable, could be improper start, stop, clock or ground connections. "Dirty" power supplies or ground loops can cause instability.

Whenever wrong Signatures or unstable ones are observed, recheck the 3 switches on the pod. They should be in the position indicated by the software.

Remember—"The least suspected error is probably the fault."

With the threshold switch in "Dual" mode absence of a pulse light on the probe indicates a faulty or tri-state mode if the Signature is other than 0000 or VCC.

FLOW CHARTS

These flow charts depict how trouble shooting is accomplished with the signature II on the Midway mother board, even to the point of telling which IC to replace. As you notice on chart II, the decision block refers to 8 data lines from the ROM. These are the only signatures that differ for games from *Gunfight* through *Bowling Alley*.

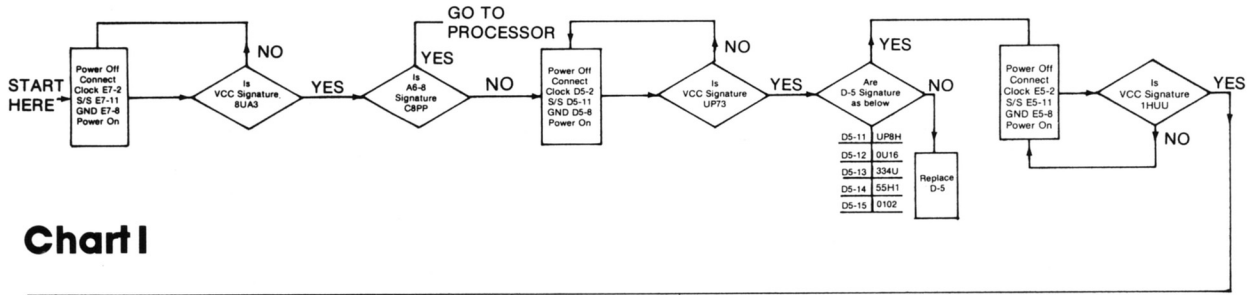
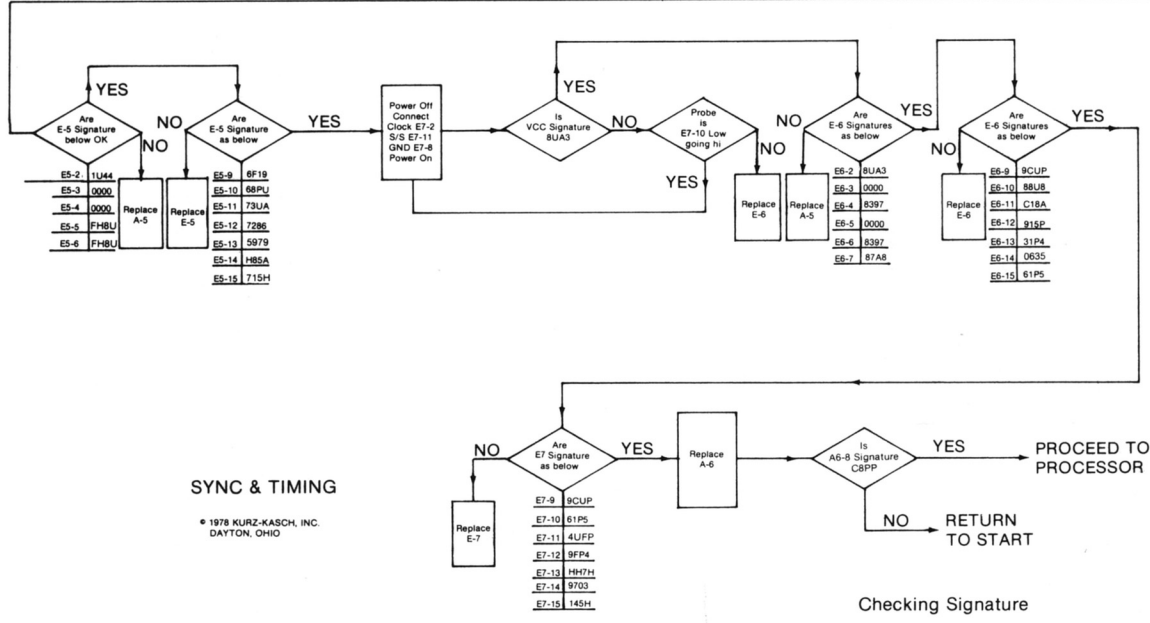
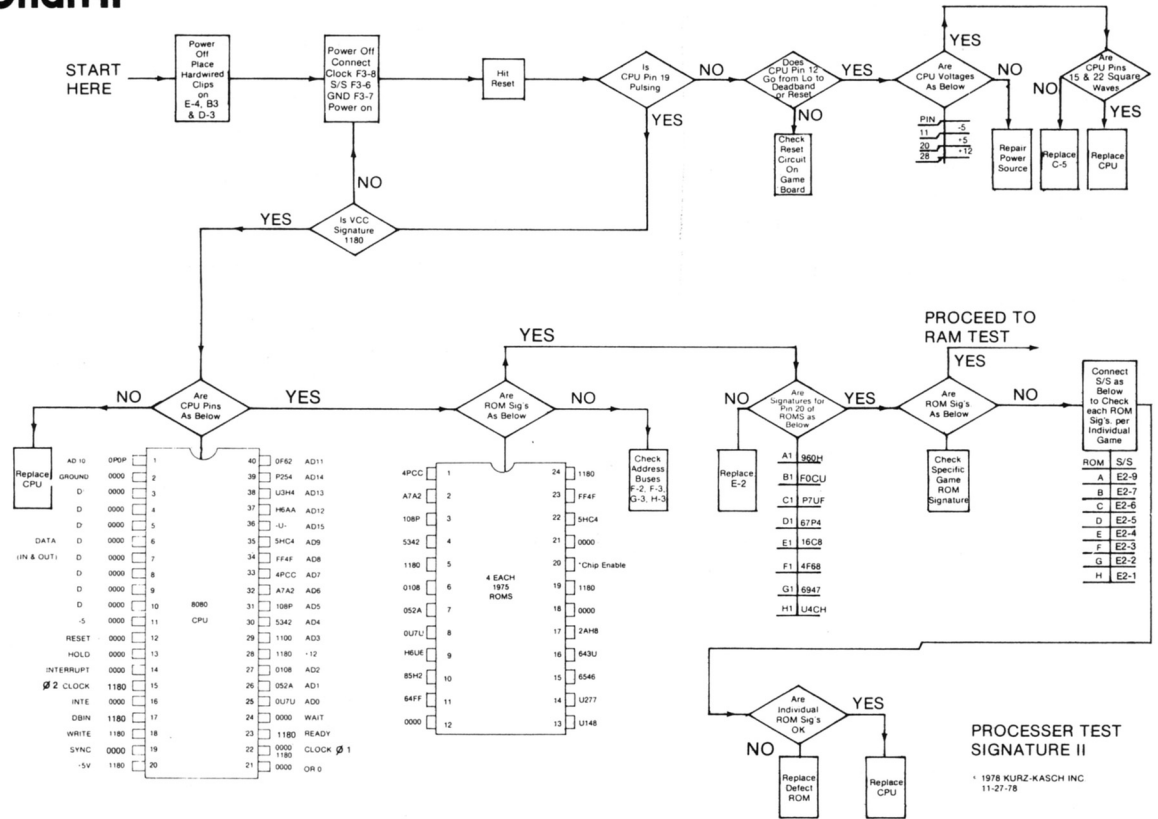


Chart I



SYNC & TIMING
© 1978 KURZ-KASCH, INC. DAYTON, OHIO

Chart II



PROCESSOR TEST SIGNATURE II
© 1978 KURZ-KASCH INC 11-27-78

Here are the instruction sets for the most popular CPU's:

CPU	D ₀	D ₁	D ₂	D ₃	D ₄	D ₅	D ₆	D ₇
6502	0	1	0	1	0	1	1	1
6800	1	0	0	0	0	0	0	0
Z-80	0	0	0	0	0	0	0	0
8080	0	0	0	0	0	0	0	0

Figure 2

Invalid. This is a bit more complicated, but easily understood. It works this way—When the stop pulse is received by the compression circuits, all activity within these circuits cease. The compressed data stream, now 4 bits in length, are stored in a RAM and at the same time they are decoded and displayed. When a new start pulse is received, the data system is again compressed until another stop pulse is received. At this time the same (or new words) are displayed and moved to storage. The first words and the last words are taken from storage and compared. If they are in any way different, the Invalid LED will flash. Remember that 1 data bit error will cause the 4 displayed words to be entirely different. When the glitch switch is activated a single or multiple bit error will cause the Invalid LED to remain on.

Control Probe

The control probe consists of 3 level detectors automatically toggling either TTL or MOS levels set by the "V REF" E-Z Hook or the internal 5V TTL levels.

Each of the 3 channels will accept pulses as fast as 20 NS.

Leading edge or trailing edge pulse selection located on the control probe, can be made by moving the appropriate selector switch for either start, stop or clock.

The "V REF" input is used to automatically set the reference level for C-MOS. If your C-MOS circuits

are operating from a VDD of say 10 volts, then the control probe reference levels are set to 10 volts internally. With "V REF" not connected, the system is automatically set for 5 volt, TTL or compatible C-MOS.

Data Probe

The data probe, which is a part of Signature II, is a 10 NS logic probe. This is a dual threshold probe—has memory (latch) and independent LEDS for "0", "1", & "P". All three LEDS work full time and display highs, lows, and pulses from DC to 100MZ. This is truly a 10 NS probe and can be used independently if the control probe ground is connected to logic ground.

The reset button on the probe is to reset the registers, latches and displays in the main logic unit to all zero's.

Duty cycle is displayed by the LEDS from DC to 100 MHZ. Duty cycle is the relative intensity of the "0" & "1" LEDS. Equal intensity is a 50% duty cycle. A "0" or "1" LED will begin to glow at a 20:1 duty cycle. You can see 10 NS pulses spaced 200 NS apart. At a 20:1 duty cycle one LED will be full brilliance and the other one will just begin to glow.

Self Test

To self test the Signature II, connect clock, start, stop and ground to the proper places on the logic board to be tested per software. NOTE: "Gate" LED must be on.

Touch data probe tip to ground—Signature II should read 0000. Touch data probe tip to VCC. Signature II should read the VCC notation on software of board to be tested. While touching VCC push "Test Button" and readout should be UUUU.

During all tests the Invalid LED should only flash on touch, unless the Signature is unstable or remain on if glitch switch is on.

If Signature II passes all the above tests you can be sure the system is working.

Processors (CPU)

If a CPU has an instruction forced into its data bus called a "NOP" (No operation) the CPU will become a 16 bit synchronous counter. (A synchronous counter or system is one in which the logic circuits change state only at certain instances determined by a common clock.) The 16 counter outputs are the address lines A0 through A15.

The instruction sets for the various CPU's will give the machine language for the NOP.

This NOP instruction causes the program counter (PC) to be advanced (incremented) 1 count each instruction fetch.

If a processor system were designed for Signature II the system would look something like Figure 3.

In computer terminology the largest numbered bus lines are the most significant i.e.: D7 is the most significant of D0 to D7, A15 is the most significant of the address lines A0 to A15.

As in Figure 3 we can cause a processor to "free-run" or to act as a 16-bit counter by use of an 8-pole double throw switch. The same results could be obtained by installing an IC socket in the data bus. A header could be inserted with either a wire feed through or a wired NOP instruction.

Unfortunately all bus oriented systems are not designed for Signature II systems. Let this not deter you. There are several ways to accomplish this task.

1. Data bus with bus drivers hardwired.
2. NOP test fixture.

Where tri-state bus drivers are used the data bus can be opened by forcing the enable input to the proper logic level.

For example a 74LS245 pin 19 is the "Enable G." This means that pin 19 must be low for the driver to operate. If pin 19 is taken high, then the data bus is effectively cut loose from the CPU.

A word of warning—no logic gate output can be tied high. The enable comes from some gate output. Since

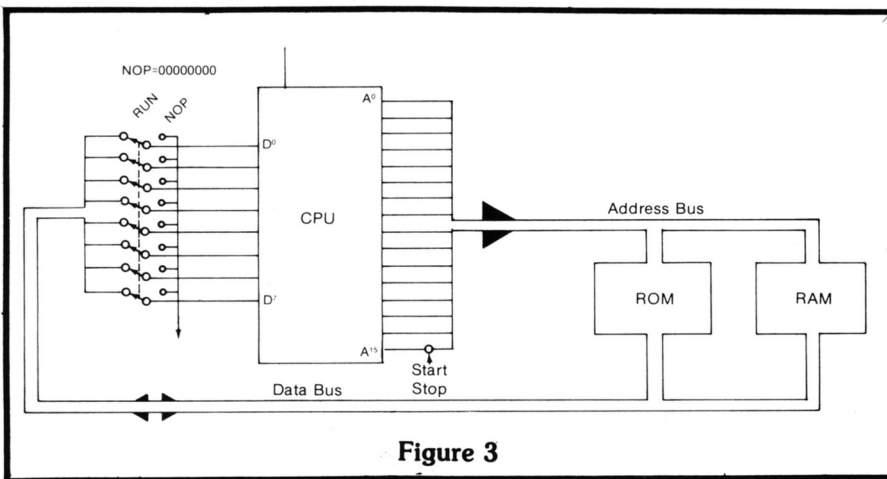


Figure 3

this input cannot be tied high, check the source of this logic level. The chances are good that there is an inverter feeding this enable line. If it is, then the inverter (or NAND/or NOR) input can be pulled low making the "Enable G" go high.

Once the buffer or bus driver has been forced to the isolation mode then a test clip such as the Kurz Kasch TC-590-89 or one of the AP Product "TC" series is placed on the bus driver or drivers and the CPU side of the bus can be hardwired for the proper NOP instruction.

Some of the common bus drivers (buffers) and their control inputs with the levels to cause isolation are:

IC	PIN	LEVEL
8T09	2,4,9,&12	1
8T26	15	0
8T28*	1 & 15	0
74LS245	19	1
8216	15	1

To hardwire the test clips for an 8216 pins 3, 6, 10, & 13 are connected together then connected to pin 8 (ground). This would give the NOP code for an 8080. (Of course two 8216's are used to obtain 8 drivers, necessitating two test clips be hardwired).

A word of warning—never power up a logic board with hardwired test clips on the drivers without the drivers forced to the isolation state.
Clock for CPU

We now know how to cause the CPU to become a counter and know to connect start/stop to the highest order address line. (Most significant bit of the CPU counter A-15.) Be sure to use the highest order address line that is used.

The clock to be used for the clock input to the Signature II is a bit more difficult to select.

The 8080 uses a 2 phase clock. Neither phase alone is suitable for the system clock. From the timing

diagrams for the 8080 we find the address bus and the data bus are both stable when / * (phase 1) and sync (pin 19 of the CPU) are both high. If we AND both / & sync we will have what we need. Some processor systems perform this AND function as the *system time base*. If it is not already done for you, an AND gate can be added to a NOP test fixture or a 74LS08 could be piggy-backed on an IC that has either / or sync as an input or output.

The 6800 CPU, pin 37, /2 is stable for the Signature II clock if the trailing edge of the clock is used.

For Z 80 use pin 21, RD, leading edge for clock and start/stop trailing edge for addresses.

The 6502 clock /2 is used as clock input to Signature II.

For other microprocessors consult the CPU timing diagrams or contact Kurz-Kasch.

Since the NOP (PC + 1) repetitively runs through all possible addresses, a signature from each address line can be obtained. These addresses will follow paths throughout the system. In other words, A12 signature at the processor can be traced with the data probe from the processor to its termination, including all branches. ROMS, RAMS, MUX, 10's, etc. can be tested both inputs and outputs as long as they are addressed by the CPU.

A known good board or system must be probed and VCC signature along with signatures at chosen points be recorded. All future checks on like boards or systems must produce the same signatures. A different signature is indicative of a failure node.

ROM tests

Once the processor is in the NOP condition the address bus starts with all address lines at "0" at reset. The 16 addresses count binarily to all "1's." Any ROM on the address bus will have all its addresses exercised repetitively. ROM data will be output

in a serial stream on each of the ROM data lines. A signature will be obtained for each data line and will be repeatable. Any deviation from the signature obtained from a good ROM indicates a defective device.

Chip enables, in multiple ROM banks are extremely useful in isolating which device is outputting bad data.

The system stable clock is used for Signature II clock. Start/Stop comes from the chip enable pin of the particular ROM you wish to check.

If the particular chip enable (CE) is an active low, that ROM will only output data during the time this input is low. If you visualize the CE waveform it becomes clear that the Signature II should begin to take data on the falling edge of this line and cease to accept data on the rising edge. Conversely, if the CE is an active high then select the rising edge for start and trailing edge for stop.

ROM signatures should be taken collectively (clock-system time base, start & stop on most significant address line used). Any one ROM which is defective will cause the collective signatures to be wrong. Should this occur then individual ROM signatures, using CE as start/stop, previously recorded from a good system will pinpoint which device is defective.

RAM tests

These are the most difficult devices to test in any system. Software must be developed which will write into the RAM a pattern of 0s and 1s and read out this pattern as a signature. A ROM with a RAM exercise pattern on the address and instruction bus must be developed.

There are several RAM cell test patterns, the best being an individual preference. Kurz-Kasch will assist you in developing a RAM test if you should desire.

The start/stop and clock inputs to the Signature II are generally the same ones used for the ROM test. KK PROM part #0500021 is used with Z80 & 8080 Systems.

* /is to be read as "null set."

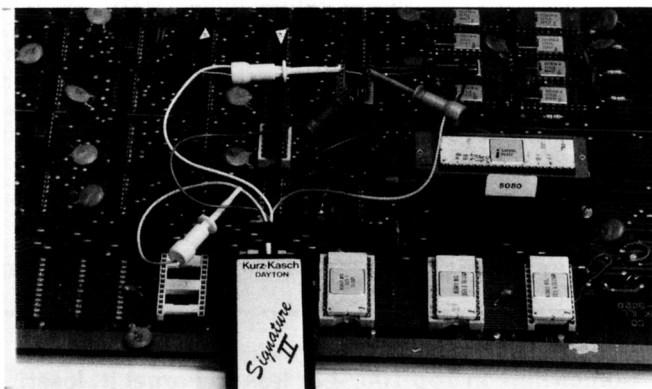


Figure 4

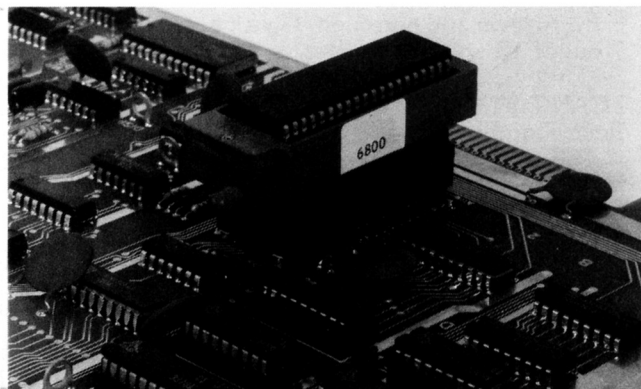
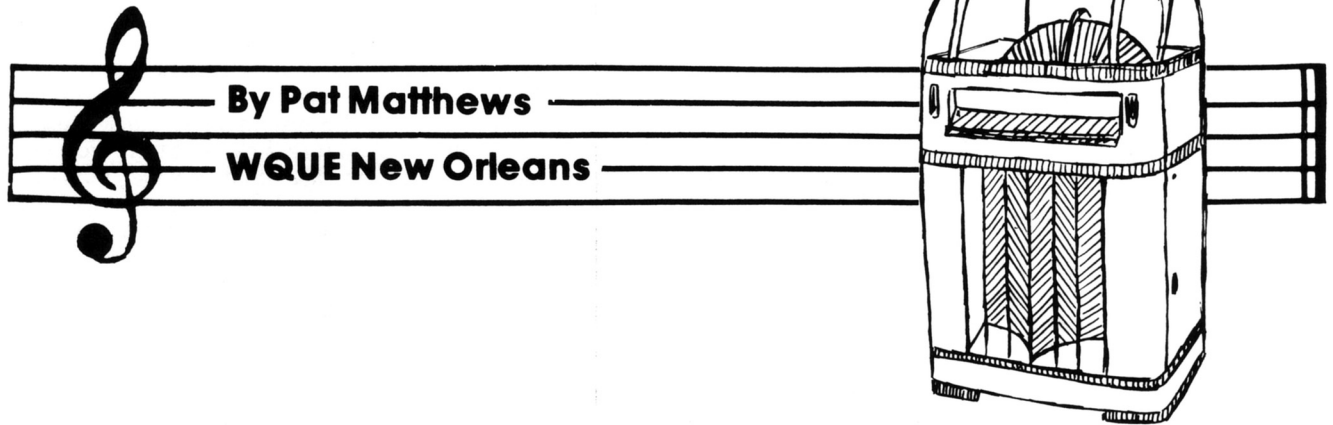


Figure 5



Top of the Crop

In an attempt to improve my batting average, I've once again selected the cream of the new crop of product which hopefully will rise to the top, or darn near close to it. Furthermore, the famous fabulous fortuitous PLAY METER Top 25 returns this issue. So let's get on with it.

LOCAL GIRLS—Graham Parker—Arista AS 0420

Leaving behind all remnants of hot pink vinyl, yet salvaging the Rumour in the process, Mr. Parker has changed labels and currently has one of the country's top long-players. "Squeezin' Our Sparks" is the title of the album and this particular cut has been deemed its most requested single by astute programmers in radio land. It's hard to describe this band any other way than: "they're the kings of the old New Wave." It's rock n' roll, but not quite punk. This one is just what the title would indicate—a not so flattering account of a select group of the feminine gender found in every town and burrough. Give it a 7 out of 10 and see ya later.

I CAN'T STAND IT NO MORE—Peter Frampton→A&M 2148-S

Though grammatically incorrect, the song won't go wrong in your music machines. It's been a long time for Peter since the highly unsuccessful "I'm In you" LP. But maybe

that unpleasant experience is just what it takes for some people to get things back into proper musical perspective. Peter returns to shine in every aspect of this number. He plays, sings, co-produces, and writes. The song is very danceable and the guitar work by Mr. Frampton is some of his slickest to date. Should do a 9 out of 10 or better.

SUPER SWEET—Wardell Piper—Midsong International MI 1005

Before you listen to this one, see if you can get a hold of the LP, just to check out the cover. Strange, huh? This particular tune is already a boogie success at discos around the 50 states. The lyrical content is fairly banal (... "your love is 'Super Sweet,' it really knocks me off my feet"). But what it loses through cliché, it makes up for in sheer grind-it-out gutsy energy. Sounds a lot like Rufus when Chaka (all right!) was warblin' for 'em. Should make a niche. Give it a 7 out of 10.

UP ON THE ROOF—James Taylor—Columbia 3-11005

I don't know why such an accomplished songwriter would continue to rely so heavily on such dated stuff. Come on, Jim! "It's worked before so let's do 'em one better" is getting to be your formula for success. Now if you think from the tone of this I don't care for the record

you're wrong. What JT has here is a "You've Got A Friend" revisited. In addition to the fact that Carole King penned both tunes and James Taylor arranged and recorded them, they seem so hauntingly similar, you'll just have to listen to them both and compare. Or, better yet, take my word for it. "Up On The Roof" is from the new Columbia release entitled *Flag*, is produced by Peter Asher, and gets a 9 out of 10 with the sky as the limit.

ONE WAY OR ANOTHER—Blondie—Chrysalis CHS 2336

"Heart of Glass" was a surprising success in this reviewer's eyes. And this new single is more representative of the Parallel Lines LP than "Heart of Glass." This is pure rock n' roll, no disco. You hear that? NO DISCO!! Deborah Harry seems to be attempting to make her group the Jefferson Airplane/Starship of the 1980's. On this tune there are lyrics for suburbia—"I'm gonna meet you at the supermarket check-out"—and she belts it out in true Ethel Merman fashion. If you liked "Heart of Glass," you'll despise this one. But, on the other hand, if you like "Blondie," you'll love it. Try an 8 out of 10 and see what happens.

CRYING—Instant Funk—Salsoul S7 2088

Penned and produced by Bunny

The records are rated as follows: 10 out of 10 = Top 10 peak; 9 out of 10 = Top 20 peak; 8 out of 10 = Top 30 peak; 7 out of 10 = Top 40 peak; 5 or 6 out of 10 = Somewhere in Top 100; 4 or less = Forget it, loser, break in half.

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SERVICE & DEPENDABILITY SINCE 1940

PLAY METER TOP 25

1. **HOT STUFF**—Donna Summer—Casablanca
2. **LOVE YOU INSIDE OUT**—Bee Gees—RSO
3. **THE LOGICAL SONG**—Peaches & Herb—Polydor
5. **DISCO NIGHTS**—GQ—Arista
6. **YOU TAKE MY BREATH AWAY**—Rex Smith—Columbia
7. **WE ARE FAMILY**—Sister Sledge—Cotillion
8. **DEEPER THAN THE NIGHT**—Olivia Newton John—MCA
9. **GOOD NIGHT TONIGHT**—Wings—Columbia
10. **JUST WHEN I NEEDED YOU MOST**—
Randy Van Warmer—Bearsville
11. **LOVE IS THE ANSWER**—England Dan &
John Ford Coley—Big Tree
12. **AIN'T LOVE A BITCH**—Rod Stewart—Warner Brothers
13. **ROCK AND ROLL FANTASY**—Bad Company—Swan Song
14. **MAKIN' IT**—David Naughton—RSO
15. **SHE BELIEVES IN ME**—Kenny Rogers—United Artists
16. **LOVE TAKES TIME**—Orleans—Infinity
17. **CHUCK E'S IN LOVE**—Rickie Lee Jones—Warner Brothers
18. **RENEGADE**—STYX—A&M
19. **GET USED TO IT**—Roger Voudouris—Warner Brothers
20. **BLOW AWAY**—George Harrison—Dark Horse
21. **A LITTLE BIT OF SOAP**—Nigel Olsson—Epic***
22. **MINUTE BY MINUTE**—Doobie Brothers—Warner Brothers
23. **IN THE NAVY**—Village People—Casablanca
24. **HONESTY**—Billy Joel—Columbia
25. **I WANT YOU TO WANT ME**—Cheap Trick—Epic

***Reviewed by *PLAY METER*

Sigler, it's Instant Funk, the prides of suburban Philadelphia, with their minds made up to try their hands at the pop charts one more time. This time around it's more of a Philadelphia sound, and that should insure success. Synthesizer and clear, crisp background vocals are weaved around a moaning lead vocal. It's very up tempo, which means it's a dancer's delight, and the only "Crying" Instant Funk's going to be doing is all the way to the bank. Bank on an 8 out of 10.

CAN'T STAND LOSING YOU— Police—A&M 2147-S

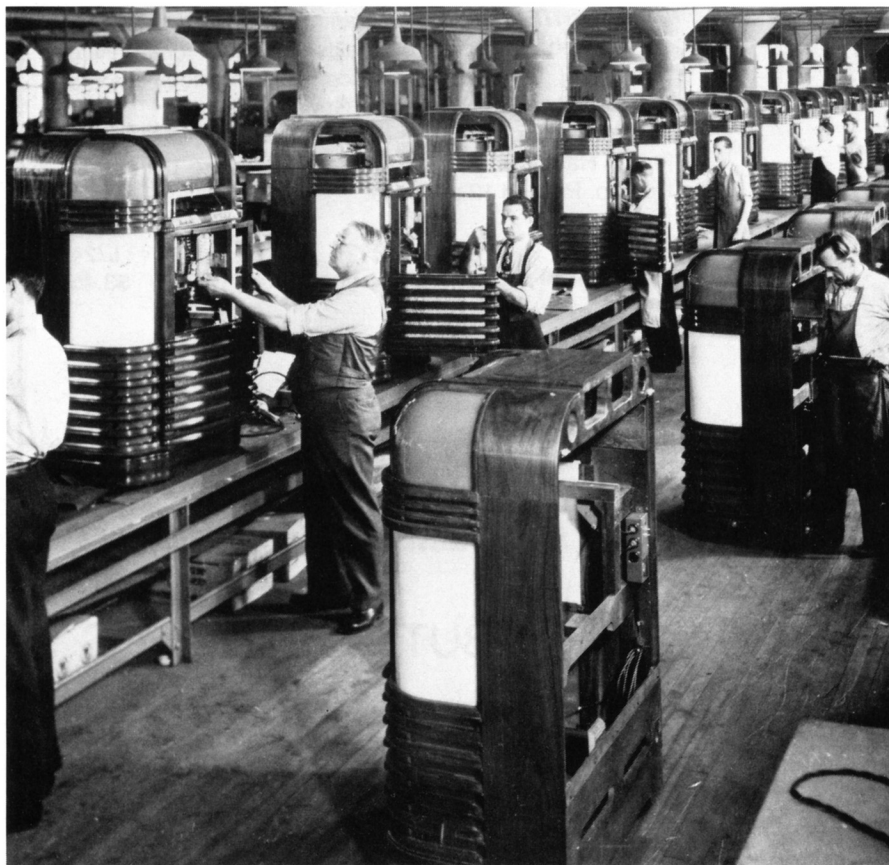
Here's a group that has made its American debut tour travelling all across this great land of ours in a station wagon. They've launched their careers in less than high fashion and are suddenly instant success! Their first single, a tender punk ballad, titled "Roxanne," hit home with some people and got an unexpected amount of radio airplay. This time around it's a bizarre combination of reggae and rock with punk lyrical content ("You sent all my records back, all scratched/You'll be sorry when I'm dead and all this guilt will be on your head"). It's kind of a neat song. Maybe there's a method to their madness. I deem it a 7 out of 10 or higher, officer.

PEOPLE OF THE SOUTH WIND— Kansas—portrait ZS8 4284

We mentioned in June's *PLAY METER* Update that the Disco in the title of Electric Light Orchestra's new LP, *Discovery*, was purely coincidental. Well, willy nilly, some people are programming their new single, "Shine A Little Love" as a Disco tune! What does this have to do with Kansas? ELO's latest sound has got to be interpreted as uncharacteristic, and, similarly, Kansas has done that, too! Except Kansas sounds more like the real ELO than ELO does. Okay? In the process, Kansas has accumulated what has to be their best group of tunes on this freshly released *Monolith* LP and culled a GREAT song from it as their new single. Positively fabulous vocals, musicianship and production. Should be an immediate smash. Just like ELO. 10 out of 10.

WORTH A LISTEN

DO IT OR DIE—Atlanta Rhythm Section—Polydor
LIGHT MY FIRE—Amii Stewart—Ariola
H. A. P. P. Y. RADIO—Edwin Starr—20th Century Fox
GO WEST—Village People—Casablanca



A look into the past at the Rock-Ola phonograph assembly line.

ELTON JOHN

MCA-13921

**SPECIAL
EDITION!**



*"Mama Can't Buy
You Love"*

*The
Thom Bell
Sessions*

Arranged, Conducted and Produced by Thom Bell

MCA RECORDS

© 1978 MCA Records, Inc.

Play Meter Pop Singles Chart

June 16 1979	June 2 1979	Weeks on chart			
• 1	REUNITED—PEACHES & HERB—Polydor 14547	6	12	38	HOT NUMBER—FOXY—Dash 5050 (TKI) 42 10
2	SHAKE YOUR BODY (DOWN)—THE JACKSONS—Epic 50656	3	14	39	I WILL SURVIVE—GLORIA GAYNOR—Polydor 14508 25 21
3	KNOCK ON WOOD—AMII STEWART—Ariola 7736	1	19	• 40	BOOGIE WONDERLAND—EARTH, WIND & FIRE & THE EMOTIONS—ARC 10956 (Col.) 60 3
4	I WANT YOUR LOVE—CHIC—Atlantic 3557	5	17	• 41	BAD GIRLS—DONNA SUMMER—Casablanca 988 65 3
5	I GOT MY MIND MADE UP—INSTANT FUNK—Salsoul 2078 (RCA)	9	14	42	SHAKE YOUR GROOVE THING—PEACHES & HERB—Polydor 14514 26 23
• 6	LOVE TAKES TIME—ORLEANS—Infinity 50006 (MCA)	16	10	43	TAKE ME HOME—CHER—Casablanca 965 13 14
• 7	LOVE YOU INSIDE OUT—THE BEE GEES—RSO 925	18	8	44	BLOW AWAY—GEORGE HARRISON—Dark Horse 8763 (W.B.) 11 14
• 8	HOT STUFF—DONNA SUMMER—Casablanca 978	19	8	45	BUSTIN' LOOSE—CHUCK BROWN & SOUL SEARCHERS—Source 40967 (MCA) 39 14
• 9	LOVE IS THE ANSWER—ENGLAND DAN & JOHN FORD COLEY—Big Tree 16131 (Atlantic)	20	8	46	HEAVEN KNOWS—DONNA SUMMER—Casablanca 959 41 21
• 10	SHE BELIEVES IN ME—KENNY ROGERS—United Artists 1273	21	8	47	GET USED TO IT—ROGER VOUDOURIS—Warner Bros. 8762 56 6
• 11	DISCO NIGHTS (ROCK FREAK)—G.O.—Arista 0388	22	8	• 48	LITTLE BIT OF SOAP—NIGEL OLSSON—Bang 4800 (CBS) 61 3
• 12	DEEPER THAN THE NIGHT—OLIVIA NEWTON JOHN—MCA 41009	23	8	• 49	DANCE THE NIGHT AWAY—VAN HALEN—Warner Bros. 8823 62 3
• 13	JUST WHEN I NEEDED YOU MOST—RANDY VAN WARMER—Bearsville 0334 (W.B.)	24	8	• 50	SHADOWS IN THE MOONLIGHT—ANNE MURRAY—Capitol 4716 66 3
• 14	THE LOGICAL SONG—SUPERTRAMP—A&M 2128	28	8	• 51	SAY MAYBE—NEIL DIAMOND—Columbia 10945 64 3
15	HEART OF GLASS—BLONDIE—Chrysalis 2295	4	14	• 52	ONE WAY OR ANOTHER—BLONDIE—Chrysalis 2336 67 3
16	STUMBLIN' IN—QUATRO & NORMAN—RSO 917	2	14	• 53	GOLD—JOHN STEWART—RSO 931 68 3
• 17	WE ARE FAMILY—SISTER SLEDGE—Cotillion 44251 (Atlantic)	32	6	• 54	DOES YOUR MOTHER KNOW—ABBA—Atlantic 3574 70 3
• 18	AIN'T LOVE A BITCH—ROD STEWART—Warner Bros. 8810	31	6	55	DANCIN' FOOL—FRANK ZAPPA—Zappa 10 (Mercury) 63 3
19	LOVE BALLAD—GEORGE BENSON—Warner Bros. 8759	15	12	56	MUSIC BOX DANCER—FRANK MILLS—Polydor 14517 8 14
20	GOODNIGHT TONIGHT—WINGS—Columbia 10939	14	10	57	LADY—LITTLE RIVER BAND—Capitol 4667 27 19
21	OLD TIME ROCK 'N' ROLL—BOB SEGER—Capitol 4702	29	8	• 58	SHINE A LITTLE LOVE—ELECTRIC LIGHT ORCHESTRA—Jet 5057 (CBS) 74 3
22	ROCK & ROLL FANTASY—BAD COMPANY—Swan Song 70119 (Atlantic)	30	8	• 59	IT MUST BE LOVE—ALTON MCCLAIN & DESTINY—Polydor 14523 75 3
• 23	HONESTY—BILLY JOEL—Columbia 10959	33	6	60	SHAKEDOWN CRUISE—JAY FERGUSON—Asylum 46041 69 3
• 24	BOOGIE WOOGIE DANCIN' SHOES—CLAUDJA BARRY—Chrysalis 2313	34	6	• 61	RING MY BELL—ANITA WARD—Juana 3422 (TKI) 1
• 25	MINUTE BY MINUTE—THE DOOBIE BROS.—Warner Bros. 8828	40	3	• 62	AIN'T NO STOPPIN' US NOW—MCFADDEN & WHITEHEAD—Phila. Int'l. 3681 (CBS) - 1
• 26	WHEN YOUR IN LOVE WITH A BEAUTIFUL WOMAN—DR. HOOK—Capitol 4705	36	6	• 63	I CAN'T STAND IT NO MORE—PETER FRAMPTON—A&M 2148 - 1
• 27	I WANT YOU TO WANT ME—CHEAP TRICK—Epic 50680	37	6	• 64	DO IT OR DIE—ATLANTA RHYTHM SECTION—Polydor 14568 - 1
• 28	RENEGADE—STYX—A&M 2110	38	10	• 65	IS SHE REALLY GOING OUT WITH HIM—JOE JACKSON—A&M 2132 - 1
29	WHAT A FOOL BELIEVES—THE DOOBIE BROS.—Warner Brothers 8725	7	19	• 66	MARRIED MAN—BONNIE TYLER—RCA 11630 - 1
30	HE'S THE GREATEST DANCER—SISTER SLEDGE—Cotillion 44245 (Atlantic)	10	14	• 67	UP ON THE ROOF—JAMES TAYLOR—Columbia 11005 - 1
31	IN THE NAVY—THE VILLAGE PEOPLE—Casablanca 973	12	14	68	GEORGY PORGY—TOTO—Columbia 10944 71 3
32	DANCER—GINO SOCCIO—RFC/W.B. 8757	35	6	69	DON'T EVER WANNA LOSE YOU—NEW ENGLAND—Infinity 50013 (MCA) 72 3
• 33	MAKIN' IT—DAVID NAUGHTON—RSO 916	44	6	70	STAR LOVE—CHERYL LYNN—Columbia 10907 73 3
• 34	IF LOVING YOU IS WRONG—BARBARA MANDRELL—MCA 12451	45	6	71	MAMA CAN'T BUY YOU LOVE—ELTON JOHN—MCA 41042 - 1
• 35	GOOD TIMIN'—THE BEACH BOYS—Caribou 9029 (CBS)	46	6	72	GO WEST—THE VILLAGE PEOPLE—Casablanca 984 - 1
• 36	CHUCK E'S IN LOVE—RICKIE LEE JONES—Warner Bros. 8825	47	6	73	DAYS GONE DOWN—GERRY RAFFERTY—United Artists 1298 - 1
• 37	YOU TAKE MY BREATH AWAY—REX SMITH—Columbia 10908	48	6	74	WEEKEND—WET WILLIE—Epic 50714 - 1
				75	MARRIED MAN—BETTE MIDLER—Atlantic 3582 - 1

Bonnie Tyler

Does It Better With
"Married Men"!

PB 11630



Who Did It First?
Who Does It Best?
Why Settle For A Copy
When You Can Have The Original?



Play Meter Country Singles Chart

June 16 1979	June 2 1979	Weeks on chart		
1	IF I SAID YOU HAD A BEAUTIFUL BODY— THE BELLAMY BROS.—W.B./Curb 8790	8	10	
2	WHERE DO I PUT HER MEMORY—CHARLEY PRIDE—RCA 11477	4	14	
3	DON'T TAKE IT AWAY—CONWAY TWITTY—MCA 41002	6	14	
4	SWEET MEMORIES—WILLIE NELSON—RCA 11465	7	14	
5	DOWN ON THE RIO GRANDE—JOHNNY RODRIGUEZ—Epic 50671	11	14	
6	LYING IN LOVE AGAIN—BROWN & CORNELIUS—RCA 11532	13	10	
7	LAY DOWN BESIDE ME—DON WILLIAMS—MCA 12458	14	12	
8	SAIL AWAY—THE OAK RIDGE BOYS—MCA 12463	19	10	
9	SHE BELIEVES IN ME—KENNY ROGERS—United Artists 1273	22	8	
10	WHEN I DREAM—CRYSTAL GAYLE—United Artists 1288	23	8	
11	IF LOVING YOU IS WRONG—BARBARA MANDRELL—MCA 12451	2	19	
12	FAREWELL PARTY—GENE WATSON—Capitol 4680	1	14	
13	BACKSIDE OF THIRTY—JOHN CONLEE—MCA 12455	3	14	
14	ALL I EVER NEED IS YOU—ROGERS & WEST— United Artists 1276	9	17	
15	HOW TO BE A COUNTRY STAR— THE STATLER BROS.—Mercury 55057	20	10	
16	I'M THE SINGER—TANYA TUCKER—MCA 41005	21	10	
17	RED BANDANA—MERLE HAGGARD—MCA 41007	33	8	
18	SEPTEMBER SONG—WILLIE NELSON—Columbia 10929	35	8	
19	AMANDA—WAYLON JENNINGS—RCA 11596	43	3	
20	NOBODY LIKES SAD SONGS—RONNIE MILSAP—RCA 11553	42	6	
21	IF I GIVE MY HEART TO YOU— MARGO SMITH—Warner Bros. 8806	44	3	
22	MY MAMA NEVER HEARD ME SING— BILLY "CRASH" CRADDOCK—Capitol 4707	39	6	
23	JUST LIKE REAL PEOPLE—THE KENDALLS—Ovation 1125	40	6	
24	WHAT A LIE—SAMMI SMITH—Cyclone 100 (GRT)	29	14	
25	THE GAMBLER—KENNY ROGERS—United Artists 1250	25	33	
26	SECOND HAND SATIN LADY—JERRY REED—RCA 11472	27	14	
27	JUST LONG ENOUGH TO SAY GOODBYE— MICKY GILLEY—Epic 50672	28	12	
28	I WILL SURVIVE—BILLE JO SPEARS—United Artists 1292	41	6	
29	SOLITAIRE/ARE YOU SINCERE—ELVIS PRESLEY—RCA 11533	49	8	
30	ME & MY BROKEN HEART—REX ALLEN, JR.—Warner Bros. 8786	36	8	
31	SLOW DANCING—JOHNNY DUNCAN—Columbia 10915	10	14	
32	I'LL LOVE AWAY YOUR TROUBLES—JANIE FRICKE—Columbia 10910	24	14	
33	ISN'T IT ALWAYS LOVE—LYNN ANDERSON—Columbia 10909	26	14	
34	IT'S A CHEATIN' SITUATION—MOE BANDY—Columbia 10889	15	19	
35	SOMEONE IS LOOKING—GAIL DAVIES—Lifesong 1784 (CBS)	17	14	
36	MUSIC BOX DANCER—FRANK MILLS—Polydor 14517	5	14	
37	I DON'T LIE—JOE STAMPLEY—Epic 50694	54	6	
38	YOU FEEL GOOD ALL OVER—T.G. SHEPPARD—WB/Curb 8808	56	6	
39	TWO STEPS FORWARD—SUSIE ALLANSON—Elektra/Curb 46036	55	6	
40	ROCKIN' MY LIFE AWAY—JERRY LEE LEWIS—Elektra 46030	57	6	
41	IF LOVE HAD A FACE—RAZZY BAILEY—RCA 11536	53	6	
42	WHAT IN HER WORLD DID I DO—EDDY ARNOLD—RCA 11537	52	8	
43	THEY CALL IT MAKING LOVE—TAMMY WYNETTE—Epic 50661	16	19	
44	YOU'VE GOT SOMEBODY—VERN GOSDIN—Elektra 46021	50	10	
45	YOU'RE THE ONLY ONE—DOLLY PARTON—RCA 11577	65	3	
46	SHADOWS IN THE MOONLIGHT—ANNE MURRAY—Capitol 4716	63	3	
47	(GHOST) RIDERS IN THE SKY—JOHNNY CASH—Columbia 10961	64	3	
48	YOU CAN HAVE HER—JONES & PAYCHECK—Epic 50708	66	3	
49	STEADY AS THE RAIN—STELLA PARTON—Elektra 46029	59	6	
50	SWEET MELINDA—RANDY BARLOW—Republic 039	58	6	
51	I CAN'T FEEL YOU ANYMORE—LORETTA LYNN—MCA 41021	61	3	
52	SPANISH EYES—CHARLIE RICH—Epic 50701	62	3	
53	TO LOVE SOMEBODY—HANK WILLIAMS, JR.—Elektra 46029	60	8	
54	I JUST FALL IN LOVE AGAIN—ANNE MURRAY—Capitol 4675	18	19	
55	NEXT BEST FEELING—MARY K. MILLER—RCA 11554	32	12	
56	GOLDEN TEARS—DAVE & SUGAR—RCA 11427	45	19	
57	DARLIN'—DAVID ROGERS—Republic 038	31	14	
58	PLAY TOGETHER AGAIN—BUCK OWENS—Warner Bros. 8830	70	3	
59	SINCE I FELL FOR YOU—CON HUNLEY—Warner Bros. 8812	71	3	
60	SAVE THE LAST DANCE—EMMYLOU HARRIS—Warner Bros. 8815	-	1	
61	NADINE—FREDDY WELLER—Columbia 10973	-	1	
62	NO ONE ELSE IN THE WORLD—TAMMY WYNETTE—Epic 50722	-	1	
63	SUSPICIONS—EDDIE RABBITT—Elektra 46035	-	1	
64	BARSTOOL MOUNTAIN—MOE BANDY—Columbia 10974	-	1	
65	WHEN A LOVE AIN'T RIGHT—CHARLY MCCLAIN—Epic 50706	67	3	
66	SIMPLE LITTLE WORDS—CHRISTY LANE—LS 172 (GRT)	68	3	
67	I'LL NEVER LET YOU DOWN— TOMMY OVERSTREET—Elektra 46023	69	3	
68	THERE IS A MIRACLE IN YOU—TOM T. HALL—RCA 11568	72	3	
69	BREAKIN' IN A BRAND NEW BROKEN HEART— DEBBY BOONE—WB/Curb 8814	73	3	
70	WORLD'S MOST PERFECT WOMAN— RONNIE MCDOWELL—Epic 50696	74	3	
71	DOWN TO EARTH WOMAN—KENNY DALE—Capitol 4704	75	3	
72	TILL I GAIN CONTROL AGAIN—BOBBY BARE—Columbia 10998	-	1	
73	FAMILY TRADITION—HANK WILLIAMS, JR.—Elektra 46046	-	1	
74	(TOUCH ME) I'LL BE YOUR FOOL—BIG AL DOWNING— Warner Brothers 8787	-	1	
75	WHO WAS THE MAN WHO PUT THE LINE IN GASOLINE JERRY REED—RCA 11638	-	1	

DOUBLE HEADERS

**CHIC
"GOOD TIMES" #3584**

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**BETTE MIDLER
"MARRIED MEN" #3582**

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THE WINNING TEAM ON ATLANTIC RECORDS



Play Meter R&B Singles Chart

June 16 1979	June 2 1979	Weeks on chart			
1	REUNITED—PEACHES & HERB—Polydor 14547	1	12		
• 2	DISCO NIGHTS (ROCK FREAK)—G.Q.—Arista 0388	3	14		
3	KNOCK ON WOOD—AMII STEWART—Ariola 7736	2	19		
• 4	HOT NUMBER—FOXY—Dash 5050 (TK)	8	14		
5	IN THE MOOD—TYRONE DAVIS—Columbia 10904	6	14		
• 6	SHAKE YOUR BODY (DOWN)—THE JACKSONS—Epic 50656	9	19		
• 7	IT MUST BE LOVE—ALTON MCCLEIN & DESTINY—Polydor 14532	14	14		
8	STAR LOVE—CHERYL LYNN—Columbia 10907	11	14		
• 9	GOOD GOOD FEELIN'—WAR—MCA 40995	17	8		
• 10	I WANNA BE WITH YOU—THE ISLEY BROS.—T Neck 2270 (CBS)	20	8		
• 11	LOVE YOU INSIDE OUT—THE BEE GEES—RSD 925	21	8		
• 12	DANCER—GINO SOCCIO—RFC/WB 8757	22	10		
• 13	YOU CAN'T CHANGE THAT—RAYDIO—Arista 0399	23	10		
• 14	DANCE WITH YOU—CARRIE LUCAS—Solar 11482 (RCA)	24	8		
15	ANY FOOL COULD SEE— BARRY WHITE—Unlimited Gold 1401 (CBS)	16	8		
16	I DON'T WANT NOBODY ELSE— NARADA MICHAEL WALDEN—Atlantic 3541	18	14		
17	I (WHO HAVE NOTHING)—SYLVESTER—Fantasy 855	19	10		
• 18	AIN'T NO STOPPIN' US NOW—MCFADDEN & WHITEHEAD— Phila. Int'l. 3681 (CBS)	28	8		
• 19	WE ARE FAMILY—SISTER SLEDGE—Cotillion 44251 (Atlantic)	29	5		
• 20	HOT STUFF—DONNA SUMMER—Casablanca 978	30	5		
21	SATURDAY NIGHT—T CONNECTION—Dash 5051 (TK)	27	8		
22	I WANT YOUR LOVE—CHIC—Atlantic 3557	4	17		
23	IN THE NAVY—THE VILLAGE PEOPLE—Casablanca 973	7	14		
24	CROSSWINDS—PEABO BRYSON—Capitol 4694	31	8		
• 25	FEEL THAT YOUR FEELING—MAZE—Capitol 4686	36	14		
• 26	BUSTIN' OUT—RICK JAMES—Gordy 7167 (Motown)	42	6		
• 27	ANYBODY WANNA PARTY—GLORIA GAYNOR—Polydor 14558	43	6		
• 28	NIGHT DANCIN'—TAKA BOOM—Ariola 7748	44	6		
29	I GOT MY MIND MADE UP— INSTANT FUNK—Salsoul 2078 (RCA)	10	19		
30	SATURDAY NIGHT, SUNDAY MORNING— THELMA HOUSTON—Motown 54297	39	8		
31	OH HONEY—DELEGATION—Shadybrook 1048	15	21		
32	AT MIDNIGHT—T CONNECTION—Dash 5048 (TK)	12	17		
33	LOVE BALLAD—GEORGE BENSON—Warner Bros. 8759	5	14		
• 34	LET ME BE GOOD TO YOU—LOU RAWLS—Phila. Int'l. 3684 (CBS)	45	6		
• 35	RING MY BELL—ANITA WARD—Juana 3422 (TK)	52	3		
• 36	BOOGIE WONDERLAND—EARTH, WIND & FIRE & THE EMOTIONS—ARC 10956 (Col.)	53	3		
37	HE'S THE GREATEST DANCER— SISTER SLEDGE—Cotillion 44245 (Atlantic)	25	17		
38	I WILL SURVIVE—GLORIA GAYNOR—Polydor 14508	26	21		
39	TAKE ME HOME—CHER—Casablanca 965	13	14		
40	(EVERYBODY) GET DANCIN'—THE BOMBERS—West End 1215	49	10		
• 41	MUSIC BOX—EVELYN "CHAMPAGNE" KING—RCA 11586	55	3		
• 42	IF YOU WANT IT—NITEFLYTE—Ariola 7747	57	3		
• 43	DON'T GIVE IT UP—LINDA CLIFFORD—Curton 927 (RSO)	54	3		
• 44	SHAKE—THE GAP BAND—Mercury 74053	56	3		
45	SUPERMAN—HERBIE MANN—Atlantic 3547	51	10		
• 46	I'M A SUCKER FOR YOUR LOVE— TENNA MARIE—Gordy 7169 (Motown)	59	3		
• 47	THIS TIME I'LL BE SWEETER—ANGELA BOFILL—GRP/Arista 2500	60	8		
• 48	YOU GONNA MAKE ME LOVE SOMEBODY ELSE— JONES GIRLS—Phila. Int'l. 3680 (CBS)	68	3		
• 49	BOOGIE WOOGIE DANCIN' SHOES— CLAUDJA BARRY—Chrysalis 2313	72	3		
50	YOU'RE A FOXY LADY— GRAHAM CENTRAL STATION—Warner Bros. 8816	58	3		
• 51	BAD GIRL—DONNA SUMMER—Casablanca 988		1		
• 52	TURN OFF THE LIGHTS—TEDDY PENDERGRASS— Phila. Int'l. 3696 (CBS)		1		
53	LIVIN' IT UP—BELL & JAMES—A&M 2069	38	19		
54	IT'S ALRIGHT WITH ME—PATTI LABELLE—Epic 50659	34	14		
55	STRAIGHT TO THE BANK—BILL SUMMERS— Prestige 768 (Fantasy)	61	8		
56	NEVER CHANGE LOVERS—MILLIE JACKSON—Spring 192 (Polydor)	62	8		
57	KEEP ON DANCIN'—GARY'S GANG—Sam 10884 (CBS)	48	19		
58	BUSTIN' LOOSE—CHUCK BROWN & SOUL SEARCHERS—Source 40967 (MCA)	46	23		
59	LOVE & DESIRE—ARPEGGIO—Polydor 14535	35	14		
60	JAM FAN—BOOTSYS'S RUBBERBAND—Warner Bros. 8818	66	3		
61	LOST IN LOVING YOU—THE MCCRARYS—Portrait 70028 (CBS)	67	3		
62	DO YOU WANNA GO PARTY—KC & THE SUNSHINE BAND—TK 1033	69	3		
63	READY OR NOT—HERBIE HANCOCK—Columbia 10936	71	3		
64	I CAN TELL—CHANSON—Ariola 7743	73	6		
65	RAISE YOUR HANDS—BRICK—Bang 4802 (CBS)	74	6		
66	DOUBLE CROSS—1ST CHOICE—Gold Mine 4019 (Salsoul)	75	6		
67	CAN'T SHAKE THE FEELING—THE BECK FAMILY— LeJoint 34003 (London)	70	3		
68	WHEN YOU WAKE UP TOMORROW—CANDI STATON— Warner Brothers 8821		1		
69	WHAT 'CHA GONNA DO WITH MY LOVING— STEPHANIE MILLS—20th Century 2403 (RCA)		1		
70	IT'S TOO FUNKY IN HERE—JAMES BROWN—Polydor 14557		1		
71	CHASE ME—CON FUNK SHUN—Mercury 74059		1		
72	EYEBALLIN'—HEATWAVE—Epic 50699		1		
73	SAY WON'T 'CHA—CHOCOLATE MILK—RCA 11547		1		
74	FIRST TIME AROUND—SKY—Salsoul 2087 (RCA)		1		
75	CAN'T SAY GOODBYE—BOBBY CALDWELL—Clouds 15 (TK)		1		

MAKE YOUR BOX TOPS!

G-7165F	Apollo	"Astro Disco"
G-7166F	High Inergy	"Shoulda Gone Dancin' "
G-7167F	Rick James	"Bustin' Out"
G-7168F	Switch	"Best Beat In Town"
G-7169F	Teena Marie	"I'm A Sucker For Your Love"
M-1458F	Bloodstone	"Don't Stop"
M-1459F	Bonnie Pointer	"Heaven Must Have Sent You"
M-1460F	Billy Preston & Syreeta	"Go For It" / "With You I'm Born Again"
M-1461F	Mandre	"Spirit Groove"
M-1462F	Diana Ross	"The Boss"
T-5497F	Thelma Houston	"Saturday Night, Sunday Morning"
T-5499F	Tata Vega	"I Just Keep Thinking About You Baby"
T-54301F	Smokey Robinson	"Get Ready"
M9-1455F	Various	"Pops, We Love You"

With Motown



Consensus

Pop Play Meter

- 1 SHAKE YOUR BODY (DOWN) - THE JACKSONS - Epic 50656
- 2 STUMBLIN' IN - QUATRO & NORMAN - RSO 917
- 3 KNOCK ON WOOD - AMII STEWART - Ariola 7736
- 4 WHAT A FOOL BELIEVES - THE DOOBIE BROS. - Warner Bros. 8725
- 5 LOVE TAKES TIME - ORLEANS - Infinity 50006 (MCA)
- 6 BLOW AWAY - GEORGE HARRISON - Dark Horse 8763 (W.B.)
- 7 CRAZY LOVE - POCO - MCA 12439
- 8 MUSIC BOX DANCER - FRANK MILLS - Polydor 14517
- 9 SULTANS OF SWING - DIRE STRAITS - Warner Bros. 8736
- 10 IN THE NAVY - THE VILLAGE PEOPLE - Casablanca 973
- 11 HEART OF GLASS - BLONDIE - Chrysalis 2235
- 12 REUNITED - PEACHES & HERB - Polydor 14547
- 13 BOOGIE WOOGIE DANCIN' SHOES - CLAUDJA BARRY - Chrysalis 2313
- 14 LOVE YOU INSIDE OUT - THE BEE GEES - RSO 925
- 15 JUST WHEN I NEEDED YOU MOST - RANDY VAN WARMER - Bearsville 0334 (W.B.)

Country Play Meter

- 1 I JUST FALL IN LOVE AGAIN - ANNE MURRAY - Capitol 4675
- 2 IF LOVING YOU IS WRONG - BARBARA MANDRELL - MCA 12451
- 3 IT'S A CHEATIN' SITUATION - MOE BANDY - Columbia 10889
- 4 GOLDEN TEARS - DAVE & SUGAR - RCA 11427
- 5 WHERE DO I PUT HER MEMORY - CHARLEY PRIDE - RCA 11477
- 6 WALKING PIECE OF HEAVEN - FREDDY FENDER - MCA 12454
- 7 MUSIC BOX DANCER - FRANK MILLS - Polydor 14517
- 8 IF I SAID YOU HAD - THE BELLAMY BROS. - W.B./Curb 8790
- 9 SWEET MEMORIES - WILLIE NELSON - RCA 11465
- 10 SAIL AWAY - THE OAK RIDGE BOYS - MCA 12463
- 11 THE GAMBLER - KENNY ROGERS - United Artists 1250
- 12 SHE BELIEVES IN ME - KENNY ROGERS - United Artists 1273
- 13 WISDOM OF A FOOL - JACKY WARD - Mercury 55055
- 14 ALL I EVER NEED IS YOU - ROGERS & WEST - United Artists 1276
- 15 BACKSIDE OF THIRTY - JOHN CONLEE - MCA 12451

R&B Play Meter

- 1 SHAKE YOUR GROOVE THING - PEACHES & HERB - Polydor 14514
- 2 SHAKE YOUR BODY (DOWN) - THE JACKSONS - Epic 50656
- 3 KNOCK ON WOOD - AMII STEWART - Ariola 7736
- 4 I WILL SURVIVE - GLORIA GAYNOR - Polydor 14508
- 5 I GOT MY MIND MADE UP - INSTANT FUNK - Salsoul 2078 (RCA)
- 6 I WANT YOUR LOVE - CHIC - Atlantic 3557
- 7 HE'S THE GREATEST DANCER - SISTER SLEDGE - Cotillion 44245 (Atlantic)
- 8 REUNITED - PEACHES & HERB - Polydor 14547
- 9 LOVE BALLAD - GEORGE BENSON - Warner Bros. 8759
- 10 HEAVEN KNOWS - DONNA SUMMER - Casablanca 959
- 11 IN THE MOOD - TYRONE DAVIS - Columbia 10904
- 12 LIVIN' IT UP - BELL & JAMES - A&M 2069
- 13 WHAT YOU WON'T DO FOR LOVE - BOBBY CALDWELL - Clouds 11 (TK)
- 14 HOT NUMBER - FOXY - Dash 5050 (TK)
- 15 IT MUST BE LOVE - ALTON MCCLAIN & DESTINY - Polydor 14532

Pop Looking Ahead

- 1 HEAD FIRST - THE BABYS - Chrysalis 2323
- 2 HEART OF THE NIGHT - POCO - MCA 41023
- 3 YOU CAN'T CHANGE THAT - RAYDIO - Arista 0399
- 4 PEOPLE OF THE SOUTH WIND - KANSAS - Kirshner 4284 (CBS)
- 5 LEAD ME ON - MAXINE NIGHTINGALE - Windsong 11530 (RCA)
- 6 DANCE AWAY - ROXY MUSIC - Atco 7100
- 7 I WAS MADE FOR LOVING YOU - KISS - Casablanca 983
- 8 VENGEANCE - CARLY SIMON - Elektra 46051
- 9 LOVE COMES TO EVERYONE - GEORGE HARRISON - Dark Horse 8844 (W.B.)
- 10 (YOU REALLY) ROCK ME - NICK GILDER - Chrysalis 2332

R&B Looking Ahead

- 1 GO WEST - THE VILLAGE PEOPLE - Casablanca 984
- 2 MARRIED MAN - BONNIE TYLER - RCA 11630
- 3 MARRIED MAN - BETTE MIDLER - Atlantic 3582
- 4 AIN'T NOBODY LIKE YOU - RUFUS - MCA 41025
- 5 WASN'T IT GOOD - CHER - Casablanca 987

Country Looking Ahead

- 1 I MIGHT BE AWHILE IN NEW ORLEANS - JOHNNY RUSSELL - Mercury 55060
- 2 RUNAWAY HEART - REBA MCENTIRE - Mercury 55058
- 3 DELLA & THE DEALER - HOYT AXTON - Jeremiah 1000
- 4 WASN'T IT EASY BABY - FREDDIE HART - Capitol 4721
- 5 PICK THE WILDWOOD FLOWER - GENE WATSON - Capitol 4723



1979-80 World Foosball Tour

ONE SOCCER TABLE DOMINATES THE WORLD.

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With that in mind, Tournament Soccer is proud to announce the 1979-1980 Million Dollar World Tour.

TOURNAMENT SOCCER

—More Promotions —More Players —More Table Revenue

Critic Cornered

(Is it humanly impossible to be unbiased?)

Dear Roger:

I have read your comments at the end of your column in the March, 1979 PLAY METER. I am one of those who have expressed an opinion that as a game designer you should no longer review pinball machines. I appreciate your commitment not to review your own games. However, no game stands in a marketplace by itself. Therefore, the review of any game competing with one designed by you affects your game. As much as I know you would want to be unbiased, I doubt that this is humanly possible.

I would also think, and hope, that you would have some loyalty to the company for which you would be designing. Even though another manufacturer's game might not compete with a game designed by you, it could conflict with someone else's design manufactured by your company. In this situation, also, I feel it would be humanly impossible to be unbiased.

I am sure that you could do much more for our industry by concentrating on game design. I would think a great deal more than by reviewing games. I believe you will do neither the industry nor yourself justice by trying to wear the two hats of designer and reviewer.

Gary Stern
President
Stern Electronics, Inc.

Dear Gary,

My initial reaction to what you've written and implied is that I'm troubled by any attempt to limit me to a single function in the coin-machine industry and pinball in particular.

Since 1974, when I first became involved with this crazy business, I ventured forth as a writer doing stories for *Gentlemen's Quarterly* and *The New York Times*. This role amplified with the undertaking of my book, *Pinball!* Rapidly, I found myself getting more and more embroiled with the survival and perpetuation of the industry by testifying in court cases in New York City and Ohio.

I spent increasingly more time with pinball, writing for all the major trade journals; but suspected conflicts of interest limited my contributions, although I still would gladly do something for everyone.

My attention to the pinball industry has led to a rather specialized and unique placement in the business for which I have been grateful. It has always been gratifying to know that I can go from one company's engineering and design room to another, seeing all the newest developments, and know that everyone trusted me not only for my input, but also for the secrecy I had avowed. It is a position that I treasure always, for I know it is something that no one else has ever had.

I never saw the conflict in making suggestions for certain features on games, whether it be at Stern or Williams or Bally or Gottlieb. Also, I never saw the harm of helping the undertaking of a tournament by one major manufacturer while simultaneously doing a promotional piece for his competitor. In so doing, I became far more sensitive to the subtle differences and personalities of all the companies—probably more than anyone else.

When Ralph Lally first presented the idea of a "Critic's Corner" to me some two and a half years ago, I took it

on, even though, at the time, it wasn't regarded by many to be in my best interests. It was then, as now, an avid interest, and not a desire to enhance my own image, that led me through the task.

I make no denial of my profession as a writer, having four books on the market now with three more (not pinball related) due soon. I also continue a career as managing editor of *Gentlemen's Quarterly*. However, I would be the first to claim that these pursuits have proven not to be even fractionally as satisfying as my involvement with the pinball industry.

One thing you say disturbs me. It has to do with the notion of loyalty which I might or might not have to any particular manufacturer. Let me pose an example in answer. Does it make me any less loyal to be taken into confidence by, say, you, your father, and Steve when *Pinball!* was being produced and *Stingray* was still in the whitewood stage? Were my advice and comments any less valid when you knew that I still had access to other companies and knew what they were doing? It didn't diminish my enthusiasm for your pieces, nor did it lessen my degree of objectivity when I visited Bally or Williams and was also trusted inside their "inner sanctums." Additionally, my effort with *Game Plan* and the resulting game *Sharpshooter* isn't an isolated case of my going into something and then turning my back on it.

You point to a conflict with competitors of those that I might do designs for. But I'd like to think that every game does indeed stand on its own merits. If *Trident* and *Hot Hand* are, in fact, remarkably good games, which I think they are, they will get their play in the market in spite of being up against the likes of *Flash*, *Superman*, *Pinball Pool*, *Star Trek*, or even *Sharpshooter*. Good equipment finds its place, and, increasingly, it's not so much who is making the game that decides its success, but whether the piece is a good one.

You should know this better than anyone. Look how far Stern has come. Forgotten are the ties with Chicago Coin. You have blazed your own trails and are fully accepted by an industry that needs succeedingly great thinking and innovative design.

I'd like to think, at this stage, that I can do something for everyone, whether it be through design, promotion, legal counsel, or just helpful advice. All anyone need do is ask.

As for the future, I don't know. I'd like to maximize my varied talents and background to really make a lasting mark on the industry. The book was just a first step and more, assuredly, will follow, such as my involvement with getting legislation through in New York City.

Interestingly, in the embryonic stages of this business everyone was doing something for everyone else. Harry Williams had games coming out with Bally or Pamco, and others followed suit. Can that sort of industry companionship still happen today?

For the present, I must remain where I am, trying to positively influence the growth and expansion of the industry as a whole.

If, indeed, Stern can ask for a coming together of the industry leaders, and Jules Millman can venture forth the idea of a truly *total* industry pinball tournament, is not my combined role just as feasible?

Roger C. Sharpe
Correspondent
PLAY METER



By Roger C. Sharpe

Four hot pingames for the summer swelter

This time around, the first games of the summer season are making their appearances as, seemingly, the manufacturers are gearing up for one of the busier times of the year. Talk surrounds the continued success of *Flash*, the final availability of *Superman*, and rumors of the upcoming wide-body, full-size (whatever you want to call them) pingames from almost everyone.

In all honesty, there are a slew of strong games on the market that are going to have to have their own space. Those locations cramped for space are just going to have to adjust to the idea that what's new is definitely better than what has been done previously.

There are some technological breakthroughs that I find extremely exciting and have recounted some of them in past columns, such as Stern's *Trident* with its resetting bonus multiplier drop targets. This month, yet another machine shows a variation on the theme of drop target action, Gottlieb's newest model, *Pinball Pool*.

Also in the mainstream is an increased emphasis on cosmetics. Almost every new game has its own "strobe-like" effect on the field, a la *Flash*. *Superman* and *Star Trek* (Bally's newest), feature this visual excitement as well as Williams' exciting wide-body *Stellar Wars*.

Sound also continues to play an

impressive part of the pinball action and almost everyone is coming up with their own tunes and auditory adjuncts to what is happening on the playfield.

And when it comes to the field, one need only look as far as Stern's newest signature model, *Hot Hand*, to see that the gimmick is back in full force and getting lots of attention.

It's all there and more as every company tries to outdo and overdo the other. The result is that the player and operator are benefiting from as wide an array of equipment as one would hope to ask for.

Once again, however, this writer cannot stress enough the need on everyone's part to judge each piece that is coming his way. There's something for everyone and all it takes is the understanding of your playing and paying public to know what it's going to take to bring another winner into your location. So choose wisely and look closely before you leap. Admittedly, you can't go too wrong no matter what you choose. And next month's selection brings even more glad tidings from the major producers who continually try to stimulate and titillate your every pinball whim and desire.

Just a word about Game Plan's *Sharpshooter*, which hits the marketplace sometime near the beginning of next month. A few words will be

offered next time around, and then I'll open the forum to your reaction and rating of this personal effort. One thing though: thanks for the reaction so far to the game from those who have been so positive about its potential.

But on to the new pieces. Four games that offer a bit of this and a bit of that as well as some timeless play.

Stern's HOT HAND

I have to lead with this model from Stern because it is so special. Right before your eyes by the left flipper is the unmistakable signature of the legendary one—that great master of the art of pinball design—Harry Williams. What a pleasing sight for these eyes. Once again, welcome back and may you stay forever.

PLAYFIELD: An unconventional top begins the action on *Hot Hand*. There's a rollover button and ten contact-sensitive "cups," as well as a large revolving super-size "flipper" that begins the card motif. At the right are two targets. At the left is a short spinner access back to the top as well as a side target. Three heart-embossed thumper bumpers come next before moving down to a very wide open playfield that is flanked by a short kick-back kicker on the left and a bank of five drop targets on the right.

Move down and there are two more targets on the right and an

Roger's Ratings At-A-Glance

Stern's HOT HAND	####	Bally's STAR TREK	###1/2
Williams' STELLAR WARS	####	Gottlieb's PINBALL POOL	###3/4

indent on the left before getting to the conventional wire lane and flipper set up.

ANALYSIS: The beauty of *Hot Hand* is its built-in scoring potential, which increases from ball to ball. A familiar system that hasn't been employed in a while but resurfaces here, is the old bingo-like grid that houses the cards of *Hot Hand*: four suits and five cards each, ace to ten, for a maximum of twenty cards.

The idea of the game? Easy! Just fill out the grid and light the joker for the super bonus. Two of a kind means 2X bonus; three of a kind means 3X bonus; four of a kind means 4X; and a full deck gets 5X and a top of 100,000 out-hole bonus points. Obviously, scoring punch is there, and then some.

Simply stated, the play happens on the sides and on top with the unique action of a constantly revolving big flipper moving a rolling ball from cup to cup. Land in the cup and the ball activates whatever the value is, from tens to kings. The secret, however, is to get the aces from the drop targets (the only place to get them) and to change the suits by either rebounding off the bottom kickers, hitting the left side thumper bumper, going over the top red rollover button, or sweeping through the spinner.

It's a matter of timing and skill to get it all working, and skill shots abound. Hit an ace of spades and the side kick-back kicker becomes an on-again, off-again extra ball possibility, while the various targets around the field, as well as lanes, increase in value according to the bonus multiplier.

It takes time to understand and really get into *Hot Hand*, but interest never wanes, even when you think you've won over the machine, and that's a nice Harry Williams touch that comes shining through.

GRAPHICS: One of the most popular themes throughout the history of pinball has been cards; and here, larger than life, is a royal flush with chips and swirls of color that may seem dated, but actually stand out from the similar futuristic themes that abound today. The colors, although muted, are distinctive and eye-catching, but it's that big revolving "flipper" that really draws the players in and keeps them playing.

PLAY: *Hot Hand* looks as if it is designed to be a three-ball game, although the sustained play of the extra two balls shouldn't hurt the action, even though it will affect the limits since the potential is great once the deck has been completed and values on the board have been quantumly increased.

On three-ball, for extra ball areas,

go with a 220,000 start, followed by 450,000 and 650,000. On free play, you'll probably want to increase this by about 100,000 points on each limit, depending on how the players are hitting it. With five-ball, you can even get away with another 100,000 points to each limit—after all, complete the deck twice and you're talking about a 200,000 point ball minimum.

RATING: ####

Williams' STELLAR WARS

When you've come up with a *Flash*, what do you do for an encore in a wide-body? Simple. You come out with a *Stellar Wars*, which has almost everything there is to have on a game, and more.

PLAYFIELD: Start with four lanes, which offer a bonus multiplier build-up similar to *Flash*. Another wrinkle is a left side access down to the field for those who just pull back the plunger without considering the consequences. A spinner fronts this access point with three thumper bumpers, making up an action-filled top with a right side three drop target bank.

On the left side *Stellar Wars* borrows a bit from both *Phoenix* and *Flash* with a captive ball ramp and a deep, recessed kick-out hole. Also on the left is yet another bank of three drop targets, while in the center is an angled four drop target bank.

The right side has a spinner lane for getting back to the top; and, for lateral movement at the bottom of the field, there are two thumper bumpers placed fairly close to the bottom set that will be very familiar to you who have played *Superman*.

The bottom has two lanes down to the flippers on either side as well as plenty of metal for the wire form.

ANALYSIS: *Stellar Wars* is truly a great wide-body game that doesn't waste the extra board space. Nor does it diminish the playability for the skilled shooter who wants to aim at and hit everything.

Everything is here with good build up and balance throughout, and a center "battlescope" that lights and flashes once S-T-E-L-L-A-R W-A-R-S has been spelled out. The letters themselves are locked into the drop targets, bottom lanes, and the captive ball.

There's good lateral movement as well, which sometimes has been lacking on the wider games, but here it's almost as if every contingency has been thought of—and with five thumper bumpers, two spinners, ten drop targets, eight lanes, kick-out hole, and captive ball, not much is missing unless the kitchen sink could be incorporated into the playfield.

The bonus multiplier, up to 5X, can be triggered from the lanes as well as by spelling out the name of the game; so the scoring potential, with its 29,000 point limit, could well mean 145,000 points if everything is going "stellar."

But it isn't even the play alone where *Stellar Wars* shines. The sound effects are imaginative and quite different, with a continual "sweep sound" option that sounds like a rapidly beating heart which quickly gets softer as the maximum bonus is counted down.

There's points, sounds, and shots throughout to sustain play and the attention of the sometime player as well as the regular customer.

GRAPHICS: Out of this world and colorful, this effort has Lonnie outdoing himself, and it appears Williams has pulled out all stops to further entrench itself in the marketplace. It's eye-catching and right in step with the mood of today's world. *Stellar Wars* takes the theme of Star Wars and Battlestar Gallactica one step further.

PLAY: Once again there seems to be more than enough action for three-ball play, but five-ball doesn't hurt the game or destroy any of the excitement.

On three-ball free play try a 350,000 start and follow it with 500,000 and 700,000 points. On extra ball play you can get away with about 100,000 points less for each limit. This should even hold true for five-ball depending upon the caliber of the players in your location.

RATING: ####

Bally's STAR TREK

Well, God only knows when the movie will finally be out, although the trade news seems to point toward this Christmas, but for those impatient throngs, Bally brings its own rendition of the hit/cult series to life in a colorful array of Trekkie touches that are sure to please.

PLAYFIELD: An angled top begins the action on *Star Trek* with two lanes, B-A, and a kick-out hole that controls all of the five letters one has to spell out B-A-L-L-Y. Three thumper bumpers are next in a top that also features a left side rollover hyperspace area for access back to the top as well as extra ball build up value. A target fronts this set that leads down to a two lane left side that rolls to the left flipper and is just behind a four drop target bank.

At the right there's a different balance with a collect lane back to the plunger (a shot, or should I say "attempt," that cost me a few pennies when I tried my hand on the whitewood with the Bally designers

way back when). Well, here it's a bit easier, although it's not a cinch shot. A center sucker shot target and three right side targets, L-L-Y, finish off the action before getting down to the standard wire lane and flipper formation at the bottom.

ANALYSIS: Play is dispersed fairly evenly on *Star Trek*, although much lateral movement comes from the middle by shooting for the right side targets and rebounding to the left side drop targets. Nudging is the order of the day for the top kick-out and lane area, so there is a balance of action. The drop targets hold only a 2X and 3X maximum with added specials, while the spelling out of B-A-L-L-Y is the real point winner with jumps from 10,000 to 25,000 to 50,000, and specials possible, depending upon how the game is set. There is memory in the letters, although they hold nothing else, and shots seem to do more good with a left-to-right or right-to-left approach rather than through the use of reverses.

Drains are apparent from the center, and even the off-balanced display of features and the bottom is death for those hoping to cajole a ball from the out-lanes back in. For the most part, the farther away from the flippers the ball is the better, although any successes in reaching the right side collect will be well worth the effort.

For the most part, the play is decent, but nothing to really stand up and cheer.

GRAPHICS: This is the strong suit of the game that is going to get play just because it is what it is—*Star Trek* with Captain Kirk, Spock, Uruhura, and Bones. Where Scotty is, is anyone's guess. But this "enterprise" does the subject justice, and the flashing center-letter display adds to the whole look of the game, and should leave players "living long and prospering."

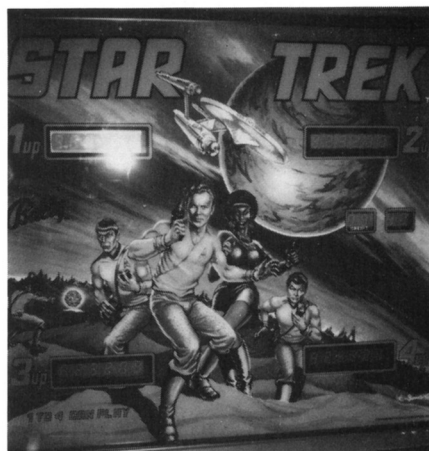
PLAY: The scoring isn't that high on *Star Trek*, although the potential is there. The reason is that it's a tough game to beat. So you may want to be a bit more liberal with the setting, both on the field and in the way of extra balls and free games.

For three-ball, on extra ball play, you might want to try a 90,000 start and follow this with a 180,000 and 360,000 limit. Another 50,000 to 100,000 points should suffice for each level on free play. As for five-ball play, a 200,000 first limit, followed by increments of 150,000 points, should be more than ample, especially if you're starting your letter bonus at 10,000 (although the 25,000 limit is recommended).

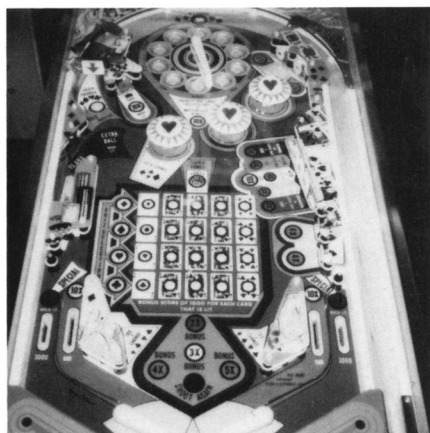
RATING: ###1/2



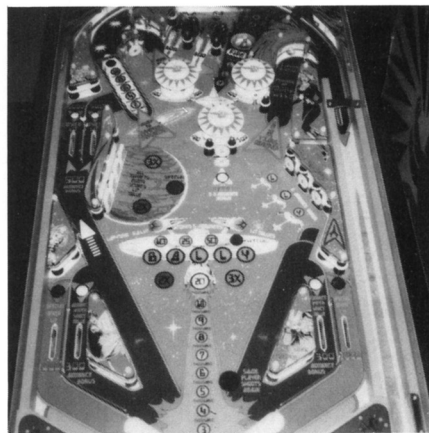
Stern's *HOT HAND*



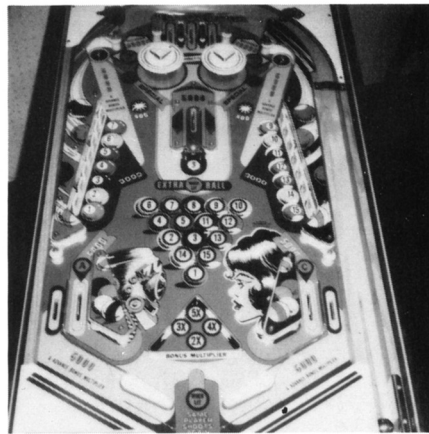
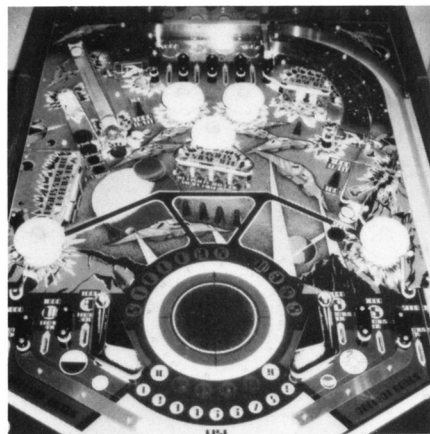
Bally's *STAR TREK*



Williams' *STELLAR WARS*



Gottlieb's *PINBALL POOL*



Gottlieb's PINBALL POOL

If card themes have proved successful in the past for pinball, pool as a motif has been no less appealing for both the players and the design of the field. Here, Gottlieb returns to some basics but with a twist that's electro-mechanically inspired.

PLAYFIELD: The top begins with three lanes, A-B-C, and fairly wide access on either side down to two thumper bumpers. Also at either side are two kick-out holes. From that point on, the field becomes fairly perpendicular. A seven drop target bank at the left (1 through 7) and a seven drop target bank at the right (9 through 15) set off a center captive ball (8) before one gets to the bottom wire lane and flipper design. Basic, simple, and yet there's more than meets the eye here.

ANALYSIS: *Pinball Pool* is a throwback to another era, and the days of *Hot Shot*, as well as many machines Gottlieb introduced featuring fairly linear action (such as *2001*).

Interestingly, much has been updated, although the top kick-out holes are reminiscent of *Jungle Queen*. But there is the novelty of a drop target bank that is different for three-ball versus five-ball.

For the former, either bank goes down simultaneously—hit the 1 and the 15 drops, hit the 14 and the 2

drops, etc.—so all you need do is make seven drop targets.

On five ball play, only the odd numbered targets go down simultaneously. It's an intricate configuration, but one that is most surprising when you first play the game.

Land in the kick-out holes and the bonus multiplier increases from 2X through 5X, and gives specials when everything is out. Make the lanes and the center captive ball is worth an extra ball. And make all the targets and the center captive ball, and, suddenly, the kick-out holes will count down the bonus, which could be substantial if it happens to be 5X value. The drop targets score 3,000 points each. Double that for three-ball play and you have a very high scoring machine.

One of the problems with *Pinball Pool* is that, although it's a shooters' game, once all the targets are down, the only thing to go for is the kick-out hole in order to get them to reset. An added problem here is that a metal rim behind the hole causes shots to bounce out if the flipper stroke is too strong or the speed of the ball is too fast off the bumper.

GRAPHICS: From the look of a space-age bucking bronco on *Solar Ride* to the sight of an updated tin man playing pool here, the Gottlieb art sense is in its own world and its

own time. The coloring is decent and green abounds for the "felt" look, while the familiar rack of balls graces the field.

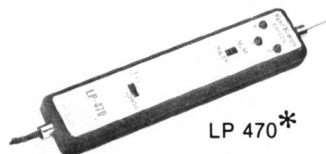
PLAY: Once again, scoring is high although you're going to find variances depending upon how the game is set—at three-ball or five-ball. I like five-ball play better here, only because I have to shoot at more drop targets and play a more complete game.

For extra ball play on three-ball, however, you might want to try a 230,000 start, followed by 360,000 and 500,000 points. On free play these levels can increase by about 50,000 to 80,000 points. As to five-ball play, you may want to lessen the levels a bit to allow for the added play in accumulating points; but once more, look to the audience to see what's fair.

RATING: ###3/4

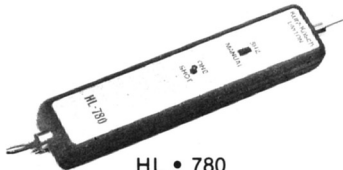
And that, fun seekers, is it this time around. Some truly unique games in their own right. All with the potential and appeal for a wide range of players and tastes as well as talents. Next time, a look at still more winners to make the scene this summer of '79. But until then, as always (with apologies to *Star Trek*) be well and prosper.

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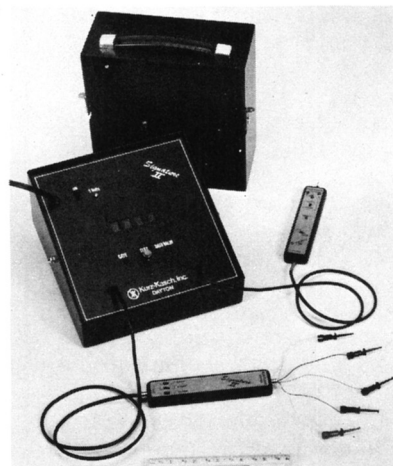
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Williams makes two appointments

William Electronics has announced two appointments.

Ward Ellis has been named Vice President of Engineering.

Ellis arrives at Williams from Memorex where he was manager of advance engineering for storing and communication projects and manager of products development.

Ellis holds a masters degree in electrical engineering from the University of Southern California and a B.S. from Washington University. He is currently working toward a masters degree in business administration at Peperdine University.

Bob Prinzing has been appointed to the position of Assistant Sales Manager and will be handling sales of the full Williams line of coin-operated equipment as well as scheduling production and shipping of the Williams/United shuffle alley.

Prinzing joined Williams in February, 1978 as Manager of Field Services and was instrumental in training operators and distributor personnel world-wide on the Williams solid state system.



Ward Ellis



Bob Prinzing

Reinhart joins International Billiards

International Billiards, Inc., a Houston-based importer and distributor of assorted billiard-related products, has acquired the BRAD product line and added to its staff as a consultant, the founder of BRAD, Howard A. Reinhart.

Reinhart's background is in engineering, primarily concentrating on industrial engineering and fuels for internal combustion engines. His lifetime interest in billiards combined with an active and inventive mind led

to the development of an electric point fitter machine which cuts the tenon to an exact prescribed diameter, a patented snap-in tip and ferrule which requires no glue, and a permanent-type scuffer to roughen the tips in order to enable them to hold the proper amount of chalk.

The 83-year-old accomplished all this after his retirement from a career with GM and Bendix. He is also a former registered race car driver, a designer of airplane engines, and once wrestled a lion, who, to quote Reinhart, "turned out to be a much finer wrestler." The multi-talented Reinhart was also the first paying passenger to use the country's trans-continental flight service, inaugurated years ago by Boeing Air Transport.

Stern picks Lang

James G. Lang, formerly assistant personnel manager, has been named parts service manager for Stern Electronics, Inc. In his new position, Lang will be responsible for working with Stern's distributors, providing parts for all Stern pingames. Lang has been with Stern Electronics for the past year.

A native of Florida, Lang holds a Bachelor of Science degree in Management Science from the Florida Institute of Technology. He is a resident of Chicago's north side.

Pizza Time names field support director

Gerald E. Meyer has been named director of field support for the growing chain of Pizza Time family entertainment centers. Meyer, who attended Long Beach Polytechnic Institute, has more than fifteen years of experience in the areas of corporate and field service.

Meyer has full responsibility for field installation and control of the unique Cyberamics system of computer-controlled animals, as well as training responsibilities for the system and Pizza Time's coin-operated games.

Prior to joining Pizza Time Theatre, Jerry was Manager of Field Service for Rockwell International in Anaheim. In that capacity he played a pivotal role in the introduction of desktop programmable calculators.

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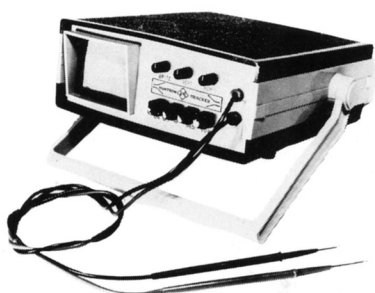
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Trouble shooting instrument

Huntron Instruments, Inc. of Irvine, California now offers an instrument for troubleshooting solid state components—in or out of circuit.

Applicable to analog or digital testing, the *Huntron Tracker* speeds the isolation and location of defective devices, reduces equipment down time, eliminates wasteful discards, and lowers repair labor costs.

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A 2 X 3 inch scope, two highly insulated, non-polar leads, and three test ranges make the *Huntron Tracker* a safe, simple, and reliable test instrument for repair bench or field screening of PC boards.

Flippers instead of cue sticks

Gottlieb's new offering bears the title *Pinball Pool*, and takes advantage of the enthusiasts never dying love affair with the billiard theme.

Pinball Pool features fourteen drop targets, a set of seven on each side of the playfield, which represents balls one through seven and nine through fifteen.

In a three-ball set-up, if a player knocks down one of the drop targets, the corresponding target on the other side of the game also drops. Knocking down targets also builds bonus scores.

Another key to high scoring is shooting for the kickout holes in each of the two far corners.

A "captive" 8-ball occupies center stage and offers a skill shot that builds the bonus. Two outside bottom rollovers also figure in the bonus scoring.

An extra ball is awarded by lighting the captive ball, which is done by making the A-B-C top rollovers.



A 'Supersize' flipper from Bally

The wide-body pinball market has been enlarged by the addition of Bally's new *Paragon*, the company's first "Supersize" flipper.

Paragon contains a three-coin entry door with two quarter slots and one dollar slot for the soon-to-be-released Susan B. Anthony dollar coin.

Another new feature on *Paragon* is a group of four in-line "Valley of Demons" drop targets—drop targets situated one behind the other. These targets score points and multiply the bonus; they also spot the center playfield P-A-R-A-G-O-N for points and special.

Paragon comes with a sound package that lets players know immediately how high the point value or bonus is from each feature hit.

Among other features, *Paragon* offers two extra flippers, additional Waterfall Drop Targets and Waterfall Lane, and a Beast's Lair Save-A-Ball Ramp.

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The 'Hot Hand' with the sweeping arm

Ten rollover pockets with a sweeping arm at the top of the playfield highlight Stern Electronics' latest four-player solid state pinball machine, *Hot Hand*.

Hot Hand offers the memory intense features of a bonus multiplier which is recalled from ball to ball and cards (four suits, five cards each) which, once lit, continue from ball to ball.

The playfield contains a bank of five drop targets—A,K,Q,J,10—which is one of the keys to the game, and is the only place where an ace appears.

Other features of *Hot Hand* include:

- spinning target leading to the top of the playfield
- kicking lane leading to rollover pockets
- stationary targets that light a spotted suit
- flush in spades which opens the way for an extra ball
- any two flushes light the special
- hundreds of ways to change suits
- mirrored backglass

Stern began production of *Hot Hand* June 1 and it will soon be available in distributor showrooms worldwide.



Right down the alley

The new 4 Player Bowling Alley from Midway features realistic pin action. Pins spin, turn, and bounce like the real thing. Striking the head pin produces over 250 different pin-fall combinations. There are more than one million pin-fall combinations programmed into the game.

Midway's 4 Player Bowling Alley comes in an attractive cabinet that measures 72½" high, 28½" wide, and 38½" deep.

The game features Midway's usual 23-inch first line monitor, double coin chutes and the Midway micro-processor with built-in ROM-RAM testing.

Another feature is the big rolling "bowling ball." It's the size of an actual duck-pin ball. Players control the position and direction of each "throw" with a hook or straight action by the speed of the spin or by using the push button feature for this option.

The 4 Player Bowling Alley can be played by one to four players who have a choice of two games—Regular Bowling or Flash Bowling. In Regular Bowling a chime sounds for each strike. For a string of strikes, there's a corresponding "read out" on the screen: *Double*, *Turkey*, *Four Bagger*, or, for five in a row, *Wow!*

The Flash Bowling field features a flashing target that moves from side to side across the front of the pins.

Either game is played throughout a 10-frame period with extra finish frames for strikes or spares similar to actual bowling.



Underwater hide-n-sneak

Subs, the first two-monitor video game from Atari, features a submarine battle putting each player in control of a search and destroy mission. Using a sonar locating image, steering and firing controls, the players act to score hits. Cabinet design allows each of the two players to use its own TV monitor. A single player has the option to play against the computer.

Subs is the first game with an operator optional add-a-coin or regular credit coinage mode. In the add-a-coin mode, the game can be set on eight different times per coin. Or the operator can choose to offer one credit per coin at any of the game times. The sonar "ping" in the attract mode is also an option offered.

Subs has a special attraction with its dual screen design. Other features include Atari's solid state circuitry and simplified self-test system.

Subs players try to outmaneuver their opponents. Each player sees only the view of the sub he is controlling. Only the opponent's missiles are seen; their sub is visible only when it crashes or when hit by the opponent's missile. The sonar scans the area to locate enemy subs and help direct hits.



A stellar attraction

Williams Electronics, Inc. is now in full production on *Stellar Wars*, the new wide body pinball game.

Stellar Wars features two industry innovations for Williams: triple scoring jet bumpers that score 100 points or 1000 when lit or 2000 when flashing, and the "Sweep-Sound" option which allows the operator to select any standard sound as the "Sweep-Sound." The sound increases in rate as the letters S-T-E-L-L-A-R W-A-R-S are lit.

"Total Front End Programming," which allows all game adjustments to be made without removing the glass, is being introduced in Williams wide body games with *Stellar Wars*.

The game features an action packed back-glass depicting a galactic dogfight, and an action center "Battlescope" which explodes into a display of frenzied flashing lights each time a bank of drop targets is knocked out.



Shuffle alley for six

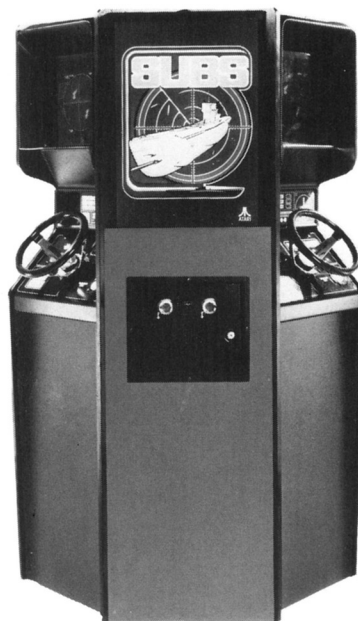
The new United six player shuffle alley *Taurus* is now in production at Williams Electronics. *Taurus* features the new game "Line Up."

"Line Up" provides competition and challenge for come-from-behind wins by providing bonus frames which score higher values as the frames advance.

In addition to "Line-Up," *Taurus* offers the play appeal of four other games: "Regulation," "Flash," "800," and "Strike 90."

Taurus also features Williams' versatile electronic sound system: trumpets, sirens, pins crashing, whistles, even a "raspberry" for a blown frame.

The game offers individual player memory, "high score to date" feature on regulation play, extensive self-test capabilities, and solid state boards which are interchangeable with all Williams' solid state games. Complete customizing features permit operators to adjust scoring difficulty and pricing to meet specific location needs.



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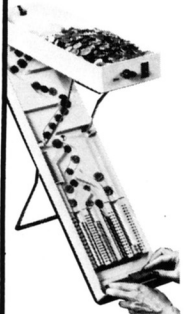
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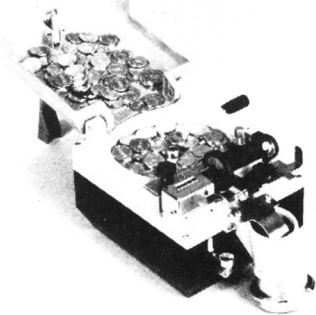
FOR SALE: Sinbad \$975, Top Score [as is] \$285, Close Encounters \$1050, Lost World \$1185, Mata Hari \$1075, Pat Hand [unshopped] \$250, Stars \$895, Atarians \$425, Time 2000 \$650, Space Rider \$975, Airborne Avenger \$525, Fandango \$250, M-4 Tank \$525, Wheels \$325, Top Gun [unshopped] \$225, Clowns \$795, Dozer \$725, Fire Chief [unshopped] \$175, Super Breakout \$1175, Starship I \$825, Smokey Joe \$995, Canyon Bomber \$785, Orbit \$840, Super Bug \$1175, Sky Diver \$745, Ultra Tank \$695, Football [write], M-79 Ambush \$795, Star Cruiser \$695, 4 in 1 cocktail table \$225, 3 D Bowling \$625, Space Wars \$1275, Dead Eye \$650, Depth Charge \$625, Foxy Lady cocktail table pinball with base \$1095, Football soccer game \$875, Desert Patrol \$695, Strike \$375, Foolsball brand new in original crates \$515, Flying Fortress \$425, Bimbo \$575, Pioneer \$250, Charlie's Angels \$1225, Evel Knievel [S.S.] \$775, Contact \$850, Sea Wolf \$795, Dogpatch \$795, Breakout \$665, Sky Raider \$925, Hit Me \$475, Road Runner [unshopped] \$95, Stingray \$850, Nugent \$1225, Shuffleboard \$725, Bi Plane [unshopped] \$175. Call or write NEW ORLEANS NOVELTY COMPANY, 1055 Dryades St., New Orleans, La. 70113. Tel. 504/529-7321.

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News Briefs

.....Jim Wiswell and Doug Furry walked away from the fifth Tournament Soccer World Championships with the \$30,000 first prize for their open doubles victory. Dan Kaiser won \$7,000 as singles champion. Tom Spear and Carrie Crowell combined to win \$4,000 as mixed doubles champs.

Look for full tournament coverage in next month's PLAY METER.....

....."Included among the beneficiaries of this legislation are record manufacturers who cannot be viewed as 'authors' of 'writings' within the terms of the Constitutional grant of authority to Congress, except by stretching those terms beyond their true meaning." In so stating, Nicholas E. Allen spoke in behalf of the AMOA against proposed congressional legislation to include rights of performers to copyright royalties. Allen was speaking to a subcommittee on Courts, Civil Liberties, and the Administration of Justice as long ago as March 30, 1978. But now the proposed measure appears to be gathering congressional support.....

.....According to a recent dispatch in the Cincinnati Enquirer, a grand jury in Hamilton County, Ohio is investigating the operation of bingo pinball machines in the area. Undercover police reportedly have spent about \$1,500 playing the machines and claim to have found dozens of places (mostly in Cheviot and Norwood) where pinball winners were paid off.

Meanwhile in Cheviot, youths are meeting with city council members in an attempt to get the city to allow minors to play pinball machines. Current city laws ban the use of machines by anyone under 21.....

.....And then there's the town of Scarborough (near Toronto) in Canada which has decided to hold a public hearing to deal with alleged pinball parlor problems. The latest claims made against the arcades are that loansharks are loaning pinball money at exorbitant rates to youngsters.....

.....Finally, how about a story about a city council which hasn't followed this new wave of silliness?

Bernie MacDonald, a convenience store owner in Layton, Utah, has convinced the city council to lift an ordinance banning pinball to those under 18. MacDonald cited manufacturers' claims that pinball games serve as an outlet for aggression. "Which would you rather have," MacDonald asked the city council members, "a kid stealing your hubcaps or playing pinball?".....

.....Exidy has relocated both of its divisions in Sunnyvale, California's Moffitt Industrial Park. The new address for the video game manufacturer is now 390 Java Drive, Sunnyvale California 94086.

The move to the new plant coincides with Exidy's shipment of its newest video game offering, Crash. In addition, Exidy is continuing to ship Ripcord and Star Fire.

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CRASH



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- The challenge of a road race
- The excitement of Destruction Derby
- Score points by driving over speed dots
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- Exciting sounds
- Daily high score display
- Accelerated-speed button
- Switch lanes to avoid crashes
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- Operator-adjustable coinage and plays



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THERE ARE MANY FOLLOWERS
BUT ONLY ONE LEADER

The Bally logo is centered within a stylized archway. The archway is composed of concentric bands of red, yellow, and black. Inside the archway, the word "Bally" is written in a blue, cursive font with a registered trademark symbol. The logo is set against a white circular background with a red sunburst pattern.

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Bally is again bringing a "first" to the industry with a three-coin entry door! Starting with PARAGON and KISS, standard on all Bally pinballs will be 2-25¢ slots and 1-\$1 coin slot designed to accept the new Susan B. Anthony dollar. What does this mean for you? Think of the variable vending prices possible, bringing additional revenue and profit. This 3-coin entry also means if one quarter should jam, the game is still fully operational for quarter play, eliminating "down time" due to a single coin jam.

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This is just one of many of Bally's innovations and contributions to the world of pinball. Bally is diligently working to improve and advance the amusement industry for your enjoyment and profit.

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