


BASICS 101 - NEGATIVE and + POSITIVE
The ORDER of THINGS
By Bruno D Puglia

<http://www.eastcoastamusements.com>
East Coast Amusements
~~Canton, MA.~~ 

This is another BEARNOTE written to help keep your operating costs down and profits up!

It don't work,, What do I do?

I am going to pass along some perceptions and some tips and tricks for you to think about. I, like most manuals, presume you already know something about the business you are in. In this case some my references are to Rowe bill changers and acceptors and their repair. I presume you have some common sense, and enough of it, to allow the ideas to meld with the way you do things. These notes will get into kindred subjects such as; point of view, order of things, vendor denial, left - right brain, No room in margin and Expert computer programs. I am not sure if I should have gotten into kindred subjects, but I have....

Perhaps you all ready comprehend the material in these notes so you may become lethargic when reading them. Being straight forward, I feel most people appear to fall into three main groups.1 Those who already know it all, 2 Those who are not going to read all of this because they do not have the enough time, and 3 Get bored and forget reading anymore. You may start reading, but for one reason or another you will not have time. I will be on the lookout for feedback from you. My Bear Magic Wand Oiler notes were a feeler to see how information was accepted by the vendors and it's service people. The only feedback I have gotten was from those who already have a needle point oiler. It appears association with others does not exist to any great extent. Only an active do-er can related to the material. This makes sense.

Outwardly it appears many people want to cut costs and reduce equipment down time but only if it is done with a quick and magical fix. Even if someone prescribes getting a spare unit, many times it appears to be a case of "right now" to solve some panic problem of doom rather than a planned strategy of reducing down time, and/or part of a good game plan to preform routine maintenance on their equipment.

No room in profit margin choices have to be made with all factors calculated for both the short and long term. If you want to reduce operational expenses which cut into your margin, you must know the true costs are over time and what the alternates are.

Validation of my information to you may be non-valid for many reasons. If I talk down to you, or use a negative presentation, the information may be discarded. A positive straight forward form may be the only form acceptable by some people. Any information supplied is filtered by your mental process. If you felt I was calling you an asshole, and I am not, then information I present becomes non-valid and will end up the trash can. Maybe you do not have the inclination to wade through the notes because you start to observe the information does not match your order of things. In a expert model of an anticheat I will get into later, I will show any single part may have a problem but it is merged with other parts of the system and these other parts connect or interact with one another. They inter-connect with the rest of the system. One has to deal with the nitty gritty and this takes time. The expert anticheat model coming up is not to make you an expert, but is basic to resolve a problem like eating bills, bill acceptance, etc. If you do not have time to wade through these pages, so be it!

Do not think I am going to imply there is a limit of knowledge. It would appear the more we learn the less remains to be learned, but... Even if you have been in this profession for a very short time, say 50 years <grin> to take an attitude we have even

remotely approached the limits of knowledge is both unreasonable but very human. New input is a daily reality; that is, if you are looking for it.

At my age [71 2005] I have already seen many changes; crime, thief, finding ways to protect yourself and property, insurance rates, taxes, health care payments, and so on, are worst then they have been in the past. These like things, plus social issues like drugs, drinking, aids, sexual life styles, etc, mean behavior of people is changing and you will be affected in one way or another. The question is to what degree, and in what directions. Everyone reading this has their own stories and knows of what I speak. Whatever I say and think, what the President or Congress does, you will attempt to handle it in your own way. "We The People" will end up paying for every thing one way or another. Every one has a hand in our pockets and there will not be much left when they are done picking it.

There is a distinction between repetitive tasks you preform because you learned or shown how to do something and having the comprehension why you do something. There is a big difference. As one example, we will talk about metal filings and particles in/on a magnetic head pressure roller which will effect the magnetic field as the bill goes down the path of the an acceptor. I can tell you about using scotch tape to clean the pressure roller, or the distasteful idea of having to replace the roller but there is a lot more to consider when it comes to the magnetic signal. What about the use of DC bias on the head, the reason for head alignment, why a shorted mag head gap causes a failure, why the frequency response of the magnetic amp is designed the way it is or why adjusting mag gain using motor noise like the manual says to do does not work. You can preform procedures at a do level, but there is a level of theory which explains why you do, or not do, something. Theory will and should impact on your work techniques.

Any acceptor can have unsatisfactory or no acceptance when metal particles get on the pressure roller/s. With a BA acceptor, it is easy to get to the pressure roller, but with the CBA/UBA acceptor it takes a little work to get at it. The BA-50 acceptor has two heads and two pressure rollers and it takes work and time to get at them. With two magnetic heads and the mag scans are more sophisticated, you will have to pay more attention to the heads and the pressure rollers. Some people may know about lubrication procedures but many service people have never seen the particle problems so it has never been an acceptance factor. It is like acceptor lubraction or replacing an anticheat lever, once you fix an acceptor with this problem you will never forget it. This is TLC [Tender Love & Care] and basic maintenance for all acceptors.

Before getting to far into this abstract, I want give you a brief look at current and future computer programs which will concern us sooner or later. In the search for a better way of doing things, the computer has more important then ever

New computer programs with expertise which interact to the user will become common place.

Years ago, the people at MIT came up with artificial intelligence programs which have developed into a high level programs which are real EXPERTs. Program shells now allow programers to create expert type programs on any subject. It is just a matter of time before more subject expert programs can be purchased. Many programs already exist and are real mentor for the user. This "Just in time learning" can be applied to engineering, service,? Entrepreneurship, business planning, etc. M.B.A.s and others may not survive without the expert advise from these programs. It will be a case of WIN-WIN. The logic is simple enough, the expert tells you what to look at or do. Any given expert program will be a voice of authority and it will provide an innovative solutions or actions to

be taken to the end user. Manager, Negotiator, or service people will use these programs. Maybe you have not seen or used these programs yet but they will impact you sooner or later. Who knows, it could be a Taylor model or some negotiation matter.

Various forms of "Just in time" are being used more and more. It was first used with Japan's system of a flow of parts from raw materials to a production line. A complete system to keep costs and labor down and still keep the line going. Out of this comes "Expert Just in Time Learning" or the flow of expert information when you need it.

Lets look the expert model with reference to a single item like an anticheat lever on a BA type acceptor. I do not consider myself an expert on anticheat levers but, I will give it a shot anyway with BA3 to 35 acceptor anticheat levers.

Assume the following are HyperCard type screens with graphics and data on each card.

A anticheat lever serves two proposes.

The information below is for BA-3 to BA35 acceptor anticheat (flipper) levers.

1a. Tell the computer when end of bill as occurred.

1b Keep someone from pulling the bill back out of the acceptor after credit as been issued.

2a.1 A new version of anticheat lever replaced the old version years ago. This version shifts the lever to the right so it not longer can hit or rub against the photo cell (P6).

3. The anticheat lever must move freely on the shaft. The level is made up of 3 different parts glued together and a spring.

3a. 1 The inside diameter may be out of specs.

3a. 2 The parts are glued together and may not be aligned.

3a. 3 Excessive glue may have reduced the inside diameter.

3a. 4 A 'cracked' lever make stick on the shaft. 3a. 5 The shaft for the anticheat lever may have dirt built up on it.

3a. 6 The shaft for the anticheat lever may be bent.

3a. 7 Spring may be not connected to the correct contact points.

3a. 8 Spring may not have correct tension

3a. 9 Someone put oil on the shaft/anticheat.. A no-no!

3a.10 The lever may catch on the fork plate below the lever. The fork plate may be deformed or bent.

3a.11 Excess metal on top plate may keep anticheat from returning all the way.

.4 The lever may be worn. The points where the bill hits the lever can cause excessive wear, make cuts or nicks.

4a. 1 the lever is worn down enough to effect timing. Look for reduced material where the bill hits the lever.

4a. 2 Nicks or cuts catch the bill and prevent the bill from passing forward out of the acceptor.

4a. 3 Nicks or cuts catch the bill and prevent the reversal of the bill back out of the acceptor.

4a. 4 The sharp edge of the top plate can cut into the anticheat.

5. The anticheat level for a WBC acceptor has been updated.

5a. 1 The spring must be carefully put in the correct position where hits the top plate. It does not just snap into place.

5a. 2 The WBC lever or replacement lever may not have the white strip glued to the lever so the light from the LED is not reflected back to the cell.

With 'Just in time learning' you can get expert information when you need it by interaction with the expert program. The interaction feedback would be from the related problems such as acceptance, eating of bills, poor stacking, \$5 bills in upper cash box, etc. Getting back to the non computer world, with all of the problems listed above, how come

vendors very seldom buy anticheat levers? Also note even if you put on a new anticheat, it may be defective or it may not solve every anticheat related problem. Please put the above list in your Magic Wand notebook. You may need this essential information some day! After the fact, it's easy to simply say; "Check the anticheat lever and shaft and if bad replace it/them. Then check the new one and confirm it's working correctly.

We must be concerned with mechanical areas, has shown in the Expert anticheat model, but there are electrical/electronic areas too. In the electronic basic area, a book by COOKE was written in 1942 and is as basic as you can get. It covers basic laws and AC with rectangular math and the use of polar form with J operator (square root of -1). It does not cover transistors and ICs yet everything in the book is as valid in 2005 as it was in 1942. That's over fiftyfive [55] years without a change in the basics laws and rules. There are many reference books which are a lot older than this one. This is one of the points of reference I use for making statements about the importance of basics. Service starts with basics, and comes back around to basics and theory.

Extended basics can be very interesting: "In 1926 Robert H. Goddard launched the first liquid-propelled rocket achieving an altitude of 41 feet. In 1962 John Glenn orbited the earth. In 1969, only 66 years after Orville Wright flew two feet off the ground for 12 seconds, and then came the rocketed flight to the moon in Apollo 11."

You should be able to grasp upon on rudiments with the understanding of what's going on. The theory behind the tasks performed comes with the time and the effort you put into learning will increase your comprehension. You will need the theory when you do not know what to do, when no one even told you, or showed you how to do something. You can tell if your are short on theory when the shit hits the fan and you don't know what to do next. An uneasy feeling will be with you, and you wish you

were somewhere else. These are the times which will put stress on you. This is when theory can really help you solve the problem. Oddly enough, many of Murphy's Laws contain some of the best theory and practical lessons around. I will attempt to illustrate the basics, and theory like Ohms Law are important, why you should learn it and more important utilize it.

Other laws for magnetism also enter the picture. Solenoids, relays, motors, etc, are just a few devices which use magnetism. Residual magnetism will get you sooner on later. It might be the catalyst why extra coins drop because the motor brake does not release, a relay stays on after the voltage is removed, or a solenoids stays in.

I like stories so... While still in high school I was working at the local TV station in New Hven, Ct. A sponsr at the TV station asked me if I would handle service installtion [with factory Tech] and service of electronic chimes. It had eight horn speakers on the bank steeple it blanketed the entire downtown area including many of the Yale buildings. One day I got a panic call from the bank because the 'machine' keep on playing taped songs instead of turning itself off. Everyone called the bank to turn the dam thing off! Yale, police, City Hall, Court house, FBI, etc, called. They finally shut it down manually and the bank called me. I spend hours endeavoring to find out what had happened, but I could not duplicate the problem. With residual magnetism in mind, I tracked the control flow to a relay, which if held in, would create the problem. I pulled the control panel out turned it over and repeated the test for 56 times. I was lucky, on the 57th test, I could see the relay did not release and the meter showed there was no voltage on the relay. I replaced the relay. By the way, this was my first kilowatt rig I had to work on. It was 2 full racks of equipment and it could run 1,000 watts of audio with 8 tubes! The chimes were on audio reel to reel tape. Well it was the 50's. Talk about a big sound! You see, a frame of reference with respect to things like residual magnetism becomes a

part of basic theory and pragmaticisms you will encounter while servicing a problem. With such frames of reference you may be able to fix a problem, and without them, the problem can become an expensive and a wild escapade.

If you do not browse the manuals, you are already deficient on the knowledge curve. I will illustrate the manual does not have everything you should know, and it will fall short on what to do when a problem occurs. I will even show the manual may even give you unsatisfactory information sometimes. Sometimes you may not understand what the manual said. None of the above means a browse through the manual can be avoided, plus most specifics can only be found in the manual.

Things have always been changing, but today, a lot of people realize how FAST changes in the work place and life style occur. Some people are attempting to be better prepared by building basic blocks which can be applied to more then just one given profession. People know they might require a job modification in the future. This is not new and it is a way of life. When I left high school must students in my day [1952] very seldom put "**Future Undecided**" in the year book. In our large class of 650 I have noted over the years very few people ended up doing what they had written in the year book. Even those who did make it to their chosen profession, many are not in their chosen field today. In my own case, "Radio and TV broadcasting" and while I spent over 30 years that business and now I am in vending related service. What was/is your chosen field?

When it comes to basics or theory, Yute or Old Timer makes no real difference. Youth has its advantages, as does being an old timer provided the old timer is not locked in a stalemate mode and overwhelmed by the large amount of new input. A 80 year old gentlemen stated a company selling water many years ago. He was ahead of his time. Two bill changers and 3 automatic one gallon

at a time despeners. After reading my OBA lube Bear note, [without glasses –he was near sighted], lubricated an OBA acceptor as well as I can. He lubricated his first OBA at age 80. Can you do as well as he did? BTW 6 years later [2005] he is still lubricating his OBAs. His early BC1s accept bills and hoppers click 10 dimes like they were new. He read my Hopper Bear notes too.....

When something new comes along, good basic roots should allow you to **get it!** Letting the state of the art get ahead of you is your deficiency. If you do not care anymore, you may be following a path which leads to a dead end. The other side of the coin is you already are a know it all person so there is no place to go. A twist of fate might alter these view points when on a single Friday afternoon, or nowadays, Monday morning you don't have a job.

One of the hardest things to do is to change your references from one point of view to another perspective. When an external force is applied, like being told you no longer have a job: " You're all done! ", then it may be to late to consider "basics" in the true sense of the word and basics may be all you may have left.!

Consider this: throughout history, some people have always failed to see change on the horizon. All they see when they look ahead, is a mirror: the future is only an extension of the past, going on forever.

Let's propose an alternative view: scientific knowledge does not proceed linearly towards an unreachable goal at infinity. Knowledge proceeds asymptotically towards a finite goal. We may never get there, just like the infinite goal, but unlike it, we can get arbitrarily close, each breakthrough taking us exponentially closer. If so, a thousand years from now, the science of today will seem crude but workable, but the basic tenets will remain intact. History shows there is the more accurate model. Newton's laws of gravity are still used by NASA today to plot the trajectories of space probes, because,

(although Einstein's equations are more accurate), they are immensely more complete and their results differ only marginally.

Maxwell's magnetic field equations discovered in the 19th century are still accurate, even though quantum mechanics has revolutionized our understanding of forces, particles and waves. Avogadro's number, the ideal gas laws, and other basic ideas of chemistry and physics survive from the 19th and 18th centuries. Again, Newton's invention of calculus in the 17th century in order to explore the theory of gravity is alive and well in mathematics today. The Algebra and Geometry of the Moors and ancient Greeks is still valid too, after 2,000 years. The arithmetic of the Sumerians, perhaps more than 6,000 years old, still works! We all believe Galileo's discovery which was Jupiter has moons, and the Earth is not at the center of the universe. In another sense, you are the center of your universe and external forces are applied to you every second of your life. New innovations come along every day so be prepared to expand your knowledge at many levels and in many areas keeping in mind, basic laws like OHM's Law still exists.

How much has really changed over the years? Not much really. In the depression in the late 20's and early 30's things may have been much worse then they are now. Driving around in a model A or 2005 Lincoln is still driving a car, but let me tell you, turning a corner on a 4 door model A or attempting to stop the 'A' with mechanical brakes is a bitch. I think you get the point. More important, is how much more do we have to assimilate then our parents had to learn on a work force level. My father was a carpenter and my mother worked in a dress shop plus made special clothing, such as, wedding gowns at home. Both became one of the best at what they did and there was very little they did could not do. I, In the other hand, worked in various fields such as Radio and Television broadcasting, Computer Energy Management Systems, and now Vending. My father worked at building fancy bars, houses,

custom cabinets such as a wood and glass cabinet used to hold medical tools at an funeral home. As a side note, the cabinet built in the 30's is still being used today. Working at basic levels, there is no really difference what my father did and what I have done. His basics were carpentering and my is electronics. Working in a dress shop is not the same as custom designing and making wedding gowns. Mom and Dad's basics were well established.

BTW, In early 1950s I looked great in wedding gowns except for the boobs. I was 100 lbs then. <hehe>. No, I'm not gay, but I did serve as a manikin for several wedding gowns when I was a teenager. Talk about side jobs,,,,,

Getting back to serious stuff... Why all this bull shit. To try to bring you to another place and time to see if you can shift your frame of reference, from one place to another. Knowing you will relate to the written page in your own way how did you reflect on the written comments? In terms of the words as written, or solely with reference to yourself or a combination of both? How open minded are you?

What a person has to know, or learn, will change over the years. Instead of an 8mm film camera used in the old days, today, you would be using a TV camera and you don't even think about the iris or focus setting. What's the big deal? You turn it on and off, pan around, move in or out (zoom), don't move to fast, don't make jerky movements, and when if there is not enough light, turn some on or stop taking pictures. O yea! I forgot, with a 8mm film camera, you didn't have to keep the battery charged. In the old days we just had to wind the spring. That was the old way 'keep it charged up'. What we have to learn may be different, but the basics are the same. Somethings are a lot easier today, maybe even better, except when have to reset the damn date/clock! I implied you would have used a 8mm film camera 55+ years ago but here is another reference point. In the 1950's, I was given a

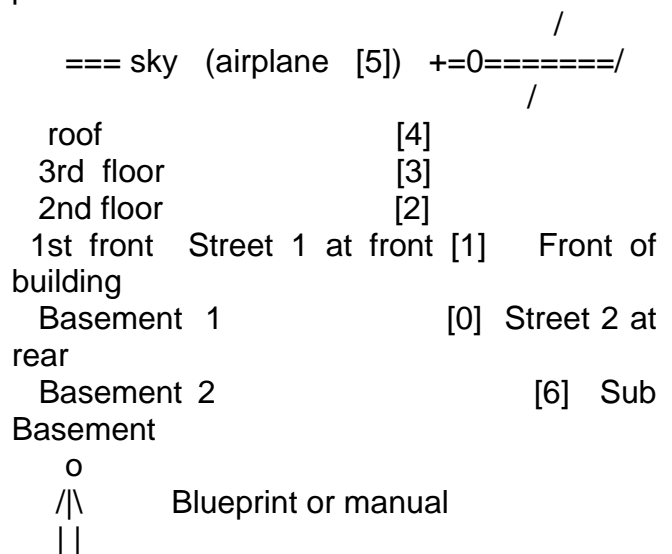
'Best Cameraman Award' by the Regulars on Connecticut Bandstand TV Show. As a matter of fact, I could handle a commercial TV camera when I was working at WNHC-TV, a TV station in New Haven Connecticut, when I was 16 years old (1948). When I borrowed a VHS camera in 1992 to make a video tape school reunion and I was running a camera again. I had gone full circle except this time it was color not black and white and the camera was a hell of a lot smaller. In 1948, we did not have video tape and I did not use a zoom lens until a few years later but the basics of running a old 8mm film or TV camera, remain the same. Years ago, I did field test Dr Black's first 40 inch zoom lens. I was the first person to ever use this new lens while doing a show for The Sport Network. It was the longest zoom made at the time. The basics were the same, zoom in and out.

A lot of the material you have read so far shows a background which is a wide and varied. Background becomes pertinent because a lot of what we do depends a lot on intuitive service techniques based on what we had done in the past. It is hard to cover every service problem point by point and it is impossible to make trouble flow charts or write manuals to cover all factors. You will see items in these notes which point out the case of variables such as AC line voltage or a screw or nut in the wrong place causing a given problem. You will find your background has allowed you to have your own intuitive skills. What works for me may not work for you.

Problems vary and the tests, or process, I use for resolving them may differ from the process you would use. When you, or I, start working on a service problem we have no idea of where we are going to find the problem, in fact, we may not know to define the problem at hand. There is no one plan of attack which can be applied to resolve an undefined problem. We have to narrow the scope of the problem point by point and take corrective action. Your process may be very different then mine. With my background of a

yute, ham radio, commercial radio and TV, cellar dwelling electronics, computers, etc I may be more inclined toward taking meter readings and look at a oscilloscope. By the time I got out of high school, I had put in two years of doing part time radio and TV service. I used a scopes, meters, signal generators and home brew signal tracer with a RF probe as well as working 2 years in at a commercial Radio and TV station while still in high school. Frame of reference for anyone becomes a very important aspect of what we do or handle a given problem. It sets up an Order of Things as does kindred stuff.

Lets try looking at variable reference view points another way. Lets use a picture of a building. You will have to use a lot of imagination with this example. If you are a Mr or Mrs Right type person, a person who is self centered, or not willing to let go of yourself for a while or you may not get any of the following. Perhaps You should read this once, then go back and re_read it again. It's a mental process. Here we go. I once found myself in a building, and being a mental case, I wondered where I was. What was my point of reference?



The picture is a fixed with no variables but, do variables exist? Its a matter of view point or reference when it come to variables. If you are at [1], you are at ground or reference level. Is this true? If you are at [2], you are at ground or reference level. Is this true? Is basement 2 [6], 1 or 2 levels down? It

depends on your reference point. It gets worst, if you are inside the building at point [3] what you see is much different then when you are at [1], [2], etc. Lets move up to the roof [4] and look around and also down. The front view is much different then the rear view. Lets really get an overview by going up to point [5] [airplane] and again we see things much differently. Nothing in the picture as changed but what we see is totally different. Each point of view or reference point allows us to see different details.

One of the hardest things to do is to change your point of view or reference and look at something from more then one reference point. If you are stuck at [6] there is not much see and you cannot see the outside world while you are locked in [6]. Moving to [1] or [5] expands your view points and the base reference is no longer fixed to one given spot. When you move from [6] to just one other [X] there are still levels more you have not seen. An early cutoff after looking at just 2 points leaves a lot you have not seen. We have covered the basics and now the question is: How important is it to see things from other points of view? In this case, we are dealing with something has no variables.

With things like people, human emotions, etc, we now have valid variables which can make it very hard to change your point of view. Is it important? Yes and No! A Mr. or Mrs. Right person would never need to see anything from another point of reference/view! Ever try to tell a Mr. or Mrs. RIGHT they were wrong? It can't be done?

Take any given situation and view it from a reference point outside yourself. Look at yourself has if you are fly on the wall or in the mirror looking outward and review the situation. If you reach a point where you have two or more positions and you really do not know which position is correct. You may have truly seen both sides of the coin. Take a coin and look at the head side. Unless you are willing to turn the coin over, or move to the other side, you never see the tails side. You have to be looking for the other side and

be willing to take action before you ever see the other side of the coin. You can see heads or tails side, but there is another position, the edge. If you are looking at the edge of the coin and are willing to move your reference point you can now see the head or tails side since they both exist.

The coin or building are physical situations but people situations are more complex and a mental reference point shift is required. This is more difficult accomplish. Many times you will only see one side of what a person does or says but they may never show you the hidden side. Sometimes the other side is even hidden from them.

Lets get back to service. A meter test of a diode can tell us the diode is not bad. In circuit, the diode may break down and is bad or it may break down intermittently. The break down may be a leakage, short or an open. Other failures like blown fuses, parts, copper burn out, or other failures could exist and the equipment does not work as it should. The failure could also be caused by other parts or items like line voltage. Like the building example, we may have to move on to other [x] points for more details before seeing or finding the problem. The problem might be a bill on goes into the acceptor two thirds the way, then gets rejected. Thats like saying there is a building.

Sometimes you cannot stop in one place and you have to move on before you can fix something. There are positive, and negative flow approaches. Building wise, lets say everything is ok till you on the third floor, but, you can't get to the roof. You have to know the basics. In this case there is a stairway, elevator, hatch opening or fire escape you must find before you can get to the roof. You may need to spend a lot of time looking for a blueprint or floor plan. It is not a problem when you have a floor plan, (or manual), keys, and you know where you want to go.

o
/\
Blueprint,Manual,key,etc & common sense!
||
> You now have feet on the ground and can move.

=====

Buzz phases are great. "Order of Things" is one of the better ones. We have a way of doing things which gets locked in over the years. Changing this order is almost impossible to change without taking action. Learning a new way of doing things can change what or how you do things. This is why think time without stress is very important.

Other phases are left and right brain. The left brain is logic like talking to yourself. You know: You're late, step on it, I can't get it to work! What part do I change now!, etc. The right brain can look at something without being blocked by the logic left brain. This allows you to turn things upside down or inside out and to be able to look at something from a totality different prospective. This allows us to switch things around, forget the order of things and we can try something new. Order of things and the left brain sometimes prevents us from seeing and trying new things. I'm not a computer programmer as such, but in 1985-88, some of the best Atari 6800 computer [not game unit] with the Flex operating system had utility improved programs like CAT, COPY, FORMAT, DISKFIND and others were written by me. In 1993, my single line formatted Catalog PLUS program for the Atari is one of the best and is the only for the single line formatted catalog program around. Why bring this up at this time? To expose you to: Once you free your brain to think about doing something you have not done before, or do something no one has shown you before the thing you attempt can work out for the best. Once you taken the first step, then the left brain has something to work on and the logic of getting the job done will follow. Getting in over your head can be self rewarding if you are willing to take the risk. As you can tell by

now, I'm not good at writing, yet this and my many Bear Notes, poorly written as they are, exist! For me this is a RISK! but this did not stop me, did it?

Lets change the reference from me and you to a 16 year old girl from Maine. This conversion below took place on The Boston Computer Society BBS system. BBS=Computer telephone line Bulletin Board System.

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Rooms (InterLine Chat) Room User # 1

>>> [Bruno Puglia] Is here
>>> [Danielle Claffey] Is here

[Danielle Claffey] HELLO
[Bruno Puglia] hi!
[Danielle Claffey] COOL. HOW ARE YOU?
[Bruno Puglia] Ok! what's up?
[Danielle Claffey] NOTHING MUCH. HOW OLD ARE YOU?
[Bruno Puglia] I'm an old timer, 59
Note: I was 59 when this took place.
[Danielle Claffey] I'M A YOUNG TIMER.....16
[Bruno Puglia] Are you using an ATARI
[Danielle Claffey] NO, AN APPLEIIIE
[Bruno Puglia] How did you get on an ATARI board?
[Danielle Claffey] I DON'T KNOW. WHERE DO YOU LIVE?
I'M FROM MAINE.
[Bruno Puglia] Long distance, How about that.. Randolph Mass ---- about 14 miles south of Boston I'm not good with names, I presume Danielle is female?
[Danielle Claffey] YES. IS BRUNO ALSO FEMALE?
[Bruno Puglia] You're cute! No, Bruno is more like a male dog or bear when used as a first name.
[Danielle Claffey] THANK-YOU.
WHAT DO YOU DO FOR A LIVING?
[Bruno Puglia] I work for a company which sells vending machines and games (you know - arcade stuff). What do U do?
[Danielle Claffey] I AM A TEACHER.
[Bruno Puglia] at 16?

[Danielle Claffey] YES, I TEACH AN A.P. BIO CLASS, ASK ME ANYTHING?

[Bruno Puglia] WOW! What's A.P. and Bio class?

[Danielle Claffey] A.P. BIO CLASS IS AN ADVANCED PREPARATION CLASS FOR STUDENTS

[Bruno Puglia] I presume you're a brainy kid , a term we used in the old days, today a Nerd would be more correct!

[Danielle Claffey] YOU GOT IT.

[Bruno Puglia] How do young people handle the Order of things and/or left and right brain functions?

[Danielle Claffey] WE ARE ABLE TO CONTROL THE IMMENSE BRAIN WAVES WE GIVE OFF, LIKE SPOCK!

[Bruno Puglia] Thats how you handle left logical side of brain but then what about abstract right side?

[Danielle Claffey] WE MEDITATE!

[Bruno Puglia] I like your answer, you're alright!

>>>> and so on into the night ! >>>>

Cute and right there at 16!! One word: Meditate! I wish I could write one word which meant something important!

Maybe I made this whole chat room conversation up on my little keyboard just to make a point! Would I do such a thing?

The real heart of service is fundamentals. With a solid underpinning you can reach out and really get into the essence of service rather than just being a black box swapper. If a job is done efficiently there can be considerable cost savings. My notes cover many items which can cause problems, but they also get into things like references (point of view). The basics are simple enough, and if you grasp them, you can build a massive foundation. The hooks can send you off on the wrong path. You may do a procedure 100 times, but the next one, [the 101st], something goes wrong. These are the times which try men's soles. Surviving on winging it, a best, is a hit or miss situation. Presume you go check an LED for the normal voltage

across a LED and you look for the an expected 1.1 to 1.2 vdc but the voltage across the BA-50 VT LED is 1.9 vdc, Rowe part 700353-14 in a BA50 acceptor voltage is 1.9 to 2.0 vdc and what you thought was it should be: 1.1 to 1.2 vdc.

In these notes I don't mean to imply my comments are the only plausible ones. In fact they may be just surrogate to yours. Your ideas may even be better than mine, but at least compare mine to yours.

Keep in mind when you are not aware of a given procedure damage may occur down the road because you are unaware of something important. One example would be with C and E retainers. Many of these C or E retainers have a smooth side because they are made by a punch process. The smooth side should always go toward the bearing or roller. The other side may be sharp enough to cut into and wear the nylon bearing or roller.

The learning process means many hours spent in one way or another. Schools, classes, seminars, reading trade magazines, even reading notes like mine, are just a few of the places you can get knowledge. Day by day, you can increase specific knowledge and at the same time increase your basic background which is very important for the long term. In the long run, I feel the basics are more important than the specifics. Being able to read a meter is simple enough, but, do you know what to do with it? Let's take a look at an example :

Rowe bill changers have a coin counter which counts the coins as the coin blocks the light going to a sensor. It is easy enough to see if a lamp is lit or not, but sometimes it is not easy to find the problem. The newer machines use an LED for the light source. The LED could be out of alignment. Have you ever read the manual and done the voltage tests on a counter sensor? I will take the position you have not gone through the manual and know how the counter test is made; let alone actually made the test with a

meter. As long as you got the machine fixed by replacing the board, fixing a wire and/or sensor then there is no need learn how to do the test is there? Why learn how to test for the voltage which should be at the sensor and the check voltage of the other wire to see if the counter is working? If you have read the manual, and learned how to make the test before you ever had to, maybe there is no need for you to read any more of these notes. If you have had a problem with a sensor and never made the voltage tests then you are just to busy and maybe you don't have the time to read these notes. If you did have a sensor problem and had a spare counter assembly in the truck or tool box, know how to test the counter then you know what I know. I'm being a bit nasty here, but I met to be..... to make a point!

In the new bill changers, if a motor runs when it should not be running, extra coins will drop and the unit will come up with the error; "Check xx Det." You could end up chasing a coin detector when the problem has nothing to do with a coin counter detector failure. How much time are you going to chase a bad detector problem when it's really OK? Punch my card! Have you noticed the newer bill changers have a different coin detectors? For those who are still reading, the value of being able to do the test is one thing, and learning how do it on a good machine is another thing.

The real point is another item, and this is " What are your doing to do to increase your learning and DO knowledge? If you are waiting for the time when must do it then it is ok! Or is it? You know how to read and use a meter so there is no need for concern. I'll punch your card, you are right if the following is true: You always have the manual, meter, you know what to measure and this is all you need, right?

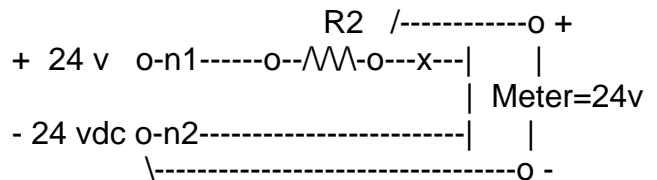
If you think I'm going to tell you how to do the test or explain why the main board, motor running, or wiring could be the problem, forget it. That is not the point of these notes. Do you have the manual, meter and know

what the voltages should be at the test points? More important, what are your comments about the above test procedure and how you would handle it if a problem/s arose.

Presume you're an old timer and feel you are to old learn anything new or you feel you have been in the business for years and got along without ever doing the test. What happens to this position when some new comer comes along and learns how to do the test correctly. If you were the Boss, who would you send to repair the machine? At what point is your worth and your professional status lessened by the fact the yute, (youth or new comer), knows how to do the test? If he knows how to do this one, how many more does he already know? How many more will he learn? Notice we are talking one of the simplest of test procedures here which is not highly technical. For the yute (youth), the message should be quite clear. You have a chance to make your mark with good sound basics which are often quite simple to learn. Ok old timer, the same goes for you. Today you can sit there and read the newspaper and find out what happening in the world, see the sports scores, or read a few pages in a manual. The choice is yours!

Lets try another type of problem :

A 200 ohm which might be a resistor, Lamp, or Solenoid.



What would cause the meter to read 24 vdc between point R2 and - 24vdc?

It would be easy just give you the answer but it is think time. Is it a trick question? No! Just basics. You can calculate the IR drop of the resistor by ohms law (E=I*R) and it must be 0 volts if you are reading 24 vdc at both ends of R. Ok, I hope you got the answer by now! There is a break or very very high resistance

in the wire between point x and the - side of the power supply so the current (I) is 0 or close to 0. The voltage IR drop is:
 Erdrop = I * R or 0amps*200 ohms = 0 volts for Erdrop so the voltage on the cold end of R(2) is:

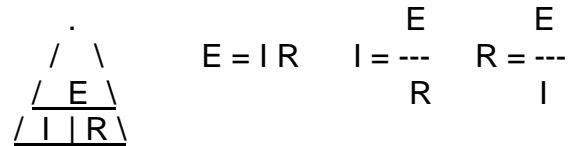
$$E = E_{\text{supply}} - E_{\text{drop}} = 24\text{v} - 0\text{v} = 24\text{vdc at the cold end.}$$

The exercise is here to poses a what if question. For those use the ohmmeter approach fine, but what happen when the break occurs only under voltage ON conditions? The ohmmeter test will not always work. I make the point of switching your reference or test procedure by changing from an ohmmeter test to a voltage/current viewpoint. Both test procedures have merit and the final choice of which test procedure would be best would depend on the problem at hand and the logic you use. It gets interesting if R was a lamp, you see the lamp is not lit, you have voltage on the both sides of the lamp and the resistance of the lamp is ok. It is like checking a diode with diode test on a meter and saying it is OK. You may later find out the diode is no good under real voltage/current conditions.

The high resistance break in a line often shows up on equipment like electronic boards as one example. With a high z meter of 11 megohms or when using a scope you may read or see said a normal 5vdc at a given point. But with a high resistance break somewhere this is a **false positive** reading. This is where you switch to an ohmmeter and instead of reading something close to 0 ohms you may read some very high resistance.

Another side of testing is using the ohmmeter. Point to point testing is a very valid test procedure. When working on wiring and/or boards, an open or short can be found. A good tech will use the ohmmeter quite a bit.

===== Ohms Law Triangle =====
 Cover what you want to find and do the math.



Another purpose for the exercise is to see if you have left Ohms Law in the closet. All too often, we have put Ohms Laws away and do not think in terms of Ohms law any more. Ohms Law has not been repealed yet so pull it out of the closet, and start thinking in terms of Ohms Law again. It is as basic as you can get. For those Mr Right guys, the R could be less then 200 ohms but this is covered by stating the R = 200 ohms and if this is not good enough, I did state an ohmmeter test can be a valid test and should also be used.

Your overview has to be large enough to allow you to see what you have to learn with regard to basics. This is not as easy to do as it sounds. For me, listening to others gives me a chance to hear and see problems from various view points. Sitting at this keyboard is just another way of spending think time about many specific items. Reading about something, even these notes, is not the same as doing. No matter how much is written, or read, only so much of the written word has value. Its like buying a music CD, record, or tape and out of all the songs, you only like 1 or 2 songs. The rest are just a waste of time and money. You will not accept ideas which are in conflict with the way you think or do things. There can be; "I am good enough" point of view and an endless amount of reasons why written words are not valid.

How many of you use the metal frame or ground point as the (-) lead of a meter connection is the same as negative or ground plane of the system and the readings taken from the ground point. One could presume these readings are valid but this may not be the case in the real world. Some where there are connection/s which bring the return, ground -end of the power supply to the metal part. If the return of the part you

are chacking is bad, then the readings can be misleading. The line/s could be open or ever worst have a resistance say 10 ohms instead of .1 ohms. This would be one of those cases where your where you place the – meter lead procedure works 100 times and this time one time, it doesn't. This is a case of reference in the true sense of the word is important. A Node(x) is a different place on the same line. The example above, the - lead was placed close to node 2 (n2) end. If the meter was placed at node 3 (n3), then there would be a totally different set of readings because there was a break between n2 and n3. As you can see in the second test, while n2 and n3 should be the same, but, there are not. To presume they are, would be incorrect from a basic reference point of view.

This is first test shown above except now the break is shown.

break or resistance in the line
^

```

24 vdc - o-n2-----/--x---n3---|
          \-----o - meter
lead

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A second test:

```

24 vdc - o-n2-----//----x---n3---|
                                   \---o-meter lead

```

Just keep in mind where you put the meter leads is important!

A side bar: You may have a surfaced mouted component mounted on a board and a lead of the surface mout may be broken away from the board by micro inchs. When you make a voltage, Ohm meter or scope checks just the placing the probe on the leg of the component restores the connection and you think everything is A OK. Wrong because when you remove the probe the ciricut opens up again.

Why measure voltages. Lets take a case of a error of "4" mag problem on a BC25 machine and the use of basic common sense servicing. What is the VDC on the mag head going to be? Where is an easy place to measure it? What are voltages (vdc) or both

open and normal head circuits. Is there a difference for other machines?

```

>----->>---+-->-----o--|
Control board [meter]      Mag head
>----->>---|-->-----o--|

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Since many problems are connectors, broken wires, poor connections, the above information is about about basic as you can yet. How do you find a broken connection under the shrink tubing on the head wire/pin? If the connection is not made, you have an open circuit, the head load is not there and the voltage will rise to the open circuit voltage level. With this procedure, it will be easy to find, if you know what causes various voltage levels such as no voltage, high voltage, etc. Tip: On a working machine, measure the head voltage at a connector with the acceptor connected, then pull acceptor, and measure the voltage on the control unit side of the connector. Record both voltages in your little black book. Put the acceptor back and with the meter connected, watch the voltage level while moving the control board, cables, connectors. Did it change?

Lets look at simple basics in yet another way. A person can get hung up by taking the long, and sometimes wrong path, when a simple basic will do the job. Example; A computer programmer who has to name a file, could use a simple name like 'foo'. Why would anyone use: Supercalifragilisticexpialidocious when a Foo will do. I write in the long form in hopes of hitting an "O yea!" in order to get people to use the short form. I have trouble writing, and sometimes, I feel I should keep my mouth shutest about certain things. Then again, I don't, and oten find a different way to say the same thing.

The following is an attempt to say something differently. It could have been written long before you where born. If given machine malfunction it returnest an error code in the event of difficulties. Thou shalt checkest for the code. If thee do not, the gods shall surely punish thee for thy arrogance. Thou shalt study thy manuals and strive not to re-invent

them without cause, and thee days willst be pleasant and productive. Thou shalt make thy service purpose and structure clear and direct, even if thou likest it not. Creativity is better used in solving problems rather than in creating beautiful new impediments to understanding. Maybe this harsh discipline be irksome and the years of its necessity stretch before thee seemingly without end, lest thou tear thy hair out and go mad on the fateful day when thou desirest to make thy machine runest.

To order to give you another reference, compare two work styles to your style, I have taken the next two paragraphs from other notes. What is your style, Paragraph 1 or 2?

1. I'm not very good with words on the written page but there is plenty of information on these pages. I would hate to put a percentage the amount of savings you could make if better diagnostic procedures were used when a problem occurs. Example: A BA50 acceptor comes in with this note, It won't accept bills. Ok, for those who don't know it, the BA50 works with a control unit which spells out the error on the display in English. Yep, you guessed it, the acceptor tested ok on the test bed machine. How would you rate this person's diagnostic and communication ability?

Do you think it might have been a loose connector, acceptor not aligned in the proper position, low line voltage, trouble in the power supply, computer programing, glitch from power bump? When I called to get additional infomation and I was told they did not remember the displayed error, but, the machine did go out of service from time to time. I asked what was the error when it went out of service. Again, they did not know what the error was. What is the biggest problem in this case?

2. How about dummies who try anyway? One person had a problem and got into the BA50 and voltages at the acceptor. He got some real strange readings on his brand new auto ranging meter scale when it changed to MV

and he thought he was was reading volts. He sweat it out, took and wrote down, the voltages from two machines. A good one and the bad one. He learned several very important things. How and where to check if 5 volts was leaving the power supply, where to hook the (-) lead on the acceptor, how to read 5 volts on pin 3 and ALL the other voltages on the acceptor, what they should be, and how to read his meter correctly. I would send this dummy to check a power supply/acceptor because he now knows how to do it like the pro. He even knows how the metal frame of the acceptor gets its ground. Can you do as well as this dummy? As a side note, I also learned a few things from him on this one because I was doing some things the wrong way too! I guess I'm a dummy too, or am I? < hehe > How many BA50's do you have to service and can you do as well as he can?

OK, what did he find out? The 5vdc varied from 3.9 to 4.95 volts. How many acceptors, computer control centers, and/or power supplies do you think you would have changed before finding the real problem? He exchanged none! He just fixed bad cable/connector pin! It was not easy. The bad connection was a pin at the power supply connector and moving cables around showed the voltage changed so it was hard to pin point just which where the problem was. All to often, just exchanging units does not get the unit on line but, it is easier to do what the manual says, replace the acceptor, control unit, or power supply. Many times this will not help. The manual assumes simple basics trouble shooting procedures like measuring voltages are done by the service person. Connectors and cables problems are basic items and these basic procedures cannot be pushed aside. In case you have to see a manual, then lets go to an extreme.

< BRUNO's MANUAL >

" Thou shall look at, and write down error code/s first"

" Thou shall look at status indicators and note all non-normal and all normal status conditions."

" Number of blinks, etc? "

" Thou shall clean and lubricate"

" Thou shall check/measure cables, connectors and voltages including AC line voltage. "

The person who does not remember the full error code or message as shown on the display is on the short end of being a good service person. Those who do not track and pass on the information is on the short side also. All status indicators should also be checked and tracked.

How practical are the manuals? I can think of several cases when the failure was a screw or something had dropped into a piece of equipment. The screw would jam something or short something out. There is nothing in the manuals about looking for a screw or other objects which should not be there. Manuals presume there is a lot you should already know.

These notes written with a several things in mind. As in the past, and as it is now, a solid base of basics and the ability to swing from one view point to another view point are really needed to be a happy camper. Better yet, a survivor.

What are we really talking about! Stress! The manual does not cover stress in terms of the person working on the equipment. Your order of things may be may not look at error codes, or count error blinks for one reason or other. Change the acceptor and/or control unit and maybe you will get it working. Murphy's law says: "The part you change will not fix the unit." Who's to said you should or can handle any given problem anyway? Nobody! Should you be able to get the job done? Maybe, maybe not! Being overly concerned if you can or cannot, leaves you on the short end of the stick. That is not the issue at all. What does the manual say, what's the error code, what's the voltage, is there a bad connection, is there a short, etc, are the questions and not if you "can or can't?!" Most people want to be able to change the position they are in when the shit hits the fan. That is generally

not possible. When a problem cannot be resolved quickly, it puts people in a position were they get a useless dumb shit feeling and this sucks. You now start complaining about the shitty way things were done or made rather staying on track with the given problem at hand. Your left side is now shifting back and forth and you are not in focus anymore. Add the stress from other people and things, now life really sucks. I have taken a very negative position because it may be a good place to reference from. Take any case you want and start at the very bottom. There is no way to go but up. The rewards of coming up from the bottom are quite high, if you can allow yourself to enjoy them. This can help stress reduction. If you're driving some place and get lost, you can stop and ask someone, get the map out, or whatever. You may not think clearly if panic disorder sets in and takes over, but if you keep your cool, you will get where you want to go. It may take extra time, and gas, but you can get there. These notes are an attempt to lay it all on you. Maybe even change your order, or references. I have done my share by writing these notes, The rest is up to to you. The information supplied here is mainly common sense and nothing really heavy. Ohms law is no big thing, and, if we could get rid of Murphy's law, we would have it made! No such luck!

There is another item which may be even more important on a personal level. In today's profit and lost world, there are very few places, or times, where you will be told you did a good job or have worth, but, you will hear about negative action/reactions. Your own self worth comes from within and based what you do or don't do. Validation, more often then not, will come from within rather then from others. In the work place, the term "just another body" does exist. The expression has merit from a Company's position. We go full circle and it is case the reference, or point of view. Some people get on the wrong road and never find the right road. They solve loose pins or dirty poor connector problems not by cleaning it, or

tightening/replacing the connector pin, but build the copper pads up with as much as 1/16 or even more of solder! When the board is installed, it will spread and wreck the female socket connector pins. What might have been just a loose pin which could have been tighten, or replaced, many pins are now wrecked and they become hard to remove. Maybe just a cleaning with contact cleaner and a brush was all it needed. Maybe cleaning the board contacts with an eraser was needed. Sometimes damage from heat from the iron can cause the copper to come right off the board when an attempt to remove the solder is made. The copper is gone forever. If the board is serviced, the cost of replacement is going to be very high because an improper procedure was used and wrecked the board. Loading the board with HEAVY solder coating is a NO-NO! It leads to other problems and higher repair costs down the road. When the board is plugged into a machine, connector damage is done. If the board is serviced, do not presume the screwed up board will be plug into the service bench connector, or another machine. Grossness is grossness and short term fixes can be the wrong the modus operandi.

Basics 101 has to cover a very common problem with electronic equipment. For any number of reasons, intermittent solder connections occur. Some make take years before they show up. Many of these problems occur because at the onset the metal lead/s where not clean or fluxed properly when first soldered. With time, additional oxidation occurs and connections become intermittent. Many of these bad connections are hidden under what appears to be a good solder connection. Running a hot iron over the connection may not be good enough to fix the connection. You have to remove the solder, scrape the dirt and/or oxidation off and maybe even replace the part or wire and then re-solder the connection. The bad connection might be one the solder leg of a connector, wire

jumper, relay, capacitor, resistor, LED, photo transistor, diode, etc.

Another item of concern is temperature and it's effect on electrical and mechanical equipment. Temperature related problems can be difficult to find. Who would think a cold temperature could harden the rear rollers on a BA acceptor and then the sharp edges of the rollers would cut the dollars bills. A few degrees warmer and there are no problems. When tests are made, you may turn off the equipment to swap some thing and the problem goes away so you presume the unit removed is the problem when it was another part of the system which cooled down. You have to keep an overview you do something, how it effected the operating temperature, and learn not to make quick conclusions. You may not be correct if a temperature related problem exists. Many problems happen within a very tight temperature range. A few degrees, one way or another, and the problem could go away or occur. You may get a machine back on line and a few hours, or weeks, but later on the problem occurs again. Just opening the door or killing the power for a very short period could make the difference. Sunlight falling on or air stream from heater, air condition, blasts of air from a door could create a problem but may not present when you do your testing. There are many variables to consider and you can spend a lot of service time finding a problem if you do not look at problems where temperature could be a factor. In the paragraph before this one we talked about connections and temperature can effect intermittent connections.

History shows my recall rate of repaired equipment runs about 2 %. This may seem high but most of the 2 % is due to people who do not adjusted speed, adjust mag gain correctly because the manual procedure is not valid, problems like voltage, bad cable/connectors, did not use correct switch settings, used wrong plug as in the case on the 4900, CDs and the new version CBA/UBA modules, or problems elsewhere in the machine, etc. Here is the hook, if the

'real' repair failure rate is really much less than 1 %, how does one explain those tickets with "Tested ok" written on it? What can you say when "tested OK" appears on rechecks of 5 % or more (10%) of the equipment you had repaired? How many times have you asked for a unit to be rechecked, and even before it is tested, you had a feeling it might be ok when tested on the test bed. Wasted time time to put the unit in, take it out, bring it to be re-checked, re-install it adds up to a lot of lost time and money. There is another related item occurs with the re_test of equipment; The switches are not set correctly and/or the error code or number of blinks is seldom given. It don't work; It won't accept bills, etc, is the type of report generally given. Many times this occurs with people who have been in the business for years. Winging it will not work! The repair persons focus goes right to the repaired unit is defective and the focus is so sharp, nothing else enters the picture. Switch settings or re_programing are as basic as you can get, yet they are often overlooked or forgotten. People have no idea or reference when something was done incorrectly. If you find you have gotten, or getting, retested units marked 'tested OK' units, then go back and see what areas you are weak in. On the average, we are talking 3 units out of 100. Anything more the 3:100, means one of two things; you are getting all the bad units, or there is an impairment some where. Deficiencies can exist and observance of the real problem can elude you. If a paradox does exist, perhaps now is the time to re-evaluate the service strategy currently being utilized when a problem exists. I would be the first one to say a problem might be with the repaired unit, but not to the exclusion of everything else in the system; including operator errors or a lack of awareness. It could be explicit diagnostic, or setup procedures are not being utilized by the service person.

Another issue is rough handling. We see this in an area like the OBA connector assembly were the connector is loose and now has poor connections. The acceptor now runs by itself, motor runs wide open, no longer

accepts bill etc. While these bad acceptors are counted has a recall with a real problem, many of them had the connector pulled away from the board and in some cases even the copper was ripped off the board so the acceptor could have never ran on the test bed. Some where between final test, and the return of the unit, excessive damage has occurred.

With dealing with electronic equipment service, you might presume it is a case of testing a single part like a diode which you think is bad and replacing it. Thats true, but, many tests used to find a bad part are not valid in terms of confirming a part is really good. A test for a part may identify the part is not BAD, but it does not identify the part is a GOOD part! The only time I know the part/s are good is when the system is up and running normally. Hence Bruno's Law exists:

A part tested with a test may indicate the part is 'NOT BAD' but the test does not mean the part is 'GOOD'.

The odds of getting a NEW part which is defective are small but it can happen. Nothing says replacing a part with new one will always fix a problem. It may even make the problems worst because the part may be defective or out of specs. In a case which will be noted below, the odds could be calculated on 5 bad units out of a 1000 or 5 out of 21. Even 5 out of 21 would be quite large. What difference do the odds make when you install a part which you presume is good is defective? At this point, the odds are 1 to 1 and the unit does not work. You have to keep this in mind when things don't work out. Recognize that in the end, the odds of getting part which is bad is 1 out of 1. Lets look at part like a motor which may not have the same specs as the original. Bill changers have hopper motors. The replacement motor may be a bit longer the original. There is a cover on the rear of the dispenser to cover the motors. The later model covers has holes in the cover to clear the longer motors. Older covers do not have these holes. Install a new motor and replace the cover without the holes and the cover puts pressure on the

motor shaft. This may keep the motor from running or it adds extra resistance on the motor. The fix is to buy new cover or drill holes in the old cover so the shaft clears the metal cover. The point here is: You think you have the correct part and presume the specs are the same. You think it should work. Wrong! Some people are 'place it safers' and may even ask the parts person, "Is this the correct motor replacement?", and the answer will be "YES" because it is the right replacement motor. It may not be the same, but it is the correct and only replacement.

Mag amps and Caps.

A mag amp might use an electrolytic cap and if it goes go bad, the gain and frequency response fail off. Changing the cap might restore the amp to normal gain and frequency response provided the cap is the correct value. Just because a cap is marked 2.2 mfd this does not mean it is a 2.2 mfd. As one example, a new 2.2 mfd cap measured 1.83 mfd and the unit did not work. The 1.83 mfd changed the designed frequency response of the mag amp. When adjusting the mag amp it went from a "4", "7" then an "F". It would not accept a bill not matter where the mag gain was set. Shot-gun repair, like changing a cap, can cause problems and leave you at a dead end since you already put new part in and it still does not work. Normally the "companies" does not supply the response curve of the Mag amplifier. We can't get the info. You are on your own unless you have the proper equipment and time to plot the frequency/gain curve of a good Mag amp so you could reference the plot to another amp. The important thing is to remember is a new part may not work!" Again, the real odds are 1:1 if it happens to you.

Some multi meters can measure the value of a cap but don't presume because it reads the correct value the cap is OK. Under a normal operating voltages, the leakage may be large enough so the cap does not work correctly. The meter test may show the cap is

not bad, but the test does not mean the cap is good. Temperature and moisture can effect the cap and these conditions may not be duplicated when the cap is 'tested'. Even if a cap tested ok, the heat of soldered the cap into the circuit can damage the cap. You guessed it, 1:1 odds.

Diodes are very simple devices but generally they test open, short, and sometimes are leaky. Sometimes they test OK with a ohm meter (even on diode test position), but diodes can break down with voltage or when voltage spikes are on them. The meter normally places a very low voltage on the diode so the test does not mean the diode is OK. When full voltage or spike is applied to the diode, it may break down. We already covered new diodes which could be are marked backwards.

Numerous technicians will check a cable by using an ohmmeter and placing the probes on the metal pins of the connector. The probe cannot be put into the connector so exposed part of the pin or connector is used. It's assumed if the wire is connected to the metal pin so the cable is ok. Is this true? No! There is another important item to consider. The pin has to make contact with the other pin or connector. The cable test does not ensure this connection is going to be made. Often the contacts have loosened up, get dirty, bend out of shape and are marking poor, or no connection. One test is to take a connector and insert it into the cable under test. The ohmmeter test is made at the mating connectors. Keep male and female connectors or pins in your tool box for cable testing. Besides open wires, the connection through the connector is required for the equipment to work.

An alternate test can be used if you know what to look for. A voltage or current tests can be used. The pit fall of this is the old case of high resistance and the voltage is there under a no load condition. 117 vac reads 117 vac in an open circuit. Put the load on and it's only X vac. An example would be only 1 vac at the motor. That may not be

enough voltage to do the job. It may appear the motor is bad, but this may not be case. The problem is the high resistance due to poor contact, wiring, or something like a bad connection or connector.

Ohms law: $E_{drop} = 117v - 1v =$ a voltage drop of 116v with Motor R of 5 ohm

$$I = \frac{E \text{ 1 v on motor}}{R \text{ 5 ohm of motor}} = .2 \text{ amps}$$

$$R_{dropresistance} = \frac{E_{drop} \text{ 116v}}{I \text{ .2 amp}} = 580 \text{ ohms}$$

Simple ohms laws gives us an idea of what we are looking for in terms of values. Who has a calculator on the bench or in the tool box? Perhaps this is why true basics which are missing.

If the current in another circuit was only 2 ma (.002 amp) we would have another set of values. Getting back to the 580 ohms, this might be a bad relay which hits a high value once in 500 pull ins. Your ohm meter might show the contact resistance of 100 milli ohms when you test it yet on another closure test, the contact resistance might be 580 ohms. Again, we get back to a basic law, your test procedure and/or meter may not be a valid test.

How test are made are very important when it comes to cables, connectors and connection problems. Not amount of unit swapping will fix problems unless it is located within a given part of the system. Example: A BC25mc machine with the acceptor motor would hum but not run. Was it the motor cap, acceptor, power supply, control board etc? No, it was a connector pin on the cable coming from the connector box on the back wall to the power control unit. A new pin and problem was fixed. In many cases, math and Ohm's Law is a quick way to find out what you need to know. Ratio math is also another math tool you can use in some

cases. Many people do not feel this is important and can locate the problem and fix the machine. I would have to agree with this in some cases. If you understand the reasoning, then you got it! As I see it, if you don't how you got there, the reason for the failure is important. In the long run, it is a level of basic understanding you should have.

Voltage or resistance measurements are only valid if you already know what the measurement should be. Record valid measurements for future reference when the unit is working. Don't presume the values given in a manual are always correct. A 8.5 vac transformer and bridge with give you about 11 vdc but the manual may state the dc voltage is 8vdc. In one case, the manual says 10 vdc at a given point, but a filter cap was added to the circuit after the manual was written and the voltage is 16 vdc. They are many manual voltages which are not listed correctly.

Some CBA2/UBA2 units have what looks like it has a simple transformer but it is really a transformer with a bridge rectifier and a filter cap. The output voltage can range from 12 to 18 vdc depending on the AC line voltage and the load on the power supply. If it goes below 12 vdc, under load, you will get poor acceptance. Many control units have a built in 5 vdc regulator and if the input voltage gets lower then 8.5 vdc, the unit may not work correctly.

Many people only read voltages after they have reached a dead end and still have a unit which is not working. They spent a lot of time and money swapping acceptors, control units, etc, and then have to look for the real problem which is the AC line voltage or the power supply. Just looking at LED indicators does not really mean much in terms of what the voltage really is.

In other notes, I cover there are really 3 important parts to a dc voltage. The AC line voltage input, the dc value and also the ripple (AC) part of the dc voltage. Problems may

show up with high or low line voltages so an AC variac is a good device to have on the test bench. Power supplies should be tested with a load. Having a meter with MIN/MAX hold feature is a good investment since the AC line, and other voltages, can vary greatly. The ripple (or hum) value is very important. You may think you have enough dc value but the ripple is so high the unit will not work correctly. The unit might appear ok most of the time but strange things happen and you have not idea where to look for the problem. The problem might just be a bad cap or a cold solder joint on the filter cap. A scope to measure ripple is nice, but a good digital meter on the AC scale will give you the ripple value too.

If you have browsed some of my other notes, you know about stickation. Lets say the relay contact plating is gone. A hot arc welds the contacts and it holds closed for a short period after the coil voltage is removed. The motor keeps running until it opens. You could be chasing motor, brake, micro switch, etc, problems when it's a case of the voltage is still on the motor. It might be a relay or some other switch problem, like a transistor, triac, etc. You have to swap parts, use the meter, or other measuring device like one of those neon lights to see if the voltage is on or off. Maybe I tricked you ! A neon indicator device only requires a very small amount of current and just the leakage from caps, varistor, or filters could leak enough voltage to light the neon. The light be may be lit, but under a normal load, there is not enough voltage/current to do the work. This can be another non valid test. A meter could read full voltage depending on the amount of leakage or the load. Even when using a meter on 24 volt circuits, you could read a normal voltage without the load connected, but never have enough to do the work required. Lets take a look at a real case. You pull a connector looking for a voltage on the pins. It might be any voltage like 117 vac, 24 volts, 5 vdc and its there. You put the connector back on and the motor still won't turn, the 24 vdc light or relay does not work, or the 5 vdc voltage drops to .1 vdc. I'll bet you'll swear you

checked the voltage and cable and everything is OK. In the real world, you could be wrong because a test is not valid without a load. You disconnected the load when you pulled the connector. The high resistance could be hidden and this can drive you crazy!

Tools and parts are very important if basics are going to be carried out. If you are going to measure the voltage on a CBA/UBA, are your meter leads small enough to reach the pins in the connector?

Do you have hook type leads so you can hook to a lead or connector?

Do you have wire with clips attached (Jumper)?

Do you have an AC cord with clips on it?

Do you have plastic card?

Do you have eraser?

Do you have switch Cleaner?

Do you have needle point oiler?

Do you have a logic probe?

Do you have your notebook?

Do you have a meter with MIN/MAX hold?

Do you have good flashlight?

Old timers, Do you have your magnifier?

Do you have the manual?

Do you have correct light bulbs?

This could go on forever, but I think you get the message. If you don't, chances are you don't know what to do with these items anyway. I won't even get into items like contact cleaner, eraser, rubber drive cleaner, hopper brush with the other end shaped into a chisel, Dry Slick, photo cell cleaner, and a Magic wand oiler, etc. Who needs all this stuff anyway. There is nothing in the manuals about this stuff anyway, so forget it, right?. Does any this make a difference anyway since you do not have any parts or spares with you anyway. It could have been a micro switch but you don't have one. If your lucky, maybe it is just the adjustment of the micro switch, but are you lucky? The problem maybe a bad motor which got wiped out by the driver card or visa-versa so both are bad!

A problem might be the acceptor and the bills are getting hung up coming out of the acceptor and you find the rear timing belt on

the BA acceptor is an old one and you just happen to have a 1/16 punch, metal block for under the gear, and a belt so you can fix it right away! As soon as you leave, your called back and the stacker and bills are stuck again. It looks like the bill should have been rejected but it gets stuck on the anticheat lever which has little nicks on it. No problem because you have an anticheat lever in the truck but you don't have your truck with you today. That's ok too, because the truck is parked so far away and this whole thing has beaten you into the ground and it's late. Besides when you took out the acceptor the 755 bulb blew out and you don't have any of those either. The soldering iron does not work anyway. Let's see, you may have a stacker problem, the board could be bad, the acceptor don't work and it's time to quit anyway. It seems you do not have the parts, tools, and thus unable to handle the repair today.

Let's say there is a stacker motor problem and it does not run. What is the easiest way to get killed? Take the AC cord and hook it to the motor and you might blow the main breaker because the motor is shorted. After you find the breaker or fuse and turn on the breaker, then you can measure the motor with ohm meter to confirm it is shorted. Presuming the motor is not shorted, then you can hook the cord up and smash your finger in the stacker when it starts running. You now know the motor is ok and the gear box and linkage is OK, but your finger isn't. That leaves you the problem of finding out if the problem is in the rest of the stacker, all the driver card, relay, transistors, etc. It is possible the board or the cables to stacker are bad but you do not have the manual to find out where the drive signal comes from anyway. A relay coil may be open and does not pull and a person can do several changes of transistors, diodes, IC changes, cable swaps, etc and never find the problem. What ever happened to the voltage and resistance checks and where does presuming the relay was ok come from? The relay coil looks ok, but the coil may be open!

Any diagnostic process requires you have a basic idea of what should happen... Error blinks or status codes may be given, you change a unit and you're all done. Yesterday I might this, but today as I see it, fundamentals makes it simpler to handle various problems because just changing a unit may not get the system back on line. This is when you have to know basics and how it should work.

People are hungry for information providing it's a short direct route to resolve a problem. The information they seek may have presented before, but, it gets lost and has to be relearned again. There is no chain of references which can be called upon to get to the root of the problem. That in itself, is the root of the problem. We get back to basics, or the lack of basics, needed to handle the various problems. It might be as unpretentious as a switch setting got moved, or a serious problem where one part of a system blows another part and it goes back and forth blowing each other up all the time. It could be a bad connection with a pin on one of the connectors which stays with the machine, even worst a cable short, a shorted solenoid, or bad diode. If you got lost driving some place, you would look at a map or ask someone for directions. When you look at the map, you would first look around and see where you are. Why is it, when you have a problem, many times you do not even know what error code is, number of blinks, or what error message was given. You have to do some pin pointing to find out where you are before you can get started in the right direction. The error reports are like street/road signs and many people are too busy looking elsewhere, or under stress, do not use or see them. Why not look first?

The whole thing is the same as a bunch of Murphy's laws coupled with the fact you always have something new to learn. It seems once you got rid of one problem, or learned to handle something, this just makes room for the next one. It's a never ending thingy! How does one account for a missing

screw turn up in a an OBA which blows the control unit sky high, or a screw, or nut in a dual stacker locking the motor up so tight it just sits there and hums. It does not move at all! By the way, in the manual you will never see : " Look for a screw shorting or jamming the unit "! For those who think the manual has all the answers, or should have, forget it.

I got one for you, "Operator error". Ever see this one in the manual? Who set or moved the switch/es? or, who did not put back those spacers for the CBA in the R92, R93, R94 or Wall Box? Mr/s Nobody must have because it was not you, so why worry about it! Everything is not in the manual! How about when some one put in the wrong transistor or installed the wrong value cap, or installed the cap backwards? Operator errors do happen!

Blunders will be made from time to time, but the crucial item is you learn from the mistake. After the deficiency is noted, think time can be very helpful in expanding your base references. Mistakes can be an important learning tool. If you took wrong turn, you may have to go back and take the correct turn! When you are working by yourself, you may not have someone to give you a hand, so it's easy to go down the wrong path. You may get stickation of the brain and may not know you have gone down the wrong road. Sometimes it's your own fault because you do not, or cannot, take a few minutes to do whatever you have to and make it easier for yourself. Panic disorder sucks!

Your order of things becomes important in finding even the simple simplest of problems. Lets say there is a short in a machine. It might be any of the voltages. 5, 12/14, 30 or 40 vdc. These voltages are cabled or harnessed to various parts of the machine. Lets assume you have checked or swapped out the power supply and you are now faced with the problem the machine does not work. What do you do next? Simple! Basic rule " Divide and conquer. "Simple, looking at the manual, disconnect at plug connectors or pull pins out of connectors the various lines which carry the voltage to various parts of the

system. You may elect to pull everything (stacker, control board, dispenser, acceptor, out of service lamp circuit, coin acceptor, various harness cables, etc) and just leave the power supply. You then start re-connecting harness cables and various sections until you lose the voltage again. Divide and conquer allows you to narrow the search from any where in the machine to a specific area within the machine. Be aware the some voltages come from another voltage. Perhaps a 5 volt source gets it's power from a 12 or 14 vdc source so if the first voltage is not there then you don't have the second voltage.

Other factors may also exist. In a ROWE bill changer the 40 vdc comes on only if the system is ready to run. If you don't have 12/14 vdc, the computer does not run so the power relay off and this will keep + 40 vdc off. While you have to look at various factors, 'divide and conquer' is a very simple basic procedure. Do you think I remember what the voltages should be on all the pins on a BA50 acceptor ? Of course not! It has 13 pins! Do you think I reach for the book every time I want to check the voltages? Well the manual does not have all voltages listed on one page. You have to look in one place for this, and another page for more information, and yet another page for cell voltages. Ok then, what is the answer? I took time and measured a working acceptor marking them down on a sheet of paper. I made some notes what the pins are and what the voltages should be. How many of you have a notebook what all the information you cannot remember and need to have at one time or another? The BA-50 voltage data is basic data you will need. Call for for help and say it don't work. I am going to ask did you check the voltages at the acceptor? What is the error messages? Did you check the cell voltages? Are any of them bad? By the way, the print in the manual is very small. If you did not have enough time before, now you have less time because the machine is down and the problem may not be in the acceptor or control board so exchanges may not get the machine running again. A voltage sheet,

or a procedure you use to get and retain data has to be done by you. It has to fit your style of doing things. Several of the better service people say, "Let me write this down in my book." God knows what else they have in the little black book. They take an extra minute to keep the information they need recorded in a place where they can get it when it's needed! I write about good basic procedures and I wonder how you handle the BA-50 voltage sheet? What's your style, and more important, does it work when the shit hits the fan?

Another item I use is the work/pull sheets which has the common parts needed for OBAs and BA acceptors. That's another aid I found handy. Many of you have already seen them because I have given them to you, or you got them other in the notes. These are my sheets made for me and may not fit your style of doing things, but what's your alternate? Do you have one, or do you wing it on a day to day basis? When it comes to my sheets, I was not going to wing thru the manual every time I wanted to do find common part numbers. The manual did not have the information I need in one place so I compiled the list with most of the parts I needed on single sheet. These sheets, notes, etc, are just common sense tools needed to get the job done without hassles.

*/////

Mr. B = Bruno
You = Someone with a prolem...
A telephone rings ! ring ring click!
Mr B. Hello!
You How are you today?
Mr B. Let me check.. Not to good! Thanks for asking, What's up?
You My bill changer won't accept any bills!
MR B. What kind of bill changer is it, a BC what?
You I don't know! It's a ROWE! I don't have any spares! Can you help me, What do I do?
Mr B. Sure, Repeat after me:
" Our Father, Who arth in Heaven.....
or

Mr B. I can't help you today, Some one borrowed my magic wand!

Just being funny, right? Not at all. It can be a serious problem when a machine is down, but the amount of help depends on the amount of input. No gazinta, no gazouta! Perhaps if you have gazinta then maybe you could get some help like: Get the manual out and you can see where 5 volt comes from and where it goes: See the power supply card and the +14vdc line which goes out to the 5 volt regulator. Notice the 5 volts output goes back to the power supply card on one pins and then goes out of the card on another pin. From there, the +5 goes to the dispenser, coin mech, and acceptor. BTW, What is the line voltage? I can't count the number of times a problem was not in the machine or acceptor but it was an external problem like an AC line voltage problem.

Here is of my favorite stories is one about basics at root levels. When I was just a kid, I helped my father work on our old house. At some point, we worked on the AC wiring. My father had the light bulb and socket with 2 wires which I used the light as a test unit. We did not have a meter. Over the years, I learned a meter did not really lie, but many things could happen. Many circuit tests need a real load to see what is going on. I also learned the Neon light tester showed you there was 117vac on a circuit but the 117 vac may not have enough current to drive a real 117 vac load. Many years after those early light socket years I still go out of my way to use 6, 12, 24 and 117 volt bulbs. It's better then a meter in many cases because I am not misled by what I see on a meter. I never realized until I started writing these notes, why my roots are so deep into plain and simple basics like that light bulb. I thank my father for starting me off with the root basics which got me started with all this electric jazz.

In the 8th grade, I started to hang around a radio transmitter building and an Radio Engineer by the name of Jack Keeler who started teaching me Ohms Law. Jack taught

me Ohms Laws and a lot more. I did the math problems he gave me but it did not mean much at the time. Years later, like with my fathers light bulb, I started putting things together! O Yea, the light came on! < grin >

When it comes to reference points, ground, this with respect to that, bias, etc, Jack did one hell of a job when seaching reference points. When he is teaching me I never knew the buzz words and algorithms would reach way beyond a circuit and Ohms Laws. They would become a part of my mental process. He taught me I could see, and talk, about things from a given reference point and I could also see and talk about something from a totally different reference point. In fact, view the same thing from many different reference points of view. The EST forum teaches "What is, is" and what is, depends on what you think whatis, is! Got it? Now you don't have to paid for the EST Forem!

As a side note, Jack was a ex New York City cop who got out of New York before he got killed. He took GI bill and went to school. He got his FCC First Class Radio Engineers license and moved to New Haven Connecticut where I was living at the time. I did not know it at the time, but Jack was using marijuana and maybe other drugs too. He would take off once in while for short periods time leaving the 'KID' in charge of the transmitter and logging. Years later, I reflected why I never got into drugs of any type and I remembered Jack's suttle but forceful influence on not starting with drugs in any form. Well maybe it was not so suttle. Jack said "Drugs can may make your life hell and cause you to die before your time." I did not even know what the hell drugs were back then but never the less in the back of my mind I remembered the words and it stuck! My father and Jack left me with many other things to do. Yes, one of them was to get my own 1st Class Commercial Ticket and also amateur ticket and the call sign of W1ETF. I now thank them both for what they left me; An order of things which I do and enjoy.

Other people helped set frames of reference for me. One being a ham radio friend of many years. I would have to say Joe (Buddy) was my best and dearest friend. He passed away many years ago but thats another story. Buddy was into to electronics and had all kinds of ideas about many things. He thought of ways to do something but always from his own frame of reference and more often then not applying something new and doing things that had not been tried before. When you are not limited by following the way people have done things you may can come up with something new. Buddy. time after time, showed me that an unlimited approach has a lot of merit and often brings great results I touched on using basics and coming from an unlimited reference. Doing something, maybe even new, can bring wonderful results. Thats what Buddy did almost everyday of his life and I was there to add positive input and sometimes became a frame of reference for him not to do something a given way. Joe's (Buddy) list of credits, patents, projects, large chunks of money, and losses too, are not important but what is is the frame of references from which he worked from. Some of Buddy's position not to stick to prescribed references points rubbed off on me and since Keeler had shown me there can be more then one reference point it was quite easy for me to mix Keeler's and Buddy's views on my own frame of references. Along the same lines I had another close friend, Charlie Vaughn is also long gone friend and mentor. Charile was another person who took quite a different path then most people in the way he did things, both in ham radio and every day life. Oddly enough his amateur radio call was W1-QAK. He designed and help me build the first [that we know of] 4-400a one kilowatt transmitter on 2 meter (144 megacycles). I spent many hours with Jack, Charile and Buddy both on and off the job. I hope you have some friends or people you spent time with who are as different as Buddy, Jack Keeler and Charlie were. They have, do, and will always effect the way I look at things and do things.

Back to you and your own magic wand. I leave you with the light bulbs, ohms laws and hope you see the light go on both on the equipment, and over your head too!

When it comes to doing a simple process, like a lube job, can you beat the odds and make it work again? Perhaps not when you waited for a full failure mode. By the time the failure occurs, excessive damage may already exist and the unit now needs repair. A simply lube may not get the unit working again. The head may be worn, belts defective, module or control unit blown, etc. Routine maintenance is one thing and panic repair is another. The stress and problems are compounded when working on unit which has deteriorated. When using a modus operandi new to you, like cleaning and lubrication, start with a unit which is working. This makes a lot more sense then trying it on a unit in a failure mode. Other problems will only confuse a simple procedures like cleaning and lubrication. Do one thing at a time!

Rowe acceptors do not jackpot (dump money or give credits) when salted but they generally don't work after being salted. The salt must be washed clean right away. Even with washing, corrosion may have already started. Salt on shafts and pins (alla for head pressure rollers, etc) may cause binding and the free movement of the assemblies or roller/s is hampered. Replacement is generally required. Salt on electronic parts may eat away metal parts. Some can be seen, cleaned, and repaired but many parts such as photo cells and LEDs may be corroded or will corrode in time. These devices may have to be un-soldered, removed, checked and the salt removed or the parts may have to be replaced depending on the extent of the damage. The extent of the damage may not be seen at first glance. It may have reached the Mag head assembly or logic board of a CBA or UCBA, pressure roller/assemblies, interface boards, connectors, connections, photocell or LED leads, solenoids, motors, lamp assemblies, etc. Sometimes the damage to parts is so

extensive, unit replacement maybe the cheapest recourse. Rowe has returned many slated acceptors as non repairable. The best way to handle salting is to remove the motors and solenoids, wash the entire acceptor right away (give it a bath) and then air blast the acceptor completely dry and then take it from there. There may be hidden areas you have to find them and take extra cleaning, repair, or replacement ac-tion.

Before ending these notes I have to say a little bit about denial. Most of what I write may end up in the trash can because it does not match your style (order of things), or you do not have time or money to do this or that. The end result, one way or other, is denial and/or a lack of action. Denial exists at many levels so I made comments about items like frames of reference, right and left brain, and a lot more which reflect back to denial and/or lack of action on your part. You may have to go back and reread these notes from a frame of reference where denial does not exist to get to the nucleus of these notes!

*/////

>> Meditate on this repair list listed below! <<
^ this word from a 16 year old woman!
^ How's this for upmanship?

The list of repairs below will show some of the problems repaired. You will see some units tested ok. Remember in most cases, the problem/s, or error codes, were not given! There are a few cases where soldering connector lead/pads was required. Many required rebuilding. Remember an acceptor exchange is not only a repair but requires rebuilding the unit. Lube/adjust on a repair is needed because of no preventive maintenance was being done. The Lube/adjusts were done because it WAS needed. The problems below are real and so are the field problems where finding out which part of the system and/or cable/connectors were bad. I once saw someone attempt to find a open wire in a cable using the meter set on diode-sounder position and the equipment still connected.

With connected equipment and just using the sounder (beeper in the meter), the person did not find the open wire!

The following list of equipment repaired is partial, and random:

CU = Computer control center

PCU= Power control unit

PS = Power Supply

PCU PS card contact burned, Bad connector pin on connector in PCU Fix = New 418 PS card and new Mod female connector pin in connector. PS 418 card 4 diodes

PS 418 card PS card 30 volt section blown away

PS 418 card PS card 418-01 Fill connector holes

PS 418/PCU No 14vdc, bad female in PCU connector

Acceptors All Photo cells and LEDs eaten away by salt

BA-3 Poor acceptance, pressure roller spring.

BA-3 Rebuilt

BA-5 Tested for days - OK Juke box on test bed but jukebox PS down to 8.3 vdc

BA-5/55 Reset front roller and spring, light guide, 2 755's

BA-5/55 Exchange/rebuild, Should have been repaired, not exchanged

BA-20 Rebuilt

BA-35 Eating bills, Back roller slipping, plus Nicks in lower part of the anticheat,

Missing clip on back roller shaft,

Mis alignment of stacker,

Anticheat tight on shaft

Oil on anticheat/shaft,

Dirty anticheat shaft,

Cutting bills was rear rubber roller with sharp edges. Bad if really cold.

BA-50 Rebuild, 2 years old, Dry, dirty (was not taken care of)

BA-50 Tested OK, Tested OK, Tested OK

BA-50 VT error dirty leads on VT cell - cleaned and re-soldered

BA-50 Accepted bills OK, dry, lubricated it

BA-50 VT cell voltage out of spec, cleaned cells. all ok now.

BA-50 VT error higher than 1.25 v, installed new version 2.4 programming

BA-50 Solder connections on connector interface board in acceptor

BA-50 Anticheat kit BA-50 Rejects a lot of \$5. Upgrade to v1.1-38 software.

BA-50 Rejects a lot of \$5,10s Upgrade to V1.1-38

BA-50 Speed slow, lubrication required.

BA-50 Head pressure rollers and assembly pin slated, binding, replaced them.

BA-50 Poor/no acceptance. Metal flakes on pressure rollers. Use tape cleaning card.

BA-50 VT error, new LED, still to high, new -02 cell, OK now

BC-11-01 cu Cap, removed A No-no solder job. They piled > 1/16" on connector copper.

BC-25 25 c Bucket driver transistor, gave him diode for solenoid.

BC-25 Z2, Removed solder piled 1/8" high on connector copper. BC-25MC machine

No acceptor motor run, just hum,

Power unit-bad connector pin.

BC-25 machine No 30 vdc, Red wire shorted to ground at acceptor.

BC-35-01 cu Pay out switches on-off set reversed, Someone did not look at the "on-off" as marked on the cover.

BC-35-20 cu Tested OK

BC-100VT problem, voltage low, resistor connections on PS board. Added wire jumpers.

BC-1200 Various errors Power supply board connections, same as above

BC-3500 Various errors Power supply board connections, same as above

BC-3500-01 cu No note - Came up with error Det Long. Reset it, unit OK.

BC-3500-01 cu Check Rt Det, extra coins dropped when right motor ran, triac

BC-3500 mach Rejects a lot of bills, bad cell voltage->+5 bad acceptor, Poor connector pin acceptor power supply connector.

CBA-1 Lube/adjust

CBA-1 Lube/adjust Pressure roller, cell assy

CBA-1 Front belts loose. However put top latch plate did not adjust it (belt tension).

CBA-2 Lube adjust, new upper track/head + pressure roller.

CBA-2 for R92 clean and lube and spacers for mounting were missing, The CBA-2 was twisted out of shape without the spacers.

CBA-2 for R92 Lube/adjust. Same as above, no spacers.
 CBA-2 Lube/adjust + bad Mag head assembly CBA-2 Tested ok, Switches not set to 1 3 4 on for 4900
 CBA-2 Tested ok, Switches not set to 1 3 4 on for CD100-C/CBA-2
 CBA-2 Tested ok, Switches not set to 1 2 3 4 on for R93
 CBA-2 Tested ok, Switches not set to all off for 448-E2
 CBA-2 for Wall Box - Stacker motor stickation after long period of non use.
 CBA-2 Jukes & wall boxes, no spacers bars (2), between CBA-2 and frame.
 UCBA-2 Track damaged with sharp object.. They did not use mylar strip to remove a dime I found inside.
 Single Stacker Open relay coil
 Dual Stacker Micro switch
 Dual Stacker Shorted motor + bad card > triac, replace blown trace on driver card + and/or blown trace on BC12 PS interface card blown trace on BC1200 PS card. blown pin contact pin on 117 vac line.
 Dual Stacker Motor would not run, just hummed. Found a strange screw in stacker jamming the motor so it could not run. Stackers Stop cam on armature slipping and armature does not stop quickly
 Hopper motor No brake, spring disconnected
 OBA-02cu,-03cu-05cu Dirty connectors, Dirty connectors, Dirty connectors
 OBA-06cu Dirty connectors
 Motor transistor/resistor
 OBA-08cu Dirty connectors
 OBA-12cu Dirty connectors
 OBA-05cu 4 ICs cooked, cable or acceptor problem? 30vdc to 5 v short or solenoid still connected?
 OBA-12 cu Resolder 7.5 ohm resistor + wire jumper
 OBA Rebuild 6 of them. No routine lubrication had been done
 OBA Someone changed upper belts, but they did not do shafts,etc.
 OBA Lube/adjust front shaft, put blue spring on the anticheat.
 OBA Lube/adjust Creasing shaft + added the head assembly retainer springs
 OBA Lube/adjust Solder connector

OBA Lube/adjust V1 dirty
 OBA Head pressure roller and assembly pin salted.
 OBA Lube/adjust Top, creasing shafts, anticheat shaft
 OBA Lube/adjust Cold solder joints on backside photo cell (v3)

By now it should be clear we are talking about connections, cleaning connectors, lube and adjusting, replacing worn parts, etc. There is no magic wand! With a large overview, we find there is nothing more than a lot of little items stacked together.

=====
 What have we learned so far! > Just kidding!

'Foo' is lot simpler to spell then :
 Supercalifragilisticexpialidocious'

The parts you get are never the right ones. If you get the right part, it still won't work.

If you check a part, the check may indicate the part is not bad, but the check cannot tell you the part is good!

Any given part is only good if the system is working. Switches or option settings are never set right. Wires and connectors never connect anything.

Expensive exchange acceptors may not fix the problem.

Preventive maintenance means something else will break down.

You never have the manual or meter when you need it. The manual never tells you what you want to know. Manuals do not always give you the right information. You already know what is in the manual and if you do what is the manual says, it still don't work. Manual double talk is no help; It could be anything! Manual trouble section say to change acceptor, control unit, etc but doing it will not fix the machine.

You don't need an Expert computer program to find a bad anticheat lever!

I didn't know! No one even told me!

If it works let it alone. >> Just kidding!

Error codes and indicators can't fix the problem, so why trouble reading or noting what they are!

Never report why the equipment was pulled from service!

Trouble reports not never exist or just use :

" It's not working! "

Note books are just for old timers who can't remember a damm thing.

Order of things, left-right brain, and meditate, are only for 16 year old girls. BTW, I did not make the conversation up ! It's real. I did correct my bad spelling and fit the actual lines into these notes. What you saw was Danielle's questions and answers has she typed them! She sures spellie beter thann I doie!

Mr or Mrs Right are always right! I got the board/unit from our shop,

I know it's a good part! <<hehe>>

I knew all this stuff anyway!

How do you know, you don't know, what you should know, if you don't know what you should know?

< a paradox >

You're just another body!

>>> Hey! What! <<<

Don't believe every thing you see:

Bucket Power On may not be a Bucket Power On problem!

You should always be able to find and fix a problem is Bullshit!"

Prevention is better then the cure!
A 13th Century proverb!

Being at risk can be FUN? -
Someone's mental sick! Could be me!

May you have friends like Buddy, Jack, and Charlie!

MAY FEK BE WITH YOU !

At some point in time you may want to check out my other Bear notebook articles because they contain a great deal of related material. You will find them on Bruno's Page in <http://www.eastcoastamusements.com/> then: left click on: **Visit his page for service notes and tips.** **OR:** <http://www.eastcoastamusements.com/services.htm> and then click on the BEAR with the flower!!

Note: These files were checked with Acrobat Reader 7.0. Earlier versions **may not** view/print correctly. I know version 5.0 will not work correctly.

If you click on that tile name and if your computer is loaded with the Adobe reader the file this will open up an Adobe window. If you want to save the Bear Notes .pdf file/s from the Bruno page you can right click on the article title and a window will appear on the screen. One of the selections will be Save Target As. Left click on it and a Save As box will appear and you can select where you want to save the .pdf file. You can save the file on your own computer.

You will want to check the East Coast Amusements site for revised or new articles. I do have more titles in the works. Here are some the posted articles.

ROWE 4900 ACCEPTOR ISSUES
ROWE BC-1 BILL CHANGER
THE MAGIC WAND (Dick's - my favorite)!
CONNECTORS - FIXING AND TESTING (another good one)
ROWE BILL CHANGER HOPPER REPAIR
MEASURING VOLTAGES
BUCKET POWER ON ERRORS
ROWE STACKERS
MAG HEAD LOOP SECRETS
DREMEL & ROWE STUFF
FEK MOTOR TEST UNIT
OBA ACCEPTORS
JACKPOTTING, FS, BUCKET POWER ON & CRASHES
BC-8 to BC-35 Bill Changers
CBA_UCBA
Basics_101
BCxx00_bill_changers

If you have trouble printing some Acrobat drawing pdf pages:
Adobe Acrobat printing of some drawn picture pages correctly may require using Acrobat printer setup and setting Print to image on.

Please take note that East Coast Amusements is supplying the Bear Note pages on their web site for you and for me at their expense. I just write and East Coast Amusements does all the rest.

To East Coast Amusements
> THANKS ! Bruno

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