

Rowe BCxx00 Bill Changers BC100,150,200,1200,1400,2800,3500

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Before proceeding let me make say much of the information you are about to read are problems which have been corrected by Rowe as time went along. New software updates, brackets, LED, anticheat, power supply card, etc. updates have resolved many of the problems. Rowe has committed to stay in the changer business. Rowe has also updated the BCxx00 bill changer line with a new Fast Pay Feature eliminating the need for a double dump.

Over the Years I have updated many Rowe BC12, BC12R and BC35s with Rowe kits which update the old series to the new BCxx0 series and we have also sold many kits to end users. With refurbished Hoppers (Dremelized see my hopper notes) the end users are very happy with these updated Rowe bill changers. I must admit that these end users have known me for many years and they have been reading my Bear Notes for many years. They are members of the Magic Wanders Club. They have needlepoint oiliers and for the most part use them for routine maintenance. The Rowe bill changers can and do last for decades. My Bear notes show you how to take care of your Rowe bill changers.

I have split up my notes in sections so you have to get and read my Rowe notes such as: Bucket power on & updates, The Magic Wand, Hoppers + Rivet problem, Magnetic Heads, Dispensers, Voltages, Connectors - Fixing and Testing, FEK and Motor Test Unit, and Stackers articles which all have more information which is not included in this article.

Much of the data within these notes also has a strong personal position about preventive maintenance. The declaration "If it is working, leave it alone" has merit, however the other side of the coin should be scrutinized. This abstract will endeavor to pontificate ideas regarding preventive maintenance. If you find this of the commentary is controversial, so be it. The alternative might be: "No one ever told me."

FAST COIN PAYOUT: On January 31, 2003 Rowe introduced a new Fast Coin Payout dispense for \$10.00 for the BC 100 and BC 200 and Fast Coin Payout for \$20.00 for the BC1200, 1400, 2800 and 3500 bill changers. On the larger dispenses the bucket door opens and the coins drop and the door is held open and as the hopper runs dropping the rest of the coins. After the count is finished, the door closes and the escrow is loaded for the next dispense. The primary changes are a new power supply board, some minor power supply hardware changes [mount a large resistor & connect cable] and a program prom for the central control computer. The update should take less than an hour.

BC100, 200 1200, 1400 Kit

<note: The BC2800 is actually two BC1400s in one cabinet.

BC3500 Kit

Note: Once you do the update to the power supply and put the prom into the computer they will not be interchangeable with the other types of power supplies and computers. In the future, you will have to pay attention to part numbers and prom numbers so you do not mix up NON Fast Pay [double dump] computers and power supplies with Fast Pay computers and power supplies. If you do update or buy a power supply and computer for Fast Pay I suggest you clearly mark them both "FastPay.Changers"

Computer updates. BC100, 200, 1200, 1400, 3500 (not BC-150) Many people

have updated to the 79800378 EPROM plug-in adaptor board and they have the V1.1 79800378 EPROM plugged into the bottom side of the adaptor. This update does not cover Fast Pay or the newest \$20 bill. As of March 4, 2005, the latest update part number for the plugin adaptor is 27030501. and has an EPROM for double dump and an EPROM for the Fast PAY computer. This update accepts the new \$20 bill. The part number for the latest BC-150 is 27030502.

Ok let us get started. Serious problems can be faulty U ground AC plug wiring, the use of 2 wire plugs or AC power extensions. Remember we said the voltage is applied HOT to items such as motors and the low end is switched to common ground when they are turned on. I presume you have one of the U ground AC plug testers and more important, you should use it. Besides being dangerous, all kinds of unexplained problems can be caused by bad or missing U ground AC power wiring.

I have deleted many pages from these notes that had to do with problems with the original Rowe power supplies. -01 version for the BC3500 and BC100-1400 changers. Many years ago, Rowe made a major redesign to a switching type power supply. There is no question in my mind that if you have an old power supply has to be it updated yesterday. If you have an older changer, you have to open the cover on BC3550 if you do not know if you have the old supply. On the BC100 to BC-1400s if up there is a heat sink on the back of the power supply and it is still be used (connected) you have the -01 supply so update the new power card. With the new supply, the heat sink with transistor and regulator is not used. When I updated a power supply, I always marked as "updated."

The updated -02 powers have a very good track record. A very few failures I found occurred when a lead from one of the

small round coils had broken away from the solder pad. I presume the power supply had gotten a hard physical jolt and the lead became loose. Scrape the lead and re-solder it.

In the early part of the -02 run of power supply cards Rowe decided to raise the 12 vdc section of the power supply to 14.8 vdc to help the BA50 motor to run a little bit better. Check the 12/14 volts with a meter for 14.8 vdc and that will tell you if you have to do the mod. To update the power supply card change R824 from 16K to 22.1K and R825 from 1.8K to 2.0K.

Use metal film ¼ watt resistors.

R824 22.1K 1% part # 7991222-12

R825 2.0K 1% part # 7991220-01

I recommend you have a late version of the Rowe manual for your bill changer. Order a new manual for you bill changers. It will have the latest part numbers and perhaps a lot more and better information about your bill changer. The BC3500 manual will be REV K or later by the time you read this.

I presume you always measure the AC line voltage over a period. If you are having problems, the AC line voltage should be measured when the problem is present. A MAX-MIN hold meter such as a Fluke 12 is a good way to measure voltage over a long period since you cannot always be there and measure the voltage when the problem is occurring.

There are case histories of machines being blown sky high when un-plugging and re-plugging connectors in the machine with the AC plug still in the wall. Many times, you cannot see what you are doing because of tight spaces or bad light. You may have HOT voltages on the motors and other parts. Motor, relays, solenoids have hot voltage on one end of the device all the time and the low end is switched to AC neutral return to turn the device on. While the connectors are keyed but you can use make a connection

contact even if the connector does not go all the way into the connector. Screw up and **poof** goes the changer and there is chance of you being killed. Maybe chance of being killed is 1 million (1,000,000) odds but... that "1" could kill you. Always pull the AC plug when working on the machine! This is serious stuff and it should not be taken lightly. When a malfunction happens, you never know where it will lead you. Your order of things can make the problem simple and the repair instinctive or repairs can get very expensive, in fact, outrageous with regard to expended time and money. More often than not, a good order of things [style] brings you along an explicit path to define the problem and then you can apply the proper fix. A surface order of things that does not include looking at an error report and not making well-founded observations normally leaves you are short on know-how. You have to avoid false positive observations. As Johnny 5 would say; "Need input" and without it, your order of things is obscure. How you deal with a repair like this will depend on the amount of time, money and the person doing the actual work. Time and money might be invested in a spare and then getting the unit/s repair done by others who do it everyday. The spare can take the pressure off you while you repair your own acceptor. If you are going to replace belts, you should expend time and money to remove, clean, replace shafts, rollers and lubricate them? If not, you might not get the acceptor to work, or at best, you will have expended time and money for a short-term repair. You may have to replace motor, magnetic heads, pressure rollers and/or other parts too. There is justification to consider having a spare acceptor, control board, various parts including BA50 acceptor cable. BA50 BC100, 150, 200 Short cable between acceptor and changer harness 3-51188-02.
BA50 BC-1200, 1400, 2800, 3500 long cable harness is 3-51188-01.

If you glance at the manual help section, the resolve listed is generally to replace the acceptor or control unit etc. When a machine has trouble, you may have to get a unit tested, replaced, or swapped, just to find out where the problem is so you can fix it. Chances are you are not going to have any of the units on hand. The problem may be loose connectors, dirty contacts, cold solders joints, voltage (internal and external), etc, but the normal order of things is to read the book. As written in the manual, you replace units to find out where the problem is. Presuming it is the acceptor, control board or a BA50 interface cable harness what can you do without a spare? Taking the acceptor in and out of the bill changer can cause damage to the acceptor cable. The original stacker brackets did not allow the acceptor cable to slide in and out without hitting and catching the acceptor cable. Rowe replaced the right side stacker brackets designed with a large U shaped opening to provide a free area for the acceptor cable to slide in and out. The single stacker right side bracket is part # 3-50660-04. The dual stacker right side bracket is: 4-50822-02

Remember not all errors shown on the display are self clearing so get in the habit of first noting the error 'in writing' and then pushing the reset button. You may have a problem that has been fixed, but the error report remains until you clear the display error report by pushing the **reset** button. These changers have an English error display [with some abbreviations] yet many people cannot tell you what the display said when a problem occurred. Most people do not record what the error message was when bills were rejected. A bill reject message given on the display is quick and self-clearing so, you have to be watching the display. On serious errors, the computer will remember the error and re-display it even if you kill the AC power and the changer will come back on with error displayed and your bill changer will be out of service.... So press the RESET

button provided you have recorded the error message!

A Rowe bill changer in trouble will do 3 things. It will shut down the AC power to stacker and hopper motors, kill the +40 VDC and move the stacker pusher plate into the bill boxes. The AC turn off, the stacker plate forward and the loss of +40 VDC may not be a problem but these conditions could be the result of a problem not related to the switched 120 VAC, stacker or +40 VDC. Do you have an error message on the display? If you have an error message fix the problem. Example CHK Left DET. Fix the detector problem and the +40 VDC will light and the stacker will go to the home position and you are back on line. BCxx00 sense lines for programming 1200, 1400, 3500 for \$10 and \$20 is on CCU P5 [bottom plug]. Lines are pulled low. In the model BC-100, the P5 plug [bottom edge of control unit] is not used I mention this now because you may have a two or three hopper changer but you cannot keep it on line because if you cannot get all the LED Counters to work. You may be able to get the changer on line has a BC100 \$1 and \$5 changer. In order to do this you have to do three things. First if the left counter is not working steal LED and/or counter from the center or right hopper and get the left counter working. Second, kill the power and pull P5 from the bottom of the control board. This will make the changer a BC100 that uses only the left hopper. Turn the power back on and third re-program the changer as a \$1 and \$5 changer. The BC100 can do a double dump if you want to accept \$10.00 but some people may walk away before the second dump occurs and a customer may think you cheated them out of \$5. For \$10, the newer changers or updated changers with the Fast pay option.

Problems will come from loose plugs, connectors, pins, pinched cables/wires etc. Also cold solder joints, bad connections, copper pads for

components, etc, bad coin counter assemblies, LEDs, etc. I recall a case where an acceptor TACH error was reported. The motor did not run. I noted one of the motor chokes (small ceramic) mounted on the acceptor interface board had one of its leads broken. It was just hanging in air. I was able to add a small piece of wire and reconnect it. I hope you protect your acceptors from damage. Be advised the original BA-50 creasing rollers were not interlocked [coupled] with the center roller. Later Rowe redesigned the two creasing rollers and the center roller between the two creasing rollers. With the new design, all three rollers are interlocked. They call them roller/s with coupling. They also added a little anticheat level that goes on the shaft above the creasing roller shaft. You can get a anticheat creasing roller/coupling kit with the three new interlocking rollers and the little anticheat lever [part #7040501]. Make sure you align the creasing roller when you install them. If improperly replaced can do damage to the drive pulleys. Make sure they line up with the pulleys.

Other updates were made to the anticheat set around July of 93; the spring was replaced with the same blue spring used on the OBA acceptor anticheat [part #3-50816-02]. The spring no longer hooked to the pin on the older anticheat level but down under on the blade of the anticheat. Oil is not a fix for the anticheat and can create a new problem. Do not get oil on the anticheat lever or its shaft.

Do not presume all VF problems are LED/Cell problems. Measure the voltages. Known VF problems have been the spring was not hooked correctly to the anticheat lever or in the hole in the interface board, the spring tension was too tight, or too loose. You can make an adjustment of the spring by bending it one way, or another. This may get the acceptor back on line. A few anticheat level problems have shown up from time to time. Sometimes the

assembly can be slightly deformed or is a little bit too long. You may have to replace it. I have ground down a few of them that were too long. Make sure everything is smooth. Timing bill problems like the bill slipping, or sticking will also cause VF errors. Eating of bills might be stacker alignment, back end of acceptor problems, bad or dirty belts, belt tension, lack of lubrication, voltage and/or connector problems. Loose or dirty belts can cause serious problems and some repairpersons have already loosened the lower belts in a bad attempt to get the acceptor to work. Instead of doing the corrective procedure of lubricating the acceptor that may be the real problem to begin with, the wrong belt adjustment will only cause additional damage to the belts and acceptor parts. The BA50 acceptor has a 13-pin connector on the side and the manual covers measuring cell plus other voltages. Pin 10 is the ground (-minus) meter reference. The connector is a handy place to measure voltages. The metal frame ground is made from the bottom of the acceptor's interface board via pin 10. Those push hook leads make it easier to measure voltages. If you do not have a third hand the hooks are handy when testing for intermittent or when making adjustments. You may, or may not, have a bill "A" reject code in your manual. By the way, you have gotten the latest version of the manual/s? It could be anything, acceptor, control unit, etc, including putting the bill in the wrong way. I bring it up now to show you not everything is in the manual and you may have to reply on Basics 101 to find and fix the problem. If a bill goes in and then is rejected and "A" error code is displayed. Pull out the acceptor look at it. You may find what I found. The upper belts had slide off the normal path and was resting on the lower track rather than on the lower belts. We can put the belts back on track but will that fix the problem? Maybe, maybe not! Someone may have gotten into the acceptor to cause the belts to slide off the normal path. A bill may have

been stuck and someone removed the bill or pieces of the bill. Ok, we could have a bill that was stuck and what do we do? The general condition of the belts is they are a little dirty and the acceptor has never been lubricated as a part of routine maintenance so the fix is to clean the belts, Magic Wand lubricate the acceptor, and make a note in our/your notebook the an "A" reject error code could also be the lower belts are no longer in the normal belt path. When an acceptor acceptance starts to fall off, it might give a [B] error message. You can turn the TEST B to the off mode. Remember turning off the "B" means you reduce number of checks made and you may get Xerox copies accepted by the bill changer. Turning B option off is only a short-term fix but I see nothing wrong, under normal conditions, turning off the B option if you want to increase your acceptance rate provided you understand fewer acceptance bill checks will be made. There may come a time when you have B errors and you may want to see if there are other acceptance related errors. When you turn test B off you may find other errors and problems exist. We have to note simple basics must be used and common sense to look at and check items which are not listed in the manual's trouble shooting sections. One item is a B error that turns out to G error when the B option error is turned off. You may find that one or both lower belt/s is slipping on and off the drum pulley/s. This little story points out three things. Remember to turn of B option when you check acceptance errors. Look and check the normal operation of things like belts, anticheat flipper, etc. We covered the lower belt G problem and the question is how the lower belts get screwed up so that it would no longer run true. Was external force applied that caused the belt problem to occur? Maybe without cleaning and lubrication of the acceptor a bill was stuck and someone attempting to get the bill out damaged to the lower belts. Excessive belt camber [sideway curvature] can cause the belt to skew

sideways and possibly slide out of the pulleys guides. These belts will have to be replaced.

Let's look at a case of swapping boards and acceptors, going back and forth bringing boards and acceptor in for checking, many phone calls, etc. To make a long story short they had poor acceptance with "E" code and could not get it fixed. To make matters worst, if they turned off the power for time, it would work but only for a short time. I keep asking them to measure the voltages starting with pin 3 of the acceptor for + 5 VDC. They could not locate where the problem was and I never heard what the + 5VDC measured! Having ran out of ideas, they were pulled the machine out of the site and bhang it in for service. They had to pull the machine, drive it in for service, wait while the machine was repaired and bring it back and reinstall it. I found in 2 hours the +5 VDC dropped from 4.98 VDC to 3.60 VDC. I do not know how many men, time and money were spent working on this machine. They had not idea of what to do next and did not take the advice to measure the +5 VDC. With any error, check the +5 VDC at the acceptor first! If it was a Video Game, etc, the service people generally always measure voltages!

A BA50 acceptor may have real VT LED or VT cell problem. Instead of exchanging or getting the acceptor repaired, it might pay to learn how to clean, check, and fix real VT acceptor problems yourself. The measurement and repair is simple once you have done it and the procedure may save many wasted man-hours, travel time, and down time. Damage to LED/Cell boards has occurred because the person doing the work did not have the proper tools to do the job. If you cannot handle replacing the LED or cell or do not have the time then order and keep the whole cell assembly boards on hand.

A VF error might a real LED/CELL problem. Let us say you have meter and find the VF voltage is above 1 VDC. If it gets to the error reference, voltage point will see the VF error on the display. Besides normal problems of the acceptor +5 VDC being to low, cables and connectors, we may have cold solder connections or it may just be a simple occurrence of LED to VF cell misalignment. With the voltage meter on the cell you can align the LED and the cell to obtain the lowest possible voltage which should be below 1 VDC. I presume you have already cleaned the LED and the cell. The above is nothing more than simple basic procedures yet I have seen people go crazy for weeks attempting to keep the bill changer on line. The above also points out the need for, and use, of the manual, and a meter. It presumes you know where to measure the acceptor's + 5VDC and VF cell voltage.

Real case history shows some VT cell have had cold solder joints at the cell itself or the wires going to the VT cell board. Scraping the cell or LED wire leads and/or re-soldering the cell have fixed these acceptors. Some times a bad connection are hidden under what appears to be a good solder connection. You have to de-solder and look at the leads. Leakage or shorts can also exist across two points of any cell (VI, VR, VT and VF) connection. Clean the LED and cell with Kodak lens cleaner [not glass or other cleaners] and re-read voltage. Remove the interconnect board. WAIT! I have already seen broken Tach motor cell assemblies because of the strain when people have pulled motor cable off the board. Older motors should have tie wraps to help remove stain on the wires and later motors have a new tach sensor motor cover. If you replace the LED; before you remove the interconnect board, note the anticheat spring is hooked to the hole in the board and the on anticheat lever. See the pin on the older anticheat lever or is hooked to the bottom of the lever? With the blue spring version,

the hook is put on the bottom of the anticheat. You will have to hook it back where it belongs. Be careful! With the interconnect board off, you can get to the VT LED / VR Cell board. You may elect to leave the board mounted or remove it to replace the LED. First note the "direction" the LED goes. There is a flat part (|) which is a key to direction. Presuming you have the correct tools to unsolder, remove the LED, clean holes, install the new LED (check flat key) and resolder it. Replace board/s, cables, anticheat spring into the hole in the interface board and make sure the anticheat end is hooked on the pin on the anticheat lever or the blue spring goes on the bottom, not the pin. Do not forget to replace the star washer used to get the ground from the interface board to acceptor's frame. With meter connected, measure the VT cell (pin 4) voltage the black cell plate should be aligned over the LED. Check the VT voltage has you adjust and tighten the screws. If the screws are those special Hi-Low sheet metal type screws, be careful not to crack or damage the head assembly. The latest version of the VT and VR cell is a part # 252363-02, not a -01 which may be listed in your older manuals. While problems have been the LED, the cell might also have to be changed. Perhaps both LED and the cell will need replacing to get the correct voltage. VR or VT Photocells Part # is 252363-02. Note the following update: Solder the following mono cap and resistor across the VT and the VR cells. 2 - 7-00285-10 .22 mfd mono cap 2 - 1/4 Watt Resistor 330k I do not fool around with VT and VR errors so while the soldering iron is hot I replace the VT/VR LED and both photocells. I want the latest version of the LED and Cells in the acceptor. The part number for the VT LED is the same as the old one; 700353-14. Please note the LED voltage for VT LED is not the 1.1 to 1.2 VDC you normally see on many LEDs. The voltage for the VT LED is normally 1.9 to 2.0 VDC Software keeps the VT/VR LED off until the acceptor starts running. You can take

resting VT or VR voltage readings but unless you fool the acceptor to run or you can block VF (flipper cell) [you can push on the flipper lever] and the acceptor VT/VR led will be turned on so you can measure active VT and VR voltages. Keep external light from reaching the acceptor cells when testing the acceptor or measuring cell voltages.

I keep talking about connections and this is just one more example. A vendor reported very high VT voltage. He said; "I already cleaned LED and Cell, had +5 at pin 3 and another acceptor worked ok in the system so the problem must be in the acceptor. With this information I followed the path from pin #4 of the acceptor with my + meter lead up to the top of the acceptor and probed the lead going to the VT cell. I found it to be 4.98 volts at the cell board so it would appear the cell was NG. I was holding the anticheat down so the VT LED was lit. I got the acceptor for repair and I inspected the VT cell connections found one connection might be bad. I de-soldered the VT cell leads. I cleaned the cell leads and re-soldered them. After fixing the bad connection, the VT voltage read 1.62 vdc that was ok. Bad connections of led and cells hidden under the solder is a problem you will find quite often but sometimes you have to unsolder the connections to find the bad ones. External light sources getting to the photocells and photo diodes in the BA-50 acceptor can affect the cell voltages. Light getting into the acceptor can cause errors, poor or no acceptance. This can happen anywhere. This happens on both of my workbenches. My main workbench has a great deal of light, but it even happens at the BCxx00 bench where the light level is normal. I get non-valid cell voltage readings and I get reject errors that do not occur when the light is blocked from getting into the acceptor. Aside for working on an acceptor, extra light can add a new problem for you when swapping an acceptor to find out if there is a problem. It must be put the machine and

close the door, or block the light that hits the acceptor. When working on machines where the cell voltages are close to the limits and opening the door caused VT and/or VR out of service alarm out of service conditions or the light can cause bad, or no, acceptance. It is possible that an open door and light reaching the acceptor put the parameters back in spec and the problem you are look for goes away while the door is open. Keep in mind, like, an OBA acceptor with an open top cover, acceptor photocells can see superfluous light and you end up with incorrect cell voltage/s. The result is wrong cell reading/s and/or poor, or no, bill acceptance. Holding, or putting, an acceptor outside the changer where light falls on the acceptor can give you misleading results and error codes. Turn off or block the light so it does not get into the acceptor otherwise voltage readings or acceptance problems may exist.

Here is just one example, a BA- 50 Reject "E" relates to VT or VR cells related problems and it might be the + 5 VDC on pin 3 of the acceptor is low, cells and LEDs needs cleaning, real VT VR cell or LED problems, cable/connector problems or it just may be just the room, bench, or sun light falling on the acceptor. I have already covered the VT problems. How much closer does the voltage get to spec if you clean LED and cell with Kodak lens cleaner? This, and the above questions, is 'what if' questions. The point here what you need to do is already in these notes. You need the manual, meter, these notes, and some basic basics provided you use them. A voltage may change with time/heat so voltages measurements must be made when the problem is occurring. Turning off the machine, even for a few minutes, may restore voltages, to or close to normal, and the problem (error) goes away. In time the problem re-occurs. Winging it by simple exchanging boards or acceptors may not put you back on line. For example: If you take an acceptor that was exposed to temperatures outside the

normal equipment temperatures and when installed it may not work. Even if it does work you have to wait till the LEDs and cell come up to operating temperatures or if the cell voltage are near a high or low limit the acceptor may fail with time. You may reach a point where you cannot fix the machine and be forced to bring the whole machine in for service. We will start with the basics and it may take hours or days to reach the same condition you had on site. Perhaps the same conditions will not occur because the temperature, AC line voltage, and/or spike condition are different then your site. The problem may not occur. Remember voltages have to be read when trouble is occurring. If you see Check XX DETector message this could be caused by the detector read coins when it should not have dropped. The motor may have run, dropped coins and the error message appeared. This is not a problem with the coin counter electronic system. What you have to do when the error appears is check the escrows to see if there are extra coins. This could mean the motor may have run. A case of a motor run could be the reason for getting extra coins. Presume the motor did run and the extra coin is loaded into the escrow, say the \$1 if it was the last vend. Then the error check detector is reset and it is now normal. Is it? There is now an extra coin in the \$1 escrow so the next \$1 vend gives 5 or more quarters. You should count the coins in **all 3 escrows** to see if a motor ran. Check RT Detector could mean the right motor ran and dropped extra coin/s or you really had a detector/ wiring/ connector/ board problem. Keep in mind an optic triac driver or Triac may turn on and could be slow to turn off. It may remain on even after it was told to turn off. This will keep the motor running until it does shuts down. The triac or it's opto driver may have leakage and put full or partial voltage, on the motor. Replacement of bad parts will be required. A motor run condition may also be caused by a wire shorting to ground. Keep in mind if a motor runs, the coins must drop

through the coin sensor for the error message to appear. If you have to test for this condition, coins have on the chain and they have to drop pass the coin detector to see the error. If there is a problem you should hear the motor running, hear it trying to run (humming) or maybe hear the brake chattering back and forth. Always dump [Use the TEST buttons] and count the coins left in all the escrow buckets.

Many coin detector problems including x DET CTR LONG may be due to the LED light not hitting the hole in the counter assembly. The light must pass through the hole in the photocell in the detector assembly. Since misalignment can occur, inspect the beam of light and re-align it if the light beam is not passing through the hole. The best check for counter problems and alignment is to make voltage checks on the LED and counter. I will attach a Bear note that I use to check counter voltages. Read it and see how to make the voltage checks.

The counter computer checks and the error reporting for two extra coins dropping by a coin counter has one hook. It remembers if there was one extra coin dropped and it will send the error message on the counter of the second extra coin. If you have had a problem, or testing the counters by blocking the light path of a counter, etc, you should press reset or turn the power off, wait a few seconds, and re-power the machine to clear the extra coin error counters. Other differences include the way some vends are made. Assuming the changer is not a new FAST PAY changer presumes \$1, 5, 10, 20 bill accept. \$ 1 to \$ 10 are normal vends, but \$ 20 vend is really two \$10 vends with the loading pause between them. When a \$20 is vended, the \$10 door opens and closes. Then the motor starts filling the \$10 escrow again. When the count reaches \$10 worth of coins, the door opens again to give the second \$10 of coins. Some users have reported a

problem with the way this works because people grab the first \$10 and leave the machine only to find out they are \$10 short because they did not wait for the second opening of the escrow. If you checked the \$2 vend you will find it is really two \$1 vends. Token/bonus options do exist so check the manual for options

Over the years, I have seen the older BA3 to 50 acceptors with a cracked or bent inlet plate or the back end banged in. I assume most of this damage was due to miss handling of one kind or other. One must be careful not to abuse acceptors and keep an eye on the side plates for damage. I have seen acceptors with the front vertical plate twisted out of shape and the side plates bent. This damage seriously affects the performance of the BA-50. Careful handing of the acceptor is necessary. While I did not see it, a vendor came in with an acceptor that had only been in the field for 9 weeks. The right side plate (front) was bent towards the back 1/8 inch. The next day the vendor reported he thinks he knows how it got bent. Upon installing the acceptor, he noted the right rail that holds the acceptor and the stacker was out of alignment. He had to align the rail and align the stacker too. Perhaps the door did in fact bang up against the acceptor causing the damage. I generally make my stacker comments in the "Rowe stacker" notes but take notice that the rail and stacker alignment is important so refer to the manual for the correct procedure of aligning of acceptor brackets and dual stackers.

A machine eats (steals) a bill now and then. A bill fails the validation tests but it did not get pushed back out to the person. Here is a real case history where the motor as running ok in forward mode, but did not run in the reverse mode. At first glance at the manual shows two wires from the computer to the motor and voltage (+ and -) is reversed by the relay for either forward or reverse mode. The motor ran forward and accepted bills so

you presume the wiring is ok so the board is the problem or the motor is bad when running in reverse mode. With no voltage readings being taken, you do not know if the voltage is reaching the motor in reverse mode. After swapping board and acceptor too, you are back to the beginning and you start looking elsewhere. Since someone tells you to check the wiring, you do it. You find the shield of the motor cable is shorting to one of the motor wires. In the forward mode, the ground end of the power supply is on the (-) wire shorted to the shield so it is ok. In reverse mode, the hot + side of the motor voltage is swapped by the relay and + is put on the wire with short to the shield. The result is there is no voltage applied to the motor. It comes down to checking the wires and measuring voltages under real load conditions and/or resistance checks and looking for opens and shorts too. It could have been a pinched cable, bad crimp, bad pin, or other basic problems and a phone call may not be able to help you find these problems. The manual has prints, and with a meter, you have what you need locate the problem. This story is just one of many stories and each story has a different specific problem area but I told this story because service people have always had problems with fraying shields touching a another pin, wires near it, other shields, or a pinched cable makes shorts or ground loops. The short could have anywhere along the cable between the computer and the acceptor. Most problems get fixed with basic trouble shooting procedures. Not much has real changed when it comes to using basic service procedures. How often to you put a bill backwards to make sure it rejects correctly? This backwards test should be part of your order of doing things.

There is a short form test feature built into the computer. Not everything is perfect and the test mode has a serious draw back. Most devices have a short duty cycle but the test mode is a forced on and

the drive stays on as long as you remain on a given test position. Serious damage and smoke can occur if you remain on a test position to long. To get into the test mode turn off the power and put the program switch on. Press and hold down the function/reset button and turn on the changer on. This will get you into the test mode. Pressing the function button will cycle you to the next test in the series. To get out of the test mode, kill the AC power, turn off the program switch, wait a few seconds and turn the power back on. Another concern occurs with counter. If you keep records, you will want to record counter figures before and after the testing. You have been warned about staying on a test position to long! Use time periods on steps 3 to 9. All tests stay on until you switch to the next test.

1. TPORT FWD Acceptor forward
 2. TPORT REV Acceptor reverses
 3. LEFT HOP MOTOR
 4. RIGHT HOP MOTOR
 5. CENTER HOP MOTOR
 6. MONEY COUNTER ON Pulse the Mechanical counter in the power supply
 7. COIN LOCKOUT
Relay to lock out coin acceptor
 8. STACKER ON Stacker motor
 9. STACKER SOL ON
Stacker Upper/lower solenoid
- Test returns back to the start #1 again.

Another informational test feature in the changers is you can see what were the last three values of bills collected by the changer. Let's say the last three values collected were a \$5, \$1 and then the last one was \$10. Simple go to the computer board and press Hopper button. You will see the last three bills accepted: LAST\$ \$10 \$1 \$5 on the display screen.

Sometimes you may get a glitch and/or have an unknown program number code was entered into the computer. You will not be able to get beyond the program enter code number window without that number. There is a way to get a special sequenced coded letter group. Turn on

the programming switch and press the function/reset switch to get to the programming display [PROGRAMMING]. Hold the hopper button down for at least 3 seconds and the coded group will appear on the screen. The code sequence the normal 00 00 will be [ACCESS = IWTVVWFF] If you see JCFDDCTT the computer has get a Rowe full restart. The only way to recover from this sequence is to send get the computer to get a full reset of entire computer memory to factory startup specs. For other code groups, write down the coded letters and call Rowe. They might be able to supply you with the corresponding programming four digit number code that is in the computer. Other codes are XEEEBHSI = 9999 ISTVKWBG=0001.

There is a battery in the control unit. With AC power off, the battery voltage should never be below 2.1 VDC. There is a slight chance the computer may not start, or run correctly, after a battery change. You may a JCFDDCTT code when you use the procedure listed in the paragraph above. You may have to get the computer to a distributor repair shop get a full computer factory restart.

The programming switch [700450-01] can become intermittent. If you are very handy with an iron and you are very careful you may be able to replace the switch yourself. The solder pads are small and the fit is very tight. When turning the small programming switch on and off treat the switch tender loving care. While you have the cover off the control board you should check the two resistors just above the slide switch.

On early boards, the resistors cooked themselves so Rowe upped the wattage on the 330 ohm and 470 ohm resistors.
R33 330 ohm 2w Part # 79920331
R24 470 ohm 2w Part # 79920741
I see 2 watts but these ceramic looking resistors look like they can handle more than 2 watts. You want to keep the

resistors raised off the board. I use the lead bending tool and bend the leads so loop goes towards the center of the resistor than back out to match the pc board holes. Since heat may have burnt the copper pads I put the resistor lead in the hole and bent the lead over to some point where I can solder the resistor lead. Where there is no other pad I scrape off the coating on the copper and solder the lead there. I want good connections and I want the leads to carry some of the heat away from the resistors.

In one of the attached Bear notes you will be told how to check coin counters. Have a spare LED assembly handy. Maybe buy some LED replacements you can solder it into the LED assembly when they go bad. I like the Red Bullet LED assembly made by OEMs but you will have to get a big grommet so you can install the bullet LED.

The microcomputer might be hit with spike from the external parts of the changer and it is wiped out occasionally and a few sockets have shown up defective. I have seen a few memory ICs go bad and a few cases where a copper line on the board breaks open. The small programming switch can fail and if you turn it on and off a lot to take coin counter readings keep a spare on hand. A few TIP115s were nailed too. I guess some kind of cable short at the acceptor or the acceptor motor had something to do with the TIP115 going bad. Once in a great while a display will go bad or are damaged. Keep hopper motor triacs and optos handy. Keep the connector pins clean and check their solder connections occasionally. Got a phone call and the vendor said he heard a noise coming out of the "board." The out of service Light was coming on and off. He thinks the error was check [?] detector. In fact, he had gotten a CHECK LEFT DETECTOR error. When I tested the board, after a period of time the left hopper motor started to chatter. On the old BC-11 to BC-35 computer centers this would have been a flashing E problem; a

motor was running when it should be off. In the BCxx00 he got the CHK LEFT DET error. If he had checked the escrow buckets, he would have found extra coin/s in one of the buckets. Did he check the buckets? If he did, he not report it! Be advised this could be one of those occasional problems so who ever resets the machine should look first at and record the error message in writing. Then record the coin count in each of the three-escrow buckets. I have few concerns with a unit that has a chattering motor when the unit is just standing there. While the problem is generally a opto and/or a triac problem in the control unit, exchanging the board without checking the motor first could take out the second board. A repair shop or Rowe may check out a board and it is possible we never see the problem. Always report the problem in writing!

Over the years, some problems have occurred with some hopper motor gearboxes. When changing a BC100 gearbox, you will need some of the old hardware from the old assembly if you do not get the full BC100 motor assembly.

"My machine does not work right! I am getting the wrong amount of coins, or all the bills are in the top bill box, or the I am getting \$1 in the lower bill box, or, it will not accept \$5 etc" The vendor very often has not idea of what to do when these types of problems occur. When asked if the vendor checked the programming; without thinking, they say: "No one as touched it." The question remains: Have you checked the programming of the machine? Is the hopper value still where you left it, say at a 25c value? Is the stacker mode on ALT or SEP? Is the SEP and bill values set to the correct upper or lower bill box? Let us take look at a story reported by a vendor. "They programmed a machine at the shop and I installed it. The next day I filled in as the route man and I found the bills stacked in the upper bill box. I found the machine was on the ALT stacker mode so I re-programmed it

to be in the SEP mode. The next day I found all the bills in the top bill box again. I had forgotten to program VALUE and I had to program which bill box, upper or lower, the bills would go into. Everything is ok now!"

Here is another story to think about: Mr. J: What does the error report Reject T A C H mean? I could not find this error in my manual. Mr B: TACH is short tachometer that is the way ROWE measures the motor speed my means of a coded disc in the acceptor. It was not in early manuals generally it means you have not been using a needlepoint oilier on the acceptor. What did you do? Do you have a needlepoint oilier? Mr. J: Yes I do. I did what I always do, knowing dirt and lubrication is a big service problem and I cleaned and lubricated the acceptor. This got it back on line. Mr B: You should lubricate it before you get to the error stage. Mr. J: I will... it gets a lot of use. There are a few interesting things here. This conversion was not held on the telephone but at work on a face-to-face basis. He came in for something else, not this bill changer stuff. There was not panic phone call or a great deal of down time because of his good order of things (style). I told him I found the spelling of T A C H letters interesting because many vendors do not even look at the display or seldom report what it said. Here is the paraphrase of what I said to him; "You always let me know what the error was and what was going on. There are vendor companies, not yours, which bring back more then 10 percent of the repaired units. There is seldom a report of error code/message or a report of what happen from these vendors. What I normally hear is "It did not work, the bill goes in 2/3s of the way, etc" and I get no error message reports or other useful information.

A phone call came in the same day from another vendor; " Bru, I got a BC100 and I got NO ERROR messages on a \$1 dispense or \$5 dispense, but I got no \$1

change and \$6 when doing the \$5 dispense. For now, I turned off the \$5 dollars accept and since the diverter door was not flipping back and forth, I pushed it into the \$1 position so it would operate. I preprogrammed the changer for only \$1. It was late and the machine had to be on line. My question was there been any diverter problems? Bruno: At a Rowe Hands on School, a comment was made about the doors and a few spring ball hang-ups. I have seen a few door problems myself. I lubricate the bucket assembly as listed in the manual. I have seen a few old BC-8, 9,10,11,25 worn door plunger linkage assemblies. These worn linkages had a lot of vends and had never been lubricated. Ok, I will go back to you tomorrow and let you know what I find out. The next day I got a phone call; I found the door toggle piece was loose because the roll pin was missing. I could not find it. I put in a roll pin I had and the problem is fixed. I had to check a bill changer that had a reported problem of Check the Left Detector. Metering, checking connections, etc, did not show any problems. Actual testing with bills and coins showed no problem. The test was normal. I then pulled out the dispenser checked the diverter doors and found the one of the roll pins was slipping in and out of the shaft's hole. At a certain slippage point the doors would jam and the coins would back up all the way to the coin counter. Sometimes the detector errors are not electrical but are caused by light blockage of the counter. I put the pin back into place but noted it was loose and it was not going to stay in place. I got another pin and installed it.

An old problem can, and has occurred when a bucket door sticks open. A bill gets accepted and stacked. The bucket drops open and drops the coins in escrow, say 20 quarters. Instead of closing, the door gets stuck open and then the hopper motor starts running. Since the door is open, you may get X (say 4) extra quarters (24) and then the door closes.

The other 16 quarters are left in the escrow bucket. The person who got the 24 coins may, or may not, tell you they got extra quarters. They may not even know they got extra quarters. They might know it if we were talking about \$1 worth of change and they get more than 4 quarters. In either case on the next bill change the escrow door opens and the coins dropped is short by that X amount that was dropped when the door was left open. In the \$5 case $20 - 4 =$ only 16 quarters. Again, the person may, or may not, know they were shortchanged. In the case of \$1 change when they see only 2 quarters they know they have been short changed. Generally, if the person knows they were short changed you will hear about it. In either case, the coin counter/s always saw the correct passage of 4 or 20 coins go by the coin counter/s. There is no error to report and if you make a bill to coin count check, everything matches. In a real case of a BC100, the vendor had it happen enough to know there was a problem and the total count of the 2 bad vends the count check was always correct. One vend getting extra coins and the second vend got short changed. You can see now why it is important to test vend all there (3) buckets and count what was left in the escrow buckets when there is a problem. What caused the BC100 problem? The bucket doors were tested and we saw the larger bucket door hang open. We also noted there was no side play to the bucket doors. The small spacer between the doors was removed and ground down a little bit on a grinding wheel. The spacer was replaced on the shaft between the doors and it was tested again. This time the bucket doors opened and closed normally. While this case was on a BC-100, the stuck open escrow door can occur on any escrow Rowe changer going back to the old BC9 hopper machine. Check those doors and make sure they can move sideways $1/32"$ to $1/16"$. In other cases, the linkage may be jamming; the solenoid plunger may be bad, have residual magnetism or there is

bad cap on the top of the solenoid so part replacement will be required to resolve the problem. Let us look at another case of swapping boards and acceptors, going back and forth, bringing boards and acceptor in for checking, many phone calls, etc. To make a long story short, they had poor acceptance with "E" code and could not get it fixed. To make matters worst, if they turned off the power for a while, it would work but only for a short time. I keep asking them to measure the voltages starting with pin 3 of the acceptor for + 5 VDC. They could not locate where the problem was and I never heard what the + 5VDC measured! They gave me the whole machine to fix. After a short time the + 5VDC dropped to 3.6 VDC. They had to pull the machine, drive it in for service, wait while the machine was repaired and bring it back and reinstall it. In this case, they were lucky and the voltage did drop within a few hours. I do not know how many men, time and money was spent working on this machine. They had no idea of what to do next and did not take the advice to measure the +5 VDC. With any cell error, check the +5 VDC at the acceptor first! There are stories where a great deal of equipment swapping, time, and money is wasted but the machine was down because someone decided not to take a simple voltage measurement. In a case history were a machine was down for days because the hopper motors would not run and after all the swapping control unit and power supply cards, the meter and manual were pulled out. A 117 VAC wire/crimp that went from the machine into the power supply was flaky and the hopper motors did not run. As you can see, swapping units would not get the changer back on line. Down time was extended by running around getting the units needed for swapping. After doing all the swapping the service person ends up using a meter and manual basics to trace the 117 VAC circuit. The bad wire crimp is just one more case finding basic problems. Going back to the manual is a

key but some common sense must also be applied.

Let us take a problem like detector long error. What are we looking for here? Something caused the sensor to be blocked or be off to long. Since the LED supplies the light source perhaps, something may have caused it to be off for a period. The LED is the same as a light bulb so the basics still apply. Did the 5 VDC drop below spec? Perhaps cabling, connector, bad connections (including the interface board on the back of the dispenser – remove it and check the solder connections), power supply problems exist, etc. If you do not look, check, and/or use a meter, you may never find the problem. Without basics like measuring voltages you are left with shotgun procedures of exchanging of units like dispenser, control unit, power supply and maybe the harnesses. Perhaps the problem is none of these but another item you did not think about or find because you did not dump the escrow buckets as the manual indicated. Perhaps two coins dropped off the chain at the same time or paper, or other junk, blocked the light going to the sensor. Maybe the LED is not aligned on the sensor and every once in a while the error appears. Did you check LED to sensor alignment and make sensor voltage readings check? See My BXCOIN1S Bear notes page for how to take measurements.

The manual is written with the understanding you have basic trouble shooting experience which means you use the manual along with basic tools like a meter. You have already seen voltage problems where you turn off the AC power for a few seconds and turn it back on and a low voltage condition fixes itself. You may go back repeatedly. You follow the same "fix" procedure every time which gets the machine back on line but this is not finding and fixing the root problem. An un-discovered root problem can remain for a long time and the result is many

repeated service calls with negative results. Now let's go back to the LED assembly. Presume you had 5 VDC at the LED assembly. Now what about the connections of the parts on the assembly? Are there cold (loose) or broken connections? Would you have thought of looking at them to see if they were ok? Would you think of measuring the voltage at the LED itself? Do you know what the voltage on the LED should be? Would you check LED to Cell alignment? Perhaps this is too much for you to handle and, if this is the case, do you have a spare LED assembly? If you install a new LED assembly or LED, would you check the alignment on the coin detector? You should consider measuring a working machine's coin counters and the LED light source voltages so then when a coin counter problem occurs you can use a meter to find and fix the problem. If you have not done the voltage check on counters do it on a working machine how do you know what you are looking for. If you have not done the test procedure, before what are you going to do? Is the + 5 VDC getting to the LED board for the coin counter? What is the voltage across the LED leads and the current limiting resistor in the LED board? Are there any bad connections on the LED assembly? Is the + 5 VDC getting blue lead of the coin detector board? Is the voltage on the switch leg (orange wire) of the coin detector above 3.5 VDC. Bad alignment of the LED may give you less than 3.5 VDC on the counter's orange wire. You can watch the switch leg voltage as you move the LED around and align it for maximum voltage. Does the orange lead voltage drop down below .6 VDC when the entire LED light source is totally blocked [Use a quarter not your finger]? If the LED assembly or coin detector assembly has bad connections, do you have a soldering iron? If you have bad assemblies, do you have a replacement assemblies or parts you can use to replace the defective parts? None of this is to say the problem could be cables, connectors, connections, power supply,

computer control board, etc. Keep in mind what we covered earlier; always write down the error message first.

Salted acceptors have shown up for repair and while the salted never got a dime from Rowe equipment, damage to equipment can be quite expensive. It gets messy when the damage is hidden and the acceptor works for a while then problems start to show up later on. This might be poor acceptance because the salt has reached the LEDs, cells, interface boards, connections, etc. An acceptor may even accept bills ok but has trouble rejecting bad bills because the salt reached the Magnetic head pressure roller assemblies. Salt can reach many areas of the acceptor and cause serious acceptance and/or bad bill rejection problems. Some of these problems show up after the salt has had time to eat away at connections, metal parts, or cause an electrical short.

Pressure roller problems include roller binding, assembly not moving freely (maybe salted or rusted shaft pin), or may even have a bad, un-hooked, or missing pressure roller spring/s. If the pressure rollers are hard, or worn, there may be excessive and un-even headwear. Since they are two magnetic heads, the changes of magnetic head and pressure rollers problems are much greater than previous acceptors that only used one head.

The care and feeding of the older BA acceptors was never really fully addressed by many vendors. Some vendors overlook problems with the anticheat lever and shaft. Many do not pay attention to the Mag head pressure roller and its spring. Maybe you were not concerned with these items in the past, but those days are gone forever. The BA50 has two heads and pressure rollers and the checks made by these magnetic heads are sophisticated. Anything that has an effect on the magnetic readings such as the rubber rollers, will seriously

affect the acceptance rate. A major problem occurs when metal particles and dirt are imbedded in the rollers. There can also be a build up of ink contamination from the bills. You can use scotch tape or those tape cleaning cards to remove the particles by rolling the tape over the rollers. If cleaning cards do not work, replacement may be required. Be prepared to change both pressure rollers when working on a BA50 acceptor. Brand new acceptors can have poor acceptance or no acceptance in one day when metal particles from bills got on the pressure roller. When reporting acceptor problems, always mention the fact the acceptor came from a machine shop or foundry. The metal particles may not be bright little specs you can see. They might be dark and blend, color wise, with the rubber used in the head pressure rollers. I will talk about replacing the rubber pressure rollers with nylon ones later,

You make your own pressure roller cleaner card/strips for the BA-50. Get a mylar or plastic sheet and cut it as wide as a bill. It should be much longer than a normal bill. The plastic, or Mylar, [.008-.12 thick] must be soft enough to get by the creasing rollers in the rear of the acceptor other wise the card will stop at the creasing rollers or cause damage to the acceptor. There is a slot cut into the sheet so scotch tape strips can be placed on top of the sheet. I have also used Scotch double coated tape #665 transparent tape on very light weight plastic type sheets used in notebooks. With this tape, you do not have to cut a hole in the strip. The purpose of the card is to get the tape to roll over the pressure rollers and lift off the dirt, ink, metal particles and other contaminants on the rollers. You may have to change the tape three, or more, times. The best way is to remove the belts and head and use the tape directly on the rollers. This is also a preventive maintenance procedure. The acceptor may not be in a bad particle location but someone with bills loaded with particles

may put the bills into your changer. A fix for worst a case for problem location with metal particles may be to install replacement pressure rollers that use a nylon roller in place of the rubber roller. I presume the trade-off is a small drop the acceptance rate. Rowe figures acceptance can drop off 10 %, but users report it is less than 10 %. I am sure it will depend on how clean and lubed the acceptor is and it will vary depending with the acceptor. I have no idea of the effect it will have on the head life. One vendor responded to a bad location problem by cleaning the acceptor and learning how to remove the 2 front rollers to free the belts, remove the mag head assembly and then use tape to clean the pressure rollers. This vendor has many machines and while it appeared they learned how to handle normal and pressure roller cleaning I found the history showed a lot of badly worn acceptors that needed rebuilding and many acceptors that needed "CL" (clean and Lube). After a time they found the problem unbearable when a rebuilt acceptor went bad in a week. At this point, they wanted to switch over to the nylon pressure rollers. The acceptor rejection rate of normal bills without particles on them with "B" option on was about 50 %. This poor rate was due to the particles on the pressure rollers. With nylon pressure rollers, the acceptance with the same test bills jumped back up to 9 out of 10 bills. The one rejected bill was just a very bad bill. I have no history of field acceptance rates where the bills have metal particles on them. The bills I used for testing were clean. I do not have any field reports on the use of the nylon rollers but I presume that cleaning of the rollers will still be essential to keep the acceptance rate up. My sense tells me that some particle locations may be very hash on an acceptor, even with the nylon rollers, and preventive maintenance will be extremely important to extend what could be a short acceptor life.

Bear logic covers some things you do not want to hear. In these notes, I covered some items that can cause a given problem. A problem with the equipment may indicate a specific problem such as VR. We have already covered the problem may have nothing to do with VR but AC power, the + 5VDC problem or external light. Another problem might indicate a bad magnetic head/s problem, but it may be the pressure rollers, speed, tight belts, dirty belts, lack of lubie, etc, and not the magnetic heads. To read the magnetic signals, everything else must be operating correctly. I hate to say this but... an error message might be the result of something else occurring and the result of that problem is an error message reported on the display. I cannot make it easy for you to get directly to the problem. Many of you have not even got to stage where you look at the display, but instead you do a panic reset or even worst kill the AC power for a while just to get the machine back on line. All too often, this may get the machine back on line and you are done..... for a while. Many times the same problem returns again and again. BA-50 repair might include the location and repair of intermitting connections. I note here that one vendor reported having acceptor problems and he located bad connections of the pins in the motor plug. He removed the small pins (he had a small probe which allowed him to push in the latch of the pin) and tightened them up and replaced the pins back into the plug. These are the same type of connector contacts used in the external side connector of the acceptor. He also had taken off the interface board and found a lot of dirt on the backside of the board. Note that he did not have a problem of taking off the interface board and putting it back nor did he have a problem of putting the anticheat flipper spring back in the right place. Perhaps you can see why this has supplied the background for other items that appear in these notes. BA-50 maintenance might be the repair of a specific problem or it could be the

rebuilding the acceptor, etc. Chances are you will be replacing belts and shafts as needed. You have to consider the magnetic heads are worn and/or starting to fail and you are getting reduced acceptance. If you have to change the magnetic head assembly consider replacing those pressure roller assemblies too. There are two magnetic heads in the head assembly and there are two pressure roller assemblies, one for each head. While you would like to be able to just replace the belts or head and be back on line there could be a little more to it. I have already written about "B" error when rejecting bills. You can turn the computer option B check off and see if there are other problems too. You might see one of the other errors to appear. Let's say with B off, an "F" error appears. This could be a flipper, rear end of acceptor problem, slippage from dirty belts, loose front springs, or even a speed problem. As with other systems and acceptors, the percentage of acceptance can only be 100 % when everything is working correctly. In the B and F case above, you can see just replacing the head and pressure rollers may not restore the acceptor to proper operating status. Another factor is what I called LED/photocell "stickation" >>>>>> Temperature affects these devices and when they are operating near the limits the device may swing into or out of the limit parameters. When a device is outside the normal operating range it may or may not work. Say you take an acceptor of out a truck or car and when you install it in a changer, it may work. As time goes on, it may fail or when if it does not work in time it may come back into parameter limits and it will work ok. With a system that has been on line and then has a problem if you kill the power even for a few seconds the device may swing back within the parameter limits, and be OK for a while, and then fail again with time.

The Mag 1 and Mag 2 have the same circuits so the static DC voltages at Pin 1

and 2 of the BA-50 acceptor should be very close to each other. Problems, as always, could be cables/connectors. Check the voltages at the plug at the magnetic head assembly. Swapping might include swapping acceptor, computer, etc. You can swap the magnetic head assembly plug into a good one, maybe from a good acceptor. I keep a worn head assembly with good electronics which does have the same DC voltage at Mag 1 and Mag 2 output pins. I have seen some computer center problems which caused un-matched Mag 1 - Mag 2 DC voltages at the BA-50 and magnetic head assembly plug. Magnetic head related problems could also be computer control center. The magnetic head signals are fed into the computer so kill the AC power switch when plugging or un-plugging the acceptor's cable. Unplugging and plugging the acceptor cable with the power on could wipe out equipment and could cause more problems then you started with!

We had a BC1200 and after the bill was accepted, got stacked, the bucket door opened then the hopper motors did not run. My FEK knows the hopper motors should be hot with 117 VAC but when I used my 117 VAC bulb tester the 117 VAC was not there. Using the manual for pin numbers, I moved the tester up to the dispenser interface board and the voltage was into the board. I pulled off the interface board and on the backside; I noted the 117VAC copper land was burnt away to nothing. I checked the motors with the ohmmeter and they were ok so I put 117 VAC on each motor with my 117 VAC test clip leads. They both ran ok. Strange! I fixed the interface board with a wire jumped and put everything back to normal. The machine was now operating normally. What had caused the failure? This machine was dispensing dimes and guess what I found in the bottom of the machine? A dime with a big-burned pit mark on the edge. The dime had gotten behind the dispenser and had shorted out

the hot lag and this cooked that 1 inch of copper. Servicing this kind of problem is a case of tracing from point A to B to C to D etc. Between bad connections and burnt out copper be prepared to look at the backside of this interface board.

I remember another case where there was a short under the connector mounted on the dispenser interconnect board. This was a case where the ohmmeter approach was used. In order to see the short I had to remove the connector and I found a single male pin that got under the connector. It must have been there from day one but only showed up after the changer was in the field a long time. A short under a connector does not happen too often but you never know just where a given problem might be found.

When Rowe started using the Imonex coin mechs in the BC-3500, many coin mechs were damaged. Imonex beefed up the pivot pin but they still broke. I worked out a fix which was to put drill and tap a new screw hole in the bill return scavenge link to limit the downward travel of the link into the coin mech. Rowe later did the same thing. I will attach the BCcoin1 Bear note page to this article to show up how to make the fix in case your BC3500 changer does not have the fix or you put a Imonex coin mech in an older BC3500 or a BC-35 changer. In case you do not use the coin mech I recommend blocking the coin slot with Rowe's Coin Block kit. # 270298-01.

While I have written about BA50 problems earlier when it comes to rebuilding the acceptor I standby the Magic Wand rules. Clean out and wash the holes in the rollers, replace worn shafts, lubricate as you put the rollers on the shaft, lubricate the shafts and nylon bearings, **never** lubricate the anticheat lever or its shaft, clean photocells and leds with Kodak lens cleaner or water. Clean the magnetic head pressure rollers with tape. Dremel and degauss both the magnetic heads.

[See maghead_loop_secrets Bear note]. Check the interface board for bad connection and check the 13-pin cable connector. When replacing the interface board make sure you replace the ground star washer. Check the motor noise with a meter. Adjust the lower belt tension with a voltage running the motor [see FEK_MOTOR_TEST_UNIT Bear note]. If the VT and VR cells do not have the resistor and cap across them better add them.

70028510 22-mfd mono cap -||-
1/4 watt 330k ----^V^V^V^----

70035314 LED VR/VT
25236302 Photo transistor VR VT VI

Check the photocell voltages and replace if bad. I have had to work on acceptors rebuild by others and the people doing the rebuilding skipped some or many of the above listed items. As a result, the acceptor did not work or had a very short life cycle.

When it comes to push and shove, I have nudged you as far as I dare. If you think, 'leave it alone' and still refuse to do preventive maintenance, update the programming, look at the manual or take voltage measurements, don't look at and write down error messages, check that power supply board, etc, lots of luck ! I saw enough to know a simple cleaning, lubrication and using simple basics pays off in the long term. There is no Magic Wand except the Magic Wand Oilier provided you use it for routine maintenance. While these notes are nearly at the end, we have peeked at the other side of the coin and we have come full circle which starts and ends with Vendor Basics 101, The Magic Wand oilier, etc, plus the acronym; FEK! At this time I wish to thank those vendors who had and found the fixes for problems and/or confirmed some of the items I wrote about. This input was/is important to you and me so again I say thanks to you

vendors who have helped me and therefore other service people too.

May the Magic Wand be with you!

Look at the programming as a series of pages where the pressing the function button gets you to the next page. The up-down arrows are raise-lower, or on-off keys. The hopper button for what hopper is being programmed, while the value button selects what value you will be setting all accept or pay out for \$1, \$5, \$10, \$20, etc. NOTE: If there is a programming error, the machine will tell you and you can simply turn on the programming switch and go back to beginning and check the various hoppers, value, and pay out selections you made and proceed with the programming.

1. Turn switch 'up' to programming mode. TEMP counter will appear on display
2. Press Function button PERM counter will appear on display
3. Press Function button ----- PROGRAMMING will appear on the display, No need to enter 00 00 because defaultthe is 00 00 > Just jump to step #4
4. Press Function button MC-PAY OUT-OFF will appear on display. We are doing quarters or token in all hoppers Press up-down to get MC mode ON.
5. Press function button Hopper VAL will appear on the display We want 25c in hoppers or see Manual for Token and bonus options
6. Press function button Accept \$1 will appear, YES or NO. Press Value for other values. Accept \$2 will appear, YES or No. Press Value again and again till all values done and you get back to \$1
7. Press Function button to show \$1 pay out \$ 1, Left hopper will blink, Set hopper amount by pressing up or down.
--- > If MC was set off use steps 8 and 9
8. Press hopper button to go to next hopper, set pay out with down or up.
9. Press hopper button to go to next hopper, set pay out with down or up.
10. Press Value button to show \$5 pay out Repeat the procedure listed above for \$1

- 11.0 Press Value button to show \$10 pay out Repeat the procedure listed above for \$1
12. Press Value button to show \$20 pay out Repeat the procedure listed above for \$1
13. Press function button for stacker mode. Use down or up to select SEParate or ALTErnate mode. With BC1200, 1400, 2800, 3500 with dual stacker we generally want the SEPrate mode. Note: If you do not go to Step 14 (VALUE). all the bills end up in the upper bill box.
14. When in SEP stacker mode (Upper-lower stacker) Press VALUE to show \$1, Select upper or lower with down or up.. Here I want upper for \$1. Press value for next one, \$5, Select with down or up Here I want lower. Press value for next one \$10, Select with down or up. Here I want lower. Press value for next one \$20, Select with down or up. Here I want lower.
- 15 Check B option on/off I think of B option has better check. Select with down or up. I want to accept as many bills as possible so I will leave option B checks OFF.
- 16 Bill test On/Off. Select with down or up In case you want to check bill acceptance but do not want dispense the coins while testing, leave test mode ON. Turn programming switch to OFF to test bills. When done, Push Reset button to restore to normal operation.
18. Restore programming switch to OFF, 'down' position and check settings by inserting money and counting coins.

BCxx00 BA50 Errors List These comments assume the original older -01 power supply boards have been updated to at least the -02 version. The control unit is updated and working ok. Pin # 3 of the BA50 has +5 vdc, and there are no bad cables or bad connections including at LEDs and photocells. In order to test VR and VT voltages you can turn on LED by pushing on the anticheat flipper lever

A Bill inserted wrong way. Upper belts off normal path. belt tension, bill is skewing, Mag head or CCC bad.

B Bad mag signals. Head unit bad [replace mag head]. Pressure rollers worn, dirty, metal particles on rollers, binding, missing springs. belts worn or not running true. Turn B off to see if a hidden error code exists. Also read my note on Motor Speed section. >>>

C Bogus bill, mag head 1. See "B".

D Mag head, see B.

E. VR - VT. Check + 5vdc at pin #3. Check LED and VR -VT cell voltages. Check for cold solder or dirty joints, cables, cell alignment, Replace LED and VR - VT cells. External light on acceptor. With current cells with use a 330k 1/8 or 1/4 watt, and a .22 mfd mono cap [700285-10] across the VT and VR cell.

F Flipper, Bill slippage, anticheat flipper spring, belts, loose front springs, check voltages.

G Same as E. Mag heads and/or pressure rollers. Belts not running true. I do not always see any cell voltage problems but I have seen G on \$1 and/or \$5 errors and fixed the problem by replacing LED and VT - VR cells.

H Bogus bill mag head 2. See B I J K M

L Length, Mag amp, bill slipping (bad belts, lack of lubie), anticheat, anticheat

spring not in the hole in the interface board.

P Counterfeit See B. REJECT-TABLES: Similar to code E. Based on VR sensor. This code if the VR data mismatches with all denominations.

S Bogus bill and/or mag head problems. Trouble shoot as B. M is error if computer thinks it is an very old style \$20 bill.

REJECT-VF RECOVER If flipper opens as the trailing edge has passed toward stacker but then re-covers as if bill had a set of holes through which the fie fingers fell through temporarily.

VI Check Input led or input cell. In some cases the problem was related to the VR/VT LED and VR and VT cell. Replacing them fixed the VI problem.

VF Check Anticheat flipper level. Spring or debris hanging up the flipper.

VR Reflective cell reads the reflected light of the backside of the bill. The LED or the cell in the hole on the track. VR cell voltage .5 to 2.00

VT Read voltage pattern from LED through the bill to the Cell mounting on the top of the acceptor. VT cell voltage .50 to 3.50 vdc

Magentic heads 1 and 2.

	[2]	[1]	
	Front		
=====			

Notes: Motor speed, Tach, Reject speed Dirty belts, tight belts, belts off belt path or rollers, lack of lubrication. Motor noise and Mag problems. Sometimes motor shell will become lose from the motor mounting. You can punch the metal tabs to fix.

Stickation: After idle time of an acceptor not being used reject/s may occur when a bill is inserted. TACH,

Reject speed or other errors may be reported, then it accepts bills ok and it may accept many bills until the next idle period. Lack of lubrication, motor, worn belts, worn shafts etc are factors. Acceptors must be lubricated every \$30,000 or once a year whichever ever comes first. Twice a year is even better. Do not over lubricate or get oil on the belts.

Tach problems: Lack of lubrication. Belts off belt path - track/rollers, belt tension too tight, motor, bad tach sensor, voltage problems. Cable/connections. Speed control/run voltage comes from the computer control center.

Eating bills: Oily/dirty belts, lack of lube, check reverse operation, [Put bill in with head going to the right], look for shorted wiring (red, black and shield), bad CCU, check rear anticheat lever for looseness or faulty anticheat operation [never lube the anticheat level or shaft], check spring and is it in the interface board hole ?

Mag head pressure rollers - Many reject codes are caused by rollers. Pressure rollers can be contaminated from ink from bills and other materials. Cleaning is a **must**. You can use those Rowe tape-cleaning cards to clean the rollers. Replace pressure rollers. In case of worst case, in metal particle sites change the rubber rollers to nylon roller assemblies.

~~~~~ Voltages ~~~~~

Auto meters switch scales, +/- signs, etc, so watch your meter. You may think you read 348 VDC but it may actually be 348 [mv]. Look for that mv [millivolt] flag.

Check Pin 3 for the +5 VDC to the acceptor. Make a voltage sheet for your notebook for ALL pins. There will be slight difference between pin 10 and metal ground. The acceptor ground is made on the bottom side of the interconnect board. A false ground could be the acceptor resting on the machine metal. Pin 10 (and other pins) may be ok on the top of the board but may be bad or flaky on the bottom side or to the frame. A difference between voltages, or Errors, could be ground loop - pin 10 to the board, and/or board to the metal frame of the acceptor. This may be why voltages (Errors) occur when moving the acceptor in and out of the machine. With later versions of software, the VT LED will be off so block input sensor and LED will come on and you can read the VT and/or VR cell voltage/s. Many vendors do not look for broken or bad connections on the copper side of the acceptor interface board, power supply boards or on cell and LED leads. Keep your soldering iron and wire jumpers handy! Stray light can affect the cell readings so watch out for stray light reaching the cells. You will be voltage shifts with external light hitting the cells. VR has two readings, one with nothing in the acceptor then with a white paper over the VR cell. When reading an error display, note which of the cells is flagged, VI VT VR VF! Are other voltages normal? Was the door open or light hitting the acceptor? Are LED - Cell paths clear, how is the anticheat, etc? Now, how about cleaning those LEDs and cells? You may see as much as .3 volt difference after cleaning a LED and/or cell!

NOTE: Rowe has uses a harness color-coding according to function. Check the bill changer manual for the page listing the function and wire color code page. Example +5 VDC = Blue.

P4 Connector

14----- VI -----7

13----- VR -----6

7----- VF -----5

10----- VT -----4

<-----GND-----10

-washer Acceptor frame

BA-50 voltages

Push to light up VR/VR led. Use white and black paper to make tests

- 1 Mag 1 ~ 1.65
- 2 Mag 2 ~ 1.65
- 3 +5 vdc 5.000 +/- .2
- 4 VT .500 - 3.500 ** +.75
- 5 VF < 1.000 to > 2.800
- 6 VR .500 - 2.000 ** +.25
- 7 VI .200 - 1.900 + .500
- 8 LED Drive
- 9 Tach Low - Hi < .1 to > 4.6
- 10 Ground > acceptor frame
- 11 Motor + in Forward ~ 9 v
- 12 Motor - in Reverse ~ 9 v
- 13 Shield

**VT no lower than
1v may be better

Cleaning Mag Head Pressure Rollers

Rowe has designed a card using paper and thin double sided tape to clean ink, dirt, and other contaminants off the magnetic head pressure rollers. The one sticky side is attached to the paper and when you are ready to use the card remove the protective paper to expose the sticky tape. Then stick the card into the acceptor. While the cards were made for the BA50 acceptor they can be used on all Rowe acceptors (except the RBA-7) and other acceptors. Some acceptors do not pull the paper into the acceptor so you will have to hand crack the acceptor. People who have seen me work know I always use tape to clean the roller/s under the magnetic head/s.



Rowe Part #
252548-01

Rowe now has a card
for the RBA-7.
Use
252548-03

Bruno

Clean51T.pgs Mar 05, 2005 1T



To join the MAGIC WAND CLUB buy one of NECo's Trinity Oilers or a similar type.

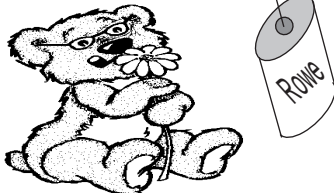
Your dues are:

- 1 Buy an oiler, Trinity, Radio Shack's Lubricator # 64-2301A or Rowe's silicone lubricant 270628-01
- 2 Use it for preventive maintenance.

- Warning -
3 Over lubrication and/or getting oil on the belts voids your membership. More is not always better !

When the oiler is empty you will be a full member in the :

**The
MAGIC
Wand
CLUB !**
Bruno



The Bear does use them !



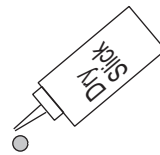
Rubber and belt cleaning should be done when cleaning and lubricating the acceptor. It should be at least once a year and more often in a dirty location. Do not over use the rubber cleaner ! Apply evenly with a soft cloth until clean. Wipe off all excess including the edges. Re-Grip is a cleaner and revitalizer.

Re-Grip
Rubber
Cleaner

Cleaning Rowe Hoppers and Dry Slick !

What can you use to clean and lubricate Rowe Hoppers and clean coin mechs ? Brushing alone is not good enough. Make a wooden or plastic chisel to clean off the hard dirt on either side of the chain. You can grind or file the end of the hopper brush to make a chisel. The product called Dry/Slick is a very good cleaner when wet and when it dries it leaves a surface film which does not collect dirt. It also lubricates the hopper chain. I do not recommend Dry/Slick use where a build up will cause a serious tightening (such as tight shaft and nylon bearing). There is no problem when used on a Rowe hopper or on the coin mech area where the coin slides.

If you can't get hoppers to work right remember "Bruno" can refurbisher your hopper and fix the rivet problem too. . Generally the cost per hopper is \$80-\$100 if it has normal wear and tear.



More good stuff !



Using those Cleaning Cards on Rowe Acceptors ?

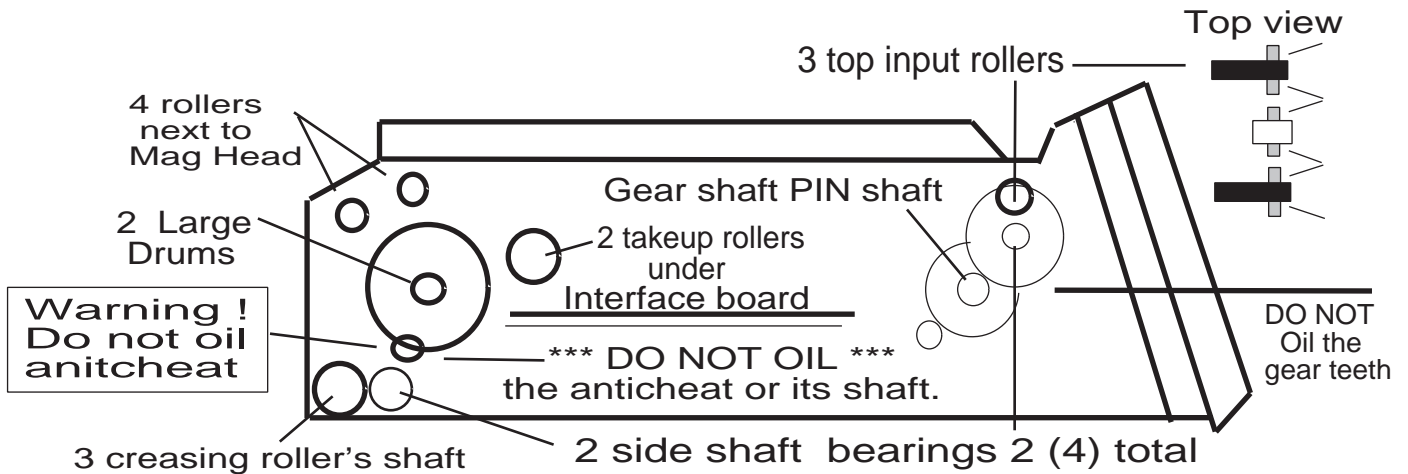
Rowe original recommended using **denatured alcohol** (paint or hardware store) to clean Rowe bill acceptors so how can you use these cleaning cards? First, let the cards dry and then apply denatured alcohol on the paper to clean the acceptor. After cleaning with a wet card **ALWAYS run a dry card into the acceptor.**

Over kill should be avoided so **do not** use the cards every week, or month, but just when the belts start to get dirty. You can judge time between card use after the first time use by inspecting the amount of dirt picked up on the card.

BA-50 Acceptor Lubrication and Cleaning

Needle point lubricate every \$30,000 or at least twice a year.

WARNING : DO NOT OVER lubricate or get oil on the belts.



Clean the photo cells and LEDs with Kodax lens cleaner, belts with rubber drive cleaner or denatured alcohol and the mag head pressure rollers with scotch tape or a magnetic pressure roller cleaning card. I have listed the information on Rowe's pressure cleaning card below. Even with normal use the ink from bills will contaminate the two pressure rollers. Keep those two pressure rollers clean.

Note: The Rowe manual does not cover lubrication details for the BA50 so read the CBA-2/UCBA-2 manual's lubrication instructions and after that do what your common sense tells you to do !

Over lubricate or get oil on the belts your Magic Wand Club membership will be canceled !



To join the MAGIC WAND CLUB buy one of Neco's Trinity Oilers or a similar type.

Your dues are:

1 Buy an oiler, Radio Shack's lubricator # 64-2301A or **Rowe's silicone lubricant 270628-01**

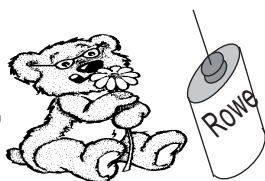
2 Use it for preventive maintenance.

- Warning -
3 Over lubrication and/or getting oil on the belts voids your membership. More is not always better !

When the oiler is empty you will be a full member in the :

MAGIC Wand CLUB !

Bruno



Cleaning Mag Head Pressure Rollers

Rowe has designed a new type of card using paper and thin double sided tape to clean ink, dirt, and other contaminants off the magnetic head pressure rollers without taking the acceptor apart. The sticky side is attached to the paper and when you are ready to use the card remove the protective paper to expose the sticky tape. Then stick the card into the acceptor. While the cards were made for the BA50 acceptor they can be used on all Rowe acceptors **except the RBA-7**. It can work with other acceptors but some do not pull the paper into the acceptor so you will have to hand crack the acceptor. People who have seen me work know I always use tape to clean the roller/s under the magnetic head/s. For the RBA-7 use part # 252548-03



Rowe Part # 252548-01

Bruno



- 25191702 Shaft Pivit for pressure rollers =
- 25193402 Shaft output rollers O
- 25193403 Shaft anticeat O
- 25235001 Shaft little front =
- 25236301 Cell assembly VI photo transistor|o|
- 25236302 Photo transistor VR VT VI |o|
- 27040501 anticheatkit |--|--|
- 35080003 Shaft drum O
- 35080004 Shaft takeup O
- 35080604 Pressure roller for Mag Head Rubber O
- 35080605 Pressure roller for Mag head Nylon O
- 35082005 Belts Lower timing |=|=|=|
- 35113601 Shaft assembly Front rubber input
- 35114401 Gear large drive
- 35114501 Shaft ouput assy
- 35114901 Belts upper ===UB===
- 35118801 Harness to BC1200,1400,3500]=====
- 35118802 Harness to BC100,150,200]=====
- 35118904 Window insert /___/
- 45058205 Cell assembly LED + VR [o o]
- 45058408 Motor =[]
- 45073001 Interconnect board assembly
- 45073101 Mag head assembly [m1 m2]
- 70028510 .22mfd mono cap -||-
- 70035314 LED VR/VT (==
- 70074413 13 pin 90 degree connector [|||||]
- B0031936 Gear small reduction O
- 1/4 watt 330k

BA50_1G.txt 02-26-2005

A BA50 MAGIC WAND

Template for a plastic tape cleaner to clean metal particles, ink and other contaminants off the BA-50 Mag head pressure rollers without taking the acceptor apart. You may have to take the acceptor apart if this does not work or you may have to replace the rollers. Serious particle problems may be addressed by replacing the rollers with 2 nylon rollers. The Rowe roller part number is 3 50806-05

13 "

TOP

TOP VIEW

SIDE VIEW

Rowe's Version

June 26, 1995 Rowe has designed a new type of card using paper and thin double sided tape. The sticky side is attached to the paper and when you are ready to use the card simple remove the protective paper and expose the sticky tape. In case you want to buy Rowe's cards the part # is: 252548-01.

It can be used with other acceptors but if the motor does not pull it in far enough you can turn off the power and hand crank the motor.

Double tape

Put scotch tape over the openings.

Soft plastic .008 - .012 thick



Bruno

Except for this cut and the side view, the rest is shown to scale.

It must be SOFT enough to pass through the creasing rollers in the back of the BA-50 acceptor. For those who have the "Hands On" school booklets, you can use the plastic covers. Those covers are comb plastic booklet covers which are .011 - .012 thick. IBICO comb presentation cover IBICLEAR # 23210 Heavy.

Use the motor gear to hand crank the strip down the bill path. Handfeed the plastic past the creasing rollers.

You can also use Scotch double coated (double sided adhesive on both sides) tape #665 on a plastic strip. I used sheet material used for notebooks.

Double tape

There is no need to cut holes in the strip with this tape..

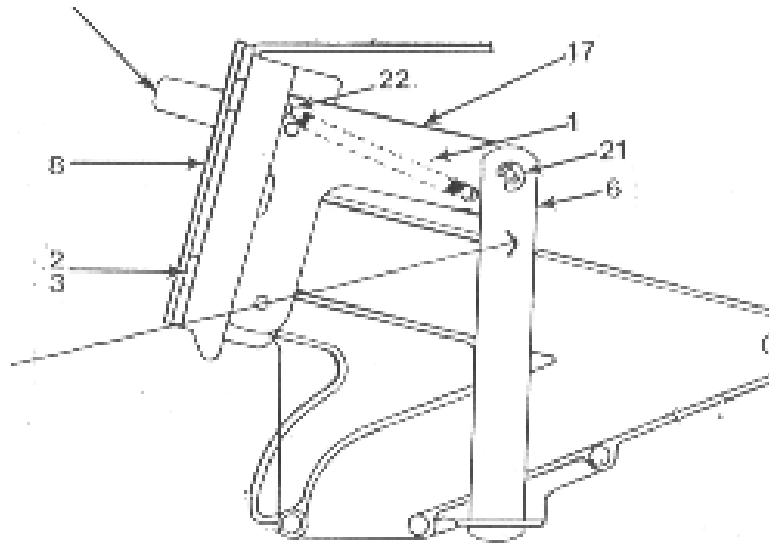
March 06, 2005 , 2005 Bx50clean1G.pgs

Prevent BC-3500 coin mech damage by installing a screw stop in the link bar.

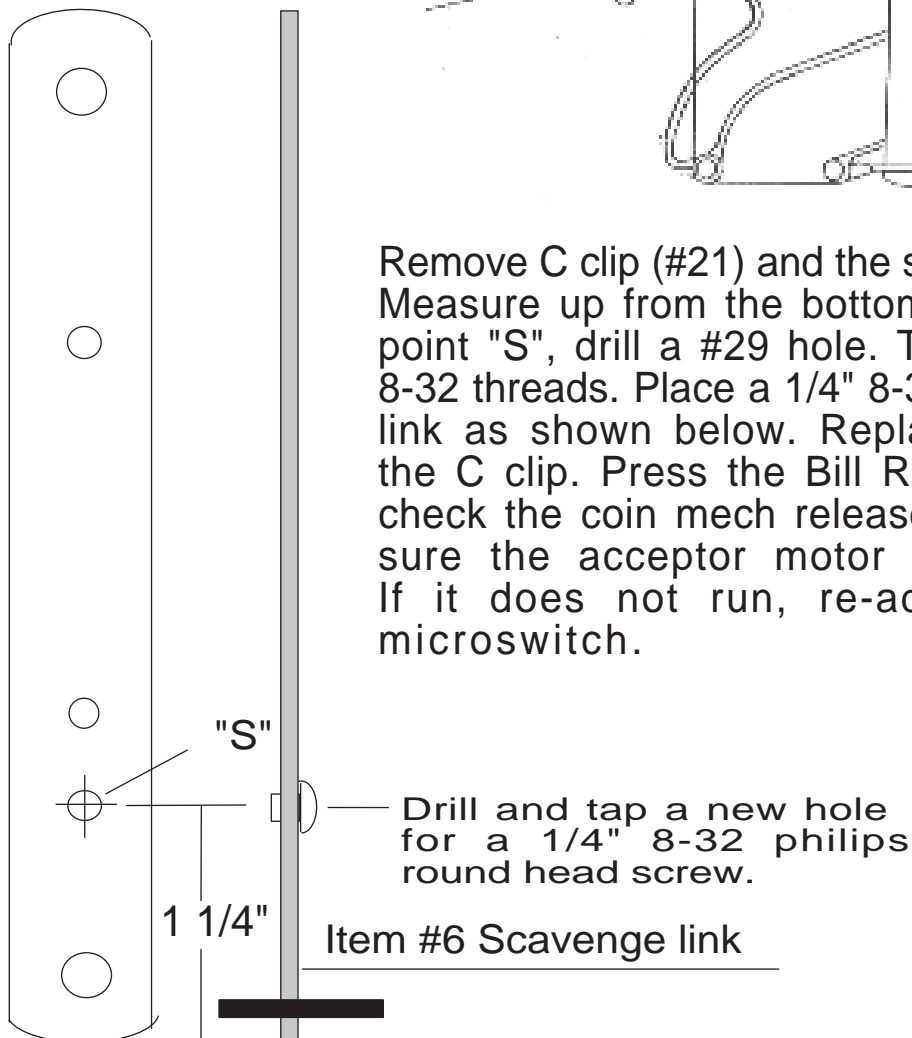
This is not an official Rowe mod.

Rowe now installs this screw in BC3500s.

We want to stop the link from going too far down into the coin mech. By adding a screw in the link we can restrict the downward travel into the coin mech. This will prevent damage to the coin mech.



Remove C clip (#21) and the scavenge link (#6). Measure up from the bottom 1 1/4" and this point "S", drill a #29 hole. Tap the hole with 8-32 threads. Place a 1/4" 8-32 screw into the link as shown below. Replace the link and the C clip. Press the Bill Return button and check the coin mech release and also make sure the acceptor motor runs in reverse. If it does not run, re-adjust the return microswitch.



BCcoin1.ps
Feb 5, 1995
July 29, 1997 E

You must program Dual Stacker Value to UPPER or LOWER

When programing a BCxx00 bill changer with a dual stacker, you can ALternate or SEParate the bills. When you select SEParate, all the bills are directed to the upper bill box unless you use the VALUE button to direct the bills [\$1,\$2,\$5,\$10, \$20] to the UPPER or LOWER bill box.

SEP - then press the VALUE button.



Bruno



See the value of the last 3 bills accepted

You can see the value of the last 3 bills accepted by BCxx00 changers. With the programing switch still off, just press the HOPPER button.

LAST \$5 \$1 \$1

Bucket power ON

There is too much information about Bucket Power on related material to put into into a little Bear note block. At some point in time you should check out my other BEAR NOTEBOOK articles including Bucket Power On. They contain a great deal of related information. They are posted on: <http://www.eastcoastamusements.com/> where you will find Bruno's page.



Bruno

Jackpotting and Bucket power ON

Do you have the -02 power supply update board in the changer ?

^ If not, get the -02 update board !

Any bucket solenoids cooked ?

Did you get an error code ?

When did the problem occur :

When changer first turned on ?

Just standing there ?

When giving out coins ?

What jackpot value was it ?

Was it more then just one value ?

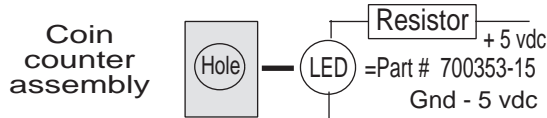
Error message after pressing "RESET" ?

Read my Voltage problem bear note !



Coin Counter Red LED

The new series of bill changers (SBC-2/4s) and BC-xx00s) use a red LED light source for the coin counters. History has shown three types of problems. [1] The supply voltage (5vdc) must reach the LED board and counter assemblies. [2] There have been cases of bad connections on the LED and counter assemblies plus cable connectors. [3] The mis-alignment of the LED's narrow light beam can miss photo cell on the counter. These problems are generally field repairable if you know what to look for and have a soldering iron. Bad connections may be hard to see. You can use a meter to locate the problem. The LED may be bad or you can not find the problem so the worst case would be you have to replace the LED assembly and align it so the beam hits the counter's cell.



Counter assemblies:

Old BC9-35 changers and updated BCxx00 kits with short wire leads and spade lugs: 251757-01
 You must follow the color code. Blue = +5vdc
 BCxx00 changers with 2 pin connector use 251757-02 assembly

Checking coin counters and escrow buckets in Rowe bill changers "CHECK XXX DET COIN COUNTER"

There are error messages which say check a left, right, or center coin counter. This error can be caused by a hopper motor running when it should be off or maybe the motor has a slow or bad braking action. When a second extra coin dropped you get an error message to check the coin counter. After resetting the error message dump (test) all the escrow buckets and count the coins looking for any which contain extra coins. Extra coins could be a counter problem or it may be a motor running, chattering or has braking problems. We have seen cases where the control computer caused the hopper motor to run, or chatter, when it should be off. This causes extra coin/s to be dropped and get a "CHECK XXX DET" error message.

CHECK XXX DET
 Always count the coins
 in the escrow buckets !



BXCOUNT.PS Feb 16, 2005 1S

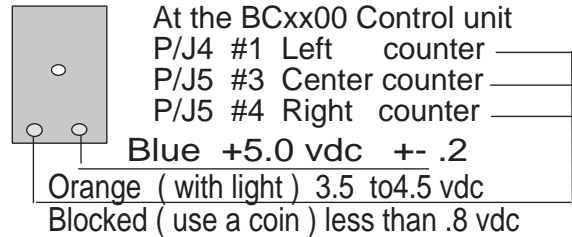
A temporary field fix for BC1200,1400,BC3500 with "Check XX Detector problems." Pulling P5 from the control unit makes it a BC100 \$1 and \$5 changer. If the left detector is working re-program the changer for \$1 & \$5. If the left counter is not working swap LEDs and /or counters from the center and/or right till left counter is working. Once the left is working you will have a working BC100 \$1 and \$5 bill changer till you get the parts to fix the bill changer..In September 2000 I learned Rowe changed wiring so this may not work on some changers. Try it, you got nothing to lose.

TAKE NOTE : Keep red LEDs assemblies on hand. There are two types. Original Bxx00 Changers with 18' of wire and connector plug assembly are part # 450761-01 and the updated BC12,12R,35 to BC-1200,1400,3500 changers use 450761-02 which has short 4" wire leads with lugs. Follow the color code !

Checking Coin Counters used in the new series of bill changers

Another part of the coin count system system is the photo cell assembly. Use a meter to check the cell's operation. You need + 5 vdc on the blue wire. You should have => + 3.5 vdc on the orange wire with the LED shining on the cell. When the light is blocked the voltage should below .6 vdc. Refer to the manual for details You may have to push function reset button to clear a coin detector error after doing any testing.

I use the meter on the orange wire to find the peek in voltage has I align the LED assembly. This is better than eye balling the alignment.



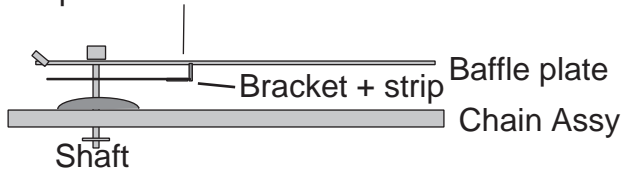
Bad coin counts

Over the years we have seen the wrong coin counts end up in the escrow buckets. We have seen a motor run when it should be off and extra coins fall into an escrow bucket. Generally there is a CK xx Detector error. There are items which effect the escrow diverter doors. We have seen a loose or missing roll pin in the diverter door. One case of the diverter door drive yoke was reversed and the tip which normally rides on the steel ball was found in the down, not up position. While not noted in the newer machines we have seen cases of the steel ball missing or the spring was too weak to hold the diverter door in the correct position. We have seen a bucket doors hang open because of burrs on the plunger which catch on the linkage. Sometimes the doors are too tight. The doors should have a little bit (1/32-1/16") side play. You can remove a door nylon spacer and file it down a bit. We have seen worn bucket doors and linkages hang the bucket door open for a while. In this case extra coin/s dropped the vend and the next vend is short. Since the total count for the 2 vends (say 1 more and then next less) is correct so no error message is given. People who convert older machines to the new version, may in the near term, have to replace worn bucket door assemble/s. You may not have seen any these problems but from time to time they will show up !

Rowe Baffle Plate update

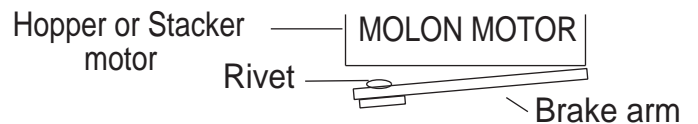
Rowe has added a small bracket and a strip of nylon to the baffle plate in newer Hi Capacity hoppers to allow better control of the coin flow. History has shown the the new baffle plate can be put in older hoppers and, while Rowe has not said so, customers have reported it did help coin flow and reduced coin jams. I like to add the new baffle plate when I refurbish hoppers.

New baffle plate update with bracket +strip. is part # 270359-01



Hopper or Stacker Molon motor coasting ! Dropping extra Coins.

Hopper and stacker motors can have brake failures which cause the motor to coast. Many older motors had a hole in the brake arm but no non-magnet rivet was not installed. This rivet prevents residual magnetism the brake arm from sticking to the motor frame after the power has been removed. This holding of the brake arm can cause extra coins to be dispensed or a stacker to coast by the stop micro switch. The rivet is a very small headed rivet You can order a new brake arm which has the rivet installed (270299-02) or add a small non-magnet rivet in the old brake.

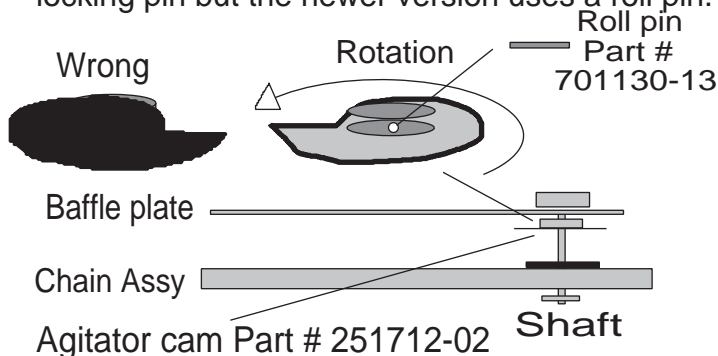


A hopper's life cycle depends the type of cleaning and maintenance you give them. Do not presume they only need work when they are in a failure mode. Basics such as slowly pouring the coins into the hopper, brushing and chiseling the tracks routinely, using Rad Dry slick and lubrication of the shaft and upper agitator will add years to the life cycle of your hoppers.

Hopper Upper Agitator Defect !

In March 1997 a vendor reported he had gotten upper agitator cams which were defective. The nylon cam was mounted on the metal ring backwards. We found half of the units in our parts box were backwards. We also found two hoppers in our machines with the backwards agitators. We replaced them. The defect may have first shown up in 1996 ! As the cam turns the small edge should start cutting into the coins.

On another note, early versions used an allen locking pin but the newer version uses a roll pin.



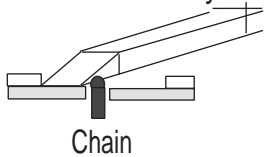
Hopper Latches - Coin Count

Some hoppers pop backwards and away from the motor's ratchet when a jam occurs. Actually the ratchet should pop backwards towards the motor but because there is something wrong with the device that is designed to hold the hopper in place the hopper jumps backwards. The devices used are latch springs, movable metal latch arms, and the one which may be missed by you, a large rubber pad. Many times I find the rubber pad is missing because it fell off. I see this in machines like the SPC-2 and other machines too. If the machine is get hot inside the glue weakens and the rubber falls off. Some hoppers have handles which hit the rubber pad but some handle plates are bent or even missing. Now when a jam occurs the hopper may move forward and away from the ratchet and the hopper may, or may not, fall back to the normal resting position. This can cause a shortage of coin payout and the changer may go out of service even if there are plenty of coins in the hopper.

WARNING: Some of the hoppers I have seen lately have stripped holes. The metal used in the plate assembly, baffle plate, and even worst, the material used for the chain adjustment block can not take abuse. Automatic nutdrivers or drills can, and have, caused stripping of the holes. Extreme care must be used when tightening screws. The three chain adjustment screws need snug tension and the lock washers will hold the block in place. Fast is not better. Gross is not better !

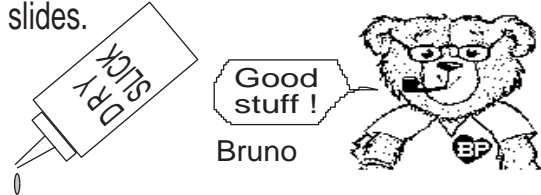
CLEANING ROWE HOPPERS !

Just brushing a Rowe hopper is not good enough to get rid of dirt build up on either side of the chain. A person should not scrap the plate with a sharp object like a screwdriver, wire brush, or use something like steel wool. Would you use these items to scrap a teflon coated pan ? Of course not ! You can make a wooden chisel out of hard wood or file/grind the back end of the hopper brush into a chisel. How often should you clean hoppers ? What ever you do don't wait till the hopper stops picking up coins. If you do the damage to the tracks has already occurred.



Dry Slick !

What can you use to clean Rowe hoppers and your coin mechs ? A product called Dry Slick is a very good cleaner when wet and when it dries, it leaves slick surface film which does not collect dirt. I do not recommend its use where a build up will cause a serious tightening. (such as tight shaft and nylon bearing). There is no problem when used on a Rowe hopper or on a coin mech area where the coin slides.

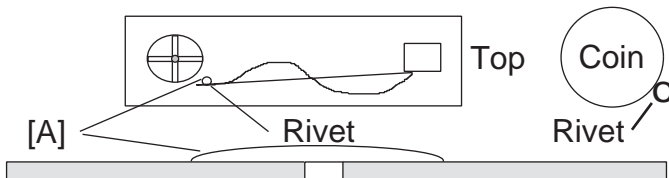


Consider having me REFURBISH your hoppers. I'll take care of the rivet problem, fix the track edges better than new and replace worn parts. If you don't have the baffle plate with the nylon strip on it I'll put it in. The cost will normally run \$80 to \$100 per hopper but the cost will be a good return on your investment. You have better running hoppers, extend the life of the hopper and other parts like motors and the gear boxes. I do more than just do a cleaning and replace an agitator. . Get those hoppers refurbished now, don't wait !

Hopper jams or coins bridges can be caused by dumping the coins into the hopper and/or shaking the coins down. Slowly pour the coins into the hopper. Failure to do it right leads to coin bridges and/or coin jams. The coin jams can cause hopper motor or gear box failures. Re-read the manual for instructions. Make sure items like paper clips, string, paper, etc, does not get into the hoppers.

Hopper Rivet Jams

We have seen two rivet problems with the small rivet near the gray agitator. We have noted gray agitators with nicks in the rounded blade edge surfaces. These nicks are caused when quarters or quarter sized coins get stuck between the rivet and the gray agitator (point A). This occurs when the rivet is loose rivet or the rivet no longer has a smooth edge. If you take the main plates apart you can hammer/punch a loose rivet tight. If the edge of the rivet is no longer smooth you can file the edge smooth so the coin slides over the rivet.



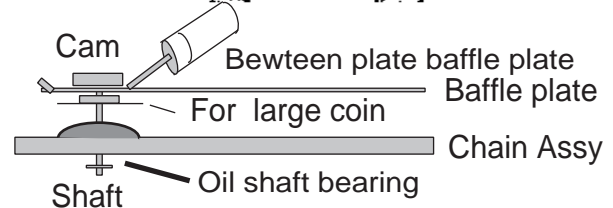
HOPPER PLACES TO OIL !

We have found it pays to oil both nylon bearings used for the hopper shaft. Oiling the area where the cam/s hit the baffle plate with Magic Wand, Radio Shack or 3 in 1 Oil will reduce the amount of friction and make the hopper easier to turn. This will reduce wear and tear on the hopper Motor. Do not use other stuff like WD-40 on the hopper. RAD Dry slick should be used on the chain.

Never oil or WD-40 the hopper chain !



Never use WD-40 on a Rowe machine or acceptor



WARNING: Some of the hoppers I have seen lately have stripped holes. The metal used in the plate assembly, baffle plate, and even worst, the material used for the chain adjustment block can not take abuse. Automatic nutdrivers or drills can, and have, caused stripping of the holes. Extreme care must be used when tightening screws. The three chain adjustment screws need snug tension and the lock washers will hold the block in place. Fast is not better. Gross is not better !

The Latest Rowe Hopper Motor

The latest Rowe hopper motor [part #450491-02] is made by Merkle-Korff Ind. While this motor is only 1/8" longer the Multi Products motor the back end is quite different. Originally Rowe's motors were a lot smaller so the metal cover was OK. Then came the longer Multi Products so holes were drilled into the cover. The Merkle-Korff motor is different so you have to cut new holes in the metal cover. If you decide to leave the cover off remember it also protected anything that might conflict with the free movement of the motor's brake. If you leave the cover off make sure you remove anything in the bill changer which could conflict with the brake's operation. When working in the bill changer keep your fingers away from the motor/s.



Fixing Mutli Products Stacker and Hopper Motors

IBrake problems are sometimes fixed with a brake Pawl 270233-02. A brake metal arm replacement part number is 270299-02. Keep old assemblies noting if motor or gear box is good or bad. At some point you may be able to put a good motor on a good gear box or visa-versa. You may even be able to take a bearing bracket, armature, etc, and repair a bad motor.

I have noted in some cases (chattering) a new motor is purchased because the manual indicates the motor is may be at fault. It might be a brake problem but generally it is not the motor but the control board. Before buying a motor swap/move it with another motor's. It is easier for me to use an AC power cord (fuse or breaker protected) with clip leads to check hopper stacker motors. Always measure the motor coil with an ohm meter before connecting the power.

A hopper or stacker gear box/motor failure may indicate there is a primary fault in the hopper or stacker and a replacement of the motor assembly does not address the real problem. See my other notes on hoppers, etc.

Generally when a hopper or stacker motor shorts you will find a connector pin and/or the copper on one of the boards has also burned open. You may find burnt copper on the stacker driver card. In the new bill changers you may an open the small connector board in back of the dispenser, or on the power supply card.

If you do have blow a motor you should look for the reason it blew. It maybe worn rollers or shaft on a dual stacker, or bad triacs in the control unit causing motor to chatter and burn, etc, etc.

If the black ratchet which drive the hopper is worn you may have a rivet problem in a hopper or some other hopper problem and it maybe time to have the hopper refurbished.

Xerox/copy onto heavy #24 paper or light cardboard.
 When storing an acceptor roll the paper strip
 into the acceptor.

Location: _____
 Date: __ __, 2005
 From EQ: _____
 Type Acc.: _____
 Serial#: _____
 Error: _____
 Problem: _____

Location: _____
 Date: __ __, 2005
 From EQ: _____
 Type Acc.: _____
 Serial#: _____
 Error: _____
 Problem: _____

Location: _____
 Date: __ __, 2005
 From EQ: _____
 Type Acc.: _____
 Serial#: _____
 Error: _____
 Problem: _____

When removing an acceptor for repair please note why it was removed and what unit it came from. Please note any error message, error code, or status blinks. In the picture below the dark stuff on the head came from the pressure roller. Never leave the mag head pressure wet [after using wet cleaning card]. Never store the acceptor without inserting a piece of white paper between the magnetic head and the pressure roller. High temperature in a hot storage area can increase the transfer of the rubber to the mag head.

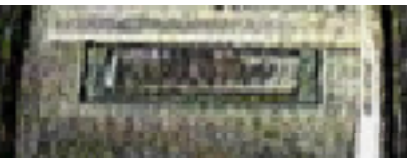
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Another Bear note from Bruno !

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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

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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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