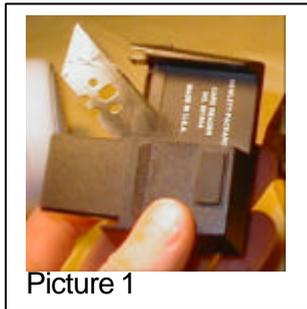


HP-41C Card Reader Repair The Short Fix Approach

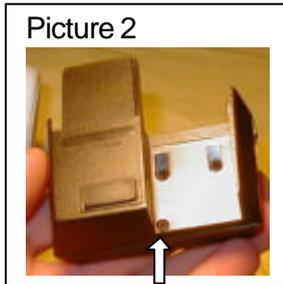


Tools needed include the following shown below. Two sizes of Phillips head screw drivers are good. One small and one medium small. Needle nose pliers are great for picking up the small roller and for pulling the wires if need be. Super glue and a pin to place it are also a requirement. Two O-rings slightly smaller than the $\frac{1}{4} \times \frac{1}{8}$ inch ones some fix-it experts use cut pink plastic airplane fuel line. I have had success with both, but prefer the O-ring approach. Place a new washcloth on the table to help grab small parts. Also invest in a set of those jewelers straight edge (common) screw drivers shown on the far left. The really small ones are great to this effort in removing the small front screws and the motor screws. Turn on a bright light.



Picture 1

This is the first step in opening up the card reader. I have already cooked the label for about 4 minutes on high via the hairdryer. Move the dryer around to somewhat equally fry the label. Then try all edges for any peeling upward. This edge is better because if you slip and nick or scrape the label it is not as noticeable as on the top part of the label. Use the flat razor to get under the label and pull it off. It usually comes off pretty well. Then stick it to some surface edge and try not to get fuzzies on the sticky part of the label.



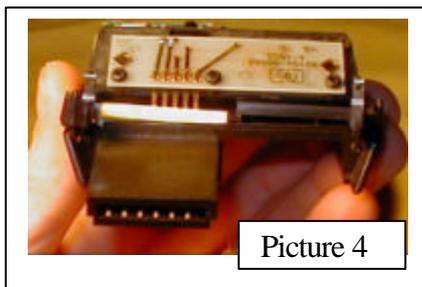
Picture 2

This is the location of the screw that begins to loosen the top of the reader. Remove it and put it aside for later. The other two screws shown here hold the internal reader into the case. They could also be removed now. Put small parts into the top of an old jar or peanut butter plastic jar. Then they roll to the edge of the lid and not the edge of the table where they practice high dives when your not looking.



Picture 3

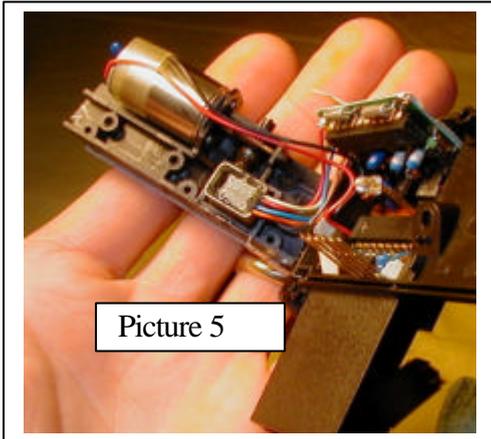
This view shows the removal of the other two front screws that hold the top onto the bottom. Sometimes these are hard to remove as they turn and do not back out. The needle nose pliers help that condition, be slow and careful these guys are past their prime. The very small jewelers screw driver works best even though the screws are hex heads. Push hard-ish and back them out. Place the small screws in the jar lid.



Picture 4

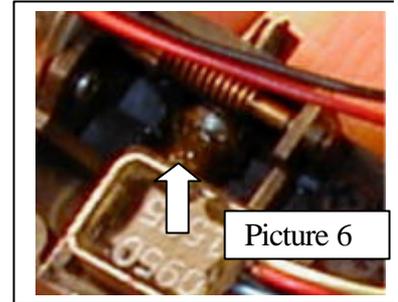
This is the front of the reader with the top and the front black plate off also. Remove them carefully because these two little clips are in place and you want to look at them in their original positions. One is left and the other is right, yet they are reversed in this view. Left is right and right is left. The one on our left (marked right) has a plastic sleeve so the metal will not short out the five golden connectors. Sounds like something from Harry Potter. Carefully remove these two clip assemblies and try to keep them together. Yep, put them in the jar with all the other parts. Note that the black front plate lower part has a raised plastic portion that holds the

metal spring parts in place. Putting it back sometimes it is hard to see which side is up on the front piece.



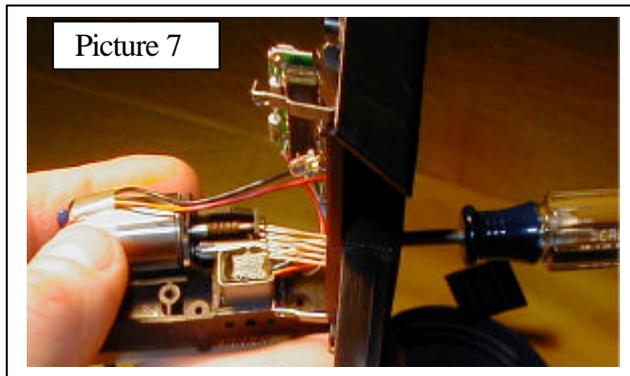
Picture 5

To get to this picture flip the upper part of the reader (after removing the two screws shown in picture 1. The wires at first seem too tight, but it really is not hard to flip it over to see the infamous gummy wheel. Shown in extreme enlargement in picture 6. Look at the amount of messy goo to determine if you need to take the upper part of the card reader apart. If it looks like the reader does not have goo all over the place, the fix is a lot easier. It just takes pulling the pin and slight clean up then reassembly to finish. If there is a lot of goo all over next to the gummy wheel, then you'll need more effort in the



Picture 6

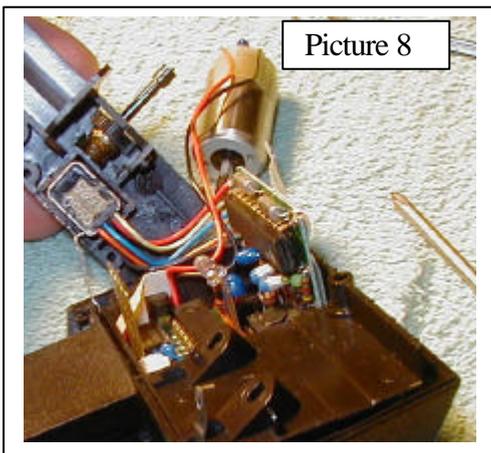
disassembly. This paper only handles the easier repair and not the taking apart of the upper card reading section. Many times, if your careful you can just clean out the area around the gummy wheel and then reassemble the reader, and it will work fine.



Picture 7

Picture 7 shows the removal of the motor assembly with all the wires still attached. Sometimes the very small screws holding the motor are Philips and sometimes they are straight or common screws. If they are stuck, try the very small jewelers screwdriver and they seem to loosen better for me. My Philips screwdriver is not flat enough and it can not always "bite" or hold the screw heads. Then I use the small jewelers screwdriver. After removing the screws, gently jimmy out the motor and clutch assembly. The 41CV clutches for some reason are usually in better condition than the HP-67 clutches.

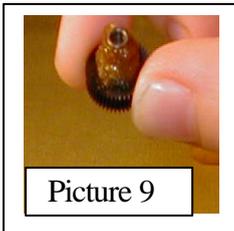
With the same slight force it takes to rip a piece of paper (not much) tug on the clutch to see if it is loose. If not then thank your lucky stars and move on. If it slips off, then touch the inside of the clutch with a pin point dipped in superglue, (**coated** not a full drop). Then slide the clutch back on the motor shaft and turn the motor for 20 seconds until any extra superglue has not adhered to the motor case freezing the shaft of the motor. Clutch fixing is tricky to get it perfect. Go slow, and carefully.



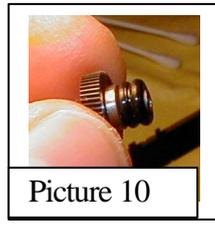
Picture 8

This part is the fun part as you get to actually get to the reason for taking this thing apart, to replace the gummy wheel. First pull the pin on the top of the upper part of the reader as shown in picture 8. Twist the pin with the needle nose pliers and it comes out pretty quickly. Use the jewelers screw driver to gently pry out the gummy wheel shown in picture 9. Try to limit the amount of goo that may fall into the area around the friction gummy wheel.

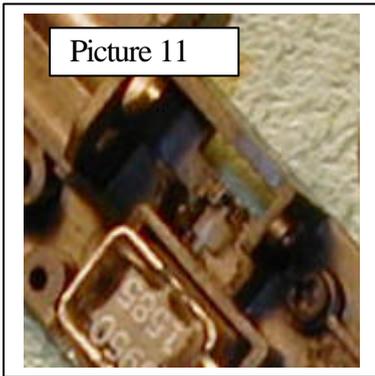
With the friction wheel or gummy wheel out, scrape off the goo with an exacto blade. Wipe the goo onto a napkin and continue until it is clean. Wipe the friction wheel with a cotton cloth to get it all clean, Q-tips and alcohol finish the cleaning. Then you have a choice as to the replacement rubber. Some techs use airplane fuel line and cut it to fit the axle (cut slightly smaller than the end of the axle). That may have more contact surface on the card, but that may not be all that important here as all we have to do is move a small card through a reader. Orings have always worked well for me, so they are shown here. Push on the first O-ring then with a touch of superglue from a pin point glue the second O-ring next to the first onto the axle. Done!



Picture 9



Picture 10

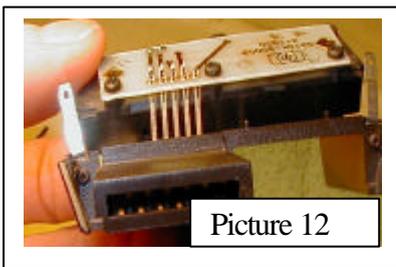


Picture 11

Picture 11 shows what the inside area around the gummy wheel looks like. The center very small white plastic piece is the roller. It actually rolls the card into the friction wheel that is being replaced. Goo will likely be around the area of the roller. Use a small flat sided screw driver to scrape out, scoop out most of the goo. You can get nearly all of it. Frequently by just touching the roller it comes up with the implement, then you can clean the roller. Clean up all you can as getting rid of the goo is important. After scraping the goo, use a Q-tip dipped in rubbing alcohol (then squeeze out excess alcohol) and twist it as you press it down onto the goo. Sort of "drill-out" the goo with the Q-tip. Do not over saturate the Q-tip so alcohol drips into the area.

The insides of the area next to the gummy wheel can be rather gummy also. To clean this use a Q-tip dipped in rubbing alcohol twisting back and forth to ungoo everything. Remove the white roller located just below the gummy wheel. This roller will jump from your hand as it were alive. You have been warned. Remember it is ALIVE, and it wants to hide from you, forever. Clean the roller (pinch in one hand and Q-tip twisting axially pushing on the roller with the other) and be quick about it as it can escape at any moment.

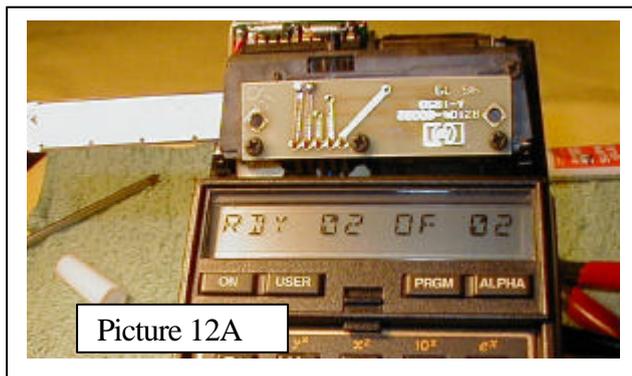
After the reader base and roller are clean, use the needle-nose pliers to place the roller back in it's place. Set the replaced gummy wheel back in place and return the push-pin to hold it. Now put everything back together.



Picture 12

It takes a little gentle persistence and do not tug on the wires, as you flip the reassembled unit back to its original place. Rock it gently back and watch the front five golden pins. If those fall into place, then your good on the positioning. Then re-screw the two underneath screws to hold the upper unit back in place.

TEST THE UNIT

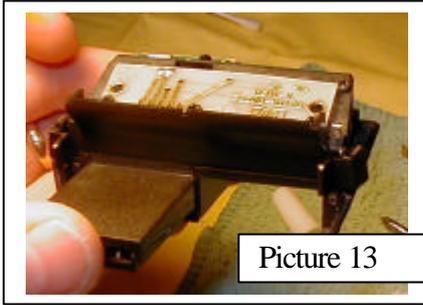


Picture 12A

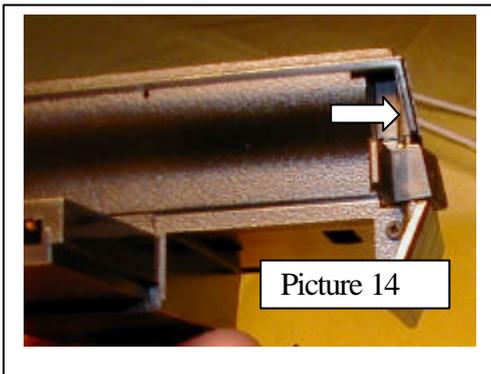
Slip the unit back onto the calculator and test to see if it works. Sometimes a small amount of goo comes off on the card. Wipe it off and try again. I have had good success with this approach. Some readers are not fixable, but in general most work fine if they have not been opened. Another issue is the clutch, but if you had it suoerglued, that might be your only realistic option.

If it works YAHOOOO!!!, if not, check the wires and take it apart to check what happened.

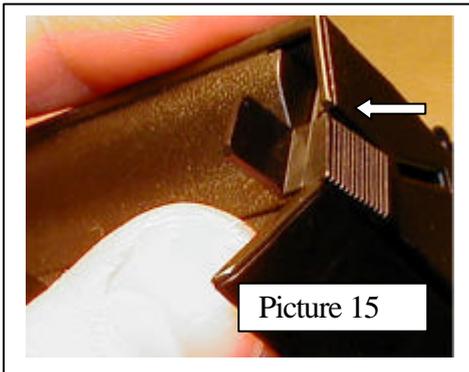
Look at picture 4 to get the orientation of the two spring clips that have to be replaced before setting the front black plastic piece. Be sure that the metal strips are set in the clips. They slip between a very small channel and then a small hole in the metal pops over a plastic raised pin attached to the clip on each side. I hope that makes some sense. Just carefully check the pins so they fit on the bottom holes and lie just inside the lower lip. Make it look like picture 4.



Picture 13 shows the front black plastic piece that needs to be placed next. Its placement tends to bump the two clips around and can be a trial and error (Someone once told me that saying should be trial and success...right?!). Anyway check the orientation so up is up on this piece. The bottom of this little beauty has two raised section designed to push back the metal clips. That is the bottom of this piece of plastic. Once this is in and your nerves are still intact, place the top onto the thing. Remember your only friend here is gravity and that does not help too much here.



The arrow is pointing to an issue that you need to understand. The front metal vertical brackets must fit inside the upper top plastic channel. This channel is just a little bigger than the vertical metal brackets. I use a jeweler's screwdriver to push the vertical brackets around until they line up with the black plastic channel. It's a balancing act but not too hard once you get the knack of it. If they are correct, then the unit almost snaps back together. The remaining hassles are the two upper pins for the side movable black plastic clips. See the next picture



Here are the last offending pins that try to foil your repair attempt. Do not let them stop you. While applying a little less pressure on the top, slip the top pins into their approved holes and be done with it. Now you can replace the two front screws and finish the job. Check the back three screws. Do not over tighten them, but make them snug

This approach to fixing the 41C reader is the short and sweet fix. Sometimes it is necessary to take it all apart as there could be extended amounts of goo inside the area where the cards travel. Here are a couple of other approaches I noticed last night when I was taking apart another 41C reader.

1) Be very careful when removing the top of the reader. The tendency is to pull pretty hard then the top jerks the rest of the unit and the two loose clips that hold the reader onto the calculator fall and you do not have a chance to study how they were oriented. Set the reader on the table and pull gingerly so it does not jump when the top separates from the rest of the reader.

2) The metal spring pieces shown in picture 4 that attach to the little end clips have small holes in one end that slip into the clips on either side. Each of the clips has a small "L" or a "R" on their inside if you look closely at them. From the picture 4 orientation as you look at them the "L" is on the right side of the reader...why??...I do not know, but it is true. Remember that the rubberized one is on your left as to look at the reader as in picture 4.

Sometimes if the black clips that the metal spring strips go into will not hold the metal strips. In that case I superglue the strips onto the black clip and then set them into place as before. Then place the long black front plate into position with the little inside ridged plastic on the bottom. It can be hard to tell which side is up on the long black front plastic piece.

3) If you during testing the fixed unit find that nothing happens when you place in a card, try first checking all the side wires. Write down the colors in order from top to bottom so if you pull or bump them off you'll know their order, same with the two power wires that go to the base.

Back to the nothing happens option. Now you may want to consider looking under the circuit board that the 5 pins go into, located on the top of the unit. This is where the switches are located that turn on and off the motor. They can get corroded and misaligned after 20+ years of existence, sort of like us. Anyway, unscrew the three holding screws and pop off the circuit board. The two long golden flexible switches are under them. They are held in place by "end holders", that the golden strips slip under. When a card goes in (try it) they rise up and touch the circuit board you just removed. Sometimes all you need to do is very gently scrap them or sand paper them with emery paper. Just scrape or sand enough only to make them glow...not hard on this one. The clips can also jump out at you so realize that too. Carefully put it all back together and test it as before.

Congratulations that is my approach. It may also be worthwhile to check the HP Museum for other articles on this repair. It is always helpful to get second opinions on things like this.

Let me know any problems you may have at Waterhosko@aol.com.

Best Regards,
Mark Hoskins