

# Bust Half Nut Club

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# Die Cracks and Die State Progression



Many of you have probably seen a coin described similar to “1810 O-108”, where ‘1810’ is the year, the ‘O’ represents Al Overton, who wrote and published the mostly comprehensive reference titled;

### ***Early Half Dollar Die Varieties 1794-1836***

This reference identified the known Die Marriages at the time of each printing, and so, back to our example, the number ‘108’ stands for the Die Marriage of the date (the pairing of the Obverse and Reverse Dies).

For some Die Marriages, which we call DM’s, Overton also used a letter designation system in an attempt at defining a major change in the Die State (or “Stage”) for one (or both) of the Dies. In this case, the latest state of the DM might be shown as a 108a, and the earlier state as a 108.

But let’s back up a moment.

Again, for the Lettered Edge Capped Bust Half Dollars, minted from 1807 to 1836, there are 450 different Die Marriages (not including different states). And for the Nuts, as we call ourselves, obtaining one example of each of them would truly be the ultimate collecting accomplishment.

These 450 Die Marriages don’t even include the 109 Different DM’s for Flowing Hair and Draped Bust Half Dollars, often referred to as “Pre-Turbans”.

But that’s a whole different group of coins, and as we discussed I’m going to try and stick with Capped Bust Halves for today. “Turbans” if you will.

So, back to the Die States.

In the early days of studying Die Marriages, certain major changes were sometimes exhibited for the same DM. For example, the die pairing may have started without any cracks or major anomalies, but then maybe the reverse die developed a series of cracks around the peripheries, across the eagle and into the shield as the use of the die continued.

And here was the point where Al Overton used the letter designations. Mostly just one, an ‘a’. But occasionally, when enough coins could be classified between three very distinctive groups, an ‘a’ and then a ‘b’ were used.

And somehow, as if 450 Die Marriages weren’t enough ... then there were more!



Several years ago, after almost a decade of comparing notes and studying different DM's, the Club created a more comprehensive Die State ("Stage") designation system for Capped Bust Halves, which the Bust Half Nut Club then published as the

***Die State Progressions of the Capped Bust Half Dollar  
Die Varieties 1807-1836***

Say that three times really fast!

Yeah. Let's just call that the "Die State Study".

So, within the designation system used for the Die State Study we have identified multiple different States for each Die Marriage, when this change of states is both noticeable and traceable.

Very important. Noticable and traceable.

So now we have certain Marriages that currently have up to 11 different States, defining different points along the way within a dies use. These are separated by a decimal directly following the Die Marriage number; written such as "108.4", where 108 is the DM, and 4 is the State.

Therefore, an 1810 Overton 108a Half Dollar could be called a lot of different things, but instead of a 108, or 108a, it might also be looked at as a 108.1 or 108.4.

Or maybe, 1810 O-108a (108.4).

Confused yet?

Try being anyone who keeps track of all 985 of them!!





What causes Die Cracks?

Die Cracks are caused almost entirely by Pressure.

Once a die is produced and ready for striking ... hardened and prepared ... and the press is set and ready, if it were never subject to the intense pressure of striking (or some other force), it would never crack.

The setting and the making of dies was not precise by any means, at least as we consider precision today. Nor was the way in which a Screw Press was set up for striking, or how it operated.

For example, if the dies were not set precisely (hardly a given using the measurements and gauges of the day), slight differences could occur in the die spacing and even in the die alignment.

And when dealing with tolerances of even a few thousands of an inch, which would have been mostly unachievable at the time, the pressure dynamic changes on the surface of the dies during the striking would not have been inconsequential.



The Screw Presses used to strike Half Dollars in the early 1800's probably operated at about 98 tons per square inch, and at such pressures, the lack of precision would show tons of pressure imbalances on the die surfaces. While I am unsure of the accuracy of some of that data, I think we can agree the force used to produce coins was noticeable.

However, it was not consistent. If teams of four men were used to swing the press down for striking, and then back again to reset and ready the press again, over and over, hour after hour, logic would dictate that the actual force could vary significantly.



Further, we left out the physical production of the dies and planchets, which also have an effect on the process, and the overall pressures of the die surfaces.

The physical die manufacturing and quality control efforts of the creating the dies, even with the die steel itself, have a big part in whether a die develops cracks.

From a purely material standpoint, the tempering of the die steel, as well as recognizing imperfections, anomalies and flaws could make the dies more prone to cracking prior to or during use.

Further, the hardening of the steel dies involves the process of heating and then rapidly cooling (called “quenching”) of the dies. While this does strengthen the die, it can also make the steel brittle, therefore more susceptible to cracks.

Any of these imperfections or weaknesses in the die steel, visible or not, would enhance the probability of cracking once striking began.

And given the lack of precise measurements, the die base could be square, but the actual face could be slightly off.

Also, once the die is fully prepared and striking begins, the actual metal flow of the coins being minted creates another type of die stress.

As we know, the preparation of the planchet included the process of rolling the coin material flat, cutting the rounds, and then having edges upset with the Castaing Machine, which imparted Edge Lettering, in addition to raising the edge to bring the dentils up while striking.

During the striking process, the metal of the planchet attempts flows both outward, trying to escape the open collar, but also upward, into the recesses of the die. This is, of course, how the design from the die transforms the planchet into a coin.

Yet as we stop to consider all of the areas where a lack of precision exists, and reconsidering the enormous pressures used, it becomes apparent that even slight differences in alignments, including planchet thickness and uniformity, can cause great pressure imbalances on the surface of the dies.

And the physical law regarding the “path of least resistance” will reign ... and chaos can ensue.





Todd's Favorite

Top 10

Cracked Dies



# #10

## 1832 O-101a (101.2)

Starting out as a thin break on the reverse die running from the tail feathers alongside the olive leaves, the crack develops into a heavy die break extending up and to the left, along and solidly attached to the upper olive leaves, and well into and nearly crossing the left wing.







### 1811 O-109 (109.3)

A heavy die crack forms on the reverse die and extends from the edge at left side of the first S, bisecting the scroll and extending into the left wing.

An additional crack runs through 50 C, across the lower olive leaves and up through UNITED ST, when a final thin crack develops and passes through TES OF AMERICA and into the arrowheads.



# #8

## 1810 O-101a (101.11)

A die crack on the obverse joins the stars on left, eventually running across the top of the cap to s8, down to s12, and eventually across lower bust to upper part of the first I.

Another crack runs under base of date and eventually extends to the left to edge near s1, and later right to s13.

Next, a short crack develops from the edge to s1.

Another obverse crack on the obverse appears above date, crosses the bust and joins the earlier die crack across the lower bust to upper part of 1st I, eventually forming an elongated lump near edge of drapery.

An additional obverse crack extends from the upper part of 2nd I to lower curls, and a die Chip develops along the break from the edge to S1.

And this doesn't even count the die cracks for the Reverse Die on this Crack Monster of a coin!!







## 1823 O-109 (109.1)

How can a prime die state have all these cracks?

When the Obverse Die is paired with a different reverse die in a remarriage.

An Obverse die crack from the edge crosses s5 through s7, further across the cap and then extends to the edge above s8.

At this point the 3 in the date was reworked and an additional die crack formed from the top of the 1, curving above the date and joining stars s12 through s8 on the right.

Another die crack crosses the end of bust to s1 where it branches from outer point of s1 to edge and from upper point of s1 to join s1 through s4.

These are the same characteristics of 1823-108.5 but using a different reverse die without cracks.



# #6

## 1818 O-104a (104.4)

Another remarriage, the reverse die was a workhorse for the 103, 104 and 105 obverse dies. And while all three obverses cracked, and all DM's are at least scarce, the reverse die seems to have finished life unscathed.

One the 104, a die crack forms on the obverse from s4 and the two inner points of s3 to cross the bust to the lower edge of the drapery. Another crack at a 90° angle to the first extends sharply upward thru the drapery, eventually extending to edge left of first I, and then an additional crack forms from the edge thru the first 8 to the previous crack.

Another sharp die crack from the edge above s7 goes through the cap I in headband, with an additional crack from the edge above cap through the right stars.

A significant triangular die chip at the bottom of drapery above first 8 in date fills the smaller angle at intersection of die cracks, which finalizes the deterioration of the die and created a recognized so-called 'b' state prior to any further die state analysis.







through s9, eventually past S8 and across the rear half top of cap.

Oh, and we're not done!

An additional obverse crack from below the 8 crosses the base of the I and the end of bust to join all stars on left, and by this point the original die dots within date are no longer visible (or barely so).

Another obverse die crack crosses the curl, drapery, and clasp to the lower neck before yet another die crack branching from first crack below I8, passes between I8 to drapery;, and the same time the die crack on the reverse crosses the neck of the eagle, from the left wing to the scroll.

And all of that is before another 'b' state develops as die chips form on obv at outer points of s2, s1, below first I in date, near inner point of s13, and on the reverse in the crack through the scroll and right wing.



# #4

## 1814 O-106a (101.5)

A die crack on the reverse develops from the edge through the R in AMERICA, eventually curving thru right wing and into the upper center of shield.

Another die break from the edge near the left wing divides into two main branches, with the lower branch crossing the olive leaves, top of 50 C and arrowheads to the edge near middle arrowhead, and the upper branch crossing the upper pair of olive leaves, tail feathers, shield, and connecting to first crack in middle of right wing.

An additional crack from extends from the edge above last A thru the arrowheads to the C in 50 C., and finally another fine crack from base of R in AMERICA meanders to the top of right wing and curves under the scroll, and eventually thru the PL in the scroll.

While not part of the Die States per se, the obverse shows extreme weakness as the reverse die collapses and also shows prominent clashing below the ear and in the left obverse field.





# #3

## 1812 O-106 (106.6)



This coin is somewhat fantastic as it uses a new reverse die paired with a cracked and failing obverse die from DM 105.

The obverse continued to deteriorate, as should be expected, and a faint die crack develops from the crack in lower loop of 8 thru bottom of 812 to the die crack through the right side of the 2.

A heavy break on the reverse also forms from N in UNITED straight across just above left wing to opposite edge left of A2; with an additional fine die crack from a heavy break at U4 in scroll through the left stand of A2 and to the edge.

Back on the obverse another die crack from edge just left of s13 to curl appears and an additional one perpendicular to that one arcs around the bottom curls and then extends into curls midway between the lower curls and the ribbon. Add in a die crack from the crack above the eye, thru the eyebrow, across the bridge of nose, and into field towards s5, a die chip in the lower loop of 8, as well as another faint crack from s13 thru the center of s12, barely inside inner point of s11, and then arcing thru field to curl above the upper ribbon and this die was long overdue for retirement.



# #2

## 1814 O-101a 1814/3 Overdate (101.5)

A die crack on first forms on the obverse from s1 through s6 and then extends across the cap and down through stars on right, with an additional crack below and through the bottom of the date. A large chip also forms at the bottom of the 4 in the date.

Additionally, there is a die crack on the reverse near left wing tip that joins UNITED ST near the base and extends to top of AI.







And the #1  
Favorite  
Die Crack

maybe not just  
for Capped Bust  
Halves, but  
for all coins  
for all-time ...





### 1807 O-IIIb Bearded Goddess (III.5)

A die crack on obverse extends through left stars, with a chest to chin crack that has become a heavy break, forming a solid lump just above the chest and extending in lighter cracks up across the eye and into the headband as well as down across the bust, with a final additional crack forming above the eye to the headband at the E and into the cap.



Thank you  
for joining us!

# BHNC Open Meeting

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