

String Field Analysis of Marvel's Agents of S.H.I.E.L.D. Diagrams

By ActiveGalaxy 2014-11-17

A series of diagrams composed of circles and lines have become as important as a character on the TV series Marvel's Agents of S.H.I.E.L.D. Thus far these diagrams have appeared in drawings on a chalkboard, a glass panel, and, curiously, as knife point carvings on a desk, the back of a painting, and a plasterboard wall. Except to say that the creators of these diagrams are unaware of any meaning and draw on impulse, the focus here is only on the content of the diagrams and not their origin or the role they may play in any story arc. A good introduction to the series as it is defined by these diagrams can be found at <http://shielDTV.net/forums/season-2-discussion/the-alien-writings>.

Because the diagrams contain repeated sets of symbols and transformations of such, an attempt will be made at a statistical and hopefully 2-dimensional linguistic analysis. In fact, however, these diagrams may be purely the artistic product of graphic designer(s).

Please post any comments to <http://shielDTV.net/forums/season-2-discussion/the-alien-writings>

This is a working paper and is subject to change.

Having said that, current major results are as follows:

- Discovery of possible common messaging structures in both the Belarus Blackboard and Back of Painting diagrams.
- Common content between the Belarus and Garrett glass door diagrams.
- Coulson's wall drawing changes with time. Previously, the changes came in the form of additions to blank areas. A promo for the next episode (2.07) shows a new drawing that doesn't match known images but is designed in the same vernacular.
- Simple line and circle statistics indicate that the wall drawing contains a different type of message or data than the Belarus Blackboard.

What is a Diagram?

The diagrams contain long horizontal and vertical lines (strings) with embedded symbols composed of large and small circles, short lines which typically appear in groups (hashmarks), and slightly longer orthogonal lines which may also contain circles or hashmarks. Strings do not turn corners. As shown in the following, the strings and hashmarks may appear in different fonts. In addition there may be small circles scattered about the diagram (grapeshot). The string density is normally larger in the center and the horizontal strings contain more symbols.

A diagram with multiple strings will at times be referred to as a string field.

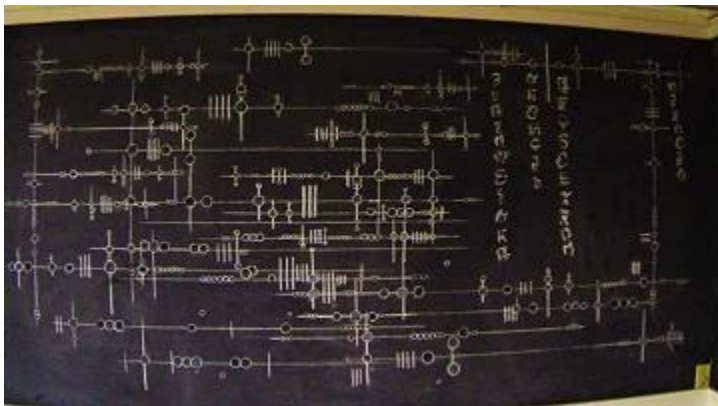
Known Examples

These diagrams are discussed in chronological order as they appeared in the series.

All the images in this section are freely available on the internet and some may be copyrighted by ABC or others. They are presented here in the spirit of fair use as this is a scholarly paper.

Belarus Blackboard

The first diagram in the series comes from episode 1.04 where it is found in a room of wall-to-wall blackboards some containing more standard mathematical equations. This example shows all the features seen in succeeding diagrams. An analysis will be given in a following section. The right-hand portion of the diagram shows writing which may or may not be an integral feature however, transliteration or phoneme replacement using known Skrull to English conversion tables¹ produce gibberish or, in the case of the character column 2nd from the right, the alphabetic sequence C to L. The analysis section shows a much better line drawing.



¹ See <http://marhawkman.deviantart.com/art/Skrull-language-translator-98842486> and <http://marhawkman.deviantart.com/art/skrull-language-translator2-98846584>

In fact there were two diagrams next to each other in the blackboard room. The only images of the second are brief and out of focus as Ward turns to look at the RH image which he photographs. The LH image is in the same style and also contains Skrull writing.



Garrett Glass Door

The next example comes from a drawing by Garrett on a glass door in 1.22. This diagram shows the other font where the lines have a toothpick shape.



Coulson Wall Carving

At the end of 1.22 Coulson carves a large drawing in plasterboard with the point of a knife.

The first image below is from the series, the second and third are billboards in LA. The fourth is from a promo for the 2.07 episode (not yet aired). Examination of the first three images shows incremental additions. Comparing the first to the second, more strings were added to the left of Coulson's left arm and the right of his right hand. Comparing the two billboards, more strings were added, for example, in the area below the word **TUESDAYS**. An example of this update through addition process is shown in an image below. This indicates that, for the wall diagram at least, writing is a process of agglomeration around a center rather than a process of concatenation.

The fourth image is from the 2.07 promo and it shows a completely different diagram in progress. While the carving still starts in the center, it doesn't match any existing imagery. Perhaps this new message will be updated later through addition.

Analysis in the following section indicates that, unlike the wall, the Belarus and BOP diagrams may be written in a top to bottom fashion as messages.





1-- First Billboard

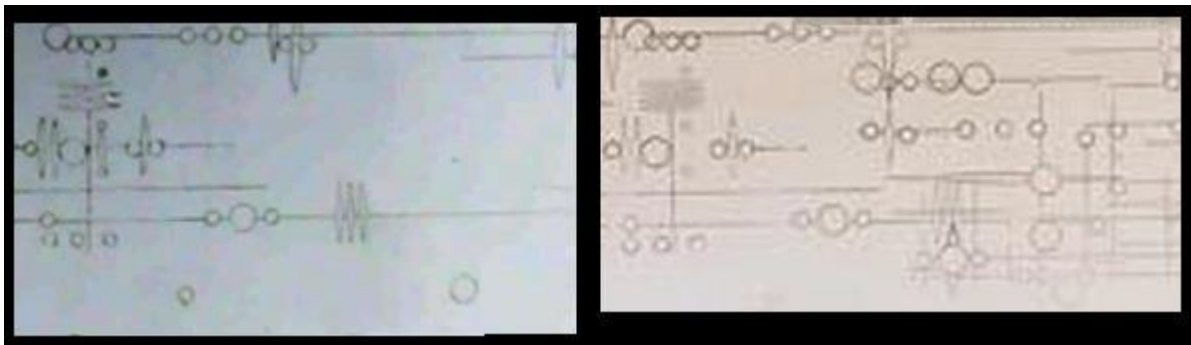


2-- Second Billboard

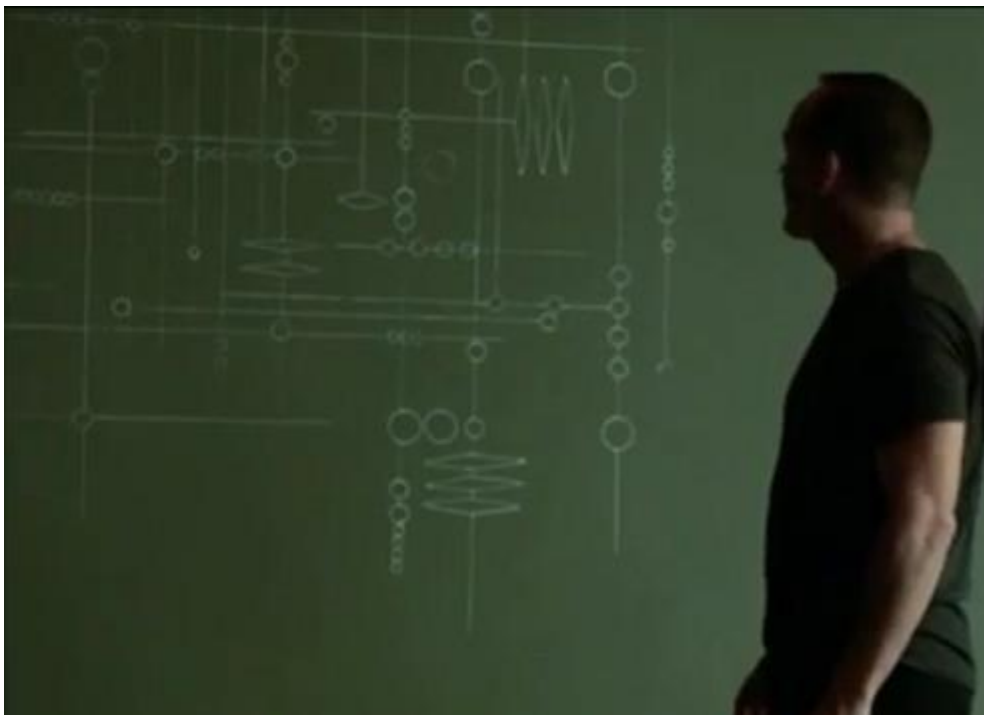
Note that in the series Coulson begins the carving near the middle rather than in a corner. He is shown drawing something that looks like a flowchart with square diamond shapes rather than the extended lozenge shapes in the “mature” diagram plus the strings have corners. Perhaps this was the studio’s first effort.



The next image shows the same section of the 1x22 wall (RH) and the second LA billboard (LH) to illustrate the process of updates through additions. The analysis section shows where this addition came from.



The new diagram from the promo (below) doesn't have features that match the original drawings.



3 – New wall diagram from 2.07 promo

Skye Computer Display

In 2.01 Skye is shown laying on top of a large computer display with a moving line drawing in the background. Note the mix of the two line fonts, single and “toothpick”.

The string fragment marked **A** appears in a horizontal string in the lower RH side of the Back of Painting (BOP) diagram (which follows). The fragment **B** has a nearly identical match in string 18 of the Belarus diagram (see following section). Using fragments **A** and **B** as markers it is not clear where this section comes from unless it is from the second blurred Belarus drawing or is just a plain old studio gaff.



Back of Painting

The wooden back of a painting was discovered to have a small diagram in 2.04. All the lines use the “toothpick” style. The font is the same as Garrett’s on the glass panel.

The back of painting (BOP) carving has either become altered or a nearly identical one will be found in 2.07. In these high contrast photos the black version with the painting still attached, is the first version from the official AOS tumblr². The other version (rotated w.r.t. the first) is from a 2.07 promo. The change of color and the double spike in the upper RH corner of the promo version shows that the carving has at least been altered. The wood grain shows some similarities and some differences. Perhaps due to lighting and paint. The promo version shows a starburst pattern on the upper cross-piece which is most likely the effect of paint on wood grain. Note machine milling marks in the bottom crosspiece of the original "500 year old" version.

Because of the brevity of this message it may be the equivalent of a tweet. More likely it is a section of a larger diagram as discussed in the analysis.

² See <http://agentsofshield.tumblr.com/post/100039668735>



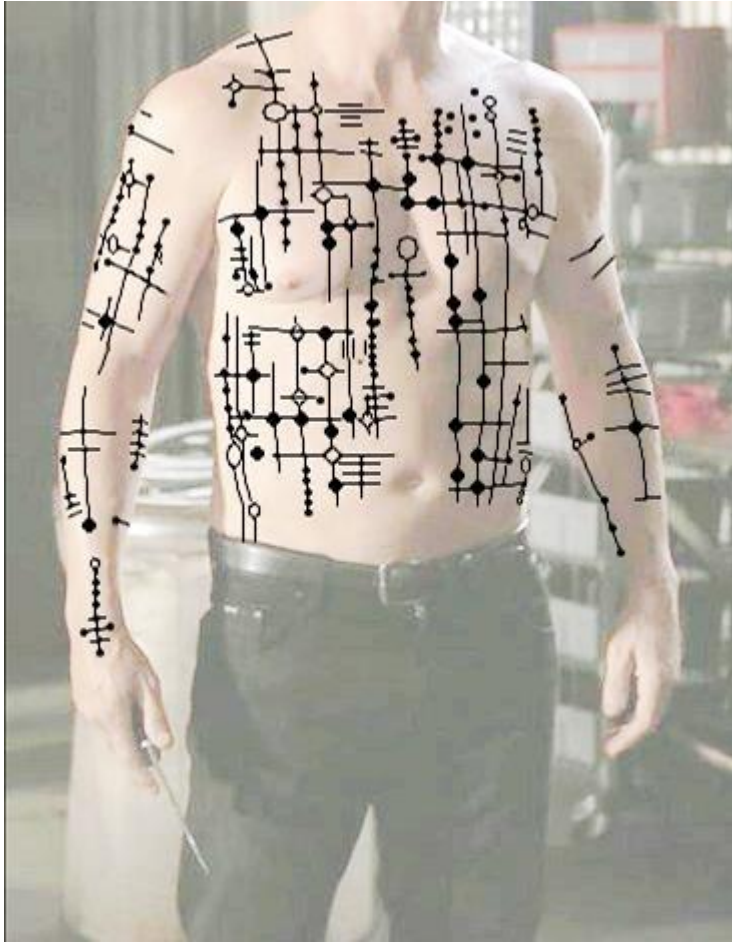
4-- High Contrast BOP Image



5—High Contrast 2x07 Promo

Tattooed Man

A tattooed man appears (will appear) in 2.07. This is written before the episode airs so only one image is available.



6-- Tattooed Man with Enhanced Overlay

String Field Analysis

There are a number of practical considerations when attempting any analysis of a string field. The following list is not exhaustive:

- Handwriting Variations – Each individual may have a different sense of how the glyphs are represented. Are the lines seen through the circles or are the circles opaque? Are hashmarks toothpick shaped (Garrett), lozenge shaped (Coulson), or just lines (Belarus)?
- Physical Medium – A blackboard allows for erasures. A carving may require additional symbols indicating that the string is to be ignored. There may even be a stet symbol for carvers!
- Transmission Link Noise – Thus far no writer is able to read what they have written. Therefore they can't correct any misinterpreted symbols.
- Optical Blurring – The billboards, the wall, and the blackboard photographs all suffer from resolution and contrast degradation.
- Temporal Issues – The wall photo and the two billboard photos represent different stages in the drawing (or possibly different versions with updates). Cutting and pasting legible portions into a temporal hybrid degrades the quality of analysis.
- Ambiguities – Some vertical strings can be decomposed into known symbols embedded elsewhere in horizontal strings. A knowledge of the orthography is required to disambiguate.
- Diacritics – Some symbols may contain elements or relationships to other symbols that act as diacritics in known alphabets. They may only serve as guides to, for example, pronunciation and not be required for understanding.
- Hollywood – This may just be random Hollywood rubbish although I think more thought went into the diagrams than into many of the scripts.

Analysis of the Belarus Blackboard

The following turn-page shows an enhanced version of the Belarus blackboard string field. Those glyphs that may be complete strings were given indexes to aid in discussion. Note that optical warping caused by the camera³ is still present.

The criteria for accepting a series of circles connected by a line as a symbol and not as a string was that the symbol was repeated and always embedded in a clearly defined string. For example the “three circles on a stick” pattern near the top of 34 also appears on the left of 21 and, with modification, near the middle of 8. Strings 29-32 may completely decompose into symbols embedded in adjoining horizontal strings. This is certainly the case for string 16. Other strings such as 14 and 15 carry very few independent symbols and may only serve for alignment between groups of strings.

The string sets {2, 4, 5, 6, 8, 21, 26}, {9, 17, 24, 28}, and {1, 34} have strong internal similarities. Strings 17, 28, and 24 (reversed) are nearly identical with the exception of a pair of circles in 28. Curiously, the location in 17 where those circles should appear is slightly blacked out⁴ in existing images. These similarities suggest that this string field may have more in common with music or chemistry than with natural language.

The role of the text is not clear. If the column 2nd from right is an alphabetic sequence, the entire diagram may act as a Rosetta stone. Or the text may be incidental. There may also be a relationship

³ Interestingly all the warping is exactly 2nd order polynomial and may be an effect of post processing.

⁴ No suggestion of conspiracy. There are a small number of other similar areas.

between the text columns and the circles directly above them. These text columns will be used to define the vertical orientation of this diagram as a standard⁵.

Similarities with the Back of Painting Diagram

If the reading order was top to bottom the 17/28 string pair might act like a salutation, name, or transmission ID. Note that the BOP string field also has a repeated top and bottom string perhaps serving the same purpose.

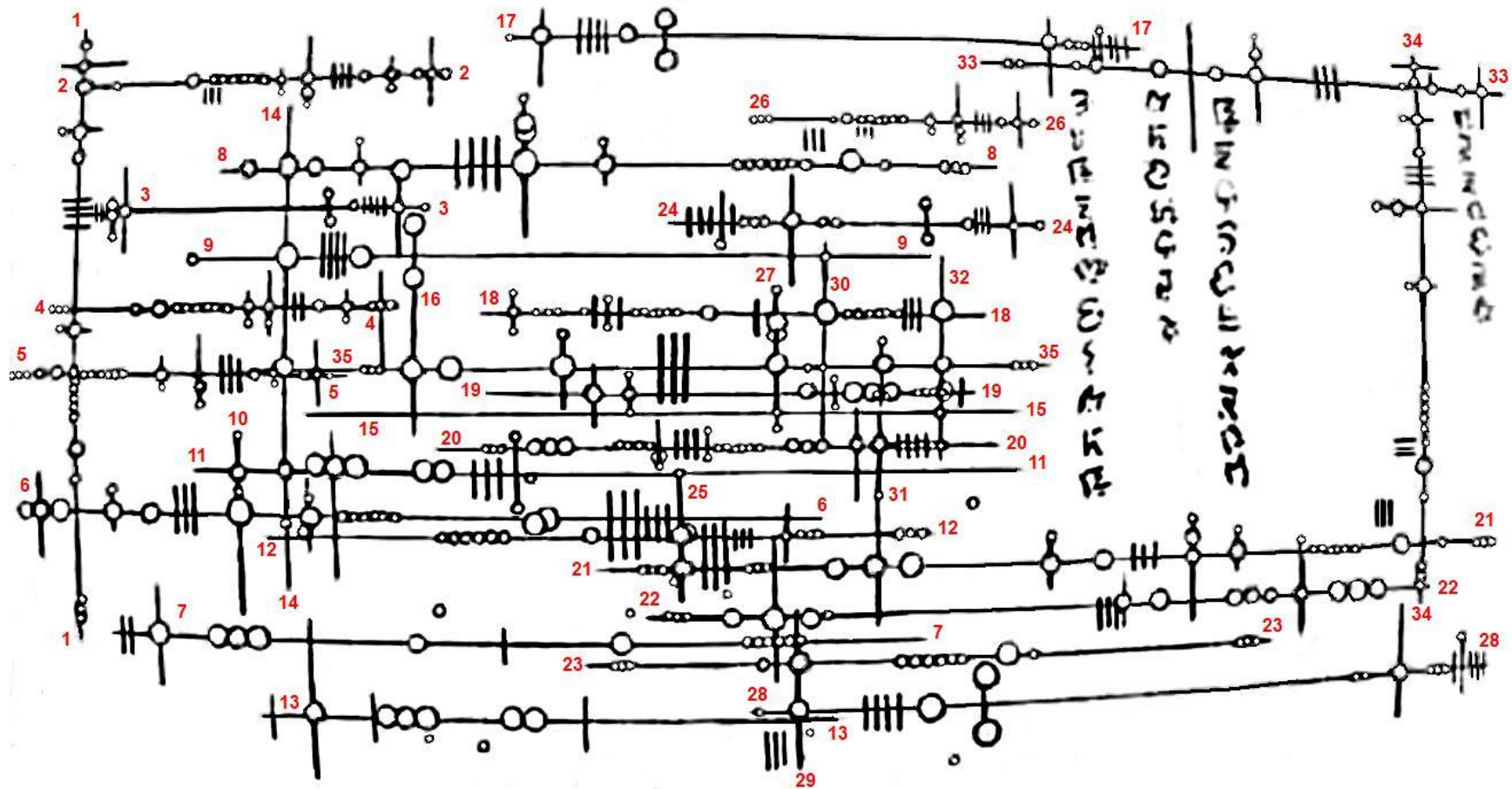
The BOP also contains a vertical alignment string similar to string 14 and the first (top to bottom) intersecting string (a string that crosses a string at a circle) has a left hand side that is nearly identical with the start of string 8 which is also a first intersecting string. Thus string 8 may be part of common message protocol or perhaps both diagrams are messages to/from the same entity.

Statistical Analysis

A count of circles and hashmarks in the string field yields the following results.

- 428 circles; 19% large circles, 28% medium sized circles, and 53% small.
- 122 independent hashmarks.
- Ratio of circles to hashmarks = 3.5

⁵ See Garrett glass door analysis below

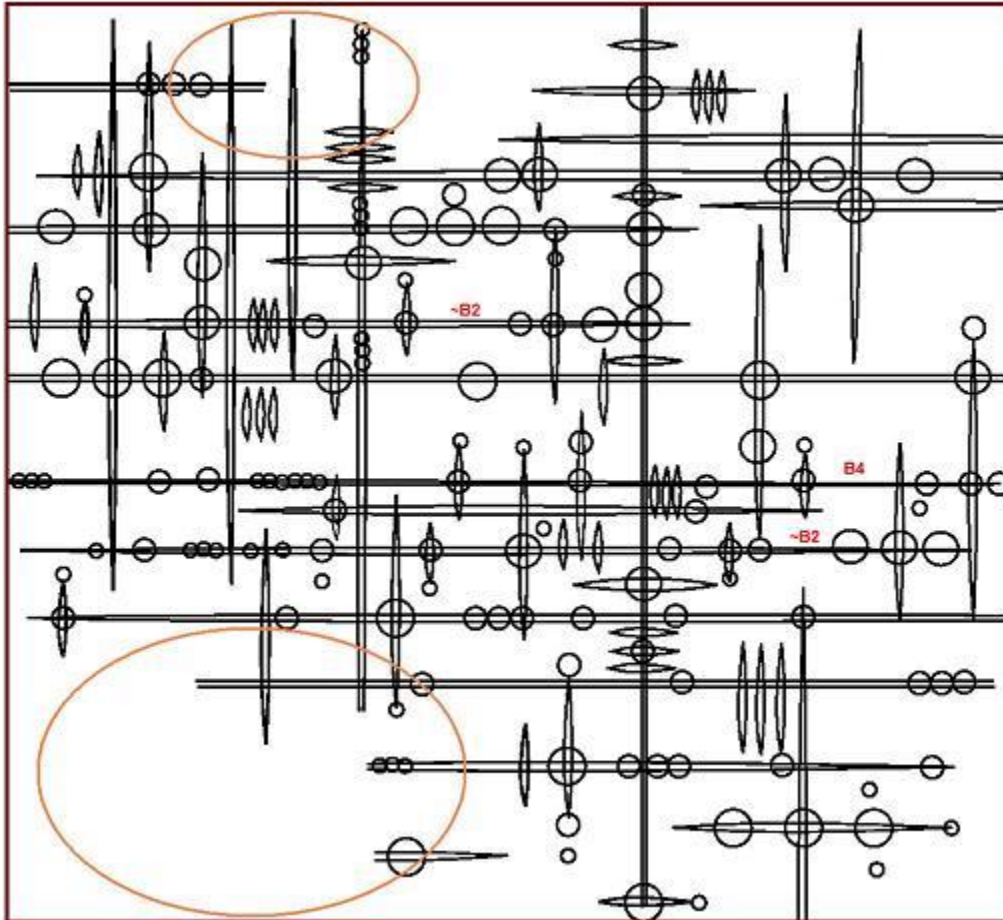


7-- Belarus Blackboard Enhanced

Analysis of Garrett Glass Door

Reconstruction of this diagram is incomplete. The areas marked in orange are either occluded or illegible in the images found thus far.

The string marked **B4** is identical to string 4 in the Belarus blackboard with a vertical flip. Vertical and horizontal flips of strings are common and does not necessarily indicate that Garrett was drawing this upside down. The strings marked **~B2** have large fragments in common with Belarus string 2 and others.



Analysis of the Wall String Field

As discussed earlier, the wall is a work in progress. The analysis presented here is based on a hybrid paste-up over several epochs and doesn't apply to the new version seen in the 2.07 promo.

Source imagery for the wall is incomplete and suffers from issues of resolution and contrast. It is not yet possible to create an enhanced graphic with enumerated strings. The darker sections were taken from the first billboard and pasted into the areas with the text and figure. The billboards show only a section of the entire wall.

The cyan ellipses show areas of symmetry. The areas marked **A** are flipped vertically. The area marked **B** is flipped horizontally to map to **C** and vertically to map to **D**. The area marked **D** is also shown above

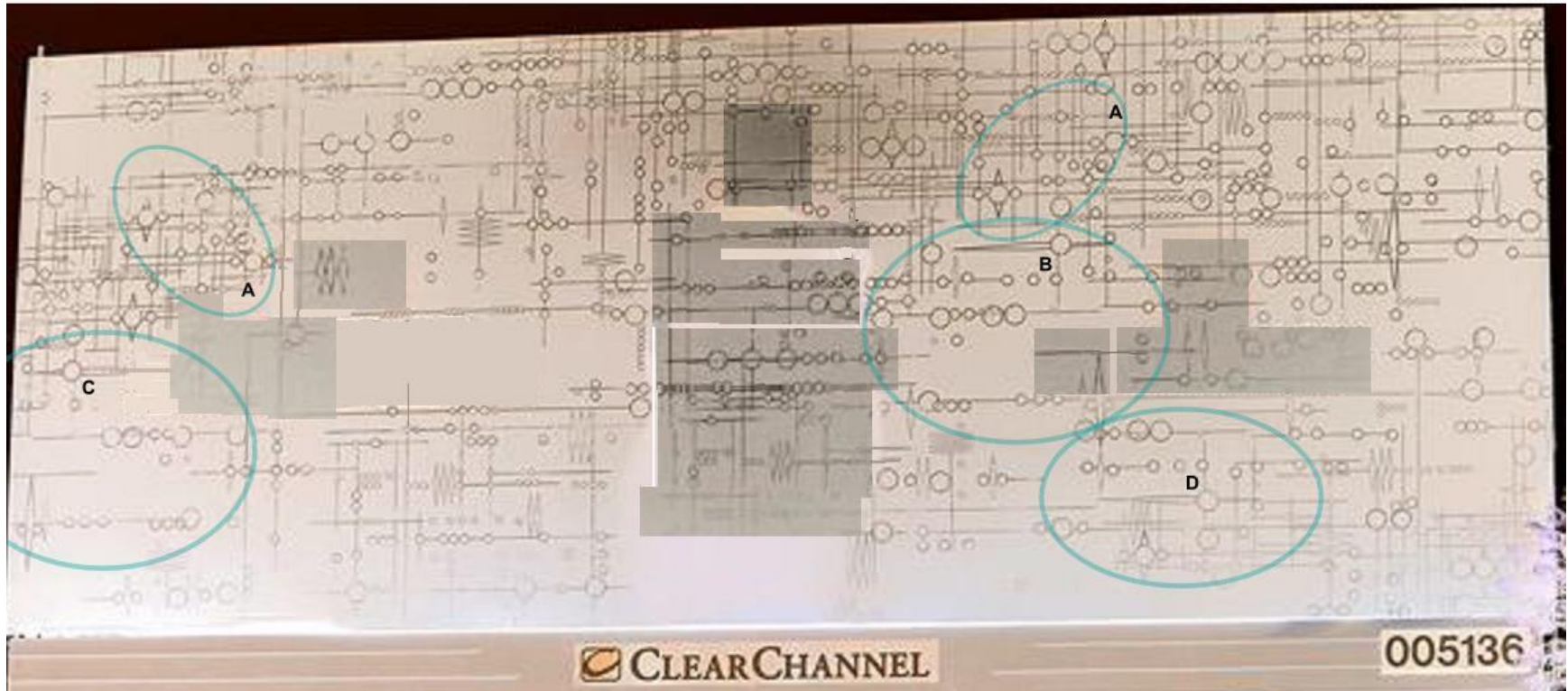
Statistical Analysis

A count of circles and hashmarks in the reconstructed string field shown below was performed. While this is not the entire wall, it should be large enough to give statistically significant results. Those results are as follows.

- 728 circles; 12% large circles, 62% medium sized circles, and 26% small circles.
- 54 independent hashmarks.
- Ratio of circles to hashmarks = 13.4

The role of small and medium circles has switched and the number of hashmarks is reduced from the Belarus string field. There could be several reasons for this.

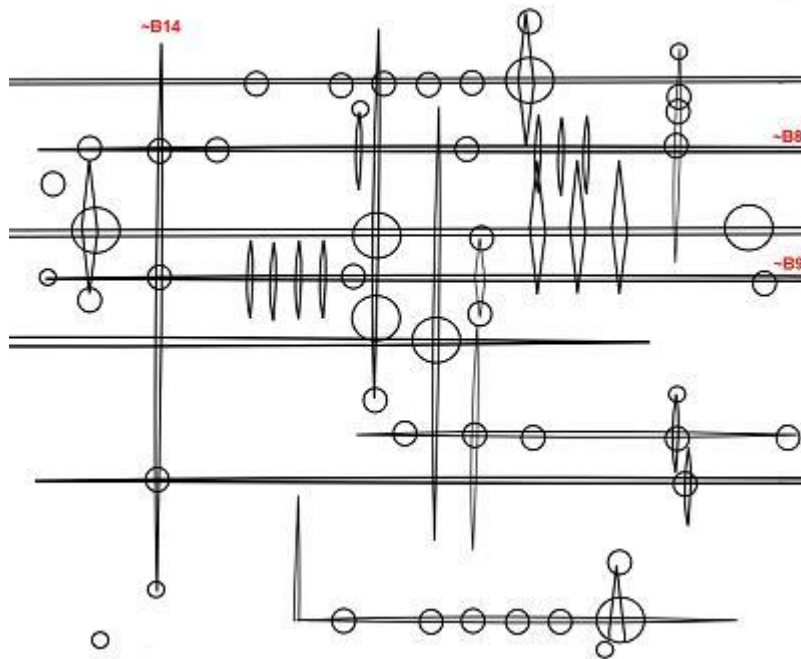
- The wall could represent a different type of data or message. No vertical alignment string such as string 14 in the Belarus Blackboard can be seen in the wall, although it may be obscured.
- Small circles and hashmarks could be added last however, current temporal analysis indicates that this doesn't happen on a large scale..



8-- First and Second Billboards Merged

Analysis of Back of Painting

The following figure shows a reconstruction of the BOP string field. The string marked **~B14** seems to have the same alignment function as string 14 in the Belarus string field. The strings marked **~B8** and **~B9** have the same positioning as strings 8 and 9 in Belarus of which they are fragments. As with the Garrett diagram the fact that most strings begin but don't terminate on the inside indicates that this is part of a larger diagram.



Preliminary Analysis of Tattooed Man

The only correspondence found thus far is a good match between the string on the right wrist with a phrase from string 18 of the Belarus blackboard and the fragment marked **B** in the Skye Computer Display image above. It has been noted by others that the tattoo on the LH arm below the elbow matches that on a blue alien seen earlier.