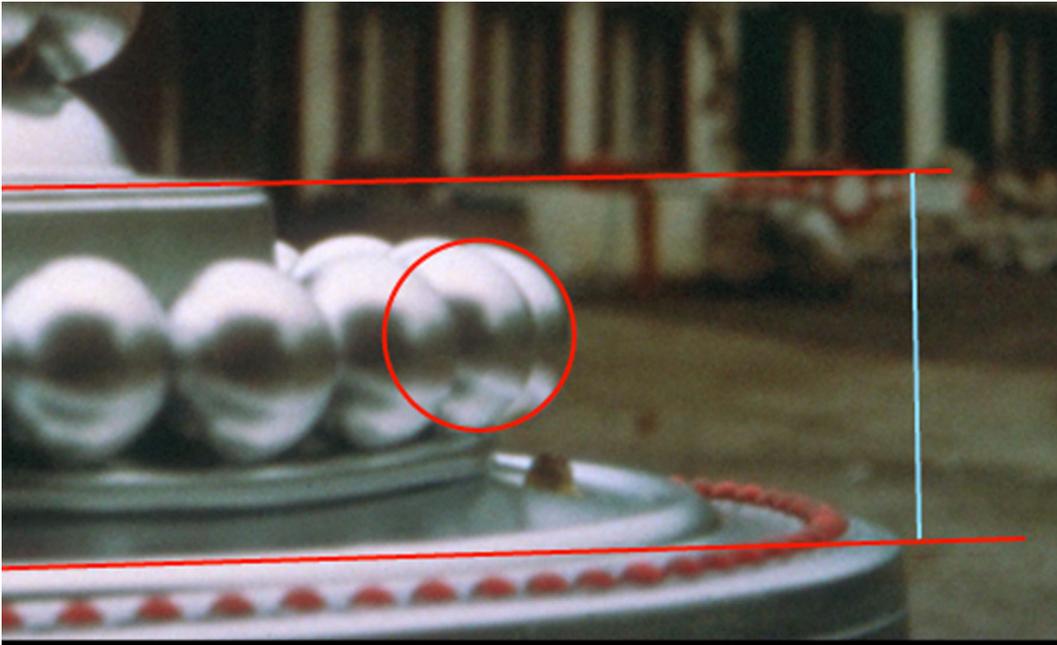


# **Analysis of the Wedding Cake UFO**

**Investigations of the WCUFO pictures taken by Billy Meier**



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*Version 2, March 2013*

# Index

Introduction and key findings .....	3
Photo #800 analysis .....	6
Photo #799 analysis .....	17
Analysis of the WCUFO above the tree tops .....	25
WCUFO at night: analysis .....	41
Annex A – WCUFO proportions .....	43
Annex B – Angle of view and plan view analysis, photo #800.....	45
Annex C – Carriage house dimensions and courtyard plan view...	51
Annex D – Distance and size of the WCUFO .....	57
Annex E – Height changing capability of a WCUFO .....	60
Annex F – Stereo images .....	69

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UFO pictures © Billy Meier and FIGU.



## Introduction and key findings

On October 22, 1980, "Billy" Eduard Albert Meier, known as "Billy Meier", started to take pictures of a unique UFO. He used a Ricoh Singlex TLS camera, with a focal length of 55 mm. This UFO was not like the others he was watching and photographing before. The new UFO had a different look, with a lot of peculiar details, with many spheres encircling it. Because of its appearance it was called "the wedding cake UFO" (WCUFO). We think it would be better to call it "the multi-sphere UFO" (MSUFO), but we will call it the WCUFO in this document.

Here, we analyze some of the WCUFO pictures taken by Billy, some of them in a parking area or courtyard of his property, others, hovering above the tree tops, and some of the pictures taken at night.

For the photos taken on October 22, 1980, Billy used a thick glass in front of his camera, to prevent it from being adversely affected by the proximity of this UFO. This situation may have made the resulting reflections in the spheres a bit blurry; however we will find during the investigation that whatever that effect, analysis of the reflections can give us a good idea of the WCUFO size.

In this document there are several analyses made with a computer tool called "Blender", which is widely used to create 3D models and animations. We also made image processing of the dark shapes reflected on the WCUFO spheres to better see what was in the surroundings and background of the camera. We use the tools Adobe Photoshop and Adobe Illustrator. And finally, we do some tests using a scale model of Billy's property, including a scale model of the northeast wall of the Carriage House, with reflecting spheres that we photograph to see and compare the reflections.

After making these analyses we will conclude:

- The WCUFO photographed on October 22, 1980, hovering above the main parking area of Billy's property, had a diameter between 3,0 m and 3,6 m (U.S. readers may note that the decimal mark used herein is the comma, as is the custom in most of Europe and South America.)
- This WCUFO is not a small-scale model as some debunkers claim. It is not a model made from a trash-can lid of 55 cm diameter, nor even a bigger model of 1 meter. We did several tests and modeled several possibilities locating this UFO in

different places within the courtyard area, and we conclude it is not possible to take such pictures using a small model. This WCUFO is an object greater than 3 meters in diameter, and probably it is a 3,5 meter object as Billy was informed.

- The WCUFO has different proportions depending on its size. We analyzed certain photographs of WCUFO craft that look to have different sizes. We conclude that the horizontal proportions are the same on the WCUFO of 3,5 m and 7 m diameter, but the vertical proportions can be somewhat different. (See Annex A.)
- In one case, from a picture taken at night, we find that if its proportions are normally the same as for the other WCUFOs, this WCUFO can extend its central core upwards  $\frac{1}{4}$  of a sphere's diameter. It means this WCUFO has the capability of expanding vertically, or else there were several WCUFOs with significantly different proportions. (See Annex E.)
- In some of the pictures, especially ones taken at night, the spheres present a form that seems non-spherical. We find this is an optical effect because of the bright reflections between contiguous spheres, not a real deformation of them.
- The reflections on the spheres, in photos of the WCUFO above the tree tops (#834 and #838 and others), show a surrounding forest. In these pictures we could not precisely quantify the size of the UFO, only made an estimate, but we can be sure it is not a scale model (like the 55cm model to be presented). It will be seen that there is a forest of trees between the camera and the UFO, so if this is a small model, these trees would look much bigger in the images. We conclude it is a distant object, not a scale model close to the camera, photographed close above the middle of a forest. Also, we will find where the companion UFO of 7 m, which Billy claims he was on board while taking the pictures, is located within the spheres' reflections, though it is very hard or impossible to discern since its image must be very small. If the original photographs could be digitized with better resolution, we could have a better view of the forest around.
- Viewing the reflected carriage-house dark shapes stereoscopically, in 3D, gives more information. Then we can see different shapes of objects as being at different distances. In photos #799 and #800, the carriage house wall is visible in a closer plane than distant trees behind it. In photos #834 and #838 the multiple forest tree tops are visible at different distances. We also produce a nice 3D image of the WCUFO hovering in front of a nearby tree. (see Annex F)

In this investigation we analyze just a few WCUFO photos. There are others, plus a video, which are still available to do further research on.

In acknowledgment, we would like to thank Christian Frehner who provided us electronic files of the WCUFO pictures, and several photos and measurements of Billy's property, which in conjunction with Google Earth images, help us to have a good plan view in making the analyses below. We also would like to thank Professor emeritus Jim Deardorff for his valuable comments and suggestions about this investigation, and his initial research that has inspired us.

## Photo #800 analysis

Billy Meier took a series of photos of a Wedding Cake UFO (WCUFO) hovering just above the main parking area or courtyard of his property on October 22, 1980. One of the photos is #800, which we analyzed to determine its actual size. Some debunkers claim that Billy made a scale model using household items, including a 0,55m bin lid and took pictures of it. We have found that is not correct. We will conclude this WCUFO is a much bigger object by checking the dark shapes reflected in its spheres.

Figure 1 shows the WCUFO, photograph #800. Billy's house is visible in the background. Every sphere shows a dark shape that is very similar in each one of them. Figure 2 shows a zoom image of two central spheres of the lower part of this UFO. These two adjacent images can be observed with a stereoscope, and the dark shapes show in three dimensions what looks to be distant trees on each side of a building. The dark shape corresponds to the northeast wall of the carriage house. Billy was standing very close to this wall when he took this picture. See Annex C to find details of the configuration of the carriage house, main residence and courtyard, and related measurements that were taken *in situ* at this location.



Figure 1 – Photo #800. WCUFO with Billy's house in the background.

In order to determine the size of this UFO, it is important to know the angle of vision it forms in the camera, and the carriage-house wall size and orientation.

Annex C shows the courtyard plan view at scale. We created this map from Google Earth images, photographs of the location, images from the "Contact" movie produced by Lee and Brit Elders, and measurements in this location as mentioned above. We recreated how it looked in 1980.

This map was used to do our analysis by two methods:

1. Creating a computer 3D model using the tool "Blender". This tool is a well know free software, used widely, to make modeling and animation in 3D. We created a model of the WCUFO, using the proportions shown in Annex A, and we assigned a reflecting material to the spheres. We also made a Blender model of the carriage house, and of Billy's main residence. The model of the WCUFO does not pretend to be a detailed representation of this UFO. We wanted to see the spheres' reflections, so the positioning of all the spheres was done very accurately. We did not model the bottom parts of this UFO, since we did not require it for our analysis.
2. Creating a scale model of Billy Meier's property, including the carriage-house wall, and taking pictures of a small reflecting test sphere at several distances. We made the model on a scale such that 1 meter in the field represents 5 centimeters in our model. By checking the reflected image of the carriage house in the photos of the test sphere, we could determine its distance from the camera, and then the size of this model UFO-sphere, and hence of the scaled up WCUFO itself.

Identifying all the details of the dark shapes in the reflections of the spheres is difficult. However, producing a view in three dimensions helps us to distinguish objects that are close to the carriage-house wall from objects that are behind it. In Annex F there are several stereoscopic images of the pictures analyzed in this investigation.

Figure 2 shows the zoomed images of the dark shapes in two spheres of the front, bottom tier of this UFO. At first sight they are just dark shapes, but by looking at them with a stereoscope (or some people have the skills to see them in 3D using only their two eyes), it is easier to notice distant trees, the carriage-house wall, and nearby objects to this wall. It helps to create an approximate outline of the carriage-house wall. Since these dark shapes are blurred, they extend laterally into a wider area, but the 3D view helps us to make a more precise definition of this wall itself.

We found it easier to see the width of the carriage-house roof in these blurry images than the wall itself. So we used in our analysis the roof

extension (with eaves), which is 10,3 m wide (horizontally). This roof in the reflected image extends horizontally a certain percentage of the sphere diameter.

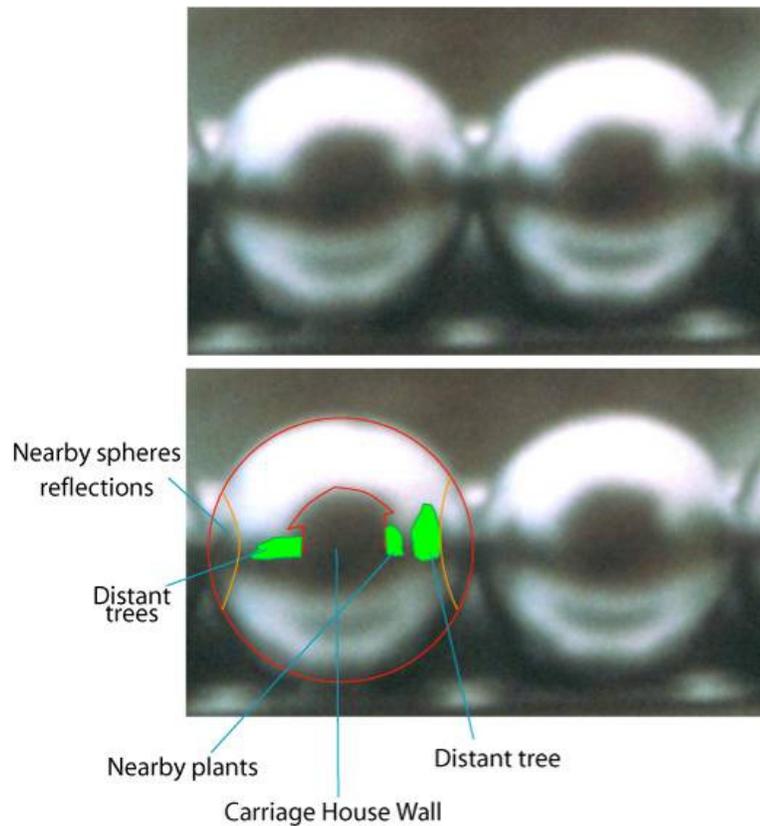


Figure 2 – Details of the reflected dark shapes on #800 spheres.

Measuring the extension of the roof in this image in a computer graphical tool (Adobe illustrator), we found:

Sphere diameter: 96 units

Roof width 33,5 units

Roof extension is 34,9% of the sphere diameter. This ratio will be denoted as  $R_{ch} = 0,349$ .

Doing the analysis by any of the two methods below, we will find the size of this UFO, and its distance to the camera.

## Method 1 – Computer modeling

We constructed a computer model by using the tool “Blender”. This tool allowed us to test different sizes and different positions of this UFO in Billy’s courtyard, and check the images reflected in the spheres.

Figure 3 shows the perspective of the model we utilized in Blender. We modeled the WCUFO, the carriage house and Billy’s house. (The back of Billy’s house is not accurately portrayed, since it is not required in this analysis.) The WCUFO’s bottom part was not modeled since it was not important, only the reflections in the spheres were required. However, the spheres’ configuration and positions are accurate.

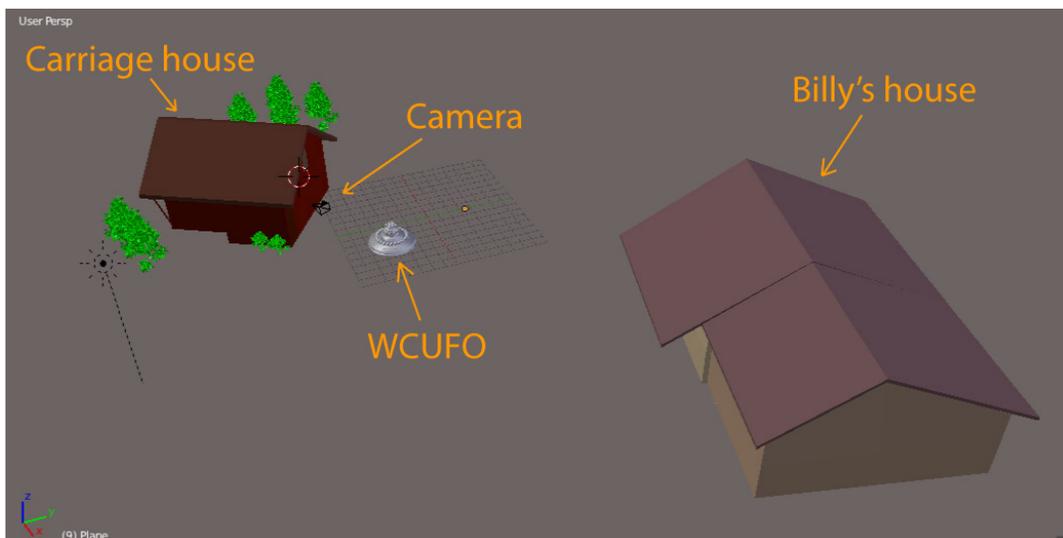


Figure 3 – Computer model on “Blender”

The camera in this model is located close to the wall, as indicated by a black pyramid. By looking at the reflected dark shapes, and knowing the camera lens is located in the center of the sphere image, we know Billy was very close to the carriage-house wall. This location was also corroborated in the field by Christian Frehner.

We created a plan view of the courtyard and located each building (Annex C). Also, we calculated the angle of view of  $27,6^\circ$  that indicated how far away from the camera the WCUFO is in this picture (see Annex B). The angle of view is the horizontal angle subtended by the WCUFO’s full diameter as viewed from the camera.

Testing different sizes of the computer-generated WCUFO, at different distances, we “rendered” the images to obtain the reflected images.

“Render” in the computer animation jargon refers to a process of creating an image, or a video, as seen from the camera, based on the modeled parameters defined in the computer tool, including the type of materials and lighting, among others. Animation tools like “Blender” use different “rendering” techniques. In the following figure all the rendered images are shown. We also rendered the image of the scale model of 55 cm favored by some debunkers.

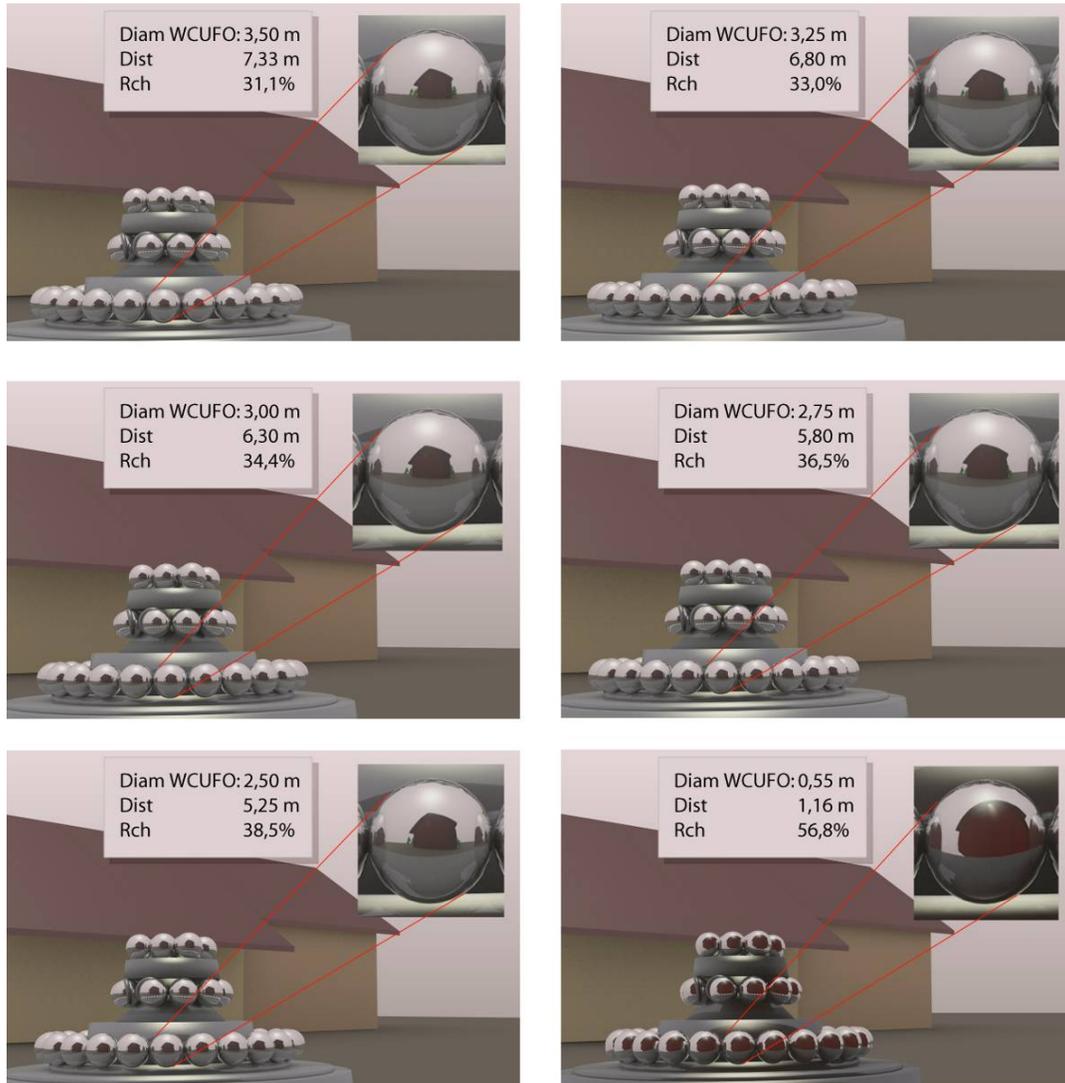


Figure 4 - Rendered images of different sizes of the WCUFO at different distances.

It is clear that the dark shapes in the spheres are very similar to the dark shapes exhibited in photo #800. All but those in the scale model of 55 cm are very similar.

The first clear conclusion is that this UFO was not any scale model, like of 55 cm diameter, as proposed by various debunkers. The wall of the carriage house is then grossly too large. The roof extends 56,8%

of the sphere diameter, not the much smaller value for Rch of 34,9% as photo #800 shows.

If Rch in photo #800 is 34,9%, then the image of the WCUFO of 3 meters diameter is very close to it. It means that our calculation with this method shows that this UFO might be around 3 meters in diameter or a bit less. However, we estimated that the error of defining the real size of the dark shape of the carriage house in the blurry image of picture #800 is around 5%. So the percentage uncertainty range for Rch would be between 33% and 37%, and the WCUFO could be in the range of 3,25 m down to 2,75 m in diameter.

Better resolution images would give us a closer estimate.

We made an additional test of the scale model proposed by the debunkers. We moved the small scale model to different locations in Billy's modeled courtyard, farther away from the carriage house. And we found that if the scale model is not close to the carriage house wall, but 5 meters away towards the main house, the reflected images are smaller and indeed look similar to the ones in picture #800. See figure 5.

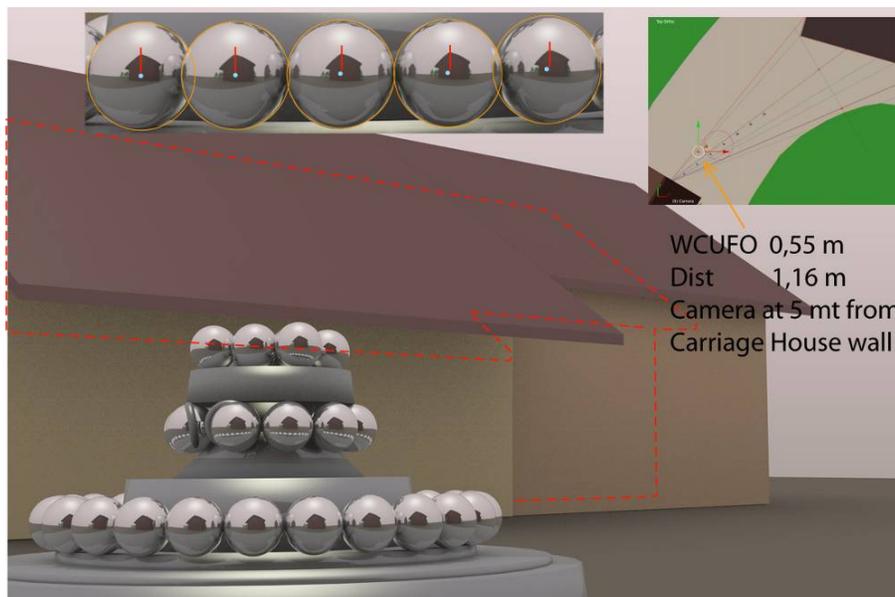


Figure 5- Scale model at 5 meters from the carriage house.

However, this could not have been the way Billy took this picture because:

- The profile of the main house is then changed relative to the original photo, as indicated by the dashed red line in figure 5.

So the house is too large in this simulation because the camera is now too close to the house.

- The photographer and his camera would then be visible in the reflections. The camera is then just 1 meter away from the nearest sphere, and at this distance he must be visible. See figure C8.
- The carriage house wall then changes its position from sphere to sphere, in relation to the center of each sphere's image where the camera has to be located. See top part of figure 5 and also figure 6. We called this a "parallax effect". This parallax effect is not present in photo #800, because Meier's camera was indeed located very close to the carriage-house wall.

In figure 6 below there is an expanded view, from the additional test, of the altered position of the carriage house from two separate spheres, in relation to the center of each. In this figure, the blue dot is located at the center of the sphere, where the camera lens must be located. If you see this image with a stereoscope, you may notice the blue dot is closer to you, as stipulated for this additional test.

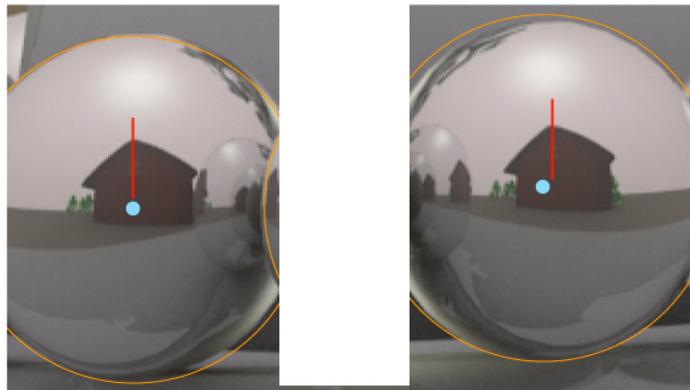


Figure 6 - Parallax effect.

## **Method 2- Reflecting sphere in a courtyard scale model:**

We have done this experiment before and the results are in YouTube (<http://www.youtube.com/watch?v=6WHqBvBZOqg>). There we estimated the size of this UFO was close to 3 meters.

With the new, revised plan view, and the detailed measurements of the carriage house, we repeated this experiment again with a scale

model of the carriage-house northeast wall (made with cardboard, scissors and glue), and a reflecting marble or sphere at different distances from the camera. We located the reflecting sphere to the direction shown in the plan view we made for this photo. (Annex D).



Figure 7 – Scale model of the northeast wall of the carriage house.

So we made the second test, now with a kid's marble in a physical model, not a computer simulated one. We also used a high precision steel sphere. Both, the steel sphere and the kid's marble were quite good. We will show here the results of using the steel sphere. We took pictures of the steel sphere atop a wooden rod.

The results are shown in the following figure. The distances,  $d$ , from the camera to the steel sphere were: 4,5 m, 5,0 m, 5,5 m, 6,0 m, 6,5 m, 7,0 m and 7,5 m.

The percentages indicated in this figure again represent  $R_{ch}$ , the ratios of width of the carriage-house roof to the width of the sphere.

## WCUFO - Picture #800

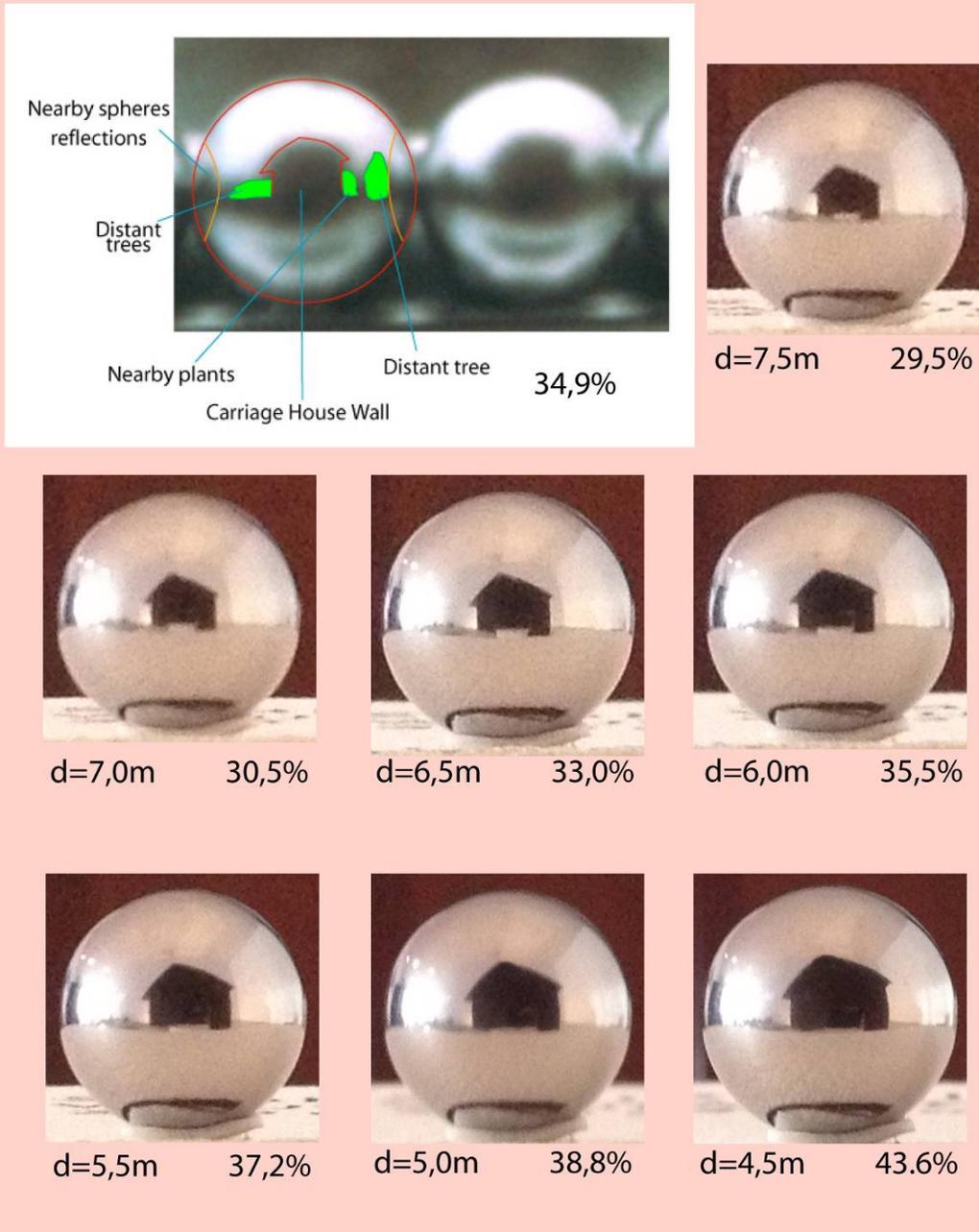


Figure 8 - Reflections on a sphere of the carriage house model

The real photo, #800, has  $R_{ch} = 34.9\%$ . So this percentage falls between the sphere at 6,0 meters and the one at 6,5 meters. Interpolating to 34,9%, we find a matching distance from the camera of 6,12 m.

In Annex D, we show the calculation for the size of this UFO, and the distance to its center, if we know the distance to the nearest sphere. If this distance is 6,12 m, the size of this UFO is 3,40 m and its center is located 7,1 m from the camera.

Again, since there is an error of 5% on the measurement of the dark shape in photo #800, this value is a good approximation, but not a precise measurement. The range is between  $R_{ch} = 33\%$  and  $37\%$ , and that means a range of 3,1 to 3,6 meters in WCUFO diameter. Also, the measurement of the roof extension on the steel sphere's reflection, has an error of 0,5%, equal to an error of less than 10 cm in the WCUFO diameter. It means the error of using a steel sphere, or a kid's marble, is very low compared to the error of estimating the dark shape's width in the real photo. And these photos, as reported by Billy Meier, were taken behind a protecting glass he located in front of his camera to protect it from electromagnetic interferences from the UFO. That may be the reason why the reflected images of the carriage house on the spheres are blurry.

Billy Meier reported that this UFO diameter was 3,5 m. In the Method 2 we are closer to this size (we found 3,40 m). In method 1 we calculated this size is around 3 m.

Method 1 was based on a computer tool that makes a render process. We are not sure how accurate the "render" method used is for showing reflections on spheres. Maybe rendering in Blender is quite good for modeling 3D objects and animating them, but the Blender render tool might not be too accurate to show real spheres' reflections. The method 2 may be more realistic.

We may conclude the following:

- The size of the UFO in photo #800 is around 3,1 to 3,6 meters. Having a better resolution image of picture #800 could help narrow the uncertainty, and confirm Billy's statement that its size was 3,5 meters. Or may be we could not ever have a better resolution image, because of the blurry effect caused by the protecting glass that Billy used.
- Photo #800 was not taken using a scale model, such as one made out of a trash can lid of 55 cm diameter, nor even 1 m. We did not find any possibility that this picture could have been taken using a scale model, no matter how we tested it in different locations within models of Billy's property.
- Doing a test with reflections on a small sphere gave definitive results, perhaps better than from using a computer modeling

tool like Blender. Perhaps in the future, somebody else will perform similar tests with different or improved computer rendering techniques, in other tools. (Like "Maya")

## Photo #799 analysis

Photo #799 shows the same WCUFO of #800, but the craft is in a different position. An analysis similar to the preceding can be done.

For the angle of view we can use the distances from the center of the picture to each edge of the UFO.

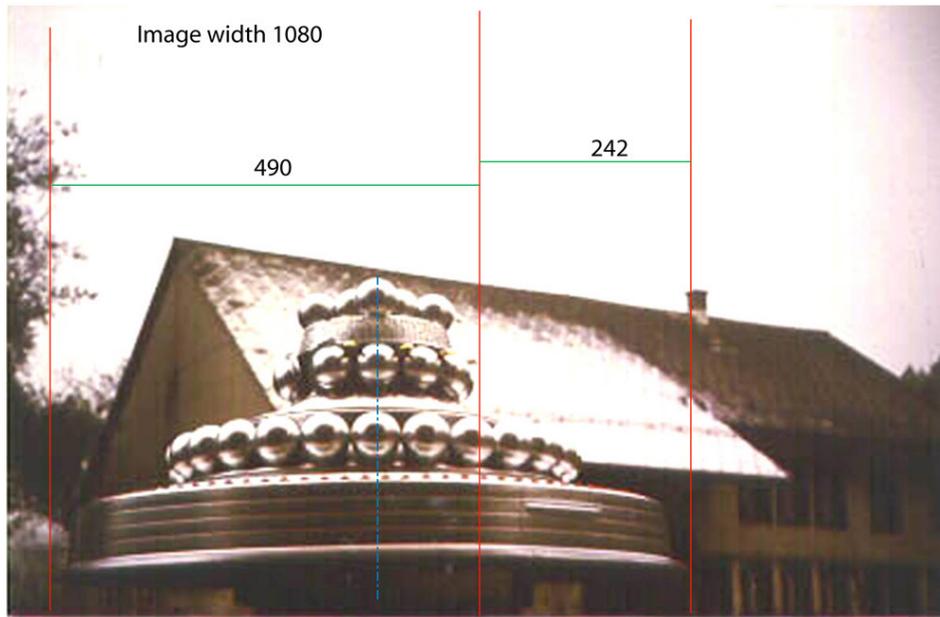


Figure 9 – Angle of view calculation, photo #799

By measuring, on a computer graphical application, the distances of each edge of this UFO to the central axis of the picture, the angle can be calculated as follows:

The width of the picture is 1080 computer-units (c-units), which represents the 35mm film negative size (we assume 36mm total width, since it is normally one millimeter wider).

The distances of 490 c-units and 242 c-units will give us the information for the angle of view of this object.

The scale factor is  $1080 \text{ mm}/36\text{mm} = 30$ .

The focal length of the camera (f) is 55 mm. The equivalent focal length, measured in the scaled units is 30 multiplied by 55 mm, equal to 1650.

So, the angle will be:

$$\text{Angle} = \tan^{-1} (490/1650) + \tan^{-1} (242/1650) = 24,9^\circ$$

The semi-angle is  $24,9^\circ / 2$  , which equals  $12,45^\circ$

The distance from this UFO to the camera lens can be calculated with:

$$\text{Distance} = \text{Radius} / \text{Sin} (\text{Semi-angle})$$

$$\text{Distance} = 4.64 \times r$$

where  $r$  is the radius of the WCUFO.

And, from Annex D, we have the formula:

$$r = \frac{D_s \text{ Sin}(\text{Semi-angle})}{1 - R_d \text{ Sin}(\text{Semi-angle})}$$

where:

**Ds** is the distance to the nearest sphere.

**r** is the radius of the WCUFO (half of the diameter)

**Rd** is the ratio of the lower line of spheres distance to WCUFO's central axis, divided by the WCUFO's radius. (See Annex A).

Substituting for the semi-angle of  $12,45^\circ$ , and using  $R_d = 0,61$  from Annex A:

$$r = 0,248 D_s$$

### **Picture Analysis:**

To make the images in the spheres of picture #799 more clear, we increased the contrast and brightness, and zoomed the spheres' images. It is quite blurry, but if the images of the spheres are observed in 3D (stereo view), it is easier to find details like distinguishing between objects near the carriage-house wall and trees in the background. The following figure shows two spheres; one is the nearest, and the other is used as the stereoscopic companion.

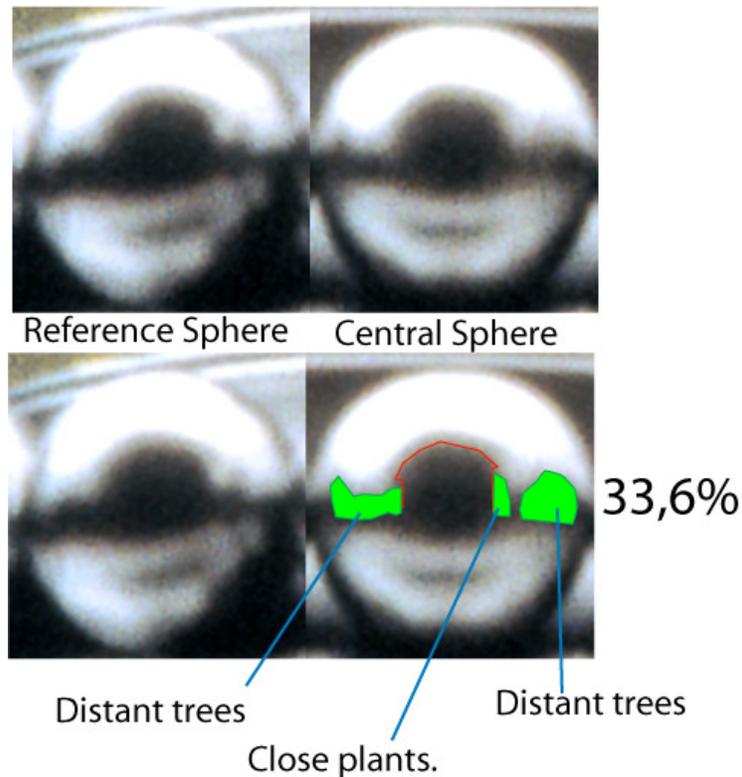


Figure 10 – Details in the reflected dark shapes – photo #799.

The measured Rch value of 0,336 has an estimated error of 5%. So the range in Rch is 32% to 35%.

### **WCUFO Computer Model Simulation:**

Using the tool “Blender” we have made a 3D model of this WCUFO, based on the proportions for the 3,5m UFO indicated in Annex A. It is a similar analysis to the one done for photo #800.

The direction to this UFO and its distance are different from #800. Here it is bit farther away, and hovering a little higher. This picture was shot only moments before #800, according to Billy’s photo *Verzeichnis*, so this UFO may have been coming from the top left (from the north), moving down and closer to the camera. This figure shows the plan view for this photo.

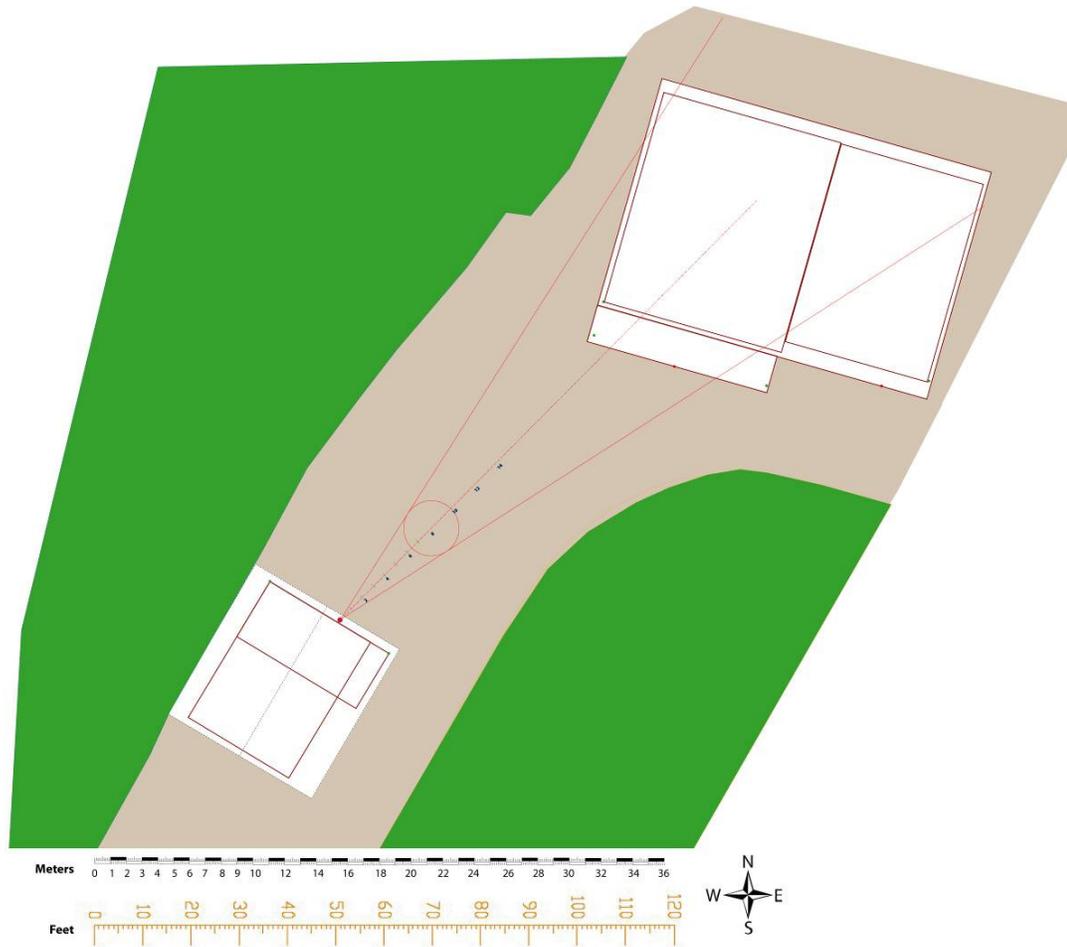


Figure 11 – Plan view for photo #799. Only the direction and angle of view are different from in Figure B5.

The resulting rendered images are in the following figure. They show the distance of the center of this computer-modeled UFO from the camera, its diameter, and the resulting Rch ratios.

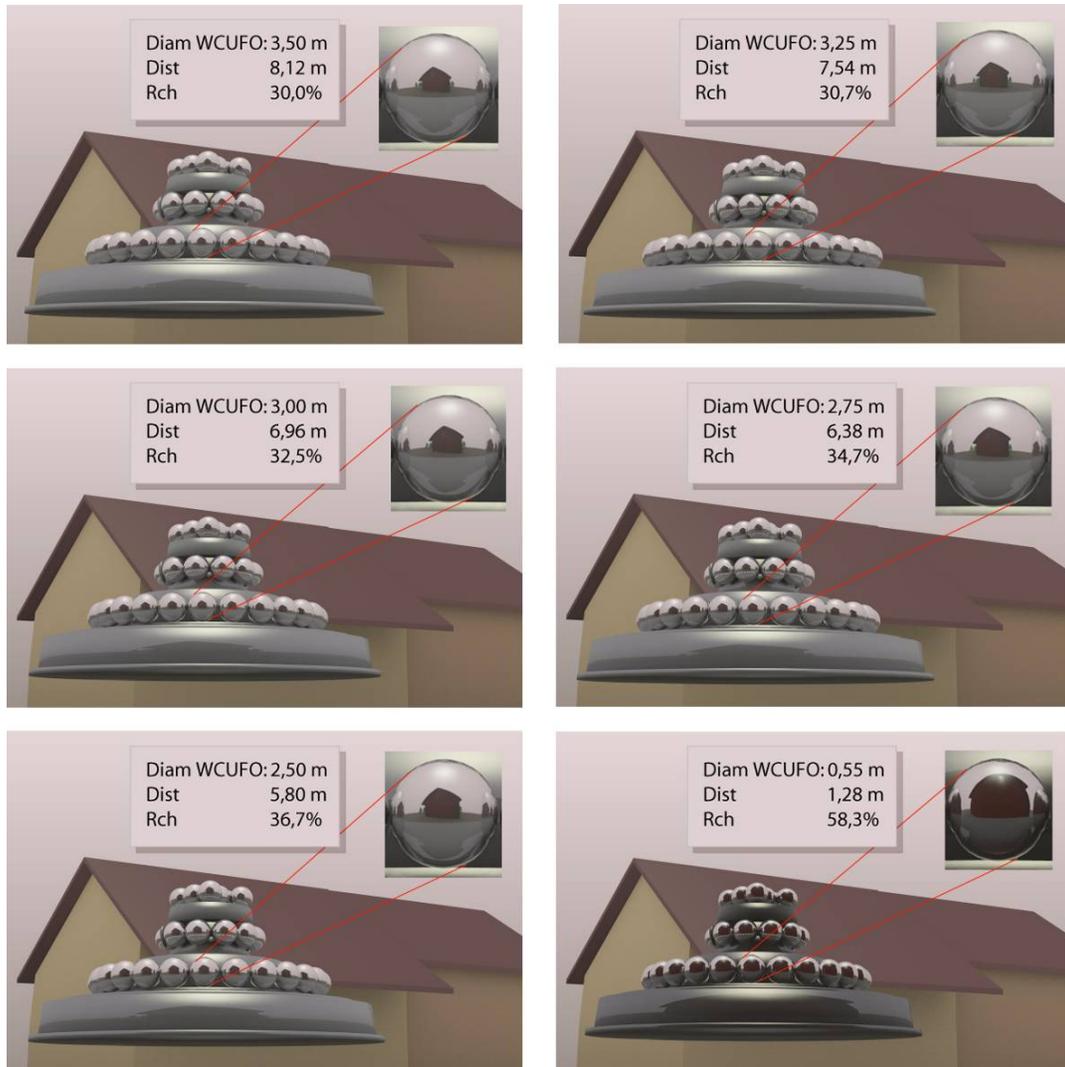


Figure 12 – Rendered images for photo #799 for different WCUF0 sizes.

It is very clear that this WCUF0 cannot be a scale model of 55 cm as some debunkers of the Billy Meier case claim. The Rch value would need to be much larger than the one for photo #799.

It is also clear, from Figure 9, that the dark shape of the carriage house is present on the base of this UFO. In photo #799 it covers, horizontally one third of the base width, and all the height of the base. The modeled WCUF0 is comprised of several layers, like adjacent rings. But in this computer model we represent the base of the UFO as one single layer or single ring, so the reflections are a bit different on the base. Hence we did not use the reflection on the base for this analysis, just the reflections on the spheres.

We also tested the scale model UFO of 55 cm in different locations in the courtyard, as we did for photo #800. We found that at 5m distance from the carriage house-wall, the dark shapes show a similar

size to those of photo #799. However, as we found from the photo #800 analysis, this cannot be the real situation since the main house then looks much too big, the photographer should be visible because he is then located just 1,28 meters from the center of the model, and the parallax effect is again present. So, as in the photo #800 analysis, we did not find any possibility that a scale model was used in taking photo #799.

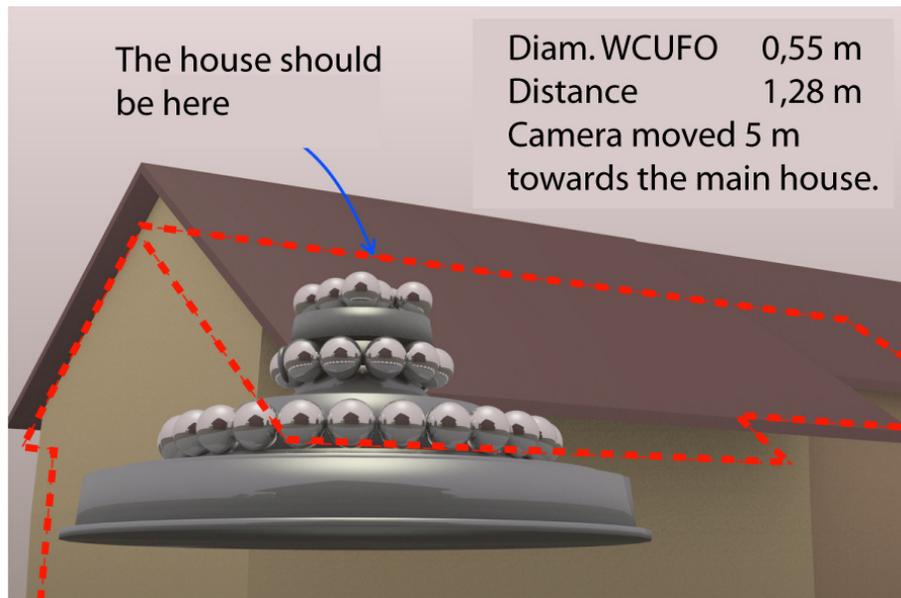


Figure 13 - Small 55cm UFO model at 5 m from the carriage-house wall

As a result of this analysis, the Rch ratio for the carriage-house image is around 33,6% (or in a range of 32% to 35%). So the size of the WCUFO from this analysis is close to 2,9 m in diameter, with a range of 2,7 m to 3,2 m.

### **Spheres reflections analysis**

As with the photo #800 analysis, we did the same test for #799 using a steel sphere. We located it in the somewhat different courtyard position as indicated in figure 11.

The results are shown in the following figure. The distances from the camera (where we took the photos) to the steel sphere were: 4,5 m, 5,0 m, 5,5 m, 6,0 m, 6,5 m, 7,0 m and 7,5 m.

## WCUFO - Picture #799

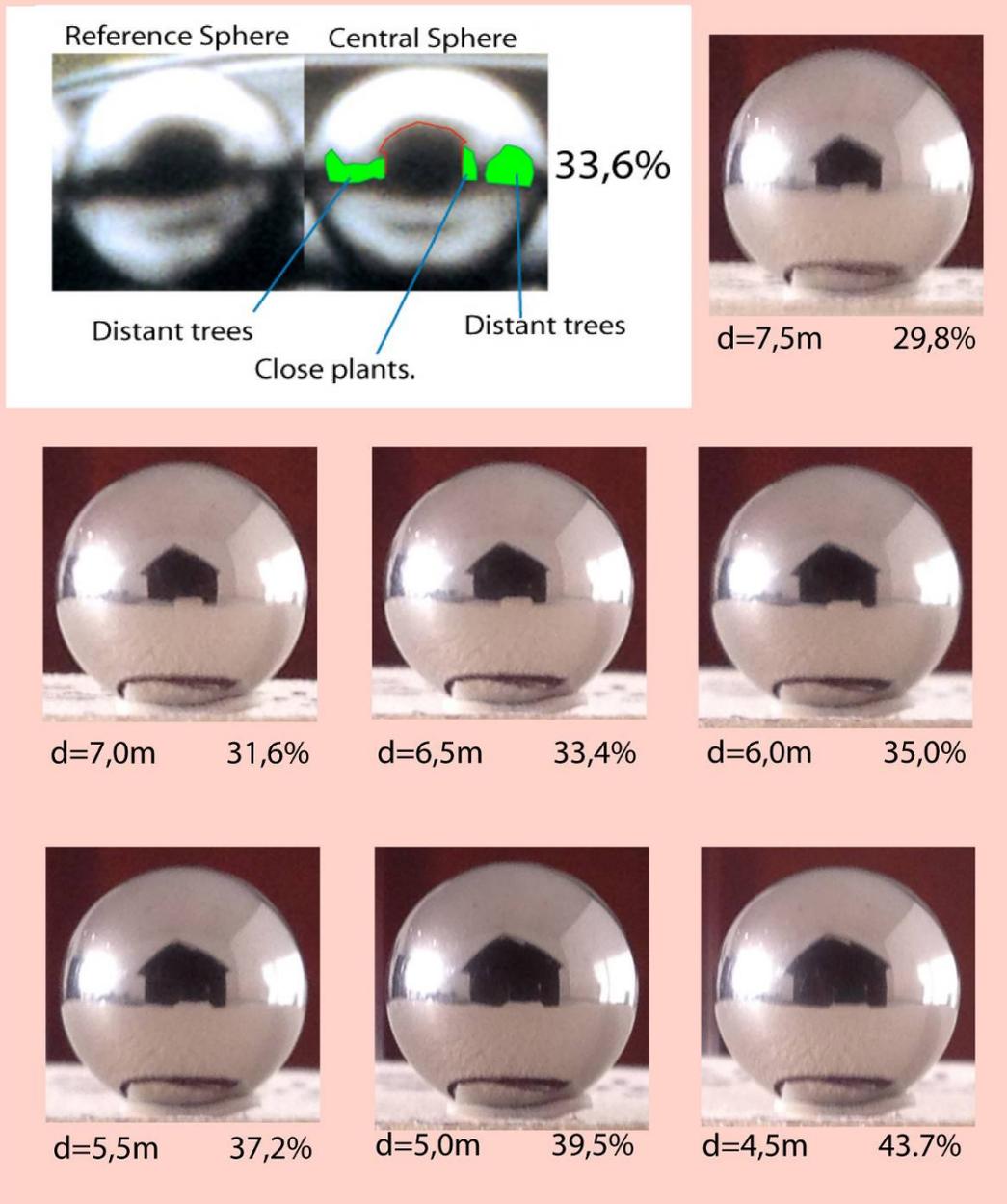


Figure 14 – WCUFO photo #799 reflection tests on a steel sphere.

Billy's photo #799 has an Rch value estimated at 33,6%. As seen from the figure, the two distances of  $d$  for which the resulting Rch values bracket 33,6% are 6,00 m and 6,50 m. Interpolating, we find  $d = 6,44$  m from the camera. By using the formula described before in this section, we can find the diameter of this UFO as follows:

$$\begin{aligned}r &= 0,248 D_s \\r &= 0,248 \times 6,44 \text{ m} \\r &= 1,597 \text{ m} \\ \text{Diameter} &= 2 r = 3,20 \text{ m}\end{aligned}$$

Again, as described in photo #800, there is a small error in measuring the roof extension in the steel sphere reflections, and a larger error estimating this width in the real photo. The latter error range for  $R_{ch}$  lies between 32% to 35%; that means a size range for the WCUFO with this method of 3,0 to 3,4 m.

The method of using Blender software showed the diameter of this UFO was 2,9 meters, while reflections on the steel sphere indicated it was 3,2 meters. As in the case of photo #800, we think the reflection on the steel sphere analysis is more accurate than the analysis with Blender. (The rendering process is not fully accurate).

For photo #799 we may conclude about the same as for #800:

- The size of the UFO in photo #799 is around 3 to 3,4 meters. (average 3,2).
- Photo #799 was not taken from a scale model, made of a trash-can lid of 55 cm, or even 1 m diameter. We did not find any possibility that this photo could have been taken of a scale model, no matter how we tested it in different locations within the model of Billy's courtyard.
- Doing a test using reflections from a sphere gives results of good definition, perhaps better than using a computer modeling tool like Blender.
- Looking at the dark shapes of the reflected images in the spheres in 3D (stereoscopic view) is useful for finding details in these images.

## Analysis of the WCUFO above the tree tops

### Picture #838 analysis

Photo #838, taken by Billy on April 3, 1981, shows a UFO (we call it the Main UFO) flying close to the tree tops. According to Billy's records, he was actually situated within or on another WCUFO (of 7m diameter, which we will call the Secondary UFO) taking the pictures of the Main UFO well above the ground. Thus two WCUFOs were involved, both apparently near treetop level. This (#838) is one of a series of several photos of this WCUFO of 3,5m diameter.

We analyzed the angle of view of this WCUFO, the reflections on its spheres of the surrounded forest using a computer model, and we compared the computer results with the picture taken by Billy Meier.

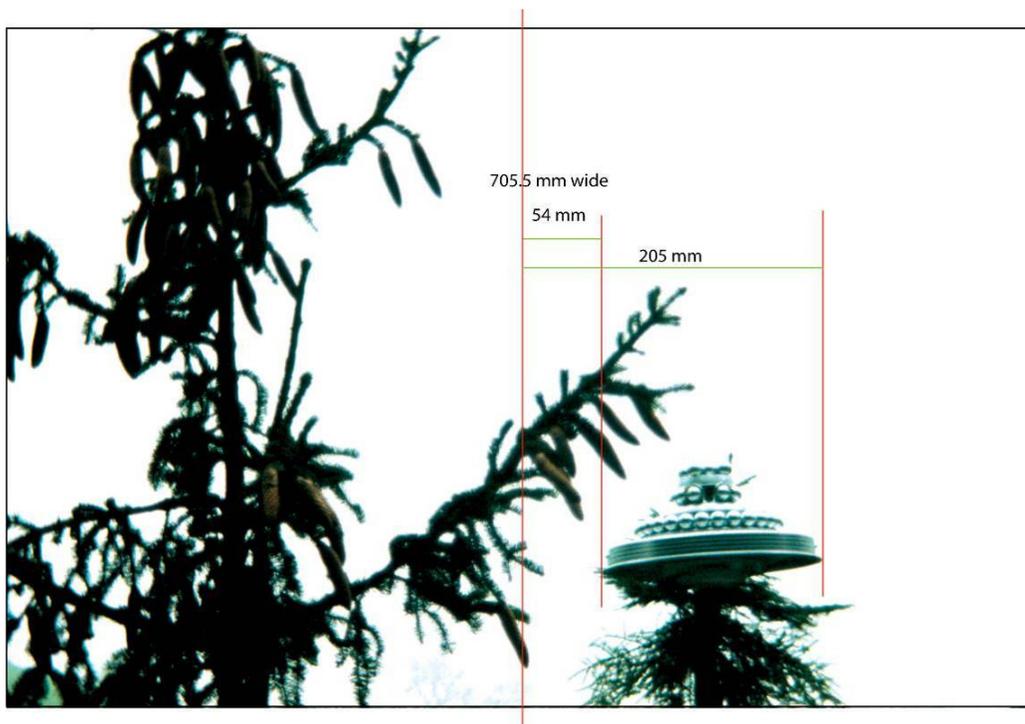


Figure 15 – Computer-screen distances for calculating the craft's angle of view in photo #838

By measuring on a computer graphical application the distances of each edge of this UFO to the central axis of the picture, we can calculate the angle of view it presents to the camera. This angle indicates how far away this UFO is from the photographer, depending on its size, and may help us to make a computer model to see the resulting reflections on the spheres, and compare them with the real reflections from Billy's photo.

The width of the picture is 705,5 computer-units (c-units), which represents the 35mm negative size (we assume 36 mm total width as before.)

The distances of 54 and 205 c-units will give us the information for the angle of view of this object.

In the following picture we represent the geometry of this UFO view inside the camera.

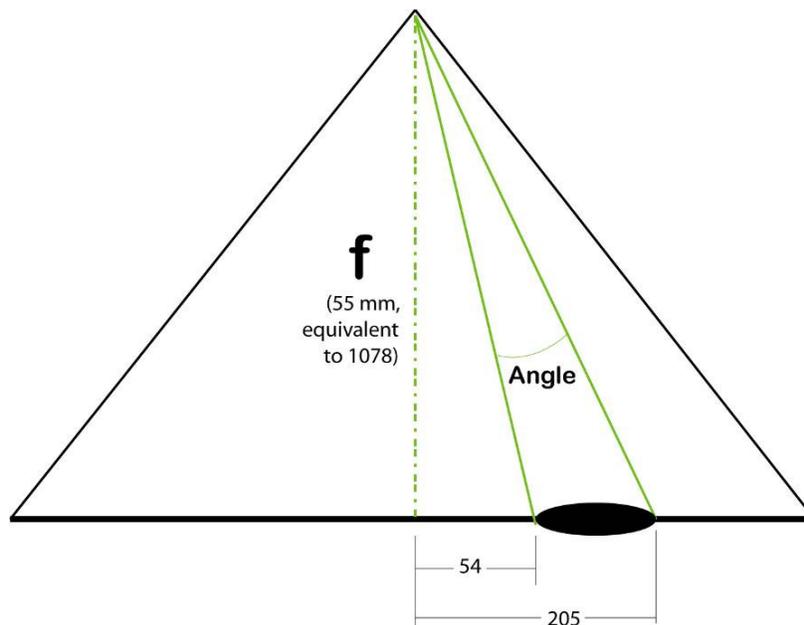


Figure 16- Angle of view within camera.

The scale factor is  $705,5 \text{ c-units}/36 \text{ mm} = 19,6 \text{ c-units/mm}$

The focal length of the camera (f) is 55 mm. The equivalent focal length, measured in the scaled units is 19,6 multiplied by 55 mm, which equals 1078 units.

So, the angle will be:

$$\text{Angle} = \tan^{-1} (205/1078) - \tan^{-1} (54/1078) = 7.9^\circ$$

The distance from this UFO to the camera lens can be calculated from:

$$\text{Distance} = \text{Radius} / \sin (7.9^\circ/2)$$

where Radius is half of this WCUFO diameter.

The distances are:

<b>Diameter</b>	<b>Radius</b>	<b>Distance</b>
3,5 m	1,75 m	25,4 m
3,0 m	1,50 m	21,8 m
0,55 m	0,275 m	4,0 m

If this WCUFO is 3,5 m in diameter, its center is located at 25,4 meters from the camera lens; if it is 3 m it is located at 21,8 meters, and if it is a scale model made from a can lid of 55cm diameter, it must be located at just 4 m from the camera.

### **WCUFO Computer Model simulation:**

Using the tool "Blender" we have also made a 3D model of this Main WCUFO, based on the proportions for the 3,5m UFO indicated in Annex A.

The figure below shows the 3D representation we modeled. We located the camera on board the model Secondary WCUFO of 7 m. Billy was assumed aboard this Secondary WCUFO taking the picture at 25,4 m from the Main WCUFO. Using either a 3,5m or 3,0m Main UFO will produce similar results for the images seen on its spheres' reflections. We shall see that this is not the case with using a small-scale model of 55 cm for the Main UFO.

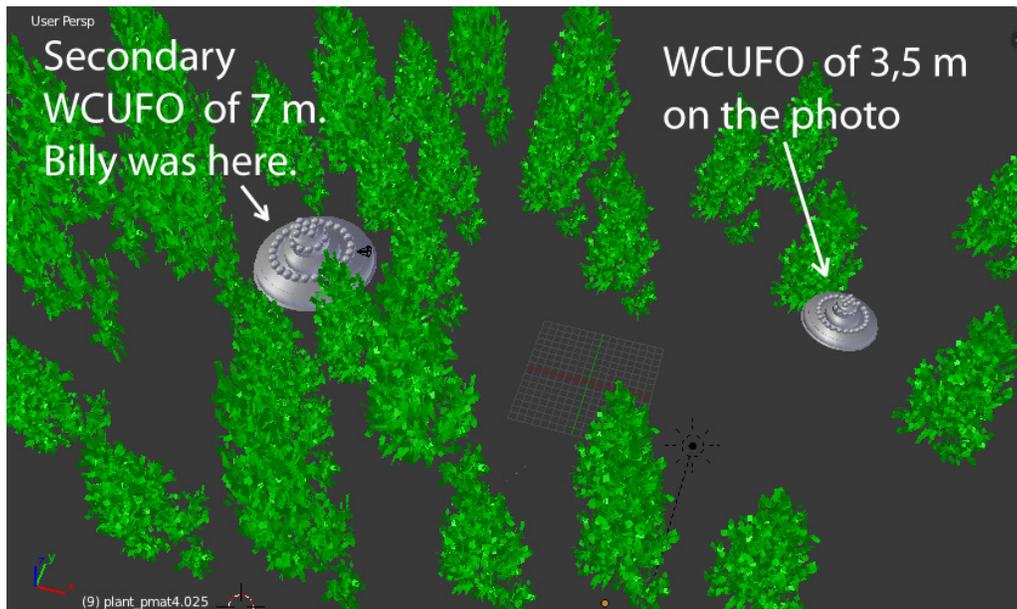


Figure 17 – Computer model of the two WCUFOs involved in photo #838

We included a few simplified trees as reference. The Secondary UFO is located behind a tree that almost interferes with its view of the Main UFO.

Using the Blender software, we rendered the image of this Secondary model to obtain the view from the camera. The camera used in this model had a 55mm focal length, same as the one Billy used.

The first rendered picture was processed with no trees in order to see the size of the Secondary UFO reflected on the Main WCUFO's spheres. This is the result:

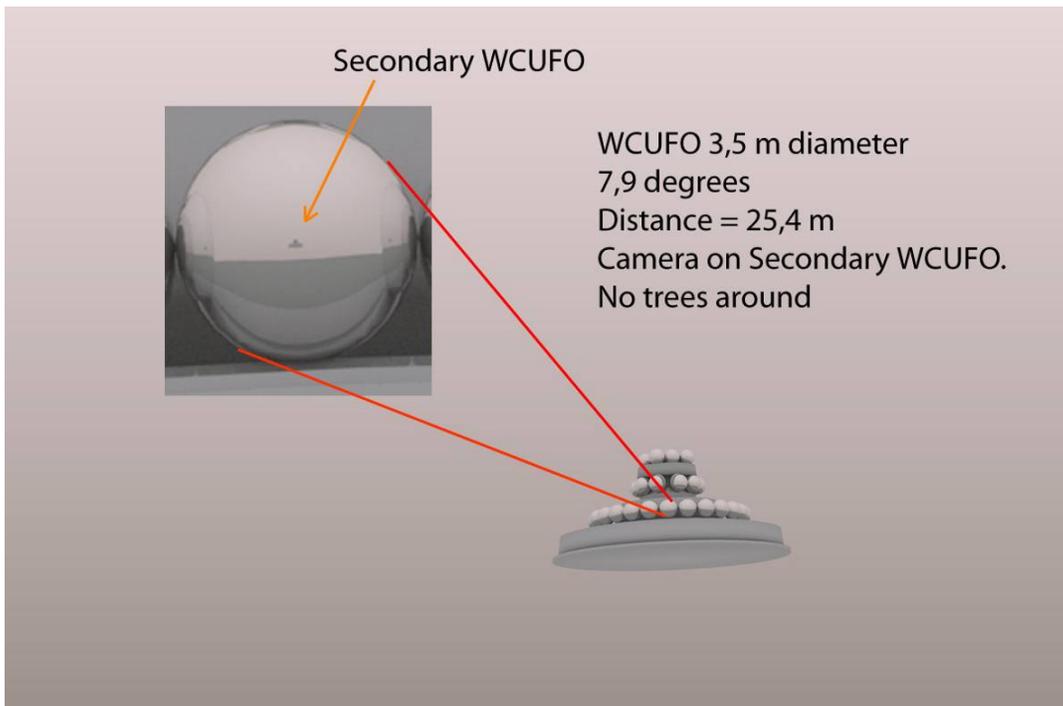


Figure 18 - Reflection on a sphere of the computer-modeled Main WCUFO showing the Secondary WCUFO's tiny image

We are magnifying the image of one of the sphere in this composition. As seen, the resulting image of the Secondary UFO in the reflection on the sphere is very small (see the center of the sphere). And, since it is metallic, it will reflect the surroundings, making it very difficult to see in the picture that Billy took.

In the next rendered picture we did the same, but now we included simplified trees.

Even though this is a computer model, it is also very hard to see the Secondary UFO reflected in the image on one of its spheres, where the camera is located. So it would be very difficult to see in Billy's

picture. However, we know it is located just in the center of the sphere's image, behind the trees.

We will see that this rendered image is similar to the real picture reflections. We included just a few trees, but with several trees of the surrounding forest, the rendered image will be very similar to Billy's photo.

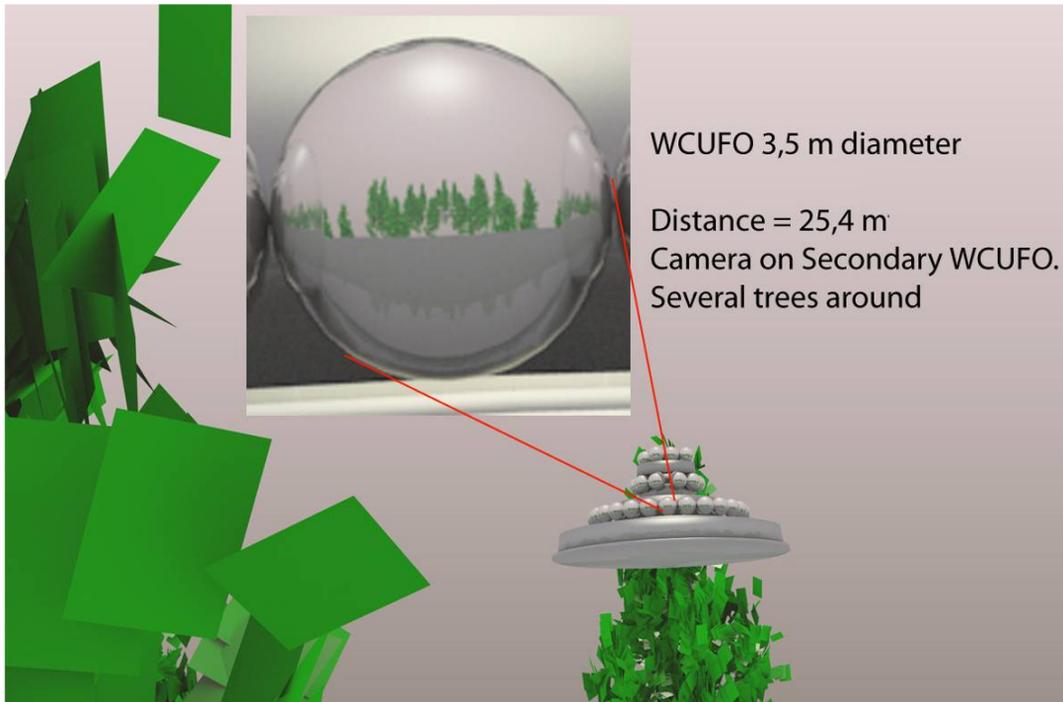


Figure 19 – Reflection on the Main WCUFO showing the surrounding forest.

The trees are not a real representation of the forest in Billy's photo (notice the rectangular leaves in place of conifer needles), but they give an idea of the size of the trees in the reflections. Also, the WCUFO model here is not a detailed representation of the real WCUFO, but the spheres are located in the same proportion of the WCUFOS photographed by Billy.

As mentioned before, some skeptics of the Billy Meier case state that this UFO is a scale model made from a trash-can lid of around 55 cm in diameter. So we rendered another WCUFO model with a 0,5 m in diameter located at a 4m distance, to compare the results. We did not include the Secondary WCUFO, since skeptics are not considering it to exist. See the results in the next figure.

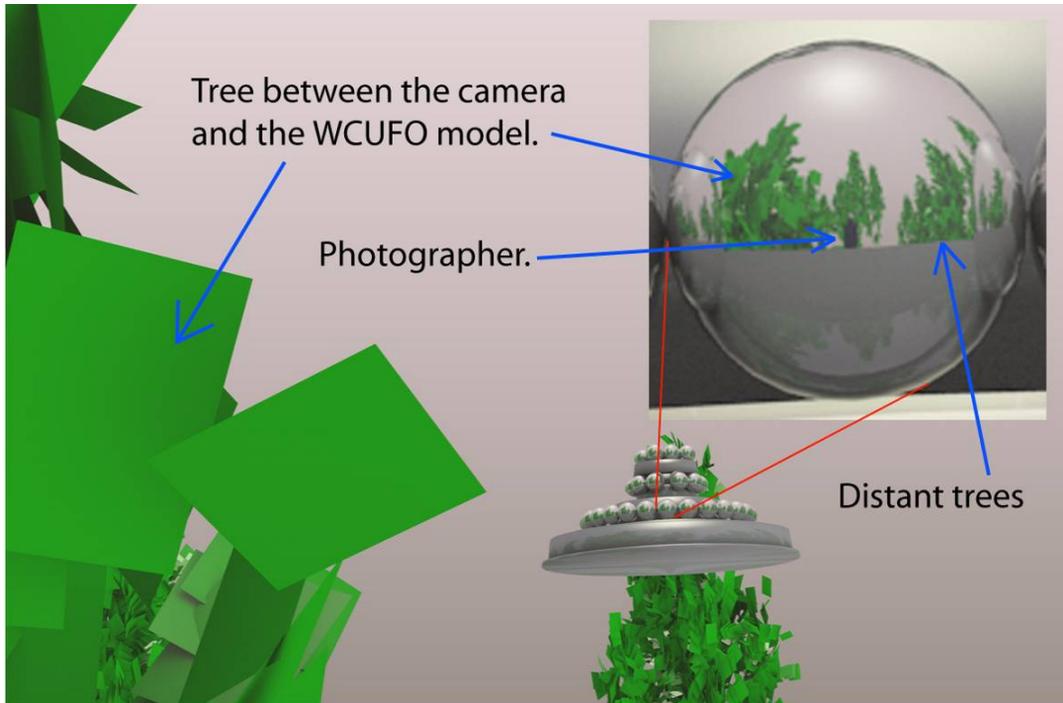


Figure 20 – Reflection on a 0,55m scale model showing the nearby trees.  
 The dark rectangle in the sphere center represents a photographer.

It is clear that the results differ significantly from those of figure 19. The trees look too large, because the scale WCUFO model would be very close to the tree in front of the camera on the Secondary UFO. If this picture had been taken by a photographer who had somehow climbed far up a tree, he and his camera would be visible in the sphere's reflection. We will see that the reflections on the real photo do not show the same configuration obtained with the 0,55m scale model. Therefore it is not possible that Billy used a small model.

### **Analysis of the spheres' reflections on Billy Meier's photo**

We made an image process of photo #838. In figure 21 we show the results. One of the central spheres was magnified, increased in contrast and saturation of the image.

As we can see, there is a forest around the WCUFO in this photo. And these green reflections, in a stereo image (see Annex F) look like trees at different distances from the camera. They are not grass or surrounding ground or meadow. We can see in figure 22 that photo #834 also reflects the surrounding trees. Some of the trees are visible even though the images are not very clear. The Secondary WCUFO on

which Billy was situated, taking the picture, is not visible but it must be in the center of the image, behind the trees, neither on the top of the highest trees nor at the bottom of the forest. The upper part of the reflected image shows a clear sky, with no nearby trees. Its middle part shows a band of trees of the surrounding forest. And in the lower part of the sphere's image the bright sky reflected from the base of the UFO is visible. There is a reddish area on the middle that could be caused by the reflection of the red crystals on the edge of the base of the UFO. The orange-ish color on the top left edge of the sphere might be caused by a sunlit cloud. Also visible are different shades of green in the forest, showing trees that might be farther away.

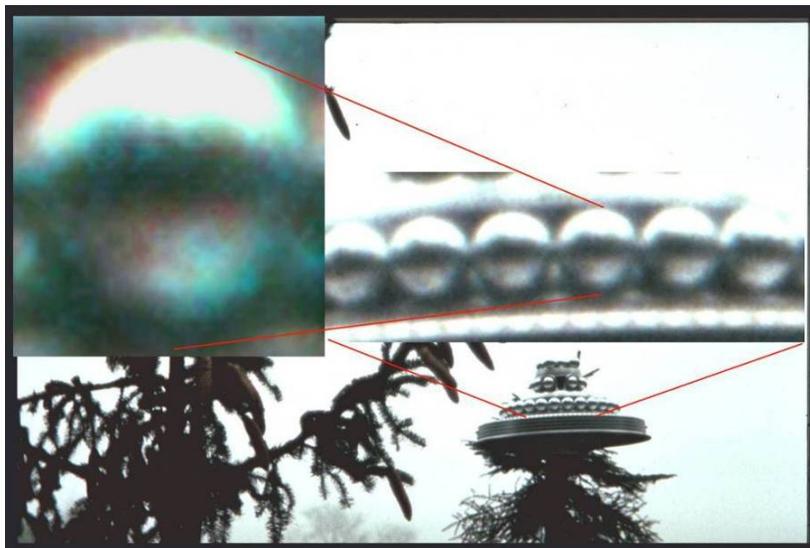


Figure 21 – Reflections on the real photo #838 showing a forest around the ship.

Comparing figure 21 with figures 19 and 20, we notice that its spheres' reflections are similar only to those of the simulation done with the distant WCUFO. It cannot have been a much closer small model, since there are no close trees projecting upwards in the reflected image of figure 21.

In this analysis, we cannot be sure of the real size of this UFO. But we can make an estimate by studying other pictures, and the tree behind the WCUFO, as present in the next section. To repeat, we can be sure it is not a small-scale model photographed in the middle of a forest, since there is not an upward extending reflection of the nearby tree that is between the camera and the UFO. At just 4 meters of distance from the camera, in the case of a scale model, the photographer and the nearby tree would need to be visible in the spheres' reflections. We will demonstrate that the nearest tree is around 3,3 m away from the camera, so for a 55cm model UFO the nearest average treetop

height and surrounded by the forest. The WCUFO shown (see figure 22 below) is again the Main WCUFO photographed from the same Secondary WCUFO, in whose reflections the forest tree to it would have to be just 0,7 m away.

Another interesting photo is #834, taken a little below the aforementioned is visible all around. Magnifying the image and increasing the contrast and saturation, we see the trees, which are fuzzy but visible. And looking at them in 3D, it is easy to see a bigger tree extending up higher a bit to the left of the center of each of the central spheres (see Annex F). This tree top is probably the upper portion of the tree whose thick trunk or stem is seen prominently nearby on the left side of figure 22 (the off-vertical "barbed" shape on the right is a very nearby out-of-focus limb extending upwards from the forementioned tree). In this photo, like in #838, the Secondary 7m WCUFO where Billy was situated taking photos is not visible, being masked behind a tree.

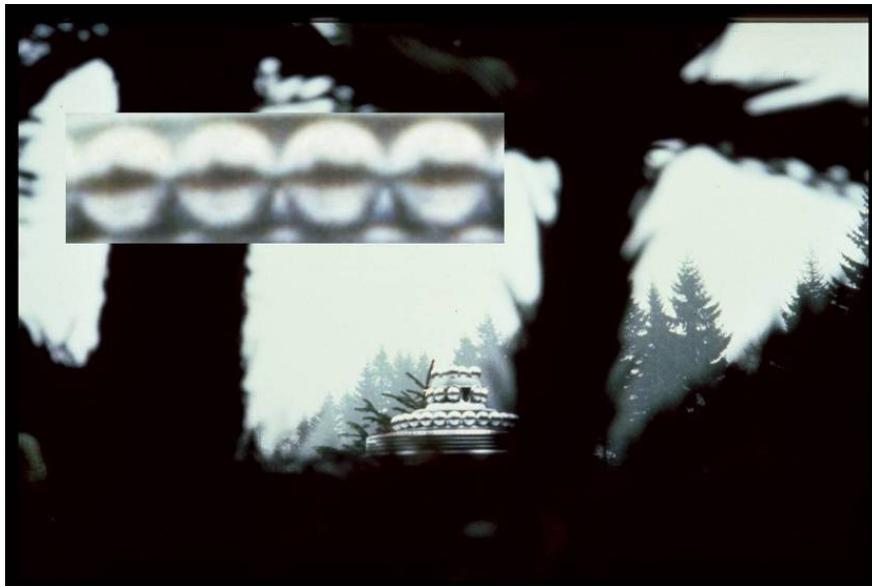


Figure 22 – Photo #834. The Main WCUFO shot from behind a tree.  
The images on the spheres show the surrounding forest.

The next figure shows a detail of the reflected image in this picture.



Figure 23 – From photo #838. Expanded view of a sphere.

Again, having better resolution photos could help us discern more details of the forest around this WCUFO.

## **Estimation of size of the WCUFO above the tree tops**

In the previous section we concluded this WCUFO is not a small model, like some debunkers claim, but we were not sure about its size, like, for example, if it was a 3,5 m or the 7,0 m WCUFO. For estimating the size of this flying object we could observe the branches of the trees around. There is another piece of evidence available. It is the portion of the tree top that was broken off “accidentally” by Quetzal in the secondary WCUFO where Billy was located taking these pictures.

On the right in Figure 24, there is one of the pictures taken by Billy, and at the left there is the piece of the tree that was broken off, and recovered later. The tractor behind can give us an idea of its size.

Comparing the tree top in both photos in Figure 24, we notice it is the same piece of the tree. Some skeptics may think Billy cut this piece of tree, and used it for making his photos on the ground, instead of hovering above the trees on another WCUFO. However, we have found in the previous section that this piece of tree must be visible in the spheres’ reflections if Billy used a small model. This nearby treetop in photo #838 does not appear as large as it should in the spheres’ reflections if this Main UFO had been a scale model much closer to it.



Figure 24- Treetop fragment.

In figure 25 there is a set of three photos taken on April 3, 1981. (See [www.futureofmankind.co.uk/w/images/6/69/3rd\\_set\\_of\\_3.jpeg](http://www.futureofmankind.co.uk/w/images/6/69/3rd_set_of_3.jpeg)). The picture in the middle is the photo #838 already analyzed. The picture at the top shows the WCUFO behind the same tree in the photo (the same limb, marked as A, B and C, is identified in all photos). The top photo is very similar to the picture in Figure 24 (not exactly the same, but taken probably almost at the same time). We are assuming these photos show a progressing sequence in time. The three photos then show that the camera was getting closer to the nearest tree, and also moving to the right, until a distant hillside slope was visible in the lower photo at the left. The apparent size of the WCUFO and the two tree tops are becoming larger in this sequence. Distance D1 increases to D2, and selecting a segment of the branch at the right, we notice it is also increasing its size (segments A, B and C in magenta color).

The WCUFO in this sequence is also moving from left to right. We can notice it by checking the blue arrows in figure 25, which show the WCUFO and the top of the tree in the background. In Annex F we included a very interesting stereo view of this WCUFO, where it is very clear that it is not far away from the tree behind. For this stereo view we used figures 25-II and 25-III (we wiped out some sub-branches in the front and the distance hillside to focus only in the WCUFO and the tree behind it).

We can estimate the real size of the broken-off tree top in figure 24, by comparing it with the nearby tractor. See figure 26. To do this, we watched the movie "Contact" produced by Brit and Lee Elders where this tractor is shown with people around, so we inserted a standing human figure close to it. Based on that, and if the human figure is 1,80 m tall, we calculated the distance "D" in figure 26 is 102 centimeters (in the range of 97 to 107 cm). So, distances D1 and D2 on figure 25 represents 102 centimeters long. On this scale, the segments A, B and C on figure 25 represent 37 cm (a range of 35 to 39 cm).

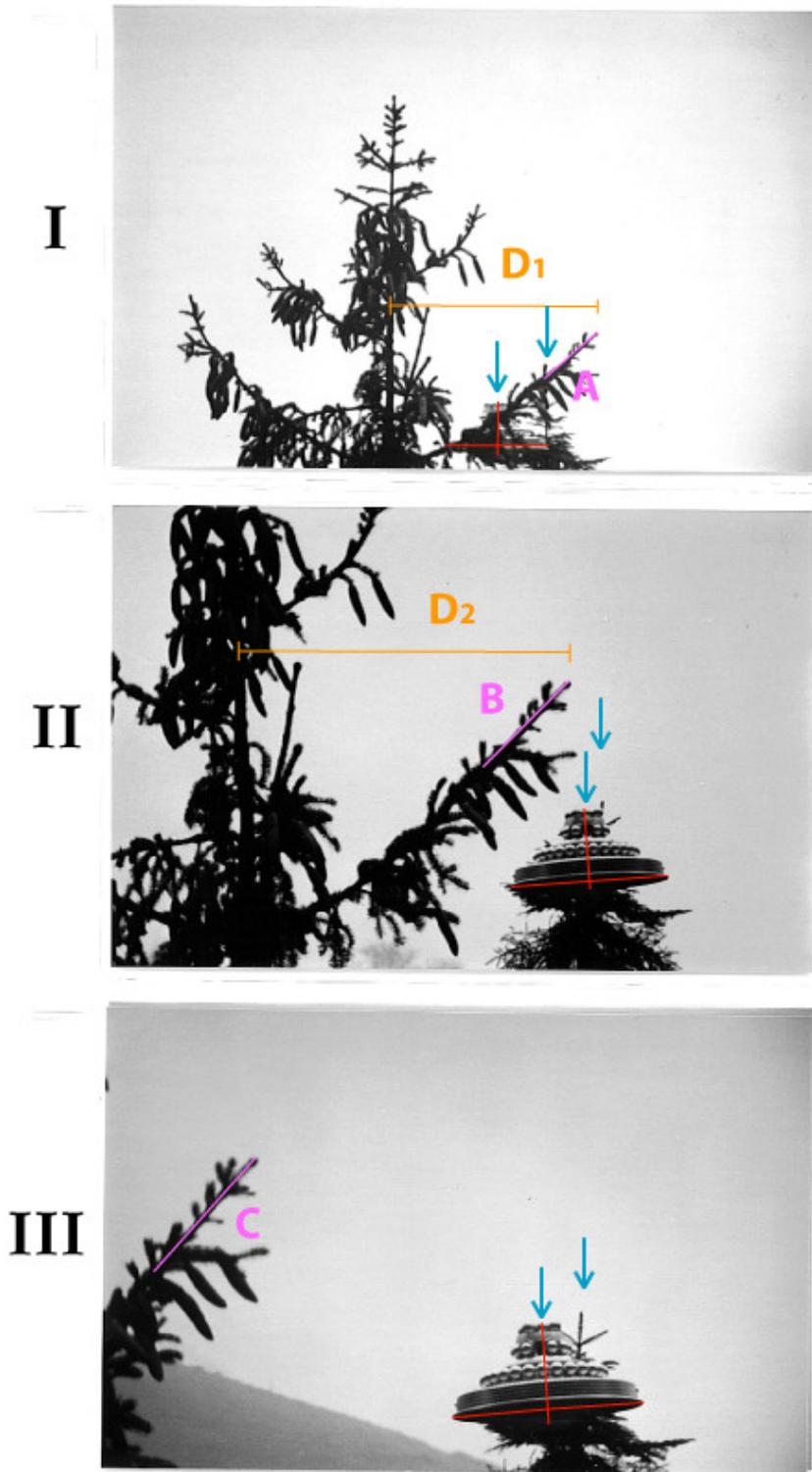


Figure 25 - Sequence of three pictures taken by Billy on April 3, 1981, of the WCUFO above the forest.



Figure 26 – Size of the tree top.

If we know the real size of the tree branches, we can calculate the distance from the camera to the nearest tree, by using the camera formula:

$$\text{Dist} = (f/h) \times H, \text{ where}$$

Dist = Distance from camera to object (The tree branch);

f = focal length of camera = 55 mm;

h = length of object's image on the 35mm film; (36 mm width)

H = length of actual object = 102 cm distance from branches.

h on figure 25-I is "D1", equal to 10,56 mm, and "D2" on figure 25-II is equal to 17,00 mm. So the distances to the tree branch are:

$$\text{Distance I} = (55 \text{ mm}/10,56 \text{ mm}) \times 1,02 \text{ m} = 5,3 \text{ m}$$

$$\text{Distance II} = (55 \text{ mm}/17,00 \text{ mm}) \times 1,02 \text{ m} = 3,3 \text{ m}$$

For the picture in figure 25-III, we made an estimate of the distance from the camera to the tree, based on the segment "C", which measures 37 cm. With the camera formula we obtained a distance of 2,6 m. In summary, the distances from the camera to the nearest tree are:

$$\text{Distance I} = 5,3 \text{ m}$$

$$\text{Distance II} = 3,3 \text{ m}$$

$$\text{Distance III} = 2,6 \text{ m}$$

which shows the camera getting closer, as assumed for this sequence.

In the previous section we indicated that if Billy used a WCUFO scale model, as the debunkers say, and if it is the 0,55m diameter model, it had to be located at 4 meters from the camera in picture #838 (same as in figure 25-II). And, if the distance to the nearest tree is 3,3 m ("Distance II" above), this model would be located at just 0,7 m from that tree, and the image of its branches would cover a big area in the sphere reflection. And this is not the case with the pictures of the WCUFO above the treetops.

Now, to estimate the distance to the WCUFO and its size, we would use the width of the needle-covered twigs in the nearest tree and the tree behind.



Figure 27 – Branches' width. Zoomed image of photo #838

In figure 27 there is a zoomed portion of photo #838, to see details in the trees. The needled branches of both trees are very similar; they have hairy branches. They look to be the same species of tree (*Picea abies*, or Norwegian spruce). Comparing the size of the new-growth branches in figure 27 and the zoomed image of figure 28, we find that their apparent width is 6 times smaller in the tree in the background. (5 to 7 times). It means this tree is six times farther away than the nearest tree. So the tree behind is located at:

$$\text{Distance to the tree in the back} = 3,3 \text{ m} \times 6 = 20 \text{ m}$$

with a range of 17 to 23 meters.

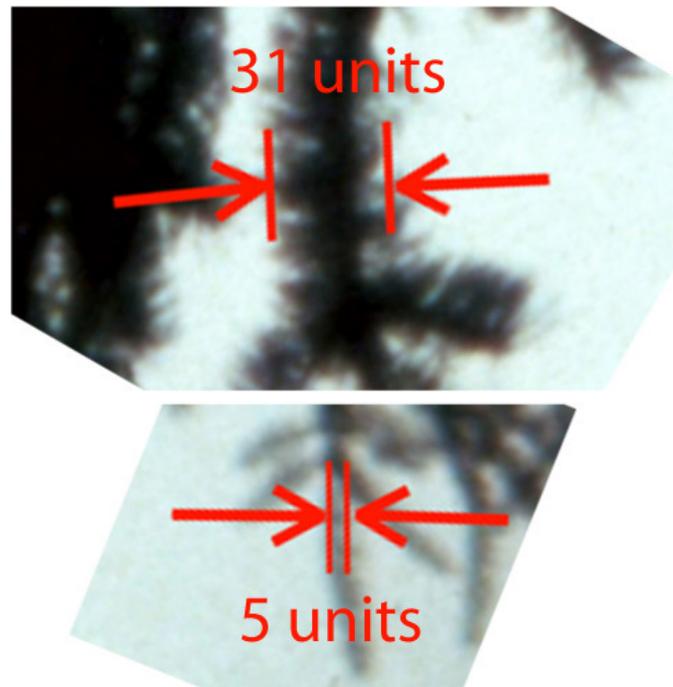


Figure 27 – Branches width

Looking at the stereoscopic image in Annex F, we find the UFO is closer but not too far away from the tree that is in the background. So we estimate the distance to this UFO to be in the range of 15 m to 20 m.

And, for the photo #838, we found this formula for calculating the distance to this UFO:

$$\text{Distance} = \text{Radius} / \sin (7.9^\circ/2)$$

or

$$\text{Radius} = \text{Distance} \times \sin (7.9^\circ/2)$$

$$\text{WCUFO Diameter} = 2 \times \text{Distance} \times \sin (7.9^\circ/2)$$

So we find an estimate of this UFO size in the range of:

$$\text{WCUFO Diameter: } 2,0 \text{ m to } 2,8 \text{ m}$$

This is a good estimate but not an accurate measurement. Due especially to unknown differences between the growth rates of the

two different trees, the size of this UFO could be 3,5 m as Billy claimed. However it is clear it is not a small scale model.

## **Summary of the WCUFO above the tree tops**

- The reflections on the spheres of this UFO show distant trees of the forest around it. The estimation of the size of this object shows it is larger than 2 meters. It is not small model.
- If Billy had used a scale model of this UFO, and if it were of 0,55m diameter, it must have been at 4m distance from the camera in photo #838 (if as large as 1 m then at 8 m distance).
- The debunkers found different household items that were construed to have been utilized with a 0,55 m model. We have not seen any solid evidence that Billy could have used a 1m model; instead, it is very hard to find a container lid of 1 m, nor the other items to construct a model of 1 m. So, if Billy used a scale model at all, it was probably of a size like 55 cm, which we have found is far too small to explain photo #838. Making a model larger than 2 m is less likely.
- Whether or not Billy cut the top of the tree off (his photos showed it had been broken, not sawed or chopped) and located it in front of the camera, between it and the UFO model, or if he somehow climbed to the top of a tree, in a hypothetical situation, the tree and its uppermost portion stood between the camera and the WCUFO within the forest canopy. This is what all of Billy's similar photos, taken at this time, show.
- We calculated the nearest tree in photo #838 is at 3,3 m from the camera. So the supposed UFO model must be at just 70 cm from this tree.
- In this case, the tree's limbs would be very visible in the model spheres' reflections, and they would occupy most of the left half of the spheres' images. And this is not what the actual reflections show. They show a distant forest, with only a bump on the left in the silhouette of the canopy where the closest tree to the camera is. So a model WCUFO cannot explain photos #834 and #838, and the others, but a 2,0m to 3,5m WCUFO at a distance of some 15 m to 25 m can.
- Even if we assumed a bigger model of 1 m, the result would be the same; the nearby tree would then be highly visible in the reflections, which it is not.

- And if the nearby tree were somehow to blend in with the distant forest and not show up at all distinctly in the reflections of a model some 3 or 4 m away, it would nevertheless then show up as being in front of the camera -- because it would then exhibit the "parallax" effect. However, the stereo images at the end of Annex F show no such parallax effect, and are thereby consistent with the WCUFO being a 2,0m to 3,5m, or so object located some 15 m to 25 m away from the camera, with the nearby tree being close to the photographer but distant from the WCUFO.
- In figure #20, several trees were included along with the block shape of a hypothetical human photographer, and one can see that the photographer would have shown up in the reflections if he has been only 4 m away from his model. Debunkers might claim that Billy and his camera were somehow up in the tree camouflaged, but the tree would certainly then be very prominent in the reflections. And it is not. So this WCUFO is a relatively distant object.

## WCUFO at night: analysis

We made an analysis of some of the WCUFO pictures taken at night by Billy Meier. There is the perception that in one of the pictures, the central core of the WCUFO extends upwards a little bit. It means that either this is another kind of WCUFO, or this WCUFO is capable of extending its central core, perhaps to provide more headroom inside. Also, some of the spheres of the WCUFO at night do not look like true spheres.

We will find that the vertical extension of the WCUFO is real. The vertical extension involved is about  $\frac{1}{4}$  of a lower sphere's diameter, and the apparent changes in the shape of some of the spheres is an optical effect that can be reproduced using a 3D computer model. We also did some analysis of these pictures by enhancing the contrast and the brightness.

### WCUFO Vertical extension

In Annex E there is a detailed analysis of the extension of this WCUFO. By using two methods we found there is a real vertical extension of 0,23 to 0,24 times the lower spheres' diameter (close to one quarter). Distance D-E on the following figure is  $\frac{1}{2}$  of the sphere diameter, but comparing it to other pictures of the WCUFO, it should be only  $\frac{1}{4}$  of the sphere diameter.

So this UFO might be a different one with different dimensions, or this UFO is capable of extending its central core upwards.

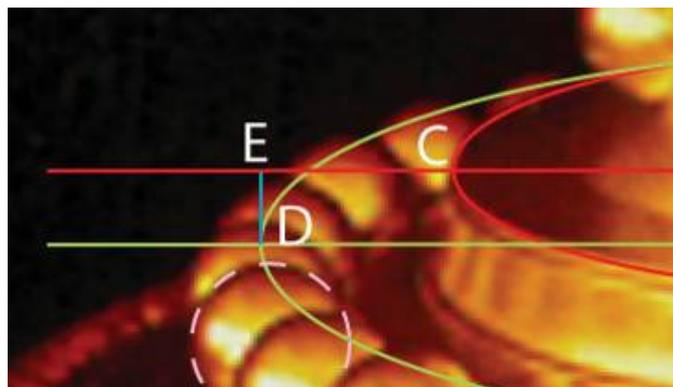


Figure 28- Upward extension of the central core of the WCUFO.

Another interesting finding in Annex E is that the horizontal proportions of the WCUFO of diameters 3,5 m and 7 m are the same, but vertical proportions are different. And it might or might not be

related to this vertical extension. We measured the proportions of the WCUFO in photo #999, which does not exhibit the upward extension.

### **Changing shapes of UFO spheres?**

In some of the night pictures of the WCUFO, a few of the spheres appear with a strange shape, with two opposite protuberant, close to the nearby sphere. We are not referring here to the semi-spheres or hemispheres, which are swung partly open.

We have found it is an optical effect of reflections between contiguous spheres. See figures E9 and E10 in Annex E.

## Annex A WCUFO proportions

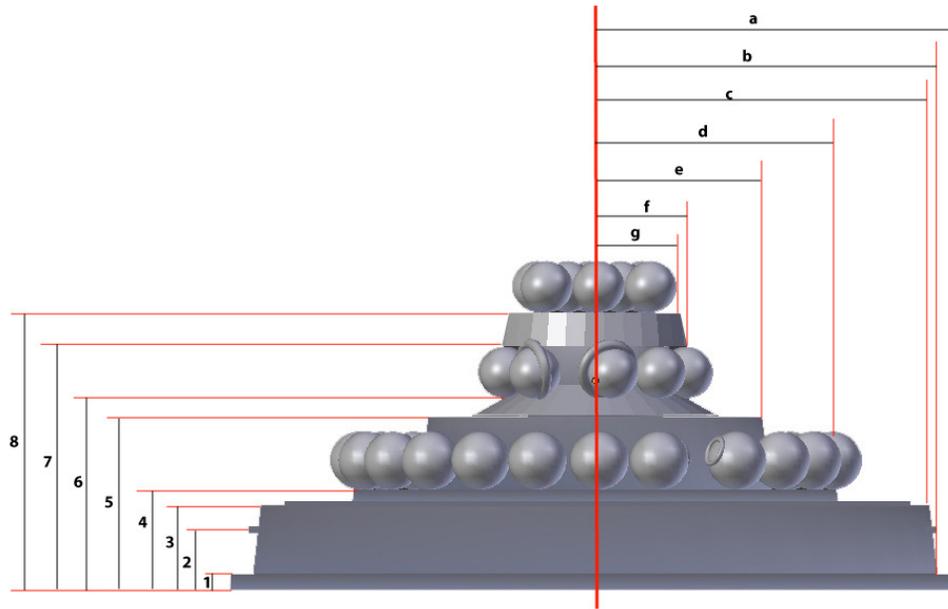


Figure A1 – Vertical and horizontal distances.

	WCUFO 3,5 m						WCUFO 7m		
	Dim 1	Norm 1	Dim 2	Norm 2	Avrg	R	Dim 1	Norm 1	R
<b>a</b>	206	6,645	244,5	6,351	<b>6,50</b>		177	<b>6,81</b>	
<b>b</b>	196	6,323	235	6,104	6,21		170,5	6,56	
<b>c</b>	191	6,161	231,5	6,013	6,09		166,5	6,40	
<b>d</b>	121,5	3,919	155,5	4,039	<b>3,98</b>	0,61	108	<b>4,15</b>	0,61
<b>e</b>	86,5	2,790	111	2,883	2,84		75	2,88	
<b>f</b>	51	1,645	64	1,662	<b>1,65</b>	0,25	46,5	<b>1,79</b>	0,26
<b>g</b>	46	1,484	57	1,481	1,48		42	1,62	
<b>0</b>			0	0,000	0,00		0	0,00	
<b>1</b>			7,5	0,195	0,19		5	0,19	
<b>2</b>			37	0,961	0,96		23,5	0,90	
<b>3</b>			50	1,299	1,30		35	1,35	
<b>4</b>			64	1,662	1,66		49	1,88	
<b>5</b>			113	2,935	2,94		85	3,27	
<b>6</b>			136	3,532	3,53		101	3,88	
<b>7</b>			172	4,468	4,47		128,5	4,94	
<b>8</b>			197	5,117	<b>5,12</b>	0,79	146	<b>5,62</b>	0,82
<b>Diam 1</b>	31	1,000	38,5	1,000	1,00		26	1,00	
<b>Diam 2</b>	29	0,935	36	0,935	0,94		24	0,92	
<b>Diam 3</b>	27	0,871	35,5	0,922	0,90		23	0,88	

The measurements were taken from photos #800 and #834 for the WCUFO of 3,5m diameter. Distances marked as 0, 1, 2, 3, etc. were not calculated for #800, since not all of them are visible.

Measurements for the WCUFO of 7m diameter were taken from photo #999. We are assuming this UFO has this diameter, but we are not

sure about its real size, just that it is larger than the 3,5m WCUFO by comparing it with the near car.

Diam 1 is the diameter for the lower circle of spheres. Diam 2 is for the middle circle of spheres, and Diam 3 is the diameter of the upper circle of spheres.

Dim 1 and Dim2 are the two measurements made from two 3,5m WCUFO (photos #800 and #834) in millimeters calculated on a flat computer screen. Norm 1 and Norm 2 are the former values normalized relative to the average individual diameter of the lower group of well-defined spheres; this diameter is considered as the basic normalizing unit (value=1). In "Avrg" column there is the average of the normalized values of both 3,5m WCUFO analyzed.

The values of "R" are ratios of horizontal and vertical proportions:

$R_d$  = ratio of lower-level spheres' distance to central axis, against UFO radius. ( $R_d$  is  $d/a$  in Figure A1)

$R_f$  = ratio of middle-level spheres' distance to central axis, against UFO radius. ( $R_f$  is  $f/a$  in Figure A1)

$R_8$  = vertical ratio. It is the vertical distance from base to upper platform where the upper spheres are located, against the UFO radius ( $R_8$  is distance "8" divided by distance "a").

In this analysis the lower part of the WCUFO is ignored, since it is not always visible and is not required for calculating the UFO diameter by using the reflections method.

$R_d$  will be used to calculate the WCUFO diameter and distance to the camera by observing the nearest sphere reflections.

It looks like the 7m WCUFO is somewhat taller, in proportions, than the WCUFO of 3,5 m. It is not due to the central core extension (see Annex E), since photo #999 used in this calculation does not show this upward extension. However both UFOs have very similar horizontal proportions.

## Annex B

### Angle of view and plan view analysis, photo #800

Knowing the “angle of view” of the WCUFO is important in photo #800 in the determination of the real size of this UFO. The angle of view is formed in the lens camera with the two bounding lines to each side of the UFO.

Here we used two methods to obtain this value, and both values came out about the same. We calculated the semi-angle value, which is half of the angle of view, and it is created from the outermost edge to the central axis of the UFO. The average semi-angle that we found for this picture of this UFO is 13.8°, or an angle of view of 27.6°.

#### Method 1:

It consists of measuring distances from the axis of the UFO to the central axis of the picture ( $d_1$ ; see figure B1 below), and from the left side, in the camera image (right side in the real object) of the UFO to the central axis of the picture ( $d_2$ ). By knowing the camera focal length is 55 mm, and that it is a 35 mm picture (actually 36 mm on the negative),  $d_1$  can be calculated with the aid of figure B1.

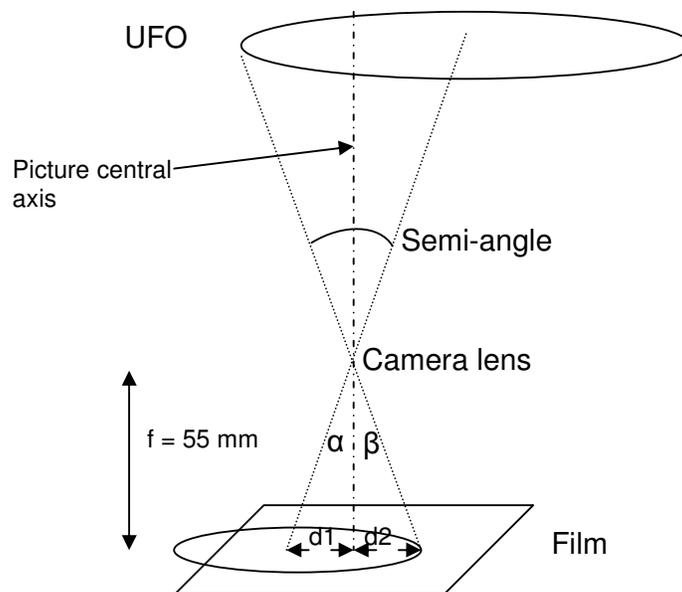


Figure B1 – Angle of view of WCUFO, picture#800

The width of the picture on a flat computer screen is 315.4 mm. So there is a scale factor of  $36/315.4 = 0,114$ .

The values of d1 and d2 on the computer screen are 60 mm and 57 mm (see next figure). And converting them to Film distances using the scale factor we have, d1=6,846 mm and d2=6,504 mm.

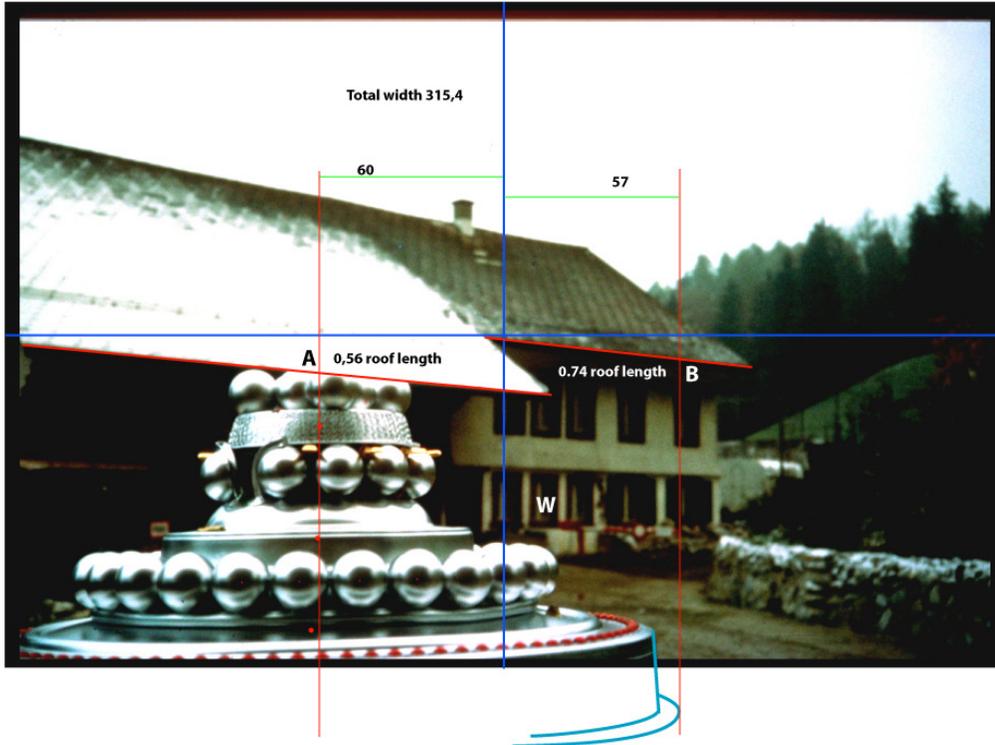


Figure B2 - Angle of view, method 1.

The angles  $\alpha$  and  $\beta$  in figure B1 can now be calculated with:

$$\alpha = \text{Tan}^{-1} (6,846/55) = 7,10^\circ$$

$$\beta = \text{Tan}^{-1} (6,504/55) = 6,74^\circ$$

$$\text{Semi-Angle} = \alpha + \beta = 13,84^\circ$$

Please note, in the above figure, the three red dots on the UFO, which try to depict the mid-point angle by close to the UFO axis, at different levels. You may notice the lower dot is not aligned with the other two, because the image has some deformation in the lower left corner. This is common in camera pictures, where the image close to the corners is somehow distorted. That is why it is better here to find the semi-angle, by using the central axis of the UFO and its right side, rather than finding the angle of view (twice the semi-angle) using the left side edge of the UFO. It is not clear where the left-side edge is because it is out of the image and it is close to the corner. The central

axis and the right edge are easy to determine. Also, there is a lower extended right edge, out of sight on the lower platform of the UFO, the location of which can be well estimated. (See figure B3.); that is why the right edge is moved a bit to the right.

## Method 2:

In this method we use a plan view to find the points A and B, where the lines of view intersect the roof of Billy's home in the background.

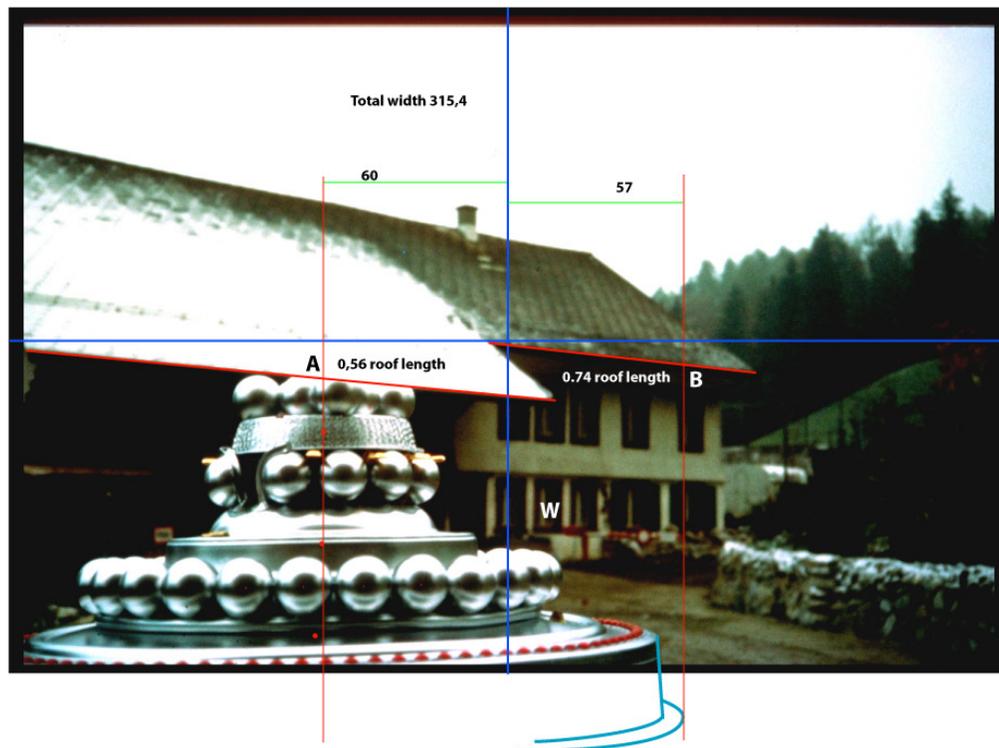


Figure B3 – Angle of view, method 2.

It is very important to have a good plan view of the place. For this analysis we used Google Earth photos, on site measurements and photos of the buildings in this area provided by Christian Frehner, and images from the movie "Contact".



Figure B4 – Google Earth view of Billy Meier property.  
Lat: 47° 25' 00" N Long: 8° 54' 23" E

The Google Earth image is not exactly from directly overhead; however, comparison of the distances in this tool with distances measured on the courtyard, shows this image is close to a good plan-view map.

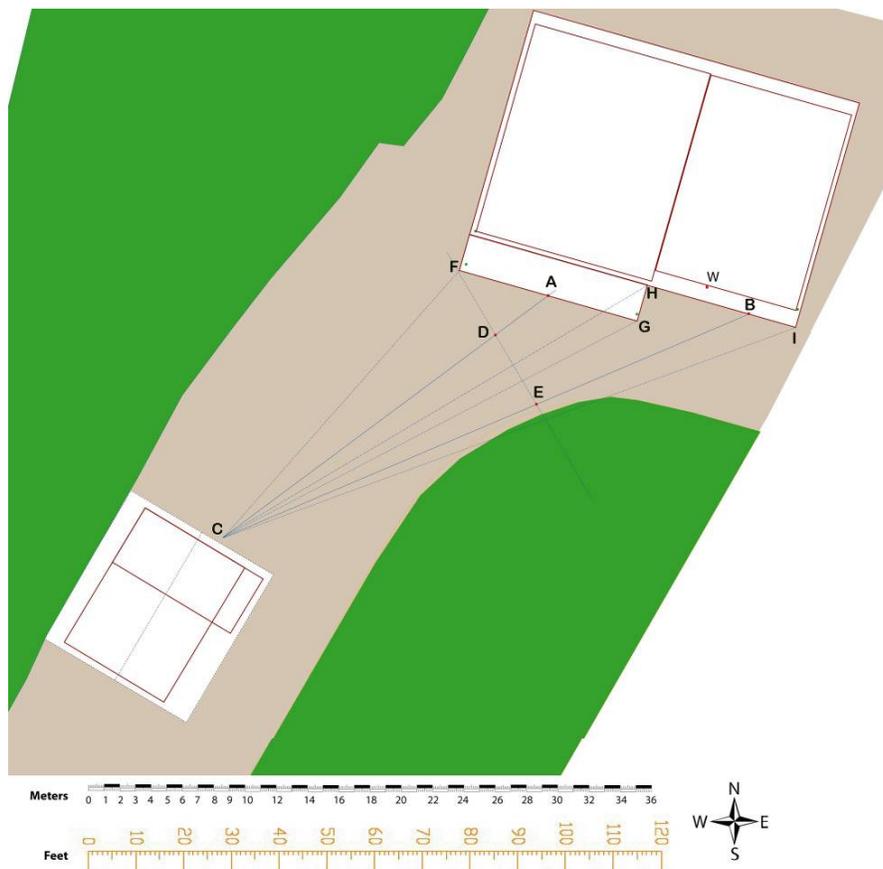


Figure B5 – Billy Meier's property, plan view.

Billy's camera is located on the point marked as "C". Measuring in photo #800, we found that the distance on the roof, F-A, is 0,56 of the distance F-G. And distance H-B is 0,74 of the distance H-I. But these measures and proportions are measured on the photo, so we need to use a line perpendicular to the axis of the photo to represent the same proportions. Hence we constructed the line F-D-E, perpendicular to the axis C-H. (C-H is very close to the central axis of the photo. There is a small difference that will not affect the angle calculation.)

By this method, we found the points D and E, which satisfy the proportion of 0,56 and 0,74 found in the photos. And we projected lines to find the points A and B. The semi-angle can now be measured on the map, which is the angle D-C-E. Making measurements on a flat computer screen, we found these values (in arbitrary computer units) indicated in the figure below (not drawn to scale):

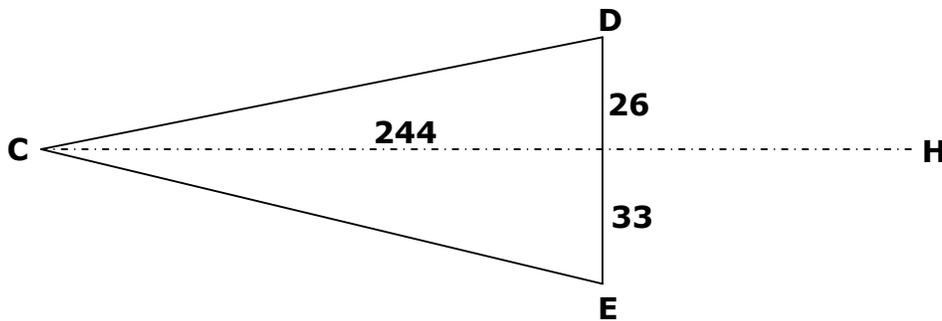


Figure B6 – Angle calculation guide on the best estimate, or average on triangles from roof projections.

So the semi-angle is:

$$\text{Semi-angle} = \text{Tan}^{-1} (26/244) + \text{Tan}^{-1} (33/244)$$

$$\text{Semi-angle} = 13,78^\circ$$

In method 1 we found a very similar value of 13,84°. So the average semi-angle is:

$$\text{Semi-angle} = 13,8^\circ$$

so...

$$\text{Angle of View} = 27,6^\circ$$

As a confirmation of the location of Billy camera in the courtyard, we used the calculation of professor Jim Deardorff in his website, where he used the window marked as "W" in figure B3. The height of this window (its glass or window opening) was measured by C. Frehner to be 1,20 m.

The measurements on Figure B3, in the computer tool are:

Width of the photo on the computer screen = 324,5 computer-units

Height of the window opening = 16 c-units (with an error of  $\pm 5\%$ )

Size of window opening on the 35mm film itself =  $16/324,5 \times 36 = 1,78$  mm

Using the camera formula:

$$D = (f/h) \times H, \text{ where}$$

D = Distance from camera to object in question;

f = focal length of camera = 55mm;

h = length of object's image on the 35mm film; (36mm real film width)

H = length of actual object = 1,20 m. (window opening)

$$D = 37 \text{ m } (\pm 5\%)$$

So the distance from the camera to the window marked as "W" on the figure B3 is in the range of 35,2 m to 38,9 m. In the plan view we found this distance is 35,5 m. It means Billy was really close to the carriage house north-east wall when he took the picture #800.

## Annex C

### Carriage house dimensions and courtyard plan view

Photos #799, #800 and others were taken by Billy Meier on October 22, 1980, showing the WCUFO hovering above the courtyard.

The UFOs' images show in their spheres the reflection of the carriage house northeast wall. Knowing the size and orientation of the carriage house is very important in determining the size of the WCUFO.

These are the dimensions of the Carriage House northeast wall, measured by Christian Frehner in Billy's property.

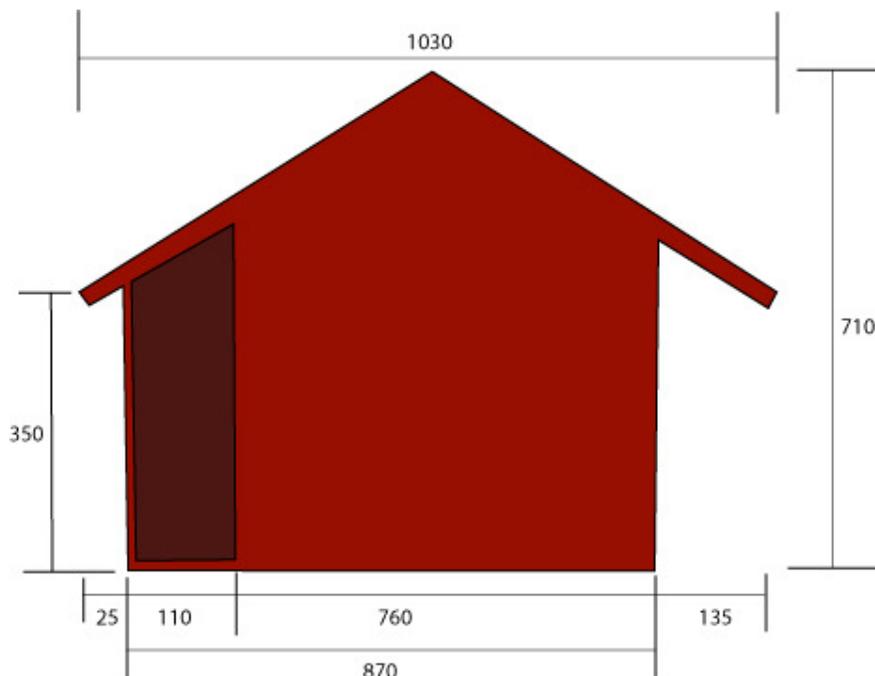


Figure C1 – Carriage house northeast wall dimensions in centimeters

The carriage house has experienced some modifications over the years. In figure C2 there is a picture taken around 1977, some years before Billy took his WCUFO pictures. By this time the southeast extension was constructed.



Figure C2 – Carriage house south-east extension, around 1977.

In 1980, when Billy took his pictures of the WCUFO, this construction was presenting this changed appearance. It can be confirmed by looking at a scene of the movie "Contact from the Pleiades" created by Lee and Brit Elders. At the end of the movie, the carriage house is visible, and shows the south-east extension. In this movie, Lee Elders talks about the then recent pictures of the WCUFO.



Figure C3 – Carriage house from "Contact" movie.

As we can see, the courtyard between Billy's main house and the carriage house had no trees then. Currently there are trees of good size in this area. Some time after 1980 another extension was made to the carriage house, on its north-west side, first floor. Looking at Google Earth recent images, the new trees are visible. Figure C4 shows a top view of Billy's house in the upper right corner, and the carriage house on the bottom left corner, where a part of the roof of the north-west extension is visible.



Figure C4 – Google Earth view of Billy Meier's property.  
Lat: 47° 25' 00" N Long: 8° 54' 23" E

Below is a recent picture, taken by Christian Frehner, which shows the carriage house with the north-west extension of the first floor (at the right).



Figure C5 – Recent picture (2013) of the Carriage House

Below is a wide angle view of Billy Meier's home at the right and the carriage house at the left, taken in 1981.



Figure C5 – Wide angle view of Billy's main property in 1981

With Google Earth images, pictures available, scenes of "Contact" movie and on-site measurements, we have generated a plan view of this area. See figure C6 below.

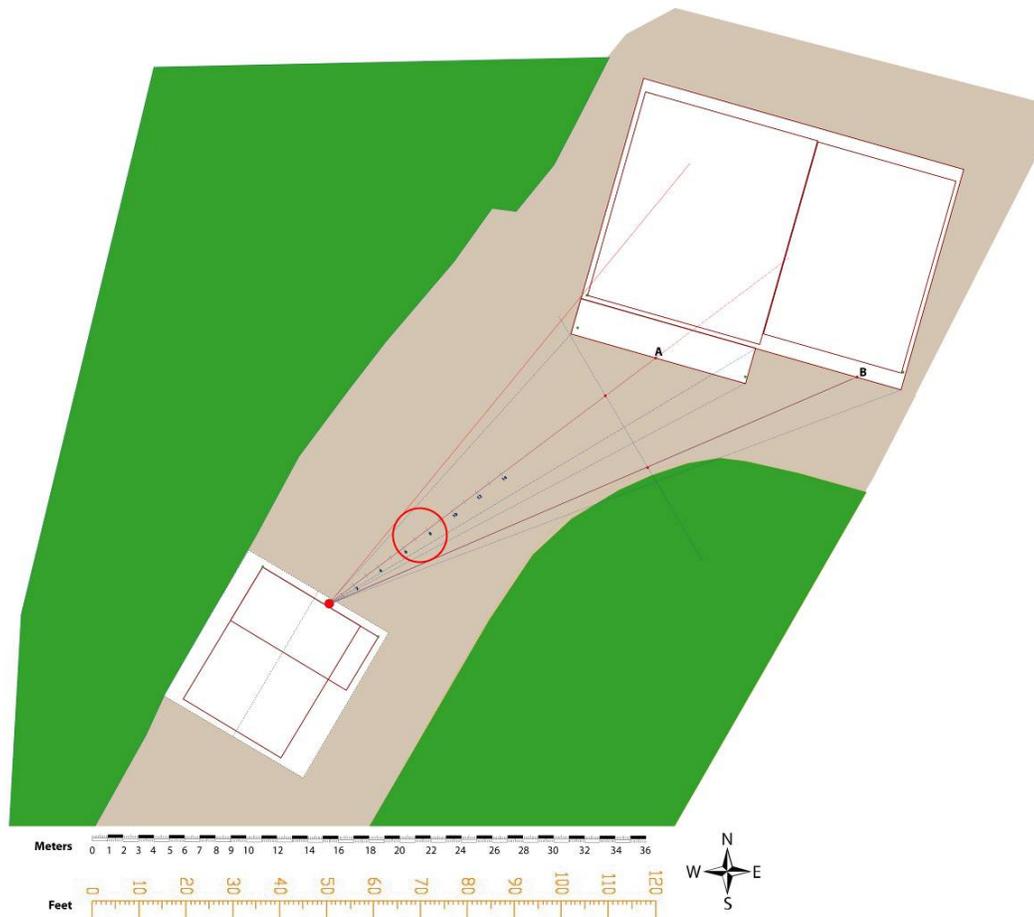


Figure C6 – Plan view of Billy's residences and courtyard in 1980

In this map, Billy's house is on the top and the carriage house is on the bottom. On the northeast wall of the carriage house, there is a red dot where Billy was taking the WCUFOs pictures. (See under "Method 1—Computer modeling" for three reasons why we know Billy took his pictures from point C and not farther away from the carriage-house wall). The angle shows the direction of the UFO projected to the main house. The red circle of 3,5 m is the place where this UFO was located, if it measured 3,5m diameter.

And these are other pictures taken by Christian Frehner a few years ago, of a reflecting test sphere. Note on the 1m distant sphere the image of Christian located in the same place where Billy was taking the WCUFO pictures.



Figure C7 – Reflecting sphere at 2 m from camera, taken from a position close to the carriage house wall looking north



Figure C8 – Reflecting sphere at 1 m from camera, showing the photographer in the center

The reflected image of the carriage house wall is very similar to the one we found in the analysis above with the computer program for making 3D models and including reflections, and by using small spheres in a scale model of Billy's property. The size of the sphere does not matter, since the size of the reflected image is directly proportional to the sphere's diameter.

In the computer program called "Blender" we made a 3D model of the WCUFO, the carriage house and Billy's main house. These models are shown in the following figure. This model helped us to make the analysis of the reflections on the spheres of the WCUFO.

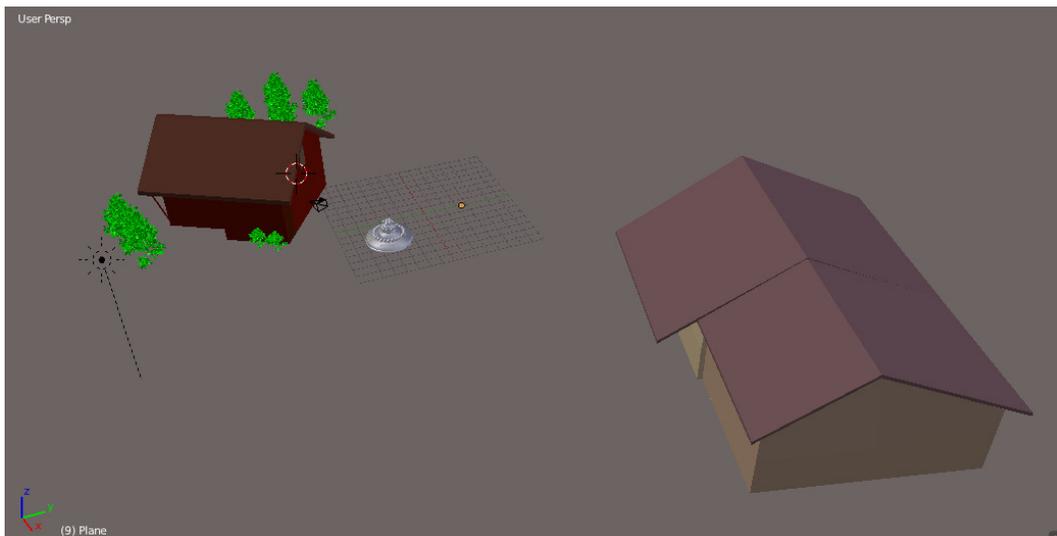


Figure C9 – Computer model on "Blender" of carriage house and main residence

## Annex D Distance and size of the WCUFO

If we know the distance to the nearest sphere of the WCUFO indicated on a WCUFO photo, like #800 for example, we can calculate the size of this UFO and the distance from the camera to the center of this object.

This is useful when a sphere-reflections analysis is done. Anybody can use a sphere, and test different distances to a camera until the desired image size is reflected. For example, someone can get close to a wall of similar size to the northeast wall of the carriage house, and by working with reflecting spheres, can see the size of the reflected wall until it matches the dark shapes that photos like #799 and #800 show. And when the reflected dark shapes match the ones in the picture, the distance to the sphere is measured. Then, with the following formulas the size of the WCUFO can be calculated.

In figure D1, the distance **Ds** is measured from the camera to the center of the nearest sphere (located in the lower level of the UFO). **D** is the distance from the camera to the center of the UFO. And "**r**" is the radius of this UFO.

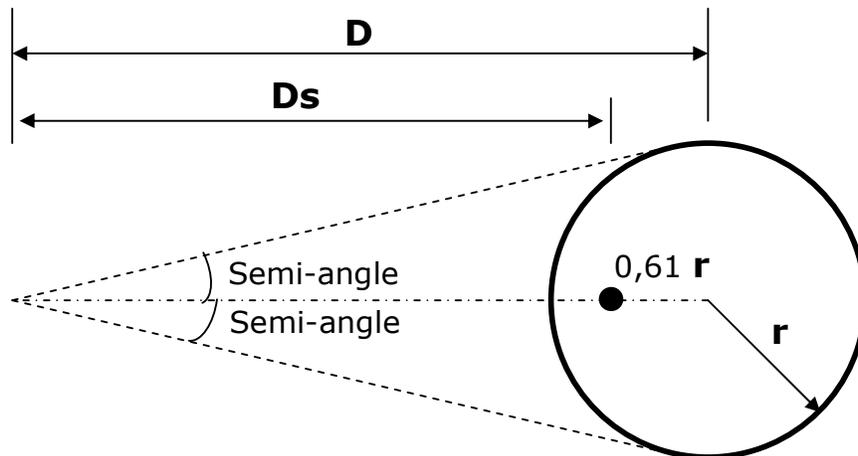


Figure D1 – Basic definitions regarding size and distance of the WCUFO

In Annex A we calculated that "Rd", the ratio of the radius of the lower circle of spheres to the radius of the UFO, is 0,61. If someone is evaluating the reflections on the middle circle of spheres, Rf must be used instead.

For photo #800 in Annex B, we found the semi-angle is 13,8°.

As we said, we can do experiments with reflecting spheres to simulate photo #800's reflections, and find the distance **Ds** to the sphere. With this distance we can calculate the radius, **r**, of the WCUFO and the distance, **Ds** to the center of the UFO with the following formulas (we are not giving details here of the trigonometric calculations to arrive to these formulas... it is easy to find it):

$$r = \frac{Ds \sin(\text{Semi-angle})}{1 - Rd \sin(\text{Semi-angle})}$$

$$D = Ds + Rd r$$

where:

**r** Is the WCUFO radius

**Ds** Distance from camera to center of nearest sphere on lower row.

Semi-angle is 13,8° for photo #800 (Annex B)

**Rd** is 0,61 (Annex A)

**D** Distance from camera to the center of this UFO.

With these values we constructed the following table:

<b>Ds</b>	<b>r (radius)</b>	<b>Diameter</b>	<b>D (distance)</b>
1,00	0,28	0,56	1,17
2,00	0,56	1,12	2,34
3,00	0,84	1,67	3,51
4,00	1,12	2,23	4,68
4,25	1,19	2,37	4,97
4,50	1,26	2,51	5,27
4,75	1,33	2,65	5,56
5,00	1,40	2,79	5,85
5,25	1,47	2,93	6,14
5,50	1,54	3,07	6,44
5,75	1,61	3,21	6,73
6,00	1,67	3,35	7,02
6,25	1,74	3,49	7,31
6,50	1,81	3,63	7,61
6,75	1,88	3,77	7,90
7,00	1,95	3,91	8,19

All values are in meters.

We may notice that the proposed (by some debunkers) scale model created with a can lid, of 55 centimeters, has to be located at just 1,17 meters from the camera (the nearest sphere at 1 meter).

The WCUFO of 3,5 m would be at 7,31m distance (the nearest sphere at 6,25m).

These formulas can be used for other photos, like #799. And the angle of view, or the semi-angle which is half of that, can be calculated as indicated in Annex B.

## **Annex E**

### **Height changing capability of a WCUFO**

The WCUFOs photographed by Billy Meier, seem to come in different sizes (3,5 m, 7 m and 14 m). They all look the same; however, there is a perception that in one case, the central core of this UFO was extended a little bit upwards.

Also, in some cases the spheres of this UFO do not look spherical and they may give the impression they are a bit separated.

The purpose of this section is to test if this is true: if the spheres can change their form, and how long such an upward extension of the WCUFO was, based on an analysis of one of the nighttime photos taken by Billy versus a daytime photo.

#### **Central core upwards extension**

The photo in figure E1 of the WCUFO was taken on the night of August 5, 1981. It may give the impression that its central core was vertically extended a bit in comparison with the other WCUFO photos.



Figure E1- WCUFO on the night of August 5, 1981. Photo #873

Upon looking at another photo, made a few days before on the night of August 2, 1981 (figure E2), it gives the impression that the core of the WCUFO in figure E1 was really elongated upwards.

Is it an optical illusion because of this perspective? Or is it due to the bright and dark bands on the core of this UFO? We will use two methods to check these possibilities.



Figure E2- WCUFO on the night of August 2, 1981. Photo #999

### **Geometrical analysis – first method**

In figure E3 below, we present the same UFO of figure E1, but the image is rotated clockwise to set the UFO's vertical axis in vertical position. Two ellipses were drawn, one on the top of the platform that holds the middle and top tiers of spheres, and the other joining the top points of the main spheres, located at the bottom part.



Figure E3 – Ellipses drawn on the upright WCUFO

The upper ellipse, red color, has a major axis indicated by the segment A-C. And the lower ellipse, green color, has a major axis indicated by the segment B-D. The points A, B, C and D, are the vertices of the ellipses.

Both segments, A-C and B-D, are parallel in space, and we will measure the distance between these two segments, and compare it with another picture of the WCUFO to check if it is the same, or if, in this case, it is increased by an extension of the central core.

The major axes of the ellipses are shown in "real dimension" to the camera. That means, the line of vision, from the lens of the camera to the center of each segment, form a  $90^\circ$  angle with each segment. So we see its real size in this perspective. On the contrary, the minor axes of each ellipse are not in "real dimension" because this WCUFO was not photographed from the top. A picture from the top would show two concentric circles.

Each one of the planes of these circles forms an angle  $\theta$  with the line of vision from the camera to the center of the circles. If  $\theta=90^\circ$ , the circles are seen in "real dimension", and they look like circles. If  $\theta=0^\circ$ , however, the two circles are two parallel lines (circles viewed on edge). Also, because this is a photo, not an isometric view, it looks like a perspective, so each one of the planes represented by the ellipses will form a different angle  $\theta$ , whether or not these planes are parallel. (See figure E4.)

The distance between these two planes, defined by the two circles that in the photo look like ellipses, is indicated as the segment E-D in figure E3. The point E is located on the horizontal projection of the major axis of the upper ellipse, and the vertical projection of the point D. The segment E-D is not in "real dimension", since it is tilted by an angle that we will assume as the average of the two angles,  $\theta_1$  and  $\theta_2$  (figure E4). Figure E5 shows a zoom image of the segment E-D.

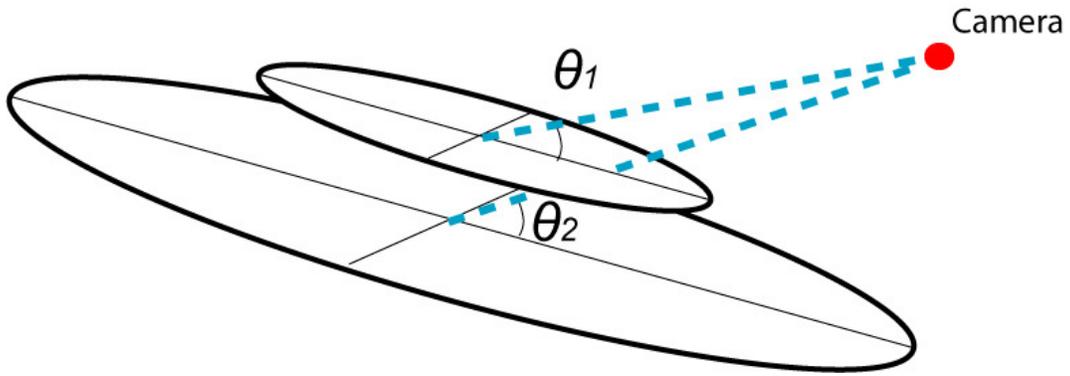


Figure E4- Angles of the two planes selected for the WCUFO extension analysis

The angles can be calculated with:

$$\theta_1 = \text{Sin}^{-1}(\text{Minor Axis 1} / \text{Major axis 1})$$

$$\theta_2 = \text{Sin}^{-1}(\text{Minor Axis 2} / \text{Major axis 2})$$

where major and minor axes can be measured in the ellipses in Figure E3.

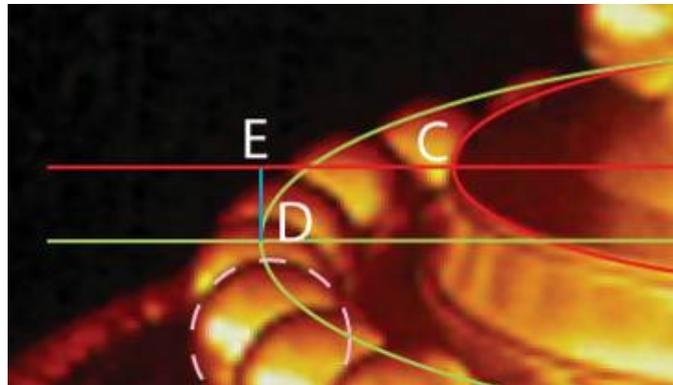


Figure E5- Elevation difference, segment E-D

The following table shows the sizes measured on the photo. They are normalized, so we will assign the sphere diameter a value of 1. (Pink circle in figure E5). So these distances and sizes are relative to the

diameter of the spheres (the ones located at the lower part of the WCUFO).

	Sizes (mm) on photo	Normalized Value
Major Axis - top Ellipse	166	6,04
Minor Axis . top Ellipse	43	1,56
Major Axis - lower Ellipse	233	8,47
Minor Axis - lower Ellipse	67	2,44
Sphere diameter	27,5	1,00
Segment E-D	13	0,47

Using the above values, the angles are:

$$\theta_1 = 15.0^\circ$$

$$\theta_2 = 16.7^\circ$$

And the average angle is:

$$\theta = 15.9^\circ$$

The segment E-D, which represents the distance, in the vertical direction, between the platform of the central core and the top of the main spheres, is not in "real dimension". To calculate its real size, we must use the  $\theta$  angle in this formula:

$$\text{Elevation} = \frac{\text{Segment E-D}}{\text{Cos } \theta}$$

This vertical separation is equal to 0.49 units.

That means the WCUFO core between the lower and middle tiers of spheres is vertically extended a distance of half a main sphere diameter.

Now, let us check another photo to see if this vertical separation is the same in another WCUFO. In this case, we may use photo #800, with the WCUFO hovering close above Billy Meier's courtyard. See figure E6. The platform of the central core is seen on edge, so here it is very easy to check this elevation.

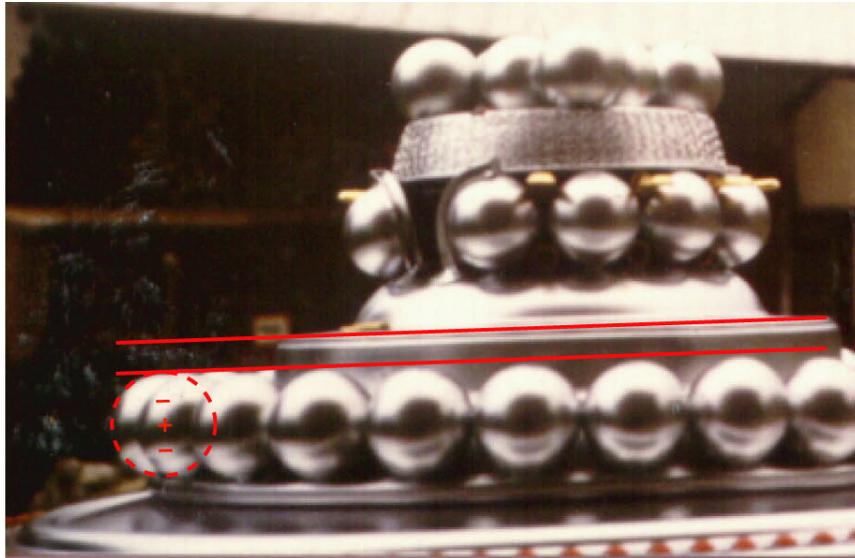


Figure E6- WCUFO hovering over Billy's courtyard. #800. October 22, 1980

You may easily note, in figure E6, that this vertical separation is one quarter of the sphere diameter (0,25), not half of that. So it is different from that of the WCUFO of #873, and it shows us that the WCUFO in the photo taken on August 5, 1981, is different than the one previously photographed on October 22, 1980. Also, the WCUFO in picture #999 shown in figure E2 does not show this extension either.

### **Geometrical analysis – second method:**

We did another analysis similar to that of method 1. But in this second analysis we checked the distance between the two platforms: the upper one being where the mid-level spheres are located, and the lower platform being where the lower lever of spheres lie. This lower level is defined on the other edge, just outside of the multiple red crystals. See figure E7.

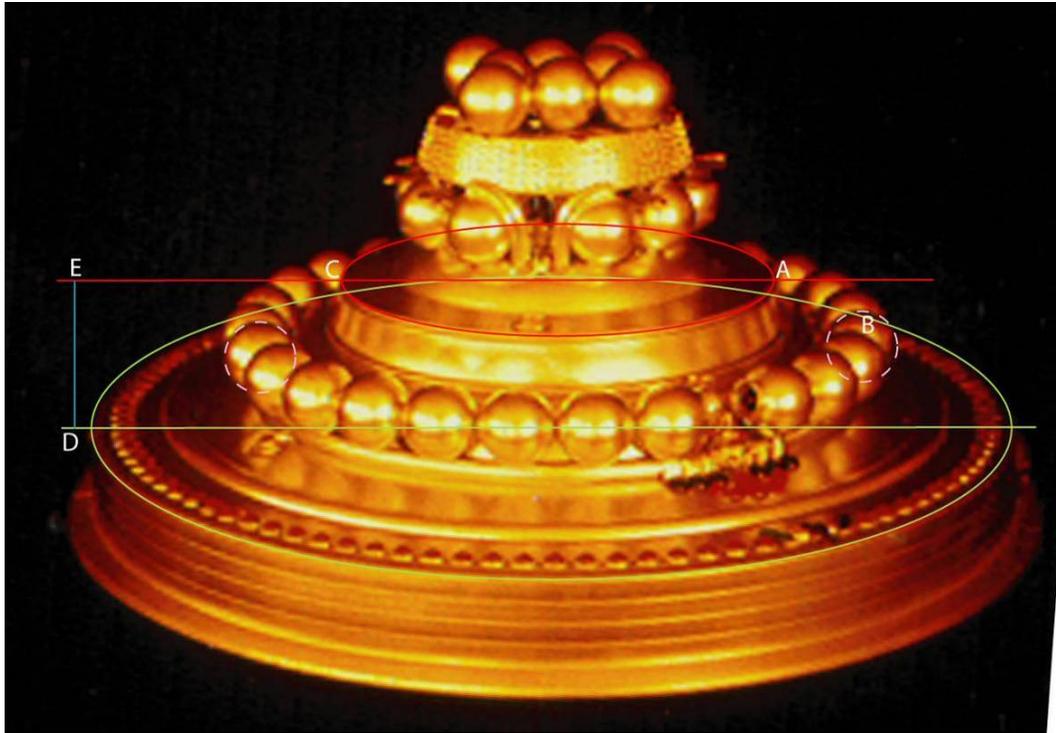


Figure E7 – Vertical separation between two differently defined platforms

Calculating the angles and distances in the same way as in method 1, we have:

	Sizes (mm) on photo	Normalized Value
Major Axis - top Ellipse	129,5	6,02
Minor Axis . top Ellipse	34	1,58
Major Axis - lower Ellipse	277	12,88
Minor Axis - lower Ellipse	90,5	4,21
Sphere diameter	21,5	1,00
Segment E-D	44,5	2,07

Using the above values, we find the angles to be:

$$\theta_1 = 15.2^\circ$$

$$\theta_2 = 19.1^\circ$$

And the average angle is:

$$\theta = 17.2^\circ$$

$$\text{Elevation} = \frac{\text{Segment E-D}}{\text{Cos } \theta}$$

Elevation= 2,17 units

It means the vertical separation between the two platforms is 2,17 times the sphere diameter.

Now we can again compare it with #800, using this different definition of vertical separation.

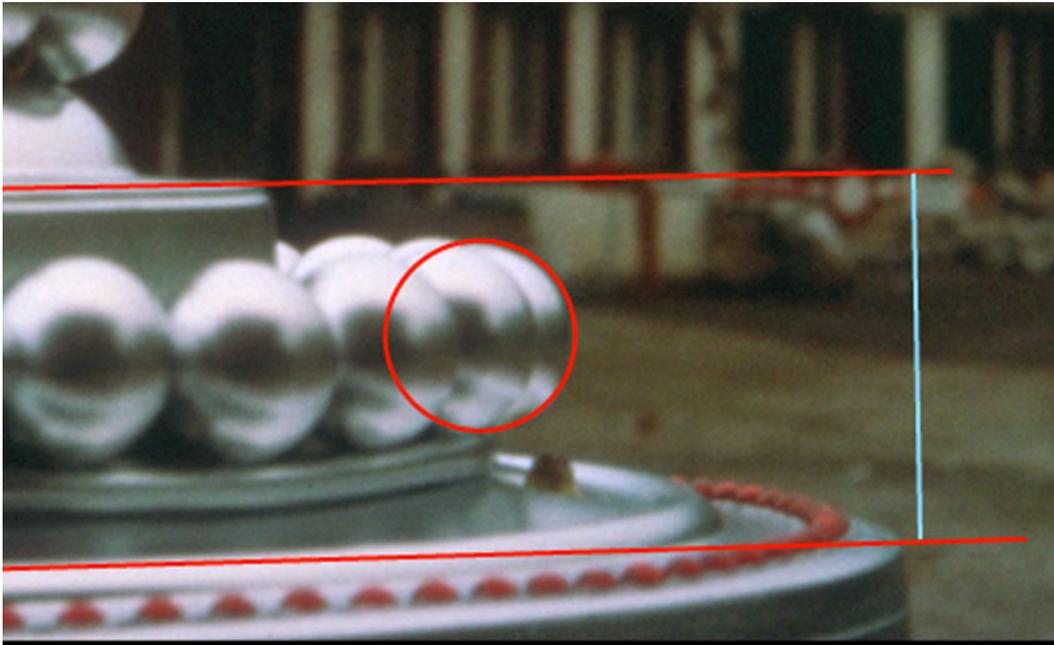


Figure E8 – Vertical separation between the two platforms.

In figure E8, the elevation measured in the image is 64 computer-units and the sphere diameter is 33 c-units. So the vertical separation is  $64/33 = 1,94$  times the sphere diameter. In figure E7 it was 2,17 times this sphere diameter. So the difference in elevation, or vertical extension is  $2,17 - 1,94 = 0,23$  of the sphere diameter.

We conclude that the WCUFO in #873 photographed at night had a difference in its dimensions. The central core was extended vertically between 0,23 and 0,24 times the lower spheres' diameter (close to one quarter of the sphere diameter). Or else there are several WCUFOs with somewhat different dimensions and proportions.

### **Changes in the spheres' shape:**

The spheres of this WCUFO, photo #873, do not all look like spheres. (Forward facing ones look like hemi-spheres with a flange at the base. We are not referring to these ones here).

Is this an optical effect or a real change in shape? See figure E9 showing the details of the apparently changed spheres.

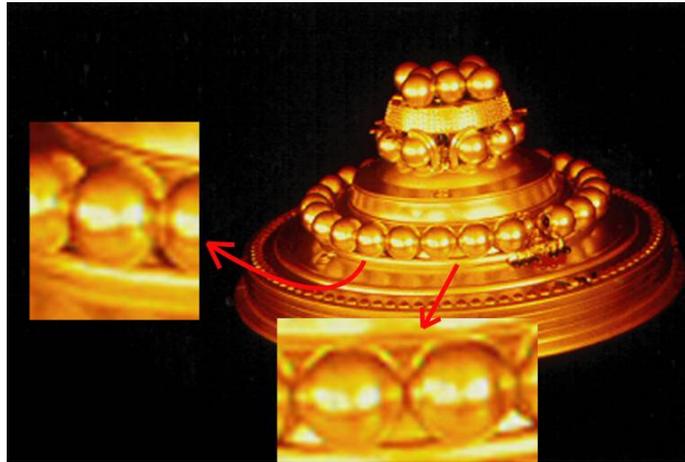


Figure E9 – Spheres’ deformations.

Using the computer model of this UFO done in Blender, we were able to duplicate this effect. The reflections on the spheres make an optical effect that makes them look not like spheres. See figure E10.

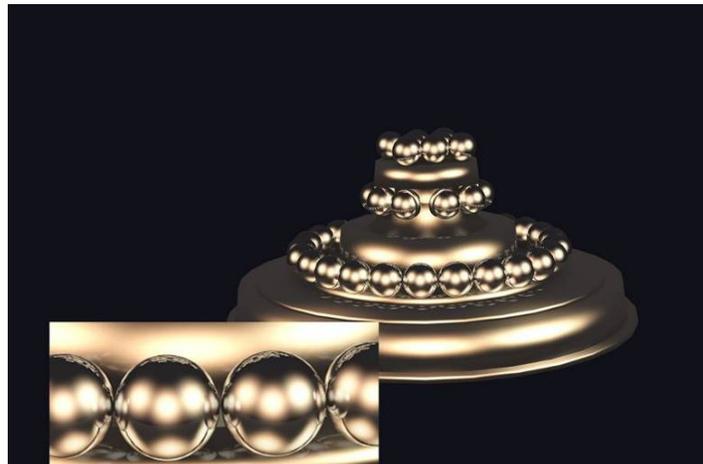


Figure E10 – Model spheres’ deformations.

Thus the same effect happens in the computer simulation. It is related to the reflections between and among the spheres, and under high contrast lighting. This effect is not present under normal daylight situation (see computer generated figure 10 where the spheres do not show this apparent deformation). So the shape of the WCUFO spheres does not change even if they do not look round.

## Annex F

### Stereo images

By looking at an object from two points of view we can construct a stereo image. The spheres of the WCUFO reflect surrounding objects, and since they are located in adjacent, side-by-side positions, we can combine them to form stereoscopic views.

Viewing the stereo images can be done in two ways. The first one is by using a stereoscope (figure F1), which is a device with two laterally separated lenses. It can also be constructed by using two twin magnifying lenses. And the second way is by the naked eye. For that, it is required to set both eyes in parallel position, like looking at infinity, and at the same time focusing on the near images. Not everybody can do that. The stereoscope might be more comfortable and provide a better view.

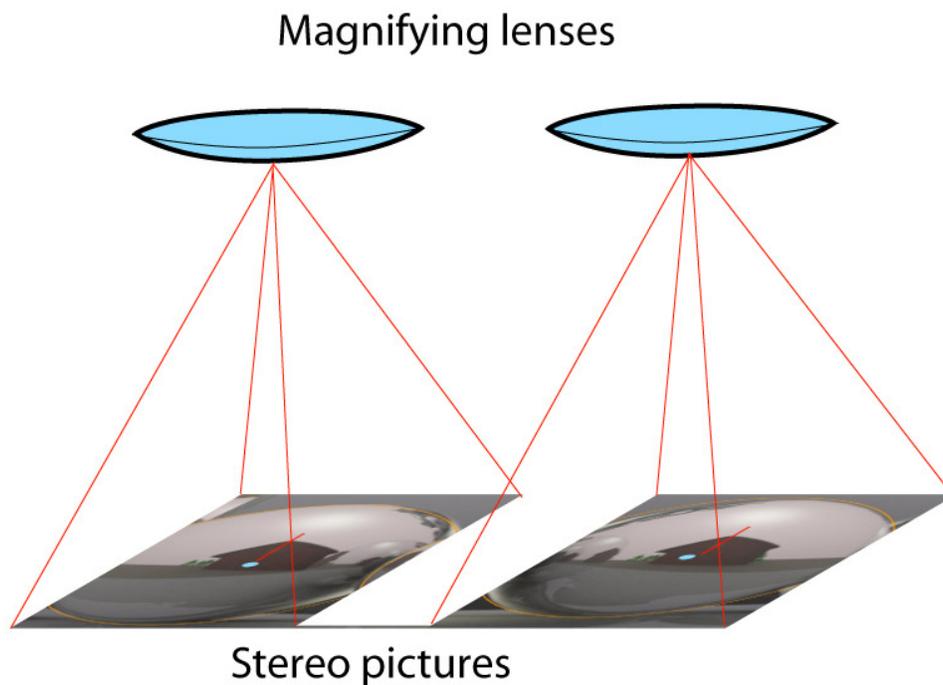


Figure F1 – Stereoscope

The following are the stereo pictures for the WCUFO analyzed.

**Photo #800**

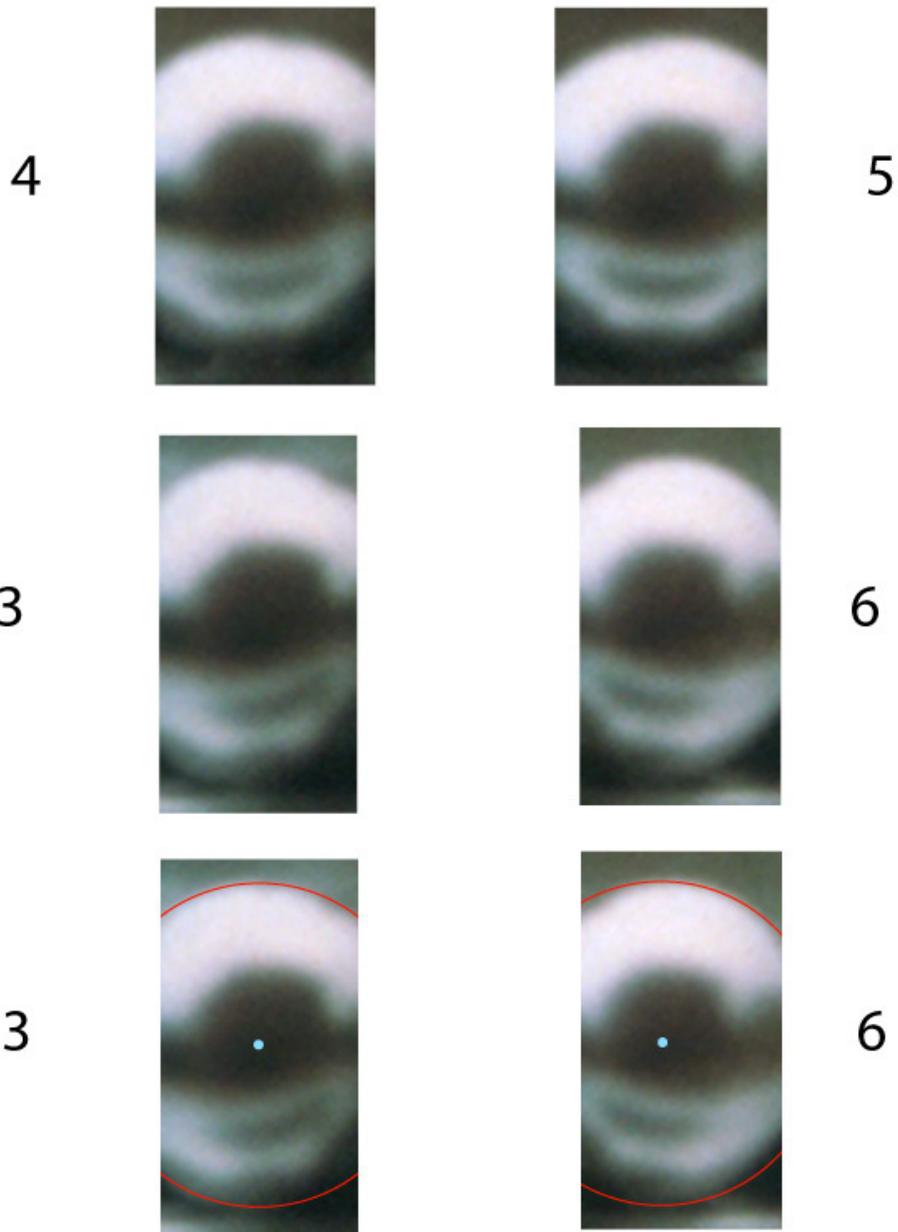
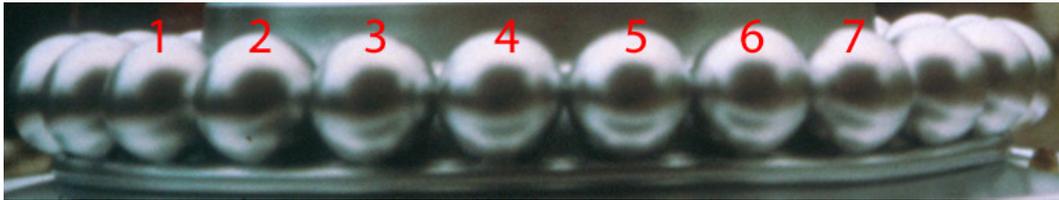


Figure F2 – Stereo pairs, #800. Blue dot on the bottom is the camera location, at the center of the sphere as observed from the camera's location

**Photo #799**

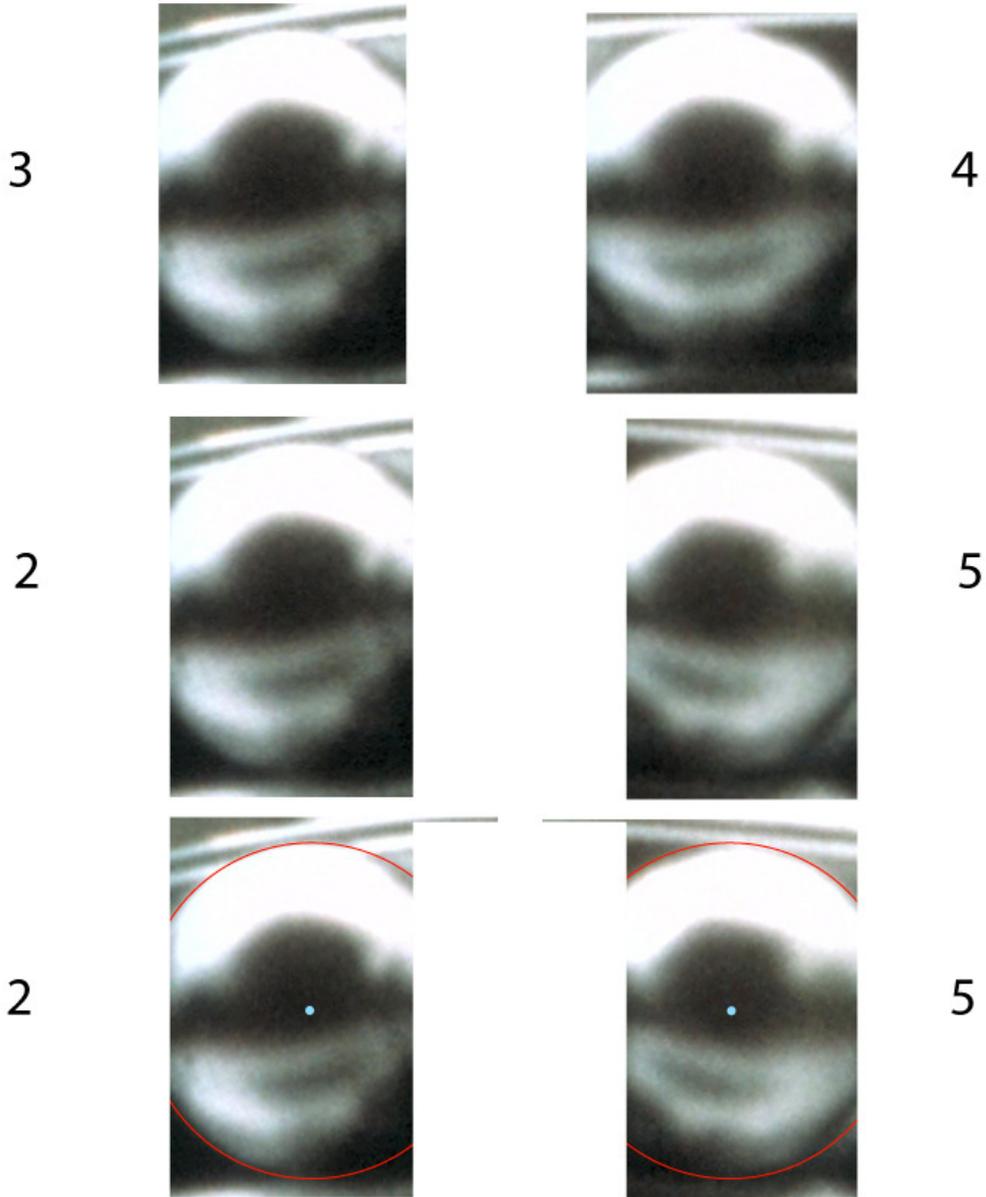
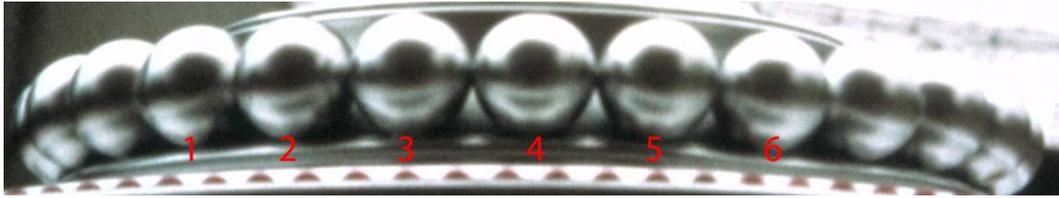


Figure F3 – Stereo pairs' #799. Blue dot on the bottom is the camera location, at the center of each sphere

Picture #838

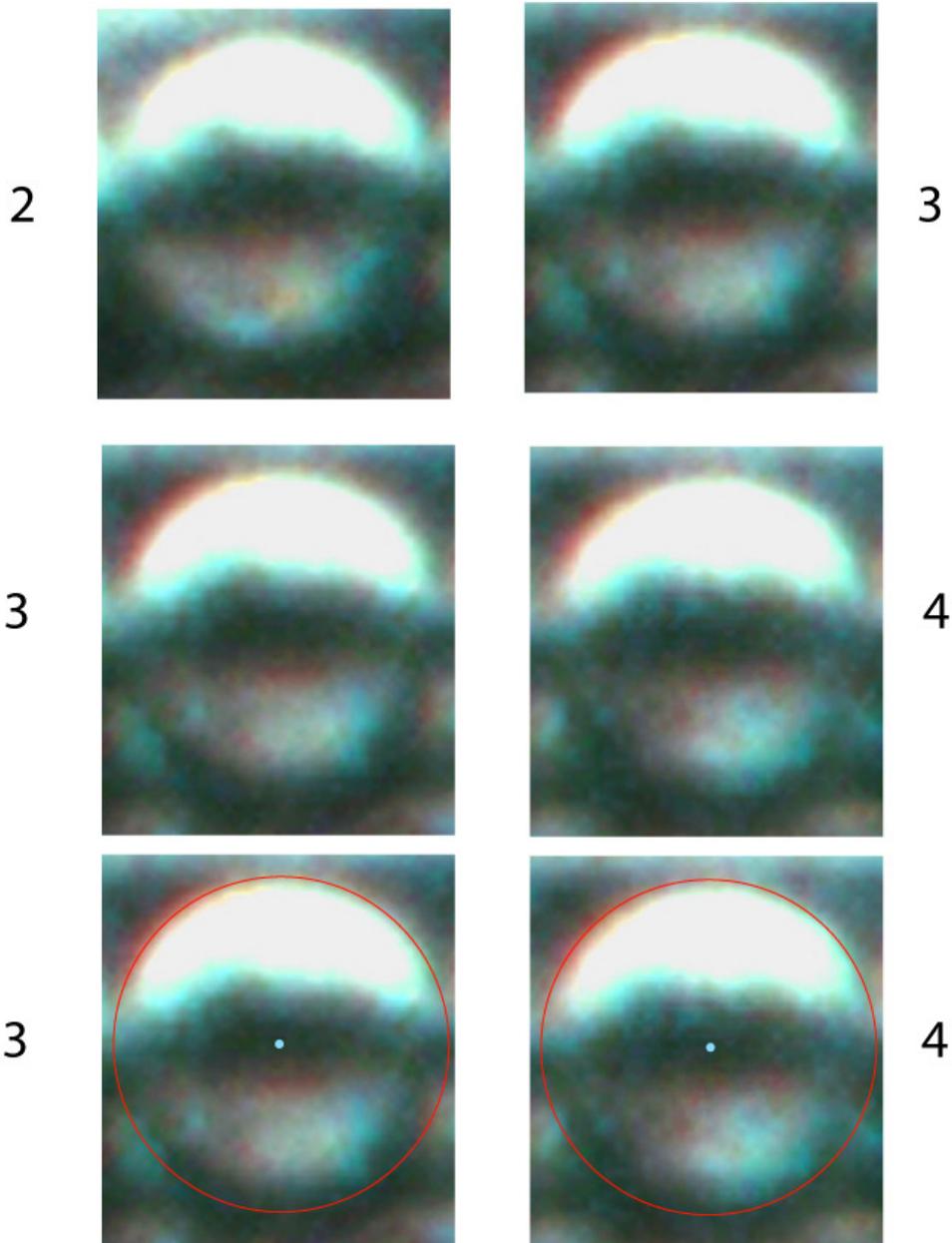
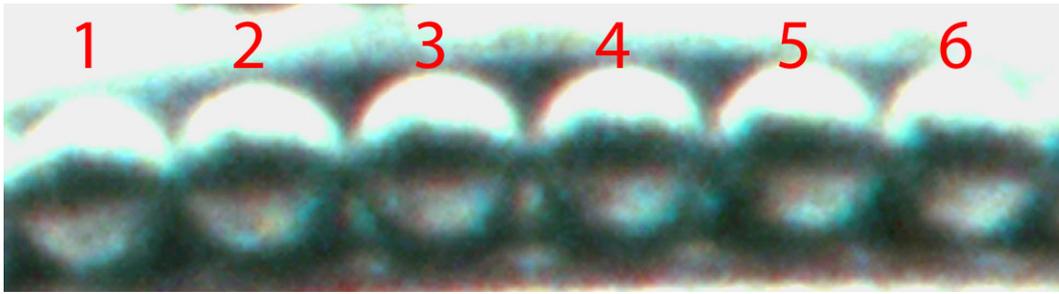


Figure F4 – Stereo pairs, #838. Blue dot in the bottom row is the camera location, at the center of the sphere..

**Photo #834**

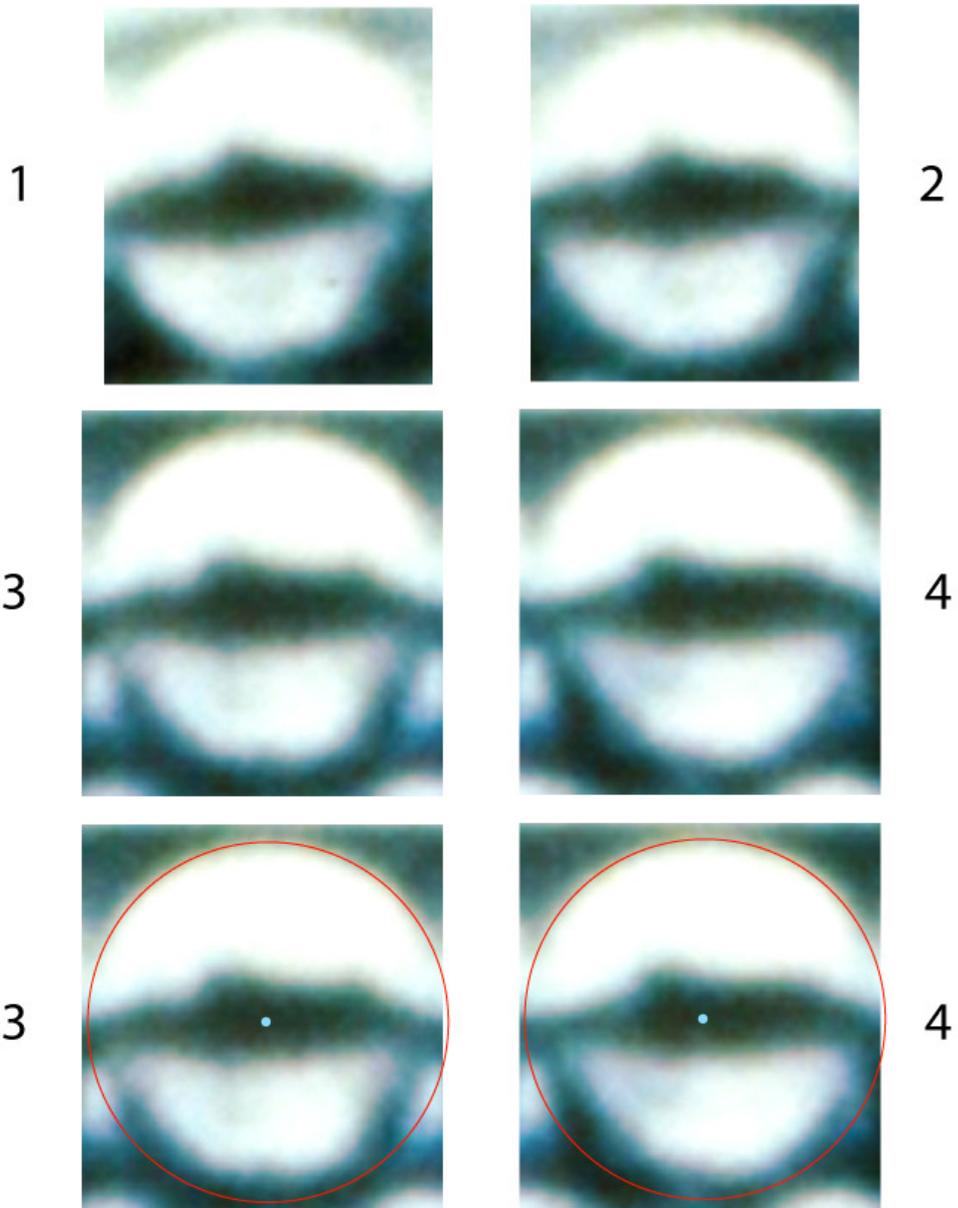
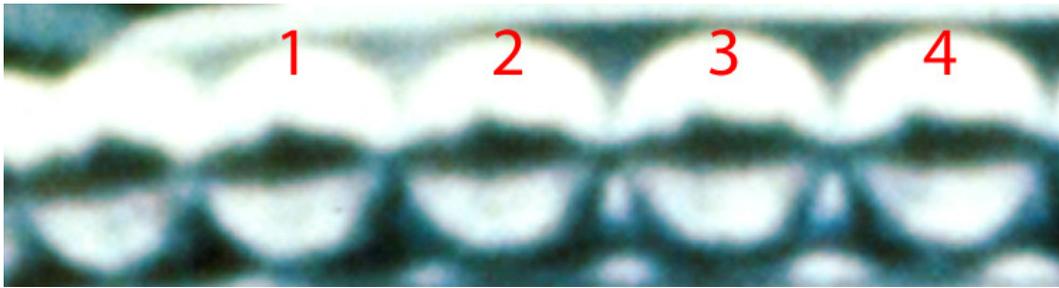


Figure F5 – Stereo pairs, #834. Blue dot in the bottom row is the camera location, at the center of each sphere. A closer tree top is visible in the middle a bit to the left of center. The camera was behind this tree.

## WCUFO on the tree tops

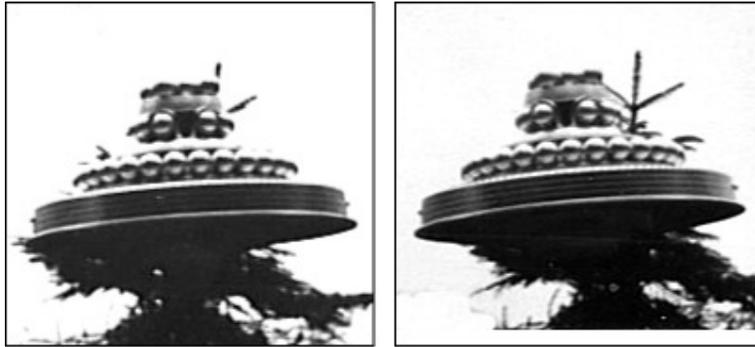


Figure F6 – A nice stereo pair formed from the photos of figure 25-II and 25-III, respectively left and right. Both images were resized to a similar size in the photos. The branches from the nearest tree, and a distant mountain were excluded. The tree behind is not far away from this UFO.

## Simulation of photo #800

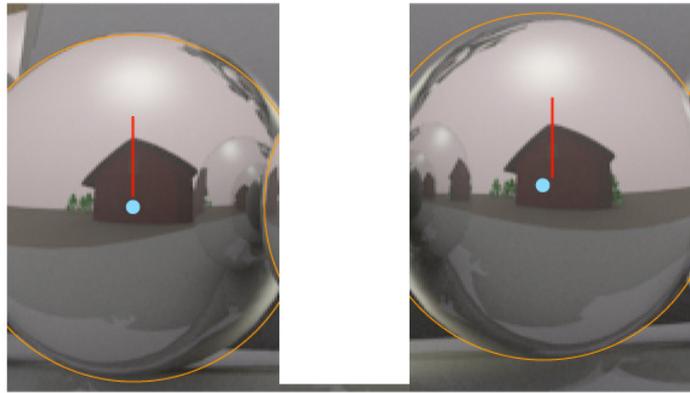


Figure F7 – Stereo pair from the computer simulation of photo #800. The UFO in this simulation is a small model at 5 m from the carriage house. Note the blue dot (the camera) is closer to you than in figure F2, where from photo #800 the blue dot remains up against the carriage-house wall.

Can anybody create such stereo pairs? Yes, you just have to find good illustrations in a book, take close photos, increase contrast and brightness, and construct your pair. For example, for photo #834, there is a good reproduction in *Through Space and Time* (Tulsa, OK: Steelmark LLC, 2004), page 25; or *Zeugenbuch* (Schmidrüti, Switzerland: Billy Eduard Albert Meier, FIGU, 2001), page 271.