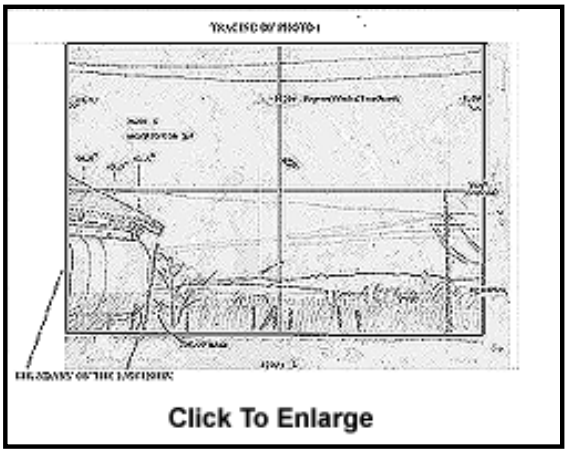
Papers

The McMinnville Photos

NOTE: The main text of this paper was started in 1977 and completed in 1981 and then submitted to the Center for UFO Studies (CUFOS) for presentation at the Second CUFOS UFO Symposium. The intent of this paper was to supplement the previous paper on the Trent photos, "On the Possibility that the McMinnville Photos Show A Distant Unidentifed Object," published by CUFOS in the Proceedings of the 1976 CUFOS Symposium. For various reasons this and the other papers presented at the Second CUFOS Symposium were not published until 1989 in the "Spectrum of UFO Research." Therefore, the previously published version includes the Addendum (1984) which provided further information on the analysis and further testimony regarding the Trents. Some modifications, clarifications and and additions to the original text have been made in April and May, 2000 and are designated by "(NOTE 2000:....)" . An Addendum (2000) has also been added to bring the status of the Trent case up to date (as of my own site visit to the "remains" of the Trent farm, May 11, 2000!)

I. INTRODUCTION

On June 8, 1950 the local newspaper in McMinnville, Oregon (USA) published two photos of a "flying saucer" which had been taken by a farmer, Mr. Paul Trent. There was also a brief description of the sighting of the object by the farmer and his wife. Copies of the photos are presented in Figure 1 and Figure 2 shown below.



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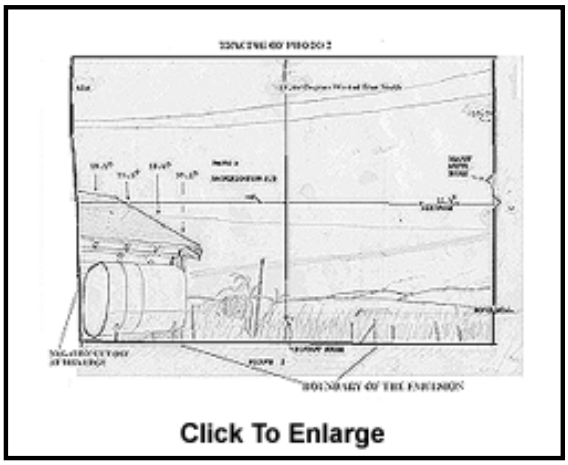

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(NOTE 2000: see the photos associated with the previous paper.) Several other newspapers published reports of the Trent sighting based upon independent interviews and an International News Service (INS) newswire story about the sighting. The INS also obtained the original negatives, which were never returned to the Trents (nor did INS pay for the photos). The Trent photos subseqently appeared in many UFO books and articles. (NOTE 2000: as of the year 2000 the Trent photos have been published hundreds of times in newspapers, journals and books worldwide.) They achieved a unique measure of official recognition in 1968-1969 when the "Condon Report" (1) was published. In the report of that Air-Force funded study at the University of Colorado the photoanalyst, Dr. William Hartmann, stated that the photographic and verbal evidence in the Trent case was essentally consistent with the claim of the witnesses that "...an extraordinary flying object... tens of meters in diameter and evidently artificial, flew within the sight of two witnesses." Despite this strong endorsement, Hartmann admitted that a hoax could not be positively ruled out. (NOTE 2000: this was the first scientific analysis of this sighting even though the photos had been available for study for 17 years as 1967.)

Several years later an investigation by Philip J. Klass and Robert Sheaffer (2) argued that the photographic evidence used by Hartmann (1) was not conclusive and that, furthermore, there seemed to be some discrepancies between the photographic evidence and the witness' story. Moreover, the stories published in the newspaper accounts seemed to be inconsistent with what Klass would have expected if the story had been true, leading Klass to indicate that the photos were probably a hoax. After seeing the analysis of Klass and Sheaffer, Hartmann revised his opinion: "I think Sheaffer's work removes the McMinnville case from consideration as evidence for the exstence of disklike artificial aircraft...(and it) proves once again how difficult it is for any one investigator...to solve all the cases. Perhaps no one has the experience for that because there are too many phenomena and methods for hoaxing."(2)

My subsequent investigation (3, 4) of the original negatives confirmed Hartmann's original conclusion about the excessive brightness of the bottom of the image of the Unidentified Object (UO) and eliminated the claim (2) that there was a relatively long time lapse between the photos. Dr. Robert Nathan, at the Jet Propulsion Laboratory in Pasedena, CA (NOTE 2000: now retired), also searched for, and failed to find, indications of a suspending thread. (NOTE 2000: in recent years the original negatives have also been studied by interested persons at the Los Alamos National Laboratory in New Mexico and also at the Brooks Institute of Photography in Santa Barbara, CA. None of these independent investigations has turned up evidence of a hoax.)

At the same time I was carefully studying the original negatives and improving upon the photometric analysis of Hartmann and Sheaffer (between January 1974 and November, 1977, when the first version of this paper was written), I carried out an intensive investigation into the background of the sighting and into the subsequent developments . (NOTE 2000: I continued the investigation into the early 1980s and again in the late 1990's, long after the original version of this paper was presented at the 1981 CUFOS conference. Pertinent results of those investigations are included in this presentation.) I have concluded, from communications with many people who have talked to the Trents, that no one who has met them personally would believe that they would think of creating any hoax or perpetrating a hoax as successful and long lasting as their flying saucer report. Dr. Hartmann, who interviewed them in 1967, was convinced of their veracity (1). However, as mentioned above, he later changed his mind (2,6) after reading Sheaffer's analysis (7). I have further concluded, contrary to the opinions expressed in Reference 2, that it cannot be proven from either verbal or photographic evidence that the case was a hoax. Instead, the available verbal and photographic evidence indicates that the sighting was not a hoax. (NOTE 2000: Evelyn died in 1997 and Paul in 1998. They were last interviewed in 1995 by Terry Halstead for a video documentary. They repeated their story once again and avowed that it was the truth.)

II. DATE OF THE PHOTOS

The "classical" date, as reported in the initial newspaper stories (8,9,10) is May 11, 1950, which was a Thursday. That date is accepted here despite the seeming contradiction between the weather reported

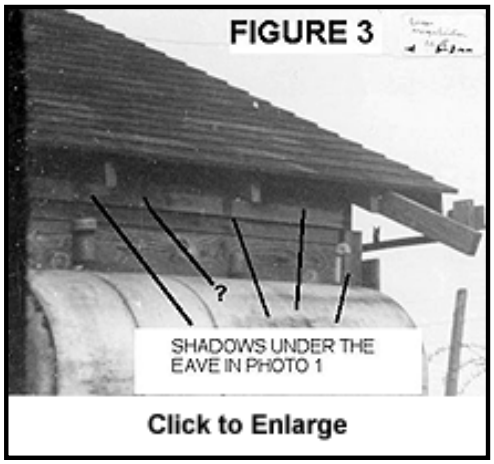
in a newspaper story (sky overcast at 5000 ft (10)) and the McMinnville Airport weather report (mostly clear sky (11)) or a sky that is uniformly overcast. (NOTE 2000: although the only source for the date is the Trent's themselves, there is nothing to contradict their claim.)

III. THE TIME OF DAY AND SHADOW ANALYSIS

The initial newspaper reports placed the time at 7:45 PM (8,9) or 7:30 PM (10) local standard time. Mrs. Trent has repeatedly claimed to me that the sun had not yet gone down when the photos were taken (12). According to the Salem, Oregon Airport Weather Report (13), the sunset was about 7:30 PM (rather than 7:15 as reported by Hartmann(1)). A visible sunset would be consistent with the nearly clear sky reported for the evening of May 11. (NOTE 2000: there are hills to the west of the Trent farm. Hence the exact time when the sun would be below the local horizon could be different from the time of "official sunset.")

Klass and Sheaffer (2, 14) have pointed to the rather sharp-appearing shadows of the ends of the roof rafters on the east wall of the garage at the left side of each photo as proof that the photos were taken in the morning rather than in the evening. This proof is based on a simplified estimate of the required brightness of a cloud in the east to create shadows on east wall of a structure. Sheaffer concluded it was _physically impossible_ for a cloud to create the shadows such as those on the garage wall. Having rejected the evening as the time of the photos Sheaffer estimated that the actual time, assuming that the sun was due east of the garage wall, was about 7:23 AM PST when the elevation of the sun was about 25 degrees.

The shadows are illustrated in Figure 3, which is a highly magnified portion of the image of the garage wall shown in Photo 1. Klass has argued that the motive for saying that the photos were taken in the evening rather than in the morning (assuming a hoax) was to make the lack of reports from other farmers more plausible because, according to Klass, around 7:30 PM "most farmers have retired to their houses for dinner..."(2) However, by Klass' reasoning, the lack of reports from other farmers would also be explainable if the photos were not a hoax and an "extraordinary flying object" did fly by in the evening.

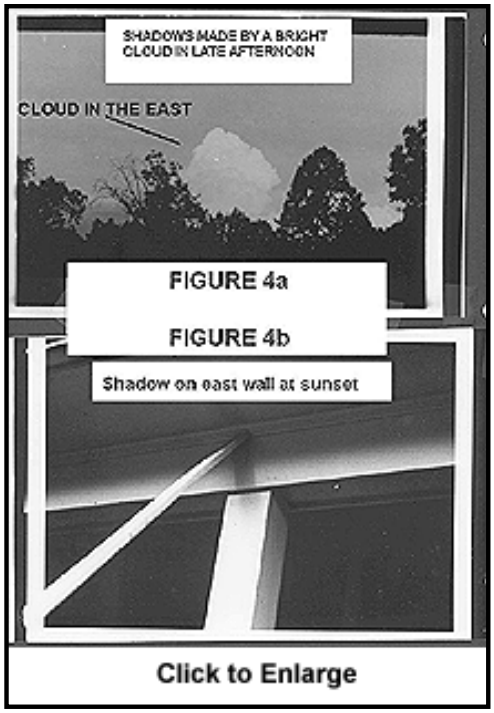


In order to determine whether or not the shadows could have been made by any source other than the sun, specifically, a brightly reflecting cloud east of the garage, I have (a) analyzed the shadow images to determine whether or not they are consistent with shadows caused by the sun and (b) observed and photographed shadows made by bright clouds in the east at sunset. These two approaches to the problem have shown that it is _physically possible_ for a cloud in the east to cause shadows on an east wall at sunset and that the actual shadows on the garage wall are more diffuse at their edges than would be expected for sun shadows. Hence the possibility that a bright cloud in the east made the shadows on the Trent garage cannot be ruled out.

Regarding (a) above, careful densitometric measurements of the relative brightness variations of the edges of the shadows on the image of the garage wall using the original negatives. These measurements are outlined in detail in Appendix A. They show that the shadows under the edge of the roof are more diffuse than would be expected from morning solar illumination, even on a hazy day. I have made experimental measurements of brightness vs. position across shadow edges using a scanning apparatus outdoors during clear and cloudy days. The shadow on a surface was created as a simulation of the Trent garage shadows. (The shadow was created by a simulated eave; the shaded portion of the simulated wall surface was illuminated by skylight.) These measurements demonstrate that the effective angular size of the solar disk increases with an increase in cloud thickness. This is important because the effective angular size of the sun determines the width (or "thickness") of the "edge" of the shadow. I call this width the shadow gradient distance or "shadow gradient region." This

is the distance, measured perpendicular to the boundary line between the shaded and dark areas (i.e., perpendicular to the "edge" of a shadow), over which the amount of light on the surface (on which the shadow appears) goes from maximum brightness (direct sunlight outside the shaded area) to minimum (no direct sunlight; shaded surface). An increase in effective angular size of the sun increases the width of the shadow gradient region. The amount of increase in effective angular size is strongly dependent upon how the "effective angular size" is defined. In these experiments the measured widths of the gradient regions for various cloud conditions were used to define effective angular sizes of the sun. The experiments indicated that the effective angular size _may_ be as much as 2.5 to 3 times the actual angular size of the sun (0.53 degree) when clouds covering the sun are sufficiently dense that the brightnesses of shaded and unshaded areas differ by only 1% or less. By comparison, the width of the gradient region of the shadow under the edge of the roof of the Trent garage is 10 or more times greater than one would expect if the shadows were made by the unobscured sun (see Appendix A) . Even if one assumes that the sun were partially obscured by clouds so that the contrast in brightness between fully illuminated and fully shaded areas agrees with the contrast in the Trent photos, the width of the garage shadow gradient region is 4 or more times greater than expected if the (partly obscured) sun were the source. Thus the horizontal shadow data (the "edge" of the horizontal shadow of the roof) indicates that a source with an angular size in the vertical direction that was much larger than the angular size of the sun was east of the Trent garage when the photos were taken.

Besides the horizontal shadow under the edge of the roof there are also shadows of the ends of the roof rafters. Sheaffer analyzed these shadows and concluded that the angular size of the source might be more than 1 degree in the horizontal direction. (7) Scanning densitometer data from these small images are sufficiently noisy to be somewhat equivocal on the angular size of the source in the horizontal direction, but they appear to indicate an angular size in the range 3 to 4 degrees. Taken together, the widths of the "edges" of horizontal and vertical shadows suggest that the light source may have had an angular size of more than 5 degrees in the vertical direction and 1 to 4 degrees in the horizontal direction. Thus the shadows seem inconsistent with what would be expected if they were caused by the sun.



As explained in Appendix A, one does not expect the edges of shadows made by the sun to be noticeably diffuse, even when the sun is partly obscured by clouds. An alternative source of light of relatively large angular size would be an brightly reflecting cloud east of the Trent garage at sunset. In order to resolve the question of whether or not a cloud could produce such shadows I first carried out a theoretical investigation making use of sky and cloud brightness data. Although the investigation was not conclusive, it did indicate that shadows such as appeared on the Trent garage might occur if a brightly reflecting but not too large cloud were optimally illuminated. Conclusive evidence that clouds can produce rather sharp shadows was obtained in Maryland in the summer of 1977, and is presented in Figures 4a and 4b. One evening I observed a cumulous cloud east of my house which made shadows of the edge of the roof at sunset. As quickly as possible, I obtained my camera and photographed shadows of the edge of the roof and also of a board which I leaned against the house. The cloud which produced the shadows was not particularly bright and had an angular size of about 5 or 6 degrees in diameter. Unfortunately the cloud had dimmed somewhat by the time I got the camera and began taking photos of a board leaning against the wall under the eave shown in Figures 4a and 4b. I believe that, had I been able to take photos when I first noticed the cloud, the shadows would have been more distinct and sharper.

The cloud made shadows which appear to be quite sharp, as do the shadows on the Trent garage. In an earlier "sighting" of cloud shadows (during the late summer of 1976 when I had no camera available) I observed shadows made by a cloud that was about 2 to 4 degrees wide by about 8 to 12 degreees high (estimated by the "finger technique.. ...a finger at arm's length subtends an angle of about 2 degrees). This cloud, illuminated at sunset, was bright enough to make a shadow of my finger (3/4" wide) on the white surface of a car when my finger was about a foot from the car with no shading of a portion of the sky (no "eave"). This earlier sighting took place in Florida , while the photographic evidence was obtained in Maryland. I have since been informed of an observation of cloud shadows in San Francisco. (5) Thus it appears that, contrary to the opinion advanced by Sheaffer (7), it is physically possible for illuminated clouds to make shadows similar to those on the Trent garage wall. (NOTE 2000: several other people have mentioned seeing such shadows since the preceding statement was written.)

Having shown that cloud shadows can occur, it would now be necessary to demonstrate that there was a brightly lit cloud east of the Trent garage at about 7:30 P.M. on May 11 , 1950. This is, of course, is impossible to do (without resorting to the shadow data in the Trent photos). However, the weather reports for both McMinnville and Salem, Oregon indicate that there were cumulous clouds in the area during the afternoon of that day. Both of these weather reporting stations are east of the Trent farm (the McMinnville station is northeast and the Salem station is southeast).

Besides the shadow data, there are also other brightness data in the Trent photos which suggest that the sun was not the source of light east of the garage. The brightness scale, to be described in a later section, is much lower than one would expect if the early morning sun at an elevation near 25 degrees were the light source.

The verbal testimony of Mrs. Trent also has a considerable bearing on whether or not the photos might have been taken in the morning. In many conversations (by phone) with Mrs. Trent I asked her questions which, I believe, she had never been asked before, at least not in relation to the UO photos. Some of these questions had to do with the daily activities of the Trents. Her answers were quite consistent during the three year period of our conversations. According to Mrs. Trent, she was "out feeding the rabbits in the yard alongside the garage" (9) just before she saw the object. (She said the same thing to Hartmann.) I therefore asked her, in several different conversations and in different contexts, when she fed the rabbits. She replied that she fed them in the morning before going to work (i.e. , before 8:00 AM) and in the evening. I also asked her what their usual morning and evening activities were "back in those days." She recalled that she and her husband would arise about 4:30 AM and take care of the animals in the barn (cleaning, milking, etc.). After finishing these chores and eating breakfast Mr. Trent would drive a truck from farm to farm collecting milk for transport to a local dairy. His "milk run" began between 5:30 and 6:30 AM, and he usually did not finish until after 10:00 AM, depending upon the number of farms he had to visit. Mrs. Trent pointed out that this milk run took place daily except under unusual circumstances (sickness, very cold weather). In the afternoon Mr. Trent worked at the Alderman berry farm . He would have been home in the evening after about 6:00 PM. (10,16,17,18)

Besides the farm chores, Mrs. Trent had to take care of her children (whom she left with her mother-in-law who lived several hundred feet west of them) before going to work at about 8:30 AM with a friend. She worked at a chicken cannery until late in the afternoon. Thus the daily schedule of the Trents strongly suggests that they would not have had time for perpetrating a photographic hoax in the morning. Moreover, their schedule indicates that Mr. Trent would not even have been home in the time frame suggested by Sheaffer.

Consider the following question: if it was a hoax, why did they do it at a very inconvenient time during the morning of a weekday when they had many other things to do in the morning? If it was a hoax they could have made the photos at any convenient time such as, for example, the evening.

Clearly the Paul and Evelyn were very busy people in those years. They had plenty to do besides

thinking of ways to create a photographic hoax to "prove" the Mrs. Trent had actually seen "flying saucers" three times before, as suggested by Klass(2). (Note: her previous sightings might have been misidentifications, as are the bulk of UFO reports. She also said she had seen some UFOs in the years following the photos but they were much farther away. Of course, if the original sighting had been a hoax, a very successful one at that, they might have easily taken more photos in later years, but they didn't.) If the Trents had publicized their photos widely and had tried to capitalize on their success one might be tempted to think that they had created a hoax for monetary gain. However, as pointed out by Hartmann, there is no indication that the Trents ever received any money for their photos, nor is there any indication that ever even tried to capitalize on their photographs.

IV. THE WEATHER

The last sentence of reference 9 states that the sky at 7:30 PM was "overcast at 5000 feet". Hartmann indicated that this sort of cloud cover was "confirmed" by the photos (1). Klass (2) obtained the McMinnville airport weather report and found a meteorological symbol which he interpreted as meaning "perfectly clear. Actually the symbol means "less than 10% sky cover," thereby allowing for the presence of some clouds within 5 - 10 miles of the airport and any number of clouds farther than 15 miles(19). (The airport weather observer is primarily interested in the cloud conditions near the airport where they could affect take-offs and landings.) The McMinnville airport is about 12 miles northeast of the former Trent farm. Another nearby airport, at Salem, Oregon, is about 17 miles southeast of the farm. The Salem airport at 7:28 PM reported altocumulus at about 12,000 ft covering about 10% of the sky and cirrus at 25,000 ft covering about 25% of the sky. Both airports reported cumulus clouds, which are puffy clouds with considerable vertical structure in the afternoon. The Salem airport indicated about 10% sky coverage with cumulus clouds at about 3000 ft from 12:28 PM to 3:28 PM. According to various residents of the area with whom I have spoken, the weather conditions near the coast of Oregon are quite variable, so conditions reported by the airports may not have been exactly the same as conditions nearer the coast where the Trent farm was. Both airports reported a light (10 mph) wind blowing toward the east or northeast, and visibilities of 15 miles or greater.

For comparison, at about 7:30 AM PST, according to the McMinnville airport, the sky was "clear" (i. e., less than 10% sky coverage) . According to the Salem airport the sky was 40% covered with cirrus clouds at about 25,000 ft. Visibilities were in the 12-15 miles range and the wind was negligible. As Klass has pointed out, the McMinnville airport reported "smky" conditions, which is interpreted as meaning smoky or hazy. No such conditions were reported at the Salem airport, although earlier in the morning there was some ground fog near the Salem airport . The photos neither confirm nor deny the sky conditions given by the airports. The photos show a sky which brightens toward the west, but is otherwise quite featureless. As pointed out by Sheaffer (7), such a brightness distribution can be consistent with the sun being either in the east or the west because of the nature of the scattering of light by small particles and molecules. There does appear to be a sort of haze over the distant mountain tops. This seems to be a real image rather than a fault in the development of the negatives . The "haze layer" does not have much contrast with respect to the sky, but it does appear slightly darker than the sky. Whether this is a relatively nearby haze or a distant, very thin cloud cannot be determined. However, if this were a distant cloud being illuminated by the sun in the east, one might expect it to appear brighter than the surrounding sky rather than darker, since water drops scatter light more stongly than clear air. On the other hand, if the source of light were in the west and the light were therefore coming through a thin cloud or haze layer, then less light would get through where the cloud is thickest and this could make the cloud appear darker than the surrounding sky.

Because the photographs can no longer be used as positive proof that the photos were taken in the morning, and because the daily activities of the Trents made it unlikely or impossible for Mr. Trent to have taken the photos at about 7: 30 AM., it appears that the weather conditions at the time of the sighting were those conditions prevailing at about 7:30 P.M. on May 11,1950.

V. THE SIGHTING

According to the original sources, Mrs. Trent had been feeding the rabbits which were in a cage located south of the house and at the east side of the southern garage wall (1, 8,9,10,12,20) (Hartmann's report is considered to be an original source since he actually interviewed the Trents) . She had just started walking back toward the house when she first saw the object. She yelled to Mr. Trent who was in the house (1,9,10) and they both scrambled to find the camera (see footnote 60). As soon as they found the camera Mr. Trent ran into the back yard south of the back door of the house and, looking toward the northwest, he saw the object moving southward. (NOTE 2000: it is likely that he heard her yell from the back yard, found the camera and went running out to approximately where she was standing and then he saw it and took the pictures from there.) Holding the camera at stomach or chest height and looking down into the viewfinder he took two pictures, pausing between pictures only long enough to wind the film in the camera. Available verbal and photographic data indicate that he took the photos from locations about 20 feet south of the house and 30 feet east of the garage. Because the object was moving southward he moved several feet to his right and a foot or so eastward to take the second picture. Both of the Trents also saw Mr. Trent's father and mother on the back porch of their house about 400 feet west of their house (9). They yelled to the in-laws to look and Evelyn ran into her house to call Paul's father and mother on a private telephone line. (9) According to Evelyn, there was no answer on the phone so she ran back into the yard in time to see the object vanishing in the west. Paul's mother had apparently gone into the house, probably to answer the phone, because she was no longer on the back porch of the other house when Evelyn came back outside. Apparently Paul's father heard Paul and Evelyn yelling and looked westward in time to see a distant shiny object fading into the distance (21, 22, 23). Paul and Evelyn think that Paul's mother may have seen the object, but they are not sure (25). During the interviews with reporters the Trents did not mention that Mr. Trent's father had also seen the object because they did not want his parents to be bothered by reporters, especially since Paul's mother was sick with cancer at the time. (25)

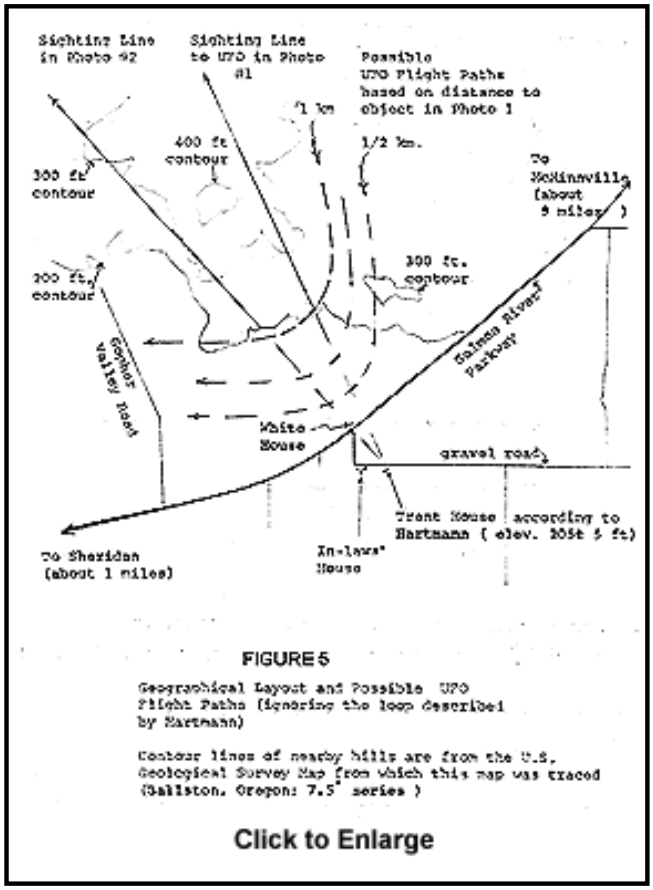


FIGURE 5

Geographical Layout and Possible UFO Flight Paths (ignoring the loop described by Hartmann)

Contour lines of nearby hills are from the U.S. Geological Survey Map from which this map was traced (Dallston, Oregon: 7.5' series)

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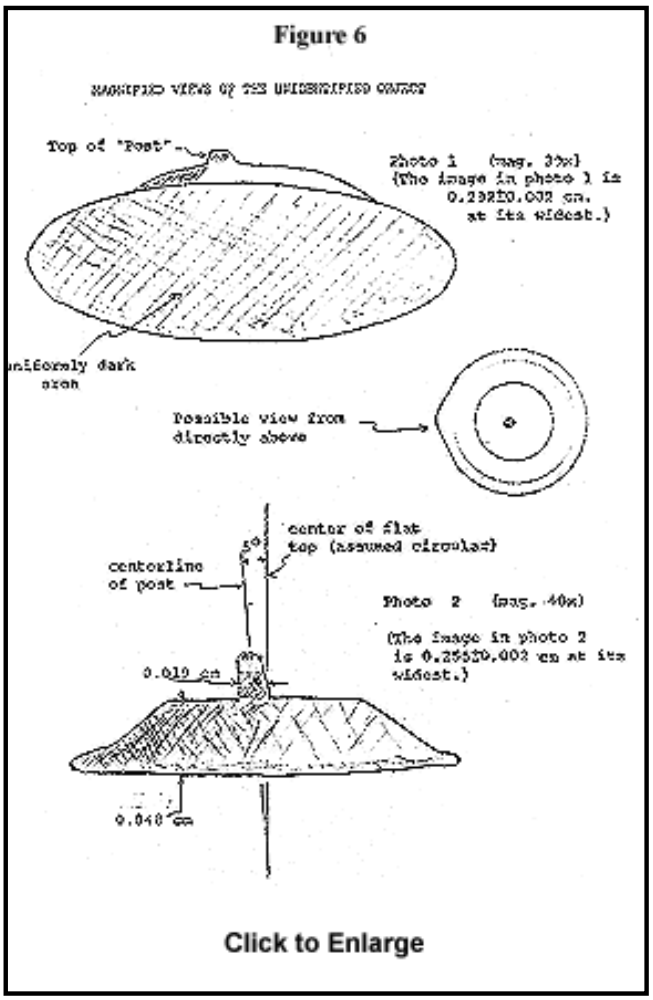
VI. THE FLIGHT OF THE OBJECT

All the original sources of information agree that the object approached from the north-northwest at a rapid rate of speed. An estimated path of the object is illustrated in Figure 5. This map is based on the general approach and departure directions and also upon Mrs. Trent's statement that it never actually-passed over their farmhouse but rather that its point of closest approach may have been near the distant farmhouse that appears in both photographs. (26) That farmhouse is on the west side of the Salmon River Parkway according to Hartmann (1). During an interview with Dr. James McDonald in 1969 Paul said that the object might have been a thousand feet away but certainly no closer than 400 feet (24). Hartmann included a loop in the flight path of the object, probably as a result of talking with Paul Trent. (Evelyn didn't mention a loop to me. However, if she ran inside to call her in-laws she might have missed a loop in the flight path. I never talked to Paul because he didn't like to talk on the phone because of his hearing problem so I didn't have any information directly from him about the flight path.) This suggests that the flight path may have been more complicated than the path illustrated in Figure 5. Mr. Trent reported that the object climbed rapidly during departure and that he didn't have time to run around the garage to see it and photograph it once more. According to reference 9, he found his camera and "took two shots. During

this time the object moved across the horizon through an arc of about 15 degrees according to her description." (Note: this quantitative estimate was probably made by the reporter who interviewed Mrs. Trent for the newspaper article rather than by Mrs. Trent herself.) This quantitative estimate of the angular motion of the object across the western sky is surprisingly close to the actual angular displacement (change in direction) as determined by comparing the sighting directions in the two photos. The sighting direction to the UO in photo 2 is about 17 degrees to the left of the sighting direction in photo 1. (Mrs. Trent would have had to be quite lucky to have described a flight path that would have given about a 17 degree spacing between sighting lines if the object had actually been a small model hanging under the overhead wires, as suggested by the hoax hypothesis of Klass and others (1,2,7).)

VII. THE UNIDENTIFIED OBJECT

The elliptical shape of the image in photo 1 suggests that the Mr. Trent photographed a circular object seen from below and to the side (an oblique view). The witnesses described it as "bright, almost silvery" (8) or "brightly metallic, silver or aluminum colored, with a touch of bronze"(9). When Hartmann interviewed the Trents in 1967 they repeated their general descriptions, adding that it seemed silvery on top and more bronze on the bottom, that it was "shiny but not as bright as a hub cap", and that it resembled a dull, aluminum painted tank ."(1) These descriptions are consistent with the brightness distribution of the images in the photographs. The bottom of the image in photo 1 is clearly darker than the image of the top part, but probably most of this darkening results from the fact that the lower surface is shaded from the sun. There is some indication that the left edge of the object as seen in photo 1 is not a perfectly round contour, but may actually be more pointed, as illustrated in Figure 6. Figure 6 contains tracings of 40X blowups made by Hartmann. At such large magnifications the fuzziness of the edges of the images becomes apparent, and therefore the solid boundary lines in the figure indicate only the apparent edges of the image. To within the accuracy of the photographic medium, it appears that the left edge is not perfectly circular. A small drawing illustrates the outline as seen from above which would be consistent with the photos. The blowup of photo 2 shows, again to within the accuracy of the photographic medium, that the right and left edges are not identical. Moreover, the "post" on the top is not centered (it is slightly to the left of center) and it tilts slightly to the left. In both the tracings of photo 1 and photo 2 the density of crosshatch lines is intended to indicate the relative darkness of the surface. The post tilts to the left at an angle of about 5 degrees. It is not uniformly bright. It appears darkest near the main body of the object and at two small regions ("dots") near the top. These dark dots at the top are also seen in photo 1, just barely protruding above the main body of the object.



The length of the elliptical image in photo 1 is 2.92 mm and in photo 2 the length is about 2.55 mm. The thickness (vertical dimension) in photo 2 is about 0.48 mm. Assume that Mr. Trent was standing roughly 16 ft from the nearby electrical wires which appear at the top of each photo. Since the camera focal length was about 103 mm (27), if the object were a small circular model UFO hanging from the wires at the time of photo 1 the size would have been about (2.92 mm/103 mm) x 16 ft = 0.45 ft = 5.4". On the other hand, if it were at a distance of about 1/2 km (not a hoax!; see Figure 5) it would have been about 14 m in diameter. The thickness, using the vertical measurement from photo 2 , would have been about (0.48 mm/103) x 16 ft = 0.074 ft = 0.95" if under the wires and about 2.3 m if at a distance of 1/2 km . The diameter of the pole would have been about 0.38" if at a distance of 16 ft, and about 0.92 m if at a distance of 1/2 km. (NOTE 2000: during a re-investigation in the year 1999 it was determined that the camera was of a type - see below - which had a rated focal length of 100 mm rather than the 103 mm assumed in 1977 when this paper was written. Hence the calculated sizes should be increased by 3%, an amount which is comparable to the "noise" in the dimensional measurements themselves because of the natural diffuseness of the edges of photographic images, even when well focused, as these are.)

VIII. ANALYSIS OF THE PHOTOGRAPHS

A) Resolution

The photographs were taken with a Kodak Monitor or Vigilant type of camera (the original camera was lost years ago) which had either a f/4.5 or f/6.3 (the least expensive) lens. The rated focal length with the bellows extended and locked was 103 or 105 mm. (I have used 103 mm (27).) (NOTE 2000: through the joint efforts of Brad Sparks, David Silver [President of the International Photographic Historical Society], Terry Halstead and Joel Carpenter in 1999 it was determined that the camera was actually a "Roamer 1" built by the Universal Camera Corporation rather than a Kodak type which had been assumed during the early analysis. The focal length for this type of camera was about 100 mm. The minimum f-stop was 11 and the shutter was fixed at about 1/50 second.)

The camera was evidently well focused, and perhaps a large f# was used (like f#22), since distant telephone wires can easily be seen in the photographs. The most distant wires were probably over 60 m away. Using a wire diameter of about 0.6 cm (1/4"), the angular width of the distant wires would have been about 0.0001 radians . Experiments with detection of small linear structures (e.g., threads) by photographic means indicate that if there is sufficient contrast between the structure and the background a linear image structure much smaller than the grain size of the film can be detected. Since the grain size of the film used by the Trents was on the order of 5-10 microns, linear structures with images as narrow as 1 micron might be detectable, corresponding to angular sizes of about 0.001 mm/100mm = 0.00001 radians (where 1 micron = 0.001 mm). This would correspond to a thickness of about 0 .05 mm at a distance of 5 meters (about 16 ft) , which would have been the distance to the

object if it had been hanging under the overhead wires. A typical thread is about 0.03-0.06 mm in diameter.

Images comparable in size to the film grain are very "bumpy" or rough. The film grain accounts for a portion of the blurring of the edges of the images in the photographs. This blurring is especially apparent in high -power blowups of images . Other contributers to image blur are diffractive ("MTF") effects and perhaps a slight amount of imperfect focus or motion blur. Nevertheless, in spite of the slight blurring effects, it appears that the photographs should have been able to detect a linear structure as small as a thread under the illumination conditions prevalent at the time if the thread had a high contrast relative to the background sky, for example if it were either black or white, but not if it had been color matched to the sky. No such structure has been found in any analysis of the photographs.

B) Photometric Estimate of the Distance of the Object

The relative brightnesses of various objects appearing in the photographs allowed Hartmann to estimate the distance to the object by making some assumptions about its intrinsic brightness or reflectivity (1). (The photometric analysis of Hartmann was criticized on fundamental grounds by Sheaffer (2,7,14) and myself (27). Hartmann noted that the image of the bottom of the object in photo 1 (i.e., the dark elliptical image), which was presumably shaded from skylight, was nevertheless brighter than any of the other shadows in the photo. He then argued that the excessive brightness would be consistent with an object that had an intrinsically dark surface (i.e., appears dark when viewed close up and is not a source of light) but which was at a considerable distance from the camera. Light scattered by the atmosphere between the camera and the object could increase the _apparent brightness_ of the surface (the apparent brightness is the brightness that it appears to have when viewed over a long distance). He used a simple formula (the "contrast reduction formula" based on exponential extinction in the atmosphere) that relates intrinsic brightness, apparent (i.e., photographic) brightness and object distance to predict the distance for various assumed intrinsic brightness levels of the bottom surface. His calculations led to an estimate of about 1 km to the object in photo 1, even if the bottom of the object were as intrinsically bright as one could expect for a maximally diffusely reflective surface, that is, for a white bottom. If the bottom were intrinsically darker than white (say, bronze colored, as reported by the witnesses) the calculation implied an even greater distance. (NOTE 2000: in my calculations I assumed a white bottom, thereby biasing the result toward the hoax hypothesis of a neaby object.) Sheaffer was the first person to point out that veiling glare could account for the excessive brightness of the bottom (2). I undertook a study of veiling glare and published a rather comprehensive paper on the subject (with no reference to the McMinnville photos) in a technical journal (28). During the study I determined how much veiling glare would have added to the brightness of the UO image so that I could subtract the veiling glare leaving the true image brightness. I also discovered a factor not accounted for by either Sheaffer or Hartmann which affected the estimate of the intrinsic brightness of the bottom surface of the UO. The complete details of the revised calculation were published in ref. 4, along with the conclusion that, if the bottom surface were white but not itself a source of light, the object would have been about a kilometer away. This calculation has not been challenged.(14) However, as I pointed out (4), this does not prove that the object was distant, because the bottom surface could, possibly be a source a light. The uniformity of the brightness distribution and the small size of the object (if hanging under the wires) would rule out an internal source of light such as a small light bulb. However, if the hypothetical model UO were translucent, light from the sky or from the source which produced the shadows could travel through the UO and out the bottom, creating an excessively bright bottom. Experiments with simple paper models under illumination conditions such as prevailed at the time indicated that a simple paper model might not yield a sufficiently constant brightness bottom (the bottom surface closest to the light source would be brighter than the portion of the bottom farthest from the light source) . However, the experiments did not rule out the possibility that a model might be constructed out of some material in such a way as to create a uniformly bright bottom. The general conclusion from the photometric analysis of the UO is that the brightness is consistent with the witness' claim that the object was approximately over the distant farmhouse or farther away, as indicated in Figure 5. The photometric analysis did not, however, prove that the object was distant.

C) The Brightness Scale of the Negatives

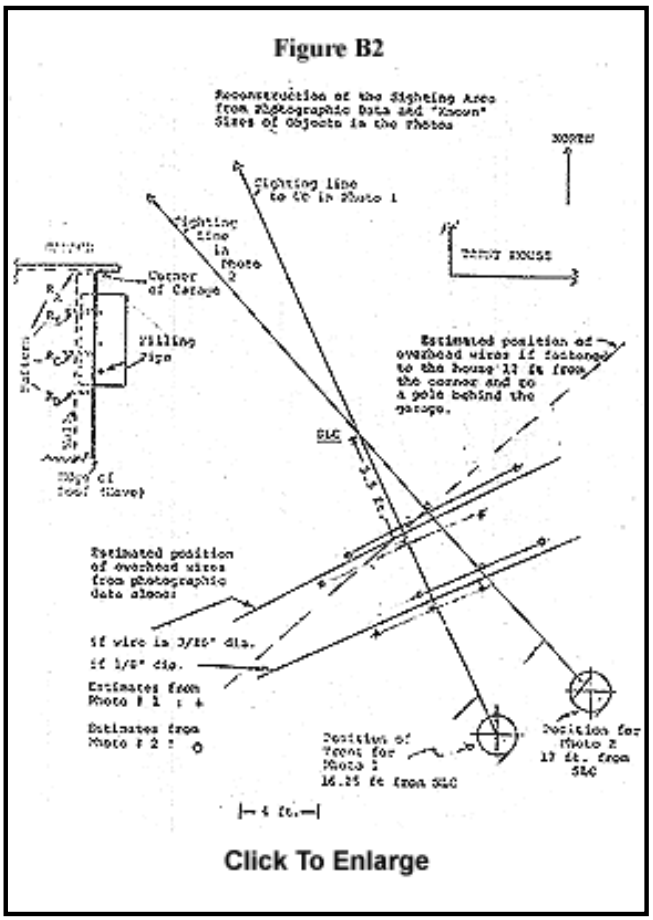
The most noticeable overall feature of the negatives is the apparent underexposure (Hartmann referred to the negatives as "thin"). The lack of high photographic density regions (regions of high brightness, such as the sky) suggests that the f stop setting was not correct for the amount of light available. (Another possible explanation for the "thinness" of the negatives which I considered (4) was that the negatives had been underdeveloped. However, a comparison of the "fog densities" - in regions of the film which had not been exposed to light - indicated that the film was developed at least to a film "gamma" rating of 0.4 , and probably to a gamma of about 0.6 to 1.0. Standard development procedure required that film be developed long enough to reach a gamma of 1.0) A quantitative measure of the degree of exposure of a film is called the brightness scale. The brightness scale is the ratio of the brightness of the brightest area of the photograph to the brightness of the most shaded area. In the Trent photos the brightest areas are in the image of the sky, and the darkest areas are in the image of the shadow under the nearby tank. (NOTE: if the sun in the east were light source one would expect the brightest part of the photo would be the reflection from the tank rather than the western sky.) The brightness scale for the Trent photos is about 13. This can be compared with the scale of 30 or more expected if this were a "front-lit" scene with the light source behind the photographer, i.e., if these photos were taken in the morning and the light source was the sun (e.g., the sun east of Mr. Trent and the garage wall). Jones and Condit (30) found that the brightness scale of front-lit scenes in which the sun was the source of light (clear days) ranged from 40 to 600. Even when the sun was largely obscured by clouds the brightness scale was greater than about 30. Thus the brightness scale of the Trent photos seems quite inconsistent with the claim that the source of light was the sun east of the garage. The low brightness scale would not be inconsistent, however, with the lighting conditions at sunset when there was a bright cloud east of the garage because the cloud would not change the brightness of the western sky , and because the generally uniform lighting near sunset would result in a low brightness scale for any photographs, regardless of the direction in which the photographs were taken.

If the photos were taken near sunset then the low overall exposure of the negatives is consistent with the hypothesis that Mr. Trent did not take the time to change the camera settings (shutter speed and f stop) from the values which were used when he took the previous pictures on the roll. According to Mrs. Trent the previous pictures were taken during bright daytime conditions (a snow scene and a picture of a tree in the front yard of his house (31)). Considering that the previous photographs had been taken during bright daytime conditions, it is probable that the camera settings were in the range f/16 to f/22 and 1/50 of a second when Mr. Trent photographed the UO. On the other hand, these same settings would probably not have produced underexposed negatives if the pictures had been taken in the morning when the sun was at an angular altitude of more than twenty degrees (32).

The rather low brightness scale and exposure level of the UO photographs indicate that the photos probably were not taken in the morning. On the other hand, the brightness scale and general exposure level of the photographs are consistent with the witness's claim that the photos were taken in the evening. Furthermore, they are consistent with the hypothesis that a bright cloud in the east could have produced the shadows on the garage.

D) Photogrammetric Analysis of the Nearby Model Hypothesis

Whereas photometry, discussed in the previous sections, is a study of relative brightnesses of objects, photogrammetry is a study of the relative angular sizes and relative directions of the various objects in the photographs. Photogrammetry and photometry are therefore independent types of analysis (e.g. , an object of large angular size could have any relative brightness, and an object of some particular brightness could have any angular size). In the first chapter of ref. 1, Dr. Edward Condon rejected the Trent photos on the basis of a comment by photoanalyst Dr. Everitt Merritt who said the photos were "too fuzzy to allow worthwhile photogrammetric analysis."(33) However, Merritt's statement did not justif'y Condon's implication that Hartmann's photometric analysis was wrong or not useful. In his summary Condon never mentioned Hartmann's conclusion . He only referred to Merritt's comment. This may have been a deliberate attempt to confuse the lay reader and thus to "hide" Hartmann's conclusion. I'm sure that Dr. Condon knew the difference between photogrammetry and photometry. Perhaps he hoped that the lay public wouldn't know the difference.



The main intent of the photogrammetric analysis, apart from the simple estimate of actual size of the UO from its angular size once a distance has been specified, is to determine whether or not the photographic evidence is consistent with the hypothesis that the UO was a model hanging under the wires. Attempts at a truly accurate photogrammetric reconstruction of the sighting have been hampered by a lack of data on the distance of the photographer from the garage wall, the exact location of the overhead wires, and the distance from the garage wall to the Trent house. (All of these measurements could have been made by Hartmann when he visited the site in 1967, but he made no measurements. Unfortunately several years after Hartmann's visit the former Trent farmhouse burned down, and several years after that the garage was torn down.) Nevertheless it has been possible to estimate the locations of the photographer and the overhead wires with some accuracy just from information contained within the photographs, combined with some educated guesses as to true sizes of objects near the garage. (NOTE 2000: the following analysis has been greatly improved by using aerial survey photos not available when this paper was written. Nevertheless it is being retained for historical reasons. The improved photogrammetric reconstruction of the scene is presented in the Addendum 1984 which follows Appendix B.) The analysis has considered the following questions: a) do the sighting lines cross underneath the wires and (b) is the ratio of angular sizes of the UO in the photos equal to the inverse ratio of distances of the photographer from the point where the sighting lines cross? If it were possible to show that the sighting lines crossed exactly under the wires, then one would have a rather unlikely occurrence if the UO were large and distant. Similarly, if the ratio of the angular size of the UO in photo 2 to the angular size of the UO in photo 1 were the same as the ratio of the distance of the photographer from the point of .intersection of the sighting lines when photo 2 was taken to the comparable distance when photo I was taken, one would have another rather unlikely occurrence if the object were distant. If both (a) and (b) occurred, the sighting lines crossed under the wires and the angular size ratio of the object equalled the ratio of distances to the sighting line crossover point, then the photogrammetric analysis would definitely point toward a nearby model rather than a distant object, since conditions (a) and (b) would be satisfied if a model were hanging under the wires, but would probably not be satisfied of the object were large and distant. The details of the analysis are presented in Appendix B. I have specifically pointed out the difficulties with the analysis in the absence of dimensional data. However, several attempts at reconstructing the area of the sighting such as is indicated in Figure B2 have yielded similar answers to questions (a) and (b) : the sighting lines do not cross under the wires and the object size ratio does not equal the photographer distance ratio. Of course, the failure to prove that the sighting lines cross under the wires and the failure to prove that the size ratio is the same as the distance ratio does not mean that the photos cannot be a hoax. If the UO were swinging toward and away from the photographer in a pendulum- like motion, or if the hypothetical suspension of the UO were moved along the wire between photos, the sighting lines would not cross under the wires and the two ratios would not be equal. Thus the most definitive answer I can give about the photogrammetric test is that the test does not prove the photos are a hoax.

IX. EVENTS FOLLOWING THE DATE OF THE PHOTOGRAPHS

The history of the Trent photos is quite long and complicated. Some specific details will be presented later, but first let me summarize the history as told to me by Evelyn Trent in numerous conversations. After the photos were taken the Trents waited about three days (until Mother's Day) to finish off the roll of film (1,34). Then probably during the following week , they took the film to a local drugstore (1,8,35) to have it developed. It probably took a week or more for the film to be returned (35). The Trents showed the pictures to their family and some friends, and, in particular, to a boyfriend of one of Mr. Trent's nieces (12,36). This young man, Andy Horness, was in the Army and about to travel to Korea (he was killed on the way). He apparently took an interest in the photos and suggested that Mr. Trent take them to the local banker, Mr. Frank Wortmann, to find out if he might know what the object was. The banker, upon seeing the photos, called the local newspaper. A slightly different version of the story of how the banker happened to see the photos was revealed in a letter by Frank Wortmann to the late Dr. James McDonald. Writing to McDonald in 1969 Wortmann stated "It was several days later (i.e., after the photos were taken) that we heard of his picture, but he had not then had the film developed and we got him to have it cared for..." (37) Mr. Trent himself, in a phone conversation with McDonald in 1969, said "(We) didn't show (the pictures) around...(I) was talking to (my) local banker and he put it up in (the) bank window" (reconstructed from notes made by McDonald while talking to Mr. Trent on the phone (36)) At this late date it would be impossible to reconstruct the exact sequence of events that led to the publication of the photos. On the same day that the banker heard of the photos (June 7, 1950), Bill Powell, the reporter for the local newspaper was contacted. He went to the Trent farm and interviewed the Trents at length (35). He also obtained the negatives which the children were playing with (he found them under the sofa). Trent was reluctant to release the negatives for publication because he was afraid he would get into trouble with the government. (35) He apparently thought that he had photographed some secret military device. However, Powell apparently convinced Mr. Trent that there would be no problem. The interest of Mr. Horness, who was in the Army, may also have had an effect on Trent's point of view. In one newspaper interview, when asked why he had delayed so long before saying anything about the photos, Trent responded that he was "kinda scared of it" . He then said " ...I didn't believe all that talk about flying saucers before, but now I have an idea the Army knows what they are." (10)

Powell took the negatives back to the newspaper office and studied them as carefully as he could. He told me he "blew them up every which way" and couldn't figure out how the Trents might have faked the pictures. (35) He could find no evidence of tampering with the negatives, so he made large blowups of the complete negatives and published them on the front page of the newspaper along with a brief story. This appeared in the June 8, 1950 issue of the paper. It was at this point that the long Trent photo "saga" truly begins.

The clarity and detail of the photos combined with the public testimony of the banker that the Trents were honest people and with the statement by Powell that he could find nothing wrong with the photos (Powell was _very_ convinced that the Trents would not have been able to carry off a hoax of this nature(35)) made the photos instant celebrities. By the tenth of June the Trents' story was carried by the International News Service (INS) and was circulated throughout the USA and the world. Apparently the INS news story was based on a second interview carried out by a reporter for the Portland paper, Lou Gillette. Life Magazine became interested and included the pictures with a very short story of the sighting. Powell gave the negatives to Life with the understanding that the negatives would be returned to the Trents (who were never paid for the use of the negatives). The Trents also accepted an invitation to appear on a TV show, "We the People," which was produced in New York City. While on the show the Trents resisted efforts by the show staff to make statements which they, the Trents, considered unfounded. (1) They were also supposed to receive their negatives after the show, but the negatives were not returned.(1,12) The negatives were subsequently "lost" in the files of the INS in 1950, and were only found again as a result of the efforts of the Colorado University investigation (Hartmann) in 1967.(1) The negatives were in the files of the United Press International which had bought INS. After the Dr. Hartmann finished with the negatives he returned them to the UPI. However, since the Trents had never been paid for the negatives, Philip Bladine, the editor of the McMinnville News Register (he was also the editor in 1950, when the paper was called the Telephone Register) wrote to UPI on behalf of the Trents to obtain the photos. UPI sent the negatives to Bladine in 1970. When I called Bladine in 1975 to find out if he could help me located the negatives he told

me they were on his desk! He had had the negatives for about 5 years, but hadn't informed the Trents! (I subsequently arranged with Mrs. Trent to borrow the negatives for research. In return I sent her excellent prints and copy negatives so she could make her own copies.)

In retrospect it probably a good thing that the negatives were "lost" between 1950 and 1967 because they were well protected during that time, and therefore the photographic information was minimally degraded. Also, in retrospect, it is interesting to contemplate the amount of money which UPI may have made off the Trent photos, which must have appeared in hundreds or thousands of UFO publications since 1950, while the Trents received nothing but trouble and harassment (crank phone calls, letters, etc.) whenever their photos appeared in widely circulated publications. (According to Mrs. Trent, over the years they received phone calls, letters, and direct visitations from people who called them liars, hoaxers, and other uncomplementary names. They have also been contacted by "true-believers" and saucer "nuts". In my opinion she maintained a remarkable degree of equanimity in the face of all this notoriety. In all the conversations I had with her she never once referred to the object as a flying saucer, nor did she try to convince me flying saucers exist, nor did she say, anything about alien contact, space brothers, or any of the saucer-related extraterrestrial mumbo jumbo which we sometimes hear from people whose sightings have become famous.)•

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