UFO Contact from the Pleiades
A Preliminary Investigation Report

The following is a reprint of information contained on pages 266 –284 of *UFO Contact from the Pleiades-A Preliminary Investigation Report* by Lt. Col. Wendelle C. Stevens (USAF, Ret), with information from the lead photo investigator, Jim Dilettoso on pages 380 - 400. Wendelle was the lead investigator in the original investigation of the Billy Meier case from the late 70's to the late 80's. His work was also published in *UFO Contact from the Pleiades -A Supplementary Investigation Report*.

Photographs of Spacecraft

by Wendelle Stevens

A selection of photographs of the spacecraft taken by Eduard Meier and his friends are shown here. Mr. Meier has taken over 800 color photographs of these spaceships. He does not carry his camera on his later contacts unless instructed to do so. Representative pictures from each series are shown. There are often more pictures in each series than those shown here.

Photographic Analysis

When we began to perceive that the large amount of evidence we were already aware of was only the tip of the iceberg we went to Switzerland to investigate the witnesses personally and to check out the sites of these remarkable UFO photographs. We had to see how this could have been accomplished by a one-armed man alone. We had been advised by this time dial there were others who had also photographed the same spacecraft and we wanted to verify that and see their pictures.

On site we took the pictures and matched every one up with the scenes, and identified every point from which each photograph was made, observing sequence and order of the successive film frames. We measured identifiable distances in appropriate pictures and carefully recorded them. We had our own pictures made on she, from the distances estimated for the positions of the spacecraft, for later comparative reference.

We viewed surviving traces of the landing tracks made as much as 3 years earlier, and verified their positions with respect to the earlier photographs when the marks were fresh. We talked to those who took time lapse photographs of the ageing marks and recorded what they observed.

We checked the exposed film through its processing routing stages and verified the processing logs, which showed that every roll of film received from Meier and his friends was developed and returned, mostly by mail. We were told, and witnesses supported this, that much of the exposed film, over 30% of it, never came back from processing. Our investigation showed that the disappearance must have taken place in the mail system — an unusually high loss rate for any public service, which in itself raises many questions.

Upon returning to Tucson, we began a search for advanced computer graphics technical capabilities available on the domestic market. We went to manufacturers and to users of these exotic devices. We attended equipment exhibits, seminars and state-of-the-art symposiums, and we talked to hardware systems designers and engineers and to software programmers.

We found excellent computer graphics systems in production and available for use now. De Anza Systems of San Jose, California, and COMTAL of Pasadena, California offer comparable computer graphics capability. We chose Hamamatsu System's microdensitometer and scanning electron microscope modules to introduce the data into the De Anza equipment Mr. Jim Dilettoso of Phoenix undertook a one-man campaign of operation between the various scientific disciplines, i.e. Lasers, Optics, Video Cameras, Computers, and Video Graphics Systems, seeking the best marriage of equipment for what we wanted to do.

When we finally got alt the pieces in one place we were able to perform the following repeatable steps:

1. Microscopic examination of film, transparency or print to very high magnifications, up to 500 diameters.
2. Microdensitometric scanning of film or transparencies, using various scanning programs.
3. Scanning Electron Microscope examination o£ film and film make-up.
4. Laserscopie examination of film or transparencies, and preparation of laser holographic plates for computer work.
5. Computerization of the data for storage on discs or tapes.
6. Videographic display of stored data, examinations, and the results of various tests, also transferred to storage disc or tape together with analysis programs used,

Basically, for our initial test programs we performed the following steps:

1. Microscopic examination of the film for anomalies in grain pattern and distribution; comparative density of activated crystals in light areas, crossing outlines, and in dark areas of objects in the same picture; aberrations resulting from double exposure, etc. Everything indicated a single exposure under ambient light conditions at the time and place of the incident as alleged. No reflected images, double exposures, montages or laminations could be detected.
2. Microdensitometric scanning showed a single light source and reflections from structured objects in the picture. Light and shadow angles and patterns were consistent throughout the image frame. This scan was accomplished using special filters for both below and for above the visual range, and were entered into the computer memory.
3. Scanning electron microscope examination was done with photons, and X-ray

and other energy particles. This data was also entered into the computer memory.
4. The Laserseope was used for 3-dimensional or holographic scanning of the film or transparency. An infra-red scan was also accomplished with the Laserseope, and all this data was entered into the computer memory.
5. Then we call up the picture originally introduced just as it was entered. If it is not sharp enough we sharpen it with contrast and brightness controls.
6. Then we identify the gray-scale value of any moisture or haze in suspension in the air and cancel it out in the computer. This further contrasts the picture and we adjust to desired contrasts again.
7. Now we blow up the whole picture in the image area of the UFO until the grain is clearly visible. Then we program the computer to average the values so that we no longer see gaps between the color granules. Now we have increased picture clarity and sharpness many fold. Then we adjust contrast and brightness to desired levels again and enter this image into the memory.
8. Now we can call up one by one from the memory, or together, the microdensitometric scan (including 300% below and 60070 above the visual range), the electron microscope scan, and the laser scan, as desired, and can manipulate these overlays as we like in our search for evidence. We can even overlay the same picture data several times for greater density, and can add or take out any overlay as we go. In the Swiss pictures we picked up some beautiful patterns around the spacecraft in the extended ranges of vibration. We are not sure yet whether this is a force field effect or possibly "noise" in the computer system. We identify and store any of these patterns desired.
9. Next we begin looking for specific answers, adding or taking away overlays as desired to evaluate what is depicted as we carry out those significant steps among the following:

   a. Digitizing at 5 microns and again at 1/2 micron to evaluate the reflected (or radiated) light.
   b. Hi-pass filter.
   c. Pixel grain distortion.
   d. Spatial filtering.
   d. Histogram.

      (1.) Edge enhancement. We now find that we can count the 1/2 micron pixels across the edges of stationary objects for relative distance estimates.
      (2.) Color contour. We can now read the structural shapes like a contour map.
      (3.) Color separation. We can color contrast as we choose to reveal any particular details more vividly.

10. We can remove all visible light values from the video picture and leave only those below or above our visual range or both. When this was done on the Swiss pictures we were left with an unusual pattern in the place of the spacecraft in the image array.

Because of the exceptional number of sharp clear photographs of structured objects, many in series and sequence, an unusual opportunity for scientific analysis was recognized. All of the established photogrammetric and computer analysis techniques were examined and some of them tried with affirmative result. It was then decided that what was needed was a whole new approach to the problem of analyzing photographs of Unidentified Flying Objects.

Discussions were held with leaders in this field of research including optical sciences engineers, aeronautical engineers, computer programmers, laser specialists and photographic technicians, and the latest state-of-the-art equipment was reviewed and evaluated. These experts worked together, inventing as they proceeded, in an effort to come up with a procedure that would definitely prove the nature of the subject photographed in UFO cases such as this.

Basically we started by examining the sample transparency or negative with a laserscope, the same way we used to examine black and white negatives with a microscope to determine faking before computers came along, and we made preliminary judgments about factors. Laser technology makes it possible for a skilled examiner to determine much before he ever goes to the computer. He can set up a grid, 10,000 lines per centimeter vertical and horizontal, and go back and forth scanning the whole picture. With the laserscope we can blow this up even further to look at individual grains or color laminations in the film emulsion and make judgments particle by particle. Laser holography is then used to provide a 3-dimensional image from a 2-dimensional picture. And laser projection of the hologram is so fine that a10th of a centimeter square can be blown up to many feet to view the grains and laminations in graphic 3-D. The finest suspension threads and expert retouching overlaps should stand out graphically. Homogeneity of the grains and color layers can be studied carefully for deviations from norm.

The next step consists of isolating, with a computer, the different planes of focus, or planes of blurring within the focus, even when all of the image field is beyond the fixed focus range of the lens of the camera. Using the laser we make holographic plates where we go to first, the extreme depth-of-field, to the horizon, where we run verticals to get some idea of the true focus there. Then we will come up to a closer area, to the main focus field and designate that, and then in the same way we will designate the nearest focus plane. Then we begin to work inside these focus planes, setting up as many additional ones as we have objects in the picture to tie them to. We will make a laser holographic plate for each of these designated planes by isolating, with a video-laser technique, things that have a particular amount of blur.

Then we set up programs to judge why an image is blurred. It is blurred because it is out of focus or it is blurred because it is moving or because the camera is moving. The boundary lines of things will tell us the amount of focus an object has. An index is designated for this. We use single digit algorithms here because the space in the computer is needed for other things. In digital analysis we can draw certain conclusions about how distant things are by how sharp the real focus is. This is observed and registered as blur factor. By going to the object most in focus and then deciding where the true depth of field actually lies, we can determine the depth of field of each point in the picture, and whether it is nearer or farther than another point. We can then set up holographic plates for each depth of field in the photograph and can create a distance scale within the computer.

Then, when we have defined the planes, we extract them out. We now know what is farthest away and so we lift all elements of that blur factor out and store it. We will make a holographic plate of that and save it. Then we will go to the true focus field in the picture, divided it into 3 or 4 planes and make a plate for each and save them also. Then we go to the closest focus plane and do the same with it.

Now, we are not just making a transfer of a photograph into the computer - we are making a 3-dimensional transfer on each depth of field into the computer. We are then able to analyze just where any object is within the actual depth of field - and then we have the computer bring it closer and move it farther away by simulating the entire photograph in 3-dimension in the computer. The computer hologram will look at every line and really be able to scan and make judgments about what is in focus. That's what laser holography can do. It is analyzing, area by area, the density, color scale, gray scale, blurring, light scatter, and any other variable in the picture.

We now run aspect size tests on the UFO image and then begin analyzing all the data. We can now say the object is this big, it is moving this much, and it is doing this. And we can tell within a very small percentage how far away it is in distance, and is it moving or not moving, and which direction. We can definitely tell whether it is a small object at a slow velocity or a large object at a much higher velocity. We can also set up programs to tell us what the shutter speed of the camera must have been and other characteristics of the snapshot and how the picture was taken.

This whole process is based on the reality that the picture field is not really all in focus from 30' to infinity. It only appears so to our untrained eye because the amount of apparent change of focus is so small beyond the farthest distance setting of the camera.

A new recently invented binary camera, which is a digital still camera having few moving parts, and which uses charged glass plates instead of film will facilitate the transfer of photographs into a computer. The computer then constructs the holographic presentation and can produce holographic plates that are much finer than the finest film available today.

Another method allows us to check and verify our analysis results obtained by studying blur factor. This method also requires the use of computers to separate the data. This process is based on gray scale variations produced by moisture, haze, dust, or any other matter in suspension in the air.

With a computer we can separate the image field into levels of gray shading produced by matter suspended in the air. The farther an object is from die camera, the more gray it will be, and this can be correlated to distance. If we can measure any two distances in the picture and we assign those distances to the gray scale indicated for those objects, we can then extend the scale and obtain a measuring yardstick for any other factors of grey in the same picture. This can be set up to read out directly in distance. Now with the computer we can look at any object in the picture and read its distance from the lens. Then, knowing the characteristics and geometry of the lens we simply calculate the size of the object from its measured distance in our gray scale readout.

We can calculate size relationships and relative distances for all objects in the two-dimensional picture. Unless the air is extremely clear on the day of the photograph we can use one of these computer methods to confirm the other.

Use of polarization and special light filters, and diffraction and Fly's Eye lenses would fantastically increase the data analysis potential through the use of computers.

The cruise missile detects and analyzes objects in its path by computer processes similar to these. Its on-board computers identify obstructions in the low-level flight path ahead in time to re-program the trajectories and adjust the track to miss them.

Portrait Quality Photographs

The standard 35mm internegatives used in commercial copy printing of the positive 35mm transparencies produced good pictures all right, but we were searching for some revealing method to get to the real truths behind these diapositives.

We took them to a custom photo laboratory and had custom enlarged internegatives made on 4" x 5" film plates, and then from those we printed 20" *x* 30" enlargements. All we had accomplished that was different was to carry the depth of image in the original transparency into a larger format negative capable of recording the magnified depth of image more efficiently than paper. Then when we printed back into larger format on paper we carried more of the original depth of image forward to the paper print, and we got spectacular results.

While searching for a computer laboratory to try some of the basic computer analysis steps, we came into contact with INTERREPRO, A. G., on the outskirts of Basel, who could apply some techniques with their equipment that we hadn't encountered before. They could put our original 35 mm or enlarged 4"x5" negative into their HELL Chromograph DC 300 scanning computer where an Argon laser beam scanned our negative 400 lines per centimeter, so fine that it looks between adjacent color granules and adds the average color in between in a new negative created in the computer.

This same machine was programmed to scan the enlarged negative the same way, and simultaneously create 4 new individual color separation negatives, perfectly indexed, for preparation of plates for a 4-color printing process. These 4-color separation negatives for Meier photo number 200 were than taken to SCHORI REPROS in Bern for set-up and making of printing plates. This is done at 60 lines per centimeter, standard poster print grade, (although 80 lines is possible), because printing at a greater density requires finer and more expensive plates, which can then only be printed on very hard special paper.

Even the 60-line poster print, however, was quite spectacular and revealed detail not available in the original with a strong magnifying glass.

We still find no evidence of fraud or trickery in any of these photographs so enhanced. On the other hand, we find details revealed that tend more to establish the validity of the story told by the witness.

While this development was going on and the procedures were being worked out, another of the Meier photographs of the alien spacecraft was sent out to Design Technology of Poway, California for a conventional photogrammetric and computer analysis similar to the method used by Ground Saucer Watch of Phoenix.

First, they examined the image field visually and microscopically to qualitatively evaluate the sharpness of the image of the object and the scene, and they found no discernable difference in image sharpness. Then color separation and black and white negatives were made at magnifications of 1 to 10. The resulting negatives were processed by a scanning microdensitometer yielding density contour plots. Examination of these plots did not reveal any details which would cast doubt upon the authenticity of the photograph.

Then the print, color copy negatives, and color separation black and white negatives were carefully examined for evidence of double exposure, photo paste-up, model at short range suspended on a string, etc., and nothing was found to indicate a hoax

Evaluation of the location of the shadows and highlights in the photograph verifies that the object and the scene were apparently snapped under the same conditions of illumination.

A surprise came when the analysts found many small black specks, apparently caused by dirt on a previous positive, or the print. Their presence indicated that this print was either a second-generation print from a color negative copy or that the original was a copy negative from a positive transparency, and not a negative as was inferred. I immediately got in touch with Mr. Meier to inquire about the original negative and learned that the original picture was in fact a positive transparency, and that the negative from which this print was made was produced from the original transparency by Kodak of Geneva. This tended to confirm the accuracy of the rest of the findings of Design Technology.

Design Technology concluded that the object in the photograph must have been a large object photographed some distance from the camera.

Design Technology holds contracts with NASA, Jet Propulsion Laboratory and the U. S. Navy. they also do subcontracted work for General Dynamics Engineering, the aircraft and submarine builders of San Diego.

Still another method referred to us by Ron Spanbauer of De Pere, Wisconsin was tried in judging depth-of-field or distance of objects in the picture from the lens of the camera at the time the photographs were made. This method is based on a color spectrum study of the color granules seen in extreme magnification. We find that the color red diminishes the further away from the camera the object is. As the distance from the lens increases the color cast of the corona or halo seen around the color granules making up the image shifts from red to blue and then to green. In other words, the relative distance of every object in the photograph from the camera, or with respect to each other in a straight line from the lens, can be determined by studying the color of the corona around the color granules making up the image of each object as seen microscopically in the film emulsion. The objects closer to the camera will contain more red in the corona structure. Objects farther from the camera will show more blue in the corona, and objects still farther will show more green.

The Meier photographs from Switzerland analyzed by this method were found to be consistent with the reported data, and with the photogrammetric and computer data generated.

A paper, *"Analysis ofUFO Photographs"* (included below), prepared by Mr. Jim Dilettoso, presents an overview of the methodology developed by Jim and his associates for extended evaluation of photographs of Unidentified Flying Objects. Diligent application of these methods certainly increases the potential for detecting faked and fraudulent UFO photographs.

Having involved ourselves in the photographic research in this case to the extent described, we readily admit the desirability of working directly from the original 35mm transparencies. Any reproduction from them necessarily involves a short distance travel of tight and a degree of color shift in the whole image frame. Knowing that this color shift is uniform however, we can compensate for it. It is also possible when copying short focus to tilt the image plane of the print or the copying film so as to make any part of the picture go more out of focus than another part which thereby reduces the possibility of detecting a very thin suspension line of appropriate color.

Being aware also of the extremely high rate of loss of original diapositives, both in return mail from the processing laboratories, and in substitution of clever duplicates for originals during reprinting attempts, a situation which is further complicated by outright thefts of originals from both inside the witness's circle of friends and by outright burglaries from outside, and knowing also that the witness has no personal desire to convince anybody of the reality of his experiences, and that he has become extremely wary of letting any more of the originals out of his personal possession, we have contented ourselves with inspecting the originals in his home and with working from enlarged internegatives made from the originals in our presence and that of one of his most trusted assistants by an excellent professional photo laboratory, Photo Color Studio, of Zurich.

The finest, most accurate custom internegatives were made on high quality expensive professional machines in 7 x 9 centimeter and 4" x 5" format. A greater amount of data from the original can be transferred to another film medium, i.e. transparency to negative, because the image can be transferred in depth, than from either of these to paper, as may be seen from the quality of the photographs we have been able to bring forward. And then computer processing allows us to bring up even more detail than is immediately apparent from prints made directly from the original transparency.

We have accepted this degradation of capability rather than attempt to remove any more of the precious originals from the witness's possession. We have no intention of being a party to any farther loss in this case. After all, the story and the evidence are strictly his. We are the only ones who seem motivated to tell it publicly at large. The witness sees nothing but further problems for him coming from our efforts.

For analysis of the moving picture sequences of the Pleiadian spacecraft filmed in color in super 8mm format by Eduard Meier we turned to Mr. Jun-Ichi Yaoi of Tokyo, Japan, a world recognized expert in the film and television industry, now working as an officer in Nippon Television Corporation.

In the 18 March sequence Meier filmed the spacecraft circling a large tree in front of a farmhouse. The sky was overcast with a low ceiling, and occasionally light snowflakes fell. The motion of the spacecraft looks suspiciously like it is tethered from above as it appears to circle the tree and then to swing back and forth over the tree, except that on three occasions the spacecraft changes its motion abruptly with no change in the tilt of the vertical axis of the ship. If it was in fact tethered, one would expect the vertical axis to tilt as the tether point above was moved. In another measurement it was found that the tilt angle of the vertical axis in one oscillation sequence was sufficient that the axis crossed within the frame and would have put the tether point within the picture. No tether point source was revealed, in one of the final oscillation sequences the object appeared to pass directly over the top of the tree, and it is clearly seen that the tree was swept over in the direction of the spacecraft, or appeared to follow the spacecraft as it passed. Clearly no model could have produced this effect. When we revisited the scene we found that the tree had died and was cut down.

The 12 June sequence filmed near Berg-Rumlikon in the forenoon shows the spacecraft hovering over a country road as the filming is being done from a slight rise about 200 yards away. Three cars are seen to pass beneath and just beyond the hovering object. The film was stopped and vertical lines drawn marking the front and rear of one of the automobiles. More vertical lines marked the edges of the spacecraft and we find that the spacecraft is apparently twice the size of the automobile (about 10 feet for the auto versus about 20 feet for the spacecraft). This checks with the witnesses stated size of the spacecraft. Both the auto and the ship seem to be in the same focus. A branch extending into the picture frame is seen blowing indicating a wind of about 15 knots, if the spacecraft were a model on a line it would have to swing in this much wind, which is clearly not the case.

In the 14 June sequence the spacecraft is seen moving slowly toward the camera as it flies out ever a valley near Berg-Rumlikon. In this scene also the wind is blowing the top of a small tree and it appears to be more than strong enough to sway any model suspended from a line, which again is not the case. In this footage we get a surprise. Twenty-eight seconds into the sequence the UFO "blinks" out and is gone for 30 seconds and then it returns the same way. When this part was analyzed frame by frame it was found that there was no break in the film. The section was continuous with no alteration. There was no splice. We see the spacecraft in the last frame containing the full image and then in the next frame, a fraction of a second later, we see only a dim shadow of the UFO image, and in the next frame it is gone. It returned the same way. A unique phenomena was observed at the time of "disappearance", however. At the point of disappearance there was a flare of light in the frame. Not a flash but a flare. Everything got lighter in the field around the hovering spacecraft momentarily and then immediately returned to normal. The same thing happened in reverse as the spacecraft reappeared in the sky in almost its same position, hovering as before.

On 8 March, at Ober-Sadelegg, Meier had followed his telepathic instructions and set his camera up in a position looking up a path up the side of a small hill. He was not sure what to expect, and then he noticed the spacecraft far away beyond the hill in the sky and he turned the camera on automatic and walked into the scene and up the path a short way, and then squatted down and pointed in the direction of the distant spacecraft. He could hear the camera starting and stopping a couple of times and later learned that the aliens had tried operating the camera from their remote position. The developed film showed such stoppings for very short intervals of time.

One year later, on the 28th of March 1976, Meier was led many kilometers away to Bachtelhomli and a shoulder of the mountain called Unterbachtel where he had two contacts and exposed movie film and shot still pictures with his 35mm hand camera twice the same day. In the morning, at about 10:30, the spacecraft appeared with two remote controlled monitor craft in company with it. He was able to film a few seconds of footage showing all 3 craft in the same frame. He left the movie camera and snapped a full roll of still pictures of this exercise. Then he went back to the movie camera and filmed the 3 ships in perfect formation, where they are seen to be not fixed in space with relationship to one another, but seemed to drift ever so slightly in their formation. And then he got another surprise. Suddenly the two remote vehicles "blinked" out as he had seen before. Again analysts found the flare of light at the moment of disappearance. And then, both remote ships "blinked” back on again simultaneously and are in place in their formation again. Here we discovered another surprise. Born of the remote vehicles demonstrated a moment of instability and for a moment wobbled around their vertical axis and then regained stability once more. The motion was sort of like a penny falling down but was of very short duration. He shut the movie camera off and shot another 36-shot roll of color slide film of the three ships sometimes together and sometimes separately. Suddenly the whole formation flew away. Meier hung around for a long time, then ate his lunch and waited some more, feeling that this wasn't over yet. Finally he took down the movie camera and started to load his things on his Moped when the three ships returned, approaching from a different direction. It was now near 16:50 in the afternoon.

He grabbed the movie camera again and hurried to get it set up once more feeing 90 degrees from its original position so as to film the ship slowly approaching from over the valley beyond. It was high in the frame when he looked through the viewfinder and he was about to adjust the elevation angle of the camera when the craft suddenly "jumped" from the high position to a low position below the horizon and now approaching only a few feet above the brow of a small rise in front of him.

When the analysts stop-framed this segment it was seen that the "jump" transition took place instantly, with no other break in film continuity. After the last distinct frame there is a very indistinct nebulous disturbance in the upper position the ship formerly occupied as we look at the next frame and a more distinct almost clear image in its new position below the horizon. The ship continued its approach below the horizon as the movie film ran out. He went for his still camera as the object passed overhead and then it was joined by the two remote controlled vehicles and they circled the location as he exposed another roll of color slide film before they disappeared in the distance. An eventful day indeed.

The next day, on the 29th of March 1976, he exposed two rolls of movie film and four 36-shot rolls of color slides at a location about 50 kilometers away called Hasenbol-Langenberg. He got there late in the afternoon and about 19:45 he noticed the spacecraft arriving as it was still far in the distance. He first exposed a roll of 35mm slides of the approach of the craft where it is initially seen as a dark fuzzy point in the afternoon haze gradually becoming more distinct as it gets closer, approaching over the handlebars of his Moped. It continues its approach, getting nearer and the image becomes larger as it slides to his right in a smooth descent toward a small bare tree, or rather two of them, a larger one and a smaller one, seen in the lower right hand comer of the later frames. He finished the 35mm roll and went to the super 8mm movie camera and began filming the first roll. He let it run out while he reloaded his hand camera and continued shooting the arrival stages of the beautiful ship. When he could see that it was apparently going to descend he began walking toward his right toward the apparent landing point. As he did so trees and bushes passed between him and the arriving spacecraft and we got marvelous pictures with a good exercise in focus. We had branches near the camera, inside the focus setting and farther out nearing good focus, and then the spacecraft in good sharp image in infinity focus for Meier's camera. The ship continued to descend to a hover position only about 100 yards beyond the bare branched tree, where Meier shot one of the most beautiful UFO pictures ever made. The object is seen hovering in clear detail behind the tree with a flash of the setting sunlight off the curved surface of the cabin dome of the ship.

The film in his 35mm camera ran out again. He reloaded the movie camera and made it ready. One of the aliens, Quetzel, descended on a beam of light and stood with Meier near the tree where they talked for some minutes. Then Quetzel returned to his ship and Meier walked back and turned the movie camera on again, reloaded the Olympus and continued to shoot movies and stills until both cameras were out of film. He shot one more roll of 35mm slides as the spacecraft departed.

This was the last movie sequence Meier has filmed to date. The analysts examining the movie footage from this last event were amazed to find that what at first looked like a flash of reflected sunlight from a part of the rim of the ship and an area of the dome, was in fact a projected beam of bright coherent white light from something. The beam is clearly seen and it is sharply distinct and does not spread out as it leaves the ship. There were pine tree branches visible in the movie frame that are clearly blowing in a sharp breeze of perhaps 20 knots. There is no apparent wind effect on the spacecraft. The spacecraft withdrew and Meier packed up and went home in the dark.

It seems almost impossible that all of this could be faked by any man. Even with a laboratory, good equipment, and both arms.

Analysis of UFO Photographs

Proposed broad-scale methods for analyzing and evaluating UFO photographs for the purpose of detecting and exposing fraudulent hoaxes and misrepresentation

By
Jim Dilettoso

Preface

This paper is an overview. It is intended to give the layman and scientist a feeling for what is available for use in Photogrametric Analysis of UFO Photographs. The techniques described have been simplified as much as possible, but are based on complex testing procedures. The procedures have been consolidated from the methods used by NASA, principally those at Jet Propulsion Laboratory; LANDSAT, Nuclear Medicine; The US Navy, and others.

Hopefully, it will inspire the inquisitive mind to join others in the positive pursuit of scientific knowledge. Anyone who asks questions and objectively attempts to answer those questions, is supplying energy to the scientific body.

Anybody wishing further information concerning these procedures, or new and untested procedures, may write to the author, care of APRO. for personal correspondence. All letters will be answered.

I wish to thank the many individuals who have inspired the and offered their experience. Among them, Jim and Coral Lorenzen of APRO, Col. Wendelle Stevens, Marcel Vogel of IBM, Dr. Bernard Friedlander, Bill Spaulding, & Emile Touraine. Also Don Showen and Rick Coupland who are experts in their own right.

Jim Dilettoso

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Introduction: Qualitative vs. Quantitative Analysis

Before the use of computers in Photogrametric analysis, the eye was the judge. The microscope was the principal tool used to examine the film grain itself. Those skilled in film chemistry and darkroom techniques used their personal judgment to decide if the film had been tampered with in any way. Observation of the print itself included artists, film animators, and special effects experts who were skilled in the art of deception. By and large they were looking for signs of the hoax. What constituted a real picture varied from expert to expert as there were no numbers to compare picture to picture, only opinion.

It is true that a person who works with film and art techniques, day after day, develops a feeling for what is real. Their opinion is to be respected. Someone who is perpetrating a hoax is using the same techniques as these professionals, therefore they should be able to quickly spot the simple techniques. But what of the authentic picture. What can they tell us about that? How tar away is the object? How fast is it moving? Are there any unusual properties about the light in the picture? For the answers to these questions we must seek more sophisticated methods.

Applied technology from new methods in nuclear medicine, microcircuits. satellites, and optical computers have paved the way for Quantitative Analysis of UFO PICTURES. Thorough examination requires application of a variety of procedures. Each is aimed at answering a specific question - conclusively. Positive results on a certain test does not prove that the picture is authentic, but supplies more information for the next test, and so on. Each test provides part of the answer in the form of a yes/no matrix and a set of numbers that can be compared to a set of reference values. In this way the judgment of the analyst is not as key an issue in the determination of the authenticity of the photographs. The skill of the analyst is in what questions are asked and how he applies the question to an equipment system with a quantity (numbers) as the output of the test.

Overview of Test Scoring Method

The criteria for a pass/fail system has been widely discussed by experts from every major UFO group. The issues over what constitutes an authentic UFO picture based on examination of the negative have been resolved to the point of a checklist. The issues concerning the negative & print are given the bulk of the test value. Testing for illumination values of the object itself is the principal area of non-agreement among experts. The reason for this is that the properties of an actual UFO are still under investigation. A craft in flight has unusual properties due to it's advanced propulsion system that appears to involve sound and light in the creation of an electromagnetic force. As such, illumination properties give us more information about the UFO, but are not as important in test scoring to determine if the photograph is genuine.

Overall, it can be stated that the tests are broken in two categories:

1. Determine the authenticity of the photograph.
a. Is the photograph a hoax.
b- Is the object in question identifiable as a known: (i.e. bird, cloud, aircraft)

2. What are the properties of the UFO (after photo is deemed authentic)
a. size, distance, speed calculations
b. unusual light properties; (absorption, emission, diffraction)

Test scoring exists to determine if the photograph is genuine or a hoax. Various questions can be asked and a specific test applied to that question. Each question can be answered by ayes/no or a set of numbers based on the output of the test equipment. For each question, a number value equals a perfect score. For example. Question: Does negative show signs of airbrush technique? Answer: NO. A NO answer is 2 points, yes answer is-15. In this case a No answer does not prove that the picture is real so it is only given a small N of points. BUT, a yes is most definitely cause for failing so a high point value is given. Some questions have no test value but are necessary in order to perform the tests; such as what was the F-stop of the camera, or what is the dynamic range of the film. Depending on the availability of equipment for testing, certain questions are selected to test a picture. Tests are performed and a value assigned to each. Values are tabulated against the pass/fail scale; if genuine, proceed to part 2.

Questions

1. What type of film was used. Manufacturer, ASA, date of film?
2. What type of camera was used, model number?
3. What are the properties of the lens used, MM, focal length?
4. What were the camera settings during exposure, shutter speed, F-stop, lens focus?

5. What time of day was the picture taken?
6. What direction was the object from the photographer?
7. What is the depth of field of the photograph?
8. What is the dynamic range of the film used to take the picture?
9. What generation of copy is the picture in hand?
10. Is this the original negative?
11. Are there two or more types of film grain in the negative?
12. Does the negative show overlapping or irregular grain patterns?
13. Is the negative properly exposed in the camera, good contrast, focus etc?
14. Is the negative properly exposed, developed, in the darkroom; chemicals correct?
15. What is the density of the negative?
16. Does the negative show signs of airbrush technique?
17. Does the negative show signs of double exposure?
18. Does the negative show signs of overlays?
19. Does the negative show signs of trick photography?
20. Does the negative show any unusual properties in individual crystal structure?
21. Has the negative been exposed to direct radiation?
22. Has the film negative been exposed to other than visible spectrum light?
23. Does the film grain show any magnetic or diffraction properties?
24. Does the print show all information uniformly throughout?
25. Are all colors/grey tones consistent throughout the print?
26. Is the sun visible in the print; what time of day is it?
27. What is the angle of light on any objects in the picture?
28. Are any shadows visible; what is their angle compared to the sun?
29. If pictures are in sequence, has any information changed/remained same?
30. What is the level of picture noise?
31. What is the level of picture haze/clouds?
32. What is the brightness level of light in the picture?
33. Is any object emitting light?
34. Is any object absorbing light?
35. Is any object reflecting light?
36. What is the exact shape of all objects in the picture?
37. Where are the exact edges of all objects in the picture?
38. What are the properties of all edges: width & density?
39. Are there any objects of known size or distance in the picture?
40. How big are all objects in the picture?
41. How far away are all objects?
42. Are all distance/focus relationships proper?
43- Is there a string visible, holding up any object?
44. Is object in question, a small or large object (model)?
45. Is the object actually 3 dimensional, or is it a 3d drawing?
46. Do the edges show any signs of red/blue color shift?
47. Does the angle of light on object in question match angle of sun/shadows elsewhere?
48. Is object in question moving; what direction how fast?
49. Was the camera moving?
50. What is the Focus Field Index for all object is the picture?

51. Are there any shadows of Object in question, elsewhere in picture?
52. Does object show any unusual light properties?

Step by Step Procedure

Examination of Negative: Equip. Program

1. Take Film 1D# off edge of film; contact manufacturer for info.
2. Log dynamic range of edge *TD#* into pattern recognition file.
3. Place film in Microscope 40X power; observe grain pattern.
4. Place film in microdensitometer; 1.6 micron scan.
5. Digitize quadrant 10 micron X 10 micron; cover complete pie.
6. Tie-all vector points of quadrants; build complete picture.
7. Dynamic range/pattern recognition program.
8. Thermoluminescence test.
9. Streak test.
10. Make infrared copy print (see appendix).
11. Digitize Infrared copy print.
12. Histogram of both negatives with microscope & microdensitometer.

Digitize Picture/negative:

1. Place neg./print on appropriate light table.
2. Scan with Vidicon system minimum 5 micron resolution.
3. Place color filters in sequence red, green, blue.
4. Magnify 10X, repeat procedure; join tie points.
5. Histogram.

Edge Identification:

1. Gradient edge identification.
2. Laplacian edge identification.
3. Focus Field Index Identification.
4. Depth of Field calibration.
5. String search.
6. Reference object calibration.
7. Size/distance functions calculations.
8. Edge enhancement; save; calibrate tie points.
9. Blur ID; movement calculations; object/camera.
10. Color shift one on all edges.
11. Shadow edge ID; x,y locations.
12. Movement calculations: calibrate to shutter speed.

Light & Contour Identification:

1. Call up Histogram.

2. Band pass filtering; 4 bands, 10 false colors assigned each.
3. Histogram ID of Z scale 230 and up; find hot spots.
4. Find shadows; center line for angle of sun.
5. Compare sun angle (hot spot on OBJ) to shadow angles; time.
6. Contour ID based on each band Z scale; topograph.
7. Find cold spots; Z scale under 40; focus under 30.
8. Contrast enhancement; save tie points ID.
9. Identify noise level/haze level.
10. Match noise level on OBJ to FFI #.
11. Observe reflected properties craft to ground images.
12. Band pass filter; observe edge/thermal diffraction.

Enhanced and Composite Image:

1. Recall enhanced images and tie points.

Equipment List:

Principal

1. Microscope 10-100 x power minimum.
2. Microdensitometer,; Recommend Joyce Loebel-Vickers PI V77 or comparable
3. Interferometer; 0045 Tolerance with .06 micron window.
4. Infraredometer; +7 -.0001% deviation from I degree Kelvin +/-.0001% from wavelength.
5. Digitizer; Recommend Fairchild CCD-2: 512X512 array minimum.
6. Image Process Computer
    Any of these systems:
        De Anza Systems
        Ramteck Systems
        ComTol systems
        Evans-Sutherians
        Spatial Data
        FORTH Systems

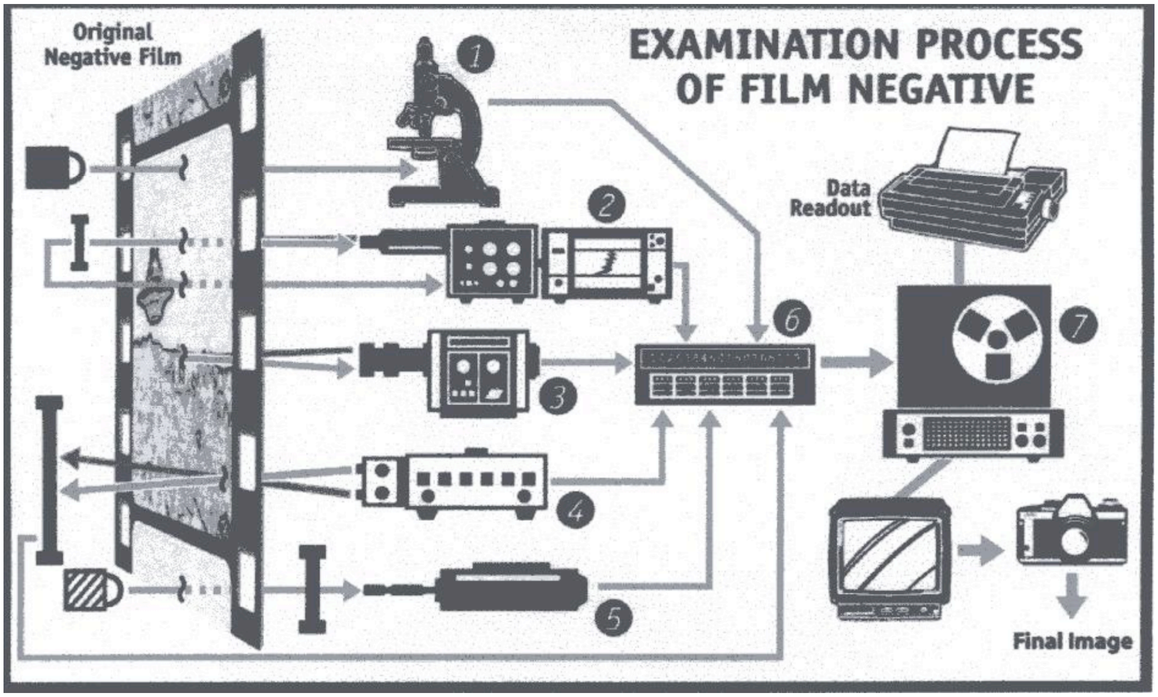
Auxiliary

1. Light table.
2. Copy Camera 4"X5" with film holders.
3. Infrared film system for copy prints.
4. Electron Microscope.
5. Thermoluminescence peak/streak camera.
6. Kirlian Photography system.
7. Spectrum Analyzer.

Image Processing System

<u>Input sources:</u>
Film negatives
Film positives/Transparencies
Film positives - paper prints
Magnetic tapes from digitizer
Histogram

<u>Processing:</u>
Histogram expansion
Histogram equalization
Fast Fourier convolution windowing
False color mapping
Scaling
Camera tilt removal
Aspect ratio change
Image addition, subtraction and masking
Image averaging
Overlay comparisons
Multiple scale cursor comparisons
Spatial filtering
Pattern recognition
Edge Identification
Edge enhancement
Contour Identification
Contour Enhancement
Image Enhancement
Image composite; associated points and vectors
Focus indexing
High pass filtering
Low pass filtering
Band pass filtering
Gradient edge identification
Laplacian edge identification
Size/distance calculations from focus indexing
Radiometric temperature conversion
General Data Base management



LABORATORY EQUIPMENT

1. *Electron Microscope*, powerful close-up microscope
2. *Micro Densitometer*, measures density of film grain
3. *Vidicon Tube*, converts picture to electronic image
4. *Interferometer*, measures waveform/frequency of film crystals (as lenses)
5. *Infraredometer*, measures infrared light not visible to the naked eye
6. *Digitizer*, converts Vidicon image to 300,000 computer cells called pixels
7. *Image Process Computer*, defines, analyzes, measures of photo

Overview of Examination Criteria

The methods herein described are based on the following uses of the data.
QUALITATIVE Judgment by the researcher, based on observation of the evidence, opinion.
QUALITATIVE Judgment by the researcher, based on QUANTITATIVE DATA, opinion.

QUALITATIVE DATA; conclusive.
The tests to determine the validity of the photographs can be broken into two categories: 1.) Examination of the Negative, film grain & emulsion, and 2.) Examination of the picture/light structural properties.

The tests to understand more about a picture found to be valid take on a more elusive structure. Consistently, UFO pictures are found to be either blurry or extremely clear. There seems to be no in-between. Pictures that are very clear are always suspect. This seems a bit unfair since, clear pictures are what everyone is hoping for. Nonetheless, correlations among pictures believed to be authentic is the wide open field.

Image composites, unusual energy fields, and X-ray approaches have found themselves a place in UFO photo research. Since the phenomena ofUFOs themselves falls into an abnormal physics structure, we find that the methods of analysis must take on an unusual texture. Studies of the non-visible light spectrum and electromagnetic radiation must be applied to understand the pictures once proved authentic.

The basis for this composite understanding comes from analysis of the following properties of the picture
itself;

1. Study of the EDGES of the UFO and other objects in the picture.
2. Study of the LIGHT PROPERTIES in the picture.
3. Study of Energy Fields around the craft. Magnetic Diffraction, & Infrared Light.
4. Building a Composite picture from pictures in sequence or similar craft.
5. Devising new methods of photographing UFOs.

Examination of the Negative

In order to accurately conduct these tests, it is imperative that the original negative or transparency be examined. Since copy negatives will obscure the detail of the grain or film emulsion, we must examine the film itself that was in the camera. Manufacturers code each batch of film with numbers that are visible on the edge of the negative. By contacting the manufacturer, one can get information about the nature of the chemistry and grain characteristics of that batch. Give as much information as you can, including date of processing, and conditions of exposure. A local film processor may also be able to give you an accurate picture of what the grain should look like under normal conditions. Using a microscope, a minimum of 40X power, examine the negative and look for even distribution of film grain. These results are qualitative based on visual judgment.

Positive Results	Negative Results
EVEN film grain patterns	uneven distribution of grain
Separate grains in area of given grey scale	overlapping grains in area of given grey scale

Using a microdensitometer, a minimum 1.6 micron scan, with a microscope; transfer the negative to a digitizer and into a computer. First perform a histogram function in 10 micron quadrants. The 10 X 10 micron histogram should be a 512 x 512 x,y. The Z scale or grey density, will be of the individual film grains. Perform period functions and look for even distribution of spatial slope, around areas of like Z values. Fluctuations of more than 10% indicate a negative result.

This histogram now becomes a highly accurate digitized picture that can be examined further in the computer as a positive print.

Examination of the Edges

Edge Identification - using the computer to identify edges is one of the most important functions of Photogrametric analysis. First, we can clarify whether an object is indeed a symmetrical and hard edge object; or lights, reflections, or clouds. Depending on the quality of the original picture and depth of field, we may be able to further clarify the size and distance of the object. If the object is suspended by a string, we will be able to see the string as an edge, suspended in the air.

Examination of the histogram compared to the original picture will give the edges as a series of pixel values. The objective is to determine how wide the edge is. Provided the picture has been digitized in 1.6 micron scan, we can have an array for a 10 micron quadrant transferred to a 512 x 512 display. This will provide us with a range for edges to be from 1 to 512 pixels. In a 35mm negative, we found most edges to be from 5 for the sharpest images to 45 pixels for those that are at a great distance from the depth of field or are considerably out of focus. This gives us a spread of 40 pixels.

With the depth of field being the area where the edges are the smallest numbers and the smallest single number being the exact center of the lens focus, we can determine how far away one object is in relation to another. This would be in %, unless we know the distance of any other object in the picture. We then assign a distance to that pixel value and add or subtract % of distance based on the pixel scale. The system used to perform these calculations is a Hammamatsu Array system.

If we do not know, the distance of any reference object, then we must state that one object is further than another. Our size/distance calculations at that point are accurate within 25%; what we can tell is if it is a model.

Light Properties

Light reflected and absorbed forms the basis for photography. Intensity, angle, color and wavelength all provide important information about the picture. The following programs provide us with the answers to important questions:

Histogram readout gives the light values of each pixel in a scale from 0 to 256. With 0 representing the darkest and 256 the brightest value. On a black and white print we would only have one Z scale as it is called. In a color print we would have introduced the print into the digitizer using red, blue, green & sometimes yellow filters. For each picture then, we have a Z scale from 0 to 256 for each color. This gives us a highly accurate density value for each wave length in the visible spectrum.

The basic test to run first is to see if we can determine the angle of the sun on the object. This is done by building a false color contour based on the Z scale by filtering the different intensities of light from highest to lowest, until we find the "hot spot". This is where the light is brightest from the sun shining directly on the object. Conversely, we will then look to find any shadow either from the object or any other reference point on the ground. Matching angles means that both the object and the location were shot under the same conditions of illumination. This does not however eliminate a model.

hi the process of looking for the hot spot, we built a contour based on the Z scale density. We now in fact have a topographical map of the UFO. This shows us the actual shape of the UFO in 3-D perspective. By performing band pass filtering in different wave lengths, we can look at the reflective and absorptive properties of the craft itself. Are any objects in the ground below being reflected in the bottom of the craft? Mere comparison of the false color scale will show this vividly. Also we can detect any light absorbing properties that most genuine craft appear to have. This will appear as a 0 to 30 on the Z scale.

The end result is that we can determine if the illumination is correct as well as get a good topographical look at the craft.

Energy Fields, Magnetic Properties, Infrared Film

The study of UFO photographs becomes intensely exciting once the researcher has discovered that a photograph is genuine. The study then becomes one of understanding the properties of the craft itself. This area is one of considerable importance to those who have come to understand the Phenomena as real. Tandem study is required in the area of UFO propulsion systems in order to relate the characteristics of the picture to the properties of flight. It is believed that UFOs use magnetics in order to manipulate the energy of light and matter through time and space. This manipulation would make certain craft appear foggy or transparent, at times, in our physical dimension. Photographs that represent only our VISIBLE SPECTRUM, may not be the only information that can be photographed. This calls for methods of examining the subtle traces of non-visible spectrum light whose HARMONICS, may be minutely visible (trapped) in visible spectrum film.

The magnetic properties of the craft would show-up as areas of light absorbing light emitting, or light diffracting edges. Through special equipment, light can be filtered to specific frequencies to examine those properties. More on this to those who will write.

A few pictures have been taken with infrared film of UFOs. The pictures are particularly interesting as they show thermal energy fields that are definitely not those of a tossed or suspended model. These photographs are light filtered to further examine the narrow bandwidths within the infrared spectrum. It is interesting to note that there are harmonic pulses in some of these spectra. This entire area is one that interests scientists the most. Collaboration among scientists will prove this study of magnetics to be most productive in understanding the UFO Phenomena.

Composite and Enhanced Pictures

With the use of the Image Processing Computer, we can now examine UFO Craft to much greater detail than ever before. The computer can store all of the information about a picture and IMPROVE it's visual quality to the point where detail is now visible.

Appendages, protrusions, and exact shape are commonplace detail that can now be seen visually like never before. Furthermore, this detail can be stored in the computer as a kind of line drawing blueprint. It can then be classified according to tie points that describe the geometry of the craft. With this file number, the craft can then be compared to other craft in an attempt to cross correlate sightings of the same craft in other parts of the world. When the same craft has been photographed multiple times, these tie points can be overlapped and more detail can be added to the composite picture of that craft. In addition, the computer can turn this picture 360 degrees and look at all sides of the craft, (now called Identified Flying Object).

These composite pictures can be continually updated. In this way a clear view of the types of craft can be studied like blueprints. In this way perhaps an understanding of the propulsion systems used will be more accessible to scientists, particularly aerospace engineers.

Drawing Conclusions, Correlating Data

The objective of photogrametric analysis is to fund authentic pictures that can be studied. Finding the fakes is necessary, but does the researcher no real service. AUTHENTIC PICTURES are the real prize. For only then can the UFO Phenomena be studied. Once a picture has been deemed genuine, then the real testing begins. A conclusion that a picture is real is actually No Conclusion to the Scientist. Only by correlating data from further picture analysis, correlating sounds analysis reported, radiation and burn marks, and possibly metal samples from craft can real Conclusions evolve.

The use of computers puts this data at the fingertips of the researcher. Provided of course that the resources are available to access this technology. Since the Government does not sponsor any open research, the responsibility must be in the hands of those who have access to the technology and the knowledge of how to investigate and cross correlate the data

Logically then, it seems that the true advances in research will come from a marriage of industry, the universities (who have the needed equipment) and experienced UFO researchers. Well, let's get started.

Summary of Research Activities

I. Criteria for examination of the NEGATIVES

- A. What equipment was used to conduct these tests?
    1. Zeiss Microscope
    2. YOOL Laser System
    3. Simmons Gamma/Alpha Emission Tube
    4. Grinnel Computer Graphics Terminal GMR-37
    5. Tektronix Computer System 4081=peripherals
    6. Fairchild CCD-2 Digital Camera
    7. Singer zx-2 Digital Camera

8. CMX-700 & 340; Computer Video Graphics
9. Assorted Custom Laboratory Equipment

B. What questions were considered?

1. All of the above tests
2. Theta Wave Field emission tests (possibly Delta/Orgone sensitive plates).

C. Further examination of the SOUNDS reported as a UFO, presently in possession.

D. Voice Stress Analysis of the questions posed to Edward Meier by W. Stevens 5-78

E. Additional Camera & Sound equipment supplied to Edward Meier.

Camera Data

Eduard Meter's Photographic Camera:

Make	OLYMPUS 35 ECR
Serial Number	200519
Maximum shutter speed	1 /100th Sec.
Lens	l:2.8f42mm
Film Used-24 x 3 5mm 18 DIN	Kodak Agfa Peruz

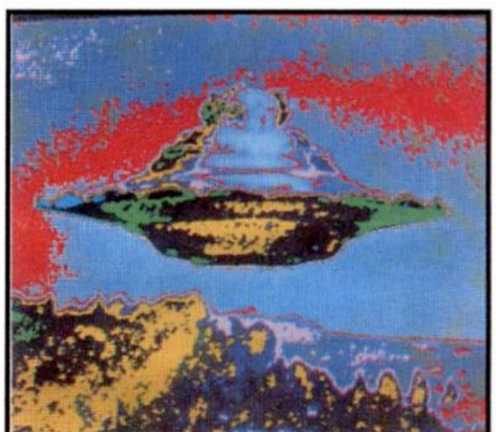
Eduard Meter's Movie Camera;

Make	MALCOLM FTL
Serial Number	03320
Lens	l:1.8f8-64mm
Film Used-Super 17 DIN	Kodak Agfa Peruz

Camera data on the photographs taken by Hans Koni Schutzbach, Guido Moosbrugger, Wolfgang Wotzer and Olga Walder is not available. Others, unidentified, have also taken pictures in connection with the contacts.

Nr.200: 8. März, 1976; Bachtelhörnli (Detail) ©FIGU

Thermogram - low frequencies - color density separations Properties of light/time of day are correct; light values on ground are reflected in craft bottom; eliminates double exposure and paste-ups.



Thermogram - hi frequencies - color density separations Properties of light/time of day are correct; light values on ground are reflected in craft bottom; eliminates double exposure and paste-ups.