PULSAR

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INTERNATIONAL ASSOCIATION FOR THE ASTRONOMICAL ARTS

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Underpainting

by Joe Tucciarone

Most new car owners have invested large sums of hard earned money in their vehicles, and, therefore, end up spending even more money trying to keep their new cars looking good. One treatment they are likely to spend some money on is known as "undercoating". But while it is very important to keep floorboards from corroding, this article has absolutely nothing to do with rustproofing cars!

Undercoating" is the name of an art technique which enhances the brilliance of paint colors when they are airbrushed against a black background. There are probably as many different styles of art in the world as there are artists who paint. Some artists are impressionists, while others are pointillists, cubists, realists, or even surrealists. Where one artist may work with a hand brush, another might not touch the canvas with anything but the spray from an airbrush. But, except for planetarium artists, the vast majority of artists begin their artwork in the same way. No matter what styles or media are used, most paintings are started on a white surface.

Much of the credit for the brilliant colors in a painting is due to the white canvas or paper on which the painting is done. When oil or acrylic paints are laid down thick, as with a palette knife, they are totally opaque. That is, whatever is beneath the paint cannot be seen through the paint. But the thin layers of paint normally laid down by a hand brush or airbrush are fairly transparent, allowing light to pass through the paint and reach the underlying white surface, which is of course, highly reflective. It is the light reflected from this white surface, passing back up through the pigments, which gives the colors their brilliance. The cutaway side view of Figure 1 illustrates this. Naphthol crimson is a good example of a very intense color.

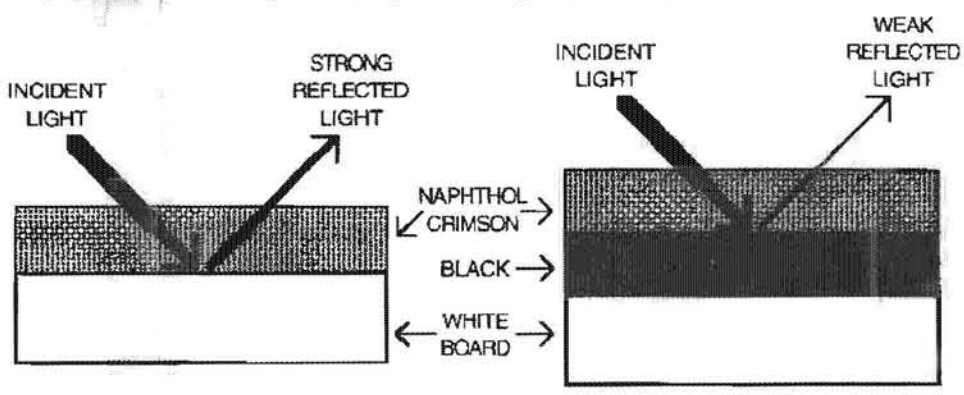

Figure 1. Figure 2.

What happens when a normally vibrant, intense color is airbrushed onto a black surface? Again, the thin layer of paint is fairly transparent and allows light to pass through. But the black surface beneath absorbs the light and none is reflected back up through the paint to enliven it. As a result, this normally colorful paint will appear dark and dull, robbed of its intensity by the underlying black surface, (see Figure 2).

This is the paradox that planetariums have struggled with since time immemorial. Artwork destined for use in the theater must be very colorful because our tiny 35mm slides are enlarged several thousand times in area by the time they reach the dome. But planetarium artwork is usually done on black paper to aid whatever opaquing method is being used to eliminate the rectangular background of a slide. No matter how intense the color of a particular paint may be, it will suffer when it is airbrushed onto a black surface. Happily, there is at least one solution to this problem.

Before I continue, it might be interesting to list a few of the characteristics of commercially available paints. I work with Liquitex acrylic paints, which are sold just about everywhere. There are almost a hundred different colors of Liquitex acrylics, and printed on each tube of paint is an impressive list of characteristics for that particular color. For now, the two most interesting characteristics are the value and the chroma. The VALUE of a particular color, a number between 0 and 10, is a measure of how dark or light it is. A value of "10" implies total reflectance, while a value of "0" corresponds to total absorption of light. I have divided the paints into three groups: "lights" have a value between 5 and 10, "darks" have a value between 0 and 5, and "intermediates" have a value equal to 5. It is interesting to note that titanium white has a value of 9.6, indicating a slight absorption of light, and the value of 1.5 for ivory black means that it is actually somewhat reflective.

The chroma of each paint is a number which indicates how colorful it is. Brilliant Orange, having a chroma of 14, is a very vibrant, intense color. Raw Umber has a pastel hue and a chroma of only 1. Interestingly, both titanium white and ivory black contain a little residual color since neither has a chroma of zero.

And now we can return to the original problem via an example. Let's say we're working on an artwork starfield and we want to emphasize the brilliance and color of a red star by surrounding it with a dazzling red glow. Simply spraying some naphthol crimson paint (a dark paint with a value of 3.7) directly onto the black background won't work. I have done this, and the normally vibrant crimson appears dark and dull brown. The black surface reflects no light back up through the crimson paint to bring out its brilliant red hue.

The solution is to first "underpaint" the starglow with a color of high value. One color particularly good for this is brilliant orange, which has a relatively high value of seven. This light orange paint can be sprayed down liberally into the starglow area in order to provide a relatively light, reflective backdrop. A thin coating of a dark red color like naphthol crimson can then be sprayed over the orange paint. Light, reflect-

continued on back

Results of 1993-1995 Board of Trustees Election

Fifteen IAAA members were elected to a two year term to the Board of Trustees. I would like to welcome four new trustees: Dana Berry, Bob Eggleton, Mark Maxwell, and Joe Tucciarone. Two past board members, Ron Miller and Rick Sternbach, were not re-elected. Both have been active members throughout IAAA's history, and they will continue to be valued members in the future.

The number of votes each trustee received is in parenthesis after their name. (Twelve ballots were returned out of thirteen sent out). The new trustees are by order of number of votes: Beth Avary (12), Dana Berry (12), Michael Carroll (12), Dennis Davidson (12), Joel Hagen (12), David Hardy (12), William K. Hartmann (11), Pamela Lee (10), Bob Eggleton (9), Kara Szathmary (9), Joe Tucciarone (9), Jon Lomberg (9), Carter Emmart (8), Mark Maxwell (8), and Lee Battaglia (7).

Congratulations to all board members for their election or re-election.

Reports from Exhibits

by Beth Avary

"Space Art: Probing the Outer Limits" is showing at the Cleveland Museum of Natural History in Cleveland, Ohio. The exhibit features eighteen artists, fifteen of them IAAA members. Included from our group are Lynette Cook, Michael Carroll, Dennis Davidson, Rob Eggleton, Marilynn Flynn, John Foster, Mark Hamel, Bill Hartmann, Pamela Lee, John Lomberg, Mark Mercury, Ron Miller, Joe Tucciarone, Cathy Yankovich and yours truly. The other artists are Real Musgrave, Phil Weisgerbor and Michael Whelan. Head of the astronomy department, Joseph M. DeRocher, said the public was very impressed by the show. Almost five hundred people attended the opening, and he expects over six thousand people will see the exhibit before it closes January 3rd. "Cosmic Horizons, The Art of Robert McCall", opened December 16th at the Society of Illustrators Museum of American Illustration in New York City. "McCall is renowned throughout the world for his soaring murals and canvasses, his classic U.S. postage stamps commemorating U.S. space achievements, and the spectacular works he painted for the movies, including 2001: A Space Odyssey, Star Trek, and Walt Disney's 1981 space thriller, "The Black Hole". His work will be on display through January 15, 1993.

Underpainting *from pg. 1*

ing up from the bright orange underpainting, now passes through the crimson pigments and brings out their vibrant red hue. White paint would have provided an even lighter underpainting, but the already warm tint in the orange paint gives the star a more realistic, fiery glare. If necessary, the outer "edges" of the naphthol crimson starglow can be lightly sprayed over with black paint to blend it into the black background. The cutaway side view of Figure 3 shows the paint structure within this glow, exaggerated vertically for clarity. The underlying orange paint was applied most heavily in the center and thinned out at the edges to produce the glow effect.

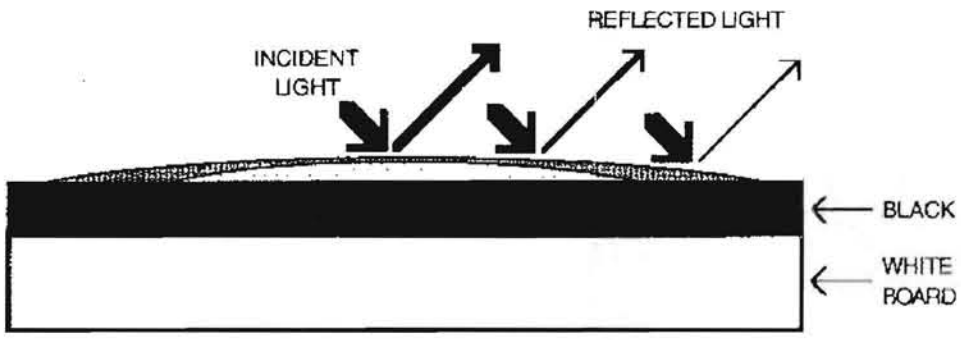

Figure 3.

The naphthol crimson was applied lightly at the center of the glow to leave it bright, but more heavily toward the edges. The combination of a low value color (naphthol crimson, for example), sprayed over a high value color (brilliant orange, for example), is required to coax the intense hues out of paints. This technique is also good for creating richly glowing nebulae, colorful comet tails, and vivid planetary atmospheres.

Finally, it interesting to note that airbrushing one color paint over another is not the same as physically mixing the two colors. For example, when phthalocyanine blue paint and brilliant orange paint are mixed together, the result is a dull, grayish green. But airbrushing phthalocyanine blue over a layer of brilliant orange results in a wonderfully vibrant greenish hue.

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Free Workshop !!!

The IAAA is proud to announce the first in a series of local workshops *free of charge* to any member. The first local workshop is to be held from 1:00 pm on Feb. 27 to 4:00 pm on Feb. 28, 1993. Site of the festivities will be the Reuben H. Fleet Space Theater and Science Center in San Diego, California. The goal of this workshop is to provide an inexpensive opportunity for new artists in Southern California and Arizona to meet and work with professional space artists. (The workshop is open to non-members for $55.00). Guest instructors tentatively include Michael Carroll, Pamela Lee, Joel Hagen and Don Dixon. Topics range from business to technique, so *bring your paint*! Travel, food and lodging is up to each attendee, but we can help you find a hotel if needed. For reservations, please call Michael Carroll at (619) 292-5460. *Reservations must be made in advance.*

Upcoming Events

The following announcements were culled from various aerospace journals and could potentially lead to more contacts and $$$ for IAAA members.

• Aerospace industry representatives will exhibit their products and services during the "Satellite 12" Conference February 25 - 26 at the Sheraton Washington Hotel in Washington, D.C. A visitors's pass to the exhibit hall is $50.00; Call Phillips Business Information Inc. at 301-424-3338 (from within the United States call 800-777-5006).

• Space Exploration and the future of humans in space will be the topic of an international conference at the Conseil General de la Cote d'Or in Dijon, France, March 29-30. The United Nations Office of Outer Space Affairs and the European, French, Japanese and U.S. space agencies are co-sponsoring the event. Organizers include the Consortium for Analysis in Space Exploration. Registration is $150.00; contact Michel Prost via fax at +33 80-36-07-88.

• Futuristic aerospace concepts will be discussed at an interdisciplinary symposium sponsored by NASA's Lewis Research Center and the Ohio Aerospace Institute in Cleveland March 30-31. The Vision-21 Symposium will be held at the Holiday Inn in Westlake, Ohio. Registration fee is $120.00 through February 15; $175.00 thereafter. Contact Vannel Hasset at 216-962-3041.

• Skylab, Spacelab, Space Station & Beyond 1993 marks three significant aerospace anniversaries: Skylab's 20th, Spacelab's 10th, and Space Station Concepts Development's 10th. This conference provides a critical view of our progress and plans in long duration manned space research and technology. Sponsored by NASA, MSC-Huntsville, ESA, UAH. Call the University of Alabama in Huntsville at 800-448-4035 or fax 205-895-6760.

• The 25th International Symposium on Remote Sensing and Global Environmental Change will be held at the Grazer Congress Center in Graz, Austria, April 4-8. The conference is sponsored by the Consortium for International Earth Science Information Network and the Environmental Research Institute of Michigan (ERIM). One-day registration is $100. Contact Nancy Wallman of ERIM via fax at 313-944-5123.

Mount Wilson Observatory Workshop Update

by Dennis Davidson

We met at the gate to the observatory grounds, Walter Bennett, an astronomer and site supervisor at Mt. Wilson. Near sunset, the city below twinkled with thousands of street lights. Though the drive from Pasadena took less than thirty minutes, the transition from a megalopolis in a constant state of gridlock to the quiet pine forests of the summit was welcomed.

After a brief survey of the Los Angeles basin below us, with Mexico and Catalina Island visible in the distance, Walter escorted us through the grounds, past the 100" telescope, to "the monastery" where we would be staying for the night. The monastery is a small, two story structure, built on a promontory overlooking Los Angeles. The Mt. Wilson Observatory Institute is slowly renovating the rooms for use by visiting astronomers. At the time of our visit, ten rooms were finished and at least six more were scheduled for renovation. The rooms were furnished simply: a single bed, a desk, and a sink. Just the right accommodations for visiting artists! Bathrooms are shared on each floor. We were warned by Walter that stargazing was not advisable that night because a mother bear and her cubs were sighted around the grounds. We took his advice. Besides, the mosquitoes were biting, so we retreated to a very quiet night in the monastery.

Up early the next morning for sunrise. Walter started us out on a tour of the library and machine shop. Most of the books and tools are gone, but the buildings are of some historical interest. Just up the steep path through the scrub oak towards the solar telescopes is the cement block that Michelson used in his experiments measuring the speed of light. Almost everywhere we visited had a story that related to the early years of modern astronomy.

The solar telescopes, which are still in use, were visited by dozens of the greats in astronomy and physics, including Albert Einstein. After meeting the staff operating the solar telescopes, we moved on to the 100" Hale telescope. Walter took us on a "behind-the- scenes" tour beginning with the ground floor which housed the mechanisms used to remove and refurbish the primary mirror.

I was struck by the robust design of the hardware. It was like going back into time. Heavy steel girders, with rivets everywhere. The original operating consoles or switches are still used and give the interior a vaguely Frankensteinesque quality. The observatory was designed and built in the early twentieth century, so in a real sense, it represents a transition from the Industrial Age to our current Information Age.

Besides the obvious interest in observing through the optics of a 100" or 60" telescope, I found the physical construction these instruments to be points of interest for paintings. Mt. Wilson Observatory is in a transition, as well. The 60" is currently used for a survey of nearby star surfaces, and the 100" is being refurbished at this time.

Much work needs to be done to maintain ninety year old structures, in addition to maintaining the grounds. Since the 60" is dedicated to a long term study of star surfaces, its optics are connected to a spectrometer, so it was unavailable for viewing that night. However, Dr. Baliunas is committed to reserving some time on the 60" for our group. There would be time for direct observation through this telescope. The 100" will probably be unavailable for observation over the next year, so our observation time would be confined to the 60" telescope. Dr. Baliunas would be taking time out of their star survey to accommodate our group, thus I would expect that we would organize ourselves to use most efficiently this opportunity.

Once we know how many artists are interested in attending the workshop, we can work out a viewing schedule. Removing the spectrograph from the 60" is a task requiring advance planning. Laurie Ortiz will be coordinating this workshop with me. Interested IAAA members should contact Laurie and let her know the best time of the year for you to attend. Walter Bennett said that viewing conditions are good year round, however winter storms can dump snow on the summit, in addition to making star gazing difficult. Our visit took place in September, usually one of the warmest months in California. At the summit, we were comfortable during the day in shorts and t-shirts. However, the mosquitoes were very persistent, making any painters miserable outdoors.

Of course, the date of the workshop must be convenient for the Mt. Wilson staff, but before we begin setting dates I would like some feed-back from those members who would like to attend.

The duration of this workshop could be as short as one evening for local Southern California artists. I envisioned no more than three consecutive observing days at the summit. However, access time is less of an issue for those artists who wish to do landscape, architectural, or hardware painting. We could include site visits to JPL as well during this workshop. The structure of the workshop is open at this point.

I would like to see an exhibit come out of this workshop, most likely some months after to allow time for painting. An exhibit would be beneficial for both the Mt. Wilson Observatory and the IAAA.

For more information, questions, or ideas contact me at 212-769-5916 or send faxes to me at 212-769-5007. You may also contact Laurie Ortiz at 619-238-1233.