EDITORIAL MATTER

Sharing the Wonder

As you may notice, we've enclosed a questionnaire with this issue. No, we don't want to know your occupation, income, or how many cars you own. We leave those questions to product warranty cards and mortgage applications.

We are terribly curious about the more intellectual and aesthetic matters that are important to you, as artists and associates, and why.

In a certain sense we who formed the IAAA are a small, intimate group of like souls who have been drawn to space art for a variety of reasons. Many of us have become close friends through events such as the workshops. We know, however, that there are many more new friends around the world who are just now joining us, who feel the wonder as we do.

The act of filling out a simple questionnaire can go a long way toward sharing the wonder with others. We will publish the results of the survey, not only the interesting statistical information, but a look at the more human qualities of space artists. Just as our artistic styles may be compared, so too can we compare our methods and philosophy. We will see how we are similar and, just as importantly, how we are individuals.

AIR TO GROUND CHATTER

I began painting space in 1983 after including the sun and moon for several years in my Jemez Mountain landscapes. Since then I have been working with Dr. Marcus Price and Dr. Michael Zeilik, of the University of New Mexico Astronomy Department, who have provided me with information and reference materials.

I am interested in a meditative approach to painting and have
studied and practiced Zen, Tibetan, and Native American techniques for twelve years.

Surface is of major importance to me in painting in oils; scale, the use of metallics and archetypal imagery are also factors in expressing my perceptions of space. I am also drawn to images that repeat themselves in nature (micro- and macrocosmic) as well as prehistoric past and the present.

I believe my painting is complimentary to other space art although I would not call myself a strict realist (more abstract and expressionistic if terms apply). I am very interested in joining IAAI and showing with the organization in upcoming shows. I found the Vernal Equinox issue of PARALLAX very interesting and useful and I look forward to the prospect of personally meeting other space artists and seeing their work rather than just admiring it from afar.

Judy Asbury
Ponderosa, NM

* * *

Congratulations on the growth of PARALLAX— I enjoy hearing what all my space at friends are up to.

I'm glad that Science Digest gave me the opportunity to work with and then become friends with such a talented and committed group of artists. Space art was a foreign land to me, and I enjoyed the education you all gave me. I'm glad in return I was able to give you a showcase for your art. I'm sorry that doesn't exist any longer, but I can still give moral support through the IAAI. The OTHER WORLDS poster hangs in my office for all to admire.

Kim and Andy dropped into New York and we saw Pam's show at the Hayden. We enjoyed the reunion and the show was beautiful. It would be great if PARALLAX could alert members to shows like that—I had no idea the show was there.

I'm in the midst of planning a trip for myself to Australia in October—it's been a longtime dream. Is there any one or group I can contact while I'm there for the IAAI for a possible future workshop? If so, let me know.

Mary Zisk

[Editors Note: We didn't know the show was there either; we do, of course, dig about to get and publish the latest news. We'll also try to find out who in Australia is involved with astronomical art. Any help, IAAI members?]

NEWS BITS

Invitation to Exhibit at Brunner Gallery

The Brunner Gallery and Museum and the Astronomical Program at Iowa State University will present a national juried exhibition of works inspired by astronomical images and theories. They invite all interested artists to submit entries to this exhibition, titled IMAGES OF THE UNIVERSE: THE ARTIST'S VISION.

A total of three entries, in the form of slides, may be submitted, and all must be original and completed since 1990. All media are acceptable. Slide entries are due no later than January 10, 1986.

Running concurrently will be IMAGES OF THE UNIVERSE: THE SCIENTIST'S VIEW, a permanent multiprojector slide exhibition of images which are "produced by scientists for scientific purposes". A total of ten images may be submitted.

If you are interested in either exhibition and have not received the complete prospectus, please contact:

Brunner Gallery and Museum
Iowa State University
Ames, Iowa 50011
(515) 294-3342

International Space Art Day Proposed

Members of the IAAI Steering Committee have discussed the possibility of proclaiming a special day devoted to the celebration and awareness of space art on an international scale. At present, we are focusing our attention on March 5. In 1979, this was the date of Voyager 1's encounter with Jupiter. The space art community was witness to something of a revolution during the Voyager missions, with the sudden increase in knowledge of the outer planets and their satellites. The persistent questions raised have also played a part in keeping our field alive.

We will, of course, entertain members' suggestions for other dates which might be just as important, and we encourage your feedback.
Many IAA members have reported payment and reproduction rights problems dealing with Smithsonian Books over the production of *Space Time Infinity*. Artists represented in the book have been given conflicting information as to when they would be paid; none we have spoken with have been paid as of August 5.

Your PARALLAX editors may be a bit more unfortunate than most. Our painting of the Hubble Space Telescope, which first appeared in the July 1983 *Science Digest*, is reproduced on page 198. Mysteriously, our same telescope appears on page 248, in a different painting. This was not simply a case of separate renderings based on a NASA-type diagram; the original view was obtained from a scratchbuilt 1/20-scale model. The culprit has been dealt with; our advice to other artists: beware of thieves bearing X-acto knives.

Midwest Space Development Conference

The Marcum Center at Miami University will be the site of the first Midwest Space Development Conference to be held September 27-29, 1985 in Oxford, Ohio. Speakers will include representatives from NASA, universities, Space Studies Institute, and private industry. For information, write to:

Midwest Space Development Conference
2720 West 40th St.
Lorain, OH 44053

JPL to Launch Exhibition, Collection

The Jet Propulsion Laboratory in Pasadena, California is inviting space artists to contribute photographic copies of their work to hang in the mission operations facilities.

Joel K. Harris, Information Coordinator for the Project Galileo, writes:

The incentive for your involvement is that there is a continuous flow of professional and scientific leaders from around the world visiting here at JPL, and your work would thus be constantly on display to this audience. With the upcoming Voyager/Uranus Encounter, and the Galileo mission about to launch, your displayed work would receive even greater public exposure than normal. Your participation is voluntary. Please note, however, that JPL cannot pay you for copies of your work. We ask you to consider the extensive exposure you'll receive as "remuneration" in lieu of money.

Harris requests that interested artists submit 2-3 slides for consideration before having final photographic prints (16"x20" desired size) made up. JPL will matte and frame the selected prints. With regards to copyright, JPL will insure that none of the artwork will be reproduced without permission while in their possession.

For complete details, please write to:

Joel K. Harris
Information Coordinator/Project Galileo
Jet Propulsion Laboratory
California Institute of Technology
4800 Oak Grove Dr.
Pasadena, CA 91109

Griffith Exhibit Area Available

The Griffith Observatory has a large display case available for exhibitions of space art. IAA member Robert Kline, who works at the Griffith, tells us that the facility is always looking for quality work to present to the public. The case measures approximately 48"x96"x18", totally enclosed to guard against curious fingers. If you are interested in exhibiting your work at the Griffith, contact:

Robert Kline
18961 Florida St., #7
Huntington Beach, CA 92648

Volcanologist Injured in Hawaii

Membership Secretary Maralyn Vicary sent us a short article from the Flagstaff, Arizona Sun, along with a note telling prospective Hawaii workshop attendees how exciting things are on the islands. We quote excerpts from the article, dated July 28:

A well-known U.S. Geological Survey volcanologist,
George Ulrich, is recovering from severe burns on his legs suffered June 12, when he fell through a crust into a pool of boiling lava near an eruption in Hawaii.

Ulrich apparently was making a routine check of lava temperatures at the erupting [Kilauea] volcano when he fell through the lava crust and into a pool of hot lava beneath. An assistant noticed the 51-year-old scientist's plight and rescued him from the pool...and he was transferred from the eruption site to a hospital in nearby Hilo.

Ulrich was wearing protective clothing at the time of the accident. USGS officials credit that with preventing more serious injuries. He is due to be released from the burn center within the next two weeks.

This is not meant to give the impression that we are likely to be as near to danger as the scientists undoubtedly are. Rather, it allows us to appreciate the work that they are doing to add to our understanding of geological processes, which in turn helps us in our artistic efforts.

Transfer Paper Find

From Maralyn also comes word of a particularly useful art material:

I've discovered some transfer paper that is very good for tracing spacecraft or whatever hardware onto your already-black skies. It is SARAL transfer paper from S.B. Albertis Company. It comes in rolls or sheets, in yellow, white, graphite, blue, and red. It is not waxy like sewing-pattern tracing paper, and you can erase it! It is great if you have a diagram or blueprint of a spacecraft that you want to transfer to your painting. If you can't find it in your own art store, I can always get it for you; it costs about $7.00 per roll, plus postage [Maralyn's address is on the inner front cover. *Editors].

Neutron Star Colors

Dr. Robert Forward, senior scientist at Hughes Research Labs and science-fiction author, sent us some information dealing with life on a neutron star:

In preparation for my novels DRAGON'S EGG and STARQUAKE, I spent some time trying to envision what things would look like on the surface of a neutron star. A typical neutron star is hotter than the sun and all the colors are broadband emission "colors". That means that they all are "white" with the cooler objects being reddish white, like a charcoal ember, medium temperature objects being yellow-white, like the sun, and hotter objects being blue-white to ultraviolet-white.

The spectrum for different temperatures in shown in Figure 7 in the technical appendix to DRAGON'S EGG. The topside of objects that are facing the dark sky would be cooler (redder) than the sides that see the glowing neutron crust or other objects. The inside of a cave or a cavity in a body would be a thermally emissive "black body" and would be bright, not dark.

I attempted some paintings to guide me using fluorescent paints and did poorly, but did much better for the book cover on STARQUAKE, which shows the aliens battling on the surface of Egg, but still you can find subtle flaws in the colors because of the limitations of the medium and the force of habit of living in a reflective spectrum world instead of an emissive spectrum world. I guess the only way to really see what it would look like would be to build a massive charcoal fire, blow lots of oxygen to it up through a grate until it got white hot, and then put in alien models made of tungsten or ceramic and look at the result through a neutral density filter.
Archivist's Report

The system for having an archive is all set up, but there is so little in it that it is not of much use to anybody now. I would like to make it a real resource for IAAS, but I need more artists submissions and land formations. There are quite a few from Death Valley, Mike Carroll is donating a lot of his Poor SutaiSSiOlS so little in ... to audio of our resources like to rool.erial , if $ .60 , copies ; x e r oxes feel for interest to those for Archivist 's Report anybody Archivc m.Jterials The System thanks ! Laurie Ortiz Thanks! [Edi tors have 4 slide s anyb:xly [Em thanks . Kim] . and anyb:ly what. anyb:ly is available . We <lnticipate p,ililishing <IS ... 20 Mule Team Canyon Golden Canyon Amargosa Hotel Devil's Golf Course Mud Formations (Cracks and craters in dried mud) Road to Furnace Creek Ubehebe Crater Sand Dunes The files could use more of Ubehebe Crater and the Sand Dunes, if anybody has any extras or can let me borrow them long enough to duplicate them. If anybody desires copies of anything, the duplicating cost is $.60, plus postage. I will be giving Rick black & white photos of some of our resources in the future to print, so everyone can get a feel for what is available. Thanks! Laurie Ortiz

[Editors Note: The Archives is also looking for other material, from newspaper and magazine articles on space art and artists to scientific references to audio and video tapes of interest to IAAS members. We won't ask you to part with your only copies; xeroxes will be just fine for printed matter, and dupes of recorded items are as welcome. We anticipate publishing a catalog of Archive materials with periodic supplements to coincide with those for the Space Artist Handbook; stay tuned for more information.]

THE KEYBOARD ARTIST

A Computer Simulation of a Volcanic Plume on Io

by Joel Hagen

The parabola, represented by the simplest quadratic equation (y=x²), can be a useful graphic element for the computer-oriented artist to explore. This shape occurs frequently in physical phenomena from ballistic trajectories to theoretical curves of Antarctic ice sheets. It is a handy tool for representing the volcanic plumes on Io.

Many of Io's photographed plumes of volcanic gas and dust show a beautiful symmetry characteristic of the non-explosive, fountain-like nature of the eruption, Io's lack of appreciable atmosphere, and the satellite's low gravity (1.8 m/s/s, about 1/6 Earth gravity). The high velocities of the ejecta (500 to 1000 m/s) can raise umbrella plumes 300 km or more above the surface of Io. Creating our own idealized representations of these plumes can add to a better understanding and interpretation of the Voyager photographs, and enhance our ability to render them in paintings. With a printer, it is even a simple matter to generate templates for laying in the initial profile of a plume.

The method I will outline here is simply to generate parabolas from the same point of origin repeatedly, using a constant ejecta velocity. We start at the minimum angle of ejection and continue to draw parabolas at 5 or 10 degree increments, past the vertical, until the same minimum angle is reached on the other side. Each parabola is essentially a ballistic trajectory with only the "launch angle" changing. The cumulative profile of these trajectories is our idealized plume cross section.

For the basic method of drawing curves using program loops, see the Death Valley issue of Parallax. I will use the following abbreviations:

\[
\begin{align*}
\text{A} & \quad \text{Angle} \\
\text{D} & \quad \text{Distance} \\
\text{G} & \quad \text{Gravity} \\
\text{TA} & \quad \text{Time Aloft} \\
\text{H} & \quad \text{Height} \\
\text{I} & \quad \text{Increment} \\
\text{T} & \quad \text{Time} \\
\text{V} & \quad \text{Velocity}
\end{align*}
\]

Io's gravity is 1.8 m/s/s. We will use an ejecta velocity of 500 m/s. The minimum angle of ejection is thought to be about 55 degrees.

The following formulas are relevant to the plume
characteristics:

**HEIGHT OF PLUME**
\[ H = \frac{V^2}{2G} \]

**MAXIMUM DISTANCE OF EJECTA FROM VOLCANO THROAT**
\[ D = \frac{V^2}{G} \sin(2A) \]

**TIME ALOFT OF ANY GIVEN PARTICLE**
\[ t_a = \frac{V}{G} \sin(A) \]

Now we do the representation by plotting or drawing to \( x,y \) coordinates repeatedly in a program loop for each parabolic trajectory. Each \( x,y \) point is derived by the following formulae:

\[ X = V \cos(A) \cdot T \]
\[ Y = V \sin(A) \cdot T - 0.5G \cdot T \cdot T \]

Each time through the drawing loop for the parabola, increase Time (\( T \)) by an Increment (\( I \)). This can be one second, ten seconds, or any practical increment you choose. In my program, \( I = TA/10 \) as part of a self-scaling feature I use to keep the speed of plotting reasonable no matter what the data are. Figure 1 shows a schematic of the plume profile done by drawing the line of the parabola and increasing (\( A \)) ten degrees each trajectory. Figure 2 shows a more interesting representation by plotting points along the parabola and increasing (\( A \)) only two degrees each trajectory. In addition, the plotted points in this figure are not on the true arc but are drawn randomly within a circle centered on each true point on that arc. This "territory of randomness" is a circle of radius \((D/20)\), another part of the self-scaling feature.

Remember in drawing these shapes to use a screen height correction factor on each \( x,y \) coordinate, since screen pixels are taller than they are wide. Most printers do not suffer from the same distortions as monitors and you must set that factor back to 1 to get accurate printer plots.

Photos of Pele and Prometheus on Io are excellent references once you get your program going.

**LOGO!**

This issue's LOGO! comes from Dennis M. Davidson, a former medical illustrator who moved over to the aerospace field. He currently resides in Del Mar, California.
A Conversation with Rich Terrile

Dr. Richard J. Terrile should be a familiar name to any space artist who has researched and painted the outer planets. He is Acting Team leader for the Optical and Infrared Astronomy Group at JPL and is principal investigator on three programs in planetary astronomy, planetary atmospheres, and planetary geology. He is a member of the Voyager Imaging Science Team and is involved in the study of Saturn's rings and their interactions with Saturn's satellites.

He is also a devotee and supporter of astronomical art.

PARALLAX: Why do you believe that space art is important, and how can the space artist help the astronomical community?

Terrile: I personally think it's incredibly important for several reasons. One of them is that we do a lot in science, and it's funded by the public, yet the public very rarely gets a chance to reap the benefits of it. We do exploration with our spacecraft and come out with some rather esoteric ideas about the way things are on other planets, yet we don't always have images of them. It's through the space artist that we can convey these esoteric ideas into real pictures of the things that people can actually realize and enjoy. The space artist in the past translated science fiction ideas into visual images. Nowadays, the space artist can actually convey reality into pictures. For instance, some of the satellites around Jupiter have actually exceeded people's imaginations. Io, a satellite where erupting volcanoes occur constantly, has a surface whose geology changes on the time scale of human lives, rather than millions of years. We forecast the weather on our planet, but if people lived on Io, they'd be forecasting the geology. It's only now, through space art, that we can put these ideas on paper. I've had the pleasure of working with several space artists in my work, in helping out on different movies and books, and it's an extraordinary feeling to have a visual conception of something you've worked on and studied, to have that "taken out" of your brain and put on paper. I don't have the talent to draw, but you guys do, and I think that's a very important connection, to connect the scientist with the artist.

PARALLAX: What do your colleagues feel about that connection?

Terrile: Well, I think there's this old school of "ivory tower" science which feels that science should be done and to hell with everyone else. Scientists have come to realize that this really does not serve any purpose. It certainly doesn't help us, because it's always best to convey our ideas; it pays to advertise, more or less. Funding comes from the government, and the more the public is concerned about science, and is aware about science, the better off we are. The new feeling in scientists, both old and young, particularly the younger ones, is that it really is important to get your ideas to the public. That's not only in space art, but in writing popular articles. There's no better way to convey an idea than with a picture.

PARALLAX: Can the space artist play a role in the actual scientific investigation process, or must he/she wait until all of the data has been analyzed?

Terrile: There are many stages of space art. The people who map the satellites, the cartographers, people like Jay Inge, are a very important part of the science. They interpret the photographs, where you've got a non-uniform data set, and create a map which looks fairly uniform. That's certainly a mixture of art and science right there. There's a gradual blending-in of this. Occasionally, we have to convey an idea. You can't see a magnetic field, but an artist can draw, conceptually, what a magnetic field looks like, and where the interaction points on the spacecraft are with the magnetic field. A second way in which this is done, and I don't know how much you want to consider this art, but the field of computer graphics is becoming very important in planning a spacecraft encounter. There's no better way to picture what you're going to be looking at than to have a model constructed in the computer to show you what the geometry is. You can see things in those images that you just can't visualize mentally. In turn we can give those same geometries to people painting pictures of, say, Saturn and the rings, and their shadows. So it comes full circle.

PARALLAX: Is space art helpful to you in getting an idea across to your colleagues?

Terrile: I think a picture often really helps. It certainly helps the attention span; it's often difficult to get through a long description of something. It's a lot easier if you have a picture in front of you which has all the elements you're trying to talk about.

PARALLAX: Could you tell us about some of the upcoming events with which you're involved?

Terrile: I'm on the Voyager Imaging Science Team, and we're looking forward to January when we have a close encounter with Uranus, and that's going to be very, very exciting. We know very little about
this planet because it's so far away from the sun. This will give us our first glimpse of what the planet is like, what its extremely dark ring system is like, and what its collection of moons is like. Parallel with that, I'm conducting a program of ground-based astronomy. We're using an instrument called a coronagraph to look for planetary systems around other stars. We've found one so far, around the star called Beta Pictoris. We're excited about looking for others, and we're using the same kind of equipment to build an instrument we can fly on the space shuttle. PARALLAX: What's the latest on the photographs of Uranus? TERRILE: We have both ground-based images which Brad Smith and I have been taking from Chile, and in fact three days from now I'll be going down to Chile again for some more of that. We just got some pictures from Voyager — we've been getting spacecraft pictures all along. In theory, they should be the highest resolution photographs of the planet, since they exceed ground-based resolution. However, they're taken in a wavelength where, in general, we don't see very much contrast, so we haven't seen any features, at least on the Voyager data. We have seen features, though, on some of the ground-based data.

PARALLAX: What resolution are we seeing right now from Voyager? TERRILE: The planet has something like 25 resolution elements across the disk, so there are several hundred resolution elements on the planet.

PARALLAX: What do you expect will be the best resolution on Uranus during the close encounter? TERRILE: Good question. I don't know what the maximum resolution on Uranus is; it's something on the order of 1-10 kilometer resolution. We'll get the same kind of resolution on the rings in the imaging data, and we should get resolution exceeding 1 kilometer on Miranda. We'll make a very close flyby of Miranda.

PARALLAX: What can we expect to see of the surface of Miranda? Will it be similar to Saturn's icy moons? TERRILE: The only thing we can expect during an encounter is that we can expect to be surprised. If there's anything we've learned, it's that. I hate to make any predictions on what the surface will look like. We've seen everything from highly cratered, very ancient terrains, to terrains on relatively small bodies which have been greatly modified by geologic processes we don't quite understand. Miranda fits into the size range where we have seen that kind of modification, so it's anyone's guess as to what the surface would look like. I'd like to step back a second; the artist also serves another very important function. We can understand planetary histories. We think we can derive what they are by looking at the pictures of the surface. Sometimes we understand processes which act on the surface of one planet which are very different from processes which act on our planet. For instance, a typical landscape image on the Earth is dominated by water erosion, even in the driest areas on this planet. I know, because I've been to some in Chile; the driest deserts in the world are there. It may rain there only once every hundred years, but water still dominates the erosion. If you go to other places -- Mars, for instance -- it looks like the dominant erosive factor in many of the terrains is wind. So you can't go anywhere on Earth and take a picture of a terrain which is mainly wind erosion, but you can create that kind of a landscape in an artist's conception. There are ways of showing geological processes where you really don't have a physical model.

PARALLAX: What kind of scientific background do you feel is necessary for a space artist to have? It seems as though we have to know physics, geology, meteorology, optics, and spacecraft engineering all at once.

TERRILE: That's another good question. I've worked with artists in creating models of the Galilean satellites for 2010, and they didn't have any geological background, but it seemed to help to explain to them a little bit about geology and how it works. I would explain about the age of features, how one feature would overlay another, and how the oldest features should be painted first. It seemed to help them, if they understood in a physical sense what kind of geological model they were working on and what the processes were on the surface. The same is true about painting the clouds on Jupiter. It really helped if they understood which colors were the deepest clouds, and which ones were overlaid on top of them. I think they don't have to be experts in the field, but I think if they have a little sense of what's going on, it may enhance the art a little.

PARALLAX: Have you found that different space artists come into an assignment armed with different specialties?

TERRILE: Yes, that's certainly true. You guys have all sorts of backgrounds and interests. Some of you are really good with hardware, some are really good with craters, some are really good with surfaces — some of you are actually really good geologists.

PARALLAX: Do you find it easier working with an artist who already knows the some of the science?

TERRILE: Either way. It's always fun when the person you're working with is also interested in the field and gets excited about it, but if the person doesn't have a background, you do your best to get the person excited.

PARALLAX: We appreciate your taking time to talk to us. Is there anything further you'd like to say?
Terrile: I just want to reiterate that it's important for us to get the message out, and you guys are just great at doing that, perhaps in some sense better than we are. People pay a lot more attention to a splashy picture which looks very realistic, and it's more heartening when it's based on reality rather than just somebody's imagination. It's really a kick to have your brain "read" by somebody and put down on paper.

CompuServe Conference


Dave Smith: I think we've all seen how far computer graphics have advanced in the past few years. Do you feel that c/g is a true art form and to what extent (if any) do you use it?

Rick: I believe that c/g is a real art form, and at the same time I think that the computer can be just another tool, like an airbrush or a charcoal pencil. The hardware and software developed for c/g can, in a way, effect the style of the images produced, but I have yet to see a real limit to what can be accomplished.

Don: Rick has worked more extensively with real c/g systems that I have, but we've been jointly developing programs for home computers that have greatly assisted us in our work. For instance, we have a program that will produce wire-frame perspective drawings of Saturn and its rings from a given point in space. It's been a real time-saver.

Rick: We've even produced programs for something as small as the HP-41C which will, when connected by HP-IL loop to a 7470A plotter, draw the angles of Saturn that we want. I borrowed a 7470 from HP for a few months to try the programs out. You should have seen us bouncing about the room when the pens went zipping over the paper the right way!

John Young: Blatent curiosity... how do you receive an assignment from a magazine, film, etc.? Do they contact established artists or do you hear of a project and apply?

Rick: Well, first you mug an editor on his way to work. Seriously, you can submit a series of 35mm slides of your work or tear sheets of published pieces and by all means send a well-written resume.

Don: An advantage to being in such a specialized field is that we have a scarce commodity. Many art directors are surprised to find that images of Jupiter as seen from its moons are available!

Rick: As far as film goes, it helps to be in the IATSE, the International Alliance of Theatrical Stage Employees, the largest union in Hollywood. This is not to say that a newcomer can't find stimulating film work. There are plenty of independent production companies all over the country, and they all require the services of an artist at one stage or another. One of the tricks (a tip, really) is to make your presence known. No one will hire you if they don't know you exist.

RWJ: Do space artists use U.S. Geological Survey maps as research material?

Rick: We can take a map or controlled photomosaic and plot a hypothetical POV (point of view), and then project the different features onto an illustration board. Some of the best maps, of course, are produced by some very talented artists at the USGS at Flagstaff, Arizona, particularly Jay Inge and Patricia Bridges.

Don: As far as using projection techniques goes, often we simply "eyeball" the perspective, using the map as a guide to placing the features.

Thomas Hess: As artists, we're curious...do you find that prices for your work are based on what the market will bear, or are there set standards in force for classes of illustration?

Rick: Many publishers have set prices, others will dicker. That's for the publishing field. Collecting is another story. Each market is something the individual artist has to scout out and see where the prices are going. You find that you're overpriced when no one is buying!

Don: One good way to get a feel for the market is to attend a major SF con and look at what the pros are asking (or getting). I grossly underpriced my stuff the first time out.

DeLoach: I understand, Rick, that you served as "planetary map artist" for The Last Starfighter. There were some complimentary remarks made here in SpaceSIG about your work on that film before anyone knew the artist was lurking among us. I wanted to ask exactly what a planetary map artist does, and if you used some of the techniques you mentioned in answering the recent question about using maps in general.

Rick: First off, I want to say that I had the pleasure of working with Ron Cobb for some 8-9 months on that film. Ron, you may know, was responsible for much of the design work on Alien and other SF/fantasy films. Ron and I both get AVWeek and are in love with the science in science fiction. Anyhow, working from Ron's basic ideas about the look of the planets and moons, I painted a
set of flat maps, each measuring 14"x28", divided into 10 degree squares; 360 around and 180 top to bottom. The Cray 1 at Digital Productions wrapped them into spheres. I didn't use the same techniques mentioned, but did use my knowledge of what the alien planets and moons were "supposed" to look like to render the features.

RWJ: If you started with a flat (Mercator?) projection and the computer wrapped it into a globe, how did you handle the polar distortion (I was a cartographer)?

Rick: With great difficulty! The entire length of N and S poles were crushed down into single points, so I had to be careful to paint a single band of color within 10 degrees of the poles. Jim Blinn of NASA/JPL ran into similar problems with his Voyager animation and I'm sure the programmers at Digital got their algorithms from his work.

RWJ: What did you think of the Genesis Effect in Star Trek II? Well done?

Rick: From a technical standpoint? Yeah, I think so. The c/g guys at Lucasfilms did a pretty nice job with a combination of paintbox program, wireframe pencil test, particle system animation. Actually, the whole sequence was darned amazing when you consider that a few years before it would have taken a flock of animators months to get the same result.

RWJ: Considering the advances being made, do you think there is a danger of computers replacing human hands in cinema and magazines. I saw photos of city skylines altered in a science mag that were incredible!

Rick: I don't believe the human hand is in danger; we'll still squeeze out tubes of paint and drag a charcoal stick across paper because it feels good. The computer is good for some things, others not so well-suited. Soft things, for example, aren't rendered well at this point, but if the simulation guys keep it up, every texture in the known universe will be packed away in somebody's database.

Don: I recently played with a program called "Doctor Halo" on a modified IBM PC that gives a hint of what may be on the horizon in a few years. The program came close to turning the CRT into a piece of illustration board. I was really able to feel that I was painting with it. Unfortunately, it still doesn't have sufficient resolution to produce the sort of photorealistic effects we can achieve in an illustration by painting.

Rick: The Cray XMP at Digital Productions, a step up from the Cray 1 they used to have, can render pictures at 4000x6000 pixels, more than enough to beat the grain of the film used to photograph them!

RWJ: I think hi-definition TV is approaching 35mm.

Rick: So, it won't be long before we artists can take our notebook terminals and sketch in the wild, save the picture on a built-in laser disk, or beam the image by satellite back to the studio.

RWJ: Laserdisc doesn't smell like oils, though.

DeLoach: It is going on half-past midnight here in the east and I think we ought to wrap this one up. I want to thank our guests for an extremely interesting CO.

Here is a sample of something you'll see in the Autumn Equinox issue of PARALLAX. This is a plot of Comet Halley in the Hawaiian night sky on March 30, 1986, at 2:15 a.m. Clearly visible around Halley are the moon, Neptune, Mars, and Uranus, as well as numerous deep-sky objects. We will have a review of the computer program that made this plot, an interview with artists at the USGS, more workshop news, tips and techniques, and all of our regular features.
Techniques I

Part II of the instructive series Light, Shadow, and Perspective.
by Ron Miller

Cast the grid at the right into perspective to accurately locate points on circle...

Note difference in widths about 2/3 distance from center

IMPORTANT NOTE
Concentric circles are not represented in perspective by concentric ellipses.

This is wrong Each ellipse will have its own center...

A, B is the center line of the ellipse, but not of the circle. If it is used as the center for smaller, concentric circles serious distortion will result.

Note that where A is longest in the circle, B is the longest in perspective.

light direction

terminator

the "longitude" lines can be arbitrary

only the portion of the ring between the dashed lines is casting a shadow on the planet

1. Establish "longitude" lines on both views, polar view first
2. Extend lines across rings
3. Where lines cross rings, raise verticals to meet side view of rings at top
4. From these points draw diagonal light rays to meet side view of longitude lines

Approx. 3° light angle

Approx. 17° light angle

A-Major axis, large ell.
B-Major axis, small ell.
The Tool Kit

conducted by Don Dixon

Optimizing the Paasche AB

The AB airbrush is among the space artist's most useful tools, but it is also one of the most difficult to master. Few of the airbrushes come from the factory in immediately useable condition; while shopping for a new AB, I found only one in five whose airpipe was directed anywhere near the color cup. Almost invariably, the airpipes must be bent inward before paint can enter the airstream. Even after this problem is solved, the new user is confronted with several other controls that must be set properly before the AB will begin to perform: turbine speed, color cup angle, color cup/nozzle separation, airstream volume, needle curve—all of these must be adjusted. This is an arcane art, too complex to discuss here, and the best advice to a new user is to find someone to demonstrate the process.

Even after the AB is properly adjusted, however, it may still frustrate the artist's attempts to create pencil-thin lines. More often than not, the needle is the culprit. The AB needle is rotary ground, in effect, turned on a lathe, to produce a sharp (and fragile!) point. This rotary grinding creates striations that are at right angles to the shaft. These striations act rather like the furrows in contour plowing, in that they retard the free flow of paint toward the tip. Pigment gradually accumulates on the needle, necessitating frequent removal of the needle for wiping. During this cleaning, the point may be damaged, producing a hook that disastrously affects performance. The result of all this is that AB needles tend to be short-lived and perform poorly.

The artists at Jay Inge's office at the USGS in Flagstaff, AZ, have custom-polishing AB needles for years. It is a simple process, and well worth the investment in a Dremel power drill (about $80). The Dremel is used extensively by model makers for fine drilling, sculpting, and polishing. The variable-speed model comes with a wide selection of drill bits and polishing tools, including the sharpening stones required shaping AB needles. Here's one way to do it:

1). Insert the tail end of a new AB needle into the four-jawed grip of a standard X-acto knife handle. With the jaws screwed tight, you can easily manipulate the needle for sharpening.

2). Attach a sharpening wheel to the Dremel. Lay the Dremel on your work surface with the business end pointed to your left. A folded towel under the Dremel will minimize vibration and keep the Dremel in place (make sure the wheel spins clear of the towel, of course).

3). Start the Dremel at a fairly low speed setting (1 or 2 on the newer models).

4). Using some sort of magnifier to monitor the proceedings—a jewelers loupe or camera lens—carefully begin polishing the AB needle against the upper rim of the spinning polishing stone. Hold the needle so that it points away from you in the direction that the wheel is spinning. Slowly rotate the X-acto handle so that the tip of the needle is polished uniformly.

The object of all this is to replace the factory-ground striations with striations that parallel the shaft of the needle. These will help paint flow more easily toward the tip. With practice, you can also create a very sharp tip that will allow you to airbrush extremely thin lines.

Like everything else involved with the AB, this is an art, more easily described than done, and a lot of trial and error may be necessary. A nicely polished needle, however, can be used for hours without excessive paint buildup, thereby minimizing the down time due to cleaning. I've also found that putting a polish well up along the shaft makes the needle oscillate more freely within its guideway, so that lower air pressure can be used to spin the turbine.

Press Liaison Andy Chaikin reports that he will soon be sending all IAAA members copies (tear sheets) of a Sky and Telescope magazine article of particular interest to space artists. The article, What Color is the Solar System? by Andrew Young, examines the problems encountered in portraying the colors of the planets and their satellites, as well as the asteroids.
Techniques II

A Spin Table for Astronomical Art

by Robert Kline

Reading Rick Sternbach's article, A Simple Airbrush Compass (Vernal Equinox issue of PARALLAX), gave me an idea. I needed to make a top view of Saturn for a planetarium show and we know that thousands of ringlets make up Saturn's rings. What was needed was a fast and efficient way to make planetary ring systems and other astronomical and atmospheric effects, with little "down time" constructing a new specialized setup, at low cost.

An old record turntable turned out to be a good solution. All that was required was one with a working motor, preferably with three speeds, 33, 45, and 78 RPM, and some imagination. Only minor modifications were necessary; these were removal of the center spindle and tone arm. Some turntables have removable spindles. The one I found did not, so it was cut with a hacksaw blade (Fig.1).

If you cannot easily find an old turntable, the good one that you have can be used by constructing a spacer box, from illustration board or foam core, to clear the spindle and tone arm. This spacer can be taped securely to the platter.

Once a turntable is ready, you can apply the painting surface. The best way to keep the painting on the turntable is double-stick foam tape 1/16" to 1/8" thick, 1/2" to 1" wide. This can be found at most art supply stores (Radio Shack is another source). The standard thin double-stick tape has poor contact between heavy illustration board and the turntable platter and the painting has a tendency to fly off unpredictably while you are working, especially at 78 RPM. One advantage to the turntable setup is that since it is horizontal and turns at low speeds, combined with the high-tack foam tape, you can paint circles, arcs, and spirals far from the center of the painting. Arcs can be done by manually rotating the platter back and forth.

For the top view of Saturn, a ruling pen and airbrush were used. One problem cropped up; the board was 18"x24" and Saturn was off center by 3", which made the board swing out a 30" diameter circle. This made it difficult to reach and hold a steady hand at the center of rotation. The solution was a stack of books on each side of the turntable topped by a "x2" board long enough to span the entire swing of the painting (Fig.2).

The ruling pen was used first. To make the most realistic-looking rings you need to get the finest line possible without skipping. Acrylics can be used in a ruling pen if thinned out to the proper consistancy. The smooth-surface illustration boards, such as Crescent "Line Kote" or other hot press boards,
produce the best results. After the rings were drawn a frisket was placed over the painting. Then very light translucent airbrushing was done. Since this was a polar view, even the banding on the planet was airbrushed. It is important to note that you should experiment on scrap board to get a feel for the technique before committing to the final artwork.

Many other effects can be produced, such as 22° halos and arcs or, in the case of newly-formed stars in nebulae, halos which are too small for a compass.

Use your imagination.

**Call for Submissions**

The IAA is looking for a design for a membership card. The card, which will be issued annually and will acknowledge the fact that you are a member in good standing, should provide the following minimum features:

- Space for Member name (typed)
- Space for Member Signature
- Calendar Year
- IAA logo and Organization Name
- Member Number

Be creative. Don't hesitate to suggest paper stocks or colors, and feel free to work in interesting graphic.

Readers interested in submitting sketches for this card should send them to us here at PARALLAX. Deadline for submissions is December 1, 1985.

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**Workshops**

Late news comes from Bill Hartmann, coordinator for the Third IAA Workshop and Conference. Within the next few weeks, Bill will send out an informational mailing to all paid-up 1985 IAA members who have responded by returning their blue cards. If you did not receive a blue card and wish to attend, please let us know here at PARALLAX as soon as possible. The number of attendees will be limited.

A deposit of between $100-150 will be called for, possibly no later than November 1, on a total fee estimated at $300.00. Exact amounts and dates will be announced. The fee will cover housing, food, and transportation around the island. Transportation to Hawaii is not included.

Bill is preparing a tentative program of events for the workshop at this time. Surrounding Magma House, our base at Volcano National Park, are analogues for Mars, Venus, and the Moon. These areas will visited during trips for sketching, painting, and photography.

The night skies will feature a variety of objects and phenomena, especially the return of Comet Halley. During the workshop dates March 23-April 5, the comet will rise around 2 a.m. and reach an elevation of roughly 30° before 6, when the sun will wash out the background. Uranus, Mars, and Neptune will be in the vicinity of Halley, and the moon will be close by around March 30.

One of the activities we may undertake is a trip to the observatory at Mauna Kea, whose 14,000' summit is topped by a number of large (88-100") telescopes. There is a state park facility at 9000', where we might camp overnight. Preparations are still being made, but there is a chance we may get to view the heavens through a 24" instrument. The best views of the comet, however, are through binoculars, according to Bill. He suggests 7x50s for seeing the tail. Bill emphasizes that while exciting, the Mauna Kea trip should not be considered the central feature of the workshop or our observing time. He tells us that "the area around Magma House should be plenty dark for casual night to night viewing."

Since this is a professional conference, the costs to the attendees should be tax deductible.
ARTISTS BROCHURE

In the past few months, several people who have seen the OTHERWORLDS show, or read about the DAA, have called or written to enquire about the availability of original art, prints, or a catalog. We'd like to compile something to send out in response to these enquiries. A black & white brochure (on glossy paper if the budget runs to that) containing artists' names, addresses, short bios/statements & a representative piece of art from each artist seems to be a reasonable solution. We'd like to get to work on this as soon as possible, so please get back to us immediately if you want to be included. The brochure will, of course, carry proper copyright notices. If you are interested, please send a glossy b&w photo or a halftone stat (see specs below) of your piece of art, the address (and/or phone #) you want to use, and whatever text you'd like included. (Please limit text to 200 words.)

DEADLINE FOR THE BROCHURE IS NOVEMBER 1, 1985!

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General Artwork Specifications:

Artwork can be black & white inkwork or computer printout, in the form of original, photostat, or clean xerox. Paintings should be submitted as glossy black & white photos, or as halftone stats at a density of no more than 160 lines/inch, and should be trimmable to exact publication size. For PARALLAX that is 4.5 x 7.5 inches or smaller; for the brochure, we'd like your art to fill one quarter of an 8.5 x 11 inch page, allowing for half inch margins. Vertical and horizontal formats are acceptable.

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CHANGING ORBITS:

As of August 16, the Planetary Society has moved to:

65 North Catalina Ave.
Pasadena, CA 91106