THE HISTORY OF THE INTERNATIONAL ASSOCIATION OF ASTRONOMICAL ARTISTS, PART I

by Michael Carroll

It all started back in 1981 during the Voyager 1 encounter of Saturn. The IAAA had its genesis in an art show sponsored by the Planetary Society. "Planetfest" was to be the biggest and best astronomical art show of its time. To accomplish this feat, a list of artists who had been involved in the acclaimed PBS series Cosmos was compiled by the Planetary Society and given to the co-chair of the art show, Judy Teitelman and me. We added artists from magazines such as Astronomy, Omni, Science Digest, and Sky & Telescope. In all, the list grew to about fifty invited participants. During the night of the show's opening, which was concurrent with discussion groups led by Carl Sagan, Bruce Murray, Ray Bradbury, and others, the artists who attended were invited to a rendezvous at Judy Teitelman's home. It was there that Dr. William K. Hartmann brought up the possibility of having a space artist's workshop in Hawaii. The idea was well received.

Being the man of action that he is, Bill Hartmann put together the first Space Art Workshop on the island of Hawaii in June of 1982. Nine artists from the United States and Canada attended. Some were highly skilled professionals. Others were just getting started. All learned valuable lessons and made new contacts and friendships. The workshop was covered in several magazines, including Science Digest, Sky & Telescope and Astronomy.

In December of 1983, a second workshop was held in Death Valley, California. It was larger in scope, attracting 19 artists. As in Hawaii, emphasis was on geology of the area, critiques of work and learning from nature how to paint convincing landscapes of other worlds. It was at Death Valley that the IAAA was organized into a recognizable form. The leadership was a steering committee of three: Marilyn Flynn was membership secretary, Asemaph Hammond was treasurer, and Laurie Ortiz was archivist.

As word got out, more artists joined IAAA. The "international" part became more and more a reality as people from Saudi Arabia, the Netherlands, France, England, and the

(continued on page 11)
THE ART IN SPACE ART

by Ron Miller

It is a worthy and necessary ambition to try to obtain recognition of Space Art as a legitimate school of painting (I'll ignore for the moment the questions: Recognition by whom? Legitimized by whom?). Is Space Art now, or on its way to becoming a genuine school — like the Ash Can, Hudson River or Dadaist Schools. Or if not, what are its chances of becoming one?

What of artistic schools? The Hudson River School, which Space Art most resembles in spirit, was very much an after-the-fact affair — many of its member artists had no idea they were members. Most had never seen the Hudson River. Space Art is far too cliché and too specialized for anyone not to be aware that they are Space Artists. The artists of the Brandywine School were all students or followers of the work of Howard Pyle. While few Space Artists have not been inspired by Chesley Bonestell, I think we have all developed too individually to be compared with the Brandywine artists. We must not confuse similarity of theme with similarity of technique or attitude. The Pre-Raphaelites set out from the very start to found a new school of painting. They were small in number and shared many of the same ideals, while their expression of these ideals was individually different in technique and theme. Perhaps this is Space Art's position. We are still a small enough group to attempt a definition of what we are attempting to do — or better yet, of what we think Space Art ought to be attempting to do. Herein lie difficulties that may be unsolvable: how important is the representational aspect? Can we and should we make room in our definition for the abstract, semi-abstract and surreal painters? If we do, what then of the importance, if any, of the scientific content of the art? In my opinion, it is possible that too much stress is laid on the science in Space Art, to the extent that I feel that occasionally artistic content is given only secondary consideration. Even if the two balance, is it still Art?

There are exceptional artists doing exceptionally beautiful medical illustrations, but there is still a great deal of difference between an illustration of the muscles of the human head however well done — and a portrait by Sargent. Is Space Art simply creating pictorial equivalents of the diagrams and graphs in a scientific paper, or is it contributing something to the understanding of the universe that scientist cannot? If the former, then we have a long way to go. If the latter, then we're almost there.

The Impressionists were scientific painters: they were deeply involved (though perhaps not so deeply or fanatically involved as Seurat) in the physics of light. But not just the physics but the physiology of light as well. Not just what it did within and because of the atmosphere, but also its affect on the person watching. Looking at one of Monet's paintings, one not only says, "Ah, that is just what the cathedral would look like on a dusty summer afternoon," but also, "That is just what it would feel like to see that cathedral on a dusty summer afternoon." Perhaps in Space Art it is not enough to be able to point to a picture and say, "That is exactly what Saturn would look like from Rhea and that is just what the ground beneath your feet would look like." Only half the job would have been done.

A corollary problem is that Space Art often seems to depend too much on its own novelty. That is, just showing a unique landscape or sky, and being able to say that is represents some place real in the universe, cannot replace good painting or make up for bad painting. The novelty of the subject or its scientific verisimilitude cannot carry the full load. After all, someday these views will no longer be unique — and all that will be left is a bad painting.

What Space Art needs to do more than anything else is to produce artists of the caliber of, say, Moran Bierstadt, Church or Cole. Space Art needs its Monets, Manet's, and Reanoirs, its Dalis, Tangays, and Magrittes, its Wyeths, Schoonovers, and Parrishes. Then it can be considered on a par with the Impressionist, Surrealist, Brandywine, or any other "school" of art.

LEONARDO

AND A CREDO FOR SPACE ARTISTS

by William K. Hartmann

Recently I rediscovered the fact that Leonardo da Vinci (he of keen interest in everything) had written a treatise on painting. Many of Leonardo's writings and musings are lost, but a trip to the library netted me a translation and reconstruction of Leonardo's painting book. It is full of interesting thoughts, by one who saw the Earth in the 1500s the way we are seeing the planets now — afresh, with eyes full of wonder, and a mind asking how these things got to look this way. Among sections on anatomy and how to draw faces, you will find extraordinary pre-
LEONARDO, con’d.

physics discussions of atmospheric perspective and why distant mountains look blue; and discussions of the shapes of mountains, tones of clouds and fog, and impressions of water spray.

Amidst all this, I discovered a passage that partly sums up, for me, what space art is all about:

The divinity inherent in painting transmutes the painter’s mind into a resemblance of the spirit of God [read as nature if you like — W.K.H.], for with free forcefulness it gives itself to the creation of diverse things...landscapes; fields; landslides in the mountains; frightful and appalling places that terrify those who see them; or instead, delightful places, soft and pleasant meadows of many-colored flowers, swayed by soft waves of breezes, watching the winds flee; rivers that descend from the high mountains with the force of great floods, dragging along uprooted trees wildly mixed with stones, roots, earth, and foam, pushing everything that opposes its flow. And the sea with its tempest that battles and rages against opposing winds; and raising itself in proud waves, it falls, destroying the wind that beats against the base of the waves, enclosing and imprisoning it, beating and breaking it into a mixture of troubled foam. Then the fury of the sea is instilled. At times, overcome by the winds, the water leaves the sea and plunges over the high banks of neighboring promontories and, reaching over the summits of mountains, it descends into the valleys beyond. A part dissolves into spray, torn away by the wind, as part descends from the high promontories, spreading rain and pushing away all that hinders its course. Often, meeting a wave coming at it, it crashes against it and raises itself heavenward, filling the air with a confused and clouded foam, which, thrown by the winds into the innermost recesses of the promontories, forms dark clouds that are the prey of the conquering wind.

Necessity compels the mind of the painter to transform itself into the very mind of nature and to become an interpreter between nature and art...Everywhere there is something to learn.

In pursuing our art, we would do well to emulate Leonardo, who was known for his grace and cleverness, as well as his intelligence and keen interest in nature. Leonardo today might remind us that every shape of broken rock, every crack in the concrete or flow of softened asphalt, each quality of light reflected off soil or stone, each pink of sunset, Rayleigh-scattered blue of distant mountain shadow, or water droplet-grayed haze of a fog bank, and each earth-reflected tan of the underside of a cloud has some application to some space art picture in your future. §

SOME NOTES ON VISION RELEVANT TO THE SPACE ARTIST

by Joel Hagen

In thinking about the nature of vision and the question of field of view in establishing an astronomical painting, I thought I might summarize a few relevant points in hope of opening some discussion among my colleagues.

Light is focused in the eye upon the retina which is packed with photoreceptor cells of two types. Cones respond best to bright light and give us our color vision. Rods, 18 times as numerous, function in dimmer light and respond in shades of black and white.

The distribution of rods and cones in the retina is not uniform. There is a tremendous concentration of cones (160,000 per millimeter) in a small dimple on the retina called the fovea. This area affords us our greatest visual acuity in bright light, but foveal vision only takes in a visual field of about 1/4 inch at 12 inches. Foveal vision allows us to focus on minute detail in good light, but in dim light becomes nearly useless for the lack of rods. This is why we can see faint stars better by slight averting the eyes to use the higher concentration of rods in the surrounding area of the retina.

The fovea is a recent evolutionary development we share with birds and anthropoid apes. Part of the reason for the extreme visual acuity in the foveal region is the relatively direct linkage to the brain. Each individual foveal cone connects to a single bipolar cell and ganglion cell to transmit a signal; uncomplicated by other photoreceptors. In surrounding areas of the retina, several rods and cones will connect to a bipolar cell, and several bipolar cells to a single ganglion cell. In some areas, a neuron can wind up connected to two hundred or more rods and
VISION, cont’d.
cones. The fiber carries many signals and interpretation by the brain is less specific.

Surrounding the fovea is the macula, less densely packed, but still well saturated with cones for good color vision and clarity. Our macular field of view covers about 3 degrees in the vertical plane and 12 to 15 degrees in the horizontal. We use macular vision for reading, and similar activities, while our foveal vision allows us to focus on extremely fine work.

The contours of our faces, our brows, cheeks and noses, set the limits of our visual field. Our peripheral vision extends to about 180 degrees. Each eye takes in about 150 degrees horizontally and 140 degrees vertically with about a 120 degree horizontal field of binocular vision. The further toward the extremes of our peripheral vision, the less detail and color we perceive, although motion perception is amplified.

In his book, The Hidden Dimension, Edward Hall contends that Rembrandt fully understood the differences between foveal, macular and peripheral vision and employed that understanding in a very tangible way in his painting. Hall contends that each of Rembrandt’s paintings is meant to be viewed from a specific distance with the viewer’s eye (his foveal vision) fixed on the spot of greatest detail...Rembrandt’s eye, for example, in his self-portrait. Viewed in this way the painting suddenly jumps into three dimensional life.

In laying out an astronomical painting, a fundamental step is establishing the field of view of the painting itself. This gives meaning to the angular diameter of planets or moons represented in the sky. In talking to other artists, I find that no one (including myself) sticks to a consistent field of view. The only time I do so is in rendering a sequence, each of the Galilean moons, for example. By using a consistent field of view, there is a sense of increasing orbital distance, a “feel” for the system.

A field of view of 40 degrees had been mentioned as a familiar format because it is about what a camera with a 50mm lens takes in. I find I usually work within about 30 to 50 degrees. Ophthalmologists I have talked with feel that we get most of our real visual input about a 30 degree cone. Subjectively, if I draw a circle on a sheet of paper trying to represent the size of the full moon in the night sky, I invariably come out with about a 20 degree field of view (figuring the moon at 1/2 degree). This may be interesting for others to try, as our full moon is one of the few consistent benchmarks we all share to gauge our subjective perception of representing our field of view, $\theta$.

[Joel, which of Rembrandt’s many self-portraits do you refer to?]

PHOTOGRAPHING YOUR ARTWORK: SOME HINTS

by David A. Hardy, LRPS

Now that all the judging for the Dialogues exhibition has been completed, I suppose I can shed my anonymity. (Is there anyone who didn’t guess who the ‘Juror from Great Britain’ was...?)

Like the other judges, I have been impressed by the quality and variety of the work submitted, though I would have liked to see more artists entering into the true spirit of the theme: Co-operation between nations. A painting of Jupiter from Io (a recurrent subject) may depict an international exhibition — but how is the viewer to know?

I was also surprised that, as Kara noted in the November-December issue of Pulsar, so many slides had not been ‘cropped’ properly, and that several had a bad glare problem. One or two were even out of focus or suffered from camera-shake! If there is one vital point about space art, it is that space should look black, not pale gray!

Whether you are submitting transparencies to a fellow IAAA member for an exhibition or to a publisher for possible reproduction, it really is important to make a good impression with presentation. (Do you show actual artwork in a neat portfolio, nicely matted or sling a few paintings into a paper bag?) Professionalism is important.

Although I have been a space artist for over 35 years, it took time for me to work out the system I use today for preparing slides. As most of you will know, in addition to judging Dialogues, I have also been receiving work for inclusion in a new book on space art, Artists in Space. (If you were not approached, please do not be insulted. I
PHOTOGRAPHING, cont’d

wrote to every artist, IAAA member or not, whose work I had seen, and asked other artists to recommend any whom I might have missed, perhaps because they have not yet been widely published. A few artists to whom I wrote — at least twice — did not even bother to reply, so I have no way of knowing if they received my letters, have moved, or gone sketching a black hole....

Some of the slides sent for Dialogues had clearly been photographed out of doors, because grass or bushes could be seen around them! Photographing artwork outside is a method I used to employ in my early days, and still do occasionally if a piece of work is too large, or is rather glossy with texture (e.g. impasto oils on canvas) which picks up highlights. But in this case it is essential to pick a day which is cloudy but reasonably bright (common here in the UK, though probably less so in, say, California), and ‘bracket’ your exposures — take several at different f-stops.

Other artists, submitting work for the book, complained that they could not supply large-format trannies for some weeks, as their only local photographer was slow, as well as expensive. It makes sense to make your own repro-quality slides, doesn’t it?

The professional method is often to photograph artwork in a horizontal position, but this really requires a special rig: photographing downwards with a camera on a tripod is not easy, and mounting the camera underneath by reversing the camera head, as sometimes recommended, can involve one in painful gymnastics.

So what I have now done is to set up a lighting studio in a disused garage. Using a plumb-line and spirit-level, I attached a large sheet of matt black-painted board to a wall. This has fine white cross-hairs painted on it, to make positioning artwork easier, using pins under or above each corner. I bought a second-hand Pentax Six camera, which takes 12 exposures on 120 film to make 2.25 inch square (60 mm) slides, using Kodachrome Professional EPY (balance for artificial light) color-slide film. In any event, a single-lens reflex (SLR) type of camera is essential.

The camera is mounted on a rigid tripod, facing the board, and lines marked on the floor indicate its parameters of movement. A useful hint is to mount a small hand-mirror at the exact center of the board (shown by the cross-hairs). If your camera lens is reflected right at the center of this, when seen through the view-screen, you must be directly in front of it, mustn’t you! Two reflectors with long-life tungsten (photo-flood-type) lamps are placed at either side of the board, each at 45 degrees to it. Position them carefully so that they give even illumination, with no glare-spots, and not too close or your artwork will curl — or worse. Cover any windows etc. which might give stray reflections.

Finally, run through a test film, using the squares drawn on the board — or better, a proper test-grid containing black, white and colors, with perhaps a Kodak gray-scale — to ensure that the edges which appear on your view-screen really are the edges that appear on the slide. If not, take this into account when you photograph your artwork. And if unwanted areas do appear, because your artwork, unlike the film, is not square, do mask them with metal foil or black paper inside the mount.

Use a good exposure meter and gray card each time, and, of course, ensure that the distance is accurately set to give pin-sharp focus. You can use the same set-up, changing cameras, to obtain 35mm slides from your artwork for slide-shows or other uses. I’m not sure how prices here compare with the USA and other countries, but each slide certainly works out at well under $1.00, on actual film and processing costs.

I have yet to run across a publisher who will not accept 2 1/4" format, although (even in these days of laser-scanning) some still will not use 35mm. I hope these tips are of some help to members — and that next time we have a slide-submission, the standard of the slides will match that of the artwork.

(LRPS’ means Licenciate of the Royal Photographic Society)

COLOR PENCIL TECHNIQUES

by Marilynn Flynn

Don’t draw directly on paper with the color pencils, use graphite which will erase more easily or can be drawn over. Don’t use a heavy line or it will leave a groove in the paper, which will remain even if the line is erased, and will cause any other color laid on it to slip over the groove.

On large areas, a "base coat" of color can be worked in, by using loose strokes of pencil, then blending with kleenex.

Layer colors for depth and to achieve colors not available
in the pencils. Using just one color of pencil in an area makes it dull and flat-looking. Use pencil strokes in different directions to build up layers. This allows the pencil to catch all the hills on the paper texture.

Use workable fixative between layers of color, if building up many layers. It helps prevent the surface from building up a waxy resistance to the next layer, and prevents wax bloom (a residue of wax that will leech out of the layers and lay on the surface of the drawing, leaving a dull film).

Working from light to dark or dark to light is a personal preference. It also can depend on whether you are using white or colored paper. Keep in mind that it is nearly impossible to layer light colors over dark.

There is a technique called burnishing where a white or very light dull-point color pencil is rubbed hard all over the surface of darker colors. This blends the colors, and leaves a smooth, solid appearance useful in depicting hard-surfaced subjects such as glass, metal, or gas giant planets seen from orbit. Once burnishing is done, it will be almost impossible to add any other color on top. Burnished areas should be fixed as soon as possible to prevent wax bloom. A modified burnish technique can be used to do reflections on helmets. However, any facial details showing inside the helmet must be thoroughly sprayed with fixative first, to prevent smudging.

The more layers of color applied, the more the surface texture of the paper will be covered. For any arty-sketch style, do not build up too many colors in one area.

A sharp edge (such as the sharpened end of a water color brush handle) can be used to scratch resist-lines. The lines can be scratched over the plain paper surface, or on some color which has been added. The subsequent layers of color drawn will skip over the lines, leaving the under-color showing through. This technique works especially well for drawing foliage or grass.

A kneaded eraser can be used to selectively remove color for special effects. For instance, on white paper, a large area of blue-gray can be drawn in, then blended to remove individual lines. The eraser can then be patted on to remove small sections, leaving white clouds. This is much faster than trying to draw in the sky color, while working around the cloud areas, and also gives a softer, more cloud-like effect.

For nebulae or galaxies, light colors can be drawn on black paper, then blended or smudged. Dark lines can be added later, or sections removed by the technique described above. Also, a faster technique than drawing the color on, is to sharpen your color pencil over the area where you want the nebula. Carefully remove the wood shavings (they usually come out in long, easily removed pieces), then rub the color shavings with a kleenex, giving you the nebula effect. This technique can leave too much paper texture showing through, depending on what kind of paper you use. You may have to rub the shavings harder, or go over the area again with a pencil to add more color in the valleys to eliminate the texture.

Individual stars or Millerite* either have to be painstakingly drawn in by hand, or you will have to cheat and use paint spatters. If you decide to draw them by hand, be careful to be very random, or you will end up with an unnatural polka-dot effect.

On black paper, some very delicate, transparent effects can be achieved. Terminators are easy to do.

*For novice space artists, “Millerite” is layers of spattering (spattered paint) used to produce gravelly or sandy textured grounds. It is named after Ron Miller, who probably invented the technique and uses it in plenty of his paintings.

PAPER

Canson Charcoal Paper. Comes in many colors, has good tooth with only slight texture show-through, thicker than other brands, holds up well to erasing (except for the black colored paper which show eraser marks). There are several buff to rust colors that work well for Venus or Mars landscapes. Also black for space scenes, and turquoise for Earth-orbit drawings. Will take several layers of color build up (about 4 or 5 is the limit).

Arches Cover Stock

Has a slightly textured side that is good for a very soft, watercolor-like drawing. Will take several layers of color build-up. Erasing tends to maul the surface, and stains may be left.

Bristol Board (rough)

Works very well, accepts many layers of color, erases well, is thick, has good tooth with no overpowering texture. Allows very crisp lines, sharp colors.

Coquille Board

For special effects gives interesting show-through texture. Good only for large drawings, or texture will be overpowering. Sturdy, holds up well to erasing.

PENCILS

Rexel Cumberland/Derwent Studios

Not as waxy as other brands, also greater color build-up and less chance of wax-bloom. Sold in sets or singly.
PENCILS, cont’d.

Berol Prismacolor and Berol Verithin
Waxier and with thicker leads than Rexel’s. Limited colors
in Verithin.

Can be used to spark up a drawing by alternating layers of
graphite pencil (use an “H” series) with color pencil. Works
best on white papers.

Whites
On color paper especially, it is sometimes difficult to add
a final white highlight to some areas with the white color
pencil (due to color build-up, and the weakness of the white
pencil). To blast in a white highlight, use a paint pen in
opaque white, white opaque airbrush paint, or acrylic paint.
The paint pens and airbrush paint work best, as acrylic tends
to leave a gray shadow. Grease pencils do not work.

ETC.

Stub Holder
A pen-style, refillable eraser-holder works as a holder for
the first bit of color pencil when it gets too small and awk-
ward to use alone. Also there are special-made stub holders
on the market.

Electric Pencil Sharpener
A life-saver if you are serious about color pencil drawing.
A must if you are working on a large piece. Color pencils
must be kept sharp to avoid a crayon effect, and they wear
down fast. Despite the dire warnings on the sharpener’s
box, I found they work very well with the Rexel brand
pencils, and would probably be fine with the Verithins. The
faster, waxier Prismacolors might gum them up, however.

Regular Pencil Sharpener
Keep a regular, hand-held sharpener around for the little
stubs too small for the electric kind.

Kneaded Eraser
The best eraser for use without destroying the texture of the
paper. Can also be used to lift mistakes without rubbing.
Can be formed to fit into tight spots, and lift surface colors
without harming colors layered beneath. Can be used for
special effects this way.

Pencil-Style Hard Eraser
Use for erasing many layers of color in a small space. Will
ruin paper surface on soft papers like Arches.

Kleenex
Use under your hand while drawing to protect paper from
oils in skin. Oils in skin will leave invisible spots on the
paper that will not accept color. Also use a blender rag, to
smudge colors together. (The cheaper the brand of tissue,
the better, as they will not leave lint on the drawing, or fall
apart as easily if used for blending). Also useful to dry your
tears if you ruin a really good drawing.

Stomps, Chamois
Also can be used for blending, but chamois are expensive,
and the stomps don’t blend as well as kleenex.

Blender
A clear Ad-marker or Chart-Pak brand blender can be used
for special effects by melting colors. But for better blend-
ing, use a kleenex.

Saral Transfer Paper
Good for transferring complicated drawings or spacecraft
that need to be sketched out first. Comes in several colors,
including white, which is great for use on black paper. Is
not waxy, and erases very easily just by touching with a
kneaded eraser. §

AIRBRUSH INKS
by Geoffrey Chandler

All inks (including Pelikan) are not light fast. I did a color-
strip test with inks along with other paints, etc. and the inks
fade quite rapidly. I tried out the new Shivair Opaque and
Transparent Airbrush Color (sold in 2 oz. bottles) and they
are awful. They have a tacky, shiny look about them.

The Air-Opaque airbrush colors don’t make it either. But,
the new Com-Art Airbrush Colors are different. They are
non-fading pigments (rather than dyes) that are premixed in
1 oz. bottles with an easy-to-use dropper. The vehicle is a
hydrocarbon resin base that is extremely permanent. They
are finely ground and spray with ease, with no clogging, etc.

Liquiex acrylic paints have always been consistently
good for me. Their titanium white is still the best white
available! I have a lot of faith in these and have been
using them for over fifteen years. Most colors stay mixed
for long periods of time (I store them in 4 oz. plastic
bottles with a “york” top, using organdy fabric as a filter).
Some colors, however, separate beyond useability after
a short time.

For anyone who has been frustrated with their Paasche
AB airbrush, or anyone who feels it’s not working right
for whatever million reasons, it should be “custom tuned”.
Each one offers a catalog.

Artistic Airbrush offers a “Paasche AB Maintenance Manual” for $5.00. I’ve found that Soluvar (matte picture varnish) made by Liquitex is a very easy and effective way to give a painting a good finish (it’s a spray.)

LIGHT LEVELS ON OTHER WORLDS

by Dr. William K. Hartmann

Here are the notes I made about light levels on other planetary bodies, as a function of distance from the sun — but did not find time to present at the second Space Art Workshop at Death Valley.

Two Kinds of Light Level: Two measurements of light level are of interest as we move away from the sun:

1. Solar Light Level. This is just the brightness of sunlight hitting the surface or cloud tops, and depends only on solar distance. It is a measure of what reading you’d get by pointing your exposure meter at the sun.

2. Landscape Brightness. One planet at a certain solar distance may have black rocks and another at the same distance may have bright snow. They’d have the same solar light level, but different landscape brightnesses. Landscape brightness is thus the surface brightness of rocks, soils, clouds, snow, etc. It depends on the reflectivity as well as the solar light level. It is a measure of reading you’d get by pointing your exposure meter at the ground. It determines the camera setting if you are photographing the landscape.

Application: Table 1 gives the two parameters, relative to values on Earth. These numbers don’t mean much to me, so I tried to re-express them in the fourth column in terms of typical 35mm camera exposure. My own philosophy in applying these results is not to apply them too literally. I think light level is something we ought to be aware of in starting a painting, but the awareness should be only implicit, not explicitly, in the finished painting. That is, we don’t want all scenes beyond Mars to be dismal and gloomy looking just because the light level is lower than here. Remember that your eyes adapt automatically to light levels from about the Venus range to about the Uranus range. Similarly, astronauts or mission controllers adjust camera openings to the light conditions, so all photos end up looking as if made under the same light level. Paintings might try to convey a sense of light level without being too literal. My inclination is to make Mercury look bright and Neptune, Pluto and Titan abnormally dim. I won’t guarantee anything about Titan, but it looks from my estimates like Titan’s surface is going to be one of the darkest surfaces in the solar system — disappointingly night-like.

I believe Arthur C. Clarke first made the point that the light levels on Jupiter’s satellites resembled that of a well-lit office but I’m not sure of the source. Imperial Earth? 2001? Can anyone enlighten me, so to speak?

Appendix: Math Definitions of Light Levels on Other Worlds

Two Factors are important in judging characteristic brightnesses of scenes on other planets.

1. SOLAR LIGHT LEVEL —

\[
\text{Solar Light Level} = \frac{1.00}{R^2}
\]

where \( R = \text{distance from sun in A. U.} \)

2. LANDSCAPE BRIGHTNESSES —

\[
\text{Landscape Brightness (Relative to typical Earth landscapes in sunlight)}
\]

\[
\text{(Solar Light Level) (Albedo of Surface)} = 0.25
\]

where Albedo = reflectivity, assumed to be .25 for many Earth rocks.
<table>
<thead>
<tr>
<th>PLANET</th>
<th>SOLAR LIGHT LEVEL (Earth = 1)</th>
<th>LANDSCAPE BRIGHTNESS (Earth = 1)</th>
<th>TYPICAL EXPOSURE, Kodachrome 64 of Landforms</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Venus Cloud Tops</td>
<td>1.9</td>
<td>4.5</td>
<td>1/125 f18</td>
<td>Dazzling</td>
</tr>
<tr>
<td>Mercury</td>
<td>6.7</td>
<td>3.2</td>
<td>1/125 f112</td>
<td></td>
</tr>
<tr>
<td>Earth</td>
<td>1.0</td>
<td>1.0</td>
<td>1/125 f8</td>
<td></td>
</tr>
<tr>
<td>Moon</td>
<td>1.0</td>
<td>0.44</td>
<td>1/125 f5</td>
<td>Like snowy Alpine Valley</td>
</tr>
<tr>
<td>Mars</td>
<td>.43</td>
<td>.26</td>
<td>1/125 f4</td>
<td>(contrast with black sky)*</td>
</tr>
<tr>
<td>Venus Surface</td>
<td></td>
<td>.12</td>
<td>1/125 f2.8</td>
<td>Like heavy overcast day on Earth</td>
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<tr>
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Using NASA Photos As Reference
by Ron Miller

Photographs from NASA probes such as Voyager, the Lunar Orbiters, Viking and so on have been true gold mines for the astronomical artist. They can be subtle traps, too, if they are not used with some care. Many neophyte space artists (and not a few old timers) have been led astray by misleading information in these photos.

There are three main sources of confusion, and any one photo can contain any one or even all three: increased contrast, false color and distorted perspective. The first two are distortions introduced by NASA in order to make the photos more useful to scientists, who are more concerned with the information to be gotten from the pictures than whether or not the pictures accurately represent what the naked eye would see. The third problem is caused by the very nature of the picture-taking process itself.

Take a look at pictures of Mars, before and after enhancement. The former is closer to what the naked eye would be likely to see — in reality, the surface contrasts on Mars are very low. Most of the craters, for example, would be almost invisible except near the terminator. Yet a computer-enhanced photo shows vivid detail — and therein lies the temptation and the trap.

Jupiter and Saturn have been the greatest victims of false-color enhancement, in addition to having the contrast of their pictures increased. Be very careful to try to discover whether the reference photos you are using have been enhanced. Check them against earth-based telescopic photos and the drawing of visual observers.

Since the photos taken by NASA fly-by and orbital vehicles are through high-powered telescopes, there is often a distortion of perspective introduced. This usually takes the form of “flattening” the subject. For example, the bands of Jupiter’s clouds appear nearly straight, whereas if you were seeing the planet from a point where it appeared to the naked eye as large as it does in the photo, the bands would be greatly curved and less of the polar regions would be visible.

Using telescopes also distorts the apparent relative distance between, say, Jupiter and its moons. The famous picture of Io suspended against the frame-filling clouds of the planet is a good example. If you were close enough to have it appear to your unaided eye as the size does in the picture, Jupiter would be many, many times smaller.

The main thing to keep in mind is not to be deceived by the apparent reality of the NASA photos. Yes, they are photos taken with real cameras of real places, but they do not necessarily represent what you would see if you were to go to these places yourself — no more so than your own insides look like an X-ray. This is one of the ways in which astronomical art can demonstrate its genuine value — not by slavishly copying photographs, but by intelligently interpreting them in order to make them more real than they were to begin with.
SLIDES:
1. Use Kodachrome 64, or Kodachrome 25 slide film.

2. Always use a tripod. The heavier, the better. If your painting is on an illustration board, etc., attach it to a heavy board (wood). You may want to paint it black, for an easy solution to the borders.

3. Use an easel to hold the painting while you’re photographing it. I bought an all-aluminum easel for this. You want the painting to be at a straight angle to the camera’s lens.

4. Always use a polarizer filter, to eliminate glare! Have your artwork at an angle to the sun for best results.

5. To find the optimum settings for your camera, for getting the best exposures: bracket. Experiment with a couple of rolls of film. Over the years, I found using Kodachrome 64, on a bright (smog-less) day, around 1 pm: at 125 or 5.6 at 250 gave me the best results.

6. Bring your exposed roll of film in to be developed immediately. Only a Kodak lab can be used! You will usually get it back the next day.

7. Mask-off the borders (if needed), with a silver tape that you can buy at a photography store. It takes practice, but by holding the slide up to a bright window, etc.: place a cut piece of the silver tape on the side of the slide (use the printed side, so you can use the blank side for writing your name, title, date, size, “All Rights Reserved”, etc.), so that you have an even, clean, black border.

4 × 5 COPY TRANSPARENCIES:
1. Find the best possible professional color lab near you. You will have much better luck in a large city. Try different ones over the years.

2. You will get very good results if your paintings are small and on a smooth surface. Large paintings on canvas (ex - a 3ft. x 4ft. painting on canvas) is very difficult for most labs. Usually it’s because their lights are ‘fixed’ (they can’t move them around) and they get ‘hot spots’ (glare). The way they get around that is by using a polarizer filter. But demand that they do not use one. Unlike Kodachrome film, Ektachrome (which is what they all use) film used with a polarizer filter, makes the photograph of the painting look very unnatural. There’s too much contrast, the colors and blacks are too ‘rich’, you lose subtle detail, etc. You should always demand perfection. All professional color labs will re-do a job, at no extra cost. A 4 × 5 transparency usually costs around $20. I would also recommend having a 4 × 5 copy negative made at the same time. This will give you the best possible print, which is called: a Type R Print. They should use the 4 × 5 copy transparencies for matching colors correctly. Copy negatives usually cost around $12.

HISTORY, cont’d
Soviet Union joined.

More workshops were held in Arizona, another in Hawaii, a small-scale meeting in Death Valley, and, most recently, in Houston. As time went on, it became evident that a steering committee was not the best approach to strong leadership. The leaders were all working hard, but communication was not always good, and some duplication of effort took place as well. Elections were again held in 1986, and the current slate of officers, under the able leadership of Kim Poole, was ushered in.

The first Death Valley workshop led to a major exhibition which is currently traveling across the U.S. and Canada. We have several other art shows in negotiation, most of which cannot be discussed at this time. Additionally, art shows have been held at several important events, including the Case for Mars conference held in Boulder, Colorado. The Planetary Society held an IAAA auction in Houston. Although there were some technical problems to be ironed out, the auction was a success, and there may be more to come.

Perhaps the most promising developments at the interna-
Welcome to the revival of PARALLAX.

This issue combines reprints of some of the best articles from previous issues* along with the new articles I've received. I hope you'll enjoy this first issue. Please write to me with suggestions and ideas for columns, features, and any fund-raising (grants, ads) to finance paper and printing costs of PARALLAX. I'd like to find contributors to write book reviews, product reviews: software, hardware, artist supplies, etc. What else? Help me by sending your ideas! I'd like to have an interview/profile of one member in each issue so I'll need you to interview each other and send the interviews and a photo of the subject and probably 1 b/w photo of her/his work. If you purchase JPL during the Neptune fly-by, please write about it in PARALLAX. Send all correspondence to the following address: 2840 N. Hackett Avenue, Milwaukee, WI 53211. When you send something you want published, please send a self-addressed and stamped postcard or envelope so that I can let you know that your work arrived safely.

Future issues will be much less time-consuming to prepare since I will soon have access to a scanner which will save me the effort of retyping all the articles into MacWrite. But if you feel like sending your work in on a disc, please send it on a 3 1/2 x 3 1/2 inch floppy written in MacWrite or Microsoft Word. I work on a Mac SE or Mac II so what you send must be compatible with that. You may also send via modem. You may call me at 414-466-3580 during business hours for more information about how to access the modem.

Kara Szathmary and I think it would be great to get a new logo for PARALLAX. If you wish to design a new one, please do so and send it to me, camera ready. I'll run the various submissions in future issues and after we've received all the designs, we'll have a vote by members to choose everyone's favorite. To make it more democratic, I'm not going to reveal the creator of the logo designs when they're run in PARALLAX — first time round.

A word about me for those of you who don't know me. I work at Gareth Stevens Children's Books (GSC Inc.) as the Acquisitions Editor. Part of my job is also Special Sales. [By the time this reaches you I will have an eight week old Weimaraner puppy in addition to three cats.]

I got to know many of the IAAA members when I worked as the picture researcher on the first ten volumes of Isaac Asimov's Library of the Universe. I very much enjoyed meeting (via phone or letter) many of the members and am pleased to be able to extend my contact with you via PARALLAX.

My basic editorial policy will be to print articles without editing them. All that I will do is correct typo's and standardize certain stylistic elements.

I will publish the next issue in December. The deadline for new material for the December issue of PARALLAX is Halloween. Send material earlier if possible.

If you have good half-tones of your work, yourself or IAAA related-imagery, I would like to begin to print black and white photos in PARALLAX.

Thank you for your letters and words of encouragement. I hope that my work on this journal will provide a service to the membership and that it will also please you. I do look forward to your ideas and writings. I especially encourage members abroad to submit your work. I very much want to hear from you.

*Table of Contents refers to the PARALLAX issue in which article first appeared. If no reference, it's new!

Kathy Keller, Editor