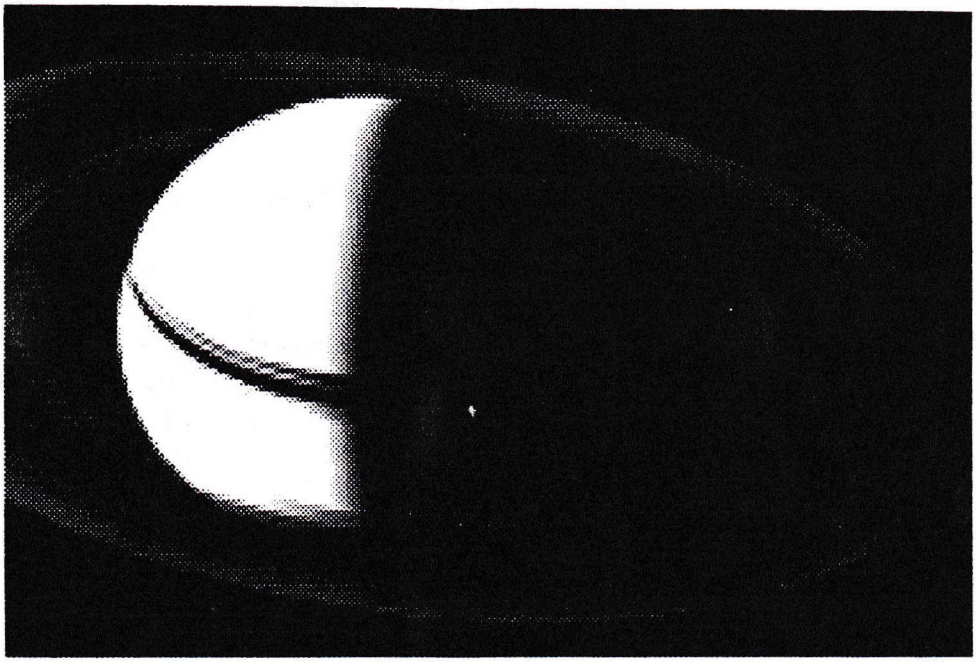
REFLECTIONS



REFLECTIONS

December , 1991

This CCD image of Saturn was taken by the Voyager spacecraft and was reduced in pixels to fit the AstroIP format.

R. Tanner, ed.

University Lowbrow Astronomers

The University Lowbrow Astronomers is a club of astronomy enthusiasts which usually meets in the historic "Detroit Observatory" on the corner of Observatory and Ann Streets in Ann Arbor. The meetings start at 7:30 on the third Friday of each month and are open to the public. For further information, call Fred Schebor at 426-2363.

This Month:

December 20 - Meeting, At the **Detroit Observatory in Ann Arbor**. Stuart Fulkerson will talk on **Project SETI**, a Search for Extra-Terrestrial Intelligence.

December 28 - Club Observing Session, Peach Mountain Observatory, here is a chance for the club members to get out and observe as a group, without the constraints of a public open house.

Next Month:

January 3 - Computer Subgroup Meeting at **Tom Ryan's** house, 7:30 pm. John Laffitte will talk about the software required to point his telescope to an object in the sky, and the group will discuss how this can be applied to the 24". Note that this date is a **Friday.**

January 4 - Club Observing Session, Peach Mountain Observatory.

January 17 - Meeting at the **Detroit Observatory in Ann Arbor**. A special meeting, **Tony England**, former **NASA astronaut**, now a U of M professor will talk on the politics required to get science done.

Observing Objects in this months Sky Map

This month the newsletter has a sky map with some observing objects marked on it. Some interesting information for these objects is on the reverse. The objects are arranged in several categories; bright, for the smaller scopes and binocular observers, medium, for the 8" and 10" scopes, and dim, for the larger scopes and darker nights. Hopefully, everyone can find some challenging objects on the list. If you think this is a good idea for the newsletter let me know at the meeting. If anyone has some objects they are interested in observing, let me know and I will include them in the newsletter. At the meeting we can talk about how easy or hard these objects are to see. Also, can anyone supply a list of interesting features to look for on the planets, the moon, and, ,maybe some double stars, both some easy and difficult features?

Club News

Update on the 24" Renovation.

D. C. Moons and Fritz Bausch have finished the remachining of the bearing supports and have aligned the bearings and reassembled the polar axis with the R. A. gear and the declination housing. With the new bearings and everything freshly lubricated, the assembly reportly moves very smoothly.

Calendars are still available

Dick Sider wants everyone to know that there are still calendars available. Since this is one of the club's money sources we should make an effort to sell the calendars before the new year starts and they become less valuable.

Three astronomy magazines are ceasing publication!

I just recieved notice of Deep Sky and Telescope Maker's demise. They reportably are not making money for the publisher and are being stopped as a cost cutting move. A month ago I recieved notice that the Observers Guide is also ceasing publication after the next couple of issues. The Observers guide is being stopped because its is more trouble than its worth. This is probably a sign of the slow economy, and the low return on magazines with small circulations. I hope someone picks up their concepts and continues, it would be a shame to lose them.

More Numbers in Acceleration and Relativity

by Alan Wilde

Editors Note: this article is a continuation of the article Alan wrote in the October newsletter and there will be more parts of the article in future Issues.

In relativity, if a spaceship accelerates at a steady rate, the clocks aboard the ship slow down more and more as velocity increases. I will give figures on the effect for one gravity acceleration that I computed on a T. I. SR-50 calculator. One gravity is approximately 1.03 light-years per year squared.

Let v be the velocity achieved upon acceleration from rest. v/c is then the ratio of v to c, the velocity of light. Let s be the ship time in years from rest; t be the time relative to earth in years; and x be the distance in light years. The following table results.

vel/c	s (ship years)	t (earth years)	x (distance LY)
1-10e-1	1.426	2.0002	1.2537
1-10e-2	2.56	6.7985	5.8985
1-10e-3	3.681	21.645	20.698
1-10e-4	4.797	68.494	67.533
1-10e-5	5.912	216.61	215.65
1-10e-6	7.028	685.00	684.03
1-10e-7	8.142	2166.2	2165.2
1-10e-8	9.258	6850.0	6849.0
1-10e-9	10.373	21,661	21,660
1-10e-10	11.489	68,501	68,449

(1-10e-10 means 1 minus 1/10,000,000,000 th : very close to 1)

Note the trends in the table. x is always 1 less than t. With the velocities we used, s increases approximately linearly by 1; and, t increases geometrically by about a factor of 3. For the T.I. calculator, 1-10e-10 is the highest velocity we can punch on the calculator (since v must be less than c). To achieve higher values for s (ship time) and t (earth time), we must punch in s.

For the next table, let us have a spaceship accelerate at 1 G, decelerate a 1 G, and return. 4s is the total ship time and 4t is the total earth time for the round trip. The following table shows some results.

4s	4t
5	6.5076
10	25.439
15	92.941
20	337.89
25	1,227.92
30	4,462.3
35	16,216
40	58,930
45	214,250
50	778,230
55	2,828,100
60	10,227,400

(con't on next page)

Note here that 4s increases 5 years each time and 4t increases by a factor about 3.6 each time. We would also compute that x would always be 1 less than t (or 4x would be 4 less than 4t). However, our round trip would go out 2x light-years, which is about one-half of 4t in years.

By an arbitrary calculation, I found out that if s = 40 years, than t=4.1454 x 10e17 years. A T.I. SR-50 calculator has a range less than 10e100. However, I found a mathematical trick whereby I could use the calculator and still get higher figures. This table is the result.

s (ship time)	t (earth time)
223.73	.96874 x 10e100
2231.3	.96874 x 10e1000
22,307	.96874 x 10e10,000
223,060	.96874 x 10e100,000

As the figures reach this level, the error in t becomes great. Indeed, a linear error in s results in a quotient error in t. In the last line, the error in s is so large that t is virtually indistinguishable from 10e100,000. Looking at the first line of the table, note that a ship time of 223.73 years results in a earth time which is much greater than the estimated age of the universe. However, the energy needed to achieve those figures is enormous. Even accelerating at 1 G halfway to Alpha-Centuri (4.3 light-years away) and decelerating at 1 G the other half requires a mass ratio of 40.

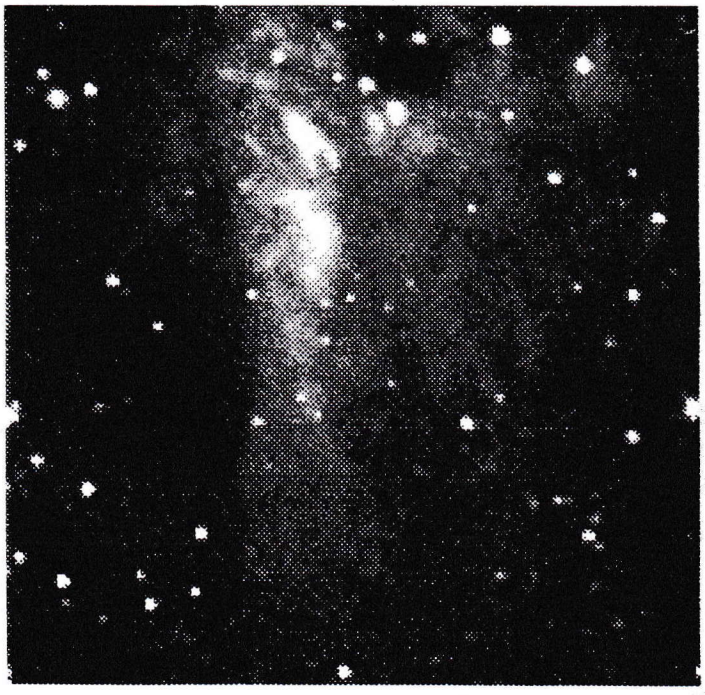
(Source of formulas: Sebastian von Hoerner, "The General Limits of Space Travel", Science, Volume 137, Number 3523, July 6,1962.)

Comparison of SBIG ST-4 and SpectraSource LYNXX PC CCD Cameras.

Below is a comparison of the images of the SpectraSource LYNXX PC and the "other" CCD camera , the Santa Barbara Instruments Group ST-4, sort of. While the telescopes were both 6' f5 newtonians, the LYNXX image is 200 seconds,while the ST-4 image is 60 seconds. The LYNXX images was taken by Richard Berry and were supplied on the AstroIP disc as examples you can play with. The ST-4 image was taken by myself (R. Tanner), at the Texas Star Party on my first night out with the camera. It may not come across in these images after the laser printer tries to simulate grey scales with dot dithering and the zerox machine tries to make everything black and white, but, the LYNXX image has many more grey scales due to its 12 bit converter vs. the ST-4's 8 bit.

LYNXX PC CCD camera, 200 second

SBIG ST-4 CCD camera, 60 second exposure



Subgroup Reports

Computers in Astronomy Subgroup

The tenth meeting of the Computers in Astronomy Subgroup was held at Tom Ryan's house. There was a good turnout of 7 members.

The meeting started with a demonstration of the demo software for the **Santa Barbara Instrument Group**'s new **CCD camera**, the **ST-6**. This software demonstrated that near professional level technology is available to the amateur astronomer at the price level of $3500. This camera is based on a new CCD chip which has bigger pixels (25 microns vs. 15 microns for the ST-4). In addition there is more resolution (375 x 242 pixels vs. 192 x 165 for the ST-4), a two stage thermo electric cooler with better regulation (dark current limit takes 1 hour to reach rather than 5-10 minutes for the ST-4) and, a 16 bit converter for the pixel charges (vs. 8 bit for the ST-4) for greatly enhanced sensitivity and resolution. All this means greatly improved imaging over the ST-4, the ST-4 camera was not particularly designed for imaging, it being more of a guider.

The demo software comes with several images taken by the SBIG employees and Jack Newton with his 25" f5 telescope. The images were filling the screen with the larger number of pixels. The image of the Ring Nebula taken by Jack with only a ten second exposure was exceilent (a tribute to the resolution of the 16 bit converter). There were images of M100 and M101 taken with a Mead 8" f4 in 2 minutes which were very good.

However, the image of the Eagle Nebula M16 taken by Jack with a 5 minute exposure was particularly outstanding, as good as professional pictures I have seen. I would have a sample of that image in the newsletter except I have not figured out how to capture the screen with the original grey scales, they always come out a random pseudocolor. If anyone knows how to do this I would appreciate a call. There was also an image if NGC891, the edge on galaxy in Andromeda, which was excellent. There was a small galaxy in the field which could be brought out with some judicious setting of the grey scaling of the image.

Tom Ryan and Jack Brisban then analyzed a coma corrector that Jack had made based on the article in the last Telescope Maker magazine. The fed the position and curvature of each of the optical surfaces in to Tom's optical analysis program. The glass type for each lens was also specified. Jack had built the design which was limited to a .7" diameter field, sufficient for visual use. Tom quickly produced spot diagrams for on axis, .12" and .37" off axis. For a fast Newtonian, the coma on axis is zero, but off axis it is about 20 times the airy circle. The coma corrector increased the on axis coma to about 2 airy discs, but the off axis coma was reduced to about 2 airy discs instead of 20. Tom was very impressed, and is looking forward to a report on the actual performance from Jack. Jack reported that the lenses cost about $90 with the coating and shipping.

The discussion then turned to what the computer subgroup could do to enhance the 24" when it is finished. The discussion ran along the lines of using a microcontroller to control the telescope in two modes; enter coordinates and the microprocessor will slew the telescope to the coordinates, or enter the common name of the object, and the controller will slew to the object. The micro will have the position of some of the common deep sky objects stored in ROM. At the core of this is the algorithm to move the telescope to the object, based on knowing where the telescope is at the present, and how the scope can be moved without running into things or having the scope wind any cables up around it.

There is the problem of how much of the control task to have the microcontroller perform and how much to do in hardware. Another problem is when to decide to flip the scope over center when the tracking or slewing will take it over the center. Also there is the matter of correcting for the errors in the alignment of the scope, they are never set up exactly on the pole. After some discussion, it was decided to ask John Laffitte to come over and talk about his software to control his computer controlled scope. Since his scope is an alt-azimuth mount, John must have figured out the coordinate conversions to convert from the RA-DEC to altitude and azimuth of his mount.

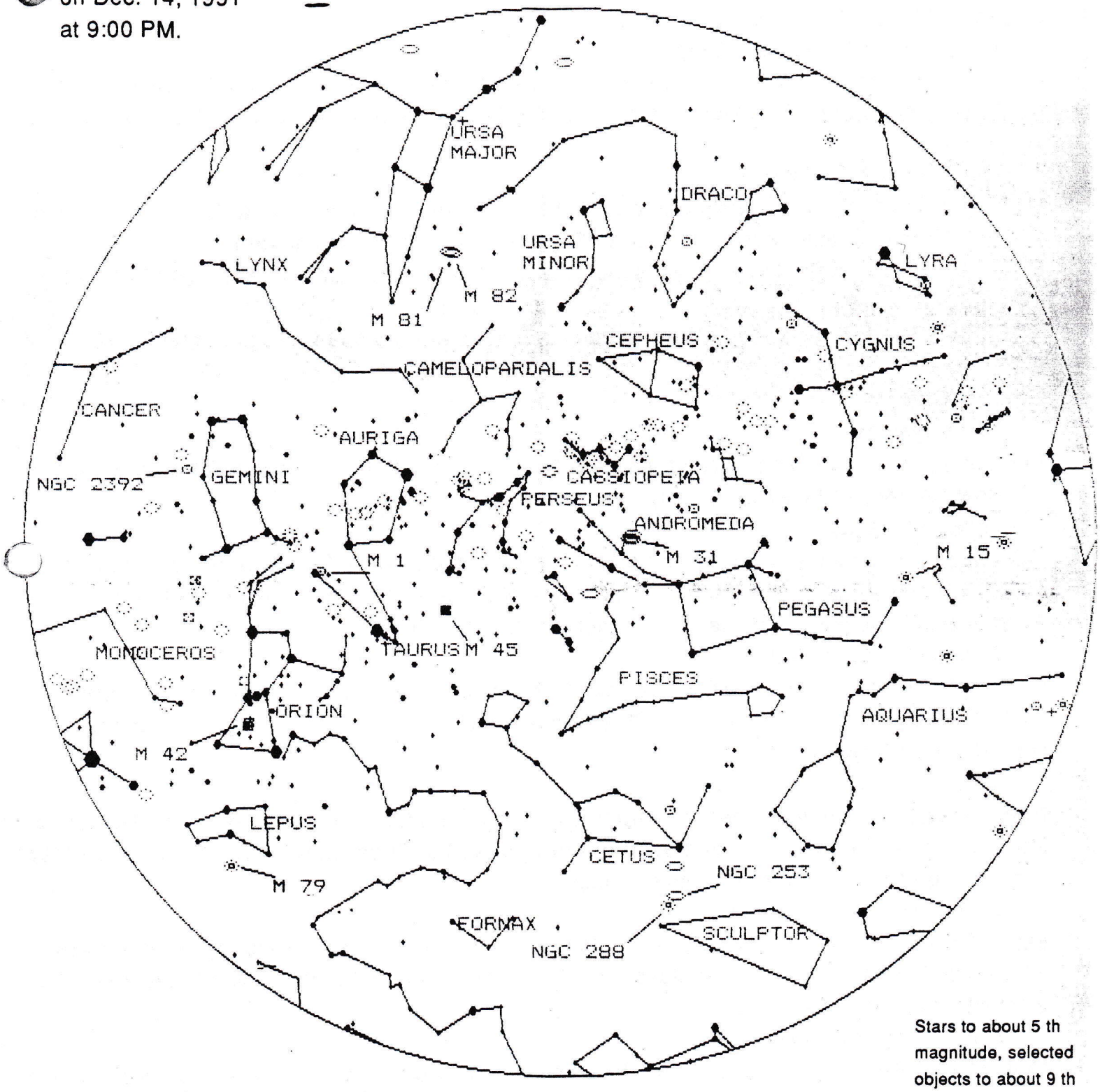
Tom Ryan says that they are already planning to have encoders for the scope to provide a position readout. The control circuitry is already built with digital logic rather than switching the motor current directly. This will make the conversion to microprocessor control much easier.

Next Meeting

The next meeting will be on January 3, a Friday at Tom Ryan's house at 7:30. John Laffitte will talk about the software that he wrote to point his computer controlled telescope at an object in the sky. Then the group will discuss how this could be applied to the club 24" to improve it's user friendliness (like a microcontroller with the 1000 brightest deep sky objects to drive the scope). Future topics could be " Online astronomy databases and BBS's ",or, " User programming for various astronomical calculations". Any other topics that are desired please contact me (Roger Tanner) and I will try and find someone to talk about it. As always, if anyone wants to demo some astronomy software feel free to bring it to the meeting.

Sky Map

Peach Mountain
on Dec. 14, 1991
at 9:00 PM.



Stars to about 5 th magnitude, selected objects to about 9 th magnitude.

An Observing List for December

Bright Objects

Solar System Objects

Saturn 1.2 Mag. Saturn will set by 8:00.

Local objects in the Milky Way

M45 - The Pleiades is an open cluster in Taurus - 20 M years old, 470 LY (light years) away.

NGC 869 & NGC 884 - The Double Cluster in Perseus - 2 groups of stars 7400 LY away, each 70 LY in dia.

Outside the Milky Way

M31, The Great Galaxy in Andromeda - 2.2 M LY away, inclined 15 deg. from line of sight, 180,000 LY in dia., magnitude 3.5, 180' x 63' (yes that is 6 moon diameters).

M32 - the closer of the two easily visible dwarf companion galaxies of M31, 2,400 LY in dia., Mag 9.5, 7.6' x 5.8'.

NGC 205 - The farther away of the two companions to M31, 5,400 LY in dia., Mag. 10.8, 17' x 9.8'.

Medium Objects

Solar System

Planets: Uranus - 5.8 Mag., Neptune - 8.0 Mag., Uranus and Neptune will be difficult due to their low altitude, and they set shortly after 6:00PM.

Local Milky Way

NGC 457 - (RA 1h 19.1' DEC 58 deg 20') This open cluster in Cassiopeia is located about 10,000 LY away and is 30 LY in dia. with an apparent size of 13' and a magnitude of 6.2. The Arizona Database gives a name of the "Kachina Doll Cluster" ?.

Outside the Milky Way

NGC 7662 - (RA 23h 25.9' DEC 42 deg 33') A very small planetary nebula in Andromeda, 32" x 28", 8.3 magnitude. Also called the "Blue Snowball Nebula". 5600 LY away, .8 LY in dia.

Dim/ Difficult Objects

Solar System

Periodic comet Faye in Pisces moving toward Aries and Cetus (see map in October issue) about 9.5 Mag. The comet has moved to the edge of the finder map, if anyone is interested maybe Doug Nelle can produce another map.

Local Milky Way

M76 - (RA 1h 42.3m DEC 51deg 34') This is a planetary nebula in Perseus, 1000 LY away, 10.1 magnitude, 2.7' x 1.8'. This planetary is typically called the "Little Dumbell" because it has a similar shape but is much smaller.

Outside the Milky Way

NGC 891 - (RA 2h 22.6m DEC 42deg 21') A large but low surface brightness edge on galaxy in Andromeda, 43 M LY away, 12 th magnitude, 12' x 1'. This galaxy shows a dark lane running down its entire length, photographs of this galaxy look like wide field pictures of the Great Rift in the Milky Way which runs from Cygnus through Sagittarius. This object is difficult because of the light pollution at Peach Mountain.

☞ Places:

The *Detroit Observatory* is at the corner of Observatory and Ann Streets in Ann Arbor, across from the old U of M Main Hospital. The Detroit Observatory is an Historic Building which houses a 19th century 12-inch refractor and a 6-inch transit instrument.

The *Peach Mountain Observatory* is the home of the U of M radio telescope and the 24-inch McMath telescope used by the Lowbrows. This observatory is located northwest of Dexter, off North Territoral Road, West of Dexter-Pinckney Road. The entrance is just west of Sportsman's party store and is marked by a small maize and blue university sign. Go through the gate and follow the gravel road. Once parked at the observatory parking lot, follow the path away from the radio telescope and around the fenced in compound to the telescope.

☞ Times:

The monthly meetings are held on the 3rd Friday of each month at 7:30 pm. Meetings are either at the "Detroit Observatory" in Ann Arbor or at the Peach Mountain Observatory. Meetings held at Peach Mountain are cancelled if the sky is not clear at sunset.

Public Star parties (Open Houses) are held on the Saturdays before and after the new moon at the Peach Mountain Observatory. Star parties are cancelled if the sky is not clear at sunset. Many members will bring their own telescopes. Your scope is welcome. Wear warm clothes for the season and bring insect repellent. The next scheduled Open Houses are listed on the first page.

☞ Dues:

Membership in the Lowbrow Astronomy Club is $20 per year for individuals or families, and $12 per year for students. Among other things. this entitles you to use the club telescope after some training.

☞ Magazines:

The Lowbrow Astronomy Club offers discount subscriptions to popular astronomy magazines:

Sky and Telescope : $18/yr.

Astronomy : $16/yr., 12 issues.

☞ Magazines: (cont)

Deep Sky : $10/yr., 4 issues.

Odyssey : $10/yr., 12 issues.

Telescope Making : $10/yr., 4 issues.

Contact Dick Sider (663-3968) for more information or write to him at the address below:

Dick Sider
902 Pauline Blvd.
Ann Arbor, Mich. 48103

❒ Sky Map:

The *Sky Map* section in this issue of *REFLECTIONS* is produced by Doug Nelle. Doug uses the program Deep Space 3D and prints the sky for the middle of the month.

☞ Newsletter Contributions:

Please send any information, short articles, or drawings to the address below. The closing date is 10 days before the meeting. Currently there are not many people contributing and we could use some fresh observations from the members.

University Lowbrow Astronomers Reflections
1770 Walnut Ridge Circle
Canton, Mich. 48187

☎ Important Numbers:

President: Fred Schebor 426-2363
VicePres: Stuart Cohen 665-0131
Doug Nelle 996-8784
Paul Etzler 426-2244
Treasurer: Richard Sider 663-3968
Observatory: D.C. Moons 795-8159
Newsletter:Roger Tanner 981-0134
Membership: Ron Avers 426-0375

Peach Mountain Keyholder:

Fred Schebor 426-2363

Monthly Meeting:

Politics

Project SETI - The Search For Extra-Terrestrial Intelligence by Stuart Fulkerson

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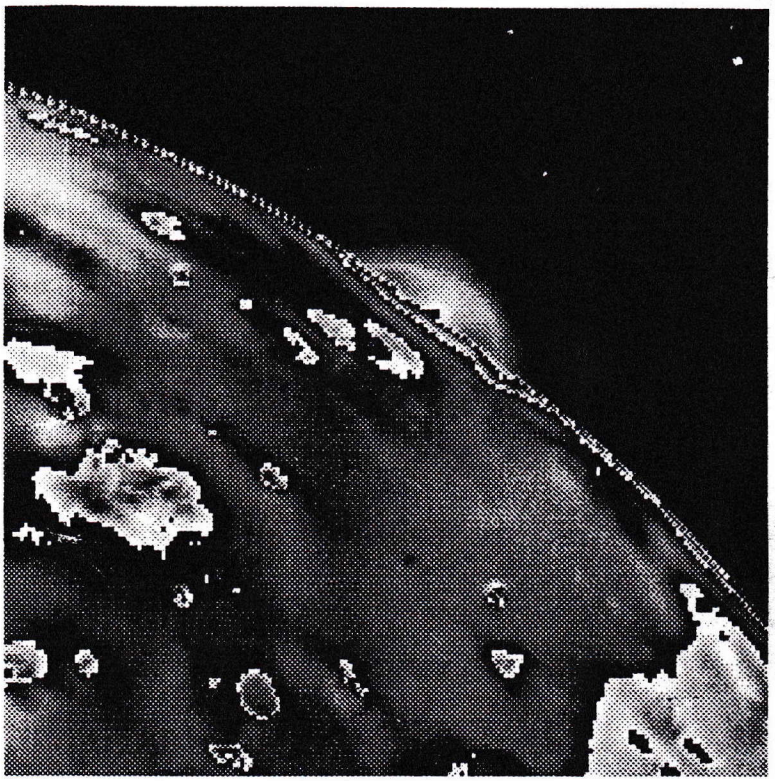
Engla...

At the
Detroit Observatory in
Ann Arbor



This CCD image of the edge of IO showing the discovery frame of the volcano has been reduced to the AstroIP format by Richard Berry and shown here with sawtooth scaling.

University Lowbrow Astronomers
9287 Chestnut Circle
Dexter, MI 48130