Regulus
R.A.S.C. Kingston Centre Newsletter
1989-10/89-11 Edition

The Kingston Centre, along with most of the rest of North America, had the occasion to witness a most fascinating event during the month of August. I am referring to the chance alignment of the Earth, its star and its satellite. Watching the full Moon slowly fade away is definitely a pleasurable occasion for any deep sky object lover. Not only that, it is an easy event for almost anyone at all to see. There is not any need for special equipment.
The Doctor and I set up our lawn chairs just as the umbral phase of the eclipse was beginning. It was hard to believe that the Moon was already dimmed by part of the Earth's shadow, because the light cast by the Moon was bright enough to see colour in our surroundings. Armed with our binoculars, we were content to just lie back and watch as the shadow crept across the Moon. Not a particularly action packed occurrence, but compared to the time it takes for light to travel from our nearest stellar neighbour, or the closest galaxies, this is an absolutely whiz bang event. A lunar eclipse typifies the astronomical idea of excitement. Extremely laid back, but very beautiful.

As the Moon reached farther into the Earth's shadow, slowly at first, accelerating as more of the Moon was covered, the surroundings got darker, more and more stars were visible. The evening was perfect, still and warm as only an August night can be. Voices drifted in and out from around the Lake. We were not the only people watching the eclipse. Many others were drawn to the sky, astronomers for one night. Judging from their tone, the reaction to the fading Moon was the same as ours.
I found it interesting that the lighted part of the Moon looked larger than the dark part, especially to the naked eye and when the dark part was the larger section. The orange glow that was easily visible after totality, crept onto the Moon while there was still brightness on the face. Once the Moon was in darkness, the night sky was almost like a new Moon sky. The Milky Way stretched overhead, and lots of stars were visible. The orange Moon did not cast any shadow at all. It made for an almost eerie sight.

We did not stay up to watch the Moon reappear. I went to bed counting my blessings. It was quite a sight, and to top it all off, and against all odds, it remained clear for the entire event.

Voyager Flyby Of Neptune Update

Aside from David Levy's Great Comet Discovery, the month of August also had another significant astronomical happening. The Voyager Two instrument platform raced by the planet Neptune and its satellites. Here is some information about the flyby of Neptune and Triton:

Larry Soderblom, Deputy Imaging Team Leader for the Voyager project, concluded that Triton's surface appears to be geologically young. According to Dr. Brad Smith, Voyager imaging team leader, the features that appear to be craters are almost certainly not impact craters, but must be related to internal processes within Triton.

Ice in the area of Neptune is so cold it is very rock-like. Earth geysers range in temperature from 125 to 1330 degrees C. Triton methane plumes range from -213 to 0 degrees C. This is phase-change vulcanism and does not require a lot of heat. The "volcanoes" on Triton spew material up several kilometres. Voyager evidently arrived during a "springtime" on Triton and nitrogen frost appears to be extensive. Each season probably lasts about 80 years. Parts of Triton have an albedo of 70%. Dark areas on Triton appear dark only in contrast to the other brighter parts, nothing is as black as soot on Triton. Liquid nitrogen can't exist on Triton's surface, but might exist 30 km down. The N2 atmosphere of Triton is ~10 microbars. The pictures we're getting of Triton are about equal to telescopic views of the Moon taken from Earth. The density of Triton makes it more like Pluto than like Callisto and other icy satellites.

Neptune's magnetic field was found to be tilted 50 degrees from the planet's rotation axis, according to data obtained from the plasma and low-energy charged-particle instruments carried on Voyager. The magnetic field is dipolar for 3 to 20 planetary radii. The dipole is offset from center by 0.4 radii. This is the largest offset found on any planet. The magnetosphere undergoes dramatic changes as Neptune rotates and its satellites orbit.

The length of Neptune's day is 16 hrs. 3 min. (about 2 hours shorter than previously believed).

Voyager images disclosed three more rings, according to Brad Smith. The two earlier rings are called 1989N1A, (the outer) and 1989N2A. One new ring, wider than those two, lies closer to Neptune. The second new ring orbits between 1989N1A and 1989N2A. A third new ring is broad and diffuse, and extends from just outside 1989N1A, all the way to the outer edge of 1989N2A. Another interesting Voyager discovery is the clouds and their cycle. Ultraviolet sunlight converts methane to hydrocarbons, (ethane, acetylene) which drift down to the cold lower stratosphere, evaporate and condense. Hydrocarbon ice particles fall into the warm troposphere, evaporate and are converted to methane. Buoyant, convective methane clouds rise large distances to the base of the stratosphere or higher to return methane vapor to the stratosphere. There appears to be no net loss of methane in this cycle. Neptune has an active atmosphere, 1100 kmph winds blowing in the opposite direction of the planet's spin, huge storm systems such as the Great Dark Spot and high cirrus-like clouds that cast shadows on the blue layer of clouds below.

(Information courtesy of, and collected from, The Astronomy Echo, Mystery Bulletin Board (1:250/810), Kingston, 613-541-0796, 9600HST-8N1)

The month of October has a special event planned. Clyde Tombaugh, the only living planet discoverer, is coming to town. He will give a lecture at MacArthur Hall, MacArthur College, on 89-10-20-20:00. There will be a nominal admission fee of three dollars, two dollars for students.

The next two meetings of the local chapter will take place on:

89-10-13 C. Joadi Ulrich: Astronomy on Canvas
89-1 1-10 Lloyd Higgs: RASC President’s Report

Hope that we have a good turnout and generate some good observational reports. Meetings are at 20:00 EDT at Queens, Macintosh-Corry, room D-214. Deadline for next issue: 11-20. Any articles from anyone wiLl be considered, and letters to the editor about any relevant topic will be greatly appreciated. Send them to:

Mark Kaye
Box #15
RR1 Inverary
Ontario, K0H 1X0

or

Computer
613-353-2313 (Voice)
2400-8-N-1

MK

David Levy's Fifth

On Saturday afternoon, 08-26, I received a phone call that brought the kind of good news I had received four times previously in the past five years. My good friend, David Levy, had discovered another comet! I immediately felt that this was the report of an event of quite special significance. This find had made David the outstanding comet discoverer of this decade, and the most prolific in the history of Canadian astronomy.

Sometimes in astronomy, events appear to happen in bunches. David's most recent find happened on the very night of the closest approach of the Voyager spacecraft to Neptune. Not being a person who glues himself to the television set, David was out searching the skies from his backyard. After the end of

twilight, his search program began and before long he noticed, well up in the north western sky, a faint object not previously seen. It was right near the border between the constellations Corona Borealis and Bootes. Its movement was confirmed the following evening. He needed only to report the discovery to Dr. Brian Marsden. Meanwhile, from his home near Boston, Michael Rudenko had also noticed the same faint object and reported it. The comet would bear both names, as did David's first comet in 1984. Michael's phone call to David contained the words: "We must stop meeting like this!"

From the coordinates David gave me, I thought there was a chance I would see his comet that night, if the skies would stay clear. For a while is seemed doubtful, but just before midnight they became gloriously clear. I found the beautiful little comet just a degree or so west of the star Delta Bootes, somewhat faint and diffuse at about magnitude 10.5, but not very difficult to detect. There was no clear evidence of a tail. (The sky also provided a splendid Aurora about a half-hour after I first saw the comet.) What a joy to be able to see it so soon after its discovery, thanks to David's thoughtfulness in providing me with its coordinates.

By the time readers see this, the discovery will be well known and many more people will have viewed this heavenly visitor as it marches though the constellation Bootes, making its inward journey towards the Sun. Here I will provide the comet's coordinates for epoch 1950 as known on the day the discovery was announced, 89-08-26.

Comet Okasaki-Levy-Rudenko, 1989r
89-08-25:00:00 15:27.7 +34:12
89-08-26 15:25.6 +34:11

Congratulation David! This is a very considerable achievement, and we are extremely proud to call you a member of our Centre.

Leo Enright

Lunar Eclipse at Fairfield Provincial Park

August's lunar eclipse was viewed from Fairfield Provincial Park by approximately 200 people. Originally the executive had planned to organize a public night at McDonald Park. After receiving a call from Barbara Snyder, the Director of Fairfield Park, we decided to work with her at her public night. It turned out to be the right decision. As a result of a joint effort between Barbara and me, we received much publicity. Reporters from CKWS-TV, Kingston This Week, and The Napanee Beaver were there to cover the event.

Barbara had organized a family night. She began the evening with games for the children of all ages. A sing-along was held, and a fire was lit to roast marshmallows. At dusk, I presented a half hour program on the eclipse, and locating the constellations. When I finished my presentation, two wonderful things happened: The eclipse began, and eight members from our Centre arrived with their instruments to show the public the night sky. They were: Murray Anderson, Marty McConnell, Chris and Irene Collins, John Hansen, Ruth and Terry Hicks and David Stokes. As I reconnoitered through the crowds answering questions, these people stuck to their posts as lines formed at their eyepieces. By the oo's and ah's, it was quite apparent that Saturn was their favourite object. As totality approached, some people were lying down on blankets, and some took advantage of the dark skies to identify constelLations and observe dim deep sky objects.

When the moon started to leave the umbra, people started to leave the park. By 23:00, the crowd had dwindled, and the telescopes were being packed away. By 23:30, I decided to leave. I had a long drive ahead and wanted to catch the last moments of the eclipse over Sharbot Lake.

A special thanks goes to Leo for preparing a handout with the times of the phases of the eclipse. This handout also included the benefits of membership to the Kingston Centre of the RASC, and an application for joining. A total of 75 handouts were distributed.

The evening was successful and exciting. The best part of the evening was the cooperation and enthusiasm of our members. To those of you who helped, I would like to extend my sincerest thanks.

Denise Sabatini

A Night Out With Some Old Friends

I really enjoy gazing at the stars. For as long as I can remember, my eyes have been drawn sky-ward in the evenings. Long before I knew the names of any stars, I watched them avidly. Whether I watched from a campsite within earshot of the Glenora ferry, or was bivouacked part way up the slope of Mt. Hood, Oregon, or sitting in the quiet evening solitude of a trappist monastery in the Pacific Northwest, I have thrilled to the sparkling tapestry woven so majestically overhead. When one adds to this the wonders of meteors, comets satellites, and aurora, it becomes even more fascinating.

I recall several encounters with meteor showers as a youth. The most outstanding for me was during the summer I was preparing to move away to college. I shall never forget that mid-August display. I took it as a good omen. On another occasion it was a thrill to see the trails of the "falling stars" reflected in the still, dark surface of a lake in the Cascade mountain range of Washington. However, even with all of these experiences I did not even know the names of these displays.

My interest was piqued by the articles in the 88-08 issues of Astronomy, and Sky and Telescope about viewing and recording meteor showers. I read each article thoroughly and then decided to make my own observations.

On the evening of the height of the Perseids showers I was very disappointed to see the sky clouded out. I went to bed around midnight, resigned to the fact that I might have to wait another year to see my old friends. I awakened at 01:45, which was unusual as it was fortunate. I decided to check the sky and found it clear. Within minutes, armed with warm clothing, lawn chair, my binoculars, a blanket to keep off the dew, and my six cup coffee maker, I was ready to settle in for a visit with the Perseids.

I recorded the meteors on copies of the map provided in Astronomy. I divided the viewing times into three segments. The following is what I recorded for each segment:

88-08-12-02:00/03:00 EDT. Stars to 5.5 mag. I saw 44 meteors, 37 I believe were Perseids. The other seven seemed to be random fliers because they did not have an apparent radiant. Six of the meteors lasted 2.5/3 seconds. I viewed four meteors in my 7*35 binoculars. I also saw four satellites.

88-08-12-03:00/04:00 EDT. Stars to 6.2 mag. I saw 38 meteors, 30 of which appeared to be Perseids, eight were random. Five lasted 2.5/3 seconds. I saw one in the binoculars and recorded nine satellites.

88-08-12-04:00/05:00 EDT. Magnitude decreasing steadily. I saw 32 meteors, three of which were random. Eight lasted 2.5/3 seconds and I saw five satellites.

Each year I hope that I will be able to view another spectacular show such as I did years ago, but now with a more knowledgeable eye.

Stanley Hanna

Aurora Hot Line

There have been several request to have an aurora hot line. If you would like to be called when there is an aurora, please send me your name, phone number and the latest time that you want to be called. The list will be given to all participants. PLEASE realize that you may have to make a long distance call.

1. Call the next name on the list.
2. That person calls the next person.
3. The last person on the list calls the person at the top of the list.
4. Each person also passes on the name of the first caller, to prevent going through the List more than once.
5. If it's past the time the next person on the list wants to be called skip over them to the next name on the list.
6. If there is not an answer, go to the next name.

Hopefully, we will be able to compare aurora observation at our meetings.

Denise Sabatini

1989 General Assembly

"G. A. '89" was held in Cape Breton, Nova Scotia this year at the Canadian Coast Guard College, Sydney and was hosted by the unattached members of the RASC. Some folks coming from the centre of Canada found night by the Atlantic Ocean to be very cool.

If the temperature was cool, the welcome was not. We arrived to find things very well organized, complete with our luggage to our various rooms.

The program was varied and proceeded with the usual things like, "Welcoming Party" and "Murphy Slide Show". The paper sessions went well and were interesting. The topics were varied, as usual and included "Astronomy for the Handicapped" by our president, Denise Sabatini, while another took us to Russia to view the observatories there. A side trip to the hospital for the speaker certainly added adventure to his tour.

Dinner on Saturday was after a bus ride to Fortress Louisbourg, where we had a guided outside tour (being after hours) and dinner was served at one of the taverns. The service and lighting (candles) were done in the manner of the period and the food was delicious. After dinner, a lecture was given by Ken Donovan, chief historian, entitled "The Marquis de Chabert and the Louisbourg Observatory in the 1750's". Coming outside afterwards, the only lights to be seen were those of the buses waiting to take us back to the college. Observing at that spot would be great, barring fog and chilling winds.

On Sunday, an ecumenical service was available, and paper sessions finished at noon. The General Assembly was in the afternoon, with Council meetings afterwards. The Banquet was held in the Mess hall and the Awards were given at the end. The National Newsletter will no doubt give details. Raymond Auclair received the Service Award, and judging by the applause, the idea was a popular one.

Monday was a day for exploring. Since Terry and I were on a visit with my relatives, we went back to the mainland and felt we had experienced another great General Assembly.

Ruth Hicks

Some Observing Notes From Farmfest '89

On the Labour Day weekend, (09-01/04) I held the 5th annual "Farmfest". (with apologies to Andreas Gada!) Although it rained Friday, the sky cleared several hours after I went to bed. (so, what else is new?) Saturday started sunny, but very cool, (6 at 07:00) as Randy Hendricks helped me set up the 44cm (The 17) and his 32cm scope. By Saturday afternoon, several people had arrived form Oshawa and Toronto. Now there were 5 20cm SCTs present as well as Steve Chomniak's 33cm Coulter, for a total of 8 telescopes.

On Saturday evening, Murray Anderson, Terry and Ruth Hicks, their son, and Eldon Adams arrived. The 17 was then used to Look at M22, 13, 57, 31/2, 110, and the Double Cluster in Perseus using some of Peter Sargent's Tele Vue eyepieces. Terry and Ruth had 7x50 and 11x80 binoculars with them which were used to observe the summer Milky Way and its objects, such as the Coathanger (Collinder 399). The dew was quite heavy, so the eyepieces could not be left sifting in the open. Fortunately, The 17 is rather resistant to dewing, so its optics remained clear all night. Later on in the evening, clouds seemed to form in Ursa Major and then float southward across the sky in a long procession, with a few clear periods in between cloud forming episodes. As a result, my efforts to observe NGC1 (how about that for an observing project?) were thwarted. One cloud actually backed up (northward) over the Alpha Andromeda area just as I was getting ready to try a second time! However, I did manage to observe several other objects while the sky was unobscured: M71, 27 (and its central star), and M33 (with a very bright NGC604), for example.

Sunday evening started with a slide show. Peter Sargent showed a set of Ronald Royer's awesome astrophotos, followed by Paul Markov and his shots of the August total lunar eclipse. At this point it was discovered that the sky was clear and an aurora was well underway! After making a call to the next person on the aurora list, I joined the others outside. The aurora was active, with several arcs, rays and red patches.

Murray was present again, this time with the Centre's 25cm telescope, and we spent the night viewing various objects. The 25cm is a beautiful scope, and its performance (especially with the Tele Vues) was excellent. I resumed my hunt for NGC1, finding NGC16, a 13th magnitude galaxy just 1.5 degrees south of Alpha Andromeda. This put me just half a degree from NGC1/2! Unfortunately, by this point, the aurora had increased in intensity and was now extending to the zenith and covering the entire northern half of the sky! Needless to say, this degraded the transparency of most of the rest of the sky and this stalled my NGC1 hunt once again. At this point I switched to naked eye observing from a lawn chair and watched the aurora as well as several meteors. In the few hours before dawn, the aurora died down.

Since I was very tired, I took a couple of naps to try to get up some more energy. One nap was taken on a cot underneath the roof of Doug Clapp's roll off roof observatory with a blanket Murray loaned me. While I was asleep Doug rolled his roof off towards the other side of the observatory, leaving me exposed to the sky. When I woke up, Orion had risen clear of the trees in the south east, I was freezing cold and my shoes were completely soaked by the heavy dew that was falling! Murray wore just a sweater and said he wasn't cold all night. I wish I had his resistance to the cold!

Monday night the sky was overcast with cirrus, so Doug and I just played with his CAT (the astronomical variety) in his observatory. (which we have nick named the "Litter Box") The Cat is a device which must be seen in the field and in operation, to be truly appreciated. (another story...) The aurora was active again, although it was mostly obscured by clouds approaching from the north. (so, no call to the aurora list)

All in all, it was a very successful weekend of observing, even if it was hampered some what by clouds and aurora. (with all due respect to aurora enthusiasts!) Thanks to all who came out to Farmfest '89.

Walter MacDonald

Sky Calendar

The fall sky presents a unique view of extra-galactic space for northern observers. Two nearby galaxies are resplendent in the nighttime sky. Both can be naked eye objects under perfect conditions, but usually only M31 is visible without the aid of at least binoculars. To me, the autumn sky is funny, sort of a left-over from the other three seasons. The summer sky still lingers overhead at dusk and while there are still many interesting sights, the sky can not be typed like the rest of the year. October is a good month for people that stay up all night to catch the winter constellations. The nights are not freezing, and this aids in viewing the more difficult nebulas of the winter sky, without poor seeing created by the ice laden wintery air.

Mercury should be well placed around 10-10 for morning observers as it will be 16 degrees above the horizon, but it will be gone by November. Venus is still a beacon in the west after sunset It has been clinging to the horizon all summer and will not really climb much higher in the sky. The Moon has some fun at the start of November, occulting Antares, Venus and Vesta. Of course, none of these events arc visible from Kingston area, but look for these objects near the Moon, as well as Saturn, Uranus and Neptune. These will be in the western sky after sunset Mars will spend October to near the Sun, but will reappear in the morning sky in November. Disappointing, because it is so far away from us. Jupiter is making its way back into the evening sky in the constellation of Gemini and will rise shortly after twilight by the end of next month. The outer three gas giants are still forming a fine group in Sagittarius and will be visible for a short time before setting. Here are the ephemeris for comet 1989r. This could be a very bright comet, and one had better catch this one now, because it is not scheduled to ever return to solar system near you:

DATE	RA (H.M)	DEC (D.M)	DATE	RA (H.M)	DEC
89-09-21	14.52	31.29	89-10-26	14.11	26.52
89-09-26	14.47	31.02	89-10-31	14.01	24.59
89-10-01	14.42	30.35	89-11-05	13.51	22.04
89-10-06	14.37	30.07	89-11-10	13.39	17.35
89-10-11	14.32	29.36	89-11-15	13.27	10.48
89-10-16	14.26	28.58	89-11-20	13.15	0.51
89-10-21	14.19	28.06	89-11-25	13.04	-12.50

The numbers to plug into "S&T"'s Basic Comet finder program are:

T = 1989 Nov 11.826 ET, q = 0.64060 AU

Peri. = 150.663, Node = 274.735, Incl. = 90.044

Vesta is getting dimmer, and the only other bright asteroid target would be Ceres, which is brightening in Taurus and Gemini. Dimmer Pallas will be at its best in early October. Look for this target in Cetus in the evening sky.

MK

The Galileo Mission

Project Galileo is targeted for an 89-10-12 launch. The launch period extends to 11-21, although some aspects of the full mission may not occur with a later launch date. After the 41-day launch period, the planets are not properly aligned. Galileo would have to wait about two years for another launch opportunity.

There is great interest in Jupiter because scientists believe Jupiter contains much of the material, in its original state, from which the Sun and planets formed some 4.6 billion years ago. The similarity between Jupiter and our own Sun, in addition to the presence of Jupiter's numerous orbiting satellites, has led to the characterization of the Jovian system as a miniature solar system. NASA's Galileo spacecraft will be the first

spacecraft ever to orbit the planet. The spacecraft will also insert a probe into Jupiter's atmosphere to directly investigate the thick cloud layers covering this colossal planet. Over a period of 22 months, the orbiter will fly a series of orbits around the planet that will take it close to the Galilean satellites frequently. During this period, the spacecraft will also make extensive measurements of Jupiter's complex electromagnetic environment. This broad range of investigations can only be done in the immediate vicinity of Jupiter. Galileo will use radioisotope thermoelectric generators (RTGs) to produce the electricity that will power the spacecraft, science instruments and engineering support subsystems. Using thermocouples, RTGs convert into electricity the heat generated from the radioactive decay of plutonium-238 dioxide. RTGs are lightweight, cost-effective, and highly reliable. These generators produce low levels of power, a design characteristic perfectly suited for deep space missions. The RTG's design has no moving parts. This feature greatly contributes to the generator's endurance records.

Scientists hope to discover more of the secrets of our solar system by studying a miniature version, the Jovian system, with the STS-34 launch of Project Galileo aboard the Space Shuttle Atlantis.

STS-34 will be the second planetary mission of 1989, and the second Shuttle flight to deploy a planetary spacecraft. The spacecraft Magellan was launched on the STS-30 Atlantis mission in May, to map Venus. STS-34 will be the fifth flight for the orbiter Atlantis and the 31st Space Shuttle mission.

Although two Pioneer and two Voyager spacecraft did flybys of Jupiter in the 1970s, Galileo will make the first extended observations of the Jovian system and first direct sampling of the atmosphere of Jupiter. The flight path also will provide the opportunity to make the first asteroid flybys, and mapping in near-infrared of the far side of Earth's moon. It will also be the first time a spacecraft with a dual-spin design is used on a planetary mission.

The spacecraft has two major components, a planetary orbiter and an atmospheric entry probe. The probe arrived at Kennedy Space Center in mid-April, the orbiter arrived a month later in mid-May. The final major element of the payload is the Inertial Upper Stage (IUS) booster which is attached to the spacecraft during pre-launch processing at KSC. The IUS was mated to the spacecraft in early August.

Atlantis Will be launched from Pad 39B into a 185-statute-mile circular orbit at a 34.3-degree inclination to the equator. The five-day mission is scheduled to end with a landing at Edwards Air Force Base, Calif. The next major space science mission will be deployment of the Hubble Space Telescope in 1990.

Project Galileo was first scheduled for launch in 1982, but delays in the Shuttle program pushed the date back several times to May 1986. The loss of the Space Shuttle Challenger in January 1986 presented another major delay. Galileo at that time was targeted for a direct boost to Jupiter via a liquid-oxygen/liquid-hydrogen-fueled Centaur upper stage which would be released from the Space Shuttle payload bay. With the Centaur, the more direct route to Jupiter Would have taken about 2 1/2 years. But use of the Centaur upper stage with the Shuttle was canceled after the Challenger accident because of safety concerns.

Without the Centaur, there is less launch energy available for the Galileo orbiter and probe. Now, the spacecraft will be boosted out of Earth's gravity on its circuitous journey by a two-stage Inertial Upper Stage (IUS), which is fueled by solid propellant. The trip to Jupiter will now take slightly more than six years and will require a total of three gravity assists from two planets, Earth and Venus. However, the new flight path offers significant additional scientific benefits. Galileo will now be able to study Venus, the Earth, the Moon and the asteroids Gaspra and Ida, as well as performing its original mission in the Jovian system.

The Galileo spacecraft Will begin its approximately 2.5-billion-mile journey with launch aboard the Space Shuttle Atlantis, which will deploy it in Earth orbit. The two-stage IUS will boost it from orbit onto an interplanetary trajectory. Then the complicated part begins. Galileo will need a triple gravity assist, Venus-Earth-Earth, to propel it from the inner part of the solar system to the outer section of the solar system and its destination, Jupiter. The initial trajectory calls for a a flight to Venus, gravity assist by that planet and then two gravity-assist flybys of Earth before entering the final flight path to Jupiter. This trajectory has been dubbed VEEGA, for Venus-Earth-Earth Gravity Assist.

After launch in October 1989, the spacecraft will approach Venus in February 1990 from the nightside and then pass across the sunlit hemisphere. There, it will map the atmospheric composition and distribution. It will also search for evidence of lightning storms in the atmosphere. Since the high-gain antenna will not yet be deployed, the Venus data will not be sent to Earth until some eight months later when the spacecraft is close enough to transmit through a low-gain antenna. Venus' gravity Will accelerate Galileo and send it back towards Earth.

During the 10-month flight between Venus and Earth, ultraviolet instruments will search for Lyman-alpha radiation from neutral hydrogen atoms. This might indicate residue from comets.

Observations of Earth will include the nightside and sunlit side, and parts of the dark and bright sides of the moon. During the next leg of the journey, in October 1991, Galileo will accomplish an historic first when it flies by the asteroid Gaspra at a range of about 620 miles and a relative speed of approximately 18,000 miles per hour. It will take pictures and examine Gaspra's surface composition, roughness, optical and thermal properties, rotation rate and mass.

In December 1992, two years after the first Earth gravity assist, the spacecraft will complete its elliptical orbit around the Sun, and will return to Earth for a 200-mile flyby and its third and final gravity assist. Again, Galileo will not be idle during the Earth-Moon encounters. It will examine the outermost part of Earth's atmosphere and the magnetic tail which streams out opposite the Sun. Galileo also will photograph the north pole of the Moon to determine if ice exists there. Passing about 200 miles above Earth's surface, the spacecraft will change direction and increase velocity by about 9,000 miles per hour.

The second asteroid flyby, to the larger Ida, is expected to take place around August 1993. The planned approach distance is the same as with the earlier asteroid, about 620 miles, although the relative velocity will be higher, nearly 30,000 miles per hour. Again, many observations will be made and measurements taken. The spacecraft will spend a total of about 15 months in the asteroid belt.

A total of 18 experiments will be conducted on the Galileo orbiter and probe to provide scientists with enough information for years of study. More than 100 science investigators from six nations have formed teams to study the data. Also, NASA appointed 15 interdisciplinary scientists to the project. The spinning section of the orbiter will contain the following instruments and/or experiments:

Magnetometer to measure magnetic fields and their dynamics, including the effects of the satellites' interaction with Jupiter's magnetic field.

Plasma instrument to provide information on low-energy particles and clouds of ionized gases in the magnetosphere.

Plasma wave instrument to investigate plasma waves generated inside Jupiter's magnetosphere and plasma waves radiated by possible lightning discharges in the atmosphere.

Energetic particles detector to measure composition, distribution and energy spectra of high-energy particles trapped in Jupiter's magnetic field.

Dust detection instrument to determine size, speed and charge of small particles such as micro-meteorites.

Celestial mechanics/radio science experiment to measure the gravity fields of Jupiter and its satellites and to search for gravity waves propagating through space.

Radio propagation experiment which uses radio signals from the orbiter and probe to study the structure of the atmospheres and ionospheres of Jupiter and its satellites.

Instruments/experiments on the non-spinning section of the orbiter are:

Solid state imaging camera system to obtain color pictures of the Jovian system. The camera system uses a charge-coupled device instead of the vidicon tubes flown on previous planetary missions.

Near-infrared mapping spectrometer to study surface composition of planets, asteroids and atmospheres, as well as cloud structure and temperature profiles, though spectral images, reflected sunlight spectra and thermal emissions.

Ultraviolet spectrometer to examine the composition and structure of the upper atmosphere of Jupiter and its satellites and the torus of charged particles injected into the magnetosphere by the moon Io.

Photopolarimeter radiometer to measure the temperature profiles and energy balance of Jupiter's atmosphere and the cloud characteristics and composition.

Instruments/experiments on the atmospheric probe will include:

Atmosphere structure instrument to provide information about temperature, density, and pressure for determining the structure of Jupiter's atmosphere.

Neutral mass spectrometer to measure the composition of the gases in Jupiter's atmosphere and the variations at different levels of the atmosphere.

Helium abundance interferometer to measure the ratio of hydrogen to helium in Jupiter's atmosphere.

Nephelometer to determine the properties of cloud particles and location of cloud layers.

Net flux radiometer to measure the difference in the energy radiated from Jupiter and the energy received from the Sun, at different levels of the atmosphere.

Lightning and radio emission instrument to measure electromagnetic waves generated by lightning in the atmosphere and to detect the light and radio emissions from the flashes.

Energetic particle detector to measure electrons and protons in the inner regions of Jovian radiation belts and determine their spatial distribution near the edges of the belts. The detector is contained in the lightning and radio emission instrument.

(Information courtesy of and collected from, The Astronomy Echo, Mystery Bulletin Board (1:250/810), Kingston, 613-541-0796, 9600HST-8N1)

For Sale

Meade 200mm Schmidt-Cassegrain Model 2080

In mint condition, complete with tripod, carrying case and other accessories, including a Barlow lens and a Moon filter.
Asking $1150.00 Contact:
Rev. J. B. Armstrong
Box 309,
Marmora, Ont, K0K 2M0
(613) 472-3844

Electronic News Notes

As you can see, my modem has provided me with some interesting information about upcoming NASA events, as well as the recent Voyager flyby of Neptune. I have also acquired some new astronomical software. I have a Star catalogue, and a Deep Space Catalogue. At present I have not explored these programs all that much, as each program takes up two archived disks. If they are as good as they claim to be...

In any case. If you have an MS-DOS computer, you would be able to take advantage, of this, and the rest of my limited supply of astronomical software. As well, a new Bulletin Board has arrived in Kingston run by Keith Goobie (542-9901, 2400 8N1) that has lots of interesting programs to do with satellite tracking. For those of you that do not consider satellites as a scourge to Astrophotography, some of these programs might be of interest to you.

MK

The mailing address for the Centre is:
Royal Astronomical Society of Canada
Kingston Centre
P.O. Box 1793
Kingston, Ont. K7L 5J6

This newsletter does not necessarily voice the opinion of this Centre. The editor is responsible for all the views stated within.

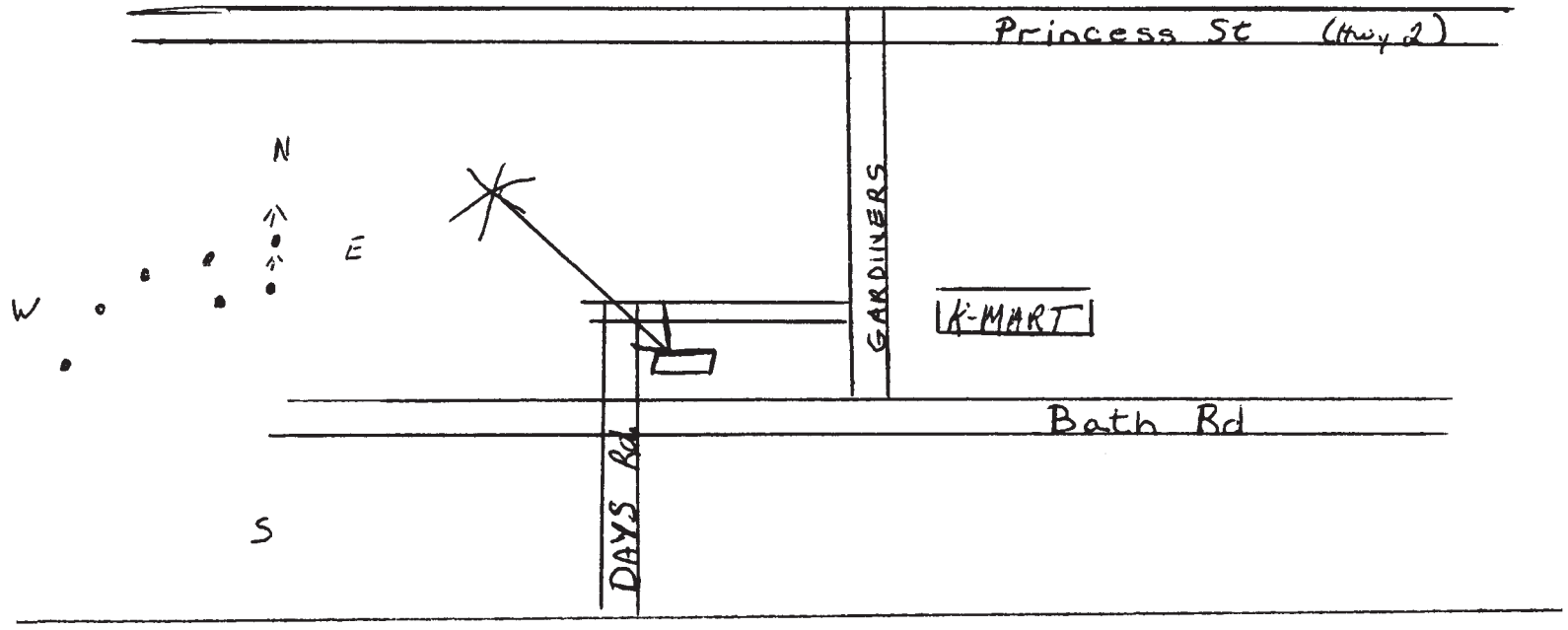
Mark Kaye

RASC--Kingston Centre: HOLIDAY DINNER & ANNUAL MEETING

Our annual holiday dinner will be held at:

Winning Goal

690 Bath Rd.
6:00 PM
Dec 8, 1989



ANNUAL MEETING

The annual meeting will be held at 8:00 PM, Dec. 8, 1989 in room D-214, MacInstosh - Cory Bldg., Queen's. (The usual place)

JOHN GRIESE--Guest Speaker
Variable Stars

Election of officers will be held at our annual meeting. ALL positions will be voted on. They are:

President
Vice-President
Secretary
Treasurer
National Council Rep.
Newsletter Editor
Librarian

If you wish to retain a position OR if you'd like to take over a position, you must attend the meeting or phone me to convey your wishes.
(613) 279 2577

PLEASE COME AND VOICE YOUR OPINION.