Hamilton Amateur Astronomers

Event Horizon

February 1998 Volume 5 Issue 4

Apos and Oranges

By Clive Gibbons

There are few more popular scopes on the market today, than the apochromatic refractor. They come in many shapes, sizes and colours, and range from less than 4 " aperture, right out to 7 " and larger monsters. Most sport truly exquisite image quality and all are fairly (or more so!) expensive for their size. But, what is an "apochomatic" refractor anyway? Is it better than an "achromat" and if so, by how much?

First, let's define what an achromatic refractor is: It usually describes a telescope having a two-element (i.e. two piece) objective lens, which is capable of bringing two separate and widely spaced wavelengths of light to a common focus. In smaller sized, this type of refractor can give very pleasing, well corrected images. However, the achromatic design isn't perfect. Because two types of "normal" glass can only bring two wavelengths of light to a common focus, all other wavelengths in the visual spectrum will be less well focused. This defect usually appears a a purplish haze surrounding the image of bright objects. Additionally, this unwanted spectral effect (called secondary chromatic aberration increases in severity as the lens gets larger and/or the focal length gets shorter.

Enter the "apochromatic" refractor. It normally has an objective lens which either has two elements (one of which is made of special "ED" glass or fluorite crystal) or three elements (one of which might be ED glass or fluorite). It's the advent of ED glass (meaning, Extra-low Dispersion) and large, artificially grown fluorite crystal, that has made possible the apochromatic refractor "revolution" we see today. The superiority of the "apo" refractor comes from it's ability to bring *three* different wavelengths of light to a precise focus. The upshot of this capability, is that other wavelengths are less likely to be grossly out of focus, as seen in the achromat's "purple fuzz" around bright objects. Apos (short for apochromat) can deliver a level of

(Continued on page 4)

HAA's Annual Star Party!

We need your input!!

Traditionally, we've held our annual star party in the month of June on the weekend closest to new moon at a glider field near Arthur, Ontario. This location is within 2 hours' drive of Hamilton, offers cheap camping and decent washroom facilities, but the skies have deteriorated noticeably over the past two years.

We need to find a new location that offers darker skies and similar facilities and isn't too far to drive for a weekend. If anyone knows of such a place, **PLEASE** let us know!!

Another problem we have had is that the weather in June these past few years has been poor. Should we hold the star party in July? (Remember that August is Star Fest, September is the Huronia Star Party and North Bay has a star party in July.)

I welcome any and all comments, ideas or suggestions!

Ann Tekatch (905)575-5433
tekatch@nas.net

inside...

Editorial

We have a number of contributors this month - both long time members (including our "Korean correspondent") and some new voices. Thanks to everyone!

There are a number of ways you can send me your articles. The easiest method is e-mail but you can also mail me a disk, print out or handwritten copy to

HAA
P.O. Box 65578
Dundas Postal Outlet
Dundas, Ontario
L9H 6Y6

If you have any questions or comments you can reach me at

(905) 525-9140 x24574 Work
(905) 525-8745 Home

I've had a couple of suggestions that I have incorporated in this month's issue - including putting the author's name *before* the articles since it seems everyone flips to the end first to check!

If there is anything you'd like to see (or have had enough of) please don't hesitate to let me know.

-Tracy Webb
webb@physics.mcmaster.ca

Chair's Report

Finally some clear skies! I have seen the statistics that show there is no correlation between the full Moon and just about anything you can think of except ht tides. In spite of this, I could swear that more often than not when we get clear skies the moon is within just a few days of being full. It's surprising how much you can see in spite of a full Moon though. Due to the long spell of cloudy weather some of us did some observing recently wit the Moon closer to full than is usually necessary to deter us. Instead of complaining about the Moon you can simply modify your choice of objects. For example, there are lots of open clusters to view that can tolerate a bright sky, the planets are still great to observe and of course the moon itself is always interesting to look at with its constantly changing shadows. If all else fails you can use the opportunity to collimate your scope.

To continue the topic of observing, I understand hat we have a number of beginners in the club. Some of you also have scopes or binoculars and little experience in using them. If you want to to learn more please come out to one of our scheduled observing sessions. Everyone is welcome whether or not you have your own equipment. If you do, we can give you some guidance on selecting and finding suitable objects.

- Stewart Attlesey
attlesey@interlog.com

HAMILTON AMATEUR ASTRONOMERS

Event Horizon is a publication of the Hamilton Amateur Astronomers (HAA).

The HAA is an amateur astronomy club dedicated to the promotion and enjoyment of astronomy for people of all ages and experience levels

The cost of the subscription is included in the $15 individual or $20 family membership fee for the year. Event Horizon is published a minimum of 10 times a year.

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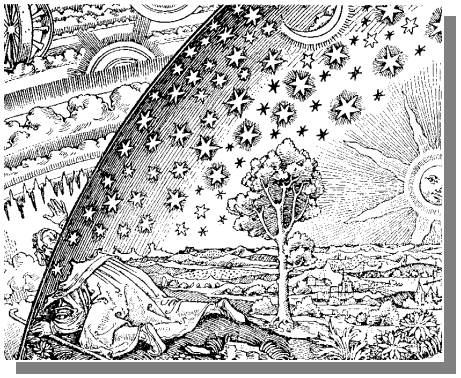


Letters to the Editor

Input From a New Member

I am a fairly new and relatively unknowledgeable member of our club. I first joined the club because of interest, out of curiosity, but mostly for enjoyment.

Having had some training in celestial navigation I always enjoyed looking up and having names for some of those bodies but I wanted to know more. Especially I wanted to recognize planets. At my first observing night I was thrilled to find Jupiter and I have not lost him since.

As I enquired about a simple and cheap star finder, I got no usable answer. Our most obvious members are just too knowledgeable to be involved with such a tool. Since then I found a "STAR AND PLANET LOCATOR" which is good for four years and costs less than $5 - plus tax. I don't know if it is o.k. to mention here where I found it so I won't. But it is a great tool for beginners. It is easy to use, easier to to read and more informative than the page of "Night Sky" in the "Event Horizon".

Using this tool and a bit of back yard observing I now recognize several constellations and the obvious planets. But now I have a problem with Mars. Throughout most of the year and still now he should be visible and during November he was supposed to be close to Venus. I could always see Jupiter and Venus but never Mars. Is there any explanation or is it just me?

Somehow I feel that I am not the only low knowledge, low equipped member of our club. There must be others with simple questions hoping for understandable answers. I don't mind if I start a trend. No doubt a good way to learn is to participate in observing nights and as several times before, I say : "I'll try to make the next one". Till then I keep looking up.

- Kurt Wolfsgruber

You're definitely right, Kurt, you are not the only beginner! In fact, we have over 100 members and I'm willing to bet that *at least* half of them are relatively new to amateur astronomy - and I'm one of them! To say that participating in observing nights is a good way to learn is an understatement - it's the only way to learn. The great thing about the sky is that you can study it by yourself in your own back yard. However, if one is really keen on learning the best thing to do is to attend a scheduled HAA observing night out in Binbrook. This way one can take advantage of the years of experience of our veteran observers. As Stewart said in his Chair's Report, it doesn't matter if you don't have any equipment. I attended an observing night last week and although I do have a little scope of my own, I spent just as much time looking through those brought by others. And I should also mention that people seemed just as excited to look through my little 4.5" as through Stewart's giant 20"! However, it can be somewhat intimidating for a new member to be surrounded by experts. Might I suggest that some of our new members exchange phone numbers and get to know each other too. It's much more fun to learn together (and saves on gas when travelling to Binbrook!). If anyone out there is interested in this please contact Tony Wallace (our Observing Director, 526-6154) and he can put people in contact with each other.

Thanks for recommending a helpful tool. Myself, I have found the monthly sky charts in the magazines **Sky News**, **Astronomy** or **Sky and Telescope** very helpful. As for your problem with Mars, it's usually quite a bit fainter than Jupiter or Venus and so a little more difficult to hunt down. However, once you know what area of the sky to look in it's unusually red colour should give it away.

Fire in the Sky

On the night of Sunday January 24 (Superbowl Sunday), around 11:15 p.m. to 11:20 p.m., my father and I noticed a white streak in the north-eastern sky, very high up. It disappeared after about thirty seconds. Two or three minutes later, I noticed another one, except it was a reddish colour and a little farther west; the reddish colour could have possibly been a refection from the steel companies. This streak also disappeared after about thirty seconds. My first though was a vapor trail left behind by a jet, but it was too short, and there was no jet or any other type of aviation in the sky. Then I got thinking, maybe they were meteors. These streaks still remain a mystery to me so if you have any idea what it could have been, please contact me at denham@cyberdude.com. Thanks!

-Sean Denham
denham@cyberdude.com

Sounds like meteors to me - but perhaps one of our members who knows for sure could send you some e-mail!

Apos and Oranges Cont ...

(Continued from page 1)

colour correction which approaches the perfection that reflector telescopes possess, but have the advantage of having no contrast reducing, central obstruction (caused by the reflector's secondary mirror). These factors can results in images which are as contrasty and "textbook perfect" as possible in an astronomical telescope. As a bonus, apo refractors are usually made in reasonably "fast" focal ratios (generally f/6 to f/9), so their physical size is more manageable and they can be used more effectively for astronomical photography.

Alas, such wonderfulness doesn't come cheap! Even an 80mm apo can cost in the neighborhood of $2000 (Canadian) and that doesn't include a tripod, mounting, or oculars. Consider that a fully mounted 8" (200mm) Schmidt-Cassegrain can be bought for quite a bit less and you wonder if apo performance is worth the asking price. For many, the answer is a very big "yes!". The apo can display a quality of image unattainable by most larger, less well corrected, optical systems. And, of course, if one wants more light gathering power to go along with that imaging perfection, 6 or 7" apochromatic refractors can be had. However, it's really the smaller examples (3 to 5") which are the most popular, largely due to their good portability, excellent image quality and more "digestible" price.

One thing to be aware of, when considering an apo refractor, is that not all telescopes advertised as apochromatic are "the real thing". The first instance of such misrepresentation that I can recall, happened with the Vernonscope Brandon 80mm apo, sold during the mid-1980s. This scope enjoyed a truly remarkable advertising campaign, featuring statements by the company president (Don Yeier) which proclaimed the li'l scope could withstand magnifications up to 1800x with *no* breakdown and *no* colour defects. The good news was that the scope was inexpensive. The bad news was that it wasn't actually anywhere ear apochromatic, let alone as miraculous as the ads suggested! More recently, another incarnation of the Brandon 80mm is being offered by Vernonscope. This scope is a true apochromat, as reported by the users, but there seems to be inconsistency in it's optical quality, from unit to unit. Some are great while other show defects in optical figure, which affect high power performance. As always, it's buyer beware! Another example of creative marketing is the Meade ED "apochromatic" refractors. These scopes have been available since 1992 and come in 4, 5, 6 and 7" apertures. All are f/9 in focal ratio and all use the same optical formula and glass types. This design is close to apochromatic in the 4" (especially) and 5" versions, but the 6 and 7" units aren't really in the ball park. How does Meade justify labeling these refractors as apochromatic? Well, they define the them by it's literal translation, "colour free". Full stop. No mention of bringing three wavelengths to a common focus, as the classical definition stipulates. Meade could certainly be accused of misrepresenting the colour correction of these scopes, but they are very well priced, considering the performance they can deliver. I say "can" because there are user reports of Meade ED refractors having quality problems. Some of them are more frequent with the larger (6 and 7") sizes. But before I'm accused of unfairly criticizing the Meade scopes, let me say that I'd happily by one if the price and quality were right. Once again, it's caveat emptor.

Apochromats marketed y Astro-Physics, Celestron, Takahashi, TeleVue, Vixen and Zeiss can all be counted on to provide virtually flawless service. It's worth noting, though, that TeleVue's smallest (and most popular) refractors, the 70mm Ranger and Pronto, use ED glass, but are not apochromatic. TeleVue deems them to be "semi-apo", so their colour correction is somewhere between an achromat and an apochromat.

So, let's pretend you're all fired up to by an apochromatic refractor ... you call up the friendly neighborhood Astro-Physics dealer and surrender your credit cared info. "Can you deliver the scope in a few days?", you might innocently ask. Gales of laughter erupt from the dealer! So, hear comes the really bad news about apo refractors: the wait to get them. Unless, by some miracle, the scope is sitting in the dealer's showroom, you can expect to sit for months or even *years* before the scope arrives in your hands. Why? It's simply a case of tremendous demand and limited supply. Most apo scope manufacturers are small companies, with tiny production volumes. Even the "big names", like Meade, are hard-pressed to keep up with the demand. If you really, really, REALLY pine for an apo refractor, then you must be patient. But, if patience isn't one of your virtues, you can always by an nice old Celestron 8 instead! (...and that's where the "Oranges" in the title finally comes in). ;-)

A Midwinter Tradition

By Denise Kaisler
kaisler@soback.kornet.nm.kr

Have you ever wondered why, on February 2nd, so many of us supposedly rational people can be found staring at the ground, waiting for the appearance of a certain fuzzy someone? I mean, a lot of our customs are odd, but at least we know where they came from. Yet we continue to observe the ritual of the groundhog year after year. Don't you ever feel the slightest bit sheepish about turning on the radio to listen for news about Wiarton Willie or one of his buck-toothed brethren?

Well, squirm no longer. You're about to find out why we think groundhogs can predict the weather.

It all started back in the old country -- Germany in this case. The farmers were far more in touch with the seasons than we are today. They recognized that six weeks after the winter solstice, burrowing animals such as the badger became more active. Thus, midwinter was designated "Badger" day in recognition of this fact. When the people pulled up their roots and settled in America, the custom came with them. But in Philadelphia, badgers were not exactly commonplace. So, the immigrants substituted the American groundhog.

That takes care of the animal. However, to understand the part about foretelling the future we have to go further back, all the way back to ancient Greece in fact. Recall the legend about Demeter, goddess of the hearth and harvest, whose daughter Persephone was kidnapped by Hades. It is said that Demeter descended to the underworld and searched for Persephone, with only a single candle to guide her.

The ancient Greeks built an underground temple (Nekyomanteion of Ephra) dedicated to Hades and Persephone. Guided by a single torch, petitioners would wander deep underground to consult the oracles of the dead for advice and prophesy.

In ancient Rome, women would parade through the streets with lighted candles in recognition of the suffering of Ceres (Demeter), the mother who had lost a child. When the Roman Catholic church came to power, they performed their old trick of renaming the holy days. Midwinter now became Candlemas, the purification feast of the Virgin Mary, which occurred forty days after she gave birth. Today, many people still observe Candlemas through the lighting of blessed candles.

Perhaps because of the Greek tradition, many European societies see Candlemas as a day on which it is possible to foretell the future. Accordingly, they have many legends about the weather. For example, an old Scottish rhyme says

If Candlemas day be warm and fair,
the half o' winter's to come and mair.

Which brings us back to our groundhog. Now everyone knows that if Wiarton Willie sees his shadow, we have six more weeks of winter, right? But the trick is, we always have six more weeks of winter. That's the whole reason we have this day -- to mark the halfway point between the winter solstice and the vernal equinox, more commonly known as the first day of spring!

And let's face it, with El Niño acting up as it has been, nobody, especially not the groundhogs, has a real handle on the weather.

The Viking Missions To Mars

By Martha Milkeraitis
milkerm@mcmaster.ca

The Viking Missions to Mars were a great success of the American Space Program. The missions consisted of two spacecraft: Viking 1 and Viking 2. I would like to introduce (or familiarize) many of you amateur astronomers to these missions, as I find the history of space exploration very exciting, and the Viking landings were perhaps the most significant landing on another world since Apollo 11 landed on the moon. Shadowed by the more recently successful missions to Mars, I thought it would be interesting to remind everyone of the Viking Missions that made it all possible...

A brief history of the exploration of Mars will help to put the Viking missions into perspective. The first spacecraft to reach the vicinity of Mars was the Soviet Probe Mars 1, a fly-by mission which arrived on Nov. 1 1962 but sent back no useful data. Further Soviet missions included Mars 3 (launched in May, 1971), which successfully landed on Mars but didn't send any data back to Earth after landing. The Soviets collected useful imaging data throughout their missions but were not able to successfully land a spacecraft on Mars and maintain contact with it.

During this time, the U.S. space program was busy with its own exploration of the red planet. Mariner 4 was the first American spacecraft to be launched toward Mars. It began its journey on Nov. 28 1964. Mariner 4 recorded Mars' magnetic field and low contrast images of the planet. Various other "Mariners" followed. Mariner 8 was launched in 1971 but its second stage rocket failed and the spacecraft landed in the Atlantic Ocean. Mariner 9 was quickly rescheduled to be launched in Mariner 8's launch window. This launch window was the last opportunity to send up a spacecraft to orbit Mars and preselect landing sites for the upcoming Viking missions. Success of Mariner 9 was critical to the planning of the Viking missions.

The Viking missions involved two spacecraft: Viking 1 and Viking 2. The planning phase began in 1968 and the actual implementation period (involving hardware and software development and spacecraft assembly) lasted from 1971 until 1975. On August 20, and September 9, 1975 Viking 1 and 2 respectively were launched.

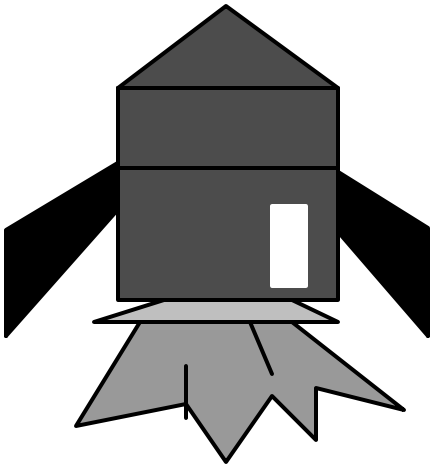
Viking 1 and 2 were designed after the Mariner spacecraft. The Viking missions however, required larger spacecraft due to larger fuel reserves and involved lander-tending responsibilities. Each Viking spacecraft consisted of an orbiter and a lander. The orbiter weighed 900kg and the lander 600kg. The orbiter and lander together and with fuel weighed 3530kg.

The orbiter instrumentation consisted of (1) a pair of cameras, incorporated in a visual imaging subsystem (VIS), which provided a larger format and higher spatial resolution than the Mariner 9

(Continued on page 7)

The next meeting of the Hamilton Amateur Junior Astronomers will be on Monday, February 16th, at 7:00 pm and we will be learning about observing the sun. If you have a budding astronomer this is the place to be! We learn about space and astronomy and have fun at the same time with activities and games. All children are welcome. The meetings take place on McMaster Campus in the Bourke Science Building, room 148, right beside the planetarium. For more information contact Rosa Assalone at 540 8793 or Tracy Webb at 525-8745.

webb@physics.mcmaster.ca



The Viking Missions to Mars Cont ...

(Continued from page 6)
cameras and could lay down swaths of pictures that overlapped to cover large areas, (2) a multiple-sensor, multiple-wavelength infrared radiometer, called the infrared thermal mapper (IRTM), which was evolved from a Mariner 9 instrument but had more wavelengths and more spatial coverage capability, and (3) an infrared spectrometer of a type not previously flown, the Mars atmospheric water detector (affectionately called Mawd), which could map the total abundance of water vapor in the atmosphere over approximately the same areas that were being observed by the other two instruments. In addition, the spacecraft's radio was used to measure the planet's gravity field and atmospheric profiles for topographic profiling.

The orbiter science instruments did not usually operate during the spacecraft's trip to Mars, but pictures of earth, Jupiter, Mars and several star fields were taken at various times for use in calibrating the cameras. Pictures of Phobos and Deimos (the two Martian moons) were also taken, which were analyzed to provide more precise information on the relative positions of the spacecraft than could be derived from radio tracking. Overall, the orbiters acquired over 60,000 images.

The Viking landers were attached underneath the orbiters during the spacecrafts' construction on Earth. The landers were heat sterilized within a bioshield which was not removed until the spacecraft was in space. This prevented any sort of Earthly biological contamination of the lander's experimental instruments, not to mention the landers themselves. The instruments held by each lander were a gas chromatograph-mass spectrometer (to detect organic content in the soil), and a biological experimental package. Additionally, there was an x-ray fluorescence analytical device, a seismometer and a set of meteorological instruments.

Viking 1 arrived at Mars on June 19, 1976 and went into orbit. Lander 1 landed on the Martian plains of Chryse Planitia, on July 20, 1976. Viking 2 entered Martian orbit on August 7, 1976. Viking 2 was landed on September 3, 1976 on Utopia Planitia.

Communications between Earth and the Martian Viking landers were possible due to transmitting and receiving antennas mounted atop the landers. The length of this link changed with the geometry of the Earth and Mars but characteristically was several hours each day. A preprogrammed mission was not needed, due to the flawless landings of Viking 1 and 2 landers.

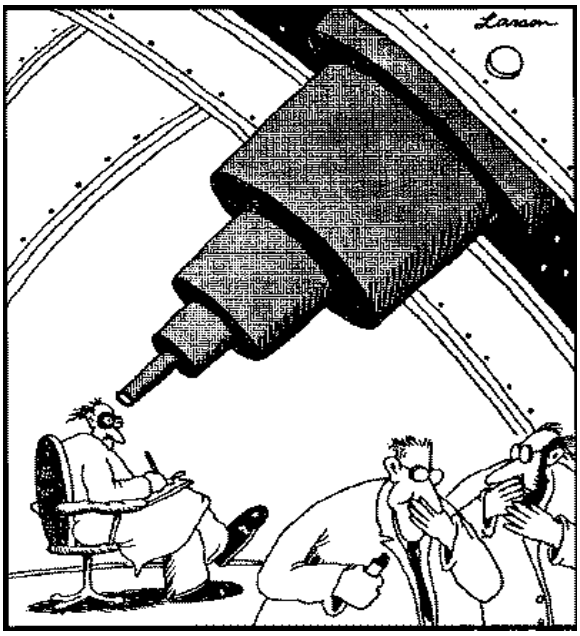
Once they were on the surface, the landers began to perform investigations. Three biology tests scrutinized soil samples, searching for life. In addition to these biological experiments, the gas chromatograph-mass spectrometer (GCMS) tested for extinct life. Results, from all of these tests, were deemed by NASA to be inconclusive.

Other experiments examined detailed weather patterns including air dust and diurnal temperature variations and atmospheric water vapour content. A seismometer investigated Marsquake activity. It is interesting to note that the seismometer on board Viking 1 failed to uncage, the only instrument that did not return usable data. The Viking 2 seismometer operated normally. A complete record of the experimental results from the Viking missions can be found in the September 1977 *Journal of Geophysical Research* publishing by the American Geophysical Union.

Ultimately, the Viking missions had to come to an end. The spacecraft elements were originally designed with the objective of achieving an operational life of only 90 days, but remained in operation for from two to six years. Viking 2 lander, too far north for direct communications with Earth, was shut off just before its communications relay through the orbiters broke. Viking 2 orbiter was deactivated when it ran out of altitude control gas on July 25, 1978. Viking 1 orbiter was deactivated for the same reason on August 7, 1980. Viking 1 lander continued to send signals until it was accidentally shut down on November 13, 1982. Controllers at NASA's Jet Propulsion Laboratory tried unsuccessfully for another six and one-half months to regain contact with the lander, but finally closed down the overall mission on May 21, 1983.

The Viking spacecraft were the first successful landers to ever land on another planet. Collectively Viking 1 & 2 assembled a database essential for planning future spacecraft missions and manned exploration of Mars. The American Space Program used this experience to prepare for the future: Mars Observer, Mars Global Surveyor, and Mars Pathfinder with Sojourner Rover were all erected on the successes of the Viking missions.

Announcements



Reminder - The Royal Astronomical Society of Canada, Hamilton Centre meets every first Thursday of the month in the Spectator Building auditorium.

Come out and meet your fellow astronomers!

We meet after every general meeting for drinks, food and great conversation at the Winchester Arms in Dundas. We have the whole back room to ourselves and everyone is welcome!

How to reach us

Web Page:
http://www.science.mcmaster.ca/HAA/

Mailing Address:
Hamilton Amateur Astronomers
P.O. Box 65578
Dundas Postal Outlet
Dundas, Ontario
L9H 6Y6

CALENDAR OF EVENTS

♦ Friday, February 20th, 7:30 PM	**COUNCIL MEETING** - At the home of Rob Roy. Call Stewart at (905)-827-9105 if you are interested in attending.
♦ Monday, February 16th, 7:00 PM	**HAJA MEETING** - McMaster Burke Science Building, room B148. For more information contact Rosa Assalone at 540-8793 or Tracy Webb at 525-8
♦ Friday, February 13th, 7:30 PM	**HAA GENERAL MEETING** - At the Spectator Building auditorium. The speaker will be Glen Petitpas of McMaster University who will be talking about *Inflow in Starburst Galaxy M83: Fuel for the Fire?*
♦ February 27,28, March 27,28 8:00 PM	**BINBROOK OBSERVING NIGHTS** - For confirmation or directions call Tony Wallace (526-6154) or Ann Tekatch (575-5433)
♦ Friday, March 6th, 7:30 PM	**COUNCIL MEETING** - Location to be announced.
♦ Friday, March 13th, 7:30 PM	**HAA GENERAL MEETING** - Speaker to be announced.