NOVA

NEWSLETTER OF THE VANCOUVER CENTRE RASC

VOLUME 2002 ISSUE 3 MAY/JUNE 2002

Looking Ahead

Remember, you are always welcome to attend meetings of Council, held on the first Tuesday of every month at 7:30pm in the G.S.O.

May 14: Andrew Chaikin, authour of *A Man on the Moon* talks about "The Apollo Experience."

June 11: Members' Night; Steve Whitehouse will talk about the summer Messiers.

Next Issue Deadline

Material for the July Nova should submitted by Monday, July 1, 2002. Please send submissions to:

Gordon Farrell
(gfarrell@shaw.ca)

Building the GSO's New Scope

by Craig Breckenridge

The Gordon Southam MacMillan Observatory has just completed a year-long retrofit. The original Dobbin's designed telescope had some inherent mechanical flaws that resulted in less than optimum performance. After much consultation with several groups, funding was arranged that would allow for the complete redesign of the telescope to bring it up to current standards. It is the story of how this modernization was achieved that is related here.

The original Dobbin's mount was a modified German Equatorial type. It had its Right Ascension axis parallel to the earth's rotation as is necessary to track the stars as the planet rotates. The Declination axis was mounted at right angles to that in order to

continued on page 8

Cosmological Fantasies

by Marc Verschueren

In every astronomer there is somewhat of a cosmologist. Every astronomer likes a little bit of fantasy. You need imagination to look at the stars. When observing the sky, we must always think about the deeper meaning of what we are looking at. We are looking at the fantastic objects in space, but how hangs this all together?

In any venture of human thinking, if not too many facts are known for sure, the wide world of fantasy opens up. It becomes possible for everybody to constructs their own theory, with invented properties and all. Astronomy is not alone in this. There are many aspects of everyday life about which no definite, well-established theory exists. It is easy then to claim there is such a theory, even if it is not really the case. I mean a theory where certain conditions always lead to certain consequences; one can predict facts. Economics and the governance of the country do not have such a theory, and that field is then wide open to fantasy, as we well know. This is not a criticism for the lack of knowledge. In such fields the world is much too complicated to allow a simple theory. All too often this simple truth gets lost in the heat of the discussion. Astronomy does not escape this.

Not too long ago there was yet another article in one of the astronomical magazines about a new concept of the origin of the universe. Cosmology and the physics behind it are in fact much simpler than the areas mentioned above. One could hope to find a simple consistent theory of the origin of the universe. But at this moment such a theory does no exist and very few facts are known about what happened in the beginning, and this leads to the inevitable fantasies. This new concept about the origin of the universe has to do with spaces that slam together like pancakes and bounce off one another like colliding frisbees. You can explain virtually anything in such a world. It is interesting and fun, but who as ever seen anything like that?

All this is not too different from the world of *Star Trek* or *Battlestar Galactica*—or time travel for that matter. Quite often science contains some element that gives such speculations some base to work from. Time travel is a good case in point. Time travel could be possible if wormholes were to exist, and these so-called wormholes could exist as mathematical solutions of the General Theory of Relativity. So far, so good. But that does not mean that such a wormhole actually does exist in reality. There are many solutions of mathematical equations which do not exist in reality. I heard a very good argument not long ago against the possibility of time travel. If, in the future, time travel will become possible, why do we not meet lots of people out of the future who are travelling back in time (I think this argument is due to Stephen Hawking)? I really like this argument. It is a little bit like doing an experiment in the future.

And experiments are what is it is all about. The recent lecture we had by Dr. Halpern of UBC brings us back to Earth. Measurements of the spatial structure of the cosmic background radiation give information—realistic information—about the conditions which existed at the beginning of the universe. It is that kind of measurement that the MAP satellite is making. The dynamics of the very early universe have an effect on the properties of the current cosmic background radiation, and this can be measured. And so this confirms or denies theories about the early history of the universe. It is not fantasy anymore. It makes it all very real. It is only fantastic that such measurements are possible at all. We measure something that actually happened long before the universe looked the way it looks today—long before we existed. But what happened then made it possible that we exist.

The measurements make it possible to make deductions about the geometry of the universe. Not some pure fantasy but real properties. As pointed out during the lecture, if you could measure some of the elementary geometrical properties of space,

continued on page 5

President's Message

Well aren't those planets something! It was very nice of the skies to organize this little meeting of the solar system to celebrate Astronomy Day. The attendance this year was the best we have had in a long time. The clouds co-operated and stayed away until almost 11:30 so we were able to get quite a bit of observing done. The day was a great success and my thanks go out to Bob and Pomponia for putting on another great show.

There are a great number of events coming up in the next couple of months. This is a good time to get that scope out and take a peak at the night sky. Take a look at the sun as well, provided you have a proper solar filter. I check it out several times a month just to see how the spots are moving around. But getting back to the upcoming events:

We have the Fraser River Festival on June 2nd. It will be held at the same location as last year and we have asked for the same location. The crowds at this event are huge so any members who can come out to help would be greatly appreciated. Bring your scope out, bring the family as well, as there are lots of things for them to do, and have a good time!

We will be holding a Sidewalk Astronomy on June 7th. If weather is inclement then we will try for the 8th. We will try out a new location this year—one discovered

continued on page 7

2002 Vancouver Centre Officers

President
Craig Breckenridge 604-437-3103
cbrecken@shaw.ca

Vice-Pres./Webmaster
Bill Ronald 604-733-7036
ronaldb@shaw.ca

Secretary
Marcellus Redmond 604-533-1830

Treasurer
Marc Verschueren 604-986-1485
marcver@shaw.ca

Librarian
William Fearon 604-939-1895

National Representatives
Pomponia Martinez 604-215-8844
pomponia@telus.net
Bob Parry 604-215-8844
robpar@telus.net

Membership
Sean Roddick 604-946-1137
smrgeog@yahoo.com

Chair, CARO Committee
Eric Fuller 604-540-2373
eric.fuller@ballard.com

Director of Telescopes
Phil Morris 604-734-8708

Public Relations
Norman Song 604-299-7924
norman_song@telus.net

Speakers
Barry Shanko 604-271-0615
barry.mail@intouch.bc.ca

Merchandising
Doug Montgomery 604-596-7058
moondoug@home.com

Nova Editor
Gordon Farrell 604-734-0326
gfarrell@shaw.ca

Councillors
Dan Collier 604-732-6046
Jason Rickerby 604-502-8158

Trustees
Sally Baker 604-324-3309
Lee Johnson 604-941-5364

About RASC

The Vancouver Centre, RASC meets at 7:30 PM in the auditorium of the H.R. MacMillan Space Centre at 1100 Chestnut St., Vancouver, on the second Tuesday of every month. Guests are always welcome. In addition, the Centre has an observing site where star parties are regularly scheduled.

Membership is currently $51.00 per year ($26.00 for persons under 21 years of age) and can be obtained by writing to the Treasurer at the address below. Annual membership includes the invaluable Observer's Handbook, six issues of the RASC Journal, and, of course, access to all of the club events and projects.

For more information regarding the Centre and its activities, please contact our P.R. Director.

NOVA, the newsletter of the Vancouver Centre, RASC, is published on odd numbered months. Opinions expressed herein are not necessarily those of the Vancouver Centre.

Material on any aspect of astronomy should be e-mailed to the editor, mailed to the address on page 5, or uploaded to SpaceBase™ at 604-473-9358, 59.

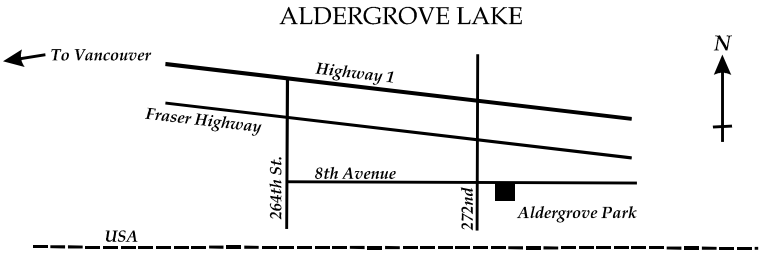
Advertising

Nova encourages free use of its classified ads for members with items for sale or swap. Notify the editor if you wish your ad to run in more than one issue.

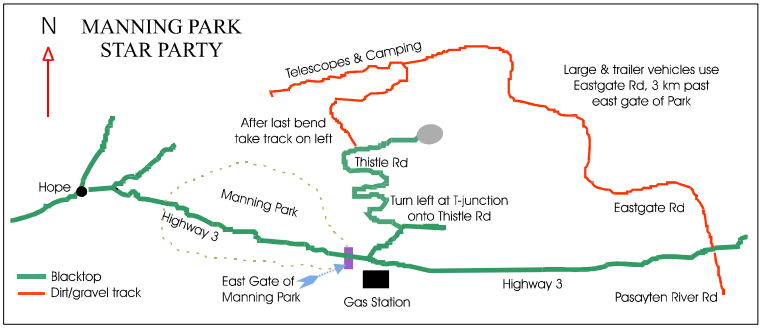
Commerical Rates

1/2 Page: $25.00 per issue
Full Page: $40.00 per issue
Rates are for camera-ready, or electronic files. Payment, by cheque, must accompany ad material. Make cheque payable to: RASC Vancouver Centre.

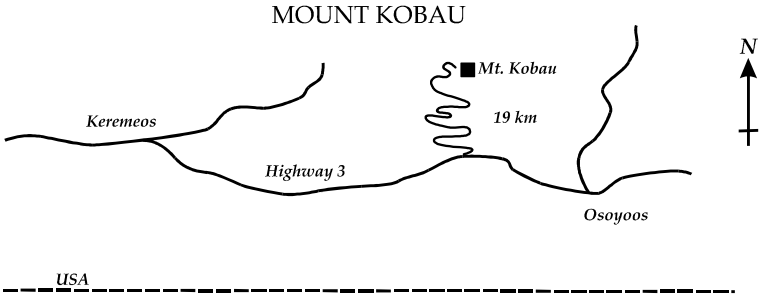
Observing Sites



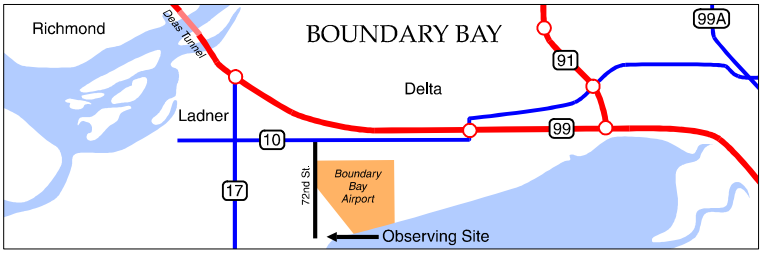
Dale McNabb Observatory in Aldergrove Lake Park (RASC Vancouver Centre's regular viewing site)
Contact Mike Penndelton (604-888-1505) or Howard Morgan (604-856-9186)



Site of the annual star party organized by the RASC Vancouver Centre



Site of the annual Mt. Kobau Star Party organized by the Mount Kobau Astronomical Society



Site of the regular Thursday night star party. On the dike at the foot of 72nd St.

continued from page 2

such as the sum of the angles of a triangle, one can make conclusions about the geometry of the universe. And this tells us how it is evolving and what its future is. The basic geometry of the universe affects the behaviour of the cosmic background radiation as a function of the direction in space in which it is measured. That is fantastic. This does indeed allow us to find some of the properties of this geometry.

Fantasy keeps science alive. Without some fantasy we would not be astronomers. Without fantasy we would never make new discoveries. Measurements show us when our fantasy was just that. Or they show us that our fantasy was confirmed by the beauty of the universe. ✸

ASTROCOMPUTING

SpaceBase™ (604-473-9358,59). Affiliated since 1992 with RASC Vancouver, our link to RASC Net, RASC Members only chat area. Future data distribution hub for CARO Project. Features include latest HST images, current world space news and astronomy programs. Provides a file uploading facility for submitting articles and imagery to Nova.

LIBRARY

The centre has a large library of books, magazines and old Nova's for your enjoyment at the GSO. Please take advantage of this club service and visit often to check out the new purchases. Suggestions for future library acquisitions are appreciated.

RASCVC on the Internet

http://members.shaw.ca/rascvan/
or http://www.rasc.ca/vancouver

H.R. MACMILLAN SPACE CENTRE

The Pacific Space Centre Society is a non-profit organization which operates the H.R. MacMillan Space Centre and Gordon M. Southam Observatory. Annual Membership ($30 Individual, $65 Family) includes a newsletter, Discounts on Space Camps, special programs and lectures, Vancouver Museum Discounts, and free admission to the Space Centre. Admission to the Space Centre includes: Astronomy shows, Motion Simulator rides, multimedia shows in GroundStation Canada, and access to the Cosmic Courtyard Exhibit Gallery. For Membership information, call Mahi Jordao at 604-738-7827, local 237 for information. You can also reach them on the Internet at http://www.hrmacmillanspacecentre.com/

MEMBERSHIP HAS ITS PRIVILEGES!

New members, did you know? The Vancouver Centre has 6 telescopes available for loan free of charge! We have telescopes ranging from 3" to 10" diameter. For more information call Phil Morris, Director of Telescopes at 604-734-8708, or see him in the lobby of the GSO after the members meeting. The loaner period is for one month only. All telescopes are to be picked up and returned after the members meeting. No telescope will be allowed to circulate outside of these meetings!

Your greatest opportunity as a member of the R.A.S.C. is to take advantage of the company of other enthusiasts to increase your knowledge, enjoyment and skill in astronomy.

The best thing you can do to gain the most from your membership is to get active! Take in the club meetings; engage other members with questions; come out to observing sessions (also known as "star parties"), and, by all means, volunteer to take part in our many public events.

Observing takes place at the Dale McNabb Observatory in the Aldergrove Lake Park, located in Langley, on 8th Avenue, just east of 272nd Street. We are there most clear nights. Contact Mike Penndelton at 604-888-1505 or Howard Morgan at 604-856-9186.

RASC
1100 Chestnut Street
Vancouver, B.C.
V6J 3J9
604-738-2855

Going to the Moon

by Barry Shanko

Alan Shepard was the first American in space. Ten years later, as commander of Apollo 14, he became the only one of the original seven astronauts to walk on the moon.

The above is recorded in the history books. But what is not as well known is that after setting foot on the moon, he looked up at the Earth and cried at the sight.

But you'd find it in the book, *A Man on the Moon: The Voyages of the Apollo Astronauts*. The author, and our May speaker, is space writer Andrew Chaikin. In 1998, it served as the basis for the Emmy award winning mini-series, *From the Earth to the Moon*. Both are available in the centre's library.

Chaikin interviewed the Apollo astronauts to get a viewpoint that hadn't appeared in any history; the personal thoughts and feelings of the first people to leave our planet.

Where else would you learn that upon being the first men to go around the far side of the moon, Bill Anders looked out his window and saw a black hole in the star-filled sky void of stars? It took him a second to realize that hole was the Moon's unilluminated hemisphere. Then he felt the hair on the back of his neck stand up.

The human dimension makes this book unique. The facts, figures, transcripts, reports and photos have been available for a while. Chaikin used these as the framework upon which he hung the personal stories of the astronauts, recording a previously unknown dimension of this era.

Chaikin is not only a good researcher, but he's a fine writer. He described riding the Saturn 5 as being shaken in the jaws of a large, angry dog. On final approach to Hadley-Apennine, Apollo 15 commander Dave Scott looked out his window and saw the Apennine Mountains slide by beside him, something he'd never experienced in all his simulations.

He described how the moon walkers found the moon's surface as resembling the deserts where they carried out their training. But they had trouble finding their way around because they lacked familiar signposts like trees, roads and towers—they had nothing to judge distance against. Add to that the clarity offered by the lack of atmospheric haze, and navigation proved difficult.

The book is available in two versions. One is a Penguin paperback. The other is a three-volume version from Time-Life books. The latter is gorgeously illustrated, with photographs both familiar and not. Andy mentioned he could have written a book the same size on each of the missions.

This is a great read. Of the space history books on my shelves this is my favourite. I hope some day he'll finish the job and do a volume on each mission.

Andy Chaikin has also written or contributed to: *Apollo* with Apollo 12 astronaut and space artist Alan Bean; *Full Moon* by Michael Light; The Smithsonian Air and Space Museum; and soon he will release a picture book on the history of space flight. He has been a senior editor at *space.com* and contributed to *Air and Space Smithsonian*, *Final Frontier* and *Popular Science*. ✸

Upcoming Events

May
17-19 – 2002 GA in Montreal

June
2 – Fraser River Festival
7 – Sidewalk Astronomy #1 (rain day: June 8)
10 – Annular Solar Eclipse (45% in Vancouver); observing to take place at Spanish Banks
14-15 – Young Naturalists observing night

July
5-7 – Manning Park Star Party #1
TBD – Manning Outreach

August
3-11 – Mt. Kobau Star Party
12 – Perseid meteor shower peaks; observation at Aldergrove Park

September
6-7 – Manning Park Star Party #2

October
4 – Sidewalk Astronomy #2 (rain day: Oct. 5)

November
18 – Leonid meteor shower peaks

December
10 – Annual General Meeting

continued from page 3

by Angela and Phil Morris last October—beside the Inuit statue at the south end of the English Bay Beach. There is a pay parking lot right near the point so we won't need to park on the sidewalk. We will be putting signage up across from the English Bay café so we should still get a fair bit of traffic and the light should be quite a bit less there.

On June 10th there will be an annular solar eclipse. While this is only a partial, we will try and meet at Spanish Banks and see who comes by. The eclipse starts at 5:02, reaches maximum at 6:02 and is over by 6:57. It is only a partial as the path of totality is in Mexico, but it is still worth the look. There will be an Umbral eclipse of the moon on June 24th. Again it won't be great, but I always try to check them out anyhow.

On June 14th (rain day June 15th) we will host a group called the Young Naturalists' Society at our Boundary Bay site. This is a group of young women who meet under the umbrella of the Van Dusen Garden. We hope to entertain them with some nice sights so again volunteers with scopes are invited to participate.

The Manning Park Star Party will be on July 5th through 7th at our usual site. We will be inviting the Fraser Valley Astronomer's Society to join us for this event. The group out the valley is quite an interesting bunch and they are all very keen observers. If you want to know more about building your own scope, their web site is worth a check as they are quite active in that area as well. We will be holding our Manning Outreach the following weekend provided all arrangements are completed in time. We will try for the same use of the volunteer's camp site as we did last year and hopefully some of our members can make it out. Until the clouds rolled in last year, we had a pretty good crowd.

For now, I will leave you with the mandate to go forth and view. ✸

continued from page 1

achieve the range of view across the ecliptic or equator of the celestial sphere. The telescope was then mounted on the end of this Declination axis. All of this meant that considerable counterweights had to be used. First, counterweights were required to balance the telescope tube upon the Declination axis. These were mounted on the rear of the telescope. The second set of counterweights were mounted on the Declination shaft itself, opposite the telescope and its weights. The third set of counterweights was mounted opposite the telescope on the rotating part of the Right Ascension axis. All of this was necessary to keep the telescope balanced. The problem of course is that it all had to be moved by the motors that drove the telescope and the weights had to be carried by the bearings and shafts on the two axes.

Craig (left) with the new fork prior to heat-treating, stress-relieving, and machining.

The crew that was assembled at AMEC Dynamic Structures to redesign the telescope has been working together on telescopes since 1993. Several of the members of the team had participated in the design and construction of the CFHT in Hawaii in the late 70's and had gone on to work on many telescope projects such as the Keck I and II telescopes, Gemini and Subaru. Since AMEC has such a huge background in telescope design, they were the obvious choice to upgrade the Dobbins instrument. Initial discussions and financial considerations soon pointed out that the complete redesign of the scope would not include changing the optical configuration. The scope would be changed only in the mount and control systems.

The first major items to be addressed were the mount style and the drive type. The old Dobbin's had been a friction drive where steel belts were driven by stepper motors to turn the two axes. This format was kept due to loading considerations on the belts and motors. The new telescope would still have steel belts and stepper motors, however the motors would be controlled differently. The mount chosen was a fork mount, which is almost universally regarded as a much more stable design. Then came the math.

Some of the parts awaiting assembly. The large disk is the observing back of the scope.

In order to determine the sizes of members and shafts, educated guesses had to be made in order to determine the loads that had to

continued on page 9

continued from page 8

be carried. These numbers would be monitored as the design process progressed in order to ensure that the initial assumptions were correct. Every aspect of the new telescope was examined to ensure that a sufficient safety factor was incorporated. Each item was then sized up and a new mass calculated. The drawings of each item and assembly to this stage was then sent out for review by experienced astronomers, volunteers and engineers. Comments from these approvers were reviewed and several further improvements were added to the design. In November, fabrication and purchase of off-the-shelf items started.

The beginnings of the trial assembly of the scope at AMEC's Dynamic Structures plant.

Since most of the parts in the telescope were custom made for this project, a considerable number of them were made entirely in machine shops. The same shops used for the fabrication of parts for the large telescopes built by AMEC were engaged to manufacture this new telescope. Bearings were custom made by SKF to ensure tight tolerances were maintained. Although these bearings are catalog items for SKF, demand for the accuracy required is not very common. The new fork was assembled by a firm that has had previous experience working for AMEC for their 'BLAST' project, a balloon-assisted telescope scheduled to be launched in Antarctica this summer. Materials for all parts were inspected to ensure only the highest quality was used. Care was taken to ensure that the location of the installation (near salt water) would not present corrosion problems with the materials used.

Control of the new telescope is with a software and hardware package from Astrometrics. This firm has a background of 8 years in design and manufacture of computer controlled drive systems for telescopes of the amateur to small research size. The new package utilizes popular software packages such as *TheSky* and *Earth Centred Universe* to point the telescope. These allow the user to pick a star or feature on a planetarium-type display and then tell the telescope to move to it. To ensure that the telescope is pointing accurately, another program called *T-Point* is used to keep track of any mechanical deficiencies that may occur. *T-Point* will mathematically predict any correction required to ensure tracking and aiming are perfect.

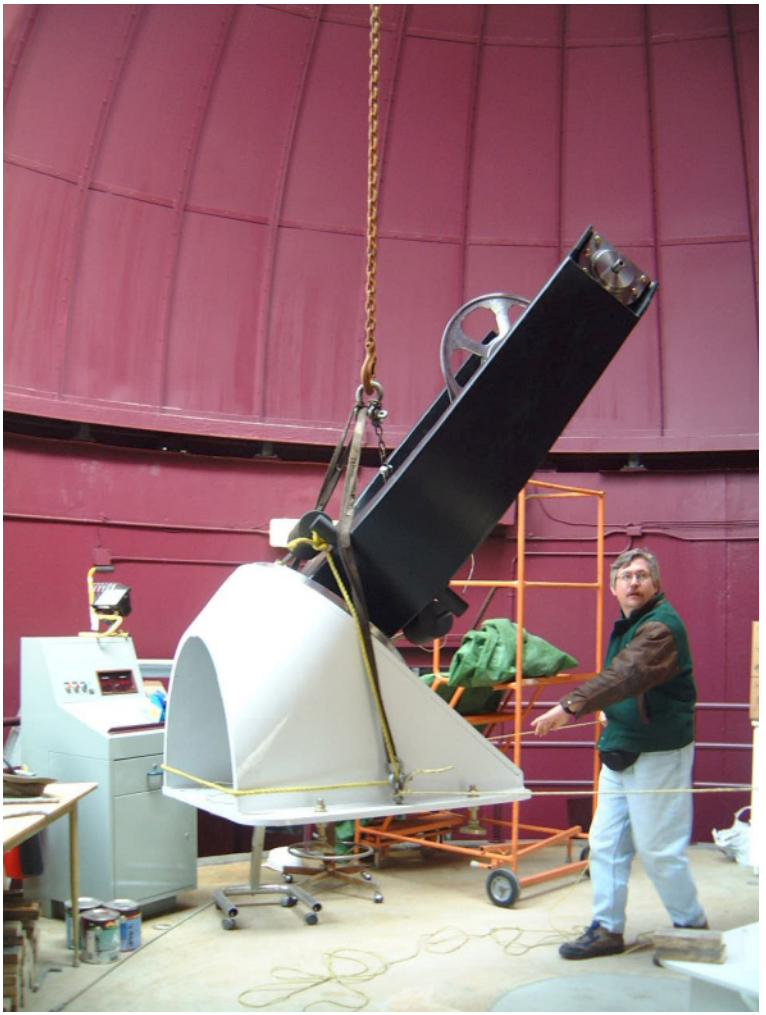
Provision has been made to further automate the dome rotation and include CCD imaging. Eventually dome control may be added to the hand paddle for the telescope. The computer has been chosen to represent current state-of-the-art technology and expandability. There should be no problem keeping this telescope up to date. Other features that have been added include electronic clutches on both axes to ensure safety. Limit switches are also wired in and will be placed to limit

continued on page 10

continued from page 9

travel and prevent cord wrap-up. Full positional locks have been provided to park the telescope at night and lock the telescope both in the vertical and horizontal positions.

A bit about weight; the old telescope weighed around 3000 pounds. The new telescope also weighs around 3000 pounds. The old scope carried most of its weight in counterweights and on the movable portion of the scope with only about 300 pounds that was stationary. The new scope has a movable weight of 750 pounds. All the weight in the new scope is in the base. The concrete upon which the new scope sits weighs about 100,000 lbs. Probably this is more than building which encloses it weighs. The old scope was driven by two 65 oz.-in. stepper motors with a combined gear ratio of around 800 to 1. The new motors are 200 oz.-in. stepper motors and are servo controlled. The gear ratio on the new system is 8000 to 1. We have added increased power and lightened the movable mass, which yields a more efficient design right from the start. ✸



The fork is lowered into place in the GSO (mind your feet, Craig).

A portion of the wiring within the scope.

Bill Ronald
Comet C/2002 C1 Ikeya-Zhang
April 1, 2002

Installation of the tube assembly of the new GSO scope.

RASC MERCHANDISE

Available for purchase after meetings:

Calendars	$12.00
Beginners' Guides	$15.00
Observers' Guides	$20.00
Star Charts	$10.00
Cloth Crests	$11.00
Lapel Pins	$ 6.00
L.E.D. Flashlights	$22.00