

THE PRAIRIE ASTRONOMER

The Official Newsletter Of The Prairie Astronomy Club, Inc.

June 2006

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 OAS: www.OmahaAstro.com
 Hyde Observatory www.hydeobservatory.info
 NEB-STAR www.neb-star.org

Club Events

Club Star Party

Friday, June 23, 2006

PAC Club Meeting

Tuesday, June 27, 2006 7:30pm
Program: "Lighting 101"

Mahoney Star Party

July 14, 2006

Nebraska Star Party

July 23-28, 2006

Club Star Party

Friday, July 21, 2006

PAC Club Meeting

Tuesday, July 25, 2006 7:30pm

Program

"Lighting 101" – Jack Dunn will talk about light pollution and effective lighting design, and Martin Gaskell will discuss the proposed new Lincoln lighting ordinance. This is a topic that has recently generated a lot of interest among club members.

PAC-LIST: You may subscribe to the PAC listserv by sending an e-mail message to: imailsrv@prairieastronomyclub.org. In the body of the message, write "Subscribe PAC-List your-email-address@your-domain.com"

For example:
Subscribe pac-list stargazer@myISP.com

To post messages to the list, send to the address pac-list@prairieastronomyclub.org

Mahoney Star Parties

July 14, August 18, September 15.

PAC/OAS Banquet

Sunday October 15, 2006

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The Prairie Astronomer is published monthly by the Prairie Astronomy Club, Inc. Membership expiration date is listed on the mailing label. Membership dues are: **Regular \$30/yr, Family \$35/yr.** Address all new memberships and renewals to: **The Prairie Astronomy Club, Inc., PO Box 5585, Lincoln, NE 68505-0585.** For other club information, please contact one of the club officers listed on the last page of this newsletter. Newsletter comments and articles should be submitted to: **Mark Dahmke, PO Box 80266, Lincoln, NE 68501 or mdahmke@4w.com,** no less than ten days prior to the club meeting. The Prairie Astronomy Club meets the last Tuesday of each month at Hyde Memorial Observatory in Lincoln, NE.

Secretary's Report

President Ron Veys called the meeting to order. There were 8 visitors. Ron discussed current and upcoming club events:

- Beginning Astronomy Class: The last session was April 26. The class went well and student evaluations were good. We plan to follow up with students to keep them informed of upcoming club events.
- Astronomy Day was a success, with over 670 people attending.
- The City of Lincoln will rededicate Holmes Park on June 10 to commemorate the completion of the park renovation. This event, called Waterfest, will take place from 5 PM to 8 PM, followed by an observing session at Hyde.
- The UNL Student Observatory will be open June 2, July 7 and August 4.
- The next Mahoney Star Party will be June 16. This is a public outreach activity jointly sponsored by PAC and OAS. Telescopes are set up near the golf driving range at Mahoney State Park. Additional MSP's are scheduled for July 14, August 18, and September 15.
- The next club star party will be held June 23 at the farm.
- The next club meeting will be Tuesday, June 27.
- The Nebraska Star Party is scheduled for July 23 – 28. Early registration ends June 1. There is a good article about NSP in the July issue of Sky and Telescope.
- Dave Knisely has an article in the current issue of Night Sky Magazine.
- The PAC/OAS Annual Banquet is scheduled for October 15 at the SAC Museum.

Treasurer's report: Lee Thomas reported the following account balances:

Hyde checking balance - \$181.41
PAC checking balance - \$1,250.48
Hyde Savings balance - \$1,948.29
PAC Savings balance - \$11,665.23
CD 1 - \$16,400.58
CD 2 - \$3,628.13

Total - \$35,074.12

Ron reminded everyone that the PAC store is now open on cafepress.com. You can purchase t-shirts, hats, mugs, mouse pads, etc. with the PAC logo.

Hyde Observatory is open Saturdays from sundown to 11:00 pm (summer hours). If you'd like to help at Hyde, contact volunteer coordinator Dave Churilla.

The PAC board met recently and established a new policy for handling star parties on private property. The policy is as follows:

“The new club observing site is located on private land that the owner has graciously offered for our use for official club star parties. The site may be used by PAC members and their guests for star parties and on special occasions scheduled and approved in advance by club officers. Individual and group use of the site without prior PAC notification and approval is not allowed by the landowner.

Since the site is privately owned, we must protect the owner from liability. Therefore all individuals who attend star parties at the site are required to sign a waiver releasing the landowner from any and all injuries or damages received or sustained while using the observing site.

Star parties held at the site must be official club functions, not impromptu star parties organized by club members. Club members may invite guests to PAC star parties provided that they do so through a club officer prior to each star party. Each guest must sign the waiver (which is available through the PAC website).”

Ron reviewed upcoming observing highlights for the month of June.

The meeting was adjourned to the program. Dr. Mansur Ibrahimov presented the program “Observing Quasars and Other Things from Uzbekistan.”

Submitted by,
Bob Leavitt

Club Telescopes – Checkout Policy

To check out one of the club telescopes, contact Mark Dahmke (475-3150) or mdahmke@4w.com. If you keep a scope for more than a week, please check in with Mark once a week, to verify the location of the telescope and how long you plan to use it. The checkout time limit will be two weeks, but can be extended if no one else has requested use of a club scope.

Hyde Observatory Volunteer Schedule

Date	Team Leader	Operators		Supervisor	Events
June					
6/24/2006	Dave Hamilton	Steve Lloyd	Josh Machacek	Dave Brokofsky	
July					
7/1/2006	Dan Delzell	Joey Churilla	Mitch Paine	Dave Churilla	
7/8/2006	Bob Leavitt	Jim Kvasnicka	Dave Hamilton	Jack Dunn	
7/15/2006	Jeff King	Bob Kacvinsky	Steve Lloyd	Dan Delzell	
7/22/2006	Bill Wells	Josh Machacek	Dave Brokofsky	Martin Gaskell	
7/29/2006	Dave Churilla	Joey Churilla	Jim Kvasnicka	Martin Gaskell	
August					
8/5/2006	Bob Leavitt	Mitch Paine	Dave Brokofsky		
8/12/2006	Dave Churilla	Joey Churilla	Bob Kacvinsky		
8/19/2006	Dave Hamilton	Jim Kvasnicka	Josh Machacek		
8/26/2006	Bill Wells	Jeff King	Dan Delzell		
Summer Hours: April through September (Sundown to 11:00 PM)					
Winter Hours: October through March (7:00 PM to 10:00 PM)					

Building an Observatory –Rick Johnson

As most of you know, one of my goals, when I retired and moved to the Minnesota lake I've been spending my summers at since 1949, was to build an observatory. Since skeeters are out in force in the summer and winters are really cold up here it had to be one I could run from inside the house. Here's how I went about accomplishing this.

First you need a dark location. That was easy. The house is miles from anything. There are only 28 registered voters in our township of 36 square miles! From the lake shore you see only one home with lights. It is nearly 3 miles away and the lights come from a light on their path to the lake. It is about as bright as a 1st magnitude star.

But we are in the middle of the woods here so lots of trees had to go. I also learned from viewing at the cabin that being right down by the lake was bad. The higher you were above the lake the better for seeing. Then too being up a ways from the ground improved seeing as well. Also, since the observatory needed to be close to the house I didn't want it to block the view. No use cutting down trees then build a house that blocks more than they did. Our house is an upside down house. Main living level is the second floor with the lower level being what most would put on their upper floor. This was done to maximize the view which is spectacular. But how do you build an observatory close to a 2 story house and not block half the sky? The answer was to build it even higher than the second story of the house! This also got me high in the air where seeing is far better. In fact ground level is 46 feet above lake level and the pier and mount are 16 feet above ground level. I can easily see down to about 20 degrees of the horizon looking over the house so it isn't a problem. Pouring a 16 foot tall reinforced pier - that was interesting. Good thing they have concrete pumper trucks though it did perplex the concrete man. He wondered why we were building a one support concrete bridge. For many months only the pier was completed. We left the black plastic form in place so it was a 16 foot tall something. Neighbors came up with all sorts of ideas. It was a chimney for an under ground wood furnace. How you got the wood into the furnace didn't seem to bother them. Most gave up and said it must be my gun to shoot down airliner flying terrorists.

The lower level of the observatory is for storage and a fish cleaning house. But you do have this big hunk of concrete in the middle you have to work around and the 12 foot ceiling is a bit unusual.

Next was the roof design. I went through several designs as a roll off roof about 18 feet in the air didn't seem practical. Besides, we have to tie down the roof at Hyde with turnbuckles and who wants to go out and turn those at -25 degrees! Clear winter nights here usually are that cold. Since I wanted to put in a visual scope as well as the remote controlled one a dome wasn't practical. I found a good clam shell design that would work well but no builder had ever seen anything like it and wouldn't touch it. It needed hydraulics so that added to the problem. Finally I was able to track down a welder who liked challenges. He didn't see problems with a roll off roof. I told him about needing to seal it from weather but I didn't want tie downs I had to go out to use nor the wind trying to lift it off like happens at Hyde when the tie downs aren't tight. I didn't need belt slippage either like we have at Hyde either.



Two views of the observatory, from the east and from the west respectively.

His answer was to reverse things from the way we did it at Hyde. Instead of the roof wheels rolling on a track, he put the track on the roof and the wheels on the building. Not just a few wheels either but a raceway of wheels. And the roof isn't be held by gravity to the roof. The roller raceway is shaped like a T. Wheels on the roof ride on the bottom of the T as well as on the side of the vertical bar and on the top side of the cross bar. This is much the same as some roller coasters do it. No way can it come off the track and it always rolls straight and true. While the roof weighs about 800 pounds you can push it back and forth with one finger. And you don't need to push in the center. You can push or pull at the very edge and it still runs straight and true. With wheels top and bottom it is always tight to the track and the wind can't lift it one little bit. I've rolled it off in 50 mph wind and it had no problem at all. No tie downs, no horrible scrunching noises as it tries to run a bit left then a bit right like Hyde's does. It is all powered by a small 1/4 horsepower garage door opener. So I just use the remote from the house to open and close the observatory.

Another problem we have at Hyde is if the C-14 is pointed up when the roof rolls, it hits the scope. I will have the same problem here. But again it is the garage door opener to the rescue. They all have an infra red beam that if blocked prevents the door from opening and closing. I put a small mirror on the outside of the tube. When the scope is "parked" in its safe position, something the software does to extreme precision; the infra red beam hits the mirror and bounces back to the receiver. That allows the roof to roll. If the scope is in any position but park the eye doesn't hit the mirror and the roof doesn't open or close. A simple and virtually no cost option as that electric eye was included in the cost anyway.

Next was the mount choice. That was the easy part. There's only one mount out there that met my requirements. It had to be able to run remotely, point and track with high accuracy and not get lost in space if the power goes out or I forget to put it into hibernation etc. Only one mount does this, the Paramount ME by Software Bisque.

First it has to find the pole. Polaris is blocked by trees here so it had to find it without seeing Polaris. Due to zoning rules I had to skew the observatory building about 10 degrees east of south. So I couldn't line it up with the building. Lining that up would require a surveyor anyway. One sunny day, I checked with my planetarium program and looked up when the sun would be exactly on the meridian. I used a plumb bob to define vertical and at the time the sun was on the meridian it would cast a perfectly north south line. I traced that on the floor by the top of the concrete pier which ended a foot above the floor. It was easy to eyeball the drilling of the 4 bolts to hold the 2 foot steel pier so they were parallel to the line on the floor to a degree or two. The steel pier had arc shaped slots for the mounting bolts that allow it to rotate +/- 5 degrees, the mount has another +/-3.5 degrees of adjustment so I only had to be within 8 degrees of north. Once the steel pier was mounted I again used the plumb bob trick to align it to north though moving it was a chore and when I finished I thought it was exactly the time the sun was on the meridian but when I looked at my watch it was 2 minutes late. I was going to redo it the next day but 2 weeks of clouds rolled in and I figured I had enough adjustment in the mount itself so didn't bother.



The pier as it appeared all winter. It is 16 foot high and 16" in diameter. It extends up 4' from an underground to underground 8x10 foot base so is 20 foot tall in total. A 2 foot steel pier was later attached to that.



Roof open this spring before the snow finished melting.

Once the mount was in, but not polar aligned I had a problem. The LX200R OTA Meade said would be out wasn't and was delayed until March. Come March still no LX200R OTAs were being produced. Since the 4.5 foot height of the mount was set for Cassegrain scopes, I couldn't put my 10" f/5 on it and have any hope of looking through the eyepiece. So I mounted my 6" f/4 on the mount. That huge mount for that tiny scope looks crazy but until Meade starts turning out the LX200R OTA it will have to do. With a scope on the mount I was ready for polar alignment. For altitude the mount has a built in, highly accurate protractor so I raised the mount to 48 degrees. I forgot about the 2 minute mistake I made when setting the pier as several months had passed.

The mount uses software called "TPoint to control its pointing and tracking. This is the same software used with the Gemini scopes and several other major observatories. So it is very powerful and far from user friendly. Still it turned out rather easy to use. First you "map" 20 or so stars. What this mean is you first let the control software point the scope to some star. I chose Procyon. Then, using a cross hair eyepiece, you slew the scope until Procyon is on the crosshair and click the "sync" button. Then you click the "map" button. You then go to 25 or so other stars but only hit the "map" button. After 6 stars it points very accurately. After 25 you solve for the error in polar axis alignment. It took me two evenings to get that many points mapped as I was fighting the learning curve. It told me I was 30 minutes of arc east of the pole and a full degree north of it. Since the protractor was so accurate how did I miss by a degree? It's easy when you live at 47 north, not 48. I miscounted tick marks. The 30 minutes east is exactly the 2 minutes of time I was late setting the pier.

Both the altitude and azimuth controls are calibrated in 2 minute increments making it easy to move a known distance and they move easily and smoothly. Easier and smoother than the main axes of my other mounts! But I used the protractor to go down one degree as the scale is designed for moves of less than 20 minutes. It took only a minute to make the adjustment and I again ran 25 map points. This time I did 25 in the time I needed for 10. I checked alignment and found I was very close, 13" of arc west and a minute of arc below the pole. At this time I changed out the focuser for a good electric one from JMI and collimated the scope. This meant another mapping run so I again adjusted the polar axis then ran 100 map points. Yes 100. I used a web cam rather than my eye and it worked much like a video game. Slew the scope to a star. Watch it rocket in to the field like a meteor and instantly stop. No quiver or overshoot. Just wham it is there and unmoving. Then you use the joystick to move it to the crosshair, click on "map" and go on to the next star. After 100 points mapped were mapped in an hour, I solved for all the various errors that wreck pointing; axes not perpendicular, optical axis not aligned precisely, gear centers being a few microns off, gravity causing things to sag, etc. I ended up with a mount that points with extreme accuracy. My pointing error is now such that it hits 85% of all targets within +/- 7 seconds of arc and hits 100% of them within +/- 20 seconds of arc! This map is also used for tracking, along with other factors such as barometric pressure and temperature. These are used because metal expands and contracts with temperature and both alter atmospheric refraction. If you have temperatures at higher altitudes you can put that into the equations as well. The polar axis is 4" above the refracted pole and 13" west of the pole it reports. Close enough!

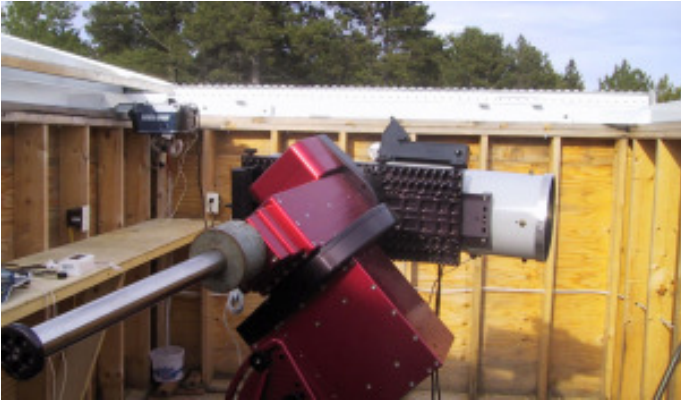
The result is I can easily take 10 minute CCD exposures without any guiding at all and still have nice round stars! While all this might sound perfect for Hyde I doubt it would ever work there unless you have one and only one telescope operator. The learning curve is very steep. If I had a cloudy night I was starting over. I had forgotten nearly everything. It was only when I had several nights of clear skies things started to stick. Even now a day or two of clouds leaves me scratching my head.

There are three programs involved, TPoint is only one. The Sky 6 Professional Edition and CCDSoft are the other two. When you need an option where do you find it in the menu structure? You might think an option like setting the focus movement of the camera would be set in CCDSoft which controls the camera. Nope, it is set in The Sky but the focus button is in CCDSoft. You set the parameters, how far to move and how fast in The Sky since it does the focus control but the button is in the CCD program, very confusing. I've spent 5 hours lost in menus. That happened when I accidentally turned off the stars. I only knew one way to get to the menu I used to toggle the stars off, that was to right click on a star. Difficult, when they are turned off. I had to go to the net and their support group and plead for help. 5 hours later I had stars back. For an individual it works great, but unless you use it constantly you are quickly lost in space. The programs interact in odd ways you don't expect. The

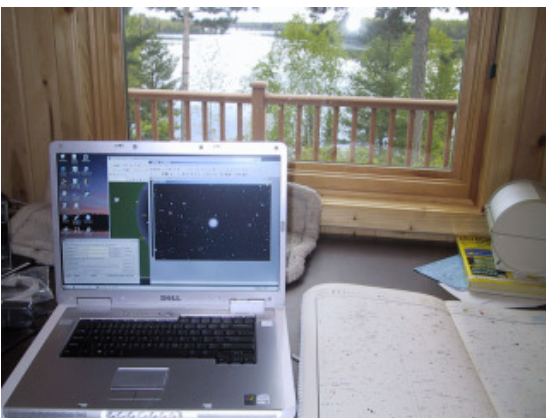
CCD program has an automatic focus feature. But when I tried to use it all I got was error messages. I could use the focus control in the scope control program but it was too coarse and I only had a fast/slow option with slow being way too fast. After posting a message to the online support group they told me to get the camera software to control the focuser you had to go into the internet server options of the scope control software and make changes. The menu to change the speed of the focuser wasn't in the focuser control section at all but in "Other adjustments". The manual says you'll never need to change these. It lies.

If Meade ever gets their act together I hope to put a 14" LX200R on the mount. Until then there's lots to explore with the 6". I took a shot of NGC 4656 and found a tidal arm I had never seen in any photo though a check of the blue Palomar plates turned up the arm. Oddly, it was little brighter than it was in my shot.

The setup has turned me into an armchair astronomer. I sit in my office and look over miles of uninhabited lake by day and light-years of space at night.



Track Opener: This shows the way off center opener. No need for the dual left and right drive as at Hyde as the multitude of wheels on three sides of the track keep things in constant alignment. The race of wheels the roof rolls on is easily visible. It runs the entire 21 feet of track. Rollers attached to the roof roll against the side of the roller raceway just below the holes. You can see a horizontal streak in one spot toward the right where they took off some paint. Similar rollers ride on the other side as well. If you look close you can see the top of the raceway has a horizontal flat surface. Wheels on the roof roll up against the bottom side of this preventing the roof from lifting even the slightest in the wind. All these wheels are adjustable should wear take its toll. The Paramount ME with my little 6" f/4 can be seen on the mount. This, and most of the photos were taken before I installed the through the axes cabling.



This is my operating position by day. At night it looks the same but is dark outside. No lights are visible, just stars.



The two flat wheels at the corners are two of the 4 bolts that hold the mount to the pedestal. Under them are levelers. Since we'd already leveled the pier they weren't used but have to be there as they provide threads needed by the hold down screws. The two degree scales can be seen either side of the opening where not washed out by the flash. They allow the altitude to be set to 0.1 degree accuracy right from the start. Azimuth is controlled by the two screws on the tab that sticks out from the base. Both are very easy to adjust. Each notch in the wheels denotes 2 minutes of motion so you can easily tell how far you have adjusted the axes.



Two of the cables going through the axes have been installed when this was taken. They go to the CCD camera providing power and the USB connection. This keeps them from catching when you flip sides of the meridian and literally turn the scope upside down. The USB from the camera and mount as well as the joystick go to a USB hub at the base of the pier then a single USB cable goes under the floor to the counter on the north wall. The end of the cable is on the left. It can either plug directly into a computer there or into a Ethernet converter and then via Ethernet to the house where I normally run the scope. I can change locations in less than a minute with this setup.



M101 is a very large spiral galaxy just "above" the handle of the Big Dipper. This is a very deep shot of it compared to what you see in most books. The shot at the URL below is almost exactly the same scale as my image but you have to rotate their image clockwise about 1/6th of a circle to get them to match. Only the brighter parts of my image are seen in theirs it is processed to such high contrast the faint detail is lost. Probably to better show the arms. Was this guy distorted by a passing galaxy. Could be and the next galaxy is a likely candidate for the culprit.
<http://seds.lpl.arizona.edu/messier/m/m101.html>
8 x 5 minutes, 6" f/4, ST-7

Events Calendar

July 2006						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1  Sun: 17:59 - 09:01 Hyde Observatory Open to the Public
2  Sun: 17:59 - 09:01 Venus close to Aldebaran;	3  Sun: 18:00 - 09:01	4  Sun: 18:00 - 09:01	5  Sun: 18:01 - 09:01 Moon close to Jupiter	6  Sun: 18:01 - 09:00	7  Sun: 18:02 - 09:00	8  Sun: 18:03 - 09:00 Moon close to Antares; Hyde Observatory Open to the Public
9  Sun: 18:03 - 08:59	10  Sun: 18:04 - 08:59	11  Sun: 18:05 - 08:59	12  Sun: 18:06 - 08:58	13  Sun: 18:06 - 08:58	14  Sun: 18:07 - 08:57 Mahoney Star Party	15  Sun: 18:08 - 08:56 Hyde Observatory Open to the Public
16  Sun: 18:09 - 08:56	17  Sun: 18:09 - 08:55	18  Sun: 18:10 - 08:55	19  Sun: 18:11 - 08:54	20  Sun: 18:12 - 08:53	21  Sun: 18:13 - 08:52 Club Star Party	22  Sun: 18:14 - 08:52 Mars close to Regulus; Hyde Observatory Open to the Public
23  Sun: 18:15 - 08:51 Nebraska Star Party; Moon close to Venus	24  Sun: 18:16 - 08:50	25  Sun: 18:16 - 08:49 PAC Club Meeting	26  Sun: 18:17 - 08:48	27  Sun: 18:18 - 08:47	28  Sun: 18:19 - 08:46	29  Sun: 18:20 - 08:45 Hyde Observatory Open to the Public
30  Sun: 18:21 - 08:44	31  Sun: 18:22 - 08:43					

Moon phase images by: António Cidadão

**Directions to Olive Creek
Observing Site**

Shorter:

Take Hwy 77 South out of Lincoln until you get to the Crete corner (junction Hwy 77 and Hwy 33). Go West on Hwy 33 (toward Crete) until you get to SW 72 St. Turn Left (South) on SW 72 St. and go about 5 miles until you get to SW Panama Rd. Turn right (West) until you get to SW 100 St. (SW 100 St does NOT go through to Hwy 33). Turn Left (South) on SW 100 St and go about 1 to 1 1/2 miles until you see the sign and entrance to Olive Creek (this is the West side of the Park). It's on your left (East) side of the road.

More Black Top:

Take Hwy 77 South out of Lincoln until you get to the Crete corner (junction Hwy 77 and Hwy 33). Go West on Hwy 33 (toward Crete) until you get to about SW 114 St. - the first intersection after SW 100 St. (forgot to look at this street sign, sorry - you'll see a sign for Olive Creek though at this road- but don't count on anymore signs after that, I didn't see any). Turn Left (South) on SW 114 St and go about 5 miles or so until you get to SW Panama Rd (you'll see a church and small school on your right). Turn Left (East) and go about a mile to SW 100 St, then turn Right (South) and go 1 to 1 1/2 miles until you see the Olive Creek entrance and sign (on your left hand side of the road).

**OFFICERS
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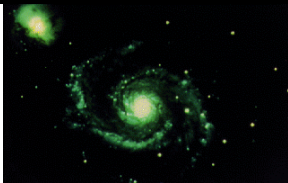
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**The Prairie Astronomer
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First Class Mail

**Next PAC Meeting
June 27, 2006
7:30 PM
Hyde Observatory**

«TITLE» «FIRSTNAME» «MIDDLENAME» «LASTNAME» «RENEWALDATE»
«CAREOF»
«ADDRESS1»
«ADDRESS2»
«CITY», «STATE» «ZIP»