

OCA Observatory

William Kuhn Telescope



Photo by: Paula Knoll

Operation Manual

Revision: August 2008

Orange County Astronomers

OCA Kuhn Operation Manual

ORANGE COUNTY ASTRONOMERS

KUHN TELESCOPE OPERATION MANUAL

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SECTION 1

GENERAL INFORMATION

Emergencies requiring medical, fire, or police aid should be reported by dialing 911. There should be phones in the warming room and the observing area of the observatory and one on a separate line in Anza House. Most people find that the best cellphone coverage on the site is around the Upper Pad area, above the observatory, though this depends on the telephone and the provider.

An emergency First-Aid kit is in a box in the warming room. A fire extinguisher is kept in the northwest corner of the observing room.

The observatory phone number is (951) 763-5152. The Anza House number is (951) 763-9693.

The official names for the telescope and the observatory are:

The William Kuhn Telescope
(named after the designer and builder of the telescope)
The Orange County Astronomers Observatory

The location is:

33 degrees 29 minutes 2 seconds North Latitude
116 degrees 43 minutes 14 seconds West Longitude
4340 feet altitude

The address is:

44050 Bonny Lane
Aguanga, CA
The site is located in the Anza Ranchos development.

Telescope Information:

Type: Modified Cassegrain
Aperture: 22 in. (558 mm)
Focal Length: 176 in. (4470 mm)
Focuser: Williams Optics 4 inch or Astro Physics 2.7 inch.

Weather Information

Summer – usually 50F-90F

Winter – usually 25F-70F

Note: temperatures can get to highs over 100F, lows below 15F

For help or information not in this manual please contact the appropriate person. See the back of a current issue of the *Sirius Astronomer* or the “Contacts” page of the club website (www.ocastronmers.org) for the current Contact List, with email addresses and phone numbers.

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SECTION 2

OPENING THE OBSERVATORY

NOTE: *The observing room is to be opened ONLY by a trained Star Member or others authorized by the OCA Board of Trustees or the Observatory Custodian. Non-Star Members may only use the telescopes in the observing room under the supervision of a trained Star Member.*

A. OPENING THE OBSERVING ROOM

1. Unlock and open the observing room, and check for mice and other critters. The door locks every time it is closed.

NOTE: *Everyone who is authorized to have access to the Observing Room is issued a unique combination to the door lock. The lock keeps a record of which combination is used to open it, providing a record of who opened it and when, so it is very important that you do not give your combination to anyone else. Enter your combination by pushing each button until it clicks, including any symbols you were given with your combination. If the combination is entered correctly and is good, when the last item is entered, the lock will cycle and the light will turn green, at which point you can turn the handle and open the door. If the light turns red, there was an error; wait a minute or so for the lock to clear before trying again, or turn the knob full right to clear and reset the lock.*
2. At the electrical panel *inside* the observing room (see Figure 1, below), the top line of breakers is numbered (from left to right) 8 (“reserved for future” breaker), 7, 5 and 6; of these, No. 6 should be left on all the time, and the others are generally off. The bottom line of breakers is numbered 2, 1, 3 and 4; No. 2 should be left on all the time, No. 7 and 5 should be off all the time, and No. 4 (the right-most breaker) is used to control power to the Kuhn telescope. Breaker 3 controls the subfloor fan, which is *not* used because of concerns about the dust it stirs up and the potential for spreading Hanta Virus. *Please note that “on” is the **down** position for the top row of breakers, and “on” is the **up** position for the bottom row of breakers.*
3. If they are off, turn on the power strip on the north wall and on the power strip attached to the bottom of the shelf to the left of the monitor for the computers controlling the Kuhn. The switches on the power strip on the north wall are on the top of the power strip, and are kept covered because they are too bright otherwise. These should be left on all the time and covers for the switches should be replaced if they come off.
4. If the working lights are on, be sure to unplug them and plug the end of the power cord to the “dummy” receptacle on the east side of the roof. For observing, turn on the red lights (exposed switch on the east wall), and turn off the white lights (covered switch on the east wall). Turn on the red step light (if needed). Each desk has a desk lamp with brightness controls to adjust its brightness. For star parties or when the observatory is in use for a class or an outreach, the red porch lights by the front door and the restroom door should be on. The warming room also has separate red and white lights, controlled by the switches on the inside of the wall on the north side of the outside door to the observatory. The red lights are on a rheostat to control their brightness. [While the wall lights in the observing area and/or the desk lights are generally on during viewing sessions, if you are viewing by yourself or with one or two others, you may want

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to turn them off to get more contrast while viewing dimmer objects. If you are hosting a group at the observatory or if people are moving around a lot, the lights should always be on to avoid accidents.]

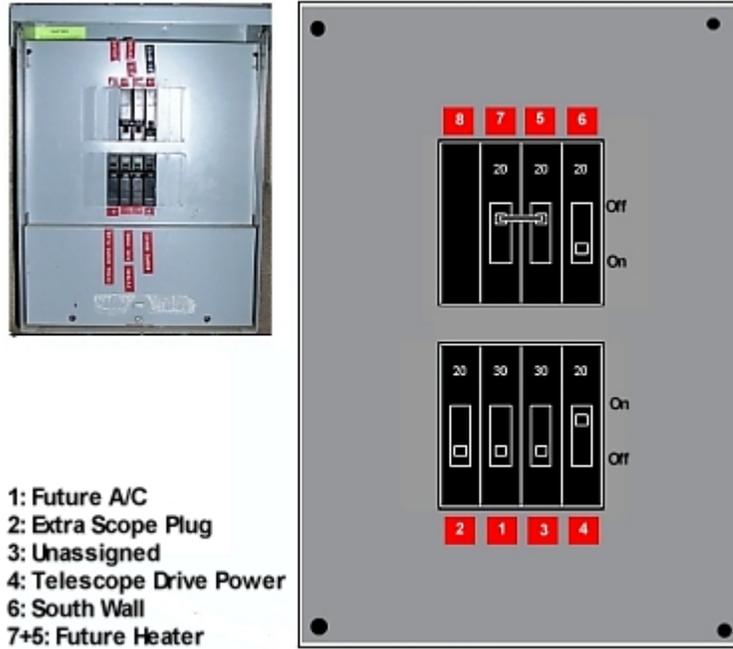


FIGURE 1

This is the indoor electrical panel (located on the East wall of the Observing Room)

B. OPENING THE ROLL-OFF ROOF

Note: These instructions are for the new metal roof. Please note that there are differences in the procedure for opening and closing it from those we followed with the original wooden roof.

B(1) General Information:

When the roof is closed and fully secured, it should be held by two tie-downs, one in the center of each side of the observatory, and the flap on the south wall (the “south flap”) should be up/vertical and locked with two bolts, one on each side of the flap, which slide into sockets on each side of the end of the moving roof. There are counterweighted bars projecting into the observatory on both sides of the south flap (referred to as “control bars”), which are used to raise and lower it. The counterweights on the control bars also help hold the flap in position both when it is closed and when it is open. The area around these two control bars needs to be kept clear at all times, to allow them to move up and down freely and to allow easy access to the bars and to the bolts on each side of the south flap. Either control bar can be used to raise or lower the south flap.

WHENEVER THE SOUTH FLAP IS UP IN ITS “CLOSED” POSITION, AT LEAST ONE SIDE BOLT NEEDS TO BE LOCKED TO INSURE THAT IT DOESN’T FALL OPEN!

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NEVER PULL THE SOUTH FLAP UP TO ITS “CLOSED” POSITION IF THE ROOF ISN’T CLOSED!

NEVER MOVE THE ROOF WHILE THE SOUTH FLAP IS CLOSED, whether or not it’s locked in place, as this could cause extensive damage to the moving roof, the south flap, and anything below the south flap if it falls, as well as injuries to anyone in the vicinity.

Some other points to be aware of: The reduction gears were removed from the chain drive, as they were no longer needed because the new roof is a lot lighter than the old one. As a result, the new roof moves a lot faster than the old one and can be opened and closed in much less time. This is more convenient and easier on the operator’s thumbs, but it also means that you need to be more careful about monitoring for possible problems whenever the roof is moving as there is less time to react. Another change to the chain drive is that a spring was added to the chain, so we no longer have to reverse the motor and “jog” it to take tension off the chain after opening or closing it. This is particularly important when closing the roof, as the tolerances for the fully closed position are a lot tighter than with the old roof.

B(2) Roof Opening Procedure

1. Make sure the control bars on both sides are clear of obstructions. Unbolt the side bolts on south flap – keep close to the control bar after unfastening the second bolt, in case the south flap starts to fall open. NEVER allow the south flap to fall or drop without controlling the motion, as that will damage the flap and the observatory structure.
2. After both side bolts are unlatched, lower the south flap by holding on to one of the control bars; pull up on the bar to start the flap moving and control the movement until it is fully open and lying flat on the supports. It will feel heavy at the beginning and end of the motion, and lighter mid-way.
3. Remove the two tie-downs, one on each side of the observatory. Leave each of the tie-downs near the position where you removed it, to make it easier to find them and so they don’t get mixed up, as they are adjusted to different lengths.
4. Check to be sure the working lights in the roof are unplugged from the wall; the power cord for the lights is on the east side of the roof. When the lights are not in use, the power cord should be plugged into the “dummy” receptacle located on the east side of the moving roof, to keep it out of the way when the roof moves.
5. Check to be sure that nothing on the Kuhn or the LX-200s will come into contact with any part of the moving roof as it opens, particularly that everything will clear the support beam across the south end of the moving roof. This is particularly important if the Kuhn is not in its “park” position at the time the roof is opened; as a general matter, the Kuhn should always be left in its proper “park” position when it is not in use, but if you find that it is out of position when you open the observatory, you should be able to open the roof without repositioning it if it is not very far from its “park” position. If it looks like anything on the Kuhn might come close to any part of the roof when it is opening, move the Kuhn to a better position or remove whatever might come in contact with the roof before starting to open the roof, and make sure you monitor any area where something might come in contact with the roof throughout the time the roof is moving. The roof should never come in contact with any part of the Kuhn or anything attached to it – *if you can’t position the Kuhn to keep it from contacting the roof or*

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remove any of its attachments that would touch the roof while it is moving, DON'T open the roof!

Make sure everything else in the observatory is clear of the roof, as well, particularly any ladders in the observing area, before opening the roof.

6. Check the roof tracks and roof chain/cable for obstructions inside and outside of the observatory building.
7. Call out "Roof is moving!" to warn all persons present that the roof is about to move.
8. Open the roof using the chain drive – on the motor control for the chain drive, turn the indicator to “Open” and push the “Motor Run” button momentarily to verify correct roof movement. **DOUBLE CHECK:** Are BOTH hold-downs removed? Is the power cord for the working lights plugged into the dummy receptacle? Is the south flap fully open? Correct any problems before proceeding. **KEEP YOUR FINGERS, ANY OTHER BODY PARTS, CLOTHING, AND ANY OTHER PEOPLE PRESENT AWAY FROM MOVING PARTS.**

NEVER use anything but the direct pressure of your fingers or thumbs to hold in the push-button, as it would be too hard to keep the necessary control and you would risk damaging the drive, the chain and the roof as well as anything that the roof might come in contact with. Because the reduction gears have been removed from the chain drive, and the roof moves much faster than before, it is even more important than before to keep checking for possible problems whenever the roof is moving.

Note: The roof winch should already be plugged in. If the motor doesn't start when you press the push-button, check to be sure that it is plugged in, check to be sure you have moved the switch all the way to the “Open” position, and check to be sure that the power is on for the north wall of the observing area.

9. **READ THIS STEP AND THE ENTIRE NOTE BEFORE PROCEEDING FURTHER:**

Hold the push-button in until the roof has moved to desired position. Use only your fingers to hold the button.

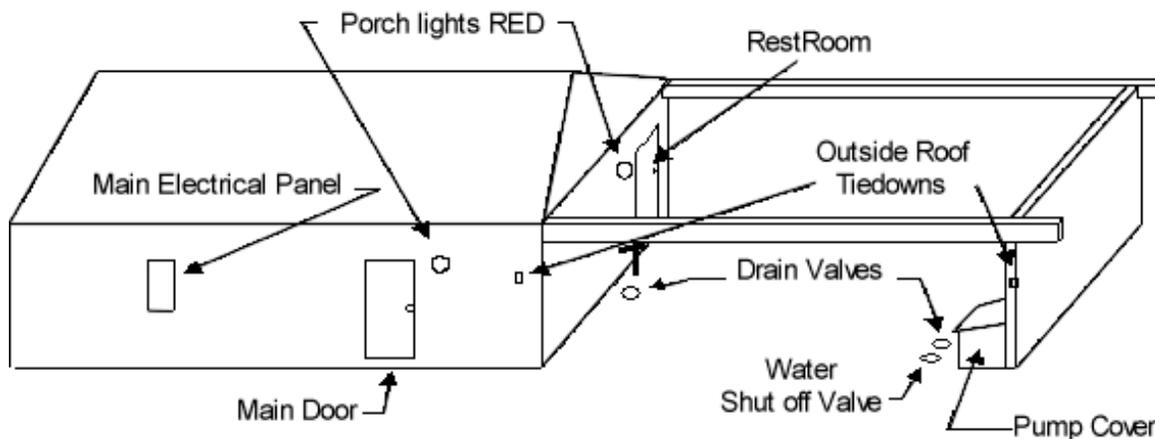
NOTE: THERE IS NO LIMIT SWITCH to stop travel of the roof before it rolls too far. *There is a metal U-shaped bolt through the chain to use as a guide. When the bolt reaches the weathershield that tops the north wall of the observing room, the roof is opened as far as it can safely go, though it is unusual to open it quite that far. If the cable bridle reaches the far pulley (on the outside metal support at the north end of the observatory), you have gone too far, and may have to repair the system. During roll-off, watch the chain/cable and winch chain wheels for smooth operation. Watch to make sure that the roof clears the telescope and finders. Watch that no obstructions occur for the roof or for the chain/cable. STOP THE ROOF before adjusting any kinks or other problems.*

10. When the roof is fully open, turn the roof winch selector switch the “Off” position (center, neither Open nor Close) to help make sure that it won't be accidentally activated.

For roof closing procedure, see below (p. 26).

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Anza Observatory



Ref # 2

C. PREPARING THE TELESCOPE

The Kuhn telescope should always be left with the main and secondary mirrors properly covered, covers on all of the finderscopes, the Telrad turned off, and the diagonals on the main telescope and the upper refractor turned down with covers inserted. If you find the telescope in any other condition, you may have to make suitable modifications to the directions for preparing the telescope; please also note anything unusual in the log, and notify the Observatory Custodian of any condition you find that endangers any of the equipment.

1. Mount the diagonal on the main telescope (if not already mounted) and an eyepiece. There should be a spare diagonal in the brown cabinet, if needed.
2. Open the two doors covering the primary mirror and push them back against the latches to secure them open. Note: In the past there was a second cover over the primary that was placed on the baffle tube under the mirror doors. That is no longer in use, as it caused too much contact with the primary mirror.
3. Remove the secondary mirror cover.
4. Remove the covers over all finders. (Note: It helps to keep all of the covers together in one place. Usually the most convenient spot is on the desk to the west of the control desk). If any finder you intend to use does not have an eyepiece, place one in it. Adjust the finders if necessary.
5. Turn on the Telrad finder and adjust the brightness (this can be turned off when you don't expect to use it for a while, to preserve the batteries). If the Telrad doesn't appear to turn on, turn the "on" switch as far as it will go to turn any light in the Telrad to its brightest level, and check again to see if it is producing any light (sometimes it's hard to see the red target it produces because of the angle). If it is clear that the unit isn't producing any light, you probably need to replace the batteries: remove the Telrad from the telescope by loosening the thumbscrews holding it to its base and lifting it out of its base, then open the battery case and replace the

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batteries. The unit currently on the Kuhn has a lid on the top of the unit that slides open to expose the batteries, and it takes two AA batteries (this may change).

5. Mount the diagonal on the upper refractor/finder, if not already mounted, and insert an eyepiece. Note that the cover for this finder is inside the dewshield, and generally the best way to remove it is to use the rolling ladder to access it. Because of its position, it is very difficult to remove the cover from this finder unless you do it before moving the Kuhn from its “park” position.
6. Examine all parts of the telescope for any unusual conditions or problems, and report them, if any, in the Log and to the Observatory Custodian. This includes any books or accessories that appear to be missing and eyepieces or other accessories that have been damaged.

***NOTE:** Every use of the Observatory **MUST** be entered in the Observing Log.*

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SECTION 3

USING THE TELESCOPE AND COMPUTER

The Kuhn Telescope is to be operated ONLY by a trained Star Member or under the supervision of a trained Star Member. The telescope is currently controlled by computer using “TheSky” software and the Comsoft interface that configures the telescope to make it appear to “TheSky” to be an ACL compatible telescope. Anyone with older manuals showing instructions for any prior system should replace the entire manual with this new edition.

A. **COMPUTER CONTROL OF THE KUHN TELESCOPE USING "TheSky" AND COMSOFT SOFTWARE**

A(1) Introduction

An IBM/PC-compatible computer is used to control the Kuhn Telescope using the “TheSky” software from Software Bisque. This computer is connected to a second IBM/PC-compatible computer that is used solely for the Comsoft software that configures the Kuhn Telescope so it is an ACL compatible telescope. The two computers both use the same keyboard, mouse and monitor; there is a switch that allows the operator to go from one to the other.

The telescope can be pointed to deep-sky and solar system objects using the simple point-and-click or the “Find” functions of TheSky, or you can use the Move To command under the Orientation menu to type in the location of an object. The hand paddle can also be used in conjunction with computer operation of the telescope. ALWAYS wait until computer slewing is completed before you try to move the telescope with the hand paddle.

KEYBOARD NOTES. The keyboard used for the two computers is wireless, to reduce problems with mice chewing on the cables. The batteries should last for more than 6 months without needing replacement. If the keyboard does not appear to work – check the batteries and replace as necessary. There should be spare batteries in one of the drawers in the desk to the left of the computer station. Once you replace the batteries, you will need to reestablish the link between the keyboard and the computer by pushing the “connect” button on the back of the keyboard at the same time as you push the “connect” button on the wireless receiver that is generally to the right of the computer monitor.

MOUSE. The mouse is also a wireless device; if it does not appear to be working, move it from the keyboard tray to the desk to get better reception. If it still does not function well, check the batteries and replace as necessary. It takes 2 AAA batteries. Once the batteries are changed, you need to reconnect to the receiver by pushing the “connect” button on the receiver. You may then have to reconnect the keyboard again as well.

A(2) Startup Sequence.

1. The two PCs that control the Kuhn are located on shelves under the computer desk just west of the entrance to the observing area. The one on the right, Computer No. 1 (“Kuhn-1”), is

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dedicated to the Comsoft control software, which is a DOS program. NO OTHER PROGRAM IS TO GO ON THIS COMPUTER. This is the computer that connects to the drives on the telescope and that configures the system to emulate an ACL compatible telescope.

2. The computer on the left, Computer No. 2 (“Kuhn-2”), has Software Bisque’s TheSky 5.1 software installed on it and is used for the actual control of the telescope. The push-button switch that allows you to go back and forth between the two computers is located in the middle of the desk level of the computer desk at the back, below the monitor.
3. Turn on the two computers. On the current system, you can turn them on in any order.
 - a. The “on” button for Kuhn-1 is located on the top left side of the machine, near the front, and the Comsoft program should come up automatically after it boots up. If not, click the top one of the two Comsoft icons on the desktop (the one with the title “TCSSYS.” The other Comsoft icon is PFSKYS; if you open it by mistake, just exit the program and open the other one). The Comsoft program is a DOS program operating on a Windows system.

Note: This computer MUST be set to Universal Time for Comsoft to work right; please note that this is always UT, even when we have Daylight Savings Time (for Pacific Time, the adjustment is by adding 8 hours; during Pacific Daylight Time, the adjustment is by adding 7 hours). Check the time for accuracy, as it does not update automatically; this computer is not connected to the Internet. If the time is incorrect, the computer time itself needs to be corrected, not just in Comsoft.

- b. The “on” button for Kuhn-2 is located under the red cover taped onto the front of the computer. Push it “on” through the red cover, and leave the covering in place – the light underneath it is very bright. Once it boots up, start TheSky using either the icon on the desktop. This computer is set to local time, and TheSky takes its time from the computer time. Check the computer time for accuracy.

Note: This computer is connected to the Internet, so the database for TheSky can be updated. It can also be used to check for information on the Internet while operating the Kuhn without affecting control of the telescope, though you should *not* attempt to connect to the Internet or use any other program while the Kuhn is slewing.

- c. The power button for the monitor is on the right side on the top of the monitor.

Note: Both computers are plugged into a power strip that is attached to the bottom of the shelf to the left of the monitor. If you have problems turning the computers on, check this power strip to make sure the switch is turned on.

4. Turn on the telescope, (breaker No. 4 in the circuit box on the east wall of the observatory). The Comsoft program will connect automatically.
5. On TheSky, click on the "Telescope Connect" Icon to connect TheSky with Comsoft and the

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telescope. TheSky should display a "cross-hair" showing where the Kuhn is currently pointing (to start with, it should show it pointing to its parked position, a little above the horizon line on the southern horizon).

6. To align the telescope, select an object from the display or by using the "Find" function (a bright star is best). A pop-up window will come up, displaying the information for that object. This window also has the major command buttons used to control the telescope. The "Slew-to" button () is on the bottom of the pop-up window; click it. The Kuhn should move to the desired object. If it is not centered in the eyepiece when the Kuhn stops moving, center it manually, using the hand paddle.
7. Click on "Sync" to tell TheSky the object is now centered. The "Sync" button is under the "Telescope" tab on the pop-up window, near the center of the window.
8. The telescope should now be aligned and ready for observing. You may need to re-sync it over the course of your observing if you find that it is losing its accuracy. For more on how to use TheSky to control the telescope, see below.

A(3) Shutdown Sequence.

Please read this entire section before attempting to Park the Kuhn.

1. We currently park the Kuhn using the Comsoft program. Terminate the link between TheSky and the telescope (click the "Terminate Link" button, which is in the same group of buttons as the "Establish Link" button) and switch to the Comsoft program on Kuhn-1. Use the mouse or the cursor controls to get to the "Shutdown" option (bottom right of the screen). You can select either "Auto" or "Manual" from the pop-up menu; "Manual" allows you to step through the different steps, while "Auto" runs through them all automatically. If you select "Manual," keep pushing the "enter" key until it completes the sequence and asks if you want to "abandon TCS for system?" If you select "Auto," the program goes through these steps automatically and ultimately asks if you want to "abandon TCS for system?" If you press "enter" at this point, you exit the Comsoft program. If you push the "escape" key, the program stays on, which is helpful if you need to adjust the final position of the Kuhn (see below).

Note: Because of the red film over the screen, when the "Shutdown" menu seems to have "Manual" highlighted, it actually is indicating "Auto," and vice versa.
2. During the parking process, the Kuhn should move to the designated Park position (0 matched to 0 on the scales for the RA drive and 0 matched to -55 on the scales for the Dec drive). If it stops moving before it is in the correct position, you will need to adjust the position with the hand paddle (see below). **The Kuhn needs to be in the correct Park position to ensure that the roof will clear it when it closes.**
3. Carefully observe where the telescope is moving during the Park procedure. The tube should stop moving down before it reaches an inch above the fork (at or close to -55 dec), and the forkarms should both be the same distance above the floor (0 RA).

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4. If you see the telescope overshoot the Park position, particularly if the tube is likely to hit the fork, switch off the power to the Kuhn (Breaker No. 4). When the Closedown procedure gets to the point that it asks if you want to abandon TCS for system, you can press the “Escape” key and stay in the Comsoft program. If the program seems to be acting strangely, it is probably better to close it completely and then restart it.
5. If you left Comsoft on by using the “Escape” key, you should now be able to use the handpaddle to reposition the Kuhn (turn the power back on if you turned it off). If it doesn’t respond, you should shut off the power to the telescope, exit Comsoft completely and restart the program. Once you restart Comsoft and turn the power to the Kuhn back on, you should be able to use the handpaddle to reposition the scope in the proper Park position (0 RA and - 55 Dec). If the telescope doesn’t respond to the hand paddle, check the Comsoft program to see if you have reached a limit (it generally will have a flashing sign saying “Limit” if you have). If so, please follow the procedure described in the troubleshooting section below to correct the problem.
6. Turn off the power to the Kuhn after you move it into its proper park position.
7. Exit the Comsoft program (select “Shutdown” and either “Auto” or “Manual” and keep pressing “Enter” until it closes). Close down the computer using the Windows “Exit” procedure.
8. Close TheSky WITHOUT saving any changes, and close down the computer using the Windows “Exit” procedure.

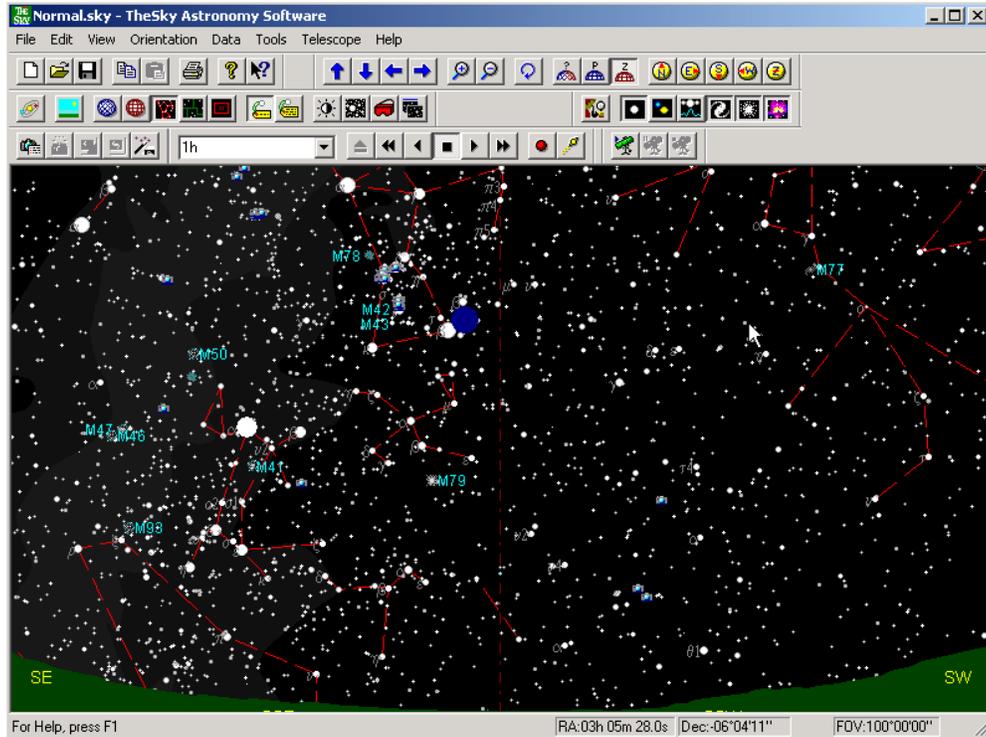
A(4) Using TheSky software to control the Kuhn

Many thanks to Liam Kennedy for putting this section together.

4.1 Typical startup screen.

After you start TheSky, you should get a screen that looks something like this:

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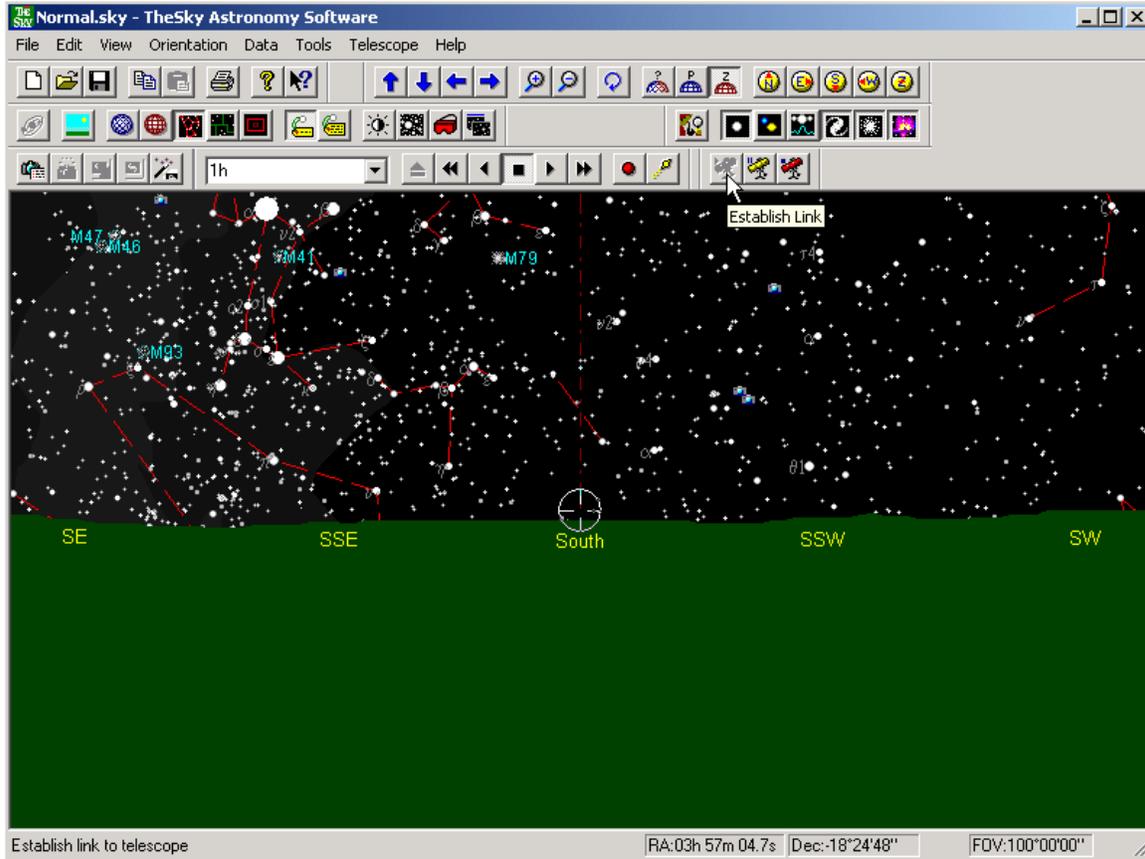
4.2 Establish Link

To get TheSky “talking” to the Kuhn telescope, click on the “Establish Link” button (right side of bottom row of buttons at top of screen).



After doing this you will see the screen below – notice the cross-hair displaying where the telescope is currently pointing (at the beginning of the session, this should be to the standard park position).

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With TheSky in this mode the software is continually asking the Comsoft program to give it the telescope's current position and this position is being updated on the screen very rapidly. It also ties the display to where the Kuhn is pointing, so you will not be able to look at other areas of the sky on the display. This mode of operation is unnecessary and you can turn this constant communication off by suspending the link.

4.3 Suspend Link



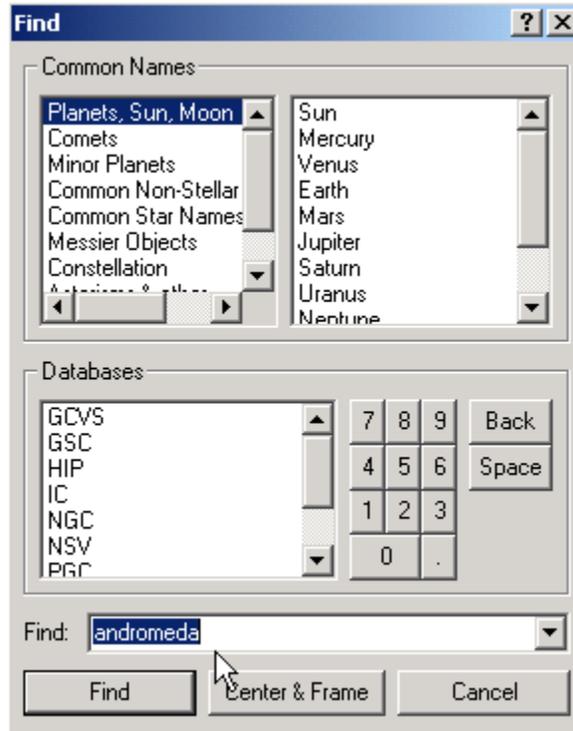
The "Suspend Link" button is the next icon to the right of the "Establish Link" button. Clicking on the "Suspend Link" button does not affect your ability to control the Kuhn. It just breaks the tie between the display and the scope location and allows you more freedom in your use of TheSky to locate objects you might want to view, and also reduces unnecessary traffic between the two computers.

4.4 Moving the Kuhn to an object.

You can just click on any star or other object on the screen and tell the telescope to Slew to the object. Often, the easiest way to locate or select an object is to use the special Universal Find feature of TheSky as follows:

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Press the “F” key, press the  icon, or right click with the mouse and select “Find” to bring up the following pop-up display:

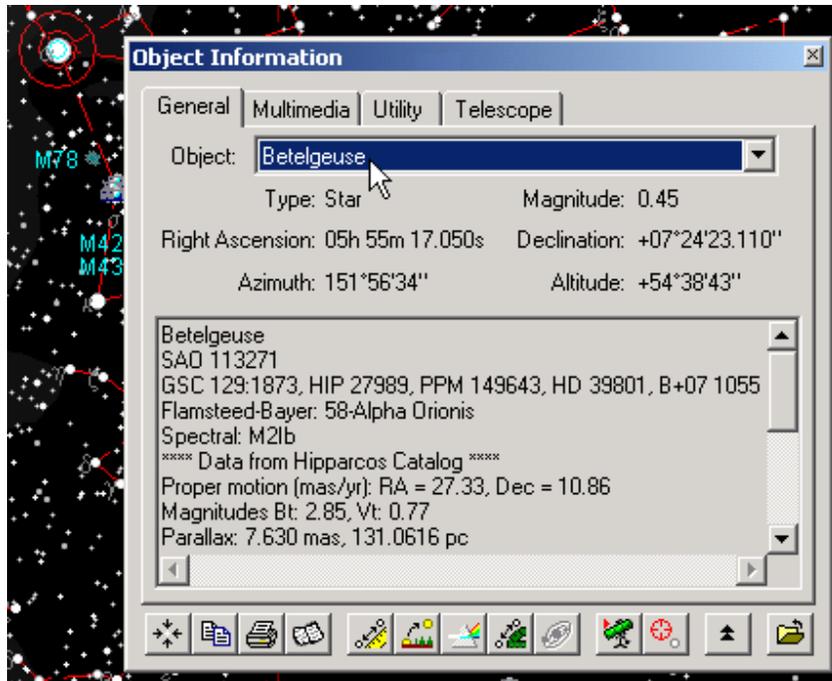


You can immediately start typing the first few letters of ANY object you are interested in. This can be a star name, Messier object, planet name. e.g. above I have entered “Andromeda”. You can also use the submenus shown on this window to select an object. This interface is very flexible and you will see there are many different ways to quickly select any object you want..

Clicking the FIND button will bring up the object details pop-up box (and the display will now show the area of the sky where the object is located).

You can also use the Move To command under the Orientation menu to go to an object.

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In order to get the Kuhn to move to this object you must click the SLEW ->  icon. The telescope should begin to slew to the object and you will see the following display:



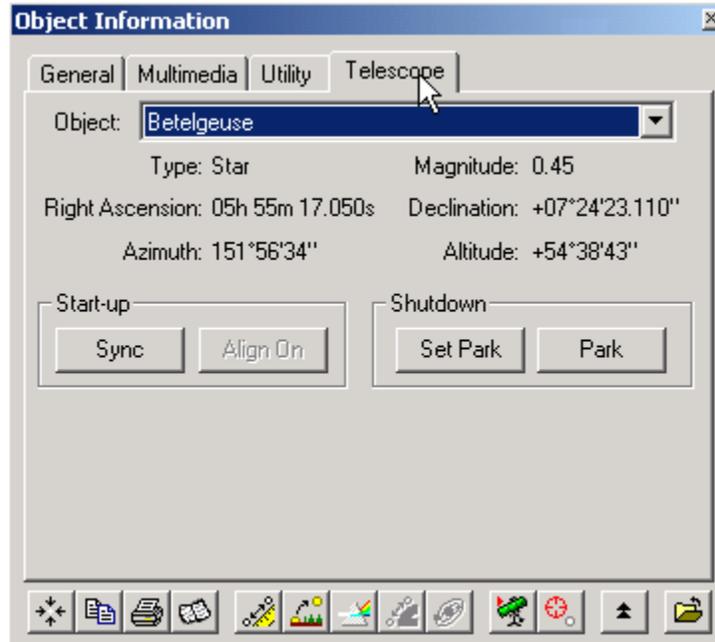
Note: Occasionally the Kuhn may not actually move. Try clicking the Slew button again.

4.5 Syncing TheSky to an object centered in an eyepiece on the Kuhn.

Sometimes the object you have selected is not centered in the eyepiece at the end of the slew. You need to center the object in the eyepiece using the hand paddle attached to the Kuhn. When you have done this you must tell TheSky that you are now actually centered on the object. This is called Syncing.

To Sync, find the object as described above in 3.4. Then, in the Object Information box, select the tab labeled Telescope. You will then see the following:

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With the object you want centered in the eyepiece – just click the Sync button.



If you are watching the screen while you do this, you will see the cross-hairs that mark where the Kuhn is pointing move to a position centered on the object you selected from a position that is off-centered from the object.

4.6 [Reserved]

4.7 Terminating the link with the telescope

There may be times while you are operating the Kuhn that you need to terminate the link between TheSky and the Kuhn. You can do this by clicking this button on the main toolbar:



A(5) Using your own computer to control the Kuhn.

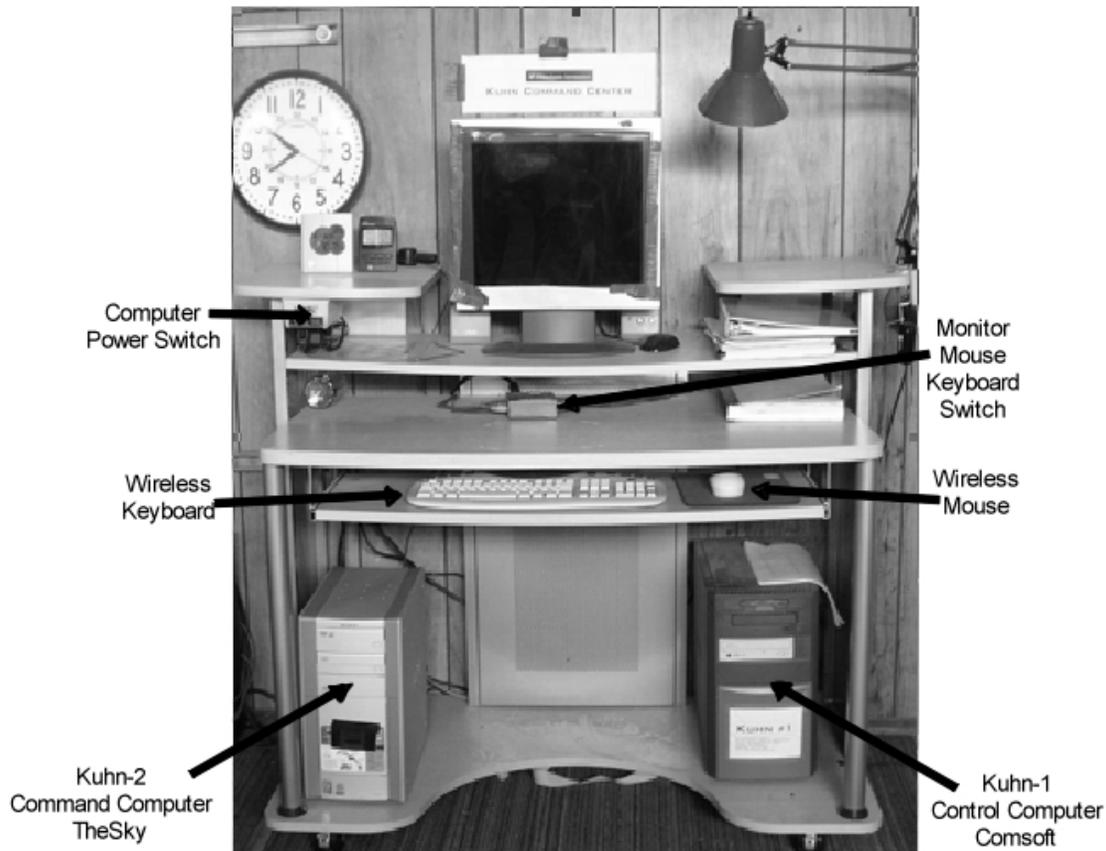
At this point, ONLY the club PC running TheSky can be used to control the Kuhn.

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A(6). Photographs of the Equipment

6.1 The Observatory Computer setup

Below is a photograph of the observatory setup. Kuhn-2, running TheSky, is on the left shelf at the bottom of the computer desk. Kuhn-1, which runs the Comsoft software that actually interfaces with the telescope, is on the shelf on the right. They both use the same monitor, keyboard and mouse, and the button used to switch between them is on the grey box located under the monitor.



Note: the power switch for Kuhn-2 (the computer on the left) is under the small piece of red film on the front of the computer about a third of the way up from the bottom of the computer. You can press the power switch without lifting the film. The film is there to reduce the light from the otherwise VERY bright blue power-on light of the computer. The power switch for Kuhn-1 is located on the left side of the computer at the top and toward the front.

The keyboard and mouse are both wireless, and the batteries need to be replaced periodically. If you find the keyboard or the mouse does not work – check the batteries. Replacement batteries should be in one of the drawers in the desk to the left of the computer desk. Once you replace the batteries, you will need to reconnect the mouse and the keyboard. The mouse reconnects by pushing the “connect” button on the receiver that is generally located to the right of the monitor, and the keyboard connects by pushing both the “connect” button on the back of the keyboard and the “connect” button on the receiver.

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Both computers get their power through a power strip attached to the bottom of the top left shelf (just to the left of the flashlight in the picture). It has two on/off switches that face the front. If you have problems getting power to the computers, check these switches to be sure that they are on.

6.2. The Comsoft Handpaddle



This is the Comsoft handpaddle, used for manual control of the Kuhn (this is the original handpaddle. Any substitute handpaddle would have a similar configuration). The labels on the direction buttons are add-ons, and may change over time, but they show the direction that each of these buttons moves the Kuhn. They are labeled for the way most people hold the handpaddle naturally, which puts the South button at the top. The North and South buttons control the Dec drive, and the East and West buttons control the RA drive.

The very top button (the one furthest from the cable) increases the slew speed when it is held down at the same time as one of the direction buttons. It can also be used to “jog” the telescope by tapping it while holding down one of the direction buttons, which increases the telescope’s speed very briefly. This can be very useful if the telescope has to move a significant distance to center an object or if it does not seem to be responding to one of the direction buttons.

The silver-colored switch at the bottom of the box (closest to the cable) switches between two sets of slew speeds, one slower than the other. The exact speeds assigned may change as the system is adjusted over time. If the telescope does not seem to be responding to the handpaddle the way you expect, try moving this switch to the other side to see if the other setting is better for you.

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B. RECOVERY AFTER EMERGENCY SHUT-DOWNS

You may sometimes have to shut power to the Kuhn during operation, especially if it is slewing to a dangerous position or in danger of hitting something, such as the fork. To reinitialize it after shutting it off, follow these steps:

1. If you have had to close either the Comsoft program or TheSky, restart the program, so both programs are running.
2. Turn on power to the Kuhn (Breaker 4 on the indoor electrical panel). The telescope should continue pointing to the same spot until you link to it with TheSky.
3. Click on “Establish Link” on TheSky. The telescope should begin tracking.
4. If the screen for the last object you went to is still up on TheSky and you can get it centered in the eyepiece, use that object for syncing. If not, move the telescope manually to a nearby bright star, center it in the eyepiece, and call it up on the object screen in TheSky, then click on “sync” for that star.

The Kuhn should now be ready to continue regular operation.

Note: If the emergency shut-down was required because the Kuhn was going into dangerous territory, move it out of the danger zone before reinitializing it and resuming operations. If it was shut down because it was overshooting the “Park” position, you do not need to reestablish the link with TheSky – just move it with the handpaddle under the Comsoft program to the correct “Park” position (see instructions under “Shutdown Sequence,” above, and in the troubleshooting section below).

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C. TROUBLESHOOTING

The following are particular problems that may occur and suggestions for resolving them:

1. The Kuhn is out of position when you want to open the observatory roof.

Since the Kuhn cannot be moved into position by hand, you need to be able to control it with the hand paddle to move it into the correct position. To do this:

- a. Turn on Kuhn-1 (the one with the Comsoft software). When it boots up and the Comsoft TCS program is running,
- b. Turn on the power to the telescope (Breaker No. 4).
- c. You should now be able to control the telescope with the hand paddle, to move it into its proper "Park" position. Once it is in proper position,
- d. Turn off the power to the telescope (Breaker No. 4). This keeps it from accidentally moving before you are ready to use it.

You can leave Computer 1 on; when you have the roof open, boot up Computer 2, start up TheSky, and proceed as usual to start up and align the telescope.

2. The Kuhn stops out of position when you "Park" it.

Once the Kuhn is in what the computer believes is the "Park" position, it will no longer respond to the hand paddle. To move it into proper position, you need to reestablish that connection. To do this:

- a. Turn off power to the telescope (Breaker No. 4).
- b. Close the Comsoft TCS program if it is not already closed.
- c. Restart the Comsoft TCS program.
- d. Turn on the telescope (Breaker No. 4).
- e. The hand paddle should now work. Use it to move the telescope into the proper "Park" position (Dec at -55, RA at 0).
- f. When the Kuhn is in proper position, turn off the power (Breaker 4)
- g. Shut down the computers as usual.

Note: If you find that you are "limiting out" when you try to move the Kuhn into the proper "Park" position, you may need to try a variation of the procedure described for Problem 3 (see end of that section).

3. The Kuhn stops responding to the computer and the hand paddle.

This almost always means that the Kuhn has "limited out" on the Comsoft program.

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The first place to check if the telescope stops responding is the Comsoft computer – if it has limited out, there will be a flashing message on the screen indicating this. When this happens, it's usually because the software has mistaken information about where the telescope is pointing, so, to solve the problem, you have to correct the position information (i.e. sync it on something after you reestablish control). The easiest steps to correct the problem are:

- a. Turn off power to the telescope (Breaker No. 4).
- b. Terminate the link from TheSky to the telescope (i.e. use the “Terminate Link” button on the toolbar). You can leave TheSky running unless it seems to be having a problem; if you have any doubts, close the program and restart .
- b. Close the Comsoft TCS program (using the “Exit” menu).
- c. Restart the Comsoft TCS program.
- d. Turn on the power to the telescope (Breaker No. 4).
- e. Reestablish the link with TheSky (use the “Establish Link” button)
- f. Use the hand paddle to move the telescope to a nearby identifiable object, center it, find that same object on TheSky, and click the “Sync” button. You should now be back in normal operation.

Note: If the “limiting out” problem occurs while you are trying to park the Kuhn, instead of putting the Kuhn on a specific object and syncing on it, use TheSky to sync it on a point or object several degrees north of where it really is. This should allow you to use the hand paddle to move it far enough south to get it into the “Park” position; this problem has only happened with the limit to the south, but the same tactic would work for east or west limits as well. Once the telescope is in the correct position, turn off the power. **BE VERY CAREFUL IN MOVING THE KUHN IF YOU DISABLE THE LIMITS THIS WAY, AS THERE WILL BE NOTHING TO STOP IT FROM HITTING THE FORK IF YOU GO TOO FAR SOUTH.**

4. You cannot see your target in the field of view at the end of a slew. If the object you are looking for is dim, the easiest way to find it is:
 - a. Find a nearby bright/identifiable object
 - b. Locate the same object on TheSky (using “Find” or clicking on the object on the screen), then click the “Sync” button.
 - c. Try the original object again.
5. You cannot get power for the computers.
 - a. Check that the switches on the power strip attached to the bottom of the shelf to the left of the monitor are on.
 - b. Check that the “master” power strips on the north wall of the observatory are on.
 - c. Check that the outside breakers are all on.
 - d. Check that all of the power cords and connections are properly plugged in.

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6. If the keyboard or mouse don't work while on the keyboard tray, put them on the main part of the desk where they will have an unobstructed path to the receiver, which is usually on the right side of the monitor. They are both wireless, and sometimes have problems getting a good connection, especially the mouse. If that doesn't solve the problem, the batteries may need to be replaced. There should be replacement batteries in one of the drawers in the desk to the left of the computer desk. Once you replace the batteries, you will need to reconnect the mouse and the keyboard. The mouse reconnects by pushing the "connect" button on the receiver that is generally located to the right of the monitor, and the keyboard connects by pushing both the "connect" button on the back of the keyboard and the "connect" button on the receiver.
7. If the motor drive for the winch that moves the roof winch doesn't respond to the push button control, check to be sure that it is plugged in, check to be sure you have moved the switch all the way to the "Open" position, and check to be sure that the power is on for the north wall of the observing area.

Miscellaneous Information

1. **Declination Circle**
A standard mechanical declination circle is on the east side of declination axis, with a vernier reading to 5 minutes arc. Declination can also be read from the computer display.
2. **Hour Angle Circle**
The mechanical circle under the fork is an hour angle circle, not a right ascension circle. The reading can be converted to right ascension only by subtracting local sidereal time. Since the hour angle circle is rotatable, it can be momentarily set to read right ascension, but drifts as sidereal time changes. For this reason, it is much more convenient to use the right ascension display on the computer.
3. **Focusing**
Focusing is done with the standard eyepiece focuser on rear of telescope. It is never done by moving the secondary.
4. **Secondary Mechanism**
The secondary mirror drive mechanism is for use only in aligning the mirrors for proper operation, not for focusing, nor for moving the focal plane. This fact should be taken into account when designing cameras or instruments for use on the telescope: the focal plane of the telescope cannot be moved without image degradation.
5. **Dewing problems**
Use blow drier only (kept in the corner cabinet); never wipe optical surfaces.
6. **Observing Log:**
It is recommended that you make the entries regarding what was observed in the Observing Log book as you observe, rather than trying to remember later. An entry should be made in the log every time the observatory is opened for anything other than maintenance.

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7. **Roof Closure:**

Because of quickly changing weather conditions, the roof and south flap should be closed if you intend to leave the telescope unwatched for more than a few minutes, particularly when you end observing for the night

12. **Photographic or Instrument Use of Telescope**

Most modern CCD cameras and other devices used for imaging attach to the visual focuser. Large devices should be mounted to their own backplates, which then would replace the visual focuser backplate (by use of 6 mounting screws) while the camera or instrument is in use. If you use this type of equipment on the Kuhn, the visual focuser has to be replaced before you leave the observatory.

The telescope has been balanced in three dimensions (1: east-west. 2: north-south with telescope tube horizontal, 3: north-south with telescope tube vertical). It is intentionally balanced a few ounces toward the nose (aperture end) of the telescope being heavy. Whenever cameras, finders, or other instruments substantially change the balance, the telescope must be rebalanced, or excessive gear wear or even drive slippage can result. Rebalancing is to be done *ONLY* by qualified people with the consent of the Observatory Custodian. If you feel that the Kuhn is in need of balancing, please notify the Observatory Custodian. Do NOT attempt to balance is yourself unless you have been authorized to do so.

13. **Collimation**

COLLIMATION ADJUSTMENTS CAN ONLY BE MADE BY QUALIFIED PEOPLE WITH THE CONSENT OF THE OBSERVATORY CUSTODIAN. If you feel that the Kuhn is out of collimation, please notify the Observatory Custodian. Do NOT attempt to collimate it yourself.

14. **Use of Autoguider** (to be added later)

15. **Finder Alignment** (to be added later)

16. **Changing of the Secondary Mirror** (to be added later)

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SECTION 4

CLOSING THE OBSERVATORY

A. STOWING THE TELESCOPE

1. Park the telescope (see above for instructions). Check that the telescope is in proper parked position (0 RA and -55 Dec) and that the power is turned off (Breaker 4).
2. Examine all parts of the telescope for any unusual conditions or problems, and report them, if any in the Maintenance Log and to the Observatory Custodian.
3. Close the 2 primary mirror doors, west one first, making sure the latches have engaged.
4. Replace the secondary mirror cover.
5. Replace all the covers on the finders. The eyepieces in the lower finders are generally left in place. Remove the eyepiece from the large refractor, put the dust cap on the diagonal and turn the diagonal so it points down, to minimize any dust getting inside.
6. Check to be sure the Telrad finder is off.
7. Return all eyepieces (except lower finder eyepieces) and other accessories to the eyepiece box, the accessory drawers of desk, or the accessory cabinet. Any missing or damaged items should be noted in the Log and reported to the Observatory Custodian.
9. Turn the diagonal on the Kuhn downward and mount the dust cap in the eyepiece hole.

B. CLOSING THE ROLL-OFF ROOF

Note: These instructions are for the new metal roof. Please note that there are differences in the procedure for opening and closing it from those we followed with the original wooden roof.

1. Check to be sure that the telescopes (the Kuhn and the two LX200s) are all in their parked positions, and that nothing on the Kuhn or anywhere else in the observatory will get in the way of the roof as it closes. Do whatever is needed to clear the way for the roof to close. Check the rails and chain for obstructions, and the outside area of the observatory for hazards as well as the inside of the observatory before starting to close the roof.
2. Close the roof using the chain drive – on the motor control for the chain drive, turn the indicator to “Close” and push the push-button momentarily to check the direction of travel before pushing it continuously to close the roof. Be sure to keep checking to be sure that the roof will not come in contact with anything as it closes, and stop it immediately if it appears that it is getting too close to something and take whatever action is necessary to clear the path. *Because of the new spring on the chain, the roof will often continue moving forward a bit after you stop the drive, so it is important to stop it as soon as you suspect there may be a problem.*

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The full “closed” position for the roof is when the ends of the south wheel assemblies just touch the metal end-blocks on the southern ends of the roof tracks. Since the roof moves much faster than before, you need to be particularly careful as it gets close to this position. Stop the roof a few inches before the end point and tap the control button on the chain drive to ease the roof to the point where it is touching the end-blocks. The spring can make this motion more difficult to control, but it also allows a little bit of tolerance when the wheels contact the end-blocks. Tape markers have been placed on the track on the east wall and on the wheel assembly to make it easier to gauge the point when the roof is closed; when the two pieces of tape are lined up, you should be at or very close to the point where the roof is fully closed. The wheel assemblies have to be in contact with the end-blocks for the south flap to lock into position. When you reach this point, turn the indicator to the “off” position to insure that the chain drive isn’t accidentally activated.

3. After the roof is fully closed, the next step is to close and lock the south wall flap.
 - a. Unless you are sure that you are tall enough to reach the slide bolts on the south flap without it, place the step ladder near one of the control bars for the south flap;
 - b. Raise the south flap by holding on to the control bar on the side where you placed the step ladder and pulling or pushing it down until the flap is vertical and won’t move any further. It should feel somewhat heavy at the beginning and end of its motion, and lighter in the middle.
 - c. *Immediately* lock the slide bolt at the side of the flap where you were when you raised it, using the step ladder to reach the bolt (unless you are tall enough to reach it without the stepladder), to insure that it won’t fall. If the slide-bolt won’t slide into its socket in the side of the moving roof, this almost certainly is because the roof isn’t at its proper “closed” position.
Before you make any attempt to re-position the roof, lower the south flap again. NEVER MOVE THE ROOF WHILE THE SOUTH FLAP IS CLOSED, whether or not it’s locked in place, as this could cause extensive damage to the moving roof, the south flap, and anything below the south flap if it falls, as well as injuries to anyone in the vicinity.
 - d. Once you are able to lock the slide-bolt on the side where you closed the roof, lock the other slide-bolt.

4. After the south flap is closed and locked, put the two tie-downs into position, one on each side of the observatory at the location of the center strut on the moving roof, and lock them so they are reasonably snug but not so tight that they may bend the eye-hooks that hold them or the metal of the roof. If one won’t lock, check where it is anchored at both ends to be sure it is sitting in the eye-hooks correctly and also check the end with the chain on it to be sure that it isn’t twisted. If it still won’t lock, adjust the tie-down by unscrewing the central shaft a few threads to lengthen it a little; if either of the ties is too loose, tighten it a little by screwing the central shaft in a few threads.

Note: In case of power failure, the roof can be winched closed (with difficulty) with the hand crank that is kept in the brown cabinet in the northwest corner of the observing area.

C. CLOSING THE OBSERVING ROOM

1. Observing Log – make sure there is a brief description of anything significant that occurred and what was observed; include the date and time when the observatory was opened and closed, who was in charge, and sign it. When done, leave the Observing Log in the right top cubbyhole on the

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computer desk.

2. Return all OCA equipment and materials to their proper locations.
3. Check that all the lights in observing room, and the small red step light are off.
4. Check to be sure that all breakers on the bottom row of indoor electrical panel are off except for Breaker No. 2, and particularly that Breaker No. 4 is off. Check that Breaker No. 6 in the top row is on and the other two breakers in the top row are off.
5. Check the small covered trash can used for the observing area; take any trash or garbage with you, and put in a new trash bag if needed.
6. Pull the observing room door closed and check to be sure it locked; it should lock automatically.

D. CLOSING THE WARMING ROOM

1. Check that the warming room faucets are off.
2. Check that the phone receiver is in place and the answering machine is on.
3. Turn off all lights in warming room, and turn off both red porch lights (the one outside the warming room and the one outside the bathroom).
4. Unplug any appliances, except the microwave, particularly any heater and the refrigerator. If it was used, be sure to dry the inside of the refrigerator. All food that might spoil or attract rodents should be removed from the warming room; eating utensils and anything left that is edible should be in rodent-proof containers.
5. If there is a door mat outside the door, put it inside the door
6. Lock the warming room door. The warming room door uses the same key as the bathroom and should be locked at both upper and lower keyholes. **RETURN THE KEY** to the outside electrical panel immediately!

CAUTION: All our doors, even the inside one, are weathered and warped a little. Wiggle and shove the doors until absolutely sure they are locked.

7. At the outdoor electrical panel turn off breakers 5 and 7 (leave 7 on if hot water is still needed).

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E. CLOSING THE SITE

1. Instructions if you need to turn off the water valves (not generally required): Use the sprinkler valve rod (kept in the toilet room) to turn any valve down in a hole. The caps over all valve holes are labeled – read them to make sure you are turning off the right valve. If any valve is missing its handle, do not attempt to change the valve setting. Double check the picture to make sure you have the correct valve. All our valves turn counter clockwise to open, and clockwise to close. The water shut-off valve near water pump closes by turning clockwise; this is generally left on all the time now.
2. In the restroom, make sure the urinal upper valve is closed (handle crossways to pipe), and that the faucet is off. Also make sure that the outside spigot beside the restroom door is off.
3. WINTER MONTHS ONLY (November through February 15) if nobody will be at the site for several weeks: pour anti-freeze (Prestone), 1/4 cup into each sink, 1/4 cup into urinal, and 1/2 cup into toilet bowl.
4. Replace the valve rod (if used) in the restroom, and turn out the bathroom lights. Put any door mat(s) inside the restroom and main observatory doors. Turn off both red porch lights. Lock the restroom door dead bolt with the key from the electrical panel.
CAUTION: All our doors are weathered and warped a little. Wiggle and shove doors until absolutely sure they are locked.
5. Check to be sure the warming room door is locked as well as the restroom (both knob lock from inside and the dead bolt above, same key as bathroom). RETURN THE KEY to the electrical panel immediately.
6. At outdoor electrical panel turn off all remaining breakers except those clamped or taped in the “on” position, make sure Breaker No. 6 for the water pump and Breaker No.7 (water heater) are off. Close the panel, snap the padlock shut through panel latch, and check that the combination dials are set to "0000." Push and pull on the lock to check that it is securely latched.
7. Check the storage container across from the observatory, make sure that all equipment that may have been moved outside or used has been returned, that the doors are secured, the padlocks on both doors are locked, and the combination dials have all been set to “0000.”
8. If you are the last person on site, or think you may be, check Anza House before you leave to be sure that the heater, evaporative cooler, lights, water faucets, etc., are all off, and that all doors are locked.
9. Replace gate across road and latch it as you leave the site.
10. Report any problems to the Observatory Custodian, the Anza House Custodian, the Anza Site Custodian, or one of the club officers or other members of the OCA Board. Please see the “Contacts” section of the OCA website or on the back of the Sirius Astronomer for contact information.