



JUNE 2020

Volume XX Number 6

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Upcoming Events	
June 19/20	NHAC Star Party @ O'Brien Dark Site (precautions in effect)
June 26 (Cancelled)	Novice and General Meeting @ Lone Star College - Kingwood
July 3 (Cancelled)	Public Night @ Insperty Observatory
July 18	NHAC Star Party @ O'Brien Dark Site
July 24	Novice and General Meeting @ Lone Star College - Kingwood

MONTHLY MEETINGS

The Novice and General Meetings originally scheduled on June 26 have been cancelled.

CLUB NEWS

Corona Virus Update

All NHAC meetings and activities through June are cancelled. Check your NHAC emails and the [NHAC Website](#) for new information and updates to the schedule. In the meantime, please continue safe distancing, hand washing and obey any applicable restrictions. Stay safe.

NHAC Outreach

See the calendar at the [NHAC Website](#) for dates and more information about planned outreach events. These are outdoor events and are weather dependent. Currently, these events are cancelled due to the Corona Virus pandemic.

Cliff Herseim and Aaron Clevenson will provide NHAC coordination and will advise of any changes or cancellations via Club email. Any cancellations will also be posted on the NHAC website event calendar.

The latest issue of "What's Up, Doc" by Aaron Clevenson is at [What's Up, Doc?](#)

Astronomical League

The North Houston Astronomy Club has been an affiliate of the Astronomical League since the Club's inception in 1999. The Astronomical League has established a number of structured observing programs for members who wish to learn more about the sky.

NHAC members are automatically enrolled in the League and can participate in the observing programs according to their time and interests.

Aaron Clevenson serves as the NHAC Astronomical League Coordinator. He may be contacted at alcor@astronomyclub.org.

Aaron recently completed several observing programs: Multiple Star, Binocular Galileo, Binocular Variable Star and Binocular Master Observer. Congratulations!

We welcome news, photos, comments and contributions for the newsletter. Please send them to newsletter@astronomyclub.org by the 10th of each month.

GALLERY

Image by Aaron Linderbaum

This image of M51 was captured in my driveway (best view of sky with no tree cover or electrical lines) with extensive LED lights from an apartment complex 200 yards away. It is really the first time I was able to successfully capture all my calibration frames properly! I used my Omni 150 XLT (6 inch f5) Newtonian on AVX mount, and Canon 1000D with APT for image capture. Polar alignment and star alignment and calibration were by hand. I made 92 x 37 second exposures, with a total of 56 minutes of exposure. I used Startools to process and did some final touch up using GIMP.



Image by José J. Chambó (<https://cometografia.es>)

Comet C/2017 T2 (PANSTARRS) on 2020 May 22, just as it passed near galaxies M 81 (right) and M 82 (center) in the constellation Ursa Major. On the left, the comet with a brightness around magnitude 9 shows a coma about 5' in angular size and a dust tail of one degree in length. The image is a mosaic composed horizontally of three tiles to cover the field of almost three degrees required by the scene.

COSMOLOGY - I

By William W. Leach, Lone Star College Professor of Physics, NHAC Founder

Cosmologists, scientist that study the physical universe in its entirety, are a strange lot. They play by different rules in their pursuit of the truth. Those of us that grew up in the United States were trained from early years to use the British Imperial system of units like feet, pounds and seconds. In school we also learned about a scientific system of units called the metric system which is now used world-wide by all but three countries, including the United States. In physics, scientists try to adhere to what is called the International System (S.I.) of units which is derived from the old MKS system of meters, kilograms and seconds. But cosmologists do it differently. The concept in cosmology is that all units should be derivable from the fundamental constants found in nature and that all these fundamental constants have values of 1.

The idea is that all systems of units seem to be culturally based, but we live in a universe that behaves as if it is controlled by natural laws: gravity, electromagnetism and the weak and strong forces. The physical evidence indicates that these laws are universal, they are omnipresent and the mathematics that is used to describe these laws is also universal. The constants associated with these laws must also be universal and they can be used to set up a system of units that is universal, that is, available and applicable to any inhabitant of the universe.

This system, known as the Planck system, is based on the constants G , the universal gravitational constant where $G = 6.67 \times 10^{-11} \text{ m}^3/\text{kg s}^2$, the constant c , the speed of light where $c = 3.00 \times 10^8 \text{ m/s}$ and \hbar , ($h/2\pi$), called “ \hbar ” bar, where h is Planck’s constant and $h = 6.626 \times 10^{-34} \text{ Js}$. The following can be calculated:

$$\begin{aligned} \text{Planck length: } l_p &= (G\hbar/c^3)^{1/2} = 1.62 \times 10^{-35} \text{ m} \\ \text{Planck mass: } m_p &= (\hbar c/G)^{1/2} = 2.18 \times 10^{-8} \text{ kg} \\ \text{Planck time: } t_p &= (G\hbar/c^5)^{1/2} = 5.39 \times 10^{-44} \text{ s} \end{aligned}$$

Using Einstein’s equation, the Planck energy can be calculated.

$$\text{Planck energy: } E_p = m_p c^2 = 1.22 \times 10^{+28} \text{ eV}$$

Using the Boltzmann equation, the Planck temperature can be calculated.

$$\begin{aligned} \text{Planck temperature: } T_p &= E_p/k = 1.42 \times 10^{32} \text{ K.} \\ \text{where } k &= \text{Boltzmann constant, } k = 8.62 \times 10^{-5} \text{ eV/K} \end{aligned}$$

In the Planck system of units all the Planck units are set to unity. For example, the Planck length, where: $l_P = (\hbar/c^3)^{1/2} = 1$. So, one Planck length: $1 l_P = 1.62 \times 10^{-35}$ m in S.I. units and $10 l_P = 1.62 \times 10^{-34}$ m....

This same process can be applied to all the Planck units. In order for all the Planck units to equal to unity the values of \hbar , c , G and k must also be unity. So, the speed of light in the Planck system has a value of one.

The speed of light = 1, Planck system

The speed of light = 3.00×10^8 m/s, S.I. system

The Planck system of units has an interesting effect on the fundamental laws of physics. Since $c = 1$ now, Einstein's equation, $E = mc^2$, becomes $E = m$. The Planck energy is numerically equivalent to the mass in Planck units. Since $G = 1$ now, Newton's law of gravity, $F_G = Gm_1m_2/r^2$, becomes $F_G = m_1m_2/r^2$.

While the Planck system may be innovative, even universal, it could also point the way to hidden meanings found in the underlying symmetry of nature. For those of us that like to dot our I's and cross our t's and watch our units all dimensionally cancel out nicely, the Planck system can be a nightmare.

Like it or not the Planck system has some interesting implications about the way nature behaves.

THE UNITRON MODEL 152

By Kurt Johnston



Unitron Model 152 on Original Mount

I'll start off with a simple question that was posed in a telescope ad from 1954: "How large is a 4-inch refractor?" The answer was simple: "It's bigger than you think!" This was an ad for the Unitron 152 telescope, a 4" f15 achromat refractor on an equatorial mount that included the following items: Telescope, equatorial mount, wood tripod, 10X-42mm viewfinder, 6 eyepieces, sunscreen, sunglass (You'll burn your eye out), solar aperture diaphragm, star diagonal, erecting prism, dew cap, dust cap, and wooden cabinets to neatly hold everything. All for \$785. Everything you needed to observe the heavens in beautifully crafted boxes. The Unitron 152 came in four boxes: 1) Optical tube and accessory box, 2) Equatorial Mount head box, 3) Tripod leg box, and 4) Tripod spreader box.

For many of us, the ads in Sky & Telescope magazine lured us to observe the heavens with a Unitron telescope. The gleaming white and black optical tubes mounted on equatorial or altazimuth mounts with nicely dressed amateur astronomers gazing through the eyepiece. A child cradling a new Unitron telescope at Christmas while dad quietly watches while smoking his pipe. Ah, the good old days.

I am a bit younger than the early Unitron ads and have only come to appreciate these scopes over the last several years. I started my observing with a very cheap department store scope (a Jason) around the time of Halley's Comet. The scope was a true department store piece of junk, but it gave me my first views of the Moon. Fast forward many years and many telescopes from Schmidt-Cassegrainian to apochromat refractors

and we come to where I am today, an avid imager and visual observer. I grew up with an appreciation of finely crafted items from yesteryear from my father (A bad influence). A few years back, I read about some early Takahashi scopes from the 1970's. Since I have a passion for Takahashi, I wanted to obtain one of these early scopes to see where the modern Taks came from. I managed to pick up a 1976 TS-65p (65mm triplet objective and 500mm focal length), thus started my trip into classic and even antique scopes.

What have I learned? Not all department store scopes are trash, like my first scope. Several are amazing instruments capable of splitting double stars and crisp lunar views with little to no chromatic aberration. There is a pretty fanatical group of classic telescope collectors/users out there, just check out the Cloudy Nights Forum: Classic Telescopes and you will see. These classic instruments led me down a path of telescope restoration and optical testing. For my classic scopes, I mainly collect and use refractors.

For this article, I will focus on my Unitron 152 [4" (100mm), FL 1500mm; Equatorial refractor). I purchased this scope about three years ago. I am the fourth caretaker of this beautiful scope. It is an early model, produced sometime between July 1953 (Introduction of the Tray Light) and 1954 (Objective cell retaining ring held on by three screws with no labeling on the ring). Figure 1 shows the Model 152 laid out in all of its wood cases. It's a good thing that cars were large in the 50's. The optical tube case barely fits in my wife's truck.

The optical tube is brass, painted white. The objective cell is unlabeled, which was typical for the early Unitrons. Later versions, have Unitron, objective diameter, and focal length engraved on the lens cell, as well as the addition of two smaller screws next to the 3 large screws that hold the retaining on. Inside the rear of the optical tube is a fairly large counterweight (Figure 2), which allows the optical tube to sit forward on the mount, which is important on the early versions, which I'll cover on the mount description.

The focuser is the Unitron standard rack and pinion focuser, which is the same size as focusers on the 60mm and 75mm Unitrons. This also helps to date the scope as an early Unitron, as later models came with the Deluxe Focuser or the Super Focuser. My early focuser is a form of a rack and pinion style focuser. However, it does not have a traditional rack. Instead, the focuser tube itself is engraved all the way around to accept the pinion gear (Figure 3). Crude focusing is done by sliding a draw tube out to reach focus, then clamping in place. Final focus is done using the focuser, which has about 3" of travel. The use of the draw tube helps to keep the long scope as short as possible.

The finderscope brackets and sunscreen rod brackets are permanently attached to the optical tube. The sunscreens, rod, and solar diaphragm are still wrapped in the original brown paper. I have left them wrapped as well to preserve some of its original character (see Figure 1). One drawback to the early Unitrons is the lack of collimation screws on the objective cell. To align the focuser, and to collimate the objective, you have to loosen the five screws the hold each on and fidget with them until everything lines up. By the late fifties, three "bunny ears" were added to the objective cell to adjust the collimation. These work very well.

The equatorial mount is a massive beast, about the size of a GM11. It has two brass levels mounted on the hub, although there is no way to adjust the leg lengths since they are of a fixed height. The tripod tray has holes for holding 5 eyepieces (0.965" variety only). The tray is attached to the tripod legs by bolts. In later versions, the

eyepiece tray is connected to the legs via clips. I prefer the bolts, but they do add time to setting up the scope for observing. This mount has the tray light, one of the most prized items for Unitron collectors. Luckily, all previous owners never left the batteries in the light and it still looks brand new. The reflector for the light is painted red, but the lightbulb is clear. It does give a somewhat red glow when in use. The tray light screws into the base of the mount (Figure 4) and shines directly down onto the eyepiece tray. The mount is adjusted in altitude for polar alignment via a cylinder nut. Black setting circles with white letters make it easy to see the RA and DEC numbers in the dark and are much better than the silver circles with black letters on Unitron's newer mounts. Movement in right ascension is done by rotating one of two large solid knobs connected to the worm gear. Movement is smooth and easy and has a full 360 degrees of movement possible. Movement in declination is done via a combination of rotation lock rod and a rod connected to a spring driven piston. Limited hand control movement can be done via this slow-motion rod. If you need to move further, you have to unlock the declination axis and start over. The RA knobs and rods on the declination axis are located perfectly for hand driven movement of the mount while at the eyepiece (Figure 5). This is also the reason for the counterweight in the optical tube. Lastly, the counterweight shaft is threaded, but the weight is not. The weight is held in place by two hex nuts (one above and one below the weight). Balancing takes patience. It takes about a solid hour to set this monster up for a night of observing.

I have made a few changes to the mount. In its original form, the mount is purely hands-on with no option for motor driven tracking. Considering the 1500mm focal length, this is a bit of a pain when trying to track an object. In 1955, Unitron introduced the weight driven clock drive (I'm still looking for one of these, but they are very expensive when they do show up). In 1961, Unitron added an electric synchronous motor drive option. The motor sits on a shelf that clamps to the base of the mount and the drive shaft inserts into a hexagonal hole on the RA knob. I have added one of these drives to my mount. In order to make it work, I had to obtain a newer RA knob. Unfortunately, the worm gear shaft on my mount was larger than the more recent versions. So, I drilled and tapped the newer knob to fit onto my mount's RA shaft. Now, I can center an object and engage the motor for tracking. The motor does block the use of the scope in some portions of the sky (Astronomy-Shoppe.com makes a motor that is thinner and that allows for some forward/backward "slewing" as well).

Other things I have done. I added a photo guide scope (Unitron 60 x 700mm) and optical tube balance kit. Both are attached to the optical tube via accessory rings (Figure 6). I also added a Unitron Super focuser to allow the use of 2" eyepieces. The Super focuser has a 58mm diameter draw tube and locks built in to lock the draw tube in place, as well as a lock on the focuser tube. I added an aftermarket (Astronomy-Shoppe.com) adapter for the draw tube that allows the use of 2" accessories.

The original objective on mine was average, with some issues observed under double pass optical testing (DPAC). I am currently working on it to see if one of the lenses got flipped sometime in its history, although the marks on the lens edge do line up. However, I recently acquired a spare objective from the late 50's. This objective was missing a spacer, so I replaced all the spacers using 0.004" thick aluminum. The "new" objective cell screwed into the original cell holder on my scope. Tested the "new" objective under DPAC, which produced nice straight bars inside and outside of focus. Much better than the slight curves on the original objective.

Overall, Unitron telescopes have a consistent build quality. The altazimuth and equatorial mounts are extremely solid and easy to use. The optical tube, focusers, and other features are very good. The objectives, the heart of any refractor, range a bit in quality from average for the time period to exceptional. Conventional wisdom among collectors is that the older lenses, especially in the 60mm and 75mm sizes, are better than ones from the 70's and 80's. The 4" objectives are a little more variable, as the manufacturer source for the objectives varied. One of the best Unitron objectives I have is from a 1997 Unitron 142 (75mm) which I purchased from the original owner, which also may have been one of the very last Unitrons sold. After the mid 1990's, all scopes were sold from left over stock and inventory.

References and related reading:

Unitron History Project (unitronhistory.com)

English, Neil. 2013. *Classic Telescopes: A guide to collecting, restoring, and using telescopes of yesteryear.*



Figure 1. Equatorial mount in case with counterweight storage. Tripod tray in case (Very rare). Optical tube in case with diagonal, porro prism, and eyepiece box. Tripod legs in case.



Figure 2. Counterweight inside optical tube.



Figure 3. Focuser parts



Figure 4. Eyepiece tray light.



Figure 5. Unitron Model 152 on AP Mach 1 mount



Figure 6. Fully outfitted. This photo shows the scope with guide scope, balance kit, super focuser, and motor drive. The objective almost touches the ceiling, which is 8ft.

JUNE STAR PARTY

Please refer to the email sent by Rusty Hill to Club members on June 17 describing the Star Party at the O'Brien dark site on Friday night, June 19. Rusty will be providing a sky orientation and binocular viewing session for novices.

All members and their guests are welcome to attend Rusty's session, or to come and work on their own visual or imaging activities. The site has been reserved for both Friday (June 19) and Saturday (June 20) evenings.

This is an outdoor activity and safe distancing precautions will be in effect.

DARK SITE INFORMATION

If you are new to the club, Star Parties are especially for you. We, the members, are the reason we have observing Star Parties, and they are great occasions to get familiar with observing. We have 10" Dobsonian telescopes available at the Dark Site for your use. There will also be several other scopes available for all to try. And do bring a Binocular-- you can do lots of successful observing with nothing more.

NHAC Club Policy is that the focus of the Star Parties will be to give as much assistance as possible to new observers. For those who may not have been to the O'Brien Dark Site, it is just north of Dobbin, which is on Highway 105 west of Montgomery. It has reasonably dark skies and a great low horizon in all directions. The Owners, Tim and Wanda O'Brien, are very generous hosts, and they do turn off any outside lights which might bother us, if we remember to ask.

The specific Dark Site location is password protected. Any club officer can give you the password, but it is NOT FOR THE GENERAL PUBLIC!

Access to the Dark Site must be requested from the O'Brien's in advance via the NHAC email. It is only necessary for any 1 member to request access... Access approved for any of us is access approved for all of us.

On our NHAC web site, click on "Observing" then select "O'Brien Dark Site". Scroll down to the O'Brien Dark Site information and look for the "detailed directions" link. You will need to enter the password. There are maps as well as directions. It is well worth the drive, which is about 6- or 7-minutes driving time north of Dobbin off of State Highway 105 west of Montgomery.

Star Parties are routinely scheduled for the Saturday on, just before, or just after the New Moon throughout the year. This is to provide the best opportunity for dark skies.

INSPERITY OBSERVATORY



Due to the Corona Virus pandemic, the observatory is closed until future notice.

These Public Nights are a great opportunity for us to be a part of Astronomy Outreach, and also to observe with scopes we might never get to use, otherwise. The Observatory has a 6" Takahashi refractor, a 16" Meade Schmidt-Cassegrain, and a 20" Plane Wave telescope. Each is computer controlled, and provides an awesome view of the sky. There are usually about 75 to 100 guests, sometimes more, on Public Night, with many repeating. Our guests are very appreciative of the opportunity to enjoy the sky and also expose their kids to Astronomy. Then after all our guests have departed, several of us usually stay for a while and enjoy the views and each other's company. This can be an opportunity to see a new or favorite object in a large telescope.

The Observatory is about 3/4 of a mile south of Will Clayton Parkway on S. Houston Ave, just north of Rankin Road in Humble, in the back part of the Jack Fields Elementary School on the East side of S. Houston Ave. The address is:

Jack Fields Elementary School
2505 S. Houston Ave.
Humble, TX 77396

For more information, the Observatory phone number is 281-641-STAR and the web site is <https://www.humbleisd.net/observatory>.

Dates and times are subject to change.

ABOUT NHAC

The North Houston Astronomy Club (NHAC) is a not-for-profit organization established in 1999 for educational and scientific purposes, for people of all races, creeds, ethnic backgrounds and sex. Our primary purpose is to develop and implement programs to increase the awareness and knowledge of astronomy, especially for those living near the north side of Houston, Texas.

NHAC is dedicated to providing an opportunity for people to pursue the science of astronomy, to observe in a dark-sky site, to learn the latest technology, and to share their knowledge and experience, thus our “Observe-Learn-Share” motto.

Public meetings are normally held each month on the fourth Friday. In the months of October, November and December they are usually rescheduled for the third Friday of each month, so as to not conflict with the Annual All Clubs meeting, Thanksgiving, or Christmas.

The benefits for membership include:

- Loaner telescopes after being a member for 6 months.
- Opportunity to observe from dark sky observing sites.
- Learn from experienced observers.
- Astronomy Magazine subscriptions at a discount.
- Astronomical League membership, with its many observing programs.
- Subscription to the Astronomical League magazine "Reflector".
- Access to the NHAC library
- Discounts on purchases at Land, Sea and Sky. Be sure to identify yourself as an NHAC member.

More information at the [NHAC Website](#)

Check out our [Facebook page](#).

Our mailing address is:

North Houston Astronomy Club
Post Office Box 5043
Kingwood, TX 77335-5043

NHAC is sponsored by:



CALENDAR. MEMBERSHIP. OFFICERS

NHAC General Calendar

	Executive Board Meeting	Star Party	General Meeting
June 2020		Jun 19/20	Jun 26
July 2020	Jul 13	Jul 18	Jul 24
August 2020		Aug 15	Aug 28
September 2020	Sep 14	Sep 12 (and BBQ)	Sep 25
October 2020		Oct 17	Oct 23
November 2020	Nov 9	Nov 14 (and BBQ)	Nov 20
December 2020		Dec 12	Dec 18

Dates and times are subject to change. Star parties are weather permitting.

Membership

Memberships run from January 1 through December 31.

Full year dues are:

Students \$10

Individuals \$30

Family Groups \$40

Membership applications and dues payments can be made at the NHAC website at:

[NHAC Website](#)

2020 NHAC Executive Board

President

Carlos Gramajo - [email](#)

Vice-President

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AFFILIATIONS

NHAC is a member of:



The Astronomical League

<https://www.astroleague.org/>



Night Sky Network

<https://nightsky.jpl.nasa.gov/>



INTERNATIONAL DARK-SKY ASSOCIATION

International Dark Sky Association

<https://www.darksky.org/>