



NORFOLK SKIES



The Official Newsletter of the new Norfolk Astronomical Society

Glendon L. Howell, Editor

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Meetings And Events For July 2001

Date	Activity
Tue., July 10	<u>Molecular Electronics</u> , free Sigma Series lecture given by Dr. Theresa Mayer, 7:30 PM at the Virginia Air & Space Center, Hampton.
Wed., July 11	<u>NAS Regular Meeting</u> , 6:30 PM, at MRO Computers & Astronomy, 1620 Cedar Rd, located at the intersection of Cedar Road and Dominion Blvd in Chesapeake. Come and meet CEO Mike Barnes. Glen plans to show a short NASA DVD.
Fri., July 13	<u>NAS Observing Session</u> , dusk until ? at Glen Howell's parents. Caravan down to Glen's parents for observing that evening, weather permitting.
Wed., July 25	<u>ALCON 2001</u> , the Astronomical League Convention begins in Frederick, MD.

Local Planetarium Shows

THE SUMMER STARS will be shown **Thursdays, July 12 and 26**, from 8 to 9 PM at the Chesapeake Planetarium, 300 Cedar Road. The program examines the constellation patterns and mythology of the Summer Sky. Telescope outing immediately after the show, weather permitting. Admission free. For reservations call 547-0153.

JOURNEY TO MARS (June 9 – Sept. 16) will be shown weekdays at 2:30 PM, and at 11 AM, 1:30 PM, and 3:30 PM Saturday, and at 1:30 PM and 3:30 PM Sundays at the Virginia Living Museum Planetarium, 524 N. J.Clyde Morris Blvd, in Newport News. The program discusses the planet through our mythology up to what we now know about it from space exploration, and projects ideas about what a future mission to the red planet might be like. Admission \$3.00. For information call 595-1900.

Comet Linear Climbs Into The Morning Sky

What has up to this point been a comet for the southern hemisphere, Comet Linear continues its northward trek this month, climbing higher into our morning sky. The comet surprised everyone by an outburst in mid-June which brought it to a bright magnitude +3.0. In July, the comet quickly moves from Cetus through Pisces and into Pegasus by month's end. Currently fading, the optimum time to observe this comet is when the Moon is out of the morning sky, which occurs before July 2 and after July 19.

Orbital elements which can be plugged into many software programs are given below. One such program is SkyMap by Chris Marriot. A finder chart prepared from that program appears later in this issue.

C/2001 A2 (LINEAR)

Epoch 2001 May 11.0 TT = JDT 2452040.5

T 2001 May 24.5204 TT

q	0.779029	(2000.0)	P	Q	
z	+0.000835	Peri.	295.3284	-0.4763961	+0.6952415
	+/-0.000003	Node	295.1255	-0.4247712	-0.7179677
e	0.999350	Incl.	36.4752	-0.7698157	-0.0340839

From 444 observations 2001 Jan. 3-May 31, mean residual 0".6.

ALCON 2001 – July 25-28, 2001

Don't forget the Astronomical League national convention late this month in Frederick, MD. Site is the Holiday Inn and FSK Conference Center located at I-270 exit 31A at Rte. 85. Highlights include guest speakers, vendors, observing, tours, and a banquet. The current line-up of speakers includes well-known names like Dr. David W. Dunham of the International Occultation Timing Association (IOTA), Eclipse chaser Fred Espenak, Dr. David Crawford of the International Darksky Association, Dr. Richard Gott, Ryan Hannahoe, Bob Gent, Chuck Allen, Inge Heyer, Dr. Tim Hunter (cofounder of IDA), Dr. Larry Lebofsky, Dr. Richard Schmude, Susannah Lazar, Jared Jude Lutkowski, Dr. Julius Benton, Walter Haas, David Corum, and Bill Burton.

Up-to-date information can be located via the Astronomical League website at

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

Observing Earth Satellites

By Glendon L. Howell

The months around the Summer Solstice (June 21) are the best time to observe Earth satellites. Why? Because the Sun is riding at its highest in our sky, so Earth's shadow is riding at its lowest. This means satellites are able to stay in sunlight longer, and are thus visible longer.

Since the observer must be in darkness while the satellite must be sunlit to be visible, the best time to look in the evening is the first few hours of darkness after sunset, and in the morning sky, the first few hours of darkness before sunrise. There are, however, a few high inclination orbit satellites which in the Summer months are able to stay in perpetual daylight.

It typically takes a satellite about 10 minutes maximum to cross the sky from horizon to horizon. Practically all satellites also orbit the Earth and cross our sky from west to east because it takes less rocket fuel to achieve orbit when you launch in the direction of Earth's rotation.

The typical satellite takes an amazingly quick 90 minutes to complete one orbit. Most orbit 100 to 500 miles above Earth's surface. The higher the satellite, the longer its orbital period. A satellite orbiting at 100 miles takes only 88 minutes, whereas one orbiting at 500 miles takes 92 minutes, just slightly longer. To make a satellite stay roughly over the same place on Earth requires an orbital period of 24 hours; these special "geosynchronous" satellites orbit out at 22,000 miles and are faint and thus hard to observe but not impossible.

Inclination of the orbit in many cases is a function of the latitude of the launch site. This is again due to rocket fuel conservation. Satellites launched from Cape Kennedy in Florida are often put into 28.5 degree inclination orbits because this is the latitude of the launch site. Satellites pass over their launch site twice per day.

Review: STS Orbit Plus 0034

By Glendon L. Howell

While there are many satellite tracking software programs available, the one I have always preferred to use because of its magnificent display and other features is STS Orbit Plus. Written to run on the MS DOS platform, it runs fine under Windows 3.1, 95, 98, and ME. The program amazingly is freeware, though the author, David Ransome suggests a donation of only \$15.

The program reads ascii text files containing satellite lists in the standard NASA 2-line element format. Once the file of elements is chosen, the specific satellite may be found by browsing the file, searching by the satellite's common name or its NORAD designation. The observing site coordinates

must also be entered at least roughly for this program to work, and there is a fairly complete database supplied of U. S. cities plus many major cities around the world. Time is defaulted to your computer's system clock but may be overridden if desired.

What impressed me the most was this programs many display modes and ease of switching between them. Simply press the "W" key and you instantly switch to World Map mode. Press "O" and the Orthogonal map displays the Earth impressively as a globe. Press "L" to switch to the Location map depicting your primarily location complete with altitude circles. Press "M" to lock onto the satellite and follow it in a Motion map. Most all of these map modes also allow zooming by pressing the Page Up/Down keys.

Perhaps the easiest map modes to use to understand satellites and their passes are the World Map and Location map. Displayed on all modes is the point where the Sun is directly overhead (as a yellow filled circle), and a yellow line depicting the sunrise and sunset terminator of the Earth. Use the Sun symbol to determine which side of the yellow terminator is day and night.

Around your chosen observing location you will see a violet circle denoting that site's local horizon for the chosen satellite, and around the satellite itself there is a white circle depicting the area on the ground where the satellite is above the horizon.

A quick method of determining if a satellite will be visible is to look at the ground tracks on the World Map and at what latitudes they cross the yellow sunrise and sunset terminator. To be visible, the latitude range must correspond to that of your observing site.

Three ground tracks are displayed. The most eastwardly one (to the right) is green filled with red dots and depicts the last pass of the satellite. The next track depicts the current pass and switches to green filled with yellow dots depicting the future track. Each track shifts westward typically because the Earth is rotating under the orbit and each track is thus offset by 90 minutes roughly of rotation.

The satellite's current position itself is depicted and its color indicates whether it is currently sunlit or not. A white satellite is sunlit. As the satellite moves into shadow, you can watch it shift color from white to yellow to red and finally to gray when it is fully in shadow. A recently added feature of this program is the ability to also display an icon showing the current position of 15 other satellites of interest.

Along the border of each map mode you will also note various information displayed. Some modes display elevation of the satellite, etc. Most all modes display AOS/LOS times for our observing site, the Sun, and selected Tracking Data Relay Satellites (TDRS). AOS means "Acquisition of Signal" while LOS means "Loss of Signal". These times in minutes and seconds denote how long it will be before the next AOS/LOS. The Sun AOS/LOS indicates when the satellite will next enter sunlight and leave sunlight. The Location AOS/LOS similarly indicates time until the satellite will next come above and leave your local observing horizon. Audible beep tones are used by this program to alert the user when such events occur.

This program will also calculate future passes of a satellite over your observing site and report this information via various reports that can be directly printed or exported to an ascii log file. Each pass is numbered and the user is also given the capability of displaying the pass.

Satellite Observing Websites

Provided By Dave Kratz and Glendon Howell

Site Name	URL
Celestrak (T. S. Kelso)	http://www.celestrak.com/
Heavens Above	http://www.heavens-above.com/main.asp
ISS Visibility Data	http://www.hq.nasa.gov/osf/station/viewing/issvis.html
Amateur Satellite Observers of SE Virginia	http://www.seva.net/reg/satellite/
Dave Ransome's Home Page	http://www.dransom.com/
Visual Satellite Observer's	http://www.satellite.eu.org/sat/vsohp/satintro.html

STS-104 Set To Launch July 12

Space Shuttle Atlantis is currently set to launch at 5:04 AM July 12 within a 5 minute window. The launch will bring the Shuttle up the east coast, providing a splendid opportunity to spot it traversing low in the southeastern sky about 10 minutes after launch. This mission will deliver the Joint Airlock to the International Space Station. The Shuttle is expected to dock with ISS about 10:50 PM EDT July 13. Undocking is set for 12:15 AM July 21, with landing at 1 AM July 23. Visible Passes of ISS follow:

During this mission, both the Shuttle and the ISS may be visible flying across the sky in nearly identical paths across the sky, only minutes apart. Times of the better visible passes for Hampton Roads for the ISS are listed below. Please note that all passes for this month occur a few hours before sunrise or a few hours after sunset.

Three points define each pass:

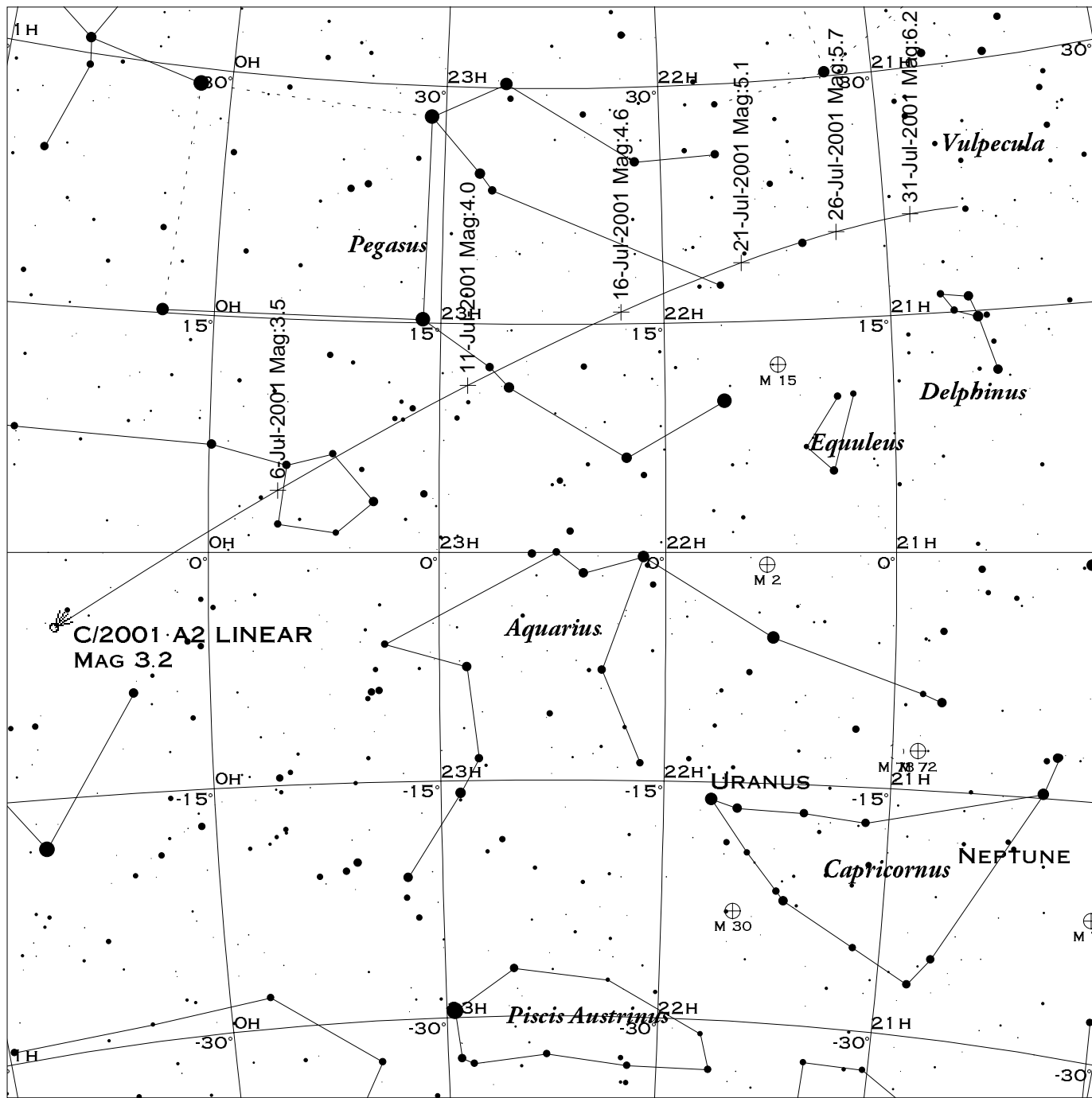
- AOS (when it first comes above your horizon),
- MAX VISIBILITY (it's maximum altitude point in the sky), and
- LOS (when it goes below your horizon).

Azimuth (Az) is the direction along the horizon to look (0 = North, 45 = NE, 90 = East, 135 = SE, 180 = South, 225 = SW, 270 = West, 315 = NW). Altitude (Alt) is the height above the horizon to look (0 = on the horizon, 90 = directly overhead on the zenith).

STSORBIT PLUS Data Output to STSPLUS.LOG, Data = 19
 Location: Chesapeake, VA
 Satellite Name: ISS Space Station

		-----AOS-----			--MAX VISIBILITY--			-----LOS-----		
#	EDT Date & Time	Azm	EDT Time	Alt	Azm	EDT Time	Azm	Duration		
2	11 JUL 01 05:18:09	210.0	05:23:07	34	134.0	05:28:10	57.5	0:10:01		
	VIS: 05:19:25	205.7	05:23:08	34	133.5	05:27:24	59.7	0:07:59		
4	13 JUL 01 04:50:04	220.9	04:55:10	61	137.1	05:00:20	52.7	0:10:16		
	VIS: 04:52:57	214.3	04:55:10	61	136.3	04:59:35	53.4	0:06:38		
6	14 JUL 01 05:24:04	250.6	05:29:02	30	326.3	05:34:05	42.1	0:10:01		
	VIS: 05:25:30	256.8	05:29:02	30	326.0	05:33:17	39.1	0:07:47		
8	15 JUL 01 04:21:45	231.1	04:26:53	77	321.9	04:32:04	48.6	0:10:19		
	VIS: 04:25:51	240.4	04:26:52	77	318.7	04:31:18	48.0	0:05:27		
9	16 JUL 01 03:19:50	210.5	03:24:48	35	133.5	03:29:49	57.3	0:09:59		
	VIS: 03:26:04	86.4	03:26:04	24	86.4	03:29:03	59.5	0:02:59		
11	17 JUL 01 03:53:12	241.0	03:58:14	46	322.9	04:03:23	45.1	0:10:11		
	VIS: 03:58:10	317.2	03:58:15	46	323.1	04:02:37	43.3	0:04:27		
13	18 JUL 01 02:50:50	220.8	02:55:53	61	137.4	03:01:02	52.7	0:10:12		
	VIS: 02:58:06	59.2	02:58:06	17	59.2	03:00:17	53.5	0:02:11		
15	19 JUL 01 03:24:19	250.4	03:29:15	30	325.9	03:34:16	42.1	0:09:57		
	VIS: 03:29:54	351.2	03:29:54	27	351.2	03:33:28	39.1	0:03:34		
41	28 JUL 01 05:11:43	320.0	05:16:36	23	31.5	05:21:27	102.7	0:09:44		
	VIS: 05:12:33	324.0	05:16:36	23	31.8	05:20:41	99.1	0:08:08		
44	29 JUL 01 05:43:51	310.6	05:49:00	87	45.2	05:54:07	131.1	0:10:16		
	VIS: 05:44:36	310.8	05:48:59	87	33.4	05:53:26	131.0	0:08:50		
47	30 JUL 01 04:40:25	317.7	04:45:24	31	34.5	04:50:24	110.9	0:09:59		
	VIS: 04:41:13	320.6	04:45:25	31	34.8	04:49:39	108.2	0:08:26		
48	30 JUL 01 21:10:42	203.6	21:15:24	25	132.3	21:20:12	60.8	0:09:30		
	VIS: 21:11:26	200.4	21:15:25	25	132.0	21:17:58	74.3	0:06:32		
49	30 JUL 01 22:46:16	254.8	22:51:03	25	327.4	22:55:55	40.7	0:09:39		
	VIS: 22:47:02	258.3	22:50:14	22	300.5	22:50:14	300.5	0:03:12		
51	31 JUL 01 03:36:57	322.8	03:41:33	16	27.1	03:46:09	91.3	0:09:12		
	VIS: 03:37:51	328.6	03:41:34	16	27.5	03:45:19	86.0	0:07:28		
52	31 JUL 01 05:12:24	307.0	05:17:30	58	223.0	05:22:36	139.8	0:10:12		
	VIS: 05:13:10	306.1	05:17:30	58	223.4	05:21:54	140.6	0:08:44		
54	31 JUL 01 21:42:16	234.4	21:47:15	64	320.5	21:52:18	47.3	0:10:02		
	VIS: 21:42:59	235.3	21:47:15	64	321.2	21:51:33	46.3	0:08:34		
55	31 JUL 01 23:19:18	282.1	23:23:27	11	338.2	23:27:41	34.8	0:08:23		
	VIS: 23:20:16	289.9	23:23:27	11	338.2	23:25:13	9.5	0:04:57		

Comet C/2001 A2 (LINEAR)



STARS	SYMBOLS	
● <2	☄ Comet	⊕ Globular Cluster
● 3	♁ Asteroid	⊕ Planetary Nebula
● 4	☉ Galaxy	⊕ Quasar
● 5	☁ Open Cluster	○ Other Object
● 6	☄ Bright Nebula	

Calculated magnitude shown is based upon the outbursts observed in June. In reality, this comet may be as much as 7 magnitudes fainter.

Local Time: 00:00:00 1-Jul-2001	UTC: 03:59:59 1-Jul-2001	Sidereal Time: 17:31:42
Location: 36° 48' 0" N 76° 21' 0" W	RA: 22h30m00s Dec: +0° 00'	Julian Day: 2452091.6667

Norfolk Astronomical Society Astronomical Calendar

June 2001							July 2001							August 2001						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
					1	2	1	2	3	4	5	6	7	5	6	7	8	9	10	11
3	4	5	6	7	8	9	8	9	10	11	12	13	14	12	13	14	15	16	17	18
10	11	12	13	14	15	16	15	16	17	18	19	20	21	19	20	21	22	23	24	25
17	18	19	20	21	22	23	22	23	24	25	26	27	28	26	27	28	29	30	31	
24	25	26	27	28	29	30	29	30	31											

All times are EDT

<http://groups.hamptonroads.com/NAS/>

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
		6:00 AM Mars 6 degrees S of Moon	10:00 AM Earth reaches aphelion 10:10 PM Moon occults 24 SGR (+5.5)	11:04 AM Full Moon 10:10 PM Moon occults 49 SGR (+5.5)		10:00 AM Neptune 3 degrees N of Moon 3:00 PM Asteriod Ceres reaches opposition
8	9	10	11	12	13	14
6:00 PM Uranus 3 degrees N of Moon	1:21 AM Moon occults 29 SGR (+6.4) 1:00 PM Mercury at elongation (21 degrees W)	1:13 AM Moon occults Tau AQR (+4.1) 7:30 PM "Molecular Electronics" lecture at VASC	4:23 AM Moon occults 252 AQR (+6.9) 7:00 PM NAS Regular Meeting at MRO	6:00 PM Mercury 1.9 degrees S of Jupiter	4:00 AM Saturn 4 degrees N of Aldebaran 2:45 PM Last Quarter Moon	5:00 PM Venus 3 degrees N of Aldebaran
15	16	17	18	19	20	21
1:00 AM Venus 0.7 degrees S of Saturn 4:12 AM Moon occults SAO 93059 (+6.5)	4:08 AM Moon occults SAO 93489 (+7.6)	3:29 AM Moon occults SAO 93942 (+6.9) 2:00 PM Venus 0.3 degrees S of Moon	8:00 PM Jupiter 0.2 degrees N of Moon; occultation	9:00 AM Mercury 1 degree S of the Moon	3:44 PM New Moon	
22	23	24	25	26	27	28
		9:59 PM Moon occults SAO 119272 (+7.6)	9:00 AM ALCON 2001	9:00 AM ALCON 2001	6:08 AM First Quarter 9:00 AM ALCON 2001 10:31 PM Moon occults SAO 158808 (+6.3)	9:00 AM ALCON 2001 2:00 PM Delta Aquarid Meteor Shower
29	30	31	1	2	3	4
	8:00 AM Neptune reaches opposition 10:00 AM Mars 6 degrees S of the Moon					