SJAA EPHEMERIS

VOLUME 5 NUMBER 8 OFFICIAL PUBLICATION OF THE SAN JOSE ASTRONOMICAL ASSOCIATION August 1994

The Eyepiece
by Bob Madden

Whoa! Was Fremont Peak the place to be on July 9th or was it!! Lech and Gosia, my friends from Poland, were with me to visit the Peak for their second time. The first was two weeks earlier and that night we were alone, except for a Racoon and four Hoot Owls. It was a beautiful night also, but there was no fog to cover Monterey and Watsonville. The Saturday of July 9th had fog covering the valley below. It was warm (not hot) and a very light breeze. It was a wonderful night with many friends there - Jack Zeiders and Jim Eislet at the work shop, Rich Newshaefer, Alan Nelems, Crazy Ed, Mark Wagner, Dean Linebarger, Paul Barton and many more. Paul had a list of 30 or more people - his sign-up sheet was full. There was more than a low murmur of voices talking in Coulter Camp.

Rick Morales came by, stopping at all the voices he could recognize in the dark. Rick commented that he had never seen so many people on an evening like this. I couldn't see it, but I think he had a smile on his face. I think he was happy he could host such a well mannered group of people. We owe Rick and the State Park system a large "thank You" for providing us with such a fine place to do our observing as not many people are so privileged.

Rick has had a fire pit installed at the north end of Coulter Camp with a long row of tables placed along side. The Park has begun something new this year. If any of you been to other State Parks you may know about Camp Hosts. This year Fremont Peak has begun a host program. This individual comes around to talk with you to see if you are having any trouble and always checks to see if you have payed your fees. It is not very expensive to spend the night there or the day. For such a nice observing site, it is worth the money and time. Rick also gets a better head count for the use of the park - something which may help in these times of park closings.

After a visit to the Challenger 30" at the observatory, Lech and Gosia returned to Coulter Camp. There just seemed to be too many people waiting to view through the big telescope. They did view M13 and Jupiter and were impressed with the optical performance. Once back at Coulter Camp, they quickly found me at Paul Bartons C-11 set-up. Paul checked them out on its operation and turned it over to them. Paul wandered away to talk to other friends. Every M object in Saggitarius and Scorpius

See Fremont Peak page 4

Aug 6: Star party, H. Coe SP & Fremont Peak, Sset 8:08. No moon. ALSO: Public star party at Grant Ranch County Park.
Aug 12: Star Party, Houge Park, Sset 8:03 pm, 38% moon, Mset 11:13 pm.
Aug 13: AANC picnic at Fremont Peak. Includes SJAA & many clubs.
Aug 20: SJAA picnic at Houge Park, afternoon. Games at 2:00 pm, Food at 4:00 pm. Dogs/Burgers provided, bring drinks/utensils and Pot Luck.
Aug 20: Observational Astronomy class, Houge Park, 8:00 p.m.
Aug 27: No general meeting; picnic replaces the talk and meeting.
Sept 3: Star Party, Coe Park, Sset 7:32 pm. No moon.
Sept 9: Star Party, Houge Park, Sset 7:25 pm, 25% moon, Mset 9:56 pm.
Sept 10: Star Party, Fremont Peak, Sset 7:21 pm, 35% Moon, Mset 10:45 pm.
Sept 17: Observational Astronomy Class at Houge Park, 8:00 pm.
Sept 24: Show and Tell night. Board and General Meeting at Milpitas Library. Board of Directors meeting at 6:15 pm followed with the General Meeting at 8:00pm. Please pring your latest gidgit, slides, photographs or what have you to share with others. How about showing some Perseid meteor photos?

General Meeting
Speaker: Mike Rushford,
Tri-Valley Astronomers

Eyes on the Sky's Bulletin Board
510 / 443-6146 (24 hours)

Assisted by Christopher Brown
by Jim Van Nuland

Mike was inspired to interconnect his computer and a telescope when he came on a Celestron Comp-u-Star scope. The learning path was long and contorted, as he learned the myriad things needed to do such a thing. As so often in the Bay Area, he connected with Kevin Medlock and Vance Chin, who have worked on this for some time. And also as so often done, much of the hardware was obtained at swap meets and the LLNL surplus sales.

Eventually he completed a number of weather instruments (thermometer, wind, rain, cloudiness, humidity), and a solar scope with CCD camera, all under computer control, with much of the control programming written in QuickBasic.

Most of the weather instruments are fairly straightforward. The cloud detector is not! It consists of two horizontal steel plates, with thermometers to measure the difference in their temperatures. Since the top plate is heated by the Sun or radiating to the sky, it is hottest when the sky is clear (this is reversed at night). The important wavelength is one that is blocked by clouds so that the detector will function at night.

The telescope is rather simple: a 2 inch singlet objective, made of energy-rejecting red glass, a Barlow to give f/30, followed by a 0.6 Angstrom Daystar filter. Since there is plenty of light, a simple security CCD camera is all that's needed. It's field is small, only 1/4th of the Sun's diameter. However, this gives good resolution of solar features. The raw image has 240 by 256 pixels, with 6-bit resolution.

The mounting is machined of aluminum and steel, using the steel-on-steel friction drive pioneered by Kevin Medlock. It provides only enough motion in declination to reach the Sun and the Moon.

It's all housed in a 9-foot square building, whose top half is rolled back by a garage-door opener. When opened, the computer moves the scope to the expected position of the Sun. Presently, the opening of the building is controlled locally, but will eventually be allowed under remote control, when the weather instruments can be made reliable enough to be depended upon for safe operation.

All of this is accessed remotely by means of a fairly conventional computer Bulletin-Board System, which also provides connection to the FidoNet (amateur) network, and has a UUCP link to provide Internet E-mail. The BBS software provides "doors" which allow access to specialized programs; in this case, those that manage remote instruments. Christopher Brown presented a description of the board's software.

To control the weather station and the telescope, the caller needs only the modem program. The scope may be pointed, an image captured, and transfered to see at home, all in near-real-time. The scope's depth of focus is so wide that no remote focussing is needed.

Images are captured and converted to a compressed format called "GIF", which is usable on all computers. Now, this (or any) compressed form works best when the image or data is mostly the same. Reversing this logic gives it an amazing property: otherwise identical images will give LEAST compression when the image is sharpest!! Since daytime seeing is often rather poor, the computer captures eight images, compresses each, and selects the largest file — which will have the most detail! Mike showed a series of slides to illustrate this, using both test patterns and actual solar images.

Mike advertises his board by occasionally posting a description on the astronomy newsgroup (SCI.ASTRO). People have called from all over the world! A fellow in Norway calls often, presumably getting a lower long distance rate because it's nighttime over there.

Having a H-alpha solar scope at home is a wonderful thing; a radio can be used to detect the onset of a solar flare. The visible action on the Sun follows, taking a few to some tens of minutes before it's run its course. Mike had several sequences to show, in which the flare material was seen to move across the face of the Sun.

Thank you, Mike and Christopher!

From: Jim.Van.Nuland@dataport.com (Jim Van Nuland)
Date: 07 Jul 94 22:32:00 -0800

Join the Perseid photography

From: winter@apple.com (Patty Winter)
Date: 5 Jul 1994 18:34:48 -0700

Would you like to help with a fascinating photographic study of next month's Perseid shower, which could produce some spectacular meteor storms?

Peter Jenniskens, a Dutch meteor watcher currently working at NASA/ Ames, would like to see strong California participation in this year's study. Last year's effort, which was centered in Europe, resulted in some excellent data about the duration and direction of specific Perseid events. This year, conditions favor North America.

Specifically, Peter needs someone who can sign up volunteers, send out newsletters, organize a post-event meeting, etc. Peter has all the necessary background information the organizer will need.

A description of the project is attached below. Please contact Peter for more information. I met him at an astronomy meeting recently and offered to post his request to the net, but I don't know any more about the study.
Patty

Photographing the Perseids on August 11/12 1994.

This summer's Perseid display may be richer than usual because of the passage of the parent comet: P/Swift-Tuttle. Last year, a meteor outburst was observed over Europe and the eastern USA. Here in California, we only saw some spectacular long meteor trails early in the evening of August 11. As someone responded: "Too few to keep the kids quiet." However, this year will be our turn for a chance to see an outburst at its best. Rates are expected to be about twice as high as usual after midnight August 11/12. The meteors will be relatively bright and are therefore relatively easy to photograph.

Before coming to the USA, I spend ten years coordinating the scientific efforts of a group of amateur meteor observers of the Dutch Meteor Society (DMS). Last year, DMS observers were able to photograph more than 200 Perseids from two or more sites simultaneously. Such sets of photographs allow to calculate the trajectory of the meteor in the atmosphere and its orbit in space. This is a great result, especially because professional efforts have thus far been unsuccessful in trying to get multistation photographs during a meteor outburst. I cannot share in the credit for this wonderful feat, because, like most of you, I was here in California and missed most of the outburst. But this year there is another chance. Fortunately, I found some amateurs willing to give it a try and set up a project with the goal to photograph the Perseids from two or more sites. You can help to greatly increase our chance of success by increasing the number of sites and the number of cameras that cooperate in this project.

In order to participate, you will need a camera, with the regular 50mm lens, which can make time exposures without exhausting a battery. Equipped with HP500 (400 ASA) black and white film and a cable release, it is ready to go. It further needs patience and discipline. Patience, because one will only photograph maybe five meteors in a whole night. Discipline, because it is necessary to record the exact times of opening and closing of each time exposure (within one second accurately). It is also necessary to keep an eye on the sky and note the time of all bright meteors that pass your camera field and to remember the exact location of where you were relative to roads and buildings!

The direction of where to best point your camera depends on where other people are looking. The meteors appear between 66 and 56 miles altitude (some 60 miles up). To have a good idea of where the meteor appeared, one has to photograph it from two different angles. The two photographers should therefore be some 20-80 miles apart. I am going to set up a meteor observing post at Morgan Hill, equipped with several 50mm F1.8 cameras and rotating shutters. A battery of four cameras will operate from Fremont Peak Observatory. Other amateurs should operate photographic equipment from locations as far apart as in the Santa Cruz mountains, the Sierras near Mount Hamilton and Mount Diablo, and between Livermore and Los Banos in the Central Valley. Best chance of photographing a meteor is by directing the camera 50 degrees up in the direction North-East. But in order to photograph meteors from two sites, we have to aim at the same part of the atmosphere 60 miles up. Therefore, we will issue general aiming points for those people who want to participate.

When are most meteors expected? To answer that, let us look at the previous outbursts. In 1991 and 1992, the meteor outbursts were of short duration, lasting for two hours only, with rates at maximum 6 times higher than usual. The event in 1991 was recorded on photographic film by Japanese observers, but no multistation photographs were obtained. In 1992, the event was favourable for central Asia, and well observed by Chinese observers. In Europe, the author was among a few observers that caught a glimpse of it in bright twilight while observing from Switzerland. In 1993, rates soared again, now to about 3 times higher than usual, peaking at 18h Pacific Daylight Savings Time (PDST). This time the outburst lasted much longer, about 7 hours.

I expect another outburst in 1994, again with a duration of some 7 hours and possibly centered at 01h PDST on August 11/12. The comet is heading back to the darker and colder realms of our Solar System and meteor rates are expected to be less high than in 1993. If rates decrease exponentially away from the comet, then the peak rate can still be as high as 130 meteors per hour on top of the annual rate of 80 per hour. Twilight ends at about nine in the evening, when rates will still be low. The numbers should go up quickly after 23h PDST, because of a rising radiant. It is not certain that rates will peak at 01h. Observations of other outbursts have shown a progressive later time of maximum after perihelion passage. So it is quite possible that the rates will keep rising until the morning hours.
See Perseids on page 4

Perseids

Continued from pg 3

After the event, we will come together (time and place will be given in this journal) and compare the negatives to see which meteors have been photographed and by whom. Usually, the trails of meteors are quite faint and you will need a magnifying glass to see the trails on the negatives. Each set of two or more negatives per meteor will be fully documented: begin- and end time of the exposure, time of the meteor, location and name of the observers. The negatives will then be measured on JENA X-Y astrorecord and from the resulting astrometric data we will calculate the position of the meteor in the atmosphere, its velocity (from the rotating shutter breaks) and the orbit in space. If we get this far, we have something to be proud of. All successful participants in this project will receive a full report on the results.

If you want to participate or have suggestions, feel free to contact me.

Dr. Peter Jenniskens
tel: 415-604-3086 fax: 415-604-1088
e-mail: peter@max.arc.nasa.gov

FREMONT PEAK

Continued from pg 1

was looked at with wonder, because these constellations are not visible from their home latitude in Poland - 50 degrees north. Lech and Gosia were quite impressed with the ease of operation of Compustar C-11.

They were also impressed with the number of telescopes and observers present that night. I would say there were about 30 telescopes and maybe 50 people. During the evening a common complaint was the light from cars with unknowing drivers coming up the road. One car even drove into the observing area with the lights on! I'm not sure how he got out safely. Even so, it was still a wonderful night.

Ptolemy

From: tth@dhruva.caltech.edu (Thomas Hamilton)
Newsgroups: sci.physics,sci.astro
Subject: Re: Ptolemy got a bum rap
Date: 9 Jun 1994 23:22:02 GMT
Organization: California Institute of Technology, Pasadena

[concerning Ptolemy]

Anyone know why they liked to use circles way back when? Because everyone thought circles looked pretty, better than yucky looking ellipses? Or just a starting point approximation, and add "subcircles" (epicycles) as you get better at it?

Plato, for example, thought that circles were perfect, and that since the heavens were the realm of perfection, you must use circles to describe the motion (I can never follow all these "perfection" arguments, but that's contemporary influence, I guess).

Greek astronomers believed that planets moved in circles for perfectly reasonable, although mistaken, physical reasons. Greek scientists did not believe in vacuum or action at a distance. They believed that space was filled with some sort of transparent material. The motions of the celestial bodies could be understood if one accepted that this celestial matrix was in the form of a series of hollow balls embedded one within the other like Russian dolls. The outermost ball contained the fixed stars and inner balls each contained one planet whose movements reflected the movement of the hollow ball (or thick sphere if you prefer) in which it was embedded. It is obvious that a solid object which rotates while embedded in another solid object must be symmetric about its axis of rotation. This is the reason the Greeks preferred circular orbits. Anomalous motions can be explained by epicycles, smaller spheres embedded in the larger sphere.

Elliptical orbits only make sense if you believe in planets hurtling through vacuum under the control of a invisible force coming from a distance, e.g. Newtonian gravity.

We are taught from childhood to believe in empty vacuum and action at a distance, we only unlearn those ideas in grad school. Ancient Greeks, naturally believing space to be full of stuff, accepted circular orbits because they were the only orbits compatible with their basic physics.

Plato may have been confused about all this, but Ptolemy and the other astronomers certainly understood it. The idea that the Greek scientists were driven to circles by some philosophical prejudice may originate, like the famous woodcut, in some nineteenth century effort to belittle the intelligence of people in the past.
-Tom

From: Jim.Van.Nuland@dataport.com (Jim Van Nuland)
Date: 11 Jul 94 20:12:00 -0800
Subject: Comet N-N-Machholz
Organization: Data Port BBS [Info: info@dataport.com]
To: madden@netcom.com

Hi, Bob,

Here's an excerpt from the FidoNet Astronomy echo, in which Dave Chandler (an old Bay-Area boy) reports the preliminary orbit for the new comet. I presume the orbit was computed by people at Marsden's office. Positions computed by myself using Dave's Deep-Space 3D program. I decided on 3-day intervals since the R.A.is changing rapidly.

==========

Parabolic elements for the comet based on 11 observations over 3 days:

T: 1994 JUL 10.627 Peri: 119.368l
e: 1.0 Node: 161.397l (J2000.0)
q: 1.18077 A.U.'s i: 94.963l

Absolute Magnitude: 8.01 Magnitude Coefficient: 10.00

The comet is currently in Camelopardalis heading southward through Cassiopeia, Pegasus, Aquarius, and Capricornus. The coma is estimated at 2.5' by one observer and 5' by another and described as "diffuse with some central condensation" by one observer and "diffuse with strong central condensation" by another.

—David Chandler, co-editor of Comet Watch

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N-N-Machholz (1994m)

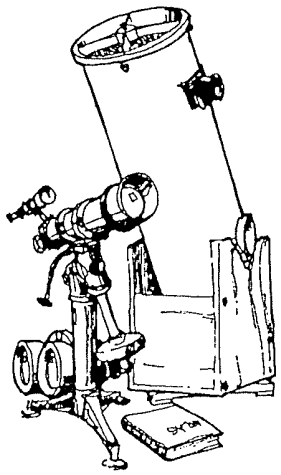
Ephemeris computed for equinox 2000.0

1994	R.A (H,M)	DEC (D,M)	R	DELTA	ELONG	PHASE	PA	MAG
JUL 11	3 43.4	70 5	1.181	1.361	57.4	46.5	296.8	9.4
JUL 14	3 34.4	69 59	1.182	1.312	59.4	47.8	291.5	9.3
JUL 17	3 24.4	69 51	1.185	1.261	61.6	49.0	286.1	9.3
JUL 20	3 13.3	69 41	1.190	1.208	64.0	50.1	280.5	9.2
JUL 23	3 0.8	69 28	1.197	1.153	66.6	51.2	274.8	9.1
JUL 26	2 46.9	69 9	1.205	1.097	69.5	52.1	268.9	9.0
JUL 29	2 31.4	68 43	1.216	1.038	72.6	52.8	262.7	8.9
AUG 1	2 14.2	68 7	1.228	0.979	76.0	53.3	256.2	8.9
AUG 4	1 55.2	67 18	1.242	0.920	79.7	53.5	249.5	8.8
AUG 7	1 34.5	66 10	1.257	0.859	83.8	53.3	242.4	8.7
AUG 10	1 12.3	64 38	1.274	0.800	88.4	52.7	235.1	8.6
AUG 13	0 49.1	62 33	1.292	0.741	93.5	51.5	227.7	8.5
AUG 16	0 25.3	59 47	1.311	0.685	99.3	49.6	220.2	8.4
AUG 19	0 1.7	56 9	1.332	0.632	105.9	47.0	212.8	8.3
AUG 22	23 38.8	51 29	1.354	0.584	113.3	43.3	205.5	8.2
AUG 25	23 17.3	45 38	1.377	0.544	121.7	38.6	198.1	8.1
AUG 28	22 57.5	38 34	1.401	0.512	131.0	33.0	190.4	8.0
AUG 31	22 39.6	30 25	1.426	0.493	140.8	26.6	181.2	8.0
SEP 3	22 23.8	21 34	1.452	0.487	150.2	20.2	168.2	8.1

1994 SJAA Calendar

General Meeting		Houge Park Star Party	Observational Astronomy Class
Aug	13	AANC Picnic at Fremont Peak	
Aug	20	SJAA Picnic at Houge Park	
Aug	27	15	16
Sept	24	9	17
Oct	22	14	15
Nov	19	11	no meeting
Dec	17	9	no meeting

Please read your *Ephemeris* each month for changes



Telescope Loaner Status

by Paul Barton

SJAA no.		Name	User	Due
1	4-1/2"	Newt/P mou	---------->	available
2	6"	Dobson	---------->	available
3	4"	Quantum	Jason Sun	8/12/94
5	60 mm	Refractor	John DeSilvia	7/20/94
6	C-8	Celestron	Albert Chen	8/12/94
7	12-1/2"	Dobson	Tom Rice	Indefinite
8	14"	Dobson	Lee Courtney	9/9/94
14	6"	Newt/P mount	---------->	available
15	8"	Dobson	John Schoenenberger	8/13/94
18	8"	Newt/P Mount	Bob Maillot	8/11/94
19(B)	6"		Jerry Lovelace	8/7/94
20	4-1/4"	Dobson	---------->	available
21	10"	Dobson	Alex Calderon	8/1/94

Solar telescope (#16). Available only to experienced members for special occasions such as day time public star parties, etc. Call.
(on waiting list)

Ken St. George - #8

If you want to borrow a telescope call Paul Barton (number is on the credit Marquee) and get your name on a general list (any telescope) or on a specific telescope list.

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Rich Neuschaefer
work (408)-285-0730
home (408)-446-0975 4/94

2010 Meade SCT, GEM Mount w/RA drive. 1-1/4 25 mm eyepiece. Good cond. purchased at Orion as a blemish 7 yrs ago and still in good shape. Asking $1000, paid $1600. Am getting a smaller telescope. Call Bob Madden at:
(408)-264-4488 6/94

8" Meade, Schmidt Cassegrain, Multi Coated corrector plate, GEM, w/26mm eyepiece. Call Maria Peterson
(408)-262-1457 (after 6pm or leave message) 7/94

Celestron 4.5" Newt. "like new", w/ Orion 2X Fully baffeled Barlow, Polaris mount. Call Tom Rossi.
(408) 879-9874 7/94

6" Mirror Blank/Grinding tool. Any reasonable offer. Call Richard Roupe
(408)-253-2393 7/94

CELESTIAL CALENDAR

August 1994

LunarPhases	Date	Rise	Tran	Set
NM 01:46hr	07-8	0644	1313	2011
FQ 22:58hr	13-8	1325	1844	2358
FM 23:47hr	20-8	1921	0018	0557
LQ 23:41hr	28-8	2351	0622	1338

Nearer Planets

Mercury	07-8	0544	1252	1959
1.361 AU	17-8	0646	1333	2019
Mag -1.90	27-8	0739	1402	2023
Venus	07-8	1001	1604	2206
0.735 AU	17-8	1036	1601	2147
Mag -5.10	27-8	1023	1556	2128
Mars	07-8	0259	0937	1659
1.836 AU	17-8	0205	0927	1649
Mag 0.80	27-8	0154	0916	1638
Jupiter	07-8	1258	1821	2344
5.623 AU	17-8	1224	1746	2308
Mag -2.00	27-8	1152	1712	2233
Saturn	07-8	2119	0257	0831
8.734 AU	17-8	2038	0215	0748
Mag 0.80	27-8	1957	0133	0705

SOL Star Type G2 V Mag - 26.72

RA	DEC				
0909	1621	07-8	0616	1313	2010
0949	1309	17-8	0624	1312	1958
1026	0946	27-8	0633	1309	1045

Astronomical Twilight		Dawn	Dusk
JD 2,449,571.5	07-8	0437 -	2149
,581.5	17-8	0449 -	2133
,591.5	27-8	0501 -	2116

Sidereal Time

Transit Right	07-8	0000	PDT=1957
Ascention at	17-8	0000	PDT=2037
Local Midnight	27-8	0000	PDT=2116

Darkest	Saturday Night Aug 6
Sunset	2011
Twilight End	2150
Moon Set	1935
Dawn next morning	0437

TIMES AND DATES ARE PACIFIC DAYLIGHT

Times are Local Civil

Planet distance and Magnitude for 17th of month

Derivation of these values are from

Astronomy with Your Personal Computer

by Peter Duffet-Smith

MacEphem

by Elwood Charles Downey

Comet Comments

by Don Machholz

Many of our comets have now faded, leaving only three observable comets in our skies. Meanwhile, one returning comet has been recovered, and one bright and one faint comet discovered.

Periodic Comet Borrelly (1994l): This comet was recovered in mid-June by Alan Gilmore and Pam Kilmartin of Mt. John Observatory in New Zealand and by G. Garradd of Siding Spring, Australia. At that time it was at magnitude 17, but this comet, with a period of 6.9 years, will brighten to magnitude 7 by the end of the year. You can presently find it in the morning sky.

Comet Nakamura-Nishimura-Machholtz (1994m): Three independent discoveries were made of this comet over a course of sixteen hours on July 5-6. M. Nakamura and H. Mishimura of Japan both used 25x150 binoculars to find this tenth magnitude object in Camelopardalis. I used my homemade 27x120 binoculars, built in 1983 out of surplus parts for under $400. For myself this find was 574.75 hours and 337 sessions since my last discovery two years ago. Presently no orbit has been determined. By the middle of July, however, I expect to have it posted on the Kingmont BBS at (916) 652-5920; ask for file cc192.txt.

Comet McNaught-Hartley (1994n): Robert McNaught discovered this comet on a 110-minute plate exposed by Malcom Hartley on July 5 from Siding Spring, Australia. It was then at magnitude 16 in the southern morning sky. The orbit is not yet known.

EPHEMERIDES

PERIODIC COMET BORRELLY (1994l)

DATE(00UT)	R.A.(2000)	DEC	EL	SKY	MAG
07-17	03h08.2m	-13d57'	76d	M	12.2
07-22	03h20.3m	-13d13'	78d	M	11.9
07-27	03h32.6m	-12d30'	79d	M	11.6
08-01	03h45.0m	-11d44'	80d	M	11.4
08-06	03h57.4m	-10d58'	81d	M	11.1
08-11	04h09.9m	-10d11'	82d	M	10.8
08-16	04h22.4m	-09d22'	82d	M	10.5
08-21	04h35.0m	-08d31'	83d	M	10.3
08-26	04h47.6m	-07d38'	84d	M	9.9
08-31	05h00.3m	-06d41'	85d	M	9.7
09-05	05h13.0m	-05d42'	86d	M	9.4
08-10	05h25.7m	-04d38'	87d	M	9.2

CC192.TXT

PERIODIC COMET TEMPEL 1

DATE(00UT)	R.A.(2000)	DEC	EL	SKY	MAG
07-17	14h08.1m	-15d27'	101d	E	9.2
07-22	14h19.3m	-17d19'	99d	E	9.4
07-27	14h31.2m	-19d06'	98d	E	9.5
08-01	14h43.6m	-20d49'	96d	E	9.6
08-06	14h56.6m	-22d26'	95d	E	9.8
08-11	15h10.5m	-23d57'	93d	E	9.9
08-16	15h23.9m	-25d21'	92d	E	10.1
08-21	15h38.2m	-26d38'	91d	E	10.3
08-26	15h52.8m	-27d48'	89d	E	10.5
08-31	16h07.7m	-28d49'	88d	E	10.7
09-05	16h22.8m	-29d44'	87d	E	10.9
09-10	16h38.1m	-30d30'	85d	E	11.1

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