FROM HERE AND THERE -- Cont'd. from p. 3

We would like to print a list in STARDUST of the NCA members that belong to other astronomical groups such as the AAVSA, ALPO, the AMS and others. If you belong to one of these groups, please give the information to the secretary, Mrs. Nora Keel.

***

NEXT MONTH

Our speaker for March will be Dr. David Musto, who will describe the beginnings of the U.S. Naval Observatory.

***

Astronomy compels the soul to look upwards
And leads us from this world to another.
- Plato

***

NO MD-DC JUNIOR MEETING in FEBRUARY.

* STAR DUST

Published monthly except August by and for members of the NATIONAL CAPITAL ASTRONOMERS, INC., a non-profit public service organization promoting interest and education in astronomy and the related sciences.

WASHINGTON D.C. FEB-1'68 U.S. POSTAGE 06 PB METER 118021

Library,
Naval Observatory
Washington 25, D.C.

STAR DUST

February 1968 Vol. XXV No. 6

NATIONAL CAPITAL ASTRONOMERS

GRAVITY WAVES

February's speaker is Dr. Joseph Weber, from the Department of Physics and Astronomy, University of Maryland. Dr. Weber's area of investigation recently has been gravity waves; he is in charge of experiments which promise possible detection of this elusive form of radiation.

Relativity predicts that an oscillating mass will radiate energy in the form of gravity waves, much as an alternating current will produce electromagnetic radiation. However, this radiation is on the order of only 10^{-37} watts for a terrestrial source*, making detection virtually impossible. Even a spectroscopic binary star system does not radiate sufficient energy to be detected by means we now have at our disposal. Nature may provide a much more intense source of gravity waves; this might possibly occur when a star undergoes gravitational collapse. Conservation of angular momentum in the system would dictate faster and faster rotation as the radius shrinks, until the velocity of light is approached. Gravitational radiation energy of perhaps 10^{50} watts would be attained. This could very well be detected with equipment now available to the physicist.

Dr. Weber's apparatus, which he will describe in his talk, has detected "events" which can apparently be explained only by brief pulses of gravity radiation, although it is still much too early to say definitely whether this is the case. Certainly it appears as though he and his staff are onto something big, possibly a development in physics fully as significant as the experiments of Hertz in the detection of electromagnetic waves emitted by an alternating current. -- Cont'd. p.2.

***

CALENDAR

FEBRUARY 3 6:00 p.m. Dinner with the speaker, Bassin's (14th & Pa.) Call Jerry Hudson, 948-2809 for reservations.

7:30 p.m. meeting of the officers and board of trustees. (Because of bad weather, we were unable to meet a quorum last month) Dept. of Commerce Auditorium.

8:15 p.m. GRAVITY WAVES, Dr. Joseph Weber, Univ. of Maryland. Dept. of Commerce Auditorium.

10 8:15 p.m. Discussion Group. (upstairs) Commerce Bldg., Rm.2062. Topic will be an amateur's observatory--that of our treasurer, Mr. Robert N. Bolster. Slides will be shown which were taken during various phases of construction, and mention will be made of certain Fairfax County zoning regulations pertinent to observatory building.

6,13,20,27 TELESCOPE MAKING CLASS at the Board of Education's Material Center in Bladensburg with Ted Noble.

2,9,16,23 TELESCOPE MAKING CLASS at the Chevy Chase Community Center at 7:30 P.M. with Hoy Walls.

3 GENERAL MEETING OF JUNIOR DIVISION at 7:30 P.M. in the Dept. of Commerce auditorium. All juniors are urged to attend. January Junior Meeting was cancelled due to snow.

JUNIOR DIVISION ASTRONOMY CLASS Sunday afternoon at 3 P.M. in Planetarium of Montgomery Junior College. Call 933-0823 (Mark Goldberg) for the date.

* This was calculated by Einstein for a rotating rod 1-meter long, at an angular velocity as fast as the material would allow.

GRAVITY WAVES - Cont'd. from p. 1

Dr. Weber received his Ph.D. in physics from the Catholic University of America in 1951. He has been the recipient of two Guggenheim fellowships under which he has done work in quantum electronics and general relativity. Before coming to the University of Maryland, he was with the Institute for Advanced Studies.

Those who may want to do some more reading on the subject will find an excellent, non-technical article in the October 1967 issue of Scientific Research (pp. 41-43).

***

MIDDLE EAST REGIONAL CONVENTION JUNE 14, 15, and 16, Pittsburgh, Pa.

The convention will be held at the Quality Courts Motel East (near the Westinghouse Bridge). It is on Route 30 off the Pa. Turnpike at the Irwin interchange. The motel is giving special rates. Friday evening will be a bus trip to the Allegheny Observatory. The Banquet will be Saturday evening with Dr. Wagman of the Allegheny Observatory being the speaker. Sunday will be a trip to large private Observatory in the Pittsburgh area. Plan now to attend this convention. In case you will consider presenting a paper, please write to Mr. George G. Lingbloom, 1606 Burchfield Road, Allison Park, Pa. 15101.

***

NEW MEMBERS

Membership Applications Received at the January Meeting

Joint Membership:

Darrel J. Freund and Darrel Jr.
4703 Teak Ct.
Camp Springs, Md. 20031

***

NOTE FROM EDITOR

All of us associated with the publication of Stardust regret that it is often received late and sincerely hope that this has not caused you to miss a lecture that you particularly wanted to hear. The publication of Stardust requires the efforts of many people to collect the information necessary to write even just the calendar! It should be remembered that these people, including the editor, and the photographer are all voluntary and can not be expected to take time away from their regular jobs to work on Stardust. If you have never worked on a project like this you may not believe the number of things small and large that can go wrong--a last minute change in speaker, the speaker forgets to send his resume, someone is sick, someone is called out of town. When an emergency arises, there is no one prepared to take over and fill the gap. Several times in the last two years requests have been made in Stardust and at the regular meetings for help. No one has volunteered! Stardust belongs to the membership and your help is needed to make it the type of publication you want.

***

FROM HERE AND THERE

The Astronomical Society of Harrisburg will hold their annual dinner February 15, Gallileo's birthday. Dr. Peter Van De Kamp will be the speaker.

***

How about the NCA having an annual dinner? Guess it would be our 31st year. Seems like it has been 10 or 12 years since we have had a banquet. Someone get the ball rolling.

***

We also note in the "STARDUST" of the Harrisburg group that their Junior group is selling the Messier OBSERVE Manual for $1.50. Copies are still available from Bob Wright for $1.00. - Cont'd.p. 3

LUNAR OCCULTATIONS COMPUTED FOR WASHINGTON
(LAT 38.920 LONG 77.065) FOR 1968 (DISTANCE FROM STANDARD STATION = -0 MILES)
STANDARD STATION AT LAT 38.920 LONG 77.065

DATE	TIME(UT) H M S	ACC SEC	V O	Z.C.	USNO REF NO	S.A.O. NUMBER	MAG	SP	PH	PERCENT SUNLIT	ELG	PA DEG	CUSP ANGL	VA DEG	MOON ALT	MOON AZI	SUN ALT	AA DEG	LIBRATION LONG	LIBRATION LAT	MIN MAG
FEB 10	6 2 9	20	8 2		Z05458	77988	9.0	B8	D	83 WAX	130	24	20N	322	39	277		23	-5.3	-5.9	
FEB 10	8 32 50	15	8 3		Z05615	78108	8.5	F2	D	83 WAX	132	169	16S	117	11	296		167	-5.4	-5.7	
FEB 10	8 49 5	5	8 4		Z05648	78128	8.2	K2	D	83 WAX	132	100	85S	49	9	299		98	-5.4	-5.7	
FEB 10	9 19 35	24	8 1		Z05654	78133	9.0	K0	D	84 WAX	132	176	9S	128	4	303		174	-5.4	-5.7	
FEB 10	23 22 41	8	6 1		Z06614	78848	8.5	A0	D	88 WAX	140	137	54S	199	48	90	-9	132	-4.5	-6.3	
FEB 11	1 21 1	5	6 2		Z06699	78917	8.3	M0	D	89 WAX	141	95	84N	147	69	117		90	-4.8	-6.4	
FEB 11	3 26 52	15	7 1		Z06762	78965	8.7	K0	D	89 WAX	141	30	18N	354	76	221		24	-5.2	-6.4	
FEB 11	3 39 7	6	7 2		Z06778	78976	8.2	A0	D	89 WAX	141	136	56S	95	74	228		130	-5.3	-6.4	
FEB 11	8 47 52	5	9 8	1088	Z07019	79141	5.6	A2	D	90 WAX	143	113	80S	58	18	290		106	-5.9	-6.0	
FEB 11	9 43 37	28	9 2		Z07047	79164	7.8	K0	D	90 WAX	144	184	9S	134	8	298		177	-5.9	-6.0	
GRAZING OCCULTATION NEARBY-- APPROXIMATE S. LIMIT LAT. = 38.39 + 0.63(W. LONG. - 77.06)																					
FEB 12	4 35 29	5	9 6	1206	Z08057	79861	5.9	K0	D	95 WAX	154	110	89N	73	72	224		98	-5.5	-6.4	
FEB 12	5 34 11	8	9 6	1211	Z08073	79869	6.2	A0	D	95 WAX	154	163	38S	109	63	248		151	-5.7	-6.3	
FEB 12	9 23 32	16	9 1		Z08224	79980	8.0	G5	D	96 WAX	155	40	18N	345	20	286		28	-6.0	-5.9	
FEB 13	2 26 59	5	9 2	1330	Z09039	80496	7.6	G5	D	98 WAX	165	114	81N	165	59	113		99	-4.8	-6.1	
FEB 13	4 23 17	5	9 3	1334	Z09085	80529	7.0	G5	D	98 WAX	166	130	84S	138	73	171		115	-5.1	-6.0	
FEB 13	10 13 42	6	9 2	1357	Z09243	80634	7.7	G0	D	99 WAX	168	154	62S	100	18	282		138	-5.7	-5.4	
FEB 14	11 17 13	5	9 1		Z09990	98897	7.8	K0	R	100 WAN	176	306	15N	253	13	280	-9	287	-5.2	-4.5	
FEB 14	23 29 32	10	9 1		Z10422	99185	7.7	A3	R	99 WAN	170	229	46S	280	2	75	-9	209	-3.4	-4.5	
FEB 15	8 2 38	10	9 1		Z10604	99296	8.0	A3	R	99 WAN	166	250	59S	214	53	227		229	-4.2	-3.8	
FEB 15	8 30 12	18	9 1		Z10625	99302	7.9	A0	D	99 WAN	166	202	11S	162	49	235		181	-4.2	-3.8	
FEB 15	8 49 0	18	9 1		Z10625	99302	7.9	A0	R	99 WAN	166	233	42S	190	46	240		212	-4.3	-3.7	
FEB 15	8 47 37	5	9 8	1576	Z10630	99305	5.3	A0	R	99 WAN	166	324	47N	281	46	240		303	-4.3	-3.7	
FEB 17	6 35 13	7	9 3		Z11926	138796	7.9	G5	R	89 WAN	141	270	68S	290	46	153		248	-1.8	-1.1	
FEB 17	7 24 26	5	9 4	1790	Z11948	138813	7.6	M0	R	88 WAN	140	314	69N	321	48	170		292	-1.9	-1.0	
FEB 17	11 15 17	7	9 3	1801	Z12002	138852	8.0	G5	R	88 WAN	139	265	62S	222	27	248	-9	243	-2.4	-0.5	
FEB 17	11 37 5	6	9 3		Z12017	138861	8.0	K5	R	88 WAN	139	337	46N	292	24	244	-5	315	-2.4	-0.4	
FEB 18	3 4 40	5	8 1		Z12542	139226	8.7	F2	R	81 WAN	129	301	81N	351	2	101		280	-0.5	0.1	
FEB 18	3 38 11	7	7 3		Z12569	139243	9.0	G5	R	81 WAN	129	349	33N	38	6	106		329	-0.5	0.2	
FEB 18	3 53 49	7	7 5		Z12572	139246	8.2	G5	R	81 WAN	128	345	37N	33	10	109		324	-0.5	0.2	
FEB 18	4 55 31	5	7 5		Z12593	139258	8.3	K5	R	81 WAN	128	324	58N	7	21	120		304	-0.5	0.4	
FEB 18	4 49 43	7	7 3		Z12597	139261	9.1	G0	R	81 WAN	128	346	36N	30	20	119		325	-0.5	0.3	
FEB 18	5 37 32	5	9 8	1911	Z12606	139268	7.1	F8	R	81 WAN	128	292	90S	330	27	129		271	-0.5	0.5	
FEB 18	6 37 13	7	9 3		Z12624	139277	9.0	F2	R	80 WAN	127	262	60S	291	35	143		242	-0.6	0.6	
FEB 18	6 58 55	5	9 5		Z12634	139282	8.4	K0	R	80 WAN	127	297	85N	321	37	149		276	-0.7	0.7	
FEB 18	7 9 23	5	9 4		Z12641	139284	8.5	G5	R	80 WAN	127	323	59N	345	36	152		303	-0.7	0.7	
FEB 18	8 13 52	11	9 2		Z12671	139305	9.3	F8	R	80 WAN	127	14	9N	21	42	171		353	-0.8	0.8	
FEB 18	10 24 53	5	9 3		Z12695	139318	9.2	G0	R	79 WAN	126	285	82S	260	36	212		264	-1.1	1.1	
FEB 18	11 28 5	9	9 5		Z12714	157931	8.7	G5	R	79 WAN	125	247	44S	212	27	227	-6	227	-1.3	1.2	
FEB 19	5 24 47	6	7 8		Z13404	158400	9.3	F5	R	71 WAN	114	339	41N	23	13	121		321	0.6	2.1	
FEB 19	5 50 54	6	7 8		Z13407	158403	9.3	K2	R	71 WAN	114	267	67S	308	17	126		249	[illegible]	2.1	
FEB 19	6 2 59	6	7 6	2031	Z13414	158410	9.0	K0	R	70 WAN	114	276	76S	316	18	128		258	0.5	2.2	
FEB 19	6 27 56	5	7 4		Z13422	158418	9.6	G0	R	70 WAN	114	287	87S	323	22	133		268	0.5	2.2	
FEB 19	6 35 0	5	8 5		Z13424	158419	9.2	F8	R	70 WAN	114	282	82S	317	23	135		264	0.5	2.3	
FEB 19	7 15 49	7	7 7		Z13440	158432	8.8	A5	R	70 WAN	114	261	61S	290	28	144		243	0.4	2.4	
FEB 19	7 17 32	7	7 7		Z13442	158434	8.8	K0	R	70 WAN	114	266	66S	294	28	144		248	0.4	2.4	
FEB 19	9 2 38	7	8 7	2040	Z13472	158453	8.6	K0	R	70 WAN	113	264	64S	271	35	172		246	0.2	2.6	
FEB 19	9 34 46	5	8 5		Z13486	158459	9.4	G5	R	69 WAN	113	300	80N	299	35	182		282	0.1	2.7	
FEB 19	9 57 0	6	8 6		Z13505	158472	9.1	G0	R	69 WAN	113	337	43N	331	35	188		319	0.1	2.7	
FEB 19	10 52 51	6	8 5		Z13527	158486	9.3	F8	R	69 WAN	112	332	48N	313	32	203		314	-0.1	2.8	
FEB 19	11 34 30	15	8 5		Z13540	158496	9.4		R	69 WAN	112	230	30S	203	28	213	-5	212	-0.2	2.9	
FEB 20	5 31 44	5	7 4	2153	Z14266	183166	8.2	A0	R	60 WAN	101	301	76N	348	2	118		286	1.6	3.6	
FEB 20	6 23 9	5	7 7		Z14296	183195	8.7	F8	R	59 WAN	101	287	89N	330	9	126		273	1.6	3.8	
FEB 20	6 53 2	5	8 9		Z14312	183209	8.1	K2	R	59 WAN	100	325	51N	4	14	131		310	1.5	3.8	
FEB 20	8 45 38	5	8 6	2168	Z14367	183253	9.1	F5	R	59 WAN	100	285	89S	305	26	155		271	1.3	4.1	
FEB 20	8 42 10	6	8 5		Z14377	183257	9.2	G5	R	59 WAN	100	332	44N	353	26	154		318	1.4	4.1	
FEB 20	10 55 41	6	7 5		Z14441	183312	9.2	K5	R	58 WAN	99	329	47N	322	29	188	-12	315	1.0	4.4	
FEB 21	7 24 50	5	7 8		Z15414	184150	8.5	F0	R	48 WAN	87	301	70N	342	7	130		291	2.5	5.2	
FEB 21	7 40 23	6	8 8		Z15420	184161	8.5	F2	R	47 WAN	87	258	67S	297	9	133		248	2.5	5.3	
FEB 21	8 24 25	5	8 8		Z15446	184183	8.5	K0	R	47 WAN	87	293	77N	327	14	141		284	2.4	5.4	
FEB 21	8 27 14	5	8 6		Z15448	184185	9.0	A3	R	47 WAN	87	283	87N	315	15	141		273	2.4	5.4	
FEB 21	8 50 6	5	7 7		Z15457	184196	8.8	F0	R	47 WAN	86	278	88S	307	17	146		268	2.4	5.4	
FEB 21	8 51 31	5	8 6		Z15461	184200	9.1	F0	R	47 WAN	86	303	67N	332	17	146		294	2.4	5.4	
FEB 21	9 11 49	5	8 5		Z15476	184213	9.3	G0	R	47 WAN	86	319	51N	344	19	150		310	2.3	5.5	
FEB 21	9 56 24	10	7 4		Z15498	184230	9.6	K5	R	47 WAN	86	236	46S	253	23	160		227	2.2	5.5	
FEB 22	8 53 25	6	7 6		Z16571	185164	9.0	B8	R	36 WAN	73	314	49N	351	8	137		310	3.3	6.4	
FEB 22	9 36 5	8	8 8		Z16598	185184	8.5	K0	R	36 WAN	73	239	56S	270	13	145		235	3.2	6.5	
FEB 22	10 43 52	5	7 6		Z16640	185221	9.1	A5	R	35 WAN	73	286	77N	305	19	158		282	3.1	6.6	
FEB 23	9 27 30	10	8 6		Z18339	186607	8.5	B8	R	25 WAN	60	220	45S	261	4	133		222	4.0	7.1	
FEB 23	10 19 34	5	9 8		Z18387	186642	8.5	A0	R	25 WAN	60	295	60N	329	11	142		298	4.0	7.2	
FEB 23	10 24 53	6	8 6	A	Z18391	186646	9.0	K0	R	25 WAN	60	247	72S	279	11	143		249	3.9	7.2	
FEB 23	10 30 52	7	8 6		Z18404	186657	9.0	G5	R	25 WAN	60	236	61S	268	12	144		238	3.9	7.2	
FEB 23	10 42 2	7	8 5		Z18418	186666	9.2	K5	R	25 WAN	60	232	57S	262	13	146		234	3.9	7.2	
FEB 23	10 48 52	5	8 5		Z18420	186667	9.2	F2	R	25 WAN	60	289	66N	318	14	147		292	3.9	7.3	
FEB 23	10 52 55	5	8 9		Z18426	186672	7.4	G5	R	25 WAN	60	287	68N	315	14	148	-12	290	3.9	7.3	
FEB 23	10 51 12	8	8 5		Z18432	186676	9.2	K0	R	25 WAN	60	228	53S	256	14	148	-12	230	3.9	7.3	
FEB 23	11 21 29	5	8 6		Z18451	186688	9.0	K2	R	25 WAN	60	282	73N	306	17	154	-6	285	3.8	7.3	
FEB 23	11 27 49	11	8 5		Z18491	186720	9.2	B9	R	25 WAN	60	340	15N	2	17	155	-5	342	3.8	7.3	
FEB 24	10 5 31	6	8 3		Z20170	188013	8.6	G5	R	16 WAN	47	233	66S	276	2	129		241	4.7	7.4	
FEB 24	11 11 7	8	8 5		Z20242	188066	9.4	M3	R	16 WAN	47	322	24N	357	10	139	-8	330	4.6	7.5	
FEB 24	11 15 59	9	8 8		Z20250	188073	8.5	K0	R	16 WAN	47	325	21N	359	11	140	-7	333	4.6	7.5	
FEB 24	11 28 15	8	9 9	2831	Z20258	188079	5.9	B3	R	16 WAN	47	316	30N	349	12	143	-5	325	4.5	7.5	
FEB 25	11 34 42	6	9 1		Z21687	189239	9.0	K5	R	9 WAN	34	287	51N	327	8	132	-3	300	5.1	7.4	

OCCULTATION PREDICTIONS

These predictions are provided by David W. Dunham(Yale Observatory) and Thomas C. Van Flandern (U.S. Naval Observatory). The following explanations apply to column headings:

TIME (UT): Note that events are generally, but not always, in strict chronological order.
ACC SEC: Approximate accuracy of predicted time, in seconds.
V: Value code, indicating expected usefulness of the observation.
O: Observability code, indicating expected difficulty/ease. 9= easiest.
Z.C.: Zodiacal Catalog number. A=double star (Aitken's catalog). B or C= other double star. D= double and variable star.
S.A.O. NUMBER: Star's number in Smithsonian Astrophysical Obs. catalog.
PH: Phenomenon. G= graze. M'miss. It is possible for extremely shallow solid occultations to be listed as grazes, and vice-versa. ELG: Elongation, i.e., distance of Moon from Sun, in degrees. PA DEG: Position angle of the event, in degrees, meas. eastward from the north point of Moon's disc (not from the north cusp). CUSP ANGL: Distance of event meas. onto dark limb from N or S cusp. VA DEG: Vertex angle, meas. counterclockwise from uppermost (toward the zenith) point on Moon's disc (for use with alt-azimuth instruments). SUN ALT: Given only when critical. AA DEG: Axis angle, meas. eastward from Moon's north pole. MIN MAG: Magnitude at min. brightness of var. star (for which MAG=max.) GRAZING OCCULTATION NEARBY--&c.: This extra line is printed out if the star is within 0.02 radius (approx. 20 miles) of the mean limb at central occultation or closest approach. (This line refers to prev. line).

LUNAR OCCULTATIONS COMPUTED FOR WASHINGTON
(LAT 38.920 LONG 77.065) FOR 1968 (DISTANCE FROM STANDARD STATION = -0 MILES)
STANDARD STATION AT LAT 38.920 LONG 77.065

DATE	TIME(UT) H M S	ACC SEC	V	O	Z.C.	USNO REF NO	S.A.O. NUMBER	MAG	SP	PH	PERCENT SUNLIT	ELG	PA DEG	CUSP ANGL	VA DEG	MOON ALT	MOON AZI	SUN ALT	AA DEG	LIBRATION LONG	LIBRATION LAT	MIN MAG
JAN 31	22 52 30	7	7	5		Z24328	165304	9.3	K5	D	6 WAX	27	96	69S	54	18	237	-5	117	4.4	4.8	
FEB 31	23 55 47	5	8	9		Z24345	165316	7.9	A5	D	6 WAX	28	46	61N	358	8	248		67	4.4	4.7	
FEB 1	23 50 38	6	6	6	3479	Z24983	146796	9.1	F5	D	11 WAX	39	93	67S	49	20	244		115	4.0	3.5	
FEB 1	23 53 47	5	7	6		Z24985	146797	9.1	F8	D	11 WAX	39	72	88S	27	20	245		94	4.0	3.5	
FEB 2	1 21 1	6	8	6		Z25002	146808	8.7	G5	D	12 WAX	40	25	45N	335	4	260		47	3.9	3.4	
FEB 3	2 0 2	5	7	6		Z00256	109160	9.0	A2	M	19 WAX	52	330	-8N	279	8	264		352	3.1	2.0	
GRAZING OCCULTATION NEARBY— APPROXIMATE N. LIMIT LAT. = 38.69 - 0.06(W. LONG. = 77.06)																						
FEB 3	22 50 33	5	6	4	A	Z00802	109616	8.6	G0	D	26 WAX	62	56	78N	26	51	219	-4	77	2.5	0.9	
FEB 3	22 56 14	6	6	7		Z00886	109620	8.3	A5	D	26 WAX	62	86	72S	55	50	221	-5	107	2.5	0.9	
FEB 3	23 35 35	25	6	7		Z00900	109630	8.7	A5	D	27 WAX	62	131	27S	93	44	232		152	2.4	0.8	
FEB 3	23 52 15	25	6	7		Z00900	109630	8.7	A5	R	27 WAX	62	155	3S	114	42	237		176	2.3	0.8	
FEB 4	2 17 14	5	6	7		Z00962	109680	8.6	K5	D	27 WAX	63	43	65N	352	16	265		64	2.0	0.6	
FEB 5	1 46 4	6	6	5		Z01611	92649	9.2	K0	D	36 WAX	74	28	49N	337	33	258		47	0.9	-0.7	
FEB 5	2 15 43	5	6	7		Z01623	92656	8.7	K5	D	36 WAX	74	60	81N	8	28	263		79	0.8	-0.8	
FEB 5	3 58 8	10	7	9		Z01658	92671	8.2	A0	D	37 WAX	75	9	30N	317	8	279		28	0.6	-0.8	
FEB 7	1 12 31	5	9	9	486	Z02748	75886	5.2	B3	D	55 WAX	95	50	65N	3	60	241		64	-1.6	-3.3	
FEB 7	2 59 1	51	4	9	A	Z02764	75906	7.4	G5	D	55 WAX	96	157	9S	101	40	265		171	-1.9	-3.4	
FEB 7	3 46 46	6	6	9		Z02787	75923	8.0	M1	D	56 WAX	96	106	60S	49	32	272		119	-2.0	-3.4	
FEB 7	4 37 38	5	6	6		Z02803	75930	8.9	F8	D	56 WAX	97	70	84N	14	23	280		83	-2.1	-3.4	
FEB 8	1 26 55	6	6	7		Z03476	76491	8.8	F5	D	64 WAX	106	103	67S	58	68	234		112	-2.8	-4.4	
FEB 8	1 35 5	5	6	8		Z03478	76493	8.3	K0	D	64 WAX	106	74	84N	27	67	238		83	-2.8	-4.4	
FEB 8	2 51 59	5	6	6		Z03499	76509	9.0	G0	D	65 WAX	107	54	63N	357	53	259		64	-3.1	-4.5	
FEB 8	5 21 27	7	7	7		Z03542	76537	8.7	B8	D	65 WAX	108	131	40S	74	25	282		140	-3.4	-4.5	
FEB 8	5 28 11	6	8	7		Z03545	76538	8.6	K0	D	65 WAX	108	48	57N	352	24	283		57	-3.5	-4.4	
FEB 8	5 53 10	15	8	8	632	Z03549	76542	8.5	A2	D	66 WAX	108	14	23N	319	19	287		23	-3.5	-4.4	
FEB 8	22 59 33	8	4	9	A	Z04060	76895	7.8	B5	D	73 WAX	117	119	57S	175	63	109	-5	125	-3.2	-5.2	
FEB 8	23 10 28	5	4	9	750A	Z04067	76903	6.9	F5	D	73 WAX	117	92	84S	147	65	111	-7	97	-3.2	-5.2	
FEB 8	23 12 13	6	4	8		Z04068	76904	8.8	G5	D	73 WAX	117	97	79S	152	65	112	-7	102	-3.2	-5.2	
FEB 9	1 29 40	9	4	7		Z04102	76936	9.3	K0	D	73 WAX	118	21	25N	353	76	212		25	-3.7	-5.3	
FEB 9	1 31 2	8	4	9		Z04110	76945	7.7	A2	D	73 WAX	118	132	44S	104	76	212		137	-3.8	-5.3	
FEB 9	1 19 6	5	4	8		Z04111	76946	8.9	F2	D	73 WAX	118	88	88S	70	77	201		93	-3.7	-5.3	
FEB 9	2 51 32	5	5	8		Z04137	76965	8.3		D	74 WAX	118	80	83N	24	64	251		85	-4.0	-5.4	
FEB 9	5 8 46	23	6	7		Z04177	76999	9.0	K5	D	74 WAX	119	168	9S	108	38	276		172	-4.4	-5.3	
FEB 9	5 1 19	11	6	7		Z04178	77000	9.0	G5	D	74 WAX	119	154	23S	93	39	275		158	-4.4	-5.3	
FEB 9	7 41 45	8	8	6		Z04253	77061	9.0	G0	D	75 WAX	120	40	42N	348	11	296		43	-4.6	-5.2	
FEB 9	7 51 25	7	8	7		Z04265	77070	8.6	G5	D	75 WAX	120	45	47N	355	9	298		49	-4.6	-5.2	
FEB 10	0 9 50	10	4	4		Z05180	77777	8.7	B8	D	81 WAX	129	20	17N	76	67	110		20	-4.2	-6.0	
FEB 10	0 9 7	10	5	3		Z05187	77783	9.1	A2	D	81 WAX	129	139	44S	194	67	111		139	-4.2	-6.0	
FEB 10	0 27 35	8	5	3		Z05207	77801	9.0	G0	D	81 WAX	129	134	49S	186	70	117		134	-4.2	-6.0	
FEB 10	1 3 31	6	4	8		Z05240	77818	7.0	K5	D	81 WAX	129	57	54N	97	76	135		57	-4.4	-6.0	
FEB 10	2 14 34	8	5	2		Z05288	77853	9.0	A0	D	82 WAX	129	40	36N	16	78	206		39	-4.6	-6.0	
FEB 10	2 25 31	6	6	2		Z05303	77866	9.0	K0	D	82 WAX	129	60	56N	29	77	216		60	-4.7	-6.0	
FEB 10	2 51 29	8	6	2		Z05315	77875	9.0	K2	D	82 WAX	129	41	37N	355	74	234		40	-4.7	-6.0	
FEB 10	4 46 33	6	6	1		Z05404	77944	9.4	K0	D	82 WAX	130	125	59S	64	53	266		124	-5.1	-6.0	
FEB 10	4 52 29	5	6	3		Z05418	77957	8.6	A0	D	82 WAX	130	94	90S	32	52	267		93	-5.1	-6.0	
FEB 10	5 18 49	9	6	2		Z05420	77959	9.3	F8	D	82 WAX	130	155	29S	93	47	271		154	-5.2	-6.0	
FEB 10	5 39 34	5	8	4		Z05457	77987	8.5	B9	D	82 WAX	130	100	84S	39	43	274		99	-5.2	-5.9	

JANUARY LECTURE - ROCKETS, ASTRONOMY, AND AERONOMY

X-ray stars are the hottest topic in astronomy today according to our January speaker--Mr. Charles Johnson-- head of the Aeronomy Section of the Naval Research Laboratory. The most famous X-ray source is the Crab Nebula (Taurus XR-1) which an Aerobee rocket flight proved several years ago is not a point source of X-rays. This flight occurred during an occultation of the nebula by the moon, and the X-ray emission did not cut off sharply but decreased gradually. The strongest X-ray source is Scorpius XR-1. Most X-ray sources exist along the galactic equator with the greatest concentration toward Sagittarius. Few are extra-galactic; a notable example of one of these is quasar 3C-273. One variable X-ray star has been discovered; i.e., Cygnus XR-1, whose strength decreased significantly between June 1964 and the following April.

Aeronomy is a new field of science barely a decade old which deals with that part of the upper atmospheres of planets where ionization and disassociation are important. Here the density of air is millions of times less than at the surface.

The German V2 rockets were the first to observe and record the ultraviolet spectrum of the sun. Only by rocket or satellite can the sun's Lyman alpha line of hydrogen (1216 A.) be seen. After the V2's had been used up, N. R. L. Aerobee rockets continued upper atmosphere research by carrying a wide variety of instruments into near space up to 250 kilometers. Various bands of ultraviolet can be selected and measured by detectors having different combinations of windows and gases; for example, nitric oxide exposed to uv through a lithium fluoride window. The window sets a lower limit on the detected radiation wavelength and the gas, an upper limit. A Schmidt camera with a calcium fluoride corrector plate and image intensifier electronics has been used on board Aerobees for studying hot O and B type stars in ultraviolet light down to 1250 A. These optics are blind to Lyman alpha radiation which is strong in air glow and would fog uv star fields.

The Bennett R F mass spectrometer has been successfully used on Aerobees for measuring ion concentrations in our upper atmosphere. This instrument has revealed many interesting facts about the ionosphere such as the presence of a great deal of the nitrous oxide ions in our upper atmosphere. (Perhaps there is a Martian Dr. Kiess who thinks that life is impossible on the earth because of the presence of this poisonous compound of nitrogen in our atmosphere!) The Marina V fly-by of Venus studied the ionosphere of this planet. Apparently the ionosphere of Venus is high at night but low during daytime. Mr. Johnson explained that since Venus has no appreciable magnetic field, the solar wind is strong enough to blow the ionosphere off the planet or to the night side.

- Leith Holloway

***

FROM HERE AND THERE...Cont'd. from p.2

From "THE GUIDE STAR" of the AAA of Pittsburg: How are we going to teach logic in a world where everybody talks about the Sun setting, when it is really the horizon rising?

***

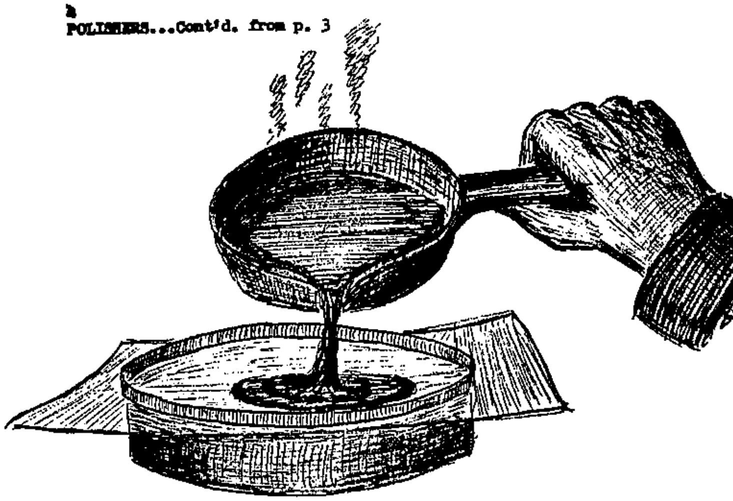
"STAR LITE" is the name of the newsletter sent out by the Peoria Astronomical Society of Peoria, Ill.

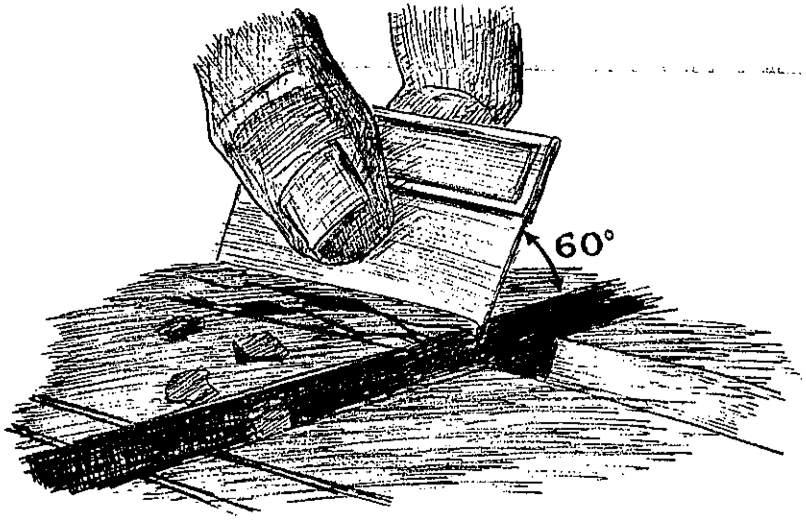
"STAR Newsletter" is the title of the publication of the Society of Telescopy, Astronomy and Radio (STAR) of Eatontown, N.J., a society belonging to the Middle East Region of the Astronomical League.-Concluded on p. 8

***

The January-February issue of Review of Popular Astronomy carries an article by Jerry Hudson. It is the same article that appeared in a recent STAR DUST on A Simple Clock Drive Design.

POLISHERS...Cont'd. from p. 3





Before one has gone once around the barrel, the HCF has worn into contact with the optical surface.

HCF is useful too when making gross zonal corrections, such as removing a severe case of turned-down edge, or correcting a hyperbola. Final smoothing and blending can only be done on a pitch lap, however.

This suggests one might wish to use another piece of glass (preferably one with approximately the right curvature) for the pitch lap, keeping the original tool free for HCF working. One can proceed a bit more confidently on his pitch lap, knowing he has an intermediate alternative to the one dreaded by all mirror-mak returning to find grinding.

OCCULTATION PREDICTIONS

The use of the table is self-explanatory, with possibly the following explanations needed:

Z.C.= Zodiacal Catalogue number. If followed by "M", take the mean time of the appearance (disappearance) of the double star. For any other letter, use the brighter component of the pair.

Some Z.C. numbers have been assigned to bright Solar System objects:

Mercury.....	4001	Uranus..........	4007
Venus.......	4002	Neptune.........	4008
Mars........	4004	Ceres...........	5001
Jupiter.....	4005	Pallas..........	5002
Saturn......	4006	Juno............	5003

Vesta.......5004

PHEN= Phenomenon D= Disappearance R=Reappearance *=Near Graze

P.A. DEG=Position Angle (degrees), measured eastward from the northernmost point on the moon's disc. For example, 90° would be the center of the dark limb during waxing; 270° during waning.

P.A.C.B.L.=Position Angle of the Center of the Bright Limb.(same convention)

Altitudes of the sun and moon are only given when these are important.

LUNAR OCCULTATIONS COMPUTED FOR WASHINGTON
(LAT 38.920 LONG 77.065) FOR 1968 (DISTANCE FROM STANDARD STATION = 0 MILES)
STANDARD STATION AT LAT 38.920 LONG 77.065

DATE	TIME(UT) H	M	S	ACC SEC	V	O	Z.C.	USNO REF NO	S.A.O. NUMBER	MAG	SP	PH	PERCENT SUNLIT	ELG	PA DEG	CUSP ANGL	VA DEG	MOON ALT	MOON AZI	SUN ALT	AA DEG	LIBRATION LONG	LAT
JAN 2	22	42	50	6	7	9	3143A	223031	190356	7.5	KO	D	10 WAX	36	22	33N	347	18	223	-9	39	5.6	6.6
JAN 3	22	36	53	10	5	6		223906	165002	8.9	K2	D	17 WAX	48	113	50S	86	29	214	-7	133	5.8	5.8
JAN 3	22	55	23	5	5	6		223912	165005	9.0	AO	D	17 WAX	48	75	88S	45	27	218	-11	95	5.7	5.8
JAN 3	23	47	40	5	5	7		223929	165016	8.6	G5	D	17 WAX	48	37	54N	359	20	229		57	5.6	5.7
JAN 3	23	48	50	5	5	6		223935	165017	9.0	KO	D	17 WAX	48	56	73N	18	20	230		76	5.6	5.7
JAN 4	0	19	14	5	6	5		223947	165024	9.2	G5	D	17 WAX	49	62	79N	21	15	235		83	5.6	5.6
JAN 4	1	11	46	39	6	9	3284	223961	165032	7.1	F5	D	17 WAX	49	140	23S	93	7	244		160	5.5	5.5
GRAZING OCCULTATION NEARBY— APPROXIMATE S. LIMIT LAT. = 38.77 - 0.35(W. LONG. - 77.06)																							
JAN 4	1	19	56	38	6	9	3284	223961	165032	7.1	F5	R	17 WAX	49	155	7S	108	5	246		175	5.5	5.5
JAN 4	22	36	26	11	4	9		224596	146509	7.3	KO	D	25 WAX	60	348	9N	328	38	205	-7	9	5.6	4.8
JAN 4	23	1	13	5	5	7		224609	146517	8.8	GO	D	25 WAX	60	41	62N	16	36	211	-12	62	5.5	4.7
JAN 4	22	51	8	5	5	8		224610	146518	8.4	FO	D	25 WAX	60	60	81N	38	37	209	-10	82	5.5	4.8
JAN 5	0	22	47	5	4	7		224631	146536	8.8	GO	D	25 WAX	60	32	53N	354	26	231		54	5.3	4.6
JAN 5	1	21	16	8	6	6		224649	146547	9.1	K5	D	26 WAX	61	104	55S	59	17	243		125	5.2	4.5
JAN 5	1	49	3	6	6	7		224660	146556	8.6	F8	D	26 WAX	61	89	70S	42	12	248		111	5.1	4.4
JAN 6	0	34	7	5	6	7		225239	146972	8.8	F8	D	35 WAX	72	62	85N	27	35	228		85	4.6	3.4
JAN 6	2	22	2	5	7	7		225273	146992	8.8	F8	D	35 WAX	73	55	78N	8	18	251		77	4.3	3.2
JAN 6	3	48	38	8	7	7		225307	147015	7.3	FO	D	36 WAX	73	120	47S	59	2	265		132	4.2	3.0
JAN 6	22	29	22	12	5	6		200462	109303	9.0	FO	D	44 WAX	83	112	45S	116	52	176	-6	134	4.1	2.3
JAN 6	23	20	52	9	5	6		200470	109310	9.0	MA	D	44 WAX	83	106	51S	93	52	196		127	3.9	2.2
JAN 7	0	33	45	5	5	6	82	200483	109319	9.1	F8	D	44 WAX	83	43	66N	12	45	222		65	3.6	2.0
JAN 7	1	3	53	6	5	6	A	200489	109325	9.0	F8	D	44 WAX	83	17	40N	339	41	230		38	3.5	2.0
JAN 7	0	55	39	5	5	6		200502	109335	8.9	F5	D	44 WAX	83	57	80N	21	42	228		78	3.6	2.0
JAN 7	3	33	3	5	6	7		200565	109385	8.8	K2	D	45 WAX	84	83	74S	32	16	261		104	3.2	1.7
JAN 7	3	34	33	7	6	6		200566	109386	9.0	G	D	45 WAX	84	105	52S	55	16	261		127	3.1	1.7
JAN 7	4	25	20	7	7	7		200587	109399	8.8	F5	D	45 WAX	85	19	42N	328	6	269		41	3.1	1.7
JAN 7	22	28	10	5	3	9		201139	109802	7.8	G5	D	53 WAX	94	70	88S	88	56	157	-5	91	2.9	0.9
JAN 7	22	58	38	6	2	7		201147	109808	8.7	G5	D	53 WAX	94	84	74S	92	58	170	-11	104	2.8	0.8
JAN 8	1	10	23	5	5	7		201183	109827	8.8	G5	D	54 WAX	94	68	90S	34	51	225		88	2.3	0.6
JAN 8	2	40	16	8	5	9		201217	109853	8.2	A3	D	54 WAX	95	109	49S	62	36	248		129	2.1	0.4
JAN 8	4	45	20	7	6	7		201272	109894	8.6	K2	D	55 WAX	96	110	48S	58	13	270		131	1.8	0.3
JAN 8	5	18	2	6	8	6		201286	109906	8.9	KO	D	55 WAX	96	94	64S	42	7	275		114	1.7	0.3
JAN 8	22	12	12	5	6	2		201794	92761	7.5	KO	D	63 WAX	104	66	86N	103	55	131	-2	84	1.7	-0.4
JAN 9	1	13	43	14	6	7	305	201836	92788	8.7	KO	D	63 WAX	105	124	36S	96	60	216		143	1.1	-0.8
JAN 9	1	14	35	5	6	9		201838	92789	8.1	F5	D	63 WAX	105	64	84N	35	60	217		82	1.1	-0.8
JAN 9	1	51	35	5	6	9		201848	92795	7.9	KO	D	64 WAX	106	64	84N	25	55	231		82	0.9	-0.9
JAN 9	4	35	23	6	7	7		201889	92814	8.7		D	64 WAX	106	41	61N	348	26	267		59	0.4	-1.0
JAN 9	4	33	8	5	7	7		201891	92816	8.8		D	64 WAX	106	49	69N	355	27	267		67	0.4	-1.0
JAN 9	6	11	4	12	9	9	325	201925	92837	7.9	KO	D	65 WAX	107	136	25S	84	8	281		154	0.3	-1.1
JAN 9	6	16	33	5	9	7		201929	92840	8.7	KO	D	65 WAX	107	57	76N	6	7	282		76	0.3	-1.1
JAN 9	22	25	53	5	7	5	A	202327	93112	9.2		D	72 WAX	115	43	60N	90	54	117	-5	59	0.4	-1.8
JAN 9	22	31	19	5	3	9		202331	93115	7.4	M6	D	72 WAX	115	77	86S	124	55	118	-6	93	0.4	-1.8
JAN 10	3	42	2	10	8	8		202388	93167	8.8		D	73 WAX	117	6	22N	314	47	255		22	-0.7	-2.3
JAN 10	6	42	25	15	9	9	432	202419	93189	5.9	M8	D	73 WAX	117	141	23S	86	35	265		156	-0.9	-2.4
JAN 10	6	40	25	5	9	6		202466	93225	9.2		D	74 WAX	118	95	69S	42	14	283		110	-1.1	-2.4
JAN 10	7	33	42	5	9	5		202473	93230	9.C		M	74 WAX	118	166	-2S	116	4	291		181	-1.2	-2.4
GRAZING OCCULTATION NEARBY— APPROXIMATE S. LIMIT LAT. = 39.04 + [illegible] LONG. - 77.06)																							
JAN 10	22	48	13	5	7	4		202921	76022	8.8	G5	D	80 WAX	127	52	64N	106	52	106	-8	64	-0.9	-3.1
JAN 10	23	43	35	8	7	3		202944	76037	9.1	GO	D	80 WAX	127	111	57S	158	62	121		124	-1.0	-3.2
JAN 11	0	48	35	12	7	6		202960	76050	7.8	AO	D	80 WAX	127	126	42S	150	71	152		138	-1.3	-3.3
JAN 11	2	20	23	11	7	3		202977	76067	8.8	A2	D	81 WAX	128	3	14N	332	70	218		15	-1.6	-3.5
JAN 11	1	50	10	5	7	4		202979	76069	8.7	K2	D	80 WAX	127	42	53N	27	73	197		54	-1.5	-3.4
JAN 11	4	39	29	22	8	4	A	203015	76097	8.6	F5	D	81 WAX	128	358	9N	301	47	262		10	-2.1	-3.6
JAN 11	5	26	23	5	9	5	540	203070	76154	8.0	AO	D	81 WAX	128	56	67N	358	38	270		68	-2.2	-3.6
JAN 11	6	58	58	5	9	4		203111	76196	8.4	AO	G	82 WAX	129	351	2N	295	21	283		2	-2.4	-3.6
GRAZING OCCULTATION NEARBY— APPROXIMATE N. LIMIT LAT. = 38.93 + 0.33(W. LONG. - 77.06)																							
JAN 11	7	10	46	5	9	4		203144	76224	8.4	B9	D	82 WAX	129	64	75N	9	19	284		76	-2.4	-3.6
JAN 11	7	18	4	6	9	4		203154	76232	8.3	AO	D	82 WAX	129	111	58S	57	17	285		123	-2.5	-3.6
JAN 11	7	40	40	10	6	8	563	203163	76242	6.9	B9	D	82 WAX	129	141	29S	88	13	288		152	-2.5	-3.6
JAN 11	7	46	39	7	9	5		203175	76254	8.0	F5	D	82 WAX	129	125	45S	72	12	289		136	-2.5	-3.6
JAN 11	7	49	52	5	9	3	A	203178	76257	8.7	F5	D	82 WAX	129	104	66S	51	12	290		115	-2.5	-3.6
JAN 11	8	40	30	6	7	4		203206	76283	7.8	GO	D	82 WAX	130	119	51S	71	3	297		131	-2.5	-3.5
JAN 11	22	58	1	6	7	1		203663	76615	8.9	AO	D	87 WAX	138	37	43N	96	47	94	-10	45	-1.9	-4.2
JAN 12	1	27	6	19	7	1		203704	76637	8.7	G5	D	87 WAX	138	143	32S	176	73	140		151	-2.4	-4.5
JAN 12	1	59	50	7	8	2	683	203715	76646	8.2	A2	D	88 WAX	139	116	59S	129	76	165		124	-2.5	-4.5
JAN 12	5	31	34	6	9	4	698	203768	76676	7.3	K2	D	88 WAX	140	50	54N	351	48	266		58	-3.3	-4.6
JAN 13	6	43	55	9	9	1		204528	77258	8.0	KO	D	94 WAX	151	151	34S	89	45	271		153	-4.3	-5.4
JAN 13	6	40	26	5	9	1		204536	77266	7.9	FO	D	94 WAX	151	103	82S	41	46	271		105	-4.3	-5.4
JAN 14	1	27	59	6	9	2		205862	78291	7.5	K2	D	97 WAX	161	54	39N	115	57	98		51	-3.8	-6.0

SHOP TALK

POLARIS TELESCOPES

Many portable telescopes lack a ready means for lining up the polar axis with the earth's axis, thereby assuring the observer of hours of tracking by the clock drive, and making possible the taking of long exposures. Either the problem is ignored, whence observing becomes less pleasant and photographs unsatisfactory; or the observer spends half an hour tediously lining up the mounting, using his finder for sighting.

A glance of Fig. c shows why even careful guiding is not able to eliminate trailing of star images if the axis is misaligned. The film and camera remain in the same alighment north-south with respect to the false pole, F, while the direction on the film toward true north, P, changes during the exposure. Of course, the guide star remains fixed on the film, while all other parts of the field rotate about that point. The angle through which the film rotates is $\theta_1 - \theta_2$. Under the worst possible conditions, for a pole misalignment E, a co-declination of the guide star D (90° - decl.), and an exposure of length T.

$$(\theta_1 - \theta_2)_{max} \approx \frac{EWT}{D}$$

W is the angular rate of the earth's rotation, 15°/hr. Thus, if our polar axis is misaligned 2°, our guide star 30° from the pole, and we make an hour's exposure, we could rotate the field as much as 1°, which would easily be seen on any photograph. Cameras of short focal length are not immune to this effect—all that matter are film size and off-set of the guide telescope.

The polaris telescope shown in Fig. a is patterned after one built by Mr. Robert N. Bolster, and could be adapted to any standard mounting. A means for adjusting the alignment of the telescope is needed, such as the ring mounts shown. The reticle is a standard cross-line ruled on glass (obtainable from Edmund Scientific Co.). A ring of the correct angular radius (54' for 1968.0, +0'.3 per ann.) is scribed onto stiff, transparent plastic with a pair of dividers. One should use very light pressure, and practice on several scraps before doing the final one. The plastic is then centered on the cross-line reticle, and the two mounted inside an eyepiece. The threaded retaining ring that was intended for the field lens can be used; machine washers can be inserted to obtain the right focus.

In use, the mounting is lined up approximately, and the main telescope pointed to any of the following bright stars:

I. (0^h) α Andromedae (N.E. corner of the Great Square)

II. (6^h) α Orionis (Betelgeuse)

III. (12^h) γ Ursae Majoris (in the Big Dipper)

IV. (18^h) γ Draconis (in the Dragon's head)

Final adjustment is made by lining up the Polaris telescope with Polaris on the appropriate hair and the scribed circle, as shown in Fig. b. The view is as one would look directly into the eyepiece in Fig. a, and it assumes a simple star diagonal was used in the Polaris telescope.

Adjusting the rig consists of bringing the intersection of the cross hairs into coincidence with the rotation of the mounting and turning the reticle until hair I coincides with an angle $30^\circ(2^h)$ east of the meridian. The main telescope should be clamped to point along the meridian.

A little time in the shop making a Polaris telescope will be repaid during the first few nights of observing. Lining up should not take over five minutes, and accuracy can be held consistently to within 1/10 degree.

POLARIS TELESCOPE