



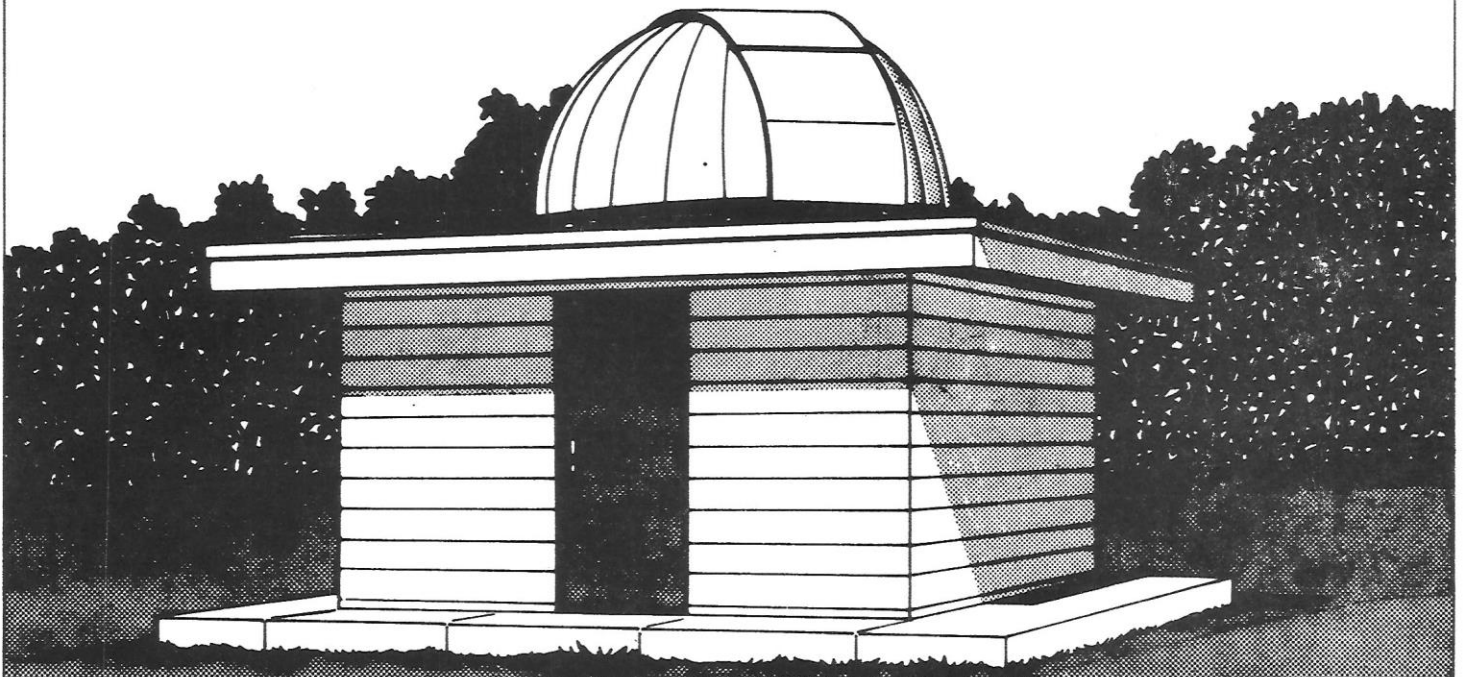
the
WASP



Journal of the Warren Astronomical Society

FEBRUARY 1982

Stargate



The illustration above shows the exterior of the W.A.S. STARGATE observatory, located on Camp Rotary property off North Ave. on 29 mile road. The building contains a 12½" cassagrain telescope of 100" focal length. The use of this observatory is the privilege of all members & guests of members. The equipment within the building will allow observational astronomy to be conducted at all times, weather permitting. A sun filter is also available for use on request.

Warren Astronomical Society Paper

Editor; Doug Bock

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Detroit, MI 48223

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The W.A.S.P. is the official publication of the Warren Astronomical Society and is available free to all club members. Requests by other clubs to receive the W.A.S.P. and all other correspondence should be made to the editor at the above address. Articles should be submitted at least one week prior to the general meeting.

W.A.S.

Warren Astronomical Society
P.O. Box 474
East Detroit, MI 48021

President: Doug Bock 533-0898
1st V.P.: Frank McCullough 759-5215
2nd V.P. : Alan Rothenberg 355-5844
Treasurer: John Wetzel
Secretary: Nancy Tomczyk

The Warren Astronomical Society is a local, non-profit organization of amateur astronomers. The Society holds meetings on the first and third Thursdays of each month. The two meeting locations are listed below:

1st Thursday - Cranbrook Institute of Science
500 Lone Pine Road
Bloomfield Hills, MI

3rd Thursday - Green Acres School
Cousino at Holmes
Warren, MI 48092
264-2509

Membership is open to those interested in astronomy and its related fields. Dues are as follows and include a year's subscription to Sky and Telescope.

Student	\$18.00	College	\$22.00	Senior Citizen	\$22.00
Individual.....	\$27.00	Family	\$32.00		

Stargate

Observatory Chairman: Alan Rothenberg 355-5844

Stargate Observatory is owned and operated by the Warren Astronomical Society in conjunction with Rotary International. Located on the grounds of Camp Rotary, Stargate features a 12½" club-built Cassegrainian telescope under an aluminum dome. The observatory is open to all club members according to the "Stargate Observatory Code of Conduct."

Lectures are given at Stargate Observatory each weekend. The lecture will be either Friday or Saturday night, depending on the weather and the lecturer's personal schedule. If you cannot lecture on your scheduled weekend, please call the Chairman as early as possible or contact an alternative lecturer. Those wishing to use Stargate must call by 7:00 p.m. on the evening of the observing session. The lecturers for the coming month are:

January 22/23.... Doug Bock	533-0898	February 19/20 . Dave Harrington.....	879-6765
January 29/30.... Ray Bullock ..	879-9458	February 26/27 . Frank McCullough...	879-6765
February 5/6 John Root.....	464-7908	March 5/6..... Ron Vogt	545-7309
February 12/13... Lou Faix.....	781-3338	March 12/13..... Alan Rothenberg.....	355-5844

***** WANT ADS ***** WANT ADS ***** WANT ADS ***** WANT ADS ***** WANT ADS *****

For Sale - 8 in. f/15 cassegrain telescope, equatorial mount with motor drive, slow Dec. control, 6X 35mm right angle finder, 40 mm eyepiece. Best Offer. Call Ebb Shannon-at 885-4283.

For Sale - Celestron 8 in., Exceptional condition. Complete system \$1200.00 Call John Lippman at 884-4541.

For Sale - Falkauer Atlas. Photographic star atlas. Black stars on white background down to 13th magnitude. Price \$45.00. Like new. Contact Marty Kunz at 477-0546.

For Sale - 60mm 9TE-5 TASC0 refractor, 700mm focal length. 4.0,6.0 and 12.5mm eyepieces, Barlow lens, star diagonal, solar wedge and sun screen. Make best offer. Used - good condition. Call Brian Klaus at 731-0011.

Warren Astronomical Society
Schedule of Events
FEBRUARY

Mon. 2/1	First Quarter Moon
Thur. 2/4	*** CRANBROOK MEETING AT 7:30 pm
Mon. 2/8	Full moon
Wed. 2/10	Livonia meeting
Thur. 2/11	*** ATM, Observing group meeting at Doug Bock's house Time: 7:30. For the telescope maker we will begin grinding mirrors and organizing further activities. The observing group will have a presentation and discussion of future activities. Items on the agenda are Messier observing, for those who are after the coveted Messier Club certificate of which only about 500 have been earned by amateur astronomers throughout the United States. Phone 533-0898
Mon. 2/15	Last quarter moon
Wed. 2/17	Cosmology meeting, contact John Wetzel at 882-6816
Thur. 2/18	*** GENERAL MEETING at 7:30, Green Acres School
Fri. 2/19	STAR PARTY at Stargate, Coffee and donuts supplied, plus heat. Sat. is an alternate if cloudy on Friday.
Tues. 2/23	New moon
Thur. 2/25	Astro-photography meeting, contact Larry Kalinowski at 776-9720

THE JOYS OF ASTRONOMY...

An Evenings Viewing

by Craig Kruman

It is night. While looking out of a window, I gaze in awe at the crystal clear night sky. It looks like an opportune time for some observing.

Excitedly, I run to my star atlas to plan the night's viewing program. After a half hour with the atlas, the evening's schedule is complete. Next, I spend some time with Burnham, to brush up on some celestial facts. I glance outside again at the steadily shining points of light. A chill climbs up my spine from the excitement of what I will soon see.

Quickly, I run upstairs to put on some warm cloths, layer upon layer to assure warmth for all the hours that I plan on staying outside. I gaze out the window once more.

The telescope must now be taken outside. The 50 pound mount feels like a feather as Orion beckons to me. The tube is set up so that it can acclimate to the colder outdoor temperatures.

After gathering my last few supplies, a flashlight, lens case, and a star atlas, I run outside as the telescope and stars await me. I pop in a lens and point the tube to the position of the Pleiades. I looked through the objective, let me describe what I saw•••, a close-up view of what was now, a clouded night sky

CHRISTMAS BANQUET

THE WARREN ASTRONOMICAL SOCIETY HELD ITS ANNUAL CHRISTMAS BANQUET DECEMBER 16, 1981 AT MARINELLI'S. IT WAS VERY SUCCESSFUL. THERE WAS A FULL HOUSE FOR THE EVENINGS ACTIVITIES, WHICH STARTED WITH COCKTAIL HOUR. THE OLD TIMERS CAME OUT OF THE WOODWORK TO BE SEEN ONCE AGAIN. THEY CAME TO SEE THEIR OLD FRIENDS AND THE NEW COMERS. THE ROTATING SLIDE DISPLAY KEPT PEOPLE ENTERTAINED, GAWKING AT OUTRAGEOUS PICTURES OF THEMSELVES AND OTHERS. THEN IT WAS TIME FOR DINNER. AND TOASTING WAS DONE ALL AROUND. THE CONVERSATION CONTINUED THROUGHOUT DINNER. SOME MEMBERS TALKED ABOUT THE MANY GET-TOGETHERS THIS PAST YEAR AND YEARS BEFORE. ALL THE GOOD TIMES LIKE SHUTTLE LAUNCHES, ECLIPSES, STAR PARTIES, CAMPOUTS AND THE OCCASIONAL GOOD MEETINGS.

AFTER DINNER IT WAS TIME FOR THE AWARDS CEREMONY. THE FIRST AWARD WAS GIVEN BY DAVE HARRINGTON TO FRANK MCCULLOUGH. THE GIFT WAS A POOR MAN'S TIME CUBE. THIS WAS A SMALL BOX CONTAINING THE FOLLOWING INSTRUCTIONS, 'GO TO PAY PHONE AND DIAL TIME'. THE NEXT AWARD WAS GIVEN TO DAVE HARRINGTON FOR HIS OUTSTANDING WORK IN THE FIELD OF DOING 'NON-OBSERVATIONAL' ASTRONOMY. HE RECIEVED THE 'ARMCHAIR ASTRONOMER OF THE YEAR' AWARD.

THE NEXT AWARD WAS ON A MORE SERIOUS NOTE. A W.A.S. AMATEUR ASTRONOMER CERTIFICATE WAS GIVEN TO CRAIG KRUMAN FOR HIS RECENT ACTIVITY AND INTEREST IN ASTRONOMY. HE HAS, IN THE PAST FEW MONTHS, ACQUIRED A TELESCOPE, USED IT RIGOROUSLY. DONE SOME ASTRO-PHOTOGRAPHY, GIVEN TALKS AT THE MEETINGS AND WRITTEN ARTICLES FOR THE NEWSLETTER. CONGRATULATIONS CRAIG. THE NEXT AWARD WAS GIVEN TO JOHN WETZEL, FOR DISTINGUISHED SERVICE TO THE WARREN ASTRONOMICAL SOCIETY. JOHN IS CHAIRMAN OF THE COSMOLOGY GROUP AND TREASURER OF THE CLUB. HE WRITES ARTICLES FOR THE NEWSLETTER AND HAS COMPUTERIZED THE ROSTER. HE CALLS ME FREQUENTLY WITH NEW IDEAS AND SUGGESTIONS ABOUT THE CLUB. CONGRATULATIONS TO YOU, JOHN FOR YOUR FINE WORK AND THE AWARD.

THE FINAL AWARD GIVEN OUT WAS THE E. JOHN SEARLES AWARD. THIS AWARD WENT TO A MAN WHO FOR THE PAST DECADE HAS CONSTANTLY GIVEN MUCH OF HIS TIME TO THIS ORGANIZATION AND TO ASTRONOMY IN GENERAL. I CAN'T LIST ALL THE THINGS HE HAS DONE IN THE LAST TEN YEARS DO TO LACK OF SPACE ON THIS PAGE. THIS AWARD WENT TO LOU FAIX. CONGRATS TO ALL.

THE NEXT ITEM ON THE AGENDA WERE DOOR PRIZES. AFTER ALL THE GOODIES WERE PASSED OUT, IT WAS TIME FOR THE CLASSIC CHRISTMAS SLIDE SHOW. THIS FOUR STAR PERFORMANCE WAS PUT TOGETHER BY FRANK MCCULLOUGH, ALAN ROTHENBERG AND DOUG BOCK. THIS PROGRAM BROUGHT ON SUSTAINED APPLAUSE AND A HALF STANDING OVATION. I WISH EVERYONE THE BEST FOR THIS YEAR.

D. H. BOCK

01/21/82

ANALYSIS OF SOLAR ECLIPSES OF THE NEXT FIFTY YEARS

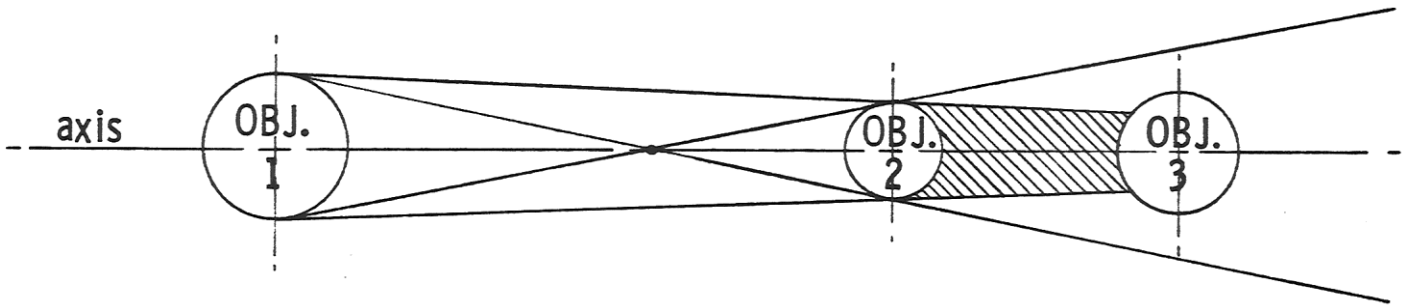
David L. Harrington Jan., 1982

There are many items to consider in calculating the circumstances of solar eclipses. Computer programs can be written to determine the type of eclipse, as well as the date, time and location of the path. This has been done by numerous people, including the author. In some of these studies, the circumstances have been calculated for every solar eclipse that has occurred for the last 3100 years. I have analyzed the more than 100 eclipses and categorized them as to type, time of year, travel distance, local climate and site accessibility. The following eclipses were then rejected; all partial eclipses, all annular eclipses in the southern hemisphere, all total eclipses occurring in the non-tropical regions of the southern hemisphere during their winter, and all annular and total eclipses considered to be in inaccessible areas (Siberia, China, Arctic Ocean, etc.). The remaining eclipses were then further analyzed for merit based on either proximity to the United States or the vacation prospects for the eclipse path (eclipse cruise prospects). This final screening indicated that, for practical purposes, there are at most only 13 more solar eclipses available for viewing during our lifetime. These eclipses are listed below. This information should enable you to plan your eclipse chasing for the rest of your life. Good hunting!

<u>DATE</u>	<u>TYPE</u>	<u>PATH</u>	<u>COMMENT</u>
1984, May30	Annular	Pacific, Mexico, Southern U.S.	Do not miss this one. This eclipse is about as close to total as it can get without being total. It should be short but spectacular. Plan on going to Georgia.
1991, July 11	Total	Pacific Ocean, Mexico, South America	This should be a very good eclipse as viewed from southern Mexico. A cruise might be organized, but it is unnecessary to view this eclipse from offshore (except to stay cool and well-fed).
1992, Jan. 4	Annular	Pacific Ocean, Southern California	A fine vacation opportunity here. See a fine annular eclipse at sunset, and go to the Rose Bowl.
1994, May 10	Annular	Pacific Ocean, United States, Atlantic Ocean	It will be difficult to avoid seeing this one. The central line will cross the U.S. from coast to coast on a Tuesday, and may cross southeastern Michigan at local noon (I'm still plotting the exact path). It will pass the closest to Detroit of any solar eclipse until July 23,2093.
1998, Feb. 26	Total	Pacific Ocean, Central America, Atlantic	This is the best eclipse cruise opportunity this century. This is a fine total eclipse, with the best viewing point in the world being not far from the Panama Canal. The eclipse there occurs at local noon with the sun nearly at the zenith.
1999, Aug.11	Total	North Atlantic, Europe, India	An excellent summer vacation opportunity here. Fly to Paris, view a fine total eclipse not far from there, and tour Europe during its best weather until your money runs out. If you don't want to visit France, view the eclipse just before local noon from Germany or Switzerland.
2006, March 29	Total	Atlantic Ocean, Africa, Russia	An excellent eclipse cruise opportunity. This total eclipse would most likely be observed off the west coast of Africa. This would be viewed during midmorning at 8° North of the equator, whereas the 1973 eclipse was viewed at 19° north of the equator.
2013, Nov. 3	Total	Atlantic Ocean, Africa	An excellent eclipse cruise opportunity. As with the total eclipses of 1973, 1980 and 2006, totality would most likely be observed off the west coast of Africa. At the most favorable viewing location of 5° north of the equator, totality will occur with the sun nearly at the zenith.
2017, Aug 17	Total	Pacific, Oregon to South Carolina, Atlantic Ocean	For the U.S., this will be one of the finest solar eclipses ever. On Monday, Aug. 21, the path of totality will sweep across the entire U.S. from coast to coast, with the sun high in the summer sky. The best place in the world to view this eclipse will be just outside Kansas City.
2024, April 8	Total	Pacific, Mexico, Texas to Massachusetts, Atlantic Ocean	Another fine eclipse for the U.S. The moon's umbral shadow will cross Mexico and move northward. across, the U.S. From Texas to the east coast.

PHENOMENA RESULTING FROM THE ALIGNMENT
OF ANY THREE ASTRONOMICAL OBJECTS
(AS VIEWED FROM EARTH)

David L Harrington
Warren Astronomical Society



<u>EVENT</u>	<u>OBJECT 1</u>	<u>OBJECT 2</u>	<u>OBJECT 3</u>	<u>COMMENT</u>
<u>Eclipses</u>				
Solar	Sun	Moon	Earth	More than 200 per century
Lunar	Sun	Earth	Moon	More than 200 per century
Planetary Moon	Sun	Planet	P.Moon	Common for Jupiter
<u>Transits</u>				
Planetary	Sun	Planet	Earth	Venus and Mercury only
Planetary	Planet	Planet	Earth	Quite rare
Transit of moon	Sun	P. Moon	Planet	Common for Jupiter & Saturn
Transit of Shadow	Sun	P. Moon	Planet	Common for Jupiter & Saturn
<u>Occultations</u>				
Lunar (stellar)	Star	Moon	Earth	Common event
Lunar (planetary)	Planet	Moon	Earth	More than 20 per century
Planetary	Star	Planet	Earth	Rare for naked-eye stars
Asteroidal	Star	Asteroid	Earth	Rare for naked-eye stars

ADDITIONAL COMMENTS

1. Conjunctions occur when objects are nearly in alignment, but are not perfectly aligned.
2. Every non-stellar object has an infinite number of shadows, one for each star in the universe.
3. There are many other combinations of three objects (such as the occultation of one asteroid by another asteroid) that are not listed because they are extremely rare.

SOME ASTRONOMICAL REFLECTIONS

The history of life on Earth and, even more so, the study of the Universe encompasses time and distances so vast that they defy our comprehension. We have, however, learned to handle the large numbers by using scientific notation and larger basic units of measurement to reduce the sizes of these numbers. One system utilizes the distance from the Earth to our Sun as an astronomical unit of one. The distance from the Sun to Venus is then given as 0.723 AU and the distance from the Sun to Saturn as 9.539 AU.

The distances to our "near" stars can be given in parsecs, a parsec representing the distance of a star having an observed parallactic displacement angle of one second relative to more distant background stars observed at 6-month intervals of the Earth's rotation around the Sun. The nearest star, Alpha Centauri, is 1.31 parsecs (25,000,000~000,000 miles) away. Stars spoken of as "near" stars are less than 5 parsecs (16 light years) distant. The greatest distance that we are able to determine using this method of trigonometrical parallax is presently about 100 parsecs (326 light years). The light year, of course, is the distance that a ray of light can travel in one year or $186,000$ (miles/second) $\times 60$ (seconds) $\times 60$ (minutes) $\times 24$ (hours) $\times 365.26$ (average number of days per year) or $5,869,874,304,000$ miles which can be written as $5.869E12$.

Stars beyond the 326 light year range would have remained unknown if the method of trigonometric parallax were the only method at our disposal. Fortunately, however, through the use of great mathematical and physical ingenuity, entirely different methods of measurements were also developed.

The first of these methods makes use of the proper motion of the stars and our Sun. As a result of our Sun's motion through space, the stars, because of their great distances, will show a lesser amount of displacement. (This lesser displacement can be compared to the scene viewed from a window of a moving train where the distant objects are seen to move much more slowly than the nearby objects.) Once the Sun's absolute velocity is established, by mass observation of radial velocities, the mean annual proper motion of the group of stars will reveal the distance of this group. The distances thus determined are known as hypothetical distances. Since the Displacements are very small, one must wait for 20, 50, 100 years, perhaps, until accurate proper motions can be determined.

Another method, that of dynamic parallax, which is only applicable to double stars, is based on the assumption each star of such a pair is of the same order as the sun, having the same gravitational effect. Making that, this assumption and applying the laws of gravitation to the observed motions of the two stars, the linear radius of the orbit can be derived. By comparing the linear radius with the observed angular radius,

the distance of the double stars from the observer can be calculated. Due to the great number of double stars observable, valuable distance information can thus be obtained.

The most valuable method of all is that of spectroscopic parallax. Basically, the apparent magnitude of a star is compared with its absolute magnitude as deduced from the observed density of the star's spectroscopic absorption lines, the difference being a function of distance. At the beginning of this presentation, we mentioned that the vast stretches of time and distance defy our understanding. If we consider evidence as to the length of time that life has existed on earth, we are confronted by another large number. The oldest known Pre-Cambrian fossils are found in Northern Michigan. These are the fossils of primitive one-celled organisms, similar to blue algae, and are found in a remarkably ancient shale-like stone known as the "gunflint chert". This find, supported by some recent additional South Africa finds, establish that life has existed on earth for at least three billion years. The age of our earth has been established at more than three and one half billion years and there is evidence that our Sun began to form from a giant galactic cloud some 6 to 8 billion years ago, and, condensing into its present shape, has been radiating light and heat for some 4 to 5 billion years and that it will continue to do so for at least another 5 billion years.

Furthermore, the Sun is radiating light and heat in all directions with our earth receiving only a very small portion of the Sun's total radiation. In fact the Sun radiates enough light and heat to take care of 2,728,678,000 earths, all grouped around the Sun as a giant shell at equal distances of 93,000,000 from the Sun.

One can stand in the sunlight on a clear midsummer day and feel the heat of the Sun on their face and marvel that the warmth from the Sun, 93,000,000 million miles away, can thus be felt. And now? we are being informed that almost 3 billion Earths, at the same distance from the Sun as our Earth, could feel the same warmth. All this makes one realize, more than ever, how brief and insignificant we humans are, in terms of time, size and in comprehension, in respect to the Earth, the Sun, our Milky Way Galaxie and the vast Universe. But, we are learning!

John J Wetzell

***** MEMBERSHIP LIST FOR THE WARREN ASTRONOMICAL SOCIETY *****

NAME =====	PHONE =====	ADDRESS =====	CITY, STATE =====	ZIP ===	1ST YR =====	MEM =====	MAG =====
ANDREWS, FRANK & ()	683-2416	2888 W HURON	PONTIAC, MI.	48054	1981	FAM	S&T
BALDWIN, JEAN	264-4082	4047 HILLCREST	WARREN, MI	48092	1973	IND	S&T
BASTISTONE, ROBERT	855-5763	5581 TADWORTH PL	W BLOOMFIELD, MI	48033	1981	IND	S&T
BAUMAN, TONY	754-9229	21451 SUNSET	WARREN, MI	48091	1980	COL	A/S
BERRY, ROBERT M.	851-1650	29641 GLADSTONE	FARMINGTON HLS, MI	48018	1981	IND	S&T
BIENIEK, MARK	284-7595	13431 VENNESS	SOUTHGATE, MI	48195	1978	IND	-
BIONDO, STEVE	245-0493	17130 STRASBURG	DETROIT, MI	48205	1980	IND	A/S
BOCK, DOUG & ROBIN	533-0898	15489 PATTON	DETROIT, MI	48223	1973	FAM	A/S
BOYD, GARY	839-0973	15850 STATE FAIR	DETROIT, MI	48205	1974	IND	S&T
BRADLEY, MICHAEL	882-5593	4191 BEDFORD RD	DETROIT, MICH	48224	1981	IND	-
BULLOCK, RAYMOND	879-9458	2991 CHARNWOOD	TROY, MI	40084	1975	HON	-
DOBRZELEWSKI, DAVID	778-9715	32446 HALMICH	WARREN, MI	48092	1975	COL	S&T
DOMBRZEL, JOHN		12267 GALLAGHER	DETROIT, MI	48212	1980	STU	S&T
UCHER, BARRY M.	27075 PIERCE AVE	SOUTHFIELD, MI	48076	1981	IND	SU
EBBINGHAUS, CARL	273-5004	14380 MINOCK	DETROIT, MI	48233	1981	IND	-
ENGLER, BARBARA/DAUGHTER	758-4138	21283 DOEPFER	WARREN, MI	48091	1981	FAM	S&T
EVERINGHAM, WILLIAH P.	589-9153	515 BRECKINRIDGE	FERNDALE, MI	48073	1982	IND	AST
FAIX, LOUIS & PAT KRAUSE	781-3338	6088 ROBINHILL RD	WASHINGTON, MI	48094	1973	FAM	S&T
FAUSEL, C.A.	1-623-1668	4095 IRONSIDE	WATERFORD, MI	48095	1981	IND	S&T
FERA, RALPH	593-3372	20151 TIREMAN	DETROIT, MI	48228	1981	IND	AST
FULLENWIDER, ALLAN C.	682-8584	592 SHARON ST S	PONTIAC, MI	48054	1979	IND	S&T
GRISDALE, WESLEY A.	548-4380	10545 TALBOT AVE	HUNTINGTON WDS, MI	40070	1981	FAM	S&T
HARRINGTON, DAVID L.	879-6765	2876 QUARTZ	TROY, MI	48084	1975	IND	-
KALINOWSKI, LARRY	776-9720	15674 FLANAGAN	ROSEVILLE, MI	48066	1979	IND	AST
KAPUSHINSKI, MARK	979-0959	13251 MONTAGO DR	STERLING HEIGHTS, MI	48077	1981	STU	S&T
KRUMAN, CRAIG	557-1997	16996 MORRISON	SOUTHFIELD, MI	48076	1981	STU	AST
KWENTUS, PETE & GINGER	771-3283	22107 MELROSE CT	E DETROIT, MI	48021	1973	FAM	S&T
LEMONS, BRIAN & MAUREEN	739-5786	11967 DIEHL	STERLING HGTS, MI	48078	1982	FAM	S&T
LUETZ, TOM, II	756-7287	7267 CADILLAC	WARREN, MI	40091	1981	STU	-
MCCULOUGH, FRANK	1-254-1786	45200 KEDING AP102	UTICA, MI	48097	1973	IND	A/S
MCLESKEY, EDWARD P.	832-2569	491 W HANCOCK #11	DETROIT, MI	48201	1981	COL	S&T
MUSE, KENNETH H.	268-3486	11188 GLENIS	STERLING HTS, MI	48077	1978	IND	S&T
OLAH, DAN	542-8144	25436 WAREHAM	HUNTINGTON WDS, MI	48070	1980	IND	S&T
PAULASKY, JAMES	465-3886	37176 GARVIN	MT CLEMENS, MI	48043	1977	IND	S&T
PERSHA, BEVERLY	1(616)897-6224	1033 LINCOLN LAKE	LOWELL, MI	49331	1981	IND	S&T
ROMANCHUK, STEPHAN	754-3221	27345 SANTA ANA	WARREN, MI	48093	1981	STU	S&T
ROOT, JON M.	261-1962	16820 RENWICK	LIVONIA, MI	48154	1976	IND	S&T
ROTHENBERG, ALAN	355-5844	21700 COLONY PARK	SOUTHFIELD, MI	48076	1980	COL	S&T
SHANNON, BOB & CONNIE	885-4283	194 MORAN	GROSSE PTE FARMS, MI	48236	1980	S&F	-
SMITH, STEVEN	468-3509	18776 MONICA DR	MT CLEMENS, MI	48043	1973	IND	S&T
SPADA, RAYMOND	254-3946	8544 HAMPSHIRE	STERLING HTS, MI	48078	1979	IND	-
TANNER, ROGER D.	981-0134	1770 WALNUT RIDGE	CANTON, MI	48187	1981	IND	AST
TOMCZYK, NANCY	777-9273	17824 STEPHAN	E DETROIT MI	48021	1979	IND	AST
UGO, KEVIN	871-7062	3813 BELMONT	HAMTRAMCK, MI	48202	1981	STU	S&T
UMBARGER, JEFF	884-0227	1268 BRY'S DRIVE	GROSSE PTE WDS, MI	48236	1979	STU	S&T
VINCENT, BRAD	751-8506	28401 LOS OLAS	WARREN, MI	40093	1977	IND	-
VOGT, RONALD C.	545-7309	11 ELM PARK	PLEASANT RIDGE, MI	48069	1981	IND	S&T
WETZEL, JOHN J	882-6816	36 NEWBERRY PLACE	GROSSE PTE FARMS, MI	48236	1980	SR	A/S

THE ABOVE LISTS ALL WAS MEMBERS IN GOOD STANDING.

THE MAGAZINE CODE USED ABOVE AS FOLLOWS: AST=ASTRONOMY,

S&T= SKY & TEL, A/S=BOTH AST AND S&T, - denotes NO MAGAZINE.

SPECIAL NOTE: FEBRUARY DUES ARE NOW PAYABLE! JJWETZEL