Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS - SOLAR DIVISION

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Table I. Mean Sunspot Numbers for September

Da	Raw	s.d.	K-corrected	s.d.
1	164	5.5	138	4.1
2	148	6.0	126	4.1
3	150	6.5	119	4.3
4	157	6.2	127	4.9
5	144	5.4	115	3.9
6	147	5.6	120	4.4
7	136	5.3	116	4.0
8	112	6.7	100	6.6
9	73	4.5	62	4.7
10	55	8.6	53	9.8
11	19	2.3	16	1.7
12	51	8.1	49	9.9
13	76	8.8	68	9.2
14	93	8.0	85	8.3
15	114	7.5	99	6.9
16	120	6.7	101	6.0
17	155	6.2	132	5.3
18	160	8.4	130	5.6
19	163	8.9	132	5.5
20	183	9.8	157	8.4
21	174	8.6	139	6.5
22	189	10.6	146	7.8
23	195	9.7	159	6.6
24	206	10.5	169	7.7
25	197	9.5	157	6.1
26	189	8.9	154	6.4
27	191	9.9	155	7.4
28	170	9.1	135	7.5
29	151	6.7	127	4.2
30	125	4.3	107	3.5
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Means: 140.3 **116.5**

No. of Observations: 1124

No. of Observers: 68

Table II. September Observers

8	AAP	P.Abbott
6	ANDE	E.Anderson
13	BARH	H.Barnes
14	BATR	R.Battiola
18	BEB	R.Berg
13	BERJ	J.Berdejo
15	BMF	M.Boschat
18	BOSB	B.Bose
22	BRAB	B.Branchett
10	BRAD	D.Branchett
28	BRAR	R.Branch
20	CARJ	J.Carlson
29	CHAG	G.Morales
26	CKB	B.Cudnick
7	CLZ	C.Laurent
20	COMT	T.Compton
30	CORA	A.Coroas
29	CR	T.Cragg
4	DEMF	F.Dempsey
18	DRAJ	J.Dragesco
17	DUBF	F.Dubois
28	ELR	E.Reed
22	FEEC	C.Feehrer
18	FERJ	J.Fernandez
26	FLET	T.Fleming
26	FUJK	K.Fujimori
20	GIOR	R.Giovannoni
12	GOTS	S.Gottschalk
5	HALB	B.Halls
16	HAYK	K.Hay
8	HRUT	T.Hrutkay
22	JAMD	D.James
6	JEFT	T.Jeffrey
4	JENS	S.Jenner
5	JENV	V.Jennings
25	KAPJ	J.Kaplan
14	KNJS	J&S Knight
4	LARJ	J.Larriba
19	LERM	M.Lerman
24	LEVM	M.Leventhal
13	LIZT	T.Lizak
8	LUBT	T.Lubbers
18	MALK	K.Malde
30	MARJ	J.Maranon
20	MCE	E.Mochizuki
7	MILJ	J.Miller
20	MMI	M.Moeller
13	MUDG	G.Mudry
11	NILB	B.Nilson
3	OBSO	IPS Obs.
9	PENG	G.Pennington
15	RADS	S.Radabah
9	RICE	E.Richardson
20	RITA	A.Ritchie
11	SCHG	G.Scholl
6	SIMC	C.Simpson
16	STEF	G.Stefanopoulis
27	STEM	G.Stemmler
27	STQ	N.Stoikidis
23	SUZM	M.Suzuki
23	SZAK	K.Szatkowski
9	TESD	D.Teske
16	THR	R.Thompson
21	URBP	P.Urbanksi
16	VALD	D.del Valle
19	VARG	A.Vargas
17	WILW	W.Wilson
27	YESH	H. Yesilyaprak

Reporting Addresses

Sunspot Reports **-- email:** solar@aavso.org
postal mail: AAVSO, 25 Birch St. Cambridge, MA 02138
FAX *(AAVSO):* (617) 354-0665

SES Reports **-- email:** noatak@aol.com
postal mail: Mike Hill
114 Prospect St. Marlboro, MA 01752

Magnetometer Reports **-- email:** capaavso@aol.com
postal mail: Casper Hossfield
PO Box 23, New Milford, NY 10959
FAX: (973) 853-2588

Editor's Notes

Have We Passed the Maximum of the Current Cycle?

Evidence continues to mount that we have passed the maximum for this cycle. The data suggest that the maximum may have been reached during July. Daily values of RaK for the 18th through the 21st of that month were 236, 259, 258, 243, respectively. The magnitudes of these values and the length of the sequence are both greater than before or since.

Estimates of Sunspot Groups and Comparison of American (Ra) with International (Ri) Numbers

Table III presents the mean estimates of the numbers of groups reported by observers during the month of September. As indicated in earlier Bulletins, these are raw, uncorrected averages, and an individual observer's results may or may not correspond closely to them.

Table III. Means of Group Counts for September 2000

Day	Mn.	Day	Mn.	Day	Mn.	Day	Mn.
1	10.4	9	4.9	17	7.3	25	8.1
2	9.2	10	3.8	18	6.1	26	8.7
3	9.5	11	1.6	19	6.0	27	9.9
4	8.9	12	3.6	20	6.1	28	8.7
5	7.5	13	5.2	21	5.8	29	7.9
6	8.2	14	5.5	22	5.7	30	6.7
7	8.1	15	5.9	23	5.4	31	---
8	7.3	16	5.6	24	7.2	Mn.	6.83

Figure 1 presents a comparison of the daily provisional International (Ri) estimates for September with the American (Ra) estimates.

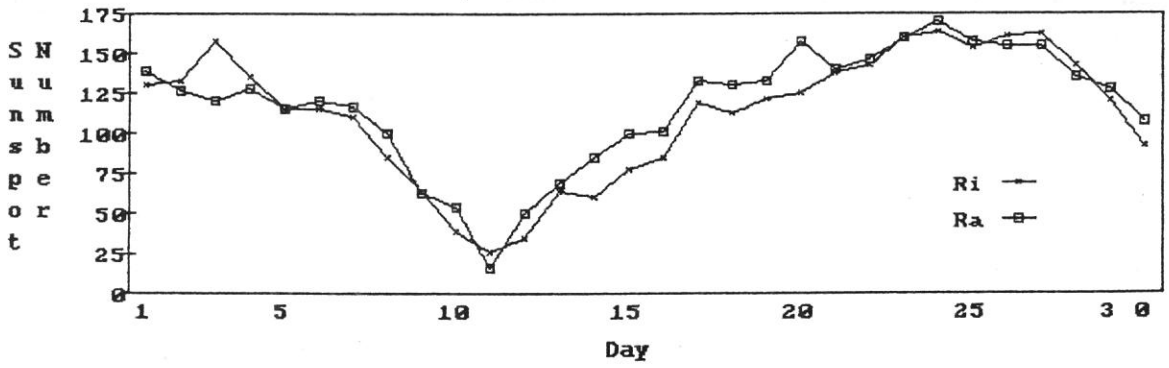

Fig. 1. Comparison of Ri (provisional) and Ra estimates for September.
(Source: www.oma.be/KSB-ORB/SIDC/index.html)

Smoothed Mean Sunspot Number

The smoothed mean sunspot number (Rsm) for March 2000, computed via Waldmeier's (1961) method, is equal to 124.9.

Profile of AAVSO Solar Observer Telescope Parameters

Guidelines are occasionally presented in the Bulletin concerning recommended apertures, magnifications, and methods to be used for the estimation of sunspots. These guidelines suggest that effective apertures in the range of 50 mm to 80 mm be used with a three-scan procedure in which powers of 40x to 50x be employed to search for major groupings, powers of 60x to 70x be used to refine group estimates and initial spot counts, and, weather permitting, powers of 80x to 100x be used for final counts. The primary reason for promoting these values of aperture and magnification and of the 3-scan procedure is to help assure that an observer can

successfully detect all of the spots present at a given time and thereby aid in maintaining the quality of the American index. Much of the rationale for the guidelines can be found in Schaefer (1993, 1997).

Despite the publication of the guidelines, it has not been customary to compile and present statistics relating to the apertures and magnifications actually employed by observers who report to the Solar Division. Because they can serve a useful purpose in comparing real performance against recommended performance, the information provided in the monthly reports by a (large) sample of 80 active observers has now been analyzed and is presented below.

Table VI presents the distribution of telescope types in the sample. As the table indicates, 75% of the observers view the sun directly while the remaining 25% project its image. The average image size employed by the latter group is approximately 7.9 inches.

Table V. Summary of telescope types and viewing methods used.

Type/View	Direct	Projection	Total
Refractor	30	15	45
Reflector	16	3	19
SCT/Mak	14	2	16
Total	60	20	80

Results of the analysis for those observers who view the sun directly are presented in Figures 2 and 3. Figure 2 groups the reported magnification ranges into 4 categories. The height of each bar represents the frequency with which magnifications in that range were reported. Where a given observer employed more than one eyepiece, only the one offering the maximum power is included in the count.

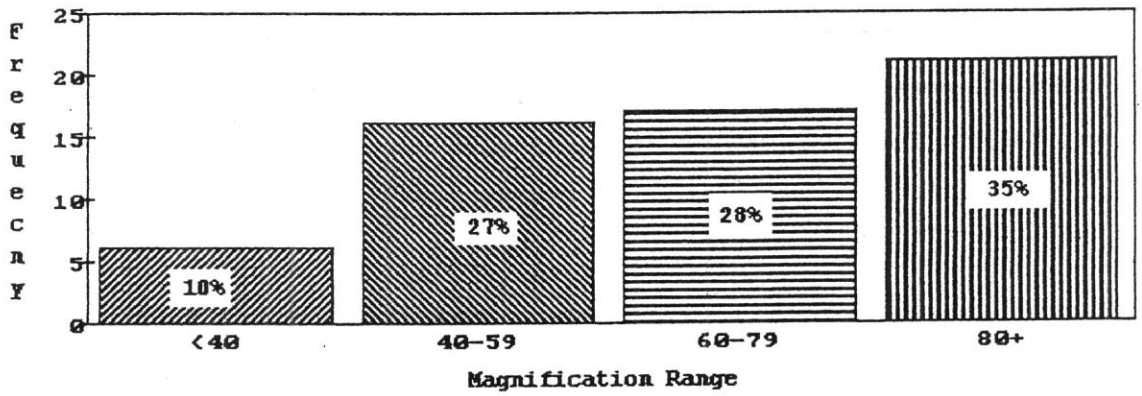

Fig.2. Distribution of Maximum Magnifications Reported in Sample.

Note that 10% of the observers make their estimates with less than the minimum magnification recommended, while approximately 27% work only within the minimum range. To the extent that the sample is representative of the entire population, this is nearly certain to mean that well over a third of the observers underestimate the number of spots potentially visible on the disk.

Most of the 17 observers in the 60x-79x category are probably seeing all of the groups and spots, provided that their eyesight and seeing conditions are good. The remaining 35% of observers, operating above 80x are almost certainly in a position to detect all groups and spots.

Figure 3 presents a breakdown of the effective apertures used by direct-view observers. Although the raw average of this distribution is considerably larger than that typically recommended, a substantial number of the apertures are in the range from 50mm to 109mm. The modal aperture--the one most frequently reported in the sample--is 80mm.

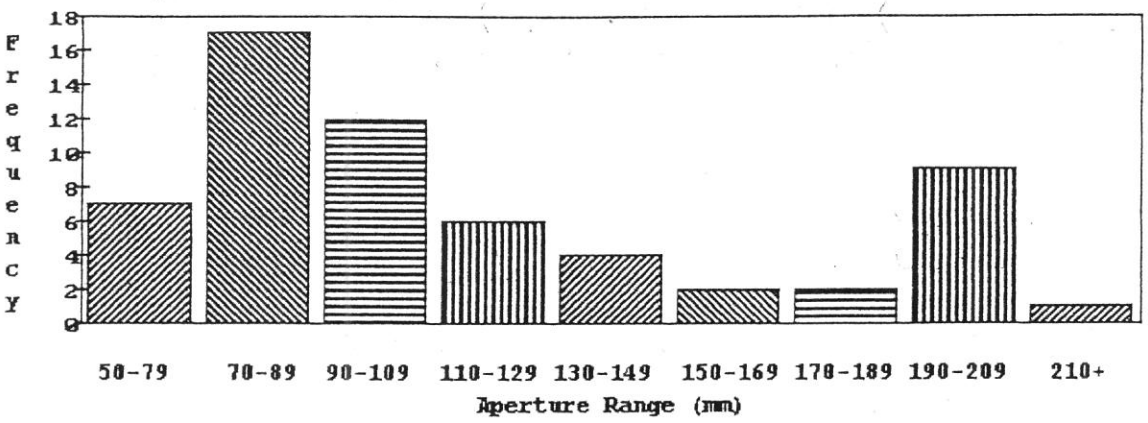

Fig. 3. Distribution of Aperture Ranges Reported in Sample.

No analysis of the three-step scanning procedure has been made, although it can be said that few observers in the sample report systematic use of more than one eyepiece in their work. Certainly it is true that the format of the monthly reporting form is not conducive to entering such information and should be revised.

References

Schaefer, B. 1993, *Astrophys. J.*, **411**, 909.
Schaefer, B. 1997, *J. Amer. Assoc. Var. Star Obs.*, **26**, 1, 47.

Final Note

Please remember in the coming months that your report must be received by 5pm EST on the 10th of the month in order for it to be processed in time for production of the Bulletin.

Clear Skies,

-CEF

Sudden Ionospheric Disturbance Report

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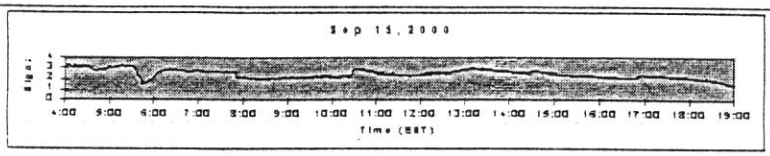

Sudden Ionospheric Disturbances (SID) Recorded During July 2000

(Analysis performed by Michael Hill, SID Analyst)

Date	Max	Imp	Date	Max	Imp	Date	Max	Imp
000903	2250	1+	000916	2016	1+	000926	2147	2+
000904	1421	2	000917	0534	1+	000927	0312	1
000904	1458	2	000917	0640	2	000927	1918	2
000904	1641	1	000917	1226	2	000929	0658	2
000904	1751	1+	000917	1636	1	000929	1316	2
000904	1909	2	000919	0333	1-	000929	1647	1+
000904	1959	1	000919	0515	1-	000929	2050	1+
000904	2140	1	000919	0815	2+	000930	0435	1
000905	0820	1-	000921	0353	1+	000930	1003	1-
000905	1912	2	000921	0925	2+	000930	1616	2
000907	1859	1	000922	1308	1+	000930	1715	3
000907	2002	1-	000922	1615	2	000930	2015	1+
000907	2037	3	000922	1902	2	000930	2043	2
000909	0835	2	000922	2105	2	000930	2320	2+
000911	0921	1-	000922	2113	2			
000912	0905	2	000923	0232	1-			
000913	1424	2	000923	0555	1			
000914	1357	2	000923	0720	2			
000914	1929	2+	000923	1848	2+			
000915	1435	2+	000923	2015	1			
000915	1830	2	000923	2041	2			
000915	2045	1-	000923	2140	1			
000915	2053	2+	000924	1409	2			
000915	2235	2	000924	1835	1			
000916	1426	2+	000926	2000	2			

The events listed above meet at least one of the following criteria

1) Reported in at least two observer reports
2) Visually analyzed with definiteness rating = 5
3) Reported by overseas observers with high definiteness rating

Observer	Code	Station(s) monitored
Jerry Winkler	A50	NAA, NPM
Art Stokes	A62	NAA, TDB
James Ellerbe	A63	ICV
Peter King	A80	FTA
Mike Hill	A87	NAA

Importance	Duration (min)
1-	< 19
1	19 – 25
1+	26-32
2	33-45
2+	46-85
3	86-125
3+	> 125

Solar Events

September was a bit more active with 63 recorded events compared to last months 12. There were 10 M Class flares and 1 X-Class flare out of a total of 197 X-Ray flares recorded by the Goes spacecraft. Interestingly, a large number of smaller flares were observed by our observers, thereby refuting my estimate last month that the lowest class of flare detected was C4. This month a couple observers, Jerry Winkler (A50) and Alex Panzer (A83) were able to regularly detect C3 and sometimes C2 level flares.

Many Thanks to all of you for cooperating with the new guidelines for data submittal. Hopefully the SIDFORM program is easier to use with the directions I provided last month. This month I have included a form which can be used to log events on paper on a daily basis and then used to enter data into SIDFORM at the end of the month. By pre-compiling data each day or every couple of days it is not such a daunting task at the end of the month and final entry into SIDFORM only should take about 15 minutes.

Name___________________ ID _______ Month _____ Year ____

Location ________________

Station ______ Freq ______ Location _________________

Day	Start	Peak	End	Def Rating	Notes

SOLAR BULLETIN of the American Association of Variable Star Observers. Vol. 56, No. 10, September, 2000

SUDDEN IONOSPHERIC DISTURBANCES SUPPLEMENT

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SUDDEN IONOSPHERIC DISTURBANCES
RECORDED DURING September, 2000

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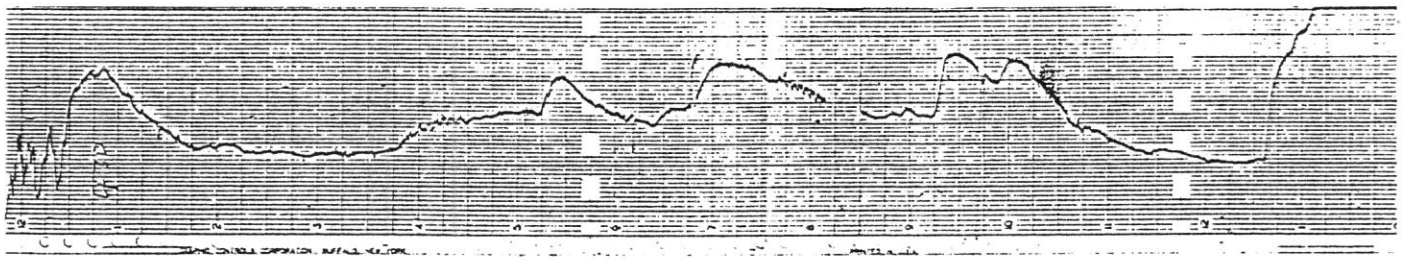
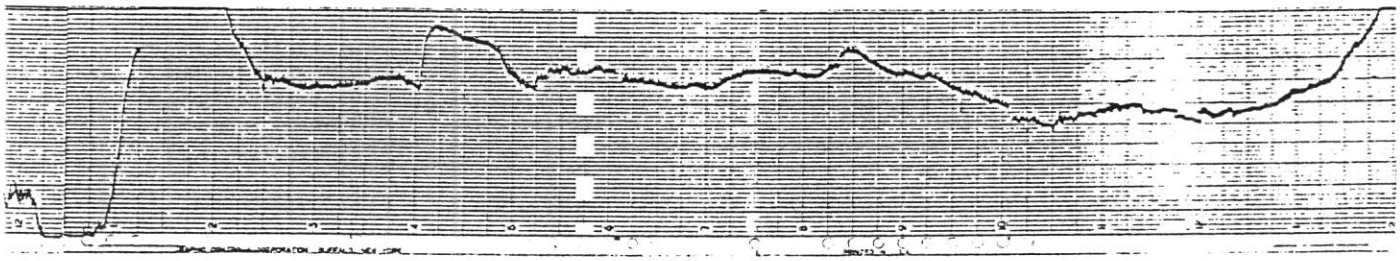
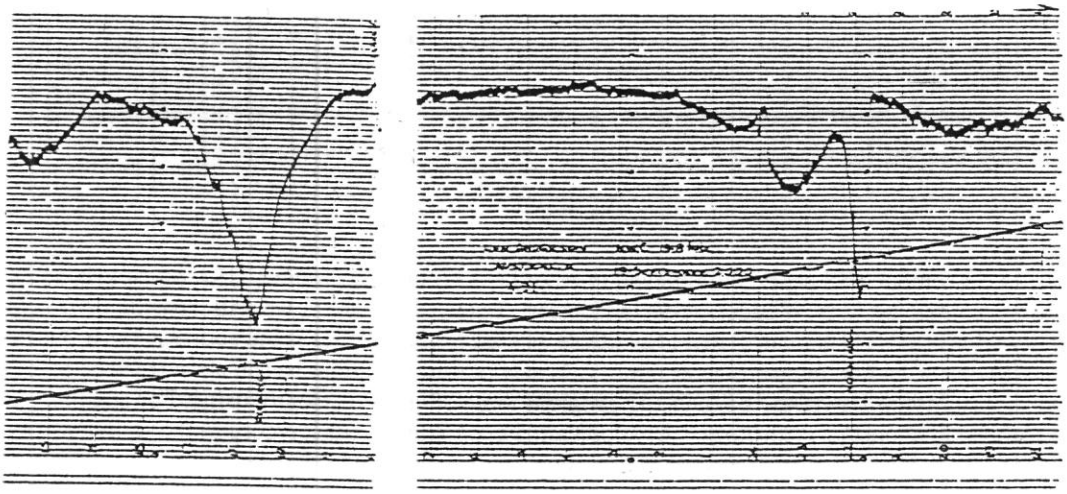
Recently a new US Navy VLF radio transmitter has come on the air. It transmits on 25.2 kHz and is listed as being in La Moure, North Dakota, USA. No call letters are known so far for this new station. La Moure is also the location of one of the Navy Omega navigation system transmitters that transmit on about 10 kHz. It is thought that the Navy may have shut down the Omega transmitter and used the antenna for the 25.2 transmitter. VLF transmitters require huge top-loaded antennas that are very expensive to build, and are a large percentage of what it costs to set up a VLF station. The big antenna for NSS used to be easily seen from the bridge crossing the Chesapeake Bay at Annapolis, Maryland. NSS had been off the air for many years and the antenna was recently taken down. The new station in La Moure transmits the same MSK modulation that the other Navy transmitters use. Its power is listed as 500 kW and puts out a powerful signal. Below are two SES recording of flares made with the La Moure signal. They were made by Art Stokes, A-62, in Hudson, Ohio. They show a large sunrise drop which is often associated with propagation paths that have good sensitivity. The flares recorded below by Art bare this out.

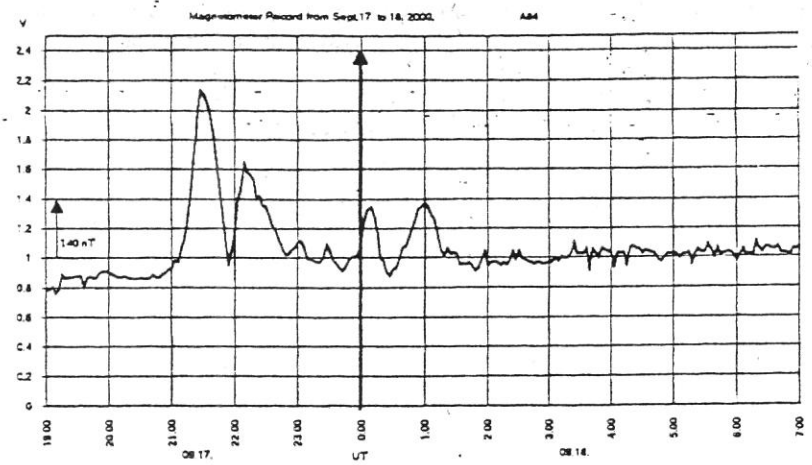


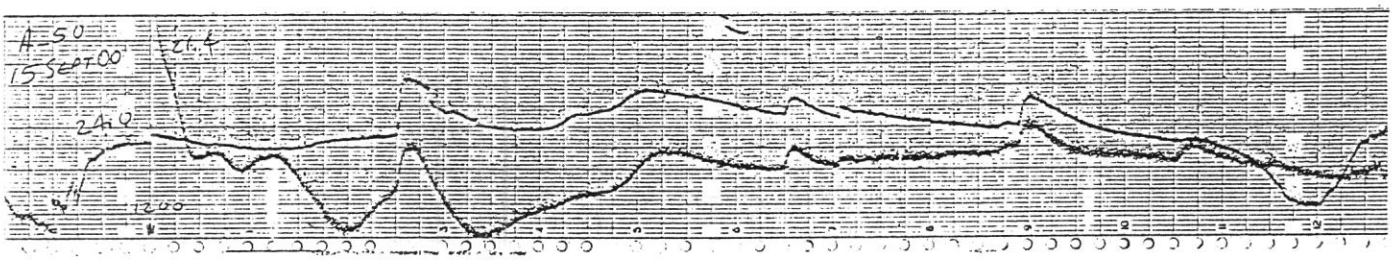


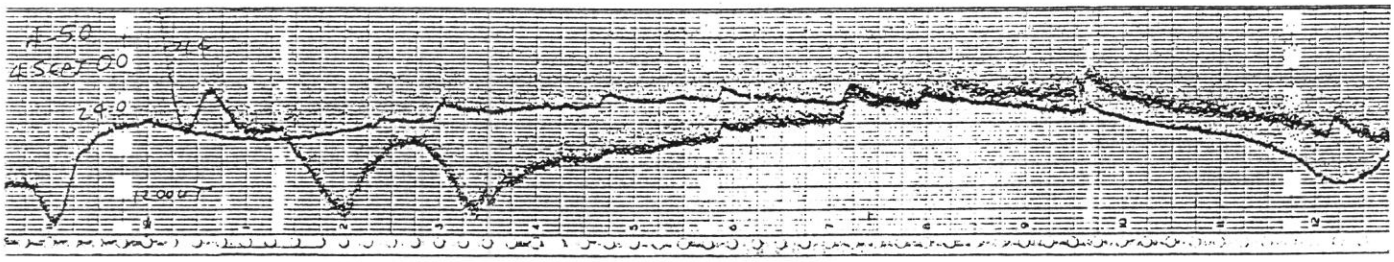


The SES recording above was made by Len Anderson in South Perth, West Australia on 19 September, 2000. Len recently put his station, A91, back on the air. He records the 19.8 kHz signal from NWC in Northwest Cape, West Australia. Time increases from right to left on his chart. The sunrise drop is on the right hand end of the chart about two hours before a nice SES. It is very deep and of short duration because NWC is almost due North of South Perth. Sunrise takes place along the whole propagation path at about the same time. Sunset is on the left end of the chart about an hour after another nice SES The sunset drop is not as sudden as sunrise drop. The trace is at about the same level in the daytime as it is at night.

The 17 September magnetic storm was recorded by Dr. Walter Moos, A-84 in Switzerland. His chart recording is shown below. Walter made this chart with a fluxgate magnetometer he recently built from a kit. The kit is from Erich Kern in California. The sensor is burried 10-inches deep in a thermos bottle filled with sand. It is buried in the garden 50-feet from the street and 25-feet from his house. It detects cars going by on the street but the street is dead end so they are not a big problem Walter built a Helmholtz coil to calibrate his new magnetometer. His chart shows the calibration line for 140 nanoteslas.







Two charts above show 4 and 15 September SES charts multiplexed to record NAA in Cutler, Maine, USA on 24 kHz and NPM in Hawaii on 21.4 kHz. These were made by Jerry Winkler, A-50 in Houston, Texas. Next month we will have charts from Jerry made with new software for the MAX186 A/D converter that is available as a kit from AAVSO at the address above. This new software is written by Al McWilliams of torsion magnetometer fame. Al's new plotting program has an abundance of neat options so it is a lot more useful than Joseph Lawrence's SIDPLOT program some of us are presently using. For one thing it can be set to run at ¼ -inch/hr to make magnetometer recordings. I have prevailed upon Al to make it record in the same format and size as the Rustrak strip chart recorders most SID observers use. That way charts can be sent to me electronically and I can print them and put them in the artwork for the Solar Bulletin and the SESs will line up under one another. Magnetograms will be the same scale as Rustrak charts run at ¼-inch/hr. CHH