Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS - SOLAR DIVISION

Carl E. Feehrer, Editor
9 Gleason Rd.
Bedford, MA 01730

Email: cfeehrer@hotmail.com

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Table I. Mean Sunspot Numbers for June 2001
[boldface = maximum, minimum]

Day	N	Raw	s.d.	K-corrected	s.d.	s.e.
1	33	82	5.4	**66**	4.0	0.72
2	30	128	7.2	107	4.4	0.80
3	31	131	6.9	108	4.0	0.72
4	37	141	6.4	114	3.8	0.65
5	30	135	7.7	113	4.8	0.91
6	29	155	6.3	128	5.0	0.93
7	41	175	6.9	146	5.1	0.80
8	46	209	8.3	167	5.1	0.79
9	46	232	9.4	185	5.9	0.89
10	41	221	7.8	177	4.7	0.76
11	44	2350	7.2	194	3.9	0.61
12	37	227	10.0	183	5.4	0.93
13	45	220	6.8	178	4.2	0.65
14	46	237	6.9	190	5.0	0.78
15	35	253	9.7	**206**	6.5	1.10
16	36	256	9.7	204	5.5	0.96
17	41	227	9.0	184	5.3	0.84
18	43	201	8.0	162	5.0	0.79
19	47	191	7.4	153	5.0	0.73
20	45	187	8.9	153	6.0	0.89
21	37	200	9.1	166	6.3	1.07
22	34	210	8.8	170	5.0	0.91
23	37	210	7.1	174	4.3	0.71
24	43	206	7.1	172	4.5	0.69
25	46	186	7.5	153	5.1	0.75
26	47	160	6.9	134	4.2	0.61
27	42	143	6.3	113	4.3	0.66
28	40	119	5.5	94	3.6	0.57
29	42	99	3.6	82	2.3	0.35
30	36	93	4.1	75	2.7	0.45
31	---	---	---	---	---	---

Means: **182.4** **148.4**

Total No. of Observers: 68

Total No. of Observations: 1187

Table II. June Observers

15	AAP	P.Abbott
9	ANDE	E.Anderson
12	ATON	A.Attanasio
16	BARH	H.Barnes
17	BATR	R.Battaiola
15	BEB	R.Berg
30	BEGM	M.Begbie
16	BMF	M.Boschat
14	BOSB	B.Bose
24	BRAB	B.Branchett
26	BRAR	R.Branch
27	BROB	R.Brown
6	CAMP	P.Campbell
20	CARJ	J.Carlson
19	CHAG	G.Morales
25	CKB	B.Cudnik
6	CLZ	L.Corp
22	COMT	T.Compton
30	CORA	A.Coroas
25	CR	T.Cragg
5	DEMF	F.Dempsey
25	DRAJ	J.Dragesco
23	DUBF	F.Dubois
30	ELR	E.Reed
11	FEEC	C.Feehrer
26	FLET	T.Fleming
24	GIOR	R.Giovanoni
13	GOTS	S.Gottschalk
7	HAYK	K.Hay
12	HSF	C.Hossfield
1	IMPR	R.Imperi
22	JAMD	D.James
5	JEFT	T.Jeffrey
13	JENJ	J.Jenkins
2	JENS	S.Jenner
28	KAPJ	J.Kaplan
15	KHAR	R.Khan
15	KNJS	J&S Knight
7	KUZM	M.Kuzmin
22	LERM	M.Lerman
13	LEVM	M.Leventhal
19	LIZT	T.Lizak
25	MALK	K.Malde
18	MARE	E.Mariani
30	MARJ	J.Maranon
19	MCE	E.Mochizuki
12	MILJ	J.Miller
25	MMI	M.Moeller
20	MUDG	G.Mudry
16	OBSO	IPS Obs.
19	RICE	E.Richardson
22	RITA	A.Ritchie
28	SCGL	G.Schott
8	SCHG	G.Scholl
4	SIMC	C.Simpson
11	STEF	G.Stefanopoulis
25	STEM	G.Stemmler
18	SUZM	M.Suzuki
15	SZAK	K.Szatkowski
15	SZUM	M.Szulc
27	TESD	D.Teske
9	THR	R.Thompson
25	URBP	P.Urbanski
16	VARG	A.Vargas
17	VIDD	D.Vidican
16	WILW	W.Wilson
6	WITL	L.Witkowski
29	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 or (407) 482-3963

Table III. Means of Raw Group Counts (RG) and Ratios of Spots to Groups (S:G) in June

Day	RG	S:G	Day	RG	S:G	Day	RG	S:G	Day	RG	S:G
1	6.1	3.4	9	12.3	8.9	17	12.0	8.9	25	9.7	9.2
2	8.3	5.4	10	12.9	7.1	18	9.9	10.3	26	8.8	8.2
3	7.5	7.5	11	14.9	6.1	19	9.2	10.8	27	8.2	7.4
4	7.1	9.9	12	15.6	4.5	20	8.4	12.3	28	8.5	4.0
5	7.6	7.8	13	15.4	4.3	21	10.3	9.4	29	7.9	2.5
6	9.1	7.0	14	15.7	5.1	22	11.4	8.4	30	7.1	3.1
7	10.6	6.5	15	15.8	6.0	23	11.6	8.1	31	---	---
8	11.1	8.8	16	14.3	7.9	24	11.2	8.4	Mn.	10.6	7.2

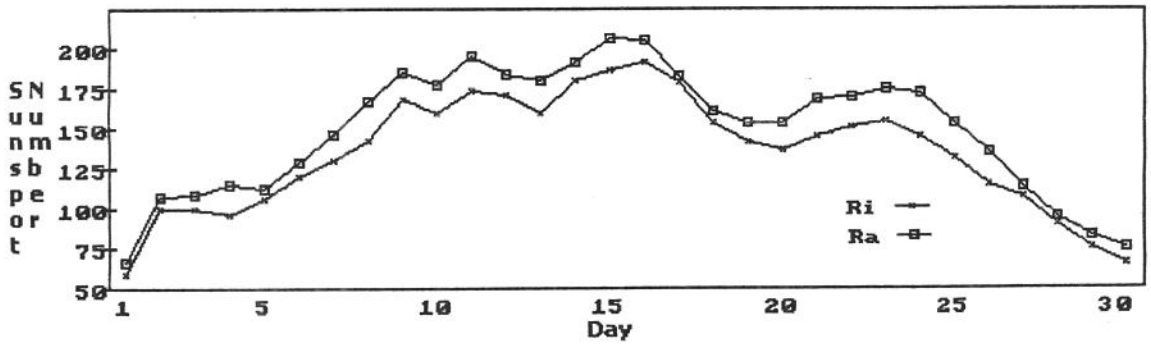


Fig. 1. Comparison of Ri (provisional) and Ra estimates for June.
(Ri Source:http://sidc..oma.be/index.php3)

Smoothed Mean Sunspot Number (Rsm) for December 2000: 118.0

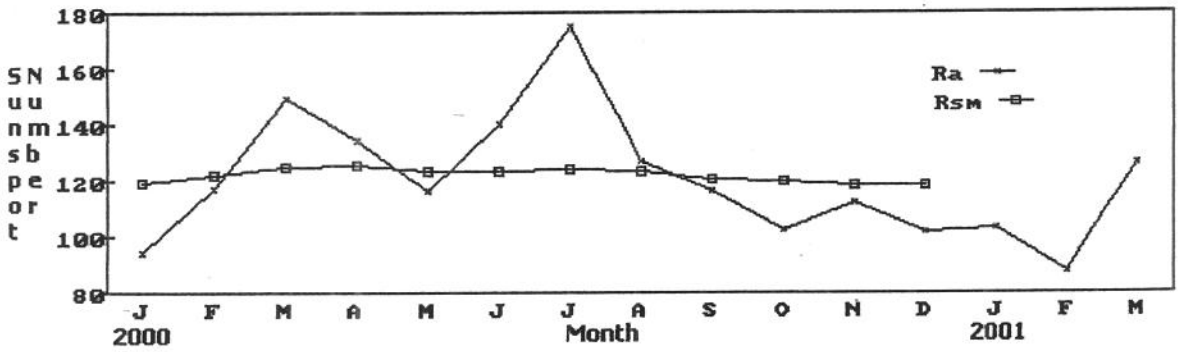


Fig. 2. Monthly Ra and Smoothed Mean Sunspot Numbers (Waldmeier method).

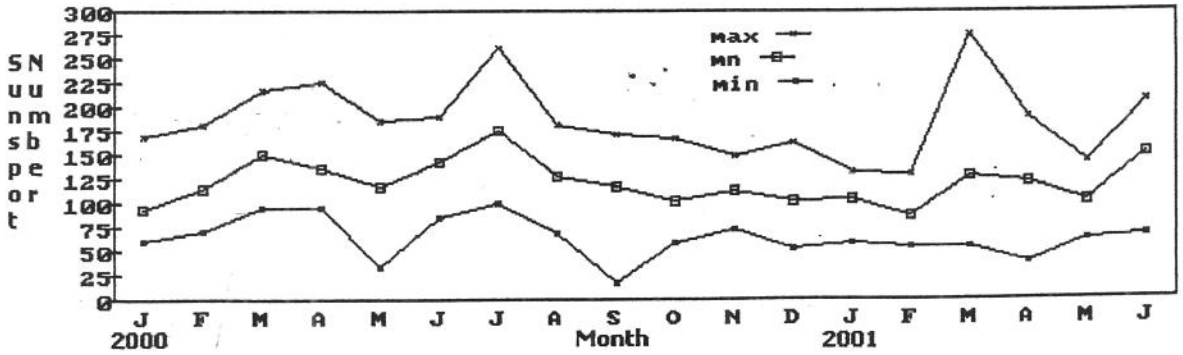


Fig 3. Maximum, mean, and minimum Ra Values for Each Month from January 2000 to Present.

Editor's Notes

Errors in Reports

A significant number of errors, distributed over a relatively wide range of reporting parameters, were found in observer reports for June. Please be careful that your report contains the *correct month* and the *correct ID code*, and that the *R numbers* for each day are computed correctly. Please do not make any entries (e.g., zeros, asterisks, commments) on days when no observations were made. If you use the text version of SUNKEY on the website, remember that the dates in the header must be manually updated.

One additional request: If it is at all possible for you to report using SUNKEY.exe, its text version, or SolObs.exe, please do that. The information furnished in spreadsheet and word processor files must be recoded before it can be analyzed with the AAVSO software, and there is always the possibility that errors will be made during that recoding process.

Table I Column Definitions

Several observers have asked for definitions of the values included in Table I of the Bulletin. These are as follows:

Day: the cardinal number of the day for which data in the row are reported

N: the total number of observers who contributed observations on a given day

Raw: the mean of all R numbers reported on a given day

s.d.: the standard deviation of R values reported on a given day. Assuming a normal distribution of reported values--a reasonable assumption except when R values become very low-- the range from -1 sd to +1 sd includes approximately 68% of the reported R values, and the range from -2 sd to +2 sd includes approximately 95%. For example, given a mean of 100 and a standard deviation of 5, approximately 68% of reported values lie between 95 and 105, while approximately 95% lie between 90 and 110.

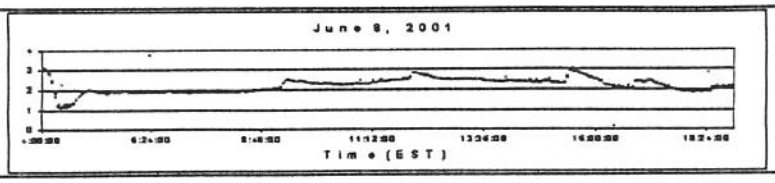
K-corrected: the mean of R values reported on a given day after the application of an accuracy coefficient to each observer's reported R. The k-corrected value is called Ra in Fig.s 1, 2, and 3.

s.d.: the standard deviation of the k-corrected values, with the same interpretation as above.

s.e.: the standard error of the estimate of the mean K-corrected value for a given day. The standard error is equal to the standard deviation of the K-corrected value for the day divided by the square root of the number of contributing observers (N) on that day.

Sudden Ionospheric Disturbance Report

Michael Hill, SID Analyst
114 Prospect St
Marlborough, MA 01752 USA
noatak@aol.com



Sudden Ionospheric Disturbances (SID) Recorded During June 2001

(Analysis performed by Michael Hill, SID Analyst)

Date	Max	Imp	Date	Max	Imp	Date	Max	Imp
010601	2120	1+	010610	1518	1-	010616	2015	2+
010603	2015	2	010610	1548	1	010616	2240	2
010603	2122	2+	010610	1951	2	010617	0548	1-
010604	1517	1+	010611	0559	2	010617	1035	1
010604	2249	3	010611	1013	1-	010617	1354	1
010605	0451	3+	010611	1042	1-	010617	2240	1+
010605	1205	1-	010611	1447	2	010618	2011	2+
010605	1423	2+	010611	2053	2	010619	1826	2
010606	1730	1+	010612	0715	1-	010620	1907	2
010606	1920	2+	010612	0730	2	010620	2045	2
010606	2128	2	010612	1744	1+	010620	2300	2
010607	1616	1	010612	2136	2	010621	1604	1
010607	2012	2+	010613	1140	3	010622	1432	2+
010608	1118	1-	010613	1628	2+	010622	1729	1
010608	1322	2	010613	1850	2	010622	1830	2
010608	1604	2	010613	2000	2+	010622	2030	2
010608	1926	2+	010614	0941	2+	010622	2123	2+
010608	2051	1	010614	1706	2	010623	0511	1-
010608	2106	2+	010614	2015	2	010623	0630	2+
010608	2256	1	010615	0644	1-	010623	0838	1
010608	2320	2+	010615	0706	1+	010623	1434	2+
010609	1922	2	010615	0857	1-	010623	1731	1+
010609	2122	2	010615	1015	2	010624	0457	1-
010610	0109	2	010615	2015	2	010624	1533	2
010610	0913	2+	010615	2227	2+	010626	1330	3
010610	1248	2	010616	1914	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
A Clerkin	A29	NAA
J Winkler	A50	NAA, TBD(25.2Khz)
A Stokes	A62	NAA
J Ellerbe	A63	ICV
W Moos	A84	FTA, ICV, GBZ
M Hill	A87	NAA
J Mandaville	A90	NAA, NPM
T Poulos	A95	NAA
R Battaiola	A96	HWU
J Wallace	A97	NAA
M King	A99	GYA

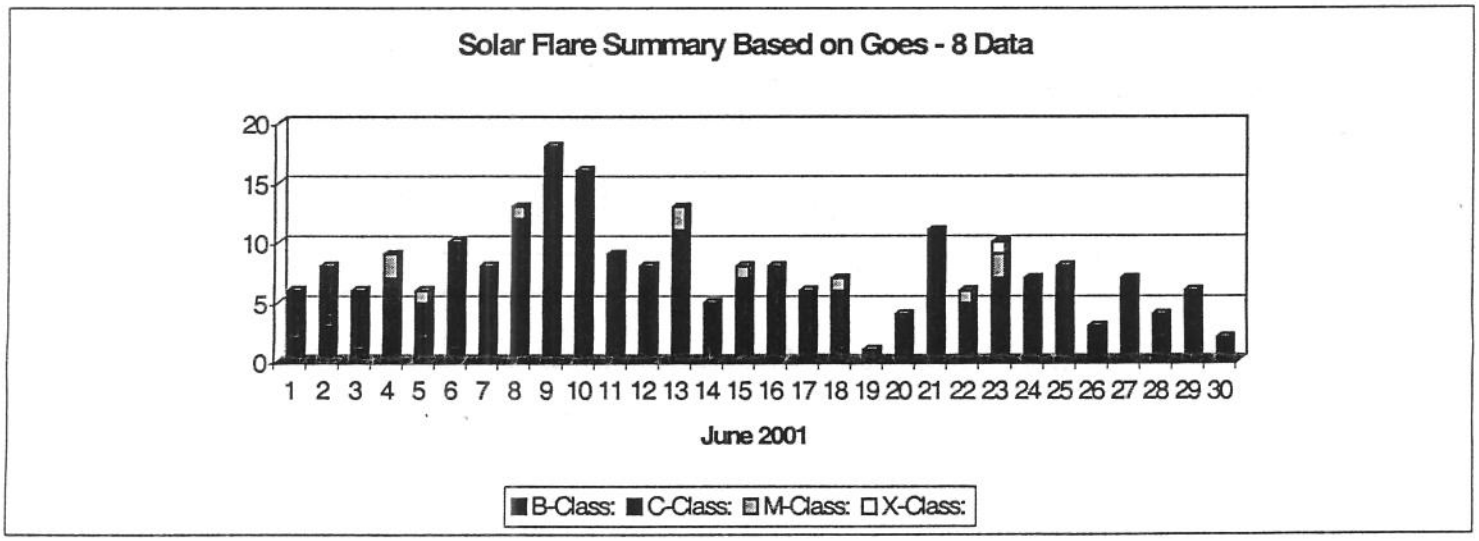
Importance	Duration (min)
1-	< 19
1	19 – 25
1+	26-32
2	33-45
2+	46-85
3	86-125
3+	> 125

Solar Events

June was a fairly busy month, especially around the 9th and 23rd. There were 235 flare events recorded by the GOES-8 satellite. However, most were lower class flares. Of those events, there were only 10 M-Class flares and 1 X-Class.

Our observers registered 76 SID Events. Most of them had an importance ratings of 2 and 2+. The most active day was the 8th of June, with many others spread out between that date and the 23rd. After that, activity really tapered off as the sun became almost devoid of spots for the rest of the month, with only 3 registered SID events.

Thanks to all of you for getting data in by the 5th. I will be asking you to do the same next month. After that you can get back to having until the 10th to get data to me.
Thanks also to those of you who send in reports that have only a few recorded events. All observations help to correlate the event reports, so whether you report 5 events or 50 events, they all are helpful.



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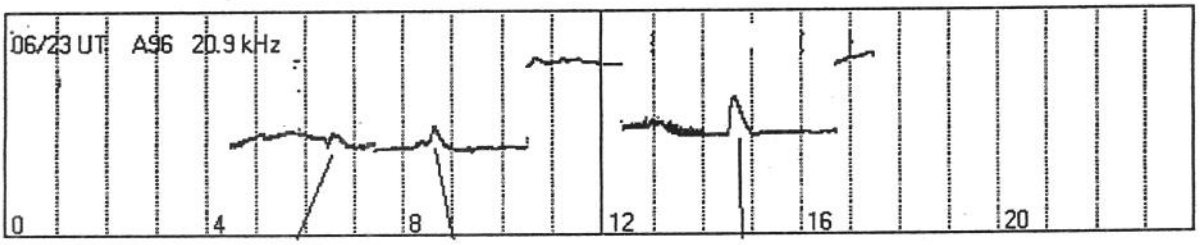
SUDDEN IONOSPHERIC DISTURBANCES SUPPLEMENT

Casper H. Hossfield, SID Sup. Editor
PO Box 23
New Milford, NY 10959, USA
capaavso@aol.com
Fax 973 853 2588

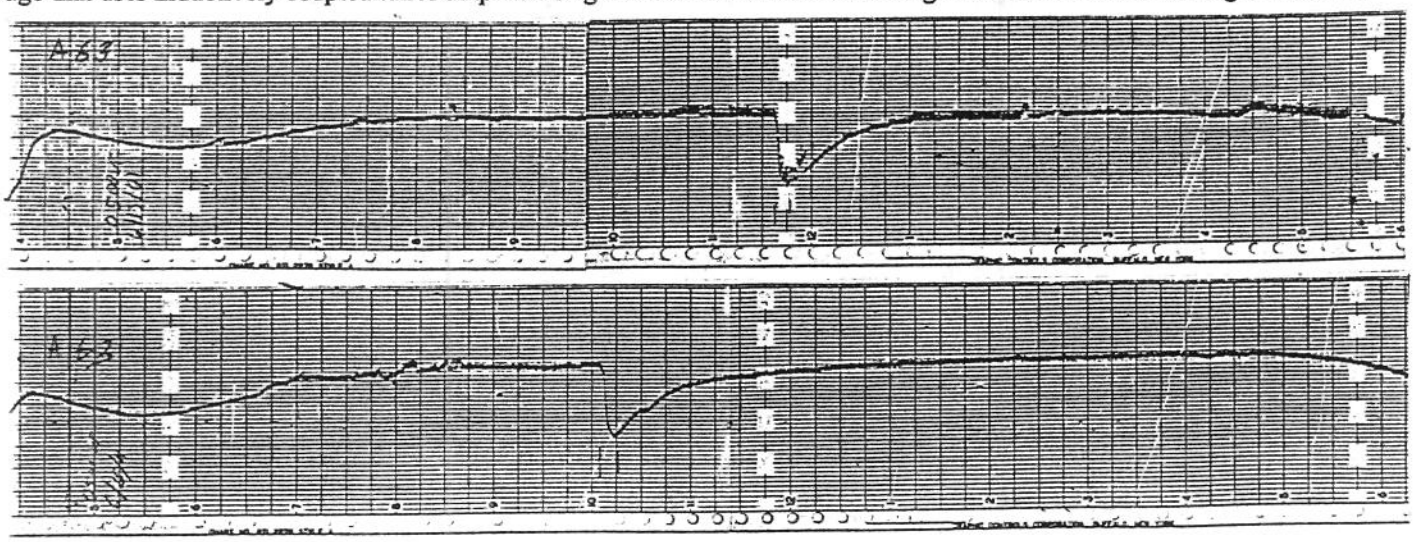
SUDDEN IONOSPHERIC DISTURBANCES
RECORDED DURING June, 2001

Roberto Battaiola in Italy made the SES recording below of three solar flares that occurred on 23 June. He sent them electronically as an attachment to an email letter for publication in this Solar Bulletin. Roberto made the recording on a computer using an A/D converter that used to be available as a kit when Joseph Lawrence was Solar Division Chairman. When Lawrence resigned almost three years ago the kit became no longer available. Many people have asked for the kit so AAVSO has now made it available again as for $35.00. It is the same MAX186 converter kit that Lawrence designed and in the same neat little Aluminum box that Joseph supplied. The aluminum box is fully machined so the kit is easy to put together. All you have to do is mount the parts in the circuit board, solder them and connect everything together with the cables which are supplied with the kit and it is ready to go. Joseph's LOGGER software used to be available from his web site which is now closed. Now the kit comes with all the software you will ever need on 3 ½ inch floppy disks with complete instructions for installing. There is a disk with Joseph's original software which is all you need to record on a computer and prepare your monthly SID report. There is another disk with a much improved program called SIDENTRY by SID analyst Mike Hill to prepare your monthly report. Another disk contains a plotting program called PICLOGGER that Roberto used to prepare his chart below. PICKLOGGER has many useful options. It can plot charts that are duplicates or Rustrak charts. You can also run the Rustrak format chart at ¼ inch/hour which is a more appropreate chart speed for recording the output of a magnetometer. If you are not up to putting kits together you can have the MAX186 A/D converter completely assembled, wired and tested for $90.00. If you are interested in this converter send me an email at my address above and I'll tell you more about it.

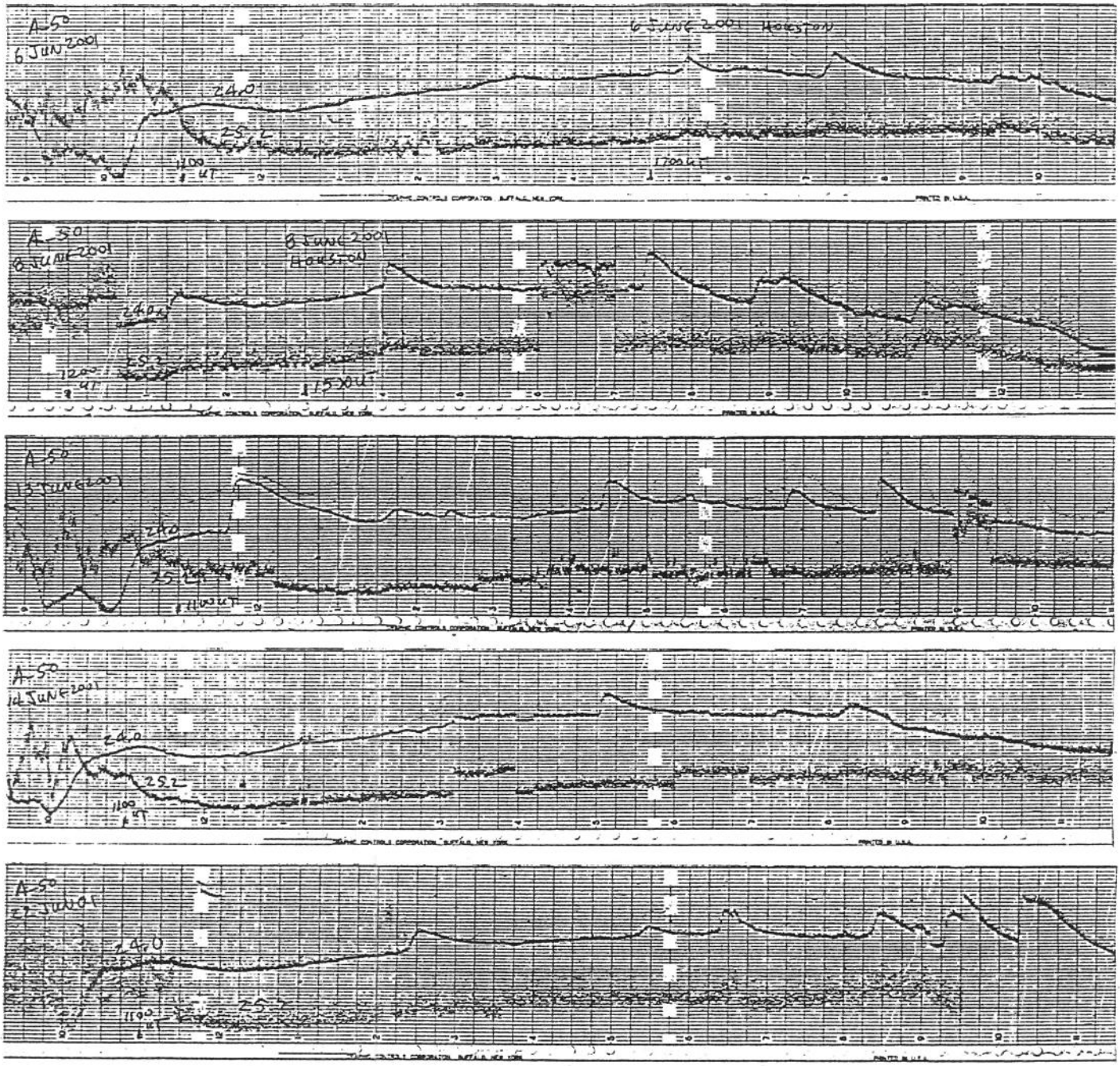


You can also record SESs on a computer using an ADR2000A A/D converter. The big advantage of this converter is it will run on your computer while you are using it for other purposes such as answering email or writing stuff in Microsoft Word or perhaps checking the news and weather. It also displays the SES chart in real time on the monitor. Lawrence's converter can do neither of these things and requires a separate dedicated computer if you want to run an SES receiver continuously as would be preferable if you want to search for gamma ray bursts. The GRBs can be detected throughout the 24-hour day unlike solar flares which can only be detected when the sun is well above the horizon. The cost of the second computer is saved by using the ADR2000A and makes up for most of the extra cost of this much better converter which costs $265.00. Al McWilliams has written excellent software with many useful options for running the ADR2000A. A letter from Al can be found on the last page of this supplement that tells of the latest improvements he has made in the software.

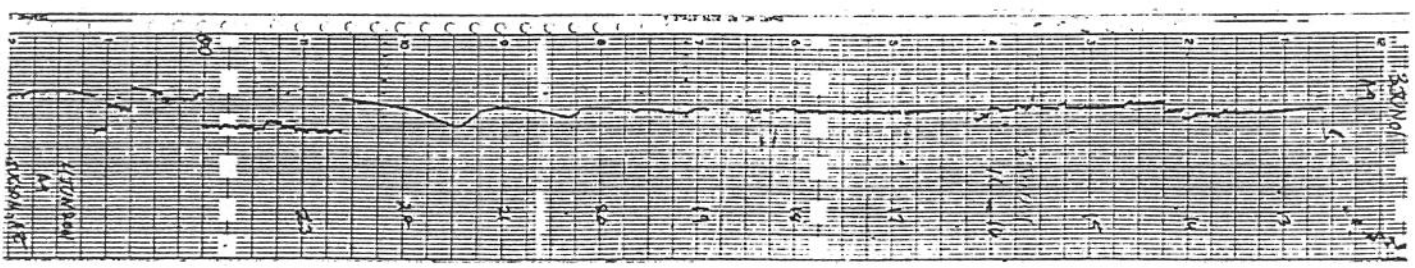
Below are two nice Rustrak SES recordings from Jamie Ellerbe in Spain. He records Italian VLF station, ICV in Sardinia and his SESs are inverted. Notice how both days are nice clean charts free of interference. Jamie uses a receiver he built many years ago that uses inductively coupled tuned amplifier stages made with Merret 6319 slug tuned coils that are no longer available.

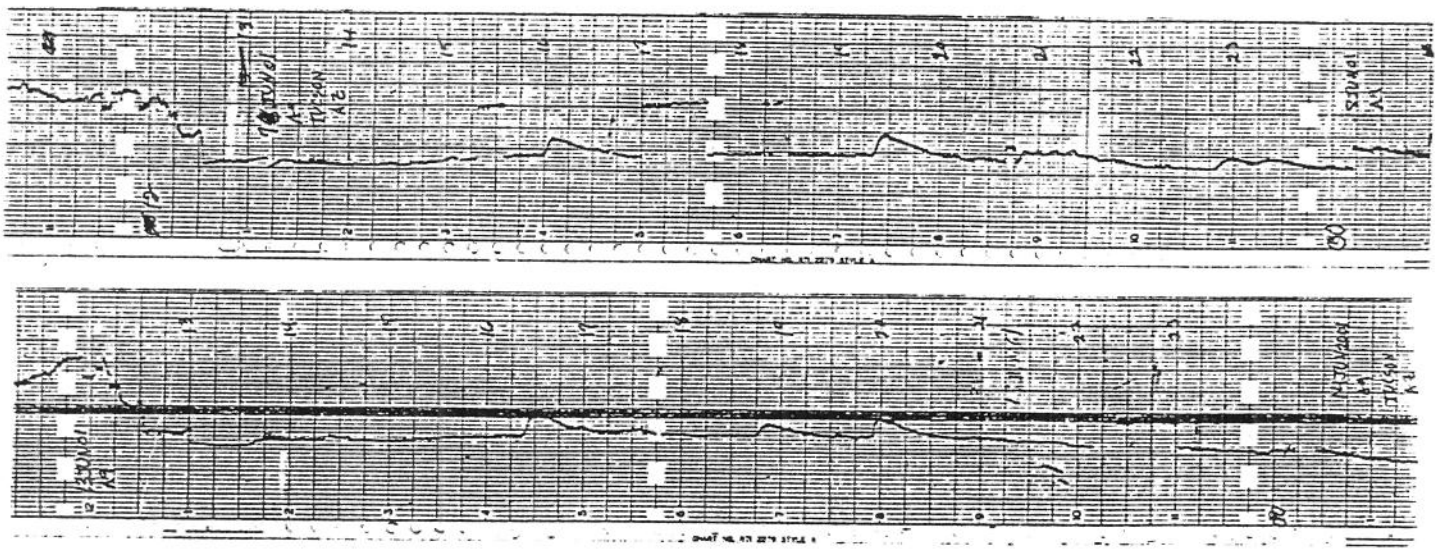


June was a month when the sun produced many flares that were recorded by AAVSO SID observers. Below are five SES charts made by Jerry Winkler, A-50, in Houston, Texas, USA. On the 8th and 13th Jerry recorded seven in one day. His multiplexed charts of NAA on 24 kHz in Maine and NPM on 21.4 in Hawaii were made with a receiver of his own design.

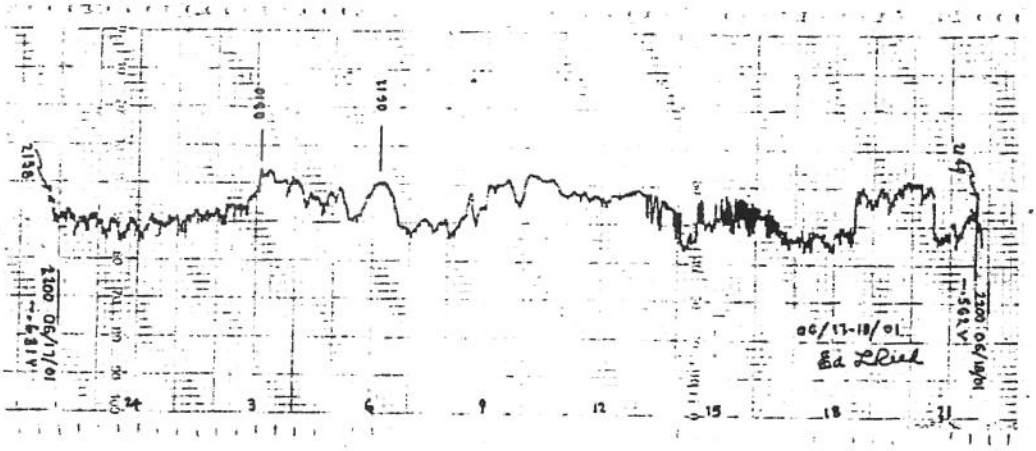


Werner Scharlach, A-9, in Tucson, Arizona, USA made the three SES charts below using a Gyrator receiver. He only recently replaced his slug-tuned-coil SES receiver with a gyrtor receiver. Werner first became an SID observer in about 1960 using n SEA receiver designed by David Warshaw, A-1, in 1956. The SEA (Sudden Enhancement of Atmospheric noise) receivers also used slug tuned coils and were tuned to 27 kHz.. They were broad band receivers that integrated the level of amospheric noise from lightning in distant thunderstorms.





AAVSO sunspot observer, Ed Reed made the magnetogram below. He made this recording of a magnetic storm on the 17th of June using a torsion balance magnetometer designed by Al McWilliams over 20 years ago. It is a simple device but still the best magnetometer for amateurs to build. Ed sent a copy of the same storm recorded by the US Geological Survey magnetic station in Tucson, Arizona not very far from where Ed lives in West Texas. The two recordings are so similar it's hard to tell the difference between them. If anyone is interested in building a McWilliams magnetometer I can send plans for it if you send me an email at my address above. Below the magnetogram is a letter from Al McWilliams describing his latest progress in writing a program to Record SIDs on the ADR2000A A/D converter mentioned above on the first page of this SID supplement.



Testing the program is progressing satisfactorily. I am making different changes all the time and hope to finalize version #1soon.

By the way, I made a simple change in the program which allows one the option to run the program at all out speed. I can now collect data at a rate of over 30 samples per second. This high rate is probably computer dependent. So Cap, maybe in another version of this software I can include a GRB and/or seismic option as well.

I suspect that many "professional" ADs have a clock built into them which triggers the readings and reading rate. In the ADR2000A case I have to rely on the computer's clock to set the reading rate. But one can bypass this entirely by ignoring the computer's clock and merely put in a simple busy cycle to delay and thereby control (roughly) the time between readings. I am still working on this. Another way to trigger readings, I suppose, is to connect an external pulse device (maybe a 555 timer chip) and feed this into a digital port of the ADR2000A to trigger readings. The rate would then depend on this external clock. So there are many possibilities. Whatever the method, the readings are correctly time stamped by the computer's clock and correctly plotted versus time.
The best trigger method would ignore the computer's clock and use some other means.

Best wishes, Al