

Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS - SOLAR DIVISION

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Table I. Mean Sunspot Numbers (Ra) for September 2002 [boldface = maximum, minimum]

Day	N	Raw	s.d.	Ra	s.d.	s.e.
1	41	188	7.8	139	4.2	0.66
2	37	201	7.9	153	4.2	0.69
3	46	217	9.4	165	4.8	0.71
4	46	216	9.2	162	4.8	0.71
5	40	220	10.8	158	5.1	0.81
6	45	177	8.2	136	3.9	0.58
7	43	179	9.7	135	4.5	0.69
8	45	184	8.4	136	4.1	0.61
9	39	179	9.0	134	4.0	0.64
10	46	176	8.0	132	4.2	0.62
11	40	178	9.2	135	4.2	0.66
12	42	179	8.9	133	4.7	0.73
13	40	156	9.0	118	4.9	0.77
14	35	142	6.3	111	3.6	0.61
15	33	157	10.7	115	6.6	1.15
16	27	153	8.7	118	4.4	0.85
17	36	175	7.2	134	4.3	0.72
18	35	194	9.3	141	4.0	0.68
19	34	191	8.4	140	4.5	0.77
20	33	173	8.5	128	4.6	0.80
21	27	157	8.0	114	3.7	0.71
22	28	171	9.6	134	4.7	0.89
23	33	175	8.0	133	4.2	0.73
24	41	162	7.9	122	3.9	0.61
25	29	162	7.6	117	4.6	0.85
26	30	128	6.3	102	4.6	0.84
27	28	140	7.5	106	4.1	0.77
28	28	108	6.2	87	3.3	0.62
29	37	99	5.0	77	2.8	0.46
30	33	91	6.8	70	3.1	0.54
31	---	---	---	---	---	---

Means: 36.6 167.6 126.2

Total No. of Observers: 70

Total No. of Observations: 1097

Table II. September Observers

14 AAP P.Abbott	24 KAPJ J.Kaplan
7 ANDE E.Anderson	23 KHAR R.Khan
17 ARAG G.Araujo	13 KNJS J&S Knight
8 ATON A.Attanasio	1 KUZM M.Kuzmin
12 BARH H.Barnes	11 LARJ J.Larriba
6 BATR R.Battaiola	16 LERM M.Lerman
14 BEB R.Berg	24 LEVM M.Leventhal
5 BEDJ J.Bedient	14 LUBT T.Lubbers
16 BERJ J.Berdejo	24 MALK K.Malde
9 BMF M.Boschat	7 MARE E.Mariani
15 BOJP P.Bojda	28 MARJ J.Maranon
8 BOSB B.Bose	16 MCE E.Mochizuki
24 BRAB B.Branchett	11 MMI M.Moeller
10 BRAD D.Branchett	2 MUDG G.Mudry
29 BROB R.Brown	12 RICE E.Richardson
4 CAMP P.Cambell	19 RITA A.Ritchie
18 CARJ J.Carlson	21 SCGL G.Schott
29 CHAG G.Morales	9 SCHG G.Scholl
25 CKB B.Cudnik	13 SIMC C.Simpson
16 CLZ C.Laurent	18 STEM G.Stemmler
20 COMT T.Compton	20 STQ N.Stoikidis
30 CORA A.Coroas	18 SUZM M.Suzuki
26 CR T.Cragg	18 SZAK K.Szatkowski
12 DELS S.Delaney	22 SZUM M.Szulc
5 DEMF F.Dempsey	20 TESD D.Teske
20 DGP G.Dyck	22 THR R.Thompson
20 DRAJ J.Dragesco	10 TJV J.Temprano
26 DUBF F.Dubois	27 URBP P.Urbanski
27 ELR E.Reed	19 WILW W.Wilson
3 ERRA A.Errico	10 WITL L.Witkowski
18 FEEC C.Feehrer	
13 FUJK K.Fujimori	
23 GIOR R.Giovanoni	
11 GOTS S.Gottschalk	
13 HALB B.Halls	
9 HAYK K.Hay	
15 HRUT T.Hrutkay	
19 JAMD D.James	
7 JEFT T.Jeffrey	
2 JENS S.Jenner	

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 September 2002

Day	RG	S:G	Day	RG	S:G	Day	RG	S:G	Day	RG	S:G
1	10.1	8.6	9	9.3	9.3	17	10.1	7.3	25	9.7	6.7
2	11.3	7.8	10	8.2	11.5	18	11.3	7.2	26	8.1	5.8
3	11.6	8.7	11	7.3	14.4	19	12.1	5.8	27	8.6	6.3
4	11.3	9.1	12	6.9	15.9	20	10.4	6.6	28	6.5	6.6
5	10.3	11.4	13	6.4	14.4	21	9.0	7.4	29	5.9	6.8
6	8.5	10.8	14	6.2	12.9	22	10.0	7.1	30	4.5	10.2
7	9.6	8.7	15	7.8	10.1	23	10.5	6.7	31	---	---
8	10.4	7.7	16	9.0	7.0	24	9.8	6.5	Mn.	9.02	8.84

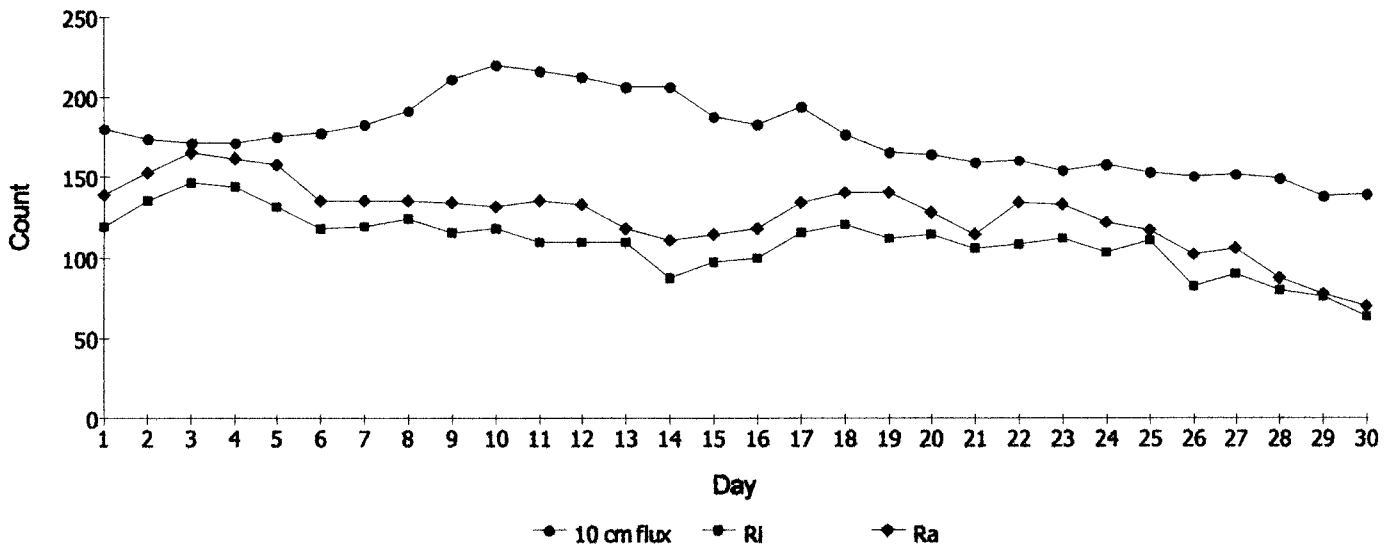


Fig. 1. 10 cm Solar Flux and Comparison of Ri (provisional) with Ra Estimates for September 2002; $r=0.960$.

Ri source: <http://www.sidc.oma.be/index.php3>
 10 cm source: <http://www.drao.nrc.ca/icarus>

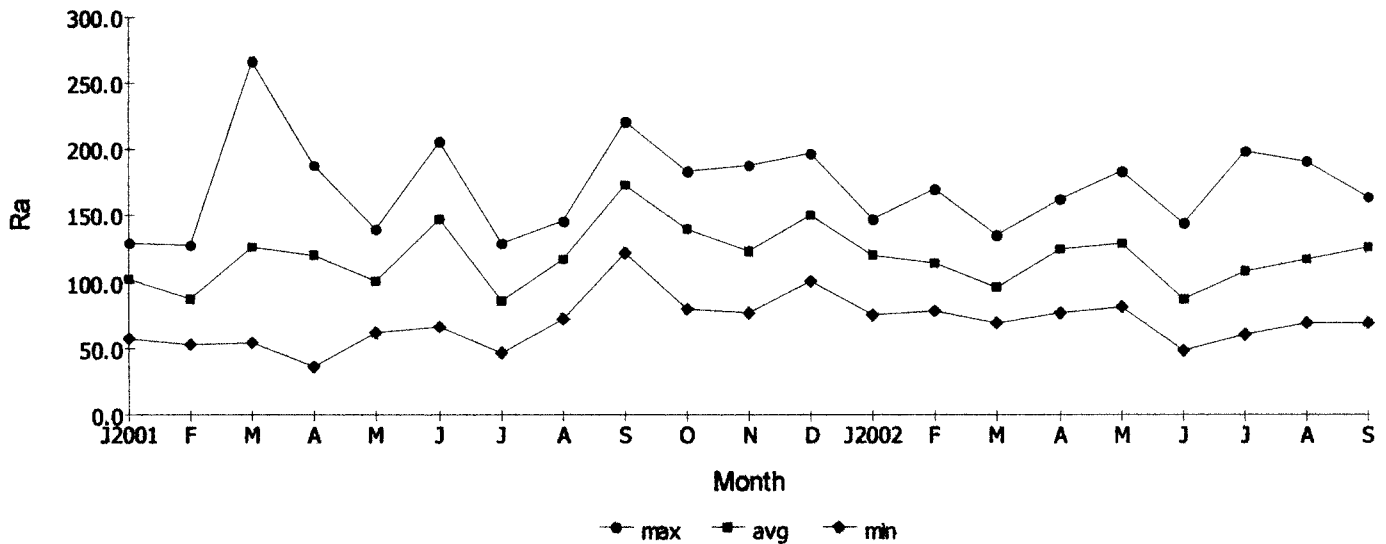
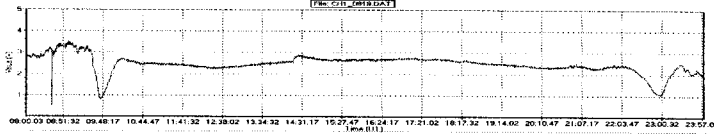


Fig. 2. Maximum, Mean, and Minimum Values of Ra for Each Month from January 2001 to Present.

Sudden Ionospheric Disturbance Report

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 noatak@aol.com



Sudden Ionospheric Disturbances (SID) Recorded During September 2002

(Analysis performed by Michael Hill, SID Analyst)

Date	Max	Imp	Date	Max	Imp	Date	Max	Imp
020901	0933	1+	020915	1924	1	020930	0151	2
020901	1231	1+	020917	0921	1	020930	0532	1-
020901	1645	1-	020918	1030	2	020930	0544	2
020901	2024	2	020918	1724	2	020930	0639	1+
020902	0910	1-	020919	0517	3+	020930	0810	1
020903	0745	1-	020919	0814	1+	020930	0919	1+
020904	0630	1	020919	1437	1+			
020905	1241	2	020920	0000	2+			
020906	1629	1+	020920	0510	1+			
020906	1644	1	020920	0926	2			
020907	1744	2	020920	0933	2			
020908	0140	2	020921	1704	1+			
020908	1449	1+	020922	0552	1+			
020910	1033	2	020924	1603	2			
020910	1456	1+	020927	0822	2+			
020910	1722	2	020927	1302	2+			
020911	0736	2	020927	1311	2			
020911	1051	2	020927	1452	2+			
020912	0713	2	020927	1653	2			
020912	1155	1-	020927	1908	2			
020913	0714	2	020927	1945	2			
020915	0447	1+	020929	0640	2			
020915	0750	1	020929	0855	2			
020915	1538	1	020929	0903	2			
020915	1737	2	020929	1451	1			

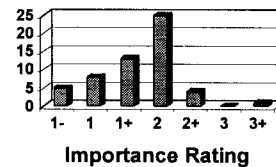
Importance rating : Duration(min)	-1: <19	1: 19-25	1+: 26-32	2: 33-45	2+: 46-85	3: 86-125	3+: >125
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The events listed above meet at least one of the following criteria

- 1) Event reported by two or more observers within ± 5 minutes
- 2) Event matched to GOES-8 XRA event to within ± 15 minutes and event time < 1000 UT
- 3) reported by observer with a quality rating > 8 (scale 1-10)

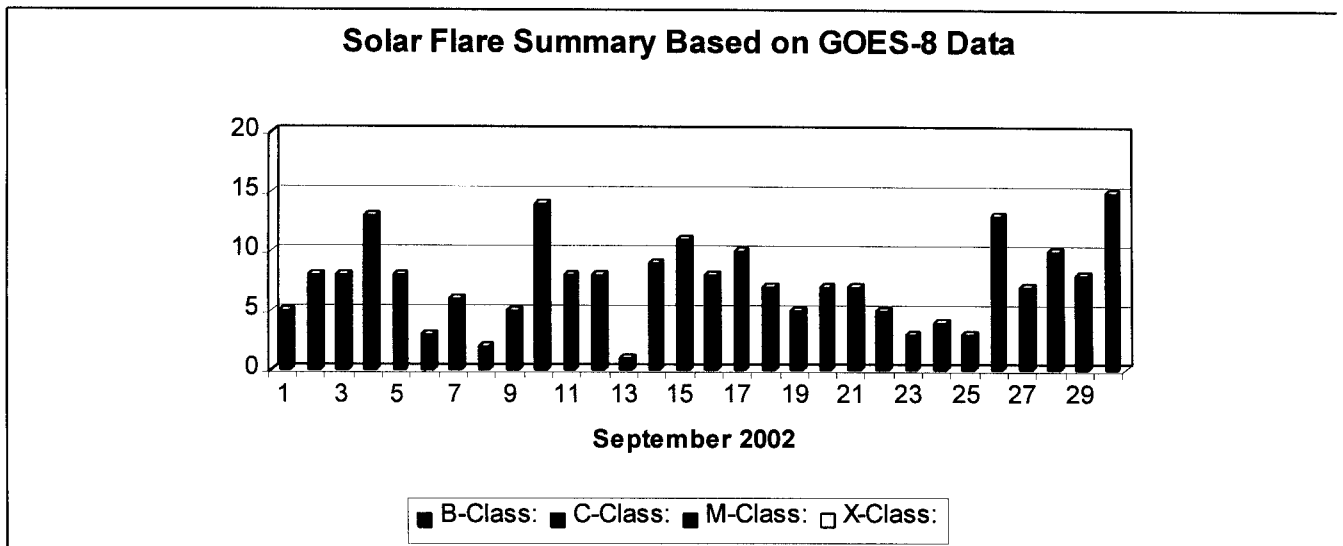
Observer	Code	Station(s) monitored
P Campbell	A100	NLK
S Bressan	A101	HWU
F Steyn	A102	NAA NWC
E Smith	A105	DHO
A Clerkin	A29	NAA
D Toldo	A52	HWU NAA NWC
J Ellerbe	A63	ICV
A Panzer	A83	NAA
W Moos	A84	DHO FTA
M Hill	A87	NAA
G DiFillipo	A93	HWU
T Poulos	A95	NAA
R Battaiola	A96	DAO HWU
J Wallace	A97	NAA
M King	A99	HWU

SID Events Recorded for September 2002



Solar Events

Solar Flare activity slowed down significantly in September. There were 220 X-Ray flare events recorded by the GOES-8 spacecraft. Of those only 13 were M-Class events with no X-Class events. This was borne out in our observers data. We recorded only 56 correlated events, most of average importance rating. Now that I have the automated analysis program written, I am starting to do the analysis on the six months of backlogged data from January – June of 2000. So those of you who contributed for those months can be happy that your data will soon make it into the AAVSO SID Database. It will be nice to fill in this gap in the data set. Thanks to all of you for your continued contributions to the SID program.



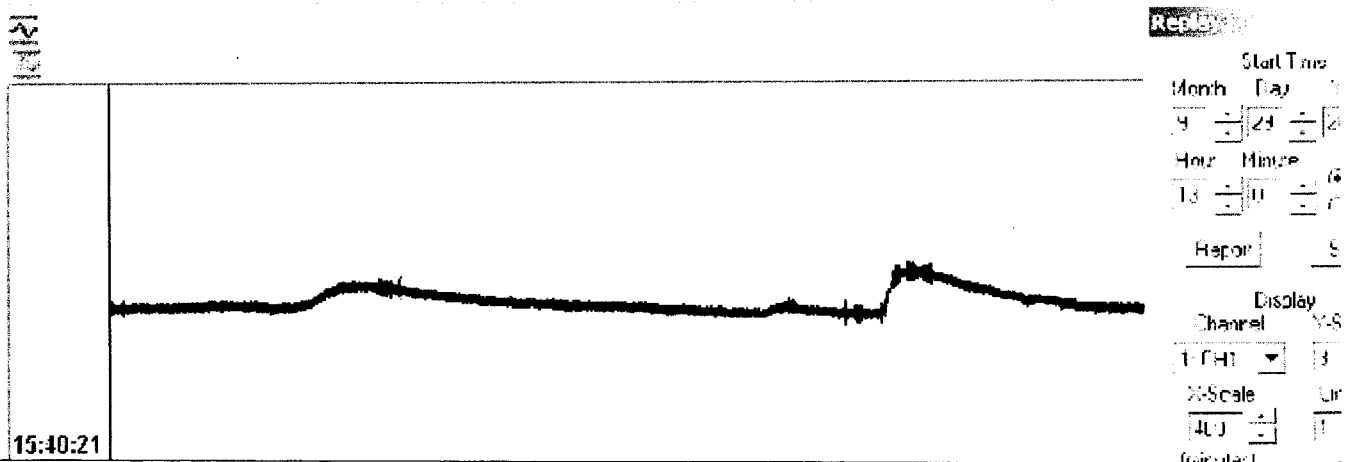
SUDDEN IONOSPHERIC DISTURBANCES SUPPLEMENT

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 PO Box 23
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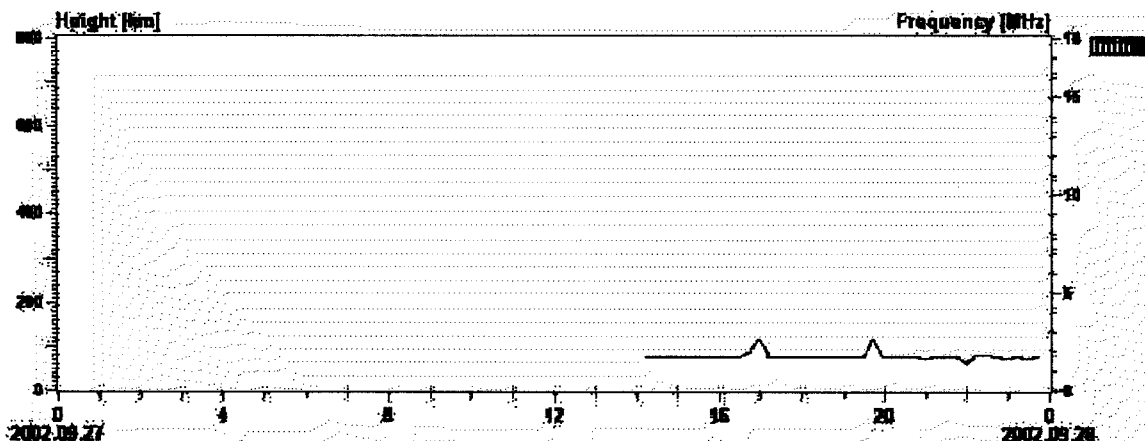
**SUDDEN IONOSPHERIC DISTURBANCES
 RECORDED DURING SEPTEMBER, 2002**

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 Fax 973 853 9054

Various very low frequency (VLF) radio receivers can be used to detect solar flares as sudden ionospheric disturbances (SIDs). The chart below shows an SID recorded with a Sierra 127B-CR frequency selective voltmeter, a device used to measure the signal strength of VLF radio signals. Steve Hansen, A59, uses one of these triple conversion superhetrodyne receivers that he bought from Fair Radio Sales, a surplus dealer in Lima Ohio back in the '80s to record SIDs. Steve records by computer using an A/D converter and software that is normally used by amateur seismologist to record his SIDs. Here, in his own words, is Steve's description of how he recorded the SIDs below: Here are the two relevant screen captures. The first (927sid.jpg) is my 24.0 SES trace for NAA on 9/27/02. The shot is of the replay screen of Larry Cochrane's WinSDR, a program normally used with amateur seismographs. It can record up to 8 channels with sample rates of 5 to 200 samples per second. The program has to be used with Larry's A/D board. The time at any point on the record can be read by placing the cursor at the point of interest and the time will appear in a box at the lower right. Full details can be found at Larry's site at <http://psi.quake.net/>

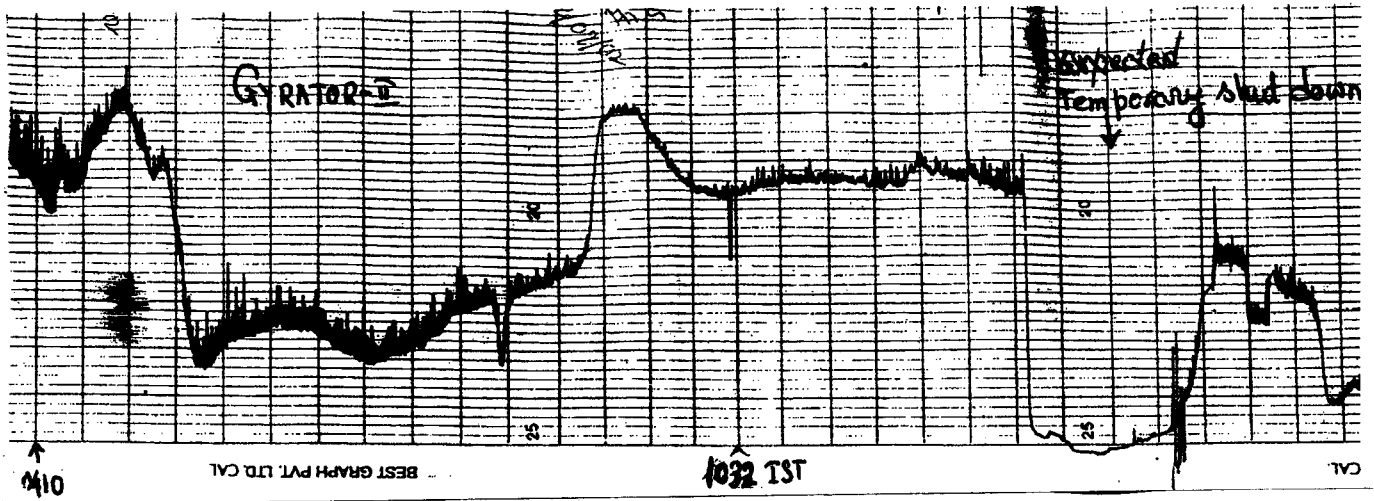


Steve lives near Amherst, massachusetts and not far from NOAA's Millstone Hill ionosonde station. Steve has found that the ionosonde also detects SIDs Here is how Steve describes it: I get my fmin data from the Millstone Hill ionosonde which is located in Westford, MA just a few miles south of my location. The data can be obtained from the website at <http://ionosonde.millstonehill.edu/>. For analyzing the daily data I use a program called SAO-Explorer that can be downloaded from the University of Massachusetts at Lowell's Center for Atmospheric Research at <http://ulcar.uml.edu/>. (SAO stands for Standard ADEP Output, a format for archiving ionosonde data.) So, the second file (927fmin.jpg) shows the fmin record for the same day. Note the two peaks that correspond to the SES events.

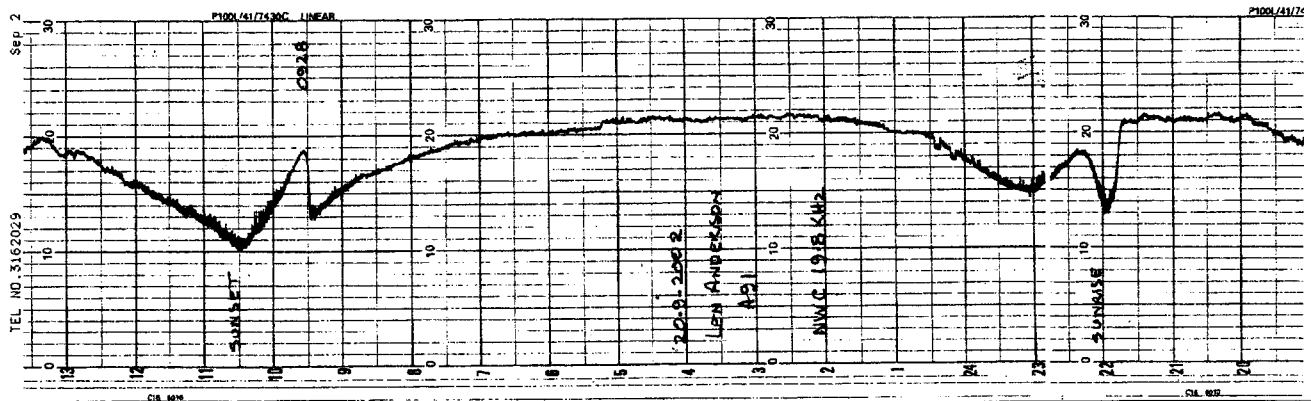


Steve is the publisher of "The Bell Jar" a little periodical for amateur scientists interested in vacuum technology. He has been helping Jim Mandaville, A90, build a cosmic ray detector that Jim will use to record Forbush Decreases that are the signature of the sun's coronal mass ejections. This homemade detector is first partially evacuated and then flushed out and filled with Argon and a small amount of ethyl alcohol as a quencher.

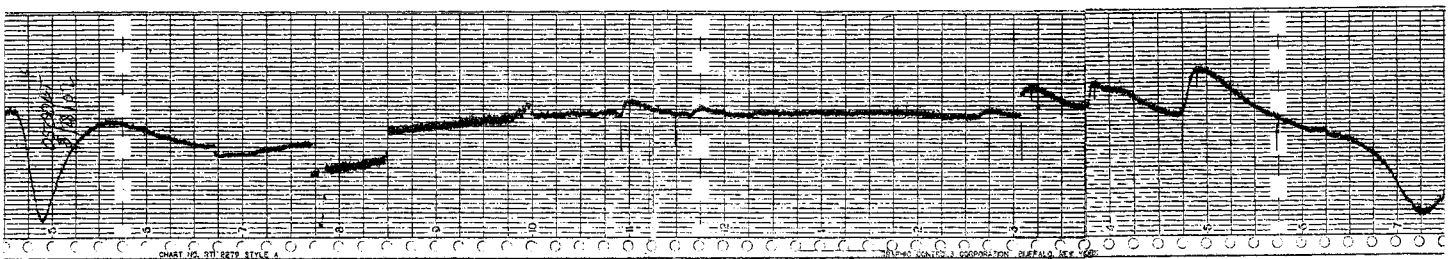
Below is a nice chart showing an SID recorded as an SES of VLF station VTX3 in India transmitting on 18.2 kHz. It was made by Biswajit Bose, A103, who lives in Calcutta, India. Biswajit was the first to build a loop antenna receiver I first described in the March issue of the SID Supplement. He has his 1.5 meter loop antenna mounted on the roof with TV antennas because there is no other place to put it in down town Calcutta where he lives. At first he tuned it to NWC in West Australia but the 19.8 kHz signal is too weak to overcome interference from the TV antennas. Later he tuned it to VTX3 which is about 750 km distant and puts in a much more powerful signal that can overcome the TV interference. Unfortunately VTX3 is not on the air continuously so there are interruptions in the trace but other than that it is a good signal source for detecting solar flares. Biswajit is an AAVSO sunspot observer. He is also interested in radio astronomy and belongs to SARA. He is presently working with professional radio astronomers at Pune, India where there is a big 45meter dish. They are observing the peculiar object SS433, a micro quasar.

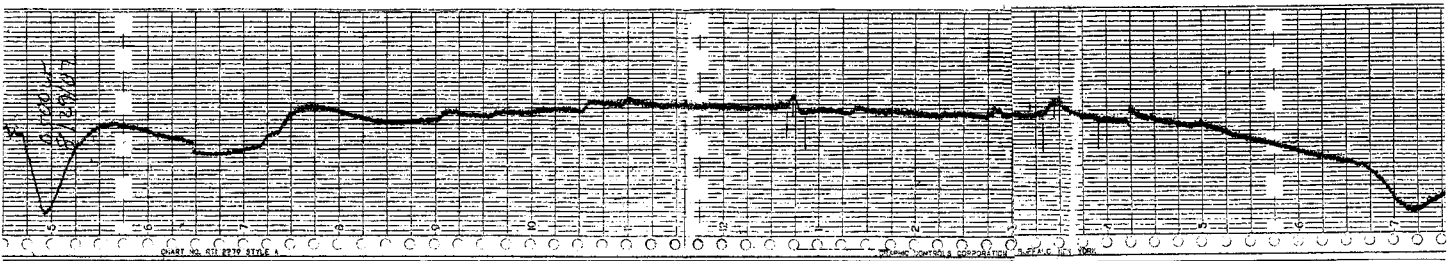


The last days of September were days when the sun was quite active producing solar flares. Len Anderson, A91, in South Perth, West Australia recorded a flare on 28 September shown below as an SID starting at 0930 UT, about an hour before his sunset pattern reached its minimum value.



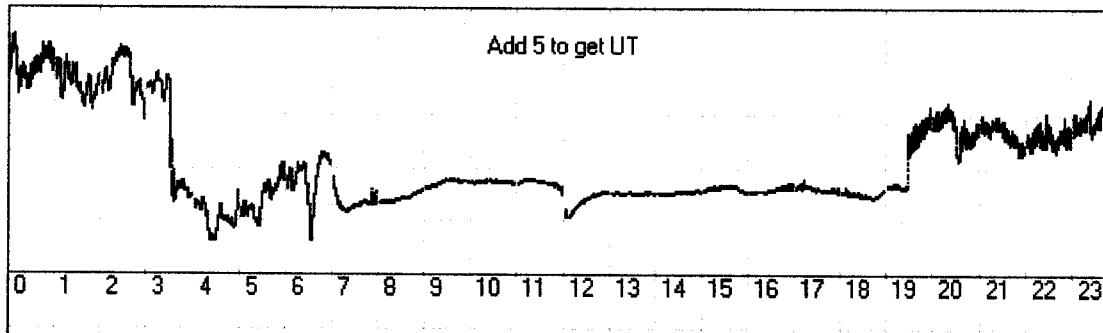
James Ellerbe, A63, in Nerja, Spain recorded flares on 28 and 29 September as SIDs using VLF station, ICV, in Sardinia as his signal source. He uses a Gyrator receiver built by Art Stokes and records on a Rustrak strip chart recorder.





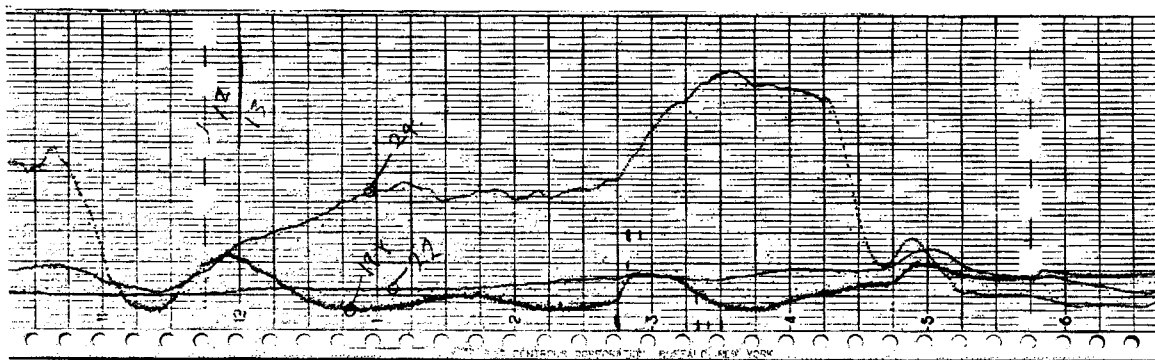
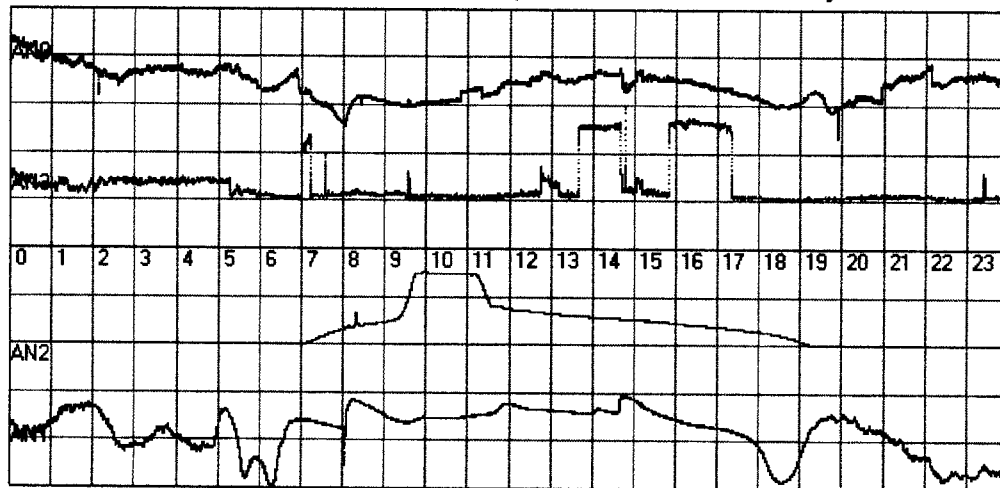
Here is a recording of a flare as an SID made by Al McWilliams, A94, in St Cloud Minnesota. Al records the VLF station in La Mourie, North Dakota, USA transmitting on 25.2 kHz. The SID is inverted as are all of his SIDs of this station.

25.2 kHz RCVD at ST. CLOUD 9/21/02 12:00:00 AM 10 point filter 1 sec/scan 5 of 20 days



Here is an SID recorded by Jerry Winkler, A50 in Houston, Texas, USA. Jerry uses the same ADR2000A converter that Al McWilliams uses. These A/D converters have the advantage that they record in the background while other things are being done with the computer like answering email.

25.2.NPM,NAA,Houston 9/27/02 12:00:02 AM 10 point filter 1 sec/scan 2 of 5 days



Here is a multiplexed recording made by Domenic Toldo in Johannesburg, South Africa. The three signals that are multiplexed are NAA in Maine, USA, NWC in Northwest Cape, Australia. And a signal on 22 kHz which may be HWU in le Blanc, France transmitting on 21.75 kHz. The NWC signal recorded an SES starting at 0245 UT on 13 August but this chart was received too late to appear in the August SID Supplement. This SES was also recorded by A91 and A102.