Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS - SOLAR DIVISION

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Volume 58 Number 1 **January 2002**

Table I. Mean Sunspot Numbers for January 2002
[boldface = maximum, minimum]

Day	N	Raw	s.d.	K-corrected	s.d.	s.e.
1	30	176	9.1	136	3.6	0.66
2	28	191	9.4	145	4.3	0.81
3	33	197	7.9	**147**	4.7	0.82
4	34	200	9.1	147	3.9	0.67
5	26	163	10.2	119	4.1	0.80
6	24	133	11.7	92	4.9	1.00
7	23	103	8.5	**76**	3.2	0.67
8	29	138	5.2	105	2.6	0.48
9	30	163	6.3	121	2.3	0.42
10	27	173	9.6	126	4.6	0.89
11	33	181	7.6	142	4.4	0.77
12	28	188	9.8	141	3.8	0.72
13	27	192	8.4	144	5.7	1.10
14	27	183	8.7	135	3.6	0.69
15	21	146	8.0	111	3.9	0.85
16	26	112	6.0	85	2.8	0.55
17	22	105	5.1	87	3.8	0.81
18	29	125	4.8	92	3.4	0.63
19	22	144	7.3	104	3.9	0.83
20	29	153	9.0	118	3.4	0.63
21	20	175	8.8	132	4.7	1.05
22	34	180	9.0	134	3.1	0.53
23	25	172	14.1	128	5.7	1.14
24	23	154	11.8	114	5.4	1.13
25	34	142	8.1	102	4.2	0.72
26	29	145	5.5	115	3.2	0.59
27	31	164	10.2	120	4.3	0.77
28	33	165	10.8	126	4.6	0.80
29	27	163	10.6	122	5.1	0.98
30	24	170	9.0	122	3.0	0.61
31	30	174	10.0	129	3.7	0.68

Means: 27.7 160.3 119.9

Total No. of Observers: 66

Total No. of Observations: 858

Table II. January Observers

15	AAP	P.Abbott
2	ANDE	E.Anderson
10	ATON	A.Attanasio
19	BARH	H.Barnes
10	BATR	R.Battaiola
13	BEB	R.Berg
6	BERJ	J.Berdejo
8	BMF	M.Boschat
9	BOSB	B.Bose
22	BRAB	B.Branchett
20	BRAD	D.Branchett
25	BRAR	R.Branch
23	BROB	R.Brown
8	CARJ	J.Carlson
31	CHAG	G.Morales
21	CKB	B.Cudnik
8	CLZ	L.Corp
3	COMT	T.Compton
28	CR	T.Cragg
1	DEMF	F.Dempsey
21	DGP	G.Dyck
19	DRAJ	J.Dragesco
14	DUBF	F.Dubois
25	ELR	E.Reed
8	FEEC	C.Feehrer
19	FERJ	J.Fernandez
15	FLET	T.Fleming
23	FUJK	K.Fujimori
22	GIOR	R.Giovanoni
9	GOTS	S.Gottschalk
17	GUNM	M.Gundlach
3	HALB	B.Halls
22	JAMD	D.James
16	JEFT	T.Jeffrey
6	KHAR	R.Khan
16	KNJS	J&S Knight
2	KUZM	M.Kuzmin
7	LARJ	J.Larriba
5	LERM	M.Lerman
19	LEVM	M.Leventhal
22	MARJ	J.Maranon
26	MCE	E.Mochizuki
7	MILJ	J.Miller
10	MMI	M.Moeller
2	MUDG	G.Mudry
18	OBSO	IPS Observatory
2	RAMJ	J.Ramsey
10	RICE	E.Richardson
15	RITA	A.Ritchie
12	SCGL	G.Schott
4	SCHG	G.Scholl
4	SIMC	C.Simpson
9	STEF	G.Stefanopoulos
20	STQ	N.Stoikidis
27	SUZM	M.Suzuki
2	SZAK	K.Szatkowski
6	SZUM	M.Szulc
17	TESD	D.Teske
10	THR	R.Thompson
5	TJV	J.Temprano
4	URBP	P.Urbanski
12	VALD	D.delValle
16	VARG	A.Vargas
7	WILW	W.Wilson
8	WKW	K.Watts
13	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 January

Day	RG	S:G	Day	RG	S:G	Day	RG	S:G	Day	RG	S:G
1	10.8	6.3	**9**	9.0	8.1	**17**	7.1	4.8	**25**	9.5	5.0
2	11.5	6.6	**10**	8.6	10.1	**18**	8.1	5.4	**26**	8.8	6.5
3	12.0	6.4	**11**	10.3	7.6	**19**	9.6	5.0	**27**	8.6	9.1
4	12.5	6.0	**12**	10.8	7.4	**20**	10.2	5.0	**28**	9.3	7.7
5	10.5	5.5	**13**	10.4	8.5	**21**	11.3	5.5	**29**	8.8	8.5
6	8.3	6.0	**14**	10.4	7.6	**22**	11.0	6.4	**30**	9.3	8.3
7	6.6	5.6	**15**	9.2	5.9	**23**	12.1	4.2	**31**	8.0	11.8
8	8.7	5.9	**16**	7.7	4.6	**24**	10.3	5.0	**Mn.**	**9.7**	**6.6**

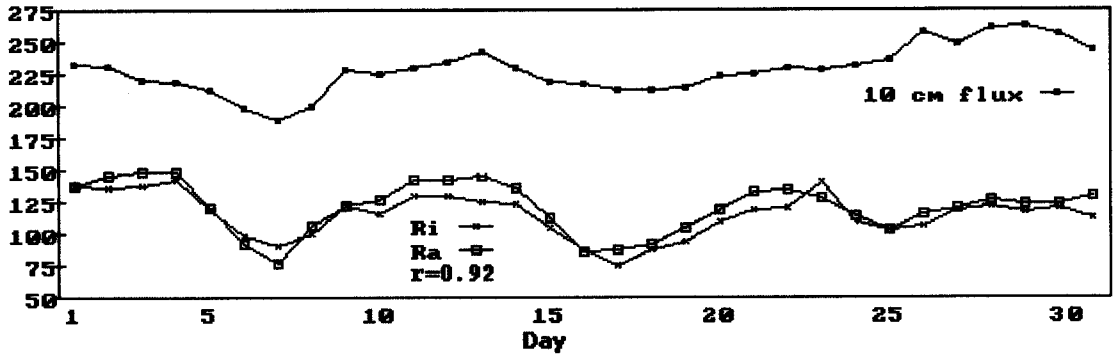

Fig. 1. 10 cm Solar Flux and Comparison of Ri (provisional) and Ra Estimates for January.
(Ri Source:http://sidc..oma.be/index.php3)
(!0cm Source: http://www.drao.nrc.ca/icarus)

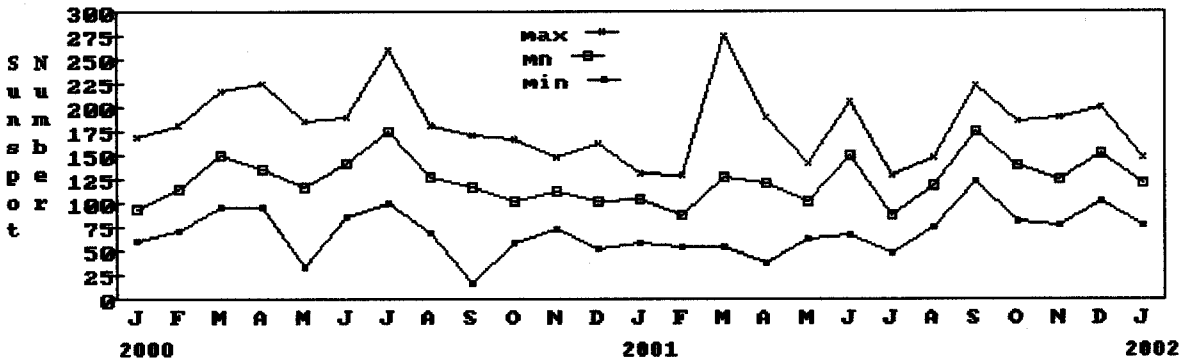

Fig. 2. Maximum, Mean, and Minimum Ra Values for Each Month from January 2000 to Present.

Smoothed Mean Sunspot Number (Rsm) for July 2001: 124.0

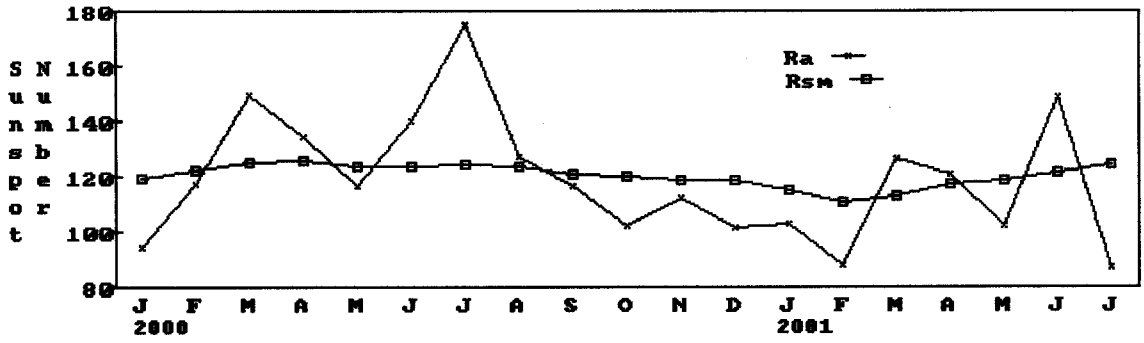

Fig. 3. Monthly Ra and Smoothed Mean Sunspot Numbers (Waldmeier method).

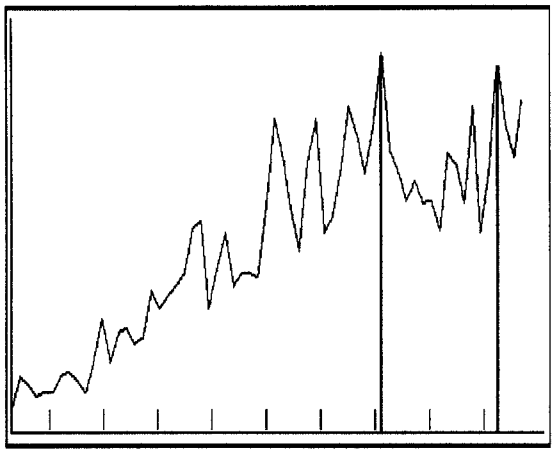

Fig. 4a. Plot showing peaks in Ra in July 2000 and September 2001.

Recently, sources that report on the sun's activity (see for example, http://science.nasa.gov,Jan.18; http://www.nationalacademies.org, Jan. 24) have pointed to evidence of a second maximum in the current solar cycle. This possibility is suggested by both sunspot counts and radio activity and may represent occurrences of "twin" peaks similar to those observed in the last two cycles. The AAVSO Solar Division's data clearly support the argument for a double maximum, and the peaks can be seen in Figures 2 and 3.

Figure 4a (left) presents a more favorable plot of a portion of the cycle, beginning with a rise in Ra from October 1996 and continuing to December 2001. Maximum values of the Ra index are identified with July, 2000 and September, 2001.

Figure 4b below presents a close-up of the critical region, along with the plot of a 4th order polynomial (smooth line) that helps to highlight the overall symmetry of this portion of the distribution.

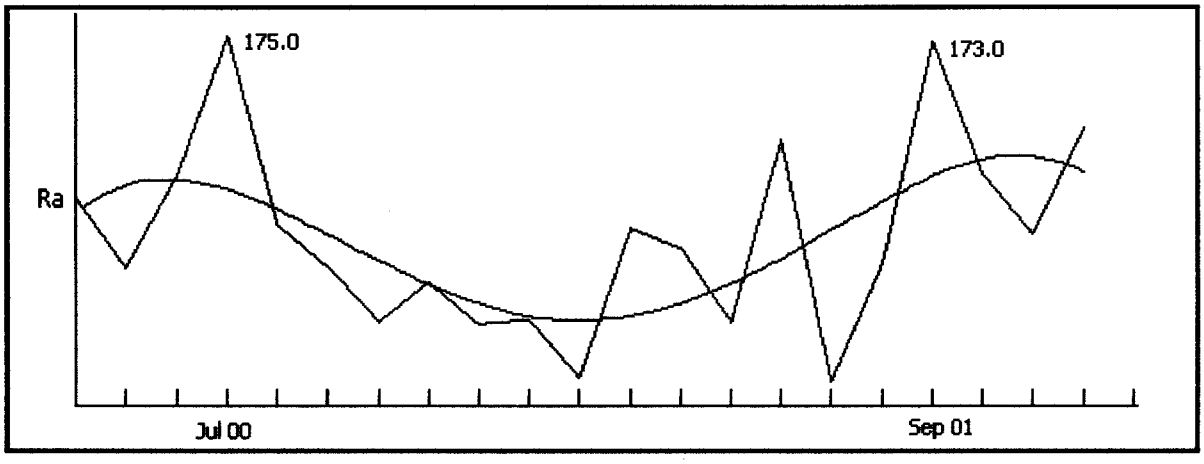

Fig. 4b. Close-up of Critical Region.

Editor's Notes

Death of a SID Observer

I regret to inform you of the death of Phil Del Vecchio (A-03) in December, 2001 at the age of 97. Phil's participation began in 1956 when the AAVSO's SID observation program was initiated in support of the International Geophysical Year (IGY) activities. Details of Phil's interests and contributions to the AAVSO can be found in Casper Hossfield's supplement to this issue of the Bulletin.

Omissions in December 2001 Bulletin

Two names were omitted from the Vol. 57, No. 12 list of observers (Table IV) who contributed sunspot reports in 2001. One of the observers, Laurent Corp (CLZ), who lives in Rodez, France, has been a loyal observer for several years and has recently contributed several solar photographs to the AAVSO/Solar Division website. The second observer, Javier Temprano, (TJV), lives in Santander, Spain and made his first report to the Division at the end of December. I apologize to both of you for having failed to include your names in the table.

Returning Observers

After interruptions of several years, three former observers, Marcelo Gundlach (GUNM), who lives in Cochabamba, Bolivia, James Ramsey (RAMJ), who lives in Batesville, Arkansas, and Kenneth Watts (WKW), from North Hill, California, submitted reports this month. Thank you for your observations and welcome back!

Additions to Bulletin

Beginning with this issue of the Bulletin, a plot of the 10-cm flux measurements reported by the Dominion Radio Astrophysical

Observatory (DRAO) of Canada will routinely be included in Figure 1. Also included in the Figure will be the correlation between Ri and Ra indices.

Reminder: Deadline for Submission of Monthly Sunspot Reports

Often, several email and regular mail reports arrive too late for inclusion in the monthly database that is used to produce the estimates of the Ra index. This can result in greater uncertainty (larger standard deviations and/or standard errors) in our estimate of the sunspot number than would be the case if the full set of contributed reports was able to be used. The effective "loss" of data is of particular concern when, during the winter months in northern Europe and the U.S., the numbers of observations typically tend to be lower than during the rest of the year.

The value of the Ra index to the solar research community is directly related to the numbers of observations that are used in its preparation. Please try very hard to get your monthly report into the AAVSO's hands by *5pm EST on the 10th* of the month. Earlier, if possible. Thank you.

Clear Skies,

-CEF

Sudden Ionospheric Disturbance Report

Michael Hill, SID Analyst
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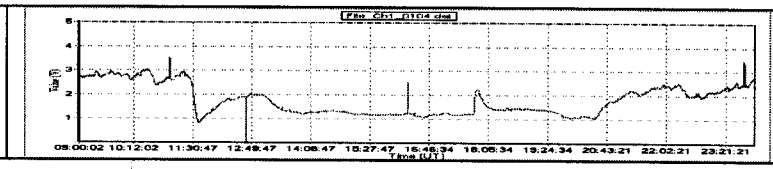


Sudden Ionospheric Disturbances (SID) Recorded During January 2002

(Analysis performed by Michael Hill, SID Analyst)

Date	Max	Imp	Date	Max	Imp	Date	Max	Imp
020202	0930	1-	020212	1842	3	020222	1428	1-
020202	1247	2	020213	1313	1+	020224	1508	1-
020202	1758	1+	020213	1340	1	020225	1820	1+
020203	1713	2	020213	1526	2+	020225	1909	1+
020204	1746	2+	020213	1712	1	020225	2218	2+
020204	1829	1+	020213	1947	2	020226	1450	1-
020204	2016	3	020215	1729	1-	020226	1954	2+
020205	1041	2	020215	1752	1	020229	0855	1+
020205	1714	2+	020216	0811	1	020230	1228	1+
020205	1828	2+	020216	0909	1-	020230	1337	1
020206	1141	1-	020216	0931	1-	020230	1639	1-
020206	1246	1	020216	1010	1	020230	1741	1-
020206	1311	1-	020216	1400	2	020231	1010	1-
020206	1445	1-	020216	1508	1	020231	1428	1-
020207	1419	1-	020216	1530	1-	020231	1445	2+
020208	1723	2+	020216	1557	2	020231	1524	1-
020209	0955	1	020216	1657	1+	020231	1645	1+
020209	1116	2	020216	1758	1			
020209	1755	3	020216	2009	1			
020210	1018	2+	020216	2028	2+			
020210	1516	1+	020217	1149	1-			
020210	1603	2	020219	1007	1			
020211	1848	1-	020220	1552	2			
020211	2006	2	020222	0858	2+			
020212	1517	2+	020222	1316	1			

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

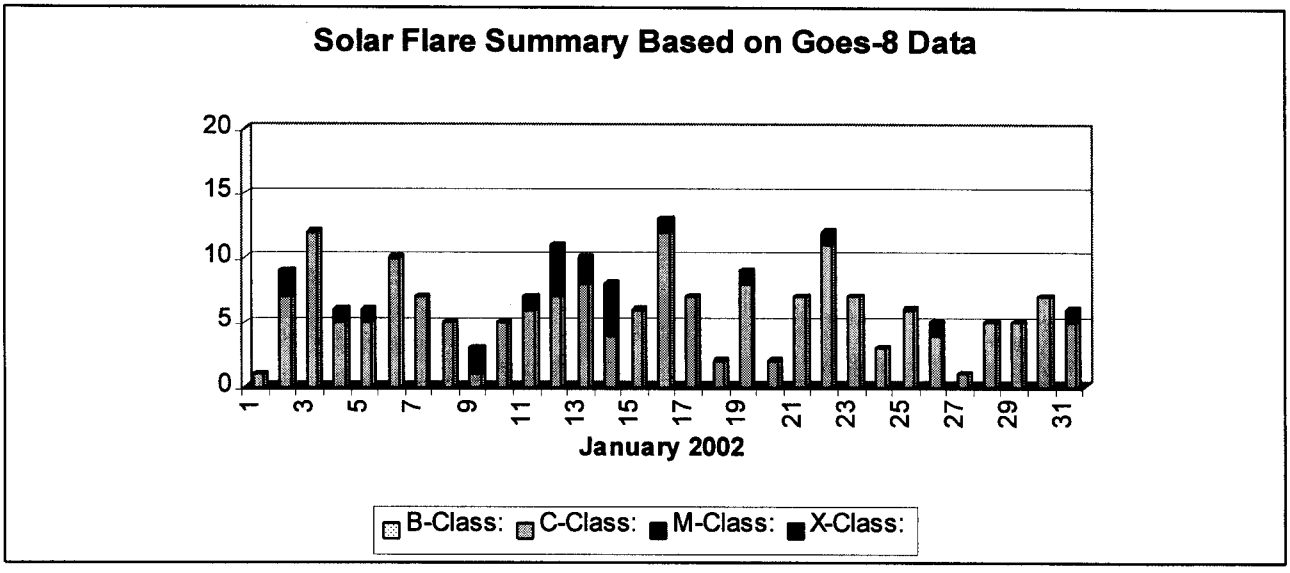
Observer	Code	Station(s) monitored
A Clerkin	A29	NAA
J Winkler	A50	NAA, NPM
D Toldo	A52	NWC
J Ellerbe	A63	ICV
P King	A80	FTA
W Moos	A84	FTA
M Hill	A87	NAA
T Poulos	A95	NAA
R Battaiola	A96	HWU
J Wallace	A97	NAA
NJAA	A98	NAA
M King	A99	GBZ

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

Solar Events

January was not an overly busy month for SID recordings, although there were a few days that did have a lot of activity. The most active day, of course, was January 16th, with all but one of the X-Ray flares recorded that day resulting in SID events for many observers. There were 12 in all that day. The GOES-8 Satellite recoreded 202 X-Ray events this month, but many of them were of the smaller scale. Of these, 22 were M-Class flares. There were no X-Class flares at all. Many of the SID events recorded were of small duration; hence most of the events had an average importance rating of 1- to 1+. There were, however, three events with an importance rating of 3. These were on the 4th at 2016, the 9th at 1755, and the 12th at1842.

We are going to be heading into a time where there will be more and more smaller C-Class flares as opposed to the large M and X Class we have been used to in the past 6 months or so. I just re-tuned my receiver for better reception. I would suggest the same to all observers if you have not done so recently. This will help to catch the smaller SID events that will be more prominent in the months to come. I found that, once adjusted, I had a much cleaner trace and a bit more sensitivity to smaller changes in signal strength. If you are having trouble recording events don't hesitate to try a different station. It might be interesting for European observers to tune in to NAA, which is a strong signal, to get a perspective on the effects in conjunction with American observers looking at the same signal from the south and from the west. Don't be afraid to experiment. That is where the fun comes in this endeavor, and it may lead to some interesting results.



SOLAR BULLETIN of the American Association of Variable Star Observers. Vol. 58, No. 1 January, 2002

SUDDEN IONOSPHERIC DISTURBANCES SUPPLEMENT

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SUDDEN IONOSPHERIC DISTURBANCES RECORDED DURING JANUARY, 2002

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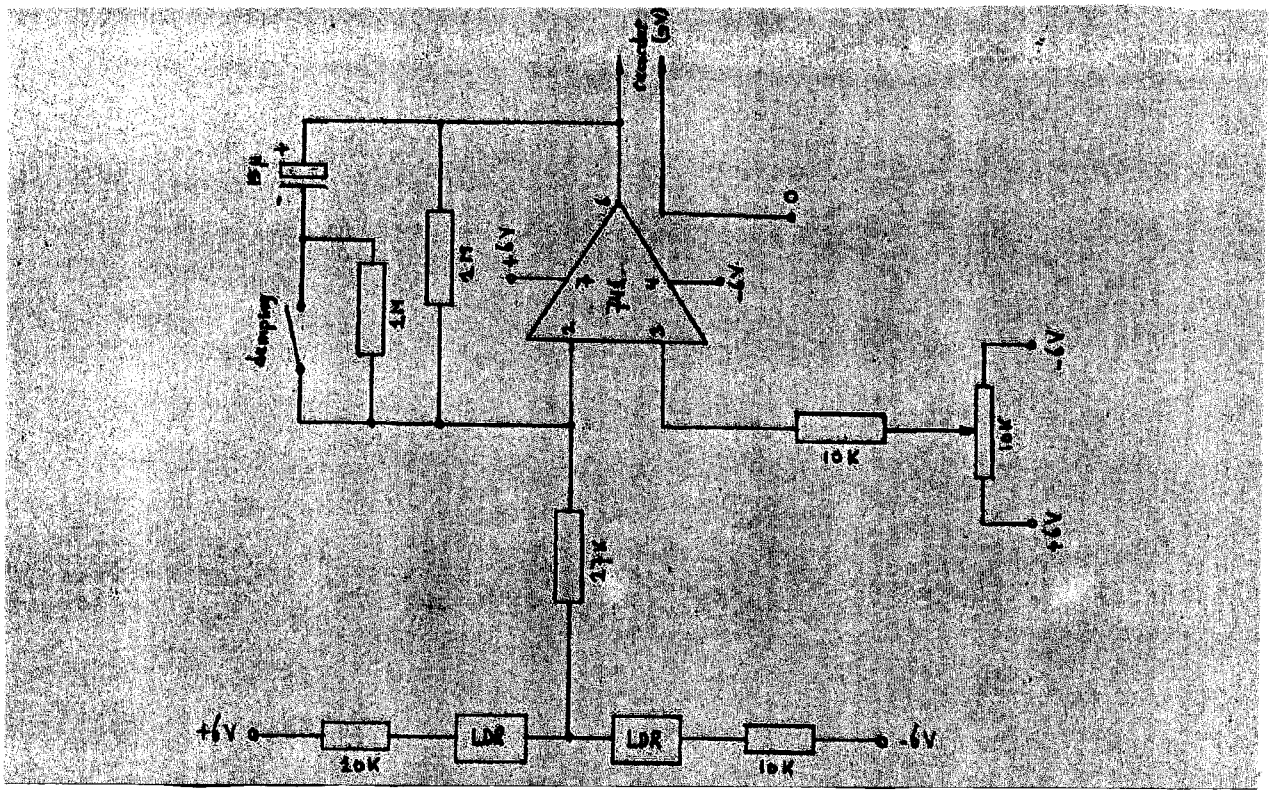
There is sad News to report. We have lost Sudden Ionosphereic Disturbance observer, A-3, Phil Del Vecchio, our oldest SID observer who died 28 December, 2001 at age 97. Phil was one of the four original observers when the SEA program started in 1956 as part of the International Geophysical Year, IGY. Phil still had an SES receiver running in the nursing home where he spent his last years and it was still recording solar flares the day he died. The National Bureau of Standards had set up the AAVSO's SID program by loaning them four Brown strip chart recorders one of which went to Phil who was then an AAVSO sunspot observer. Phil lived in Paterson, New Jersey where he wrote the Nature Column for the Paterson Morning Call newspaper and often mentioned his solar flare detector and the big flares of solar cycle 19 he was then recording. I too lived in Paterson and visited Phil one day to see his SEA receiver and decided I had to have one and became A-5 in 1958. Phil was also an amateur seismologist and a seismograph he built for the Nature Center in Garret Mountain Park near Paterson can still be seen recording earthquakes for the US Geological Survey. It is the main attraction for school children who visit the Nature Center on field trips. They are fascinated by the line the seismograph draws on paper at 1mm/sec and the way the pen lifts for one second to mark each minute of time. Children intuitively understand how a seismograph works. This was something Phil understood and the reason he built the seismograph for the nature center as a way of sharing the wonders of science with the public. As Director of the Paterson Museum and through his Nature Column Phil spent much of his lifetime popularizing science and getting children interested in doing science as amateurs which sometimes lead to their choosing science as a career. Phil will be missed by the many people whose lives he touched during his long lifetime.

Below is a schematic for an amplifier that Andries Son in Belgium designed for his McWilliams magnetometer. It is basically the same Wheatstone bridge most of us use to draw our magnetograms but adding the 741 operational amplifier has many advantages. Andries uses a 0.25 mm diameter torsion wire 30 cm long whereas most of us use a thinner 0.2 mm wire about 40 cm long. The sensitivity of the magnetometer varies directly as the length and as the fourth power of the diameter of the torsion wire so Andries would have little chance of recording magnetic storms without the amplifier. There are other advantages too. The 10 k potentiometer can be used to center the recording and the 27 k resistor could be made variable to adjust the gain when calibrating the magnetometer with a Helmholtz coil so it will measure the strength of the magnetic storms in nanoTeslas.



Below are two charts made by Jerry Winkler, A-50, in Houston, Texas of flares recorded by monitoring 25.2 kHz in La mourie, North Dakota, USA. The upper halves of these charts are an attempt to monitor NRK on 37.5 kHz in Iceland. Jerry and I have been trying to monitor this distant and weak signal but with no success. The problem seems to be the signal is overwhelmed by interference. I decided the best way to monitor NRK might be to design a better receiver less prone to pick up interference. I have been experimenting with this new receiver by recording NAA in Cutler, Maine, USA on 24 khz. Below Jerry's charts is an NAA chart I made on 4 Feb with the new receiver here in Florida where I spend the winters. It shows two inverted SESs starting at ~1530 and ~1900 UT. Notice the nice clean thin interference-free trace. You might think I got this nice trace by using a big integrating capacitor. Wrong. The capacitor across the DC output is only 0.1 mfd compared to 10.0 mfd used in Gyrator receivers. The response of the receiver is so fast it ignores lightning interference which is plentiful here in Florida. It is a surprisingly simple fixed-frequency receiver consisting of only two Radio Shack TL082 op amps, a 33 mH ferrite core coil, two diodes and six resistors plus capacitors to tune the loop antenna and the 33 mH coil. A 5000 ohm potentiometer across the DC output adjusts the gain. If you would be interested in building one of these simple interference-free receivers send me an email and I'll send you a schematic and additional information how to build it.