Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS - SOLAR DIVISION

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ISSN 0271-8480

Volume 57 Number 8 **August 2001**

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

Day	N	Raw	s.d.	K-corrected	s.d.	s.e.
1	47	93	4.1	**73**	2.3	0.34
2	35	115	4.4	94	2.7	0.46
3	44	133	4.5	111	2.4	0.36
4	44	164	6.1	132	3.1	0.47
5	45	183	7.4	**146**	3.7	0.55
6	46	173	6.3	139	2.8	0.41
7	42	171	4.7	140	2.1	0.32
8	45	159	5.3	133	2.4	0.36
9	43	139	5.1	111	2.5	0.38
10	48	129	3.7	106	1.5	0.22
11	43	159	5.2	131	2.8	0.43
12	41	148	5.6	122	3.4	0.53
13	37	120	5.1	95	2.3	0.38
14	50	124	4.5	100	1.9	0.27
15	55	145	4.3	118	2.4	0.32
16	42	162	6.3	124	3.4	0.52
17	42	145	6.0	113	3.8	0.59
18	43	139	5.9	115	2.9	0.44
19	42	137	4.7	110	3.0	0.46
20	41	128	5.4	102	2.0	0.31
21	45	150	5.4	125	2.6	0.39
22	46	159	5.6	126	3.0	0.44
23	40	157	6.5	124	3.4	0.54
24	44	144	7.4	114	3.9	0.59
25	47	133	4.8	107	2.5	0.36
26	36	135	5.2	113	2.9	0.48
27	39	156	6.3	125	2.6	0.42
28	37	155	6.9	123	3.0	0.49
29	45	139	4.4	112	2.8	0.42
30	35	143	5.2	116	3.4	0.57
31	33	155	6.8	126	3.2	0.56
Means:		**144.9**		**117.1**		

Total No. of Observers: 71

Total No. of Observations: 1322

Table II. August Observers

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

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

ay	RG	S:G	Day	RG	S:G	Day	RG	S:G	Day	RG	S:G
1	5.8	6.0	9	8.1	7.2	17	11.0	3.2	25	7.5	7.7
2	6.7	7.2	10	7.6	6.9	18	9.2	5.1	26	7.5	8.0
3	7.6	7.5	11	9.4	6.9	19	8.7	5.8	27	9.1	7.1
4	8.4	9.5	12	8.9	6.6	20	7.4	7.3	28	8.5	8.2
5	9.0	10.3	13	7.1	6.9	21	8.5	7.6	29	7.5	8.5
6	8.6	10.1	14	7.9	5.7	22	8.6	8.5	30	6.9	10.7
7	9.1	8.8	15	10.7	3.6	23	8.9	7.6	31	7.8	9.9
8	9.3	7.1	16	12.6	2.9	24	8.5	6.9	Mn.	8.5	7.3

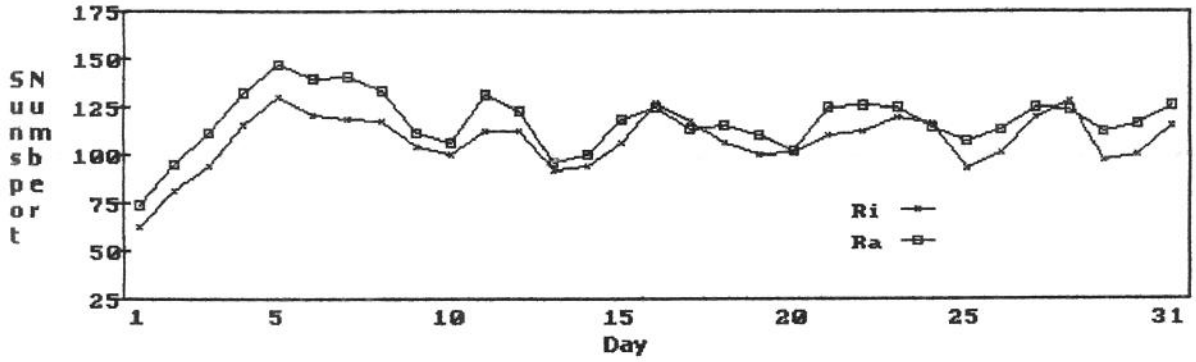

Fig. 1. Comparison of Ri (provisional) and Ra Estimates for August.
(Ri Source:http://sidc..oma.be/index.php3)

Smoothed Mean Sunspot Number (Rsm) for February 2001: 110.6

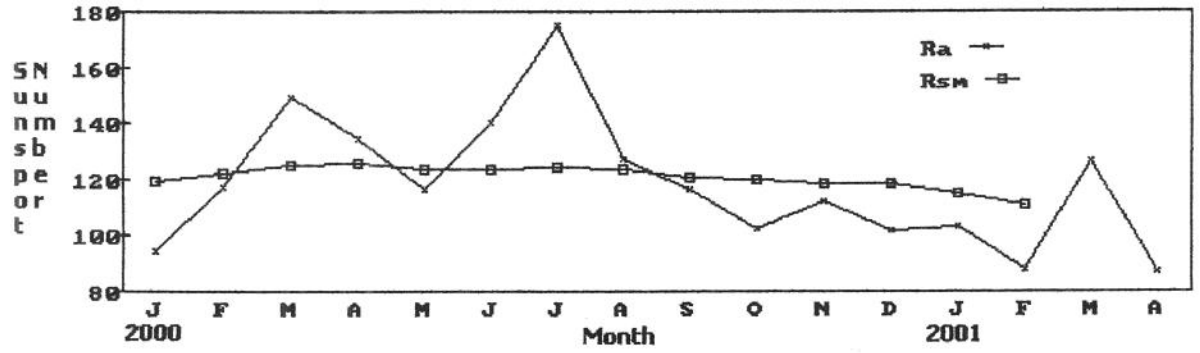

Fig. 2. Monthly Ra and Smoothed Mean Sunspot Numbers (Waldmeier method).

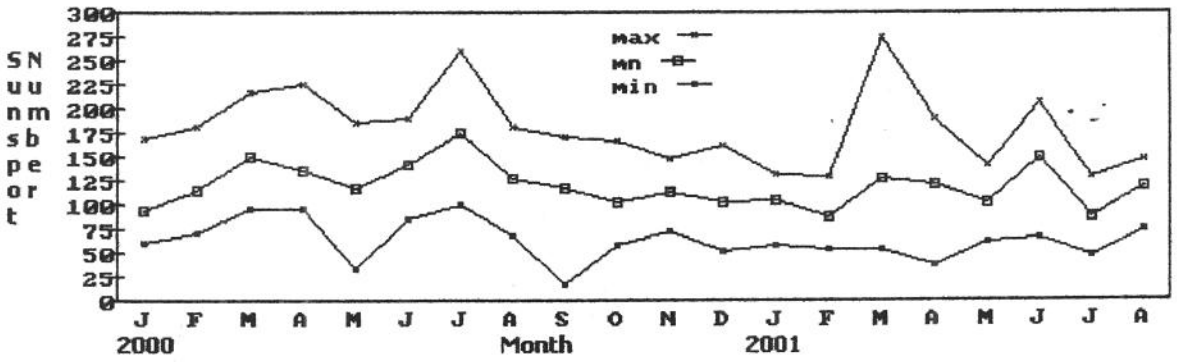

Fig 3. Maximum, Mean, and Minimum Ra Values for Each Month from January 2000 to Present.

Sudden Ionospheric Disturbance Report

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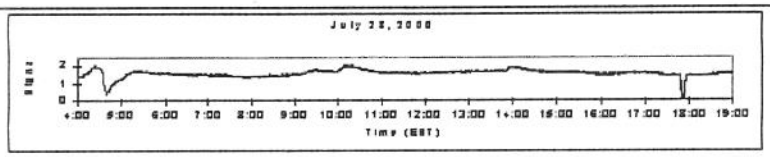
noatak@aol.com



Sudden Ionospheric Disturbances (SID) Recorded During August 2001

(Analysis performed by Michael Hill, SID Analyst)

Date	Max	Imp	Date	Max	Imp	Date	Max	Imp
010802	1208	1	010807	0739	2+	010813	1400	2+
010802	1241	2+	010807	0854	1+	010814	0947	2
010802	1500	1+	010807	1049	2	010816	1000	2
010802	1613	2	010807	1137	1+	010816	1525	1-
010802	1858	1	010807	1304	2	010817	0915	2+
010802	2016	2	010807	1336	2	010818	0402	1-
010803	0307	1	010807	1447	2	010818	1252	1+
010803	1006	1+	010807	1540	2	010820	0823	1
010803	1149	1+	010807	1630	1+	010821	2200	2
010804	0951	1+	010807	1855	1+	010822	0507	2
010804	1232	2+	010807	2128	2+	010822	0740	2
010804	1845	2	010807	2331	1	010822	0912	1+
010804	1945	1	010808	0711	1	010822	0940	1
010805	1254	1	010808	0800	2+	010822	1220	2
010805	1325	1	010808	1022	1-	010822	1509	1
010805	1440	1	010808	1032	1-	010822	1555	1
010805	1505	1	010808	1503	1+	010822	1731	2
010805	1533	2	010808	1700	2	010823	0515	2+
010805	1832	1+	010808	2001	1+	010823	0800	2
010805	2126	1+	010809	0650	2	010823	0950	1
010805	2222	2+	010809	0727	2	010823	1349	2
010806	0733	1+	010809	0815	1+	010823	1357	1
010806	0800	2	010809	1102	2	010823	1757	2
010806	1219	1+	010809	1832	2+	010824	0630	2+
010806	1527	2	010812	2100	2	010824	0910	2+

Event Listing - Continued

Date	Max	Imp	Date	Max	Imp	Date	Max	Imp
010824	1320	1-	010826	0925	1+	010829	0914	2+
010824	1335	2	010826	1010	2	010829	1115	1+
010824	1511	1+	010826	1305	2+	010829	1246	2+
010824	1700	2	010827	1342	1+	010829	1445	2+
010824	1800	2	010827	1415	2+	010829	1825	2+
010824	1850	2+	010827	1531	2	010829	2020	2
010824	2030	2+	010828	0007	1+	010830	0646	1+
010824	2115	1+	010828	0653	1	010830	0820	1+
010824	2245	2+	010828	0825	2+	010830	1733	1-
010825	0727	2	010828	0927	1	010830	1752	2
010825	0821	1	010828	1147	1	010830	2035	2
010825	0845	1-	010828	1230	2	010831	1040	2
010825	0928	1+	010828	1340	2+	010831	1145	2+
010825	0958	1-	010828	1437	1	010831	2113	2+
010825	1326	1	010828	1538	1	010831	2242	2+
010825	1413	2	010828	1610	2+			
010825	1531	1-	010828	1947	1			
010825	1642	2+	010828	2007	2			
010825	1957	1	010829	0516	2			
010825	2222	1+	010829	0718	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

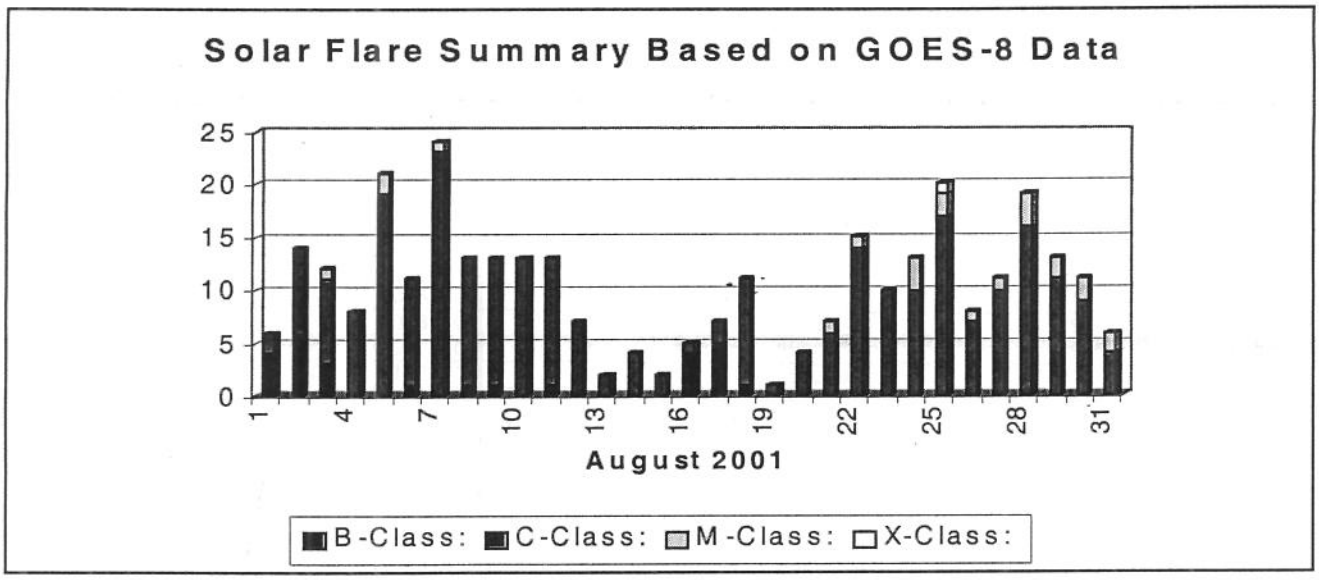
Observer	Code	Station(s) monitored
A Clerkin	A29	NAA
J Winkler	A50	NAA, NPM
D Toldo	A52	NWC, NAA, NSS
A Stokes	A62	NAA
W Moos	A84	FTA, ICV
G DiFillipo	A93	HWU
T Poulos	A95	NAA
R Battaiola	A96	NWU
J Wallace	A97	NAA
M King	A99	GYA
G Bessen	A101	NDH

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

Solar Events

August turned out to be a very active month. Many observers who sent in data remarked to me how many SID events they had detected. Indeed there were so many events that I had to change the format of the report somewhat to accomadate the event listings.

There were 323 X-Ray flares reported by the GOES-8 Satellite. Of these, 22 were powerful M Class flares and one, on the 25th, was rated as an X5.3 class event. The activity clustered about the 5th of the month and the 24th. Our observers recorded a record 130 events, the largest event list that I have ever seen. Most of the events recorded were also centered about the 5th and 24th of the month with a couple of unusually quiet days on the 10th and 11th of the month.



SOLAR BULLETIN of the American Association of Variable Star Observers. Vol. 57, No.8, August, 2001

SUDDEN IONOSPHERIC DISTURBANCES SUPPLEMENT

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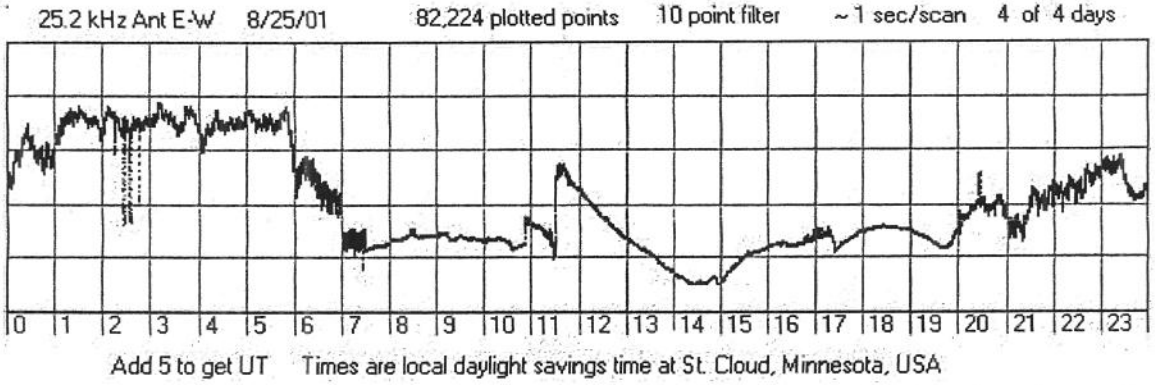
SUDDEN IONOSPHERIC DISTURBANCES
RECORDED DURING AUGUST 2001

A large flare occurred on 25 August that was visible in white light for about two minutes during its maximum. A recording of this flare as a sudden ionospheric distúrbance, SID, is shown below. The SID was detected as a sudden enhancement of the signal, SES, of the Navy very low frequency, VLF, transmitter in La Maure, North Dakota, USA transmitting on a frequency of 25.2 kHz. The SES recording was made by Al McWilliams, A-94, using a Gyrator II VLF receiver and a large loop antenna in his basement. The chart shows the flare starting at about 11:30 local time and lasting about 3 hours, an unusually long time.



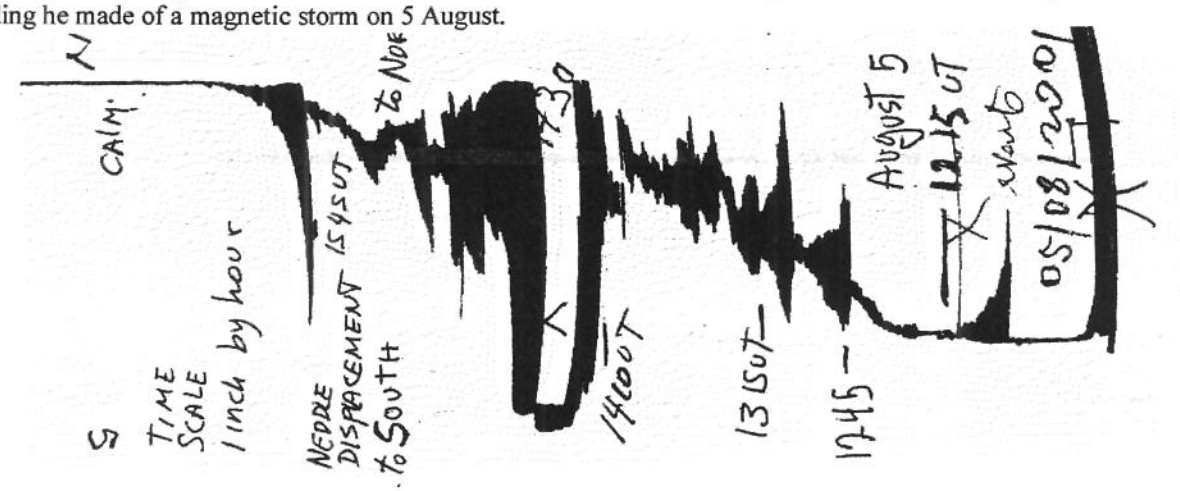
White flares, those visible in white light, are a very rare phenomenon and only occur at the time of maximum of great flares. AAVSO sunspot observer, Jim Carlson, just happened to be making his daily sunspot observation at that time and was lucky enough to see this rare event. Below is his report of his observation of the white flare:

Region 9591 produced a white light flare today (25 August) in the following (easternmost) large penumbra at approximately 16:32 UT. I'd just made a drawing of that area only two minutes earlier, then gone back to view it again and noticed a large, bright white oval region inside the umbra. My watch read 16:32:33, although I didn't see it begin. As of back a couple of minutes later, realized it had turned completely black.

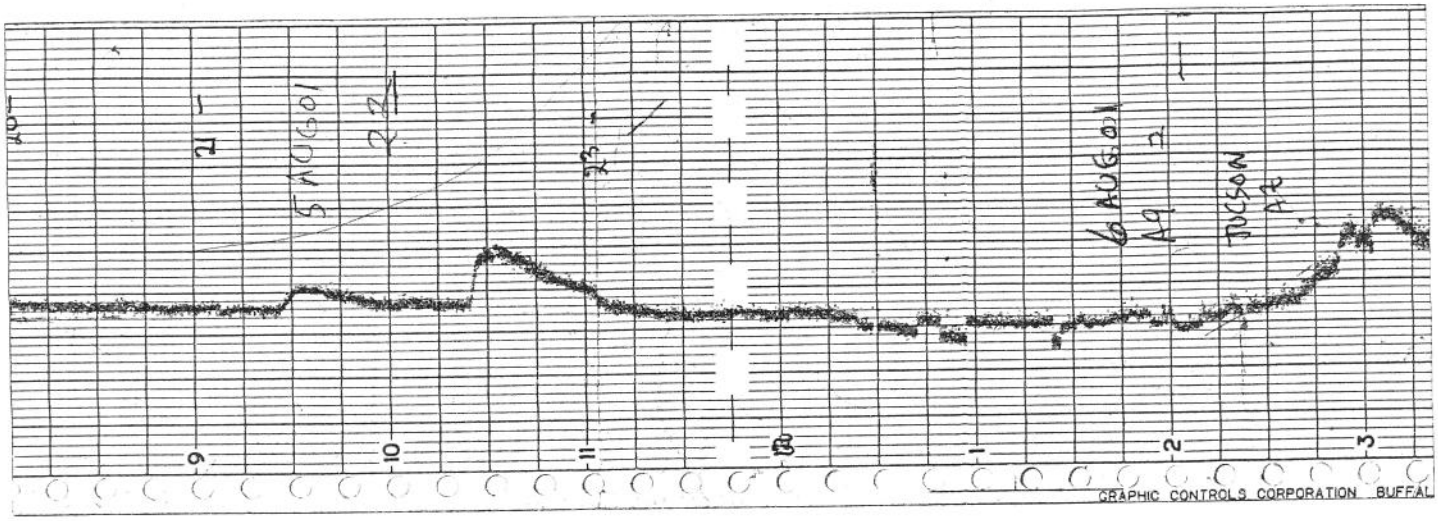
This differed from the two white light flares I'd seen on 4/15/2001 in AR9415, since that occurred on the limb and both flares were shaped like mountain peaks. Today's was shaped like an ellipse and was very bright for at least two minutes. I didn't feel that I timed the first one adequately enough, and feel the same about this one too. I hope others saw it as well.

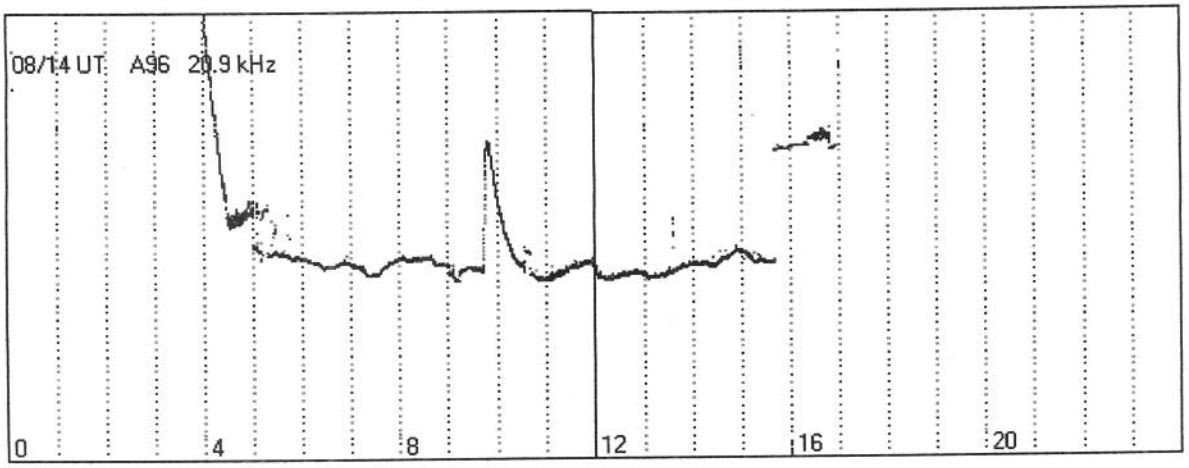
JC

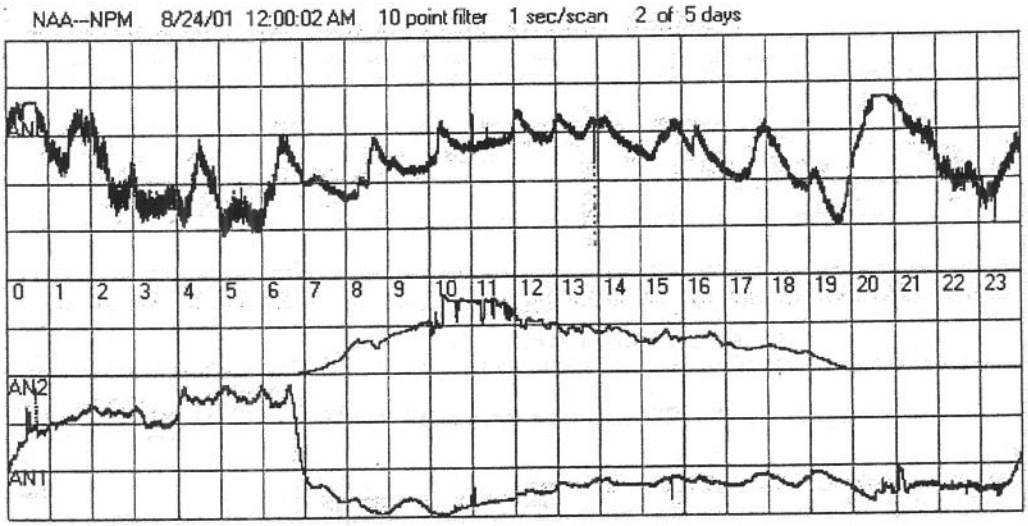
Gonzalo Vargas who lives in Bolivia is also an AAVSO sunspot observer and he has tried for many years to record flares as SIDs using the SES method of monitoring a VLF radio station. His early attempts used a receiver built for him by Bob's Electronics, a company in Florida that used to make SES receivers commercially. Bob's receivers were a good design and quite sensitive but Gonzalo was never able to get his to record a VLF signal successfully. He attempted to record NAU in Puerto Rico but it is a low power transmitter compared to most Navy VLF stations. Bolivia is too far from Puerto Rico to produce a strong enough NAU signal and much farther still from NAA in Maine, USA which also didn't produce a strong enough signal. Ganzalo also tried a Gyrator receiver but still no luck. Now he has built a magnetometer and it works quite well. Below is a recording he made of a magnetic storm on 5 August.



Charts below show SESs recorded during August. The first chart made by Werner Scharlach, A-9, in Tucson, Arizona shows events on 5 August. The second chart is by Roberto Battaiola, A-96 in Italy showing an SES he recorded on 14 August. The third chart is by Jerry Winkler, A-52 in Houston, Texas showing nine SESs he recorded on 24 August.







Art Stokes has written an article below on the last three pages of this SID Supplement that is the latest version of his Minimal Gyrator II receiver. This latest version includes changes in the schematic that show the power supply. A revised printed circuit board is now available from FAR Circuits. You can call FAR Circuits at 847 836 9148 and order the printed circuit board with a credit card for $7.00 which includes shipping. They also have a web site.

A Minimal Gyrator II VLF Receiver

Arthur J. Stokes N8BN

The Gyrator II VLF receiver is described in another section of the SID equipment. The Minimal Gyrator II receiver described here is an attempt to show a lower parts cost receiver for solar monitoring that would be a suitable school project. The number of parts has been reduced to the essentials.

This simplified version eliminates the metal cabinet and expensive BNC connectors. Also eliminated is the metal working associated with drilling mounting holes in the cabinet. All parts are mounted on the circuit board. The only modification to the circuit board is the need to drill four holes to mount two connectors and two potentiometers. The basic circuit is the same as the previous Gyrator II circuit with the exception of the power supply. The previous Gyrator II used a center tapped 12 volt AC transformer and two diodes to form a bipolar power supply. Since there is no convenient mounting place on the board for this type of transformer, I decided to use a wall plug transformer. Radio Shack does not carry a center tapped 12 volt AC wall plug transformer. I modified the power supply circuit to use a 9 volt DC wall plug transformer. To simulate a center tap, I used two 180 ohm resistors in series across the 9 volt DC transformers, with the common center point connected to ground. This may seem like a short circuit, however only about 25 milliamps flow through the resistors. The two resistors nicely replace the diodes D4 and D5 in the original Gyrator II circuit. Capacitors C8 and C9 complete the power supply circuit. The white lead from the transformer is connected to the junction of .C9 and R15. This is the + voltage point. The white lead with a black tracer is connected to the junction of C8 and R14. This is the - voltage point. It would be well to check the polarity of the leads with a voltmeter before soldering.

Construction:

The circuit board is a new version with an overlay showing parts placement. The first 1/4 inch hole is made 3/4 of an inch from the left side of the board and 1 inch from the back edge. The second 1/4 inch hole is made 1 and a 1/4 inch from the right side and 7/8 inch from the back edge. The third hole is made with a 3/8 inch drill 1 and 3/4 inches from the left edge and 1 inch from the back of the board. The second 3/8 inch hole is made 3/4 inch from the right edge and 5/8 inch from the front edge of the board. The shafts on the potentiometers are usually long and should be cut off with a hacksaw to about 3/4 of an inch. Some small washers should be placed on the shafts to lift the pots slightly off the PC board to prevent shorting to the copper foil. All parts should be mounted on the PC board and soldered carefully before the pots are put in place. The pots should be rotated to position the tabs close to the corresponding points on the circuit board where the connections are to be made. Short pieces of bare copper wire are used to connect the pots. There is no need to use shielded wire

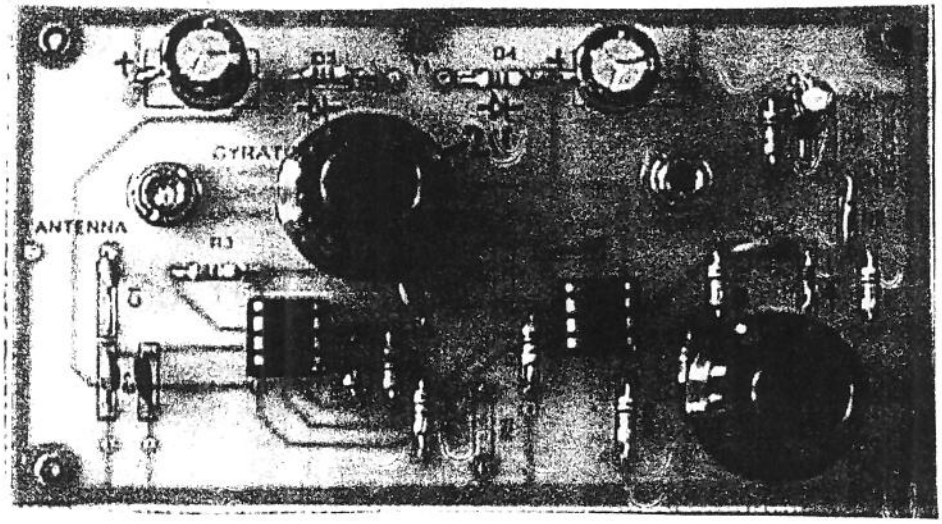
since the connections are short. The 10K tuning pot is connected between ground and the end of R5. The 50K gain pot is connected between R7 and pin 1 of the second TL082 IC. There are no feedback problems with these short connections. The four corner mounting holes on the PC board were enlarged slightly and used to make legs that would allow the receiver to sit on a flat surface. Insulated standoffs form the legs. It was necessary to glue two together to make the 3/4 inch clearance needed. A cheaper alternative would be four 3/4 inch 6/32 screws and nuts to form the standoffs.
The two 1/8 inch audio connectors replace the more expensive BNC connectors. One is used as the antenna input with the outer sleeve connected to ground and the center pin connected to the 100 pfd C1 capacitor. The second audio connector is used for the recorder output with the outer sleeve connection to ground and the center pin connected to the junction of D2 and C7.
This version uses ceramic capacitors available from Radio Shack. Although the Q of these capacitors is not as high as the polypropylene capacitors, they still provide sufficient selectivity for good tuning.

Performance:
This little receiver has worked very well. It has about the fewest number of parts that can make a workable VLF receiver. The tuning range is about from 17 kHz to 34 kHz.

The Gyrator II circuit board may be purchased from FAR Circuits, 18N640 Field Court, Dundee, IL 60118

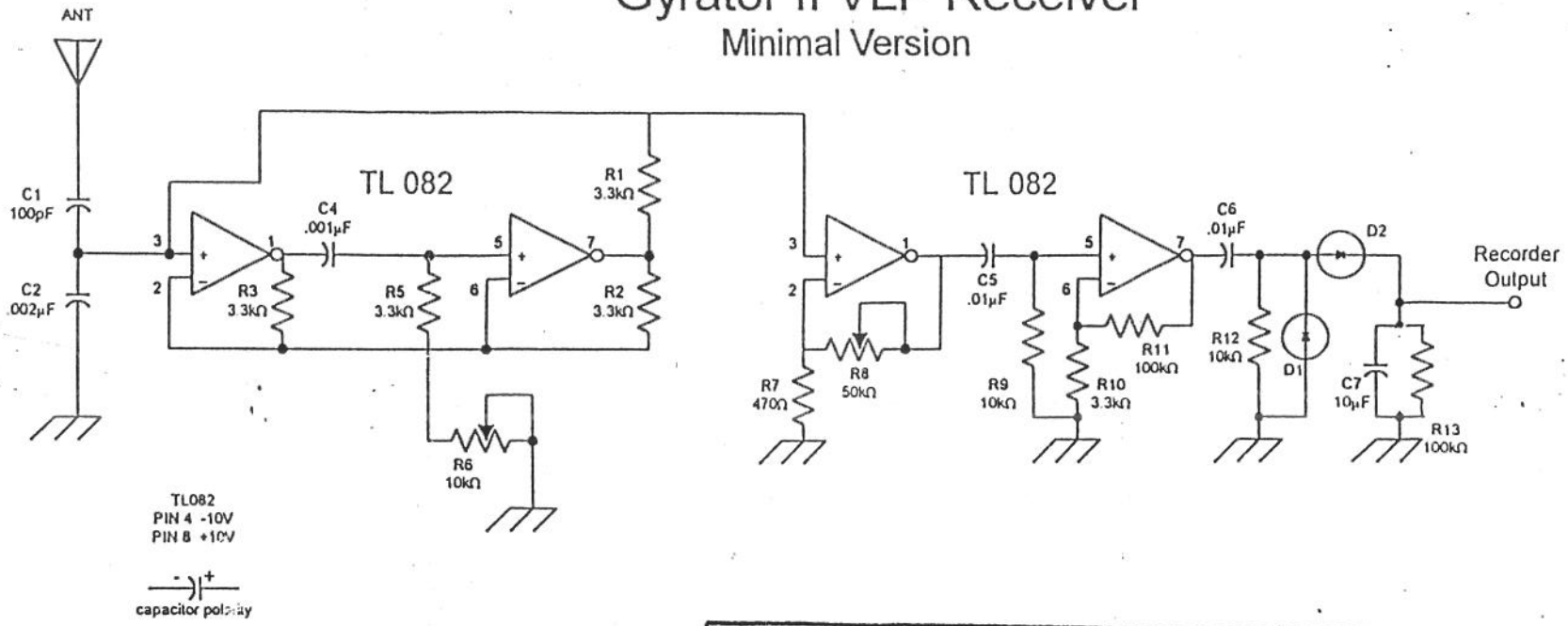
References:

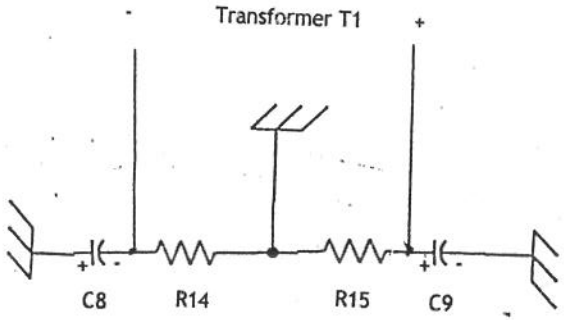
1. Arthur J. Stokes, "A Gyrator Tuned VLF Receiver", *Communications Quarterly,* Spring 1994, pgs 24-26.
2. Arthur J. Stokes, "A Gyrator Tuned VLF Receiver", *SID Technical Bulletin,* Vol. 5,1
3. Arthur J. Stokes, "Gyrator II - An Improved Gyrator Tuned VLF Receiver", *SID Technical Bulletin,* Vol. 10,1 Available at www.aavso.org



Gyrator II VLF Receiver

Minimal Version





Parts List: Minimal Gyrator II VLF Receiver

R1,R2,R3	3.3-k resistors 1/4 watt
R4,R10	271-1328
R9,R12	10-k resistors 1/4 watt 271-1335
R11,R13	100-k resistors 1/4 watt 271-1347
R7	470 ohm resistor 1/4 watt 271-1317
R6	10-k linear pot 271-1715
R8	50-k linear pot 271-1716
R14,R15	180 ohm resistors. ½ watt .271-1110
C1	100 pfd Hi-Q ceramic disc capacitor 272-123
C2	Two parallel .001 ufd Hi-Q caps 272-126
C4	.001 ufd Hi-Q cap 272-126
C5,C6	.01 ceramic caps 272-131
C7	10 ufd electrolytic capacitor 272-999
C8,C9	470 ufd electrolytic capacitors 272-957
TL082	Dual Bifet Opamps 276-1715
T1	9 V DC 300 mil wall transformer 273-1455
	Audio connectors 274-251
	Knobs 274-407
	IC sockets 276-1995