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

ISSN 0271-8480

Volume 58 Number 7 **July 2002**

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

Day	N	Raw	s.d.	Ra	s.d.	s.e.
1	43	81	2.7	63	1.8	0.27
2	43	92	4.3	68	1.8	0.27
3	43	125	6.2	89	2.7	0.41
4	43	124	4.2	93	2.0	0.30
5	51	124	3.9	94	1.9	0.27
6	45	101	4.6	77	2.1	0.31
7	45	83	3.4	62	1.6	0.24
8	35	94	5.1	70	2.7	0.46
9	40	90	3.7	67	2.3	0.36
10	40	83	3.2	63	1.9	0.30
11	50	85	3.2	63	1.4	0.20
12	51	79	3.3	**60**	1.6	0.22
13	43	94	4.4	71	2.2	0.34
14	45	110	5.0	84	2.5	0.37
15	43	131	6.5	95	3.0	0.46
16	49	151	6.2	109	2.4	0.34
17	44	144	5.5	109	2.9	0.44
18	42	137	6.8	101	2.6	0.40
19	38	127	5.9	95	3.1	0.50
20	43	110	5.8	83	3.2	0.49
21	43	121	4.8	88	2.3	0.35
22	44	144	6.8	108	3.3	0.50
23	47	170	7.2	128	3.3	0.48
24	52	195	6.6	146	3.3	0.46
25	43	200	8.5	148	3.9	0.59
26	37	248	13.1	182	5.0	0.82
27	34	276	14.3	198	5.4	0.93
28	38	266	12.6	192	5.3	0.86
29	41	277	11.9	**199**	5.3	0.83
30	40	259	11.5	190	5.5	0.87
31	41	214	9.0	160	3.7	0.58

Means: 43 146.2 108.2

Total No. of Observers: 73

Total No. of Observations: 1336

Table II. July Observers

```
17 AAP  P.Abbott
 6 ANDE E.Anderson
27 ARAG G.Araujo
18 BARH H.Barnes
20 BATR R.Battaiola
 6 BEB  R.Berg
20 BERJ J.Berdejo
 8 BLAJ J.Blackwell
12 BMF  M.Boschat
18 BOSB B.Bose
29 BRAB B.Branchett
27 BRAD D.Branchett
21 BRAR R.Branch
29 BROB R.Brown
 3 BURS S.Burgess
11 CAMP P.Cambell
21 CARJ J.Carlson
31 CHAG G.Morales
20 CKB  B.Cudnik
15 CLZ  C.Laurent
19 COMT T.Compton
31 CORA A.Coroas
16 DELS S.Delaney
13 DEMF F.Dempsey
28 DRAJ J.Dragesco
27 DUBF F.Dubois
31 ELR  E.Reed
14 FEEC C.Feehrer
16 FERJ J.Fernandez
24 FLET T.Fleming
22 FUJK K.Fujimori
22 GIOR R.Giovanoni
11 GOTS S.Gottschalk
11 HALB B.Halls
 9 HAYK K.Hay
16 HRUT T.Hrutkay
12 JEFT T.Jeffrey
 2 JENS S.Jenner
11 KHAR R.Khan
14 KNJS J&S Knight
16 KUZM M.Kuzmin
22 LERM M.Lerman
24 LEVM M.Leventhal
19 LIZT T.Lizak
14 MARE E.Mariani
31 MARJ J.Maranon
21 MCE  E.Mochizuki
 8 MILJ J.Miller
26 MMI  M.Moeller
17 MUDG G.Mudry
13 OBSO IPS Observatory
13 RICE E.Richardson
26 RITA A.Ritchie
26 SCGL G.Schott
15 SCHG G.Scholl
 3 SDP  D.Sharples
14 SIMC C.Simpson
15 STEF G.Stefanopoulis
18 STEM G.Stemmler
25 STQ  N.Stoikidis
22 SUZM M.Suzuki
14 SZAK K.Szatkowski
25 SZUM M.Szulc
 8 TESD D.Teske
20 THR  R.Thompson
17 TJV  J.Temprano
27 URBP P.Urbanski
17 VALD D.delValle
20 VARG A.Vargas
21 VIDD D.Vidican
20 WILW W.Wilson
20 WITL L.Witkowski
31 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 July

Day	RG	S:G	Day	RG	S:G	Day	RG	S:G	Day	RG	S:G
1	5.1	5.9	**9**	6.6	3.6	**17**	5.1	18.2	**25**	8.9	12.5
2	5.6	6.4	**10**	5.8	4.3	**18**	4.6	19.8	**26**	10.2	14.3
3	7.3	7.1	**11**	5.1	6.7	**19**	4.7	17.0	**27**	11.9	13.2
4	7.3	7.0	**12**	4.3	8.4	**20**	4.3	15.6	**28**	11.1	14.0
5	8.4	4.8	**13**	4.4	11.4	**21**	5.5	12.0	**29**	10.2	17.2
6	6.9	4.6	**14**	5.0	12.0	**22**	7.3	9.7	**30**	10.5	14.7
7	5.4	5.4	**15**	6.0	11.8	**23**	9.2	8.5	**31**	8.9	14.0
8	6.4	4.7	**16**	6.6	12.9	**24**	9.4	10.7	**Mn.**	**7.0**	**10.6**

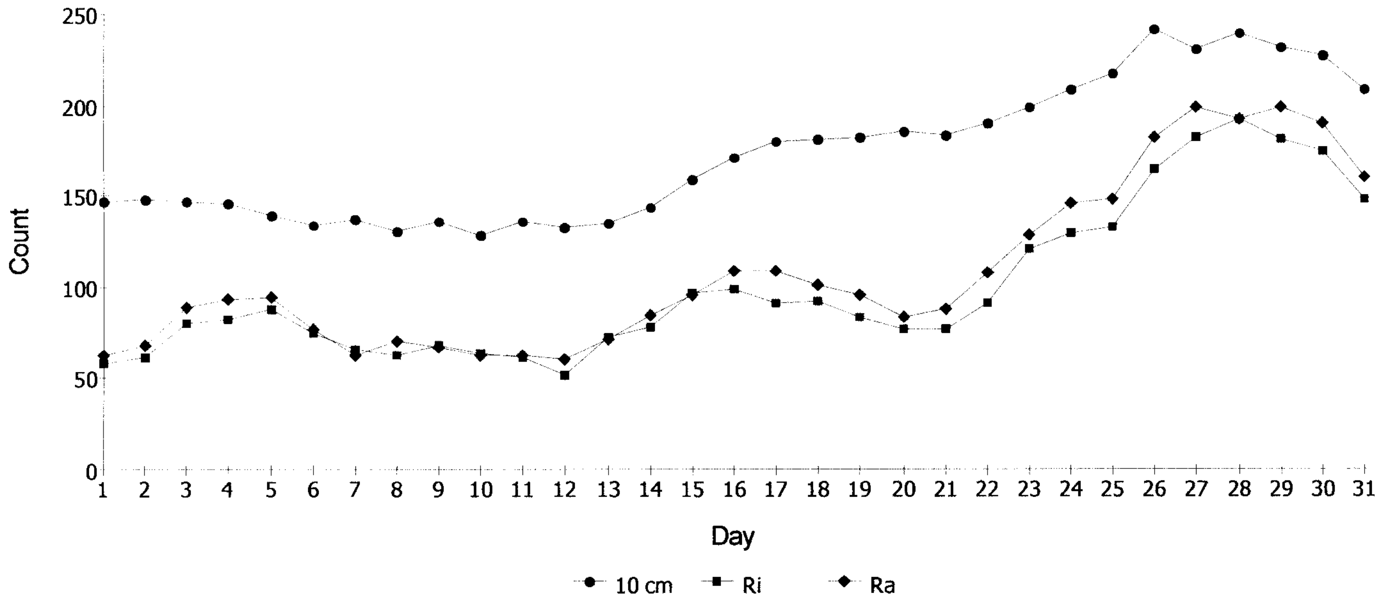


Fig. 1. 10 cm Solar Flux and Comparison of Ri (provisional) with Ra Estimates for June; r=0.992**)**.
Ri source: http://www.sidc.oma.be/index.php3
10 cm source: http://www.drao.nrc.ca/icarus

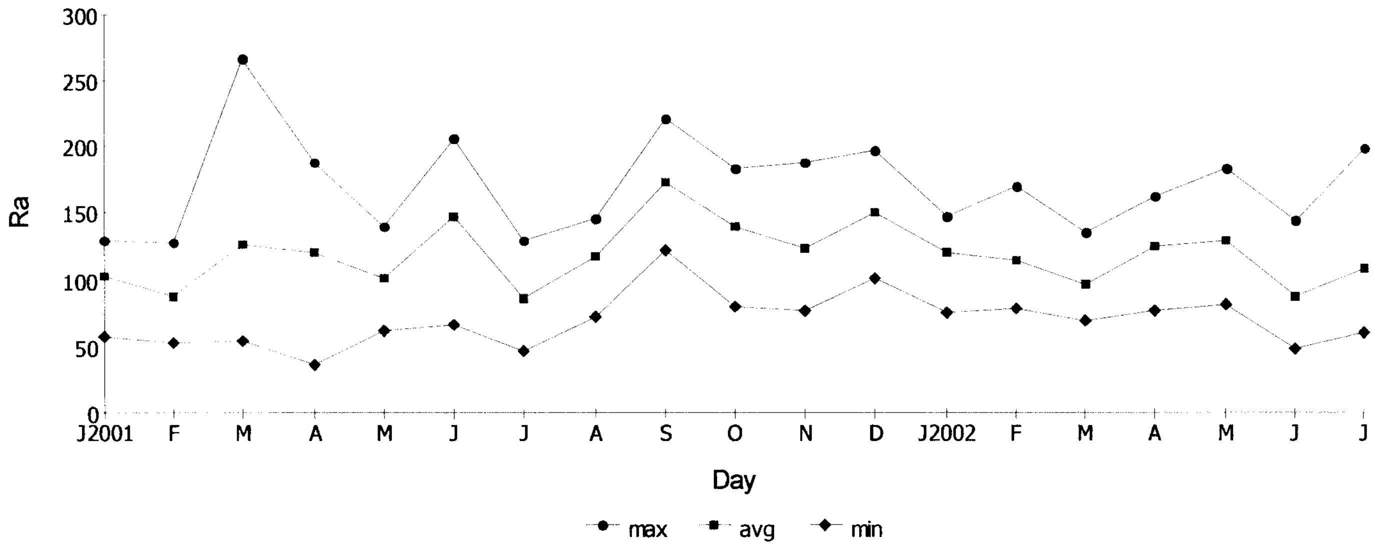


Fig. 2. Maximum, Mean, and Minimum Values of Ra for Each Month from January 2001 to Present.

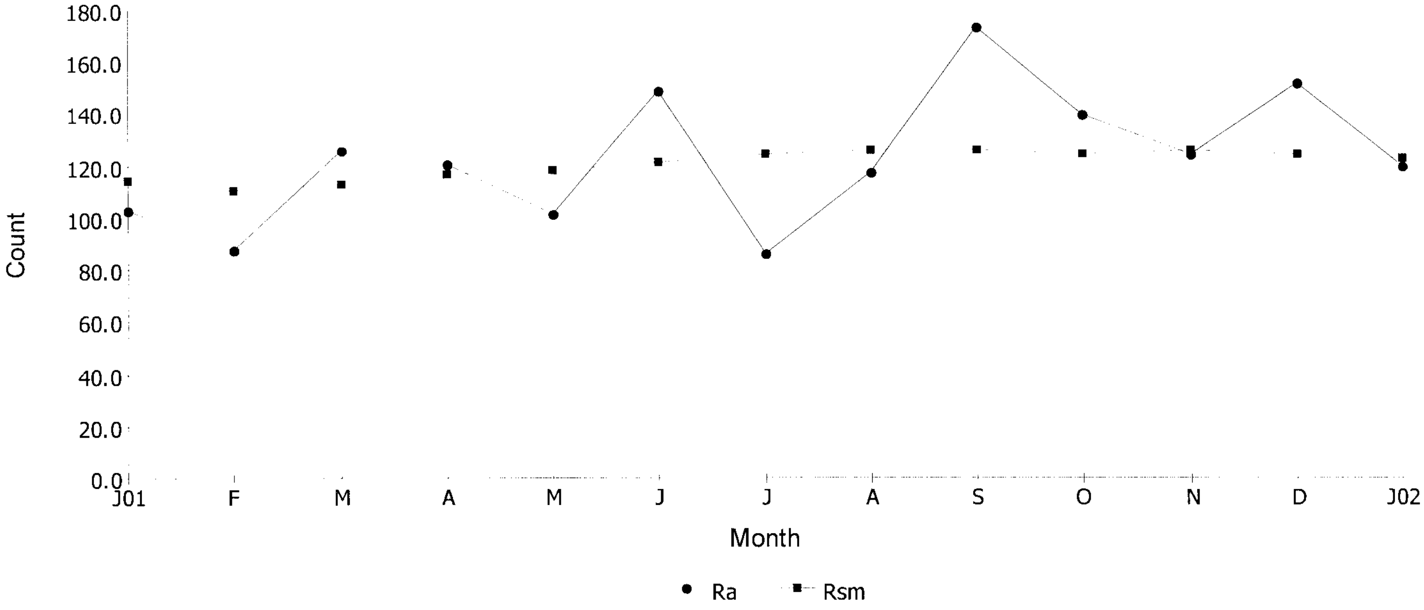


Fig. 3. Monthly Ra and Smoothed Mean Sunspot Numbers (Rsm) for January 2001 to January 2002.

Editor's Notes

New Observers

I'm pleased to report that Gema Araujo (ARAG) of Bajados, Spain has joined the group of observers. He has also contributed a set of sunspot images and related drawings to the the photo gallery. In addition, two other observers, Eduardo Garcia (GARE) and Gabriel Otero (OTEG), both of whom live in Montevideo, Uruguay, sent their initial reports last month. Thank you all for your contributions. I hope that you will continue to send your observations to the Solar Division.

Semi-Annual Report

Presented below is a summary of the report presented at the July 1 - July 5 meeting of the AAVSO in Hawaii. As you can see, interest in the Solar Division continues to increase, and I want to thank all of you for that outcome. Keep up the good work!

-CEF

Summary of AAVSO Solar Division Activity for the Period from Sept. 2001 to May 2002

The Solar Division continues to benefit from the presence of the *Solar Bulletin* and associated data on the AAVSO website and from media attention being paid to the Sun during the continuing maximum. In the period covered by this report, 9 new sunspot observers and three new SID observers have contributed observations, bringing the totals in each group to 89 and 18, respectively.

Sunspot Reports

- During the period, 623 sunspot reports containing a total of 9,189 observations, were received and processed.

SID Reports

- One hundred fifty reports containing a total of 650 validated events were received and processed..

Website Activity

- The Solar Photo Gallery now contains 88 images, an increase of 63 since the last reporting period.
- The SID portion of the website has been particularly attractive to viewers owing to the addition of two simplified receiver circuits, one of which was designed by Arthur Stokes shortly before his death in October of 2001, and the second of which was designed very recently by Casper Hossfield. The renewed interest shown in building receiver equipment, together with the formation of the new SID/GRB discussion group described in the June issue of the *Bulletin*, should provide exciting new avenues of research for many observers.
- Figure 1 below presents the numbers of downloads from the AAVSO/Solar website during the reporting period., and Figure 2

presents the subset of downloads associated with the Solar Bulletin.

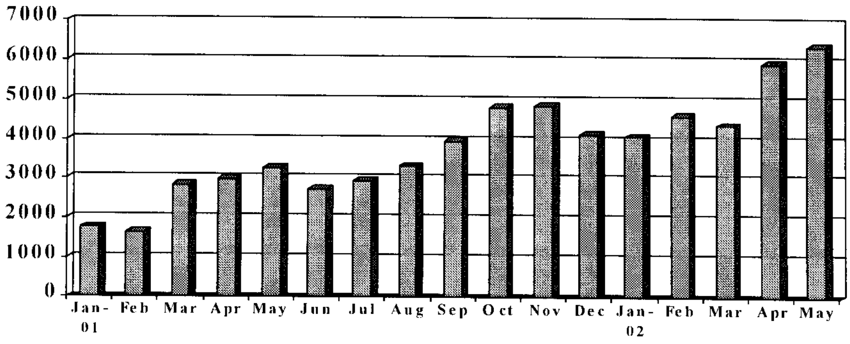


Fig. 1. All Solar Pages

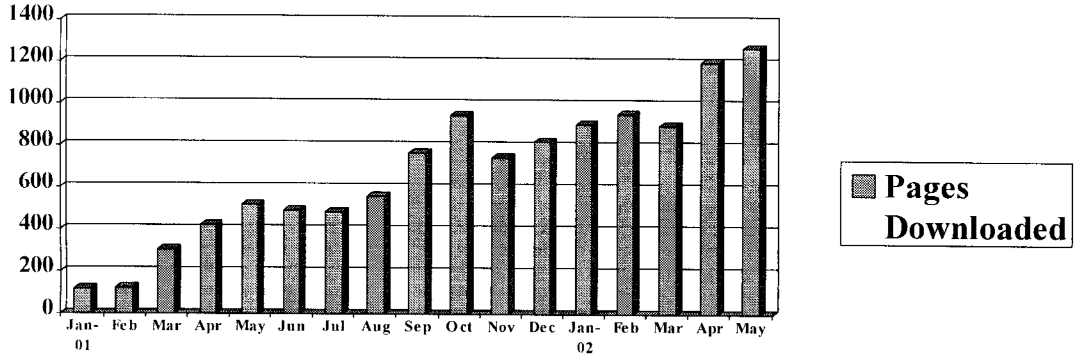


Fig. 2. Solar Bulletin Pages

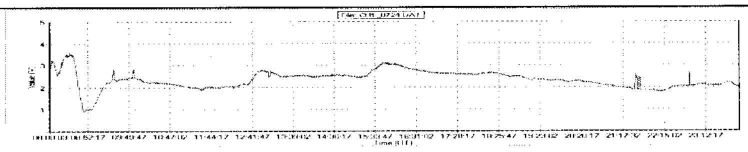
Acknowledgements

I want to acknowledge the valuable contributions to the Solar Division's performance and products that were made during the period by the parties listed below. Each has given unstintingly of his/her time and has helped our organization continue to grow.

- the many dedicated observers who send their reports each month
- Mike Hill, Analyst and Chairperson of the SID group, and Editor of the SID portion of the bulletin
- Casper Hossfield, Editor of the monthly SID supplement to the bulletin
- Kate Davis, the AAVSO's website maintainer
- Arthur Ritchie, a volunteer at the AAVSO 's headquarters who ably assists in the preparation of the monthly sunspot data

Sudden Ionospheric Disturbance Report

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



Sudden Ionospheric Disturbances (SID) Recorded During July 2002

(Analysis performed by Michael Hill, SID Analyst)

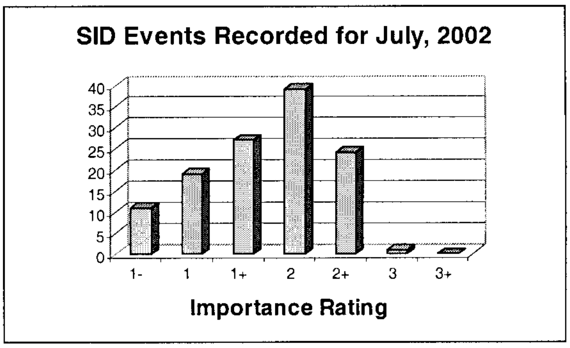
Date	Max	Imp	Date	Max	Imp	Date	Max	Imp
020702	2000	2	020711	1450	2	020725	1427	1+
020702	2029	2+	020712	0000	1-	020725	1556	1+
020703	0808	2	020712	0007	2+	020726	0013	2+
020703	1157	2	020712	0028	2+	020726	0640	1-
020703	1809	1	020715	0510	1	020726	0705	2
020703	1945	1-	020715	1152	2	020726	0830	2+
020703	2007	1+	020715	1403	1	020726	0919	1+
020703	2014	2	020715	2006	2+	020726	1339	1+
020703	2327	2	020716	0648	2+	020726	1530	1+
020704	0131	1	020716	1144	1+	020726	1616	1-
020704	0627	2+	020716	1341	1	020726	1622	1-
020704	0735	2	020716	1412	2	020726	1828	2
020704	1239	2+	020717	0330	1+	020726	1904	2
020704	1334	1+	020717	0551	1	020726	2100	2+
020704	1500	1+	020717	0649	1-	020726	2109	2+
020704	1629	2	020717	0709	2+	020726	2212	2
020704	1744	1+	020717	1952	1	020727	1827	2
020704	1849	1	020718	0336	1+	020728	0040	2+
020705	0738	1	020718	0654	1	020728	0600	1+
020705	0807	2+	020718	0746	2	020728	0642	2
020705	1319	2+	020718	1356	2	020728	0844	1+
020705	1326	2	020718	1748	1	020728	1108	1
020705	1556	2	020718	2018	1+	020728	1555	1+
020706	0334	1+	020720	1243	1+	020728	1706	1
020706	0939	2	020720	2028	2+	020728	1800	2+
020706	1553	2	020720	2113	2+	020728	1854	2
020706	1601	2	020721	0311	1-	020728	2006	1+
020707	0555	2	020721	0614	2	020728	2016	2
020707	1130	3	020721	0745	2	020728	2047	1+
020708	0920	2	020721	1422	1+	020728	2309	2
020708	2318	1+	020722	1159	1	020729	0025	1
020709	0715	1	020723	0029	2	020729	0240	1+
020709	0721	1	020723	1225	1+	020729	1033	1-
020709	0905	2	020723	2045	2+	020729	1044	2+
020709	1437	2	020724	0322	1-	020729	1942	2
020710	1333	2	020724	1251	2+	020729	2112	2+
020711	1122	2	020724	1545	2+	020730	0720	1-
020711	1208	1	020724	1555	2+	020731	0155	2
020711	1322	2	020724	1813	1+	020731	0854	1-
020711	1420	1+	020725	0920	1+	020731	0958	2
						020731	2024	1

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

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

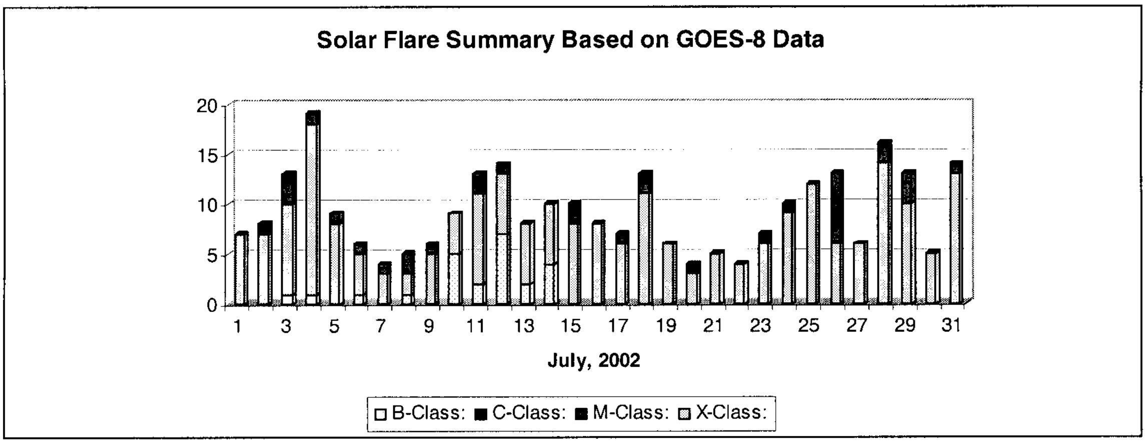
1) Reported in at least two observer reports
2) Visually analyzed with definiteness rating = 5
3) Reported by overseas observers with high definiteness rating

Observer	Code	Station(s) monitored
A Clerkin	A29	NAA
J Winkler	A50	NAA
D Toldo	A52	HWU NAA NWC
J Ellerbe	A63	ICV
A Panzer	A83	NAA
W Moos	A84	FTA
M Hill	A87	NAA
G DiFillipo	A93	HWU
T Poulos	A95	NAA
R Battaiola	A96	HWU
J Wallace	A97	NAA
M King	A99	HWU
P Campbell	A100	NLK
F Steyn	A102	NAA NWC



Solar Events

WOW! What a month July was! We had 121 SID events reported this month. The most we have had since last September. There were 285 GOES-8 events recorded. Thirty of them were M-Class events and five were X-Class events. I will let the data speak for themselves this month. The sun is very active, which is making for some very interesting observing. Hope you are all enjoying this.



SOLAR BULLETIN of the American Association of Variable Star Observers. Vol. 58, No 7, July, 2002

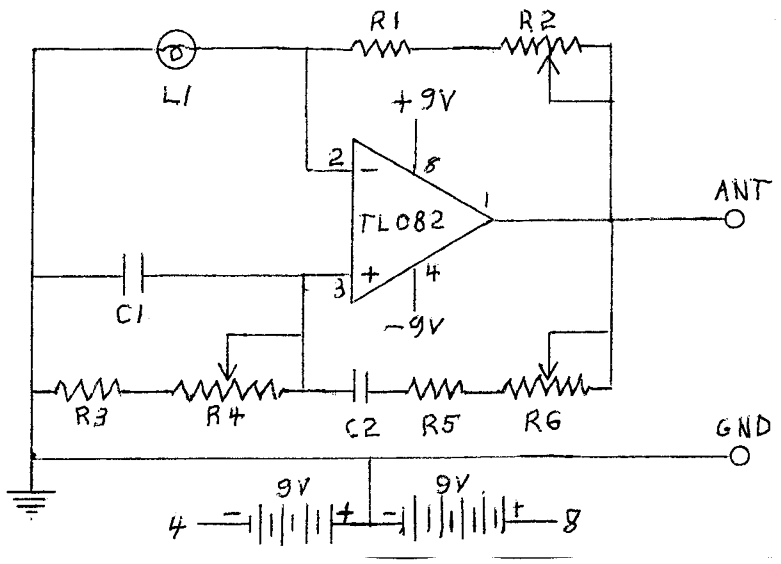
SUDDEN IONOSPHERIC DISTURBANCES SUPPLEMENT

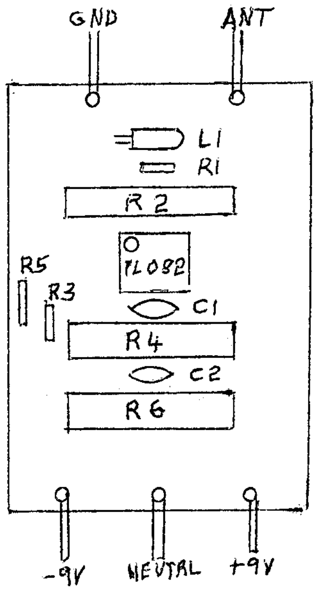
Casper H. Hossfield, SID Sup. Editor
PO Box 23
New Milford, NY 10959, USA
capaavso@aol.com
Fax 973 853 9054

SUDDEN IONOSPHERIC DISTURBANCES RECORDED DURING JULY, 2002

A SIMPLE EASY-TO BUILD SIGNAL GENERATOR.

The hexagonal loop antenna receiver described in the April Solar Bulletin SID Supplement can be tuned to a signal on a given frequency without the need of an oscilloscope and signal generator. Only a multimeter is needed to tune it. If the loop antenna is wound with #14 wire it has a high Q and tunes quite sharp with a pass band that can be about 500 Hz. It is very desirable to have a narrow pass band but this makes it unlikely you can use the formula or capacity table to tune it to the frequency of the station you want with ordinary readily available capacitors. The reason is they have wide tolerances, some vary as much as 20%. An easy way around this problem is to build the tuner that is also described in the May SID Supplement. Some have found their station with the tuner but others had difficulty, especially if they were trying to tune to a weak signal. It is for them that I have designed the simple signal generator described below. It is portable and operates from two 9-Volt batteries. The parts are all from Radio Shack and cost about US$12. You hang it right on the loop antenna and it puts out a powerful signal you can't miss. It Tunes from 15 kHz to 40 kHz but you need to set it to the exact frequency of the station you want to receive with a frequency counter. If you don't have one and don't have a friend who has one you can mail it to me and I will set it to your desired frequency and mail it back to you. It is very light and can be mailed in a padded envelope to anywhere in the USA for 60 cents or all the way to Australia by air for US$1.70. It is a Wien-bridge oscillator, an analog device that produces a true sine wave signal. You zero in on its powerful signal and when you turn it off your desired station will be right there ready to record and produce sunrise and sunset patterns and detect SIDs from Solar Flares.





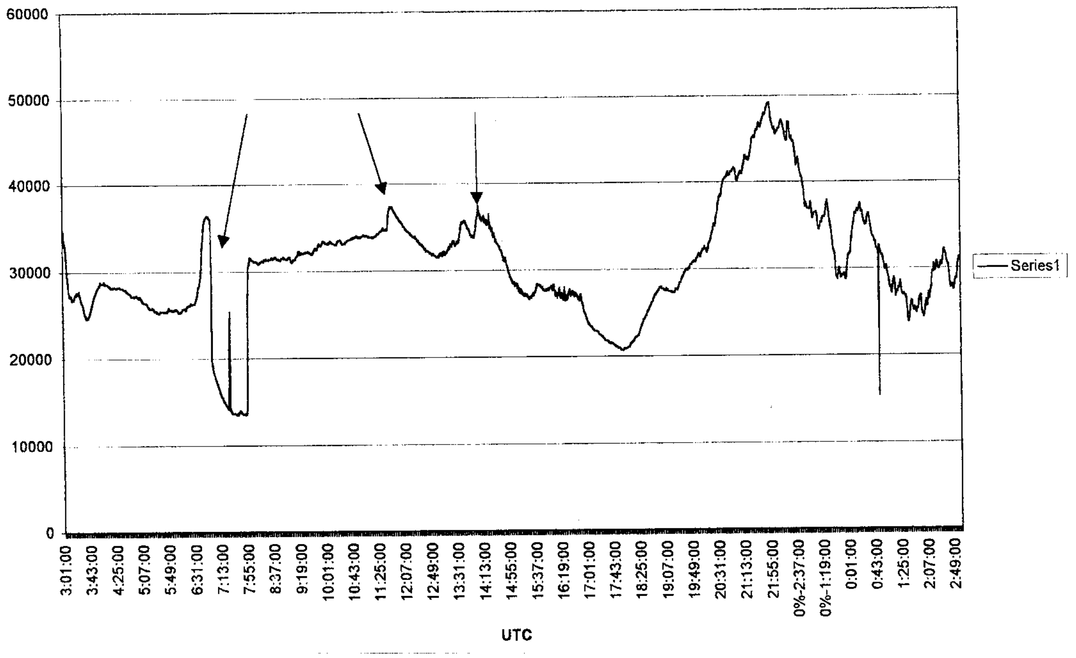
R1, 100 ohm ¼ Watt	R4, R6 10k 15 turn potentiometer
R3, R5 1k ¼ Watt	C1, C2 0.001 mfd (1 nfd)
R2 1k 15 turn potentiometer	L1 12 V, 25 mA Lamp, Radio Shack Part # 272-1141A

In order to make the schematic above easy to follow for those not very experienced in building electronic devices, I have made a drawing of how to lay the parts out on a little printed circuit board, Radio Shack part #276-149A. Notice the little circle in the top left corner of the TL082 opamp. It identifies where pin number 1 is. It is also in the top left corner. The pins are numbered down and across and up with pin # 4 in the bottom left corner and pin # 8 in the top right corner. This is a top view of the opamp and you will find the same pin out diagram on back of the card the TL082 comes on. It is also a top view. Turn the board over and solder pins 4 and 8 into the board so the opamp don't fall out. Connect pin # 8 to the +9 V lead and pin # 4 to the – 9V lead remembering you are now seeing the bottom view and the pins have changed sides. Now that you see how the leads and components connect to the numbered pins the rest is easy. Use thin uninsulated wire to hook things together point to point. Wire from the four-wire telephone cable is suitable. Cut the insulation with a knife and you can slide off long pieces to provide hook up wire. It is bare copper wire so tin the ends with solder before soldering them in place. Check your hook up several times to make sure everything goes to the right numbered pin. Now it is ready to hook up the batteries and test to see if it is generating a signal.

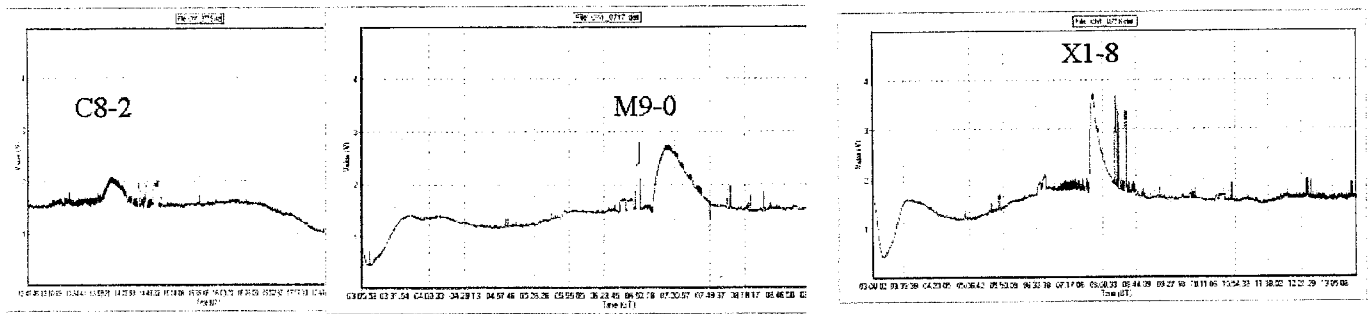
Before you test it, it helps to understand how this simple device made from six resistors, two capacitors and a little lamp, hooked to a TL082 dual operational amplifier (opamp) can generate a pure sine wave signal. The resistors, R3, R4 and C1 form a parallel resonant circuit that connects the noninverting input, pin 3, to ground. Resistors, R5, R6 and C2 form a series resonant circuit that connects it to the output, pin 1. Together these provide positive feedback that will make the thing oscillate at a frequency that can be tuned by variable resistors R4 and R5. It will "swing between the rails", +12 V and –12 V, and generate a square wave. The lamp, L1 plus R1and R2 provide negative feed back that will keep it from oscillating. The resistance of R2 is adjusted so before the signal reaches the positive rail it draws enough current through the lamp to heat the filament and increase its resistance and this produces negative feedback that quenches the signal and it turns back and heads for the negative rail. Before it gets there the filament cools and the resistance goes low and the signal turns around and heads back again for the positive rail. There is enough time lag in the filament heating and cooling to turn the signal back and forth slowly so it produces a sine wave. This requires R2 to be set so the signal swings about half way between the rails. This clever little analog oscillator was invented by Mr. Wein way back in the 1920s and so it has been named a Wien-bridge oscillator. I'll let you figure out why it's a bridge oscillator.

To test your oscillator to see if it is generating a signal, first set the three variable resistors, R2, 4 and 6. Use your multimeter set to measure resistance. Set R2 to 185 ohms. This will balance the resistance of the lamp so the signal swings about 75% of the distance between the rails but never reaches them before tuning around to produce the sine wave. Set R4 and R6 both to 5700 ohms. These settings tune my oscillator to 24 kHz using the 0.001 mfd ceramic capacitors from Radio Shack. The best way to test the oscillator is with your receiver. If you have the 24-turn, 1 ½m hexagonal loop antenna connect about 0.0185 mfd across it for C1 and it should tune somewhere close to 24 kHz. Attach about 1 meter of flexible stranded insulated wire to the oscillator for an antenna. Attach the ground lead of the oscillator to the loop's ground and wrap several turns of the antenna wire around the loop antenna. Hook the 9-volt batteries to the oscillator and it should put out a powerful signal the receiver will pick up even if neither the receiver nor the oscillator is tuned very close to 24 kHz. You will see the signal level of the receiver output increase when you hook the batteries to the oscillator. The signal level increase shows that the oscillator is putting out a signal. The next step is to have somebody tune the oscillator to exactly 24 kHz with a frequency counter and then use it to tune the receiver to 24 kHz. You do this the same way you tested the oscillator. Connect the ground and wrap some of the antenna wire around the loop and hook up the batteries. The receiver output will increase and probably be driven to saturation. Unwrap some of the antenna wire so the signal level
Decreases to about half its saturation level. Now you are ready to tune the receiver to 24 kHz. Close one of the switches that connects 100 pfd across C1 and notice if this changes the signal level. If there is no difference switch in a little more capacity 100 pfd at a time until you see a change. If the change is a lowering of the signal level it means you are tuned below 24 kHz and need to remove capacity to get to 24 kHz. Switch off a .001 capacitor(1000 pfd) so the total value of C1 is 0. 0175. This should lower the signal level. If not switch out another 0.001 mfd capacitor to make C1 equal 0.0165 mfd. Once you have gotten the signal level down a little you know you are now tuned to a frequency higher than 24 kHz. From there start adding capacity slowly 100 pfd at a time until you reach a maximum signal level but this should be at a level well below saturation. Keep below saturation by unwrapping the oscillator's antenna wire. With patience you will find a combination of capacitors switched in that gives the maximum signal. This means you have the receiver tuned to 24 kHz. Unsolder these capacitors from the tuner and solder them across the loop for C1. Protect the amplifier from lightning with a new automobile spark plug with the gap set to 0.2 mm (0.008 inch) In addition protect it by connecting back-to-back 1N914 diodes across the loop. Let the receiver run for a few days. You should see sunrise and sunset patterns and record SIDs if there are any. To find out go to << http://www.sel.noaa.gov/ftpmenu/indices/events.html >> and see if any are listed for your daylight hours. If there were M-class events you certainly should have recorded them. If the receiver is working right it will also record C-class events. What I have described above is the same procedure you would use to tune to a VLF station on another frequency

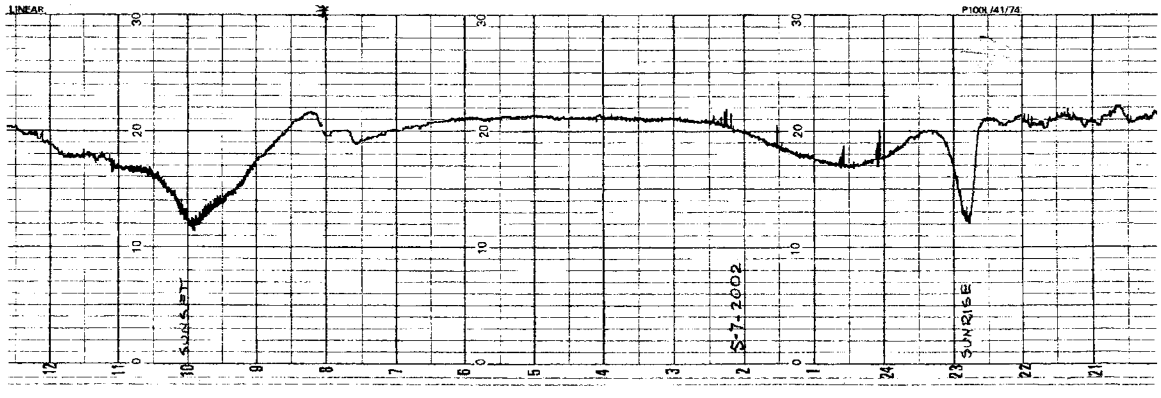
16 july 2002 total picture



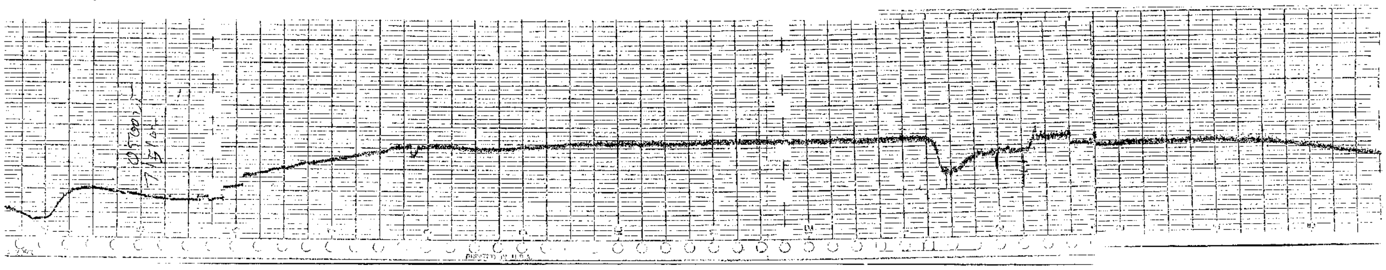
The chart above on the previous page was made by Erik Smith, new observer, A-105,who lives in Hoogstraten, Belgium. He records VLF station DAO38 in Ramsloh, Germany, A North Atlantic Treaty Organization (NATO) VLF station transmitting on 23.4 kHz and 270 km east of where he lives. He can also record HWU in Le Blanc, France which is 700 km to his southwest. Eric, like many of us is an amateur radio operator, ON1DAG. He has already been posting letters on the SID Network so we are getting to know him.



Three charts above were made by Georgio Bressan, A-101, who lives in Italy and also records VLF Station DAO38 in Germany. He uses a Gyrator II receiver to which some improvements have been made by his friend, Guglielmo di Filippo, A-93. Georgio is also a ham radio operator with call letters, IV3ZCY. We have also gotten to know him better through a letter he posted on the SID Network.



The above chart was made by Len Anderson, A-91, in South Perth, West Australia. He records NWC at Northwest Cape which is about 1000 km north of where he lives.



The chart above was made by Jamie Ellerbe, A-62, in Spain recording ICV in Sardinia The nice big SID he recorded on 5 July is also seen below on one of the charts made by Werner Scharlach, A-9, in Tucson, Arizona, USA. Werner's other chart shows five SESs on 4 July.