

# Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS - SOLAR DIVISION

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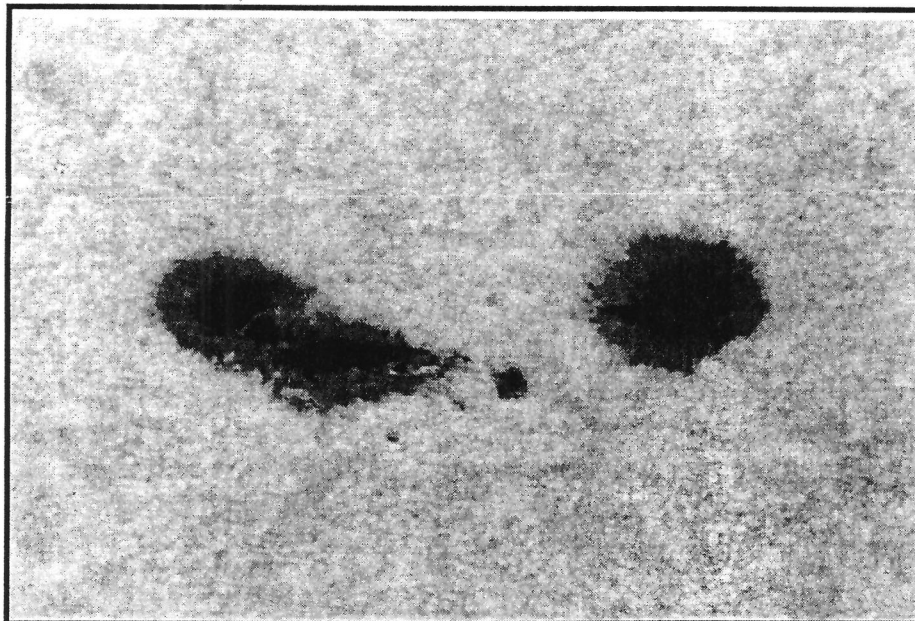
## American Relative Sunspot Numbers, $R_a$ , for September 1997

Date	$R_a$ Final		Date	$R_a$ Final		Date	$R_a$ Final
1	59		11	95		21	29
2	53		12	87		22	44
3	46		13	83		23	41
4	38		14	67		24	43
5	53		15	66		25	45
6	57		16	63		26	27
7	69		17	47		27	23
8	84		18	32		28	19
9	98		19	17		29	18
10	98		20	15		30	21

Monthly Mean = 51.3

(Based on 1028 observations contributed by 61 observers.)

East



NOAA Region 8083 - September 6, 1997. East is at the left and south at the bottom. Photographed by Art Whipple with narrow-band continuum filter and a 4-1/2 inch refractor. This group persisted across the whole face of the sun at high southern latitude. In the picture, it is about a day prior to crossing the solar meridian and spans a length of about 0.1 solar radius.

Betty Stephenson

# Sudden Ionospheric Disturbance Report

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## Sudden Ionospheric Disturbances Recorded During September 1997

Date	Start (UT)	Date	Start (UT)	Date	Start (UT)
970902	1228	970914	1700	970918	1708
970902	641	970915	647	970918	1936
970903	1507	970917	1140	970918	1952
970909	1839	970917	1729	970922	1313
970910	949	970917	1748	970922	1415
970913	1949	970917	2252	970924	1828

The following observers submitted reports and/or charts for September: \*A-05 Hossfield, New York/ A-09 Scharlach, Arizona/ A-40 Parker, California/ A-50 Winkler, Texas/ \*A-52 Overbeck-Toldo, Republic of South Africa/ \*A-62 Stokes, Ohio/ \*A-63 Ellerbe, Spain/ \*A-69 Rosenberg, Arizona/ \*A-72 Witkowski, Florida/ \*A-80 King, England/ \*A-81 Landry, New Hampshire/ \*A-82 Lawrence, Indiana/ A-83 Panzer, Ohio/ A-84 Moss, Switzerland.

\*observers who analyzed their own charts and submitted e-mail reports.

The September SID Report was prepared as a coordinated effort between Cap Hossfield (A-05) and Joseph Lawrence (A-82). The events listed above meet the following criteria:

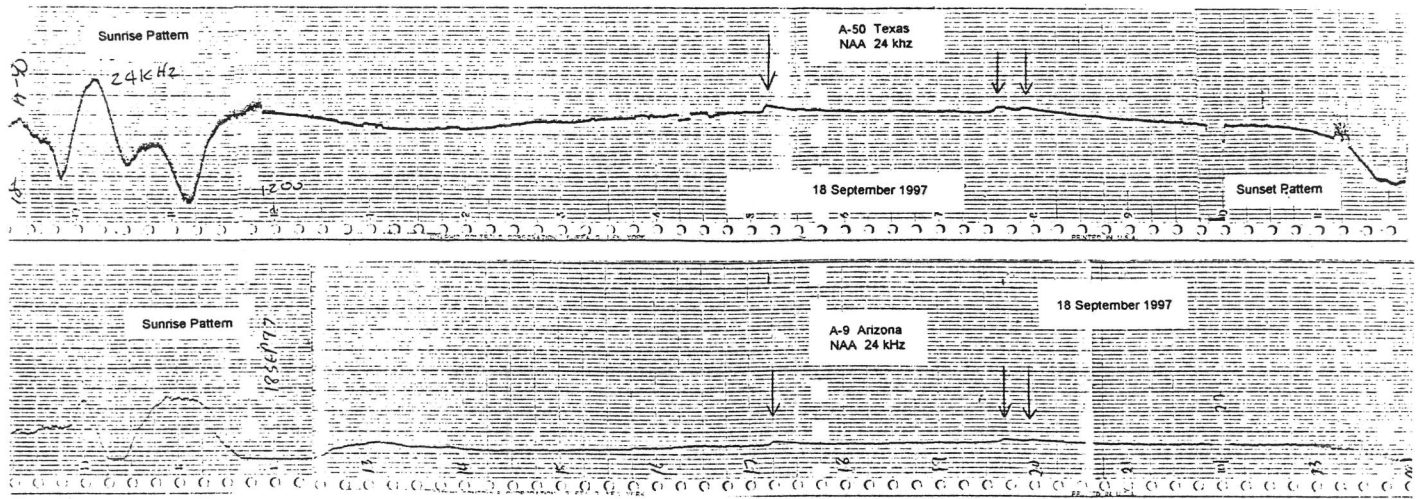
- 1) identified on at least two observer's charts.
- 2) definiteness rating = 5

Observer's charts were visually analyzed by Hossfield while e-mail submissions were organized, sorted, and analyzed for event correlation by a software program recently developed by Lawrence. This software prepares and formats the monthly report transmitted to the National Geophysical Data Center (NGDC). Only those reports submitted via e-mail to Lawrence can be included in the NGDC report. All observers are strongly encouraged to analyze their own charts and submit a formatted e-mail report.

To aid in preparation of the report, observers may use SIDFORM, a software program that prompts the user for all necessary SID event information. SIDFORM computes the event importance from input start/end times, displays the input to the screen for review, and then writes all the formatted data to an ASCII file ready to e-mail to Lawrence for analysis. For easy access, SIDFORM may be downloaded from the following web address:

<http://www.ipfw.indiana.edu/kt2/lawrence/web/programs.htm>

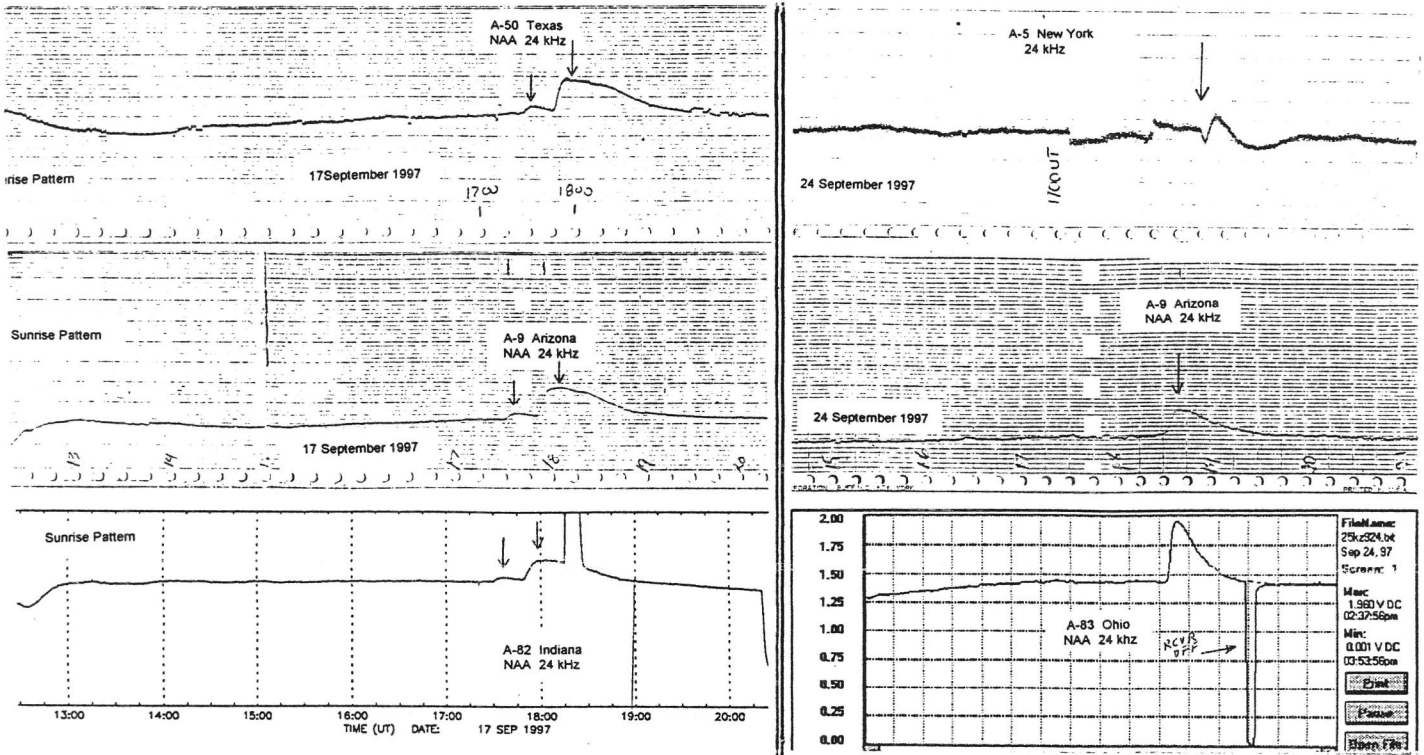
If you have any problems downloading this file, then request a copy on diskette from Lawrence at the address above.



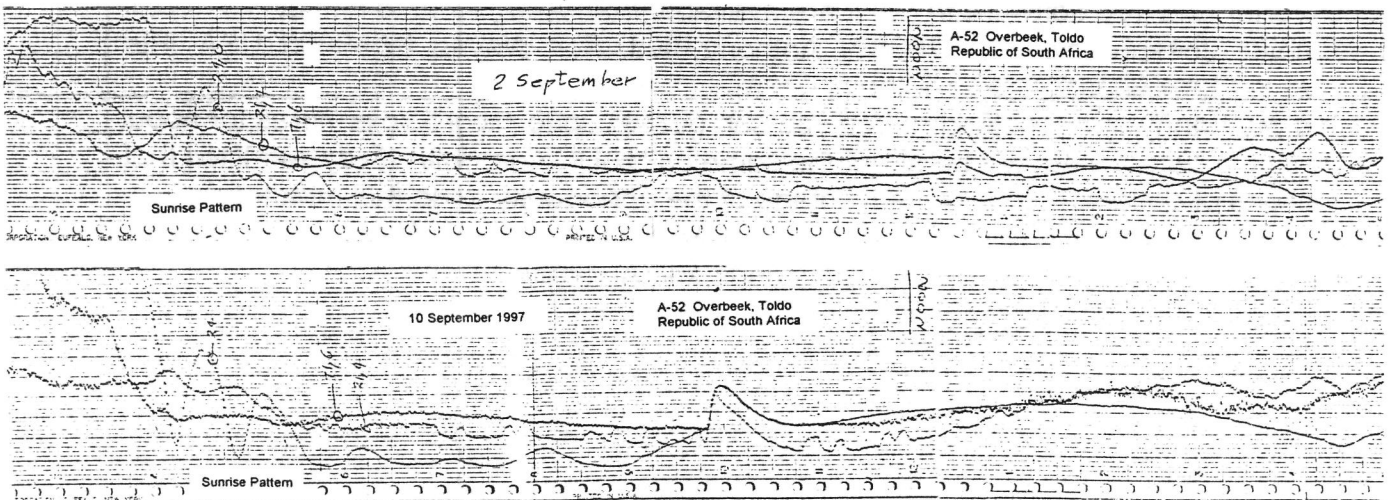
Two charts above show three very small SID's. They are confirmed by being found on more than one chart in my visual analysis so I could rate them definiteness-5 despite their being near the limit of sensitivity of the SID method of detecting solar flares. The flares that caused these tiny SID's were rated C-1.5s and a C-1.6 by the National Geophysical Data Center so they are also near the limit of sensitivity of X-ray satellites. Satellite data is rated according to a system where great flares are rated X-1 to 10, medium flares are M-1 to 10 and small flares are C-1 to 10. According to this system a C-1 flare is the limit of detectability for X-ray satellites. The above charts show that sensitivity of the SID method is about equal to that of the X-ray satellites. The SID method detects Very-Low-Frequency radio propagation anomalies in the ionosphere caused by the same X-rays. Their equal sensitivity should not be surprising given that the SID method monitors thousands of kilometers of VLF radio propagation path through the D-layer of the ionosphere. Solar Ultraviolet maintains the daytime D-layer but solar flare X-rays enhance its free-electron content which causes the VLF propagation anomaly.

The above recordings were made with "Art Stokes" SID receivers such as are used by most AAVSO observers. Parts to build this receiver cost about \$30. A printed circuit board, schematic and instructions for building it are available from A-62. His address: Art Stokes, PO Box 398, Hudson, OH 44236, USA. e-mail = astokes@gwis.com For another \$40 you can buy parts to build an A/D converter and record SID's on your computer. A schematic you will need to build the converter and free software to run it are available from A-82. write to him at his Postal address which is: Joseph Lawrence, 1808 N. Anthony Blvd., Fort Wayne, IN 46805, USA. His e-mail address is: Lawrence@cvax.ipfw.indiana.edu

If you are handy with a soldering iron you can get set up to record solar flares for about \$70. Your ability to detect them will be about the same as NGDC does with X-ray satellites that cost many millions of dollars. If you take advantage of the opportunity to do this interesting scientific work you are welcome to become one of our AAVSO observers. We need observers from outside USA, especially Asia, the Pacific Islands and Australia. C.H.H.



Charts above on the left show a double SID on 17 September. A-82's chart was recorded with his computer recording system using his A/D converter and software mentioned above. Charts above on the right show an SID on 24 September. The A-5 chart started out inverted but then changed its mind. The two other charts are normal because A-9 and A-83 are both farther from NAA's 24kHz transmitter in Maine. Being relatively close to the transmitter often produces the inverted SIDs. A-83's chart was made using a digital multimeter made by Tandy Corporation. A-83, Alex Panzer, described how he uses this multimeter to record SIDs in Technical Bulletin, Volume 7, Number 2, April 1996. If you would like a copy of this Technical Bulletin write to him. His address: Alex Panzer, 11341 Glamer Avenue, Parma, OH 44130-5916.



The above charts show an SID on 2 September that was too early to be recorded by US observers. A later event on 10 September was late enough to be recorded in the USA. Both events can be rated definiteness-5 because three signals are multiplexed.