

# Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS - SOLAR DIVISION

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May 1999

## Daily Mean Sunspot Numbers, $R_a$ for May 1999

(computational analysis performed by Joseph Lawrence)

simple average

k-corrected

Day	$R_a$ avg	Std. Dev.	$R_a$ k	Std. Dev.
1	92	3.8	77	2.8
2	100	5.2	87	3.4
3	92	6.0	75	2.8
4	85	4.9	67	2.9
5	96	4.8	75	2.4
6	108	5.2	93	2.8
7	148	6.6	130	4.3
8	184	7.4	151	4.5
9	171	10.2	149	6.3
10	139	7.9	119	5.5
11	132	6.8	116	4.1
12	136	7.4	117	5.5
13	114	8.3	97	5.3
14	105	5.0	88	3.1
15	127	5.5	108	3.5
16	118	4.1	106	2.4
17	110	5.1	98	3.4
18	104	5.4	91	3.8
19	113	6.9	99	5.2
20	114	4.9	100	3.8
21	127	5.7	104	3.6
22	118	5.7	97	4.1
23	107	5.3	93	2.9
24	103	4.1	87	2.6
25	105	3.9	87	2.5
26	119	5.4	100	3.9
27	125	5.4	108	4.1
28	119	4.4	102	3.6
29	124	4.9	106	3.3
30	115	6.1	97	4.2
31	139	6.0	124	3.9

Monthly Mean  $R_a$  avg = 119.0

Monthly Mean  $R_a$  k = 101.6

Observer	Code	Country	Days Obs.
Abbott, P	AAP	Canada	12
Anderson, E	ANDE	USA, NY	7
Atac, T	ATAT	Turkey	30
Atkinson, G	ATKG	USA, MA	13
Attanasio, A	ATON	Italy	11
Barnes, H	BARH	New Zealand	14
Barton, W	BARW	England	3
Battaiola, R	BATR	Italy	11
Berg, R	BEB	USA, IN	21
Berdett, J	BERJ	Spain	13
Blackwell, J	BLAJ	USA, NH	14
Boschat, M	BMF	Canada	24
Bose, B	BOSB	India	19
Branchett, B	BRAB	USA, FL	28
Branch, R	BRAR	USA, CA	22
Carlson, J	CARJ	USA, MA	22
Morales, G	CHAG	Bolivia	27
Cudnik, B	CKB	USA, TX	13
Clemens, C	CLEC	USA, PA	18
Compton, T	COMT	USA, MI	19
Conlin, G	CONG	USA, WA	17
Cragg, T	CR	Australia	27
Dempsey, F	DEMF	Canada	14
Dyck, G	DGP	USA, MA	19
Dragesco, J	DRAJ	France	22
Dubois, F	DUBF	Belgium	21
Ellerbe, J	ELLJ	Spain	3
Reed, E	ELR	USA, TX	29
Feehrer, C	FEEC	USA, MA	23
Ruiz, J	FERJ	Spain	20
Fleming, T	FLET	USA, TX	26
Galvez, E	GALE	Peru	14
Giovanoni, R	GIOR	USA, MD	28
Gottschalk, S	GOTS	USA, IA	18
Hay, K	HAYK	Canada	7
Ibanez, J	IBAJ	Spain	23
Imperi, R	IMPR	USA, OH	17
Iskum, J	ISKJ	Hungary	15
Janssens, J	JANJ	USA, TX	3
Jenkins, J	JENJ	USA, IL	17
Jenner, S	JENS	England	6
Kaplan, J	KAPJ	USA, MN	17
Knight, J	KNJS	South Africa	19
Lawrence, J	LAWJ	USA, IN	8
Lerman, M	LERM	Canada	21
Leventhal, M	LEV M	Australia	24
Lizak, T	LIZT	USA, RI	24
Lubbers, T	LUBT	USA, MN	13
Lohvinenko, T	LWT	Canada	9
Malde, K	MALK	Norway	26
Mariani, E	MARE	Italy	11
Mochizuki, E	MCE	Japan	19
McHenry, L	MCHL	USA, PA	5
Miller, J	MILJ	USA	18
Moeller, M	MMI	Germany	13
Prestage, N	OBSO	Australia	16
Parker, N	PARN	USA, CA	11
Randall, T	RANT	USA, NY	7
Richardson, E	RICE	England	20
Ritchie, A	RITA	USA, MA	22
Schott, G	SCGL	Germany	24
Scholl, G	SCHG	USA, NY	16
Simpson, C	SIMC	USA, OH	19
States, B	STAB	England	14
Stoikidis, N	STQ	Greece	27
Suzuki, M	SUZM	Japan	23
Takuma, H	TAKH	Japan	21
Teske, D	TESD	USA, MS	25
Thompson, R	THR	Canada	20
Vargas, G	VARG	Bolivia	18
Vardaxoglou, P	VARP	Greece	17
Vazquez, C	VAZC	Argentina	16
Wilson, W	WILW	USA, TN	19
Witkowski, L	WITL	USA, FL	24
Watts, K	WKW	USA, CA	9
Wydra, K	WYDK	Poland	28

# AAVSO Sunspot Observer Code List May 1999

AAP	Patrick Abbott	HALB	Brian Halls	RANT	Thomas Randall
ANDE	Eric Anderson	HANS	Stanley Hanna	REYD	Darryl Reynolds
ATAT	Tamer Atac	HAYK	Kim Hay	RICE	E. C. Richardson
ATHE	Nat. Obs. Athens	HRUT	Timothy Hrutkay	RITA	Arthur Ritchie
ATKG	Gerald Atkinson	HSF	Casper Hossfield	RMAJ	Jim Ramsey
ATON	Antonio Attanasio			RMAS	Sharon Ramsey
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BARH	Howard Barnes	IBAJ	Jose Manuel Oporto Ibanez	ROSG	George Rosenberg
BARW	Bill Barton	IMPR	Ruth Imperi	SCGL	Gerd-Lutz Schott
BATR	Roberto Battaiola	ISKJ	Jozsef Iskum	SCHG	Gregg Scholl
BDT	David Branchett	ISLJ	John E. Isles	SIMC	Clyde Simpson
BEB	Ray Berg			SPEP	Pam Spence
BERA	Alberto Berdejo	JANJ	Jan Janssens	SPER	Robert Spellman
BERJ	Jose Alberto Berdett	JEFT	Thomas Jeffrey	STAB	Brian States
BLAB	Bill Black	JENJ	James Jenkins	STEE	Elizabeth Stephenson
BLAJ	John A. Blackwell	JENS	Simon Jenner	STEF	George Stefanopoulos
BMF	Michael Boschat	JENV	Vernon Jennings	STEM	Gerhard Stemmler
BOSB	Biswajit Bose			STQ	Nick Stoikidis
BRAB	Brenda Branchett	KAPJ	John Kaplan	SUZM	M. Suzuki
BRAR	Robert Branch	KIRS	Istanbul Univ. Obs. (S. Kirvac, Lib.)	-----	
BROR	Rodney Brooks	KNJS	James Knight	TAKH	H. Takuma
BURS	Scott Burgess	KOS	Attila Kosa-Kiss	TESD	David Teske
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CARJ	James Carlson	KUEK	Kevin Kuehl	THR	Raymond Thompson
CHAG	German Morales			TORM	Marcello Torsoli
CHOJ	John Chouinavas	LAWJ	Joseph Lawrence	-----	
CKB	Brian Cudnik	LERM	Michel Lerman	VARG	Gonzalo Vargas
CLEC	Carl Clemens	LEVM	Monty Leventhal	VARP	Paraskhos Vardaxoglou
COMT	Thomas Compton	LGN	Gennaro Lopriore	VAZC	Carlos Vazquez
CONG	Gregory Conlin	LIZT	Tom Lizak	-----	
CR	Thomas Cragg	LOPJ	Jerry Lop	WHIM	Matthew Whitehouse
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DAVT	Thomas F. Davis	LUBT	Thomas Lubbers	WILW	William M. Wilson
DEMF	Frank Dempsey	LUNH	Hugh Lund	WISM	Michael Wiskirken
DRAJ	Jean Dragesco	LWT	Todd Lohvinenko	WITL	Leonard Witkowski
DUBF	Franky Dubois			WKW	Kenneth Watts
DGP	Gerald P. Dyck	MALK	Kjell Inge Malde	WYDK	Krzysztof Wydra
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ELEG	Gontran Eleizalde	MARE	Enrico Mariani	-----	
ELLJ	Jaime Ellerbe	MARH	Hubert Martin	YESH	Hulya Yesilyaprak
ELR	Ed L. Reed	MARJ	Javier Jarboles Maranon		
EVAC	Charles Evans	MCE	E. Mochizuki		
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FEEC	Carl Fehrer	MCHL	Larry McHenry		
FERJ	Javier Ruiz Fernandez	MILJ	Jay Miller		
FLEN	Nicolas Alejandro Fleming	MMI	Michael Moeller		
FLET	Tom Fleming	MOJH	Hector Mojica		
FUJK	K. Fujimori	MUDG	George Mudry		
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GALE	Enrique Galvez Ferreyros	OBSO	IPS Observatory (Nigel Prestage)		
GIOR	Richard Giovanoni				
GOTS	Steve Gottschalk	PAIM	Marie-Therese Pain		
GUNM	Marcelo Mojica Gundlach	PARN	Norm Parker		
GUTD	David Montes Gutierrez	PEAC	Penteli Astronomical Center		
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		QUAG	George R. Qualley		

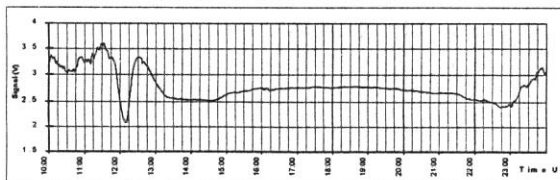
**Editor's Note:** All sunspot observers are requested to include their observer code listed above on monthly reports and all correspondence with the AAVSO Solar Division. All individual observations are referenced by your observer code in the sunspot database. This will allow more efficient searches of data and recognition of individual contributions.

Many thanks to the observers who used the SUNKEY data entry program to submit their monthly reports. There were problems noted with the program. It is expected that a more user-friendly version of the program be available in the next couple of months and it will eliminate these problems.

JDL

# Sudden Ionospheric Disturbance Report

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 lawrence@ipfw.edu  
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## Sudden Ionospheric Disturbances (SID) Recorded During May 1999 (correlation analysis performed by Joseph Lawrence, SID Analyst)

Date	Max	Imp	Date	Max	Imp	Date	Max	Imp	Date	Max	Imp
990501	2304	2	990508	1057	2+	990516	1726	2+	990524	1007	1-
990502	0804	2	990508	1403	1	990516	2015	2+	990524	1220	1
990502	1005	2	990508	1430	3	990516	2233	2+	990524	1715	1+
990502	1442	1+	990509	0010	2	990517	0025	2	990524	1740	1-
990502	1655	2+	990509	0048	2+	990517	0907	2	990525	2018	2
990503	2313	2+	990509	1100	2+	990517	1708	2	990527	1143	2
990504	1015	1	990509	1216	3+	990517	1805	2+	990527	1306	1+
990504	1855	2+	990509	1410	1+	990517	2015	1+	990527	1532	2
990505	1245	1+	990509	1605	3	990517	2200	2+	990527	1558	2
990505	1525	1+	990509	1800	3	990518	1130	2+	990527	1658	2+
990506	1330	1+	990509	2234	2+	990519	1845	1	990529	2010	1+
990506	2209	2+	990510	1555	1	990519	2000	1	990530	1920	1
990507	1020	2	990510	1740	1+	990521	1800	3+	990530	2344	2+
990507	1312	1	990511	2039	2+	990523	1438	2+	-	-	-
990507	1430	2+	990511	2158	3	990523	1731	1+	-	-	-
990507	1834	1-	990516	1354	2	990524	0815	2	-	-	-

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

- 1) reported in at least two observers' reports.
- 2) visually analyzed with definiteness rating = 5 on submitted charts
- 3) reported by overseas observers with high definiteness rating

Observer	Code	Station(s) Monitored
Parker, N	A-40	NPM
Winkler, J	A-50	NAA, NPM
Overbeek, D	A-52	NAA, NSW, NPM
Toldo, D	A-52	NAA, NSW, NPM
Stokes, A	A-62	NAA
Witkowski, L	A-72	NAA
King, P	A-80	FTA
Landry, A	A-81	NAA
Lawrence, J	A-82	NAA
Moos, W	A-84	FTA, GBZ, ICV
Dormann, M	A-89	NPM
Mandaville, J	A-90	NAA, NPM

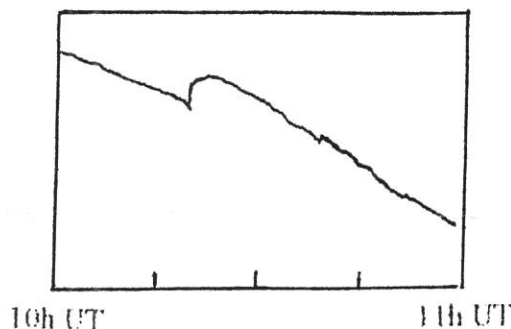
Importance	Duration (min)
1-	< 19
1	19 - 25
1+	26 - 32
2	33 - 45
2+	46 - 85
3	86 - 125
3+	> 125

# Sudden Ionospheric Disturbances Recorded During May

Prepared by  
Casper H. Hossfield

A-52 Edenvale: Gamma Ray Burst of 1998 08 27

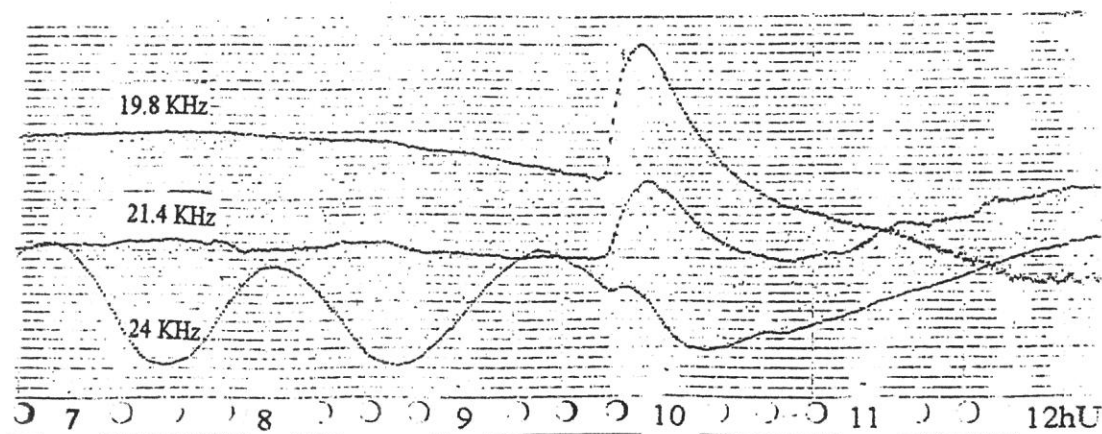
19.8 KHz Signal from NW Cape, Australia



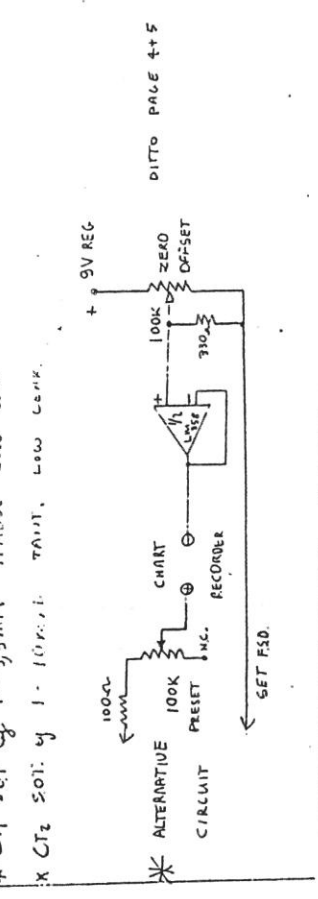
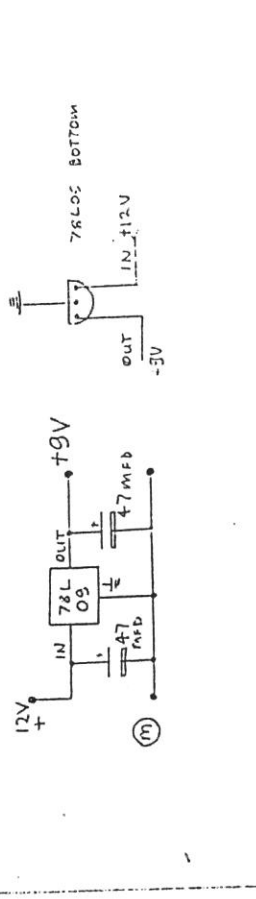
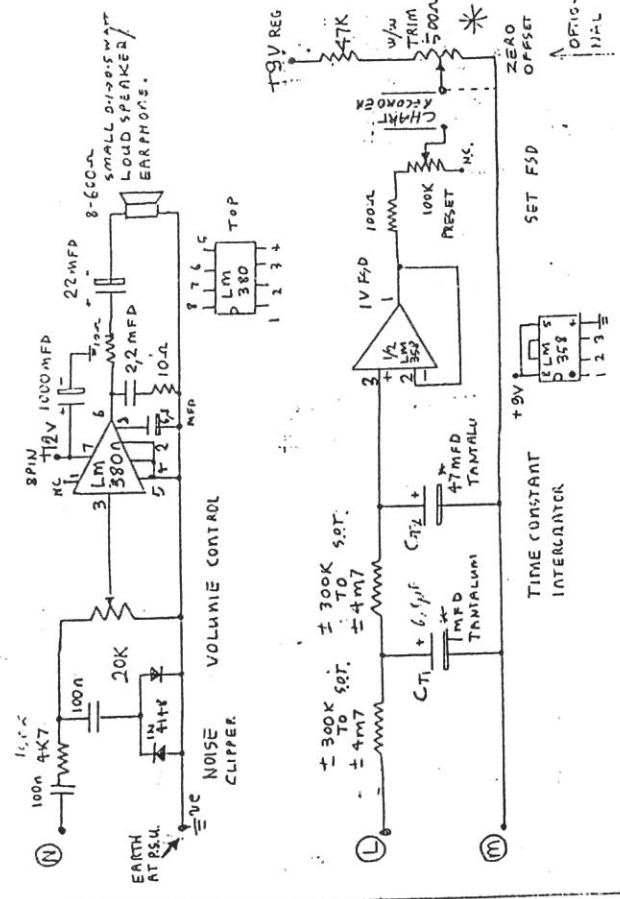
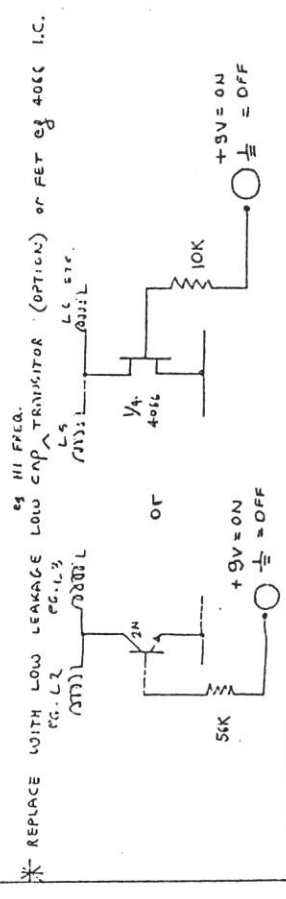
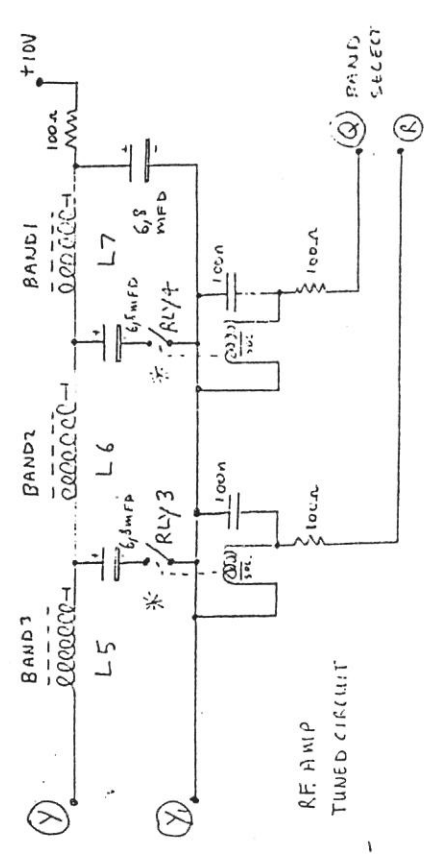
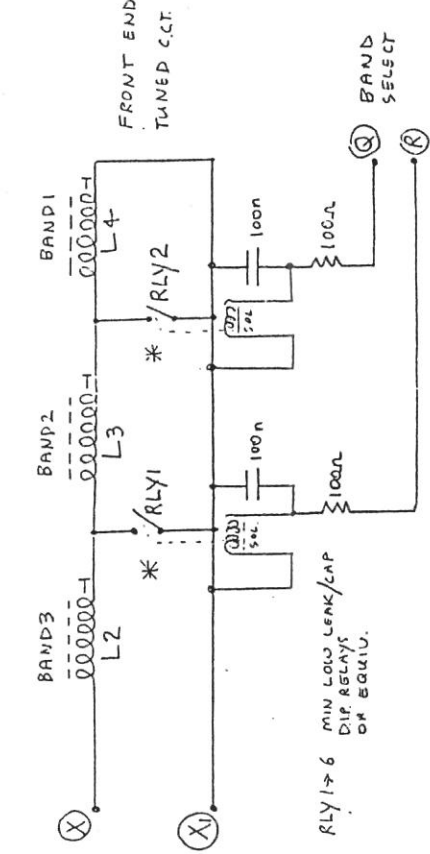
The enlarged section of a chart above shows a recording of the gamma ray burst at 1022 UT on 27 August 1998. It was made by A-52 in South Africa and shows an SES (sudden enhancement of signal) of VLF (very low frequency) radio station NWC at Northwest Cape in West Australia on 19.8 kHz. The enlargement is taken from a multiplexed chart like the chart below that recorded a solar flare on 27 February 1999. Here three signals are recorded and the flare enhanced all three. The flare that caused these enhancements was much more intense than the gamma ray burst that caused only a very small enhancement of NWC's signal. Although it was small it was nevertheless very definite and occurred at exactly the right time on a clean interference free chart. This is the only recording of the gamma ray burst by an amateur that I know of. A recording of the burst as an SES by a professional observatory recording NPM in Hawaii was published in *Science* and also in *Sky & Telescope* magazine. A-52's success in recording the gamma ray burst is due to the excellent receivers that make the multiplexed charts. The receiver is a superhetrodyne designed by Domenic Toldo who operates station A-52 for Danie Overbeek. It is a true superhetrodyne that down-converts the VLF signal to a lower IF (intermediate frequency) signal, in this case 1359 Hz. The IF frequency is in the lower audible range so a second detector is not needed to hear the signal. All other superhetrodyne receivers I know of in use by AAVSO observers use a VLF converter that up-converts into a commercial communications receiver. The inherent selectivity advantage of a superhetrodyne receiver is lost when the VLF signal is up-converted. Domenic has kindly supplied a detailed schematic for his receiver that is shown below. If you are interested in this receiver and would like to know more about it please contact me at my new e-mail address, < [CapAAVSO@aol.com](mailto:CapAAVSO@aol.com) > or my new Fax number, 973 853 2588. My postal address remains the same.

CHH

Fig 2 A-52, Edenvale. Solar Flare of 1999 02 27

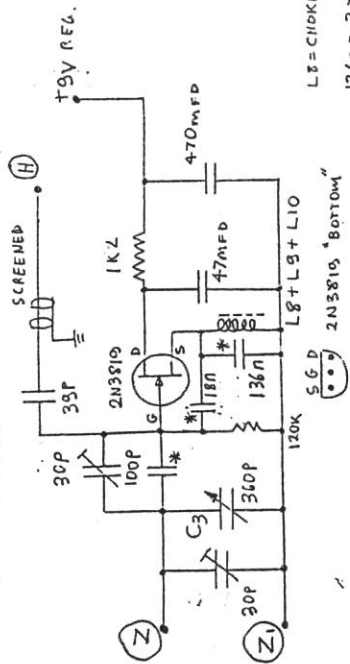




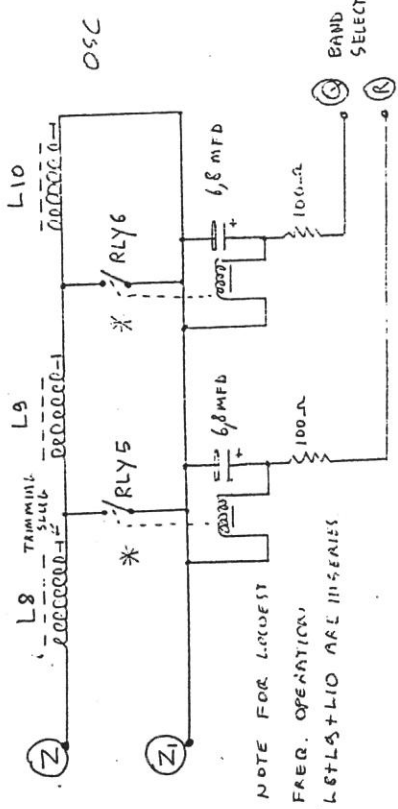




VLF RECEIVER CONT. LOCAL OSC. 23/8/99 5



LB = CHOKE = 55mm  
 136n = 2x 68n HI STAB/LOW CAPS  
 USE NORMAL METHODS OF ADJUSTMENT C3 = 360P VARIABLE CAP. "AIR"  
 FOR TRACKING OF RF STAGES + LC STAGE  
 C1 = C2 = C3 NB ONE BANK = 360P



NOTE FOR LOWEST  
 FREQ. OPERATION  
 L8+L9+L10 ARE IN-SERIES

N.B. VARIABLE CAPACITORS TO BE LOCKED TOGETHER  
 BY MEANS OF GEARS OR OTHER MEANS.  
 IDEAL WOULD BE A 360P CAP.

