VLB ARRAY MEMO No. 446

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NATIONAL RADIO ASTRONOMY OBSERVATORY

Socorro, NM

RFI SURVEY FOR THE VLBA

FT. DAVIS, TX SITE

PART ONE: HARVARD RADIO OBSERVATORY

PART TWO: McDONALD OBSERVATORY

March 1985

Jim Oty

The fourth VLBA proposed location selected for a RFI survey was in the Davis Mountains near Ft. Davis, TX. Two locations were surveyed - a primary location at the Harvard Radio Observatory and a secondary location at McDonald Observatory. This report covers both locations.

During the two weeks I spent in the Davis Mountains I experienced some very strong winds. Before a decision is made as to the final location of the VLBA antenna, a careful study of any wind data available should be made. Wind data from McDonald Observatory may be obtained from Mr. David Doss of the McDonald staff.

PART ONE
HARVARD RADIO OBSERVATORY

The Harvard Radio Observatory (HRO) is located on Cook Flat, a valley surrounded by the Davis Mountains, about four miles from the village of Ft. Davis, TX. Figure 1 is a map of the area showing Cook Flat and the HRO. The elevation is about 5200 feet. Figure 2 is a plot of the elevation of the horizon for 360 degrees around the site. The highest elevation was about 7 degrees at 340 degrees azimuth.

The interference survey at HRO was started on Tuesday, March 19 and was completed in nine days. This was somewhat shorter than the previous surveys, but in the interest of saving time and money and the lack of interfering signals to monitor, the time spent monitoring the frequencies above 4 GHz. was reduced.

The first indication that this area would be a quiet radio area was the lack of AM and FM signals. Another indicator was the presence of TV sattelite dishes at each ranch house rather than the conventional TV antenna. As expected this survey turned up very little in the area of interference.

The HRO Staff was interested in some interference they had experienced around 2.1 GHz. A check of that frequency indicated a strong signal (1X10^-11 W/M^2) at 2.143 GHz. which was very near the passband of their instrument. This signal was traced to the only micro-wave facility in the area, a two way link from Mt. Locke (McDonald Observatory) to Marfa, TX. operated by the Texas Highway Department. The down link from Mt. Locke to Marfa is on 2.143 GHz. and is the interfering signal. The strength of this signal is somewhat surprising as the HRO facility is 90 degrees from the main beam. The uplink signal from Marfa to Mt. Locke was not seen. The HRO Staff, in checking with the Highway Department, found that an additional link is planned from Mt. Locke to Ft. Davis that will pass over the HRO facility. The frequency of this link has not yet been decided.

One other factor noted was the wind. For a 24 hour period, March 19 - March 20, the winds were very strong. The average velocity was around 60 MPH with gusts to 70 MPH. The rest of the time the wind average was 10 to 30 MPH. This was, however, the 'windy' season and the local weather forcasters continued to forcast strong winds for the Davis Mountains. It is interesting to note that the winds at McDonald Observatory on Mt. Locke were about half again as strong as at HRO. On the one windy day, the winds on the mountain were averaging near 90 MPH with gusts to 100 MPH !!!!!

The survey was completed without problems. There were no significant contributors to the RF environment - the nearest 'civilization' was more than 150 miles away. I made a visual check of the surrounding mountains and could find no commercial micro-wave facilities (other than the one on Mt. Locke) closer than Alpine, TX, about 30 miles south. No AM or FM radio stations or TV staions are in the area. There are several two-way business communication facilities in the 160 MHz. and 450 MHz. bands scattered throughout the mountains but these are few compared to a metropolitain area.

The following comments are my observations:

73 MHz. to 75 MHz. Should be the quietest spot in the country. No low channel TV signals (CH 4 or 5) to work between.

300 MHz. to 350 MHz. Very quiet compared to previous surveys. Some signals from aircraft but fewer and weaker than other locations. Rails are localy generated by control computer.

550 MHz. to 650 MHz. A couple of low power TV translators present. Also a 650 MHz. radar that operates intermitently.

500 MHz. to 1 GHz. A quick look for high level signals (VLBA IF) turned up nothing.

1.35 GHZ. to 1.75 GHz. A few low level signals and the usual 1.67 GHz Radiosonde signals twice as day.

2.15 GHz. to 2.35 GHz. Only one low level signal in this band at 2.192 GHz.

4.6 GHz. to 5.2 GHz. No signals.

5.9 GHz. to 6.4 GHz. No signals. This location is not near any A.T.T. or M.C.I. facilities.

7.9 GHz. to 8.9 GHz. The one signal found at 8.08 GHz. turned out to be a L.O. used at the HRO facility.

10.2 GHz. to 11.2 GHz. No signals.

Table I lists the plots included for this part of the report. These are typical plots showing items of interest. Many other plots were generated and are on file. (Plots 1 thru 24)

PART TWO
McDONALD OBSERVATORY

As an added attraction, a second, short version of an interference survey was conducted near McDonald Observatory on Mt. Locke. This survey was actually conducted at a location known localy as Flattop, a nearby mountain NNE of Mt. Locke. Figure 3 is a map of the area. The elevation of this location is about 6600 feet. Measuring the horizon elevation around this site shows zero degrees in most directions with Mt. Locke at 200 deg azimuth and 2 deg elevation and a nearby mountain from 350 deg to 20 deg azimuth and 2 deg elevation. Figure 4 is a plot of this elevation.

After the 90 MPH winds of the week before, I was concerened with the safety of the RFI monitoring trailer at this location (also my own skin), but was able to find a site that was somewhat shielded by two small buildings and a few scrub trees. Fortunately the wind remained relatively calm (not more than 40 MPH) and no problems were encountered.

I expected to find a much different R.F. environment at this higher exposed location over the HRO location but this was not the case. As the included plots show, there is not a lot of difference. After an inspection of the horizon, it was apparent that in each direction, there were two or more ridges of mountains for shielding. That and the fact that 'civilization' was still many miles away contributed to the mild R.F. environment.

Again, to save time, this survey was short. It was completed in 2 1/2 days but all bands were checked carefully. Few changes from the HRO location were noticed. The following comments are my observations about the various bands:

73 MHz. to 75 MHz. Very quiet. No low band TV signals (CH 4 or 5) to work between.

300 MHz. to 350 MHz. Aircraft signals stronger and more numerous than HRO but still much better than other locations surveyed.

550 MHz. to 650 MHz. The only acivity was a low power TV translator or two.

500 MHz. to 1 GHz. No signals.

1.35 GHz. to 1.75 GHz. Few low level signals and occasional intermittent signals.

2.15 GHz. to 2.35 GHz. Several signals around 2.19 GHz. Probably from the Highway Department installation on Mt. Locke.

4.6 GHz. to 5.2 GHz. No signals.

5.9 GHz. to 6.4 GHz. No signals. No A.T.T. or M.C.I facilities in the area.

7.9 GHz. to 8.9 GHz. No signals.

10.2 GHz. to 11.2 GHz. No signals.

Table II lists the plots (plots 25 thru 48) included for this part of the report. Again these are typical plots. The remainder of the plots are on file. Table III shows the harmfull interference level for each of the VLBA bands as defined in VLB Array Memo 81.

Table III has been expanded to include data from VLBA Electronics Memp No. 39, Table I. This data gives the flux density required by an interfering signal that would result in 1% compression in the amplifiers. For these two locations, there were no interfering signals that approached this level.The measurment level in this table is applicable to both parts of this report.

TABLE I
HARVARD RADIO OBSERVATORY
Ft. Davis, TX

Plot #	Frequency	Filter Fc/BW	Comments
1	50 - 100 MHz	None	North.
2	50 - 100 MHz	None	South.
3	74 - 76 MHz	75/5%	North. Single plot showing noise floor.
4	74 - 76 MHz	75/5%	South. Single plot showing noise floor.
5	300 - 350 MHz	325/50	West. Signals are air/ground communications.
6	300 - 350 MHz	325/50	East. Rails are from Compaq computer.
7	550 - 650 MHz	600/100	Low power TV translator signals.
8	550 - 650 MHz	600/100	Signal at 650 MHz. seems to be a radar. Operation was intermittent.
9	640 - 660 MHz	600/100	One record plot of radar signal at 650 MHz.
10	500 - 1000 MHz	None	Quick look for signals in the VLBA IF band.
11	1350 - 1550 MHz	1500/1000	Very little acivity.
12	1550 - 1750 MHz	1500/1000	The usual radiosonde activity.
13	1300 - 1800 MHz	1500/1000	Long term plot.
14	1650 - 2650 MHz	None.	One record plot showing 2.143 GHz. signal from Highway Dept. micro-wave facility on MT.Locke. Signal at 2.02 GHz. is L.O. from HRO.

TABLE I (Cont.)

15	2150 - 2350 MHz	None.	North.
16	2150 - 2350 MHz	None.	East.
17	4.6 - 4.8 GHz	HP4000	Typical plot.
18	4.8 - 5.0 GHz	HP4000	Typical plot.
19	5.0 - 5.2 GHz.	HP4000	Typical plot.
20	5.9 - 6.4 GHz	HP4000	Typical plot.
21	7.9 - 8.4 GHz.	HP6000	Signal at 8.08 GHz. is L.O. from HRO.
22	8.4 - 8.9 GHz	HP6000	Typical plot.
23	10.2 -10.7 GHz	HP6000	Typical plot.
24	10.7 11.2 GHz	HP6000	Typical plot.

TABLE II
McDONALD OBSERVATORY
Ft. Davis, TX

Plot #	Frequency	Filter Fc/BW	Comments
25	50 - 100 MHz	None	North.
26	50 - 100 MHz	None	South.
27	74 - 76 MHz	75/5%	North. Single plot showing noise floor.
28	74 - 76 MHz	75/5%	South. Single plot showing noise floor.
29	300 - 350 MHz	325/50	North. Signals are air/ground communications.
30	300 - 350 MHz	325/50	West. Rails are from Compaq computer.
31	550 - 650 MHz.	600/100	Low power TV translator signals.
32	550 - 650 MHz	600/100	No sign of radar seen from HRO.
33	500 - 1000 MHz	None	Quick look for signals in the VLBA IF band.
34	1350 - 1550 MHz.	1500/1000	Very little acivity.
35	1550 - 1750 MHz.	1500/1000	Signal at 1.51 GHz. not identified.
36	1300 - 1800 MHz.	1500/1000	Long term plot.
37	1650 - 2650 MHz	None.	One record plot showing signals from Highway Dept. micro-wave facility on MT.Locke. Signal at 2.132 GHz. is uplink from Marfa.
38	2150 - 2350 MHz	None.	East.
39	2150 - 2350 MHz	None.	West.

TABLE II (Cont.)

40	4.6 - 4.8 GHz	HP4000	Typical plot.
41	4.8 - 5.0 GHz	HP4000	Typical plot.
42	5.0 - 5.2 GHz.	HP4000	Typical plot.
43	5.9 - 6.4 GHz	HP4000	Typical plot.
44	7.9 - 8.4 GHz.	HP6000	Typical plot.
45	8.4 - 8.9 GHz	HP6000	Typical plot.
46	10.2 -10.7 GHz	HP6000	Typical plot.
47	10.7 11.2 GHz	HP6000	Typical plot.

TABLE III
HARMFUL INTERFERENCE LEVELS

VLBA TUNNING RANGE	HARMFUL INTERFERENCE LEVELS (Note 1)	RFI MEASURED THRESHOLD (Note 2 & 3)	FLUX DENSITY FOR 1% COMP. (Note 4)
50 - 100 MHz.	*	-138 dBW/m^2	#
310 - 340 MHz.	-151 dBW/m^2	-152 dBW/m^2	-72 dBW/m^2
580 - 640 MHz.	-146 dBW/m^2	-148 dBW/m^2	-67 dBW/m^2
1.35 - 1.75 GHz.	-135 dBW/m^2	-135 dBW/m^2	-59 dBW/m^2
2.175 - 2.425 GHz.	*	-133 dBW/m^2	-55 dDW/m^2
4.6 - 5.1 GHz.	-120 dBW/m^2	-127 dBW/m^2	-49 dBW/m^2
4.99 - 5.0 GHz. (Sub-band)	-127 dBW/m^2	-127 dBW/m^2	-49 dBW/m^2
5.9 - 6.4 GHz.	-120 dBW/m^2	-125 dBW/m^2	-47 dBW/m^2
8.0 - 8.8 GHz.	*	-122 dBW/m^2	-44 dBW/m^2
10.2 - 11.2 GHz.	-110 dBW/m^2	-117 dBW/m^2	-42 dBW/m^2

Note 1: These levels, from VLB Array Memo No. 81, are increased by 10 dB since ground based RFI is likely to enter the antenna through 0 dBI sidelobes rather than the +10 dBI sidelobes assumed in Memo 81.

Note 2: These levels are threshold levels from Table I plots.

Note 3: These values may vary slightly from survey to survey because of minor equipment changes.
Note 4: These levels are from VLBA Electronics Memo No. 39.

* These frequency bands not included in memo 81.
# These frequency bands not included in memo 39.

Figure 1

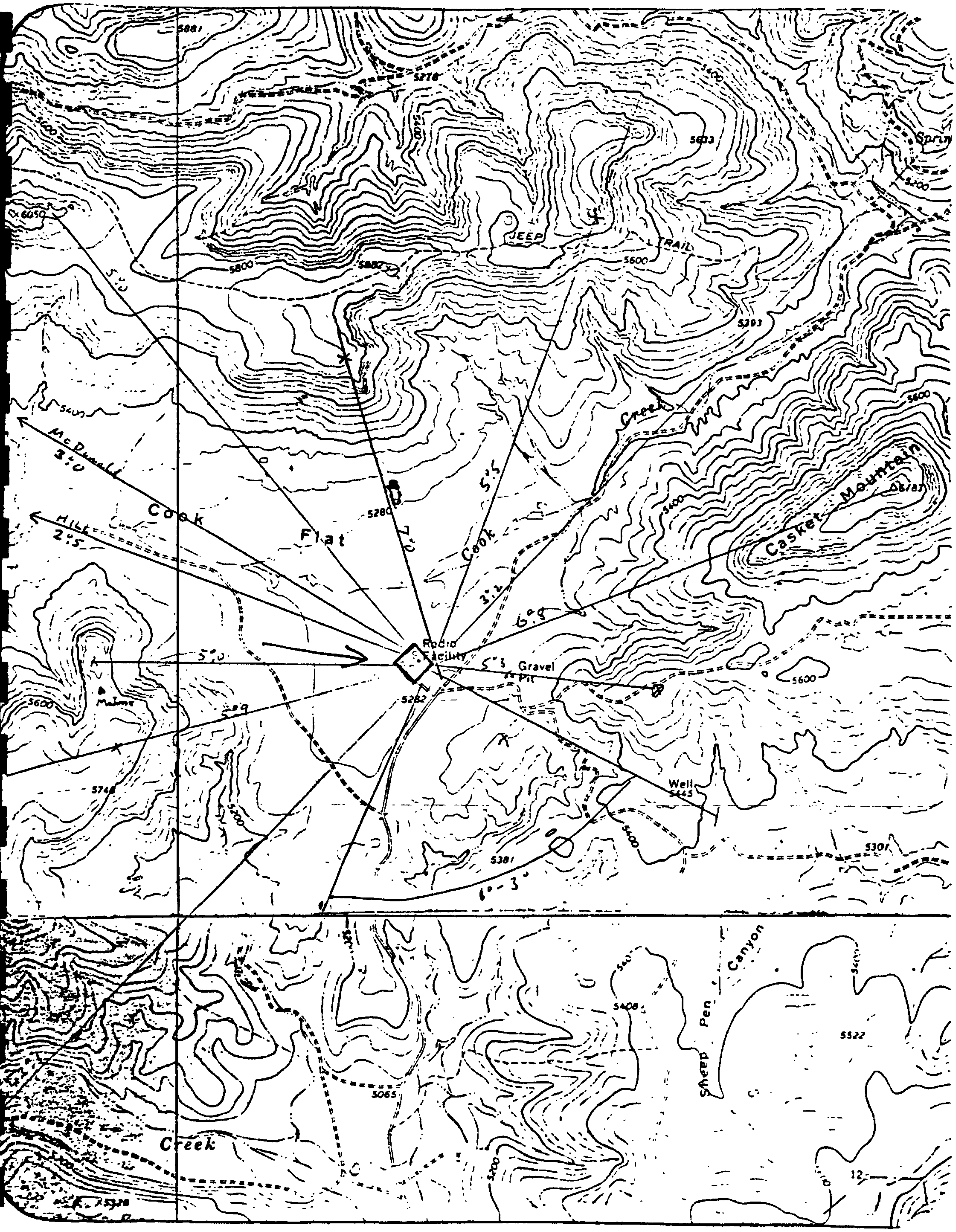

Cook Flat
Cook Creek
Casket Mountain
Radio Facility
Gravel Pit
Well
Sheep Pen Canyon
Creek
JEEP TRAIL
McDonald
HILL
5881
5278
5600
5633
5200
6050
5800
5882
5393
5280
5282
5445
5381
5301
5748
5408
5522
5065
6183

FIG C
PAGE 12

Figure 2

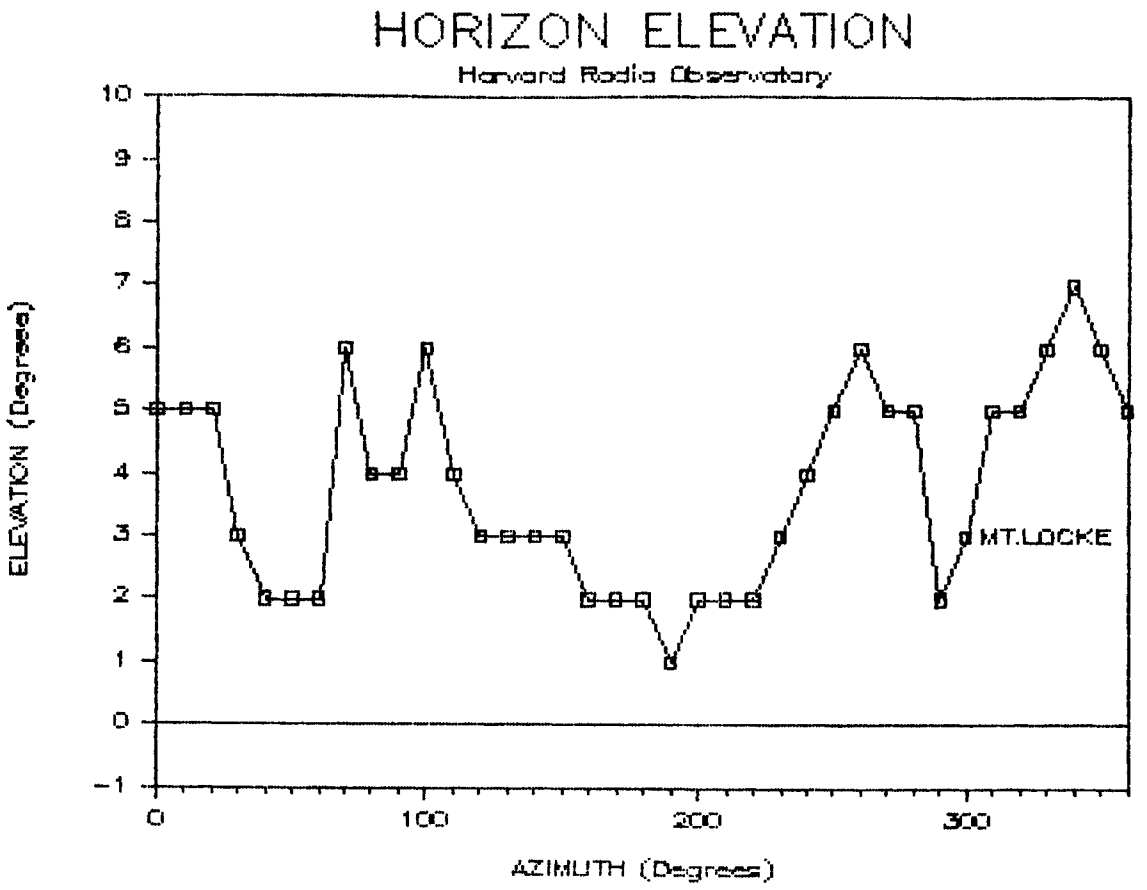


Fig 3
Page 13

Figure 3

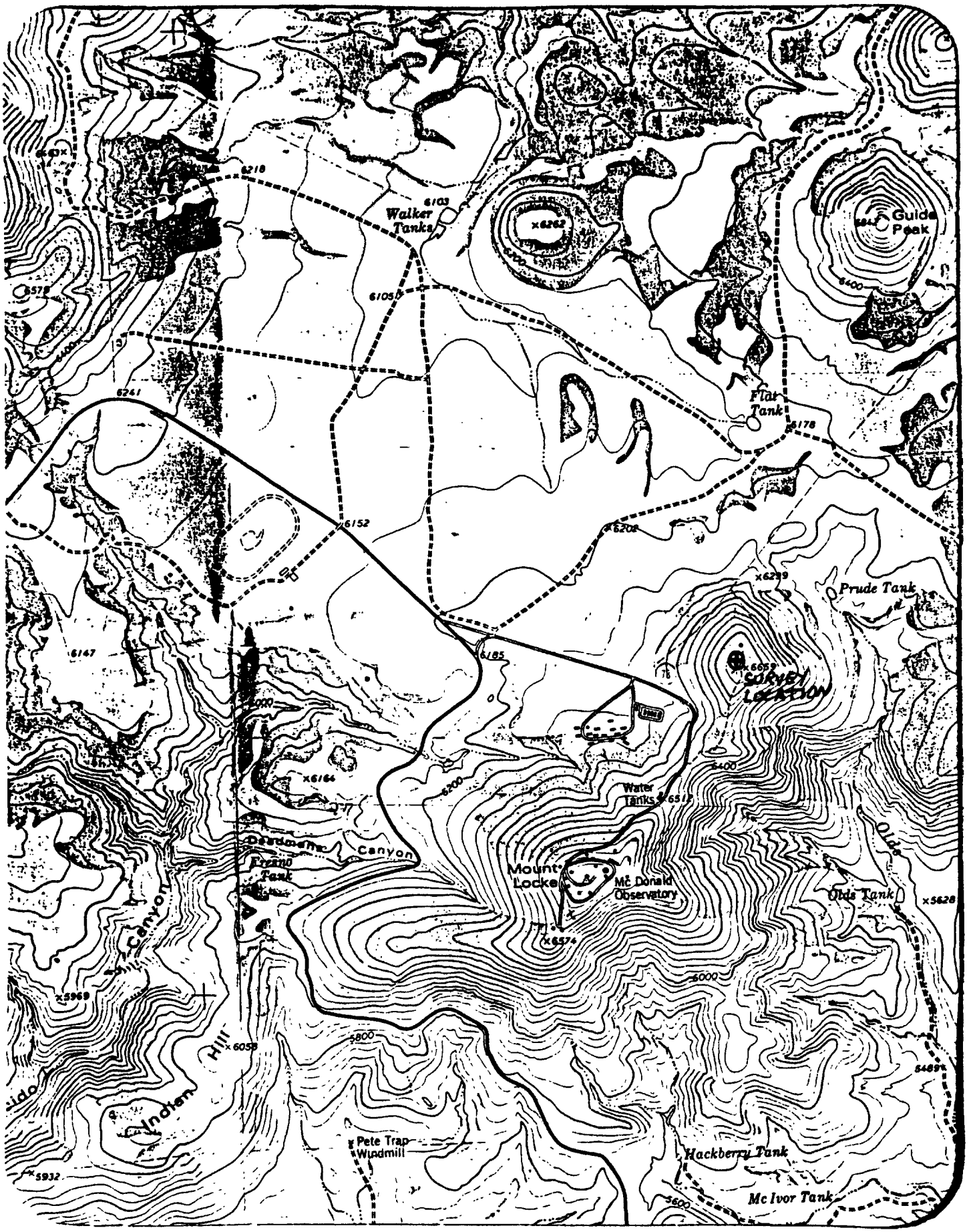
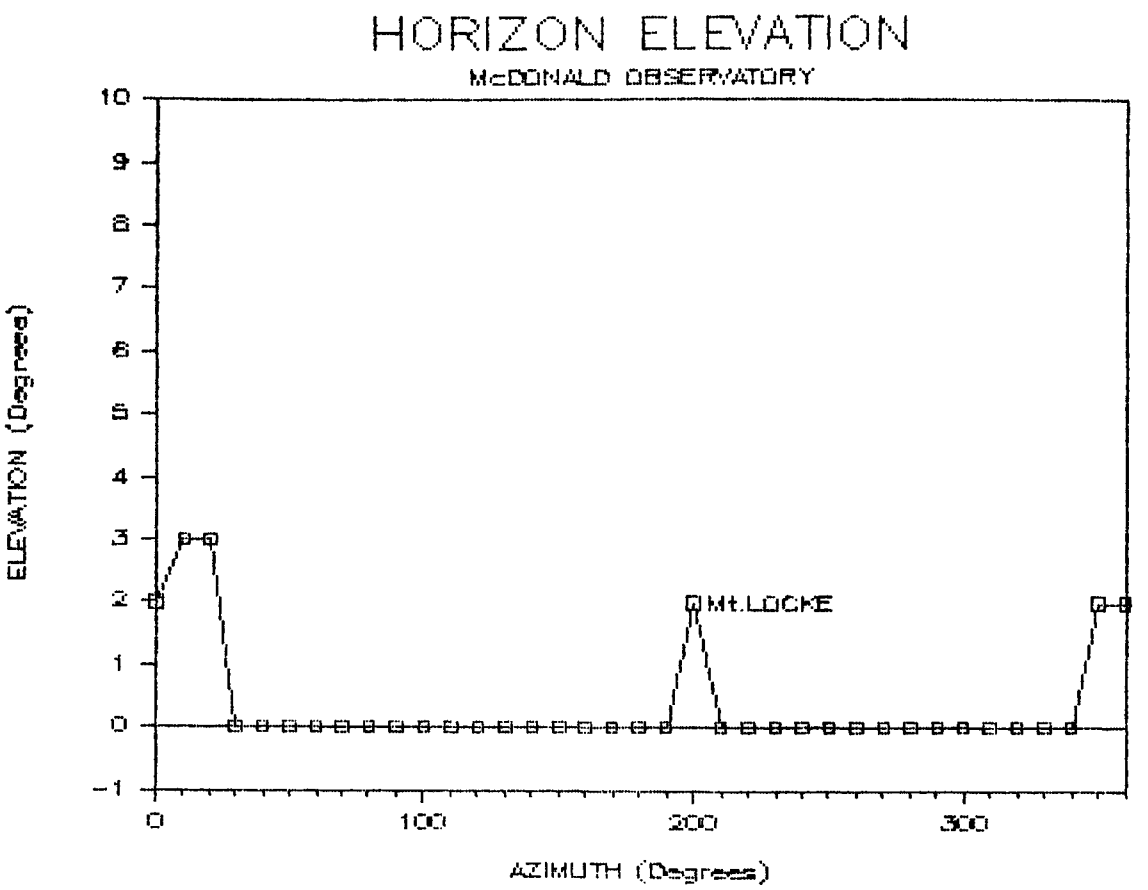
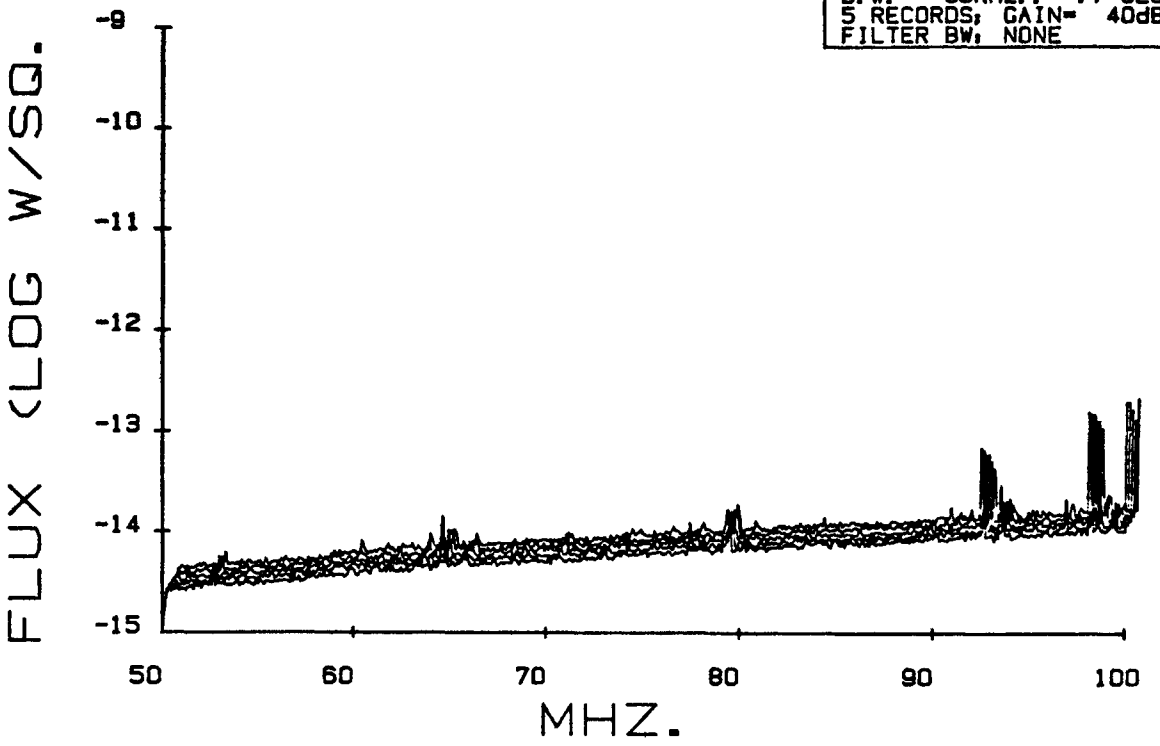


Figure 4


HORIZON ELEVATION
McDONALD OBSERVATORY
ELEVATION (Degrees)
AZIMUTH (Degrees)
Mt.LOCKE
10
9
8
7
6
5
4
3
2
1
0
-1
0
100
200
300

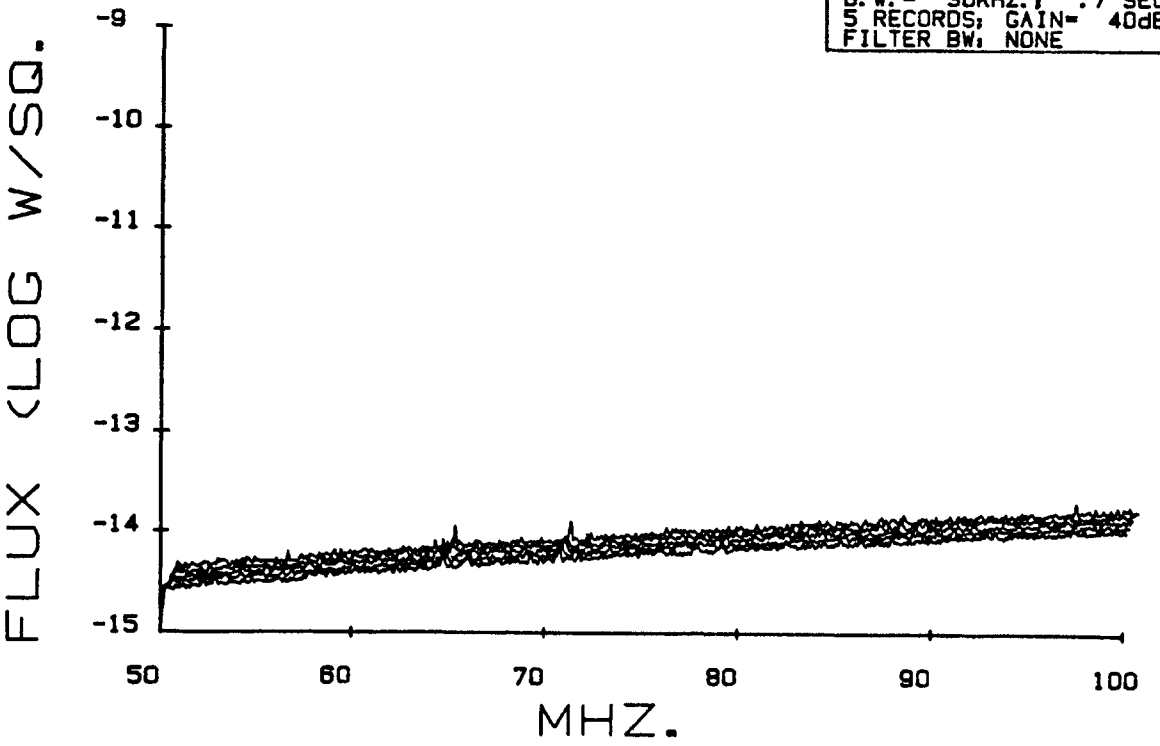
PLOT # 1

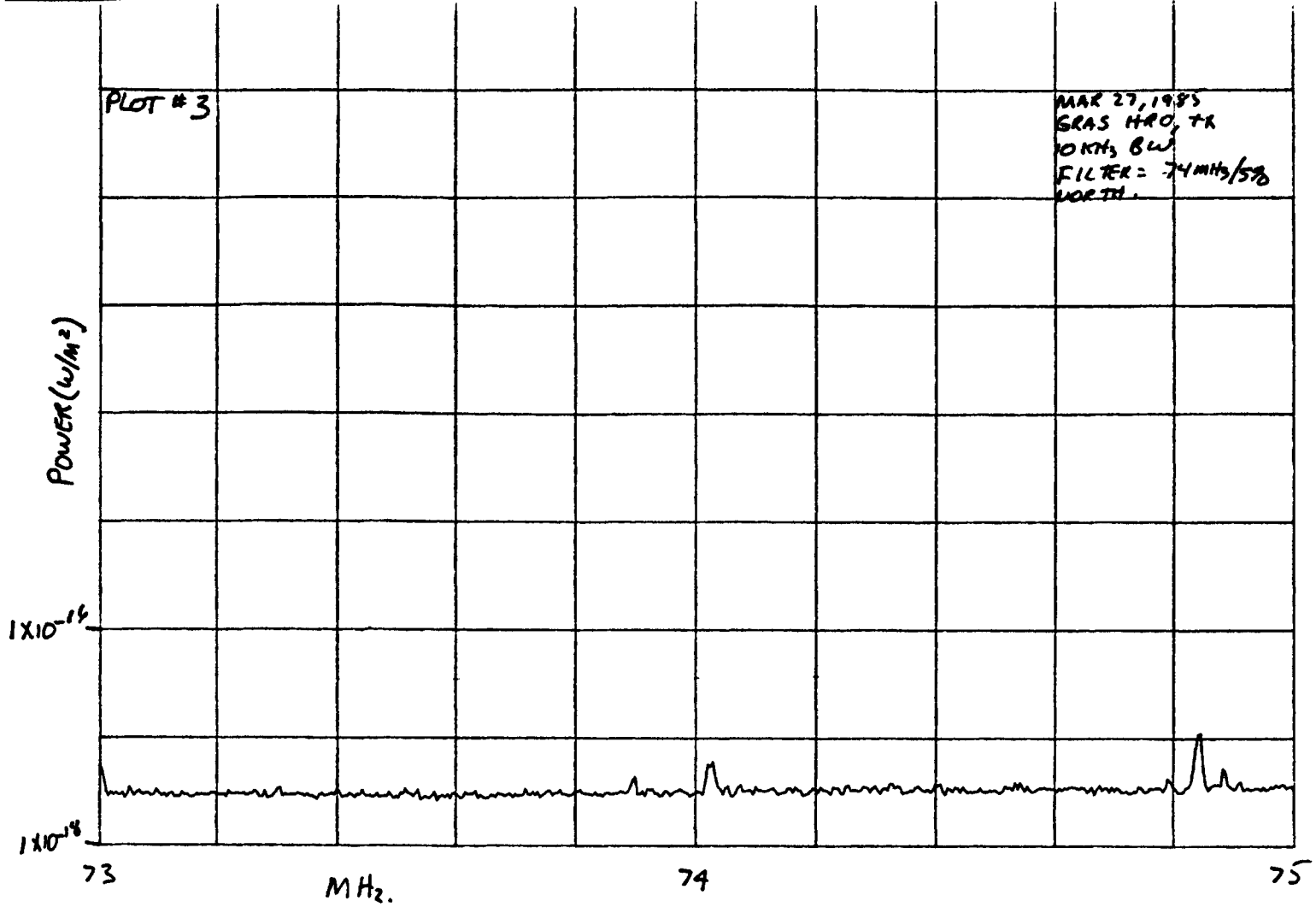
VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 09:32:01 03-27-1985
STOP : 09:42:03 03-27-1985
50 TO 100 MHZ. 0 DEG AZ.
B.W.= 30KHZ.; .7 SEC/CM.
5 RECORDS; GAIN= 40dB
FILTER BW: NONE

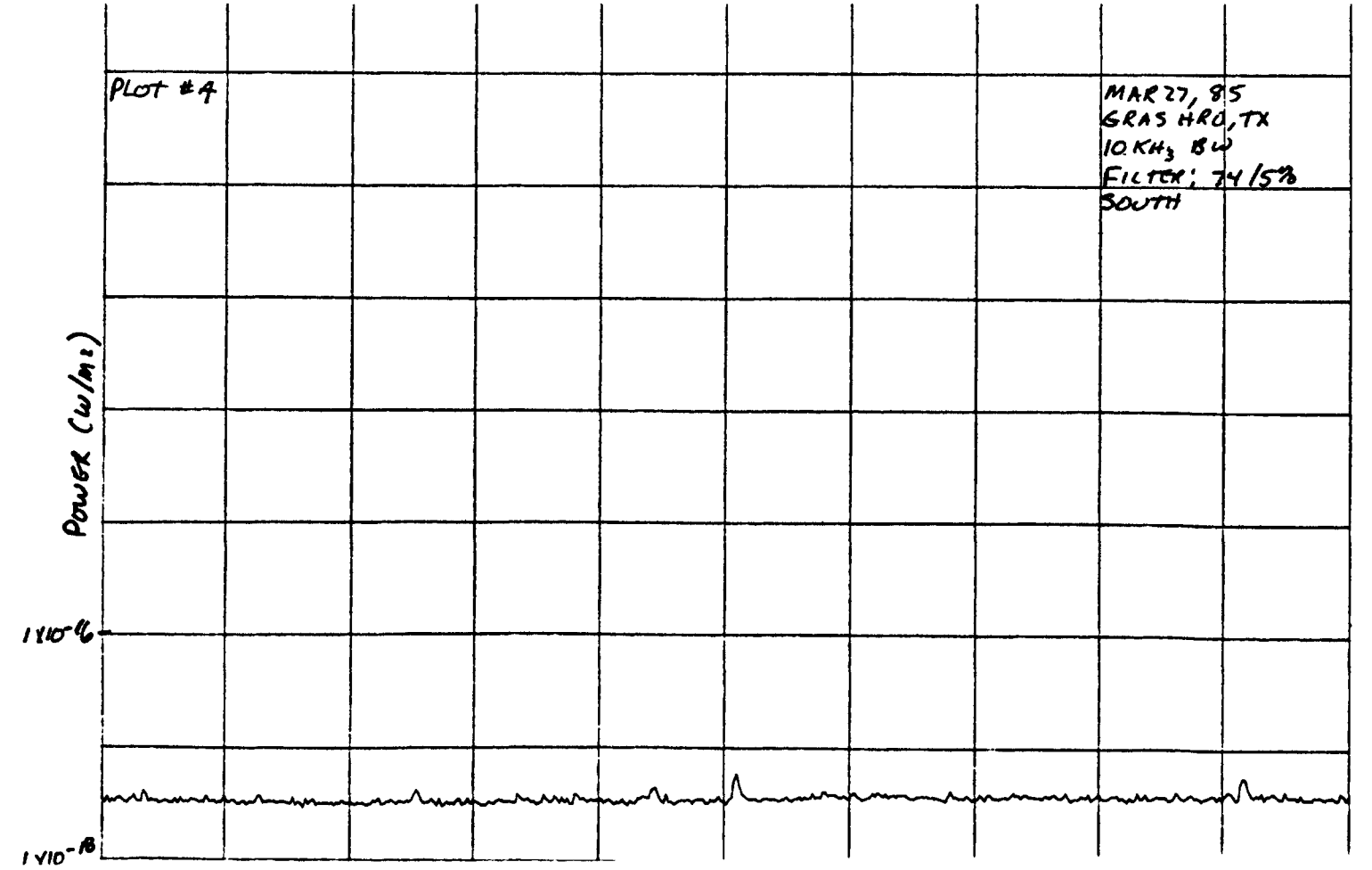


PLOT # 2

VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 09:56:30 03-27-1985
STOP : 10:06:30 03-27-1985
50 TO 100 MHZ. 180 DEG AZ.
B.W.= 30KHZ.; .7 SEC/CM.
5 RECORDS; GAIN= 40dB
FILTER BW: NONE

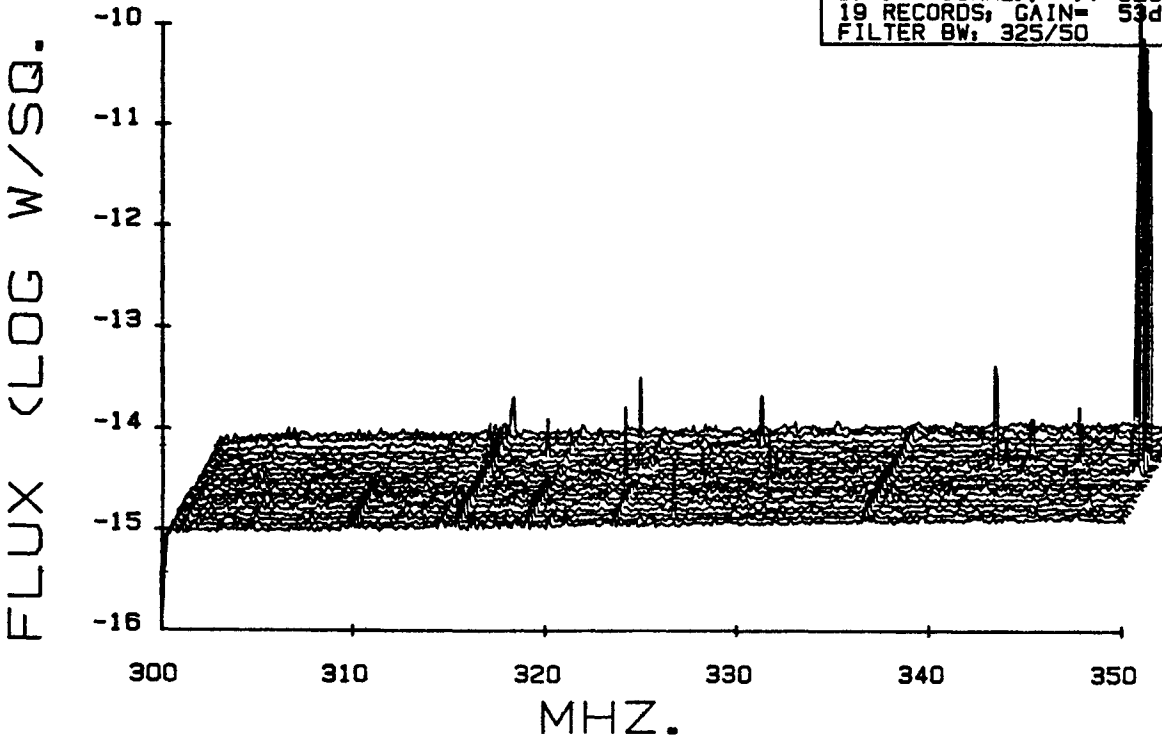



PLOT #3
MAR 27, 1985
GRAS HRO, TX
10 KHz BW
FILTER = .74 MHz/5%
NORTH.
POWER (w/m²)
1X10⁻¹⁴
1X10⁻¹⁸
73
MHz.
74
75


PLOT #4
MAR 27, 85
GRAS HRO, TX
10 KHz BW
FILTER: 74/5%
SOUTH
POWER (w/m²)
1X10⁻¹⁶
1X10⁻¹⁸

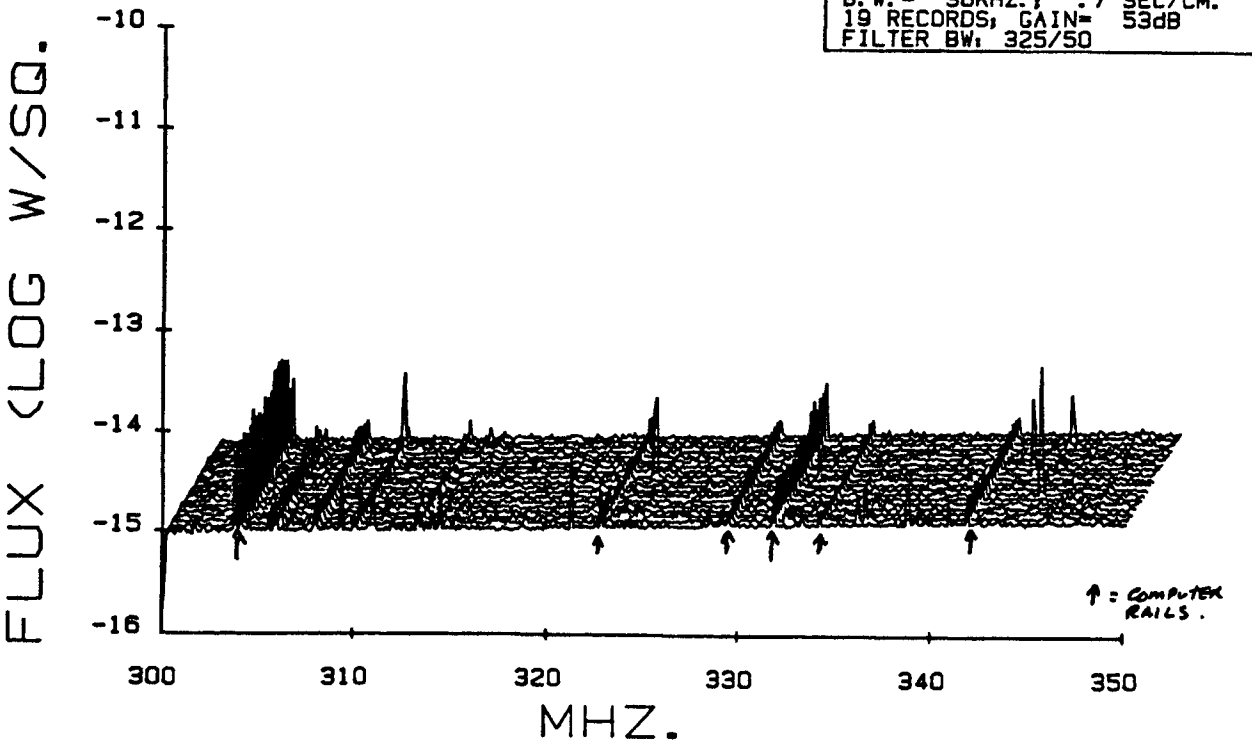
PLOT #5

VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 07:37:09 03-26-1985
STOP : 11:14:23 03-26-1985
300 TO 350 MHZ. 270 DEG AZ.
B.W.= 30KHZ.; .7 SEC/CM.
19 RECORDS; GAIN= 53dB
FILTER BW: 325/50



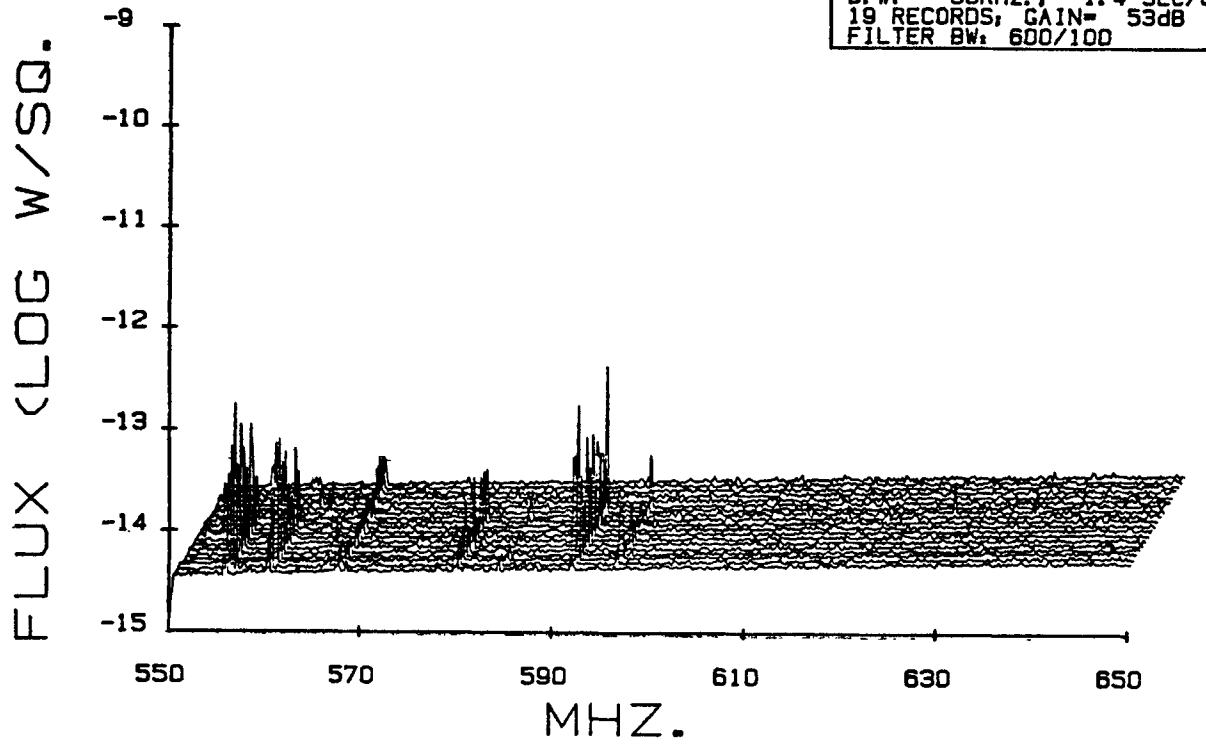
PLOT #6

VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 14:53:38 03-26-1985
STOP : 17:45:06 03-26-1985
300 TO 350 MHZ. 90 DEG AZ.
B.W.= 30KHZ.; .7 SEC/CM.
19 RECORDS; GAIN= 53dB
FILTER BW: 325/50



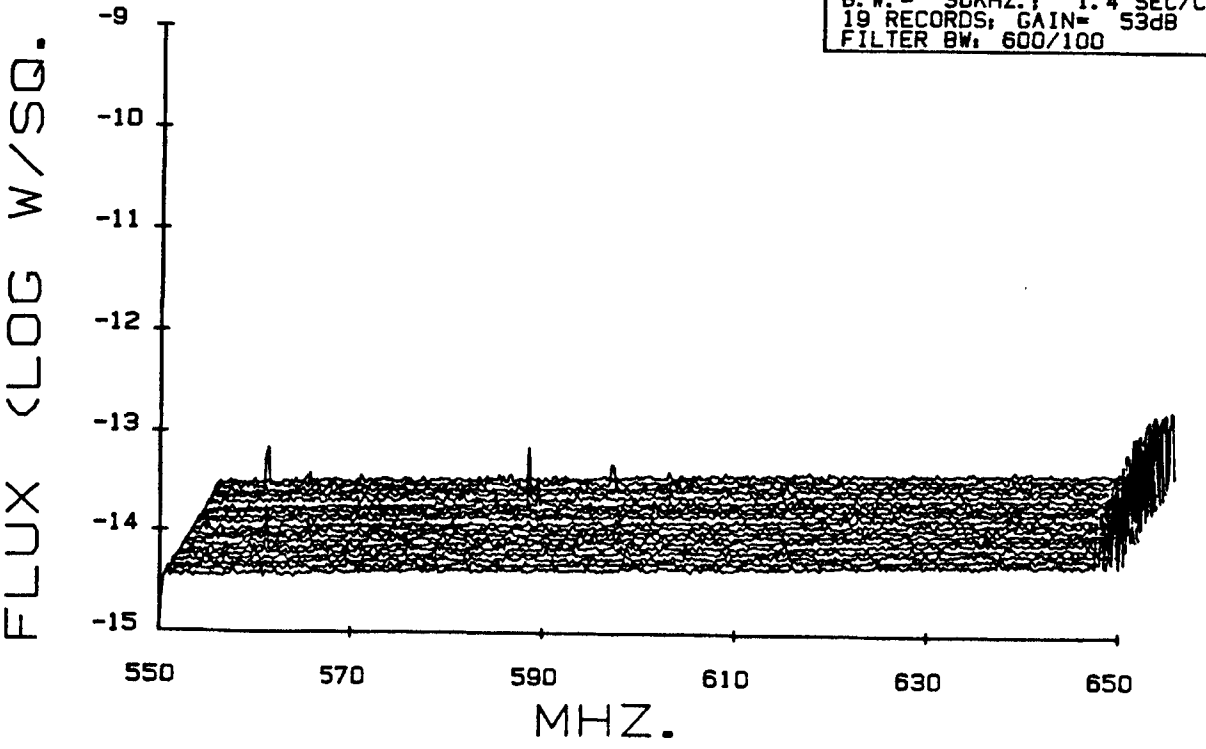
PLOT # 7

VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 15:40:09 03-24-1985
STOP : 05:56:47 03-25-1985
550 TO 650 MHZ. 0 DEG AZ.
B.W. = 30KHZ.; 1.4 SEC/CM.
19 RECORDS; GAIN= 53dB
FILTER BW: 600/100



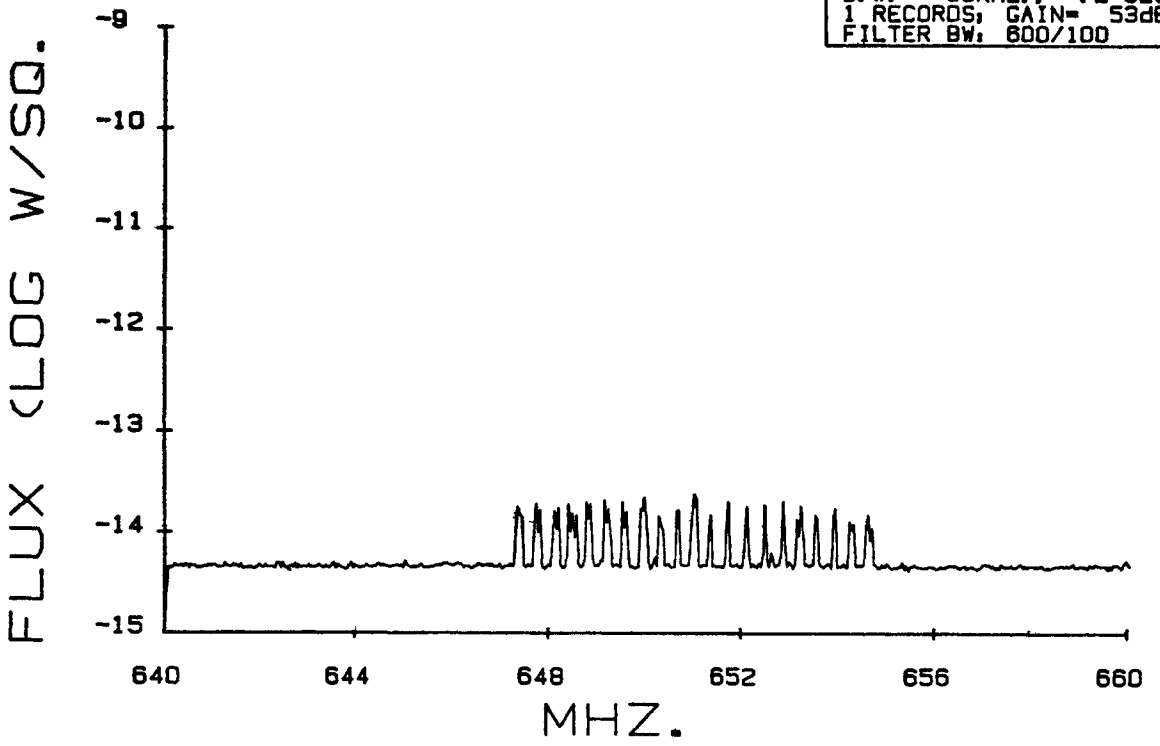
PLOT # 8

VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 15:51:39 03-25-1985
STOP : 18:42:18 03-25-1985
550 TO 650 MHZ. 270 DEG AZ.
B.W. = 30KHZ.; 1.4 SEC/CM.
19 RECORDS; GAIN= 53dB
FILTER BW: 600/100



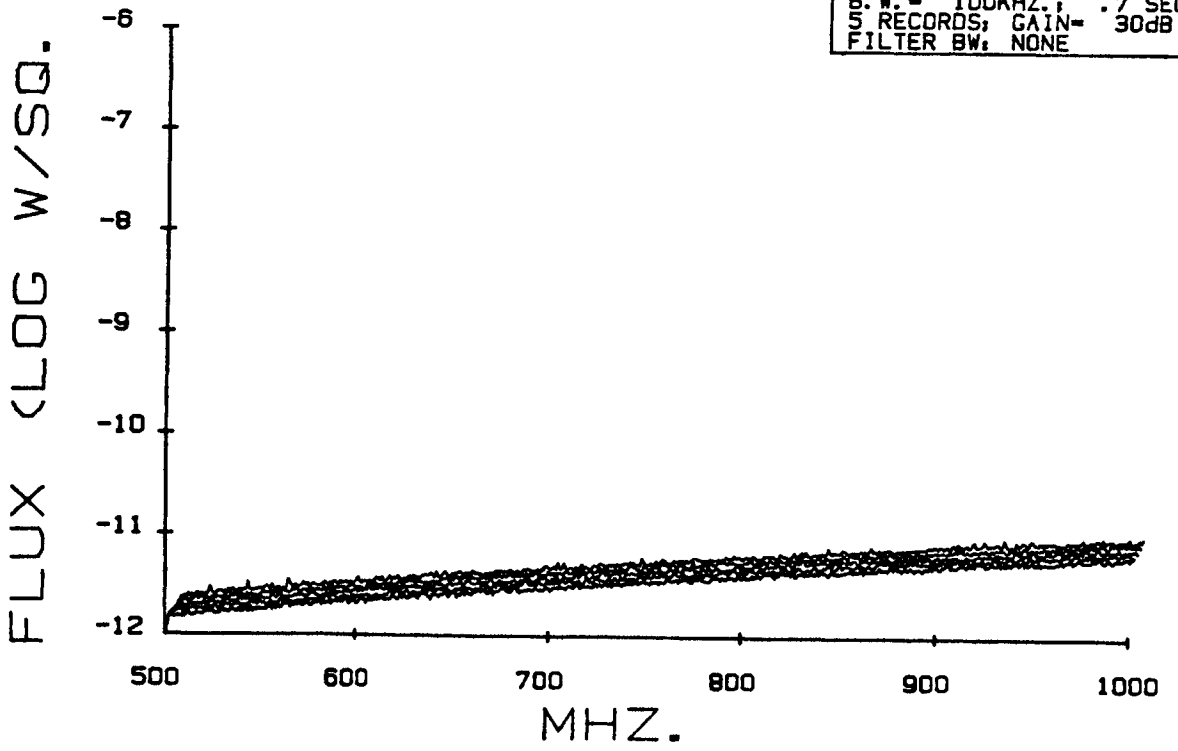
PLOT # 9

VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 18:46:47 03-25-1985
STOP : 18:49:36 03-25-1985
640 TO 660 MHZ. 270 DEG AZ.
B.W. = 30KHZ.; .2 SEC/CM.
1 RECORDS; GAIN= 53dB
FILTER BW: 600/100



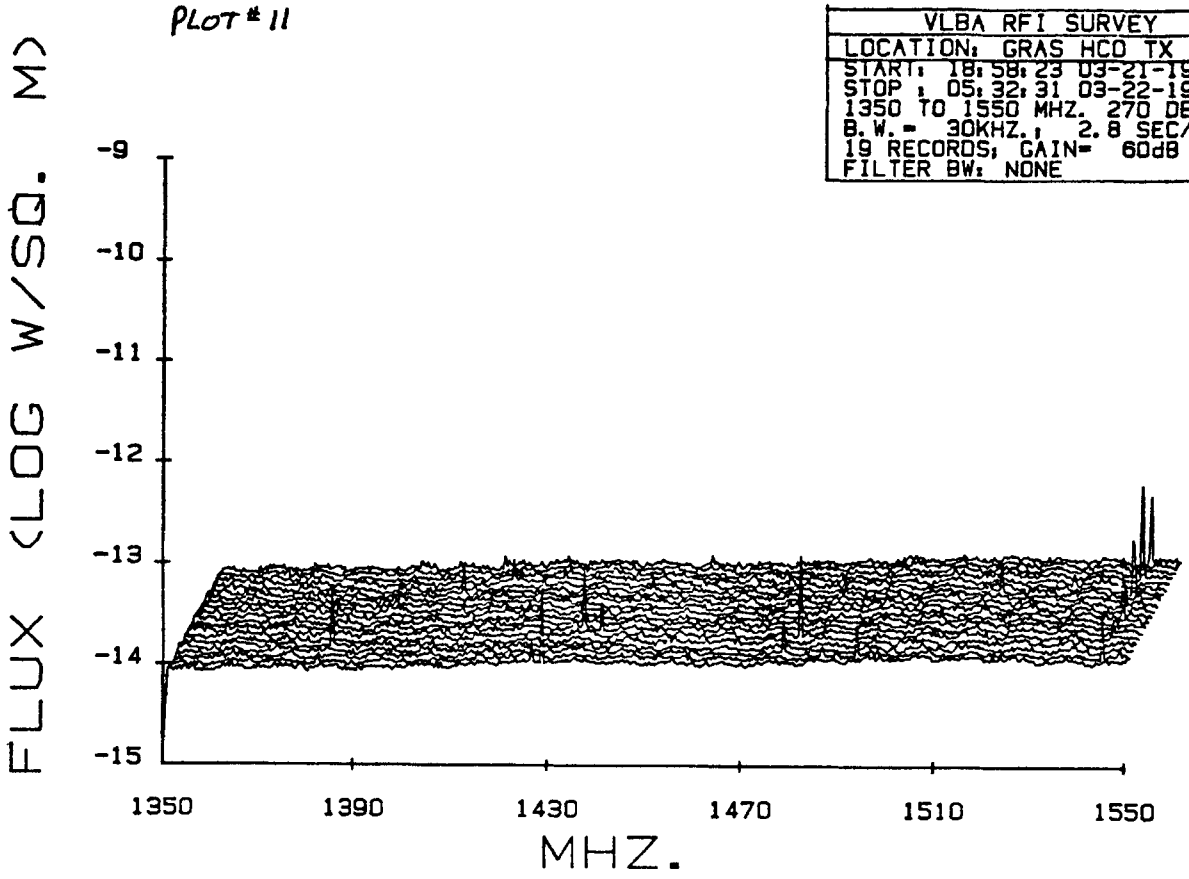
PLOT # 10

VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 13:43:28 03-24-1985
STOP : 13:55:34 03-24-1985
500 TO 1000 MHZ. 0 DEG AZ.
B.W. = 100KHZ.; .7 SEC/CM.
5 RECORDS; GAIN= 30dB
FILTER BW: NONE



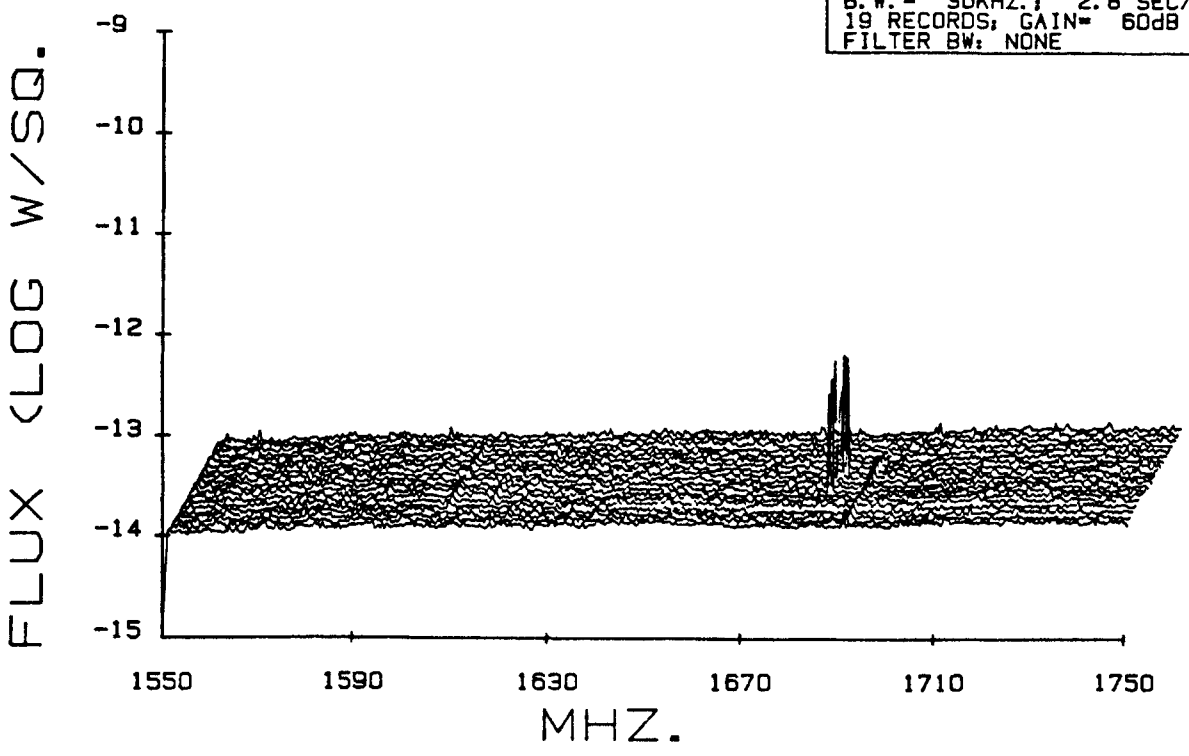
PLOT # 11

VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 18:58:23 03-21-1985
STOP : 05:32:31 03-22-1985
1350 TO 1550 MHZ. 270 DEG AZ.
B.W.= 30KHZ.; 2.8 SEC/CM.
19 RECORDS; GAIN= 60dB
FILTER BW: NONE



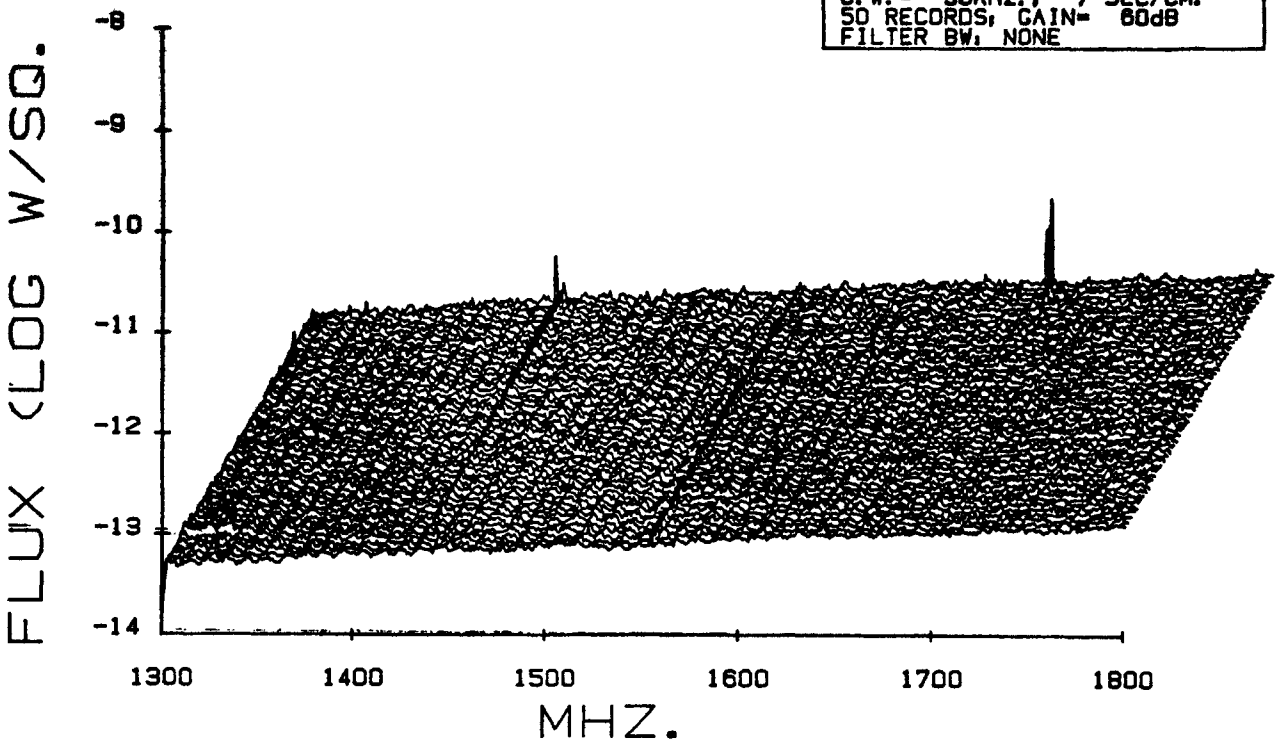
PLOT # 12

VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 16:50:39 03-21-1985
STOP : 18:55:09 03-21-1985
1550 TO 1750 MHZ. 180 DEG AZ.
B.W.= 30KHZ.; 2.8 SEC/CM.
19 RECORDS; GAIN= 60dB
FILTER BW: NONE



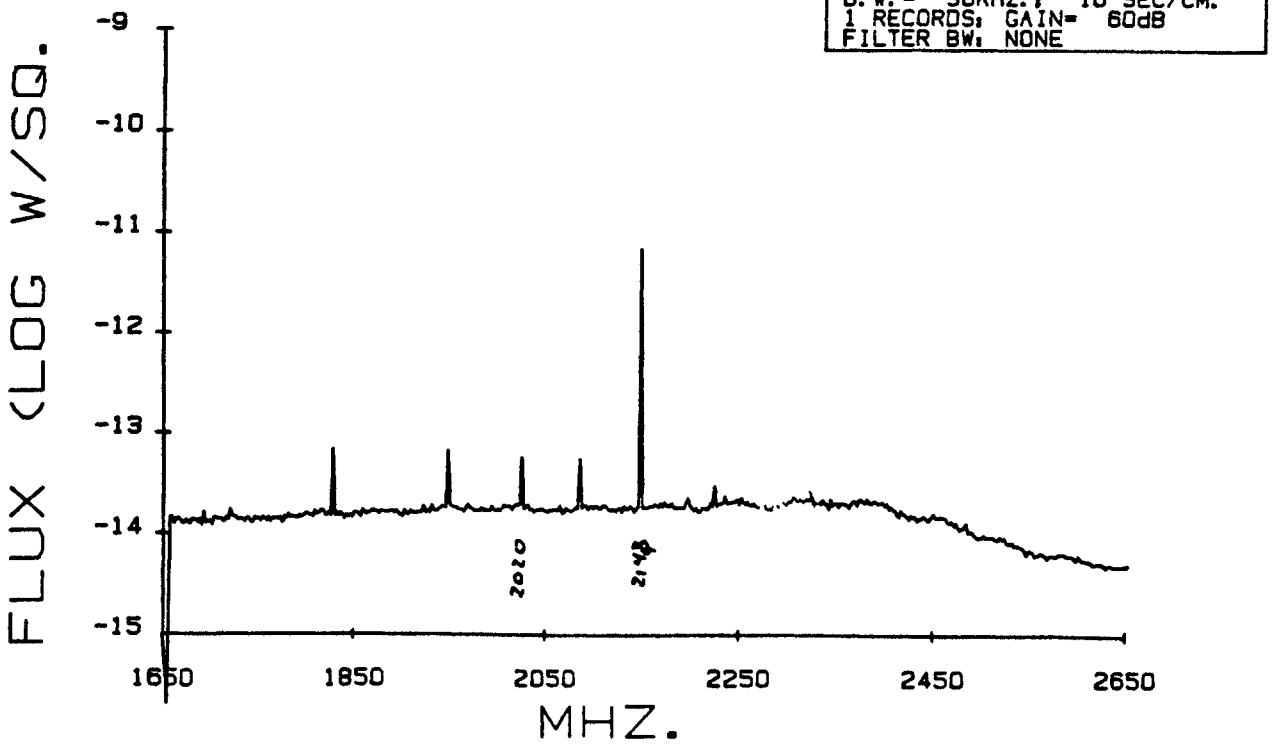
PLOT #13

VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 20:02:26 03-20-1985
STOP : 06:01:16 03-20-1985
1300 TO 1800 MHZ. 360 DEG AZ.
B.W.= 30KHZ.; 7 SEC/CM.
50 RECORDS; GAIN= 60dB
FILTER BW: NONE



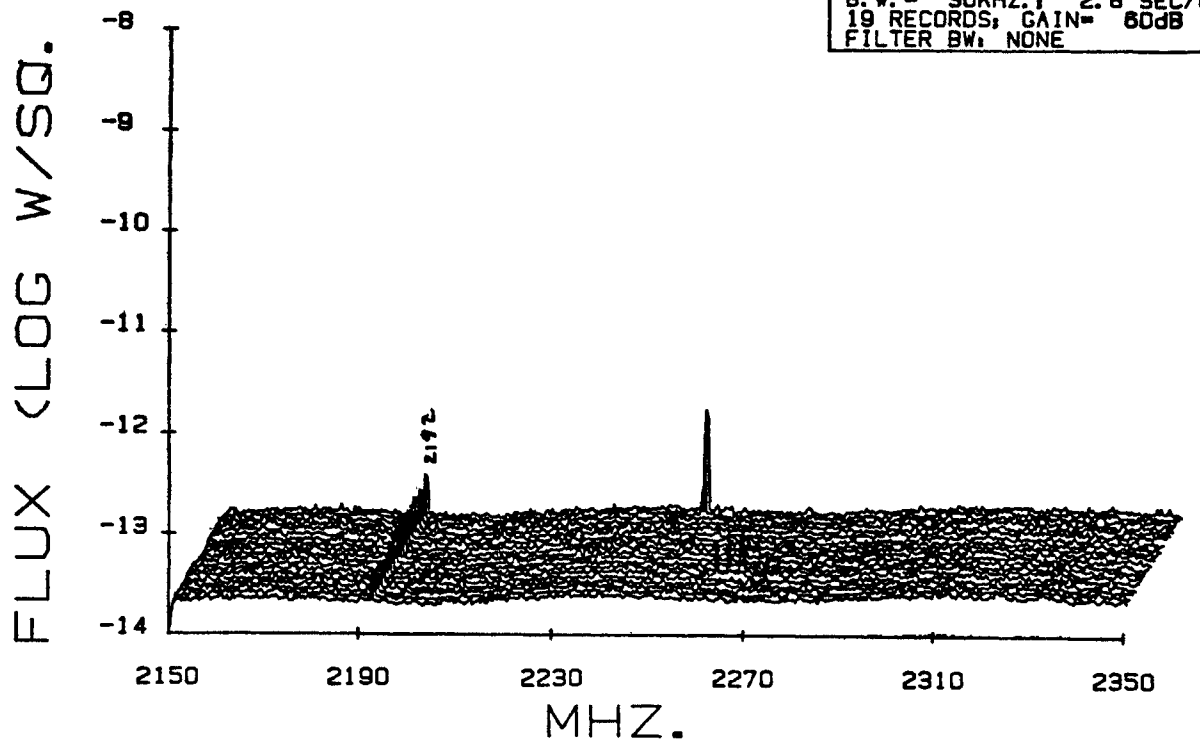
PLOT #14

VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 19:06:41 03-20-1985
STOP : 19:09:20 03-20-1985
1650 TO 2650 MHZ. 270 DEG AZ.
B.W.= 30KHZ.; 10 SEC/CM.
1 RECORDS; GAIN= 60dB
FILTER BW: NONE



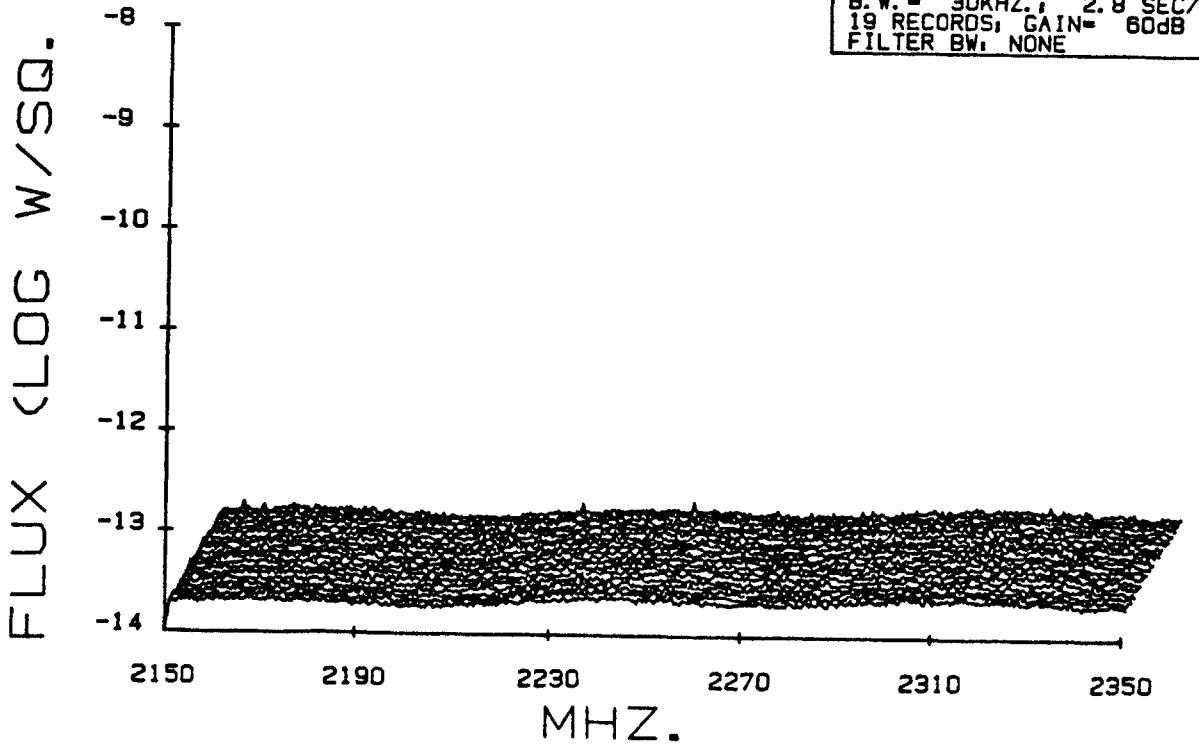
PLOT #15

VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 10:17:18 03-20-1985
STOP : 13:08:10 03-20-1985
2150 TO 2350 MHZ. 0 DEG AZ.
B.W.= 30KHZ.; 2.8 SEC/CM.
19 RECORDS; GAIN= 60dB
FILTER BW: NONE



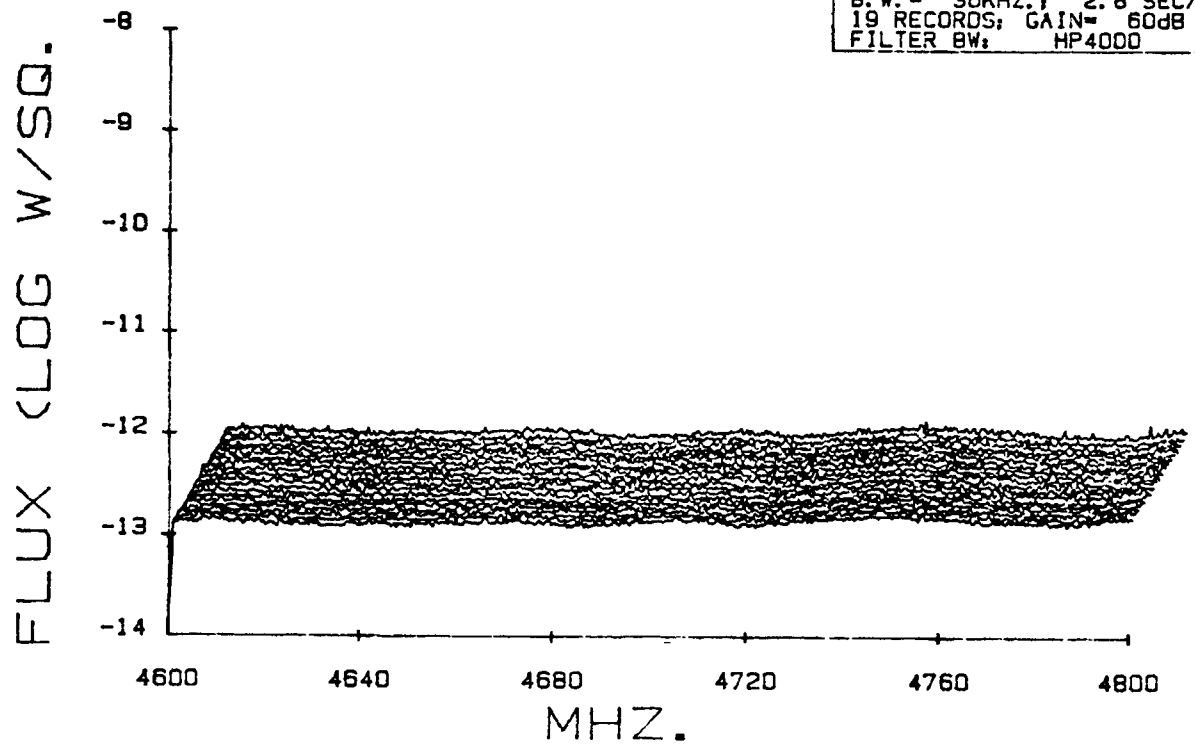
PLOT # 16

VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 13:12:01 03-20-1985
STOP : 15:59:44 03-20-1985
2150 TO 2350 MHZ. 90 DEG AZ.
B.W.= 30KHZ.; 2.8 SEC/CM.
19 RECORDS; GAIN= 60dB
FILTER BW: NONE



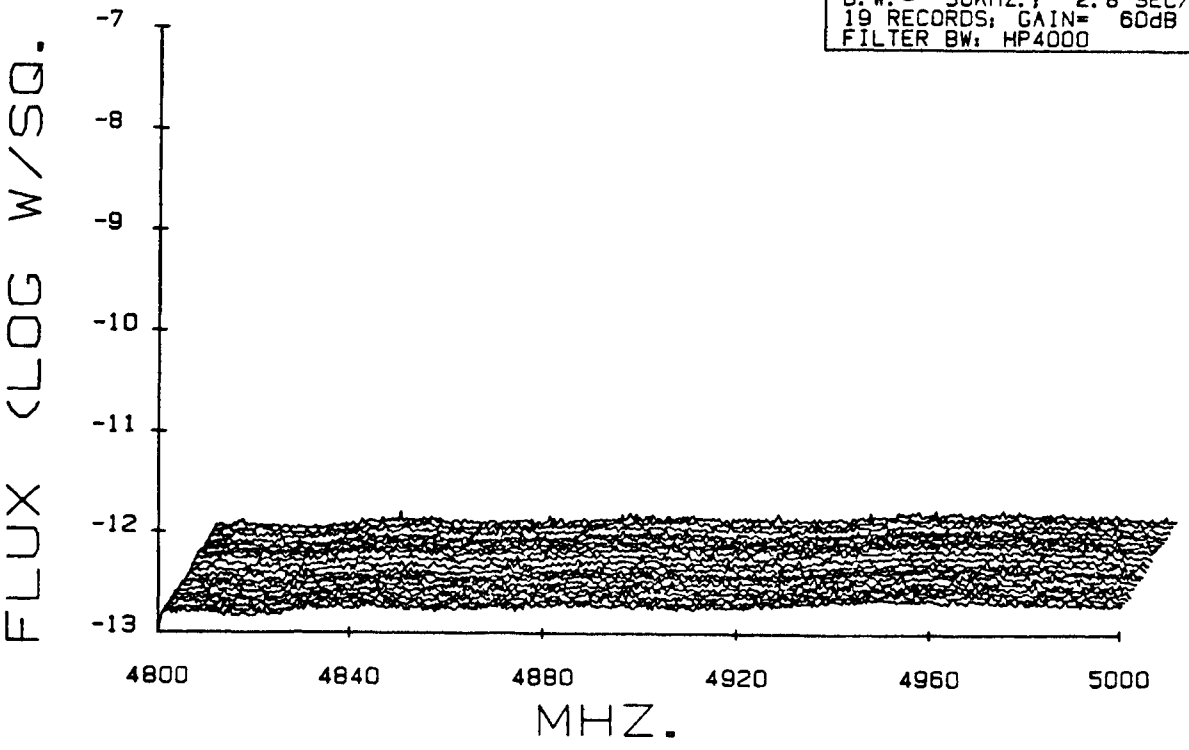
PLOT #17

VLBA RFI SURVEY
LOCATION: GRAS HCO T
START: 12:41:20 03-19-1985
STOP : 14:49:30 03-19-1985
4600 TO 4800 MHZ. 270 DEG AZ.
B.W.= 30KHZ.; 2.8 SEC/CM.
19 RECORDS; GAIN= 60dB
FILTER BW: HP4000



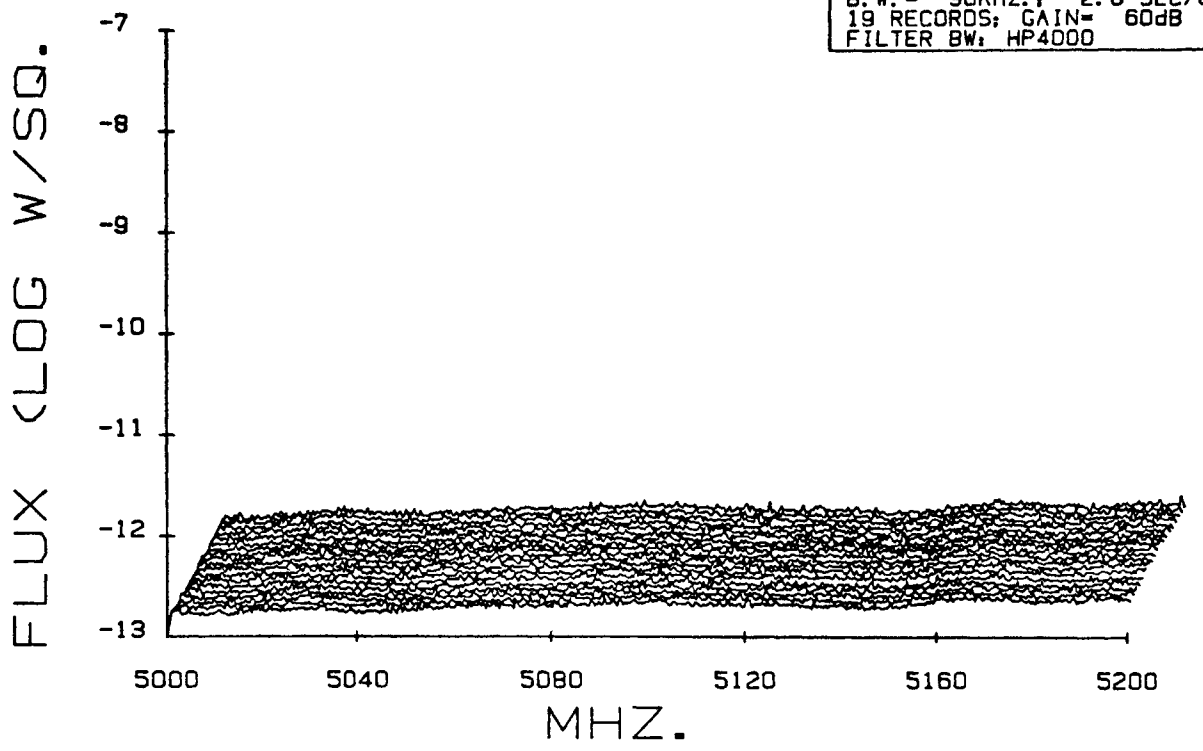
PLOT #18

VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 15:00:25 03-19-1985
STOP : 17:08:00 03-19-1985
4800 TO 5000 MHZ. 270 DEG AZ.
B.W.= 30KHZ.; 2.8 SEC/CM.
19 RECORDS; GAIN= 60dB
FILTER BW: HP4000



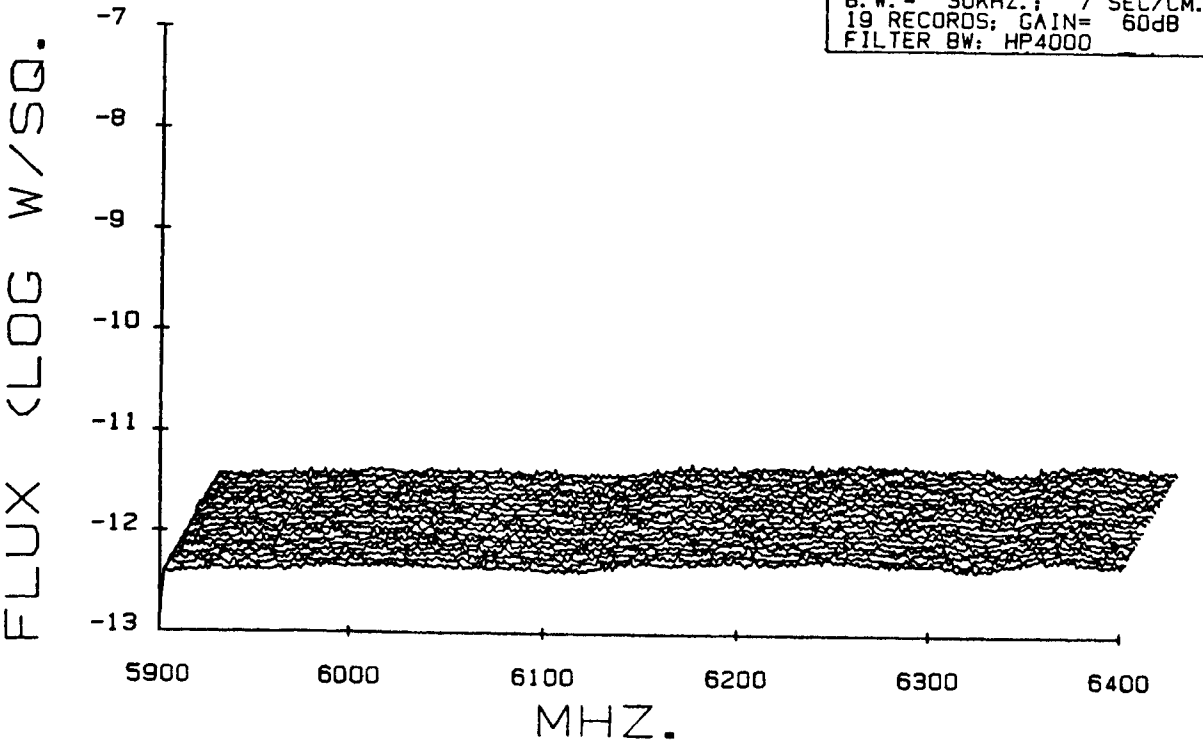
PLOT #19

VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 17:17:34 03-19-1985
STOP : 19:24:50 03-19-1985
5000 TO 5200 MHZ. 270 DEG AZ.
B.W. = 30KHZ.; 2.8 SEC/CM.
19 RECORDS; GAIN= 60dB
FILTER BW: HP4000



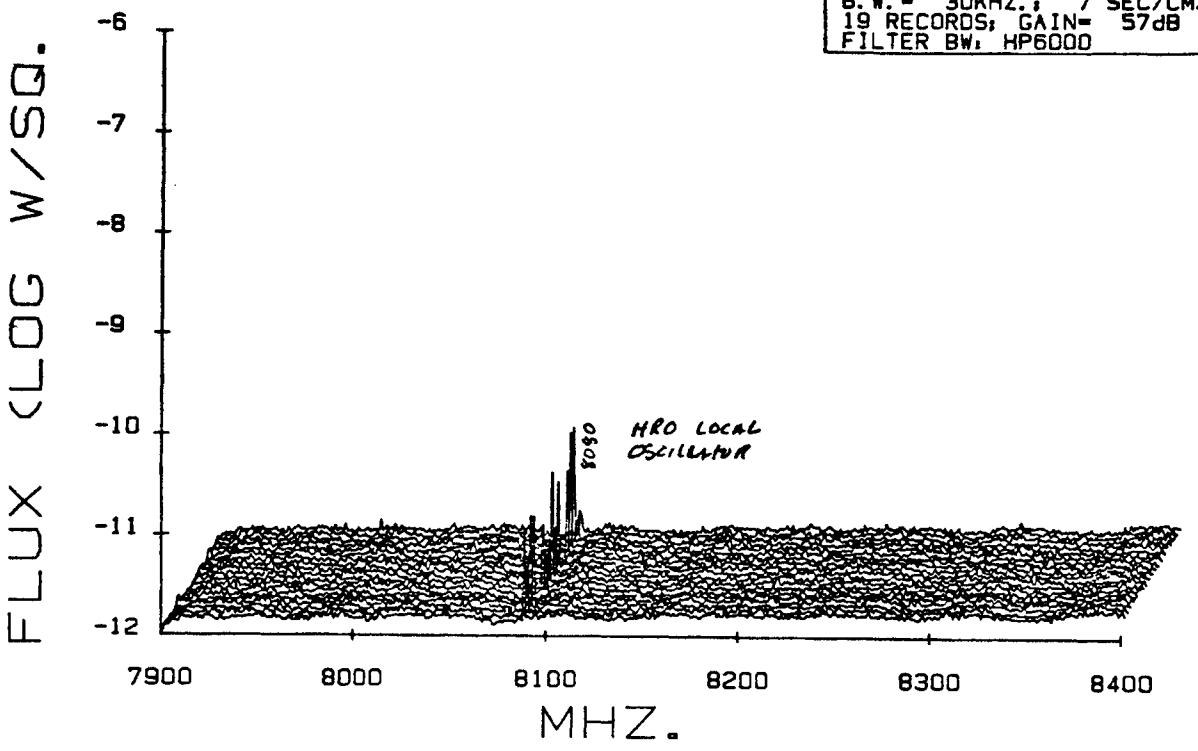
PLOT # 20

VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 19:56:32 03-19-1985
STOP : 03:35:06 03-20-1985
5900 TO 6400 MHZ. 270 DEG AZ.
B.W. = 30KHZ.; 7 SEC/CM.
19 RECORDS; GAIN= 60dB
FILTER BW: HP4000



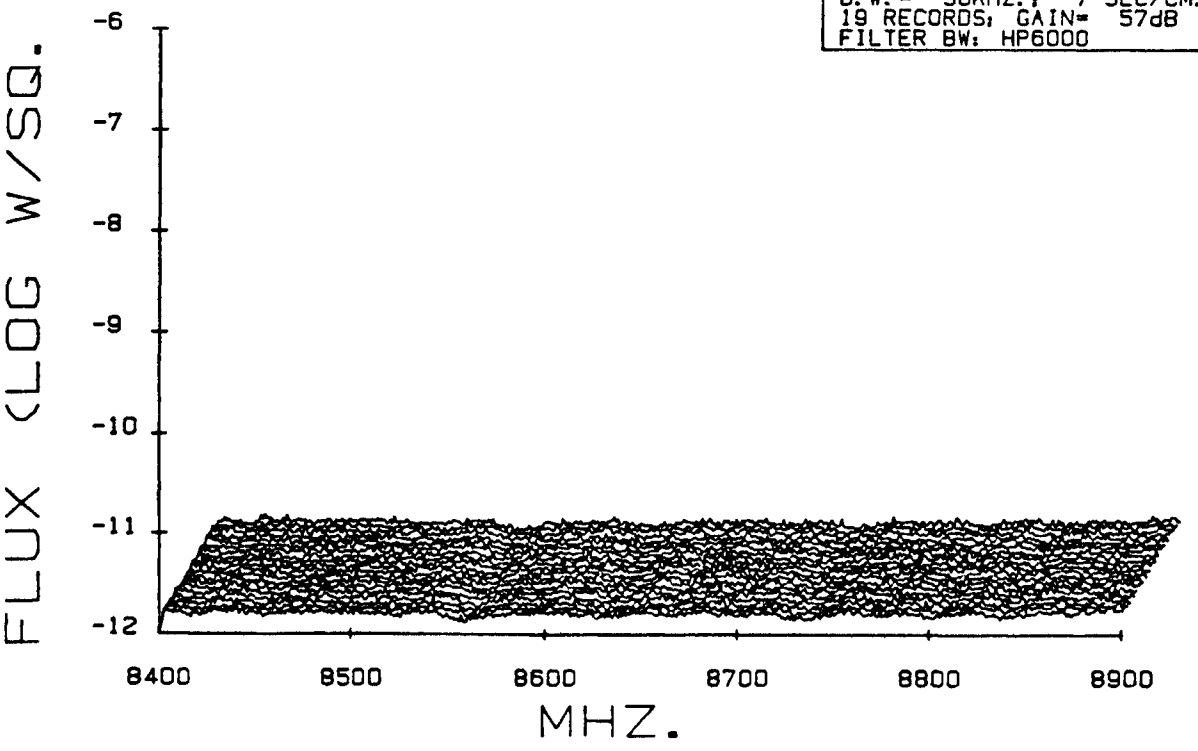
PLOT # 21

VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 08:24:56 03-20-1985
STOP : 12:16:22 03-20-1985
7900 TO 8400 MHZ. 0 DEG AZ.
B.W.= 30KHZ.; 7 SEC/CM.
19 RECORDS; GAIN= 57dB
FILTER BW: HP6000



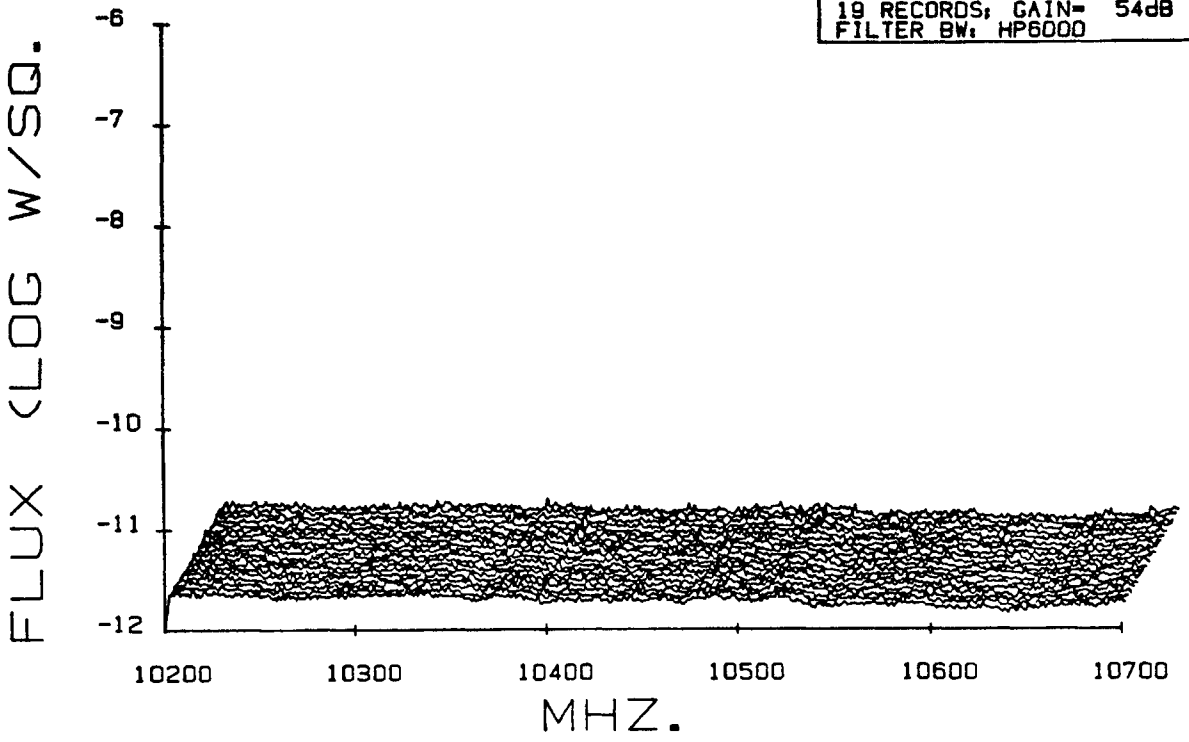
PLOT # 22

VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 12:41:13 03-20-1985
STOP : 16:27:20 03-20-1985
8400 TO 8900 MHZ. 0 DEG AZ.
B.W.= 30KHZ.; 7 SEC/CM.
19 RECORDS; GAIN= 57dB
FILTER BW: HP6000



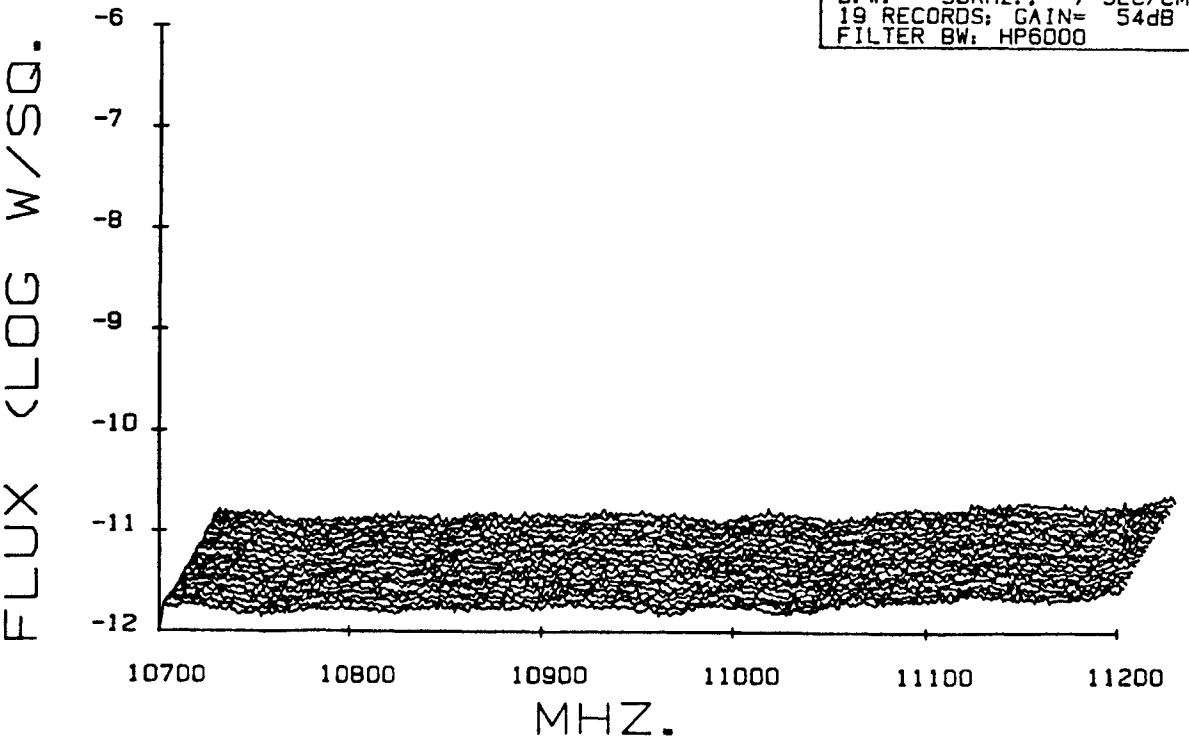
PLOT # 23

VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 16:46:26 03-20-1985
STOP : 18:16:23 03-20-1985
10200 TO 10700 MHZ. 0 DEG AZ.
B.W. = 30KHZ.; 7 SEC/CM.
19 RECORDS; GAIN= 54dB
FILTER BW: HP6000

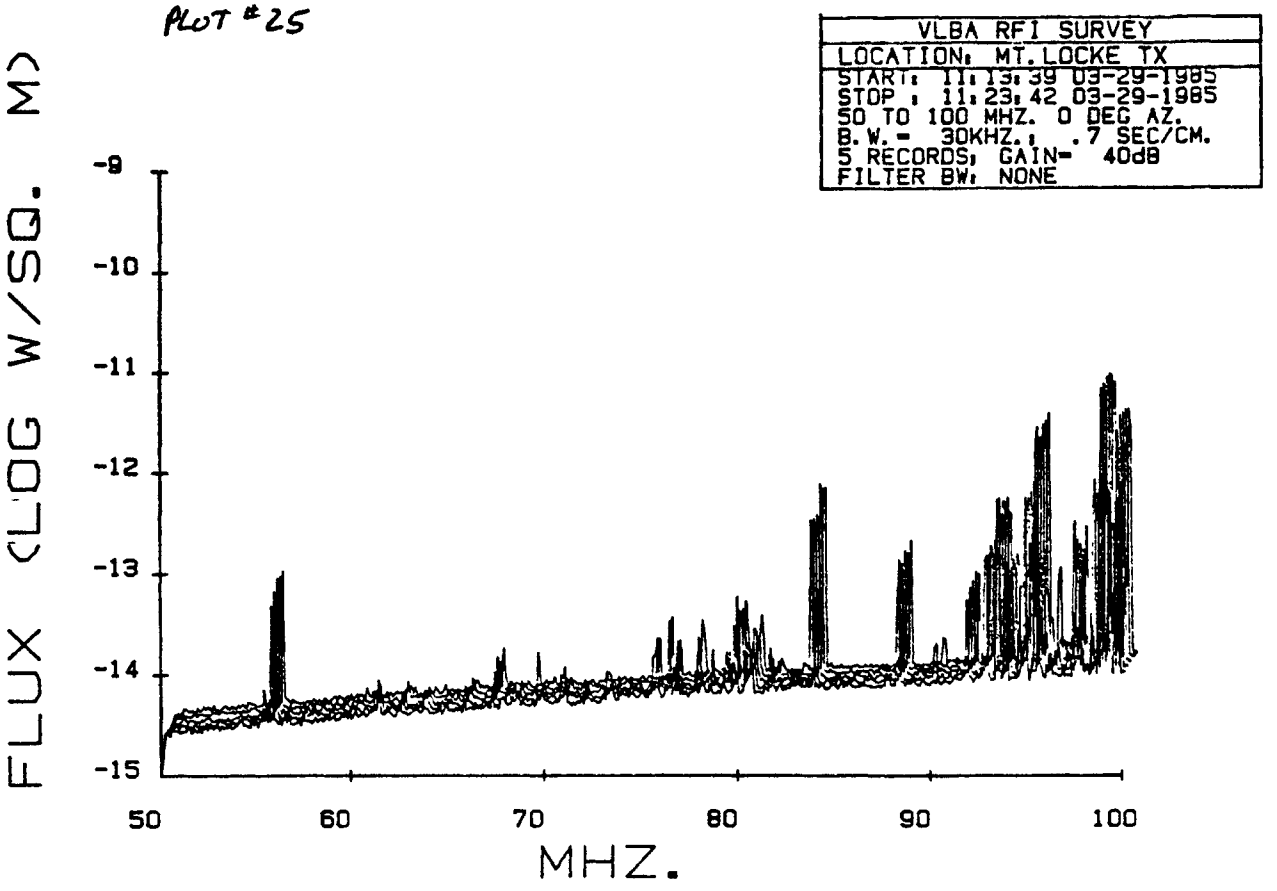


PLOT # 24

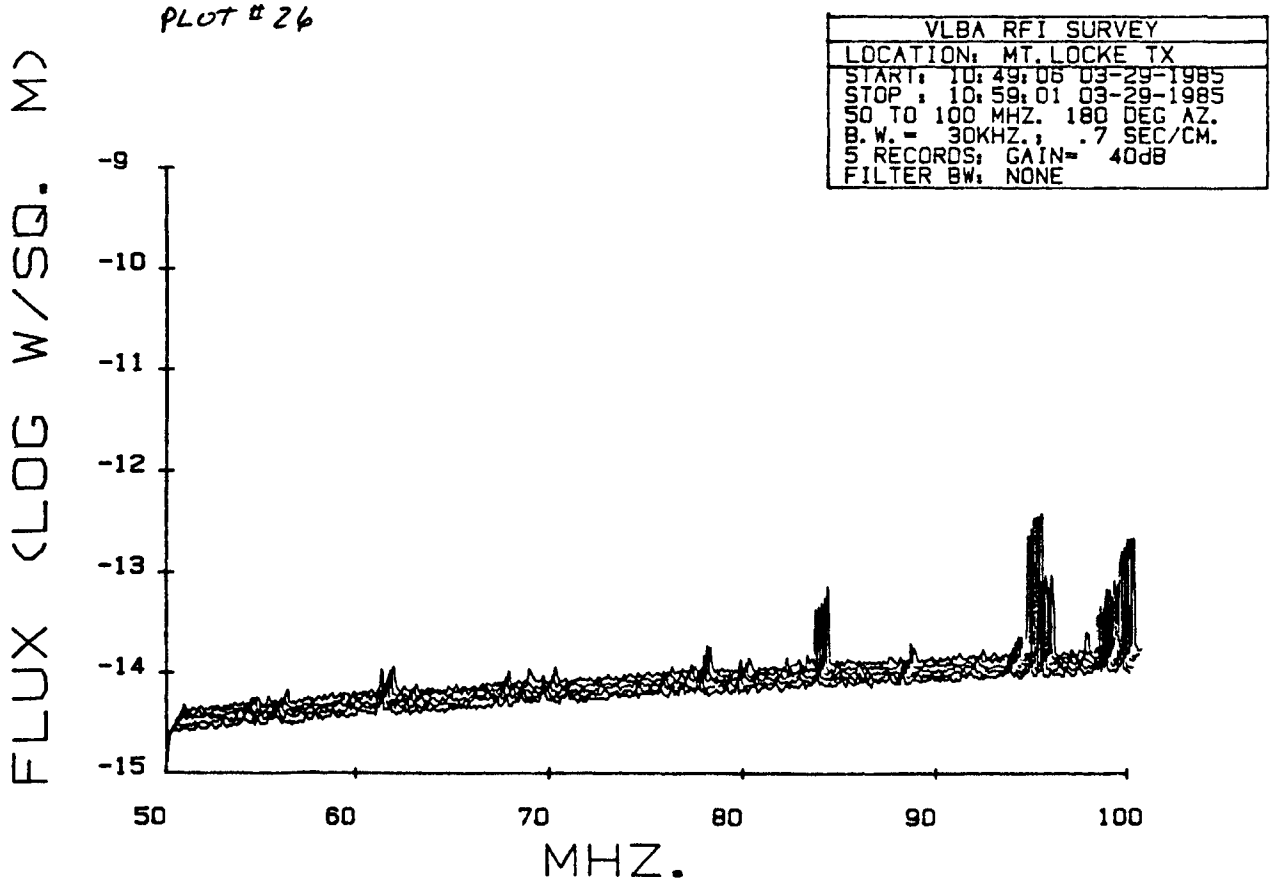
VLBA RFI SURVEY
LOCATION: GRAS HCO TX
START: 18:18:50 03-20-1985
STOP : 19:48:32 03-20-1985
10700 TO 11200 MHZ. 0 DEG AZ.
B.W. = 30KHZ.; 7 SEC/CM.
19 RECORDS; GAIN= 54dB
FILTER BW: HP6000



PLOT # 25



PLOT # 26



PLOT # 27

MAR 29, 85
MT. LOCK TX.
10 KHz BW
74/50 FILTER
NORTH

POWER (w/m²)

1X10-14

1X10-18

73 MHz 74 75

PLOT #28

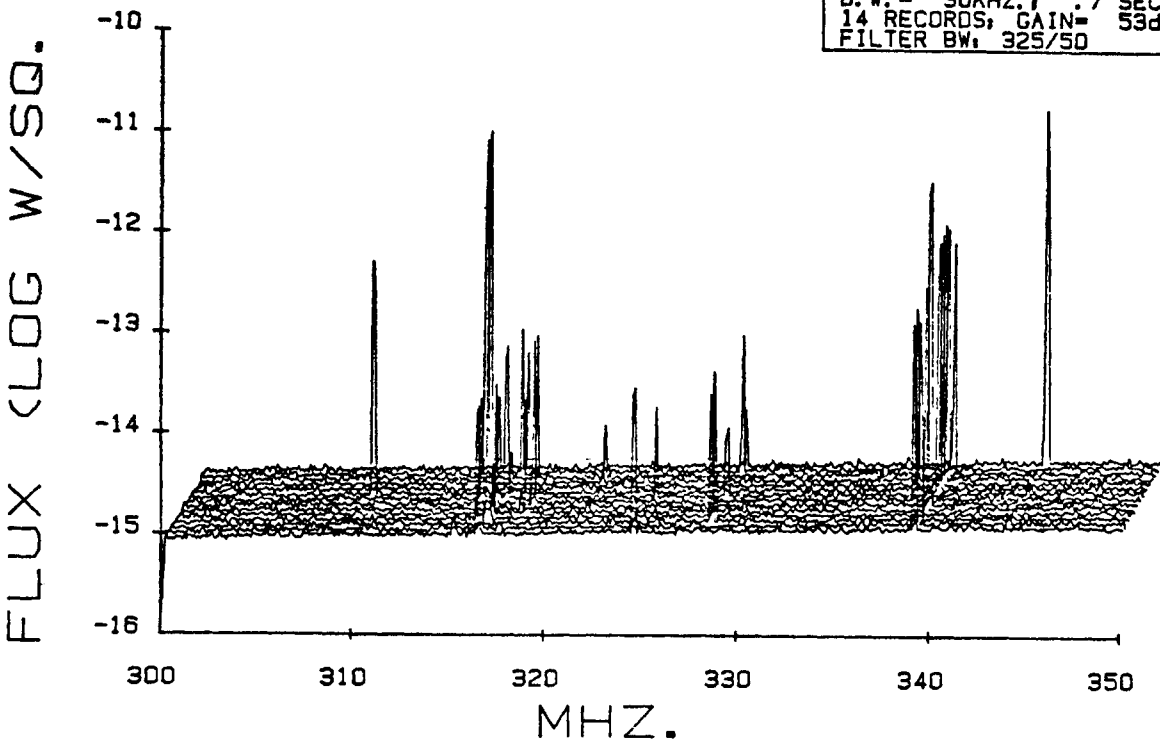
MAR 29, 85
MT. LOCK, TX.
10 KHz BW
74/50 FILTER
SOUTH.

POWER (w/m²)

1X10-14

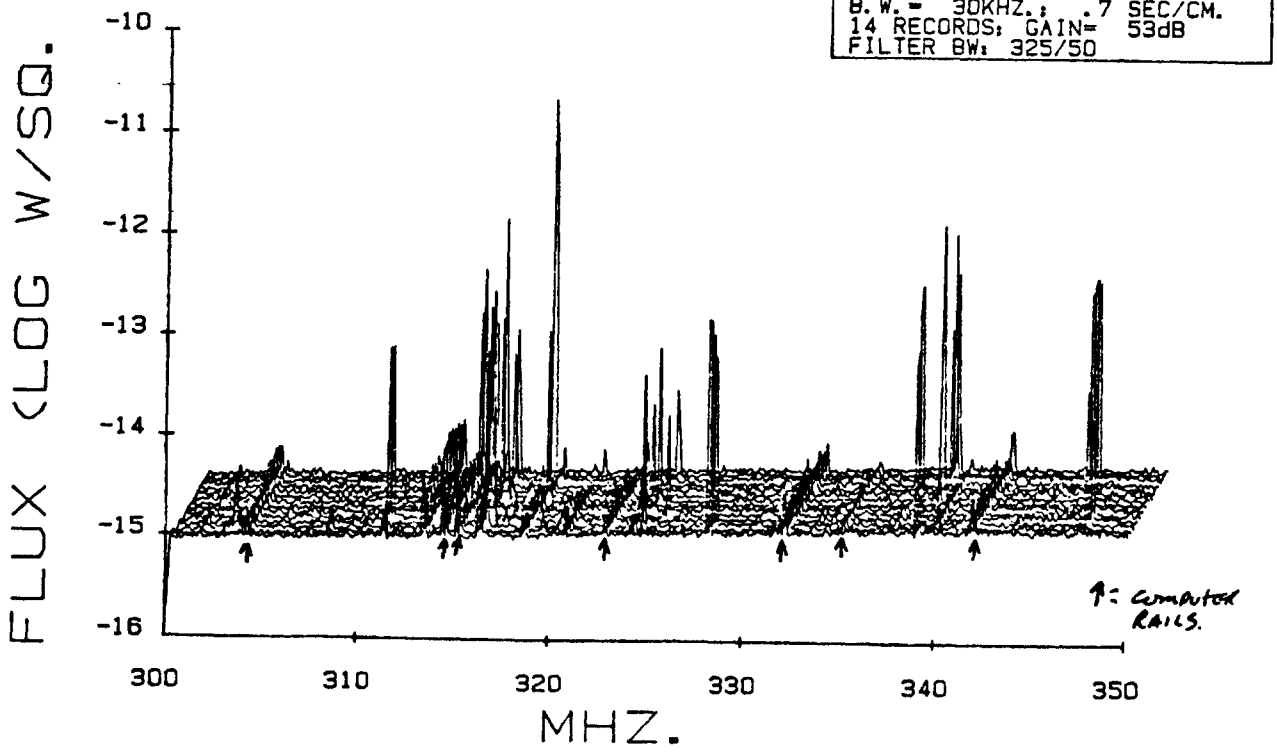
PLOT # 29

VLBA RFI SURVEY
LOCATION: MT. LOCKE TX
START: 09:46:13 03-29-1985
STOP : 10:11:18 03-29-1985
300 TO 350 MHZ. 0 DEG AZ.
B.W. = 30KHZ.; .7 SEC/CM.
14 RECORDS; GAIN= 53dB
FILTER BW: 325/50



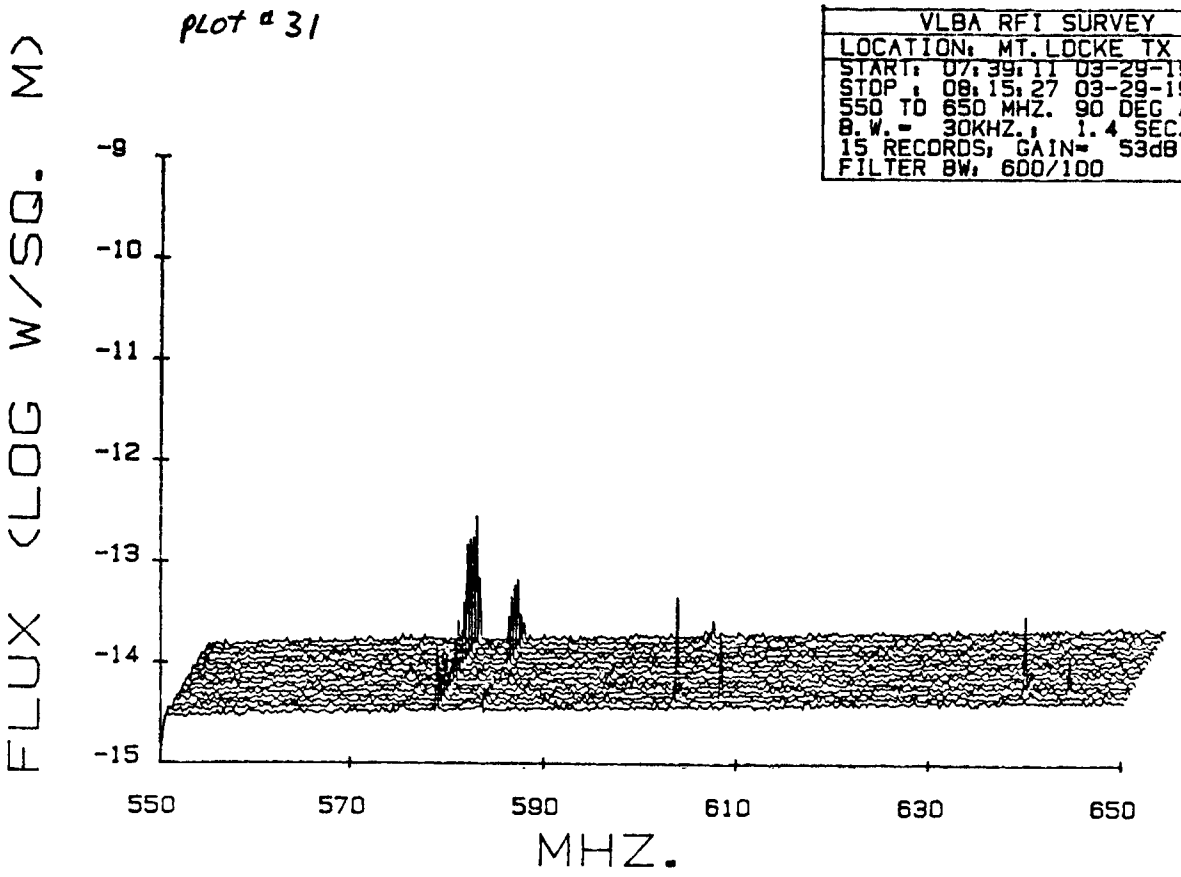
PLOT # 30

VLBA RFI SURVEY
LOCATION: MT. LOCKE TX
START: 09:16:03 03-29-1985
STOP : 09:43:34 03-29-1985
300 TO 350 MHZ. 270 DEG AZ.
B.W. = 30KHZ.; .7 SEC/CM.
14 RECORDS; GAIN= 53dB
FILTER BW: 325/50



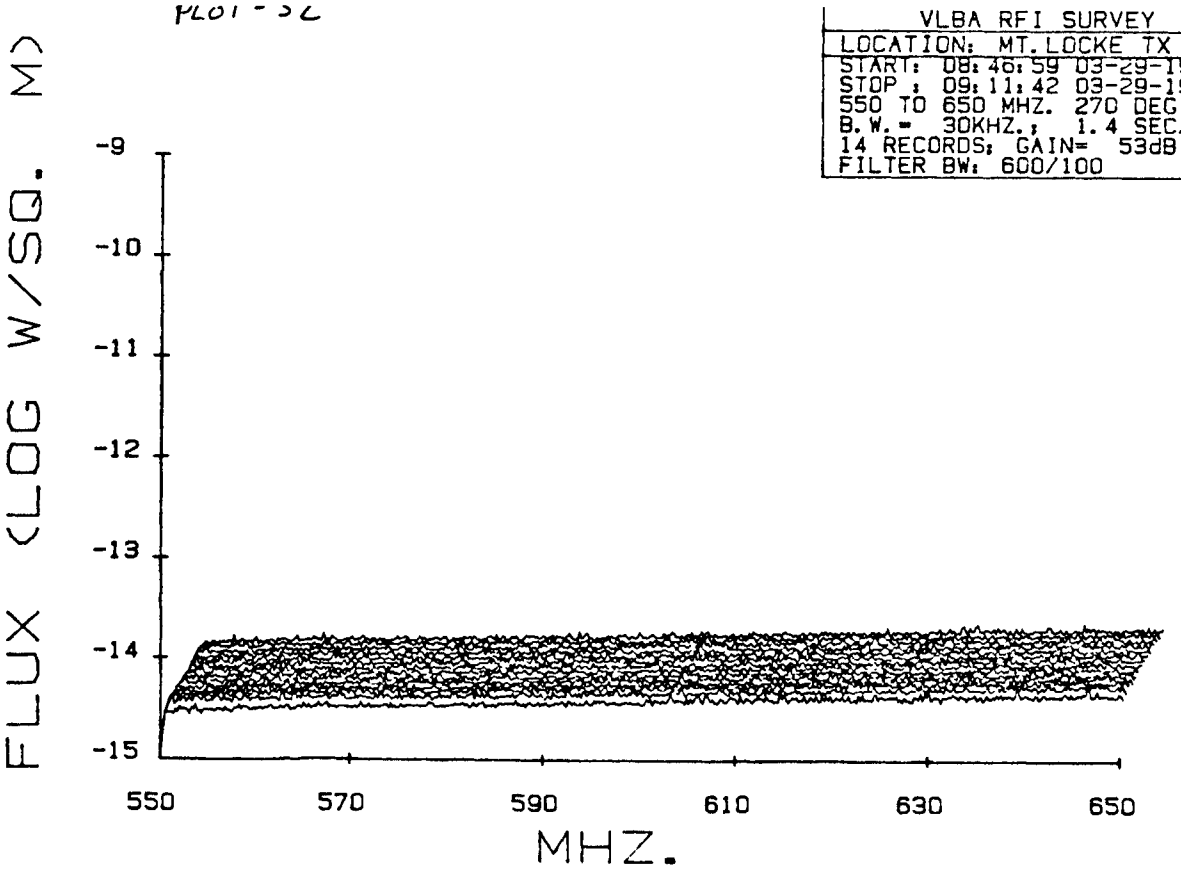
plot # 31

VLBA RFI SURVEY
LOCATION: MT. LOCKE TX
START: 07:39:11 03-29-1985
STOP : 08:15:27 03-29-1985
550 TO 650 MHZ. 90 DEG AZ.
B.W. = 30KHZ.; 1.4 SEC/CM.
15 RECORDS; GAIN= 53dB
FILTER BW: 600/100



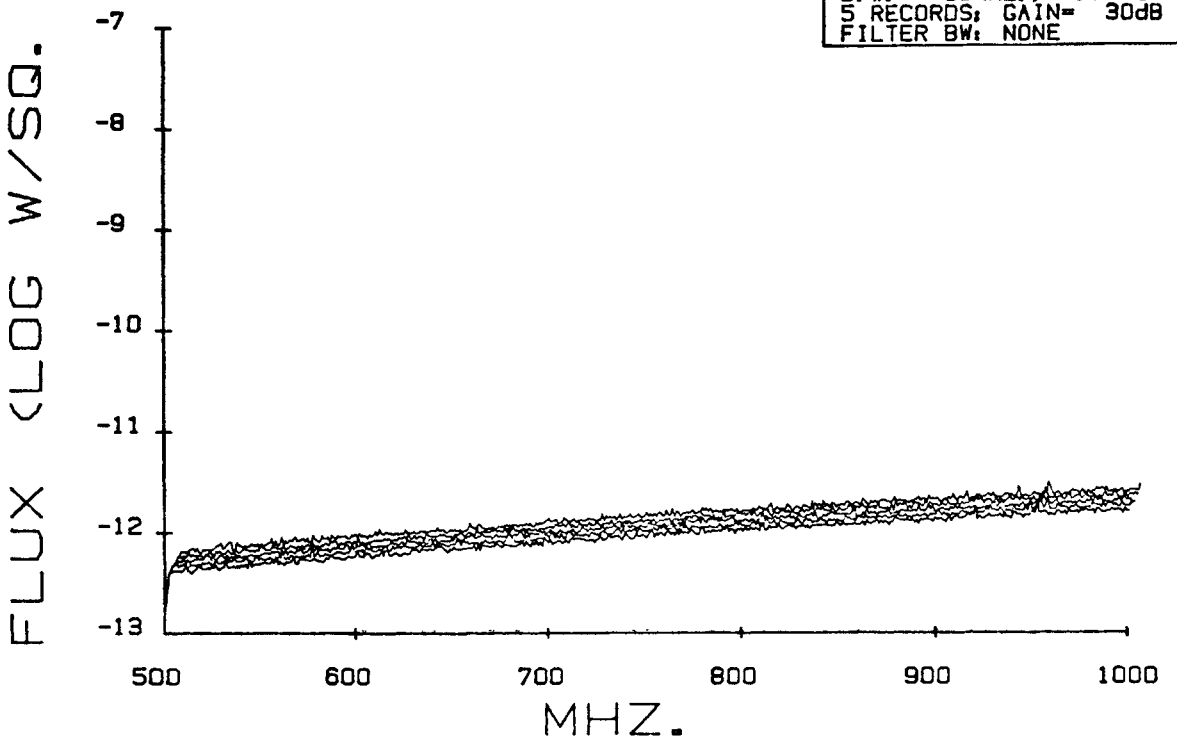
plot - 32

VLBA RFI SURVEY
LOCATION: MT. LOCKE TX
START: 08:46:59 03-29-1985
STOP : 09:11:42 03-29-1985
550 TO 650 MHZ. 270 DEG AZ.
B.W. = 30KHZ.; 1.4 SEC/CM.
14 RECORDS; GAIN= 53dB
FILTER BW: 600/100



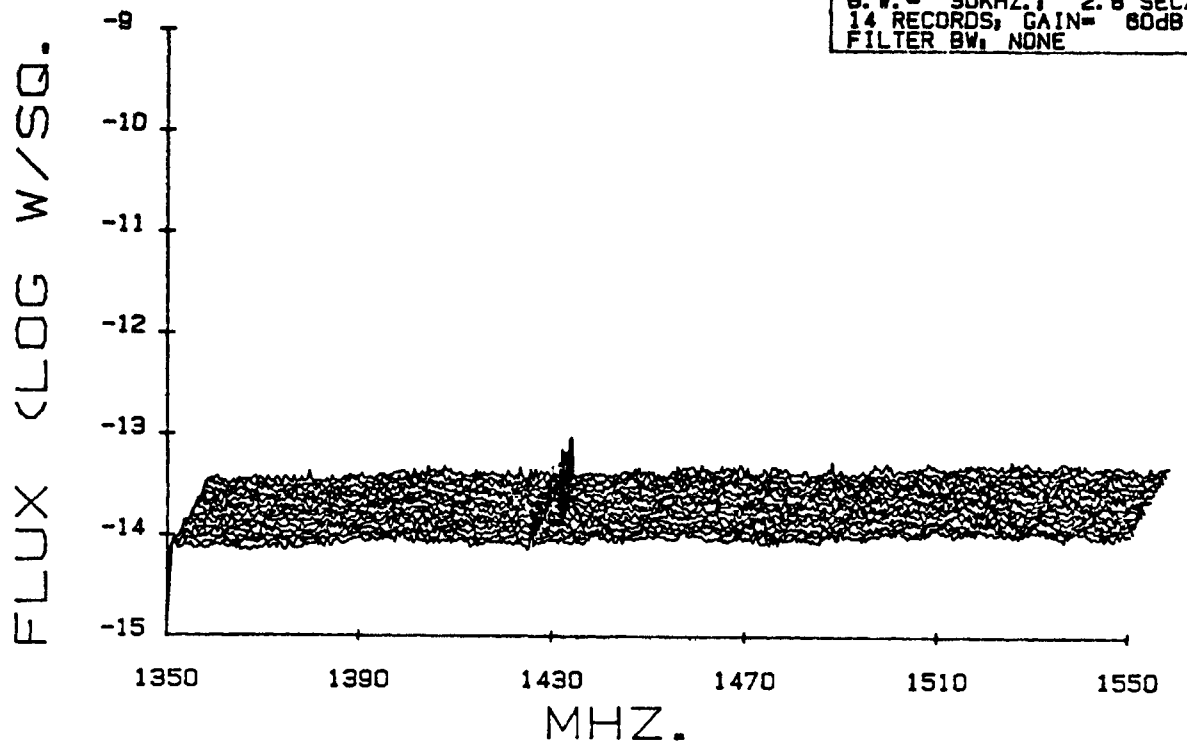
PLOT # 33

VLBA RFI SURVEY
LOCATION: MT. LOCKE TX
START: 18:12:26 03-28-1985
STOP : 18:21:44 03-28-1985
500 TO 1000 MHZ. 90 DEG AZ.
B.W. = 30KHZ.; .7 SEC/CM.
5 RECORDS; GAIN= 30dB
FILTER BW: NONE



PLOT # 34

VLBA RFI SURVEY
LOCATION: MT. LOCKE TX
START: 15:54:35 03-28-1985
STOP : 16:20:37 03-28-1985
1350 TO 1550 MHZ. 180 DEG AZ.
B.W.= 30KHZ.; 2.8 SEC/CM.
14 RECORDS; GAIN= 60dB
FILTER BW: NONE



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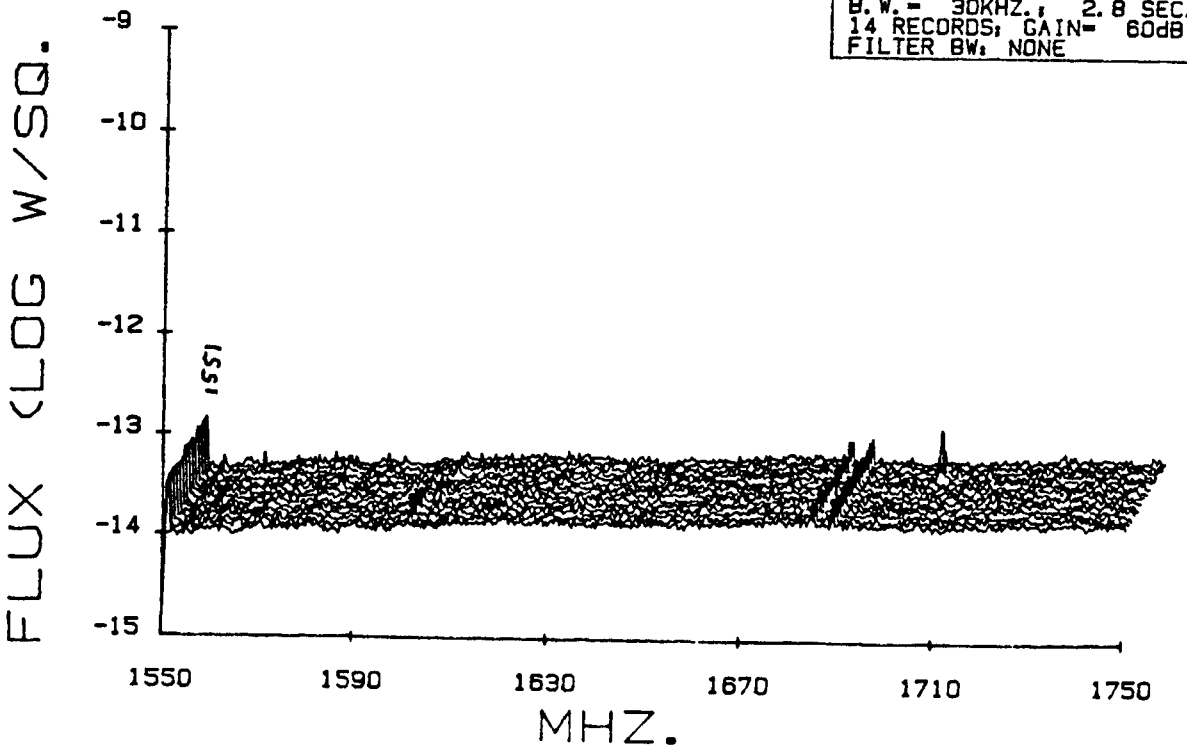
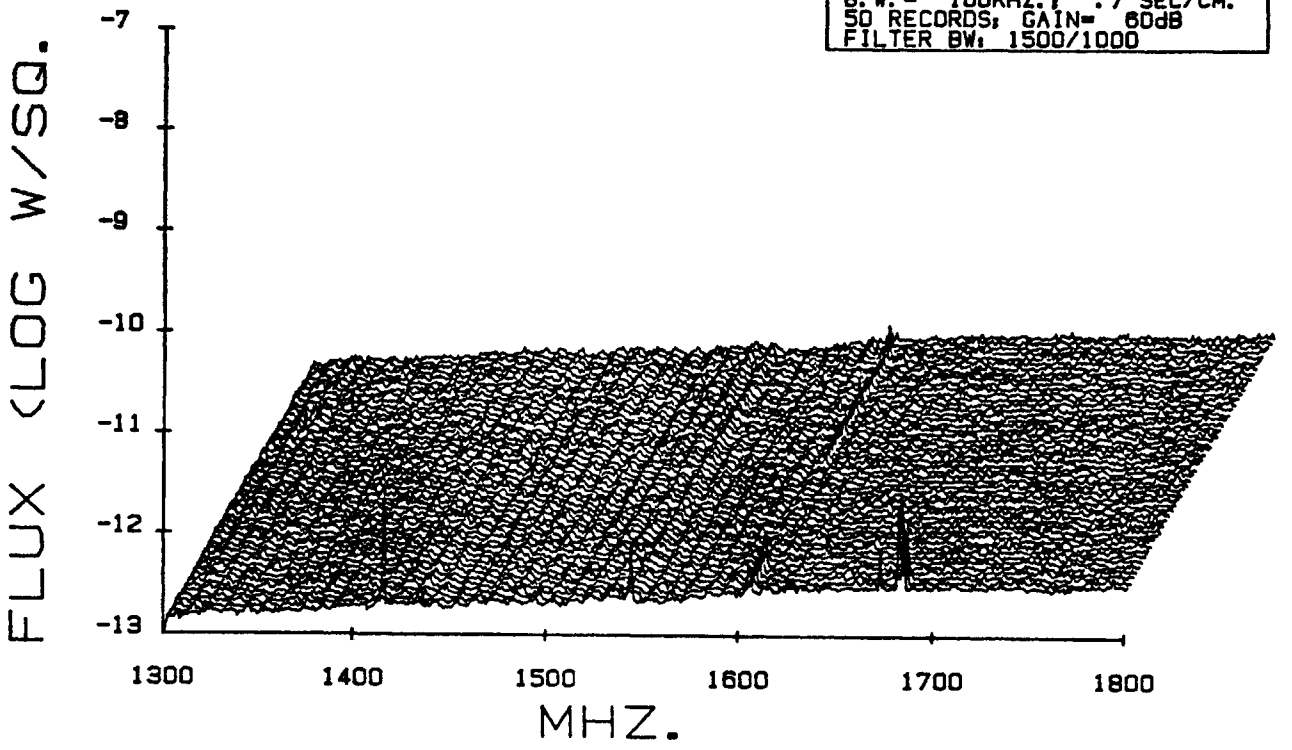
PLOT # 35

VLBA RFI SURVEY
LOCATION: MT. LOCKE TX
START: 15:24:52 03-28-1985
STOP : 15:50:56 03-28-1985
1550 TO 1750 MHZ. 180 DEG AZ.
B.W.= 30KHZ.; 2.8 SEC/CM.
14 RECORDS; GAIN= 60dB
FILTER BW: NONE



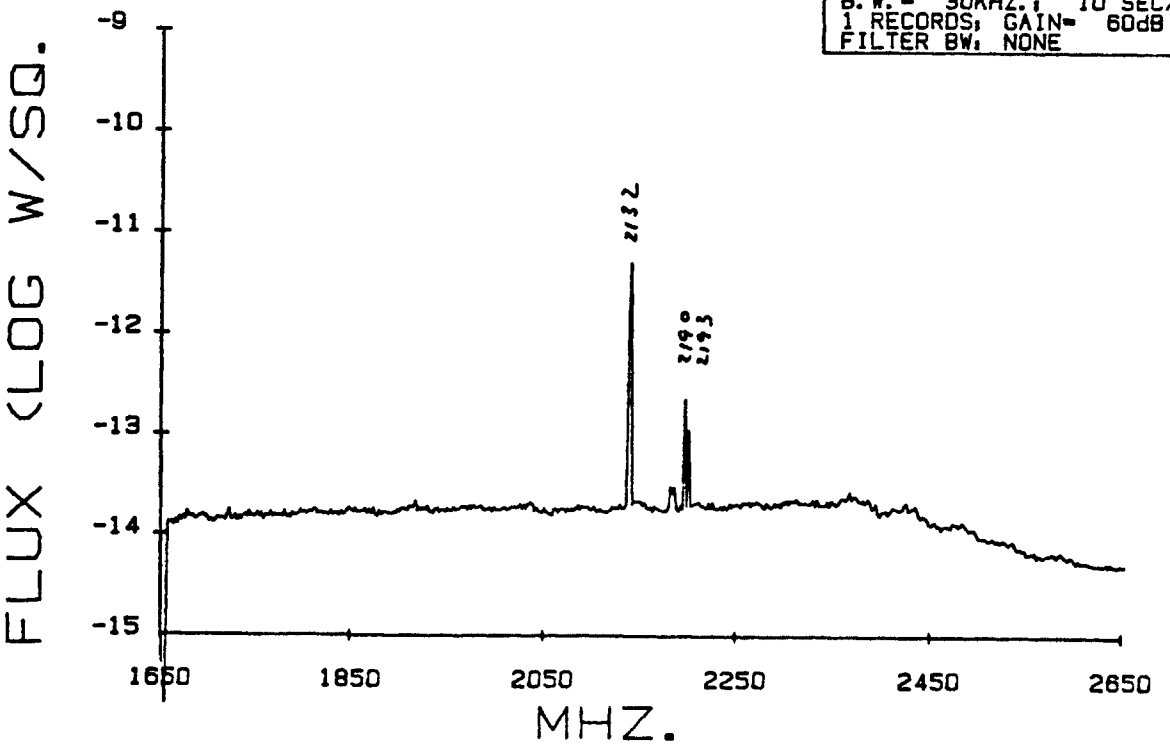
Plot # 36

VLBA RFI SURVEY
LOCATION: MT. LOCKE TX
START: 18:20:45 03-27-1985
STOP : 03:41:42 03-28-1985
1300 TO 1800 MHZ. 360 DEG AZ.
B.W. = 100KHZ.; .7 SEC/CM.
50 RECORDS; GAIN= 60dB
FILTER BW: 1500/1000



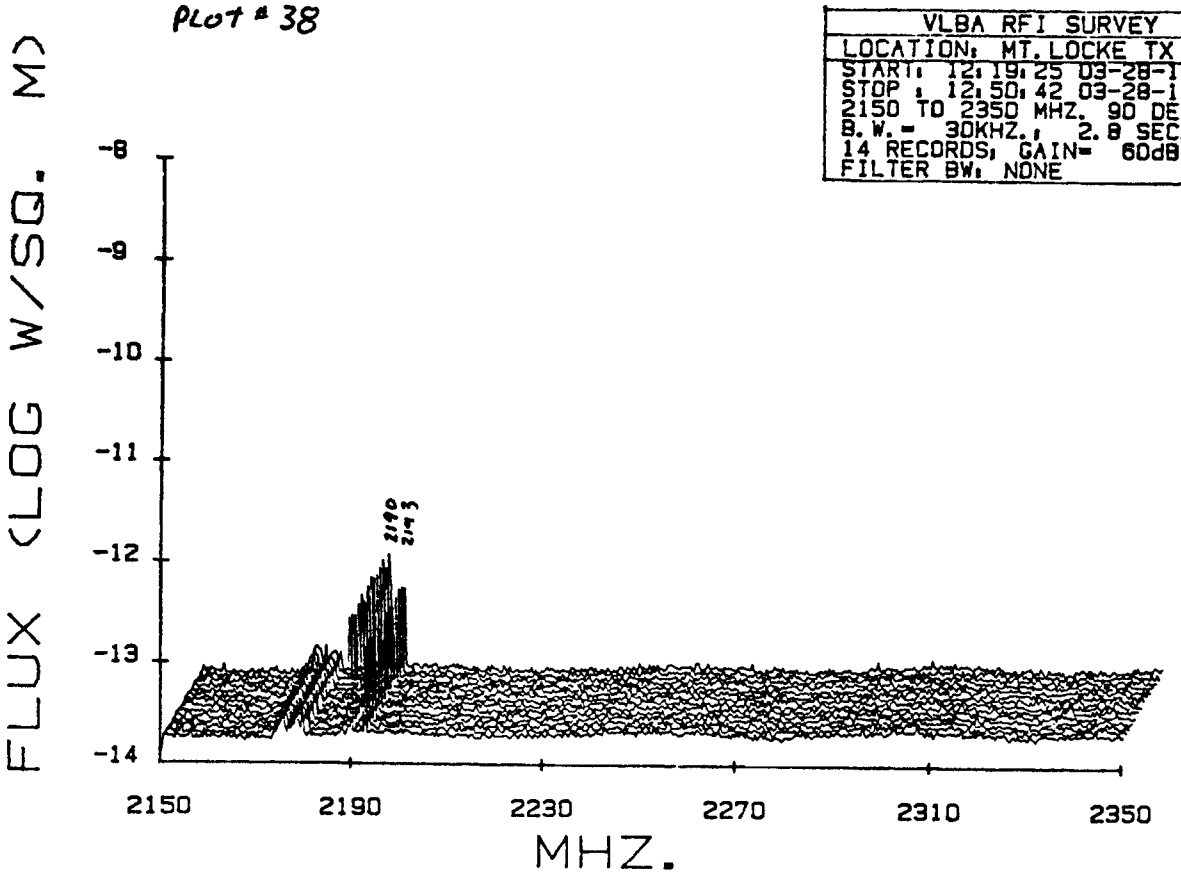
Plot # 37

VLBA RFI SURVEY
LOCATION: MT. LOCKE TX
START: 11:24:40 03-28-1985
STOP : 11:27:51 03-28-1985
1650 TO 2650 MHZ. 90 DEG AZ.
B.W. = 30KHZ.; 10 SEC/CM.
1 RECORDS; GAIN= 60dB
FILTER BW: NONE



PLOT # 38

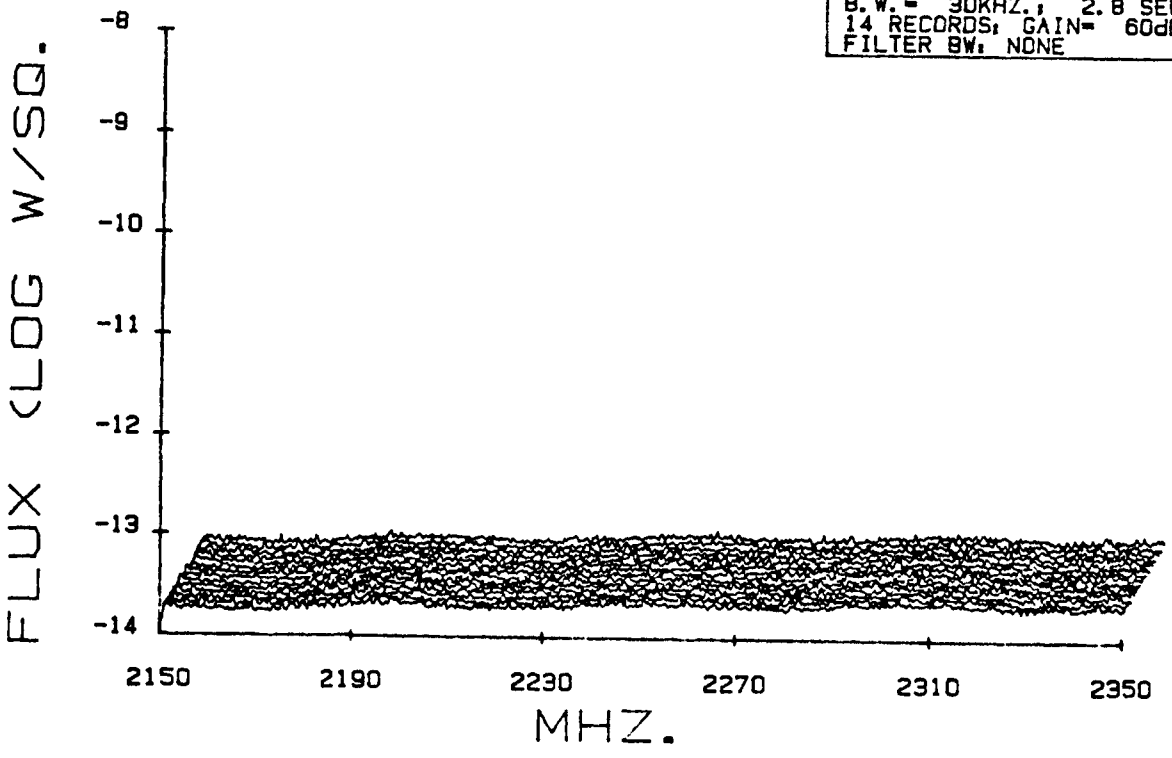
VLBA RFI SURVEY
LOCATION: MT. LOCKE TX
START: 12:19:25 03-28-1985
STOP : 12:50:42 03-28-1985
2150 TO 2350 MHZ. 90 DEG AZ.
B.W.= 30KHZ.; 2.8 SEC/CM.
14 RECORDS; GAIN= 60dB
FILTER BW: NONE



39.

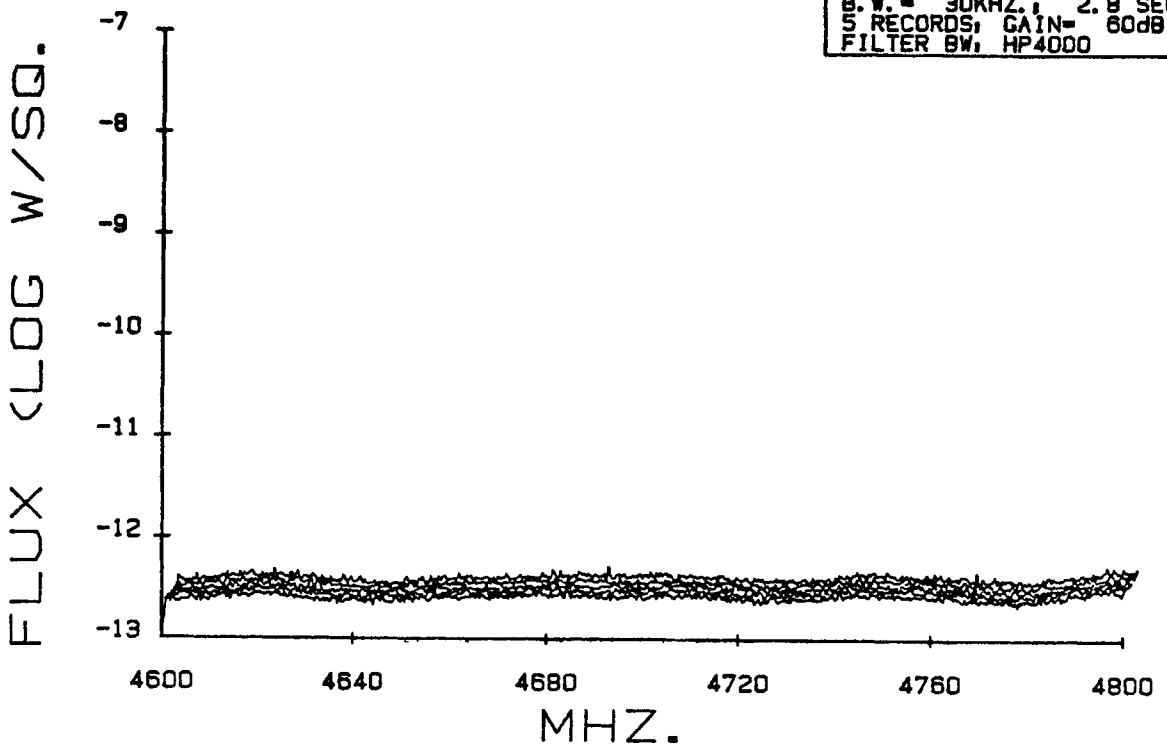
PLOT # 39

VLBA RFI SURVEY
LOCATION: MT. LOCKE TX
START: 13:26:23 03-28-1985
STOP : 13:57:23 03-28-1985
2150 TO 2350 MHZ. 270 DEG AZ.
B.W.= 30KHZ.; 2.8 SEC/CM.
14 RECORDS; GAIN= 60dB
FILTER BW: NONE



PLOT # 40

VLBA RFI SURVEY
LOCATION: MT. LOCKE TX
START: 10:49:26 03-28-1985
STOP : 11:01:14 03-28-1985
4600 TO 4800 MHZ. 180 DEG AZ.
B.W.= 30KHZ.; 2.8 SEC/CM.
5 RECORDS; GAIN= 60dB
FILTER BW: HP4000



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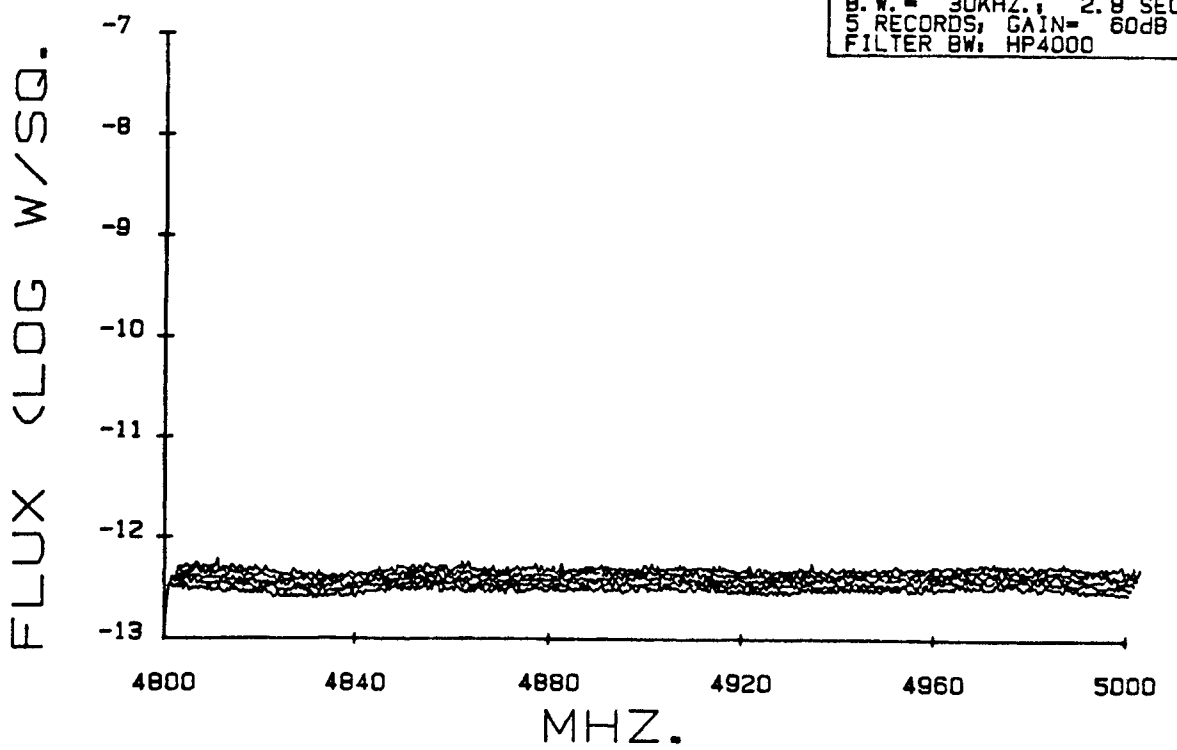
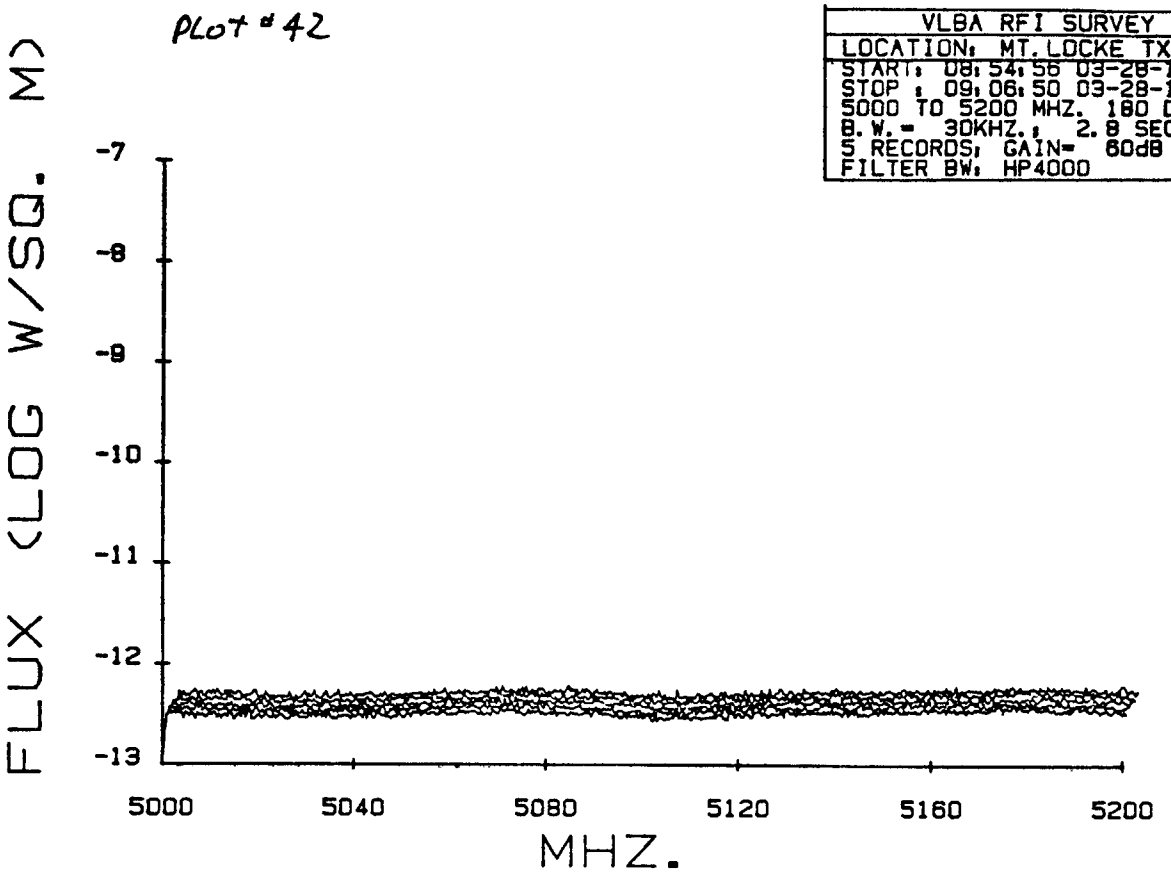
PLOT # 41

VLBA RFI SURVEY
LOCATION: MT. LOCKE TX
START: 09:38:12 03-28-1985
STOP : 09:50:03 03-28-1985
4800 TO 5000 MHZ. 0 DEG AZ.
B.W.= 30KHZ.; 2.8 SEC/CM.
5 RECORDS; GAIN= 60dB
FILTER BW: HP4000



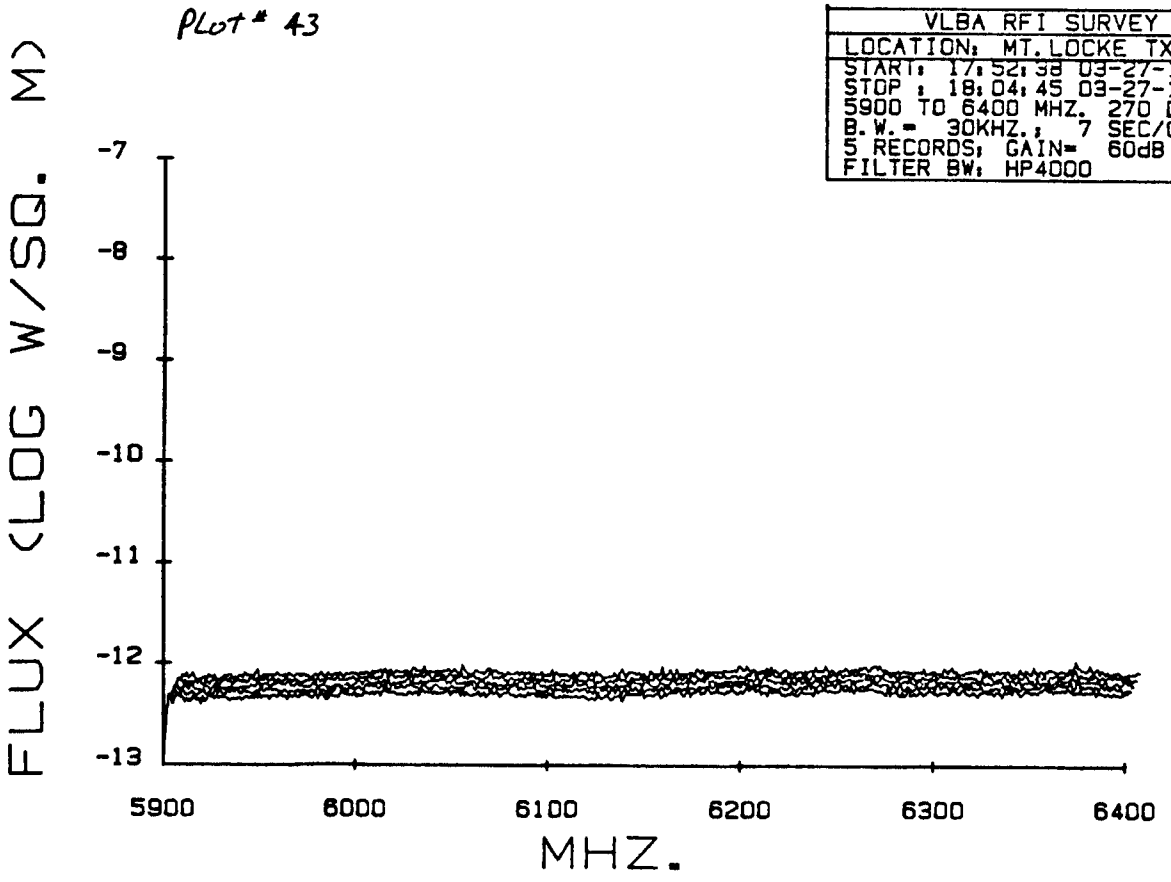
Plot # 42

VLBA RFI SURVEY
LOCATION: MT. LOCKE TX
START: 08:54:56 03-28-1985
STOP : 09:06:50 03-28-1985
5000 TO 5200 MHZ. 180 DEG AZ.
B.W.= 30KHZ.; 2.8 SEC/CM.
5 RECORDS; GAIN= 60dB
FILTER BW: HP4000



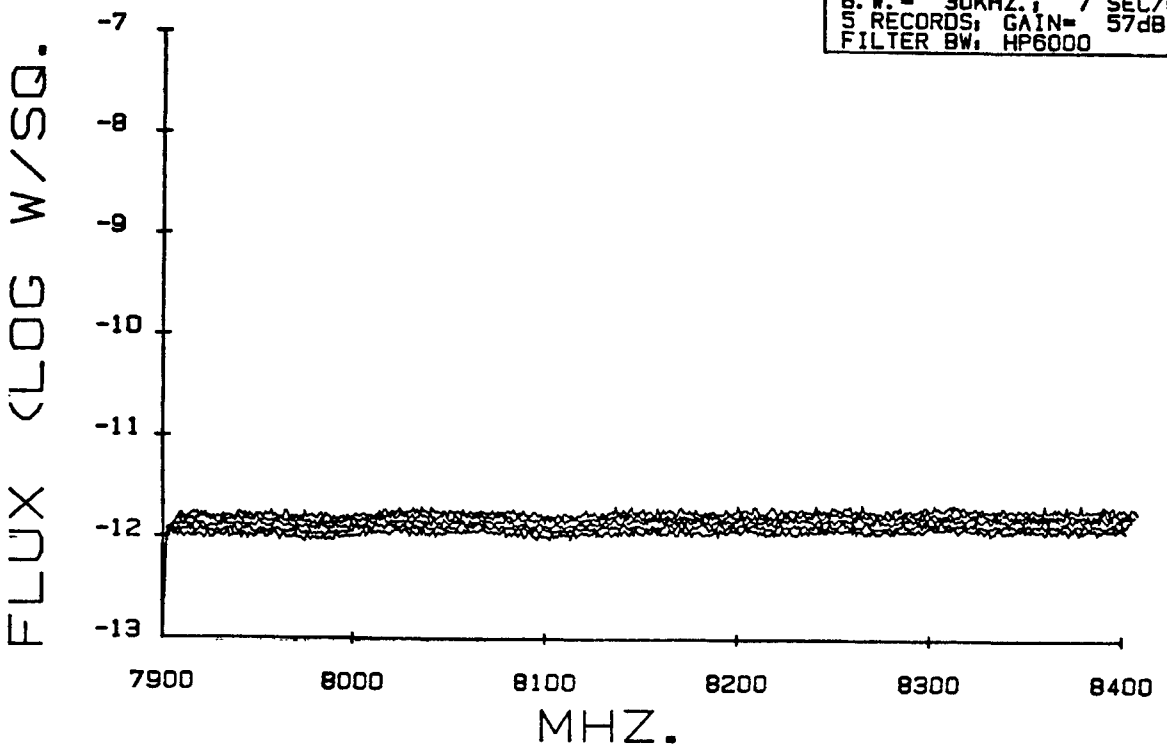
Plot # 43

VLBA RFI SURVEY
LOCATION: MT. LOCKE TX
START: 17:52:38 03-27-1985
STOP : 18:04:45 03-27-1985
5900 TO 6400 MHZ. 270 DEG AZ.
B.W.= 30KHZ.; 7 SEC/CM.
5 RECORDS; GAIN= 60dB
FILTER BW: HP4000



PLOT # 44

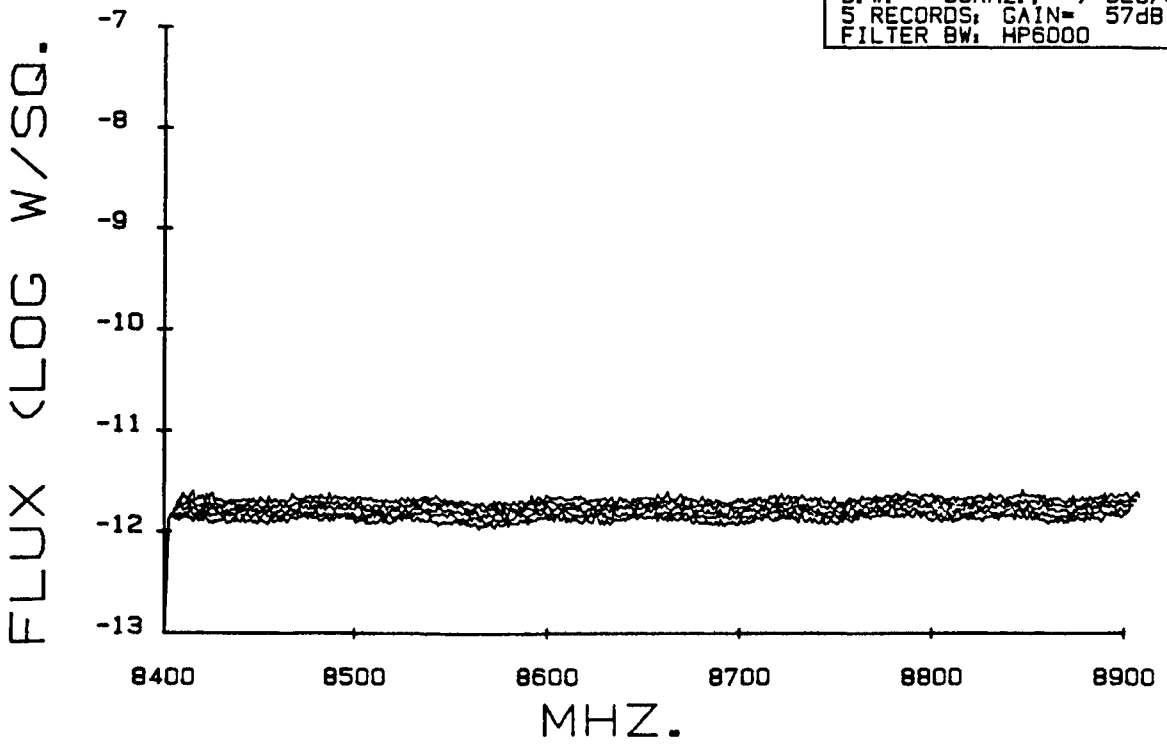
VLBA RFI SURVEY
LOCATION: MT. LOCKE TX
START: 16:52:47 03-27-1985
STOP : 17:04:57 03-27-1985
7900 TO 8400 MHZ. 180 DEG AZ.
B.W.= 30KHZ.; 7 SEC/CM.
5 RECORDS; GAIN= 57dB
FILTER BW: HP6000



45.

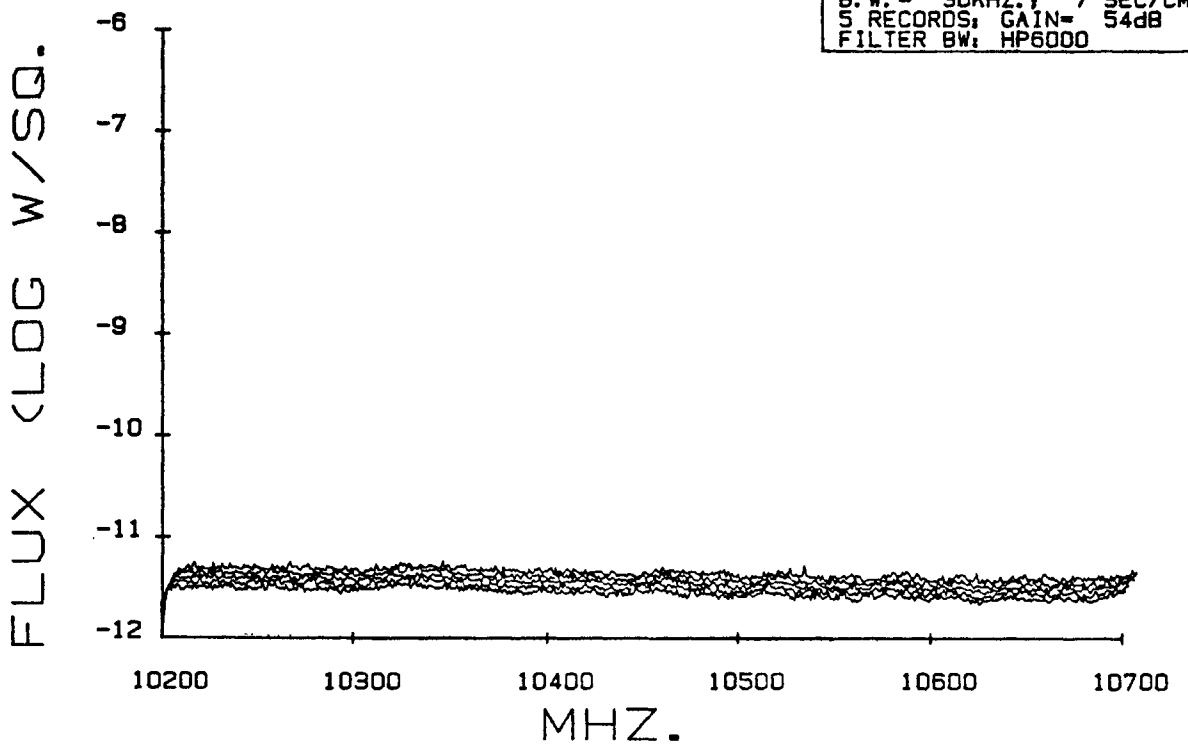
PLOT #45

VLBA RFI SURVEY
LOCATION: MT. LOCKE TX
START: 15:40:07 03-27-1985
STOP : 15:52:20 03-27-1985
8400 TO 8900 MHZ. 0 DEG AZ.
B.W.= 30KHZ.; 7 SEC/CM.
5 RECORDS; GAIN= 57dB
FILTER BW: HP6000



PLOT # 46

VLBA RFI SURVEY
LOCATION: MT. LOCKE TX
START: 14:43:46 03-27-1985
STOP : 14:56:05 03-27-1985
10200 TO 10700 MHZ. 180 DEG AZ.
B.W. = 30KHZ.; 7 SEC/CM.
5 RECORDS; GAIN= 54dB
FILTER BW: HP6000



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PLOT # 47

VLBA RFI SURVEY
LOCATION: MT. LOCKE TX
START: 13:14:17 03-27-1985
STOP : 13:26:53 03-27-1985
10700 TO 11200 MHZ. 90 DEG AZ.
B.W. = 30KHZ.; 7 SEC/CM.
5 RECORDS; GAIN= 54dB
FILTER BW: HP6000