

ION.ANT.— 53

# IONOSPHERIC DATA AT SYOWA STATION (ANTARCTICA)

July 1989—December 1989

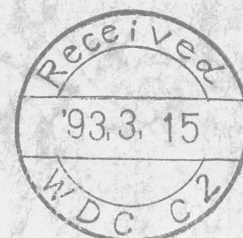
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## INTRODUCTION

This data book gives summarized results for vertical soundings of the ionosphere at Syowa Station, Antarctica in 1989. The observations were conducted by the Communications Research Laboratory under the sponsorship of the National Institute of Polar Research of Japan. The location of the station, specifications of the ionosonde and symbols used in this data book are as follows:

## LOCATION OF SYOWA STATION

Geographic		Geomagnetic	
Latitude	Longitude	Latitude	Longitude
69° 00.4'S	39° 35.4'E	-69.8°	78.2°

## SPECIFICATIONS OF THE IONOSONDE USED AT SYOWA STATION

Items	Specifications
Frequency Range	400 kHz-15 MHz
Transmitting Power	10 kW (peak value)
Duration of Sweep	20 sec
Transmitted Pulse Width	80 $\mu$ sec
Recurrence Frequency of Transmitted Pulse	50 Hz (by power source frequency)
Frequency Scale	every 1 MHz
Height Range	900 km
Height Scale	every 50 km
Total Receiver Gain	120 dB
Recording Method	35 mm film and video fax for ionograms
Power Supply	1000 volt AC, 2.0 kVA
Transmitting Antenna and Receiving Antenna	30 m height vertical delta terminated by 600 $\Omega$ respectively

## DESCRIPTION

- a. All symbols and terminology in the tables or figures of ionospheric data are used in accordance with the "URSI Handbook of Ionogram Interpretation and Reduction (Second Edition 1972)"
- b. Ionograms data are printed in the quarter hourly of every days.
- c. Characteristics of Ionosphere
  - fxI Top frequency of spread F traces or oblique traces.
  - foF2 Ordinary wave critical frequency for the F2 layer.
  - fEs(ftEs) Top frequency of Es layer as reflected overhead.
  - fmin Lowest frequency showing vertical ionospheric reflection.
  - h'F Minimum virtual height of the ordinary wave F trace as a whole.



## Symbols

### (1) Descriptive Letters.

The following letters are entered after, or used to replace, a numerical value on the monthly tabulation sheets.

- A Measurement influenced by, or impossible because of, the presence of a lower thin layer, for example, Es.
- B Measurement influenced by, or impossible because of, absorption in the vicinity of  $f_{min}$ .
- C Measurement influenced by, or impossible because of, any non-ionospheric reason.
- D Measurement influenced by, or impossible because of, the upper limit of the normal frequency range.
- E Measurement influenced by, or impossible because of, the lower limit of the normal frequency range.
- F Measurement influenced by, or impossible because of, the presence of spread echoes.
- G Measurement influenced or impossible because the ionization density of the layer is too small to enable it to be made accurately.
- H Measurement influenced by, or impossible because of, the presence of stratification.
- K Presence of particle E layer.
- L Measurement influenced by or impossible because the trace has no sufficiently definite cusp between layers.
- M Interpretation of measurement questionable because the ordinary and extraordinary components are not distinguishable.
- N Conditions are such that the measurement cannot be interpreted.
- O Measurement refers to the ordinary component.
- P Man-made perturbation of parameters-Presence of polar spur traces.
- Q Range spread present.
- R Measurement influenced by, or impossible because of, attenuation in the vicinity of a critical frequency.
- S Measurement influenced by, or impossible because of, interference or atmospherics.
- T Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.
- V Forked trace which may influence the measurement.
- W Measurement influenced or impossible because the echo lies outside the height range recorded.
- X Measurement refers to the extraordinary component.
- Y Lacuna phenomena, severe layer tilt.
- Z Third magneto-electronic component present.

## (ii) Qualifying Letters

The following letters are entered in the first column before a numerical value on the monthly tabulation sheets.

D	Greater than.
E	Less than.
J	Ordinary component characteristic deduced from the extraordinary component.
M	Mode interpretation uncertain.
O	Extraordinary component characteristic deduced from the ordinary component.
T	Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.
U	Uncertain or doubtful numerical value.
Z	Measurement deduced from the third magneto-electronic component.

## Definitions of the CNT, MED, UQ and LQ

Median count (CNT) is the number of values from which a median has been computed. In addition to numerical values, the count may include certain descriptive letters.

Median (MED) of a set of numbers is the middle value when the numbers are arranged in order of magnitude, or the average of the two middle values if there is an even number of values.

Upper quartile (UQ) is the median value the upper half of the values when they are ranked according to magnitude; the lower quartile (LQ) is the median value of the lower half.

IONOSPHERIC DATA STATION SHOWA ST.

JUL.1989 FXI (0.1MHZ)

45°E MEAN TIME (G.M.T. + 3H)

LAT.69°00.4'S LON. 39°35.4'E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H/D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
1	A	A	A	A	A	A	A						0 X	X	0 X	X						A	A	A	A		
2	A	A	A	A	B	A	A	A	A	A			B	60	65	70	81	70	66	56		B	B	B	B		
3	B	0 X	R			A	A							0 X	0 X	X	S			0 X	X	B	B	A			
4	27	27	29	28	30	29	29	28					51	76	90	95	90	90	0 X	X	0 X	0 X	B	B	B		
5	A		19	32	27	30		B					S	0 X		0 X	0 X	X	S		X	B	A	0 X	A		
6	A	B	A	A	A	A	A	A	B	B	B		66	80	93	95	95	93	71	65	60	X	B	A	A	A	
7	A	A	A	A	A	A	A	A	0 X	A	B	B		R	0 X	0 X							B	B	B		
8	A	A	A	X	A				45				X	X	0 X		0 X		0 X			A	S	A	S		
9	B	B	A	A	B								81	107	96	96		60	66	61	36		B	B	B		
10	B	A	A	A	B								70	85	100	93	116	105	100	100	94	S	A	A	A	A	
11	A	A	A	B	A	A	A					X	X		0 X	X	0 X			0 X		B	B	B			
12	A								60	50	45	51	70		95	101	91	81	76	77	53	26		B	B	S	B
13	S	A	A	A	0 X	0 X								94	100	111	101		71	50	58	32		A	0 X	0 X	
14	A	A	A	A	A	A	A	B	A					79	102	100	101		105	81	80	52	35		A	0 X	0 X
15	A	A		A	A	A							X	0 X	X	X			R	0 X		S	B	B	A	S	
16	A	A	A	A	A								X	0 X	0 X	0 X	0 X	X		0 X			A	0 X	0 X		
17	26	26	27	29	32	46								80	111	116	102		96			0 X	A	A		24	
18	A	A	A		A	B	A	A	A	B	B			B	0 X				0 X	S	X	0 X	S	A	A	A	A
19	A	A	A	A	A	A	A	A	A	B	X			60	72	90	104	100	80	85	70	67		B	B	B	B
20	A	A												X	0 X	0 X				0 X			B	B	B	B	0 X
21	A	A	A	A	A	0 X	X	B	B	B	S				B	B	B	X	0 X		0 X	B	B	B	B	A	
22	A	A	A	A	A	A	X							0 X	X	0 X	S	X	0 X	X			B	A	A		
23	A	A		A	A	A	A	A						0 X	X	0 X	X	X	0 X	X	X					A	
24	A	A	A	A	A	A								0 X	B	X	0 X	X	0 X	0 X	0 X	0 X	0 X	0 X	0 X	A	
25	0 X	A	A	A	A	A	A	A						40	53	54										A	
26	A	A	A	A	A	0 X	X	B	B	B	S			70						0 X	X	B	S	A	A	A	
27	A	A	A	A	A	B	A	A							B	B							A	A	A	S	
28	0 X	B	A	A	A	0 X	B	B	B					40													
29	A	A	A	B	A	B	A							50	60												
30	A	A	A	A	A	A								0 X	B	X	0 X	0 X	X	R	0 X	X	S	A	A	A	
31	A	B	A	A	B	A	A							45	46												
														X	B	0 X	0 X	X	0 X	X		0 X	B	B	B	B	
									40	48	56			86	101	90	96	90	90	71	69						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
CNT	4	5	7	8	7	11	13	17	19	18	23	23	26	30	28	29	29	28	30	20	12	1	4	6			
MED	28	27	33	30	30	37	43	46	45	46	60	75	90	98	98	96	81	76	70	44	30	26	29	28			
U	0 X								X				X	0 X	0 X	0 X	X	X		X							
L	0	26	22	29	28	30	35	36	32	37	43	51	72	81	94	96	94	74	67	61	38	26		25	24		



IONOSPHERIC DATA STATION SHOWA ST.

JUL. 1989 FOF2 (0.1MHZ)

45°E MEAN TIME (G.M.T. + 3H)

LAT. 69°00.4'S LON. 39°35.4'E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H/D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	A	A	A	A	A	A	A	F	F	F	F	F			U R		F	F	F	F	A	A	A	A	
2	A	A	A	A	B	A	A	A	A	A	F	B	F	F	F		F	F	F	F	B	B	B	B	
3	B	U R	R	F	F	A	A	F	F	F	F	F	F	U R		S	F	F	F			B	B	A	F
4	F	F	F	F	F	F	F	F	F	B		F	F	F	F	F	U R		F				B	B	B
5	A	F	F	F	F	B	F	F	F	F	F	S		F	F		S	F	F			B	A		A
6	A	B	A	A	A	A	A	A	B	B	B	F	F		U R		F	F	F			B	A	A	A
7	A	A	A	A	A	A	A	A		A	B	B	R	U R		F	F	F	F	F	F	F	B	B	B
8	A	A	A		A	F	F	F	F	F	F	F		U R		F	F	F	F	F	A	S	A	S	
9	B	B	A	A	B	F	B	B	F	F	F	F	J S		S	J S	F	F	F	F	A	B	B	B	
10	B	A	A	A	B	F	A	A	A	B	F	F					F	F	F	S	A	A	A	A	
11	A	A	A	B	A	A	A	F	F	F	F	F		U R		F	F	F	F	F	B	B	B	F	
12	A	F	F	F	F	F	F	F	F	F	F	F		U R	U R	U R	F	F	F	F	B	B	S	B	
13	S	A	A	A		F	F	F	F	F	B	B		U R		F	F	F	F	F	A				
14	A	A	A	A	A	A	A	B	A	F	F	F					R	F	S		B	B	A	S	
15	A	A	F	A	A	A	F	F	B	U R	F	F		F	F	F	F	F	F	F	S	A	A	A	
16	A	A	A	A	A	F	F	F	F	F	F	F		U R	U R	J S	F	F	F	F	F	A			
17	F	F	F	F	F	F	A		F	F	B	B		F	F	F	F	B	S	F	F	A	A	F	
18	A	A	A	F	A	B	A	A	A	B	B	F				F	U S	S	J S	U S	S	A	A	A	A
19	A	A	A	A	A	A	A	A	A	B	J S	F					F	F	F	F	B	B	B	B	
20	A	A	F	F	F	F	F	F	F		U R			S	D R		F	U R	F	F	B	B	B	B	
21	A	A	A	A	A	A	U R	F	F	F	F	F		F	F		F	F	F		B	B	B	B	A
22	A	A	A	A	A	A		F	F	F	U R					S		F	F	F	F	B	A	A	
23	A	A	F	A	A	A	A	A	A	F	U R						D S	F	F	F	F	F	F	A	
24	A	A	A	A	A	A	F	F	U R	B	F	F					U R	R	F			B	A	A	
25		A	A	A	A	A	A	A	A	B	B						F	F	F	F	B	B	B	A	
26	A	A	A	A	A			B	B	B	S	F		B	B	B	J S	U R	B	U R	B	S	A	A	A
27	A	A	A	A	A	B	A	A	A	F	B	B		S		U R	F	F	F	F	A	A	A	S	
28		B	A	A	A		B	B	B	F	B						U R	U R	R	R	S	B	A	A	
29	A	A	A	B	A	B	A	F	F	F	B						R	R	F	S	F	A	A	A	
30	A	A	A	A	A	A	F	F	A	B	F	F						F	F	F	F	B	B	A	
31	A	B	A	A	B	A	A	A	F	F	B						R	F	F		B	B	B	B	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	4	5	7	8	6	8	12	14	17	18	22	23	26	30	28	29	28	28	30	19	12	1	4	6	
MED	20	20	26	24	25	30	36	38	39	40	54	69	84	92	92	90	75	68	62	35	24	20	23	21	
U Q	30	38	33	34	38	36	45	50	48	45	56	80	88	100	100	98	88	72	70	44	30		32	29	
L Q	F	F	F	F	F	F	F	F	F	F	F	F					F	F	F	F	F			F	
	18	16	21	20	24	27	30	26	27	37	45	64	75	88	90	88	67	60	55	30	20		19	17	



IONOSPHERIC DATA STATION SHOWA ST.

JUL.1989 FMIN (0.1MHZ) 45°E MEAN TIME (G.M.T. + 3H)

LAT.69°00.4'S LON. 39°35.4'E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	11	15	19	14	20	20	18	13	10	10	13	26	15	18	19	11	15	10	11	15	20	19	20	15
2	25	25	20	20	B	25	14	19	19	23	15	B	18	20	15	19	25	20	20	B	B	B	B	B
3	B	10	14	10	10	10	10	10	13	14	10	10	13	14	13	15	13	14	13	15	B	B	9	8
4	8	14	14	10	9	10	15	18	16	B	15	14	13	16	13	15	16	18	14	15	13	B	B	B
5	10	10	9	9	9	B	13	15	20	14	14	18	18	10	10	12	25	19	14	15	B	14	10	9
6	9	B	15	15	20	19	13	19	B	B	B	23	14	24	24	19	14	22	20	14	B	9	9	9
7	9	10	9	21	19	14	12	15	10	20	B	B	53	22	23	30	30	13	13	20	9	B	B	B
8	13	9	9	14	11	10	10	10	9	9	9	13	16	11	13	18	18	13	14	13	14	10	10	10
9	B	B	10	10	B	9	B	B	19	13	10	13	14	13	23	23	24	17	10	10	14	B	B	B
10	B	10	10	15	B	17	20	20	21	B	15	9	19	14	12	24	13	10	30	23	10	13	9	10
11	17	14	14	B	30	15	14	10	9	13	19	18	18	22	14	14	12	12	18	13	B	B	B	9
12	9	9	10	9	8	9	10	10	10	14	15	13	12	14	15	13	12	10	11	11	B	B	9	B
13	8	10	9	10	15	10	9	10	10	9	B	B	30	16	18	10	10	17	12	13	9	9	8	9
14	8	19	10	23	15	19	23	B	23	10	10	14	19	17	25	30	35	24	24	20	B	B	8	9
15	8	8	9	10	21	14	14	12	24	B	34	35	55	25	23	24	40	24	20	20	17	9	8	10
16	10	10	15	13	10	9	9	10	10	11	10	20	12	16	10	9	10	10	9	10	9	10	10	10
17	9	10	9	8	7	11	19	20	10	9	23	B	30	14	12	10	19	B	39	20	15	9	9	8
18	10	9	9	13	13	B	15	17	20	B	B	21	B	40	30	55	57	19	15	22	19	8	8	7
19	9	10	10	9	15	18	19	19	17	B	23	20	25	19	14	15	15	10	13	B	B	B	B	B
20	10	8	9	9	8	10	14	11	13	16	14	18	16	14	9	11	18	19	19	B	B	B	B	8
21	9	8	12	7	13	11	9	8	9	B	20	14	19	20	13	20	18	15	20	B	B	B	B	9
22	9	9	13	10	13	12	13	11	9	10	9	50	55	40	35	24	23	13	17	20	20	B	12	8
23	8	8	10	15	13	13	13	19	14	14	25	20	20	24	14	10	15	14	10	10	8	10	8	8
24	9	11	19	24	20	15	14	10	13	B	20	30	18	19	10	31	26	30	22	18	18	B	10	10
25	14	10	23	20	14	14	20	14	10	B	B	30	29	25	30	14	24	13	11	14	B	B	10	10
26	10	10	19	20	15	13	14	B	B	B	34	23	B	B	B	40	30	B	30	B	18	9	9	9
27	20	10	10	20	30	B	14	20	22	17	B	B	55	30	30	20	32	35	13	13	9	10	12	9
28	10	B	10	14	12	17	B	B	B	20	13	B	23	24	30	19	22	16	14	34	19	B	13	9
29	9	9	30	B	14	B	18	10	14	29	B	28	19	21	24	17	16	20	18	11	14	10	10	8
30	13	19	15	14	10	19	18	9	24	B	24	20	19	21	20	13	10	10	9	19	15	B	B	9
31	10	B	19	19	B	19	13	24	15	10	14	B	35	24	16	14	13	25	30	B	B	B	B	B
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	10	10	10	14	14	14	14	15	14	17	19	21	19	20	16	17	18	17	14	18	19	B	10	9
U O	13	15	15	20	20	19	18	20	21	B	B	B	34	50	30	24	24	24	25	22	20	B	B	B
L O	9	9	9	10	10	10	13	10	10	11	13	14	16	14	13	13	13	13	12	13	14	10	9	9



IONOSPHERIC DATA STATION SHOWA ST.

JUL. 1989 H'F (KM)

45°E MEAN TIME (G.M.T. + 3H)

LAT. 69°00.4'S LON. 39°35.4'E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	A	A	A	A	A	A	A	E A 380	290	250	240	230	250	215	205	210	200	210	215	220	A	A	A	A	
2	A	A	A	A	B	A	A	A	A	A	A	B	275	265	225	230	E B 260	225	230	B	B	B	B	B	
3	B	A		Q	A	A	A	A	Q				205	205	205	200	210	205	230	210	B	B	A	E A 300	
4	Q E 320	B E 310	B E 340	B E 325	E A 375	E A 400	E A 400	E B 410	E B 360	B	250	225	215	210	210	210	190	E B 250	210	225	E B 275	B	B	B	
5	A	A	A	A	E A 310	E A 350	E A 320	E A 350	B	350	325	350	300	290	250	200	210	210	205	200	240	210	210	A	
6	A	B	A	A	A	A	A	A	B	B	B		275	250	230	225	230	210	245	240	240	B	A	A	A
7	A	A	A	A	A	A	A	A	A	A	B	B	E B 290	225	200	250	E B 250	240	220	230	250		B	B	B
8	A	A	A	E A 350	A	A	A	E A 345	280	250	190	220	190	215	200	200	195	230	245	215	A	235	A	E A 325	
9	B	B	A	A	B	E A 360	A	B	E A 400	E A 330	225	245	225	210	225	225	210	210	210	220	A	B	B	B	
10	B	A	A	A	B	A	A	A	A	B	Q	350	240	220	220	200	215	240	250	245	245	A	A	A	A
11	A	A	A	B	A	A	A	E A 310	270	240	240	245	215	210	200	200	210	200	205	220	Q	B	B	B	275
12	A	A	A	E A 310	E A 350	E A 350	E A 320	E A 310	E B 275	250	245	220	215	210	205	200	220	200	240	200	B	B	220	B	
13	E A 290	A	A	A	A	A	A	E A 350	300	270			260	230	205	225	200	230	210	220	E A 300	A	E A 300	A	
14	A	A	A	A	A	A	A	B	A	260	230	230	230	215	210	250	240	250	215	250	E B	B	B	A	E A 310
15	A	A	A	A	A	A	A	E B 370		280	275	250	250	230	250	255	240	230	250	260	E A 345	A	A	A	
16	A	A	A	A	A	A	A	E A 350	E A 300	E A 310	225	225	210	215	200	230	190	215	220	210	220	A	310	290	
17	E A 320	310	310	E A 350	350	340		E A 440	E A 360	E A 355	E B 350		250	200	215	230	200		230	225	270	A	A	A	
18	A	A	A	E A 290	A	B	A	A	A	B	B		260	E B 290	E B 270	E B 300	E B 280	240	245	280	E B	A	A	A	A
19	A	A	A	A	A	A	A	A	A	B		260	240	220	220	200	200	225	200	230	B	B	B	B	B
20	A	A	A	A	E A 375	E A 375	A	A	E B 370	E B 290	225	215	225	210	200	200	210	200	225	B	B	B	B	290	
21	A	A	A	A	A	A	A	E A 290	E A 310	B	Q	260	250	205	230	200	210	210	215	200	B	B	B	B	A
22	A	A	A	A	A	A	A	E A 280	240	270	250	340	270	250	250	230	230	230	230	230	250	B	A	A	
23	A	A	210	A	A	A	A	A	A	E A 290	E A 300	220	245	250	225	205	200	220	205	210	E A 250	E A 310	E A 300	A	
24	A	A	A	A	A	A	A	E A 350	E A 340	B	A	220	240	225	250	240	220	250	210	200	240	B	B	A	
25	A	A	A	A	A	A	A	A	A	B	B		250	225	220	210	220	215	225	225	210	B	B	B	A
26	A	A	A	A	A	A	A	B	B	E B 270	E B 240		B	B	B		240	250		E B 260	E B 300	A	A	A	
27	A	A	A	A	A	B	A	A	A	B	B		260	225	200	225	225	250	240	230	A	A	A	E A 275	
28	E A 320	B	A	A	A	A	B	B	E A 310	255		225	225	225	225	200	200	215	225	E A 290	B	A	A	A	
29	A	A	A	B	A	B	A	A	E A 340	E B 340	B	225	240	225	230	200	190	230	200	200	230	B	B	A	
30	A	A	A	A	A	A	A	A	A	B		250	210	230	225	215	195	200	200	240	225	230	B	B	A
31	A	B	A	A	B	A	A	A	E A 400	275	250		240	220	200	205	215	200	240	B	B	B	B	B	
CNT	4	3	5	7	5	5	3	12	18	17	22	24	29	30	30	31	31	29	31	25	13	3	5	7	
MED	E A 320	E A 310	U 260	E A 325	E A 350	E A 360	E B 350	E A 348	E 340	E 275	245	232	228	220	210	215	210	225	225	220	E A 240	E A 310	E A 300	E A 290	
U O	320	310	E 345	350	375	388	400	365	360	310	270	250	250	230	225	230	230	240	240	230	E A 282	E A 345	E A 305	E A 310	
L O	E A 305	E A 310	E A 228	E A 310	E A 350	E A 345	E A 320	E A 310	290	255	230	220	215	210	200	200	200	202	210	210	235	235	220	275	



IONOSPHERIC DATA STATION SHOWA ST.

AUG.1989 FOF2 (0.1MHZ)

45°E MEAN TIME (G.M.T. + 3H)

LAT.69°00.4'S LON. 39°35.4'E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	A	A	A	A	A	A	A	F	F	F			U R	R	F		F	F		F	F	F	B	A
2	A	A	A	A	B	B	A	F	F	F			90	105	105	100	F	F	F	F	R	B	B	A
3	A	A	A	A	F	F	B	F	F	F	F	F	S	B	F	S	F	S	F	F	B	B	B	A
4	A	A	A	A	A	A	F	F	F	F	F	F	F	U R			J S	F	D R			A	A	A
5	A	A	A	A	A	A	F	F	F	F	F	J S		S	R					F	U R		R	B
6	E G	A	A	A	F	F	F	F	F	F			R					F	F	F	F	B	A	A
7	A	A	A	A	A	F	F	F	A		F	F	U R			D R		F	F	U R	F	A	A	A
8	A	A	A	A	A	A	A	A	B	F	F		F	U R			F		B	B	B	B	B	A
9	A	A	A	B	A	A	F	F	F					F		J S		F					A	F
10	F	A	F	F	F	A	B	A	B	A	A		A	B	F						A	A	A	A
11	A	A	B	A	A	A	F	A	A	B	B	B			F	U R	B		D R		A	A	A	A
12	A	A	A	A	B	A	B	B	A	B	B	B	100		B	F		D S	R	S	B	B	B	B
13	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
14	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	S	B	B	B	B	B
16	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
17	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
18	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	70		B	B	U R
19	A	A	A	A	B	B	B	A	B	B	B	B	B	B	B	B	B	U S		F	F	A	B	B
20	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		B	F	B	B	B	E G
21	F	F	J S	F	F	F		F	U R	U R	U R	U R	S			J S				A	S	A	A	A
22	A	A	A	A	A	F	A	A	B	B	B	B	B	B			F	B	F	S	B	B	B	B
23	A	A	A	A	A	A	A	A	B	B	B	B	70	U R	U R	B		R	R	R	B	A	A	A
24	A	B	F	A	A	A	A	A		B	S	B	U R	U R	U R	U R	F	F	F	F	F	F	B	B
25	B	A	F	F	F	F	F	A	F				U R	U R	U R	U R		F	F	F	F	F	F	F
26	B	A	A	A	F	F	F	A	F				U R			R	R	R	F	B	B	B	A	A
27	A	A	F	F	A		A	B	B	B	B	B	B					F	F	F	F	A	A	F
28	A	A	A	A	F	B	F	F	F				U R	D R	D R	U R		U R		F	U R	A	S	A
29	A	A	B	B	B	A	B	B	B	B	B	B	B	B	B		41	44	35	A	A	A	A	A
30	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B		88	85	S	A	A	A	A
31	A	B	B	A	A	A	B	B	A	B	U R	U R	U R	U R	U R	U R			F	F	A	F	A	A
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	3	1	4	4	7	7	9	11	11	13	12	15	16	15	20	19	19	23	20	17	12	6	2	4
MED	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
U O	40	43	36	56	40	40	37	44	40	55	68	78	88	91	90	94	90	85	74	50	30	22	22	36
L O	E G		F	F	F	F	F	F	F									F	F	F	F			
	16		28	52	30	34	34	38	39	45	60	70	80	84	85	90	80	70	62	41	24	20		26



IONOSPHERIC DATA STATION SHOWA ST.

AUG.1989 FES (0.1MHZ) 45°E MEAN TIME (G.M.T. + 3H)  
 LAT.69°00.4'S LON. 39°35.4'E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
1	31	29	39	37	45	57	47	36	27	17	20	21	24	21	20	18	13	16	12	14	12	10	30					
2	34	41	38	50	B	B	45	35	18	21	B	B	24	23	26	19	16	15	17	15	14	B	B	27				
3	37	38	41	40	40	45	B	31	57	53	E	B	E	B	E	B	E	B	E	B	E	B	B	B	29			
4	36	41	31	40	45	37	35	30	23	17	E	B	E	B	E	B	E	B	E	B	E	B	E	B	38			
5	70	41	39	45	42	35	27	14	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	B			
6	12	26	32	36	34	30	20	30	19	E	B	E	B	E	B	E	B	E	B	E	B	E	B	B	70			
7	75	80	32	49	41	33	36	28	35	34	35	24	29	30	25	31	20	13	30	24	12	29	44	46				
8	70	60	90	46	60	37	57	46	B	E	B	E	B	E	B	E	B	E	B	E	B	B	B	B	32			
9	35	36	33	B	51	40	31	21	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	35			
10	45	44	36	66	22	52	B	43	B	58	45	55	45	B	E	B	E	B	E	B	35	31	21	40	35	41	39	41
11	22	42	B	41	35	41	30	41	52	B	B	B	35	30	27	59	B	22	30	16	18	37	34	36				
12	43	39	42	60	B	B	B	B	46	B	B	B	35	24	26	19	18	30	24	B	B	B	B	B	B			
13	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
14	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
16	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
17	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
18	B	B	B	106	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	60		
19	37	45	43	82	B	B	B	40	B	B	B	B	B	B	B	B	B	53	19	18	23	21	B	B	B			
20	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	37		
21	37	27	27	E	26	28	28	28	E	30	35	40	39	55	35	35	30	24	19	20	35	24	75	70	38			
22	70	42	62	55	35	35	31	47	B	B	B	B	B	46	34	32	26	31	B	B	B	B	B	B	B			
23	33	33	36	48	47	42	40	32	B	B	B	B	38	60	B	55	26	30	31	B	71	50	63					
24	53	B	25	57	72	32	44	42	28	B	30	60	35	30	30	30	20	15	17	12	12	E	B	B	B			
25	B	21	31	29	17	16	14	16	E	20	23	31	31	30	30	30	31	26	18	13	10	10	10	21	9			
26	B	20	37	47	36	34	45	45	E	32	32	30	60	35	30	60	57	59	34	B	B	B	B	27	21			
27	30	34	27	37	31	35	32	B	B	B	B	B	56	30	30	26	18	14	19	13	38	52	32					
28	45	45	51	65	20	32	31	E	20	23	26	30	35	29	30	26	23	18	13	13	33	44	90	65				
29	46	75	B	B	B	42	B	B	B	B	B	B	B	B	B	20	30	23	27	37	41	90	90	37				
30	32	38	90	46	45	B	B	B	B	B	B	E	39	30	B	B	20	22	18	E	34	43	31	36				
31	49	B	B	41	42	43	B	B	B	B	B	55	40	39	31	30	24	20	20	25	32	21	31	31				
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
CNT	22	22	21	23	20	20	17	19	16	14	14	15	19	16	21	21	21	24	23	24	18	17	16	21				
MED	37	40	37	46	40	37	32	32	26	23	28	27	35	30	30	30	26	20	20	18	15	31	41	36				
U O	49	44	42	57	45	42	44	42	40	34	35	39	38	30	35	35	31	24	30	30	32	44	61	44				
L O	33	33	32	40	32	34	29	28	E	20	17	22	24	24	24	25	22	20	16	13	15	12	17	31	30			

IONOSPHERIC DATA STATION SHOWA ST.

AUG. 1989 FMIN (0.1MHZ)

45° E MEAN TIME (G.M.T. + 3H)

LAT. 69° 00.4' S LON. 39° 35.4' E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	9	8	8	24	26	18	10	10	10	8	15	18	18	18	16	18	13	10	9	14	9	10	B	8
2	8	10	14	21	B	B	13	10	10	11	B	B	24	23	26	19	11	15	17	15	14	B	B	11
3	9	14	10	13	14	11	B	15	12	24	35	24	32	B	35	55	30	24	13	9	B	B	B	9
4	10	10	9	9	9	11	11	10	9	10	24	22	24	18	50	24	30	15	13	17	15	8	9	14
5	13	14	12	22	12	10	10	10	13	15	21	18	23	19	23	15	11	9	10	10	9	18	18	B
6	9	8	11	9	9	9	11	9	10	19	24	25	20	15	19	23	22	15	11	15	11	B	10	8
7	10	10	10	21	11	10	10	8	20	34	35	24	29	30	25	31	12	10	30	24	12	9	9	10
8	10	10	10	14	15	19	20	19	B	28	22	27	23	25	19	40	60	22	B	B	B	B	B	10
9	10	10	19	B	18	13	10	11	14	14	22	18	25	19	25	21	18	13	14	15	14	13	15	16
10	13	12	11	17	13	17	B	24	B	17	20	55	20	B	24	18	35	18	10	10	10	12	10	12
11	8	25	B	15	13	30	10	14	25	B	B	B	35	30	27	59	B	22	30	10	10	8	8	9
12	10	8	10	8	B	21	B	B	17	B	B	B	35	B	24	26	19	18	30	24	B	B	B	B
13	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
14	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
16	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
17	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
18	B	B	B	55	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	30	B	B	B	60
19	23	20	30	24	B	B	B	24	B	B	B	B	B	B	B	B	B	53	19	18	23	12	B	B
20	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	30	B	30	B	B	B	15
21	15	18	13	23	14	18	14	14	30	35	40	39	55	35	35	30	24	19	20	14	24	15	15	23
22	14	20	20	13	23	14	20	18	B	B	B	B	B	B	46	34	32	B	26	31	B	B	B	B
23	11	10	18	16	16	20	17	18	B	B	B	B	38	B	60	B	55	26	30	21	B	15	18	14
24	14	B	12	23	17	15	17	12	19	B	30	60	B	35	30	30	20	15	10	9	12	B	B	B
25	B	10	10	10	10	10	8	16	20	23	31	31	30	30	30	31	18	13	13	10	10	8	21	9
26	B	10	10	11	10	13	10	24	24	32	30	60	35	30	60	57	59	34	B	B	B	B	15	14
27	10	11	12	12	19	13	10	B	B	B	B	B	B	56	30	30	26	14	14	19	13	10	15	15
28	20	12	12	13	10	B	10	14	20	23	26	30	35	25	30	26	23	18	13	13	9	10	13	14
29	14	14	B	B	B	18	B	B	B	B	B	B	B	B	B	20	30	23	15	10	13	25	30	18
30	14	12	20	20	24	B	B	B	B	B	B	39	B	30	B	B	20	13	18	10	13	12	11	B
31	13	B	B	17	30	24	B	B	23	B	B	55	40	39	31	30	24	20	20	13	10	10	10	10
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	14	14	14	21	19	19	20	19	30	B	B	B	38	56	35	31	30	20	20	18	15	18	30	15
U O	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	53	B	B	B	B	B	B
L O	10	10	10	13	13	13	10	12	17	23	26	27	25	25	25	24	22	15	13	13	10	10	13	10

IONOSPHERIC DATA STATION SHOWA ST.  
 AUG. 1989 H'F (KM) 45° E MEAN TIME (G.M.T. + 3H)  
 LAT. 69° 00.4' S LON. 39° 35.4' E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23					
1	A	A	A	A	A	A	A	A	300	260	255	230	215	205	200	220	210	195	220	230	B	210	250	B	A				
2	A	A	A	A	B	B	A	A	E A	E A	B	B	220	220	240	210	190	195	210	225	E B	B	B	A					
3	A	A	A	A	A	A	B	A	E A	E A				B	E B		240	240	205	210		B	B	A					
4	A	A	A	A	A	A	A	A	290	265	250	240	230	210	250	200	220	230	245	220	260		A	A	A				
5	A	A	A	A	A	A	E A	E A	375	380	280	250	245	215	210	200	210	220	220	200	200	215	190	250	240				
6	E A	A	A	A	E A	E A	E A	E A	325	350	300	255	290	265	225	220	220	220	205	225	200	230	200	245	B	A	A		
7	A	A	A	A	A	A	A	A	A	E B			340	275	220	240	220	230	240	230	200	230	240	245		A	A	A	
8	A	A	A	A	A	A	A	A	B	E B			310	240	225	230	225	225	245	245	250	B	B	B	B	B	B	A	
9	A	A	A	B	A	A	A	E A	390	275	240	240	240	230	220	205	215	210	190	220	205	225			B	A	E A	275	
10	A	A	A	A	265	A	B	A	B	A	A	E B	400	A	B	E B	305	230	E B	E A	E A	A	A	A	A	A	A	A	
11	A	A	B	A	A	A	Q	A	A	B	B	B	E B	270	250	240	300		220	245	220	330			E A	A	A	A	
12	A	A	A	A	B	A	B	B	A	B	B	B		245		230	240	210	215	240	200			B	B	B	B	B	
13	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
14	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	E B	275	B	B	B	B	B	B	B	B
16	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
17	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
18	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		245			B	B	B	E B	275
19	A	A	A	A	B	B	B	A	B	B	B	B	B	B	B	B	B	B	E B	250	220	210	230			A	B	B	
20	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	E B	260	280	280				B	B	B	A
21	A	A	A	B	Q	A	E A	E A	E A	E B	E B		E B	250	245	230	230	225	240	235		245			A	A	A	A	
22	A	A	A	E A	E A	A	A	A	B	B	B	B	B	B	E B		275	255	260		250	210			B	B	B	B	
23	A	A	A	A	A	A	A	A	B	B	B	B	E B	250	290		270	250	290	240					B	A	A	A	
24	A	B	A	A	A	A	A	A	A	B	E B	275	E B	320		220	215	200	230	225	220	195	250			E B	B	B	
25	B	A	A	E A	E A	E A	E B		250	225	230	220	230	210	225	215	210	210	200	200	220	210	225	280		E B		280	
26	B	A	A	A	A	A	A	A	E A	E B	E B		250	245	310	250	260	220			B	B			B	B	A	A	
27	A	A	A	E A	A	A	A	B	B	B	B	B	B	E B	310	240	250	230	230	220	205				E B	A	A	250	
28	A	A	A	A	E A	B	E A	A	260	250	255	250	250	240	240	230	225	210	225	230					A	E A	A	A	
29	A	A	B	B	B	A	B	B	B	B	B	B	B	B	B	E B	E B	E B	E B	A	A	A	A	A	A	A	A	A	A
30	A	A	A	A	A	B	B	B	B	B	B	E B	290	E B	260			210	240	340					E B	A	A	A	A
31	A	B	B	A	A	A	B	B	A	B	B	E B	290	250	240	220	225	210	200	225	260				E A	A	E A	A	A
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23					
CNT	1			3	3	3	5	6	11	13	13	15	18	16	21	21	21	24	22	21	13	6	2	4					
MED	E A			E A	U	E A	E A	E A	U	U		272	255	250	232	235	221	225	222	218	212	225	215	U	232	240	232	E	275
U Q				E A	E A	E A	E A	E A	E	E	E B		250	245	245	250	252	245	245	245	240	255	280		E	E A		E B	278
L Q				E A	E A	E A	E A	E A					260	250	242	225	230	215	220	215	210	200	220	208	215	250			262



IONOSPHERIC DATA STATION SHOWA ST.

SEP. 1989 FXI (0.1MHZ)

45° E MEAN TIME (G.M.T. + 3H)

LAT. 69° 00.4' S LON. 39° 35.4' E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	A	A	A	A	A	A	A	A	B	X	X	X	X	X	S	X	X	X	X	84	46	B	A	A	A
2	A	A	A	A	0 X	A	0 X	0 X	70	78	86	86	106	105	110	109	110	126	106		A	A	A	A	A
3	A	A	A	A	A	A	A	48	B	A	0 X	X	0 X	X	X	X	0 X	0 X	0 X	0 X	70	45	B	B	A
4	A	A	A	49	A	0 X	B	B	B	B	B	B	B	B	0 X	X	X	B	0 X	B	B	B	B	B	
5	B	B	A	A	A	71	B	B	B	B	B	B	B	X	90	86	90	91	77	66	52	37	A	A	
6	A	A	A	0 X	A	59	60	51	74	80	80	86	100	111	111	116	111	116	96		A	A	A	A	
7	A	A	A	X	0 X	A	A	70	76	76	81	86	106	116	121	116	116	90		B	A	A	A	A	
8	A	A	A	B	A	60	B	B	B	B	B	B	75	81	90	106	110	111	90	70	X	A	A	A	A
9	A	A	A	A	B	A	A	S	X	X	X	X	X	X	0 X	0 X	0 X	0 X	0 X	X	X	0 X	0 X	A	
10	27	A	A	A	A	A	A	A	B	B	B	B	0 X	0 X	0 X	0 X	X	X	B	0 X	86	55	A	A	A
11	A	A	A	0 X	A	A	50	69	70	76	82	100	114	110	116	121	116	116	80	84	70	50	36	A	
12	30	29	A	45	A	33	A	A	B	B	B	0 X	0 X	X	S	X	0 X	0 X	0 X	91	76	59	38	A	
13	32	A	0 X	A	A	B	B	0 X	S	0 X	0 X	0 X	0 X	0 X	0 X	S	0 X	0 X	0 X	70	A	A	A	A	
14	A	A	A	A	A	0 X	B	0 X	0 X	0 X	X	0 X	X	X	X	B	X	X	96	83	81	60	49	38	
15	31	S	A	A	A	56	50	51	B	B	0 X	81	99	91	108	116	116	96	80	65	A	A	A	60	
16	B	X	B	60	A	B	B	B	A	B	A	B	B	B	B	B	0 X	B	X	A	A	A	A	A	
17	A	A	A	A	A	45	39	49	59	59	66	67	74	81	86	86	94	86	85	66	56	45	36	X	
18	X	0 X	A	A	A	B	A	A	B	A	S	B	X	B	0 X	X	0 X	X	X	A	A	60	B	B	
19	A	B	B	A	B	B	A	S	B	0 X	B	B	0 X	B	0 X	B	X	X	A	A	A	A	A	A	
20	B	A	A	A	X	X	X	A	S	0 X	X	X	X	X	0 X	0 X	0 X	0 X	0 X	74	61	45	35	A	
21	A	A	A	A	A	A	46	70	72	76	81	86	104	105	105	106	111		96	75	64	51	0 X	B	
22	30	A	A	A	70	75	71	A	76	80	B	B	B	0 X	X	X	0 X	X	65	71	A	A	A	50	
23	F	43	A	A	A	43	46	61	71	78	81	89	93	100	99	98	101	106	90	80	70	55	50	44	
24	38	40	A	45	46	39	43	70	71	74	90	96	100	105	105	102	106	110	106	96	92	71	58	A	
25	A	A	A	A	A	A	70	80	80	82	90	96	96	96	101	91	91	90	81	70	56	31	28	A	
26	30	41	50	55	63	41	50	64	71	80	76	86	81	94	95	70	66	61	A	A	A	A	A	A	
27	A	65	60	A	A	A	A	A	0 X	0 X	0 X	0 X	0 X	X	S	X	X	X	X	X	0 X	0 X	0 X	39	
28	33	32	32	32	40	A	A	61	71	71	79	86	88	100	99	101	116	106	111	100	50	A	A	A	
29	A	X	A	60	60	61	60	70	81	90	100	102	106	111	116		111	B	B	B	B	B	B	B	
30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
31																									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	9	9	6	11	10	12	15	13	17	17	19	22	23	24	25	26	28	26	25	24	16	12	12	8	
MED	31	41	52	46	50	47	51	60	70	74	76	82	92	100	100	105	106	106	90	80	70	58	48	38	
U O	32	47	60	58	60	66	60	67	71	79	86	89	100	106	110	116	111	116	106	90	76	62	50	47	
L O	30	32	32	45	46	42	46	50	62	69	74	75	81	88	90	98	90	91	80	68	56	50	36	36	

IONOSPHERIC DATA STATION SHOWA ST.

SEP. 1989 FOF2 (0.1MHZ) 45°E MEAN TIME (G.M.T. + 3H)

LAT. 69°00.4'S LON. 39°35.4'E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H/D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23					
1	A	A	A	A	A	A	A	A	B		62	66	75	100	99	S	120	118	110	F	F	B	A	A	A				
2	A	A	A	A		A	F		F		60	72	80	80	F	100	99	104	103	F	U	R	A	A	A				
3	A	A	A	A	A	A	A	F	B	A										J	S	U	R	F	B	B	A		
4	A	A	A	F	A	A	R	B	B	B	B	B	B	B	B	U	R	J	S			B	B	B	B	B			
5	B	B	A	A	A	F	B	B	B	B	B	B	B			F				J	S	F	F	F	A	A			
6	A	A	A	A		A	F	F	F											R			A	A	A	A			
7	A	A	A		43	45	47	A	F	F	68	70	74	80	94	105	105	110	95	110	90		A	A	A	A			
8	A	A	A	B	F	A	F	B	B	B	B	B	B	F						F		A	A	A	A				
9	A	A	A	A	B	A	A	S														F		F	A				
10	F	A	A	F	A	A	A	A	A	B	B	B								F		F	A	A	A				
11	A	A	A	A		A	A	F	F									D	R		F	F	F	F	F				
12	F	F	A	F	A	F	A	A	B	B	B	U	R	U	R	S				U	R	F	F	F	A				
13	F	A	F	U	R	A	A	B	B	R	S	D	R	R	R					S		R	F	A	A	A			
14	A	A	A	A	A	F	B	B	R	R										F	F	F	F	F	F	F			
15	F	S	A	A	A	F	F	F	B	B	B	F	F	F	F			D	R	F	F	A	A	A	F				
16	B		B	F	A	B	B	B	A	B	A	B	B	B	B	B	F			B		A	A	A	A				
17	A	A	A	A		A	F	F				S			R	R								F					
18	F	R	A	A	A	B	A	A	A	B	A	S	B									A	A	F	B				
19	A	B	F	B	A	F	B	B	A	S	B	E	G	B	E	G	B	F	F	F	F	A	A	A	A				
20	B	A	A	F	A				A	S								D	S	D	S	U	S	F	F	F	A		
21	A	A	A	A		A	F	A	F											S	F	F	F	U	S	B			
22	F	A	A	A	F	F	F	A	F	F	B	B	B							F	F	A	A	A	F				
23	F	F	A	A	A	F	F	F	F	F										R	F	F	F	F	F	F			
24	F	F	A	F	F	R	F	F	F	F										F	F	D	R	F	U	R	F	F	A
25	A	A	A	A	A	A	A	A	F	F										F	F	F	F	F	F	F	F		
26	F	F	F	F	F	F														F	F	F	F	A	A	A	A		
27	A	F	F	A	A	A	A	A																	F	F	F		
28	F	F	F	F	F	A	A	F	F	F															A	A	A		
29	A		A	F	F	F	F	F	F	F										R		B	B	B	B	B	B		
30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
31																													
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23					
CNT	9	7	4	9	9	10	15	13	17	17	19	22	23	24	25	25	28	26	25	24	16	12	11	7					
MED	F	F	F	F	F	F	F	F	F	F					U						F	F	F	F					
UO	25	34	36	40	43	37	45	50	64	68	70	76	86	95	96	99	100	100	84	74	64	50	40	32					
LO	F	F	F	F	F	F	F	F	F	F											F	F	F	F					
	26	37	62	44	48	50	50	58	65	73	80	83	94	100	104	110	108	110	100	84	70	56	44	38					
	F	F	F	F	F	F	F	F	F	F										F	F	F	F	F					
	23	23	26	34	36	34	40	44	56	63	68	69	75	82	84	94	82	85	73	60	48	44	28	27					

IONOSPHERIC DATA STATION SHOWA ST.

SEP. 1989 FES (0.1MHZ)

45°E MEAN TIME (G.M.T. + 3H)

LAT. 69°00.4'S LON. 39°35.4'E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1	70	102	37	42	45	53	66	70		B	E	B	E	B	E	B	E	B	E	B	E	B	E	B		
2	32	31	32	36	37	35	46	42	28	31	27	30	30	19	26	E	B	E	B	E	B	E	B	E	B	
3	36	38	110	46	37	40	42	42		B	E	B	E	B	E	B	E	B	E	B	E	B	E	B		
4	47	45	60	36	90	35	E	B	B	B	B	B	B	B	E	B	E	B	E	B	E	B	E	B		
5	B	B	45	45	32	30	E	B	B	B	B	B	B	B	E	B	E	B	E	B	E	B	E	B		
6	31	40	31	28	27	45	32	23	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B		
7	41	40	55	41	46	45	47	43	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B		
8	54	49	46		35	34	38		B	B	B	B	B	E	B	E	B	E	B	E	B	E	B			
9	41	42	40	45		43	46	33	26	27	27	29	37	32	30	30	27	23	31	17	13	14	13	29		
10	90	70	55	69	49	36	36	41	59		B	B	E	B	E	B	E	B	E	B	E	B	E	B		
11	67	45	45	42	42	46	47	34	26	27	28	29	31	30	31	29	28	26	16	11	10	10	10	9		
12	E	B	13	21	32	27	26	15	E	B	50	45	B	B	E	B	E	B	E	B	E	B	E	B		
13	31	31	32	25	27	27			30	31	35	33	39	30	35	31	30	30	35	23	24	31	32	80		
14	80	39	42	36	42	37	27		B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
15	E	B	25	20	26	27	28	25	E	B	30	35	34	31	30	28	30	25	29	28	65	45	45	51		
16	B	45		21	40				34		32						30	35		26	29	36	45	41		
17	40	37	70	63	37	36	33	23	E	B	24	26	27	38	44	28	27	26	E	B	E	B	E	B		
18	E	B	E	B	E	B			B	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B		
19	65	19	19	45	41	50		41	32		35	35		37		35	27	26	21	17	27	41	48			
20	B	34	36	21	25	20	26	31	33	35	29	31	E	B	E	B	E	B	E	B	E	B	E	B		
21	32	40	41	51	45	40	35	37	31	39	50	56	56	50	55	30	27	30	25	31	24	20	24			
22	28	36	27	42	48	36	42	43	38	32				29	60	55	30	34	24	40	41	47	49	42		
23	40	53	70	41	41	40	33	21	24	26	27	27	33	36	33	28	25	22	26	14	10	10	10	10		
24	E	B	14	28	67	80	40	31	36	36	29	17	29	28	31	31	30	28	27	25	19	14	31	11	31	38
25	70	41	42	49	49	46	52	42	26	28	27	28	31	31	31	31	29	25	20	19	20	13	15	28		
26	26	27	25	25	12	E	B	E	B	E	B	E	B	E	B	E	B	36	32	38	41	46	71	90	70	
27	60	31	21	47	32	42	36	32	35	37	32	35	E	B	28	32	33	36	26	23	21	20	11	13	13	22
28	21	27	29	31	28	41	46	44	37	38	29	27	31	31	36	33	26	26	20	19	15	43	29	42		
29	90	52	76	36	34	29	32	46	25	33	36	29	39	37	29		E	B	E	B	E	B	E	B		
30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
31																										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	26	27	28	27	28	28	24	22	22	21	22	23	23	25	27	26	29	26	26	26	26	26	26	25		
MED	40	39	40	41	37	36	36	39	30	30	28	30	E	B	E	B	E	B	E	B	E	B	E	B		
UO	65	45	55	46	44	42	46	43	35	36	35	35	E	B	E	B	E	B	E	B	E	B	E	B		
LO	28	31	32	28	30	30	32	32	26	27	27	29	31	30	30	28	E	B	E	B	E	B	E	B		



IONOSPHERIC DATA STATION SHOWA ST.  
 SEP. 1989 FMIN (0.1MHZ) 45° E MEAN TIME (G.M.T. + 3H)  
 LAT. 69° 00.4' S LON. 39° 35.4' E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	13	14	13	17	17	20	19	23	B	35	52	36	41	60	60	50	40	30	30	20	B	13	13	13
2	11	13	10	10	10	24	12	14	20	17	20	30	22	21	18	27	24	15	13	10	9	9	10	14
3	9	11	10	15	10	10	15	14	B	30	35	28	31	35	24	28	24	21	15	10	18	B	B	15
4	20	20	23	19	22	23	25	B	B	B	B	B	B	B	52	40	38	B	35	B	B	B	B	B
5	B	B	30	30	20	30	B	B	B	B	B	B	B	35	35	30	30	24	19	22	13	17	13	12
6	10	15	10	15	14	12	11	14	19	30	35	23	40	21	19	18	17	39	20	20	9	10	10	10
7	10	10	15	12	10	15	13	18	39	23	20	15	55	54	59	30	30	22	25	B	15	8	12	15
8	9	18	20	B	10	14	23	B	B	B	B	B	34	35	35	35	45	25	14	15	9	9	10	21
9	11	11	22	23	B	23	19	17	18	19	20	21	37	21	30	30	19	23	10	9	13	14	13	9
10	10	16	11	13	20	22	18	18	20	B	B	B	36	52	30	20	19	14	B	30	10	8	22	20
11	17	14	13	13	13	14	15	14	19	20	17	24	20	19	20	18	18	12	10	11	10	10	10	9
12	13	10	10	17	10	15	24	24	B	B	B	35	35	50	60	65	30	23	18	15	11	9	10	10
13	9	14	13	14	15	18	B	B	30	31	35	33	39	20	35	21	30	30	35	23	24	20	23	20
14	22	25	23	20	20	19	19	B	30	34	31	31	24	40	24	35	37	B	39	23	25	20	14	18
15	15	20	15	19	17	14	22	20	B	B	30	35	34	24	30	28	30	25	20	18	12	15	14	17
16	B	13	B	12	30	B	B	B	21	B	23	B	B	B	B	B	30	35	B	16	10	10	13	15
17	13	14	14	20	23	13	13	23	18	19	22	24	24	22	19	20	20	23	20	14	9	12	12	13
18	15	19	19	19	30	30	B	25	24	B	24	35	B	37	B	35	24	19	15	17	15	15	13	B
19	35	B	20	B	18	11	B	B	30	20	B	10	B	B	25	B	24	19	21	10	9	10	9	15
20	B	10	11	10	10	11	13	18	20	25	23	24	35	22	21	30	18	17	18	15	11	10	13	10
21	8	14	15	14	19	23	15	20	20	20	50	56	56	50	55	30	27	30	25	31	24	20	24	B
22	14	14	15	24	13	10	15	24	25	20	B	B	B	22	60	55	30	34	24	10	10	14	14	9
23	14	10	9	25	16	14	10	15	15	15	20	19	18	14	18	15	13	13	13	14	10	10	8	10
24	14	9	22	19	13	12	14	14	14	14	15	15	19	18	30	19	15	15	14	10	31	11	9	10
25	10	19	24	18	24	23	19	19	18	19	18	20	16	17	31	20	15	14	20	19	20	13	15	9
26	8	10	10	10	9	10	20	23	18	30	24	18	33	B	15	35	12	10	10	14	19	19	18	11
27	10	10	10	20	9	18	10	14	14	18	20	35	20	19	15	13	14	10	10	11	11	10	9	8
28	8	9	9	9	8	13	25	18	15	16	15	20	20	20	18	15	16	14	13	19	15	9	8	10
29	8	10	13	13	10	10	10	14	13	10	17	18	17	18	20	B	E	B	B	B	B	B	B	B
30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	55	B	B	B	B	B	B	B
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
MED	13	14	14	18	16	15	19	20	20	28	27	30	35	30	30	30	24	23	20	16	13	12	13	14
U O	17	19	22	20	20	23	25	B	B	B	B	B	56	56	52	55	40	30	30	30	23	24	19	18
L O	10	10	10	13	10	12	13	15	18	19	20	20	22	20	20	20	18	15	14	11	10	10	10	10



IONOSPHERIC DATA STATION SHOWA ST.

SEP. 1989 H'F (KM)

45° E MEAN TIME (G.M.T. + 3H)

LAT. 69° 00.4' S LON. 39° 35.4' E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23						
1	A	A	A	A	A	A	A	A	B	E B	E B	E B	E B	E B	E B	E B	230	240	230	250	B	A	A	A						
2	A	A	A	A	A	A	A	A	260	260	240	240	240	230	240	230	245	245	255	A	A	A	A	A						
3	A	A	A	A	A	A	A	A	B	A	250	250	250	250	240	240	240	240	205	230	250	B	B	A						
4	A	A	A	A	A	A	B	B	B	B	B	B	B	E B	E B	305	290	260	B	B	B	B	B	B						
5	B	B	A	A	A	Q	B	B	B	B	B	B	B	270	250	250	240	230	215	245	230	260	A	A						
6	A	A	A	A	A	A	A	A	280	270	255	240	250	250	230	240	240	E B	220	225	A	A	A	A						
7	A	A	A	A	A	A	A	A	E B	310	250	240	230	H E B	E B	325	300	275	230	250	240	260	A	A	A	A				
8	A	A	A	B	A	A	A	B	B	B	B	B	E B	E B	255	250	250	250	225	220	250	A	A	A	A					
9	A	A	A	A	B	A	A	E A	400	250	240	240	250	240	230	220	240	220	210	210	225	220	225	225	A					
10	E A	A	A	Q	A	A	A	A	A	B	B	B	E B	E B	E B	250	310	250	250	250	240	B	225	250	A	A	A			
11	A	A	A	A	A	A	A	A	280	240	245	250	230	230	205	230	210	210	205	200	225	205	225	220	220					
12	E B	E B	E B	A	A	E B	A	A	B	B	B	250	270	250	300	300	240	240	230	210	210	230	270	E A	A					
13	E A	A	A	E A	A	A	B	B	E B	300	240	240	240	240	225	230	230	230	220	220	250	A	A	A	A					
14	A	A	A	A	A	A	A	B	E B	E B	280	275	250	240	240	300	250	240	E B	B	275	250	240	230	240	260	275			
15	A	E B	A	A	A	A	E B	E A	B	B	245	240	240	250	250	245	290	290	250	275	A	A	A	E A	390					
16	B	A	B	275	A	B	B	B	A	B	A	B	B	B	B	B	E B	E B	B	E B	390	A	A	A	A					
17	A	A	A	A	A	A	A	B	E A	280	265	255	270	420	245	230	245	230	230	220	215	200	200	225	290					
18	E B	E B	E B	E B	A	A	A	B	A	A	B	A	E B	B	E B	E B	290	270	240	230	230	240	A	A	250	B				
19	A	B	E A	B	A	A	B	B	A	A	B	E A	B	B	E A	B	E A	290	275	275	275	A	A	A	A					
20	B	A	A	E A	A	E A	A	E A	A	E A	270	240	225	230	230	220	225	215	225	225	200	210	210	250	A					
21	A	A	A	A	A	A	A	A	E A	E A	E B	E B	E B	E B	E B	E B	245	230	280	220	240	240	245	B						
22	E B	A	A	A	A	A	A	A	E A	300	260	B	B	B	E B	E B	E B	E B	E A	A	A	A	E A	275						
23	F	A	A	A	A	A	E A	E A	405	290	245	245	210	225	225	225	225	210	220	220	210	200	215	225	225					
24	260	260	Q	A	A	A	E A	E A	H	225	225	205	225	210	210	230	225	230	230	210	195	225	210	250	E A	A				
25	A	A	A	A	A	A	A	A	E A	H	275	230	230	240	240	240	225	240	230	225	225	240	245	290	340	E A				
26	A	E A	E A	E A	E A	E A	E B	E B	340	340	380	375	325	280	250	245	245	230	225	250	B	E B	245	310	305	270	A	A	A	A
27	A	E A	E A	E A	A	A	A	A	A	A	A	A	E A	300	255	240	240	255	240	245	245	230	225	220	220	240	265	A	A	A
28	290	375	420	450	410	A	A	E A	480	290	240	230	230	225	220	230	240	240	220	220	210	245	B	B	B	B	B	B	B	
29	A	A	E A	E A	A	A	E A	E A	305	225	370	400	230	250	240	240	230	240	230	270	B	B	B	B	B	B	B	B	B	
30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
31																														
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23						
CNT	7	7	5	7	2	6	5	8	16	19	20	23	23	25	27	26	29	25	26	24	16	12	12	8						
MED	E	E	E	A	E	A	U	E	A	E	A	U	264	248	240	240	235	238	238	238	240	230	226	225	228	222	240	260	U	
UO	E	E	B	E	A	E	A	E	E	E	E	E	E	B	E	B	E	B	E	B	E	B	B	B	B	B	B	B	E	A
LO	350	420	425	380	325	398	430	295	270	252	250	255	270	275	250	265	242	250	248	242	240	255	315							
	290	340	E	A	300	240	325	275	248	240	235	230	230	230	230	230	230	228	220	212	215	210	225	245						

IONOSPHERIC DATA STATION SHOWA ST.

OCT.1989 FXI (0.1MHZ)

45°E MEAN TIME (G.M.T. + 3H)

LAT.69°00.4'S LON. 39°35.4'E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H/D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A
2	B					0 X	B	S	S	0 X	0 X	X	0 X	X	0 X	0 X	X	X	X	X	0 X	X			
3	45	52	A	46	56	S	0 X	B	0 X	0 X	S	S	0 X	X	X	0 X	0 X	S	0 X		B	A	A	A	
4	A	A	A		B	A	0 X	A	A	0 X	0 X	X	0 X	X	X	0 X	0 X	X	X	0 X					A
5	A	A	A	B	A	X	A	S		X	X	X	0 X	S	X	X	X	X			0 X				X
6	41	A	A	A	A	0 X	0 X	0 X	0 X	0 X	0 X	0 X	0 X	0 X	S	X	X	X	0 X				A	0 X	45
7	A	52	41		A	A	B	B	A	B	B	A	S	S	X	X	X	X	0 X	0 X	X		A	A	
8	A	A	A		A	46	B	B	B	S	0 X	0 X	X	X	0 X	0 X	X	0 X	0 X	0 X	X	X	A	A	
9	A	A	A	B	A	B	B	B	B	B	B	S	0 X	X	X	0 X	X	X	0 X	0 X	0 X	0 X	X	X	X
10	45	40	47	0 X	A	0 X	0 X	0 X	0 X		B	0 X	0 X	X	0 X	X	X	S		X	X				
11	46	39	45		A	A	B	B	B	A	B	0 X	X	X	X	X	X	X	0 X	X	X	X	X	X	X
12	40	41	41	55	60	X	S	S	0 X	B		X	X	X	X	X	0 X	0 X	0 X	0 X	X				
13	43	46	47	53		A	0 X	0 X		X	B	S	S	0 X	0 X	0 X	X	X	0 X	X	X	X	X	X	X
14	X	57	60	64	70	70	75	91	100	105	111	116	121	116	116	116	111	106	104	101	92	90		80	70
15	65	65	70	70	70	70	72	86	0 X	S	0 X	0 X	0 X	X	0 X	0 X	0 X	0 X	X	X	0 X	0 X	0 X	0 X	A
16	45	46	40		56	60	A	0 X	S		X	0 X	X	X	X	X	X	X	X	X	X	X	A	A	
17	46	46	50	55		61	58			A	A	S	0 X		0 X	0 X	X	X	X	X	X	X	X	X	X
18	A	61	65	60	70	60				62	75	80	86	90	100	105	116	96	81	83	74	55		A	A
19	46	50	70	65		0 X	A	A	A	B	B	0 X	0 X	B	B	B	B	B	B	B	B	B	B	B	B
20	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
21	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
22	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
23	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
24	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
25	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
26	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
27	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
28	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	0 X	0 X	S	0 X	B	B	B	A	B	
29	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	0 X	75	70	66	S	S	A	B	
30	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	X	66	60	51	0 X	A	A	
31	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	0 X	76	76	B	S	49	49	49	B
CNT	11	13	12	11	8	11	7	7	6	8	10	13	17	17	17	17	19	17	20	18	18	16	12	10	
MED	45	46	47	55	58	60	66	75	78	88	82	86	90	90	96	98	96	96	91	86	76	57	52	45	
U 0	46	56	64	65	70	66	72	86	96	96	96	98	102	103	103	103	105	101	96	92	86	72	60	56	
L 0	43	40	41	46	52	48	51	66	71	76	75	73	78	78	88	88	91	83	78	81	73	50	44	45	

IONOSPHERIC DATA STATION SHOWA ST.

OCT.1989 FOF2 (0.1MHZ)

45°E MEAN TIME (G.M.T. + 3H)

LAT.69°00.4'S LON. 39°35.4'E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H/D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
1	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A			
2	B	F	F	F	F	R	B	S	S	R	R		R		R									F	F			
3	F	F	A	F	F	S	B	R	B	D	S	S	U	R	R				S		F	B	A	A	A			
4	A	A	A	F	B	A		A	A	B		62	64	69	73	74	80	90	90	85	80	R	F	F	F	A		
5	A	A	A	B	A		A	S	F					S		85	77	85	90	80	80	F	F	F	F	F		
6	F	A	A	A	A	B		B	D	R							S								F	A	A	39
7	A	F	F	A	A	B	B	A	B	B	A	S	S		64	69	72	74	74	80	75	R	U	S	F	A	A	
8	A	A	A	F	A	F	B	B	B	S		U	S		U	S	U	S	D	S	U	R	R		A	A		
9	A	A	A	B	A	B	B	B	B	B	B	B	S	U	R		R			D	S		R		F	F	50	
10	F	F		A				F	B	B			U	R		U	S		S	F			F	F	F	F	F	
11	F	F	F	A	A	B	B	B	A	B	B		65	73	75	90	94	90	95	90	80		70	50	48	30	F	
12	F	F	F	F	J	S	S		B	F								D	S	U	S		R	R	F	F	F	
13	F	F	F	F	A		U	S	F		B	S	S	D	R		U	R										
14	51	50	58	58	60	65	85	94	99	105	110	115	110	110	110	105	100	98	95	86	80				70	60	60	
15	F	F	F	F	F	F	F	F	S			D	R		J	S	U	S	J	S	U	S	J	S		A		
16	F	F	F	A	F	F	A	U	S	S	F		72	79	80	88	84	85	86	85	89	60	44	F	F	A	A	
17	F	F	F	F	A	F		A	A	A	S		F		R	D	R	J	S	J	S		F	F	F	F		
18	A	F	F	F	F	F	A	A	F	S		F		69	74	80	84	94	99	110	90	75	77	68	49	A	A	
19	F	F	F	F	F	R	A	A	A	B	B	B	R		B	B	B	B	B	B	B	B	B	B	B	B	B	B
20	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
21	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
22	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
23	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
24	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
25	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
26	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
27	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
28	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	90	90		S		B	B	B	A	B		
29	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	69	64	60		S	S	A	B		
30	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	60	S			A	A			
31	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	70	70	B	S	F	U	S	B		
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
CNT	10	12	10	11	7	11	7	7	6	8	10	13	17	17	17	17	19	17	20	18	18	16	12	10				
MED	F	F	F	F	F	F	60	69	72	82	76	80	86	84	90	92	90	90	85	80	70	51	46	37				
U Q	F	F	F	F	F	F	F	F	D												R		F	F				
L Q	F	F	F	F	F	F	F	F	F	F																		
	35	38	30	40	50	42	45	60	62	68	69	67	72	73	82	82	85	77	72	75	67	44	36	30				



IONOSPHERIC DATA STATION SHOWA ST.

OCT. 1989 FES (0.1MHZ) 45°E MEAN TIME (G.M.T. + 3H)

LAT. 69°00.4'S LON. 39°35.4'E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23															
1	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	33															
2	B	29	E B	20	22	28	29	B E	B E	B E	B	31	32	E B	35	31	30	32	26	E B	E B	E B	E B	E B	E B	19	19	25	26										
3	32	43	60	28	E B	27	25	B E	B	B	34	31	40	E B	35	31	32	30	E B	E B	E B	E B	E B	B	42	48	37												
4	70	80	45	31	B	41	38	41	40	B	41	32	32	32	31	31	30	27	E B	E B	E B	E B	E B	E B	14	13	35	37											
5	36	45	45	B	41	26	42	32	19	29	32	32	36	32	31	31	29	26	27	20	12	E B	E B	E B	9	20	11												
6	28	45	45	53	45	B E	B	B E	B	34	29	32	33	37	35	31	32	32	27	E B	E B	E B	E B	25	24	28	34	39											
7	46	37	33	31	41	B	B	36	B	B	41	31	E B	E B	E B	E B	32	26	24	23	13	13	42	37															
8	40	45	46	31	41	29	B	B	B	34	37	35	33	35	35	35	29	28	24	18	E B	E B	E B	17	27	35	36												
9	36	45	90	B	41	B	B	B	B	B	B	33	33	33	35	30	29	26	26	20	15	13	13	23															
10	30	36	28	45	45	31	32	33	41	B	B	32	32	37	40	30	E B	E B	E B	E B	20	22	12	22	31														
11	30	36	40	45	60	B	B	B	41	B	B	36	33	31	32	35	28	32	22	E B	22	22	14	16	20														
12	31	31	29	32	28	21	26	36	B	E B	42	35	32	30	32	33	31	E B	30	25	23	E B	E B	18	17	28	16												
13	34	36	36	43	38	22	23	26	29	B	35	32	35	32	32	31	31	28	22	20	18	12	10	10															
14	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	9	10	10	14	16	20	21	25	34	30	32	32	37	36	33	31	36	32	23	20	15	14	E B	10	15				
15	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	14	9	9	12	16	20	24	28	29	36	32	32	34	40	40	31	36	33	22	E B	21	16	E B	9	35	60			
16	40	32	32	29	32	36	41	33	32	30	32	31	33	32	32	37	36	31	E B	E B	E B	E B	51	41	46	41													
17	41	41	41	31	55	30	41	41	50	63	E B	40	42	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	23	25	32	70											
18	41	41	71	32	36	64	42	68	41	41	33	33	E B	40	33	35	30	27	28	29	43	27	34	39	47														
19	41	40	42	32	B	31	40	53	40	B	B	B	E B	32	55	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
20	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
21	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
22	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
23	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
24	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
25	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
26	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
27	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
28	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
29	34	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
30	70	65	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
31	41	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23															
CNT	20	19	18	16	16	14	12	14	13	11	14	17	18	18	17	18	19	20	20	20	19	20	21	19															
MED	36	40	40	31	40	29	37	34	34	34	32	32	33	32	32	31	30	29	E B	E B	E B	E B	16	35	36														
U O	41	45	45	38	43	31	42	41	41	41	37	34	E B	37	36	35	35	35	32	E B	E B	E B	25	30	40	41													
L O	30	32	E B	28	28	22	25	30	30	30	32	32	33	32	32	31	29	27	24	20	15	E B	E B	E B	13	21	20												



IONOSPHERIC DATA STATION SHOWA ST.

OCT. 1989 FMIN (0.1MHZ)

45° E MEAN TIME (G.M.T. + 3H)

LAT. 69° 00.4' S LON. 39° 35.4' E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	19	
2	B	15	20	15	13	23	B	30	30	34	23	21	35	25	25	20	23	30	30	30	19	19	13	13	
3	10	12	15	13	14	25	B	39	B	23	20	25	35	23	19	21	35	55	35	35	B	14	23	24	
4	10	14	13	10	B	20	19	20	25	B	20	20	22	20	21	19	19	15	24	24	14	13	10	10	
5	23	15	10	B	15	15	15	18	20	18	18	18	20	20	15	15	15	14	15	14	8	9	20	8	
6	9	14	14	19	20	B	44	B	34	24	22	20	20	24	20	24	20	20	30	25	24	21	11	24	
7	18	13	13	22	13	B	B	23	B	B	20	18	39	35	20	20	16	18	24	23	10	9	10	10	
8	10	23	15	10	15	17	B	B	B	24	37	35	20	35	35	35	20	28	24	15	17	10	10	10	
9	20	15	10	B	22	B	B	B	B	B	B	B	20	24	24	35	20	18	18	15	20	15	13	13	9
10	10	10	13	20	14	15	15	22	22	B	B	20	15	17	30	16	35	30	26	15	15	10	10	10	
11	10	10	10	24	20	B	B	B	30	B	B	26	23	22	25	35	13	15	18	22	20	14	11	10	
12	9	10	10	13	13	16	20	24	B	16	35	25	25	20	18	15	30	15	18	23	18	10	9	9	
13	10	10	10	13	15	15	17	15	15	B	30	20	24	18	15	15	14	10	13	20	18	9	10	8	
14	9	10	10	14	10	20	14	14	14	15	19	15	15	18	20	19	14	18	12	8	9	9	10	10	
15	14	9	9	9	10	14	15	14	15	14	19	18	20	14	15	15	11	14	14	21	13	9	10	13	
16	14	11	9	21	14	14	17	13	14	14	15	14	12	18	14	15	14	13	31	26	16	26	22	14	
17	19	14	14	13	19	19	15	24	19	19	40	30	40	52	53	39	34	40	27	26	23	15	10	14	
18	16	13	12	18	12	19	25	24	19	26	20	19	40	25	35	24	23	23	23	20	14	10	12	10	
19	8	10	10	10	B	24	15	14	14	B	B	B	24	55	B	B	B	B	B	B	B	B	B	B	B
20	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
21	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
22	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
23	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
24	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
25	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
26	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
27	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
28	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	45	35	30	35	B	B	B	24	B	
29	15	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	35	32	30	30	35	25	B	
30	20	34	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	30	31	30	23	14	12	
31	14	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	20	20	B	17	25	17	14	B	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	
MED	18	15	15	24	22	B	B	B	B	B	B	30	39	35	35	35	34	30	30	26	24	19	14	14	
U O	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
L O	10	11	10	13	14	19	17	22	20	24	20	20	22	20	20	19	18	18	23	20	15	10	10	10	

IONOSPHERIC DATA STATION SHOWA ST.

OCT.1989 H'F (CKM) 45°E MEAN TIME (G.M.T. + 3H)

LAT.69°00.4'S LON. 39°35.4'E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H/D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
1	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A			
2	B	OE	BE	A	A	A	B																		E B	A		
	330	325	320					265	245	240	230	225	230	230	235	240	230	220	240	225	225	260		340				
3	E A	A	A	A	A	B	BE	B	B								E	BE	B	E	B	B	A	A	A			
	280						290		240	240	230	225	225	230	240	250	270	225	260									
4	A	A	A	A	B	A	A	A	A	B															A	A		
								250	230	240	240	240	240	240	240	240	240	240	240	225	215	240						
5	A	A	A	B	A	A	AE	A																				
							350	265	250	240	240	225	245	220	240	230	245	240	225	230	240	245	260		260			
6	A	A	A	A	A	B	B	B																	AE	A		
								260	240	230	225	225	240	225	240	240	240	240	250	225	280			A	AE	A		
7	AE	A	A	A	A	B	B	A	B	B	A														AE	A		
	360										250	240	230	250	250	250	250	250	240	240	220	250		A	A			
8	A	A	A	A	A	A	B	B	B																A	A		
								260	270	250	250	250	240	245	250	250	245	250	245	250	245	280						
9	A	A	A	B	A	B	B	B	B	B															A	A		
								240	230	240	225	230	230	225	230	230	225	230	225	230	225	215	230	290				
10	E A	A	A	A	A	A	AE	AE	A	B	B														AE	A		
	340						350	260				230	230	225	230	250	245	245	250	240	290	275	280					
11	A	A	A	A	A	B	B	B	A	B	B														AE	A		
								240	240	240	245	240	240	240	240	240	240	240	240	240	250	265	275	290				
12	A	A	A	A	A	A		A	B																AE	AE	A	
							275			255	230	225	230	230	240	230	240	230	225	230	230	260	360	365				
13		A	A	A	AE	A																			AE	A		
	250				350	300	290	250		260	245	220	250	240	230	250	245	245	245	245	245	230	235	240				
14																									AE	A		
	255	295	315	325	330	285	260	250	230	230	240	225	210	220	230	240	240	230	230	215	225	225	230	230	AE	A		
15																									AE	A		
	230	260	300	315	290	310	290	260	250	240	230	240	220	240	250	230	230	245	240	230	225	225	280					
16	A	A	A	A	A	A	AE	A																	AE	A		
							300	240	240	230	250	240	245	240	230	250	250	340	325					A	A	A		
17	A	A	A	A	A	A	A	A	A	AE	BE	AE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	AE	AE	A	
										295	260	260	450	450	250	245	250	235	250	260	240	295	375		AE	AE	A	
18	A	A	OE	AE	A	A	A	A																	A	A		
			375	375				260	275	245	230	250	245	250	250	250	240	250	240	250	310							
19	A	AE	AE	A	B	A	A	A	A	B	B	B	BE	A	B	B	B	B	B	B	B	B	B	B	B	B		
		300	300										280															
20	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
21	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
22	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
23	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
24	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
25	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
26	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
27	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
28	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	BE	B								AE	B		
																310	260	245	270									
29	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	BE	B	BE	B	BE	BE	BE	BE	A	B	
																		250	250	255	270	280						
30	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	BE	BE	BE	BE	BE	BE	BE	A	A	
																			260	280	290	325						
31	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	BE	A							AE	AE	A	B
																	270	260							AE	AE	A	B
																									350	300	370	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
CNT	5	4	5	5	2	3	4	8	9	10	13	17	18	17	17	18	19	20	20	19	18	17	11	8				
U																												
MED	242	295	308	318	310	298	282	272	250	240	240	235	229	240	240	240	242	244	240	235	236	250	255	260				
E A						EA		EA					E							E	BE	BE	BE	BE	AE	A		
U 0	310	345	350	350		350	295	325	260	255	255	248	240	245	248	250	250	250	250	250	270	280	340	328				
L 0	240	278	300	308		285	268	262	242	240	230	228	225	230	230	230	240	240	238	225	225	235	235	245				

IONOSPHERIC DATA STATION SHOWA ST.

NOV. 1989 FXI (0.1MHZ)

45° E MEAN TIME (G.M.T. + 3H)

LAT. 69° 00.4' S LON. 39° 35.4' E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	A	0 X	0 X	A	B	S	A	A	X	A	B	S	X	0 X	0 X	0 X	0 X	0 X	0 X	X		X	A	A	
2		54	A	A	0 X	A	A	A	B	B	B	B	X	0 X	0 X	0 X	0 X	0 X	X	X	X	B	B	A	
3	0 X	46	47	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	0 X	0 X	B	B	B	B	
4	A	A		B	B	S	0 X	0 X	0 X	0 X	0 X	B	B	B	B	B	X	S	B	B	S	A	B	A	
5	A	B	38	A	B	B	B	A		B	B	B	B	B	B	B	0 X	B	S		X	0 X	0 X	0 X	
6	B	B	A	B		B	B	B	B	B	B	B	0 X	X	X	X	X	B	0 X	X	X	0 X	X	A	
7	0 X	52	54	B	B	B	B	B	B	B	B	B	B	B	0 X	0 X	B	A	B	B	0 X	0 X	0 X	B	
8	51		A	A	A	A	A	A	A	B	B	B	B	B	0 X	0 X	0 X	0 X	0 X	0 X	A	0 X	0 X	0 X	
9	48	51		B	A	B	B	B	B	B	B	B	B	B	B	B	X	0 X	0 X	0 X	X	A	A	A	
10	A	A	A	A	B	B	A	A	A	B	B	B	B	B	0 X	0 X	S	X	X	X	X	X	X	X	
11	S	S	X	B	B	X	B	A	S	A	A	B	B	X	0 X	S	0 X	X	X	0 X	0 X	A	0 X	A	
12	51	45	47	B	A	A	A	S	0 X	A	0 X	0 X	0 X	A	0 X	0 X	66	64	65	65	64	63	65	62	
13	46	60	70	A	B	A	A	B	B	A	B	B	B	B	S	S	A	S	S	B	A	A	A	A	
14	41	X	47	A	0 X	0 X		A	A	A	A	A	A	A	0 X	A	A	0 X	S						
15	60	65	65	66	74	0 X	71	70	75	76															
16	0 X	75	66	S	S	0 X	0 X		S	A	S	B	A	A	0 X	0 X	F	0 X	0 X	X	X	S	0 X	0 X	
17	B	B	A	A	67	A	B	A	0 X	0 X	B	B	B	S	A	S	S	B	B	B	A	0 X	A	43	
18	A	53		60	B	B	B	B	S	A	B	B	B	B	0 X	0 X	S	S	0 X	X	X	X	X	X	
19	0 X	47	56	56	60			X	0 X	0 X	0 X	0 X	S	S	0 X	0 X	0 X	0 X	X	0 X	0 X	0 X	0 X	A	
20	0 X	48	55	B	0 X			B	B	A	A	B	B	B	0 X	0 X	0 X	0 X	X	X	0 X	0 X	X	X	
21	A	0 X	65	61	64	B	A	B	B	B	A	B	B	B	0 X	0 X	0 X	0 X	X	X	X	X	X	X	
22	X	68	66	65	65	B			S	B	S	S	S	A	0 X	0 X	0 X	X	X	X	0 X	0 X	0 X	0 X	
23	A	A		58	60	60	B	A	X	0 X	0 X	0 X	0 X	X	X	0 X	0 X	0 X	0 X	0 X	X	X	X	X	
24	0 X	66	59	56	A	A	A	A	A	X	0 X	0 X	X	X	0 X	0 X	X	B	S	0 X	0 X	0 X	A	A	
25	A	60	66	61	71	75	80		S	0 X	A	A	A	A	0 X	0 X	X	X	X	X	X	0 X	X	X	
26	0 X	71	72	B	X	S	0 X		X	X	S	A	0 X	X	A	0 X	X	X	0 X	0 X	0 X	0 X	A	0 X	
27	50	B	B	0 X	47	A	A	A	0 X	47	S	S	B	B	0 X	0 X	A	S	S	B	S	B	B	B	
28	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
29	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	S	B	S	B	S	B	B	B	S	
30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
31																									
CNT	16	17	12	10	10	7	7	8	9	8	5	3	6	9	16	18	14	16	17	21	22	17	17	15	
MED	51	X	56	60	60	68	75	75	72	75	80	76	80	78	79	76	76	76	75	73	70	66	61	63	60
UQ	0 X	63	65	66	65	71	76	80	81	78	86	80	81	80	83	80	81	80	80	76	75	73	68	69	68
LQ	48	50	52	60	60	71	41	59	70	76	74	76	76	77	72	71	71	70	66	65	64	58	56	52	



IONOSPHERIC DATA STATION SHOWA ST.  
 NOV. 1989 FOF2 (0.1MHZ) 45°E MEAN TIME (G.M.T. + 3H)  
 LAT. 69°00.4'S LON. 39°35.4'E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
1	A	U	S		A	B	S	A	A		A	B	S			R		R	F		F	R	A	A			
2	F	A	A	A	U	R	A	A	A	B	B	B	B		U	R	U	S			F	B	B	A			
3		F	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B			B	B	B			
4	A	A	F	B	B	S	E	G	E	G			R					S	B	B	S	A	B	A			
5	A	B	A	B	B	B	A			B	B	B	B	B	B	B		90	B	S	F						
6	B	B	A	B	F	B	B	B	B	B	B	B	B				60		B	B		58	53	41	42		
7		R	B	B	B	B	B	B	B	B	B	B	B					B	A	B		60	61	41			
8	F	A	A	F	A	A	A	A	A	B	B	B	B	B	B	R		U	R		A	U	R	B			
9	F	F	B	A	B	B	B	B	B	B	B	B	B	B	B			75	84			64	55		43		
10	A	A	A	A	B	B	A	A	A	B	B	B	B	B	B			74	75	70	67	52					
11	S	S		B	B		B	A	S	A	A	B	B	R		S		59	59	59		60	64	62	63		
12	F	F	F	B	A	A	A	S		A	U	S		U	R	R		72	71	69	70	68		57			
13	F	F	F	A	F	B	A	A		B	B	B	A	B	B	S		60	58	59	59	58	57	59	56		
14	F		A	A		R	F	A	A	A	A	A	A	A	A					S	F	F	F	F	F		
15	F	F	F	F	F	B	R	F	F	R	B	B	B	B	B	B			49		54	54	55	50	50		
16	69	60	S	S	R	U	S	F	F	S	A	S	B	A	A	U	S	F	U	S			S	R			
17	B	B	A	A	F	A	B	A	U	R		B	B	B	S	A	S		S	B	B	B	A	U	S	F	
18	A	F	A	F	B	B	B	B	S	A	B	B	B	B						S	S			F	F		
19		U	R	F	A	B	S					S	S	U	R	R			F			50	50	48	47		
20	42	49				F	B	B	A	A	B	B	B	B	B				F			68	55	50	50		
21	A	59	55	58	B	A	B	B	B	A	B	B	B	B				66	67	65	64	64	64	61	63	64	62
22	62	60	F	F	B	F	F	F	S	B	S	S	S	A					D	R				F	F		
23	A	A	F	F	F	B	A		R		U	R							F	D	R						
24	60	53	F	A	A	A	A	A			U	R	R	U	R				B	S			U	R	A	A	A
25	A	F	F	F	F	R	A		S	D	R	A	A	A	U	R			R	F							
26	65	66	B	R	S		F	F			S	A	U	R		A	U	R					A	F	F		
27	F	B	B		A	A	A		S	S	S	B	B	B						A	S	S	B	S	B	B	B
28	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B				B	B	B	B	B	B	B	B
29	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	S	B		S	B	S	B	B	B	S	B	
30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B				B	B	B	B	B	B	B	B
31																											
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
CNT	16	17	11	10	10	7	7	8	9	8	5	3	6	9	16	18	14	16	17	21	22	17	17	15			
MED	45	50	52	54	61	69	69	66	69	74	70	74	72	73	70	70	70	70	67	64	60	55	57	50			
U O	57	59	59	59	65	70	74	75	72	80	74	75	74	77	74	75	74	74	70	69	67	62	63	62			
L O	42	44	43	54	53	65	36	53	64	70	68	70	70	71	66	65	65	64	60	59	58	52	49	46			



IONOSPHERIC DATA STATION SHOWA ST.

NOV. 1989 FES (0.1MHZ) 45°E MEAN TIME (G.M.T. + 3H)

LAT. 69° 00.4'S LON. 39° 35.4'E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1	36	32	28	32	B	36	40	41	31	32	B	31	30	32	31	31	29	25	E B	E B	27	35	41	44		
2	61	41	41	38	32	41	41	45	B	B	B	B	39	41	40	32	B	27	E B	E B	E B	B	B	42		
3	29	40	71	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	E B	E B	B	B	B		
4	31	35	27	B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	29	35	E B	E B	B	32	50	39		
5	28	B	27	B	B	B	38	B	B	B	B	B	B	B	B	B	30	B	E B	E B	E B	E B	27	32	41	
6	B	B	37	E B	E B	B	B	B	B	B	B	B	E B	E B	E B	32	E B	B	E B	E B	E B	E B	E B	E B	40	
7	35	27	B	B	B	B	B	B	B	B	B	B	B	B	E B	35	B	29	B	B	E B	E B	30	B	B	
8	89	39	35	28	38	41	38	39	40	B	B	B	B	B	E B	39	E B	35	28	115	E B	27	30	25		
9	27	26	B	36	B	B	B	B	B	B	B	B	B	B	B	B	E B	35	33	E B	E B	26	32	37	39	
10	42	110	45	40	B	B	38	38	36	B	B	B	B	B	B	32	34	29	26	23	28	31	31	19		
11	E B	21	23	E B	B	B	29	42	37	32	32	B	B	40	42	41	36	31	32	27	32	43	41	45		
12	45	29	25	B	45	33	43	28	31	37	35	41	41	32	36	33	31	33	31	36	37	31	17	15		
13	37	40	16	31	70	64	42	B	B	B	31	B	B	28	32	28	27	26	B	31	37	36	60			
14	31	36	37	32	31	30	29	45	40	36	41	29	39	36	36	36	32	28	25	21	31	29	31	31		
15	26	31	95	48	27	37	41	41	32	B	B	B	B	B	B	B	B	B	E B	E B	E B	E B	E B	E B	24	
16	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	32	36	41	81	36	33	33	E B	E B	E B	E B	E B	E B	
17	B	B	31	70	47	41	40	41	60	E B	B	B	B	30	32	33	30	B	B	B	32	33	35	41		
18	38	31	40	27	B	B	B	B	32	38	B	B	B	E B	E B	E B	40	36	31	29	32	28	E B	29	27	
19	31	31	40	30	31	B	32	30	32	33	32	36	33	39	39	40	32	35	25	33	26	36	56	41		
20	E B	E B	B	B	26	25	B	B	42	41	B	B	B	B	E B	E B	E B	E B	E B	E B	E B	30	36	26	29	
21	81	36	36	51	B	B	B	B	B	B	B	B	B	E B	E B	E B	E B	E B	E B	E B	47	36	45	48		
22	27	32	22	24	E B	B	27	29	30	36	B	43	40	45	43	50	70	50	32	28	25	35	32	36	33	
23	57	32	36	42	26	38	42	32	32	32	32	32	31	29	38	40	32	30	26	25	23	24	19	18		
24	37	43	26	70	41	41	35	39	31	31	32	31	40	E B	55	43	39	E B	B	29	28	33	41	45	41	43
25	55	48	40	36	41	32	40	43	66	33	70	105	65	39	33	33	41	32	35	36	34	21	25	26		
26	21	31	B	28	29	31	43	30	31	31	33	60	44	41	43	43	53	41	43	28	E B	39	51	42	42	
27	31	B	B	22	41	31	27	32	31	28	26	B	B	B	32	26	30	36	38	E B	E B	E B	B	B	B	
28	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
29	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	32	E B	36	E B	38	B	B	E B	35	B	
30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
31																										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	25	23	22	19	16	16	18	19	19	17	12	10	11	14	20	22	22	22	22	22	26	24	23	24		
MED	33	32	36	33	34	32	38	39	35	32	33	34	40	39	36	34	31	30	28	29	30	32	32	39		
U Q	44	40	40	42	43	38	40	42	40	36	42	41	44	43	42	40	35	E B	E B	E B	35	36	41	42		
L Q	28	30	27	28	30	30	32	31	31	32	32	31	33	32	32	32	30	29	26	25	E B	27	29	26	26	

IONOSPHERIC DATA STATION SHOWA ST.  
 NOV. 1989 FMIN (0.1MHZ) 45°E MEAN TIME (G.M.T. + 3H)  
 LAT. 69°00.4'S LON. 39°35.4'E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1		20	15	14	22	B	21	23	30	20	16	B	20	23	23	23	20	16	22	25	24	18	14	14	10	
2		13	20	16	15	20	20	23	23	B	B	B	B	24	35	24	23	B	19	30	25	24	B	B	19	
3		19	18	19	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	35	B	B	B	B	
4		15	19	15	B	B	30	30	21	35	21	60	B	B	B	B	B	19	35	B	B	19	22	B	19	
5		20	B	21	B	B	B	23	B	B	B	B	B	B	B	B	B	20	B	30	30	30	22	17	16	
6		B	B	17	B	30	B	B	B	B	B	B	B	B	55	56	16	35	B	B	35	22	24	26	24	
7		12	24	B	B	B	B	B	B	B	B	B	B	B	B	B	35	B	24	B	B	21	23	18	B	
8		23	18	16	18	25	21	23	25	30	B	B	B	B	B	B	39	B	35	24	19	27	18	B	15	
9		14	19	B	24	B	B	B	B	B	B	B	B	B	B	B	B	35	23	35	30	17	25	23	24	
10		15	18	19	24	B	B	26	26	23	B	B	B	B	B	B	22	23	18	16	15	19	15	10	9	
11		21	14	23	B	B	13	B	23	24	26	23	B	B	23	22	19	19	15	10	10	10	10	10	10	
12		10	8	11	B	20	14	20	12	15	21	21	19	24	20	19	18	18	12	10	10	9	10	9	9	
13		10	11	10	10	23	B	15	23	B	B	B	20	B	B	20	18	19	15	14	B	20	19	17	10	
14		10	10	23	10	8	10	11	13	14	16	22	21	28	23	18	26	21	23	18	13	15	14	11	9	
15		10	13	12	10	10	B	23	20	20	24	B	B	B	B	B	B	B	B	B	60	35	30	30	24	
16		25	30	30	33	45	36	36	35	35	23	14	B	20	24	18	18	20	35	35	30	30	30	24	25	
17		B	B	24	24	26	20	B	30	30	60	B	B	B	19	25	20	23	B	B	B	18	16	17	13	
18		10	11	13	10	B	B	B	B	20	20	B	B	B	B	40	36	19	20	15	17	30	19	18	18	
19		15	9	21	18	24	B	23	20	20	19	20	24	23	39	17	19	20	35	20	28	26	15	16	19	
20		9	30	B	B	23	16	B	B	21	25	B	B	B	B	58	40	19	32	39	30	20	14	14	14	
21		15	11	20	18	B	20	B	B	B	B	B	B	B	B	40	39	17	37	18	18	13	15	14	14	
22		15	15	13	24	B	18	20	24	36	B	20	18	37	19	18	20	20	15	18	15	18	19	14	16	
23		15	25	18	15	15	19	25	14	18	16	19	19	24	17	20	19	10	14	20	20	15	14	11	11	
24		13	13	15	17	20	15	14	18	14	15	15	17	24	55	23	39	B	19	15	14	10	14	14	10	
25		9	13	10	10	10	19	20	20	14	13	15	15	14	18	19	19	20	13	10	10	10	10	11	10	
26		9	9	B	19	18	10	10	18	14	18	19	15	20	18	15	14	14	10	10	10	39	13	21	14	
27		15	B	B	14	14	16	18	15	15	15	19	B	B	B	18	20	21	36	38	B	B	B	B	B	
28		B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
29		B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
30		B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
31																										
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT		30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
MED		15	18	20	24	38	33	24	26	30	26	B	B	B	B	24	24	20	28	28	29	20	19	18	16	
U O		B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
L O		21	30																			30	30	35	24	
		10	13	15	15	20	18	20	20	20	18	20	20	24	23	19	19	19	18	15	15	18	14	14	10	

IONOSPHERIC DATA STATION SHOWA ST.

NOV. 1989 H'F (KM)

45°E MEAN TIME (G.M.T. + 3H)

LAT. 69°00.4'S LON. 39°35.4'E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H/D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1	A E A 370	A A 325	A	B E A 380	A	A	A	E A 290	A	B	215	230	A	240	240	225	250	250	250	275	E A 320	A	A	A		
2	A	A	A	A E A 340	A	A	A	A	B	B	B	B	A	A	A	240	B E A 260	260	265	270	B	B	B	A		
3	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
4	A	A	A	B	B E B E B E A 320 305 280	B	A	B	A	B	B	B	B	B	B	B	250	E B 270	B	B	A	A	B	A		
5	A	B	A	B	B	A		B	B	B	B	B	B	B	B	B	245	A	B	250	270	275	305	E A E A 390 390		
6	B	B	A	B E B 340	B	B	B	B	B	B	B	B	B	E B 250	B	B	245	B	B	280	290	280	E B 360	A		
7	A E A 375	B	B	B	B	B	B	B	B	B	B	B	B	B	B	245	B	A	B	B	E A E A E A 295 300 320	B				
8	E A 305	A	A E A 350	A	A	A	A	A	A	B	B	B	B	B	B	240	B	255	260	A	E A E A 295 310	B	A			
9	A E A 330	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	260	260	270	260	E A 330	A	A	A		
10	A	A	A	A	B	B	A	A	A	B	B	B	B	B	B	260	250	250	250	275	280	275	280	305		
11	320	A E B 345	B	B	B	A E A 275	A	A	B	B	A	A	A	A	A	240	230	240	240	260	260	A	A	A		
12	A	A E A 325	B	A	A	A E A 280	250	A	A	A	A	A	A	A	A	250	245	245	245	250	E A E A E A 275 280 290	305				
13	E A 400	A	A	A	B	A	A	B	B	A	B	B	B	B	A E A 245	265	A E A 260	255	B	A	A	A	A	A		
14	A	A	A	A	A E A 300	E A 280	A	A	A	A	A	A	A	A	A	230	A	260	260	285	270	295	A	A		
15	E A E A 300 320	E A 375	A	290	B	A	A E A 270	A	B	B	B	B	B	B	B	B	B	B	B	E B 400	275	270	265	280		
16	280	E B E B E B 325 340 345	E B E B E B 425 325 275	250	250	230	B	A	A	A	A	A	230	240	250	245	260	255	300	275	270	270				
17	B	B	A	A	A	A	B	A	B	B	B	B	270	A E A 280	290	B	B	B	B	A E A 400	A	A	A	A		
18	A	A	A	A	B	B	B	B	230	A	B	B	B	B	E B E B 250 230	250	255	280	275	290	330	330	E A 350			
19	A E A 380	A E A 400	A	B E A 300	275	240	225	245	215	225	230	240	250	250	250	260	270	250	330	300	E A 330	300	A	A		
20	E A E B 400 380	B	B E A 350	270	B	B	A	A	B	B	B	B	B	B	E B E B 250 250	240	260	250	290	A E A 340	E A E A 310					
21	A	A E A 325	E A 375	B	A	B	B	B	A	B	B	B	B	B	B	250	240	245	250	250	270	275	280	290	300	
22	E A E A 300 325	E B 260	300	290	275	250	240	B	A	240	A	A	A	A	E A E A 220 240	230	240	250	250	E A E A 390 350	290	325	E A 325			
23	A	A E A 380	E A 350	290	B	A	A E A 260	210	230	230	225	230	250	220	230	250	240	255	255	275	270	290				
24	E A 350	A	A	A	A	A	A	A	210	210	215	A	A	B	A	B	B	E A E A 240 240	250	350	250	A	A	A		
25	A	250	A E A 360	290	350	A	A	A	240	A	A	A	A	A	A	225	225	230	240	230	240	250	250	255	260	260
26	275	325	B E A 295	E B E A 320 310	260	240	240	240	230	A	A	A	A	225	245	245	260	260	B	A	A	A	A			
27	A	B	B	290	A	A	A	250	240	225	270	E A 225	225	B	B	B	A	E B 265	320	250	B	B	B	B		
28	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
29	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	240	240	290	B	B	B	E B 350	B		
30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
31																										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	9	10	8	9	8	9	6	7	13	7	7	5	3	4	14	21	19	21	22	20	22	17	15	11		
MED	E A E A 305 328	E A E A 332 350	E A E A 330 310	278	250	238	225	230	230	225	230	240	240	242	250	251	264	266	300	280	E A 305					
U O	E A E A 375 375	E A E A 360 368	E A E A 345 338	300	280	265	240	245	242	230	250	250	248	250	260	260	275	290	325	340	E A 325					
L O	E A E A 290 325	E A E A 325 298	290	280	275	250	240	210	230	215	225	228	230	230	240	242	250	258	255	278	275	280				



IONOSPHERIC DATA STATION SHOWA ST.  
 DEC. 1989 FXI (0.1MHZ) 45°E MEAN TIME (G.M.T. + 3H)  
 LAT. 69°00.4'S LON. 39°35.4'E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
1	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B			
2	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B			
3	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	0	X	0	X	
4	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	X	X	B	X	X	B	S	S	S		
5	A	B	B	A	B	B	A	S	B	B	A	B	B	A	B	S	B	B	0	X	0	X	0	X	0	X	
6	X	B	A	A	A	A	S		0	X	0	X	0	X	0	X	A	0	X	0	X	S	X	X	0	X	
7	X	S	0	X	A	A	A		66	71	71	71	70	71		A	0	X	0	X	0	X	0	X	0	X	
8	A	A	A	0	X	X	A		0	X	0	X	0	X	B	B	S	A	A	A	0	X	0	X	0	X	
9	0	X		0	X	A	A	A	S																		
10	0	X	0	X	B	A	S	X																			
11	X			X																							
12	58	60	61	65	68	56																					
13	60	A	A	0	X	F	A	S	S	A	S	S	0	X	0	X	0	X	0	X	0	X	0	X	0	X	
14	0	X	0	X	0	X	X																				
15	A	A	58	60	A	B	B	A																			
16	54	54	61	66	A	0	X	X																			
17	X	A	49	50	60	B	0	X	S	X	0	X	0	X	0	X	0	X	0	X	0	X	0	X	0	X	
18	0	X	B	A	B	B	A	0	X	X	0	X	0	X	0	X	0	X	0	X	0	X	0	X	0	X	
19	0	X	0	X	A	A	0	X	S	A	A	A															
20	0	X	0	X	A	A	S	A																			
21	A	A	B		A	B	A	0	X	X	0	X	A	B	A	A	X	0	X	0	X	0	X	0	X	0	X
22	0	X	56	56	56	A	S	A	0	X	0	X	S	A	0	X	0	X	0	X	0	X	B	S	A	A	
23	S	A	58	56	56	56	S	S	B	A	B	B	B	B	B	B	B	S	S	S	S	S	S	S	S	S	
24	0	X	56	53	49	S	S	S	A	A	A	0	X	B	B	B	B	0	X	0	X	S	S	B	0	X	
25	A	A	44	A	A	A	B	B	B	B	B	A	A	B	B	B	S	S	S	S	S	S	S	S	S	S	
26	A	A	B	R		S	S																				
27	A	A	45	A	A	S	A	S	S	B	B	B	B	B	0	X	S	S	B	B	0	X	A	A		0	X
28	A	A	0	X	A	58	A	S	B	S	B	B	B	A	B	A	S	S	S	S	S	X	60	65	66	61	63
29	X	56	60	A	A	A	A																				
30	A	A	50	A	A	0	X	0	X	S	A	A	B	B	B	B	B	0	X	S	A	A	0	X			
31	A	A	48	60	60	B	B	A	B	A	A	B	B	B	B	B	A	S	0	X	B	A					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
CNT	16	12	16	15	12	8	9	11	15	17	16	16	12	11	14	15	20	16	14	19	22	20	23	23			
MED	X	57	60	58	60	66	58	70	70	70	71	71	72	74	76	73	76	71	71	67	66	62	59	57	57		
UO	0	X	0	X		X	X	0	X	0	X	0	X	0	X	0	X	0	X	0	X	0	X	0	X	0	X
LO	X	55	55	50	56	60	56	59	66	66	69	70	70	70	71	71	70	68	66	64	60	58	56	53	55		



IONOSPHERIC DATA STATION SHOWA ST.

DEC.1989 FOF2 (0.1MHZ)

45°E MEAN TIME (G.M.T. + 3H)

LAT.69°00.4'S LON. 39°35.4'E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
1	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B			
2	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B			
3	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	U	R	R			
4	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B						B	S	S			
5	A	B	B	A	B	B	A	S	B	B	A	B	B	A	B	S	B	B				U	R				
6		B	A	A	A	A	S	F					R		A		S				U	R					
7	51	S		A	A	A	F	F				B	B	S	A				H		R	H	A	A			
8	50	60		60		A	F	64	65	56					63	64	63	60	58	59	59	46					
9	A	A	A	U	R		A	F			B	R			S	A			S	R				R			
10	60	58	54	59		A	A	A	S	F	F	R	R	A	A	R	R						S	56	54		
11	58	59	59		B	S		F		F		F		S													
12	J	S	F			F	F			R		D	R	S	S						F		F	F			
13	64	60	65	70	70	69	85	87	90	89	84	90			85	92	84	65	60	60	59	60	56	55			
14	F	F	F	F	F	F	A	F	F	F	F													F			
15	52	54	55	59	62	50		59	60	64	63	64	64	65	65	64	65	65	65	65	65	60	46	50			
16	F	A	A		F	A	S	S	A	S	S			U	R	S	U	R	R	F	F	F	F	F			
17	U	R	R	D	R		F			R	U	R	D	R		R	U	R		S	A						
18	48	60	60	62	66	70	75	84	82	85	84	84	80	80	74	80	84	69					F	F			
19	A	A	F	F	A	B	B	A	A	F			R								F	F	54	60	54	52	
20	F	F	F	F	A			F	F	F			F		U	R	A	A	S	A	A	50	F	F	U	R	
21	48	48	55	60		57	64	61	62	66	65	65	69	70	70	74					F	F	A	U	R	38	
22	A	F	F	F	F	B		S					U	R			B	U	R	S	S	F	U	R			
23	40		43	40	50		52		64	70	67	68	68	68	68						46	50	51	47	49		
24	B	A	B	F	B	A		66	74	74	75	73	74	70													
25	47			63											U	R				A	F						
26	56	60		60		S	A	A	A	A	A	F											A				
27	U	R	A	F	F	A	S	A	A	A	A		S	U	R	A	U	R	R								
28	51	46		59	60					62	60	62		S	U	R	73	A	U	R	R						
29	A	A	B	F	A	B	A			F		A	B	A	A		63	64	64	62	65	U	R				
30		F	F	F	A	F	S	A	57	60	60	F	S	A								A	A	A	A		
31	56	50	50	50		50		57	60	60				70	65	65	57		B	S	A	A	A	A	A		
32	S	A	F	F	F	F	S	S	B	A	B	B	B	B	B	B	B	B	S	S	S	S	S	S	S		
33	50	50	45	43	S	S	S	A	A	A		64	B	B	B	B											
34	A	F	A	A	A	F	B	B	B	B	A	A	B	B	B	B	S	S	S	S	S						
35	38					54																					
36	A	A	B	R	F	S	F	S	F	58	64	65	65		A	B	B	B			F						
37	A	A	F	A	A	S	A	S	S	B	B	B	B	B	B	D	R	S	S	B	B	E	G	A	A	F	
38	A	A	R	A	F	A	S	B	S	B	B	B	A	B	A	S	S	S	S								
39	A	A	A	A	A	A	A	F																			
40	50	54						60	60	70	70	65	68	65						S	B	B	A	B	R	R	
41	A	A	F	A	A			S	A	A	B	B	B	B	B	B					S	A	A	R	F	A	
42	A	A	F	F	F	B	B	A	B	A	A	B	B	B	B	B	A	S	U	R	B	B	A				
43	42		54	54																50							
44	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
CNT	16	12	16	15	12	8	9	11	15	17	16	16	12	11	14	15	20	16	14	19	22	20	23	23			
MED	50	54	51	54	60	52	64	64	64	65	65	66	68	70	68	70	65	65	61	60	56	53	51	51			
U O	56	60	57	60	62	63	72	71	70	72	74	71	72	70	72	74	69	65	65	62	60	60	55	54			
L O	49	49	44	50	53	50	53	60	60	62	64	64	64	65	65	64	62	60	58	54	52	50	47	49			

IONOSPHERIC DATA STATION SHOWA ST.

DEC. 1989 FES (0.1MHZ) 45° E MEAN TIME (G.M.T. + 3H)

LAT. 69° 00.4' S LON. 39° 35.4' E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
2	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
3	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	E	B
4	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	E	B	B	B	B	E	B	B
5	40	B	B		B	B			B	B	41	B	B	B	B	B	B	E	B	B	B	E	B	B
6	E	B	B																					
7	29	E	B	32	38	32	32	32	30	32	32	32	33	41	40	40	26	32	32	27	32	32	27	22
8	79	46	45	33	33	33	31	31	33	32		B												
9	28	31	33	31	25	41	42	31	40	42	E	B	E	B										
10	32	21	23		B	38	37	42	45	45	32	40	41	32	33	40	33	45	40	35	46	45	47	58
11	21	28	31	24	23	32	33	41	44	68	42	42	42	37	57	61	36	E	B	37	42	45	33	31
12	37	37	43	42	70	30	41	35	36	32	32	33	32	32	34	32	31	30	32	32	45	48	33	36
13	42	42	42	E	B	41	42	28	36	42	32	32	33	32	41	42	41	40	36	33	31	32	36	36
14	31	32	37	35	33	31	27	28	30	31	36	36	36	40	35	33	E	B	38	33	33	24	31	45
15	92	43	38	33	41		B		43	51	52	33	E	B	56	33	32	31	33	35	31	28	35	30
16	36	30	30	36	43	41	33	37	31	36	33	35	E	B	51	32	32	26	28	32	23	32	42	43
17	37	48	36	42	32		B		38	32	32	36	41	E	B	58	40	75	42		32	27	32	31
18	31		B	43		B		41	33	31	33	32	46	41	59	43	40	32	42	71	42	29	29	36
19	70	45	70	40	42	36	32	31	31	32	33	32	33	40	32	32	22	31	29	50	29	50	42	36
20	37	37	40	27	33	33	36	28	33	33	38	36	33	75	45	32	35	33	46	36	43	32	22	34
21	70	51		B	33	42		B	45	35	31	32	33	33										
22	55	55	41	38	45	36	32	64	37	36	32	32	33	41	41	40	32							
23	50	52	34	40	32	27	42	32																
24	36	43	45	36	35	35	33	32	41	39	43													
25	41	31	42	33	28	35																		
26	41	45		B	33	34	38	32	33	32	E	B	E	B	E	B	55	55	53	31				
27	42	43	28	40	40	31	44	32	33															
28	67	42	41	37	52	32	30		32															
29	32	80	80	60	60	41	43	38	40	32	32	32	40	36										
30	41	40	55	41	30	27	27	28	31	30														
31	46	29	26	25	37																			
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	24	24	25	26	21	24	25	23	23	22	19	19	19	19	21	26	25	25	25	27	26	29	28
MED	40	42	39	36	36	35	33	33	33	33	33	34	33	38	39	33	32	32	30	32	32	32	36	36
U O	50	46	43	40	42	40	42	38	40	39	41	E	B	46	40	41	42	39	35	36	36	41	37	41
L O	32	31	32	33	32	32	32	31	31	32	32	33	32	33	32	32	31	30	28	28	29	28	32	30

IONOSPHERIC DATA STATION SHOWA ST.

DEC.1989 FMIN (0.1MHZ)

45°E MEAN TIME (G.M.T. + 3H)

LAT.69°00.4'S LON. 39°35.4'E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
2	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
3	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	33	26
4	B	B	B	B	B	B	B	B	B	B	20	B	B	B	B	B	33	25	B	24	30	B	19	20
5	30	B	B		B	B		B	B		25	B	B		B	23	B	B	35	35	30	26	17	17
6	30	B	21	16	27	18	19	19	15	15	12	19	19	19	16	15	15	14	15	15	14	10	10	14
7	16	30	14	18	15	19	19	19	23	20	B	B	22	19	19	16	19	15	13	16	15	10	23	15
8	16	14	14	20	16	15	13	15	18	13	B	25	19	20	20	18	20	20	15	15	28	15	10	10
9	9	9	18	10	14	19	19	15	18	35	55	56	18	19	18	15	15	13	13	13	15	11	8	10
10	10	10	10	B	14	14	14	15	10	10	14	15	15	10	19	14	19	13	10	15	11	10	10	15
11	14	9	10	10	18	10	10	10	13	14	17	18	17	16	17	17	27	37	15	10	18	15	15	10
12	15	18	17	10	10	11	10	15	10	10	10	14	16	15	17	10	16	14	10	9	17	9	10	9
13	17	16	16	32	14	13	21	8	20	17	17	15	17	20	17	15	18	10	10	10	10	9	10	12
14	15	10	11	9	10	10	10	10	10	16	19	18	17	10	12	15	38	20	15	10	12	10	9	8
15	15	11	10	10	22	B	B	20	20	24	20	56	25	25	15	15	15	19	15	35	30	10	13	8
16	14	10	10	10	11	15	15	10	10	10	16	13	10	51	14	19	18	14	10	15	10	14	15	10
17	18	10	10	9	10	B	15	28	15	16	10	58	31	35	16	B	15	18	10	10	11	10	10	19
18	14	B	17	B	10	B	17	19	15	10	11	10	31	18	15	15	15	10	10	14	10	10	8	17
19	9	19	30	20	14	8	10	10	20	19	24	15	17	18	17	14	14	14	16	13	15	10	9	14
20	10	11	19	10	20	18	10	10	10	13	10	15	15	15	14	14	14	10	10	11	10	9	8	9
21	10	15	B	9	18	B	17	14	15	14	18	20	B	20	26	20	17	14	10	15	14	15	10	18
22	10	17	10	10	10	10	10	17	15	10	14	19	19	10	10	15	16	B	36	14	10	10	10	20
23	15	10	10	14	10	14	13	15	B	23	B	B	B	B	B	B	B	36	19	11	10	10	10	9
24	9	16	10	10	10	13	10	15	14	20	15	B	B	B	B	15	20	17	17	B	14	10	20	B
25	19	10	20	10	15	10	B	B	B	B	20	25	B	B	B	20	16	37	39	36	15	10	11	10
26	22	14		19	10	22	14	15	15	55	55	53	21	B	B	B	15	17	15	15	18	10	18	15
27	12	15	18	15	18	15	18	15	17	B	B	B	B	B	39	20	16	B	B	20	10	10	10	18
28	20	27	15	14	10	13	10		20				17		20	17	30	16	36	15	10	9	9	8
29	14	10	16	19	17	17	17	15	15	19	25	18	20	18	B	B	23	19	B	15		19	19	
30	27	17	10	15	10	10	10	15	19	22	B	B	B	B	B	B	38	19	15	15	10	15	18	9
31	10	18	10	10	10	B	B	25	B	24	25	B	B	B	B	B	23	19	19	B	10	10	10	13
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	15	16	16	15	14	17	17	15	18	20	20	53	22	25	20	18	19	19	15	15	15	10	10	14
U 0	22	30	30	20	20		21	25	B	B	B	B	B	B	B	B	33	37	36	35	28	15	18	19
L 0	10	10	10	10	10	13	10	15	15	14	15	18	17	18	16	15	15	14	10	13	10	10	10	10



IONOSPHERIC DATA STATION SHOWA ST.

DEC.1989 H'F (KM)

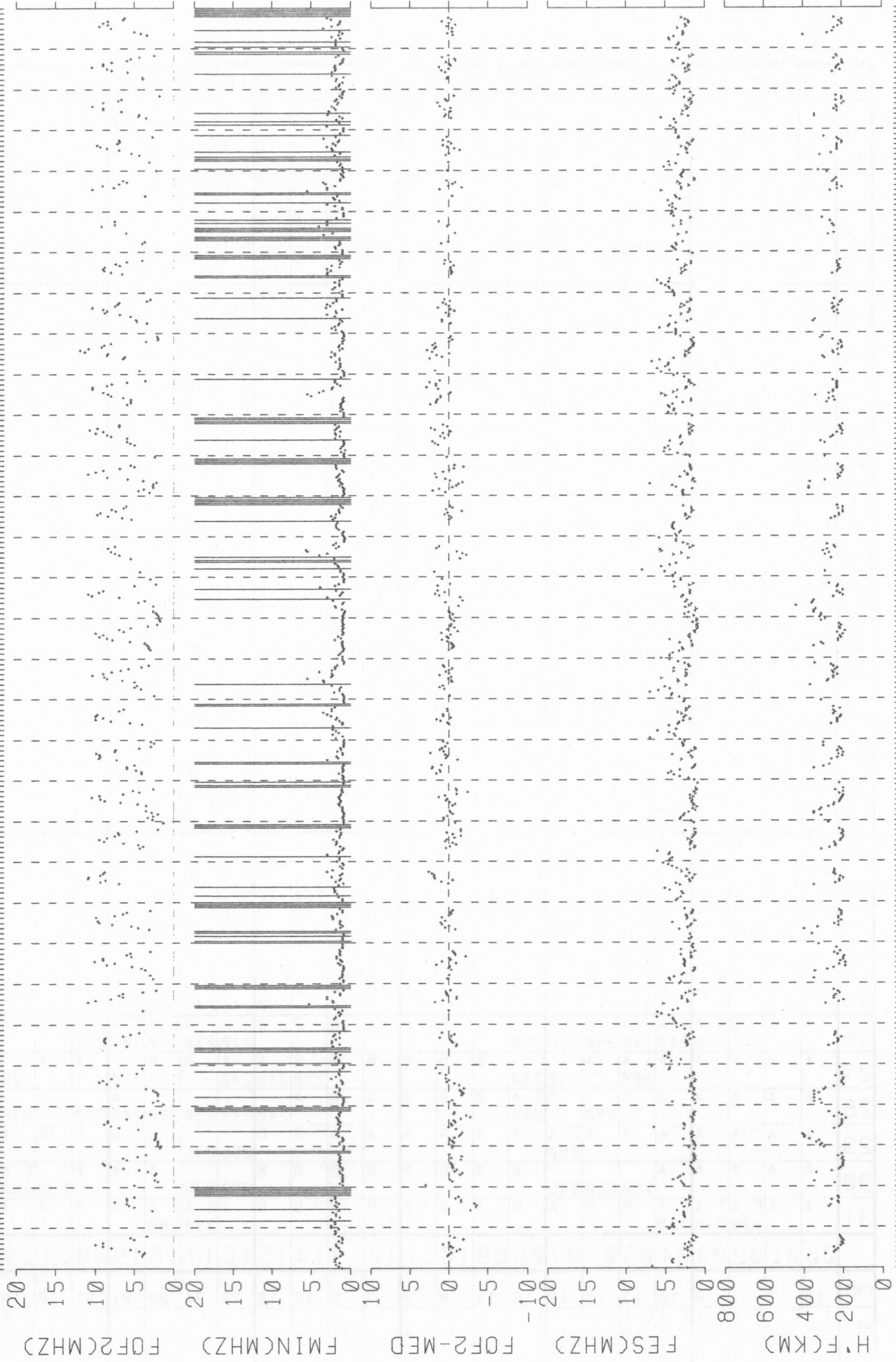
45°E MEAN TIME (G.M.T. + 3H)

LAT.69°00.4'S LON. 39°35.4'E SWEEP 0.4MHZ TO 15.0MHZ IN 20.0SEC IN MANUAL SCALING

H/D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23						
1	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B						
2	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B						
3	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	E	E	B					
4	B	B	B	B	B	B	B	B	B	B	A	B	B	B	B	B	230	250	E	A	E	A	B	A						
5	A	B	B	A	B	B	A	E	A	B	B	A	B	B	A	B	A	B	B	B	B	B	255	A						
6	E	B	B	A	A	A	A	A	E	A	A	A	A	A	A	A	225	230	E	A	E	A	E	A	A					
7	E	A	E	B	A	A	A	A	E	A	E	A	B	B	A	A	230	230	A	A	A	A	255	275	A					
8	A	A	A	E	A	E	A	A	A	E	A	A	B	B	A	A	225	225	E	A	E	A	A	E	A					
9	300	305	405	E	A	A	A	A	E	A	E	A	A	B	B	A	A	225	225	250	240	E	A	A	E	A				
10	280	275	275	B	A	E	A	A	220	240	220	210	210	220	230	225	225	225	255	270	255	275	275	270						
11	300	280	290	260	E	A	A	A	E	A	E	A	A	A	A	A	225	250	E	B	E	A	E	A	E	A				
12	A	A	A	A	A	A	A	A	E	A	A	A	A	A	A	A	225	240	E	A	E	A	E	A	E	A				
13	200	A	A	B	F	A	A	A	H	A	A	A	A	A	A	A	220	230	225	225	210	240	240	255	230	300	A			
14	250	E	A	E	A	E	A	E	A	A	A	A	A	A	A	A	220	240	E	B	H	E	A	A	E	A	A			
15	A	A	A	A	A	A	B	B	A	A	A	A	B	B	A	A	220	220	230	250	240	250	B	B	A	A	A			
16	B	A	E	A	A	A	A	A	A	A	A	A	220	220	B	B	230	245	A	A	220	A	A	A	A	A	A			
17	A	A	A	E	A	Q	B	A	E	A	A	E	A	B	A	A	A	B	H	A	A	A	A	A	A	E	A	A		
18	E	A	B	A	B	250	B	A	H	245	210	230	210	A	A	A	220	225	225	A	225	230	300	E	A	E	A	A		
19	E	A	A	A	A	E	A	A	A	A	A	A	A	A	A	A	230	230	230	E	A	A	A	E	A	E	A	A		
20	A	A	A	A	E	A	A	A	A	A	A	A	A	A	A	A	220	250	E	A	A	240	225	240	230	260	265	280		
21	A	A	B	E	A	A	B	A	E	A	A	A	A	B	A	A	A	220	230	230	240	250	250	255	345	E	A	E	A	
22	A	E	A	A	A	A	A	A	A	A	A	A	A	A	A	A	220	230	E	A	B	A	A	A	A	A	A	A	A	
23	E	A	A	E	A	E	A	E	A	E	A	E	A	B	A	B	B	B	B	B	B	B	B	B	B	E	A	E	A	A
24	A	A	A	E	A	E	A	E	A	A	A	A	A	B	B	B	A	A	A	B	E	A	E	A	E	A	E	A	E	A
25	A	E	A	A	A	A	A	E	A	B	B	B	B	A	A	B	B	B	A	A	B	B	B	B	E	A	E	A	A	
26	A	A	B	E	A	E	A	E	A	A	A	A	A	B	B	B	A	A	A	E	A	E	A	A	A	A	A	A	A	A
27	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	A	A	A	B	B	B	B	A	A	A	A	A	A	A
28	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A	240	240	230	250	245	260	A	A	A	A	A	A	A	A
29	A	A	A	A	A	A	A	A	E	A	A	A	A	A	A	B	B	255	275	B	B	A	B	A	B	A	A	A	A	A
30	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	250	275	A	A	A	A	A	A	E	A	E	A	A	A
31	A	A	E	A	E	A	E	A	B	B	A	B	A	A	B	B	B	B	A	E	A	E	A	B	B	A	A	A	A	A
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23						
CNT	10	7	7	9	10	12	13	18	16	13	9	9	7	5	10	18	23	24	23	21	21	18	18	16						
MED	U	E	E	A	E	A	E	A	E	A	A	A	228	228	220	220	220	225	226	225	230	238	238	250	255	272	E	A	E	A
UO	330	350	325	365	310	305	258	260	255	240	230	222	225	228	230	240	245	250	250	278	268	290	320	355	330	350	320	355	330	350
LO	260	275	275	275	270	255	245	245	220	220	215	210	210	218	220	220	225	230	230	248	250	265	280	275	260	275	280	275	260	275

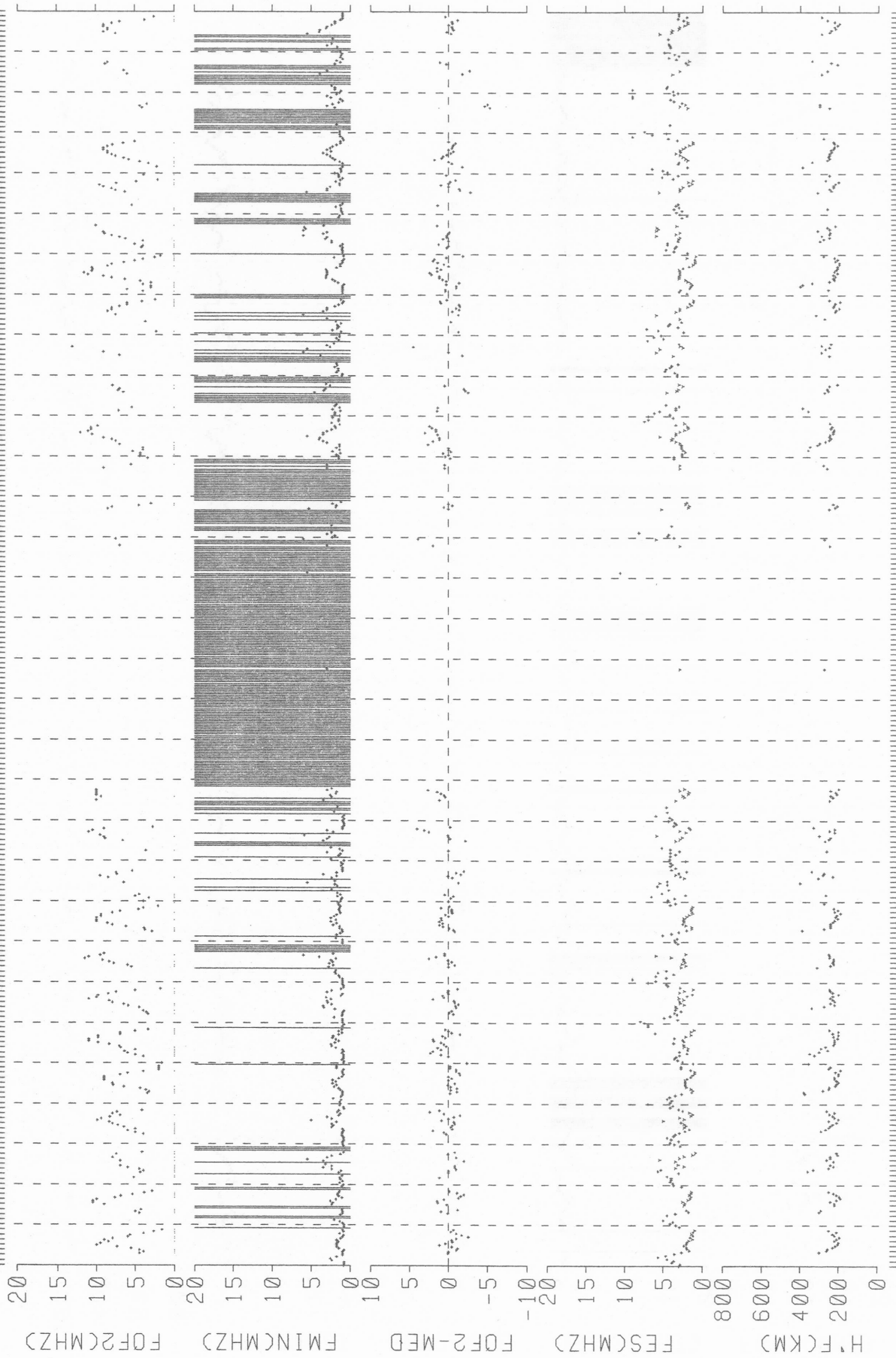


19890701 -> 19890731 SHOWA ST.



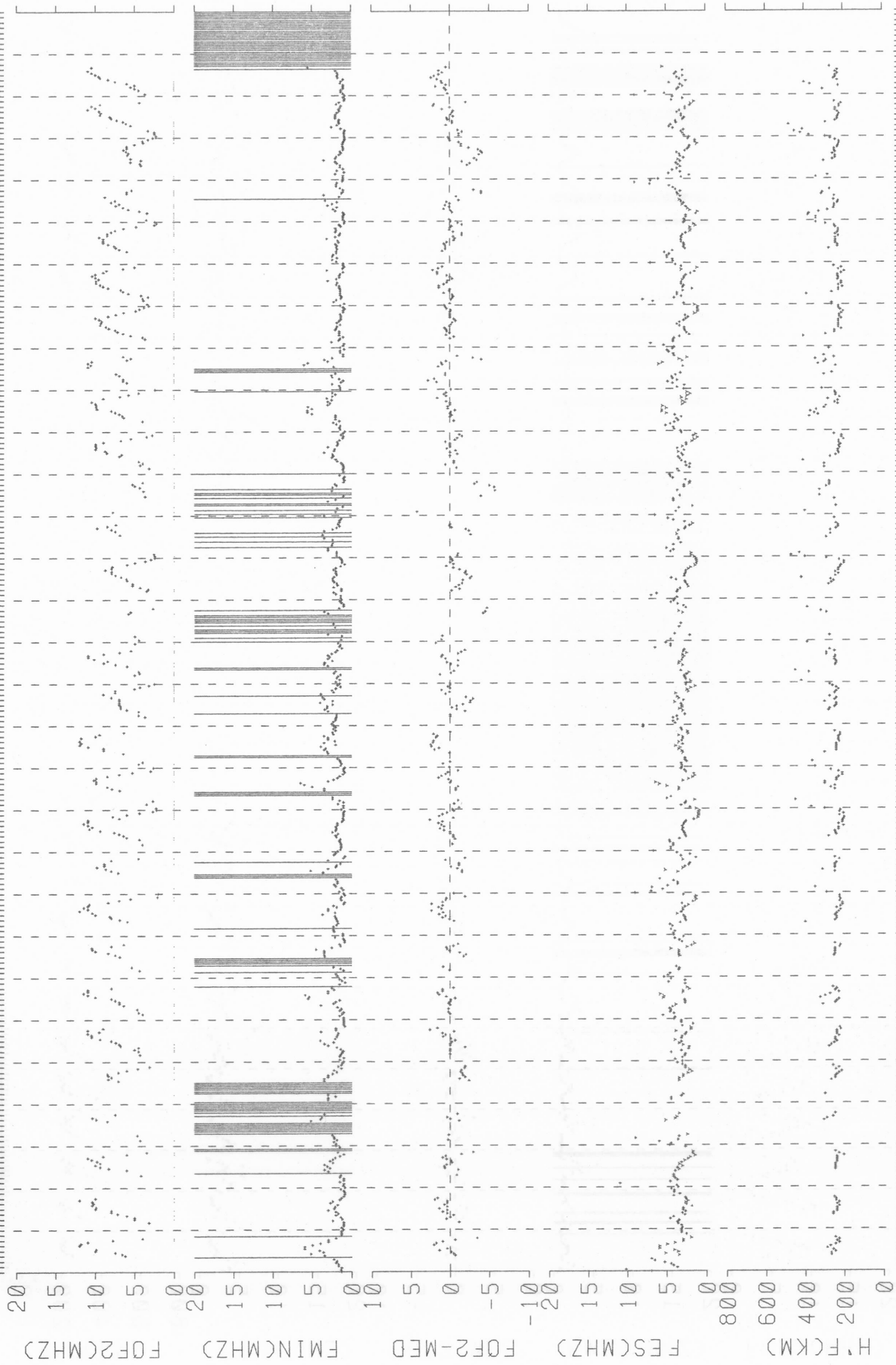
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 DAY

19890801 -> 19890831 SHOWA ST.



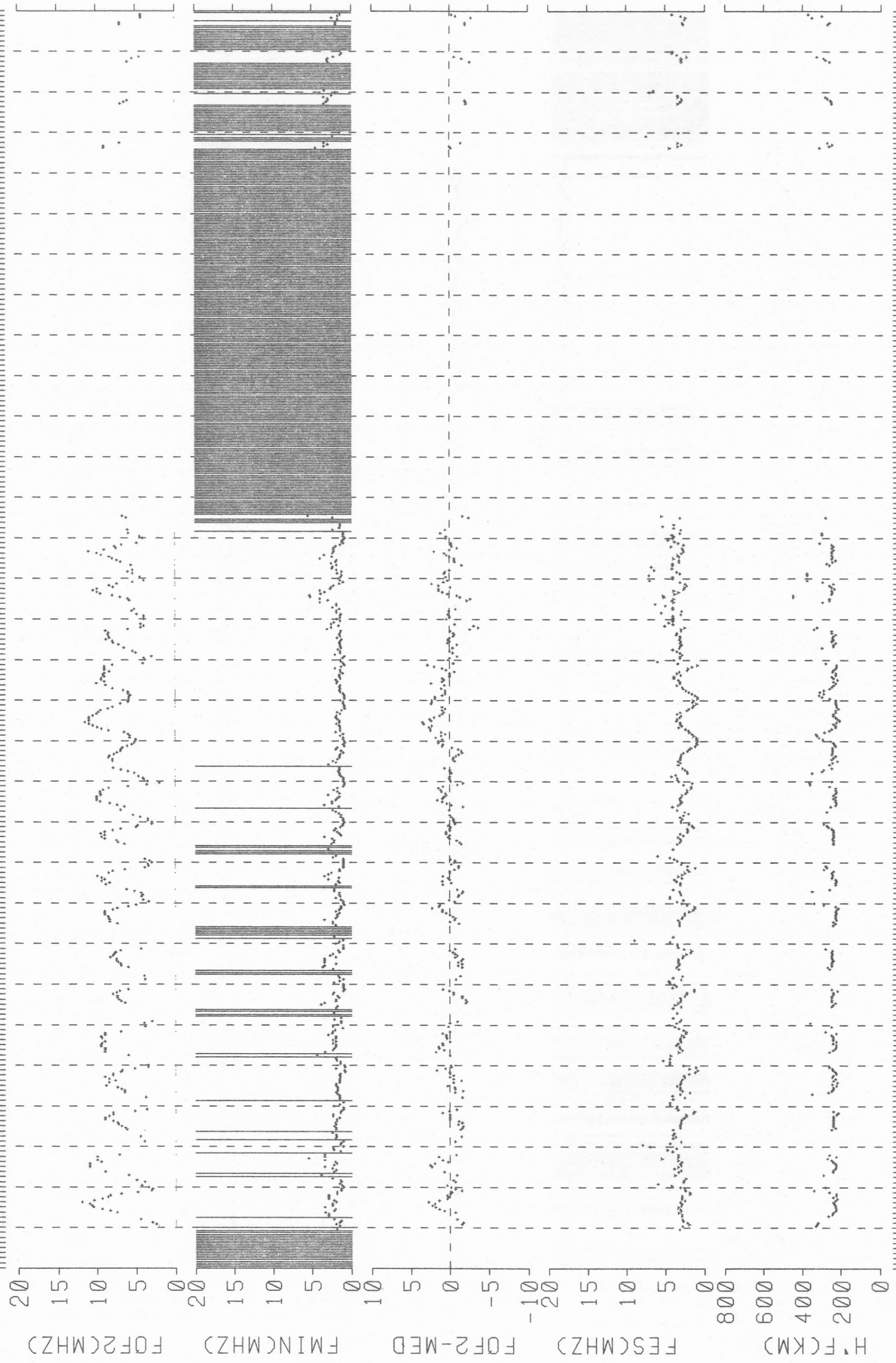
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 DAY

19890901 -> 19890930 SHOWA ST.



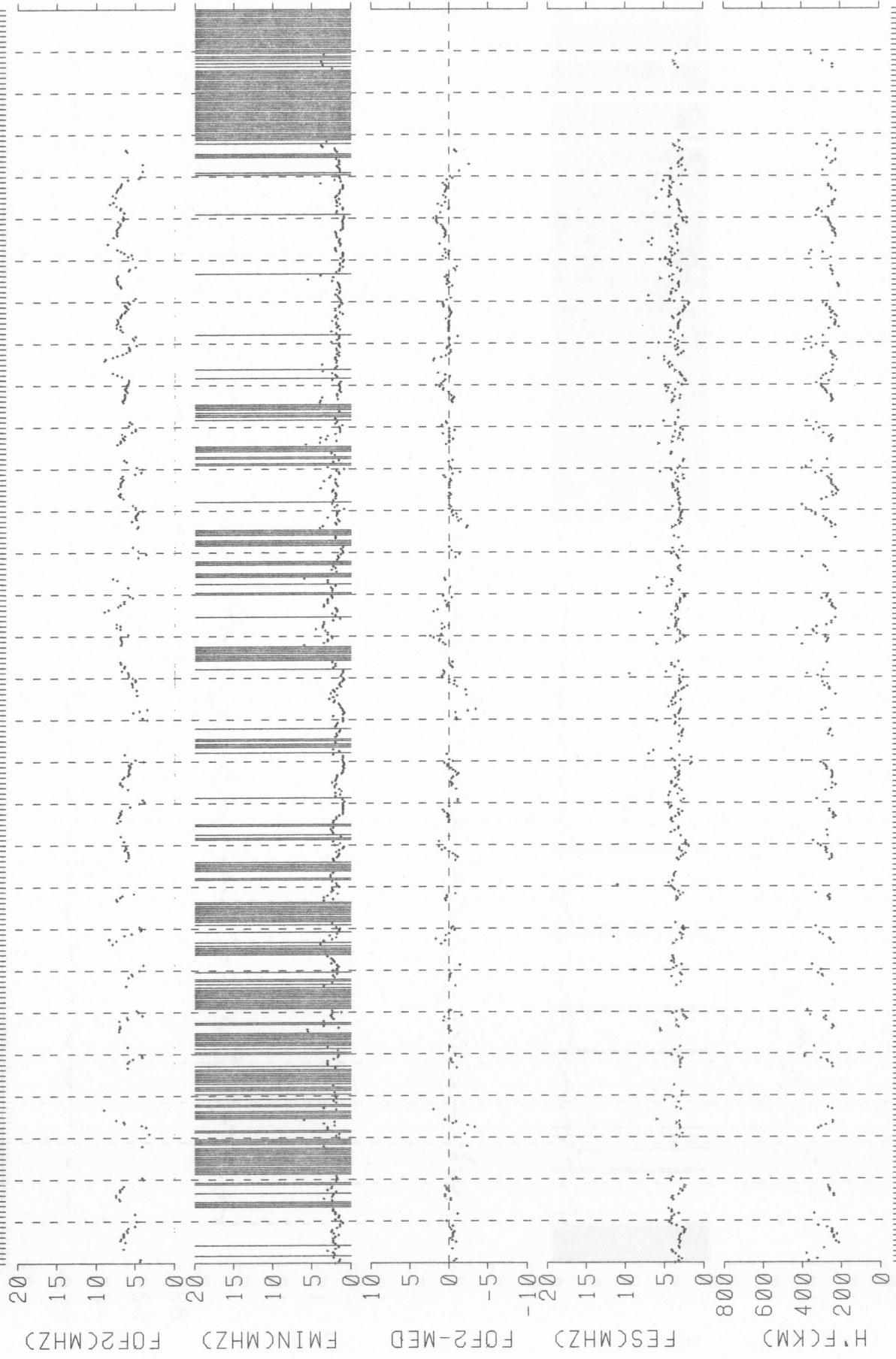
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 DAY

19891001 -> 19891031 SHOWA ST.



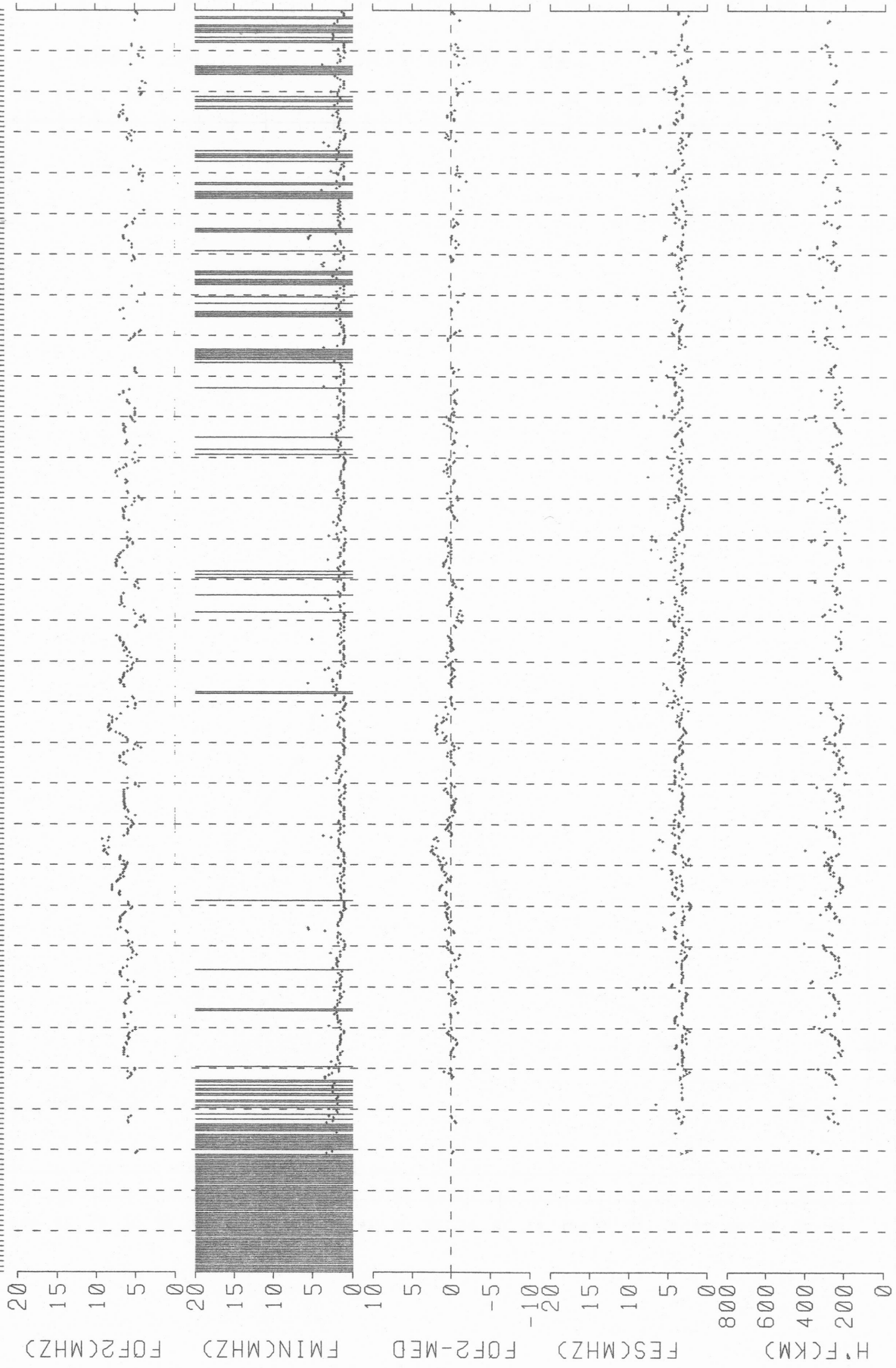


19891101 -> 19891130 SHOWA ST.



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 DAY

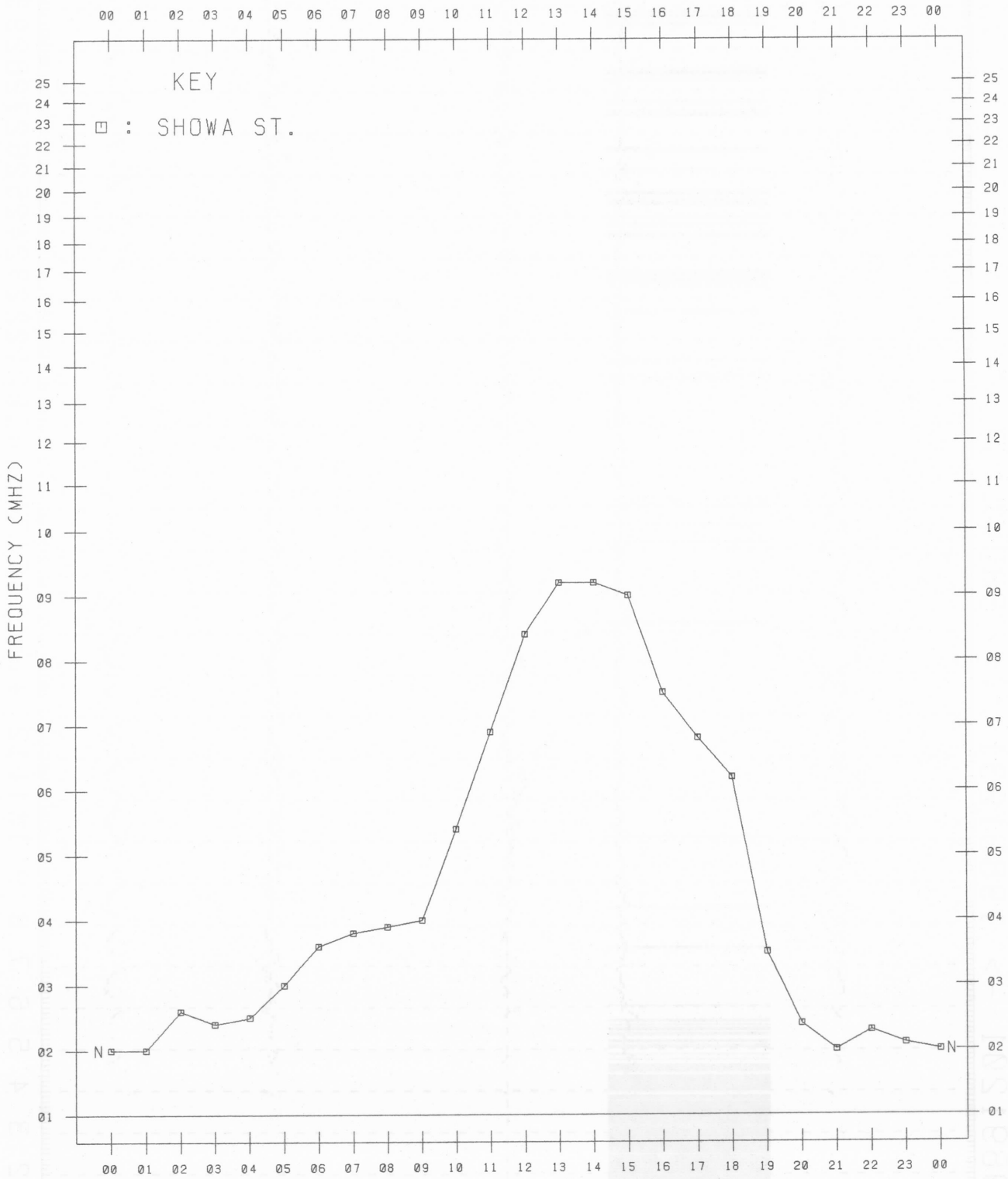
19891201 -> 19891231 SHOWA ST.



# MONTHLY MEDIAN VALUES OF FOF2

45 °E MEAN TIME

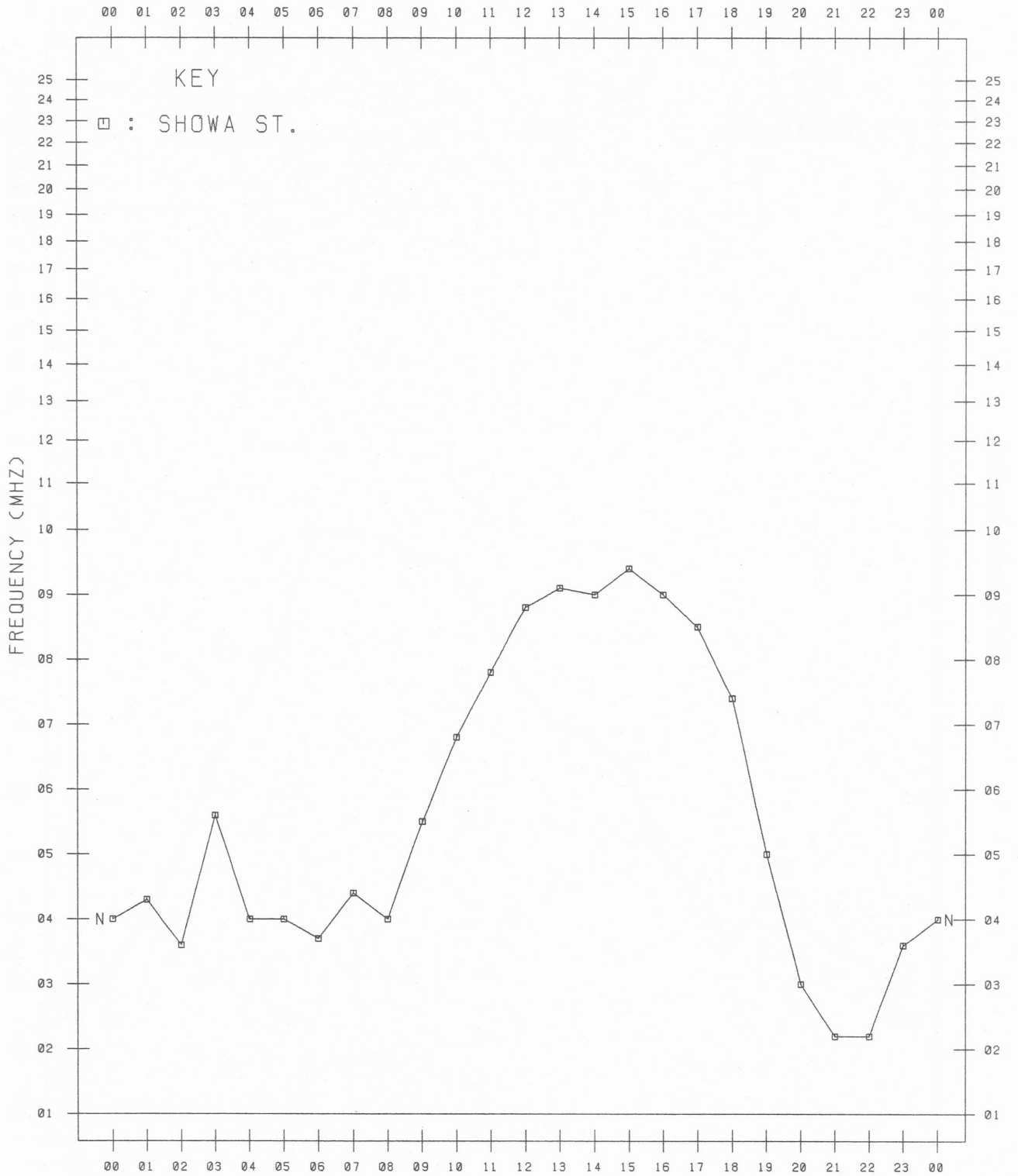
JUL. 1989



# MONTHLY MEDIAN VALUES OF FOF2

45 °E MEAN TIME

AUG. 1989

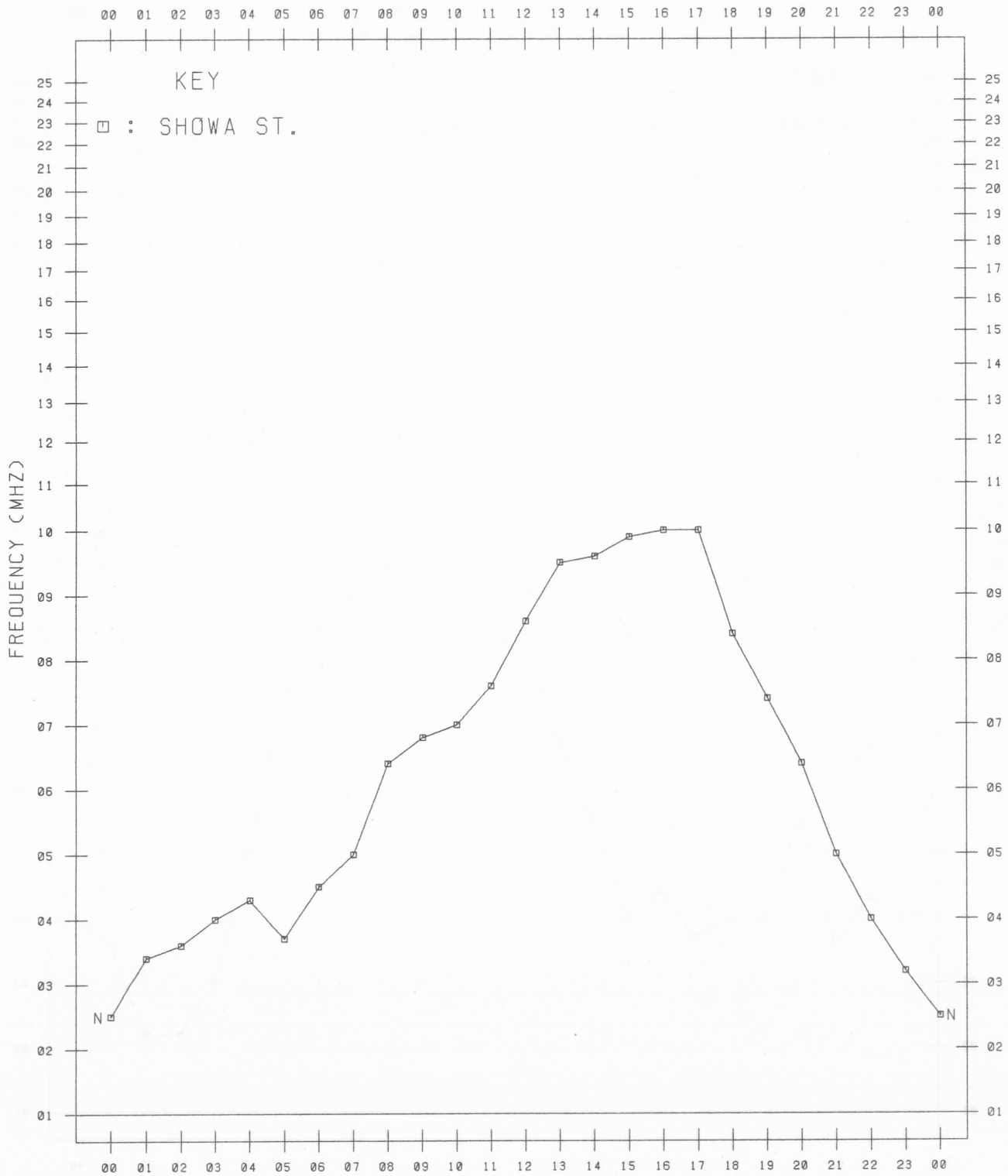




# MONTHLY MEDIAN VALUES OF FOF2

45 °E MEAN TIME

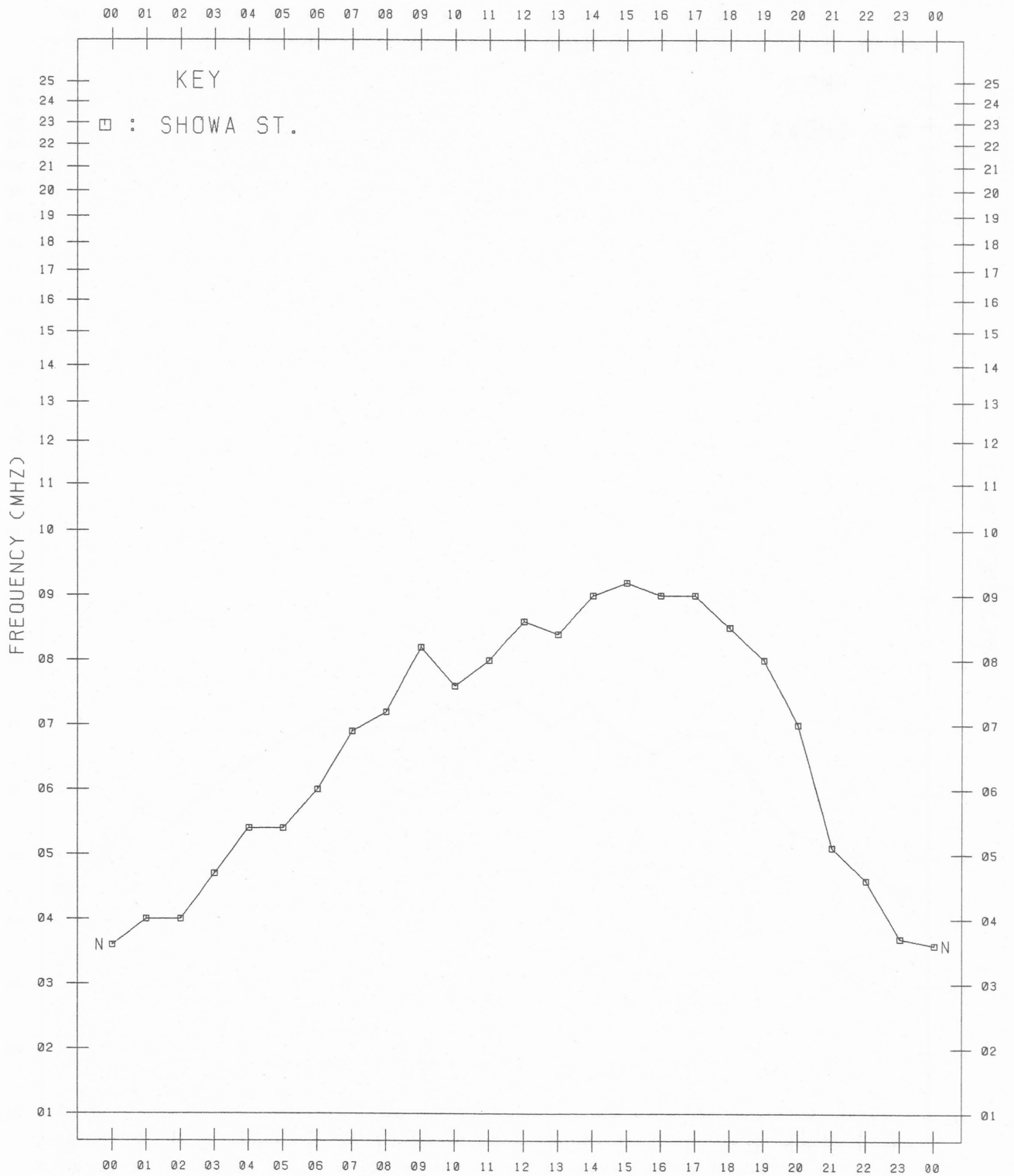
SEP. 1989



# MONTHLY MEDIAN VALUES OF F<sub>0</sub>F<sub>2</sub>

45 °E MEAN TIME

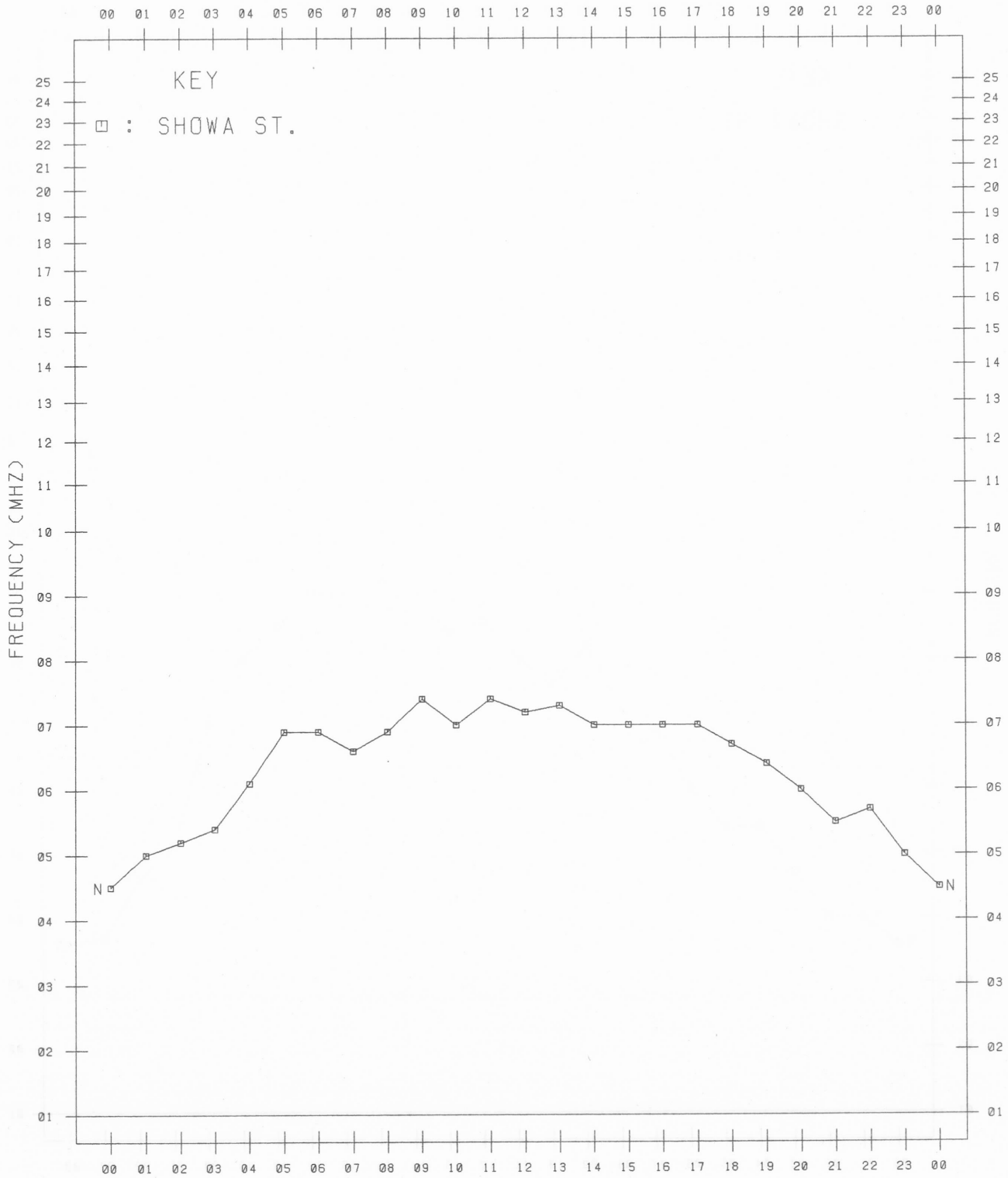
OCT. 1989



# MONTHLY MEDIAN VALUES OF FOF2

45 °E MEAN TIME

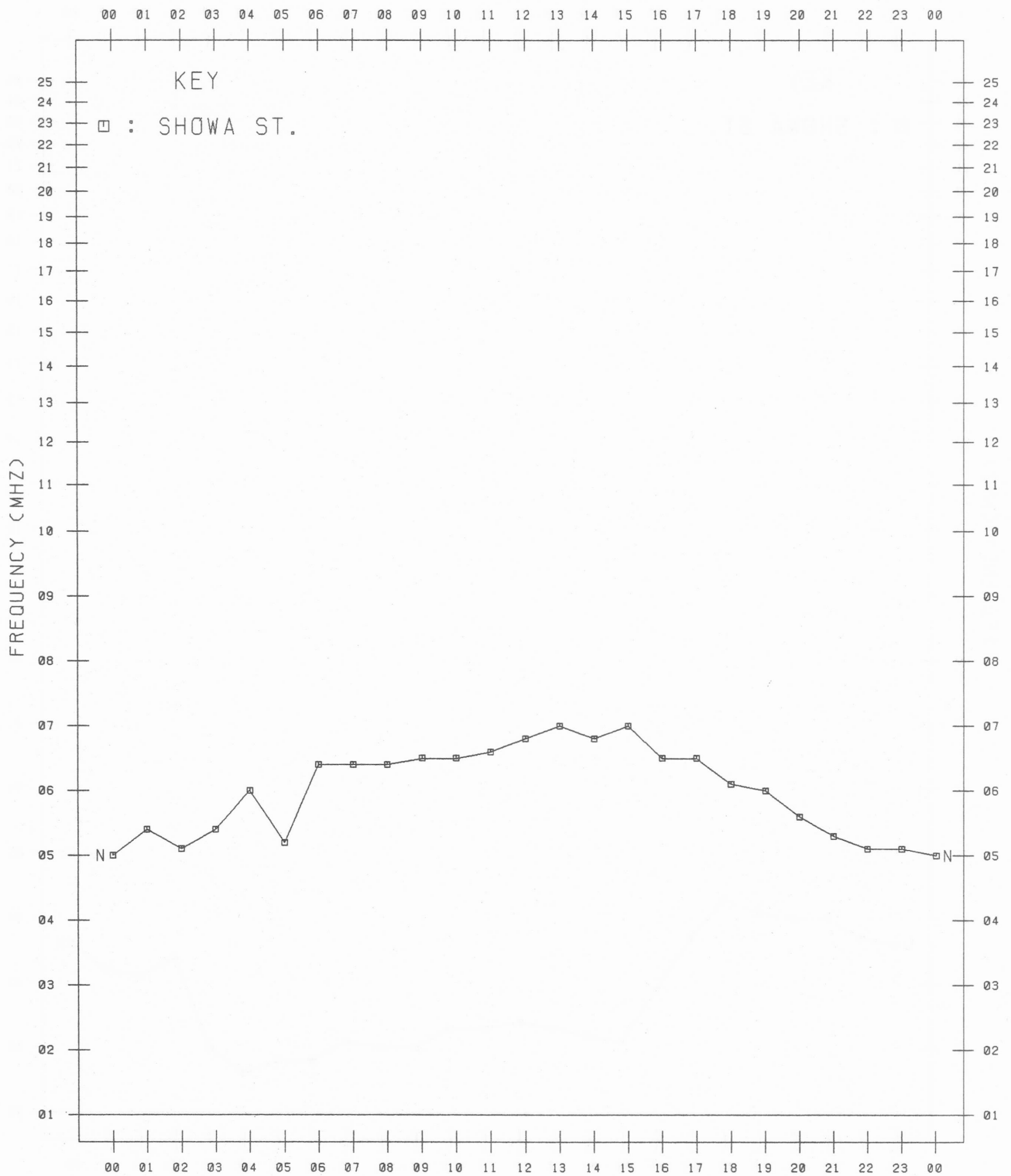
NOV. 1989



# MONTHLY MEDIAN VALUES OF FOF2

45 °E MEAN TIME

DEC. 1989

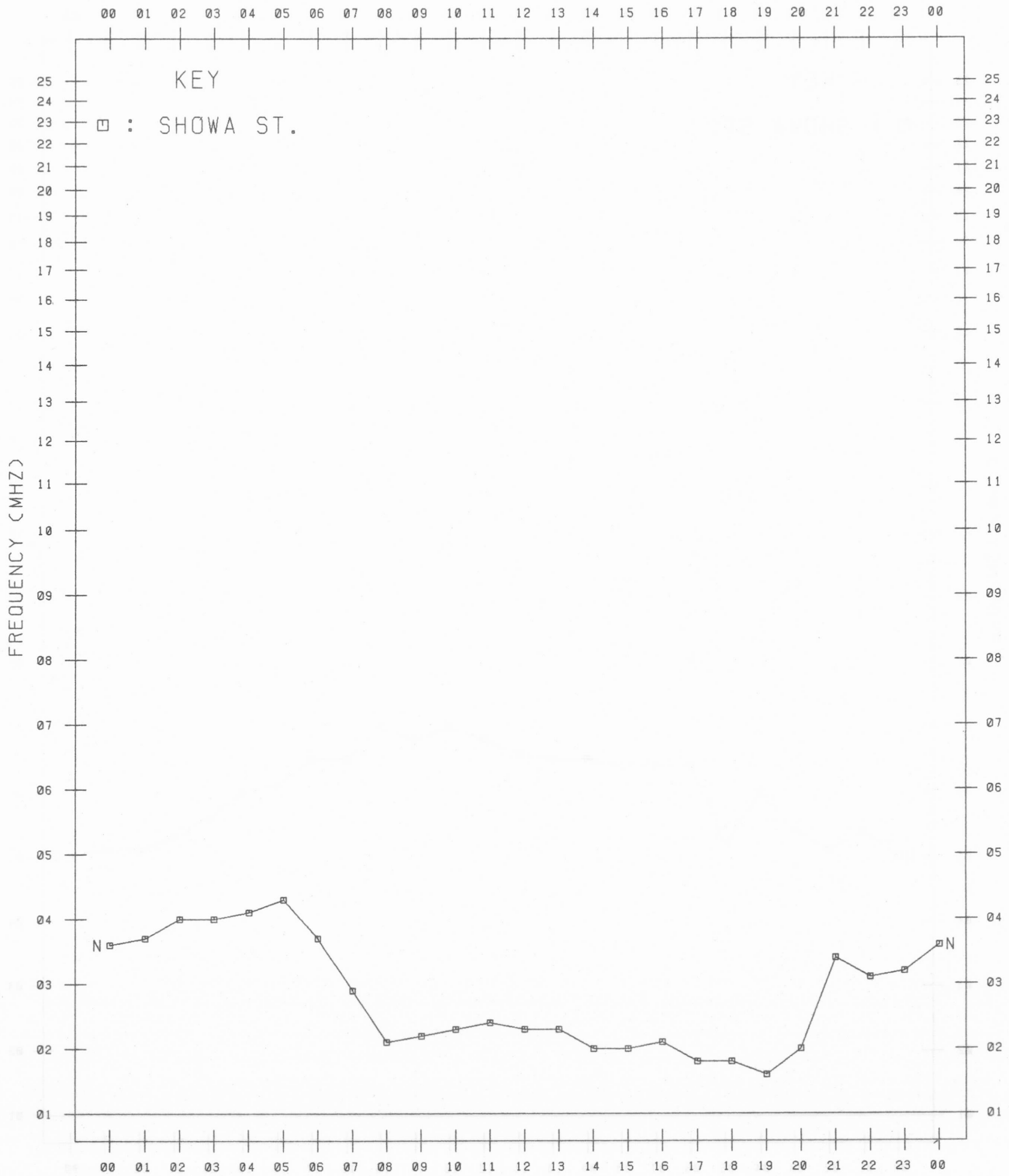




# MONTHLY MEDIAN VALUES OF FES

45°E MEAN TIME

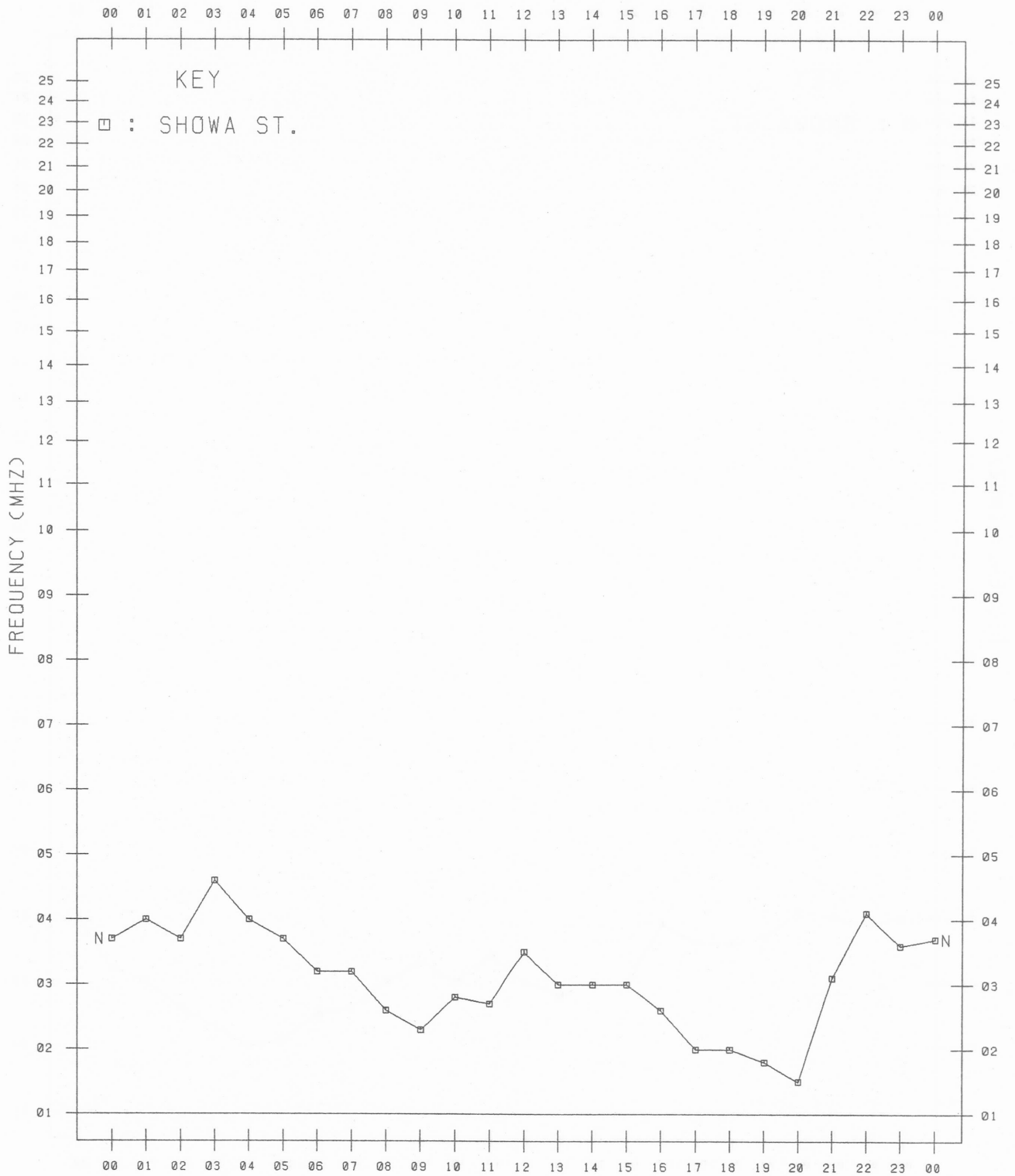
JUL. 1989



# MONTHLY MEDIAN VALUES OF FES

45°E MEAN TIME

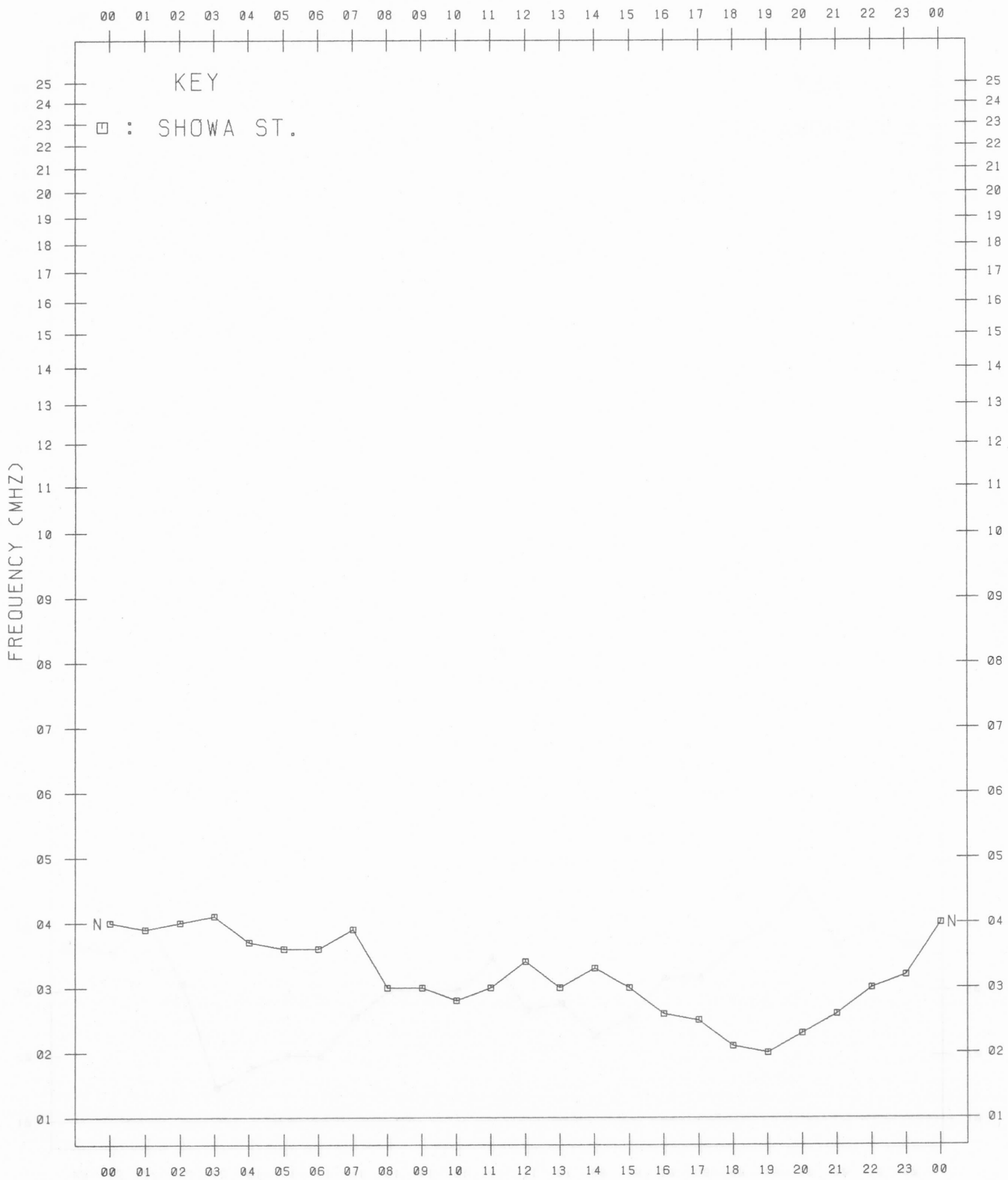
AUG. 1989



# MONTHLY MEDIAN VALUES OF FES

45 °E MEAN TIME

SEP. 1989

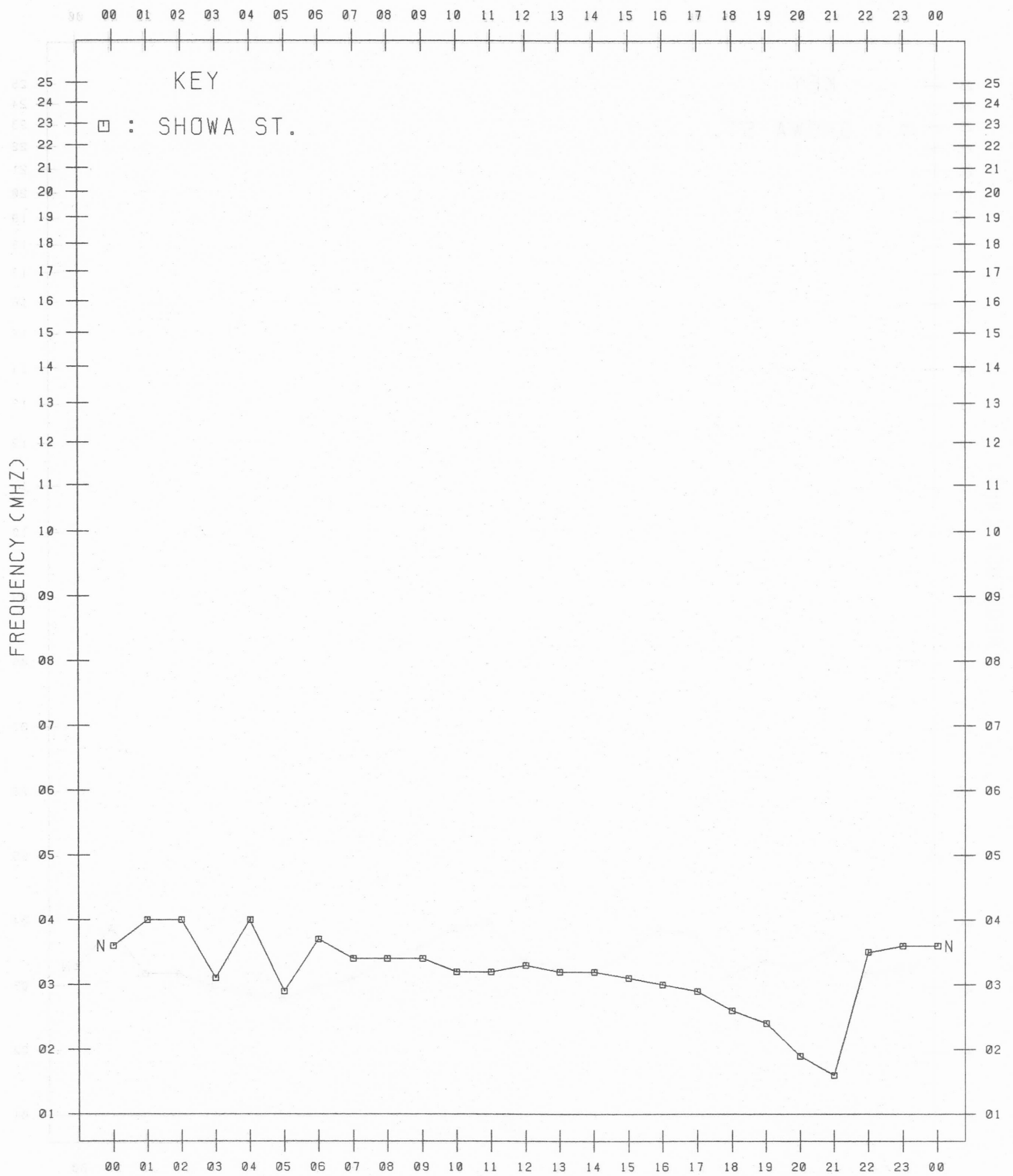


# MONTHLY MEDIAN VALUES OF FES

NOV. 1989

45 °E MEAN TIME

OCT. 1989



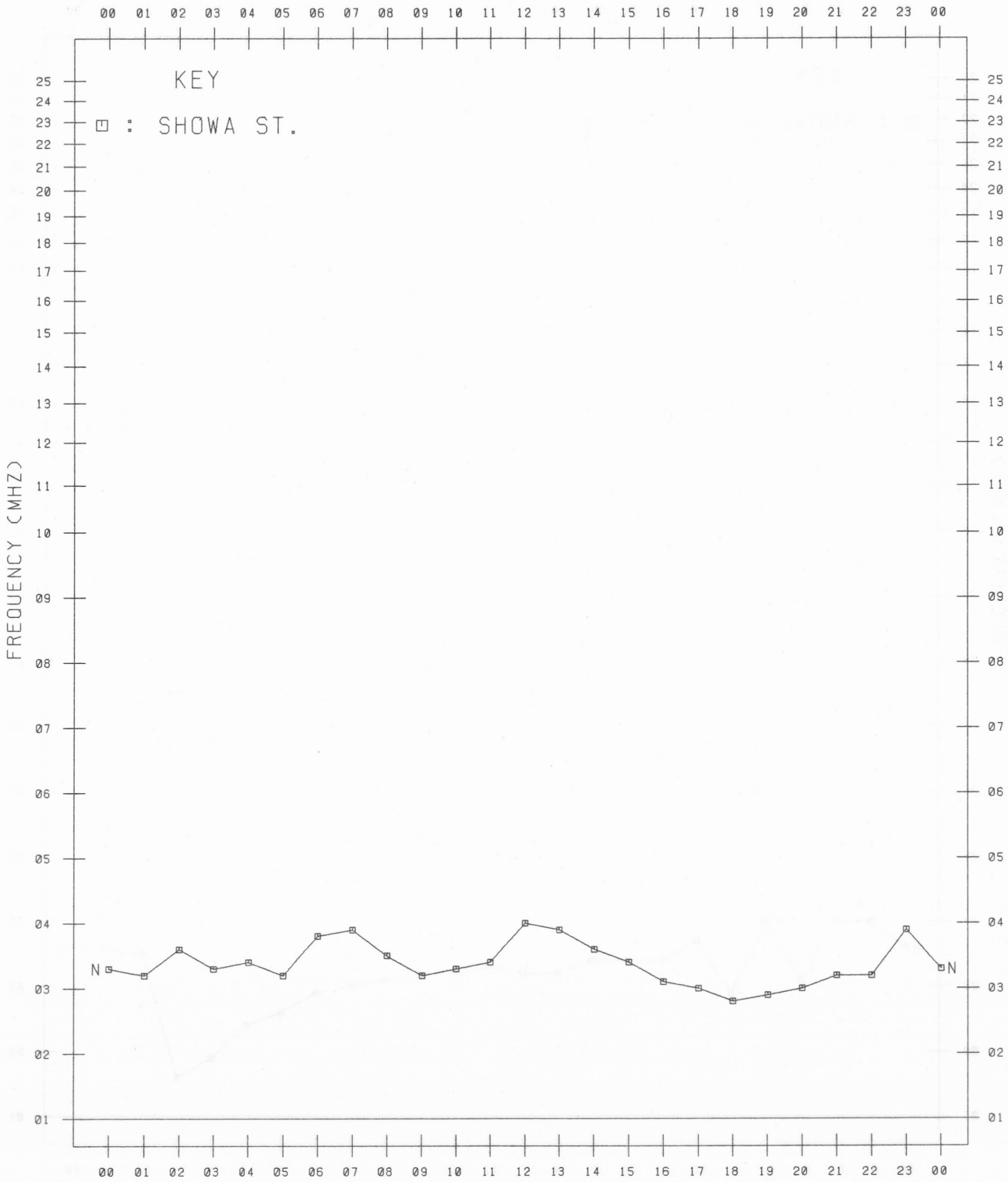


# MONTHLY MEDIAN VALUES OF FES

SEP 0000

45 °E MEAN TIME

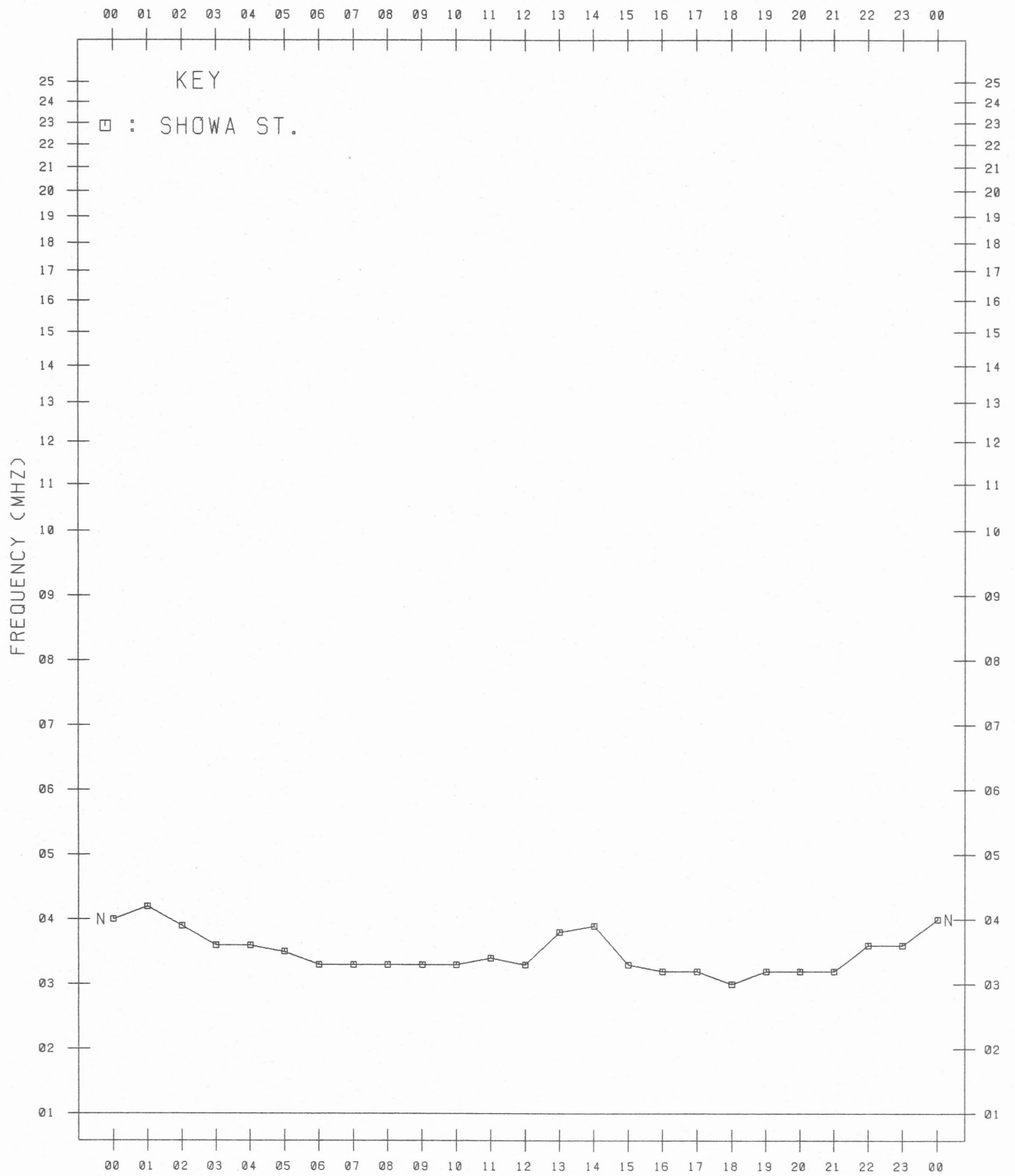
NOV. 1989



# MONTHLY MEDIAN VALUES OF FES

45 °E MEAN TIME

DEC. 1989



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IONOSPHERIC DATA AT SYOWA STATION (ANTARCTICA)  
ION.ANT.— 53 July 1989—December 1989 (Not for Sale)

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Ministry of Posts and Telecommunications, 2-1 Nukui-Kitamachi 4-chome, Koganei-shi, Tokyo 184 JAPAN.