

ION. ANT.—65

IONOSPHERIC DATA AT SYOWA STATION (ANTARCTICA)

January 1998—December 1998

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TOKYO, JAPAN

INTRODUCTION

This data book gives summarized results for vertical soundings of the ionosphere at Syowa Station, Antarctica in 1998. 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 the symbols used in this data book are as follows:

LOCATION 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 Rang	400 k Hz - 15MHz
Transmitting Power	10kW (peak value)
Duration of Sweep	20 s
Transmitted Pulse Width	80 μ s
Pulse Repetition Frequency	50 Hz
Frequency Marker	every 1 MHz
Height Range	0 - 900km
Height Marker	every 50km
Recording Media	8mm digital tape
Power Supply	100-V-AC, 2.0kVA
Transmitting Antenna and Receiving Antenna	30-m-high vertical delta antennas terminated by 600 Ω

OBSERVERS

Observer: K. Kusano
Scaler: K. Fukushima

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. 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

(i) 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 fmin.
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.

(iii) 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 of 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.

JAN. 1998 f_{XI} (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	X 58	X 60	X 58	X 60	X 71	X 70	X 74	X 78	X 76	B	X 86	X 87	B 91	X 90	X 90	R	A 67	X 60	X 60	X 60	X 59	X 60	X 57	X 51
2	X 45	X 46	X 49	X 58	X 63	X 62	Y	R	O 61	X 62	X 71	X 72	X 75	X 75	X 71	X 70	X 66	X 65	X 64	X 60	B 55	X 54	X 53	
3	X 50	X 50	X 49	X 51	X 58	X 76	X 80	X 81	X 80	X 74	X 70	X 68	X 72	X 78	X 88	X 90	X 74	X 71	X 60	X 55	X 54	X 62	X C	X C
4	C	48	61	60	66	71	77	82	88	89	89	89	74	72	75	75	68	68	70	57	52	43	41	
5	A	48	55	55	62	66	75	80	81	80	76	72	70	70	72	72	74	80	70	65	58	46	52	44
6	O 44	X 45	X 46	X 52	X 56	Y	B	Y	X	49	68	65	60	63	65	65	60	67	68	67	56	84	A	R
7	Y	A	A	45	A	A	B	B	Y	B	B	B	B	B	B	R	B	O	X	A	O	A	A	X
8	X 42	X 44	X 44	X 48	X 51	X 50	X 57	R	O 50	X 60	R	X 64	R	R	O 57	X 53	O 53	X 53	X 52	X 51	X 45	X 90	X 44	X 57
9	A	A	A	A	53	44	B	71	46	56	R	R	R	B	B	B	B	O	X	Y	O	X	X	X
10	X 44	X 46	B	X 45	B	B	Y	Y	O 54	X C	C	C	C	C	C	C	C	C	C	C	O	X 46	X 41	X 43
11	R	O 40	X 66	R	R	B	B	R	X	56	X 58	X 56	X 60	B	B	B	R	R	X	B	O	X 54	X 49	X 52
12	O 46	X 43	X	A 50	X	A	X 48	X 52	X 47	Y	Y	B	O 66	X 68	X 64	X 48	X 48	R	R	X	O 58	X 51	X 51	
13	X 46	X 48	O 47	X 50	X 52	X 57	X 53	X 58	X 57	X 58	X 60	X 63	X 60	X	R	C	C	C	C	C	C	52	50	B 45
14	X 45	X 46	X 48	X 56	X 62	B 50	X 46	X 63	X 66	X 72	X 68	X 70	X	B	B	R	R	R	R	X	57	54	52	
15	X 46	X 44	X 44	X 48	X 56	X 58	X 67	X 72	O 66	X 66	X 69	X 66	X	R	B	B	R	R	R	X	57	64	57	
16	54	52	62	R	A 52	O 62	X 67	O 72	X 78	X 87	X 80	X 74	X 67	X	C	C	C	C	C	C	C	C	C	C
17	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	X	X	X	O	X	X	X
18	71	A	A	42	40	R	X	53	69	A	A	R	B	B	B	B	R	X	B	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	X	O	X	X
20	O 38	X 39	X	S	S	56	46	56	O 44	X 58	Y	Y	Y	A	X	X	X	X	X	O	X	R	A	A
21	A	B 47	O 47	X	A	B	X	A	O 51	X R	A	B	B	B	O 48	X R	R	R	X	O	X	X	X	X
22	X 50	X 54	X 57	X 50	X 54	X 54	X 62	X 62	X 69	X 65	X 66	X	R	R	R	R	R	R	O	X	X	X	X	X
23	X 41	X	A	A	S 49	X	X	Y	X	X	X	X	X	X	Y	R	R	O	X	R	O	X	X	X
24	X 54	X 46	S 46	O 53	X 60	X 67	X 69	X 73	X 74	X 72	X 76	X 76	X 64	X 65	X 64	X 62	X 64	X 58	X 60	X 58	X 61	X 58	X 38	
25	A	S	A	A	R 50	O X	Y	Y	B	R	R	R	R	R	R	R	R	R	O	X	X	X	A	O
26	X 44	X 44	X 45	X 45	X 48	X 49	X 52	X 60	X 63	X 64	X 64	X 62	X	R	X 62	X 63	R	R	R	A	O	X	X	X
27	X 39	X 42	X 53	X 49	X 50	X 54	X	B	60	66	68	73	86	83	B	84	65	61	59	58	62	52	52	44
28	X 33	X 40	X 47	X 49	X 54	X 59	X 60	X 68	X 72	X 73	X 72	X 67	X 66	X 63	X 62	X 61	X 63	X 55	X 54	X 55	X 50	X 50	X 52	X 49
29	X 34	X 42	X 43	A	B	R	Y	Y	X	68	74	70	69	73	78	72	65	65	65	68	56	49	44	47
30	46	S	B	Y	Y	B	B	Y	Y	B	B	B	B	B	R	O	X	X	X	Y	O	X	X	Y
31	X 38	O 36	X 50	X 38	O 41	X 38	X 42	X 46	X 47	B	Y	B	R	O 54	X R	B	O	X	X	X	O	X	X	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	22	22	19	20	20	20	18	20	22	20	18	19	13	15	14	14	16	20	22	26	27	24	21	26
MED	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
U Q	50	48	57	54	60	61	67	72	72	74	73	76	74	75	72	70	68	66	60	60	54	56	53	51
L Q	41	42	46	46	50	48	53	54	56	61	66	64	67	62	62	60	56	54	53	51	46	50	44	42

JAN. 1998 f_{XI} (0.1MHz)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 1998 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	J	F	J	R	F	F	F	F	F	B	R	B	R	R	R	A	R	J	R	J	R	B	R	R		
2	F	F	F	F	F	R	Y	R	J	R	R	R	69	69	65	64	60	59	J	F	J	R	B	R	R	
3	44	44	43	43	52	58	74	75	74	68	64	62	66	72	82	84	68	65	54	49	48	56	C	C		
4	C	41	47	46	52	65	66	76	82	83	83	83	68	66	A	J	R	66	62	62	64	51	46	37	35	
5	A	F	R	S	F	F	J	S	F	F	F	F	R	R	R	J	R	J	S	J	R	R	F	F		
6	S	F	F	F	F	Y	B	Y	F	F	F	F	57	59	54	57	59	59	J	R	R	F	A	D	R	F
7	Y	A	A	A	A	A	B	B	Y	B	B	B	B	B	B	R	B	R	A	R	R	A	A	A	A	
8	36	38	38	42	41	44	51	44	44	54	58	58	R	R	R	R	R	R	R	R	R	A	R	R	F	
9	A	A	A	A	37	38	B	F	57	40	50	R	R	R	B	B	B	B	Y	46	40	37	42	41	42	
10	J	F	B	J	R	B	Y	Y	R	C	C	C	C	C	C	C	C	C	C	C	R	R	R	R	R	
11	R	R	R	R	R	B	B	R	J	R	J	R	B	B	B	R	R	51	B	R	R	V	R	R	R	
12	U	R	A	R	A	R	R	Y	Y	B	R	R	R	R	R	R	R	R	R	R	R	43	46	41	35	
13	40	39	41	44	46	51	47	52	51	52	54	57	54	R	C	C	C	C	C	C	46	44	B	R	39	
14	F	40	42	50	56	44	40	57	60	66	62	64	B	B	R	R	D	R	45	51	48	46	45	46	39	
15	38	28	33	32	50	52	61	66	57	60	63	60	R	B	B	R	R	R	J	R	R	R	R	F	F	
16	F	F	F	R	A	R	R	F	J	R	R	R	72	81	74	68	61	C	C	C	C	C	C	C	C	
17	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	J	R	J	R	R	R	R	R	
18	A	A	A	F	F	R	F	A	A	R	B	B	B	B	R	J	R	B	C	C	C	C	C	C	C	
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	50	48	45	48	48	41	
20	S	R	S	S	F	F	R	Y	J	R	Y	Y	A	J	R	J	R	J	R	R	R	A	A	A	A	
21	A	B	R	A	B	J	R	A	R	R	A	B	B	B	R	R	R	J	R	R	R	R	R	R	S	
22	44	48	51	40	48	48	56	56	63	59	60	R	R	R	R	D	R	R	R	R	44	48	52	49	44	
23	34	A	A	S	43	Y	Z	56	60	59	58	60	58	Y	R	R	R	R	R	R	45	49	46	46	44	
24	48	F	S	S	47	54	58	63	67	68	66	70	70	58	59	58	56	58	J	R	R	R	R	F	F	
25	A	S	A	A	R	44	Y	Y	B	R	R	R	R	R	R	R	R	R	R	45	36	36	A	A	37	
26	38	38	39	39	42	43	46	54	57	58	58	56	R	J	R	R	R	R	A	R	46	44	46	35	28	
27	F	F	F	F	F	B	F	J	F	F	F	F	77	B	74	59	55	53	52	56	46	46	32	25	F	
28	26	34	40	43	48	53	46	62	66	67	66	61	60	57	56	55	57	49	48	49	44	44	46	43	S	
29	28	29	34	A	B	R	Y	Y	62	65	64	60	67	68	64	59	59	59	62	J	R	R	R	F	F	
30	F	S	B	Y	Y	B	B	Y	Y	B	B	B	B	R	R	R	R	F	J	R	Y	R	R	Y	Y	A
31	32	30	44	30	33	32	36	40	41	B	Y	B	R	R	R	B	47	45	48	45	42	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	21	22	18	20	20	20	18	20	22	20	18	19	13	15	14	15	16	21	22	26	27	23	22	25		
MED	38	38	41	42	48	48	54	56	58	58	64	61	66	59	59	59	56	52	51	48	45	46	42	39		
U Q	42	40	47	45	52	55	61	62	66	68	66	70	68	68	66	64	60	60	54	54	48	49	46	44	F	
L Q	33	32	39	39	40	42	46	47	50	55	60	58	61	56	56	51	50	46	47	45	40	43	37	35	F	

IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 1998 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	34	35	27	57	31	33	26	33	36		33	42	B	40	41	77	110	33	26	34	34	30	23	23				
2	31	36	35	44	32	38	42	42	37	33	36	30	36	36	34	32	35	32	29	25	B	28	35	40				
3	28	37	34	31	36	33	32	43	33	35	72	35	40	38	34	43	42	33	26	27	31	29	C	C				
4	C	36	37	27	25	33	44	32	35	34	57	84	74	87	91	44	38	34	30	36	37	33	36	38				
5	39	44	35	38	90	39	57	37	26	30	35	34	35	47	46	74	44	47	31	32	34	34	31	35				
6	35	33	30	28	36	37	B	38	35	32	30	37	37	39	34	42	46	66	42	28	39	71	48	45				
7	49	62	45	27	67	88	B	B		B	B	B	B	B	B		B		44	66	37	44	80	76	87			
8	28	44	38	31	30	24	24	E B	31	32	40	36	E B	34	27	30	30	32	39	29	26	44	46	41	89			
9	51	50	45	40	33	32	B	40	31	28	G	G	E S	B	B	B	B	E B	B	29	38	26	24	32	23	22		
10	27	27	B	42	B	B		45	41	32	C	C	C	C	C	C	C	C	C	C	C	C	C	C	33	28	30	26
11	41	38	30	30	32	B	B		44	30	34	31	30	B	B	B E B	32	28	29	B	25	24	24	32	24			
12	38	36	44	42	43	39	25	26	36	34		28	36	30	30	28	28	26	26	33	25	18	22	17				
13	17	18	20	24	24	26	33	26	29	33	34	34	31	34			C	C	C	C	C	24	27	B E B	24			
14	18	26	34	33	36	B	40	36	27	29	32	36	32		B	B E B	35	36	40	29	26	22	E B	17	18	17		
15	17	19	33	24	36	22	34	37	36	30	31	34	34		B	B	32	32	28	28	24	24	21	28	17			
16	28	28	27	44	48	42	43	32	28	30	37	35	36	32		C	C	C	C	C	C	C	C	C	C	C		
17	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			53	34	35	26	30	30	40	95			
18	43	39	39	30	35	36	41	30	65	56	34		B	B	B	B	30	30		B	C	C	C	C	C	C		
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			26	28	33	38	44	E B	12		
20	39	38	35	41	32	37	32	37	34	34	39	37	69	70	42	40	35	48	32	41	41	57	38	71				
21	49	B	46	74	B	38	47	38	43	58		B	B	B	E B	28	33	32	26	34	26	24	24	32	22	28		
22	16	15	23	33	28	35	32	27	27	29	31	29	39	34	32	35	29	34	31	33	E B	30	19	15	18			
23	42	43	50	41	30	38	39	32	28	29	33	36	43	31	34	28	27	39	32	E B	26	28	29	18	27			
24	28	48	38	27	22	29	32	32	27	30	32	33	34	43	36	31	37	29	29	22	23	26	34	33				
25	41	43	45	42	41	36	39	39	B	31	28	30	30	32	29	28	28	39	27	35	24	42	41	34				
26	36	38	36	E S	34	35	32	31	32	33	35	38	38	37	60	40	33	32	30	68	36	32	24	18	30			
27	26	32	23	26	30	27	B	36	32	28	35	30	27	B		32	30	28	31	27	27	23	42	25	14			
28	E B	12	14	15	25	19	28	30	26	31	34	34	43	40	54	61	39	49	35	31	34	31	34	32	28			
29	E B	19	33	33	59	B	32	36	44	41	33	36	31	32	35	31	35	37	37	38	30	29	42	40	22			
30	24	38	B	38	36		B	B	40	24		B	B	B	E B E B	B	28	33	33	33	35	39	37	20	36	34	43	
31	54	44	38	32	34	31	36	35	46	B		B		31	48	44	B			30	34	28	25	22	59	66	66	
	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	28	28	27	29	26	25	23	28	28	24	24	23	22	21	20	24	25	26	26	27	28	29	27	28				
MED	32	36	35	33	34	33	36	36	32	32	34	34	36	36	34	32	33	34	30	28	30	32	32	28				
U Q	41	43	39	42	36	38	42	40	36	34	36	37	39	48	42	40	40	39	35	34	34	42	40	42				
L Q	25	30	30	28	30	30	32	32	28	30	32	30	32	32	32	30	28	31	27	26	24	26	23	22				

IONOSPHERIC DATA STATION SHOWA-ST.

JAN.1998 fmin (0.1MHz) 45'E MEAN TIME (G.M.T. + 3 H)

LAT.69'00.4'S LON.039'35.4'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	10	19	20	16	12	10	10	11	B	22	24	B	33	36	31	22	25	23	12	11	12	11	8
2	10	9	10	10	9	12	12	12	10	10	11	10	13	10	11	14	12	9	10	21	B	19	10	13
3	10	9	11	11	10	8	8	9	10	8	10	11	19	22	15	10	12	15	18	13	E S	21	C	C
4	C	13	10	8	8	9	8	8	10	10	10	11	11	13	11	10	11	9	12	9	16	9	12	15
5	16	13	12	13	10	10	9	8	10	9	9	11	11	11	11	10	10	12	10	10	8	11	11	10
6	9	10	10	10	10	E A	B	21	14	14	12	11	13	14	12	13	11	11	11	10	10	11	17	8
7	10	11	10	10	16	20	B	B	12	B	B	B	B	B	B	B	23	B	12	17	16	13	11	9
8	10	10	11	9	10	10	11	26	16	11	11	15	34	E S	E S	23	22	16	13	10	10	9	14	12
9	12	11	10	10	10	10	B	14	11	10	24	24	E S	B	B	B	B	29	14	E S	22	14	11	14
10	14	10	B	14	B	B	24	18	15	C	C	C	C	C	C	C	C	C	C	C	C	20	13	13
11	12	10	18	18	25	B	B	12	13	14	13	18	B	B	B	32	13	13	B	14	12	11	18	20
12	12	12	15	15	11	11	9	11	16	23	B	24	21	18	13	17	14	14	13	15	16	11	10	12
13	12	11	10	10	10	12	10	13	13	11	12	12	14	14	C	C	C	C	C	C	11	14	B	24
14	11	11	10	10	10	B	25	13	12	10	12	12	17	B	B	35	20	11	14	18	11	17	13	10
15	8	10	11	9	9	10	11	10	11	11	16	16	22	B	B	24	29	19	20	20	12	13	12	8
16	8	7	8	14	11	19	20	11	10	14	12	13	12	13	C	C	C	C	C	C	C	C	C	C
17	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	15	15	13	13	11	10	10	11
18	12	12	12	13	13	10	20	16	14	19	24	B	B	B	B	20	14	B	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	13	10	12	10	9
20	11	9	20	18	10	13	19	12	13	22	E B	30	18	13	12	12	12	11	11	15	13	12	16	10
21	8	B	18	18	B	12	12	12	14	12	B	B	B	24	33	24	24	21	14	12	11	9	9	8
22	8	8	7	12	11	24	12	11	10	13	12	18	20	20	19	20	20	12	12	11	8	10	8	9
23	10	25	15	22	21	22	16	12	11	11	10	11	10	12	20	19	13	20	17	26	21	15	12	11
24	8	8	18	11	10	9	9	10	14	12	11	12	13	12	13	11	10	16	12	10	11	10	10	9
25	8	10	12	12	17	17	23	34	B	24	20	18	17	20	12	16	15	13	10	10	19	20	29	10
26	10	11	11	10	10	9	9	8	11	11	12	18	14	12	12	12	17	20	E S	17	14	11	12	10
27	10	10	10	10	10	12	B	12	13	10	9	11	22	B	23	27	22	12	12	19	16	13	10	10
28	12	10	10	10	12	10	10	12	11	11	15	15	14	14	12	12	12	10	10	13	11	9	13	10
29	19	9	11	30	B	20	29	13	10	21	13	15	14	12	12	10	10	9	12	13	10	11	11	10
30	9	15	B	32	33	B	B	23	18	B	B	B	B	16	33	33	25	15	22	11	14	20	11	9
31	10	12	10	8	9	11	12	26	12	B	B	B	20	20	20	B	21	17	13	12	15	12	11	12
	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	28	29	29	29	29	29	29	29	29	28	28	28	28	28	26	26	27	27	27	27	29	29	28	28
MED	10	10	11	11	10	12	12	12	12	12	12	16	18	18	18	18	14	13	13	13	12	12	11	10
U Q	12	12	16	16	16	21	27	17	14	22	23	24	28	B	B	36	27	22	19	17	16	16	14	13
L Q	9	10	10	10	10	10	10	10	10	10	11	12	14	13	12	12	12	11	11	10	11	10	10	9

IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 1998 h'F (KM)

45° E MEAN TIME (G.M.T. + 3 H)

LAT. 69° 00.4' S LON. 039° 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	E A 274	226	A	A E A 272	234	214	204	198		B	A	A	B	A	A	A	A E A 236	A 218	A 206	A 230	198	230	252	E A			
2	A	236	232	234 252	E A 252	A	A	A	206	216	232	206	236	200	212	196	202	222	216	220		B	232	234	226		
3	E A 252	A	A E A 258	A E A 242	216	220	214	196	202	216	202	E A 272	212	200		A	208	212	214	206	212	E S 254	C	C			
4	C	A	A E A 252	232	210	224	214	208	198		A	A	A	A	A		196	210	210	224	226	230	A E A 276	A			
5	206	230	E A 250	A	218	216	A	194	198	204	204	200	218		A	A	A		A	200	194	210	A	Q 260	210		
6	A	A	A	234	250	A	B	A	232	202	196	A	228	218	202	210	214	224	202	210	218	Q	A	Q 236	266		
7	A	A	A	248	A	A	B	B	Y	B	B	B	B	B	B		210	B E A 238	A	220		A	A	A E A 268	A		
8	E A 278	A	A E A 268	A E A 262	224	200	216	202	202	234	210	218	198		A	208	204	236	204	216	E A 256	A E A 256	A	A			
9	A	A	A	A E A 248	A E A 262	B		224	198	206	200	204	204		B	B	B		214	A	214	222	228	230	246		
10	E A E A 258	264	B	208	B	B	A	A	242		C	C	C	C	C	C	C	C	C	C	C	A	A	A	262		
11	232	232	A	A	A	B	B	A	196	196	194	194		B	B	B					B	E A 204	204	236	242	A	
12	A	A	A	A	A	242	226	200	A	A	B	194	202	210	194	200	200	214	206	218	228	220	220	210			
13	E A 248	238	E A 246	228	230	222	218	216	212	206	198	204	202	202		C	C	C	C	C	C		216	244	244		
14	E A 252	246	E A E A 256	278	230		200		212	196	196		200		B	B		220	200	214	214	220	214	222	224	238	
15	244	262	E A E A 286	280	236	236	210	196	198	194	212	212	194		B	B		190	200	200	224	214	210	220	220	220	
16	230	240	270		A	A	A	A	194	194	202	202	214	214	198		C	C	C	C	C	C	C	C	C		
17	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			A E A 232	210	232		A E A 254	A	A	204		
18	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B		200	210		B	C	C	C	C		
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C						206	206	200	226	248	260	
20	A	228	A E A 286	204	Q E A 208	A E A 244	220		A		A	A	A E A 232	A E A 236		A	206	206	206		A	A	A	A	A		
21	A	B	A	A	B	A	A	A	A	A	A	B	B	B			206	208	196	198	224	204	216	224	226	238	246
22	200	E A 266	208	218	E A 256	A	214	206	204	204	192	202	E A 246	218	204	198	222	204	202	210	220	224	E A 246	E A 230			
23	E A 278	A	A	A	A	A	A		210	198	198	218	216		A	206	206	220	212	220	196	246	240	234	238	254	
24	E A E A 258	258	A	A E A 258	234	238	202	202	206	200	188	198	212		A	214	196	206	206	216	204	220	E A 254	A			
25	A	A	A	A	A E A 280	A	A		212	202	216	198	220	196	196	218	202	206		A E A 240	A	A	A	A	A		
26	E A 292	A	224	A	A E A 246	214	210	202	204	202	204	204	204	206	202	212	218	206	208	236	236	240	282	Q			
27	Q 290	236	240	224	E A 282	Q 218	B	230	238	200	196	200	198		B	192	216	212	220	206	218	Q 208	242	254	252		
28	206	E A 268	Q 248	232	222	214	214	204	206	206	214		A	A	A	196	202		A	210	204	232	228	228	236	260	
29	292	304	Q 204	A	A	B	A	Y	Y	A	214	206	214	214	220	200	208	200	220	208	240	246	Q 238	248	258		
30	Q 252	242	B	A	A	B	B	A	Y	B	B	B	B	E A 250	232	232	222	244		A	A	A	A	A	A		
31	238	248	A	238	238	A	A		A	B	A	B		A	A	B		206	216	224	210	226	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	19	17	10	15	17	15	13	17	20	21	20	17	18	17	15	19	22	25	23	24	23	20	19	21			
MED	U 241	239	238	228	U 223	220	214	210	202	202	202	204	204	209	203	202	206	215	206	216	220	228	237	U 241			
U Q	E A E A 278	E A E A 263	E A E A 256	E A E A 268	E A E A 257	242	225	216	210	206	215	213	218	220	A 212	214	212	224	214	220	230	237	248	261			
L Q	232	234	232	228	230	216	212	201	198	199	197	200	200	203	196	198	200	208	204	209	210	223	230	228			

IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 1998 fXI (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	35	43	42	44	44	42	XO	X	AO	XO	X	R	B	B	R	BO	X	X	X	X	X	X	
2	56	40	X	A	R	47	55	61	68	74	75	76	72	62	62	X	RO	X	RO	X	X	XO	XO	XO	
3	X	X	X	X	X	X	X	XO	X	XO	XO	XO	X	R	RO	XO	X	R	B	XO	X	X	X	RO	
4	O	XO	X	AO	X	R	R	R	R	R	XO	X	B	B	B	B	B	B	BO	XO	XO	XO	XO	XO	
5	A	X	X	X	XO	X	X	X	R	X	X	X	R	A	R	A	R	C	C	C	O	X	X	X	
6	39	51	XO	X	A	A	A	C	66	X	X	X	X	R	X	X	XO	X	X	X	X	X	X	X	
7	36	41	49	49	51	54	58	65	68	O	X	X	X	XO	X	Y	YO	X	R	R	R	XO	X	B	
8	O	X	A	XO	X	R	R	R	R	RO	XO	X	R	R	Y	Y	R	XO	XO	XO	XO	XO	X	S	
9	A	A	33	B	AO	XO	XO	X	R	R	RO	X	R	Y	Y	RO	X	RO	XO	X	X	X	XO	X	
10	A	B	AO	X	B	Y	B	BO	XO	X	R	B	B	B	YO	XO	X	B	BO	X	B	B	O	XO	
11	A	A	Y	Y	A	A	B	B	YO	XO	XO	X	R	O	X	X	X	BO	X	B	B	Y	A	A	
12	B	Y	A	B	YO	X	B	BO	X	B	B	B	B	B	B	Y	RO	X	BO	XO	X	XO	X	A	
13	O	X	A	A	AO	X	B	RO	XO	X	B	B	B	B	B	B	B	B	B	B	B	XO	X	A	
14	AO	X	R	A	RO	XO	XO	XO	X	G	B	B	B	B	BO	XO	X	RO	XO	XO	XO	XO	X	XO	
15	O	X	B	A	B	B	B	B	Y	XO	XO	X	R	R	R	B	RO	X	RO	XO	X	XO	X	X	
16	X	41	40	44	XO	X	X	YO	XO	X	X	X	Y	Y	X	R	X	X	X	X	X	XO	X	X	
17	43	36	S	BO	X	O	X	XO	X	YO	XO	X	XO	XO	XO	XO	XO	XO	XO	X	B	B	A	A	
18	A	G	R	R	B	Y	R	53	B	Y	R	R	R	B	B	B	BO	X	YO	XO	X	R	O	XO	
19	AO	X	40	37	BO	X	X	X	RO	X	R	R	R	R	R	R	RO	XO	X	XO	X	X	O	X	
20	A	A	A	B	B	B	B	R	O	X	R	R	B	B	B	B	BO	XO	XO	XO	XO	X	X	A	
21	B	AO	X	B	B	B	A	RO	X	X	X	X	X	X	XO	X	X	X	X	X	X	X	X	S	
22	A	A	A	A	A	X	A	Y	X	X	X	X	X	XO	XO	XO	XO	XO	X	X	X	X	X	X	
23	O	X	A	54	36	46	B	A	A	Y	YO	X	X	B	B	B	R	R	X	B	BO	X	X	A	
24	A	A	B	44	41	B	YO	X	48	60	62	65	66	72	74	74	R	XO	X	XO	XO	XO	X	X	
25	41	34	A	35	38	O	XO	X	X	X	X	X	X	X	X	X	XO	X	X	X	X	X	X	S	
26	24	30	A	40	43	49	54	62	68	71	75	80	80	84	86	77	66	63	59	54	49	49	44	45	
27	46	40	37	42	55	60	58	69	74	72	72	80	X	B	91	88	69	A	X	X	X	X	A	A	
28	A	B	A	A	B	B	A	A	R	B	RO	X	56	64	67	67	67	80	80					A	A
29																									
30																									
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	14	14	11	14	15	15	12	16	18	17	19	18	10	11	13	14	16	20	20	23	23	26	19	16	
MED	40	40	37	42	43	48	55	60	60	62	63	64	64	67	67	66	58	56	54	52	51	48	40	41	
UQ	43	44	49	44	51	54	60	63	68	72	72	72	74	81	80	69	66	65	57	54	54	51	48	46	
LQ	O	X	X	X	X	X	O	XO	XO	XO	XO	XO	X	X	X	X	XO	XO	XO	XO	X	X	X	X	

IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 1998 foF2 (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	F 20	F 22	F 22	F 30	F 35	36	R 40	A	R 52	R 50	R	B	B	R	B	R	47	49	48	48	46	42	40
2	F 34	F 36	A	R	F 37	49	55	62	68	69	J R 70	R 66	J R 56	R	R	R	40	J R 50	R 53	49	R	R	45	46	
3	41	42	F 44	F 44	48	J R 55	R 55	56	62	65	66	61	R	R	R	62	62	R	B	50	44	36	29	R 34	
4	R 35	R 38	A	G 32	R	R	R	R	R	42	45	R	B	B	B	B	B	B	R	40	38	34	40	34	31
5	A	30	30	34	J R 39	44	50	J R 53	R J 52	R J 46	R	A	R	A	D R 48	R	C	C	C	45	46	44	45	37	
6	F 28	F 42	V 36	R 39	A	A	A	C	F 56	V 62	57	52	58	R	53	54	J R 53	R 50	48	47	47	48	28	22	
7	F 24	F 29	F 38	V 43	V 45	48	J S 52	59	61	67	J R 71	67	68	61	Y	Y	36	R	R	R	J R 40	45	R	34	
8	R 26	F 31	A	30	36	R	R	R	R	R	R	62	62	R	Y	Y	R	J R 51	45	45	48	47	S	A	
9	A	A	F 25	B	A	R 35	R 34	R 36	R	R	R	R	40	Y	Y	R	R	R	40	47	44	37	38	32	
10	A	B	A	R 36	B	Y	B	B	R 39	R 39	R	B	B	B	Y	R	R	B	B	R	B	F 31	R 29	R 24	
11	A	A	Y	Y	A	A	B	B	Y	R 41	R 39	40	R	R	J R 40	J R 50	J R 51	B	R	B	B	Y	A	A	
12	B	Y	A	B	Y	R 34	B	B	R 37	B	B	B	B	B	Y	R	R	B	R	44	42	38	26	A	A
13	R 34	A	A	A	R 33	B	R	R	46	46	B	B	B	B	B	B	B	B	B	42	41	41	R 41	A	F 24
14	A	R 38	R	A	R	R 38	42	48	R 48	R 39	B	B	B	B	R	R	R	R	50	48	47	42	38	29	25
15	S 29	B	A	B	B	B	B	B	Y J 55	R 47	R 48	R	R	R	R	B	R	R	D R 48	42	48	46	42	41	38
16	V 35	F 32	F 34	V 38	S 47	42	Y	R 56	56	61	60	Y	Y J 55	R 58	R J 56	J R 56	J R 55	J R 54	J R 50	49	49	46	41	40	
17	F 34	F 20	F S	B	S 34	40	55	58	54	Y	57	61	J R 56	R J 60	R J 60	61	62	62	47	R	B	B	A	A	A
18	A	G 33	R	R	B	Y	R	F 34	B	Y	R	R	R	B	B	B	R	Y	R	R	R	R	R	R	R
19	A	R 34	F 31	B	R J 35	R 42	F J 32	D R 48	R 40	R 51	R	R	R	R	R	R	49	48	47	45	42	20	26	R A	
20	A	A	A	B	B	B	B	R	R 38	R	R	R	B	B	B	B	R	R	47	43	44	42	34	12	F A
21	B	A	F 25	B	B	B	A	R	R J 40	R 55	57	56	59	57	J R 55	57	52	J R 49	48	46	46	38	21	F S	
22	A	A	A	A	A	32	A	A	39	51	J R 51	R 50	58	60	64	66	61	R 60	J R 49	48	48	29	27	19	
23	S 28	A	A	F 30	F 36	B	A	A	Y	Y	J R 57	R 54	B	B	B	R	R J 52	B	B	R	R	45	36	28	
24	A	A	B	F 22	F 30	B	Y	42	54	56	59	60	J R 66	R J 68	R J 68	R	56	59	52	R	R	44	45	40	
25	F 29	F 28	A	F 26	F 30	R 40	R J 48	R 56	63	68	64	68	J R 74	R J 75	R J 88	76	64	59	J R 54	54	50	42	J S 35	S	
26	F 18	F 21	A	F 26	F 33	F 40	48	56	J S 62	F 65	69	74	74	78	80	73	60	57	J R 53	48	43	43	38	34	
27	F 40	F 25	F 24	F 33	F 36	F 50	F 56	66	F 66	F 61	F 66	74	R	B	R	82	63	A	59	57	55	44	33	F A	
28	A	B	A	A	B	B	A	A	R	B	R	R	F 50	F 58	F 59	60	61	J R 74	R 74		Y	Y	F 22	A	A
29																									
30																									
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	14	15	10	14	15	14	12	16	19	18	19	18	11	10	13	15	16	20	21	23	23	25	19	16	
MED	32	F 32	F 30	32	36	40	49	54	54	56	57	58	58	60	60	60	52	50	48	46	45	40	34	34	
U Q	35	38	F 36	38	39	44	54	56	62	65	66	66	J R 68	R 68	74	63	60	59	J R 51	R 48	48	44	41	39	
L Q	F 28	F 28	F 25	F 26	F 33	35	38	44	R 40	51	51	R 50	R J 56	R 58	54	51	40	48	44	44	41	32	F 28	F 24	

IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 1998 ftes (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	104	66	20	32	32	25	36	30	39	42	30	35	39	B	B	33	B	28	35	40	38	32	46	48				
2	40	50	70	40	25	27	28	33	33	29	30	40	42	30	33	47	39	39	28	32	23	18	14	E B				
3	12	E B	11	14	21	18	26	28	28	28	31	35	44	36	38	40	30	B	31	E B	30	30	31	41	42			
4	44	47	46	35	28	39	39	46	41	31	31	B	B	B	B	B	B	B	E B	B	28	39	35	37	36	37		
5	36	32	31	26	18	20	28	32	34	31	36	50	104	37	55	40	C	C	C		29	21	32	37	36			
6	37	41	50	43	48	51	45	C																				
7	28	30	28	24	18	26	21	23	E B	E B	B	24	26	34	39	38	40	39	31	32	25	26	22	20	19	26	20	
8	31	44	56	37	32	46	42	48	43	26	28	31	31	36	39	38	48	32	39	28	22	E B	18	39	41			
9	36	45	25	B	41	29	25	35	42	26	31	33	34	38	24	32	25	E B	E B	B	30	29	24	32	31	38	46	
10	39	B	41	34	B	36	B	B	31	28	26	B	B	B	B	E B	E B	B	B	B		21	B	E B	24	17	17	
11	28	58	22	34	72	42	B	B	35	30	31	E B	32	32	31	26	25	B	26	B	B	B	B	26	51	68		
12	B	30	35	B	28	32	B	B	28	B	B	B	B	B	B	B	E B	B	B		26	27	23	28	38	40		
13	37	41	42	68	29	B	37	28	38	B	B	B	B	B	B	B	B	B	B	B		22	E B	E B	23	37	20	
14	32	36	36	40	39	38	27	22	23	G	B	B	B	B	B	G	G	E B	E B	E B	E B	E B	E B	E B	E B	E B	K	
15	33	B	43	B	B	B	B	B	39	34	G	33	32	E B	E B	B	B	E B	E B	B	22	26	24	26	20	16	12	33
16	25	36	32	35	32	38	40	35	28	32	34	34	35	33	32	36	34	37	21	22	27	20	16	26				
17	26	34	34	B	40	40	35	25	27	32	E B	34	28	32	34	36	38	39	G		B	B	104	102	61			
18	37	49	39	34	B	31	40	36	B	17	36	44	B	B	B	B	B	G		28	25	36	37	38	42	102		
19	44	45	40	B	36	32	26	26	33	30	28	30	30	31	32	32	26	28	G		16	18	18	34	89			
20	34	38	56	B	B	B	B	42	35	30	31	B	B	B	B	B	E B	E B	B	30	26	25	26	19	27	17	37	
21	B	43	42	B	B	B	48	42	39	27	30	34	35	37	30	29	28	25	26	28	22	26	41	35				
22	39	52	57	56	42	38	40	43	65	G	27	28	30	30	33	32	30	30	B	E B	E B	E B	24	27	19	16	17	23
23	35	40	37	30	24	B	41	39	34	39	31	30	B	B	B	E B	E B	B	33	30	21	B	B	31	34	36	94	
24	37	35	B	40	70	B	28	40	26	24	30	27	27	31	27	26	E B	B		E B	E B	E B	E B	E B	E B	E B	E B	
25	17	28	37	33	17	15	19	16	19	24	26	28	27	29	32	34	29	27	21	22	28	16	35	26				
26	16	31	38	29	26	16	25	27	30	36	43	42	39	35	34	36	34	46	40	34	54	47	69	42				
27	38	21	26	34	27	25	17	32	34	26	55	32	B	E B	B	63	36	39	66	39	47	36	42	32	33	44		
28	48	B	44	42	B	B	41	43	38	B	41	33	30	28	27	26	30	33	B		41	35	28	46	45			
29																												
30																												
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	25	27	21	22	21	23	23	27	25	25	22	19	19	22	23	23	22	22	25	25	28	27	28				
MED	36	40	38	34	30	32	35	33	34	28	31	33	34	34	32	33	30	28	26	27	25	26	36	37				
U Q	39	46	44	40	40	38	40	42	39	32	34	35	39	37	36	38	34	32	34	33	34	32	41	46				
L Q	28	32	31	31	25	26	26	27	28	26	28	30	30	31	30	29	29	26	24	22	20	18	17	22				

FEB. 1998 ftes (0.1MHz)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 1998 fmin (0.1MHz) 45'E MEAN TIME (G.M.T. + 3 H)

LAT. 69'00.4'S LON. 039'35.4'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	23	10	10	10	8	9	10	145	13	25	11	23	19	B	B	11	B	16	12	13	12	13	11	9	
2	11	19	19	20	13	9	9	8	9	12	15	12	12	14	19	14	15	12	12	9	8	12	11	13	
3	7	11	9	6	10	8	9	9	9	10	11	12	13	13	22	21	13	B	10	30	10	10	8	10	
4	10	13	9	12	21	10	11	13	17	11	14	B	B	B	B	B	B	B	B	28	22	11	12	11	10
5	9	9	10	10	10	10	10	11	12	11	12	16	19	20	16	14	C	C	C	12	11	10	9	9	
6	8	17	10	11	10	10	11	C	10	10	12	11	13	16	11	11	10	18	10	11	11	10	10	10	
7	9	7	8	9	9	10	12	11	29	30	24	32	20	22	24	29	29	24	17	12	11	11	B	8	
8	E S	12	8	8	10	21	12	11	11	11	10	12	12	13	12	10	13	10	13	13	21	17	18	11	11
9	10	11	10	B	10	19	11	12	11	13	12	12	12	19	11	13	14	30	29	10	10	10	9	12	
10	22	B	14	16	B	13	B	B	12	19	14	B	B	B	27	31	31	B	B	19	B	12	17	9	
11	9	11	11	14	17	23	B	B	23	17	16	32	11	21	21	17	B	13	B	B	B	14	E S	9	
12	B E S	18	18	B	20	18	B	B	15	B	B	B	B	B	28	16	30	B	23	18	12	E S	17	10	15
13	E S	16	17	19	12	24	B E S	17	11	12	B	B	B	B	B	B	B	B	B	15	23	23	11	11	
14	9	9	18	17	20	14	12	12	8	11	B	B	B	B	18	13	17	26	24	26	20	16	9	8	
15	10	B	19	B	B	B	B	B	21	13	13	19	17	34	34	B	32	27	17	14	13	12	14	10	
16	7	9	8	8	11	10	20	14	12	13	13	30	30	24	29	22	19	17	13	13	10	9	10	7	
17	6	6	11	B	17	12	10	11	12	26	34	18	17	22	18	30	16	11	11	B	B	13	10	9	
18	9	10	21	14	B	20	12	8	B	12	10	24	B	B	B	B	22	24	10	15	17	13	13	11	
19	8	10	9	B	10	7	10	8	10	9	10	12	11	20	15	28	14	12	12	10	11	11	10	32	
20	10	12	20	B	B	B	B	24	23	14	13	B	B	B	B	B	30	22	15	11	14	10	8	10	
21	B	11	12	B	B	B	23	18	14	14	14	12	13	12	21	18	13	13	11	13	12	12	8	9	
22	8	13	11	16	18	19	19	25	20	13	13	19	18	14	30	32	30	30	19	12	13	9	8	8	
23	7	7	8	8	8	B	19	25	24	26	13	20	B	B	B	33	30	14	B	B	23	22	8	9	
24	9	21	B	9	9	B	19	22	12	11	11	13	18	20	22	20	31	22	13	31	25	21	15	10	
25	9	8	10	10	14	12	12	9	8	10	12	22	18	25	28	19	23	20	14	9	8	8	8	8	
26	8	7	8	8	10	10	8	9	11	9	11	11	12	16	11	9	10	11	9	9	8	10	9	8	
27	8	8	7	10	8	11	8	10	10	12	11	13	B	63	20	23	13	13	12	13	10	10	10	7	
28	11	B	12	11	B	B	23	11	21	B	16	19	20	14	16	11	14	9	B	17	11	8	14	15	
29																									
30																									
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	28	28	28	28	28	28	28	27	28	28	28	28	28	28	28	28	27	27	27	28	28	28	28	28	28
MED	9	10	10	12	16	12	12	12	12	13	13	19	18	22	22	20	22	20	14	14	12	12	10	10	
U Q	11	17	18	B	B	B	B	B	20	22	16	32	B	B	B	B	B	B	B	22	18	14	12	11	
L Q	8	8	9	10	10	10	10	10	10	11	12	12	13	16	17	14	14	13	12	12	10	10	9	8	

IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 1998 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	226	216	216	216	200	198	242	E A	A	A	202	206	E A	B	B	210	B	210	E A	E A	A	A	E A	E A	
2	E A	250	196	A	A	A	246	214	204	196	208	216	A	224	204	210	210	202	202	200	218	222	226	222	222	
3	242	254	E A	A	250	236	218	208	196	196	210	216	A	222	222	A	200	B	210	B	228	244	A	216		
4	210	210	200	234	A	A	A	A	A	230	222	B	B	B	B	B	B	B	E B	B	A	A	234	234	E A	
5	A	224	214	210	208	244	222	220	220	214	214	210	A	A	A	A	C	C	C	210	204	230	238	228		
6	216	220	252	A	A	A	A	C	202	202	226	A	A	246	232	212	208	208	208	224	224	238	250	260		
7	230	214	E A	E A	E A	A	220	204	224	200	200	200	248	A	A	A	202	E B	244	238	232	230	B	220		
8	S	198	224	A	A	A	A	A	A	206	202	198	A	A	A	A	A	210	A	A	222	242	A	A		
9	E A	254	A	B	A	A	A	A	A	196	196	246	E A	A	A	204	196	210	224	232	222	E A	A	A		
10	A	B	A	A	B	A	B	B	A	216	204	B	B	B	B	A	222	228	B	B	222	B	244	E B	A	
11	216	A	A	A	A	A	B	B	A	208	234	206	A	E A	A	222	B	218	B	B	B	A	A	A		
12	B	A	A	B	A	A	B	B	234	B	B	B	B	B	A	222	222	B	228	E A	258	248	240	A	A	
13	230	A	A	A	A	B	A	246	198	B	B	B	B	B	B	B	B	B	B	238	248	250	A	A		
14	224	212	A	A	A	224	218	208	220	B	B	B	B	B	B	222	212	220	218	E B	224	224	234	226	266	232
15	236	B	A	B	B	B	B	A	204	194	248	204	238	232	B	220	226	226	236	232	236	236	236	236	Q	
16	E A	262	274	Q	Q	264	254	A	232	206	206	200	A	A	A	202	A	206	230	212	198	238	226	226	Q	Q
17	274	332	S	A	B	196	206	244	218	202	E B	238	210	212	236	228	A	E A	250	198	A	B	B	A	A	A
18	A	Q	A	A	B	Y	E A	A	B	Y	A	A	B	B	B	B	244	A	250	270	A	A	A	A	A	
19	A	216	200	B	E A	240	208	A	214	238	216	216	202	216	202	228	210	210	218	230	204	232	A	232	A	
20	A	A	A	B	B	B	B	A	A	A	232	B	B	B	B	B	222	222	218	238	Q	238	270	A	A	
21	B	E A	276	F	B	B	B	A	A	218	210	228	230	230	208	202	204	206	214	226	234	A	238	238	248	A
22	A	A	A	A	A	A	A	A	242	204	200	218	218	222	236	218	218	218	196	262	236	260	F	260	A	
23	224	A	A	A	A	B	106	A	A	A	254	234	B	B	B	218	216	224	B	B	248	262	234	A	A	
24	A	A	B	F	A	B	A	A	218	202	206	206	206	206	214	214	216	224	Q	208	244	244	244	236	Q	Q
25	Q	F	A	A	A	256	230	222	192	204	216	210	206	246	216	228	208	208	220	232	220	228	A	A	A	
26	A	A	E A	A	A	218	232	202	202	224	214	234	208	208	214	204	200	220	218	216	234	226	228	254	F	
27	F	S	S	A	A	A	224	218	204	214	210	196	B	B	A	224	258	A	A	244	234	226	E A	A	A	
28	A	B	A	A	B	B	A	E A	A	B	A	244	214	214	214	218	208	208	B	A	A	A	A	A	A	
29																										
30																										
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	14	16	9	6	7	11	10	14	17	20	23	18	12	13	17	17	21	21	19	22	21	23	16	13		
MED	230	222	219	226	228	236	221	217	206	207	212	210	214	214	219	214	210	218	221	229	234	239	235	230		
U Q	242	264	253	258	264	246	230	232	222	215	226	234	227	237	230	222	221	224	232	238	238	250	251	257		
L Q	224	213	207	216	208	208	214	208	200	203	202	206	207	205	212	210	206	209	210	222	223	230	230	225		

FEB. 1998 h'F (KM)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 1998 f_{XI} (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	B	B	A	O	X	X	X	X	X	O	X	B	X		B	A	A	A	
2	B	B	B	X	A	A	B	B	A	Y	B	B	B	B	O	X	O	B	O	X	O	X	A	A	A
3	A	A	A	66	A	A	A	A	B	B	B	B	R	R	O	X	O	X	O	X	X	X	X	R	
4	A	A	A	A	O	X	O	X	Y	A	O	X	O	X	O	X	B	B	X	X	X	B	A	A	
5	Y	O	X		A	A	A	X	A	O	X	O	X	R	B	B	B	O	X	X	X	O	X	X	
6	40	34	31	28	43	44	44	47	53	57	61	69	72	66	69	70	69	64	56	55	47	44	42	43	
7	40	38	40		A	A	A	R	A	A	Y	B	B	X	O	X	O	X	O	X	O	X	O	X	
8				29	58	42	50	59	66	58	65	70	69	72	72	73	66	62	56	52			41	40	
9	38	38	40	40	41	56	58	67	63	68	79	83	82	86	86	87	74	70	67	55	46	42	41	43	
10	43	42	27	36	32	31	47	59	62	62	70	58	68		90	75	98	74	46		31	A	A	O	
11	A	56	B	B	90	Y	A		O	X	B	B	B	B	B	B	B	B	B	S	Y	R	R	O	
12	X	A	B	B	B	B	B	B	R	B	B	B	B	B	B	B	O	X	O	X	B	X	O	X	
13	A	A	A	A	A	A	B	B	B	B	O	X	B	B	B	B	B	B	X	X	X	O	X	Y	
14	R	R	B	B	A	A	Y	X	B	B	R	B	B	O	X	B	B	B	O	X	O	X	A	A	
15	B	A	A		B	B	B	B	B	O	X	B	B	R	B	B	O	X	B	B	B	B	B	A	
16	O	X	X	A	A	B	R	B	B	R	B	R	B	B	R	O	X	X	B	O	X	A	A	A	
17	A	O	X	A	O	X	B	Y	B	Y	Y	B	R	B	O	X	X	B	X	X	O	X	O	X	
18	38	48	B	A	A	B	A	R	R	X	B	B	B	O	X	O	X	X	O	X	X	X	X	X	
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	X	X	X	X	X	X	
20	57	A	O	X	A	R	O	X	O	X	X	C	C	X	X	X	O	X	B	O	X	B	X	A	
21	50	38	116	46	A	A	A	O	X	O	X	O	X	R	O	X	B	B	O	X	O	X	O	X	
22	A	O	X		A	A	A	A	B	O	X	O	X	O	X	X	B	B	B	X	O	X	X	Y	
23	O	X	O	X	A	R		B	B				O	X	O	X	X	X	X	X	X	X	X	X	
24	A	A	A	O	X	57	46	56	45	53	62	65	72	75	90	85	77	75	73	68	29		66		
25	B	A	R	B	B	R	O	X	Y	O	X	X	X	O	X	O	X	X	O	X	O	X	A	A	
26	A	O	X	A	35	43	A	O	X	O	X	X	X	O	X	O	X	X	O	X	X	X	A	A	
27	56	45	40	42	68	A	88	B	B	R	O	X	X	B	B	X	B	O	X	X	X	X	B	Y	
28	54	A	A	B	A	B	B	B	B	B	R	X	X	X	X	B	B	B	B	B	X	B	B	Y	
29	A	A	O	X	B	A	A	A	B	B	B	O	X	O	X	X	O	X	X	X	X	A	A	A	
30	A	B	B	B	A	R	R	O	X	O	X	X	B	B	B	B	B	B	B	X	B	O	X	O	
31	A	A	B	B	A	R	A	B	B	B	B	B	B	B	B	B	B	B	B	X	O	X	X	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	12	14	12	14	13	8	9	12	14	16	15	15	15	19	18	19	20	24	26	25	18	15	15	11	
MED	40	39	40	40	43	44	47	48	53	54	61	63	70	65	70	69	66	62	56	50	44	42	40	40	
UQ	52	45	54	46	79	48	58	54	57	62	66	69	72	72	72	73	72	65	57	54	47	44	42	43	
LQ	38	38	32	36	37	34	45	44	48	46	46	45	56	57	58	58	57	56	52	42	34	38	34	32	

MAR. 1998 f_{XI} (0.1MHz)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 1998 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	B	B	A	R	R	J	R	R	J	R	R	B	J	R		B	A	A	A		
2	B	B	B	20	A	A	B	B	A	Y	B	B	B	B	R	41	40	B	R	R	R	A	A	A	A		
3	A	A	A	R	A	A	A	A	B	B	B	B	R	R	U	R	R	R	S					F	R		
4	A	A	A	A	R	R	Y	A	R	R		R	R	R	B	B					B	A	A	A	A		
5	Y	R	37	30	20	A	A		42	48	46	R	B	B	B	B	57	52	50	48	46	42	37	36	35		
6	F	31	28	22	19	22	30	38	41	47	51	55	63	66	60	63	64	62	58	50	49	41	38	36	33		
7	F	28	21	20	A	A	A	R	A	A	Y	B	B		62	62	66	64	56	50	J	R	R	R	F	F	
8	A	A	23	A	F	F	F	F	S	J	R			R	66	66	66	67	60	56	50	46		33	30	28	
9	F	28	26	30	30	31	30	41	58	57	62	73	77	76	80	80	81	68	64	61	49	40	34	30	32		
10	F	35	32	18	26	26	25	36	43	49	56	60	52	62		74	65	77	64	40		14	A	A	R		
11	A	22	B	B	Y	Y	A	F	R	B	B	B	B	B	B	B	B	B	B	B	S	Y	R	R	R	36	
12	32	A	B	B	B	B	B	B	R	B	B	B	B	B	B	B	B	R	R	B		R	J	R	R	R	
13	A	A	A	A	A	A	B	B	B	B	R	B	B	B	B	B	B	B	59	54	34	23	R	Y	Y	R	
14	R	R	B	B	A	A	Y		B	B	R	B	B	R	B	B	B	B	B	R	R	R	A	R	A		
15	B	A	A	F	B	B	B	B	B	F	B	B	R	B	B	B	R	B	B	B	B	B	B	A	A	A	
16	R	J	R	A	A	A	B	R	B	B	R	B	R	B	B	R	R	50	49		B	43	33	A	A	A	A
17	A	R	34	A	F	R	B	Y	B	Y	Y	B	R	B	U	R		B	J	R	R	R	F	F	F	F	
18	F	30	42	B	A	A	B	A	R	R		B	B	B	R	R		58	50	50	50	38	30	18		B	
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		52	51	44	36	32	22	18	
20	R	A	R	A	A	R	R		J	R	R	C	C	J	R		R	B		B	J	F	A	A	R	A	
21	R	R	R	R	A	A	A		R	R	R	R	R	R	R	R	B	B	R	R	F	F			F	A	
22	A	R	F	F	F	F	F	A	A	B	R	R	R	R		B	B	B		U	R	Y	Y	A	Y		
23	E	G	R	A	R	A	B	B	B	F	F	60	63	65	J	R	J	R		J	R	F	F	F	F	F	
24	A	A	A	R	F	F	F	R	R	R	R	R	R	J	R	J	R	R	R		B	R	A	A	A	A	
25	B	A	R	B	B	R	Y	R	R	F	J	R	F				J	R			A	A	A	A	A	A	
26	A	R	F	A	F	F	A	R	J	R			R	R	62	63	68	82	66	J	R	F	A	A	A	A	
27	A	F	F	R	A	A	A	B	B	R			B	B	J	R	J	R	B	R		F	J	R	B	Y	A
28	A	A	A	B	A	B	B	B	B	B	R		57	58	58		B	B	B	B	B	J	R	B	B	Y	A
29	A	A	R	B	A	A	A	B	B	B	R		42	43	J	R	R				A	A	A	A	A	F	24
30	A	B	B	B	A	R	R	R	R		B	B	B	B	B	B	B	B	B		45		34	34	A	A	A
31	A	A	B	B	A	R	A	B	B	B	B	B	B	B	R	B	J	R		J	R	R	B	B	Y	Y	
	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	14	12	11	9	8	8	12	14	16	15	15	15	19	18	19	20	24	26	23	18	13	14	11			
MED	30	29	F	F	F	F	F	F	R		R		R	R	R	R	60	56	50	44	38	34	30	31	F	F	
U Q	32	34	R	R	F	F	F	42	49	56	60	63	66	66	66	67	66	59	51	R	46	41	38	36	33	F	F
L Q	F	28	23	F	F	F	F	R		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	F	F

IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 1998 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	44	42	125	32	37	44	B	B	41	33	32	27	30	29	30	27	26	B	27	24	B	42	72	75				
2	B	B	B	31	34	38	B	B	42	G	B	B	B	B	G	26	B	25	GE	B	20	40	60	K	K			
3	76	35	36	38	58	G	38	42	B	B	B	BE	B	31	34	36	40	29	56	25	22	20	44	17	32			
4	33	34	44	48	34	30	36	40	36	26	G	26	29	30	B	B	B	G	G	21	B	115	47	47	42			
5	K	39	50	40	29	59	42	41	32	26	28	26	B	B	B	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE			
6	16	24	36	31	22	26	16	17	21	G	33	28	27	36	35	34	34	33	28	G	19	14	27	26				
7	25	19	38	43	49	50	42	59	59	26	B	B	31	28	31	29	28	E	B	23	23	24	E	B				
8	44	66	36	39	37	36	35	20	35	24	25	29	33	42	48	36	37	24	20	44	96	62	38	69				
9	104	29	34	33	28	14	22	20	31	35	44	42	42	44	45	64	68	60	63	42	38	42	27	17				
10	34	20	34	43	43	48	25	30	23	27	E	B	28	27	B	27	26	23	31	26	B	44	65	43	36			
11	43	34	B	B	38	16	40	23	26	B	B	B	B	B	B	B	B	B	B	B	S	25	29	34	38			
12	38	95	B	B	B	B	B	B	36	B	B	B	B	B	B	B	BE	B	B	27	E	B	21	14	34	29		
13	38	75	41	38	42	36	B	B	B	BE	B	B	B	B	B	B	B	BE	B	22	24	24	15	20	29	38		
14	40	44	B	B	40	45	34	26	B	BE	B	B	BE	B	B	B	B	B	BE	B	32	22	22	40	60	80		
15	B	40	42	40	B	B	B	B	B	25	B	BE	B	B	B	B	B	B	B	B	B	B	B	B	43	32		
16	34	35	39	49	48	B	36	B	B	39	B	B	B	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE		
17	K	36	41	37	27	22	B	B	40	38	BE	B	BE	B	30	28	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE		
18	19	20	B	42	48	B	41	36	34	26	E	B	B	B	33	31	27	24	E	BE	B	15	15	11	13	B		
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	21	16	14	15	12	E	S	11	12	
20	35	43	40	41	42	39	26	44	31	22	C	C	E	BE	B	E	B	B	B	49	BE	B	42	39	29	43		
21	95	36	85	58	35	42	38	41	38	23	25	26	27	26	26	B	B	B	33	21	27	43	45	65	49			
22	43	Q	Q	27	26	25	20	42	46	BE	B	30	27	31	28	B	B	B	Q	E	BE	BE	BE	BE	BE	BE	BE	
23	34	27	32	29	47	B	B	B	27	26	25	25	26	29	27	26	23	19	15	13	11	12	11	12	11	12		
24	31	40	43	Q	33	16	16	15	20	22	24	28	E	BE	BE	BE	BE	BE	BE	BE	BE	B	F	Q	44	87		
25	B	46	30	B	B	39	38	35	35	26	24	27	25	26	E	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE		
26	56	42	40	76	38	39	42	37	25	22	26	35	28	32	26	42	E	B	E	B	55	30	24	16	34	41	48	45
27	36	43	72	45	43	36	58	B	B	39	26	28	B	BE	BE	B	BE	BE	B	BE	BE	B	B	B	20	36		
28	41	43	49	B	40	B	B	B	B	BE	B	B	29	24	B	B	B	B	B	BE	B	B	B	B	21	38		
29	39	54	35	B	41	40	37	B	B	B	30	27	23	26	33	25	22	21	14	31	92	104	75	56	56			
30	48	B	B	B	37	28	21	E	B	20	23	B	B	B	B	B	B	B	BE	B	B	B	B	B	40	42	36	33
31	35	50	B	B	41	28	41	B	B	B	B	B	BE	B	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	B	B	14	
	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	28	23	22	27	23	23	18	21	21	18	16	18	20	19	19	20	24	26	25	28	27	30	30				
MED	38	40	39	38	40	36	37	34	34	26	26	28	28	30	28	28	27	24	21	22	32	41	35	36				
U Q	44	45	43	43	43	42	41	41	39	30	31	28	31	34	36	34	34	30	26	27	41	45	46	45				
L Q	34	34	35	31	34	26	25	20	26	22	25	27	27	28	27	27	24	E	BE	B	22	19	16	20	23	21	29	

IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 1998 fmin (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	10	12	15	11	26	21	B	B	15	20	14	13	12	12	14	13	23	B	20	11	B	12	13	13	
2	B	B	B	9	26	16	B	B	19	19	B	B	B	B	17	19	B	20	11	20	10	17	11	11	
3	16	24	22	10	14	24	19	17	B	B	B	B	31	23	22	19	19	18	11	10	11	8	7	7	
4	8	9	13	20	15	14	26	20	12	13	17	15	29	30	B	B	15	11	9	B	33	12	12	10	
5	8	7	11	9	17	14	15	13	12	17	23	B	B	B	B	33	28	24	21	23	11	14	11	10	
6	9	14	9	9	9	9	12	10	11	12	14	28	16	14	13	11	12	16	14	14	11	10	8	6	
7	9	7	6	16	13	16	24	20	15	19	B	B	29	19	31	12	12	23	14	19	23	23	15	10	
8	8	8	7	8	10	8	8	12	12	12	12	20	19	14	14	12	13	17	12	14	10	10	7	8	
9	7	6	6	7	7	10	9	15	9	14	14	14	14	29	18	19	19	18	21	19	15	13	8	8	
10	9	9	8	9	7	8	8	10	10	13	31	14	11	B	20	21	18	12	21	B	8	19	14	11	
11	13	10	B	B	12	11	24	12	23	B	B	B	B	B	B	B	B	B	B	S	12	8	9	10	
12	10	13	B	B	B	B	B	B	24	B	B	B	B	B	B	B	30	22	B	14	21	8	9	10	
13	11	9	23	24	19	20	B	B	B	B	30	B	B	B	B	B	B	23	14	24	11	9	10	8	
14	13	21	B	B	21	22	24	19	B	B	29	B	B	34	B	B	B	B	32	20	12	11	10	9	
15	B	28	21	12	B	B	B	B	B	21	B	B	30	B	B	B	23	B	B	B	B	22	16		
16	10	7	25	20	14	B	22	B	B	22	B	22	B	B	30	33	25	B	30	11	10	11	11	10	
17	16	11	11	9	10	B	20	B	20	23	B	32	B	30	21	B	27	24	18	23	22	10	10	8	
18	11	17	B	23	16	B	22	26	20	26	B	B	B	24	28	19	19	22	20	11	10	11	10	B	
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	15	12	12	10	9	11	8	
20	9	12	12	12	14	23	20	10	11	16	C	C	32	29	21	30	B	B	B	19	11	11	9	20	
21	12	15	9	14	10	17	12	18	21	16	17	17	17	18	26	B	B	23	11	8	8	9	9	12	
22	11	8	8	8	12	10	9	14	9	B	30	24	31	22	B	B	B	12	26	16	9	9	8	8	
23	11	9	9	18	16	B	B	B	22	18	18	22	19	21	12	19	14	13	15	10	11	12	11	12	
24	10	12	17	14	12	9	10	12	13	14	22	26	56	32	57	27	26	19	22	B	9	8	11	10	
25	B	25	16	B	B	30	12	20	20	13	20	14	15	18	29	30	59	24	23	12	18	11	9	8	
26	8	9	8	15	8	12	14	16	17	16	17	19	12	20	20	15	54	23	24	9	15	12	12	13	
27	19	9	11	12	18	23	25	B	B	24	20	20	B	B	38	28	E B	E B	28	23	11	9	B	16	8
28	24	15	11	B	15	B	B	B	B	B	33	55	21	17	B	B	B	B	B	28	B	B	13	10	
29	10	15	16	B	31	29	32	B	B	B	23	19	20	26	33	25	18	21	10	8	14	13	9	10	
30	10	B	B	B	19	15	16	20	17	20	B	B	B	B	B	B	B	B	B	B	18	11	10	19	8
31	15	18	B	B	12	15	32	B	B	B	B	B	B	B	B	B	33	34	23	20	13	12	B	11	
	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	29	29	30	30	30	30	30	31	31	30	31	31	31	31	
MED	10	12	14	14	14	18	22	20	20	20	30	28	31	29	30	30	28	23	20	15	11	11	11	10	
U Q	15	17	B	B	19	30	32	B	B	B	B	B	B	B	B	B	B	B	B	B	18	14	13	11	
L Q	9	9	9	9	12	12	12	14	12	16	18	19	19	20	20	19	19	18	14	11	10	9	9	8	

IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 1998 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	B	B	A	242	208	200	220	212	224	216	224	B	260	250	B	A	A	A	
2	B	B	B	A	A	A	B	B	A	A	B	B	B	B	228	220	B	252	280	302	A	A	A	A	
3	A	A	A	A	A	A	A	A	B	B	B	B	244	238	238	232	212	E A	256	234	234	232	E A	E A	A
4	A	A	A	A	A	194	A	A	A	208	206	202	216	224	B	B	236	234	248	B	A	A	A	A	
5	A	230	A	246	A	A	A	A	266	218	222	B	B	B	BE	B	246	220	220	228	240	228	246	246	
6	244	A	A	A	A	AE	A	268	212	230	220	E A	228	208	214	182	216	216	230	218	220	212	224	230	240
7	234	E A	A	A	A	A	A	A	A	Y	B	B	220	220	244	214	214	214	230	230	220	E B	264	250	234
8	A	A	A	A	A	A	A	206	226	218	206	210	216	A	A	238	214	218	218	238	A	A	270	248	228
9	AE	AE	SE	S	A	A	E A	228	238	224	224	E AE	A	A	A	A	AE	A	A	256	232	240	260	258	248
10	248	242	316	244	244	240	E A	278	246	214	204	232	216	208	B	218	230	208	238	A	B	F	A	A	A
11	A	A	B	B	A	Y	A	260	A	B	B	B	B	B	B	B	B	B	B	S	A	A	A	A	226
12	230	A	B	B	B	B	B	B	A	B	B	B	B	B	B	B	238	256	B	258	E B	278	208	282	A
13	A	A	A	A	A	A	B	B	B	BE	B	B	B	B	B	B	B	230	234	280	A	A	A	A	A
14	224	A	B	B	A	A	AE	A	B	B	224	B	BE	B	B	B	B	BE	B	246	316	A	A	A	A
15	B	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	224	B	B	B	B	B	B	A	A
16	238	228	A	A	A	B	A	B	B	A	B	232	B	B	E B	248	262	244	B	B	308	A	A	A	A
17	A	262	A	210	210	B	A	B	A	A	B	B	B	B	228	220	B	234	224	214	236	234	254	254	254
18	E A	254	198	B	A	A	B	A	A	A	242	B	B	B	234	240	228	224	220	220	220	210	232	E B	B
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	218	218	214	222	230	246	A
20	232	A	212	A	A	A	A	E A	226	254	238	C	C	B	238	220	230	E B	274	260	Q	A	A	A	A
21	E A	274	274	242	232	A	A	A	244	A	238	244	232	242	238	242	B	B	A	Q	F	224	220	A	A
22	AE	A	AE	A	A	244	236	A	A	BE	BE	AE	B	B	B	B	B	240	230	230	216	A	A	A	A
23	232	230	218	A	A	B	B	BE	A	304	250	214	244	238	220	234	214	210	214	198	202	216	230	242	E B
24	A	A	A	220	A	A	E A	296	246	222	236	214	228	244	258	224	242	222	220	B	A	A	A	A	206
25	B	A	A	B	B	A	A	A	A	228	236	238	228	228	228	262	B	268	B	A	A	A	A	A	A
26	AE	A	F	244	200	212	A	238	218	226	218	226	238	E A	226	258	332	256	224	224	A	A	A	A	A
27	A	200	202	E A	A	A	A	B	B	A	E A	E A	B	BE	BE	B	B	258	222	256	A	B	A	A	A
28	A	A	A	B	A	B	B	B	B	BE	B	BE	A	246	226	B	B	B	B	B	B	B	B	A	A
29	A	A	A	B	A	A	A	B	B	BE	B	296	236	240	240	240	226	214	206	224	A	A	A	220	208
30	230	B	B	B	A	A	A	B	BE	A	B	B	B	B	B	B	B	B	268	B	218	216	A	A	A
31	A	A	B	B	A	A	A	B	B	B	B	B	B	220	B	248	252	226	226	226	220	B	B	Y	Y
	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	11	12	6	10	4	5	5	9	9	16	18	16	16	18	17	18	18	23	23	22	14	13	13	10	
MED	233	232	222	240	226	240	252	238	224	230	222	229	231	225	230	223	224	227	225	235	220	231	248	234	
U Q	E A	E A	E	252	243	267	287	246	260	240	250	240	241	238	243	246	238	256	246	258	232	262	262	246	
L Q	230	229	212	232	205	203	232	219	220	219	214	221	218	220	225	220	214	220	218	226	216	222	244	226	

IONOSPHERIC DATA STATION SHOWA-ST.

APR. 1998 f_{XI} (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	Y		O X	A	X	X	B	A	A	O X	O X	R	B	B	B	B	X	O X	O X	X	X		O X	O X	O X
2	O X	O X							O X	O X	O X	X	X	X	X		X	X	X	X			O X	O X	O X
3		52	69	A	A	A	A		42	47	62	59	62	79	86	95	92	75	62	56	47	34	O X	O X	R
4	A	A	O X	X	A	A	B	B	B	B	A	B	O X	O X			X	X	X	X	O X	X	X	X	
5	A	O X		O X	O X		O X		X	X	X	X	X	X	X	X	X	X	X	X	X	O X	O X	O X	
6	X	X	O X	O X	O X				X	X	X	X	X	X	X	X	X	X	X	O X	X	X	X	X	
7	O X	O X	A	A	X	X			B	R	O X	X	X	X	X	X	X	X	X	X	X	O X	X	A	
8	O X	O X	O X		A	A		B	A	O X	O X	X	X	O X	X	O X	X	X	X	X	X	X	X	X	
9	A	A	A	A	A	A	R	A	A	B	X	B	B	B	B	X	80	86	90	75	61	B	B	A	
10	A	A	X			A	A	O X	X	B	B	O X	O X	X	X	X	B	B	B	O X		A	A	A	
11	A	B	A		B	B	B	A	O X	O X	X	X	X	B	B	O X	O X	O X	O X	O X	X	X	A	A	
12	A		A	A	Y	A	A	B	O X	B	B	B	B	B	B	B	B	B	B	O X		B	B	Y	
13	Y	A		S	X				X	X	O X	X	X	X	X	X	X	X	X	X	X	X	O X	O X	
14		B	B	A	O X	O X	B	B	R	O X	B	B	B	B	B	B	B	B	B	B		R	B	R	
15	O X	O X	X	A					O X	X	R	X	X	X	X	C	C	C	C	C	C	C	C	C	
16	C	C	C	C	C	C	C	C	C	C	X	X	B	X	O X	O X	X						B	B	
17	B	R	O X	X				A	O X	X	X	X	X	B	X	X	B					A	A	A	
18	O X	A	A	O X					X	O X	O X	O X	X	X	O X	X	O X	X	O X	X	X		O X	O X	
19	O X	O X	O X	O X	O X	B	B	X	42	58	66	76	80	84	80	86	71	49	44	36	29	17	A	A	
20	A	A	B	O X				B	B	B	B	B	B	B	B	X	X	X	X	O X		B	A	A	
21	A	A	B	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
22	B	B	A	A	A	R	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	
23	A	B	A	R	R	Y	B	R	B	B	B	B	B	B	B	B	B	X	C	C	C	C	C	C	
24	C	C	C	C	C	C	C	C	C	C	B	B	B	B	B	B	B	B			B	A	A	A	
25		A	B	B	A	B	B	B	B	B	B	B	B	B	B	B	O X	O X	O X	O X			A	A	
26	A	A	R	A	B	B	R	B	B	B	B	B	B	B	B	B	B	O X	O X	A	A		A	A	
27	O X	A	B	B	B	B	B	B	A	B	B	B	B	B	B	B	R	O X	O X	B	B	B	Y	Y	
28	A	A	A	B	B	B	B	A	A	B	B	B	B	O X	O X	B	B	B	B	B	B	B	Y	R	
29	A	A	B	B	A	B	R	B	A	O X	O X	X	O X	X	X	X	X	X	B	B	B	B	B	A	
30	A	A	A	A	A	B	R		35	34	48	48		67	76	76	68	55	37	40		A	R	A	
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	11	10	11	11	13	11	10	11	14	15	16	15	16	16	19	17	19	21	19	16	15	12	9	10	
MED	O X	O X	O X	X	X				X	O X	X	X	X	X	X	X	X	X	X	X		O X	X	X	
U Q	43	44	O X	49	39	48	43	43	53	52	60	66	75	80	86	86	86	80	72	59	50	40	O X	34	
L Q	O X	O X	O X	X					O X	O X	X	X	O X	O X	X	X	X	X	X	X	X	X	X	O X	
	24	22	25	36	32	35	37	35	43	48	55	59	68	71	73	70	68	46	48	42	34	28	22	20	

IONOSPHERIC DATA STATION SHOWA-ST.

APR. 1998 foF2 (0.1MHz) 45° E MEAN TIME (G.M.T. + 3 H)

LAT. 69° 00.4' S LON. 039° 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	Y	A	R	A	28	26	B	A	A	R	U	R	R	B	B	B	B	62	60	46	40	28	24	17	16						
2	16	16	F	15	12	12	F	F	R	J	R	R	J	R	J	F	F	J	R	54	42	38	26	19	18	14					
3	R	F	A	A	A	A	A	F	30	41	56	53	56	73	80	89	80	69	56	48	36	21	31	22	R						
4	A	A	R	J	R	A	A	B	B	B	A	B	60	67	67	65	64	54	49	43	31	20	18	19	R						
5	A	R	24	18	32	30	25	33	40	J	R	48	44	60	68	67	J	R	76	67	75	66	58	J	R	53	35	30	23	18	17
6	18	16	R	R	R	F	F	F	F	F	F	57	57	74	90	89	J	R	87	93	81	88	80	67	52	36	26	22	29	R	
7	26	25	R	A	A	34	37	32	36	42	B	R	65	72	80	80	82	74	62	52	42	31	29	R	A	A	R	R	R	R	
8	R	R	R	F	A	A	F	B	A	R	R	J	R	66	63	66	67	S	64	58	48	33	26	20	16	A	A	A	A	A	
9	A	A	A	A	A	A	R	A	A	B	49	51	B	B	J	R	F	74	77	76	64	52	B	B	A	A	A	A	A	A	
10	A	A	26	A	A	A	A	R	35	38	B	B	47	59	59	65	B	B	B	B	49	34	F	A	A	A	A	F	27	R	
11	A	B	A	F	B	B	B	A	41	45	52	53	54	B	B	B	R	R	B	R	42	31	17	A	A	A	A	A	A	A	
12	A	F	A	A	Y	A	A	B	R	B	B	B	B	B	B	B	B	B	B	B	R	B	B	B	Y	R	R	R	R	R	
13	Y	A	R	S	34	29	20	27	37	J	R	46	58	63	68	73	73	78	62	51	38	32	28	24	16	12	R	R	R	R	
14	F	B	B	A	R	R	B	B	R	R	B	B	B	B	B	B	B	B	B	B	B	F	R	B	R	R	R	R	R	R	
15	R	R	J	R	A	A	F	F	F	F	R	R	R	78	80	74	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
16	C	C	C	C	C	C	C	C	C	C	57	68	B	82	95	91	F	F	F	F	F	F	F	B	B	B	B	B	B	B	
17	B	R	R	40	30	30	27	31	42	53	59	69	68	F	B	101	B	F	F	J	R	R	A	A	A	A	A	A	A	A	
18	R	A	A	R	F	F	F	F	37	44	52	62	66	68	79	76	J	R	R	62	59	49	36	24	14	16	13	R	R	R	R
19	13	13	R	F	R	B	B	F	16	33	52	60	70	74	78	74	80	65	43	38	30	19	10	F	F	A	A	A	A	A	
20	A	A	B	R	F	F	F	B	B	B	B	B	B	B	B	68	62	68	66	59	F	R	B	A	A	A	A	B	B	B	
21	A	A	B	A	B	A	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	A	A	A	R	A	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	A	B	A	R	R	Y	B	R	B	B	B	B	B	B	B	B	B	B	B	J	R	C	C	C	C	C	C	C	C	C	
24	C	C	C	C	C	C	C	C	C	C	B	B	B	B	B	B	B	B	B	F	B	A	A	A	A	A	A	A	A	A	
25	F	A	B	B	A	B	B	B	B	B	B	B	B	B	B	B	R	B	R	B	B	B	A	A	A	A	B	B	B	B	
26	A	A	R	A	B	B	R	B	B	B	B	B	B	B	B	B	B	B	R	A	A	A	A	A	A	A	A	A	A	A	
27	R	A	B	B	B	B	B	B	A	B	B	B	B	B	B	B	R	R	R	R	B	B	B	Y	Y	A	A	A	A	A	
28	A	A	A	B	B	B	B	A	A	B	B	B	B	49	45	R	B	B	B	B	B	B	B	Y	R	A	A	A	A	A	
29	A	A	B	B	A	B	R	B	A	F	R	33	47	53	64	62	65	66	J	R	B	B	B	B	B	B	B	B	B	B	
30	A	A	A	A	A	B	R	F	F	R	B	J	R	70	67	62	49	25	34	F	A	R	R	A	A	A	A	A	A	A	
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	11	9	11	10	11	11	10	11	14	15	16	15	16	16	19	17	19	21	19	16	13	12	9	9							
MED	28	25	26	32	30	27	29	30	41	45	54	63	68	72	74	75	65	56	49	37	28	24	18	16							
U Q	31	36	40	32	32	32	33	36	42	53	60	69	74	80	80	80	69	63	52	44	31	27	20	23							
L Q	18	16	15	16	22	25	24	25	37	42	49	53	62	65	67	64	62	40	42	34	22	20	16	14							

IONOSPHERIC DATA STATION SHOWA-ST.

APR. 1998 ftEs (0.1MHz)

45'E MEAN TIME (G.M.T. + 3 H)

LAT. 69'00.4'S LON. 039'35.4'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	16	38	34	40	48	41	B	42	50	30	28	31	B	B	B	B	E	B	E	B	E	B	E	B
2	16	26	22	23	14	10	E	B	12	20	21	25	55	57	24	25	23	E	B	E	B	E	B	E
3	37	81	55	65	55	46	41	21	29	39	23	25	26	26	42	46	34	14	36	28	24	36	30	17
4	27	32	36	38	41	35	B	B	B	B	B	46	B	E	B	E	B	E	B	E	B	E	B	E
5	33	34	31	39	37	40	54	33	24	24	24	25	24	25	26	23	20	19	19	11	12	14	13	10
6	E	B	10	30	20	27	36	44	46	31	20	22	24	26	26	26	24	23	20	16	21	21	15	16
7	36	37	50	51	47	44	42	34	20	B	E	B	E	B	34	26	44	22	20	26	14	E	B	E
8	48	42	34	73	42	44	22	B	36	36	E	B	14	26	27	25	23	E	S	20	16	14	15	16
9	55	44	41	42	56	45	22	42	42	B	B	29	28	B	B	E	B	E	B	22	22	16	18	B
10	41	74	34	58	65	42	39	44	32	B	B	28	31	E	B	E	B	E	B	B	B	E	B	E
11	67	B	37	61	B	B	B	44	36	20	21	24	26	B	B	E	B	E	B	30	32	B	E	B
12	40	31	38	30	22	34	39	B	36	B	B	B	B	B	B	B	B	B	B	B	B	B	B	15
13	15	35	34	33	33	22	13	14	E	A	16	21	24	25	32	24	24	22	18	E	B	E	B	E
14	93	B	B	35	37	48	B	B	42	36	B	B	B	B	B	B	B	B	B	B	B	B	B	24
15	34	45	40	39	43	25	14	13	16	E	B	E	B	E	B	24	23	24	C	C	C	C	C	C
16	C	C	C	C	C	C	C	C	C	C	C	E	B	B	B	E	B	E	B	E	B	E	B	B
17	B	50	45	41	28	25	18	44	35	36	21	23	23	B	E	B	B	23	22	53	32	19	18	16
18	42	38	37	38	30	26	16	14	16	19	21	22	22	23	25	21	22	18	19	15	12	14	13	17
19	21	15	16	12	12	B	B	15	13	18	22	25	22	23	23	26	22	20	27	E	B	E	B	E
20	42	38	B	42	34	24	14	B	B	B	B	B	B	B	E	B	E	B	E	B	E	B	E	B
21	25	29	B	40	B	44	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
22	B	B	38	40	39	37	42	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	36
23	36	B	36	30	32	28	B	31	B	B	B	B	B	B	B	B	B	B	30	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	B	B	B	B	B	B	B	E	B	E	B	E	B
25	77	91	B	B	39	B	B	B	B	B	B	B	B	B	B	B	24	24	31	B	B	B	B	B
26	36	39	30	40	B	B	35	B	B	B	B	B	B	B	B	B	B	B	E	B	E	B	E	B
27	41	35	B	B	B	B	B	B	43	B	B	B	B	B	B	E	B	E	B	E	B	E	B	E
28	43	32	45	B	B	B	B	61	41	B	B	B	B	E	B	E	B	E	B	E	B	E	B	E
29	47	37	B	B	42	B	36	B	39	28	27	24	34	23	23	22	24	B	B	B	B	B	B	B
30	30	44	40	42	50	B	39	27	E	B	E	B	E	B	E	B	25	36	E	B	23	23	18	10
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	24	22	24	23	20	18	17	21	15	18	17	16	16	19	18	19	21	20	19	21	22	25	23
MED	36	38	36	40	39	38	36	31	32	24	24	24	26	24	E	B	22	21	E	B	E	B	16	16
U Q	43	44	40	42	47	44	41	43	40	36	27	E	B	33	E	B	E	B	E	B	E	B	26	31
L Q	27	32	34	34	32	26	16	14	18	21	21	24	24	23	E	B	23	22	20	16	18	E	B	E

APR. 1998 ftEs (0.1MHz)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

APR. 1998 fmin (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	10	10	9	17	15	9	B	24	21	21	20	31	B	B	B	B	24	18	20	16	12	12	9	9	
2	8	8	8	9	8	7	8	10	14	18	21	55	58	20	20	18	22	22	12	14	12	7	8	8	
3	10	8	10	10	20	22	13	10	12	12	12	17	16	15	17	13	18	12	11	8	8	8	8	9	
4	8	10	8	10	22	22	B	B	B	B	24	B	30	32	31	20	24	17	17	13	15	9	8	8	
5	10	10	8	11	8	12	13	12	15	19	20	18	20	18	18	16	13	19	19	11	12	14	13	10	
6	10	7	8	10	13	11	10	9	12	14	18	16	15	17	14	12	11	11	21	21	12	9	9	10	
7	8	8	15	13	11	12	11	9	12	B	30	56	23	18	15	14	16	12	10	16	16	14	10	13	
8	16	15	14	16	15	16	11	B	12	13	14	14	15	15	13	E S 23	14	9	9	9	8	8	8	7	
9	12	16	21	10	14	14	14	16	14	B	18	14	B	B	52	20	16	14	18	B	B	11	10	20	
10	13	14	11	15	20	19	20	12	16	B	B	18	20	27	34	B	B	B	30	11	11	14	12	11	
11	10	B	21	12	B	B	B	23	19	11	14	16	16	B	B	30	32	B	22	13	10	8	9	10	
12	17	14	18	12	14	14	20	B	32	B	B	B	B	B	B	B	B	B	31	B	B	B	12	9	
13	12	8	8	8	8	8	9	9	10	15	16	15	14	16	13	12	13	15	14	12	8	13	9	7	
14	15	B	B	29	11	13	B	B	20	9	B	B	B	B	B	B	B	B	B	30	10	B	17	8	
15	10	12	12	12	14	15	11	10	12	24	21	30	18	19	24	C	C	C	C	C	C	C	C	C	
16	C	C	C	C	C	C	C	C	C	C	9	24	B	19	18	54	32	12	9	16	13	B	B	B	
17	B	13	11	10	8	8	7	16	12	12	14	14	13	B	58	B	13	9	12	28	12	10	10	10	
18	14	11	13	10	8	10	9	9	8	8	12	18	13	19	25	21	22	18	19	15	12	8	9	10	
19	8	8	8	8	10	B	B	11	13	15	15	25	20	17	16	12	12	10	10	10	10	7	8	14	
20	22	19	B	16	9	10	8	B	B	B	B	B	B	B	B	33	29	21	19	24	B	16	14	18	
21	21	23	B	29	B	30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
22	B	B	30	29	33	34	35	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	29	B	
23	30	B	22	22	22	24	B	26	B	B	B	B	B	B	B	B	B	30	C	C	C	C	C	C	
24	C	C	C	C	C	C	C	C	C	C	B	B	B	B	B	B	B	B	B	B	14	11	11	11	14
25	11	57	B	B	20	B	B	B	B	B	B	B	B	B	B	24	B	31	B	B	10	11	23	B	
26	22	20	18	19	B	B	21	B	B	B	B	B	B	B	B	B	B	19	10	10	30	15	12	14	
27	10	10	B	B	B	B	B	B	26	B	B	B	B	B	B	32	26	25	B	B	B	B	13	10	10
28	12	22	22	B	B	B	B	24	28	B	B	B	B	34	23	B	B	B	B	B	B	11	12	11	
29	14	24	B	B	32	B	B	B	21	B	17	19	23	24	34	23	23	22	24	B	B	B	B	11	
30	14	17	13	19	22	B	19	13	16	22	24	B	25	23	23	19	11	10	10	22	18	22	25	26	
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	28	28	28	28	28	28	28	28	28	28	30	30	30	30	30	29	29	29	28	28	28	28	28	28	
MED	12	14	14	14	15	18	20	24	16	23	24	43	46	33	32	29	24	19	20	16	12	12	10	10	
U Q	16	22	B	26	27	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	18	18	17	
L Q	10	10	10	10	10	12	11	10	12	14	16	18	18	19	18	18	15	12	12	12	10	9	9	9	

IONOSPHERIC DATA STATION SHOWA-ST.

APR. 1998 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	
D	Y	A		A		A	B	A	A	A			B	B	B	B							E	B	A
1			218		238						254	254					228	204	202	222	230	222	256		
2	A	A			A	A	E	B					E	B			198	202	206	216	206	240	236	274	
3	246	A	A	A	A	A	A	E	A	E	A		270	218	228	226	200	212	210	220		F	230	222	
4	A	A			A	A	B	B	B	B	A	B		A	B	B	234	236	228	218		E	A	A	
5	A		F	E	A	A	F	A	A				Q				212	196	196	208	226	E	B	E	
6	274		B	B		F							256	252	246	228	220	206	200	224	212	196	196	252	
7	214	222		A	A		A	A					222	222	210	210	212	198	212	216	244	282	206	226	
8	E	A		Q	A	A	A	B	A	A			196		B	B	204	204	204	212	228	E	B	A	
9	A	A	A	A	A	A	A	A	A	A			112	250	256	240	230	222	210	204	208	220	238	244	
10	A	A		A	A	A	A	A	A		A	B	B				B	B	B		Q	A	A	A	
11	A	B	A	A	B	B	B	A	A				256	236	246	228							A	A	A
12	A	A	A	A	A	A	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	Y	A
13	Y	A					A	A	E	A															B
14	248		B	B	A		A	B	B	A	A	B	B	B	B	B	B	B	B	B	Q	A	B	A	
15	A	A		A	A	A	A			Q	E	B	B			C	C	C	C	C	C	C	C	C	
16	C	C	C	C	C	C	C	C	C	C	C										Q	E	B	B	
17	B		240	224	218	238	202	214		A	A	E	A	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
18	232	A	A		216	224		A	A	A	E	A													
19	226	A	A	A	A	A	B	B	A				238	220	204	208	218	214	206	192	184	202	210	216	
20	A	A	B		234	218		A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
21	A	A	B	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
22	B	B	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
23	A	B	A	A	A	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
24	C	C	C	C	C	C	C	C	C	C	C	B	B	B	B	B	B	B	B	B	B	B	B	B	
25	Q	A	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
26	A	A	A	A	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
27	Q	A	B	B	B	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
28	A	A	A	B	B	B	B	A	A	B	B	B													
29	A	A	B	B	A	B	A	B	A	E	A	A													
30	A	A	A	A	A	B	A	A	E	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	10	5	8	8	9	4	4	5	10	12	16	17	15	16	19	18	19	20	18	16	13	11	8	5	
MED	232	226	220	226	230	211	215	216	U	U	233	224	226	223	220	221	226	212	206	208	218	227	230	236	
U Q	248	241	226	237	238	230	262	266	E	A	E	A	243	256	232	233	252	240	228	244	226	235	238	276	
L Q	218	221	216	218	223	199	210	207	224	225	215	215	220	213	210	216	200	200	204	214	215	224	228	225	

IONOSPHERIC DATA STATION SHOWA-ST.

MAY 1998 fXI (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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		B	B	A	A	B	A	X	X	X	B	B	B	O	X	X	X	X	X	O	X	B	B	B	B	A						
2		B	B	A		O	X	A	A		B	B	B	B	B	B	B	B	B	B	B	X	X	A	A							
3		A	A	A	A	B	A	A	B	B	B	B	B	B	B	B	B	B	B	A	R	R	O	X	A	A						
4		B	B	A	B	B	B	B	B	A	B	B	R	B	B	B	B		O	X	O	X	A	A	A	A						
5		A	B	A	A	B	B	B	B	B	A	B	B	B	B	B	B	O	X	B	O	X	O	X	R	A	A					
6		A	B	B	A	O	X	R	O	X	O	X	O	X	O	X	O	X	B	B	B	B	B	A	R	R						
7		R	B	A	A	B	B	B	B	B	B	O	X	O	X	O	X	B	B	B	B	B	B	A	B	B						
8		B	R	B	A	A	A	R	Y	B	B	B	B	B	B	B	B	B		84	62	32	Y	R	A	A						
9		B	A	A	R	B	A	A	R	A	B	B	B	B	B	B	B	B	B	40	X	B	R	A	A	A						
10		A	A	O	X	A	A	A	A	O	X	A	B	O	X	B	B	B	B	B	B	B	R	B	A	A						
11		A	A	A	R	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	O	X	A	A	A					
12		A	A	R	O	X	A	A	R	B	B	B	Y	B	B	B	C	C	B	B	B	A	Y	A	A	O	X	53				
13		A	A	A	B	A	A	A	A	O	X	O	X	R	B	B	X	X			X		B	B	S	A						
14		A	A	A	A	A	A	X	38	38	42	42		70	68	86	92	76	54	O	X		B	B	B	B	Y					
15		O	X		O	X	O	X		A				X	X	X	X	X		O	X	O	X	B	B		A					
16		59	A	A	A	44	46	50	49	56	46	58	73	O	X	86	90	79	68	55	50	45	37	24	A	A	A					
17		A	A	A	A	A	B	A	A	O	X	33	35	44	55	68		R	X	O	X	X	X	O	X	O	X					
18		A	A	B	A	A	A	O	X	35	35	41	39	49	55	68	69	79	54	48	B	B	B	O	X	A	A	A				
19		A	O	X	B	X	A	A	A	A	B	B	O	X	X	O	X	X	B	B	B	O	X	X	O	X	B	B	A			
20		B	A	A	A	A	X	47	55	69		B	35	44	59		R	X	O	X	O	X	X	O	X	A	A	A				
21		O	X	A	A	B	B	B	R	B	B	B	C	C	C	C	C	C	C	C	C	B	B	A	A	A	A					
22		A	A	A	B	B	B	A	A	A	A	B	O	X	X	X	B	R	O	X	O	X	O	X	O	X	B	B	B	B		
23		S	S	O	X	O	X	A	R	B	A	A	A	B	B	B	B		O	X	B	O	X	B	O	X	A	A	A			
24		A	A	B	A	A	A	A	A	B	B	B	B	B	B	B	O	X		41	B	B	B	B	A	A	A	A				
25		A	A	A	A	A	A	O	X	24	40	37	46				B	B	B	O	X	B	A	A	A	A	A	A				
26		A	A	A	A	B	B	B	B	B	B	B	O	X	O	X	X	X	O	X	O	X	B	S	O	X	X	A	A	A		
27		A	A	B	A	A	A	A	A			C	C	49	59	54	54			O	X	B	O	X	A	B	B	B	A	A		
28		58	A	X	A	A	A	B	B					X	O	X	X	X			B	B	B	B	B	O	X	A				
29		A	O	X	A	O	X	A	A	A	A	A	O	X	47	48	49	68	66	54	66	46	50	38	A	A	O	X	A	A		
30		A		O	X	O	X	A	A	B	A	B	B	B	B	B	B	O	X		B	B	B	O	X	B	O	X	S	A		
31		A	A		O	X	X	A	R	R	R	R		X	X	X	X	X	X		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		5	5	6	8	5	3	8	10	10	12	13	14	13	13	15	16	15	14	14	11	8	6	3	2							
MED		O	X	O	X	X		X				O	X	X	X	X	X	X	X	X	O	X	O	X	O	X	O	X	O	X	X	
U Q		64	74	47	46	46	54	44	49	42	44	52	60	70	84	79	68	54	47	38	36	36	45	54								
L Q		O	X	X	O	X	O	X	O	X			O	X	X	X	X	O	X		O	X	O	X	O	X	O	X	O	X	O	X
		49	29	34	37	37	46	32	35	33	36	44	49	56	60	60	42	36	33	34	26	26	24	18								

IONOSPHERIC DATA STATION SHOWA-ST.

MAY 1998 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°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	A	A	B	A	32	31	28	B	B	B	R	50	59	58	56	J	R	R	B	B	B	A			
2	B	B	A	F	R	A	A	F	B	B	B	B	B	B	B	B	B	B	B	B	B	33	28	A	A		
3	A	A	A	A	B	A	A	B	B	B	B	B	B	B	B	B	B	B	A	R	R	R	39	A	A		
4	B	B	A	B	B	B	B	B	A	B	B	R	B	B	B	B	F	R	R	A	A	A	A	A	A		
5	A	B	A	A	B	B	B	B	B	A	B	B	B	B	B	B	23	34	25	F	R	R	R	A	A		
6	A	B	B	A	R	R	R	R	R	R	R	R	R	B	B	B	B	B	B	B	B	B	A	R	R		
7	R	B	A	A	B	B	B	B	B	B	R	R	R	B	B	B	B	B	B	B	B	B	A	B	B		
8	B	R	B	A	A	A	R	Y	B	B	B	B	B	B	B	B	B	F	F	73	56	22	F	Y	R	A	A
9	B	A	A	R	B	A	A	R	A	B	B	B	B	B	B	B	B	J	F	34	B	B	R	A	A	A	
10	A	A	R	A	A	A	A	R	A	B	R	B	B	B	B	B	B	B	B	B	B	B	R	B	A	A	
11	A	A	A	R	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	R	A	A	A		
12	A	A	R	R	A	A	R	B	B	B	Y	B	B	B	C	C	B	B	B	A	Y	A	A	R	47		
13	A	A	A	B	A	A	A	A	F	F	R	R	B	B	J	R	F	F	F	F	F	B	B	B	Y		
14	A	A	A	A	A	A	F	F	F	F	F	B	J	F	F	F	F	F	F	F	F	B	B	B	Y		
15	38	Y	33	35	25	A	F	F	F	F	F	F	J	F	F	F	F	F	F	F	F	B	B	A	A		
16	40	A	A	A	F	F	F	F	F	F	F	F	R	F	F	F	F	F	F	F	F	F	A	A	A		
17	A	A	A	A	A	B	A	A	R	F	F	38	48	67	80	78	70	58	44	41	39	27	14	A	A	S	S
18	A	A	B	A	A	A	F	F	F	F	F	43	49	62	63	73	48	42	B	B	B	R	A	A	A		
19	A	R	B	J	R	A	A	A	A	B	B	41	46	66	75	B	B	B	B	R	29	25	21	R	B	B	A
20	B	A	A	A	A	41	33	55	B	F	R	38	53	48	71	66	44	38	38	29	19	A	A	A	A		
21	A	R	A	A	B	B	B	R	B	B	B	C	C	C	C	C	C	C	C	C	B	B	A	A	A	A	
22	A	A	A	B	B	B	A	A	A	A	B	R	43	49	54	B	R	R	R	S	F	B	B	B	B		
23	S	S	R	R	A	R	B	A	A	A	B	B	B	B	B	62	62	61	R	B	R	B	S	A	A	A	
24	F	A	A	B	A	A	A	A	B	B	B	B	B	B	B	B	R	B	B	B	B	A	A	A	A		
25	A	A	A	A	A	A	S	F	R	B	B	B	B	B	B	F	B	B	R	B	B	A	A	A	A		
26	A	A	A	A	B	B	B	B	B	B	B	R	R	38	44	49	J	R	F	F	B	S	S	A	A	A	
27	A	A	B	A	A	A	A	A	F	F	C	C	43	J	R	54	31	22	B	R	A	B	B	B	A	A	
28	A	A	17	A	A	A	A	B	B	F	F	22	37	48	61	59	S	65	34	26	B	B	B	B	R	A	
29	A	R	A	R	A	A	A	A	A	F	F	38	37	40	62	58	J	R	R	F	F	A	A	R	A	A	
30	A	R	R	R	A	A	B	A	B	B	B	B	B	B	B	B	R	B	B	B	R	B	R	S	A		
31	A	A	R	R	A	R	R	R	R	R	F	J	R	J	R	R	30	54	56	44	47	36	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	3	4	6	8	5	2	8	10	10	12	13	14	14	13	15	16	15	14	14	11	8	5	2	2			
MED	40	R	R	R	34	39	F	F	F	F	39	48	62	59	65	52	39	34	28	22	24	28	R	17	32		
U Q	F	R	R	R	40	40	F	F	F	F	J	54	62	75	73	61	R	F	F	R	R	R	R				
L Q	38	23	28	30	28		24	24	26	27	38	43	49	54	54	36	30	27	26	19	19	16					

IONOSPHERIC DATA STATION SHOWA-ST.

MAY 1998 ftes (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°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	40	40	B	42	25	E B	18	26	B	B	B	B	B	B	B	B	S E	B	B	B	B	30		
2	B	B	46	25	41	43	46	50	B	B	B	B	B	B	B	B	B	B	B	B	B	27	37	118	62	
3	59	71	72	40	B	43	36	B	B	B	B	B	B	B	B	B	B	B	33	24	24	44	89	40		
4	B	B	92	B	B	B	B	B	122	B	B	B	B	B	B	B	30	29	19	41	32	38	38	72		
5	74	B	43	41	B	B	B	B	B	35	B	B	B	B	B	B	E B	B	B	61	36	34	29	35	33	
6	40	B	B	33	37	34	18	24	15	24	22	22	E B	B	B	B	B	B	B	B	B	B	E B	27		
7	31	B	38	35	B	B	B	B	B	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	36	B	B	
8	B	28	B	35	42	38	35	37	B	B	B	B	B	B	B	B	B	E B	B	24	23	23	22	28	40	85
9	B	49	39	32	B	41	37	32	42	B	B	B	B	B	B	B	B	E B	B	18	B	B	31	42	70	72
10	34	61	53	39	41	40	34	20	35	B	B	B	B	B	B	B	B	B	B	B	B	27	B	34	40	
11	33	38	36	28	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	30	42	42	44	
12	92	42	37	43	36	39	35	B	B	B	B	B	B	B	C	C	B	B	B	B	34	17	42	40	35	
13	42	36	38	B	44	40	46	39	33	19	19	22	B	B	E B	E B	E B	E B	E B	E B	E B	E B	19	34		
14	E B	23	45	44	43	41	37	37	22	15	13	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	18	
15	34	35	34	49	40	42	31	19	13	12	19	28	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	30	47		
16	47	70	44	46	42	39	20	18	12	14	15	G	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	38		
17	80	40	40	39	36	B	29	35	22	19	36	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	24		
18	39	39	B	36	41	41	48	26	30	24	19	25	31	24	24	17	24	B	B	B	40	40	102	67		
19	40	72	B	42	39	41	48	42	B	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	E B	32		
20	B	37	32	38	36	26	35	33	B	E B	E B	E B	E B	E B	E B	E B	E B	E S	E B	E B	E B	E B	E B	40		
21	32	47	43	35	B	B	B	30	B	B	B	C	C	C	C	C	C	C	C	C	C	40	33	70	47	
22	49	38	37	B	B	B	40	43	43	38	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	B	B	B
23	19	27	37	41	48	28	56	49	40	B	B	B	B	B	B	B	B	B	B	B	B	35	35	34	34	56
24	88	65	40	B	37	61	50	62	B	B	B	B	B	B	B	B	B	B	B	B	B	39	39	40	42	
25	54	48	43	42	37	25	20	23	11	E B	11	B	B	B	B	B	B	B	B	B	B	31	39	44	42	37
26	41	60	41	44	B	B	B	B	B	B	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	E B	44	
27	41	38	B	46	39	45	40	49	43	31	C	C	27	18	18	19	E B	B	25	25	B	B	B	22	37	
28	38	48	41	41	40	35	43	B	B	31	20	20	32	20	15	17	12	B	B	B	B	14	16	32		
29	43	33	36	38	40	48	48	38	40	38	25	18	19	20	19	24	E B	E B	E B	E B	E B	E B	E B	E B	111	
30	46	44	48	33	40	34	36	B	B	B	B	B	B	B	B	B	B	B	B	B	B	21	34	20	32	
31	44	48	40	41	41	48	37	35	32	31	25	E 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	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	25	25	26	27	21	23	23	23	17	16	14	16	14	14	15	17	15	14	17	16	19	22	25	28		
MED	41	44	40	40	40	40	37	35	32	24	24	E B	E B	U	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	40	
U Q	52	54	44	42	41	43	46	42	42	33	30	E 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	52	
L Q	34	38	37	35	37	35	31	23	15	14	19	20	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	

IONOSPHERIC DATA STATION SHOWA-ST.

MAY 1998 fmin (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°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	26	22	B	19	14	18	18	B	B	B	36	27	22	21	17	E S	13	22	B	B	B	19		
2	B	B	16	16	14	19	16	15	B	B	B	B	B	B	B	B	B	B	B	B	22	22	26	18		
3	18	15	19	30	B	25	24	B	B	B	B	B	B	B	B	B	B	B	27	12	10	15	16	14		
4	B	B	24	B	B	B	B	B	91	B	B	23	B	B	B	B	15	18	15	10	9	9	12	10		
5	11	B	12	10	B	B	B	B	B	24	B	B	B	B	B	B	24	B	12	10	8	22	21	21		
6	20	B	B	19	11	11	12	9	9	11	19	22	B	B	B	B	B	B	B	B	B	19	18	16		
7	17	B	28	25	B	B	B	B	B	B	30	36	B	B	B	B	B	B	B	B	B	30	B	B		
8	B	17	B	24	21	27	29	22	B	B	B	B	B	B	B	B	B	24	14	13	13	E S	11	10	9	
9	B	14	30	26	B	24	14	22	22	B	B	B	B	B	B	B	B	18	B	B	11	12	14	13		
10	11	14	12	25	21	14	11	10	14	B	25	B	B	B	B	B	B	B	B	B	11	B	10	9		
11	18	14	14	22	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	10	16	10	14		
12	14	20	22	11	33	20	14	B	B	B	29	B	B	B	C	C	B	B	B	10	10	12	10	8		
13	21	19	22	B	22	22	12	11	10	10	15	18	B	B	33	28	16	16	18	11	B	B	B	10	8	
14	23	13	15	13	13	10	9	11	10	10	B	57	27	19	11	9	13	17	16	B	B	B	B	8		
15	8	8	10	10	12	18	11	8	8	8	11	12	23	22	19	12	12	12	14	11	B	B	14	14		
16	9	9	10	10	12	10	10	9	8	9	11	13	18	24	16	10	9	9	9	8	9	10	10	12		
17	13	17	16	14	28	B	18	12	17	11	12	21	26	24	21	15	12	12	13	20	B	11	10	10		
18	9	10	B	29	23	30	12	16	11	9	11	15	16	15	14	13	10	B	B	B	11	11	10	9		
19	12	11	B	21	32	25	24	30	B	B	23	21	31	25	B	B	B	B	20	11	16	B	B	15		
20	B	13	19	8	11	12	12	26	B	11	24	19	32	25	23	26	E S	17	10	16	11	10	10	19	10	
21	19	12	25	26	B	B	B	24	B	B	B	C	C	C	C	C	C	C	C	B	B	10	16	12	10	
22	19	29	23	B	B	B	30	18	20	30	B	24	20	10	B	32	22	18	13	12	B	B	B	B		
23	10	10	9	16	E S	22	B	16	12	12	B	B	B	B	B	E S	54	24	29	16	B	10	13	8	32	
24	12	17	14	B	15	14	14	52	B	B	B	B	B	B	B	B	30	B	B	B	B	9	8	10	10	
25	8	18	17	15	11	10	10	8	9	11	B	B	B	B	B	29	B	B	18	10	8	9	11	9		
26	12	11	17	16	B	B	B	B	B	B	B	24	24	22	E S	22	17	12	B	12	10	8	8	10	12	
27	E S	22	22	B	31	20	21	18	18	10	8	C	C	12	13	11	19	B	10	9	B	B	B	9	9	
28	9	14	17	23	22	30	25	B	B	12	12	14	14	14	11	10	10	B	B	B	B	9	9	10		
29	14	17	17	16	19	20	20	24	19	17	10	12	14	12	9	8	20	13	9	10	11	12	10	30		
30	11	12	8	10	28	24	B	22	B	B	B	B	B	B	B	32	B	B	B	B	9	9	12	9		
31	9	14	12	11	15	20	31	24	22	12	11	36	29	18	16	10	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	31	31	31	31	31	31	31	31	31	31	30	29	30	30	29	29	30	30	31	31	31	31	31	31	31	
MED	14	15	17	21	22	22	18	22	22	30	B	36	B	B	54	30	B	B	22	20	11	15	12	12		
U Q	B	B	B	26	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	21	18
L Q	11	12	14	13	15	18	12	12	11	11	15	20	24	22	18	14	15	16	14	10	10	10	10	10	9	

IONOSPHERIC DATA STATION SHOWA-ST.

MAY 1998 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	A	A	B	A	A		A	B	B	B	E B 260	B	B	B	200	200	214	242		B	B	B	A
2	B	B	A	Q 208	Q 208	A	A		B	B	B	B	B	B	B	B	B	B	B	B		218	190	Q	A
3	A	A	A	A	B	A	A	B	B	B	B	B	B	B	B	B	B	B	A	A	A		198	194	A
4	B	B	A	B	B	B	B	B	A	B	B	A	B	B	B	B	A	A	A	A	A	A	A	A	A
5	A	B	A	A	B	B	B	B	B	A	B	B	B	B	B	B		286	B	Q 252	230	230		A	A
6	A	B	B	A		A		A	A				B	B	B	B	B	B	B	B	B	B	A	A	A
7	A	B	A	A	B	B	B	B	B		260	234	234	B	B	B	B	B	B	B	B	B	A	B	B
8	B	A	B	A	A	A	A	A	B	B	B	B	B	B	B	B	B		242	260	Q	A	A	A	Q 232
9	B	A	A	A	B	A	A	A	A	B	B	B	B	B	B	B	B	Q 252	B	B	A	A	A	A	A
10	A	A	A	A	A	A	A	A	A	B	A	B	B	B	B	B	B	B	B	B	B	A	B	A	A
11	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		A	A	
12	A	A		AE A 226	A	A	A	B	B	B	A	B	B	B	C	C	B	B	B	B	A	Y	A	A	220
13	A	A	A	B	A	A	A		AE A 218	A	A	B	B	B	B	Q	Q	Q	A	Q		B	B	A	A
14	A	A	A	A	A	AE A 404	AE A 328	AE A 282	AE A 244	A	AE A 254	AE A 212	AE A 218	AE A 194	AE A 194	AE A 216	AE A 226	AE A 236	AE A Q	AE A Q	AE A B	B	B	B	Y
15	208	212		A	A	A	A	AE A 284	A	Q 230	Q 208	Q 208	Q 200	Q 212	Q 198	Q 188	Q 188	Q 188	Q 224	Q 224	Q 224		B	B	A
16	214		A	AE A 258	AE A 226	AE A 226	AE A 226	AE A 286	AE A 246	AE A 220	AE A 210	AE A 210	AE A 206	AE A 182	AE A 182	AE A 222	AE A 212	AE A 212	AE A 212	AE A 212	AE A 240	AE A 226	AE A 226	AE A 226	
17	A	A	A	A	A	B	A	AE A 286	AE A 254	AE A 226	AE A 222	AE A 200	AE A 216	AE A 214	AE A 196	AE A 252	AE A 232	AE A 232	AE A 232	AE A 232	AE A 232	AE A 232	AE A 232	AE A 232	
18	A	A	B	A	A	AE A 366	AE A 300	AE A 220	AE A 204	AE A 206	AE A 216	AE A 212	AE A 200	AE A 212	AE A 212	AE A 212	AE A 212	AE A 212	AE A 212	AE A 212	AE A 212	AE A 212	AE A 212	AE A 212	
19	AE A 276	AE A 248	B	A	A	A	A	A	B	BE A 256	BE A 248	BE A 222	BE A 222	BE A 222	BE A 222	BE A 222	BE A 222	BE A 222	BE A 222	BE A 222	BE A 222	BE A 222	BE A 222	BE A 222	
20	B	A	A	A	A	A	A	A	B	210	226	212	206	214	196	202	230	228	236	236	236	236	236	236	
21	A	232	A	A	B	B	B	A	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	
22	A	A	A	B	B	B	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
23	A	A		232	238	A	A	B	A	A	A	B	B	B	BE B 232	BE B 224	BE B 224	BE B 224	BE B 274	BE B 274	BE B 220	BE B 220	BE B 220	BE B 220	
24	226	A	A	B	A	A	A	A	B	B	B	B	B	B	B	BE B 276	BE B 276	BE B 276	BE B 276	BE B 276	BE B 276	BE B 276	BE B 276	BE B 276	
25	A	A	A	A	A	A		AE A 208	AE A 302	AE A 320	AE A 304	AE A 304	AE A 304	AE A 304	AE A 304	AE A 304	AE A 304	AE A 304	AE A 304	AE A 304	AE A 304	AE A 304	AE A 304	AE A 304	
26	A	A	A	A	B	B	B	B	B	B	B	B	222	216	222	212	216	254	254	254	254	254	254	254	
27	A	A	B	A	A	A	A	A	Q 230	Q 240	C	C	214	206	206	224	224	224	224	224	224	224	224	224	
28	A	A	A	A	A	A	A	B	B	A	Q 240	Q 218	Q 218	Q 200	Q 200	Q 194	Q 224	Q 224	Q 224	Q 224	Q 224	Q 224	Q 224	Q 224	
29	A	A	A	A	A	A	A	A	A	A	Q 242	Q 242	Q 226	Q 230	Q 208	Q 200	Q 232	Q 210	Q 238	Q 238	Q 238	Q 238	Q 238	Q 238	
30	A	228	206	218	A	A	B	A	B	B	B	B	B	B	BE B 304	BE B 304	BE B 304	BE B 304	BE B 304	BE B 304	BE B 304	BE B 304	BE B 304	BE B 304	
31	A	A	A	A	EA 272	EA 226	EA 228	EA 228	EA 228	EA 228	EA 228	EA 228	EA 228	EA 228	EA 228	EA 228	EA 228	EA 228	EA 228	EA 228	EA 228	EA 228	EA 228	EA 228	
	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	4	3	6	4	1	5	5	5	8	12	15	14	14	14	17	14	11	12	9	7	5	3	4	
MED	214	225	232	226	222	226	EA 234	EA 284	EA 284	EA 244	EA 237	EA 223	EA 216	EA 217	EA 210	EA 206	EA 213	EA 235	EA 241	EA 227	EA 219	EA 205	EA 200	EA 220	
U Q	226	254	272	238	EA 243	EA 243	EA 385	EA 315	EA 303	EA 293	EA 250	EA 248	EA 222	EA 222	EA 216	EA 228	EA 232	EA 252	EA 258	EA 243	EA 234	EA 233	EA 226	EA 226	
L Q	208	220	206	218	212		217	206	256	242	232	218	210	206	206	199	200	222	236	222	216	194	194	214	

IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 1998 f_{XI} (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	O X 25	X 26	X 24	A	A	A	A	A	X 26		O X 28	X 36	X 48	B O X 67	X 66	41	36		Y	B	Y	B	B	B	B
2		B O X 68	R	A	A	A	A O X 40	X 30	O X 33	33	43	46	49	70	X 49			B	R	R	B	B	B	B	B
3		B	A	R O X 40	O X 33	O X 27	33	34	33	33	36	O X 50	X 47	69	68	X 37	B	X	B	B	B	Y	A	A	A
4	A	A	A	B	A	B	B	B	B	B	B	B	B	B	B	R	B	B	B	B	B	B	B	B	R
5	O X 39	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
6	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
12	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
15	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
16	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
17	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
18	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
20	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
23	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	A	A
24	Y	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B O X 38	A	A	91	A	
25	A	A	A	A	36	43	A	A	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	O X 22
26	O X 23	X 30	X 43	A	A	B	B	B	B	B	B	B	B	B	X 37	B	X 38	B	B	B	B	A	A	A	A
27	A	A	A	A	A	A O X 36	X 33	O X 32	A	X 35	X 42	X 43	X 56	X 51	32	40	27	X O X 27	Y	A	B	B	B	R	
28	A	A O X 32	X 30	A	31	34	33	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
29	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
30	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
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	3	3	2	3	2	3	3	4	4	3	4	4	3	4	4	3	4	1		1			1	1	
MED	O X 25	X 30	X 38	O X 30	34	31	34	34	X 31	33	36	47	X 47	X 68	X 58	X 41	X 38	O X 27		O X 38				O X 22	
U Q	O X 39	X 68		O X 40		43	O X 36	37	32	33	40	X 49	49	70	67	49	39	X							
L Q	O X 23	X 26		O X 24		O X 27	33	33	X 28	28	36	44	X 43	X 62	X 44	X 32	36								

JUN. 1998 f_{XI} (0.1MHz)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 1998 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	R 19	R 20	A 18	R 18	A	A	A	A		F 20	R 22	F 30	F 42	B 61	R 54	F 33	F 27	Y	B	Y	B	B	B	B
2	BU 62	R	R	A	A	A	A	R	F	F	F	F	F	J 41	R 64	R	F 39	B	R	R	B	B	B	B
3	B	A	R	R	R	F	F	F	F	F	F	U 44	R 41	R	59	62	B		B	B	B	Y	A	A
4	A	A	A	B	A	B	B	B	B	B	B	B	B	B	B	B	R	B	B	B	B	B	B	R
5	R 33	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
6	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
12	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
15	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
16	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
17	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
18	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
20	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
23	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	A	A
24	Y	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	R 32	A	A	A	A
25	A	A	A	A	F 23	F 31	A	A	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	R 16
26	R 17	R 24	R 37	A	A	B	B	B	B	B	B	B	B	B	31	B	32	B	B	B	A	A	A	A
27	A	A	A	A	A	A	R 30	27	26	A	29	36	37	J 50	R 45	R 24	F 34	21	Y	A	B	B	B	R
28	A	A	R 26	R 24	A	F 22	F 24	F 22	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
29	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
30	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
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	3	3	2	3	2	3	3	4	4	3	4	4	3	4	4	3	4	1		1				1
MED	R 19	R 24	R 32	R 24	25	F 22	F 24	24	22	F 22	30	40	41	R 60	R 50	F 33	32	21		R 32				R 16
U Q	R 33	R 62		R 34		F 31	F 30	30	25	F 23	32	43	41	R 62	R 58	F 39	33							
L Q	R 17	R 20		R 18		F 21	F 23	F 22	18	F 16	28	38	37	54	38	F 24	29							

IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 1998 ftEs (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	23	32	33	29	41	43	40	33	20	18	16	E B 16	B	24	18	15	18	15	B	14	B	B	B	B
2	B	36	37	42	42	40	40	39	23	16	14	17	22	E B E B 24 24	18	B	E B E B 16 14	B	B	B	B	B	B	B
3	B	36	37	42	36	26	17	15	16	E B E B E B E B 10 12 24	17	22	24	B	B	27	B	B	B	B	17	38	40	82
4	60	49	36	B	40	B	B	B	B	B	B	B	B	B	E B E B 31	B	B	B	B	B	B	B	B	21
5	40	B	B	B	35	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
6	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
12	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
15	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
16	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
17	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
18	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
20	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
23	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	35 36
24	28	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	42	49	62	62 40
25	78	73	48	37	89	44	43	38	37	C	C	C	C	C	C	C	C	C	C	C	C	C	C	12
26	11	40	47	39	56	B	B	B	B	B	B	B	B	E B E B 18 15	B	B	B	B	B	B	31	45	43	34
27	44	81	43	49	74	37	26	40	26	42	33	32	23	20	E B E B E B 16 18 18	15	20	44	B	B	B	B	22	
28	26	36	37	41	48	34	40	41	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
29	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
30	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
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	8	8	8	7	9	6	6	6	5	4	4	4	3	4	5	4	4	3	2	3	3	3	4	7
MED	34	38	37	41	42	38	40	38	23	17	15	18	22	22	E B 18 17	18	15	17	42	31	45	42	34	
U Q	52	61	45	42	65	43	40	40	32	30	24	28	23	24	E B 24 24	22	E B 16		44	49	62	52	40	
L Q	24	36	36	37	38	34	26	33	18	13	13	16	E B 17	21	E B 17	16	E B 16	15		14	17	38	38	21

JUN. 1998 ftEs (0.1MHz)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 1998 fmin (0.1MHz) 45'E MEAN TIME (G.M.T. + 3 H)

LAT. 69'00.4'S LON. 039'35.4'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	10	8	11	10	13	17	11	13	12	10	10	16	B	20	10	11	11	11	B	10	B	B	B	B	
2	B	9	9	9	12	18	13	10	10	10	10	10	11	24	24	15	B	16	14	B	B	B	B	B	
3	B	12	8	14	8	7	8	9	7	10	12	24	17	22	24	B	8	B	B	B	B	8	18	10	19
4	13	26	12	B	22	B	B	B	B	B	B	B	B	B	B	31	B	B	B	B	B	B	B	16	
5	11	B	B	B	22	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
6	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
12	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
15	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
16	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
17	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
18	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
20	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
23	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	19	22	
24	24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	12	9	9	12	10	
25	9	9	12	10	9	10	12	9	9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	9	
26	8	9	11	10	12	B	B	B	B	B	B	B	B	B	18	B	15	B	B	B	20	10	9	12	
27	15	14	18	11	14	18	10	8	8	21	11	10	11	12	16	18	18	12	11	15	B	B	B	9	
28	8	8	9	7	8	9	8	8	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
29	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
30	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
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	11	10	10	10	10	10	10	10	10	8	8	7	7	7	7	7	7	7	8	8	8	8	9	10	
MED	13	10	12	10	12	18	12	12	B	B	B	24	B	24	24	31	18	B	B	B	B	B	B	18	
U Q	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 Q	9	9	9	10	9	10	10	9	9	10	10	10	11	20	16	15	11	12	B	14	14	14	11	10	

IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 1998 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	218	260	A	224	A	A	A	A	E A	252	284	234	222	B	196	196	208	212	A	B	Y	B	B	B	B	
2	B	214	A	220	A	A	A	210	A E	A E	A	220	208	210	E B	240	210	B	E B	B	B	B	B	B	B	
3	B	A	218	230	E A	A	A	A	A E	B E	B E	B	214	214	206		B E	A	B	B	B		A	A	A	
4	A	A	A	B	A	B	B	B	B	B	B	B	B	B	B		226	B	B	B	B	B	B	B	R	
5	230	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
6	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
12	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
15	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
16	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
17	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
18	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
20	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
23	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	A	A	
24	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	228	A	A	A	A	
25	A	A	A	A	236	218		A	A	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	198	
26	A	214	226	A	A	B	B	B	B	B	B	B	B	B	B	E B	258	B E	B	B	B	B	A	A	A	A
27	A	A	A	238	A	A	A	232	212		A	A	A	232	210	208	250	E B	222	E A	A	A	B	B	B	A
28	A	A	222	226	A	A	214	A	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
29	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
30	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
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	2	3	3	5	2	1	1	2	2	3	3	4	3	4	5	4	4	2	1	1	1			1		
MED	224	214	222	226	236	218	214	221	232	E	E	224	214	210	202	214	230	242	E B	272	228	234		198		
U Q		260	226	234						E	B	234	232	212	E B	238	E									
L Q		214	218	222						E	A	264	234	221	208	203	201	209	217							

JUN. 1998 h'F (KM)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 1998 f_{XI} (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	B	B	A
2	B	A	A	O X 46	A	A	A	A	S	B	B	B	B	O X 55	X 67	X 63	X 61	O X 37	B	B	B	B	B	Y
3	R	A	O X 33	A	A	A	A	A	B	R	O X 42	X 51	O X 51	X 64	X 68	X 52	X 37	X 33	B	B	B	B	B	B
4	A	X 41	A	B	B	R	R	B	C	C	C	C	C	C	C	C	O X 40	C	C	C	C	O X 41	A	A
5	A	A	A	A	B	B	B	A	B	B	B	B	B	X 62	X 74	X 69	X 55	X 42	X 34	B	B	Y	A	A
6	A	B	B	A	B	B	B	B	A	B	B	B	B	O X 50	X 50	B	B	B	B	A	A	A	A	A
7	A	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	R	B	B	B	B	A
8	Y	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
9	C	C	A	A	O X 33	A	O X 34	33	A	25	38	R	C	C	C	C	C	O X 49	O X 57	A	A	A	A	C
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	O X 36	O X 27	C	C	C	C	C
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
12	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B
14	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	X 37	X 26	B	O X 23	O X 21	Y	B	B
15	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
16	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	O X 55
17	C	O X 42	O X 40	B	R	A	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C
18	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	Y	O X 23
19	O X 51	A	O X 36	A	A	A	A	R	A	R	C	C	C	C	O X 50	C	C	C	C	Y	R	A	Y	A
20	A	A	A	O X 34	A	A	A	A	31	35	44	55	56	64	66	42	38	33	28	O X 28	Y	B	Y	Y
21	A	A	A	A	32	34	32	A	A	A	A	45	B	B	B	O X 60	B	B	O X 33	B	B	A	A	A
22	A	O X 42	A	A	A	B	A	A	31	38	46	43	O X 68	O X 60	O X 64	O X 50	O X 47	O X 50	O X 32	O X 25	A	A	Y	A
23	O X 60	O X 45	A	A	A	A	A	A	B	B	A	B	B	B	B	B	B	X 64	X 69	60	A	O X 33	A	A
24	52	B	B	O X 44	O X 46	O X 34	A	B	B	B	B	B	B	B	B	B	B	B	O X 36	O X 32	A	O X 32	R	A
25	A	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	Y	R
26	49	A	A	A	A	A	A	B	B	B	B	B	B	B	B	O X 72	X 44	X 43	31	B	B	B	B	A
27	A	R	A	63	A	O X 31	O X 35	B	R	B	O X 41	O X 62	O X 75	O X 68	B	B	B	B	O X 32	B	R	A	Y	B
28	B	A	60	38	34	32	48	49	42	43	64	59	54	62	59	46	40	34	30	32	O X 33	O X 34	A	
29	A	42	B	B	A	A	A	A	A	40	47	59	66	71	67	68	48	44	34	28	Y	Y	B	A
30	24	A	O X 45	O X 45	A	A	X 33	B	B	36	51	54	56	68	69	56	59	45	40	30	Y	O X 20	B	B
31	B	Y	O X 29	A	A	56	A	A	B	Y	B	B	B	B	B	B	B	B	B	O X 30	A	A	O X 56	O X 54
	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	6	7	4	5	5	2	3	6	8	8	7	9	9	11	12	14	13	6	3	4	3	2
MED	51	O X 42	O X 39	O X 44	34	34	33	40	31	37	44	54	59	64	67	59	46	41	34	29	O X 32	O X 33	O X 34	O X 54
U Q	56	O X 44	45	46	40	50	O X 34		49	40	46	60	68	68	68	68	57	45	38	30	O X 32	O X 37	56	
L Q	36	42	O X 33	38	32	32	32		31	35	O X 42	48	56	58	63	50	39	36	32	25	O X 21	O X 26	O X 23	

IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 1998 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	B	B	A
2	B	A	A	R 40	A	A	A	A	S	B	B	B	B	R 49	J 61	R 57	F 42	R 31	B	B	B	B	B	Y
3	R	A	R 27	A	A	A	A	A	B	R	R 36	45	45	58	62	46	31	27	R	B	B	B	B	B
4	A	34	A	B	B	R	R	B	C	C	C	C	C	C	C	C	R 34	C	C	C	C	C	R	A
5	A	A	A	A	B	B	B	A	B	B	B	B	B	J 56	R 68	R 63	49	33	27		B	B	Y	A
6	A	B	B	A	B	B	B	B	A	B	B	B	B	B	R 44	B	B	F 30	B	A	A	A	A	A
7	A	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	R	B	B	B	B	A
8	Y	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
9	C	C	A	A	R 27	A	F 25	F 23	A	F 16	F 30	R	C	C	C	C	C	R 43	R 51	A	A	A	A	C
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	R 30	R 21	C	C	C	C	C
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
12	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B
14	B	C	C	C	C	C	C	C	C	C	C	C	C	B	B	C	C			B	R	R	Y	B
15	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	31	20		17	15	C	C
16	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	A
17	C	C	R 36	R 34	B	R	A	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C
18	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	Y	R
19	R 45	A	R 30	A	A	A	A	R	A	R	C	C	C	C	C	R 44	C	C	C	Y	R	A	Y	A
20	A	A	A	R 28	A	A	A	A	F 21	F 24	38	49	50	49	56	32	29	22	22	Y	B	Y	Y	C
21	A	A	A	A	F 23	F 24	F 22	A	A	A	A	F 36	B	B	B	B	B	B	B	B	B	A	A	A
22	A	R 36	A	A	A	B	A	A	F 22	F 26	40	37	62	54	56	40	41	40	26	16	A	A	Y	A
23	A	R 39	A	A	A	A	A	A	B	B	A	B	B	B	B	B	B	58	J 63	R	A	A	R	A
24	A	B	B	R 38	R 40	F 24	A	B	B	B	B	B	B	B	B	B	B	B	B	30	A	R	R	A
25	A	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	Y	R
26	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	R 66	J 38	R 34	F 22	B	B	B	A
27	A	R	A	A	A	R 25	F 26	B	R	B	R	F 35	F 54	F 68	R 62	B	B	B	B	24	B	R	A	Y
28	B	A	Y	F 27	F 25	A	F 23	F 32	F 38	F 30	F 37	R 58	J 53	R 48	J 56	R 53	F 38	F 30	F 24	F 21	F 18	R 27	R 28	
29	A	F 32	B	B	A	A	A	A	A	A	F 32	F 40	53	59	65	61	62	40	38	24	16	Y	Y	B
30	F 17	A	S 39	R 39	A	A	A	B	B	F 28	F 47	R 48	50	60	62	50	47	31	29	19	Y	R	B	B
31	B	Y	R 23	A	F	A	A	A	B	Y	B	B	B	B	B	B	B	B	B	B	24	A	A	R
	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	2	4	5	6	4	3	5	2	3	6	8	8	7	9	9	11	12	14	12	6	3	4	3	2
MED	31	35	R 30	R 36	26	24	F 25	F 28	F 22	F 27	38	48	53	56	61	53	39	31	25	18	R 18	R 27	R 27	R 48
U Q		R 38	R 38	R 39	R 34	R 25	26		F 38	F 30	F 40	54	62	61	62	62	44	38	28	R 21	26	R 31	R 28	
L Q		33	R 25	28	F 24	F 24	F 22		F 21	F 24	R 36	41	50	49	56	44	32	30	23	16	R 15	R 20	R 17	

IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 1998 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	B	B	96					
2	B	42	46	39	62	39	98	45	32		B	B	B	BE	BE	BE	BE	BE	B	B	B	B	B	18					
3	27	32	34	43	42	40	50	41		B	35	28	20	E	B	E	BE	BE	B	B	B	B	B	B					
4	45	40	40		B	B	37	36		B	C	C	C	C	C	C	E	B	C	C	C	C	41	72	40				
5	39	37	35	38	B	B		B		B	B	B	B	BE	BE	B	E	B	E	B	B	B		17	74	69			
6	39		B	B	B	B	B	B		B	B	B	B	BE	BE	B	B		B		B	B							
7	40	37	C	C	C	C	C	C		C	C	C	C	C	C	C	C	C		27	B	B	B	B	36				
8	18	B	B	C	C	C	C	C		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C				
9	C	C		31	30	36	41	35	28	34	18	E	BE	B	C	C	C	C	E	BE	B				C				
10	C	C	C	C	C	C	C	C		C	C	C	C	C	C	C	C	C	E	BE	B	C	C	C	C				
11	C	C	C	C	C	C	C	C		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C				
12	C	C	C	C	C	C	C	C		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C				
13	C	C	C	C	C	C	C	C		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B			
14	B	C	C	C	C	C	C	C		C	C	C	C	B	B	C	E	BE	B	B	B	E	B	B	B				
15	C	C	C	C	C	C	C	C		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C				
16	C	C	C	C	C	C	C	C		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	55	43			
17	C	C		44	42	B	30	36		B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C				
18	C	C	C	C	C	C	C	C		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	14	24	40		
19	E	B										C	C	C	C	E	B	C	C	C									
20	32	45	44	32	26	25	30	23	32	31							27				29	30	48	17	33				
21	31	36	64	34	44	43	43	36	19	25	17	17	20	32	45	37	38	39	17	16	B		14	14	C				
22	42	34	48	43	36	27	31	42	38	41	38	18		B	B	BE	B	B	BE	B	B	B	32	38	38				
23	57	45	51	52	48		56	48	28	19	31	18	E	BE	B	22	21	21	14	E	BE	B	32	24	20	32			
24	43	81	39	49	43	92	80	36		B	B	B	B	B	B	B	B	B	23	31	28	44	36	36	62	37			
25	39	B	B		43	48	49	42		B	B	B	B	B	B	B	B	B	B	B	29	48	17	20	42	B			
26	37	B	B	B		B	B	B		B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	18	22			
27	28	36	40	44	41	53	51		B	B	B	B	B	B	B	BE	BE	BE	SE	SE	SE	B	B	B	B	38			
28	40	23	35	38	38	28	25		B	BE	B	26	22	22	25	B	B	B	BE	B	B	B	22	26	17	B			
29	B	34	26	40	48	41	30	25	16	36	24	20	26	24	24	20	20	16	12	13	38	34	37	51					
30	69	70	B	B	52	45	50	42	41	44	18	24	23	20	E	B	17	E	B	15	12	14	18	17	22	B	34		
31	33	40	48	48	43	56	47		B	B	25	29	36	21	27	20	20	E	BE	B	12	12	13	12	15	10	B	B	
00	B	16	34	85	45	43	39	45		B	24	B	B	B	B	B	B	B	B	B	B	B	34	39	36	37	43		
CNT	17	16	16	17	16	16	17	12	10	10	10	9	7	9	9	11	12	14	14	12	12	17	16	17					
MED	39	37	40	42	43	41	42	40	33	28	27	19	22	E	BE	BE	BE	BE	BE	18	16	24	31	26	38	38			
UQ	42	44	47	46	48	47	50	44	38	36	31	23	26	28	27	27	24	24	24	21	40	38	36	50	43				
LQ	32	34	34	36	37	34	33	32	28	24	18	18	20	24	E	B	20	20	E	BE	B	15	13	14	13	17	16	19	34

IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 1998 fmin (0.1MHz) 45'E MEAN TIME (G.M.T. + 3 H)

LAT. 69'00.4'S LON. 039'35.4'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	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	B	B	13	
2	B	12	10	11	12	9	21	9	23	B	B	B	B	26	19	28	16	21	B	B	B	B	B	11	
3	12	10	10	23	31	23	12	22	B	18	20	14	19	17	23	27	19	22	B	B	B	B	B	B	
4	17	16	24	B	B	19	23	B	C	C	C	C	C	C	C	C	24	C	C	C	C	10	40	12	
5	21	30	20	25	B	B	B	B	32	B	B	B	B	25	22	15	26	23	17	B	B	10	12	34	
6	23	B	B	16	B	B	B	B	30	B	B	B	B	B	30	B	B	17	B	22	12	12	10	12	
7	10	9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	18	B	B	B	B	15	
8	12	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
9	C	C	9	9	9	9	9	11	9	10	15	18	C	C	C	C	C	13	14	15	12	13	18	C	
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	25	18	C	C	C	C	C	
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
12	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B
14	B	C	C	C	C	C	C	C	C	C	C	C	B	B	C	C	14	12	B	9	10	8	B	B	
15	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
16	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	14	10
17	C	C	9	14	B	20	25	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C
18	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	9	7	8
19	32	8	10	11	9	11	8	11	10	23	C	C	C	C	C	27	C	C	C	24	19	11	8	9	
20	9	7	8	8	12	11	10	12	9	8	9	10	12	13	8	12	11	12	14	12	B	10	10	C	
21	8	7	15	10	9	7	8	16	12	12	18	16	B	B	B	24	B	B	20	B	B	10	10	10	
22	10	10	14	16	16	B	14	10	10	10	16	54	28	15	12	21	10	20	10	15	14	12	10		
23	10	16	15	10	10	10	11	12	B	B	20	B	B	B	B	23	24	14	9	10	10	10	20	B	
24	29	B	B	11	14	10	11	B	B	B	B	B	B	B	B	B	B	B	12	10	13	11	9		
25	20	B	B	B	19	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	9	10	
26	10	10	8	17	14	12	12	B	B	B	B	B	B	B	B	26	E	E	S	S	B	B	B	19	
27	14	9	10	10	9	10	9	B	24	B	26	15	15	25	B	B	B	B	21	B	16	14	10	B	
28	B	9	9	10	10	14	9	10	12	10	24	20	21	24	20	20	20	16	10	10	9	8	8	10	
29	10	9	B	B	15	32	18	17	17	10	12	24	18	15	20	10	15	9	9	8	10	10	B	15	
30	10	10	11	10	15	11	9	B	B	14	9	10	10	15	10	8	12	11	10	9	9	10	B	B	
31	B	13	9	28	20	16	18	23	B	15	B	B	B	B	B	B	B	B	B	10	11	16	9	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	21	20	21	20	20	20	20	20	19	19	18	18	18	17	16	17	18	19	21	21	21	23	25	23	
MED	14	10	11	12	14	13	12	22	30	23	25	B	B	28	26	27	22	21	18	22	16	11	12	13	
U Q	B	B	B	24	B	B	22	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
L Q	30	23		26	28																				
L Q	10	9	9	10	10	10	9	12	12	10	15	16	19	20	20	14	15	12	14	10	10	10	10	10	

IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 1998 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	B	B	A			
2	B	A	A	262	A	A	A	A	A	B	B	B	B	220	226	254	216	250	B	B	B	B	B	A			
3	A	A	222	A	A	A	A	B	A	A	E	A	248	234	228	228	212	250	288	B	B	B	B	B			
4	A	A	A	B	B	A	A	B	C	C	C	C	C	C	C	C	266	C	C	C	C	220	A	A			
5	A	A	A	A	B	B	B	A	B	B	B	B	B	E	B	240	242	250	234	202	224	B	B	A	A		
6	A	B	B	A	B	B	B	B	A	B	B	B	B	B	E	B	270	B	E	B	B	A	A	A	A		
7	A	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	A	B	B	B	B	A		
8	A	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
9	C	C	A	A	A	A	A	A	A	A	E	B	250	206	C	C	C	C	C	262	230	A	A	A	A	C	
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	E	B	E	B	C	C	C	C	
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
12	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	
14	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	196	218	B	E	A	E	B	A	B	B	
15	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
16	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	A	212	
17	C	C	216	254	B	A	A	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	
18	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	Y	212	A	
19	224	A	228	A	A	A	A	A	A	A	C	C	C	C	C	206	C	C	C	A	A	A	A	A	A	A	
20	A	A	A	216	A	A	A	214	238	238	250	Q	210	194	192	210	190	Q	E	A	A	Y	B	Y	Y	C	
21	A	226	A	A	A	200	A	A	A	A	A	E	A	B	B	B	212	B	B	B	B	B	B	A	A	A	
22	A	220	A	A	A	B	A	A	Q	228	276	218	212	242	220	220	204	Q	Q	Q	Q	B	A	A	A	A	
23	A	A	A	A	A	A	A	A	B	B	A	B	B	B	B	B	344	306	A	A	A	206	A	A	A	A	
24	A	B	B	234	224	224	A	B	B	B	B	B	B	B	B	B	B	B	B	A	A	266	A	A	B	B	
25	A	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	A	
26	216	A	A	A	A	A	A	B	B	B	B	B	B	B	B	212	232	188	226	Q	B	B	B	B	A	A	
27	A	A	A	A	A	A	A	B	A	B	212	198	192	214	Q	Q	B	B	B	E	B	B	A	A	Y	B	
28	B	A	A	210	210	218	A	Q	Q	276	248	206	236	226	226	206	220	194	206	240	246	216	240	238	A		
29	A	244	B	B	A	A	A	A	A	A	Q	222	226	232	208	216	204	192	204	208	208	A	A	B	A		
30	232	A	Q	212	A	A	A	B	B	A	Q	292	218	206	216	226	212	196	200	218	200	200	A	E	B	B	B
31	B	Y	226	A	A	A	A	A	B	A	B	B	B	B	B	B	B	B	B	B	B	212	220	A	A	230	
	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	3	5	6	2	2	1	1	3	4	7	9	7	9	9	11	12	14	10	5	4	5	2	2			
MED	224	226	224	225	217	212	218	214	238	262	218	209	221	220	218	212	228	224	224	210	220	218	225	221			
U Q	232	244	227	254					Q	276	284	250	E	A	242	234	227	235	220	249	262	240	245	253			
L Q	216	220	219	212					228	243	212	206	194	211	211	204	198	206	214	204	218	211					

IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 1998 fxI (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	46	41	38	33	42	41		52	52	42	53	65	62	73	64	80	47	49	45	40		R	A	A	A	
2	A	A	A	O X 53	A	O X 52	47	42	44	46	52	53	O X 56	O X 73	60	67	60	42	30	O X 27	B	B	B	B		
3	B	O X 40	R	R	36	41	36	30	26	36	51		R	O X 66	B	68	64	54	O X C	C	B	B	R	R	28	
4	A	A	A	30	30	36		A	R	B	B	R	X	X	X	O X 61	52	43	45	34		A	B	A	A	
5	A	O X 40	A	O X 41	A	A	A	A	R		O X 42	O X 57	O X 69	X	B	X	O X 62	57	B	B	B	B		Y	A	
6	A	A	A	O X 36	A	A	60	B	A	B	B	B	O X 34	O X 42	100	108		A	R	A	A	A	A	O X 35	O X 38	
7	O X 39	A	B	B	X	A	A	B	R	B	R	B	B	B	X	B	B	B	B	B	B	A	O X 26	A	A	
8	O X 34	A	A	A	B	A	A	A	B	B	B	B	B	B	B	B	B	B	O X 64	30		B	A	A	A	
9	A	O X 33	A	A	O X 24	30	31	32	32	45	56	66	78	73	77	85	68	48	52	40	O X 30	B	B	C		
10	A	A	O X 28	O X 28	A	A	B	A	O X 45	59	62	X	B	B	O X 77	75	75	75		B	A	B	A	A	84	
11	A	A	A	B	A	A	39	38	42	48	57	66	75	72	80	73	63	60	53	46		B	R	A	A	
12	X	O X 43	X	B	B	A	A	48	A	O X 51	O X 55	B	O X 75	X	X	X	O X 69	O X 55	O X 45	37	38	O X 21	Y	Y	Y	
13	O X 22	A	A	B	A	A	A	B	B	O X 48	X	X	B	B	B	B	B	B	B	46	41	O X 27	A	B	B	
14	B	B	A	B	B	R	A	A	O X 35	B	O X 60	O X 59	X	X	X	82	80	74	69	41	O X 41	O X 42	O X 41	O X 40	A	
15	A	A	O X 36	O X 39	O X 30	34	36	32	37	50	65	74	75	78	70	69	55	62	54	37	28	B	A	A		
16	A	O X 38	A	O X 30	O X 30	O X 28	O X 28	39	44	54	68	68	73	74	74	68	66	54	51	42	31	B	B	B		
17	A	A	A	B	O X 32	A	O X 36	39	36	46	66	79	73	74	75	59		B	O X 47	O X 44	O X 36	O X 32	B	B	Y	
18	B	Y	Y	Y	A	O X 38	44	44	58	50	B	B	B	X	88	70	62	57	39	36	22	O X 22	B	B	B	
19	Y	58	29	O X 32	35	40	35	37	46	54	66	68	78	78	61	77	59	50	43	41		B	Y	Y	A	
20	O X 48	A	A	44	A	A	53	50	53	48	58	58	63	72	80	104		74	A	A	68	A	A	A	A	
21	A	A	95	A	B	A	A	O X 32	35	41	46	52	60	76	71	67	67	52	50	36	O X 22	O X 20	O X 20	O X 19	X	
22	O X 22	A	58	A	39	42	41	44	42	47	B	B	B	B	O X 82		B	O X 55	44	46		A	A	A	A	
23	A	A	40	116	B	A	A	A	A	B	B	52	B	B	B	B	B	B	66	40		B	A	A	A	
24	A	O X 40	A	O X 37	A	A	A	A	A	B	B	B	B	B	B	B	B	X	X	O X 58	O X 54	B	B	Y	A	
25	A	B	A	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	O X 42		B	B	B	B	
26	B	B	B	B	A	A	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	34	A	A	
28	B	A	A	B	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	R	A	Y	Y	
29	A	A	A	A	B	R	B	B	B	B	B	B	B	B	B	B	B	X	X	A	A	A	A	B	A	
30	A	B	A	B	A	R	B	B	B	B	B	B	B	B	B	B	B	B	B	O X 72	O X 42	B	A	A	A	
31	A	A	A	A	A	B	B	R	O X 47	O X 46	B	B	B	B	B	B	B	X	X	O X 94	O X 74	92	A	O X 38	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	7	8	8	12	10	10	13	13	16	18	16	15	16	15	19	18	17	18	21	20	11	6	4	4		
MED	O X 39	O X 40	X	O X 38	O X 36	34	39	39	39	43	48	57	65	70	73	71	72	62	54	51	40	O X 30	O X 34	O X 38	33	
U Q	46	40	49	42	39	41	48	44	46	50	64	68	75	78	77	80	68	62	62	42	O X 42	O X 38	O X 42	61		
L Q	O X 22	O X 38	O X 32	O X 31	O X 30	34	36	32	36	45	54	57	62	72	64	67	55	48	44	36	O X 22	O X 26	O X 28	O X 24		

AUG. 1998 fxI (0.1MHz)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 1998 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	F 32	F 28	F 20	F 19	F 25	F 25	A 36	F 32	F 34	F 47	J 59	R 56	R 67	R 58	F 69	41	43	35	26							
2	A	A	A	R 47	A 46	R 26	F 32	F 24	F 32	F 46	R 47	R 50	R 67	R 48	F 60	47	30	22	18		B	B	B	B		
3	B	R 34	R	R	F 26	F 29	F 26	R 18	16	28	40		60		F 61	58	48	C	C		B	R	R	F 17		
4	A	A	A	F 20	F 19	F 21	A	R	B	B	R	58	56	54	61	55	46	33	32	25	A	B	A	A		
5	A	F 31	A	R 35	A	A	A	A	R	F 33	R 51	R 63	57		B 56	B	R	B	B	B	B	B	F 21	Y	A	
6	A	A	A	R 30	A	A	A	B	A	B	B	B	R 28	F 33	F	F	A	R	A	A	A	A	A	R 29	R 32	
7	R 33	A	B	B		A	A	B	R	B	R	B	B	B		58	B	B	B	B	B	A	F 17	A	A	
8	R 28	A	A	A	B	A	A	A	B	B	B	B	B	B	B	B	B	B	58	24	F	B	A	A	A	
9	A	R 27	A	A	R 18	F 20	F 23	F 24	F 24	J 39	R 50	59		67		74	58	42	43	30	24	B	B	C		
10	A	A	R 22	R 22	A	A	B	A	R	F 39	J 50	R 56		B	B	R 71	69	67	F	B	A	B	B	A	F 69	
11	A	A	A	B	A	A	F 30	F 26	F 30	J 42	R 51	60	J 69	R 66	74	67	57	J 54	R 47	R 40		B	R	A	A	
12	J 37	R 32	R	B	B	A	A	F 27	A	A	R 45	R 49		69	66	62	63	49	39	30	27	15	Y	Y	Y	
13	R 16	A	F 25	B	A	A	A	B	B	R	J 42	R 52	51	B	B	B	B	B	B	38	32	21	R	A	B	B
14	B	B	A	B	B	R	A	A	R	29	54	53	74	74	68	72	68	68	60	35	36	35	34	R	A	
15	A	A	R 30	R 33	24	24	25	20	26	44	59	68	J 69	R 72	62	60	49	53	F 48	F 24	18	F	B	A	A	
16	A	R 32	A	R 24	R 24	R 22	R 22	R 29	F 33	F 48	62	62	67	68	68	62	60	48	44	36	25	B	B	B		
17	A	A	A	B	R 26	A 25	F 26	F 26	F 26	40	60	73	67	68	69	53	B 41	J 35	R 30	26	R	B	B	Y		
18	B	Y	Y	Y	A 26	F 38	R 16	S 48	F 44	R	B	B	B	82		64	56	51	33	29	16	B	B	B	B	
19	Y	Y	F 20	R 26	F 24	F 28	F 26	F 28	F 35	F 44	60	62	R 72	R 72	55	71	53	44	35	35		B	Y	Y	A	
20	R 42	A	A	F 24	A	A	F 41	F 40	F 44	F 42	J 52	R 52	57	66	J 74	98	B 62	F	A	A	A	A	A	A	A	
21	A	A	A	A	B	A	A	R 26	R 29	R 35	40	46	54	70	65	61	61	46	44	25	16	14	14	13	R	
22	16	A	A	A	F 28	F 32	F 28	F 34	F 36	F 41		B	B	B	B	B	B	49	38		40	A	F 29	A		
23	A	A	F 28	A	B	A	A	A	A	B	B	U 46	R	B	B	B	68	63	B	60	30	B	A	A	A	
24	A	R 34	A	R 31	A	A	A	A	A	B	B	B	B	B	B	B	67	56	J 52	R 48		B	B	Y	A	
25	A	B	A	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	36	B	B	B	B	
26	B	B	B	B	A	A	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	F 25	A	A	
28	B	A	A	B	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	R	A	Y	Y	
29	A	A	A	A	B	R	B	B	B	B	B	B	B	B	B	B	B	59	55		A	A	A	B	A	
30	A	B	A	B	A	R	B	B	B	B	B	B	B	B	B	B	B	B	B	66	36	R	B	A	A	A
31	A	A	A	A	A	B	B	R	U 41	R 40	B	B	B	B	B	B	B	B	J 88	F 68	R	Y	A	R 32	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	7	7	6	11	10	10	12	13	16	18	16	15	15	15	17	17	17	18	21	19	10	6	4	4		
MED	R 32	R 32	F 24	R 26	24	26	F 26	F 26	F 31	42	52	59	R 60	67	62	64	56	48	44	30	22	23	29	24		
U Q	R 37	R 34	28	R 33	26	F 29	F 29	F 33	38	44	58	62	J 69	72	70	70	62	56	56	36	26	32	32	50		
L Q	16	28	20	F 22	F 24	F 22	F 25	22	26	35	48	51	56	66	58	60	48	42	35	25	16	17	22	15		

IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 1998 ftes (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°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		41	41	33	28	30	33	37	27	27	22	18	E B	19	41	26	38	21	18	79	30	32	28	40	55	45	
2		40	49	40	42	40	39	28	20	29	14	18	21	22	26	E B	19	18	E S E S	14	14	18	18	B	B	B	
3		B	25	27	23	20	22	15	E B	10	11	13	E B	16	35	25	26	24	26	C	C	B	B	18	23	35	
4		40	39	41	26	22	26	38	27	B	B	32	32	E B	24	24	20	18	27	12	20	20	28	B	40	34	
5		45	37	50	44	42	48	44	32	40	28	30	20	22	B E B	34	B E B	26	B	B	B	B	B	34	19	28	
6		32	40	46	44	70	51	44	B	40	B	B	B E B E B	24	21	27	18	38	38	36	33	35	39	36	42		
7		49	70	B	B	36	41	34	B	26	B	42	B	B	B	23	B	B	B	B	B	B	31	31	26	44	
8		35	39	74	54	B	35	45	42	B	B	B	B	B	B	B	B	B	B E B	32	22	B	37	30	34		
9		29	33	34	30	25	32	15	E B	10	16	18	27	26	22	E B	20	20	16	26	37	17	E B	B	B	C	
10		34	32	34	32	45	46	B	41	42	32	21	B	B	B E B E B E S	56	20	17	B E B	30	B	B	32	38	86		
11		70	63	96	B	47	48	41	20	16	16	20	20	26	23	34	22	E B E B E B E B	19	24	19	15	B	16	39	40	
12		69	76	B	B	43	45	22	62	50	42	31	E B	33	27	36	35	24	E B E B	14	15	18	23	15	22	14	
13		22	31	35	B	43	44	39	B	B E B E B	30	20	22	B	B	B	B	B	B	30	28	E B	12	30	B	B	
14		B	B	38	B	B	25	40	26	31	B E B E B	23	28	92	91	74	44	42	E B	13	18	42	44	40	38	40	
15		39	39	37	35	27	24	26	22	15	21	47	24	70	32	26	24	19	E S E B E S	16	20	15	32	B	32	60	
16		46	44	36	32	30	32	25	44	34	26	22	23	27	25	24	26	19	27	32	E B	12	17	B	B	B	
17		26	32	36	B	26	38	40	13	14	E B	14	20	G	G	27	24	25	B E B E B	26	19	16	15	B	B	27	
18		B	14	14	25	36	15	15	E S E S E B	10	14	21	B	B	B E B	72	30	26	E B E B	20	14	26	20	B	B	B	
19		14	22	41	36	28	42	40	40	24	20	24	23	25	24	24	21	20	E B E B	24	19	18	B	14	19	81	
20		51	99	42	28	40	42	37	35	19	28	E B	23	25	26	25	32	23	B	32	43	45	43	39	77	44	
21		47	42	58	37	B	42	40	33	29	21	28	24	24	24	22	22	20	15	13	12	12	13	12	16		
22		20	29	42	44	38	29	20	16	44	42	B	B	B	B E B	34	B	B	26	43	46	46	48	44	104		
23		40	38	36	104	B	43	44	42	45	B	B E B	32	B	B	B	26	33	B E B	25	29	B	26	26	39		
24		43	39	34	36	41	43	40	50	41	B	B	B	B	B	B	B	B	E B E B E B E B	25	21	23	21	B	B	18	40
25		94	B	38	34	B	40	B	B	B	B	B	B	B	B	B	B	B	B	B	B E B	28	B	B	B	B	
26		B	B	B	B	40	40	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 E B	20	99	62	
28		B	38	37	B	36	40	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	22	34	23	22	
29		39	43	80	40	B	30	B	B	B	B	B	B	B	B	B	B	B	B E B E B	23	19	41	39	37	B	92	
30		32	B	34	B	38	34	B	B	B	B	B	B	B	B	B	B	B	B	B E B E B	19	19	B	34	37	32	
31		45	42	35	33	40	B	B	38	31	26	B	B	B	B	B	B	B	B E B E B	22	53	32	38	39	42	39	
		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	26	27	21	24	28	24	22	22	18	18	16	16	15	19	18	18	19	24	24	18	21	22	24		
MED		40	39	37	35	38	40	38	30	29	22	21	23	26	24	25	21	20	E B E B	23	22	21	28	34	34	40	
U Q		46	43	42	43	42	43	40	41	40	28	30	28	30	27	34	26	26	26	32	32	38	39	40	52		
L Q		32	32	34	29	29	31	26	20	16	16	E B	20	20	24	24	23	20	19	E B E B E B	15	19	18	17	19	23	33

IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 1998 fmin (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	10	10	9	11	10	10	9	10	10	10	11	19	17	18	11	13	10	9	9	10	9	10	9	10	
2	18	12	16	13	11	12	9	8	E S 14	10	14	14	18	18	19	15	E S 14	E S 14	E S 14	E S 15	E S 12	B	B	B	B
3	B	11	10	10	11	10	10	10	10	10	16	24	25	B	26	24	26	C	C	B	B	10	9	10	
4	10	10	10	10	10	10	13	10	B	B	E S 24	15	24	18	20	18	28	12	10	12	10	B	10	9	
5	10	10	12	10	15	20	11	10	21	14	E S 14	18	17	B	34	B	26	B	B	B	B	11	10	10	
6	10	10	10	10	15	20	12	B	25	B	B	B	24	21	20	18	12	19	13	12	10	10	10	10	
7	10	11	B	B	10	10	10	B	14	B	12	B	B	B	17	B	B	B	B	B	10	10	10	10	
8	10	10	10	12	B	18	13	24	B	B	B	B	B	B	B	B	B	B	B	32	11	B	9	9	9
9	10	10	9	10	9	11	10	10	10	10	18	18	19	20	20	14	10	19	11	10	10	B	B	C	
10	10	11	11	10	10	20	B	16	10	13	14	B	B	B	56	20	17	B	30	B	B	10	10	10	
11	19	16	19	B	24	15	13	9	9	9	20	18	17	23	13	11	19	24	19	15	B	10	10	9	
12	16	12	B	B	24	11	15	15	13	14	31	B	33	27	21	20	16	14	15	11	10	9	11	11	
13	10	9	10	B	28	20	30	B	B	30	20	18	B	B	B	B	B	B	B	19	13	12	18	B	B
14	B	B	16	B	B	11	12	10	18	B	23	28	22	19	16	E S 14	E S 15	E S 13	E S 10	E S 12	9	10	13	16	
15	10	10	10	9	9	10	8	10	10	14	17	18	14	16	15	17	14	E S 16	E S 20	E S 14	E S 15	B	17	14	
16	15	13	10	10	11	10	10	10	10	10	9	16	17	15	E S 15	E S 15	E S 13	E S 10	E S 10	E S 12	11	B	B	B	
17	10	12	10	B	10	9	10	9	9	14	E S 15	E S 16	19	17	24	25	B	26	19	16	15	B	B	20	
18	B	10	10	11	10	10	10	E S 10	E S 14	21	B	B	72	B	B	30	23	20	14	10	11	B	B	B	
19	10	10	10	10	10	11	E S 16	11	11	11	15	16	15	E S 15	E S 14	13	E S 17	24	19	15	B	10	10	10	
20	11	20	15	10	24	21	12	11	10	21	23	17	16	17	32	23	B	E S 18	E S 14	E S 15	E S 14	E S 14	E S 15	16	
21	17	15	16	E S 16	B	20	13	10	10	12	18	19	21	18	17	19	14	11	10	10	10	9	9	10	
22	10	9	16	15	10	12	10	10	12	15	B	B	B	B	34	B	B	18	16	14	E S 16	E S 14	E S 15	E S 15	20
23	21	17	10	13	B	22	20	23	26	B	B	32	B	B	B	26	33	B	25	16	B	B	14	15	15
24	11	12	15	14	16	12	11	17	18	B	B	B	B	B	B	B	25	21	23	21	B	B	12	10	
25	15	B	21	14	B	26	B	B	B	B	B	B	B	B	B	B	B	B	B	B	28	B	B	B	B
26	B	B	B	B	31	26	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	20	21	25
28	B	20	16	B	23	B	19	B	B	B	B	B	B	B	B	B	B	B	B	B	B	13	18	17	14
29	13	12	20	24	B	22	B	B	B	B	B	B	B	B	B	B	B	23	19	E S 15	E S 15	E S 15	E S 15	B	32
30	15	B	19	B	20	30	B	B	B	B	B	B	B	B	B	B	B	B	19	19	B	B	15	15	16
31	21	15	26	21	25	B	B	22	19	23	B	B	B	B	B	B	B	22	53	16	E S 14	E S 15	E S 15	E S 15	15
	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	30	30	31	31	31	31	30	
MED	13	12	15	14	16	15	12	11	14	21	23	32	33	B	32	25	26	22	19	15	15	15	15	14	
U Q	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	32	28	B	B	25
L Q	10	10	10	10	10	10	10	10	10	12	15	18	18	18	17	17	15	16	14	12	10	10	10	10	

IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 1998 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	240	232	F	F	F	244	A	216	246	246	196	206	226	214	220	220	170	240	250	220	A	A	A	214
2	A	A	A	A	A	A	A	278	280	250	232	210	192	208	204	216	184	204	260	214	B	B	B	B
3	B	A	A	A	214	A	A	BE	A	Q	272	218	226	206	198	222	206	202	C	C	B	B	A	Q
4	A	A	A	A	A	A	A	A	B	B	A	240	212	210	218	210	216	204	228	220	A	B	A	A
5	A	220	A	228	A	A	A	A	A	Q	278	254	202	214	BE	B	B	B	B	B	B	B	A	A
6	A	A	228	212	A	A	A	B	A	B	B	B	B	B	272	A	Q	A	A	A	A	A	AE	A
7	E	A	A	B	BE	A	A	A	B	A	B	A	B	B	B	244	B	B	B	B	B	A	A	A
8	256	A	A	A	B	A	A	A	B	B	B	B	B	B	B	B	B	B	B	246	242	B	A	A
9	A	216	A	A	A	A	A	Q	278	222	202	220	220	216	202	220	208	198	266	262	208	202	B	B
10	A	A	208	A	A	A	B	A	204	256	230	B	B	B	222	234	210	Q	Q	B	B	A	A	Q
11	A	A	A	B	A	A	A	A	232	232	222	198	214	210	230	212	198	220	226	228	B	A	A	A
12	A	240	B	B	A	A	156	218	A	214	242	B	B	230	214	210	218	210	192	244	208	224	Y	Y
13	224	A	Q	B	A	A	A	B	BE	B	266	232	228	B	B	B	B	B	Q	222	214	224	A	B
14	B	B	A	B	B	A	A	A	A	B	224	236	254	224	204	218	220	226	244	228	218	A	250	240
15	A	A	208	214	A	A	A	AE	A	278	228	220	224	224	224	210	210	220	218	232	222	S	B	A
16	A	228	A	218	240	206	A	A	214	226	224	216	240	194	224	198	208	208	218	208	A	B	B	B
17	A	A	A	B	A	A	A	AE	A	248	196	228	228	218	218	214	198	B	220	232	228	210	B	B
18	B	Y	Y	A	A	A	A	S	256	250	BE	B	B	BE	B	B	238	212	202	190	206	A	B	B
19	Y	A	Q	244	232	256	246	A	226	252	230	214	206	220	206	194	212	216	198	232	216	B	Y	Y
20	220	A	A	262	A	A	A	A	224	224	A	Q	238	248	258	224	274	254	B	Q	A	A	A	A
21	A	A	A	A	B	A	A	A	216	238	276	280	244	238	220	208	212	206	202	202	194	258	230	248
22	236	A	A	A	242	A	A	A	236	218	A	B	B	B	BE	B	B	B	Q	A	A	A	A	Q
23	A	A	Q	A	B	A	A	A	A	B	BE	B	B	B	B	B	B	B	B	270	A	B	A	A
24	A	226	A	230	A	A	A	A	A	B	B	B	B	B	B	B	B	202	186	258	226	B	B	A
25	A	B	A	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
26	B	B	B	B	A	A	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	192	A
28	B	A	A	B	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	A	A
29	A	A	A	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	214	240	A	A	A	B
30	A	B	A	B	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	228	260	B	A	A
31	A	A	A	A	A	B	A	A	A	A	B	B	B	B	B	B	B	B	Q	B	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	6	6	6	7	5	4	1	8	13	16	16	16	15	15	18	18	17	18	21	18	6	5	4	5
MED	234	227	223	228	241	235	156	225	235	226	226	220	218	214	218	214	210	214	232	218	221	224	251	214
U Q	256	232	238	232	256	372	A	257	264	253	235	238	238	224	230	234	218	240	254	228	224	239	258	248
L Q	224	220	208	214	227	225	217	223	218	221	206	214	208	210	210	200	202	224	208	210	198	249	193	Q

AUG. 1998 h'F (KM)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 1998 fXI (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	B	A	A	37	B	B		B	B	B	B	O	X	O	X	O	X	X	O	X		A	A	A				
2	A	B	A	R	A	R			X	O	X	R	R	O	X	X	X	X	X	X	O	X		A	A	A			
3	A	A	A		A	A	A	B	O	X	X	X	X	O	X	X	X	X	X	X	X				Y				
4	R	O	X		R	A	A	O	X	O	X	B	B	O	X	X	X	X	X	X				B	O	X			
5	A	A	A		35	39	44	55	41	52	66	74	88	92	88	91		B	X	X	O	X		R		25			
6	O	X	A	R	A	A	A	A	A	R	X	X	O	X	X	X	X	X	X	X	X		B	B	O	X	O	X	
7	O	X	O	O	X			R			X	X	X	X	O	X	X	X	X	X	X				A	O	X	X	
8	A			A	O	X	A	A	B	R	A	B	X	O	X	X	X	X	X	X	O	X	X		B	O	X	A	
9	A	A		58	R	A	A	A	A	A	O	X	O	X	X	X	X	X	X	X	O	X	X		B	O	X	X	
10	54	O	X		A	A	A		A	O	X	X	X	X	X	X	X	X	X	X	X				44	32	27	34	
11	24	36	O	X	X			X	X	X	X	X	O	X	X	X	X	X	X	X	X			B	B		B		
12	O	X	X	O	X			A	B	X	B	B	B	B	B			X	O	X	O	X	A	A	A	A	A	A	
13	R	A	A	A	A	R	B	R	O	X	B	B	X	X	X	X	O	X	X	X	X	O	X	B	B	R		R	
14	A	A	A	A	A			X	X	X	B	X	X	X	X	X	X	X	X	X	O	X	X	X	X	X	O	X	X
15	A	O	X		A			B	B	B	O	X	B	B	B	B		X	O	X	X	X	X	O	X	O	X	X	
16	A	R	R	A	A	O	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A		
17	A	B	O	X	O	X		B	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
18	39	67	58	O	X			R	O	X	O	X	X	X	X	X	X	X	X	X	X	X				O	X	A	
19	52	A	56	A	A	R				X	X	X	X	X	X	X	X	X	X	X	X				O	X	X	X	
20	O	X	A	A	B	B			B	O	X	O	X	X	X	X	X	X	X	X	O	X	X	B	B	B	B	B	
21	O	X	A	X	A	A		A	R	O	X	B	R	X	X	X	B	O	X	X	O	X				O	X	X	
22	30	26	O	X	R	Y		B	O	X	O	X	R	B	X	X	X	X	X	X	O	X	O	X	X	Y	O	X	
23	A	A	A	O	X			A	A	X	B	B	B	O	X	X	X	X	X	X	B	O	X	X	A	A	A	A	
24	A	A	A	O	X			B	A	A	B	B	B	R	B	B	B	B	B	B	X	X	A			A	A	A	
25	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	Y	B												
26	O	X	32	30	30	33	37	42	R	R	O	X	O	X	B	B	X	X	X	X	O	X		A	A	A	B	B	
27	A	B	B	B	B	A	B	B	B	B	O	X	O	X	X	O	X	X	B	B	B	B	B	B	B	O	X	X	
28	A	A	O	X				O	X	O	X	O	X	O	X	X	X	X	X	X	X	X				X	X	X	X
29	O	X	X	X				X	B	B				X	B	B													
30	A	O	X					B	B	O	X		R	R	X	X	X	X	X	X	X	X	X	X	X	O	X	X	
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	12	12	15	16	12	15	10	15	18	18	16	22	24	24	25	26	26	25	28	27	21	20	15	15					
MED	38	36	42	42	44	43	50	45	54	55	62	74	76	81	86	83	80	73	66	56	44	34	27	34					
UQ	44	51	56	46	53	45	53	56	55	62	73	80	86	88	92	92	86	79	70	67	52	42	35	42					
LQ	27	32	31	34	38	40	42	42	49	50	60	62	69	73	79	79	77	68	59	50	38	32	24	25					

IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 1998 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	B	A	A	F	B	B	F	B	B	B	B	R	R	J	R	R	J	R	R	A	A	A	A	
2	A	B	A	R	A	R	F	F	R	R	R	R	62	63	68	69	68	60	30	61	F	F	F	F	
3	A	A	A	F	A	A	A	B	38	48	58	71	77	90	88	78	74	63	57	59	40	22	20	Y	
4	R	F	A	A	F	A	A	R	42	B	B	R	J	R	R	F	F	F	J	R	F	F	F	R	
5	A	A	A	F	F	F	F	R	R	R	R	R	J	R	J	R	B	74	57	48	42	30	20	R	
6	R	A	R	A	A	A	A	A	R	J	R	R	R	J	R	R	J	R	J	R	F	B	B	R	
7	15	52	36	33	29	30	R	F	F	J	R	J	R	J	R	J	R	J	R	J	R	F	F	R	
8	A	F	A	R	A	A	B	R	A	B	J	R	R	R	J	R	J	R	R	R	F	B	R	A	
9	A	A	R	R	A	A	A	A	A	R	R	J	R	J	R	J	R	J	R	R	F	B	R	A	
10	A	R	F	F	A	A	A	A	A	R	J	R	R	J	R	R	J	S	J	R	R	F	F	F	
11	F	R	R	R	F	F	F	J	R	R	R	J	R	R	J	R	J	R	R	F	R	F	F	B	
12	R	17	49	17	25	R	A	R	F	A	B	B	B	B	B	F	J	R	R	R	A	A	A	A	
13	R	A	A	A	A	R	B	R	U	R	B	B	J	R	J	R	U	R	R	R	R	B	B	R	
14	A	A	A	A	A	F	F	49	49	56	B	74	81	77	74	74	75	65	60	54	39	24	12	S	
15	A	R	A	F	F	B	B	B	B	49	B	B	B	B	B	83	74	65	62	62	48	31	28	28	
16	A	R	R	A	A	28	36	45	47	49	56	61	64	76	85	82	64	76	68	53	33	24	S	A	
17	A	B	U	R	R	F	B	A	49	56	66	79	78	93	90	J	R	R	R	F	F	F	F	F	
18	21	F	31	40	30	36	R	R	R	49	54	60	65	59	73	76	100	58	54	A	A	F	R	A	
19	R	A	R	A	A	R	F	F	R	B	B	R	U	R	R	R	R	F	F	F	F	F	F	R	
20	R	A	A	B	B	F	B	B	R	R	J	R	R	J	R	J	R	R	F	J	R	B	B	B	
21	R	A	J	R	A	A	A	R	R	B	R	J	R	J	R	B	R	R	R	F	F	F	F	R	
22	F	F	R	R	Y	F	B	R	R	A	B	68	82	88	91	92	79	67	60	52	40	35	Y	R	
23	A	A	A	U	S	A	F	A	J	R	B	B	B	67	70	J	R	J	R	B	B	U	R	A	
24	A	A	A	R	B	A	A	B	B	B	B	R	B	B	B	B	B	B	B	63	42	A	A	A	
25	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	Y	B	B	B	35	40	23	34	R	
26	R	F	F	F	F	F	F	R	R	42	38	41	B	B	76	69	71	73	40	A	A	A	A	B	
27	A	B	B	B	B	A	B	B	B	B	B	53	46	59	67	R	B	B	B	J	R	B	R	F	
28	A	A	R	F	F	F	S	R	R	R	R	R	R	91	82	95	83	75	71	62	59	54	48	F	
29	F	S	R	F	F	F	F	B	B	F	J	R	B	B	J	R	F	J	R	B	B	J	R	F	
30	A	R	F	F	F	F	B	B	R	R	R	R	J	R	J	R	J	R	R	J	R	J	R	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	11	11	14	16	12	15	10	14	18	17	16	22	24	24	25	26	26	25	28	25	20	17	14	14	
MED	R	28	28	29	32	28	33	38	38	47	49	56	68	70	75	80	77	74	66	57	50	34	24	20	25
U Q	32	41	36	40	34	36	45	46	49	57	66	74	80	82	86	86	86	77	72	62	56	40	34	28	30
L Q	R	F	F	F	F	F	F	F	R	R	R	R	R	R	R	R	R	R	R	R	F	F	F	F	R
	17	24	22	24	26	30	31	32	42	44	54	56	63	67	73	73	71	59	53	42	30	22	17	19	

IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 1998 ftEs (0.1MHz) 45° E MEAN TIME (G.M.T. + 3 H)

LAT. 69° 00.4' S LON. 039° 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	44	B	38	36	44	B	B	21	B	B	B	B	E	B	B	B	B	E	B	B	57	45	42	64	42						
2	42	B	57	37	40	44	26	17	E	B	E	B	21	20	26	25	27	27	26	30	28	21	E	S	14	16	40	28	38		
3	40	51	40	41	43	55	39		B	E	B	E	B	B	B	B	G	G			E	S	E	S	E	S	15	16	16	18	
4	32	36	38	27	30	42	40	42	25	B	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	B	18		
5	24	28	40	30	23	13	E	S	E	S		G	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	37		
6	40	48	37	40	42	38	54	42	36	32	E	B	25	25	26	25	26	23	E	B	E	B	E	B	E	B	E	B	10		
7	24	33	41	37	34	35	38	31	22	23	22	26	28	27	26	23	23	18	14	11	10	10	10	10	10	10	36	48			
8	48	72	42	42	45	40	B	35	40	B	27	31	28	27	34	27	22	E	B	E	B	E	B	E	B	E	B	50			
9	46	42	42	40	33	40	37	39	44	22	26	28	29	27	26	34	30	28	16	16	15						17	39			
10	40	37	33	38	40	48	70	44	42	27	28	28	27	27	28	25	23	22	17	E	B	E	B	E	B	E	B	15			
11	19	21	26	26	26	E	S	E	B	31	20	22	26	27	28	31	28	25	24	22	28	28	28	28	28	28	B	B			
12	29	34	43	74	41	55	48	39	55	B	B	B	B	B	B	E	B	E	B	E	B	E	B	E	B	E	B	43			
13	29	70	48	40	42	38	B	37	31	B	B	27	32	48	28	31	29	47	32	19	16						15				
14	29	31	33	38	42	40	31	19	23	23	B	33	31	28	29	28	23	20	E	B	E	B	E	B	E	B	26				
15	36	41	38	17	14	22	B	B	B	33	B	B	B	B	B	G	G	G			E	B	E	B	E	B	E	S	32		
16	41	19	15	28	38	40	22	18	21	24	G	29	32	32	28	27	E	B	E	B	E	B	E	B	E	S	20	32			
17	33	B	54	51	43	41	B	55	40	32	30	28	34	37	32	32	29	24	22	20	E	B	E	B	E	S	10	13			
18	24	27	76	40	32	35	40	43	35	35	30	31	30	32	26	25	27	44	44	42	103	46	87	42							
19	57	79	58	92	42	35	42	36	43	B	B	30	30	29	28	24	28	22	22	E	B	E	B	E	B	E	S	37			
20	38	48	40	B	B	38	B	B	22	26	27	27	29	28	29	27	27	23	20	E	B	E	B	E	B	E	B	B	B		
21	40	54	67	94	48	48	50	47	49	B	42	34	28	34		37	56			E	B	E	B	E	B	E	B	29			
22	35	25	32	27	19	30	B	34	27	18	B	E	B	E	B	E	B	G	29	24	22	20	24	24	22	18	42				
23	46	43	44	70	49	36	68	43	37	B	B	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	29		
24	80	68	59	44	B	40	40	B	B	B	B	33	B	B	B	B	B	B	B	E	B	E	B	E	B	E	B	43			
25	68	B	76	B	B	B	B	B	B	B	B	B	B	B	B	B	36			36		71	31	30	36	42					
26	41	67	55	29	24	31	25	36	35	27	29	33	B	B	E	B	E	B	E	B	E	B	E	B	E	B	B				
27	37	B	B	B	B	38	B	B	B	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	18		
28	27	33	34	32	24	17	E	B	E	B	G	G	30	29	30	29	28	28	26	26	18	17	E	B	E	B	15	30			
29	36	28	21	16	16	16	19	21	B	B	B	E	B	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	92		
30	41	E	B	17	24	35	B	B	28	27	30	30	30	32	32	42	26	26	22	E	B	E	B	E	B	E	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	25	29	27	26	28	20	23	24	18	20	25	24	24	25	27	26	25	28	29	27	25	26	26							
MED	39	37	40	38	39	38	38	36	30	24	28	28	29	28	28	26	25	21	E	B	E	B	E	B	16	22	29	37			
UQ	42	52	54	42	42	40	45	42	40	27	30	33	E	B	E	B	E	B	E	B	E	B	E	B	E	B	31	35	36	36	42
LQ	29	30	34	28	24	33	24	21	22	22	26	27	28	27	26	25	23	20	E	B	E	B	E	B	E	B	E	B	18		

IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 1998 fmin (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	14	B	15	11	16	B	B	11	B	B	B	B	49	35	53	23	23	28	19	E S	E S	E S	E S	20	23
2	21	B	25	25	22	12	11	10	21	20	19	20	22	22	18	17	15	15	E S	16	10	10	10	10	10
3	10	16	20	11	22	31	23	B	29	24	20	20	20	16	19	20	20	18	E S	E S	E S	10	10	16	14
4	10	10	10	20	10	18	24	13	16	B	B	55	35	33	29	21	23	14	16	16	12	11	B	10	
5	10	10	10	10	10	8	E S	E S	15	20	25	29	32	28	20	B	26	19	30	11	9	10	11	10	
6	12	12	30	16	10	21	12	20	29	18	25	19	22	19	19	20	22	15	15	10	B	B	15	10	
7	10	10	13	10	10	10	20	15	14	16	17	19	22	19	17	16	12	10	9	10	10	10	13	11	
8	13	10	20	12	17	14	B	12	24	B	14	16	16	18	19	14	19	22	19	20	11	B	10	21	
9	10	10	10	10	8	18	9	15	11	11	18	17	15	19	22	34	30	28	16	16	15	B	12	9	
10	10	10	10	10	16	11	15	16	14	15	18	15	16	14	14	14	14	15	9	10	10	10	9	10	
11	10	12	10	8	10	E S	16	11	10	E S	14	16	15	14	16	15	14	16	14	12	14	E S	16	B	B
12	10	26	10	10	23	24	14	11	16	B	19	B	B	B	B	56	16	54	16	10	9	10	11	12	
13	22	21	16	16	22	23	B	18	20	B	B	17	24	48	21	31	29	47	32	19	E S	16	B	E S	15
14	10	10	10	24	17	11	10	10	11	14	B	26	21	16	16	16	E S	17	12	25	16	12	10	10	E S
15	11	10	16	12	10	10	B	B	B	21	B	B	B	B	B	19	19	15	16	16	11	10	11	10	10
16	11	10	10	10	11	11	10	13	14	13	15	19	24	24	17	E S	15	26	15	22	18	15	E S	E S	E S
17	10	B	14	16	9	11	B	12	12	13	13	16	E S	E S	E S	E S	E S	E S	E S	12	11	15	9	10	10
18	E S	10	10	11	14	13	12	24	11	14	14	15	E S	14	15	13	18	16	E S	13	11	10	10	10	10
19	10	11	10	11	20	15	11	12	14	B	B	18	20	13	14	16	14	17	E S	16	15	14	10	10	10
20	9	23	19	B	B	16	B	B	19	14	17	19	16	16	17	15	15	14	14	20	B	B	B	B	
21	10	23	10	39	19	22	20	20	12	B	26	24	24	34	B	37	56	B	34	22	15	12	10	9	
22	11	11	10	15	15	13	B	14	18	G	B	55	29	21	18	16	18	22	20	24	24	E S	E S	E S	
23	12	16	16	22	25	16	29	18	16	B	B	B	54	22	24	56	B	B	54	23	16	12	14	29	
24	11	10	16	12	B	19	17	B	B	B	B	28	B	B	B	B	B	B	20	10	10	13	12	17	
25	16	B	24	B	B	B	B	B	B	B	B	B	B	B	B	24	B	21	B	14	12	13	16	11	
26	10	16	11	9	10	12	16	20	20	18	19	24	B	B	20	28	19	26	24	21	21	16	15	B	
27	18	B	B	B	B	19	B	B	B	B	24	30	24	54	B	B	B	B	24	B	B	22	13	11	
28	10	10	12	18	15	10	19	23	20	19	20	18	20	20	19	18	19	14	14	12	16	10	9	10	
29	10	14	14	11	9	10	12	14	B	B	23	33	B	B	31	24	60	B	B	34	21	13	10	10	
30	16	18	18	10	10	15	B	B	15	14	18	15	15	15	15	14	E S	13	15	15	25	22	21	22	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	30
MED	10	12	14	12	16	14	20	15	17	20	22	20	23	22	19	20	19	18	16	15	14	12	12	10	
U Q	12	B	18	20	22	19	B	B	B	B	B	B	B	B	B	31	29	28	24	20	16	B	21	16	17
L Q	10	10	10	10	10	11	14	12	14	14	18	17	16	16	17	16	15	14	14	11	10	10	10	10	

SEP. 1998 fmin (0.1MHz)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 1998 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	B	A	A	A	B	B	A	B	B	B	B	E B	E B	E B					A	A	A	A	A			
2	A	B	A	A	A	208	234	A	E B	278	200	236	234	226	226	210	234	214	202	208	192	246	A	A	A		
3	A	A	A	Q	A	A	A	B	E B	308	252	230	228	228	230	228	210	214	204	208	222	212	278	272	A		
4	218	216	A	A	Q	A	A	A		190		B	E B	B			Q	Q	Q	Q	Q	206	208	B	A		
5	A	A	A	A	A	Q E	S E	S									B					Q	Q	Q	Q		
6	E A	A	A	A	A	A	A	A	A	A	A	E A	Q									B	B	E B	E B		
7	200	216	A	Q	A	A	A	A		210	206	210	226	226	216	212	200	222	206	190	204	198	A	A	220		
8	A	206	A	212	A	A	B	A	A	B			Q		E A					Q	Q	234	234	B	A	A	
9	A	222	220	A	A	A	A	A	A		200	220	222	196	216	228	234	218	214	210	236	264	B	A	A		
10	A	A	A	A	A	A	A	A	A	Q	232	196	218	228	208	226	228	228	208	196	196	Q	204	204	226	A	
11	A	A	A	224	228	S	S	224	230	228	228	228	218	218	218	218	218	196	208	208	224	Q	F	B	B		
12	212	244	238	A	A	A	A	250	212		B		B	B	B	E B	E B	E B	A	A	A	A	A	A	A		
13	194	194	A	A	A	A	B	A	A	B	B		E A	E B	A				E B	E B	E S	B	B	Q	160		
14	A	A	A	A	A	A	A	248	230	206		B	E A	260	216	224	214	210	206	206	230	212	210	216	F	A	A
15	A	220	A	A	220	A	B	B		B	B	B	B	B			220	234	222	214	214	214	A	A	258	260	
16	A	A	A	A	A	A	A	252	230	224	244	242	228	212	228	210	212	216	222	216	Q	S	S	S	A		
17	A	B	224	210	234	206	B	A	222	246	222	222	222	218	218	214	216	204	204	204	214	208	236	228	A		
18	Q	F E	A	F	A	A	208	A	Q	214	234	212	202	214	214	234	198			230	A	A	F	210	A		
19	E A	A	A	A	A	224	224	A	B	B		244	236	206	206	230	254	218	214	212	240	284	222	214	B		
20	230	A	A	B	B	A	B	B	220	208	208	238	222	224	214	208	214	222	218	232	Q	B	B	B	B		
21	226	A	226	A	A	A	A	208	B	A	Y E	A		B	E B	E B	B	B		Q	Q	Q	Q	Q	Q		
22	216	A	234	A	A	A	B	236	250	Q	G	B	B	224	226	202	206	218	212	210	222	222	260	A	212		
23	A	A	A	A	206	A	A	216		B	B	B	B		222	234		B	B	B	B	272	A	A	200		
24	A	A	A	224	B	A	A	B	B	B	B	A	B	B	B	B	B	B	B	Q	222	316	A	A	A	A	
25	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	A	B E	A	280	B	A	A	A	A	A	240	
26	240	A	A	A	Q	204	A	A	A	246	234		A	B	B	Q	220	236	250	314	A	A	A	A	B		
27	A	B	B	B	B	A	B	B	B	B		228	218	218		B	B	B	B		B	B	242	250	A		
28	A	A	A	A	A	A	256	240	222	216	224	212	242	222	212	214	220	208	204	210	216	222	222	268	Q		
29	F	A	A	A	Q	Q	Q	B	B	Q		206	222	B	B		232	224	240	B	B	234	214	242	B	A	
30	A	234	B	A	242	234	B	B	238	216	216	196	196	196	212	218	226	224	212	Q	234	220	B	A	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	12	8	7	7	7	7	5	10	16	16	19	21	23	23	25	25	26	24	26	24	19	14	10	11			
MED	222	218	225	224	222	208	245	241	224	216	223	224	223	218	219	220	220	211	214	214	217	230	223	216			
U Q	237	228	238	230	234	304	289	250	239	239	234	238	232	226	229	234	230	224	230	234	238	260	250	240			
L Q	214	211	220	210	208	206	229	224	214	207	210	220	216	212	213	212	214	205	208	205	210	212	216	202			

SEP. 1998 h'F (KM)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 1998 f_{XI} (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	O	X	A	B	B	B	B	B	B	B	B	B	B	O	X	O	X	X	X	B	B	98	A	49	B	
3	A	A	B	A	A	B	B	B	B	B	B	B	B	B	B	B	O	X	O	X	O	X	X	X	X	
4	O	X	O	X	A	A	B	RO	X	O	X	X	X	O	X	O	X	O	X	O	X	O	X	X	X	
5	38	40	42	B	42	44	56	63	67	74	79	83	86	87	90	88	87	87	78	66	49	45	40	31		
6	X	A	O	X	43	48	50	59	75	81	90	101	98	102	98	100	110	103	96	78	69	O	X	X		
7	29	O	X	56	54	A	O	X	O	X	B	B	B	B	B	B	B	B	B	B	116	A	A	O	X	
8	43	O	X	A	A	46	B	B	R	B	B	B	B	B	B	B	O	X	B	B	X	56	46	38	A	A
9	R	A	A	Y	S	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
10	C	C	C	C	C	C	C	C	B	B	B	B	X	O	X	X	X	X	B	O	X	O	X	X	X	
11	41	42	43	B	B	B	R	B	X	O	X	X	X	X	X	X	X	X	X	O	X	O	X	X	X	
12	X	O	X	R	B	O	X	Y	B	X	X	X	X	X	O	X	O	X	X	X	O	X	O	X	X	
13	A	A	A	44	46	A	B	A	O	X	O	X	X	X	B	B	B	B	B	B	78	69	62	61	68	49
14	A	41	44	O	X	O	X	R	R	X	O	X	X	X	X	X	X	X	X	X	X	O	X	X	X	
15	54	54	55	59	59	59	B	R	RO	X	X	X	X	X	O	X	X	X	X	X	X	X	X	X	X	
16	27	32	43	42	38	65	63	72	74	74	74	69	72	78	73	74	74	70	69	66	59	56	53	48	A	
17	56	A	62	44	48	X	R	A	X	X	B	X	B	B	B	O	X	X	X	X	X	X	44	44	41	A
18	X	B	RO	X	X	O	X	R	B	R	X	X	X	X	B	B	81	82	81	70	57	42	46	46	47	X
19	A	38	A	A	O	X	R	R	B	Y	B	R	B	B	YO	X	Y	BO	X	O	X	O	X	O	X	
20	A	A	36	42	34	A	RO	X	RO	X	O	X	O	X	R	R	B	RO	X	X	X	O	X	A	B	A
21	B	A	40	BO	X	O	X	B	B	B	B	B	B	B	B	B	BO	X	BO	X	A	A	55	A	A	
22	X	B	AO	X	X	B	R	RO	X	B	B	B	B	B	BO	X	O	X	X	RO	X	A	YO	X	B	
23	B	B	B	B	BO	X	O	X	B	B	B	B	B	B	BO	X	B	B	BO	X	R	A	52	A	A	
24	A	A	AO	X	B	B	B	B	B	BO	X	B	B	B	B	B	BO	X	R	X	O	X	A	AO	X	
25	R	B	B	A	R	B	B	B	B	B	R	B	B	B	B	B	O	X	O	X	X	AO	X	A	A	
26	O	X	AO	X	44	59	59	57	65	66	72	B	B	B	B	BO	X	R	BO	X	X	X	X	X	X	
27	49	49	49	B	AO	X	X	X	X	O	X	R	X	X	BO	X	X	X	X	X	O	X	X	X	X	
28	50	A	37	A	BO	X	O	X	R	RO	X	B	O	X	O	X	O	X	X	X	X	X	X	X	X	
29	O	X	AO	X	B	B	B	RO	X	O	X	R	R	R	BO	X	O	X	X	B	X	X	X	X	X	
30	A	B	AO	X	O	X	O	X	Y	BO	X	B	B	BO	X	O	X	X	C	C	C	B	X	X	X	
31	52	39	46	49	X	O	X	O	X	X	X	B	X	O	X	O	X	BO	X	O	X	X	X	X	X	
	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	18	12	15	15	17	14	9	11	15	17	14	16	17	15	17	20	22	19	22	26	25	22	22	19		
MED	41	42	43	44	48	49	57	65	69	72	76	77	78	80	77	80	79	74	70	60	56	52	48	42		
U Q	52	48	49	49	55	57	62	72	74	76	80	84	85	87	89	88	86	81	74	69	62	56	53	49		
L Q	X	36	38	38	42	45	44	52	57	61	67	60	68	71	72	70	73	71	66	62	55	44	41	40	37	

OCT. 1998 f_{XI} (0.1MHz)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 1998 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	A		
2	R 59	A	B	B	B	B	B	B	B	B	B	B	B	38	40	42	48	52	B	B	R	A	F	B		
3	A	A	B	A	A	B	B	B	B	B	B	B	B	B	B	B	44	B	R	47	43	39	32	25	19	
4	F 15	R 17	A	A	B	F 34	R	R	R	J	R	R	R	J	R	R	J	R	J	R	J	R	F	F	F	
5	F 30	F 30	F 32	B	F 33	F 35	50	57	61	68	73	77	80	81	84	82	81	81	72	60	40	36	30	21		
6	20	A	F	F	F	F	J	R	J	R	R	R	J	R	R	S	R	F	F	R	R	F	F	F		
7	F 20	R 41	F 41	F 37	A	R	42	56	B	B	B	B	B	B	B	B	69	B	B	90	F	A	A	A	R	
8	F 33	R 49	A	A	34	B	B	R	B	B	B	B	B	B	B	B	69	B	B	50	35	32	A	A		
9	R	A	A	Y	S	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
10	C	C	C	C	C	C	C	C	B	B	B	J	R	R	R	J	R	B	R	R	R	F	F	A		
11	F 28	F 31	F 32	B	B	B	R	B	63	58	54	55	72	72	73	78	78	74	64	B	60	56	54	27		
12	35	42	R	B	S	Y	B	60	67	66	68	75	79	79	82	77	81	80	62	61	32	28	29	A		
13	A	A	A	F	R	A	B	A	66	71	74	68	62	B	B	B	B	B	72	63	56	55	58	39		
14	A	F	F	F	R	R	R	J	R	R	R	R	R	R	R	R	74	68	64	62	57	48	51	55		
15	F 48	F 44	F 40	F 50	F 49	F 49	B	R	84	92	86	90	88	90	85	74	75	73	63	46	24	18	15			
16	F 16	F 20	F 32	F 30	R	S	R	59	57	66	68	68	68	63	66	72	67	68	68	64	63	60	53	49	47	40
17	39	A	R	R	R	A	51	67	B	J	R	B	B	B	B	67	72	72	68	52	35	35	30	A		
18	J 49	R	B	R	J	R	R	R	B	R	62	63	69	68	74	72	73	71	60	51	36	40	36	38		
19	A	F	A	A	R	R	R	B	Y	B	R	B	B	Y	R	38	Y	B	R	R	R	R	F	F	A	
20	A	A	F	R	F	A	R	R	R	R	R	R	R	R	R	B	R	59	52	45	31	A	B	A		
21	B	A	F	R	R	R	B	B	B	B	B	B	B	B	B	B	R	B	R	A	A	F	A	A		
22	34	B	A	R	B	R	R	R	R	B	B	B	B	B	B	B	R	R	R	R	A	Y	R	B		
23	B	B	B	B	B	R	R	B	B	B	B	B	B	B	B	B	88	80	62	32	R	R	A	F	A	
24	A	A	A	R	B	B	B	B	B	B	R	B	B	B	B	B	B	R	R	47	42	R	A	A	R	
25	R	B	B	A	R	B	B	B	B	B	R	B	B	B	B	B	74	71	60	56	53	37	A	F	A	
26	R	A	F	F	F	R	R	R	R	B	B	B	B	B	B	R	R	B	B	F	F	F	F	F		
27	F 40	F 38	F 38	B	A	R	F	F	J	R	R	J	R	J	R	B	R	J	R	J	R	R	R	R	F	
28	F 28	A	F	A	B	R	R	R	R	R	B	R	R	R	R	R	68	63	67	57	60	63	67	54	49	45
29	R 34	A	E	G	F	B	B	B	R	R	R	R	R	R	B	R	R	R	B	49	50	32	28	25	22	
30	A	B	A	R	R	R	Y	B	R	B	B	B	R	R	R	C	C	C	B	J	R	55	50	46	43	43
31	F 42	F 28	40	43	48	51	51	52	J	R	B	60	62	61	66	B	R	R	R	R	57	54	50	48	A	F
	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	18	11	15	15	17	14	9	11	15	17	14	16	17	15	17	20	22	19	22	26	25	21	22	17		
MED	F	F	F	37	41	41	51	59	63	66	70	71	72	74	71	73	72	68	63	54	46	40	36	32		
U Q	F	R	R	42	48	49	56	66	68	70	74	78	79	81	83	82	80	75	68	62	55	48	46	40		
L Q	F	F	F	F	F	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	F	F	F	
	28	28	28	34	36	38	46	51	55	61	54	62	65	66	64	67	65	60	56	49	36	32	30	24		

IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 1998 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	36						
2	E B 38	67	B	B	B	B	B	B	B	B	B	B	B	B	B	B	25	24	B	B	B	41	41	42	B						
3	36	49	B	37	34	B	B	B	B	B	B	B	B	B	B	B	29	B	B	B	29	26	23	18	16	25					
4	14	32	40	34	B	32	34	33	G	G	28	29	32	30	28	32	G	G	20	24	12	13	15	15	S						
5	E S 15	E S 14	28	B	E S 30	16	18	21	25	25	27	31	32	32	29	27	26	24	19	17	E	B	B	14	10	B					
6	14	26	42	33	16	17	21	22	24	27	28	30	30	30	30	32	32	23	22	21	E	B	E	14	15	S					
7	39	43	52	67	36	38	35	B	B	B	48	37	28	29	30	E B 30	G	27	B	B	38	60	82	96	46	S					
8	35	49	40	41	33	B	B	36	B	B	B	B	B	B	B	B	B	58	B	B	22	32	39	41	36	S					
9	36	39	44	39	38	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	S					
10	C	C	C	C	C	C	C	C	B	B	B	33	E	B	E	B	B	B	B	B	E	B	E	B	E	S	S				
11	30	16	28	B	B	B	38	B	39	G	G	32	32	28	29	26	26	E	B	E	B	B	24	22	30	32	S				
12	39	43	36	B	82	34	38	33	30	31	G	30	30	28	28	27	25	21	E	B	G	26	27	32	36	S					
13	37	41	44	34	34	48	B	47	39	35	34	31	31	B	B	B	B	B	B	E	B	E	B	18	24	17	32	S			
14	68	56	40	44	56	43	42	37	35	28	32	35	33	45	36	32	33	26	23	21	E	S	E	12	12	11	S				
15	E S 14	E S 16	36	36	E S 16	22	B	43	36	28	33	35	31	31	34	30	27	26	26	23	32	30	18	25	S						
16	26	30	32	32	G	38	46	32	E B 56	29	32	32	32	37	30	28	32	33	30	17	E	B	E	B	E	B	S				
17	42	40	59	48	45	36	48	43	G	B	35	B	B	B	B	B	59	29	26	27	36	37	33	26	40	S					
18	46	B	38	40	E B 25	34	44	B	42	35	32	32	39	E	B	G	B	32	31	26	26	44	36	44	36	39	S				
19	43	43	74	48	E B 22	39	34	B	28	B	30	B	B	32	31	26	B	B	E	B	31	25	22	26	16	42	61	S			
20	44	44	34	38	27	84	32	34	33	30	E B 32	25	31	28	33	B	28	27	22	23	38	64	B	26	S						
21	B	39	34	B	29	27	B	B	B	B	B	B	B	B	B	B	31	B	B	E	B	25	31	41	44	40	33	S			
22	32	B	35	29	42	B	37	35	28	B	B	B	B	B	B	B	G	G	24	34	G	80	28	74	B	S					
23	B	B	B	B	E B 31	26	B	B	B	B	B	B	B	B	B	B	28	B	B	B	23	28	35	60	36	S					
24	38	71	41	36	B	B	B	B	B	B	28	B	B	B	B	B	B	B	E	B	27	34	23	19	37	40	41	S			
25	28	B	B	30	G	B	B	B	B	B	31	B	B	B	B	B	28	E	B	E	B	32	32	35	36	33	39	40	37	S	
26	38	47	36	35	34	34	32	33	29	32	B	B	B	B	B	B	56	26	B	31	30	20	21	36	23	S					
27	34	34	43	B	39	41	33	27	28	E B 37	32	34	G	B	E	B	E	B	60	34	28	24	24	19	38	27	23	S			
28	34	108	24	70	B	34	38	42	39	32	B	E	B	E	B	E	B	58	58	59	32	28	34	32	27	24	26	23	38	42	S
29	40	75	42	31	B	B	B	41	30	28	34	30	35	B	31	36	28	B	B	E	B	24	24	26	E	15	16	30	S		
30	33	B	42	39	31	36	33	B	34	B	B	B	B	B	B	B	C	C	C	C	B	E	B	E	B	E	B	E	S	B	S
31	E S 14	23	34	28	25	28	50	41	39	30	B	30	G	37	30	B	28	32	38	35	20	21	39	34	S						
CNT	27	24	25	22	22	20	18	17	20	17	18	17	18	17	18	21	24	19	24	27	29	29	28	28	S						
MED	36	42	40	36	32	34	34	36	32	30	32	31	32	30	30	29	28	26	25	24	25	24	31	32	S						
U Q	39	49	42	41	38	38	42	42	39	34	33	34	E B 33	34	33	32	32	32	32	31	34	38	40	36	S						
L Q	28	31	34	33	25	30	32	32	28	28	28	30	30	30	29	28	26	24	24	22	E	16	E	16	23	S					

IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 1998 fmin (0.1MHz) 45'E MEAN TIME (G.M.T. + 3 H)

LAT. 69'00.4'S LON. 039'35.4'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	27			
2	38	62	B	B	B	B	B	B	B	B	B	B	B	31	31	31	19	16	B	B	41	19	11	B			
3	20	25	B	23	17	B	B	B	B	B	B	B	B	B	B	B	29	B	29	26	23	11	10	10			
4	10	10	10	15	B	13	19	18	23	15	15	19	20	18	19	14	17	16	E S	E S	E S	E S	E S	E S			
5	E S	E S	E S	E S	B	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S			
6	10	10	10	12	10	10	13	12	15	15	13	15	16	16	15	14	13	14	14	13	20	14	14	15			
7	12	15	14	10	19	15	15	B	B	21	16	21	24	19	30	16	16	B	B	21	10	10	12	10			
8	10	10	16	13	11	B	B	32	B	B	B	B	B	B	B	B	58	B	B	22	10	10	9	17			
9	14	24	23	27	20	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
10	C	C	C	C	C	C	C	C	B	B	B	22	56	32	47	20	20	B	34	55	28	16	E S	E S			
11	10	10	12	B	B	B	16	B	15	18	18	22	19	20	19	20	18	56	32	B	24	E S	E S	E S			
12	E S	E S	E S	B	16	29	B	19	16	15	16	18	19	19	20	15	15	14	21	11	16	10	10	10			
13	21	10	18	14	24	17	B	E S	E S	E S	14	14	22	B	B	B	B	B	29	28	11	10	10	10			
14	18	10	10	14	12	21	19	27	12	24	14	15	20	17	12	16	13	12	12	15	11	12	12	11			
15	14	16	16	12	16	14	B	25	18	20	25	15	16	18	14	16	14	13	12	10	12	E S	16	12	14		
16	E S	E S	E S	10	20	22	14	E S	57	16	19	16	15	14	15	15	14	13	E S	14	10	13	13	12	14		
17	9	10	10	21	12	12	12	11	12	B	26	B	B	B	B	59	29	E S	13	16	16	E S	E S	10	10		
18	12	B	20	14	25	23	20	B	24	16	16	14	39	22	B	15	E S	13	20	15	E S	E S	10	10	10		
19	13	11	18	20	22	22	30	B	17	B	22	B	B	24	18	21	B	31	22	16	16	11	13	10			
20	10	10	10	10	11	16	24	20	19	23	32	22	18	14	29	B	15	E S	14	15	E S	E S	E S	B	15		
21	B	18	16	B	20	20	B	B	B	B	B	B	B	B	B	B	19	B	25	20	15	16	22	23			
22	17	B	18	25	E S	B	24	21	20	B	B	B	B	B	B	B	19	23	15	29	18	20	16	10			
23	B	B	B	B	B	31	21	B	B	B	B	B	B	B	B	B	18	B	B	B	16	16	11	10	11		
24	10	12	16	18	B	B	B	B	B	B	24	B	B	B	B	B	B	B	16	34	E S	E S	E S	E S	13		
25	17	B	B	24	20	B	B	B	B	B	22	B	B	B	B	B	16	32	32	18	E S	E S	E S	E S	14		
26	15	14	E S	E S	14	14	E S	E S	E S	19	19	B	B	B	B	B	56	24	B	20	E S	E S	E S	13			
27	14	E S	E S	E S	B	21	16	E S	E S	E S	37	29	17	24	B	60	34	16	20	24	20	15	E S	E S	13		
28	E S	13	19	13	E S	B	15	15	16	14	20	B	58	58	59	29	22	E S	E S	12	13	18	18	13	14	11	13
29	20	14	E S	10	12	B	B	B	16	15	13	16	18	E S	B	17	14	21	B	24	14	14	15	10	13		
30	20	B	21	15	E S	E S	14	12	23	B	17	B	B	B	E S	17	12	15	C	C	C	B	26	20	16	E S	15
31	14	14	E S	15	15	22	15	E S	14	14	16	B	E S	13	16	20	15	B	14	18	E S	E S	E S	E S	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	30	30	30	30	30	30	30	30	31	31	30	30	30	30	30	29	29	29	30	30	30	30	30	30	30		
MED	14	14	16	16	20	22	24	26	19	24	26	22	32	32	30	20	19	20	23	16	14	12	11	13			
U Q	20	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	30	B	B	B	34	24	20	16	14	15	
L Q	12	10	12	14	14	15	15	15	15	16	16	17	18	18	17	16	14	14	E	15	13	12	11	10	10		

IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 1998 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	E B 214	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	220	254	Q	B	B	B	A	Q	B	
3	A	A	B	A	A	B	B	B	B	B	B	B	B	B	B	B	244	B	B	B	238	248	250	258	294	
4	A	A	A	A	B	A	A	A		226	222	226	220	214	232	212	214	216	222	212	218	206	222	236	230	
5	Q E S 282	S E S 274	S	B	A	S E A 258	A	228	230	216	202	224	196	196	200	234	222	222	208	204	192	210	244	Q	B	
6	A	A	216	228	208	A	250	218	234	212	216	208	210	210	218	214	222	214	206	206	206	232	240	240	Q	
7	A E A 252	A	210	214	Q	A	A	A	B	B	A		E A	226	216	252	218	232	218	228	214	A	A	A	276	
8	A	206	A	A	A	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	242	222	220	A	A	
9	A	A	A	A	A	B	B	B	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
10	C	C	C	C	C	C	C	C	C	B	B	B	A	B	206	B	244	226	B	232	B	236	228	226	Q	A
11	230	A	A	B	B	B	A	B		260	242	212	212	214	214	190	206	216	274	242	B	B	Q	Q	226	
12	232	A	A	B	A	A	B	A E A 228	A	224	218	228	224	224	212	212	222	228	242	244	A E A 266	A	A	A	A	
13	A	A	A	A	A	A	B	A	220	642	226	226	210		B	B	B	B	B	240	238	224	262	250	238	
14	A	228	A E A 246	A	A	A	A	A	216	216	216	230	228	230	212	212	222	222	220	208	216	216	228	228	Q	
15	Q E S 242	S	Q E A 304	S	A E S 318	A	B	A	236	224	220	220	218	218	218	218	226	226	228	220	256	296	296	A	Q	
16	A	A	A	A E A 222	A	222	198	240	Q	B	230	210	212	212	212	224	216	222	218	222	214	210	218	224	E B 230	
17	230	A	240	A	216	A	A	216	218	B	A	B	B	B	B	B	B	232	224	220	262	260	284	302	A	
18	A	B	A	A	334	A	A	B	A	218	214	210	E B	252	234	B	222	230	232	242	E A	A	A	242	222	
19	A	A	A	A E B 286	A	A	B	A	A	B	A	B	B	A	A	A	B	B	E A E A 316	268	260	264	198	220	220	
20	232	A	Q	238	A	A	A E A 292	A	218	234	228	214	206	A	B	E A	Q	238	242	232	240	264	A	B	A	
21	B	A	A	B	A	A	B	B	B	B	B	B	B	B	B	B	B	238	B	B	A	A	Q	A	A	
22	A	B	A	A	A	B	A	A E A 226	B	B	B	B	B	B	B	B	210	240	256	A	A	A	A	A	B	
23	B	B	B	B	B E B 264	A	B	B	B	B	B	B	B	B	B	B	232	B	B	B	E A	A	A E A 284	A	A	
24	A	A	A	A	B	B	B	B	B	B	A	B	B	B	B	B	B	236	E B	258	242	254	A	A E A 236	A	
25	A	B	B	A	A	B	B	B	B	B	E A 218	B	B	B	B	B	226	240	252	252	302	234	A	A	A	
26	E A 256	A	A	A	A	A	244	226	232	216	B	B	B	B	B	E B	268	206	B	226	230	222	234	230	Q	
27	222	216	E A 206	B	A	A E A 248	212	220	232	242	218	210		B	B	234	212	220	242	230	216	250	Q	A	298	
28	A	A	262	A	B E A E A 300	230	228		A E A 262	B	B	B	B	B	E A	230	218	226	218	238	242	226	254	254	232	
29	A	A	A	198	B	B	B	A	242	212	212	218	204	B	222	212	212	B	234	208	A	304	298	Q	A	
30	A	B	A	A	A	A	A	B E A 256	B	B	B	B	204	222	222	C	C	C	C	B	240	240	244	242	260	
31	E S 256	A	A E A 308	A	A	A	A	A	228	218	210	B	212	192	192	210	B	210	230	230	232	234	234	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	6	8	7	6	3	6	9	15	16	15	15	16	15	14	19	23	19	23	24	22	21	20	15		
MED	231	240	228	U	U	E A U 264	230	227	227	219	218	218	212	215	216	218	222	225	227	228	230	233	240	231		
U Q	E	E S	E A	E A	E A	300	250	234	236	231	226	226	221	230	224	234	E	232	252	E	E A	248	258	256	260	
L Q	230	216	213	214	216	222	230	217	220	216	212	212	207	206	212	212	216	222	222	222	216	216	219	225	226	

OCT. 1998 h'F (KM)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 1998 f_{XI} (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	X				O X	R	B	X	X	X	O X	O X	X	X	R	O X	X	X	X	X	X	X	X	X
2	O X		O X	X	Y	Y	O X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	O X	X	R
3	O X	X	O X	O X	O X	O X	O X	O X	O X	O X	O X	O X	O X	O X	O X	O X	O X	O X	O X	O X	O X	O X	O X	O X
4	X	R	B	A	R	R	X	O X	X	X	O X	X	O X	B	B	R	B	B	X	O X	X	R	O X	A
5	X		X	X	B	A	R	X	X	X	O X	O X	R	O X	O X	X	X	X	X	X	R	O X	X	A
6	42	A	54	53	R	X	B	B	B	Y	B	B	B	B	B	B	B	B	B	B	B	B	B	B
7	Y	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	R	B	R	R	R	B	O X
8	A	O X	O X	B	B	B	B	B	B	B	B	B	B	B	B	B	O X	O X	O X	X	X	X	O X	O X
9	O X		O X				R	R	B	B	B	Y	R	Y	B	B	B	B	O X	O X	O X	O X	A	O X
10	B	A	X	A	A	X	A	O X	R	X	R	B	Y	B	R	B	O X	O X	B	X	O X	O X	X	X
11	X	X	B	O X	X	X	X	X	X	R	O X	O X	B	X	X	X	X	X	X	X	X	X	O X	X
12	54	B	O X	O X	R	R	R	X	X	X	X	O X	X	X	O X	O X	O X	O X	O X	O X	X	X	X	X
13	49	88	A	R	R	B	B	B	B	B	B	B	B	B	Y	C	B	R	X	O X	X	X	A	
14	37	48		O X	O X	O X	R	O X	R	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	O X	R	O X	R	B	O X	O X
17	O X	B	R	R	R	R	R	R	Y	O X	B	B	B	R	X	X	O X	X	X	X	X	X	X	X
18	X	R	O X	O X	R	A	O X	X	B	B	B	X	X	O X	O X	X	X	X	X	X	X	X	X	O X
19	53	56	54	B	X	R	B	X	X	X	X	X	X	X	X	X	O X	X	X	X	X	X	X	X
20	X	X	X	A	O X	X	X	X	X	B	B	B	B	X	X	X	X	B	B	O X	O X	O X	X	A
21	A	O X	R	B	B	B	R	R	Y	B	O X	O X	O X	O X	O X	O X	B	O X	O X	O X	O X	X	X	X
22	X	B	A	R	B	B	R	B	O X	X	B	X	X	O X	O X	X	B	O X	O X	X	X	X	O X	O X
23	O X	O X	O X	O X	B	B	B	R	B	R	B	B	B	B	R	Y	R	X	X	X	R	O X	O X	A
24	45	42		O X	B	Y	Y	R	R	B	R	R	R	R	R	X	X	R	O X	O X	R	O X	R	X
25	O X	R	B	R	A	R	R	X	B	B	R	B	R	R	R	R	R	R	R	X	O X	R	X	X
26	O X	B	B	O X	R	B	R	R	O X	X	B	R	B	B	B	B	B	B	O X	O X	O X	O X	O X	X
27	O X	O X	R	B	B	R	R	R	B	B	R	B	R	R	R	R	B	R	X	X	R	R	X	X
28	X	67	68	67	X	R	B	R	R	B	B	O X	O X	O X	R	O X	O X	O X	O X	X	X	O X	O X	X
29	O X	O X	O X	R	R	R	B	R	R	R	R	R	R	R	R	R	R	R	R	X	X	X	X	R
30	R	O X	X	X	X	O X	X	R	R	B	R	R	R	R	R	B	B	R	X	X	X	X	R	R
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	23	18	16	15	9	9	8	12	13	11	9	11	10	11	12	12	16	19	21	24	21	23	23	18
MED	X	X	X	O X	X	X	O X	X	X	X	O X	O X	X	X	X	X	X	X	X	X	X	X	X	X
U Q	53	56	54	58	62	70	72	78	82	85	86	88	81	81	76	74	72	69	68	64	62	62	57	56
L Q	45	48	O X	O X	O X	X	X	X	X	O X	O X	X	X	O X	O X	X	O X	O X	X	O X	O X	X	O X	X

IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 1998 foF2 (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	F 33	F 42	F 39	R 44	R	B	51	54	59	60	R 59	R 58	R	R 59	60	60	58	56	J 52	R 52	R 52	49	28		
2	R 40	F 34	R 38	J 50	Y	Y	R 48	56	62	65	68	J 72	R 70	J 67	66	66	62	61	62	58	56	F 58	F 44	R		
3	R 41	44	R 41	R 48	R 46	R 36	R 43	64	76	79	76	R 82	R 76	J 75	69	69	68	63	63	64	53	F 36	F 36	F 29		
4	J 43	R	R	B	A	R	R	59	77	84	84	79	84	90	R	B	R	B	B	66	59	46	R 39	R 39	A	
5	37	F 26	48	45	B	A	R	61	69	70	68	65	R 70	J 69	68	68	69	J 73	62	R	R 41	R 38	R 34	34		
6	F 37	A	F 45	F 43	R	53	B	B	B	Y	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
7	Y	B	A	B	B	B	B	B	B	B	B	B	B	B	B	R	R	R	R	R	B	B	R 38	B		
8	A	R 34	R 33	R	B	B	B	B	B	B	B	B	B	B	B	B	R 41	R 40	R 43	55	J 56	R 42	R 40	R 50		
9	R 45	F 38	F 36	R 40	F 34	F 34	R	R	B	B	B	Y	R	Y	B	B	B	B	37	34	41	R 30	R 30	R		
10	B	A	31	A	A	A	R	R	J 54	R	R	B	Y	B	R	B	R 43	R 43	B	49	50	R 49	R 49	49		
11	F 43	49	B	44	S 59	J 72	91	96	95	R 86	R 82	B	J 78	71	63	61	J 66	64	64	64	64	62	57	S 55		
12	F 45	B	R 48	R 52	R	R	R	66	75	82	82	82	75	74	64	64	65	66	61	62	59	J 58	60	61		
13	F 36	F 56	A	R	R	B	B	B	B	B	B	B	B	Y	C	B	R	36	33	30	J 50	R 50	A	B		
14	F 27	F 38	A	36	R 36	F 32	R 39	R	R	R	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	
16	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	R 58	R 58	R	R	B	R 48	R 44		
17	R 44	B	R	R	R	R	R	R	Y	R 60	B	B	B	R	62	59	67	58	52	J 55	54	53	51	54		
18	J 54	R	R	R	R	A	R	R	B	B	B	B	J 61	R 62	59	60	61	57	58	58	57	46	43	R 38		
19	F 43	50	R 48	B	R	B	J 58	59	62	67	69	74	J 75	R 72	67	65	R 60	58	55	40	43	51	F 45			
20	42	46	55	A	R 50	J 65	R 74	83	73	B	B	B	B	J 73	76	74	73	B	B	R 58	57	59	44	A		
21	A	R 45	R	B	B	B	R	R	Y	B	R	R	R	R	R	B	R	R	J 56	R 48	45	45	47	48		
22	44	B	A	R	B	B	R	B	R	J 74	R 76	B	J 71	R 73	68	67	60	59	56	J 54	55	42	R 40	R 40		
23	R 41	R 48	R 48	R 48	B	B	B	R	B	R	B	B	B	B	R	Y	R 59	R 60	52	R	R	43	R 42	A		
24	F 35	F 32	A	F 40	F 47	R 41	B	Y	Y	R	R	B	R	R	R	J 56	62	44	42	R	R	42	48	B		
25	R 42	R	B	R	A	R	R	48	B	B	R	B	R	R	R	R	R	R	J 52	49	R	39	42	B		
26	F 34	B	B	R	R	B	R	R	63	69	B	R	B	B	B	B	B	R 43	R 58	R 48	R 44	41	39	42		
27	R 44	R 46	R	B	B	B	R	R	B	B	R	B	R	R	R	B	R	J 55	B	R	R	56	54	53		
28	53	F 57	F 58	J 61	R	B	R	R	R	B	B	R	R	R	R	R	R	R	R	R	R	56	49	R 50	R 44	R 50
29	R 47	51	46	R	R	R	B	R	R	R	R	R	R	R	R	R	R	J 54	R 52	J 54	53	52	R	R		
30	R	R 47	J 50	R 52	62	62	U 58	R	R	B	R	R	R	R	R	B	B	R	57	56	49	49	F	R	R	
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	23	18	16	15	9	9	8	12	13	11	9	11	10	11	12	12	16	19	21	24	21	23	22	18		
MED	42	46	47	48	47	41	56	62	69	69	68	71	72	70	66	64	63	59	58	55	52	49	44	46		
U Q	44	49	48	52	54	64	66	72	76	79	80	82	75	75	70	68	66	63	62	58	56	53	51	50		
L Q	F 37	F 34	R 40	40	40	33	46	54	60	60	64	65	66	65	63	60	60	55	52	49	44	42	40	38		

NOV. 1998 foF2 (0.1MHz)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 1998 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	29	30	35	34	33	39	B	37	28	29	34	32	32	32	31	36	28	28	24	22	19	19	E S	14	30
2	36	32	27	E B 36	42	40	39	34	33	30	32	32	34	40	36	36	34	32	32	29	25	E S	16	27	44
3	40	36	28	30	27	36	40	38	33	34	32	G	33	31	30	E B 34	26	38	42	27	28	36	37	41	
4	45	38	B	41	40	34	36	28	28	32	34	33	34	B	B E 33	B	B	B	23	30	22	41	39	41	
5	41	43	48	44	B	44	39	36	30	38	E B 56	26	32	28	31	30	35	31	35	42	48	42	37	37	
6	39	60	71	88	35	32	B	B	B	28	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
7	28	B	102	B	B	B	B	B	B	B	B	B	B	B	B	33	B	B	E B 31	38	26	B	B	B	
8	36	26	E B 25	B	B	B	B	B	B	B	B	B	B	B	B	B E 32	B	29	32	36	28	30	25	42	
9	37	31	26	44	34	32	40	40	B	B	B	33	30	31	B	B	B	B	24	26	43	37	42	43	
10	B	42	37	38	37	31	37	36	28	28	29	B	28	B	27	B	22	26	B	29	36	24	37	27	
11	31	34	B E 37	26	27	30	E B 32	31	27	27	32	B	49	40	34	44	30	29	26	23	18	E B 15	E S	15	
12	27	B	34	35	36	40	37	37	G	G	30	35	37	38	37	32	29	32	43	43	34	19	18	E B 15	
13	28	37	46	38	39	B	B	B	B	B	B	B	B	B	32	C	B	29	26	24	20	53	67	B	
14	44	27	39	33	43	30	38	41	34	31	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 E 30	B E 24	B E 25	B E 27	B E 29	B E 29	B E 29	B E 26	B E 26
17	E B 23	B	42	35	38	36	36	36	34	28	B	B	B	32	31	30	30	27	23	25	24	23	21	E S 22	
18	E B 26	31	32	76	36	41	33	32	G	B	B	B	33	29	34	30	30	28	27	22	22	21	19	E B 24	
19	23	25	E B 33	B	30	42	B	38	32	31	32	32	32	30	33	32	30	25	25	24	35	34	20	40	
20	42	47	38	73	35	38	33	32	38	B	B	B	B E 56	B	30	33	32	B	B	39	E B 34	26	38	36	
21	39	34	38	B	B	B	40	49	28	B	34	27	33	33	30	B	29	29	26	36	33	24	22	32	
22	31	B	43	38	B	B	39	B	35	33	B	32	32	32	E B 59	B	31	28	26	23	25	33	36	33	
23	25	22	28	38	B	B	B	43	B	47	B	B	B	B	34	33	32	30	30	26	33	43	42	39	
24	36	68	70	37	30	34	B	29	28	44	33	B	34	34	33	32	30	26	28	27	37	38	37	34	
25	34	38	B	36	92	40	39	33	B	B	34	B	34	34	33	34	31	32	35	27	29	E B 28	40	B	
26	34	B	B	34	37	B	34	36	37	36	B	32	B	B	B	B	B E 34	B E 31	B	30	32	26	42	39	
27	31	E B 36	40	B	B	B	42	41	B	B	36	B	33	36	34	B	30	27	B E 31	30	26	23	21		
28	24	32	30	G	28	B	46	47	42	B	B	34	35	35	43	40	37	32	29	26	26	24	36	32	
29	24	24	35	40	37	34	B	42	38	38	33	32	34	32	33	33	35	31	35	31	40	23	25	35	
30	44	36	36	36	33	31	28	38	39	B	33	36	36	38	35	B	B	B	31	28	32	26	74	43	41
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	27	23	24	23	21	19	19	23	20	17	15	15	18	19	21	17	20	24	24	27	26	25	27	24	
MED	34	34	36	37	36	36	38	37	32	31	33	32	33	32	33	33	30	30	28	27	28	26	36	34	
U Q	39	38	42	41	38	40	40	41	36	37	34	33	34	38	36	34	33	32	34	31	34	38	39	40	
L Q	27	30	31	35	32	32	34	33	28	28	32	32	32	31	31	32	30	28	26	25	25	23	22	E 26	

IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 1998 fmin (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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					
D	E S	E S	E S	S			B		E S													E S							
1	12	13	13	13	17	30		14	12	14	14	14	16	15	17	14	13	14	13	12	14	14	14	14					
2	E S	13	14	19	36	21	16	E S	E S	E S	16	19	15	15	107	15	11	16	E S		13	13	16	14	14				
3	E S	13	14	19	20	19	22	E S	14	18	17	14	15	14	16	14	29	34	24	E S	E S	13	13	12	13	13	14		
4		15	17		19	30	14	15	E S	E S	13	13	14	15	14		33				20	14	14	12	13	12			
5		12	10	10	10		15	22	E S	14	19	16	56	23	18	24	23	18	14	15	E S	13	16	15	12	12	13		
6	E S	14	15	14	14	29	17		B	B	B		23		B	B	B	B	B	B	B	B	B	B	B	B			
7		23		69		B	B	B	B	B	B	B	B	B	B	B	B	20		24	24	26				B			
8		20	18	25		B	B	B	B	B	B	B	B	B	B	B	B		32	24	20	22	24	16	14	16			
9	E S	13	13	E S	E S	E S				B	B	B			B	B	B	B	E S	E S		12	13	12	13	14	12		
10			16	13	14	15	E S	E S	14	14	15	16	17		15		24		B		19	19		20	17	14	14	11	
11		12	12		37	20	14	E S	12	32	22	19	24	22		21	20	16	15	12	12	10	10	12	15	15			
12		10		15	16	30	17	20	12	16	16	16	16	15	18	19	18	15	14	16	11	14	13	12	15				
13		10	14	18	25	E S	20		B	B	B	B	B	B	B	B	C	B			14	14	13	11	10	15	B		
14		11	12	24	11	14	10	10	19	14	16			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		
17		23		B							B	B	B						30	24	25	27		29	26	E S			
18		26	24	24	27	26	12	15	13	14				B	B	B		20	18	20	15	15	12	14	12	13	15	14	24
19		13	14	33		25	20		B	14	15	15	12	11	23	18	24	23	14	14	14	11	10	14	15	14			
20		14	15	14	16	20	16	12	14	11					B	B	B		56	19	19	18			28	34	16	16	20
21		26	14	30		B	B			24	17	22		B	25	23	23	21	23		B	22	18	16	12	18	14	14	14
22		10		20	25		B	B		24		26	20		B	21	20	23	59		B	22	20	20	15	21	13	10	12
23		14	15	16	13		B	B	B		27		B	20		B	B		28	30	16	17	14	13	20	11	13	16	
24		12	14	15	10	14	14		B	20	24	22	25		B	20	23	20	13	14	E S	23	18	16	22	16	20	23	B
25		16	24		10	23	27	18	16			24			B	18	22	21	15	15	24	20	22	20	28	15			
26		16		B	12	16		B	19	25	20	21		B	18					34	31	14	22	15	16	16			
27		24	36	24		B	B		20	22		B	20		B	22	16	20		B	24	22		31	E B	22	20	14	15
28		14	9	10	15	23		B	23	18	18		B	B	24	23	24	23	25	22	24	17	16	13	14	15	14		
29		12	15	13	17	26	24		B	25	23	18	17	15	16	18	19	18		B	16	14	13	13	10	11	13	23	
30		18	20	15	15	14	10	16	21	24		B	20	20	20	14	24			B		20	15	12	10	12	18	16	
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	29	30	30	30	30	30	30	30	30	30				
MED	14	15	20	18	26	21	22	20	22	22		B	B		22	23	24	30	22	20	16	14	15	14	14	16			
U Q	23	B	B	B	B	B	B	B	32		B	B	B	B	B	B	B	B	B	B	B	B	22	22	16	24	B		
L Q	12	14	14	13	19	15	15	14	15	16	17	19	16	18	20	17	15	14	14	13	13	13	13	14	14				

IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 1998 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	
D	E	SE	A	Q	A	A	B															Q	Q	E	B
1	216	358	328	206				222	212	202	202	202	208	208	210	214	226	226	232	232	232	238	228	346	
2	242	306		A	B	A	A	A	232	208	192	208	218	224	206	206	214	218	232	226	226	226	238	246	216
3	208	234		A	AE	A	A																		
4	216		A	B	A	A	A																		
5	214	212	266	294	Q	B	A	A																	
6	A	A		A	AE	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
7	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	A	B	A	AE	B	B	B	A	B	B
8	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
9	E	A		Q	A	A	A	A	A	B	B	B	AE	A	Y	B	B	B	B	B	B	B	A	A	A
10	268	234	204	A	A	A	A	AE	A																
11	Q	A	B	B	A	A																			
12	284			252			226	236		208	228														
13	268		B	A	A	A	AE	A	274	212	198		220	220											
14	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
15	254	244		A	A	A	A	A	A	A	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
17	282		B	A	A	A	A	A	Y																
18	284		A	B	A	A	A																		
19	Q		B	BE	A	A																			
20	278	286		252			402																		
21	E	A	A	A	AE	A	246	212	212																
22	236		258		254	246	212	212																	
23	A	A	A	B	B	B	A	A	Y	B	A														
24	264		B	A	A	B	B	A	B	A	B														
25	A	278	288		A	B	B	B	A	B	A	B	B	B											
26	Q		A	A	AE	A	B	A	A	A	A	B	A	A	AE	A									
27	278	242		A	A	A	A	A	A	A	A	B	A	A	AE	A									
28	A	A	B	A	A	A	A	A	A	B	B	A	B	A	A	A									
29	A	A	A	A	A	AE	A																		
30																									
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	18	10	7	3	3	3	6	9	9	12	7	9	10	9	14	13	20	23	22	25	21	22	19	14	
MED	U	256	250	258	252	252	260	230	226	214	213	212	216	210	210	216	215	222	224	228	232	238	234	246	254
U Q	278	288	288	294	364	272	252	257	246	226	228	219	228	239	226	224	226	230	238	239	260	272	252	278	
L Q	236	234	238	206	236	254	224	216	212	204	202	210	208	207	210	207	218	220	222	225	232	232	240	228	

IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 1998 fXI (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	O X 52	A B	49	R	R	R	R	B	R	R	R	R	R	R	R	R	O X 62	R	B	O X 53	XO 55	XO 52	X 48	X 49
2	X 57	B	B	B	R	XO 65	X 64	X 72	X 79	X 81	X 86	XO 85	XO 86	R	XO 70	XO 71	XO 67	XO 69	B	X 66	X 68	X 68	X 65	X 57
3	O X 62	X 56	X 60	B	R	X 66	X 72	XO 85	X 86	X 90	X 92	X 93	R	XO 78	XO 73	XO 66	XO 66	XO 67	XO 62	X 59	XO 54	XO 50	X 54	X 54
4	O X 50	X 55	X 48	B	X 54	B	R	O X 64	XO 64	X 72	X 73	XO 69	XO 74	XO 70	XO 81	B	B	O X 47	XO 49	XO 54	XO 50	X 53	XO 56	X 56
5	O X 56	X 47	X 66	R	R	R	R	B	B	B	B	B	B	B	B	R	O X 71	R	B	O X 52	R	O X 56	B	Y
6	X 50	Y	B	B	O X 60	X 73	X 75	X 84	X 74	B	Y	B	B	B	B	X	R	R	O X 48	XO 54	XO 48	X 54	X 54	B
7	B	Y	B	B	Y	R	X 63	X 74	X 79	X 77	R	B	B	B	R	R	O X 72	XO 69	XO 67	XO 61	XO 52	X 49	X 49	X 55
8	R	X 58	XO 49	X 63	R	X 59	Y	X 64	X 70	X 69	X 80	XO 77	XO 75	XO 72	B	B	O X 71	XO 70	B	X 64	B	X 58	X 61	X 58
9	X 58	X 65	O X 62	B	B	B	X 70	X 77	XO 80	XO 83	XO 87	XO 84	XO 85	X 74	X 75	X 73	X 75	X 78	XO 63	XO 46	R	X 60	X 59	X 50
10	X 54	X 57	B	O X 56	R	X 63	X 80	X 86	X 84	X 97	X 93	X 82	X 77	X 78	Y	X 78	X 78	X 76	X 73	X 61	R	O X 55	XO 50	X 50
11	O X 57	X 52	X 48	R	R	A	Y	Y	B	B	B	Y	B	B	B	B	B	Y	Y	88	O X 53	XO 54	XO 54	XO 48
12	A	A	X 47	X 45	X 48	A	R	O X 50	R	R	R	R	B	B	R	B	O X 52	XO 60	XO 63	X 56	X 57	X 56	X 56	X 51
13	O X 48	XO 50	XO 53	R	XO 42	X 58	X 60	X 68	XO 70	XO 68	XO 69	XO 66	R	R	O X 56	B	XO 62	XO 51	XO 60	XO 59	XO 60	XO 64	XO 59	XO 54
14	R	A	X 49	X 57	R	O X 39	X 47	X 67	X 68	X 71	X 75	X 76	X 76	X 74	R	R	XO 67	XO 74	XO 76	XO 66	XO 62	XO 56	XO 53	XO 53
15	R	O X 52	XO 54	XO 46	A	R	R	R	R	XO 64	XO 68	R	R	O X 68	XO 68	XO 70	XO 71	A	X 66	XO 63	XO 61	XO 62	XO 60	XO 50
16	X 55	X 57	A	O X 48	B	R	O X 46	R	R	R	R	B	B	B	B	B	B	B	O X 51	XO 54	XO 46	XO 50	XO 52	XO 57
17	X 53	X 58	X 56	X 59	X 60	X 68	X 76	X 82	X 89	XO 90	XO 86	R	R	R	R	R	O X 67	XO 64	XO 65	XO 65	XO 63	XO 61	XO 68	XO 64
18	67	68	72	75	86	97	98	98	98	98	98	92	R	X 80	X 80	B	O X 73	XO 73	XO 70	XO 66	XO 63	XO 64	XO 67	XO 67
19	X 68	X 70	X 76	R	X 66	X 69	X 80	X 99	XO 103	XO 106	XO 105	XO 96	XO 94	XO 90	XO 80	XO 75	XO 74	XO 71	XO 68	XO 60	XO 51	XO 54	XO 49	R
20	50	A	R	B	67	66	R	R	R	B	R	B	B	O X 74	XO 74	XO 71	B	B	R	O X 49	R	R	XO 53	XO 47
21	O X 47	XO 50	B	O X 58	X 54	B	R	X 81	X 88	X 90	XO 89	XO 89	X 81	B	O X 76	R	XO 79	XO 72	XO 70	XO 62	XO 60	XO 61	XO 61	XO 52
22	X 56	B	B	R	R	R	O X 68	X 93	XO 104	XO 101	XO 101	XO 89	XO 91	XO 90	XO 86	XO 76	XO 78	XO 73	XO 72	XO 68	XO 68	XO 65	XO 47	B
23	O X 49	X 55	R	R	R	O X 50	X 80	X 90	X 92	B	O X 76	XO 83	XO 86	XO 86	XO 88	XO 80	XO 88	XO 80	B	R	R	O X 80	X 52	R
24	O X 49	R	O X 50	X 52	R	R	O X 46	A	R	R	R	XO 68	XO 70	X 76	A	O X 72	XO 67	XO 63	A	X 61	X 57	X 58	X 54	X 61
25	O X 54	XO 57	X 58	X 57	R	B	R	R	R	O X 70	XO 69	XO 74	R	X 92	X 94	B	B	R	A	X 59	X 56	X 54	X 53	X 48
26	O X 41	XO 53	X 68	XO 49	X 50	A	R	R	R	B	B	B	B	R	O X 68	XO 70	R	R	X 69	X 62	X 62	XO 54	XO 48	XO 44
27	A	A	R	A	B	R	R	X 65	XO 68	XO 66	XO 64	R	XO 68	XO 68	R	X 56	X 62	A	O X 68	X 67	X 62	XO 63	XO 61	XO 62
28	X 63	X 66	X 67	X 74	X 80	X 84	X 74	X 79	X 91	B	O X 88	X 91	R	X 80	R	O X 74	XO 78	R	O X 70	XO 70	XO 68	XO 48	XO 57	XO 57
29	64	R	X 44	X 42	O X 43	R	R	O X 56	R	R	O X 72	B	B	B	O X 66	B	O X 75	B	O X 49	R	X 63	A	A	R
30	B	R	X 46	R	R	R	O X 48	R	A	B	Y	Y	Y	Y	R	R	R	O X 52	XO 51	XO 62	XO 52	XO 54	XO 57	XO 56
31	O X 56	R	O X 51	R	O X 46	XO 42	Y	Y	X 63	XO 75	XO 72	XO 72	XO 71	R	R	R	R	O X 63	XO 64	XO 63	XO 56	XO 61	XO 63	XO 54
	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	24	18	21	14	14	14	17	19	20	19	18	16	13	16	14	15	23	18	23	28	24	28	29	25
MED	X	X	X	X	X	X	X	X	X	X	XO	XO	XO	XO	XO	XO	XO	XO	XO	XO	X	X	X	X
U Q	58	58	64	59	66	69	76	85	90	92	92	90	86	82	80	76	75	73	70	65	62	63	60	57
L Q	O X 50	O X 52	X 49	X 48	X 46	XO 58	XO 49	X 67	XO 69	XO 70	XO 72	XO 74	XO 70	XO 74	XO 68	XO 70	XO 63	XO 64	XO 63	XO 56	XO 61	XO 63	XO 55	XO 54

DEC. 1998 fXI (0.1MHz)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 1998 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	R	A	F	R	R	R	R	B	R	R	R	R	R	R	R	R	56	R	B	R	47	49	46	42	43						
2	J	R	B	B	R	59	58	66	J	R	75	80	79	80	R	64	65	R	R	B	60	62	62	J	R						
3	R			B	R	60	66	79	R		J	R	J	R	R	J	R	J	R	R	J	R	R	R	R						
4	R	J	R	J	R	B	B	R	R	R	B	R	R	R	R	R	B	B	R	R	41	43	48	44	47	50					
5	R		F	R	R	R	R	B	B	B	B	B	B	B	B	R	R	R	B	R	46		50	R	Y						
6	44	Y	B	B	R	54	67	69	78	68	B	Y	B	B	B	B	67	R	R	R	R	R	R	R	B						
7	B	Y	B	B	Y	R		J	R	J	R	R	B	B	B	R	R	R	R	J	R	R	R	R	J	R					
8	R	J	R	J	R	R	J	R	Y	F	F	J	R	R	R	B	B	R	R	B	58	B	J	R	R						
9	52	56	56	R	B	B	B	J	R	J	R	R	R	R	R	R	R	J	R	J	R	R	R	J	R						
10	48	J	R	B	R	R	J	R	80	78	91	87	76	71	72	Y	J	R	J	R	67	55	R	R	R						
11	F	R		R	R	A	Y	Y	B	B	B	Y	B	B	B	B	B	Y	Y	R	R	R	R	R	R						
12	A	A	F	41	39	42	A	R	R	R	R	R	R	B	B	R	B	R	R	J	R	51	50	50	45						
13	R	44	47	R	36	52	54	62	64	62	63	60	R	R	R	R	B	J	R	R	J	R	54	58	53	48					
14	R	A	F	F	R	F	R	F	F	R	J	R					R	R	J	R	61	68	70	60	56	50	J	R			
15	R	U	S	R	F	A	R	R	R	R	R	R	R	R	R	R	R	R	A		J	R	R	J	R	R					
16	49	51	A	R	B	R	R	R	R	R	R	R	B	B	B	B	B	B	B	R	45	48	40	44	46	51					
17	47	J	R	50	53	54	62	70	76	83	84	80	R	R	R	R	R	R	R	61	58	59	59	57	55	62	58	55			
18	F	J	F	F	J	R	80	91	92	92	92	92	86	R	R	R	R	B	R	R	U	R	60	57	58	U	S	U	S		
19	62	64	64	F	J	R	J	R	F	F	J	R	R	R	R	R	R	R	R	J	R	R	R	45	48	43	R				
20	42	A	R	B	F	F	R	R	R	R	B	R	B	B	R	B	B	B	R	R	R	R	R	J	R	R	R	R	R		
21	R	44	B	F	R	R	B	R	J	R	75	82	84	83	83	75	B	R	R	J	R	R	R	R	54	55	55	46	R		
22	50	B	B	R	R	R	R	62	87	98	95	95	83	85	84	80	70	72	67	66	62	62	59	41	R	B	R	R	R		
23	R	J	R	R	R	F	R	R	R	R	J	R	B	B	R	R	R	R	R	R	B	R	R	R	R	R	R	R	R	R	
24	R	R	R	R	R	R	R	A	R	R	R	J	R	R	R	A	R	R	R	A	J	R	51	52	48	J	S	R	R		
25	S	R			R	B	R	R	R	R	64	63	68	R	R	J	R	J	R	B	B	R	A	53	50	48	J	R	R	R	
26	R	R			R	A	R	R	R	R	B	B	B	B	R	R	R	R	R	R	62	64	63	56	56	48	42	38	R	R	
27	A	A	R	A	B	R	R	J	R	59	61	60	58	R	R	R	R	R	R	J	R	50	56	A	62	61	56	57	55	56	
28	57	60	J	R	J	S	74	78	62	73	85	R	R	J	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
29	F	R	F	F	R	R	R	R	R	R	R	R	R	B	B	B	B	B	R	R	R	R	R	A	A	A	R	R	R	R	
30	B	R			R	R	R	R	R	A	B	Y	Y	Y	Y	R	R	R	R	R	46	45	56	46	48	51	47	50	R	R	
31	R	R	R	R	R	R	R	Y	Y																						
	50	45	40	40	36				57	69	66	66	65								57	58	57	50	55	57	49	48			
CNT	24	18	21	14	14	14	17	19	20	19	18	16	13	16	14	15	23	18	23	28	24	27	28	25							
MED	48	50	45	48	51	58	62	73	74	75	80	77	70	71	68	67	65	63	59	55	54	51	48	48							
U Q	52	52	55	53	57	63	70	79	84	86	86	84	80	76	74	70	69	67	64	59	56	57	54	51							
L Q	R	R	F	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
	43	46	42	42	40	52	43	60	60	64	66	68	64	68	62	64	57	58	54	49	48	48	45	44							

IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 1998 ftEs (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°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	76	56	26	38	36	32	36	B	33	32	31	31	32	32	30	28	32	38	B	30	33	32	28	28			
2	33	B	B	B	42	40	32	31	32	38	38	33	36	39	34	33	34	34	B	33	35	41	31	39			
3	36	36	38	B	44	46	37	34	35	36	36	35	36	36	36	38	34	30	28	32	36	35	31	30			
4	35	34	34	B ^E B	34	B	40	35	39	35	B	34	35	34	34	33	B	B	34	G	24	41	36	37	27		
5	36	38	68	36	44	36	35	B	B	B	B	B	B	B	B	32	31	28	B	28	38	38	B	30			
6	26	32	B	B	30	37	35	34	31	B	30	B	B	B	B	34	31	27	34	26	36	30	35	B			
7	B	32	B	B	34	38	37	35	35	34	34	B	B	B	32	35	33	33	27	23	24	28	32	40			
8	41	59	41	37	G	G	41	38	36	36	32	34	32	E B	B	B	E B	B	B	25	B	22	22	32			
9	21	25	33	B	B	B	37	33	G	29	33	G	30	32	35	33	33	32	44	29	28	26	39	35	33	36	
10	35	32	B	28	36	30	34	34	32	32	E B	B	56	32	32	30	34	31	35	30	31	30	44	39	43	39	
11	40	42	57	42	42	74	28	37	B	B	B	36	B	B	B	B	B	B	28	24	36	44	41	38	34		
12	41	37	38	56	53	36	56	41	36	41	40	35	B	B	32	B	30	29	34	36	37	31	33	30			
13	32	36	37	39	36	34	36	32	31	37	33	34	34	32	36	B	37	35	34	42	41	46	27	27			
14	39	96	35	35	37	35	33	32	40	43	33	37	38	41	40	36	68	26	G	26	26	34	23	29	27		
15	35	40	35	40	47	41	38	40	42	38	41	49	39	38	36	63	36	63	74	48	26	38	32	41			
16	39	40	47	39	B	44	30	35	45	31	31	B	B	B	B	B	B	B	30	33	36	32	27	29			
17	25	28	35	36	38	31	31	35	36	34	38	37	37	38	38	39	33	31	32	40	45	46	48	44			
18	28	30	36	43	39	36	38	41	48	38	40	26	38	68	41	B	31	E B	56	27	32	40	32	32	26		
19	33	38	31	36	34	35	33	37	36	30	32	33	38	35	36	32	30	28	27	35	E B	30	38	39	47		
20	42	46	41	B	44	36	33	34	38	B	36	B	B	35	B	B	B	B	33	28	43	37	39	44	44		
21	38	32	B	40	27	B	36	36	31	32	33	32	33	B	40	60	45	38	29	29	34	30	27	26			
22	27	B	B	39	44	31	33	33	32	30	32	34	33	36	29	38	46	44	39	28	38	36	38	B			
23	33	31	34	36	34	43	40	34	36	33	B	B	36	34	33	E B	25	30	29	B	38	42	36	40	41		
24	39	41	36	35	38	37	36	49	45	36	38	41	37	38	72	33	B	B	28	34	91	26	25	31	40	43	
25	42	42	58	50	43	B	42	30	39	39	34	33	37	31	33	B	B	42	99	37	36	40	36	39			
26	40	42	42	43	38	102	44	40	37	B	B	B	B	34	E B	56	28	34	31	E B	33	35	42	37	43	41	
27	49	39	34	38	B	34	40	34	30	29	33	34	39	42	43	40	44	73	39	34	29	30	22	20			
28	26	28	30	33	33	32	28	32	36	B	32	35	32	39	34	45	38	37	39	36	27	41	57	42			
29	92	41	37	32	42	44	40	40	44	44	E B	B	55	B	B	B	34	B	E B	34	36	38	28	40	69	95	47
30	B	49	40	39	36	34	38	31	43	B	33	33	33	33	31	30	32	30	37	26	25	26	29	24			
31	38	36	38	48	35	28	25	34	32	34	34	34	32	61	34	41	34	32	28	35	29	31	27	21			
	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	29	29	25	24	28	27	31	29	29	24	26	23	22	23	25	22	26	29	26	31	30	31	30	29			
MED	36	38	37	38	38	36	36	34	36	34	34	34	36	36	34	34	34	32	32	32	36	36	33	34			
U Q	40	42	41	41	42	41	40	38	40	38	38	35	37	39	39	39	37	38	38	36	40	39	40	41			
L Q	32	32	34	36	34	32	33	33	32	32	32	33	33	33	33	32	31	29	28	26	30	31	29	27			

DEC. 1998 ftEs (0.1MHz)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 1998 fmin (0.1MHz)

45° E MEAN TIME (G.M.T. + 3 H)

LAT. 69° 00.4' S LON. 039° 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	12	10	10	30	23	19	18		B	19	16	15	15	14	16	16	E S	23	18	12	B	10	11	10	12	11		
2	10		B	B	21	13	12	14	13	14	10	12	15	16	16	20	22	20		B	18	11	10	12	10			
3	21	14	13		23	14	10	12	11	15	12	15	20	15	14	14	12	14	19	12	12	11	10	11				
4	11	11	16		33		16	26	21	19		B	20	16	19	20	16		B	B	12	12	11	15	12	8		
5	14	15	16	28	16	26	25		B	B	B	B	B	B	B	B	21	23	22		B	13	13	14	24			
6	14	25		B	11	10	11	10	12		B	B	B	B	B	B	24	24	20	12	10	10	13	12	B			
7		22		B	22	23	16	12	12	14	15		B	B	B	24	16	23	16	18	14	10	16	10	12			
8	13	10	16	18	24	16	25	10	10	12	19	19	28	55			B	B		B	23	56		13	B	10	10	12
9	14	10	11		B	B						E S	20	20	15	15	14	16	15	14	16	16	10	16	13			
10	11	15		B	15	18	15	12	12	10	14	56	22	15	18	21	16	16	14	13	11	14	25	10	10			
11	10	10	10	15	16	15	14	18		B	B	B	21		B	B	B	B		B	23	13	12	14	13	10	10	
12	16	16	11	15	10	13	22	11	14	17	30	24		B	B	18		B		17	12	16	10	10	10	11	11	
13	14	10	12	17	16	11	13	13	14	12	12	15	10	11	16			B		13	14	11	10	10	10	11	10	
14	28	16	11	10	19	12	11	11	11	12	12	11	12	16	16	17	15	20	14	17	11	12	10	11				
15	21	16	19	10	15	11	21	16	12	10	13	10	16	26	12	16	16	15	14	16	15	14	15	10				
16	10	10	17	11	B	15	11	12	21	11	15		B	B	B	B	B	B	B		B	12	25	10	12	10	13	
17	9	10	11	10	10	11	11	11	11	10	12	20	14	16	17	12	16	16	16	12	12	11	11	11	11			
18	11	9	11	10	20	10	10	11	10	14	12	24	E S	19	16	24		B		20	56	14	16	12	17	15	10	
19	10	10	10	13	10	12	16	14	14	15	13	10	16	12	16	20	18	19	11	10	30	13	16	24				
20	11	14	25		B E S	10	10	12	19	20		B	B	B	B	B	B	B		B	15	11	10	21	10	12	19	
21	19	30		B	10	18		19	15	21	22	19	20	15		23	18	14	26	19	15	10	13	10	12			
22	10		B	B	25	22	24	14	11	12	14	13	12	15	15	14	14	16	12	11	11	11	11	10	B			
23	18	21	16	30	16	12	14	13	15	17		B	B	26	15	18	25	14	12		B	11	15	11	10	11		
24	10	10	15	11	16	12	11	12	14	10	15	12	13	12	12	24	24	20	13	17	11	9	14	18				
25	16	12	14	12	21		17	16	16	20	19	14	21	14	14		B	B		11	16	16	10	10	14	12		
26	18	15	14	14	10	12	11	15	14		B	B	B	B	22	56	18	18	14	33	11	18	15	14	18			
27	16	24	21	13	B	22	20	12	14	20	15	12	13	20	19	14	12	15	12	14	11	11	12	15				
28	14	13	14	14	12	12	14	12	31		B	21	20	19	19	12	34	15	19	15	11	9	19	23	11			
29	14	9	10	14	11	14	16	15	16	18	55		B	B	B	19		B		15	36	12	13	14	12	10		
30		10	10	15	12	12	11	11	14		B	22	19	13	15	13	14	15	12	16	10	15	11	12	13			
31	14	19	14	14	15	19	12	20	13	13	14	12	14	23	12	15	15	14	15	10	10	9	11	8				
	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	15	16	14	14	13	14	16	19	20	19	19	18	20	17	16	14	12	11	11	12	11				
U Q	18	19	21	30	22	22	17	16	19	22	30		B	B	B	B	B	B		B	23	22	19	16				
L Q	11	10	11	12	12	12	11	11	12	13	13	12	14	15	14	16	15	14	12	10	10	10	10	10				

DEC. 1998 fmin (0.1MHz)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 1998 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

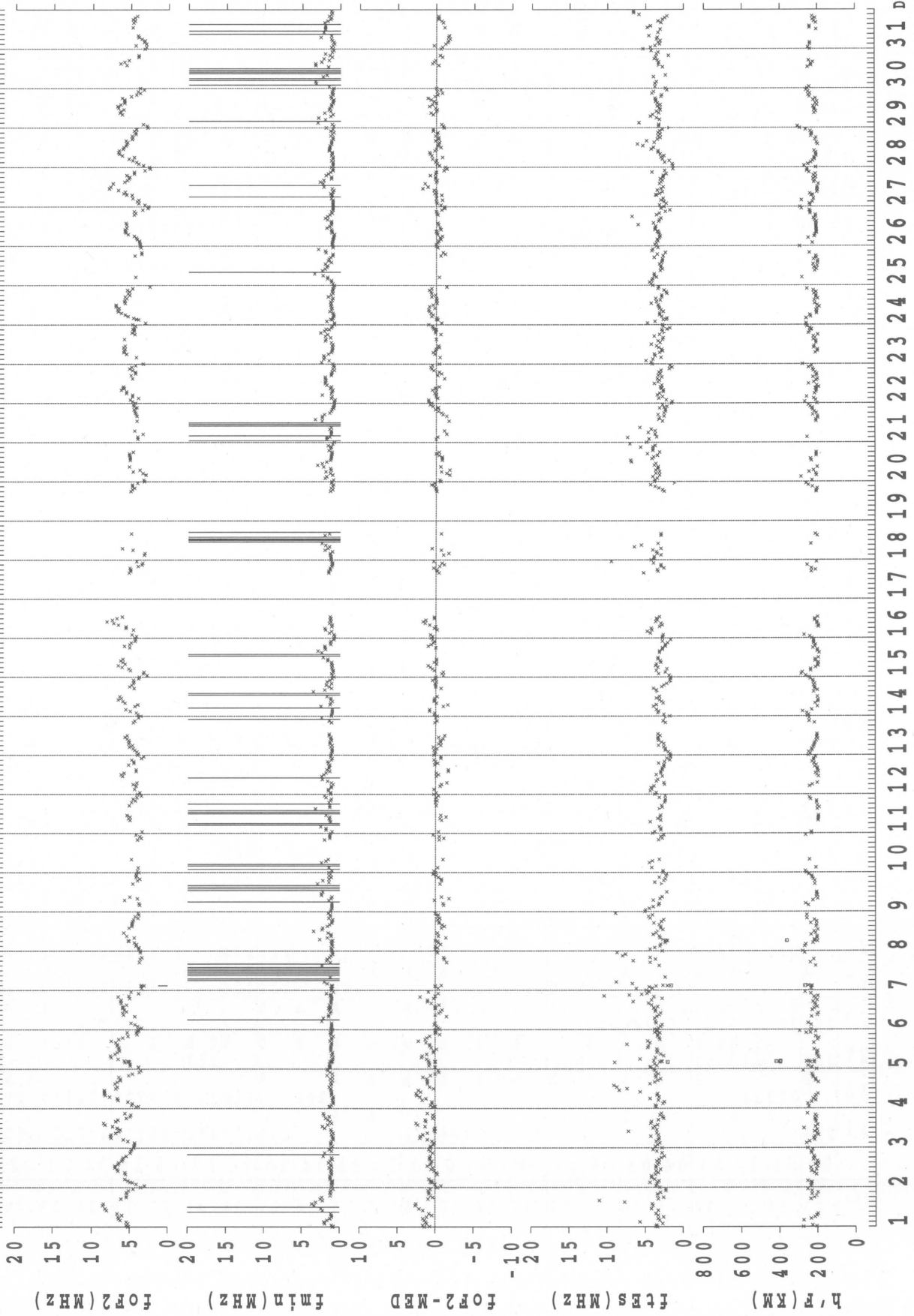
LAT. 69°00.4'S LON. 039°35.4'E SWEEP 0.4MHz TO 15.0MHz IN 20.0SEC IN MANUAL SCALING

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	Q 258	A	A	A	A	B	A	A	A	A	A	A	A	E A 236	222	214	B	196	E A 272	E A 260	E A 266	A	272
2	224	B	B	B	A	218	242	226	220	218	218	A	A	E A 230	A	A	220	230	A	B	242	E A 234	E A 258	274	294
3	A	A	238	B	A	A	E A 258	202	202	A	202	206	A	228	218	A	204	216	E A 244	234	A	E A 290	A	E A 244	242
4	E A 280	E A 272	A	B	E B 274	B	A	A	A	A	A	B	E A 224	E A 234	A	A	232	B	B	E A 274	A	A	A	E A 274	
5	A	A	288	A	A	A	A	B	B	B	B	B	B	B	B	B	E A 258	A	B	254	280	A	A	B	A
6	A	A	B	B	A	276	202	220	218	B	A	B	B	B	B	B	A	A	E A 220	250	266	A	236	262	B
7	B	A	B	B	A	A	A	212	194	202	202	B	B	B	B	A	224	224	210	228	226	182	246	212	246
8	A	A	A	A	A	E A 246	E A 238	204	204	216	A	A	B	B	B	B	216	B	B	222	B	246	250	240	
9	268	258	A	B	B	B	A	222	212	A	A	A	A	A	A	A	A	216	226	260	E A 244	A	E A 250	230	
10	E A 252	256	B	E A 302	A	272	210	210	210	208	B	A	A	A	A	A	218	210	228	236	A	A	A	A	
11	F	A	A	A	A	A	A	A	B	B	B	Y	B	B	B	B	B	Y	Y	A	E A 248	E A 262	230	A	
12	A	A	A	A	208	214	A	A	E A 274	A	A	A	B	B	A	B	206	222	216	224	E A 252	240	248	238	
13	A	266	A	A	A	A	E A 240	220	206	200	A	A	A	A	A	A	B	A	216	226	210	E A 238	E A 270	E A 256	A
14	A	A	Q 240	Q 224	A	218	A	E A 262	226	A	224	216	222	230	A	212	A	214	224	230	240	252	232	A	
15	A	A	A	218	A	A	A	A	A	184	A	A	A	A	A	210	220	220	A	224	E A 228	242	242	198	
16	240	A	A	A	B	A	264	A	A	206	206	B	B	B	B	B	B	B	B	196	E A 250	254	246	260	254
17	254	258	246	E A 266	252	254	238	240	212	202	210	A	A	A	A	A	198	214	216	230	E A 260	244	244	252	
18	258	270	A	E A 274	A	234	228	234	226	214	204	B	212	A	A	B	218	318	208	224	250	246	250	244	
19	A	268	266	A	E A 238	E A 260	216	222	222	200	A	A	A	A	A	A	A	218	204	250	E B 262	248	224	A	
20	276	A	A	B	A	238	218	A	A	B	A	B	B	A	B	B	B	222	236	A	A	214	284	A	
21	A	A	B	E A 268	256	B	A	244	A	A	E A 218	A	A	B	A	A	206	222	208	220	E A 250	E A 260	248	248	
22	E A 284	B	B	A	A	176	200	194	194	216	210	B	B	194	200	206	206	A	A	216	220	240	236	208	
23	A	A	A	E A 266	A	186	206	192	230	216	230	216	236	220	216	236	220	230	222	A	238	E A 276	A	A	
24	A	A	236	A	A	A	196	A	A	A	A	200	A	A	A	A	B	230	222	A	214	220	256	E A 256	A
25	A	A	230	236	A	B	A	228	A	A	A	A	A	A	A	B	B	220	232	220	A	A	E A 274	E A 254	246
26	A	230	A	230	A	E A 260	A	A	A	B	B	B	B	A	B	218	204	A	E B 262	256	254	E A 272	E A 238	E A 264	
27	A	A	A	A	B	A	A	202	206	216	A	A	A	A	A	A	224	224	A	216	236	232	232	242	258
28	258	E A 270	E A 262	E A 264	E A 264	240	222	222	A	A	B	A	A	A	A	A	212	A	A	212	216	236	A	A	A
29	226	E A 282	E A 260	A	A	A	A	A	A	A	A	B	B	B	B	A	B	E B 252	A	A	A	A	A	A	A
30	B	242	240	A	A	A	A	A	A	A	B	A	A	A	A	A	202	224	242	216	220	224	250	E A 250	274
31	258	A	A	A	A	A	A	A	222	212	228	212	A	A	A	A	234	218	230	222	214	242	254	260	240
CNT	13	10	11	10	8	12	14	18	17	16	12	6	6	6	6	11	19	21	22	25	24	25	26	18	
MED	255	260	243	E A 262	242	234	216	221	211	207	210	210	209	226	208	220	218	218	220	227	237	246	247	245	
U Q	272	E A 270	266	E A 268	265	260	240	234	222	217	218	216	216	230	218	232	224	226	E 228	246	E A 254	E A 259	260	264	
L Q	246	256	238	230	245	226	202	210	203	201	205	206	206	220	202	216	206	215	216	220	235	243	242	240	

DEC. 1998 h'F (KM)

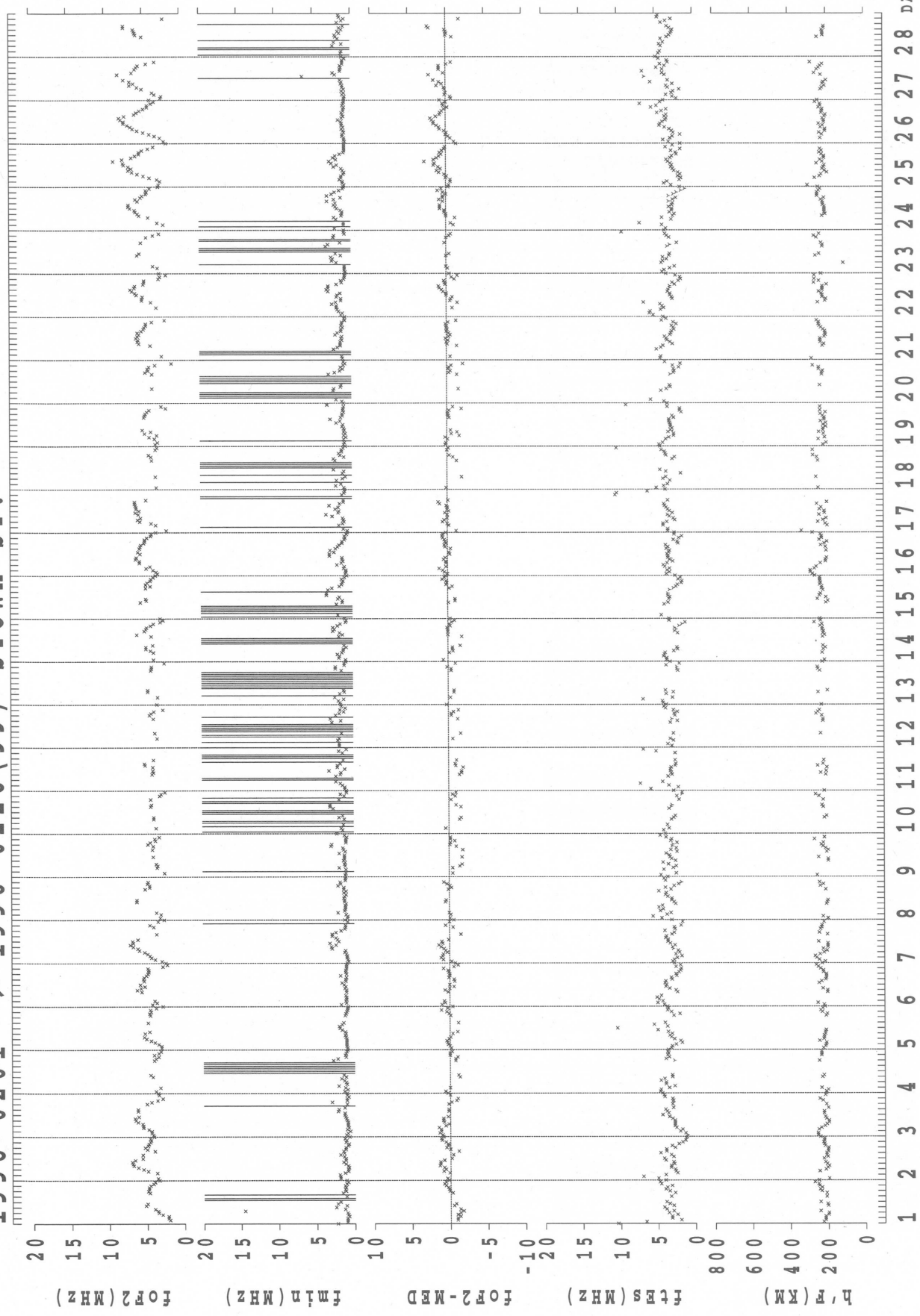
COMMUNICATIONS RESEARCH LABORATORY, JAPAN

1998 0101 -> 1998 0131(99) SYOWA-ST.

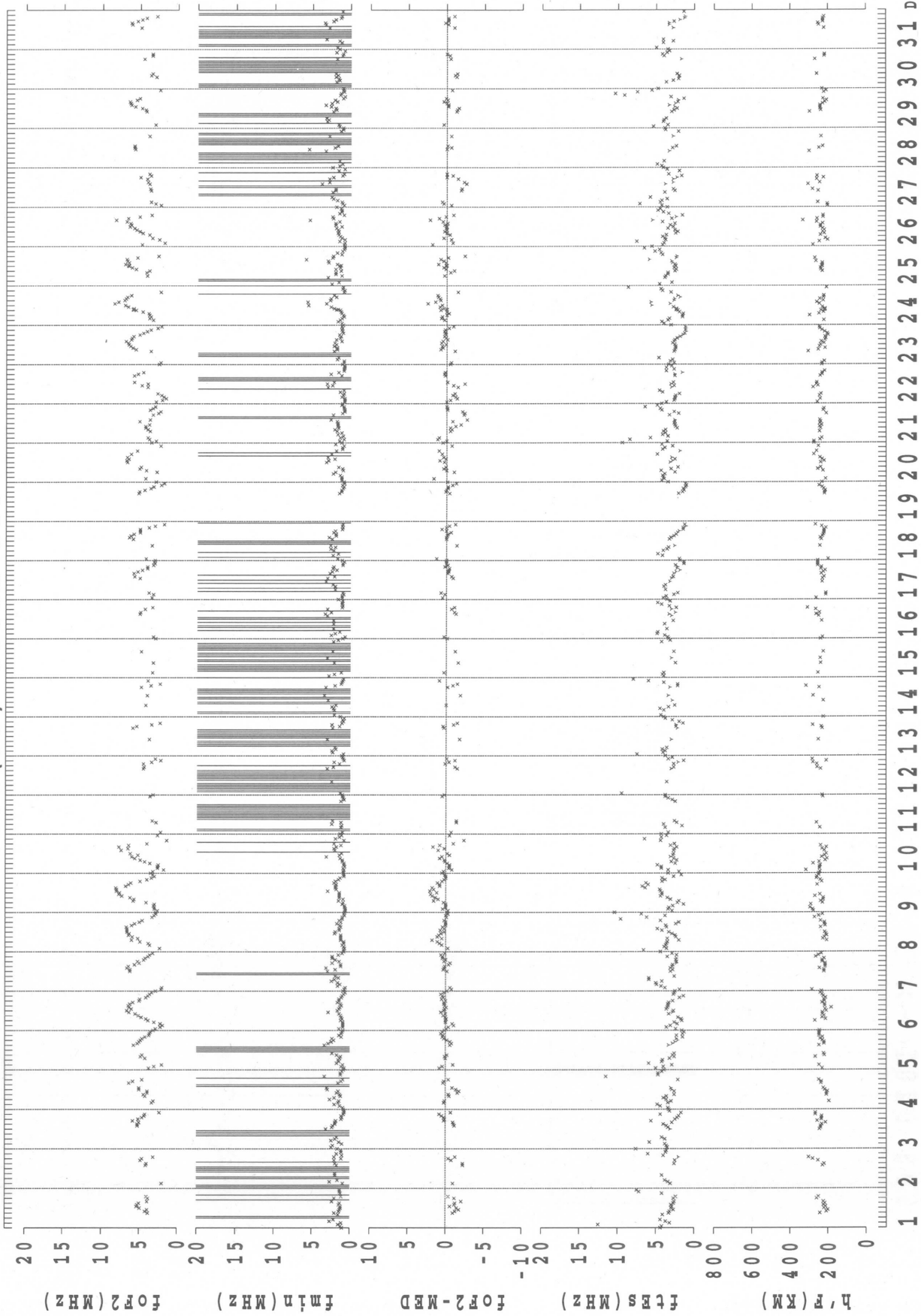


DAY/45' EMT

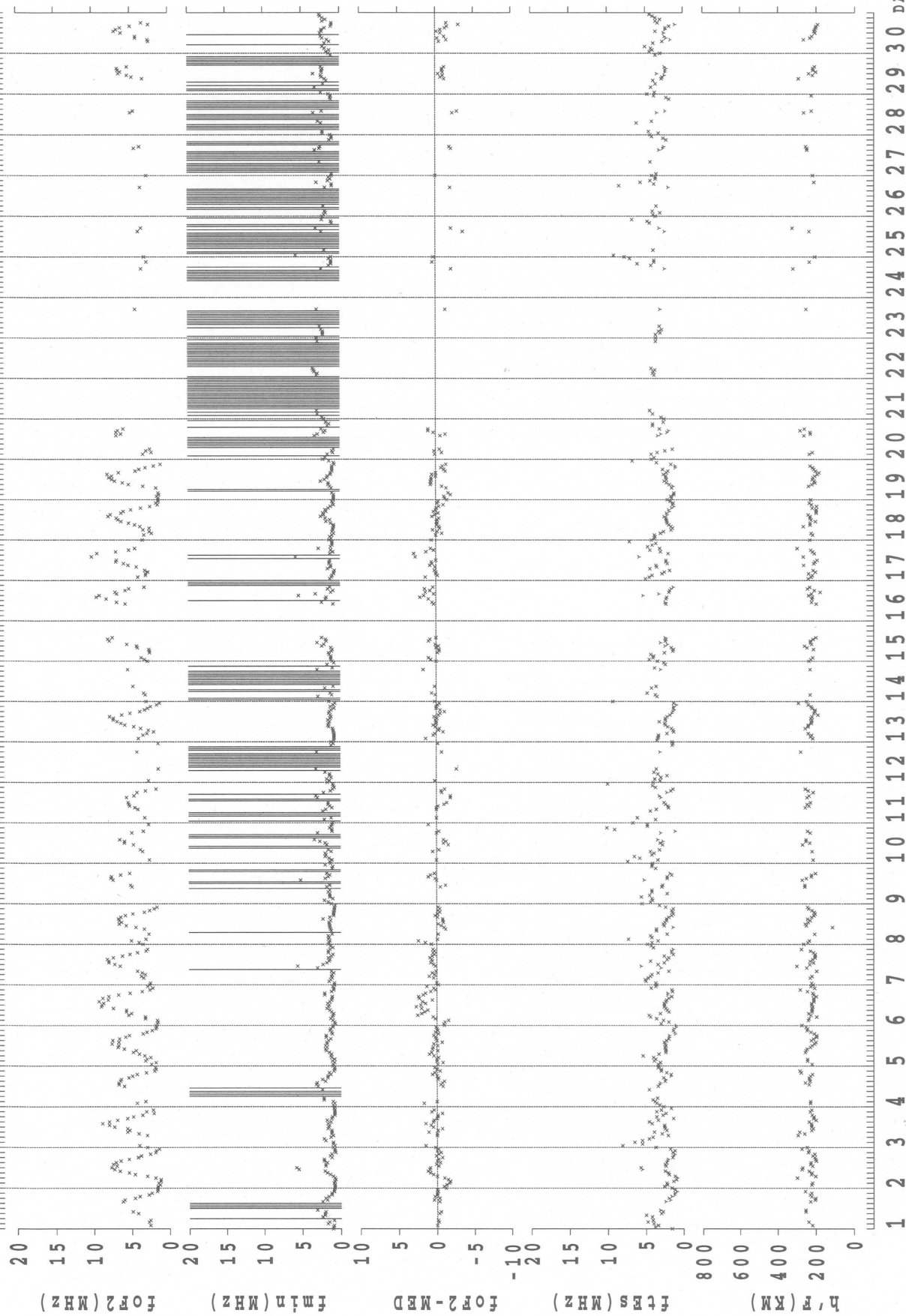
1998 0201 -> 1998 0228 (99) SYOWA-ST.



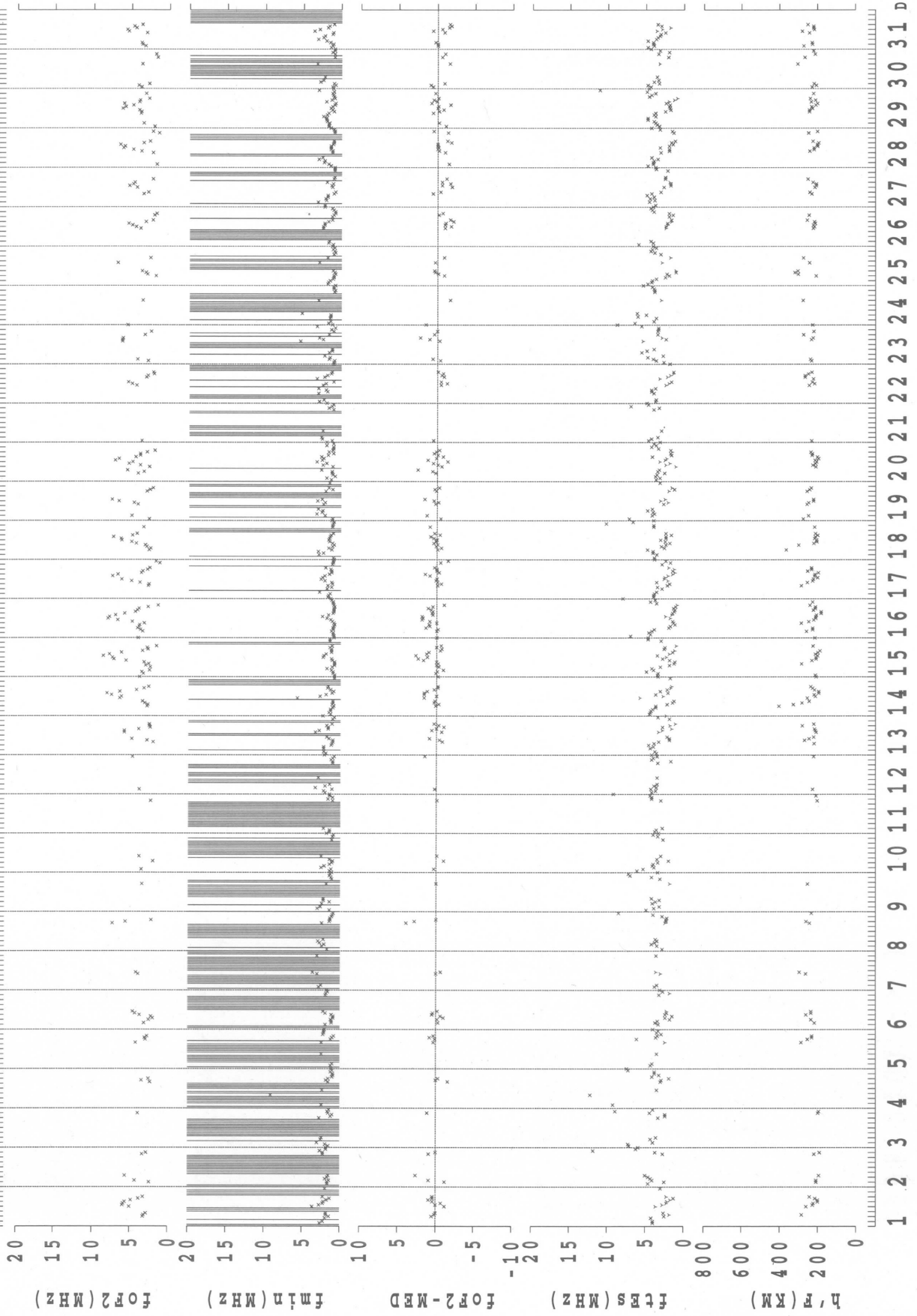
1998 0301 -> 1998 0331 (99) SYOWA-ST.



1998 0401 -> 1998 0430 (99) SYOWA-ST.

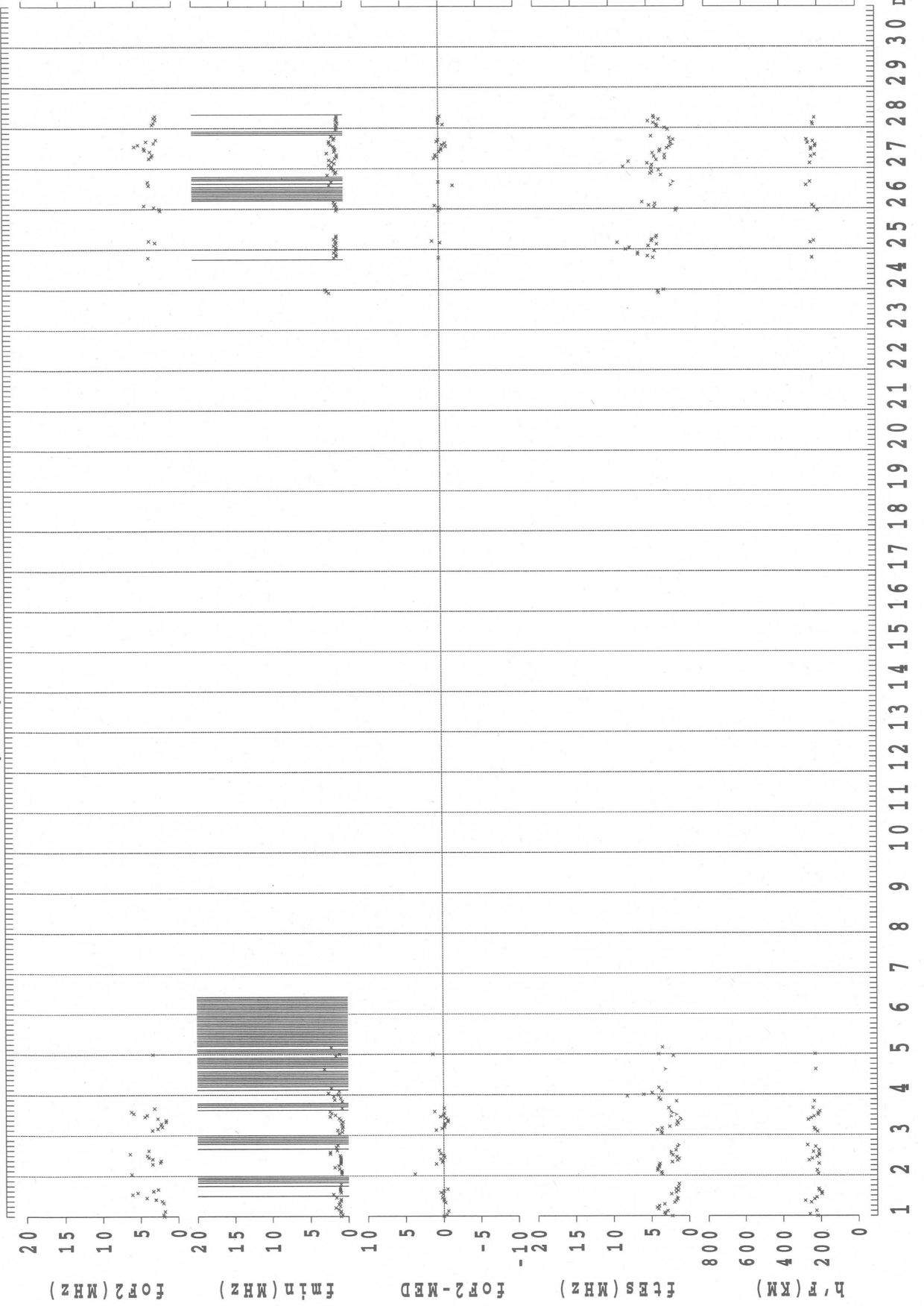


1998 0501 -> 1998 0531(99) SYOWA-ST.

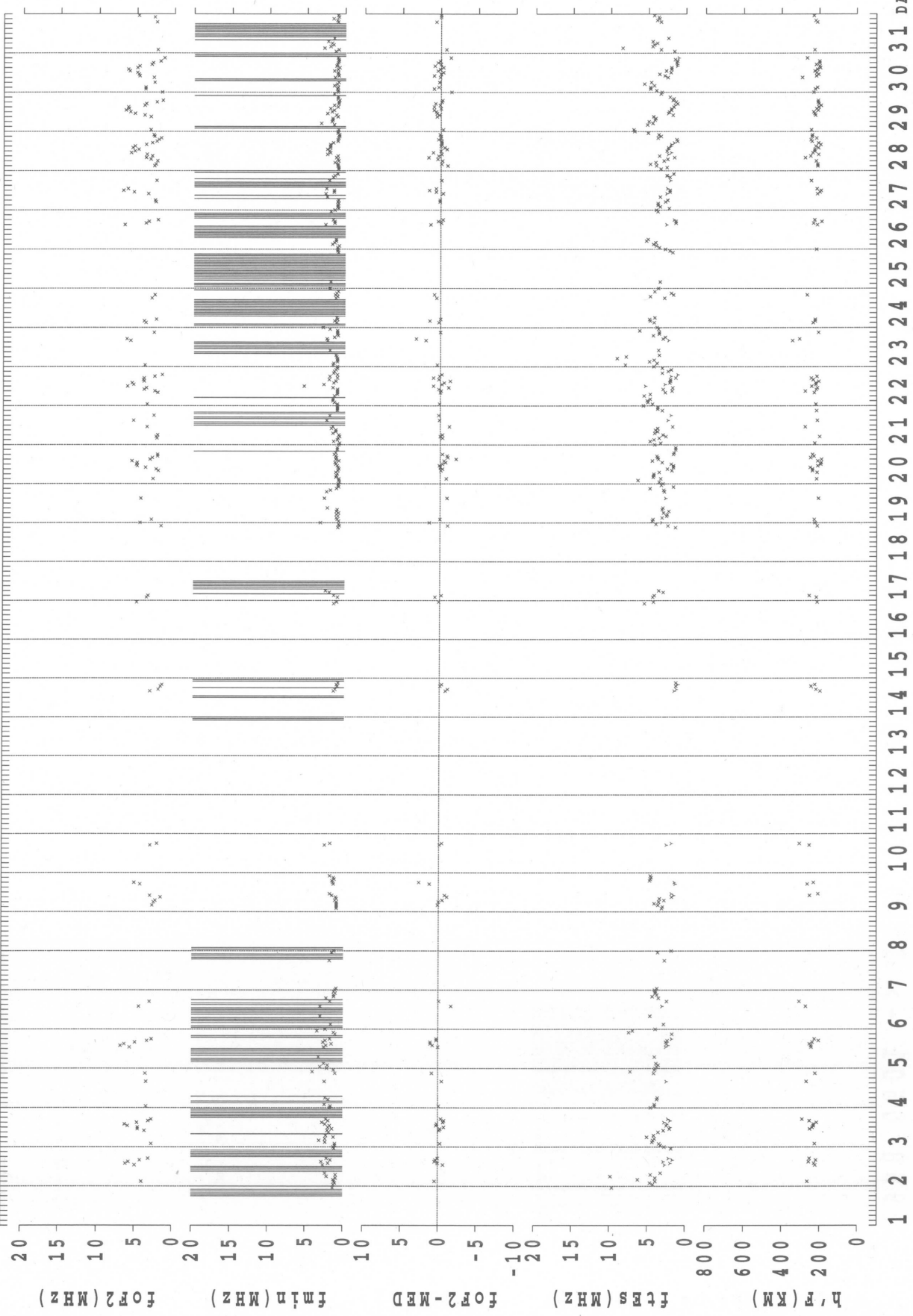


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 DAY/45' EMT

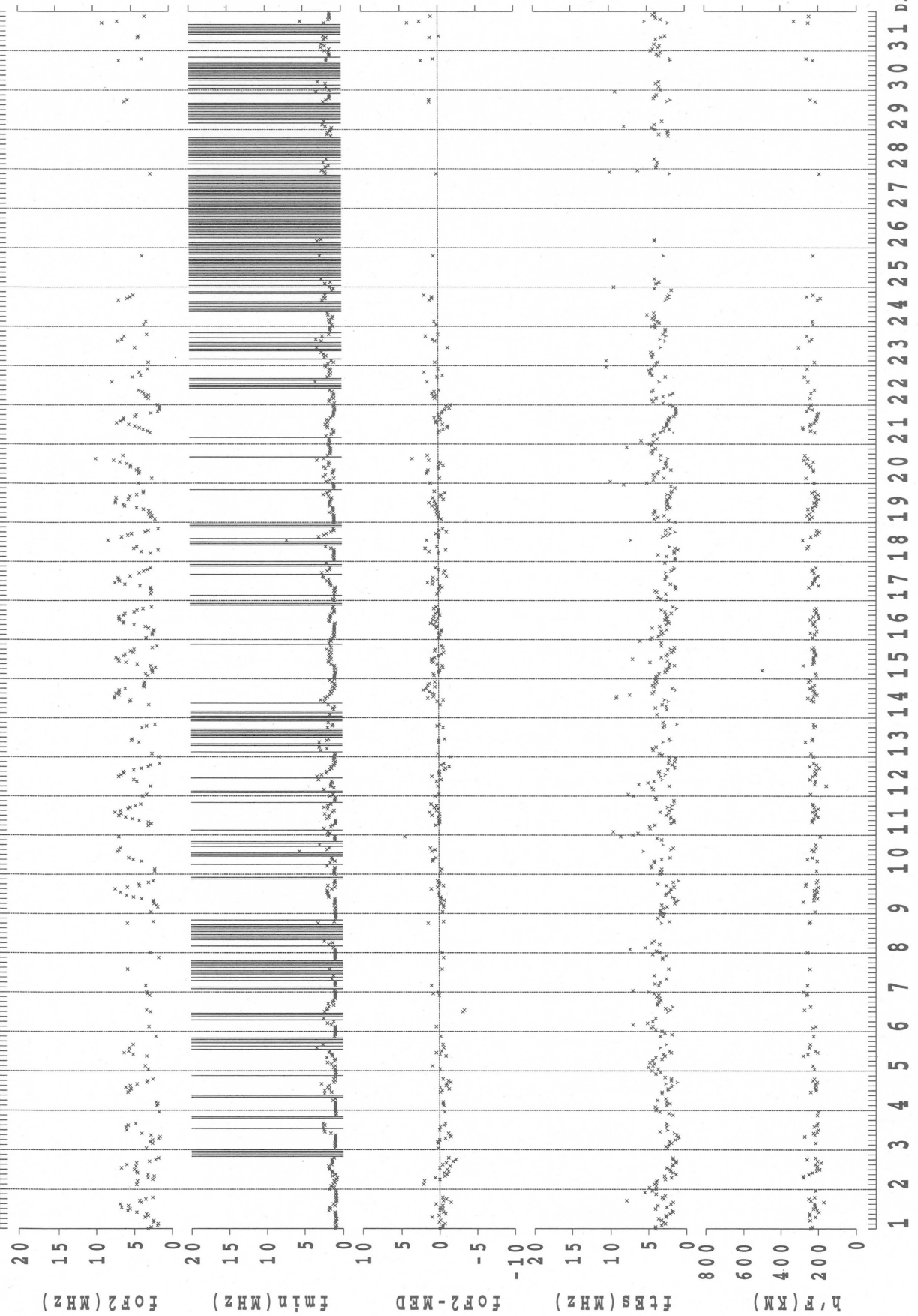
1998 0601 -> 1998 0630 (99) SYOWA-ST.



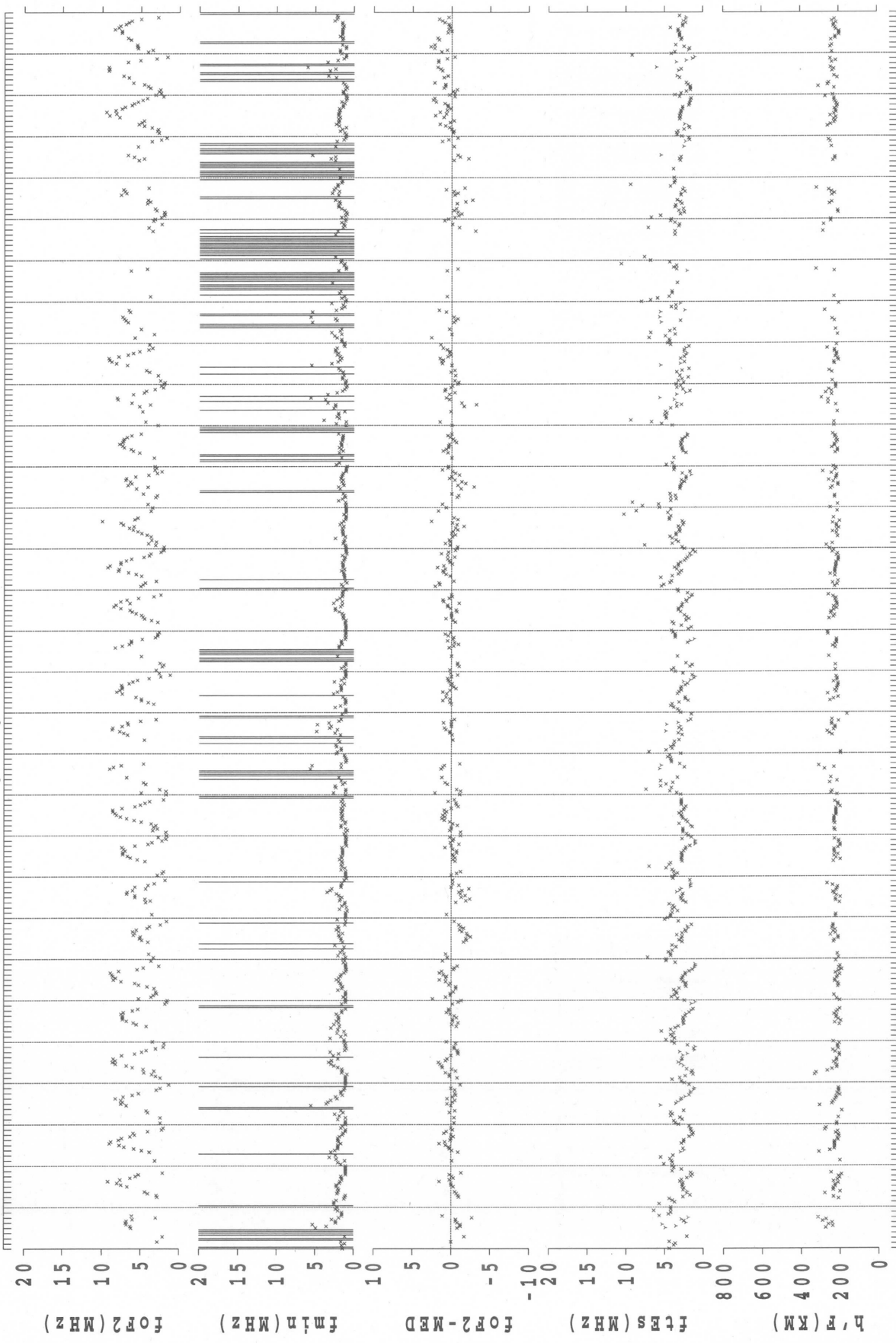
1998 0701 -> 1998 0731(99) SYOWA-ST.



1998 0801 -> 1998 0831 (99) SYOWA-ST.

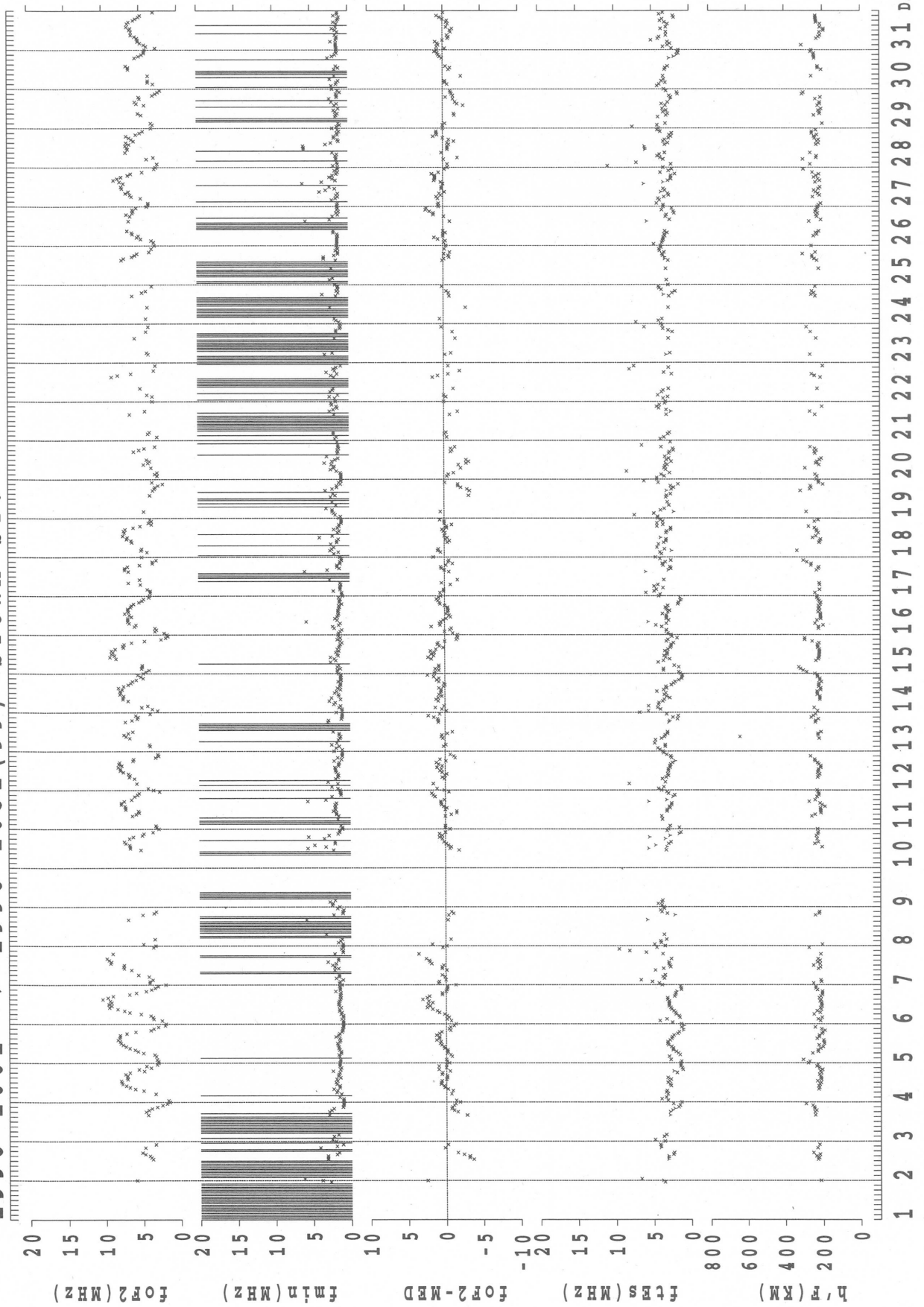


1998 0901 -> 1998 0930 (99) SYOWA-ST.

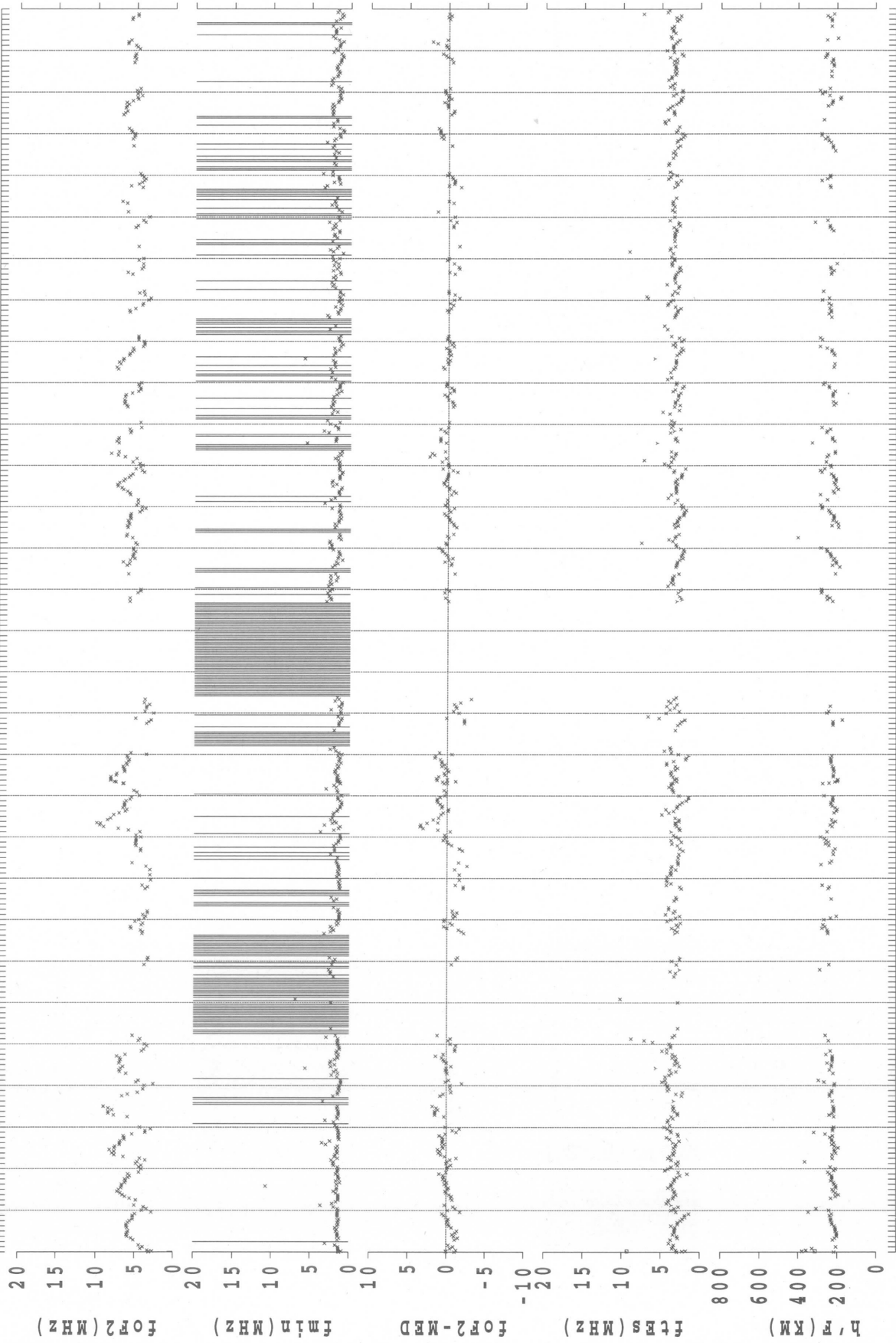


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 DAY/45' EMT

1998 1001 -> 1998 1031(99) SYOWA-ST.

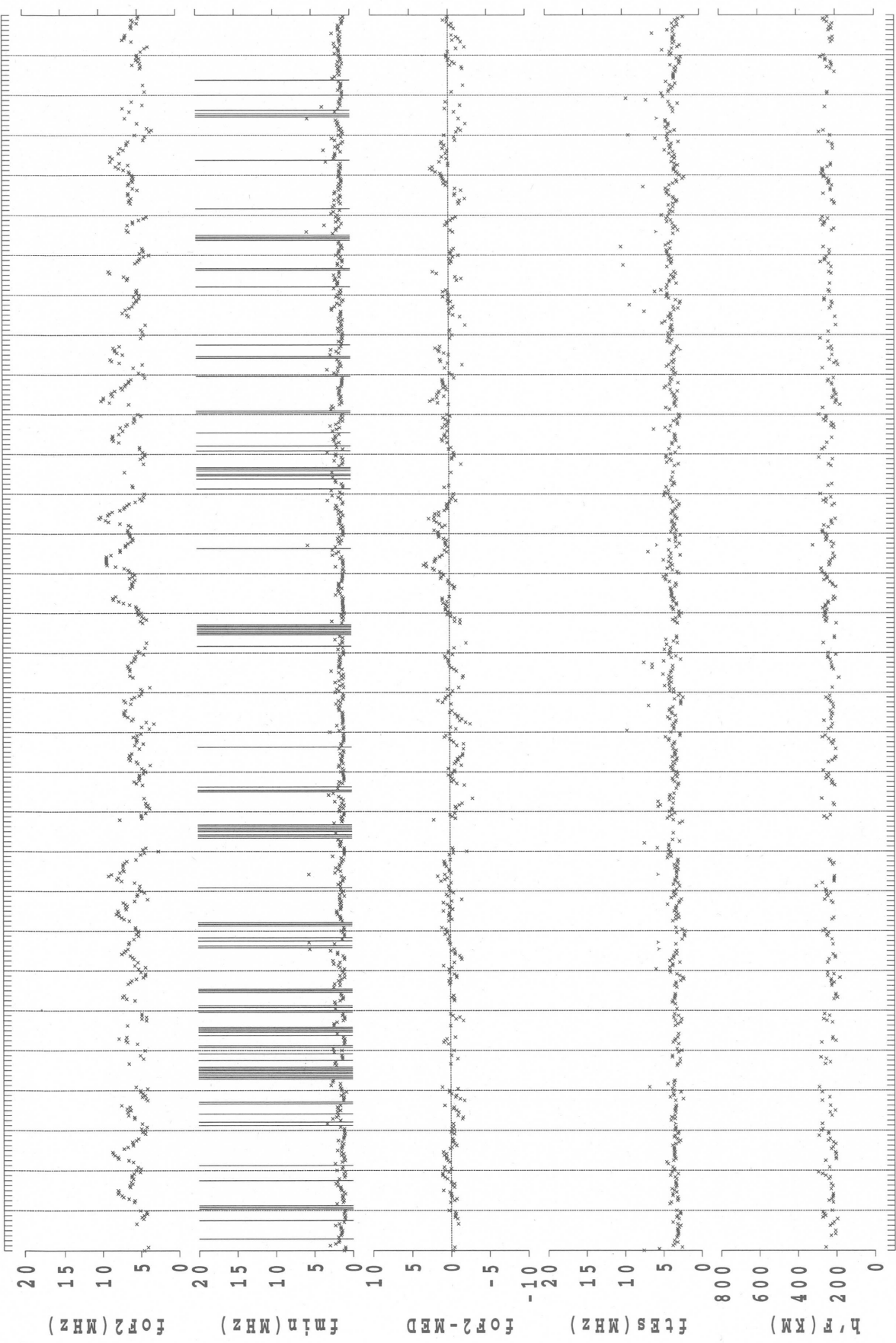


1998 1101 -> 1998 1130 (99) SYOWA-ST.



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/45' EMT

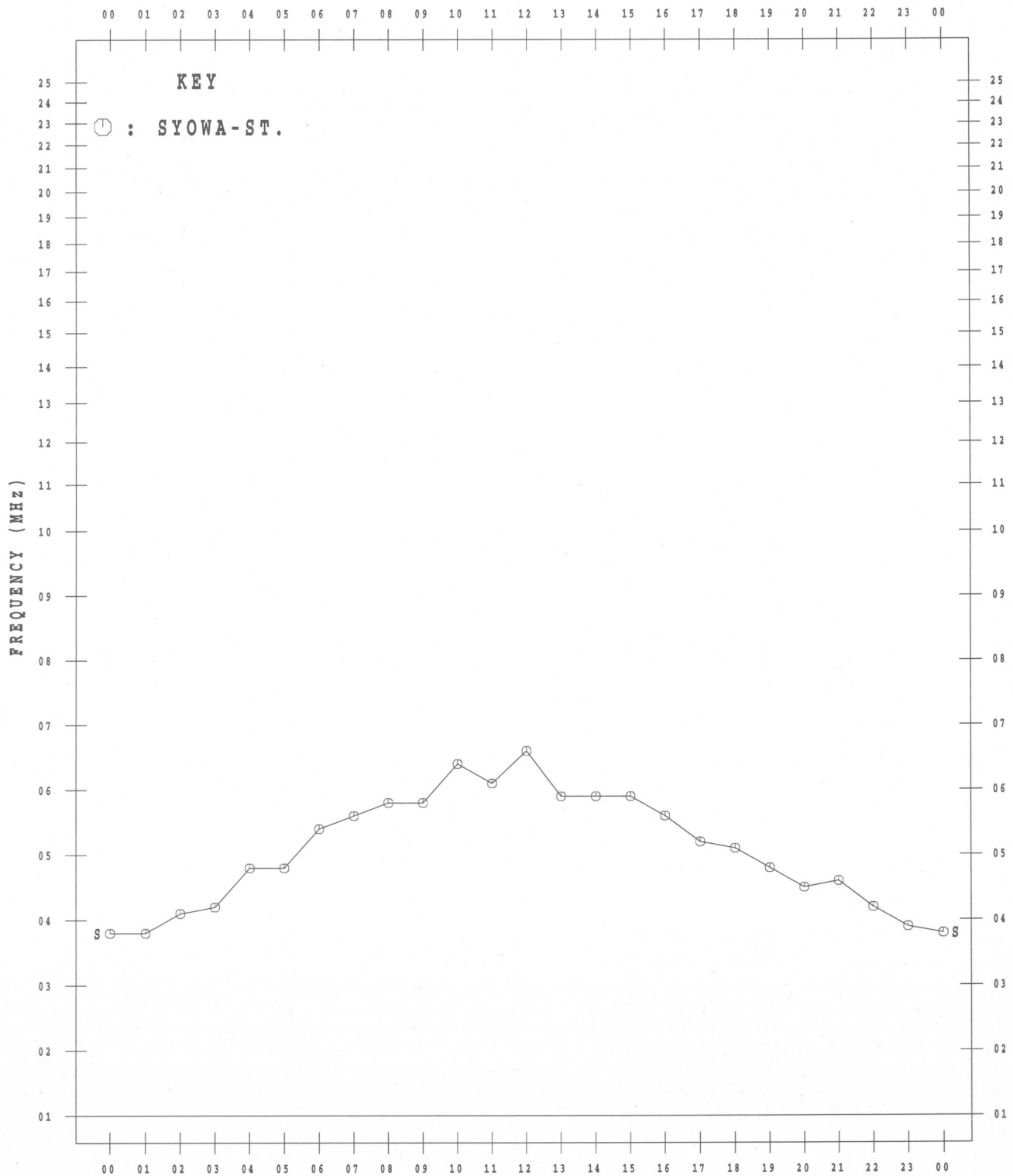
1998 1201 -> 1998 1231(99) SYOWA-ST.



MONTHLY MEDIAN VALUES OF foF2

45° E MEAN TIME

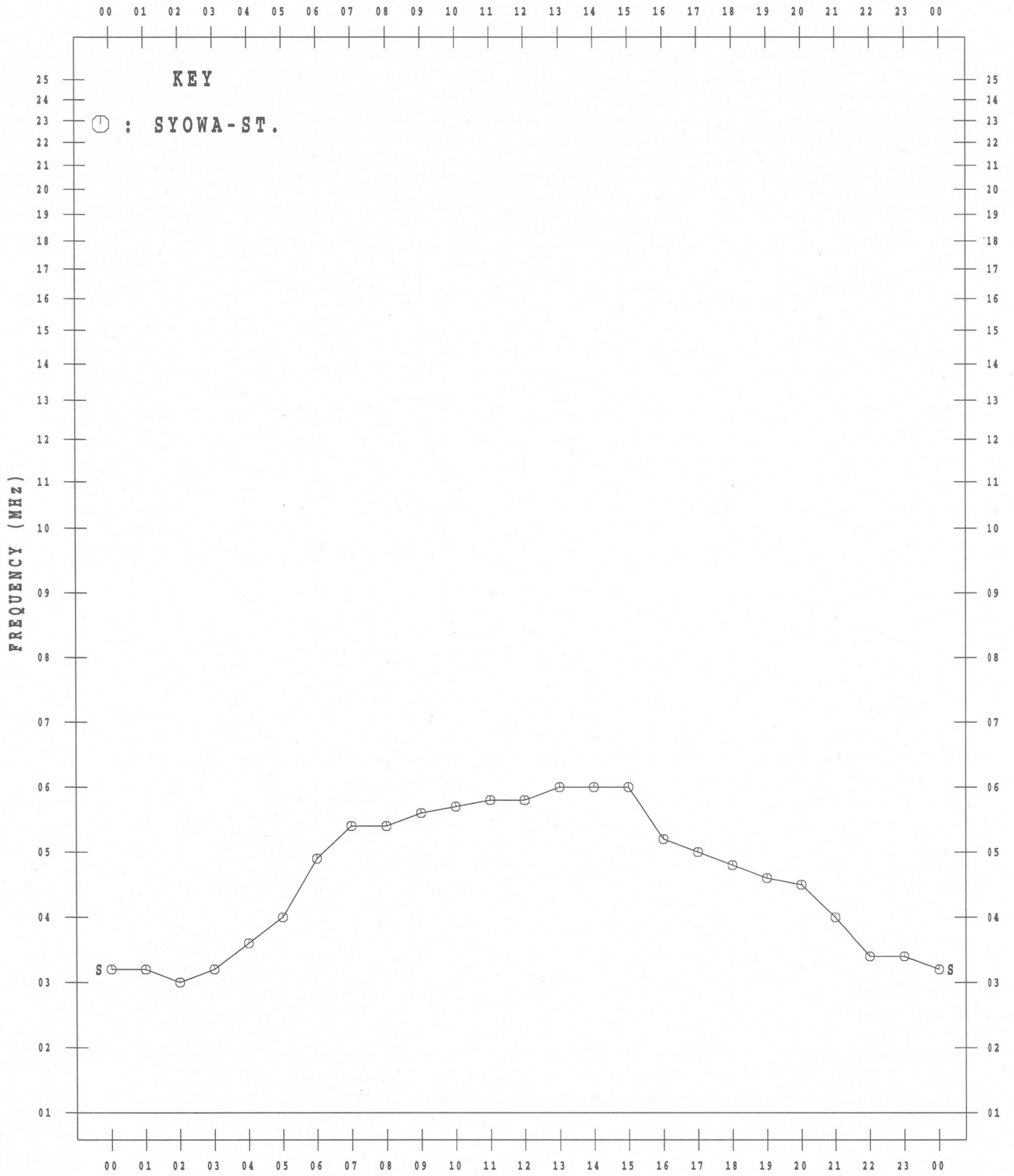
JAN. 1998



MONTHLY MEDIAN VALUES OF f_oF₂

45° E MEAN TIME

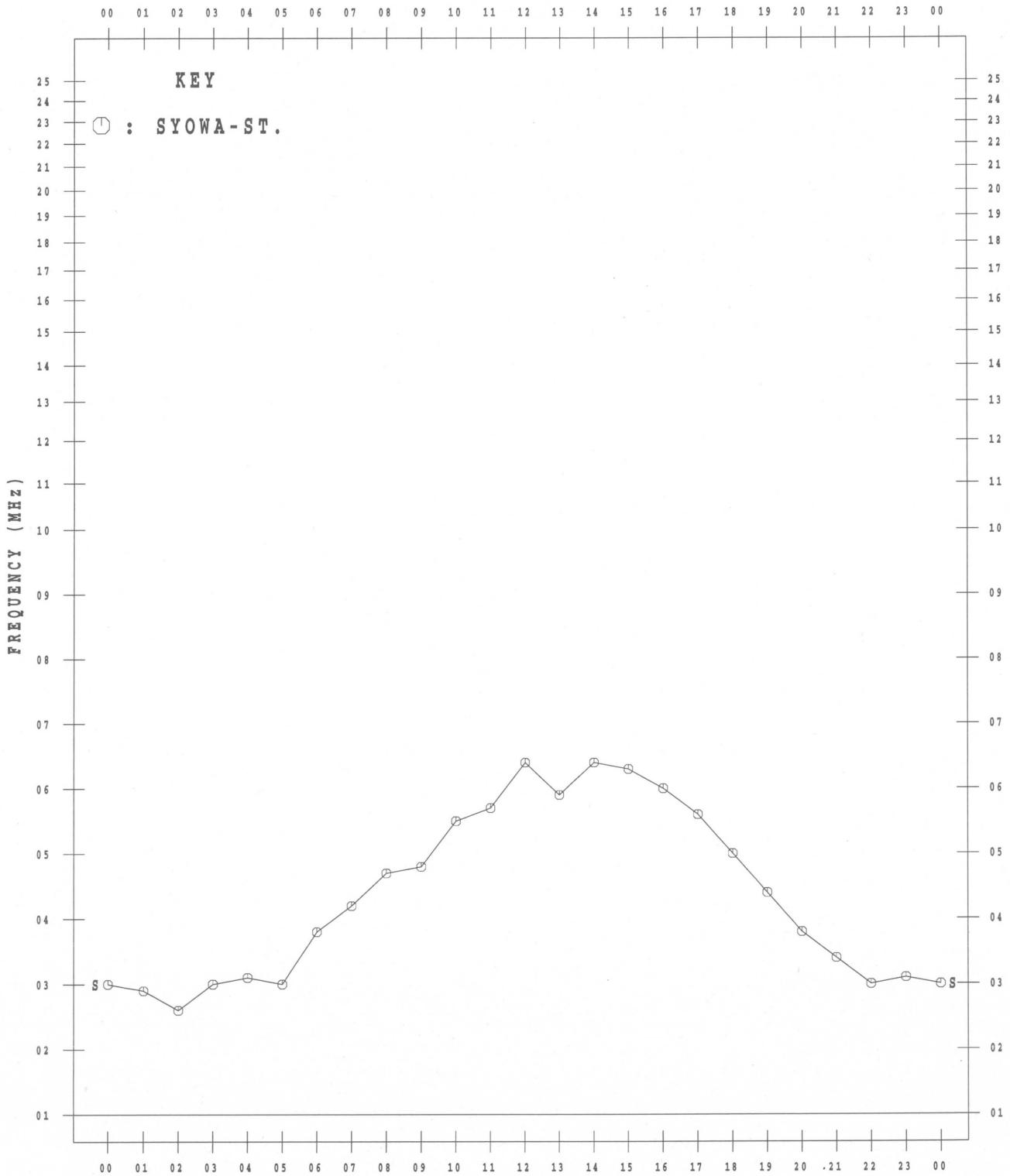
FEB. 1998



MONTHLY MEDIAN VALUES OF foF2

45° E MEAN TIME

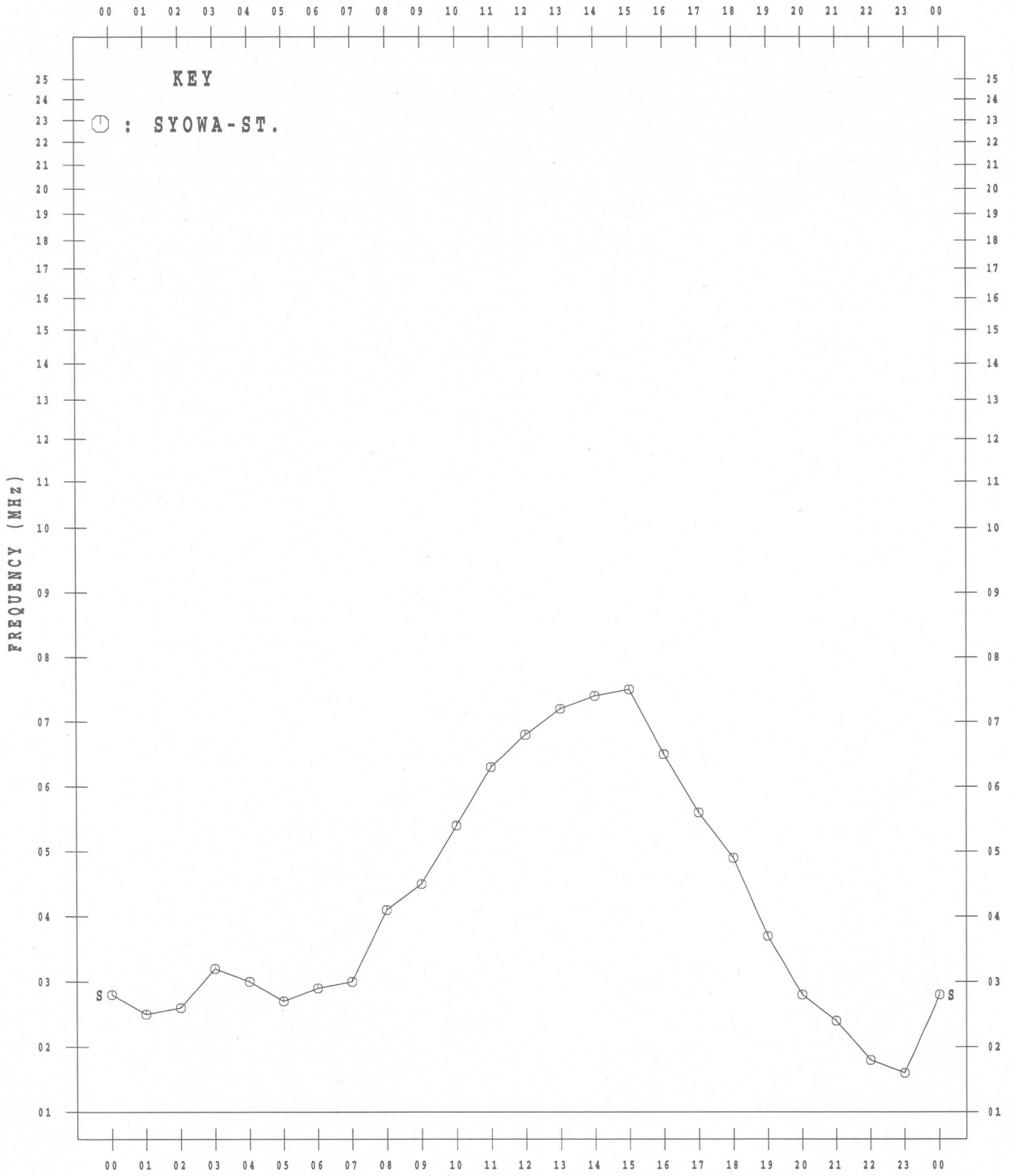
MAR. 1998



MONTHLY MEDIAN VALUES OF f_oF₂

45° E MEAN TIME

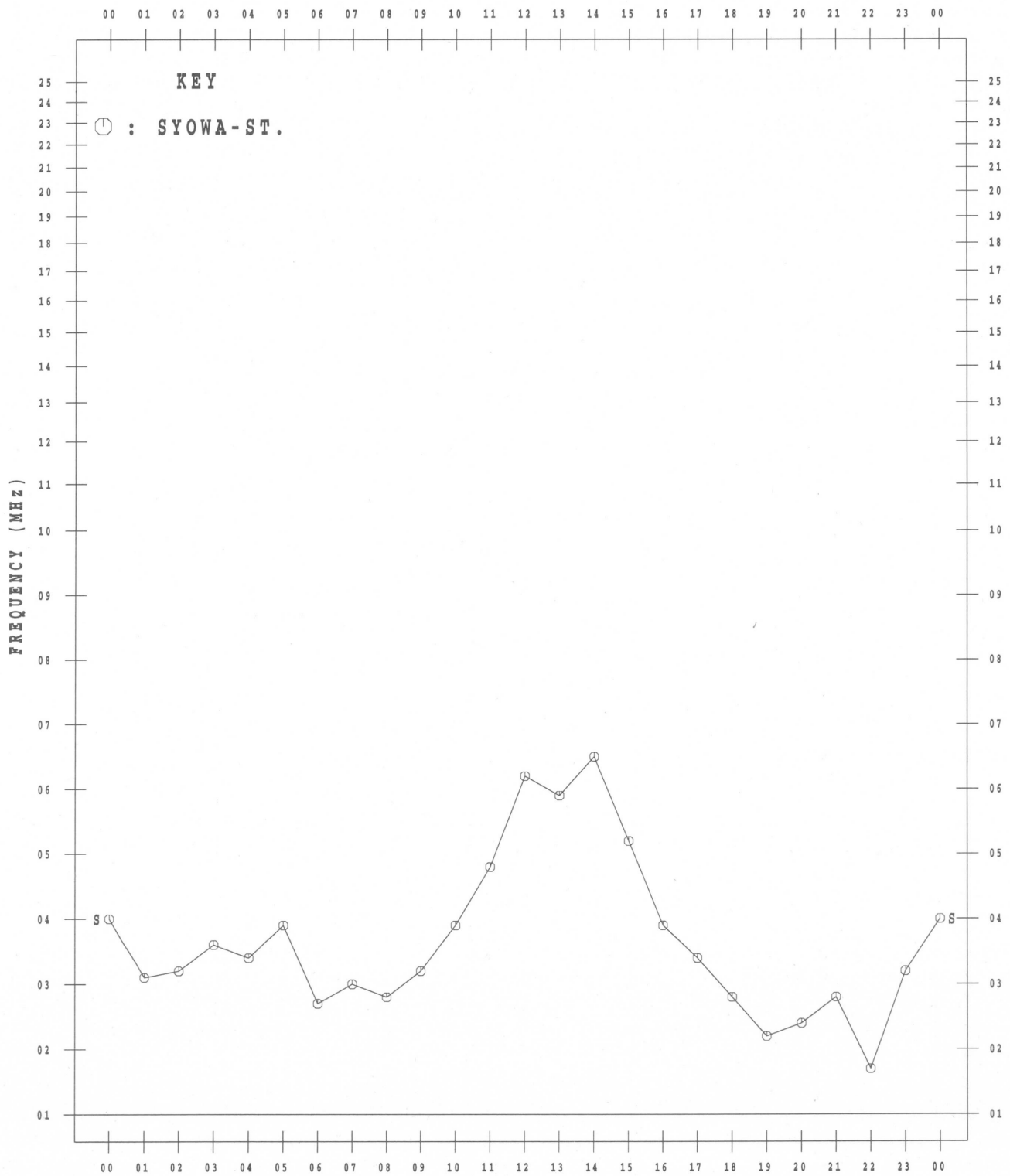
APR. 1998



MONTHLY MEDIAN VALUES OF f_oF₂

45° E MEAN TIME

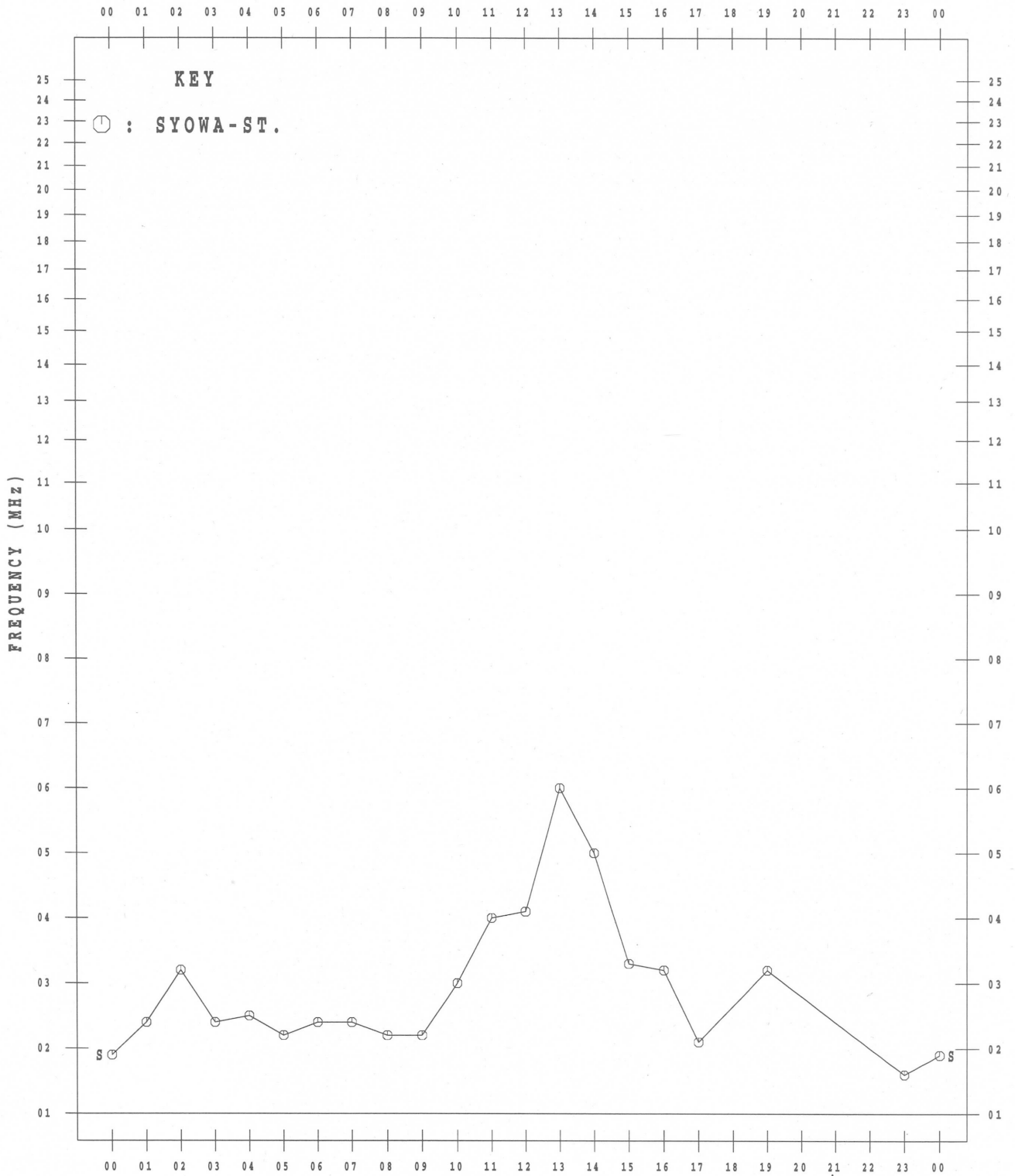
MAY 1998



MONTHLY MEDIAN VALUES OF f_oF₂

45° E MEAN TIME

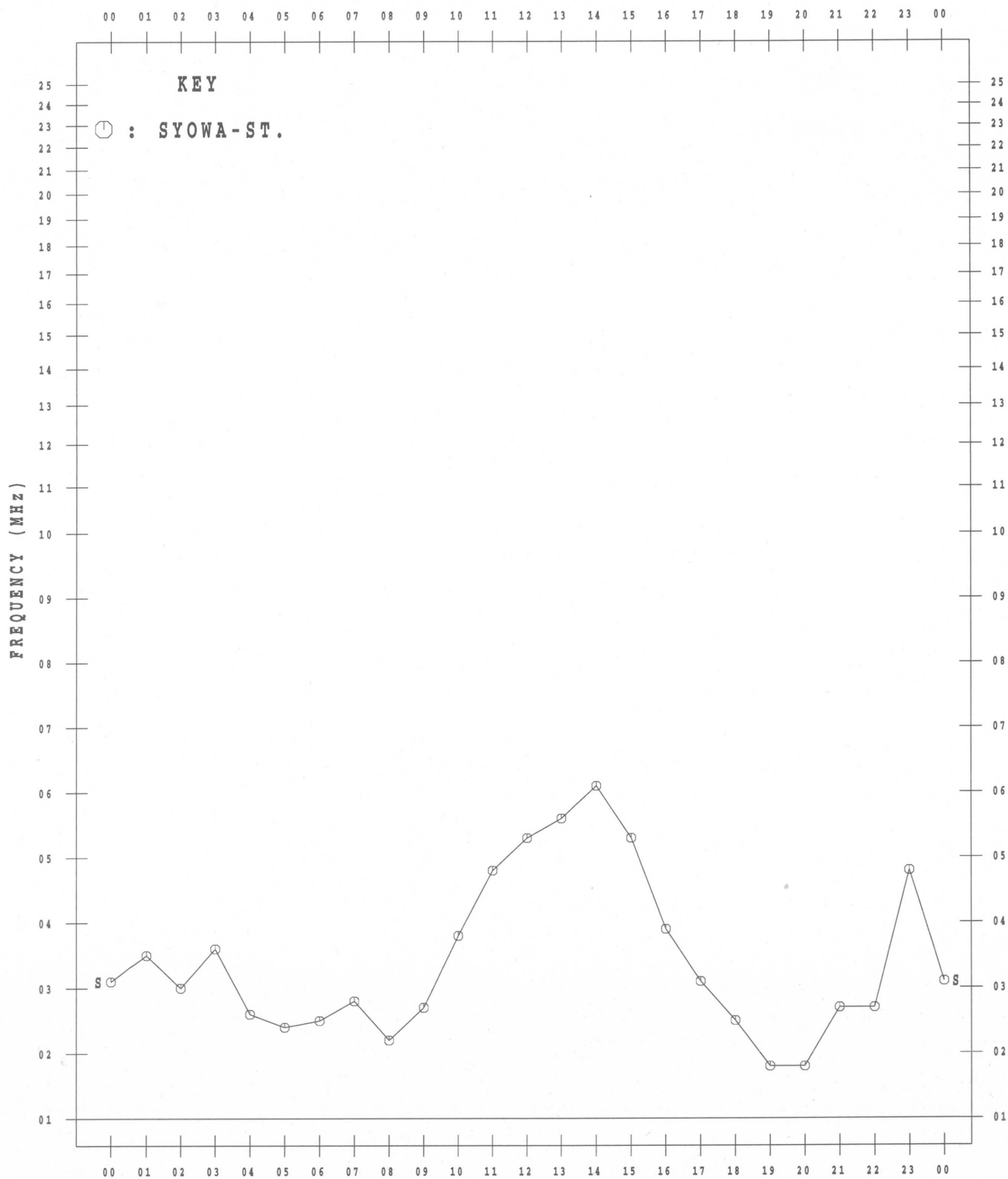
JUN. 1998



MONTHLY MEDIAN VALUES OF foF2

45° E MEAN TIME

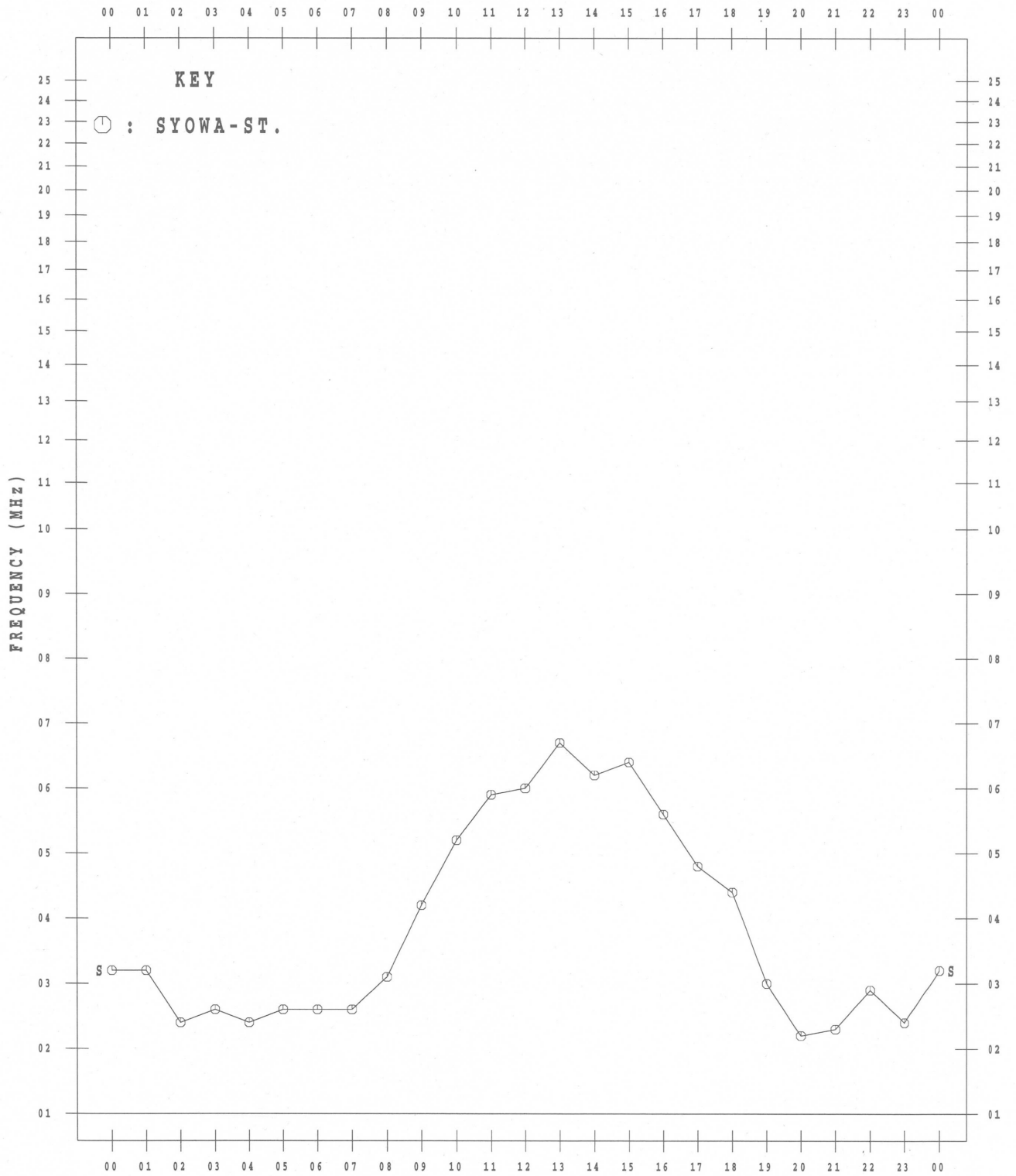
JUL. 1998



MONTHLY MEDIAN VALUES OF f_oF₂

45° E MEAN TIME

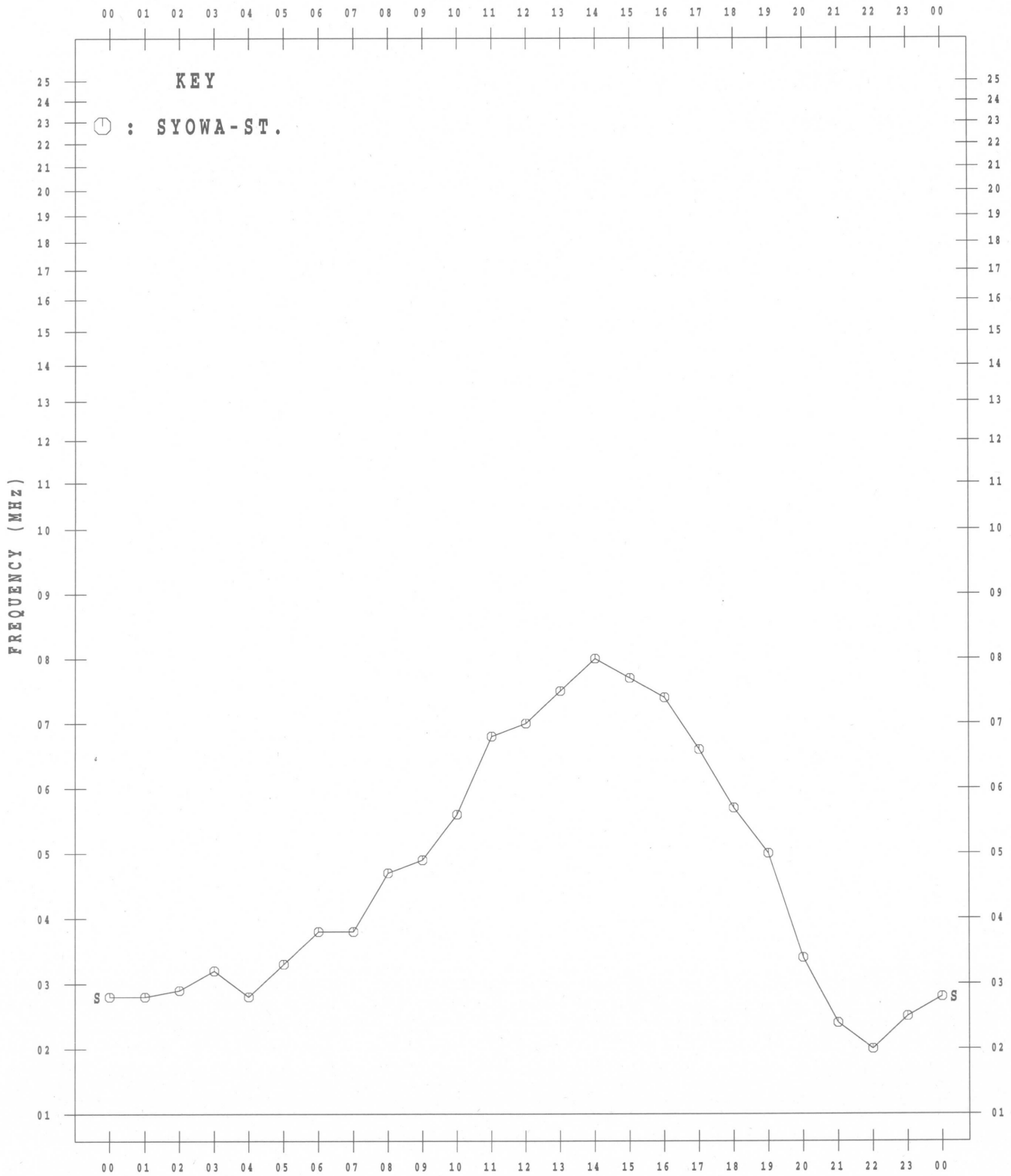
AUG. 1998



MONTHLY MEDIAN VALUES OF foF2

45° E MEAN TIME

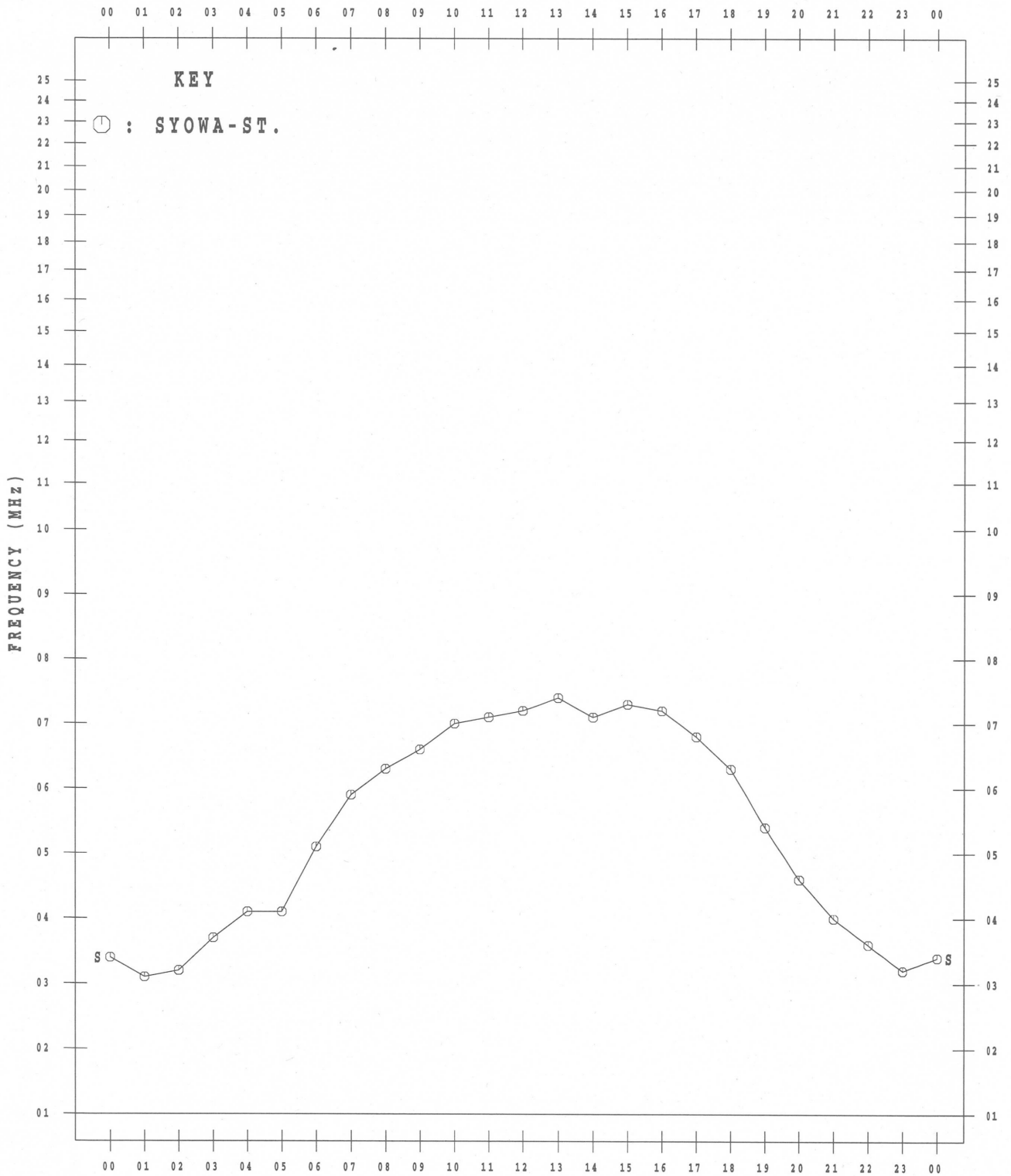
SEP. 1998



MONTHLY MEDIAN VALUES OF f_oF₂

45° E MEAN TIME

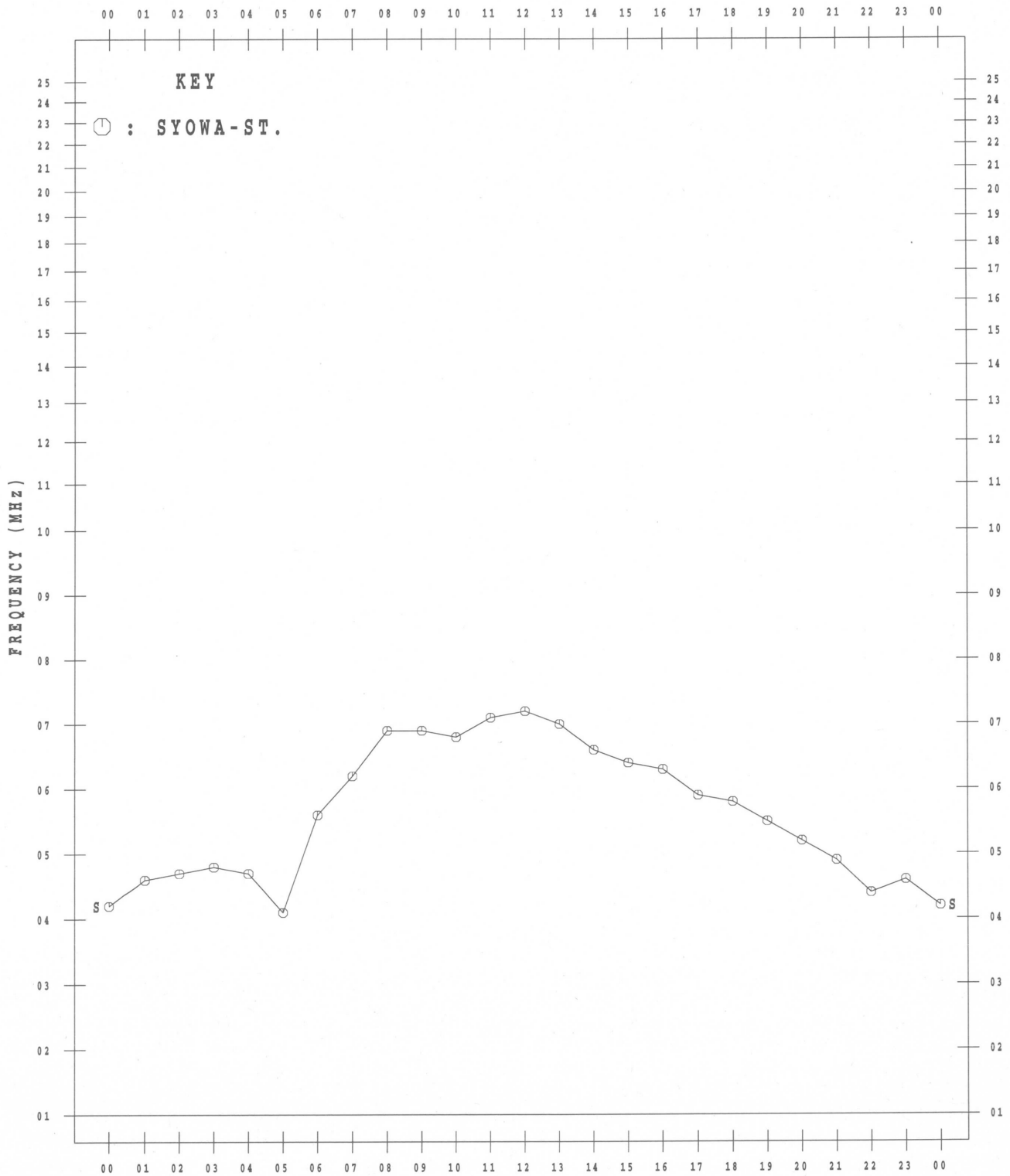
OCT. 1998



MONTHLY MEDIAN VALUES OF foF2

45° E MEAN TIME

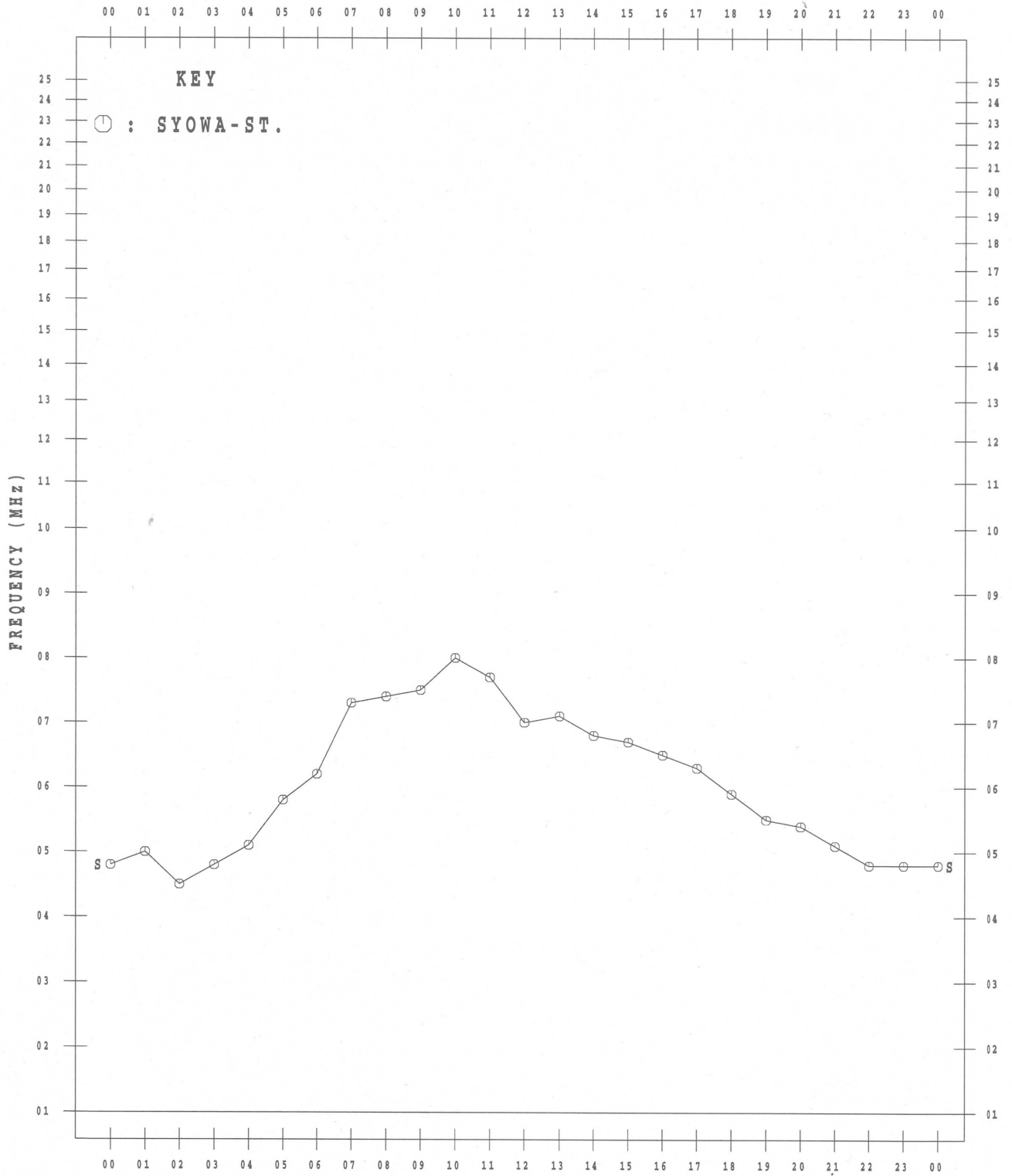
NOV. 1998



MONTHLY MEDIAN VALUES OF f_oF₂

45° E MEAN TIME

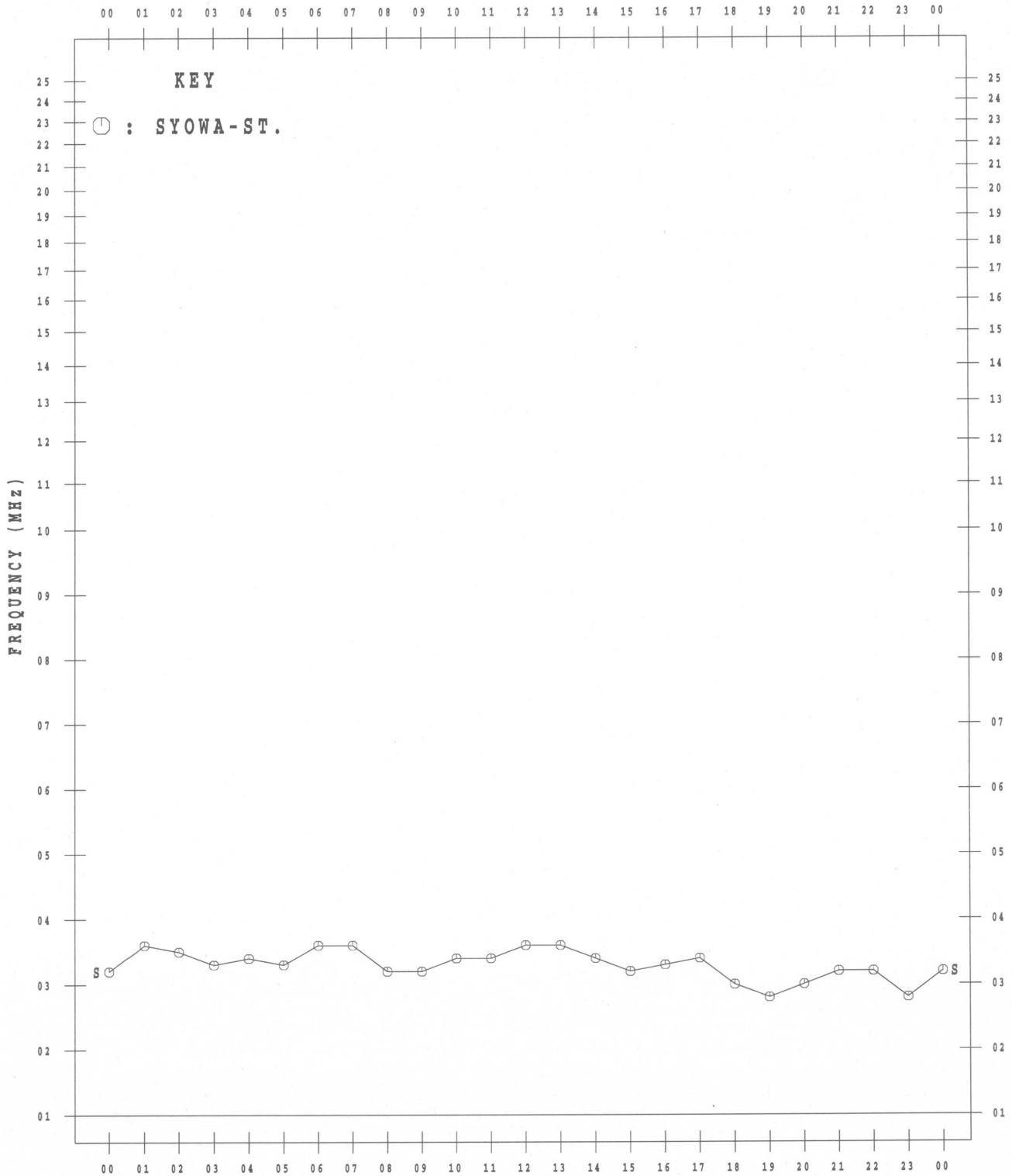
DEC. 1998



MONTHLY MEDIAN VALUES OF f_tE_s

45° E MEAN TIME

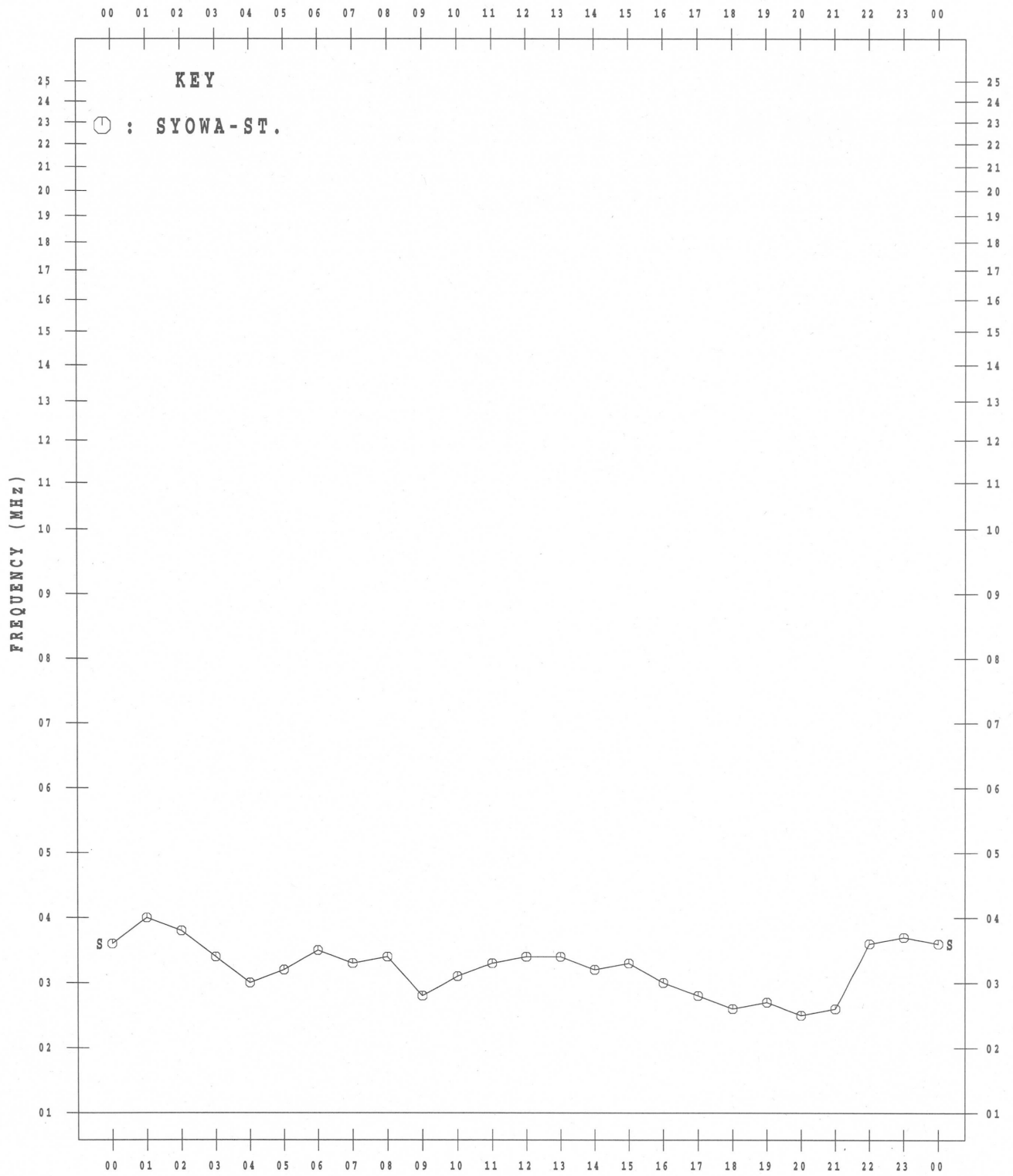
JAN. 1998



MONTHLY MEDIAN VALUES OF f_tE_s

45° E MEAN TIME

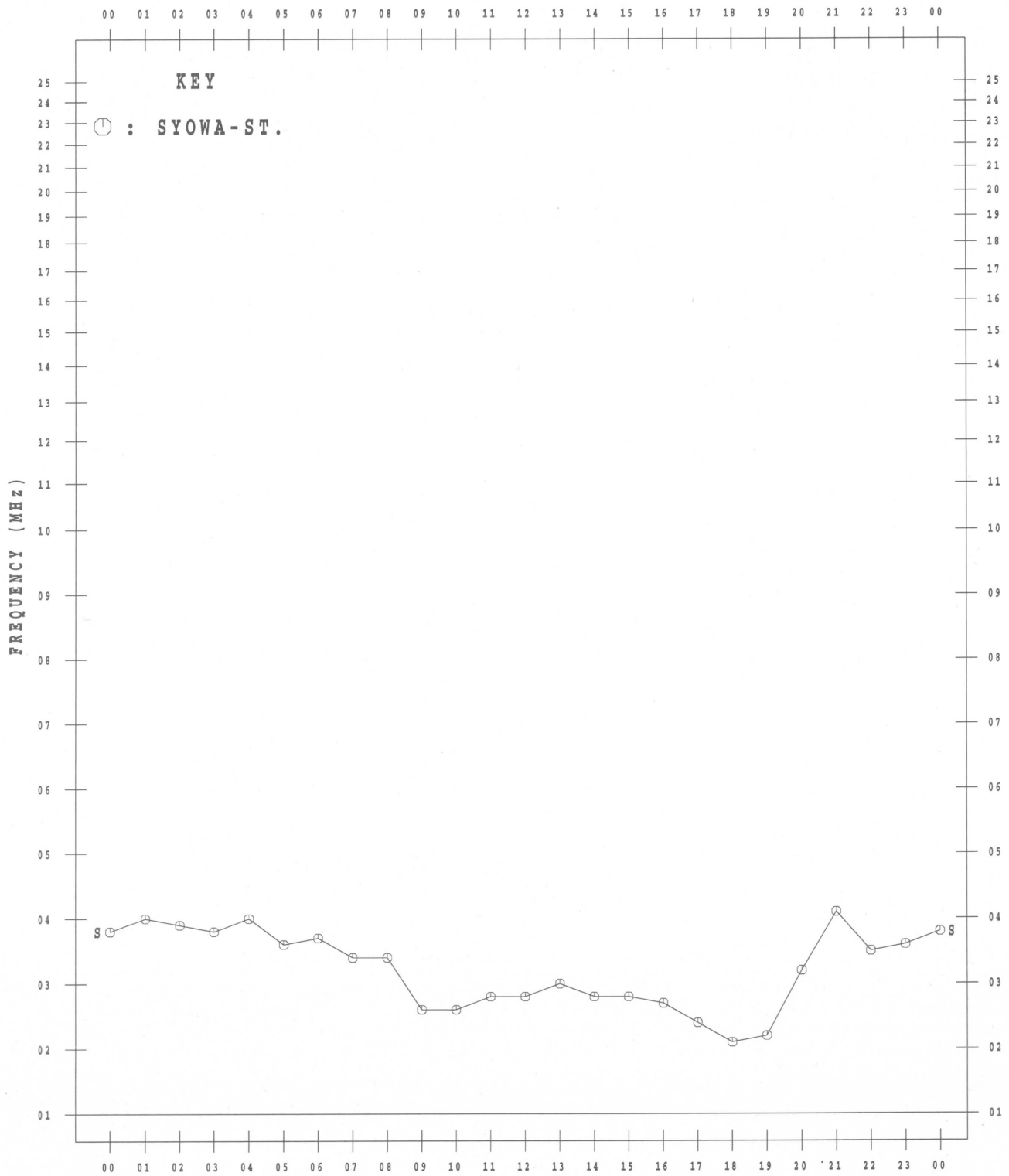
FEB. 1998



MONTHLY MEDIAN VALUES OF f_{TE}s

45° E MEAN TIME

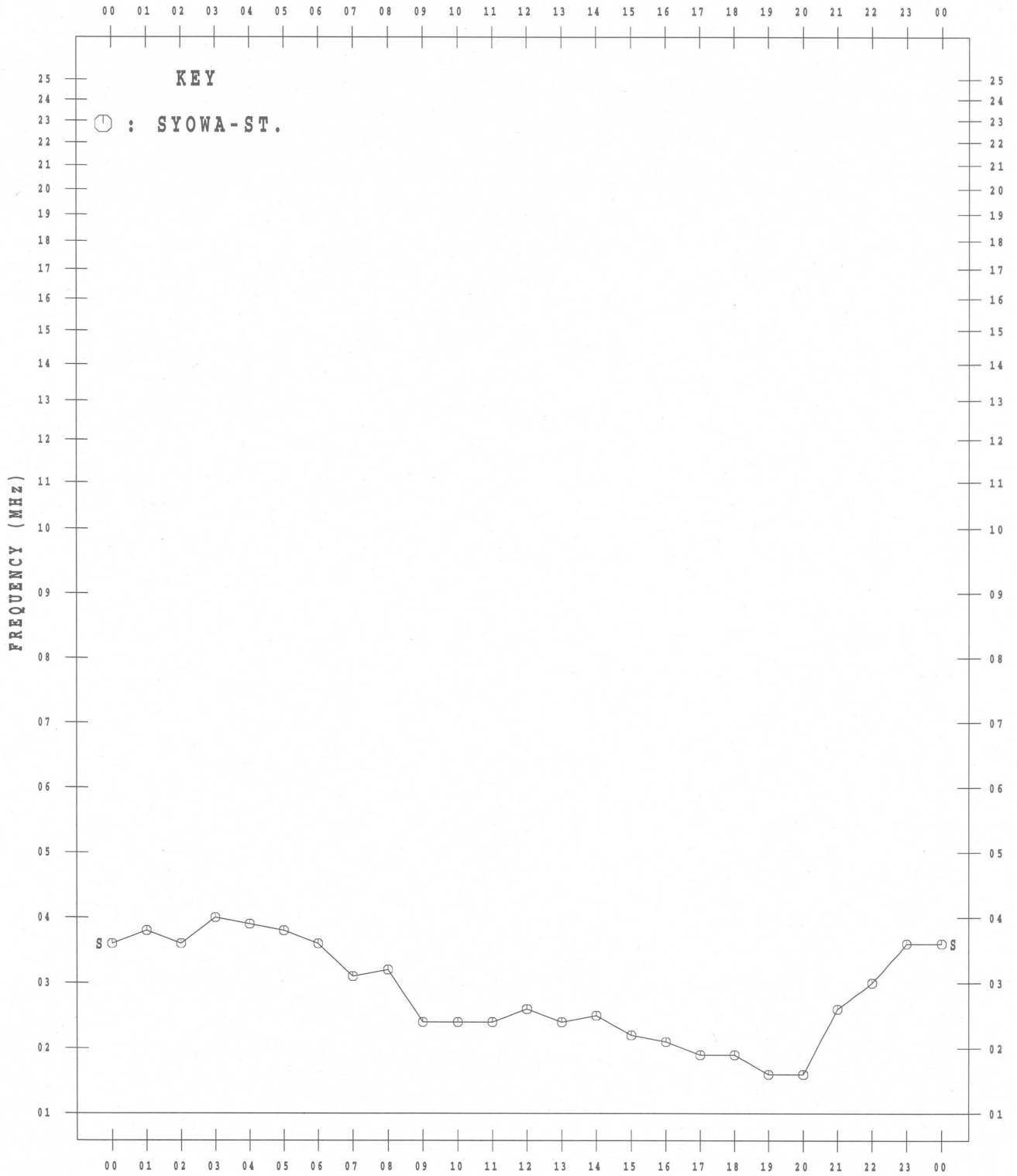
MAR. 1998



MONTHLY MEDIAN VALUES OF f_tE_s

45° E MEAN TIME

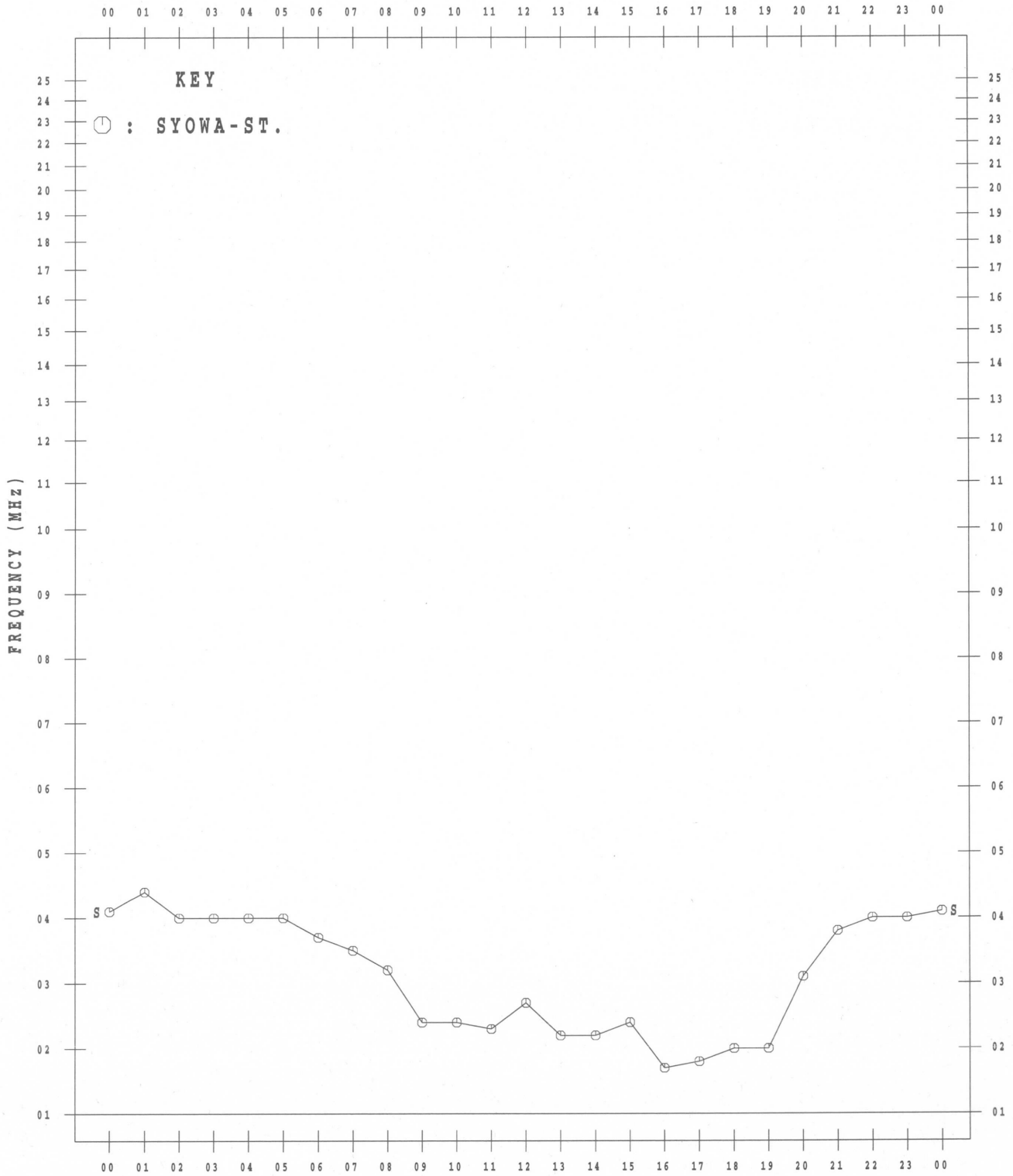
APR. 1998



MONTHLY MEDIAN VALUES OF fteS

45° E MEAN TIME

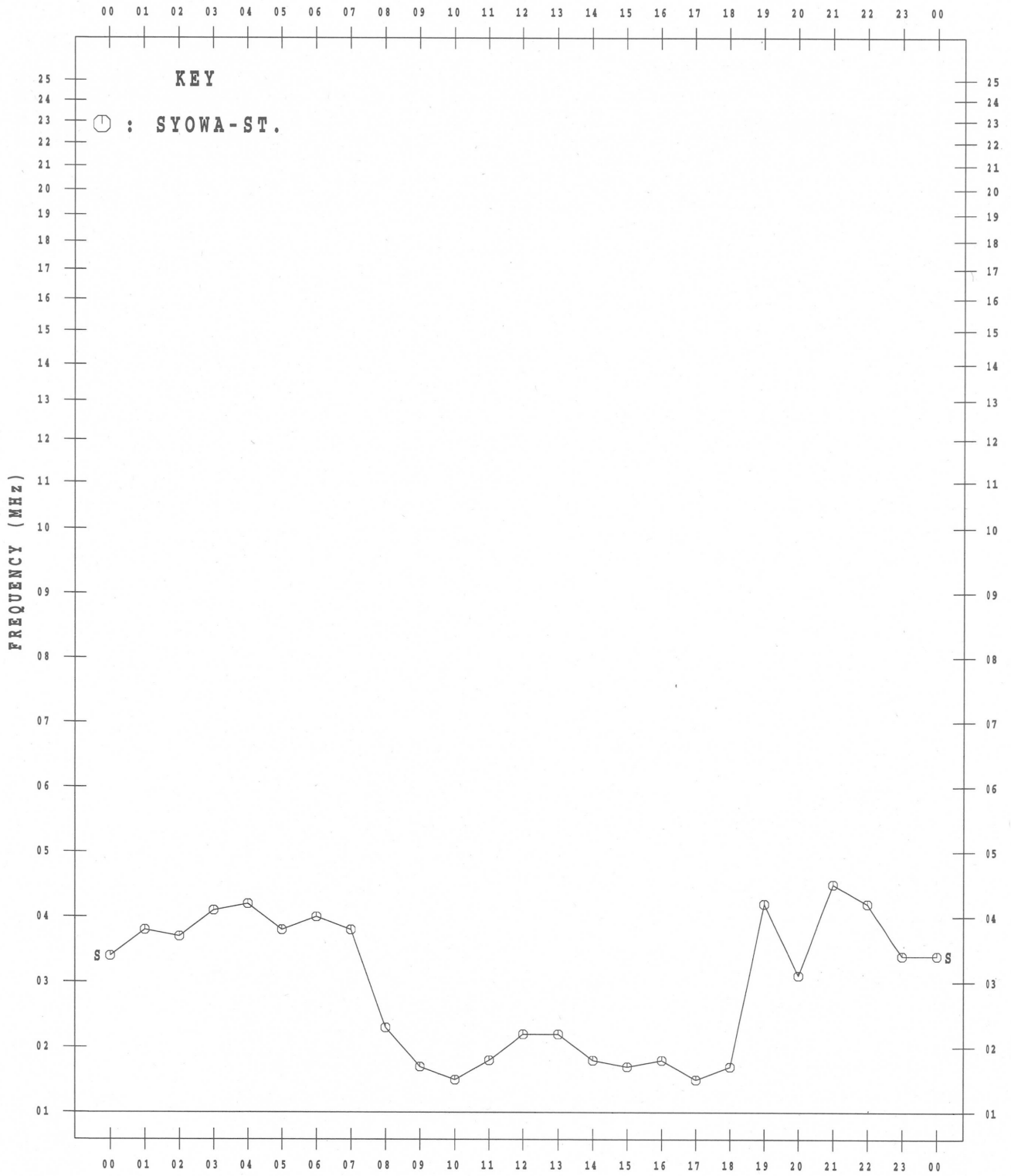
MAY 1998



MONTHLY MEDIAN VALUES OF ftes

45° E MEAN TIME

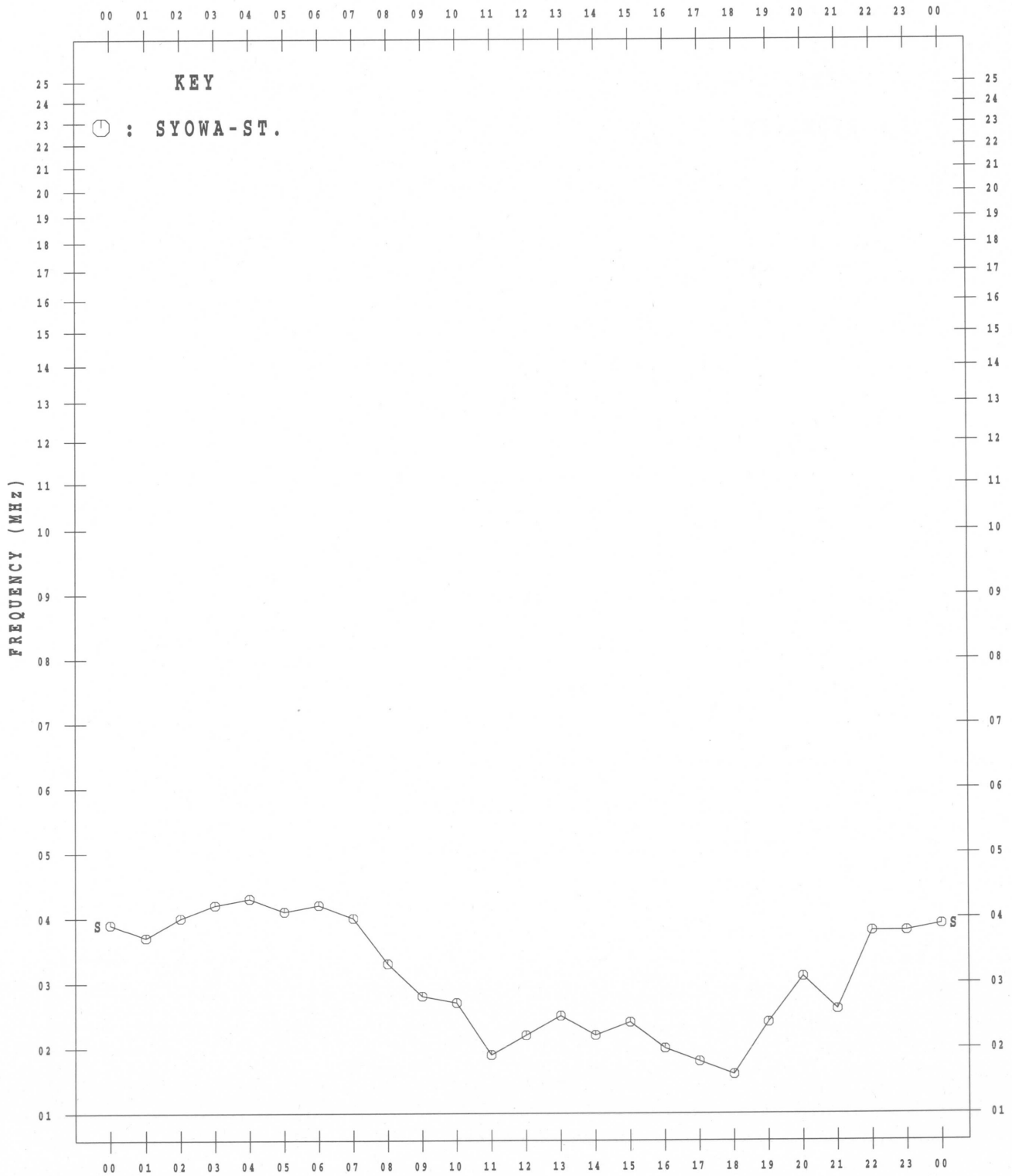
JUN. 1998



MONTHLY MEDIAN VALUES OF f_{TE}s

45° E MEAN TIME

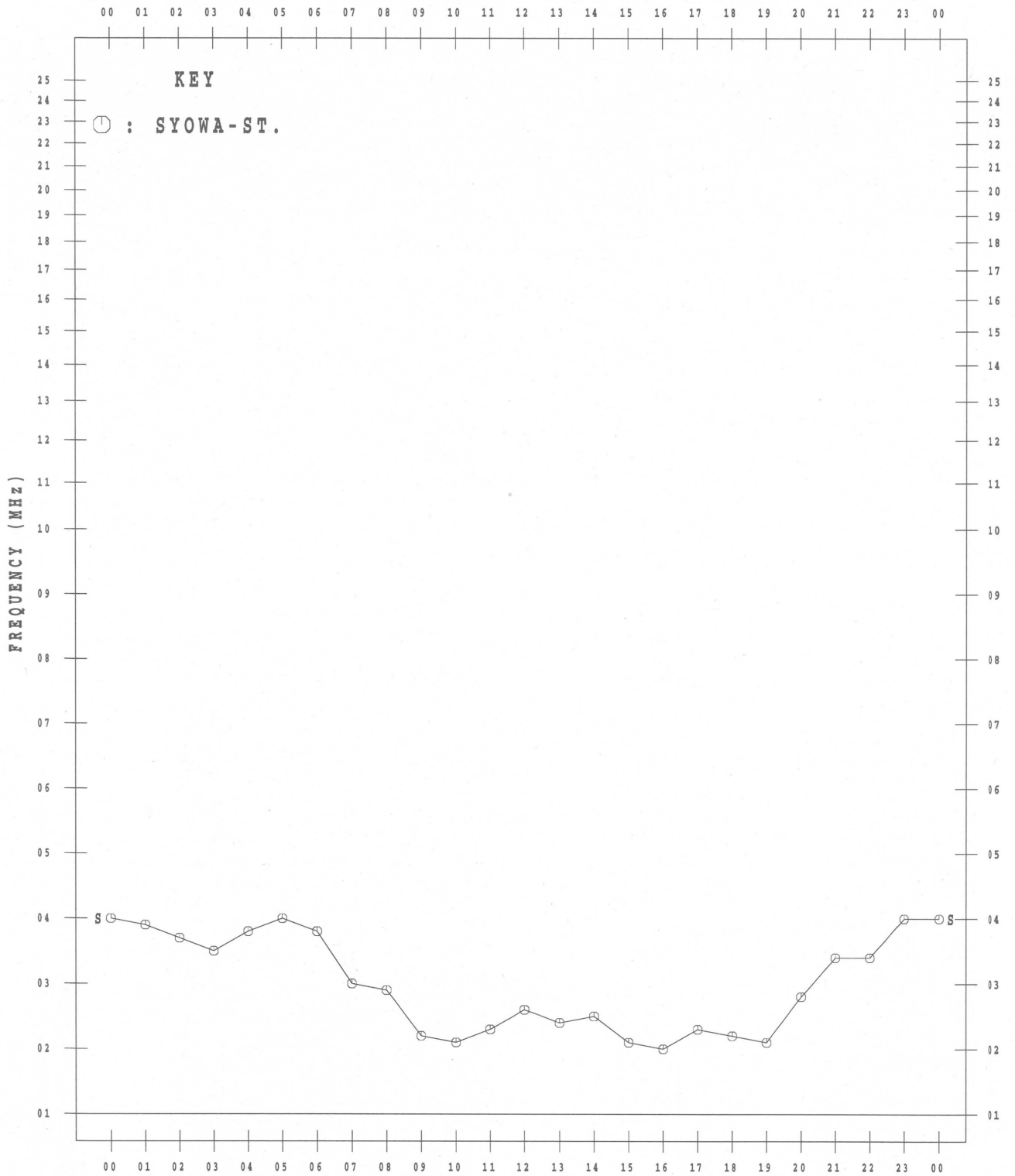
JUL. 1998



MONTHLY MEDIAN VALUES OF fteS

45° E MEAN TIME

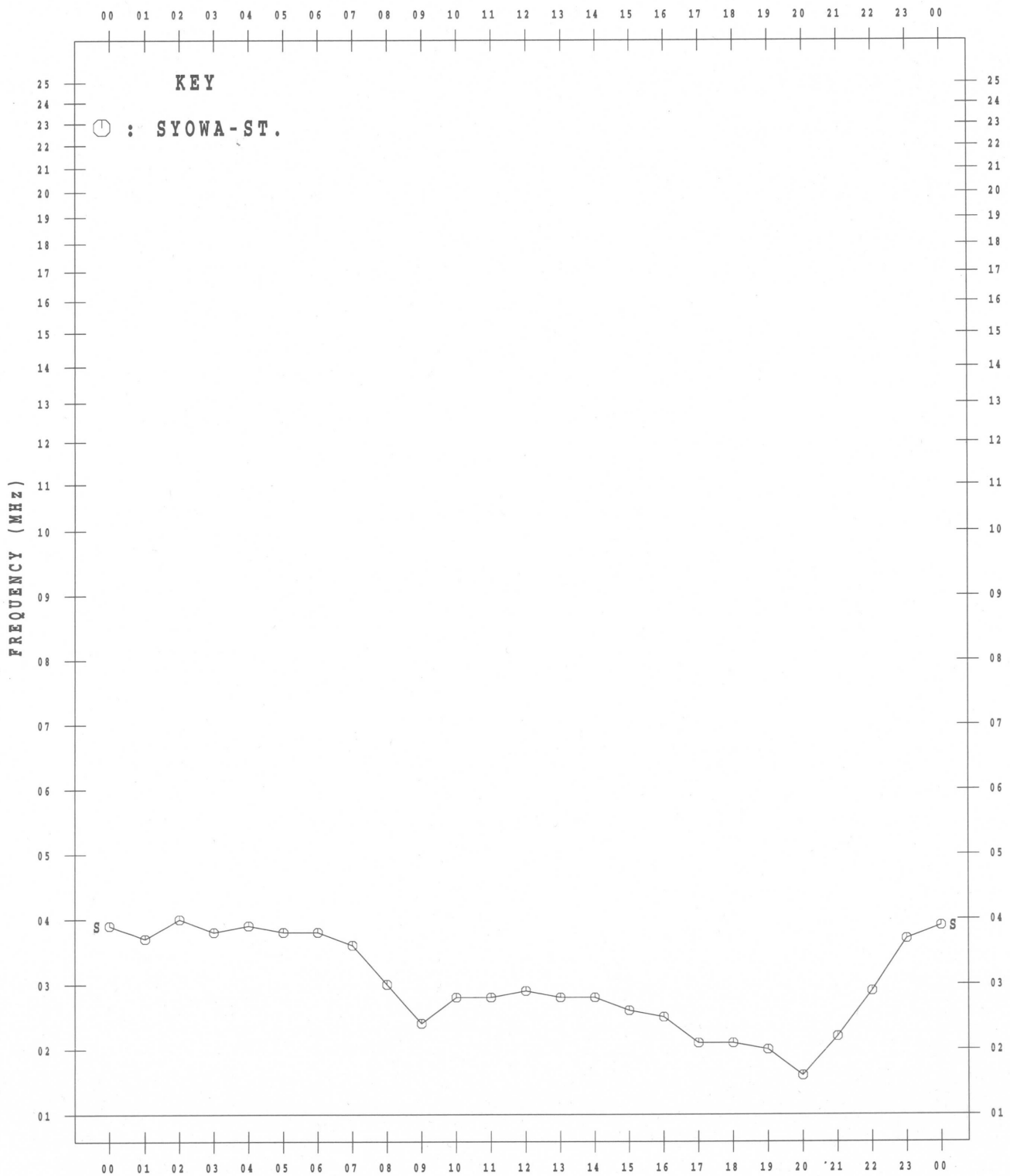
AUG. 1998



MONTHLY MEDIAN VALUES OF fteS

45° E MEAN TIME

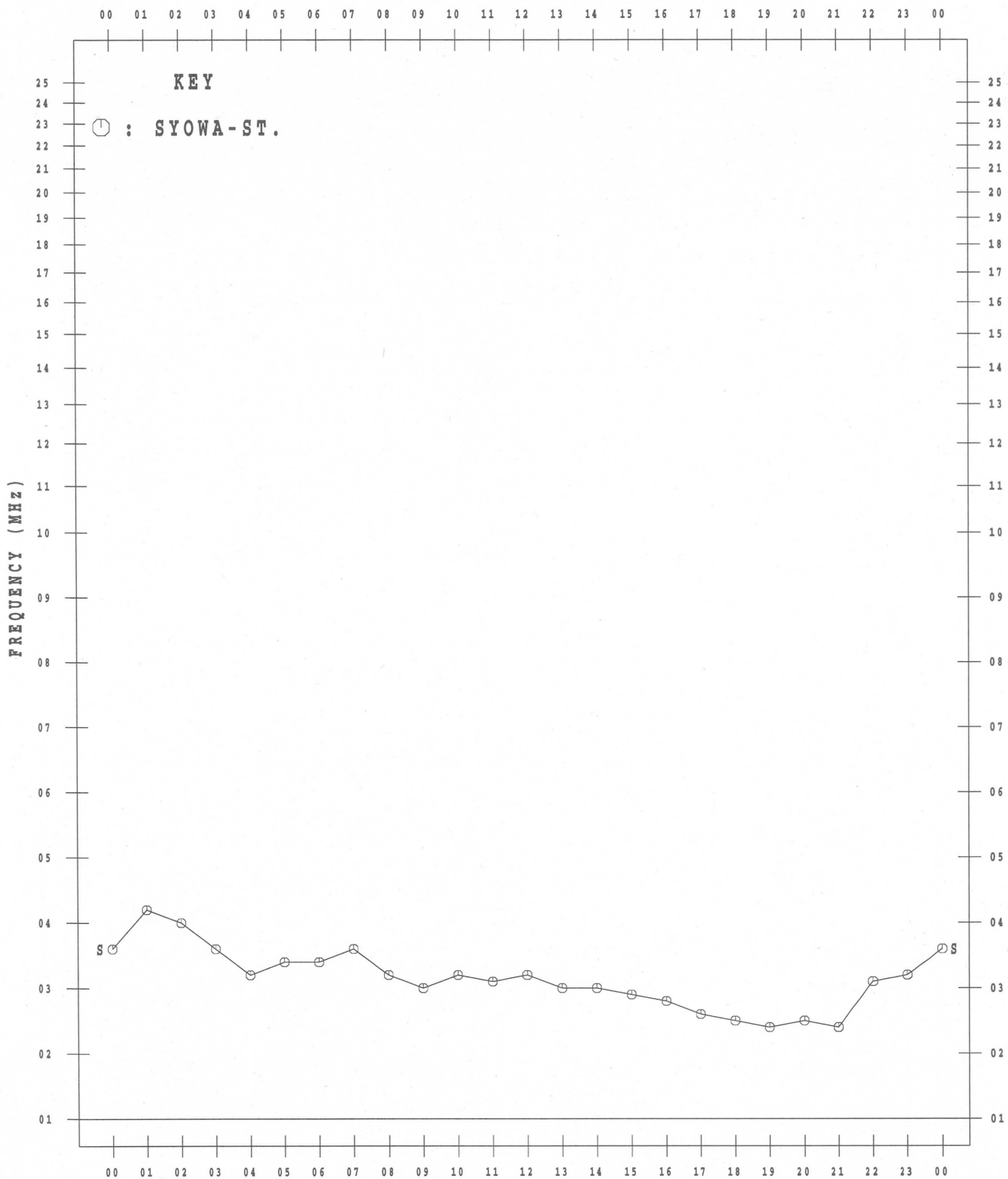
SEP. 1998



MONTHLY MEDIAN VALUES OF f_{TE}s

45° E MEAN TIME

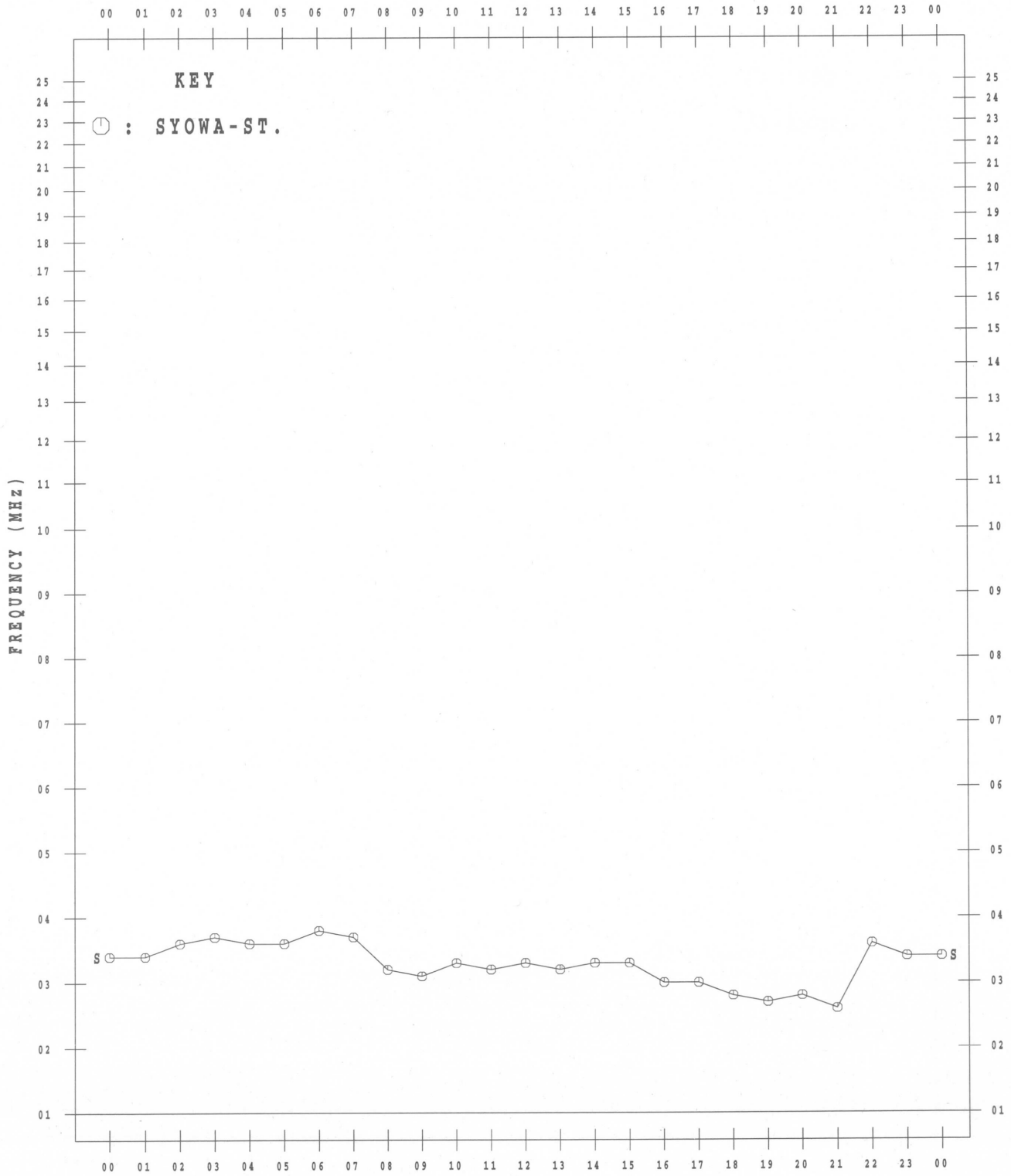
OCT. 1998



MONTHLY MEDIAN VALUES OF ftes

45° E MEAN TIME

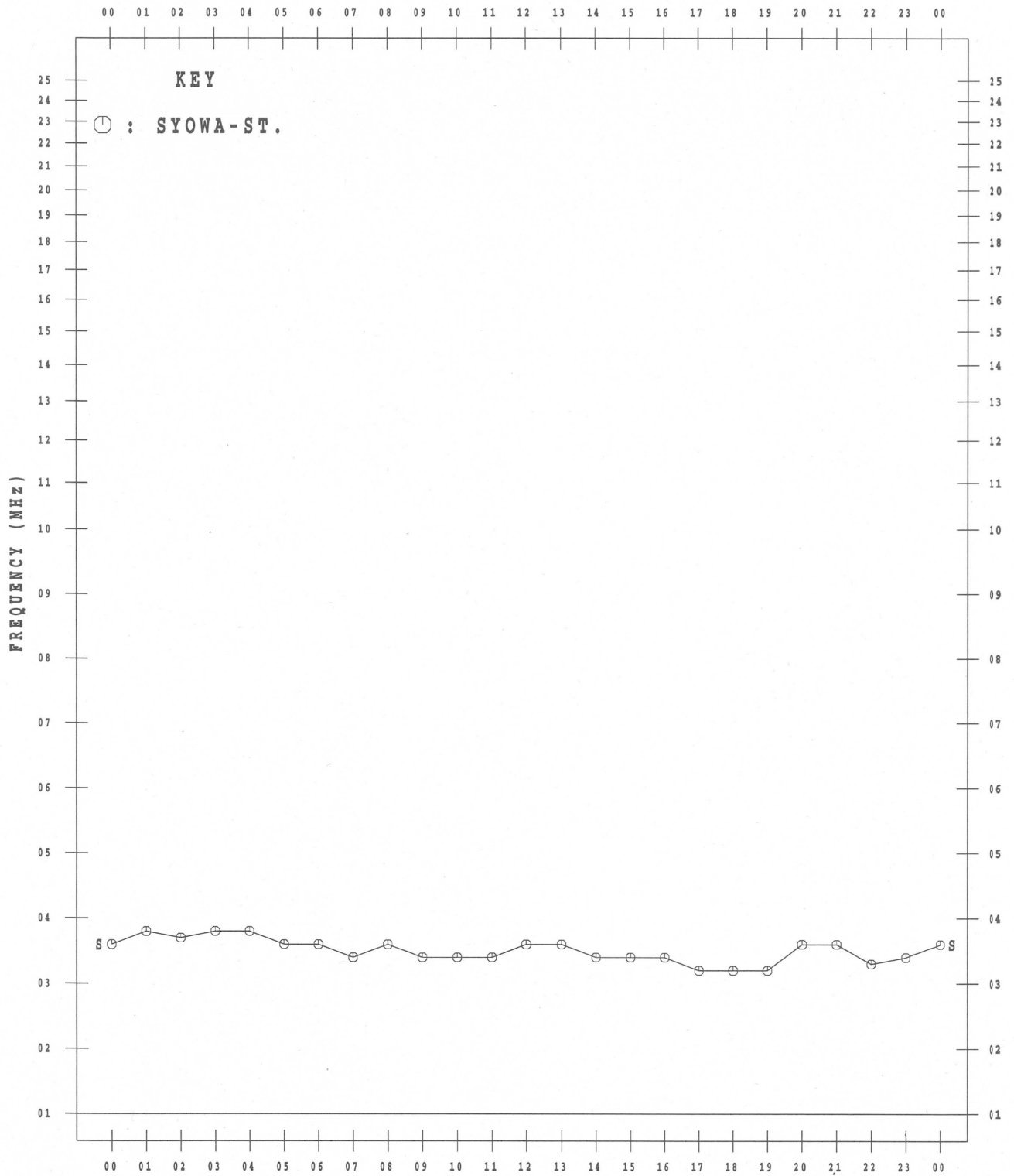
NOV. 1998



MONTHLY MEDIAN VALUES OF f_{TE}s

45° E MEAN TIME

DEC. 1998



IONOSPHERIC DATA AT SYOWA STATION (ANTARCTICA)
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