

ION.ANT.—66

IONOSPHERIC DATA AT SYOWA STATION (ANTARCTICA)

January 1999 — December 1999

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NATIONAL INSTITUTE OF INFORMATION
AND COMMUNICATIONS TECHNOLOGY
TOKYO, JAPAN

INTRODUCTION

This data book gives summarized results for vertical soundings of the ionosphere at Syowa Station, Antarctica in 1999. The observations were conducted by the National Institute of Information and Communications Technology 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 Range	400 kHz - 15MHz
Transmitting Power	10kW (peak value)
Duration of Sweep	20 s
Transmitted Pulse Width	80 μs
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: H. Nakamoto
 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. 1999 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	56	X	X	X	C	O	X	X	R	X	B	B	O	X	X	X	O	X	X	X	X	X	X	X			
1	56	57	60		69	72	76		78				80	80	82	80	84	93	85	74	66	66	65	62	62		
2	56	X	X	X	B	R	X	O	X	X	X	R	R	O	X	O	X	O	X	X	X	X	X	R			
2	56	56	65		61	75	81	87	90				79	76	80	77	79	70	67	55	57	59	56				
3	63	X	O	X	X	O	X	R	R	X	O	X	B	X	X	O	X	Y	O	X	X	X	R	X			
3	63	63	63	60					71	69	73		80	81	82				68	68	69	69	69	62	68	68	
4	69	X	X	O	X		X	X	R	O	X	X	B	Y	B				X	O	X	R	O	X	X		
4	69	65	65	70	74	90			67	72								78	85			50	49	48	48		
5	A	O	X	O	X	X	O	X	R	A	B	B	Y	B	B	B	B	B	O	X	B	O	X	X			
5	50	50	46	44															51		53	56	56	54	50		
6	X	O	X	O	X		O	X	R	R	O	X	O	X	X	O	X	R	B	B	O	X	O	X	A		
6	49	66	58	54	48	50			48	66	69	70							67	70	64	57	65	55	50		
7	0	X	A	X	X	R	O	X	O	X	R	X	O	X	R	O	X	O	R	O	X	O	X	R	O		
7	46	62	50		46	46	63			65	66	69							66	62	55	53	55	53	56		
8	B	A	A	A	O	X			R	Y	R	C	R	R	R	B	B	B	O	X	X	R	R	A	B		
8			B	R	O	X	R	R	R	R	R	R	R	R	R	B	B	B	B	B	B	B	B				
9	36	44			45																51	51	49	44			
10	R	A	B	A	B	R	X	49	46	R	R	R	R	R	R	A	B	B	R	R	O	X	O	X			
11	X		X	R	R	O	X	X	R	R	C	C	C	C	C	C	O	X	Y	R	C	B	R	X	R		
11	46	55	46			44	56											70					58	54	44		
12	0	X	O	X	A	R	R	X	R	O	X	X	O	X	X	R	R	R	B	O	X	R	R	X	O		
12	49	52	47			46			71	74	68	69							64				58	58	54	44	
13	A	B	X	R	B	R	B	B	Y	R	R	Y	B	R	X	O	X	X	O	X	A						
13			56															66	65	68	67	54	65	94	57	63	
14	A		X	X	O	X	O	X	O	X	Y	O	X	O	X	B	B	B	X	Y	Y	O	X	O	A		
14	44	44		51	38	39	43	45	47			62	66	65					48		48	55	50	43			
15	0	X	B	B	R	R	R	A	B	B	B	B	B	B	B	B	B	B	B	O	X	O	X	X			
15	47																		57		49	48	55	51	45		
16	R	X	O	X	B	B	B	R	R	B	B	B	B	B	B	B	O	X	Y	B	B	R	R	X	X		
16	44	44																66					56	52	56	55	
17	X	X	B	B	B	B	B	O	X	X	X	X	O	X	B	C	B	X	X	O	X	X	O	X	X		
17	52	55						66	67	76	73	76						78	74	72	72		62	63	64	58	
18	X	X	O	X	X	X	X	X	X	B	B	B	R	X	O	X	R	X	X	X	X	X	X	A	B		
18	48	54	56	66	74	80	89	98	95	93								76	74	62	69	64	67	63			
19	R			R	R	O	X	X	X	X	O	X	X	X	X	B	B	X	O	X	O	X	X	X	X		
19	58	70	70			64	74	77	81	77	78	78	80					80	75	72	70	66	66	67	68	63	
20	X	X	X	R	A	O	X	X	X	X	O	X	X	O	X	X	X	O	X	X	X	R	X	O	R		
20	58	53	56			57	66	73	77	84	81	83	84	87	82	88	92	92	89	62		60	48				
21	0	X	X	X	O	X	Y	R	B	B	B	B	O	X	O	X	Y	B	B	O	X	B	B	O	X		
21	52	52	60	58	62	65	65	65										66	65			59	69	63	63		
22	X	O	X	R	R	O	X	X	O	X	B	B	B	O	X	O	X	X	X	O	X	B	Y	R			
22	69	72	69	64		72	78	84	85				88	86	86	81	79	69							53		
23	B	R	B	R	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B			
24	A	B	R	B	A	B	R	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B			
25	B	R	O	X	48	46	B	B	R	R	B	B	B	R	B	Y	B	B	B	O	X	R	R	O	X		
26	X	X	X	B	O	X	B	X	X	X	X	X	O	X	O	X	X	X	B	B	B	O	X	O	X		
26	47	52	54		55	74	85	88	88	91	87	89	81	79					67	68	66	62	64				
27	X	O	X	B	B	R	B	A	R	Y	R	R	O	X	X	X	O	X	X	R	X	R	O	X	X		
27	60	48																69	75	86	67	54	57	52	49		
28	X	X	A	O	X	X	O	X	X	O	X	X	B	B	B	B	B	B	B	B	O	X	O	X	X		
28	45	44	48	52		42	72	73	81	84	77							71	67		60	54	50	44	44		
29	A	O	X	X	O	X	Y	Y	R	R	X	O	X	O	X	X	X	X	X	X	O	X	X	X	X		
29	117											68	69	72	72	63	72	64	66	65	56	56	49	50	38		
30	A	X	A	X	O	X	A	X	O	X	X	X	C	B	X	X	O	X	B	O	X	X	X	X	X		
30	40		55		54	42		80	84	80	84							73	74	70	65	62	58	65	57	52	
31	X	X	51	63	65	67	57	70	80	71	78	82	85	R	X	O	X	X	X	X	X	X	X	X	X		
31	49	48	51	63	65	67	57	70	80	71	78	82	85		74	72	74	77	74	70	67	62	61	57			
	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	21	22	14	13	15	16	15	16	13	13	11	12	9	13	16	18	20	17	23	21	27	25	23			
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	49	53	56	54	57	65	73	78	81	77	78	80	76	76	78	78	70	67	65	57	58	58	54	54			
L Q	58	58	62	64	67	72	72	78	84	86	80	82	84	86	80	82	79	71	71	65	66	63	62	62			

IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 1999 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

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	50	J	R	C	R		R		B	B	R	J	R	J	R	J	R	87	79	68	60	59	56	56
2	50	R		B	R	U	S	75	J	R	R	R	R	R	R	R	R	R	R	R	J	R	R	
3	57	U	R	J	S	R	R	F		B	J	R	J	R	R	Y	R	R	R	R	R	F	F	
4	63	J	S	S	F	J	R	R	B	Y	B	Y	B	J	R	72	79	B	B	R	R	R	R	
5	A	R	R	R	R	A	B	B	Y	B	B	B	B	B	B	R	B	R	R	44	43	42	42	
6	43	F	R	U	R	F	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	A	
7	R	A	F	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
8	B	A	A	A	F	A	R	Y	R	C	R	R	B	B	B	R	J	R	R	J	R	R	A	
9	F	F	B	R	39	R	R	R	R	B	B	B	R	B	B	B	B	B	B	B	B	45	45	
10	R	A	B	A	B	R		43	40	R	R	R	A	B	B	R	R	R	R	50	51	46	46	
11	F	R	R	R	R	R	R	R	R	C	C	C	C	C	R	Y		C	B	R	R	R	R	
12	R	R	R	A	R	R		40	R	R	R	R	R	R	R	R	R	R	R	R	J	R	R	
13	A	B	R	B	R	B		Y	R	R	Y	B	R		R	R	R	R	R	A	F	F	F	
14	F	F	A	F	R	R	R	R	R	Y	R	R	R	R	R	64		C	B	R	52	48	38	
15	R	B	B	R	R	A	B	B	B	B	B	B	B	B	B	42		Y	Y	R	R	A	R	
16	R	38	R	B	B	B	B	R	R	B	B	B	B	B	B	60	59	62	61	48	59	38	44	
17	J	R	B	B	B	B	R	J	R	J	R	67	70	R	B	C	B	J	R	72	68	66	56	57
18	42	48	R	U	S	J	R	J	R	J	R	60	61	70	R	R	R	R	J	R	56	63	58	61
19	R	F	F	R	R	R	R		58	68	71	75	71	72	74	R	B	B	J	R	R	R	R	R
20	52	47	50	R	A	R	J	R	J	R	J	60	67	71	78	75	77	78	J	R	R	J	R	R
21	R	F	F	R	F	R	Y	R	B	B	B	66	72	78	79	R	R	R	Y	B	B	R	R	
22	63	66	63	58	S	R	R	R	J	R	R	82	80	80	75	73	63	R	B	Y	R	B	47	A
23	B	R	B	R	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	R	
24	A	B	R	B	R	B	R	B	B	B	B	B	B	B	B	B	B	R	R	B	J	R	B	
25	B	R	R	F	B	B	R	R	B	B	B	B	B	B	B	Y	B	B	R	R	R	R	R	
26	41	46	48	R	B	49	59	68	79	82	82	85	81	83	75	73	R	J	R	R	B	B	61	62
27	54	42	R	B	B	R	B	A	R	Y	R	R	R	R	R	63	69	78	80	61	R	R	R	
28	39	38	40	37	F	F	A	R	R		J	R	36	66	75	78	71	B	B	B	65	61	R	R
29	A	A	R	J	R	R	R	Y	Y	R	R	62	63	66	66	57	66	R	J	R	R	R	R	R
30	31	38	49	46	45	F	A	A	R	R	C	C	C	B	J	R	R	R	B	R	67	68	64	58
31	43	42	36	56	57	F	F	F	R	F	R	J	R	R	R	R	J	R	R	R	59	56	52	59
	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	21	22	14	13	14	16	15	16	13	13	11	12	9	13	16	18	20	17	23	21	27	25	23
MED	43	46	50	49	48	48	59	67	71	75	71	72	74	70	70	72	64	61	59	51	52	51	48	46
U Q	51	50	54	58	60	56	66	72	78	80	74	76	78	80	74	76	73	65	65	59	60	57	56	53
L Q	40	42	42	39	38	38	46	60	66	66	62	63	64	62	66	66	60	58	50	48	50	46	44	38

IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 1999 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	27	34	37	C	34	32	32	36	36	B	B	E	B	G	57	42	31	32	42	66	40	36	41	38	36	41	47		
2	35		37	B	42	34	28	32	31	31	37	G	B	G	35	33	26	53	60	37	26	35	32	39	35				
3	32	31	38	34	38	43	36	39	23	G	B			34	30	31	43	42	43	35	32	30	28	25	26	57	29		
4	33	26	38	41	38	41	38	42	40	B	37	B	B	E	B	B	56	36	B	B	31	33	38	42	43	44			
5	49	32	42	43	38	41	70		25	B	B	B	B	B	B	B	B	B	33	28	27	39	45	35	G				
6	39	58	49	48	42	43		39	30	35	42	39	28	38	B	B	35	33	36	31	28	18	32	44	G				
7	44	39	47	40	34	27	32	32	33	26	31	40	44	44	37	33	31	35	26	30	26	39	36	39	B				
8	B	44	47	45	35	43	40	25	30	C	33	32	27	B	B	B	30	29	27	28	36	42	46						
9	26	37		B	38	27	36	40	38	40	B	B	B	G	B	B	B	B	B	B	B	24	30	31	19				
10	32	37	40		39	32	32	28	28	28	28	26	36	B	B	B	34	34	26	37	40	36	34	31					
11	26	34	36	36	36	35	39	42	36	E	B	C	C	C	C	C	28	33	31	C	B	E	B	29	34	26	30	37	
12	32	38	31	44	41	38	26	31	36	40	27	37	27	43	36	B	G	32	27	28	38	40	30	32					
13	76	32	42		B	38	B	B	32	42	38	33	31	34	25	30	39	36	50	60	32	26	49	G					
14	42	40	44	34	24	30	38	27	27	34	32	36	28	B	B	B	28	26	38	23	30	38	48	40					
15	41		B	B	36	28	40	39	B	B	B	B	B	B	B	B	32	26	32	36	42	40							
16	36	38	38		B	B	B	B	44	39	B	B	B	B	B	B	32	27	B	E	B	E	B	31	30	26	24	21	
17	G	26		B	B	B	B	36	35	33	37	38	E	B	B	C	B	39	40	31	28	B	E	B	24	24	20	20	
18	30	24	30	28	33	32	33	34	33	57	B	B	B	B	B	B	36	44	61	40	54	46	25	43	23	99	B		
19	36	39	37	36	44	42	38	29	31	28	33	46	30	B	B	B	38	33	31	30	26	33	51	18	19				
20	23	27	32	41	43	42	40	31	34	32	31	38	43	36	34	36	33	33	28	36	41	41	53	45					
21	44	40	40	25	26	29	33	32	43	B	B	B	B	B	B	B	B	B	E	B	E	B	34	31	38	28			
22	E	B	23	26	22	28	27	26	26	E	B	B	B	B	B	B	34	35	32	37	40	28	B	25	G	B			
23	B		B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	E	B	B	B	B	B	31	36			
24	36	35		B	33	35	B	B	B	B	B	B	B	B	B	B	32	27	31	B	56	G	B						
25	B	34	26	23		B	B	B	40	44	B	B	33	B	29	B	B	E	B	E	B	B	32	30	26	21	G		
26	34	32	27	B	37	B	33	31	31	28	30	34	28	34	57	34	E	B	B	B	E	B	E	B	29	24	24	20	21
27	20	31		B	B	43	58	32	39	32	34	28	38	36	56	42	37	27	27	36	40	44	42	36	E	B			
28	37	41	32	31	67	30	36	32	28	31	34	B	B	B	B	B	31	29	24	26	38	40	21	38					
29	48	44	39	31	40	34	38	42	44	31	29	27	31	G	G	29	30	28	28	27	32	24	27	20	30				
30	30	43	35	49	31	39	40	36	38	30	32	C	C	B	31	33	31	31	33	30	29	26	23	26	21				
31	21	27	25	25	27	28	44	34	34	34	34	31	34	32	31	32	23	39	32	27	37	22	24	44					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23					
CNT	28	28	25	24	25	24	26	26	27	19	19	18	19	17	18	17	21	24	24	27	29	29	29	28					
MED.	34	35	37	36	36	37		33	34	32	33	33	32	34	32	35	32	32	29	28	32	32	34	36					
U Q	40	40	40	42	42	41	40	39	39	35	37	38	38	37	42	42	38	36	32	32	38	40	44	42					
L Q	28	31	32	31	30	31	33	31	31	28	31	30	28	G	31	33	30	30	27	26	26	24	22	24					

IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 1999 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	10	C	10	10	10	23	12	B	B	57	19	15	16	13	13	21	14	20	10	12	10	10	
2	15	10	10	B	14	12	10	10	11	20	14	16	13	11	13	53	60	12	12	23	11	11	15	12	
3	11	12	10	14	24	21	12	12	14	B	18	19	28	20	20	15	15	16	15	20	14	13	14	11	
4	14	11	16	15	12	16	15	14	15	B	24	B	24	B	56	16	B	B	18	19	11	14	12	10	
5	10	17	14	13	11	13	20		19	B	B	B	B	B	B	B	B	33	14	19	11	15	14		
6	11	13	16	10	11	16	25	18	18	12	15	11	23	23	B	B	24	19	12	10	10	12	21	10	
7	13	15	12	11	20	23	19	14	10	12	12	12	13	16	22	14	17	10	14	16	22	16	20	13	
8	B	13	11	15	10	12	24	11	15	C	12	20	20	B	B	B	14	15	20	16	12	10	11	B	
9	13	9	22	14	20	20	19	21		B	B	B	B	B	B	B	B	B	B	B	18	11	11	13	
10	B	21	20	21	19	16	11	10	12	13	12	16	B	B	B	B	20	19	20	16	15	13	12	10	
11	10	10	11	25	12	14	13	16	36	C	C	C	C	C	C	19	18	24	C	B	29	23	26	16	11
12	16	18	17	16	19	16	15	11	12	11	14	19	19	20	18	B	19	22	16	19	14	10	9	18	
13	B	47	10	17	23				17	20	26	24	B	15	18	11	15	16	15	16	12	10	11	11	
14	10	12	18	13	14	10	14	11	12	20	13	14	22	B	B	B	19	15	12	16	21	11	17	18	
15	12		18	22	20	20		B	B	B	B	B	B	B	B	B	B	18	16	18	14	16	12		
16	24	15	26		B	B	B	B	21	22	B	B	B	B	B	14	18	B	31	30	16	24	16	12	
17	12	17			B	B	B	B	15	16	16	21	38	B	C	B	18	19	21	24	24	20	17	10	
18	10	12	11	11	10	10	12	14	33	57	B	B	B	B	B	30	23	14	19	12	10	11	11	B	
19	23	10	10	11	12	17	15	14	12	12	12	16	15	B	B	38	19	15	17	11	12	15	12	10	
20	10	10	11	19	14	10	11	10	10	9	10	15	16	14	11	13	12	11	12	12	15	14	16	20	
21	14	10	10	11	16	20	18	18	24	B	B	B	B	B	B	B	19	26	24	B	47	34	31	16	17
22	15	23	15	18	18	16	19	24	19	58	B	B	B	B	B	25	23	19	19	24	18	20	19	17	16
23	B	23	22		B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	26	
24	28	30	B	26	23	B	B	B	B	B	B	B	B	B	B	B	B	B	32	21	20	B	28	B	B
25	24	18	16		B	B	B	23	20	B	B	19	B	B	B	B	B	27	32	30	24	18	18	15	
26	11	12	15	B	21	B	20	19	20	18	14	12	22	12	57	24	B	B	B	29	24	24	20	14	
27	10	21		B	B	29	58	23	21	24	23	21	19	36	55	24	32	14	19	15	14	11	E S	12	10
28	10	11	11	10	25	21	12	10	11	15	19	E S	B	B	B	B	B	14	15	19	26	10	12	12	12
29	21	24	10	16	20	9	19	21	15	12	11	14	23	30	22	14	17	14	14	12	12	27	14	11	
30	10	10	10	22	12	18	21	22	14	11	13	C	C	B	B	B	20	20	23	27	20	13	14	11	
31	11	10	10	9	12	11	11	12	11	29	18	23	28	20	20	21	18	17	16	11	16	15	13	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	31	31	31	30	31	31	31	31	31	29	30	29	29	29	31	31	31	30	31	31	31	31	31	31	
MED	13	13	14	16	18	18	19	18	16	20	20	23	23	30	55	38	23	18	19	19	15	14	15	12	
U Q	21	21	26	22	26	23	24	23	22	B	B	B	B	B	B	B	B	33	32	29	22	24	17	17	
L Q	10	10	10	13	12	12	13	12	12	12	13	16	19	18	19	16	17	15	14	15	12	11	12	11	

IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 1999 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	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	208	A	A	C	A	234	236	204	A	204	B	B	B	A	E	A	A	A	E	AE	AE	AE	A	A	
2		A	A	A	B	A	A	200	200	212	Y	A		Y	B	B	220	228	248	248	246	264			
3	E	A	244	228	226				A	214	194	B	220	200	Y	A	A	E	A		E	A	E	A	
4	E	A	A	A	AE	A	A	A	A	B	A	B	Y	B	B	210	210	222	232	240	234	236	244		
5	A	A	A	A	A	A	B	B	Y	B	B	B	B	B	B	224		228	244	246	260	256			
6	284	F	240	232	190	A	A	AE	A	A	198	E	A	A	A	B	B	A	A	228	220	254	250		
7	246	A	A	A	A	AE	A	246	216	218	A	A	A	A	A	216	212	218	234	218	238	244	232		
8	B	A	A	A	A	A	AE	A	238	C	A	A	A	B	B	214	222	A	242	A	A	A	B		
9	AE	A	B	AE	A	A	A	A	200	B	B	B	B	B	B	B	B	B	Q	A	238	238	230	264	
10	A	A	B	A	B	A	A	250	206	200	200	A	A	B	B	206	204	220	264	212	256	280			
11	E	A	Q	A	A	A	AE	B	C	C	C	C	A	A	224	190	C	B	E	A	E	B	A		
12	A	A	A	A	A	AE	A	260	212	202	202	212	212	202	A	A	B	A	E	A	A	A			
13	A	B	E	A	A	B	A	B	A	A	Y	B	224	216	216	A	AE	AE	A	A	Q	Q	220	212	230
14	220	A	A	230	206	210	284	204	186	A	238	220	A	A	B	B	210		250	252	248	A	A		
15	206	B	B	A	A	A	A	B	B	B	B	B	B	B	B	BE	A	B	248	224	258	236	222		
16	A	A	A	B	B	B	B	A	A	B	B	B	B	B	B	198	A	B	B	220	232	232	250	266	
17	E	AE	A	B	B	B	B	A	214	214	AE	B	B	C	B	A	220	220	222	252	232	238	262		
18	270	214	294	264	264	238	222	214	236	E	B	B	B	B	B	B	258	210	276	258	A	B			
19	A	A	F	A	A	A	A	188	218	234	210	A	A	A	B	230	214	216	216	210	258	284	246	246	
20	E	A	A	A	A	222	222	214	222	A	A	A	A	A	A	210	220	216	222	250	A	E	A	A	
21	286	288	E	A	E	A	A	254	268	268	A	B	B	A	A	Y	A	B	BE	BE	258	262	248	276	
22	252	264	A	A	AE	A	242	216	226	B	B	B	A	A	Y	214	214	B	Y	A	BE	A	256		
23	B	A	B	A	B	B	B	B	B	B	B	B	B	B	B	236	B	B	B	B	B	B	A		
24	A	B	A	B	A	B	B	B	B	B	B	B	B	B	B	228	252	A	B	228	B	B			
25	B	A	Q	B	B	B	A	A	B	B	A	B	Y	B	B	224	232	246	236	258	264	278			
26	E	AE	A	B	A	B	Y	234	Y	196	208	224	210	B	Y	B	B	220	200	244	244	238			
27	274	A	B	B	A	BE	B	246	A	A	Y	E	B	A	B	Y	230	248	E	A	A	A	232	222	222
28	E	A	A	A	A	248	212	218	214	214	B	B	B	B	B	B	212	214	232	236	266	232	250	230	
29	A	A	A	A	A	A	A	212	216	208	216	200	B	224	218	214	214	232	254	208	240	240	282		
30	266	260	A	A	192	AEE	A	306	232	206	C	C	B	212	212	218	B	E	AE	A	Q	E	B		
31	272	248	248	288	274	262	A	234	214	A	Y	Y	204	A	204	204	218	222	230	230	234	234	234	234	
	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	10	10	8	8	6	13	13	17	10	9	8	4	7	5	9	13	20	22	23	22	26	23	20	
MED	U	255	258	249	258	239	237	223	216	210	214	208	211	201	204	220	216	212	218	226	231	238	240	242	244
U	Q	E	A	Q	E	A	E	E	E	Y	Y	Y	204	204	204	218	222	230	230	234	E	E	E	E	
L	Q	244	248	240	231	220	210	218	212	205	202	199	210	200	194	214	211	208	214	222	220	234	234	236	233

IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 1999 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	X 61	66	64	64	68	69	80	87	92	90	86	84	81	74	73	73	70	65	66	62	60	58	58	58		
2	X 58	56	54	59	68	70	79	92	97	88	87	86	84	72	72	68	67	67	65	62	A		56	57		
3	X 57	54	93	49	60	79	80	80	80	82	80	84	81	72	72	71	67	71	70	64	58	39	44	0		
4	O X 43	44	A	R	R	C	A	O	X 47	46	66	65	68	62	68	63	64	60	54	53	R	A	A	A		
5	O X 41	RO	XO	X	A	R	R	X 54	63	62	66	60	R	R	X	X	R	C	X	R	A	A	A	A		
6	A	R	A	O	XO	X	X 40	42	45	49	53	A	B	C	C	B	B	B	XO	X	B	RO	XO	XO	X	
7	O X 50	X 47	X 40	BO	X 40	R	B	R	A	B	B	R	C	C	C	C	C	BO	X	R	XO	X	A			
8	B	A	A	A	R	R	R	R	RO	X	R	R	R	B	CO	XO	X	X	XO	X	X	50	35	42		
9	C 34	C	C	C	C	C	C	C	X 67	73	69	73	68	75	78	74	63	64	63	58	53	50	36	X	XO	X
10	A A	A	A	O	X 45	RO	X 44	B	A	O	X 67	X 67	BO	XO	XO	XO	XO	RO	X	XO	X	XO	X	X	X	
11	A	A	O	X 47	51	B	RO	XO	X	R	B	B	B	B	B	B	B	B	B	C	C	C	C	C		
12	C	C	C	C	C	C	C	C	C	B	B	B	B	B	B	B	B	BO	XO	X	X	A	O	X		
13	A	B	B	B	A	A	X 54	61	R	R	X 66	B	B	B	B	B	BO	X	X	X	X	X	X			
14	A	A	X 48	X 57	X 60	68	71	78	X C	C	C	X 82	80	81	92	88	75	60	52	48	RO	X	A	A		
15	A 59	45	44	48	63	X XO	X R	R	R	R	B	B	BO	XO	X	RO	X	XO	X	X	X	X	X	X		
16	X 43	44	53	49	48	RO	X 70	X 78	86	91	86	87	84	88	83	80	76	72	70	70	64	63	66	56	X	
17	X 51	56	57	60	69	70	69	R	X 67	X 70	B	BO	XO	X	B	X	X	X	B	XO	XO	XO	XO	X		
18	A	X 33	44	51	49	57	R	B	R	R	B	Y	Y	B	B	RO	XO	X	X	A	A		39			
19	A	A	B	B	B	B	R	BO	X 49	B	B	B	B	B	B	BO	X	X	R	R	A	O	X			
20	X 42	A	A	A	X 45	X 51	X 59	X 64	X 67	X 73	R	R	RO	X	R	X 67	66	66	62	66	66	62	58	51	X	
21	R 42	X 58	57	56	68	66	70	87	89	87	X 84	88	84	88	R	R	X 74	69	68	63	60	59	51	46	X	
22	X 44	38	39	63	R	R	X 70	86	95	98	92	92	87	87	83	80	79	73	73	68	64	66	53	60	X	
23	A 57	C	C	C	C	C	C	RO	XO	X	X 62	62	70	72	78	74	76	73	69	58	50	34	34	37	X	
24	39	39	60	40	59	59	X 80	X 86	X 84	R	BO	X	X 98	86	B	B	X	X 68	60	R	A	A	O	X		
25	A 48	A	41	42	44	69	X 61	B	Y	X 68	X 67	68	68	69	72	70	64	62	34	42	44	38				
26	33	35	32	36	54	52	64	64	70	86	83	84	91	92	92	86	82	74	71	68	70	62	56	48	53	X
27	52	47	48	62	57	59	B	BO	X 86	78	87	R	96	92	99	83	72	76	81	73	65	54	40			
28	A 44	A	47	56	60	64	68	72	79	83	84	91	92	92	86	82	78	77	63	51	43	82		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	21	18	17	15	14	15	16	14	17	13	14	17	15	18	18	21	24	26	21	20	21	20		
MED	X 44	47	48	50	56	59	68	68	79	78	82	84	82	81	78	74	74	67	66	61	58	52	44	43	X	
U Q	X 52	56	56	59	60	69	70	80	86	89	86	86	84	90	83	82	76	72	69	65	62	58	54	50	X	
L Q	41	39	44	45	46	51	64	54	67	67	64	68	70	69	72	68	68	62	60	57	52	44	40	38	X	

IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 1999 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	V 5 1	F 5 7	F 5 5	S 5 8	F 5 8	6 3	7 4	8 1	8 6	8 4	8 0	7 8	J 7 5	R 6 8	R 6 7	R 6 7	R 6 4	5 9	6 0	5 6	5 4	5 2	5 2	5 2					
2	F 5 2	J 5 0	R 4 0	F 5 3	F 5 7	5 9	7 3	8 6	9 1	8 2	8 1	8 0	7 8	R 6 6	R 6 6	R 6 2	R 6 0	6 1	5 9	5 6	A 5 0	4 7	F 5 0	4 7					
3	U 5 1	R 4 4	R 5 5	R 4 3	R 5 4	7 0	6 9	6 9	7 4	7 6	7 4	7 8	7 5	6 6	6 6	6 5	6 1	6 5	6 2	5 8	5 2	2 8	3 8	F U R					
4	R 3 7	F 1 8	A R	R C	R A	R 4 1	R 4 0	R 4 1	R 4 0	R 6 0	R 5 9	R 6 2	R 5 6	R 6 2	R 5 7	R 5 8	R 5 4	R 4 8	R 4 7	R R	R A	A A	A A						
5	R 3 5	R 3 8	R 4 0	R 4 8	R 5 7	R 5 6	R 6 0	R 5 4	R 5 9	R 5 9	R 4 8	R 4 8	R R	R A	A A	A A	R												
6	A 3 3	R 3 3	F 3 6	A 3 9	C 4 3	C 4 7	A 4 7	A B	C C	B B	B B	B B	B B	B B	B B	B B	B B	B B	B B	R 5 4	R 6 3	R 4 4	R 3 8	R 4 1					
7	R 4 4	R 4 1	R 3 4	B 3 4	R R	R B	R A	B B	B R	C C	C C	C C	C C	C C	C C	C C	R 4 4	R 2 9	R 3 6	R R	A A	R R	A A						
8	B B	A A	A A	R R	R R	R R	R R	R R	R 5 0	R R	R R	R R	R B	R C	R R	R J	R J	R J	R 5 2	R 4 9	R 4 4	R 2 9	R 2 5						
9	F 2 4	C C	6 1	6 7	6 3	R 6 7	R 6 2	R 6 9	R 7 2	R 6 8	R 5 7	R 5 8	R 5 7	R 5 2	R 4 7	R 4 4	R 3 0	R R J R											
10	A A	A A	R R	R R	R B	A A	R 6 1	R 6 1	R B	R R	R R	R R	R R	R R	R R	R R	R R	R R	R 6 0	R 5 3	R 5 1	R 4 9	R 3 8	R 2 5	R 4 2				
11	A 4 1	A 4 0	R F	B B	R R	R R	R 4 2	R 4 0	R B	B B	B B	B B	B B	B B	B B	B B	B B	B B	B B	C C	C C	C C	C C	C C					
12	C C	R R	B B	B B	B B	B B	B B	B B	B B	B B	B B	B B	R 4 0	R 3 8	R 3 8	A A	R A	R A											
13	A A	B B	A B	B B	A A	A A	5 5	R R	R R	R 6 0	R B	B B	B B	B B	B B	B B	B B	B B	R 5 8	R 5 1	R 5 1	R 4 7	R 3 3	R 2 6	F F				
14	A 3 8	A 5 1	F 5 4	J R	R A	R F	F 5 8	F 6 4	7 2	C C	C C	J 7 6	R 7 4	R 7 5	R 8 6	R 8 2	R 6 9	R 5 4	R 4 6	R R	R R	R 4 2	R R	A A	A A				
15	A 3 8	F 3 0	F 3 1	R 4 2	R 5 6	R R	R R	R R	R B	B B	B B	R B	R B	R R	R 4 6	R 4 6	R 6 2	R 5 4	R 5 3	R 5 4	R 3 7	R 2 6	R 3 9	F F					
16	F 3 5	3 8	F 4 3	4 3	4 2	R R	R 6 4	R 7 2	R 7 8	J 8 5	8 0	8 1	7 8	8 2	7 7	7 4	7 0	6 6	6 4	6 4	5 8	5 7	5 5	5 0	R Z				
17	4 5	5 0	5 1	5 4	6 3	6 4	6 0	F R	R R	6 1	6 4	B B	R 6 4	W 9 6	B 1 0 3	R 6 8	R 4 9	R 5 8	R 4 8	R 4 4	R 3 3	R R	R R	R R	F A A				
18	A 2 7	F 3 3	F 4 2	R 4 3	R 5 1	R R	R B	R R	R B	B Y	Y Y	B B	R B	R B	R R	R R	R 3 6	R 2 8	R 3 3	R R	R A	R A	R A	3 0					
19	A A	A 3 0	F B	B B	B B	B B	R R	R B	R B	B 4 3	B B	B B	B B	B B	B B	B B	R B	R J	R R	R 4 5	R 5 2	R R	R A	3 6					
20	A 3 6	A A	A A	J R	R 3 9	R 4 5	R 5 3	R 5 8	R 6 1	R 6 7	R R	R R	R R	R R	R R	R R	R 6 1	R 6 0	R 6 0	R 5 6	R 6 0	R 5 6	R 5 2	R 4 5					
21	R 3 6	F 4 4	F 4 6	Z 5 0	J 6 2	R 6 0	R 6 4	R 8 1	R 8 3	R 8 1	R 7 8	R 7 8	R 8 2	R R	R R	R R	R 6 8	R 6 3	R 6 2	R 5 7	R 5 4	R 5 3	R 4 6	R 3 2					
22	3 8	3 2	3 3	5 7	R 6 4	R 8 0	R 8 8	R 9 2	R 8 1	R 8 1	R 7 7	R 7 4	R 7 3	R 6 7	R 6 7	R 6 2	R 5 8	R 5 6	R 5 6	R 4 0	R F	R F	R A	R A					
23	A 3 4	F C	C C	C C	C C	C C	C C	C C	R R	R R	R 5 6	R 5 6	R 6 4	R 6 6	R 7 2	R 6 8	R 7 0	R 6 7	R 6 3	R 5 2	R 4 0	R 2 5	R 2 7						
24	F 2 9	F 3 0	A 3 4	F 4 8	R 5 3	R B	B 7 4	R 8 0	R 7 8	R R	R 9 2	R 8 0	R 9 2	R B	R B	R B	R B	R B	R B	R 6 2	R 5 4	R R	R A	A A	R R	3 6			
25	A A	A 2 9	R 3 4	F 3 4	R 3 4	R 6 3	R B	R B	Y Y	J R	R J	R R	R R	R R	R R	R R	R 5 5	R 6 2	R 6 1	R 6 2	R 6 3	R 6 4	R 5 8	R 5 6	R 2 8	R 3 4	R 2 8		
26	F 2 4	F 2 5	F 2 4	F 2 4	F 3 3	F 4 3	F 5 8	F 6 4	R 8 0	R B	B B	R B	R 8 0	R 7 9	R 7 7	R 7 6	R 6 8	R 6 5	R 6 2	R 6 4	R 5 6	R 5 0	R 4 2	R 4 1	F F				
27	F 4 0	F 3 5	F 3 8	F 5 0	F 4 8	F 4 9	B 8 0	R 7 2	R 8 1	R B	B J	F 9 0	F 7 8	F 9 0	F 7 2	F 6 6	F 7 0	F 7 5	F 6 1	F 5 9	F 4 8	F F	F F	F F					
28	A A	A 3 0	F 3 0	F F	F U	S	5 8	6 2	6 6	7 3	7 7	7 8	8 5	8 6	8 6	8 0	7 6	7 2	7 1	5 7	4 5	3 2	A A	F F	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	18	18	16	14	14	15	16	14	17	13	14	17	15	18	18	21	24	26	21	20	20	18					
MED	3 8	3 6	3 8	4 2	4 6	5 2	6 0	6 2	7 3	7 2	7 6	7 8	7 6	7 5	7 2	6 8	6 8	6 1	6 0	5 5	5 2	4 6	3 8	3 6					
U Q	4 5	4 4	4 3	5 1	5 4	6 2	6 4	7 2	8 0	8 3	8 0	8 0	7 8	8 4	7 7	7 6	7 0	6 6	6 3	5 9	5 6	5 2	4 6	4 1					
L Q	3 5	3 0	3 3	3 4	3 8	4 3	5 8	4 8	6 1	6 1	5 8	6 2	6 4	6 3	6 6	6 2	6 2	5 6	5 4	5 1	4 6	3 8	3 1	3 0					

IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 1999 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	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	34	27	25	24	26	E 29	B 31	42	32	39	40	41	30	40	62	76	69	36	33	25	20	68	22																					
2	26	25	22	17	24	34	32	26	26	32	36	43	49	67	50	68	77	53	52	46	43	64	37	35																					
3	36	31	39	41	40	36	30	31	30	36	47	37	37	66	67	46	32	25	30	30	28	31	42	G																					
4	43	44	62	44	37		54	40	44	38	30	38	43	45	74	64	43	40	30	34		40	56	56																					
5	43	36	40	44	70	44	39	32	25	32	33	32	34	34	38	36	29	27		32	38	43	42	40																					
6	39	40	32	35	32	35	32	24	58	B C	C C	B B	B B	B B	B B		25	24		40	42	43	47																						
7	54	48	36		28	43		43	62		28		C C C C	C C C C	C C C C	B B		30	20	21	39	33																							
8		104	114	58	44	33	41	36	41	39	35	26	34	34		B C G G	G G G G	28	32	19	18	17	30																						
9	28									30	27	34	36	37	49	35	40	35	23	26	28	19		37																					
10	35	48	48	34	33	42		41	47	42			B 55	B 56	35	38	29	31	28	35	25	24	31	27	50																				
11	46	42	36	47			K 32	35	39	42		B B B B	B B B B	B B B B	B B B B	B B B B	B B B B	B B B B	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	C C	C C	C C	C C	C C	C C	C C	C C																							
13	35		B G	B B				G 39	35	34	36	40	32	B B B B B B	B B B B B B	B B B B B B	B B B B B B	B B B B B B	24	23	20	20	23	18																					
14	36	38	30	33	35	36	26	27	24				G C C	B B B B	B B B B	B B B B	B B B B	B B B B	30	36	28	36	28	31	33	37	36	38	42	44															
15	44	58	46	56	66	24	44	42	39	39			B B B B B B	B B B B B B	B B B B B B	B B B B B B	B B B B B B	28	33	24	28	26	28	34	26	34	29																		
16	35	36	41	40	49	40	42	36	34	35	32	39	36	36	30	32	32	30							G																				
17	E 15	20	14	14	14	18	21	44	37	36			E B B B B B	E B B B B B	E B B B B B	E B B B B B	E B B B B B	36	32	26	26	31		32	26	22	28	31																	
18	31	35	23	19	32	26	35		B 41	38	B B			B B B B B B	B B B B B B	B B B B B B	B B B B B B	B B B B B B	27	26		28	32	29	26	27	91	37	41																
19	34	38	36							26	29														34	34	19	38	47	40															
20	38	35	93	38	30	24	22	24	27	26	32	36	37	37	34	33	29	25	24	21	19	18	16	36																					
21	35	41	35	33	29	22	22	22	24	27	27	40	36	35	38	43	32	28	29	22	22				G																				
22	32	34	38	49	46	31	22	25	24	29	18	35	28	50	44	36	28	32	37	23	36	27	11	36																					
23	41	39												G C C C C C	E B B B B B	E B B B B B	E B B B B B	E B B B B B	38	36	28	33	34	33	32	28	26	25	20	28	16	15	24												
24	38	35	34	30	24	29			B 28	38	38	32			G B B B B B	G B B B B B	G B B B B B	G B B B B B	G B B B B B	42	27		26	33	40	47	42	42																	
25	43	37	36	30	41	34	32								G B B B B B	G B B B B B	G B B B B B	G B B B B B	G B B B B B	32	27	22	27	31	37	31	43	44	25	26	18	26	32	41											
26	34	31	35	31	44	18	20								G 30	E B B B B B	E B B B B B	E B B B B B	E B B B B B	40	31	28	33	30	24	21	16	17	37	31															
27	30	29	27	28	30	25			B 29		33					G B B B B B	G B B B B B	G B B B B B	G B B B B B	G B B B B B	28	28	31	26	26	31	26	22	34	30	32														
28	40	46	32	27	16	18	19	22	24						G S																														
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	25	22	22	23	20	20	24	20	18	18	18	21	19	19	21	22	24	26	27	27	27	27																					
MED	36	37	36	34	32	32	32	32	32	33	32	35	35	36	37	33	29	30	26	30	27	27	37	36																					
U Q	41	43	40	44	44	36	37	40	42	38	36	40	37	39	44	36	42	32	32	33	33	26	24	25	26	19	19	19	19	23	31	31	42	42	42	42									
L Q	32	34	28	28	28	24	22									G 30	30	29	32	30	33	30	31	28	26	24	25	19	19	19	19	23	31	31	42	42	42	42							

IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 1999 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	11	14	10	14	20	29	31	14	16	15	16	19	16	16	14	15	15	10	14	12	12	10	10		
2	10	10	10	11	12	10	12	12	10	14	12	13	11	11	12	10	10	12	11	10	10	10	11	10		
3	8	11	10	13	10	10	10	10	12		12	10	12	24	17	12	12	11	10	12	10	12	12	12		
4	12	10	16	12	14		17	10	12	10	15	12	10	11	15	9	9	10	12	13	19	12	10	11		
5	10	18	14	12	14	15	22	13	12	12	10	14	14	14	12	13	14	18		11	10	14	11	16		
6	13	11	9	20	14	12	12	12		B	C	C	B	B	B	B		10	12		14	12	11	10		
7	14	13	15		16	30		18	18		B	B		C	C	C	C	C	B		15	20	12	10	14	
8		25	32	20	22	25	22	20	25	16	15	20	18	16		B	C		22	18	18	18	14	12	9	
9	11		C	C	C	C	C	C	C		14	22	24	20	31	21	19	18	10	15	14	12	14	11	10	
10	10	21	24	19	24	16		15	12	19		56	56	29	20	21	23	16	15	16	13	12	9	14		
11	14	11	16	10		24	13	12	17		B	B	B	B	B	B	B	B	B	C	C	C	C			
12	C	C	C	C	C	C	C	C	C	B	B	B	B	B	B	B	B	B	B	18	16	13	31	15	12	
13	B	20	26		B	B	26	22	15	23	20	12		B	B	B	B	B	B	20	15	10	10	10	9	
14	20	11	11	13	14	18	14	12	12		C	C	16	20	24	16	10	17	27	14	12	10	9	11		
15	14	10	10	E	S	16	14	14	29	25	20	20		B	B	B	16	34	24	16	16	18	17	10	11	10
16	10	11	12	12	15	22	22	18	12	15	16	17	21	16	19	21	16	22	18	19	17	17	12	12		
17	14	10	10	10	11	11	16	14	15	36		B	B	36	32	24	16	20		18	16	16	16	14		
18	16	15	12	12	13	20	14		30	22	B	B	21	19	B	B	18	17	18	10	14	15	20	11		
19	21	11	12		B	B	B	B	B	12	12		B	B	B	B	B	B	14	22	10	10	12	12		
20	12	9	23	19	21	11	9	11	10	10	13	19	18	18	18	19	17	17	14	11	11	18	10	9		
21	18	14	12	10	10	11	11	10	13	19	16	18	22	33	24	23	22	18	14	14	14	14	14	10		
22	10	11	10	11	14	20	12	16	12	17	11	22	20	22	16	16	16	14	10	12	11	11	11	12		
23	10	10		C	C	C	C	C	C	C	19	22	18	33	22	30	32	18	13	16	16	14	16	10		
24	13	12	10	11	11	11		B	B	15	16	19	26	27	13			24	13	14	11	10	10			
25	13	13	11	9	13	18	18		B	21	13	14	11	24	17	15	20	21	14	13	11	11	10			
26	10	9	10	10	10	11	11	14	30		B	B	57	30	24	13	14	14	14	12	12	11	11	12		
27	12	12	13	13	13	12		B	B	29	15	33	B	B	20	20	20	19	26	31	18	12	11	12	11	
28	12	14	12	13	16	12	13	10	13	13	13	10	E	S	E	S	E	S	E	SE	E	SE	S			
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	27	26	25	25	25	24	25	25	25	27	26	26	27	27	27	26	27	27	27	28	27	27	27	27		
MED	12	11	12	12	14	16	17	15	13	19	16	22	21	24	20	20	18	17	15	14	13	12	11	11		
U Q	14	14	16	19	18	21	29	28	22	B	B	B	33	B	B	B	24	22	20	18	14	15	12	12		
L Q	10	10	10	10	12	11	12	12	12	15	13	16	16	16	16	15	14	13	13	12	11	11	10			

IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 1999 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	Q 2 4 6	2 4 8	2 4 8	2 7 0	2 5 8	2 4 4	2 2 4	2 4 0	E 2 5 4	E 2 2 8	A 2 2 8	A A	Y 2 3 0	E A	A A	2 1 2	2 2 2	2 2 2	2 2 8	2 2 4	2 4 2	2 2 8			
2	2 3 4	2 4 4	2 8 4	2 7 6	2 6 2	2 4 4	1 9 2	1 8 4	2 1 0	2 0 0	2 1 0	1 9 8	A 2 1 4	A A	A E	A E	A 2 5 2	2 5 0	2 3 6	A	2 2 6	2 3 2			
3	2 3 4	2 6 8	2 4 0		1 8 8	2 4 8	2 2 6	2 3 4	2 1 2		2 1 4	2 0 2	A A	2 0 6	2 1 8	2 1 6	2 1 6	2 3 0	2 3 0	2 2 8	Q A	A	A		
4	2 3 6	2 4 4		2 3 0		A C	A		A 1 9 2		2 1 4	2 3 8	2 1 6	A 2 0 8	A A	A A	2 2 6	2 0 4	2 2 8	2 4 8	A	A	A		
5	2 1 8		A A	A	A	A	A		2 5 0	2 0 8	1 8 2	1 7 0	2 0 4	2 0 8	2 1 0	2 2 4	2 2 2	2 1 2	2 3 0	A A	A	A			
6	2 2 4	2 2 4	2 2 4		A 2 2 0	A 2 4 0		A	A B	C C	B B	B B	B B	B B	B B	B B	2 2 2	1 8 8	B A	E A	2 2 4	2 3 8	2 1 6		
7	2 2 8	2 0 8		A B	A A	B A	A	A	B B	B E A 2 2 8	C C	C C	C C	C C	C C	C C	B E A E B 2 4 4	1 7 2	2 0 6	2 1 8	A				
8	B C	A C	A C	A A	A A	A A	A A	A A	2 2 6	2 1 0	2 1 0	1 9 8	B C	2 2 8	2 2 0	2 2 4	2 4 8	2 3 0	2 3 8	2 6 4	2 6 4				
9	2 5 8	C A	C A	C A	C A	C A	C A	C A	C 1 9 6	1 9 0	2 1 6	Y 2 1 8	A E A 2 1 2	2 0 0	2 0 8	2 0 0	2 1 0	2 2 4	2 2 4	2 4 4	A				
10	A 1 1	A A	A A	A A	A A	A A	A A	A A	A A	A B	A A	A A	2 2 8	2 0 8	2 0 6	1 9 2	2 1 6	2 2 2	2 3 4	2 3 4	A A	E A 2 2 2			
11	A C	A C	A C	Q 2 5 4	B C	A C	A C	A C	A B	B B	B B	B B	B B	B B	B B	B B	B B	B B	C C	C C	C C				
12	C 1 2	C B	C C	C C	C C	C C	C C	C C	C B	B B	B B	B B	B B	B B	B B	B B	B B	E A 2 4 8	2 6 0	A A	2 2 6				
13	A 1 3	B A	A B	B A	A A	A A	A A	A A	2 2 0	B B	B B	B B	B B	B B	B B	B B	B B	2 1 8	2 3 2	2 4 0	2 4 2	2 9 4	2 6 4		
14	A 1 4	A 2 3 4	A 2 2 6	A 2 3 8	2 3 8	2 2 8	2 1 2		C C	C A	A Y		2 2 4	2 2 6	2 3 6	A A	A A	A A	2 3 4	A A					
15	F 1 5	A 2 2 8	A E A 2 4 8	A E A 2 8 0	A A	A A	A A	A A	B B	B B	B B	B A	2 2 8	2 2 0	2 3 0	2 1 2	2 3 8	2 4 4	2 4 2	2 0 6	A A				
16	A 1 6	A 2 2 0	A 2 2 6	A 2 2 0	A A	A A	A A	A A	2 2 0	2 3 6	2 0 8	2 1 8	2 0 8	2 0 2	2 0 6	2 1 0	2 2 8	2 1 0	2 2 2	2 3 6	2 4 0	2 5 4	2 6 8		
17	E 1 7	A 2 5 2	2 7 4	2 8 4	3 1 0	3 1 2	2 7 4	2 7 0	A A	2 7 2	2 5 2		B B	B B	B B	B B	2 3 4	2 2 0	2 3 2	2 3 8	A B 2 6 6	2 0 8	2 7 2	2 6 2	2 5 2
18	A 1 8	A 2 7 2	A A	A A	A A	A A	A A	A A	B B	A A	B B	Y Y	B B	B B	B A	A A	2 6 0	2 6 6	A A	2 1 8	A A				
19	A 1 9	A 1 9 0	B B	B B	B B	B B	A B	B B	2 0 0	B B	B B	B B	B B	B B	B B	B B	B B	B E A 2 9 2	2 8 2	A A	A A	2 3 0			
20	A 2 0	A 2 3 8	A A	A A	A A	A A	A A	A A	2 9 0	2 1 8	2 2 2	2 1 6	2 1 4	2 1 2	A 2 0 0	1 9 4	1 8 6	2 0 6	2 1 4	2 1 8	2 0 4	2 2 0	2 2 8	2 3 6	
21	A 2 1	A 2 3 6	2 2 2	2 2 4	2 2 4	2 5 2	2 4 4	2 1 4	2 1 4	2 0 6	2 0 6	2 0 6	A 2 5 8	A E A 2 5 8	2 1 2	2 5 2	2 4 0	2 3 4	2 4 2	2 4 4	2 2 8	2 3 8	3 2 2		
22	A 2 2	2 1 8	2 1 8	2 1 8	A A	A E A 2 7 8	A E A 2 3 6	2 2 0	2 0 6	2 1 6	2 3 6	2 1 6	A 2 5 8	2 0 2	2 0 6	1 9 8	1 9 4	2 4 6	2 2 6	2 2 6	2 1 8	A			
23	A 2 3	A 2 0 8	A A	C C	C C	C C	C C	C A	A A	2 2 8	2 2 0	2 3 0	2 3 0	2 3 0	2 2 0	2 3 2	2 2 8	2 4 2	2 4 0	E A 2 7 0	B B	E A			
24	A 2 4	E A 2 9 8	A A	A A	A A	A B	B B	A B	2 1 8	2 4 6	2 2 6	A A	B A	2 0 0	B B	B B	E A 2 4 2	2 3 8	A A	A A	A A				
25	A 2 5	2 3 6	2 3 2	2 3 2	F A	A A	B B	A A		2 1 6	2 0 8	2 0 0	2 2 0	2 1 0	2 1 8	2 6 6	E A 2 2 4	2 5 0	2 3 2	2 7 4	2 3 4	2 5 6			
26	A 2 6	A A	A A	2 2 0	2 1 2	2 1 8	2 1 4	2 1 6	2 3 0	B B	B B	B B	A E A 1 9 0	2 2 4	2 2 4	2 0 4	2 3 0	2 2 6	2 1 6	2 2 0	2 3 6	2 3 6			
27	Q 2 7	Q 2 3 6	Q 2 6 6	Q 2 8 2	Q 2 9 2	Q 2 8 0	A B	B E B	E B	B B	E B	B B	2 1 4	2 2 4	2 2 6	2 1 4	2 1 8	2 4 6	2 3 4	2 1 8	Q Q Q	Q Q F			
28	A 2 8	A 2 0 4	A A	S	E A	2 8 2	2 5 2	2 1 4	2 2 2	2 1 6	2 1 2	2 1 0	2 1 0	2 1 0	2 1 0	2 1 8	2 1 0	2 1 6	2 1 4	2 5 0	2 5 4	F 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	11	10	11	9	10	13	14	14	18	12	8	13	14	16	17	18	23	24	20	18	16	14	
MED	2 3 4	2 4 0	2 3 4	2 4 2	2 4 8	2 4 6	2 3 5	2 2 4	2 1 8	2 1 4	2 1 4	2 1 0	2 1 0	2 1 2	2 1 0	2 1 9	2 1 9	2 1 6	2 2 3	2 3 4	2 3 1	2 2 8	2 3 6	2 3 6	
U Q	2 3 8	2 6 8	2 6 6	2 7 6	2 6 2	2 8 0	2 7 0	2 4 0	2 3 0	2 2 8	2 2 6	2 1 6	2 1 8	2 2 4	2 2 8	2 2 5	2 2 9	2 2 2	2 4 2	2 4 7	2 4 1	2 4 0	2 4 9	2 6 4	
L Q	2 2 4	2 1 8	2 2 4	2 2 0	2 2 4	2 3 2	2 2 4	2 1 5	2 1 2	2 0 2	2 1 0	2 0 7	2 0 2	2 0 7	2 0 8	2 0 8	2 1 2	2 1 6	2 2 9	2 2 2	2 2 4	2 3 0	2 2 8		

IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 1999 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	68	75	41	35	61	B	A	X	B	B	B	R	R	X	X	X	X	X	X	B	A	A	A	
2						B	B	R	B	R	X	R	B	B	BO	XO	X	X	X	X	A	A	A	
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								
11	R	38	A0	X	0	X	B	B	X	BO	X	XO	XO	XO	X	X	BO	X	X	A	0	X	A	
12																								
13	A	43	40	42	48	56	58	67	70	74	80	108	110	106	94	78	70	54	44	36				
14	A	48	46	48	48	50	64	69	80	87	81	80	78	80	82	92	87	69	55	43	30			
15	52	46	45	A	A	B	B	BO	X	X	XO	XO	XO	X	RO	X	X	X	X	A	0	40	58	
16	60																							
17	A0	X0	X0	X0	X0	X	X	X	X0	X	X0	X0	X0	X	X	X	X	X	X	X	X	X	X	
18	36	36	32	36	46	56	56	68	79	81	90	89	89	88	88	82	81	74	65	58	49	44	44	
19	X	X																						
20	46	45	40	38	40	39	46	49	65	76	84	86	90	94	91	81	73	65	57	46	29	31		
21																								
22	36	35	31	48	54	55	59	72	90	108	106	94	106	113	94	99	80	65	53	41	44			
23	48	39	38	36	31	34	42	52	61	66	73	85	94	91	102	92	103	87	76	75	66	60	48	50
24																								
25	49	41	32	40	37	33	36	49	65	73	78	88	94	97	103	101	104	102	88	78	65	64	47	41
26	A	A0	X	A	A	B	A	R	X	BO	X	X	X	X	X	X	X	X	X	X	X	X	X	
27	0	X	A	A	RO	X	BO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
28	34	37	43	46	50	52	44	46	60	71	84	98	102	108	106	114	97	90	80	70	54	94		
29	49	47	40	39	42	49	55	56	75	92	99	113	112	111	110	109	108	107	106	105	104	103	102	101
30	26	25	97																					
31	0	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	13	16	16	16	18	17	14	16	16	19	13	14	18	16	16	21	22	20	25	25	20	17	18	14
MED.	46	38	40	42	42	46	48	50	63	69	76	84	88	90	93	90	90	81	72	65	54	46	40	42
U Q	50	45	46	48	50	49	56	57	68	73	83	90	94	102	104	103	100	91	79	70	60	55	44	48
L Q	34	34	36	36	38	38	42	48	60	60	73	78	80	79	86	72	77	72	57	48	49	41	35	32

IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 1999 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 33	F 56	R 35	F 25	F 29	B 32	A		B	B	B	R	R	RJ	R	J	R	R	B	A	A	A	A		
2	A	A	A	B	B	R	B	R		34	R	B	B	B	R	RJ	RJ	R			A	A	A		
3	A	A	A	B	R	A	R	R	A	R	B	B	R	B	R	RJ	RJ	R	R	A	F	A			
4	A	A	A	F	A	R	A	R	B	B	B	B	B	B	R	R	R	Y		A	A	A	A		
5	A	B	A	B	B	B	A	R	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	B	B	B	B	B	B	B	B	B	B	B	B		
7	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C		B	A	A	F		
8	A	A	B	B	B	B	B	B	B	B	Y	B	B	R	Y	R	B	B	R	R	A	A	Y		
9	A	B	Y	A		A	B	B	B	B	B	B	B	B	B	B	B	B	R	40	42	A	A	Y	
10	A	A	A	A	A	B	B	B	R	B	B	B	B	B	B	U	R	B	B	R	46	47	38	35	34
11	R 29	F 39	A 20	R 15		R	B	B		44	B	RJ	R	R	R	R	R	R		A	F	R	A		
12	A	A	F	F	F	R	J	R			RJ	R	B	J	R	J	R	J	R	F	F	F	A		
13	A	F 31	R 40	A	F 40	R	J	R		61	64	68	74	72	74	76	86	81	B	R	F		F	A	
14	F 46	R 40	F 35	A	A	B	B	B		63	74	81	75	74	72	74	83	83	R	U	S	F	A	F	
15	R 32	A	A	A	F	A	B	B		B	B	B	B	B	B	B	B	R	R	R	R	F	F		
16	A	R	R	F	F	J	R		62	73	75	84	83	83	82	82	82	76	75	68	59	48	43	38	38
17	40	39		F	F	25	23	36	43	59	70	78	80	84	U	R	B	J	R	R	F	F	F	F	
18	F 26	F 24	R 26	R 29	R 35	47	28	66	66	75	B	B	R	R	R	83	102	98	RJ	R	F	F	F	23	
19	F 24	F 22	R 34	F 41	R 41	51	51	58	68	C	C	C	C	C	C	C	C	C	C	C	C	C	C	A	
20	A	A	RJ	F	A	A	B	A	R		58	B	R	RJ	R			RJ	R	F	A	R	R		
21	A	F 30	R 29	R 22	F 42	F 36	49	53	65		B	J	R	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ		
22	F 36	33	32	28	23	24	33	46	55	60	67	79	88	85	96	86	97	81	70	69	60	54	39	39	
23	F 40	35	24	34	25	24	28	41	59	67	72	82	88	91	97	95	98	96	82	72	59	58	31	22	
24	A	A	A	R	F	F	F	41	55	57	69	72	74	75	86	84	84	73	66	61	46	42	38	24	
25	F 22	R 31	32	34	39	36	33	42	54	65	78	92	96	102	100	108	91	84	74	64	48	38	R	A	
26	U 43	R A	A	R	F	R	F	R	R	R	B	RJ	R	R	R	R	R	R	R	R	R	R	B		
27	B 22	R A	A	R	R	B	R	R	F	J	R	J	R	R	J	S	R	J	S	R	R	R	F		
28	F 19	R 19	A	A	A	A	A	A	58	59	67	77	75	86	98	93	74	75	68	58	48	43	26	22	
29	F 16	R 32	A	F 47	F 25	F 24	43	43	56		B	B	B	R		S	Y	R	R	A	F	A	F		
30	F 23	F 33	B A	A	B	B	A	A		46	38	R	B	B	B	B	B	B	R	F	R	A	A		
31	A 30	A 30	R 30	A	B	R	B	B	A	R	B	B	B	B	R	B	R	F	F	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	12	15	12	15	18	17	13	16	16	19	13	14	18	16	16	21	22	20	25	25	19	17	17	12	
MED	32	31	31	34	30	36	36	43	57	60	70	78	82	84	87	84	84	75	66	58	46	38	27	24	
U Q	40	35	34	39	36	42	47	51	62	67	77	84	88	96	98	97	94	85	73	64	53	44	34	37	
L Q	24	29	26	26	25	24	32	41	54	54	67	72	74	73	80	66	71	66	51	42	34	26	22		

IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 1999 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	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	42	47	43	31	38	B	44	26	B	B	B	33	32	G	28	37	29	G	B	54	92	59	43					
2	42	37	44	B	B	37	B	37	21	37	G	B	B	BE	B	31	28	30	28	27	25	20	32	42	43			
3	43	45	41	B	25	36	36	28	42	G	B	B	BE	B	B	BE	B	33	22	27	25	32	37	42	60101			
4	39	33	94	46	45	34	78	38	B	B	B	B	B	BE	B	30	24	27	27	27	35	77	38	34				
5	38	B	42	B	B	B	B	37	34	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	B	B	B	B	B	B	B	B	B	B	B	B	B				
7	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	B	27	75	92	99						
8	36	43	B	B	B	B	B	B	B	33	B	B	G	GE	B	B	BE	BE	25	29	41	38	40	28				
9	54	19	43	39	34	B	B	B	B	B	B	B	B	B	B	33	B	40	34	41	37	33	36					
10	36	35	44	39	40	B	B	B	28	B	B	B	B	B	27	B	BE	E	26	23	17	20	42	36				
11	32	74	40	36	43	79	B	B	B	B	26	28	34	55	54	44	46	E	BE	B	31	25	45	24	39	41		
12	48	41	41	38	29	37	38	22	25	30	30	32	28	B	E	B	E	BE	E	25	32	25	22	35	43			
13	40	70	47	46	41	48	32	31	26	27	29	38	27	30	28	28	31	28	E	BE	E	55	30	38	34	37		
14	37	37	68	72	40	B	B	B	B	BE	B	G	53	30	26	29	27	36	27	60	59	22	24	36	37	25	76	
15	46	41	43	43	34	37	B	B	B	B	B	B	B	B	B	B	BE	BE	BE	26	26	32	30	24	22	29	31	
16	34	38	38	33	42	21	19	21	G	26	31	31	30	35	29	30	E	B	G	26	20	19	18	13	18	19	13	
17	20	18	26	27	15	GE	B	G	16	G	GE	BE	BE	E	B	B	BE	BE	BE	56	29	24	23	26	18	18	13	18
18	19	18	28	35	27	E	B	20	18	34	33	28	33	29	26	G	BE	BE	E	56	55	18	13	19	26	13	14	
19	30	30	31	32	28	31	14	25	22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	78		
20	39	37	80	36	39	39	B	42	40	32	B	32	32	63	29	E	BE	B	G	19	56	53	19	22	34	41	50	
21	38	31	34	36	34	22	E	BE	BE	BE	BE	B	54	31	31	26	31	E	BE	BE	BE	SE	SE	BE	BE	S	10	
22	E	BE	SE	S	14	15	16	21	23	18	18	17	21	26	22	30	33	28	27	26	G	21	18	15	12	12	10	12
23	E	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	G	12	12	16	18	16	12	16	12	16	12	14	10	14		
24	40	50	44	40	35	27	22	15	26	30	21	26	27	24	G	G	24	25	20	20	26	28	26	14	27	E	B	
25	27	40	38	33	27	14	14	20	24	24	27	34	35	38	28	26	23	20	16	13	10	42	80	46				
26	57	105	60	38	38	38	38	24	26	32	E	B	B	E	BE	B	BE	BE	B	46	25	22	25					
27	B	24	30	27	21	25	B	30	37	32	E	BE	BE	BE	BE	BE	BE	G	GE	BE	BE	BE	BE	BE	S	18		
28	E	SE	S	14	13	39	42	47	49	42	48	39	32	26	27	26	26	25	20	G	18	E	BE	BE	BE	BE	S	
29	26	40	37	39	38	29	46	40	36	E	B	B	30	28	57	25	E	BE	B	28	35	38	37	31	39	38		
30	38	33	35	B	B	B	38	48	44	26	26	E	B	B	B	BE	B	BE	B	30	34	30	106	43	38			
31	68	35	33	29	26	B	B	B	41	28	14	28	26	54	32	37	18	30	27	39	88							
	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	27	27	25	24	23	18	22	20	21	14	15	19	17	18	23	23	21	26	26	27	28	28	28	28			
MED	38	37	40	36	36	31	27	27	26	27	27	29	30	28	28	26	25	24	22	24	25	26	34	36	36			
U Q	42	43	44	41	40	37	38	37	36	32	30	34	33	42	36	32	33	30	31	30	36	38	42	44	44			
L Q	28	30	31	32	27	21	16	21	22	25	23	27	28	26	G	G	G	G	G	20	18	18	17	20	14	16		

IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 1999 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	13	13	14	11	E S	B	E S	B	B	B	B	29	28	20	16	14	12	15		B	28	12	15	16					
2	19	17	16		B	B	B	30	25	15	24	E S	B	B	B		31	16	12	22	14	15	12	11	10				
3	35	14	17		B	13	19	22	17	22	23		B	B	54		33	13	17	17	12	30	12	11	40				
4	20	22	19	10	12	15	19	13		B	B	B	B	B	B		30	22	12	19	16	11	15	18	17				
5	10		16		B	B	B	B	26	19		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	B	B	B	B	B	B	B	B	B	B	B	B					
7		B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C		17	B	10	10	11						
8	11	15			B	B	B	B	B	B	B	25	B	B	20	22	33		B	B	24	29	13	11	11	11			
9	11		12	16	16	24			B	B	B	B	B	B	B	B		19	B	22	16	11	16	17	18				
10	15	14	12	18	15				B	B	B	B	B	B	B	20	22		B	26	19	17	12	12	11				
11	20	12	11	11	15	16			B	B	B	20	23	34	54	54	21	46		B	31	18	14	11	10	12			
12	19	9	13	12	10	18	18	22	13	30	20	22	22		72	16	55	60	20	15	11	10	10	10					
13	12	10	12	11	24	12	13	11	16	19	18	18	20	22	21	18	18	16		55	10	10	11	12					
14	14	13	14	22	16				B	B	B	B	53	25	22	24	22	36	21	60	59	22	20	12	12	13	11		
15	10	14	15	16	12	25			B	B	B	B	B	B	B	B	B	B	26	26	32	30	24	15	12	10			
16	9	13	14	14	14	12	15	16	17	17	24	16	17	22	24	30	23	18	16	12	13	10	10	10					
17	10	9	10	10	10	9	16	16	18	19	30	34	32		B	B	56	29	29	23	11	12	11	13	18				
18	10	12	10	11	12	10	18	18	15	28			B	21	19	22		56	55	12	12	11	12	13	14				
19	14	11	12	15	12	15	14	16	14			C	C	C	C	C	C	C	C	C	C	C	C	C	14				
20	12	15	13	14	23	13			B	20	19	17		15	19	63	29	22	28	56	53	19	22	12	16	16			
21	10	12	12	12	12	10	15	21	26	30		54	31	18	19	31	29	29	20	18	12	12	10	10	15				
22	E S E S					E S				E S		15	20	18	26	22	18	21	21	19	16	14	15	12	11	12			
23	E S	E S E S	E S E S	E S E S	E S	12	12	16	18	16	12	16	15	15	18	21	17	17	14	15	12	16	10	10	12	E S			
24	12	12	19	16	11	10	9	15	14	14	14	14	14	15	14	20	19	14	13	11	11	10	9	14	14	E S			
25	14	16	10	14	12	14	14	15	14	16	14	14	16	14	16	14	18	15	15	12	9	10	10	10	11				
26	10	12	18	11	10	14	10	12	11	32		B	13	29	47		B	30	29	46		25	22	15		B			
27		15	16	18	16	14			18	18	18	23	60	32	55	73	29	20	15	18	15	18	19	13	14	E S			
28	E S E S	14	13	16	17	20	19	20	15	14	19	32	19	20	18	22	17	14	15	12	29	16	16	14	14	E S			
29	E S	14	14	15	14	14	13	14	13		B	B	B		19	22	57	25	14	23	15	20	14	13	14	14	E S E S		
30	E S	13	17		28		25	24	20	18	26		B	B	B	B	B	B		15	13	14	14	13	15	E S E S			
31	26	28	15	18		B	B	B	22	29	28		B	B	B	B	54		32	15	13	10	13	13	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	31	31	31	31	31	31	31	31	31	30	30	30	30	30	30	30	30	29	29	30	30	30	30	30	31				
MED	14	14	14	16	14	18	20	18	18	26		B	B	32	54	56	30	27	29	19	16	13	12	12	14				
U Q	19	17	17	22	24		B	B	B	B	B	B	B	B	B	B	B	B	B	56	60	28	29	22	15	14	16		
L Q	11	12	12	12	12	13	15	15	15	19	24	21	20	20	22	19	15	16	14	13	11	11	11	11	11				

IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 1999 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	E	A	E	A		E	A	B	A	A	B	B	B					A	S	B	A	A	A	A				
	258	250	222	218	238									250	236	238	238		244									
2	A	A	A	B	B	A	B	A	E	A	A	B	B	B	B	234	236	236	248	252		A	A	A	A			
3	A	A	A	B	A	A	A	A	A	A	A	B	B	B	B	B	E	B	E	A	A	A	F	A				
4	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	E	B	E	A	Y	260	A	A	A			
5	A	B	A	B	B	B	A	A	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	B	B	B	B	B	B	B	B	B	B	B	B	B				
7	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	A	B	A	A	242				
8	A	A	B	B	B	B	B	B	B	B	Y	B	B				B	B	246	254	248	A	A	A	A			
9	A	B	Y	A	A	A	B	B	B	B	B	B	B	B	B	B	E	A	B	A	A	A	A	A				
10	A	A	A	A	A	B	B	B	A	B	B	B	B	B	B	B	B	B	278	250	282	292	292	A	A			
11	A	A	A	A	A	A	B	B	B	B	E	B	B	B	B	E	A	E	B	B	A	A	A	A				
										230	222	238				244	300		236	254					250			
12	A	A		240	240	234	A	A	238	236	236	220	234	234		B	B	E	E	B			E	A	A	A		
13	A	258	226		A	A	A	AE	AE	AE	276	256	230	226	240	218	226	226	222	222	222		B	B	Q	A		
14	A	206		A	A	B	B	B	B	B	E	A				E	BE	AE	BE	B			A			222222		
15	222		A	A	A	A	B	B	B	B	B	B	B	B	B	E	BE	B	B	B		A	A		258			
16	A	A	E	A	A	A			252	236	222	228	212	232	234	222	230	230	214	216	206	206	206	236	250			
17	266	300	336	354	A	A	E	A	E	A	354	288	264	222	208	238	228	234	B	B	E	B	A	A	S	270		
18	A	A		262	226	A	A	E	BE	AE	A	348	330	274	238	B	B	256	240	224	E	BE	B		E	S		
19	A	S	F	S	S					F	C	C	C	C	C	C	C	C	C	C	C	C	C	C	A			
20	A	A	A	A	A	A	B	A	A		188		B			B	E	B		E	E	B	E	A	A	E		
21	A	228	228	232	232	A	A		230	274	266	252	E	B	B	226	244	242	242	242	288	272	234	264	264	252	254	
22	E	BE	SE	S	A	A	SE	S	SE	S	304	242	224	224	234	234	228	222	218	218	222	202	206	210	204	E	S	
23	E	SE	S	S	S	S	SE	SE	A		288	248	234	220	216	224	194	222	220	206	204	210	198	202	210	240	224	264
24	A	A	A	A	A	A			232	222	190	208	226	226	210	228	220	222	220	218	210	224	296	266	290		S	
25	S	A		224	A	A	E	SE	S	300	294	240	228	228	220	226	220	228	216	216	206	206	206	206	208	230		
26	A	224		216	A	A	A	A	A	228	228	256	228	228	300	B	238	220	260	B	B	242	266	270	A	B	S	
27	B	A	A	A	A		B		256	264	254	216	242	274	228	258	276	222	218	210	210	202	218	232	222	234		
28	S	130	A	A	A	A	A	A		212	232	262	230	242	232	220	232	220	218	210	210	238	212	234	242	278	E	S
29	S	A	A		E	S			A	B	B	B				B		A	A	A	A	A	A	A		236		
30	F	208	B	A	B	B	A	A	A		236	240		E	B	B	B	B	B	B	B	B	312	A	A	A	A	A
31	A	A	A	A	B	A	B	B	B	A	E	B	B	B	B	B	B	B	B	B	250	250	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	8	10	9	7	6	9	12	16	17	13	15	18	15	16	22	22	20	22	21	19	15	15	11			
MED	U	U		241	236	228	236	238	270	259	244	229	226	224	227	231	232	224	232	225	222	223	226	219	233	246	242	
U Q	E	S		266	285	262	259	252	300	299	269	258	236	241	240	238	236	268	234	236	E	BE	B		E	S		
L Q	224	218	224	222	232	256	230	239	222	217	220	226	226	226	220	222	220	216	210	210	209	210	230	224	236			

IONOSPHERIC DATA STATION SHOWA-ST.

APR. 1999 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	B	A	B	A	B	O	X	B	B	A	B	B	O	X	R	X	O	X	X	Y	B	Y	O	X	
2	A	O	X	O	X	A	B	A		A	B	B	O	X	B	B	O	X	X	X	X		A	A	35	
3	O	X	A	A	R	O	X	O	X	A	A	B	B	B	B	B	B	B	B	B		A	A	A		
4	B	B	B	B	B	B	A	A	B	B	B	B	B	B	B	X	B	B	B	B	B	X	A	A		
5	B	B	A	B	B	A	A		X	O	X	B	B	B	B	B	B	O	X	O	B	O	28	B	A	
6	O	X	O	X	O	X	R	R	R	B	B	B	B	B	B	O	X	X	O	X	O	O	X	B	B	
7	A	A	B	B	A	B	B	B	A	B	B	B	B	B	B	B	X	X	B	BO	X	X	A	A	B	
8	A	A	A	A	A				X	X	B	X	X	X	X	X	O	X	X	X	X	B	A	A	A	
9	A	A	A		A	A		31	30	40	47	41	45	70	83	96	92	88	82	67	69					
10	A	O	X	O	X	X	O	X	X	B	B	R	X	X	O	X	X	80	75	70	62	58	36	31	28	
11	A	36																								
12	O	X	O	X	A	A	B	A		X	X	X	X	X	O	X	R	X	B	B	B	O	X		X	
13	O	X	O	X	23	28	26	31	31	34													40	29	30	27
14	B	B	A		42	55	61	67	56	61	68		B	B	B	B	B	B	97	66	64	45				
15	A	A	A		X	O	X	A	O	X			X	X	X	X	X	X	X	X	X	X			X	
16	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	117	116	104	90	73	46	62	49	
17	A	A	Y	A	A	A	B	B	A	B	B	Y	B	O	X	B	B	O	X	B	O	X	O	X		
18	O	X	A	43	44	30	A	A	O	X			X	X	X	X	X	X	X	X	X	B	B	A	A	
19	O	X	X	A	A	A	X	X	B	X	O	X	B	O	X	X	B	O	X	X	B	X	O	X		
20	A	A	A				A	B	A	B	B	B	B	B	X	B	B	X	B	B	A	A	O	X	O	
21	X	A	O	X	O	X	A	A	O	X	0	X	X	O	X	O	X	X	X	O	X	X	A			
22	A	A	A		A	O	X							O	X	O	X	X	X	X	B	B	B	B		
23	A	A	O	X	32	32	39	38	42	56	58	56	68		O	X	O	X	X	X	O	B	B	B	B	
24	Y	F	C		31	93			A	Y	A	X	X	X	O	X	X	O	X	X	X	B	B	B	B	
25	Y	Y	Y	O	X	X	X			O	X	B	O	X	B	B	X	O	X	X	X	O	X	B	B	
26	Y	X	O	X	A	41	30	31	41	48	42	40	51		X	C	C	C	X	X	X	X	A	A	A	A
27	A	O	X	A	A	A	A	A	A	O	X	O	X	A	A	O	X	O	X	X	O	X	O	A		
28	B	A	A	B	B	B	B	B	A	B	B	B	B	B	B	B	B	R	B	O	X	A	A	A		
29	O	X	O	X	43	44	40		B	A	A	A	B	B	B	O	X	O	X	B	B	A	A	A	44	
30	B	B				52		B	B	A	A	B	B	B	B	B	B	B	B	B	B	Y	A	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	9	10	9	11	11	12	16	12	14	13	13	13	15	14	16	21	19	22	21	21	19	14	9	10		
MED	O	X	O	X	35	36	41	38	39	36	42	44	48	52	62	66	73	84	92	89	81	72	65	48	39	29
U Q	O	X	O	X	43	41	46	43	52	44	48	56	55	62	70	78	88	92	100	106	93	84	68	60	45	38
L Q	O	X	O	X	32	34	31	31	31	34	38	42	41	47	54	50	67	72	73	76	75	60	53	40	34	28

IONOSPHERIC DATA STATION SHOWA-ST.

APR. 1999 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	B	A	B	R	B	B	A	B	B	R	B	R	R	R	R	Y	B	Y	R	29			
2	A	R	R	A	B	A	F	A	B	B	R	B	B	B	R	J	R	R	F	F	A	A				
3	R	A	A	R	R	R	A	A	B	B	B	B	B	B	B	B	B	B	R	F	A	A				
4	B	B	B	B	B	A	A	B	B	B	B	B	B	B	B	72	B	B	B	B	A	A				
5	B	B	A	B	B	A	A	36	42	R	B	B	B	B	B	B	95	59	19	18	R	B				
6	R	R	R	R	R	R	B	B	B	B	B	B	R	B	J	R	R	J	R	R	F	R	B			
7	A	A	B	B	A	B	B	A	B	B	B	B	B	B	B	92	92	B	B	R	A	A	B			
8	A	A	A	A	A	F	F	F	J	R	B	J	R	39	64	77	90	86	82	76	61	57	A	A		
9	A	A	A	F	A	A	R	B	B	51	56	63	67	70	74	72	74	69	64	56	48	26	22	22		
10	A	R	R	F	F	R	R	40	B	B	R	J	R	R	F	59	74	80	94	92	78	78	68	60	24	
11	A	F	A	B	B	F	B	B	B	F	B	B	B	B	B	R	J	R	R	B	B	R	A			
12	R	R	A	A	B	A	F	F	J	R	J	R	R	D	R	J	R	B	B	B	F	30	23	20	21	
13	R	R	F	Z	F	B	B	R	B	R	J	R	79	92	97	99	105	104	107	J	R	R	F	B		
14	B	B	A	F	F	F	F	F	B	B	B	B	B	B	B	91	62	55	36	A	A	A	A			
15	A	A	A	R	A	R	F	43	51	57	63	84	93	99	102	103	101	J	R	F	F	R	J	R		
16	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	111	110	98	84	63	37	56	43	67		
17	A	A	Y	A	A	A	B	B	A	B	B	Y	B	R	R	35	38	B	R	R	R	F	R	F		
18	R	A	F	F	A	A	R	F	F	35	32	30	43	60	63	61	66	67	68	61	58	50	31	B	A	
19	R	A	A	A	29	32	B	R	B	31	46	70	74	B	B	R	J	R	B	R	F	R	A	A		
20	F	A	A	F	A	B	A	B	B	B	B	B	B	B	B	61	77	B	J	R	B	A	A	R		
21	J	R	A	R	U	R	A	A	R	F	R	R	U	R	R	J	R	R	J	R	A	A	A	F		
22	A	A	A	R	F	F	F	R	F	35	26	24	28	35	43	52	56	56	66	67	66	73	76	68	64	
23	A	A	F	F	F	F	F	R	R	26	22	33	28	40	51	50	62	82	91	89	88	75	54	60	B	
24	Y	F	C	F	R	A	Y	A	F	20	40	30	39	48	60	64	86	92	87	63	55	57	29	23	B	
25	Y	Y	Y	R	R	R	F	F	R	28	24	26	29	25	35	64	85	84	83	70	57	42	36	22	20	
26	Y	F	R	A	F	F	F	F	C	30	24	23	31	36	30	45	C	C	CJ	R	89	74	79	61	49	
27	A	R	A	A	A	U	R	R	A	A	A	R	R	R	B	B	B	B	R	R	R	A	A	B		
28	B	A	A	B	B	B	B	A	B	B	B	B	B	B	B	B	B	B	R	B	A	A	R	38		
29	R	U	R	B	R	B	A	A	A	B	B	B	R	B	R	R	B	B	R	B	A	A	A	F		
30	R	37	38	34	34	33	33	36	40	40	44	56	64	72	82	86	93	97	86	78	62	53	34	29	33	
31																										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	9	10	8	10	10	12	15	10	15	13	13	13	15	14	17	21	19	22	21	21	18	13	9	10		
MED	R	R	R	29	30	27	28	28	33	32	39	46	56	60	67	78	86	83	75	63	59	42	30	23	26	
U Q	R	R	R	37	34	36	34	33	36	40	40	44	56	64	72	82	86	93	97	86	78	62	53	34	29	34
L Q	R	F	F	23	28	22	24	26	28	28	31	41	48	44	61	66	67	70	63	54	47	34	24	18	20	

IONOSPHERIC DATA STATION SHOWA-ST.

APR. 1999 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	42	B	32	B	79	B	B	35	B	BE	B	B	BE	BE	BE	BE	BE	BE	B	B	22	32	
2	34	36	38	40		43	32	39	B	B	31	B	B	B	BE	BE	BE	BE	BE	BE	E	B			
3	40	38	35	35	32	42	40	41	B	B	B	B	B	B	B	54	23	23	33	29	14	32	38	32	
4	B	B	B	B	B	B		43	37	B	B	B	B	B	BE	B	B	B	B	B	B		18	35	
5	B	B	B	B		43	42	34	37	B	B	B	B	B	B	BE	BE	BE	B	57	37	30	15	42	
6	31	31	35	29	24	29		B	B	B	B	G	B	BE	BE	BE	BE	BE	BE	B		B	B		
7	24	35		29		B	B	B		B	B	B	B	B	BE	BE	B	BE	B	BE	B			B	
8	34	28	41	37	37	27	18	15	E	BE	B	BE	B	22	28	E	BE	BE	BE	E	B	B		48	
9	39	33	79	38	41	43	43		B	B	E	B	G	32	22	25	23	22	14	13	12	12	18	22	
10	29	42	39	38	34	44	36	28	B	BE	B	G	30	21	25	26	26	24	20	26	15	34	76	37	
11	37	29	34		B	B	B	B		B	B	B	B	B	BE	BE	BE	BE	BE	B	B		33	33	
12	40	42	34	46		40	27	20	19	G	E	B	25	27	28	26	23	34	E	B	B	B	E	SE	
13	E	B	14	19	26	22	30	20	E	B	B	E	B	23	23	26	31	30	25	22	29	26	17	16	15
14	B	B			E	S	S	G	B	B	B	B	B	B	BE	BE	BE	BE	BE	24	30	18	21	27	
15	33	40	35	33	34	39	46	19	14	20	25	22	E	B	26	24	25	24	22	16	20	15	12	12	
16	C	C	C	C	C	C	C	C	C	C	C	C	C	C	G	G	B		22	22	24	50	42	36	
17	40	42	28	46	32	32		B	B	B	46		B		E	B	B	BE	BE	BE	22	20	17	27	32
18	29	46	29	44	55	44	42	35	25	18	20	22	40	26	22	21	31	E	BE	BE	B	B		33	
19	36	35	34	33	32	26	19	16	18	38	24		B	BE	BE	BE	BE	BE	17	40	36	27	36	42	
20	27	41	38	34	34	44		57	B	B	B	B	B	B	BE	B	B	39	36	40	37	40	44		
21	40	45	46	46	42	42	38	28	25	G	BE	BE	BE	BE	E	B	22	22	24	18	20	24	18	37	
22	61	42	41	40	41	37	25	25	18	20	30		E	B	E	B	E	BE	E	B	B	B	B	25	
23	F	37	38	34	32	31	30	22	11	13	14	24	B	E	B	22	21	23	22	19	24	E	B	B	
24	F	22	36	C	29	35	38	30	36	31	20	22	18	G	E	BE	BE	BE	GE	BE	BE	SE	S	B	B
25	18	26	28	28	26	21	15	16	20	26		B	E	BE	BE	BE	BE	BE	BE	E	BE	SE	B	B	
26	19	40	34	38	27	22	16	15	14	18	E	SE	S	G	C	C	C	E	BE	SE	BE	B			
27	41	41	45	49	41	42	42	40	38	36	32	23	E	BE	B	B	B	E	BE	B	E	B			
28	B	37	43		B	B	B	B	B	B	B	B	B	B	B	B	B	BE	B	BE	23	34	41	39	
29	45	38		34	B	43	42	36	B	B	BE	B	B	31	E	B	B	BE	B	B	44	40	42	46	
30	B	B			B	B			B	B	B	B	B	B	B	B	B	B	B	B	19	40	40		
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	24	24	25	22	21	25	22	20	19	15	14	14	15	14	17	21	21	22	22	25	24	24	25	22	
MED	35	38	35	38	32	38	36	31	23	20	24		G	E	G	E	BE	BE	BE	BE	E	B			
U Q	40	42	41	40	39	43	42	38	38	26	30	27	30	26	26	26	32	28	24	29	36	36	41	41	45
L Q	28	34	34	33	30	29	22	18	16		G	E	B	22	22	23	22	22	20	18	18	15	14	17	26

IONOSPHERIC DATA STATION SHOWA-ST.

APR. 1999 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	16	B	30	B	21	16	B	B	28	B	B	30	B	B	31	29	24	24	14	12	E	S	B	11	11			
2	11	11	12	12		19	14	15	B	B	22	B	B	B	54	23	23	33	28	15	10	10	10	10				
3	12	13	10	20	14	20	23	16	B	B	B	B	B	B	B	B	B	B	30	14	14	14	14	15				
4	B	B	B	B	B	B		18	27	B	B	B	B	B	B	B	26	B	B	B	B	12	13	16				
5	B	B	B	B		15	14	16	18	B	B	B	B	B	B	B	B	57	37	B	E	S	B	E	S			
6	12	13	14	18	13	15	B	B	B	B	B	22	B	31	38	22	21	29	19	11	14	E	S	B	B			
7	15	13		21			B	B	B	B	B	B	B	25	24	B	B	26	14	13	20		B					
8	24	20	20	30	23	15	14	13	21	25		22	23	26	29	29	28	33	12	20	18	17	12					
9	E	S	12	25	16	15	16	14	13	B	B	20	22	19	25	22	18	23	22	13	14	13	12	13	12	13		
10	E	S	14	12	12	12	14	13	14	14	B	30	23	25	30	26	26	24	20	15	15	15	13	14	17	14		
11	E	S	12	14	24		B	B	B	B	18	17	B	B	B	B	B	58	19	32	14	B	B	12	14			
12	12	12	14	12		20	12	13	13	16	25	21	28	20	18	34		B	B	B	B		E	S				
13	14	12	10	10	13	20	B	B	B	23	18	18	19	19	18	22	17	26	17	10	15	15	17	14	B			
14	B	B	12	9	8	8	11	E	S	E	S	16	14	16	B	B	B	B	B	24	30	18	12	12	12	13		
15	12	12	10	11	11	16	12	E	S	S	12	10	15	18	22	20	19	18	19	22	16	20	15	13	12	12	13	
16	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	16	15	B	10	11	10	11	10	11	12		
17	15	26	25	25	15	23	B	B	B	19	B	20	B	20	22	B	B	21	22	20	9	10	10		B	B		
18	10	10	12	12	17	12	12	11	B	9	12	14	14	15	16	16	16	13	17	15	14					11	12	
19	10	12	12	10	11	10	20	B	16	18	38	15	B	B	32	56	B	17	12	11	14	14	12					
20	11	19	25	23	13	22	B	12	B	B	B	B	23	B	39	B	B	12	17	12	10	12	12					
21	10	9	15	16	19	14	11	10	10	14	22	22	24	23	20	14	20	24	18	14	11	11	11	16				
22	11	11	19	24	15	12	10	11	10	20	30	20	17	21	16	22	19	27	B	B	B	B	B	E	S			
23	11	12	10	9	10	12	15	11	9	10	14	B	32	18	11	11	20	9	23	B	B	B	B	B	10			
24	C	10	11	10	17	11	12	17	10	12	11	11	23	24	22	15	19	15	14	12	12	12						
25	10	15	15	15	13	12	14	16	20	B	B	26	33	30	23	18	23	15	14	11	14	E	S	E	B	B	B	
26	13	12	13	13	11	10	16	15	14	14	C	C	C	C	C	C	22	14	21	13	21	16	10	12	11	20		
27	16	13	14	14	14	14	13	13	14	14	32	23	B	B	23	22	15	22	14	12	12	19	B					
28	B	18	30		B	B	B	B	B	22	B	B	B	B	B	B	B	23	23	18	12	13	14	13	E	S		
29	12	14	15		16	25	21		B	B	B	B	31	17	23	B	B	22	B	10	12	10	9	10				
30	B	B		B	B	B	17	20	20	27	29	B	B	B	B	B	B	B	B	10	10	10		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	29	29	28	29	29	29	29	29	29	29	29	29	28	28	28	28	30	30	30	30	30	30	30	30	30	30	30	
MED	12	13	15	15	16	15	14	16	21	28	B	B	B	31	30	30	24	24	24	23	16	12	14	12	14	14		
U Q	B	B	22	25		20											B	B	B	B	B	B	B	26	15	17	17	
L Q	11	12	12	12	13	12	12	13	14	16	22	22	23	20	18	22	21	17	15	14	12	12	11	12				

IONOSPHERIC DATA STATION SHOWA-ST.

APR. 1999 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	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	B	A	B		B	B	A	B	B	E	B	B	E	B	E	B	240	234	A	B	A					
2	A						224					250			274	266	248	240	234						230				
3	A							B	A	A	B	B		B	B	E	B	E	B	254	258	252	A	A	A				
4	B	B	B	B	B	B	A	A	B	B	B	B	B	B	B		B	B	B				A	A	A				
5	B	B	A	B	B	A	A	A	B	B	B	B	B	B	B	E	B	E	S	S	B	A							
6	208	210	210					A	A	A	B	B	B	B	B	222	216	234	216	208	218	230	232	A	B	B			
7	A	A	B	B	A	B	B	A	B	B	B	B	B	B	B	E	B	B	B	B	B		A	A	B				
8	A	A	A	A	A	A	A	E	B	B	B	250	234	226	232	222	222	216	216	224	230		B	A	A	A			
9	A	A	A	F	A	A		B	B	E	A	270	214	230	214	214	226	226	226	208	204	208	198	244	244	S			
10	A	E	S					F	A	A	B	B	E	A	E	A	236	236	244	238	232	228	214	214	222	222	A	A	A
11	A																						B	B	A				
12	214																									222	210		
13	B	S	A	A	S	B	B					228	220	220	222	212	228	214	206	198	204	198	200	226	236		B	B	
14	B	B	A	A				S	F			B	B	B	B	B				202	238	224	244	A	A	A			
15	A	A	A		A	A	A	272	380	350	332	234	234											E	SE	SE	S		
16	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C								F	A					
17	A	A	Y	A	A	A	B	B	A	B	B	A	B	270	274								212		198				
18	A	F	F	A																			B	B	A	A			
19	216	210																					A	A	A				
20	A	A	A	A	A	B	A	B	B	B	B													214	214	230			
21	A																									196			
22	A	A	A	A	A	A	A	A	E	B	B	278	254	238	250	228	222	232	248	204	224	240							
23	A	A	A																				B	B	B	A	B		
24	A	F	C																				B	B	B	B			
25	Y	A	A	A	A	S	S	B	E	B	B	280	228		B	B							E	B	B	B			
26	Y																						A	A	A				
27	A	E	A	A	A				A	A	A	B	E	B	B	B	B	B	242	242	224	256	230	222	198		A	B	
28	B																						B	E	B	A	A		
29	A	226	244		B				B	A	A	B	B	B	B	B	E	B	B	252	256	248					248		
30	B	B							B	A	A	A	B	B	B	B	B	B	B	B	B	B	Y	A	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	8	8	5	9	7	5	5	3	13	12	13	12	15	14	17	21	20	22	21	19	16	9	7	9					
MED	221	224	220	230	210	212	226	212	236	232	228	230	228	222	221	221	212	221	216	216	224	221	237	220					
U Q	235	228	227	256	270	286	279	258	269	248	237	243	236	238	232	242	234	224	240	234	245	251	244	273					
L Q	213	217	203	214	198	204	223	210	226	228	221	225	222	220	216	207	201	202	206	208	208	213	222	204					

IONOSPHERIC DATA STATION SHOWA-ST.

MAY 1999 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		A	B	B	B	O	X	A	A	B	B	B	B	B	B	B	B	B	O	X	B	O	X	A		
2		A	A	B	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	Y	A	O	X	A		
3		A	A	B	B	B	B	B	X	B	B	B	B	B	B	O	X	X	X	B	B	A	O	X		
4	0	X	O	X	A	O	X	X	A											X	X	X	O	X	B	
5	44	33	28	32	26	30	29	36	47											72	70	69	38	33	B	
6		O	X	A	A	O	X	O	X																B	
7		44	42	35	38	50	53	44	65	71	87	102	106	113	99	84	69	49	46	28					B	
8		A	A	A	A	O	X	A	B	O	X	B	B	X	X	B	X	X	B	B	B	B	B	B		
9		34	37	41	56	53	76	91	82	114	107	93	81	70											B	
10		O	X	A	B	O	X	A	57	59	60	68	86	91	103	111	113	102	84	69	72	40	32			
11		23	25	44																						
12		B	B	O	X	A	A	O	X																	
13		68	40																							
14		48	49	49	A	A	B	A	A	Y	X	B	B	X	X	R	O	X	B	B	A	A	A	A		
15		62	57		A	A	A	B	O	X	44	42	48	54	73	89	102	108	101	82	81	71	41			
16		O	X	A	A	B	A		40	43	42	48	66	85	103	108	106	100	54	47	41	30	24	20	22	23
17		21	22	22	22	23	54	53	26	32	41	66	84	96	99	85	88	66	48	39	34	25				
18		O	X	O	X	X	X		A	A																
19		40	43	46	32	32	74																			
20		A	A	R	A	B	B																			
21		O	X	A	A	B	A																			
22		Y	R	A		A																				
23		Y	Y	B	B	O	X	A	41	48	39	49	34	46	67	71	84	85	85	78	60	42				
24		C	C	C	C	C	C	C																		
25		C	C	C	C	C	C	C																		
26		55	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
27		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
28		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	O	X	B	B	A	A		
29		A	A	R	A	A	A	A																		
30		Y	A	A	O	X																				
31		O	X	O	X	48	52	38	42	44	44	43	53	67	84	92	80	67	48	43	49	39	28			
		38	30	33	30	29	31	38	33	34	40	56	64	77	70	78	70	48	39	31	25	25				
		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	9	6	7	10	8	14	18	17	18	17	14	17	20	20	20	19	21	18	15	13	2	5	5	
MED		O	X	O	X	X	X																			
U Q		39	34	29	32	34	38	40	42	42	48	66	83	89	98	106	98	72	68	50	39	28	24	29	26	
L Q		O	X	O	X	O	X																			

IONOSPHERIC DATA STATION SHOWA-ST.

MAY 1999 f₀F2 (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	B	B	R	A	A	B	B	B	B	B	B	B	B	B	B	R	B	R	A	R	A		
2	A	A	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	Y	A	R	A			
3	A	A	B	B	B	B	B	31	B	B	B	B	R	J	R	F	B	B	B	A	R	A			
4	R	R	A	R	26	20	A	F	F	F	B	F	F	F	F	F	F	R	B	B	B	B			
5	R	A	AU	R	36	29	F	F	F	F	R	J	R	R	S	F	F	F	F	B	B	B			
6	A	A	A	A	36	42	A	B	R	B	R	B	J	R	F	B	F	F	B	B	B	B			
7	A	R	A	A	A	B	B	B	B	R	B	B	B	B	B	B	73	52	J	F	R	B	B		
8	R	A	A	A	A	R	B	A	F	F	R	98	106	115	100	89	J	R	B	R	B	B	B		
9	R	R	A	A	A	F	F	F	F	J	R	R	J	R	R	R	B	B	R	B	B	R			
10	R	A	F	B	R	A	F	F	F	J	R	S	S	S	S	F	F	F	R	B	B	B	B		
11	B	A	A	B	A	F	F	F	J	R	R	J	R	J	R	J	R	F	R	R	B	B	Y		
12	B	B	R	A	A	R	F	F	F	R	B	B	J	R	F	F	F	R	C	C	F	A			
13	R	A	A	A	A	A	B	B	A	B	B	B	R	B	F	F	A	A	R	A	A	A			
14	A	F	F	A	A	B	A	A	Y	39	B	B	94	92	R	U	R	R	B	B	A	A			
15	A	F	A	A	A	B	R	F	F	R	F	R	93	102	95	76	72	57	32	B	A	A			
16	R	A	A	B	A	A	F	F	F	R	J	R	F	F	F	R	R	F	R	R	F	R			
17	F	R	R	12	16	16	17	22	18	20	20	31	55	75	89	93	79	82	60	42	30	28	20		
18	R	A	F	F	A	A	A	F	A	B	B	50	59	64	75	96	96	90	R	Y	A	A	A		
19	A	A	R	A	B	B	B	B	R	B	35	42	B	62	71	77	74	66	62	B	B	R	B		
20	A	A	B	A	A	B	F	F	B	B	31	36	B	72	86	J	R	B	B	B	A	R	20		
21	R	A	A	B	A	A	F	F	B	R	R	29	28	40	54	63	80	80	68	54	46	26	20		
22	Y	R	A	F	34	39	30	40	27	36	60	62	78	79	75	68	54	33	R	B	B	B	B		
23	Y	Y	B	B	R	A	F	F	F	B	B	B	B	B	B	B	B	C	C	C	C	C			
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
25	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
26	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
27	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
28	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	R	B	B	A	A				
29	A	A	R	A	A	A	F	F	F	J	R	26	26	30	44	56	75	65	C	C	R	F	A		
30	Y	A	A	R	F	F	F	F	F	R	J	R	J	R	R	F	F	F	F	F	A	A			
31	R	F	R	32	22	26	32	33	35	26	47	61	78	86	74	56	42	37	40	30	18	R	R		
	R	F	R	32	20	27	22	19	23	22	24	24	28	50	58	71	64	72	64	42	27	23	15	17	
CNT	11	8	6	7	10	7	14	17	17	18	17	13	17	19	20	20	19	21	18	15	13	2	5	4	
MED	R	R	28	24	18	26	26	23	28	31	32	40	55	75	83	92	99	90	66	60	42	32	20	18	18
U Q	R	R	34	28	27	36	32	28	34	39	38	46	66	83	96	101	102	96	78	66	57	36	26	R	R
L Q	R	F	20	21	16	22	20	18	22	22	26	31	46	62	76	71	78	71	54	41	30	24	18	F	R

IONOSPHERIC DATA STATION SHOWA-ST.

MAY 1999 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	49	B	B	B	32	34	41		B	B	B	B	B	B	B	B	B	E	B	B	22	13	28	56	43
2	96	33	B	B	B	B	42		B	B	B	B	B	B	B	B	B	B	B	B	17	39	66	38	
3	58	36	B	B	B	B	B	28		B	B	B	B	E	E	B	60	25	17	24		28	17	28	
4	33	28	26	23	22	35	33	26	13	17		B	E	E	E	E	E	E	E	E	E	E	B	B	
5	20	34	42	45	33	46	40	28	16	16	17	44	26	26	22	25	18	18	14	12	11				
6	32	43	42	37	22	39		31		B	E	E	B	B	B	B	B	E	E	E	B	B	B	B	
7	30	29	53	44	42				B	B	B	B	B	B	B	B	B	E	E	E	E	B	B	B	
8	25	36	34	34	33	41	38		B	E	B	E	B	E	E	E	E	E	E	E	B	B	B	B	
9	35	33	48	40	40	36	39	34	33	24	20	24		E	B	E	E	E	E	B	B	E	B	B	
10	17	19	18		B	26	38	26	19	22	21	22	20	36	40	22	18	18	14	13	12	11			
11	26	27		B	E	B	E	B	E	B	E	B	E	B	E	B	E	E	E	B	B	B	B	20	
12					24	11	14	12	14	19	21	26	27	35	25	22	27	26	24	16	13				
13						E	B			B	B	E	E	B	E	E	B	E	E	B	C	C	C	28	
14	40	40	71	50	42		39	27		B	B		41		B	B	E	E	E	E	B	B	B	40	
15	32	36	40	47	42	42		B	45	39	40	31	21		B	B	E	E	E	E	B	B	F	36	
16	35	40	49		B	45	49	35	20	12	14	17	20	E	B	E	E	E	E	E	E	E	E	E	
17	13	13	15	14	E	B	E	B	E	B	E	B		11	10	10	20	22	22	18	18	16	12	11	24
18	29	33	36	36	48	61	41	45	34	42		F	B	E	S	E	B	E	E	E	B	B	B	95	
19	42	39	32	43		B	B	B	B	E	B		22	19	30	23	25	20	18	19		B	27	35	
20	39	40		B	36	40			B	B	B	B	B	B	E	B	E	B	B	B	B	B			
21	30	36	48		B	42	39	33	42		B	E	B	E	B	E	B	E	E	E	B	B	B		
22	16	26	33	42	48	36	30	21	35	22	22	24	22	18	16	25	16	18		E	B	B	B	B	
23	26	26		B	B	34	40	28	18	26	22		B	B	B	B	B	B	B	C	C	C	C	C	
24		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
25		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
26	38	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
27		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
28		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	E	B	B	B			
29	40	38	31	38	42	41	40	18	13	14	16	20	E	B		C	C	E	E	E	E	B		42	
30	17	46	34	36	30	33	29	27	17	18	14	24	83	67	31	28	23	24	11	12	23	39	37	42	
31	41	31	32	24	22	18	12	18	15	11	16	17	18	16	15	16	16	10	12	10	11			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	25	24	21	18	23	19	20	20	19	20	18	14	17	20	20	20	20	21	19	17	15	11	13	18	
MED	33	35	34	38	34	38	34	25	22	21	20	22	E	E	B	E	E	B	E	E	B	B	32	30	
UQ	40	40	45	43	42	41	40	32	33	22	23	26	E	B	E	E	B	E	E	E	B	B	44	42	
LQ	26	28	29	34	26	33	27	18	14	16	17	20	E	B	E	E	B	E	E	E	B	B	23	20	

IONOSPHERIC DATA STATION SHOWA-ST.

MAY 1999 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	25	B	B	B	10	22	20		B	B	B	B	B	B	B	B	B	B	21	9	10	10	23			
2	22	9	B	B	B	B	24		B	B	B	B	B	B	B	B	B	B	B	10	11	13	30			
3	20	29	B	B	B	B	B	15		B	B	B	B	B	60	25	11	24	B	B	B	10	10	10		
4	10	10	10	14	10	19	10	10	8	12		B	32	53	33	25	21	21	18	14	15	18	B	B		
5	11	16	14	16	15	14	10	10	9	12	13	19	19	11	22	17	18	11	14	12	11	B	B	B		
6	20	19	19	24	22	20	31		B	22	23		B	29	24	34		57	20	20	B	B	B	B		
7	19	22	21	20	22		B	B	B	B	B	27	B	B	B	B	B	18	24	21	14	B	B	B		
8	14	19	18	18	20	20	17		19	23	18	22	18	25	21	62	28		24	16	B	B	B	B		
9	12	11	14	14	12	12	14	11	11	12	11	24	18	19	21	23	59	31		19	B	B	10			
10	10	11	9		B	12	16	12	10	10	11	9	11	18	12	14	12	9	9	10	12	11	B	B	B	
11		B	11	12		11	11	9	12	14	12	20	20	28	24	20	14	16	15	13	16	13	B	B	10	
12	B	B	10	10	10	10	10	12	12	16		B	B	33	56	22	16	15	18	16	24	C	C	14	15	
13	10	11	29	20	24		B	16	16		20	B	B	22		27	15	10	10	14	10	9	9	10		
14	11	10	10	20	20		B	18	18	17	22	15		B	B	55	54	56	30	22	B	B	18	10		
15	9	9	19	20	25	15		15	13	13	26	27	24	32	25	22	16	10	11	16	B	B	10	10		
16	11	10	15		B	23	15	13	10	12	9	10	12	20	26	16	15	12	15	10	13	10	11	10	12	
17	10	9	10	9	11	9	10	10	11	13	10	14	13	15	14	16	12	12	11	10	11	B	B	10		
18	10	10	10	10	10	18	22	18	10	19		B	B	29	23	22	30	52	21	B	12	10	12	14	11	
19	20	18	12	29		B	B	B	B	B	B	22	13	B	30	23	25	20	18	19	B	B	B	9	10	
20	13	24	21	20		B	B	14	12		B	B	B	29	22		B	B	B	B	B	10	10	10		
21	10	12	18		B	20	16	13	12		B	22	24	20	18	19	13	9	15	17	14	12	B	B	B	
22	12	10	10	11	12	12	10	10	18	13	14	15	22	18	12	11	10	18	B	B	B	B	B	B	B	
23	18	15		10	22	12	11	11	10		B	B	B	B	B	B	B	B	C	C	C	C	C	C		
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
25	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
26	12	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
27	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
28	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	29	B	B	11	10	12	
29	12	17	22	14	15	19	16	10	10	10	11	20	15	14	C	C	14	13	11	10	10	11	E	SE	SE	
30	12	10	11	9	10	11	11	10	10	11	10	11	13	13	9	10	10	10	11	11	9	10	11	11	10	
31	10	14	11	10	10	9	12	9	9	11	10	10	12	16	10	10	9	10	12	10	11		B	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	27	26	26	26	26	25	26	26	26	26	26	26	26	26	25	25	26	26	27	26	25	25	26	26		
MED	12	12	14	20	15	18	15	12	12	14	20	30	28	24	22	22	17	18	20	16	14		B	B	12	
U Q	20	19	22		B	B	B	B	B	B	B	B	B	B	56	58	58	59	31	B	B	B	B	B	B	
L Q	10	10	10	14	10	12	11	10	10	12	11	19	18	18	15	14	12	12	11	12	10	10	10	10		

IONOSPHERIC DATA STATION SHOWA-ST.

MAY 1999 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		A	B	B	B	A	A	B	B	B	B	B	B	B	B	B	E	B	B	A	A	A	A	A	
2		A	A	B	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	A	A	A	A	A	
3		A	A	B	B	B	B	B	A	B	B	B	B	B	E	B	250	200	200	222	B	B	A	A	
4	212	A	A	A	A	A	A	A	E	A		B							Q	E	B	B	B	B	
5	224	A	A	A	A	A	A	E	A	298	238	216	264	218	204	204	204	224	224	224	224	224	224	238	
6		A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	238	238	228	232	232	198	242	B	
7		A	A	A	A	A	B	B	B	B	E	B	B	B	B	B	B	B	B	206	214	230	206	B	
8		A	A	A	A	A	A	A	B	A	Q	250	232	212	222	218	220	256	202	B	E	B	Q	B	
9	200	F	A	A	A	A	A	A	A	A	A	230	220	202	214	224	200	238	230					230	
10	230	A	A	A	B	A	A	Q	Q	Q	288	314	246	214	206	210	208	198	198	192	192	192	210	220	
11		B	A	A	B	A	B	A	B	E	B	280	220	206	206	206	218	206	186	202	236	212	216	230	
12		B	B	A	A	A	A	A	B	A	A	234	234	220	188	190	204	210	216		B	C	C	A	
13	240	A	A	A	A	A	A	B	B	A	B	256	256	258	282					A	A	A	A	A	
14		A	A	F	A	A	B	A	A	A	E	A	284				234	246	258	210	242	B	B	B	
15	226	A	A	A	A	B	A	A	A	254	234	226	226	226	210	196	196	202	206	222				218	
16	214	A	B	A	A					Q	Q	222	316	270	234	242	210	216	196	202	200	166	212	224	224
17	244	A	A	A	A	A	B	B	E	B	264	230	228	208	212	212	210	200	202	186	208	210	238	228	
18		A	230	222	222	A	A	A	F	A	B	B	E	SE	BE	B	288	266	266	256	284	250	B	A	
19	234	A	A	A	A	B	B	B	E	B	308	248	226	218	218	216	224	210			B	B	B	A	
20		A	A	B	A	A	B	B	A	A	B	B	B	B	B	196	206			B	B	B	A		
21	208	A	A	B	A	A	A	212	B	E	B	B	264	218	208	210	202	206	202	190	202	196	226	B	B
22	212	Y	A	A	A				A	Q	Q	220	224	268	230	200	220	202	202	190	194	210	B	B	B
23		A	A	B	B	A	A		Q	Q	234	238	226	286	268	B	B	B	B	B	B	C	C	C	
24		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
25		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
26		A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
27		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
28		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	A		
29		A	A	A	A	A	A		Q		230	208	286	226	220	214	212	C	C	Q	E	B	S	A	
30		A	A	A	A	A	A	A	A	Q	238	208	232	216	210	206	190	190	Q	Q	E	B	A	A	
31	212	A	A	A	A	A	B	A	AE	B	220	220	254	216	210	218	192	202	174	210	186	208	204	232	270
		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	3	1	6	1	3	7	8	13	17	14	17	20	20	20	20	20	18	15	13	3	4	6
MED		212	226	222	224	226	208	222	226	270	242	229	211	215	212	206	200	200	210	210	223	225	213	206	217
U Q		228	235	234		234	238	288	292	268	245	216	226	222	222	222	224	217	223	224	230	239	264	232	268
L Q		204	213	212		220	220	212	265	232	220	208	210	204	202	193	191	203	200	216	213	206	199	214	

IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 1999 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	0 X 24	A O X 42	X O X 39	A	44	43	45	40	48	51	70	87	82	88	X O X 68	64	54	B	B	B	B	B O X 29		
2	A O X 43	49	93	B	A O X 46	53	50	49	60	53	X O X 81	B R	X R X 55	X	X C	C O X X 64	46	39	27	24	A	B	B	
3	52	76	A A	A O X 46	A	0 X 60	49	50	66	77	102	92	X X C X C	C O X X 64	46	39	31	26	X O X O X B	B O X 25				
4	0 X 23	X X 23	O X 24	C C	C C	C C	C C	C C	X O X 98	99	80	74	69	B	C C	C C	C C	C B						
5	B B	A A	A A	44	39	35	38	57	71	82	93	96	71	66	69	44	21	X O X A	B	Y	Y			
6	A A	A O X O X 32 29	31	34	36	36	38	50	68	74	98	83	56	50	54	33	27	O X B	B	B	A			
7	A A	R B	A O X A A	A A	A O X 29	X O X 48	67	84	91	81	61	45	47	41	33	X X Y	A Y B B							
8	44	37	A A	A O X 38	42	47	A B	B O X 55	70	B	X O X 82	91	78	64	62	37	30	38	O X B O X 33					
9	A A	43	A A	A A Y A	40	48	66	72	78	87	80	61	53	49	Y A A	Y A								
10	A A	B A	B B A	40	38	52	X B O X 86	X O X 90	80	X O X O X 64	70	44	B	B	B	B	B	Y						
11	0 X 24	A O X 23	23	26	27	34	32	36	33	48	B	X B	B O X O X O X 78 70	43	31	27	25	A A A						
12	A A	A B A A B	B O X 41	40	46	62	73	82	70	69	X O X R	X O X 56	42	B	B	A A A								
13	A A	A A A A A B A	36	40	45	57	X X B	B B	B O X 75	42	32	O X B B B B Y												
14	44	28	27	33	33	39	43	45	42	46	47	66	X B B 95	51	42	42	O X B B C C							
15	C A	36	30	36	37	39	36	36	38	48	68	65	82	75	53	36	30	33	27	30	Y Y O X 25			
16	A	37	57	50	54	68	68	68	68	67	49	53	68	88	88	70	56	57	46	34	34	45 27 26		
17	A X 26	55	A A A A X X	49	51	B O X O X O X 49	78	81	79	86	72	60	58	44	22	18	22	R R						
18	A A	X O X X X O X A	52	54	60	74	O X O X 86	O X O X 80	69	55	50	44	23	B	B	B								
19	A A	B A A	42	55	40	55	50	54	66	81	80	56	54	42	40	30	B	B	B					
20	O X 20	X X 24	26	28	48	43	48	63	53	58	66	65	67	71	80	60	51	52	42	26	20 23			
21	C C	24	26	36	38	30	30	44	58	63	75	67	52	42	34	32	28	X O X B B A						
22	A A	28	26	28	29	28	29	33	46	62	67	70	64	60	42	33	24	22	X B B B B					
23	X O X 18	27	48	A X 31	44	48	52	57	48	46	54	X B	X O X O X O X 80 88	69	47	44	30	A B A A A						
24	A A A A A A	A O X 40	44	46	47	60	69	86	79	80	48	X B O X B	B R O X A 44											
25	O X 38	X A A O X A	47	43	50	50	49	60	73	74	80	60	59	41	32	19	21	B Y						
26	X X 19	64	90	O X O X 47	50	56	60	51	68	74	B	R	74	102	104	B Y B Y A A								
27	A X 63	32	36	36	40	39	40	48	66	66	86	87	88	B R	B O X A 32									
28	A B A A A	A O X 36	58	B B A	X X B	B B B	B B B	B B B	B B B	B B B	B O X O X 64 78													
29	O X O X 37	A A B B	38	38	B B A O X C	X B B	X B B	X B B	X B B	X B B	80	B B B B B B												
30	O X 34	R O X O X X 26	26	26	34	34	34	31	38	51	64	77	C O X X C	X O X A Y	34 24	B O X 28								
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	13	12	17	14	14	17	20	22	24	24	26	25	24	26	22	24	26	25	23	17	9	6	3	6
MED	O X 34	X X 31	32	31	32	37	42	42	40	43	49	64	73	82	81	69	56	47	40	27	26	25	28	27
U Q	44	38	48	39	47	44	45	53	50	50	52	68	80	90	87	74	66	56	44	30	31	38	35	29
L Q	X X X 22	25	26	26	28	30	35	36	36	38	47	58	67	78	80	60	48	42	32	22	22	22	27	25

IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 1999 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

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 18	A 36	R 33	U 25	R 32	F 25	F 30	F 45	F 60	F 77	F 73	F 78	F 62	F 58	F 44	B F	R 23							
2	F 24	A 43	R 40	A 39	A 39	R 54	F 47	R 75	R 49	R 40	R 23	R 18	R 18	R A	R B									
3	A 60	F 40	A 50	A 43	A 38	R 59	F 71	R 96	R 86	R 58	R 40	R 32	R 25	R 20	R 19	R R	R C	R C	R C	R C	R C	R C	R B	
4	R 17	17 17	18 17	17 18	A A	A A	F F	F F	R R	R 92	R 93	R 70	R 65	R 60	R F	R Y	R Y							
5	B 31	B 29	A 28	A 30	A 51	A 65	R 76	R 87	R 90	R 63	R 56	R 55	R 38	R 15	R F	R A	R Y							
6	A 26	A 23	A 22	R 22	F 24	F 29	F 30	F 39	F 61	F 64	F 92	F 74	F 50	F 44	F 35	F 25	F 21	R B	R B	R B	R B	R B	R A	
7	A 23	A R	A B	A A	R A	A A	R A	R A	R 42	R 57	R 78	R 85	R 69	R 53	R 37	R 38	R 35	R 27	A A	Y A	B B	B B		
8	F 32	F 27	A 32	A 30	A 38	R F	F A	B B	R 49	R 61	F 76	F 78	F 72	F 54	F 56	F 26	F 21	F 32	R B	R B	R B	R B	R 27	
9	A 32	A 32	F A	F A	A Y	A A	F 30	F 40	F 57	F 66	J 72	J 81	J 74	J 55	J 47	J 36	F Y	A A	Y A	A A	A A	A A		
10	A 32	A B	B A	B B	B B	A A	F 32	F 30	F 46	R 80	R 84	R 74	R 58	R 64	R 38	R R	R B	R B	R B	R B	R B	R Y		
11	R 18	A 17	R 17	16 16	16 24	F 20	F 18	F 23	F 42	B 72	J 64	R B	R B	R 37	R 25	R 21	R 19	R A	R A	R A	R A	R A	R A	
12	A A	A A	B B	A A	A B	B B	R 35	R 33	R 40	R 56	R 67	R 76	R 64	R 63	R 38	R 31	R B	R A	R A	R A	R A	R A		
13	A A	A A	A A	A A	A B	A A	F 26	F 27	F 39	F 51	B B	B B	B B	B 69	B 32	B 26	R B	R B	R B	R B	R B	R Y		
14	F 23	F 20	F 19	F 22	F 23	F 24	F 33	F 33	F 38	F 38	F 60	B 89	J B	F 40	F 32	F 36	R R	R B	R B	R B	R B	R C	C C	
15	C A	F 26	F 19	F 21	F 22	F F	F 26	F 27	F 38	F 56	F 59	F 76	F 70	F 47	F 27	F 24	F 27	R 21	R 24	R Y	R Y	R 19		
16	A 26	F 39	F 38	F F	F F	F F	F 26	F 27	F 40	F 47	R 62	R 82	R 82	R 59	R 44	R 41	R 38	R 26	R 28	R 39	R 18	R 20		
17	A 20	A 35	A A	A A	A A	A A	R 43	R 45	R 43	R 72	R 75	R 73	R 80	R 66	R 54	R 48	R 38	R 12	R 12	R 16	R R	R R		
18	A A	R 26	R 20	R 20	R 23	R 25	R 26	R 39	R 42	R 53	R 68	R 75	R 74	R 61	R 44	R 41	R 32	R 16	R B	R B	R B	R B		
19	A A	A A	B B	A A	A F	A F	F 32	F 38	F 31	F 41	F 41	F 57	F 75	F 70	F 44	F 36	F 28	F 28	F B	F B	F B	F B		
20	R 14	F 18	F 16	F 20	F 21	F 22	F 22	F 20	F 23	F 35	F 59	J 61	J 65	J 74	J 54	J 42	J 42	J 32	J 20	J 14	J 17	R C	C C	
21	C C	F 14	F 15	A 21	A 29	A A	F 16	F 19	F 35	F 52	F 57	F 69	F 61	F 46	F 32	F 26	F 26	F 22	R B	R B	R B	R B	R A	
22	A A	F 18	F 19	F 19	F 19	F 19	F 20	F 20	F 34	F 53	F 56	F 60	F 53	F 54	F 31	F 22	F 16	F 16	B B	B B	B B	B B		
23	J F 12	R 21	F 34	A 25	A 34	A 37	F 37	F 41	F 34	F 48	B 74	J 82	J 63	J 41	J 38	J 24	R R	A R	B A	A A	A A	A A		
24	A A	A A	A A	A A	A A	A A	R 34	R 36	R 36	R 41	R 54	R 63	R 80	R 68	R 70	R 42	R 38	R 32	R 29	R A	R B	R R		
25	R 32	R 28	A 41	A 35	F 40	F 37	F 39	F 54	F 62	F 68	F 74	F 54	F 53	F 29	F 23	F 13	F 12	F B	F Y					
26	J S 13	S J 13	S A	A 41	A 44	R 43	R 47	R 39	R 36	R 36	R 62	R 65	R 66	R 68	R 94	R F	R B	R Y	B Y	A A	A A	A A		
27	A A	A 26	A A	F 28	F 25	F 32	F 27	F 34	F 38	F 56	F 60	F 81	F 80	F 81	F 82	B B	R B	R 26	R B	R A	R A	R A		
28	A A	B A	A A	A A	A A	R 30	R 32	R B	R B	R A	J 58	J 72	R B	R R	R R	R A								
29	R 31	R 34	A A	A B	B B	F 28	F 29	F B	F B	A 66	R 74	R 74	B 74	B 74	B B	C C								
30	R 28	R 20	R 20	R 20	R 20	R 25	R 23	R 25	R 28	R 45	R 58	R 71	R 68	R 38	R C	R 28	R 18	R A	R Y	R B	R B	R 22		
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	11	16	12	13	15	18	20	24	22	26	25	24	26	22	24	26	25	23	17	9	7	3	6
MED	20	21	26	20	21	23	28	32	30	30	40	56	64	75	74	62	46	38	31	20	20	21	22	21
U Q	26	28	34	24	28	32	33	38	38	37	43	60	74	84	80	68	58	46	36	24	25	32	29	23
L Q	16	18	18	18	20	21	25	26	26	27	38	52	60	72	70	54	40	32	25	16	16	18	19	

IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 1999 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	24	40	42	44	43	24	16	12	18	14	25	25	20	22	27	13	15	11	E	B	B	B	B	34						
2	38	42	42	50		42	41	28	17	14	18	8		BE	BE	BE	BE	BE				B	B							
3	36	89	76	41	78	45	44	35	31	45	22	24	41	30	C	CE	BE	BE	BE	BE	B	B	BE	12						
4	E S	11	23	21	27	24	C	C	C	C	C	C	CE	BE	BE	BE	BE	BE	B	C	C	C	B							
5	B	B				E	BE	BE	BE	BE	BE	BE		E	BE	BE	E	B			B		17	21						
6	28	40	38	40	26	28	26	16	17	18	31	37	18	18	36	25	20	16	16	16	16	B	B	39						
7	28	40	17		42	37	37	63	42	40	32	23	40	32	35	43	30	23	27	21	27	22		B	B					
8	E S	16	37	50	42	40	41	22	24	42			B	BE	BE	BE	BE	BE	BE	BE	BE	BE	B	41						
9	49	58	75	43	34	34	48	22	60	34	32	16	18	18	17	15	11	20	15	12	46	40	22	44						
10	41	40		34		B	B	B			40	40	22	22	E B	BE	BE	BE	BE	BE	B	B	B	16						
11	20	22	22	24	26	16	15	20	35	31	21		24	26			BE	45												
12	44	44	40		42	50			B	BE	B	E	BE	BE	E	BE	BE	BE	BE	E	B	B	22	35	38					
13	38	41	41	36	36	47		43	43	20	19	16		B	BE	BE	BE	BE	BE	B	B	B	B	17						
14	36	33	35	33	30	17	E F	SE	B	Q	11	13	36	18	18		BE	BE	BE	BE	BE	B	B	C	C					
15	C	31	23	40	34	33	20	10	10	11	22	18	15	18	14	14	12	20	11	10	11	16	17	18						
16	30	30	28	36	40	18	14	10	16	26	26	26	26	20	20	15	18	15	17	16	34	48	24	34						
17	36	34	39	44	42	50	48	39	37		B	E	B	31	57	19	21	17	18	E	BE	BE								
18	32	38	37	29	24	18	21	42	49	32	18	22	34	20	21	28	11	10	32	32	B	B	B	B						
19	42	42	103			E S	44	30	19	17	28	20	29	32	21	23	16	14	10	37	11									
20	23	16	31	32	19	14	22	56	20	18	22	15	18	39	19	10	24	18	10	13	14	30	C	C						
21	C C	36	37	96	60	106	55	23	16	23	20	36	23	15	22	14	12	12	11					20						
22	28	30	30	22	12	15	22	32	27	29	23	60	39	22	59	33	11	22	10	18	B	B	B	B						
23	22	21	40	46	39	36	26	27	23	20	22	14	E B	BE	E	B	E	B	E	B			B	22	37	40				
24	34	42	44	40	44	50	48	43	38	18	16	22	22	23	26	12	15		22				15	39	38					
25	39	35	47	75	68	45	42	44	33	29	24	23	23	16	16	10	14	18	16	17	E	B	B	10	17					
26	27	21	30	44	58	48	36	32	28	31	30		28	25	30	22	26	25		23			20	34	43					
27	34	44	68	73	42	33	20	40	26	24	24	23	18	25	30	13	12		29	31	34	43	36							
28	38		40	38	42	40	38	24	20		B	B	E	BE	B	B	B	B	B	B	B	B	20	33	36					
29	36	42	42	42			26	18		B	B	E B	CE	B	B	BE	B	B	B	B	B	B	B	C						
30	20	23	22	22	19	17	18	14	35	10	16	44	16	C	CE	BE	BE	C	15	10	16	24	39	23	B	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	27	27	29	27	27	26	28	28	25	27	26	24	27	23	25	27	25	24	20	13	17	12	21							
MED	34	38	40	40	39	36	26	28	26	21	22	22	19	23	20	18	15	17	16	16	20	22	34	34						
U Q	38	42	43	44	42	45	41	41	38	31	26	34	30	26	30	26	20	22	24	20	34	33	38	40						
L Q	24	30	30	33	26	18	20	17	18	15	18	18	18	20	17	14	12	14	12	12	14	18	20	19						

IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 1999 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	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	11	11	11	10	16	12	10	10	14	13	20	19	12	13	10	11	B	B	B	B	B	15	
2	11	10	12	16		24	12	11	12	11	14	8		32	25	24	13	13	12	9	7	11		B	
3	14	14	16	30	10	17	12	9	17	11	9	12	13	15			11	13	12	15	10		B	E S	
4	E S	12	10	10	12		C	C	C	C	C	C	C		25	58	26	19	22	B	C	C	C	B	
5	B	B		32	20	18	17	19	16	15	12	17	12	11	18	20	12	12	16	10	9	10	B	12	
6	15	12	15	16	10	10	9	8	9	11	11	10	10	12	11	9	11	16	16	16			B	15	
7	20	11	10		12	11	21	14	20	15	19	18	15	13	11	10	10	9	12	12	10	10		B	
8	E S	16	10	14	13	14	14	10	15	19			22	20		24	31	20	15	11	10	10	12	11	
9	11	23	15	11	10	10	19	15	12	11	15	11	12	11	10	10	11	10	8	8	9	9	11	24	
10	25	16		18				19	11	10	22		19	20	24	19	18	22		B	B	B	B	11	
11	10	10	10	10	10	10	10	10	9	15	21		24	27				22	15	15	10	10	10	15	
12	16	26	19		20	26			22	8	15	21	16	19	20	16	14	10	10			10	10	11	
13	14	11	25	13	23	22			12	10	12	10	12				30		16	12		B	B	B	10
14	E S	10	13	12	11	14	12	16	11	10	10	12	10		40			11	16	20		B	B	B	C C
15	C	10	12	10	8	10	10	10	10	11	10	10	15	18	14	8	10	12	11	10	11	10	11	10	
16	10	10	10	10	9	10	10	10	10	16	16	16	26	26	20	14	15	18	15	17	16	12	10	10	
17	10	11	10	21	15	14	10	10	11			26	57	14	15	11	18	10	15	26	10	8	9	10	11
18	10	10	11	10	10	9	10	10	14	10	10	10	34	20	10	11	11	10	10	9		B	B	B	B
19	11	10	16		12	18	12	10	9	10	10	14	13	11	10	10	10	10	10	10	11			C C	
20	E S	11	11	11	11	14	10	10	11	10	10	10	10	10	9	10	9	10	10	9	10	10	B	B	B
21	C C	10	11	11	10	11	9	10	10	9	10	10	10	10	15	16	14	12	12	12		B	B	B	9
22	E S E S	10	10	11	10	12	15	10	10	9	9	10	15	10	10	10	10	10	10	10	10		B	B	B
23	9	8	11	10	11	10	10	10	10	10	10	10	14		26	10	16	18	21	10	7		10	9	10
24	10	26	24	16	13	14	15	12	10	10	7	9	12	23	12	12	15		18			10	10	17	
25	10	10	9	10	13	11	9	20	10	10	10	10	10	10	10	10	10	11	10	10		10		10	
26	11	9	9	10	11	12	10	10	10	11	13		13	25	30	22	26	25		18		10	11	17	
27	25	16	14	13	13	11	10	10	10	24	18	16	12	25	30	13	12		26		10	10	11	18	
28	B	15	26	26	16	21	21	17	14		19	23	22		C	B	B	B	B	B	B	10	10	10	
29	13	13	11	26		13	12			21	48		32		B	B	B	B	55		B	B	B	C	
30	12	10	10	10	11	9	10	10	10	10	16	10	12		C	C	15	10	10	9	9	10		11	
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	29	30	30	30	29	29	29	29	29	29	29	28	29	28	29	30	29	30	29	28	29	27	27	
MED	11	11	12	12	12	12	10	10	10	11	14	13	14	19	15	16	12	15	12	12	11	12			
U Q	15	15	16	20	15	18	18	14	14	15	20	22	22	26	30	25	18	22	26		B	B	B	24	
L Q	10	10	10	10	11	10	10	10	10	10	10	10	12	12	10	10	10	10	10	10	10	10	10	10	

IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 1999 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			
1	E S	2 0 6	2 1 2	2 1 6	Q	A	S E S	E A	A	Q	2 5 0	2 0 8	2 1 4	2 0 4	2 0 8	2 1 0	2 0 6	1 9 8	B	B	B	B	B	F			
2	1 9 8	A	A	A	B	A	A	A	F	2 7 0	2 0 6	2 4 0	2 1 8	B	2 1 4	2 0 4	1 9 6	2 0 4	2 2 8	2 1 2	A	2 5 2	A	B	B		
3	A	A	A	A	A E A	A	F	A	F	2 4 4	2 5 2	2 5 0	2 3 0	2 0 4	C	C	1 8 4	2 1 0	2 2 4	2 4 0	2 3 8	B	B E S	2 7 2			
4	S	S	A	A	A	C	C	C	C	C	C	C	2 2 8	2 3 8	2 1 6	2 2 6	2 3 6	B	C	C	C	C	C	B			
5	B	B	A	A	A	B E B	E B			3 0 4	2 6 2	2 5 6	2 2 4	2 2 0	1 9 8	2 1 0	2 1 6	1 8 0	2 1 2	2 1 8	2 1 2	2 1 2	A	B	Y	Y	
6	A	A	A	A	A	A	A E A E A	Q	Q	2 7 4	2 6 2	2 2 0	2 1 4	2 0 2	2 1 0	1 9 0	1 8 2	2 0 2	2 0 6	2 3 0	2 4 2	F	F E B	B	B	A	
7	A	A	A	B	A	A	A	A	A	2 5 6	2 0 2	2 2 0	2 0 0	2 0 0	2 0 0	2 1 8	2 1 4	2 2 6	2 1 2	A	A	B	B				
8	S	2 1 2	A	A	A	A	A	A	B	B E B	2 6 6	2 1 4	B	2 3 0	2 1 2	2 1 2	2 2 2	2 2 2	2 3 8	A	2 3 2	B	2 3 0				
9	A	A	A	A	A	A	Y	A	A	2 3 0	2 1 8	2 1 0	2 1 4	1 9 4	1 8 4	2 1 6	2 0 4	2 0 4	A	A	A	A					
10	A	A	B	A	B	B	A	A	A E B	2 6 0	2 2 2	2 0 2	2 3 2	2 0 4	2 2 4	2 3 8	B	B	B	B	B	Y					
11	A	A	A	A	A	A	A	A	A	2 4 0	B	2 0 2	2 3 8	B	B	B	E B	2 2 4	2 4 2	2 7 0	2 4 0	2 2 6	A	A			
12	A	A	A	B	A	A	B	B	B E A	2 3 0	2 7 0	2 4 4	2 3 6	2 1 0	2 1 0	2 1 0	2 2 4	2 1 4	2 2 2	1 9 6	B	B	A	A			
13	A	A	A	A	A	A	B	A	A	2 8 4	2 5 6	2 1 4	B	B	B	2 0 4	B	2 2 4	2 2 4	B	B	B	B	Y			
14	F	F	A	A	A	A	S	B	A	2 5 4	2 1 0	B	2 3 8	B	B	2 1 4	2 5 0	2 2 6	B	B	B	C	C				
15	C	A	2 2 6	A	A	A	B	B	Q	Q	Q	Q	Q	Q	Q	Q	E B	E B	A	A	2 4 6	1 9 2					
16	A	F	F	F	2 2 2	2 0 2	A	A	S	S	S	B E B	2 6 8	2 3 6	2 3 2	2 0 0	2 0 4	2 2 6	2 3 8	2 1 0	2 4 2	2 9 2	2 2 2	F	A		
17	A	A	A	A	A	A	A	A	B	2 5 8	3 1 6	2 1 4	2 0 2	2 1 2	2 0 0	2 2 0	2 2 3	2 2 2	2 4 8	2 0 2	2 5 6	A	A				
18	A	A	A	2 3 2	A	A	A	A	Q	2 2 4	2 7 6	2 3 0	2 3 4	2 2 6	2 2 2	2 0 0	1 9 4	2 0 6	1 9 8	1 9 8	B	B	B	B			
19	A	A	A	B	A	A	A	Q	A	3 0 4	2 1 4	2 3 0	2 0 4	2 2 8	2 1 2	1 9 6	1 7 8	2 0 2	2 0 2	2 0 2	2 0 8	E B	B	B	B		
20	A	S	A	A	S	S	A	A E A	Q	2 9 4	2 4 2	2 2 8	1 9 6	1 9 6	1 9 8	2 0 2	1 9 0	2 4 2	2 2 6	1 9 6	2 1 8	E A	C	C			
21	C	C	2 6 2	3 0 8	A	A	A	A	A E A A	2 8 0	2 5 6	2 3 2	2 0 8	2 1 6	1 9 8	2 1 2	2 1 2	2 0 6	2 4 0	2 0 6	2 1 6	B	B	A			
22	A	A	A	A	S	S	S	A	Q	2 5 6	2 1 2	2 0 8	2 0 8	2 1 4	1 8 8	1 8 4	1 8 0	2 5 2	2 2 2	2 0 2	B	B	B	B			
23	A	S	F	A	A	2 0 6	A	A	A	Q	B	2 2 4	2 4 8	2 6 4	B	2 2 0	2 2 0	1 8 8	2 2 0	2 4 4	2 4 4	A	B	A	A	A	
24	A	A	A	A	A	A	A	A	2 2 0	2 0 8	1 9 4	2 2 6	2 2 6	2 1 0	2 0 8	1 9 6	2 1 2	2 2 4	B	2 5 2	B E A	2 4 8	2 3 6	A			
25	2 1 4	2 1 0	A	A	A	A	A	A	Q	2 0 8	2 0 6	2 4 8	2 7 0	2 1 6	2 0 0	2 0 4	2 1 0	1 7 4	1 8 4	2 0 2	2 0 0	2 6 0	A	E B	B	A	
26	A	A	A	A	2 2 8	2 1 4	2 5 0	2 2 6	A	A	A	B E A	B	2 7 8	2 6 0	2 4 8	2 6 8	2 9 0	2 1 8	Q	B	A	B	A	A	A	
27	A	A	A	A	A	A	A	A	Q	2 3 2	2 2 8	B	A	Q	2 6 2	2 0 2	2 1 8	2 0 8	2 4 2	2 7 8	B	2 5 8	2 1 0	A	A	A	
28	A	B	A	A	A	A	A	A	B	2 6 2	2 5 4	B	B	B	B	B	B	B	B	B	B	B	B	A	2 2 2		
29	E	A	A	A	B	B	2 3 4	A	B	B	A	2 8 6	2 3 6	C	B	B	E B	B	B	B	B	B	B	B	B	C	
30	A	A	A	A	A	A	A	A	Q	2 8 6	2 6 4	2 2 6	2 2 0	2 0 2	C	C	1 8 8	1 8 8	C	2 0 4	A	A	A	B	2 1 4		
31																											
	0 0	0 1	0 2	0 3	0 4	0 5	0 6	0 7	0 8	0 9	1 0	1 1	1 2	1 3	1 4	1 5	1 6	1 7	1 8	1 9	2 0	2 1	2 2	2 3			
CNT	4	3	3	4	3	3	5	6	1 4	1 4	2 2	2 5	2 4	2 7	2 3	2 5	2 7	2 5	2 4	1 6	8	8	2	3			
MED	2 1 6	2 1 0	2 2 6	2 2 7	2 1 2	2 1 0	2 3 3	2 4 2	U	U	U	2 3 5	2 4 2	2 1 8	2 1 3	2 1 2	2 1 0	2 0 0	2 0 9	2 2 4	2 2 0	2 1 8	2 2 8	2 2 4	2 2 9	2 2 2	
U Q	2 2 6	2 1 2	2 6 2	2 7 0	2 2 8	2 7 0	2 7 7	3 0 4	E A	E A	2 6 4	2 5 6	2 5 6	2 2 5	2 2 8	2 2 0	2 1 2	2 2 4	2 3 8	2 2 8	2 4 2	2 4 9	2 6 4	E S	2 7 2		
L Q	2 0 6	2 0 6	2 1 2	2 1 9	2 0 2	2 0 6	2 2 0	2 2 6	2 2 8	2 2 4	2 2 8	2 0 8	2 0 2	2 0 4	2 0 0	1 8 7	1 9 4	2 1 2	2 0 4	2 1 0	2 1 6	2 2 4	2 1 4				

IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 1999 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	28	0	X	X	X	X	X	R	A	O	X	B	B	X	O	X	X	70	68	66	38	A	A	B	B	A
2	46	29	29	30	31	42	47			48	87	75	94	70	68	66	38									
3		48		A	X	A	A	A			B	B	B	B	B	B	B	76	72	28	O	X	A	A	A	
4																										
5																										
6																										
7																										
8																										
9																										
10																										
11																										
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23																										
24																										
25																										
26																										
27																										
28																										
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	10	13	16	13	11	14	15	20	19	22	19	17	21	22	25	23	24	25	23	10	4	4	5	6		
MED	0	X	X		X	X					X	X	X	X	X	X	X	X	X	O	X	X				
U Q	38	33	36	42	39	42	40	42	41	40	49	63	71	74	82	70	58	53	39	28	50	34	30	38		
L Q	0	X	X	X	O	X					O	X	X	X	X	X	X	X	X	O	X	X	X			

IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 1999 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 17	R 23	23	24	25	36	41	R	A 42	R 81	B 69	BJ 88	R 60	F 57	F 54	F 30	A A	A A	B B	B B	A A	B B	A A			
2	R 40	A 42	R 33	A 33	R	A 32	A 32	F R	F B	B B	B B	B B	B B	R B	R B	R B	R B	A A	A A	A A	A A	A A	A A			
3	A A	A A	B B	A B	B B	A A	F F	R F	B B	BU R	R B	B B	B B	J R	B B	J R	B B	B B	B B	B B	B B	B B	R 19			
4	Y 24	A 24	A 25	R 26	R 20	22	23	28	30	57	70	84	79	44	39	43	29	20	R Y	B Y	A A	Y A	Y Y	Y A		
5	A 16	F 15	F 16	R 22	R 19	19	21	25	26	41	54	62	72	83	58	48	33	22	A A	Y A	Y Y	Y Y	Y Y	Y Y		
6	R 18	A A	A A	A B	B B	A A	A B	A A	AJ R	RJ R	RJ R	RJ R	RJ R	R 44	R 45	R 24	R B	B B	B B	B B	B B	B B	A A			
7	A 25	A 28	F 30	F 30	F 29	F 30	F 30	F 33	F 35	F 59	F 80	F 64	F 67	F 53	F 38	F 30	F 20	R B	B B	B B	B B	B B	B B	Y Y		
8	B 22	F 16	F 15	A 27	A 30	F 26	F 30	F 37	F 57	F 62	F 66	F 78	F 89	F 66	F 58	C C	C C	A A	A A	A A	A A	A A	A A	A A		
9	A A	A A	A A	B A	A A	F 25	F 28	F 29	F 38	F 57	F 62	F 66	F 76	F 58	F 42	F 38	F 28	R B	B B	B B	B B	B B	B B	30 R		
10	R 20	A A	A A	A A	R 30	F 30	F 31	F 30	F 42	F 49	F B	F B	F B	F 64	F B	F B	F B	R B	B B	B B	B B	B B	B B	A A		
11	A 26	A R	A A	R 36	F 30	F 30	F 32	F 30	F B	F B	F B	F B	F 74	F 69	F 62	F 56	F 26	B B	B B	B B	B B	B B	B B	Y A		
12	B A	A A	A A	B A	A A	B B	A B	B A	B B	B B	R R	B B	B B	B R	R 48	R 32	R 18	A A	R A	A C	33 A	33 C	33 A			
13	R 40	A R	A A	B A	A A	A A	R 33	R 43	R 58	R 62	R 75	J 76	R 44	R 37	R 44	R 26	F B	B B	A A	F F	26 18	26 18	26 18	26 18		
14	B 22	A 20	R 22	A 23	R 25	F 20	F 25	F 40	F 59	F 65	F 76	J 61	R 66	R 41	R 30	R 29	A A	R B	B Y	A R	B Y	A A	Y A	Y A		
15	F 30	R 20	R 18	A 39	A 40	R 40	F 34	F 34	F 34	F 57	F 71	R 68	R 68	R 48	R 32	R 18	R 33	R 28	R B	B B	B B	B B	B B	B B	R 24	R 24
16	R 32	A 40	R 40	A 35	A 30	R 27	F 26	F 43	F 55	R 68	R 65	R 66	R 62	R 41	R 33	R 28	F Y	B Y	B B	B B	B B	B B	B B	B B	B B	
17	Y 17	A 48	R 36	F 34	F 32	F 29	F 26	F 41	F 55	F 54	F 58	F 65	F 67	F 45	F 32	F 26	F F	F B	B A	B A	B R	B R	B R	B R	B R	
18	A A	A A	A A	17	25	32	34	30	25	35	47	59	58	66	54	42	44	31	18	S A	R R	R A	22 R	22 R	22 R	
19	A B	B A	A 38	A 35	A 34	R C	C C	C C	C C	C C	C C	C C	C C	C B	F Z	F B	B B	B B	B B	B B	B B	B B	B B	B B		
20	Y 18	R 30	F F	J 61	R 70	R 77	R 61	R 64	R 50	R 41	R 21	B B	B B	Y Y	Y Y	Y Y	Y Y									
21	A A	A 44	R 44	U 46	S A	A A	A F	F F	F F	F F	F B	F 66	F 74	F 69	F 60	F 48	F 26	R 17	R 13	A A	A A	A A	A A	A A	A A	
22	A 32	30	R 26	F 44	F F	R R	J R	R A	B B	B B	B B	R 56	R 54	R 59	R 55	R 22	A A	F A	A A	A A	A A	A A	A A	A A	A A	
23	A A	A A	A A	A A	A B	B B	B B	R 27	R 39	R 50	R 57	R 64	R B	R B	R B	R B	R B	R 36	R 36							
24	A 24	R 33	R 44	A R	B B	B A	R 40	R B	R 46	R 60	R 63	R 65	R 81	R 86	R B	R B	R B	R B	R B	R B	R B	R B	R B	R B	A A	
25	A A	A A	A A	A A	B B	B R	B B	R 41	R B	R B	R B	R 74	R 80	R 76	R 54	R 48	R B	R B	R B	R B	R B	R B	R B	R B	A A	
26	R 34	A A	A A	A A	A A	F 32	F 29	F 32	F B	F B	F B	R 71	R 74	R 63	R F	R R	R B	R B	R B	R B	R B	R B	R B	R B	R 18	
27	J 21	R A	A A	R 42	R 39	R 32	R 30	R 32	R B	R B	R B	R 70	R 68	R 74	R 60	R 58	R 44	R 23	R B	B B	R A	R A	R A	R A	R A	R A
28	A A	A A	R A	R 36	R 25	R 26	R 26	R 36	R 41	R 62	R 66	R 68	R 95	R 54	R 47	R 43	R A	A A	A A	A A	A A	A A	A A	A A	A A	
29	A 27	R 36	A 32	A A	A A	A A	A F	R 37	R 45	R B	R 71	R 73	R 84	R 58	R 43	R 38	R B	B B	B B	B B	B B	B B	B B	B B	Y Y	
30	Y 23	F 23	F 19	A A	A A	A A	A R	B B	B B	B B	B B	B 60	B 97	B B	B B	B B	R A	R A	R A	R A	R A	R A	R A	R A	44 A	
31	A 27	A A	B A	B A	B B	A B	B B	B B	R 44	R 41	R 54	R 52	R 53	R 51	R 43	R 33	R B	R B	R B	R B	R B	R B	R B	R B	34 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	9	9	16	11	8	12	15	18	19	22	19	17	21	22	25	23	24	25	23	9	2	3	4	5		
MED	30	23	26	28	28	36	30	30	29	30	41	57	62	67	74	61	52	44	30	21	21	24	22	30		
U Q	37	26	32	40	32	36	34	32	31	33	43	58	70	72	80	69	60	49	38	24	33	35	35	35		
L Q	19	19	20	20	24	26	25	25	26	26	38	50	60	64	66	54	42	36	26	18	22	18	21	21		

IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 1999 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	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	22	23	29	38	39	41	42	42	44	41	B	B	E	B	E	B	E	B	E	35	40	38	B	B					
2	44	44	37	41	41	44	39	41	31		B	B	B	B	B	B	B	E	B	26	32	28	43	43					
3	46	40		36			35	32	34	32	B	B	E	B	B	B	E	B	B	B	B	B	29	19					
4	18	32	38	26	35	32	32	24	34	14	14	16	28	17	20	22	22	22	15	16	12	18	B	18	23				
5	27	26	32	41	60	47	36	18	15	15	12	18	28	25	27	24	24	20	18	33	17	32	23	18					
6	28	31	37	40	46			42	37		B	E	B	E	B	B	E	B	E	B	B	B	B	31					
7	24	42	34	30	31	29	38	31	28	23	17	21	19	19	18	19	11	18	16					18					
8	B	E	S	15	28	29	40	34	20	16	14	14	11	15	31	16	22	26	19	16	C	C	C	48	50	86			
9	44	41	37	33				38	41	31	22	21	30	26	17	17	20	15	15	17	14	20	B	B	B	15			
10	26	29	39	48	44	47	44	23	18	16	14	20		B	B	E	B	B	B	B	22			33	32				
11	38	34	36	44	48	42	27	24	12	22	E	B	B	B	E	B	E	B	E	31	44	16	B	19	40				
12	B								B	B		B	B	E	B	B	B	E	B	22	16	19	39	39	42				
13	45	40	32	40		62	42	40	47	26	E	B	E	B		E	B	E	B	B	B		31	31	23				
14	B	E	S	32	17	27	34	35	38	22	15	23	32	28	28	36	18	36	50	36	47	27	22		22	41			
15	41	30	31	40	49	44	42	41			B	B	B	E	B	B	B	B	B	B	B	B	33	43	36				
16	38	34	38	42	45	50	40	29	18	30	27	23	20	23	22	32	21	14	27	22		B	B	B	20				
17	18	33	37	41	42	36	23	30	25	21	24	28	34	26	18	21	14	36	20	13	21	E	S	B	B	34			
18	44	43	32	38	32	23	31	45	38	22	29	34	22	29	30	41	36	22	14	31	32	22	24	44					
19	84		31	44	49	40	23		C	C	C	C	C	C	B	E	S	E	S	B	B	B	B	B					
20	E	S	E	S	E	S	E	S	E	S	E	S	E	S		E	S			E	B	B	B	B	18	28			
21	32	36	28	34	48	54	48	34	17	29	19	21		B	E	B	E	E	B	22	26	13	18	13	35	58	60	42	
22	41	36	58	42	42	37	32	41	31	48	B	B	B	E	B	B	E	E	B	22	12	20	18	22	36	59	42	43	38
23	73	42	40	41	38	39			B	B	E	B	E	B	S	B	B	B	B	19	18					23	41		
24	36	32	39	41	43		B	B	39	42	B	12	27	24	24	28	18	E	B	B	B	B	B	B	B	30			
25	40	38	36	42	40		B	B	36		B	E	B	B	B	23	27	23	14	12						39			
26	38	44	32	35	46	46	42	31	20	15	B	B	E	B	E	B	B	E	B	B	B	B	B	16	27				
27	18	21	40	42	48	44	56	44	33	28	B	B	E	B		58	23	25	26	22	14	24	17		19	28			
28	23	38	34	29	43	40	34	34	17	13	16	23	20	26	31		E	B	E	B	E	B	B	31	44	78	86		
29	72	66	57	41	37	76	73	42	42	41	27		30		E	B	E	B	E	B	27	24	20			15	18		
30	27	31	33	49	53	27	43	50	45	40	B	B	E	B	E	B	B	E	B	60		40	33	48	40	43			
31	133	73	36			36			38		B	B	B	E	B	E	B	E	B	21	29	21	18	33	46	41			
	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	30	30	30	28	25	26	29	25	24	21	18	21	22	25	23	24	26	23	16	13	13	22	28					
MED.	38	35	36	40	42	40	38	34	31	22	20	22	26	24	23	24	22	20	18	22	32	39	30	35					
U Q	44	42	38	42	47	46	42	42	38	31	31	28	30	28	29	30	26	26	22	32	38	46	43	41					
L Q	25	31	32	34	38	34	32	26	18	16	14	20	22	23	20	20	19	16	16	16	20	32	19	25					

IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 1999 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	14	15	11	11	10	10	18	15	14	B	B	39	18	13	20	26	20	15	25	10	B	B	10	
2	12	12	11	20	14	25	15	10	10	B	B	B	B	B	B	B	27	12	11	10	10	10	15		
3	15	12	10	B	B	16	10	10	10	B	B	B	B	B	B	B	32	B	B	B	B	B	10		
4	10	10	10	10	12	12	10	10	9	9	10	10	10	11	20	22	22	16	16	12	9	B	11	10	
5	10	10	10	10	10	10	9	9	9	10	12	18	9	25	24	25	88	13	13	11	10	10	10		
6	10	10	25	14	20	B	B	24	24	24	29	26	22	74	56	B	22	30	19	B	B	B	11		
7	11	10	10	10	11	10	12	9	10	10	17	21	20	18	14	19	8	18	16	B	B	B	10		
8	B	E	S	15	10	10	25	25	11	10	9	10	11	8	10	16	22	26	19	16	C	C	C	12	
9	10	18	20	12	B	26	13	14	13	11	15	12	8	17	18	15	15	8	14	20	B	B	B	11	
10	E	S	12	10	10	12	15	11	10	10	10	10	10	B	B	B	B	26	B	B	B	15	B	E	S
11	10	10	10	13	20	10	9	10	12	10	B	B	B	B	B	B	33	29	19	18	16	B	B	12	
12	B	8	30	26	24	B	27	22	B	B	B	B	B	24	53	B	B	22	16	12	14	14	E	S	C
13	16	26	20	21	B	18	33	26	16	26	36	15	17	15	26	26	20	16	13	B	B	E	S	E	
14	B	E	S	E	S	14	17	14	14	16	15	12	15	14	9	11	11	16	10	9	10	18	11	14	11
15	10	10	9	10	18	15	9	9	B	17	12	B	B	B	22	54	B	B	B	B	B	11	10	9	
16	11	28	27	16	16	11	10	12	18	11	9	11	14	14	12	18	21	14	14	14	B	14	B	B	
17	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	B	B	11	
18	12	14	11	11	9	11	11	11	10	9	11	26	16	12	12	12	13	11	14	14	10	E	S	14	
19	B	15	10	11	26	12	13	E	S	C	C	C	C	C	C	B	E	S	E	S	B	B	B	B	
20	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	B	E	S	
21	15	13	13	13	15	14	14	14	9	14	14	13	B	28	21	14	26	13	8	10	8	18	10	10	
22	10	10	9	9	10	11	24	13	12	15	B	B	B	22	8	20	18	14	10	8	8	11	19		
23	9	15	12	9	9	10	B	B	B	12	17	13	25	28	B	B	B	11	18	B	B	B	B	10	
24	9	9	10	11	24	B	B	20	11	B	8	14	11	24	12	18	B	B	B	B	B	B	B	10	
25	10	16	13	12	18	B	B	25	B	B	26	B	15	14	14	14	12	B	B	B	B	B	B	10	
26	10	12	19	30	14	22	17	12	12	11	B	B	24	22	24	36	B	B	B	B	B	B	9		
27	8	9	9	12	13	11	12	10	10	11	B	B	58	15	15	12	11	14	11	10	B	B	12		
28	15	12	8	8	20	12	10	9	9	8	10	19	20	26	30	21	20	19	B	14	10	22	9		
29	12	10	16	13	15	14	12	18	16	11	15	B	30	34	14	27	24	13	B	B	B	B	9		
30	9	8	6	29	14	14	28	15	18	29	B	B	22	60	B	B	B	B	B	9	9	8	14		
31	58	14	9	15	B	B	B	25	B	B	20	26	28	23	29	12	30	21	12	10	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	30	30	30	30	30	30	30	31	31	31	31	30	30	30	31	31	30	
MED	11	11	10	12	15	14	12	12	12	12	16	20	22	24	22	22	21	18	16	22	B	B	12	10	
U Q	15	14	17	14	20	25	27	18	18	26	B	B	B	B	B	B	B	B	B	B	B	B	14		
L Q	10	10	10	10	13	11	10	10	10	10	11	13	13	15	14	14	14	13	13	12	10	12	10	10	

IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 1999 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	214	208	A	204	A	A	A	B	B	214	194	184	188	212	222	222	A	A	B	B	A		
2	200	A	210	A	210	A	A	A	210	B	B	B	B	B	B	B	234	222	A	A	A	A	A			
3	A	A	B	A	B	B	A	188	198	A	B	B	B	B	B	264	228	B	B	B	B	B	A			
4	A	A	A	A	196	194		A	A	Q	242	176	212	200	210	186	172	210	210	210	212	E	B	Y		
5	A	A	A	A	A	A	A	300	278	260	198	200	184	236	204	198	226	214	A	A	A	A	A			
6	206	198	A	A	A	B	B	A	A	B	A	A	E	B	E	B	B	A	B	B	B	B	A			
7	A	AE	A	284	230	230	234	A	272	254	254	256	220	224	214	206	218	240	206	252	E	B	B	B	Y	
8	BE	SE	A	A	A	A	A	A	A	Q	Q	Q	256	226	212	220	220	214	218	218	212	C	C	C	A	A
9	A	A	A	A	B	A	A	A	A	268	242	212	210	214	200	224	232	E	BE	B	B	B	B	A		
10	A	A	A	A	A	A	A	260	266	216	196		B	B	B	206	B	B	A	B	B	A	A			
11	208	A	210	A	E	A	A	Q		B	B	B	258	214	222	224	226	QE	B	B	B	A	A			
12	B	A	A	A	B	A	A	B	B	A	B	B	B	B	B	B	234	238	A	A	A	C	210			
13	220	A	A	A	B	A	A	A	B	E	B	252	222	206	208	202	216	300	214	190	E	A	Q	B	B	
14	B	A	S	S	A	A	A	S	S	A	Q	208	230	198	210	182	204	198	238	208	A	A	B	A	A	
15	A	A	A	A	A	208	A	A	B	A	A	B	B	B	242	242	B	B	B	B	B	A	A	202		
16	210	A	A	A	A	232	198	A	B	E	A	276	268	212	202	216	204	198	228	204	Q	A	A	B	B	
17	A	A	A	A	A	208	S	S	S	S	Q	210	214	198	198	198	198	218	206	196	204	208	S	B	B	A
18	A	A	A	Q	210	212	A	A	A	A	Q	240	222	212	200	210	202	218	194	206	206	A	A	S	A	A
19	A	B	A	S	A	A	S	C	C	C	C	212	208	192	208	190	186	190	192	198	Q	Q	B	B	B	
20	Y	S	S	S	S	S	S	SE	S	Q		250	226	192	208	192	188	186	236	190	178	210	S	B	B	Y
21	A	A	S	A	A	A	206	Q	Q	Q	B	210	226	212	232	260	224	230	196	234	202	202	216	A	A	A
22	A	A	248	246	218	F	A	A	A	A	B	232	232	260	B	B	B	266	262	268	238	226	200	A	A	A
23	A	A	A	A	A	A	B	B	B	A	B	308	254	224	238	226	S	B	B	B	Q	B	B	B	A	
24	A	AE	A	A	A	B	B	A	A	B	Y	212	226	204	196	212	218	B	B	B	B	B	B	B	A	
25	A	A	A	A	A	B	B	A	B	B	E	242	242	216	228	204	202	186	B	B	B	B	B	B	A	
26	230	A	A	A	A	A	A	266	276	Q	B	B	224	234	B	252	252	B	B	B	B	A	A			
27	A	A	228	210	210	A	A	A	210	B	E	272	206	194	194	230	222	210	220	B	B	A	A			
28	A	A	A	222	216	A	A	Q		218	238	242	234	214	246	222	238	252	238	B	A	A	A			
29	A	A	254	A	A	A	A	A	A	236		226	226	216	226	212	212	212	212	B	B	B	A			
30	200	210	A	A	A	A	A	A	B	B	Y	203	203	203	200	196	211	204	205	210	218	A	200			
31	A	A	224	B	A	B	B	A	B	B	A	240	234	246	218	202	240	244	B	A	A	A	218			
	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	6	10	8	6	7	3	5	10	14	16	16	20	21	25	23	24	26	21	6	2	2	2	3		
MED	209	229	U	222	216	210	210	201	232	240	249	231	221	212	212	214	204	222	216	215	212	209	208	224	218	
U Q	225	254	E A	284	226	212	216	228	286	266	266	253	228	232	225	235	218	237	238	239	220			234		
L Q	203	212	210	212	208	208	198	199	210	236	215	206	203	203	200	196	211	204	205	210			202			

JUL. 1999 h'F (KM)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 1999 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	B	A	A	0	X	A	A	B	O	X	X	X	X	X	X	X	X	O	X	Y	A	A					
					40	48				44		74	75	74	79	63	50	53	32	24								
2	0 24	X	A	O	X	X	O	X	A	A	B	B	B	B					B	R	B	Y	A	R				
				25	26	27	37								102	97			90									
3	A	A	B	O	X	A	A	A		35	54	54	61	75	75	93			B	R	B	X	O	X				
					40														58	38	35	32	24	24				
4	R	O	X	O	X	O	X	O	A		B	B	B	O	X	X	X	X	X	X	O	X	O	X				
		33	37	46	42	38			63					52	86	79	80	82	74	59	44	32	24	24	28			
5	A	69	44	42					A	A	A	A		X	O	X	O	X	X			B	R	O	X			
														52	58	66	79	99	87	90	83	81	86	64	35	29		
6	A	A	B	A	A	X				41	48	54	41	47	X	O	X	X	X	X	O	X	X	A	R	A		
														58	74	87	93	92	80	72	90	67	83					
7	A	A		A	A	A	B	A	A	B	B	B	B	B	X	X	B	O	X	X	B	A		A				
					62														76	78	86	50	31		58			
8	0 39	X	A	A	A	O	X			44	36	41	58	41	49	61	87	87	91	92	97	68	54	38	B	A	A	
9	A	B	A	O	X	B	A	O	X	R	A	B	B	B	B	X	O	X	B	B		X	R	A				
					40				50												76	30						
10	A	A	A	O	X					35	38	41	40	35	37	48	66	72	68	73	79	65	67	64	53	34	23	
																								0	X	A		
11	0 56	X	O	X		B	A	A	A		52	55	61	76	77	87	75	81	97	80	48	39	28	22	22	A		
				41	50	57																						
12	A	O	X		A												B	B	X	O	X	O	X	B	A	A		
					59	65												79	79	99	98	82	68	49	34			
13	89	92		A	A	A	A	B	A	A	B	O	X	O	X	X	X	O	X	B		A	O	X	A			
												52	67	73	72	75	78							27				
14	A	A	A	C	C	A	X			36	43	46	46	62	65	75	90	77	88	66	60	44	32	24	18	20	A	
																	B	X	O	X	X	X	X					
15	0 25	X	O	X						55	62	43	44	42	44	32	61	74	72	86	83	94	80	91	80	51	28	A
				24																						51		
16	0 50	X	A		A	A					49	48	53	51	55	54	56	X	B	B	B	X	B	R	O	X	A	
																							36	42				
17	A	O	X		A	B	B	A	B		B	B	B	B	B	B	B	B	B	B	B	O	X	Y	R			
					43														69	76	48			40				
18	A	A	A						B	B	B	B	B	B	B	B	B	B	B	X	B	B	A	R	A			
									44	40									87	79	74							
19	A	O	X		A	A	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	X	Y	R			
					48																		34					
20	A	B	A	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	O	X	36	32	35		
21	A	B	C	C	C	C	C	C											80	70	66	54	53					
22	B	B	Y	Y	Y	A	Y			35	45	50	X	B	B	B	B	B	B	B	X	O	B	A	A	A		
23	A	B	A		39	A	A	B	B	B	B	B	B	B	B	B	47		106	R	B	85	68	A	39	46	43	
24	A	O	X		43	38	A	B	B	A	A	A	B	B	B	B	B	B	B	X	O	X	Y	A	A	A		
																			100	52	62		36					
25	B	B	B	A	A	A	O	X		45	46	55	57	74	84	83	87	68	69	72	74	51	32	27				
26	A	A	B	B	A	O	X	B	A	B	B	O	X	X	X	X	X	X	O	X	X	A	62	35				
																	49	57	66	74	87	90	93	104	94			
27	A	B	A	A	A	B	B	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	X	A	27			
28	A	B	A	B	A	B	A	B	Y	B	B	B	O	X	X	B	B	B	B	O	X	B	Y	A	A			
																	74	86				100	75	42				
29	A	A		56					B	B	O	X	R	O	X	B	B	X	B	B	X	O	X	X	A	A	A	
														40	42													
30	A	B	A	A	41	44	O	X	B	B	O	X	X	X	B	B	B	B	B	X	X	O	X	S	S	Y	Y	
														48	64	74	80											
31	A	A	A	B	A	A	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	X	103	79	41	48		
	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	9	10	9	9	12	9	11	14	13	12	15	16	17	15	21	21	23	27	22	16	10	11	4				
MED	O	X	O	X	41	43	52	40	41	41	42	44	46	50	61	74	76	86	80	83	80	74	62	37	31	27	28	36
U Q	56	64	60	52	44	45	48	54	51	55	64	76	86	90	90	92	92	90	79	53	38	38	46	47				
L Q	O	X	O	X	X	X	X					X	O	X	X	X	X	X	X	O	X	X	O	X	O	X	X	

IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 1999 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

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	R	A	A	B	R	B	R	J	R	F	F	F	F	R	Y	A	A										
					29	42			38			68	69	68	69	57	38		26	18												
2	R	A	R	R	R	R	A	A	B	B	B	F	J	F	B	B		B	R	B	Y	A	R	R								
	18		19	20	21	31						91	91			80																
3	A	A	B	R	A	A	A	F	F	F			F	J	R	B	R		52	32	29	26	18	18								
					34			27	32	39	55	69	65	87																		
4	R	R	R	R	R	F	A		B	B	B	46	80	73	74	76	68	53	38	26	18	18	22	A								
	27	31	40	36	29			32				46	80	73	74	76	68	53	38	26	18	18	22									
5	A	A	A	F	A	A	A	A	F	F		40	46	60	73	93	81	84	77	72	78	54	24		23 24							
					30							40	46	60	73	93	81	84	77	72	78	54	24									
6	A	A	B	A	A	F	F	F	F	J	R	J	R	R	J	R	J	R	R	84	61	20										
					35	28	25	27	41	52	68	81	87	86	74	66	84	61	20													
7	A	A	A	A	A	A	B	A	A	B	B	B	B	B	J	R	B	R	R		B	A	A	A								
															70	72		80	44	25												
8	R	A	A	A	R	F	F	F	F	J	R	R			J	R	J	R	B	J	R	R	B	A	A							
	33				38	28	31	29	31	43	55	81	81	85	86	91				62	48	32										
9	A	B	A	R	B	A	R	D	R	A	B	B	B	B																		
					34			44	67																							
10	A	A	A	R	F	F	F																									
					29	29	31	22	22	31	42	61	66	62	67	73	56	57	56	44	22	12	11	21								
11	R	R	F	B	A	A	F	F		J	R	J	R	F			F	F	F	F	F	R	R	A								
	24	35	44	50				42	47	55	70	71	81	64	75	84	67	36	26	16	16	16										
12	A	R	F	A	F	F	F		F	F	B	B			F	R	R	F	F	R	B	A	A	A								
	53	53			27	32	33	29	26	36			73	69	93	92	72	60	43	28												
13	A	54	A	A	A	A	B	A	A	A	B	R	R	R	J	R	R	B	F	B	A	R	A	A								
												46	61	67	66	69	72		41				21									
14	A	A	A	C	C	A		30	31	31	40	56	59	69	84	71	82	60	54	38	22	16	12	14	A							
											F	B	J	R	R	R	J	R														
15	R	19	18	40	27	33	32	34	22		55	68	66	80	78	88	74	80	74	39	18					45						
16	U	R	A	F	A	A	F	F	F	F	J	R	B	B	B	J	R		B	R	R	A	A	A								
	44					40	39	42	40	44	48	50										30	36									
17	A	R	37	A	B	B	A	B	B	B	B	B	B	B	B	B	B	63	70	42	R	Y	R	A	A							
																							34									
18	A	A	A	A	F	B	B	B	B	B	B	B	B	B	R	J	R	81	73	68	B	B	A	R	A							
						30																										
19	A	R	42	A	A	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	Y	R	A						
																									28							
20	A	B	A	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	R	R	R	R	A							
																					30	21	33	32	29							
21	A	B	C	C	C	C	C	C	B	B	B	B	B	B	B	J	R	74	62	58	48	47										
22	B	B	Y	Y	Y	A	Y		25	36	44	B	B	B	B	B	B		68	73	R	B	A	A	A	A						
23	A	B	A	F	A	A	B	B	B	B	B	R	B	B	B	F	D	R	B	A	F	A	R	R	R	R						
					31							41				98	44				54	30	40	37								
24	A	R	37	25	F	A	B	B	A	A	A	B	B	B	B	B	B	94	46	53	26	F	A	A	A							
25	F	B	29		B	A	A	A	R	39	40	49	51	68	78	77	81	62	61	62	64	41	26	16								
26	A	A	B	B	A	R	B	A	B	B	R	R	J	R	J	R	J	R	U	S	J	R	A	R	25							
												43	51	60	68	81	84	87	98	88												
27	A	B	A	A	A	B	B	A	A	B	B	B	B	B	B	B	J	R	J	R	85	84	74	67	61	20	21					
28	A	B	A	B	A	B	A	B	Y	B	B	R	68	80	B	B	B	B	S	F	R	B	Y	A	A							
29	A	A	A	B	B	R	34	36	R	B	B	B	B	B	B	82		106	94	78	62	26										
30	A	B	A	A	F	R	B	B	R	42	58	68	74	B	B	B	98	104	98	100	F	R	S	S	Y	Y						
					32	38																										
31	A	A	A	B	A	A	B	B	A	B	B	B	B	B	B	B	97	68	35	F	R	A	F	26								
	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	8	5	9	8	12	9	12	14	13	12	15	16	17	15	21	22	23	25	22	15	10	10	4								
MED	R	R	R		F	F	F	F	F	R	R	R	R	R	R		R	77	72	68	53	28	24	20	22	30						
U Q	26	37	31	34	29	32	32	30	34	43	55	68	70	80	74																	
L Q	R	R	R	R	R	R	R	R	R	R	R	R	R	R	J	R	J	R	R	R	R	R	R	R	R	R	R	R	R	R	R	

IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 1999 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	46		70	38	76	45	40	36	B	B	B	29	34	24	20	21	32	27	13	13	18	33	32								
2	29	38	25	38	24	37	44	39	B	B	B	BE	BE	B	B	BE	BE	BE	BE	B	20	30	19	18							
3	34	39		41	38	40	32	43	37	22	32	24	24	22		BE	BE	BE	BE	BE	B	22	16	21	13						
4	30	40	41	42	43	37	44	28	B	B	B		33	25	25	25	36	22	20	41	13	13	16	30	40						
5	40	40	37	36	40	52	32	60	33	18	22	22	22	22	20	E	BE	BE	BE	E	B	B	16	35	37						
6	42	44		38	43	38	24	16	13	28	20	38	39	24	21	45	33	31	29	35	36	27	37	42							
7	98	50	45	42	102	67		40	46							E	BE	BE	BE	E	B	B	27	36	38						
8	36	41	86	38	33	32	31	17	17	19	23	42	35	41	34	32		BE	BE	BE	B		40	90	72						
9	104		42	83		43	40	65	42							E	B	B	BE	B	B		31	23	20	31					
10	44	33	44	34	32	28	33	18	46	41	33	43	44	25	24	20	17	14	26	18	8	12	27	31							
11	39	37	33	38		42	55	52	33	15	20	23	23	24	22	22	21	16	17	14	13	11	24	24							
12	30	36	64	44	34	23	16	16	14	16		B	BE	B		E	B		E	BE	B	B	34	32	36						
13	42	42	61	50	67	44		46	48	58		B	BE	BE	BE	E	BE	B	BE	B	B		30	26	38	46					
14	69	47	50			48	47	33	22	16	22	21	23	21	21	25	21	15	15	15	18	15	14	23	24						
15	24	39	36	34	32	32	20	19	18		B	E	BE	BE	E	B	E	B	E	B	20	18	38	31	54	52	56				
16	69	50	42	82	59	49	43	28	23	18	21	31		E	B	B	BE	BE	BE	B		40	33	40	40	105	34				
17	42	42	33			B	B	B	B	B	B	B	B	B	B	E	BE	BE	B	B		54	23	39	21	32	43	83	40		
18	41	36	67	70	38	61		B	B	B	B	B	B	B	B	E	BE	BE	B	B		55	59	22		116	33	33	35		
19	69	69	79	73			42									E	B	B	B	B	B		22	17	28	43					
20	39		67	96		36		B	B	B	B	B	B	B	B	B	B	B	B	B		36	22	38	37	39	38				
21	34	B	C	C	C	C	C	C	C	B	B	B	B	B	B	E	BE	BE	BE	BE	B	B	B	B	B	B	B				
22		B	B	29	23	26	40	32	34	29	28		B	B	B	B	BE	BE	BE	BE	B		46	56		22	78	100	36		
23	42	B	E	B	43	22	66	34		B	B	B	B	B	B	E	BE	BE	BE	B											
24	68	66	69	43		B	B	69	32	40	45		B	B	B	B	B	B	E	B	28	22	32	36	41	36	57	40			
25	81	B	B	B	36	46	41	36	34	21	27	26	27	26	28	23	23	20	21	16	12	15	32	22		E	B				
26	40	35	B	B	42	39		37		B	BE	BE	BE	BE	BE	BE	G	BE	BE	B	60	14	39	29	27	33	36				
27	38	B	39	33	30			B	B	41	32	B	B	B	B	E	BE	BE	BE	BE	B	35	31	19	13	15	14	38	21	36	
28	38	B	47	B	41		36		31	B	B	B	BE	BE	B	B	B	BE	BE	BE	B	40	20	22		18	28	36			
29	35	36	39			B	B	B	35	30	25		B	B	B	BE	BE	BE	BE	B	26	30	39	16	12	40	49	60			
30	42	B	38	36	35	40		B	B	26	24	35	30	E	BE	B	B	BE	BE	B	54	22	24	53		30	23	35			
31	89	31	38			B	B	46	41		42	B	B	B	B	B	B	BE	BE	BE	B	52	20	39	41	34	98				
	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	21	26	23	22	25	20	22	21	15	12	15	16	17	15	22	22	23	29	25	23	30	30	30							
MED	42	40	42	38	39	40	38	35	32	22	22	28	26	24	28	23	23	27	19	29	28	33	36								
UQ	68	46	64	50	46	46	44	41	41	29	30	33	42	32	28	35	29	31	38	29	38	40	49	42							
LQ	36	36	38	36	33	36	32	28	22	18	22	22	24	23	23	24	21	20	18	16	13	18	27	32							

IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 1999 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	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	28	B	16	20	14	13	15	25	B	B	B	B	25	18	18	14	10	13	14	8	10	9	9	8	
2	7	8	8	8	9	8	19	16	B	B	B	B	28	30	B	B	29	26	12	8	9	8			
3	11	8	B	13	29	20	15	14	10	12	12	18	19	19	B	27	26	17	22	16	12	7	9		
4	8	8	10	14	14	12	17	15	B	B	B	25	19	25	26	25	18	14	15	13	9	9	8	8	
5	8	8	8	9	25	15	18	16	10	10	12	10	14	14	10	26	26	22	19	11	B	8	7	8	
6	7	13	B	16	10	8	8	7	13	10	12	15	22	16	14	14	12	11	8	9	14	11	10	10	
7	10	14	12	19	26	14	B	24	24	B	B	B	B	B	16	24	B	20	22	17	B	8	20	8	
8	9	11	10	24	12	13	12	11	11	8	13	16	25	22	34	33	B	34	29	25	B	9	19	10	
9	9	B	25	12	B	15	15	40	26	B	B	B	B	B	24	29	B	B	2.3	8	15	10	10		
10	8	8	9	9	9	7	9	10	12	11	17	18	20	25	24	20	10	10	11	9	8	8	9	7	
11	8	11	20	9	B	24	15	13	10	10	12	9	10	15	15	12	9	8	10	8	9	9	7	6	
12	8	8	9	10	8	8	8	7	9	8	B	23	20	10	61	14	18	17	16	B	8	9	8	8	
13	10	10	14	13	10	15	B	15	16	53	B	22	54	22	19	32	25	16	19	18	8	8			
14	25	18	17	C	C	14	10	9	10	8	10	15	15	9	25	15	15	14	15	9	7	8	8	8	
15	8	9	7	9	8	7	8	6	9	B	18	30	61	31	26	19	20	10	18	10	8	10	8	14	
16	14	12	8	12	16	10	11	7	8	9	20	25	B	B	B	25	38	B	9	8	10	9	13	15	
17	9	9	8	B	B	11	B	B	B	B	B	B	B	B	B	54	9	9	10	10	11	10			
18	12	22	15	15	15	8	B	B	B	B	B	B	B	B	B	55	59	22	B	9	10	11	16		
19	12	11	9	7	B	25	B	B	B	B	B	B	B	B	B	B	B	B	11	B	8	9	10		
20	25	9	49	20	B	B	B	B	B	B	B	B	B	B	B	B	B	12	9	10	11	10	16		
21	15	B	C	C	C	C	C	C	B	B	B	B	B	B	B	28	19	21	32	18	B	B	B		
22	B	B	19	16	14	10	25	10	10	17	B	B	B	B	B	46	56	B	11	12	9	10			
23	10	B	14	22	13	17	B	B	B	B	B	B	22	B	B	24	23	12	12	13	10	9	10		
24	9	12	9	26	B	B	13	25	15	23	B	B	B	B	B	15	23	10	30	10	10	10	11		
25	9	B	B	30	18	20	10	11	21	27	26	27	26	19	18	14	11	11	7	12	9	9	8		
26	9	28	B	B	29	10	B	24	B	B	25	31	30	30	60	32	17	60	14	8	13	9	10	16	
27	24	B	29	15	16	21	20	B	B	B	B	B	B	B	B	35	31	19	13	15	14	7	10	10	
28	20	B	13	25	B	16	23	B	B	B	58	30	B	B	B	40	20	22	B	8	10	9			
29	11	12	13	B	B	15	22	19	B	B	B	63	B	B	B	26	30	39	11	10	9	13	8		
30	13	16	16	11	16	B	B	18	19	35	30	B	B	B	54	16	24	53	S	S	16	13	9		
31	29	10	20	10	17	B	B	32	B	B	B	B	B	B	B	52	20	10	9	9	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	31	31	30	29	29	30	30	30	31	31	31	31	31	31	31	31	31	31	30	30	31	31	31		
MED	10	12	14	16	16	14	18	18	18	B	B	B	B	B	61	31	32	26	23	17	12	12	9	9	10
U Q	15	B	20	38	20	B	B	B	B	B	B	B	B	B	B	B	B	B	29	22	19	11	11	11	
L Q	8	9	9	11	10	10	13	10	10	11	18	22	23	22	19	24	15	14	12	9	10	8	9	8	

IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 1999 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	A	216	A	A	B	B	B	236	200	200	200	228	208	208	236	A	A	A		
2	A	A	A	216	220	216		A	A	B	B	B	236	210		236		226		B	A	A	A		
3	A	204	234					230	246	226	218	222	222		228		228	238	234	204			A		
4	204	210	214	214	212			A	A	A	B	B	A	204	218	212	214	224	210	206	218	278	226	218	
5	A	A	A	A	A	A	A	A	Q	254	226	226	220	202	218	186	222	206	208	240	Q	B	A		
6	A	A	B	A	A	206		A	A	278	250	204	226	222	224	212	204	226	212	220	220	A	A	A	
7	A	A	A	A	A	A	B	A	A	B	B	B	B	B	B	B	230	218	218	244	254	B	A	A	
8	202	A	A	A	A	A	202	294	260	218	218	224	218	218	226	214	254	248	256		B	A	A	A	
9	A	B	A	A	B	A	264	A	A	B	B	B	B	B	E	B	B	B	258	A	A	A	A		
10	A	A	A				A	E	EE	A	216	296	242	210	234	226	212	212	190	188	206	210	210	212	
11	E	A	Q		B	A	A	A		212	212	232	220	214	204	202	202	212	200	200	210	210	224	A	
12	244	244	220							A	E	B	Q	B	E	B	Q	Q	Q	Q	Q	Q	Q	198	
13	F	A								236	218	286	242	236	258	218	228	254	226	222	200	246	B	A	A
14	A	214	A	A	C	C	A	A	F	222	272	212	224	216	218	224	210	204	204	218	204	218	A	A	A
15	A	224	A	214	A	S	A	A	B	244	236	236	B	234	240	234	210	218	218	226	210	A	A	220	
16	A	214	216	A	A	A	214	216	216	216	226	254		B	B	B	B	B	A	220	200	A	A	A	
17	A	200		A	B	B	A	B	B	B	B	B	B	B	B	B	B	260	210	A	A	248			
18	A	A	A	A	A	242	B	B	B	B	B	B	B	B	B	B	E	B	B	B	A	A	A		
19	A	200		A	A	B	B	A	B	B	B	B	B	B	B	B	B	B	B	A	B	A	A		
20	A	B	A	220	B	A	B	B	B	B	B	B	B	B	B	B	B	B	A	212	214	A	A	A	
21	A	B	C	C	C	C	C	B	B	B	B	B	B	B	B	B	E	B		B	B	B	B		
22	B	B	A	A	A	A	A	A	254	274							210	196	206	228	220	A	A	A	
23	A	B	A	266	A	A	B	B	B	B	266		B	B	B	B	266	266	B	A	196	A	216	216	
24	A	228	252		A	B	B	A	A	A	B	B	B	B	B	E	A	290	268	262	Q	A	A	A	
25	Q	B	B	B	A	A	A	236	216	260	238	232	224	220	224	194	224	208	212	222	204	228	A	A	
26	A	A	B	B	A	214	B	A	B	B	246	254	226	230	258	234	236	262	224	A	A	214	A	A	
27	A	B	A	A	A	B	B	A	B	B	B	B	B	B	B	B	216	222	204	200	226	226	A	A	
28	A	B	A	B	A	B	A	B	B	B	288	230	B	B	B	B	B	B	232	212	270	B	A	A	
29	A	A	A	B	B	A	A	B	B	B	B	314	B	B	B	B	204	228	238	192	224	Q	A	A	
30	A	B	A	A	218	A	B	B	A	240	244	238	B	B	B	B	220	206	228	266	B	S	S	A	A
31	A	A	A	B	A	A	B	B	A	B	B	B	B	B	B	B	B	B	B	242	222	230	A	F	240
	0	0	0	1	0	2	0	3	0	4	0	5	0	6	0	7	0	8	0	9	1	0	1	1	
CNT	5	9	5	7	5	8	3	7	9	12	12	14	14	17	15	22	20	23	26	20	12	7	6	5	
MED	210	210	216	220	218	216	214	219	248	234	226	230	222	219	221	214	221	220	218	220	219	224	211	216	
U Q	225	226	248	234	228	230	264	286	275	252	237	254	236	230	240	234	231	254	244	233	232	228	218	230	
L Q	203	202	215	214	210	211	202	216	223	217	221	224	218	211	212	204	205	208	208	211	210	214	204	202	

AUG. 1999 h'F (KM)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 1999 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		A	A		A	B	A	B	A	B	B	B	B	B	B	X						R		A	A					
				42												48		87	74		32			90						
2		A	A	A		A	A	B	O	X	B	B	B	B	B	X							B	B	A	A				
					39				43							78	86	85	86	82	83	42								
3		A	A	A	B	A	A			B	B	B	B	B	B	X							O	X	A	A				
						50	52									99		102	82	34	24	25								
4		X		B	A	A	A	B	B	B	B	B	B	B	B	B	75						A	O	X	A	A			
		36	38																				36		34					
5		A	A	R	A	A	A	B	B	B	B	R	O	X	B	O	X	O	X	92	87	69	40	C	C	C				
													86				93	86												
6		A	A	A	X	O	X	X	X	O	X	X	B	B	B	X	X	X	X				O	X						
					45	44	46	49	60	63	66					103	91	88	96	75	70	51	46	36	24	55				
7		A		A	O	X		A	A	X	X	X	R	B	B	X	O	X	X	O	X	X	R	O	X	A	B			
					70	37	56			56	65	75	80				100	110	94	69	66	64		26						
8		A	A	O	X	A	A	A	X	O	X	O	X	X	X	X	X	X	X	X	X	Y	B	B	A					
					47				42	52	58	67	71	86	84	80	75	70	71	46										
9		R		O	X	B	A	A	A	O	X	X	X	O	X	X	B	O	X	X	X				C					
				44	33				40		42	49	59	60	67	77	79		68	62	47	44	31	27						
10		CO	X	A	O	X	A	A	A	A	B	B	B	B	B	B	B	O	X	X	O	X	Y	O	X	O	X			
			33		48												76	70	80	47				30	64					
11		A		B	B	B	B	A	A	B	B	B	B	B	B	B	O	X	O	X	O	X	B	O	X	O	X			
		86	62	43													46	58	56	54	59	51	40		28	25				
12		Y	O	X	A	O	X	B	A	A	R	O	X	X	R	X	O	X	B	O	X	A	62		A	A				
			44	38	50						52	63	79	53				106	75	64	47									
13		A	B	B	B	A	A	A	A	B	B	B	B	B	B	B	B	O	X	44	46	44	57	R	A	53	46			
																									B					
14		B	A	X	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	R	A	A	A				
			34																											
15		O	X	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	B	A	Y			
			41																											
16		A	A	A	O	X	R	A	B	B	B	B	B	B	B	B	B	B	B	B	B	O	X	R	O	X				
					42																		57	37	32	35				
17		A	B	A	Y	A	B	B	B	B	B	O	X	R	B	B	B	B	X	O	X	X	O	X	A	A	A			
												47							79	66	54	46								
18		B	A	B	A	R	A	A	X	R	B	B	R	O	X	B	B	B	O	X	R	B	R	O	X	O	X			
						47								68				73					34	33	34					
19		A	A	A	A	O	X	A	B	B	O	X	O	X	B	O	X	O	X	B	X				O	X				
					38		46				54	49				67	69		81	91	77	70	54	65	44	38	47			
20		X	A	A	A	A	A	A	B	B	A	B	B	B	B	B	B	O	X	69	86	74	72	71	65	43	39	42		
			38																											
21		A	O	X	O	X				O	X	O	X	R	O	X	X	O	X	X	X	X	B	X		A				
			44	58	37	38	48	41	63	61	69	74	72	78	75	68	72	76	44	44					89	56				
22		A		A	34		44	A		55	A	A	X	X	C	C	C	C	R	X	X				A	C	C			
												64	66							60	54	41								
23		B	A	A	A	O	X			X	B	B	B	B	R	O	X	R	X	O	X	X	X	X	A	A				
						32	41	43	32							50		42	56	51	43	36	31							
24		A	A	O	X				X	O	X	B	O	X	B	B	O	X	O	X	X	X	X	X	O	X				
				41	43	54	71	50	47	65	59		47	70	70	74	72	62	54	48	31	22	20							
25		A	A	O	X				A	O	X	X	X	X	O	X	O	X	X	X	X	X	X	X	O	X				
				38	33	60			45	53	64	66	68	84	86	100	94	92	91	82	73	65	48	39	28					
26		A	X		36	40	46	51	52	62	51	60	69	86	96	93	100	104	94	104	92	97	80	84	A	O	X	41		
27		A																												
28		B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B							
29		B	A		46	57			B	B	B	B	B	B	B	B	B	R	X	X	59	50	41		A	A	A			
30		A	X	A		37	42		A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	36		Y	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		6	10	10	13	9	7	8	12	8	8	11	6	10	12	14	15	19	24	23	25	14	17	12	9					
MED		42	42	39	42	50	46	47	52	62	62	64	72	76	78	85	81	76	70	64	47	42	34	36	42					
U Q			0	X						X	O	X	X	X	O	X	X	X	X	X	X	X	X	X						
L Q		46	44	42	46	55	52	50	56	64	68	69	84	86	92	93	92	91	76	73	54	48	50	42	56					

IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 1999 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 32	A	B	A	B	A	B	B	B	B	R 42	B	F 81	B 62	R 26	B	R	A	A	A		
2	A	A	A 30	F	A	A	B	R 37	B	B	B	B	B 72	R 80	J 79	R 80	R 76	R 73	R 36	B	B	A	A	
3	A	A	A	B	A	A	F 38	F 42	B	B	B	B	B B	J 93	R 92	B 76	R 27	R 18	R 19	R	A	A		
4	30	F 28	B	A	A	A	B	B	B	B	B	B	B B	R 69	B R	B B	F 28	A 28	R	A	A			
5	A	A	R	A	A	A	B	B	B	B	R	80	B 87	R 80	B 86	R 81	R 63	R 31	F	C	C	C		
6	A	A	A	J	R	R	J	R	F	S	B	B	B 97	J R	R 82	J 90	R 66	F 59	F 43	F	F	R	F	
7	A	F 26	A	R 31	A	A	A	50	59	69	74	R	R B	R 94	J 104	R 88	R 63	R 60	R 53	R	R	A	B	
8	A	A	R 41	A	A	A	36	46	52	60	65	80	J F	78	78	74	69	Z J R	64	65	40	Y	B	A
9	R	F 30	R 27	B	A	A	F 30	R 36	R 43	R 53	R 54	61	J R	71	73	R 62	R 56	R 41	R 31	F	F	F	C	
10	C	R 27	A	R 42	A	A	A	A	A	A	B	B	B B	B B	R 70	R 64	Z R	Z R	R B	Y	R	R 24	58	
11	F	A	A	F 21	B	B	B	A	A	B	B	B	R 40	R 52	R 50	R 48	R 53	R 45	R 34	B	R	R	B	
12	Y	R 38	R 25	A	R 44	B	A	A	R 46	R 57	R	R 73	R 47	R 100	R 60	R 58	R 41	R	R	A	F	A	A	
13	A	B	B	B	A	A	A	A	B	B	B	B	R 38	R 35	R 38	A	R	A	A	F	B			
14	B	A 28	A	B	B	B	B	B	B	B	B	B	B 41	B 62	B 67	B 47	B 45	B 24	R	A	A	A		
15	R 35	A	C	C	C	C	C	C	C	C	C	C	C C	B B	B B	B B	B B	B B	B	A	Y	A		
16	A	A	A	U 36	R	A	A	B	B	B	B	B	B B	B B	B B	B B	B B	B B	R 51	R 31	R	A	R 26	
17	A	B	A	Y 28	A	B	B	B	B	B	R 41	R	R B	B B	B B	B B	B B	B B	R 73	R 60	R 48	R 40	A	A
18	B	A	B	A	R 41	A	A	R	B	B	R	R 62	R 67	R R	R R	R R	R R	R R	R R	R R	R 28	R 27	R 28	
19	A	A	A	A	R 40	A	B	B	R	R	B	R 61	R 63	B 75	R 80	R 67	R 62	R 48	R 57	R 35	R 30	R 41		
20	32	A	A	A	A	A	A	B	B	A	B	B	R 63	R 80	R 68	R 66	R 65	R 59	R 37	A	A	R 33	R 36	
21	A	R 38	R 52	F 28	F 25	F 36	F 32	F 57	F 55	R	R 63	R 68	R 66	R 72	R 69	R 62	R 66	R 70	J R	B	R	F	A	A
22	A	F 26	A	F 28	A	F 26	A	F 36	A	A	J 58	R 60	R C	R C	R C	R C	R C	R C	54	48	25	F	A	C
23	B	A	A	A	R 26	F 19	F 25	F 26	B	B	B	B	R B	R R	R R	R R	R R	R R	R	R	R	A	A	
24	A	A	F 26	R 37	F 30	R 38	F 44	R 41	F 59	R 53	B	R B	B 41	R 64	R 64	R 68	R 66	R 56	R 48	R 32	R 21	R 16	R 14	
25	A	A	F 27	R 27	F 29	A 39	R 47	F 58	R 60	D 62	78	R 80	R 94	R 88	R 86	R 85	R 77	R 67	R 59	R 54	R 42	R 28	R 22	
26	A	A	R 34	F 30	F 34	F 43	F 51	F 45	J 54	R 63	R 80	J 90	R 87	J 94	R 98	R 88	R 98	R 86	R 91	R 69	F	A	R 35	
27	F	A	A	A	A	B	B	B	B	B	B	B	B B	R B	R B	R B	R B	R B	R 39	R B	F	A	R 26	
28	B	B	A	B	B	B	B	B	B	B	B	B	R 46	R B	R B	R B	R B	R 48	R 36	R Y	A	A	A	
29	F	B	A	F 26	B	B	B	B	B	B	B	B	B B	B B	B B	B B	B B	R 53	R 44	R 30	F	A	A	
30	A	A	F 31	A	F 32	A	B	B	B	B	B	B	B B	B B	B B	B B	B B	59	55	B	F	Y	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	5	8	9	13	8	7	8	12	8	11	6	10	12	14	15	19	24	22	25	13	15	10	7	
MED	30	29	28	31	30	38	38	42	56	56	58	66	70	72	79	75	70	64	58	40	30	26	26	29
U Q	34	34	38	36	36	40	44	48	58	62	63	78	80	86	87	86	85	68	67	48	34	28	30	41
L Q	26	26	26	28	28	26	31	36	50	47	53	60	62	46	52	64	66	56	53	34	26	21	18	21

IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 1999 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	92	57	34	97		B	36	B	B	B	B	B	B	22	32	31	B	21	22	41	76	93								
2	36	50	39	36	37	38		B	B	B	B	B	B	56	56	28	25	18	16	25		38	44							
3	37	39	89		42	40	34	30		B	B	B	B	B	74	B	B	B	B	15	19	23	39	34						
4	38	74		53	50	49		B	B	B	B	B	B	B	56	B	B	B	E	B	38	33	34	34						
5	38	45	32	39	41	41	42		B	B	B	B	B	30	30	29	26	31	29	26	14									
6	97	49	42	40	38	40	44	32	24	23		B	B	28	29	24	23	20	15	15	14	16	14	24						
7	96	89	48	59	45	50	51	36	22	23	G	B	B	B	B	86	76	26	29	22	24	27	27	51						
8	35	40	39	34	40	36	42	22	32	23	24	24	38	38	29	27	23	21	13	36	30			37						
9	36	36	38		37	41	36	40	41	34	26	23	29	23	E	B	B	E	B	12	13	10	12	23						
10	C	33	36	46	58	49	41	44	41	49	B	B	B	B	B	30	26	22	27	E	B	B	18	32	38					
11	88	40	37	23		B	B	B	B		35	39	B	B	B	30	28	29	26	27	23		15	12						
12	14	76	34	38	98		42	43	34		G		22	26	28	28	E	B	E	B	E	B								
13	50		B	B	B		37	79	40	42	33	B	B	B	B	B	27	28	38	39	34	65	42	57						
14	B	40	46	40		B	B	B	B	B	B	B	B	B	B	B	B	B	29	22	17	24	38	32	24					
15	43	32	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	B	B	B	27	20	27						
16	33	35	40	38	37	41		B	B	B	B	B	B	B	B	B	B	B	E	B	22	40	26	33	40	38	38			
17	40		B	43	30	60		B	B	B	B	B	B	B	B	26	30	G	G	34	24	39	91	37	44					
18	B	38		31	31	44	38	33	38	B	B	E	B	E	B	31	34	B	31	E	B	37	23	33	34	34				
19	34	33	25	34	27	49	43		B	B	B	B	B	B	30	30	54	28	42	33	20	18	28	14	18	34	35			
20	35	38	43	40	36	42	37		B	B	B	B	B	B	38	26	34	55	35	30	16	13	35	39	42	92				
21	42	44	42	35	34	34	33	22		G	G	30	30	29	28	C	C	C	G	E	B	BE	22	34	42	54	50			
22	47	72	102	34	58	24	39	35	43	40	26	28		C	C	C	C	C	33	23	26	37	51			C	C			
23	B	42	37	42	49	24	34	26		B	B	B	B	B	B	29	24	28	25	26	21	21	13	12	28	31				
24	37	38	32	58	42	37	34	32	24	B	G	B	B	E	B	30	28	29	26	31	21	15	16	21	28	23				
25	32	38	63	33	31	44	39	42	31	34	32	30	28	31	28	G	G	G	G	G	16	20	30	22	12	ES				
26	26	34	34	30	31	22	16		G	G	31	34	35	32	30	27	31	28	20	22	13	46	43	40	57					
27	52	44	104	41	33		B	B	B	B	B	B	B	B	B	24	28	25	26	21	21	13	12	28	31					
28	B	B	41		B	B	B	B	B	B	B	B	B	B	B	30	28	29	26	31	21	15	16	21	28	23				
29	54		B	38	34		B	B	B	B	B	B	B	B	B	B	B	B	B	31	25	17	37	36	40	49				
30	35	73	42	36	63		B	B	B	B	B	B	B	B	B	B	B	B	E	B	30	31	17	18	24	49				
31																														
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23						
CNT	25	26	26	25	24	21	18	17	14	13	11	11	10	13	14	16	19	28	24	28	26	27	27	24						
MED	38	40	40	38	39	41	39	32	32	31	30	29	29	30	27	E	B	E	B	BU	U	19	26	33	37	38				
UQ	51	50	43	42	50	46	42	41	38	38	30	30	34	30	29	48	32	30	28	26	37	42	42	46						
LQ	35	38	36	34	35	36	34	26	24	23	26	26	28	28	27	25	23	20	17	16	17	18	28	32						

IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 1999 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	11	13	11	11		B	29	22	B	B	B	B	B	B	22		32	14	14	9	14	10	10			
2	21	17	14	11	26	28		21	B	B	B	B	B	B	56	56	27	25	11	16	25		8	9		
3	16	11	16		25	16	11	12	B	B	B	B	B	B	74		25	53	16	10	10	10	9			
4	10	9		17	15	12		B	B	B	B	B	B	B		56		16	12	8	12	8				
5	8	10	19	26	15	16	15		B	B	B		30	30	B	29	26	31	30	26	14	C	C	C		
6	10	10	25	16	20	12	10	10	11	16		B	B	B	24	24	20	18	16	10	15	14	10	8		
7	11	12	17	10	16	17	14	10	16	18	19	19	26		B	86	76	26	29	22	15	7	9	10		
8	20	22	17	20		20	24	24	11	10	10	16	20	18	19	15	16	15	12	8	9	10		8		
9	14	10	10		20	12	11	21	18	18	18	16	20	29	18	B	56		24	10	10	6	7	8	C	
10	C	8	9	12	19	12	10	12	25	15		B	B	B	B	B	30	26	15	27		14	9	8		
11	13	19	24	10				25	24		B	B	B	B	30	28	29	22	26	27	23		15	7		
12	10	9	10	18	15		15	18	21	20	18	20	20	28		B	56	16	26	22	11	10	18	26		
13	10		B	B	B		25	21	15	19	19	B	B	B	B	20		28	15	11	13	12	14	13	B	
14		13	14	25		B	B	B	B	B	B	B	B	B	B	B	B	29	22	17	12	12	14	12		
15	14	16	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	B	B	B	B	14	9	11		
16	12	10	9	11	13	14		B	B	B	B	B	B	B	B	B	B	B	B	22	14	26	9	10	9	12
17	25		B	20	26	30		B	B	B	B		26	30	B	B	B	B	20	16	16	15	8	12	20	10
18		20		11	25	14	15	17	29		B	B	31	34	B	B	B	30	19		13	23	13	14	13	
19	10	11	20	10	14	16	22		B	B	30	30	B	54	26	B	42	33	20	18	28	14	10	9	8	
20	8	25	20	15	18	21	26		B	B	25		26	34	55	35	30	11	9	10	11	10	8			
21	10	11	16	12	10	10	11	14	16	17	20	20	20	20	24	24	20	19	25		22	9	17	10	10	
22	11	10	15	12	29	8	15	15	20	25	16	19		C	C	C	C	C	24	16	14	9	10		C	C
23		25	21	12	10	8	8	11		B	B	B	B	B	20	19	28	25	19	14	12	9	10	7	8	
24	8	9	9	13	12	20	9	10	15		B		22	B	30	24	29	26	31	21	15	9	8	9	9	
25	9	10	12	12	16	27	15	16	17	14	15	15	20	18	17	14	15	19	15	14	12	11	12	12	E S	
26	8	8	10	8	7	9	10	13	11	17	16	14	18	16	16	16	11	12	12	8	8	10	10	11		
27	10	27	28	26	10		B	B	B	B	B	B	B	B	B	B	24	18		10	13	11	9	8		
28		B	B	26		B	B	B	B	B	B	B	B	B	30	B	B	B	28	28	12	11	11	14	15	
29	12		33	9		B	B	B	B	B	B	B	B	B	B	B	B	31	25	14	10	9	25	12		
30	25	9	28	13	26		B	B	B	B	B	B	B	B	B	B	B	30	14		17	12	13	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	29	30	29	29	29	29	29	29	29	29	29	29	29	29	28	29	29	29	30	30	30	30	29	28	27	
MED	11	12	17	13	20	20	15	21		B	B	B	B	B	B	B	B	74	32	24	20	15	11	11	10	
U Q	20	22	26	26	28		B	B	B	B	B	B	B	B	B	B	B	29	30	23	14	14	14	13		
L Q	10	10	12	11	14	12	11	12	18	18	20	23	30	25	24	26	24	16	14	13	9	10	9	8		

IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 1999 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 224	A	A	A	B	A	B	A	B	B	B	B	B	E 282	E 270	B 280	Q	B	A	A	A	A	A	
2	A 230	A	A	B	A	B	B	B	B	B	B	B	B	E 292	E 264	C 230	218	228	220	262	E	B	B	A
3	A 236	A	A	A	B	A	A	A	B	B	B	B	B	B	B	Q 244	B	B	A	A	A	A	A	
4	220 228	B	A	A	A	B	B	B	B	B	B	B	B	B	E 278	B	B	E 258	A	214	A	A	A	
5	A 226	A	A	A	A	A	B	B	B	B	B	B	B	230	246	218	226	B	216	222	208	230	C	C
6	A 226	A	A	A	A	A	A	Q 254	230	B	B	B	B	212	220	210	206	206	206	212	220	222	212	226
7	A 232	F	A	A	A	A	A	232	248	248	232	238	B	B	B	266	206	222	260	228	A	A	B	B
8	A 226	A	A	A	A	A	A	254	246	228	228	232	216	216	210	212	228	A	A	B	B	A	A	A
9	238 226	B	A	A	A	A	A	220	226	226	206	B	244	B	206	190	200	192	246	254	Q	Y	C	C
10	C 216	212	230	A	A	A	A	A	B	B	B	B	B	E 254	E 246	224	238	B	254	246	224	238	218	216
11	F 196	A	A	B	B	B	A	A	B	B	B	B	B	E 250	E 244	E 240	234	240	240	256	B	E	B	B
12	E 186	A 228	A 210	198	B	A	A	A	A	232	226	236	236	B	E 246	E 208	E 240	274	E	B	B	A	F	A
13	A 226	B	B	B	A	A	A	A	B	B	B	B	B	E 266	E 274	E 286	B	A	A	A	A	F	B	
14	B 226	A	A	A	B	B	B	B	B	B	B	B	B	B	E 264	E 264	B	A	A	A	A	244	A	
15	230	A	C	C	C	C	C	C	C	C	C	C	C	C	B	B	B	B	B	B	A	A	A	
16	A 210	A	A	A	B	B	B	B	B	B	B	B	B	B	B	256	A	B	A	A	222	240	A	
17	A 226	B	A	A	A	B	B	B	B	B	B	B	B	B	B	216	246	278	238	A	A	A	A	
18	B 226	A	B	A	A	A	A	A	B	226	232	B	B	B	E 274	E 260	B	A	B	A	A	226	A	
19	A 226	A	A	A	A	A	B	B	E 254	254	B	B	B	E 234	E 250	E 240	202	238	234	210	234	252	A	
20	A 226	A	A	A	A	A	A	B	B	A	B	B	B	B	E 238	E 246	E 278	242	234	242	268	202	232	A
21	A 244	A	E	A	234	A	A	E	A	A	258	224	226	238	210	222	212	218	232	256	A	B	A	A
22	A 220	A	A	A	A	A	A	A	A	232	242	C	C	C	C	C	A	244	240	244	A	C	C	
23	B 240	A	A	A	232	232	A	B	B	B	B	B	B	E 238	E 230	E 232	240	254	236	244	244	248	A	A
24	A 236	E 218	A 200	194	A	A	202	212	208	B	B	B	B	B	216	210	234	224	232	220	228	224	228	196
25	A 218	200	198	202	A	A	A	A	Q	236	218	218	218	210	220	220	220	232	214	208	206	200	204	196
26	A 252	A	A	A	252	252	244	228	230	230	230	220	220	222	220	220	220	220	224	212	222	A	A	218
27	A 272	A	A	A	E 282	A	B	B	B	B	B	B	B	B	B	244	B	A	B	190	206	212	232	A
28	B 278	B	B	A	B	B	B	B	B	B	B	B	B	236	B	B	B	B	B	B	A	A	A	
29	E 278	A	B	A	238	B	B	B	B	B	B	B	B	B	B	B	248	248	254	224	A	A	A	A
30	A 284	A	A	A	A	B	B	B	B	B	B	B	B	B	B	E 284	E 278	B	B	Y	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	7	7	8	8	6	4	3	3	6	7	11	11	9	13	13	15	19	25	20	21	10	12	11	5
MED	225	226	215	220	228	229	236	228	238	230	226	228	228	226	218	226	226	234	230	229	220	226	226	224
U Q	272	228	222	234	252	242	244	232	254	254	232	238	237	237	255	244	254	256	246	257	230	240	252	265
L Q	218	220	210	199	202	221	203	222	202	230	224	220	226	216	218	217	220	218	215	220	220	202	213	218

SEP. 1999 h'F (KM)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 1999 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	B	B	A	B	B	B	X	B	B	B	B	B	O	X	X	B	X	X	X	B	X	A	85	
2	A	A	A	X	A		B	A	B	B	B	B	B	O	X	B	O	X	X	B	X	62	59	A A	
3	42	A	B	A	39	48	A	O	X	O	X	R	R	O	X	B	X	O	X	X	R	44	44	A	
4	O X 48	A	56	46	54		B	A	B	B	B	B	B	41		B	B	R	O	X	B O	X		A	
5	A	B	A	A	A	O	X	B	R	B	B	B	B	74		X	R	X	X	X	B	X	A A	A	
6	A	A	B	A	A	O	X	O	X	X	R	R	R	B	R	O	X	B	B	B	O	X	X	0 X	
7	36	34	42	37	48	55	X	R	X	X	B	B	B	X	O	X	O	X	X	Y	X	O	X	X	
8	X 49	43	45	44	56		X	Y	B	B	B	R	R	72	78	79	82	97	98	105	104	84	61	B O	X
9	X 46	42	A	44	43	44	X	X	X	O	X	X	X	X	X	X	X	X	X	X	X	X	X	A	
10	O X 45	A	A	49	58	56	X	B	R	B	B	B	B	B	B	B	B	B	B	O	X	A	41	42	
11	A	A	A	A	O	X	B	B	Y	O	X	B	B	B	B	B	B	B	B	B	X	Y	B	X A A	
12	A	Y	Y	B	X	Y	B	B	B	B	B	B	B	B	B	B	B	B	B	B	62		32		
13	X 62	42	B	Y	B	R	O X 41	R	R	B	B	B	B	B	B	B	B	B	B	O	X	X	A R	A	
14	X O X 57	39	48	40	A	Y	B O	X	B	B	B	B	B	B	B	B	B	B	B	B	O	X	X	A	
15	A	A	46	B	B	B	B O X 45	B	B	B	B	B	B	B	B	B	B	B	B	O	X	39	43	A A	
16	A	A	A	B	B	B	B	B	B	B	R	R	B	B	B	B	B	B	X	O	X	X	R	A	
17	B	A	51	B	B	B	B	B	B	B	B	B	B	B	B	R	X	O	X	Y	O	X	X	A	
18	O X 42	A	A	49	69	62	R	B	X	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
19	A	X	X	B	B	B	A	X	69	78	B	B	B	B	B	B	B	B	B	O	X	X	X	X	
20	X O X 44	34	46	A	O	X	42	69	78	84	B	B O	X	X	X	X	X	X	X	O	X	X	X	X	
21	44	48	44	49	O	X	B	A	B	B	X	X	O	X	X	X	X	X	X	X	O	X	A	A	
22	O X O X 81	44	38	35	B	B	C	C	C	C	C	C	C	C	C	C	C	O	X	A O	X	R	O	X	
23	B O X 33	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	O	X	X	A O	B	
24	A O X 52	R	A	B	B	R	O	X	46	B	B	B	B	B	B	B	B	B	R	B O	X	O	X	42	
25	B	B	B	B	B	B	R	O	X	49	B	B	B	B	B	B	B	B	B	X	O	X	X	42	
26	44	41	43	X O X 50	59	66	X	B O	X	71	81	B	B	B	X	X	X	X	X	X	O	X	X	X O X	
27	A	A	76	A	B	B	R	B	B	B	R	B	B	B	B	B	B	B	B	Y	R	38	R B R		
28	R O X O X 42	48	57	42	O X O X	A	R	X	B O	X	B	B	B	B	B	B	B	X	O	X	O	X	B	38	
29	37	45		B	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	X	O	X	X		
30	40	49	58	65	68	50	66	58	74	78	82	83	86	84	96	92	81	84	74	67	57	54	48		
31	O X 46	A	A	B	R	B	A O	X	R	B	R	B	R	X	O	X	X	X	X	X	X	X	O 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	16	15	14	13	15	12	7	15	8	7	6	10	9	12	16	20	21	20	25	26	24	24	18	18	
MED	44	42	47	49	48	52	54	56	70	67	76	78	86	84	87	86	82	76	65	52	57	45	44	46	
U Q	X 48	45	50	53	59	59	66	63	76	80	87	90	96	94	98	100	89	88	78	69	62	58	53	52	
L Q	X 42	39	44	42	42	44	47	48	58	49	73	70	74	80	82	77	74	68	50	47	42	40	40	40	

IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 1999 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	B	A	B	B	R	B	B	B	B	R	71	68	B	J	R	J	R	B	F	26	23	A	A	
2	A	A	A	F		A	F	B	A	B	B	R	B	U	R	B	R	J	R	B	F	A	A			
3	F	A	B	A	F	F	A	R	R	R	R	B	R	B	J	R	R	R	96	85	53	56	48	A		
4	R	A	F	F	F	F	A	B	B	B	B	F	B	B	R	R	F	R	B	R	F	F	A	A		
5	A	B	A	A	F	A	A	R	B	R	B	B	B	R	68	72	74	66	B	A	A	A	A			
6	A	A	B	A	A	R	R	R	R	R	B	R	80	B	B	R	J	R	R	F	F	R				
7	F	F	F	F	F	R	J	R	B	B	F	92	97	102	102	101	Y	R	R	F	F	26	23			
8	26	24	35	28	32	49	52	53									88	83	70	55	45	44	46			
9	F	U	R	F	J	R	Y	B	B	R	J	R	66	72	73	76	91	92	96	98	78	55	B	B	R	
10	43	32	39	33	50																			34		
11	F	A	F	J	R	52	57	67	74	72	73	76	91	92	96	98	78	55	62	55	32	29	27	F	A	
12	R	A	A	F	F	B	R	B	B	B	B	B	B	B	B	B	R	J	R	R	F	F	A	B		
13	56	26	F	B	Y	B	R	F	R	R	B	B	B	B	B	B	R	F	41	R	A	R	A			
14	51	33	42	34	R	A	Y	B	R	B	B	B	B	B	B	B	R	R	R	R	R	R	A			
15	A	A	F	B	B	B	B	R	B	B	B	B	B	B	B	B	62	33	42	39	37					
16	A	A	A	B	B	B	B	B	B	B	R	R	B	B	B	B	R	J	R	R	A	F	F			
17	B	A	F	B	B	B	B	B	B	B	B	B	B	B	B	R	J	R	R	46	37	30	27			
18	U	R	A	A	F	F	F	R	B	F	J	R	R	66	74	81	85	80	76	78	74	78	80	75	J	R
19	36	39	54	48	39	54	48	R	B	F	J	R	72	B	B	B	B	R	57	43	46	37	30	27	J	R
20	A	34	43	R	A	R	F	F	B	B	R	R	93	84	91	90	92	92	92	86	74	70	70	63	56	36
21	31	28	40	31	28	40	36	60	71	78	B	B	B	B	B	B	R	J	R	R	J	R	J	R	A	
22	F	38	32	26	R	R	F	B	B	C	C	C	C	C	C	C	C	C	R	A	R	R	A	A	B	A
23	B	27	B	B	B	B	B	B	B	B	B	B	B	B	B	B	R	J	R	F	R	R	A	R	B	
24	A	46	R	R	A	B	B	R	R	B	B	B	B	B	B	B	R	B	R	B	42	45	44	31	27	
25	B	B	B	B	B	B	B	R	R	B	B	B	B	R	R	B	B	101	103	66	44	53	37	34	31	
26	F	29	30	32	44	53	53	60	65	72	F	B	B	B	J	R	J	R	R	88	95	102	107	104	102	R
27	A	A	F	A	B	B	R	B	B	R	B	B	B	B	B	B	R	92	100	92	100	Y	R	30		
28	R	36	42	42	28	36	41	R	R	A	R	60	64	B	B	B	B	R	70	72	46	33	33	28	26	30
29	F	26	30	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	J	R	R	F	
30	F	31	40	39	45	53	53	44	56	52	R	R	68	72	76	77	80	R	86	75	78	68	61	51	44	31
31	R	40	A	A	B	R	B	A	R	R	B	R	R	R	J	R	R	75	84	77	76	68	63	60	50	36
	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	15	15	14	13	15	12	7	15	8	7	6	10	9	12	16	20	21	20	25	26	24	23	18	15		
MED	F	38	32	37	34	36	46	46	50	64	61	70	72	80	78	81	80	76	70	59	46	50	37	34	34	
U Q	42	38	42	42	53	50	56	57	70	74	81	84	90	88	92	94	83	82	72	63	56	50	44	46		
L Q	F	29	28	32	30	31	37	41	42	52	43	67	64	68	74	76	71	66	62	42	41	34	30	29	30	

IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 1999 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	37	B	B		B	B	B	E	B	B	B	B	B	E	E	B	B	E	E	B	B	B	E	B				
2	64	39	42	38	36	39	33		B		B	B	B	E	B	B	E	B	B	B	B	16	15	49	44			
3	57	68		B	37	34	23	37	36	40	27	26	28	60		54	36	31	28	39	34	24	29					
4	71	80	29	27	37	29	34		B	B	B	G	B	B		32	27	26	24	B	E	B	30	37	68	102	32	
5	56		B	37	39	35	34	35	34		40		B	B	31	30	30		B	24	46	43	47	46				
6	51	39		40	32	38	24	29	26	29	29	30		B	E	B	B	B	36	20	31	22	27	30				
7	28	28	38	34	33	45	42	36	37		B	B	E	B	E	B	B	G	G	E	B	E	B	E	B			
8	32	32	43	39	29	33		B	B	B	40	36	34	30	33		30	28	32	25	B	E	B	B	B			
9	36	39	33	37	39	38	32	38		B	34	35	31	31	39	30	32	28	18	26	22	19	20	18	44			
10	45	56	38	37	43	21		42	B	B	B	B	B	B	E	B	B	23	32	58	102	36	35	59	34			
11	42	37	35	41	34	31		B	B	34	28	B	B	B	B	B	B	B	B	37	35		23	42	40			
12	42	34	38		37	32		B	B	B	B	B	B	B		28	60	34	26	34	44	46	42		B			
13	70	58		B	36	34	32	33	33	31		B	B	B	B	B	B	B	G	24	24	38	42	34	68			
14	37	57	40	37	40	32		B	B	B	B	B	B	B		30	29		38	39	34	31	20	45		G		
15	66	42	43		B	B	B	B	32		B	B	B	B	B	B	B	G	B	26	38	35	38	34	36			
16	46	36	38		B	B	B	B	B	B	B	B	E	B	34	32	B	B	B	30	36	26	33	38	70	38		
17		40	26		B	B	B	B	B	B	B	B	B	B	B	B	B	G	30	32	32	28	28	26	36			
18	43	42	39	28	32	30	35		G	B	36	32	30	30	31	31	31	30	35	32	30	21	18	16	34	38		
19	44	38	28		B	B	B	B	39	32	40		B	B	B	B	B	E	B	E	E	E	E	E	B			
20	30	24	38	37	23	21	24	32		B	B	E	B	58	32	34	34	32	31	30	28	24	22	19	15	16	33	
21	37	36	45	27		41		B	B	39	31	32	33	32	35	33	36	31	28	29	22	21	45	55	50			
22	64	44	37	28		B	B	C	C	C	C	C	C	C		32	38	34	34	34	38	40	43		40		B	
23		36		B	B	B	B	B	B	B	B	B	B	B	B	B	B	30	28	28	37	38	35	93	37			
24	38	43	36	39		B	B		39	33		B	B	B	B	B	B	B	B	33		26	34	34	36			
25		B	B	B	B	B	B	B	B	38	34		B	B	B	E	B	60	31	B	B	32	23	36	34	36		
26	35	36	43	35	34	23		B	41	34		B	B	34	36	34	32	34	32	27	37	32	22	23	37			
27	43	39	31	41			34	B	B	B	36		B	B	E	B	G	B	B	Y	38	76	38		40			
28	43	38	37	44	68	32	33	37	35	34		B	E	B	B	B	B	G	E	B			B					
29	38	64		B	C	C	C	C	C	C		B	C	C	C	C	C	C	B	B	E	B	29	27	28	24	34	58
30	60	57	32	38	31	29	37		G	42	35	34	34	32	36	64	38	33	29	28	33	39	30	27	34			
31	43	44	44		B	32	37	38	41	35		B	E	B	B	34	32	33	35	31	38	34	29	33	22	24	40	
	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	24	22	18	19	16	17	15	12	10	12	11	13	19	21	22	24	25	29	30	30	27	29				
MED	43	39	38	37	34	32	34	33	37	33	32	31	32	34	32	30	30	30	28	29	33	34	34	38				
U Q	56	50	41	39	37	38	37	38	40	34	36	34	34	36	34	32	35	38	37	41	42	44						
L Q	37	36	34	34	32	29	32	32	34	30	30	30	31	32	30	30	28	26	26	24	25	22	24	34				

IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 1999 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	22	B	B	25		B	B	B	32	B	B	B	B	33	31	B	32	26	30	B	E	S	13	15	11	13			
2	30	22	20	9	15	21	15		B	20	B	B	B	33	36	B	68	16		B	E	S	E	S	14	14	10	13	16
3	11	14		15	11	13	26	20	16	15	20	16		60	54	36	31	15	16	20	14	13	10	11	14				
4	15	12	19	13	15	25	20		B	B	B	B		20		17	22	15	24		B	30	13	10	15	15			
5	26		24	25	12	30	26	18	B	26	B	B	B		25	26	20	14	21		13	13	10	11	14				
6	19	26		15	18	16	16	12	15	14	14	18		B		B	B	B		36	14	11	12	12	11				
7	E S	6	8	11	8	10	14	15	15	17		B	B	25	39	25	32	36	20	13	18	52	19	15	11	11			
8	E S	14	13	16	11	16	20		B	B	B		20	15	26	25	16	16	14	15	13	25		25			18		
9	10	15	26	13	14	16	14	15	11	15	13	17	15	15	15	14	14	12	11	8	12	11	10	13					
10	15	26	16	15	13	16		B	B	B	B	B	B	B	B	B	23		15	22	14	10	6	10	10				
11	16	25	13	12	14	11		B	B		24	18	B	B	B	B	B	B	B		15	15		15	12	21			
12	25	25	20		19	19		B	B	B	B	B	B	B		25	59	25	15	27	22	12	10	15					
13	14	12		18		26	16	15	26	B	B	B	B	B	B	B	B	B		26	19	15	12	10	22	10			
14	10	14	11	15	18	26		B	B	B	B	B	B	B	B	B	B	25	29	B	15	16	14	14	12	15			
15	12	25	12		B	B	B	B	18	B	B	B	B	B	B	B	B	25	B	26	17	12	11	16	15				
16	15	18	22		B	B	B	B	B	B	B	B	B	34	26	B	B	B	B	30	21	19	11	11	12	11			
17	B	10	13		B	B	B	B	B	B	B	B	B	B	B	B	27	25	18	24	17	19	13	10	10	10			
18	14	14	15	10	12	12	20		B	21	18	16	16	15	19	19	15	13	16	12	15	18	16	10	12				
19	11	15	20		B	B	B	B	18	16	14		B	B	B	B	B	B	59	30	31	25	25	17	14				
20	11	12	15	18	20	14	14	12		B	58	26	19	15	13	14	16	14	12	14	14	11	11	14					
21	11	12	11	14		B	25		B	25	15	15	16	20	15	16	15	16	14	13	18	14	15	14	24				
22	14	17	14	10		B	B	C	C	C	C	C	C	C	C	C	C	C	16	15	15	28	13	12	15	12	27		
23	13		B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	17	15	28	18	22	29	10	15	B			
24	23	12	15	26		B	B	20	18	B	B	B	B	B	B	B	B	B	16		20	15	14	14	14				
25	B	B	B	B	B	B	B	26	26	B	B	B	B	B	B	B	60	25	B	B	15	18	13	14	12	12			
26	10	11	12	14	14	13		B	14	25	B	B	B	B	18	21	22	20	15	14	27	12	14	14	10	14			
27	15	24	9	25		B	26		B	25	B	B	B	B	68	25		B	B	14	30	15	18		12				
28	14	13	13	14	14	24	18	15	25	20		54	B	B	B	27	15	14	27	15	15	15	15	14	14				
29	14	11		B	C	C	C	C	C	C	C	C	C	C	C	C	C	B	B	29	20	14	15	8	12				
30	10	9	10	12	14	14	14	14	24	15	16	14	16	14	64	25	14	29	18	14	14	14	12	9					
31	13	24	22		B	25	14	15	26		35	B	27	20	15	18	17	13	11	11	11	14	9	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	31	31	31	30	30	30	29	29	29	29	29	29	29	29	29	30	30	31	31	31	31	31	31	31	31	31	31		
MED	14	14	16	15	18	25	26	20	26	B	B	B	B	B	34	25	25	24	19	16	14	14	12	14					
U Q	22	25	26		B	B	B	B	B	B	B	B	B	B	B	B	B	31	29	22	15	15	15	15	15	15	15		
L Q	11	12	13	13	14	16	16	15	22	19	22	22	26	20	19	18	15	14	15	14	12	10	11	12					

IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 1999 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	B	A	B	B	B	B	B	B	B	B	242	230	234	224	248	B	A	246	278	A	A		
2	A	A	A	A	A	A	B	A	B	B	B	226	244	282	230	268	254	230	Q		A	A			
3	206	A	B	A	A	A	A	228	238	238	230	B	E	B	E	B			A	B	Q	A			
4	256	A	A	A	A	A	B	B	B	B	A	218	B	B	A	Q		BE	B	A	F	A	A		
5	A	B	A	A	A	A	AE	A	B	A	B	B	250	232	236	242	256	B	A	A	A	A	A		
6	A	A	B	A	A	A	A	260	246	224	236	228	B	E	B	A	B	B	Q	Q	SE	S	208		
7	F	A	A	224	222	A	A	226	256	A	B	B	208	254	220	230	234	A	E	B	Q	Q	Q		
8	Q	A	A	A	A	A	B	B	B	A	A	248	230	216	222	220	232	236	240	A	E	B	B	A	
9	A	234	A	218	A	A	A	254	240	228	220	224	220	218	218	212	236	226	216	170	214	246	Q	A	
10	E	A	A	A	A	Y	B	A	B	B	B	B	B	B	E	B	B	A	292	276	254	308	290436		
11	A	A	A	A	AE	AE	A	B	B	AE	Y	B	B	B	B	B	B	B	A	B	A	A	A		
12	A	A	A	B	A	A	B	B	B	B	B	B	258	296	B	E	AE	A	B	A	F	F	A	B	
13	F	B	A	B	A	A	252	A	A	B	B	B	B	B	B	B	A	240	276	A	A	A	A		
14	Q	312	180	196	A	A	A	B	260	B	B	B	B	B	B	B	B	B	A	A	A	A	A		
15	A	222	208	B	B	B	BE	A	B	B	B	B	B	B	B	250	B	E	B	A	A	A	A		
16	A	A	A	B	B	B	B	B	B	B	B	224	204	B	B	B	BE	B	A	Y	A	A	204214		
17	B	A	A	B	B	B	B	B	B	B	B	236	252	A	A	A	AE	AE	A	278	264	238	220	A	
18	A	214	224	A	230	A	B	A	224	230	218	218	216	214	210	210	232	222	222	230	224	214	A		
19	A	226	A	B	B	B	AE	A	270	216	B	B	B	B	B	B	B	230	230	226	224	220	232		
20	A	224	218	A	A	A	252	226	B	B	BE	B	Y	332	306	220	216	224	226	230	216	216	222	214	
21	228	228	218	246	A	B	A	B	A	206	230	A	212	224	250	232	228	236	224	230	242	A	A		
22	F	242	234	238	A	B	C	C	C	C	C	C	C	C	A	AE	A	268	216	A	A	A	B		
23	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	228	230	236	218	A	A	A		
24	A	218	A	A	B	B	A	A	B	B	B	B	B	B	B	B	B	A	B	226	246	272	A		
25	B	B	B	B	B	B	B	AE	A	258	B	B	B	B	B	B	B	278	244	210	220	222	222		
26	A	222	224	A	226	B	A	248	B	B	BE	A	238	210	232	232	226	226	258	218	270	246	264	218	
27	A	236	A	B	B	A	B	B	B	A	B	B	B	B	B	256	B	B	Y	A	A	A	B		
28	224	228	212	286	264	A	A	A	A	B	B	B	B	B	B	Y	232	Y	B	A	210	F	B		
29	264	F	B	C	C	C	C	C	C	C	C	C	C	C	C	B	BE	B	Q	248	252	260	252		
30	A	F	236	F	210	AE	A	A	292	282	A	230	224	220	202	226	B	Y	E	B	218	244	248	242	220
31	220	A	A	B	A	B	A	A	B	232	B	A	A	222	234	234	218	228	230	246	248	A	232		
	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	13	8	9	7	4	3	2	10	6	8	8	10	9	12	13	17	19	19	20	18	20	18	12	11	
MED	226	227	218	224	291	228	272	250	243	226	229	224	216	220	226	233	231	231	234	232	235	240	223	225	
U	Q	260	231	235	246	451	408	E	A	E	A	E	E	E	B	E	E	E	E	259	262	254	248	261	264
L	Q	221	221	210	222	237	226	252	228	224	227	218	208	217	217	226	228	226	223	222	218	224	217	214	

OCT. 1999 h'F (KM)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 1999 fxI (0.1MHz)

45° E MEAN TIME (G.M.T. + 3 H)

LAT. -69° 00'.4" S LON. 039° 35'.4" E SWEEP 0.4 MHZ TO 15.0 MHZ IN 20.0 SEC IN MANUAL SCALING

NOV. 1999 fxi (0.1MHz)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 1999 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	10	R	F	A	A	F	A	A	R	R	R	R	B	B	B	R	B	R	58	60	48	38	A					
2		A	F	R	B	R	Y	A	R	R	R	B	B	B	B	B		58	61	56	61	52	39					
3	41		A	F	B	B	J	R	R	F	J	R	R	R	Y	R	R	R		F	F	F						
4		A	A	R	F	F	R	Y	R	R	J	R	R	J	R	R	R	J	R									
5	48	J	S	R	R	S			J	R	J	R	R	J	R	R	J	R	67	66	62	57	58	30				
6	27	F	A	A	A	A			R	R	R	Y	Y	R	R	R	B	R	R	J	R	F	A	A				
7		B	F	A	F				B	R	R	Y	B	B	Y	B	B	R	R	F	F	B	F					
8	25	F	F	A	A	R			R	B	B	B	B	Y	B	R	R	A	F	F	R	F	F	A				
9		A	F	F	A	F			R	B	B	B	B	B	B	B	R	R	R	J	R	R	B					
10	36	F	B	R	B	R			Y	R	B	B	R	Y	B		J	R	J	R	R	J	R					
11		B	B		B	B	B	B	B	B	B	B	B	B	Y	B	J	R	R	J	R	A	F	R				
12		B	R	R	B	J	R	F	B	B		R	Y	B	B	B	B	B	B	B	B	B						
13		B	F	R	U	S	Y	B	B	R	B	B	B	B	B	B	Y	R		A	R	F	A	R				
14		A	A	F	F	F	R	F	R	R	B	R	45	B	B	B	R	64	58	50	45	43	37	39				
15	39	F	R	B	B	B			J	R	J	R	R	B	B	Y		81	75	68		60	58	54	42			
16	42	F	F	R	R	Y	R	Y		B	Y	J	R	R	B	R	Y	Y	R	R	F	A	R	F				
17	42	A	A	F	F	R			R	J	R	Y	R	R	B	B	Y		56	53	50	46	R	A	A			
18	42	F	F	J	R	F	R	R	B	R	R	B	B	B	B	B	R	R	47	46	50	43	49	R				
19		B	B	B	F				R	B	R	Y	B	B	B	B	R	R	47	44	55	49	44	R	45			
20		R	Y	Y	B	R	R		R	R	B	B	B	B	B	B	R	J	R	53	57	57	56	55	56			
21	56	R	R	R	R	R	R	R	R	B	B	B	B	B	B	B	B		59	59	42	58	40	44	31			
22	46	44	A	R	R	F	R	R	R	R	R	B	B	B	B	B	Y	B		51	58	47	46	48				
23	53	58	R	68	60	61	66	67	80	86	R	J	R	B	R	B	B	B	B	R	R	R	C	C	C			
24	43	B	R	R	R	A	R	R	R	B	R	R	R	B	B	B	Y	R	R	R	J	R	A	A				
25		A	B	R	R	R	R	R	R	B	J	R	R	70	70	R	B	J	R	B	J	R	B	C	C			
26	45	R	J	R	R	F	R	R	B	J	R	J	R	Y	U	R	R	R	R	B	B	60	59	J	R	J		
27	57	R	61	67	76	76	86	83	96		Y	R	Y	Y	92	80	75	80	74	74	74	72	71	68	64			
28	67	64	U	S	S	R	B	A	R	R	R	B	B	B	B	B	R	R	R	R	R	R	F	R				
29		A	A	R	F	A	A	R	J	R	J	R	R	R	R	R	R	62	64	64	62	63	58	58	62	56	56	53
30	48	R	A	R	J	R	R	56	57	57	R	Y	B	R	R	J	R	R	J	R	B	B	R	B	B	Y		
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	17	18	16	15	13	13	8	11	14	12	4	8	7	9	11	15	18	20	25	27	23	22	15				
MED	42	46	49	53	48	44	56	68	66	70	71	79	76	77	68	73	66	64	58	54	55	48	46	46				
U Q	48	57	60	60	54	60	72	82	86	82	74	84	82	79	76	81	75	70	62	60	56	53	56					
L Q	39	34	44	46	38	36	42	50	57	66	64	73	70	62	65	65	62	58	56	46	49	43	40	32				

IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 1999 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	40	50	32	43	58	35	32	38	36	34	36	33	37	B	B	B	B	32	28	29	44	28	36			
2	38	38	30		39	44			37	38								38	36	31	18	28	35			
3	38	44	58			G	G							G	G											
4	38	42	37	35	45	37	33	31	42	30	34	32	36	38	36	33	41	28	24	24	27	17	15	E S		
5	38	41	36	40	35	36	36		34	25	31	39	38	37	37	36	38	36	28	24	27	22	18	15		
6	30	40	56	48	44	37	40	40	34	32	30	36	34	33	34	37	31	26	25	32	34	48	44			
7	B	38	42	32	32		45	45	32		34								B			G				
8	35	38	41	38	41	39	35	38		B	B	B	B	B	B	B	32	32	28	41	35	37	37	42		
9	40	56	44	38	31				B	B	B	B	B	B	B	B			34	32	29	43	37	38		
10	B	34	32	B	E	B	B		G	B	G	G	G	B	G	G	31	30	35	31	30	36	40	43	46	
11	B	B	45	B	B	B	B	B	B	B	B	B	B	B	B	B	33		32	32	28	38	94	40	34	
12	B	80	35	29	29		B	B		G	G	B	B	B	B	B			B	B			B			
13	B	38	40					36	B	B	B	B	B	B	B	B			32	38	47	43	34	38	36	
14	74	36	32	22	23	35	26	32	G	B	G	B	B	B	B	B	28	28	32	40	37	34	21	B		
15	32	35		B	B	B	B		G	39	36	33	34		B	B	32	34	G	G	B	E	B			
16	37	59	56	42	40	40	31	48	33	37		33	35	36			34	28	29	33	40	25	41	34	39	
17	39	39	40	36	34	31	41	38	36	36	36	36	56	43			34	32	44	40	32	37	81	41		
18	39	62	46	43	34	35	38		B	36	36	B	B	B	B	B			28	29	37	33	36	35	39	
19	B	B	B	B	B				B	33	36	B	B	B	B	B			33	29	34	28	34	40	33	40
20	36	61	39	34			40	38	38	36	34	B	B	B	B	B		39	37	37	62	60	33	30	38	
21	31	28	36	43	40	43	41	38	40		B	B	B	B	B	B		30	31	30	32	26	33	81		
22	41	35	70	37	40	35	36	42		G	G	B	B	34	36	33	30	32			28	35	38	38	36	
23	33	32	31	33	42	39	34	36	36	B	38	B	B	B	B	B		37	38	38	36		C C			
24	41	39	34	57	33	40	38		B	33	38	32	B	B	B	B		33	33	38	34	41	34	40	39	
25	60	35	28	34	37	39	43	42		B	35	35	35	33	33			32	41	30				44		
26	37	37	39	30	38	37	37		B	35	34	35	33	42	32	36	35	32			38	35	36	36	30	
27	27	25	26	26	44	33	28	32	32	32	32	35	33	78	39	69	36	40	47	42	36	34	38	47	33	
28	20	23	38	42	40		49	46	40	G	G	B	B	B	B	B			35	33	26		36	41	40	
29	50	42	40	41	41	44	43	37	36	34	34	34	40	37	40	35	35	32	32	27	33	28	21	34		
30	40	40		54	71	39	38	45		G	38	34	39	37	37	36		62			42			20		
31																										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	25	25	28	24	25	23	27	25	24	20	18	15	14	12	11	17	20	26	24	27	28	27	27	26		
MED	38	39	39	36	40	36	38	38	36	34	34	33	36	35	36	34	32	32	33	30	34	36	35	37		
U Q	40	47	43	42	43	39	41	41		G	35	36	35	40	37	37	36	34	37	38	40	36	40	41		
L Q	34	36	34	31	33	33	33		G	34	30	32	34	32	33	33			G							

IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 1999 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	16	10	14	15	11	12	15	24	15	18	14	14	B	B	B	B	21	B	28	13	12	13	12				
2	14	12	30	B	26	26	15	20	26	25	38	B	B	B	B	B	B	25	14	11	13	9	11					
3	12	16	13	B	B	14	18	16	13	14	12	16	16	21	15	16	13	14	13	10	12	12	10	10				
4	29	20	14	11	13	15	14	14	16	14	15	12	15	12	15	12	11	15	15	13	12	12	11	15				
5	16	15	28	18	16	14	13	12	14	14	14	15	14	16	14	14	12	15	11	12	11	11	11	15				
6	10	17	15	17	14	11	16	14	13	13	25	24	26	16	14	18	16	B	26	25	14	12	11	14				
7	B	12	26	11	10	B	14	16	21	B	B	B	B	B	B	B	B	15	15	12	10	14	20	10	10			
8	12	9	19	25	18	15	15	B	B	B	B	B	B	B	B	B	B	25	18	13	14	13	12	10	11	10	19	
9	15	14	11	16	13	B	27	16	B	B	B	B	B	B	B	B	B	B	18	14	14	14	14	25	B			
10	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	21	17	14	31	30	14	14	13	12		
11	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	26	24	24	16	14	14	11	22	B		
12	B	18	25	11	17	B	B	18	18	15	B	B	B	B	B	B	B	B	19	B	B	15	14	12	B			
13	B	13	15	13	30	B	B	25	B	B	B	B	B	B	B	B	B	B	20	14	12	14	17	10	14	28	B	
14	15	20	12	12	12	10	12	14	13	19	B	B	B	B	B	B	B	24	18	14	13	15	12	15	B			
15	13	19	B	B	B	B	25	20	18	16	19	B	B	B	B	B	B	26	18	20	14	B	B	31	15	13	11	
16	12	16	12	14	17	15	26	18	30	19	B	25	15	24	B	B	B	17	18	19	13	11	10	20	19	14		
17	9	18	17	10	12	22	15	12	14	15	14	15	14	B	B	B	B	25	26	12	11	13	12	13	14			
18	10	12	11	12	14	15	17	B	24	26	B	B	B	B	B	B	B	28	B	19	14	14	15	14	15	B		
19	B	B	B	B	B	B	B	B	18	15	18	21	B	B	B	B	B	B	18	18	16	18	17	17	17	B		
20	25	15	28	25	B	18	16	15	14	18	B	B	B	B	B	B	B	B	16	31	15	17	14	14	15	15		
21	14	16	18	19	26	19	16	15	14	B	B	B	B	B	B	B	B	B	15	27	30	18	15	14	16			
22	13	14	26	18	12	15	14	15	15	14	18	B	B	B	B	B	B	20	15	28	16	22	B	14	12	11	10	10
23	10	12	10	12	15	14	13	12	14	B	19	B	B	B	B	B	B	B	14	12	16	14	C	C	C	C		
24	8	B	15	10	12	14	12	17	B	19	16	15	B	B	B	B	B	25	14	38	13	12	12	16	12	15		
25	25	B	15	14	10	14	13	14	16	B	15	15	15	B	B	B	B	15	16	14	15	B	C	C	13			
26	11	14	26	17	14	14	15	B	13	15	14	14	14	18	15	16	15	14	B	B	26	25	17	10	14			
27	13	10	12	11	12	11	25	13	18	25	21	23	19	29	21	13	23	15	12	12	12	14	15	13				
28	9	13	14	14	14	B	15	16	15	25	B	B	B	B	B	B	B	26	20	12	26	13	14	14	15			
29	12	14	12	18	12	15	14	12	14	15	14	16	17	14	14	14	14	14	14	14	11	11	11	12				
30	14	15	11	14	17	14	15	14	18	26	B	18	18	14	14	13	B	B	62	42	B	B	15					
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	28	28	29				
MED	14	16	15	16	14	15	15	16	18	23	23	B	B	B	B	B	B	26	19	18	14	14	14	13	15			
U Q	25	19	26	25	26	26	18	20	26	B	B	B	B	B	B	B	B	26	27	26	17	15	14	16				
L Q	12	13	12	12	12	14	14	14	14	15	15	16	17	21	15	16	15	14	13	12	12	12	11	12				

IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 1999 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	232	196	204	F	A	A		A	A	A	A		B	B	B	B	B	B	Q	Q	A	A			
2		A	A	B	B	A	A	A	A	A	YE	B	B	B	B	B	B	A	A		Q				
3	230		226					224	206	232	204	220	224		210	232	220	226	246	224	236	244	262	228	
4		A	A	A				A	A	A			224	206	206	232	228	218	210	202	236	234	228	242	244
5	Q	A	A	A	A						A					218	212	230	230	222	218	235	282		
6	266							224	256	218	218	218	216	210	210	210	206	224	218	212	230	222	218	235	
7		A	A	A	F	F	B	A	A	A	B	B	A	B	B	B	BE	A	A	A	B	A	A		
8		A	F	A	A	E	A				B	B	B	B	B	A	B	A	A	A	E	A	A		
9		A	A	A	A	A	B	A			B	B	B	B	B	B	B	A	A	A	E	A	B		
10		A	B	A	B	B	A	A	B	B	BE	A	A	Y	A	B	Y	E	A		A	A	A		
11		B	B	E	A	B	B	B	B	B	B	B	B	B	B	B	A	BE	AE	A		A	FE		
12		B	A	A	B	A	A	B	BE	A		A	B	B	B	B	BE	A	B	BE	A	A	B		
13		B	AE	A	A	A	B	B	A	B	B	B	B	B	B	B	A		A	A	F	A	A		
14		A	A					A	A	A	A	BE	A	B	B	B	B	234	234	210	A	A	B		
15				228	218	236					250							234	234	210	268	306			
16	286	354	274	274				A	A	Y	A	Y	Y	B	Y	Y	B		Y	Y	A	F	A	A	
17	238		A	A	230	230	AE	A	250	220	234	A	A	A	A	B	B	234		230	244	246	234		
18		A	316	A	A	246	268	A	A	B	A	A	B	B	B	B	B	232	240	A	A	A	A		
19		B	B	B	A	B	A	A	B		224	A	B	B	B	B	B	230	230	266	200				
20		A	204									278	212	B	B	B	B	B	230	244	230	248	262	272	
21		A	A	A	A	A						202	A	A	B	B	B	B	B	228	234	258	258	278	
22		220						A	AE	A	A	Y	B	B	232	220	A	A	A	B	218	218	242		
23		240	284	302				A	A	A	B	A	B	B	B	B	B	A	A	A	A	C	C		
24		A	B	A	Q	A	A	A	B	A	AE	Y	B	B	B	YE	AE	B	268	300	236	240	A	A	
25		A	B	A	AE	B	AE	A	A	A	B	Y	A	B	220	B	B	216	212	226	B	C	C		
26		A	A	A	A	A	A	B	EA	Y	Y	Y	A	Y	226	226	202	B	BE	AE	256	258	236	252	268
27		EE	A	EE	A	A	Y	Y	Y	Y	Y	A	Y	A	220		Y	A	264	230	230	222	236	248	
28		250	286	278	244							254	A	Y	B	B	B	Y	Y		216	220	250	250	272
29		A	A	A	A	A	A	A	A	A	A	200	A	A	A	A	A	210	228	228	228	226	222	242	
30		EA	AE	A	A	A	A	A	A	A	B		226	Y	A	A	B	B	BE	B	B	272	Y		
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	10	11	8	8	8	9	9	9	7	7	5	3	8	13	15	18	21	18	23	13	14	12	
MED	246	284	248	247	230	228	220	225	218	218	210	211	224	228	217	227	226	232	230	230	241	239	246	248	
U Q	266	305	276	276	252	245	261	245	248	226	244	226	232	232	220	235	232	244	240	248	266	250	278	277	
L Q	232	223	0228	236	225	218	211	221	212	211	206	208	211	210	213	218	216	230	225	224	228	235	236	243	

NOV. 1999 h'F (KM)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 1999 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	B	B	B	B	B	Y	Y	Y	B	B	B	B	B	B	B	B	B	Y	B	Y	Y	Y	Y	
2	B	B	Y	A	Y	B	B	Y	B	B	B	B	B	B	B	B	B	B	Y	R	C	C	C	
3	Y	A	Y	B	B	Y	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	R	
4	R	B	R	R	R	B	B	B	B	B	B	B	B	B	C	C	C	R	X	Y	B	Y	A	
5	A	B	BO	X	47	B	B	B	B	B	B	B	B	R	B	B	BO	XO	XO	X	XO	X	R	B
6	R	R	B	B	B	B	B	B	B	B	B	B	B	B	R	R	O	X	BO	X	A	X	B	
7	A	O	X	A	B	45	B	B	R	B	B	B	B	R	R	B	B	XO	X	XO	X	X	B	
8	56	64	B	B	B	A	R	B	B	R	B	B	B	B	B	B	XO	X	B	X	R	B		
9	A	B	B	RO	X	46	B	B	R	B	R	B	R	B	RO	X	B	B	B	X	XO	X	X	
10	X	B	B	B	R	B	B	X	R	BO	XO	X	BO	X	B	R	R	RO	X	BO	X	X	R	
11	B	B	B	R	C	C	C	C	C	B	B	B	B	B	B	BO	X	B	R	BO	X	Y	X	
12	O	X	X	X	66	70	72	80	82	B	B	YO	X	X	X	X	X	B	B	B	B	X	X	B
13	R	X	A	47	R	R	R	C	C	C	R	R	R	R	R	R	R	R	X	X	X	X	X	
14	X	XO	X	50	65	62	72	71	80	82	89	79	71	A	R	R	R	R	X	X	C	C	O	
15	X	64	69	35	68	76	70	80	81	93	90	87	89	72	RO	XO	R	RO	X	XO	A	X	X	X
16	A	A	X	64	56	66	60	X	R	R	R	B	B	B	R	RO	X	X	R	X	X	X	X	
17	O	XO	X	57	50	A	A	XO	X	R	R	A	O	XO	X	R	Y	O	X	RJ	R	XO	X	X
18	X	62	66	62	65	67	68	66	73	72	82	82	87	X	O	X	Y	YO	X	X	R	X	X	X
19	X	R	R	C	C	C	C	C	C	XO	X	RO	X	R	RO	X	R	X	X	X	X	X	X	
20	O	X	X	57	66	65	66	X	80	85	86	87	88	88	A	X	R	RO	XO	XO	XO	XO	X	
21	XO	X	XO	55	66	63	59	69	80	92	94	94	92	96	92	89	Y	YO	XO	XO	X	X	R	A
22	C	C	C	C	C	C	C	C	C	CO	XO	XO	X	X	X	X	X	X	X	X	X	X	X	
23	X	X	X	71	70	69	69	70	78	80	82	96	X	C	C	C	C	C	C	C	C	C	C	C
24	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	R	R	X	X	X	X	X	
25	O	XO	XO	66	64	56	54	68	R	X	X	R	B	B	BO	XO	XO	X	XO	X	X	X	XO	
26	O	X	65	63	63	61	68	66	76	79	88	89	89	86	C	C	XO	X	X	XO	X	X	X	X
27	68	71	71	66	60	O	X	R	X	XO	XO	X	XO	XO	XO	XO	XO	X	X	X	X	X	X	
28	O	XO	X	53	65	B	B	R	X	R	RO	XO	X	X	X	X								
29	B	A	A	B	67	BO	X	B	C	C	R	R	R	R	R	R	RO	X	X	X	XO	X	X	
30	A	55	A	O	XO	X	43	63	64	48	68	79	84	84	89	69	68	R	C	C	C	C	X	XO
31	49	46	67	B	A	R	B	B	B	B	B	B	B	B	B	XO	XO	XO	XO	X	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	17	17	11	15	14	14	9	11	10	11	12	13	8	9	6	10	13	14	20	18	23	20	20	19
MED	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	60	64	65	61	68	68	80	79	87	87	82	86	88	72	72	73	71	66	67	66	65	59	60	61
L Q	66	66	69	66	70	78	82	82	93	90	88	90	89	83	82	80	76	73	71	70	68	66	65	66

IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 1999 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

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	Y	Y	Y	B	B	B	B	B	B	B	B	B	Y	B	Y	Y	Y	Y		
2	B	B	Y	A	Y	B	B	Y	B	B	B	B	B	B	B	B	B	Y	R	C	C	C	C		
3	Y	A	Y	B	B	Y	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	R		
4	R	B	R	R	R	B	B	B	B	B	B	B	B	B	C	C	R	R	Y	B	Y	A			
5	A	B	B	R	B	B	B	B	B	B	B	B	B	R	B	B	R	R	J	R	R	R	B		
				41													59	45	46	55	50				
6	R	R	B	B	B	B	B	B	B	B	B	B	B	B	B	B	R	R	R	B	R	A	42		
7	A	R	A	B	F	B	B	R	B	B	B	B	R	R	B	B	B	B	R	R	R	R	B		
				46				39										39	43						
8	F	F	B	B	B	B	A	R	B	B	R	B	B	B	B	B	B	B	R	B	J	R	R		
				40	56													58	45	37			B		
9	A	B	B	B	R	R	B	B	R	B	R	B	R	B	R	B	B	B	B	B	50	49	48	50	
						40												68							
10	B	B	B	R	R	B	B	J	R	R	B	R	R	B	R	R	R	R	R	B	R	J	R	R	
								70			59	59		63					57		52	51		B	
11	B	B	B	F	R	C	C	C	C	C	B	B	B	B	B	B	R	B	R	B	R	Y	56	58	
						34												64							
12	S	60	60	64	66	72	69	F	F	B	B	Y	R	J	R	J	R	B	B	B	B	B		B	
													68	72	69	73	74								
13	R		A	F	R	R	C	C	C	R	R	R	R	R	R	R	R	R	R	R	R	65	59	55	
																							59	50	
14	R	44	54	59	56	66	65	J	R	R	R	R	R	R	R	R	R	J	R	R	C	C	S	62	
													73	65											
15	J	R	58	63	10	62	70	J	R	R	F	J	R	R	R	R	R	R	R	A					
16	F	A	A	J	R	R	50	60	54	R	R	R	B	B	B	R	R	R	J	R	J	R	R		
																			50	50	57	53	54		
17	R	51	44							R	R	A	R	R	R	R	R	A	J	R	R	J	R	R	
													48	52						50	62	57	35	57	
18	J	R	56	54	56	56	61	58	60	67	66	76	R	J	R	R	Y	R	J	R	J	R	R	48	
													76	81				70	72		69	66	60		
19	R	54								C	C	C	C	C	C	C	C	C	C	C	C	J	R	57	
20	R	51	55	59	57	60	67	79	F	J	R	R	R	R	R	R	A	R	R	R	R	R	R	58	
													80	81	82	82		70		68	61	64	65	63	
21	R	50	60	57	53	63	74	86	88	88	88	86	90	86	83	R	Y	R	R	R	R	A	R	37	
																							J		
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	64		
23	J	R	65	64	60	63	64	66	F	F	F	C	C	C	C	C	C	C	C	C	C	C	C	C	
24	B	C	C	C	C	C	C	C	C	C	C	B	B	C	C	C	C	B	R	R	57	60	60	54	
																							56		
25	R	60	58	50	48	60	R	F	R	F	R	R	B	B	B	B	R	R	R	R	U	S	U	S	
													58	61	66			66	64	63	60	48	59	60	
26	S	59	52	54	55	59	60	F	R	F	R	R	J	R	R	R	J	R	R	R	R	59	60	61	61
													73	82	83	80	C	J	R	R	R				
27	F	59	60	55	56	54											R	U	R	R	R			F	
28	R	47	59	S	B	B	R		R	R	R	R	R	R	R	R	R	J	R	R	J	R	U	S	
29	B	A	A	B	B	R	B	C	C	R	R	R	R	R	R	R	R	R	R	R	J	R	R		
30	A	39	F	A	R	R	F	R	F	R	R	R	R	R	R	R	C	C	C	C	C	C	R	45	
31	F	30	36	53																				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	17	17	11	15	14	14	9	11	10	11	12	13	8	9	6	10	13	14	20	18	23	20	20	19	
MED	54	56	56	55	60	60	71	73	81	81	76	80	82	66	66	67	65	60	61	60	59	53	54	55	
UQ	59	60	59	57	64	66	76	76	87	84	82	84	83	77	76	74	70	67	65	64	62	60	59	60	
LQ	48	49	53	41	57	56	59	66	73	68	68	66	68	62	63	60	58	55	57	47	52	48	48	50	

IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 1999 fTFS (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	19	20	23	23	B	B	B	B	B	B	B	B	22	B	20	22	G	26					
2	B	B	23	28	23		B	B	21	B	B	B	B	B	B	B	B	22	28	C	C	C						
3	27	29		B	B	22	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	28					
4	31	26	G	26	B	B	B	B	B	B	B	B	B	B	C	C	35	41			36	59						
5	39	39	B	B	B	B	B	B	B	B	B	B	B	34	B	B	G	34	33	46	41	G	B					
6	40	33	B	B	B	B	B	B	B	B	B	B	B	B	B	33	28	E B	B	39	34	34	B					
7	40	35	72	31	B	B	37	B	B	B	B	B	B	34	36	B	B	B	28	29	32	44	38	F B				
8	37	44	B	B	B	39	43	B	B	B	31	B	B	B	B	B	B	28	G	B	G	36	B					
9	36	B	B	B	38	33	B	B	35	34	B	35	B	G	B	B	B	34	34	40	33							
10	32	B	B	B	G	B	B	G	B	34	G	B	44	B	37	G	G	30	28	26	26	42	B					
11	B	B	B	32	33	C	C	C	C	C	C	B	B	B	B	B	G	B	G	B	27	29	30	40	21			
12	32	23	32	36	32	33	B	B	G	G	G	32	G	G	G	B	B	B	B	B	B	B	35	37				
13	40	38	39	44		G	G	G	C	C	C	C	34	36	35	32	G	B	33	36	38	42	54	44	48	60		
14	39	43	32	32	35	36	36	36	43	38	49	43	68	39	37	37	38	36	50	46	C	C	C	27				
15	21	26	35	32	33	31	33	33	32	35	36	34	48	47	38	34	37	36	42	66	63	31	24	28				
16	35	61	50	43	36	37	33	41	42	40		B	B	B	B	36	33	39	35	34	32	32	32	29	27			
17	35	42	48	70	34	42	45		G	41	36	34	34	34	35	35	33	34	28	31	31	27	37	30	26			
18	34	32	34	35	34	39	41	37		G	33	35	44	43	36	34	38	47	37	34	38	36	32	25				
19	38	36		C	C	C	C	C	C	C	33	33	33	34	36	32	36	31	27	28	34	29	31					
20	35	33	38	35	33	34	30	34	35	38	41	36	73	43	35	39	35	34	33	28	36	37	33	G				
21	29	40		G	32	30	33	35	34	34	36	37	46	37	36	35	36	34	56	50	40	30	71	28	28			
22	C	C	C	C	C	C	C	C	C	C	37	40	39	40	35	42	38	49	32	34	35	42	40	28	26			
23	28	39	71	45	48	36	35	36	37		C	C	C	C	C	C	C	C	C	C	C	C	C	C				
24	B	C	C	C	C	C	C	C	C	C	B	B	C	C	C	B	G	31	34	32	24	33	32	35				
25	38	37	35	35	48	48	42	38	36	37	B	B	B	36	36	38	36	35	33	29	38	40	35					
26	35	40	108	42	41	40	34	34		G	33	42	42		C	C	37	34	37	36	33	38	42	50	35	40		
27	24	31	39	37	48	43	40	35	35	30	34		G	36	60	E B	G	35	34	40	36	32	28	31	34	36		
28	40	35		G	B	B		40	38	35	46	38	37	33	37	32	32	30	34	32	30	30	40		20	30		
29		36	56		B	B	22		G					34	32	33	31	35	33	33	29	31	22	28	38	37	38	
30	52	22	39	34	36	34	32		G	36	32	32	37	38	36	35	C	C	C	C	C	C	23	33	46			
31	31	36	40		B	56	37	B	B	B	B	B	B	B	E B	G	G	G	22	32	26	48	78	40	38			
	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	22	21	18	22	20	16	18	16	16	15	18	14	19	17	17	20	20	25	22	26	26	26	23				
MED	35	36	38	35	34	34	35	34	36	36	34	34	36	35	36	34	34	34	33	32	31	35	34	30				
U Q	39	40	49	42	40	38	39	38	38	37	40	37	44	43	36	37	37	36	36	40	39	40	38	38				
L Q	31	33	32	32	30	32	32	23	28	31	33	32	33	34	35	33		G	G	29	27	28	31	29	26			

IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 1999 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	14	14	16	16	B	B	B	B	B	B	B	B	B	B	16	14	15	14	13	
2	B	B	17	16	14			B	B	B	B	B	B	B	B	B	B	B	B	15	14	C	C	C	
3	16	15	14			14	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	14	
4	13		15	15	16		B	B	B	B	B	B	B	B	B	C	C	C	14	14	12		17	14	
5	22		20		B	B	B	B	B	B	B	B	B	B	B	17	B	B	20	13	12	14	12	21	
6	22	19		B	B	B	B	B	B	B	B	B	B	B	B	B	25	18	32	13	20	16	B		
7	16	29	15		24	B	B	26	B	B	B	B	B	B	21	15	B	B	13	14	12	11	20	B	
8	10	14		B	B	B	16	16	B	B	B	24	B	B	B	B	B	B	16	13	14	16	B		
9	11		B	B	B	20	16	B	B	B	24	15	B	26	B	18	B	B	B	11	17	12	11	B	
10	13		B	B	B	18		21	30	B	15	23	21	B	28	26	16	16	B	12	12	21		B	
11	B	B	B	14	27	C	C	C	C	B	B	B	B	B	B	B	2.0	B	12	12	19	15	15		
12	14	15	14	14	13	12		B	B	26	28	17	18	20	30	B	B	B	B	B	14	11		B	
13	10	11	15	12	24	26	19	C	C	C	C		15	16	15	24	B	13	13	13	14	10	12	11	10
14	10	11	12	12	11	10	10	12	11	11	14	14	13	13	11	12	12	14	12	10	C	C	C	16	
15	11	10	10	9	10	11	10	12	12	12	14	14	13	15	14	14	14	13	15	13	14	11	13	12	
16	12	11	10	14	15	13	15	14	14	27	B	B	B	B	B	B	15	15	14	14	14	12	11	10	
17	13	18	16	26	13	12	17	14	16	15	15	14	12	14	14	13	15	15	19	31	12	12	14	15	
18	11	12	15	15	13	15	16	16	16	16	13	16	15	14	12	13	15	14	14	13	13	14	11	14	
19	13	21	19	C	C	C	C	C	C	C	13	14	14	16	16	14	14	14	14	12	16	14	10	10	
20	15	10	10	11	11	13	12	14	12	14	14	15	16	15	14	14	15	14	14	14	12	12	11	10	
21	10	14	11	12	12	13	10	12	15	13	19	14	20	18	15	14	14	15	13	12	13	13	10	12	
22	C	C	C	C	C	C	C	C	C	C	14	14	15	16	14	26	14	13	15	11	15	15	12	11	
23	12	10	10	12	13	15	15	11	12	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
24	B	C	C	C	C	C	C	C	C	B	B	C	C	C	C	B	18	14	12	12	12	13	16	12	
25	12	9	9	10	12	12	10	12	12	28	B	B	B	B	B	20	15	14	13	14	12	20	18	11	
26	14	9	10	16	12	16	9	9	12	11	13	12	C	C	14	11	10	13	12	11	12	12	9	8	
27	8	9	10	11	13	25	16	12	12	11	13	12	12	60	30	24	18	18	15	11	12	12	10	8	
28	B	B	12	14	16	26	26	17	20	16	21	20	16	16	16	11	15	10	14	9	9	16	10		
29	B	19	20		15	B	C	C	22	12	12	11	12	14	16	15	14	12	10	10	14	14			
30	16	14	26	11	10	11	8	12	10	12	11	14	15	12	10	C	C	C	C	C	C	10	8	10	
31	10	10	8	12	13	B	B	B	B	B	B	B	B	B	B	22	11	18	13	14	13	11	17	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	30	29	29	28	28	27	27	25	25	27	28	29	28	28	29	28	28	28	29	29	28	28	28	29	
MED	13	14	15	16	14	15	16	16	16	16	27	20	16	B	20	24	20	15	15	14	14	12	12	14	
U Q	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	16	14	16	16	
L Q	11	10	10	12	12	13	12	12	12	14	14	14	15	15	14	14	14	14	12	12	12	11	11	10	

DEC. 1999 fmin (0.1MHz)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 1999 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

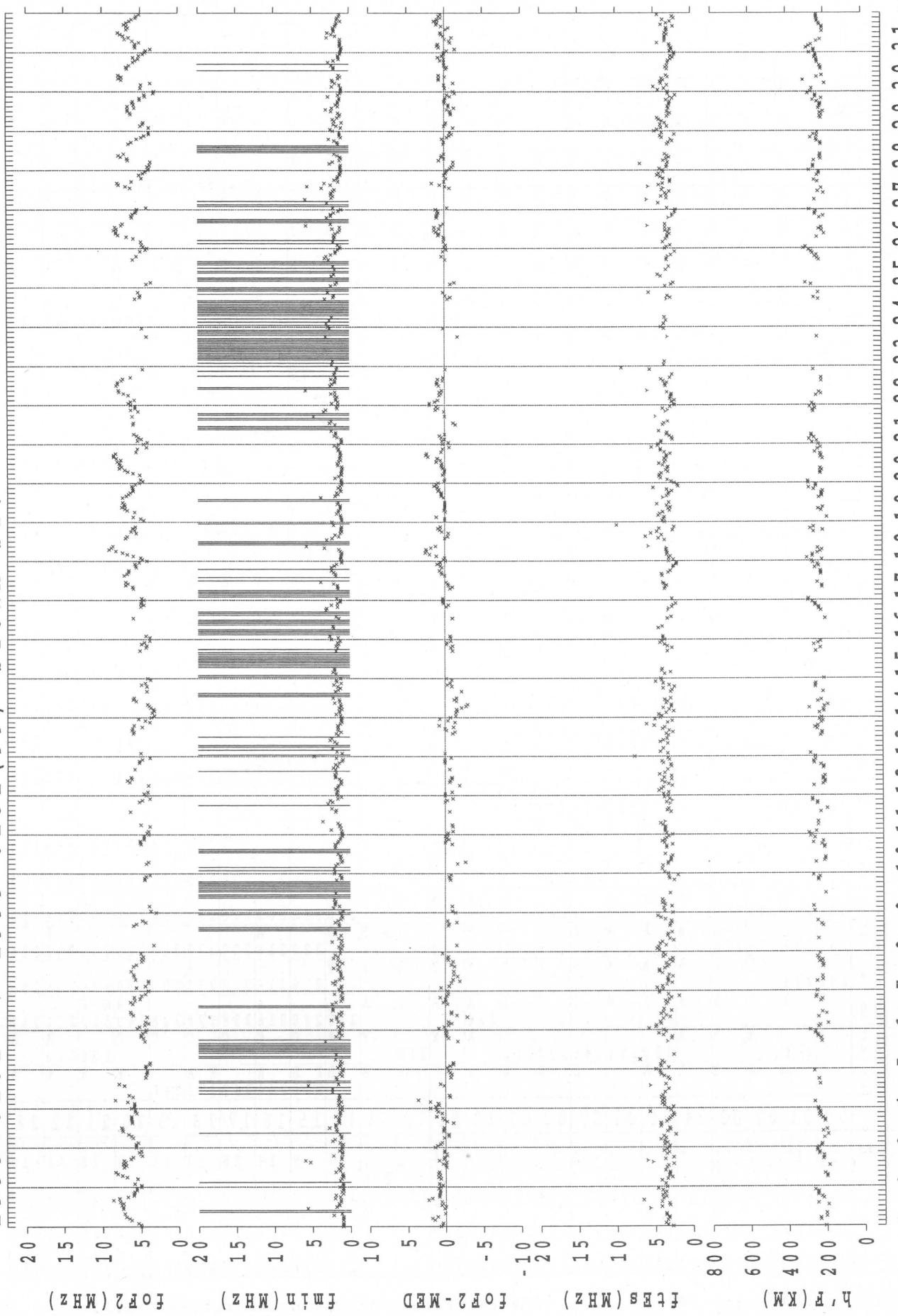
LAT. 69°00'.4"S LON. 039°35.4"E SWEEP 0.4MHz TO 15.0MHz IN 20.0SEC IN MANUAL SCALING

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	Y	Y	Y	Y	B	B	B	B	B	B	B	B	Y	B	Y	Y	Y	A				
2	B	B	Y	A	Y	B	B	Y	B	B	B	B	B	B	B	B	B	B	Y	A	C	C	C				
3	A	A	A	B	B	Y	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A				
4	A	B	A	A	A	B	B	B	B	B	B	B	B	B	C	C	C	A	A	A	B	A	A				
5	A	B	B	A	B	B	B	B	B	B	B	B	A	B	B	B	220	244	278	228	268	A	A	B			
6	A	A	B	B	B	B	B	B	B	B	B	B	B	B	A	A	226	304		A	A	A	B				
7	A	A	A	B	A	300	B	B	A	B	B	B	B	A	A	B	B	234	238	268	A	A	B				
8	A	A	B	B	B	B	A	A	B	B	B	A	B	B	B	B	236	244	B	216	A	B					
9	A	B	B	A	A	B	B	B	A	B	216		B	A	B	A	B	B	B	212	232	230	220				
10	B	B	B	A	B	B	Y	A	B	222	220		B	A	B	A	220	222	262	186	274	238					
11	B	B	B	A	A	C	C	C	C	B		B	B	B	B	B	218	228		244	A	A	262				
12	Q	A	AE	A	Q	A	B	B	A	A	214		Y	Y	Y	B	B	B	B	262	260	A	B	B			
13	A	A	A	A	A	AE	A	C	C	C	A	A	A	A	B	A	A	AE	A	266	254	242	242	268			
14	AE	A	F	Q	272	272	246	218	202	A	198		A	A	A	A	204	222	A	A	C	C	CE	A			
15	204	208	198	238	204	204	220	208	208	210	228	A	A	A	A	218	220	222	AE	A	288	254	248	260			
16	Q	A	AE	A	AE	A	A	A	A	A	B	B	B	B	A	AE	A	244	218	226	242	242	242	252			
17	264	A	A	A	A	A	A	A	AE	A	238	214	A	Y	A	A	A	AE	AE	B	210	234	236	238	232	264	274
18	A	A	A	A	A	A	A	Y	212	210	Y	A	Y	Y	YE	Y	Y	Y	AE	A	248	238	208		264		
19	240	A	A	A	C	C	C	C	C	C	218		Y	A	A	A	218	224	232	254	246	252					
20	298	278	A	E	A	214	268	236	226	232	240	264	E	A	A	A	234	220	220	218	232	238	238	242	260		
21	256	258	A	A	258	256	230	226	206	202	210	Y	Y	Y	Y	214	232		228	A	A	250					
22	C	C	C	C	C	C	C	C	C	C	246	Y	Y	Y	Y	224	206	226	204	218	240		242	246			
23	Q	A	A	AE	A	278	242	228	208	C	C	C	C	C	C	C	C	C	C	C	C	C	C				
24	B	C	C	C	C	C	C	C	B	B	C	C	C	C	B	A	216	226	234	238	242	258	268				
25	314	A	A	A	A	A	A	216	226	Y	B	B	B	Y	Y	220	210	224	238	270	238	244	260	278			
26	292	264	280	370	A	A	A	258	214	220	266	238	C	C	C	C	210	198	208	216	216	198	256	252	214	256	
27	260	282	274	274	A	A	A	A	200	206	208	210	Y	YE	B	A	390	322	216	200	238	218	210	206	232	224	
28	A	B	B	A	A	A	A	A	Y	Y	Y	Y	Y	Y	Y	218	216	216	232	226	230	236	236	266			
29	B	A	A	B	B	Y	B	C	C	A	224	A	A	A	A	218	200	216	216	228	228	240	312	272	242		
30	A	218	A	A	A	220	194	246	208	202	A	Y	210	Y	A	C	C	C	C	C	228	242	A	A			
31	F	A	A	B	A	A	B	B	B	B	B	B	B	B	B	270	244	242	272	240		Y	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	15	11	6	10	7	9	8	9	10	7	7	6	2	1	4	9	14	16	20	18	22	18	18	18			
MED	256	254	273	246	249	230	232	217	208	209	222	213	212	390	215	219	216	220	228	231	238	242	244	259			
U Q	274	268	274	274	272	266	244	230	220	246	228	220			224	252	220	223	238	242	254	254	262	266			
L Q	238	220	220	222	222	214	216	223	211	206	202	214	210			213	209	210	216	224	226	228	232	238	250		

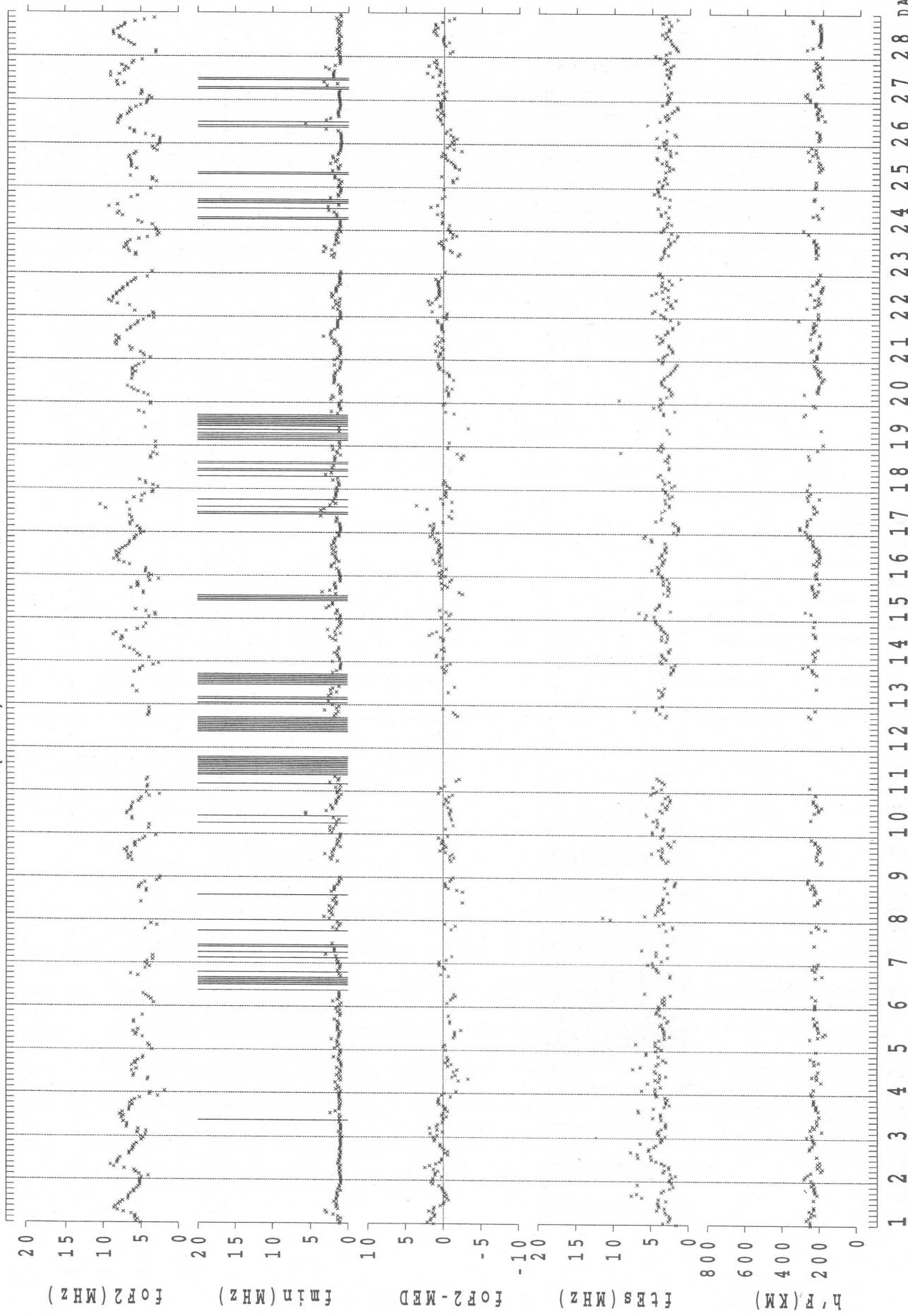
DEC. 1999 h'F (KM)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

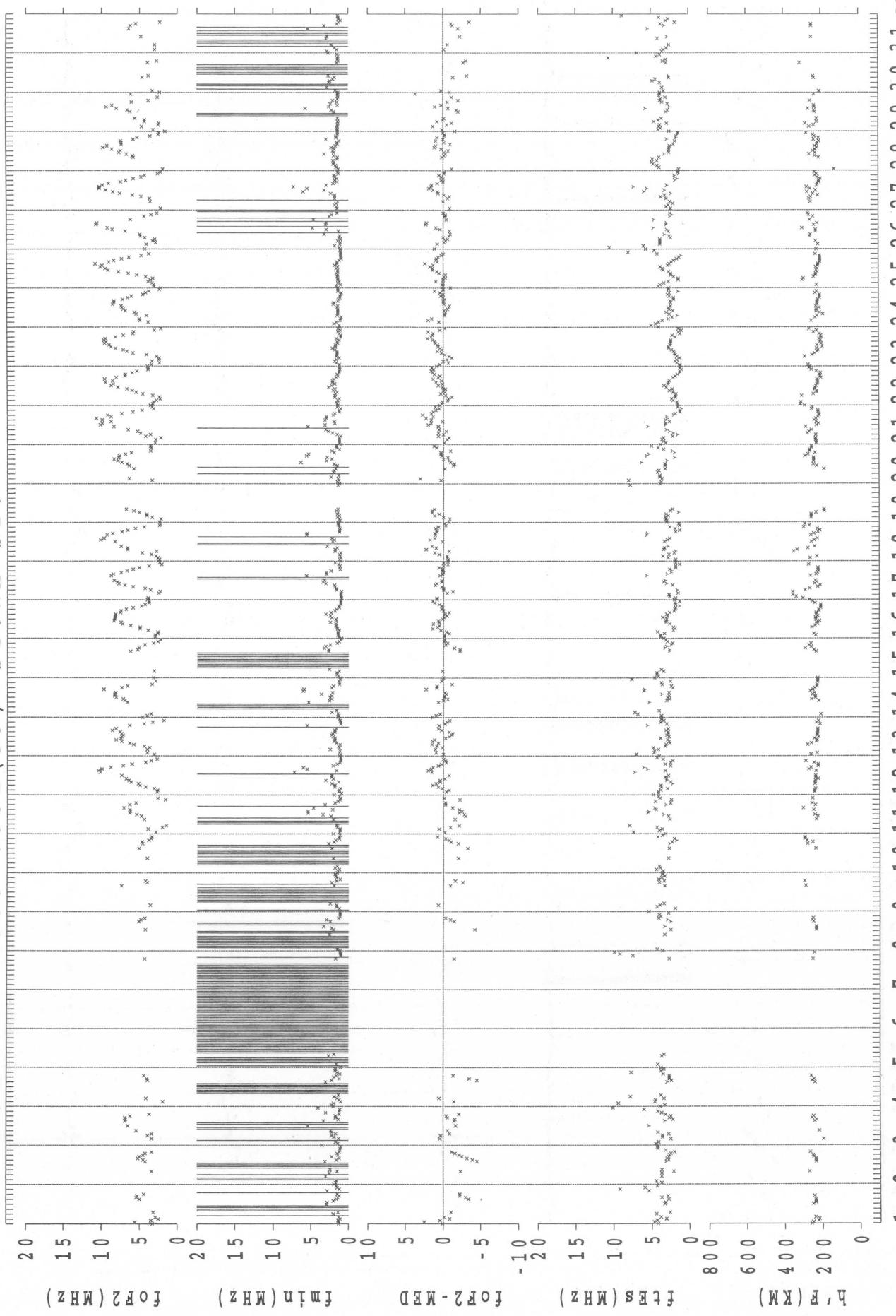
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1999 0201 -> 1999 0228 (99) SYOWA-ST.

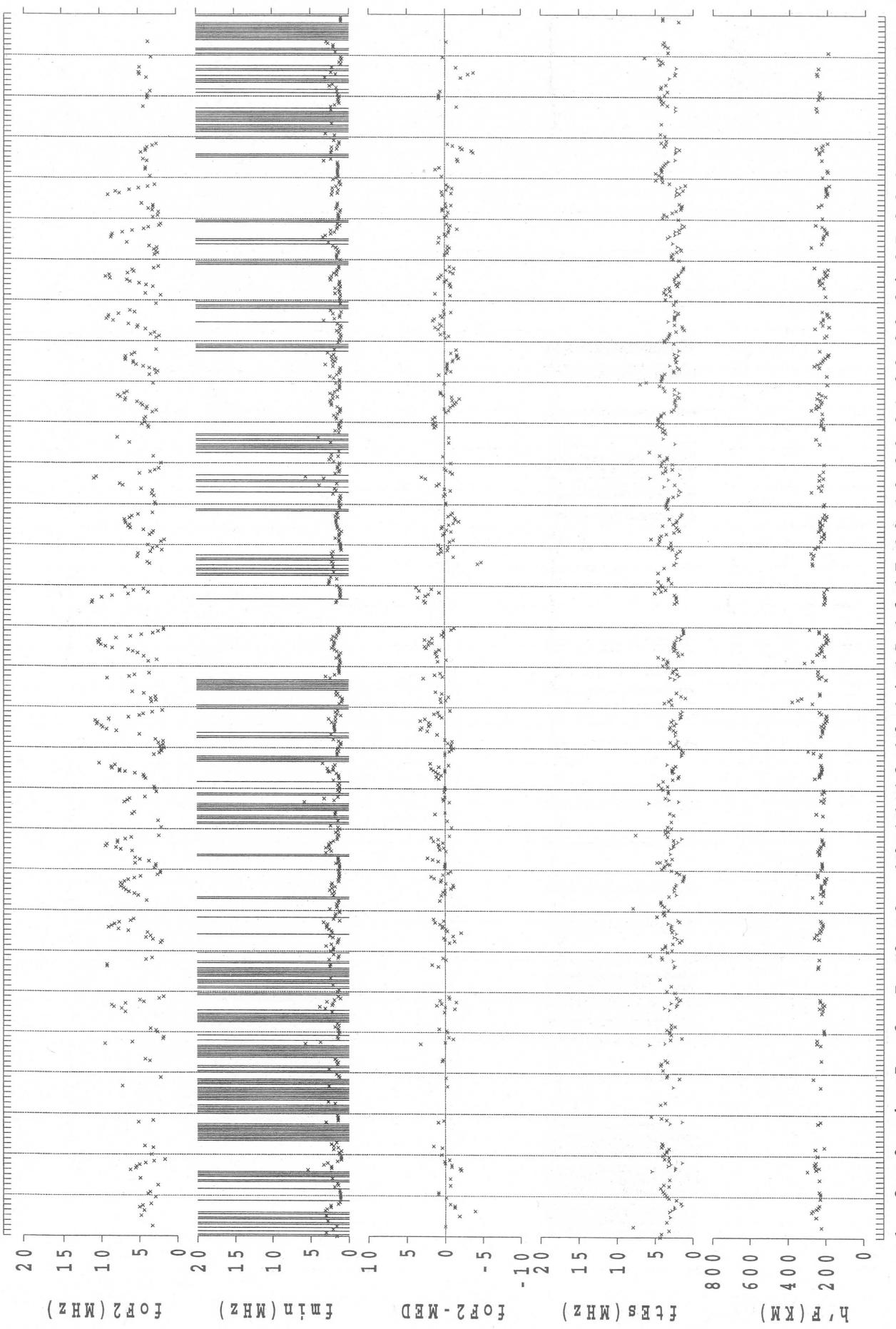


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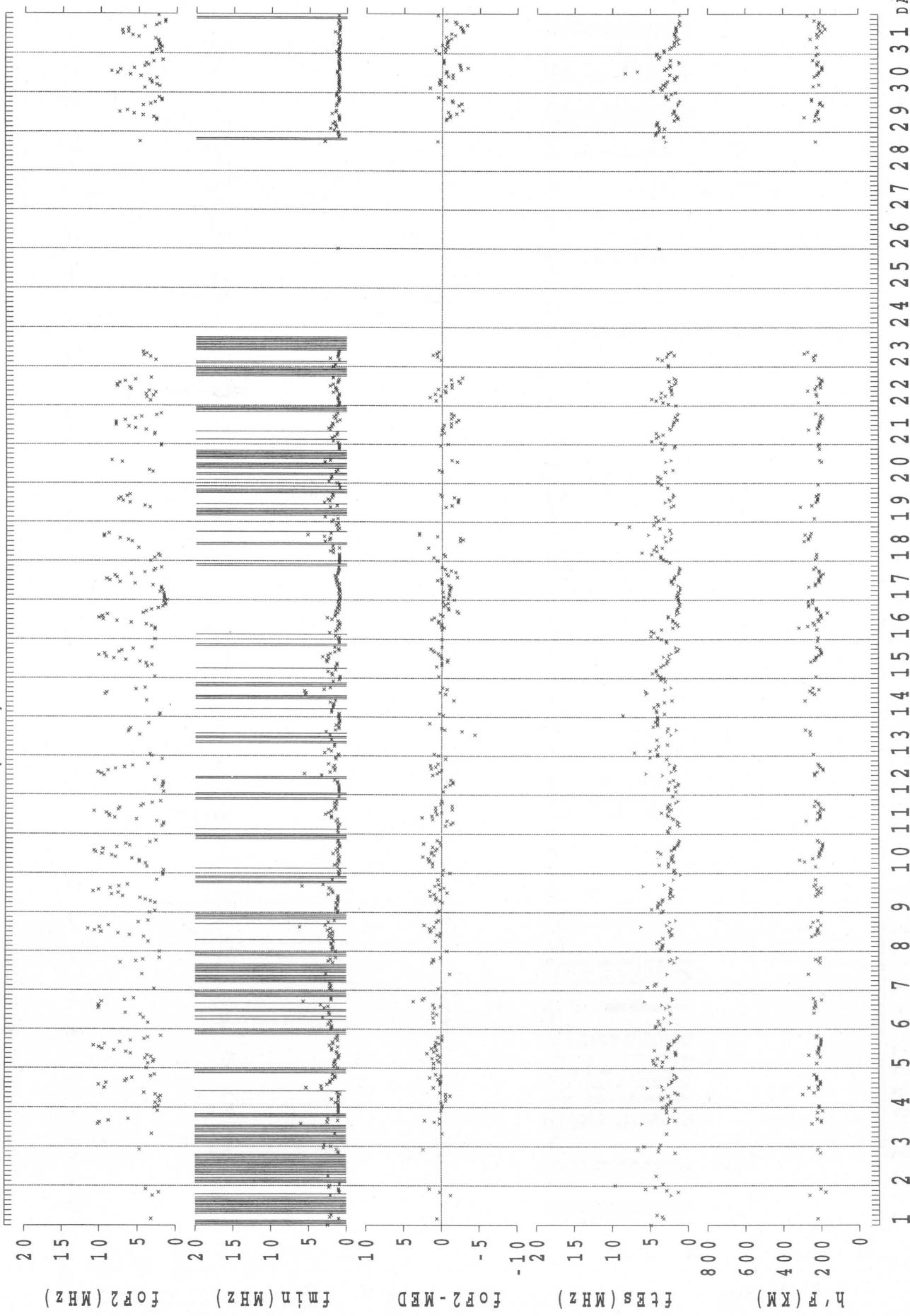


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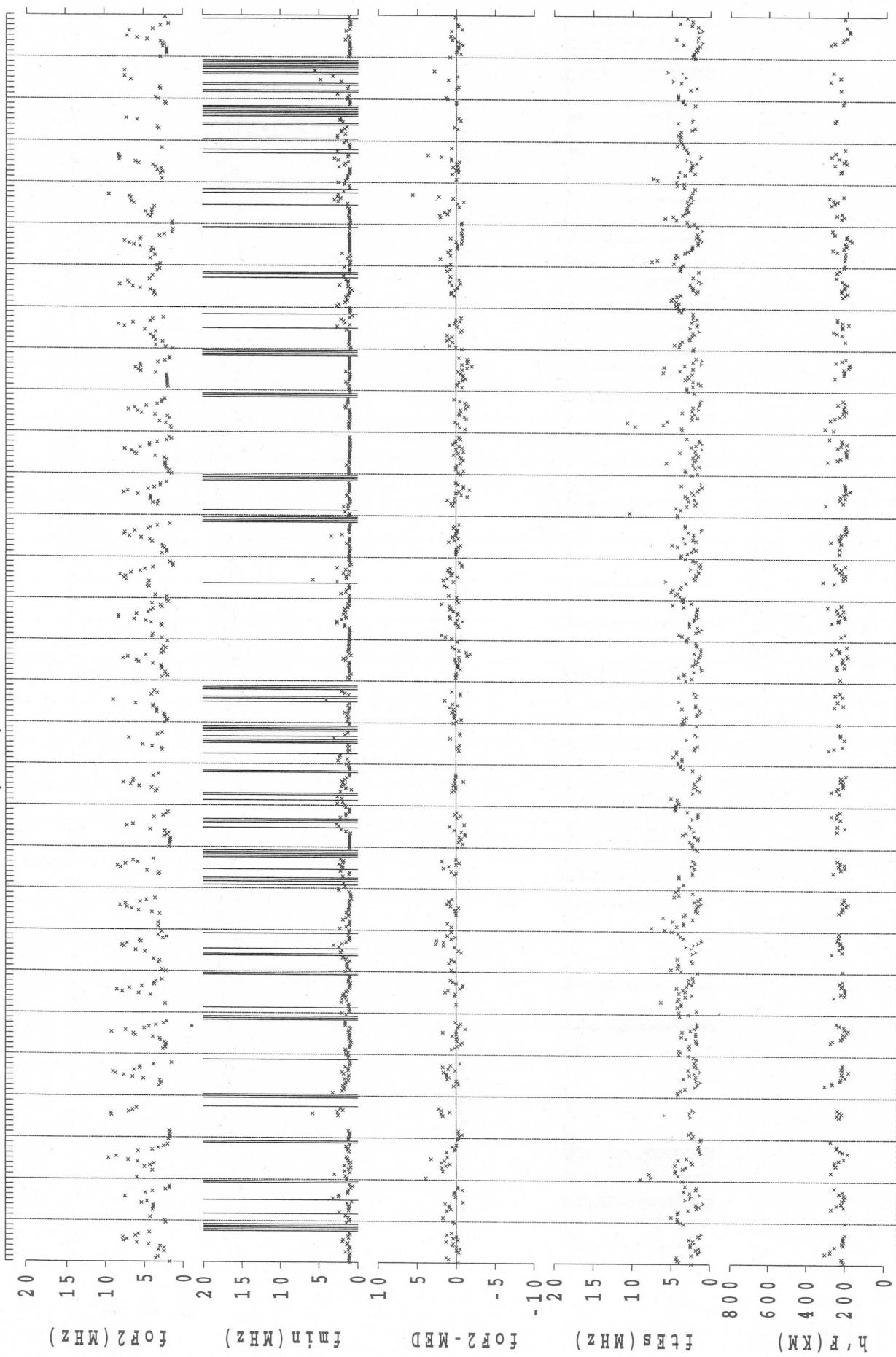


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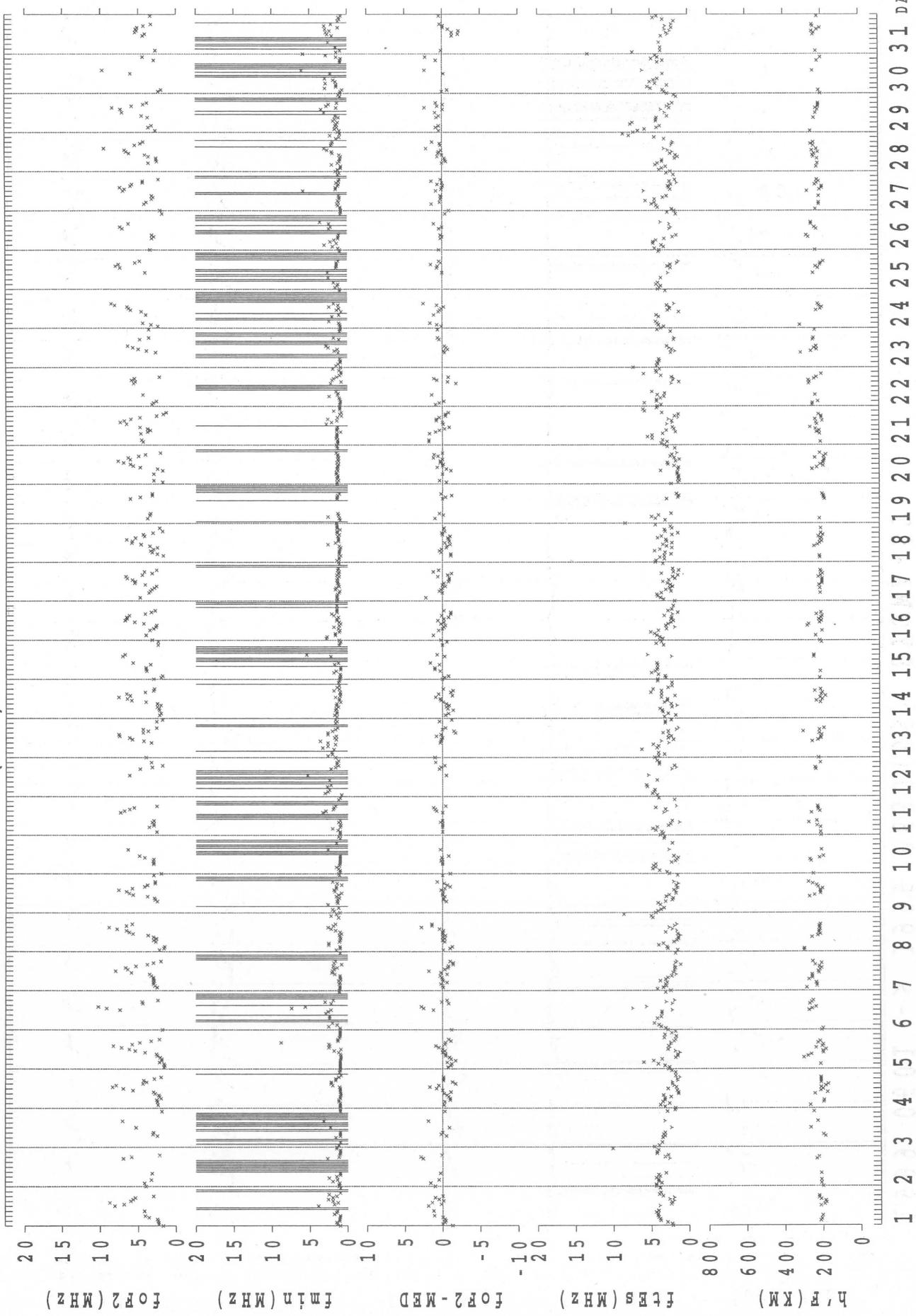
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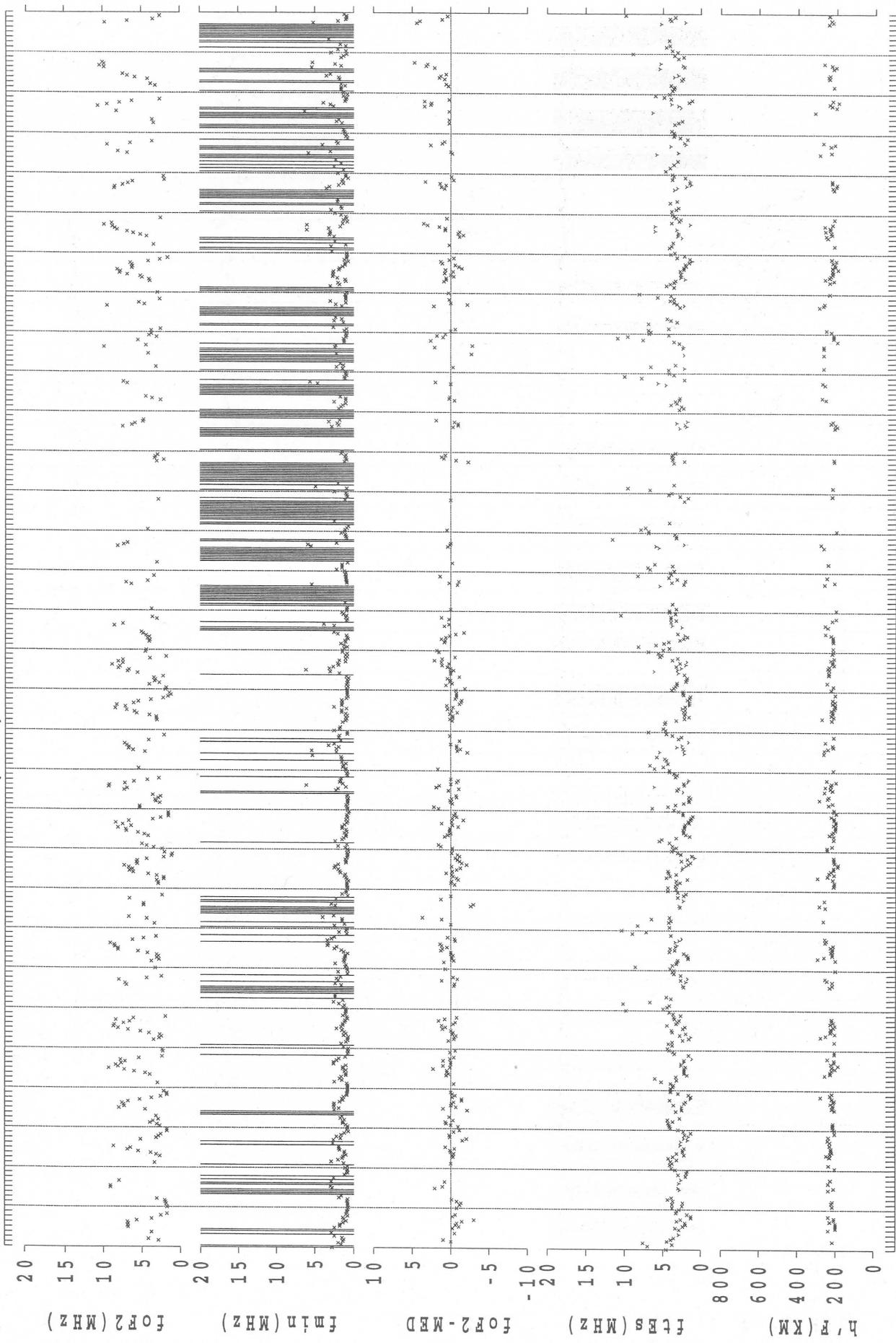


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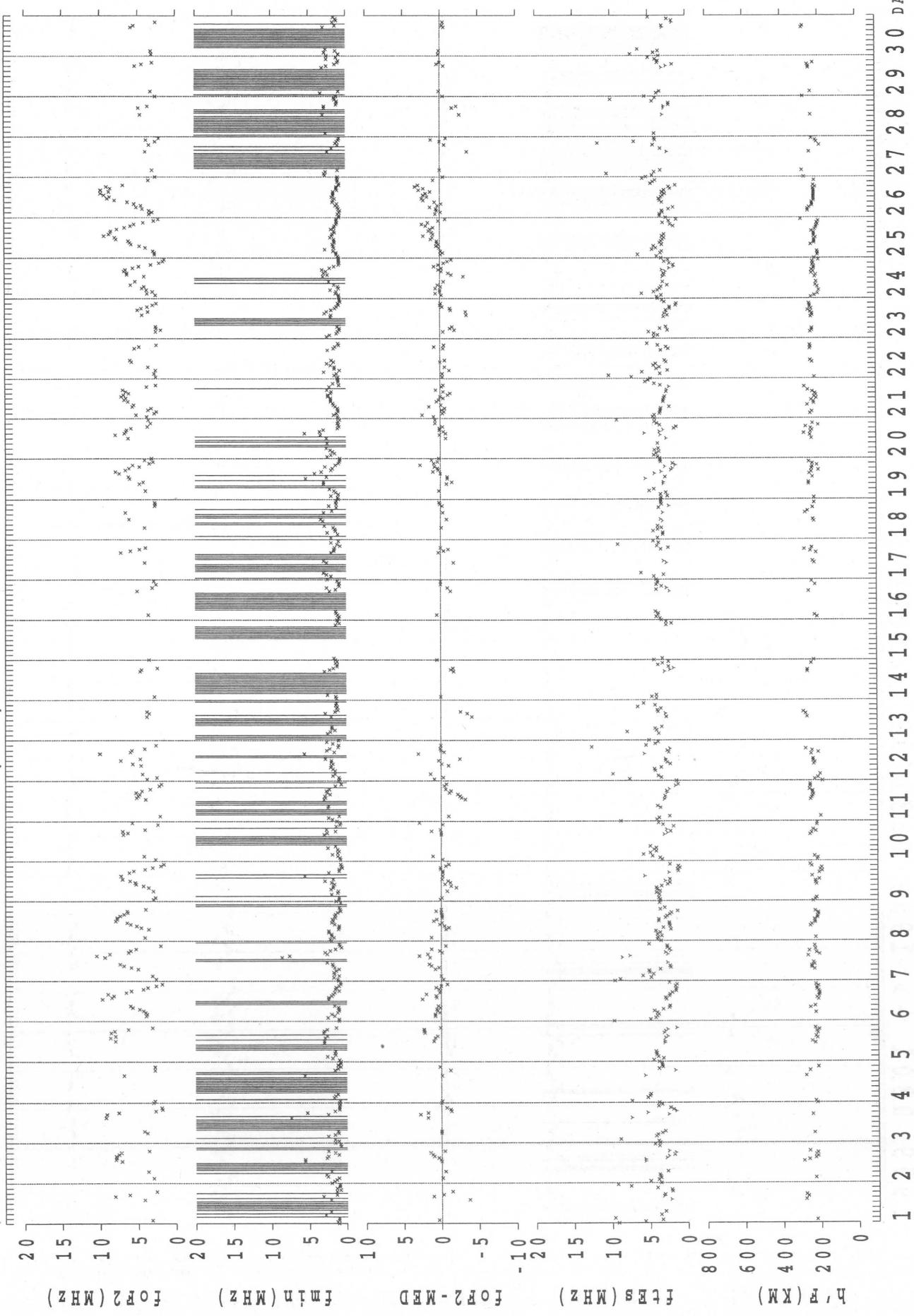


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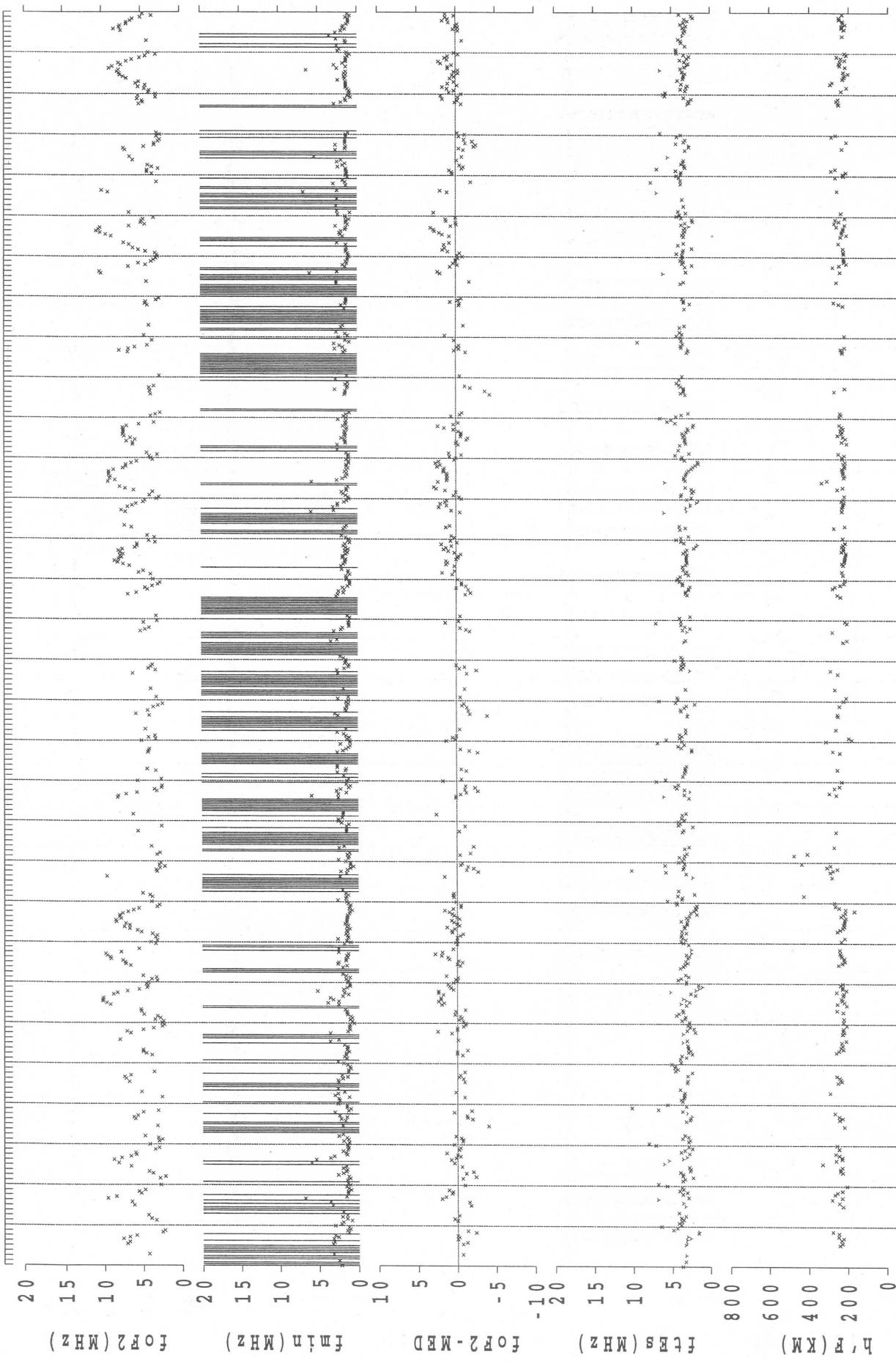


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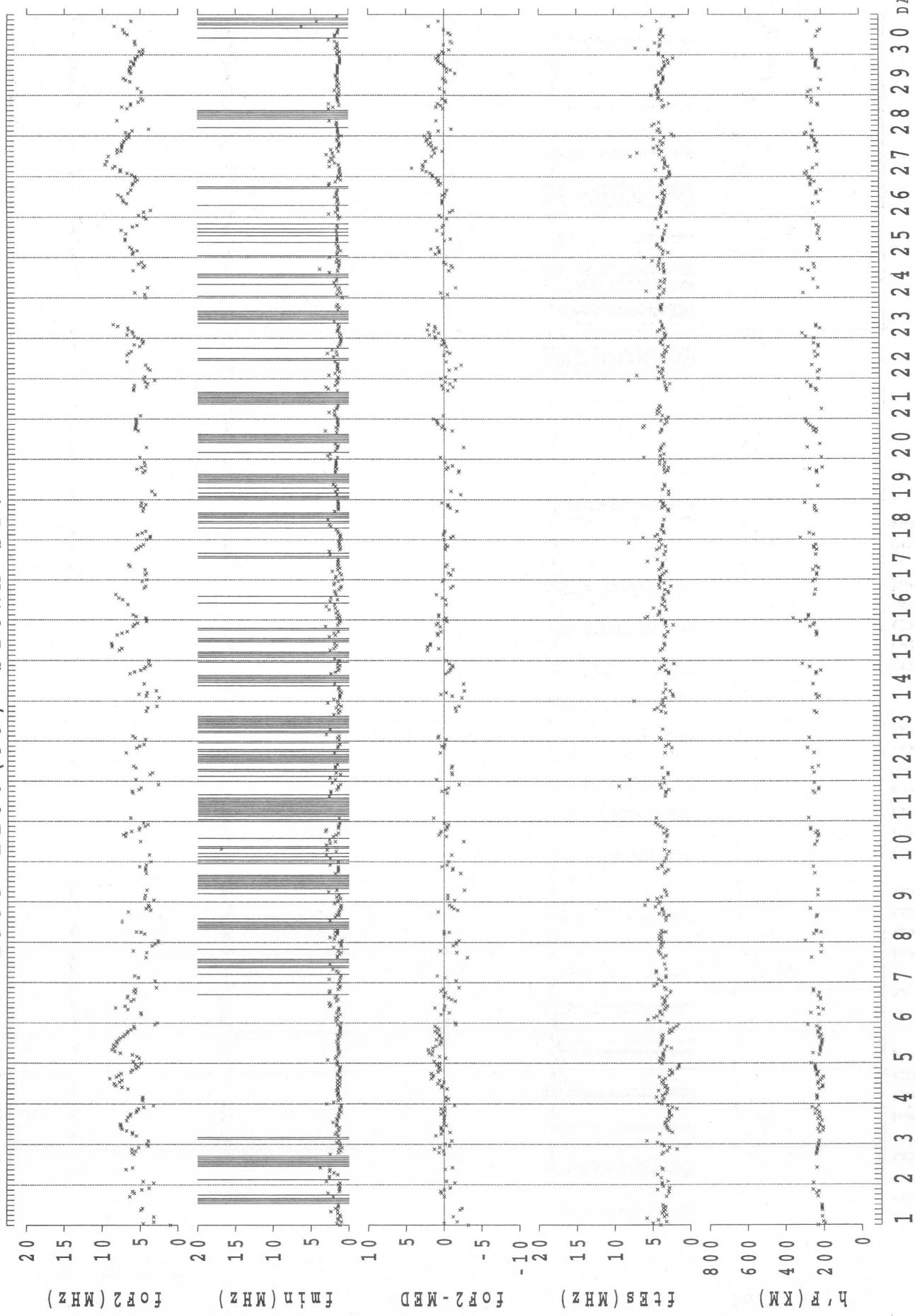


1999 1001 -> 1999 1031(99) SYOWA-ST.

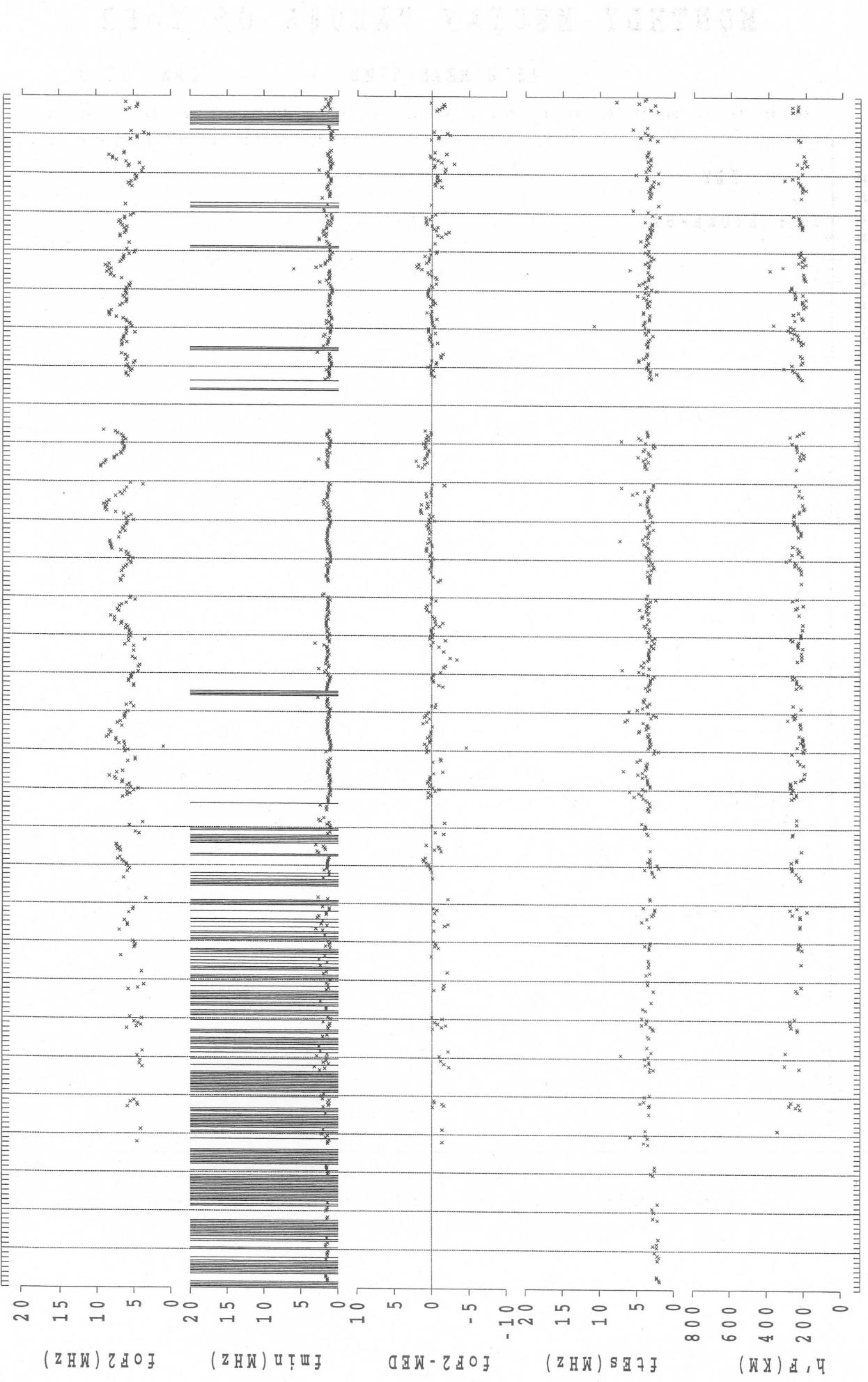


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1999 1201 -> 1999 1231 (99) SYOWA-ST.

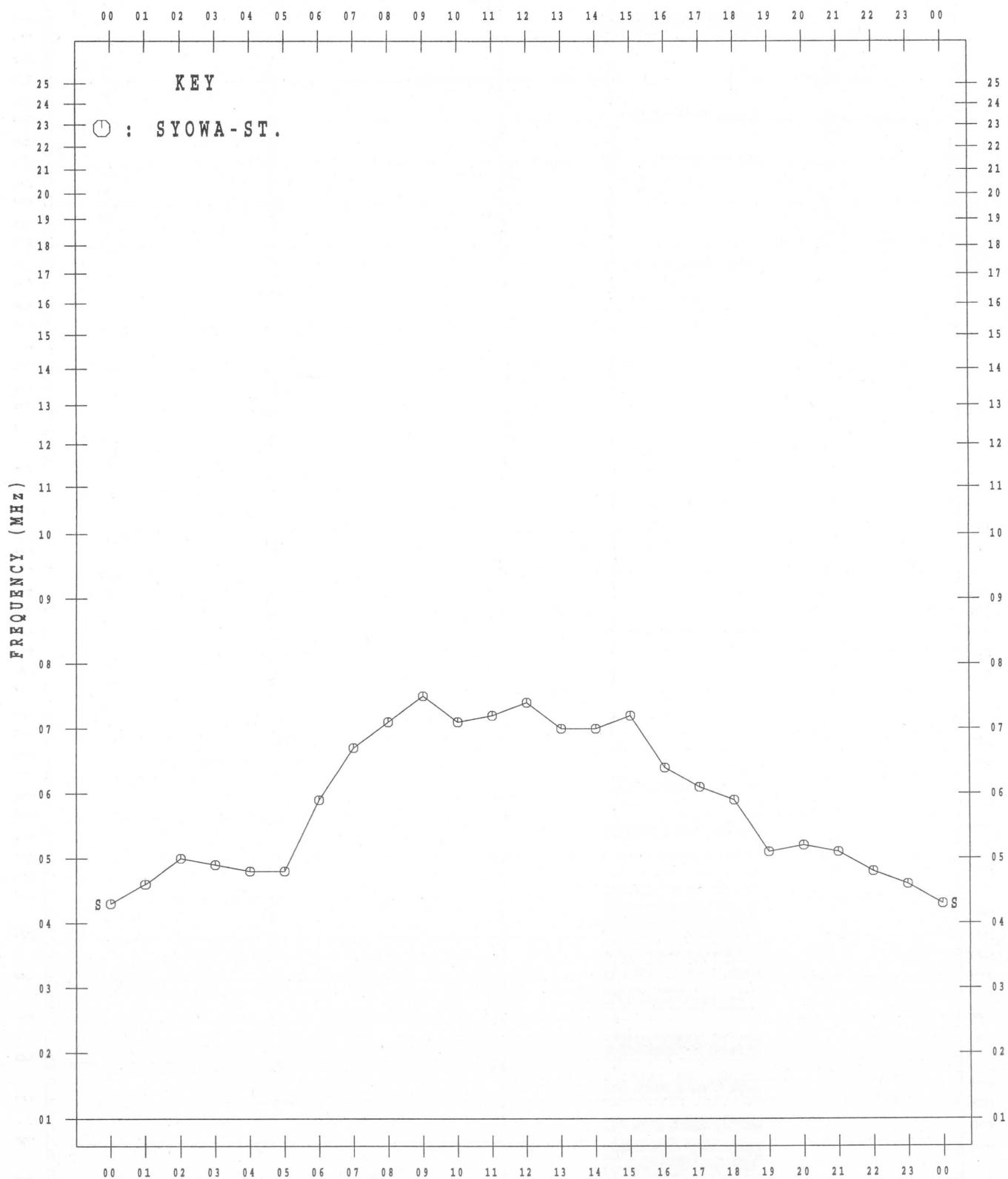


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MONTHLY MEDIAN VALUES OF f_{oF2}

45° E MEAN TIME

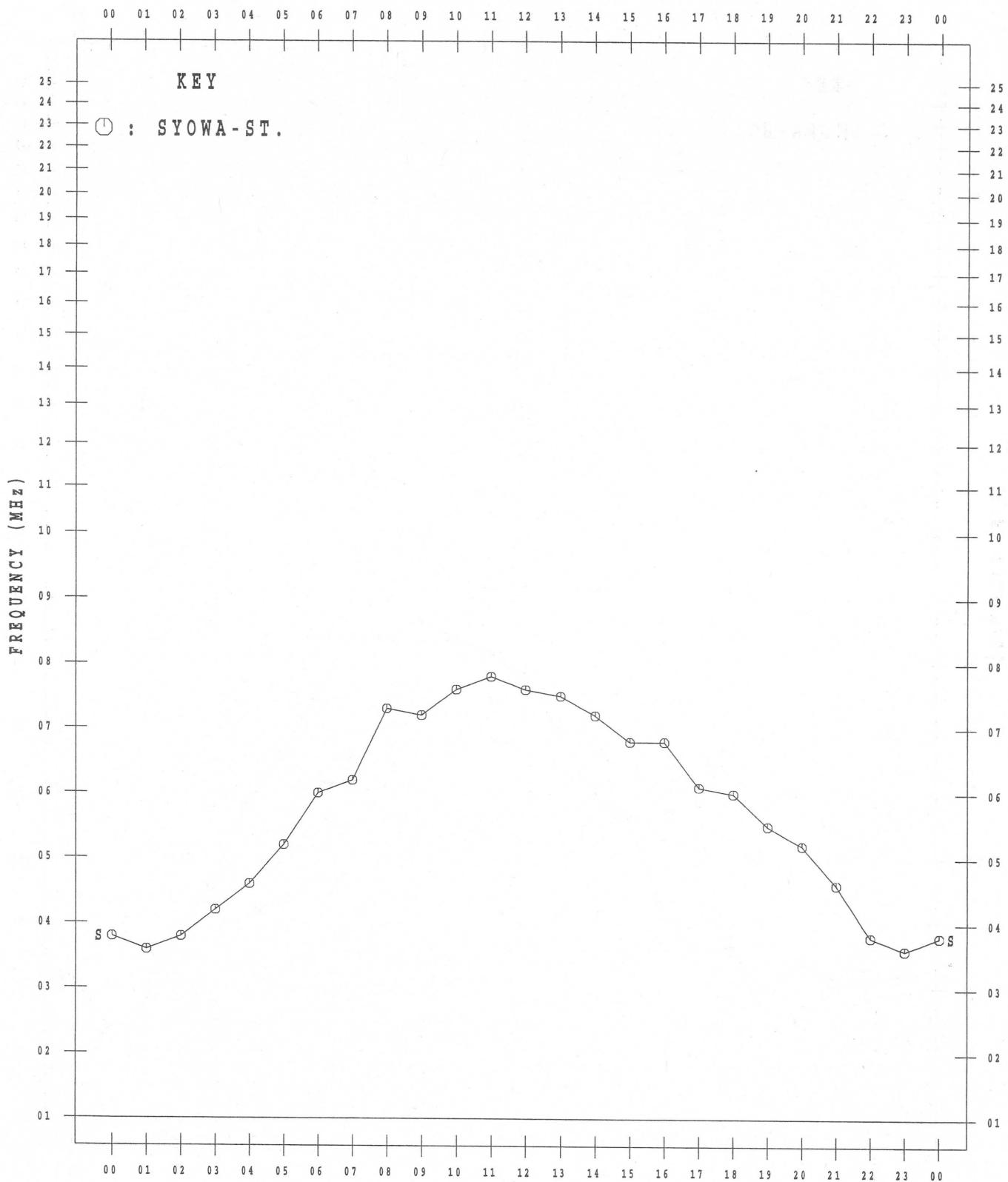
JAN. 1999



MONTHLY MEDIAN VALUES OF f_{oF2}

45° E MEAN TIME

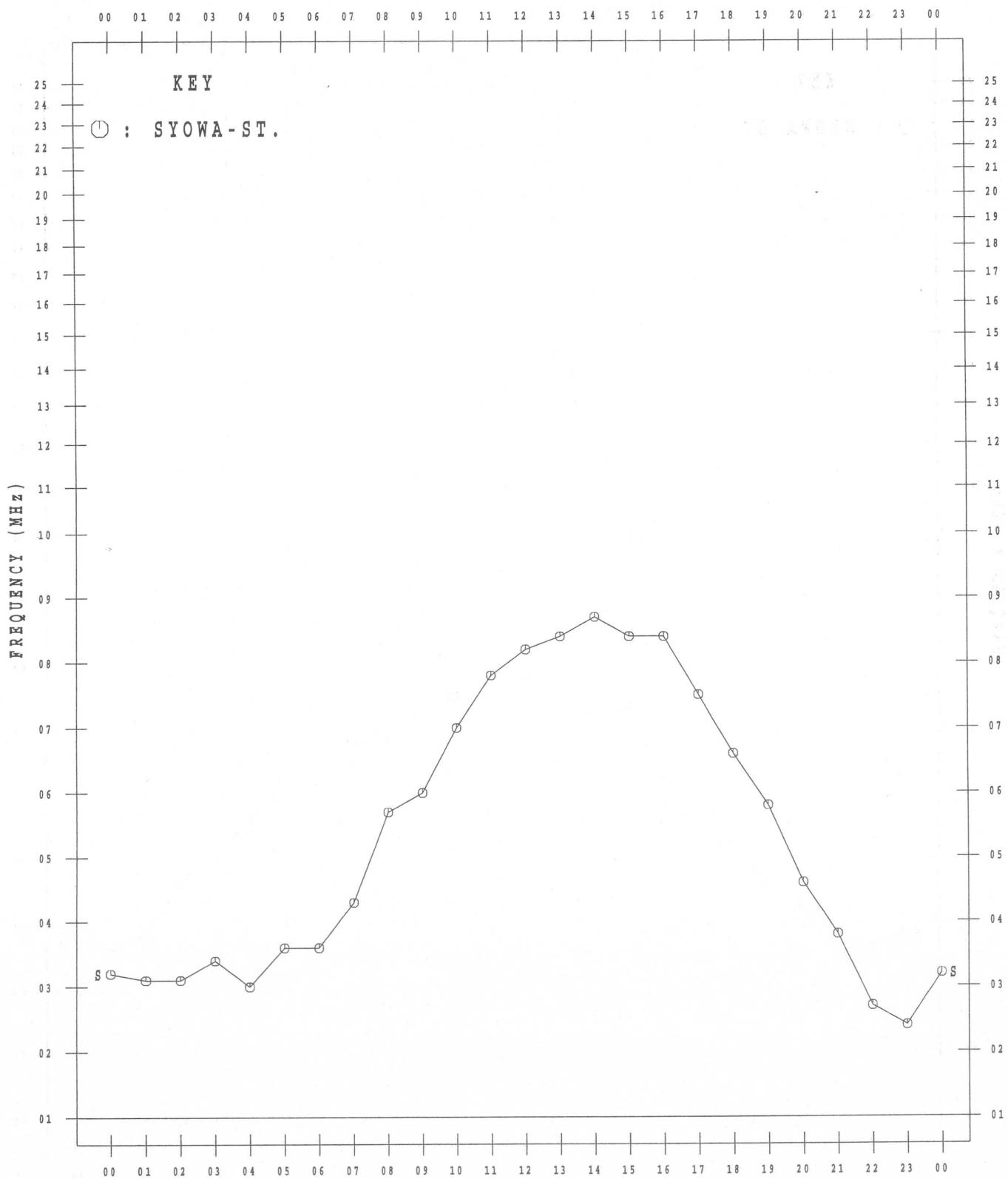
FEB. 1999



MONTHLY MEDIAN VALUES OF f_{OF2}

45° E MEAN TIME

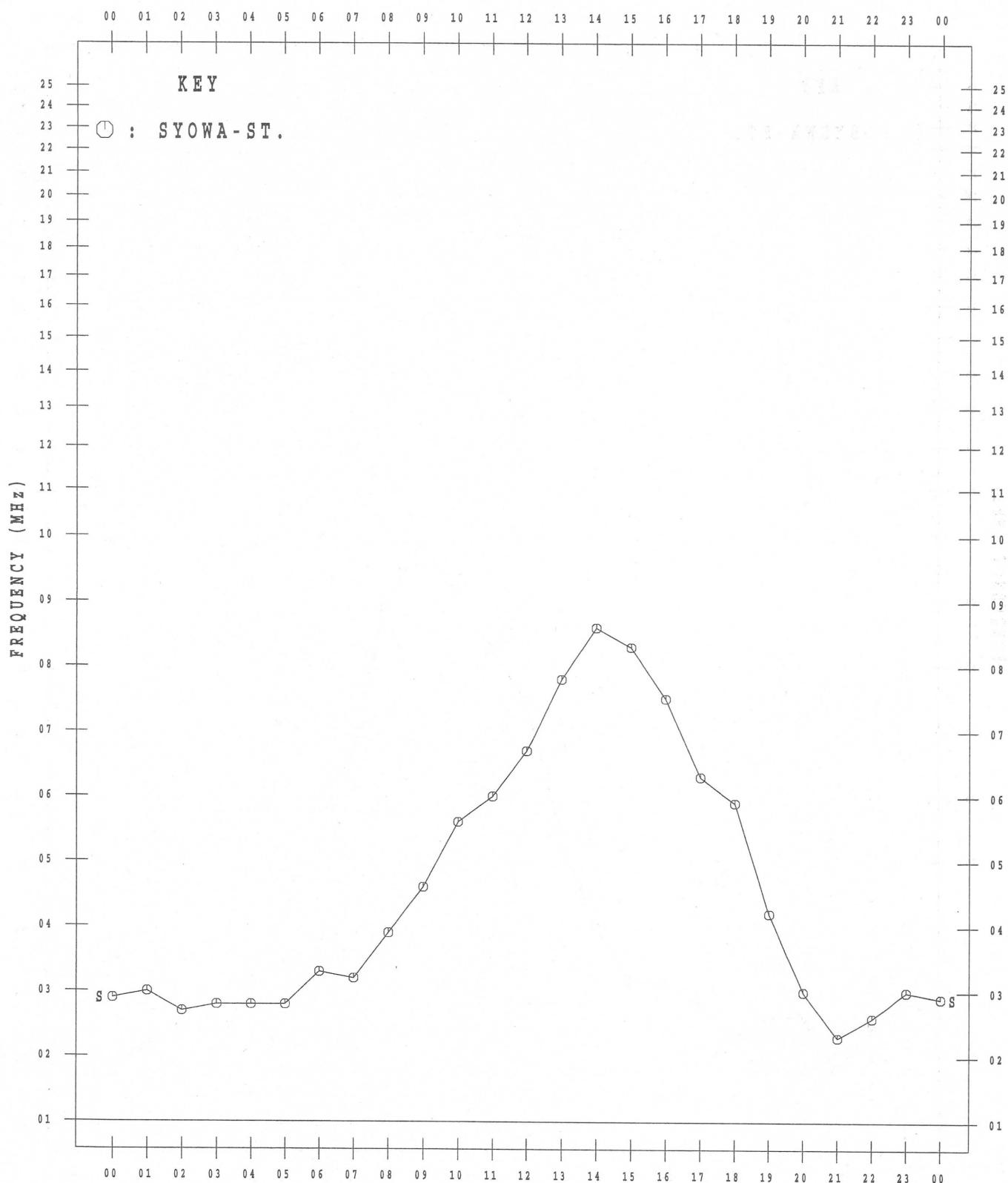
MAR. 1999



MONTHLY MEDIAN VALUES OF f_{oF2}

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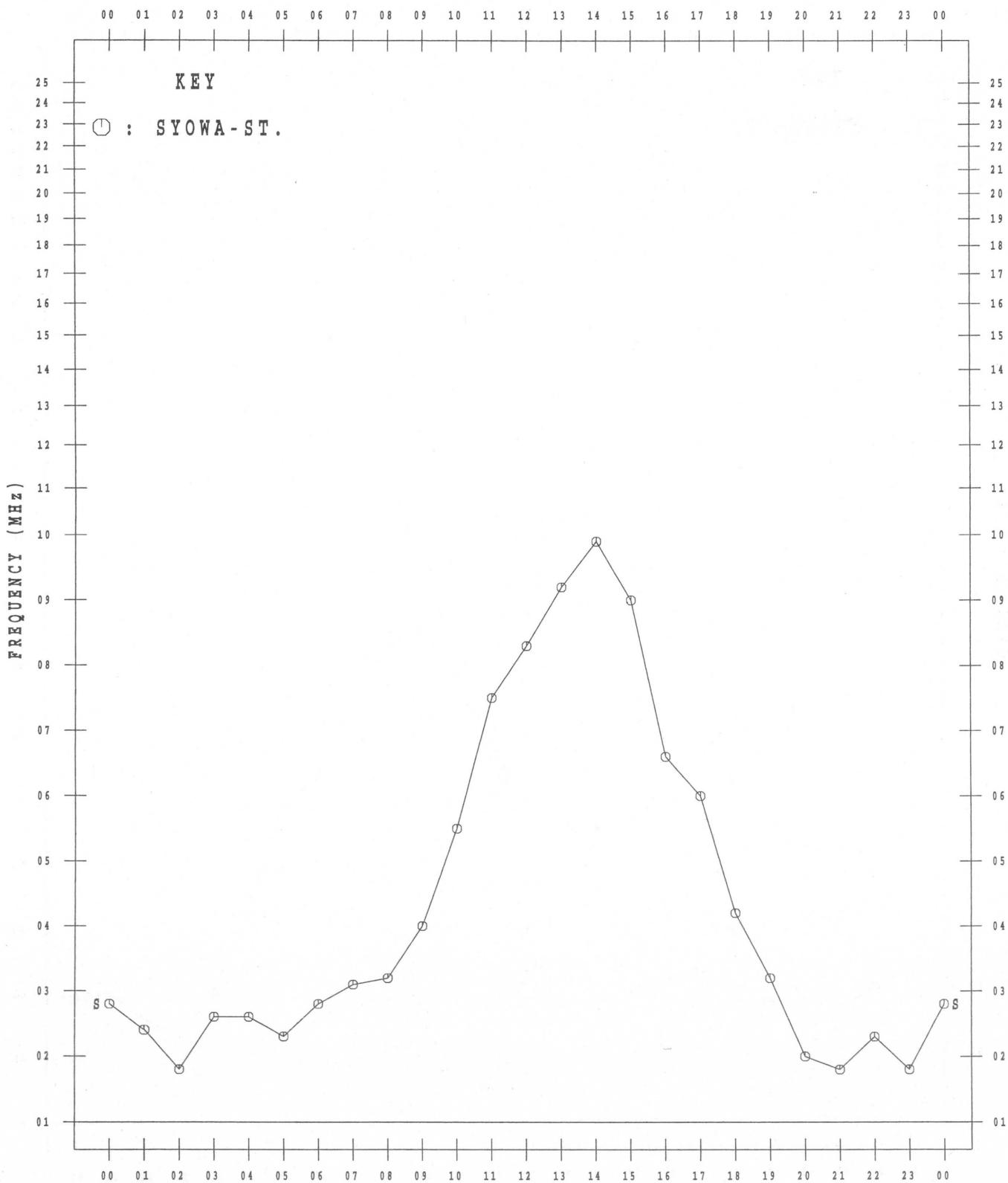
APR. 1999



MONTHLY MEDIAN VALUES OF f_{oF2}

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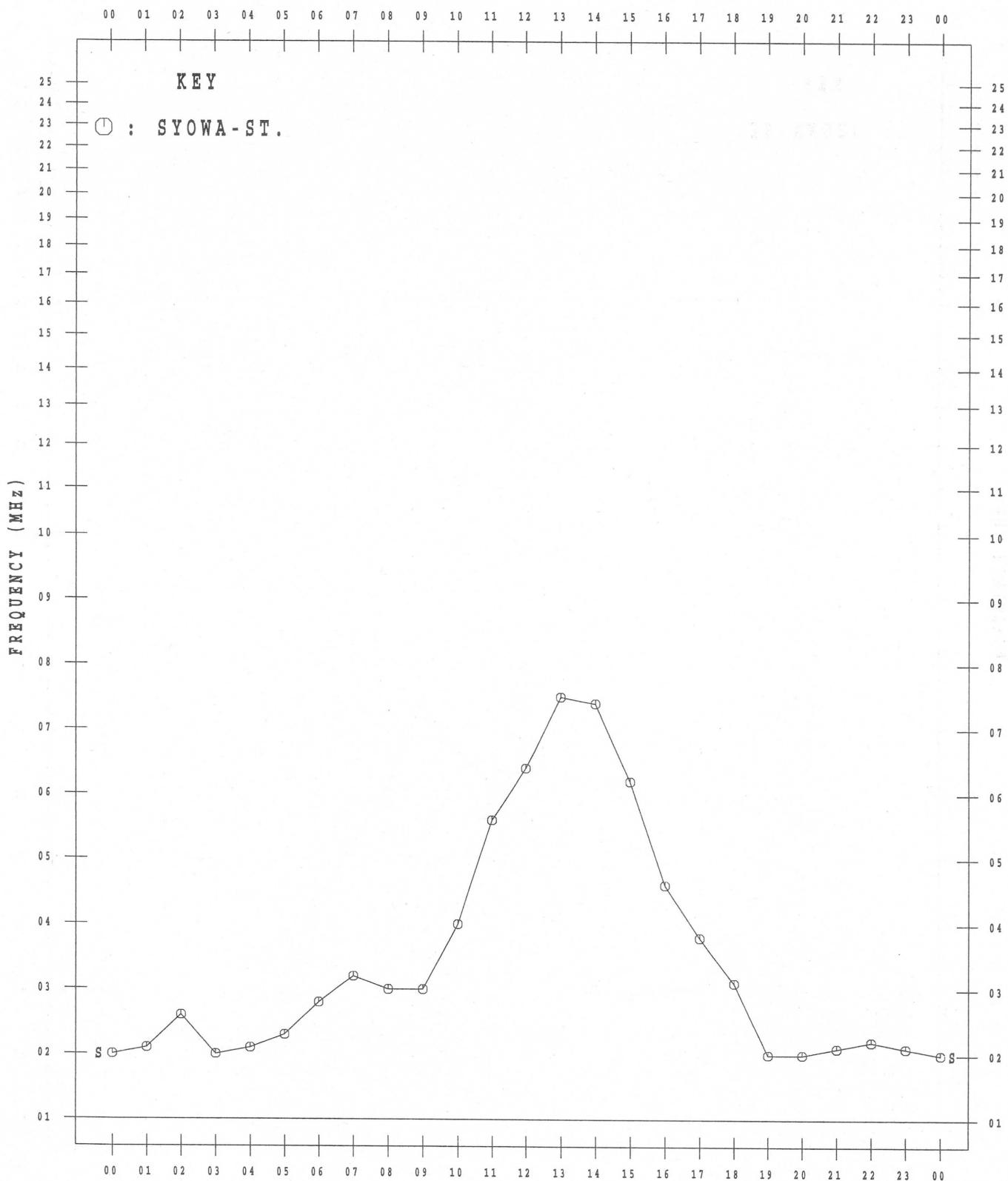
MAY 1999



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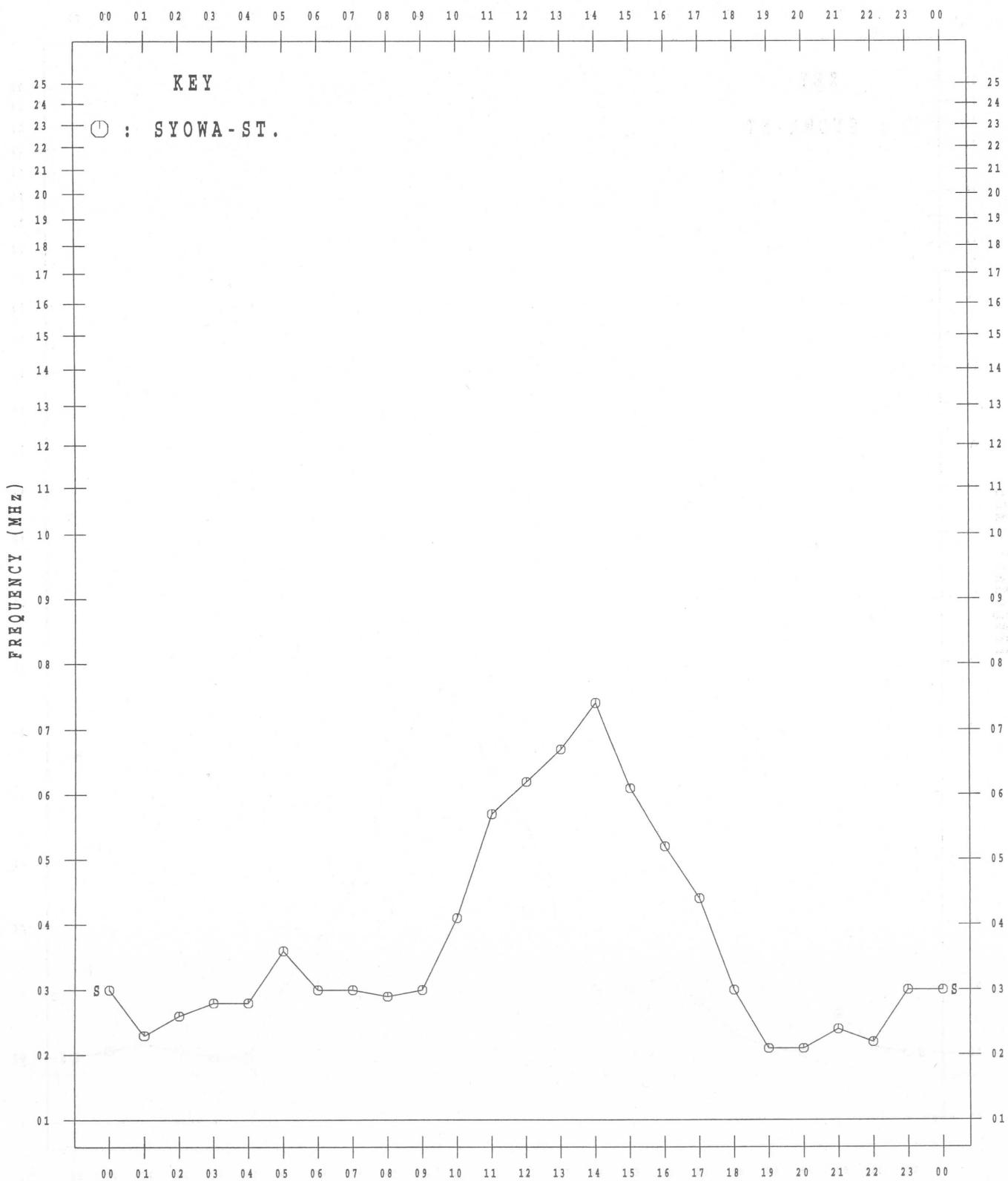
JUN. 1999



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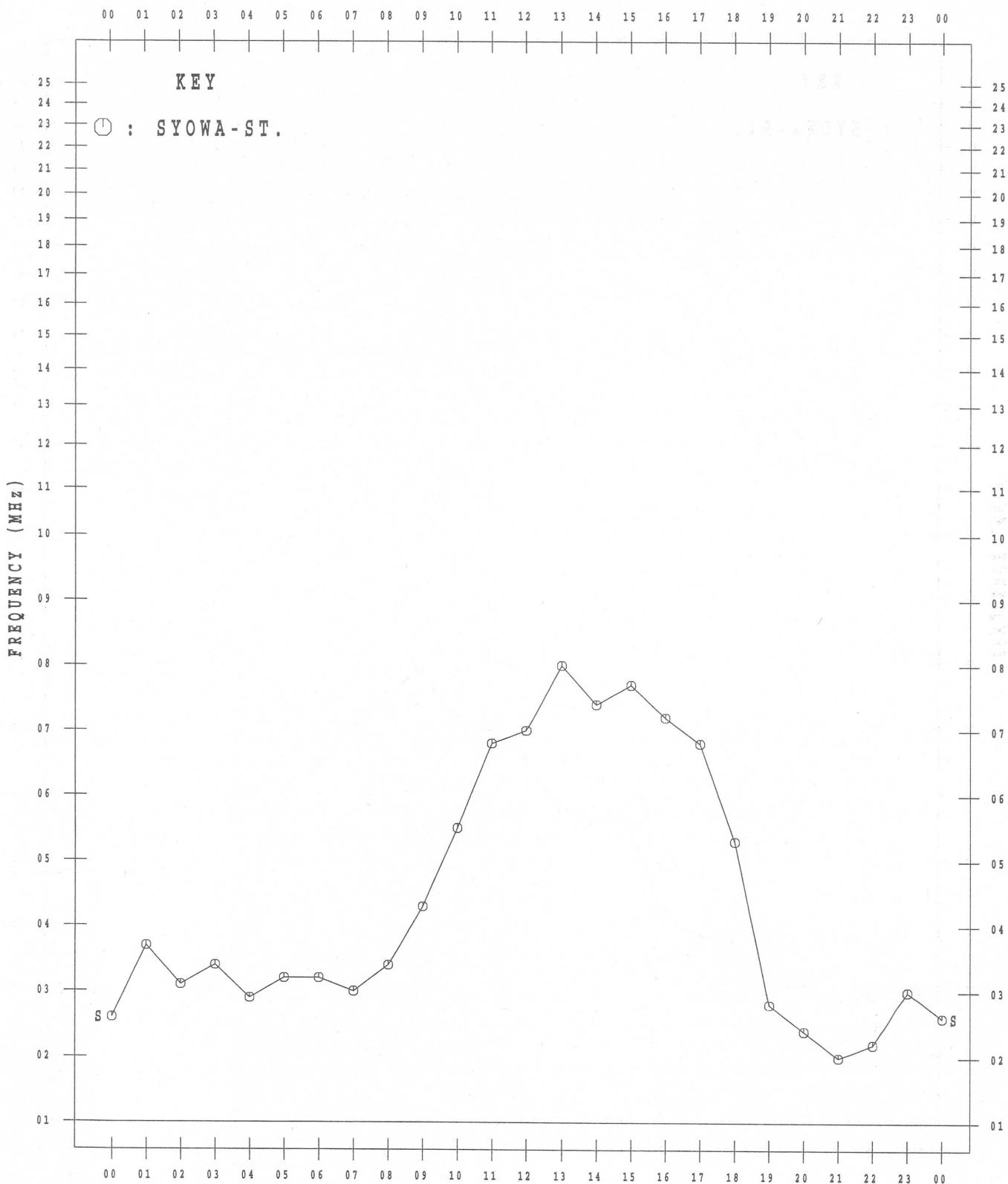
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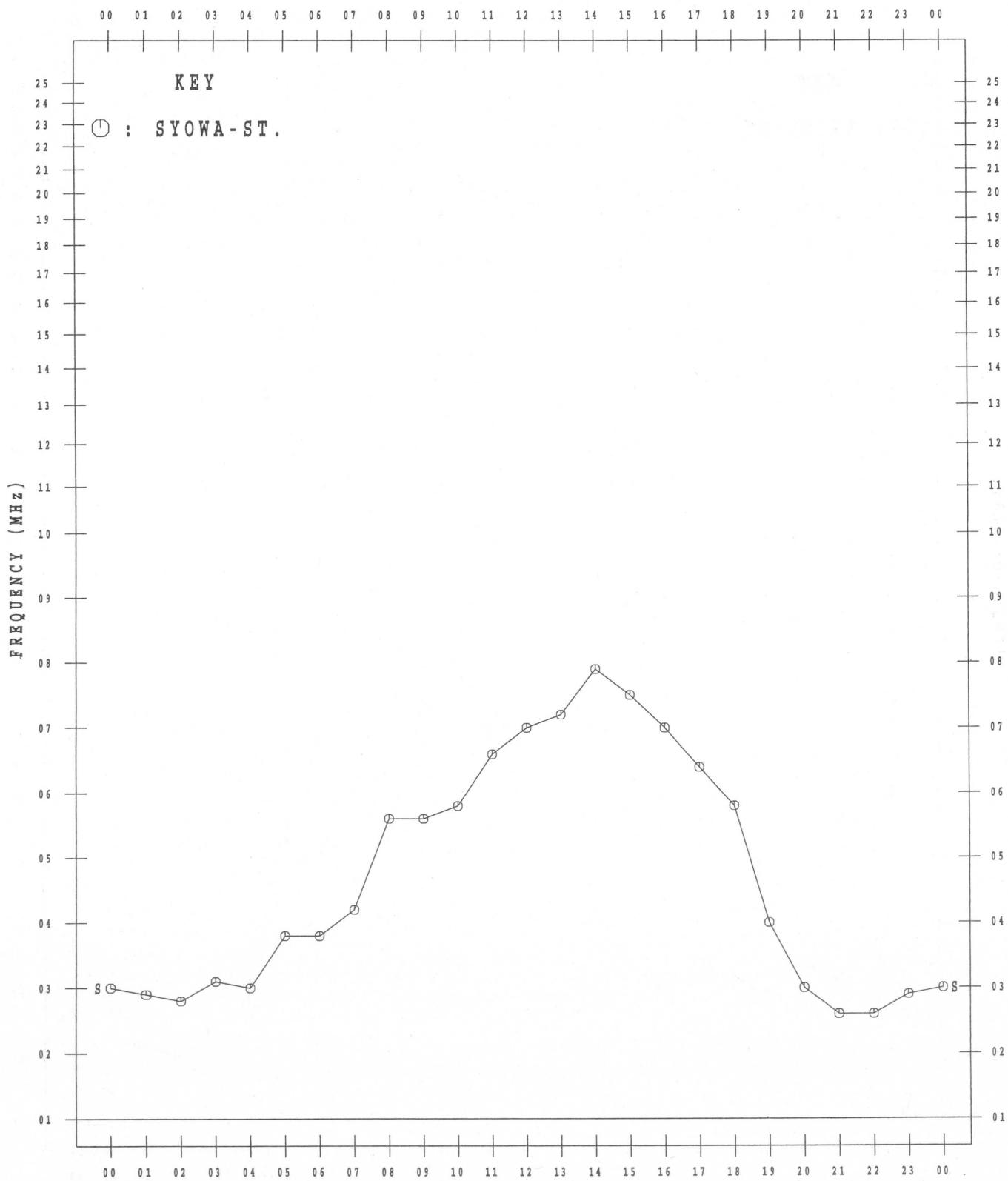
AUG. 1999



MONTHLY MEDIAN VALUES OF f_oF2

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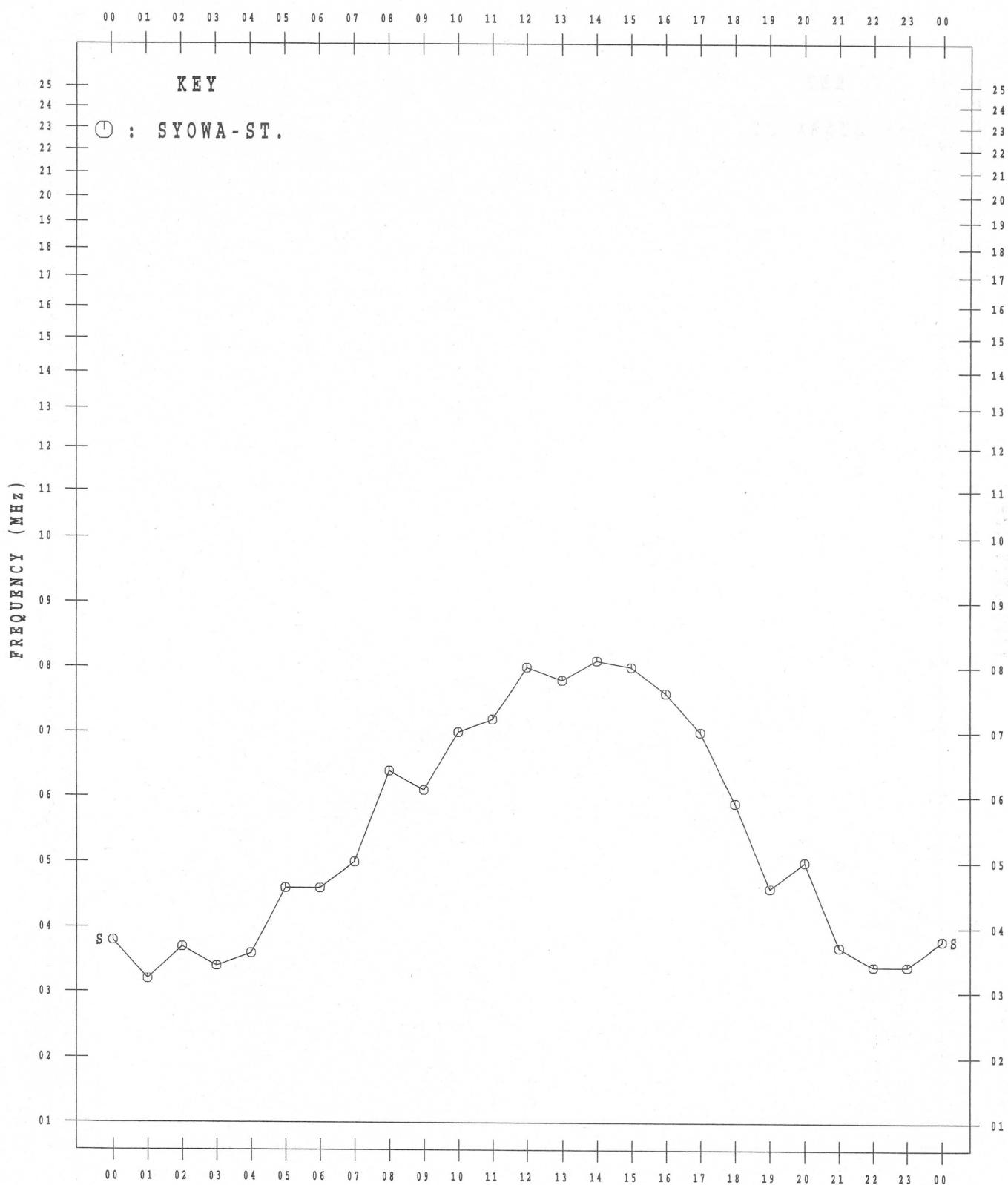
SEP. 1999



MONTHLY MEDIAN VALUES OF f_{oF2}

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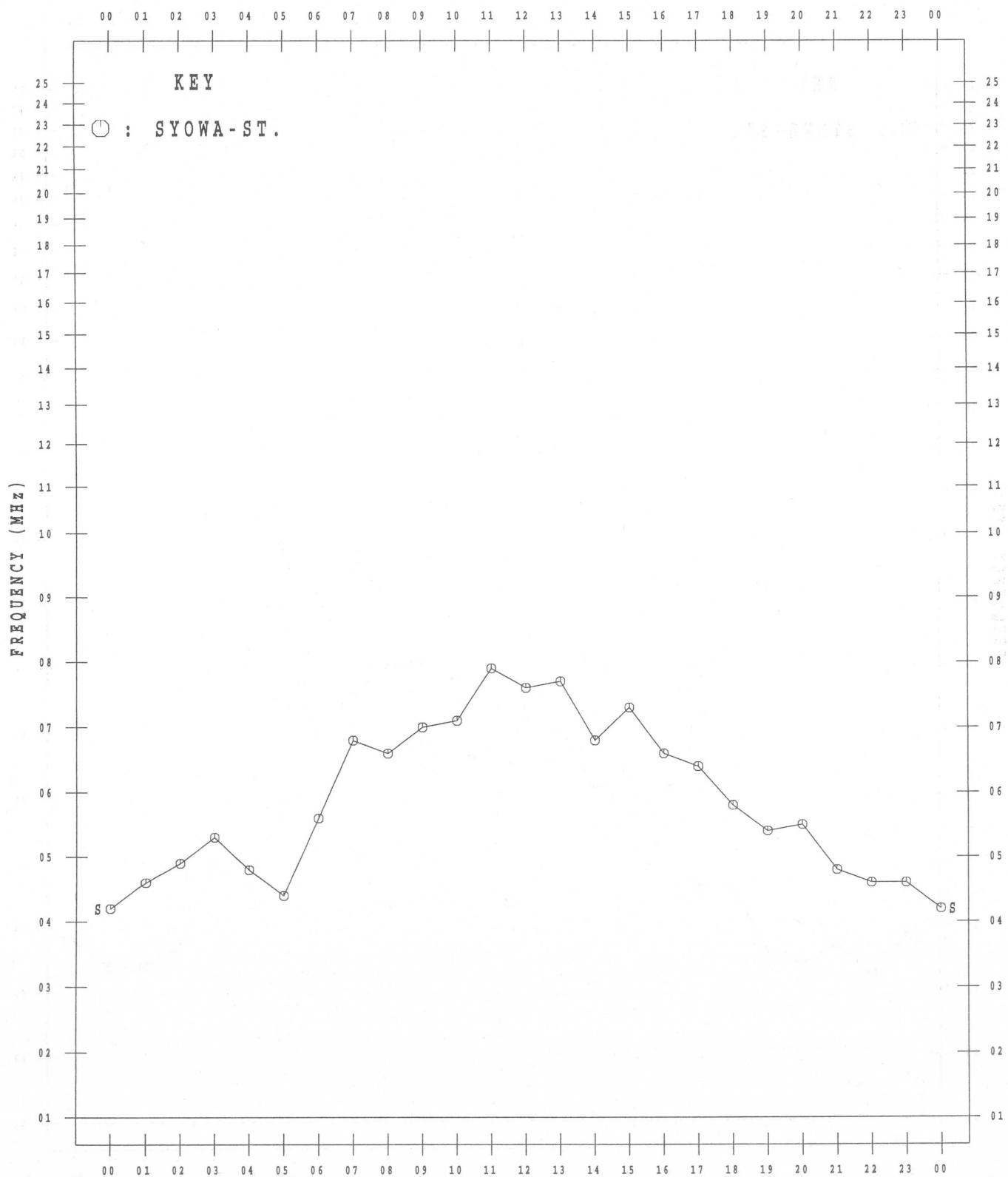
OCT. 1999



MONTHLY MEDIAN VALUES OF f_{oF2}

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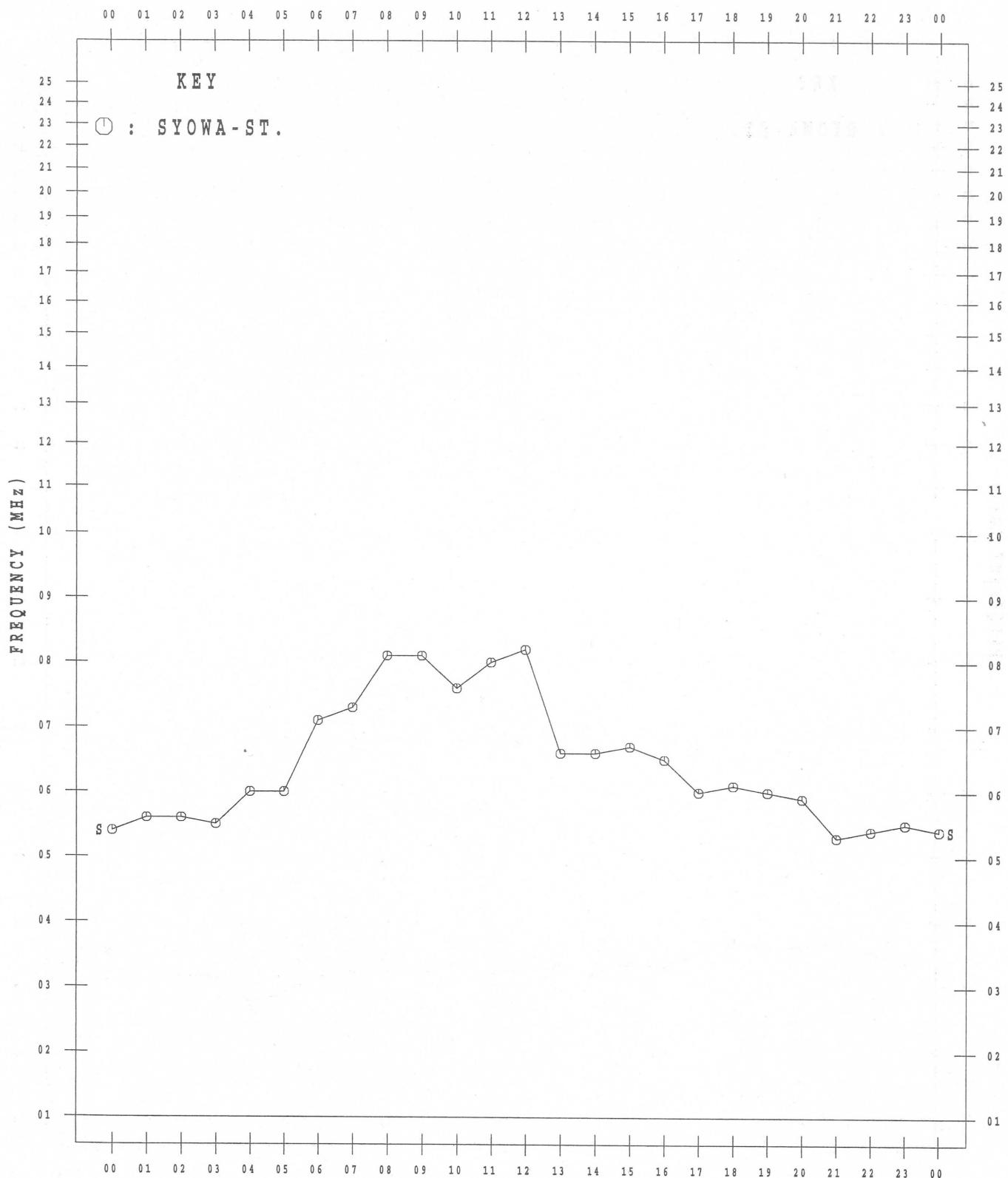
NOV. 1999



MONTHLY MEDIAN VALUES OF f_oF2

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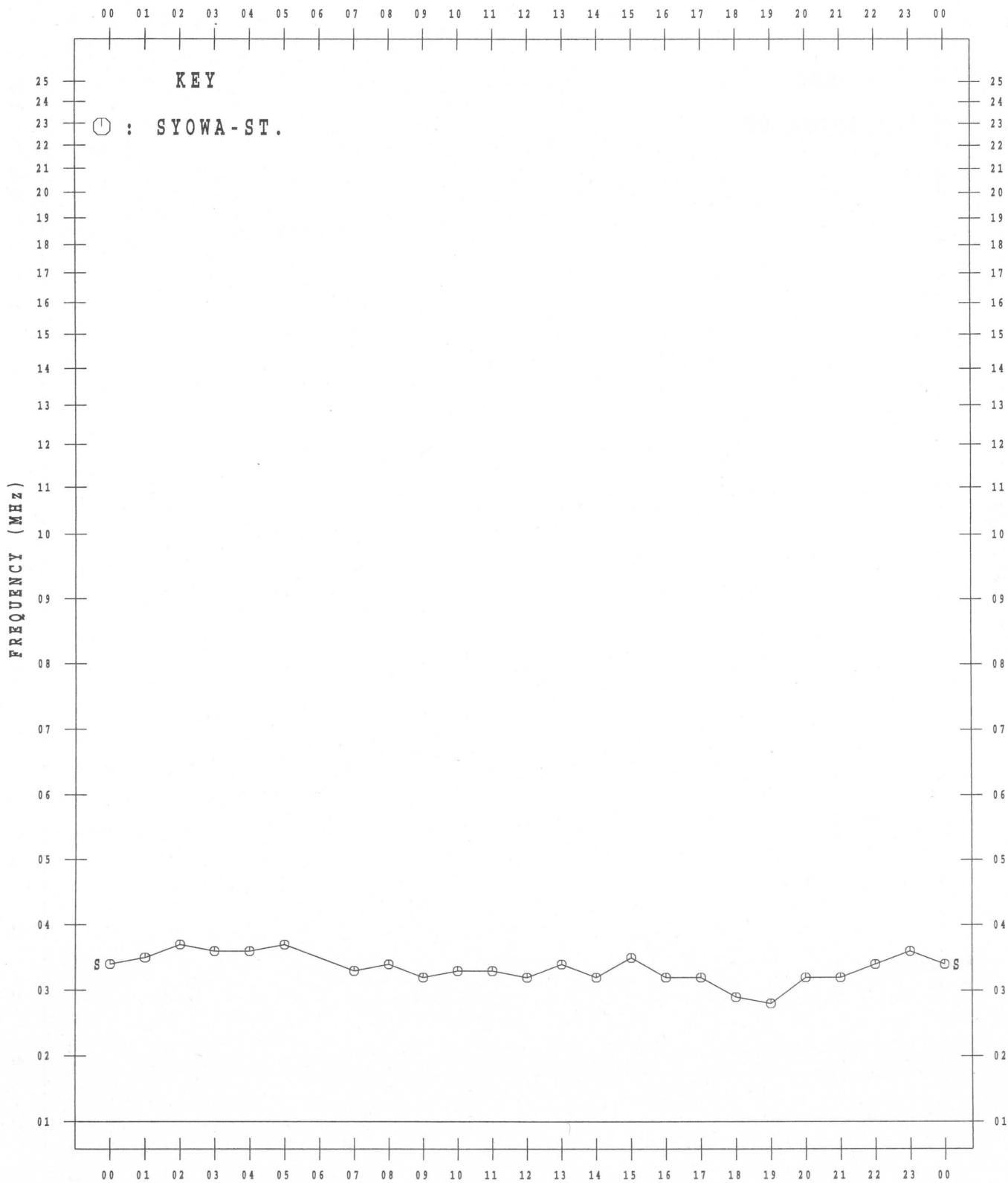
DEC. 1999



MONTHLY MEDIAN VALUES OF f_{TE}S

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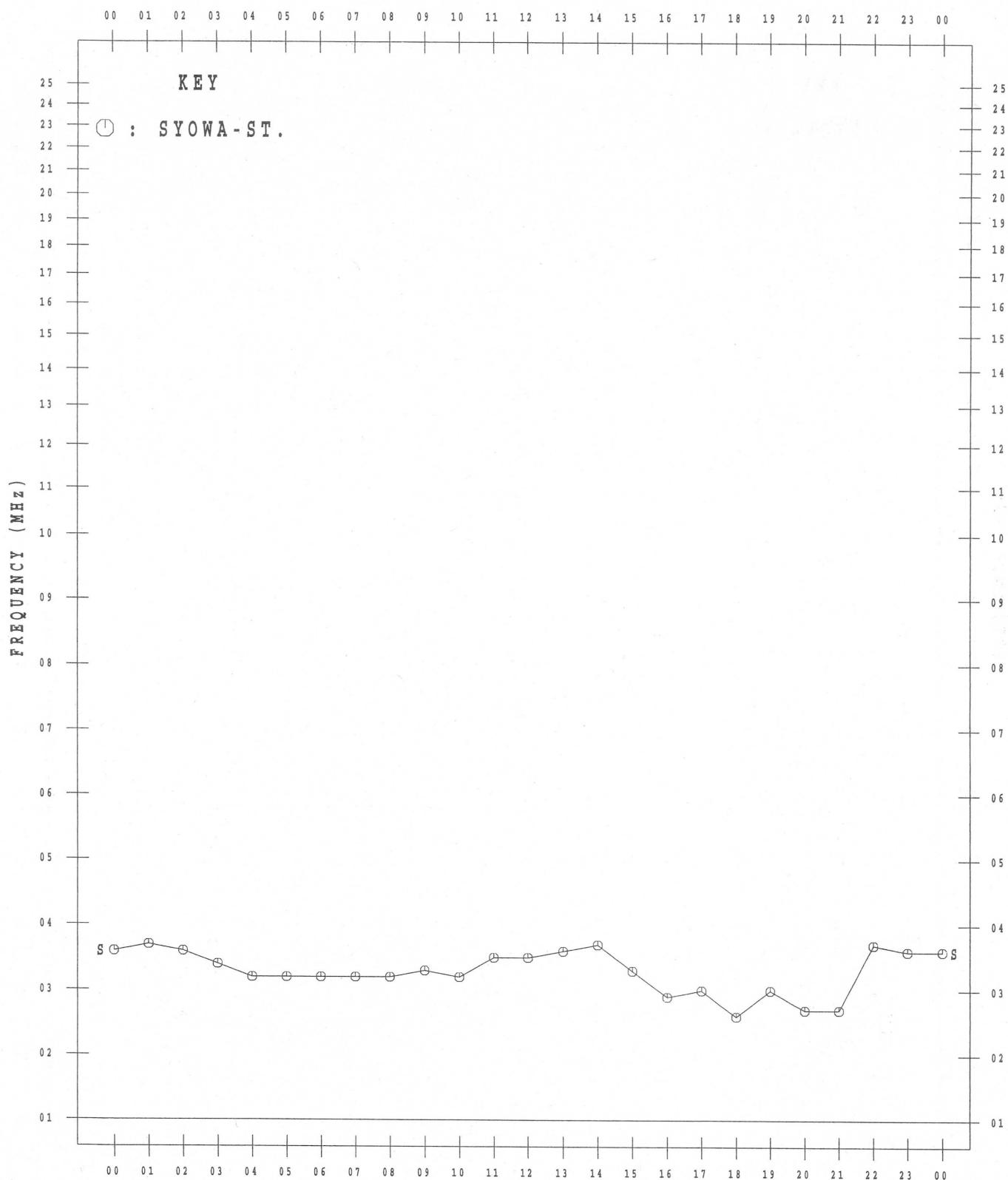
JAN. 1999



MONTHLY MEDIAN VALUES OF f_{TES}

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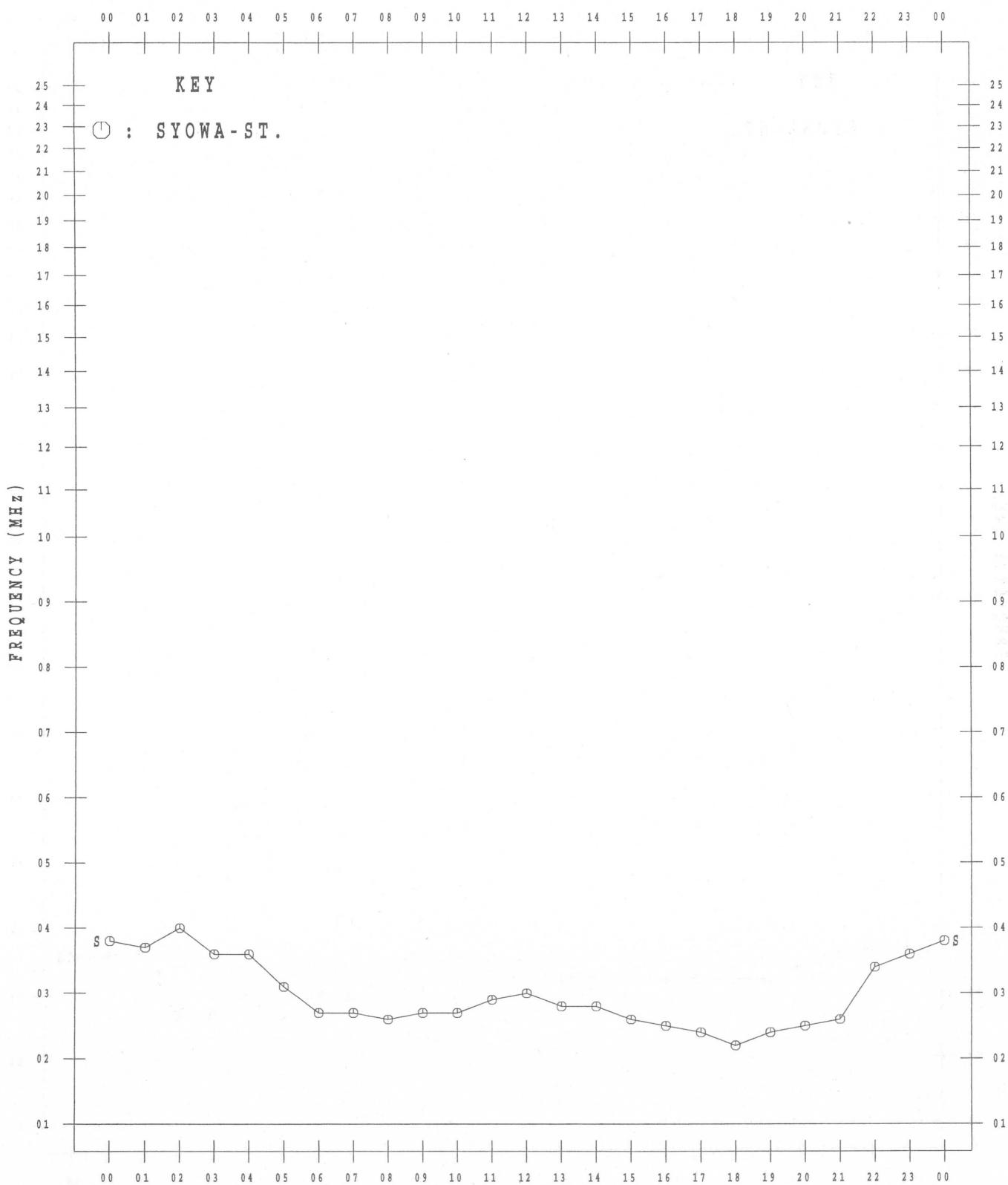
FEB. 1999



MONTHLY MEDIAN VALUES OF f_{TE}S

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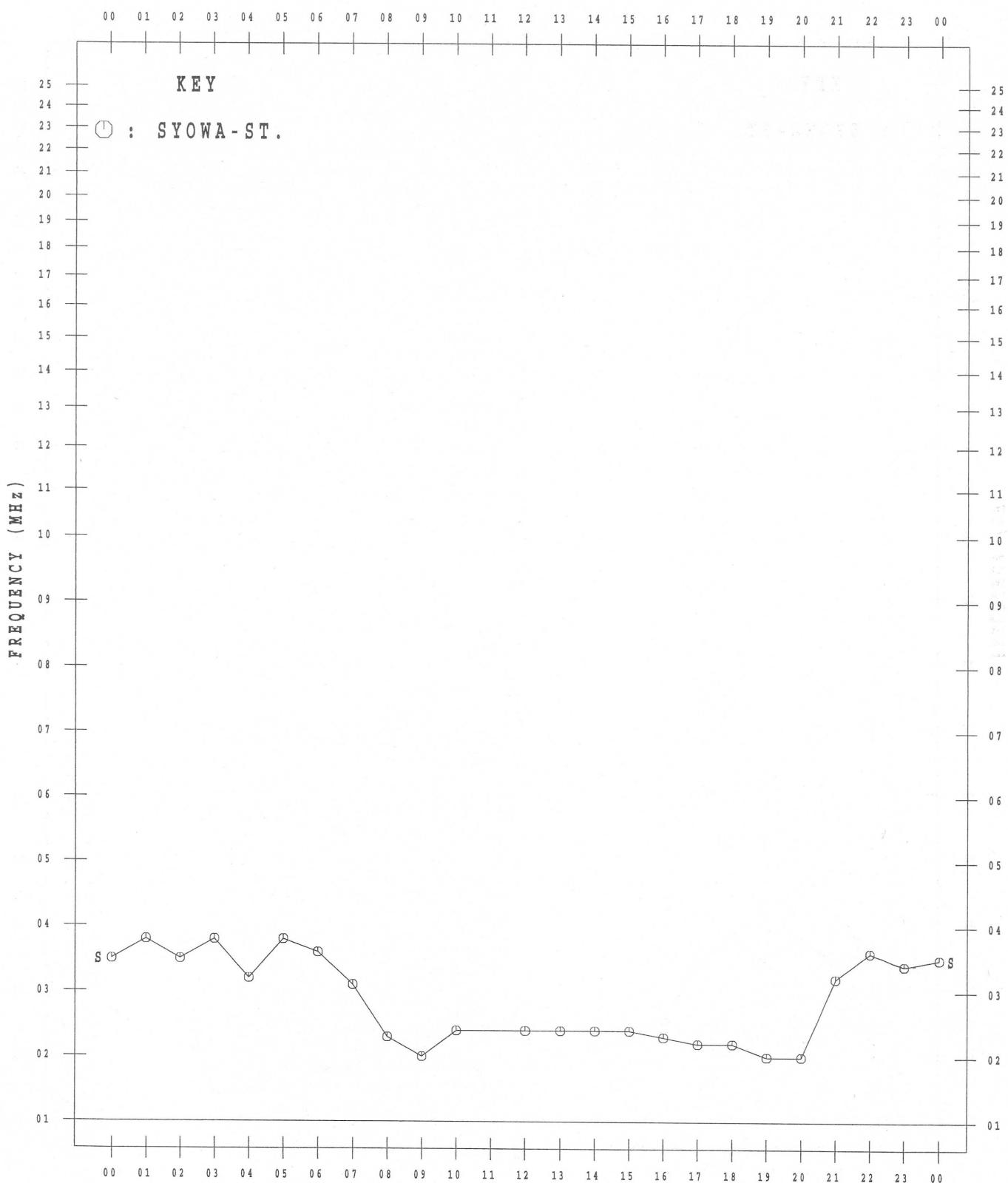
MAR. 1999



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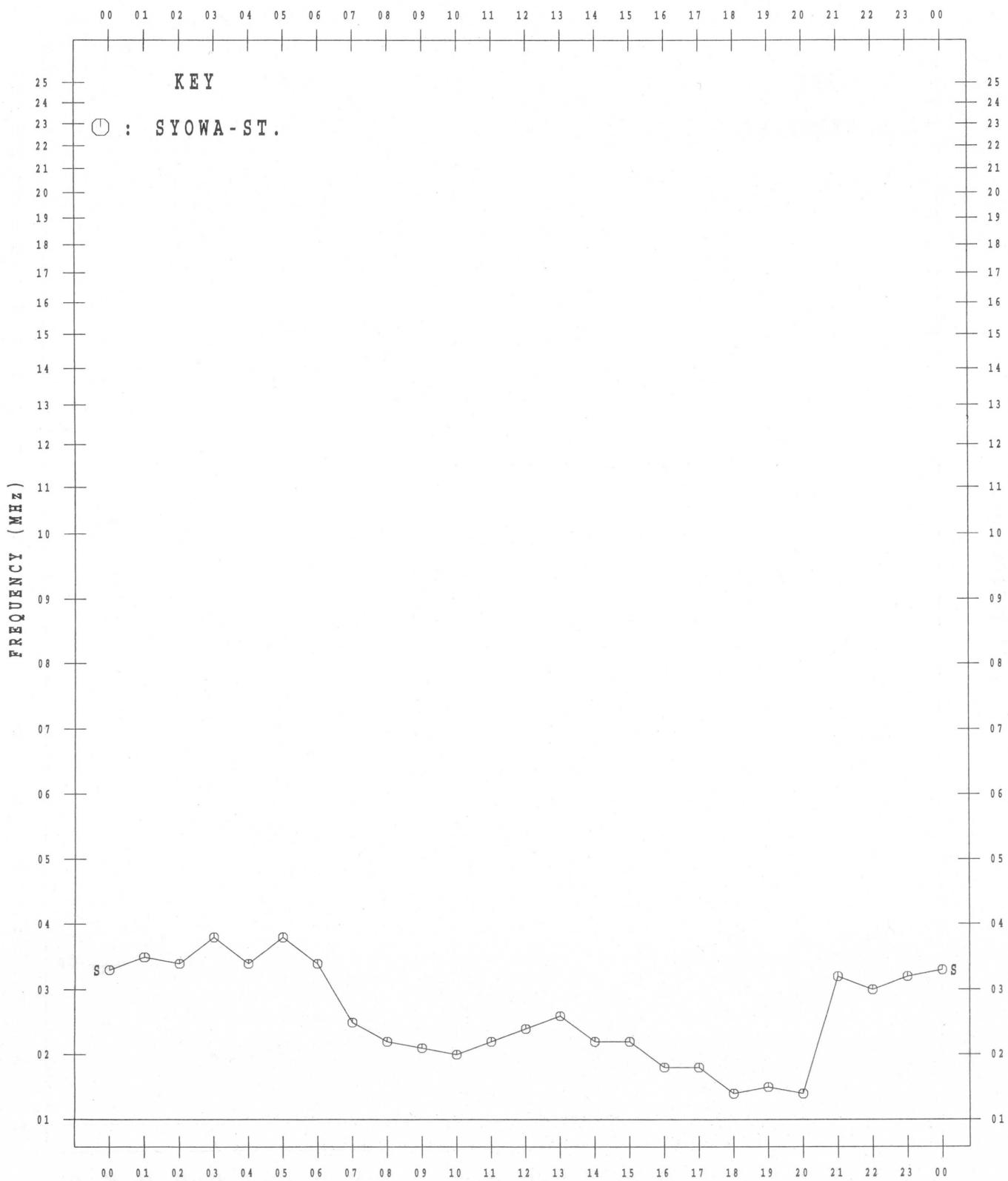
APR. 1999



MONTHLY MEDIAN VALUES OF f_TE'S

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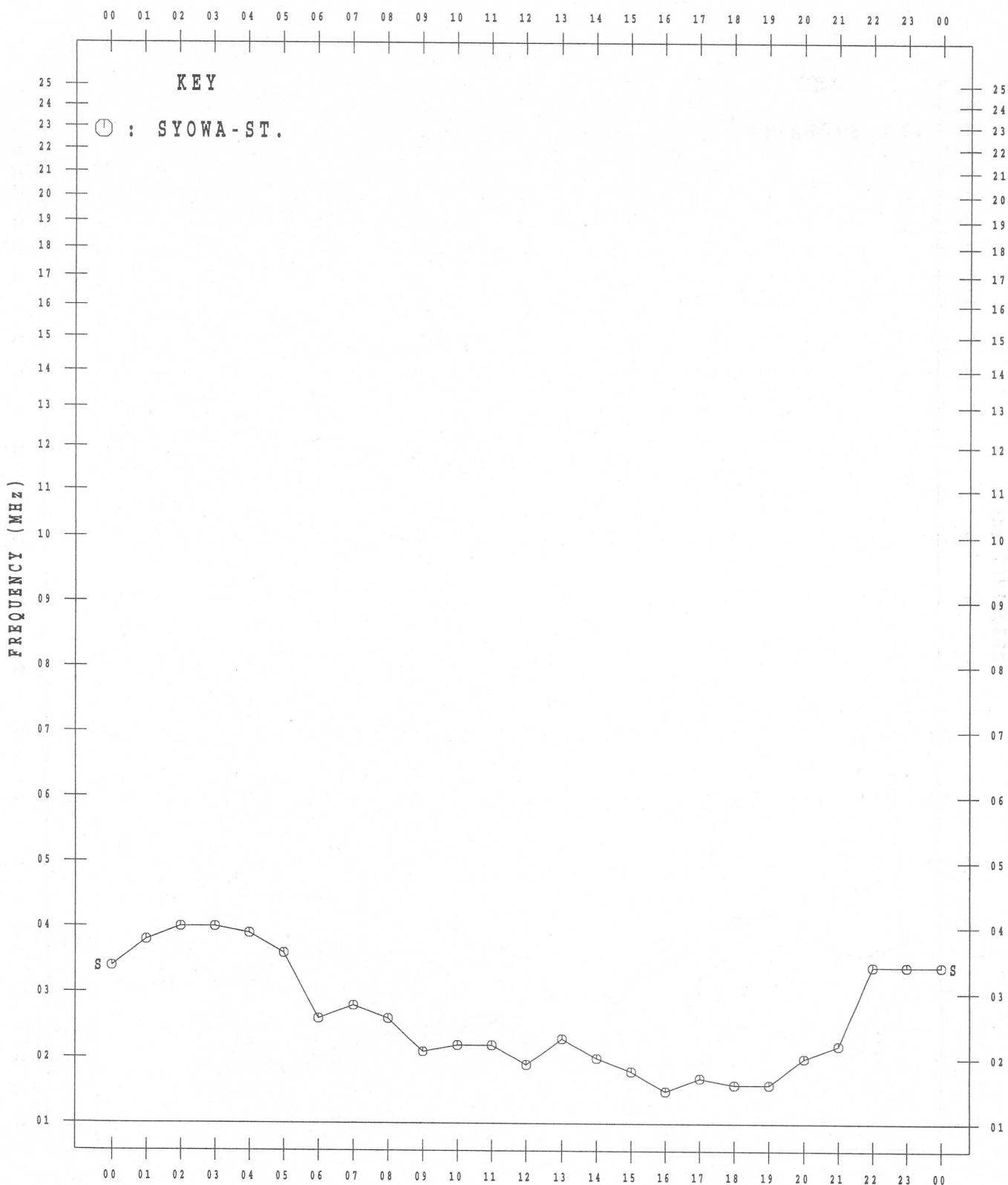
MAY 1999



MONTHLY MEDIAN VALUES OF f_{TES}

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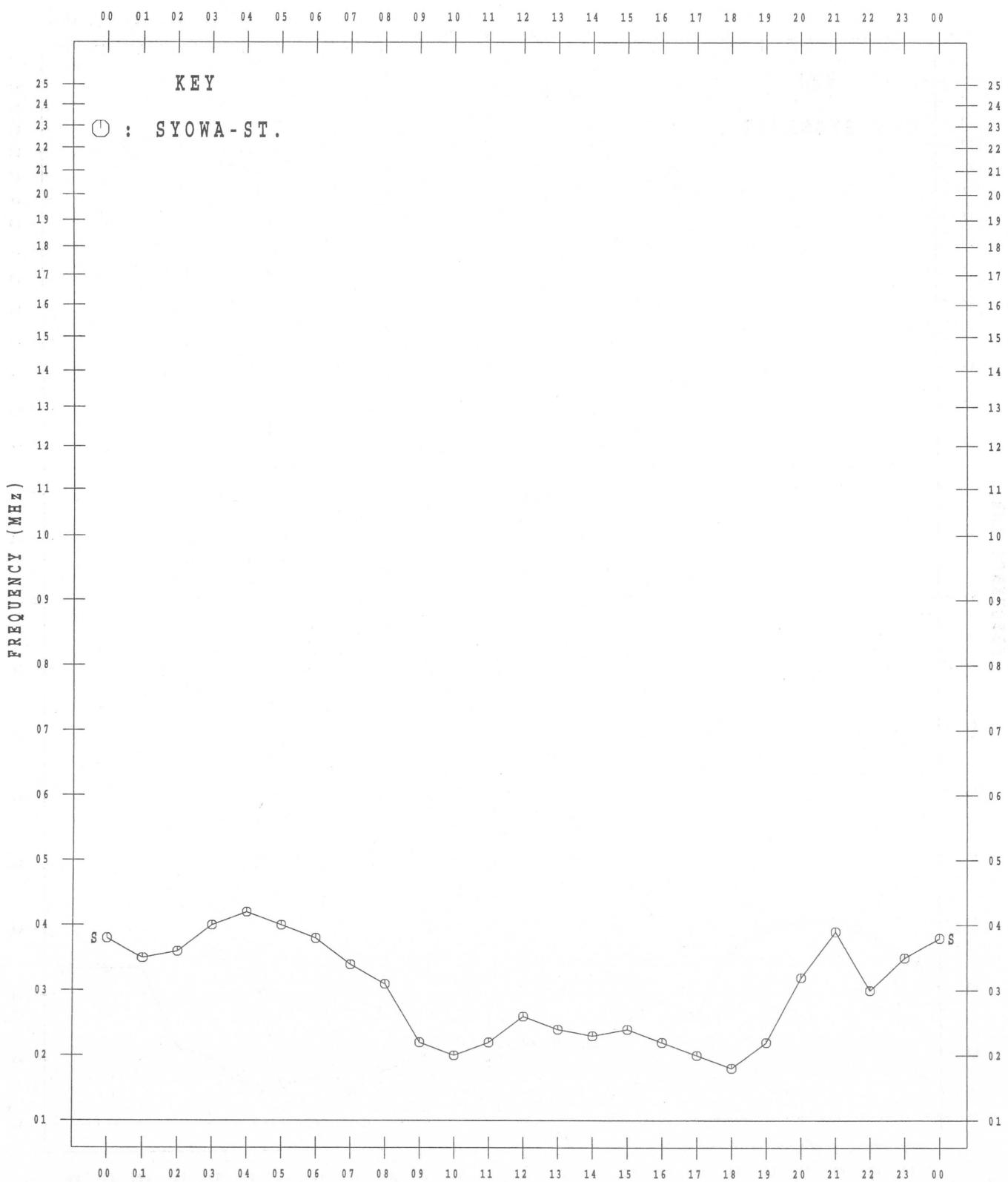
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MONTHLY MEDIAN VALUES OF f_TE

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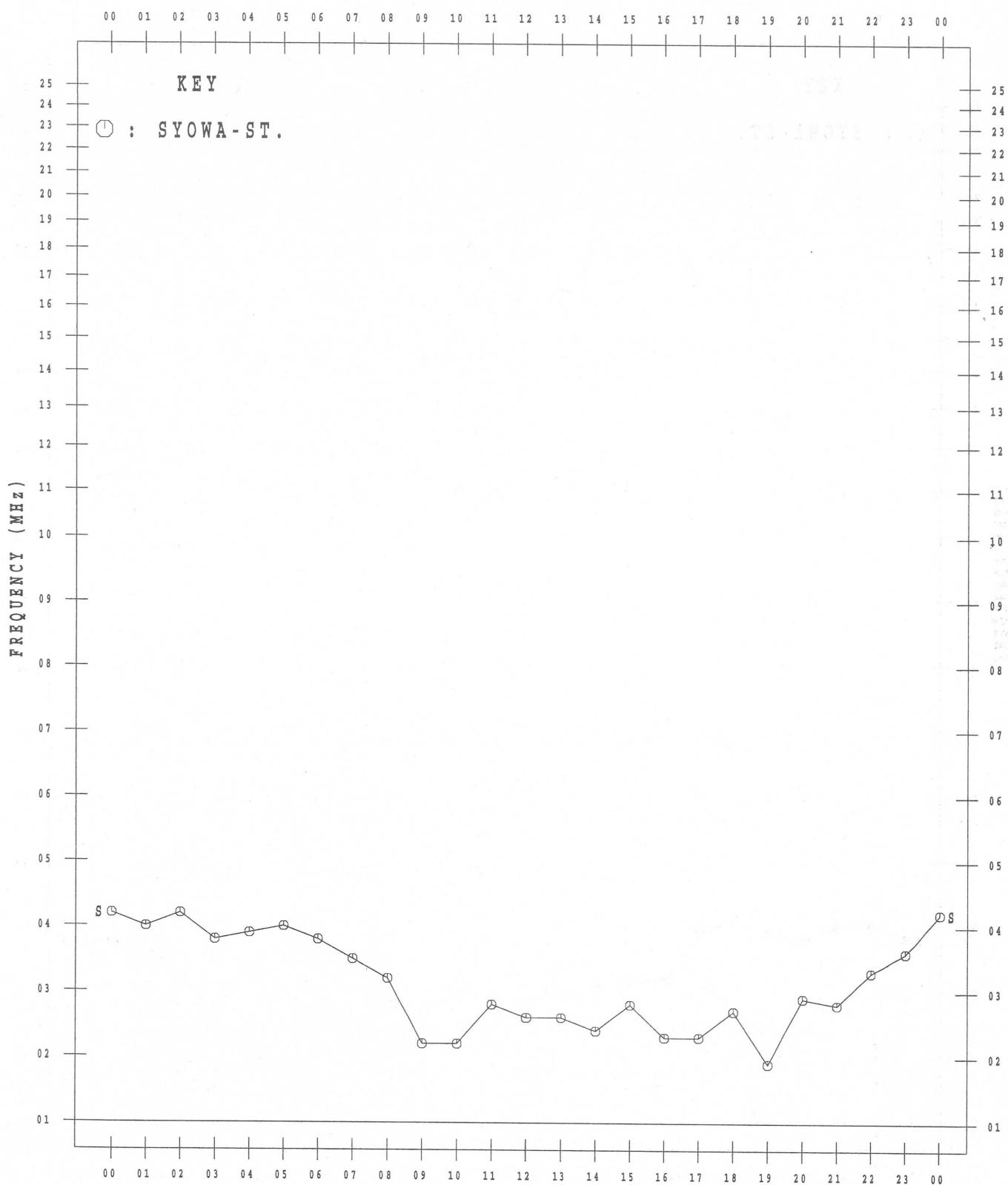
JUL. 1999



MONTHLY MEDIAN VALUES OF f_{TE}

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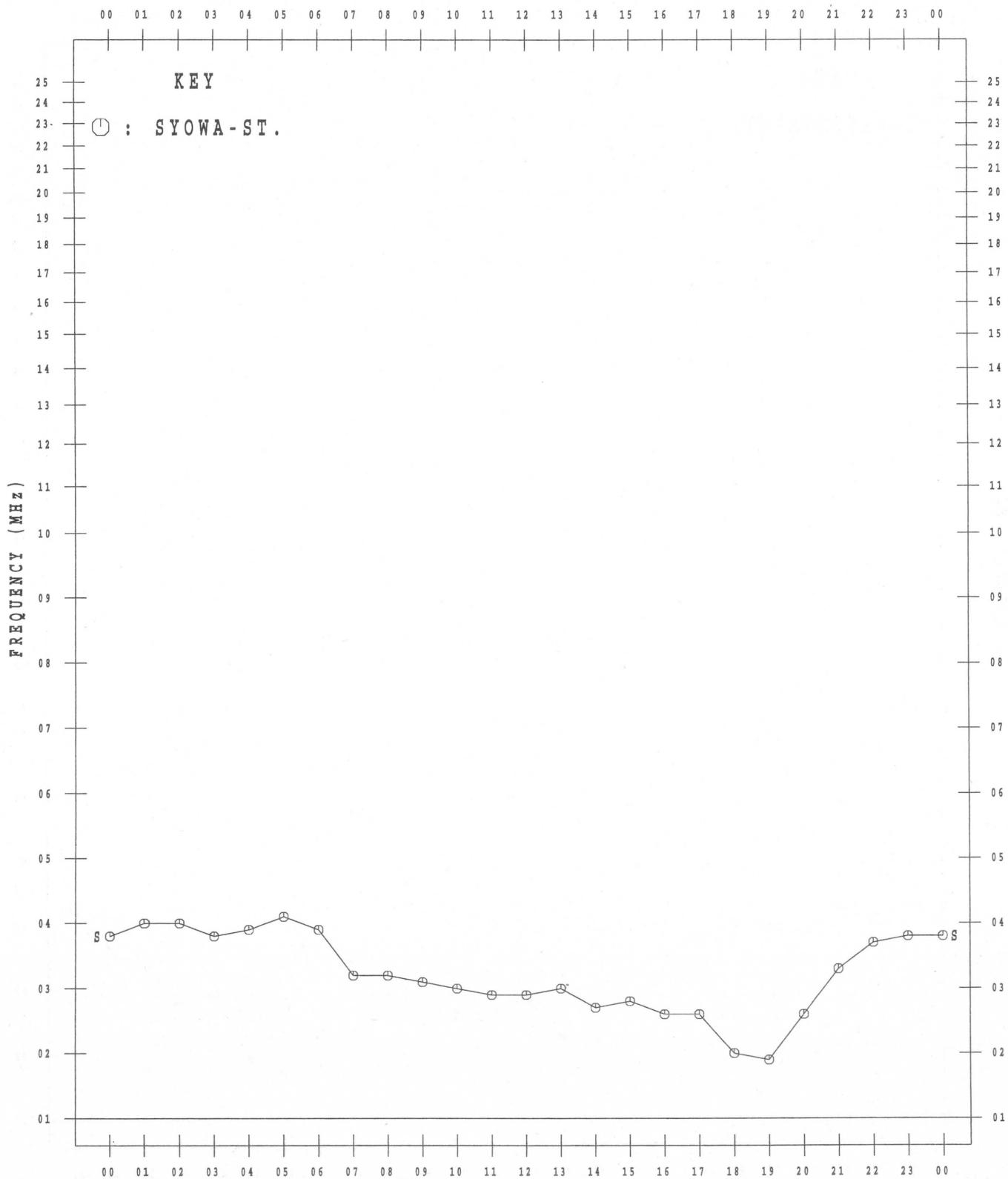
AUG. 1999



MONTHLY MEDIAN VALUES OF fTEs

45° E MEAN TIME

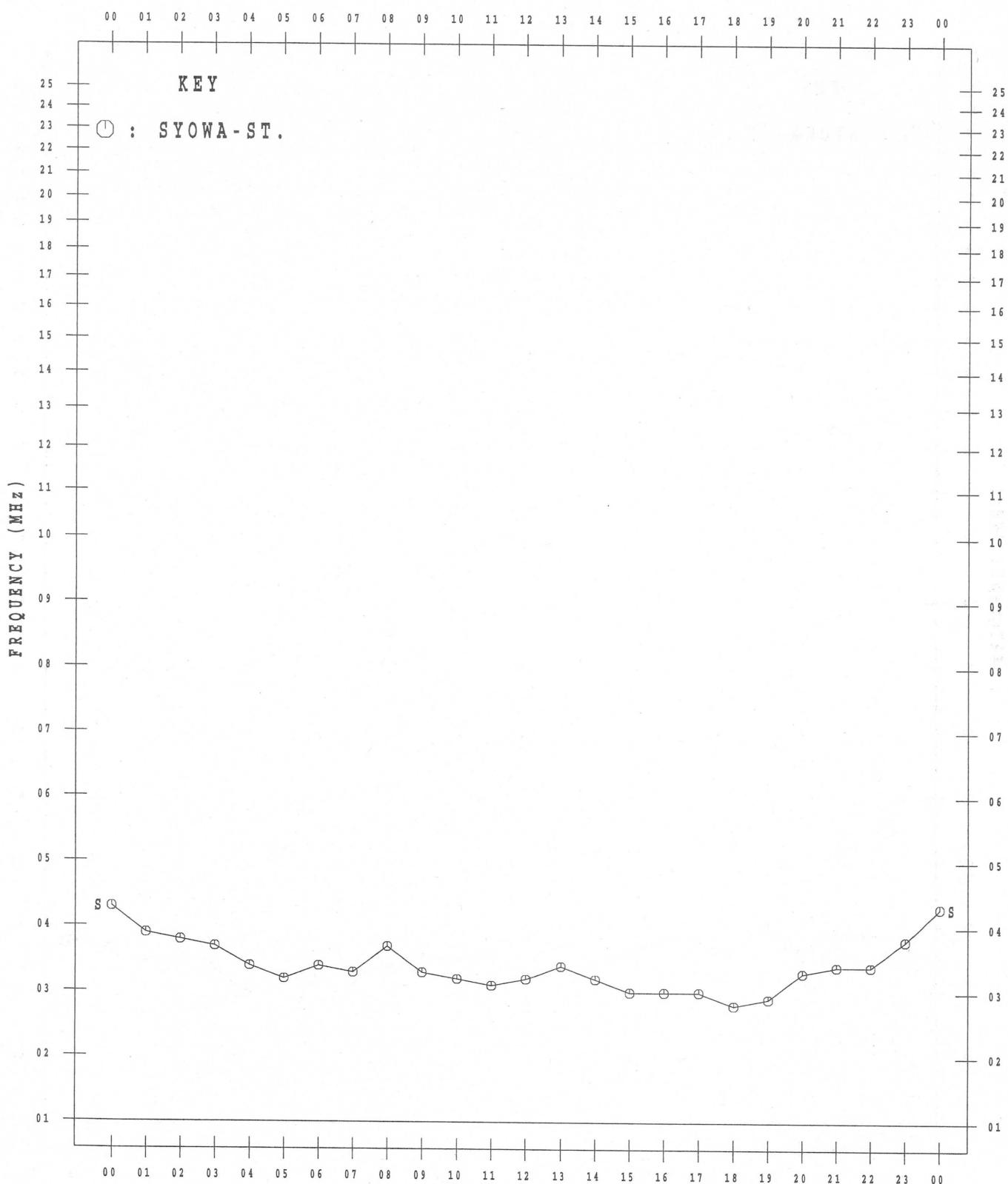
SEP. 1999



MONTHLY MEDIAN VALUES OF f_{TES}

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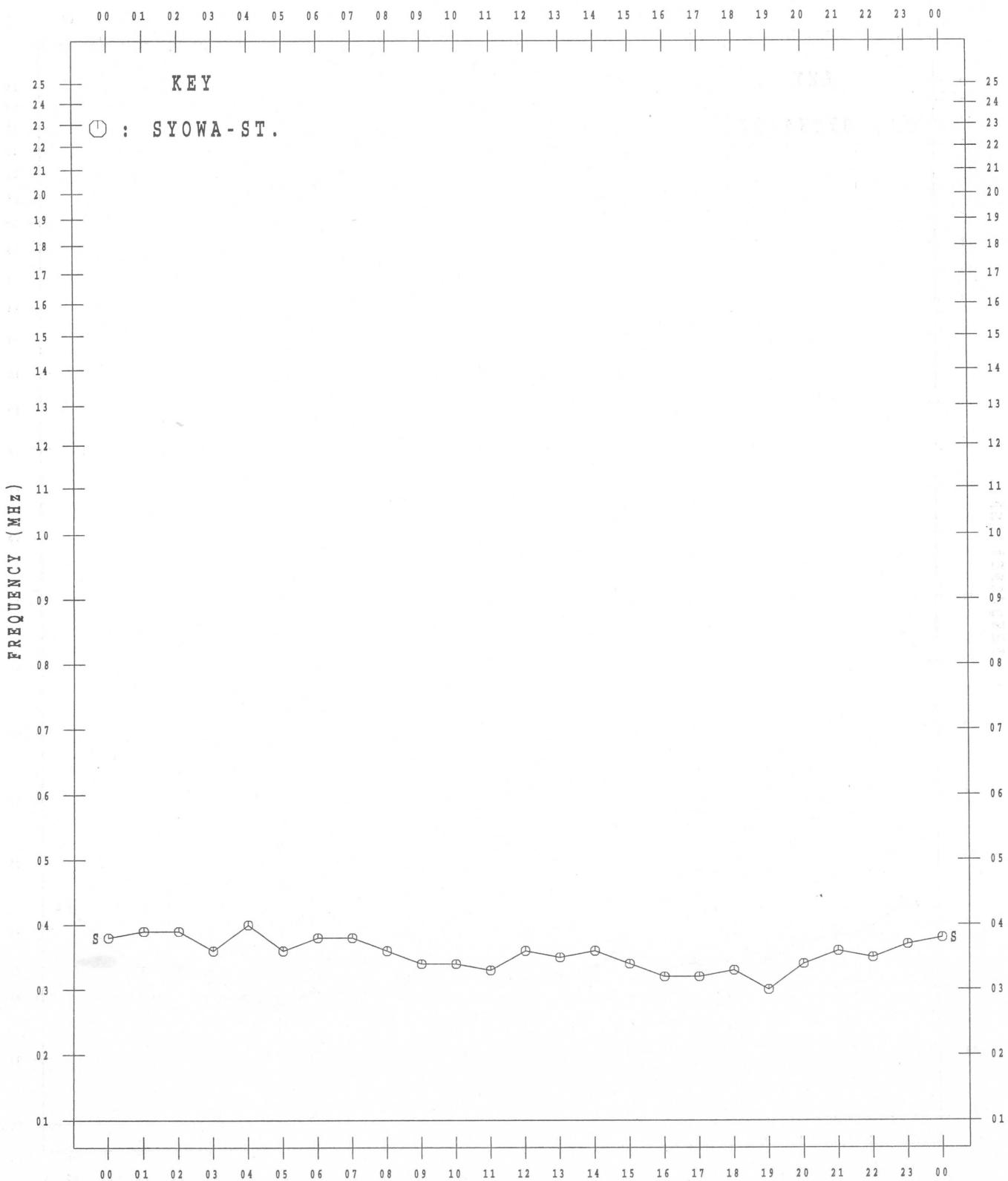
OCT. 1999



MONTHLY MEDIAN VALUES OF f_{TE}S

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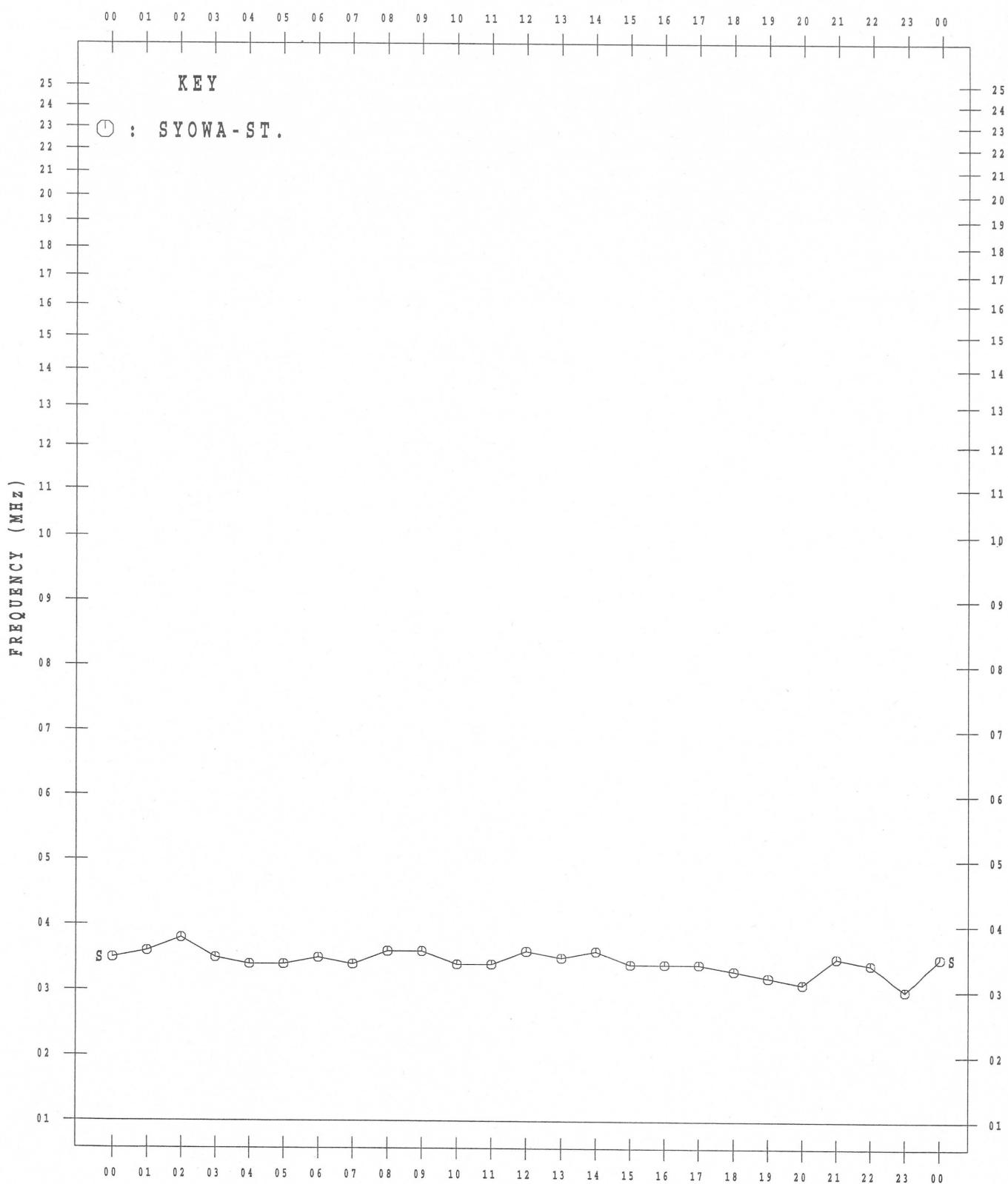
NOV. 1999



MONTHLY MEDIAN VALUES OF fTES

45° E MEAN TIME

DEC. 1999



IONOSPHERIC DATA AT SYOWA STATION (ANTARCTICA)
ION.ANT.-66 January 1999 — December 1999 (Not for Sale)

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☎ 042(327)6911(直通)

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