

ION. ANT.—60

# IONOSPHERIC DATA AT SYOWA STATION (ANTARCTICA)

January 1993—December 1993

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**COMMUNICATIONS RESEARCH LABORATORY****MINISTRY OF POSTS AND TELECOMMUNICATIONS****TOKYO, JAPAN**

# ERRATA

to

## IONOSPHERIC DATA AT SYOWA STATION (ANTARCTICA)

January 1993 — December 1993

Corrections are in boldface

Date	Time	fmin	ftEs	h'F	foF2	fxl
1/24	20:00	18	37	A	S	S
1/31	00:00	<b>16</b>	40	S	S	S
2/ 4	18:00	31	31EB	245EB	54JS	<b>60X</b>
2/ 5	06:00	<b>30</b>	<b>42</b>	A	S	S
2/ 6	06:00	<b>18</b>	<b>37</b>	A	<b>60F</b>	<b>72</b>
2/16	12:00	56ES	56ES	S	70DS	S
	13:00	56ES	56ES	S	80R	86OX
	15:00	54ES	54ES	S	80R	86OX
2/18	20:00	14	33	320EA	36S	<b>42OX</b>
2/21	16:00	30	<b>30EB</b>	215	60F	70
4/ 2	14:00	<b>58</b>	58EB	B	71	77X
4/20	01:00	19	41	<b>315EA</b>	42	48OX
	10:00	31	31EB	<b>B</b>	44UR	50OX
	13:00	36	36EB	<b>B</b>	59F	69
4/24	13:00	50ES	<b>50ES</b>	260ES	67V	73V
4/29	10:00	17	<b>20</b>	215	68	74X
5/14	16:00	<b>B</b>	<b>B</b>	<b>B</b>	<b>B</b>	<b>B</b>
5/25	09:00	<b>B</b>	<b>B</b>	<b>B</b>	<b>B</b>	<b>B</b>
8/ 6	20:00	10	33	220	<b>35US</b>	<b>41OX</b>
8/ 7	21:00	<b>9</b>	<b>26</b>	S	S	S
8/ 8	00:00	23	<b>39</b>	A	S	S
	21:00	S	S	S	S	S
	23:00	<b>18</b>	<b>26</b>	S	S	S
8/11	18:00	28	28EB	290EB	<b>31R</b>	<b>37OX</b>
	19:00	<b>16</b>	<b>16EB</b>	<b>250EB</b>	<b>19UR</b>	<b>25OX</b>
8/29	11:00	C	C	C	C	C
	14:00	23	23EB	225	<b>41</b>	<b>47OX</b>
10/2	19:00	<b>B</b>	<b>B</b>	<b>B</b>	<b>B</b>	<b>B</b>
10/4	01:00	<b>B</b>	<b>B</b>	<b>B</b>	<b>B</b>	<b>B</b>
10/7	12:00	18	37	A	S	S

COMMUNICATIONS RESEARCH LABORATORY  
MINISTRY OF POSTS AND TELECOMMUNICATIONS  
TOKYO, JAPAN

## INTRODUCTION

This data book gives summarized results for vertical soundings of the ionosphere at Syowa Station, Antarctica in 1993. The observations were conducted by the Communications Research Laboratory under the sponsorship of the National Institute of Polar Research of Japan. The location of the station, specifications of the ionosonde, and the symbols used in this data book are as follows:

### LOCATION OF SYOWA STATION

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

### SPECIFICATIONS OF THE IONOSONDE USED AT SYOWA STATION

Items	Specifications
Frequency Range	400 kHz - 15 MHz
Transmitting Power	10 kW (peak value)
Duration of Sweep	20 s
Transmitted Pulse Width	80 $\mu$ s
Pulse Repetition Frequency	50 Hz
Frequency Marker	every 1 MHz
Height Range	0 - 900 km
Height Marker	every 50 km
Recording Media	35 mm film
Power Supply	100-V-AC, 2.0 kVA
Transmitting Antenna and Receiving Antenna	30-m-high vertical delta antennas terminated by 600 $\Omega$

### OBSERVERS

Observer: T. Yamaguchi

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 atmospheric effects.  
 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. 1993 f<sub>x</sub>I (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

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

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
1	X 53	B	Y	60	68		72	S		O X 86	X 86	X 81	X 87	X 74	X 72	X 75	X 68		X 70	X 64	X 65	X 67	X 62	X 58	X 54	X 47	
2	O X 52	A		S	S	Y	S	A	S	O X 48	X 63	O X 49	S	B	O X 50	B	B	B	B	X 48	X 44	S	S	S	A	B	
3	S	S	S	S	O X 49	B	B	B	B	B	B	B	B	B	B	B	B	X 60	X 60			X 42	X 48		O X 46	O X 49	
4	O X 42	A	B	B	B	B	B	Y	B	B	B	B	B	B	B	B	B	B	B	B	O X 44	S	S	X 51	X 52	S	
5	S	S	B	B	B	A		B	B	B	Y	B	B	B	B	O X 63	B	B	B	O X 53		X 54	X 52	X 58	X 42		
6	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	O X 70	X 64				X 55	X 46	X 43	X 48		
7	S	O X 48	B	S	S	X	B	B	B	S	B	O X 49	X 59	X	B	B	B		X 68	X 66	X 62	X 53	X 40	X 46	X 49	A	
8	S	S	Y	B		B	Y	Y	S	S	B	B	B	B	B	Y	B	O X 49	X 59	X	S	O X 44	X 53	S	S		
9	B	B	S	B	B	Y	B	B	B	B	B	B	B	B	B	B	O X 59	X 72	X 66		S		O X 56	X 49	X 50	X 49	
10	O X 42	B	A	B	B	A	O X 48	O X 46	B	B	B	B	B	B	B	B	B	O X 65	B		S	O X 55	X 53	S	X 55		
11	53	54	54	64	58	41	43	59	77	78	66	69	68	63		73	66		O X 73	Y	B	X 46	S	S	A	O X 54	
12	O X 48	S	B	S		B	Y	Y	Y	B	B	B	B	X	B	B	O X 64	B	X	B		B	O X 54	X 55	X 44		
13	O X 47	X 46	X 47	S	X 60	S	S	A		O X 71	X 76	X 78	X 74	X 73	X 70	X 67	X 68	X 66	X 70	X 66	X 59		S	X 54	X 47	S	
14	B	S	S	B	B	S	B	S	O X 45	X	B	B	B	B	B	B	B	B	B	O X 49			X 54	X 53	X 59	S	
15	A	B	B	S	B	S	S	X 68	X 66	B	70		B	B	B	B	B	B	O X 50	X 59	X 54		S	O X 49	X 46	A	
16	A	A	A	Y	B	B	S	B	O X 48	X 63	C	O X 64	X 69	X 67	X 64	X 67	X 62	X 68	X 62	X 43	X 49	X 46	X 48	X 47	X		
17	O X 43	B	B	B	B	B	B		74	74		B	B	B	B	B	O X 70	B	B	B		B	O X 57	X 47	X 48	X 44	
18	B	B	O X 49	X 50	Y	B	B	Y		66	69	69	68	66	69		68	65	67	59	X	Y	Y	O X 54	X 50	X 60	
19	Y	B	B	Y	Y	S	B	S		S	O X 51	X 49	X 57	B	B	B	O X 50	S	X	X	X	X	O X 57	S	A	69	
20	A	A		47	49	61	52	59	Y	X 63	X 66	X 67	X 68	O X 74	X 73	X 71	X 69	X 61	X 46		S	X 54	X 50	X 53	X 53	X 48	
21	X 46	X 48	X 44	S	S	X 43	B	S	B	S	S	O X 46	S	O X 61	X 58	X 63	X 63	X 64	X 62	X 61	X 58	X 60	X 57	X 58	X 53	X 53	
22	X 47	X 48	X 46	X 48	B	S	S	S	O X 68	X 71	O X 75	X 79	X 79	O X 77	X 75	X 68	X 64	X 62	X 65	X 61	X 63	X 63	X 58	X 54	X 46		
23	S	45	B	B	S	A		S		68	65	73	73	70	69	66	66	66	66	61	63	62	58	62	57	48	
24	S	A	O X 48	S	S	S	S	S	S	S	S	S	X 64	X 66	X 70	X 75	X 75	X 78	X	X	X	X	X	S	S	A	A
25	S	O X 48	X 49	B	O X 52	X 60	X 68	X 67	X 72	X 73	X 69	X 69	X 65	X 68	X 70	X 78	X 58	X 52	X 55		S	S	O X 44	X	A	A	
26	S	S		A	B	S	B	S	B	B	B	B	B	B	B	B	B	B	B	X 61	X 58	X 49	X 41	X 40	S	S	
27	B	S	B	B	B	B	B	B	B	S	B	B	B	B	B	B	B	B	81	76	66	56	S	B	O X 46	X 50	
28	B	S	S	B	B	B	Y	B	B		O X 64	X 67	X 64	X 64	X 63		66	66	66	66	66	58	53	53	53	44	
29		X 35	X 44	X 45	X 44	S	S	V	O X 66	X 65	X 69	X 63	X 74	X 78	X 75	X 69	X 70	X 68	X 63	X 61	X 60	X 60	X 56	X 51	X 42	S	
30	O X 47	S	S	S	S	B	B	B	B	B	B	B	B	66	69	68	70		X 70	X 68	X 69	X 57	S	S	S	S	
31	S	S	S	B	B	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	S	B	Y	S	A	B	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
CNT	12	8	11	6	8	5	8	6	13	13	13	16	15	15	12	16	20	23	22	20	19	24	21	19			
MED	X 47	X 48	X 48	50	55	52	59	66	68	66	69	68	69	69	70	68	66	64	62	56	55	53	51	48			
U Q	O X 50	X 48	X 54	60	60	56	67	68	73	74	74	74	74	72	73	70	69	68	65	59	58	54	54	53	X 48		
L Q	O X 42	X 46	X 46	X 48	X 48	X 42	X 48	X 59	X 64	X 63	X 64	X 64	X 65	X 63	X 65	X 66	X 63	X 60	X 59	X 51	X 49	X 48	X 48	X 48	X 44		

IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 1993 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	47	B	Y	F	56	B	F	S	F	80	75	80	68	66	69	62	59	58	59	60	56	53	48	41							
2	46	A	F	S	S	Y	S	A	S	42	57	43	S	B	S	B	B	B	42	38	S	S	A	B							
3	S	S	S	S	U	S	B	B	B	B	B	B	B	B	B	B	J	S	B	S	36	42	J	F							
4	36	A	B	B	B	B	B	Y	B	B	B	B	B	B	B	B	B	B	B	U	S	S	F	S							
5	S	S	B	B	B	A	F	B	B	B	Y	B	B	B	B	S	B	B	B	J	F	47	48	46	52	36					
6	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	F	S	B	S	J	S	49	40	37	42					
7	S	42	B	S	S	46	B	B	B	S	B	J	S	B	B	B	64	58	B	U	S	34	40	43	A						
8	S	S	Y	B	F	B	Y	Y	S	S	B	B	B	B	B	Y	B	S	S	U	R	38	47	S	S						
9	B	B	S	B	B	Y	B	B	B	B	B	B	B	B	B	B	53	66	60	S	F	U	S	44	43						
10	36	B	A	B	B	A	42	S	B	B	B	B	B	B	B	B	B	59	B	S	49	47	D	S	49						
11	J	F	F	F	J	F	J	F	J	S	71	72	60	63	62	57	A	F	Y	B	40	S	S	A	U	S					
12	42	S	B	S	F	B	Y	Y	Y	B	B	B	B	B	B	B	58	B	J	S	B	B	48	49	37						
13	41	40	41	S	J	S	S	A	F	Z	58	70	72	69	67	64	61	62	60	64	57	53	D	S	F	42					
14	B	S	S	B	B	S	B	S	S	B	B	B	B	B	B	B	B	B	B	B	S	B	U	S	S						
15	A	B	B	S	B	S	S	62	60	B	F	B	B	B	B	B	B	44	53	48	S	43	40	S	A						
16	A	A	A	Y	B	B	S	B	S	42	57	C	R	63	61	58	61	56	62	56	37	43	40	42	41						
17	S	B	B	B	B	B	B	J	F	F	B	B	B	B	B	B	64	B	B	B	B	U	S	41	42	38					
18	B	B	U	S	U	S	Y	B	B	Y	F	F	F	R	60	63	B	62	59	61	53	Y	Y	U	S	S					
19	Y	B	B	Y	Y	S	B	S	S	U	S	U	S	J	F	B	B	B	U	S	S	J	S	U	S	A	F				
20	A	A	F	F	F	F	F	Y	57	60	61	62	68	67	65	63	55	40	S	S	48	44	47	F	42						
21	J	S	42	38	S	S	J	R	B	B	S	S	D	S	S	J	S	55	52	57	57	58	56	55	52	54	51	J	S	52	47
22	41	42	40	42	B	S	S	S	F	F	F	F	F	F	71	69	62	58	56	59	55	57	J	R	J	F	40				
23	D	S	F	B	B	S	A	J	F	S	J	F	F	V	64	63	60	60	60	55	57	56	52	56	51	38					
24	S	A	42	S	S	S	S	S	S	S	S	S	S	S	S	S	S	F	F	S	S	S	S	A	A						
25	S	42	43	B	F	F	61	66	67	63	63	59	62	64	68	J	F	F	J	S	S	S	S	A	A						
26	S	S	J	F	A	B	S	B	S	B	B	B	B	B	B	B	B	B	J	S	J	S	S	U	S	S	S	S			
27	B	S	B	B	B	B	B	B	B	S	B	B	B	B	B	B	B	F	70	70	60	J	S	S	B	40	F	40			
28	B	S	S	B	B	B	Y	B	B	F	61	58	58	57	60	60	60	60	60	60	52	47	47	47	J	F	38				
29	F	37	39	F	S	S	V	60	59	58	57	68	66	67	63	64	62	57	55	54	54	50	45	36	F	36					
30	41	S	S	S	S	B	B	B	B	B	B	B	F	63	62	64	B	64	62	63	51	45	S	S	S	S					
31	S	S	S	B	B	S	S	S	S	B	B	B	B	B	B	B	B	B	B	S	B	Y	S	A	B						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23							
CNT	13	8	11	5	7	3	6	6	13	12	13	15	15	15	12	16	20	22	22	20	21	24	22	18							
MED	41	42	42	44	46	37	48	60	60	60	61	62	63	63	64	62	60	58	55	50	48	46	44	41							
U Q	44	42	45	53	54	46	60	62	64	68	66	68	67	66	67	64	62	61	59	53	52	48	49	43							
L Q	36	40	40	42	40	35	37	53	56	57	58	57	59	57	59	60	57	54	53	45	42	42	42	38							

IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 1993 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	38	B	32	32	29	B	35	36	32	26	33	E B	56	26	42	39	36	33	33	32	26	23	26	26	28			
2	33	93	56	43	46	26	40	70	45	33	30	33	29	B	33	B	B	B	33	33	42	53	43	B				
3	35	33	38	33	32	B	B	B	B	B	B	B	B	B	B	B	33	50	B	B	33	26	32	32	70			
4	37	33	B	B	B	B	B	32	B	B	B	B	B	B	B	B	B	B	B	B	E B	30	33	27	44	42		
5	43	40	B	B	B	40	27	B	B	B	26	B	B	B	B	28	B	B	B	B	E B	30	27	22	26	27		
6	27	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	26	26	B	B	40	27	25	22	32			
7	49	37	B	46	37	33	B	B	B	36	B	32	33	B	B	B	E B	E B	B	21	33	E B	E B	B	40	52		
8	42	46	34	B	26	33	33	33	27	B	B	B	B	B	B	26	B	28	27	39	E B	30	32	46	42			
9	B	B	43	B	B	31	B	B	B	B	B	B	B	B	B	B	E B	E B	E B	B	52	40	31	33	26	24	25	32
10	33	B	115	B	B	58	33	26	B	B	B	B	B	B	B	B	B	B	B	B	26	B	42	42	42	33	31	
11	33	27	26	33	32	32	29	46	42	36	36	51	37	36	100	28	26	29	B	39	46	60	52	68				
12	69	68	B	34	26	B	36	36	65	B	B	B	B	27	B	B	E B	B	B	28	B	B	17	19	26			
13	21	26	35	39	37	34	27	70	33	34	E S	52	54	38	39	33	32	32	28	27	26	32	27	25	42			
14	B	47	46	B	B	38	B	37	28	B	B	B	B	B	B	B	B	B	B	E B	B	B	32	41	26	43		
15	70	B	B	32	B	37	37	33	36	B	E B	57	B	B	B	B	B	B	B	27	26	27	40	37	37	43		
16	40	80	39	33	B	B	37	B	33	26	C	32	33	32	31	33	27	27	27	E B	30	24	24	41	26			
17	33	B	B	B	B	B	B	33	32	B	B	B	B	B	B	B	57	B	B	B	B	21	37	33	40			
18	B	B	36	26	37	B	B	38	33	28	30	32	39	41	B	B	33	27	27	33	38	26	43	37	31			
19	38	B	B	33	33	32	B	43	27	33	32	32	B	B	B	27	32	27	26	27	26	44	39	37				
20	59	81	26	26	46	24	48	42	32	32	27	32	28	32	31	27	27	32	33	38	33	33	32	19				
21	19	34	32	42	43	38	B	B	32	33	33	27	32	32	41	33	36	26	36	27	26	23	26	19				
22	22	32	32	33	B	38	42	42	37	E B	E B	E B	E B	B	B	B	E B	E B	B	26	30	37	26	21	36	18	23	
23	71	44	B	B	36	60	28	35	33	34	33	35	40	42	35	28	32	33	36	28	24	19	17	E B	20			
24	37	52	40	42	40	36	32	34	46	40	27	28	28	E B	E B	E B	E B	E B	B	26	25	37	44	47	42			
25	40	33	32	B	28	28	32	33	37	40	32	33	42	40	41	42	27	27	36	42	43	30	51	68				
26	46	43	32	85	B	28	B	41	B	B	B	B	B	B	B	B	B	B	B	E B	26	27	27	40	34			
27	B	70	B	B	B	B	B	B	B	27	B	B	B	B	B	B	B	E S	E S	E S	26	E B	B	18	24			
28	B	27	32	B	B	B	B	B	B	34	33	26	26	22	B	E S	51	26	27	23	38	40	21	E B	E S	19		
29	32	33	33	27	40	37	33	27	28	26	B	E B	E S	57	35	27	80	29	26	27	33	26	42	E B	E B	19	27	
30	27	33	39	36	33	B	B	B	B	B	B	B	27	24	40	26	B	E B	E B	E S	54	56	37	37	43			
31	40	37	46	B	B	40	26	34	40	B	B	B	B	B	B	B	B	B	B	B	26	B	34	40	105	B		
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
CNT	26	23	21	18	17	19	18	21	20	18	15	17	16	15	13	17	21	24	24	27	30	30	31	29				
MED	38	37	35	33	36	36	33	36	33	33	32	30	32	34	34	30	U	30	28	30	30	30	32	33	32			
U Q	43	52	42	42	40	38	37	42	38	36	E B	E B	38	41	48	39	E	34	E B	34	34	40	40	41	42			
L Q	33	33	32	32	30	31	29	33	32	27	30	30	28	32	31	28	26	27	26	26	26	24	25	26				



IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 1993 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 <sup>H</sup>	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
1	14	B	20	14	14	B	19	25	15	13	18	56	24	26	19	18	14	14	14	14	10	13	15	19			
2	17	16	16	23	18	14	19	9	18	16	19	20	18	B	19	B	B	B	17	15	16	15	18	B			
3	17	19	25	10	23	B	B	B	B	B	B	B	B	B	B	B	19	50	B	18	16	16	15	16			
4	18	16	B	B	B	B	B	24	B	B	B	B	B	B	B	B	B	B	B	30	19	18	18	19			
5	19	16	B	B	B	15	13	B	B	B	19	B	B	B	B	18	B	B	B	30	16	16	18	16			
6	19	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	19	24	B	30	25	10	10	15			
7	25	24	B	30	19	19	B	B	B	24	B	25	18	B	B	B	55	56	19	30	30	14	18	20			
8	25	25	13	B	18	B	24	19	21	18	B	B	B	B	B	20	B	18	18	18	30	16	17	18			
9	B	B	20	B	B	21	B	B	B	B	B	B	B	B	B	B	52	40	31	18	24	17	14	18			
10	18	B	24	B	B	19	18	19	B	B	B	B	B	B	B	B	B	24	B	25	15	19	16	16			
11	14	14	14	14	8	13	14	14	16	23	36	51	19	31	20	20	20	19	B	14	16	15	14	8			
12	14	14	B	24	15	B	16	30	20	B	B	B	B	24	B	B	33	B	14	B	B	14	8	14			
13	8	11	19	24	19	30	24	24	19	23	E S E S	52	54	24	19	19	24	18	9	22	18	14	13	18	15		
14	B	16	20	B	B	19	B	24	20	B	B	B	B	B	B	B	B	B	30	B	19	17	10	19			
15	25	B	B	24	B	25	20	18	20	B	57	B	B	B	B	B	B	19	19	10	14	20	18	10			
16	16	24	24	24	B	B	23	B	16	20	C	19	19	24	19	10	19	16	19	30	18	19	10	13			
17	13	B	B	B	B	B	B	19	16	B	B	B	B	B	B	57	B	B	B	B	19	14	10	16			
18	B	B	18	18	20	B	B	19	19	14	15	19	19	19	B	B	19	15	15	16	18	18	13	10	30		
19	23	B	B	26	19	19	B	25	19	25	19	25	B	B	B	17	19	16	18	16	16	18	19	9			
20	16	15	14	15	17	15	15	14	9	9	16	16	16	15	19	16	18	14	23	18	13	13	18	14			
21	14	13	18	31	24	18	B	B	30	24	15	18	18	18	16	19	30	20	15	18	23	19	23	17			
22	15	19	16	18	B	30	18	18	19	55	54	35	51	31	24	19	22	30	37	14	16	19	18	7			
23	18	20	B	B	20	25	15	31	16	16	19	19	16	16	16	18	16	18	19	15	14	9	8	20			
24	17	24	15	19	16	21	19	22	19	24	20	18	14	51	56	56	E S	54	36	19	19	18	18	17	13		
25	14	16	19	B	19	16	9	13	16	15	18	18	19	18	18	16	13	18	19	9	18	13	14	18			
26	13	8	8	24	B	21	B	20	B	B	B	B	B	B	B	B	B	B	24	32	18	17	15	14	21		
27	B	18	B	B	B	B	B	B	B	20	B	B	B	B	B	B	E S	53	56	41	20	24	B	16	19		
28	B	21	20	B	B	B	35	B	B	21	18	18	18	18	B	E S	51	20	20	18	18	19	19	19	E S		
29	10	12	14	25	31	24	18	20	18	19	B	57	E S	35	24	18	18	19	18	16	19	19	22	19	8		
30	17	18	21	25	20	B	B	B	B	B	B	B	24	19	E S	40	24	B	30	55	E S	53	53	18	18	16	
31	12	13	31	B	B	20	18	20	30	B	B	B	B	B	B	B	B	B	18	B	18	20	24	B			
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
CNT	31	31	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31		
MED	17	19	20	26	24	25	24	24	20	24	B	56	51	B	B	56	U	26	24	19	18	18	16	17	16		
U Q	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	56	50	30	23	19	18	19
L Q	14	15	16	23	19	19	18	19	18	19	19	19	19	19	24	19	18	18	18	16	16	14	14	14	14		

IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 1993 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		320	B	Y	250	240	B	E	S	310	250	210	210	205	B	S	S	230	215	200	215	215	240	225	240	275	265					
2		A	A	E	A	S	S	Y	S	A	S	220	200	260	E	S	S	235	B	B	B	270	290	A	E	S	A	B				
3		A	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	210	B	B	B	A	250	265	E	A	A					
4		A	A	B	B	B	B	B	S	B	B	B	B	B	B	B	B	B	B	B	B	240	S	260	320	E	S	A				
5		S	S	B	B	B	A	B	B	B	S	B	B	B	B	B	B	215	B	B	B	250	220	250	E	S	A					
6		A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	210	210	B	B	S	E	S	280	230	S	A				
7		S	A	B	S	S	E	A	B	B	B	S	B	S	B	B	B	240	B	B	B	S	E	B	E	B	E	S	A			
8		A	A	A	B	B	S	S	S	S	S	B	B	B	B	B	Y	B	B	B	215	215	A	290	A	S	S					
9		B	B	B	B	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	280	230	A	255	240	E	A	E	A		
10		A	B	A	B	B	A	S	B	B	B	B	B	B	B	B	B	250	B	B	B	240	B	A	S	250	240	E	S	A		
11		260	240	270	250	220	240	215	200	200	245	230	B	E	S	A	230	230	Y	B	215	S	E	S	270	250	A					
12		A	220	B	S	210	B	Y	Y	A	B	B	B	B	210	B	B	210	B	205	B	B	B	260	260	A						
13		A	S	A	S	S	S	S	S	240	S	S	S	S	S	240	225	250	215	200	240	E	S	305	255	250	225					
14		B	220	A	B	B	S	B	S	205	B	B	B	B	B	B	B	B	B	B	245	B	E	A	280	230	275	245				
15		A	B	B	A	B	A	A	E	A	A	B	B	B	B	B	B	B	B	E	S	230	210	250	260	250	220	A				
16		A	A	A	A	B	B	A	B	E	S	S	C	S	S	S	S	215	205	200	225	E	B	250	250	270	230	E	A			
17		230	B	B	B	B	B	B	250	210	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	240	240	310	240			
18		B	B	A	E	A	A	B	B	A	E	A	250	225	215	210	220	A	B	205	205	205	215	A	200	235	240	E	S			
19		S	B	B	S	E	A	S	B	A	A	220	200	S	B	B	B	220	A	205	205	245	250	A	A	E	A	330				
20		A	A	A	E	A	A	A	S	200	235	200	235	230	215	220	220	200	245	S	E	S	290	245	270	250	265					
21		270	300	E	S	A	A	B	B	S	S	195	S	240	200	245	210	S	200	210	210	200	240	200	240	255	265					
22		290	280	335	A	B	S	S	A	S	B	B	215	B	S	S	200	225	200	285	230	E	B	240	285	250	255					
23		225	A	B	B	A	A	S	245	195	240	230	200	225	245	200	200	220	230	200	230	220	230	220	250	240	260					
24		S	A	E	A	A	S	A	A	A	210	S	H	E	S	B	B	E	B	270	250	240	250	E	B	A	A					
25		S	S	S	B	S	S	260	235	210	215	190	200	A	210	210	225	200	S	A	A	A	E	A	285	A	A					
26		A	A	E	S	A	B	S	B	A	B	B	B	B	B	B	B	B	B	B	230	E	S	S	S	E	S	A	A			
27		B	S	B	B	B	B	B	B	B	Y	B	B	B	B	B	B	B	S	B	E	S	E	S	B	240	290					
28		B	S	S	B	B	B	S	B	B	235	215	200	E	S	S	B	S	215	220	220	235	250	250	260	270						
29		B	E	A	E	S	A	S	E	A	H	B	B	205	200	205	210	S	S	E	S	E	S	250	260	235	225	265				
30		E	S	A	S	A	S	B	B	B	B	B	B	S	E	S	280	205	215	S	S	240	250	A	S	S						
31		S	S	A	B	B	S	S	S	S	B	B	B	B	B	B	B	B	B	B	S	B	Y	S	A	B						
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23							
CNT		7	6	8	5	6	4	7	7	11	11	11	7	10	11	10	13	16	18	20	19	25	25	21	16							
MED		265	245	254	E	U	238	212	250	242	208	225	205	205	225	212	215	215	210	216	215	240	245	245	248	262						
UQ		300	290	302	E	A	E	A	270	280	E	A	E	270	240	235	215	235	240	E	S	245	235	222	222	230	242	250	270	270	278	268
LQ		230	220	250	250	220	202	220	235	200	215	200	200	205	210	205	208	205	205	210	235	240	240	240	240	252						

IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 1993 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	S	B	B	B	S	B	S	B	B	Y	Y	B	B	B	B	B	B	B	B	Y	B	S	S	S		
2	O	X	B	S	S	B	B	B	B	B	B	B	B	B	B	B	B	O	X	O	X	O	X	O	X	
3	S	S	B	B	B	B	S	Y	B				X	B	O	X	X	S		X		S	O	X		
4	B	A	S	B	O	X	X	S	B	B	S	B	X	X	X	X	B	B	B	O	O	X	O	X	O	X
5	S	S	B	S	S	S		S	S	S	X	V	X	X		B	X	X	X	X	X	O	X	O	X	
6	S	B	B	S	Y			B	B		X	X	O	X	X	X	X	X	X	X	X	X	O	X	X	
7	S	Y	B	Y	S			B	Y	B			V	B		B	B	B	B	62	59	60	64	62	56	
8	B	Y	O	X	S	O	X	Y	B	B	B	B	B	B	B	B	O	X	O	X	B	B	S	B	A	
9	B	B	S	B	B	B	B	A	B	B	B	B	Y	B	B	B	B	B	O	X	O	X	S	O	X	
10	A	Y	Y	B	B			S	B	B	B	B	B	B	B	B	X	B	O	X	X	O	X	S	A	
11	B	Y	B	O	X	O	X	B	B	B	B	B	B	B	B	B	O	X	B	X	B	X	S	S	S	
12	S	B	B	B	Y	B	S	B	B	B	B	B	O	X	O	X	B	B	B	B	B	X	O	X	O	
13	S	S	O	X		Y	B	B	B		X	X	B	X	O	X	X	X	B	O	X	X	X	X	X	
14	S	S	B	O	X	B	B	B	B	B	O	X	X	X	O	X	O	X	X	X	X	X	X	O	X	
15	X		S	O	X	B	Y	B	Y	X	O	X	X	X	X	O	X	X	O	X	X	O	X	X	X	
16	43	45	O	X	O	X	O	X	X	X	O	X	B	O	X	B	O	X	O	X	B	O	X	X	S	
17	O	X	X	S	S	S	S	O	X	X	X	X	X	O	X	O	X	B	B	S	O	X	S	A	A	
18	S	S	S	S	S	B	S	S	X	X	X	X	X	X	O	X	O	X	B	B	X	X	S	A	A	
19	B	O	X	A		A		B		X	B	B	O	X	X	X	X	O	X	O	X	X	X	O	X	
20	X	O	X	A	O	X	B	S	B	B	B	B	B	O	X	B	O	X	X	X	O	X	S	O	X	
21	A	A	S	A	X	S	S	S		X	B	B	O	X	X	B	O	X	X	X	O	X	A	S	S	
22	A	B	O	X	O	X	S	B	B	B	B	B	O	X	O	X	B	O	X	X	X	O	X	S	S	
23	Y	B	B	B	B	O	X	B	B	Y			X	X	X	X	O	X	B	B	B	X	O	X		
24	S	A	O	X	O	X	Y	B	S	Y			X	X	X	X	X	X	X	X	X	X	X	X		
25	O	X			S	S		O	X	B			X	X	X	X	X	X	O	X	X	X	O	X		
26	O	X	X	S	S	S		X		X	X	X	O	X	X	X	O	X	O	X	X	X	O	X		
27	X	S	O	X	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	O	X		
28	O	X	Y	Y	S		B	A	Y	Y	X		O	X	O	X	O	X	B	O	X	X	X	X		
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	9	7	8	11	7	10	8	5	10	14	17	20	19	16	19	20	17	19	23	24	22	18	17	11		
MED	X	X	O	X	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
U Q	42	42	46	49	55	62	72	74	72	79	72	74	71	74	72	72	70	64	63	59	55	54	49	45		
L Q	O	X	O	X	O	X	O	X	O	X	X	X	X	X	X	X	X	X	X	O	X	X	X	O	X	
	46	45	50	54	66	68	74	74	75	82	80	78	76	80	78	80	85	73	69	66	66	61	60	57	50	
	X	O	X	O	X	O	X	X	X	X	X	X	X	X	X	X	X	O	X	O	X	O	X	O	X	
	36	32	38	43	42	48	69	68	70	72	69	69	65	70	65	65	64	59	53	54	46	47	40	39		

IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 1993 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	S	B	B	B	S	B	D	S	B	B	Y	Y	B	B	B	B	B	B	B	Y	B	S	S	S	
2	U	S	B	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	R	S	U	S	J	F	V
3	S	S	B	B	B	B	S	Y	B	F	F	F	56	B	U	S	R	D	S	F	F	D	S	R	B
4	B	A	S	B	U	S	S	S	B	B	S	B	56	57	58	58	B	B	B	J	S	S	R	U	S
5	S	S	B	S	S	S	S	F	S	S	S	V	65	59	63	63	59	58	58	J	S	S	J	S	F
6	S	B	B	S	Y	F		B	B	F	J	S	74	74	68	63	65	62	J	S	J	S	J	S	J
7	S	Y	B	Y	S	F	F	B	Y	B	F	F	57	60	67	54	58	57	58	52	46		S	F	56
8	B	Y		S	U	S	Y	B	B	B	B	B	B	B	B	B	B	S		B	B	S	B	A	A
9	B	B	S	B	B	B	B	A	B	B	B	B	Y	B	B	B	B	B		S	J	S	U	S	S
10	A	Y	Y	B	B	J	S	S	B	B	B	B	B	B	B	B	B	B	U	S	J	S	U	S	R
11	B	Y	B	U	S	S	B	B	B	B	B	B	B	B	B	B	S	B	B	B	B	J	S	U	S
12	S	B	B	B	Y	B	D	S	B	B	B	B	S	S	B	B	B	B	B	B	J	S	U	S	U
13	S	S	U	S	F	Y	B	B	B	F	F	B	61	68	70	70	B	U	R	B	R		D	S	33
14	S	S	B	S	B	B	B	B	B	S	F	J	F	40	60	59	59	64	58	59	56	56	55	J	S
15	J	S	F	S	R	B	Y	B	Y	R	R	B	67	76	74	72	74	74	68	69	68	67	66	62	57
16	F	F	46	48	52	59	65	69	70	75	75	70	80	80	80	90	90	78	65	55	53		S	U	47
17	U	S	J	S	S	S	S	S	F	F	R	R	60	60	64	70	70	70	69	B	B	S	S	A	A
18	S	S	S	S	S	B	S	S	54	60	62	62	65	64	63	62			B	B		S	S	A	A
19	B	U	S	A	F	A	J	F	F	F	B	F	F	61	68	71	74	74	74	66	J	R	J	S	D
20	J	S	U	S	A	S	B	S	B	B	B	B	B	B	B	B	42	60	67	65	67	60	57	46	40
21	A	A	S	A		S	S	S	F		B	B	R	B	B	66	70	60	64	57	38		A	S	S
22	A	B	S	U	S	S	B	B	B	B	B	U	R	U	R	B	B	S	B	S	J	S	S	S	A
23	Y	B	B	B	B	S	B	B	B	Y	F	F	58	59	59	60	59	61	60		B	B	B	J	S
24	S	A	U	S	U	S	Y	B	S	Y	F	F	F	59	69	78	72	69	70	68	66	64	62	57	56
25	J	F	S	F	F	S	S	J	F	U	R	B	F	F	F	F	J	R	F	F	U	R	J	F	F
26	U	S	J	S	F	S	S	J	S	F	J	S	F	F	J	S	U	S	R	F	F	S	U	S	S
27	40	S	S	S	S	F	F	F	F	F	F	J	S	J	R	J	R	80	80	80	80	79	78	64	54
28	S	Y	Y	S	F	F	B	A	Y	Y	J	R	F	R	R	F	F	95	95	95	95	46	48	47	41
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	9	7	8	11	7	10	10	5	10	14	16	20	20	16	19	20	18	19	23	24	25	19	17	13	
MED	S	S			S	F	F		F	F												S		S	
U Q	40	37	44	48	60	59	65	68	67	74	74	71	70	74	68	74	74	67	62	60	55	54	51	43	
L Q	J	S	S	S	S	S	F		F		F						S	S	S	S	S	S	S	S	
	30	26	29	37	36	42	60	60	59	62	61	60	59	64	59	59	58	53	52	48	40	40	34	28	

IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 1993 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	43	B	B	B	46	B	26	B	B	B	36	26	B	B	B	B	B	B	B	B	26	B	40	40	33												
2	42	B	44	42	B	B	B	B	B	B	B	B	B	B	B	B	B	B	31	23	E	30	23	19	26	70											
3	38	33	B	B	B	B	28	37	B	B	26	36	36	37	B	23	24	31	27	27	24	E	30	21	B	33											
4	B	41	37	B	33	40	31	B	B	48	B	27	27	29	26	B	B	B	B	E	31	36	26	26	26	40											
5	33	51	B	36	38	41	37	40	42	39	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	S	26										
6	49	B	B	28	28	26	B	B	E	B	E	B	51	36	26	26	37	E	B	35	33	29	31	30	43	35	28	14	26								
7	39	44	B	43	32	27	32	B	43	B	33	33	33	B	26	B	33	26	28	33	26	43	33	B	B	B	B	B	B								
8	B	40	33	32	39	42	B	B	B	B	B	B	B	B	B	B	E	B	30	26	B	B	32	B	70	110	B	B	B								
9	B	B	37	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	E	S	28	42	32	60	B	B	B								
10	80	31	33	B	B	29	33	B	B	B	B	B	B	B	B	E	B	B	E	B	E	B	E	B	E	B	E	B	B	B							
11	B	33	B	24	25	B	B	B	B	B	B	B	B	B	B	B	B	B	B	E	B	E	B	E	B	E	B	E	B	B	B						
12	32	B	B	B	36	B	50	B	B	B	B	B	B	B	B	B	B	B	B	B	E	B	E	B	E	B	E	B	E	B	B	B					
13	40	30	46	20	33	B	B	B	B	B	50	54	56	56	B	59	60	52	26	B	E	B	E	B	E	B	E	B	E	B	B	B					
14	41	36	B	32	B	B	B	B	B	B	26	32	27	33	32	55	26	E	B	36	26	27	25	21	32	28	28	E	B	B	B						
15	26	26	27	28	B	B	32	B	40	34	16	36	36	34	27	36	36	31	39	36	33	25	19	11	10	E	B	E	B	E	B						
16	27	27	27	26	17	E	B	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	S				
17	27	32	34	33	33	27	26	26	25	26	E	B	31	72	64	73	32	B	B	24	26	33	47	42	38	36	B	B	B	B	B	B					
18	32	28	33	37	38	B	39	42	33	27	31	34	32	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	S				
19	B	48	70	33	91	27	27	B	32	27	27	32	58	54	50	31	26	26	28	26	20	16	13	27	B	B	B	B	B	B	B	B					
20	22	31	54	27	B	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				
21	47	59	32	46	32	17	39	40	41	27	B	B	E	S	B	E	S	E	B	E	S	E	B	E	S	E	B	E	S	E	B	E	S				
22	60	B	36	35	41	B	B	B	B	B	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	S	E	S			
23	33	B	B	B	B	26	B	B	B	B	E	B	34	31	26	28	26	51	31	30	B	B	20	18	19	16	B	B	B	B	B	B	B				
24	28	37	37	32	27	B	40	37	37	27	27	26	27	22	27	33	28	E	B	30	26	27	27	17	15	14	B	B	B	B	B	B	B				
25	17	38	34	33	37	36	33	52	E	S	B	E	B	31	51	24	26	26	32	28	33	26	25	20	31	30	18	12	E	B	E	B	E	B			
26	12	27	31	27	27	37	39	26	33	26	31	60	58	28	33	38	36	59	62	24	E	B	E	S	E	S	E	S	E	S	E	S	E	S			
27	12	39	41	29	25	15	21	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B		
28	26	32	47	46	34	23	B	90	25	33	32	26	27	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B		
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	23	21	19	21	20	17	16	13	13	19	18	20	21	16	19	20	18	20	23	26	27	27	27	25													
MED	33	33	36	32	33	28	32	38	33	29	E	U	U	U	E	B	30	28	27	29	27	30	30	33													
UQ	42	40	44	36	38	38	39	54	42	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B												
LQ	26	30	33	28	28	26	28	34	31	26	31	26	27	28	27	30	29	26	26	26	26	22	19	19	26												

IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 1993 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 <sup>H</sup>	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	18	B	B	B	18	B	18	B	B	18	21	B	B	B	B	B	B	B	B	19	B	18	18	31		
2	9	B	30	17	B	B	B	B	B	B	B	B	B	B	B	B	B	31	21	30	20	17	19	18		
3	19	19	B	B	B	B	18	31	B	19	36	36	37	B	23	18	31	18	17	19	30	18	B	30		
4	B	21	18	B	20	20	20	B	B	31	B	21	20	20	20	B	B	B	31	24	18	19	18	18		
5	18	20	B	20	18	30	18	18	20	20	55	55	56	52	B	36	36	31	21	30	16	19	E S	10		
6	16	B	B	18	18	18	B	B	B	51	36	21	18	18	35	18	18	31	30	18	18	13	10	17		
7	17	14	B	30	17	15	8	B	25	B	18	18	20	B	19	B	19	19	18	14	17	10	13	B		
8	B	19	17	10	23	18	B	B	B	B	B	B	B	B	B	B	30	19	B	B	18	B	19	31		
9	B	B	20	B	B	B	B	30	B	B	B	B	B	B	B	B	B	20	18	E S	30	10	18	18	18	
10	19	17	20	B	B	20	20	B	B	B	B	B	B	B	B	51	B	32	18	18	13	30	18	B		
11	B	18	B	8	19	B	B	B	B	B	B	B	B	B	B	20	B	32	B	30	15	15	14	19		
12	19	B	B	B	30	B	50	B	B	B	B	23	E S	36	B	B	B	B	B	31	30	30	18	C		
13	10	20	10	10	24	B	B	B	50	54	56	56	B	59	60	52	19	B	40	31	19	21	30	8		
14	18	21	B	18	B	B	B	B	B	18	20	18	20	18	55	24	36	19	18	19	18	16	10	10		
15	8	8	9	19	B	19	B	30	18	8	36	36	18	19	E S	E S	31	E S	36	23	25	19	9	10		
16	9	11	9	9	10	E S	E S	E S	E S	E S	E S	E S	B	E S	E S	E S	B	E S	E S	E S	51	25	21	19	10	7
17	7	8	9	10	19	18	19	15	19	20	31	31	24	60	30	B	B	20	8	29	16	9	13	17		
18	9	9	10	20	20	B	19	19	19	19	19	19	19	E S	E S	E S	B	B	20	11	14	20	20	19		
19	B	22	20	18	19	20	20	B	19	19	19	19	58	54	50	31	20	17	19	18	19	11	8	7		
20	7	9	20	20	B	20	B	B	B	B	B	B	37	B	35	31	31	19	10	19	14	16	15	9		
21	8	9	9	10	11	14	16	24	14	16	B	B	E S	56	B	E S	30	30	E S	50	19	19	15	14	13	9
22	19	B	9	10	20	B	B	B	B	B	E S	E S	58	60	B	E S	E S	B	30	19	15	14	8	15	7	
23	10	B	B	B	B	19	B	B	B	24	31	20	23	20	51	31	30	B	B	B	15	E S	E S	E S	8	
24	11	9	8	7	15	B	24	15	17	19	16	18	19	16	15	30	25	30	16	18	15	9	9	8		
25	9	10	13	9	14	19	15	E S	52	B	31	51	20	20	21	19	20	20	19	19	20	31	30	18	8	
26	8	8	9	20	19	15	19	17	19	19	31	E S	60	58	24	20	19	18	19	23	24	16	E S	8	7	
27	7	10	8	9	9	8	13	30	31	E S	E S	52	31	53	24	25	19	19	19	55	35	14	13	14	7	7
28	7	18	18	19	16	15	B	30	19	20	19	19	19	50	55	30	19	B	25	15	19	11	7	9		
29																										
30																										
31																										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	28	28	28	28	28	28	27	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	
MED	14	18	19	18	20	20	22	B	B	U	U	U	U	30	58	53	33	31	30	20	20	18	18	14	10	
U Q	19	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	38	30	20	19	18	19
L Q	8	10	9	10	18	18	18	30	19	19	26	20	20	22	26	27	20	19	18	18	15	14	10	8		

IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 1993 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	B	A	B	200	B	B	S	Y	B	B	B	B	B	B	B	B	Y	B	S	S	S					
2	A	B	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	205	240	250	280	245	290	S					
3	A	S	B	B	B	B	S	S	B	205	230	225	220	B	240	205	205	200	H	235	205	250	240	B	A				
4	B	A	A	B	A	A	S	B	B	A	B	S	S	S	210	B	B	B	E	B	E	S	E	A	A				
5	S	A	B	S	S	A	A	A	A	A	B	215	B	B	B	210	E	B	E	B	E	S	E	B	E	A			
6	A	B	B	S	S	A		B	B	B	S	S	E	S	205	235	205	205	205	210	230	235	250	235	235	280			
7	S	S	B	S	A	S	S	B	S	B	S	S	235	205	215	B	230	220	250	A	250	270	240	B					
8	B	A	A	S	250	A	B	B	B	B	B	B	B	B	B	B	225	240	S	B	B	A	B	A	A				
9	B	B	A	B	B	B	B	A	B	B	B	B	Y	B	B	B	B	250	265	290	S	S	S	A	A				
10	A	A	A	B	B	A	S	B	B	B	B	B	B	B	B	B	B	E	B	E	S	S	B	A	B				
11	B	A	B		B	B	B	B	B	B	B	B	B	B	B	B	B	230	270	250	265	250	265	A	A				
12	A	B	B	B	Y	B	B	B	B	B	B	B	E	B	B	B	B	B	B	B	B	250	255	250	250	C			
13	A	A	A	S	B	B	B	B	B	B	B	B	B	B	B	B	215	B	B	285	265	240	265	250	300	E	A		
14	A	S	B	A	B	B	B	B	B	E	S	S	S	E	S	B	230	225	240	S	250	250	250	A	A				
15	A	A	A	A	B	A	B	S	A	210	225	250	230	210	220	220	225	270	E	B	245	235	235	235	245	250			
16	290	A	A		E	B	S	S	230	S	B	E	S	E	S	S	B	E	S	E	A	S	250	235	E	A			
17	A	A	A	A	A	310	250	250	255	245	205	A	A	A	S	B	B	S	S	250	230	A	A	A	A				
18	A	A	A	A	A	B	A	A	A	215	220	220	210	S	S	240	B	B	E	S	250	215	320	A	A	A			
19	B	A	A		A	E	A	E	A	B	Y	H		B	E	B	B	215	215	215	235	245	250	260	255	A			
20	E	A	E	A	A	B	A	B	B	B	B	B	B	B	B	280	225	230	245	245	250	300	250	230	A	A			
21	A	A	E	A	A	A	S	A	A	E	A	S	B	B	S	B	S	225	215	S	A	270	265	A	A	A			
22	A	B		A	A	B	B	B	B	B	B	S	S	B	B	S	B	B	E	B	250	305	A	S	A	A			
23	Y	B	B	B	B	B	B	B	B	S	210	200	200	200	B	215	220	B	B	B	B	E	S	E	S	A			
24	A	A		225	225	A	B	A	A	S	240	220	205	205	200	200	255	210	215	205	245	235	240	250	270	E	A		
25	A	A	A	A	A	A	S	S	B	225	B	S		200	220	225	225	215	240	S	235	200	230	230	225	250	E	S	
26	E	S	E	S	A	A	S	A	A	E	S	S	S	B		205	220	230	215	260	250	235	220	250	230	230	E	S	
27	E	S	A	A	A	A		E	B	285	250	250	215	245		225	220	200	200	285	255	240	240	235	235	240	260	E	A
28	285	S	A	A	E	A	B	A	Y	Y	S		235	210	B	B	235	S	B	E	A	295	250	245	255	250	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	5	2	5	5	4	7	5	4	5	10	12	12	15	10	11	17	17	18	23	23	22	19	15	9					
MED	E	E	U			U		U																					
U Q	310		298	300	282	310	275	292	268	240	238	230	240	240	225	232	232	250	265	255	E	255	260	E	E	A			
L Q	285		232	228	250	205	220	250	222	210	215	210	205	205	205	208	215	215	240	235	235	235	235	250					

FEB. 1993 h'F (KM)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN





IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 1993 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	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	S	S	S	S	S	S	S	S	S	R			B			F		F	J	S		B	S	S	S	A			
2	A	B	J	S	A	S	B	S	Y	S	B	B	B	B	B	F		F	B	J	S	S	S	S	A	B			
3	S	S	S	A	S		B	B	Y	B	B	B	B	B	B			R	U	S	U	S	S	S	A	A			
4	B	S	B	S	S	B	B	B	Y	B	B	B	B	U	S	S	B	U	S	D	S	B	B	B	B	B			
5	S	S	S	S	B	B	B	B	B			R							R	J	S	J	S	U	S	F	S	S	
6	Y	S	D	S	S	S	S	S	S	F	F	F	F	R		R		R				J	S	S	A	S			
7	S	S	S	D	S	S	S	B	B	B	B	B	B	B	B	B				J	S	U	S	S	S	A			
8	B	S	B	A	S	S	B	B	B	B	B	B	B	B	S	J	S	B				B	B	S	Y	A	S		
9	S	S	A	S	S	S	S	C	S	B	B	B	B	B	B	B		R	B	B	R	R	S	Y	Y	Y			
10	S	S	B	S	J	S	S	S	B	B	B	B	B	B	B			B	J	F	J	S		S	J	S	F	A	
11	S	S	S	S	S	S	S	S	S	S	B	B	R					F	J	S	F	B	B	F	S	S	S		
12	A	B	S	Y	B	B	B	B	B	B	R	B	B	B	B			B	F	R	U	S	S	Y	S	A	S		
13	A	B	Y	Y	B	B	B	B	B	B	B	B	B	B	R								S	S	B	S	B		
14	S	S	B	B	B	S	B	B		R	R	B	B	B									S	S	S	S	S		
15	B	S	B	B	S	S	B	B	B	C	B	B	B	B	B								S	S	S	S	S		
16	S	S	B	B	B	Y	Y	Y	B	U	S	B	B	B	B	B	U	S	B	S			Y	S	S	S	S		
17	S	D	S	S	B	B	S	B	B	S	R	R	B	B	B	B	B	B	B	B	B	B	S	U	S	A	B		
18	B	A	B	B	B	B		Y	B	B	B	B	B	B	B	B			R		F	F	F	S	S	S	S		
19	S	A	A	A	S	S	U	S	D	S	R		R	U	R				F			J	S	B	S	B	S		
20	S	D	S	A	S	B	S	B	B	B	B	B	B	B	U	R			F			U	S	S	S	U	S		
21	A	A	A	B	A	B	S	B	S	B	B	B	R	F				J	R	B	U	R	B	Y	A	U	S	A	
22	A	S	A	B	F	B	B	B	S	B	B	B	B	B	B				S	F	F	B	Y	Y	S	Y	Y		
23	S	A	S	B	S	B	B	S	D	S	F	F							S	F	F	B	B	B	S	B	B		
24	S	B	A	F	S	Y	B	B	S	B	B	B	B	B	B				J	S	D	S	B	U	S	Y	Y	B	S
25	S	B	B	B	S	B	S	Y	B	B	B	B	B	J	S	B	J	S	B	B	B		S	S	S	S	S		
26	S	A	A	A	S	S	R	U	S	B	U	S	56	61	61	66	74	78	67	69	60	54	38	40	25	U	S	S	
27	S	S	S		B	S	S	B	B	B	B	B	B	S				S	J	S			S	S	S	S	S		
28	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	U	S	J	S	S	A	A	A		
29	A	S	B	S	S	Y	B	B	B	B	B	A	B	B	B	B	B	U	S	S	D	S	C	B	B	B	B		
30	B	B	S	S	S	S	S	B	B	B	B	B	B						F	F	B	S	Y	D	S	A	A		
31	A	S	S	A	S	B	B	B	B	S	S	U	S	44					J	S		J	S	J	S	S	S		
00																													
CNT		2	2	3	4	5	5	4	5	10	9	7	10	14	19	18	24	24	23	20	10	8	6	1					
MED	D	28	42	U	58	40	41	43	44	57	60	62	66	68	64	63	70	60	58	53	47	38	34	28	33	S	U	S	
U Q				71	S	S	U	S	46	58	60	64	67	74	68	70	75	68	70	63	54	44	40	34	S	S	S		
L Q			D	S	S	S	S	D	S	U	S								S			F	S	S	S	S	S	S	
			37	35	32	38	42	44	42	57	49	61	60	57	60	56	50	45	43	37	28	24							

IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 1993 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

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

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	29	34	42	35	36	22	22	27	22	25	30		31	32	31	30	26	26	22		34	41	42	68	
2	42		23	70	37		43	26	37						55	32	31		30	12	40	41	94		
3	43	42	33	70	36	26			39							25	28	30	27	26	39	42	104	72	
4		37		39	25				38					34	32		16	30							
5	36	38	29	37						55	31	59	55		36	40	26	30	27	20	19	17	33	33	
6	22	40	45	44	42	34	42	33	26	27	27	31	60	56	59	31	30	23	26	23	21	38	59	41	
7	42	37	40	33	31	23											31	43	30	24		40	40	70	
8		70		40	43	37								35	60		30	30				41	41	59	41
9	47	46	68	40	46	40	46		32							57			24	24	27	41	42	42	
10	33	40		39	24	40	42									30		22	30	22	20	13	17	27	
11	24	35	42	42	33	33	38	38	27	28			36	31		56	39	27			28	43	41	33	
12	77		34	16							32				50		29	29	31	33	42	45	41	33	
13	70		34	16										37	52		29	27	30	33	43		43		
14	41	33			28				50	55	54			32	27		30	30		21	39	38	33	33	
15		32			43	21					C					55				38	47	41	39	39	
16	38	30			37	27	33		30							30		30	26	18	34	40	33	42	
17	41	39	41		37				41	33	30									24	26	33	38		
18		70					36	27									35	30	25	30	24	19	27	22	
19	26	31	35	43	40	28	16	20	21	30	17	35	37	26	29	31	31	30	24	27		21		27	
20	38	33	52	26		33								57	31	31	56	55	31	36	37	46	47	39	
21	46	43	42		42		37		38			55	36	30	30	36		56		27	18	40	71	46	
22	38	39	49		26				41							55	30	30	31		40	17	33	39	
23	40	66	65		40			35	41	28	30	24	25	26	28	29	30	24	30	21			17		
24	37		66	23	37	33			68								36	24		21	35	38		47	
25	39				34		37	40					30		30				38	16	34	42	34	40	
26	42	70	71	50	38	37	26	26		31	26	30	30	30	36	55	34	31	31	24	19	19	15	30	
27	42	42	39	59		33	31						55	31	56	55	30	50	23	11	38	39	33	37	
28	37	38	41	33															39	24	37	78	67	52	
29	70	54		45	41	32					42						31	40	31						
30			31	47	33	47	33							51	50	30	24	33	30		65	43	43	73	
31	70	39	43	75	41				41	39	31				31	31	30	24	22	23	27	18	40	42	
	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	22	22	21	19	14	10	14	11	11	7	10	14	19	18	24	25	23	24	26	27	27	25	
MED	40	39	42	40	37	33	36	30	38	30	30	31	36	32	32	32	30	30	30	24	34	40	40	40	
U Q	43	44	49	47	42	37	42	35	41	41	39	55	37	52	55	31	32	31	27	40	42	47	46		
L Q	37	34	34	33	33	28	27	26	27	28	27	30	30	30	30	30	28	27	24	20	26	21	33	33	

## IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 1993 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		9	13	10	15	13	9	18	15	15	18	30	B	31	32	31	E S	30	18	18	19	B	15	15	13	10			
2		18	B	15	30	19	B	19	24	25	B	B	B	B	B	E S	32	31	B	30	10	15	14	15	B				
3		23	9	6	9	24	15	B	B	24	B	B	B	B	B	B	23	21	30	18	18	14	14	10	9				
4		B	25	B	9	22	B	B	B	30	B	B	B	B	34	32	B	14	30	B	B	B	B	B	B				
5		14	18	19	21	B	B	B	B	E S	55	31	59	55	B	36	40	26	30	27	20	19	17	10	11				
6		9	17	19	18	18	20	20	19	19	20	19	31	60	56	59	31	30	20	18	23	21	10	18	23				
7		15	21	21	26	8	23	B	B	B	B	B	B	B	B	B	C	31	31	30	24	C	14	15	14				
8		B	15	B	30	22	25	B	B	B	B	B	B	B	35	60	B	30	30	B	B	20	19	19	24				
9		15	19	14	14	20	19	18	C	20	B	B	B	B	B	B	57	B	B	20	24	18	19	16	19				
10		18	30	B	24	8	24	25	B	B	B	B	B	B	B	B	B	19	30	19	20	19	11	10	8				
11		8	10	16	22	18	15	14	18	18	16	B	B	E S	36	31	56	39	15	B	B	7	14	24	8				
12		20	B	7	8	B	B	B	B	B	B	24	B	B	B	50	B	29	29	31	18	10	14	30	7				
13		20	B	8	8	B	B	B	B	B	B	B	B	B	37	52	B	29	24	30	18	13	B	9	B				
14		18	18	B	B	B	19	B	B	E S	50	55	54	B	B	B	32	23	B	30	30	15	14	9	19	18			
15		B	10	B	B	30	16	B	B	B	B	C	B	B	B	B	E S	55	B	B	B	14	16	14	19	19			
16		24	9	B	B	B	22	21	19	B	30	B	B	B	B	B	B	B	30	B	30	19	10	9	19	20	20		
17		9	8	15	B	B	23	B	B	30	24	30	B	B	B	B	B	B	B	B	B	24	15	14	15	B			
18		B	19	B	B	B	B	19	23	B	B	B	B	B	B	B	B	35	30	25	30	24	19	9	9	B			
19		14	10	24	31	18	19	18	20	19	30	14	35	E S	37	23	E S	E S	E S	E S	E S	31	31	24	19	B	11	B	10
20		18	10	16	21	B	23	B	B	B	B	B	B	B	E S	57	31	31	E S	56	55	31	10	10	10	17	19	B	
21		21	13	7	B	23	B	18	25	B	B	B	55	36	30	30	36	B	56	B	19	18	9	13	14	B			
22		16	E S	39	9	B	19	B	B	B	24	B	B	B	B	B	55	30	30	31	B	12	10	13	13	B			
23		30	13	50	B	30	B	B	23	E S	18	E S	28	30	20	19	18	19	29	30	24	30	21	B	10	B	10	B	
24		24	B	13	13	16	18	B	B	30	B	B	B	B	B	B	B	E S	E S	E S	B	10	8	19	B	15			
25		19	B	B	B	30	B	23	23	B	B	B	B	B	B	B	B	B	B	B	38	16	16	10	14	14	B		
26		14	24	24	19	30	23	19	19	B	31	24	30	30	30	36	E S	55	34	31	31	24	19	19	E S	15	11	B	
27		23	30	24	21	B	24	29	B	B	B	B	B	B	55	31	56	55	30	E S	50	23	8	8	22	21	24	B	
28		24	24	24	20	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	39	24	20	25	19	16	B	B	
29		24	14	B	21	22	16	B	B	B	B	31	B	B	B	B	B	31	40	31	C	B	B	B	B	B	B	B	
30		B	B	20	19	14	14	19	B	B	B	B	B	B	51	50	30	24	25	30	B	14	14	16	19	B	B	B	
31		22	31	21	24	22	B	B	B	B	23	39	E S	31	B	B	B	31	31	30	24	20	23	11	9	9	14	B	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
CNT		31	31	31	31	31	31	31	30	31	31	30	31	31	31	31	30	31	31	31	30	30	31	31	31	31			
MED		20	18	21	22	23	23	B	B	B	B	B	B	B	B	55	55	30	30	30	20	16	14	16	16	B			
U Q		B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	56	55	B	B	24	20	19	20	24	B		
L Q		15	13	14	18	18	19	19	23	24	30	31	B	55	32	31	31	29	25	23	16	12	11	13	11	B			

MAR. 1993 fmin (0.1MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 1993 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	S	S	E S	S	Y	270	235	E S	E S	E B	B E B	B E B	B E B	B E B	B E B	B E B	B E S	E S	E S	B	A	A	240	A	
2	A	B	A	A	B	A	Y	S	B	B	B	B	B	B	B	S	230	250	B	B	S E A	S	A	A	B
3	A	S	A	A	A	B	B	S	B	B	B	B	B	B	B	B	235	S E B	280	250	280	A	A	A	A
4	B	A	B	A	S	B	B	S	B	B	B	B E B	B E B	B E B	B E B	B	250	260	B	B	B	B	B	B	B
5	A	A	S	A	B	B	B	B	B	B	205	B	B	B E B	B E B	B E B	240	250	250	250	240	250	250	250	250
6	S	A	250	A	A	S	A	A E S	E S	S	275	275	230	225	B	B	B	240	240	250	240	250	245	A	A
7	A	A	A	S	A	B	B	B	B	B	B	B	B	B	B	B	C	255	255	B E B	B	C	A	A	A
8	B	S	B	A	A	A	B	B	B	B	B	B	B	B E B	B	B	B E B	260	275	B	B	210	A	A	A
9	A	S	A	A	A	A	C E S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	A	A	A	A
10	A	S	B	A	A	A	A	B	B	B	B	B	B	B	B	B	245	B E S	E B	280	B	A	A	A	A
11	240	A	S	A	A	A	A	S	B	B E B	B E B	B E B	B E B	B E B	B	B	300	B	B	B	B	S	S	A	A
12	A	B	A	S	B	B	B	B	B	B	S	B	B	B	B	B	B E B	260	260	280	S	A	210	A	A
13	A	B	A	Y	B	B	B	B	B	B	B	B	B	B E B	B	B	B E B	260	260	275	A	A	B	A	B
14	A	A	B	B	B	A	B	B	B	S	B	B	B	B	B	B	240	230	B	B	B	280	A	A	A
15	B	205	B	B	A	B	B	B	B	C	B	B	B	B	B	S	B	B	B	B	A	A	A	A	A
16	A	A	B	B	B	S	S	S	B E B	B	B	B	B	B	B	B	250	B	280	260	260	S	A	A	A
17	A	230	A	B	B	S	B	B	A	A	250	B	B	B	B	B	B	B	B	B	245	290	240	A	B
18	B	A	B	B	B	B	A	S	B	B	B	B	B	B	B	B	280	235	E B E B	E B E B	255	270	290	340	A
19	A	A	A	A	A	A	A	290	270	260	275	S E B	S E B	E B	E B	E B	225	240	240	290	E S	B	S	B	A
20	A E A	280	A	S	B	S	B	B	B	B	B	B	B	S E B	S E B	S E B	250	230	300	280	210	250	A	A	245
21	A	A	A	B	A	B	A	B	A	B	B	B E B	B E B	280	240	250	265	B E B	B	Y	B	A	280	A	A
22	A E B	300	A	B	A	B	B	B	A	B	B	B	B	B	B	B	240	260	235	B	A	Y	S	A	A
23	S	A	S	B	A	B	B	A	E S	270	250	250	230	215	270	220	230	225	250	210	220	B	B	200	B
24	S	B	A	S	A	S	B	B	S	B	B	B	B	B	B	B	B	S	S	B	A	Y	S	B	205
25	A	B	B	B	S	B	A	S	B	B	B	B E B	B E B	240	240	B	B	B E B	B	B	A	210	225	A	A
26	250	A	A	A	S	A	A	S	B E B	E S	285	250	240	230	215	260	255	235	220	230	210	E B E B	E B E B	270	A
27	S	S	S	A	B E S	S	B	B	B	B	B	B	B	S	E B	E B	E S	E S	215	240	S	A	S	S	S
28	A	A	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B E B	B E B	285	200	A	A	A
29	A	240	B	A	A	S	B	B	B	B	A	B	B	B	B	B	B E B	E B E B	285	290	270	C	B	B	B
30	B	B	260	A	S	A	A	B	B	B	B	B	B	S	S	260	270	A E B	B	B	A	S	210	A	A
31	A	A	A	A	A	B	B	B	B	S	B E S	B	B	245	B	B	250	260	255	225	230	E B E 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	2	6	3	3	1	2	1	2	6	7	7	4	7	11	13	15	21	22	23	15	10	9	9	3	
MED	245	235	250	260	235	288	270	262	265	270	250	232	240	230	232	240	245	260	242	248	228	245	230	245	
U Q	E	280	260	260					275	280	250	242	260	255	250	265	260	280	270	265	280	270	290	250	
L Q		230	250	250					E S	250	250	230	228	215	220	225	230	240	250	235	245	240	225	218	205

# IONOSPHERIC DATA STATION SHOWA-ST.

APR. 1993 f<sub>x</sub>I (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	S	B	S	B	B	B	Y	B	B	B	O	X	O	X	B	O	X	O	X	B	B	O	X	B	B	S	
2	A	B	S	S	B	S	O	X	O	X	B	S	B	O	X	X	B	O	X	O	X	S	O	X	B	B	B	
3	S		S	S	S	S	Y	Y	O	X	X	X	X	X	X	X	X	X	X	X	O	X	O	X	O	X	O	X
4	S	S	S	S	S	S	S	O	X	X	O	X	O	X	X	S	O	X	O	X	X	X	S	S	S	S	S	
5	S	Y	A	B	A	B	B	S	B	B	B	B	S	B	B	B	B	B	Y	B	S	S	S	S	S	S	S	
6	S	A	O	X	A	S	O	X	S	A	O	X	X	X	S	X	X	C	X	X	S	Y	Y	A	A	A		
7	X	Y	B	B	A	S	Y	B	A	B	B	B	O	X	O	X	O	X	X	X	O	X	S	S	S	A	A	
8	S	A	A	A	S	S	O	X	S	O	X	S	B	B	B	O	X	B	X	X	X	Y	A	A	B	A	A	
9	S	A	A	B	B	S	B	B	B	S	X	B	B	X	X	O	X	X	X	O	X	S	A	A	S	S	S	
10	S	S	B	B	S	B	B	B	B	B	B	B	B	B	B	B	O	X	B	B	S	B	S	A	A	A		
11	S	B	B	S	A	A	S	B	B	B	O	X	S	X	X	X	X	B	O	X	X	O	X	S	S	S	S	
12	B	A	A	A	B	B	B	B	A	B	B	B	B	B	B	X	X	X	X	X	O	X	O	X	O	X	B	S
13	O	X	O	X	S	O	X	S	X	S	S	B	B	B	B	B	B	B	B	B	Y	S	S	A	A	S	S	
14	S	A	B	B	A	B	S	B	B	B	B	B	B	B	B	B	O	X	O	X	B	Y	S	S	S	S		
15	A	S	B	S	C	S	B	B	B	B	B	B	B	B	B	O	X	B	B	B	O	X	B	B	B	B	S	
16	B	S	S	S	A	A	B	A	B	B	B	B	B	B	B	B	O	X	O	X	O	X	B	S	B	B	A	
17	S	B	B	B	B	B	B	B	O	X	B	B	B	B	B	B	B	B	B	O	X	X	A	A	A	S	S	
18	S	S	S	A	S	S	B	S	B	B	B	B	B	B	B	B	B	B	X	X	44	44	32	B	S	A	S	
19	S	S	B	S	B	S	B	S	X	O	X	C	X	X	O	X	O	X	X	X	X	B	S	S	B	B	B	
20	S	O	X	A	O	X	S	A	B	B	B	B	O	X	O	X	B	C	B	B	O	X	B	B	S	S	S	S
21	S	A	A	B	B	B	S	B	B	B	B	B	B	B	B	B	B	B	B	O	X	B	B	S	B	S	S	
22	A	B	B	S	B	S	S	B	B	B	B	B	B	B	B	B	B	X	X	O	X	O	X	B	A	A	A	
23	A	S	A	S	S	S	S	S	S	X	O	X	X	V	X	X	B	X	X	O	X	O	X	S	A	S	Y	
24	Y	S	B	B	S	B	A	O	X	O	X	O	O	X	X	O	X	V	O	X	O	X	S	B	S	S	S	
25	40	S	S	54	Y	Y	A	58	S	B	B	B	B	O	X	O	X	O	X	O	X	S	B	B	S	S	S	
26	S	S	Y	Y	O	X	O	X	X	X	S	O	X	X	X	C	O	X	X	X	O	X	B	S	B	B	B	
27	B	X	O	X	S	S	S	O	X	S	S	O	X	X	X	O	X	O	X	O	X	O	X	B	B	S	S	
28	S	O	X	O	S	O	X	X	S	S	S	S	X	X	O	X	O	X	O	X	O	X	B	B	Y	S	S	
29	Y	53	S	S	64	59	70	70	S	X	X	X	X	O	X	X	X	O	X	O	X	O	X	Y	S	O	X	
30	40	B	A	A	A	S	S	O	X	B	89	90	90	88	90	84	77	70	48	B	A	S	S	S	S	S	S	
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	4	6	4	2	4	4	7	9	9	10	14	13	15	17	18	21	23	23	24	16	9	3	1	2				
MED	46	46	43	48	49	36	44	51	44	52	64	74	75	81	84	84	73	69	52	45	38	31	27	42				
U Q	55	50	46		64	48	70	60	52	60	74	88	91	92	91	95	81	72	62	50	48	34						
L Q	40	35	36		34	32	34	36	41	46	50	58	68	71	75	71	66	57	47	38	30	25						

# IONOSPHERIC DATA STATION SHOWA-ST.

APR. 1993 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	S	B	S	B	B	B	Y	B	B	BU	S	S	B	S	S	77	69	S	B	B		B	B	S							
2	A	B	S	S	B	S	S	39	45	B	S	F	BU	R	F	71	71	F	64	62	D	S	U	S	B	B	B					
3	D	S	F	S	S	S	S	Y	Y		45	60	68	69	J	S	J	S	J	S	F	F	U	S	F	F	U	S				
4	D	S	S	S	S	S	S	S	J	S	F	S	S	R	J	R	D	S	U	S	J	S	S	S	S	S	S					
5	S	Y	A	B	A	B	B	S	S	B	B	S	B	B	B	B	B	B	Y	B	S	S	S	S	S	S	S					
6	D	S	A	U	S	A	S	U	S	S	A	S	J	S	J	S	S	J	S	C	J	F	S	Y	Y	A						
7	J	S	Y	B	B	A	S	Y	B	A	B	B	59	68	80	87	74	66	62	67	46	S	S	S	S	A						
8	S	A	A	A	S	S	S	28	38	S	B	B	B	B	65		69	69	56	Y	A	A	B	A								
9	D	S	A	A	B	B	S	B	B	S	J	S	B	B	66	72	66	69	61	54	41	U	S	S	A	A	S					
10	D	S	S	B	B	S	B	B	B	B	B	B	B	B	B	B	BU	S	B	B	S	B	S	A	A							
11	S	B	B	S	A	A	S	B	B	B	BU	S	D	S	J	R			B			47	42	32	25	F	S	S				
12	B	A	A	A	B	B	B	B	A	B	B	B	B	B	61	61	58	52	39	28	U	S	U	S	B	S						
13	U	S	44	38	50	58		S	J	R	S	S	B	B	B	B	B	B	94	60	Y	S	S	A	A	S						
14	S	A	B	B	A	B	S	B	B	B	B	B	B	B	B	B	B	R	J	S	U	S	B	Y	S	S	S					
15	A	S	B	S	C	S	B	B	B	B	B	B	B	B	BU	S	B	B	B	BU	S	B	B	B	B	S	S					
16	B	S	S	S	A	A	B	A	B	B	B	B	B	B	B	B	U	S	S	S	B	S	B	B	A							
17	S	B	B	B	B	B	B	B	R	B	B	B	B	B	B	B	B	B	B	BU	S	J	S	F	A	A	S					
18	S	S	S	A	S	S	B	S	B	B	B	B	B	B	B	B	B	B	J	S	J	S	F	B	S	A	S					
19	S	S	B	S	B	S	B	S	J	S	U	S	D	C			U	R	R				S	S	B	B						
20	S	42	A	S	S	A	B	B	B	B	BU	R	U	S	B	F	C	B	B	60	B	B	S	S	S	S						
21	S	A	A	B	B	B	S	B	B	B	B	B	B	B	B	B	B	B	BU	S	B	B	S	B	S	S						
22	A	B	B	S	B	S	S	B	B	B	B	B	B	B	B	B	59	64	51	43	33	U	S	B	A	A	A					
23	A	S	A	S	S	S	S	S	S		40	48	58	63	64		63	60	49	40	31	D	S	AD	S	Y						
24	Y	S	B	B	S	B	A	U	S	U	R	R	U	S		V	U	R	R	U	S	S	S	B	S	S						
25	F	S	S	S	Y	Y	A	A	S	B	B	B	B	F	63	75	75	93	66	60	54	37	28	B	BD	S	28					
26	D	S	S	Y	Y	U	S		J	S	S		43	56	68	C		F	F	F	S	B	S	B	B	B						
27	B	29	24	S	S	S	S	38	32	46	50	72	80	90	98	96	93	86	64	46	33	18	B	B	S							
28	D	S	S	S	S	U	R	R	J	F	F	F	F	F	R	J	S	R	R	J	F	F	S	B	B	Y	S					
29	Y	47	S	D	S	F	J	F	J	F	J	F	D	S	50	68	85	85	90	108	105	80	60	57	J	R	U	S	Y	D	S	S
30	F	34	B	A	A	A	S	S	F	U	S	B	F	Z	Z	F				F			B	A	S	S	S					
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	6	4	3	4	4	7	8	11	10	15	14	15	17	19	21	23	23	24	17	11	3	3	3								
MED	U	55	40	37	42	42	30	38	41	40	47	56	66	69	75	76	78	66	60	46	37	28	25	53	28							
UQ	D	58	44	40	50	56	42	64	52	47	50	68	80	85	86	84	89	75	64	56	46	39	26	58	47							
LQ	F	34	29	30	37	28	26	28	30	37	43	43	47	62	65	69	64	60	51	41	32	21	19	19	26							



IONOSPHERIC DATA STATION SHOWA-ST.

APR. 1993 fmin (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S ION. 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	31	B	30	B	B	B	24	B	B	B	31	56	B	59	55	E S E S	B	B	15	B	B	10		
2	24	B	25	30	B	23	18	14	B E S	38	13	B E S E S E S E S E S E S	55	55	28	51	50	50	40	30	E S	B	B	B	
3	8	7	19	18	19	22	19	24	19	24	30	30	23	24	30	23	24	28	15	14	9	9	E S E S	8	8
4	8	14	14	14	16	14	19	15	E S E S	30	30	30	31	31	31	26	30	20	15	24	7	7	9	14	
5	19	16	30	B	16	B	B	19	B	B	B	54	B	B	B	B	B	19	B	13	9	9	19	11	
6	9	9	7	9	7	14	15	16	24	24	31	23	E S	24	39	24	21	24	C	9	9	9	7	7	19
7	8	16	B	B	29	19	16	B	25	B	B E S E S E S E S	36	54	55	56	31	30	E S	31	18	23	8	9	16	17
8	14	24	16	18	14	9	10	19	23	30	B	B	B	B	B	55	B E S	50	19	19	19	20	10	B	25
9	15	10	24	B	B	20	B	B	B	30	24	B	B E S E S	56	56	55	31	21	13	13	14	9	11	9	
10	14	15	B	B	30	B	B	B	B	B	B	B	B	B	B	B	31	B	B	19	B	8	17	20	
11	23	B	B	30	24	24	24	B	B	B	31	28	30	29	25	23	35	B	18	17	15	14	10	9	
12	B	9	8	16	B	B	B	B	30	B	B	B	B	B	B	56	24	24	24	19	18	21	15	B	8
13	11	8	8	8	10	13	19	16	19	B	B	B	B	B	B	B	55	B	19	10	9	9	14	10	16
14	19	19	B	B	14	B	24	B	B	B	B	B	B	B	B	B	B	30	24	23	B	9	8	10	10
15	10	30	B	C	19	21	B	B	B	B	B	B	B	B E S	55	B	B	B	B	20	B	B	B	13	
16	B	30	19	18	16	25	B	30	B	B	B	B	B	B	B	30	30	30	23	B	9	B	B	10	
17	28	B	B	B	B	B	B	B	18	B	B	B	B	B	B	B	B	B	30	16	9	11	10	13	
18	10	19	19	14	10	11	B	24	B	B	B	B	B	B	B	B	B	21	11	10	B	16	9	10	
19	10	19	B	19	B	21	B	16	14	25	22	19	19	19	30	24	24	E S	30	15	10	10	B	B	
20	10	19	10	10	14	14	B	B	B	B	31	31	B	36	C	B	B	31	B	B	10	9	19	21	
21	10	7	30	B	B	B	24	B	B	B	B	B	B	B	B	B	B	B	30	B	B	10	B	24	
22	10	B	B	31	B	19	19	B	B	B	B	B	B	B	B	B	36	30	24	24	15	B	14	16	19
23	9	30	30	10	19	20	26	19	19	19	23	30	23	24	B	30	25	24	20	14	10	8	9	22	
24	13	14	B	B	20	B	19	18	19	30	24	30	E S E S	35	50	30	E S	24	23	16	10	15	10	B	15
25	8	14	23	21	16	25	16	19	18	B	B	B	30	E S	36	E S	56	30	15	20	19	B	B	B	13
26	13	24	30	19	18	19	19	11	10	18	20	24	C	30	30	23	23	16	24	B	23	B	B	B	
27	B	9	9	17	10	15	11	10	14	21	20	E S	36	30	31	30	23	30	16	16	19	7	B	B	10
28	10	10	18	18	16	16	8	18	19	14	24	23	23	23	25	21	18	18	19	19	B	B	7	8	
29	9	9	8	9	10	9	8	8	10	E S	18	17	20	21	24	23	20	11	8	11	10	9	9	14	9
30	10	B	24	11	19	14	15	18	19	B E S	54	51	30	E S E S E S E S E S E S	25	26	26	18	21	18	B	9	8	7	10
31																									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	30	30	30	30	29	30	30	30	30	30	30	30	29	30	29	30	30	29	30	30	30	30	30	30	30
MED	10	18	24	19	19	20	22	22	26	B	B	52	56	54	U	U	33	30	22	19	19	11	10	16	13
U Q	19	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	20
L Q	10	10	16	14	14	14	16	16	19	25	24	30	30	30	30	24	24	20	15	14	9	9	10	10	



IONOSPHERIC DATA STATION SHOWA-ST.

APR. 1993 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	S	B	S	B	B	B	S	B	B	BE	B	B	BE	BE	SE	S	B	BE	B	B	B	B	A		
2		A	B	A	A	B	A	A	A	BE	S		BE	B	B	BE	BE	BE	BE	BE	BE	BE	BE	B	B	B	
3		A	A	A		A	A	A	Y	S		240	240	245	240	235	245	235	215	205	205	200	225	220	250	270	
4		A		A	A	A	S	A	AE	SE	SE	SE	B		E	BE	B		E	B	A	S	AE	S	A		
5		A	A	A	B	A	B	B	A	B	B	B	A	B	B	B	B	B	S	B	S	S	A	A	A		
6		200		A	A			A	B	SE	B	AE	AE	SE	A			CE	A		B	Y	S	A			
7		200	S	B	B	A	A	S	B	A	B	BE	BE	SE	SE	S			E	B	E	B	A	A	A		
8		A	A	A	AE	SE	S		S		S	B	B	B	BE	B	BE	B	270	230	275	Y	A	A	B	A	
9		200	A	A	B	B	B	B	BE	B	B	B	BE	SE	SE	B			235	230	220	250	A	A	A	A	
10		E	A	A	B	B	S	B	B	B	B	B	B	B	B	B	B	250	B	B	S	B	A	A	A		
11		S	B	B	A	A	A	A	B	B	BE	B	B	260	250	250	245	245	250	245		215	215	235	235	280	
12		B	A	A	A	B	B	B	B	A	B	B	B	B	B	B		245	240	235	240	E	B	BE	B	B	A
13		275	200	255		A	A	A	A	A	B	B	B	B	B	B	B	B		275		210	A	A	A	205	
14		A	A	B	B	A	B	A	B	B	B	B	B	B	B	B	BE	B	BE	B	BE	B	S	S	A	S	
15		A	S	B	A	C	S	B	B	B	B	B	B	B	BE	S	B	B	B	B	B	B	B	B	B	215	
16		B	A	A		A	A	B	A	B	B	B	B	B	B	B	BE	BE	BE	B		B	A	B	B	A	
17		A	B	B	B	B	B	B	B		B	B	B	B	B	B	B	B	B	B	B	B	A	A	A	245	
18		A	S	A	A	A	A	B	A	B	B	B	B	B	B	B	B	BE	BE	AE	S	B	A	A	A		
19		A	A	B	A	B	A	B	A	A									E	B		B	A	A	B	B	
20		AE	A	A	A	A	A	B	B	B	BE	BE	B	BE	B	C	B	BE	B	B	B	S	A	A	A		
21		A	A	A	B	B	B	A	B	B	B	B	B	B	B	B	B	B	BE	B	B	B	A	B	S		
22		A	B	B	A	B	A	A	B	B	B	B	B	B	B	B	B	240	235	215	250	255	B	A	A	A	
23		A	A	A	A	S	A	A	A		A												E	A	A	Y	
24		Y	A	B	B	A	B	A	AE	BE	B		E	BE	S		E	B				E	B	S	B	A	
25		A	A	A	S	S	S	A	A	B	B	B											B	B	B	250	
26		245	A	A	A		SE	BE	B	S												BE	B	B	B	B	
27		B	A	S	A	A	A	A	AE	A		E	B									B	B	B	S		
28		E	A	235	240	220	235	S	S	BE	B	280	235	235	230	205	210	210	200	200	205	210	245	B	Y	S	
29		S	A	A	A	S	A	A	AE	BE	B	235	245	215	220	205	215	220	205	200	210	215	240	250	SE	A	
30		200	B	A	A	A	AE	A	E	S	BE	SE	BE	BE	SE	SE	S					B	A	A	A	A	
31																											
CNT		8	5	4	3	3	3	5	2	12	11	15	14	14	16	16	20	23	23	24	17	12	5	4	6		
MED		211	215	248	220	240	202	248	288	230	248	242	240	232	226	231	226	222	220	224	228	242	228	260	220		
UQ		272	248	278	250	250	260	302		285	295	270	255	250	270	250	250	250	250	255	250	250	260	285	275	250	
LQ		200	208	230	200	235	200	222		215	245	240	240	230	218	230	220	210	210	215	212	235	228	250	205		

APR. 1993 h'F (KM)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

MAY 1993 f<sub>XI</sub> (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

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

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1	O X 39	S	S	A	A	B	S	B	B	B	54	70	70	70	77	80	84	64	O X 40	S	S	S	S	A		
2	S	S	Y	S	S	B	B	B	X	45	70	71	76	80	81	88	76	63	75	51	B	B	B	S	A	
3	S	S	S	S	S	S	S	O X 67	58	O X 60	60	74	94	92	94	95	94	98	O X 46	B	O X 46	B	B	A	S	
4	O X 40	S	O X 53	A	S	O X 65	S	O X 63	O X 65	B	X	52	66	90	90	84	80	64	46	S	O X 32	B	S	S	S	
5	S	S	S	A	S	X	A	O X 59	X 73	X 66	70	74	84	108	104	96	O X 95	O X 80	X 76	B	B	B	S	B	O X 33	
6	O X 32	S	O X 34	S	O X 63	S	B	S	O X 48	O X 52	65	62	68	78	84	B	B	60	52	48	O X 38	O X 38	A	S	A	
7	S	S	S	S	S	S	S	Y	B	B	O X 49	53	57	62	73	74	63	B	X 58	Y	A	A	A	A	B	
8	S	S	A	B	B	B	S	S	O X 42	B	B	B	B	B	B	B	B	B	B	Y	S	S	A	A	A	
9	S	B	A	A	B	B	A	B	A	B	B	B	B	B	B	B	B	B	B	S	S	S	A	A	B	
10	A	B	B	B	S	B	A	B	Y	B	B	B	B	B	B	B	B	B	B	Y	Y	S	A	A	A	
11	S	S	S	S	S	B	S	S	X	X	X	X	X	X	X	X	O X 44	O X 33	B	B	B	B	B	B	B	
12	Y	S	O X 33	A	A	A	S	B	B	B	B	B	O X 74	O X 77	O X 70	O X 74	72	59	73	S	S	S	S	S	S	
13	A	S	B	B	B	B	B	B	S	B	B	B	B	O X 66	O X 67	O X 69	O X 64	57	44	O X 37	S	B	B	S	S	
14	S	B	S	B	B	S	S	B	B	B	B	B	B	X 74	B	C	90	B	47	66	B	S	S	S	S	
15	S	A	S	S	X	X	X	O X 52	O X 44	O X 56	65	70	74	73	67	X 55	X 56	X 43	O X 39	B	B	B	B	B	S	
16	S	O X 66	A	S	S	S	A	B	B	B	O X 53	O X 62	O X 73	O X 73	O X 73	O X 69	O X 52	S	S	B	B	B	B	B	O X 33	
17	O X 61	S	B	S	B	B	X	B	B	O X 71	O X 53	O X 60	O X 67	X	X	B	B	O X 47	O X 49	46	B	B	B	B	B	
18	A	B	Y	S	S	O X 50	O X 49	O X 46	O X 41	O X 42	O X 48	O X 60	O X 61	O X 71	O X 82	O X 70	S	39	O X 32	O X 31	O X 29	O X 23	S	S	S	
19	Y	S	B	B	B	S	A	B	S	S	O X 44	B	B	B	B	B	B	B	X 52	B	B	B	B	Y	S	
20	S	B	S	B	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
21	B	B	O X 30	S	B	O X 30	O X 32	S	S	O X 39	O X 52	O X 76	O X 80	O X 67	O X 64	O X 47	O X 37	B	A	S	B	B	S	B	B	
22	B	S	S	S	O X 28	O X 32	O X 29	B	B	O X 36	O X 44	O X 70	O X 76	O X 71	O X 73	O X 52	O X 39	O X 29	B	B	B	B	B	B	B	
23	S	S	S	O X 30	A	B	X	S	S	X	X	X	X	X	X	X	O X 45	O X 38	O X 40	B	B	B	B	B	S	
24	S	S	S	S	O X 33	A	A	S	B	B	O X 41	O X 69	B	B	B	O X 76	O X 49	O X 40	S	B	B	B	B	B	B	
25	Y	Y	Y	X	O X 58	O X 52	O X 62	B	B	O X 47	O X 65	O X 69	O X 74	O X 70	O X 51	O X 33	B	B	B	B	B	O X 25	B	B	Y	
26	Y	S	S	X	S	S	X	B	B	O X 29	O X 43	S	X	X	S	S	B	B	B	B	B	B	B	S	A	
27	A	S	A	S	S	S	A	A	B	B	B	B	57	69	65	60	X 62	X 60	Y	Y	S	S	O X 40	S	S	
28	S	S	S	O X 50	S	S	A	A	A	B	B	B	O X 63	O X 65	O X 66	O X 72	S	O X 53	O X 43	O X 39	B	S	S	S	S	
29	A	S	S	B	B	S	B	B	B	B	O X 44	O X 47	B	B	B	B	B	B	B	B	B	B	B	B	S	O X 33
30	S	S	A	A	S	S	O X 29	O X 32	O X 33	B	X	O X 58	O X 62	O X 62	O X 79	O X 72	S	O X 39	O X 52	B	B	B	B	B	S	B
31	B	B	S	A	X	S	X	B	B	B	55	68	74	84	78	51	X 40	B	X 40	B	B	B	B	B	B	B
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	4	1	4	4	6	7	9	8	10	11	21	21	24	23	22	20	20	19	13	6	3	1	2	3		
MED	O X 40	O X 66	O X 34	O X 46	O X 38	O X 50	O X 43	52	O X 46	O X 44	O X 52	O X 65	O X 70	O X 71	O X 73	O X 68	O X 54	O X 52	O X 46	O X 42	O X 29	O X 23	54	O X 33		
U Q	O X 50	O X 44	O X 54	O X 52	O X 65	O X 57	O X 62	58	O X 58	O X 66	O X 57	O X 70	O X 75	O X 79	O X 82	O X 78	O X 64	O X 60	O X 55	O X 48	O X 38			O X 33		
L Q	O X 36	O X 32	O X 36	O X 32	O X 32	O X 30	O X 39	O X 41	O X 38	O X 44	O X 61	O X 64	O X 67	O X 69	O X 52	O X 42	O X 40	O X 40	O X 40	O X 32	O X 25			O X 33		

IONOSPHERIC DATA STATION SHOWA-ST.

MAY 1993 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

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

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	R 33	S	S	A	A	B	S	B	B	B	F 44	F 57	F 60	F 60	F 68	F 74	F 70	F 54	F 34	S	S	S	S	A	
2	D 22	S	S	Y	S	S	B	B	B	J 39	S 47	F 51	F 66	F 74	F 75	82	70	57	66	45	B	B	B	S	A
3	S 75	S 38	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
4	U 34	S 47	S	A	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
5	S	S	S	A	S	J 59	A	S	J 59	A	F 57	F 59	J 60	J 64	F 62	F 74	F 96	F 94	F 90	89	64	70	B	S	C 27
6	U 26	S 28	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	A
7	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	A
8	S	S	A	B	B	B	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	A
9	S	B	A	A	B	B	A	B	A	B	B	B	B	B	B	B	B	B	B	S	S	S	S	A	A
10	A	B	B	B	S	B	A	B	Y	B	B	B	B	B	B	B	B	B	B	Y	Y	S	A	A	A
11	S	S	S	S	S	B	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	B
12	Y	S	S	A	A	A	S	B	B	B	B	B	B	68	71	64	68	60	53	67	S	S	S	S	S
13	A	S	B	B	B	B	B	B	B	B	B	B	B	60	61	60	58	51	38	31	S	B	B	S	S
14	S	B	S	B	B	S	S	B	B	B	B	B	B	68	B	C	F	79	B	41	60	B	S	S	S
15	S	A	S	S	J 26	S 32	J 35	F 28	J 46	S 38	S 50	F 55	F 60	F 68	F 63	61	49	50	J 37	S 33	B	B	B	F 52	S
16	D 31	R 60	A	S	S	S	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	U 27
17	U 55	S	B	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
18	A	B	Y	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
19	Y	S	B	B	B	S	A	B	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
20	S	B	S	B	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
21	B	B	S	S	B	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	B
22	B	S	S	S	J 22	S 26	23	B	B	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	B
23	S	S	S	S	A	B	J 53	S 50	F	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
24	S	S	S	S	S	A	A	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
25	Y	Y	Y	J 52	F 46	56	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	Y
26	Y	S	S	S	S	S	S	B	B	R 23	S 37	S	S	65	54	S	S	S	S	S	S	S	S	S	A
27	A 26	S	A	S	S	A	A	B	B	B	B	B	B	46	57	59	47	56	54	Y	Y	D 25	S 34	S	
28	S	S	S	S	S	A	A	A	B	B	B	B	B	57	59	60	66	47	37	33	B	B	B	B	S
29	A	S	S	B	B	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	S 27
30	S	S	A	A	S	S	S	F	S	B	J 52	F 56	56	73	62	S	S	S	S	S	S	S	S	S	B
31	B	B	S	A	J 36	S 37	S 34	F	B	B	F 40	J 62	68	78	72	45	B	J 34	S	B	B	B	B	B	B
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	6	3	5	5	7	7	9	9	11	11	21	21	24	23	22	21	20	20	14	6	4	1	2	3	
MED	U 38	U 68	U 28	S 40	S 34	S 44	S 37	S 44	S 40	S 38	S 43	S 57	S 61	S 65	S 66	S 62	S 48	S 46	S 39	S 36	S 24	S 17	S 43	S 27	
U Q	U 34	S 75	S 42	S 48	S 46	S 59	S 51	S 54	S 52	S 54	S 50	S 61	S 69	S 73	S 76	S 72	S 58	S 54	S 46	S 42	S 28			S 27	
L Q	S 26	S 26	S 26	S 28	S 26	S 26	S 24	S 28	S 35	S 32	S 38	S 54	S 58	S 61	S 61	S 45	S 36	S 36	S 33	S 26	S 21			S 27	

IONOSPHERIC DATA STATION SHOWA-ST.

MAY 1993 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	47	46	42	58	88		42				50	34	31	30	36	24	18	30	22	21	23	27	26	46
2	33	30	31	32	16				32	21	30	50	30	23	23	31	30	24	23				26	71
3	43	47	46	41	90	40	47	26	17	17	20	56	26	27	24	24	16	19		35			33	38
4	37	40	58	68	37	34	39	29	26		18	30	30	25	24	19	21	15	19	16		28	21	26
5	33	33	32	42	32	55	58	49	47	29	20	27	50	30	24	24	16	26	30			37		33
6	38	38	36	26	70	51		39	42	31	27	24	33	33	20		18	10	39	40	41	42	70	
7	37	38	37	37	33	38	34	42			24	30	23	20	56	56	51		38	30	46	51	59	
8	47	40	60				38	40	33										39	37	44	50	43	60
9	42		52	71			81		60										32	40	38	46	46	
10	106				60		74		46										28	25	21	33	36	47
11	38	43	38	33	43		39	43	27	26	22	21	22	42	37	32	25	22						
12	12	31	38	37	39	38	48						57	60	51	60	40	30	26	43	37	37	39	71
13	71	37							43				25	30	24	30	21	18	17	19			25	78
14	36		40			38	33						35			50			19	38		20	21	24
15	33	80	44	38	33	20	31	32	19	19	16	24	30	55	30	19	19	18	24	18		115	38	
16	39	37	110	60	60	59	86				30	21	23	23	21	18	18	36	30					37
17	40	45		60			35			37		21	36	30			22	29	28					
18	80		28	37	40	31	22	27	21	18	26	21	24	27	26	26		20	19	16	16	14	20	33
19	39	45				46	58		41	37	28						19						33	41
20	33		32		40	37	37																	
21			27	30		16	20	27	27	19	19	19	29	23	27	20	16		40	27			12	
22		11	31	27	27	17	12			19	19	19	30	24	27	37	41	27						
23	26	27	32	38	32		27	28	34	19	16	19	21	20	19	16	18	16	19					26
24	31	27	27	25	26	38	51	33			24	19			31	20	19	21						
25	12	16	26	17	27	27				19	19	19	19	19	19	19	14				10			12
26	22	27	41	24	12	24	19			14	19	30	30	23	24	23							21	32
27	35	34	37	38	48	33	51	59					32	25	18	24	19	26	32	26	33	30	32	34
28	32	46	46	34	31	33	68	60	60		24	30	30	36	30	24	24	18			41	38	42	42
29	43	41	38			38					20	31											21	33
30	37	41	42	41	33	23	21	38	32		19	19	25	30	31	30	18	18					26	
31			32	65	40	32	26	24			26	23	27	18	26	18		16						
	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	24	27	24	23	22	27	16	17	13	21	22	24	23	23	23	20	21	20	15	11	13	21	21
MED	37	38	38	38	37	36	38	36	33	19	20	24	30	27	26	24	19	21	25	27	37	37	32	38
UQ	42	44	44	50	48	38	51	42	44	30	26	30	32	30	31	31	24	26	31	38	41	44	42	54
LQ	33	30	32	31	31	27	26	28	26	18	19	19	24	23	23	19	18	18	19	19	21	28	21	32

IONOSPHERIC DATA STATION SHOWA-ST.

MAY 1993 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		14	18	19	19	30	B	19	B	B	B	E	S	E	S	E	S	24	14	30	19	16	15	7	9	14					
2		11	18	18	10	14	B	B	B	19	21	30	E	S	30	23	21	23	30	24	23	B	B	B	8	15					
3		10	16	10	11	20	24	19	11	9	14	20	E	S	26	19	24	24	16	19	B	24	B	B	15	9					
4		9	16	10	8	11	19	13	7	10	B	E	S	E	S	E	S	19	21	15	19	16	B	19	10	8					
5		9	9	9	8	10	19	20	10	10	10	16	27	50	30	24	24	16	26	30	B	B	24	B	15						
6		10	15	9	18	9	19	B	23	19	31	23	24	16	16	E	S	B	B	18	10	10	9	9	10	9					
7		8	30	19	34	19	14	18	29	B	B	24	30	23	20	E	S	E	S	E	S	B	9	8	10	17	15				
8		13	17	16	B	B	B	20	14	19	B	B	B	B	B	B	B	B	B	B	19	9	10	7	17	10					
9		30	B	19	20	B	B	30	B	31	B	B	B	B	B	B	B	B	B	B	9	10	9	10	19	B					
10		18	B	B	B	50	B	30	B	23	B	B	B	B	B	B	B	B	B	B	19	14	9	7	19	10					
11		9	22	25	19	23	B	19	14	9	14	14	15	16	19	14	14	25	22	B	B	B	B	B	B	B					
12		7	7	11	16	18	19	30	B	B	B	B	B	E	S	E	S	E	S	E	S	E	S	E	S	19	7	9	8	19	30
13		18	18	B	B	B	B	B	B	19	B	B	B	B	E	S	E	S	E	S	16	18	17	19	B	B	15	19			
14		30	B	20	B	B	18	22	B	B	B	B	B	35	B	C	E	S	50	B	E	S	B	14	13	10					
15		9	19	19	18	14	14	19	14	19	19	15	24	30	55	30	19	19	18	24	18	B	B	B	17	14					
16		14	24	19	36	20	24	24	B	B	B	30	21	23	23	21	18	18	E	S	36	30	B	B	B	B	9				
17		31	19	B	24	B	B	10	B	B	31	B	21	36	30	B	B	E	S	22	29	28	B	B	B	B	B				
18		30	B	24	16	14	10	13	9	10	18	25	18	19	16	19	16	S	20	19	16	16	14	18	10	10					
19		23	9	B	B	B	24	23	B	20	24	19	B	B	B	B	B	B	19	B	B	B	B	B	10	15	B				
20		19	B	24	B	18	19	19	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B				
21		B	B	10	14	B	13	15	19	16	19	19	19	E	S	29	23	19	16	14	B	15	19	B	B	10	B				
22		B	9	9	19	10	7	8	B	B	19	19	19	30	24	19	20	19	19	B	B	B	B	B	B	B	B				
23		10	10	10	8	9	B	18	28	9	19	11	19	21	20	19	16	18	16	19	B	B	B	B	B	9	B				
24		9	9	10	10	10	10	10	20	B	B	24	19	B	B	31	20	19	21	B	B	B	B	B	B	B	B				
25		10	8	8	13	8	18	19	B	B	19	19	19	19	19	19	19	14	B	B	B	B	10	B	B	7					
26		7	8	9	7	9	8	19	B	B	14	19	30	30	23	24	23	B	B	B	B	B	B	B	7	7					
27		14	10	9	10	15	13	10	18	B	B	B	B	14	25	18	24	19	16	14	10	10	10	7	8	10					
28		11	10	10	9	8	10	19	18	24	B	24	30	30	36	30	24	24	18	B	10	18	18	18	18	18					
29		14	18	10	B	B	14	B	B	B	B	18	31	B	B	B	B	B	B	B	B	B	B	B	13	10					
30		10	15	14	19	17	13	18	19	13	B	19	19	25	30	31	30	18	18	B	B	B	B	B	7	B					
31		B	B	10	9	10	10	10	17	B	B	19	23	19	18	16	18	B	16	B	B	B	B	B	B	B	B				
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23						
CNT		31	31	31	31	31	31	31	31	31	30	31	31	31	31	30	31	29	31	31	31	31	31	31	31	31					
MED		13	18	14	18	18	19	19	29	24	B	24	27	30	28	24	24	20	23	23	B	B	B	17	15						
U Q		23	30	20	36	B	B	24	B	B	B	B	B	57	B	56	B	B	B	B	B	B	B	B	B	B					
L Q		9	10	10	10	10	13	15	17	16	19	19	19	23	20	19	19	18	18	19	14	10	14	10	10						

IONOSPHERIC DATA STATION SHOWA-ST.

MAY 1993 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		230	E A 260	A	A	A	B	A	B	B	B	B	E S 265	E S 270	E S 270	E S 275	235	235	235	255	E S 275	A	A	A	A
2		250	S	A	S	S	B	B	B		E 245	E 275	E S 250	E S 255	235	235	235	220	225	250	205	B	B	B	S A
3		235	230	220	250		S	A	A E A 280	255	250	245	280	E S 235	240	235	200	220	270		B	A	B	B	A 235
4		230	210	245	A	260	200	A	230	230		215	235	E S 235	205	205	200	215	200	E B 230	265		B	A	A
5		A	A	200	A	A	A	A	A	280	250	225	250	E B 250	210	220	220	215	230	230		B	B	S	B 240
6		225	A	235	A	200	A	B	A	A	B	265	240	245	245	230		B	235	230	215	240	A	S	A
7		A	210	A	A	S	S	A	S	B	B	E 270	E 240	E B 250	245	280	E S 270		S	B	A	S	A	A	A B
8		A E A 250	A	A	B	B	B	A	A	A	B	B	B	B	B	B	B	B	B	S	A	A	A	A	A
9		S	B	A	A	B	B	A	B	A	B	B	B	B	B	B	B	B	B	230	A	A	A	A	A B
10		A	B	B	B	200	B	S	B	S	B	B	B	B	B	B	B	B	B	S	S	S	A	A	A
11		200	A	A	A	A	B	A		A E A 210	310	245	245	225	205	205	205	215	E B 270	B	B	B	B	B	
12		Y	S	230	A	A	A	A	B	B	B	B	B	E S 280	E S 290	E S 260	S	S	E S 285	S	A	A	A	A S	
13		A	S	B	B	B	B	B	B	A	B	B	B	235	220	220	230	205	205	E B 250	225	B	B	S A	
14		S	B	A	B	B	A	S	B	B	B	B	B	245	B	C E S 270			E S 260	220		B	A	A	
15		230	A	A	245	245	A	S	A E B 300	250	235	250	205	E B 250	205	205	205	230	230	230	230		B	A	
16		225	S	A	A	A	A	A	B	B	B	E B 240	230	220	210	220	195	230	E B 270	235	B	B	B	B 230	
17		200	A	B	A	B	B		B	B	A	B	235	245	225		B	E B 240	E B 270	240		B	B	B	
18		A	B	S	A	A	A E A 300	A E A 270	A E B 265	270	235	205	205	215	210	210	215	S 255	E B 280	230	E B 260	300	S	A	
19		S	A	B	B	B	A	A	B	A	A E A 320	B	B	B	B	B	B	B	250	B	B	B	B	S A	
20		A	B	S	B	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
21		B	E A 325	A 250		B	205	A	A	A E B 300	230	220	205	200	205	200	200	200		B	A	A	B	S B	
22		B	S	A	A	A	A	S	B	B	270	250	210	205	210	200	205	205	250		B	B	B	B	B
23		A	A E A 280	A 250		A	B	A E B 350	A E B 280	230	220	210	200	200	200	200	230	E B 220	245		B	B	B	B A	
24		A	A	A	S	A	A	A	A	B	B	260	225		B	210	200	210	E B 240	B	B	B	B	B	
25		Y	Y	S	255	220		S	S	B	B	230	210	210	200	210	205	200		B	B	B	B	Y	
26		Y	S	A	255		S	A	B	B	E B 290	240	210	225	200	210	200		B	B	B	B	B	S A	
27		A	260	A	200	230		A	A	A	B	B		E S 280	E S 250	240	265	250	260		S	S	E A 240	280 230 230	
28		A	A	A	235		A	A	A	A	A	B	B	250	230	E B 255	250	210	240	255	215	B	S	A A	
29		A	A	A	B	B	A	B	B	B	B	E B 270	250		B	B	B	B	B	B	B	B	B	A 225	
30		A E A 250	A	A	A	A	S	S	S E S 250		B	250	220	210	205	205	200	235	235		B	B	B	S B	
31		B	B	A	A	A	A	A	S	B	B	250	240	215	215	200	200		B	230		B	B	B	B
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT		9	7	7	8	6	2	2	5	7	10	20	22	24	23	23	22	19	21	14	7	4	3	2	5
MED		230	240	228	250	225	202	262	E 270	250	E 272	242	229	222	210	208	202	218	242	231	228	231	E A 280	240	230
U Q		232	260	E A 280	252	245			E 315	280	E B 290	255	250	245	245	235	220	235	265	E 250	E 265	250	E B 300		238
L Q		212	210	220	240	200			220	245	250	232	220	210	205	205	200	210	230	230	220	222	E A 280		228

IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 1993 f<sub>XI</sub> (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	S	A	A	A	O	X	B	A	S	S	X	O	X	X	X	X	X	X	B	B	B	B	S		
2	S	S	A	X	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	B	B	B	X	S		
3	S	X	X	X	S	B	A	A	A	B	B	B								S	S	S	S	S		
4	A	A	S	S	S	S	B	B	B	B	A	B	B	B	B	B	B	B	Y	A	S	S	A	B		
5	A	A	B	B	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	S	S	S	A		
6	S	Y	B	B	B	S	B	B	B	B	B	B	B	B	B	B	B	B	X	B	B	B	Y	B		
7	S	B	B	A	B	B	B	A	A	Y	B	B	B	B	B	B	B	B	B	B	S	B	S	S		
8	Y	A	B	B	A	B	B	B	B	B	O	X	O	X	B	B	B	B	X	B	B	B	S	S		
9	O	X	S	S	Y	B	B	B	B	B	B	B	X	O	X	X	B	B	B	B	S	B	B	B		
10	Y	S	O	X	Y	S	X	X	X	O	X	X	O	X	X		B	B	B	B	B	B	S	S		
11	A	A	A	A	A	S	A	Y	A	O	X	B	O	X	O	X	B	B	B	B	B	S	S	S		
12	S	A	S	A	A	A	S	O	X	O	X	B	B	B	B	B	B	B	B	S	B	A	A	A		
13	A	A	B	S	B	B	S	B	B	O	X	O	X	B	B	X	O	X	B	B	B	B	B	S	S	
14	A	A	A	S	S	S	S	A	B	B	B	O	X	O	X	B	B	B	B	B	B	B	B	S		
15	A	A	B	A	S	A	B	B	S	B	B	B	B													
16	S	S	S	B	A	B	A	A	A	A	O	X	O	X	O	X	X	B	B	B	B	B	A	A		
17	S	A	S	A	X	A	O	X	A	O	X	X	X	O	X	X	S	O	X	A	O	X	Y	S	S	
18	A	A	O	X	A	A	O	X	O	X	X	O	X	X	O	X	O	X	O	X	S	B	B	B	B	
19	Y	S	A	Y	A	A	A	S	B	B	B	B	B	B	B	B	B	X	X	S	B	B	B	O	X	S
20	S	O	X	A	O	X	S	Y	Y	O	X	A	Y	O	X	B	B	B	B	B	A	S	B	B	Y	S
21	Y	S	A	A	Y	Y	Y	Y	A	X	X	O	X	X	X	O	X	S	S	S	B	B	S	S	S	S
22	Y	O	X	X	S	S	A	A	X	O	X	X	X	O	X	X	X	O	X	X	S	S	A	A	A	A
23	S	A	A	A	Y	A	A	A	S	X	X	X	O	X	X	X	X	X	X	X	A	O	X	S	Y	A
24	S	S	S	A	Y	O	X	S	S	B	S	B	B	B	B	B	B	B	B	X	S	B	B	B	S	S
25	S	A	A	S	S	S	B	A	S	B	B	O	X	B	B	B	B	B	B	B	B	B	S	O	X	S
26	O	X	S	B	A	A	B	A	B	B	B	X	X	X	X	X	O	X	B	X	B	O	X	B	B	S
27	A	S	O	X	A	A	S	A	A	O	X	X	X	X	X	X	X	X	B	B	B	B	B	B	B	
28	S	S	S	A	O	X	O	X	X	A	X	O	X	X	O	X	X	X	S	A	A	A	A	A	B	
29	Y	B	S	Y	A	A	A	A	Y	Y	X	X	X	X	X	X	X	X	X	B	B	B	S	O	X	S
30	A	S	A	A	A	S	B	B	B	S	S	B	B	B	B	B	B	O	X	O	X	S	S	S	S	S
31																										
CNT	2	3	5	3	2	5	5	7	8	11	14	18	17	18	19	14	14	8	6		2		3	1		
MED	O	X	O	X	X	X	O	X	X	X	X	O	X	X	X	X	O	X	X	X	O	X	O	X	X	
U Q		75	44	43		48	39	44	40	41	42	51	70	71	68	58	40	60	39					58		
L Q		36	36	31		30	34	33	28	28	34	46	52	58	55	45	32	31	33					34		

IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 1993 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

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

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23						
1	B	S	A	A	A	U	S	B	A	S	D	S	J	S	S	J	S	J	S	J	S	B	B	B	B	S				
2	S	S	A		A	A	J	S	J	S	J	S	F	J	S	J	R	F	J	S	F	U	S	B	B	B	D	S		
3	S		J	S		S	B	A	A	A	B	B	B	F	F	J	F	B	J	F	B	D	S	S	S	S	S			
4	A	A	S	S	S	S	S	B	B	B	B	A	B	B	B	B		B	B	Y	A	S	S	A	B					
5	A	A	B	B	S	S	B	B	B	B	B	B	B	B	B	B	F	B	B	B	B	S	S	S	A					
6	S	Y	B	B	B	S	B	B	B	B	B	B	B	B	B	B	B	B	B		B	B	B	Y	B					
7	S	B	B	A	B	B	B	A	A	Y	B	B	B	B	B	B	B	B	B	B	B	S	B	S	S					
8	Y	A	B	B	A	B	B	B	B	B	U	S	U	S	B	B	B	J	S	B	B	B	B	S	S					
9	U	S	S	S	Y	B	B	B	B	B	B	B										D	S	B	B	B				
10	Y	S	S	Y	S	J	S	J	S		F		45	45	48		B	B	B	B	B	B	B	S	S					
11	A	A	A	A	A	S	A	Y	A	S	B	S		F	J	S	S	B	B	B	B	B	S	S	S					
12	S	A	S	A	A	A	S		27	24	22	F	B	B	B	J	F	F	B	B	B	S	B	A	A	A				
13	A	A	B	S	B	B	S	B	B	U	S	U	S	B	B		B	B	B	B	B	B	B	B	S	S				
14	A	A	A	S	S	S	S	A	B	B	B	B													S					
15	A	A	B	A	S	A	B	B	S	B	B	B	B	F	B	B	B	B	B	B	B	B	B	B	B	S				
16	S	S	S	B	A	B	A	A	A	A	U	S	S												A	A				
17	S	A	S	A	J	S	A		A	J	S	J	S	U	J	S	D	S	A		B	A	Y	A	Y	S	S			
18	A	A	U	S	A	A	S	J	S	J	S	D	S	U	S	J	F	S	J	S	R	S	B	B	B	B				
19	Y	S	A	Y	A	A	A	S	B	B	B	B	B	B	B	B	J	S	B	D	S	B	B	B	U	S	S			
20	S	U	S	A	U	S	S	Y	Y	U	S	A	Y	U	S	B	B	B	J	F	B	B	B	A	S	B	Y	S		
21	Y	S	A	A	Y	Y	Y	Y	A	J	S	F		J	S		S	S	S	B	B	S	S	S	S	S	S			
22	Y	R	J	S	S	S	A	A		36	36	27	28	45	57	53	52	38	J	S	U	S	S	A	A	A	A			
23	S	A	A	A	Y	A	A	A	D	S	J	S	J	S	R				J	S	J	S	J	S	A	U	S	S	Y	A
24	S	S	S	A	Y	U	S	S	S	B	S	B	B	B	B	B	B	B	B	J	F	S	B	B	B	B	S	S		
25	S	A	A	S	S	S	B	A	S	B	B															U	S	S		
26	U	S	S	B	A	A	B	A	A	B	B	B	40	48	52	52	52	33	U	S	B	B	R	B	B	B	S			
27	A	S		A	A	S	A	A		32	24	32	41	53	61	59	47	34	B	B	B	B	B	B	B	B	B			
28	S	S	S	A	R	J	S	F	F	A			J	S	F			U	R	S	A	A	A	A	A	A	B			
29	Y	B	S	Y	A	A	A	A	Y	Y	J	S	J	S	F			J	S	B	B	B	B	U	S	S	S			
30	A	S	A	A	A	S	B	B	B	S	S	B	B	B	B	B	B	S	U	S	D	S	S	S	S	S	S			
31																														
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23						
CNT	2	3	5	3	2	5	5	7	9	12	15	18	17	19	19	14	14	9	9		3		3	2						
MED	U	S	S	S	20	S	J	S	28	30	25	32	40	51	56	52	46	30	U	40	32		3	2	8					
U Q		69	38	37		U	S	J	36	34	31	36	45	58	65	59	52	34	J	54	33		25	52						
L Q		30	30	25		24	28	27	22	22	27	40	46	52	46	39	26	24	24		D	S	U	S						



IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 1993 ftes (0.1MHz) 45'E MEAN TIME (G.M.T. + 3 H)

LAT. 69'00.4'S ION. 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	26	46	41	46	21	B	51	27	E	B	B	19	14	21	40	E	B	19	37	14	11	11	E	B	B	B	B	27
2	29	39	40	46	47	45	37	27	26	16	16	32	33	E	B	23	26	40	32	21	E	B	B	B	B	42	33		
3	39	40	41	38	33	B	51	51	45	B	B	B	E	B	S	E	B	B	E	B	B	B	38	39	42	41	46	46	
4	90	80	58	47	41	38	37	B	B	B	41	B	B	B	B	B	25	B	B	26	48	42	46	59	B				
5	63	78	B	B	37	37	B	B	B	B	B	B	B	B	B	E	B	B	B	B	B	40	40	34	42	B			
6	40	38	B	B	B	46	B	B	B	B	B	B	B	B	B	B	B	B	E	B	B	B	B	B	B	23	B		
7	42	B	B	70	B	B	B	40	40	23	B	B	B	B	B	B	B	B	B	B	B	B	39	B	26	37			
8	45	70	B	B	80	B	B	B	B	B	E	B	E	B	B	B	B	B	E	B	B	B	B	B	B	40	33		
9	38	34	38	27	B	B	B	B	B	B	B	E	B	E	B	E	B	B	B	B	B	E	B	B	B	B	B		
10	20	49	43	29	32	17	13	12	11	11	E	B	E	B	E	B	E	B	B	B	B	B	B	B	B	39	41		
11	60	57	58	51	40	32	70	33	40	38	B	B	E	B	E	B	E	B	E	B	B	B	B	B	16	16	37		
12	33	43	39	43	42	40	31	25	18	17	B	B	B	E	B	E	B	B	B	B	B	B	32	B	36	37	37		
13	44	60	B	39	B	B	37	B	B	B	23	20	B	E	B	E	B	B	B	B	B	B	B	B	B	33	38		
14	47	93	42	36	37	34	27	40	B	B	B	E	B	E	B	B	B	B	B	B	B	B	B	B	B	B	31		
15	40	47	B	43	39	60	B	B	27	B	B	B	B	E	B	E	B	B	E	B	B	14	B	B	B	B	27		
16	27	26	26	B	72	B	95	80	60	31	E	B	E	B	E	B	E	B	E	B	B	B	B	B	B	31	52		
17	26	37	26	32	20	32	87	70	71	16	40	E	B	E	B	E	B	B	B	B	B	B	B	B	B	21	27		
18	48	46	34	41	38	12	26	20	9	32	12	12	16	15	16	27	12	19	B	B	B	B	B	B	B	B			
19	19	39	70	12	90	90	71	39	B	B	B	B	B	B	B	E	B	E	B	E	B	B	B	B	B	38	38		
20	43	39	51	46	34	20	15	23	40	10	E	B	B	B	E	B	B	B	B	B	B	B	B	B	B	11	32		
21	19	38	70	70	12	11	12	12	70	59	E	B	E	B	E	B	E	B	B	B	B	B	B	B	20	12	12	12	
22	26	32	38	57	40	60	47	33	26	12	17	20	32	39	16	12	12	12	12	20	41	32	30	30					
23	32	41	47	70	23	53	70	69	46	23	E	B	12	14	12	16	18	14	12	E	B	27	31	22	E	B	45	84	
24	43	47	42	70	41	51	33	51	B	41	B	B	B	B	B	B	B	B	E	B	19	33	B	B	B	33	39		
25	45	59	70	41	38	47	B	48	37	B	B	22	B	B	B	B	B	B	B	B	B	B	B	B	33	28	32		
26	38	42	B	58	70	B	47	47	B	B	B	E	B	E	B	E	B	B	E	B	B	B	B	B	B	B	32		
27	59	60	32	40	48	40	52	37	22	16	16	12	E	B	E	B	E	B	E	B	B	B	B	B	B	B	B		
28	32	17	17	39	31	42	17	26	43	73	70	83	27	32	39	27	E	B	18	26	37	70	38	52	37	B			
29	16	B	27	26	52	60	58	80	37	32	20	27	47	32	11	E	B	E	B	E	B	E	B	B	B	27	37		
30	60	42	70	52	91	38	B	B	B	70	37	B	B	B	B	B	E	B	19	16	26	32	33	33	29	38			
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	28	23	26	26	23	21	22	19	19	17	18	17	19	19	16	15	12	15	9	12	12	23	24					
MED	40	42	42	42	40	40	37	40	37	23	16	E	B	E	B	E	B	E	B	U									
U Q	46	58	58	52	48	51	64	51	45	38	34	27	32	32	26	34	25	24	33	44	40	40	39	38					
L Q	28	38	34	38	34	32	26	26	26	16	E	B	E	B	E	B	E	B											

IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 1993 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	7	9	10	7	7	B	19	19	19	14	14	19	19	10	14	9	9	14	B	B	B	B	9	
2	9	9	7	9	9	19	19	9	10	8	11	14	14	23	19	16	10	10	18	B	B	B	14	9	
3	9	10	10	10	14	B	25	18	13	B	B	B	31	50	24	B	25	B	19	14	8	7	8	8	
4	16	14	15	16	11	19	18	B	B	B	24	B	B	B	B	18	B	B	10	9	10	14	17	B	
5	19	14	B	B	20	19	B	B	B	B	B	B	B	B	B	55	B	B	B	B	10	14	24	16	
6	19	24	B	B	B	19	B	B	B	B	B	B	B	B	B	B	B	B	24	B	B	B	13	B	
7	24	B	B	14	B	B	B	14	19	16	B	B	B	B	B	B	B	B	B	B	15	B	16	15	
8	29	30	B	B	23	B	B	B	B	B	30	30	B	B	B	B	B	16	B	B	B	B	9	16	
9	15	14	14	24	B	B	B	B	B	B	B	24	19	19	B	B	B	B	B	B	11	B	B	B	
10	10	8	18	20	14	9	10	7	10	10	17	18	18	15	19	B	B	B	B	B	B	10	14	B	
11	14	10	30	19	19	13	10	19	16	14	B	31	25	21	13	30	B	B	B	B	B	7	7	7	
12	8	9	31	15	15	9	10	10	9	10	B	B	B	18	18	B	B	B	B	18	B	17	18	8	
13	10	10	B	29	B	B	19	B	B	19	17	B	B	50	30	B	B	B	B	B	B	B	9	8	
14	18	19	24	19	19	18	14	16	B	B	B	25	24	B	B	B	B	B	B	B	B	B	B	14	
15	10	14	B	21	21	25	B	B	23	B	B	B	B	20	18	10	14	B	10	B	B	B	19	B	
16	15	18	14	B	30	B	21	19	23	19	18	24	30	24	19	B	B	B	B	B	B	B	14	17	
17	10	10	7	7	8	9	7	7	7	9	14	20	18	19	25	16	16	B	19	10	10	9	7	7	
18	18	14	14	14	14	8	8	7	7	7	8	8	10	10	8	10	7	10	B	B	B	B	B	B	
19	10	10	9	7	10	7	8	10	B	B	B	B	B	B	B	18	14	18	B	B	B	B	10	9	
20	10	10	10	14	10	10	8	7	10	8	13	B	B	B	19	B	B	B	19	18	B	B	9	10	
21	14	10	8	9	8	8	10	10	9	18	14	15	21	20	24	18	14	10	B	B	9	10	7	7	
22	7	7	10	10	15	15	15	10	10	9	7	9	10	9	10	8	9	8	8	10	8	7	7	7	
23	8	19	23	16	16	9	24	20	14	14	10	14	10	10	18	14	7	14	10	10	9	10	8	14	
24	10	9	15	10	17	14	10	19	B	19	B	B	B	B	B	B	B	19	23	B	B	B	9	9	
25	20	14	14	30	21	19	B	19	23	B	B	19	B	B	B	B	B	B	B	B	B	14	8	8	
26	10	19	B	30	24	B	24	24	B	B	B	18	18	17	14	19	23	B	11	B	9	B	14	B	
27	14	14	14	13	16	19	19	19	14	10	10	9	30	30	23	24	14	B	B	B	B	B	B	B	
28	10	10	9	9	9	8	9	9	9	10	14	10	10	10	18	20	18	14	18	18	20	9	10	B	
29	9	B	9	10	14	9	10	18	14	19	14	18	18	16	8	31	60	35	30	B	B	16	10	B	
30	14	19	14	9	56	30	B	B	B	30	19	B	B	B	B	B	19	9	14	20	19	13	14	10	
31																									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
MED	12	14	14	14	16	18	19	19	19	19	22	24	30	22	24	43	B	B	B	B	B	B	14	12	
U Q	18	19	B	24	23	30	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	24	17	
L Q	10	10	10	10	11	9	10	10	10	10	14	15	18	18	18	18	14	14	18	18	10	13	9	8	

IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 1993 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		B	A	A	A	A	S	B	A	AE	B										B	B	B	B	A			
2		A	A	A	A	A	A	A				300	245	205	205	205	200	200	EA	240	205		B	B	B	215	240	
3		A		220	220	225		A	B	A	A	A	B	B	B	ES		B				A	A	A	A	A		
4		A	A	A		230		A	A	A	B	B	B	A	B	B	B	B	A			A	A	A	A	B		
5		A	A	B	B		A	A	B	B	B	B	B	B	B	B	EB	B				B	B	A	A	A	A	
6		A	A	B	B		B	A	B	B	B	B	B	B	B	B	B	B					B	B	B	A	B	
7		A	B	B	A	B	B	B	A	A	A	B	B	B	B	B	B	B	B				B	B	A	B	S	A
8		A	A	B	B	A	B	B	B	B	BE	BE	B	B	B	B	B	B				B	B	B	B	AE	S	290
9		EA	A	A	A	S	B	B	B	B	B	B	B				B	B	B	B	B			B	B	B	B	
10		Y	A	A	A	AE	A							220	200	200		B	B	B	B	B	B	B	A	A		
11		A	A	A	A	A	A	A	A	A			BE	B				B	B	B	B	B	B	A	A	A		
12		A	A	S	A	A	A	A	AE	AE	A	B	B	B				B	B	B	B	B	A	B	A	A	A	
13		A	A	B	S	B	B	A	B	BE	AE	S	B	BE	S			B	B	B	B	B	B	B	B	A	A	
14		A	A	A	A	A	A	A	A	B	B	B						B	B	B	B	B	B	B	B	B	A	
15		A	A	B	A	A	A	B	B	S	B	B	B										B	B	B	B	A	
16		A	A	A	B	A	B	A	A	A	AE	B						B	B	B	B	B	B	B	B	A	A	
17		A	A	A	A	A	A			AE	AE	A						A	A	B	A	A	A	Y	A	A		
18		A	A	A	AE	A	E	AE	S													A	B	B	B	B	B	
19		Y	A	A	Y	A	A	A	A	B	B	B	B	B	B	B						B	B	B	BE	A	A	
20		AE	A	A	A	S	Y	A	A	Y	E	B	B	B	B							B	B	A	A	B	Y	A
21		A	A	A	A	Y	Y	Y	Y	A	A							S		EA	B	B	A	S	S	S		
22		A								AE	A												A	A	A	A	A	
23		A	A	A	A	Y	A	A	A																		A	
24		230	220		A	A	A																				A	
25		A	A	A	S	A	A	B	A	S	B	B															A	
26		215		A	B	A	A	B	A	A	B	B	B														A	
27		A		225	265	205	230	225	200	220	330	250	250	240	235	230	250	215	220								B	
28		A	S	A	A	A	A	A	A	A	AE	A															B	
29		A	B	A	A	A	A	A	A	A	S																B	
30		230		A	A	A	A	S	B	B	B	S	S	B	B	B	B										A	
31																												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		4	5	5	5	3	5	5	5	8	12	15	18	17	19	19	14	15	10	10		3	1	5	3			
MED		226	222	235	225	232	215	230	265	251	255	232	227	225	210	210	202	220	239	232		220	280	215	230			
UQ		232	272	252	230	255	288	278	305	315	295	280	250	235	230	235	220	250	250	240		245		245	290			
LQ		222	220	218	212	230	202	215	225	232	250	225	215	210	200	200	200	205	235	210		200		210	220			

IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 1993 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		O X 50	S	A	S	B	B	B	B	S	B	B	B	B	B	X 53	62	63	70	56	X	S	S	S	S	O X 63
2		S	B	B	S	A	S	B	B	S	S	B	B	O X 51	O X 54	X 61	B	B	O X 64	Y	Y	S	S	A	A	
3		A	S	B	B	S	B	B	B	B	B	Y	C	B	O X 43	X 44	B	B	B	B	B	B	S	B	S	
4		S	O X 48	52	A	A	B	A	S	O X 33	X 34	O X 38	X 42	X 60	X 62	O X 74	B	B	B	B	B	B	B	B	B	S
5		S	S	S	A	A	A	S	B	S	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
6		C	C	C	C	C	C	C	C	C	C	C	C	C	O X 48	X 51	C	C	C	C	C	C	C	C	C	C
7		S	O X 27	C	S	S	A	A	A	S	S	49	48	X 47	X 52	X 54	54	O X 36	33	S	B	S	Y	Y	B	
8		Y	Y	X 55	S	S	S	B	S	O X 39	X 40	O X 44	O X 60	X 66	O X 69	O X 66	60	46	B	O X 30	A	S	S	S	S	
9		S	A	S	A	A	S	S	B	B	B	S	O X 47	X 53	B	S	B	B	O X 33	O X 26	O X 26	A	A	A	A	
10		A	A	A	A	A	B	B	S	S	A	B	B	B	B	B	B	B	B	B	B	B	B	A	A	
11		A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	S	A	
12		O X 33	O X 33	S	O X 39	A	S	O X 32	S	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
13		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
14		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
15		C	C	C	C	A	S	S	S	Y	B	B	B	56	49	48	48	O X 30	O X 33	X	B	B	B	B	Y	S
16		O X 39	B	A	A	A	S	S	S	B	O X 33	O X 38	O X 53	O X 58	O X 56	O X 53	O X 57	S	33	B	B	A	B	B	B	
17		Y	A	A	A	S	S	O X 33	O X 33	B	A	X 37	A	X 48	X 60	X 60	44	29	O X Y	B	S	S	B	B	S	
18		S	S	S	S	A	O X 34	X 34	A	O X 29	B	X 38	X 51	B	B	B	X 42	B	B	B	B	B	B	S	S	
19		A	A	O X 39	S	A	A	A	A	X 46	X 47	X 53	X 60	X 59	X 66	X 62	37	27	27	X	O X A	A	B	B	A	
20		B	O X 71	O X 64	O X 61	A	O X 59	S	A	O X 46	S	B	O X 52	O X 59	O X 68	O X 71	O X 55	70	B	B	Y	S	S	S	A	
21		A	A	A	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	O X 42	S	S	A
22		O X 42	A	S	O X 44	B	B	A	A	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	S
23		A	A	S	A	A	B	B	S	O X 33	O X 40	B	B	O X 76	O X 51	O X 49	O X 51	O X 49	B	B	B	B	B	B	B	B
24		B	B	S	A	A	S	O X 32	O X 33	O X 34	O X 33	O X 43	O X 53	X 63	B	B	B	B	B	B	B	B	B	S	Y	S
25		S	S	S	S	A	B	B	B	B	B	X 58	X 59	B	B	B	70	60	S	B	O X 32	B	B	B	B	B
26		B	A	S	S	S	S	A	O X 33	B	B	O X 54	S	68	71	48	51	46	33	33	24	B	B	B	B	B
27		S	S	A	S	S	S	O X 44	O X 59	O X 56	O X 41	O X 45	O X 52	60	78	52	65	40	41	32	Y	Y	S	S	S	
28		O X 51	O X 44	A	A	O X 43	B	A	S	O X 43	O X 36	O X 39	B	X 58	X 60	X 59	X 55	X 57	X 42	X 33	B	B	B	A	A	
29		A	A	A	B	A	B	A	A	S	O X 39	O X 42	O X 47	B	X 68	X 58	X 68	X 75	B	O X 32	A	A	A	A	A	
30		A	A	A	S	A	B	B	A	A	S	X 37	X 45	X 53	X 54	X 54	X 55	X 43	X 40	X 44	S	B	S	B	B	
31		S	A	A	A	S	S	A	S	B	B	O X 44	O X 51	O X 59	O X 63	O X 52	O X 66	O X 53	O X 54	O X 34	B	B	B	Y	Y	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT		5	5	4	3	1	2	5	4	6	9	16	14	16	18	20	17	14	14	10	3	1			1	
MED		O X 42	O X 44	O X 54	O X 44	O X 43	O X 46	O X 33	O X 33	O X 38	O X 36	O X 41	O X 51	O X 58	O X 60	O X 54	O X 55	O X 48	O X 40	O X 32	O X 26	O X 42			O X 63	
UQ		O X 50	O X 60	O X 60	O X 61			O X 39	O X 46	O X 46	O X 40	O X 46	O X 53	O X 60	O X 68	O X 64	O X 64	O X 60	O X 49	O X 34	O X 30					
LQ		O X 36	O X 30	O X 46	O X 39			O X 32	O X 33	O X 33	O X 33	O X 38	O X 47	O X 53	O X 54	O X 52	O X 50	O X 37	O X 33	O X 32	O X 24					

IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 1993 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	U S 44	S	A	S	B	B	B	B	S	B	B	B	B	B	J	F	F	J	F	J	S	S	S	S	S	U S 57					
2	S	B	B	S	A	S	B	B	S	S	B	B	S	S	J	S	B	B	F	Y	Y	S	S	A	A						
3	A	S	B	B	S	B	B	B	B	B	Y	C	BU	S	J	S	B	B	B	B	B	B	S	B	S						
4	S	F 38	R 46	A	A	B	A	S	F	U	S	J	S	R	F	R	B	B	B	B	B	B	B	B	S						
5	SD	SD	S	A	A	A	S	B	S	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C						
6	C	C	C	C	C	C	C	C	C	C	C	C	C	C	R	C	C	C	C	C	C	C	C	C	C						
7	S	U S 21	C	S	S	A	A	A	S	S	F	J	F	J	S	J	S	F	S	J	F	D	S	B	S	Y	Y	B			
8	Y	Y	J	S	S	S	S	B	S	U	S	J	S	R	F	F	F	F	J	S	B		A	S	S	S					
9	S	A	S	A	A	S	S	B	B	B	S		41	45	B	D	S	B		27	20	20	A	A	A	A					
10	A	A	A	A	A	B	B	S	S	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	A					
11	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	S	A					
12	S	27	27	S	U	S	A	D	S	U	SD	S	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C				
13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C					
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C					
15	C	C	C	C	A	D	S	S	Y	B	B	B	F		S		R		B	B	B	B	Y	S							
16	U S 33	B	A	A	A	S	S	S	B		R	R	J	F	F	U	S		S	J	S	B	B	A	B	B	B				
17	Y	A	A	A	S	S	U	S	B	A		A	J	S	S	F	U	S	U	S	Y	B	S	S	B	B	S				
18	S	S	SD	S	A	U	S	A		B	J	S	U	S	B	B	B	J	S	B	B	B	B	B	S	S					
19	A	A	U	S	S	A	A	A	A	A	J	S	J	S	J	S	J	S	R	J	S	J	S	A	A	B	B	A			
20	B	F	U	S	U	S	A	U	S	S	A	S	S	B	S	F	J	F	J	F	U	S	F	B	B	Y	S	S	S	A	
21	A	A	A	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	U	S	SD	S	A				
22	U S 36	A	S	U	S	B	B	A	A	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	S				
23	A	A	S	A	A	A	B	B	S	U	S	S	B	B	S	J	S	U	S	S	U	S	B	B	B	B	B	B			
24	B	B	S	A	A	S		26	27	28	27	37	47	57	B	B	B	B	B	B	B	B	B	S	Y	S					
25	S	S	S	S	S	A	A	B	B	B	J	F	J	S	B	B	F	F	S	BU	S	B	B	B	B	B					
26	B	A	S	S	S	S	A	R	B	B	U	S	S	F	J	F	U	S	S	U	S	U	S	B	B	B	B				
27	S	S	A	S	S	S	U	S	J	F	F	J	S	S	J	S	U	S	R	J	S	S	Y	Y	S	S	S				
28	U S 45	S	A	A	U	R	B	A	S	S	U	S	B	J	S	J	S	J	S	J	S	B	B	B	A	A					
29	A	A	A	B	A	B	A	A	S	S	33	36	41	62	52	58	69		B	R	A	A	A	A	A	A					
30	A	A	A	S	A	B	B	A	A	S	J	S	J	S	U	S	U	S	J	S	S	D	S	B	S	B	B				
31	S	A	A	A	S	S	A	S	B	B	R	U	S	J	S	J	S	S	U	S	U	S	B	B	B	Y	Y				
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23							
CNT	5	6	5	4	1	4	5	5	6	9	16	14	16	18	21	17	14	14	11	4	1			1	1						
MED	U S 36	S	U	S	U	S	U	R	U	U	S	S		S	S	45	52	54	48	49	42	34	26	22	U S 36	D	S	U	S	57	
U Q	U S 44	F 38	S	U	S		S	33	40	40	34	40	47	54	62	56	57	F	51	43	J	S	28	24							
L Q	S	S	S	S	S	S	S	28	26	27	27	27	32	41	45	48	45	44	31	27	21	19									

IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 1993 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	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1	36	51	70	32	B	B	B	B	52	B	B	B	B	BE	BE	BE	BE	BE	BE	BE	33	26	41	48		
2	41	B	B	41	72	39	B	B	43	40	B	BE	SE	BE	BE	B	B	37	33	38	47	47	106	68		
3	47	54	B	B	37	B	B	B	B	B	34	C	BE	BE	BE	B	B	B	B	B	B	B	31	26		
4	33	38	33	62	52	B	59	46	37	28	32	31	23	72	30	B	B	B	B	B	B	B	B	32		
5	38	37	37	38	46	42	37	B	40	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
6	C	C	C	C	C	C	C	C	C	C	C	C	C	E	BE	B	C	C	C	C	C	C	C	C		
7	28	32	C	33	46	68	70	54	59	46	32	12	17	18	16	16	12	14	12	B	19	12	13	B		
8	12	26	43	41	31	30	33	B	33	20	23	20	26	30	36	36	30	28	B	B	38	37	41	42	39	
9	40	46	47	70	71	32	40	B	B	B	38	27	21	BE	B	B	BE	BE	BE	BE	47	47	39	36		
10	41	41	67	48	44	B	B	39	40	32	B	B	B	B	B	B	B	B	B	B	B	B	B	30	47	
11	94	59	70	80	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	22	42	
12	27	33	40	42	41	41	35	38	32	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
15	C	C	C	C	42	42	34	27	12	B	B	BE	BE	BE	BE	BE	BE	BE	B	B	B	B	BE	B	32	
16	39	B	47	47	46	42	40	30	B	12	12	20	16	18	19	14	32	12	B	B	33	B	B	B		
17	12	42	118	48	32	28	23	13	B	119	29	65	16	26	16	E	B	14	17	B	32	27	B	21		
18	22	26	26	41	42	32	29	32	36	B	12	24	B	B	B	26	B	B	B	B	B	B	B	27	27	
19	24	32	42	38	62	45	54	70	51	37	21	27	22	16	26	16	16	28	27	26	32	B	B	39		
20	B	41	70	40	47	42	42	37	38	33	B	20	26	20	27	E	S	E	B	B	31	41	41	42	69	
21	59	80	70	45	48	41	47	B	B	B	B	B	B	B	B	B	B	B	B	B	40	33	39	43		
22	42	70	33	31	B	B	47	46	33	39	B	B	B	B	B	B	B	B	B	B	B	B	B	B	32	
23	38	37	33	37	40	40	B	B	27	21	20	B	BE	BE	BE	BE	BE	BE	B	B	B	B	B	B	B	
24	B	B	31	51	40	38	26	26	16	15	19	19	31	B	B	B	B	B	B	B	B	B	31	26	16	
25	21	33	37	37	37	41	38	B	B	BE	BE	S	23	20	20	16	23	27	18	15	B	B	B	B		
26	B	60	28	43	58	58	51	32	30	23	20	20	16	23	27	18	15	E	BE	B	B	B	B	B		
27	28	30	39	41	41	38	38	31	27	12	19	19	19	21	18	19	19	15	14	12	12	26	37	40		
28	59	40	43	38	40	B	58	32	22	17	20	E	B	BE	BE	BE	BE	SE	SE	SE	B	B	B	37	42	
29	37	41	39	B	39	B	41	51	37	17	16	22	BE	BE	BE	BE	BE	BE	S	19	42	46	40	70	71	
30	47	46	46	37	39	B	B	40	47	34	26	24	21	19	19	19	15	14	12	12	B	B	B	B		
31	35	41	71	46	39	40	47	36	B	B	E	B	E	BE	B	12	43	12	18	B	B	B	B	22	32	
CNT	24	24	24	25	25	19	21	18	19	16	18	15	16	18	21	17	16	15	12	11	12	12	16	20		
MED	38	41	42	41	42	41	40	36	37	30	21	21	21	E	BE	BE	BE	BE	B	E	26	35	32	37	39	
U Q	42	48	68	48	48	42	49	46	43	38	30	27	28	E	BE	BE	BE	BE	B	28	26	38	44	41	42	45
L Q	28	33	35	38	39	38	34	31	27	17	19	19	19	19	18	16	16	14	14	13	30	26	24	32		

IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 1993 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		8	10	14	10	B	B	B	B	18	B	B	B	B	24	16	32	18	24	19	10	16	13	19		
2		10	B	B	24	20	19	B	B	25	23	B	B	34	26	18	B	B	17	14	9	10	13	9	19	
3		19	9	B	B	23	B	B	B	B	B	24	C	B	E S	24	35	B	B	B	B	B	11	B	18	
4		9	9	9	19	19	B	23	15	13	16	10	26	18	10	30	B	B	B	B	B	B	B	B	9	
5		7	10	10	18	19	11	19	B	19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
6		C	C	C	C	C	C	C	C	C	C	C	C	C	18	17	C	C	C	C	C	C	C	C	C	
7		14	7	C	18	21	19	20	21	19	19	10	10	15	18	11	9	9	8	9	B	9	10	9	B	
8		10	10	9	7	7	7	21	B	10	18	15	14	13	30	36	36	30	24	B	10	23	30	14	8	
9		9	10	10	9	9	14	20	B	B	B	18	19	18	B	30	B	B	18	14	13	12	10	7	9	
10		9	10	19	14	9	B	B	B	19	15	14	B	B	B	B	B	B	B	B	B	B	B	11	9	
11		9	14	9	7	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	10	9	
12		7	9	9	14	19	19	14	10	10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
13		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
14		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
15		C	C	C	C	8	14	9	9	8	B	B	B	19	23	19	15	15	15	B	B	B	B	13	17	
16		10	B	10	14	18	14	10	9	B	9	9	14	13	18	19	10	10	10	B	B	17	B	B	B	
17		9	8	18	14	8	8	9	9	B	8	9	10	14	14	10	19	10	10	B	10	10	B	B	9	
18		7	7	7	7	18	14	8	7	7	B	8	24	B	B	B	20	B	B	B	B	B	B	10	6	
19		7	8	9	19	14	10	14	14	10	10	10	14	15	15	10	9	10	9	10	9	13	B	B	8	
20		B	7	8	14	10	14	10	14	20	19	B	18	15	14	18	36	30	B	B	19	10	17	14	10	
21		10	14	19	19	29	30	24	B	B	B	B	B	B	B	B	B	B	B	B	B	10	14	9	9	
22		10	10	20	10	B	B	23	22	19	20	B	B	B	B	B	B	B	B	B	B	B	B	B	8	
23		14	13	14	18	19	25	B	B	19	19	19	B	B	55	24	19	21	30	B	B	B	B	B	B	
24		B	B	19	19	19	19	10	9	9	15	19	19	31	B	B	B	B	B	B	B	B	8	14	9	
25		7	7	8	8	10	20	15	B	B	B	19	19	B	B	19	20	24	B E S	19	B	B	B	B	B	
26		B	15	17	15	20	19	13	18	B	B	30	S	19	20	20	16	23	20	18	15	B	B	B	B	
27		10	7	10	19	16	16	15	9	10	9	19	19	19	19	18	19	19	15	14	7	7	7	7	19	
28		19	10	14	10	16	B	19	10	9	10	20	B E S	30	20	20	16	16	19	10	B	B	B	17	9	
29		19	9	19	B	19	B	19	16	15	10	10	16	B	50	19	19	24	B	19	9	14	10	9	7	
30		7	8	10	10	10	B	B	19	18	24	20	E S	24	19	16	19	19	15	9	8	10	B	B	B	
31		19	10	7	9	20	20	15	18	B	B	21	31	18	19	18	10	9	10	18	B	B	B	8	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		27	27	26	27	28	28	28	28	28	26	26	24	26	27	27	26	26	26	26	26	26	26	26	26	26
MED		10	10	10	14	19	19	19	18	19	20	20	24	22	24	20	20	27	22	B	B	B	B	14	9	
U Q		19	13	19	19	20	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
L Q		8	8	9	10	10	14	14	10	10	14	10	17	18	18	18	16	15	15	14	10	10	11	9	9	

IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 1993 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	215	A	A	A	B	B	B	B	A	B	B	B	B	B	270	240	E B 310	260	230	S	A	A	A	A	
2	A	B	B	A	A	A	B	B	A	A	B	B	E S 255	245	235	B	B	A	S	S	A	A	A	A	
3	A	230	B	B	S	B	B	B	B	B	S	C	B	E B 285	E B 295	B	B	B	B	B	B	A	B	A	
4	220	210	250	A	A	B	A	A	A E 305	A E 295	A	260	250	245	240	B	B	B	B	B	B	B	B	A	
5	A	230	230	A	A	A	A	B	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
6	C	C	C	C	C	C	C	C	C	C	C	C	C	200	200	C	C	C	C	C	C	C	C	C	
7	S	250	C	S	A	A	A	A	A	A E 300	A	200	230	205	225	225	205	240	265	B	A	Y	Y	B	
8	Y	Y	255	A	A	A	A	B	A E 340	S E 295	A	230	260	240	240	E S 250	275	240	B	A	A	A	A	205	
9	A	A	230	A	A	A	A	B	B	B	S	270	245	B	235	B	B	E B 295	E B 320	E B 300	A	A	A	A	
10	A	A	A	A	A	B	B	A	215	A	B	B	B	B	B	B	B	B	B	B	B	B	B	A	A
11	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	S	A
12	220	220	A	225	A	215	235	200	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
15	C	C	C	C	A	225	225	A	Y	B	B	B	225	200	200	200	E B 250	E B 230	B	B	B	B	S	A	
16	230	B	A	A	A	240	210	A	B E 270	A	210	220	235	210	200	200	S	225	B	B	A	B	B	B	
17	Y	A	A	A	A	A	A E 300	A	B	A	240	A	205	210	205	215	210	A	B	A	A	B	B	A	
18	A	A	A	240	A E 325	A E 335	A	A E 270	A	B	220	250	B	B	B	200	B	B	B	B	B	B	A	A	
19	A	A	230	S	A	A	A	A	A E 325	A	210	230	225	205	200	200	200	250	230	A	A	B	B	A	
20	B	210	200	210	A	240	A	A	A E 320	A	B	250	240	255	245	E S 280	E S 235	B	B	S	A	A	A	A	
21	A	A	A	S	S	S	A	B	B	B	B	B	B	B	B	B	B	B	B	B	210	A	210	A	
22	235	A	A	200	B	B	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A
23	A	A	A	A	A	A	B	B	A	330	220	B	B	230	210	205	230	220	B	B	B	B	B	B	B
24	B	B	A	A	A	225	A E 320	A	250	250	235	205	225	B	B	210	215	250	B E 290	S	B	B	B	B	
25	S	A	A	A	A	A	A	B	B	B	220	205	B	B	210	215	250	B E 290	S	B	B	B	B	B	
26	B	A	A	230	A	A	A	A	B	B	250	S	230	210	200	200	260	230	230	250	B	B	B	B	
27	A	A	A	A	A	A	A	280	235	E S 250	230	200	200	230	195	205	200	200	E B 260	Y	Y	210	A	A	
28	E A E 270	A	A	A	230	B	A	A E 300	A	285	280	B	E B 240	210	215	225	E S 225	E S 200	E S 245	B	B	B	A	A	
29	A	A	A	B	A	B	A	A	A	260	250	250	B	255	220	250	250	B E 275	B	A	A	A	A	A	
30	A	A	A	A	A	B	B	A	A	A	300	E S 255	240	205	195	200	210	250	210	225	B	210	B	B	
31	S	A	A	A	A	A	A	S	B	B	260	E B 250	215	205	205	200	205	210	230	B	B	B	A	S	
	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	7	6	5	1	7	4	4	5	10	16	14	16	18	21	17	15	14	11	3	1	2	1	1	
MED	222	225	230	225	230	232	224	290	U 232	E 295	235	232	230	210	210	202	220	235	238	U 238	210	210	210	205	
U Q	235	250	250	235	250	285	310	E A E 285	A E 325	E A 288	250	242	245	238	232	250	250	E B 275	E B 300						
L Q	220	210	230	205	225	218	240	225	260	220	205	225	205	200	200	205	220	230	225						



IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 1993 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	Y	Y	S	S	S	A	S	O X	X	O X	X	X	X	X	57	67	O X	O X	O X	S	X	B	B	Y	S
2	S	S	S	A	Y	S		34	28	38	48	58	60	57	67	61	48	39		26		B	B	B	S
3	S	S	A	A	A	S	A	S	X	O X	X	X		O X	X	X	O X	X	C	C	C	B	B	S	S
4	S	S	B	S	S	A	B	B	B	B	C	S	C	C			B	B	O X	S	S	S	A	S	
5	A	A	A	B	B	S	S	B	B	B	B	B	B	B	B	B	O X	B	B	B	B	A	A	S	
6	S	X	B	B	A	B	X	A	A	B	B	B	B	B	B	B	B	B	C	Y	S	Y	Y	Y	
7	S	S	A	S	A	B	B	A	B	B	B	B	S	B	B	B	B	B	B	Y	B	S	Y	A	
8	B	S	B	B	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
9	Y	S	S	A	S	B	B	B	S	B	B	B	B	B	B	B	B	X	X	S	B	S	A	A	
10	O X	A	A	A	A	A	S	S	S	O X	O X	O X	O X	X	X	B	B	B	O X	Y	S	B	S	A	
11	A	A	A	B	A	S	S	S	X	O X	X	B	O X	B	B	X	B	O X	S	B	B	B	B	B	
12	B	Y	Y	B	A	S	O X	O X	B	B	B	X	X	X	O X		B	O X	O X	B	B	B	B	S	
13	B	S	S	A	S	A	A	A	B	B	S	S	X	X	X	X	X	X	O X		O X	Y	Y		
14	O X	S	S	Y	S		X	O X	X	X	X	X	X	X	X	X	X	X	X	O X	Y	B	Y	B	
15	S	S	S	S	B	S	O X	S	O X	O X	X	X	X	O X	X	X	X	X	X		O X	S	A	A	
16	A	A	A	A	O X	Y	Y	S	Y	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
17	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
18	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
20	C	C	C	C	C	C	C	C	C	B	B	B	B	B	B	B	B	B	B	B	B	B	S	B	
21	S	S	A	S	A	A	S	S	O X	S	B	B	B	O X		O X	O X	B	B	B	B	B	B	S	
22	Y	S	A	A	A	A	A	S	B	B	X	X					B	X	B	S	B	B	B	B	
23	S	S	A	A	S	S	S	X	O X	B	B	O X	X					O X	O X	B	B	B	B	Y	
24	A	S	B	B	B	B	B	S	O X	B	B						B	O X	X	S	O X	B	B	B	
25	Y	A	A	S	S	B	S	O X	O X	X	X	X	X			O X	X	X	O X	O X	O X	B	Y	Y	
26	Y	S	A	A	A	B	S	O X	X	O X	X	X	X	X	X	X	O X	O X	O X	B	B	B	B	S	
27	A	A	O X	B	B	S	S	O X	X	O X	X	X	X	X	X	X	X	X	B	B	A	S	A	S	
28	A	A	S	B	S	S	O X	A	O X	C	S	C	S	O X	O X	O X	X	C	C	C	B	C	C	C	
29	A	A	S	B	A	C	B	S	B	C	B	O X	C	C			S	S	B	B	C	B	C	C	
30	S	S	B	S	S	S	S	S	C	O X	O X	B	B	B	X		X	O X	O X	B	B	B	B	B	
31	B	S	O X	S	A	S	A	S	O X	X	X								O X	O X	B	B	B	S	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	2	1	2		1	1	6	8	13	12	13	15	15	17	18	17	17	13	12	9	3	1			
MED	O X	X	O X		O X		X	O X	O X	O X	X	X	X	X	X	X	X	X	O X	O X	O X	O X	O X	O X	
U Q							51	50	46	50	59	65	70	72	72	70	67	62	52	41	35				
L Q							X	O X	X	O X	X	X	X	O X	X	X	O X	X	O X	X	X				

IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 1993 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

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

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

IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 1993 ftEs (0.1MHz) 45'E MEAN TIME (G.M.T. + 3 H)

LAT. 69'00.4'S ION. 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	33	33	37	37	36	38	27	E 29	11	14	16	27	21	21	26	21	26	12	12	12	B	B	12	26	
2	28	32	32	37	26	25	21	19	E 9	S 15	B 18	B 30	21	20	E 19	B 26	E 19	B 39	C	26	B	B	B	26	
3	28	27	42	38	41	36	38	29	27	12	21	21	28	21	20	21	E 14	B	C	C	B	B	39	33	
4	23	40	B	37	37	53	B	B	B	B	C 23	B	C	C 35	E 25	S	B	B	42	60	29	50	71	56	
5	51	60	85	B	B	58	27	B	B	B	B	B	B	B	B	B	E 23	B	B	B	B	B	40	38	29
6	34	37	B	B	37	B	40	43	64	B	B	B	B	B	B	B	B	B	C	33	33	41	42	45	
7	39	41	80	47	54	B	B	66	B	B	B	B	80	B	B	B	B	B	B	30	B	S	39	89	
8	B	40	B	B	40	33	41	B	B	B	B	B	B	B	B	B	B	B	B	B	B	S	B	B	
9	21	33	39	71	38	B	B	B	38	B	B	B	B	B	B	B	B	B	E 20	E 24	E 18	B	24	40	37
10	38	36	42	39	39	37	27	30	E 29	B 18	E 19	B 23	E 23	B 32	B 32	B	B	B	C	28	31	24	B	27	58
11	80	71	70	B	40	35	27	28	E 16	B 17	E 23	B	B	E 31	B	B	32	B	E 28	E 28	B	B	B	B	B
12	B	13	28	B	39	28	E 17	E 17	B	B	B	E 36	E 32	E 24	E 55	E 24	B	E 18	E 18	B	B	B	B	20	
13	B	37	41	59	39	46	46	69	B	B	27	31	24	23	23	19	13	E 13	E 16	E 11	E 11	13	12	11	
14	20	41	41	41	32	17	11	37	20	20	20	25	E 32	E 24	E 24	21	13	23	9	13	13	B	19	B	
15	29	25	38	28	B	13	12	11	E 16	B 18	20	24	E 25	E 51	E 23	E 23	20	11	E 19	E 27	31	26	35	70	
16	60	71	61	40	67	67	41	38	26	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
17	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
18	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
20	C	C	C	C	C	C	C	C	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
21	35	60	35	27	40	30	28	19	E 18	B 31	B	B	B	E 51	E 33	E 31	E 23	B	B	B	B	B	B	B	27
22	14	27	38	40	57	56	46	35	B	B	28	26	28	E 33	E 32	B	E 50	B	19	B	B	B	B	B	
23	13	27	60	60	40	38	36	23	E 23	B	B	E 33	28	27	E 27	E 21	E 20	E 18	E 23	B	B	B	B	14	
24	47	36	B	B	B	B	B	E 27	E 18	B	B	E 26	27	26	33	B	E 32	E 24	E 22	E 17	B	B	B	B	
25	28	75	70	37	32	B	27	38	20	19	22	23	27	26	25	20	22	14	12	13	E 10	B	13	12	
26	13	28	45	47	58	B	38	37	12	27	23	26	26	28	26	23	19	16	13	E 27	B	B	B	34	
27	46	40	42	B	B	40	30	E 18	E 18	20	21	E 23	E 37	E 31	27	28	E 18	B	B	70	31	69	60	41	
28	47	62	37	B	37	30	31	39	21	C	E 23	C	26	23	30	23	20	C	C	C	B	C	C	C	
29	82	54	41	B	77	C	B	36	B	C	B	C	C	C	E 23	E 32	E 23	B	B	C	B	C	C	C	
30	27	38	B	41	39	38	29	33	C	E 32	20	B	B	B	E 27	E 25	E 22	E 19	E 17	E 16	B	B	B	B	
31	B	E 16	E 32	60	40	40	38	29	E 22	E 18	19	26	E 33	E 32	20	24	19	14	E 16	E 16	B	B	B	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	23	27	22	18	23	20	22	23	18	13	15	16	18	17	20	18	18	14	16	16	8	7	14	18	
MED	33	37	41	40	39	38	30	30	19	18	20	24	26	E 26	E 26	23	E 20	E 16	E 18	20	26	40	36	34	
U Q	47	54	60	47	41	43	38	38	26	24	23	E 28	E 32	E 32	E 32	26	E 23	E 23	E 24	30	31	50	40	45	
L Q	23	28	37	37	37	30	27	23	E 16	16	19	23	E 25	E 23	23	21	E 19	14	14	14	E 12	24	19	26	

## IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 1993 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	7	7	10	9	19	10	10	29	7	10	10	18	15	15	10	9	17	9	7	10	B	B	7	7		
2	7	8	7	6	7	7	7	8	9	15	18	30	19	19	19	19	19	19	C	19	B	B	B	9		
3	8	7	8	10	13	19	15	19	9	10	16	15	15	16	14	14	14	C	C	C	B	B	9	13		
4	14	16	B	13	12	18	B	B	B	B	C	23	C	C	E S	35	25	B	B	15	9	23	20	10	8	
5	7	10	23	B	B	18	17	B	B	B	B	B	B	B	B	B	23	B	B	B	B	10	9	9		
6	9	16	B	B	18	16	19	15	B	B	B	B	B	B	B	B	B	B	C	20	10	9	9	9		
7	10	10	18	23	16	B	B	22	B	B	B	B	68	B	B	B	B	B	B	19	B	S	9	19		
8	23	17	B	B	23	17	21	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
9	17	9	9	17	22	B	B	B	21	B	B	B	B	B	B	B	B	17	24	18	B	17	10	10		
10	10	9	11	16	21	19	17	17	17	18	18	23	23	32	32	B	B	B	23	21	16	B	10	19		
11	12	10	11	B	21	17	16	16	16	17	23	B	31	B	B	32	B	28	28	B	B	B	B	B		
12	B	11	10	B	15	16	17	17	B	B	B	36	32	21	55	24	B	18	18	B	B	B	B	16		
13	B	8	11	19	21	20	17	18	B	B	23	31	24	23	23	17	10	13	16	E S	11	11	8	9	8	
14	10	10	17	11	10	9	9	9	9	17	18	22	32	24	22	18	10	9	6	9	9	B	10	B		
15	9	9	9	9	B	9	7	8	E S	16	16	18	19	25	E S	51	18	23	15	9	19	9	10	16	12	18
16	9	19	16	16	8	23	6	16	19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
17	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
18	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
20	C	C	C	C	C	C	C	C	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
21	8	8	8	18	22	17	11	9	18	31	B	B	B	E S	E S	31	23	B	B	B	B	B	B	B	11	
22	8	8	7	18	17	18	18	19	B	B	22	23	24	33	32	B	50	B	18	B	B	B	B	B	B	
23	8	16	34	27	19	13	18	15	23	B	B	33	24	23	27	21	20	18	23	B	B	B	B	9		
24	10	13	B	B	B	B	B	13	18	B	B	26	18	17	33	B	32	24	22	17	B	B	B	B		
25	17	15	9	15	8	B	17	13	9	17	16	17	18	12	19	17	17	11	9	10	10	B	9	9		
26	9	9	18	18	17	B	18	12	10	19	17	16	16	17	16	16	16	9	9	27	B	B	B	9		
27	9	8	16	B	B	19	15	18	18	15	17	E S	23	37	31	23	23	18	B	B	17	7	7	7	16	
28	9	12	9	B	11	9	15	11	9	C	23	C	22	23	30	23	13	C	C	C	B	C	C	C		
29	18	17	31	B	23	C	B	22	B	C	B	C	C	C	23	32	23	B	B	C	B	C	C	C		
30	9	24	B	23	23	18	17	18	C	32	18	B	B	B	27	18	22	19	17	E S	16	B	B	B	B	
31	B	16	8	30	17	17	18	22	E S	18	17	17	33	32	18	18	12	12	16	16	B	B	B	9		
	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	27	27	27	26	27	27	26	25	26	25	25	25	27	27	27	25	23	24	27	24	25	25		
MED	9	10	11	19	19	18	17	18	18	32	23	30	31	U	28	28	24	23	24	22	19	B	B	12	13	
U Q	17	16	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
L Q	8	8	9	15	13	16	15	13	10	17	18	20	20	20	19	18	16	12	16	14	16	18	9	9		

AUG. 1993 fmin (0.1MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 1993 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	S	A	A	A	A	A	A	A	B	S													B	B	Y	A	
2	A	A	A	A		200	AE A	320	SE B	280	260	220	230	200	205	200	230	200	230	C	S		B	B	B	A	
3	A	S	A	A	A	S	A		SE A	300	255	230	205	200	205	210	205	205		C	C	C	B	B	A	A	
4	A	S	B	A	A	A	B	B	B	B	B	C		C	CE SE S	260	270		B	B	A	A			A	S	
5	A	A	A	B	B	A	A	B	B	B	B	B	B	B	B	B	B		B	B	B	B	B	A	A	S	
6	A		B	B	A	B		A	A	B	B	B	B	B	B	B	B		B	B	C	S		A	A	A	
7	A		A	A	A	B	B	A	B	B	B	B	B	S	B	B	B		B	B	B	Y	B	S	Y	A	
8	B	A	B	B	A	A	S	B	B	B	B	B	B	B	B	B	B		B	B	B	B	B	B	B	B	
9	Y	A	A	A	A	B	B	B	A	B	B	B	B	B	B	B	B			240	265	230		B	S	A	A
10		A	A	A	A	A	A	A	A		250	240	210	230	235	235		B	B	B		S	S	B	A	A	
11	A	A	A	B	A	A	A	A		275	230	230		240		B	BE B		B		235	290		B	B	B	B
12	B	Y	Y	B	A	AE B	B	B	B	B	B	BE B	B	250	250	230	250	210		B		210	220		B	B	S
13	B	S	A	A	A	A	A	A	B	B	S		230	230	230	200	215	200	200	240	220	220	290		Y	Y	
14	200	200		S	S	230	A	AE A	300	250	230	230	215	220	220	205	205	200	200	240	260		Y	B	Y	B	
15	A	S	A	S	B	S	S	SE B		275	245	235	245	205	250	215	200	200	205	240	235	300		A	A	A	
16	A	A	A	A	A	A	A		235	S	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
17	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
18	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
20	C	C	C	C	C	C	C	C	C	C	B	B	B	B	B	B	B		B	B	B	B	B	B	S	B	
21	S		A	A	A	A	A	A		220	245		B	B	BE BE B				B	B	B	B	B	B	B	S	
22	Y	A	A	A	A	A	A	A	B	B		255	250	240	245	200		BE B	B		210	B	B	B	B	B	
23	S	A	A	A	A	A	AE SE B	280	280		B	B		240	225	225	205	210	205	200	225		B	B	B	Y	
24	A	A	B	B	B	B	B	AE B	280		B	B	B		220	215	200	210		B		220	205	220	210	B	
25	Y	A	A	A	S	B	AE AE A	325	285	245	230	200	205	205	205	200	200	200	205	200	220		B	Y	Y		
26	Y	A	A	A	A	B	AE A	285	260	240	205	210	210	210	205	215	215	200	215	250		B	B	B	A		
27	A	A		B	B	A	AE B	280	250	240	220	220	250	245	200	255	240		B	B	A		A	A	A	220	
28	A	A	A	B	AE A		AE A	300	210	310		245		CE B	260	220	250	245	250		C	C	C	B	C	C	
29	A	A	S	B	A	C	B	A	B	C	B	C	C	C		225	285	250		B	B	C	B	C	C	C	
30	A	A	B	S	A	A	A	A	CE B	275	215		B	B	B		220	215	215	200	205	210	S	B	B	B	
31	B	S		S	A		A	A		260	200	210	210	250	225	210	210	200	200	210	225		B	B	B	A	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT		2	5	2		2	2	4	6	13	13	14	16	17	17	20	18	18	14	15	10	5	2		2		
MED		210	220	220		215	262	275	282	275	245	230	219	220	218	209	211	205	200	222	225	220	248		235		
U Q		235						328	300	282	252	235	240	245	235	228	245	240	210	250	240	270					
L Q		205						220	280	255	235	215	210	205	205	205	210	200	200	210	210	220					

AUG. 1993 h'F (KM)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 1993 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 36	A	XO 68	X 33	A	34	A	X 38	48	51	S	X 68	X 78	X 71	X 67	X 68	60	XO 60	XO 49	XO 47	27	B	B	B			
2	Y	Y	Y	S	S	S	S	B	S	S	56	64	67	76	72	76	73	65	S	C	B	S	A	A			
3	A	A	B	A	A	A	B	B	B	B	S	B	B	B	B	72	58	X	C	B	S	A	S	A	B		
4	C	A	A	B	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	S	B	B	S	S			
5	A	B	B	A	B	B	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	S	S			
6	S	S	S	A	B	S	A	B	B	B	O 46	XO 47	X	B	B	B	B	B	B	B	44	S	S	S	A		
7	A	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	S	O 48	XO 48	X	B	B	B	B			
8	S	S	S	B	B	S	S	S	S	B	B	B	B	B	B	56	Y	O 56	XO 42	XO 43	X	32	S	B	S		
9	S	A	A	B	S	S	O 30	X 37	XO 46	X 48	XO 52	X 54	X 63	X 60	X 66	68	65	55	52	53	33	S	Y	S			
10	S	S	O 35	X 36	C	A	A	O 44	XO 44	X 53	C	67	64	B	69	C	X 68	S	C	XO 53	X 33	B	B	A			
11	A	A	S	A	A	A	A	O 48	X 49	XO 53	X 57	X 66	X 65	X 66	X 60	X 68	55	49	39	30	25	S	S	S			
12	A	A	A	A	B	A	A	X 44	X 47	XO 47	X 48	X 56	XO 64	X 64	X 65	X 67	60	68	60	S	S	S	S	S			
13	A	S	S	A	X 40	A	B	B	B	B	B	B	B	B	Y	B	S	A	S	O 43	X	S	A	B	S		
14	S	B	A	B	B	B	B	B	B	B	B	B	C	B	B	B	B	O 40	X	B	A	B	A	A	A		
15	B	B	B	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	O 44	X	B	B	A	A	A		
16	A	A	O 33	X 33	A	A	O 74	XO 48	S	X 47	X 47	X 67	X 64	X 67	X 70	X 68	78	69	B	52	S	Y	S	S			
17	S	S	S	S	O 32	XO 34	XO 31	X 39	X 38	B	B	B	B	X 71	X 72	68	73	73	58	46	S	B	B	B			
18	S	S	S	S	B 44	O 44	X 44	S	B	B	B	66	70	X 75	X 79	74	74	75	B	B	B	B	33	29	B		
19	B	B	S	S	A	A	B	O 48	XO 53	X 54	X 58	X 64	X 64	X 70	X 72	X 77	64	58	60	61	36	28	X	S	B		
20	A	A	A	A	O 33	X 33	B	B	O 38	XO 53	XO 52	X 59	X 66	X 67	XO 74	XO 75	XO 96	X 96	85	Y	Y	O 55	X 55	A	C	C	
21	C	C	C	C	B	B	S	S	C	C	C	C	C	C	S	C	X 56	X 56	XO 56	X 50	S	S	O 36	X 36	A	A	
22	Y	A	S	S	S	B	S	B	S	S	B	B	B	B	B	B	B	B	S	O 51	XO 52	X 58	S	S	O 30	X 30	
23	26	A	O 65	X 65	S	S	O 37	XO 29	XO 34	X 37	X 46	C	O 69	XO 73	XO 80	X 72	X 70	68	68	60	59	45	43	S	C	A	A
24	S	A	A	S	A	S	S	S	O 34	X 38	XO 39	XO 39	XO 30	XO 31	X 46	X 47	X 47	X 49	47	43	S	C	A	A	A		
25	A	S	S	A	S	S	S	S	X 46	XO 43	XO 41	S	S	S	S	B	X 51	X 51	X 48	X 49	XO 49	X 33	S	A	A	A	
26	S	S	A	A	A	B	B	S	B	B	B	O 44	XO 43	X	B	B	B	B	O 54	X 54	B	O 51	XO 40	B	B	Y	
27	S	S	S	S	B	S	A	B	B	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	O 50	XO 47	XO 44	X 60	X	C	XO 71	X 74	X 80	X 67	X 63	X 52	Y	B	A	A	A	
29	A	A	B	A	O 33	X 33	A	A	O 41	X 53	X 54	X 53	X 59	B	X 53	X 63	B	X 75	X 55	Y	A	Y	A	B	B	B	
30	A	A	S	B	B	B	B	B	B	B	B	B	B	B	B	B	S	O 49	XO 47	XO 46	XO 46	X 44	X 26	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	2		3	2	5	4	4	9	12	13	13	16	14	13	15	17	19	20	16	17	12	6	1	1			
MED	31		O 65	XO 33	XO 33	XO 36	XO 30	XO 39	X 46	XO 49	X 52	X 62	X 64	X 70	X 70	X 68	X 68	XO 56	XO 50	X 49	X 34	X 30	X 29	XO 30			
U Q			X 68		XO 38	XO 40	XO 52	XO 46	X 50	X 52	X 57	X 67	X 67	X 75	X 72	X 74	X 75	X 68	X 59	X 52	X 44	X 36					
L Q			O 35		O 32	X 34	O 30	X 38	X 41	XO 46	XO 46	X 50	X 63	X 62	X 66	X 58	XO 58	XO 52	XO 48	XO 44	X 32	X 26					

IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 1993 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	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	30		AJ	SU	S	A		A		FJ	SD	S		J	S		J	S	F		U	SU	S	F	B	B	B
2	Y	Y	Y	S	S	S	S	S	BD	SD	SJ	S	62	72	65	61	62	52	52	43	41	22		S	A	A	
3	A	A	B	A	A	A	B	B	B	BD	S	B		B	B	B	F		C	B	S	A	S	A	B		
4	C	A	A	B	S	B	B	B	B	B	B	B		B	B	B	B	B	B	B	S	B	B	S	S		
5	A	B	B	A	B	B	S	B	B	B	B	B		B	B	B	B	B	B	B	B	B	B	S	S		
6	S	S	S	A	B	S	A	B	B	BU	SU	S		B	B	B	B	B	B	B	F	S	S	S	A		
7	A	S	S	B	B	B	B	B	B	B	B	B		B	B	B	BD	SU	S		B	B	B	B	B		
8	S	SD	S	B	B	S	S	S	S	B	B	B		B	B	B	J	S	Y		U	S	S	S	B	S	
9	S	A	A	B	S	SU	S		SJ	S	SJ	S						J	SU	S	F		S	YD	S		
10	S	SU	S	C	S	A	A	A	S	S	S	C		57	54	60	62	59	49	46	43	27		B	B	A	
11	A	A	S	A	A	A	A	A	S		SJ	S						J	SJ	SU	SU	S		A	A		
12	A	A	A	A	B	A	A		J	S	SJ	S		60	59	60	54	62	49	43	33	24	19		SD	S	
13	A	S	S	AJ	S	A	B	B	B	B	B	B		B	B	Y	B	S	A	SU	SD	S	A	B	S		
14	S	B	A	B	B	B	B	B	B	B	B	B		C	B	B	B	B	S		B	A	B	A	A	A	
15	B	B	B	S	S	B	B	B	B	B	B	B		B	B	B	B	B	B	S	B	B	A	A	A		
16	A	A	AU	S	A	AU	SU	SD	SJ	SJ	S						F		F	B	FD	S	Y	S	S		
17	S	S	S	SU	SU	S		J	S	B	B	B		BJ	F		F	F	J	S	SD	S	B	B	B		
18	S	S	S	S	BU	S	B	B	B	B	V			J	R	F	F		B	B	B	B	J	S	F	B	
19	B	B	S	S	A	A	B		U	SJ	SJ	S		64	62	68	58	52	54	55	30	22	17		SD	S	
20	A	A	A	AU	S	B	BU	S	S	J	S	V		61	68	69	90	90	J	S	Y	Y	S	A	C	C	
21	C	C	C	C	B	B	S	S	C	C	C	C		CD	S	C		J	SJ	S	SD	S	SU	S	A	A	
22	Y	A	S	SD	S	B	S	B	S	S	B	B		B	B	B	B	BD	SU	S		D	SD	SD	S	24	
23	F	A	S	S	S	S		SJ	SJ	S	C					FJ	F			FJ	SJ	SJ	S	S	S	A	
24	S	A	A	S	A	S	S	S	S	S	S	S		S	S	S	24	25	40	41	J	S	F	S	C	A	A
25	A	S	S	A	S	S	S		R	U	R	D	S		SD	S	BJ	S		J	S	S	S	A	A		
26	S	S	A	A	A	B	B	S	B	B	BU	S		S	B	B	B	BU	S	B	U	S	B	B	Y		
27	S	S	S	S	B	S	A	B	B	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	CU	SU	S		C		R	J	S		R	R	Y	B	A	A		
29	A	A	B	AU	S	A	AU	SJ	S	J	SJ	S		B		R	B	J	S	Y	A	Y	A	B	B		
30	A	A	S	B	B	B	B	B	B	B	B	B		B	B	BD	SU	SU	S			F	A	A			
31																	37	43	41	40	40	38	20				
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT		2		4	2	6	4	4	9	14	14	15	17	14	15	15	18	20	22	16	19	15	7	4	2		
MED	24		U	U	SU	S	S			SU	U	4	56	58	63	62	62	60	50	44	42	31	27	32	36		
UQ			S		S	S	S		S	J	S							67	59	50	46	39	37	36			
LQ			S		U	S			S	S	S						S	S	S	S	S	S	S	S			
			33		27	28	24	32	38	41	39	41	57	47	59	50	51	42	42	37	26	20	20				





IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 1993 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 <sup>H</sup>	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	17	33	16	18	12	17	17	17	16	23	23	23	19	17	17	17	16	15	16	17		B	B	B	
2	8	7	8	10	10	9	12		B	19	22	23	23	19	18	17	24	32	32	32	C	B	11	12	12	
3	16	23	B	18	15	15	B	B	B	B	B	22		B	B	B	24	23	C	B	19	17	12	19	B	
4	C	7	17	B	23	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	12	B	B	11	10	
5	18	B	B	16	B	B		B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	10	9	
6	8	23	9	27	B	36	23	B	B	B	24	32		B	B	B	B	B	B	B	16	17	9	9	24	
7	18	24	21	B	B	B	B	B	B	B	B	B	B	B	B	B		29	30	10	B	B	B	B	B	
8	14	19	19	B	B	24	30	18	20		B	B	B	B	B		32	34	20	E S	E S	19	15	19	B	18
9	16	25	18	B	18	19	14	14	19	19	E S	E S	E S	E S	E S	E S	29	31	30	18	18	10	S	9	10	
10	10	10	9	C	9	9	18	14	30	18	C	19	36		30	C	19	31	C		23	18	B	B	8	
11	10	10	18	18	20	30	18	20	17	19	19	19	18	24	18	19	18	18	18	11	10	10	10	10	10	
12	14	19	13	13	B	18	10	10	17	18	18	19	52	35	18	19	30	18	10	24	10	10	10	17	19	
13	18	14	30	20	11	20	B	B	B	B	B	B	B	B	24	B	20	45	18	9	22	9	B	10		
14	19	B	13	B	B	B	B	B	B	B	B	B	C	B	B	B	B	20	B	10	B	10	8	14		
15	B	B	B	19	19	B	B	B	B	B	B	B	B	B	B	B	B	B	B	30	B	B	10	10	14	
16	11	18	9	9	7	23	18	9	31	25	29	31	30	31	31	32	31	23	B	18	13	10	7	10		
17	10	9	10	9	9	10	10	18	24	B	B	B	B	32	36	31	30	25	19	23	25	B	B	B		
18	11	24	19	18	B	19	19	B	B	E S	E S	E S		E S	E S	E S	E S	B	B	B	B	19	15	B		
19	B	B	19	10	19	50	B	18	18	19	24	22	23	56	31	31	50	24	18	16	18	16	9	9		
20	11	18	9	9	9	B	B	19	18	23	24	32	19	E S	E S	E S	19	57	30	18	19	10	8	C	19	
21	15	C	C	10	B	B	18	19	18	C	C	C	C	18	C	19	18	19	14	8	7	7	14	15		
22	15	14	13	9	16	B	16	B	18	18	B	B	B	B	B	B	B	31	18	16	14	19	15	10		
23	18	15	25	13	14	14	11	15	14	19	C	16	18	16	19	15	19	16	28	9	14	10	9	10		
24	9	16	16	16	18	10	15	15	18	14	17	17	20	18	14	16	13	15	10	8	7	14	14	8		
25	9	8	8	18	9	9	18	10	12	14	15	30	23	27	B	20	16	20	14	18	14	9	8	10		
26	19	19	19	18	18	B	B	18	B	B	B	20	32	B	B	B	B	30	B	19	23	B	B	10		
27	7	16	24	18	B	19	19	B	B	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		15	14	19	19	C	30	30	18	20	19	14	10	B	18	10	
29	16	14	B	19	8	9	24	9	7	7	7	16	B	50	19	B	23	18	14	15	16	16	B	B		
30	20	24	30	B	B	B	B	B	B	B	B	B	B	B	B		31	30	23	15	10	19	7	8	7	
31																										
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		
CNT	28	28	28	28	29	29	29	29	29	28	26	28	27	28	28	28	29	28	28	28	28	29	28	28	29	
MED	14	18	18	18	18	23	19	19	24	24	28	32	36	54	34	31	30	24	18	17	17	13	14	10		
U Q	18	24	28	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	21	B	B	B	B		
L Q	10	14	12	12	10	13	16	15	18	18	22	20	20	28	22	20	19	20	15	12	12	10	9	10		

# IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 1993 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

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

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1	240	AE S	350	240	A	A	A	300	250	205	205	240	250	210	210	200	200	200	E S E S	215	215	230	B	B	B	
2	Y	Y	Y	S	S	S	S	B	250	250	220	230	205	225	220	220	215	200	225	C	B	A	A	A		
3	240	A	B	A	A	A	B	B	B	B	230	B	B	B	B	235	250	E B	C	B	S	A	S	A	B	
4	C	A	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	A	A	
5	A	B	B	A	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	S	S	
6	A	A	A	A	B	S	A	B	B	B	E B	B	B	B	B	B	B	B	B	E S	230	240	A	A	A	
7	A	S	S	B	B	B	B	B	B	B	235	265	B	B	B	B	240	240	240	B	B	B	B	B	B	
8	A	A	240	B	B	A	A	A	A	B	B	B	B	B	B	245	Y U	S E B	E S	210	260	220	250	240	B E S	
9	S	A	A	B	A	A	S	260	235	215	245	240	250	230	230	250	220	205	235	215	230	S	Y	235		
10	A	A	A	C	250	A	A	AE B	290	200	C	235	225	B	240	C	210	225	C	E B	B	B	B	A		
11	A	A	A	A	A	A	A	AE A	310	235	200	235	220	240	210	205	205	205	210	215	230	210	A	A		
12	A	A	A	A	B	A	A	260	200	205	200	240	300	240	200	220	230	240	230	E A	A	A	210	A		
13	A	A	A	A	A	A	B	B	B	B	B	B	B	B	Y	B	A	A	A	AE A	240	A	B	A		
14	A	B	A	B	B	B	B	B	B	B	B	B	B	C	B	B	B	B	265	B	A	B	A	A		
15	B	B	B	A	S	B	B	B	B	B	B	B	B	B	B	B	B	B	E B	280	B	B	A	A		
16	A	A	AE A	A	A	A	AE AE B	300	270	215	220	260	230	220	230	240	240	215	B	230	E B	Y	A	A		
17	A	S	A	AE AE	AE AE	AE AE	AE B	B	B	B	B	B	B	220	245	215	240	205	200	230	230	B	B	B		
18	S	S	A	A	B	A	B	B	B	E S	E S	E B	210	E S	E S	E S	B	B	B	B	B	E B	E B	B		
19	B	B	A	A	A	S	BE A	280	235	200	200	200	200	310	230	240	250	215	220	215	250	250	260	B		
20	A	A	A	A	A	B	BE B	260	200	205	220	250	220	320	320	240	280	240	235	Y	240	A	C	C		
21	C	C	C	C	B	B	A	A	C	C	C	C	C	215	C	220	230	230	205	230	A	230	A	A		
22	A	A	A	A	200	B	A	B	A	A	B	B	B	B	B	B	B	B	240	215	230	205	225	220	230	
23	245	A	200	240	A	AE A	310	260	200	225	C	225	200	210	215	215	235	220	205	220	245	250	A	A		
24	A	A	A	A	A	A	AE A	300	240	225	250	220	220	210	215	240	240	245	280	E A	A	C	A	A		
25	A	A	A	A	A	A	A	200	200	250	210	240	E B	S	205	B	220	225	235	250	235	260	A	A	A	
26	A	A	A	A	A	B	B	A	B	B	B	E B	B	B	B	B	B	B	250	BE B	230	260	B	B	A	
27	A	A	A	A	B	A	A	B	B	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	250	235	225	200	C	E B	E B	235	230	220	235	A	B	A	A		
29	A	A	B	A	300	A	A	200	E A	305	215	235	235	B	B	215	BE A	290	250	A	A	A	A	B	B	
30	A	A	S	B	B	B	B	B	B	B	B	B	B	B	B	B	BE B	BE B	E A	260	280	250	290	250	245	290
31																										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	3		3	3	4	2	2	10	14	14	15	17	14	14	15	18	20	22	18	18	16	8	4	3		
MED	240		U	220	240	U	248	270	300	255	222	215	220	235	212	216	222	218	230	230	223	228	236	232	228	232
U Q	245		E S E A	350	320	295			E AE A	280	290	240	235	250	240	240	240	248	240	E	245	235	E B E	250	262	265
L Q	240		200	240	225				240	200	205	205	228	205	210	210	215	222	210	215	220	230	228	215	230	

IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 1993 f<sub>XI</sub> (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	S	S	B	B	B	A	B	B	B	B	B	B	B	B	B	O	X	X	B	A	A	A	
2	A	B	B	S	A	S	X	X	O	X	X	B	B	O	X	X	X	X	X	X	X	B	O	X	X	
3	A	A	A	S		X	X	O	X	X	X	B	B	X	X	X		O	X	X	X	X	X	A	A	
4	A	B	C		60	51	46	48	53	53	44	61	63	66	73	72	74	73	75	62	56	40	37	A	X	
5	X	A	B	A	C	A	S	B	B	O	X		X	O	X	S	O	X	C	X	X	X	X	A	A	
6	C	A	A	A	C	O	X	C	B	B	S	B	B	B	B	B	B	S	O	X	O	X	X	X	S	
7	S	S	S	S	S	S	S	O	X	X	O	X	Y	O	X	S	X	X	X	X	X	X	X	O	X	
8	S	O	X	Y	Y	Y	S	S	O	X	X	C	B	C	B	B	X	B	B	B	O	X	X	S	S	
9	S	O	X	A	A	S	S	S	B	O	X	Y	B	B	B	B	B	O	X	X	X	O	X	S	S	
10	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	S	Y	B	O	X	S	S	Y	
11	X	B	B	Y	O	X	B	O	X	B	B	B	B	B	B	B	B	B	B	B	Y	B	B	Y	S	
12	Y	B	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	X	O	X	B	O	X	B	
13	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	X	X	S	S	S	
14	S	S	S	B	B	S	B	Y	B	Y	B	O	X	O	X	Y	Y	X	X	B	B	B	O	X	S	
15	O	X	S	B	A	A	A	S	X	X	X	B	B	X	S	V	X	X	X	X	X	X	O	X	O	
16	A	A	S	A	B	A	S		59	66	68	70	73	76	78	87	92	80	66	66	55	B	O	X	X	
17	A	A	B	B	A	S	B	B	B	O	X	X	S	O	X	X	X	X	X	X	X	X	X	S	Y	
18	S	A	B	B	B	B	B	B	B	B	B	B	S	S	S	O	X	X	C	C	X	B	S	S	S	
19	A	S	S	A	A	B	A	B	S		O	X	X	O	X	X	X	X	X	O	X	X	S	S	S	
20	A	S	O	X	A	A	O	X	O	X		X	X	X	B	Y	X	X	X	X	X	X	S	S	S	
21	S	A	X	S	A	B	S	Y	Y		B	Y		X	X	X	X	X	X	X	X	X	O	X	X	
22	S	A	A	O	X	X	S	B	B	S	O	X	B	B	B	B	X	X	X	X	X	X	O	X	A	
23	A	A	A	A	A	S	O	X	O	X	S	B	B	B	B	B	B	B	O	X	S	O	X	X	S	
24	S	O	X	A	S	S	B	B	S	O	X	O	X	O	X	O	X	O	X	X	X	X	X	O	X	A
25	A	O	X		O	X	O	X	Y		C	O	X	B	C	X	B	B	O	X	Y	S	O	X	S	
26	A	S	S	S	S	O	X	X	X	O	X	S	X	B	S	X	S	S	O	X	S	X	X	A	S	S
27	O	X	B	S	S	S	O	X	B	S	S	B	B	B	B	B	B	B	B	B	S	S	O	X	O	X
28	S	A	S	B	B	O	X	S	B	B	B	B	B	B	B	B	X	B	O	X	X	B	X	X	A	
29	S	B	B	B	S	O	X	B	B	S	B	B	B	B	B	B	B	S	O	X	B	O	X	S	S	
30	B	A	A	O	X	B	B	A	O	X	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
31	X	X	S	O	X				X	X		X	X	O	X	O	X	X	X	X	X	X	O	X	S	
	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	5	6	10	8	13	13	16	12	10	12	14	16	17	22	20	25	23	22	18	7	5		
MED	X	O	X	X	O	X	X	X	X	X	X	X	O	X	X	X	X	X	X	X	X	X	X	O	X	
U Q	43	43	35	42	46	47	48	53	57	54	60	61	65	66	68	65	64	62	58	53	46	42	47	44		
L Q	X	X	X	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	O	X	X	
	46	47	42	51	51	54	58	59	68	64	69	68	71	73	74	72	69	68	62	59	51	50	48	52		
	X	O	X	O	X	X	O	X	X	O	X	O	X	O	X	X	O	X	X	X	X	O	X	X	X	
	34	26	32	40	45	45	45	48	51	48	56	54	56	58	62	62	59	54	50	47	43	34	39	30		

IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 1993 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	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	S	S	B	B	B	A	B	B	B	B	B	B	B	B	B	U	S		B	A	A	A				
2		A	B	B	S	A	S										J	R		J	S	B	S		A	A				
3		A	A	A	S	F		37	41	45	46			61	67	70	66	60	60	49		B	35	28		A	A			
4		A	B	C	J	F	F		U	S	J	S					R		R		U	R	F	23		A	A			
5	27		A	B	A	C	A	S	B	B							S	D	S	U	S		J	S	A	A	S			
6		C	A	A	A	C	S	C	B	B	S	B	B	B	B	B	B	S	U	S	U	S	U	S		F	S			
7		S	S	S	S	S	S	S	S	43	44	37	Y	S	S	J	S	J	S	J	S		J	S		F	S	F		
8	D	S	S	Y	Y	Y	S	S	S	41	36	53	C	B	C	B	B		B		B	J	S	U	S	F	D	S	S	
9		S	U	S	A	A	S	S	S	B	U	R	Y	B	B	B	B	B	R			R		S	S	S	S	S		
10		B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	S	Y	B	U	R	D	S	S	Y	A			
11	37		B	B	Y		B	U	S	B	B	B	B	B	B	B	B	B	B	B	B	Y	B	B	Y	S	S			
12		Y	B	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B		U	S	B			B	S	S			
13		S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		45	40	F	F	S	S		
14		S	S	S	B	B	S	B	Y	B	Y	B	S	S	Y	Y			B	B	B		37	19	17	F	D	S	S	
15	S	S	B	A	A	A	S			J	S	B	B	D	S	V		F	F	F	F	F	U	S	F	S	S			
16	A	A	S	A	B	A	S	F	F	F	64	67	F	F	F	F	F	F	F	F	F	B	U	S	J	S	D	S	S	
17	A	A	B	B	A	S	B	B	B	46	48		U	S	S						J	S		S	Y	S	Y	S		
18	S	A	B	B	B	B	B	B	B	B	B	B	S	S	S	R	60	56	C	C	J	S	B	S	D	S	S	S		
19	A	S	S	A	A	B	A	B	S	F	S	J	R		F						J	S	D	S	S	S	D	S	S	
20	A	S	S	A	A	S		F	F	F	61	65	65	61	62	B	Y	J	S	J	S	J	S	S	S	S	S	S	S	
21	S	A	J	S	S	A	B	D	S	Y	Y	J	F	B	Y	J	F	J	S	F	F	F	J	S	F	F	U	R	S	
22	S	A	A	U	S		S	B	B	S		B	B	B	B	F	62	62	58	63	63	60	51	46		A	D	S	S	
23	A	A	A	A	A	S	U	R	R	S	B	B	B	B	B	B	B	S		S	U	S	S		S	S	S	S	S	
24	S	U	S	A	S	S	B	B	S		U	S	U	S	S	S	S	S	S	J	S		U	S	F	A	A	A		
25	A	S	F	F	S	U	R	Y	J	F	J	F	C	R	B	C				F	U	S	F	Y	S	S	S	S	S	
26	A	S	S	D	S	D	S	U	S	J	S	S	S	J	S	B	S	S	D	S		41	33	A	S	S	S	S	S	
27	S	B	S	S	S	S	B	S	S	S	B	B	B	B	B	B	B	B	B	B	B	S	S	R	U	R	A	S	S	
28	S	A	S	B	B	S	S	B	B	B	B	B	B	B	B	B	J	S	U	S		B		S	A	A	A	A	S	
29	S	B	B	B	S		B	B	S	B	B	B	B	B	B	B	B	S		59		37		S	S	S	S	S	S	S
30	B	A	A	S	B	B	A	S	D	S	J	S	J	S	S	J	S				F		53	46	44	42	42	S	S	
31	44	44	S	36	46	54	59	65	65	67	69	68	F	U	R	F	74	80	79	74	67	64	54	46	38	R	A	S	S	
		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	5	3	6	7	10	9	13	14	16	12	10	13	16	16	17	22	21	25	23	24	20	8	8					
MED		35	37	29	35	40	41	42	44	50	47	54	55	58	60	62	59	56	56	51	47	40	36	37	39					
UQ		37	41	36	37	42	48	52	52	57	58	62	62	64	65	68	66	63	62	56	53	45	44	40	42					
LQ		27	20	26	33	28	38	37	42	45	42	50	48	43	51	56	56	53	47	44	41	37	28	28	27					

IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 1993 ftEs (0.1MHz) 45'E MEAN TIME (G.M.T. + 3 H)

LAT. 69'00.4'S ION. 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		40	B	B	33	32	B	B	B		B	B	B	B	B	B	B	B	BE	BE	B	B	41	42	70													
2		51	B	B	33	37	34	29	26	25	30	B	B	26	E	B	26	E	B	22	E	BE	BE	B	BE	BE	B	14	14	40	42							
3		41	41	41	38	26	16	16	21	23	28	36	B	B	26	26	26	26	22	19	19	16	15	32	37													
4		42	B	C	20	12	12	27	23	24	26	C	27	26	37	27	27	81	E	BE	BE	BE	BE	B	B	12	42	46										
5		32	38	B	80	C	42	34	B	B	16	26	17	27	32	28	C	26	22	21	18	19	37	76	78													
6		C	70	39	43	C	E	B	C	B	B	B	B	B	B	B	BE	BE	BE	BE	BE	B	B	21	14	12	39											
7		40	41	41	41	41	38	28	22	25	28	28	27	37	41	38	27	26	21	16	17	20	20	12	12													
8		11	11	12	26	27	41	42	41	31	27	C	B	C	B	BE	B	B	B	33	26	40	E	B	30	30												
9		38	49	47	61	41	40	38	B	38	21	B	B	B	B	B	B	26	33	33	33	31	40	28	36													
10		B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	BE	B	B	BE	B	19	40	36	79												
11		32	B	B	33	33	B	26	B	B	B	B	B	B	B	B	B	B	B	B	B	32	B	B	38	26												
12		26	B	68	B	B	B	B	B	B	B	B	B	B	B	B	B	BE	B	24	27	21	15	B	38													
13		40	40	47	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	BE	B	17	28	27	36												
14		43	34	34	B	B	33	B	32	B	38	BE	B	31	27	27	27	27	22	B	B	BE	BE	B	12	17												
15		32	32	B	41	37	45	40	28	26	36	B	B	E	B	B	B	28	27	27	26	27	24	24	24	16	E	BE	B	19	18	26						
16		31	32	32	33	B	41	33	33	27	27	27	27	28	27	32	28	28	24	21	19	B	16	26	31													
17		82	49	B	B	71	62	B	B	B	32	31	32	32	27	27	32	24	23	E	BE	B	16	27	26	22												
18		32	51	B	B	B	B	B	B	B	B	B	B	28	28	27	27	26	C	C	24	B	41	39	41	47												
19		68	32	38	70	52	B	60	B	43	36	31	E	B	30	26	27	27	32	E	BE	BE	BE	20	38	37	37	71										
20		79	32	21	40	52	40	33	24	24	27	26	26	27	B	27	27	25	23	22	19	26	33	38	39													
21		38	90	90	39	47	B	37	43	40	37	B	27	27	E	S	26	50	E	SE	BE	BE	BE	22	E	BE	BE	B	24	19	19	29						
22		28	70	90	67	27	30	B	B	37	28	B	B	BE	B	30	27	E	B	31	25	30	22	27	26	26	93	40										
23		42	79	41	48	47	39	26	26	42	B	B	B	B	B	B	B	26	E	B	25	23	E	B	21	26	42	42										
24		33	27	69	34	33	B	B	41	36	27	28	28	27	27	27	26	22	23	25	21	27	E	B	19	23	27											
25		33	24	26	27	32	37	39	46	27	C	23	B	C	E	S	55	B	B	32	23	28	41	16	58	46	43											
26		79	41	38	37	33	37	33	41	24	27	27	B	26	27	27	27	27	27	23	22	23	71	38	42	36												
27		33	B	39	39	39	22	B	39	36	B	B	B	B	B	B	B	B	B	B	B	38	42	92	38	60	37											
28		47	71	32	B	B	32	32	B	B	B	B	B	B	B	B	27	BE	B	31	26	B	22	23	37	71	59											
29		58	B	B	B	22	33	B	B	39	B	B	B	B	B	B	B	41	27	BE	B	24	32	33	37	40	39											
30		B	80	89	35	B	B	37	27	26	27	27	27	32	26	35	27	32	26	26	22	21	16	13	14													
31		26	27	37	33	21	24	25	27	27	27	28	E	BE	BE	S	36	56	33	28	32	28	26	26	27	33	41	38	42									
		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	23	21	23	21	21	19	17	21	20	12	13	16	18	19	19	24	23	26	27	28	30	30	31													
MED		39	41	39	38	33	36	33	28	27	28	28	27	27	27	27	27	26	24	24	22	22	26	38	38													
U Q		45	70	58	43	44	40	38	41	38	34	30	E	B	E	B	E	BE	BE	B	B	27	27	32	38	42	43											
L Q		32	32	33	33	27	31	27	25	25	27	26	27	26	27	27	27	26	23	22	20	18	16	26	29													

## IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 1993 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	B	B	24	24	B	B	B	56	B	B	B	B	B	B	B	B	B	30	20	B	9	10	18	
2	17	B	B	24	19	19	18	16	18	30	B	B	24	55	19	50	18	30	19	30	14	14	8	10	
3	20	19	23	16	18	9	10	13	18	19	36	B	B	19	19	18	16	14	19	19	16	15	10	19	
4	15	B	C	10	8	9	10	19	10	19	C	23	19	19	22	23	51	29	22	20	18	8	10	10	
5	18	14	B	14	C	20	18	B	B	14	19	19	19	19	20	C	15	14	14	14	17	9	14	19	
6	C	19	17	18	C	39	C	B	B	19	B	B	B	B	B	B	30	25	30	30	19	11	10	9	
7	10	14	18	14	14	19	14	14	16	14	14	19	18	18	19	19	18	18	10	9	9	8	7	9	
8	10	10	8	9	9	13	19	14	16	18	C	B	C	B	B	55	B	B	19	24	19	19	9	9	
9	19	7	9	10	23	20	14	B	30	16	B	B	B	B	B	B	19	19	15	9	9	9	16	14	
10	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	E S 37	20	B	20	13	9	19	19	
11	8	B	B	19	19	B	19	B	B	B	B	B	B	B	B	B	B	B	B	20	B	B	14	14	
12	21	B	19	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	24	23	B	18	9	14	
13	19	19	18	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	22	14	9	7	10	
14	14	19	19	B	B	20	B	24	B	30	B	31	21	25	22	18	19	B	B	B	25	14	8	9	
15	14	10	B	22	19	22	20	14	14	36	B	B	19	19	19	23	20	20	24	24	15	19	18	10	
16	10	10	14	19	B	24	19	19	16	15	19	24	24	24	19	19	19	19	19	13	B	13	10	9	
17	19	19	B	B	19	62	B	B	B	19	19	19	19	16	16	10	15	18	23	23	11	9	7	9	
18	23	18	B	B	B	B	B	B	B	B	B	19	20	19	19	19	C	C	19	B	18	20	18	10	
19	13	21	13	13	21	B	20	B	24	18	14	30	25	18	19	18	27	30	23	16	10	15	10	14	
20	15	19	16	31	19	18	15	15	15	15	15	18	20	B	19	23	19	18	15	15	10	10	18	14	
21	8	14	14	19	18	B	31	31	18	16	B	25	24	E S 56	24	E S 50	30	30	25	19	24	19	19	8	
22	19	18	9	10	14	9	B	B	16	15	B	B	B	30	20	31	18	30	19	19	10	9	9	23	
23	7	8	25	15	19	19	14	15	19	B	B	B	B	B	B	B	19	25	15	20	14	10	14	14	
24	10	10	14	7	14	B	B	19	16	19	19	16	18	18	14	18	14	15	8	13	9	19	13	7	
25	7	10	10	10	13	14	19	18	13	15	B	B	C E S 55	B	B	B	24	10	10	10	10	10	8	8	
26	8	9	9	8	6	9	15	8	10	13	15	B	23	19	18	20	19	18	10	14	18	14	19	15	
27	19	B	19	19	14	19	B	23	24	B	B	B	B	B	B	B	B	B	16	9	19	10	18	9	
28	18	9	18	B	B	18	19	B	B	B	B	B	B	B	B	19	31	18	B	18	18	14	49	24	
29	23	B	B	B	15	18	B	B	19	B	B	B	B	B	B	B	19	19	B	24	15	15	13	10	14
30	B	10	10	10	B	B	25	15	18	19	19	19	19	18	19	15	15	14	9	9	13	8	10	8	
31	8	18	16	16	10	10	10	10	11	18	16	36	E S 56	20	22	23	18	18	10	13	18	9	18	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	31	30	31	29	31	30	31	31	30	29	31	29	31	31	30	30	30	31	31	31	31	31	31	
MED	15	18	18	19	19	20	20	24	19	19	B	B	24	42	22	25	19	22	19	19	16	10	10	10	
U Q	19	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	23	19	15	18	14	
L Q	10	10	14	10	14	18	15	15	16	16	19	23	20	19	19	19	18	18	15	13	11	9	9	9	

OCT. 1993 fmin (0.1MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 1993 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	S	B	B	B	A	B	B	B	B	B	B	B	B	B	E	E	B	B	A	A	A							
2	A	B	B	A	A	A	A	E	A		B	B		E	B	E	B	E	B		B	E	B	A	A							
3	A	A	A	A	S	S					E	B	B																			
4	A	S	C	E	A	E	S	E	S	E	A																					
5	A	A	B	A	C	A	A	A	B																							
6	C	A	A	A	C	B	C	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A							
7	A	A	A	A		A	S			E	S	E	S		A										E	A						
8	E	S	E	S	Y	S	S	A	A																S							
9	S			A	A	A	A	A	B	E	S	Y	B	B	B	B	B	E	A	E	A	A	A	A	A							
10	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	E	B	Y	B	E	A	A	A							
11	255		B	B	S	E	A	B	E	S	B	B	B	B	B	B	B	B	B	B	Y	B	B	Y	240							
12	Y	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	E	S	B	A	A	B	130							
13	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		E	A	A	A							
14	A	A	A	B	B	A	B	S	B	S	B				S	S									S							
15	275		A	B	A	A	A	A		E	B	B													A							
16	A	A	A	A	B	A	A	A		225	220	215	230	210	220	220	215	E	A			B	A	E	A							
17	A	A	B	B	A	S	B	B		B	E	A													Y							
18	S	A	B	B	B	B	B	B	B	B	B	S	S												A	A						
19	A	S	S	A	A	B	A	B	A																A	A						
20	A	A	E	A	A	A																			E	A	A					
21	A	A			A	B		S	Y	A	B	Y													E	A	A					
22	S	A	A		E	A	B	B	A																A	A	A					
23	A	A	A	A	A	A	E	A																		A	A	A				
24	A	A	A	A	A	B	B	A																		E	B	E	S	A		
25	A	A	A	A	A																					E	B	E	S	A		
26	A	A	A																							A	A	A	A	A		
27	A	B	A	S	A	B	A	S	B	B	B	B	B	B	B	B	B	B	B	S	A				A	A	A	A	A			
28	A	A	S	B	B	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B						A	A	A	A	A		
29	S	B	B	B	E	A	B	B	A	B	B	B	B	B	B	B	B	B	B	B						A	E	A	A	A	A	
30	B	A	A	A	B	B	A	E	A	S																						
31	275	E	A	E	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	4	4	3	4	7	10	8	11	14	17	13	11	14	15	18	18	24	22	25	22	25	20	9	11								
MED	270	268	300	224	280	236	238	228	216	220	212	218	211	218	220	222	220	228	232	239	242	245	248	248								
U Q	300	320	350	285	315	270	282	240	230	250	242	230	230	235	230	230	245	245	252	250	262	278	280	300								
L Q	265	240	240	215	230	225	238	225	210	215	205	215	205	205	210	215	212	220	225	230	232	240	240	220								

IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 1993 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	S	S	S	S	O X 43	S	S	O X 44	X 60	C	C	C	C	C	C	C	C	C	C	X 54	S	C	C	S				
2	C	C	C	C	C	C	C	X 51	X 57	X 60	X 60	X 59	X 59	S	O X 66	X 62	X 62	X 62	X 63	X 63	C	S	C	C	C			
3	C	C	C	C	C	C	O X 65	X 76	X 72	S	X 69	X 70	X 74	X 73	X 71	X 67	X 65	X 61	X 60	X 56	X 53	C	B	A				
4	S	S	A	A	S	A	S	B	B	B	B	B	B	B	B	S	Y	A	S	B	A	Y	A	S	S			
5	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	O X 44	O X 44	O X 42	O X 48	S	O X 44	B			
6	X 39	B	B	B	B	B	B	B	B	S	B	B	B	B	B	B	B	B	B	O X 40	O X 62	O X 46	S	S	B			
7	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	S	O X 43	O X 39	S	S	S			
8	S	B	B	B	B	B	O X 44	X 44	B	B	S	S	B	X 60	B	B	B	B	O X 51	O X 50	O X 43	B	A	B	B			
9	43	A	A	S	B	O X 53	X 54	B	B	X	65	69	67	67	B	B	B	B	O X 56	O X 52	O X 48	X 46	X 45	O X 42	O X 53			
10	42	B	B	B	B	B	O X 50	X 62	A	X	B	B	O X 70	X 69	B	B	B	B	O X 59	O X 59	X 51	Y	B	Y				
11	O X 52	B	O X 43	O X 45	B	B	A	Y	B	B	Y	B	B	X 59	X 63	X 62	X 59	X 58	X 54	X 55	X 51	X 53	O X 58	O X 50	O X 50			
12	X 51	X 51	X 53	X 53	B	B	A	71	79	84	82	80	X 75	X 75	X 73	X 69	X 60	X 59	X 54	X 57	X 57	X 53	X 57	X 57	X 57			
13	49	51	O X 54	X 57	X 57	61	75	75	80	79	80	80	75	83	81	76	81	81	59	52	49	S	S	A	S			
14	48	S	A	51	S	O X 54	A	O X 56	O X 61	O X 69	O X 69	X	B	X 66	X 66	X 66	X 63	X 60	S	B	S	S	S	A	S			
15	S	S	B	S	B	O X 51	S	S	A	Y	B	B	B	O X 63	X 61	X 54	X 53	X 56	X 58	X 57	X 56	X 59	S	Y				
16	Y	Y	Y	51	58	B	B	A	S	B	B	B	B	O X 57	O X 56	X	B	B	O X 50	S	O X 53	O X 52	S	S				
17	S	Y	Y	S	S	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
18	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
20	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
22	C	C	C	C	C	C	C	C	C	C	C	X	X	O X 67	O X 69	O X 68	O X 70	O X 64	O X 61	O X 59	O X 55	O X 54	O X 54	O X 54	O X 53	O X 52	O X 44	
23	S	A	A	A	A	A	X 58	Y	Y	65	68	69	61	Y	59	60	58	59	54	54	O X 54	O X 53	O X 48	B	X 41			
24	O X 44	O X 47	O X 49	X	S	S	S	X 65	X 70	X 72	X 76	X 79	X 74	X 68	X 71	X 69	X 69	X 64	X 61	X 60	X 57	X 54	X 49	X 53	X 58			
25	O X 55	B	S	S	Y	Y	Y	70	70	70	66	62	65	65	65	65	63	60	59	60	52	O X 47	O X 49	O X 50				
26	51	B	S	O X 54	S	X 55	B	O X 67	O X 75	O X 80	O X 90	O X 75	O X 73	O X 65	O X 63	O X 67	O X 61	O X 59	O X 59	O X 60	O X 49	A	B	S				
27	Y	A	B	B	Y	A	B	Y	X 63	X 69	X 66	X 65	X 63	X 62	X 58	X 57	X 56	X 58	X 56	X 56	X 50	X 46	X 46	X 47				
28	S	S	X	O X 61	O X 54	O X 61	O X 69	O X 75	O X 86	O X 86	O X 81	O X 78	O X 78	O X 76	O X 76	O X 69	O X 62	A	X 57	X 57	X 57	X 57	X 52	X 46	X 47			
29	O X 47	X 47	X 52	X	A	B	B	C	62	71	68	60	59	X	X	B	X	X	O X 63	O X 66	O X 66	O X 72	O X 46	O X 48	O X 49	O X 55	O X 47	O X 47
30	O X 44	O X 49	B	S	S	S	Y	O X 67	O X 69	O X 74	O X 73	O X 64	O X 63	O X 66	O X 69	O X 64	O X 57	O X 62	O X 60	O X 57	O X 57	O X 52	O X 46	O X 48				
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	5	6	8	6	7	7	11	13	14	15	14	18	15	17	17	15	18	21	20	20	14	11	11				
MED	O X 48	O X 49	X 51	X 52	X 58	X 55	O X 65	O X 67	X 70	X 70	X 69	X 69	X 66	X 66	X 65	X 64	X 60	X 59	X 56	X 56	X 52	X 52	X 47	X 48				
U Q	O X 51	X 51	X 54	X 54	X 58	X 61	X 75	X 75	X 77	X 79	X 79	X 75	X 73	X 73	X 69	X 68	X 64	X 61	X 59	X 57	X 54	X 53	X 52	X 53				
L Q	O X 43	O X 47	X 47	X 51	X 53	X 53	X 54	X 51	X 62	X 65	X 68	X 65	X 61	X 63	X 62	X 60	X 58	X 56	X 51	X 52	X 49	X 47	X 46	X 47				



IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 1993 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	S	S	S	D	S	S	S	S	J	S	C	C	C	C	C	C	C	C	C	J	S	S	C	C	S			
2	C	C	C	C	C	C	C	45	J	S	J	J	J	S	S	60	R	R	U	S	C	S	C	C	C			
3	C	C	C	C	C	C	J	F	59	70	66	S	63	64	68	67	65	61	59	55	54	50	47	C	B	A		
4	S	S	A	A	S	A	S	B	B	B	B	B	B	B	S	Y	A	S	B	A	Y	A	S	S	S			
5	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	S	S	U	S	S	S	S	B			
6	33	B	B	B	B	B	B	B	B	S	B	B	B	B	B	B	Z	B	B	S	S	S	S	S	B			
7	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	D	S	U	S	S	S			
8	S	B	B	B	B	B	U	S	B	B	D	S	D	S	B	J	R	B	B	B	R	B	A	B	B			
9	Z	A	A	S	B	U	S	B	B	B	D	S	D	S	B	J	R	B	B	B	R	B	A	B	B			
10	F	B	B	B	B	B	B	S	A	J	S	B	B	B	B	B	B	B	B	S	U	S	S	S	S			
11	U	S	B	U	S	S	F	F	Y	B	B	Y	B	B	J	S	J	S	S	S	S	S	F	F	F			
12	45	45	47	J	F	B	B	A	J	F	F	F	J	F	U	R	69	69	67	63	J	S	J	S	F			
13	F	S	F	U	R	J	S	J	S	F	F	F	F	F	J	R	70	75	70	75	75	53	46	43	A	D	S	
14	42	S	A	F	S	U	S	A	S	50	55	59	63	B	B	60	60	60	57	J	R	S	S	S	A	S		
15	D	S	S	B	S	B	U	S	S	S	A	Y	B	B	B	B	S	F	J	S	S	S	S	S	Y			
16	Y	Y	Y	F	F	B	B	A	S	B	B	B	B	B	R	R	B	B	B	S	S	U	S	S	S			
17	S	Y	Y	S	S	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
18	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
20	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
22	C	C	C	C	C	C	C	C	C	C	61	63	62	U	S	55	53	49	48	48	S	J	S	47	R	U	S	
23	S	A	A	A	A	A	J	S	Y	Y	J	F	F	F	Y	J	R	53	53	52	J	S	48	48	47	B	35	
24	S	R	S	S	S	S	59	59	60	70	73	68	62	65	63	63	58	55	54	J	S	48	48	47	42	J	S	
25	49	B	S	S	F	Y	Y	Y	F	F	F	F	60	60	60	60	56	59	59	59	57	54	53	54	46	41	43	44
26	F	B	S	U	S	S	J	S	B	S	V	U	S	F	F	J	F	59	57	61	55	53	53	54	43	A	B	S
27	Y	A	B	B	Y	A	B	Y	J	S	F	F	J	R	J	R	J	J	S	J	S	U	S	44	40	40	41	
28	S	S	55	48	55	J	F	69	80	80	J	R	J	R	J	R	R	70	70	63	56	A	J	R	J	R	J	S
29	Y	S	J	S	S	A	B	B	C	F	F	F	F	J	R	B	57	60	60	66	40	37	43	49	41	41	S	
30	38	43	B	S	S	S	Y	61	63	68	67	58	57	60	63	58	U	S	51	56	54	51	51	46	40	42	S	
31																												
CNT	11	5	6	9	6	7	7	11	13	15	16	14	18	15	17	17	15	18	21	21	20	14	11	12				
MED	39	43	45	46	44	48	59	61	60	60	62	61	58	60	59	58	54	53	51	50	46	45	41	42				
U Q	45	45	48	48	51	50	69	65	65	70	71	68	67	67	63	62	58	55	54	51	48	47	46	45				
L Q	37	41	41	40	41	47	48	45	54	58	60	58	55	57	56	54	52	50	45	44	43	41	40	40				

IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 1993 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		33	33	33	28	36	40	37	39	24	C	C	C	C	C	C	C	C	C	C	24	40	C	C	33				
2		C	C	C	C	C	C	34	26	27	27	27	28	29	27	27	36	27	24	42	C	19	C	C	C				
3		C	C	C	C	C	C	22	24	27	27	27	37	36	40	60	27	E B	50	33	33	28	28	C	B	50			
4		44	32	80	80	39	70	34	B	B	B	B	B	B	B	B	26	22	80	27	B	90	40	94	41	38			
5		36	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	27	25	21	32	36	91	B				
6		60	B	B	B	B	B	B	B	B	32	B	B	B	B	B	E B	31	B	B	E B	30	33	32	37	51	B		
7		46	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	E B	E B	22	20	23	33	33		
8		38	B	B	B	B	B	28	B	B	27	27	27	B	B	B	B	B	E B	E B	E B	30	31	29	40	B			
9		20	65	60	27	B	29	31	B	B	26	26	27	27	B	B	B	B	E B	E B	E B	32	32	33	19	19	15	20	
10		35	B	B	B	B	B	B	38	58	46	B	B	E B	E B	E B	B	B	B	E B	E B	E B	40	35	24	39	B	37	
11		41	B	32	28	35	28	38	B	B	41	B	B	27	27	27	27	26	23	25	E B	E B	E B	E B	31	31	27	32	41
12		45	31	21	26	B	B	51	33	26	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	20	24	21	17	19	12	
13		E B	18	26	20	27	E B	40	37	41	27	26	28	E B	E B	35	41	37	37	27	31	27	30	29	43	43	48	54	42
14		42	41	70	28	42	45	52	48	41	33	E B	E B	E B	E B	35	27	27	28	24	32	B	35	47	37	83	51		
15		44	43	B	44	B	37	47	46	60	42	B	B	B	B	29	26	26	26	26	25	32	26	31	26	46	37		
16		44	43	37	33	26	B	B	78	42	B	B	B	E B	E B	E B	E B	46	55	B	B	B	26	40	40	49	48	36	
17		43	43	42	38	27	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
18		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
19		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
20		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
21		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
22		C	C	C	C	C	C	C	C	C	C	C	C	26	26	27	31	29	27	26	26	38	E B	E B	23	20	31	38	
23		37	39	58	68	51	44	32	41	37	26	33	28	26	37	43	63	27	24	39	27	42	17	B	20				
24		26	26	34	40	47	42	41	60	32	28	26	36	39	33	34	28	35	26	23	28	23	26	22	26				
25		27	B	37	34	32	27	48	46	32	38	32	36	34	33	42	41	28	33	24	27	23	32	22	26				
26		31	B	42	105	43	41	B	44	37	E B	55	30	17	E B	34	27	29	30	22	40	E B	E B	24	24	71	38		
27		37	69	B	B	33	47	B	43	38	28	29	28	32	31	27	27	27	26	23	24	21	21	19	19	E B	19		
28		34	42	31	37	33	27	27	33	28	27	28	27	32	42	41	70	80	42	24	48	44	32	32	27				
29		36	33	33	40	51	B	B	C	37	32	36	33	34	B	26	27	33	32	24	36	39	41	44	32				
30		33	33	B	46	42	42	32	26	27	27	31	27	42	42	42	27	27	38	23	23	23	21	17	29				
31																													
ES		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
CNT		23	15	15	17	15	14	16	16	17	19	16	14	18	17	18	18	17	20	21	24	24	22	18	21				
MED		37	39	37	37	38	40	36	40	32	28	28	28	32	32	28	28	27	28	26	28	28	32	32	33				
UQ		44	43	58	45	43	44	44	46	40	41	32	36	37	41	42	32	34	32	32	35	40	40	48	38				
LQ		33	32	32	28	33	29	32	30	27	27	27	27	27	28	27	27	26	26	24	24	23	21	22	26				

IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 1993 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	19	19	23	18	10	20	25	19	14		C	C	C	C	C	C	C	C	C	10	8		C	C	10														
2		C	C	C	C	C		18	15	15	15	19	14	15	18	18	16	15	16	9	C	16		C	C	C													
3		C	C	C	C	C		10	10	14	16	18	18	18	18	15	14	50	14	14	7	9		C	B	10													
4	20		8	19	19	19	18	15		B	B	B	B	B	B		19	19		B		19	15	15	19	21													
5	10		B	B	B	B	B	B	B	B	B	B	B	B	B	B		B		19	21	16	16	19	19	B													
6	10		B	B	B	B	B	B	B	B	B	B	B	B	B	B		B	B	E	S		16	14	13	16	B												
7	9		B	B	B	B	B	B	B	B	B	B	B	B	B	B		B	B	B		22	16	18	16	15													
8	25		B	B	B	B	B		19		B	B	B	B	B	B		B		30	31	19		B	18	B	B												
9	18	19	19	19		B	20	19		B	B		24	19	19	20		B	B	B		32	32	30	16	19	10	11											
10	15		B	B	B	B	B	B		30	30	24		B	B		56	35		B	B		B	B	40	35	20	18	B	19									
11	10		B		19	19	11	24	24		B	B		19		B	B		18	18	18	18	18	18	20	19	31	31	18	14	8								
12	9	10	18	10		B	B		19	15	16	50	55	55	55	55	30	32	30	32	18	24	18	14	15	9													
13	18	9	9	10	40	15	18	10	14	10	35	32		B			20	24	21	15	16	30	29	18	15	15	19	6											
14	9	8	10	8	30	19	18	10	13	16	32		B			35	18	16	14	22	18		B		10	10	15	10	8										
15	8	16		B	23		B		15	16	19	19	24		B	B		B		19	24	18	19	16	18	8	10	10	19	11									
16	30	23	18	24	19		B	B		24	19		B	B	B	B		B	B	B		17	19	15	10	28	24												
17	20	31	24	25	8		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
18	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
20	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
22	C	C	C	C	C	C	C	C	C	C	C																												
23	19	18	18	18	16	18	15	19	24	16	19	18	21	16	18	18	15	20	24	23	10	10		B		10													
24	13	15	20	19	18	24	19	19	14	18	18	20	18	17	15	15	15	16	15	13	14	10	14	10															
25	18		B	21	18	18	18	18	18	16	16	16	16	15	18	16	23	18	16	15	7	9	18	15	16														
26	14		B	19	19	15	16		B	16	18	55	22	13	34	23	18	23	17	15	27	21	10	15		B		19											
27	24	9		B	B	21	29		B	19	20	15	16	15	15	15	18	17	15	16	10	9	15	18	14	19													
28	23	18	14	13	9	8	9	9	9	16	18	18	19	24	19	16	18	19	13	8	10	9	14	14															
29	25	10	15	16	31		B	B	C		18	17	21	18	18		B		18	14	16	15	14	22	15	10	8	9											
30	15	18		B	19	19	16	18	14	18	18	19	18	18	16	16	18	15	8	16	16	14	10	8	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	23	23	23	23	23	22	24	23	24	23	24	24	24	24	24	24	24	24	24	24	24	25	22	23	24														
MED	18	19	20	19	21	22	19	19	18	19	24	26	20	24	18	18	18	19	18	18	15	15	16	14															
U Q	20		B	B	B	B	B	B	B	B	B	B	B	B	B	B		B	B		31	30	22	16	18	28	20												
L Q	10	10	18	18	16	18	18	15	14	16	18	18	18	18	18	18	16	16	16	14	10	10	10	14	10														

IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 1993 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	S	S	SE	EA	A	A	EA	A		C	C	C	C	C	C	C	C	C	C	250	A	C	C	A		
2	C	C	C	C	C	C	C	250	205	205	210		AE	S	205	205	220	230	EA	C	235	C	C	C		
3	C	C	C	C	C	C	220	215	205	205	200	220	240	205	A	220	315	EA	B	220	230	230	240	C	B	A
4	S	S	A	A	A	EA	A	B	B	B	B	B	B	B	S	Y	A	A	B	A	A	A	A	A	A	
5	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	265	250	EA	SE	S	A		B	
6	A	B	B	B	B	B	B	B	B	S	B	B	B	B	B	B	235	B	EA	EA	EA	A	A	A	B	
7	235	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	EA	EA	EA	EA	A	A	B
8	A	B	B	B	B	EA	A	B	B	200	225		235		B	B	B	B	EA	EA	EA	EA	A	A	B	
9	S	A	A	S	EA	EA	A	B	B	205	210	210	200		B	B	B	EA	EA	EA	EA	EA	EA	EA	EA	
10	A	B	B	B	B	B	B	A	EA	A	B	B	EA	B	B	B	B	B	EA	B	EA	EA	EA	EA	EA	
11	235	EA	A	A	A	S	A	B	B	A	B	B	205	220	230	220	220	225	220	EA	B	205	205	250	250	
12	215	280	305	305	B	B	A	200	210	330	330	330	B	B	205	220	215	215	200	235	240	245	235	250		
13	275	220	280	290	B	EA	A	230	200	220	225	200	205	215	230	205	210	225	235	EA	EA	EA	EA	EA		
14	EA	A	A	A	EA	A	A	205	245	210	225		205	EA	S	205	220	225	S	B	A	A	A	A		
15	200	A	B	A	B	A	A	A	A	A	B	B	B	B	B	B	B	B	EA	A	EA	EA	EA	EA		
16	A	A	EA	EA	A	B	B	A	A	B	B	B	B	B	B	B	B	B	245	A	EA	EA	EA	EA		
17	A	A	A	EA	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
18	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
20	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
22	C	C	C	C	C	C	C	C	C	C		190	230	200	200	210	205	210	205	235	215	240	240	EA	EA	
23	A	A	A	A	A	A	A	A	A		205	200	200	S	215	205	A	205	200	230	EA	S	230	200	EA	EA
24	250	290	EA	A	A	A	A	A		215	200	200	205	220	200	215	200	205	205	215	215	210	240	EA	EA	
25	275	B	A	A	A	A	A	A		205	200	200	200	210	200	205	200	240	215	200	235	215	EA	EA	EA	
26	EA	B	A	A	A	A	B	A	S	B		205	200	200	200	215	200	220	EA	210	220	220	240	A	B	EA
27	A	A	B	B	A	A	B	A	A		210	225	210	200	215	200	200	200	200	230	230	215	235	240	EA	EA
28	A	A	A	A	EA	A	200	215	210	200	200	205	200		A	A	200	EA	EA	EA	EA	EA	EA	EA	EA	
29	A	A	A	A	A	B	B	C		220	200	190	190	200	B	240	215	205	215	235	A	A	220	210	EA	EA
30	EA	A	B	A	A	EA	A	S		255	225	210	260	205	205	A	220	235	205	200	215	235	235	235	EA	EA
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	4	4	5	4	4	7	8	12	15	15	13	14	14	13	16	15	18	21	19	20	13	11	11		
MED	U	U		EA	EA	EA	A																			
UQ	240	265	278	280	275	258	250	218	208	205	200	205	204	212	205	210	210	216	228	240	236	240	240	250		
LQ	275	285	310	298	EA	EA	EA	A																		
	235	235	265	262	245	248	220	210	205	200	200	200	200	200	205	202	205	210	220	230	230	228	225	250		

IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 1993 fxI (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

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

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	O X 59	X 53	A	X 53	X 59	A	A	S	X 73	X 74	X 68	X 60	X 61	X 65	X 70	X 76	X 78	Y	Y	A	A	O X 50	X 50	S	S
2	45	A	S	A	A	S	B	B	B	B	B	B	B	63	B	B	S	O X 45	S	Y	O X 54	A	A	42	
3	S	59	B	Y	A	Y	Y	B	B	B	B	B	B	B	B	B	X 59	X 43	X 60	X 48	X 53	X 46	X 43	A	
4	O X 54	X 55	A	A	A	Y	O X 49	X 56	X 54	X 60	X 60	Y	O X 47	X 60	Y	X 60	X 60	B	S	S	56	55	52	52	S
5	S	B	B	O X 49	Y	B	O X 54	X 64	X 65	X 67	X 65	S	X 69	X 68	X 69	X 70	X 70	X 68	B	O X 49	S	X 48	X 50	B	
6	B	B	B	B	O X 48	Y	X 77	X 74	X 76	X 72	X 74	X 72	X 73	X 69	X 71	X 71	X 68	64	62	O X 61	X 50	X 45	X 45	X 53	
7	B	55	S	B	B	S	61	64	73	76	75	74	73	69	69	61	O X 61	B	Y	Y	Y	O X 64	S	S	
8	A	S	O X 51	B	B	B	Y	B	B	Y	Y	B	B	B	64	Y	O X 48	A	A	Y	Y	60	A	A	
9	X 47	44	40	55	A	A	O X 62	X 70	X 76	X 70	X 62	X 62	X 63	X 63	X 60	X 60	X 61	X 57	X 56	S	X 53	X 52	X 52	X 55	
10	O X 59	X 60	A	70	S	Y	A	69	77	79	84	86	X 84	X 83	76	O X 74	74	65	60	X 53	X 56	X 48	X 66	Y	
11	Y	Y	61	S	B	O X 44	A	S	X 53	X 60	72	75	O X 84	X 75	B	O X 50	B	X 60	X 57	X 52	X 53	X 46	X 49	X 51	
12	O X 43	B	O X 57	O X 60	Y	Y	Y	X 59	X 61	X 69	X 69	X 70	X 70	X 74	X 72	X 70	X 64	X 62	X 57	X 58	X 50	X 46	X 48	X 47	
13	O X 48	S	48	A	S	X	X	X 72	X 79	X 80	X 78	X 78	X 73	X 73	X 72	X 71	X 69	X 64	X 61	X 56	X 53	X 53	X 51	X 47	
14	O X 44	S	S	S	54	58	68	70	77	78	77	76	X 73	X 73	X 72	X 69	X 72	X 70	X 62	X 57	X 54	X 53	X 53	X 53	
15	O X 53	X 52	X 50	X 57	S	X 59	A	O X 47	S	A	60	S	X 63	X 64	X 59	X 58	X 62	X 59	X 60	B	X 58	X 59	X 59	X 57	
16	O X 55	X 51	60	59	69	S	65	X 70	S	B	S	S	X 53	X 58	X 65	X 70	O X 48	X 51	X 51	X 54	X 51	S	S	A	
17	A	B	S	B	S	S	S	B	A	A	O X 45	B	B	B	B	B	B	B	B	48	B	X 44	X 44	X 47	
18	B	B	B	S	B	B	B	S	O X 48	Y	B	B	B	B	B	B	B	B	X 56	B	S	X 59	O X 53	X 50	
19	O X 46	B	B	B	B	B	B	B	O X 52	X 53	X 53	B	O X 47	B	O X 48	X 47	X 60	X 61	X 60	X 54	X 48	X 47	X 45	X 49	
20	50	S	S	B	S	B	B	B	Y	Y	O X 54	Y	O X 48	Y	O X 47	B	O X 59	X 58	X 58	X 57	X 56	X 48	X 43	A	
21	A	A	A	44	48	B	Y	O X 60	X 59	X 62	X 65	B	B	O X 63	X 62	B	O X 68	X 62	X 53	B	A	S	S	A	
22	A	A	A	O X 49	B	A	O X 52	X 52	X 66	X 62	Y	O X 65	X 63	X 57	X 54	B	X 66	X 61	X 52	X 53	X 54	X 53	X 53	X 52	
23	S	S	B	Y	A	O X 63	B	Y	B	O X 58	X 70	67	O X 65	X 59	X 66	X 66	X 69	X 61	X 64	X 61	X 50	X 53	X 49	X 46	
24	A	B	A	S	B	46	45	S	62	70	80	80	O X 67	B	O X 74	B	Y	X 55	X 58	X 58	X 58	B	60	58	
25	47	Y	Y	Y	S	S	B	Y	Y	X 60	X 60	Y	X 58	Y	X 62	Y	O X 69	X 62	B	B	X 62	X 55	X 49	Y	
26	X 45	X 48	B	S	S	S	A	X 59	X 63	X 70	X 67	X 67	X 64	X 63	X 64	X 61	X 59	X 58	X 58	X 56	X 55	X 53	X 60	X 51	
27	X 52	A	S	60	A	S	X 59	S	Y	Y	B	B	O X 64	B	Y	O X 60	X 65	X 64	X 62	B	O X 53	X 61	X 46	X 54	
28	X 55	X 54	B	61	S	C	62	72	80	90	80	73	X 70	X 71	X 66	X 65	X 63	X 65	X 64	C	X 56	X 54	X 44	X 44	
29	X 45	X 52	Y	S	64	70	80	80	90	84	86	78	X 74	X 73	X 69	X 67	X 65	X 62	X 64	X 59	X 59	X 57	X 59	X 60	
30	X 59	X 62	S	B	Y	Y	Y	70	78	81	82	84	O X 84	O X 84	X 75	X 68	X 65	X 66	X 68	X 66	Y	X 63	X 58	X 60	X 63
31	O X 65	X 68	O X 74	O X 70	O X 75	Y	68	70	70	B	B	B	Y	Y	S	Y	X 59	X 61	X 62	X 53	X 50	A	S	A	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	19	13	8	12	7	7	14	18	21	21	23	16	24	21	23	19	26	26	23	18	26	25	24	18	
MED	X 50	X 54	54	58	59	58	62	70	70	70	69	74	66	68	66	66	64	61	60	56	54	53	50	52	
U Q	O X 55	X 60	X 60	X 60	X 69	X 63	X 68	X 70	X 77	X 78	X 78	X 78	X 73	X 73	X 70	X 70	X 69	X 64	X 62	X 58	X 58	X 56	X 56	X 55	
L Q	X 45	X 52	X 49	X 51	X 48	X 46	X 54	X 59	X 60	X 61	X 60	X 67	X 62	X 63	X 62	X 60	X 60	X 58	X 57	X 53	X 53	X 48	X 46	X 47	

IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 1993 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	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	U R	53	47	A	47	53	A	A	S	67	68	62	J R	54	55	59	64	70	J R	Y	Y	A	A	S	S							
2	F	35	A	S	A	A	S	B	B	B	B	B	B	B	57	B	B	B	S	U	S	S	Y	U	S	A	A	F	37			
3	S	F	B	Y	A	Y	Y	B	B	B	B	B	B	B	B	B	B	B	U	S	53	37	54	42	47	40	37	U	S	A		
4	U R	48	F	A	A	A	Y	U R	F	J R	J R	J R	Y	S	J S	Y	J S	54	54	B	D	S	42	50	49	46	46	B	S			
5	S	B	B	43	Y	B	U	S	S	S	F	F	S	63	62	63	64	64	62	64	62	B	S	D	S	42	42	44	B	S		
6	B	B	B	B	R	Y	71	68	70	70	66	68	66	67	63	65	U	S	U	S	F	F	S	U	S	55	44	37	47	U	S	
7	B	F	S	B	B	S	J	F	F	F	F	F	R	R	63	63	B	R	B	Y	Y	Y	Y	F	S	S	S	S	S			
8	A	S	F	B	B	B	Y	B	B	Y	Y	B	B	B	B	53	Y	U	S	A	A	Y	Y	F	A	A	A	A	A			
9	R	F	F	F	A	A	U	S	F	R	F	F	F	57	57	54	54	J	S	J	S	D	S	J	R	47	46	46	J	S	49	
10	J R	S	A	J	F	D	S	Y	A	F	F	F	F	78	70	62	68	66	59	U	S	J	S	R	R	50	42	60	S	Y		
11	Y	Y	F	S	B	U	S	A	S	F	F	F	F	U	S	U	S	B	R	B	J	S	J	S	J	S	J	S	U	S	U	S
12	U R	37	B	F	2	54	Y	Y	Y	J	F	53	55	59	60	60	64	68	66	64	58	56	51	J	S	44	40	42	41	S		
13	U S	S	F	A	S	50	62	66	73	74	72	72	67	67	66	65	63	58	55	50	J	S	J	S	47	47	45	38	F	S		
14	U S	D	S	S	F	J	S	58	60	68	72	71	70	J	R	67	66	63	66	64	56	J	R	J	S	48	47	47	47	F	S	
15	S	S	F	F	S	J	S	A	U	R	S	A	F	S	J	S	F	J	S	F	B	J	S	U	S	U	S	J	S	S	S	
16	U S	A	F	F	F	S	F	J	S	S	B	D	S	S	J	S	F	F	U	S	S	S	R	J	R	U	R	S	S	A	A	
17	A	B	S	B	S	S	S	B	A	A	U	S	B	B	B	B	B	B	B	B	B	F	B	J	R	38	38	41	R	B	B	
18	B	B	B	S	B	B	B	B	S	U	S	Y	B	B	B	B	B	B	B	B	50	B	S	53	Y	47	40	R	F	F		
19	R	B	B	B	B	B	B	B	F	U	S	B	R	B	B	42	41	54	55	54	48	U	S	42	41	39	43	S	S	S		
20	F	S	S	B	S	B	B	B	Y	Y	U	S	Y	S	Y	R	B	R	J	S	J	R	J	R	50	42	37	A	A	A		
21	A	A	A	F	F	B	Y	S	S	54	53	56	59	B	B	R	B	B	62	56	47	B	A	S	S	A	A	A	A	A		
22	A	A	A	S	B	A	R	R	46	46	60	56	Y	R	59	57	51	48	B	60	55	46	47	48	47	47	46	J	F	S	46	
23	S	S	B	Y	A	S	B	Y	B	S	F	52	60	61	59	53	60	60	63	55	58	55	44	47	43	40	F	S	S	S		
24	A	B	A	S	B	F	F	S	F	F	F	F	F	F	S	B	S	B	Y	J	S	J	S	52	52	54	48	B	F	48	F	
25	F	Y	Y	Y	S	S	B	Y	Y	J	S	54	54	Y	J	R	Y	Y	R	63	56	B	B	56	49	43	Y	Y	Y	Y		
26	J S	S	B	S	S	S	A	J	S	R	F	61	61	R	R	57	58	55	J	R	J	R	J	U	S	49	47	51	45	F	S	
27	46	A	S	F	A	S	53	S	Y	Y	B	B	B	S	B	Y	54	59	58	56	B	U	S	47	55	40	48	S	S	S	48	
28	J S	J S	B	F	S	C	F	F	F	F	F	J	R	67	64	65	60	59	F	J	S	C	J	S	J	S	J	S	U	S	S	
29	39	46	Y	S	F	F	F	J	F	F	F	F	J	S	R	R	U	S	R	U	R	R	R	B	U	S	50	48	38	38	S	
30	53	56	57	B	Y	Y	Y	Y	F	F	F	F	F	S	S	S	J	S	R	60	62	60	Y	J	S	57	52	54	57	S	S	
31	R J	S	R	F	S	Y	F	F	F	F	B	B	B	Y	Y	S	Y	53	55	56	47	44	R	A	S	A	S	A	A	A		
00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23									
CNT	19	14	9	12	8	7	14	18	21	21	24	16	24	21	23	19	26	26	24	19	27	25	24	18								
MED	42	46	F	F	52	52	54	58	60	60	60	68	60	62	60	59	58	55	54	50	48	46	44	46								
U Q	49	48	S	F	56	56	58	60	69	71	70	71	67	67	63	64	63	58	56	52	52	48	49	48								
L Q	39	42	F	F	43	38	48	53	52	54	54	60	56	57	54	54	53	52	50	47	45	42	40	40								

## IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 1993 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	42	70	48	46	47	57	44	33	37	27	26	27	32	31	29	28	50	51	66	65	38	42	44
2	32	89	53	70	46	26		B	B	B	B	B	B	E B	B	B	37	21	34	40	41	70	92	41
3	47	39		40	80	34	41		B	B	B	B	B	B	B	B	34	27	51	27	37	37	40	53
4	71	37	59	71	62	41	38	32	38	27	57	49	E B	36	61	27	37	38	B	22	24	22	20	30
5	41	B	B E B	37	28		36	26	23	28	31	28	38	37	37	32	E B	36	26		B	27	26	33
6	B	B	B	B	33	37	27	27	27	32	29	32	29	42	37	42	27	26	37	47	44	38	26	32
7	B	42	40	B	B	37	37	47	27	31	E B	56	23	37	28	27	B	B	B	26	50	45	53	59
8	60	44	34	B	B	B	37		B	B	27	37	B	B	B	29	28	35	70	70	32	59	23	52
9	39	31	42	45	62	57	32	39	33	38	27	42	33	33	36	27	27	30	33	27	25	32	27	46
10	26	26	83	32	45	45	68	42	37	27	E B	55	56	E B	54	37	39	27	E B	30	22	30	E B	24
11	33	41	41	33	B	26	42	46	35	33	27	31	E B	E B	B	B	E B	B	B	27	25	26	23	34
12	37	B	40	51	42	50	49	37	27	36	32	33	22	E B	56	27	27	27	27	27	32	37	27	33
13	37	37	27	70	43	38	26	E B	45	32	32	33	33	58	41	33	35	31	26	27	32	32	31	32
14	27	39	37	42	43	40	42	33	E B	35	27	37	48	36	40	33	27	32	27	27	46	61	42	32
15	39	46	44	36	33	59	60	42	42	53	32	37	32	30	36	27	32	24	E B	35	B	E B	31	33
16	32	34	32	32	27	41	37	27	29	B	31	27	33	27	26	28	40	23	42	38	49	43	43	71
17	91	B	32	B	41	42	42		42	41	28		B	B	B	B	B	B	B	27		26	23	35
18	B	B	B	33	B	B	B	47	45	39		B	B	B	B	B	B	E S	30	B	72	31	41	37
19	37	B	B	B	B	B	B	B	26	32	24		E B	34	B	E B	36	27	27	26	25	22	26	27
20	33	37	46	B	27	B	B	B	37	26	27	33	26	29	27		B	28	26	26	26	E B	24	24
21	59	48	55	31	41		37	51	47	27	27		B	E B	B	B	E B	B	B	27	32		42	38
22	46	98	52	37	B	47	45	30	30	32	27	E B	52	32	33	28	B	27	E B	E B	32	71	105	90
23	46	46	B	41	E B	40	B	46		28	E B	45	31	38	40	69	32	E B	B	45	37	32	26	38
24	68	B	46	38	B	26	32	41	42	52	33	E B	E B	B	E B	B	B	E B	B	32	27	36	26	E B
25	89	44	37	38	33	43	B	27	43	37	33	31	31	27	27	26	32	E B	B	B		70	32	23
26	27	37	B	43	37	37	46	33	27	29	27	27	29	28	28	32	27	27	26	25	29	41	27	36
27	36	47	41	34	51	37	42	70	43	38		B	B	37	B	37	26	27	27	27	B	38	28	33
28	37	30	B	38	37	C	36	40	28	32		C	26	40	73	60	46	47	27	26	C	C	23	32
29	19	34	27	47	41	33	32	31	27	26	28	29	60	46	37	33	36	36	26	25	30	27	23	27
30	46	37	26	B	40	46	37	47	37	E B	40	27	31	28	37	41	37	69	52	37	42	42	26	60
31	59	48	38	33	32	41	41	33	52		B	B	B	27	32	33	32	27	35	37	34	41	44	42
	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	24	23	24	24	24	25	25	27	27	25	22	25	24	26	22	28	28	28	25	30	30	31	29
MED	38	40	41	38	41	40	38	40	35	32	30	32	33	U	34	34	29	31	27	28	30	34	34	37
U Q	53	46	52	46	46	46	44	46	42	38	35	42	39	44	37	35	36	30	36	41	44	41	42	45
L Q	32	37	34	34	33	37	36	32	27	27	27	28	29	31	28	27	27	26	26	26	26	27	27	32

IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 1993 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		10	19	15	16	19	14	19	19	16	17	19	18	19	16	18	20	20	16	15	9	16	16	16	12		
2		10	18	41	19	15	10		B	B	B	B	B	B	55	B	B	19	19	13	14	17	15	19	7		
3		18	10		13	20	21	20		B	B	B	B	B	B	B		19	19	19	15	16	10	10	10		
4		7	7	7	10	7	20	14	14	15	18	18	31	36	18	17	20	19		19	19	16	18	18	24		
5		33		B	37	23		24	14	16	15	18	19	32	19	18	19	36	19		19	16	14	8	B		
6		B	B	B	B	19	14	16	12	10	15	19	19	19	19	18	19	19	24	18	15	23	13	13	14		
7		B	19	19	B	B	24	17	16	19	19	56	19	17	19	19		19		19	13	14	16	9	10		
8		8	10	11	B	B	B	19		B	B	19	19		B	B	16	19	31	16	16	16	15	16	15	17	
9		11	9	7	9	19	9	19	9	16	16	16	16	15	18	18	16	15	16	18	16	10	18	7	7		
10		16	19	21	24	18	24	25	15	14	16	55	56	54	24	17	24	24	30	19	16	24	20	9	19		
11		19	15	18	8	B	14	24	19	15	16	19	18	55	54		36		23	19	10	14	11	10	14		
12		16	B	10	9	19	15	19	14	9	9	14	14	16	56	20	19	18	16	14	9	10	15	10	7		
13		10	14	19	19	14	7	9	45	20	16	14	16	18	16	16	17	16	13	18	14	14	7	7	7		
14		7	18	19	27	15	10	11	7	35	19	18	19	18	16	16	15	16	18	18	13	18	19	17	14		
15		13	7	17	24	7	14	19	19	24	19	7	18	16	15	16	16	15	15	35		31	14	10	9		
16		10	14	10	7	8	8	7	10	18		17	16	16	16	20	19	19	13	23	25	14	8	7	10		
17		13	B	15	B	16	20	14		20	19	18		B	B	B	B	B	B	16	B	14	17	10	B		
18		B	B	B	24	B	B	B	24	19	19		B	B	B	B	B	B	E S	B	56	19	14	14	14		
19		19	B	B	B	B	B	B	B	18	19	19		34		36	24	18	19	19	19	15	13	14	14		
20		18	20	24	B	18	B	B	B	19	24	19	19	19	18	19		17	18	18	19	24	16	18	19		
21		19	19	19	9	16		19	19	16	10	20			39	13		53	24	18		15	15	30	24		
22		20	30	16	14		30	15	14	13	15	19	52	15	16	16		19	30	31	18	14	16	8	18		
23		21	19	B	24	15	40		19		24	45	19	19	17	24	25	45	19	30	14	14	14	15	15		
24		31	B	24	18	B	16	11	20	19	19	16	50	56		35		32	18	18	14	23	B	15	18		
25		17	18	18	23	10	20		B	16	18	15	16	18	18	17	18	22	17	31	B	30	19	14	18		
26		18	18	B	23	16	24	18	19	15	15	15	16	18	18	19	17	15	16	15	19	24	25	10	9		
27		9	19	19	9	19	24	19	55	19	20		B	32		33	21	16	18	19		31	17	13	14		
28		9	19	B	18	19	C	17	13	14	21	C	22	18	18	16	16	16	17	15	C	C	18	10	14		
29		13	13	19	31	16	14	14	9	16	19	21	21	25	23	18	23	23	21	18	19	15	16	15	14		
30		19	8	15	B	20	18	16	14	13	40	23	23	23	33	20	21	21	19	16	30	16	16	16	14		
31		9	8	9	7	9	18	14	15	16		B	B	B		20	21	24	16	16	16	15	10	7	13	10	16
		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	30	31	31	31	31	30	31	31	31	31	31	31	31	31	31	30	30	31	31	31	
MED		16	19	19	23	19	20	19	19	18	19	19	21	20	19	19	21	19	19	18	17	16	16	13	14		
U Q		19	30	B	37	B	B	B	B	45	20	21	45	55	56	33	B	31	24	19	25	23	18	15	18		
L Q		10	13	15	10	15	14	14	14	14	15	16	17	18	18	17	17	19	16	16	16	14	14	14	10	10	



IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 1993 h'F (KM)

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

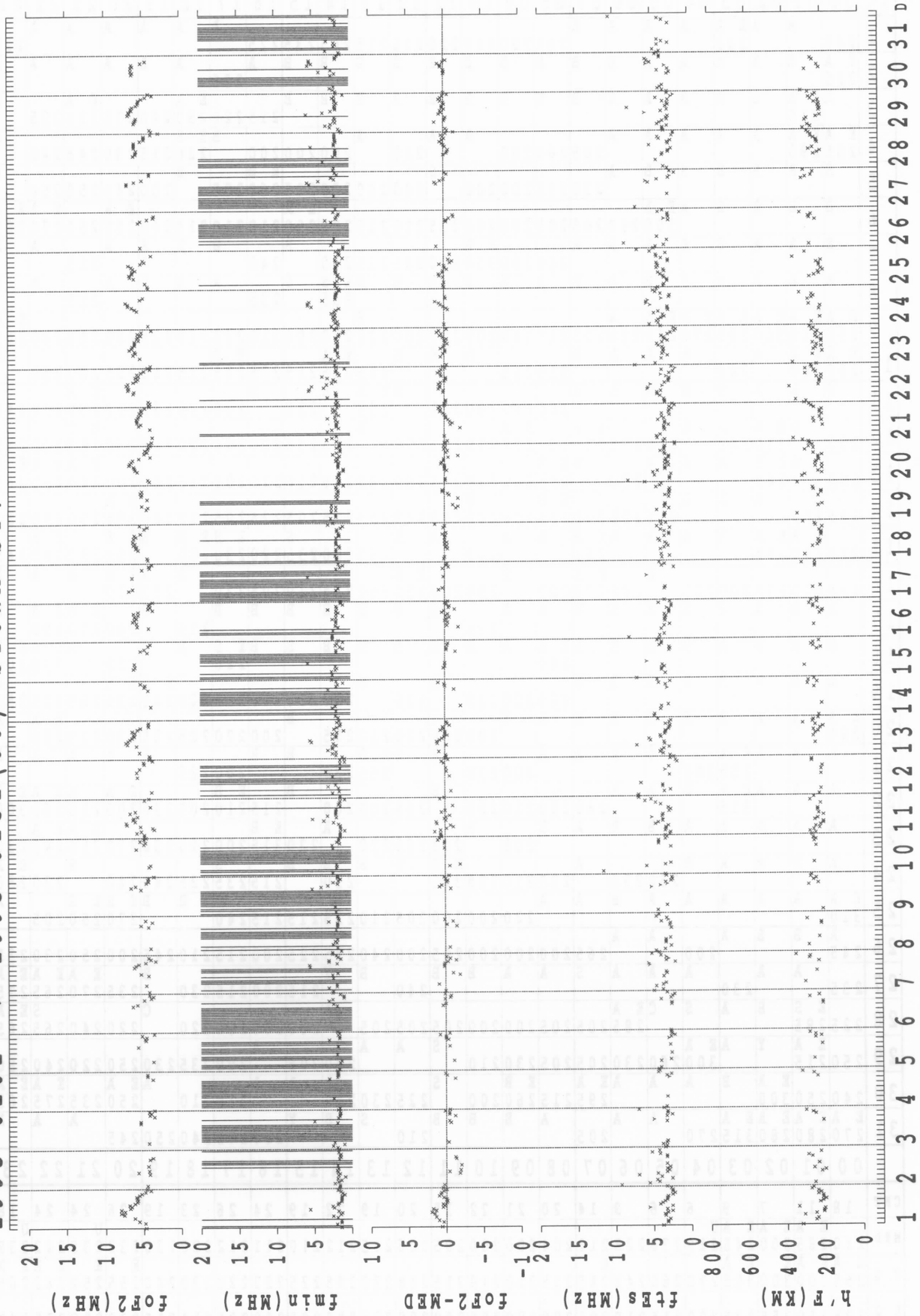
LAT. 69'00.4'S LON. 039'35.4'E SWEEP 0.4MHz TO 15.0MHz IN 20.0SEC IN MANUAL SCALING

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		205	A	AE A	A	A	A	A		205	200	200	220	215	215	205	235	225		A	A	A	A	A	A	225		
2		E A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	A		235	A	A	A	A	A	A		
3		AE A	B	A	A	A	A	A	B	B	B	B	B	B	B	B		215	220	E A	250	240	275	E A		A		
4		E A E A	A	A	A	A	A			205	200	200		220		A	200	200	200	B E S	220	215	230	245	240	S		
5		S	B	B	B	S	B	A		230	205	200	200		S			E B	260	205	B	200	240	250	250	B		
6		B	B	B	B	AE A	300	250	205	205	200	200	205	210	215	200	250	E A	210	210	215	240	E A		E A E A	E A		
7		B	A	A	B	B	A	A	A		200	200	350	200	245	215	230	B	240	B	Y	A	A		A	A		
8		A	A	A	B	B	B	A	B	B	Y	A	B	B	B	E S	255	S	235		A	A	A	A		A		
9		E A E A E A E A E A E A	250	310	300	295	270	240	220	200	215	205	205	200	200	225	200	200	210	205	215	225	220	240	240	265		
10		E A E A	290	300		240					215	205			215	225	215	205	E B	215	215	215	235	200	250	A		
11		Y	A	A	S	B	A	A	A		200	200	200	205	B E B	235	B	225	B	220	220	235	210	250	230	240		
12		250	BE A	AE A	A	A	210	215	290	E A	200	230	210	215	200		205	205	200	200	220	215	250	E S	285	240	235	
13		220	AE S	300	A	A	A	230	BE S	235	200	220	195	200	205	205	210	215	205	215	205	200	E A E A E A	240	250	265		
14		255	250				215	205	200	E B	235	200	220	215	200	215	215	205	225	205	215	200	E A	285	250	250	250	
15		215	E A E A	290	255	A	A	A	AE A	260	A	A	200	A	A		200	200	235	S	E S E B	220	230	250	255	230	E A	245
16		235	225	200	200	205		A	E S	270	200		200	200	E S	250	200	225	210	205	220		250	270		A	A	A
17		A	B	A	B	A	A	A	B	A	A		195	B	B	B	B	B	B	B	B	B	B	B	E S E A	270	290	B
18		B	B	B	A	B	B	B	S E A	240	A	B	B	B	B	B	B	B	BE S	220		B	S	215	310	300	A	
19		A	B	B	B	B	B	B	B		200	200	210	B		210	210	210	210	215	220	E S E S	240	235	255	205	250	A
20		E A	A	A	B	S	B	B	B	S	Y		200	200	210	210	215		200	220	225	235	230	215	250	E A	A	
21		A	A	AE A			B	A	A	A		200	230	B	BE B	255	220		B	B	200	225	B	A	A	A	A	
22		A	A	AE A	B	A	A			240	210	210	200		205	205	200		215	E B	210	205	230	300	225	260	300	
23		A	A	B	A	A	B	B	A	B		205		205	200	220		220	E B	315	200	225	230	270	E A E A	245	230	
24		A	B	A	A	B			250	235	220	210	225	345	E B	B	B	B	B	215	235	235	240	240		230	250	
25		E A	A	A	A	A	A	B	A	A		220	200	200	205	210	225	215	215	240		B	B	E S E S	270	250	205	A
26		A	B	B	A		A	A		265	200	200	200	205	200	240	225	225	200	215	210	245	200	250	230	235		
27		235	A	A	230	A	A	A	S	A	A	B	B		240	B	Y		215	200	215	230	B	E A E A E A	265	275	A	
28		E S	B	A	S	C E A	285	205	205	200	200	205	205	205		A	A	200	200	200	220	C	220	240	265	265	S E A	
29		E A	Y	AE A			300	260	230	205	205	230	210	S	A	A		200	205	A	200	235	230	250	220	240	250	
30		240	250	300				A	AE A	295	215	260	200		225	230	220		A	A	A		210	210	250	235	275	265
31		E A E A E A E A	270	280	280	315	270			205					210				200	245	240	250	245			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		18	11	7	9	6	6	9	14	20	21	22	15	20	19	22	19	24	26	23	19	26	24	24	18			
MED		240	285	300	245	219	236	225	212	204	200	200	205	206	215	212	210	211	212	220	230	232	235	242	239			
U Q		E A E A E A	300	300	305	270	260	242	E	265	215	210	210	215	218	230	225	225	222	220	230	240	E E E A E A	255	252	262	265	
L Q		235	250	255	235	200	215	210	205	200	200	200	200	200	205	200	205	200	205	215	215	230	228	235	240			

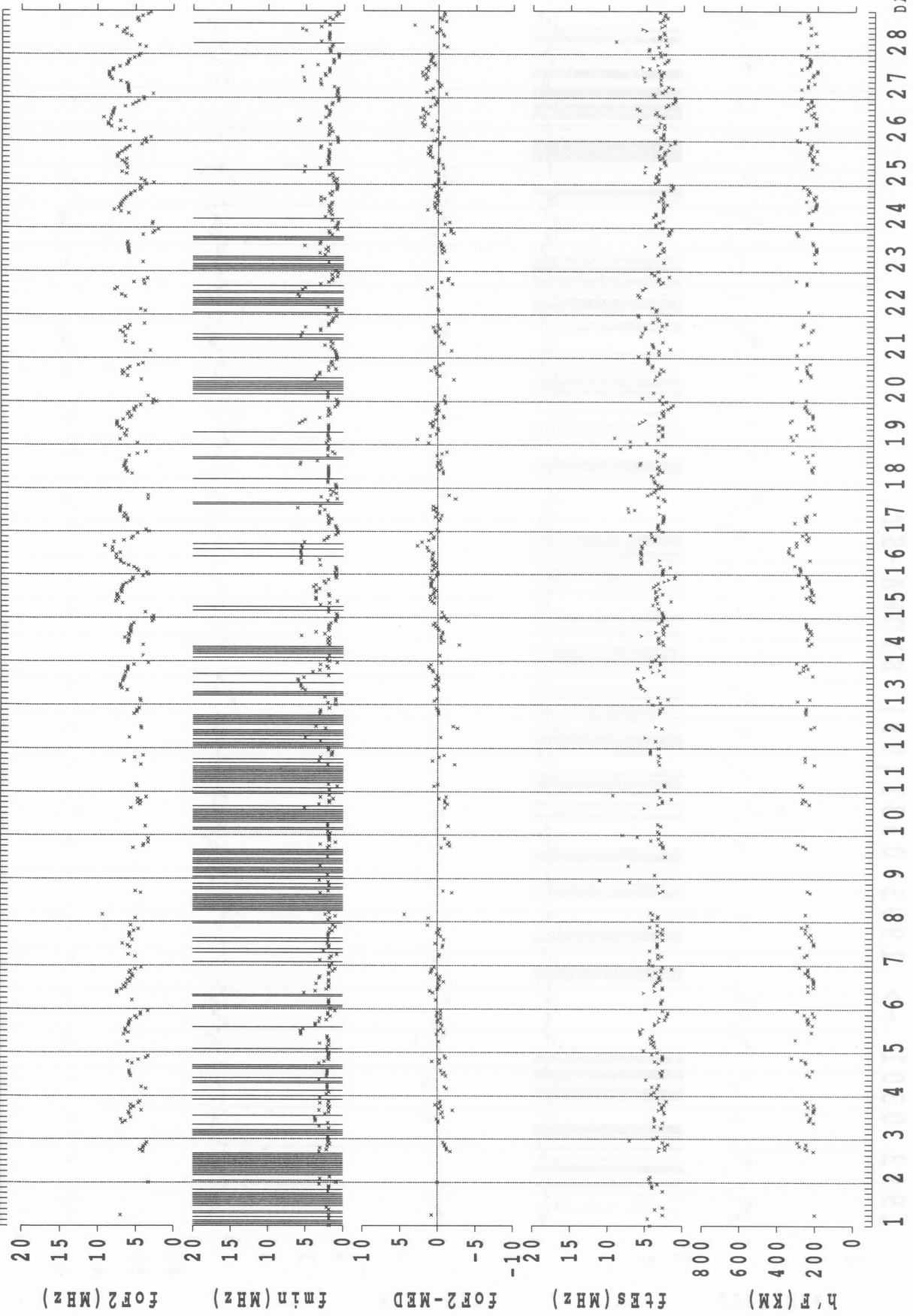
DEC. 1993 h'F (KM)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

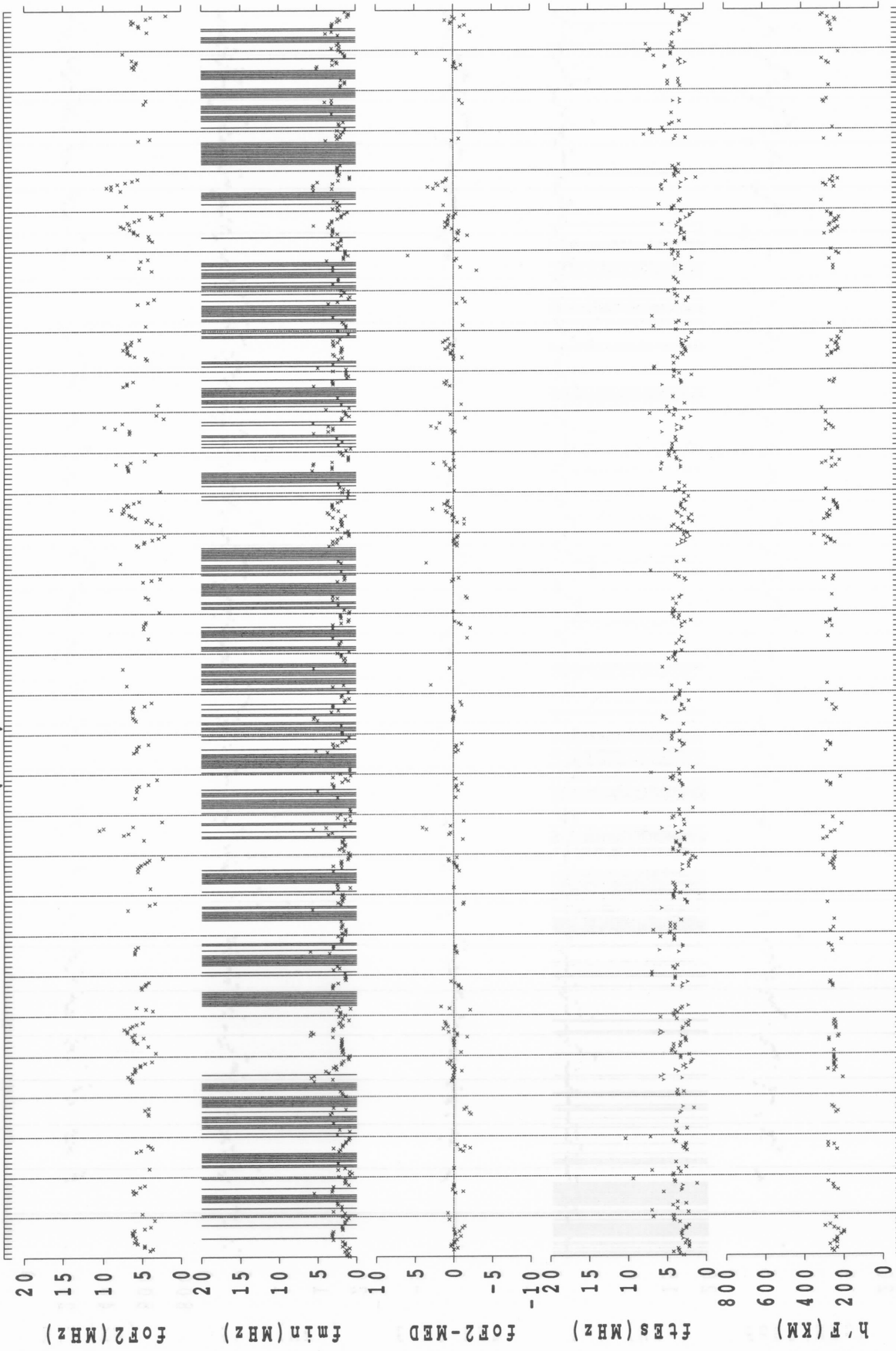
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1993 0201 -> 1993 0228 (99) SYOWA-ST.

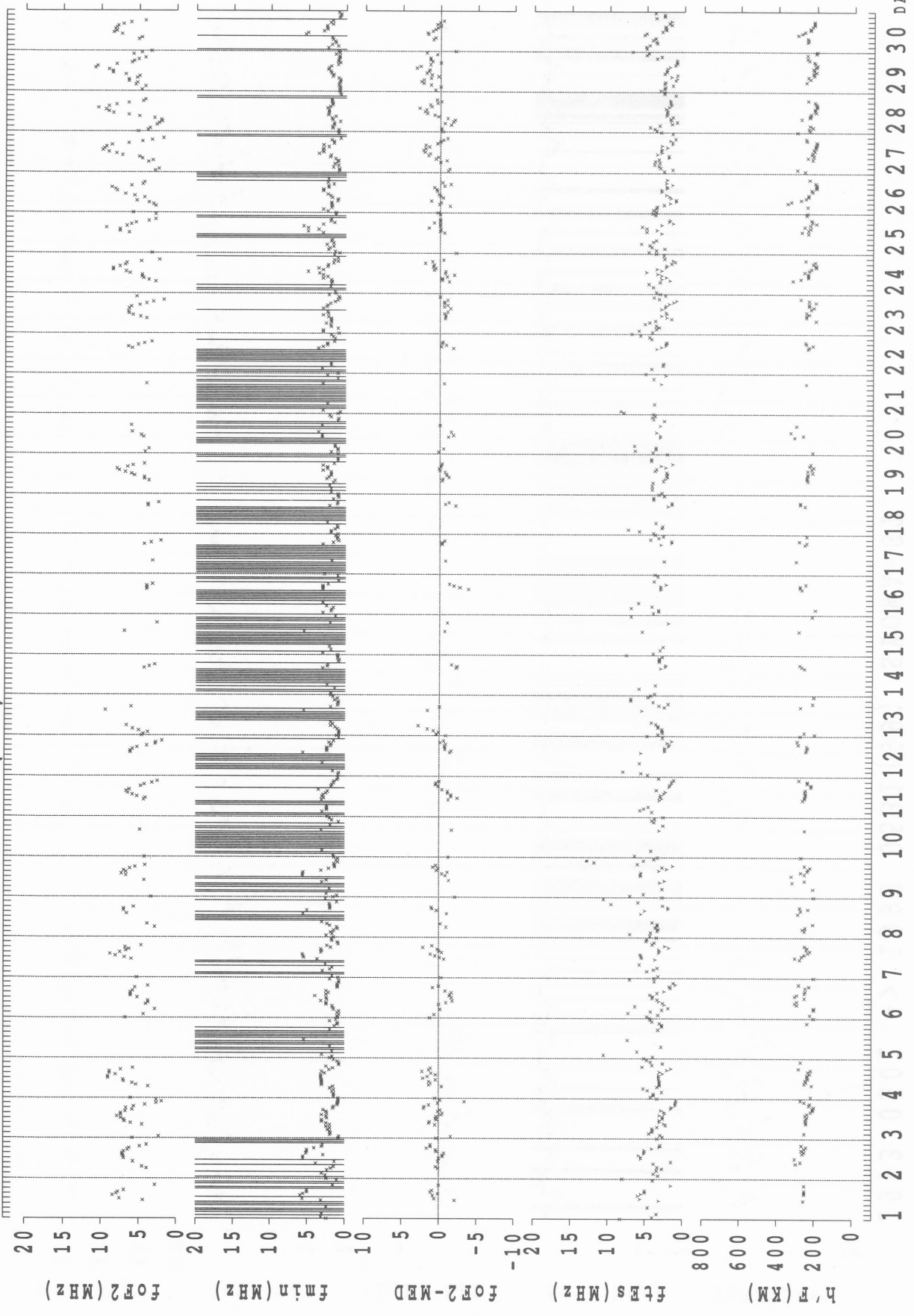


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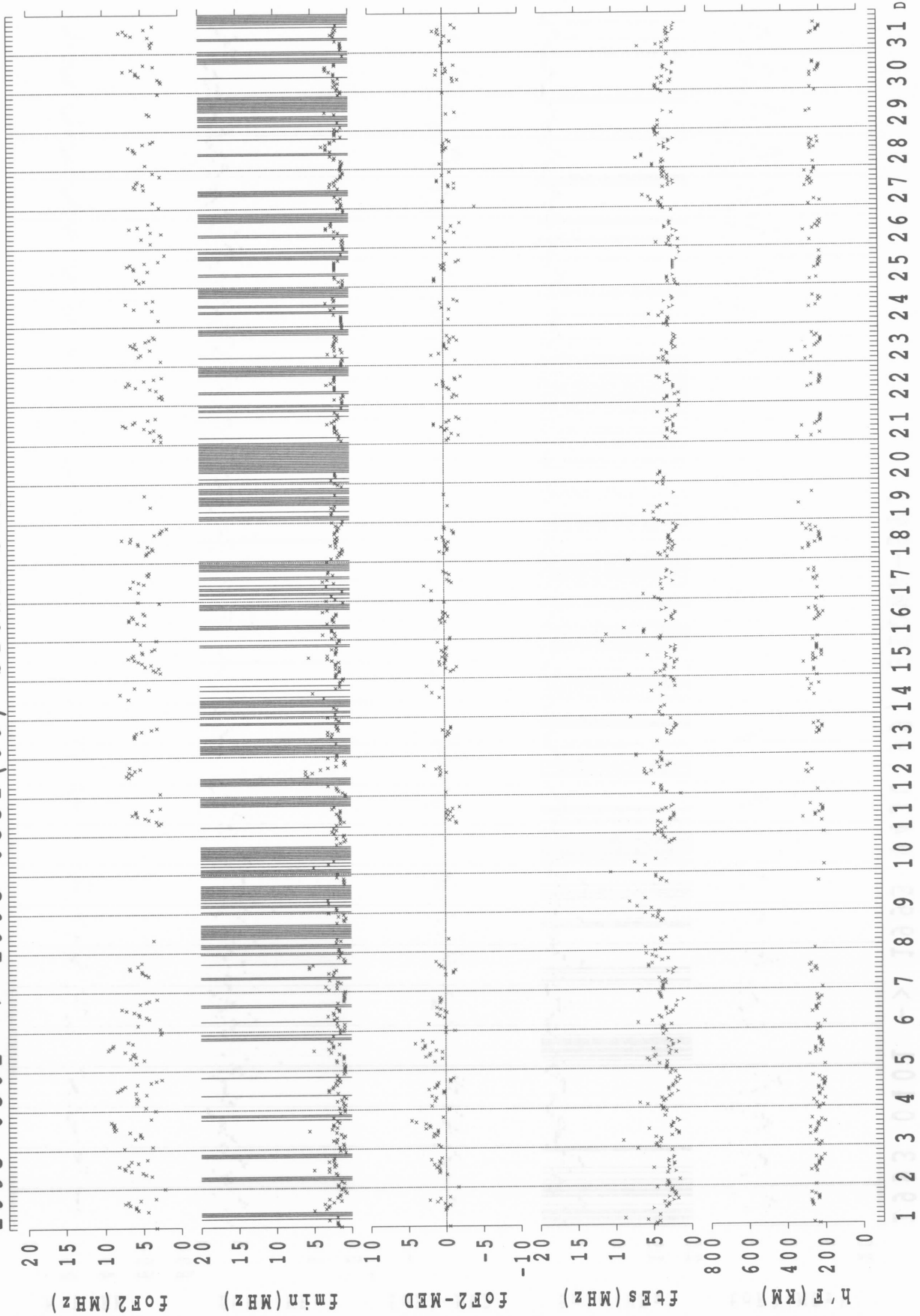


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 DAY/45' EMT

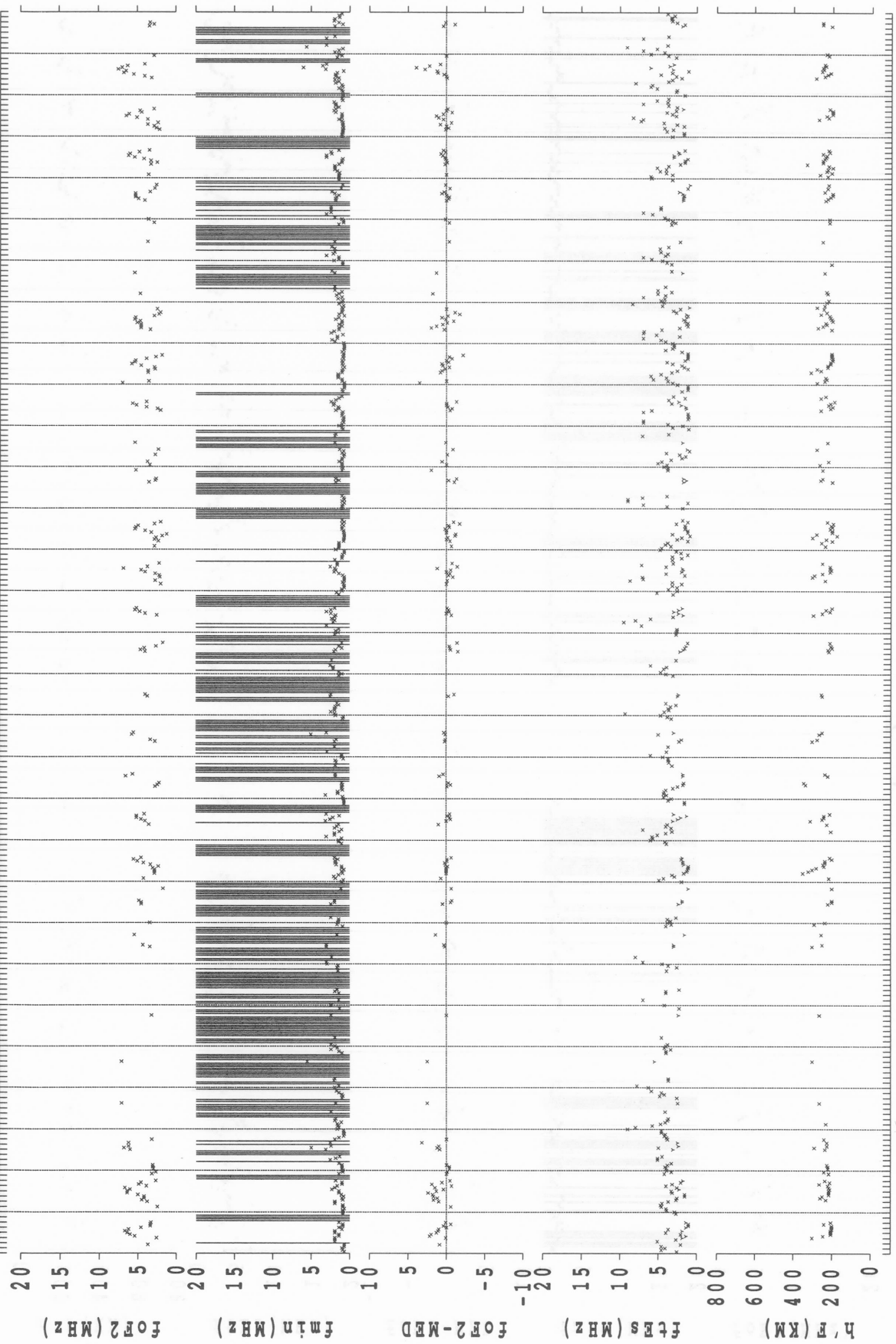
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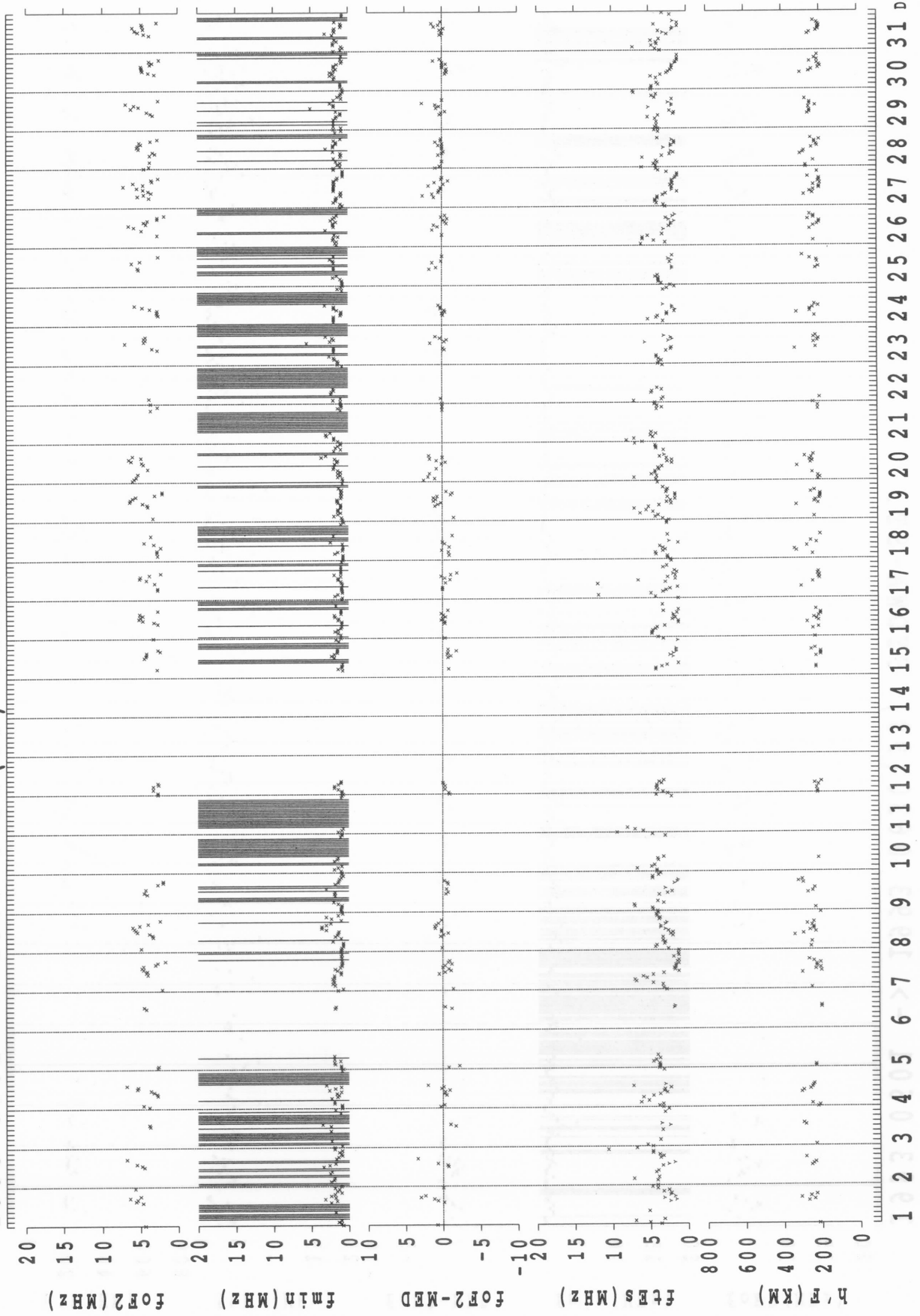


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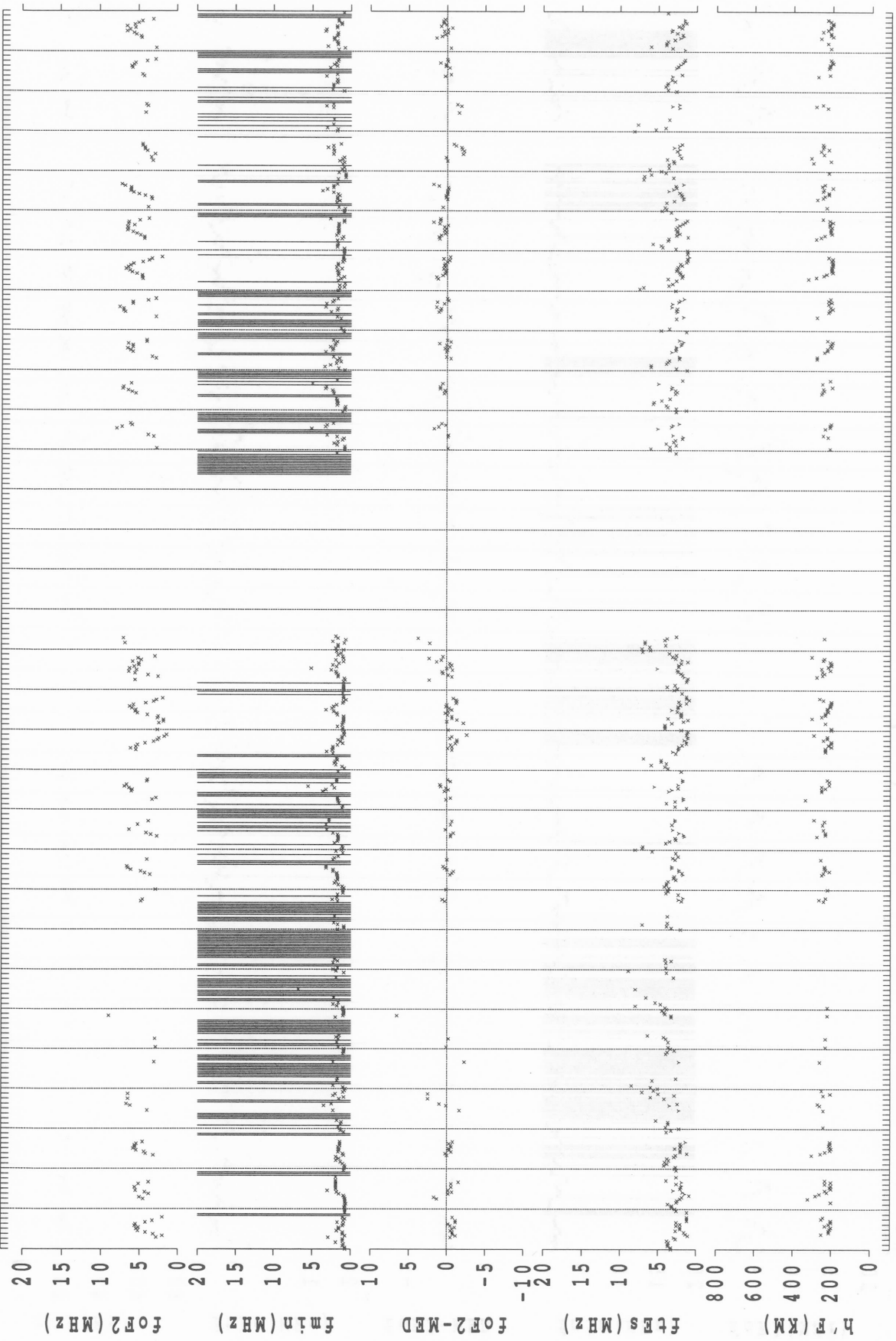
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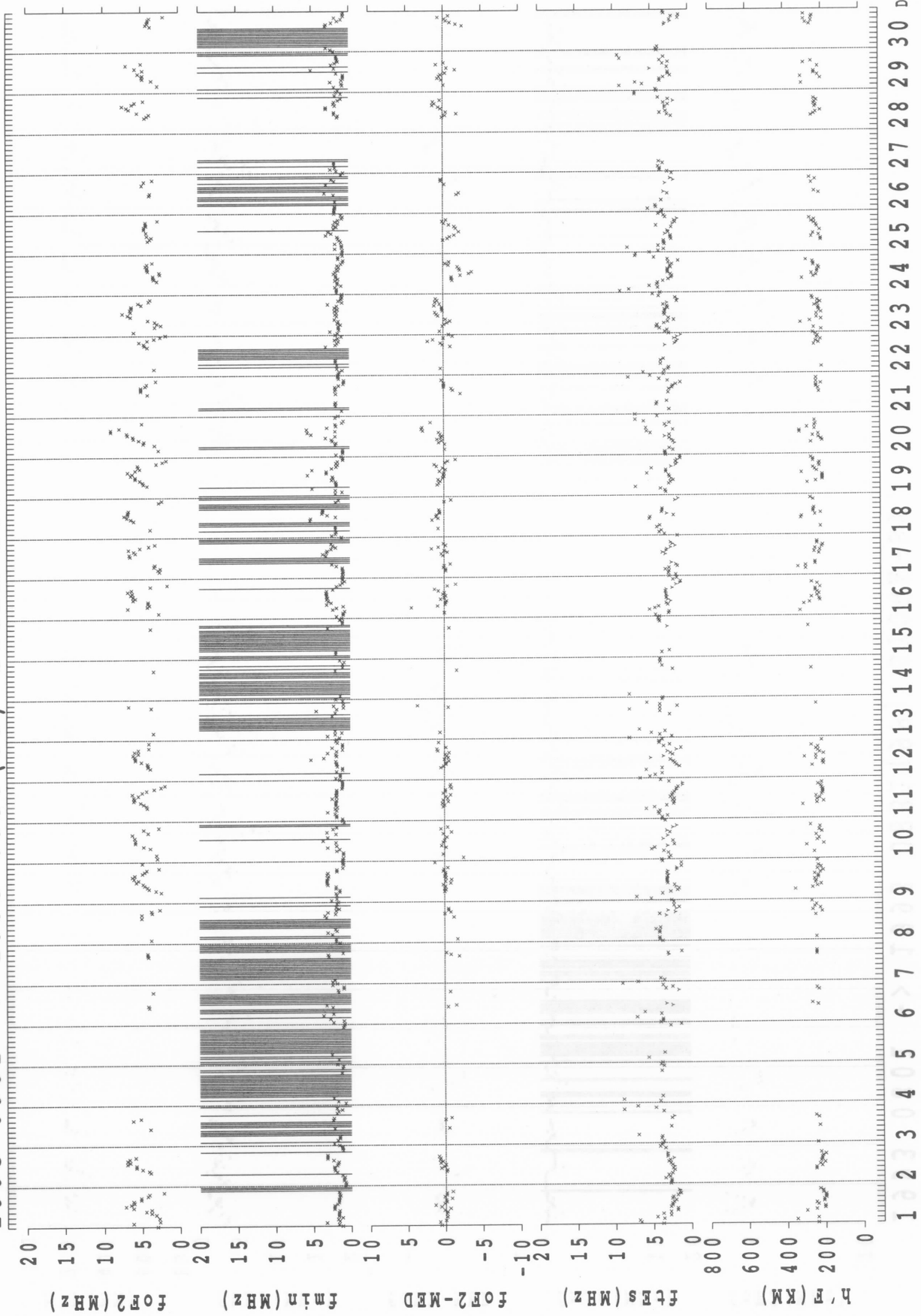


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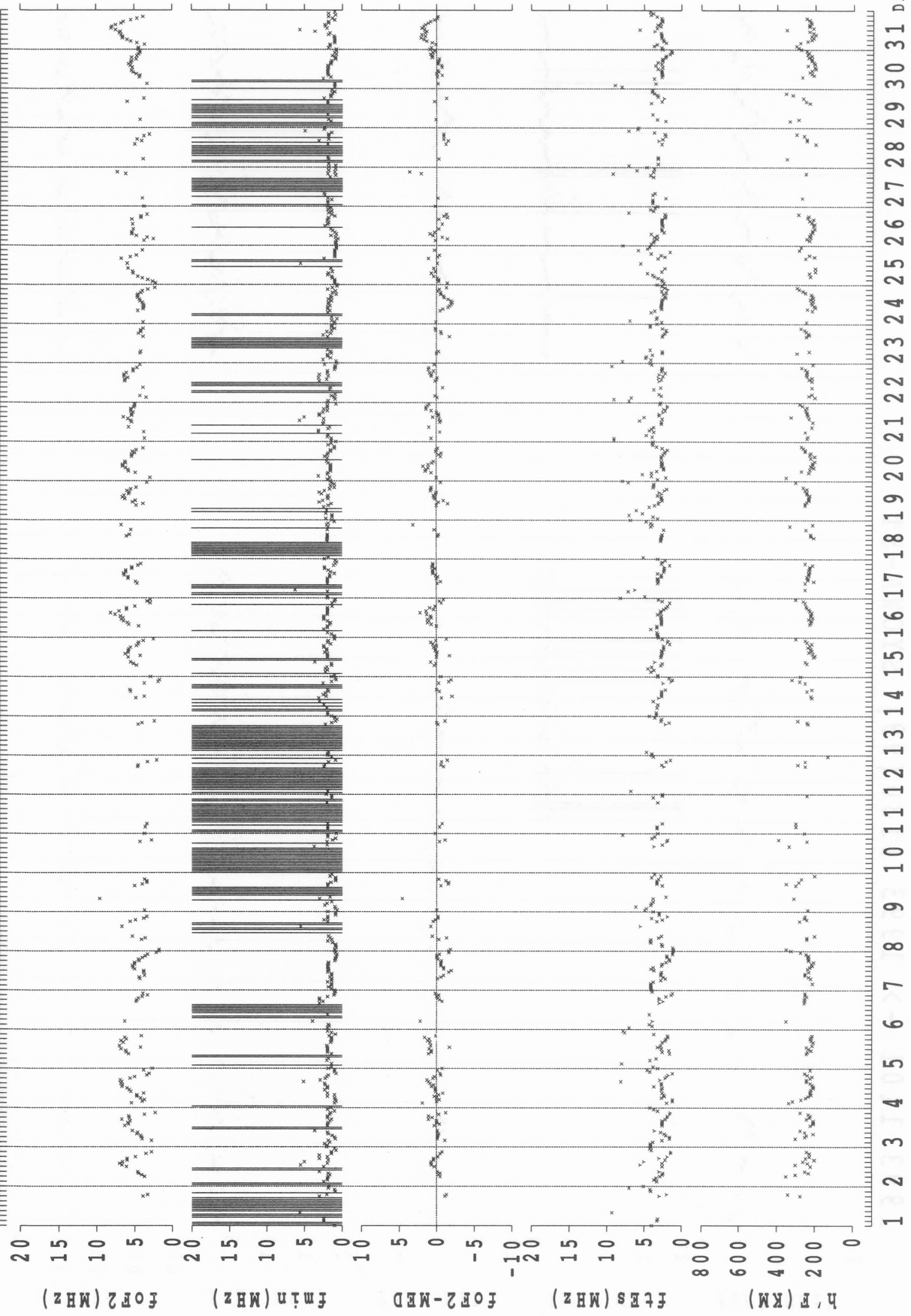


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 DAY/45' EMT

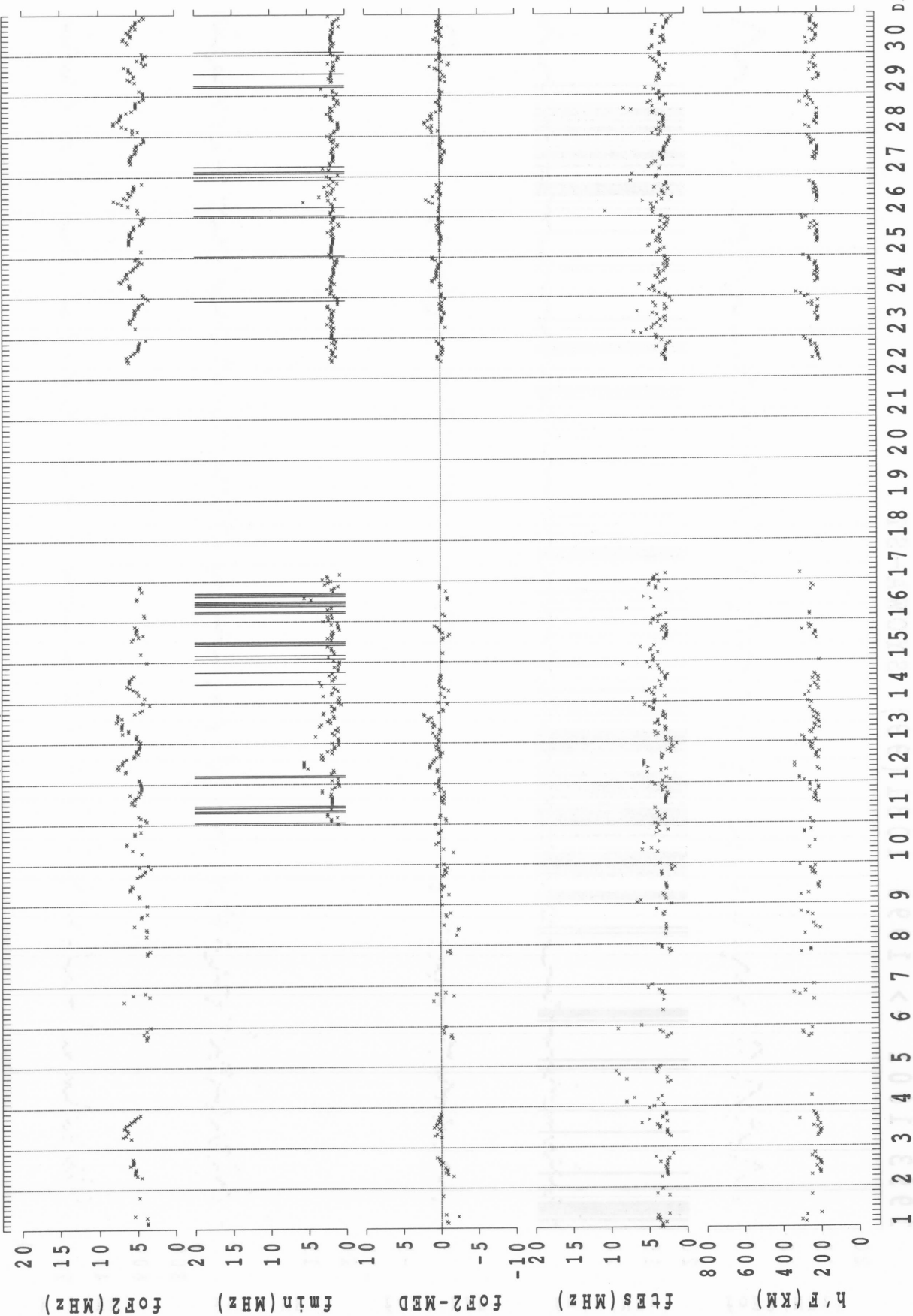
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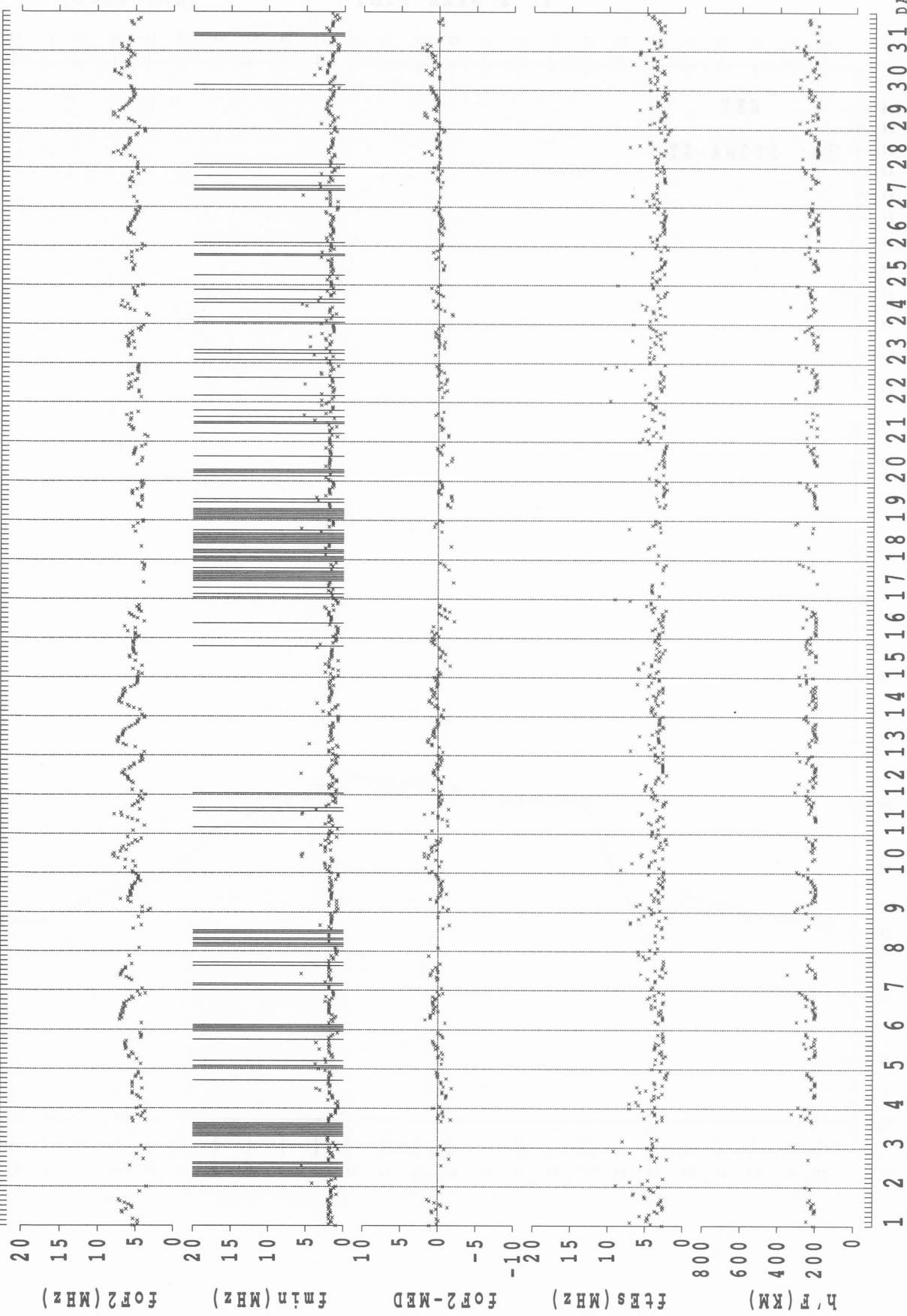
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1993 1101 -> 1993 1130 (99) SYOWA-ST.



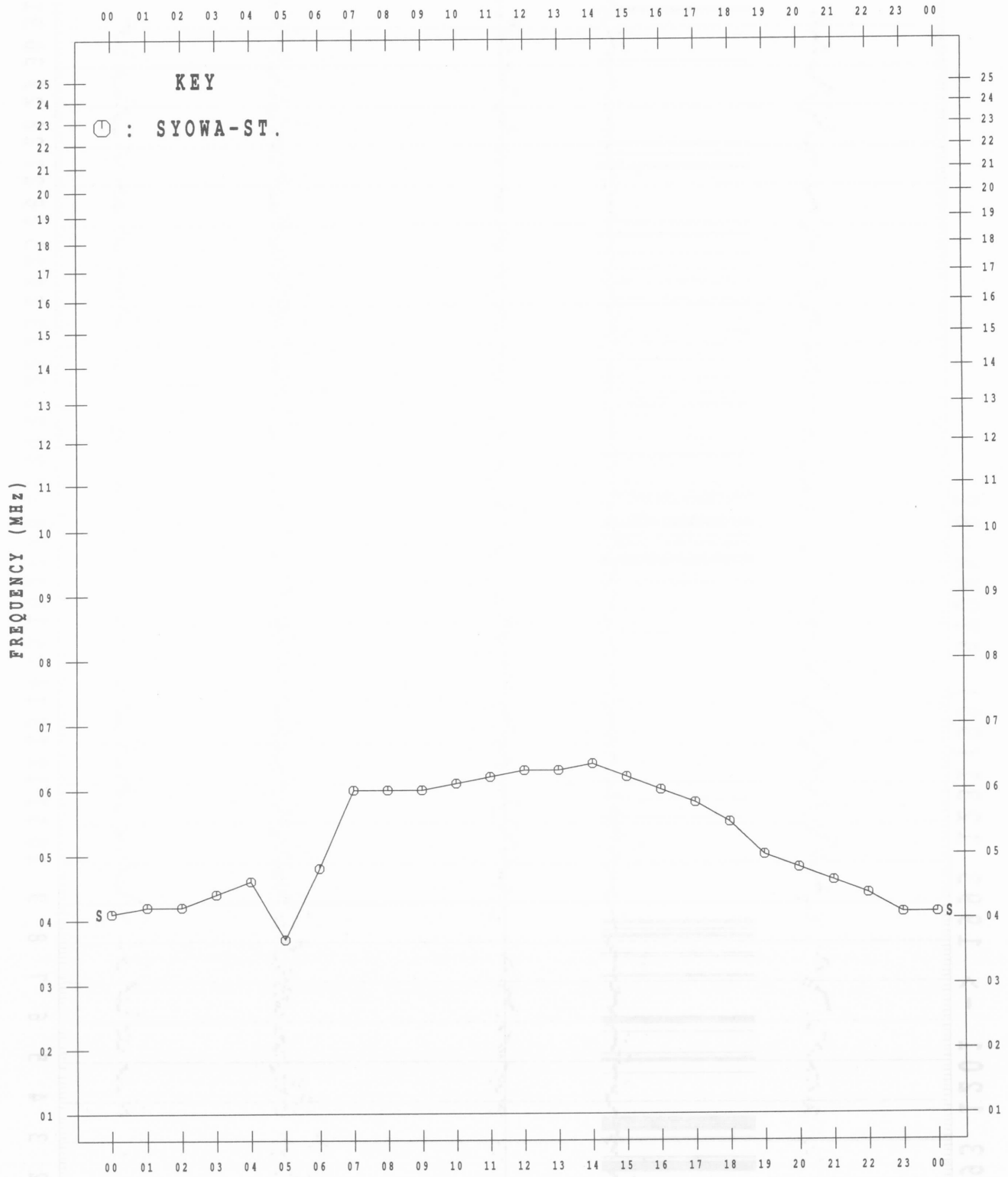
1993 1201 -> 1993 1231(99) SYOWA-ST.



## MONTHLY MEDIAN VALUES OF foF2

45°E MEAN TIME

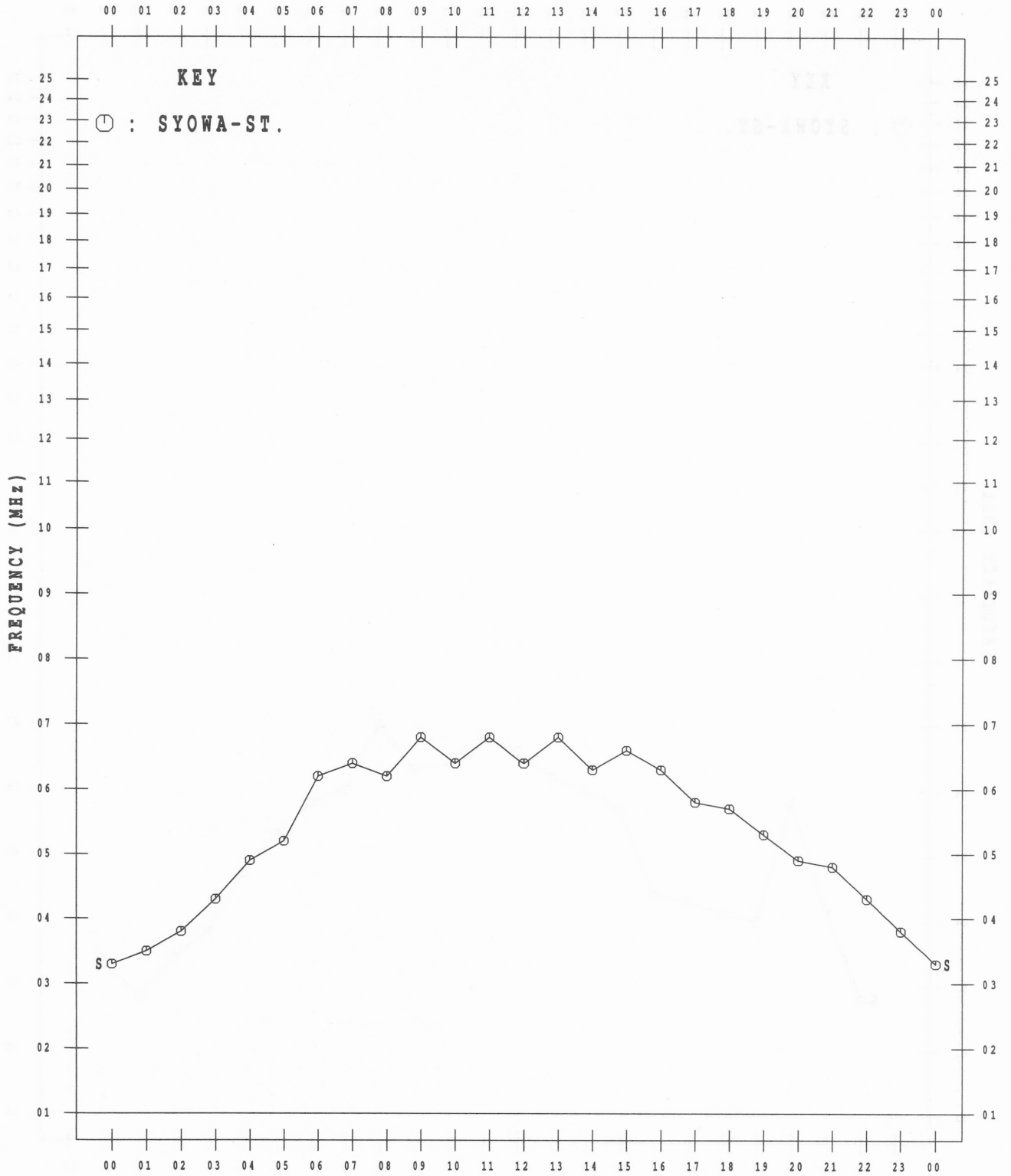
JAN. 1993



# MONTHLY MEDIAN VALUES OF foF2

45° E MEAN TIME

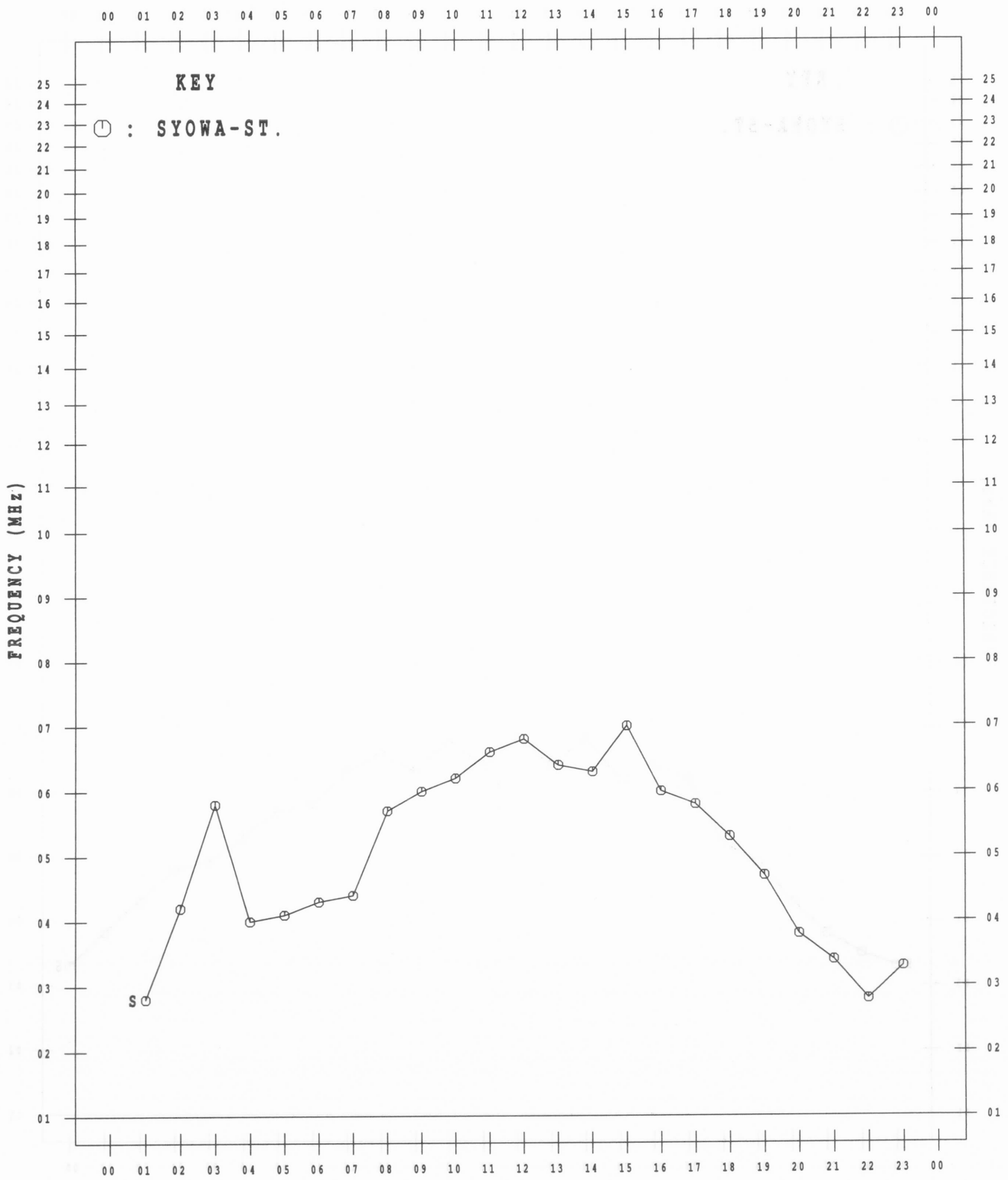
FEB. 1993



# MONTHLY MEDIAN VALUES OF foF2

45°E MEAN TIME

MAR. 1993



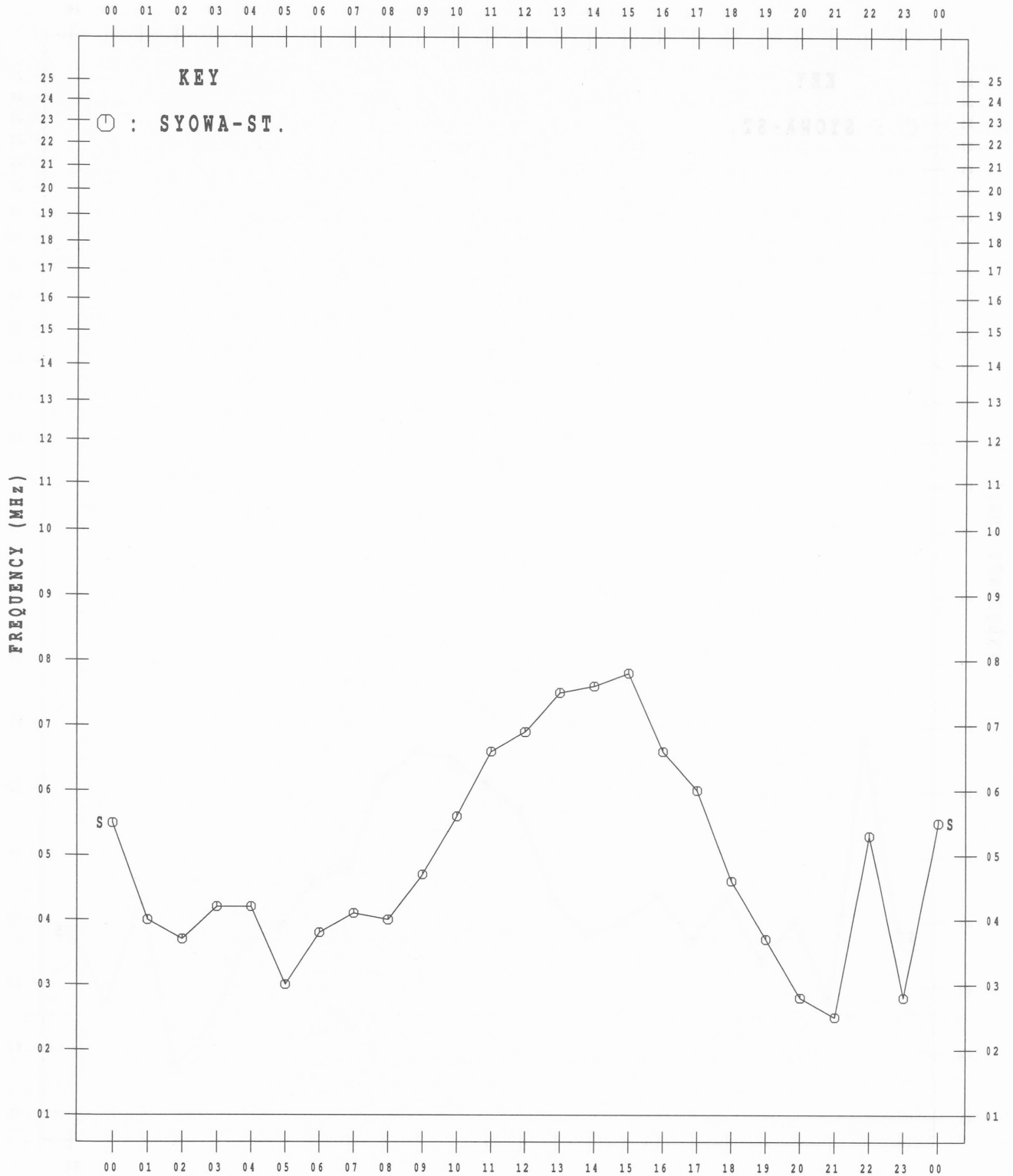


# MONTHLY MEDIAN VALUES OF $f_oF_2$

0001 JAN

45° E MEAN TIME

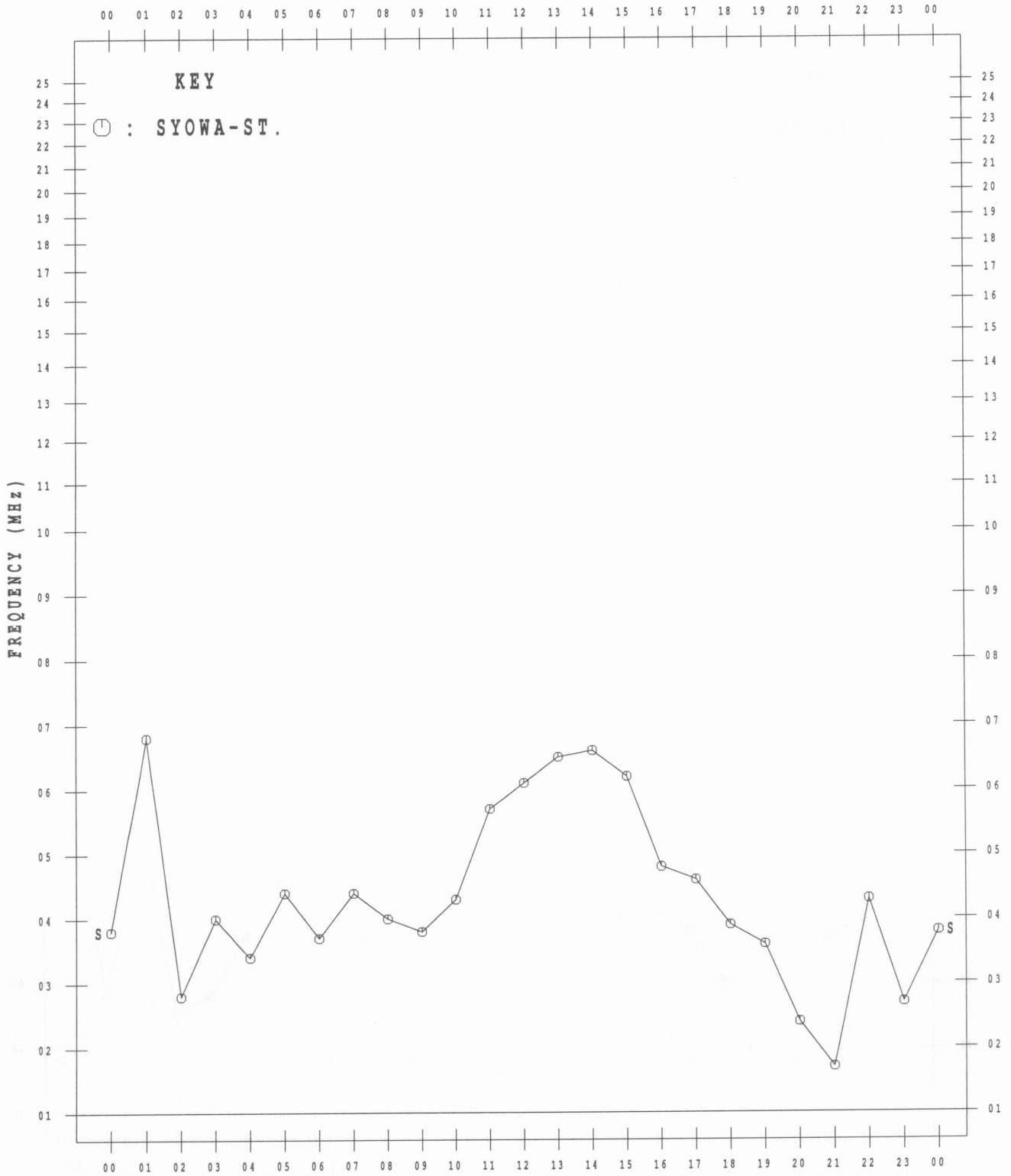
APR. 1993



# MONTHLY MEDIAN VALUES OF foF2

45° E MEAN TIME

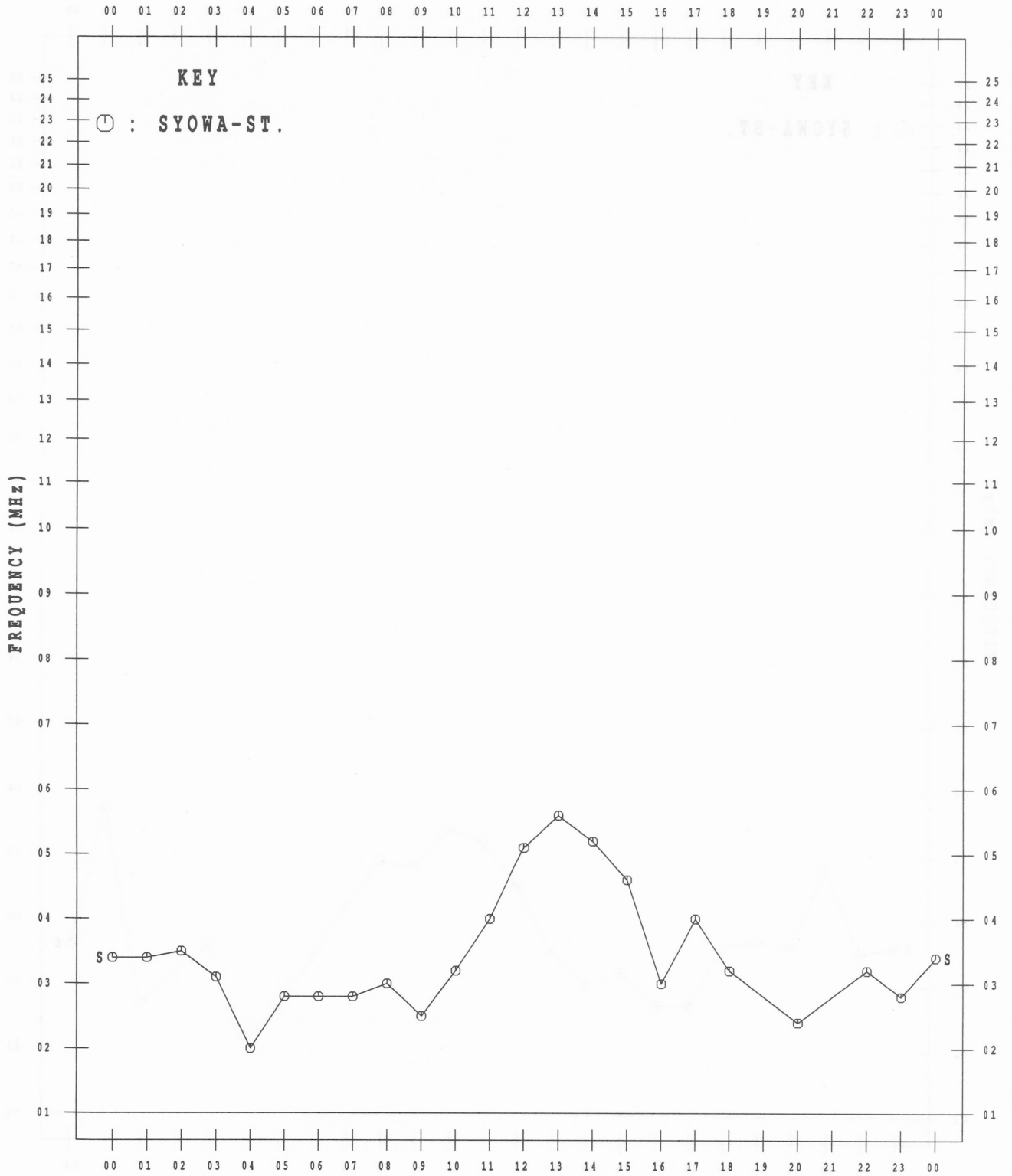
MAY 1993



# MONTHLY MEDIAN VALUES OF $f_oF_2$

45° E MEAN TIME

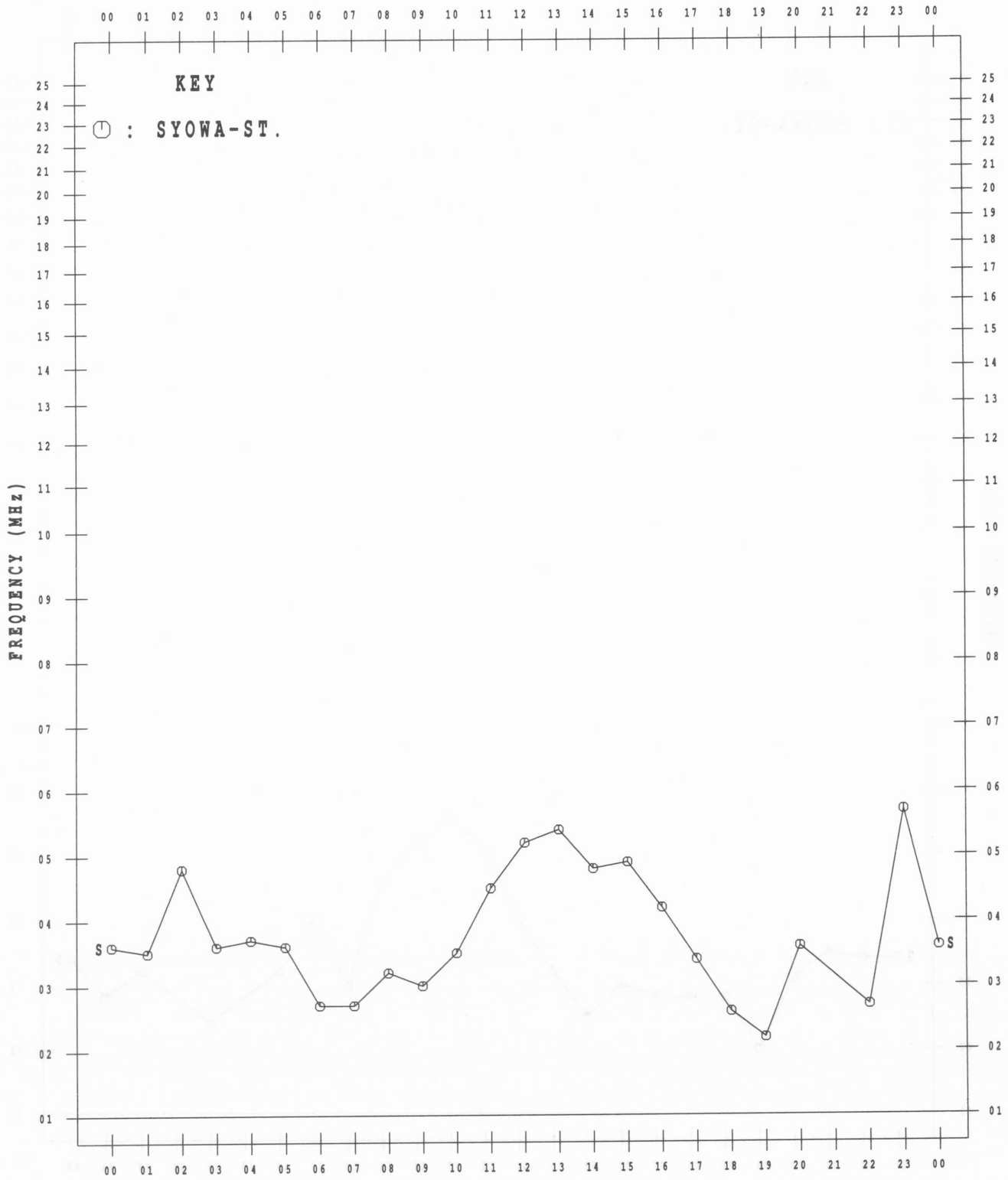
JUN. 1993



# MONTHLY MEDIAN VALUES OF foF2

45° E MEAN TIME

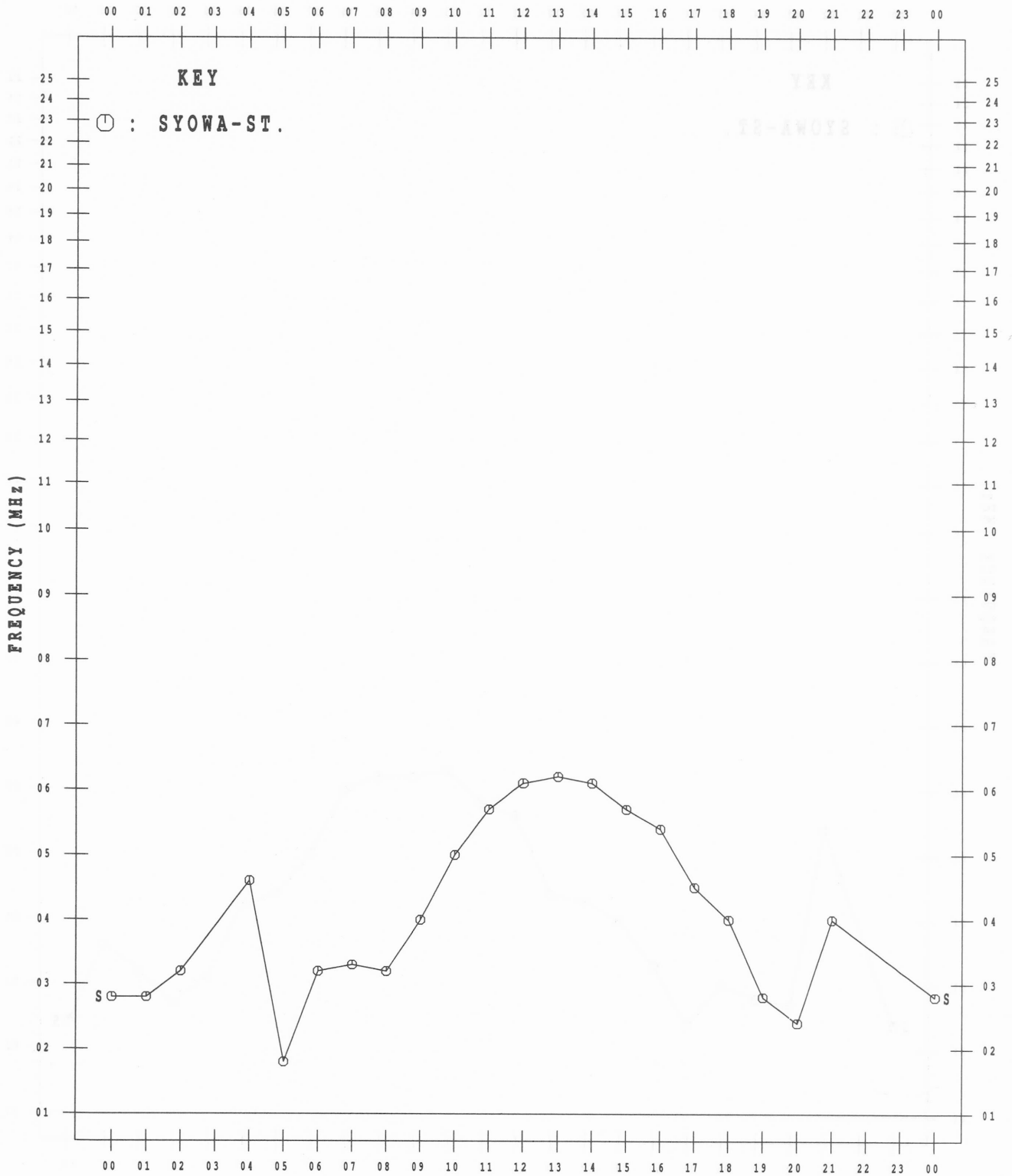
JUL. 1993



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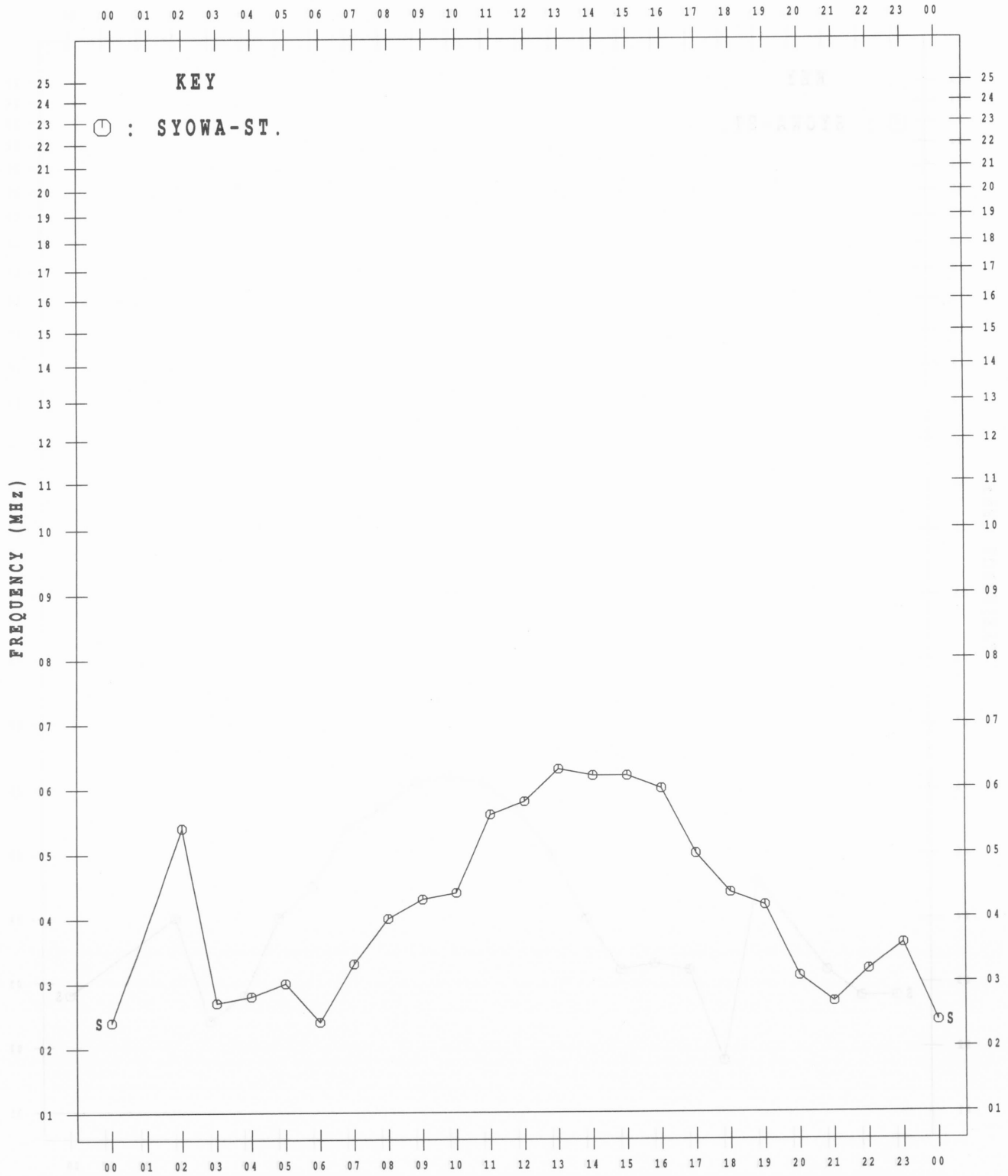
AUG. 1993



# MONTHLY MEDIAN VALUES OF foF2

45° E MEAN TIME

SEP. 1993

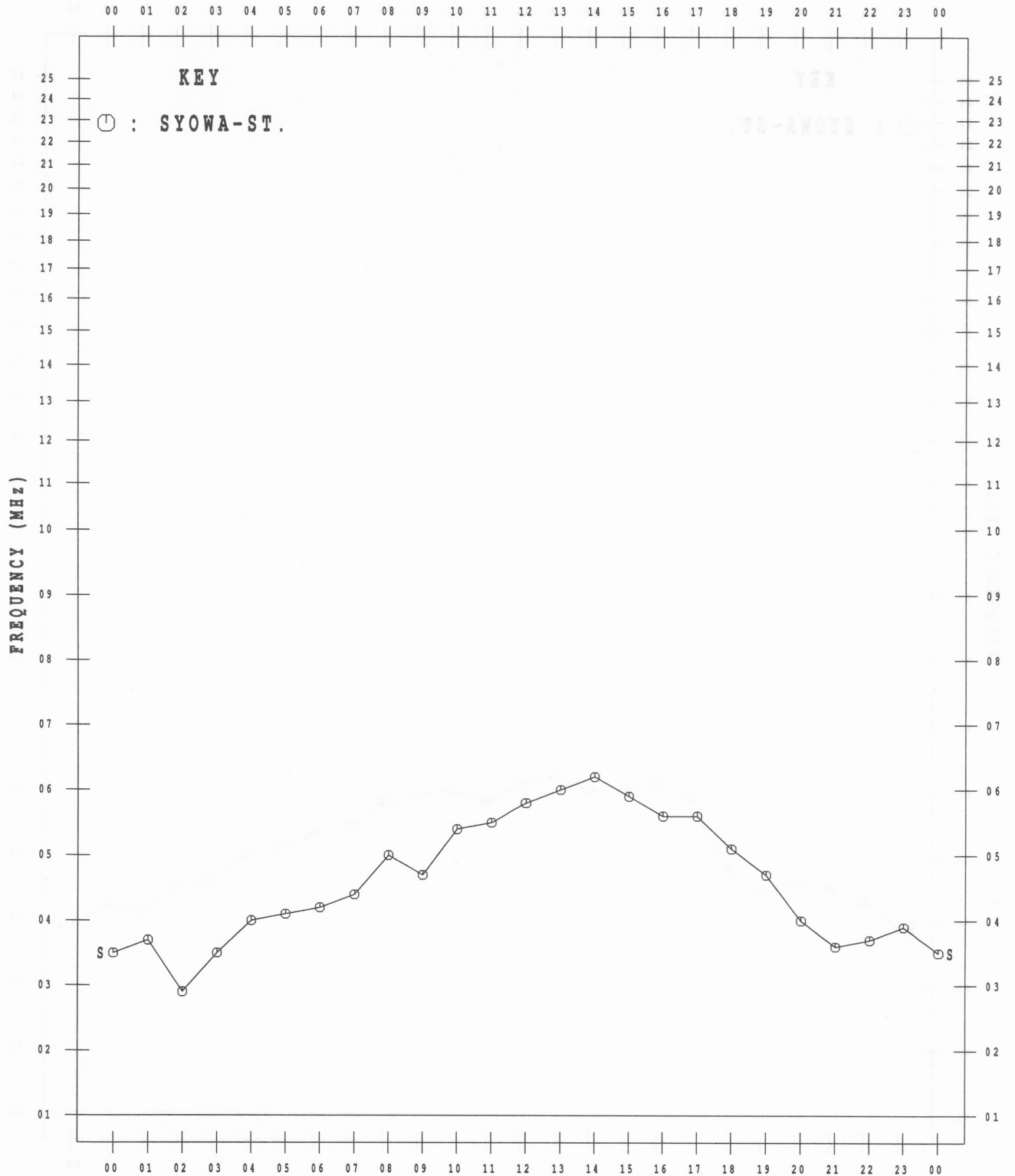


# MONTHLY MEDIAN VALUES OF $f_oF_2$

0001 1993

45° E MEAN TIME

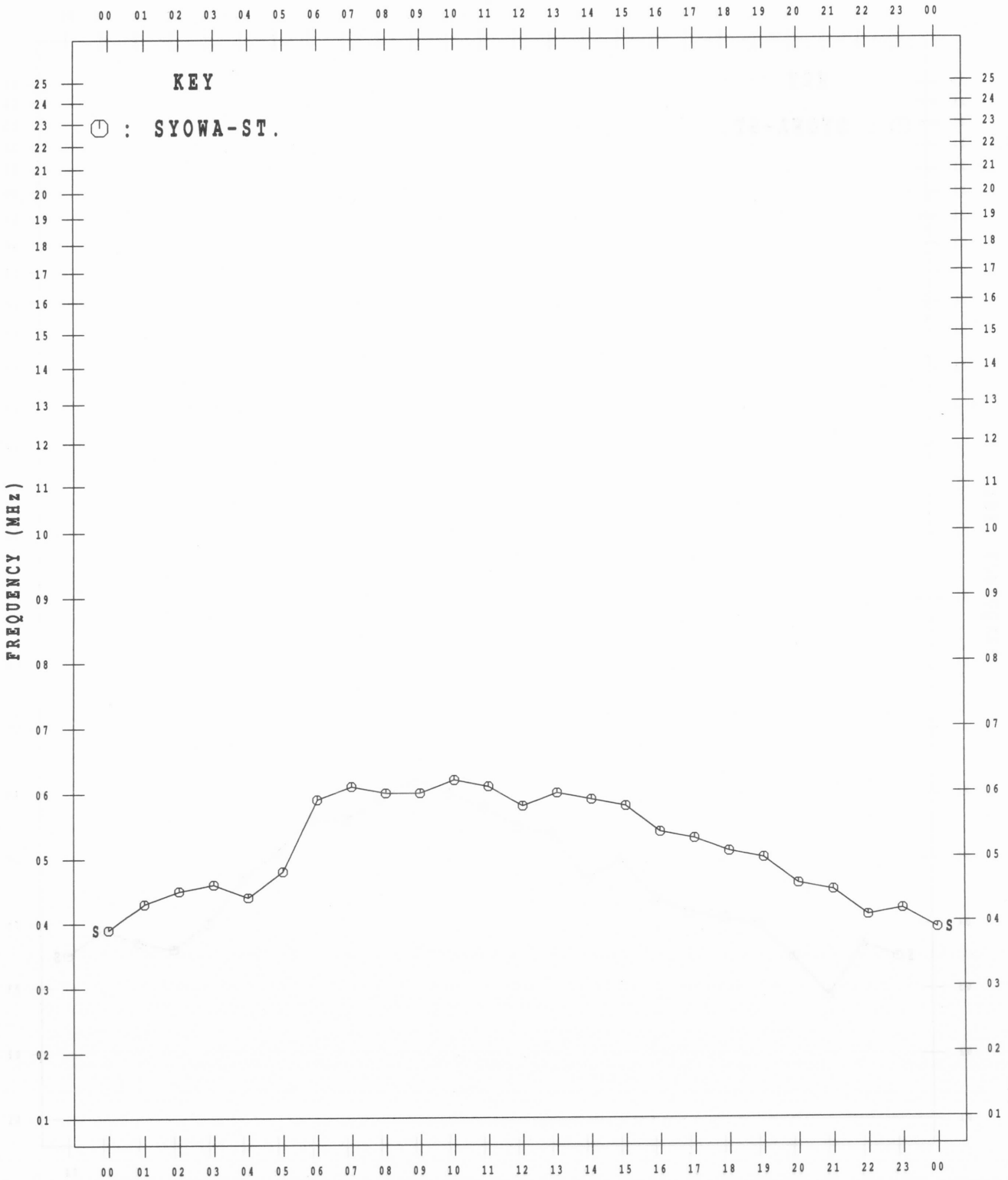
OCT. 1993



# MONTHLY MEDIAN VALUES OF foF2

45°E MEAN TIME

NOV. 1993



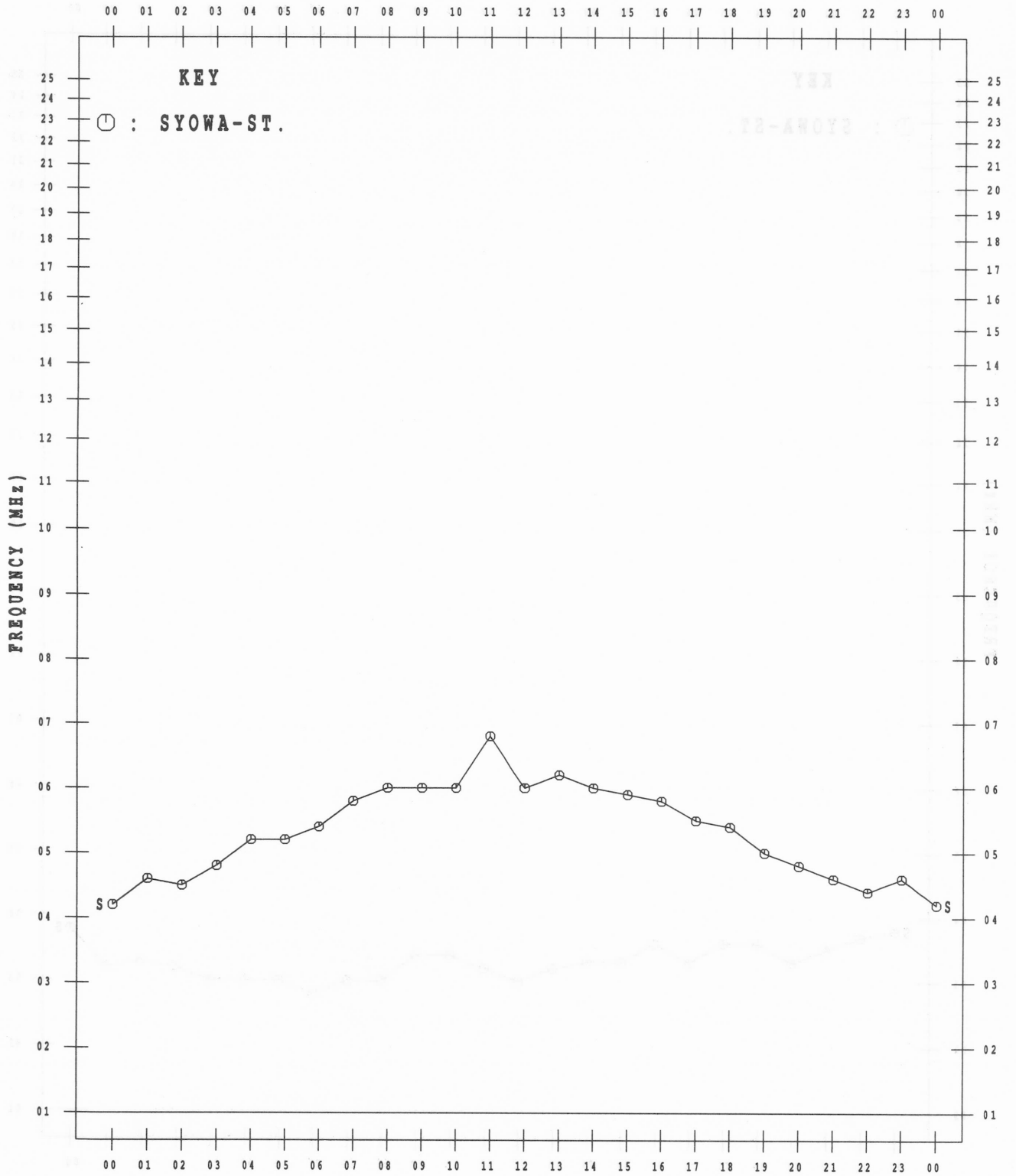


# MONTHLY MEDIAN VALUES OF $f_oF_2$

0001 0001

45° E MEAN TIME

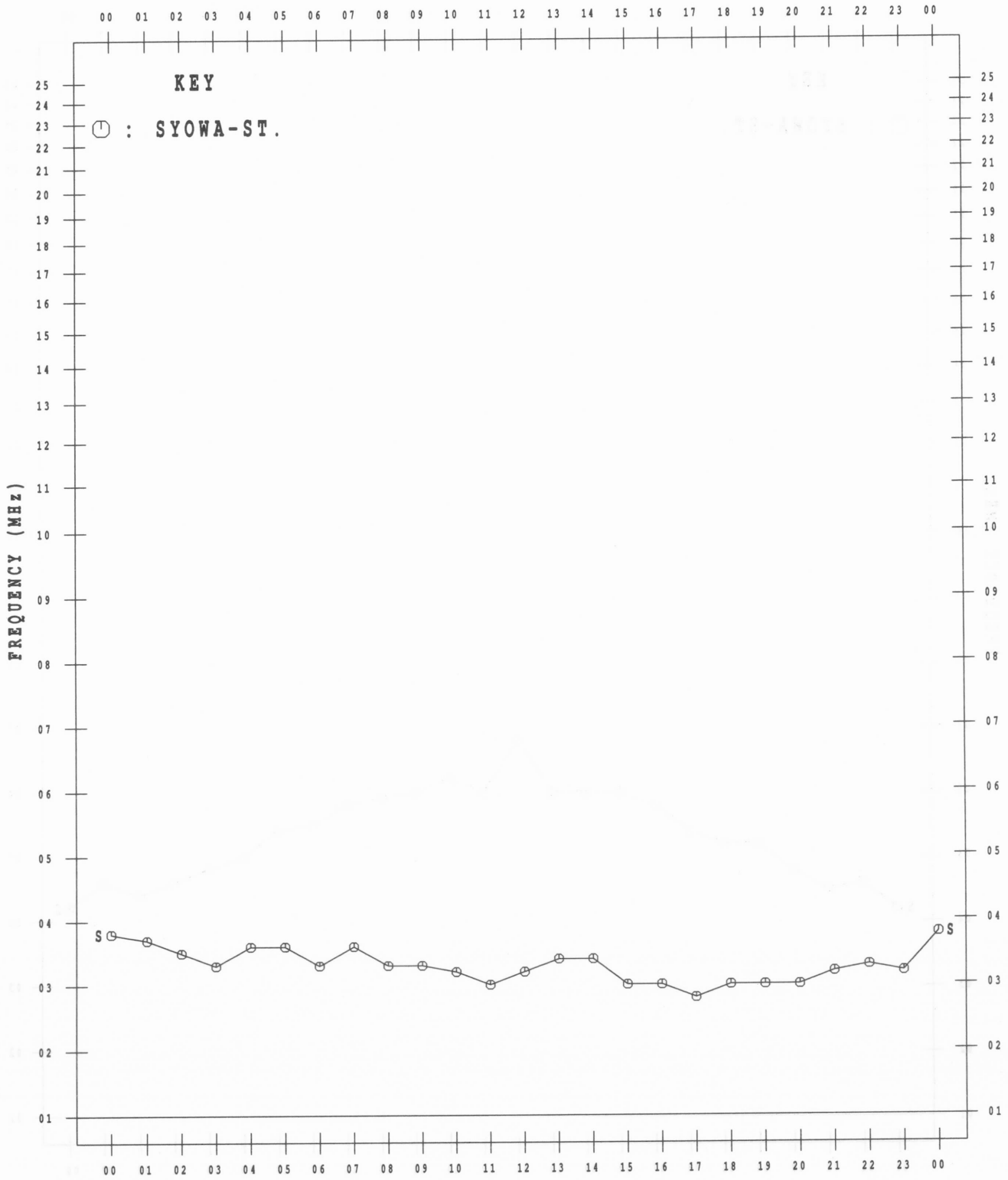
DEC. 1993



# MONTHLY MEDIAN VALUES OF f<sub>TE</sub>s

45°E MEAN TIME

JAN. 1993

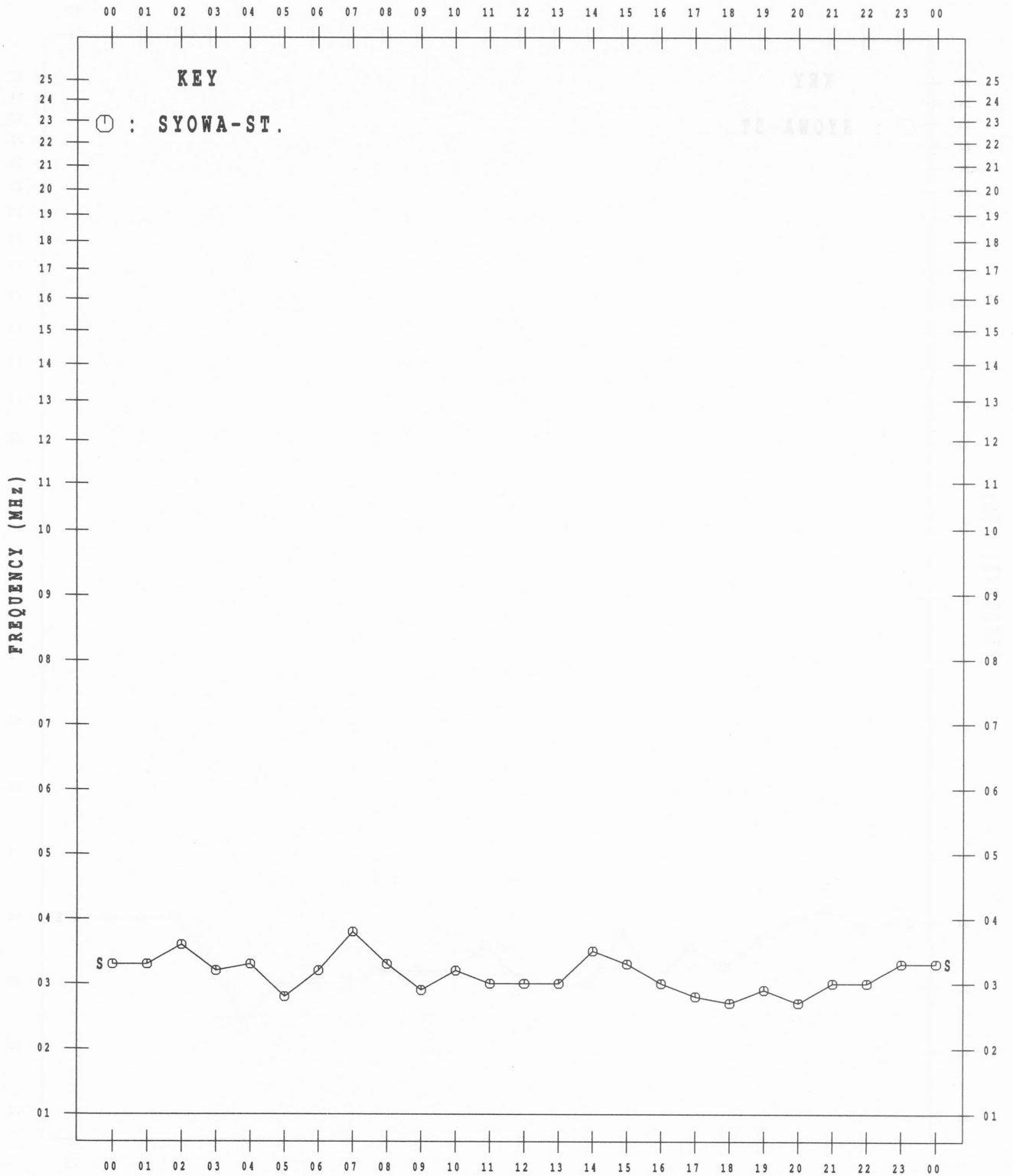


# MONTHLY MEDIAN VALUES OF HftEs

1993 JAN

45° E MEAN TIME

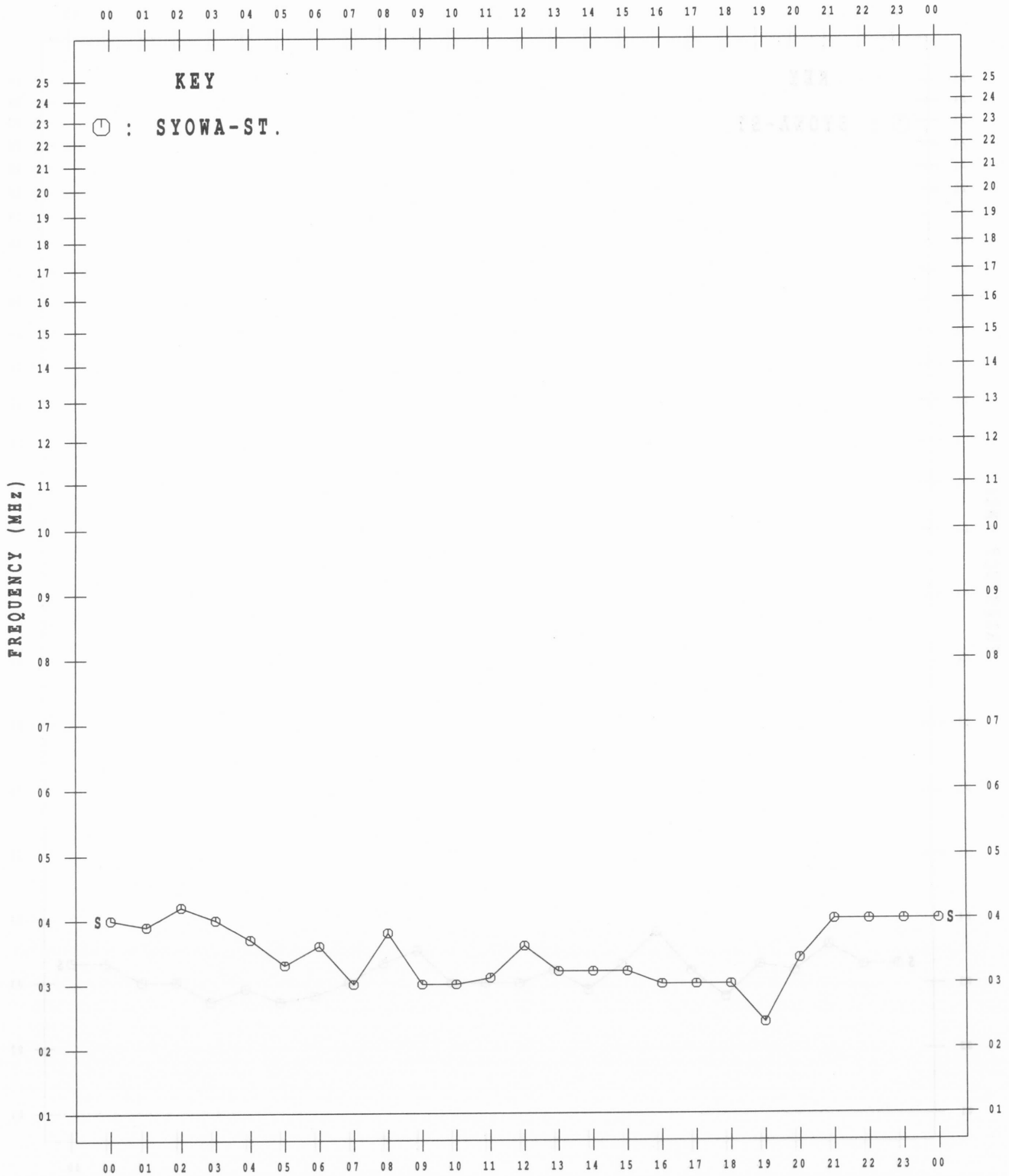
FEB. 1993



# MONTHLY MEDIAN VALUES OF $f_{TE}$ s

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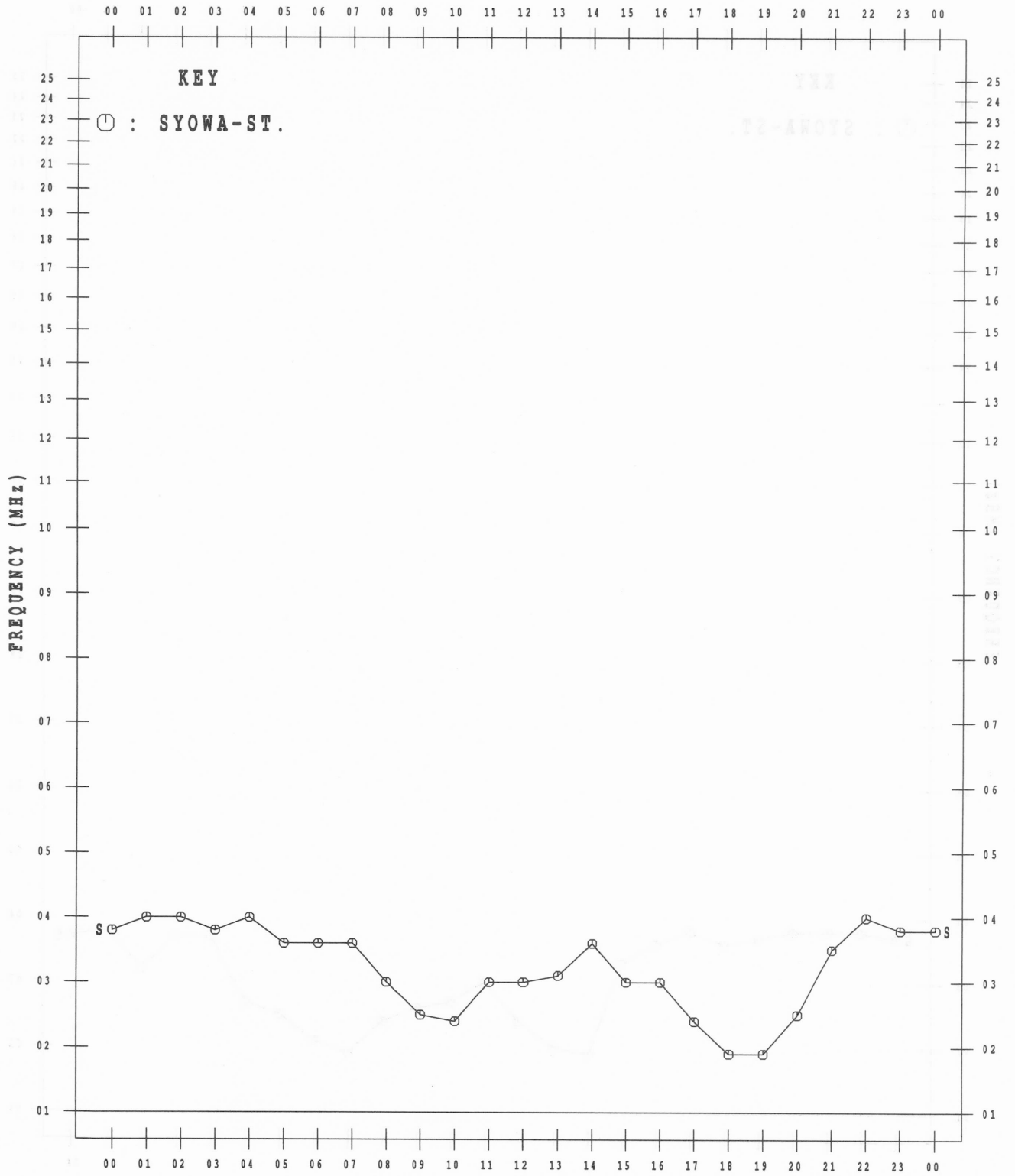
MAR. 1993



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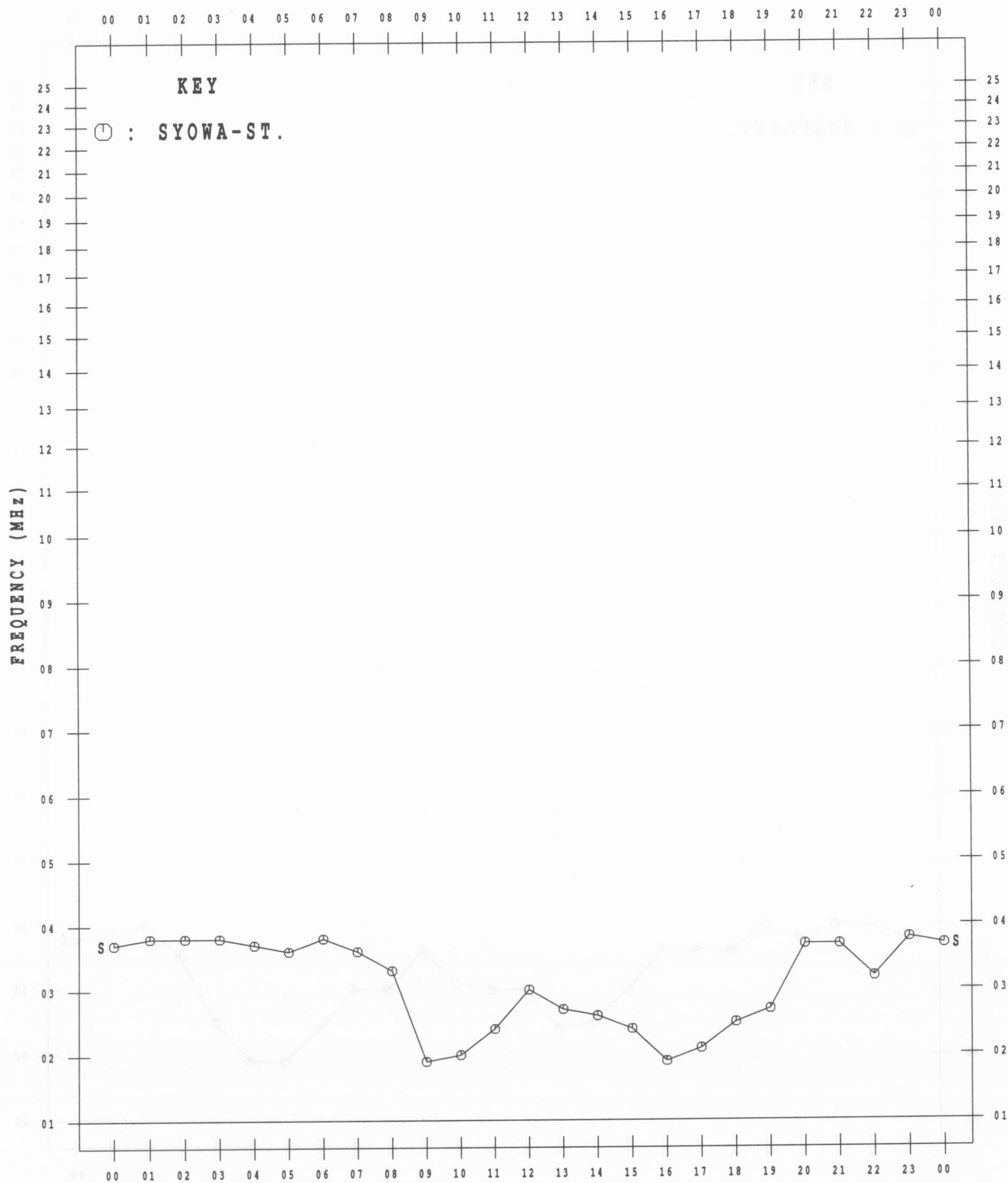
APR. 1993



# MONTHLY MEDIAN VALUES OF fteS

45°E MEAN TIME

MAY 1993

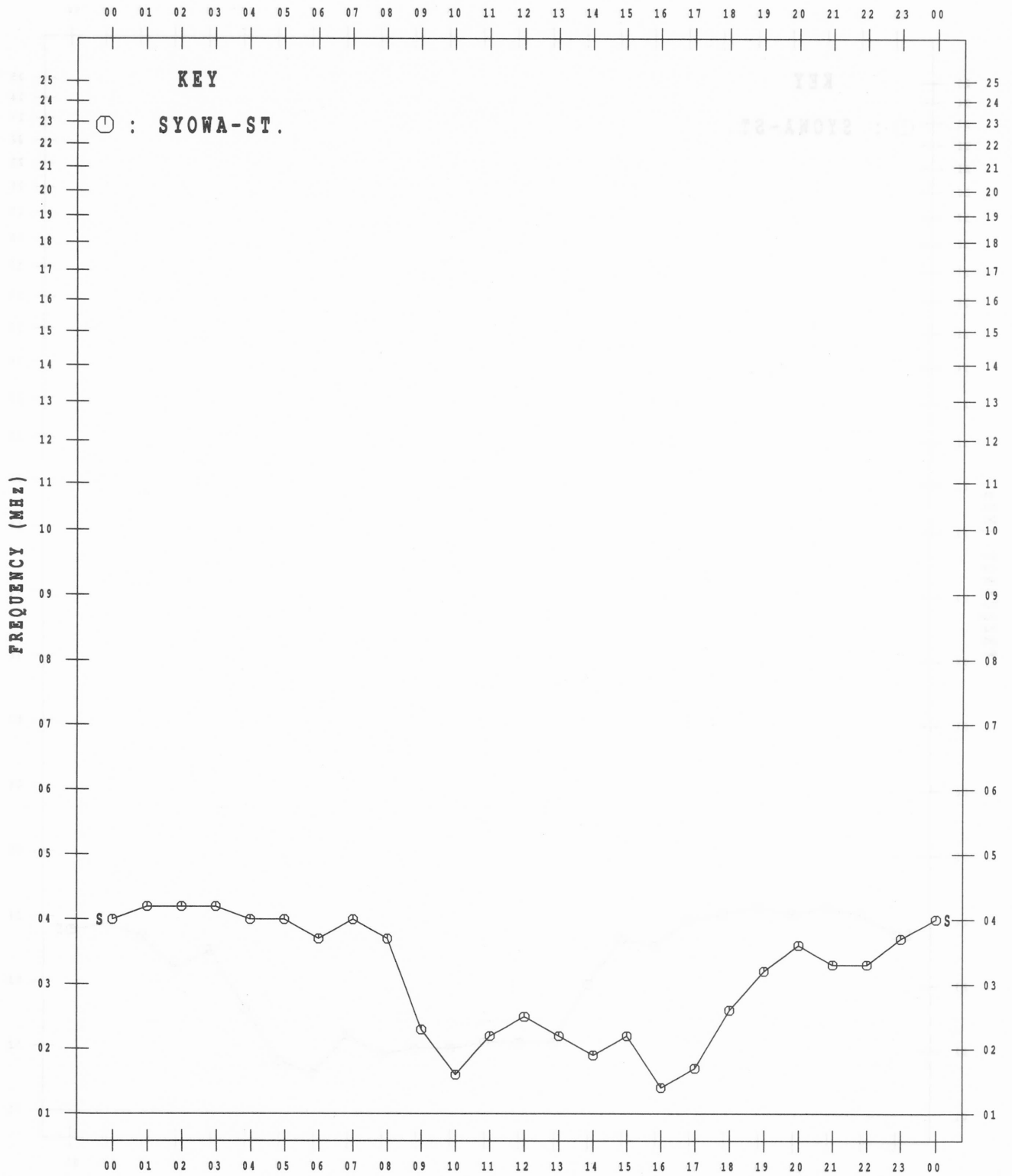


# MONTHLY MEDIAN VALUES OF fteS

JUN. 1993

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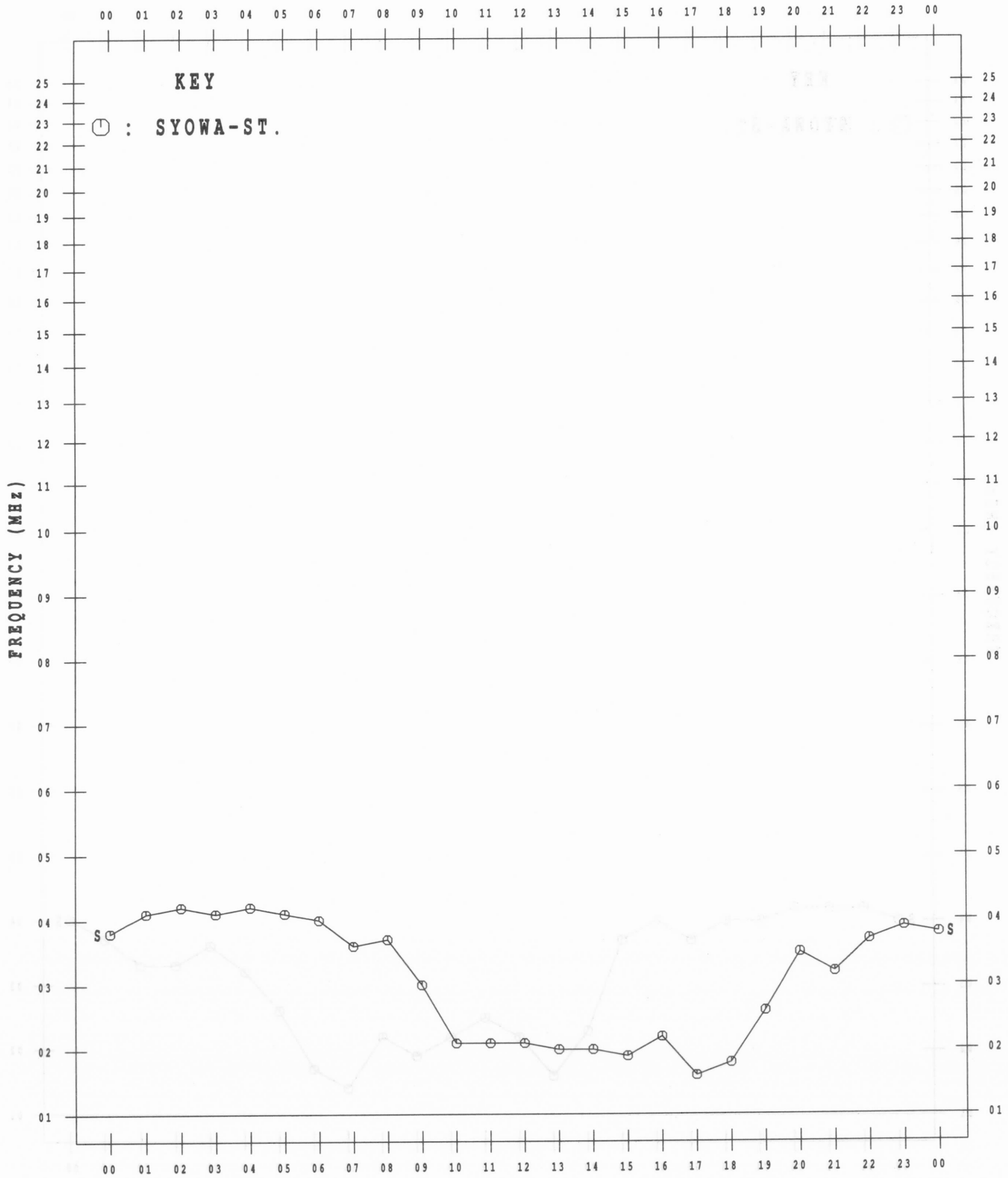
JUN. 1993



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45°E MEAN TIME

JUL. 1993

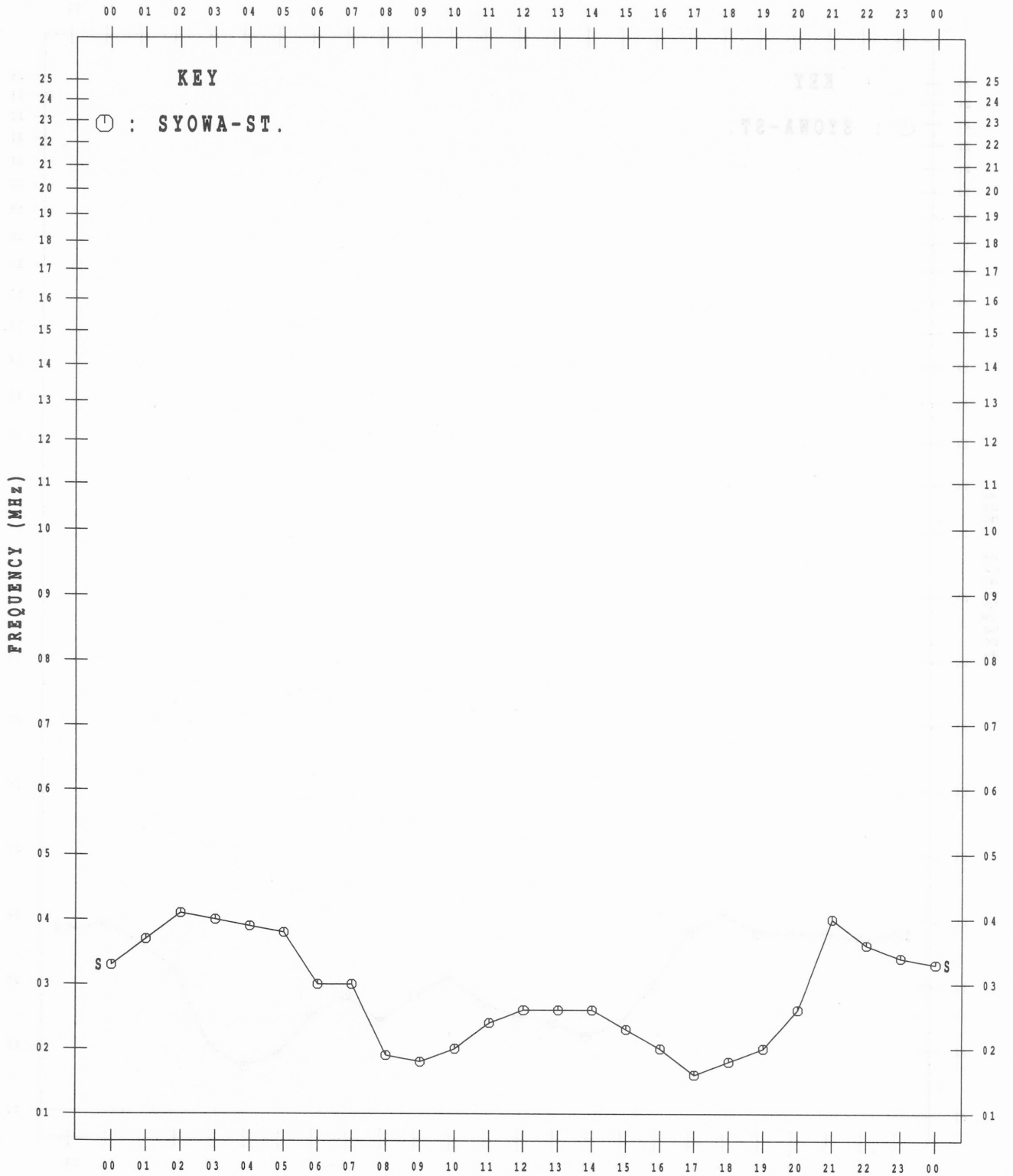




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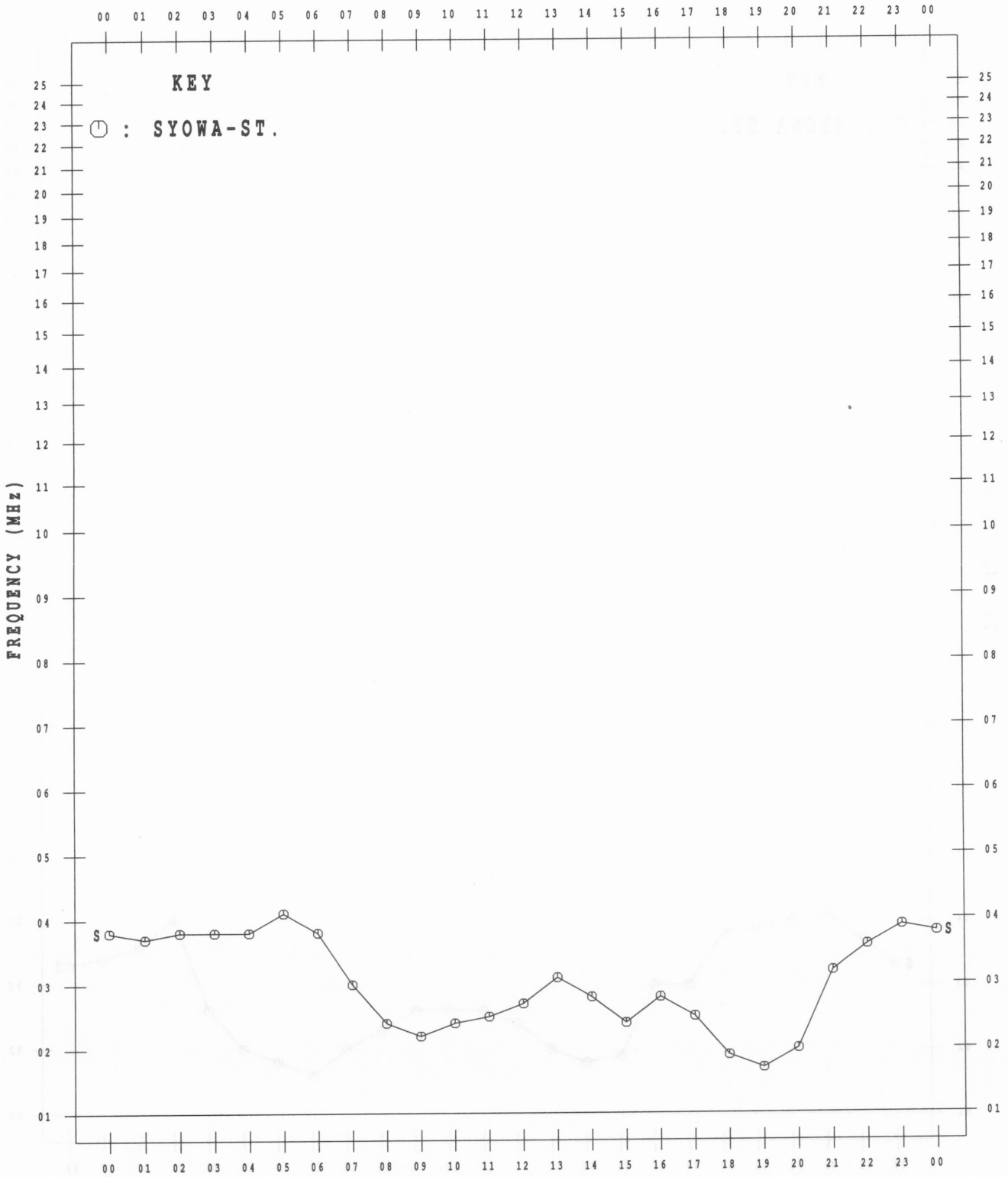
AUG. 1993



# MONTHLY MEDIAN VALUES OF f<sub>TE</sub>s

45° E MEAN TIME

SEP. 1993

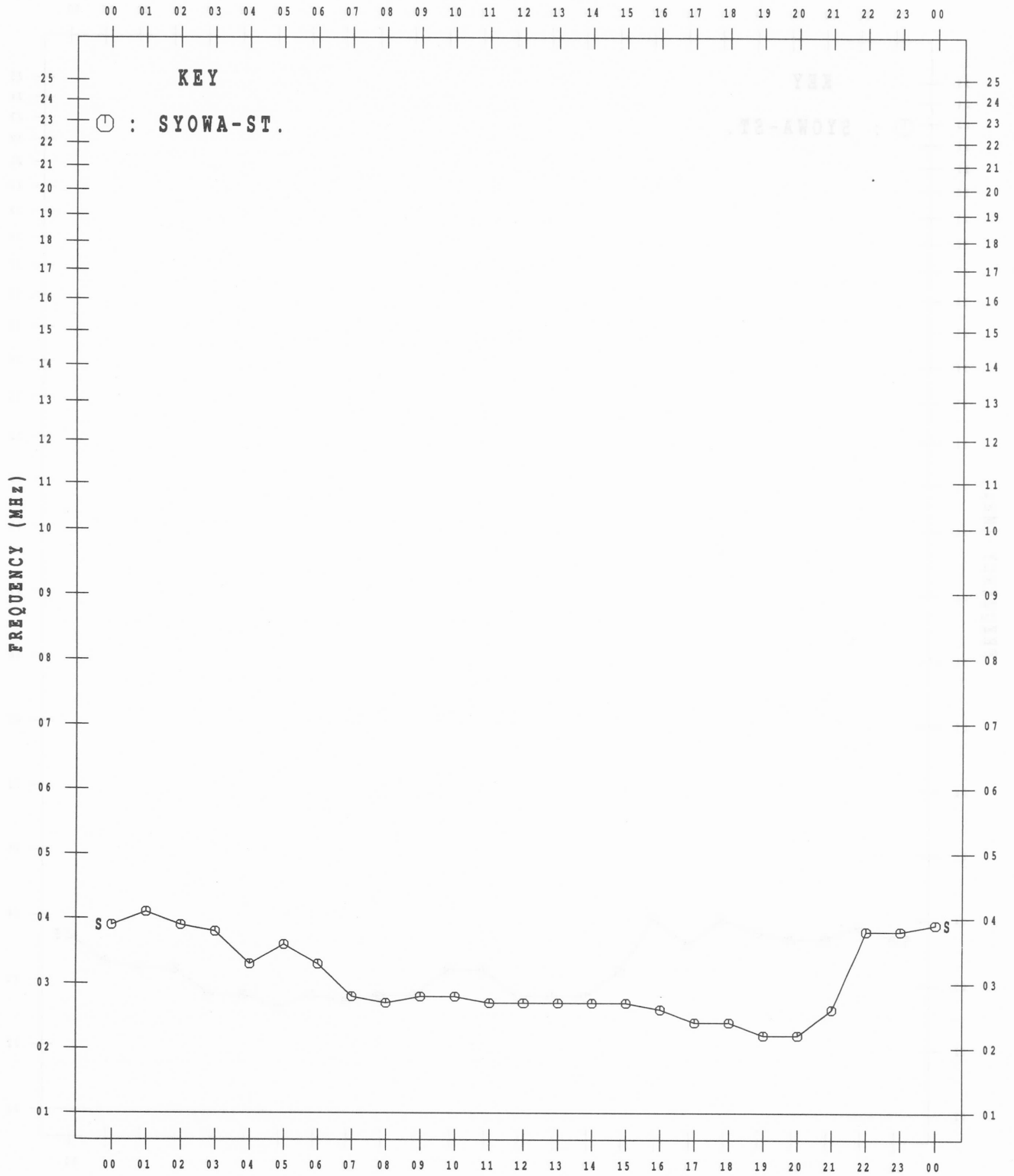


# MONTHLY MEDIAN VALUES OF $f_{TE}$ s

EREL VON

45° E MEAN TIME

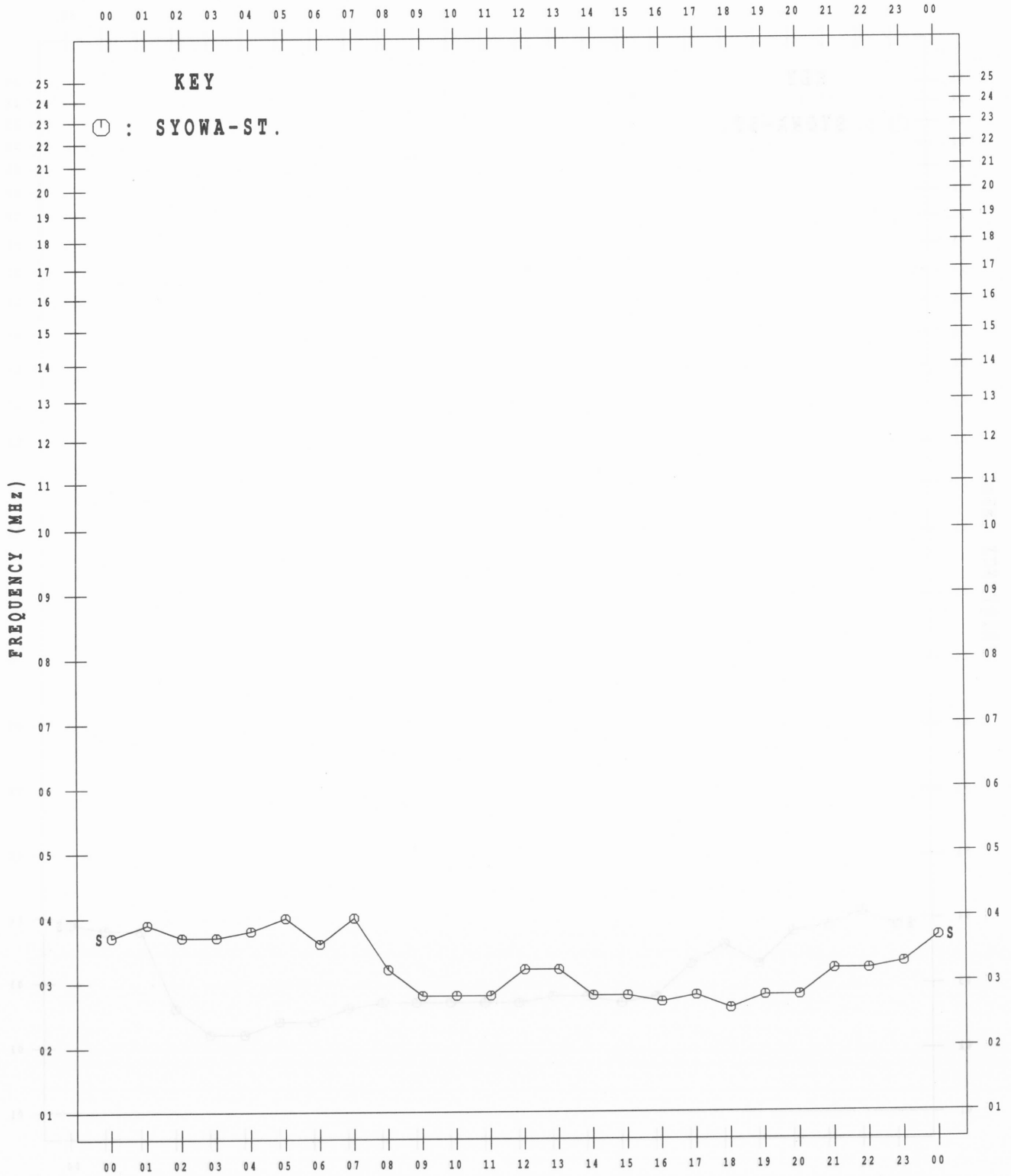
OCT. 1993



# MONTHLY MEDIAN VALUES OF f<sub>TE</sub>s

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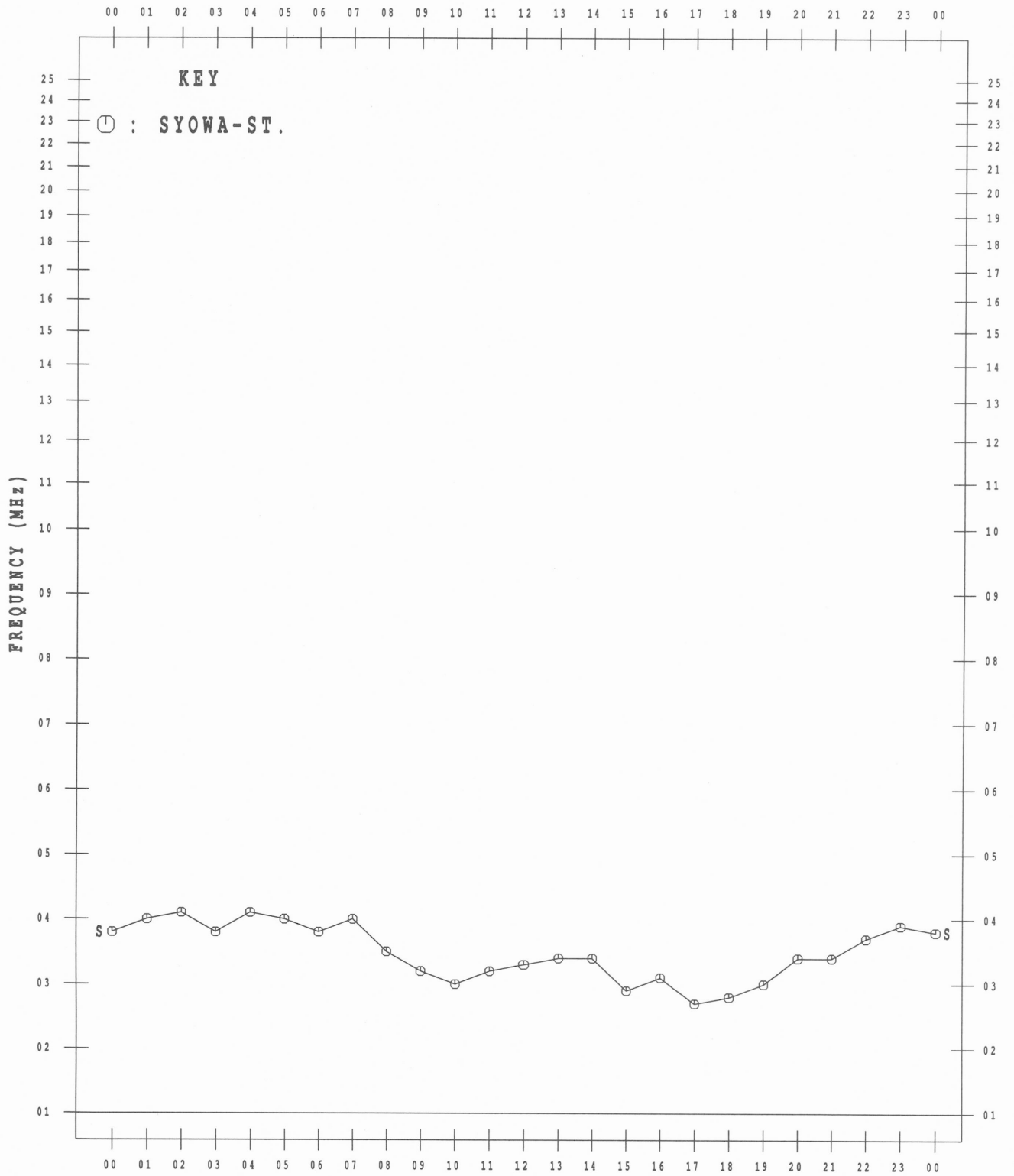
NOV. 1993



# MONTHLY MEDIAN VALUES OF f<sub>t</sub>E<sub>s</sub>

45° E MEAN TIME

DEC. 1993



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IONOSPHERIC DATA AT SYOWA STATION (ANTARCTICA)  
ION. ANT.—60 January 1993—December 1993 (Not for Sale)

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昭和基地電離層資料(南極)

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Queries about "Ionospheric Data at Syowa Station" should be forwarded to: The Communications Research Laboratory,  
Ministry of Posts and Telecommunications, 2-1 Nukui-Kitamachi 4-chome, Koganei-shi, Tokyo 184 JAPAN.