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IONOSPHERIC DATA IN JAPAN

FOR JUNE 1949

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(Denki-Tushin Kenkyujo)

MINISTRY OF TELECOMMUNICATIONS

TOKYO, JAPAN

THE ELECTRICAL COMMUNICATION LABORATORY

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CONTENTS

	Page
Foreword	2
Site of the Ionospheric Stations	3
Remarks on Symbols	3
Ionospheric Data for Every Day and Hour at Wakkanai	4
Ionospheric Data for Every Day and Hour at Fukaura	15
Ionospheric Data for Every Day and Hour at Shibata	26
Ionospheric Data for Every Day and Hour at Kokubunji	37
Ionospheric Data for Every Day and Hour at Yamagawa	49

FOREWORD

Although we have had long period of experience on the ionospheric observations in Japan since 1931, it was unable to publish the results of the observations as restricted by the military officials of the past.

Japan is not allowed to become a member of the International Telecommunication Conference. However, in accordance with the Recommendation of C.C.I.R., we send our results of the ionospheric observations and on radio propagation to the main organizations concerned with radio propagation hereafter.

Symbols and presentation in this report were used in accordance with the Recommendation No. 6 of C.C.I.R. Stockholm 1948: Standardization of Symbols and presentation of Results of Ionospheric Soundings Annex 1—5.

We will be very much appreciated to receive the similar publications from the organizations concerned with radio propagation in the world.

June, 1949

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Director of

The Electrical Communication Laboratory,

Ministry of Telecommunications,

Tokyo, Japan

SITE OF THE IONOSPHERIC STATIONS

Ionospheric observation is carried out at five stations in Japan.

The stations are situated as follows:

	longitude	latitude	site
Wakkanai	141° 41.1' E	45° 28.6' N	Wakkanai-machi, Soya-gun, Hokkaido
Fukaura	139° 54.1' E	40° 36.6' N	Fukaura-machi, Nishitugaru-gun, Aomori-ken
Shibata	139° 15.8' E	37° 57.0' N	Seiro-mura, Kitakanbara-gun, Niigata-ken
Kokubunji	139° 29.3' E	35° 42.4' N	Koganei-machi, Kitatama-gun, Tokyo-to
Yamagawa	130° 37.7' E	31° 12.5' N	Yamagawa-machi, Ibusuki-gun, Kagoshima-ken

REMARKS ON SYMBOLS

Except both $f_{\min} E$ and $f_{\min} F$, other symbols are used in accordance with recommendation of C.C.I.R. $f_{\min} E$ and $f_{\min} F$ in the table are defined as follows:

- Z_d . Half breadth of the layer, calculated by the method of Booker.
- $f_{\min} E$ Minimum frequency, on which echo reflected from E-layer begins to appear by use of the observation equipment on routine work.
- $f_{\min} F$ Minimum frequency, on which echo reflected from F-layer begins to appear by use of the observation equipment on routine work.

Lot 45°23.6'N
Long 141°41'E

Wakkanai

IONOSPHERIC DATA

135°E Mean Time

f_oF₂

Day	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	7.6	7.6 ^P	7.0 ^P	7.6 ²	6.8 ^P	(7.0) ^S	9.2	10.0	10.6	C	C	C	C	C	(9.5) ^P	8.8	9.0	B	A	A	A	A	B	B	
2	B	8.0	8.4	7.6	6.9 ^J	7.2 ^J	7.7	7.3 ^J	(6.9) ^A	6.5	C	C	C	7.6 ^P	7.3 ^J	A	A	A	8.0 ^N	8.3	(7.9) ^S	7.4	7.4	6.6	
3	7.3	(7.4) ^C	7.5 ^J	6.7	6.3 ^F	6.5 ^F	6.8	6.8	7.3 ^J	7.3 ^J	7.5	(7.4) ^S	7.2 ^J	7.6	7.3 ^J	7.9 ^J	7.2 ^J	8.1	7.9	7.9	(7.9) ^S	7.8	(7.6) ^S	7.4	
4	7.5	7.8	7.4 ^P	7.5	7.6	7.8	(8.1) ^C	8.3	8.3 ^F	B	B	B	B	8.4	8.2	7.9	8.1 ^P	8.0 ^P	7.0 ^J	7.8	S	S	7.6 ^P	(7.7) ^S	
5	7.8	6.3 ^P	S	S	8.7	(7.9) ^B	7.1	B	C	C	C	C	C	C	C	C	A	B	B	B	7.7	B	B	B	
6	6.6	6.7 ^J	(7.6) ^B	6.4 ^M	6.0 ^K	6.3 ^K	6.0 ^N	B ^K	B ^K	B ^K	A ^K	A ^K	B ^K	B ^K	B ^K	B ^K	B ^K	B ^K	A ^K	A ^K	5.4 ^K	5.5 ^K	5.3 ^K	5.1 ^K	
7	5.4 ^K	5.9 ^A	5.2 ^K	5.0 ^K	5.2 ^K	5.7 ^K	8.5	(8.3) ^B	8.1 ^S	(8.1) ^S	8.0	(8.1) ^J	8.2 ^P	7.4 ^J	(7.8) ^C	8.1	8.1	8.1	(8.2) ^A	8.2	7.8 ^P	(7.3) ^S	6.7 ^P	7.0 ^P	
8	6.0 ^A	6.4	6.6 ^P	6.5	6.7	6.1	6.6	A	S	S	S	C	(7.8) ^B	A	A	B	8.2	8.3	8.1	8.0	7.5 ^S	(7.5) ^S	7.4 ^J	(6.9) ^A	
9	6.4	7.0 ^J	5.8 ^J	6.4	7.1 ^J	(7.5) ^S	7.9	7.8	7.8	C	B	C	B	B	7.8	(7.9) ^B	7.9	7.3	6.3	7.8	(7.8) ^S	(7.5) ^C	7.1 ^J	(7.0) ^S	
10	6.9 ^J	6.6 ^K	6.6	6.6	7.4	8.3 ^F	(6.6) ^M	7.7 ^J	9.4 ^F	(8.9) ^T	8.3 ^J	(8.4) ^J	8.4	(7.8) ^C	7.1	(7.6) ^B	8.0 ^P	7.8	(7.9) ^B	7.9	8.2	B	B	B	
11	B	7.5	7.5	7.2	8.0	8.1	9.1 ^J	9.0	18.6 ^S	8.2	(8.2) ^B	7.6 ^P	8.1	8.3	7.8 ^S	S	T	C	C	(7.9) ^F	(7.4) ^B	6.6	B	B	
12	T	(6.2) ^P	6.7	7.2 ^J	7.4	8.0	8.4	8.4	8.2	C	S	8.0	(8.0) ^S	(8.0) ^S	(7.7) ^S	7.3 ^S	7.2 ^J	7.5 ^J	S	S	C	C	C	C	
13	7.6	6.4	6.5	6.2 ^F	6.3	6.3	5.5 ^N	5.3 ^K	5.7 ^K	S ^K	B ^K	B ^K	B ^K	B ^K	(6.3) ^K	C	C	C	C	C	C	C	C	7.4	
14	6.5 ^F	6.5 ^F	6.1 ^F	6.3 ^F	(7.3) ^M	8.3 ^H	9.0	7.9 ^F	(7.3) ^S	(6.4) ^S	8.2	7.7	8.0	8.4	8.2	8.2	8.2	8.2 ^J	7.3 ^T	8.8 ^J	S	S	7.5	7.5 ^S	
15	S	S	T	7.9 ^F	6.6 ^F	(6.6) ^S	6.5 ^F	(7.2) ^S	T	C	7.1	8.4 ^S	S	S	S	S	8.1	7.8	6.9	7.0 ^P	6.7	6.5 ^P	(7.3) ^S	(7.4) ^S	
16	7.7	7.7	7.7	6.8	(6.8) ^P	7.2	7.5	7.5	S	S	S	S	S	8.1 ^F	8.2	8.5	8.5	A	A	B	B	B	B	7.9 ^F	
17	(8.2) ^P	8.5	7.7	7.1 ^J	(7.4) ^B	7.6	7.8	B	B	B	B	B	S	S	8.3	8.2	8.2	7.8	7.2	T	S	8.0 ^P	S	S	
18	7.8	7.2	(7.2) ^S	7.1	6.7 ^M	6.1	8.0 ^B	B	B	A	B	B	B	A	A	A	A	A	B	B	S	B	B	B	6.5 ^P
19	(6.7) ^B	6.9	6.2	6.4	5.8	6.3 ^H	S	T	C	C	C	C	C	C	C	C	A	A	B	B	(7.3) ^B	B	T	7.0	
20	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	6.0 ^K
21	6.6 ^P	(6.8) ^F	7.0 ^F	6.7 ^F	6.3 ^F	6.4 ^B	(7.0) ^S	(7.5) ^S	(7.6) ^S	7.7	7.4	S	S	7.1	7.4 ^S	(7.5) ^S	7.6	S	S	S	S	(7.0) ^P	S	S	
22	S	S	S	S	S	S	S	S	(8.0) ^P	(8.5) ^P	T	T	8.7	8.0	(8.0) ^T	8.0	T	C	C	S	S	8.3	S	S	
23	S	C	C	C	C	C	C	C	C	C	(6.4) ^A	6.5	6.2	6.4	(6.5) ^F	6.5	6.5	T	T	T	A	6.8 ^P	T	7.3 ^F	
24	7.3 ^F	7.0 ^F	6.2	6.1	6.6	7.8	8.3 ^P	(8.3) ^A	8.2	A	A	A	A	6.3 ^J	(6.3) ^M	6.3 ^J	(6.8) ^S	7.3 ^P	A	S	S	A	A	6.4 ^P	
25	7.5 ^P	7.7 ^F	7.0	6.6	6.3 ^H	7.5 ^H	8.9	9.9	10.0	9.7 ^F	8.1	S	B	6.5	(6.5) ^B	6.4	7.8	(7.7) ^A	7.6 ^J	B	B	8.1 ^H	6.8	7.3 ^J	
26	7.2	7.0	7.1 ^J	6.5	6.7	7.3	8.1	9.1	9.0	7.6	7.9	6.6	6.5	6.8	7.4	(7.4) ^J	7.3 ^J	6.4	7.4	8.2	7.5 ^J	7.3	7.3	6.9	
27	7.0	7.8	8.3	7.8	6.9 ^J	6.8	7.0 ^P	7.4 ^J	8.3	8.1	C	C	C	8.1	(8.1) ^C	8.0	8.0 ^H	8.3	8.3	(8.0) ^S	S	S	S	8.0	
28	(7.6) ^S	7.1 ^J	(7.3) ^S	7.5	7.1	8.3	7.9	8.3 ^J	8.3	8.5	8.1	7.9	8.4	8.2	8.1	S	S	7.5	(6.3) ^S	5.2 ^A	(7.0) ^S	8.8	6.3	(7.2) ^S	
29	7.6 ^F	8.3 ^F	7.4 ^F	6.7	7.0	7.3 ^S	8.2	8.2	(7.3) ^B	6.3	7.4	(7.7) ^B	8.0	7.8	7.6	7.6	S	S	6.4	6.4	T	T	T	7.3	
30	6.6	6.9	7.4	6.0	6.4	6.2	7.4	S	S	7.0 ^H	S	S	S	7.0	(7.3) ^S	(7.4) ^S	7.5	(7.8) ^S	7.6	8.0	(7.0) ^J	6.8	6.9	6.8	
31																									
Median Value	7.3	7.0	7.1	6.7	6.7	7.2	7.8	8.1	8.2	7.9	7.7	8.0	8.0	7.8	7.6	7.8	7.9	7.8	7.4	7.9	7.5	7.5	7.1	7.2	
Count	23	26	25	26	27	27	27	22	19	12	12	12	12	19	21	19	19	17	17	16	16	15	15	23	

Sweep 1.0 Mc to 17.0 Mc in 1.5 min

Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
(Denki-tsushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

hp F₁

Lat. 45°23.6'N
Long. 141°41.1'E

Wakkanai

135°E Mean Time

Day	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	420	410 ^P	400 ^F	400 ^Z	380 ^P	350 ^S	340	330	410	C	C	C	C	C	C	(360) ^B	350	360	A	A	A	A	A	B	B
2	B	390	420 ^F	360	350 ^T	370 ^T	360	(370) ^B	410 ^T	450	C	C	C	C	410 ^P	A	A	360 ^H	380	(380) ^S	380	380	380	340	340
3	420	(430) ^C	430	390	440 ^F	400 ^F	360	400	(310) ^B	390 ^T	(390) ^T	(390) ^T	380	(380) ^B	410 ^T	420 ^T	430 ^T	430	340	420	(410) ^S	390	(400) ^S	410	410
4	380	400	400	420	430	340	(380) ^C	420	400 ^B	B	B	B	B	B	340	350	(370) ^B	390 ^B	430 ^T	360	S	S	410 ^F	(430) ^S	410
5	430	410 ^P	S	S	390	(440) ^B	490	B	C	C	C	C	C	C	C	C	A	A	B	B	B	B	B	B	430 ^S
6	390	450 ^T	(420) ^B	450 ^H	470 ^K	500 ^K	440 ^K	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	430 ^S
7	450 ^T	410 ^K	380 ^K	430 ^K	370 ^K	390 ^K	360	(330) ^B	300 ^S	(330) ^S	360	(360) ^C	360 ^P	390 ^T	(360) ^C	330	390 ^B	330	(340) ^A	350	350 ^P	380 ^P	380 ^P	410 ^P	450 ^K
8	400 ^P	370	380 ^P	350	310	350	360	A	S	S	S	C	A	A	A	A	380	280	360	310	360 ^S	(370) ^S	370	(380) ^A	380 ^A
9	390	380 ^T	380 ^B	330	350	340 ^P	(370) ^S	390	B	C	B	B	B	B	B	420	400	400	380	(440) ^S	(440) ^S	(460) ^S	470 ^T	(460) ^S	470 ^T
10	440 ^T	450	400	420	370	350 ^F	(300) ^K	380 ^T	310 ^P	(360) ^T	400	(400) ^C	390	(410) ^T	420	(390) ^B	350 ^P	330	(380) ^B	420	340	340	B	B	B
11	B	410	420	370	400	370	330 ^T	320	(350) ^C	360	(380) ^B	390 ^P	440	380	390 ^S	S	T	C	C	(290) ^S	340	B	B	B	B
12	T	(390) ^P	400	410 ^T	390	360	400	300	400	C	S	470	(440) ^T	(400) ^S	(390) ^S	380 ^S	380 ^B	390 ^T	S	C	C	C	C	C	370
13	430	450	430	470 ^F	420	380	370 ^K	G	G	S	B	B	B	B	B	A	A	310	310	T	S	S	390 ^P	S	370
14	470 ^F	410 ^F	440 ^F	420 ^F	400 ^F	(400) ^F	390 ^M	340	320 ^F	(310) ^S	(320) ^S	400	360	390	410	360	370	360 ^T	400 ^T	390 ^T	S	S	400	400 ^S	400 ^S
15	S	S	T	BF	370 ^F	(390) ^S	400 ^F	(400) ^B	T	C	400	400 ^S	S	S	S	410	330	310	350 ^P	320	(310) ^T	S	S	440 ^S	440 ^S
16	410	420	400	350	(340) ^B	320	350	320	B	S	B	B	B	B	S	380 ^S	340	340	A	A	B	B	B	B	380 ^F
17	(350) ^B	340	330	360 ^T	(350) ^F	340	330	B	B	B	B	B	B	B	S	(340) ^B	310	310	310	T	S	S	390 ^P	S	380 ^F
18	350	380	S	B	380 ^H	390	B	B	B	A	A	A	A	A	A	A	A	A	B	B	S	S	B	B	380 ^P
19	(380) ^B	380	400	440	450	400 ^N	ST	B	C	C	C	C	C	C	C	C	A	B	B	JB	B	T	380	B	380 ^P
20	B	B	B	AK	AK	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
21	300 ^P	(340) ^P	380 ^F	350 ^F	400 ^F	350 ^B	S	S	S	S	370	S	S	S	390	420 ^S	(400) ^S	370	S	S	S	(350) ^F	S	S	S
22	S	S	S	S	S	SH	(320) ^P	(400) ^F	T	T	360	330	330	T	T	T	T	C	C	S	S	S	S	S	S
23	S	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	460 ^T	470	T	A	A	350 ^P	T	T	460 ^F
24	370 ^F	310 ^F	370	400	350	400	320	A	A	A	A	A	A	A	380 ^T	(390) ^M	400 ^F	(370) ^S	340 ^P	A	S	S	A	A	420 ^P
25	400 ^P	370 ^F	350	360	370 ^M	420 ^M	410	370	(350) ^T	330	S	B	400	(400) ^S	390	(400) ^S	490 ^T	370	(370) ^S	360 ^T	B	B	300 ^M	330	410 ^T
26	410	410	370 ^T	410	440	410	400	370	330	360	400	400	470	400	390	(400) ^S	490 ^T	310	350	330	320 ^T	350 ^P	400	370	370
27	390	410	360	330	320 ^T	330	370 ^P	400 ^T	350	B	C	C	C	C	B	C	500 ^H	400	470	(330) ^S	S	S	S	S	S
28	S	S	S	380	410	320	B	S	390	(390) ^B	380	(400) ^B	420	420	390	390	S	380	S	A	S	400	330	(370) ^S	370
29	400 ^T	410 ^F	430 ^F	410	440	470 ^S	420	420	B	B	B	B	B	B	400	(430) ^F	440	400	S	S	380	410	T	T	420
30	420	470	370	450	400	400	410	500	S	S	410 ^H	S	S	S	510	540 ^S	(480) ^F	410	S	S	420	320 ^T	360	420	470
31																									
Mean Value	400	410	400	400	390	380	370	390	370	(360)	380	400	400	390	400	390	380	360	360	360	360	380	380	390	410
Count	22	25	23	24	27	27	24	19	15	9	11	11	11	16	17	17	19	16	15	14	15	14	14	22	22

Sweep 1.0 Mc to 11.0 Mc in 1.5 min

Manual

IONOSPHERIC DATA

Lat. 45°23.6'N
 Long. 141°41.1'E
 Wakkanai

h_pF₂

135°E Mean Time

Day	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	310	290	300	270	270	250	300	290 ^A	290 ^A	C	C	C	C	C	C	A	330	280	(300) ^A	A	A	A	A	A
2	A	A	A	280	300	260 ^A	320	A	A	C	C	C	C	C	4.00	4.00	A	A	A	310 ^H	330 ^A	360 ^A	300	320 ^A
3	A	C	300 ^A	300 ^A	360	340	400	280	310	(390) ^A	380 ^A	(390) ^A	380 ^A	(390) ^A	4.00	4.00	4.00	4.00	330	360	4.00	(300) ^A	270	320
4	320	350 ^A	330 ^A	330	A	A	380	400	280	A	A	A	A	A	(320) ^B	310	350	380	390	300	270	260	300	310
5	320	350	330	380	330	360	460	B	C	C	C	C	C	C	C	C	A	B	B	300	300	A	A	320
6	290	320	300	300 ^H	400 ^K	490 ^N	B ^K	B ^K	B ^K	B ^K	A ^K	A ^K	B ^K	B ^K	B ^K	B ^K	B ^K	B ^K	B ^K	A ^K	A ^K	A ^K	A ^K	
7	A	A ^N	280	(300) ^K	300 ^K	390 ^K	320	290	280	S	A	A	320	280	(340) ^C	320	320	290	(300) ^A	900 ^A	(250) ^T	270	280	300
8	300	300	280	270	260	320	340	(390) ^N	400	340	A	A	A	A	A	300	340	230	220	270	300 ^A	(300) ^A	300 ^A	(340) ^A
9	380 ^A	300 ^A	280 ^F	260	270	270	320	390	T	C	4.00	C	B	B	4.10	(370) ^B	330	320	280	250	270	280	300	380
10	280	B	A	A	280	290	280	290	290	340	380	(330) ^T	360	(330) ^F	4.00	390	330	300	300	300	290	270	270	270
11	270	310 ^A	300	280	290	250	(300) ^L	280	(330) ^C	370	350	390	430	370	350	400	T	C	C	290	(300) ^H	300	310	300
12	320	(310) ^A	300	310	260	290	380	280	(440) ^C	470	460	380	400	380	400	360	340	(300) ^T	340	330	290 ^A	C	C	C
13	300	310	310	370	380	340	370 ^N	400 ^N	460 ^N	S ^K	B ^K	B ^K	B ^K	B ^K	4.00 ^A	C	C	C	C	C	C	300	270	280
14	310 ^F	(300) ^F	300	310 ^F	300	260 ^H	290 ^H	300	310	300	320 ^S	390	350	390	400	360	330	290	280	300	(270) ^A	(300) ^A	300	(300) ^F
15	300 ^A	(330) ^A	(310) ^A	290	300	300	390	360	340	(370) ^C	400	390	400	420	400	360	310	300	300	300	250	300	300	310
16	300	310	300	270	300	260	280	290	330	310	300	330	(330) ^S	320	380	300	300	A	A	A	A	A	A	290 ^A
17	300	290	260	260	290	300 ^A	300	A	A	A	A	A	A	A	A	350	350	300 ^A	260	(300) ^A	(300) ^A	300 ^A	330 ^A	310 ^A
18	(300) ^T	(300) ^A	(300) ^A	370 ^A	280 ^H	350	270	240	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	290
19	(300) ^T	300	300	320	380	300 ^H	310	C	C	C	C	C	C	C	C	A ^K	A ^K	280 ^A	250 ^A	(260) ^A	(300) ^K	A ^K	C ^K	390 ^A
20	340	320	330 ^A	340 ^B	(370) ^K	400 ^A	360 ^A	340 ^K	(400) ^B	A ^K	A ^K	A ^K	A ^K	A ^K	500 ^K	(380) ^K	A ^K	A ^K	380	320	300	310	(320) ^A	320
21	280 ^A	320 ^A	300	270	260 ^H	290	(330) ^A	(360) ^A	300 ^B	(370) ^A	340	(400) ^A	410	390	390	360 ^S	350	310	320	(300) ^A	(290) ^A	(290) ^A	280	290
22	280	320 ^A	290	290	290	270 ^H	290	380	370	T	T	330	320	330	S	S	C	C	C	A	280	280	310	(300) ^A
23	A	C	C	C	C	C	C	C	C	C	C	A	470	480	490	410	500	390	(380) ^S	(260) ^A	320	(300) ^A	(340) ^T	370 ^F
24	(310) ^F	(300) ^F	280	320 ^A	280	290	300	(300) ^A	(300) ^A	A	A	A	A	A	(340) ^A	300	380	340	(330) ^A	310	(400) ^S	A	A	380 ^S
25	290	280	260	250	250 ^H	280 ^H	330	300	320	(310) ^B	300	(350) ^T	390	400	(400) ^A	380	310	(310) ^A	(310) ^A	240	250	240	230	300
26	300	300	280	280	300	310	330 ^A	330	300 ^A	350	380	400	470	400	370	400	350	300	310	280	250	240	230	300
27	320	300	280	260	260	300	340	300	320	(310) ^B	C	C	C	400	(390) ^C	370	410	370	350	300	240	290	290	300
28	280	290	290	300	310	290	280	330	350	330	400	390	380	360	390 ^S	330	330	A	A	A	290	290	290	(290) ^A
29	290	300	300	320	290	400	390	400	380	(400) ^B	410	490	390	320	450	390	350	370	280	390	320	300	280	260
30	300	350 ^A	300	310	310	340	300	480	(430) ^A	380	400	470	(500) ^S	510	510	480	400	(360) ^S	(370) ^S	380	280	290	300	(340) ^A
31																								
Mean Value	300	300	300	300	300	300	320	340	330	340	380	390	390	390	390	370	340	320	310	300	300	300	300	300
Count	26	25	27	28	28	28	28	24	22	15	14	15	17	22	23	21	21	22	21	25	26	24	24	28

Manual

Sweep 1.0 Mc to 17.0 Mc in 1.5 min

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
 (Denki-tsushin Kenkyujo) Gotanda, Shinagawaku, Tokyo, Japan

IONOSPHERIC DATA

Lat. 45°23.6'N
 Long. 141°41.1'E

Wakkanai

ft

135°E Mean Time

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1						Q	L	A	A	C	C	C	C	C	C	A	B	Q	Q	A					
2						Q	L	A	A	A	C	C	C	A	A	A	A	A	A	A	A				
3						L	B	4.6	L	A	A	C	A	A	5.5	(5.4)	4.8	A	A	A	A				
4						A	Q	A	Q	A	A	A	A	A	S	5.2	L	L	L	L	L				
5						3.6	4.8	4.5	C	C	C	C	C	C	C	C	A	4.7	B	Q	A				
6						A	A	5.1	A	A	A	A	B	B	B	B	A	A	A	A	A				
7						4.5	4.4	4.5	5.0	5.0	5.2	5.2	4.9	L	C	4.7	4.1	L	A	A					
8						L	L	A	5.1	5.0	A	A	A	A	A	5.0	5.0	Q	Q	A					
9						L	L	4.8	5.0	(5.0) ^A	5.0	C	L	4.9	5.0	5.2	L	L	Q	Q					
10						L	Q	B	Q	5.2	(5.2) ^B	5.2	5.0	5.2	5.1	4.6	5.0	4.2	L	A					
11						Q	L	L	C	5.5	5.1	5.1	5.3	5.1	5.3	5.0	A	C	C	Q					
12						Q	L	4.5	5.4	(5.4) ^C	5.4	5.2	5.1	5.0	(5.0) ^B	4.9 ^B	4.7	4.8	(4.1) ^T	Q					
13						3.5	4.0	4.3	4.5	4.8	A	A	A	A	5.4 ^S	A	C	C	C	C					
14						Q	(4.7) ^B	L	L	5.0	(5.0) ^S	5.0	5.0	5.2	5.1	A	A	L	B	B					
15						L	4.3	(4.5)	4.7 ^B	(5.1) ^C	5.5	6.1	5.2	5.5	5.0	(4.8)	4.5	S	L	L					
16						Q	Q	Q	5.4	(5.2) ^L	5.0	5.5 ^B	L	A	5.4	(4.9) ^M	(4.3) ^L	A	A	A					
17						A	A	A	A	A	A	A	5.9	A	A	4.6	4.9 ^L	A	A	A					
18						A	(4.2) ^L	(4.5) ^A	4.7	A	A	A	A	A	A	A	A	A	A	A					
19						2.9	(3.7) ^L	4.4	C	C	C	C	C	C	C	C	A	A	A	A					
20						3.6	4.0 ^B	4.4	(4.7) ^L	A	A	A	A	A	4.9	4.6	A	A	(4.3) ^A	A					
21						L	A	L	L	A	5.0	(5.1) ^A	5.1	5.0	5.0	5.0	4.4	4.0	A	A					
22						Q	L	4.8	4.9	5.2	(5.1) ^T	5.0	5.0	S	S	S	A	A	A	A					
23						C	C	C	C	C	C	A	(5.0) ^A	5.2	5.0	4.8	4.9	B	S	A					
24						Q	4.6 ^T	A	A	A	A	A	A	A	A	A	A	4.7	(4.3) ^T	A	A				
25						Q	4.4	(4.5) ^A	(4.6) ^A	(4.8) ^A	5.0	(5.1) ^A	5.2	5.0	4.8	A	A	A	3.9 ^A	L					
26						L	A	A	A	5.2	5.0	5.2	5.3	5.1	5.0	4.9	4.8	4.7	L	A					
27						3.8	4.7	5.0	5.1	5.1	C	C	C	5.4	(5.0) ^C	(5.0) ^L	4.9	(4.9) ^L	L	L					
28						L	Q	A	A	A	5.0	(5.2) ^L	5.4	5.3	5.2	4.8	4.9	A	A	A					
29						L	L	4.5	4.8	(4.9) ^A	4.9 ^T	5.2	5.4	5.5 ^A	5.3	4.6 ^T	A	L	3.2	2.7 ^A					
30						L	L	Q	5.0	(4.9) ^A	4.7 ^T	5.0	(5.2) ^S	(5.3) ^S	5.2	5.4 ^M	4.3	(4.0) ^S	S	A					
31																									
Median Value						3.7	4.4	4.5	4.9	5.1	5.0	5.2	5.2	5.2	5.0	5.0	4.7 ^S	(4.5)	-						
Count						1	6	12	15	15	16	15	14	15	16	17	18	15	8	3					

SWEEP - 1.0 Mc to 17.0 Mc. 1.5 min

Manual

IONOSPHERIC DATA

h'F₁

Wakkanai

Lat. 45°23.0'N
 Long. 141°41.1'E

135°E Mean Time

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1						Q	240	A	A	C	C	C	C	C	C	A	A	Q	Q	A					
2						Q	L	A	A	A	C	C	C	A	A	A	A	A	A	A	A				
3						290	B	A	A	A	A	C	A	A	A	A	280 ^A	A	A	A	A				
4						A	Q	A	Q	A	A	A	A	A	A	A	220	220	290	320	270				
5						A	280	A	C	C	C	C	C	C	C	C	290	300	230	Q					
6						A	A	A	A	A	A	A	A	A	A	B	A	A	A	A	A				
7						(290) ^A	(270) ^A	250	230	280	A	A	A	220	A	C	220	(230) ^A	240	A	A				
8						250	270 ^A	A	A	A	A	A	A	A	A	A	230 ^A	250	Q	Q	A				
9						240	220	A	B	A	A	A	A	A	A	A	A	A	A	A	A				
10						250	Q	B	230	(220) ^B	230	(230) ^C	A	B	250	240	220	B	A	A	A				
11						Q	230	(260) ^A	(260) ^A	(250) ^A	(230) ^A	220	250	(260) ^A	260	A	A	C	C	A	A				
12						Q	300	210	220	(220) ^F	210	220	270	220	230 ^B	240	220	270	270	Q					
13						360	300	240	220	250	200	A	(250) ^A	(200) ^A	A	C	C	C	C	C					
14						Q	210	250	250	200	(200) ^S	200	210	(290) ^A	220	(210) ^A	200	200	200	B					
15						250	220	B	B	C	A	A	220	230	240	240	220	230	280 ^A	250					
16						Q	Q	Q	270	210	220 ^A	A	S	A	250	(250) ^A	250	A	A	A	A				
17						A	A	A	A	A	A	A	A	A	A	A	A	260	A	A	A				
18						A	A	250	(260) ^A	270	A	A	A	A	A	A	A	A	A	A	A				
19						310	260	260	C	C	C	C	C	C	C	C	C	C	A	A	A				
20						A	A	240	B	A	A	A	A	A	A	A	A	A	A	A	A				
21						230	(280) ^A	330	300	(260) ^A	210	A	A	260 ^A	210	200	200 ^A	(250) ^A	A	A	A				
22						Q	280	290	260	320	(310) ^T	(300) ^S	250 ^A	(250) ^S	240	S	A	A	A	A	A				
23						C	C	C	C	C	C	A	250 ^A	380	340 ^B	(360) ^B	(310) ^B	230	S	A					
24						Q	290	A	A	A	A	A	A	A	A	A	B	A	A	A	A				
25						Q	250	A	A	A	A	A	A	A	A	290	(280) ^A	270	(260) ^A	240	210				
26						280	A	A	A	200	200	220	220	210	200	230	250	280	260	A					
27						260 ^S	240	280	280	280 ^A	C	C	C	200	230	260	250	270	300	250					
28						240	Q	A	A	A	210	200	230	(280) ^B	230	260	300 ^A	A	A	A					
29						250	260	270	280	B	A	260	A	A	290	310	A	A	A	A	A				
30						280	Q	300	A	A	300	(300) ^S	290	210	320	(290) ^M	250	210	A	A					
31																									
Mean Value						260	260	260	260	220	220	220	250	250	240	250	250	260	260	260	250				
Count					4	13	18	12	11	11	10	10	11	14	15	16	18	14	14	17	260	250	260	250	

Sweep 1.0 Mc to 17.0 Mc in 15 min Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
 (Denki-sushun Kenkyūjo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

fe

Lat. 45°23.6'N
 Long. 141°41'E

Wakkanai

135°E Mean Time

Day	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						2.5	2.8	3.2	3.3	C	C	C	C	C	C	A	3.4	2.9	2.3	B				
2						2.2	2.8	3.3	3.4	3.3	C	C	C	(3.7) ^A	A	A	A	A	A	A				
3						2.3 ^B	2.9	3.1	3.5	A	A	C	A	3.4 ^B	A	A	A	A	A	(1.7) ^B				
4						A	2.8 ^J	(3.0) ^A	3.1 ^J	3.6	A	A	A	A	A	A	A	2.9	2.3	A				
5						B	2.7	3.0	C	C	C	C	C	C	C	C	3.5	2.8	(2.5) ^B	(1.8) ^B				
6						2.2	2.9	3.1	A	A	A	A	3.8	B	B	B	A	A	A	A				
7						2.2	2.9	3.0	3.3	3.5	3.7 ^B	3.6	3.2	B	C	A	3.3 ^A	3.1	2.4 ^J	A				
8						2.2	2.9 ^B	3.2	3.4	A	A	A	B	A	A	B	3.2	A	A	A				
9						2.3 ^B	2.8 ^B	3.1 ^B	3.5	3.5	B	C	A	A	3.8	3.4	(3.2) ^A	3.0	A	A				
10						(2.0) ^A	2.3	3.0	3.1	3.6	3.4	B	B	A	B	3.6	(3.3) ^A	3.0	A	A				
11						2.4	2.7	2.9	(3.3) ^C	3.6	(3.6) ^A	(3.6) ^A	A	A	A	A	2.7	A	C	C				
12						B	2.2	2.4	3.1	A	C	A	B	B	A	B	3.5	3.3	2.7	2.5	B			
13						1.6	2.4	2.8	A	A	B	3.7	(3.6) ^A	3.5	A	A	C	C	C	C				
14						B	2.0 ^J	2.8	3.1	A	(3.7) ^B	(3.8) ^B	3.8	(3.8) ^A	3.7	(3.4) ^J	3.1 ^A	2.6 ^J	1.9	1.7				
15						B	2.3	2.8	(3.1) ^B	3.4	A	A	A	A	A	B	3.3	3.2	2.9	2.4	(1.4) ^J			
16						2.3	3.2	(3.5) ^A	3.7	3.6	(3.6) ^B	3.6	(4.0) ^S	(3.9) ^S	(3.7) ^B	3.6 ^B	(3.1) ^B	(2.5) ^A	A	A				
17						A	(3.0) ^A	3.5	3.5	3.5	3.6	3.8	(3.7) ^A	3.5 ^B	B	A	3.5	A	A	A	B			
18						B	(1.6) ^B	2.7	3.3	3.6	A	B	A	A	B	A	3.3 ^A	A	A	A				
19						1.5	(2.2) ^S	2.7	3.2	C	C	C	C	C	C	C	3.8	A	A	A	(2.2) ^A			
20						A	2.7	(2.9) ^A	3.0	A	A	A	(3.9) ^B	(3.8) ^A	3.7	3.5	3.4	3.0	2.3	B				
21						B	2.9 ^F	3.2	(3.2) ^A	3.2 ^B	3.3 ^B	B	B	B	3.6 ^B	A	A	A	(2.2) ^A	A				
22						B	2.4	3.5	3.6	3.6 ^B	3.6	S	S	S	B	S	B	A	A	A				
23						C	C	C	C	C	C	B	A	A	A	B	B	B	2.5	(2.4) ^B	A			
24						2.3	3.2	A	A	A	A	B	A	A	B	A	3.0	A	A	A	A			
25						2.2	2.8	(3.1) ^A	3.4	3.5	3.7 ^B	A	A	A	A	A	3.4	3.1	A	A				
26						(1.8) ^B	2.0	3.1	3.2	3.5	3.6	3.7 ^B	(3.5) ^S	3.3 ^B	3.5	3.6 ^B	3.7	3.7	3.3	2.2	A			
27						S	2.2	3.0	3.2 ^F	3.5	3.6 ^B	C	C	A	3.7 ^A	3.7	2.9	3.0	2.4	2.2				
28						B	2.5	2.8	3.3	A	B	A	B	B	3.9	3.7	(3.1) ^B	2.5	B	B				
29						B	2.4	2.7	3.2	3.6	(3.8) ^A	4.0	(3.9) ^B	3.7	(3.4) ^A	3.0	A	A	A	A				
30						1.8	2.5	3.0	3.5	(3.6) ^A	3.7	4.0	4.1	(3.9) ^A	3.7 ^J	A	A	3.0	(2.5) ^B	1.9				
31																								
Mean Value					1.8	2.3	2.8	3.2	3.5	3.6	3.7	(3.6)	3.8	(3.7)	3.7	3.6	3.3	2.9	2.4	(1.8)				
Count					5	24	29	27	21	15	11	9	10	9	10	12	18	17	13	7				

Sweep 1.0 Mc to 17.0 Mc in 1.5 min

Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
 (Denki Tsushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

h_pF

Lat. 45 23.6 N
 Long. 141 11.1 E
 Wakkanai

135°E Mean Time

Day	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						110	100	100	100	C	C	C	C	C	A	110	120	150	B					
2						100	100	100	100	C	C	C	C	100	A	A	A	A	A					
3						100	110	100	100	A	A	A	A	100	A	A	A	A	110					
4						A	100	[100] ^A	100	100	A	A	A	A	A	A	A	120	100	B				
5						B	130	150	C	C	C	C	C	C	C	C	100	130	130	B				
6						B	100	100	A	A	A	A	150	B	B	A	A	A	A	A				
7						110	100	100	100	100	100	100	110	C	A	100	100	120	A					
8						100	100	100	100	A	A	100	A	A	100	100	A	A	A					
9						100	110	110	100	100	B	C	A	A	110	100	[100] ^A	100	A					
10						A	110	110	100	110	110	100	[100] ^A	100	110	100	[100] ^A	100	A					
11						100	100	100	[100] ^C	100	[110] ^A	110	110	110	110	[110] ^A	110	110	C	120				
12						120 ^B	120	110	100	[110] ^C	110	110	120	110	110	110	110	110	110	B				
13						130 ^B	100	100	100	100	100	[100] ^A	100	100	A	C	C	C	C					
14						B	120	100	100 ^A	100	100	100	100	[100] ^A	100	[100] ^A	100	100	100	110				
15						B	110	110	100	A	A	A	A	A	100	100	100	100	100	B				
16						110	110	[110] ^A	100	100	100	100	[100] ^S	100 ^S	100 ^S	100	100	100	A	A				
17						A	100	100	100	110	110	[110] ^A	110	110	110	[110] ^A	100	A	B	B				
18						B	[100] ^B	100 ^B	110	110	100	100 ^B	B	A	A	110 ^B	[110] ^A	100	A	A				
19						[110] ^B	[110] ^S	100	100	C	C	C	C	C	C	C	C	100	110	130				
20						A	100	100	110	100	A	A	100	[100] ^A	100	100	100	100	100	B				
21						B	110 ^F	110	110 ^A	110	100	[110] ^B	100	110	100	100	A	100	A					
22						100	100	100	100	100	100	[110] ^S	100	100	100	100	B	A	A					
23						C	C	C	C	C	C	100	[100] ^A	100	110	110	100	B	B					
24						100	100	A	A	A	A	100	[100] ^A	100	[110] ^A	110	A	A	A					
25						110	110	100 ^A	100	100	100	A	A	A	A	A	100	100	A	A				
26						[150] ^B	100	100	100	100	100	100	100	100	100	100	100	100	A					
27						110	100	100	100	100	C	C	C	A	A	110	120	100	100					
28						100	110	100	[100] ^A	100	A	A	100	100	100	100	100	110	100 ^B	B				
29						B	100	110	100	[110] ^A	110	[110] ^B	110	[110] ^A	100	A	A	A	B					
30						100	100	100	100	110 ^A	100	100	150 ^B	[140] ^A	120	A	B	100	110	B				
31																								
Mean Value						100	100	100	100	100	100	100	100	100	100	100	100	100	100	110	110	110	110	110
Count				4	22	29	28	25	21	15	15	19	19	19	19	19	20	18	14	5				

Sweep 1.0 Mc to 17.0 Mc in 1.5 min

Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
(Denki Tsushin Kenkyujo) Gotanda Shinagawa-ku Tokyo, Japan

IONOSPHERIC DATA

165

Wakkanai

Lat. 45°23.6'N
Long. 141°41.1'E

155°E Mean Time

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	25
1	G	G	2.7Y	G	G	G	3.9	6.8	6.6	C	C	C	C	C	C	7.9Y	B	3.8	4.2	6.3	12.0	11.8	8.0	6.3	
2	7.7	5.2	5.8	3.8	2.6	4.5	4.3	7.2	2.0	C	C	C	7.4	6.3	8.2	8.4	8.1	8.5	6.0	6.2	6.4	6.4	3.6	4.7	
3	6.3	CF	3.1	2.8	3.7Y	G	B	4.1	5.4	6.7	6.8	C	6.1	6.0	5.5	5.1	4.7	6.4	4.7	3.7	3.7	2.2	G		
4	4.9	4.1	4.5	5.5	5.9	4.4	5.5	5.5	7.2	7.9	7.4	7.6	7.8	6.6	4.4	4.0	3.7	G	G	2.0	1.9	G	G		
5	G	G	G	G	G	2.6	3.1	3.9	C	C	C	C	C	C	C	C	8.2	B	B	2.4	B	4.0	5.6	2.2	
6	1.9	G	G	G	3.2	4.3	5.6	5.6	5.2	4.6	11.8	10.9	4.5	5.2	(3.8) ^B	(3.7) ^B	5.8	6.9	6.7	7.5	G	G	B	3.6	
7	3.2	4.0	4.5	3.2	2.5	3.7	4.0	4.4	6.0Y	7.0	C	3.2	4.5Y	C	3.6	3.6	B	7.8	4.2	3.5	6.3	1.9	G		
8	G	G	G	G	1.7	G	3.0	9.0	5.5	6.5	4.9Y	7.2	2.9	10.5 ^F	5.3	3.7	4.7	3.6	4.8	7.4	7.6	4.3	7.6		
9	4.4	3.6	2.7	2.3	1.8	8	3.0	4.4	3.8	5.6	4.8	C	4.1	5.0Y	4.8	5.0	3.8	G	5.9	4.2	3.6	2.2	G		
10	G	G	3.7	2.5	1.9	2.8	B	4.8Y	4.8	5.7Y	4.5Y	4.3Y	4.2	B	B	B	5.3	B	4.1	2.2	2.1	3.6	2.6	4.0	
11	4.4	3.0	B	G	1.9	4.3	3.2	3.8	C	5.0	4.2	4.3	4.2	4.3	4.7	3.8	5.2	C	C	3.5	3.0	2.7 ^F	2.2	G	
12	4.1	2.5	2.4Y	G	G	G	4.8	4.0	3.7	C	4.6Y	4.3	B	3.9	B	B	G	B	3.7	2.6	C	C	C		
13	G	G	G	G	1.8	G	3.7	4.4	4.6Y	B	6.2Y	5.5	5.7	5.8	9.2	C	C	C	C	C	G	G	1.8	2.8	
14	G	2.7	G	G	(1.8) ^B	3.3Y	3.4	5.0	6.0	7.2	B	G	G	5.6	6.7	7.8	7.1	3.9Y	2.3	B	2.9	(3.4) ^B	G	3.1	
15	6.5	5.7	5.1	3.6Y	G	G	3.0	(5.2) ^B	B	C	5.8	7.8	4.8	4.7	B	B	4.2	3.7	3.3	2.2	2.2	C	1.8	G	
16	2.6	G	G	1.7	2.0F	3.6	G	4.1	B	4.6Y	5.0	5.5	S	6.4	5.6	6.0	8.4	9.2	9.0	6.5	5.8 ^F	6.1	5.5	5.0	
17	5.4	3.6	3.3	3.8	2.4	4.8	5.0	6.8	8.9	9.2	7.9	6.7	6.6	5.7	4.6	4.6	4.3	4.7	3.3	3.0 ^B	5.4	5.1	4.2	5.6	
18	6.9	6.1	5.0	3.9	2.4	5.8Y	5.9	6.6	5.5	8.4	8.2	6.6	6.9	8.1	12.2	12.0	8.7	6.8	5.6	4.1	6.2	6.0	3.3	G	
19	G	G	2.3	2.5	2.8	G	G	3.6	C	C	C	C	C	C	C	C	8.3	6.4	4.8 ^B	3.2	4.5	(5.1) ^F	4.2	4.1	
20	6.8	5.7	3.4	10.0F	5.2 ^B	4.4	4.0	5.4	5.5Y	6.8	11.5	10.2	11.4	6.0	6.0	6.3	6.4	6.3	6.2	5.0	7.7	5.5	C	5.4	
21	5.1	3.4	5.8	3.6F	4.0F	(3.1)Y	6.1	5.5	3.6 ^B	6.0	5.0Y	G	5.5	4.4Y	G	3.9	4.2	5.2	5.8	7.8	6.5	3.7	3.4	3.7	
22	2.3	2.4	1.8	G	G	G	3.7	4.3	4.4Y	5.1Y	(7.4)Y	S	7.3	4.4 ^S	S	S	(5.2) ^C	(6.4) ^C	6.4	5.6	4.8	5.7	5.7	3.6	
23	6.8	C	C	C	C	C	C	C	C	C	7.9	6.0	B	B	B	B	B	B	3.6Y	8.2	6.8	5.4	3.6	3.5 ^F	
24	3.9F	3.5F	3.4	6.9	3.6	2.6	4.6	8.0	8.0	11.8	13.7	11.7	9.5	5.8	7.4	5.8Y	4.5	5.1	7.8	(3.7) ^B	(3.8) ^B	6.8	(7.8) ^B	5.2	
25	2.6	2.3	1.7	1.6	B	4.2	G	5.6	7.4Y	7.1	4.6	5.8	4.8	6.4	6.5	5.6	5.3	7.4	6.0	3.0	2.2	2.5	G		
26	G	G	2.8	2.6	G	4.2	5.0	5.2	7.0	6.0	4.0	4.7	B	4.1	G	G	G	4.7	3.2	3.5	3.5	1.7	2.2	3.2	
27	2.2	G	2.8	G	S	S	4.1	4.7	5.2	4.8	C	C	C	4.6	4.6	5.8	4.0	G	3.3	3.6	4.1	3.6	3.3	2.4	
28	2.4	G	G	1.9	G	3.3	4.4	5.7	6.0	5.6	4.7	4.3	G	B	4.3	4.8	4.9	(5.8) ^Y	5.8	4.2	3.0	(5.4) ^Y	6.2		
29	5.2	G	G	G	G	2.9	4.8	5.6Y	4.2	4.3	5.7	6.4	6.0	5.2	3.8	5.2	5.6	6.2	5.4	6.0	3.6	2.0	B	1.7	
30	G	2.8	G	1.4	G	G	4.6	5.8	7.4	5.0Y	G	4.6	4.2 ^B	4.2	5.0	4.7	3.5	3.9	3.8	4.8	3.6	G	(2.4) ^B	4.6 ^F	
31																									
Mean Value	2.9	2.5	2.8	1.9	1.9	3.1	4.3	5.4	5.5	6.0	5.8	5.8	5.9	5.4	5.5	5.2	4.9	5.1	5.4	4.2	3.8	3.7	3.3	3.6	
Count	30	28	28	29	27	27	27	29	24	23	23	21	22	24	21	22	27	23	27	28	28	28	29	30	

Sweep: 1.0 Mc to 17.0 Mc in 15 min Manual

IONOSPHERIC DATA

F-M3000

Lat. 45°24.6'N
Long. 141°41.1'E

Wakkanai

135°E Mean Time

Day	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	2.6	2.6	2.6P	2.6E	2.7P	(2.8)	2.8	2.9	2.6	C	C	C	C	C	C	(2.7)	(2.8)	3.0	2.7	B	A	A	A	B	
2	B	2.6	2.5F	2.8	J	2.7	J	2.7	A	2.6	C	C	C	2.6	J	A	A	A	A	2.8H	2.8	(2.7)	2.7	2.8	
3	2.6	C	J	2.7	2.4F	2.8	2.6	JF	JF	J	2.9	C	B	2.7	J	J	2.5	2.8	2.5	(2.5)	2.6	(2.6)	2.6		
4	2.7	2.7	2.7	2.5	2.5	2.9	(2.7)	2.6	2.6	B	B	B	B	3.0	2.9	(2.8)	2.8P	2.5P	J	2.8	S	S	2.6P	(2.5)	
5	2.5	2.7P	S	S	2.7	(2.5)	2.3	B	C	C	C	C	C	C	C	C	A	A	A	B	B	B	B	2.5S	
6	2.7	J	(2.5)	2.4H	2.6K	2.3K	A	B	B	B	A	A	B	B	B	B	B	B	B	B	A	A	B	2.5S	
7	J	2.5K	2.7K	2.4K	2.7K	2.8K	2.8	(3.0)	3.2S	(2.9)	2.7	(2.7)	2.8P	J	C	3.0	2.7	3.0	(2.9)	A	2.6K	2.4K	(2.5)	2.5K	
8	2.7P	2.8	2.7P	2.9	3.1	2.8	2.8	A	T	S	C	A	A	A	A	A	(2.7)	3.3	2.8	3.1	2.8S	S	J	A	
9	2.8	J	F	2.9	2.8	2.8P	(2.7)	2.7	T	C	B	C	B	B	2.6	(2.7)	2.8	2.6	2.6	2.7	(2.5)	C	J	S	
10	J	2.5R	2.7	2.7	2.7	2.8F	(3.4)	J	3.0P	T	J	T	2.8	(2.7)	2.7	(2.8)	2.9P	2.9	2.9	2.5	(2.5)	C	J	S	
11	B	2.6	2.6	2.8	2.6	2.7	J	2.9	(2.8)	2.7	(2.7)	2.7P	2.5	(2.6)	S	S	T	C	C	(2.9)	(2.9)	3.0	B	B	
12	T	(2.7)	2.7	J	2.6	2.6	2.6	2.6	2.5	C	S	2.5	(2.5)	(2.6)	S	2.8	J	J	S	S	C	C	C	2.7	
13	2.6	2.5	2.5	2.4F	2.6	2.7	2.8K	2.8K	2.6K	S	B	B	B	B	B	C	C	C	C	C	C	C	C	2.7	
14	2.4F	2.6F	F	F	2.6F	(2.6)	2.7H	2.8	3.0F	S	2.7	2.8	2.8	2.6	2.6	2.9	2.8	J	J	J	S	S	2.7	(2.4)	
15	S	S	T	FS	2.7F	(2.7)	2.7F	S	T	C	2.7	2.9S	S	S	2.6	2.9	3.1	2.9P	2.9	2.9	3.1	S	S	2.7	
16	2.6	2.6	2.7	2.8P	(2.6)	3.0	2.8	2.9	S	S	FS	B	S	2.8	2.8	2.8	2.8	A	A	B	B	B	B	JF	
17	B	2.9	3.0	J	2.6B	2.8	2.9	B	B	B	B	B	S	S	S	2.7	3.1	3.0	T	S	P	S	S	S	
18	2.9	2.7	(2.6)	2.5	2.7H	2.7	B	B	B	A	A	A	B	B	A	A	A	B	B	S	S	B	B	B	
19	B	2.8	2.6	2.5	2.5	2.7H	ST	C	C	C	C	C	C	C	C	C	A	B	B	S	S	B	B	B	
20	B	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	A	A	B	B	B	T	2.8	B	
21	3.0P	(2.8)	2.7F	2.8F	2.7H	3.0B	S	S	S	S	2.7	S	S	(2.8)	J	S	2.9	S	S	S	S	J	P	S	
22	S	S	S	S	S	SH	(2.9)	J	J	T	2.8	2.9	2.4A	2.5	2.4	(2.4)	C	C	C	S	2.7	S	S	S	
23	S	C	C	C	C	C	C	C	C	C	2.4A	2.4A	2.4A	2.5	2.4	(2.4)	T	T	T	A	2.9P	T	T	JF	
24	JF	JF	2.7	2.6	2.8	2.5	3.0P	(3.1)	3.3	A	A	A	A	J	A	J	2.9P	2.9P	A	S	S	A	A	2.6P	
25	2.6P	2.8F	2.9	2.8	2.7H	2.5H	2.7	2.6	2.7	J	2.8	S	B	2.7	(2.7)	2.8	2.8	A	J	B	B	3.1H	3.0	J	
26	2.6	2.6	J	2.6	2.4	2.7	2.6	2.7	3.0	2.8	2.7	2.8	2.4	2.6	2.6	S	J	3.0	2.8	2.9	J	(3.0)	2.6	2.8	
27	2.7	2.5	2.2	2.9	J	2.9	2.8P	J	2.8	(3.0)	C	C	C	C	B	C	2.5H	2.8	2.5	(2.9)	S	S	S	S	
28	S	J	S	2.6	2.6	3.0	B	J	2.7	2.7	2.5B	2.6	2.6	2.7	S	S	2.8	S	A	S	2.6	3.1	S	S	
29	JF	JF	JF	2.5	2.4	(2.4)	2.4	2.5	B	2.7	B	2.7	2.7	2.7	2.5	2.7	S	S	2.7	2.7	T	T	T	2.5	
30	2.6	2.3	2.7	2.4	2.6	2.6	2.6	2.5	S	S	2.5H	S	S	2.3	(2.3)	(2.5)	2.7	(2.6)	2.7	2.7	J	2.9	2.7	2.4	
31																									
Median Value	2.6	2.6	2.7	2.6	2.7	2.7	2.7	2.8	2.8	(2.9)	2.9	(2.9)	2.7	2.7	2.7	2.7	2.8	2.9	2.8	2.8	2.8	2.8	2.7	2.7	2.6
Count	16	20	19	22	25	26	22	15	13	6	10	9	10	16	14	15	15	14	13	13	12	10	12	13	

Sweep 1.0 Mc to 17.0 Mc in 15 min

Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
(Denki-tsushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

f_{min}

Wakkanai
 LAT. 45°23.6'N
 LONG. 141°41.1'E

135°E Mean Time

Day	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	1.3	1.3	1.3	1.4	1.8	2.6	3.0	A	A	C	C	C	C	C	C	A	A	A	A	A	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A	C	C	C	A	A	A	3.6	A	A	A	A	A	A	A
3	A	A	A	A	A	2.2	A	A	A	A	A	C	A	A	A	A	A	A	A	A	A	A	A	1.3
4	1.5	1.3	1.4	1.5	A	A	A	A	A	A	A	A	A	A	(5.9) ^S	A	3.0	2.2	A	A	A	1.5	1.5	1.5
5	1.5	1.5	1.5	2.2	2.2	[2.7] ^A	3.2	A	C	C	C	C	C	C	C	C	3.5	2.9	2.5	1.8	2.3	A	A	1.4
6	1.5	1.5	1.3	1.4	A	A	A	A	A	A	A	A	A	A	B	B	A	A	A	A	1.3	1.9	1.7	A
7	A	A	1.4	A	A	A	A	3.6	3.5	3.9	A	A	A	A	C	3.7	3.5	3.0	A	A	A	2.0	1.8	1.6
8	1.5	1.4	1.4	1.5	2.2	2.4	A	A	A	A	A	A	A	A	A	A	3.4	A	A	A	A	A	A	A
9	A	A	A	A	A	2.4	3.3	[3.9] ^A	4.5	A	A	C	A	A	A	A	A	3.1	[2.3] ^A	1.5	(1.5) ^A	1.5	1.4	1.4
10	1.3	1.5	A	A	2.1	2.4	3.1	3.4	3.7	A	A	A	A	4.7	4.3	4.3	3.3	4.0	A	A	A	A	A	A
11	A	A	1.5	1.4	1.6	2.5	3.0	3.5	[3.9] ^C	4.3	(4.2) ^A	4.3	4.1	(4.1) ^A	(4.2) ^A	A	A	C	C	2.6	1.5	2.2	1.5	1.5
12	(1.5) ^A	1.4	1.4	1.4	2.0	2.6	3.4	(4.1) ^A	4.0	[4.1] ^C	4.2	4.1	4.2	3.8	4.1	3.9	3.4	3.3	3.0	2.4	C	C	C	1.4
13	1.3	1.3	1.3	1.3	1.8	2.6	3.2	3.9	3.8	4.0	A	A	A	A	A	A	C	C	C	1.6	1.6	1.6	1.5	1.5
14	1.5	(1.5) ^A	1.4	1.5	1.6	2.1	3.1	3.5	3.4	4.0	5.4	4.2	4.2	[4.3] ^A	4.3	4.0	[3.6] ^A	3.1	4.0	3.3	A	A	1.5	(1.5) ^A
15	1.5	A	A	1.5	1.9	2.4	3.5	(4.1) ^A	4.7	A	A	A	4.3	4.4	4.2	3.8	3.4	3.3	2.6	2.1	1.8	1.8	1.7	1.5
16	2.0	1.3	1.3	1.4	1.7	2.6	3.2	3.6	4.4	3.8	4.2	A	S	A	4.2	4.4	4.0	A	A	A	AF	A	A	A
17	3.0	3.2	2.4	2.0	2.2	3.1	4.6	A	A	A	A	A	A	A	A	A	3.9	2.2	3.3	A	A	A	2.1	1.6
18	A	AF	1.6	2.3	2.4	(2.7) ^A	3.0	3.5	3.8	A	A	A	A	A	A	A	A	A	A	A	A	A	2.2	1.5
19	1.4	1.4	1.4	1.4	2.2	2.4	3.0	C	C	C	C	C	C	C	C	C	C	A	A	A	A	A	2.8	(2.8) ^A
20	2.3	1.7	1.5	3.2	AF	A	A	A	4.2	A	A	A	A	4.0	A	A	A	2.1	A	A	A	A	C	A
21	A	2.3	1.4	1.5	1.9	2.3	[3.5] ^A	4.6 ^A	4.2	(4.2) ^A	4.2	A	4.4 ^A	4.0	4.0	4.0	A	A	A	A	A	2.2	2.5	1.5
22	1.5	2.1 ^A	1.3	1.3	1.3	2.6	4.3	4.0	4.0	4.6	[4.7] ^A	4.7 ^S	4.5 ^A	5.2	4.4	[4.2] ^S	3.9	A	A	A	A	A	A	2.3
23	A	C	C	C	C	C	C	C	C	C	C	A	4.2	4.4	4.4	4.5	(4.0) ^B	3.4	(4.3) ^S	A	A	A	A	4.4 ^F
24	A	A	A	A	2.2	2.7	3.2	A	A	A	A	A	A	A	A	A	A	A	A	A	5.0	6.0	A	A
25	A	1.6	1.4	1.4	1.9	3.2	3.3	A	A	9.5	A	A	A	4.2	A	A	4.1	[3.5] ^A	2.8	2.1	2.0	2.0	1.5	1.5
26	1.6	1.5	1.8	1.7	1.9	3.2 ^A	A	A	A	4.0	4.0	4.0 ^S	4.1	4.0	4.0	3.9	4.0	3.3	2.2	[2.8] ^A	3.3	1.6	2.2 ^A	1.4
27	1.4	1.3	1.6	1.4	2.2	2.4	3.1	4.0	4.2	4.3 ^A	C	C	4.0	4.0	4.0	3.9	3.5	3.3	2.4	2.2	2.2	1.6	1.6	
28	1.6	1.6	1.5	2.0	2.0	2.8	3.4	A	6.0	4.0	4.0	4.2	4.3	4.7	4.3	4.0	A	A	A	A	f	3.0 ^A	A	
29	1.4	1.5	1.5	1.5	1.8	2.5	3.3	3.4	4.8	5.0	4.8 ^A	4.8	(5.1) ^A	5.3	4.8	4.8	A	A	A	1.7	2.5 ^A	2.3	2.4	1.7
30	E	2.0 ^A	E	E	1.7	2.6	3.3	4.0	A	A	4.2	(4.2) ^A	4.2	4.0	4.6	(4.1) ^A	3.5	3.2	3.0	2.0	(2.0) ^A	1.9	1.9	(1.8) ^A
31																								
Mechan. Value	1.5	1.5	1.4	1.5	1.9	2.6	3.2	3.9	4.0	4.2	4.2	(4.3)	4.2	4.3	4.3	4.0	3.6	3.2	2.7	2.2	2.0	2.0	1.7	1.5
Count	20	21	23	23	23	24	21	15	15	13	10	8	10	15	15	14	16	15	12	12	12	14	17	21

Sweep 1.0 Mc to 17.0 Mc in 1.5 min Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
(Denki-tsushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

Lat. 45°23.6'N
Long. 141°41'E

Wakkanai

f_oF min

135°E Mean Time

Day	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	G	G	1.3	G	G	1.5	1.6	1.5	1.8	C	C	C	C	C	C	2.2	2.0	2.2	1.5	1.5	1.5	1.5	1.5	1.5	
2	1.4	1.5	1.9	1.5	1.5	1.5	1.6	1.5	2.1	2.1	C	C	C	2.1	2.1	2.1	1.7	1.8	1.8	1.5	1.4	(1.6) ^B	1.4	1.4	
3	1.4	1.4	1.3	1.4	1.4	1.5	1.5	1.9	2.2	2.2	2.2	(2.2) ^C	2.1	2.2	2.2	2.2	2.2	2.2	1.9	1.5	1.5	1.6	1.5	G	
4	1.4	1.3	1.3	1.3	1.3	1.5	1.5	1.4	2.0	1.6	1.5	1.8	1.8	2.0	2.0	2.2	2.0	1.8	1.5	1.5	1.5	G	G	G	
5	G	G	G	G	G	2.3	1.5	1.7	C	C	C	C	C	C	C	C	2.0	1.8	1.4	1.5	(1.5) ^B	1.5	1.5	1.4	
6	1.5	G	G	G	1.6	1.7	1.5	2.0	1.8	2.2	3.0	3.0	2.2	3.5	3.2	3.2	2.6	2.2	1.3	1.4	G	G	B	1.3	
7	1.3	1.3	1.3	1.3	1.5	1.5	1.8	1.6	2.0	2.2	2.3	2.0	2.0	2.1	(2.1) ^C	2.1	2.1	1.6	1.6	1.4	1.5	2.0	1.6	G	
8	G	G	G	G	1.5	1.5	2.0	2.1	2.2	2.2	3.0	3.3	2.1	2.4	2.1	1.9	1.6	1.6	1.5	1.5	1.5	1.5	1.5	1.5	
9	1.5	1.4	1.4	1.4	1.4	1.5	1.6	2.2	1.5	2.1	3.8	(3.6) ^C	3.3	3.2	3.0	2.2	2.2	1.6	1.5	1.5	1.5	1.5	G	G	
10	G	G	1.3	1.4	1.4	1.6	2.1	2.1	2.3	2.1	2.0	2.1	2.2	2.1	2.1	1.8	1.8	1.6	1.6	1.5	1.5	1.5	1.6	1.5	
11	1.5	1.4	B	G	1.5	1.5	1.4	1.5	(1.8) ^C	2.0	2.1	2.1	2.2	2.1	2.1	1.8	1.8	C	C	1.4	1.5	1.4	1.5	G	
12	1.4	1.4	1.2	G	1.4	1.6	1.5	1.6	1.5	(2.2) ^C	2.9	3.0	3.2	2.5	2.1	2.1	2.1	1.5	1.5	1.5	C	C	C	G	
13	G	G	G	G	1.4	1.5	1.5	1.6	2.0	2.1	2.3	2.1	2.2	2.0	C	C	C	C	C	C	C	C	C	G	
14	G	1.3	G	G	1.6	1.7	1.6	1.6	1.6	1.5	1.6	2.1	2.1	2.1	2.0	2.1	1.9	1.6	1.5	1.5	1.6	1.5	G	1.5	
15	1.5	1.5	1.5	1.5	1.5	1.6	1.6	1.6	2.1	2.2	2.1	1.9	1.7	2.2	2.2	2.1	1.9	1.6	1.6	1.6	1.6	1.5	G	1.5	
16	1.5	G	G	1.3	1.5	1.5	1.5	1.5	1.5	1.8	1.8	2.0	2.0	2.3	2.0	1.9	2.1	1.9	1.6	1.6	1.6	1.6	1.6	1.6	
17	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.2	2.1	2.3	2.2	2.1	2.1	2.1	2.2	1.8	1.5	1.9	1.5	1.6	1.5	2.0	1.6	
18	1.4	1.6	1.5	1.5	2.0	1.7	1.5 ^B	2.2	2.2	1.6	2.3	3.9	2.2	2.7	2.1	2.2	1.5	1.5	2.5	1.5	1.4	1.4	1.5	G	
19	G	G	1.4	1.4	1.4	2.2	1.5	2.0	C	C	C	C	C	C	C	C	2.1	1.6	1.5	1.6	1.6	1.6	1.6	1.6	
20	1.6	1.6	1.5	1.5	1.5	1.6	1.6	1.8	1.9	2.1	2.1	2.2	2.2	2.2	2.3	2.0	2.2	2.1	1.6	1.5	1.4	1.5	(1.5) ^C	1.5	
21	1.5	1.5	1.4	1.4	1.4	(1.8) ^B	2.1	1.6	2.2	2.2	2.1	2.3	2.1	2.0	2.2	2.1	1.9	1.6	1.5	1.5	1.5	1.5	1.5	1.5	
22	1.5	1.4	1.3	G	G	1.6	1.8	1.9	2.0	2.1	2.0	2.5	2.8	4.0 ^S	(3.2) ^B	2.3	3.9	2.1	2.1	2.0	1.5	2.0	1.6	1.5	
23	1.4	C	C	C	C	C	C	C	C	C	C	2.0	2.0	2.3	2.2	2.4	2.0	1.9	(2.4) ^B	1.6	1.5	1.5	1.5	1.4 ^F	
24	1.5 ^F	1.4	1.4	1.4	1.4	1.3	1.4	1.6	1.6	2.2	2.2	3.3	2.2	2.3	3.5	2.2	2.2	2.0	1.6	1.4	1.4	1.4	1.3	1.3	
25	1.4	1.5	1.4	1.4	1.4	1.4	1.4	1.5	1.6	1.8	2.1	2.2	2.4	2.4	2.4	2.2	1.6	1.6	1.5	1.6	1.2	1.5	G	G	
26	G	G	1.3	1.4	1.5	1.5	1.6	1.6	1.6	1.9	2.0	1.8	2.1	2.1	2.0	2.2	1.6	1.6	1.6	1.4	1.4	1.5	1.4	1.4	
27	1.4	G	1.6	G	1.5	1.5	1.5	1.6	1.5	2.2	C	C	C	2.3	2.2	2.2	2.0	1.6	1.5	1.9	1.6	1.6	1.6	1.6	
28	1.6	G	G	1.6	1.6	1.5	1.6	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3	1.7	1.6	1.5	1.6	1.6	1.6	1.6	1.6	
29	1.4	G	G	G	G	1.6	2.2	2.1	2.3	2.1	2.2	4.4 ^T	3.4	2.1	2.4	2.2	2.1	2.0	1.5	1.5	1.7	1.7	(1.6) ^B	1.4	
30	G	E	G	E	E	1.3	1.5	1.6	1.8	3.0	3.3	3.7	3.8	3.3	3.7	2.9	3.1	1.6	1.2	1.7	1.3	G	1.2	1.2	
31																									
Median Value	1.4	1.3	1.3	1.3	1.4	1.5	1.5	1.6	1.8	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.0	1.6	1.5	1.5	1.5	1.5	1.5	1.4	
Count	30	29	28	29	28	29	29	29	27	26	24	25	25	27	27	27	29	28	28	28	29	29	29	29	30

Sweep 1.0 Mc to 17.0 Mc in 1.5 min Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
(Denki-Isushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

Lat 40°36.6'N
Long 139°54.1'E

f_oF₂

Fukaura

135° E Mean Time

Day	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	8.1	8.3	7.8	7.7	7.6	7.7	9.1	10.4	10.4	10.6	9.8	9.8	10.4	9.5	10.5	10.3	10.4	10.7	10.6	10.5	10.0	9.4	9.3	9.2	9.1
2	A	SF	A	8.1	8.2	8.2	7.9	A	A	A	A	A	8.0	8.9	9.2	9.0	9.2	9.1	9.0	9.2	9.5	8.5	8.5	8.5	8.9
3	A	A	8.8	8.2	7.5	7.3	7.4	C	C	C	C	C	C	C	C	C	C	C	C	C	7.8	7.7	8.0	7.3	8.0
4	7.4	7.6	8.0	7.8	7.2	7.6	9.0	8.8	9.2	9.3	9.2	9.1	8.4	10.6	10.0	9.5	A	A	8.3	8.6	9.1	8.1	8.1	8.0	8.9
5	7.4	(7.3)	7.0	5.8	6.2	6.7	6.1	6.1	6.1	6.6	7.2	7.6	7.9	8.0	7.9	7.8	8.7	8.4	8.0	8.2	8.4	8.8	8.3	8.3	8.9
6	8.6	8.3	C	C	7.2	7.1	6.4	(5.4)	5.5	A	A	A	B	6.0	B	A	5.5	5.4	(5.6)	5.6	6.3	(6.5)	6.1	6.0	6.0
7	7.0	6.9	6.9	6.0	4.8	5.8	7.3	8.1	7.2	7.0	8.2	8.6	8.5	8.4	8.6	9.2	(9.1)	9.0	9.4	9.5	8.7	8.3	8.4	7.9	7.9
8	7.7	7.4	7.0	6.8	6.5	7.5	7.3	7.6	7.8	8.2	8.8	8.4	8.2	8.8	(8.8)	8.7	8.7	9.0	9.3	9.0	8.9	7.7	(7.8)	7.6	7.6
9	(7.6)	8.2	H	F	6.2	6.4	7.2	8.4	9.2	9.3	8.8	8.1	8.2	7.8	8.2	9.0	8.4	7.7	7.4	8.5	8.7	7.2	7.8	7.4	7.4
10	7.4	7.3	7.3	7.1	7.1	7.0	C	C	C	C	C	C	C	C	C	C	C	C	C	9.0	9.4	9.5	8.8	9.0	8.0
11	7.9	7.8	7.8	6.9	8.5	9.2	9.2	9.1	(8.8)	8.4	8.4	8.6	8.4	8.6	8.4	8.4	8.7	8.2	8.6	8.7	9.1	9.0	8.7	8.1	8.1
12	7.9	7.5	7.6	7.4	7.6	C	C	C	7.6	7.3	7.6	7.6	9.1	9.0	9.4	9.4	C	C	8.0	8.1	8.5	8.9	8.7	8.6	8.6
13	7.3	7.4	7.5	6.5	7.3	7.0	6.7	6.1	6.2	5.5	6.1	6.0	6.5	6.8	7.0	7.0	7.3	7.3	7.5	7.6	7.5	7.5	7.3	7.5	7.5
14	7.2	7.3	7.2	7.0	7.0	7.8	8.5	8.5	8.6	(8.1)	8.0	7.9	8.5	(8.5)	8.6	(8.8)	9.0	9.8	9.7	9.1	(8.5)	8.1	(8.4)	8.5	8.5
15	(8.0)	8.4	8.0	7.6	7.0	7.2	7.2	7.3	7.3	7.4	7.5	8.0	7.9	A	A	A	8.1	8.9	8.0	7.9	7.0	7.8	7.9	8.0	8.0
16	8.6	8.4	7.4	6.5	6.8	8.4	8.6	10.0	10.5	(10.0)	9.3	9.8	9.5	9.2	9.5	(9.6)	9.6	9.3	8.9	8.4	8.2	8.2	8.3	(8.8)	(9.9)
17	(9.5)	9.0	8.0	7.4	7.7	8.3	C	C	C	C	C	C	C	C	C	C	C	C	C	8.2	(8.4)	8.2	8.0	8.0	8.0
18	8.2	8.2	7.2	7.0	7.4	6.7	6.5	A	A	8.4	8.1	7.8	7.3	7.6	7.8	7.6	7.7	8.2	8.6	7.1	7.6	7.6	8.5	8.5	8.5
19	7.7	7.3	6.7	6.7	6.8	6.9	7.2	7.3	7.2	7.2	7.3	7.4	A	A	7.4	(7.6)	7.6	7.4	7.5	7.0	7.7	7.8	8.1	7.5	
20	7.4	7.4	6.6	5.9	(5.3)	5.3	7.4	7.8	A	A	A	A	A	A	6.0	6.1	6.2	6.4	(6.5)	6.6	6.6	7.8	7.6	7.2	7.8
21	8.0	8.0	8.4	7.3	(7.0)	7.9	7.9	C	A	C	7.4	7.2	7.8	(8.0)	8.0	8.0	(8.0)	8.0	7.8	8.3	8.5	8.2	(7.9)	7.5	
22	8.4	9.0	8.0	7.7	7.1	7.4	9.0	10.4	10.0	9.6	10.2	9.6	9.3	C	C	9.4	9.4	8.9	9.1	(9.0)	9.0	9.1	9.4	9.3	
23	9.4	9.2	9.0	F	F	9.3	(8.6)	(7.8)	7.6	(7.6)	7.6	7.6	7.1	6.7	6.9	6.8	6.8	7.7	7.2	7.3	7.1	7.4	8.1	8.2	
24	(7.8)	(8.0)	8.1	F	(7.4)	7.7	9.5	C	C	C	C	C	C	C	C	C	C	C	C	A	8.0	8.0	8.4	8.2	
25	8.4	8.1	7.9	7.0	6.2	7.2	(8.7)	10.1	10.0	9.9	(9.6)	9.2	(9.4)	9.6	10.1	9.5	C	A	A	C	C	C	C	7.3	
26	7.6	8.0	8.0	7.2	7.6	7.5	(8.3)	10.4	10.1	8.6	8.6	8.6	8.5	7.8	7.9	7.9	8.1	8.6	8.7	9.1	8.3	8.6	8.8	9.2	
27	9.1	(9.7)	(19.1)	9.4	9.4	7.7	8.1	8.3	9.5	8.4	8.0	8.5	8.6	8.4	8.8	8.3	8.1	(9.0)	9.8	9.1	8.4	8.2	8.6	8.5	8.5
28	8.3	8.2	8.1	7.6	7.5	8.5	8.3	9.5	9.0	8.8	(8.5)	8.6	9.3	9.6	9.3	9.3	9.1	8.9	8.7	8.5	9.0	(8.0)	(8.6)	8.2	8.2
29	7.8	8.9	7.6	7.8	7.5	7.8	8.0	(8.1)	8.2	(8.0)	7.7	(8.2)	8.7	8.5	(8.3)	8.8	(8.5)	8.0	7.1	4.7	(6.3)	7.6	7.8	8.2	8.2
30	8.2	8.2	7.2	6.6	6.6	6.6	7.8	7.6	8.0	7.3	8.3	8.1	8.0	8.1	8.8	9.0	9.0	9.0	8.4	8.6	(8.5)	8.4	7.3	8.6	8.6
31																									
Median Value	7.9	8.0	7.7	7.2	7.2	7.4	7.9	8.2	8.4	8.3	8.1	8.4	8.4	8.5	8.6	8.9	8.5	8.6	8.4	8.5	8.4	8.1	8.3	8.1	8.1
Count	28	28	28	28	29	29	27	22	22	22	24	23	23	22	23	24	23	23	23	25	27	29	29	29	29

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
(Denki-tsushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

hp F_z

Fukaura
Lot. 40°36'N
Long 139°54'E

IONOSPHERIC DATA

135°E Mean Time

Day	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	420	380	380	380	370	320	330	340	360	340	380	390	380	400	370	370	360	340	330	320	(350)	270	420	F	A
2	A	SE	A	(300)z	300	320	A	A	A	A	A	A	A	380	380	360	(370)	A	370	350	340	370	440	410	
3	A	A	440z	400	430	410	360	C	C	C	C	C	C	C	C	C	C	C	C	C	C	360	340	360	
4	350	340	350	340	360	340	330	370	320	370	400	400	430	400	380	320	A	A	340	380	350	360	(370)	410	
5	430	(430)	440	470	440	480	B	B	F	400	(390)	370z	(390)	380	380	380	(370)	350	400	350	370	350	420	410	
6	390	400	C	C	500	330	380	320	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
7	440	440	420	410	(380)	350	(350)	310	(340)	370	350	340	380	400	380	380	(370)	350	360	340	310	330	370	400	
8	490	380	380	360	310	310	360	340	380	360	330	360	370	(360)	370	370	370	360	330	310	360	340	(400)	360	
9	410	400	420	350	340	310	350	350	370	400	370	350	400	390	380	360	360	350	360	340	320	360	380	370	
10	400	390	380	350	370	320	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	320	420	
11	370	360	360	340	310	300	320	320	380	320	380	390	(370)	340	360	370	340	330	340	340	340	340	340	360	340
12	350	410	370	400	340	C	C	C	330	(370)	410	410	380	390	380	380	C	C	320	370	400	410	370	330	
13	420	420	400	420	410	400	340	460	500	A	A	A	A	A	A	400	390	330	330	320	330	330	400	430	
14	400	400	390	370	350	350	350	310	320	300z	370	360	390	390	380	340	330	330	320	320	340	360	400	370	
15	370	310	320	360	320	370	360	320	340	340	400	400	A	A	A	A	A	A	320	330	320	310	310	390	
16	400	350	310	350	400	330	310	340	310	(350)	380	400	380	370	360	(350)	320	310	300	310	370	310	410	460	
17	400	320	330	350	340	320	C	C	C	C	C	C	C	C	C	C	C	C	C	C	330	360	380	340	
18	370	330	380	380	360	360	A	A	A	400	(400)	400	400	390	390	380	380	350	330	290	380	410	400	360	
19	360	380	370	380	390	400	360	380	(380)	440	370	A	A	A	A	360	330	300	320	340	350	360	370		
20	240	260	320	380	(360)	330	330	A	A	A	A	A	A	A	A	B	B	B	(370)	350	400	380	360	460	
21	480	450	390	390	380	340	320	C	A	C	A	430	390	(380)	360	370	(360)	350	350	340	330	370	(390)	410	
22	370	380	320	320	350	400	390	320	350	350	420	390	370	A	C	360	320	320	330	340	360	380	400	380	
23	360	410	390	360	(340)	320	C	A	A	A	430	420	380	B	A	400	380	330	350	330	360	430	480	370	
24	400	(420)	430	440	440	380	360	C	C	C	C	C	C	C	C	C	C	C	C	C	A	370	380	360	
25	320	320	330	360	360	330	(360)	330	350	370	(380)	370	(380)	370	390	320	C	A	A	C	C	C	C	390	
26	410	380	370	350	350	370	(350)	330	310	310	400	460	380	390	370	390	360	360	330	310	320	420	420	390	
27	380	400	360	390	360	350	340	390	340	330	420	410	400	390	370	370	380	400	350	300	330	370	420	350	
28	350	350	350	350	380	310	390	340	300	A	A	410	390	400	380	370	380	360	340	340	340	350	(370)	380	
29	430	420	400	410	410	390	370	(400)	420	A	A	A	400	400	380	A	A	390	340	340	(360)	380	(390)	380	
30	400	440	360	430	380	400	320	360	340	(370)	390	360	380	380	380	370	370	370	330	350	(390)	420	410	420	
31																									
Mean Value	400	390	370	360	360	350	340	340	350	370	390	390	380	390	380	370	370	350	340	340	360	380	400	390	
Count	28	28	28	29	30	29	19	19	19	18	19	20	20	20	19	23	21	23	24	27	29	29	29	29	29

Sweep - Lo. Mc to Up. Mc in 13 min Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
 (Denki-tsushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

h.F.

LT. 40.366N
 Loos 139°54.1E

Fukaura

135°E Mean Time

Day	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) ^A	310	300	280	280	220	290 ^A	270	300	320	350	350 ^A	340	350	340	320	300	330	300	270	300	320	360 ^A	A
2	A	A	A	250	270	270	260	A	A	A	A	A	A	370	350	340	(350) ^A	A	A	300	280	300	300	360
3	A	A	310	(310)	330	310	280	C	C	C	C	C	C	C	C	C	C	C	C	C	300	300	300	300
4	300	300	300	290	280	270	290	340	300	310	380	400	(480)	320	340	310	A	A	A	300	290	280	260 ^A	300
5	300	350	340	330	350	380	380	B	400	400	(310) ^B	370	(380) ^A	370	460	370	(340) ^A	A	A	300	300	300	240	290
6	300	270	C	C	310	420	480 ^K	A	A	A	G	A	A	B	G	K	G	G	G	(400) ^K	A	A	A	A
7	350	330	330	330	(330) ^A	320	(310) ^A	300	A	A	A	A	390	370	340	340	(340)	A	A	330	300	260	310	320 ^A
8	300	290	280	280	280	260	270	290	350	330	320	340	350	(350) ^A	330	350	310	310	240	270	250	250	(250)	280
9	A	AH	260	270	270	240	220	320	310	370 ^A	340	330	330	330	360	340	320	320	300	300	260	270	250	240
10	300	300	300	270	250	280	300	C	C	C	C	C	C	C	C	C	C	C	C	C	280	250	270	240
11	310 ^A	300 ^A	300 ^A	300 ^A	290	290	270	280	350	320	330	380	(360) ^C	340	350	350	280	210	280	280	280	280	280	280 ^A
12	300	310	310	320	290	C	C	290	(350) ^A	400	400	400	360	390	370	370	280	300	300	280	300	280	280	270
13	280	310	310	350	350	310	320	450 ^K	B	A	A	A	A	A	360 ^K	370 ^K	380 ^K	A	A	280	260	240	280	H
14	310	320	300	300	290	300	320	290	290	300	370 ^A	330	390	370	370	320	320	300	290	260	290	270	300	290
15	320	300	280	270	270	300	330	320	380	370	400	370	370	A	A	A	A	310	310	300	240	(300)	330 ^A	320 ^A
16	310	280	230	270	310	280	280	290	290	(310)	350	340	370	360	350	(340) ^A	330	300	280	270	350	350	350	310 ^A
17	300	280	250	270	280	220	C	C	C	C	C	C	C	C	C	C	C	C	C	290	310	(340)	360	A
18	310	300	310	350 ^H	300	A	A	A	A	400	(400)	400	320	390	390	380	370	330	330	290	(290)	(350)	350	280
19	280	280	300	310	310	(320) ^L	(330) ^B	340	370	440 ^B	370	(350) ^A	A	A	(390) ^B	360 ^B	340	300	300	290	280	290	300	310
20	320	(300) ^A	280 ^K	300 ^K	(300) ^K	290 ^K	310	A	A	A	A	A	A	A	A	(300) ^K	440 ^K	410 ^K	380	(340) ^K	340	(320)	320	340
21	320	310	(310)	310	290	250	270 ^A	C	A	C	A	420	(390)	(370)	(350)	350	(330)	300	(310)	(320)	280	300	(290)	270 ^A
22	290	280	250	270	280	250	280	310	320	320	350	(390) ^A	330	A	C	350	310	320	280	270	270	270	330	300
23	290	300	300	300	300	260	C	A	A	A	400	400	380	430 ^B	A	400	380	320	250	270	260	(300) ^A	330	320
24	A	C	(340) ^A	310	310	350	320	C	C	C	C	C	C	C	C	C	C	C	C	A	300	310	330	310
25	(300)	280	270	270	290	350	(330) ^C	300	320	310	(340) ^A	350	(360) ^A	350 ^A	310 ^B	320	(350) ^A	A	A	C	C	C	C	300
26	310	300	270	270	290	(350) ^L	(330)	310	300	300	(350) ^A	350	390	370	380	360	350	320	300	280	280	320	320	320
27	310	300	250	250	230	240	(320) ^A	310	320	320	420	390	(380) ^B	370	370	350	(300)	300	260	280	260	290	310	290
28	300	290	300	290	300	240	250	300	(290)	A	A	300	380	390	360	370	350	330	300	280	300	320	A	A
29	A	290	310	350	300	310	260	C	A	A	A	A	400	400	A	A	A	A	310	310	300	(330) ^C	350	300
30	300	310	300	310	300	320	310	320	340	(350) ^A	370	360	380	380	380	390	330	330	(310) ^A	290	(370) ^A	(350) ^A	340	310
31																								
Median Value	300	300	300	300	290	280	300	310	310	320	360	370	370	350	370	360	340	320	300	280	290	300	320	310
Count	25	26	28	29	30	28	26	17	16	17	20	21	21	22	22	23	23	23	25	27	28	28	29	28

Sweep 1.0 Mc to 11.0 Mc in 1.5 min

Manual

IONOSPHERIC DATA

Lat. 47°36.0'N
Long. 139°54.1'E

Fukauro

135°E Mean Time

f₁

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1						Q	A	Q	A	A	A	A	A	L	A	A	L	L	L	A						
2						Q	Q	A	A	A	A	A	A	A	A	A	A	A	A	A	Q					
3						3.5	L	C	C	C	C	C	C	C	C	C	C	C	C	C	C					
4						Q	Q	Q	A	A	A	Q	A	A	A	A	A	A	A	A	Q					
5						3.4	B	B	B	B	B	B	A	A	A	A	A	A	A	A	Q					
6						A	4.2 ^J (4.5)	A	4.7 ^J (4.7)	A	4.7 ^J (4.7)	A	4.7 ^J (4.7)	A	4.7 ^J (4.7)	4.4	4.4	4.3	(4.0) ^S	Q						
7						A	A	A	A	L	5.5	L	L	L	L	5.6	S	C	L	A	A					
8						L	L	4.9	(5.1) ^A	(5.2) ^B	B	B	B	A	A	A	A	A	A	A	Q					
9						A	Q	4.8	A	A	A	A	L	(5.7) ^B	L	B	B	B	4.6	L	Q					
10						L	L	C	C	C	C	C	C	C	C	C	C	C	C	C	Q					
11						Q	L	L	C	L	B	B	C	B	A	B	L	L	L	L	Q					
12						C	C	C	A	A	5.6	L	L	L	5.6 ^H	L	C	C	L	A						
13						L	4.8	4.9 ^J (4.9)	A	A	A	A	A	A	A	A	A	A	A	A	Q					
14						L	L	L	L	A	A	A	A	A	5.4 ^J (5.1)	B	L	L	L	L	L					
15						L	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A					
16						L	A	A	A	T	B	A	L	B	A	A	L	L	L	L	Q					
17						Q	C	C	C	C	C	C	C	C	C	C	C	C	C	C	Q					
18						A	A	A	A	C	A	A	A	A	A	B	5.0	5.0	(4.8) ^L	L	Q					
19						L	B	L	4.5 ^B	B	B	A	B	B	B	B	B	A	A	A	A					
20						A	4.2	A	A	A	A	A	A	A	A	B	B	4.2 ^P	A	A	A					
21						Q	A	C	A	C	A	B	B	A	A	A	A	A	A	A	A					
22						Q	A	L	A	(5.3) ^A	5.7	(5.6) ^A	A	C	A	C	(5.0) ^B	(4.8) ^A	A	A	A					
23						Q	C	A	A	A	(5.2) ^A	(5.5) ^B	A	A	A	(5.2) ^B	(4.9) ^A	4.5	Q	Q						
24						A	L	C	C	C	C	C	C	C	C	C	C	C	C	C	Q					
25						4.3	4.6	A	A	A	A	6.0	A	A	L	B	A	A	A	A	C					
26						L	C	L	A	A	A	5.6	5.5	5.5	5.5	5.2	5.0	(4.1) ^L	3.1	A						
27						Q	Q	A	L	A	6.3	5.6	(5.7) ^B	5.7 ^J	5.6	(5.4) ^L	5.1	Q	Q	Q						
28						Q	Q	5.0	A	A	A	5.8	(5.7) ^A	5.6	5.7	5.4	A	A	A	A	Q					
29						3.5 ^H	Q	C	A	A	A	A	Q	A	A	A	A	A	L	4.3	Q					
30						L	L	L	L	A	Q	L	6.0	5.8	A	L	5.4	A	A	A	A					
31																										
Median Value						-	-	4.9	-	5.6	5.6	5.7	5.7	5.7	5.6	5.2	5.0	4.5	-	-						
Count						4	4	5	4	3	5	6	6	6	7	8	9	5	3							

Sweep 1.0 - Micro 11.0 Mc in 1.5 min Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
 (Denkikatsushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

h'F₂

Fukaura

Lat 40°36'6"N
 Long 139°41'E

135°E Mean Time

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1					Q	A	Q	A	A	A	A	A	A	A	A	A	250	260	250	A					
2					Q	Q	A	A	A	A	A	A	A	A	A	A	A	A	A	Q					
3					280	260	C	C	C	C	C	C	C	C	C	C	C	C	C	C					
4					Q	Q	Q	A	A	A	A	Q	A	A	A	A	A	A	A	Q					
5					280	250	250	A	B	220	A	B	220	A	A	A	A	A	A	350	Q				
6					A	A	A	A	(240) ^A	230	A	A	A	230	A	A	A	A	A	Q					
7					A	A	A	A	A	200	200	B	B	B	B	B	5	250	A	Q					
8					240	220	220	A	B	B	B	B	B	B	B	B	B	B	240	240	Q				
9					A	Q	240	A	A	A	A	B	B	B	B	B	B	B	240	Q					
10					250	240	C	C	C	C	C	C	C	C	C	C	C	C	C	Q					
11					Q	220	230 ^A	(220) ^A	210	B	B	C	B	C	A	B	240	230	250 ^A	Q					
12					C	C	C	A	A	250	A	A	B	B	B	H	C	C	260	A					
13					260	260	(260) ^B	A	A	A	A	A	A	A	A	A	A	A	A	Q					
14					260	220	220	210	A	A	A	A	A	A	A	230	(230) ^B	(240) ^F	240	250	230				
15					260	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A					
16					240	A	A	A	A	T	B	A	A	A	B	A	A	A	A	240	Q				
17					Q	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C					
18					A	A	A	A	A	C	A	A	A	A	A	A	230	(230) ^B	220	250	Q				
19					250	240	250	230	220	B	B	A	A	A	B	B	B	A	A	A	A				
20					A	300	A	A	A	A	A	A	A	A	A	B	230	(240) ^A	A	A	A				
21					Q	A	C	A	C	A	B	A	B	A	A	A	A	A	A	A					
22					Q	A	280 ^A	A	A	(230) ^B	A	A	A	A	A	C	B	A	A	A	A				
23					Q	C	A	A	A	A	A	A	B	A	A	A	A	A	240	Q					
24					A	A	C	C	C	C	C	C	C	C	C	C	C	C	C	A					
25					240 ^A	230	A	A	A	A	A	B	A	B	A	A	A	A	A	A	C				
26					250	C	A	A	A	A	A	A	B	(250) ^B	220	230	(250) ^A	260	250 ^A	A					
27					Q	Q	A	A	A	A	A	B	B	B	A	B	220 ^A	Q	Q	Q					
28					Q	Q	A	A	A	A	A	A	B	B	B	B	A	A	A	A	Q				
29					210	Q	C	A	A	A	A	A	Q	A	A	A	A	A	A	250	240	Q			
30					250	260	A	A	A	A	Q	A	B	A	A	A	A	(250) ^A	A	A	A				
31																									
Median Value	250	240	250	220					220	5	3	4	2			230	240	240	250						
Count	13	11	8											2	3	5	8	9	10						

Sweep 10.0 Mc to 110.0 Mc in 1.5 min Manual

IONOSPHERIC DATA

fE

Lat 40°36.6'N
Long 139°54.1'E

Fukaura

135°E Mean Time

Day	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					(2.0) ^B	2.1	A	A	A	A	A	A	A	A	A	A	3.3	3.0	2.4	A				
2						A	2.3	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
3						B	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
4						A	2.6	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
5						2.0	2.9	3.2	B	A	(3.4) ^B	3.7	3.4 ^J	3.4 ^J	3.4 ^J	(3.4) ^J	3.4 ^J	2.8	2.3	B	B			
6						A	2.6	3.0	3.6	A	A	A	A	B	B	B	3.3	2.9	2.4	A				
7						A	A	3.1	3.3	A	B	B	B	B	B	A	3.4	3.4 ^J	A	A				
8						2.3	2.8	3.2	3.6	(3.4) ^A	A	A	B	A	A	A	A	A	A	A	A			
9						A	2.8	(3.2) ^A	3.6	A	A	A	A	A	A	A	3.2	(2.8) ^A	2.4	A				
10						B	2.8	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
11						B	A	A	A	A	B	B	C	A	B	A	A	A	A	A	A			
12						C	C	C	A	A	A	A	A	A	B	A	C	C	C	2.6	A			
13						2.0	(2.3) ^A	2.6	3.0	A	4.0	(3.9) ^A	3.8	A	A	A	A	3.0	2.6	A				
14						B	2.6	(3.2) ^A	3.7	A	A	A	A	A	A	B	B	3.0	2.6	B				
15						B	A	3.2	3.2	(3.2) ^A	3.2	3.6	A	A	A	A	A	A	A	A				
16						2.2 ^A	2.3	3.2	A	A	A	A	A	A	B	A	3.2 ^A	A	A	A	A			
17						2.5	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
18						A	2.6	2.8	(3.1) ^A	3.4	C	A	A	A	A	A	A	A	2.6	(2.0) ^J				
19						2.4	2.8	3.6	B	A	A	A	A	A	A	B	A	A	A	A	A			
20						A	3.0	3.2	A	A	A	A	A	A	4.0	A	A	A	A	A	A			
21						(2.3) ^A	A	A	3.4	C	A	A	A	A	A	A	A	A	A	A	A			
22						A	A	A	A	3.5	(3.6) ^B	A	A	A	A	C	B	3.6	2.8	A	A			
23						2.3	(2.8) ^C	3.2	3.2	3.6	A	A	A	A	A	A	A	A	3.1	2.6	2.0			
24						A	2.8	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
25						A	2.7	3.2	3.4	A	A	B	A	A	B	A	3.4 ^J	A	A	A	C			
26						2.1 ^J	(2.7) ^A	3.3	A	A	A	3.7 ^B	3.6	(3.6) ^B	A	A	A	A	2.6	A				
27						2.4	2.8	3.3	3.7	A	A	A	4.0	(4.0) ^B	3.8	A	A	A	2.8	A				
28						2.0	2.6	3.2	3.4	3.3	A	A	A	A	A	A	A	A	A	A				
29						A	2.9	C	A	3.4	A	A	A	A	A	A	A	A	A	A				
30						2.4	2.8	3.2	3.5	4.0	4.1	A	B	A	A	(3.8) ^A	3.6	3.4	2.7	A				
31																								
Medium Value						2.3	2.8	3.2	3.4	3.4	-	-	3.8	-	-	-	3.4	3.0	2.6	-				
Count	2	13	21	18	13	8	4	3	4	5	4	4	4	4	4	4	8	11	12	2				

Sweep 3000 Mc to 1100 Mc in 15 min Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
(Denki-tsushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

Lat. 40°56'N
Long. 139°54'E

Fukaura

h'E

IONOSPHERIC DATA

135°E Mean Time

Day	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	110	A	A	A	A	A	A	A	A	A	A	120	100	120	A					
2						A	110	A	A	A	A	A	A	A	A	A	A	A	A	A					
3						B	A	C	C	C	C	C	C	C	C	C	C	C	C	C					
4						A	110	A	A	A	A	A	A	A	A	A	A	A	A	A					
5						130	100	100	100	100	100	100	110	B	B	A	110	110	120	B					
6						A	110	120	110	A	A	A	110	110	100	100	110	110	120	A					
7						A	A	110	110	110	110	110	110	110	110	110	110	120	A						
8						130	120	110	110	A	A	A	B	B	A	A	A	A	A	A					
9						A	110	110	110	A	A	A	A	A	A	A	120	120	120	A					
10						B	120	C	C	C	C	C	C	C	C	C	C	C	C	A					
11						B	A	A	A	A	110	110	C	A	A	A	110	A	A	A					
12						C	C	C	A	A	A	A	110	110	110	110	C	C	110	A					
13						110	110	110	110	110	110	110	110	110	110	A	A	110	110	A					
14						B	110	110	110	A	A	A	A	A	A	110	110	120	120	B					
15						B	A	110	110	110	110	110	110	100	A	A	A	A	A	A					
16						110	110	110	A	A	A	A	B	110	110	A	A	A	A	A					
17						110	C	C	C	C	C	C	C	C	C	C	C	C	C	A					
18						A	110	110	110	110	110	110	A	A	A	A	A	A	120	130					
19						B	120	120	110	A	A	A	A	A	A	110	110	A	A	A					
20						A	120	110	A	A	A	A	A	A	A	A	A	A	A	A					
21						A	A	A	100	C	A	A	A	A	A	A	A	A	A	A					
22						A	A	A	A	110	110	A	A	A	A	110	110	110	110	A					
23						120	120	110	110	110	110	A	A	A	A	A	A	120	120	B					
24						A	110	C	C	C	C	C	C	C	C	C	C	C	C	A					
25						A	110	110	110	A	A	110	110	A	A	A	120	A	A	A					
26						110	110	110	A	A	A	A	110	110	110	A	A	A	120	A					
27						B	110	120	120	A	A	A	110	110	110	110	A	A	110	A					
28						110	110	110	110	110	110	A	A	A	A	A	A	A	A	A					
29						A	120	C	A	110	A	A	A	A	A	A	A	A	A	A					
30						110	110	120	120	120	120	A	B	A	110	110	110	110	120	120					
31																									
Mean Value						110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110
Count						10	21	18	16	11	8	7	8	8	9	10	9	11	12	1					

Sweep 1.0 Mc to 17.0 Mc in 1.5 min Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
(Denki-tsushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

IES

Lat. 40°36'N
Long. 139°54'E

Fukaura

135°E Mean Time

Day	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	4.8	2.6	2.6	3.0	2.1	5.0	5.0	5.8	7.2	5.5	7.2	7.2	6.4	3.0	5.3	4.0	B	3.0	4.6	3.4	4.3	4.5	4.7	4.7	
2	3.0	4.7	4.6	5.8	3.1	3.1	4.6	10.0	10.0	10.2	10.0	8.0	6.0	6.8	6.8	6.8	8.2	6.2	4.4	3.4	2.8	6.9	6.2	6.2	
3	4.6	1.2	3.0	5.1	3.2	2.4	4.0	C	C	C	C	C	C	C	C	C	C	C	C	C	5.0	4.7	3.0	2.5	
4	2.4	3.0	3.6	4.0	4.3	3.4	2.9	4.4	7.0	7.0	6.0	7.0	7.4	9.6	9.4	(11.4)F	9.2	5.2	3.5	3.0	3.0	3.0	3.0	3.0	
5	2.1	3.0	2.4	2.6	2.4	2.4	4.6	4.8	B	4.8	4.0	B	7.0	7.0	5.8	8.0	(4.8)F	5.4	5	G	G	G	3.0	3.4	
6	2.8	2.6	C	C	3.2	6.4	4.6	4.4	4.2	5.9	4.7	5.6	4.6	4.6	5.2	5.0	Y	4.7	5.1	4.5	5.6	5.8	G	G	
7	G	G	G	3.0	4.0	5.0	6.2	6.5	6.5	5.6	B	B	B	B	B	B	C	4.6	5.6	5.2	3.9	5.8	5.5	4.3	
8	3.2	2.4	2.4	G	2.2	3.0	3.6	3.2	5.2	4.0	4.1	4.0	B	7.9	4.8	4.2	5.0	7.0	6.0	4.0	6.0	3.0	8.5	7.6	
9	6.6	4.6	4.0	3.0	3.2	4.4	G	4.0	5.8	7.2	7.0	4.8	4.4	4.2	4.2	4.0	4	4.0	3.5	3.0	2.8	4.0	3.2	2.2	
10	2.3	2.4	2.5	2.8	2.3	2.2	3.6	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	2.2	
11	3.8	5.4	4.8	5.8	3.6	3.4	3.2	6.6	6.2	4.4	4.2	4.0	C	5.6	4.8	B	4.4	4.0	3.0	3.4	3.5	2.6	3.6	3.4	
12	3.6	G	3.0	G	G	C	C	C	5.0	6.8	5.0	5.8	4.2	B	4.2	B	C	C	4.0	3.0	3.4	3.7	3.8	4.0	4.6
13	2.8	G	3.0	G	2.4	3.2	4.7	B	5.3	5.3	6.4	7.0	6.8	Y	6.8	Y	C	C	4.0	3.6	2.4	2.4	2.4	3.6	
14	G	G	2.6	3.0	2.8	2.8	3.4	4.4	8.3	10.5	9.6	6.5	7.0	4.1	4.6	4.0	7.0	6.0	4.6	5.0	3.4	4.8	3.4	3.0	
15	2.5	3.0	2.6	3.0	2.8	2.6	5.0	5.2	4.8	4.6	5.0	7.0	7.0	9.6	9.6	9.0	B	6.0	4.8	4.9	4.8	3.5	2.6	3.2	
16	2.2	2.2	2.6	2.6	3.2	3.2	4.4	5.8	5.0	7.0	4.0	4.2	7.0	5.4	4.9	11.8	6.2	3.8	3.5	2.7	8.2	8.6	4.6	5.8	
17	4.9	4.4	4.2	3.5	3.0	2.5	3.0	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	5.8	
18	5.0	4.0	4.4	5.0	3.8	6.2	7.0	10.0	11.4	7.2	C	5.8	7.0	6.0	4.6	6.8	3.4	4.0	3.5	3.2	6.2	5.0	5.5	7.0	
19	B	B	2.4	2.3	2.2	2.8	3.7	4.1	5.2	4.2	4.0	7.4	7.2	Y	7.2	Y	7.0	7.0	5.0	3.5	3.8	3.6	3.4	4.8	
20	5.0	9.8	8.8	7.4	8.0	4.0	4.5	7.4	11.8	11.6	9.2	7.0	7.0	10.5	G	3.4	3.8	7.2	10.8	11.0	10.0	8.0	6.6	4.0	
21	3.4	4.5	6.6	4.4	4.8	3.0	5.8	C	9.6	C	6.4	4.0	4.4	8.4	6.4	6.1	10.2	7.0	6.0	7.0	4.0	4.8	7.8	4.0	
22	3.4	2.6	2.4	2.4	2.8	4.8	5.6	5.8	8.2	6.0	4.4	7.2	8.2	12.1	(3.9)B	3.8	9.2	9.2	6.0	4.7	3.4	3.7	6.6	4.0	
23	5.0	9.0	8.5	6.6	3.0	B	C	7.0	7.4	7.5	5.4	6.7	B	5.8	6.5	10.8	5.4	G	2.8	2.5	3.2	6.2	4.5	5.2	
24	2.2	C	8.0	5.8	5.6	5.0	5.4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	5.2	
25	6.4	5.0	5.4	4.8	3.4	3.2	G	7.0	7.2	7.2	10.7	B	11.7	7.1	5.6	4.4	B	7.2	7.5	7.0	C	C	C	5.4	
26	G	G	G	G	G	3.5	C	5.8	6.0	6.6	5.6	5.2	B	G	(3.6)B	4.9	4.8	3.6	G	4.2	7.2	3.2	3.2	4.2	
27	3.4	2.8	2.8	2.2	3.1	3.7	3.7	5.1	5.5	5.4	4.7	5.2	Y	4.8	5.8	5.9	Y	4.7	5.0	4.0	3.0	3.2	5.6	6.2	
28	4.6	3.0	3.0	2.6	2.6	4.6	4.6	5.7	7.0	10.0	8.2	6.6	6.0	4.8	4.2	B	4.8	5.8	4.4	4.4	4.8	12.0	8.6	4.5	
29	3.1	3.8	3.0	4.6	3.2	4.0	3.6	C	6.8	6.8	7.0	7.2	6.8	6.4	7.4	9.0	11.8	7.5	4.0	3.4	C	5.8	7.8	6.2	
30	5.4	2.4	2.8	3.0	6.6	3.3	4.4	5.6	5.5	7.0	7.0	5.6	4.7	6.0	5.9	5.2	G	6.2	7.2	5.8	12.0	9.2	3.2	2.7	
31																									
Mean Value	3.6	3.0	3.0	3.0	3.1	3.3	4.4	5.7	6.2	6.8	5.8	6.6	7.0	6.2	5.8	5.3	5.4	4.9	4.7	3.8	3.1	4.2	4.6	4.1	
Count	29	28	29	29	30	28	27	22	25	25	24	24	21	24	24	22	23	24	26	28	28	29	29	30	

Sweep 11.0-Mc to 17.0-Mc in 1.5-min

Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
 (Denki-tsushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

F₂-M3000

Lat 40° 36.6'N
 Long 139° 34.1'E

Fukaura

135° E Mean Time

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	25	27	26	27	26	30	29	28	28	29	28	26	25	28	27	27	27	30	29	30	(28) ^C	27	26	27	26
2	A	SE	A	3.1	3.1	3.0	F	A	A	A	A	A	A	2.7	2.8	2.7	2.8	(2.7) ^A	2.7	2.8	2.8	2.8	2.8	2.5	2.5
3	A	A	2.6	2.6	2.5	2.6	2.8	C	C	C	C	C	C	C	C	C	C	C	C	C	2.8	2.8	2.8	2.8	2.8
4	28	29	28	29	27	28	28	28	29	27	28	2.4	2.4	2.8	2.8	3.0	A	A	A	2.9	2.6	2.8	2.7	(2.6) ^S	2.5
5	25	(2.5) ^S	2.5	2.3	2.4	2.6	2.4	2.5	2.7	2.7	(2.7) ^B	2.7	2.5	2.7	2.7	2.8	3.1	2.8	2.7	2.9	2.5	2.8	2.6	2.6	2.6
6	26	26	C	C	2.3	2.4	2.4	J	K	K	A	G	A	A	K	J	A	G	K	(2.5) ^K	2.5	(2.4) ^K	2.4	2.3	2.3
7	24	24	2.5	2.6	2.8	2.8	2.7	3.0	3.0	2.7	2.7	2.8	2.7	2.7	2.7	(2.7) ^C	2.8	2.8	2.9	3.0	3.0	3.0	2.7	2.6	2.6
8	27	28	2.7	2.8	3.0	3.0	(3.0) ^Z	2.9	2.8	2.9	2.9	2.9	J	B	J	J	I	2.8	2.9	3.1	2.8	J	(2.6) ^S	2.8	2.8
9	(2.6) ^F	2.8	2.8	2.8	2.7	2.7	2.7	2.8	2.7	2.6	2.8	3.0	2.6	2.8	2.8	2.7	2.9	2.8	2.8	2.9	2.9	2.9	3.0	2.7	2.7
10	27	27	2.8	2.8	2.7	3.3	C	C	C	C	C	C	C	C	C	C	C	C	C	C	2.7	2.9	3.0	2.6	2.6
11	27	2.8	2.8	2.8	3.0	3.0	2.9	2.8	(2.9) ^F	3.0	2.7	2.7	(2.8) ^C	2.9	2.8	2.7	2.8	2.9	2.9	2.8	2.8	3.0	2.8	2.7	2.7
12	2.8	2.6	2.7	2.7	2.8	C	C	C	C	2.9	2.8	2.7	2.6	2.7	2.8	2.7	2.8	C	C	2.9	2.7	2.7	2.7	2.9	2.9
13	2.6	2.5	2.7	2.5	2.7	2.6	2.6	2.5	2.5	2.5	2.3	2.3	J	K	2.9	2.8	2.5	2.8	2.9	2.9	2.9	3.0	2.7	2.7	2.5
14	2.7	2.7	2.6	2.6	2.7	2.7	2.8	3.0	2.9	2.9	(2.8) ^A	2.7	2.6	2.8	2.8	T	J	2.9	3.0	2.8	(2.9) ^S	2.8	(2.6) ^S	(2.7) ^S	(2.7) ^S
15	(2.7) ^S	2.8	2.9	2.7	3.0	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.9	A	A	T	3.0	J	J	J	2.8	2.6	2.6	2.6	2.6
16	2.5	2.8	3.1	2.7	2.6	2.9	3.0	2.8	2.9	(2.8) ^T	2.8	2.6	2.9	2.9	2.8	(2.8) ^A	2.9	3.0	3.0	3.0	3.0	2.6	2.7	(2.5) ^F	2.5
17	IF	3.0	2.8	2.8	2.8	2.8	C	C	C	C	C	C	C	C	C	C	C	C	C	2.9	2.7	2.7	2.7	2.7	
18	2.7	2.7	2.7	2.8	2.7	2.5	2.7	2.8	A	A	(2.6) ^S	2.7	2.6	2.7	2.7	2.8	2.7	2.8	2.9	2.9	2.7	2.7	2.5	2.7	2.7
19	2.8	2.7	2.7	2.7	2.5	2.7	2.8	2.9	2.6	2.8	2.8	A	A	2.7	IB	IB	3.0	3.0	3.2	2.9	2.8	2.7	2.7	2.7	2.7
20	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	K	K	A	A	A	K	J	J	2.7	2.9	2.9	(2.8) ^K	2.8	2.6	2.8	2.4	2.4
21	2.3	2.4	2.7	3.0	2.7	2.7	2.9	3.1	C	A	(2.6) ^P	J	P	2.7	(2.8) ^A	2.8	(2.8) ^A	2.9	2.7	2.8	2.9	2.7	2.7	(2.5) ^T	2.6
22	2.8	2.7	3.0	3.0	2.8	2.6	3.0	2.8	2.8	2.8	2.5	2.7	2.7	A	C	2.8	3.0	2.9	2.9	JB	2.8	2.7	2.7	2.7	
23	2.8	2.6	2.6	F	F	3.0	C	A	2.7	A	J	J	2.8	2.7	2.8	2.8	2.9	2.9	2.9	2.9	2.7	2.6	2.7	2.8	2.8
24	(2.5) ^F	(2.4) ^C	2.4	F	F	2.7	2.8	C	C	C	C	C	C	C	C	C	C	C	C	A	2.7	2.6	2.6	2.6	2.6
25	2.6	3.0	3.0	2.8	2.7	2.7	2.8	2.8	2.9	2.8	(2.7) ^A	2.7	(2.7) ^A	2.7	2.8	C	A	A	C	C	C	C	C	C	2.7
26	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	3.0	3.1	2.7	2.7	2.8	2.8	2.7	2.7	2.8	2.8	2.8	3.0	2.9	3.0	2.7	2.8	2.8
27	2.7	(2.7) ^F	2.8	2.7	2.8	2.8	2.8	2.6	2.8	2.8	2.6	2.7	2.7	2.7	2.7	2.7	2.8	2.7	(2.5) ^F	2.8	3.0	2.8	2.5	2.5	2.5
28	2.6	2.8	2.9	2.7	2.6	3.0	2.9	2.9	3.0	A	A	2.6	2.7	2.7	2.7	2.7	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.7	2.7
29	(2.5) ^F	2.6	2.6	2.7	2.7	2.6	2.9	(2.7) ^C	2.6	(2.5) ^B	2.4	(2.6) ^B	2.9	2.8	J	J	A	2.9	2.9	2.9	(2.8) ^C	2.7	3.0	2.7	2.7
30	2.6	2.4	2.8	2.6	2.7	2.6	2.9	2.8	2.8	2.8	2.8	2.8	J	2.8	2.5	2.7	2.7	2.7	2.6	2.9	(2.7) ^A	2.6	2.7	2.6	2.6
31																									
Median Value	2.7	2.7	2.7	2.7	2.7	2.8	2.8	2.7	2.7	2.8	2.8	2.7	2.7	2.8	2.8	2.7	2.8	2.8	2.8	2.9	2.8	2.7	2.7	2.7	2.7
Count	27	28	28	28	28	29	26	20	22	20	21	22	19	18	20	22	20	22	24	25	28	28	29	29	29

Sweep rate: Mc to 1.5 Mc in 1.5 min

Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
(Denki-tsushin Kenkyūjo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

f_oF min

Fukaura

Lat. 40° 36.6'N
Long. 139° 34.1'E

135° E Mean Time

Day	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.2	2.6	2.0	2.0	2.0	1.8	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
2	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.0	2.0	2.0	2.0	2.2	2.2	2.2	2.2	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
3	1.4	1.3	1.3	1.8	1.6	2.0	2.0	C	C	C	C	C	C	C	C	C	C	C	C	C	1.8	1.8	1.8	1.8	
4	1.8	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
5	2.0	1.5	1.8	1.8	1.4	1.8	1.8	2.0	2.2	2.3	2.2	2.0	2.0	2.6	3.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
6	2.0	2.2	C	C	1.5	2.0	2.0	2.0	2.0	2.2	2.2	2.3	2.0	2.2	2.0	2.2	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
7	5	5	5	2.0	2.0	1.8	1.8	1.8	2.1	2.4	2.2	2.4	2.6	2.3	2.1	2.3	2.2	2.0	2.0	2.1	1.9	1.3	1.4	1.8	1.8
8	2.0	2.0	1.8	5	2.0	1.8	1.9	1.9	2.2	2.3	2.0	2.5	2.6	2.8	2.3	2.4	2.0	2.0	2.0	2.2	2.0	2.0	2.0	2.0	2.0
9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.4	1.8	1.4	2.0
10	2.0	2.0	2.0	2.0	2.0	2.0	2.0	C	C	C	C	C	C	C	C	C	C	C	C	2.2	2.0	2.0	1.5	1.5	
11	1.9	1.6	1.7	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	(2.0)	2.0	1.9	1.8	1.8	2.1	1.8	1.8	1.8	1.8	1.8	1.8	
12	2.0	2.0	2.1	5	5	C	C	C	2.0	2.0	2.0	2.2	2.0	2.0	2.0	2.0	2.0	C	1.8	1.8	1.8	1.8	2.0	1.8	
13	1.8	5	1.9	5	1.4	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
14	5	5	1.4	5	1.5	2.2	2.0	2.0	1.8	1.8	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.8	1.8	2.0	
15	2.0	2.0	2.0	2.0	2.0	2.0	2.6	2.2	2.1	2.1	2.2	2.2	2.0	2.0	2.0	2.0	2.0	1.9	1.7	1.8	1.8	1.8	1.8	1.8	
16	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0	1.8	2.0	1.8	2.0	2.0	2.3	2.0	2.0	2.0	2.0	2.6	2.0	1.9	1.9	
17	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.8	2.0	1.8	2.0	2.2	3.0	2.0	2.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
18	1.8	2.0	2.0	1.8	1.8	2.0	2.0	2.0	2.2	1.8	(1.9)	2.0	2.2	2.2	2.3	2.2	2.0	2.0	1.8	1.8	1.8	1.8	1.8	1.8	
19	B	B	1.8	1.8	1.8	1.9	1.8	1.8	2.0	2.0	2.0	2.2	2.0	2.0	2.8	2.8	2.0	2.0	2.0	2.0	1.8	1.8	1.8	1.8	
20	1.8	1.9	1.8	1.8	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.0	2.0	2.0	2.0	2.0	2.0	1.4	1.4	1.8	1.8	
21	1.8	E	E	E	E	1.4	2.0	2.2	2.1	(2.1)	2.0	2.4	2.2	2.2	2.2	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
22	1.4	1.4	1.4	1.4	1.4	2.0	2.0	2.0	2.0	2.0	2.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	2.0	1.5	
23	1.6	1.8	1.8	1.8	2.0	1.8	(1.8)	1.8	2.0	2.0	2.0	2.2	2.0	2.0	2.0	2.0	2.0	1.8	1.8	1.8	1.8	2.0	1.8	1.8	
24	1.8	1.8	1.8	1.6	1.8	1.8	C	C	C	C	C	C	C	C	C	C	C	C	C	2.0	2.0	2.0	2.0	2.0	
25	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.8	2.4	3.0	2.5	2.1	2.0	2.0	1.8	2.0	2.0	C	C	C	2.0	
26	5	5	5	5	5	2.0	2.0	2.0	2.2	2.2	2.2	2.2	2.0	2.0	2.2	2.2	2.0	1.8	1.8	1.8	1.4	1.4	1.8	1.4	
27	1.4	2.0	2.0	2.0	2.2	2.0	2.0	2.0	2.0	2.0	1.9	2.2	2.4	2.2	2.2	2.2	1.8	2.0	2.0	1.8	1.8	1.8	1.8	1.8	
28	1.8	2.0	2.0	1.8	2.0	1.9	2.0	2.2	2.0	2.0	2.0	2.0	2.0	2.6	2.4	2.2	2.0	2.0	2.0	1.8	1.8	1.8	1.8	1.8	
29	1.8	1.4	1.3	1.1	E	2.0	2.0	(2.2)	2.3	2.3	2.3	2.4	2.2	2.3	2.2	2.4	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
30	2.0	1.4	1.4	1.4	2.0	2.0	2.0	1.8	2.0	2.0	2.0	2.8	4.0	2.0	2.2	2.2	2.2	2.2	2.2	2.0	2.0	2.0	2.0	2.0	
31																									
Median Value	1.8	1.8	1.8	1.8	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	1.9	1.8	1.8	
Count	29	29	29	29	30	29	24	25	26	25	26	26	26	26	26	26	25	25	25	25	24	24	29	30	

Sweep 1.0 Mc to 11.0 Mc in 1.5 min

Manual

IONOSPHERIC DATA

177°57.0N
Long 139°15.8E

Shibata

135°E Mean Time

f_oF₂

Day	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	3.5	4.1	8.2	8.0P	8.1	4.5	10.7	10.9	10.3	10.1	10.7	10.1	10.7	10.0	10.6	11.3	10.7	11.7	11.1	10.8	9.2	8.9	8.7	A
2	A	10.3	4.2	4.2	7.5	8.4	8.1	8.0	A	A	A	8.8	9.0	10.3	10.5	10.5	10.8	10.4	10.3	9.8	9.4	8.3	8.2	9.1
3	4.5	9.7	4.4	9.0	8.4	8.0	8.1	C	C	C	C	C	C	C	C	C	9.1	9.3	9.8	8.9	8.5	8.0	7.6	7.4
4	8.3	8.4	8.2	7.9	7.0	7.4	8.9	4.6	4.5	4.7	4.6	4.6	4.0	11.2	10.6	A	A	A	8.6	9.0	9.3	S	S	8.0
5	8.2	7.6	7.3	7.3	6.2	6.1	6.0	6.1	7.2	7.0	7.3	7.6	7.9	7.9	8.5	(9.0)	4.4	8.9	8.7	8.8	8.4	4.4	8.9	9.3
6	4.8	4.0	8.7	7.4	7.3	7.7	6.8	5.8	5.5	5.3	5.3	5.4	5.3	5.3	5.3	B	B	5.5	5.8	5.8	6.3	6.6	6.8	6.6
7	6.3	6.3	5.8	5.6	5.8	6.2	7.2	7.6	8.0	8.3	8.4	4.2	4.4	8.8	9.1	9.7	9.8	4.6	10.0	A	A	8.5	8.8	9.0
8	8.8	7.9	7.6	7.3	7.3	7.3	7.6	8.2	8.3	8.8	9.1	9.3	9.7	9.3	9.4	C	C	4.6	4.7	4.4	8.2	8.5	8.4	8.6
9	8.3	8.4	8.2	6.9	7.2	6.6	7.1	8.1	4.2	8.9	4.1	4.0	8.8	8.8	4.1	4.3	8.7	8.0	8.0	8.8	4.1	8.1	7.9	7.7
10	7.6	7.5	7.5	7.2	7.1	7.5	8.8	C	C	4.0	C	C	C	C	C	C	8.3	8.7	8.7	4.2	4.7	4.5	8.8	8.0
11	8.4	8.4	8.3	8.2	8.2	4.2	4.3	8.7	8.0	8.7	8.6	4.1	4.6	4.3	8.8	9.1	4.1	8.8	8.9	4.2	4.5	8.7	8.4	8.3
12	8.1	7.9	7.9	8.1	8.1	8.7	4.6	7.9	7.7	7.9	8.1	4.3	10.2	9.9	10.1	9.9	4.1	4.1	8.8	8.9	4.2	4.5	8.7	8.4
13	7.4	7.5	7.4	7.7	7.4	6.9	6.7	6.4	6.2	6.8	6.3	7.8	7.6	7.3	7.3	7.1	7.7	7.9	7.9	8.1	9.0	4.1	8.0	7.9
14	8.0	7.7	7.7	7.5	8.1	7.6	8.5	8.6	8.3	8.4	8.2	8.2	8.9	8.6	10.4	10.7	10.4	10.5	10.5	4.4	7.7	8.0	7.9	7.8
15	9.1	8.6	8.4	8.0	7.8	7.5	7.9	8.2	8.2	8.1	8.4	18.3	8.2	8.2	8.6	8.6	4.2	4.2	10.4	10.5	4.4	7.7	8.7	8.1
16	8.3	8.6	7.4	6.8	6.7	8.0	4.2	10.6	4.3	4.2	4.5	4.8	10.5	4.8	4.8	10.2	10.6	10.2	9.2	8.3	8.4	8.8	8.4	8.1
17	B	4.4	4.4	8.4	7.9	8.4	8.9	C	C	C	C	C	C	C	C	C	10.1	4.4	4.0	8.7	8.5	8.6	7.8	8.4
18	8.9	8.2	7.2	7.3	7.3	6.7	A	A	A	8.2	7.7	7.7	8.2	8.2	8.3	8.6	4.1	4.0	4.0	7.3	7.5	7.6	7.4	8.0
19	7.9	6.9	6.9	6.7	6.4	6.8	6.8	8.7	7.6	7.5	7.7	8.5	8.0	8.2	7.8	8.8	7.8	7.8	8.8	8.6	8.4	8.5	8.5	8.4
20	7.8	7.6	6.6	6.1	6.0	6.1	7.1	6.7	6.8	A	A	A	A	A	A	6.8	6.6	6.5	6.3	6.9	7.2	7.7	7.5	7.4
21	7.5	7.5	7.8	8.0	8.0	7.6	8.1	8.4	8.7	8.0	7.2	7.3	8.0	8.6	8.9	8.9	8.6	8.7	8.2	8.6	8.8	8.7	9.3	8.5
22	8.9	4.2	4.2	4.0	7.8	6.8	7.2	8.6	10.0	A	A	A	4.5	4.6	4.5	11.3	10.0	4.8	4.8	4.7	4.6	S	S	4.2
23	4.5	8.7	8.6	8.5	4.0	4.6	10.6	8.8	7.9	8.1	4.0	8.7	7.9	7.5	7.6	7.6	7.6	7.9	8.1	7.6	7.3	7.0	7.2	7.8
24	7.7	F	F	F	F	7.8	10.0	C	C	C	C	C	C	C	C	C	A	A	4.0	8.7	8.3	8.2	8.5	8.8
25	8.3	8.5	7.8	6.2	5.9	6.7	4.0	4.6	4.6	4.3	4.4	4.5	4.9	10.1	10.2	10.3	4.0	A	A	A	SF	9.1	8.2	8.3
26	F	F	8.4	7.8	7.2	4.0	4.4	10.8	10.9	4.3	8.4	8.5	8.6	8.8	4.0	8.9	4.0	4.3	4.5	4.2	8.6	8.7	8.6	8.3
27	10.0	10.1	10.3	9.4	4.4	8.6	9.2	4.1	4.6	8.5	8.6	4.0	7.0	8.7	4.2	8.7	8.7	7.4	4.8	4.6	8.2	8.2	8.4	8.7
28	8.4	8.1	7.9	8.6	7.3	7.8	8.6	4.8	8.9	4.0	4.2	4.4	10.2	4.9	10.1	9.9	4.2	4.2	4.2	4.2	8.9	8.0	8.6	9.2
29	4.5	8.9	8.3	8.1	7.7	7.8	8.8	8.1	7.7	7.6	8.2	8.7	4.3	4.1	4.0	4.4	4.7	4.3	8.2	8.9	8.5	8.2	A	A
30	A	F	8.0	6.8	6.5	6.9	7.7	7.6	8.1	7.6	8.2	8.7	8.7	8.7	4.4	4.5	4.8	4.5	4.8	4.5	4.0	8.0	8.4	8.2
31																								
Median Value	8.3	8.4	8.0	7.8	7.3	7.6	8.4	8.8	4.0	8.8	4.2	4.3	4.1	4.3	4.0	8.9	4.1	4.3	4.0	8.9	8.5	8.5	8.4	8.4
Count	26	26	29	29	29	30	29	25	23	23	23	24	25	25	24	23	26	27	29	28	28	28	27	27

Sweep 1.0 Mc to 1.2 Mc in 1.5 min

Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
(Denkitsu-shin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

hp F.

Shibata

Lat. 37°37'0"N
Long 139°15'8"E

IONOSPHERIC DATA

135°E Mean Time

Day	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	420	400	370	440 ^B	390 ^F	340	400	370	340	320	(360)	390	390	400	340	350	370	370	340	320	320	370	400	A
2	A	A	340	390	320 ^F	310	A	350	A	A	A	340	360	350	330	(340)	350	320	330	350	240	350	360	F
3	360 ^F	400 ^F	(310)	340 ^F	410 ^F	380	C	C	C	C	C	C	C	C	C	C	310	330	300	320	320	370	(360)	380 ^S
4	380	350	310	310	340	340	300	310	210	330	370	310	320	350	310	A	A	A	A	A	240	S	S	400 ^S
5	(440)	(420)	400	390	420	350	340	290	370	350	340	(390)	370	390	360	(350)	380	320	360	440	370	370	370	400
6	380	360	330	390	410	410	440	500 ^K	G ^K	G ^K	G ^K	B ^K	G ^K	G ^K	G ^K	B ^K	B ^K	420	350	360	370	(400)	420	410
7	340	360	310	340	320	300	330	320	330	330	330	360	320	330	350	340	330	330	310	A	A	410	(390)	370
8	370	320	320	350	320	280	300	300	300	300	320	310	320	320	310	360	C	C	310	300	300	350	370	350
9	350 ^F	340 ^F	280 ^F	300	310	240 ^F	350	320 ^F	310	370	340	340	360	340	340	320	240	240	310	320	300	310	340	350
10	350	350	320	320	240	240	C	C	C	310	C	C	C	C	C	C	340	310	340	340	350	310	330	350
11	370 ^F	350	320 ^F	310	310	270	350	500	(320)	330	350	360	340	370	330	330	320	320	320	310	290	270	350	310
12	360	370	380	370	320	250	250	240	320	(350)	370	410	340	350	340	340	350	310	330	330	360	340	330	340
13	380	390	380	400	400	310 ^F	320 ^K	390 ^K	400	(400)	(390)	(380)	370	(360)	340	370 ^K	320 ^K	320 ^K	320 ^K	330 ^K	330 ^K	250 ^K	310	330
14	340	340	360 ^F	370	340	270 ^F	280	300	280	280	380	320	360	360	350	330	330	330	300	300	300	320	370	380
15	340	340	330	310	320 ^H	310	A	A	A	A	A	300	320	300	(320)	330	340	340	290	A	A	B	340	360 ^F
16	380 ^F	320 ^F	310	360	350	300	290	310	300	320	360 ^H	370	340	410 ^F	320	320	320	320	290	300	300	280	410 ^F	370
17	B	310 ^F	330 ^F	320 ^F	300 ^F	320 ^F	280	C	C	C	C	C	C	C	C	C	C	300	310	300	320 ^H	310	320	410 ^F
18	330 ^F	300 ^F	320 ^F	(330)	340 ^F	330	A	A	A	A	310	390	370	360	360	340	310	310	300	290	300	(330)	440 ^H	370 ^F
19	330 ^F	320 ^F	(350)	380 ^F	340 ^F	380 ^F	370 ^H	310	340	370	380	310	(330)	340	330	300	300	300	330	320	310	330	370	390
20	310	(310)	310 ^F	340 ^F	360 ^F	300 ^F	320 ^K	A ^K	A ^K	A ^K	A ^K	A ^K	A ^K	A ^K	A ^K	A ^K	A ^K	340 ^K	300 ^K	320 ^K	320 ^K	340	370	370
21	(350)	320 ^F	340 ^F	340 ^F	340 ^F	360 ^F	320	320	300	A	A	A	A	A	370	330	310	A	A	300	310	360	380 ^F	320 ^F
22	310 ^F	330 ^F	310 ^F	270 ^F	300 ^F	340	340	300 ^F	A	A	A	A	A	360	370	340	310	300	300 ^F	300	300	350	S	330
23	310	300	340	380 ^F	370 ^F	340	280	290 ^F	A	A	390	320	380	380	400	(400)	340	340	300	280	310	(340)	(380)	340
24	(300)	F	F	F	F	260 ^F	310	C	C	C	C	C	C	C	C	C	A	A	A	A	AJ	380	350	380 ^F
25	370 ^F	310 ^F	280 ^F	360 ^F	330	320	310	320	290	300	380	370	(380)	390	390	320	320	320	A	A	A	380 ^F	350	360
26	F	F	(330)	300	300	400	370	360	340	310	340	370	340	350	340	340	330	(330)	320	A	370	310	(410)	(400)
27	340 ^F	(350)	300 ^F	300 ^F	290 ^F	320 ^F	(340)	(320)	300	320	300	360	330	350	320	330	360	330	310	280	310	360	380	350
28	350 ^F	350 ^F	310	300	350	370	310	360	290	(340)	380	380	370	370	370	350	340	310	330	300	320	380 ^F	410 ^F	380 ^F
29	310 ^F	330 ^F	350 ^F	360 ^F	320 ^F	330 ^F	330	330 ^F	330	AT	A	360	360	370	400	(380)	360	340	330	360	340	(370)	380	A
30	A	F	360 ^F	380 ^F	350 ^F	350	280	290	300	330	350	360	360	360	360	360	330	320	300	A	A	380	400 ^F	S
31																								
Written Value	370	340	320	340	320	320	310	320	320	310	370	360	360	360	340	340	330	370	370	310	320	370	370	370
Count	26	26	29	29	30	28	23	20	19	20	21	24	25	24	22	22	24	24	25	24	25	27	27	26

Sweep - LQ Mc to LT Mc in 1.5 min

IONOSPHERIC DATA

h_pF₂

135°E Mean Time

Shibata
Lat 37°57.0'N
Long 139°15.8'E

Day	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	(310) ^A	(300) ^A	(300) ^A	270	270	240	240	240	(300) ^A	(300) ^A	(300) ^A	(300) ^A	(300) ^A	(300) ^A	360	300	330	290	(280) ^A	260	250	240	220	230	
2	A	A	(300) ^A	(300) ^A	(300) ^A	240	240	240	A	A	A	360	340	320	(300) ^A	(300) ^A	(290) ^A	(300) ^A	250	240	240	240	240	240	
3	320	340	A	A	(300) ^A	300	300	C	C	C	C	C	C	C	C	C	(300) ^A	(300) ^A	270	250	250	280	290	(300) ^A	
4	(300) ^A	240	270	230	(300) ^A	240	280	280	300	300	330	300	410	300	(300) ^A	A	A	A	A	A	270	250	240	240	
5	300	310	240	240	310	(340)	240	240	370	360	380	(380)	370	360	360	(330) ^A	300	280	230	240	260	280	250	250	
6	(300) ^A	280	270	230	280	350	400	500	C	C	C	C	C	C	C	C	B	420	330	300	280	A	A	320	
7	(300) ^A	270	240	230	280	(300) ^A	(300) ^A	280	(300) ^A	320	340	300	300	330	320	300	290	240	270	A	A	A	A	300	280
8	240	280	260	230	250	270	240	240	240	270	290	300	300	300	320	C	C	280	240	220	220	250	260	(300) ^A	
9	(300) ^A	(300) ^A	240	250	240	(280)	200	200	(300) ^A	(300) ^A	310	310	340	330	330	320	260	230	270	260	310	320	340	350	350
10	350	330	330	320	290	270	270	270	C	C	C	C	C	C	C	C	340	310	240	340	350	310	300	(350) ^A	
11	300	(300) ^A	(240)	270	250	240	240	230	(280)	320	300	330	320	300	310	310	290	260	250	250	230	220	260	250	
12	270	240	280	280	250	210	220	240	200	(270)	330	410	310	320	310	300	310	300	270	260	300	270	270	220	
13	300	300	290	320	240	280	310	270	390	390	380	560	360	(330) ^A	240	300	300	300	290	260	(300) ^A	(250)	280	300	
14	300	280	280	270	270	220	220	210	260	270	280	310	330	350	310	310	300	280	270	220	230	240	230	(240) ^A	
15	250	250	270	250	240	(240)	A	A	(320) ^A	A	A	300	(320)	330	300	300	300	280	S	A	B	320	320	240	
16	280	270	220	220	240	270	260	260	280	290	300	330	340	400	300	300	300	270	240	220	260	280	280	280	
17	240	250	250	260	250	220	220	C	C	C	C	C	C	C	C	C	280	250	260	230	250	260	260	(350) ^A	
18	270	(300)	270	210	260	270	A	A	A	A	300	380	370	360	350	340	300	300	260	240	270	260	260	260	
19	240	260	250	(300)	240	260	360	270	320	370	310	(320)	330	330	330	290	280	310	(300)	280	240	270	(300) ^A	260	
20	280	320	250	260	(300) ^A	280	300	360	(370)	A	A	A	A	A	A	350	400	340	260	260	240	260	260	280	270
21	280	280	(300)	310	310	250	270	280	260	A	A	A	A	A	360	310	A	A	A	A	280	260	(300) ^A	260	290
22	210	280	250	220	(300)	300	310	270	A	A	A	A	250	310	320	290	280	280	240	240	250	(260)	280	280	
23	270	(240)	(300)	(300)	(300)	250	250	250	(300)	(380)	370	320	370	350	380	340	330	330	290	260	240	280	300	(320) ^A	
24	260	300	300	290	(300)	290	290	C	C	C	C	C	C	C	C	C	A	A	A	A	240	240	300	(320) ^A	
25	300	270	220	250	240	280	260	230	260	(300)	370	310	(350)	390	(350)	(300)	320	A	A	A	A	310	310	240	
26	(330)	240	250	230	250	270	280	280	280	220	320	360	330	320	330	330	310	(300)	280	250	220	(400)	(300)	300	
27	290	(300) ^A	240	220	200	210	240	290	280	280	270	340	310	330	310	320	330	300	(310)	240	210	260	290	280	
28	280	280	240	260	280	220	220	270	260	(320)	370	370	370	340	320	320	310	300	290	260	240	220	(250)	320	
29	370	280	290	300	240	290	(310)	320	A	A	A	360	340	340	290	350	360	320	310	290	(330)	240	A	A	
30	A	260	280	240	(300)	230	220	230	260	250	350	300	340	350	320	340	300	290	A	A	SA	S	230	S	
31																									
Median Value	280	270	260	240	270	270	280	280	300	340	330	340	330	340	330	310	300	300	270	250	240	270	290	290	
Count	28	29	29	29	30	28	24	22	21	20	21	24	25	24	23	25	26	25	26	25	24	23	27	28	

Sweep 1.0 Mc to 11.0 Mc in 1.5 min

Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
(Denkirisushun Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

f_oF₁

Lat. 37°57.0'N
Long. 139°15.8'E

Shibata

135°E Mean Time

Day	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	Q	Q	L	A	C	L	A	A	L	L	L	A	A	Q					
2						Q	A	A	A	A	A	A	L	A	A	A	A	A	A	A	A				
3						L	A	C	C	C	C	C	C	C	C	C	C	A	A	A	A				
4						L	L	L	L	A	B	L	(5.6) ^B	A	A	A	A	A	A	A	A				
5						3.5	3.8	4.0	4.6	5.2	4.9	A	A	A	A	A	A	L	L	Q	A				
6						3.3	3.9	4.4	4.6	4.6	4.7	4.8	5.0	4.8	(4.9) ^B	(4.8) ^B	4.7	A	L	L					
7						L	A	A	A	A	5.6	5.4	5.4	5.7	5.6	5.0	4.8	L	L	A	A				
8						Q	L	4.2 ^J	5.0	A	A	5.4	A	L	5.5	C	C	L	L	Q	A				
9						L	L	4.7	A	A	A	A	A	5.4	5.4 ^H	L	L	L	L	L	L				
10						Q	Q	C	C	A	C	C	C	C	C	C	5.0	L	L	L	L				
11						Q	L	L	(5.1) ^L	5.4	5.3	5.1 ^J	5.3	5.3	5.1 ^J	A	L	L	L	Q					
12						Q	Q	5.2	(5.5) ^L	5.8	5.5	5.3	5.4	(5.0) ^L	L	L	L	A	A	A					
13						Q	AF	L	5.2	5.3	5.3	5.2	(5.0) ^L	(4.7) ^L	5.0	4.5	4.4	A	A	L					
14						Q	A	Q	L	A	6.0 ^B	5.3	5.4 ^F	5.4	5.3 ^B	5.2	4.7	L	L	Q					
15						A	A	A	A	A	A	5.5	A	A	A	5.3	4.8	A	A	A					
16						L	4.4	L	C	C	A	A	A	A	(5.5) ^F	A	A	4.7	A	A	A				
17						Q	Q	C	C	C	C	C	C	C	C	C	A	A	A	A	A				
18						A	A	A	A	A	A	A	A	A	5.5	5.2	5.1	5.0	A	A	L				
19						L	L	4.5	5.1	5.8	5.8	A	A	A	A	5.3 ^A	AF	L	A	A	AF				
20						A	4.4	A	A	A	A	A	A	A	A	5.7	A	A	A	A	A				
21						L	L	A	4.6	A	A	A	A	A	(5.5) ^J	5.7	A	A	A	A	A				
22						L	L	AF	A	A	A	A	A	A	5.5 ^A	5.4	(4.9) ^L	4.4	L	Q					
23						Q	AF	A	A	A	(5.6) ^L	(5.5) ^L	(5.3) ^L	5.1	(5.2) ^L	(5.2) ^L	4.8	4.4	3.8	Q					
24						L	A	C	C	C	C	C	C	C	C	C	C	A	A	A	A				
25						A	L	A	A	A	AF	5.6	A	A	A	A	A	A	A	A	A				
26						A	A	A	A	A	A	5.5 ^L	5.5	5.1	5.2	5.1 ^L	4.9	(4.3) ^L	(3.7) ^L	3.0					
27						Q	L	A	A	A	(5.6) ^L	5.4 ^A	5.7 ^J	5.4 ^B	5.2 ^L	5.2	4.9 ^L	4.4	A	A					
28						Q	Q	A	A	A	(6.1) ^L	6.0 ^A	A	A	A	5.0	L	L	L	A					
29						A	L	A	A	A	A	A	A	A	A	A	A	A	A	A	A				
30						Q	A	L	5.0	L	A	A	5.5 ^L	A	A	5.3	L	L	L	A	A				
31																									
Median Value								4.5	5.0		5.6	5.5	5.4	5.4	5.4	5.2	4.9	4.4							
Count						2	4	6	7	4	10	13	13	14	16	13	12	6	3						

Sweep 1.0 Mc to 11.0 Mc in 1.5 min

Manual

IONOSPHERIC DATA

h_{F1}

Shibata
Lot 37370N
Long 139°15'8"E

135°E Mean Time

Day	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	Q	Q	Q	230	A	C	A	A	A	240	A	230	A	A	Q				
2					Q	Q	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
3					A	230	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C			
4					220	210	210	210	(220)	230	200	220	220	A	A	A	A	A	A	A	A			
5					250	210	230	(220)	200	A	A	A	A	A	A	A	230	220	Q	Q				
6					A	A	A	A	A	B	230	240	210	250	B	A	270	(250)	230	A				
7					220	A	A	A	A	A	200	(210)	220	200	200	200	250	A	A	A				
8					Q	210	(220)	220	A	A	190	C	A	A	A	C	C	200	230	Q				
9					210	210	260	A	A	A	A	A	A	A	A	220	B	B	210	230	240			
10					S	Q	C	C	A	C	C	C	C	C	C	C	190	A	A	A				
11					Q	220	A	A	(250)	(180)	200	200	200	200	A	A	A	A	A	Q				
12					Q	Q	200	Q	A	(230)	(220)	200	210	B	B	A	A	A	A	A				
13					Q	AF	A	A	(280)	240	A	A	A	A	C	200	210	220	250	(250)	240			
14					Q	A	Q	220	1230	230	200	230	230	A	A	A	210	210	210	250	Q			
15					A	A	A	A	A	A	A	220	220	A	A	A	200	A	A	A	A			
16					230	(230)	230	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
17					Q	Q	C	C	C	C	C	C	C	C	C	C	A	A	A	A	A			
18					A	A	A	A	A	A	A	A	A	A	A	A	(230)	A	A	A	(210)			
19					240	220	200	(210)	220	A	A	A	A	A	A	A	A	A	A	A	A			
20					A	A	A	A	A	A	A	A	A	A	A	A	(200)	A	A	A	A			
21					A	230	(220)	210	A	A	A	A	A	A	A	A	A	A	A	A	A			
22					220	(200)	AF	A	A	A	A	A	A	A	210	(210)	200	(210)	210	230	Q			
23					Q	AF	A	A	A	A	A	200	200	A	A	A	A	200	220	220	Q			
24					260	A	C	*C	C	C	C	C	C	C	C	C	C	A	A	A	A			
25					A	200	A	A	A	A	A	(230)	A	A	A	A	A	A	A	A	A			
26					A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
27					Q	210	A	A	A	A	A	A	A	A	210	230	200	290	A	A	A			
28					Q	Q	A	A	A	A	A	B	A	A	A	A	A	260	(220)	230	A			
29					A	260	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
30					Q	A	210	240	220	A	A	A	A	A	A	A	200	210	220	A	A			
31																								
Mean Value					230	210	210	220	220	230	210	210	210	210	200	210	220	220	230	230				
Count					8	13	9	8	7	7	7	8	10	8	9	8	15	12	10	10	4			

Sweep 1.0 Mc to 17.0 Mc in 1.5 min Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
 (Denki-tsushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

Fe

Lat 37°51.0'N
 Long 139°15.8'E

Shibata

Day	135°E Mean Time																																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25															
1						A	A	3.2	(3.5) ^A	3.7	(3.8) ^C	3.8	3.7	(3.8) ^A	3.8	A	A	A	A	3.6	(3.7) ^B	2.2	B																		
2						A	A	3.0	3.3	3.6	3.5	A	A	A	A	C	C	C	C	C	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A					
3						A	A	A	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				
4						A	A	A	A	3.8	3.7	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
5						2.0	2.4	3.1	3.4	3.6	3.8	4.0	B	B	B	B	B	B	B	B	3.2	(3.0) ^A	2.5	1.9																	
6						1.8	2.7	3.0	A	B	B	B	B	B	B	B	B	B	B	B	(3.3)	2.9	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
7						2.1	3.0	3.1	3.5	B	B	B	B	B	B	B	B	B	B	B	(3.4)	3.4	2.9	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A		
8						A	2.6	3.5	(3.5) ^B	A	B	B	B	3.6	A	B	C	C	C	C	3.0	(2.4) ^A	1.7																		
9						1.8	(2.5) ^A	3.1	3.6	A	B	A	A	A	B	B	B	B	B	B	3.5	(2.9) ^A	2.5	1.9																	
10						A	A	C	C	3.6	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			
11						2.1 ^F	2.7	3.0	3.3	A	A	A	B	B	B	B	B	B	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A		
12						2.1	2.7	3.0	A	A	3.8	A	B	B	B	B	B	B	B	(3.3)	(3.1) ^A	(2.4) ^A	B																		
13						2.0 ^A	(2.7) ^A	3.3	3.7	4.0	4.1	A	C	C	B	B	B	B	B	(3.7) ^B	3.5	3.3	2.5	B																	
14						(2.1) ^S	(2.7) ^A	3.2	(3.4) ^A	(3.6) ^B	B	B	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
15						1.9	2.6 ^F	3.3	3.4	A	B	B	B	B	B	B	B	B	B	B	3.5	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
16						A	2.9 ^F	(3.2) ^A	3.4	A	A	A	A	B	A	B	B	B	B	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
17						A	2.9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
18						1.6 ^B	2.9 ^F	3.2	3.3	3.5	3.8	B	B	B	B	B	B	B	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
19						A	2.6	(2.9) ^A	3.2	3.6	B	B	B	A	A	A	A	A	A	3.9	3.5	(3.2) ^A	2.8	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
20						A	A	3.2	3.4	3.7	3.9	4.0	3.8	(3.7) ^A	3.5	3.4	3.3	3.1	2.3	B																					
21						A	2.8 ^F	3.2	3.4	B	A	A	B	A	A	B	A	B	3.4	3.1	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
22						A	A	A	A	A	A	A	A	A	A	A	A	A	A	3.3	3.1	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
23						2.2 ^F	2.7	3.1	3.5 ^F	3.7	3.7	3.7	3.7	3.7	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
24						2.0	2.8	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	C	C		
25						A	(2.7) ^A	A	A	3.7	(3.7) ^B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
26						A	2.8	(3.2) ^F	3.5	3.6	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
27						1.9 ^F	A	3.2	3.4	3.7 ^B	A	A	A	A	A	A	A	A	A	3.8	(3.6) ^A	3.4	3.2	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
28						1.8	2.8	3.3	3.6	3.6	3.6	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
29						A	3.0	3.2	3.5 ^B	3.7	4.0	3.9	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
30						1.9	2.9	3.2	3.7	3.8	(3.8) ^B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
31																																									
Mean Value	2.0	2.7	3.2	3.4	3.7	3.8	4.0	-	-	3.8	3.6	3.3	3.1	2.4	1.9																										
Count	15	22	23	21	18	13	6	3	4	7	8	16	17	13	6																										

Sweep - 11.0. Mc to 11.70 Mc in 1.5 min

Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
 (Denki-sanshin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

h'E

IONOSPHERIC DATA

Shibata
 Lat. 37°57.0'N
 Long. 139°15.8'E

135°E Mean Time

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1						A	A	110	110	100	(100) ^C	100	100	110	110	100	100	110	110	110	B			
2						A	A	110	110	100	100	A	A	A	A	A	A	A	A	A	A			
3						A	A	A	C	C	C	C	C	C	C	C	C	C	C	C	A			
4						A	A	A	A	100	100	A	A	A	A	A	A	A	A	A	A			
5						100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	B			
6						120	110	100	(100) ^A	(100) ^F	(100) ^F	(100) ^F	(100) ^F	(100) ^F	(100) ^F	(100) ^F	(100) ^F	(100) ^F	(100) ^F	A				
7						110	100	100	(100) ^B	(100) ^B	(100) ^B	(100) ^B	(100) ^B	(100) ^B	(100) ^B	(100) ^B	(100) ^B	(100) ^B	(100) ^B	A				
8						A	110	100	100	(100) ^A	(100) ^A	100	100	100	100	100	100	100	100	A				
9						100	(100) ^A	100	100	(100) ^A	(100) ^A	A	A	B	(100) ^B	100	100	110	110	100				
10						A	A	C	C	C	C	C	C	C	C	C	C	C	C	A				
11						100	100	100	100	A	A	100	100	100	100	100	100	100	100	A				
12						100	100	100	A	A	100	100	100	100	100	100	100	100	100	A				
13						120 ^A	(110) ^A	100	100	100	100	100	A	C	(100) ^B	100	100	100	100	B				
14						100 ^S	(100) ^A	100	(100) ^A	100	B	A	100	A	A	A	B	100	100	B				
15						120	100	100	100	(100) ^A	100	100	100	100	100	100	100	100	100	A				
16						A	100 ^F	(100) ^A	100	A	A	A	B	A	A	100	100	100	A	A				
17						A	100	C	C	C	C	C	C	C	C	C	C	C	C	A				
18						B	110	100	100	100	100	100	100	100	100	100	100	100	100	A				
19						A	100	(100) ^A	100	100	100	110	A	A	100	100	100	100	100	A				
20						A	A	100	100	100	100	100	100	100	100	100	100	100	100	A				
21						A	100	100	100	100	100	100	100	100	100	100	100	100	100	B				
22						A	A	A	A	A	A	A	A	A	A	B	100	100	100	A				
23						120	100	100	100	100	100	100	100	A	A	A	100	100	100	A				
24						120	110	C	C	C	C	C	C	C	C	C	C	100	100	A				
25						A	(100) ^A	A	A	100	100	A	A	A	A	A	A	100	100	A				
26						(100) ^A	100	(100) ^A	100	100	A	A	A	A	A	A	A	100	100	A				
27						A	A	100	100	100	A	A	A	100	100	100	100	100	A	A				
28						120 ^A	100	100	100	100	100	A	B	A	A	100	100	100	100	A				
29						A	100	100	100	100	100	100	A	A	100	100	100	100	100	A				
30						120	100	100	100	100	100	A	A	A	A	100	100	100	100	A				
31																								
Median Value						120	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Count						14	22	23	22	23	20	15	11	12	18	14	15	18	12	2				

Sweep—1.0 Mc to 17.0 Mc in 15 min

Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
 (Denki-tsushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

Lot 37570N
 Long 139158E

Station
 Shibata

Observer
 fcs

135° E Mean Time

Day	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	2.7	2.9	4.0	2.8	3.2	3.1	3.9	4.5	5.4	(8.9) ^B	C	6.2	(10.6) ^B	10.3	5.5	5.2	5.0	5.7	10.5	2.4	4.5	4.2	10.0	10.7	
2	1.1	1.4	4.5	7.2	6.6	(4.5) ^B	4.8	7.9	(14.0) ^B	(14.8) ^B	(12.4) ^B	(14.6) ^B	9.4	7.3	7.2	(12.5) ^B	(11.2) ^B	7.4	5.0	2.8	4.0	3.8	3.0	1.4	
3	5.4	8.8	11.5	8.6	6.6	4.5	4.5	C	C	C	C	C	C	C	C	6.1	6.1	5.6	(6.4) ^B	(5.4) ^B	3.4	4.3	3.6	2.6	
4	2.7	3.7	3.5	2.7	3.2	4.0	3.6	3.9	5.1	10.1	4.7	5.1	12.7	9.0	11.3	(11.9) ^B	(14.3) ^B	(14.6) ^B	10.9	12.1	(7.1) ^B	(3.5) ^B	(4.6) ^B	2.8	
5	2.7	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.7	5.2	6.1	4.6	4.5	6.3	(10.5) ^B	(12.3) ^B	5.2	2.8	2.8	B	2.5	2.2	3.5	5.8	
6	3.9	1.8	2.5	1.7	2.4	4.3	5.8	5.7	6.1	B	4.1	4.4	4.4	B	4.5	4.1	4.5	5.7	4.6	2.8	3.0	6.1	6.0	3.1	
7	2.1	1.8	2.6	1.1	3.1	5.6	6.7	6.7	12.9	5.7	6.1	6.1	6.1	B	6.1	6.1	(5.7) ^B	9.6	(6.8) ^B	1.3	1.5	7.9	4.5	7.5	
8	2.9	3.4	3.1	2.8	1.4	2.4	3.8	3.8	5.1	6.4	7.1	6.1	7.7	6.5	5.1	C	C	5.2	3.8	2.9	G	2.5	7.0	4.6	
9	7.4	(6.5) ^B	7.3	3.5	5.1	4.2	5.2	(5.1) ^B	6.7	7.8	7.4	7.3	8.0	5.6	(4.1) ^B	4.8	B	3.6	3.5	2.9	3.5	4.8	4.5	3.1	
10	2.3	2.9	1.4	1.1	2.7	3.4	4.0	C	C	C	C	C	C	C	C	C	C	4.5	3.4	3.7	3.1	3.2	3.1	5.3	
11	3.6	4.9	3.0	3.8	2.2	3.7	3.5	5.4	(13.2) ^B	8.8	5.1	B	5.0	(7.0) ^B	6.8	6.0	(6.8) ^B	(6.8) ^B	G	2.8	G	3.2	3.9	2.8	
12	3.6	2.7	2.7	1.6	2.7	2.6	2.9	3.8	3.8	(13.1) ^B	7.1	5.3	5.9	4.0	3.2	3.5	5.6	5.4	5.1	4.3	4.6	2.8	3.1	3.4	
13	3.0	2.9	1.4	1.0	2.7	2.9	3.7	5.5	5.1	5.6	6.2	7.6	7.1	7.1	C	B	3.8	5.8	(7.0) ^B	7.2	8.3	5.1	2.5	G	
14	2.6	G	1.1	1.1	1.1	3.6	3.8	4.0	5.4	7.8	6.6	6.1	7.1	9.4	6.1	5.5	B	B	3.8	2.9	(2.4) ^B	3.1	4.7	4.3	
15	(2.7) ^B	3.4	(3.5) ^B	2.9	2.9	6.2	(11.6) ^B	(11.5) ^B	(12.2) ^B	8.5	(10.5) ^B	(13.5) ^B	(14.2) ^B	(13.5) ^B	(11.6) ^B	(8.4)	6.6	6.2	6.8	(4.4) ^B	7.6	(5.3) ^B	5.7	4.4	(4.1) ^B
16	2.5	2.6	3.0	2.7	2.7	3.4	5.1	5.1	7.1	13.7	(12.3) ^B	12.4	11.1	(14.3) ^B	14.2	5.4	7.1	5.7	3.0	3.5	4.7	7.4	5.1	6.1	
17	5.6	5.2	5.0	3.9	3.0	3.8	4.4	C	C	C	C	C	C	C	C	C	C	4.1	6.4	5.4	(4.0) ^B	3.4	4.2	9.2	
18	9.3	7.1	(7.1) ^B	(9.2) ^B	4.7	3.4	(9.4) ^B	(12.8) ^B	11.3	(13.8) ^B	(9.4) ^B	6.5	6.7	5.0	(5.1) ^B	5.2	(6.9) ^B	5.3	4.1	2.9	3.7	4.2	(4.4) ^B	3.9	
19	2.7	2.6	2.4	4.3	3.1	3.6	3.7	(5.2) ^B	4.6	5.5	7.4	(13.5) ^B	(14.2) ^B	9.5	8.5	18.0	9.5	7.3	9.5	16.2	5.1	3.7	(3.5) ^B	2.8	
20	5.2	10.1	11.7	13.7	10.8	5.6	4.3	8.3	7.9	(12.9) ^B	14.1	(12.3) ^B	13.2	(10.0) ^B	(10.5) ^B	G	5.4	5.6	(4.5) ^B	5.6	(5.2) ^B	(7.2) ^B	(6.4) ^B	5.4	
21	3.4	3.0	3.7	11.5	9.2	4.3	5.5	7.2	4.6	9.0	7.9	14.2	(14.4) ^B	7.6	7.7	7.9	(11.3) ^B	(12.1) ^B	7.2	(9.0) ^B	7.2	9.0	7.9	9.2	
22	8.9	4.1	3.5	4.6	5.6	4.7	4.8	(13.8) ^B	13.4	D	14.3	13.2	8.5	G	7.2	5.3	9.2	10.0	5.1	G	7.2	3.2	2.9	5.3	
23	(5.2) ^B	(9.4) ^B	10.8	(9.7) ^B	10.1	3.8	5.4	5.5	8.2	(13.8) ^B	9.4	9.3	14.4	11.5	9.7	9.9	4.1	4.1	3.3	3.1	2.5	3.1	2.0	5.9	7.9
24	5.3	7.4	6.3	9.3	(5.6) ^B	2.9	4.5	C	C	C	C	C	C	C	C	C	1.3	(12.8) ^B	(10.3) ^B	(10.9) ^B	9.1	5.8	4.0	4.0	
25	4.4	4.6	4.2	5.3	4.3	4.2	4.8	6.4	7.3	11.1	8.2	13.3	(12.2) ^B	(11.4) ^B	(12.9) ^B	10.1	10.6	12.9	15.0	13.2	5.7	5.2	2.8	2.1	
26	6.2	4.6	B	4.0	4.7	5.5	5.4	7.2	7.6	8.5	7.4	9.2	(5.0) ^B	B	B	5.2	4.1	C	3.8	2.7	2.8	5.7	3.6	3.2	
27	3.4	2.8	2.9	2.8	2.6	3.2	4.2	5.5	6.4	6.6	6.7	6.2	7.1	6.3	5.2	6.6	6.5	6.6	4.5	3.9	3.1	G	2.9	G	
28	3.8	4.8	3.1	4.4	3.6	2.7	3.5	5.6	6.2	10.9	9.0	8.9	5.2	7.5	8.9	7.1	6.9	4.7	5.0	3.9	3.9	13.6	9.8	7.8	
29	10.8	4.7	8.9	6.8	5.2	4.5	5.4	7.8	7.4	3.1	(12.8) ^B	13.4	12.3	7.2	9.2	10.1	11.4	9.3	8.7	7.7	7.8	10.3	12.8	13.8	
30	12.8	1.4	3.8	3.7	3.5	2.7	5.7	5.2	5.0	6.1	7.3	7.2	6.4	6.8	7.3	B	B	6.1	(19.5) ^B	7.6	(4.3) ^B	(5.7) ^B	4.5	5.7	
31																									
Median	3.7	3.9	3.5	3.6	3.2	3.7	4.8	5.7	6.9	8.9	7.6	9.1	8.5	7.4	7.3	5.8	6.5	6.0	5.1	3.0	4.0	4.3	4.5	4.5	
Q-ant	3.0	3.0	2.9	3.0	3.0	3.0	2.9	2.6	2.6	2.6	2.5	2.4	2.5	2.4	2.3	2.3	2.5	2.8	2.9	2.0	3.0	3.0	3.0	3.0	

IONOSPHERIC DATA

F₂-M3000

Lat. 37°57'0N
Long 139°15'8"E

Shibata

135°E Mean Time

Day	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	2.5	2.7	2.8	2.4 ^P	[2.6] ^C	2.8	2.6	2.7	2.8	2.9	[2.8] ^C	2.7	2.7	2.7	2.6	2.8	2.8	2.9	2.9	3.0	2.9	2.7	2.7	2.8	A
2	A	A	2.9 ^F	2.7 ^F	3.0 ^F	3.1 ^F	2.9	2.8	A	A	A	2.7	2.8	2.9	2.9	J	2.7	3.0	3.1	3.0	3.1	2.7	2.8	2.8	2.8 ^F
3	J ^F	J ^F	A ^F	J ^F	J ^F	2.7	2.4	C	C	C	C	C	C	C	C	C	2.8	2.9	3.1 ^A	3.0	2.9	2.7	2.9 ^F	2.8 ^F	
4	2.8	2.8	3.0	3.0	2.8	3.0	3.0	3.0	3.1	2.9	2.7	2.9	2.5	2.8	3.1	A	A	A	2.8	[2.9] ^A	3.1	S	S	2.7	
5	2.5	2.6	2.6	2.7	2.7	2.9	2.5	3.2	2.9	2.9	2.6	[2.7] ^C	2.8	2.8	2.8	[2.8] ^A	2.9	2.9	2.8	2.8	2.7	2.7	2.7	2.6	
6	2.6	2.7	2.9	2.7	2.5	2.5	2.4	2.4	2.3	2.2	G ^N	B ^N	G ^N	G ^N	B ^N	B ^N	B ^N	2.7 ^K	2.9 ^K	2.8 ^K	2.7 ^K	B ^K	J ^F	2.6	
7	2.7	2.8	3.2 ^F	2.9 ^F	3.2	3.0	3.0	3.0	[3.0] ^A	3.0	2.8	3.0	2.9	2.8	2.9	2.8	2.8	2.9	J	A	A	2.6 ^F	[2.7] ^F	2.9	
8	2.7	3.0	3.0	3.0	3.2	3.1	3.0	3.0	3.0	2.9	3.1	3.0	3.0	3.0	2.9	C	C	3.0	3.0	3.1	2.8	2.8	2.8	2.8	
9	2.9 ^F	2.9 ^F	3.1 ^F	2.9 ^F	3.1 ^F	3.1 ^F	2.9	3.0	3.0	2.8	2.8	2.8	2.8	2.8	2.8	C	C	2.9	2.9	3.0	3.0	2.9	2.9	2.8	
10	2.8	2.9	3.0	3.0	3.2	3.0	2.9	C	C	2.9	C	C	C	C	C	C	2.9	2.9	2.8	2.8	2.9	3.1	3.0	2.9	
11	2.7	2.8	J	3.0	3.2	3.0	3.2	3.0	[2.8] ^A	3.0	2.8	2.8	2.9	2.9	2.9	2.9	2.9	3.0	2.7	2.9	2.9	3.1	3.2	2.8	3.1
12	2.9	2.7	2.8	2.8	3.0	3.3	3.4	3.2	2.9	[2.7] ^A	2.6	2.5	2.8	2.8	2.8	2.9	2.7	2.9	2.9	2.8	2.8	2.8	2.8	3.0	2.8 ^P
13	2.8	2.6	2.7	2.6	2.7	3.0 ^F	2.9 ^F	2.7 ^K	2.7 ^K	2.9 ^K	[2.8] ^A	2.8 ^K	[2.8] ^A	2.9 ^K	[2.8] ^A	2.8 ^K	2.9 ^K	2.9 ^K	2.9 ^K	2.8 ^S	2.8 ^S	2.8 ^F	[3.2] ^S	2.7	2.7 ^P
14	2.7	2.8	2.8 ^F	2.8	3.0	3.2	3.1	3.1	3.1 ^B	3.3	2.7 ^F	3.0	2.8	2.8	2.8	2.8	2.9 ^P	3.3	3.2	3.1	3.1	3.0	3.0	2.8 ^H	2.8
15	2.9	2.8	3.0	3.0	2.9 ^H	3.0	2.9 ^H	A	A	A	3.0 ^H	A	3.0 ^H	3.0	3.0	2.9	2.8	3.2	S	J	B	2.8	J ^F	J ^F	
16	J ^F	J ^F	3.0	2.7	2.8	3.0 ^F	2.9 ^F	3.2	C	C	C	C	C	C	3.0	3.0	2.9	3.2	3.0	3.0	2.7	2.7 ^F	2.4 ^F	B	
17	B	J ^B	J ^B	J ^B	3.0 ^F	2.9 ^F	3.2	C	C	C	C	C	C	C	C	C	3.1	3.0	3.0	2.9	2.9	3.0	3.0	2.6 ^F	
18	2.8 ^F	3.1 ^F	2.9 ^F	[2.8] ^F	3.0	A	A	A	A	A	3.0	2.8	2.7	2.9 ^B	(2.9) ^B	2.9	3.0	3.1	3.2	3.0	(2.7) ^F	2.5 ^F	F	FS	
19	2.9 ^F	[2.7] ^S	[2.7] ^S	2.7 ^F	2.6	2.8	(2.7) ^F	3.2	3.0	2.8	2.8	3.0	[3.0] ^A	2.9	3.0	3.0	3.2	2.9	3.0	3.1	2.9	2.7	2.9	2.8 ^V	
20	3.0	J ^A	J ^K	2.7 ^F	3.0 ^F	3.1 ^F	3.0 ^F	2.8 ^K	2.9 ^K	A ^K	A ^K	A ^K	A ^K	A ^K	A ^K	3.1 ^K	2.8 ^A	3.0 ^K	3.1 ^K	2.9 ^K	2.9 ^K	2.7	2.8	2.7	
21	S	J ^F	J ^F	J ^F	J ^F	3.1 ^F	3.0	3.0	3.1	[2.8] ^A	(2.5) ^A	(2.2) ^A	(2.5) ^A	2.7	2.9	3.0	A	A	3.0	2.9	2.8	2.8	2.9	2.9 ^E	
22	2.8 ^F	J ^F	J ^F	J ^F	3.0 ^F	2.8	3.0 ^F	3.0 ^F	A	A	A	A	3.3	2.7	2.8	3.1	3.1	3.1 ^F	3.1	3.1	2.9	S	S	2.9	
23	3.2	2.9	2.9	2.5 ^F	2.8	3.3	3.1 ^F	3.1 ^F	2.6	2.6 ^A	2.7	2.9	(2.5) ^F	2.8	2.9	2.8	2.9	3.1	3.2	3.0	2.8	2.7	(2.8) ^S	2.8	
24	(3.1) ^S	F	F	F	F	F	2.9	C	C	C	C	C	C	C	C	C	A	A	A	A	J	2.8	(2.7) ^F	2.7 ^F	
25	2.7 ^F	3.0 ^F	3.2 ^F	2.7 ^F	2.9	2.9 ^B	2.9	2.9	3.1	3.1	2.7	2.6	2.8	2.8	(2.8) ^A	2.9	(3.0) ^A	A	A	A	S ^F	3.1	2.8 ^F	2.8	
26	F	F	(2.9) ^F	3.2	3.0	2.5	2.7	3.1	3.0	3.0	2.8	2.8	2.8	2.9	2.8	2.8	2.9	(2.9) ^C	3.0	3.1	2.9	(2.6) ^S	2.6 ^S	S ^F	
27	S ^F	S ^F	3.0 ^F	2.9 ^F	3.0 ^F	2.9 ^F	2.8 ^F	2.8 ^F	3.1	3.0	3.2	2.8	2.9	2.8	3.0	2.9	2.7	2.9	3.0	3.2	2.9	2.7	2.7	2.7 ^F	
28	2.7 ^F	2.8 ^F	3.0	3.1	2.8	3.2	3.0	3.2	3.0	[2.8] ^A	2.7	2.8	(2.6) ^F	2.8	2.8	2.7	2.8	3.0	2.8	3.0	3.0	2.7 ^F	J ^F	J ^F	
29	J ^F	2.8 ^F	J ^F	J ^F	J ^F	2.7 ^F	2.9 ^F	3.0	2.9	J	A	2.8	2.8	2.8	2.6	[2.7] ^F	2.9	2.9	2.9	2.8	2.9	2.6	A	A	
30	A	F	J ^F	J ^F	2.9 ^F	2.7	2.3	3.1	3.3	2.9	2.9	2.8	2.8	2.8	2.8	2.8	2.9	3.0	[3.0] ^A	3.1	AS	J	2.6 ^F	2.8	
31																									
Median Value	2.8	2.8	2.9	2.8	2.9	2.9	2.9	2.9	2.9	2.9	2.8	2.8	2.8	2.8	2.9	2.9	2.9	2.9	2.9	3.0	2.9	2.9	2.8	2.8	
Count	21	19	21	24	25	29	28	24	22	22	21	22	25	24	24	22	25	26	26	26	25	26	23	23	

Sweep 1.0 Mc to 15.0 Mc in 1.5 min

Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
 (Denki-tsushin Kenkyujo) Gotarada, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

f_F min

Shibata
 Lat. 37°37.0'N
 Long. 139°15.6'E

135°E Mean Time

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	A	A	A	1.3	(1.6) ^A	1.8	2.7	3.3	3.7	A	C	A	A	A	A	A	A	A	A	1.7	A	A	A	A
2	A	A	A	A	A	2.3	2.8	A	A	A	A	C	C	C	C	C	A	A	A	A	A	A	1.5	A
3	A	A	A	A	A	A	2.8	C	C	C	C	C	C	C	C	A	A	A	A	A	A	A	1.5	A
4	A	A	A	1.2	(1.8) ^A	2.3	3.0	A	A	A	A	4.3	A	A	A	A	A	A	A	A	A	A	A	A
5	A	A	A	A	1.4	2.3	A	A	A	A	A	A	A	A	A	A	3.7	2.6	2.7	1.9	1.5	1.5	A	A
6	A	E	E	E	1.4	A	A	A	A	4.3	4.3	4.5	4.4	4.3	4.8	3.9	A	A	A	2.2	A	A	A	A
7	(1.4) ^A	E	1.1	E	1.3	2.1	A	A	A	A	A	A	4.6	4.3	4.4	4.0	4.1	A	A	A	A	A	A	A
8	A	A	1.3	1.3	1.3	(2.2) ^A	3.0	A	A	A	A	4.3	A	A	4.3	C	C	A	A	1.7	1.4	1.5	A	A
9	A	A	A	A	1.6	2.0	(2.7) ^A	3.3	A	A	A	A	A	A	4.1	4.2	4.4	3.2	2.6	2.0	A	A	A	A
10	A	E	1.4	1.1	1.5	2.3	A	C	C	A	G	C	C	C	C	C	3.5	A	A	A	1.7	A	A	A
11	A	A	A	A	E	2.1	2.9	A	A	A	A	4.3	4.4	A	A	A	A	A	2.3 ^F	(1.9) ^A	1.5	A	A	1.7 ^A
12	1.3	1.7	1.3	F	E	2.1	3.0	3.5	A	A	A	A	4.4	4.3	4.3	4.6	A	A	A	A	A	A	A	A
13	A	A	1.6	A	A	A	A	A	A	A	A	A	4.4	C	4.3	3.8	4.0	A	A	A	A	A	A	A
14	A	E	1.1	E	1.5	2.2	(2.8) ^A	3.4	A	A	4.6	A	A	A	A	A	3.9	3.2	(2.4) ^A	1.9	2.1	1.9	A	A
15	1.5	A	A	A	1.8	A	A	A	A	A	A	A	A	A	A	A	3.5	A	A	A	6.7	A	A	A
16	E	1.2	(1.2) ^A	1.2	1.8 ^A	2.4 ^F	A	A	A	A	A	A	A	A	4.2	A	A	A	A	A	A	A	A	A
17	A	A	A	A	A	A	2.9	C	C	C	C	C	C	C	C	C	A	A	A	A	A	A	A	A
18	A	A	A	1.2	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
19	1.5	(1.4) ^A	1.3	A	A	2.6	3.2 ^F	(3.6) ^A	4.0	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
20	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	3.8	A	A	A	A	A	A	A	A
21	1.5	A	A	A	A	A	A	A	4.0	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1.5
22	A	A	1.6	A	A	A	A	A	A	A	A	A	A	4.4	(4.2) ^A	4.0	A	A	A	1.9	1.9	(1.7) ^A	1.5	A
23	A	A	A	A	A	2.4 ^F	A	A	A	A	A	A	4.4 ^A	4.4 ^A	A	A	A	3.1	2.4	1.9	1.6	1.5	A	A
24	A	A	A	A	A	2.0	A	C	C	C	C	C	C	C	C	C	A	A	A	A	A	A	A	A
25	A	A	A	A	A	A	2.9	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
26	(1.4) ^A	1.3	1.7	1.4	A	A	A	A	A	A	A	A	4.4	4.3	4.2	(3.7) ^A	3.2	C	A	1.9	1.7	A	A	A
27	A	A	1.7	E	2.3 ^F	3.0	A	A	A	A	A	A	4.6	4.8	4.3	4.2	A	A	A	A	1.4	1.4	1.7	E
28	1.5	1.5	1.3	(1.6) ^A	1.9	2.2	3.0	A	A	A	A	A	6.2	A	A	A	A	A	A	AF	AF	1.5	A	A
29	A	A	1.5	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
30	A	E	1.8	A	A	2.3	(2.9) ^A	3.4	(3.9) ^A	4.3	A	A	A	A	A	4.1	4.2	A	A	A	A	(7.0) ^A	A	A
31																								
Median Value	(1.5)	E	1.2	1.2	1.5	2.3	2.9	(3.4)					(4.4)	(4.3)	4.3	4.0	(3.2)		(2.6)	1.9	1.7	1.5	(1.7)	(1.5)
Count	8	10	14	13	15	18	15	6	4	2	2	4	8	7	10	10	9	4	5	10	9	11	5	7

Sweep 1.0 Mc to 1.0 Mc in 1.5 mic

Lat. 37°57.0'N
Long. 139°15.8'E

Shibata

IONOSPHERIC DATA

135°E Mean Time

fE min

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	E	E	E	E	1.5	1.5	1.6	1.7	1.5	1.8	(2.1)	2.4	2.1	2.7	2.8	1.8	1.5	1.5	1.5	1.7	1.5	1.4	1.2	E	
2	1.1	E	E	E	E	1.5	1.5	1.8	1.8	1.8	1.9	C	C	C	C	1.8	1.5	1.5	1.4	1.4	1.4	1.5	E	E	
3	E	E	E	E	E	1.4	C	C	C	C	C	C	C	C	C	1.6	1.6	1.5	1.3	1.3	1.3	1.3	1.3	1.3	
4	E	E	E	E	E	1.5	1.5	1.5	1.5	1.6	1.8	2.0	2.1	2.2	2.2	2.1	1.8	1.5	1.7	1.5	1.4	1.3	1.3	E	
5	E	E	E	E	E	1.4	1.4	1.5	1.6	2.0	2.1	2.1	2.2	2.1	2.1	2.2	1.9	1.4	1.6	1.6	1.5	1.4	1.4	E	
6	E	E	E	E	E	1.6	1.6	1.8	1.8	1.8	1.8	2.3	2.1	2.2	2.2	2.4	2.1	1.7	1.5	1.4	1.4	1.4	1.2	E	
7	E	E	E	E	E	1.5	1.4	1.4	1.9	1.9	2.1	2.1	2.1	2.2	2.2	2.1	2.0	2.0	1.5	1.5	1.4	1.4	1.5	1.2	
8	E	E	E	E	E	1.5	1.5	1.8	1.9	2.1	2.0	2.4	2.1	2.1	2.2	C	C	1.7	1.6	1.5	1.4	1.4	1.4	1.1	
9	E	E	E	E	E	1.4	1.5	1.5	1.9	2.0	2.1	2.1	2.3	3.9	2.4	2.2	2.1	1.9	1.5	1.5	1.3	1.2	1.4	1.2	
10	1.1	E	E	E	E	E	1.5	C	C	2.1	C	C	C	C	C	C	1.9	1.7	1.5	1.5	1.5	1.5	1.5	1.1	
11	1.2	E	E	E	E	1.4	1.5	2.0	1.7	2.1	1.9	2.3	2.2	2.1	2.2	2.1	2.1	1.9	1.5	1.5	1.4	1.4	1.5	1.1	
12	1.1	E	E	E	E	E	1.6	1.8	1.9	2.1	2.1	2.3	2.3	2.1	2.1	2.1	1.8	1.4	1.4	1.4	1.4	1.5	1.5	1.3	
13	1.3	E	E	E	E	1.4	1.8	1.9	1.8	1.9	2.1	(2.4)	2.6	2.0	2.0	2.0	1.8	1.8	1.8	1.5	1.5	1.5	1.4	G	
14	E	E	E	E	E	E	1.5	1.9	1.6	1.9	2.0	(2.4)	2.2	2.1	2.1	2.3	(2.1)	1.9	1.5	1.5	1.4	1.4	1.5	E	
15	1.4	E	E	E	E	1.4	1.7	1.7	2.0	2.1	2.2	2.1	2.2	2.1	2.1	2.1	1.9	1.7	1.5	1.4	1.4	1.5	1.5	1.4	
16	E	E	E	E	E	1.4	1.5	1.5	2.0	2.1	2.3	2.1	(2.3)	2.2	2.1	2.6	2.1	2.0	1.8	1.6	1.5	1.4	1.5	1.2	
17	1.1	E	E	E	E	E	1.9	C	C	C	C	C	C	C	C	C	2.0	1.8	1.8	1.6	1.6	1.6	1.4	1.5	
18	E	E	E	E	E	1.6	1.8	1.9	2.0	2.4	2.3	(2.5)	2.3	4.0	2.3	2.3	2.2	2.0	1.7	1.5	1.5	1.5	1.5	1.4	
19	1.1	E	E	E	E	1.2	2.0	2.2	2.0	2.2	2.8	2.2	2.3	2.3	2.2	2.1	1.9	1.8	1.5	1.6	1.6	1.6	1.5	1.1	
20	E	E	E	E	E	1.4	1.6	2.0	2.0	1.9	2.2	2.2	2.2	(2.6)	2.2	2.1	1.7	1.9	1.6	1.4	1.5	1.5	1.4	1.2	
21	1.1	E	E	E	E	1.4	1.6	1.6	1.8	2.0	2.2	3.3	2.4	2.2	2.2	4.0	2.1	2.0	1.6	1.4	1.3	1.3	1.3	1.2	
22	1.1	E	E	E	E	1.4	1.6	1.9	1.9	2.1	3.2	2.3	2.3	2.5	2.3	2.2	1.9	1.7	1.6	1.5	1.5	1.4	2.3	1.4	
23	1.1	E	E	E	E	1.5	1.8	1.9	2.0	3.0	2.2	2.2	2.2	2.2	2.3	2.1	1.9	1.9	1.5	(1.5)	1.5	1.8	1.4	1.5	
24	1.4	E	E	E	E	1.5	1.7	C	C	C	C	C	C	C	C	C	2.1	2.0	1.5	1.5	1.5	1.5	1.5	1.4	
25	1.2	E	E	E	E	1.5	1.5	1.7	2.0	2.2	2.3	2.3	2.9	3.4	2.3	2.1	1.9	1.9	1.8	1.6	1.4	1.5	1.5	1.6	
26	1.2	1.3	B	E	E	1.5	1.7	1.9	2.1	2.1	2.4	2.3	(2.3)	3.1	3.0	2.2	2.0	(1.9)	1.7	1.4	1.4	1.5	1.4	1.4	
27	1.2	1.2	E	E	E	1.3	1.5	1.8	1.9	2.2	2.3	2.2	3.1	2.3	2.3	2.1	2.1	1.8	1.8	1.4	1.4	1.4	1.4	1.4	
28	1.3	E	E	E	E	E	E	2.0	2.1	2.1	2.2	2.2	4.8	3.2	3.1	2.3	2.1	1.9	(1.6)	1.7	1.6	1.5	1.5	1.2	
29	1.2	E	E	E	E	1.4	1.5	1.6	2.2	2.3	3.3	3.4	2.3	3.2	3.1	2.3	2.1	1.6	1.5	1.5	1.5	1.5	1.5	1.3	
30	E	E	E	E	E	1.6	1.6	1.7	2.1	2.1	2.3	(2.3)	(2.4)	2.3	2.3	2.3	2.3	2.1	1.6	1.6	1.7	1.7	1.6	1.2	
31																									
Mean Value	1.1	E	E	E	E	1.4	1.6	1.8	1.9	2.1	2.2	2.3	2.3	2.3	2.2	2.1	2.0	1.8	1.6	1.5	1.5	1.5	1.5	1.2	
Count	30	30	29	30	30	30	30	26	27	26	26	26	26	26	26	25	29	30	30	30	30	30	30	30	

Speed: 30 Mc to 11.5 Mc in 1.5 min Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
 (Denkuisushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

Lat. 35.42.41N
 Long. 139.29.33E

Kokubunji, Tokyo

f_oF₂

135°E Mean Time

Day	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	(3.1)E	9.6	8.5E	7.9	7.6	8.0	9.2	10.1	10.6	9.9	9.4	10.6	11.2	10.7	11.1	12.0	12.0	12.1	11.7	11.5	(10.5)B	9.4	F	B
2	B	FB	F	24F	8.2E	8.1	8.2S	7.9	A	AF	A	(9.6)S	(10.4)A	11.2	11.8	11.6	11.6	12.2	11.3F	10.1	8.6S	8.1	8.4	8.8S
3	(9.3)E	9.7E	(9.4)B	9.1	8.6E	8.6	9.0	8.6	8.8	8.8	9.1	9.2	9.4	9.7	10.0	10.3	10.2	9.9	9.9	9.1	8.6	7.7	8.1	7.9
4	8.4	8.4	7.8	7.7	6.8	6.9	6.9	8.9	10.0	9.4	9.7	9.5	9.8	8.8	11.7	10.9	10.5	(9.8)A	9.0	(9.3)A	9.6	8.3	8.1	8.0
5	8.1	8.0	7.3	7.4	6.3	6.1	6.4	6.9	7.3	7.5	6.5A	6.6	8.2	8.2	8.8	9.6	9.5	9.2	9.0S	8.7S	9.7	9.6	9.4	9.1J
6	9.9	9.7	8.8	7.3P	7.4	7.5	6.5K	5.4M	(5.5)A	5.5K	KB	KB	KB	KB	KB	KB	KB	5.7E	5.8E	5.9E	6.8K	6.5E	6.2J	7.0K
7	6.6K	6.8K	5.9K	5.4K	5.6E	6.5E	6.8	7.5	7.9	8.3	8.1	9.3	9.9	(9.7)C	9.5	9.8	10.1	A	A	A	8.6A	8.6A	8.7	9.0F
8	8.9	8.5	8.0	7.7	7.5	7.6E	7.9	8.6	C	C	C	C	10.2	9.5	9.8	10.0	10.1	10.2	8.8	8.9	8.2	8.6	8.8	(8.9)S
9	9.0	8.7	8.6	7.8	7.5E	7.0	7.8	8.4	9.4	8.9	8.9	9.5	9.3	9.7	9.8	10.1	(9.5)C	8.7	(8.7)C	8.6	8.8S	7.6S	7.9	7.8
10	7.8	7.8	7.5	7.2	7.4E	7.5	8.7	8.6	8.7	8.7	10.0	(10.0)A	9.9	10.1	10.2	8.7	8.4	8.7	9.1	9.3	9.9	9.6	8.7	8.8
11	8.6	8.9	8.8E	8.6E	9.1	9.3	9.4	8.1	8.2	8.4	8.8	9.4	9.8	9.3	9.2	9.5	9.3	9.0	9.5	9.5	9.9	8.5	8.5	8.5
12	8.4	7.9	7.9	8.3E	8.2	(9.4)E	9.2E	7.6	7.9	8.0	(8.3)A	8.6A	9.6E	10.2	(10.0)S	9.8	9.4	9.7	(9.5)A	9.3	8.7	9.3	9.0	8.2H
13	8.0	7.3	7.6	8.0	7.5	7.3E	7.0E	6.4E	(6.5)K	6.6K	7.7K	(8.1)K	8.5K	8.4K	8.0K	7.7K	8.0	8.4	8.7	9.7	8.5	8.3	8.5	8.4
14	8.4	8.1	8.2E	7.9	8.1	7.9	8.6	8.7	9.2	8.4	8.0E	8.2	8.4E	9.4	10.0	11.0	11.6	11.5E	10.3E	(9.6)S	8.8	8.7	9.0E	9.0
15	9.0E	9.2	8.4	8.4	8.1	8.3	7.8	8.1	7.8E	8.0	7.9	8.4	8.8	8.8	8.9	9.3	9.9	9.8	8.7	18.0E	7.3	(7.7)E	(8.0)E	8.0
16	9.6	9.3	7.6E	7.3E	7.0E	7.5	9.1	9.9	10.1E	9.0A	9.2E	(9.7)A	10.2	10.3	10.6	10.8	11.0	10.4	9.5	8.2	(9.4)S	8.6	B	8.7
17	B	8.5E	(9.0)S	(8.3)E	8.5	8.6	8.1	8.4	A	A	A	A	9.2	10.2	10.5E	10.9	10.6	10.0	10.0	9.1	8.5	(8.4)S	8.2	C
18	F	8.5	F	F	7.2E	6.3E	A	A	A	A	A	A	8.0	8.9	(9.2)A	9.4	(9.8)A	10.1	(8.9)S	7.7	7.2	F	F	8.6
19	8.5	7.4E	6.8E	6.6E	6.3E	6.9E	8.1	8.8	8.9	8.7	8.3	8.8	8.7	8.4	8.8	8.6	7.8	8.1	9.0	8.6	(8.7)A	8.7E	9.3E	8.8E
20	8.8	8.8	6.4K	AK	AK	AK	AK	AK	6.8K	AK	AK	AK	AK	AK	AK	6.4K	AK	AK	AK	AK	6.7K	7.5	7.6	7.3
21	7.7	7.4E	7.6E	6.7E	6.3E	7.2E	8.0E	8.1E	8.5	8.6	7.3	7.9	7.7	8.3	9.1E	9.2	8.7	8.4	8.6	8.8	8.5	8.9E	F	AF
22	F	8.6E	9.1E	7.9E	7.3E	7.4E	8.8E	9.8	8.9E	8.6	(9.0)A	9.4	9.4	9.8	9.8	10.7	9.8	9.7	9.8	9.8	9.2	(9.1)S	9.4S	9.4E
23	S	9.0	8.2E	(8.7)	9.2	9.4	8.2	7.8	(8.6)A	9.4	(9.0)A	8.5	8.2	8.2	8.2	8.5	9.0	8.6	7.4H	7.5H	(7.0)E	(7.2)E	(7.6)E	7.8E
24	7.4	7.4E	6.6E	6.3E	6.5E	7.5E	9.6E	9.7E	9.1	(8.8)A	8.4	A	A	A	9.6	9.6	8.8	9.2	9.4	8.8	A	A	(7.4)E	9.2E
25	8.3E	8.7	8.2E	5.9	5.7	6.4	8.4	9.2	A	A	A	9.6	A	A	A	C	9.4	8.9	A	S	8.3S	8.6	(8.4)E	
26	A	AF	AF	(8.8)E	C	C	C	C	C	C	8.6	8.9	9.1	C	C	C	9.5	9.7	9.5	9.9	9.3	8.4	7.8	8.5E
27	9.8	9.8E	10.1	9.6	9.4E	8.4E	8.1	8.7	9.1E	8.4E	8.8	9.5	9.4	9.2	9.4	9.3	A	A	9.9A	(9.5)S	7.9	8.2	(9.0)S	(8.9)A
28	8.8	(9.0)E	7.8	8.3E	7.6E	7.8	8.8	9.5	A	A	9.6A	9.8	9.8	10.3	10.6	10.6	10.6	9.5	9.5	9.5	8.4E	8.0	8.4E	(8.7)E
29	8.9	8.4E	8.4E	7.7E	8.6	8.8	8.3A	(8.1)A	7.9	8.4	8.8	8.8	9.7	9.7	9.6	10.5	9.4	10.5	9.3	10.1	8.5	8.4	8.6	A
30	AF	8.4E	8.0E	7.9E	(7.4)E	8.1	7.7	7.4E	8.0	7.5S	8.8	8.7	8.8	9.0E	9.8	10.0	A	A	A	A	8.6	8.4	8.9	9.3
31																								
Median Value	8.5	5	8.0	7.9	7.5	7.6	8.6	8.5	8.3	8.4	8.8	9.2	9.4	9.7	9.8	9.8	9.8	9.5	9.4	9.3	8.5	8.4	8.5	8.7
Count	23	2	27	28	27	28	28	28	24	22	22	25	25	26	26	27	28	26	26	26	28	28	26	25

Sweep 1.0...Mc to 17.0 Mc in 1.5 min Manual

IONOSPHERIC DATA

h_pF₂

Kokubunji, Tokyo

Lat 35°42.4'N
Long. 139°29.3'E

155°E Mean Time

Day	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	390F	370	360F	370	350	330	360	330	280	300	330	380	360	350	380	340	330	290	400	260	(300)B	340	F	B
2	B	F S	F	F J	F J	300	250S	240	A	A	A	A S	A	330	310	330	330	300	300	260	310J	320	(340)B	410
3	(370)S	330F	(330)B	320	410F	400	350	350	340	350	360	400	(370)B	380	360	370	360	350	300	330	320	380	400	440
4	370	370	360	350	350	420	370	330	370	400	420	460	510A	430	390	380	(390)A	390	(380)A	370	360	410	460	440
5	370	370	360	350	420	370	350	370S	360	360	(350)A	330	340	370	340	340	330	330	310S	290	300	440	350	390J
6	340	340	320	380P	400	420	460K	(500)A	A K	B K	G K	G K	B K	B K	B K	B K	F K	410P	350K	360K	410K	(410)B	400K	430
7	410K	390K	370K	340K	350E	310F	270	270	310	(350)A	360	340	350	(350)C	350	360	350	A	A	A	A	A	A	(360)P
8	350	390	330	320	320	310	310	280	C	C	C	C	350	340	350	370	330	300	310	300	360	340	370	(350)S
9	330	340	360	320	310F	320	370	360	320	350	380	400	(320)A	380	360	340	(340)C	330	C	320	320S	330S	350	380
10	370	370	340	320	310S	300	290	290	340	410	350	(360)A	400	250	340	330	350	330	340	330	340	340	320	360
11	360	350	360P	330F	350P	270	280	380	270	(370)A	440	440	350	360	360	370	330	350	310	320	300	320	350	330
12	360	350	340	350F	330	(260)P	240	250	350	360	(390)A	400A	330P	350S	(340)S	370	330	310	(330)A	340A	390	360	330	430H
13	370	370	340	360	340	290F	310K	340A	C K	A K	410K	(380)A	350K	340K	310K	350K	360	320	290	300	300	400F	370	380
14	390	400	380F	300	330	330	290	280	290	370	380F	360	390F	410	390	430	340	340	290P	(310)S	360	370	350P	360
15	360S	330	330	330	340	300	300	540	360P	(360)A	(350)A	(350)A	340	350	330A	330	340	320	300	(340)A	370	(390)F	(410)F	350
16	310	310	330F	380F	360F	360	310	330	290P	270A	(350)A	(340)A	330	320	350	330	300	340	300	350	(340)S	330	B	B F
17	B	B F	(310)S	(330)F	360F	310	240	310	300	A	A	A	380	350	A	A	A	330	320	310	400	F	F	C
18	F	(320)B	F	F	F	J F	J F	A	A	A	A	A	380	350	A	A	A	340	(320)S	310	400	F	F	C
19	330	(350)S	370F	370F	380F	320P	370	360	330	330	380	350	320	(370)A	350	(310)A	320	340	320	290	(350)A	400B	390P	360
20	350	320J	290K	A K	A K	A K	A K	340K	360K	A K	A K	A K	A K	A K	A K	(420)B	B K	A K	A K	A K	A K	360K	350	340
21	370F	360F	370F	300F	300F	310F	310F	310F	310	270	380	380	(360)A	380	250F	340	340	310	340	320	370	390F	F	A F
22	F	350F	320F	300F	370F	410F	370F	360	350P	430	(430)A	420	460	410	420	400	370	380	390J	400	400	(440)S	460S	390P
23	S	S	430	400A	(390)F	380	310	320	490	(430)A	360	(370)A	(390)A	(380)B	350	350	320	280	300H	320H	(350)F	(360)F	(370)F	370P
24	310	320F	340P	350F	380F	340F	290P	290F	(310)A	A	A	A	A	420	410	390	390	400	370	330	A	A	(480)A	510F
25	450E	390	330E	440	340	370	330	C	A	A	A	380	A	A	A	C	320	320	A	A	S	F S	320	(360)F
26	A	A E	A F	J F	C	C	C	C	C	C	(430)F	430	390	C	C	C	360	390	350	330	340	330	440F	370
27	430	410F	(370)F	(350)F	350F	340P	320	350	350F	A F	A	370	350	330	320	340	A	A	300A	(280)S	310	360	(390)S	(360)A
28	330	(320)P	310	350P	(390)P	320	310	270	A	A	A	A	260	370	340	340	330	320	320	310	310P	360	440F	(370)B
29	300	(330)B	(350)F	A F	F B	320	290	A	A	330	390	370	370	350	380	360	320	320	300	360	290	370	320	A
30	A F	F	F	F	F	290	270	290F	290	380S	330	330	360F	350P	360	360	A	A	A	A	A	340F	370	400
31																								
Machine Value	360	350	340	350	320	310	330	330	360	380	380	360	350	350	350	340	330	320	320	320	340	370	26	25
Count	23	25	26	24	27	27	27	21	18	21	21	24	25	26	26	26	25	26	25	26	27	26	25	25

Sweep 1.5 Mc to 17.0 Mc in 1.5 min

Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
(Denki-tsushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

h_pF₂

Kokubunji, Tokyo

Lat. 35.424°N
Long. 139.293°E

135° E Mean Time

Day	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	300	290	280	250	260	260	230	240	250	250	350	350	320	300	330	290	290	250	240	220	210	250	(310) ^F	350	
2	(330) ^A	300 ^A	(280) ^F	260	260	250	210	230	A	A	A	(360) ^A	(340) ^A	300	290	290	260	260	230	300	230	260	250	300	
3	290	290	(290) ^F	290	340	320	320	290	320	350 ^A	270	390	380	350	340	350	330	320	300	280	290	320	320	340	
4	320	280	280	260	280	260	250	300	300	370	370	360	(370) ^A	360	330	350	(340) ^A	330	(330) ^A	330 ^A	290 ^A	320 ^A	370	340	
5	340	360	400	280	280	270	310	310	340	270	350	330	320	370	340	330	290	280	260	230	260	290	250	340	
6	270	260	240	220	300	360	450 ^K	500 ^K	(400) ^K	G K	G K	G K	G K	G K	G K	G K	G K	410 ^K	330 ^K	280 ^K	280 ^K	340 ^K	350 ^K	300 ^K	
7	310 ^K	280 ^K	240 ^K	250 ^K	260 ^K	250	240	260	300 ^A	340 ^A	350	340	330	(330) ^C	330	340	310	A	A	A	A	A	A	340 ^A	310
8	280 ^A	280	260	270	250	220	280	270	C	C	C	C	330	330	330	320	300	270	240	(250) ^A	220	270	290	320	
9	320	280	280	260	240	240	340	340	290	310	370	380	400	250	340	320	(310) ^C	290	(280) ^C	260	250	230	260	290	
10	290	280	260	260	290	230	260	240	290	300	320	330 ^A	380	330	320	300	340	300	300	270	270	250	250	320	
11	310	300	280	260	290	250	240	330	290 ^A	380	360	380	330	350	360	350	310	310	270	260	260	230	240	290 ^A	
12	270	290 ^A	270 ^A	260	260	210	220	220	350	390	(390) ^A	390 ^A	320	320	310	310	310	270	(300) ^A	330 ^A	320	320	320	300 ^A	
13	300 ^A	290	290	270	290	260	290 ^K	330 ^A	C K	A K	410 ^K	(380) ^A	350 ^K	320 ^K	310 ^K	330 ^K	330	280	270	270	250 ^F	320 ^F	240 ^F	300 ^F	
14	300	330	300	260	260	220	240	250	240	370	370 ^H	370	330 ^H	390	360	340	300	300	250	250	260	280	300 ^A	300 ^A	
15	300 ^A	290	270	280	270	250	270	330 ^A	280 ^A	370 ^A	350	270 ^A	330	350	330 ^A	320	310	300	240 ^A	(270) ^F	300 ^F	A F	A F	280	
16	250 ^F	250	220	260	290	230	250	280	250 ^F	260 ^A	330	(330) ^A	320	310	310	270	270 ^A	260	210	220	280 ^A	270 ^A	270 ^A	(260) ^A	
17	250 ^A	250	250 ^A	260 ^F	260 ^H	240	230	240	280	(320) ^A	(300) ^A	400	330	320	320	300	290	320	280 ^A	240	260	300	330 ^A	(320) ^C	
18	(310) ^F	(300) ^A	(300) ^F	300 ^F	300 ^F	(300) ^F	300 ^F	A	A	A	A	A	370	350	(360) ^A	370	(330) ^A	290	240	250	310	250	(350) ^A	290	
19	260	280	290 ^A	310	280	250	(330) ^A	290	320	320	360	350	310	370	340	330 ^A	280 ^A	300 ^A	290 ^A	270 ^A	(310) ^A	350 ^A	300 ^A	280	
20	280	260	260 ^K	A K	A K	A K	A K	340 ^K	360 ^K	310 ^K	A K	A K	A K	A K	420 ^K	410 ^K	A K	A K	A K	A K	280 ^K	290	330	370 ^A	
21	320 ^F	280	290 ^A	270 ^A	280 ^F	230 ^A	280	240	300	280	380	380	(380) ^A	380	230	320	310	290	260	A F	A F	A	310 ^F	320	
22	280	300 ^F	270 ^F	260 ^A	300 ^A	300	320 ^A	300	310 ^A	390	400 ^A	400	450	400	400	370	350	340	310	290	280 ^A	340 ^A	370 ^A	310	
23	310	280	380	370 ^A	250 ^A	270	280	300	490	(420) ^A	350	(320) ^A	280 ^A	370	340	330	300	260	250 ^H	270	270	270	290	290	
24	260	250	280 ^A	250 ^A	270 ^F	290	250	250	310 ^A	A	A	A	A	A	400	380	360	(380) ^A	(400) ^A	300	(220) ^A	A F	A	380	
25	350 ^F	300	250	(330) ^A	360	280	270	290 ^A	A	A	340	A	A	A	A	A	310	(300) ^A	A	A	A	A	(260) ^A	(270) ^A	
26	A	A F	(260) ^A	(230) ^A	C	C	C	C	C	C	350	400	370	C	C	340	370	330	300	280	270	300	300 ^A	290	
27	300	300 ^F	260	240 ^F	270 ^A	260 ^A	290	320	340	A	A	A	330	310	320 ^A	340	A	A	(270) ^A	240	230	260	270	(260) ^A	
28	240	300	270	260	270	220	290	240	A	A	A	A	260	330	320	300	280	280	260	240	220	250	(270) ^A	(270) ^A	
29	260 ^F	(280) ^F	(320) ^A	280 ^A	310 ^A	250	250 ^A	A	A	300	380	350	320	330	360	320	310	300	280	270	240 ^A	270	240 ^A	240	A
30	A F	A	250 ^F	(290) ^F	320	250	260	240 ^A	280	360 ^A	320	310	320	330	330	340	A	A	A	A	(300) ^F	340 ^A	320 ^A	330 ^F	
31																									
Mean Value	300	290	290	260	290	250	270	280	300	340	360	370	330	330	330	330	310	300	270	260	270	290	300	300	
Count	28	28	30	29	28	28	28	27	22	21	22	25	27	27	28	29	27	26	26	25	26	25	26	29	

* Sweep 1.0 Mc to 17.0 Mc in 1.5 min

Manji

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
(Denkitsu-shin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

ft

Kokubunji, Tokyo
Lat. 35°42.4'N
Long. 139°29.3'E

135°E Mean Time

Day	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					L	Q	L	A	A	A	A	L	5.9	5.9	L	L	L	A							
2					Q	A	A	A	A	A	A	A	(5.7)A	5.5	A	A	A	A	L						
3					A	B	L	A	A	A	A	5.9	5.5	5.5	A	A	A	A	A						
4					A	A	S	5.0	5.0	L	L	A	A	5.0	5.0	A	A	A	A						
5					L	4.2	4.2	A	A	A	A	A	6.3	(5.8)A	5.2	L	L	A							
6	2.8	3.3P	4.5	4.2	(4.4)A	4.6	4.7	4.9	4.9	4.9	4.9	4.9	4.9	4.8	(4.8)A	4.8	4.2	3.0							
7		Q	A	A	4.3A	A	A	5.8	5.7	A	C	B	5.4	B	5.4	B	A	A	A						
8		Q	L	L	C	C	C	C	C	C	Q	5.6	(5.6)B	5.6	5.3	A	L	L	C						
9		A	5.0	(5.0)L	5.0	A	A	A	A	A	A	A	5.4	5.3	L	L	C								
10		A	L	L	5.4	(5.4)L	5.4	5.2	5.8	5.0	5.6	L	Q	L	L	L	L	L							
11		A	Q	A	A	A	A	5.6	5.6	5.5	5.4	5.2P	5.4	4.9	A	L	L								
12		Q	L	A	6.0P	A	A	6.0	A	L	L	L	5.0	L	A	L	A								
13		(2.6)L	(3.6)L	4.5	A	C	A	5.4	(5.2)A	(5.8)P	5.2	5.5A	(5.0)B	5.0	(4.4)L	(3.6)A									
14		Q	L	4.9	(4.7)L	(6.4)L	6.0	5.8	5.6	5.3	4.6	4.6	(4.2)L	L											
15		L	L	L	A	A	A	A	A	A	5.8H	5.6A	(5.4)A	5.1	(5.1)L	L	A								
16		Q	Q	A	A	AF	A	A	A	A	5.4	5.4	4.6	4.6	L	A									
17		Q	A	A	A	5.2A	A	A	5.6	A	5.3A	(5.8)A	5.1P	(5.0)L	L	A									
18		A	A	A	A	A	A	A	A	L	5.4	A	A	A	A	A									
19		A	A	A	L	L	5.1	5.7	A	5.5	5.7A	A	A	A	A	A									
20		A	A	A	A	B	A	A	A	A	A	A	4.8	4.9	A	A									
21		A	(3.6)L	Q	A	(5.0)L	5.4	S	A	5.4S	5.3	A	A	AF	A	A									
22		L	3.9A	4.4A	(4.6)A	4.8	J	(5.6)A	(6.3)P	5.9	(5.7)A	5.4J	(5.0)J	A	4.7	L									
23		A	L	L	L	6.0	A	A	A	A	A	A	5.1P	4.9	4.8	(4.6)L	L								
24		A	L	L	A	A	A	A	A	A	A	A	A	A	A	A									
25		A	L	L	A	A	A	A	A	A	A	A	A	A	A	A									
26		C	C	C	C	C	C	C	C	C	C	C	5.3	5.1	4.8	A									
27		A	L	L	A	(5.7)A	(5.2)A	4.6	A	A	5.6	C	C	5.1	4.8	A									
28		Q	L	A	A	A	A	A	A	A	(6.6)A	A	A	5.2	(4.8)L	L									
29		3.5	A	A	A	A	6.0	5.5	5.7	(5.5)A	5.5	(5.4)A	5.2	(4.8)B	5.4J										
30		L	L	L	A	A	A	L	L	6.3	6.0	6.0	A	A	A										
31																									
Median Value Count	-	-	3	3	4.4	4.3	5.1	5.1	5.6	5.6	5.7	5.5	5.5	5.2	5.0	(4.7)	-								
Sweep	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
 (Denki-tsushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

h_pF₁

Kokubunji, Tokyo
 Lat. 35°42.4'N
 Long. 139°28.3'E

135°E Mean Time

Day	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						250	Q	230	A	A	A	A	300	210	200	200	210	200	A					
2						Q	240 ^A	250	A	A	A	340 ^A	A	A	A	A	A	A	A	220				
3						A	A	250	A	A	230	A	A	A	A	250	(230) ^A	320	A	A				
4						A	A	250	A	A	230	A	A	A	A	250	A	A	A	A				
5						240-0	200	210	A	A	A	A	A	A	A	A	200	220	220	A				
6					250	240	(230) ^B	210	(250) ^A	280 ^A	280 ^A	230	200	200	200	(230) ^A	220	230	220					
7						G	A	240-0	A	A	250	A	A	C	B	210	250	A	A					
8						G	230	220	C	C	C	A	Q	210	210	230	230	(220) ^A	210					
9						A	230	250	230	A	A	A	A	A	280 ^A	230	230	230	C					
10						A	240	(250) ^A	250	260	(240) ^A	210	230	210	270	240	G	260	230					
11						A	Q	230	A	A	250 ^A	210	220	230 ^A	230	220	260 ^A	210 ^A	210					
12						Q	210	(200) ^A	190	250	A	A	310	(310) ^B	300 ^A	240	220	220	250					
13						(240) ^A	220	A	C	A	240	230 ^A	210	170	(200) ^A	(220) ^A	210	210	210					
14						Q	220	210	200	260	200	190	220	220	230	240	210	220	230					
15						250	220	A	A	A	A	A	200 ^H	A	A	A	210	210	250	A				
16						Q	Q	A	220	C	A	A	(220) ^A	200	220	200	200	240	A					
17						Q	230	(260) ^A	280 ^A	A	A	A	270	A	(220) ^A	220	210	250	A					
18						AF	AF	A	A	A	A	A	A	A	A	A	A	A	A					
19						A	230	220	210	190	250 ^A	(240) ^A	230	A	A	A	A	A	A					
20						A	A	B	230	A	A	A	A	A	A	200	260	A	A					
21						A	210	G	260	200	190	A	A	A	A	A	A	A	A					
22						280	(280) ^A	270 ^A	(270) ^A	270	(300) ^A	320	A	A	A	A	A	A	270 ^B	250				
23						A	260	250 ^A	240	A	A	A	A	A	A	200	210	230	220					
24						230	200	A	A	A	A	A	A	A	A	A	A	A	A					
25						A	240	A	A	A	A	A	A	A	A	A	(240) ^A	A	A					
26						C	C	C	C	C	C	A	230	210	C	C	310	240	230	(280) ^A				
27						A	260	250	(250) ^A	250	A	A	A	A	A	A	A	A	A					
28						Q	240	A	A	A	A	A	A	A	A	A	220	230	210 ^A					
29						230	A	A	A	A	(250) ^A	A	A	A	A	A	260	230	230 ^A	220	220			
30						210	A	A	A	A	A	A	280	270 ^A	230	240	A	A	A					
31																								
Mean Value Count				2	9	19	17	14	240	250	250	230	220	220	230	230	220	220	230	220	220	220	220	220

Sweep 1.0 Mc to 17.0 Mc in 1.5 min Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
 (Denki-tsushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

f6

IONOSPHERIC DATA

Kokubunji, Tokyo
 Lat. 35°42.4'N
 Long. 139°29.3'E

135°E Mean Time

Day	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						1.8	2.7	3.3	(3.5)A	3.7	3.8	B	A	3.8	(3.8)B	3.7	3.4	A	A						
2						A	A	A	3.4	3.6	B	A	A	A	A	A	A	S	2.4	E					
3						A	A	A	3.0J	3.6	B	B	B	B	B	3.4	A	A	A						
4						A	A	A	(3.5)A	3.7	4.0	3.8	4.0	4.0	3.7	3.6	A	A	A						
5						2.0	2.5	3.3	A	A	3.6	3.8	4.0B	4.1	3.9	3.7	(3.1)A	2.9J	2.4						
6					A	A	A	3.0A	3.4	3.6	3.7	3.9	(3.8)B	3.6	B	B	3.1	(2.5)A	1.8						
7					1.8	(2.1)A	3.5F	3.5	3.7	B	B	B	3.9	C	B	B	3.2	A	A						
8						A	A	A	C	C	C	C	B	B	B	3.6H	(3.4)B	(3.0)	A	A					
9						A	A	2.7	3.2	3.4B	(3.1)P	3.7	3.6	3.6	3.5	3.1	A	A	C						
10						A	A	A	(3.4)A	3.6	A	A	3.8	(3.8)B	3.8	(3.6)A	3.4	2.8	2.0						
11						A	2.3	3.1	3.6	(3.7)A	3.8	3.8	4.0	B	B	A	A	A	A	1.7A					
12					E	1.9	2.5	3.0	3.0J	3.4J	3.6	B	B	B	B	A	B	AF	(1.8)A						
13					A	A	2.9	3.0	(3.2)C	3.4J	4.0	3.9	3.8	B	B	B	3.6	2.9	2.4						
14					(1.2)B	1.6	2.5J	3.0	3.3	3.5	3.7	3.8	3.8F	3.9F	3.9	3.7F	3.5B	3.1	2.4	A					
15					A	1.7	2.7	3.2	2.9	3.6	3.8	(3.8)A	3.8	3.9	(3.9)A	3.8	3.5	3.0A	2.1						
16						A	A	A	3.2	3.5	3.8	4.0	4.1	4.0	3.9	3.7	3.3	(2.8)A	2.3						
17						1.9	2.8	3.2	3.4	3.8	3.8	(3.8)B	3.8B	3.7B	(3.8)A	3.8	A	A	A						
18						A	A	A	A	A	A	B	3.6	(3.6)B	3.6	(3.1)A	2.6	2.2	A						
19						(1.4)B	(2.2)A	3.0	3.5F	3.5	3.7	4.1	3.9	4.0	4.0	3.6	3.2	A	A						
20						A	A	A	A	A	3.8	(3.8)A	3.8	B	4.2	3.6	3.6	A	A						
21						A	(3.0)F	(3.2)A	3.3	3.6A	A	B	A	A	A	B	A	2.9	2.4	E					
22						1.7	2.7	3.3	A	A	A	A	A	B	B	B	A	A	2.0J	A					
23						A	2.6	3.0	3.5F	(3.8)A	4.0	3.7	A	A	A	A	3.3F	2.4	1.5						
24					E	2.0	2.8	A	A	A	A	A	A	A	B	B	B	A	A						
25						A	A	A	A	A	A	A	A	A	B	A	A	A	A						
26						C	C	C	C	C	C	C	C	3.7	A	A	3.3	A	A						
27					A	A	A	A	3.6	3.8	3.7	A	B	3.8	B	A	A	A	A						
28						2.0	3.0	3.2	3.3A	3.6	B	B	B	A	A	A	A	3.4	2.7	B					
29						2.2	2.8	3.3	3.7	3.9	3.9	4.0	(3.8)A	3.8	3.4	3.0	A	A	A						
30						A	A	A	3.4	3.6	B	B	B	B	B	B	3.2	3.2	(2.2)A						
31																									
Median Value						1.9	2.7	3.2	3.4	3.6	3.8	3.8	3.8	3.8	3.9	3.6	3.3	2.9	2.3						
Count					3	12	17	21	21	21	19	15	16	15	13	15	16	13	14						

Sweep 1.0 Mc to 17.0 Mc in 1.5 min

Manual

IONOSPHERIC DATA

ht

Kokubunji, Tokyo

Lat. 35°41'N
 Long. 139°29'15"E

135°E Mean Time

Day	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						110	110	100	(100)A	100	100	100	100	100	100	100	100	100	100	100					
2					A	A	100	100	90	90	A	A	A	A	A	A	A	(90)A	100	100					
3					A	A	110	110	100	100	100	100	100	100	100	100	A	A	A	A					
4					A	A	100	100	100	110	110	110	110	110	110	110	A	A	A	A					
5					100	90	90	A	A	100	100	100	100	100	100	100	(100)A	100	100						
6					A	A	B	110	100	100	100	100	100	100	100	100	100	110	110	110					
7					100	(100)A	100	100	100	100	100	100	110	(110)C	100	100	110	A	A	A					
8					A	A	A	C	C	C	C	100	(100)B	100	110	110	110	110	110	110	A				
9					A	100	100	100	100	110	110	110	110	110	110	110	100	A	C						
10					A	A	110	100	100	(100)A	100	110	110	100	100	(100)A	110	110	110	110					
11					A	110	110	110	(110)A	110	110	110	120	110	110	110	100	100	100	A					
12					E	100	100	100	100	100	B	B	100	(100)A	100	100	100	100	100	100					
13					A	A	100	100	(100)C	100	100	100	100	100	100	100	100	100	100	100					
14					B	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	A				
15					(100)A	100	100	110	100	100	100	100	100	100	100	100	100	100	100	100					
16					A	100	(100)A	100	100	100	100	100	100	100	100	100	100	100	100	100	(100)A	100			
17					100	100	100	110	110	100	100	110	90	100	(100)A	100	100	A	A	A					
18					A	A	A	A	A	A	A	100	100	100	(100)A	100	100	100	100	100	A				
19					B	A	100	100	110	110	110	110	110	110	100	100	100	100	100	100	A				
20					A	A	A	A	A	A	110	110	100	(100)B	100	100	100	100	100	100	A				
21					A	100	(100)A	100	100	110	B	B	110	(110)B	110	100	100	100	100	100					
22					100	120	110	A	A	A	A	A	120	130	(130)A	120	130	110	120	A					
23					A	120	110	120	120	100	100	A	A	A	A	A	100	100	90	90					
24					E	(90)B	90	A	A	A	A	B	A	A	100	B	B	A	A	A					
25					A	A	A	A	A	A	A	A	A	100	A	A	A	A	A	A					
26					C	C	C	C	C	110	110	(100)B	(100)C	C	C	A	110	A	A						
27					A	A	A	A	110	100	110	100	(110)B	100	100	A	A	A	A	A					
28					A	100	100	90	100	B	B	B	B	A	A	A	A	A	90	100	B				
29					110	100	100	100	100	100	100	100	100	110	100	100	100	A	A	A					
30					A	A	100	100	100	100	B	B	B	B	B	B	120	110	100	100					
31																									
Mean Value						100	100	100	100	100	100	100	100	100	100	100	100	100	100	100					
Count					3	10	17	22	20	21	22	22	21	23	23	21	21	18	15	2					

Sweep 1.0 Mc to 17.0 Mc in 15 min

Manual

Kokubunji, Tokyo
Lat. 1 35°42.4' N
Long. 139°29.3' E

IONOSPHERIC DATA

IES

135° E Mean Time

Day	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	1.8	3.2	3.0	4.2	2.8	G	3.8	4.4	6.6	7.2	7.6	8.8	13.1	4.8	4.2	5.6	6.2	5.6	4.2	4.0	3.4	8.8	4.6	8.2	
2	10.4 ^Y	8.6	8.6	8.0	5.8	3.6	3.6	6.6	10.8	15.0	14.8	16.0	14.0	10.2	10.0	11.6	7.2	5.6	G	3.2	7.5	6.4	4.3	6.3	
3	5.7	10.2	8.6	7.3	6.5	4.6	3.7	5.0	6.2	8.4	7.2	6.7	7.2	5.4	4.8	7.2	6.2	7.0	7.0	4.8	5.0	3.0	2.4	3.0	
4	2.8	3.0	3.2	3.2	3.2	3.2	3.8	5.9	4.6	5.0	7.6	8.7	8.0	7.4	12.8 ^F	11.2 ^F	10.8	9.4	16.0	6.4	5.1	4.8	3.2	2.7	
5	3.0 ^F	2.8	3.0	3.4	2.6	2.1	3.6 ^Y	4.8	5.6	6.2	7.6 ^Y	8.6	7.9	5.9	6.8	4.4	3.6	G	3.4	2.2	G	1.4	2.2	7.4	
6	3.0	2.0	2.0	2.2	3.0	2.4	4.8 ^Y	4.6	6.2	6.6	5.5	5.2	4.5	4.6	5.2	5.2	5.3	5.5 ^Y	3.8 ^Y	G	3.6	8.8	9.2	4.8	
7	2.8	1.8 ^Y	2.0	1.6	2.2	2.4	4.3	5.3	6.5	7.5	5.4	5.7	6.4	C	B	B	5.2	14.2	13.0	11.4	8.8	8.8	7.4	5.8	
8	5.4	3.8	3.6	3.8	3.8	3.0	3.5	4.7	C	C	C	C	6.6 ^Y	4.8	B	G	4.4	4.8	3.6	4.6	G	2.2	3.6	3.8	
9	6.4	6.4	4.8	5.4	3.4	3.0	G	3.6	G	7.6	8.6	6.4	8.6	10.2	6.0	4.2	4.8	4.6	C	3.8	3.8	3.0	6.4	3.7	
10	3.2	2.8	2.4	2.2 ^Y	3.6	3.4	4.0	4.8	5.8	8.9	8.8	9.4	7.8	4.5	5.0	4.0	3.8	4.3	3.5	3.3	3.0	2.2	3.2	4.2	
11	6.0	3.3	3.0	3.7	7.9	6.5	4.0	8.4	7.2	7.6	7.2	4.1	4.4	5.6	6.2	5.6	5.6	5.5	4.4	3.0	2.8	2.0	5.5 ^Y	5.7	
12	3.0 ^Y	3.6	3.0	2.2	1.4	4.2	4.2	6.8	12.4	7.4	12.8	13.8	5.4	B	7.2	5.2	4.8	4.5	14.2	7.8	5.0	3.4	6.0	3.0	
13	3.8	2.9	3.4	3.8	3.1	3.6	6.1	7.7	C	6.4	5.7	8.2	7.0	4.4	5.8	4.4	G	4.0 ^Y	4.9	6.7	5.6	5.8	7.2	3.4	
14	2.6 ^B	3.6	3.6	1.8	G	3.6	3.7	3.8	3.9	6.2	7.4	12.1	6.0	4.4	4.1	5.5	3.8	3.0	2.6	3.0	2.6	3.0	3.0	5.2	7.8
15	4.8	4.2	3.8	3.0	2.4	3.2	4.0	7.2	9.4	9.0 ^B	9.3	9.0	5.8	9.2	8.0	4.3	4.7	5.6	6.6	10.6 ^B	7.4	7.4	5.4	4.0	
16	8.6	3.2	3.2	2.8	3.2	3.0	5.2	8.0 ^B	8.5	13.7	13.8	D	6.7	4.7	4.5	4.0	6.8	6.2	4.0	4.3 ^Y	4.0	5.8	3.8	8.0 ^B	
17	4.2	4.6	4.6	4.6	3.8	3.0	5.8	6.6	6.6	8.8	12.4	6.1	7.4	7.2	6.2	4.8	4.8	5.2	5.2	3.7 ^F	3.0	3.6	7.0	C	
18	6.4	7.0	5.2	3.8	8.0	7.8	6.7	8.4	11.2 ^F	13.0 ^B	14.4 ^B	14.2 ^B	6.0	13.0 ^Y	11.4 ^B	8.3	11.2	8.1	4.8	4.8	3.8	4.0	5.2	5.6	
19	4.0	4.5	5.8	4.8	4.0	5.6	7.0	5.2	5.3 ^F	4.6	6.2	9.2 ^B	11.4 ^B	8.2	11.0 ^B	10.8 ^B	5.7	7.4	6.0	7.0	9.4	6.8	4.5	3.8	
20	4.0	4.1	6.4	12.9	14.3	11.5 ^B	10.5 ^B	5.7 ^Y	5.7	8.2 ^Y	12.6 ^B	12.4 ^B	8.8	12.6	5.5 ^Y	4.2	13.0 ^B	D	13.3	9.2	4.8	5.2	6.3	6.3	
21	3.5 ^F	4.0	4.0	5.0	5.0	4.4	G	3.6	5.8	5.7	5.4	7.2	14.3	12.4 ^B	5.7	5.8	6.2	6.2	4.5	7.2	6.6	8.1	7.2	11.5	
22	7.2	6.0	6.0	6.0	3.8	2.8	6.0	10.0	7.6	7.8	12.4 ^B	7.5	4.2	6.2	B	4.6	5.7	5.7 ^Y	4.0 ^F	3.8	3.8	3.8	3.8	2.2	
23	5.0	4.6	7.4	8.6	4.8	4.3	4.5	3.7	6.6	12.8 ^F	12.4 ^F	DF	15.4 ^F	6.4	4.9	4.2	3.8	3.6	2.8	3.2	3.6	3.0	3.2	5.4	
24	6.0	4.4	9.4	4.4	3.3	3.6	3.9	5.9	8.8 ^B	9.7	10.0	10.4	10.5	6.3	5.8	5.2	9.2	8.5 ^B	5.8	8.6	9.4	9.2	7.0	4.2	
25	4.0	3.6	6.0	5.1	4.4	3.4	3.9	7.6	9.4	9.4 ^B	9.8	7.6	14.6 ^B	15.2	13.2	7.2	4.4	8.9 ^B	9.2	8.8	7.8	7.2	3.4	5.6 ^Y	
26	8.8	8.8	12.5	5.2	C	C	C	C	C	C	7.4	8.4	4.3	C	C	5.7	4.8	4.0	4.4	4.3	4.2	4.6	6.2	5.0	
27	5.8	5.8	1.6	3.8	3.8	4.8	4.0	4.8	7.2	8.6	8.6	7.4	7.8	7.2	9.0	10.2	14.8 ^B	D	10.4 ^B	4.8	4.6	2.2	4.8	13.8	
28	7.8	6.8	4.8	4.0	2.8	3.0	4.0 ^Y	6.4	8.8	13.5	13.0	10.8 ^B	10.5	8.8	12.6	7.6	5.0	4.5	4.4	3.0	2.9	2.1	7.5	6.4	
29	6.5	8.3	7.2	13.4	8.4 ^B	3.6	5.4	8.7 ^B	11.5 ^B	9.1 ^B	8.0	8.7	6.1	7.0	11.7	7.2	4.8	3.8	3.8	2.8	3.0	3.0	6.2	12.0 ^B	
30	10.0 ^F	8.0	5.9	7.8	6.4	3.8	5.2	5.3	6.4	6.8	6.0	6.8	5.4	5.4	4.5	6.6	16.0	D	15.5 ^B	2.4 ^B	7.9	6.7	5.2	4.7	
31																									

Sweep 1.0 Mc to 17.0 Mc in 15 min

Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
(Denki-tsushin Kenkyujo) Gotanda, Shinagawa-ku Tokyo, Japan

IONOSPHERIC DATA

Lat. 35°42.4'N
Long. 139°29.7'E
Kokubunji, Tokyo

F₂-M3000

155°E Mean Time

Day	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	JF	2.7	JF	2.7	2.8	2.8	2.7	2.2	3.2	3.0	2.7	2.7	2.8	2.8	2.7	2.9	3.1	3.1	2.7	3.3	(3.1)B	2.9	F	B	
2	B	FS	F	FJ	FJ	3.1	3.4S	3.4	A	A	A	AS	A	2.9	3.1	3.0	2.9	3.1	3.2P	3.3	J	3.0	2.8	2.7S	
3	FS	JF	B	2.8	JF	2.7	2.8	2.8	2.9	2.8	2.7	2.6	2.7	2.7	2.7	2.9	2.7	3.2	2.9	3.0	2.9	3.0	2.6	2.7	
4	2.8	2.9	2.9	2.8	2.7	2.6	2.7	2.8	2.7	2.6	2.5	2.4	2.4	2.5	2.6	2.7	(2.7)A	2.7	(2.7)A	2.7	2.8	2.6	2.4	2.4	
5	2.4	2.4	2.3	2.8	2.7	2.5	2.8	2.8	2.7	2.8	3.1A	3.0	3.0	2.8	2.9	2.9	2.8	3.1	3.1S	3.1	2.8	2.6	2.9	I	
6	2.9	2.9	3.0	2.7P	2.6	2.6	2.4K	2.5K	(2.6)K	2.7K	BK	BK	BK	BK	BK	BK	BK	2.7P	3.0K	2.6K	2.6K	TK	TK	2.5K	
7	2.7K	2.8K	2.8K	2.9K	2.8F	JF	3.2	3.4	3.1	2.8	2.9	2.9	(2.8)C	2.8	2.8	2.8	2.8	A	A	A	A	A	2.8	2.9P	
8	2.9	2.9	3.0	3.0	3.0	3.0	3.1	3.2	C	C	C	2.8	2.9	2.8	2.9	2.9	3.1	3.0	3.0	2.8	2.8	2.9	2.7	(2.8)S	
9	2.9	2.9	2.8	3.0	3.1F	3.0	2.8	2.8	2.9	2.8	2.8	2.6	2.7	2.7	2.8	2.9	(2.9)C	2.9	(3.0)C	3.0	3.0S	2.9S	2.8	2.7	
10	2.8	2.8	2.9	3.0	3.1S	3.0	3.1	3.1	2.8	2.8	2.8	(2.7)A	2.6	2.8	2.9	2.9	2.9	2.9	2.8	2.9	2.8	3.0	2.8	2.7	
11	2.9	2.8	2.8P	3.0P	2.9	3.2	3.1	2.8	3.2A	2.7	2.5	2.7	2.8	2.8	2.6	2.7	3.0	2.9	3.0	3.0	2.9	2.9	2.8	2.9	
12	2.9	2.9	3.0	2.8F	3.0	JP	3.5P	3.3	2.8	2.7	A	A	2.9P	2.8	(2.8)S	2.9	2.9	3.0	(3.0)A	3.0	2.7	2.7	2.9	2.4H	
13	2.8	2.8	2.9	2.8	2.9	3.1F	3.1F	3.0F	CK	AK	2.8K	(2.8)A	2.9K	3.0K	3.1K	2.9K	2.9	3.0	3.1	3.0	3.0	2.6	2.8	2.7	
14	2.7	2.6	2.8F	2.8	2.9	2.9	3.1	3.2	3.1	2.8	2.7H	(2.8)	2.6H	2.6	2.6	2.6	2.9	2.9P	2.9P	(3.0)S	2.8	2.8	2.8P	2.7	
15	2.8S	2.9	2.9	2.9	2.9	3.0	3.0	2.9	2.7P	2.9	2.9	3.3	2.9	2.9	3.0	2.8	2.9	3.0	3.1	(2.9)A	2.7	AF	JF	2.7	
16	3.1	3.1	2.9F	2.6F	2.8F	2.7	2.9	2.8	3.0P	3.2A	J	A	2.9	3.0	2.8	2.9	3.1	3.2	3.1	2.8	(2.8)S	2.9	B	B.F	
17	B	BF	(3.0)S	FJ	FHT	3.0	3.3	3.0	3.0	A	A	A	2.8	2.8	2.7P	2.9	3.0	2.8	3.0	3.0	2.8	(2.7)S	2.6	C	
18	F	(2.9)B	F	F	F	JF	JF	A	A	A	A	A	2.8	2.8	(2.7)A	2.7	(2.8)A	2.9	(2.9)S	3.0	2.6	F	F	2.9	
19	3.0	(2.9)S	2.8F	2.8F	2.7F	2.9P	2.7	2.8	2.9	2.9	2.8	2.9	2.9	2.8	2.9	3.1	2.9	2.9	3.0	3.1	(2.9)A	2.6B	2.7P	2.8P	
20	2.9	J	3.2K	AK	AK	AK	AK	3.0K	2.8K	AK	AK	AK	AK	AK	2.6K	2.8K	AK	AK	AK	AK	2.7K	2.8	2.8	2.6	
21	2.8	JF	2.8F	3.1F	3.1F	3.0F	3.1F	2.9F	3.1	3.2	2.8	2.8	2.7	2.8	3.5P	2.9	2.9	3.0	2.9	2.9	2.9	JF	F	AF	
22	F	JF	JF	JF	JF	2.6F	2.6	2.8P	2.7	(2.6)A	2.5	2.4	2.5	2.7	2.7	2.7	2.7	2.6	2.6	J	2.6	(2.5)S	2.4S	2.7P	
23	S	S	2.5	2.6A	(2.7)F	2.7	2.8	3.1	2.3	(2.5)A	2.6	(2.7)A	2.8	2.8	2.9	2.9	3.0	3.2	3.0H	2.9H	JF	JF	JF	2.7P	
24	3.1	2.9	2.8P	2.9F	F	F	3.2P	3.1P	2.9	A	A	A	A	2.6	2.6	2.7	2.6	2.7	2.6	2.7	A	A	F	2.3F	
25	JF	2.6	2.9Z	2.4	2.5	2.8	2.7	2.8	A	A	A	A	A	A	A	C	3.0	3.0	A	A	S	S	2.9	JF	
26	A	AF	AF	JF	C	C	C	C	(2.4)F	2.5	2.7	C	C	C	C	2.7	2.7	2.8	2.9	2.8	2.9	2.5	2.5F	2.8	
27	2.5	JPF	2.7	JF	JPF	2.9S	2.8	2.8	2.6	2.6A	2.8	2.8	2.8	2.8	3.0	2.9	A	A	3.2A	(3.2)S	3.0	2.9	(2.7)S	(2.8)A	
28	2.9	(3.1)P	3.2	2.8P	(2.7)P	3.0	3.0	3.2	A	A	A	A	3.3	2.7	2.9	2.9	2.9	3.1	3.0	3.0P	2.8	2.8	2.5F	(2.8)B	
29	3.2	(3.1)B	2.9F	AF	FB	2.9	3.2	(3.1)A	(3.0)A	2.9	2.7	2.8	2.7	2.8	2.7	2.9S	2.8	2.8	3.0	2.7	3.2	2.6	3.0	A	
30	AF	3.3F	2.8F	(2.9)	(3.1)F	3.2	(3.1)F	3.3	2.8S	2.9	3.0	2.9	2.8P	2.8	2.7	A	A	A	A	A	A	2.9	2.7	2.6	2.5
31																									
Mean Value	2.9	2.9	2.9	2.8	2.9	3.0	3.0	3.0	2.9	2.8	2.7	2.8	2.8	2.8	2.8	2.9	2.9	2.9	3.0	3.0	2.8	2.8	2.8	2.7	
Count	2.0	2.1	2.4	2.5	2.6	2.2	2.7	2.8	2.3	2.0	2.0	2.2	2.5	2.6	2.7	2.8	2.6	2.6	2.6	2.5	2.5	2.2	2.2	2.3	

Sweep 1.0 Mc to 1.7 Mc in 1.5 min Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
(Denki-sushin Kenkyujo) Gotanda, Shimagawa-ku, Tokyo, Japan

Lat. 35°42.4'N
Long. 139°29.3'E

Kokubunji, Tokyo

IONOSPHERIC DATA

f_oF min

135°E Mean Time

Day	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	1.2	A	A	A	A	2.1	3.2	3.5	A	A	A	A	4.5	4.3	3.9	(3.8) ^A	3.6	A	A	A	A	A	(5.1) ^B	A
2	A	AF	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	2.6	A	A	A	A	A
3	A	A	AF	A	A	A	A	4.0	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
4	A	A	A	A	A	A	A	3.2	3.7	3.9	A	A	4.2	A	A	1.8	(2.7) ^A	3.5	(2.7) ^A	1.8	1.1	1.3	A	A
5	A	A	A	A	1.4	2.1	2.8	3.8	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
6	A	A	A	A	A	2.2	3.6	A	A	A	A	4.5	4.3	4.2	A	A	3.7	(3.0) ^A	2.2	2.0	A	A	A	A
7	A	A	E	1.2	(1.8) ^A	2.3	A	A	A	A	A	A	A	C	4.8	4.0	3.8	A	A	A	A	A	A	A
8	A	A	A	A	A	2.4	3.0	4.0	C	C	C	A	4.4	4.5	4.1	3.8	4.4	2.6	4.2	1.6	1.6	A	A	A
9	A	A	A	A	A	A	2.8	3.6	3.8	A	A	A	A	A	A	3.8	3.8	A	C	A	A	A	A	A
10	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	3.2	A	A	A	A	A
11	A	4.4	A	A	A	A	2.8	A	A	A	A	4.3	4.4	A	A	A	A	A	1.8	A	A	A	A	A
12	A	A	A	A	A	1.2	2.1	2.9	(3.5) ^A	4.0	A	A	6.0	A	A	A	4.0	(3.7) ^A	3.3	A	A	A	A	A
13	A	A	A	A	A	A	A	A	C	A	4.6	(4.5) ^A	4.4	4.2	A	A	4.0	3.3	2.4	A	A	A	AF	AF
14	A	A	E	1.1	1.2	1.8	2.7	3.3	3.8	A	A	4.4	4.4	4.1	4.1	4.2	3.8	3.4	2.5	A	A	A	A	A
15	A	A	A	A	A	(2.4) ^A	3.0	A	A	A	A	4.4	A	A	A	4.1	3.7	(3.0) ^A	2.2	A	AF	AF	AF	AF
16	AF	E	A	A	A	A	A	3.9	A	A	A	A	4.4	4.2	4.0	3.8	(3.2) ^A	2.5	1.7	A	A	A	A	A
17	A	AF	AF	A	A	2.4	3.4	4.0	A	A	A	A	A	A	A	4.0	3.6	A	A	A	2.2	A	A	C
18	A	A	A	AE	AF	AF	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1.6	A	A	A
19	A	A	A	A	A	A	A	3.3	3.7	4.0	A	A	A	A	A	A	A	A	A	A	A	A	A	A
20	A	A	A	A	A	A	A	5.3 ^S	A	A	A	A	A	A	4.2	4.1	A	A	A	A	A	A	A	A
21	A	A	A	A	A	AF	A	A	A	A	A	A	A	A	A	A	A	3.7	A	A	AF	A	A	AF
22	AE	AF	AF	A	A	2.4	A	A	A	A	A	A	5.1	(5.4) ^A	5.6	A	A	3.8	2.6	2.0	A	A	A	A
23	A	A	A	A	A	A	3.2	(3.6) ^A	3.9	A	A	A	A	A	A	A	3.4	(2.9) ^A	2.4	A	A	A	A	A
24	A	A	A	A	A	A	2.9	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
25	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	5.8	A	A	A	A	A	A	A
26	A	A	A	A	C	C	C	C	C	C	A	A	4.3	C	C	A	A	A	A	A	A	A	A	A
27	A	A	A	AF	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1.8	A	A
28	A	A	A	A	A	2.2	3.0	3.6	A	A	A	A	A	A	A	A	A	3.6	A	A	A	A	A	A
29	A	A	A	A	A	2.4	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
30	A	A	AF	A	A	A	A	A	A	A	A	A	A	A	A	4.4	A	A	A	A	A	A	A	A
31																								
Mean Value	-	-	-	-	1.3	2.3	3.0	3.6	(3.8)	-	-	(4.5)	4.4	4.3	4.3	4.0	3.8	3.5	2.5	2.0	-	-	-	-
Count	1	1	2	2	5	12	13	14	6	2	1	4	8	8	8	11	1.5	1.3	1.1	5	4	3	0	0

Sweep 1.0 Mc to 17.0 Mc in 1.5 min Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications /
(Denki-tsushin Kenkyujo) Gotanda, Shinagawa-ku Tokyo, Japan

Lat. 35°42.4'N
Long. 139°29.3'E
Kokubunji, Tokyo

IONOSPHERIC DATA

f_E min

135°E Mean Time

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	25	
1	1.2	1.2	E	E	E	1.2	1.4	1.4	1.7	2.0	2.5	2.3	2.5	2.4	2.3	1.9	1.7	1.8	1.6	1.2	1.6	1.6	1.6	1.4	
2	1.6	E	E	E	E	E	1.4	1.7	1.8	2.4	2.0	2.3	2.4	2.4	2.7	2.3	1.8	1.2	1.2	1.2	1.4	1.2	1.2	1.1	
3	1.2	1.2	1.1	E	E	E	1.3	2.0	1.8	1.7	2.4	2.0	2.0	2.4	2.4	2.4	1.7	1.5	1.2	1.6	2.0	1.7	1.6	1.4	
4	1.6	1.4	1.4	E	E	E	1.2	1.3	1.8	1.8	1.9	1.6	1.8	2.2	2.4	2.0	1.9	1.8	1.6	1.3	1.2	1.2	1.1	1.1	
5	1.1	E	E	E	E	E	1.2	1.4	1.8	1.9	1.8	2.4	2.4	1.7	2.1	1.8	1.7	1.7	1.7	1.2	G	1.1	1.1	1.1	
6	1.1	1.1	1.1	E	E	1.1	1.4	2.2	1.6	1.9	1.8	2.0	2.4	2.4	1.8	1.8	1.6	1.3	1.2	G	E	E	1.2	E	
7	E	E	1.6	E	E	1.2	1.7	1.8	1.8	1.8	2.0	2.0	2.4	(2.4)C	2.4	2.3	2.0	2.0	1.7	1.3	1.2	1.2	1.2	1.1	
8	1.1	E	E	E	1.2	1.2	1.5	2.4	C	C	C	2.6	2.7	2.4	2.4	2.2	1.8	1.8	1.4	1.4	G	2.0	1.5	1.6	
9	1.4	1.4	1.2	E	1.5	1.2	1.2	1.4	1.8	1.8	2.6	3.2	2.5	3.4	2.0	2.2	1.8	2.0	(1.9)C	1.8	1.2	1.2	1.2	1.1	
10	1.1	E	1.2	E	E	E	1.2	2.0	1.5	1.8	1.8	2.5	2.3	2.0	2.6	2.1	1.9	1.7	1.3	1.2	1.2	1.1	1.3	1.1	
11	1.1	E	E	E	E	E	1.2	1.4	1.3	1.8	2.0	2.4	2.5	2.6	2.0	1.9	1.6	1.4	1.3	1.2	1.1	1.1	1.1	E	
12	1.1	E	E	E	E	E	1.2	1.8	1.7	1.4	1.2	2.4	3.8	2.4	2.0	2.6	2.2	1.8	1.4	1.5	1.1	1.2	1.5	1.5	
13	1.4	E	E	E	E	1.5	1.7	(1.8)C	1.8	2.0	2.2	2.2	2.4	2.6	2.0	1.8	1.7	1.3	1.2	1.2	1.1	1.1	1.2	1.2	
14	E	E	E	E	E	E	1.2	1.2	1.8	1.8	1.8	1.8	2.0	1.8	1.8	1.8	2.1	1.6	1.3	1.4	1.2	1.2	1.2	E	
15	E	E	E	1.2	1.2	1.1	1.6	2.0	1.6	1.8	2.3	2.1	2.4	2.0	2.4	1.6	1.5	1.6	1.2	2.0	1.2	1.2	1.2	E	
16	1.2	E	E	E	E	1.1	1.2	1.2	1.4	1.7	2.1	1.9	2.3	2.3	1.6	1.4	1.7	1.6	1.4	1.2	1.2	1.2	1.2	E	
17	1.2	E	E	E	E	E	1.3	1.7	1.6	2.0	1.9	2.4	2.0	2.2	2.0	2.6	1.6	1.4	1.4	1.6	1.6	1.4	1.6	(1.4)C	
18	1.2	E	E	E	E	E	1.2	1.2	1.4	2.0	1.8	2.6	2.6	2.4	2.4	2.2	1.6	1.6	1.2	1.2	1.6	1.3	1.2	1.8	
19	E	E	E	E	E	1.4	1.6	1.7	1.8	1.8	2.6	1.8	1.8	2.4	1.8	1.8	2.0	1.4	1.2	1.3	1.4	1.6	1.5	1.2	
20	1.1	E	E	E	E	E	1.5	1.3	1.8	2.0	2.2	2.2	2.0	3.8	1.8	1.7	1.8	1.8	1.7	1.4	1.5	1.3	E	E	
21	E	E	1.2	1.2	1.2	1.2	1.2	1.2	1.4	2.4	2.3	4.0	3.6	3.6	2.0	4.1	1.8	1.2	1.1	1.2	1.2	1.2	1.2	1.1	
22	E	E	E	E	E	E	1.3	1.4	1.4	1.8	2.5	2.5	2.4	2.3	2.3	2.4	2.2	1.5	1.4	1.2	1.2	1.4	1.6	1.6	
23	1.2	1.2	E	E	E	1.4	1.6	1.4	1.8	2.0	2.6	2.4	2.4	2.9	2.4	2.0	1.7	1.4	1.2	1.2	1.2	1.2	1.2	1.1	
24	E	1.1	E	E	E	(1.2)B	1.4	1.2	1.8	2.7	3.5	3.8	2.7	3.5	2.6	3.9	3.6	1.6	1.4	1.4	1.3	1.2	2.0	1.2	
25	1.2	1.1	1.1	1.2	1.1	1.2	1.4	1.5	2.3	2.1	2.4	2.5	2.6	2.6	2.4	2.2	2.4	1.6	1.7	1.2	1.2	1.2	1.2	1.1	
26	1.1	1.1	F	E	E	C	C	C	C	C	2.4	2.5	2.7	C	C	2.6	2.1	1.6	1.3	1.2	1.2	1.6	1.2	1.1	
27	1.2	1.2	1.1	1.2	1.2	1.2	1.4	1.4	1.8	2.4	3.2	2.5	3.2	2.4	2.3	2.4	2.0	1.8	1.8	1.8	1.8	2.0	1.2	E	
28	E	E	E	E	E	E	1.2	2.0	2.2	2.7	3.8	3.8	5.2	3.7	3.2	2.4	2.4	1.7	1.2	1.4	1.5	1.2	1.2	1.2	
29	1.1	E	E	E	E	1.4	1.6	1.6	2.3	2.8	2.5	2.5	2.6	3.6	2.5	2.1	1.8	1.8	1.8	1.7	1.6	1.8	1.7	1.7	
30	1.7	E	E	E	E	E	1.8	1.8	1.8	2.0	4.0	4.2	4.0	4.1	3.2	2.2	2.2	1.8	1.5	1.3	1.2	1.1	1.1	1.1	
31	"																								
Mean Value	1.1	E	E	E	E	1.2	1.4	1.5	1.8	2.0	2.3	2.4	2.4	2.4	2.3	2.2	1.8	1.6	1.4	1.3	1.2	1.2	1.2	1.1	
Count	30	30	30	30	29	29	29	29	28	28	29	30	30	29	29	30	30	30	30	30	30	30	30	30	30

Sweep 1.0 Mc to 17.0 Mc in 15 min

Naruji

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
(Denkikisushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

Z_d

IONOSPHERIC DATA

Kokubunji, Tokyo

Lat. 35 42.4 N
Long. 139 29.7 E

135° E Mean Time

Day	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	(90) ^z	110	140 ^F	90	110	130	140	140	100	150	110	120	110	120	90	100	110	90	70	90	(100) ^B	110	F	B	
2	B	F S	F	F J	F J	110 ^S	130	130	A	A	A S	A	A	80	90	90	90	110	60 ^P	80	60 ^J	80	(100) ^B	60 ^S	
3	(70) ^L	80 ^F	(110) ^B	130	90 ^F	80	140	130	120	100 ^A	120	110	(130) ^B	140	130	130	120	70	110	130	170	90	110	100	
4	80	80	50	90	140	80	120	100	130	130	150	110	70 ^A	100	100	90	(100) ^A	70	(110) ^A	90	100	120	110	110	
5	90	110	80	80	70	90	120	140	130	100	(80) ^A	50	70	80	70	160	100	60	100 ^S	100 ^S	80	90	80	60 ^J	
6	80	80	60	90 ^F	100	90	90 ^S	(40) ^A	A ^k	B ^k	G ^k	G ^k	B ^k	B ^k	B ^k	B ^k	B ^k	40 ^k	50 ^k	90 ^k	40 ^k	70 ^k	70 ^k	100 ^k	
7	50 ^k	60 ^k	50 ^k	70 ^k	80 ^k	90 ^k	80	80	60	(100) ^A	70	100	60	(110) ^C	150	110	100	A	A	A	A	A	A	(50) ^P	
8	70	60	80	70	110	100	70	90	C	C	C	C	110	100	110	80	100	90	110	90	120	100	100	(100) ^S	
9	90	100	90	90	80 ^F	110	80	90	160	130	70	130	(120) ^A	110	110	90	(90) ^C	90	(90) ^C	80	70 ^S	70 ^S	90	60	
10	100	80	90	90	100 ^F	100	130	150	110	100	90	(100) ^F	100	120	100	110	100	100	90	90	100	80	100	80	
11	70	90	100 ^P	70 ^F	80	100	140	70	140	(120) ^A	120	80	120	100	130	120	120	70	120	100	100	90	90	90	
12	80	70	60	90 ^F	60	(100) ^F	70 ^F	80	120	90	(90) ^A	80 ^F	50 ^P	100 ^P	(100) ^F	90	110	110	(90) ^A	70	60	60	110	(120) ^H	
13	80	80	70	70	80	70 ^F	90 ^F	80 ^F	C ^k	A ^k	30 ^k	80 ^k	130 ^k	90 ^k	60 ^k	90 ^k	80	80	120	130	140	100 ^F	80	80	
14	70	90	80 ^F	90	90	120	130	100	120	60	90 ^F	100	100 ^H	120	110	90	90	80 ^P	120 ^P	(120) ^S	80	70	100 ^P	120	
15	70 ^S	90	80	80	100	130	110	110	120 ^P	(100) ^A	(80) ^A	(80) ^A	80	80	60 ^A	120	100 ^P	120	120	(110) ^A	90	180 ^F	(70) ^F	100	
16	110	110	110 ^F	120 ^F	70 ^F	110	160	130	160 ^P	170 ^A	(140) ^S	(130) ^A	110	80	100	110	80	50	100	90	(90) ^S	90	B	BF	
17	B	BF	(110) ^S	(90) ^F	90 ^S	80	90	110	100	A	A	A	100	110	120	100 ^P	80	100	110	90	130	120	(130) ^S	130	C
18	F	(170) ^B	F	F	F	J ^F	J ^F	J ^F	A	A	A	A	110	100	A	A	A	110	(100) ^S	90	120	F	F	100	
19	80	(80) ^S	80 ^F	100 ^F	90 ^F	90 ^F	100	130	80	120	90	70	(80) ^A	(80) ^A	(80) ^A	(80) ^A	130	100	80	70	(90) ^A	100 ^S	100 ^F	100 ^P	
20	70	(100) ^F	60 ^k	A ^k	A ^k	A ^k	A ^k	A ^k	70 ^k	A ^k	A ^k	A ^k	A ^k	A ^k	(70) ^B	B ^k	A ^k	A ^k	A ^k	A ^k	100 ^k	70	110	100	
21	70	70 ^F	90 ^F	90 ^F	120 ^F	90 ^F	150 ^F	150 ^F	100	90	80	70	(70) ^A	70	80 ^P	90	70	100	110	130	70	70 ^F	F	AF	
22	F	80 ^F	90 ^F	30 ^F	100 ^F	100 ^F	140 ^F	140	130 ^P	130	(130) ^A	120	70	130	90	100	100	120	120	120 ^J	100	(110) ^S	80 ^S	70 ^P	
23	S	S	90	130 ^A	(110) ^F	90	100	50	100	(110) ^A	110	(100) ^A	(90) ^A	(80) ^B	90	90	100	80	90 ^A	100 ^H	(80) ^S	(90) ^F	(100) ^F	130 ^P	
24	70	130 ^F	90 ^F	90 ^F	(90) ^F	(80) ^F	70 ^P	110 ^F	(140) ^A	A	A	A	80	80	90	90	90	100	100	90	A	A	(40) ^A	90 ^F	
25	70 ^F	110	150 ^Z	110	100	150	150	170	A	A	A	120	A	A	A	C	100	90	A	A	S	S	120	(80) ^Z	
26	A	AF	AF	J ^F	C	C	C	C	C	C	(130) ^F	90	100	C	C	C	120	110	100	110	120	120	80	100 ^F	80
27	90	(120) ^F	(100) ^F	(120) ^F	60 ^F	90 ^F	150	90	120 ^F	AF	A	90	110	110	90	90	A	A	60 ^A	(90) ^S	80	70	(80) ^S	(90) ^A	
28	100	(60) ^P	60	(150) ^P	(50) ^P	100	100	140	A	A	A	A	140	130	110	130	90	60	70	130	110 ^F	90	80 ^F	(70) ^B	
29	60	(80) ^B	(90) ^F	AF	BF	110	90	A	A	110	140	60	120	120	130	120	110	120	120	120	80	70	140	A	
30	AF	F	F	F	F	100	80	110 ^F	80	100 ^S	160	100	60	70 ^P	90	170	A	A	A	A	100 ^A	(110) ^B	90	120	
31																									
Mean Value	80	80	90	90	100	100	110	110	120	110	110	100	100	100	100	100	100	100	100	100	100	90	90	100	90
Count	23	25	26	24	24	27	27	27	21	18	21	24	25	26	26	26	25	26	26	26	26	27	26	25	25

Sweep 1.0 Mc to 17.0 Mc in 1.5 min

Manual

K 12

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
(Denki-tsushin Kenkyujo) Gotanda, Shinagawa-ku Tokyo, Japan

IONOSPHERIC DATA

f_oF₂

Yamagawa

Lat 31 12.5 N

Long 140° 57.7 E

23° 155° E Mean Time

Day	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	8.6	8.9	9.1	9.0	7.7	7.6	8.1	9.0	8.9	8.2	8.3	10.0	11.3	10.8	10.5	12.1	13.0	11.3	11.3	10.7	10.2	9.8	10.1	9.8
2	9.3	9.9	10.2	10.4	8.8	7.2	7.9	7.8	9.3	A	A	10.8	10.4	11.9	12.8	13.3	13.7	13.4	12.4	11.3	11.1	8.7	8.9	9.0
3	8.8	10.0	9.3	8.5	7.2	6.7	7.3	8.0	9.6	9.9	9.8	10.0	10.2	10.3	11.3	12.0	11.4	11.7	11.7	10.7	9.3	8.9	9.1	9.2
4	9.9	9.9	9.7	7.9	6.6	6.9	8.2	9.0	8.1	9.3	8.9	9.3	9.3	10.1	10.6	11.1	11.6	10.8	10.6	10.7	9.0	8.7	8.6	8.6
5	9.2	9.4	8.8	8.5	6.8	6.4	6.1	6.3	6.6	6.7	6.9	7.4	7.9	7.9	8.4	9.3	9.3	9.2	8.6	8.8	9.3	9.5	9.7	9.6
6	9.9	10.4	9.2	8.4	7.1	7.7	7.3	8.2	6.2	A	A	B	5.6	6.0	B	A	S	S	B	C	5.2	5.4	5.6	7.0
7	6.6	7.0	8.5	8.9	6.3	6.2	6.7	6.8	8.0	8.6	8.9	8.9	9.7	9.9	9.8	10.3	11.4	11.1	11.1	10.5	9.5	9.8	9.5	9.1
8	8.6	7.9	8.0	7.6	7.3	7.3	7.1	7.9	8.8	9.3	9.4	9.4	10.3	10.9	11.4	11.5	12.1	11.0	10.6	9.7	9.3	9.4	9.5	9.2
9	9.3	9.7	9.8	8.8	8.0	7.1	7.6	8.6	8.0	8.9	A	A	A	10.4	10.4	10.7	11.0	10.4	9.7	8.4	8.0	8.9	8.0	8.2
10	8.9	7.9	8.2	7.9	7.5	6.9	7.0	7.6	8.2	8.2	9.4	9.8	9.8	10.5	10.4	10.3	9.0	9.5	10.1	10.7	9.4	9.4	8.4	9.1
11	9.9	9.7	9.7	8.8	8.5	8.2	8.0	8.0	8.8	8.8	9.5	10.1	10.2	10.6	11.1	10.3	10.3	10.3	10.3	10.8	B	B	8.3	8.5
12	(9.8)	(9.2)	(8.8)	(7.9)	(7.5)	7.9	8.3	8.3	8.8	9.2	(9.3)	9.3	11.1	11.3	10.6	10.6	10.8	10.8	11.0	10.2	(10.5)	10.6	8.4	7.8
13	F	F	9.2	4.4	8.0	7.8	6.9	(7.2)	9.5	(10.4)	(11.3)	(9.4)	8.5	(9.6)	8.5	9.1	11.1	9.1	9.8	10.1	7.9	7.3	7.9	8.0
14	8.3	8.5	9.3	8.3	7.8	7.4	7.4	8.3	7.2	7.9	7.9	8.1	8.7	9.8	10.3	10.7	11.5	12.1	11.1	9.9	8.7	9.1	9.3	9.8
15	10.3	10.5	9.5	8.5	7.8	7.7	7.3	8.5	9.2	9.4	9.2	9.8	10.4	10.8	10.5	11.4	11.8	11.0	11.4	11.0	(8.3)	7.5	8.3	8.7
16	10.0	8.6	8.9	9.2	9.0	8.0	8.9	9.6	9.0	8.6	8.0	9.2	9.5	10.4	C	C	10.5	10.1	8.9	8.8	10.0	9.2	9.6	9.6
17	9.0	8.8	9.1	8.8	7.9	8.2	(8.3)	8.4	8.7	(7.3)	7.9	8.7	10.3	11.0	10.9	10.2	9.8	11.0	11.0	10.2	9.6	(9.1)	(8.6)	(7.9)
18	7.1	(8.3)	(9.4)	8.4	8.2	7.4	6.5	(7.0)	7.4	8.7	7.3	7.1	8.1	10.1	9.3	10.0	11.6	10.8	10.1	(8.5)	6.9	7.8	7.7	7.6
19	SF	SF	F	(7.4)	7.1	6.9	6.9	8.1	9.5	9.1	9.5	9.8	10.1	10.8	10.9	9.6	9.3	10.7	11.0	11.0	(10.2)	(10.5)	8.2	9.4
20	8.7	8.4	8.6	7.6	7.3	7.1	7.3	7.5	6.4	6.5	5.9	6.2	6.2	(6.2)	6.2	6.7	6.9	7.0	7.5	7.5	7.0	C	C	C
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	9.5	9.2	9.4	8.9	8.7	8.7	9.1	9.3
22	9.9	(9.6)	(9.3)	(7.4)	(7.0)	(6.5)	6.8	8.2	8.9	8.8	9.1	9.4	9.2	9.1	10.3	11.7	(11.8)	11.8	(11.0)	10.1	8.7	9.7	9.0	9.4
23	10.1	10.0	8.7	(8.8)	8.8	(8.8)	8.1	7.8	(8.4)	9.0	9.6	9.6	9.8	10.3	10.5	11.0	10.4	10.1	9.7	8.4	8.0	8.5	8.7	8.4
24	9.6	8.3	8.5	7.5	6.5	(6.0)	6.2	8.0	8.1	8.9	(8.5)	9.0	9.0	10.4	10.3	10.7	11.0	11.3	10.0	9.3	8.8	8.1	(7.5)	(7.1)
25	8.9	9.3	9.3	(8.0)	7.4	(7.0)	8.0	8.8	7.3	S	A	A	(9.7)	10.0	10.5	11.5	11.3	11.0	10.5	10.5	9.4	(9.4)	(9.4)	(9.3)
26	10.4	9.9	9.4	9.1	6.7	6.4	(8.0)	9.6	(9.4)	9.2	10.3	10.1	10.3	10.8	11.0	10.9	10.5	11.0	11.3	10.1	8.7	8.8	(8.9)	9.0
27	9.6	9.2	9.8	10.4	7.8	7.7	8.0	9.8	(8.3)	A	A	A	9.0	10.1	(10.2)	10.2	9.2	(10.3)	11.4	9.9	8.8	8.7	8.9	8.8
28	9.1	8.9	10.6	9.5	7.9	8.2	9.1	8.4	8.3	7.8	9.0	9.7	10.2	(10.2)	11.1	11.3	11.4	12.2	12.5	11.2	11.2	10.2	8.2	7.3
29	7.6	8.8	9.3	(8.4)	9.4	8.7	8.4	9.0	C	C	8.4	8.7	9.3	(9.5)	9.7	11.1	(12.8)	(12.8)	12.7	11.7	9.0	8.5	(8.2)	8.8
30	8.7	8.8	F	F	8.2	9.2	8.5	7.6	7.9	7.9	10.3	9.7	9.4	(10.0)	(11.3)	10.7	(10.8)	10.9	10.2	A	A	8.8	8.8	8.8
31																								
Mean Value	9.2	9.2	9.3	8.5	7.7	7.4	7.6	8.2	8.3	8.7	9.0	9.6	9.8	10.3	10.5	10.7	11.0	10.9	10.5	10.2	8.8	8.9	8.9	9.0
Count	27	27	27	28	28	29	29	29	28	24	24	25	28	29	27	28	29	29	29	28	28	26	29	29

Sweep 1.2 Mc to 18.5 Mc in 1.5 min

Manual

Y 1

IONOSPHERIC DATA

Lat 31 12' N
Long 139 57' E

Yamagawa

hr F.

135° E Mean Time

Day	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	410	450	380	360 ^P	350 ^H	330 ^T	350	310	290	350	400 ^A	440	400	390	500	400 ^P	390 ^H	320	310	360	360	370	400 ^H		
2	380	360 ^J	320	340 ^Z	320 ^Z	310	300	320	320	370	400 ^A	400	400	400 ^A	400	390	350	340	310 ^S	280	300	380	390	420 ^H	
3	410 ^H	410 ^F	400 ^F	340 ^Z	330 ^H	330	320	290	300	370	400	380	380	380	400 ^A	400	390	390	340	340	360 ^J	400 ^J	420	450	
4	410 ^F	370	320	370	370	370	320	320	280	310	360	380	380	380	A	A	A	A	390 ^J	390	380	340	440	450 ^S	
5	440	430	420	360	400 ^H	430 ^S	430 ^S	420 ^K	400 ^K	400 ^K	450	450	440 ^A	430 ^K	420	400	270	350	390	410	380	420	420	440	
6	400 ^H	380	330	360	340	370	470	400	A	A	A	B	G	G	B	A	S	S	B	C	K	K	400 ^H	480	
7	440 ^K	390	400	390	360 ^Z	310 ^Z	300	350	400	380	400	430	420	380	400	400	350 ^P	340	340	370	370	380	380	380	
8	380	380	360	330 ^F	330 ^F	340 ^F	300	330	320	330	340	390	410	410 ^A	410	390	380	330	330	440	390	400	380	400	
9	380	370	350	330	330	300 ^F	370	330	320	A	A	A	A	380	400	390	320	340 ^A	350	330	320	300	310	330	
10	330	380	330	310	320	280	270	300	310	400	360	350	440 ^A	430	A	A	A	A	390 ^J	360	370	350	330	380 ^J	
11	380	350	320	350 ^B	330	300	310	350 ^H	330	360	390 ^A	410	400 ^A	390	380	370	380	380	340	340	360	340	490	400 ^P	
12	420 ^F	1350 ^J	1350 ^B	340 ^B	350 ^B	290	300	350 ^H	330	360	420 ^A	480	410	380	430 ^H	430 ^H	380	340	340	360	310	300	350	460	410
13	F	F	F	410 ^F	350 ^F	350 ^F	370	(240) ^B	370 ^P	320 ^A	(260) ^S	(340) ^S	420	(410) ^P	400 ^J	400 ^J	330	330	340	360	420 ^C	470	400 ^V	370 ^F	
14	430	400	400	380	340	320	300	320	300	380	340	410	380 ^S	A	A	390	350	330	330 ^R	340 ^J	380	390	400	420	
15	430	330	310	370 ^R	360 ^K	350	340	300	370	370	390 ^A	400	380	370	400	380	320	360	(500) ^Z	310	320	340	(440) ^P	400	
16	460 ^P	390	410	360	(350) ^B	330	300 ^R	300 ^H	300 ^P	340	410 ^H	410	430	410	C	C	320	330 ^J	340 ^J	330 ^P	320	380 ^Z	370 ^P	350 ^J	
17	350	370	380	420	340	330	(270) ^R	300 ^H	300	370 ^A	440	450	430	A	A	400 ^J	340	340 ^J	330	320	380	(350) ^S	420 ^V	(410) ^S	
18	(410) ^S	(390) ^S	370	(380) ^P	320 ^F	390 ^F	270	(300) ^S	330	350	290	440	400	440	400	410	390 ^J	330 ^P	310	A	A	440	380	340 ^F	
19	SF	SF	F	(440) ^R	380	420	330	320 ^J	350	400	390	400	380	390	340	350	370 ^S	380 ^P	(320) ^P	(310) ^S	(370) ^S	400 ^S	400	370 ^F	
20	360 ^J	320 ^P	370 ^T	380	390	350	350	320	320	430	G	G	G	G	G	K	K	380	380	340	310 ^K	C	C	C	
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	370 ^S	360	370	350	330	380	450	400 ^F	
22	350	340	300	350 ^V	(370) ^S	380 ^Z	370	300	300	370 ^R	370	460	420	400	400	370	(360) ^N	350	(330) ^C	310	340	400	400	360	
23	330	330	440	(410) ^B	380	(330) ^S	(280) ^F	300	440	(410) ^A	280	400	420	400	370	360	330	340	310 ^J	330	(360) ^S	390	380	310	
24	400 ^S	370	320	320 ^T	340 ^T	(340) ^B	(310) ^B	290	370	380	370	(350) ^S	420	410	410	400	400	380	330	350 ^J	340	390	(390) ^S	380	
25	410	350	310	350 ^B	360	430	310	300	270	S	A	A	(400) ^A	410	400	370	370	370	340	340	310	(370) ^A	420 ^Z	460 ^C	
26	400 ^T	370	330	290 ^F	400	360	(340) ^F	310 ^F	A	A	A	420	400	390	390	400	370	370	350	320	320	410	(420) ^S	380	
27	390	410	410	340 ^S	330	(350) ^A	370 ^F	290 ^N	A	A	A	A	390	(390) ^C	390	390	390	(410) ^S	320	320	420	430	400 ^R	380	
28	380	400	400	350	350	340	300 ^K	260	340	340	470	410	SA	A	420	410	390	360	350 ^R	320	300	300	340	340	
29	340	340	410 ^F	(390) ^F	370	370	330 ^K	330 ^C	C	C	400	430	430	(450) ^A	460	470	(420) ^F	(400) ^S	(370) ^R	320	330	310	(400) ^B	410	
30	320 ^R	JF	F	F	F	360 ^J	290	300	290 ^R	A	A	390 ^J	B	A	AB	400	(390) ^A	300	370	A	A	410 ^P	410	420 ^J	
31																									
Median Value	400	370	370	360	350	350	310	310	320	370	390	410	410	400	400	390	380	360	340	330	360	390	360	400	400
Count	27	26	27	28	28	29	29	29	26	21	22	24	24	23	23	26	28	29	29	27	26	28	29	29	29

Manual

Sweep 1.2 Mc to 18.5 Mc in 1.5 min

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
(Dankei tsushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

Lat 35 12.5 N
Long 139 37.7 E

Yamagawa

h.p.

135°E Mean Time

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
1	320 ^H	350 ^A	330 ^A	290 ^H	290 ^H	300 ^A	300 ^A	290 ^A	250 ^A	250 ^A	A	A	380	300	480	380	340 ^H	280 ^A	290 ^A	270 ^A	330 ^A	240 ^A	240 ^A	290 ^A	320 ^A	320 ^A	
2	320 ^H	310 ^A	A	A	280 ^A	300 ^A	240 ^A	280 ^A	300 ^A	A	A	A	A	A	360 ^A	350 ^A	340 ^A	320 ^A	280 ^A	260 ^A	250 ^A	330 ^A	270 ^A	300 ^A	320 ^A	300 ^A	
3	320 ^H	320 ^A	310 ^H	A	A	A	310 ^A	270 ^A	300 ^A	310 ^A	A	A	390	400 ^A	400 ^A	A	330 ^A	320 ^A	A	A	300 ^A	330 ^A	350 ^A	350 ^A	300 ^A	300 ^A	
4	300 ^H	290 ^A	250 ^A	240 ^A	230 ^H	300 ^A	320 ^A	300 ^A	270 ^A	270 ^A	300 ^A	300 ^A	300 ^A	300 ^A	A	A	A	320 ^A	320 ^A	290 ^A	280 ^A	320 ^A	320 ^A	360 ^A	350 ^A	350 ^A	
5	345 ^A	320 ^A	310 ^A	300 ^A	320 ^A	330 ^A	400 ^A	410 ^A	400 ^A	300 ^A	380 ^A	450 ^A	440 ^A	420 ^A	410 ^A	380 ^A	250 ^A	320 ^A	340 ^A	330 ^A	300 ^A	300 ^A	350 ^A	320 ^A	340 ^A	340 ^A	
6	320 ^H	300 ^A	290 ^A	280 ^A	300 ^A	330 ^A	400 ^A	280 ^A	A	A	A	A	G	B	B	A	S	S	A	C	A	A	B	370 ^A	A	A	
7	A	A	A	A	A	A	260 ^A	330 ^A	380 ^A	350 ^A	400 ^A	400 ^A	400 ^A	400 ^A	360 ^A	380 ^A	340 ^A	310 ^A	300 ^A	260 ^A	260 ^A	240 ^A	300 ^A	310 ^A	310 ^A		
8	310 ^A	325 ^A	290 ^A	270 ^A	270 ^A	250 ^A	240 ^A	290 ^A	290 ^A	300 ^A	300 ^A	390 ^A	400 ^A	380 ^A	360 ^A	340 ^A	320 ^A	300 ^A	300 ^A	370 ^A	310 ^A	320 ^A	320 ^A	320 ^A	320 ^A	320 ^A	
9	A	A	280 ^A	260 ^A	250 ^A	250 ^A	260 ^A	290 ^A	270 ^A	300 ^A	A	A	A	A	350 ^A	380 ^A	240 ^A	280 ^A	320 ^A	320 ^A	300 ^A	280 ^A	280 ^A	290 ^A	300 ^A	300 ^A	
10	A	A	280 ^A	250 ^A	220 ^A	240 ^A	240 ^A	250 ^A	230 ^A	350 ^A	340 ^A	330 ^A	400 ^A	400 ^A	A	A	A	370 ^A	320 ^A	300 ^A	300 ^A	300 ^A	300 ^A	300 ^A	310 ^A	310 ^A	
11	270 ^A	280 ^A	290 ^A	280 ^A	270 ^A	240 ^A	240 ^A	260 ^A	280 ^A	310 ^A	380 ^A	450 ^A	380 ^A	360 ^A	370 ^H	390 ^A	350 ^A	330 ^A	330 ^A	290 ^A	280 ^A	250 ^A	260 ^A	320 ^A	320 ^A	320 ^A	
12	310 ^A	300 ^A	330 ^A	300 ^A	260 ^A	250 ^A	240 ^A	240 ^A	280 ^A	310 ^A	380 ^A	450 ^A	380 ^A	350 ^A	370 ^A	390 ^A	300 ^A	360 ^A	310 ^A	270 ^A	250 ^A	290 ^A	290 ^A	290 ^A	350 ^A	350 ^A	
13	350 ^A	320 ^A	320 ^A	310 ^A	300 ^A	300 ^A	270 ^A	240 ^A	330 ^A	280 ^A	230 ^A	A	A	A	A	A	330 ^A	300 ^A	300 ^A	240 ^A	290 ^A	250 ^A	260 ^A	320 ^A	320 ^A	320 ^A	
14	360 ^A	350 ^A	330 ^A	300 ^A	290 ^A	260 ^A	220 ^A	280 ^A	250 ^A	360 ^A	300 ^A	410 ^A	380 ^A	350 ^A	370 ^A	390 ^A	300 ^A	360 ^A	310 ^A	270 ^A	250 ^A	290 ^A	290 ^A	400 ^A	360 ^A	360 ^A	
15	320 ^A	280 ^A	260 ^A	270 ^A	260 ^A	260 ^A	220 ^A	320 ^A	280 ^A	360 ^A	340 ^A	320 ^A	350 ^A	350 ^A	380 ^A	380 ^A	330 ^A	300 ^A	300 ^A	280 ^A	300 ^A	290 ^A	300 ^A	320 ^A	320 ^A	320 ^A	
16	320 ^A	330 ^A	330 ^A	300 ^A	300 ^A	280 ^A	300 ^A	300 ^A	250 ^A	300 ^A	410 ^A	400 ^A	400 ^A	350 ^A	C	C	C	300 ^A	270 ^A	310 ^H	A	B	290 ^A	300 ^A	300 ^A		
17	300 ^A	330 ^A	300 ^A	260 ^A	280 ^A	280 ^A	250 ^A	250 ^A	220 ^A	A	A	A	A	A	A	A	330 ^A	340 ^A	330 ^A	280 ^A	250 ^A	310 ^A	320 ^A	290 ^A	290 ^A	290 ^A	
18	S	S	280 ^A	280 ^A	270 ^A	260 ^A	270 ^A	270 ^A	300 ^A	340 ^A	290 ^A	440 ^A	370 ^A	390 ^A	390 ^A	400 ^A	390 ^A	390 ^A	310 ^A	290 ^A	A	A	320 ^A	310 ^A	300 ^A	300 ^A	
19	330 ^A	290 ^A	300 ^A	300 ^A	340 ^A	290 ^A	260 ^A	260 ^A	300 ^A	320 ^A	330 ^A	260 ^A	350 ^A	360 ^A	350 ^A	300 ^A	350 ^A	340 ^A	260 ^A	280 ^A	250 ^A	330 ^A	300 ^A	300 ^A	300 ^A	300 ^A	
20	300 ^A	270 ^A	330 ^A	280 ^A	300 ^A	310 ^A	300 ^A	250 ^A	310 ^A	420 ^A	430 ^A	620 ^A	480 ^A	470 ^A	480 ^A	410 ^A	380 ^A	360 ^A	330 ^A	300 ^A	280 ^A	280 ^A	280 ^A	340 ^A	340 ^A	340 ^A	
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	350 ^A	340 ^A	340 ^A	330 ^A	260 ^A	280 ^A	340 ^A	350 ^A	350 ^A	350 ^A	
22	310 ^A	300 ^A	230 ^A	220 ^A	280 ^A	280 ^A	260 ^A	280 ^A	300 ^A	320 ^A	330 ^A	330 ^A	410 ^A	390 ^A	380 ^B	330 ^A	410 ^B	290 ^A	280 ^C	270 ^A	270 ^A	300 ^A	300 ^A	300 ^A	300 ^A	300 ^A	
23	260 ^H	270 ^A	320 ^A	320 ^A	260 ^A	250 ^A	240 ^A	230 ^A	A	A	330 ^A	380 ^A	390 ^A	390 ^A	390 ^A	340 ^A	310 ^A	310 ^A	300 ^A	280 ^A	270 ^A	300 ^A	300 ^A	300 ^A	300 ^A	300 ^A	
24	300 ^A	280 ^A	270 ^A	280 ^A	300 ^A	300 ^A	270 ^A	240 ^A	240 ^A	350 ^A	360 ^A	410 ^A	390 ^A	360 ^A	380 ^A	350 ^A	360 ^A	330 ^A	320 ^A	290 ^A	270 ^A	280 ^A	280 ^A	290 ^A	300 ^A	300 ^A	
25	320 ^A	300 ^A	280 ^A	260 ^A	290 ^A	280 ^A	260 ^A	270 ^A	240 ^A	260 ^A	A	A	400 ^A	400 ^A	380 ^A	350 ^A	330 ^A	300 ^A	320 ^A	290 ^A	270 ^A	270 ^A	A	A	400 ^A	400 ^A	
26	320 ^A	300 ^A	280 ^A	240 ^A	270 ^A	290 ^A	270 ^A	270 ^A	A	A	A	A	390 ^A	400 ^A	350 ^A	280 ^A	350 ^A	330 ^A	290 ^A	260 ^A	240 ^A	300 ^A	310 ^A	300 ^A	300 ^A	300 ^A	
27	330 ^A	340 ^H	310 ^A	240 ^A	A	A	260 ^A	270 ^A	A	A	A	A	360 ^A	370 ^A	370 ^C	360 ^A	380 ^A	380 ^A	300 ^A	280 ^A	250 ^A	A	A	A	A	A	
28	300 ^A	300 ^A	280 ^H	250 ^A	280 ^A	280 ^A	270 ^A	260 ^A	300 ^A	330 ^A	400 ^A	390 ^A	A	A	370 ^A	380 ^A	340 ^A	320 ^A	290 ^A	260 ^A	240 ^A	250 ^A	280 ^A	280 ^A	280 ^A	280 ^A	
29	290 ^A	300 ^A	300 ^A	300 ^A	A	A	280 ^A	290 ^A	C	C	400 ^A	400 ^A	430 ^A	430 ^A	420 ^A	460 ^A	360 ^A	320 ^H	300 ^A	270 ^A	A	B	A	A	A	A	
30	290 ^B	340 ^A	240 ^A	A	A	290 ^A	250 ^A	260 ^A	A	A	A	A	B	A	A	A	A	A	A	A	A	A	A	300 ^A	320 ^A	300 ^A	300 ^A
31																											
Mean Value	310	300	300	280	280	260	270	270	280	320	340	390	380	380	350	340	340	320	300	290	270	290	290	310	310	310	
Count	25	26	26	24	24	27	29	29	24	21	18	17	22	23	22	24	26	28	27	26	24	23	26	26	26	26	

Sweep 1.2 Mc to 18.5 Mc in 15 min

Manual

Electrical Communication Laboratory Japanese Ministry of Telecommunications
(Denkotsushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

Yamagawa
Lat. 31°12.5'N
Lon. 139°37.7'E

ff₁

135°E Mean Time

Day	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							L	L	Q	Q	A	A	A	A	L	5.4 ^J	L	Q	Q	A				
2							L	L	L	A	A	A	A	A	A	5.8	L	4.4	L	L				
3							Q	L	L	A	A	A	A	A	A	A	L	A	A	A				
4							L	L	L	5.0	A	A	L	A	A	A	L	A	L	A				
5							4.0	L	L	L	L	5.8	(5.7) ^A	5.6	5.3	5.3	Q	A	A	A				
6							L	L	A	A	A	4.8	4.8	5.0	B	A	4.7	A	A	C				
7							L	L	5.2	5.4	L	L	A	A	A	5.5	5.6	A	A	A				
8							Q	L	L	L	A	L	L	L	A	A	5.2	L	L	A				
9							Q	L	L	L	A	A	(5.8) ^A	(5.7) ^A	L	L	L	L	L	A				
10							Q	Q	Q	L	A	5.3	L	A	A	A	A	L	L	L				
11							Q	Q	Q	5.8	A	A	A	(5.6) ^A	(5.3) ^A	5.2	(5.1) ^A	5.0	L	L	A			
12							Q	L	L	L	A	(5.1) ^J	5.6	A	A	5.5	L	L	L	A				
13							A	Q	4.3	A	Q	A	A	5.6	5.6	4.8	L	L	(4.2) ^A	Q				
14							Q	Q	Q	A	L	5.7	5.6	A	A	A	A	4.9	L	A				
15							Q	L	L	A	A	A	A	5.6	(5.6) ^L	5.5	L	L	L	A				
16							L	L	L	L	L	L	L	L	C	C	L	L	L	L				
17							Q	L	Q	A	A	A	A	A	A	A	5.4	A	L	L				
18							Q	Q	L	A	(5.0) ^A	(5.3) ^A	5.7	5.9	L	L	A	A	A	A				
19							L	L	A	B	5.6	5.6	5.0	5.6	5.3	4.7	Q	L	Q	Q				
20							Q	Q	4.8	5.2	4.9	4.9	(5.1) ^B	(4.9) ^C	4.6	4.9	(4.8) ^B	4.6	4.4	4.2				
21							C	C	C	C	C	C	C	C	C	B	A	A	L	L				
22							Q	L	L	L	L	B	A	B	5.5	L	L	5.1	C	L				
23							Q	Q	Q	A	A	(5.5) ^B	A	L	L	5.2	A	A	A	A				
24							Q	Q	A	L	5.5	(5.6) ^L	5.6	5.3	5.4	5.4	5.2	4.9	L	L				
25							Q	Q	Q	A	A	A	A	A	A	5.5	(5.3) ^L	5.0	L	L				
26							L	L	A	A	A	A	A	A	A	A	5.2	5.0	L	Q				
27							A	A	A	A	A	(5.5) ^B	5.7	(5.7) ^C	(5.6) ^L	5.4 ^J	L	L	L	L				
28							Q	L	A	A	L	5.7	A	A	A	A	A	A	Q	Q				
29							Q	Q	C	C	5.8	L	L	A	(5.5) ^J	(5.8) ^J	5.3	4.7	A	A				
30							B	A	A	A	A	A	A	A	A	A	A	A	A	A				
31																								
Mean Value											5.6	5.5	5.6	5.6	5.5	5.4	5.2	4.9						
Count						1		3	4	6	11	9	11	13	15	9	9	9	2					

Sweep 1.2 Mc to 18.5 Mc in 1.5 min

Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
 (Denki-tsushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

h_pF₂

135° E Mean Time Yamagawa Lat. 31°12.5'N Long. 139°37.7'E

Day	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						250	250	Q	Q	A	A	A	A	250	270	220	300	Q	Q	A					
2						210	260	A	230	A	A	A	A	A	240 ^A	220	220	220	240 ^A	230	250				
3						Q	210	A	240	A	A	A	A	A	A	A	A	A	A	A	A				
4						270	230	220 ^A	220	A	A	A	A	A	A	A	A	A	220	A	A				
5						270	A	A	290 ^A	A	A	A	A	A	260	240	Q	A	A	A	290				
6						290	A	A	A	A	A	B	A	A	B	A	A	A	A	A	A				
7						A	A	250	220	A	A	A	A	A	200	A	A	A	A	A	A				
8						Q	220	230	B	A	A	A	200 ^A	A	A	A	270	A	A	230	A				
9						Q	250	250	A	A	A	A	A	A	A	A	A	A	A	A	A				
10						Q	Q	Q	240 ^A	A	A	A	A	A	A	A	A	A	A	A	A				
11						Q	Q	Q	220	A	A	A	A	A	(230) ^A	220	A	A	(250) ^A	240	A				
12						Q	220 ^A	220	A	A	(230) ^A	A	A	A	A	A	A	220	A	A	A				
13						A	Q	A	A	Q	A	A	A	A	A	A	A	(220) ^A	(250) ^A	A	Q				
14						Q	Q	A	240	200	210	B	A	A	A	A	A	A	240	A	A				
15						Q	(290) ^A	A	(230) ^A	A	A	A	A	A	(240) ^B	220	230	(250) ^A	270	A	A				
16						250 ^A	(230) ^A	Q	190	220	210	(210) ^A	210	C	C	C	240	270	240	250					
17						Q	240	Q	A	A	A	A	A	A	A	A	A	250	(250) ^A	260	260				
18						Q	Q	Q	260	A	A	A	A	A	A	A	A	A	A	A	A				
19						250	230	(240) ^A	250	210	(230) ^A	(230) ^A	220	210	220	230	Q	270	Q	Q					
20						Q	Q	240	240	(230) ^A	210	200	C	A	A	210	230	210	220	230					
21						C	C	C	C	C	C	C	C	C	C	C	B	A	A	(270) ^A	(260) ^A				
22						Q	220	220	230	A	B	A	A	210	220	(250) ^A	(360) ^A	250	C	A					
23						Q	Q	Q	A	A	A	200 ^A	A	A	A	A	A	A	A	A	A				
24						Q	Q	Q	A	210	A	A	(230) ^A	200	220 ^A	200 ^A	210	(230) ^B	250	260					
25						Q	Q	Q	A	A	A	A	A	A	A	A	(220) ^B	(250) ^A	A	A					
26						A	A	A	A	A	A	A	A	A	A	A	A	(250) ^A	250	240	Q				
27						A	A	A	A	A	A	A	A	A	A	A	C	B	240	A	A	260 ^A			
28						Q	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A				
29						Q	Q	C	210 ^A	A	A	A	A	A	A	A	A	250 ^A	A	A	A				
30						B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A				
31																									
Median						250	230	240	230	210	210	210	220	220	220	230	240	250	240	260					
Count						7	12	12	10	5	7	6	8	9	9	9	14	14	9	9					

Sweep 1.2 Mc to 18.5 Mc in 1.5 min Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
(Denkikatsushin Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

Lat. 31°12.5'N
Long. 130°37.7'E

Yamagawa

IONOSPHERIC DATA

135°E Mean Time

f_o

Day	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																								
2							18 ^H	(25) ^A	34	(34) ^A	34	4.0	(4.0) ^A	4.0	4.0	B	B	3.1	A	A				
3							24 ^T	A	(36) ^A	(37) ^A	3.5	A	A	A	A	A	3.4 ^A	A	A	A				
4							24	(28) ^A	32	37	(37) ^A	3.7	3.8	3.8	3.5	3.8	A	A	A	A				
5							20	30	A	A	A	A	A	A	B	A	A	A	A	A				
6							A	26	(30) ^A	34	3.6	4.0	4.2	4.0	4.0	3.8	3.7	3.1	2.7	A				
7							A	A	A	A	A	3.7	(3.8) ^B	3.9 ^A	(3.8) ^B	3.6	A	A	A	C				
8							A	A	3.0	3.3	(3.7)	A	A	A	A	4.0	3.6	3.5	3.2	(2.6) ^A	(2.0) ^A			
9							2.2	2.7	A	B	A	A	A	A	A	A	B	A	A	2.7 ^A	A			
10							2.1	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
11							2.0 ^H	2.7	2.3	(3.4) ^A	3.5	(3.6) ^A	3.7	(3.7) ^A	3.6	(3.6) ^A	(3.5) ^A	A	A	A	A	2.0		
12							(1.9) ^B	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
13							A	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
14							A	A	A	(3.8) ^B	B	A	A	A	A	A	A	A	A	A	A			
15							A	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
16							A	A	A	3.5	(3.6) ^A	3.7	(4.0) ^B	4.3	C	C	C	A	A	A	A			
17							B	A	A	A	A	A	A	A	(3.9) ^A	A	B	A	A	A	2.9	2.1		
18							B	B	A	A	A	A	A	A	A	A	A	A	A	A	A			
19							B	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
20							A	A	(3.3) ^A	A	B	A	B	C	B	B	A	A	A	A	A			
21							C	C	C	C	C	C	C	C	C	T	A	3.3	A	A	A			
22							A	A	A	A	A	B	A	A	A	A	A	A	C	A	A			
23							2.3	A	A	3.4	A	A	A	B	A	A	A	A	A	A	A			
24							A	A	A	B	A	B	A	A	A	A	3.6	(3.2) ^B	2.7	(2.2) ^B	A			
25							2.1	3.0	(3.4) ^A	A	A	A	A	A	A	A	3.6	(3.3) ^B	(2.6) ^A	(2.0) ^A	A			
26							(1.8) ^A	A	A	A	A	A	A	A	A	A	A	A	A	A	2.7	A		
27							A	A	A	A	A	A	A	B	C	3.9	(3.6) ^A	3.4	A	A	A			
28							A	2.8	3.4	(3.8) ^A	A	A	B	A	A	A	A	A	A	A	A			
29							A	A	C	C	T	T	T	T	T	T	T	A	A	A	A			
30							A	A	A	A	A	T	T	T	T	T	A	A	A	A	A			
31							A	A	A	A	T	T	T	T	T	T	A	T	A	A	A			
Mean Value	2.1	2.8					3.3	(3.5)	(3.6)	3.7	(3.9)	4.0	3.8	3.7	3.6	3.7	3.6	2.3	2.7	2.0				
Count	11	9					8	10	7	7	6	6	7	6	7	6	7	8	7	5				

Sweep 1.2 Mc to 18.5 Mc in 15 min

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
 (Denki-tsushin/Kenkyujo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

Lat. 31°12.5'N
 Long. 139°37.7'E

h_pE

Yamagawa

135° E Mean Time

Day	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							120 ^H	110 ^A	100	110 ^A	110	110	120	110	110	110	110	120	A	A					
2							100	A	A	A	A	100	A	A	A	A	100	A	A	A	A				
3							110 ^B	100	100	110 ^A	110	100	110	110	110	110	A	A	A	A	A				
4							110	A	A	A	A	A	A	A	A	A	A	A	A	A	A				
5							A	110	110 ^A	100	100	100	100	110	100	100	110	100	110	A	A				
6							A	A	A	A	A	110	100	120	110	110	A	A	A	C					
7							A	A	100	100	110	A	A	A	A	100	100	110	A	A	A				
8							A	110	110 ^A	110	A	A	A	A	A	110	A	A	A	A	A				
9							A	A	A	A	A	A	A	A	A	A	A	A	A	A	A				
10							100 ^H	100 ^A	A	A	100	100	110 ^A	110	110 ^A	110	100	100	A	B					
11							B	110	110	A	A	A	A	A	A	A	A	A	A	A	A				
12							A	A	A	A	A	A	A	A	A	A	A	A	A	100	A				
13							A	120	A	A	A	A	A	A	A	A	A	A	A	A	B				
14							A	A	110	100	100	110	100	A	A	A	A	A	A	A	A				
15							A	A	A	A	A	A	A	B	A	A	A	A	A	A	A				
16							A	A	A	A	100	110	100	100	C	C	A	A	A	A	A				
17							B	A	A	A	A	A	A	A	A	100	100	100	100	100	100				
18							B	100	A	A	A	A	A	A	A	A	A	A	A	A	A				
19							B	A	A	A	A	A	A	A	A	100	A	A	A	A	A				
20							A	A	100	100 ^A	100	110 ^A	110 ^A	110	110	110	110	110	110	A	A				
21							C	C	C	C	C	C	C	C	C	C	T	A	110	A	A				
22							A	A	A	A	A	100	100	A	A	A	A	A	A	C	A				
23							110	A	A	110 ^A	100	110 ^A	100	110 ^A	100	A	A	A	A	A	A				
24							A	A	A	110	100	100	100	100	100	100	100	100	100	100	100				
25							A	A	A	A	A	A	A	A	A	A	A	100	100	100	100				
26							A	A	A	A	A	A	A	A	A	A	A	A	A	110	A				
27							A	A	A	A	A	A	A	100	100 ^C	100	100	100	100	100	A				
28							A	100	100	100	A	A	A	A	A	A	A	A	A	A	A				
29							A	A	C	C	T	T	T	T	T	T	T	A	A	A	A				
30							A	A	A	A	A	T	T	T	T	T	T	A	T	A	A				
31																									
Median Value	110	110	110	110	110	110	110	100	100	100	110	110	110	110	110	110	100	100	100	100	100	100	100	100	100
Count	6	9	9	9	9	9	9	9	9	9	10	10	10	10	10	10	10	9	7	3					

Sweep 12 Mc to 16.5 Mc in 1.5 min

Manual

IONOSPHERIC DATA

Yamagawa
Lat 31 12' N
Long 139 17' E

135° E Mean Time

fes

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	28	28	44	34	42	54	B	4.0	6.0	5.2	7.0	9.0	74	6.0	6.0	4.2	5.5	(4.2) B	4.8	5.0	5.4	3.0	4.4	5.5	
2	42	42	48	78	58	34	38	34	78	13.0	(16.2) B	16.7	16.8	10.8 F	5.3	3.8	4.4	4.2	4.2	3.5	4.2 Y	2.6	3.0	2.6	
3	54	48	3.5	4.9	4.1	3.7	2.2	3.8	5.2	6.6	8.2	15.2	6.4	9.0	7.6	6.6	5.4	6.0	9.6	8.0	4.2	4.2	4.2	4.0	
4	28	50 Y	2.6	2.4	6	B	2.7	3.4	4.8	5.6	5.4	5.4	4.8	10.0	6.2	16.2	7.7	4.6	3.2	5.0	5.7	4.6	4.6	4.2	
5	38	38	3.0	3.6	2.8	G	3.0	(4.2) B	4.6	3.7	6.0	7.2	7.2	4.8	4.8	4.8	5.2	5.2	6.4	3.8	(4.2) B	3.8	4.2	4.4	
6	38	3.4	8.2	5.2	4.9	3.0	3.6	4.6	5.6	8.4	10.4	4.0	5.2	5.2	4.6	7.0	4.7	4.6	5.0	C	3.0	B	3.8	7.5	
7	8.9	2.6	5.7	6.4	4.0	5.1	4.8	4.2	5.8 Y	4.2	5.2	8.7	9.6	8.0	4.1	5.7	7.1 Y	8.0	8.6 Y	3.8	2.4	G	1.8	3.8	
8	4.2	4.2	4.5	4.4 F	4.6	4.0	4.5 Y	4.4	4.4	B	6.2	6.8	4.8	11.2	6.8	B	4.2	4.4	4.6	4.8	5.0	3.6	4.2	4.6	
9	(7.6) B	3.7	(4.4) B	3.0	B	2.6	3.2	3.6	4.2	8.0	11.5	12.0	13.0	6.8	6.6	6.2	8.9	12.9	5.2	4.8	8.0 Y	6.4	4.3	3.8	
10	68	6.2	3.4	3.6	4.4	2.8	2.6	3.8	5.0	4.6	6.6	5.5	4.6	(8.0) B	12.6	12.0	9.5	4.8	3.6	3.6	5.8	5.2	4.6	3.4	
11	34	4.6	4.2	4.4	3.6	3.4	2.4	5.0	5.2	6.4	13.8	7.6	9.2	5.5	5.6	5.6	6.0	5.2	3.6	3.8	3.0	3.4	4.2	3.8	
12	68	4.6	5.5	3.5	3.5	3.3	3.8	3.8	5.6	8.0 Y	12.4	6.4	4.2	11.3	5.8	5.2	4.2	3.8	4.0	8.6	2.8	5.8	7.0	7.0	
13	6.2	4.6	5.2	2.8	3.0	3.8	6.2	5.4	5.5	11.6	6.6	7.6	6.8	8.2	6.6	4.4	(7.2) B	4.2	4.2	2.0	2.4	4.2	4.4	5.9	
14	4.8	(5.0) Y	4.0	2.8	6	6	4.6	6.0	5.2	4.8	4.9	5.4	G	12.4	14.2	9.2	6.2	4.6	4.2	7.6	9.4	7.2	2.6	4.7	
15	4.6	3.6	3.6	2.6	3.4	3.2	4.4	4.4 B	5.2 F	9.6	4.6	6.4	6.6	4.6	4.2	4.8 B	7.6	3.8	7.8	7.0	4.8	3.7	4.8	3.5	
16	7.0	10.1	7.2	4.2	2.6	3.2	4.2	5.2	5.8 Y	4.6	5.2	5.6	5.2	4.8	C	C	4.4	4.4	3.4	2.9	3.4	2.8	3.4	4.4	
17	6.4	9.6	7.0	4.0	3.2	3.0	3.5	4.8	6.0	11.8	5.0	7.4	12.0	11.2	10.4	5.2	G	6.6	3.4	3.7	2.6	5.0	4.7	4.8	
18	7.0	5.0	6.2	3.4	4.2 Y	2.6	4.2	6.4	5.0	7.6	5.0	6.0	6.9	6.2	5.8	11.3 Y	10.8 B	7.6	6.8	10.2	8.2	4.4	3.0	8.0	
19	4.2	7.0	4.2	4.5	4.4	4.8	3.6	4.8	5.2	5.8	5.4	5.4	4.2	4.2	6.4	5.6	6.4	4.2	3.6 B	5.2	4.8	4.0	3.2	3.2	
20	28	3.6	4.8	3.6	3.8	4.4	3.4	3.4	3.8	4.5	5.2	7.0 Y	4.8 Y	C	4.2	5.2	3.8	B	4.4	3.8	5.0	C	C	C	
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	4.8	6.4	4.8	4.4	3.4	4.2 Y	5.0 B	4.6	9.4 Y	
22	6.6	4.2	5.2	5.3	3.0	3.8	3.6	4.6	4.2	4.2	4.2	5.0	4.7	4.5	4.8	6.0	6.4	3.6	C	3.6	3.4	4.2	2.8	2.4	
23	3.0	4.6	4.4	2.2	G	G	G	4.8	8.8	16.6	5.2	6.3 Y	8.6	10.4 Y	10.1	8.4	10.0 Y	9.0	6.8	7.9	6.2	5.5	3.6	2.8	
24	G	2.2	6.6 Y	3.5	B	B	2.4	3.4	4.6	4.4	6.2	7.8	10.0	5.6	5.0	4.2	4.4	B	3.0	G	4.0	3.2	2.8	2.0	
25	4.2	5.0	4.8	3.4	3.2	3.6	3.4	3.6	4.2	7.6	11.6	12.4	12.6	5.4	5.0	4.2	4.4	B	4.6	5.8	8.4	2.6	2.8	7.6	
26	4.8	4.6	5.6	4.8	3.4	3.8	4.8	6.6	11.7	9.5	10.4	8.0	8.1	6.5	7.2	6.2	5.2	(5.4) B	G	5.8	3.2	B	2.2	2.4	
27	3.2	7.6	8.2	8.6	7.8	7.6	6.2	5.8	8.0	10.0	15.0	(14.8) B	5.2	B	B	4.4	4.4	4.8	5.0	4.8	7.0	5.8	5.2	7.2	
28	4.2	3.6	2.4	2.6	3.6	3.2	3.0	4.2	5.8	7.8	8.4	12.7	12.4	15.6	14.6	8.8	10.6	7.8	5.2	(5.4) B	3.2	2.7	4.2	2.6	
29	3.5	(2.8) B	B	5.4	7.8	6.2	5.8	4.4	C	C	5.2	5.0	9.2	(12.3) B	15.8	5.8	6.5 Y	4.2	(7.0) Y	4.2	6.8	5.2	4.2	5.4	
30	4.2	5.8	3.1	7.0	5.0	2.8	4.2	4.8	5.2	7.0	9.0	7.2	6.8	(9.8) B	10.4	7.4	3.2	(8.8) B	1.8	10.8	(10.2)	(5.7) Y	5.0	3.2	
31																									
Median Value	4.2	4.6	4.8	3.6	3.8	3.4	3.6	4.4	5.2	7.0	6.6	7.2	6.8	8.0	6.2	5.7	6.2	4.8	4.5	4.8	4.5	4.2	4.2	4.2	
Count	2.9	2.9	2.6	2.9	2.7	2.7	2.8	2.9	2.8	2.7	2.9	2.9	2.7	2.7	2.7	2.8	2.9	2.7	2.9	2.9	3.0	2.7	2.9	2.9	

Sweep 1.2 Mc to 13.5 Mc in 1.5 min

Manual

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
Denki-tsushin Kenkyujo, Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

F₂-M3000

Yamagawa
31°15.5'N
139°37.7'E

135°E Mean Time

Day	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	26	24	27	27 ^F	28 ^H	J	28	30	31	28	25	25	27	26	23	26	28 ^H	28	31	30 ^Z	28	28	28	27 ^H	
2	28 ^H	J	B	28 ^Z	31 ^Z	31	30	32	29	A	A	A	A	26	27	26	29	30	131 ^S	33	32	32	28	25	
3	27	26 ^F	30 ^F	30 ^F	30 ^H	29	31	31	28	27	27	26	26	26	26	27	28	28	28	28	J	J	26	26	
4	25 ^H	28	29	30	27 ^H	28	30	32	30 ^K	28	27 ^K	29	30	28	A	A	J	27	27	28	28	25 ^S	25	25 ^S	
5	25	25	25	29	25 ^H	25 ^K	25 ^K	25 ^K	25 ^K	24 ^K	24 ^K	24 ^K	25 ^K	26 ^K	26 ^K	26 ^K	32 ^K	32 ^K	26 ^K	25	27	26	25	25	
6	27	27	29	28	29	28	24	28	23 ^A	A	A	A	24 ^K	B	B	A	S	S	B	C	26 ^K	27 ^K	27 ^K	24 ^K	
7	25 ^K	27	28	29	32 ^Z	32	30	30	26	27	27	25	25	28	26	27	28 ^P	30	28	29	27	26	27	29	
8	28	27	28	29	28	28	30	29	30	29 ^S	J	27	26	26 ^A	27	28	28	29	29	24	27	26	27	27	
9	27	28	28	29	29	30 ^F	28	29	31	28 ^B	A	A	A	27	26	27	31	30 ^A	29	30	31	31	31	29	
10	30	31	30	30	30	31	32	30	30	26	28	28	25	26	27 ^A	28	J	J	29	27	30	29	32 ^Z	J	
11	28	29	30	30	30	30	27	29	28	28	27 ^A	26	31	26	27	28	28	28	26	29	26	26	27	27 ^F	
12	25 ^P	J	29	30 ^B	32	32	30	29	29	28	26 ^A	24	26	27	26	26	27	28	28	27	25 ^C	23	27	27 ^F	
13	F	F	26	25	25 ^F	28	26	26	27 ^B	A	J	S	27 ^B	27	27	J	30 ^P	27	27	30	30	27	24	25	
14	25	26	25	27	27	28	30	30	32 ^S	28	29	29	28	26	26 ^A	26	28	30	29 ^R	J	27	26	26	25	
15	26 ^R	29	30	28	27	28	28	28	28	27	26 ^S	26	25	28	26	27	J	28	28	31	30	29	27	27 ^Z	
16	25 ^R	28	26	29	26 ^Z	29	31	31 ^R	31	28	27	26	25	26	C	C	31	29	29	26 ^H	27 ^B	27 ^N	28	J	
17	28	28	28	25	29	29	34 ^K	31 ^H	30	26 ^A	23 ^B	25	26	26	J	28	J	29	28	29	27	26	26	26	
18	26	27	28	28	28	28	32	29 ^S	26 ^B	29	28	28	25	27	27	28	J	29 ^P	30	28 ^A	27 ^F	24	28	28	
19	S	F	F	24	24	27	29	30	27	26	26	27	27	27	29	28	27 ^S	27	27	28	27 ^S	27	26	J	
20	J	J	J	27	27	26	28	J	29	26	27	J	25	26 ^C	26 ^A	28 ^K	27	27	29	29 ^Z	27 ^K	C	C	C	
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	35	28	28	28	29	27	24	25	27	
22	28	J	30	27 ^V	27 ^Z	27	29	30	27 ^R	27	24	25	27	28	28	28	27 ^S	27	28	30	28	26	27	28	
23	29	29	25	25	26	5	J	32	25	25	26	25	25	27	28	29	29	J	J	30	30	26	28	26	
24	26	27	26	J	J	130 ^B	31	27	27	26	26	26	26	26	26	26	26	28	29	J	28	26	27	28	
25	26	28	30	28	J	28	31	32	32	30	A	26 ^A	26	27	27	27	27	27	27	29	30	A	F	F	
26	J	27	30	31	26	27	28	30	30 ^F	30	25	26	27	26	27	27	28	28	28	29	26	26	27	27	
27	27	27	27	28	29	28	27	31	32	A	A	A	27	27	27	27	27	27	28	30	25	26	25	28	
28	26	27	26	28	28	28	32	33	28	29	24	25	SA	A	26	25 ^R	26	29	31	32	25	26	28	30	
29	29	29	26	28	28	28	30	31	C	C	26	25	J	A	25	26	26	26	27	29	28	28	27	26	
30	29	J	F	F	F	J	32	31	32 ^R	31	J	B	28	28	27	26	26	27	28	A	A	26	25	J	
31																									
Mean	27	27	28	28	28	28	28	30	29	28	26	26	26	27	27	27	28	28	28	28	28	26	27	27	27
Count	25	22	23	25	24	25	29	28	28	23	22	21	24	26	26	25	24	24	27	27	25	27	26	28	24

Scale: 1.2 Mc Tr (18.5 Mc in 15 min)

IONOSPHERIC DATA

ft min

Yamagawa

Lat. 31°12.5'N
Long 139°37.7'E

155° E Mean Time

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	25	
1	A	A	A	20 ^A	A	A	22	31	36 ^A	A	A	A	A	A	A	4.0	39 ^A	38	A	A	A	18	A	A	A	
2	A	A	A	A	A	A	30	30 ^A	34	A	A	A	A	A	A	4.0	36	A	A	A	20 ^A	18	(19) ^A	20 ^A	A	
3	A	A	A	A	A	A	15	126 ^A	35	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	16	
4	(16) ^A	16	18	18	16	16	22	30	30 ^A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	20 ^E	
5	20 ^A	20 ^A	A	A	18	15	24	A	A	42	A	A	A	A	4.5	4.2	38	A	A	A	A	A	A	A	A	
6	A	A	A	A	A	A	28	A	A	A	A	44	A	A	A	A	A	A	A	A	A	A	4.8	A	A	
7	A	A	A	A	A	A	A	A	A	34	A	A	A	A	A	A	A	A	A	A	A	A	3.2	A	A	
8	A	A	18	(17) ^A	16	(20) ^A	23	27	36 ^A	42	A	A	A	A	A	4.2	A	A	28 ^A	A	A	(1.9) ^A	16	16	A	
9	A	A	16	14	15	(18) ^A	21	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
10	A	A	A	20 ^A	20 ^A	(21) ^A	22	25	34	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
11	(20) ^A	20 ^A	A	A	A	16	19	24	A	A	A	A	A	4.6	4.0	A	A	A	A	A	20	A	A	A	20 ^A	
12	A	A	A	A	A	29	21	A	A	A	A	A	4.6	A	A	4.2	A	A	A	A	A	2.0	2.0	A	A	
13	A	2.2	2.2	2.2	1.6	A	A	A	3.6	A	A	A	A	A	A	A	A	A	A	A	A	2.4	1.6	A	A	
14	A	A	A	14	18	21	(20) ^A	A	A	4.0	(4.0) ^A	4.0	5.0	A	A	A	A	A	A	A	A	A	A	A	A	
15	A	2.6	2.1	1.8	1.8	2.0	2.0	(2.6) ^A	3.2	A	A	A	A	A	4.0	4.0	4.6	3.6	A	A	A	A	A	A	A	
16	A	A	A	A	1.6	1.8	2.2	2.8	A	4.0	4.2	(4.3) ^A	4.4	C	C	C	4.0	A	A	A	A	A	A	A	A	
17	A	A	A	A	A	1.8	1.9	2.9	A	A	A	A	A	A	A	A	4.0	(3.5) ^A	2.9	2.1	1.5	(1.7) ^A	1.8	1.6	A	
18	A	A	A	A	A	1.6	1.8	2.7	A	A	A	A	A	A	A	4.2	(4.7) ^A	5.2	A	A	A	A	A	A	A	
19	A	A	1.8	A	A	A	A	2.2	3.2	A	A	A	A	A	A	4.2	4.0	3.3	2.0	1.8	A	A	A	A	A	
20	1.8	A	A	A	1.8	2.2	A	A	3.5	A	A	A	A	A	A	3.8	4.0	4.0	2.0	1.8	A	A	A	A	A	
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	5.4	A	A	A	A	2.0	2.0	(3.2) ^A	A	A	
22	A	A	A	A	A	(20) ^A	2.0	2.0	2.8	3.8	4.2	4.8	(4.7) ^A	(4.6) ^A	(5.2) ^A	5.8	(5.0) ^A	4.2	(4.1) ^C	4.0	2.0	3.0	1.8	1.4	A	
23	2.0	2.0	(1.8) ^A	1.5	1.5	1.4	2.3	2.6	A	A	4.6	A	A	A	A	4.6	3.8	A	A	A	A	A	A	A	A	
24	1.5	2.0 ^A	1.8	(2.1) ^A	2.3	2.4	2.2	A	A	A	A	A	4.8	4.2	4.2	4.0	3.8	4.3	2.7	2.0 ^A	2.0 ^A	1.6	1.6	1.6	A	
25	A	A	A	A	1.8	2.0 ^A	2.2	3.0	(4.2) ^A	A	A	A	A	A	A	A	4.0	4.0	A	A	A	A	A	A	A	A
26	2.0 ^A	A	A	A	A	1.7	2.0	A	A	A	A	A	A	A	A	A	A	A	2.8	A	A	1.8	1.8	A	A	
27	A	A	A	A	A	A	A	A	A	A	A	A	A	4.5	C	A	4.2	A	A	A	A	A	A	A	A	A
28	2.0 ^A	2.0 ^A	2.0 ^A	1.8	1.8	2.0	2.6	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	2.0 ^A	
29	A	A	1.4	A	A	A	3.0	C	C	A	A	A	A	A	A	A	A	A	A	A	A	A	6.0	(4.8) ^A	3.5	
30	4.7	(3.4) ^A	2.1	A	A	2.2	(3.2) ^A	4.2	A	A	A	9.0	A	A	A	A	A	A	A	A	A	A	2.0 ^A	(1.8) ^A	1.6	
31																										
Median Value (Count)	2.0	2.0	1.8	1.8	1.8	2.0	2.2	2.8	3.5	(4.0)	-	-	(4.8)	(4.5)	(4.2)	4.2	4.0	(3.8)	(2.8)	(2.1)	(2.0)	1.5	(1.8)	1.8	1.8	
Sweep	9	9	11	11	15	21	22	17	12	5	4	4	6	5	7	12	13	7	6	8	9	15	10	10	10	

Manual

Sweep 12 MC TO 18.5 MC in 1.5 min

Electrical Communication Laboratory, Japanese Ministry of Telecommunications
(Denkitsu-shin Kenkyūjo) Gotanda, Shinagawa-ku, Tokyo, Japan

IONOSPHERIC DATA

f_E min

Yamagawa
Lat. 31°12.5'N
Long. 139°37.7'E

135°E Mean Time

Day	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	1.4	1.5	1.5	1.3	1.4	1.4	1.5	1.5	1.6	1.8	2.2	2.2	2.8	2.8	2.4	2.0	2.2	1.8	1.5	1.6	1.6	1.6	1.6	1.7	
2	1.6	1.6	1.5	1.5	1.6	1.4	1.7	1.6	1.8	1.9	2.0	2.4	2.0	2.0	2.8	1.9	2.0	1.8	1.8	1.5	1.4	2.0	(1.5)	1.4	
3	1.4	1.3	1.3	1.3	1.3	E	1.5	E	1.6	2.0	2.2	2.4	2.3	2.4	2.2	2.1	1.9	1.8	1.8	1.8	1.6	1.8	1.8	2.0	
4	1.6	2.0	1.8	1.5	G	B	1.7	1.5	2.1	2.2	2.2	2.8	3.2	3.6	3.8	3.1	3.0	1.8	1.6	2.0	1.4	1.6	1.6	1.5	
5	1.6	1.4	1.6	1.8	1.6	G	1.8	1.8	1.6	1.8	1.8	2.2	2.2	2.2	2.0	2.0	2.0	1.8	1.6	1.5	1.5	1.6	1.4	1.4	
6	1.4	1.3	1.6	1.6	1.3	1.5	1.7	1.8	1.8	2.0	2.0	2.1	2.0	2.0	2.4	2.0	1.7	1.8	1.8	(1.8)	1.8	1.8	1.8	1.5	
7	1.6	1.6	1.3	1.4	1.4	1.3	1.6	1.6	1.7	2.0	2.2	2.1	2.1	2.2	2.7	2.1	2.7	1.8	2.0	1.5	1.5	G	1.6	1.6	
8	1.6	1.6	1.4	1.3	1.3	1.5	1.5	1.7	2.2	2.4	2.2	2.3	3.2	2.4	2.6	2.2	2.0	1.8	1.7	1.7	1.4	1.6	1.6	1.6	
9	1.6	1.6	1.6	1.4	(1.4)	1.4	1.4	1.8	2.0	2.6	2.2	1.8	2.2	3.4	2.2	2.2	2.3	2.0	1.5	1.4	1.5	1.4	F	1.5	
10	2.0	1.6	1.3	1.3	1.4	1.6	1.5	1.5	1.7	1.8	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.0	1.8	1.8	1.5	1.6	1.5	1.4	
11	1.4	1.4	1.4	1.5	1.5	2.0	1.6	1.4	1.8	2.0	2.0	2.2	2.2	2.0	2.0	2.2	1.9	1.8	1.7	1.5	1.5	1.6	1.4	1.6	
12	1.4	1.3	1.3	1.4	1.7	1.7	2.5	1.8	1.5	1.7	1.8	2.0	2.2	2.4	2.4	2.4	2.0	1.9	1.4	1.5	1.7	1.4	1.6	1.5	
13	1.5	1.3	1.6	1.5	1.6	1.5	1.6	1.7	1.8	2.2	2.2	2.2	2.6	2.7	2.3	2.2	2.0	2.0	1.8	1.8	1.6	1.6	1.6	1.8	
14	1.6	1.6	1.6	1.6	G	G	1.8	1.6	1.7	1.7	1.8	2.0	2.0	2.1	1.9	1.8	2.3	1.8	1.8	1.8	1.6	1.5	1.6	1.6	
15	1.4	1.4	1.4	1.6	1.5	1.6	1.7	1.7	1.8	2.0	2.2	2.0	3.0	2.5	2.0	2.0	2.0	1.8	1.6	1.5	1.5	1.5	1.4	1.3	
16	1.4	1.4	1.6	1.6	1.6	1.6	1.6	1.7	2.0	2.0	1.9	2.1	3.0	2.8	C	C	2.1	1.8	1.6	1.5	1.6	1.5	1.8	1.5	
17	1.5	1.4	1.4	1.3	1.5	2.0	1.5	1.4	1.6	1.8	2.2	2.2	2.2	2.0	2.0	2.0	1.8	1.8	1.8	1.6	2.0	1.5	1.6	1.6	
18	1.4	1.4	1.6	1.6	1.6	1.8	1.4	2.0	1.8	2.0	2.0	2.0	2.0	3.0	3.0	3.3	2.0	1.8	1.8	1.5	1.6	1.5	1.4	2.0	
19	1.8	1.5	1.6	1.6	1.5	1.6	1.8	1.8	1.8	2.0	2.0	2.8	2.4	2.5	1.6	2.0	2.0	1.8	1.8	1.8	1.7	1.8	1.8	1.6	
20	1.8	1.6	1.6	1.6	1.6	2.0	2.0	2.0	2.0	2.0	2.1	2.4	(2.2)	2.0	2.0	2.0	2.0	1.8	1.7	1.5	1.5	1.6	C	C	
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	2.6	2.0	1.8	1.6	1.4	1.5	1.8	1.8	
22	1.4	1.3	1.4	1.4	1.4	1.6	1.5	1.6	1.8	1.8	2.0	1.8	2.2	2.3	3.0	2.6	3.0	2.0	(1.8)	1.5	1.5	1.4	1.6	1.4	
23	1.4	1.4	1.4	1.4	G	G	1.6	1.8	1.7	2.0	2.2	2.2	2.2	2.8	2.2	2.1	2.0	1.8	1.8	1.8	1.6	1.6	1.6	1.4	
24	G	1.6	1.6	1.5	B	B	1.6	1.8	2.0	2.0	2.2	2.2	2.3	2.2	2.2	2.1	1.7	1.6	1.6	1.6	1.8	1.6	1.6	1.6	
25	1.6	1.4	1.6	1.6	1.4	1.6	1.3	1.8	1.7	2.0	2.0	2.8	I	I	I	2.1	2.2	2.0	1.4	1.4	1.4	1.4	1.4	1.4	
26	1.4	1.4	E	E	E	1.3	1.4	1.4	1.5	1.7	2.0	2.9	3.2	2.8	3.0	2.8	2.8	2.0	1.4	1.6	1.6	1.6	2.0	1.6	
27	1.6	1.4	1.4	1.4	1.4	1.4	1.5	1.6	2.0	2.2	2.2	3.0	2.8	2.4	(2.6)	2.8	2.0	1.8	1.7	1.6	1.6	1.4	1.5	1.4	
28	1.4	1.5	E	1.4	1.4	1.6	1.8	1.8	1.8	2.0	2.0	2.4	4.4	I	I	I	2.2	2.2	2.0	1.9	1.8	1.5	1.6	1.4	
29	E	1.4	G	1.6	1.4	1.6	1.6	1.8	C	C	I	I	I	I	I	I	2.2	2.0	2.2	2.0	2.0	2.0	2.0	2.0	
30	1.6	1.4	2.1	2.1	2.1	2.2	2.0	2.1	2.2	2.2	2.2	I	I	I	I	I	2.1	(2.1)	2.0	1.8	1.7	1.5	1.6	1.4	
31																									
Median Value	1.4	1.4	1.5	1.5	1.4	1.6	1.6	1.7	1.8	2.0	2.2	2.2	2.3	2.3	2.3	2.1	2.0	1.8	1.8	1.6	1.6	1.6	1.6	1.6	1.5
Count	29	29	29	29	28	27	29	29	28	28	28	27	26	25	24	26	30	30	30	30	30	29	29	29	29

Sweep 1.2 Mc to 1.8.5 Mc in 1.5 min

Manual

IONOSPHERIC DATA IN JAPAN FOR JUNE 1949

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發 行 人

安 部 昌 二

東京都品川區五反田5丁目55

發 行 所

電氣通信省電氣通信研究所

東京都品川區五反田5丁目55

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