F—180

IONOSPHERIC DATA IN JAPAN

FOR DECEMBER 1963

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THE RADIO RESEARCH LABORATORIES

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KOKUBUNJI, TOKYO, JAPAN

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THE RADIO RESEARCH LABORATORIES

KOKUBUNJI, TOKYO, JAPAN

CONTENTS

SITES OF THE RADIO WAVE OBSERVATORIES

Ionospheric observation is carried out at the following four observatories in Japan.

	Latitude	Longitude	Site
Wakkanai	45°23.6′N.	141°41.1′E.	Wakkanai-shi, Hokkaido
Akita	39°43.5′N.	140°08.2′E.	Tegata Nishishin-machi, Akita-shi, Akita-ken
Kokubunji	35°42.4′N.	139°29.3′E.	Koganei-shi, Kitatama-gun, Tokyo-to
Yamagawa	31°12.5′N.	130°37.7′E.	Yamagawa-machi, Ibusuki-gun, Kagoshima-ken

Solar radio emission and radio propagation conditions are observed at Hiraiso Radio Wave Observatory.

	Latitude	Longitude	Site
Hiraiso	36°22.0′N.	140°37.5′E.	Isozaki-machi, Nakaminato-shi, Ibaragi-ken

SYMBOLS AND TERMINOLOGY

A. IONOSPHERE

All symbols and terminology in the table of ionospheric data are used in accordance with the First Report of the Special Committee on World-Wide Ionospheric Soundings (URSI/AGI), Brussels, September 2, 1956, and the Second Report of the Committee, May, 1957, supplementary to the First Report.

Terminology

f_0F2, f_0F1, f_0E — The ordinary-wave critical frequency for the $F2$, $F1$ and E layers respectively.

f_0E_s — The ordinary wave top frequency corresponding to highest frequency at which a mainly continuous trace is observed.

f_bE_s — The ordinary wave frequency at which the highest blanketing E_s layer becomes effectively transparent. This is usually determined from the minimum frequency at which reflections from layers at greater heights are observed.

f-min — That frequency below which no echoes are observed.

$M(3000)F2$ — The maximum usable frequency factor for a path of 3000 km for transmission by $F2$ layer.

$M(3000)F1$ — The maximum usable frequency factor for a path of 3000 km for transmission by $F1$ layer.

$h'F2$ — The minimum virtual height, $h'F2$, refers to the highest, most stable stratification observed in the F region and can only be scaled when such stratification is present.

$h'F$ — The natural and most significant F region virtual height parameter is that for lowest F region stratification. This will be denoted by $h'F$. Thus $h'F$ is identical with the current $h'F2$ when F region stratification is absent, e. g., at night, and with the current $h'F1$ when $F1$ stratification is present.

$h'E_s$ The lowest virtual height of the trace used to give the f_0E_s.

$hpF2$ The virtual height of the $F2$ layer measured on the ordinary-wave branch at a frequency equal to 0.834 f_0F2.

$ypF2$ The semi-thickness of the $F2$ layer deduced from a parabolic fit to the "nose" of the electron density distribution with height and based on the observed $h'f$ trace. (The difference between $hpF2$ and the virtual height at 0.969 f_0F2).

a. Descriptive Symbols

Used following the numerical value on monthly tabulation sheets.

A Measurement influenced by, or impossible because of, the presence of a lower thin layer, for example E_s.

B Measurement influenced by, or impossible because of, absorption in the vicinity of f-min.

C Measurement influenced by, or impossible because of, any non-ionospheric reason.

D Measurement influenced by, or impossible because of, the upper limit of the normal frequency range. Used in a qualifying sense, see below.

E Measurement influenced by, or impossible because of, the lower limit of the normal frequency range. Used in a qualifying sense, see below.

F Measurement influenced by, or impossible because of, the presence of spread echoes.

G Measurement influenced or impossible because the ionization density is too small compared with that of a lower thick layer.

H Measurement influenced by, or impossible because of, the presence of a stratification.

L Measurement influenced by, or impossible because the trace has no sufficiently definite cusp between layers.

M Measurement questionable because the ordinary and extraordinary components are not distinguishable.

N Conditions are such that the measurement cannot readily be interpreted, for example, in the presence of oblique echoes.

O Measurement refers to the ordinary component.

R Measurement influenced by, or impossible because of, absorption in the vicinity of a critical frequency.

S Measurement influenced by, or impossible because of, interference or atmospherics.

V Forked trace which may influence the measurement.

W Measurement influenced by, or impossible because the echo lies outside the height range recorded.

X Measurement refers to the extraordinary component.

Y Intermittent trace.

Z Third magneto-ionic component present.

b. Qualifying Symbols

Used as a preceeding symbol on monthly tabulation sheets.

D *greater than.....*

E *less than.....*

I Missing value has been replaced by an interpolated value.

J Ordinary component characteristic deduced from the extraordinary component.

T Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.

U Uncertain or doubtful numerical value.

Z Measurement deduced from the third magneto-ionic component.

c. Description of Standard Types of E_s

The nine standard types of E_s are identified by small (lower case) letters: *l*, *c*, *h*, *q*, *r*, *a*, *s*, *f*, *n*. These letters are suggestive of the names low, cusp, high, equatorial, retardation, auroral, slant, flat and unclassified, respectively; it is strongly emphasized that these names are suggestive, not restrictive. The standard types are:

l At flat E_s trace at or below the normal E layer minimum virtual height. Use in daytime only.

c An E_s trace showing a relatively symmetrical cusp at or below f_0E. This is usually continuous with the normal E trace though, when the deviative absorption is large, part or all of the cusp may be missing. Use in daytime only.

h An E_s trace showing a discontinuity *in height* with the normal E layer trace at or above f_0E. The cusp is not symmetrical, the low frequency end of the E_s trace lying clearly above the high frequency end of the normal E trace. Use in daytime only.

q As E_s trace which is diffuse and non-blanketing over a wide frequency range. The spread is most pronounced at the upper edge of the trace. (This type is common in daytime in the vicinity of the magnetic equator.)

r An E_s trace which is non-blanketing over part or all of its frequency range showing an increase in virtual height at the high frequency end similar to group retardation. This is distinguished at present from true group retardation (a blanketing thick layer included in the E layer tables: f_0E, $h'E$) by the lack of group retardation in the F traces at corresponding frequencies.

a An E_s pattern having a well defined flat or gradually rising lower edge with stratified and diffuse (spread) traces present above it. These sometimes exceed over several hundred kilometers of virtual height.

s A diffuse E_s trace which rises steadily with frequency. This usually emerges from another E_s trace which should be classified separately. At high latitudes the slant trace usually starts to rise from a horizontal E_s trace, *l*, *h* or *f*, and frequencies which greatly exceed the E layer critical frequency (e.g. about 6 Mc/s) whereas at low latitudes it usually rises from equatorial type E_s, *q*, at frequencies near the E region critical frequency.

f An E_s trace which shows no appreciable increase of height with

frequency. The trace is usually relatively solid at most latitudes. This classification may only be used at night; apparently flat E_s traces observed in the daytime are classified according to their virtual height: h or l.

n An E trace which cannot be classified into one of the standard types. This must not be used for intermediate cases between any two classes. A choice should always be made whenever possible, even if it is doubtful.

d. Multiple Reflections from E_s

When the ionogram shows the presence of multiple reflections from E_s the number of traces seen should be recorded after the letter indicating the type.

B. SOLAR RADIO EMISSION

Solar radio emission is received on 200 Mc at Hiraiso Radio Wave Observatory using a 6×4 dipole broadside array and an ordinary superheterodyne receiver. The type of observation is of intensity recording of both steady flux and outstanding occurrences.

a. Daily Data

Steady flux The mean value of recorded base level. Outstanding occurrences are to be omitted except the phenomena with duration of hours or more.

Variability Variability is expressed in four grades as follows:

0=no burst
1=a few bursts
2=many bursts
3=exceptionally many bursts

Number of bursts is determined relatively in comparison with the base level. If the number of bursts be fixed, the variability is greater, when bursts are widely distributed, than in the case of being concentrated in a short period.

b. Outstanding occurrences

Starting time When the start is not obvious, 20% rise time of smoothed flux is adopted and x is suffixed. (e.g. 0234 x)

Maximum time When the instantaneous maximum can not be taken, the smoothed maximum is used and x is suffixed. (e.g. 0539x)

Time of end When the phenomena have ended obscurely the time of 20% of maximum smoothed flux is written.

Type Outstanding emissions are classified as follows: On another point of view, the classification in the URSI Interchange code is to be added.

S : simple rise and fall of intensity
C : complex variation of intensity
A : appears to be part of general activity
D : distinct from (i.e. apparently superposed upon) the general

activity

M: multiple peaks separated by relatively long period of quietness

F: multiple peaks separated by relatively short period of quietness

E: sudden commencement or rise of activity

Combined letters express one phenomenon (e.g. SD, ECD); letters joined by + express some phenomena occurring in parallel; the preceding term is more important (e.g. SD+F, SA+C).

Maximum intensity

Instantaneous: The highest value above the base level.

Smoothed: By multiplying the duration, the approximate total power of the phenomenon can be estimated.

C. RADIO PROPAGATION CONDITIONS

a. Radio Propagation Quality Figures

Radio propagation quality figures are usually expressed on the scale that ranges from one to five as follows:

1=very poor (very disturbed)
2=poor (disturbed)
3=rather poor (unstable)
4=normal
5=good

The tabulated circuits contain London (commercial circuit), WWV (frequencies 10, 15, 20 Mc broadcast from Washington, D.C.), San Francisco (commercial circuit) and WWVH (frequencies 10, 15 Mc broadcast from Hawaii), which are received at Hiraiso Radio Wave Observatory near Tokyo.

Warnings of radio propagation broadcast from JJY station are expressed in three grades:

N=normal
U=unstable
W=disturbed

The letter W expresses disturbed condition expected to be during the following 12 hours after issue. The letter U and N means also unstable or normal conditions, respectively.

Whole day radio quality indices are the averages of the 6-hourly indices of London, WWV and S. F.

Start- and end-time of principal geomagnetic storms closely correlated to radio propagation conditions are tabulated from observations at Kakioka.

b. Sudden Ionospheric Disturbances (S. I. D.)

The data of short wave fade-out (SWF) are preparated from the field intensity records on following circuits* received at Hiraiso. Characteristics of the phenomenon are classified as follows.

Circuits and Drop-out intensity

W S.....WWV 20 Mc, 15 Mc and 10 Mc (Washington)
S F.....Various commercial circuits (San Francisco)
H A.....WWVH 15 Mc and 10 Mc (Hawaii)
T O.....JJY 15 Mc and 10 Mc (Tokyo)
S H.....BPV 15 Mc and 10 Mc (Shanghai)
L N.....Various commercial circuits (London)

Start-time and Duration, Types and Importances are described from the data of a circuit whose Drop-out Intensity is underlined. Drou-out Intensities of 10 Mc ('), 15 Mc (none) and 20 Mc (").

Start-times and Durations

Types

S : sudden drop-out and gradual recoverly
Slow: slow drop-out taking 5 to 15 minutes and gradual recoverly
G : gradual disturbances; fade irregular in both drop-out and recoverly

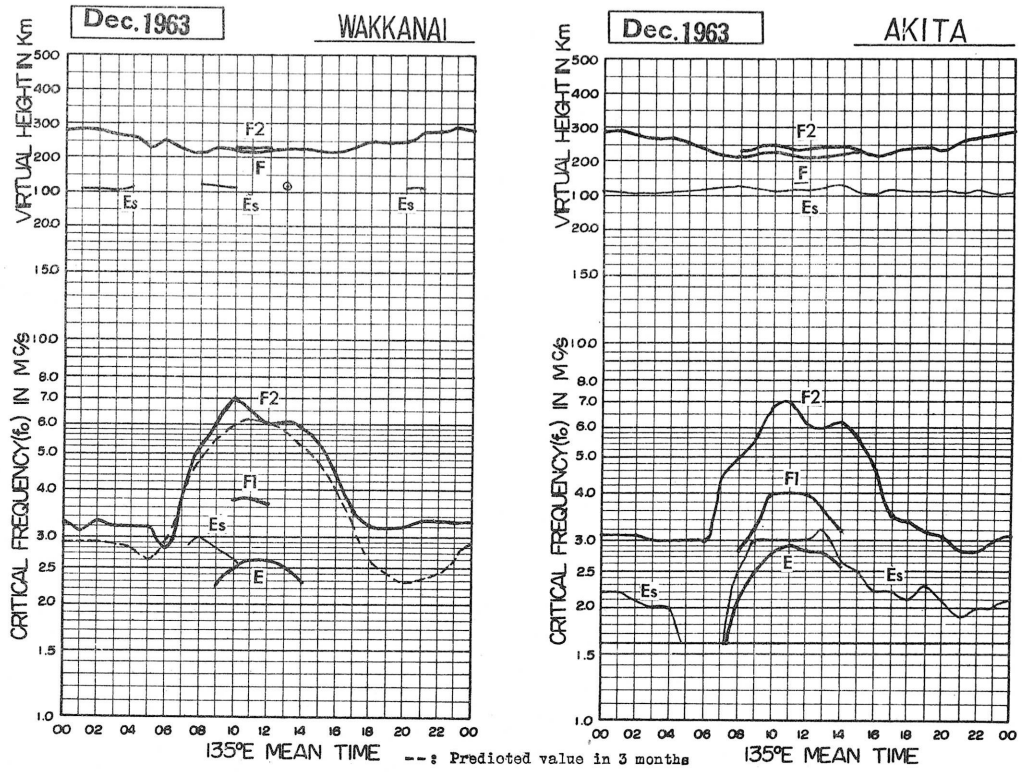
Importances

Degrees of SWF are classified into 9 grades according to the amplitude of fade-out;

1−	1	1+
2−	2	2+
3−	3	3+

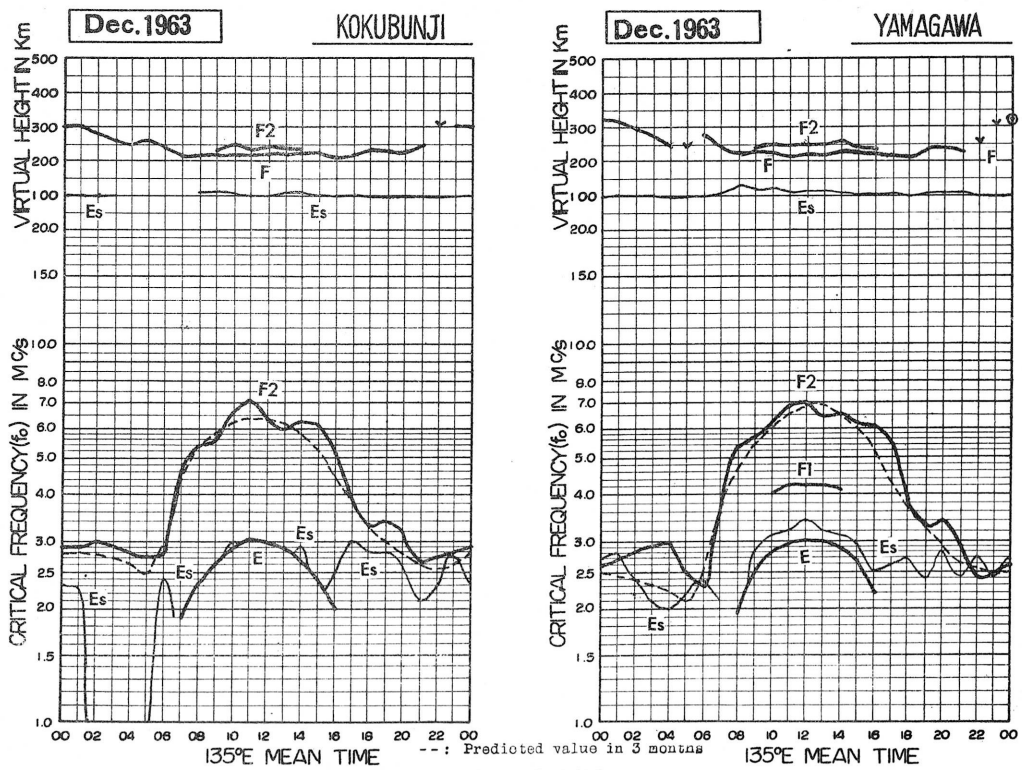
Besides, the time associated phenomena of SID's, that is, solar flare, solar radio noise outburst and crochet (solar flare effect in magnetic record) are given in this table from interchange messages or measurements at Hiraiso.

IONOSPHERIC DATA
MONTHLY MEDIAN CHARACTERISTICS



--: Predicted value in 3 months advance by R.R.L.

IONOSPHERIC DATA
MONTHLY MEDIAN CHARACTERISTICS



--: Predicted value in 3 months advance by R.R.L.

IONOSPHERIC DATA

Dec. 1963 | foF2 | 135° E Mean Time (G.M.T. +9h) | Wakkanai | Lat. 45°23.6' N, Long. 141°41.1' 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	3.0	2.8	3.4	2.4	2.9S	2.9	2.8	4.7	6.1	6.6	6.3	6.3R	6.6H	6.1	5.9	5.4	5.3	3.3	3.0	3.0	3.2	3.2	3.3	3.6
2	F	F	F	SF	U3.3F	3.0	2.7	4.1	5.4	6.0	6.9	5.7H	5.9H	5.0	5.1	4.7	4.6	3.2	U2.7S	3.1	3.2	3.3	3.4	3.0F
3	I3.5F	3.7	3.7	3.3	3.7	4.1	I2.6S	4.3	6.5S	6.0	7.0H	6.1	6.6	6.7	5.8	5.0H	5.3	3.7	3.0	3.4	U3.7S	3.3	3.4	3.4
4	3.3	3.1	3.2S	3.3	3.2	2.6	2.7	4.0	5.6	7.0	6.6	7.0	6.2	6.3	6.3	5.6	4.3	3.2	I2.8A	3.2	3.1	3.3	3.6	3.3
5	3.6	3.6	3.3	3.3S	3.3	3.1	2.9	4.5	5.3	6.3	6.7H	7.3H	6.2	6.1H	5.6	5.4	4.2	3.6	3.3	2.8	2.7	3.0	3.3	3.3
6	3.5	3.5	3.6	3.4	3.1	3.0	2.5	4.0S	5.9H	6.1	7.4	6.4	6.3	7.1	7.3	5.7	4.5	3.6	3.0	2.8	I3.0A	3.3	3.3	3.1
7	3.1	3.3	3.3	3.3	3.0	2.8	2.6	4.5	5.5	5.7H	7.0	6.0	5.8H	6.1H	6.2H	5.3	4.9	3.6	2.6	3.4	3.3	3.1	3.1	3.4
8	3.3	3.1	3.0	3.1	3.3	3.3	4.5S	5.0S	C	C	C	C	C	C	C	5.3	4.7	2.9	2.6	3.3	I2.6A	2.2	2.5	2.8
9	2.8	3.0	3.2	3.1	3.1	3.1	2.3	4.1	4.8	6.5H	7.2	I6.8S	6.6	5.9H	6.4	5.3	4.0	3.4	3.0	3.1	3.2	2.5	3.1	3.1
10	3.1F	3.4	3.3	3.3	3.1	3.6	2.6	4.0	4.8	6.0H	6.8	6.0	5.5	6.0	5.7	5.4	3.6	2.6	3.0	3.5	3.0	2.8	3.0F	3.4F
11	3.3F	3.0F	3.0F	3.0	2.7	2.9	2.4	4.1	5.2H	5.2	5.7	6.0H	6.0	5.4	5.9	5.3	3.8V	3.0	3.0	2.7	I2.5A	2.6	2.8	2.8
12	3.0	3.0	3.3	3.2	3.1	3.1S	3.0	3.9	4.8	5.3	6.8	6.5	5.4	6.3	5.3	5.9H	3.6	3.7	I3.1A	3.1	3.0S	2.6S	3.6	3.4
13	SF	FS	FS	3.6S	3.6	I3.6S	3.3S	3.7	4.9H	6.1	6.8	6.1	6.1H	7.4	5.4	5.2	5.5	4.7	3.6	3.6	3.3S	3.3	3.7S	3.7
14	4.0	F	FS	SF	4.3	U4.3S	3.8	3.7	5.2	6.7	7.1	6.6	6.1	6.8	5.8	4.7H	4.7	3.8	A	A	A	3.4	3.3	3.3
15	3.4	3.6	3.6S	3.3	3.8	3.6	2.2	4.3	6.4	7.1	I7.8R	6.7	5.9H	6.7	7.6	6.2	4.4	4.0	3.1	3.3	3.6	3.6S	SF	SF
16	SF	3.2FS	U3.4F	U2.9F	3.0	3.3	2.5	4.0	5.2	6.3	7.8	7.3	6.3H	6.5	5.8	5.4	5.0	3.8	3.4	3.7	3.6	3.3S	3.3S	FS
17	FS	FS	U3.0F	2.8	3.0	U4.3S	I4.6S	I5.2S	5.4	6.0	6.7	6.5	6.4	5.8H	5.8	4.8	3.9	2.7	3.1	3.1S	3.4S	F	F	F
18	F	F	F	F	F	F	S	3.4	5.0	6.4	6.0	6.0	5.6	6.1	6.0	4.8	3.9	3.0	3.3	3.2S	3.3S	3.4	U3.4S	I3.4FS
19	I3.3FS	3.0F	3.0	3.1S	I3.2SF	I3.2C	2.6	3.5	5.0	6.0H	7.0S	7.3H	5.8	6.3	6.0	5.7	5.0	3.3	3.0	2.5	3.6	3.1	3.4	3.6
20	3.5	3.8	3.8	I3.9FS	I3.8FS	3.8	U3.0S	4.0	5.1	6.8H	7.3	6.9	5.9H	6.3	6.2	5.9H	5.5	4.0	4.4	4.0	U3.6S	I3.4SF	I3.1SF	2.8S
21	3.0	2.7F	3.1	3.2S	3.6	3.3	3.3	4.0	5.9	5.3	7.9H	7.7H	5.5	6.1	6.3	4.9	5.0	4.4	4.0	2.6	2.3	I3.1A	3.3	I2.8A
22	2.9	2.9	2.8	2.9	3.3	3.1	3.3	3.8	4.9	6.4H	7.4H	6.6	6.4	6.2	5.8	4.7	4.8	3.8	3.3	2.8	I3.0A	2.8S	3.0	FS
23	FS	F	2.6F	2.8	I3.4F	3.3F	I3.3FS	3.6	5.9	6.3	5.4	8.1	5.9	5.9	6.2	4.6H	4.5	4.1	3.5	2.7	3.3	3.3	3.4S	3.2
24	2.6	2.6	2.3	2.5	2.8	2.5	2.6	3.7	4.6	I5.6C	6.3	6.3	5.6	5.7	6.3	5.0	4.1	3.8	3.3	3.4	3.4	3.6	4.3	4.6
25	SF	FS	FS	FS	SF	3.3S	I2.6S	3.0	4.5	5.7	6.7	5.8H	7.0	6.4	5.9	5.2	4.3	3.0	3.4	3.3S	3.0	3.3S	SF	SF
26	SF	SF	SF	SF	SF	SF	3.5S	3.0	4.4	6.0H	J7.6S	7.0	6.8H	5.3H	5.3	5.8	4.0	3.6S	3.7	3.4S	I2.9S	3.3	S	SF
27	SF	SF	SF	SF	SF	SF	I4.5S	3.6S	I4.4S	4.6	6.3S	5.9	5.9	5.6	5.0H	5.9	4.4	I3.4S	3.4	3.1	3.8	3.5S	SF	SF
28	SF	SF	SF	SF	SF	3.2FS	3.0FS	I4.0FS	U5.1S	5.3	7.3	6.5H	6.1	5.3	5.9	5.3	3.5	3.5	3.1	2.6	2.8	I2.8SF	3.0F	I3.0SF
29	3.0F	I3.1FS	3.3F	F	F	SF	2.9	3.5	4.1	6.2	7.7H	5.8	5.1H	5.7S	5.2	4.6	4.8	2.7	3.3	3.4	3.3S	3.3	3.6	4.0S
30	U3.6S	3.8	3.5S	S	S	S	3.3S	3.8	5.5	4.8	8.3	7.2	5.5	5.7H	5.8H	4.8	4.3	3.0	3.3	3.3S	2.7	3.0F	FS	FS
31	SF	SF	SF	3.1S	3.3	3.1S	2.4S	3.3S	4.3	5.0	6.2	6.7	5.9	5.1H	6.1	4.9	4.0	3.1	3.7	2.8	2.9	I3.3SF	3.8F	3.4F
No.	20	20	22	22	24	26	30	31	30	30	30	30	30	30	30	31	31	31	30	30	30	30	25	23
Median	3.3	3.1	3.3	3.2	3.2	3.2	2.8	4.0	5.2	6.0	7.0	6.5	6.0	6.1	5.9	5.3	4.4	3.5	3.2	3.2	3.2	3.3	3.3	3.3
U.Q.	3.5	3.6	3.4	3.3	3.5	3.6	3.3	4.1	5.5	6.4	7.4	7.0	6.3	6.3	6.2	5.6	4.9	3.8	3.4	3.4	3.4	3.3	3.5	3.4
L.Q.	3.0	3.0	3.0	2.9	3.0	3.0	2.6	3.6	4.8	5.6	6.6	6.0	5.8	5.7	5.7	4.8	4.0	3.0	3.0	2.8	2.9	3.0	3.1	3.0
Q.R.	0.5	0.6	0.4	0.4	0.5	0.6	0.7	0.5	0.7	0.8	0.8	1.0	0.5	0.6	0.5	0.8	0.9	0.8	0.4	0.6	0.5	0.3	0.4	0.4

The Radio Research Laboratories, Japan

foF2

Sweep 1.0 Mc to 18.0 Mc in 40 sec in automatic operation

W 1

IONOSPHERIC DATA

Dec. 1963 | foF1 | 135° E Mean Time (G.M.T. +9h) | Wakkanai | Lat. 45°23.6' N, Long. 141°41.1' 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																								
2												3.9L												
3													3.9L	A										
4											3.7L	3.8												
5																								
6											3.8L	3.7L												
7											3.7													
8											C	C	C	C										
9											3.9L	3.6L	3.6L											
10											3.5L													
11																								
12																								
13												A	A											
14											3.7L	3.8L												
15												A												
16											U3.8L													
17											U3.8L	3.8	3.6											
18											3.8L	3.8	L											
19												I3.8B		U3.6L										
20												I3.8B												
21																								
22											3.7L	3.8												
23												U3.8L	3.8L	3.5										
24												U3.8L												
25													3.7											
26											A													
27																								
28											3.8L		3.8L	A										
29											3.7	3.7												
30											3.9L	3.9	3.6											
31												3.6	3.7											
No.											13	15	8	2										
Median											3.8	3.8	3.7	U3.6										
U.Q.																								
L.Q.																								
Q.R.																								

foF1

Sweep 1.0 Mc to 18.0 Mc in 40 sec in automatic operation

The Radio Research Laboratories, Japan

W 2

IONOSPHERIC DATA

Dec. 1963 | foE | 135° E Mean Time (G.M.T. +9h) | Wakkanai | Lat. 45°23.6' N, Long. 141°41.1' 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								S	B	B	2.65	2.80	2.80	2.75	2.20	B	S							
2								S	B	2.25	2.65	2.75	2.70	2.50	I2.35B	B	S							
3								S	2.15	I2.35A	2.60	2.55	2.70	2.60	2.30	S	S							
4								S	I2.10A	2.35	2.50	2.60	2.50	2.50	S	S	S							
5								S	S	2.20	2.50	2.60	2.65	B	B	B	S							
6								S	A	A	2.50	I2.55A	I2.55A	2.50	2.35	S	S							
7								S	S	2.20	I2.40A	I2.65A	2.50	2.50	2.20	S	S							
8								S	C	C	C	C	C	C	C	S	S							
9								S	S	2.35	2.65	2.75	2.65	2.45	2.25	S	S							
10								S	S	2.05	2.60	2.65	2.60	I2.50S	S	S	S							
11								S	S	A	2.60	2.75	2.60	2.40	2.30	S	S							
12								S	A	S	B	B	B	B	B	B	S							
13								S	B	B	A	A	A	B	2.40	A	S							
14								S	S	A	A	A	2.55	2.50	2.25	A	S							
15							S	S	2.25	2.40	A	A	A	A	S	A	S							
16								S	S	2.35	2.50	2.50	2.55	2.30	A	S	S							
17								S	S	2.30	2.60	2.80	2.70	2.50	2.10	S	S							
18								S	S	2.30	2.60	2.70	2.65	2.45	S	S	S							
19								S	S	S	S	B	B	A	B	B	S							
20								S	S	S	S	B	S	S	S	S	S							
21								S	S	S	I2.35S	2.65	2.70	2.45	I2.20S	S	S							
22								S	S	2.20	2.50	2.65	2.45	2.50	A	S	S							
23								S	S	2.25	I2.40A	2.55	2.40	2.40	S	S	S							
24								S	S	C	I2.35A	2.50	I2.45S	I2.35A	I2.30S	S	S							
25								S	S	A	A	B	S	S	S	S	S							
26								S	S	S	A	A	I2.50A	S	S	S	S							
27								S	S	2.25	2.45	2.50	2.70	2.50	I2.30S	S	S							
28								S	S	2.20	I2.40A	2.50	A	A	A	A	S							
29								S	S	A	2.40	2.55	2.50	2.40	S	S	S							
30								S	S	A	I2.35A	A	A	S	S	A	S							
31								S	S	S	S	2.50	2.55	S	S	S	S							
No.									3	15	21	21	22	19	13									
Median									2.15	2.25	2.50	2.60	2.60	2.50	2.30									
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

foE

Sweep 1.0Mc to 18.0 Mc in 40 sec in automatic operation

W 3

IONOSPHERIC DATA

Dec. 1963 | foEs | 135° E Mean Time (G.M.T. +9h) | Wakkanai | Lat. 45°23.6' N, Long. 141°41.1' 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	E	E	2.2	2.5	J 3.3	E	E	J 2.5	B	2.8	G	G	G	3.3	G	B	S	2.5	E	E	E	E	E	E
2	E	E	E	E	1.4	E	E	2.5	B	G	G	G	G	G	B	B	S	2.6	E	E	J 2.3	J 2.4	E	E
3	E	E	E	E	E	2.4	S	S	G	5.1	G	3.2	G	4.0	G	S	S	E	E	E	E	2.5	E	E
4	E	E	E	E	E	E	E	2.5	J 5.3	G	2.8	G	G	G	S	S	S	E	J 4.3	E	E	E	E	E
5	E	E	E	E	E	E	E	2.8	S	2.8	G	2.3G	G	B	B	B	S	E	E	E	E	E	E	E
6	E	E	E	E	E	E	E	S	2.6	5.1	G	3.3	2.9	G	G	S	S	E	E	E	J 5.5	4.0	E	E
7	E	E	E	J 2.5	E	E	E	S	S	2.9	J 4.3	3.1	G	4.3	G	2.2	S	E	E	J 6.4	3.2	E	E	E
8	E	E	E	E	E	E	E	S	C	C	C	C	C	C	C	S	S	E	2.8	J 4.3	2.4	4.0	E	E
9	E	E	E	E	E	E	E	S	2.3	3.5	G	G	G	G	G	S	S	E	E	E	E	E	E	J 3.0
10	J 3.0	J 2.5	3.0M	2.6	E	E	E	S	S	2.7	G	G	G	S	S	S	S	E	E	E	3.0	E	3.6	J 3.3
11	E	E	E	E	E	E	E	S	S	2.9	G	G	G	G	G	S	S	E	E	E	4.0	3.2	E	E
12	E	E	E	E	3.2	E	E	S	J 5.3	S	B	B	B	B	B	B	3.7	J 2.7	J 6.3	J 5.1	E	E	E	E
13	J 3.3	3.1	3.4	3.1	3.3	2.9	E	S	B	B	4.0	5.1	4.8	B	G	4.4	J 5.1	E	E	5.0	E	3.0	5.2	3.6
14	3.0	2.4	E	E	E	E	E	S	S	5.0	3.8	3.1	G	G	G	3.7	3.6	E	5.2M	5.8M	5.8	3.0	3.2	3.5
15	3.2	E	E	E	E	E	S	S	S	2.8	3.6	J 7.8	3.9	3.0	3.0	3.8	3.7	E	3.0	E	E	3.3	E	E
16	2.8	2.0	2.4	2.5	E	E	E	S	S	G	G	4.2	3.3	4.5	3.3	4.3	3.8	E	E	E	E	E	E	E
17	E	2.4	E	2.4	2.2	E	E	S	3.3	G	G	G	G	G	2.4	S	S	E	E	E	E	E	E	E
18	E	3.1	2.3	2.7	2.0	E	E	S	S	G	G	G	G	G	S	S	S	E	E	E	E	E	E	E
19	E	E	E	E	E	C	E	S	S	S	S	B	B	3.8	B	B	S	J 3.5	E	E	E	E	E	E
20	E	E	E	E	E	E	E	S	S	S	S	B	S	S	S	S	S	J 3.5	J 3.8	J 4.3	3.0	E	3.4	E
21	E	2.8	3.6	2.3	2.6	J 3.0	E	3.0	J 5.3	S	S	G	G	G	S	S	J 5.3	J 4.1	J 3.0	E	3.0	J 3.3	3.3	3.3
22	E	E	E	E	E	2.5	E	2.8	S	G	G	G	G	3.0	2.9	3.3	J 5.0	2.7	E	E	3.2	3.6	E	E
23	E	3.1	2.8	E	E	E	E	S	S	2.4	2.5	G	G	G	S	S	S	E	E	E	E	E	E	E
24	E	E	E	E	E	E	E	S	3.0	C	3.3	G	S	2.8	S	S	S	E	E	E	E	E	E	E
25	E	3.1	2.8	E	E	E	E	S	2.3	3.0	3.0	B	S	S	S	S	S	E	E	E	E	E	E	3.1
26	E	E	E	E	1.6	E	E	S	S	3.0	J 5.1	4.2	2.9	S	S	S	S	E	E	E	E	E	E	E
27	E	E	2.8	3.1	E	E	E	S	S	3.6	3.0	G	G	G	S	S	S	2.8	E	E	E	E	E	E
28	E	2.4	J 2.8	3.0	2.7	E	E	S	S	2.8	4.0	2.3G	5.0	J 7.3	4.3	4.1	4.2M	3.7	2.4	2.6	E	E	E	E
29	E	E	E	E	E	E	E	S	S	2.9	2.7	G	G	G	S	S	S	E	E	E	E	2.5	E	E
30	E	E	E	1.6	1.6	E	E	S	S	2.8	3.0	3.0	3.9	S	S	3.1	S	E	E	E	E	E	E	E
31	E	E	E	E	E	E	E	S	S	S	3.0	3.0	2.9	2.7	3.3	S	S	E	E	E	E	E	J 5.4	E
No.	31	31	31	31	31	30	29	6	9	23	26	26	26	22	14	8	8	31	31	31	31	31	31	31
Median	E	E	E	E	E	E	E	2.6	3.0	2.8	2.6	G	G	G	G	3.8	4.0	E	E	E	E	E	E	E
U.Q.	E	2.4	2.4	2.5	1.6	E	E	2.8	5.3	3.0	3.3	3.1	2.9	3.3	3.0	4.2	5.0	2.6	2.4	E	3.0	3.0	E	E
L.Q.	E	E	E	E	E	E	E	2.5	2.3	G	G	G	G	G	G	3.2	3.7	E	E	E	E	E	E	E
Q.R.								0.3	3.0							1.0	1.3							

foEs

Sweep 1.0 Mc to 18.0 Mc in 40 sec in automatic operation

The Radio Research Laboratories, Japan

IONOSPHERIC DATA

Dec. 1963 | f_bE_s | 135° E Mean Time (G.M.T. +9h) | Wakkanai | Lat. 45°23.6' N, Long. 141°41.1' 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			E	E	2.4			G	B	G				G		B	S	E						
2					E			G	B						B	B	S	2.2			E	E		
3						E	S	S		2.7		G		4.0		S	S					E		
4								G	4.0		G				S	S	S		A					
5								G	S	G		G		B	B	B	S							
6								S	2.1	2.6		2.7	2.9			S	S				A	E		
7				E				S	S	G	2.6	2.8		G		G	S			E	E			
8								S	C	C	C	C	C	C	C	S	S		E	E	A	E		
9								S	G	G						S	S							E
10	E	E	E	E				S	S	G				S	S	S	S				E		E	E
11								S	S	2.8						S	S				A	E		
12					E			S	2.5	S	B	B	B	B	B	B	2.2	E	A	2.3				
13	E	E	E	E	E	E		S	B	B	3.6	4.3	4.0	B		2.5	2.3			E		E	E	E
14	E	E						S	S	2.8	2.6	2.9				2.5	2.2		A	A	A	E	E	E
15	E						S	S	S	G	2.2	4.3	3.5	3.0	G	2.5	G		E			E		
16	E	E	E	E				S	S			G	G	G	2.5	G	2.8							
17		E		E	E			S	G						G	S	S							
18		E	E	E	E			S	S						S	S	S							
19						C		S	S	S	S	B	B	2.7	B	B	S	E						
20								S	S	S	S	B	S	S	S	S	S	E	E	2.7	E		E	
21		E	E	E	E	E		G	5.0	S	S				S	S	G	E	E		E	A	E	A
22						E		G	S					G	2.5	G	G	E			A	E		
23		E	E					S	S	G	2.5				S	S	S							
24								S	G	C	2.8		S	2.7	S	S	S							
25		E	E					S	G	2.5	3.0	B	S	S	S	S	S							E
26					E			S	S	2.7	4.4	3.5	2.6	S	S	S	S							
27			E	E				S	S	G	G				S	S	S	A						
28		E	E	E	E			S	S	G	3.0	G	3.7	4.0	2,7	2.4	2.6	E	E	E				
29								S	S	2.5	G				S	S	S					E		
30				E	E			S	S	2.8	2.8	3.0	3.1	S	S	2.3	S							
31								S	S	S	G	G	G	G	G	S	S						2.5	
No.																								
Median																								
U.Q.																								
L.Q.																								
Q.R.																								

f_bE_s Sweep 1.0 Mc to 18.0 Mc in 40 sec in automatic operation

The Radio Research Laboratories, Japan

W 5

IONOSPHERIC DATA

Dec. 1963 | f-min | 135° E Mean Time (G.M.T. +9h) | Wakkanai | Lat. 45°23.6' N, Long. 141°41.1' 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	E1.90S	E1.60S	E	E	E	E1.60S	E1.90S	E2.00S	2.15	2.50	1.90	1.90	1.90	1.90	1.90	2.25	E2.10S	E1.80S	E1.70S	E2.00S	E1.95S	E2.00S	E1.90S	E1.90S
2	E1.95S	E	E	E	E	E	E1.90S	E1.80S	2.40	1.90	2.00	2.20	2.00	2.15	2.50	2.40	E2.10S	E2.00S	E1.85S	E2.00S	E2.00S	E2.00S	E2.00S	E1.90S
3	E1.95S	E1.60S	E	E	E	E1.70S	S	E2.00S	2.00	2.00	2.00	1.90	2.00	2.00	2.00	E2.00S	E1.75S	E1.80S	E1.95S	E2.00S	E1.95S	E2.00S	E1.85S	E2.00S
4	E1.90S	E1.50S	E1.70S	E	E1.50S	E1.90S	E1.85S	E2.00S	1.80	1.90	1.90	2.00	1.90	2.00	E2.30S	E2.20S	E1.85S	E2.00S	E1.80S	E1.90S	E2.00S	E2.00S	E1.90S	E1.90S
5	E1.95S	E1.90S	E1.85S	E	E1.20S	E1.60S	E1.90S	E1.90S	E2.10S	1.90	1.90	1.90	2.00	2.80	2.30	2.00	E1.80S	E1.80S	E1.90S	E1.90S	E1.85S	E1.90S	E1.90S	E2.00S
6	E1.90S	E1.70S	E1.50S	E1.30S	E	E1.70S	E1.80S	E1.80S	1.90	1.90	1.90	1.90	2.00	2.00	2.00	E2.00S	E1.70S	E1.90S	E1.90S	E2.00S	E2.00S	E1.90S	E2.00S	E2.00S
7	E1.95S	E1.70S	E1.70S	E	E	E1.60S	E1.90S	E1.80S	E2.00S	1.85	2.00	2.00	2.00	2.00	2.00	E1.85S	E1.90S	E1.80S	E1.90S	E1.90S	E2.00S	E1.95S	E2.00S	E1.90S
8	E2.00S	E1.90S	E1.70S	E	E1.60S	E1.70S	E2.00S	E1.80S	C	C	C	C	C	C	C	E2.00S	E1.80S	E1.90S	E1.90S	E2.00S	E2.00S	E1.85S	E1.90S	E1.90S
9	E1.95S	E1.70S	E	E	E	E1.70S	E1.90S	E1.80S	E2.00S	1.90	2.00	2.00	2.00	2.00	2.00	E2.00S	E1.95S	E1.80S	E1.80S	E2.00S	E1.90S	E1.95S	E2.00S	E1.80S
10	E1.90S	E1.65S	E	E	E	E1.50S	E1.80S	E1.80S	E2.00S	2.00	2.00	2.00	2.00	E2.70S	E2.50S	E2.05S	E1.85S	E1.90S	E1.90S	E2.00S	E2.00S	E1.95S	E1.90S	E2.00S
11	E2.00S	E1.70S	E1.50S	E	E	E1.70S	E1.85S	E1.80S	E2.05S	2.00	2.00	2.00	2.00	2.00	2.00	E2.00S	E1.95S	E1.95S	E1.95S	E2.00S	E1.90S	E2.00S	E2.00S	E2.00S
12	E2.00S	E1.60S	E1.80S	E	E	E1.70S	E1.75S	E1.90S	2.00	E2.50S	2.80	3.15	3.25	3.50	2.70	2.50	E1.85S	E1.85S	E1.85S	E1.85S	E1.90S	E1.80S	E1.90S	E1.85S
13	E1.70S	E	E	E	E1.60S	E1.50S	E2.00S	E2.00S	2.50	2.90	2.50	2.60	2.50	3.20	2.00	2.00	E1.85S	E1.75S	E1.95S	E1.85S	E1.90S	E1.90S	E1.90S	E1.80S
14	E2.00S	E1.50S	E	E	E	E	E1.80S	E1.90S	E2.15S	2.00	2.10	2.00	2.00	2.00	2.00	E2.00S	E1.80S	E2.00S	E1.85S	E1.80S	E1.80S	E1.90S	E1.90S	E1.90S
15	E1.85S	E1.70S	E1.80S	E1.50S	E1.50S	E1.50S	E1.85S	E2.00S	E2.50S	2.00	2.00	2.00	2.00	2.00	E2.20S	E2.00S	E2.00S	E1.80S	E1.90S	E1.80S	E1.80S	E1.80S	E1.85S	E1.80S
16	E1.80S	E1.60S	E1.70S	E	E	E1.70S	E1.80S	E1.90S	E2.10S	1.95	1.90	2.00	2.00	2.00	2.00	E2.00S	E1.80S	E2.00S	E1.80S	E1.90S	E1.85S	E1.85S	E1.80S	E2.00S
17	E1.90S	E1.80S	E1.60S	E	E	E1.60S	E1.70S	E1.70S	E1.90S	1.90	1.85	2.00	1.95	1.80	1.95	E2.05S	E1.80S	E1.70S	E2.00S	E1.95S	E1.95S	E1.90S	E1.95S	E1.95S
18	E1.95S	E1.70S	E	E	E	E1.80S	E1.80S	E1.80S	E2.00S	2.00	2.00	2.00	2.00	2.00	E2.40S	E1.95S	E2.00S	E1.80S	E2.00S	E2.00S	E2.00S	E1.90S	E2.00S	E1.95S
19	E1.95S	E1.80S	E1.70S	E	E	C	E1.90S	E2.00S	E2.10S	E2.50S	E3.70S	3.90	3.40	2.50	2.50	2.10	E1.80S	E1.90S	E1.90S	E2.00S	E1.80S	E2.00S	E1.90S	E2.00S
20	E1.90S	E1.60S	E1.65S	E1.50S	E	E1.60S	E1.80S	E1.70S	E2.15S	E2.90S	E2.85S	4.00	E2.70S	E3.00S	E3.20S	E2.00S	E2.00S	E1.90S	E2.00S	E1.95S	E2.00S	E1.90S	E1.90S	E1.95S
21	E1.90S	E1.60S	E1.60S	E	E	E1.80S	E1.85S	E1.80S	E2.00S	E2.30S	E2.60S	2.10	2.10	2.05	E2.40S	E2.00S	E1.80S	E1.80S	E2.00S	E2.00S	E1.90S	E1.90S	E2.00S	E2.00S
22	E1.95S	E2.00S	E1.60S	E1.60S	E	E1.70S	E1.70S	E1.80S	E2.10S	2.00	2.00	2.35	2.00	2.00	2.00	E2.00S	E2.00S	E2.00S	E1.90S	E1.90S	E1.90S	E2.00S	E2.00S	E2.00S
23	E1.90S	E1.60S	E	E	E	E1.60S	E1.80S	E1.90S	E2.00S	2.00	2.00	2.00	2.00	2.00	E2.50S	E2.00S	E2.00S	E1.85S	E1.95S	E1.90S	E1.90S	E1.90S	E1.85S	E2.00S
24	E1.90S	E1.70S	E1.80S	E1.15S	E	E1.60S	E1.80S	E2.00S	E2.00S	C	2.00	2.00	E2.70S	2.00	E2.50S	E2.00S	E2.00S	E1.95S	E1.90S	E2.00S	E1.90S	E2.00S	E2.00S	E2.00S
25	E1.95S	E1.40S	E1.60S	E1.60S	E1.70S	E1.60S	E2.00S	E1.90S	E2.00S	2.00	2.15	3.00	E2.60S	E3.00S	E2.50S	E2.15S	E2.00S	E2.00S	E2.00S	E2.00S	E1.90S	E1.95S	E1.90S	E2.00S
26	E2.00S	E1.20S	E	E	E	E1.20S	E2.00S	E1.90S	E2.20S	E2.10S	2.10	2.10	2.00	E2.80S	E2.50S	E2.00S	E1.85S	E2.00S	E2.00S	E2.00S	E2.00S	E2.00S	E2.00S	E2.00S
27	E2.00S	E1.60S	E1.60S	E	E1.30S	E1.70S	E1.80S	E1.90S	E2.00S	1.85	2.00	2.00	2.00	2.00	E2.40S	E2.10S	E1.90S	E2.00S	E2.00S	E2.00S	E2.00S	E1.90S	E2.00S	E2.00S
28	E2.00S	E1.50S	E	E	E	E1.70S	E1.80S	E1.85S	E2.05S	2.00	2.00	1.80	2.00	1.90	2.00	2.00	E2.00S	E1.90S	E1.80S	E1.95S	E1.95S	E2.00S	E2.00S	E2.00S
29	E1.90S	E1.40S	E	E	E	E1.50S	E2.00S	E2.00S	E2.10S	1.85	2.00	2.00	2.00	2.00	E2.30S	E2.00S	E2.10S	E1.60S	E1.90S	E2.00S	E2.00S	E2.00S	E2.00S	E2.00S
30	E2.00S	E1.50S	E	E	E	E1.50S	E1.90S	E1.90S	E2.00S	2.00	2.10	2.00	2.00	E2.40S	E2.40S	2.00	E2.00S	E2.00S	E2.00S	E1.90S	E2.00S	E2.00S	E2.00S	E1.90S
31	E1.80S	E1.50S	E	E	E	E1.60S	E1.70S	E1.80S	E2.10S	E2.15S	E2.40S	2.00	2.35	E2.40S	E2.20S	E2.30S	E2.00S	E2.00S	E2.00S	E2.00S	E1.85S	E1.95S	E1.85S	E2.00S
No.	31	31	31	25	24	30	30	31	30	23	26	30	27	24	16	31	31	31	31	31	31	31	31	31
Median	E1.95	E1.60	E1.50	E	E	E1.60	E1.85	E1.90	E2.00	2.00	2.00	2.00	2.00	2.00	2.00	E2.00	E1.90	E1.90	E1.90	E2.00	E1.95	E1.95	E1.90	E2.00
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

f-min

Sweep 1.0 Mc to 18.0 Mc in 40 sec in automatic operation

W 6

IONOSPHERIC DATA

Dec. 1963 | M(3000)F2 | 135° E Mean Time (G.M.T. +9h) | Wakkanai | Lat. 45°23.6' N, Long. 141°41.1' 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	3.00	3.00	3.30	3.15	3.10S	3.05	2.95	3.45	3.70	3.65	3.55	3.50R	3.30H	3.35	3.55	3.70	3.55	3.70	3.10	3.15	3.30	2.85	2.75	3.05
2	F	F	F	SF	U3.40F	3.20	3.20	3.55	3.50	3.65	3.50	3.85H	3.55H	3.60	3.70	3.55	3.65	3.20	U3.20S	3.05	3.15	2.95	3.05	3.00F
3	I3.00F	2.95	3.00	3.05	2.85	3.60	I3.20S	3.50	3.55S	3.65	3.30H	3.50	3.40	3.75	3.65	3.35H	3.60	3.25	3.00	3.05	U3.50S	3.05	2.95	2.80
4	2.75	2.85	2.80S	3.05	3.15	3.30	3.20	3.55	3.40	3.55	3.60	3.35	3.55	3.35	3.50	3.55	3.50	2.80	I3.15A	3.15	3.25	2.75	3.35	2.95
5	3.00	3.05	2.80	3.05S	2.95	3.25	3.35	3.55	3.60	3.65	3.35H	3.25H	3.75	3.60H	3.75	3.65	3.45	3.20	3.40	3.50	3.25	3.05	2.90	2.90
6	2.90	2.90	2.90	3.05	2.95	3.15	3.20	3.55S	3.75H	3.60	3.55	3.50	3.50	3.50	3.55	3.55	3.40	3.35	3.25	3.30	I3.05A	3.05	3.10	2.90
7	2.85	2.95	2.95	3.15	3.05	3.20	3.25	3.55	3.55	3.35H	3.55	3.55	3.10H	3.45H	3.40H	3.75	3.50	3.65	3.10	3.25	3.35	2.95	2.85	3.00
8	3.10	2.95	2.85	2.95	2.90	3.20	3.35S	3.50S	C	C	C	C	C	C	C	3.75	3.85	3.05	3.10	3.35	I3.25A	2.90	3.00	2.90
9	3.05	2.95	2.95	2.90	2.95	3.25	3.15	3.45	3.60	3.45H	3.60	I3.50S	3.65	3.60H	3.60	3.65	3.50	3.45	3.10	3.25	3.45	2.90	3.00	2.90
10	2.85F	3.05	3.10	3.05	3.05	3.20	3.20	3.60	3.55	3.35H	3.70	3.65	3.80	3.65	3.70	3.75	3.95	3.10	3.35	3.35	3.05	3.20	2.95F	2.95F
11	3.05F	2.95F	2.95F	3.00	3.15	3.20	3.35	3.65	3.40H	3.70	3.70	3.55H	3.70	3.85	3.40	3.60	3.05V	3.35	3.05	3.35	I3.30A	3.10	3.10	3.15
12	3.00	3.15	2.90	3.15	2.95	3.05S	3.25	3.40	3.75	3.75	3.55	3.75	3.80	3.50	3.70	2.90H	3.45	3.35	I3.35A	3.50	3.55S	3.15S	2.95	3.00
13	SF	FS	FS	3.05S	3.05	I3.20S	3.35S	3.80	3.55H	3.60	3.65	3.65	3.50H	3.65	3.70	3.80	3.25	3.55	3.40	3.35	3.35S	2.85	2.95S	3.10
14	3.00	F	FS	SF	3.00	U3.35S	3.65	3.25	3.45	3.50	3.50	3.65	3.50	3.55	3.60	3.65H	3.40	3.20	A	A	A	3.00	3.05	2.95
15	2.90	2.85	2.85S	2.95	3.15	3.90	3.10	3.45	3.50	3.40	I3.40R	3.55	3.40H	3.35	3.65	3.55	3.40	3.25	3.30	3.10	3.35	3.10S	SF	SF
16	SF	3.20S F	3.25F	U3.10F	3.25	3.50	3.55	3.55	3.75	3.35	3.35	3.45	3.30H	3.55	3.35	3.55	3.50	3.25	3.30	3.45	3.25	3.25S	3.35S	FS
17	FS	FS	U2.85F	2.95	3.00	U3.15S	I3.35S	I3.40S	3.65	3.50	3.50	3.70	3.50	3.60H	3.60	3.55	3.40	3.45	3.30	3.30S	3.20S	F	F	F
18	F	F	F	F	F	F	S	3.65	3.60	3.60	3.65	3.65	3.75	3.50	3.40	3.55	3.45	3.35	3.35	3.40S	3.05S	3.05	U3.25S	I3.20S F
19	I3.10S F	3.00F	3.00	3.10S	I3.25F D	I3.50C	3.25	3.70	3.55	3.65H	3.55S	3.45H	3.60	3.50	3.50	3.55	3.55	3.10	3.65	3.05	3.60	3.00	3.10	3.15
20	3.15	3.15	3.15	I3.05S F	I3.10S F	3.15	U3.35S	3.75	3.55	3.65H	3.50	3.60	3.65H	3.70	3.55	3.25H	3.45	3.10	3.25	3.25	U3.35S	I3.15F S	I3.20F S	3.10S
21	3.05	2.95F	2.90	2.90	3.15	3.05	3.40	3.65	3.75	3.55	3.30H	3.55H	4.00	3.45	3.50	3.45	3.20	3.50	3.40	3.30	3.15	I3.35A	3.35	I3.30A
22	3.05	2.95	2.95	2.90	3.05	3.15	3.40	3.35	3.55	3.15H	3.25H	3.55	3.60	3.55	3.50	3.50	3.25	3.35	3.40	3.10	I3.30A	3.00S	3.00	FS
23	FS	F	3.10F	3.15	I3.15F	3.40F	I3.25S F	3.20	3.50	3.50	3.50	3.50	3.80	3.55	3.55	3.35H	3.45	3.25	3.35	3.05	3.35	3.10	3.05S	3.00
24	3.10	3.20	2.95	3.00	3.20	3.50	3.20	3.25	3.50	I3.55C	3.45	3.35	3.50	3.35	3.55	3.60	3.65	3.35	3.20	3.25	3.30	3.05	2.95	3.25
25	SF	FS	FS	FS	SF	3.35S	I3.30S	3.35	3.55	3.55	3.60	3.80H	3.45	3.45	3.70	3.60	3.50	3.00	3.55	3.25S	3.35	3.20S	SF	SF
26	SF	SF	SF	SF	SF	SF	3.45S	3.45	3.55	3.40H	J3.50S	3.55	3.55H	3.50H	3.45	3.60	3.55	3.15S	3.20	3.25S	I3.35S	3.25	S	SF
27	SF	SF	SF	SF	SF	SF	I3.25S	3.35S	I3.55S	3.70	3.50S	3.75	3.55	3.75	3.40H	3.75	3.75	I3.30S	3.10	3.05	3.05	3.15S	SF	SF
28	SF	SF	SF	SF	SF	3.05S F	3.35S F	I3.45S F	U3.65S	3.40	3.55	3.40H	3.75	3.75	3.75	3.65	3.50	3.45	3.60	3.45	3.30	I3.25F S	3.00F	I2.95F S
29	2.95F	I3.00S F	3.05F	F	F	SF	3.20	3.50	3.65	3.40	3.50H	3.60	3.55H	3.50S	3.70	3.60	3.65	3.70	3.10	3.25	3.40S	2.80	3.05	3.20S
30	U2.90S	2.95	3.15S	S	S	S	3.35S	3.55	3.45	3.15	3.60	3.65	3.65	3.25H	3.45H	3.75	3.45	3.25	3.35	3.35S	3.20	3.00F	FS	FS
31	SF	SF	SF	3.30S	3.05	3.40S	3.35S	3.60S	3.85	3.35	3.70	3.60	3.65	3.75H	3.60	3.45	3.60	3.05	3.35	3.55	3.10	I3.05F S	3.15F	3.25F
No.	20	20	22	22	24	26	30	31	30	30	30	30	30	30	30	31	31	31	30	30	30	30	25	23
Median	3.00	2.95	2.95	3.05	3.05	3.20	3.30	3.50	3.55	3.55	3.50	3.55	3.55	3.55	3.55	3.60	3.50	3.25	3.30	3.25	3.30	3.05	3.05	3.00
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

M(3000)F2 | Sweep 1.0 Mc to 18.0 Mc in 40 sec in automatic operation

W 7

IONOSPHERIC DATA

Dec. 1963 | M(3000)F1 | 135° E Mean Time (G.M.T. +9h) | Wakkanai | Lat. 45°23.6' N, Long. 141°41.1' 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																								
2												4.10L												
3													3.85L	A										
4											4.00L	4.00												
5																								
6											3.75L	3.90L												
7											3.75													
8											C	C	C	C										
9											4.10L	3.90L	3.95L											
10											3.90L													
11																								
12																								
13												A	A											
14											4.05L	4.20												
15												A												
16											U3.95L													
17											U3.95L	3.95	3.90											
18											3.95L	4.10	L											
19												I3.95B		U3.60L										
20												I3.90B												
21																								
22											4.05L	4.00												
23												U3.70L	4.15L	4.05										
24												U3.95L												
25													3.80L											
26											A													
27																								
28											3.85L		A	A										
29											3.80	3.85												
30											3.85L	3.85	4.15											
31												3.85	4.05											
No.											13	15	7	2										
Median											3.95	3.95	3.95	U3.80										
U.Q.																								
L.Q.																								
Q.R.																								

M(3000)F1 Sweep 1.0 Mc to 18.0 Mc in 40 sec in automatic operation

IONOSPHERIC DATA

Dec. 1963 | h'F2 | 135° E Mean Time (G.M.T. +9h) | Wakkanai | Lat. 45°23.6' N, Long. 141°41.1' 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																								
2												230H												
3													250	240										
4											235	240												
5																								
6											230	235												
7											240													
8											C	C	C	C										
9											235	220	230											
10											245													
11																								
12																								
13												235	250H											
14											225	230												
15												220												
16											240													
17											235	225	230											
18											235	225	225											
19												230H		245										
20												230												
21																								
22											225	250												
23												240	225	230										
24												230												
25													250											
26											240													
27																								
28											250		240	240										
29											230	250												
30											240	230	230											
31												245	225											
No.											14	17	10	4										
Median											235	230	230	240										
U.Q.																								
L.Q.																								
Q.R.																								

h'F2

Sweep 1.0 Mc to 18.0 Mc in 40 sec in automatic operation

The Radio Research Laboratories, Japan

W 9

IONOSPHERIC DATA

Dec. 1963 | h'F | 135° E Mean Time (G.M.T. +9h) | Wakkanai | Lat. 45°23.6' N Long. 141°41.1' 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	280	300	260	280	325	285	275	230	210	230	225	240	220H	240	235	215	220	215	250	275	230	300	275	300
2	300	250	300	250	220	225	255	230	210	225H	250	210	240H	230	225	220	215	260	230	265	275	300	275	300
3	275	290	275	255	275	230	I250S	225	225	230	220H	235H	235	I235A	225	210H	220	225	300	280	225	280	290	275
4	310	300	315	275	260	290	260	225	I240A	230	230	220	200H	215H	240	225	210	305	I275A	265	250	310	250	290
5	300	290	310	260	295	240	250	225	225	235	230H	245H	220H	245H	230	220	215	270	240	235	250	275	290	315
6	300	300	300	280	250	230	275	210	210H	225H	240	210	245	245	225	220	210	240	250	250	I295A	275	275	305
7	300	300	280	255	250	260	270	225	220	215H	225	225	190H	240H	240H	220	220	215	285	260	250	285	310	300
8	255	295	300	260	300	260	250	210	C	C	C	C	C	C	C	225	205	270	305	250	I255A	350	310	320
9	285	290	275	250	240	260	275	220	220	230H	230	210	200	215H	230	215	215	235	250	260	235	330	280	325
10	350	300	290	260	250	235	265	220	215	220	210	225	210	230	225	220	200	300	250	245	250	275	290	300
11	280	280	300	250	250	250	250	215	205H	220	220	200H	230	225	230	220	225	230	260	250	I270A	275	300	290
12	300	270	300	260	280	285	255	210	215	210	220H	220	225	260	215	225H	220	235	I250A	250	225	300	285	300
13	330	300	280	280	275	250	240	210	215H	240	240	I230A	I230A	235	225	220	245	215	235	250	240	300	310	275
14	260	260	250	235	250	230	225	215	215	240	225	230	230	240H	230	210	220	225	A	A	A	300	300	350
15	315	300	300	300	245	205	I340S	240	230	240	230	I230A	220	240	230	225	215	230	240	250	230	280	295	300
16	285	305	285	270	275	235	240	220	210	235	235	220	215H	230	210H	215	225	225	240	240	235	240	240	320
17	300	300	305	300	260	225	215	205	210	220	220	215	200	195H	230	225	220	215	250	250	265	250	245	230
18	250	310	275	250	270	235	230	210	220	195H	230	210	225	200H	240	215	210	230	250	255	275	275	265	300
19	280	275	285	270	260	I220C	250	205	210	210	225	I220B	225	215	230	220	215	250	225	320	230	280	280	250
20	275	260	250	275	280	240	245	205	215	235	220H	I215B	200H	220	220	220	215	275	250	260	255	275	235	285
21	285	320	315	300	290	300	240	225	I215A	195H	215H	220H	210	210H	225	215	235	220	240	260	285	I260A	260	I255A
22	300	300	300	300	265	265	250	225	220	210H	225	200	200H	240	235	225	250	240	245	250	I245A	320	320	350
23	285	250	300	260	240	225	250	260	240	210H	190H	230	215	205	225	205H	225	250	225	290	260	260	275	285
24	270	260	300	300	265	225	275	230	225	I240C	245	230	220	220	240	210	210	260	260	255	250	295	255	245
25	255	260	275	265	240	225	300	250	220	230	225	210H	205	250	230H	225	210	285	250	235	250	275	250	295
26	300	255	220	270	275	240	220	240	215	235H	I230A	235	190H	210H	235	225	220	245	240	225	265	250	270	290
27	275	255	275	240	245	235	225	230	210	215	240H	220	235	235	225H	220	210	I245A	260	285	260	260	300	325
28	275	255	255	290	290	250	240	245	225	235H	245	210H	I240A	I240A	240	225	245	235	225	260	250	285	280	290
29	300	295	275	260	220	220	280	225	220	250	245	210	200H	240	220	220	215	200	270	250	225	300	300	265
30	305	280	250	270	260	280	250	225	235	225	260	230	210	180H	210H	220	215	260	250	225	240	280	300	285
31	290	290	260	230	250	220	250	230	210	185H	230	240	220	210H	235	225	215	295	250	210	285	275	280	255
No.	31	31	31	31	31	31	31	31	30	30	30	30	30	30	30	31	31	31	30	30	30	31	31	31
Median	285	290	280	265	260	235	250	225	215	230	230	220	220	230	230	220	215	240	250	250	250	280	280	295
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

h'F

Sweep 1.0 Mc to 18.0 Mc in 40 sec in automatic operation

W 10

IONOSPHERIC DATA

Dec. 1963 | h'Es | 135° E Mean Time (G.M.T. +9h) | Wakkanai | Lat. 45°23.6' N / Long. 141°41.1' 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	E	E	130	120	115	E	E	110	B	175	G	G	G	140	G	B	S	115	E	E	E	E	E	E
2	E	E	E	E	110	E	E	110	B	G	G	G	G	G	B	B	S	115	E	E	110	110	E	E
3	E	E	E	E	E	115	S	S	G	110	G	150	G	140	G	S	S	E	E	E	E	110	E	E
4	E	E	E	E	E	E	E	110	110	G	135	G	G	G	S	S	S	E	110	E	E	E	E	E
5	E	E	E	E	E	E	E	110	S	170	G	105	G	B	B	B	S	E	E	E	E	E	E	E
6	E	E	E	E	E	E	E	S	110	110	G	110	110	G	G	S	S	E	E	E	115	110	E	E
7	E	E	E	115	E	E	E	S	S	135	115	105	G	115	G	130	S	E	E	110	110	E	E	E
8	E	E	E	E	E	E	E	S	C	C	C	C	C	C	C	S	S	E	115	110	110	125	E	E
9	E	E	E	E	E	E	E	S	135	130	G	G	G	G	G	S	S	E	E	E	E	E	E	110
10	110	105	105	105	E	E	E	S	S	125	G	G	G	S	S	S	S	E	E	E	110	E	110	110
11	E	E	E	E	E	E	E	S	S	105	G	G	G	G	G	S	S	E	E	E	105	105	E	E
12	E	E	E	E	110	E	E	S	105	S	B	B	B	B	B	B	110	110	105	105	E	E	E	E
13	105	105	105	105	105	110	E	S	B	B	105	105	105	B	G	110	110	E	E	110	E	105	105	105
14	105	105	E	E	E	E	E	S	S	110	110	105	G	G	G	100	100	E	110	110	110	110	105	105
15	105	E	E	E	E	E	S	S	S	150	130	105	120	105	120	100	100	E	105	E	E	110	E	E
16	105	105	105	100	E	E	E	S	S	G	G	120	115	115	100	100	100	E	E	E	E	E	E	E
17	E	110	E	110	110	E	E	S	115	G	G	G	G	G	180	S	S	E	E	E	E	E	E	E
18	E	105	100	100	100	E	E	S	S	G	G	G	G	G	S	S	S	E	E	E	E	E	E	E
19	E	E	E	E	E	C	E	S	S	S	S	B	B	105	B	B	S	120	E	E	E	E	E	E
20	E	E	E	E	E	E	E	S	S	S	S	B	S	S	S	S	S	115	115	110	115	E	110	E
21	E	105	130	115	125	120	E	115	110	S	S	G	G	G	S	S	115	115	110	E	110	105	105	110
22	E	E	E	E	E	105	E	110	S	G	G	G	G	160	105	120	115	110	E	E	110	105	E	E
23	E	105	105	E	E	E	E	S	S	110	110	G	G	G	S	S	S	E	E	E	E	E	E	E
24	E	E	E	E	E	E	E	S	115	C	115	G	S	100	S	S	S	E	E	E	E	E	E	E
25	E	110	105	E	E	E	E	S	125	115	115	B	S	S	S	S	S	E	E	E	E	E	E	105
26	E	E	E	E	105	E	E	S	S	120	115	110	110	S	S	S	S	E	E	E	E	E	E	E
27	E	E	100	105	E	E	E	S	S	115	160	G	G	G	S	S	S	105	E	E	E	E	E	E
28	E	105	105	105	105	E	E	S	S	160	115	110	105	105	105	105	105	105	110	110	E	E	E	E
29	E	E	E	E	E	E	E	S	S	110	155	G	G	G	S	S	S	E	E	E	E	110	E	E
30	E	E	E	105	105	E	E	S	S	120	150	140	105	S	S	110	S	E	E	E	E	E	E	E
31	E	E	E	E	E	E	E	S	S	S	160	140	135	130	125	S	S	E	E	E	E	E	110	E
No.	5	10	10	11	10	4		6	8	17	14	12	8	10	6	8	8	9	8	7	10	11	6	6
Median	105	105	105	105	110	110		110	110	120	115	110	110	115	110	110	110	115	110	110	110	110	110	110
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

h'Es

Sweep 1.0 Mc to 18.0 Mc in 40 sec in automatic operation

W 11

IONOSPHERIC DATA

Dec. 1963 | **Types of Es** | 135° E Mean Time (G.M.T. +9h) | **Wakkanai** | Lat. 45°23.6' N, Long. 141°41.1' 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			f	f	f2			1		h				h				f						
2					f			1										f			f	f		
3						f				1		h		h								f		
4								1	13		c								f2					
5								1		h		1												
6									1	1		1	1								f2	f		
7				f2						h	1	12		1		c				f2	f			
8																			f	f2	f	f		
9									c	c														f2
10	f	f2	f	f						c											f		f2	f
11										1											f	f		
12					f				1								1	f	f3	f2				
13	f2	f2	f2	f2	f	f					1	1	1			1	1			f2		f	f2	f2
14	f	f								1	1	1				1	1		f3	f4	f2	f	f	f2
15	f2									h	c 1	12	c 1	1	c	1	1		f			f		
16	f	f	f	f								c	c	c	1	1	1							
17		f		f	f				c						h									
18		f	f	f	f																			
19														1				f						
20																		f	f	f	f		f	
21		f	f2	f	f	f2		c	c2								c	f	f		f	f2	f	f
22						f		c						h	1	c	c	f			f2	f		
23		f	f							1	1													
24									c		1			1										
25		f	f						c	1	1													f
26					f					c	1	12	1											
27			f	f						1 h	h							f						
28		f	f2	f	f2					h	1	1	12	12	1	1	12	f	f	f				
29										1	h											f		
30				f	f					1	h 1	h 1	12			1								
31											h	h	h	c	c								f2	
No.																								
Median																								
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

Types of Es Sweep 1.0 Mc to 18.0 Mc in 40 sec in automatic operation

W 12

20

IONOSPHERIC DATA

Dec. 1963 | foF2 | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39°43.5' N, Long. 140°08.2' 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	3.1	U2.7S	2.8S	2.5	U2.8S	2.6	U2.5S	U5.3R	5.6R	5.4	6.5	6.8	C	C	C	C	C	C	C	C	C	2.8R	2.8R	3.0
2	C	C	C	C	C	C	C	C	C	C	C	5.9	5.7	6.1	5.8	J5.5R	4.6S	I3.2A	3.0	3.3	3.0	3.0	3.1	3.2
3	3.2R	J3.2R	3.4	3.1	I3.2F	3.6	I3.2R	I4.6R	5.8R	6.4H	6.8	8.4R	5.8	7.9	6.3R	I4.8C	5.0R	4.2R	J3.8R	4.2R	3.7	2.7H	2.8R	3.1
4	3.3	3.3	3.4	3.2	3.1	2.9	3.3	5.1R	5.3R	6.8	6.9	I7.4C	6.0	6.5	6.5	J6.1R	4.5	3.3	3.4	3.4	I3.2A	I2.5R	3.0R	2.9
5	3.1R	3.2	3.2	3.1	2.9R	3.1	2.7	I4.7R	5.6	5.5	7.3S	6.5	6.1	6.1	6.5	5.3	5.4	3.3	J4.0R	3.6	2.4	2.5S	2.5	2.9R
6	3.1	3.0	3.2	3.3	3.1R	2.6	3.0	4.6S	4.8R	6.3	7.1	6.4	U6.3R	7.0R	I6.8R	7.0R	4.6R	3.6	4.1R	2.9	3.1	3.1R	3.5R	3.3
7	3.3	3.2	3.4	3.0	3.1	2.8	I3.4R	4.9R	5.4	6.1	7.0R	8.0R	5.8V	5.9	6.7	5.7	5.0	3.4R	2.9	3.4	3.7R	3.0R	2.7	3.0
8	3.3	3.0	3.1	3.1	3.0	3.0	3.2R	J5.1S	6.5	6.3	6.6R	6.1	6.1	6.2	6.4	I6.1R	4.6R	J3.0R	3.2	3.1R	3.3	2.5	2.2R	2.8R
9	3.1	2.9	2.9	2.8	2.8	2.7	2.6R	4.3	5.3	5.7	8.8R	7.6R	6.2	6.0	I6.3R	6.3R	4.5	3.2	3.8	3.5R	3.3R	2.3R	2.7R	2.9
10	3.0	3.2	3.3	2.9	3.0	3.0	3.0R	4.8R	5.8R	5.6	7.0	6.6	5.6R	6.0	5.9	5.5	5.0	2.5H	2.6	3.0	3.1	2.7	2.8F	I2.7F
11	2.6	2.5	2.8	2.8F	2.6	2.5	2.6R	4.3R	4.8	6.2	5.8	6.5	5.3	5.7	5.0	6.2R	4.3V	2.7R	3.0R	3.2	I3.2R	I2.5A	2.5	2.7
12	2.9	2.9	2.9	2.8	2.9	2.8	2.8S	5.6R	5.4	5.5	6.1	6.7	5.8	I5.6R	5.8	6.1	5.1S	2.9	3.2	3.0	3.0	I2.6A	2.7	3.1F
13	3.2	I3.3F	3.2S	3.1F	3.2S	3.0	3.4S	4.1S	4.8	4.6	6.5	6.7	6.3	5.7H	6.3	5.3	4.7	5.1	4.1R	3.0	A	A	2.9	2.9
14	3.2	3.3	3.4	I3.3F	3.6F	3.2	3.6	4.9	5.0R	5.2	6.7	7.5	6.0	5.8H	7.2S	5.9	4.1	3.7	2.9	2.9	I2.7A	2.7F	2.9_F	I2.9A
15	3.3S	3.3	I3.2A	3.0	3.2	2.2	2.3S	4.6	5.3	8.2	I8.9R	6.9	6.4	6.3H	7.4	7.0	5.4	4.2	3.8	2.5	I3.0F	3.0	3.4F	3.3F
16	3.4F	3.5	3.4F	I3.4F	3.5S	3.4	2.6	4.4	5.0	5.2	7.2	7.6	6.4	6.3	6.2	5.4	4.9	4.0	3.3	3.5	3.0	3.2	2.6	2.6
17	2.7	3.0	3.0	2.8	2.8	3.4	2.7S	4.4	5.1	7.1S	7.0	7.4	6.0	6.0	5.6	5.7	4.3	3.8	3.1	2.8	2.9	2.8	F	F
18	F	F	F	2.5F	F	F	F	4.1S	5.0	5.5	6.9	6.5	5.6	6.2	5.9	5.6	4.3R	3.3	I3.2A	I3.0R	3.1	3.0F	FS	FS
19	FS	F	2.8F	I2.8F	I3.0F	I3.0F	2.8	4.3	4.7	5.5H	U7.5R	7.6R	7.1R	6.0	6.5	5.6	4.4	I3.8A	I3.4C	3.0	I3.1A	2.8	2.8F	I3.0F
20	3.4F	3.5	3.6	3.3F	3.2F	I3.3F	I3.5F	4.3	4.5	6.0	7.5	7.1	6.2	5.4	6.4R	5.6	4.5H	J4.8R	4.5	I4.4A	I3.8R	FS	A	3.0F
21	I2.8F	2.8F	I2.8F	3.0F	I3.0F	2.9	3.2	5.0	I6.0R	I6.6R	7.0	7.8	6.4	5.2	6.2H	5.6	4.0	4.4	3.6	I3.8F	I3.3F	I3.0F	I3.2F	A
22	RF	R	RF	F	F	FS	FS	4.4	5.2	5.6	7.4	8.1	5.7	5.4	6.7	6.0	4.6	4.6	3.6	3.4	2.6	2.3F	F	F
23	F	F	F	F	I3.0F	2.7F	I3.4F	4.8S	6.4	7.0	6.6	7.5	6.6	5.2	5.9	6.7	4.6	4.2	4.6	3.3	I3.1F	3.0H	I3.0R	I2.8F
24	I2.6R	2.5	2.4	2.4F	2.8	2.9	3.2S	3.6S	5.1	5.2	6.3	U6.8R	6.6R	5.7	6.5	5.8	4.1	3.3	3.4	3.0	3.1	3.0	I3.1F	I3.2F
25	I3.2F	RF	RF	RF	RF	RF	RS	3.8R	4.5	I5.2C	C	C	C	C	C	5.6	4.3	I3.2C	3.0	3.2	U3.0S	FS	FS	FS
26	3.2F	3.1F	3.1F	2.8	FS	FS	I3.5F	I3.4R	4.3	5.3	6.7R	7.0R	5.2R	6.4	U5.2R	6.5	4.5	3.3R	3.8	3.7S	3.0S	2.7S	FS	F
27	F	F	F	F	F	F	F	FS	I4.8S	4.4S	5.3	6.2	5.8	6.0	5.8	5.7	4.6	3.0R	2.9	3.5	I3.4R	3.0F	FS	FS
28	FS	FS	FS	FS	FS	FS	FS	U4.1R	5.0R	4.5	5.6	7.2R	6.5	I5.8R	5.6	5.4	4.6	I4.0A	3.5	2.5	I2.9F	2.6F	FS	RF
29	RF	FS	RF	FS	FS	3.2F	2.8R	U3.6R	4.5R	4.3H	6.7R	U8.8R	5.0	4.8R	5.8	5.5	5.1	3.6	2.6	I3.4R	3.5	2.8	F	F
30	I3.1F	I3.1F	I3.1F	F	F	F	3.0S	I4.0S	4.7S	6.1	5.7	8.8	6.3	5.2	5.4	5.6	4.2	3.9	3.3	3.2	2.7	F	F	I2.8F
31	I2.9F	3.0F	3.0F	3.1	2.8F	3.0	2.7	3.3S	4.5	4.5	6.2	6.3	6.9	5.0	5.0	5.6	4.6	3.0	3.4	4.0	2.8	2.9F	I3.0F	3.0F
No.	23	22	23	23	22	23	25	29	30	30	29	30	29	29	29	30	30	30	30	30	29	27	21	22
Median	3.1	3.1	3.1	3.0	3.0	3.0	3.0	4.4	5.0	5.6	6.8	7.0	6.1	6.0	6.2	5.6	4.6	3.5	3.4	3.2	3.1	2.8	2.8	3.0
U.Q.	3.3	3.3	3.4	3.1	3.2	3.2	3.4	4.8	5.4	6.3	7.2	7.6	6.4	6.2	6.5	6.1	4.9	4.0	3.8	3.5	3.3	3.0	3.0	3.1
L.Q.	2.9	2.9	2.9	2.8	2.8	2.7	2.7	4.1	4.8	5.2	6.4	6.5	5.8	5.5	5.8	5.5	4.3	3.2	3.0	3.0	3.0	2.6	2.7	2.8
Q.R.	0.4	0.4	0.5	0.3	0.4	0.5	0.7	0.7	0.6	1.1	0.8	1.1	0.6	0.7	0.7	0.6	0.6	0.8	0.8	0.5	0.3	0.4	0.3	0.3

The Radio Research Laboratories, Japan

foF2

Sweep 1.60 Mc to 20.0 Mc in 20 sec in automatic operation

A 1

IONOSPHERIC DATA

Dec. 1963 | foF1 | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39°43.5' N, Long. 140°08.2' 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									I2.8A	3.1LH	I3.6L	4.2LH	C	C	C	C								
2									C	C	C	3.9R		L	L									
3										I4.7LH	I4.0L	4.0	I3.8L	L	L									
4										L	4.2L	I3.7C	3.8L	L	L	L								
5								L	A	I3.3L	I4.0L	3.9L	4.0L	L	L									
6									L	2.9LH	L	L	L	L	L	L								
7									3.0L		L	I3.8L	4.0L	I3.4L	L	L								
8										L	I3.7LH	3.7L	4.0L	I3.4L	L									
9											L	4.0L	I3.9L	3.7L	L									
10											L	4.0L	I4.0L	I3.6LH	L									
11									2.7L	I3.2L	I3.8L	4.0L	I3.8L	3.2										
12										L	L	L	4.0L	LH										
13									2.8		L	L	L		L									
14										3.4	L	L	L	L	L									
15									L	L	L	A	L	A	L									
16											L	L	L	L	L									
17										L	L	L	L	L	3.0									
18											L	4.1L	4.0LH	4.0LH	L									
19											I4.2L	I3.8L	I4.0L		L									
20										3.8LH	I4.0LH	4.1L	L	L	3.2L									
21											L	4.0L	L	L	L									
22										3.0L	I3.9L	I3.8L	I3.9L	3.6										
23										L	L	L	4.0L	L	L									
24											3.8L	4.0L	4.0L	L	LH									
25											C	C	C	C	C	L								
26											A	I4.0L	I4.0L	4.0L	I3.3L	L								
27												L	L	4.0L	3.5L									
28											4.1L	3.7L	4.0	I4.0L	3.5	L								
29											I4.0L	4.0L	3.8L	3.8L	L									
30											4.1	3.6	I3.8L	3.6	3.1									
31									2.6	2.9		3.8L	L	L	3.2L									
No.									5	9	13	21	18	12	7									
Median									2.8	3.2	U4.0	4.0	4.0	3.6	3.2									
U.Q.																								
L.Q.																								
Q.R.																								

foF1

Sweep 1.60 Mc to 20.0 Mc in 20 sec in automatic operation

IONOSPHERIC DATA

Dec. 1963 | foE | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39°43.5' N, Long. 140°08.2' 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								A	A	A	R	R	C	C	C	C	C							
2								C	C	C	C	R	R	R	R	A	E							
3								B	A	A	A	R	R	A	R	C	B							
4								B	AS	A	R	C	A	R	A	2.20R	E							
5								E	A	A	RS	R	R	R	R	A	E							
6								B	A	A	A	A	R	A	R	A	B							
7								B	A	A	A	2.90R	I2.80A	R	R	A	B							
8								S	A	A	R	A	2.85	I2.75R	I2.55A	RS	S							
9								B	A	A	A	A	A	A	A	A	E							
10								B	S	RS	A	A	A	2.75R	R	R	E							
11								E	A	A	A	R	R	2.75R	R	A	E							
12								E	A	A	2.90	2.95	A	A	A	A								
13								E	2.15	R	A	A	A	A	A	A	B							
14								E	A	2.55	2.85	I2.95A	2.90	I2.75A	A	A								
15								E	2.30H	I2.50A	2.80	A	A	A	A	A	A							
16								E	2.30	A	A	A	A	A	A	A	E							
17								E	A	A	2.75A	2.90	2.95	2.80	A	A	E							
18								E	2.05	2.55	2.85	U2.95R	2.80	I2.70A	RS	RS	B							
19									A	R	R	R	B	A	R	A								
20									A	2.65R	I2.75R	I2.80A	I2.80R	I2.80R	A	A	B							
21									B	A	A	2.90	2.90	2.80	2.55	A								
22									A	2.50	2.70	2.75	I2.80A	2.70	A	A								
23									2.05S	2.50	2.70	2.80	2.80	2.70	2.50	2.05								
24									A	A	R	R	R	R	A	A								
25								E	A	C	C	C	C	C	C	A								
26									A	A	A	A	A	A	AS	AS	B							
27									A	A	A	A	A	A	A	A	E							
28									A	A	A	R	A	R	A	A								
29									RS	A	A	A	2.90R	R	A	A								
30									A	A	R	A	A	A	2.50	I2.15A	B							
31									2.10	2.40	A	A	A	I2.75A	2.60	2.20								
No.								10	6	7	8	9	10	11	5	4	9							
Median								E	2.10	2.50	2.80	2.90	2.80	2.75	2.55	2.20	E							
U.Q.																								
L.Q.																								
Q.R.																								

foE

Sweep 1.60 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

A 3

23

IONOSPHERIC DATA

Dec. 1963 | foEs | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39°43.5' N, Long. 140°08.2' 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	E	E	2.1	E	E	E	2.2	J3.0	J3.9	3.0	J2.8	G	C	C	C	C	C	C	C	C	C	J2.8	J2.3	J2.4
2	C	C	C	C	C	C	C	C	C	C	C	3.0	2.3G	2.5G	3.0	2.6	S	J2.9	2.2	J3.1	S	J2.1	2.3	E
3	E	E	E	E	E	E	2.0	2.6	2.5	3.3	J6.5	3.5	3.6	3.4	3.4	C	S	2.2	2.3	2.2	E	E	2.0	E
4	J2.2	2.3	2.3	J2.6	J2.0	2.2	J4.5	J2.5	2.8	J3.5	J2.5G	C	3.4	G	2.5G	J1.8G	2.3	J2.2	J2.7	J3.6	J6.0Y	J1.8	J1.8	2.3S
5	2.1	2.0	E	E	2.2	2.3	2.2	S	J4.0	J3.3	G	3.2	3.3	3.0	3.1	J3.4	2.3	J1.8	E	1.9	2.3	E	2.2	E
6	2.2	2.1	2.0	E	E	1.9	2.3	S	J2.3	2.5	J3.8	2.9	2.4G	J3.3	J2.6	2.5S	2.1	J1.9	E	J2.4	J2.3	J3.3	J2.6	J2.0
7	E	E	E	E	2.3	E	2.3S	S	2.5	J2.6	J2.9	G	2.9	G	2.6	2,4	G	J2.5	2.3	J2.3	2.2	J3.6	J2.1	E
8	2.0	E	2.1	E	E	E	2.2S	S	J2.3	2.6	G	2.9	2.7G	G	2.5	J2.0G	J1.7S	E	E	J2.1	2.2	F	J2.4	J3.3
9	J2.6	J3.3	J1.8	J1.8	2.1	E	E	2.4	J2.6	3.1	J3.6	3.0	3.0	2.8	2.5	2.2	G	J2.6	J4.0	2.3S	2.0	1.9	E	E
10	J2.3	J2.4	2.3	E	E	2.2	E	2.1S	J2.3S	J2.4G	3.0	2.4G	3.0	G	G	2.3	G	2.3S	E	2.3	J2.0	1.9	J2.8	J2.4
11	J3.8	2.2	J2.2	2.0	J1.9	2.3	E	S	2.3	J2.6	J3.0	2.6G	2.2G	2.2G	2.2G	2.5	G	J2.2	J1.8	2.3	J3.8	J3.3	J1.8	J2.8
12	2.3S	2.3	2.3	2.0	2.3S	E	E	S	J2.1G	J3.4	2.8G	2.8G	3.2	J3.3	J2.6	2.7	J5.1	J3.0	J2.5	J3.8	J3.1	J5.2Y	J2.0	J3.9
13	J2.4	J3.5	J3.1	2.3	2.2	J1.8	E	S	G	2.2	J2.1	J3.1	J2.1	J3.8	3.1	J3.8	J2.0	J3.8	J2.6	J3.4	J7.6	J3.8	J2.5	2.3
14	J2.5	2.3	2.3	2.3	2.1	E	S	S	2.4	G	3.0	J3.7	J3.0	3.0	J2.8	J3.8	E	J3.4	J2.1	J2.0	J5.8	J2.5	J2.5	J3.8
15	2.2	2.1	J3.6	J3.2	J2.4	J2.5	E	G	3.0	3.6	4.0	J4.1	J4.0	J5.5	J4.5	J3.7	J3.5	J2.1	J2.2	2.2	2.1	E	E	J2.1
16	J3.0	J3.3	J2.0	J2.0	J2.0	2.2	E	G	3.0	3.3	3.6	3.6	3.0	3.0	2.7	2.6	G	J1.8	J2.5	J2.3	J2.0	2.0	E	E
17	E	J2.2	E	2.2	2.2	E	E	G	J3.3	J2.8	J3.0	2.5G	G	G	2.5	J2.4	J2.0	J1.9	E	E	E	E	E	E
18	J1.9	2.2	2.0	2.2	2.3	E	E	G	G	G	2.3G	G	2.3G	2.7	G	J2.2G	J2.0	J2.4	J6.1	J3.8	E	S	E	E
19	E	E	E	2.2	J1.8	E	E	E	1.9	3.1	3.0	G	B	J2.1G	G	2.7	J4.4	J4.5	C	J3.9	J6.0	J1.9	S	E
20	2.3	2.3	J1.8	E	E	E	2.2	J3.1	J3.6	G	J3.7	J4.0	J3.3	2.2G	2.6	2.5	J2.8	J5.2	J2.0	J7.3	J3.0	J3.2	J4.3	J2.3
21	J3.6	J2.8	J2.9	2.3	J1.8	J3.0	2.3	J2.3	J2.9	J5.2	J3.9	G	G	G	G	J2.4	J2.4	E	2.1	J3.3	J2.8	J1.8	J1.8	J3.9
22	J2.9	J3.3	J3.0	J1.8	2.2	2.2	J3.3S	E	J2.5	J3.0	J3.5	J2.8	J3.4	2.9	J3.3	J4.1	J5.0	J3.1	J2.5	J3.4	J2.1	J1.8	J1.8	J1.8
23	J2.0	J1.9	2.1	1.9	2.2	E	E	E	G	J2.3G	G	2.6G	2.5G	G	G	2.5	J2.6	J2.0	J1.8	E	J1.9	E	J2.4	2.2
24	2.2	J2.0	2.2	E	E	E	E	E	2.6	J2.8	J2.3G	C	G	3.0	2.8	2.5	E	E	E	2.3	2.3	2.2	E	J1.8
25	J2.5	J2.3	2.3	2.3	2.2	2.2	2.2S	J1.8	2.7S	C	C	C	C	C	C	J2.5	J3.8	C	S	J2.0S	E	E	2.2S	J3.3
26	J3.3	J3.1	J2.6	2.3	2.2S	2.2	2.1	S	J3.0	J3.2	J6.3	J4.3	J3.8	J3.6	2.8	2.3S	J2.4	J2.5	2.3	J1.9	J1.9	E	E	J2.9
27	E	J2.2	E	E	E	E	E	E	2.5	3.1	3.5	J3.6	J4.6	J4.2	J3.2	J3.0	J3.0	J3.5S	J2.0	E	E	E	E	E
28	2.2	J2.0	J2.0	2.2S	J1.8	J2.5	2.3	E	2.3	2.9	3.4	3.1	3.5	2.2G	2.8	2.5	J4.3	J3.8	J3.3	J2.5	J1.8	2.3S	J4.7	2.0
29	2.2S	E	2.3	J2.0	E	E	E	S	G	3.2	3.2	3.0	J3.0	3.0	J3.4	J2.3	E	E	E	E	E	E	E	E
30	E	J1.8	2.1	E	E	J1.8	E	J1.9	2.7	J3.3	G	3.2	3.0	2.9	2.7	2.6	G	E	E	E	E	E	E	E
31	E	E	E	J1.8	J1.8	J1.8	2.2	J2.0	G	J2.8	3.1	3.0	J3.8	2.8	2.5G	J2.0G	J2.3	E	J1.8	J2.3	2.2	J2.0	J2.0	J2.8
No.	30	30	30	30	30	30	29	20	30	29	29	29	28	29	29	29	28	29	28	30	29	30	30	31
Median	2.2	2.2	2.1	2.0	2.0	E	E	E	2.5	3.0	3.0	3.0	3.0	3.2	2.6	2.5	2.2	2.2	2.1	2.3	2.1	1.9	2.0	2.0
U.Q.	2.5	2.3	2.3	2.2	2.2	2.2	2.2	2.4	2.9	3.3	3.6	3.4	3.4	2.8	3.0	2.7	2.9	3.0	2.5	3.3	2.9	2.5	2.4	2.8
L.Q.	E	1.8	1.8	E	E	E	E	E	2.3	2.6	G	G	G	G	G	2.3	G	1.8	E	2.0	E	E	E	E
Q.R.		0.5	0.5						0.6	0.7						0.4		1.2		1.3				

foEs

Sweep 1.60 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

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IONOSPHERIC DATA

Dec. 1963 | f_bE_s | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39°43.5' N, Long. 140°08.2' 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			1.7				E	1.8	3.0	2.5	2.2G		C	C	C	C	C	C	C	C	C	1.9	1.8	E
2	C	C	C	C	C	C	C	C	C	C	C	3.0	1.7G	2.5G	3.0	2.5	S	A	E	1.8	S	1.8	1.7	
3							1.8	2.0	2.4S	2.7	3.7	3.2	3.5	3.4	3.3	C	S	1.8	1.7	1.7			1.7	
4	2.0	1.7	1.8	1.7	1.7	1.7	1.7	1.9S	2.4	2.5	2.0G	C	3.3		2.5G	1.7G	1.8	1.8	1.8	2.0	A	1.8	1.8	1.8
5	1.8	1.7			1.7	E	E	S	3.0	2.3		3.2	3.3	3.0	3.0	3.4	2.0	1.7		1.7	E		1.8	
6	1.7	1.8	1.8			1.7	1.7	S	2.1	2.5	3.1	2.7	2.1G	3.0	U2.6R	1.8G	1.9	U1.9R		2.0	1.8	1.8	1.7	1.7
7					1.7		1.7	S	2.3	2.5	2.7		2.9		2.6	2.4		2.5	1.7	1.7	1.7	2.0	1.7	
8	1.7		1.7				1.7	S	1.8G	2.4		2.8	2.5G		U2.5R	1.7G	1.7			1.7	E		1.7	1.8
9	E	1.8	1.7	1.7	1.7			1.7	2.2	2.5	2.7	2.9	3.0	2.8	U2.5R	2.1S		2.2	2.7S	1.7	1.7	E		
10	1.7	1.7	1.7			E		1.8	U2.3R	2.0G	3.0	2.3G	2.9			1.7G		1.7		1.7	1.7	1.7	1.7	1.7
11	1.8	1.7	1.7	1.7	1.7	1.7		S	2.0S	2.6	2.8	2.0G	2.0G	1.8G	1.7G	2.4		1.7	1.7	1.7	2.0	A	E	1.7
12	1.7	1.7	1.7	E	1.7			S	2.0G	3.1	2.0G	2.6G	2.9	3.0	2.6	2.7	2.3	E	E	1.8	E	A	E	E
13	E	2.0	E	E	E	E		S		2.0G	E2.1R	U3.1R	E2.9R	3.4	2.8	2.8	1.9	2.8	1.7	2.5	A	A	E	1.7
14	1.7	1.7	1.7	1.7	1.7		S	S	2.3		3.0	3.0	2.2	2.8	2.7	2.3		2.0	1.8	1.8	A	E	1.8	A
15	E	E	A	1.7	E	E			2.9	3.0	4.0	4.0	3.5	5.1	3.5	3.0	2.9	1.7	E	E	E			1.7
16	2.0	2.0	E	E	E	E			2.8	3.2	3.3	3.2	3.0	3.0	2.7	2.3		E	E	1.8	E	E		
17		2.0		E	E				2.5	2.6	2.8	1.9G			2.5	2.4	1.8	1.8						
18	E	E	E	E	E						2.1G		2.0G	2.7		1.7G	1.7	2.1	A	2.6		S		
19				E	1.7				E1.9R	3.1	3.0		B	E2.1R		2.5	4.0	A	C	2.1S	A	1.7	S	
20	E	1.7	1.7				E	1.7	1.8S		1.9G	3.2	2.2G	2.0G	2.6	2.4	2.5	4.2	E	A	2.1	1.7	A	E
21	E	E	2.0	1.7	E	E	E	2.0	2.5	2.9	2.8					2.1	2.0		E	E	E	E	E	A
22	A	2.5	1.9	E	E	E	E		2.3	1.8	2.5	2.5	3.0	2.2	2.9	3.2	2.0	2.3	1.8	2.2	E	E	E	E
23	E	E	E	E	E					1.8G		1.8G	1.8G			1.7	E	E	E		E		E	E
24	E	E	E						2.4	2.7	2.1G			U3.0R	2.8	2.5				1.7	E	1.7		E
25	1.8	2.0	E	E	1.7	1.7	1.7	1.7	2.2	C	C	C	C	C	C	2.4	2.8	C	S	1.8			E	1.8
26	E	1.9	1.8	1.7	E	E	1.7	S	2.0	2.5	3.8	3.6	2.8	2.0G	2.7	U2.3R	2.1	2.2	1.7	E	E			E
27		E							2.5	3.0	2.3	3.4	3.2	3.0	1.8G	2.4	1.8	2.2S	E					
28	1.7	E	1.7	E	E	1.8	E		U2.3R	2.5	3.1	3.0	3.2	2.1G	2.7	2.3	3.3	A	2.1	E2.0S	E	1.7	1.8	E
29	E		E	E				S		3.1	3.1	U3.0R	2.0G	2.9	3.1	1.7								
30		E	E			E		E	2.1	2.8		3.1	3.0	2.8	2.7	2.4								
31				E	E	E	E	E		1.7	3.1	3.0	3.0	2.8	2.1G	2.0G	2.2		E	E	E	E	E	E
No.																								
Median																								
U.Q.																								
L.Q.																								
Q.R.																								

f_bE_s

Sweep 1.60 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

A 5

IONOSPHERIC DATA

Dec. 1963 | **f-min** | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39°43.5' N, Long. 140°08.2' 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	1.75	E	1.70	1.70	1.70	1.75	E	1.70	1.65	1.65	1.65	1.70	C	C	C	C	C	C	C	C	C	1.70	E	E
2	C	C	C	C	C	C	C	C	C	C	C	1.70	1.70	1.70	1.65	1.65	1.75	1.65	E	1.65	1.70	1.70	1.70	1.70
3	1.65	1.70	1.70	1.70	E	1.70	1.75	1.70	1.65	1.65	1.70	1.65	1.70	1.70	1.75	I1.70C	1.80	1.80	1.70	1.70	1.70	1.75	1.70	1.70
4	1.70	1.70	1.75	1.65	1.70	1.70	1.70	1.65	1.70	1.70	1.70	I1.70C	1.75	1.70	1.75	1.70	1.75	E	1.70	1.75	1.65	1.70	1.75	1.80
5	1.70	1.70	1.75	1.70	1.70	E	E	E	1.65	1.70	1.70S	1.80	1.70	1.75	1.70	1.70	1.65	1.70	1.65	1.70	E	E	1.70	1.70
6	1.70	1.75	1.70	1.70	1.65	1.65	1.65	1.70	1.65	1.70	1.75	1.70	1.65	1.75	1.70	1.70	1.65	1.70	1.70	E	1.70	1.65	E	1.70
7	1.70	1.70	1.70	1.70	1.70	E	1.65	1.70	1.75	E	1.65	1.65	1.70	1.75	1.75	1.70	1.70	E	1.70	1.65	1.70	1.65	1.70	1.65
8	1.70	1.70	1.70	1.70	1.65	1.70	1.65	1.80	1.65	1.65	1.70	1.65	1.70	1.70	1.65	E	1.65	1.70	1.70	1.70	E	E	E	E
9	E	1.65	1.70	1.65	E	1.70	1.70	1.65	E	1.70	1.65	1.70	1.70	1.70	1.65	1.65	1.65	E	1.65	1.70	1.65	E	E	1.70
10	1.70	E	1.65	1.70	1.65	E	E	1.80	1.65	E	E	1.70	1.65	1.70	1.75	1.65	1.80	1.70	E	1.65	E	1.70	1.70	1.70
11	1.75	1.70	1.70	1.70	1.65	1.70	1.70	1.65	1.65	1.65	1.70	1.70	1.70	1.70	1.70	1.75	1.65	1.65	1.65	1.70	E	1.70	E	1.65
12	1.65	1.70	1.65	E	1.70	1.65	1.65	1.70	1.70	1.70	1.80	1.80	1.90	2.00	1.80	1.80	1.70	E	E	E	E	E	E	E
13	E	E	E	E	E	E	E	E	1.70	1.75	2.05	2.25	2.10	2.00S	1.70	1.70	1.70	E	1.65	E	1.65	E	E	1.65
14	E	1.70	1.65	1.65	1.70	1.65	E	1.65	1.70	1.70	1.80	1.70	1.70	1.70	1.70	1.65	1.70	E	E	E	E	E	E	E
15	E	E	E	E	E	E	E	1.75	1.70	1.70	1.65	1.65	1.70	1.65	1.70	1.65	1.65	1.70	E	E	E	E	E	E
16	E	E	E	E	E	E	E	E	1.65	1.65	1.75	1.75	1.75	1.65	1.65	1.65	E	E	E	E	E	E	E	E
17	E	E	E	E	E	E	E	E	1.65	1.75	1.75	1.65	1.65	1.65	1.65	1.65	E	E	E	E	E	E	E	E
18	E	E	E	E	E	E	E	E	1.65	1.65	E	1.65	1.70	1.65	1.65	1.70	1.65	E	E	1.70	E	E	E	E
19	1.70	E	E	E	1.65	1.65	1.70	1.70	1.70	1.80	1.90	2.10	3.40	2.00	2.20S	1.90	1.75	1.65	C	E	E	E	E	1.70
20	E	1.70	1.70	1.65	1.70	E	E	1.65	1.70	1.70	1.65	1.70	1.70	1.80	1.70	1.70	1.70	E	E	E	1.70	E	E	E
21	E	E	E	1.70	E	E	E	1.65	E	1.70	1.70	1.75	1.80	1.80	1.75	1.65	1.65	E	E	E	E	E	E	E
22	E	E	E	E	E	E	E	E	1.65	1.70	1.65	1.75	1.75	1.65	1.70	1.65	1.65	E	E	E	E	E	E	E
23	E	E	E	E	E	E	E	E	E	1.75	1.65	1.75	1.70	1.70	1.70	1.65	E	E	E	E	E	E	E	E
24	E	E	E	E	E	E	E	E	1.65	1.75	1.70	1.70	2.05	1.90	1.75	1.70	1.70	1.70	1.70	1.70	E	1.70	1.70	E
25	1.70	1.70	1.70	E	1.65	1.70	1.70	1.70	1.70	I1.70C	C	C	C	C	C	1.75	1.70	I1.70C	E	1.80	1.70	E	E	E
26	E	E	E	1.70	E	E	1.70	E	1.70	1.70	1.70	1.80	1.70	1.70	1.70	1.70	1.70	1.70	1.70	E	E	E	E	E
27	E	E	E	E	E	E	E	E	1.65	1.70	1.70	1.70	1.70	1.70	1.70	1.65	1.70	E	E	E	E	1.70	E	E
28	1.70	E	E	E	E	E	E	1.80	1.70	E	1.70	1.70	1.70	1.65	1.70	1.70	E	E	E	1.70	E	1.70	E	E
29	E	1.65	E	E	E	1.70	1.70	1.65	E	1.65	E	1.65	E	1.70	E	1.65	E	E	E	E	E	E	E	E
30	E	E	E	E	E	E	E	E	1.65	1.65	1.65	1.70	1.70	1.70	1.70	1.65	1.65	E	E	E	E	E	E	E
31	E	E	E	E	E	E	E	E	1.65	1.70	1.75	1.70	1.70	1.80	1.70	1.70	1.65	E	E	E	E	E	E	E
No.	30	30	30	30	30	30	30	30	30	30	29	30	29	29	29	30	30	30	29	30	30	31	31	31
Median	E	E	E	E	E	E	E	1.65	1.65	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.65	E	E	E	E	E	E	E
U.Q.																								
L.Q.																								
Q.R.																								

f-min Sweep 1.60 Mc to 20.0 Mc in 20 sec in automatic operation

IONOSPHERIC DATA

Dec. 1963 | M(3000)F2 | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39°43.5' N, Long. 140°08.2' 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	3.05	U3.05S	3.40S	3.20	U3.05S	3.00	U3.25S	U3.80R	3.90R	3.55	3.70	3.40	C	C	C	C	C	C	C	C	C	3.10R	3.20R	3.00
2	C	C	C	C	C	C	C	C	C	C	C	3.55	3.50	3.45	3.60	J3.80R	3.70S	I3.25A	3.15	3.30	3.35	3.35	3.15	3.05
3	3.10R	J3.05R	3.05	3.20	I3.05F	3.60	I3.60R	I3.60R	3.55R	3.00H	3.40	3.60R	3.60	3.55	3.80R	I3.60C	3.45R	3.35R	J3.20R	3.45R	3.50	2.80H	2.80R	2.95
4	2.80	2.95	2.95	2.95	3.25	2.95	3.10	3.70R	3.80R	3.40	3.50	I3.65C	3.65	3.55	3.60	J3.80R	3.35	3.10	3.25	3.25	I3.25A	I2.95R	3.35R	2.90
5	2.90R	2.95	2.90	2.95	3.00R	3.25	3.35	I3.60R	3.75	3.45	3.65S	3.70	3.50	3.60	3.70	3.70	3.90	3.10	J3.50R	3.60	3.00	3.30S	3.25	3.10R
6	2.95	2.75	2.85	3.10	3.50R	3.00	3.35	3.70S	3.65R	3.50	3.50	3.50	U3.50R	3.40R	I3.45R	3.80R	3.75R	3.30	3.40R	3.10	3.15	3.05R	3.15R	3.05
7	3.05	2.90	3.10	3.35	3.15	2.95	I3.50R	3.90R	3.50	3.50	3.50R	3.65R	3.50V	3.55	3.60	3.50	3.60	3.25R	3.10	3.25	3.55R	3.35R	2.95	3.05
8	3.20	3.00	3.20	3.05	3.05	3.15	3.40R	J3.60S	3.75	3.65	3.55R	3.70	3.60	3.60	3.50	I3.70R	3.30R	J3.35R	3.30	3.40R	3.40	3.60	2.95R	2.85R
9	3.25	3.05	3.00	3.20	3.10	2.95	3.45R	3.40	3.50	3.15	3.60R	3.60R	3.80	3.60	I3.60R	3.80R	3.55	3.20	3.55	3.40R	3.60R	3.40R	2.95R	2.95
10	3.00	3.05	3.05	3.10	3.00	3.25	3.35R	3.55R	3.80R	3.55	3.60	3.65	3.45R	3.55	3.55	3.65	3.60	3.25H	3.00	3.40	3.55	3.15	2.85F	I3.10F
11	3.10	3.10	3.20	2.85F	3.10	3.20	3.20R	3.95R	3.75	3.85	3.80	3.70	3.80	3.80	3.60	3.55R	3.70V	3.15R	3.40R	3.45	I3.60R	I3.10A	3.05	2.95
12	2.90	2.95	3.10	3.15	3.15	2.85	3.05S	3.65R	4.00	3.55	3.65	3.55	3.55	I3.50R	3.45	3.60	3.55S	3.30	3.45	3.35	3.45	I3.50A	3.00	2.95F
13	2.80	I2.85F	3.10S	2.95F	3.05S	3.35	3.40S	3.45S	3.70	3.75	3.55	3.80	3.65	3.10H	3.65	3.80	3.50	3.70	3.50R	3.50	A	A	3.15	2.95
14	3.10	3.05	3.30	I3.20F	3.35F	3.20	3.35	3.70	3.70R	3.50	3.80	3.60	3.70	3.20H	2.95S	3.75	3.75	3.45	3.25	3.20	I3.20A	2.85F	2.95F	I2.90A
15	2.80S	2.80	I3.00A	3.05	3.35	3.00	3.10S	3.30	3.30	3.40	I3.55R	3.80	3.45	3.45H	3.45	3.70	3.60	3.35	3.40	3.25	I3.20F	3.10	3.00F	2.80F
16	2.90F	2.90	3.00F	I3.00F	3.25S	3.55	3.30	3.55	3.55	3.40	3.45	3.65	3.70	3.45	3.65	3.55	3.50	3.40	3.15	3.25	3.40	3.55	3.15	2.75
17	2.85	2.85	3.05	2.90	3.05	3.45	3.45S	3.50	3.70	3.60S	3.65	3.70	3.55	3.50	3.45	3.65	3.50	3.25	3.25	3.80	3.60	3.05	F	F
18	F	F	F	3.25F	F	F	F	3.55S	3.75	3.35	3.55	3.65	3.55	3.55	3.55	3.40	3.45R	3.20	I3.35A	I3.35R	3.30	3.00F	FS	FS
19	FS	F	3.20F	I3.10F	I3.25F	I3.55F	3.75	3.50	4.05	3.35H	U3.65R	3.80R	3.65R	3.50	3.70	3.75	3.45	I3.55A	I3.45C	3.70	I3.50A	3.50	3.20F	I3.00F
20	3.10F	3.15	3.20	3.05F	3.10F	I3.25F	I3.45F	3.70	3.95	3.50	3.50	3.80	3.70	3.55	3.55R	3.75	3.15H	J3.35R	3.15	I3.30A	I3.40R	FS	A	3.10F
21	I2.75F	2.95F	I3.05F	2.85F	I3.20F	3.50	3.30	3.45	I3.60R	I3.75R	3.40	3.65	3.80	3.70	3.40H	3.70	3.65	3.20	3.60	I3.50F	I3.55F	I3.45F	I3.25F	A
22	RF	R	RF	F	F	FS	FS	3.45	3.60	3.80	3.30	3.85	3.80	3.70	3.50	3.60	3.50	3.45	3.35	3.65	3.10	2.75F	F	F
23	F	F	F	F	I3.40F	3.05F	I3.20F	3.35S	3.50	3.50	3.35	3.25	3.60	3.75	3.60	3.65	3.30	3.15	3.30	3.30	I3.40F	3.30H	I3.30R	I3.20F
24	I2.95R	3.05	3.05	3.00F	3.05	3.15	3.30S	3.35S	3.55	3.35	3.50	U3.80R	3.70R	3.55	3.45	3.70	3.60	3.25	3.25	3.35	3.20	3.00	I3.05F	I3.40F
25	I3.50F	RF	RF	RF	RF	RF	RS	3.50R	3.65	I3.50C	C	C	C	C	C	3.65	3.55	I3.60C	3.25	3.45	U3.40S	FS	FS	FS
26	3.15F	3.15F	3.15F	3.15	FS	FS	I3.50F	I3.70R	3.50	3.50	3.30R	3.70R	3.75R	3.45	U3.45R	3.55	3.80	3.35R	3.40	3.40S	3.50S	3.15S	FS	F
27	F	F	F	F	F	F	F	FS	I3.60S	3.75S	3.40	3.60	3.75	3.50	3.45	3.70	3.50	3.85R	3.10	3.20	I3.35R	3.50F	FS	FS
28	FS	FS	FS	FS	FS	FS	FS	U3.65R	3.60R	3.80	3.30	3.70R	3.55	I3.80R	3.40	3.70	3.80	I3.65A	3.55	3.10	I3.30F	3.25F	FS	RF
29	RF	FS	RF	FS	FS	3.45F	3.50R	U3.90S	3.80R	3.40H	3.45R	U3.75R	3.60	3.80R	3.55	3.50	3.75	3.20	2.80	I3.20R	3.20	3.20	F	F
30	I2.95F	I3.00F	I3.15F	F	F	F	3.20S	I3.40S	3.70S	3.60	3.10	3.75	3.90	3.70	3.50	3.65	3.40	3.35	3.40	3.45	3.35	F	F	I3.00F
31	2.90F	3.10F	3.05F	3.35	3.30F	3.35	3.75	3.65S	3.80	3.60	3.65	3.60	3.50	3.65	3.50	3.25	3.50	3.35	3.20	3.40	3.30	3.15F	I3.05F	3.20F
No.	23	22	23	23	22	23	25	29	30	30	29	30	29	29	29	30	30	30	30	30	29	27	21	22
Median	2.95	3.00	3.05	3.10	3.10	3.20	3.35	3.60	3.70	3.50	3.50	3.65	3.60	3.55	3.55	3.70	3.55	3.30	3.30	3.40	3.40	3.15	3.05	3.00
U.Q.																								
L.Q.																								
Q.R.																								

M(3000)F2 Sweep 1.60 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

IONOSPHERIC DATA

Dec. 1963 | M(3000)F1 | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39°43.5 N, Long. 140°08.2 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									I4.30A	4.50LH	I4.05L	3.60LH	C	C	C	C								
2									C	C	C	3.85R		L	L									
3										I3.80LH	I3.65L	3.80	I4.00L	L	L									
4										L	3.40L	I3.90C	3.95L	L	L	L								
5								L	A	I4.15L	I3.85L	4.00L	3.80L	L	L									
6									L	4.30LH	L	L	L	L	L	L								
7									4.35L		L	I3.95L	3.90L	I4.15L	L	L								
8										L	I3.90LH	4.00L	3.75L	I3.95L	L									
9											L	3.75L	I3.70L	3.90L	L									
10											L	3.55L	I3.65L	I3.90LH	L									
11									4.25L	I4.05L	I3.90L	3.75L	I3.80L	4.50										
12										L	L	L	3.95L	LH										
13									4.30		L	L	L		L									
14										4.40	L	L	L	L	L									
15									L	L	L	A	L	A	L									
16											L	L	L	L	L									
17										L	L	L	L	L	4.05									
18											L	3.75L	3.75LH	3.50LH	L									
19											I3.60L	I4.05L	I3.75L		L									
20										3.75LH	I3.70LH	L	L	L	3.90L									
21											L	3.80L	L	L	L									
22										4.20L	I3.80L	I4.10L	I4.20L	4.55										
23										L	L	L	3.85L	L	L									
24											3.75L	3.75L	3.90L	L	LH									
25											C	C	C	C	C	L								
26											A	I3.60L	I4.00L	3.50L	I4.05L	L								
27												L	L	3.55L	3.90L									
28											3.55L	3.80L	3.75	I3.95L	4.10	L								
29											I3.50L	3.75L	4.10L	4.00L	L									
30											3.55	3.70	I4.00L	4.15	4.30									
31									4.20	4.35		3.85L	L	L	4.10L									
No.									5	9	13	20	18	12	7									
Median									4.30	4.20	U3.70	3.80	3.90	3.95	4.05									
U.Q.																								
L.Q.																								
Q.R.																								

M(3000)F1 Sweep 1.60 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

IONOSPHERIC DATA

Dec. 1963 | h'F2 | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39°43.5' N, Long. 140°08.2' 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									225	225	250	285	C	C	C	C								
2									C	C	C	230		265	245									
3										245	260	250	240	270	235									
4										255	270	I250C	250	250	245	220								
5								220	230	250	250	230	270	250	240									
6									225	245	270	240	255	240	255	225								
7									225		250	230	250	250	240	220								
8										240	250	235	250	245	250									
9											250	240	230	240	230									
10											245	245	240	250	240									
11									220	220	230	240	225	235										
12										245	245	245	245	255										
13									230		250	235	250		245									
14										235	275	240	245	235H	245									
15									240	250	240	230	240	I250A	260									
16											260	245	245	245	250									
17										245	245	240	245	245	245									
18											240	245	245	255	250									
19											225	230	255		240									
20										275	250	230	225	240	240									
21											250	245	235	230	245									
22										245	280	235	235	245										
23										245	250	250	245	225	245									
24											260	230	255	240	255									
25											C	C	C	C	C	235								
26											255	250	240	260	240	250								
27												240	235	265	250									
28											290	250	255	220	260	230								
29											275	220	245	240	250									
30											340	245	230	245	245									
31									210	225		245	245	230	245									
No.								1	8	15	27	30	28	27	26	6								
Median								220	225	245	250	240	245	245	245	230								
U Q																								
L Q																								
Q R																								

h'F2

Sweep 1.60 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

A 9

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IONOSPHERIC DATA

Dec. 1963 | h'F | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39°43.5' N, Long. 140°08.2' 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	290	E255E	225	280	290	E300S	270	235	I200A	280H	245	210H	C	C	C	C	C	C	C	C	C	E285S	275	305
2	C	C	C	C	C	C	C	C	C	C	C	190	245H	245	250	230	205	I220A	250	255	225	255	255	280
3	285	295	300	255	285	225	235	220	215	230H	I240A	230	230	275	245	I225C	235	230	265	240	225	E250S	E310S	300
4	330	300	300	295	260	285	250	210	215	245	220	I220C	205	240	245	230	200	240	250	250A	I255A	I275A	270	300
5	300	300	320	300	300	250	250	220	I210A	240H	I230S	205	210	235A	240	230	210	245	240	220	E230E	270	255	275
6	295	315	325	275	240	295	250	210	205	200H	240A	230	270H	250	225	235	210	245A	250	I225A	260	295	265	270
7	260	310	290	240	270	270	230	210	195	245H	205	205	205	205H	225H	215	210	I230A	250S	275	230	270S	300	295
8	260	300	270	295	295	275	245	230	230	205	195H	200	200	230H	230	230	200	245H	240	240	230	230	E325S	330
9	265	305	300	255	280	285	240	225	225	220	245	220	225	200	215	225	205	I240A	240A	240	210	250	305	305
10	300	310	275	250	290	255	250	230	215	225	235	200	200	200H	230	225	220	205	300	245	230	250	295	280
11	300	300	270	300	280	270	250	205	200	I210A	205	200	200	190	230H	230	205	E300S	240	230	230	A	290	305
12	300	300	295	275	255	295	270	225	210	215	210	205	195	190H	245	235	210	220	235	235	225	A	E280E	295
13	E305E	I295A	270	290	280	245	210	210	200	220	245	230	I230A	230H	245	235	235	230	225	250A	A	A	285	280
14	275	270	250	260	265	255	245	220	200	195	240	220	200	200	245	230	205	230	240A	250	A	E320E	A	A
15	E305E	305	I305A	290	250	E310E	E290E	240	220	245	A	A	230A	A	A	230	225	240	220	230	275	265	270	330
16	I300A	315	290	265	245	230	240	210	225	240	245	240	225	215	200	230	215	220	245	245	240	225	245	270
17	E300E	I295A	295	295	295	230	225	220	210	240	220	220	200	200	195	240	215	240	230	230	210	270	265	E315E
18	290	E295E	290	265	E300E	270	210	235	215	220	220	205	190H	195H	220	240	215	225	I260A	225A	245	300	270	320
19	290	265	245	290	255	245	210	205	200	240	240	250	255	260	240	230	I225A	I235A	I250C	215	I240A	230	260	280
20	275	270	270	270	295	250	220	220	195H	180H	200H	230	220	200	200	235	225A	I240A	250	I230A	240	260	I255A	255
21	325	300	340A	320	295	215	250	225	225	200H	205	220	210	210	200	240	210	240	210	230	240	240	245	A
22	A	A	A	280	E280E	260	250	210	220	205	230	245	220	190	255	245	220	220	245	230	250	E325E	270	250
23	290	270	270	E285E	240	260	E295E	240	235	240	205	205	210	215	215	235	235	255	240	225	240	245	225	240
24	295	E295E	E295E	E295E	285	245	240	215	245	240	225	205	195	230	215H	230	215	250	270	255	250	270	280	265
25	230	295	240	215	205	270	220	215	230	I235C	C	C	C	C	C	240	230	I225C	250	235	210	260	280	265
26	275	295	280	295	280	255	210	200	210S	220	I230A	I240A	205	190	210	255	210	270A	245	220	195	260	250	230
27	240	265	255	240	240	220	230	195	220	225	245	245	240	230	225	225	220	I240S	280	250	240	220	290	255
28	290	295	270	230	230	300S	245	220	210	210	240	230	210	225H	200	220	220A	I235A	245	I240A	240	250	290	275
29	305	300	285	260	255	230	230	200	200	225	275	240	210	210	I220A	245	210	205	E290E	245	240	240	E310E	E305E
30	E305E	E300E	255	255	255	E305E	245	240	210	245	245	I240A	245	200	200	245	220	230	240	220	220	E280E	E290E	E295E
31	E290E	E295E	290	245	255	245	225	200	200	195	250	220	245	200	195	245	215	240	240	230	240	280	270	290
No.	25	28	28	28	28	27	28	30	30	30	28	29	29	28	28	30	30	29	29	30	28	24	25	26
Median	290	295	280	270	270	255	240	220	210	225	230	220	210	210	225	230	215	235	245	245	240	260	270	280
U.Q.																								
L.Q.																								
Q.R.																								

h'F

Sweep 1.60 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

A 10

IONOSPHERIC DATA

Dec. 1963 | h'Es | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39°43.5' N, Long. 140°08.2' 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	E	E	120	E	E	E	115	110	105	130	105	G	C	C	C	C	C	C	C	C	C	100	100	100
2	C	C	C	C	C	C	C	C	C	C	C	150	105	115	150	155	S	120	120	110	S	135	110	E
3	E	E	E	E	E	E	165	150	130	150	105	155	145	150	135	C	S	105	105	105	E	E	130	E
4	125	125	125	120	120	125	115	115	130	110	110	C	130	G	140	100	100	100	100	120	110	105	105	110
5	120	130	E	E	115	125	120	S	105	105	G	150	135	155	145	130	130	140	E	125	120	E	105	E
6	110	110	105	E	E	105	115	S	130	125	115	130	115	110	110	105	130	105	E	110	110	110	115	120
7	E	E	E	E	110	E	120	S	165	125	125	G	140	G	150	125	G	125	125	125	120	110	110	E
8	110	E	105	E	E	E	110	S	110	145	G	110	115	G	140	110	110	E	E	105	105	E	110	110
9	110	105	105	105	105	E	E	155	120	125	125	120	140	135	130	110	G	105	105	110	125	120	E	E
10	110	105	100	E	E	120	E	120	130	120	125	110	155	G	G	100	G	110	E	120	110	105	120	110
11	110	110	105	105	105	110	E	S	125	115	110	105	110	110	105	155	G	120	120	110	105	105	105	105
12	100	105	105	105	105	E	E	S	120	110	110	110	110	110	110	110	125	120	110	115	110	115	110	110
13	105	105	110	110	105	110	E	S	G	110	110	115	115	120	120	115	125	115	110	110	110	105	110	105
14	105	110	105	110	120	E	S	S	135	G	140	110	105	140	110	125	E	120	110	110	110	110	110	105
15	110	110	110	100	100	110	E	G	155	145	130	125	120	120	100	100	100	120	110	105	105	E	E	110
16	105	105	105	105	105	105	E	G	180	155	135	130	140	130	125	115	G	115	110	105	105	105	E	E
17	E	105	E	110	110	E	E	G	120	115	105	105	G	G	100	100	100	100	E	E	E	E	E	E
18	120	105	100	105	105	E	E	G	G	G	110	G	110	135	G	105	105	115	110	110	E	S	E	E
19	E	E	E	105	100	E	E	E	120	155	175	G	B	105	G	135	125	120	C	110	110	105	S	E
20	110	105	105	E	E	E	120	110	110	G	105	100	105	110	155	160	130	120	115	105	105	115	110	110
21	110	110	105	110	120	115	125	120	115	120	110	G	G	G	G	105	105	E	110	110	115	110	110	105
22	105	100	100	100	105	105	105	E	105	105	100	100	100	100	100	100	105	105	110	110	115	105	100	100
23	100	105	105	105	100	E	E	E	G	105	G	105	100	G	G	105	100	100	100	E	105	E	105	105
24	100	100	100	E	E	E	E	E	105	115	110	G	G	170	155	150	E	E	E	105	105	105	E	110
25	105	105	105	110	110	100	115	110	125	C	C	C	C	C	C	110	105	C	S	105	E	E	100	105
26	105	105	105	105	110	105	115	S	120	120	110	110	110	100	155	120	100	100	100	100	100	E	E	105
27	E	105	E	E	E	E	E	E	180	155	145	110	110	125	110	100	100	100	100	E	E	E	E	E
28	115	110	105	105	105	100	100	E	140	130	145	150	130	110	155	145	105	105	105	105	105	105	110	105
29	105	E	105	105	E	E	E	S	G	175	155	150	105	170	100	100	E	E	E	E	E	E	E	E
30	E	105	105	E	E	105	E	120	125	120	G	145	145	150	155	145	G	E	E	E	E	E	E	E
31	E	E	E	105	105	110	105	105	G	100	170	145	125	145	105	105	100	E	100	105	100	95	110	105
No.	22	23	23	19	20	15	14	10	25	26	25	23	25	22	24	29	19	23	20	25	22	19	20	19
Median	110	105	105	105	105	110	115	120	125	120	110	115	115	120	130	110	105	115	110	110	110	105	110	105
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

h'Es | Sweep 1.60 Mc to 20.0 Mc in 20 sec in automatic operation

A 11

IONOSPHERIC DATA

Dec. 1963 | Types of Es | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39°43.5' N, Long. 140°08.2' 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			f				f	12	12	h 12	12											f2	f2	f3
2												h 12	1	12	h2	h2		f6	f	f2		f	f	
3							f	h2	h	h	12h2	h 1	h2	h	h31			f	f	f			f	
4	f2	f2	f3	f3	f2	f	f2	1 h	h	12	12		h 1		h	1	1	f3	f2	f2	f2	f	f	f
5	f	f			f2	f	f2		12	1		h	h2	h	h2	h2	h	f		f	f2		f2	
6	f	f	f2			f2	f		h	h	12	h	12	13	12	1 h2	h31	f2		f3	f2	f2	f4	f2
7					f		f		h	h	h		h		h	h		f3	f	f2	f	f3	f2	
8	f		f				f		1 h	h		12	L		h	1	1			f	f		f2	f2
9	f2	f3	f2	f2	f2			h	c2	h	h	c2	h	h	h2	12		f3	f3	f	f	f		
10	f2	f2	f2			f		c	h	c	h	1 h	h 1			1		f		f	f2	f	f	f2
11	f2	f2	f	f2	f	f			h	1 h	12	1	1	1	1	h		f2	f	f2	f2	f3	f2	f3
12	f	f	f2	f2	f				c21	12	1	1	13	1	1	1	f	f	f	f2	f2	f3	f2	f2
13	f3	f3	f2	f2	f	f				1	1 h	1	1	c	c2	121	c 1	f2	f	f5	f4	f3	f2	f
14	f2	f	f2	f	f				h2		h	12	12	h 1	1	h		f2	f3	f3	f4	f2	f2	f4
15	f	f	f5	f2	f	f			h2	h2	h3	h3	h2	c2	12	13	14	f	f2	f	f			f2
16	f3	f2	f2	f	f	f			h	h2	h2	h2	h	h 1	c2	c2		f	f3	f2	f2	f2		
17		f3		f2	f				c2	1	13	12			12	12	12	f						
18	f	f	f2	f	f						1		1	h		1	1	f4	f2	f3				
19				f	f				c	h 1	h 1			1		h 1	f2f2	f2f2		f2f	f5	f		
20	f	f	f				f	f	1		1	1	1	1	h 1	h 1	h3	f3	f	f2	f3	f2	f2	f2
21	f2	f2	f2	f	f2	f	f2	f2	13	h2	c					1	f2		f	f	f	f	f	f3
22	f3	f2	f2	f	f	f	f		12	12	1	1	1	1	12h	12	f2	f3	f2	f3	f	f	f2	f
23	f	f	f2	f	f					1		1	1			1	f	f	f		f		f	f
24	f	f	f						12	1 h	1			h	h 1	h 1				f	f	f		f2
25	f	f	f	f	f	f	f	1	h							1	f2			f			f	f2
26	f2	f2	f2	f	f	f	f		c h	c	12	12	12	12h	h	c h	12h	f2	f	f	f			f
27		f							h	h	h2	13h2	13	h	12h	1	13	f2	f					
28	f	f	f2	f	f2	f3	f		h	h	h212	h 12	h212	1	h 1	h	f2	f4	f3	f3	f	f	f2	f
29	f		f	f						h2h2	h212	h 1	1	h 12	13h	1 h2								
30		f	f2			f		f	h	c		h2	h 1	h 1	h	h								
31				f	f	f2	f	f		1	h3	h	h	h	1	1	f2		f	f	f	f	f	f2
No.																								
Median																								
U.Q.																								
L.Q.																								
Q.R.																								

Types of Es

Sweep 1.60 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

A 12

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IONOSPHERIC DATA

Dec. 1963 | **foF2** | 135° E Mean Time (G.M.T. +9h) | Kokubunji Tokyo | Lat. 35° 42.4'N, Long. 139° 29.3'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	2.9	J 4.0S	J 2.2R	2.6	2.7	2.6	2.8	6.4	5.4	5.8	6.6	I 6.8S	6.6R	6.7	6.1	6.2	J 5.3R	4.2	3.4	2.9	2.6	2.5	I 2.6F	I 2.8F
2	I 2.9F	3.0F	3.0F	I 3.1F	3.4	2.2	2.9S	5.6	6.1	J 6.3R	6.0	6.6	6.1	5.6	6.0	6.0	5.0	I 3.0A	3.2	3.2	2.9	2.4	2.8	2.5S
3	2.8	2.9	3.1	3.4	3.6	3.1	3.1	J 4.9S	5.1	J 7.4R	7.4	7.8	6.3	6.5	I 6.9R	5.5S	4.5	3.2	4.3S	4.0	I 3.4S	2.4	2.8	2.9
4	3.0	I 3.0A	3.0	2.9	2.8	I 2.7A	2.8	5.2R	5.2	6.7R	7.3R	8.7	6.4	7.0R	7.3S	J 6.5S	4.8	3.1	3.7S	3.6	I 3.7S	2.6	2.8	3.1
5	3.0	3.3	3.0	2.3S	C	C	C	C	C	5.6	8.7	7.1S	6.1R	6.9S	7.0	6.5S	5.0	U 3.6S	C	C	C	C	C	C
6	C	C	C	3.3	3.1	J 2.2R	3.0	4.7	5.5	6.1	6.6	7.8	6.8	6.9	6.6	6.3S	J 5.2R	4.2	3.4S	3.5	3.0	3.0	3.4	I 3.2F
7	U 3.2S	3.0	3.4	3.4S	3.0	3.0	3.5S	J 5.0S	5.6	6.1	7.2S	8.0R	6.1	6.2	J 6.4R	6.7R	5.2	3.8S	3.1	3.4	I 3.5A	3.0	2.8	2.8
8	U 2.9S	2.8	3.2	2.9	2.9	U 3.1S	3.5	6.2	5.3	7.2	7.4S	6.7	6.4	6.1	6.7	6.0	5.3R	3.9S	3.3	3.9S	3.2	2.4	U 2.5S	2.5
9	3.0	3.0	2.9	3.0	2.8	2.7	3.1	4.6S	6.6	6.7	7.4	9.2S	6.2	5.9	J 6.6S	6.1	5.2	3.3	3.3	3.4	4.1	I 2.6A	2.5	2.9S
10	2.6	2.9	3.1	2.8	2.8	2.8S	2.7	4.9S	I 5.8C	5.7	6.2	7.1	6.4	5.9	6.4	6.0	5.1S	3.4	2.5	2.9	3.2	2.1R	I 2.8F	2.9
11	3.0	2.7	2.7	2.7S	J 2.8F	2.5	2.8	J 5.4R	5.8	5.3R	6.9	5.4	U 5.8R	J 5.3R	5.4S	6.5	J 5.5R	2.7	3.0	3.8	4.0S	2.6	2.6	I 2.8A
12	2.7	2.9	2.9	2.9	2.8	2.8	2.7	5.6	5.8	5.3	6.8	J 6.7R	6.1	5.5	5.9	6.4	4.8	I 3.4A	3.1	3.0	3.6	2.6	2.5	2.9
13	I 2.9A	2.9	3.0	2.9	3.0	2.9	2.5	4.8S	5.4	5.6	6.2	6.7	6.3	5.4	6.5	6.0	5.0	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	5.2	6.1	7.3	6.4	5.4R	6.7	6.4R	5.4	I 3.9A	3.2	A	A	I 2.5A	2.7	2.8
15	2.8	2.9	3.0	3.4	2.5	2.4	2.8	5.2	5.9	7.2	J10.7S	7.5	7.4S	6.4	6.9	7.4S	5.6	3.9	3.9S	2.8	2.8	2.6	3.0	2.9
16	2.9F	2.9F	I 3.0F	3.2	U 4.2S	J 2.3R	2.9	4.2	5.3	5.4	6.9	7.4	6.9	6.1	5.9	6.1	5.5	4.3	3.6	J 3.0S	3.0	3.0	2.4	2.6
17	2.8	2.9	2.9S	U 2.7S	2.8	3.1	2.9	4.4S	5.9	6.4	7.1	7.7	6.1	6.7	6.3	5.8	5.0	4.2S	4.1	3.3	2.9	2.5S	2.8	I 2.7F
18	2.7F	F	F	2.8	2.8	2.5	2.8	J 4.4S	5.4	4.8	6.4	6.8	5.7	5.6	5.9	J 6.3R	I 5.2A	I 4.4A	3.5	A	A	A	2.6	I 2.7A
19	I 2.8F	I 3.0F	2.7	2.8	2.7	2.8F	2.4	4.1	5.2R	5.3R	6.9	J 7.7S	6.9	6.2	J 6.8S	6.1	4.3	4.6	3.6	3.0	I 3.0A	3.7S	I 3.3A	3.0
20	3.4S	3.2	3.4	2.9	3.2	2.9	3.6	4.9	5.8	5.4	7.8	8.0	6.1	5.6	6.3	6.1	5.2	J 4.4S	I 4.6A	J 4.9S	3.9S	I 3.2A	I 3.0A	I 3.0A
21	I 3.0A	I 2.8A	2.8	3.0	3.0	3.1	3.1	5.5	6.1	5.8F	8.5	6.9	6.5	5.4	5.5	6.8	5.2R	4.0S	4.2	I 3.4F	2.9	I 2.5A	2.4	F
22	A	A	2.9F	2.7	2.8F	2.8F	2.9F	4.4	5.6	5.7	6.2	8.4	6.4	6.1	RH	6.9	5.8	4.1S	3.7	3.8S	2.3	2.4	2.5	3.0
23	2.9	3.0	3.1	2.8	2.8	2.5	2.4F	5.3	6.9	5.9	8.2	I 8.1C	7.6S	6.0	4.9	6,6	4.7	4.0	4.3	4.3	3.3	2.8V	2.8	2.5
24	2.3	2.4	2.5	2.4	2.6	2.5	2.9	4.5	5.1	6.3	6.7	7.4	5.4	6.8	6.7	5.5	4.6	3.2	3.1	3.1	3.4	2.6	2.7F	F
25	F	F	3.1	F	F	F	F	C	C	5.1	5.9	7.0	6.1	J 7.0R	6.1	6.8	4.6	3.8	2.7	3.5	3.4	2.2	F	F
26	F	2.9	I 2.8A	3.0	2.8	2.8	3.0	4.1	4.4	4.7	6.1	I 6.5A	5.6	5.5	I 6.2R	5.4	J 5.4S	I 3.2A	3.9	I 3.2S	3.0	2.3	F	F
27	2.9F	F	F	F	F	I 3.2F	2.5F	5.0S	4.9	5.4	I 5.2R	6.4R	6.7	U 5.8R	6.3R	I 5.8R	4.4S	4.0S	2.6	3.4	3.4	J 3.1S	I 2.4S	F
28	F	2.8F	I 2.6F	I 2.4F	2.3F	I 2.6F	2.6F	U 4.3F	5.3	5.5	I 5.5R	I 6.2C	I 6.2R	J 5.3R	4.8S	6.1	4.8S	3.2	3.2	I 2.8A	2.7	2.8	2.6	I 2.9F
29	2.8F	I 2.8F	2.8F	3.0	3.1	2.7	3.3S	4.0	4.4	I 4.5C	I 5.8R	J 6.8R	5.4	J 5.4R	5.5	5.4R	5.0S	3.4S	I 3.0S	3.4S	3.3	2.4	2.4F	2.5
30	2.4F	2.7F	3.1	2.8	2.8	2.4	2.8S	J 4.4S	5.1	4.8	U 6.4S	7.8S	6.3	5.9S	5.0R	5.8	4.6	4.7S	3.2	3.2	3.3	2.2	2.5	U 2.6S
31	2.6	2.9	2.9S	3.2S	3.1	2.6	U 2.7S	4.0	4.8	4.5S	5.0	6.1	6.4S	6.0	4.6	J 5.2R	5.7	3.8	3.0	3.5S	2.7	2.6	2.8	2.9
No.	25	25	27	28	27	28	28	28	28	31	31	31	31	31	30	31	31	30	29	27	27	28	27	24
Median	2.9	2.9	3.0	2.9	2.8	2.7	2.8	4.8	5.4	5.6	6.7	7.1	6.3	6.0	6.3	6.1	5.1	3.8	3.3	3.4	3.2	2.6	2.7	2.8
U.Q.	3.0	3.0	3.1	3.0	3.1	2.9	3.0	5.2	5.8	6.3	7.4	7.8	6.5	6.5	6.7	6.5	5.3	4.2	3.8	3.6	3.4	2.8	2.8	2.9
L.Q.	2.8	2.8	2.8	2.8	2.8	2.5	2.7	4.4	5.2	5.3	6.1	6.7	6.1	5.5	5.9	5.8	4.8	3.3	3.1	3.0	2.9	2.4	2.5	2.6
Q.R.	0.2	0.2	0.3	0.2	0.3	0.4	0.3	0.8	0.6	1.0	1.3	1.1	0.4	1.0	0.8	0.7	0.5	0.9	0.7	0.6	0.5	0.4	0.3	0.3

The Radio Research Laboratories, Japan

foF2

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

K 1

IONOSPHERIC DATA

Dec. 1963 | foF1 | 135° E Mean Time (G.M.T. +9h) | Kokubunji Tokyo | Lat. 35° 42.4'N | Long. 139° 29.3'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											L	L	L	L	L									
2									L	L	L	L	L					A						
3										4.1L	L	L	L	U4.5L										
4										L	L	L	L	L	L									
5							C	C	C	L	L	L	L	L	L									
6								L		L	L	L	L		L	L								
7											L	L		L	L									
8									L	L	L	L	L	L	L									
9										L	L	L	L	L	L									
10									C			L	L	L	L									
11											L													
12											L	L	A					A						
13											4.4L							C						
14							C	C	C	L	L	L	L		L			A						
15										L	L	L	L	L	L									
16											L	L	L	L										
17											L	L	L	L	L									
18										L	L	L	L	L			A	A						
19											L	L	L	L	L									
20									L	L	L	L	L		L									
21											L	L	L											
22											L	L	L	L										
23										L	L	C	L	L										
24										L	U4.0L	L	L	L	L									
25								C	C		A	A	L	A	L	L								
26											L	A						A						
27												L	L		L									
28												C	L											
29											L	L			L									
30										L	S	S	S	S	S	S	B	B						
31									S	L			L	L										
No.										1	2			1										
Median										4.1	U4.2			U4.5										
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

foF1

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

K 2

IONOSPHERIC DATA

Dec. 1963 | foE | 135° E Mean Time (G.M.T. +9h) | Kokubunji Tokyo | Lat. 35° 42.4'N | Long. 139° 29.3'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							B	B	I2.40A	2.60	I2.85R	3.10R	3.00	I3.00R	A	A	B	S						
2							B	B	2.40	I2.75R	2.95	3.10	U3.05R	3.00	2.70	2.55	B	S						
3							B	1.85	I2.40A	2.80	3.05	B	R	3.10	2.70R	2.40	2.15	S						
4							S	B	I2.40S	2.80	A	A	U3.10R	2.85	I2.70R	2.35	1.95	B						
5							C	C	C	2.65	2.90	I2.95R	3.05	2.90	2.65	U2.40R	2.00	S						
6							S	B	2.25	2.55	2.80R	I3.00R	3.00	2.90	2.70	I2.30A	B	S						
7							S	B	I2.20B	2.60	I2.80A	3.00	3.05	2.95	I2.80R	I2.50R	I2.05B	S						
8							B	B	I2.10B	2.60	2.70	I2.90R	I3.00A	2.80	2.80	2.40	B	B						
9							S	1.90R	2.30	I2.50A	I2.80A	U3.05R	A	A	A	A	A	S						
10							S	B	C	2.60	2.90	3.05R	I3.00A	2.90	U2.70R	2.30	B	S						
11							S	B	A	A	A	B	A	A	3.05	2.40	B	S						
12							B	I1.90B	2.40	I2.60A	A	A	A	A	R	A	A	S						
13							S	U1.90S	A	2.65	2.90R	A	A	A	A	A	A	C						
14							C	C	C	R	I3.00A	3.05	3.05R	R	A	A	A	S						
15							S	B	2.50	2.70	2.95	3.05	2.95	I2.95A	I2.75A	A	S	S						
16							S	B	I2.40S	2.70	2.90	2.95	2.90	A	A	A	A	S						
17							B	S	2.40	I2.65A	2.95	I3.05A	3.05	2.90R	2.70	2.20R	B	S						
18							B	B	2.50	2.85	2.85	3.10	3.00	3.05	I2.75R	2.50	B	S						
19							S	B	2.40R	A	A	R	B	B	I2.75B	I2.50B	B	S						
20							B	B	2.20	I2.70A	2.90	3.00	3.05	I2.95B	I2.80B	B	B	B						
21							S	A	A	A	A	3.05	U3.05R	3.00R	2.80	2.40	I1.90B	S						
22							S	B	2.10	U2.60R	2.90	3.05	I3.05B	2.90	I2.65A	I2.40A	B	S						
23							S	1.95	2.20	2.55	I2.80R	I2.90C	3.00	2.90	2.80	I2.30B	B	B						
24							S	B	I2.20A	2.60	3.05	I3.05R	3.05	3.00	2.55R	B	B	S						
25							B	C	C	A	A	A	A	A	S	B	B	S						
26							S	B	2.05	A	R	A	A	R	B	B	2.30R	S						
27							S	B	2.30	2.70	I2.90B	A	S	S	A	S	A	S						
28							S	B	2.40	S	A	C	3.00R	I2.80R	I2.70A	I2.50S	B	S						
29							S	S	I2.05R	2.55	2.95	3.00	A	A	B	2.35	B	S						
30							S	B	A	R	A	R	A	S	S	S	B	B						
31							S	S	R	2.55	I2.60R	I2.75A	I3.00B	R	R	2.45R	B	B						
No.								5	22	23	22	20	20	18	19	18	6							
Median								1.90	2.35	2.60	2.90	3.05	3.00	2.90	2.70	2.40	2.00							
U.Q.																								
L.Q.																								
Q.R.																								

foE

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

IONOSPHERIC DATA

Dec. 1963 | foEs | 135° E Mean Time (G.M.T. +9h) | Kokubunji Tokyo | Lat. 35° 42.4'N | Long. 139° 29.3'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	S	S	S	S	E	E	B	B	3.0	G	2.5G	G	G	G	3.1	2.8	B	S	S	S	S	S	S	3.4M
2	E	E	E	E	E	S	B	B	G	G	2.7G	G	2.7G	G	3.2	2.9	2.5	3.3M	2.6M	2.4	3.0M	S	S	S
3	E	E	E	E	E	S	2.2	2.3	3.1	G	G	B	2.4G	3.7	3.4	G	G	S	2.5	2.2	S	S	S	S
4	S	3.1	E	2.2	E	4.8M	2.2	B	S	2.6G	3.5	5.8M	2.8G	3.3	G	G	G	B	S	S	S	S	E	E
5	E	E	E	S	C	C	C	C	C	G	3.3	2.5G	3.4	3.1	3.0	G	G	S	C	C	C	C	C	C
6	C	C	C	E	E	S	S	B	G	G	G	2.8G	G	3.1	3.1	2.6	2.5	2.5	3.5M	3.1	2.2	2.1	S	S
7	E	E	2.1	E	E	S	S	B	G	G	3.1	3.5	G	G	2.7G	2.3G	B	2.3	S	J 4.1	J 6.8	3.1M	2.9M	2.9M
8	3.0M	2.1	J 3.4	S	E	S	B	B	B	G	2.9	G	3.0M	G	G	G	B	B	2.1	2.1	2.3	S	S	S
9	2.9M	2.8M	J 2.9	2.3	2.7M	E	S	G	2.3G	2.9	3.1	2.8G	3.1	3.0	2.7	2.7	2.9M	2.9	2.8M	2.2	J 2.3	3.1M	E	S
10	2.3	J 2.3	2.4	E	E	S	S	B	C	2.9	3.3	G	J 3.2	G	G	G	B	S	J 2.4	J 2.2	S	3.4M	S	S
11	2.1	3.4M	E	E	E	E	S	B	2.3	2.8	3.1	B	3.5	3.7	G	G	B	3.0	J 2.8	J 2.5	J 4.3	E	2.5	3.0M
12	S	J 2.5	E	2.1	E	S	B	B	G	3.2	3.0	4.8	4.4	5.9M	2.7G	2.9	3.1	5.9M	J 3.9	J 4.0	5.0	S	3.0M	2.7M
13	4.9M	J 3.9S	3.6	2.9M	2.9M	J 2.3	S	G	3.0M	G	G	J 3.8	4.3	3.1	4.7M	4.8Y	2.3	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	G	J 3.6	G	2.7G	G	2.9	3.3	3.0	J 6.0	J 2.4	3.4M	J 4.8	3.5M	2.3	J 2.3S
15	E	E	E	E	2.3	S	S	B	G	J 3.8	3.3	G	3.4	3.0	2.9	4.9M	6.0M	3.0M	S	S	S	E	E	E
16	E	E	E	E	E	S	S	B	2.8	3.2	3.1	3.7	3.5	2.9	3.1	J 3.2	3.2	6.6M	S	2.8	2.5	2.1	S	2.8M
17	2.3	E	E	S	S	E	B	S	2.2G	J 3.4	J 3.1	3.8	G	G	3.0M	G	2.0	S	S	S	2.3	S	E	J 2.8
18	3.1M	2.5	E	E	E	J 2.3	B	B	G	G	J 2.4G	G	G	G	G	G	5.8M	4.7M	4.8M	J 7.3	4.9M	6.0M	J 5.2	5.8M
19	3.5M	2.9M	3.4M	2.0	2.9M	3.0M	2.4M	B	G	4.9	J 3.5	2.8G	B	B	B	B	B	2.9	2.0	S	3.3M	5.8M	J 5.2	3.1
20	J 2.8	2.9M	E	2.2	E	E	2.4	J 2.2	2.8M	2.9	G	G	G	B	B	B	2.4	5.6M	5.9M	J 5.7Y	4.9M	5.9M	4.8M	4.9M
21	J 5.8	J 5.6	2.5M	2.5	E	4.8M	3.1M	J 3.5S	J 3.4	2.9	5.9M	2.4G	G	G	G	G	B	2.9	3.0M	J 2.7	3.0M	J 3.7	J 3.2	2.7M
22	3.8M	4.8M	J 3.0	E	E	E	S	B	2.4	G	G	G	B	2.3G	2.9	3.5	B	4.4M	2.8	4.8M	2.3	2.1	J 2.3	2.8M
23	E	J 2.3	E	2.1	E	S	S	G	2.1G	G	G	C	G	G	G	G	B	B	S	S	3.1M	E	S	J 2.8
24	E	E	2.7M	E	E	E	2.1	G	2.5	3.5	2.4G	G	G	G	3.0	2.9	2.5	2.4	3.4M	3.0M	2.6	S	E	E
25	3.0M	E	J 3.3	2.8M	E	2.4	2.9M	C	C	3.4	4.6M	J 4.9	3.4	5.9M	S	B	B	2.8	S	S	E	E	E	E
26	E	3.5M	3.0M	J 2.7	2.8M	E	S	B	J 2.5	2.8	2.9G	8.9M	3.1	G	B	B	G	J 2.9	2.3	S	S	E	E	E
27	E	E	E	E	E	E	B	B	2.5	G	G	3.4	S	S	4.0M	S	3.2	3.2	2.3M	S	E	E	S	E
28	J 2.8	3.0M	J 3.4S	2.9M	E	2.2	2.4	B	G	S	3.1	C	G	G	2.3G	G	B	S	3.4M	4.1M	2.5	3.3M	J 3.3	J 4.1
29	J 2.4	E	E	E	E	E	S	S	G	G	3.8	G	3.1	3.5	B	G	B	S	S	2.3	J 2.7	E	E	E
30	E	E	E	E	E	E	S	B	2.4	3.1	3.0	G	3.1	S	S	S	B	B	S	S	S	2.4	S	S
31	2.6	S	S	S	S	S	1.9	S	2.3	G	G	2.8	B	2.5G	G	G	B	B	E	E	E	E	E	E
No.	26	27	27	25	27	18	9	7	25	30	31	27	27	27	25	25	17	18	19	19	22	21	19	22
Median	2.3	2.3	E	E	E	E	2.4	G	2.3	G	3.0	G	G	G	2.9	G	2.5	3.0	2.8	2.8	2.6	2.1	2.3	2.8
U.Q.	3.0	3.0	E	E	E	E	2.6	G	2.6	G	3.3	G	G	G	3.1	G	3.2	4.7	3.4	4.1	4.3	3.4	3.2	3.0
L.Q.	E	E	E	E	E	E	2.2	G	G	G	G	G	G	G	G	G	G	2.9	2.3	2.2	2.3	E	E	E
Q.R.							0.4											1.8	1.1	1.9	2.0			

foEs

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

IONOSPHERIC DATA

Dec. 1963 | f_bE_s | 135° E Mean Time (G.M.T. +9h) | Kokubunji Tokyo | Lat. 35°42.4'N | Long. 139°29.3'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	S	S	S	S			B	B	2.5G		2.5G				3.1	2.8	B	S	S	S	S	S	S	2.1
2						S	B	B			2.4G		2.6G		3.2	2.9	2.5	A	1.8	1.8	2.0	S	S	S
3						S	1.9	2.3	3.0			B	E 2.4R	3.5	E 3.4S			S	S	E	S	S	S	S
4	S	A		E		A	S	B	S	2.3G	3.5	3.7	2.6G	3.2				B	S	S	S	S		
5				S	C	C	C	C	C		3.1	E 2.5R	3.4S	E 3.1S	E 3.0S			S	C	C	C	C	C	C
6	C	C	C			S	S	B				E 2.8R		2.2G	3.0	2.5	2.4	S	2.4	2.5	E	E	S	S
7			E			S	S	B			2.9	3.4			E 2.7R	E 2.3R	B	S	S	2.2	A	2.4	1.9	E
8	2.2	E	1.8	S		S	B	B	B		2.9		3.0				B	B	E	E	E	S	S	S
9	1.9	E	1.9	E	E		S		2.0G	2.9	3.1	2.3G	3.1	3.0	2.6	2.4	2.6	2.0	2.0	E	E	A		S
10	2.0	1.9	E			S	S	B	C	2.8	3.3		3.2				B	S	E	E	S	1.7	S	S
11	E	E					S	B	2.2	2.8	3.1	B	U 3.5R	3.7			B	S	E	1.9	2.0		E	A
12	S	E		E		S	B	B		3.2G	2.9	3.6	4.2	4.8	E 2.7S	2.8	3.1	A	1.9	E	1.9	S	E	2.0
13	A	1.9	2.1	E	2.0	E	S		2.6			3.7	3.9	E 3.1R	3.7	2.6	2.2	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C		3.6		2.4G		2.7G	3.3	2.3	A	E	A	A	A	1.8	E
15					1.9	S	S	B		3.6	3.2		3.3	3.0	2.7	3.8	4.5	2.2	S	S	S			
16						S	S	B	2.7	3.2	3.1	3.6	3.5	2.9	3.0	3.2	2.8	S	S	2.0	1.9	1.9	S	E
17	E			S	S		B	S	2.1G	2.9	2.5G	3.7			2.2G		E 2.0R	S	S	S	E	S		E
18	1.9	1.9				2.0	B	B			2.0G						A	A	2.3	A	A	A	1.9	A
19	1.9	1.8	1.9	E	1.9	1.9	1.8	B		3.8	3.5	E 2.8R	B	B	B	B	B	S	E	S	A	2.3	A	A
20	E	E		E			E	2.0	1.9G	2.8				B	B	B	2.3	3.7	A	2.0	2.0	A	A	A
21	A	A	E	E		1.8	1.9	1.9	2.3	2.7	3.8	2.4G					B	2.0	2.0	E	2.0	A	1.9	E
22	A	A	1.8				S	B	2.3				B	2.3G	2.9	3.4	B	2.0	1.8	2.4	E	E	E	1.8
23		2.0		E		S	S		1.9G			C					B	B	S	S	E		S	E
24			E				1.9		2.5	3.0	2.4G				2.9	E 2.9R	2.2	S	2.5	2.0	E	S		
25	1.8		E	1.9		E	E	C	C	3.4	4.0	4.1	3.3	4.0	S	B	B	2.2	S	S				
26		1.9	A	1.9	E		S	B	2.4	E 2.8R	E 2.9R	A	E 3.1R		B	B		A	E	S	S			
27							B	B	2.5			E 3.4S	S	S	3.1	S	2.7	2.5	E	S			S	
28	2.0	1.9	1.8	E		E	1.8	B		S	3.1	C			E 2.3S		B	S	2.3	A	E	1.9	E	2.1
29	E						S	S			3.5		E 3.1S	3.1	B		B	S	S	E	2.0			
30							S	B	E 2.4R	2.7	E 3.0S		E 3.1S	S	S	S	B	B	S	S	S	1.7	S	S
31	E	S	S	S	S	S	1.7	S	E 2.3S			E 2.8S	B	E 2.5R			B	B						
No.																								
Median																								
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

f_bE_s Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

K 5

IONOSPHERIC DATA

Dec. 1963 | f-min | 135° E Mean Time (G.M.T. +9h) | Kokubunji Tokyo | Lat. 35° 42.4'N | Long. 139° 29.3'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	E1.60S	E1.60S	E1.70S	E1.50S	1.55	1.50	1.80	2.10	2.10	2.20	2.00	2.10	2.10	2.60	2.30	2.05	2.05	E1.90S	E1.70S	E1.50S	E1.90S	E1.30S	E1.30S	E1.50S
2	1.60	1.30	1.50	1.60	1.50	E1.70S	1.60	1.80	2.05	2.10	2.10	2.50	2.00	2.10	2.20	2.00	1.90	E1.70S	E1.60S	E1.70S	E1.60S	E1.50S	E1.70S	E1.60S
3	1.50	1.50	1.60	1.30	1.60	E1.60S	1.50	1.50	1.90	2.00	2.10	3.50	1.80	2.20	2.10	2.20	1.90	E1.90S	E1.90S	E1.70S	E1.60S	E1.30S	E1.60S	E1.70S
4	E1.60S	E1.70S	1.50	1.50	1.50	E1.70S	E1.70S	1.90	E2.50S	2.00	1.80	1.80	1.90	2.50	2.10	1.90	1.70	1.70	E1.80S	E1.60S	E1.70S	E1.90S	1.40	1.50
5	1.40	1.50	1.40	E1.80S	C	C	C	C	C	1.90	2.00	1.90	2.10	2.20	1.90	1.90	1.80	E1.90S	C	C	C	C	C	C
6	C	C	C	1.20	1.50	E1.80S	E1.55S	1.80	1.90	2.00	2.10	2.10	2.20	2.10	2.00	1.90	1.80	E1.70S	E1.70S	E1.60S	E1.30S	E1.70S	E1.50S	E1.30S
7	1.55	1.60	E1.50S	1.40	1.60	E1.80S	E1.60S	1.90	2.30	1.90	2.05	2.20	2.50	2.00	2.10	1.90	1.90	E1.70S	E1.60S	E1.70S	E1.50S	E1.80S	E1.60S	1.50
8	1.55	1.50	E1.50S	E1.80S	1.40	E1.70S	1.70	2.05	2.30	2.00	2.00	2.50	2.00	2.10	2.05	1.80	1.95	1.80	E1.50S	E1.55S	1.40	E1.55S	E1.60S	E1.70S
9	1.50	1.50	1.50	1.50	1.60	1.50	E1.80S	1.70	1.80	1.95	1.90	2.00	1.90	2.10	2.05	1.90	1.90	E1.90S	E1.60S	E1.70S	E1.50S	E1.60S	1.20	E1.50S
10	E1.60S	E1.60S	1.50	1.60	1.60	E1.70S	E1.80S	1.80	I1.80C	1.85	2.05	2.10	2.10	1.90	1.90	1.90	2.00	E1.80S	E1.70S	E1.60S	E1.70S	E1.60S	E1.90S	E1.80S
11	E1.70S	E1.60S	1.20	1.50	1.40	1.40	E1.70S	1.90	1.70	2.20	2.10	3.90	2.30	2.10	1.80	2.05	2.10	E1.60S	1.50	E1.60S	E1.60S	1.50	1.60	E1.70S
12	E1.80S	E1.80S	1.60	1.60	1.60	E1.70S	1.50	1.90	1.90	2.10	2.05	2.20	2.20	2.20	2.40	2.10	2.05	E1.70S	E1.70S	E1.70S	E1.70S	E1.70S	E1.60S	E1.60S
13	E1.70S	E1.80S	E1.60S	1.70	E1.50S	1.50	E1.70S	1.60	1.90	2.20	2.20	2.60	2.40	2.30	2.20	2.10	1.80	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	2.10	2.00	2.10	1.90	2.20	2.10	2.05	1.95	E1.80S	E1.50S	E1.70S	E1.50S	E1.80S	E1.60S	E1.50S
15	1.60	1.70	1.40	1.40	E1.70S	E1.50S	E1.50S	1.95	1.80	1.90	2.00	2.10	2.05	1.90	1.90	1.80	E1.80S	E1.80S	E1.50S	E1.90S	E1.70S	1.40	1.40	1.60
16	1.50	1.50	1.20	1.40	1.50	E1.60S	E1.60S	2.00	E2.20S	2.10	2.05	2.05	2.20	2.05	2.10	2.05	1.90	E1.60S	E1.80S	E1.60S	E1.60S	E1.70S	E1.70S	1.50
17	1.60	1.50	1.60	E1.90S	E1.80S	1.50	1.50	E1.80S	2.00	1.80	2.10	1.90	2.10	2.10	1.90	2.00	1.80	E1.85S	E1.70S	E1.90S	E1.80S	E2.10S	1.60	E1.50S
18	E1.70S	E1.80S	1.60	1.60	1.30	1.70	1.70	1.80	1.80	1.95	1.80	2.10	2.00	2.05	2.00	1.80	1.80	E1.60S	E1.60S	1.50	E1.50S	E1.70S	1.40	E1.50S
19	E1.60S	1.60	1.60	1.60	1.60	E1.70S	E1.50S	1.80	1.90	2.10	2.25	2.30	3.80	3.10	3.15	3.20	2.30	E1.70S	E1.90S	E1.80S	E1.80S	E1.90S	E1.70S	1.40
20	E1.70S	E1.50S	1.40	1.40	1.40	1.40	1.50	1.70	1.70	2.00	2.20	2.60	2.60	3.80	3.00	2.50	1.90	1.90	E1.60S	E1.60S	E1.60S	E1.60S	E1.60S	E1.80S
21	E1.50S	1.60	1.30	1.50	1.40	1.40	E1.50S	1.70	1.90	2.05	1.95	2.00	2.40	2.10	2.00	1.85	2.10	E1.60S	E1.80S	E1.70S	E1.60S	E1.60S	E1.50S	E1.50S
22	E1.60S	E1.80S	E1.50S	1.40	1.30	1.50	E1.50S	2.00	1.90	1.90	2.00	2.60	3.20	2.10	2.20	2.20	2.00	E1.70S	E1.50S	E1.70S	E1.80S	E1.80S	E1.50S	E1.60S
23	1.50	1.60	1.50	1.50	1.60	E1.80S	E1.80S	1.70	1.80	2.00	2.10	C	2.20	2.20	2.40	2.30	2.20	1.90	E1.80S	E1.80S	1.60	1.60	E1.60S	1.70
24	1.50	1.50	E1.50S	1.60	1.60	1.50	E1.70S	1.90	1.90	1.90	2.20	2.60	2.60	2.40	2.40	2.55	2.00	E1.70S	E1.80S	E1.60S	1.60	E1.60S	1.20	1.60
25	1.40	1.60	E1.50S	1.60	1.60	1.60	1.40	C	C	2.20	2.10	2.25	2.60	2.20	E3.10S	2.60	2.20	E1.90S	E1.80S	E1.50S	1.60	1.60	1.40	1.30
26	1.50	E1.70S	1.50	1.60	1.50	1.30	E1.70S	1.60	1.75	2.00	2.60	2.20	2.10	2.80	3.90	3.15	2.00	E1.90S	E1.80S	E1.80S	E1.90S	1.60	1.50	1.20
27	1.40	1.60	1.40	1.30	1.70	1.50	1.60	1.70	2.20	2.05	1.90	2.10	E3.70S	E3.30S	1.90	E2.70S	1.70	E1.70S	E1.50S	E1.70S	1.50	1.60	E1.70S	1.60
28	1.50	1.60	1.60	1.20	1.50	1.50	E1.50S	1.90	1.80	E3.80S	2.20	I2.00C	2.50	1.95	1.90	2.30	1.90	E1.60S	E1.80S	E1.90S	E1.60S	E1.70S	1.60	1.50
29	E1.60S	1.40	1.40	1.50	1.70	1.40	E1.60S	E1.70S	2.10	2.05	2.10	2.00	2.00	2.00	3.50	2.10	2.10	E1.80S	E1.80S	1.50	1.60	1.50	1.20	1.30
30	1.60	1.50	1.50	1.40	1.60	1.70	E1.60S	1.70	1.70	1.65	2.10	1.80	2.10	E4.10S	E3.60S	E3.00S	2.20	2.75	E1.70S	E1.70S	E1.60S	E1.60S	E1.75S	E1.75S
31	E1.70S	E1.70S	E1.65S	E1.60S	E1.60S	E1.70S	E1.65S	E2.00S	1.65	2.00	2.30	2.00	3.10	2.05	2.20	2.05	2.10	1.70	1.60	1.40	1.50	1.50	1.50	1.40
No.	17	19	26	26	26	17	29	27	26	30	31	30	30	29	29	29	31	30	29	29	29	29	29	29
Median	1.50	1.50	1.50	1.50	1.50	1.50	E1.60	1.80	1.90	2.00	2.10	2.10	2.15	2.10	2.10	2.05	1.95	E1.70	E1.70	E1.70	E1.60	E1.60	E1.60	E1.50
U.Q.																								
L.Q.																								
Q.R.																								

f-min

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

K 6

IONOSPHERIC DATA

Dec. 1963 | M(3000)F2 | 135° E Mean Time (G.M.T. +9h) | Kokubunji Tokyo | Lat. 35° 42.4'N | Long. 139° 29.3'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	2.60	J3.30S	J2.75R	3.05	3.00	2.95	3.05	3.60	3.50	3.45	3.60	I3.60S	3.65R	3.45	3.60	3.70	J3.60R	3.55	3.25	3.30	3.10	3.35	I3.15F	I3.00F
2	I2.90F	3.05F	2.95F	I3.10F	3.55	3.60	3.10S	3.60	3.60	J3.65R	3.55	3.45	3.60	3.40	3.50	3.65	3.80	I3.40A	3.10	3.15	3.40	3.35	3.05	3.15S
3	2.85	3.00	2.90	3.20	3.30	3.20	3.25	J3.35S	3.55	J3.25R	3.25	3.40	3.50	3.25	I3.55R	3.80S	3.65	3.55	3.35S	3.40	I3.45S	2.90	2.85	2.95
4	2.85	I2.90A	3.00	3.00	3.30	I3.00A	3.10	3.50R	3.55	3.10R	3.55R	3.55	3.45	3.55R	3.55S	J3.70S	3.60	3.25	3.20S	3.35	I3.45S	3.45	2.75	2.95
5	2.95	2.75	2.95	2.80S	C	C	C	C	C	3.35	3.45	C	C	C	C	C	C	C	C	C	C	C	C	C
6	C	C	C	3.05	3.70	J3.00R	3.30	3.55	3.55	3.40	3.50	3.70	3.55	3.50	3.45	3.35S	J3.50R	3.60	3.45S	3.45	3.05	3.15	3.25S	I2.95F
7	U3.05S	2.90	3.05	3.30S	3.20	3.30	3.35S	J3.55S	3.55	3.60	3.45S	3.50R	3.45	3.55	J3.25R	3.65R	3.65	3.55S	3.25	2.95	I3.20A	3.35	3.05	2.85
8	U2.90S	2.95	3.10	3.00	3.10	U2.90S	3.10	3.55	3.55	3.60	3.55S	3.90	3.30	3.45	3.30	3.65	3.55R	3.55S	2.90	3.35S	3.30	3.30	U3.20S	2.90
9	3.00	3.00	3.05	3.05	3.35	3.00	3.25	3.45S	3.65	3.35	3.40	3.80S	3.55	3.55	J3.35S	3.30	3.65	3.30	3.20	3.15	3.45	I3.10A	2.80	2.75S
10	2.90	2.95	3.05	3.05	3.05	3.00S	2.95	3.65S	I3.65C	3.65	3.40	3.70	3.40	3.70	3.60	3.55	3.70S	3.40	3.20	3.10	3.45	3.05R	I3.00F	2.95
11	3.15	2.95	2.95	3.20S	J3.20F	3.20	3.20	J3.65R	3.65	3.70R	3.75	3.70	U3.65R	J3.55R	3.50S	3.50	J3.60R	3.00	3.00	3.20	3.30S	3.45	2.90	I2.90A
12	2.95	2.85	3.05	3.10	3.10	2.90	3.20	3.75	3.75	3.60	3.70	J3.45R	3.60	3.60	3.10	3.45	3.75	I3.45A	3.05	3.15	3.35	3.10	2.80	3.00
13	I2.80A	2.95	3.05	3.00	3.20	3.35	3.40	3.45S	3.70	3.60	3.15	3.25	3.50	3.55	3.40	3.65	3.60	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	3.50	3.45	3.40	3.55	3.50R	3.40	3.45R	3.70	I3.40A	3.45	A	A	I3.20A	2.65	2.85
15	2.75	2.80	2.95	3.10	3.10	3.20	3.00	3.45	3.70	3.20	J3.50S	3.50	3.40S	3.50	3.20	3.55S	3.75	3.30	3.50S	3.20	3.20	3.30	3.00	3.10
16	2.95F	2.80F	I2.95F	2.95	U3.55S	J3.15R	3.40	3.55	3.40	3.35	3.50	3.50	3.45	3.10	3.25	3.60	3.45	3.60	3.30	J3.35S	3.65	3.30	2.90	2.95
17	2.75	2.95	3.25S	U3.10S	2.95	3.20	3.45	3.40S	3.65	3.40	3.50	3.55	3.45	3.50	3.40	3.50	3.60	3.30S	3.40	3.35	3.35	3.10S	3.20	F
18	2.60F	F	F	2.95	3.20	3.00	3.25	J3.35S	3.80	3.50	3.30	3.80	3.35	3.45	3.65	J3.50R	I3.55A	I3.50A	3.45	A	A	A	3.05	I2.90A
19	I2.80F	I2.80F	3.15	3.20	3.30	3.15F	3.40	3.65	3.80R	3.60R	3.25	J3.75S	3.55	3.55	S	3.60	3.70	3.35	3.35	3.85	I3.50A	3.25S	I3.10A	2.85
20	2.95S	2.85	2.95	3.10	3.10	3.05	3.30	3.85	3.70	3.30	3.50	3.60	3.60	3.45	3.35	3.45	3.45	J3.35S	I3.20A	J3.45S	3.30S	I3.20A	I3.05A	I3.05A
21	I3.10A	I3.10A	2.90	2.95	2.95	3.20	3.20	3.55	3.60	3.40F	3.65	3.35	3.55	3.45	3.25	3.50	3.65R	3.25S	3.35	I3.50F	3.45	I3.30A	2.90	F
22	A	A	2.65F	2.95	3.05F	3.55F	3.10F	3.50	3.70	3.70	3.40	3.55	3.75	3.30	RH	3.45	3.60	3.30S	3.25	3.40S	3.50	2.70	3.00	2.95
23	3.00	2.95	3.05	3.20	3.35	3.15	2.90F	3.35	3.80	3.55	3.55	I3.50C	3.45S	3.70	3.45	3.55	3.60	3.25	3.35	3.40	3.35	3.10V	2.85	3.20
24	3.05	2.90	3.05	2.90	3.05	3.25	3.10	3.60	3.55	3.50	3.55	3.50	3.70	3.35	3.60	3.60	3.65	3.40	3.25	3.20	3.25	3.05	2.65F	F
25	F	F	3.10	F	F	F	F	C	C	3.70	3.30	3.65	3.60	J3.55R	3.30	3.65	3.65	3.40	3.30	2.90	3.40	3.20	F	F
26	F	2.95	I2.90A	2.95	3.20	3.20	3.45	3.50	3.65	3.50	3.50	I3.60A	3.55	3.45	I3.55R	3.30	J3.50S	I3.40A	3.35	I3.35S	3.35	3.00	F	F
27	2.95F	F	F	F	F	I3.30F	3.45F	3.70S	3.65	3.50	I3.50R	3.55R	3.55	U3.25R	3.50R	I3.65R	3.45S	3.35S	2.70	3.25	3.20	J3.15S	I3.20S	F
28	F	3.20F	I3.10F	I3.20F	3.25F	I3.15F	3.10F	U3.45F	3.60	3.40	I3.30R	I3.30C	I3.40R	J3.55R	3.50S	3.45	3.50S	3.45	3.30	I2.90A	3.20	(3.20	2.85	I3.00F
29	2.90F	I2.85F	2.85F	2.95	3.50	3.10	3.30S	3.45	3.70	I3.35C	I3.35R	J3.40R	3.55	J3.15R	3.25	3.35R	3.50S	3.35S	I3.20S	3.15S	3.30	2.80	2.90F	2.80
30	2.85F	2.95F	3.35	2.85	3.20	2.95	3.25S	J3.50S	3.70	3.50	U3.45S	3.60S	3.30	3.55S	3.40R	3.50	3.50	3.15S	3.20	3.15	3.40	2.95	2.85	U2.80S
31	3.05	2.80	2.85S	2.90S	3.30	3.10	U2.95S	3.35	3.50	3.55S	3.35	3.50	3.45S	3.55	3.70	J3.30R	3.60	3.45	2.95	3.40S	3.25	3.10	2.85	3.10
No.	25	25	27	28	27	28	28	28	28	31	31	30	30	30	28	30	30	29	29	27	27	28	27	23
Median	2.90	2.95	3.00	3.05	3.20	3.15	3.20	3.50	3.65	3.50	3.50	3.55	3.55	3.50	3.40	3.50	3.60	3.40	3.25	3.30	3.35	3.20	2.90	2.95
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

M(3000)F2 | Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation | K 7

IONOSPHERIC DATA

Dec. 1963 | M(3000)F1 | 135° E Mean Time (G.M.T. +9h) | Kokubunji Tokyo | Lat. 35° 42.4' N | Long. 139° 29.3' 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											L	L	L	L	L									
2									L	L	L	L	L					A						
3										3.65L	L	L	L	U3.70L										
4										L	L	L	L	L	L									
5							C	C	C	L	L	L	L	L	L									
6								L		L	L	L	L		L	L								
7											L	L		L	L									
8									L	L	L	L	L	L	L									
9										L	L	L	L	L	L									
10									C			L	L	L	L									
11											L													
12											L	L	A					A						
13											3.65L							C						
14							C	C	C	L	L	L	L		L			A						
15										L	L	L	L	L	L									
16											L	L	L	L										
17											L	L	L	L	L									
18										L	L	L	L	L			A	A						
19											L	L	L	L	L									
20									L	L	L	L	L		L									
21											L	L	L											
22											L	L	L	L										
23										L	L	C	L	L										
24										L	U3.70L	L	L	L	L									
25								C	C		A	A	L	A	L	L								
26											L	A						A						
27												L	L		L									
28												C	L											
29											L	L			L									
30										L	S	S	S	S	S	S	B	B						
31									S	L			L	L										
No.										1	2			1										
Median										3.65	U3.70			U3.70										
U.Q.																								
L.Q.																								
Q.R.																								

M(3000)F1 Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

IONOSPHERIC DATA

Dec. 1963 | h'F2 | 135° E Mean Time (G.M.T. +9h) | Kokubunji Tokyo | Lat. 35° 42.4'N | Long. 139° 29.3'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											240	225	250	240	240									
2									215	225	240	250	230					A						
3										285	230	250	245	290										
4										285	250	240	240	250	235									
5							C	C	C	225	250	205	245	250	235									
6								215		225	250	225	245		240	240								
7											255	230		230	255									
8									225	225	230	205	270	240	250									
9										230	250	220	230	230	250									
10									C			225	250	230	230									
11											225													
12											230	230	230					A						
13											300							C						
14							C	C	C	220	250	245	230		250			A						
15										270	225	250	250	245	260									
16											250	245	240	240										
17											240	230	225	250	230									
18										225	260	220	250	240			A	A						
19											280	210	245	230	240									
20									210	225	250	240	230		250									
21											220	230	230											
22											230	230	215	260										
23										230	250	C	230	225										
24										230	250	230	225	275	240									
25								C	C		260A	230	250	240	250	230								
26											240	A						A						
27												250	250		245									
28												C	260											
29											C	280	245		255									
30										235	250	250	250	225	220	230	210	220						
31									225	230			230	250										
No.								1	4	15	26	25	27	19	18	3	1	1						
Median								215	220	230	250	230	245	240	240	230	210	220						
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

h'F2

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

K 9

IONOSPHERIC DATA

Dec. 1963 | h'F | 135° E Mean Time (G.M.T. +9h) | Kokubunji Tokyo | Lat. 35°42.4'N | Long. 139°29.3'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	210	E310S	300	260	305	280	230	205	225	210	230	210	225	210	220	205	205	225	245	260	245	325	E310A
2	300	260	270	250	205	E260S	270	210	205	210	220	220	225	235	245	225	200	I230A	255	230	250	250	255	255
3	305	300	300	250	230	250	225	205	210	220	210	220	245	240	225	205	205	205	230	225	205	E310S	305	310
4	310	I310A	280	260	240	I285A	245	205	225	205	245	E250A	210	220	230	210	200	230	250	225	210	245	300	300
5	300	300	300	E360S	C	C	C	C	C	180	210	210	E250A	210S	230S	225	210	210	C	C	C	C	C	C
6	C	C	C	250	200	280	220	210	205	185	220S	245	225	245	220	210	205	200	245	240	250	250	250	305
7	280	310	260	250	260	245	225	205	220	220	220	210	225	220	220	210	205	205	230	290A	I255A	250A	260	310
8	305	300	250	300	260	E305S	250	210	180	205	210	210	205	185	205	210	200	225	255	225	205	270	245	320
9	290	300	300	260	230	260	250	205	230	220	205	225	205	200	205	210	200	225	240	250	205	I260A	310	305
10	E330A	310	270	255	270	270	E295S	205	I210C	210	220	210	205	210	220	210	210	200	260	250	245	E340A	300	300
11	255	320	260	260	245	260	250	200	210	210	210	210	225	220	220	240	200	260	270	250	220	210	305	I305A
12	310	310	260	270	255	295	260	210	205	210	210	210	I245A	E250A	235S	230	200	I240A	250	250	225	260	305	300A
13	I305A	320A	300	300	260	245	210	225	210	210	210	230	230	230	240	230	200	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	180	230	205	220	230	230	225	200	I220A	205	A	A	I265A	E350A	300
15	320	330	300	245	250	255	250	220	225	245A	230	205	210	205	210	225	E240A	220	205	240	250	250	270	260
16	300	320	305	270	200	E255S	210	205	210	225	210	230	220	220	205	230	210	200	225	220	200	230	E290S	305
17	310	305	260	E290S	290	245	210	200	220	230	205	210	205	205	200	225	220	210	210	210	230	E320S	255	350
18	340A	300A	300	295	250	300A	210	210	205	200	205	205	210	210	230	230	A	A	240A	A	A	A	E300A	I310A
19	340A	280	260	260	250	260	230	200	205	230A	205	225	E250B	225	230	225	210	225	225	205	I225A	240	I290A	310A
20	270	300	280	250	250	250	225	200	200	195	225	230	205	210	205	225	220	E250A	A	220A	210	I245A	A	A
21	A	A	300	300	300	250	250	210	210	205	230	210	205	E250S	220	230	210	230	225	230	210	A	E350A	300
22	A	A	340	255	230	280	255	210	210	225	205	230	210	205	205H	230	225	230	210	220	230	E350S	310	280
23	305	300	250	255	220	300	E360S	230	215	205	230	I220C	220	205	205	240	210	240	220	210	225	250	275	290
24	260	310	310	300	285	240	250	210	225	230	205	210	205	E260S	220	210	210	230	250A	250	230	260	310	280
25	250	300	260	205	260	330	250	C	C	220	I220A	I210A	210	I220A	205	220	200	205	260	250	225	250	300	290
26	255	290	I310A	290	210	245	210	210	205	220	205	I215A	245	230	245	230	210	I240A	240	210	210	305	255	255
27	260	260	250	250	205	210	225	205	205	225	225	E245S	220	E250S	220	210	210	220	310	255	245	210	E290S	290
28	E290A	290	230	250	205	260	300	220	210	E250S	210	I240C	230	E245R	210	210	200	205	260A	I250A	250	250A	310	E310A
29	300	310	295	260	210	260	205	200	210	I230C	230	E250S	225	245	245	225	205	210	E250S	255	250	250	310	310
30	320	310	230	260	255	310	250	210	210	230	I240S	S	S	I200S	I205S	S	B	B	210	230	205	310	330	300
31	275	310	300	275	205	255	220	210	I205S	180	225	E245S	220	210	205	230	220	200	270	225	220	290	290	260
No.	26	27	28	28	29	28	27	28	28	30	31	26	28	26	31	30	28	27	27	27	27	23	26	26
Median	300	300	280	260	250	260	245	210	210	215	210	210	220	220	220	225	205	220	240	230	225	250	E300	300
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

h'F

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

IONOSPHERIC DATA

Dec. 1963 | h'Es | 135° E Mean Time (G.M.T. +9h) | Kokubunji Tokyo | Lat. 35° 42.4'N | Long. 139° 29.3'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	S	S	S	S	E	E	B	B	100	G	100	G	G	G	110	105	B	S	S	S	S	S	S	100
2	E	E	E	E	E	S	B	B	G	G	100	G	100	G	150	145	130	105	125	125	100	S	S	S
3	E	E	E	E	E	S	150	155	160	G	G	B	100	130	125	G	G	S	130	125	S	S	S	S
4	S	110	E	110	E	105	100	B	S	100	100	100	95	120	G	G	G	B	S	S	S	S	E	E
5	E	E	E	S	C	C	C	C	C	G	170	90	160	155	135	G	G	S	C	C	C	C	C	C
6	C	C	C	E	E	S	S	B	G	G	G	105	G	100	145	125	125	120	105	105	100	100	S	S
7	E	E	115	E	E	S	S	B	G	G	110	110	G	G	110	110	B	105	S	100	105	100	100	105
8	100	100	100	S	E	S	B	B	B	G	120	G	105	G	G	G	B	B	125	100	100	S	S	S
9	100	100	100	100	100	E	S	G	120	115	110	105	105	105	105	100	100	100	100	100	110	105	E	S
10	110	105	100	E	E	S	S	B	C	145	125	G	100	G	G	G	B	S	100	100	S	100	S	S
11	100	100	E	E	E	E	S	B	110	110	110	B	105	105	G	G	B	100	100	105	100	E	100	100
12	S	100	E	100	E	S	B	B	G	110	100	100	100	100	105	100	100	105	105	100	100	S	100	100
13	100	100	100	100	100	100	S	G	105	G	G	105	105	110	100	110	105	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	G	100	G	100	G	105	100	100	100	100	100	100	100	100	100
15	E	E	E	E	100	S	S	B	G	140	130	G	115	110	100	100	100	100	S	S	S	E	E	E
16	E	E	E	E	E	S	S	B	175	150	145	115	110	110	105	100	100	100	S	100	100	100	S	100
17	105	E	E	S	S	E	B	S	115	105	100	100	G	G	100	G	100	S	S	S	100	S	E	105
18	110	100	E	E	E	110	B	B	G	G	100	G	G	G	G	G	100	100	100	100	100	100	100	100
19	100	100	100	100	100	95	100	B	G	100	100	100	B	B	B	B	B	100	100	S	100	100	100	100
20	100	100	E	100	E	E	100	100	100	105	G	G	G	B	B	B	110	105	100	100	100	100	100	100
21	100	100	100	100	E	105	110	105	110	105	100	100	G	G	G	G	B	100	100	100	100	100	100	100
22	100	100	100	E	E	E	S	B	125	G	G	G	B	100	100	100	B	100	100	100	100	100	105	100
23	E	100	E	100	E	S	S	G	110	G	G	C	G	G	G	G	B	B	S	S	110	E	S	105
24	E	E	100	E	E	E	110	G	105	140	105	G	G	G	150	130	100	100	100	100	100	S	E	E
25	100	E	100	100	E	100	100	C	C	105	100	100	100	100	S	B	B	95	S	S	E	E	E	E
26	E	100	100	100	100	E	S	B	110	105	100	100	100	G	B	B	G	100	95	S	S	E	E	E
27	E	E	E	E	E	E	B	B	145	G	G	100	S	S	100	S	100	100	100	S	E	E	S	E
28	100	100	100	100	E	100	100	B	G	S	110	C	G	G	100	G	B	S	100	100	125	100	125	100
29	105	E	E	E	E	E	S	S	G	G	145	G	100	100	B	G	B	S	S	105	100	E	E	E
30	E	E	E	E	E	E	S	B	105	110	110	G	105	S	S	S	B	B	S	S	S	95	S	S
31	110	S	S	S	S	S	100	S	175	G	G	110	B	100	G	G	B	B	E	E	E	E	E	E
No.	15	15	12	11	5	7	9	3	16	15	23	15	17	14	17	12	13	18	18	18	19	13	10	14
Median	100	100	100	100	100	100	100	105	110	110	105	100	100	105	105	100	100	100	100	100	100	100	100	100
U.Q.																								
L.Q.																								
Q.R.																								

h'Es

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

K 11

IONOSPHERIC DATA

Dec. 1963 | Types of Es | 135° E Mean Time (G.M.T. +9h) | Kokubunji Tokyo | Lat. 35° 42.4'N, Long. 139° 29.3'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									1		1				1	1								f
2											1		1		h	h	h2	12	f	f	f2			
3							h	h	h1				1	h	h				f	f				
4		f		f2		f2	1			1	1	1	1	h										
5											h	1	h	h	h									
6												1		1	h1	h	h	1	f2	f2	f2	f2		
7			f								1	c			1	1		1		f2	f3	f2	f	f
8	f2	f	f2								c		1						f	f	f			
9	f2	f2	f	f	f				1	1	1	1	1	1	1	1	1	12	f2	f	f	f2		
10	f	f2	f							h	h		1						f	f		f2		
11	f	f2							1	1	1		1	1				12	f	f2	f2		f	f
12		f		f						1	1	1	12	12	1	1	1	12	f	f2	f2		f2	f2
13	f2	f3	f2	f2	f2	f			1			1	1	1	12	1	1							
14											12		1		1	12	1	13	f	f3	f4	f2	f2	f
15					f2					h	h		c	1	1	12	12	1						
16									h	h	h	c	c	1	1	1	1	1		f2	f2	f		f
17	f								1	12	1	1			1		1				f			f2
18	f	f2				f2					1						13	14	f2	f2	f3	f4	f2	f3
19	f2	f2	f	f	f2	f2	12			12	1	1						1	f		f2	f2	f3	f
20	f	f		f			1	1	1	1							1	13	f2	f2	f2	f2	f3	f2
21	f2	f3	f2	f2		f4	12	12	1	1	1	1						1	f	f	f	f2	f	f
22	f3	f3	f						h					1	1	12		12	f	f2	f	f	f	f
23		f		f					1												f			f
24			f				1		1	h	1				h	h	1	1	f2	f	f			
25	f2		f2	f		f	1			1	1	1	1	1				1						
26		f	f	f	f				1h	1	1	1	1					12	f					
27									h			1			1		12	12	f					
28	f	f	f	f		f	1				1				1				f2	f	ff	f2	ff2	f2
29	f										h		1	1						f	f2			
30									1	1	1		1									f		
31	f						1		h			1		1										
No.																								
Median																								
U.Q.																								
L.Q.																								
Q.R.																								

Types of Es

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

K12

IONOSPHERIC DATA

Dec. 1963 | hpF2 | 135° E Mean Time (G.M.T. +9h) | Kokubunji Tokyo | Lat. 35° 42.4'N | Long. 139° 29.3'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	340	J250S	J345R	305	300	330	305	250	220	250	250	I245S	250R	250	250	230	J230R	240	280	260	300	255	F	I340F
2	I350F	310F	310F	I280F	240	260	300S	245	245	J240R	250	260	250	250	255	225	205	I300A	295	285	260	255	300	300S
3	345	330	330	290	270	290	260	J245S	240	J290R	270	260	255	300	I250R	220S	225	230	260S	260	I240S	310	350	350
4	350	I335A	315	305	250	I310A	270	230R	245	305R	250R	250	250	255R	250S	J220S	225	265	290S	265	I240S	250	360	325
5	345	350	345	365S	C	C	C	C	C	260	260	C	C	C	C	C	C	C	C	C	C	C	C	C
6	C	C	C	300	220	S	255	240	225	260	265	230	250	250	250	260S	J240R	230	250S	250	300	285	290S	I330F
7	U305S	345	300	270S	300	260	260S	J240S	230	240	265S	250R	250	250	J300R	225R	225	250S	275	310	I290A	250	300	355
8	U330S	330	300	320	300	U315S	295	225	250	235	245S	210	295	250	280	230	220R	255S	320	270S	260	295	U260S	350
9	305	320	325	305	260	310	280	230S	250	250	270	225S	250	250	J260S	260	220	260	280	295	250	I305A	355	355S
10	345	345	300	300	310	320S	310	220S	I235C	240	255	230	255	240	250	250	230S	250	295	300	260	S	I330F	340
11	300	350	320	305S	J290F	300	290	J225R	240	220R	230	220	U240R	J240R	245S	260	J220R	300	305	290	255S	250	340	I330A
12	340	340	305	300	300	330	300	230	230	230	245	J245R	240	A	290	250	210	I250A	290	280	250	300	350	340
13	A	350	305	315	290	275	250	250S	230	230	305	280	250	250	260	230	220	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	240	260	260	250	245R	260	250R	220	I245A	245	A	A	I300A	395	340
15	360	360	330	290	300	285	300	250	245	300	J240S	255	270S	255	290	250S	A	280	250S	280	300	270	305	300
16	350F	390F	I340F	330	U230S	S	250	245	245	270	260	250	250	290	290	250	250	230	260	J250S	220	270	310	320
17	340	335	300S	U305S	325	280	250	250S	245	270	255	250	250	260	260	250	250	265S	250	250	260	S	300	F
18	390F	F	F	330	300	320	270	J250S	220	245	285	235	270	250	250	J245R	I240A	I245A	250	A	A	A	310	I355A
19	I350F	I330F	300	300	280	300F	250	210	220R	240R	295	J220S	255	245	S	240	230	260	260	220	I250A	280S	I320A	360
20	310S	345	320	300	300	305	270	210	225	260	255	250	240	255	270	255	250	J260S	I300A	J250S	270S	I280A	I305A	I310A
21	I310A	I310A	340	330	350	300	280	250	245	250F	230	260	250	250	275	250	230R	280S	260	I250F	245	I300A	350	F
22	A	A	390F	315	290F	325F	300F	240	220	250	260	250	220	260	RH	260	245	280S	260	250S	245	380	340	320
23	350	340	305	290	260	310	395F	260	225	250	250	I250C	250S	230	255	255	245	290	260	250	250	300V	330	300
24	305	350	310	330	320	290	295	230	250	250	250	250	230	285	250	245	230	250	260	280	280	310	380F	F
25	F	F	305	F	F	F	F	C	C	230	290	245	250	J245R	270	245	230	250	290	310	265	290	F	F
26	F	330	I340A	320	290	290	240	250	220	240	250	I250A	250	255	I250R	260	J230S	I260A	260	I260S	250	345	F	F
27	320F	F	F	F	F	I260F	250F	220S	225	255	I250R	255R	250	U280R	255R	I245R	245S	265S	360	300	290	J290S	I320S	F
28	F	320F	I300F	I295F	290F	I300F	305F	U250F	245	260	I280R	I270C	I270R	J250R	250S	255	220S	240	280	I295A	300	290	360	I330F
29	325F	I350F	345F	310	250	305	255S	250	230	I270C	I280R	J255R	230	J300R	235	250R	240S	250S	I280S	300S	275	310	375F	350
30	355F	355F	255	330	295	330	295S	J230S	230	255	U255S	260S	265	230S	245R	250	245	275S	255	275	225	315	350	U345S
31	305	355	350S	345S	350	295	U255S	255	250	250S	260	260	250S	250	230	J250R	235	240	310	270S	270	310	320	310
No.	24	25	27	28	27	26	28	28	28	31	31	30	30	29	28	30	29	29	29	27	27	26	26	23
Median	340	340	315	305	290	300	275	240	230	250	255	250	250	250	255	250	230	255	275	270	260	290	330	340
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

hpF2

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

K 13

IONOSPHERIC DATA

Dec. 1963 | ypF2 | 135° E Mean Time (G.M.T. +9h) | Kokubunji Tokyo | Lat. 35° 42.4'N. Long. 139° 29.3'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	55	J 60S	J 60R	75	55	65	65	45	75	45	40	I 40S	20R	50	45	40	J 55R	55	65	50	50	55	F	I 55F
2	I 65F	85F	85F	I 60F	55	85	55S	35	40	J 55R	45	45	45	55	45	45	45	I 60A	60	60	45	60	60	50S
3	60	65	65	50	70	50	50	J 60S	55	J 40R	25	50	45	45	I 50R	35S	55	65	60S	45	I 60S	90	60	50
4	60	I 60A	75	55	55	I 85A	70	65R	45	75R	45R	40	45	40R	45S	J 60S	70	55	55S	45	I 50S	45	70	70
5	55	95	55	55S	C	C	C	C	C	50	45	C	C	C	C	C	C	C	C	C	C	C	C	C
6	C	C	C	50	45	S	55	55	65	55	75	35	45	50	55	50S	J 60R	65	45S	50	55	60	55S	I 50F
7	U 65S	55	55	50S	45	50	45S	J 50S	60	50	35S	50R	55	45	J 40R	45R	70	45S	65	85	I 60A	55	55	90
8	U 65S	60	55	75	55	U 75S	60	55	60	50	50S	35	50	55	65	65	75R	45S	80	50S	35	55	U 60S	50
9	85	75	55	90	45	85	40	65S	20	50	45	40S	45	40	J 50S	55	50	60	65	55	50	I 60A	75	90S
10	50	50	50	60	80	70S	85	50S	I 35C	40	55	40	45	40	45	45	40S	60	60	60	55	S	I 85F	65
11	50	50	75	45S	J 55F	55	60	J 65R	50	40R	65	50	U 55R	J 55R	55S	40	J 60R	95	85	60	55S	50	65	I 75A
12	60	60	60	55	50	70	50	40	35	50	25	J 50R	55	A	70	55	50	I 55A	65	65	60	55	70	65
13	A	50	55	65	55	35	55	50S	40	50	50	50	45	45	50	50	70	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	60	50	50	50	55R	50	50R	50	I 55A	55	A	A	I 50A	60	65
15	80	85	70	65	100	60	100	50	35	45	J 30S	45	35S	45	60	45S	A	75	45S	60	65	50	90	55
16	50F	55F	I 60F	70	U 70S	S	50	50	65	55	40	50	50	65	40	30	50	65	60	J 55S	70	75	95	75
17	65	60	40S	U 55S	70	60	55	55S	45	40	45	20	50	40	50	45	45	55S	50	60	45	S	50	F
18	65	F	F	70	50	80	45	J 65S	30	55	45	25	40	50	45	J 50R	I 50A	I 50A	50	A	A	A	80	I 70A
19	I 75F	I 90F	60	50	65	50F	60	70	35R	55R	60	J 35S	45	50	S	40	65	45	45	35	I 60A	60S	I 55A	70
20	85S	60	75	55	60	90	40	40	70	70	40	30	40	45	55	45	50	J 60S	I 60A	J 55S	70S	I 70A	I 80A	I 60A
21	I 65A	I 65A	65	65	55	50	45	50	35	50F	40	40	45	50	80	45	50R	60S	60	I 50F	55	I 50A	50	F
22	A	A	60F	75	55F	55F	50F	60	40	25	60	45	45	60	R	50	50	65S	85	55S	55	65	60	75
23	50	60	45	55	45	65	55F	60	40	55	50	I 50C	50S	45	50	45	50	60	60	55	60	55V	75	50
24	55	65	90	70	80	55	60	65	45	55	45	55	40	30	45	30	65	65	65	70	70	70	65F	F
25	F	F	45	F	F	F	F	C	C	65	35	40	45	J 50R	55	50	65	55	60	85	50	70	F	F
26	F	65	I 70A	75	55	60	60	50	75	55	45	I 40A	50	45	I 45R	65	J 65S	I 70A	50	I 55S	60	60	F	F
27	75F	F	F	F	F	I 75F	55F	50S	35	45	I 50R	40R	45	U 30R	45R	I 30R	55S	45S	85	45	60	J 55S	I 55S	F
28	F	75F	I 55F	I 55F	55F	I 50F	45F	U 50F	50	45	I 60R	I 50C	I 25R	J 45R	50S	45	75S	60	55	I 50A	50	60	85	I 65F
29	75F	I 55F	60F	90	50	50	55S	55	40	I 45C	I 45R	J 55R	50	J 60R	40	55R	60S	55S	I 70S	55S	65	90	50F	75
30	55F	45F	50	75	50	70	55S	J 70S	35	50	U 80S	70S	80	105S	85R	85	75	70S	80	80	90	95	75	U 85S
31	80	90	85S	80S	95	75	U 90S	85	80	50S	55	40	45S	45	35	J 55R	40	60	70	60S	75	45	80	85
No.	24	25	27	28	27	26	28	28	28	31	31	30	30	29	28	30	29	29	29	27	27	26	26	23
Median	65	60	60	60	55	60	55	55	40	50	45	40	45	45	50	45	55	60	60	55	60	60	65	65
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

ypF2

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

K 14

IONOSPHERIC DATA

Dec. 1963 | **foF2** | 135° E Mean Time (G.M.T. +9h) | **Yamagawa** | Lat. 31°12.5' N, Long. 130°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	3.0	F	F	F	2.7	F	F	$J_{4.8}^{S}$	$J_{5.2}^{S}$	5.9	6.7^{S}	$J_{6.3}^{S}$	$I_{6.8}^{S}$	$I_{6.6}^{S}$	6.1	6.5	6.5^{SH}	5.5	$J_{4.3}^{S}$	3.0	3.1	$I_{2.8}^{A}$	2.2	2.3
2	$J_{2.6}^{S}$	2.7	2.9	2.7	3.1	2.1	2.1	3.7	5.5^{H}	6.6	6.2^{S}	$J_{7.4}^{S}$	6.8^{S}	6.2	$I_{6.8}^{S}$	$I_{6.5}^{S}$	6.3^{SH}	5.5^{H}	$I_{3.8}^{S}$	$I_{3.9}^{S}$	$J_{4.8}^{S}$	2.9	2.7	2.6
3	2.9	2.9	2.9	3.2	$J_{4.1}^{S}$	2.6	C	C	$J_{5.5}^{S}$	$J_{7.9}^{S}$	$J_{8.9}^{S}$	$I_{7.8}^{S}$	$I_{7.0}^{S}$	$I_{6.1}^{S}$	$I_{6.5}^{S}$	$J_{5.5}^{S}$	$I_{5.3}^{C}$	$J_{5.2}^{S}$	4.2	$I_{3.9}^{S}$	$I_{3.9}^{S}$	2.7	$J_{2.7}^{S}$	2.7
4	2.8^{S}	3.1	3.3	3.2	3.0	2.8	2.7	3.9^{S}	5.0	6.0	$J_{7.9}^{S}$	$J_{8.4}^{S}$	$J_{7.9}^{S}$	6.8	7.1	$I_{6.2}^{S}$	5.4	4.2	3.7	3.6	3.1	3.0	2.4^{S}	2.5
5	2.7	3.1	$I_{3.3}^{S}$	$I_{3.2}^{S}$	3.0^{S}	3.6^{S}	$I_{2.2}^{S}$	3.6	5.5^{H}	$J_{6.4}^{SH}$	$J_{8.0}^{S}$	6.3	5.8	$I_{6.4}^{S}$	6.7	C	C	C	3.9^{S}	$I_{3.3}^{S}$	3.5	2.9^{S}	2.7	C
6	C	C	C	C	C	C	C	C	C	C	$J_{6.9}^{S}$	$I_{7.0}^{S}$	$I_{6.9}^{S}$	6.7^{S}	$I_{6.7}^{S}$	$I_{6.9}^{S}$	5.8^{SH}	5.8	3.4	3.0	3.2	3.3	$J_{2.8}^{S}$	$I_{2.8}^{S}$
7	3.2	3.2	3.4^{S}	3.4^{S}	$I_{3.5}^{S}$	$I_{3.6}^{S}$	2.8	$I_{4.0}^{S}$	5.7	5.8	7.0^{S}	$J_{7.9}^{S}$	$I_{8.4}^{C}$	$I_{7.0}^{C}$	C	C	C	5.3	4.6	$I_{3.8}^{S}$	$I_{3.5}^{S}$	3.3	$I_{3.4}^{S}$	2.8
8	2.7	2.9	$I_{3.1}^{S}$	$J_{3.2}^{S}$	3.1	$J_{3.2}^{S}$	3.1	$I_{4.5}^{S}$	$J_{5.3}^{S}$	$I_{6.8}^{S}$	6.4	6.9	6.2^{S}	6.5^{S}	7.1^{S}	$I_{7.1}^{S}$	$I_{6.8}^{S}$	$J_{6.4}^{S}$	$J_{5.3}^{S}$	3.6^{S}	$J_{4.6}^{S}$	$J_{4.1}^{S}$	2.2	2.2
9	$J_{2.5}^{S}$	2.9^{S}	2.8	3.0	$I_{3.4}^{S}$	2.7	2.8	$I_{4.2}^{S}$	$I_{6.6}^{S}$	$J_{8.1}^{S}$	$I_{7.0}^{S}$	$J_{7.5}^{S}$	$I_{6.8}^{S}$	6.1^{S}	6.9^{S}	$I_{6.8}^{S}$	5.7	$J_{5.1}^{S}$	3.7	3.0	$J_{3.5}^{S}$	$J_{2.9}^{S}$	$I_{2.3}^{A}$	2.7^{S}
10	2.7	$J_{2.7}^{S}$	3.0	$I_{3.4}^{S}$	3.6^{S}	$J_{2.6}^{S}$	2.3^{S}	3.4^{S}	$I_{6.3}^{S}$	$I_{7.2}^{S}$	$J_{6.5}^{S}$	7.4^{S}	$J_{10.0}^{S}$	$J_{8.2}^{S}$	6.7	6.5	$I_{6.8}^{S}$	5.8	$I_{3.9}^{S}$	3.3	3.6	2.4	$I_{2.7}^{A}$	$I_{2.4}^{A}$
11	$I_{2.8}^{A}$	3.1	2.6	2.8	2.9	$I_{2.7}^{S}$	$J_{2.6}^{S}$	$I_{3.8}^{S}$	$J_{5.3}^{S}$	$I_{6.8}^{S}$	$J_{6.3}^{S}$	$J_{6.3}^{S}$	5.9	$J_{6.3}^{S}$	6.1^{S}	6.3	$J_{8.3}^{S}$	4.8^{S}	3.2	$J_{4.5}^{S}$	5.6^{S}	3.5^{S}	2.7	2.2
12	2.5	2.7	2.9^{S}	2.9^{S}	$I_{2.8}^{S}$	$I_{2.7}^{S}$	2.6^{S}	$I_{3.8}^{S}$	$J_{6.1}^{S}$	$I_{5.8}^{S}$	6.5^{S}	$U_{6.4H}^{S}$	$I_{6.7}^{S}$	6.4	$I_{6.3}^{S}$	5.9^{V}	6.4	$J_{5.5}^{S}$	$I_{3.4}^{A}$	$I_{3.1}^{A}$	$I_{3.2}^{A}$	$I_{3.1}^{A}$	A	C
13	C	2.8	$J_{2.9}^{S}$	$I_{3.0}^{C}$	3.4^{S}	$I_{2.8}^{S}$	2.1	3.5	5.7	5.2	5.5	6.3^{S}	S	S	5.6	$I_{6.9}^{S}$	6.7^{S}	4.2	$J_{4.9}^{S}$	$J_{6.5}^{S}$	3.5^{S}	$I_{3.1}^{S}$	A	A
14	A	2.8	3.1	$J_{3.2}^{S}$	$I_{3.0}^{S}$	$I_{2.4}^{S}$	2.3	$I_{3.9}^{S}$	5.7	5.6	6.0	$I_{7.7}^{S}$	$I_{7.6}^{S}$	$I_{6.2}^{S}$	$I_{6.2}^{S}$	$I_{6.6}^{S}$	5.9^{S}	$J_{4.6H}^{S}$	$U_{3.3}^{S}$	S	A	2.8	$J_{2.4}^{S}$	2.6^{S}
15	$^{2}2.6^{S}$	S	S	S	2.0	1.9	2.2	$I_{3.8}^{S}$	$J_{6.2H}^{S}$	6.2^{S}	$J_{7.8}^{S}$	$J_{8.0}^{S}$	8.3	$J_{10.1}^{S}$	$J_{8.0}^{S}$	$J_{7.8}^{S}$	$I_{7.0}^{S}$	$I_{6.1}^{S}$	3.7	3.1	2.9	2.8	$J_{2.6}^{S}$	2.6^{S}
16	2.7	$J_{2.8}^{S}$	2.8	$I_{3.3}^{S}$	$I_{3.7}^{S}$	2.3	2.1	3.2	5.6^{S}	5.8	6.3^{S}	$J_{7.9}^{S}$	$J_{8.3}^{S}$	$I_{7.6}^{S}$	$I_{6.5}^{S}$	6.0^{S}	6.5^{H}	$J_{5.4}^{S}$	4.0^{S}	3.0^{S}	2.9	2.3	2.4	$I_{2.5}^{S}$
17	2.7	2.7	2.8	2.9	$J_{3.0}^{S}$	2.5^{S}	2.7	3.6^{S}	5.8	5.5	$I_{6.5}^{S}$	$J_{7.8}^{S}$	7.5^{S}	9.1^{S}	$J_{8.4}^{S}$	6.0	5.4	5.5	$I_{4.0}^{C}$	2.7	$I_{3.0}^{S}$	2.7	$I_{2.3}^{S}$	2.4
18	2.5	2.4	2.5	2.7	2.7	2.5	2.5^{S}	$I_{3.7}^{S}$	$J_{5.4H}^{S}$	5.8_{H}^{S}	5.3	6.0	6.4	5.8	5.9	5.9	6.0	5.6	$J_{4.1}^{S}$	$I_{4.0}^{S}$	3.3	2.2	$I_{2.4}^{A}$	$J_{2.7}^{S}$
19	2.5	$I_{2.6}^{A}$	$I_{2.6}^{A}$	2.8	3.1	2.9	$I_{2.4}^{A}$	3.0	$J_{4.5}^{S}$	5.1^{H}	5.3^{H}	$J_{8.4}^{S}$	8.3	$J_{8.0}^{S}$	6.7	6.2^{S}	5.2	4.4	3.6	3.6	3.2^{S}	$J_{2.6}^{S}$	F	2.5^{S}
20	$I_{2.5}^{S}$	F	2.7	2.7	3.2	2.3^{S}	2.5	$J_{3.8}^{S}$	4.9	5.2	5.4	8.3	$J_{8.4}^{S}$	$I_{6.1}^{S}$	5.8	$I_{6.5}^{S}$	$J_{6.6}^{S}$	5.4	$J_{4.8}^{S}$	$I_{4.7}^{S}$	3.9	2.7	$I_{2.5}^{A}$	2.4
21	$I_{2.6}^{S}$	2.9	$I_{3.0}^{S}$	$I_{3.1}^{S}$	$J_{2.6}^{S}$	3.1	3.0	4.1^{S}	$J_{5.5}^{S}$	$I_{6.4H}^{S}$	$I_{7.9}^{S}$	6.6	$I_{7.4}^{S}$	$I_{6.5}^{S}$	6.2	$J_{6.2}^{S}$	6.1^{S}	5.7	$I_{4.5}^{A}$	5.1^{S}	3.1	2.3	S	A
22	A	2.3	$I_{2.4}^{A}$	F	$I_{2.7}^{A}$	2.4	F	$I_{3.6}^{S}$	$J_{5.0}^{S}$	5.3^{S}	$I_{6.9}^{S}$	$J_{6.4}^{S}$	$I_{7.0}^{S}$	6.6^{S}	$I_{7.0}^{S}$	$I_{6.1}^{S}$	8.3^{S}	$J_{6.4}^{S}$	$I_{3.9}^{A}$	$J_{4.0}^{S}$	2.9	2.3	2.1	2.2
23	2.6^{S}	2.6^{S}	3.0	2.7	2.6	2.5	2.4	3.5^{S}	$J_{6.1}^{S}$	5.5^{H}	6.8^{S}	$I_{8.0}^{S}$	$J_{7.8}^{S}$	6.7	5.4	5.5^{H}	7.0^{S}	5.8^{S}	4.2	4.2^{S}	3.6	$I_{3.3}^{S}$	2.2	$I_{2.0}^{S}$
24	$I_{2.0}^{S}$	$I_{2.2}^{A}$	2.3	2.5	2.3	2.4	2.1	2.8	4.6	5.3^{H}	6.3^{S}	7.0^{S}	$J_{6.5}^{S}$	5.7	6.5	6.1^{S}	5.2	4.9	3.5	3.1	3.4	3.4	2.1	2.5
25	2.7	2.7	2.5^{S}	F	2.3	2.1	2.2^{S}	3.0	4.8^{S}	5.5^{H}	6.0	$J_{6.2}^{S}$	$I_{6.4}^{S}$	6.4	6.3	7.1	$U_{6.7}^{S}$	4.5	$I_{3.4}^{S}$	2.8	3.6	$I_{3.0}^{S}$	2.1	$J_{2.5}^{S}$
26	$I_{2.4}^{S}$	$I_{2.5}^{S}$	2.6^{S}	2.7	3.1	2.5	2.1	3.0	4.5^{S}	4.6	6.0	5.2	6.3^{S}	6.2	$J_{6.5}^{S}$	6.6	5.7	4.4	2.7^{H}	2.9	3.1	2.4	2.2	2.5
27	$I_{2.5}^{S}$	2.5	2.6	2.6	$J_{3.4}^{S}$	2.0	1.7	2.8	5.3^{S}	$J_{5.2H}^{S}$	$J_{5.1}^{S}$	$J_{6.5}^{S}$	5.9	$J_{6.2}^{S}$	6.1^{S}	5.6	5.1	4.6	3.5	3.2	3.9^{S}	3.9	3.0	2.3
28	2.5	$I_{2.9}^{S}$	2.9	2.8	2.5	$J_{1.5}^{S}$	$J_{1.8}^{S}$	2.7	$J_{4.8}^{S}$	$J_{5.2}^{S}$	$J_{6.2}^{S}$	4.9	6.0	$J_{6.2}^{S}$	5.7	5.5	6.0	4.9	2.7	3.0	2.8	3.2	3.1^{S}	2.1
29	2.5	2.6	$J_{2.6}^{S}$	2.8	3.4	3.1	2.3	2.9	$J_{4.3H}^{S}$	4.7	4.6	5.4	6.8^{S}	5.7	$I_{6.5}^{S}$	5.7	4.7	$I_{4.6}^{S}$	3.4	2.7	$I_{3.2}^{S}$	$I_{3.5}^{S}$	2.4	2.3
30	2.4	2.5	2.7	2.8	2.6	2.0	2.0	3.0	5.6^{S}	$J_{5.0}^{S}$	5.7^{H}	$I_{6.5}^{S}$	$J_{7.6}^{S}$	5.8	5.7	5.1	6.5	5.2^{S}	3.2	3.5	2.7	2.6	2.4	2.5
31	2.6	$I_{2.8}^{S}$	F	2.9	$I_{3.6}^{S}$	2.1	$I_{2.0}^{A}$	$J_{2.6}^{S}$	$J_{4.8}^{S}$	5.5	4.7	5.5	$J_{7.5}^{S}$	6.8^{S}	6.4	5.6	5.9^{H}	$J_{6.1}^{S}$	3.8	2.9	$I_{3.4}^{S}$	3.1	2.5	2.4
No.	27	27	27	26	30	29	27	29	30	30	31	31	30	30	30	29	29	30	31	30	30	31	27	27
Median	2.6	2.7	2.8	2.9	3.0	2.5	2.3	3.6	5.4	5.7	6.3	6.9	7.0	6.4	6.5	6.2	6.1	5.4	3.8	3.3	3.4	2.9	2.4	2.5
U.Q.	2.7	2.9	3.0	3.2	3.4	2.8	2.6	3.8	5.7	6.4	6.9	7.8	7.8	6.8	6.7	6.6	6.7	5.7	4.2	3.9	3.6	3.3	2.7	2.6
L.Q.	2.5	2.6	2.6	2.7	2.7	2.2	2.1	3.0	4.9	5.2	5.7	6.3	6.4	6.2	6.1	5.8	5.6	4.6	3.4	3.0	3.1	2.6	2.2	2.3
Q.R.	0.2	0.3	0.4	0.5	0.7	0.6	0.5	0.8	0.8	1.2	1.2	1.5	1.4	0.6	0.6	0.8	1.1	1.1	0.8	0.9	0.5	0.7	0.5	0.3

The Radio Research Laboratories, Japan

foF2

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

Y 1

IONOSPHERIC DATA

Dec. 1963 | foF1 | 135° E Mean Time (G.M.T. +9h) | Yamagawa | Lat. 31°12.5' N, Long. 130°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											L	L	L	4.3	3.9	L								
2										L	L	4.0	L	4.4^{H}	4.1	L								
3										L	4.3^{L}	L	4.4	3.9	A									
4											L	$I_{4.3}{}^{L}$	4.1	4.2	$I_{4.1}{}^{A}$	$I_{3.6}{}^{L}$	2.2							
5											L	L	L^{H}	L	L	C	C	C						
6									C	C	L	L	$I_{4.2}{}^{L}$	4.5	L	L								
7											L	L	C	$I_{4.2}{}^{C}$	C	C	C							
8										L	L	$I_{4.2}{}^{L}$	L	4.2	L	L	2.8							
9										L	L	4.2	$I_{4.3}{}^{L}$	L	L	L								
10										L	$I_{4.1}{}^{L}$	4.5^{H}	4.4^{H}	$I_{4.3}{}^{L}$	L^{H}	L^{H}								
11										L	L	L	$I_{4.3}{}^{L}$	L	L	L								
12											4.0	L	$I_{4.3}{}^{L}$	$I_{4.2}{}^{LH}$	4.3									
13												L	L^{H}	L	L	R								
14											L	L	L	L	L	L								
15										L	L^{H}	L	L	L	L	A	A							
16											L	L^{H}	L	L	L	L								
17											L	L	L	L	L	L								
18											4.0	L	$I_{4.3}{}^{L}$	L	L	L								
19												4.4	L	$I_{4.4}{}^{L}$	4.1	L	L							
20											L	L	L	L		A								
21											L	4.2	$I_{4.2}{}^{L}$	A	A									
22											L	L^{H}	$I_{4.2}{}^{L}$	$I_{4.3}{}^{R}$	L	L								
23											L^{H}	4.1	L	L	L									
24											4.0	$I_{4.1}{}^{L}$	4.1	L	L	L	L							
25											L	4.3^{L}	$I_{4.2}{}^{A}$	$I_{4.2}{}^{A}$	L	A	L							
26												4.2	4.0	L	4.1	$I_{3.6}{}^{L}$	L							
27											4.0	$I_{4.2}{}^{L}_{H}$	L	4.2	$I_{3.9}{}^{L}$	3.6	L							
28											4.0	4.1	L	$I_{4.3}{}^{L}$	4.0	L	L							
29												4.0	L	L	L	3.5	2.8							
30												3.9		4.2	L									
31											L	$I_{4.1}{}^{L}$	$I_{4.2}{}^{L}_{H}$	$I_{4.2}{}^{L}$	L	L								
No.											7	16	14	16	8	4	3							
Median											4.0	4.2	$U_{4.2}$	$U_{4.2}$	4.1	$U_{3.6}$	2.8							
U.Q.																								
L.Q.																								
Q.R.																								

foF1

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

Y 2

IONOSPHERIC DATA

Dec. 1963 | foE | 135° E Mean Time (G.M.T. +9h) | Yamagawa | Lat. 31°12.5' N, Long. 130°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								S	2.10	2.65^{H}	$I_{2.90}^{A}$	$I_{3.00}^{A}$	3.10	$I_{3.20}^{R}$	3.00	2.50	2.15	S						
2								S	2.05	2.70	3.00	3.00	3.10	3.10^{H}	3.00	2.60	2.15	S						
3								C	2.00	2.70	2.85	3.00	3.10	3.10	2.95	2.30^{H}	$I_{2.05}^{C}$	S						
4								S	1.90	2.50	2.85	3.00	3.05	3.00	$I_{2.80}^{A}$	$I_{2.60}^{A}$	2.00	S						
5								S	1.95^{H}	2.40	2.70^{H}	2.85^{S}	2.95	3.00	2.80	C	C	C						
6								C	C	C	2.70^{H}	2.90	3.00	3.00	$I_{2.85}^{A}$	$I_{2.65}^{A}$	2.15	S						
7								S	1.80	2.40	2.75	3.05	$I_{3.00}^{C}$	$I_{3.10}^{C}$	C	C	C	S						
8								S	2.00	2.60	2.75	2.90	2.95	$I_{3.00}^{A}$	$I_{2.85}^{A}$	2.70	2.30	S						
9								S	2.10	2.50	A	A	3.10	3.10	2.85	2.60	2.15	S						
10								S	1.90	2.70^{H}	2.90	$I_{2.90}^{A}$	$I_{3.00}^{A}$	3.00	2.90	2.70	2.20	S						
11								S	1.95	2.60	2.70	3.00	3.00	2.95	2.65	$I_{2.40}^{A}$	2.10	S						
12								S	$I_{1.95}^{A}$	2.30	$I_{2.75}^{A}$	3.05	$I_{3.05}^{A}$	3.00	2.80	A	A	S						
13								S	1.90	2.60	3.00	2.95	3.00	3.05	2.90	2.60	2.10	S						
14								S	1.90	$I_{2.50}^{A}$	2.90	3.00	3.05	3.05	2.90	2.65	2.40	S						
15								S	S	2.50	2.80	2.70	3.00	A	A	A	A	S						
16								S	2.05	2.60^{H}	2.85	2.95	2.95	2.75	2.80	2.65	2.25	S						
17								S	1.95	$I_{2.45}^{A}$	$I_{2.85}^{A}$	3.10	3.10	3.00	2.90	A	A	S						
18								S	2.00	$I_{2.55}^{A}$	2.80	2.90	3.05	3.00	3.00	2.70	A	S						
19								S	A	$I_{2.50}^{A}$	2.85	3.05	R	A	A	A	A	S						
20								S	A	2.60	2.80	2.95	A	A	2.90	A	A	S						
21								S	A	A	A	A	A	A	A	2.70	2.30	S						
22								S	1.90	2.50	$I_{2.85}^{A}$	3.00	3.10	A	A	A	A	S						
23								S	S	$I_{2.45}^{A}$	2.80	3.00	3.10	3.05	2.90	$I_{2.65}^{A}$	2.20	S						
24								S	2.15	2.60	2.85	3.00	3.10	A	A	A	2.10	S						
25								S	1.95	2.50	2.70	$I_{2.80}^{A}$	A	A	A	$I_{2.70}^{A}$	A	S						
26								S	S	2.40	2.80^{R}	A	A	3.00	2.95	2.65	2.20	S						
27								S	2.05	2.50^{H}	2.80	$I_{2.75}^{A}$	3.00	3.05	2.95	2.60	$I_{2.20}^{A}$	S						
28								S	1.90	2.50	2.75	2.90	2.85	2.80	2.70	2.65	2.35	S						
29								S	S	2.30^{H}	2.55	2.70	2.90^{H}	3.00	2.90^{H}	2.60	2.30	S						
30								S	1.80	2.40	A	A	A	$I_{3.00}^{A}$	$I_{2.80}^{A}$	2.60	2.25	S						
31								S	S	2.40	2.60	$I_{2.90}^{A}$	3.00	3.00	2.85	2.70	2.30	S						
No.									22	29	28	27	25	24	24	22	21							
Median									1.95	2.50	2.80	2.95	3.00	3.00	2.90	2.65	2.20							
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

foE

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

Y 3

IONOSPHERIC DATA

Dec. 1963 | foEs | 135° E Mean Time (G.M.T. +9h) | Yamagawa | Lat. 31°12.5' N, Long. 130°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	S	S	S	2.1	$J_{2.1}$	S	2.6	2.1	G	G	3.9	3.4	3.5	3.7	3.6	2.8	G	S	S	2.2	S	3.7	2.3	S
2	S	S	S	E	E	S	S	S	2.4	G	G	3.5	2.7^G	2.5^G	3.5	3.1	2.1^G	S	S	S	S	S	S	S
3	S	S	S	2.3	E	S	C	C	G	3.1	4.3	G	3.6	3.8	3.8	$J_{2.4}$	C	$J_{2.6}$	2.2	1.9	$J_{2.8}$	2.4^M	S	S
4	3.1^M	3.2^M	S	E	E	S	S	S	G	G	3.2	G	3.2	2.2^G	$J_{5.1}$	3.8	G	2.2	$J_{1.6}{}^S$	$J_{2.4}$	S	S	S	S
5	S	S	S	2.1^M	2.2^M	S	S	G	G	G	3.2	3.4	3.5	3.3	G	C	C	C	S	2.4	S	2.2	$J_{2.8}$	C
6	C	C	C	C	C	C	C	C	C	C	3.3	3.6	3.6	4.0	3.2	2.8	2.1^G	$J_{2.2}$	S	2.0	S	2.3^M	2.1	S
7	S	S	S	S	2.7^M	S	S	S	G	G	3.2	3.6	C	C	C	C	C	S	S	2.0	3.5^M	2.7^M	2.3	3.5^M
8	3.1^M	2.8^M	2.1	S	S	S	S	S	G	G	2.9	3.2	3.5	3.3	3.0	G	G	2.2	S	S	S	S	S	S
9	S	S	2.2^M	2.4^M	3.1^M	2.4^M	2.2^M	S	G	2.9	3.1	3.8	3.1	3.1	2.9	2.9	2.1^G	S	S	$J_{2.4}$	$J_{2.3}$	3.6^M	$D_{3.5}{}^S$	S
10	S	S	S	E	E	S	S	S	G	G	3.1	4.7^M	3.4	3.1	2.8^G	2.9	2.5	$J_{2.3}$	$J_{2.7}$	3.1^M	2.5^M	3.0^M	3.3^M	3.5^M
11	3.5^M	3.1	3.0	E	E	S	S	S	3.1	3.1	3.5	$J_{5.1}$	4.2	3.7	5.1	3.7	2.2	3.6	$J_{2.8}$	$J_{1.9}$	3.6^M	S	S	2.2
12	2.7	2.4	S	S	2.7^M	S	S	S	2.3	3.3	3.1	3.2	3.3	G	3.5	2.9	3.8^M	2.7	$J_{5.3}$	3.6^M	5.8^M	3.8^M	3.7^M	C
13	C	2.4^M	E	1.2	E	S	S	S	G	G	3.1	3.1	3.7	3.7	3.8	3.3	2.7	S	S	S	S	$J_{2.9}$	3.2	4.8^M
14	$J_{5.1}$	3.1^M	2.2^M	S	E	2.1^M	2.2	S	1.9^G	4.2	3.0	2.9^G	G	G	G	2.7	2.5	S	S	3.0^M	3.2	2.8^M	S	S
15	S	S	S	1.2	E	2.1	S	S	G	G	G	4.3	3.1	3.8	3.8	4.8	5.3^M	$J_{2.7}$	$J_{2.1}$	S	2.1	S	S	S
16	S	S	S	E	2.4^M	2.1	S	S	G	2.9	3.2	3.4	3.1	3.1	3.0	2.1^G	G	$J_{3.2}$	$J_{2.5}$	2.3	S	2.3	2.1	2.4
17	2.1	S	2.3	S	E	S	S	S	G	2.7	2.9	2.7^G	2.7^G	3.1	2.6^G	3.0	3.8	3.8	$J_{3.1}$	2.4	2.0	S	S	S
18	2.6	3.0^M	2.7^M	2.6^M	E	1.8	S	S	2.3	2.8	3.0	3.1	3.6	$J_{3.3}$	2.7^G	$J_{2.9}$	4.5	3.7	2.5	3.0	3.1^M	3.7^M	5.7^M	$J_{2.5}$
19	2.4	3.0	3.1	$J_{2.4}$	$J_{2.1}$	2.7	$J_{2.6}$	2.2	2.8	3.1	3.4	3.0^G	3.7	3.4	3.6	3.7	2.9	2.7	3.1	2.8	2.3	S	2.8^M	2.4
20	2.3	S	S	2.4^M	2.6^M	2.5^M	S	1.9	$J_{2.9}$	3.6	3.1	3.0	3.7	3.0	$J_{3.1}$	$J_{5.5}$	$J_{3.2}$	1.9	S	$J_{1.6}{}^S$	$J_{2.9}$	2.4	$J_{2.6}$	S
21	2.7	$J_{2.4}$	$J_{2.8}$	$J_{2.6}$	2.7^M	S	$J_{2.4}$	3.5^M	4.8^M	2.5	$J_{5.1}$	4.3	6.2^M	8.5^M	6.0^M	2.8	2.5	3.1^F	$J_{5.2}$	3.1	$J_{2.5}$	$J_{2.0}$	$J_{2.0}$	3.1^M
22	3.7^M	2.2^M	3.0	2.6^M	2.9	$J_{2.5}$	2.4^M	$J_{2.0}$	G	3.4	3.0	G	3.0^G	3.1	3.4	5.1	2.8	3.3	$J_{5.2}$	S	S	$J_{2.4}$	S	2.1
23	2.5	S	2.8^M	$J_{2.6}$	$J_{2.0}$	$J_{2.4}$	2.4	2.1	1.9	3.1	2.7^G	G	G	G	2.6^G	2.8	$J_{2.5}$	2.4	2.5	2.2	2.2	S	S	S
24	S	3.1	S	E	E	S	S	S	G	2.6^G	G	2.6^G	2.7^G	$J_{3.1}$	3.0	3.0	2.7	2.4	S	S	3.2	2.3	2.4^M	2.4^M
25	S	2.7^M	$J_{2.5}$	2.7^M	2.7^M	S	2.7^M	2.4	2.3	2.7	3.6	$J_{5.2}$	$J_{4.5}$	7.0^M	5.1	$J_{6.6}$	3.1	3.2	3.1	$J_{2.7}$	S	2.2	S	S
26	S	S	E	E	E	S	S	S	G	2.9	3.2	3.0	3.0	2.8^G	3.1	G	2.4	S	S	S	S	S	S	S
27	S	S	S	E	E	S	S	S	G	3.1	3.0	3.2	3.4	G	2.3^G	3.7	3.5^M	S	E	2.1	S	$J_{2.1}$	S	S
28	S	S	E	E	E	S	S	S	2.3	2.9	3.1	3.4	4.5	3.3	3.8	3.1	2.7	S	S	2.3	S	S	S	S
29	2.3^M	$J_{2.1}$	S	E	2.5^M	E	S	S	G	3.3	3.5	3.5	3.7	3.7	G	3.8	2.1^G	2.1	S	S	S	S	S	2.2
30	S	2.4^M	2.4^M	2.3^M	2.1^M	S	S	S	G	3.0	3.1	3.0	3.4	3.7	3.1	3.0	G	G	S	S	S	S	S	S
31	S	S	S	2.3^M	2.7^M	S	2.4^M	S	G	G	2.9	3.0	G	G	2.6^G	G	G	S	S	S	S	S	S	S
No.	13	14	15	25	29	10	9	8	30	30	31	31	30	30	30	29	28	20	15	21	15	18	14	11
Median	2.7	2.8	2.4	2.1	2.0	2.2	2.4	2.1	G	2.8	3.1	3.2	3.4	3.2	3.1	3.0	2.5	2.6	2.7	2.4	2.8	2.4	2.7	2.4
U.Q.	3.3	3.1	2.8	2.4	2.6	2.5	2.6	2.3	2.3	3.1	3.3	3.6	3.7	3.7	3.8	3.7	3.0	3.2	3.1	2.9	3.2	3.0	3.3	3.5
L.Q.	2.4	2.4	2.1	E	E	2.1	2.3	2.0	G	G	3.0	G	3.0	G	G	2.8	G	2.2	2.2	2.0	2.3	2.3	2.3	2.2
Q.R.	0.9	0.7	0.7			0.4	0.3	0.3			0.3		0.7			0.9		1.0	0.9	0.9	0.9	0.7	1.0	1.3

foEs

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

IONOSPHERIC DATA

Dec. 1963 | f_bE_s | 135° E Mean Time (G.M.T. +9h) | Yamagawa | Lat. 31°12.5' N, Long. 130°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	S	S	S	E	1.7	S	1.8	G			3.5	3.4	3.5	3.6	3.6	G		S	S	E	S	A	1.8	S
2	S	S	S			S	S	S	2.4			3.2	2.5^G	2.4^G	3.4	3.1	1.9^G	S	S	S	S	S	S	S
3	S	S	S	E		S	C	C		G	3.4		3.6	3.7	3.8	G	C	2.2	E	E	2.0	E	S	S
4	2.0	2.5	S			S	S	S			3.2		3.2	2.2^G	4.0	3.2		2.2	S	2.1	S	S	S	S
5	S	S	S	1.8	E	S	S				3.2	3.4	2.2	2.4		C	C	C	S	2.3	S	E	1.8	C
6	C	C	C	C	C	C	C	C	C	C	3.3	3.5	3.6	3.9	3.2	2.8	2.0^G	G	S	E	S	2.0	E	S
7	S	S	S	S	E	S	S	S			3.2	3.4	C	C	C	C	C	S	S	E	A	2.0	E	1.9
8	1.8	1.9	1.8	S	S	S	S	S			2.9	G	3.3	3.1	2.9			1.8	S	S	S	S	S	S
9	S	S	1.8	1.7	1.7	1.6	E	S		2.9	3.0	3.4	2.5	2.3	2.4	2.2	1.9^G	S	S	1.9	1.9	1.9	A	S
10	S	S	S			S	S	S			G	3.4	3.2	2.7	2.0^G	1.9	1.9	1.9	2.6	2.1	E	1.9	A	A
11	A	2.0	1.8			S	S	S	G	2.2	3.2	3.5	3.7	3.5	4.0	2.8	1.9	3.5	2.3	E	$E_{3.6}^S$	S	S	2.0
12	1.7	1.8	S	S	2.1	S	S	S	2.2	$E_{3.3}^S$	$E_{3.1}^R$	3.2	3.3		3.5	$E_{2.9}^R$	$E_{3.8}^S$	2.5	A	A	A	A	A	C
13	C	E		$E_{1.2}^S$		S	S	S			2.1	$E_{3.1}^R$	3.4	3.6	3.3	$E_{3.3}^R$	2.6	S	S	S	S	A	A	A
14	A	1.9	E	S		2.0	1.8	S	1.8^G	4.0	2.3	2.2^G				G	2.1	S	S	2.1	A	1.9	S	S
15	S	S	S	$E_{1.2}^S$		1.6	S	S				3.5	2.5	3.2	3.3	4.0	4.0	1.9	1.8	S	1.9	S	S	S
16	S	S	S		1.7	1.7	S	S		G	3.2	3.3	G	$E_{3.1}^R$	2.4	2.1^G		2.3	$E_{2.4}^A$	E	S	E	2.0	A
17	1.7	S	1.7	S		S	S	S		2.7	2.9	2.7^G	2.4^G	2.4	2.0^G	2.9	3.4	3.8	A	1.9	2.0	S	S	S
18	1.8	2.0	1.9	2.0		1.8	S	S	G	2.6	2.4	2.2	3.5	2.0	2.1^G	1.9	3.5	2.9	2.1	2.0	2.0	2.0	A	2.0
19	2.0	A	A	2.0	E	1.8	A	1.9	2.8	3.1	3.3	2.5^G	3.5	3.3	3.3	3.4	2.6	2.4	3.1	2.2	E	S	2.0	1.8
20	2.0	S	S	1.6	1.7	1.9	S	1.8	2.9	1.8	G	G	3.5	$E_{3.0}^R$	2.2	5.4	3.0	1.8	S	S	2.9	2.2	A	S
21	2.1	1.9	2.1	A	1.9	S	2.1	2.0	4.8	2.4	3.4	3.3	3.9	5.5	4.6	2.2	2.0	2.4	A	2.7	2.2	1.7	A	A
22	A	E	A	E	A	2.1	E	1.7		3.3	2.9		2.6^G	$E_{3.1}^R$	3.3	3.3	2.8	3.2	A	S	S	1.9	S	1.8
23	E	S	2.2	2.3	1.9	2.0	E	G	G	2.6	2.0^G				2.0^G	2.7	1.9	G	1.8	E	1.8	S	S	S
24	S	A	S			S	S	S		2.4^G		2.4^G	2.0^G	$E_{3.1}^R$	3.0	$E_{3.0}^R$	2.0	2.0	S	S	E	1.9	E	E
25	S	1.9	2.0	1.8	E	S	1.8	G	G	G	3.5	3.4	4.2	4.6	3.4	5.3	2.5	2.2	A	2.0	S	1.9	S	S
26	S	S				S	S	S		G	$E_{3.2}^R$	$E_{3.0}^R$	$E_{3.0}^R$	2.4^G	G		G	S	S	S	S	S	S	S
27	S	S	S			S	S	S		2.7	G	G	3.4		2.2^G	G	2.3	S		E	S	E	S	S
28	S	S				S	S	S	G	G	G	3.2	3.6	3.2	3.2	2.9	G	S	S	1.8	S	S	S	S
29	1.8	1.8	S		1.3		S	S		3.2	3.5	3.5	3.6	3.7		3.3	G	2.1	S	S	S	S	S	E
30	S	E	1.8	1.7	E	S	S	S		2.9	3.1	$E_{3.0}^R$	$E_{3.4}^R$	3.4	2.9	2.2			S	S	S	S	S	S
31	S	S	S	E	1.9	S	A	S			G	$E_{3.0}^R$			2.2^G			S	S	S	S	S	S	S
No.																								
Median																								
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

f_bE_s | Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

Y 5

IONOSPHERIC DATA

Dec. 1963 | f-min | 135° E Mean Time (G.M.T. +9h) | Yamagawa | Lat. 31°12.5' N, Long. 130°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	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	E	$E_{1.80}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	1.70	1.60	1.60	1.80	1.70	2.00	1.70	1.70	1.70	$E_{1.80}^{S}$	$E_{1.70}^{S}$	$E_{1.65}^{S}$	$E_{1.75}^{S}$	$E_{1.75}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$
2	$E_{1.80}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$	1.10	1.10	$E_{1.60}^{S}$	$E_{1.80}^{S}$	$E_{1.70}^{S}$	1.80	1.70	1.80	1.90	1.75	1.80	1.80	1.75	1.70	$E_{1.80}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.80}^{S}$	$E_{1.80}^{S}$	$E_{1.90}^{S}$
3	$E_{1.90}^{S}$	$E_{1.80}^{S}$	$E_{1.70}^{S}$	1.60	1.70	$E_{1.50}^{S}$	C	C	$E_{1.60}^{S}$	1.90	1.90	1.90	1.95	2.00	1.80	1.70	$I_{1.60}^{C}$	$E_{1.60}^{S}$	$E_{1.80}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.65}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$
4	$E_{1.65}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	1.70	1.70	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	1.70	1.65	1.70	1.90	1.85	1.65	1.70	1.70	1.70	$E_{1.75}^{S}$	$E_{1.70}^{S}$	$E_{1.65}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.80}^{S}$
5	$E_{1.60}^{S}$	$E_{1.70}^{S}$	$E_{1.65}^{S}$	E	E	$E_{1.80}^{S}$	S	$E_{1.70}^{S}$	$E_{1.60}^{S}$	1.80	1.70	1.80	1.70	1.70	1.90	C	C	C	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.60}^{S}$	$E_{1.65}^{S}$	C
6	C	C	C	C	C	C	C	C	C	C	1.70	1.80	1.75	1.85	1.80	1.70	$E_{1.60}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.60}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$
7	$E_{1.65}^{S}$	$E_{1.60}^{S}$	$E_{1.60}^{S}$	$E_{1.65}^{S}$	E	$E_{1.60}^{S}$	$E_{1.65}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$	1.70	1.70	1.65	$I_{1.90}^{C}$	$I_{1.70}^{C}$	C	C	C	$E_{1.70}^{S}$	$E_{1.90}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$
8	$E_{1.65}^{S}$	$E_{1.65}^{S}$	$E_{1.70}^{S}$	$E_{1.80}^{S}$	$E_{1.70}^{S}$	$E_{1.80}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	1.70	1.65	1.70	1.75	1.70	1.80	1.70	1.60	$E_{1.75}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.75}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$
9	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	E	E	E	$E_{1.60}^{S}$	$E_{1.80}^{S}$	1.75	1.65	1.65	1.60	1.70	1.60	2.00	1.70	$E_{1.60}^{S}$	1.80	$E_{1.60}^{S}$	$E_{1.60}^{S}$	$E_{1.65}^{S}$	$E_{1.70}^{S}$	$E_{1.65}^{S}$	$E_{1.70}^{S}$
10	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	1.70	E	$E_{1.60}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	1.60	1.60	1.65	1.60	1.70	1.80	1.60	1.60	1.70	$E_{1.65}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.65}^{S}$
11	$E_{1.65}^{S}$	$E_{1.65}^{S}$	$E_{1.70}^{S}$	1.00	E	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	1.60	1.65	1.85	1.90	1.90	1.90	1.90	1.70	$E_{1.80}^{S}$	1.65	$E_{1.60}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.80}^{S}$	$E_{1.70}^{S}$	$E_{1.80}^{S}$
12	$E_{1.60}^{S}$	$E_{1.65}^{S}$	$E_{1.80}^{S}$	$E_{1.80}^{S}$	E	$E_{1.70}^{S}$	$E_{1.80}^{S}$	$E_{1.70}^{S}$	1.60	1.70	1.70	2.00	1.80	2.00	2.20	2.00	1.90	1.90	$E_{1.80}^{C}$	$E_{1.80}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	C
13	C	$E_{1.90}^{S}$	1.50	E	1.00	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	1.70	1.80	1.70	1.75	2.05	2.20	2.05	2.10	1.80	1.80	$E_{1.65}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	$E_{1.65}^{S}$	$E_{1.60}^{S}$
14	$E_{1.65}^{S}$	$E_{1.70}^{S}$	$E_{1.80}^{S}$	$E_{1.80}^{S}$	1.20	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.60}^{S}$	1.60	1.70	1.70	1.70	2.00	1.90	1.90	1.75	1.80	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$
15	$E_{1.70}^{S}$	$E_{1.80}^{S}$	$E_{1.70}^{S}$	E	E	$E_{1.55}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	1.90	1.70	1.70	1.75	1.75	2.00	1.70	1.65	1.70	$E_{1.65}^{S}$	$E_{1.70}^{S}$	$E_{1.65}^{S}$	$E_{1.70}^{S}$	$E_{1.75}^{S}$	$E_{1.70}^{S}$	$E_{1.90}^{S}$
16	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	1.00	E	$E_{1.60}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	1.80	1.70	1.70	1.80	1.85	1.70	1.75	1.70	1.70	1.70	$E_{1.60}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.65}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$
17	$E_{1.60}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	1.70	$E_{1.80}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$	1.65	1.65	1.80	1.80	1.70	1.70	1.70	1.70	1.75	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	S	$E_{1.80}^{S}$
18	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$	E	1.70	$E_{1.60}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.75}^{S}$	1.70	1.75	1.75	1.80	1.80	1.70	1.70	1.65	$E_{1.60}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	$E_{1.65}^{S}$	$E_{1.60}^{S}$	$E_{1.60}^{S}$	$E_{1.60}^{S}$
19	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$	1.00	$E_{1.70}^{S}$	1.10	$E_{1.70}^{S}$	$E_{1.60}^{S}$	1.65	1.80	2.00	2.05	1.90	2.20	2.05	2.20	1.90	2.00	1.95	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.65}^{S}$
20	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	E	E	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	1.60	1.70	1.70	1.80	1.80	1.80	1.75	1.85	1.70	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	$E_{1.65}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$
21	$E_{1.60}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	E	E	$E_{1.60}^{S}$	$E_{1.60}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	1.70	1.75	1.90	1.90	1.80	1.80	1.80	1.70	1.70	$E_{1.65}^{S}$	$E_{1.65}^{S}$	$E_{1.60}^{S}$	$E_{1.60}^{S}$	$E_{1.85}^{S}$	$E_{1.70}^{S}$
22	$E_{1.70}^{S}$	$E_{1.90}^{S}$	$E_{1.65}^{S}$	$E_{1.60}^{S}$	E	$E_{1.60}^{S}$	$E_{1.60}^{S}$	$E_{1.60}^{S}$	1.65	1.65	1.80	1.80	2.10	2.15	2.00	1.75	1.75	1.70	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.80}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$
23	$E_{1.70}^{S}$	$E_{1.80}^{S}$	$E_{1.70}^{S}$	E	E	$E_{1.65}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$	1.60	1.70	1.80	1.90	2.00	1.90	1.80	1.75	1.70	1.80	1.70	$E_{1.80}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.80}^{S}$	S
24	S	$E_{1.70}^{S}$	$E_{1.70}^{S}$	1.85	1.80	$E_{1.65}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$	1.70	1.80	1.90	1.80	1.85	2.00	1.75	1.80	1.75	1.80	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.80}^{S}$	$E_{1.60}^{S}$	$E_{1.80}^{S}$
25	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.65}^{S}$	1.70	1.70	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	1.70	1.70	1.75	1.95	1.90	1.75	1.80	1.80	1.90	1.70	$E_{1.60}^{S}$	1.70	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$
26	$E_{1.90}^{S}$	$E_{1.85}^{S}$	1.70	1.70	1.70	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	1.80	1.70	2.00	2.00	1.85	1.90	1.90	1.90	1.85	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.80}^{S}$	$E_{1.90}^{S}$	$E_{1.80}^{S}$
27	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	1.10	1.00	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	1.80	1.80	1.75	1.70	1.80	1.90	1.85	1.80	1.80	1.90	1.80	$E_{1.60}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.90}^{S}$
28	$E_{1.80}^{S}$	$E_{1.90}^{S}$	1.10	E	1.00	$E_{1.80}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$	1.70	1.70	1.90	1.95	1.85	1.75	1.80	1.80	1.90	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.90}^{S}$	$E_{1.70}^{S}$
29	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.90}^{S}$	1.10	E	1.15	$E_{1.70}^{S}$	$E_{1.60}^{S}$	1.80	1.60	1.70	1.70	1.70	1.80	1.75	1.80	1.80	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.80}^{S}$	$E_{1.60}^{S}$	$E_{1.60}^{S}$
30	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	E	E	$E_{1.65}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	1.70	1.70	1.70	1.80	1.95	1.90	1.90	1.80	1.70	1.75	$E_{1.70}^{S}$	$E_{1.80}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.80}^{S}$
31	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	E	E	$E_{1.70}^{S}$	$E_{1.60}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	1.70	1.70	1.85	1.85	1.80	1.80	1.75	1.70	1.80	$E_{1.80}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.70}^{S}$	$E_{1.60}^{S}$
No.	28	30	30	23	28	30	28	29	27	30	31	31	31	31	30	29	27	27	31	31	31	31	30	28
Median	$E_{1.70}$	$E_{1.70}$	$E_{1.70}$	1.00	E	$E_{1.70}$	$E_{1.70}$	$E_{1.70}$	1.65	1.70	1.70	1.80	1.85	1.85	1.80	1.75	1.70	1.70	$E_{1.70}$	$E_{1.70}$	$E_{1.70}$	$E_{1.70}$	$E_{1.70}$	$E_{1.70}$
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

f-min

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

Y 6

IONOSPHERIC DATA

Dec. 1963 | M(3000)F2 | 135° E Mean Time (G.M.T. +9h) | Yamagawa | Lat. 31°12.5' N, Long. 130°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	2.85	F	F	F	3.20	F	F	$J_{3.75}^{S}$	$J_{3.65}^{S}$	3.70	3.55^{S}	$J_{3.50}^{S}$	$I_{3.30}^{S}$	$I_{3.30}^{S}$	3.40	3.40	3.30_{H}^{S}	3.45	$J_{3.70}^{S}$	3.00	3.35	$I_{3.35}^{A}$	3.20	3.00
2	$J_{2.90}^{S}$	2.95	3.10	3.00	3.55	3.80	2.95	3.40	3.65^{H}	3.55	3.70^{S}	$J_{3.40}^{S}$	3.70^{S}	3.40	$I_{3.45}^{S}$	$I_{3.65}^{S}$	3.65_{H}^{S}	3.45^{H}	$I_{3.60}^{S}$	$I_{3.25}^{S}$	$J_{3.60}^{S}$	3.50	3.00	3.10
3	2.85	3.05	2.85	3.15	$J_{3.55}^{S}$	3.10	C	C	$J_{3.25}^{S}$	$J_{3.55}^{S}$	$J_{3.50}^{S}$	$I_{3.25}^{S}$	$I_{3.40}^{S}$	3.55^{S}	$I_{3.55}^{S}$	$J_{3.65}^{S}$	$I_{3.50}^{C}$	$J_{3.45}^{S}$	3.60	$I_{3.15}^{S}$	$I_{3.35}^{S}$	3.70	$J_{2.95}^{S}$	2.75
4	2.75^{S}	2.90	3.25	3.55	3.10	3.45	3.05	3.55^{S}	3.45	3.15	$J_{3.40}^{S}$	$J_{3.50}^{S}$	$J_{3.65}^{S}$	3.50	3.65	$I_{3.50}^{S}$	3.80	3.55	3.20	3.35	3.35	3.35	3.75^{S}	2.95
5	2.95	2.90	$I_{2.85}^{S}$	$I_{2.90}^{S}$	3.35^{S}	3.70^{S}	$I_{3.70}^{S}$	3.35	3.60^{H}	$J_{3.50}^{S}$	$J_{3.50}^{S}$	3.60	3.65	$I_{3.40}^{S}$	3.15	C	C	C	3.60^{S}	$I_{3.15}^{S}$	3.55	3.45^{S}	3.45	C
6	C	C	C	C	C	C	C	C	C	C	$J_{3.55}^{S}$	$I_{3.70}^{S}$	$I_{3.65}^{S}$	3.30^{S}	$I_{3.60}^{S}$	$I_{3.40}^{S}$	3.55_{H}^{S}	3.75	3.45	3.15	3.25	3.35	$J_{3.25}^{S}$	$I_{3.10}^{S}$
7	3.15	3.15	3.05^{S}	3.25^{S}	$I_{3.25}^{S}$	$I_{3.30}^{S}$	3.55	$I_{3.80}^{S}$	3.70	3.60	3.30^{S}	$J_{3.45}^{S}$	$I_{3.55}^{C}$	$I_{3.55}^{C}$	C	C	C	3.60	3.25	$I_{3.20}^{S}$	$I_{3.30}^{S}$	3.15	$I_{3.30}^{S}$	3.35
8	2.90	3.00	$I_{3.20}^{S}$	$J_{3.15}^{S}$	3.05	$J_{3.05}^{S}$	3.30	$I_{3.60}^{S}$	$J_{3.60}^{S}$	$I_{3.75}^{S}$	3.50	3.75	3.45^{S}	3.55^{S}	3.25^{S}	$I_{3.65}^{S}$	$I_{3.55}^{S}$	$J_{3.20}^{S}$	$J_{3.75}^{S}$	3.05^{S}	$J_{3.25}^{S}$	$J_{3.65}^{S}$	3.25	2.85
9	$J_{2.95}^{S}$	3.05^{S}	3.10	3.05	$I_{3.30}^{S}$	3.10	3.05	$I_{3.40}^{S}$	$I_{3.60}^{S}$	$J_{3.80}^{S}$	$I_{3.70}^{S}$	$J_{3.75}^{S}$	$I_{3.60}^{S}$	3.50^{S}	3.45^{S}	$I_{3.60}^{S}$	3.70	$J_{3.55}^{S}$	3.65	3.00	$J_{3.25}^{S}$	$J_{3.50}^{S}$	$I_{3.05}^{A}$	3.15^{S}
10	2.80	$J_{2.95}^{S}$	3.00	$I_{3.30}^{S}$	3.50^{S}	$J_{2.90}^{S}$	2.95^{S}	3.25^{S}	$I_{3.60}^{S}$	$I_{3.75}^{S}$	$J_{3.55}^{S}$	3.15^{S}	$J_{3.60}^{S}$	$J_{3.55}^{S}$	3.60	3.55	$I_{3.65}^{S}$	3.60	$I_{3.70}^{S}$	3.25	3.45	3.25	$I_{3.35}^{A}$	$I_{3.10}^{A}$
11	$I_{3.10}^{A}$	3.05	3.35	3.05	3.25	$I_{3.50}^{S}$	$J_{3.50}^{S}$	$I_{3.35}^{S}$	$J_{3.75}^{S}$	$I_{3.75}^{S}$	$J_{3.65}^{S}$	$J_{3.80}^{S}$	3.60	$J_{3.40}^{S}$	3.45^{S}	3.35	$J_{3.75}^{S}$	3.95^{S}	3.00	$J_{3.10}^{S}$	3.50^{S}	3.45^{S}	3.30	2.95
12	2.95	2.95	3.10^{S}	3.35^{S}	$I_{3.15}^{S}$	$I_{3.05}^{S}$	3.00^{S}	$I_{3.40}^{S}$	$J_{3.75}^{S}$	$I_{3.70}^{S}$	3.60^{S}	$U_{3.15}^{S}$	$I_{3.50}^{S}$	3.30	$I_{3.45}^{S}$	3.40^{V}	3.65	$J_{3.80}^{S}$	A	A	A	$I_{3.40}^{A}$	A	C
13	C	2.90	$J_{3.05}^{S}$	$I_{3.10}^{C}$	3.35^{S}	$I_{3.40}^{S}$	3.05	3.50	3.85	3.75	3.30	3.50^{S}	S	S	3.55	$I_{3.45}^{S}$	3.60^{S}	3.70	$J_{3.35}^{S}$	$J_{3.50}^{S}$	3.20^{S}	$I_{3.35}^{S}$	A	A
14	A	3.00	3.05	$J_{3.45}^{S}$	$I_{3.50}^{S}$	$I_{3.30}^{S}$	3.10	$I_{3.40}^{S}$	3.90	3.70	3.50	$I_{3.35}^{S}$	$I_{3.60}^{S}$	$I_{3.40}^{S}$	$I_{3.30}^{S}$	$I_{3.40}^{S}$	3.70^{S}	$J_{3.55}^{S}$	$U_{3.40}^{S}$	S	A	3.25	$J_{3.15}^{S}$	2.85^{S}
15	2.85^{S}	S	S	S	4.15	2.80	3.15	$I_{3.25}^{S}$	$J_{3.70}^{S}$	3.40^{S}	$J_{3.50}^{S}$	$J_{3.50}^{S}$	3.20	$J_{3.35}^{S}$	$J_{3.25}^{S}$	$J_{3.45}^{S}$	$I_{3.50}^{S}$	$I_{3.75}^{S}$	3.40	3.30	3.30	3.40	$J_{3.10}^{S}$	3.10^{S}
16	3.20	$J_{3.10}^{S}$	2.95	$I_{3.15}^{S}$	$I_{3.55}^{S}$	3.75	2.85	3.40	3.55^{S}	3.60	3.40^{S}	$J_{3.55}^{S}$	$J_{3.25}^{S}$	$I_{3.40}^{S}$	$I_{3.40}^{S}$	3.55^{S}	3.70^{H}	$J_{3.70}^{S}$	3.80^{S}	3.35^{S}	3.45	3.55	3.10	$I_{2.95}^{S}$
17	2.90	2.95	3.05	3.25	$J_{3.25}^{S}$	3.50^{S}	3.25	3.45^{S}	3.60	3.75	$I_{3.40}^{S}$	$J_{3.40}^{S}$	3.35^{S}	3.25^{S}	$J_{3.35}^{S}$	3.45	3.50	3.50	$I_{3.65}^{S}$	3.55	$I_{3.40}^{S}$	3.40	$I_{3.45}^{S}$	3.20
18	3.20	2.95	3.05	3.10	3.50	3.25	3.20^{S}	$I_{3.65}^{S}$	$J_{3.70}^{S}$	3.65_{H}^{S}	3.45	3.65	3.45	3.40	3.30	3.45	3.50	3.55	$J_{3.80}^{S}$	$I_{3.50}^{S}$	3.50	3.45	$I_{3.30}^{A}$	$J_{3.35}^{S}$
19	3.05	$I_{2.75}^{A}$	$I_{2.85}^{A}$	3.20	3.80	3.70	$I_{3.50}^{A}$	3.45	$J_{3.85}^{S}$	3.70^{H}	3.60^{H}	$J_{3.45}^{S}$	3.60	$J_{3.50}^{S}$	3.35	3.55^{S}	3.50	3.60	3.70	3.70	3.45^{S}	$J_{3.45}^{S}$	F	3.20^{S}
20	$I_{2.95}^{S}$	F	3.05	3.15	3.45	3.50^{S}	3.40	$J_{3.55}^{S}$	3.80	3.80	3.50	3.55	$J_{3.80}^{S}$	$I_{3.50}^{S}$	3.20	$I_{3.40}^{S}$	$J_{3.50}^{S}$	3.70	$J_{3.55}^{S}$	$I_{3.30}^{S}$	3.70	3.50	$I_{3.45}^{A}$	2.95
21	$I_{3.05}^{S}$	3.05	$I_{3.35}^{S}$	$I_{3.10}^{S}$	$J_{3.25}^{S}$	3.30	3.35	3.65^{S}	$J_{3.65}^{S}$	$I_{3.60}^{S}$	$I_{3.80}^{S}$	3.45	$I_{3.60}^{S}$	$I_{3.45}^{S}$	3.55	$J_{3.30}^{S}$	3.35^{S}	3.40	$I_{3.25}^{A}$	3.70^{S}	3.70	3.50	S	A
22	A	3.05	$I_{2.90}^{A}$	F	$I_{3.10}^{A}$	3.20	F	$I_{3.40}^{S}$	$J_{3.80}^{S}$	3.45^{S}	$I_{3.55}^{S}$	$J_{3.60}^{S}$	$I_{3.40}^{S}$	3.35^{S}	$I_{3.45}^{S}$	$I_{3.30}^{S}$	3.50^{S}	$J_{3.60}^{S}$	$I_{3.60}^{A}$	$J_{3.55}^{S}$	3.40	3.30	2.85	2.75
23	3.10^{S}	3.10^{S}	3.15	3.20	3.30	2.90	2.90	3.30^{S}	$J_{3.80}^{S}$	3.65^{H}	3.25^{S}	$I_{3.55}^{S}$	$J_{3.45}^{S}$	3.75	3.65	3.10^{H}	3.40^{S}	3.70^{S}	3.35	3.50^{S}	3.40	$I_{3.50}^{S}$	3.25	$I_{3.00}^{S}$
24	$I_{3.00}^{S}$	$I_{2.90}^{A}$	3.00	3.35	3.10	3.30	3.05	3.20	3.70	3.60^{H}	3.50^{S}	3.60^{S}	$J_{3.70}^{S}$	3.30	3.60	3.50^{S}	3.65	3.70	3.45	3.25	3.10	3.60	3.20	2.95
25	3.15	2.95	3.20^{S}	F	3.50	2.85	3.25^{S}	3.55	3.75^{S}	3.60^{H}	3.65	$J_{3.40}^{S}$	$I_{3.55}^{S}$	3.30	3.45	3.65	$U_{3.75}^{S}$	3.50	$I_{3.55}^{S}$	3.20	2.95	$I_{3.55}^{S}$	3.45	$J_{2.95}^{S}$
26	$I_{2.95}^{S}$	$I_{3.00}^{S}$	3.10^{S}	2.95	3.30	3.30	3.35	3.45	3.75^{S}	3.70	3.85	3.65	3.65^{S}	3.25	$J_{3.40}^{S}$	3.75	3.60	3.80	3.05^{H}	3.55	3.15	3.35	3.60	3.10
27	$I_{3.20}^{S}$	2.90	3.10	3.10	$J_{3.55}^{S}$	3.75	3.05	3.20	3.70^{S}	$J_{3.85}^{S}$	$J_{3.55}^{S}$	$J_{3.45}^{S}$	3.30	$J_{3.40}^{S}$	3.60^{S}	3.55	3.65	3.55	3.65	3.05	3.45^{S}	3.60	3.65	3.05
28	2.95	$I_{3.20}^{S}$	3.40	3.60	4.00	$J_{3.55}^{S}$	$J_{3.35}^{S}$	3.05	$J_{3.55}^{S}$	3.60^{S}	$J_{3.55}^{S}$	3.85	3.35	$J_{3.55}^{S}$	3.50	3.75	3.65	3.70	3.35	3.15	3.20	3.45	3.55^{S}	2.85
29	3.00	3.10	$J_{3.10}^{S}$	3.05	3.40	3.80	3.30	3.55	3.60_{H}^{S}	3.65	3.65	3.55	3.65^{S}	3.25	$I_{3.45}^{S}$	3.80	3.65	$I_{3.65}^{S}$	3.55	3.50	$I_{3.15}^{S}$	$I_{3.45}^{S}$	3.85	3.05
30	3.00	3.00	3.10	3.25	3.45	3.05	3.05	3.25	3.75^{S}	$J_{3.45}^{S}$	3.70^{H}	$I_{3.60}^{S}$	$J_{3.55}^{S}$	3.70	3.70	3.00	3.50	3.50^{S}	3.30	3.60	3.25	3.45	3.00	2.95
31	3.10	$I_{3.10}^{S}$	F	3.25	$I_{3.70}^{S}$	3.70	$I_{3.40}^{A}$	$J_{3.20}^{S}$	$J_{3.55}^{S}$	3.80	3.80	3.15	$J_{3.60}^{S}$	3.60^{S}	3.30	3.45	3.35^{H}	$J_{3.65}^{S}$	3.55	2.95	$I_{3.30}^{S}$	3.75	3.60	3.20
No.	27	27	27	26	30	29	27	29	30	30	31	31	30	30	30	29	29	30	30	29	29	31	27	27
Median	2.95	3.00	3.10	3.15	3.40	3.30	3.20	3.40	3.70	3.65	3.55	3.50	3.60	3.40	3.45	3.45	3.60	3.60	3.55	3.25	3.35	3.45	3.30	3.00
U.Q.																								
L.Q.																								
Q.R.																								

M(3000)F2

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

Y 7

IONOSPHERIC DATA

Dec. 1963 | M(3000)F1 | 135° E Mean Time (G.M.T. +9h) | Yamagawa | Lat. 31°12.5' N, Long. 130°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											L	L	L	3.65	4.00	L								
2										L	L	4.30	L	3.95^{H}	3.70	L								
3										L	3.75^{L}	L	3.85	4.25	A									
4											L	$I_{3.70}{}^{L}$	3.90	3.80	$I_{3.85}{}^{A}$	$I_{4.15}{}^{L}$	5.45							
5											L	L	L^{H}	L	L	C	C	C						
6									C	C	L	L	$I_{3.70}{}^{L}$	3.60	L	L								
7											L	L	C	$I_{3.90}{}^{C}$	C	C	C							
8										L	L	$I_{4.00}{}^{L}$	L	3.80	L	L	4.20							
9										L	L	3.75	$I_{3.95}{}^{L}$	L	L	L								
10										L	$I_{4.00}{}^{L}$	3.60^{H}	3.65^{H}	$I_{3.80}{}^{L}$	L^{H}	L^{H}								
11										L	L	L	$I_{3.95}{}^{L}$	L	L	L								
12											4.00	L	$I_{3.95}{}^{L}$	$I_{3.95}{}^{LH}$	3.70									
13												L	L^{H}	L	L	R								
14											L	L	L	L	L	L								
15										L	L^{H}	L	L	L	L	A	A							
16											L	L^{H}	L	L	L	L	L							
17											L	L	L	L	L	L	L							
18											4.00	L	$I_{3.80}{}^{L}$	L	L	L								
19												3.55	L	$I_{3.60}{}^{L}$	3.80	L	L							
20											L	L	L	L		A								
21											L	4.00	$I_{3.90}{}^{L}$	A	A									
22											L	L^{H}	$I_{3.90}{}^{L}$	$I_{3.75}{}^{R}$	L	L								
23											L^{H}	4.00	L	L	L									
24											3.85	$I_{3.85}{}^{L}$	3.95	L	L	L	L							
25											L	3.75^{L}	$I_{3.80}{}^{A}$	$I_{3.80}{}^{A}$	L	A	L							
26												4.05	4.25	L	3.75	$I_{3.90}{}^{L}$	L							
27											4.00	$I_{3.90}{}^{LH}$	L	3.65	$I_{4.00}{}^{L}$	4.10	L							
28											3.70	3.95	L	$I_{3.70}{}^{L}$	3.85	L	L							
29												3.90	L	L	L	4.05	4.30							
30												4.40		3.90	L									
31											L	$I_{3.90}{}^{L}$	$I_{3.70}{}^{H}$	$I_{3.70}{}^{L}$	L	L								
No.											7	16	14	16	8	4	3							
Median											4.00	3.90	$U_{3.90}$	$U_{3.80}$	3.80	$U_{4.10}$	4.30							
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

M(3000)F1 Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

Y 8

IONOSPHERIC DATA

Dec. 1963 | h'F2 | 135° E Mean Time (G.M.T. +9h) | Yamagawa | Lat. 31°12.5' N, Long. 130°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											260	255	245	270	270	250								
2										250	240	270	245	275	265	230								
3										255	250	280	245	250	250									
4											275	240	250	250	245	230	225							
5											250	240	240	255	295	C	C	C						
6									C	C	250	240	250	290	255	260								
7											270	250	$I_{245}C$	$I_{250}C$	C	C	C							
8										240	240	230	245	250	280	250	240							
9										240	240	230	250	245	255	245								
10										235	245	295	245	230	240	240								
11										245	240	225	255	250	250	270								
12											250	240^H	250	255	275									
13												250	250	235	250	260								
14											270	255	240	240	250	245								
15										245	250	245	285	245	255	250	250							
16											260	250	270	250	245	245								
17											245	260	255	275	245	250								
18											260	245	255	260	275	250								
19												270	250	255	265	245	230							
20											250	260	225	245		$E_{285}A$								
21											245	240	250	$E_{260}A$	255									
22											250	235	265	255	225	290								
23											290	240	260	240	245									
24											255	245	240	275	250	245	230							
25											245	275	240	285	260	250	240							
26												255	255	300	260	230	240							
27											250	260	285	285	250	245	225							
28											255	240	295	260	265	240	240							
29												255	240	290^L	250	235	225							
30												290		245	250									
31											240	260	250	245	255	265								
No.										7	26	31	30	30	29	23	10							
Median										245	250	250	250	250	255	245	235							
U.Q.																								
L.Q.																								
Q.R.																								

h'F2

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

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IONOSPHERIC DATA

Dec. 1963 | h'F | 135° E Mean Time (G.M.T. +9h) | Yamagawa | Lat. 31°12.5' N, Long. 130°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	350	230^{F}	230^{F}	255^{F}	290	255	280^{F}	210	220	240	250	240	240	250	245	230	205^{H}	230	200	220	240	A	E$_{300}$^{A}	310
2	E$_{305}$^{S}	310	285	275	220	220	E$_{340}$^{S}	230	205^{H}	200	220	190	250	200^{H}	245	250	205^{H}	200^{H}	220	250	220	225	280	E$_{300}$^{S}
3	305	300	300	270	225	E$_{250}$^{S}	C	C	250	250	230	230	245	205	I$_{240}$^{A}	225	I$_{220}$^{C}	210	200	270	220	205	E$_{300}$^{S}	E$_{330}$^{S}
4	E$_{350}$^{A}	E$_{350}$^{A}	255	225	250	250	E$_{285}$^{S}	230	225	245	245	225	200	230	I$_{230}$^{A}	225	200	220	235	245	225	220	210	E$_{300}$^{S}
5	280	300	270	300	290	225	S	240	200^{H}	230^{H}	240	225	200^{H}	210	235	C	C	C	210	295	220	240	245	C
6	C	C	C	C	C	C	C	C	C	C	250	240	250	250	230	210	210^{H}	210	205	E$_{250}$^{S}	250	235	235	270
7	290	260	270	250	250	250	220	210	230	235	240	225	I$_{225}$^{C}	I$_{210}$^{C}	C	C	C	205	240	E$_{250}$^{S}	A	250	245	250
8	340	300	290	290	295	E$_{300}$^{S}	250	225	225	240	225	225	210	200	200	230	220	205	195	E$_{230}$^{S}	240	210	E$_{270}$^{S}	E$_{300}$^{S}
9	335	295	270	280	250	255	295	250	240	240	220	215	200	210	200	220	225	210	200	295	245	240	A	E$_{300}$^{S}
10	340	340	300	250	220	E$_{290}$^{S}	330	255	225	220	205	200^{H}	195^{H}	215	205^{H}	205^{H}	225	220	220	E$_{250}$^{A}	230	E$_{260}$^{A}	A	A
11	A	300	260	270	245	245	255	220	220	240	210	210	230	200	A	205	230	200	E$_{275}$^{A}	250	E$_{250}$^{S}	220	250	E$_{350}$^{A}
12	315	315	295	285	E$_{290}$^{A}	285	300	250	225	220	205	210	205	200^{H}	225	240	230	205	A	A	A	A	A	I$_{325}$^{C}
13	I$_{320}$^{C}	325	295	295	240	225	E$_{330}$^{S}	240	230	230	210	205	240^{H}	235	220	A	230	205	225	210	230	A	A	A
14	A	305	290	240	220	E$_{235}$^{A}	E$_{300}$^{A}	240	210	240	210	210	220	195	205	240	215	200^{H}	190	365	I$_{315}$^{A}	270	E$_{300}$^{S}	E$_{330}$^{S}
15	E$_{350}$^{S}	330	290	220	190	E$_{400}$^{A}	E$_{310}$^{S}	255	230^{H}	215	220^{H}	240	215	225	220	I$_{250}$^{A}	I$_{240}$^{A}	215	205	205	E$_{250}$^{A}	240	275	305
16	265	290	310	250	215	210	E$_{340}$^{S}	250	240	240	225	225^{H}	205	210	210	225	230^{H}	210	200^{A}	240	225	230	E$_{310}$^{A}	A
17	320	320	300	275	250	250	255	240	220	230	205	235	195	200	240	230	230	240	I$_{230}$^{A}	220	250	E$_{205}$^{S}	I$_{250}$^{S}	290
18	275	E$_{350}$^{A}	340	310	250	250	290	220	220^{H}	210^{H}	235	200	245	200	230	220	255	230	200	240	230	E$_{290}$^{A}	A	275
19	E$_{300}$^{A}	A	A	325	245	225	I$_{250}$^{A}	240	210	220^{H}	190^{H}	270	250	225	210	240	215	215	245	220	240	225	300^{F}	345
20	340	300	300	290	230	E$_{260}$^{A}	250	230	210	220	210	180	230	215	225	I$_{230}$^{A}	250	230	210	225	225	250	I$_{255}$^{A}	350
21	360	330	285	I$_{290}$^{A}	340	260	250	225	250	190^{H}	245	210	E$_{250}$^{A}	I$_{235}$^{A}	I$_{240}$^{A}	230	240	230	I$_{240}$^{A}	220	210	240	A	A
22	A	340	A	285	A	E$_{330}$^{A}	E$_{295}$^{S}	235	210	240	250	200^{H}	195	205	235	260	250	220	I$_{240}$^{A}	225	250	E$_{280}$^{A}	S	E$_{380}$^{A}
23	300	300	300	E$_{300}$^{A}	270	E$_{355}$^{A}	E$_{350}$^{S}	250	210	205^{H}	200^{H}	205	200	230	200	190^{H}	250	225	220	205	240	210	E$_{290}$^{S}	S
24	S	A	330	290	300	290	E$_{300}$^{S}	260	230	240^{H}	225	220	210	210	235	240	220	220	235	250	255	255	E$_{270}$^{S}	E$_{325}$^{S}
25	280	E$_{320}$^{A}	E$_{305}$^{A}	210	250	E$_{360}$^{S}	315	240	215	230^{H}	240	230	I$_{220}$^{A}	I$_{235}$^{A}	225	I$_{220}$^{A}	240	220	A	285	255	220	275	320
26	330	350	320	305	255	E$_{250}$^{S}	E$_{295}$^{S}	230	200	225	230	200	190	270	240	225	205	210	200^{H}	230	245	E$_{255}$^{S}	E$_{250}$^{S}	320
27	280	350	320	265	225	E$_{230}$^{S}	E$_{380}$^{S}	255	220	220^{H}	205	205^{H}	230	230	225	205	220	215	225	265	240	230	205	E$_{330}$^{S}
28	340	275	240	225	195	I$_{235}$^{S}	I$_{295}$^{S}	265	230	245	245	210	250	225	205	210	205	210	205	265	250	250	215	E$_{380}$^{S}
29	320	335	330	280	245	205	E$_{290}$^{S}	240	195^{H}	250	245	240	260	240	270	225	205	230	225	240	290	210	210	350
30	350	335	300	260	245	E$_{330}$^{S}	340	250	220	245	225^{H}	200	245	220	215	190	250	220	205	210	250	250	300	E$_{320}$^{S}
31	320	310	300	275	230	E$_{245}$^{S}	A	270	235	240	210	200	200^{H}	220	250	225	220^{H}	230	210	310	245	215	245	290
No.	24	25	27	29	28	20	15	29	30	30	31	31	30	31	29	28	29	30	28	27	27	24	17	17
Median	320	310	295	275	245	E$_{245}$	280	240	220	230	225	210	220	215	225	225	225	215	210	240	240	230	E$_{250}$	E$_{300}$
U.Q.																								
L.Q.																								
Q.R.																								

h'F

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

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IONOSPHERIC DATA

Dec. 1963 | h'Es | 135° E Mean Time (G.M.T. +9h) | Yamagawa | Lat. 31°12.5' N / Long. 130°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	S	S	S	140	115	S	105	105	G	G	100	155	180	180	155	125	G	S	S	135	S	110	105	S
2	S	S	S	E	E	S	S	S	140	G	G	110	105	105	165	180	100	S	S	S	S	S	S	S
3	S	S	S	105	E	S	C	C	G	165	140	G	135	125	115	100	C	100	100	115	105	105	S	S
4	100	100	S	E	E	S	S	S	G	G	155	G	145	100	100	95	G	150	S	105	S	S	S	S
5	S	S	S	100	100	S	S	G	G	G	155	145	95	95	G	C	C	C	S	120	S	110	105	C
6	C	C	C	C	C	C	C	C	C	C	175	150	150	135	140	120	105	110	S	115	S	105	105	S
7	S	S	S	S	115	S	S	S	G	G	155	140	C	C	C	C	C	S	S	105	110	110	105	105
8	105	105	105	S	S	S	S	S	G	G	130	125	120	110	105	G	G	105	S	S	S	S	S	S
9	S	S	105	105	100	100	100	S	G	125	105	105	105	105	105	105	105	S	S	105	105	105	110	S
10	S	S	S	E	E	S	S	S	G	G	145	110	105	105	105	105	105	105	100	100	100	100	100	100
11	100	100	100	E	E	S	S	S	130	105	120	115	110	110	110	105	105	105	105	105	100	S	S	105
12	105	100	S	S	100	S	S	S	120	110	105	125	105	G	110	110	105	110	120	110	105	105	100	C
13	C	105	E	105	E	S	S	S	G	G	105	120	120	115	120	110	110	S	S	S	S	105	105	100
14	100	105	105	S	E	100	100	S	110	110	105	105	G	G	G	110	110	S	S	105	105	100	S	S
15	S	S	S	120	E	100	S	S	G	G	G	110	105	110	105	100	100	105	100	S	100	S	S	S
16	S	S	S	E	100	100	S	S	G	150	125	125	125	110	105	105	G	100	100	100	S	105	100	100
17	105	S	100	S	E	S	S	S	G	110	105	105	105	100	100	100	100	100	100	100	100	S	S	S
18	105	100	100	100	E	100	S	S	150	110	105	105	175	100	100	100	100	100	100	105	105	105	100	100
19	100	105	105	105	105	100	100	105	155	170	155	110	150	110	110	110	105	110	105	105	105	S	100	105
20	100	S	S	100	100	100	S	105	105	105	175	105	100	100	100	105	105	110	S	S	100	105	100	S
21	100	105	105	100	100	S	115	110	110	115	110	105	105	100	100	105	105	100F	105	100	105	100	100	105
22	105	105	105	105	100	100	100	100	G	155	110	G	110	115	110	105	105	105	105	S	S	105	S	100
23	100	S	100	100	100	100	100	100	120	110	105	G	G	G	100	100	100	100	100	100	100	S	S	S
24	S	100	S	E	E	S	S	S	G	115	G	105	105	105	105	105	105	105	S	S	105	105	105	100
25	S	110	105	100	100	S	100	100	140	130	115	110	110	105	105	100	100	100	100	100	S	95	S	S
26	S	S	E	E	E	S	S	S	G	155	150	105	105	105	160	G	160	S	S	S	S	S	S	S
27	S	S	S	E	E	S	S	S	G	140	155	105	145	G	100	120	110	S	E	100	S	105	S	S
28	S	S	E	E	E	S	S	S	150	145	140	120	120	120	120	130	140	S	S	110	S	S	S	S
29	110	105	S	E	105	E	S	S	G	175	155	150	145	140	G	130	105	100	S	S	S	S	S	155
30	S	105	105	105	105	S	S	S	G	120	110	110	140	140	110	105	G	G	S	S	S	S	S	S
31	S	S	S	105	100	S	105	S	G	G	125	110	G	G	105	G	G	S	S	S	S	S	S	S
No.	13	14	12	15	15	9	9	7	11	20	28	27	27	25	27	26	22	19	13	20	15	18	14	11
Median	100	105	105	105	100	100	100	105	130	120	125	110	110	110	105	105	105	105	100	105	105	105	100	100
U.Q.																								
L.Q.																								
Q.R.																								

h'Es

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

Y 11

IONOSPHERIC DATA

Dec. 1963 | **Types of Es** | 135° E Mean Time (G.M.T. +9h) | Yamagawa | Lat. 31°12.5′ N, Long. 130°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				f	f		f2	ℓ			ℓ3h	hℓ	hℓ	hℓ	h	c2ℓ2				f		f4	f2	
2									h			h	ℓ	ℓ	hℓ	hℓ2	ℓ							
3				f						h	h		h	h	c	ℓ		ℓ	f	f	f2	f		
4	f	f2									h		h	ℓ	ℓ3	ℓ3		h2	f	f2				
5				f	f						h	h	ℓ2	ℓ2						f2		f	f2	
6											h	h	h	h2	hℓ	cℓ	ℓ	ℓ		f		f2	f	
7					f						h	h								f	f2	f3	f	f2
8	f2	f2	f								h	h	h	ℓ	ℓ			ℓ						
9			f	f	f2	f4	f2			h2	ℓ	ℓ2	ℓ	ℓ	ℓ	ℓ	ℓ			f2	f2	f2	f2	
10											h	ℓ	ℓ	ℓ	ℓ	ℓ	ℓ2	ℓ	f	f2	f	f	f3	f
11	f2	f2	f2						h	ℓh	c	c2	c2	c	c2	ℓ	ℓ	ℓ2	f2	f	f2			f
12	f	f			f2				c	c2	ℓ	cℓ	ℓ		c	ℓ2	ℓ	ℓ2	f3	f2	f2	f	f	
13		f		f							ℓ	cℓ	c	c2	c	c	c2					f4	f3	f3
14	f3	f2	f			f	f2		ℓ	ℓ2	ℓ	ℓ				ℓ	ℓ			f2	f4	f		
15				f		f2						c2	ℓ	ℓ2	ℓ2	ℓ2	ℓ2	ℓ	f2		f			
16					f	f				h2	h	h	h	c	ℓ2	ℓ		ℓ2	f	f		f	f	f
17	f		f							c2	ℓ	ℓ	ℓ	ℓ	ℓ	ℓ2	ℓ2	ℓ2	f2	f2	f			
18	f	f2	f	f		f			h	ℓ	ℓ	ℓ2	hℓ	ℓ2	ℓ	ℓ2h	ℓ3	ℓ2	f3	f2	f3	f2	f2	f2
19	f	ff	ff2	f3	f2	f3	f3	ℓ	hℓ	hℓ2	hℓ	ℓ	hℓ	ℓ	ℓ	ℓ2	ℓ	ℓ	f2	f2	f		f	f
20	f			f	f	f		ℓ	ℓ3	ℓ2	hℓ	ℓ	ℓ	ℓ	ℓ	ℓ2	ℓ3	ℓ		f	f3	f4	f	
21	f	f2	f2	f3	f2		f3	ℓ	ℓ4	c	ℓ2	ℓ	ℓ2	ℓ2	ℓ2	ℓ	ℓ	ℓ2	f2	f3	f2	f2	f	f
22	f2	f	f2	f	f2	f2	f2	ℓ2		h2	ℓ		ℓ	ℓ	ℓ	ℓ2	ℓ2	ℓ3	f3			f2		f
23	f		f	f	f	f2	f	ℓ	ℓ2	ℓ2	ℓ				ℓ	ℓ2	ℓ	ℓ	f	f	f			
24		f								ℓ2		ℓ	ℓ	ℓ	ℓ	ℓ	ℓ	ℓ			f	f	f	f
25		f	f2	f	f		f	ℓ	c2	h	h2	ℓ	c	ℓ2	ℓ	ℓ3	ℓ2	ℓ	f	f		f2		
26										h	h	ℓ	ℓ	ℓ	h		h							
27										h2	h	ℓ	hℓ		ℓ	c	ℓ2			f		f3		
28									h2	h	h	h	h	h	c	h	h			f2				
29	f	f			f2					h	h2ℓ	hℓ	h	h		h	ℓ	ℓ						
30		f	f2	f2	f					c2	ℓ2	ℓ	hℓ	hℓ	ℓ	ℓ								f
31				f2	f2		f				h	ℓ			ℓ2									
No.																								
Median																								
U.Q.																								
L.Q.																								
Q.R.																								

Types of Es

Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

SOLAR RADIO EMISSION 200 Mc/s

Flux in 10^{-22} w.m.$^{-2}$ (c/s)$^{-1}$, 2 polarizations

HIRAISO

Time in U.T.

Dec. 1963	Steady Flux					Variability				
	00-03	03-06	06-09	21-24	mean	00-03	03-06	06-09	21-24	mean
1	q	q	q	q	q	0	0	0	0	0
2	q	q	q	q	q	0	0	0	0	0
3	q	q	q	q	q	0	0	0	0	0
4	q	q	q	q	q	0	0	0	0	0
5	q	q	q	-	q	0	0	0	-	0
6	-	-	-	-	-	-	-	-	-	-
7	-	-	-	q	-	-	-	-	0	-
8	q	q	q	-	q	0	0	0	-	0
9	-	-	-	-	-	-	-	-	-	-
10	q	q	q	q	q	0	0	0	0	0
11	q	q	q	q	q	0	0	0	0	0
12	q	q	q	q	q	0	0	0	0	0
13	q	q	q	-	q	0	0	0	-	0
14	9	10	10	7	10	0	0	0	0	0
15	7	6	(8)	-	7	0	0	(0)	-	0
16	-	-	-	-	-	-	-	-	-	-
17	-	-	-	14	-	-	-	-	0	-
18	11	9	7	-	11	0	0	0	-	0
19	-	7	8	(7)	7	-	0	0	(0)	0
20	(7)	7	8	7	8	(0)	0	0	0	0
21	9	9	(9)	-	8	0	0	(0)	-	0
22	(7)	7	8	7	7	(0)	0	0	0	0
23	7	7	-	-	7	0	0	-	-	0
24	-	-	-	6	-	-	-	-	0	-
25	6	6	6	(13)	6	0	0	0	(0)	0
26	(13)	14	11	-	13	(0)	0	0	-	0
27	12	9	8	-	10	0	0	0	-	0
28	12	9	7	-	10	0	0	0	-	0
29	8	8	(8)	-	8	0	0	(0)	-	0
30	10	10	8	(7)	9	1	1	0	(0)	1
31	10	10	9	-	10	0	0	0	-	0

Note No observations during the following periods:

5th	2130-	7th	0730	18th	0700-		0730
8th	2130-	9th	0730	18th	2140-	19th	0230
11th	0150-		0300	20th	0110-		0300
12th	0200-		0300	21st	2140-	22nd	0200
12th	0530-		0700	23rd	0510-	24th	0730
13th	0130-		0150	25th	0140-		0300
13th	0640-		0730	26th	0130-		0300
13th	2140-	14th	0010	26th	2150-	27th	0100
14th	0215-		0300	27th	2150-		2350
15th	2140-	17th	0730	28th	2150-	29th	0020
18th	0440-		0540	29th	0600-	30th	0100

" q " means almost quiet level but uncertain owing to receiver instability

Outstanding Occurrences

Dec. 1963	Start-time	Dura-tion	Type	Max. Int.		Max. Time	Remarks
				Inst.	Smd.		
25	0528.8	1.0	CD/8	320	120	0529.1	

RADIO PROPAGATION QUALITY FIGURES

HIRAISO

Time in U.T.

Dec. 1963	Whole Day Index	L. N. 06 12 18 / 12 18 24	W W V 00 06 12 18 / 06 12 18 24	S. F. 00 06 12 18 / 06 12 18 24	W W V H 00 06 12 18 / 06 12 18 24	Warning 00 06 12 18 / 06 12 18 24	Principal magnetic storms Start	End	ΔH
1	5-	C C C	- - - 5	4 5 5 5	4 (5) - 5	N N N N			
2	4+		- - - 4	4 5 5 4	4 (4) - 5	N N N N	2116	---	94γ
3	4+		- - - 4	5 5 4 4	4 5 - 4	N N N N	---	---	
4	5-		- - - 5	4 5 5 5	5 4 - 4	N N U U	---	24xx	
5	4+		- - - C	5 4 4 (4)	4 4 - 5	N N N N			
6	4-		- - - 4	(4) 4 3 4	(4) 4 - 5	N N N N			
7	4o		- - - 4	4 5 3 (4)	5 5 - 4	N N N N			
8	4o		- - - 3	4 4 5 (4)	5 5 - 4	N N N N			
9	5-		- - - 3	5 5 5 5	4 4 - 5	N N N N			
10	4+		- - - 3	4 5 5 4	4 4 - 4	N N N N			
11	4-		- - - 3	4 5 4 3	4 4 - 4	N N N N			
12	4-		- - - 3	4 4 4 3	4 5 - 4	N N N N			
13	4-		- - - 4	3 4 4 4	5 4 - 5	N N N N			
14	3+		- - - 3	3 4 4 (3)	5 5 - 3	N N N N			
15	3+		- - - C	3 4 4 (3)	3 3 - 5	N N N N			
16	4-		- - - 3	4 4 3 4	4 3 - 5	N N N N			
(17)	4-		- - - 4	4 4 3 4	5 5 - 5	N N N N			
(18)	4o		- - - 4	4 4 4 4	4 5 - 4	N N N N			
(19)	4o		- - - 5	3 4 4 4	5 5 - 5	N N N N			
20	3+		- - - 4	3 3 3 3	(4) 5 - 5	N N N N			
21	4+		- - - 5	4 4 4 (4)	5 5 - 4	N N N N			
22	4-		- - - 3	3 4 4 (4)	5 5 - 5	N N N N			
23	4-		- - - 4	4 4 3 4	5 5 - 4	N N N N			
24	4-		- - - 4	3 3 4 4	5 5 - 4	N N N N			
25	3+		- - - 3	3 3 4 4	5 4 - 4	N N N N			
26	4+		- - - 4	5 4 5 4	4 3 - 5	N N N N			
27	4+		- - - 4	5 4 4 4	4 4 - 4	N N N N			
28	4+		- - - 4	5 5 4 4	4 3 - 5	N N N N			
29	3+		- - - 2	3 4 4 4	3 3 - 4	N N N N			
30	4o		- - - 2	4 5 5 4	3 4 - 3	N N N N			
31	4o	C C C	- - - 4	3 4 5 4	3 4 - 5	N N N N			

IQSY GEOALERT and ADALERT (Western Pacific Region)

* = MAGSTORM

o = MAGCALME

△ = COSMIC EVENT

( ) = Regular World Day

\- = impossible to evaluate

( ) = inaccurate

C = artificial accident

--- = continuing magnetic storm

SUDDEN IONOSPHERIC DISTURBANCES (S.I.D.)

HIRAISO

No Sudden Ionospheric Disturbance was observed during December, 1963.

IONOSPHERIC DATA IN JAPAN FOR DECEMBER 1963
第15巻 第12号

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