ISSN 0021-0382

F—468

IONOSPHERIC DATA IN JAPAN

FOR DECEMBER 1987

VOL. 39 NO. 12

CONTENTS

RADIO RESEARCH LABORATORY
MINISTRY OF POSTS AND TELECOMMUNICATIONS
TOKYO, JAPAN

BRIEFING

This Series contains data on ionosphere (I), solar radio emission (S) and radio propagation (P) obtained at the following stations under the Radio Research Laboratory, Ministry of Posts and Telecommunications of Japan.

Station	Geographic		Geomagnetic		Technical Method
	Latitude	Longitude	Latitude	Longitude	
Wakkanai	45°23.5'N	141°41.2'E	35.3°N	206.5°	Vertical Sounding (I)
Akita	39°43.5'N	140°08.0'E	29.5°N	205.9°	" (I)
Kokubunji	35°42.4'N	139°29.3'E	25.5°N	205.8°	" (I)
Yamagawa	31°12.1'N	130°37.1'E	20.4°N	198.3°	" (I)
Okinawa	26°16.9'N	127°48.4'E	15.3°N	196.0°	" (I)
Hiraiso	36°22.0'N	140°37.5'E	26.3°N	206.8°	Radio Receiving (S, P)
Inubo	35°42.2'N	140°51.5'E	25.6°N	207.0°	" (P)

A. IONOSPHERE

Ionospheric observations are carried out at five stations in Japan by means of vertical sounding method.

The published data consist of tabulations of hourly values of the ionospheric characteristics and figures of daily *f*-plot.

All symbols and terminology in the tables or figures of ionospheric data are used in accordance with the "URSI Handbook of Ionogram Interpretation and Reduction (Second Edition) 1972" and its revision of chapters 1-4, published in July 1978.

a. Characteristics of Ionosphere

fxI	Top frequency of spread *F* trace
foF2 *foF1* *foE* *foEs*	Ordinary wave critical frequency for the *F2, F1, E* and *Es* including particle *E* layers respectively
fbEs	Blanketing frequency of the *Es* layer, e.g. the lowest ordinary wave frequency visible through *Es*
fmin	Lowest frequency which shows vertical ionospheric reflections
M(3000)F2 *M(3000)F1*	Maximum usable frequency factor for a path of 3000 km for transmission by *F2* and *F1* layers respectively
h'F2 *h'F* *h'E* *h'Es*	Minimum virtual height on the ordinary wave for the *F2*, whole *F*, *E* and *Es* layers respectively
Types of *Es*	See below A. b. (iii)

b. Symbols

(i) Descriptive Letters

The following letters are entered after, or used to replace a numerical value on the monthly tabulation sheets.

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

B Measurement influenced by, or impossible because of, absorption in the vicinity of *fmin*.

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

D Measurement influenced by, or impossible because of, the upper limit of the normal frequency range in use.

E Measurement influenced by, or impossible because of, the lower limit of the normal frequency range in use.

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

G Measurement influenced or impossible because the ionization density of the layer is too small to enable it to be made accurately.

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

K Presence of particle *E* layer.

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

M Interpretation of measurement questionable because the ordinary and extraordinary components are not distinguishable.

N Conditions are such that the measurement cannot be interpreted.

O Measurement refers to the ordinary component.

P Man-made perturbations of the observed parameter; or spur type spread *F* present.

Q Range spread present.

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

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

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

V Forked trace which may influence the measurement.

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

X Measurement refers to the extraordinary component.

Y Lacuna phenomena, severe layer tilt.

Z Third magneto-electronic component present.

(ii) Qualifying Letters

The following letters are entered in the first column before a numerical value on the monthly tabulation sheets.

A Less than. Used only when *fbEs* is deduced from *foEs* because total blanketing of higher layer is present.

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.

M Mode interpretation uncertain.

O Extraordinary component characteristic deduced from the ordinary component. (Used for x-characteristics only.)

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

U Uncertain or doubtful numerical value.

Z Measurement deduced from the third magneto-electronic component.

(iii) Description of Types of *Es*

When more than one type of *Es* trace are present on the ionogram, the type for the trace used to determine *foEs* must be written first. The number of multiple traces is indicated after the type letter.

The types are:

f An *Es* trace which shows no appreciable increase of height with frequency.

l A flat *Es* trace at or below normal *E* layer minimum virtual height or below the particle *E* layer minimum virtual height.

c An *Es* trace showing a relatively symmetrical cusp at or below *foE*. (Usually a daytime type.)

h An *Es* trace showing a discontinuity in height with the normal *E* layer trace at or above *foE*. The cusp is not symmetrical, the low frequency end of the *Es* trace lying clearly above the high frequency end of the normal *E* trace. (Usually a daytime type.)

q An *Es* trace which is diffuse and non-blanketing over a wide frequency range.

r An *Es* trace showing an increase in virtual height at the high frequency end similar to group retardation.

a An *Es* trace having a well-defined flat or gradually rising lower edge with stratified and diffuse traces

present above it.

s A diffuse *Es* trace which rises steadily with frequency and usually emerges from another type *Es* trace.

d A weak diffuse trace at heights below 95 km associated with high absorption and large *fmin*.

n The designation 'n' is used to denote an *Es* trace which cannot be classified into one of the standard types.

k The designation 'k' is used to show the presence of particle *E*. When *foEs* > *foE* (particle *E*) the *Es* type precedes k.

c. Definitions of the CNT, MED, UQ and LQ

Median count (CNT) is the number of values from which a median has been computed. In addition to numerical values, the count may include certain descriptive letters.

Median (MED) of a set of numbers is the middle value when the numbers are arranged in order of magnitude, or the average of the two middle values if there is an even number of values.

Upper quartile (UQ) is the median value of the upper half of the values when they are ranked according to magnitude; the *lower quartile* (LQ) is the median value of the lower half.

B. SOLAR RADIO EMISSION

Solar radio observations are carried out on 100, 200 and 500 MHz at Hiraiso. Observation equipments are: a pair of crossed doublet antennas with a 6-meter and a 10-meter parabolic reflectors for 500 MHz and for 100 and 200 MHz, respectively, and three appropriate receivers. Each pair of crossed doublet antennas is used as a polarimeter. Observations are feasible almost from sunrise to sunset.

Time is expressed in hours, minutes and tenths of minutes U.T. and the unit of flux density is 10^{-22} Wm^{-2} Hz^{-1} for both components of polarization.

All symbols and terminology in the table of data are used in accordance with the "Descriptive Text of Solar-Geophysical Data, NOAA" and "Instruction Manual for Monthly Report of Solar Radio Emission, WDC-C2".

a. Daily Data at Hiraiso

Flux density. The three-hourly and daily mean values are given.

Variability. The three-hourly and daily mean values are given at 200 MHz only.
Variability is expressed in the following four grades.

0 quiet or no burst,
1 a few bursts,
2 many bursts,
3 very many bursts.

The number of bursts exceeding the mean flux level is counted.

Daily data with parentheses mean that observation time does not exceed one third of the period.

b. Outstanding Occurrences at Hiraiso

The phenomena are picked up on the following criteria:
1. distinct from the prevailing kind of activity,
2. correlated with other known solar phenomena,
3. remarkable change-over from one situation to another.

Type is denoted by numerical code and letter symbol in parallel as follows:

SGD Cord	Letter Symbol	Morphological Classification
1	S	Simple 1
2	S/F	Simple 1F
3	S	Simple 2
4	S/F	Simple 2F
5	S	Simple
6	S	Minor
7	C	Minor+
8	S	Spike
20	GRF	Simple 3
21	GRF	Simple 3A
22	GRF	Simple 3F
23	GRF	Simple 3AF
24	R	Rise
25	R	Rise A
26	FAL	Fall
27	RF	Rise and Fall
28	PRE	Precursor
29	PBI	Post Burst Increase
30	PBI	Post Burst Increase A
31	ABS	Post Burst Decrease
32	ABS	Absorption
40	F	Fluctuations
41	F	Group of Bursts
42	SER	Series of Bursts
43	NS	Onset of Noise Storm
44	NS	Noise Storm in progress
45	C	Complex
46	C	Complex F
47	GB	Great Burst
48	C	Major
49	GB	Major+

Flux density is the increase of flux over the level at which daily flux is calculated, or the increase of flux over the underlying burst when the event is superposed on another burst of long duration.

Polarization is expressed by the polarization degree and sense as follows:

R or L	right- or left-handed polarization,
W, M or S	weak, moderate or strong polarization,
0	almost zero or unable to detect polarization due to small increase of flux,
00	polarization degree of less than 1 percent.

The following symbols may be attached after numerical values in table, if necessary.

D	greater than, or later than,
E	less than, or earlier than,
U	approximate, or uncertain.

C. RADIO PROPAGATION

a. H.F. Field Strength at Hiraiso

Field strength observation of 15 MHz standard waves transmitted from WWV and WWVH stations which are located respectively at Fort Collins, Colorado and Kauai, Hawaii, is carried out at Hiraiso. In order to avoid interference among the same frequency waves, the upper sideband of WWV or WWVH with the audio tone 660 Hz is picked up by the use of a narrow band pass filter with 80 Hz bandwidth. Particulars of the transmitters and the receiver are summarized in the following table.

Characteristics	Transmitter		Receiver
Station Call	WWV	WWVH	
Location	Fort Collins, Colorado	Kauai, Hawaii	Hiraiso, Ibaraki
latitude	40°41′N	22°00′N	36°22′N
longitude	105°02′W	159°46′W	140°38′E
Distance	9150 km	5910 km	–
Carrier Power	10 kW	10 kW	–
Power in each sideband	625 W	625 W	–
Modulation	50 %	50 %	–
Antenna	λ /2 vertical	λ /2 vertical	4.5 m vertical rod
Bandwidth	–	–	80 Hz for upper sideband
Calibration	–	–	Every an hour

The tabulated *field strength* in dB above one microvolt per meter is the peak average of the incident upper sideband field intensity in 45 seconds after the universal time indicated on the table. Abbreviated symbols are as follows:

CNT	number of observed values,
MED	median,
UD	value of the uppermost decile when they are ranked according to magnitude,
LD	value of the lowest decile when they ranked according to magnitude,
U	uncertain,
E	less than,
C	influenced by, or impossible because of, any artificial accident,
S	influenced by, or impossible because of, interferences or atmospherics.

b. Radio Propagation Quality Figures at Hiraiso

The tabulated six-hourly quality figures are calculated for standard waves WWV transmitted from Fort Collins and WWVH transmitted from Kauai.

Quality figures expressing radio propagation conditions are ranged over five grades as follows:

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

Whole day quality figure ranged in grades of 1o, 1+, 2–, 2o, 2+, 3–, 3o, 3+, 4–, 4o, 4+, 5–, 5o stands for an average of six-hourly ones of the two circuits. Abbreviated symbols are as follows:

C	artificial accident,
S	propagational accident,
U	inaccurate.

Radio propagation conditions which can be described with a code in the following

N	normal,
U	unstable,
W	disturbed

are forecast 12 hours in advance and broadcast six times per hour from JJY station.

Data on a *geomagnetic storm* correlated with a radio propagation disturbance are tabulated from observation at Kakioka Magnetic Observatory, Japan Meteorological Agency. *Time* (U.T.) is expressed in unit of hour and minute (or tenth of hour), and *range* in nanotesla. When they are uncertain quantitatively, /'s are used to replace the numerical values. Continuation of a geomagnetic storm is denoted by - - -.

c. Phase Variations in OMEGA Radio Waves at Inubo

Variations in phase and in phase deviation are monthly depicted for four OMEGA radio waves received at Inubo. Particulars of transmitting stations concerned which relate to the measurement are given in the table below.

In each of the four figures, variations in phase (ϕ) and those in phase deviation ($\triangle\phi$) are shown in the lower part and the upper one, respectively. Variations in phase (ϕ) are expressed by relative values at intervals of 30 minutes within every day (U.T.) (48 dots). An increasing value in this case denotes a phase delay. On the other hand, variations in phase deviation ($\triangle\phi$) are expressed by values at intervals of 30 minutes within every day (U.T.) (48 dots), deviated from average values at the same time for the six quietest days within the month concerned. A negative value in this case denotes a phase advance.

When a polar cap phase anomaly (PCPA) is detected on the Aldra-Inubo and/or the North Dakota-Inubo circuit[s], PCPA's detected only on the Aldra-Inubo circuit are listed, in principle, below the four figures. The list mentions the start, the end, and the maximum times of a PCPA in a form of day/hour & minute in U.T. and its maximum phase deviation as a negative value.

The following letters may be attached to values, if necessary.

D	greater than,
E	less than,
U	uncertain or doubtful.

d. Sudden Ionospheric Disturbances

(i) Short Wave Fade-out (SWF) at Hiraiso

The table of short wave fade-out (SWF) is prepared from the record of field intensities measured at Hiraiso.

Drop-out intensities of the 10 MHz, the 20 MHz, and the 25 MHz waves are respectively distinguished by marks ′, ″, and ‴ from these of the 15 MHz wave for WWV and WWVH. Values of *start*, *duration*, *type*, and *importance* are obtained from data of the circuit whose drop-out intensity in dB is underlined as xx. When these quantities are not given correctly, they are accompanied by the following symbols.

D	greater than,
E	less than,
U	uncertain or doubtful.

Types of fade-out are as follows:

S	sudden drop-out and gradual recovery,
SL	slow drop-out taking 5 to 15 minutes and gradual recovery,
G	gradual and irregular in both drop-out and recovery.

Importance of fade-out is scaled according to its amplitude into nine ascending grades as 1–, 1, 1+, 2–, 2, 2+, 3–, 3, 3+.

Correspondence of solar optical flare, solar radio burst, and geomagnetic crochet to SWF is marked by X in accordance with interchange messages of IUWDS and observations at Hiraiso.

In table (i) SWF, *date* indicates the day to which *start-time* of event belongs.

(ii) Sudden Phase Anomaly (SPA) at Inubo

Data of sudden phase anomaly (SPA) are prepared from the records of phase measurement of VLF radio waves received at Inubo. The transmitting stations are listed in the following table.

Phase advance is shown in unit of degree at its maximum stage. No transmission or no reception during the period is indicated by —, and indistinguishable record is spaced out, and multi-peak event is marked by *.

Out of more than two circuits on which the same SPA event is observed, the *phase advance* on the circuit on which the SPA is the most remarkable or distinct is underlined. As for the underlined, *phase advance*, *start*, *end*, and *maximum times* are obtained.

In table (ii) SPA, *date* indicates the day to which *start-time* of event belongs.

The following letters may be attached to the value, if necessary.

D	greater than,
E	less than,
U	uncertain or doubtful.

Transmitting Stations						
Name	Location (Geographic Coordinate)		Call Sign	Frequency (kHz)	Radiation Power (kHz)	Arc Distance from Inubo (km)
Rugby	52°22′N	001°11′W	GBR	16.0	60	9550
North West Cape	21°49′S	114°10′E	NWC	22.3	1000	6990
Norway	66°25′N	013°08′E	Ω/N	13.6	10	7820
North Dakota	46°22′N	098°20′W	Ω/ND	13.6	10	9140
Hawaii	21°24′N	157°50′W	Ω/H	13.6	10	6100
La Reunion	20°58′S	055°17′E	Ω/LR	13.6	10	10970

IONOSPHERIC DATA

DEC. 1987 | FXI (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station WAKKANAI Lat. 45° 23.5' N, Long. 141° 41.2' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	X 37	X 37	X 37	X 38	X 37	X 33	X 33											X 42	X 36	X 37	X 39	X 38	X 38	X 42
2	X 42	X 43	X 42	X 42	X 41	X 41	X 39											X 42	X 37	X 38	X 34	X 33	X 37	X 38
3	X 39	X 39	X 39	X 39	X 39	X 40	X 34											X 38	X 43	X 39	X 35	X 36	X 38	X 39
4	X 41	X 41	X 43	X 42	X 44	X 50	X 37											X 50	X 42	X 44	X 39	X 38	X 42	X 41
5	X 43	X 43	X 43	X 50	X 51	X 52	X 41											X 51	X 47	X 44	X 42	X 44	X 37	X 36
6	X 38	X 41	X 43	X 42	X 42	X 43	X 35											X 47	X 48	X 37	X 36	A	A	A
7	A	X 35	X 38	41	43	X 39	X 39											X 52	X 40	A	X 37	X 38	X 41	X 41
8	X 41	X 40	X 38	X 42	X 44	X 46	X 42											X 51	A	X 33	X 34	X 38	X 41	X 42
9	X 43	X 43	X 44	X 42	X 41	X 38	X 37											X 43	X 38	X 32	X 35	X 37	X 39	X 41
10	X 41	X 38	X 37	X 39	X 40	X 39	X 39											X 41	X 38	X 42	X 44	X 40	45	46
11	X 43	X 43	X 41	40	X 47	31	X 33											X 41	X 43	X 38	X 36	39	X 41	X 41
12	X 43	X 40	X 42	X 48	A	X 32	X 33											X 43	X 37	X 41	A	41	X 42	X 42
13	X 41	X 40	X 42	52	X 42	X 44	X 40											X 36	X 35	X 37	X 34	X 40	X 41	X 38
14	X 40	X 38	X 38	X 39	X 41	X 42	X 30											X 47	X 39	X 33	X 30	X 31	X 33	X 34
15	X 35	X 36	X 36	X 37	X 40	X 39	X 31											X 42	X 42	X 30	X 32	X 35	X 41	40
16	X 41	41	36	36	40	X 38	X 36											X 59	X 43	A	X 40	X 35	X 42	X 43
17	X 43	X 34	X 39	A	X 42	X 41	X 40											X 45	X 52	A	A	A	X 38	X 41
18	X 39	X 41	X 39	X 39	X 36	X 36	X 38											X 41	X 38	X 35	A	A	X 37	X 39
19	X 39	X 39	X 38	X 39	X 38	X 37	X 39											A	X 44	X 41	X 29	X 32	X 37	X 37
20	X 34	X 33	X 33	X 38	A	X 34	X 36											A	X 38	X 39	X 29	X 34	X 43	X 39
21	X 38	X 39	X 39	X 37	X 38	X 38	X 39											X 43	A	A	X 31	A	X 40	X 39
22	X 40	X 42	X 39	X 38	X 40	X 37	X 33											X 41	X 47	X 50	X 40	X 47	X 54	X 51
23	X 50	X 47	X 43	X 48	X 44	X 43	X 41											X 43	X 43	A	X 40	36	39	X 38
24	X 40	X 35	X 40	X 43	X 47	X 48	X 38											X 41	A	X 33	A	39	41	X 39
25	35	36	38	39	42	X 38	X 35											X 40	X 36	X 42	X 39	X 34	X 38	X 41
26	X 38	X 39	X 39	36	37	X 38	X 34											X 54	X 34	X 38	X 42	X 36	X 38	X 40
27	X 38	X 38	X 38	X 39	X 38	X 39	X 36											X 45	X 36	X 36	A	X 41	X 41	X 41
28	X 39	X 40	X 40	X 40	X 42	X 40	X 42											X 39	X 34	X 37	X 37	X 37	X 37	X 38
29	X 32	X 40	X 41	X 40	X 39	X 40	X 38											X 41	X 37	X 33	X 33	X 40	X 43	X 38
30	X 38	X 40	X 40	X 39	X 39	X 41	X 38											X 38	X 35	X 38	X 37	X 38	X 37	X 40
31	X 41	X 42	X 42	X 41	X 39	X 40	X 39											X 42	X 45	X 42	A	X 34	X 37	X 38
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	31	31	30	29	31	31											29	28	26	25	27	30	30
MED	X 40	X 40	X 39	X 40	X 41	X 39	X 38											X 42	X 38	X 38	X 37	X 38	X 40	X 40
UQ	X 41	X 41	X 42	X 42	X 42	X 42	X 39											X 47	X 43	X 41	X 39	X 40	X 41	X 41
LQ	X 38	X 33	X 38	X 39	X 39	X 38	X 35											X 41	X 36	X 36	X 34	X 35	X 37	X 38

DEC. 1987 | FXI (0.1 MHZ)

The Radio Research Laboratory, Japan

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Station WAKKANAI Lat. 45° 23.5' N, Long. 141° 41.2' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	30	30	30	31	30	26	26	53	57	58	80	74	73	H 69	66	71	36	35	29	30	32	31	31	35
2	35	36	35	35	34	34	32	50	61	68	85	77	81	72	72	66	50	35	30	31	27	26	30	31
3	32	32	32	32	32	33	27	48	57	59	67	75	78	73	H 73	61	58	31	36	32	28	29	31	32
4	34	34	36	35	37	43	30	52	65	65	88	81	79	H 84	81	64	51	43	35	37	32	31	35	F
5	36	36	41	43	44	47	34	52	69	64	75	91	94	81	H 62	57	H 61	44	40	40	35	37	30	29
6	31	34	F 36	35	35	36	28	51	81	76	88	87	73	71	62	54	52	40	41	30	29	A	A	A
7	A	28	31	F 34	F 33	32	32	45	70	70	80	72	H 76	H 76	61	59	34	45	33	A	H 30	31	34	34
8	34	33	31	35	37	39	35	46	58	71	76	88	59	H 69	67	52	44	44	A	26	27	31	34	35
9	36	36	37	35	34	31	30	43	64	69	70	67	69	H 65	53	53	44	36	31	25	28	30	32	34
10	34	31	30	32	33	32	32	40	54	61	70	73	65	74	58	50	41	34	31	S 35	37	33	F 37	F
11	36	36	34	F	40	F 25	26	38	67	81	106	76	65	66	64	60	44	34	36	31	29	F 33	34	34
12	36	33	35	S 41	A	25	26	41	60	72	81	69	69	66	57	52	46	36	30	34	A	F	35	S 35
13	34	33	35	F	35	37	33	42	65	77	77	73	65	62	54	52	51	H 29	28	30	27	33	34	31
14	33	31	31	32	34	35	23	37	56	71	79	71	H 65	63	56	52	55	40	32	26	23	24	26	27
15	28	29	29	30	33	32	24	36	59	66	71	H 67	58	68	58	51	H 46	35	35	23	25	28	34	F
16	34	F 34	F	F	F	31	29	41	53	74	74	78	84	86	76	57	64	52	36	A	33	28	35	36
17	36	27	32	A	35	34	33	36	55	99	84	87	77	67	68	63	47	38	45	A	A	A	31	34
18	32	34	32	32	29	29	31	41	57	69	97	103	76	64	65	56	45	34	31	28	A	A	30	32
19	32	32	31	32	31	30	32	43	54	63	74	76	H 65	60	H 54	56	A	A	37	34	22	25	30	30
20	29	31	31	31	A	27	29	40	56	64	79	75	65	65	64	H 53	42	A	31	32	21	27	36	32
21	31	32	32	30	31	31	32	40	58	70	79	73	64	57	58	H 54	44	36	A	A	24	A	33	32
22	33	35	32	31	33	30	31	46	74	97	83	92	76	89	77	67	50	34	40	43	33	40	47	44
23	43	40	36	41	37	36	34	44	73	81	79	86	74	74	77	71	53	36	36	A	33	F	F	31
24	33	28	33	36	40	41	31	45	57	72	89	93	H 71	70	64	70	49	34	A	31	A	F	F 32	32
25	F	F	F	F	F	32	28	47	55	76	78	81	70	62	64	55	H 50	35	29	35	32	27	31	34
26	31	32	32	F 30	F	31	27	41	65	73	75	73	63	57	60	54	54	47	27	31	35	29	31	33
27	31	31	31	32	31	32	29	34	65	66	73	73	H 65	67	H 60	60	44	38	29	29	A	34	34	34
28	32	33	33	33	35	33	35	35	57	69	63	73	64	H 58	57	60	51	32	27	30	30	30	30	31
29	32	S 33	34	33	32	33	31	41	55	68	70	69	62	62	54	56	49	34	30	26	31	33	36	31
30	31	33	33	32	32	34	31	34	56	64	H 70	68	66	54	67	63	44	31	28	31	30	31	30	33
31	34	35	35	34	32	33	32	35	52	63	73	79	68	63	64	58	46	35	38	35	A	27	30	31
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	29	26	26	31	31	31	31	31	31	31	31	31	31	31	30	29	28	26	25	24	29	27
MED	33	33	32	32	34	32	31	41	58	69	78	75	69	67	64	57	48	35	32	31	30	30	32	32
UQ	34	34	35	35	35	34	32	46	65	74	82	84	76	72	68	62	51	40	36	34	32	33	34	34
LQ	31	31	31	32	32	31	28	39	56	64	73	73	65	62	58	54	44	34	30	29	27	28	30	31

DEC. 1987 | FOF2 (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FOF1 (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station WAKKANAI Lat. 45° 23.5' N, Long. 141° 41.2' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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 340	L 350										
2													L 400	L 320										
3												L	L 410											
4											L	A												
5											L 360	L 400	L	L 350										
6											L 390	L 340	L 330	L 330										
7											L 340	L 380												
8											L	L 380		L										
9											L	L	L 370											
10											L 400	L 370	L 360											
11											L 380	L 380		L 340										
12											L 370	A	L	L 340										
13											L 410	L 350	L	L										
14																								
15											L													
16												L 400	L 340		L 310									
17														L 350										
18											L	L	L											
19											A	A	A											
20																								
21												A	L											
22											A	A		L 350										
23												L	L											
24												L	A											
25																								
26											L 330		L 350											
27													L											
28																								
29												L	L											
30																								
31												L 380	L											
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT											8	9	3	8	1									
MED											L 375	L 380	L 355	L 345	L 310									
UQ											L 395	L 380	L 385	L 350										
LQ											L 350	L 370	L 340	L 335										

DEC. 1987 | FOF1 (0.01 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FOE (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station WAKKANAI Lat. 45° 23.5' N, Long. 141° 41.2' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	210	255	265	280	275	250	225	190	S							
2								S	215	240	255	280	275	245	A	A	S							
3								A	B	235	260	275	275	260	245	B	S							
4								S	210	240	B	265	265	240	A	A	S							
5								S	B	B	B	B	B	B	B	B	S							
6								S	210	B	B	B	B	A	A	S	S							
7								S	205	250	260	B	B	260	B	S	S							
8								S	200	240	260	275	275	B	230	185	A							
9								S	205	255	B	B	B	270	245	S	S							
10								S	195	255	270	280	275	260	225	175	S							
11								S	200	230	260	270	270	245	215	S	S							
12								S	205	245	255	A	270	245	230	200	S							
13								S	195	245	255	275	270	260	A	A	S							
14								S	200	250	265	275	270	255	230	S	S							
15								S	205	250	270	275	280	265	H 235	180	S							
16								S	190	250	275	280	A	270	230	175	S							
17									200	230	260	265	270	A	230	S	S							
18								S	195	235	A	A	270	240	225	S	S							
19								S	U A 190	A	A	275	270	250	A	S	S							
20								S	205	245	275	280	275	260	240	S	S							
21								S	A	235	250	270	A	A	A	170	S							
22								S	200	230	A	A	270	255	230	S	S							
23								S	A	230	260	275	275	250	225	S	S							
24								S	B	B	B	B	B	B	B	S	S							
25								S	A	225	B	280	B	265	245	S	S							
26								S	A	230	250	270	270	245	225	195	S							
27								S	A	B	B	B	B	B	B	S	S							
28								S	A	240	260	280	280	265	230	200	S							
29								S	195	235	260	270	275	260	235	200	S							
30								S	205	240	260	285	280	250	225	205	S							
31								S	B	B	B	280	B	B	B	S	S							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									21	25	20	22	21	23	20	11								
MED									200	240	260	275	275	255	230	190								
UQ									205	250	265	280	275	260	235	200								
LQ									195	235	258	270	270	248	225	178								

The Radio Research Laboratory, Japan

DEC. 1987 | FOE (0.01 MHZ)

IONOSPHERIC DATA

DEC. 1987 | FOES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station WAKKANAI Lat. 45° 23.5' N, Long. 141° 41.2' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E S 16	E S 15	E S 16	E	E S 16	E S 16	E S 16	E S 16	G		33	34	G 25	G	G	26	24	J A 23	E S 16	24	E S 16	E S 16	E S 16	E S 16
2	E S 16	J A 22	23	25	E S 16	20	E S 15	E S 16	G	G	31	G	G	31	25	20	E S 16	26	J A 24	26	E S 16	E S 16	E S 16	E S 16
3	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	24	23	E B 21	G	G	G	G	G	G	22	E S 16	J A 21	J A 29	J A 25	E S 16	E S 16	E S 16	E S 16
4	E S 16	E S 16	E	23	J A 23	E S 16	26	E S 16	G	G	33	J A 47	32	32	33	J A 29	J A 37	J A 23	25	J A 20	26	J A 29	J A 26	26
5	E S 16	E S 16	26	J A 23	J A 25	J A 23	J A 29	E S 18	E B 21	E B 31	E B 32	E B 30	E B 31	32	39	24	E S 16	E S 16	J A 25	J A 53	J A 25	J A 26	J A 23	E S 16
6	E S 16	E S 16	E S 16	J A 21	J A 30	J A 35	J A 33	J A 23	G	E B 28	E B 30	E B 30	E B 30	29	26	30	E S 16	J A 25	J A 29	J A 35	J A 27	J A 81	J A 51	J A 49
7	J A 49	26	23	J A 25	E S 16	E S 16	J A 61	J A 32	26	G	G	E B 30	E B 30	G	E B 26	23	J A 52	J A 28	J A 48	J A 49	E S 16	J A 25	E S 16	E S 16
8	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	23	G	G	G	G	E B 28	G	26	20	E S 13	J A 52	J A 64	E S 16	J A 28	26	23
9	E S 16	23	20	E S 16	E S 16	21	22	26	G	G	E B 32	E B 32	E B 29	G	31	24	22	J A 23	26	26	26	J A 24	E S 15	E S 16
10	E S 15	E S 16	E S 15	E S 16	20	19	22	E S 15	G	G	G	G	G	G	G	23	J A 23	E S 16	E S 16	E S 16	E S 16	22	E S 16	E S 16
11	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	20	E S 16	27	27	30	31	G	G	G	E S 20	E S 16	E S 16	E S 16	E S 16	23	23	20	25
12	20	20	E S 16	26	J A 61	E S 17	E S 16	E S 17	24	G	G	J A 43	G	30	G	24	E S 16	E S 16	26	J A 22	J A 49	E S 15	E S 16	E S 16
13	E S 15	24	J A 23	J A 44	J A 28	J A 49	J A 50	J A 25	24	G	31	G	G	G	J A 50	J A 31	J A 28	J A 24	J A 33	J A 33	J A 24	J A 28	26	J A 24
14	22	22	J A 24	J A 35	J A 24	E S 16	23	26	26	30	G	G	G	G	G	21	J A 27	J A 25	E S 16	E S 16	E S 16	26	E S 16	E S 16
15	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	24	G	G	G	G	32	G	24	20	E S 16	26	J A 27	E S 16	E S 16	E S 16	E S 15
16	E S 12	E S 16	E S 16	E S 16	E S 16	E S 16	E S 17	E S 17	26	G	G	32	J A 30	G	G	24	21	J A 28	J A 48	J A 56	J A 24	E S 17	J A 29	E S 17
17	E S 16	J A 30	J A 39	J A 78	J A 39	J A 30	J A 31	E S 16	26	35	J A 41	J A 42	J A 45	30	J A 53	J A 48	J A 41	J A 25	26	J A 102	J A 95	J A 51	J A 25	J A 28
18	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	24	23	J A 35	34	G 26	G	G 21	E S 20	E S 16	E S 16	J A 25	J A 35	J A 50	J A 48	26	J A 29
19	22	E S 16	J A 24	24	26	E S 16	E S 16	E S 16	25	J A 45	42	J A 47	J A 45	41	43	20	53	J A 81	J A 36	24	24	E S 16	E S 16	E S 16
20	E S 16	26	E S 17	36	J A 33	26	23	25	G	G	G	G	G	G	32	29	41	J A 60	J A 29	E S 17	E S 16	E S 15	E S 16	E S 16
21	E S 16	E S 16	E S 17	E S 16	E	E S 16	E S 16	E S 16	25	G	36	38	J A 50	35	26	21	41	J A 27	J A 51	34	J A 22	42	J A 33	25
22	E S 16	E S 16	24	E S 15	J A 51	J A 39	E S 16	E S 17	28	J A 42	J A 42	J A 39	33	G	43	44	41	J A 27	J A 28	J A 27	22	E S 15	26	26
23	E S 16	E S 16	E S 16	22	J A 31	J A 27	J A 27	23	20	G	G	32	32	32	G	24	33	39	23	J A 70	J A 25	J A E S 16	E S 16	25
24	E S 15	E S 16	E S 15	E S 16	E S 16	J A 24	26	27	E B 20	E B 27	E B 31	34	38	23	E B 28	29	19	E S 16	J A 48	J A 43	J A 52	J A 22	J A 24	J A 24
25	24	24	E S 15	24	26	26	E S 16	J A 21	J A 50	G	E B 29	G	33	32	22	23	J A 23	J A 52	J A 31	J A 24	J A 27	26	21	E S 16
26	E S 16	E S 16	E S 16	E S 16	24	J A 21	E S 16	J A 24	J A 24	G	G	G	G	G	23	24	E S 16	26	J A 29	J A 32	J A 27	J A 25	E S 16	E S 16
27	E S 16	E S 16	E S 16	E S 16	E S 17	23	25	23	J A 59	E B 26	E B 33	E B 30	E B 32	E B 30	E B 27	22	E S 18	E S 16	J A 29	J A 52	J A 52	J A 49	26	26
28	26	E S 16	E S 16	E S 16	23	E S 16	22	J A 20	J A 27	G	G	G	G	G	G	G	E S 16	E S 16	E S 13	E S 15	E S 15	E S 16	E S 16	E S 16
29	E S 16	E S 15	E S 12	E S 16	E S 16	E S 15	E S 16	E S 16	G	G	G	G	G	G	G	24	E S 16	26	J A 20	E S 16	E S 16	J A 23	J A 24	J A 24
30	E S 17	E S 16	E S 15	E	E S 16	J A 25	J A 32	J A 35	J A 24	G	G	G	G	G	G	24	J A 24	E S 16	26	E S 16	J A 24	26	J A 23	J A 23
31	23	E S 16	E S 13	E S 15	E S 16	E S 16	E S 13	E S 16	E B 21	J A 51	E B 30	G	E B 28	E B 30	E B 28	E S 24	E S 16	E S 16	J A 23	J A 32	J A 37	J A 23	25	J A 27
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	E S 16	E S 16	E S 16	E S 16	17	E S 17	22	E S 17	24	G	E G 30	E G 30	E G 26	G	E G 26	24	21	25	J A 26	J A 27	24	23	21	E S 17
UQ	E S 16	21	22	24	J A 26	J A 24	26	24	26	28	32	33	32	30	30	26	30	J A 23	J A 30	J A 39	J A 27	J A 27	J A 26	25
LQ	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E G 20	G	G	G	G	G	G	22	E S 16	E S 16	24	21	E S 16	E S 16	E S 16	E S 16

DEC. 1987 | FOES (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FBES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station WAKKANAI Lat. 45° 23.5 N, Long. 141° 41.2 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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 S 16	E S 15	E S 16	E	E S 16	E S 16	E S 16	E S 16	G	G	G	G	G 25	G	G	E S 16	E S 16	22	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16
2	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 15	E S 16	G	G	G	G	G	G	25	20	E S 16	16	18	18	E S 16	E S 16	E S 16	E S 16
3	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	E B 21	G	G	G	G	G	G	22	E S 16	19	20	E S 16	E S 16	E S 16	E S 16	E S 16
4	E S 16	E S 16	E	E S 16	E S 16	E S 16	E S 15	E S 16	G	G	32	44	30	30	29	21	29	20	16	15	18	E S 16	20	E S 16
5	E S 16	E S 16	E S 16	16	E S 16	19	21	E S 18	E B 21	E B 31	E B 32	E B 30	E B 31	32	34	24	E S 16	E S 16	19	33	25	20	E S 17	F S 16
6	E S 16	E S 16	E S 16	E S 15	E S 16	24	27	E S 16	G	E B 28	E B 30	E B 30	E B 30	28	25	25	E S 16	20	29	26	E S 16	A A 81	A A 51	A A 49
7	A A 49	18	E S 16	E S 15	E S 16	E S 16	E S 16	23	21	G	G	E B 30	E B 30	G	E B 26	22	24	E S 16	21	A A 49	E S 16	18	E S 16	E S 16
8	E S 16	E S 16	E S 13	E S 16	E S 16	E S 16	E S 16	E S 16	22	G	G	G	G	E B 28	G	G	16	E S 13	A A 52	22	E S 16	21	S S 16	F S 15
9	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 17	G	G	E B 32	E B 32	E B 29	G	G	23	18	20	E S 16	E S 16	E S 16	E S 15	E S 15	F S 16
10	E S 15	E S 16	E S 15	E S 16	E S 16	E S 16	E S 15	E S 16	G	G	G	G	G	G	G	G	21	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
11	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	G	27	G	G	G	G	G	E S 20	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	F S 16
12	E S 16	E S 16	E S 16	E S 16	A A 61	E S 17	E S 16	E S 17	G	G	G	43	G	G	G	G	E S 16	E S 15	E S 15	E S 16	A A 49	E S 15	E S 16	E S 16
13	E S 15	E S 16	E S 16	22	E S 16	21	E S 16	E S 16	G	G	G	G	G	G	25	22	E S 17	E S 16	E S 16	22	19	21	E S 17	E S 16
14	E S 15	E S 16	E S 16	23	16	E S 16	E S 16	E S 16	26	G	G	G	G	G	G	19	19	E S 16	E S 16	E S 16	E S 16	E S 17	E S 16	E S 16
15	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	G	G	G	G	G	G	G	24	19	E S 16	20	21	E S 16	E S 16	E S 16	F S 15
16	E S 12	E S 16	E S 16	E S 16	E S 16	E S 16	E S 17	E S 17	G	G	G	G	30	G	G	24	19	24	20	A A 52	E S 16	E S 17	20	E S 17
17	E S 16	21	26	A A 78	33	22	27	E S 16	G	35	41	42	42	28	53	41	26	24	E S 17	A A 102	A A 95	A A 51	A A 16	F S 16
18	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	23	G	30	29	G 20	G	G 21	E S 20	C S 16	E S 16	E S 16	E S 16	A A 50	A A 48	E S 16	19
19	E S 16	E S 16	16	E S 15	E S 16	E S 16	E S 16	E S 16	24	31	36	45	44	33	37	20	A A 53	A A 81	22	E S 16	E S 16	E S 16	E S 16	E S 16
20	E S 16	18	E S 17	26	A A 38	E S 13	E S 16	E S 16	G	G	G	G	G	G	31	28	35	A A 60	20	E S 17	E S 16	E S 15	E S 16	F S 16
21	E S 16	E S 16	E S 17	E S 16	E	E S 16	E S 16	E S 16	24	G	G	37	31	29	26	21	35	27	A A 51	A A 34	21	A A 42	21	F S 17
22	E S 16	E S 16	E S 15	E S 15	E S 16	E S 16	E S 16	E S 17	26	39	40	36	33	G	37	38	40	24	20	18	E S 16	E S 15	E S 17	E S 17
23	E S 16	E S 16	E S 16	E S 15	25	22	E S 16	E S 16	20	G	G	G	G	G	G	22	24	32	E S 16	A A 70	E S 16	E S 16	E S 16	E S 16
24	E S 15	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	E B 20	E B 27	E B 31	33	35	21	E B 23	29	E S 17	E S 16	A A 43	22	A A 52	E S 16	E S 16	E S 16
25	E S 16	E S 16	E S 15	E S 15	E S 16	E S 16	E S 16	E S 16	28	G	E B 29	G	33	G	G	22	25	28	18	E S 15	21	E S 16	E S 16	E S 16
26	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	21	23	G	G	G	G	G	G	24	E S 16	E S 16	E S 15	F S 16	20	18	E S 16	E S 16
27	E S 16	E S 16	E S 16	E S 16	E S 17	E S 16	E S 17	E S 16	36	E B 26	E B 33	E B 30	E B 32	E B 30	E B 27	22	E S 18	C S 16	19	24	A A 52	20	E S 16	E S 16
28	E S 16	E S 16	E S 16	E S 16	E S 15	E S 16	16	E S 16	20	G	G	G	G	G	G	G	E S 16	E S 16	E S 13	E S 15	E S 15	E S 16	E S 16	E S 16
29	E S 16	E S 15	E S 12	E S 16	E S 16	E S 16	E S 15	E S 16	G	G	G	G	G	G	G	G	E S 16	E S 18	E S 16	E S 16	E S 16	E S 16	E S 16	E S 17
30	E S 17	E S 16	E S 15	E	E S 16	E S 16	19	23	G 20	G	G	G	G	G	G	G	18	E S 16	E S 15	E S 16	E S 15	18	21	E S 17
31	E S 16	E S 16	E S 13	E S 15	E S 16	E S 16	E S 13	E S 16	E B 21	30	E B 30	G	E B 28	E B 30	E B 23	E S 24	E S 16	E S 16	E S 16	25	A A 37	20	E S 16	E S 16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E G 20	G	G	G	E G 20	G	G	22	18	E S 16	17	18	E S 16	E S 16	E S 16	E S 16
UQ	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	22	E G 26	E G 30	30	29	E G 28	28	24	24	23	20	24	21	20	E S 16	F S 15
LQ	E S 16	E S 16	E S 15	E S 15	E S 16	E S 16	E S 16	E S 16	G	G	G	G	G	G	G	20	E S 16	C S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16

DEC. 1987 | FBES (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FMIN (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station WAKKANAI Lat. 45° 23.5' N, Long. 141° 41.2' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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 S 16 15	E S 16	E S	E	E S 16	E S 16	E S 16	E S 16	16	16	17	17	16	16	16	E S 16	E S 16	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16
2	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 15	E S 16	16	17	20	18	19	18	16	16	E S 16	E S 13	E S 16	E S 13	E S 16	E S 16	E S 16	E S 16
3	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 11	21	19	20	25	22	21	22	20	E S 16	E S 17	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
4	E S 16	E S 16	E	E S 16	E S 16	E S 16	E S 15	E S 16	19	20	25	26	25	20	19	17	E S 16	E S 16	E S 13	E S 16	E S 16	E S 16	E S 16	E S 16
5	E S 16	E S 16	E S 16	E S 13	E S 16	E S 15	E S 16	E S 16	21	31	32	30	31	26	23	21	E S 16	E S 16	E S 16	E S 16	E S 16	E S 15	E S 17	E S 16
6	E S 16	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	20	28	30	30	30	26	20	E S 18	E S 16	E S 15	E S 16	E S 16	E S 16	E S 15	E S 16	E S 15
7	E S 16	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	19	20	24	30	30	24	26	E S 17	E S 16	E S 16	E S 16	E S 17	E S 16	E S 16	E S 16	E S 16
8	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	18	22	23	24	25	28	20	E S 16	E	E S 13	E S 16	E	E S 16	E S 16	E S 16	E S 15
9	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 17	16	22	32	32	29	24	18	E S 17	E S 15	E S 16	E S 16	E S 16	E S 16	E S 15	E S 15	E S 16
10	E S 15	E S 16	E S 15	E S 16	E S 16	E S 16	E S 15	E S 16	16	16	19	18	18	17	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
11	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	17	20	18	17	E S 20	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
12	E S 16	E S 16	E S 16	E S 16	E S 16	E S 17	E S 16	E S 17	16	16	17	19	19	16	17	E S 17	E S 16	E S 16	E S 15	E S 16	E S 15	E S 15	E S 16	E S 16
13	E S 15	E S 16	E S 16	E	E S 16	E S 15	E S 16	E S 16	16	16	17	18	21	19	19	E S 16	E S 17	E S 16	E S 16	E S 16	E S 16	E S 17	E S 17	E S 16
14	E S 15	E S 16	E S 16	E S 16	E S 11	E S 16	E S 16	E S 16	16	17	19	19	19	18	17	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	E S 17	E S 16	E S 16
15	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	20	22	23	20	20	17	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 15
16	E S 12	E S 16	E S 16	E S 16	E S 16	E S 16	E S 17	E S 17	16	17	16	17	20	20	17	E S 17	E S 16	E S 16	E S 16	E S 16	E S 16	E S 17	E S 15	E S 17
17	E S 16	E S 15	E S 15	E S 16	E S 15	E S 16	E S 16	E S 16	16	17	17	18	18	17	19	E S 17	E S 18	E S 16	E S 17	E S 17	E S 15	E S 16	E S 16	E S 16
18	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	18	19	16	17	16	E S 20	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 15
19	E S 16	E S 16	E	E S 15	E S 16	E S 16	E S 16	E S 16	19	18	17	20	21	19	21	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
20	E S 16	E S 16	E S 17	E S 16	E S 16	E S 15	E S 16	E S 16	16	18	19	21	21	20	20	E S 17	E S 16	E S 16	E S 17	E S 17	E S 16	E S 15	E S 16	E S 16
21	E S 16	E S 16	E S 17	E S 16	E	E S 16	E S 16	E S 16	16	17	20	21	20	19	17	E S 16	E S 16	E S 15	E S 16	E S 15	E S 16	E S 17	E S 17	E S 17
22	E S 16	E S 16	E S 15	E S 15	E S 16	E S 16	E S 16	E S 17	17	17	22	19	22	23	19	E S 19	E S 15	E S 16	E S 17	E S 16	E S 16	E S 15	E S 17	E S 17
23	E S 16	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	16	20	22	21	22	19	19	E S 20	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 15
24	E S 15	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	20	27	31	28	29	30	23	E S 24	E S 17	E S 16	E S 15	E S 15	E S 16	E S 16	E S 16	E S 16
25	E S 16	E S 16	E S 15	E S 15	E S 16	E S 16	E S 16	E S 16	17	20	29	22	29	23	21	E S 22	E S 16	E S 15	E S 16	E S 15	E S 15	E S 16	E S 16	E S 16
26	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	20	21	22	22	22	19	E S 18	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16
27	E S 16	E S 16	E S 16	E S 16	E S 17	E S 16	E S 17	E S 16	20	26	33	30	32	30	27	E S 18	E S 18	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16
28	E S 16	E S 16	E S 16	E S 16	E S 15	E S 16	E S	E S 16	16	18	17	20	24	22	19	E S 17	E S 16	E S 16	E S 13	E S 15	E S 15	E S 16	E S 16	E S 16
29	E S 16	E S 15	E S 12	E S 16	E S 16	E S 15	E S 16	E S 16	16	17	17	20	19	20	18	E S 17	E S 16	E S 18	E S 16	E S 16	E S 16	E S 16	E S 16	E S 17
30	E S 17	E S 16	E S 15	E	E S 16	E S 16	E S 16	E S 16	16	17	21	21	21	23	21	E S 16	E S 16	E S 16	E S 15	E S 16	E S 15	E S 16	E S 17	E S 17
31	E S 16	E S 16	E S 13	E S 15	E S 16	E S 16	E S 13	E S 16	21	25	30	25	28	30	28	E S 24	E S 16	E S 16	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	18	20	21	21	20	19	E S 17	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
UQ	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	19	20	24	25	26	24	21	E S 20	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
LQ	E S 16	E S 16	E S 15	E S 15	E S 16	E S 16	E S 16	E S 16	16	17	17	19	20	18	17	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16

DEC. 1987 | FMIN (0.1 MHZ)

IONOSPHERIC DATA

DEC. 1987 | M(3000)F2 (0.01) | 135° E Mean Time (G.M.T. + 9 h)

Station WAKKANAI Lat. 45° 23'.5 N, Long. 141° 41'.2 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	295	290	300	290	310	315	305	360	375	350	365	330	355	H 335	350	365	340	320	335	305	310	290	290	310
2	290	305	295	315	300	315	335	345	355	350	345	360	350	335	360	380	360	335	325	340	335	315	270	285
3	280	285	295	290	310	335	315	355	370	360	345	360	345	350	H 315	360	330	340	335	330	320	295	285	285
4	300	290	275	290	300	335	365	365	360	355	350	320	340	H 335	350	345	350	330	320	345	335	295	295	F
5	305	310	295	280	295	320	330	350	350	360	335	325	335	360	H 345	335	H 325	340	300	330	325	345	325	280
6	280	295	F 305	310	290	320	A	365	240	335	345	365	340	340	340	360	345	310	340	A	295	A	A	A
7	A	285	285	F 295	F 285	310	320	340	355	375	340	365	H 335	H 335	340	345	325	355	325	A	H 355	310	325	300
8	315	325	295	300	325	320	320	345	345	345	340	365	365	H 340	375	345	360	340	A	A	290	305	325	315
9	305	310	310	315	330	330	320	335	370	345	335	370	345	H 305	375	360	340	340	355	320	330	295	280	310
10	315	320	300	320	335	330	320	320	360	325	340	340	355	350	360	380	340	325	300	S 320	300	335	F 320	F
11	325	305	300	F	320	F 280	305	330	345	320	350	345	340	335	355	345	335	325	325	320	295	F 265	295	295
12	305	325	320	S 360	A	295	300	330	345	340	360	345	345	350	355	365	345	340	310	325	A	F	315	S 300
13	300	325	315	F	315	325	325	335	335	350	345	365	360	355	345	360	370	H 275	330	350	290	290	300	300
14	310	320	320	310	325	355	305	325	345	350	360	365	H 305	345	340	360	350	330	350	355	305	285	285	295
15	290	285	295	285	315	345	340	335	360	355	365	H 345	350	355	375	350	H 245	320	340	A	290	290	310	F
16	295	F 295	F	F	F	330	310	330	360	350	335	310	335	345	330	335	330	325	320	A	320	265	295	305
17	310	295	A	A	A	310	A	340	325	350	335	345	350	335	340	340	350	310	335	A	A	A	290	310
18	280	310	310	320	290	305	320	340	345	310	340	350	370	345	370	355	335	315	315	345	A	A	300	300
19	305	310	295	310	320	305	345	355	365	340	360	350	H 340	355	H 350	360	A	A	325	350	310	305	305	320
20	290	295	330	A	A	325	345	350	355	340	355	360	365	355	345	H 360	340	A	340	345	335	280	310	290
21	295	285	285	285	305	320	345	325	365	360	355	365	350	335	360	H 325	340	340	A	A	A	A	280	300
22	295	315	305	305	305	325	315	325	335	350	325	360	320	335	355	360	350	330	345	330	295	300	300	290
23	280	290	315	330	300	305	295	335	360	360	380	360	340	340	350	350	365	A	325	A	335	F	F	320
24	325	285	305	300	285	290	315	355	345	335	340	365	H 340	355	345	360	345	330	A	330	A	F	F 290	330
25	F	F	F	F	F	310	305	345	360	350	350	360	355	340	355	365	H 325	A	345	335	345	295	290	325
26	290	285	295	F 300	F	320	310	340	365	370	360	360	350	350	345	350	350	360	350	320	320	310	290	305
27	320	330	315	285	290	310	345	330	335	350	370	370	H 340	365	H 335	350	365	350	315	A	A	315	280	300
28	310	310	305	310	300	320	340	340	370	360	365	365	365	H 340	345	345	365	335	335	335	335	325	335	295
29	300	S 315	300	320	305	320	320	340	365	350	345	355	355	355	350	355	330	325	335	305	320	295	315	330
30	290	295	305	310	310	325	350	345	365	345	H 320	350	360	350	360	365	365	330	330	340	300	320	300	310
31	295	295	310	300	295	320	345	340	370	345	340	370	350	365	340	360	370	340	315	340	A	290	285	310
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	28	25	25	31	29	31	31	31	31	31	31	31	31	31	30	27	28	22	24	24	29	27
MED	300	300	302	305	305	320	320	340	360	350	345	360	350	345	350	360	345	330	330	332	320	295	295	300
UQ	310	315	310	315	315	325	340	348	365	355	360	365	355	355	360	360	360	340	340	345	335	312	310	310
LQ	290	290	295	290	295	310	310	332	345	342	340	345	340	335	342	345	335	325	320	320	298	290	285	295

DEC. 1987 | M(3000)F2 (0.01)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | M(3000)F1 (0.01) | 135° E Mean Time (G.M.T. + 9h)

Station WAKKANAI Lat. 45° 23·5 N, Long. 141° 41·2 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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 380	L 365										
2													L 350	L 375										
3												L	L 340											
4											L	A												
5											L 390	L 325	L	A										
6											L 360	L 410	L 410	L 385										
7											L 375	L 380												
8											L	L 375		L										
9											L	L	L 380											
10											L 355	L 380	L 360											
11											L 330	L 355		L 355										
12											L 350	A	L	L 360										
13											L 355	L 385	L	L										
14																								
15											L													
16												L 360	A		L 355									
17														L 400										
18											L	L	L											
19											A	A	A											
20																								
21												A	L											
22											A	A		L 385										
23												L	L											
24												L	A											
25																								
26											L 380		L 380											
27													L											
28																								
29												L	L											
30																								
31												L 335	L											
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT											8	9	7	7	1									
MED											L 358	L 375	L 380	L 375	L 355									
UQ											L 378	L 380	L 380	L 385										
LQ											L 352	L 355	L 355	L 362										

DEC. 1987 | M(3000)F1 (0.01)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | H'F2 (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station WAKKANAI Lat. 45° 23·5 N, Long. 141° 41·2 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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												230	225	225										
2													250	230										
3												230	250											
4											L 235	235												
5											250	250	L 230	210										
6											250	235	230	230										
7											235	210												
8											240	225		245										
9											240	220	240											
10											250	230	240											
11											240	225		250										
12											230	240	240	230										
13											250	220	230	230										
14																								
15											230													
16												240	250		230									
17														230										
18											250	230	220											
19											230	230	225											
20																								
21												220	235											
22											235	215		230										
23												215	230											
24												225	225											
25																								
26											215		220											
27													230											
28																								
29												225	225											
30																								
31												235	240											
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT											15	21	19	10	1									
MED											240	230	230	230	230									
UQ											250	235	240	230										
LQ											232	220	225	230										

DEC. 1987 | H'F2 (KM)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | H'F (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station WAKKANAI Lat. 45° 23.5' N, Long. 141° 41.2' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	300	290	295	260	255	255	270	210	205	205	H 230	210	205	210	H 205	210	195	A 250	240	260	255	270	300	275
2	295	275	260	255	265	245	230	225	205	H 215	235	215	225	210	220	210	205	210	250	240	225	245	305	310
3	305	305	300	290	275	235	250	215	H 205	H 200	220	230	205	225	230	225	205	230	250	250	250	250	305	305
4	285	300	300	305	285	225	205	205	215	H 205	235	A	H 210	H 220	240	215	230	230	240	235	235	280	A 300	285
5	265	285	275	275	270	235	250	215	H 205	210	215	220	230	A	205	215	225	215	270	A	A 275	230	250	310
6	340	300	260	245	305	A 250	A	205	230	225	215	195	210	205	210	215	205	250	255	A	280	A	A	A
7	A	A 295	300	275	305	255	255	240	225	220	205	205	220	220	210	215	A	200	270	A	200	300	250	255
8	250	230	230	260	255	225	240	205	205	230	225	215	H 205	200	225	200	195	225	A	A	305	A 300	270	255
9	250	270	255	250	235	240	240	230	215	225	225	A 230	205	220	220	225	205	220	220	245	235	295	305	275
10	255	255	255	255	245	240	250	240	215	215	230	225	210	230	210	205	205	245	265	265	275	260	275	255
11	250	275	250	275	250	190	280	235	235	245	240	220	225	205	235	220	205	235	245	240	255	325	300	305
12	275	245	240	205	A	285	265	235	225	240	230	A	235	215	230	205	210	215	250	240	A	325	270	295
13	280	255	255	265	250	255	245	235	225	230	225	220	215	225	215	210	205	205	250	A 255	A 295	310	290	295
14	255	250	255	A 300	250	200	240	220	220	225	225	225	210	225	215	230	225	215	215	235	E A 265	E A 300	E A 295	E A 270
15	280	275	295	305	255	220	E S 230	225	215	230	225	H 215	215	230	215	210	220	225	220	A	E A 295	295	275	255
16	255	290	345	325	285	255	245	205	205	225	225	220	A	230	205	220	230	235	250	A	240	325	300	255
17	245	A 290	A	A	A	A 285	A	220	235	235	240	230	235	A 225	A	A 245	210	A 270	225	A	A	A	325	290
18	305	275	280	230	250	275	255	215	210	220	245	230	225	H 210	225	H 205	200	240	255	245	A	A	295	300
19	285	265	280	270	250	270	235	205	205	220	A	A	A	225	220	210	A	A	255	210	E A 250	E A 305	290	255
20	305	305	260	A	A	255	245	205	205	215	235	225	225	230	225	205	A	A	250	230	E A 225	E A 325	275	300
21	275	305	300	295	260	255	235	205	200	210	230	A	A 210	220	225	210	A 255	A 245	A	A	A	A	A 340	300
22	300	280	275	255	230	295	255	235	230	235	A	A	235	220	235	215	A	A 250	255	220	250	255	265	295
23	280	280	275	230	A 305	300	260	230	210	220	225	225	220	230	230	225	205	A	240	A	210	255	295	245
24	235	275	290	300	275	275	255	215	210	220	245	A	A	225	230	225	210	210	A	A 260	A	295	305	250
25	305	325	295	295	285	280	270	220	200	H 200	220	220	225	225	225	220	210	A	240	220	250	250	295	250
26	255	305	300	300	290	255	265	225	210	H 210	200	H 205	205	220	225	220	225	205	240	260	275	250	305	275
27	250	255	250	295	305	255	235	215	235	210	225	H 220	210	215	215	210	205	205	A 255	A	A	275	305	275
28	275	280	300	265	270	250	225	205	200	H 205	210	225	215	H 205	225	220	205	210	225	245	240	250	255	290
29	275	285	275	250	265	250	250	205	205	225	205	225	210	H 210	H 210	225	210	235	245	E A 255	245	280	255	245
30	295	295	280	255	275	250	230	235	215	H 210	210	230	230	220	230	205	205	240	235	245	255	255	A 305	260
31	300	295	270	285	290	255	220	200	205	220	235	205	205	230	235	220	205	245	245	A 250	A	A 325	300	290
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	31	30	29	28	31	29	31	31	31	29	25	28	30	30	31	27	27	28	21	24	27	30	30
MED	278	280	273	270	270	255	245	215	210	220	225	220	215	220	225	215	205	230	248	245	249	275	295	275
UQ	300	295	295	295	285	262	255	230	222	225	235	225	225	225	230	220	215	242	255	255	270	300	305	295
LQ	255	272	260	255	252	240	235	205	205	210	220	215	210	210	215	210	205	212	240	235	236	255	272	255

DEC. 1987 | H'F (KM)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | H'E (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station WAKKANAI Lat. 45° 23.5' N, Long. 141° 41.2' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	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	125	120	115	120	A 125	115	125	S 145	S							
2								S	130	125	120	120	125	125	A	A	S							
3								A	B	130	125	B 130	120	120	135	B	S							
4								S	B 150	140	B	B	B	125	120	A	S							
5								S	B	B	B	B	B	B	B	B	S							
6								S	B	B	B	B	B	A	A	S	S							
7								S	A	135	B 135	B	B	B 130	B	S	S							
8								S	A 145	A 135	A 135	135	135	B	A 130	S 130	A							
9								S	135	130	B	B	B	130	130	S	S							
10								S	120	120	120	120	125	125	115	S 125	S							
11								S	145	120	120	120	120	120	125	S	S							
12								S	130	125	120	120	120	115	120	S 150	S							
13								S	135	130	125	120	125	125	130	A	S							
14								S	130	125	120	125	125	120	125	S	S							
15								S	145	135	135	135	130	125	125	S 140	S							
16								S	135	125	120	120	120	120	120	S	S							
17									145	115	115	110	115	A	105	S	S							
18								S	130	110	A	A	120	110	A	S	S							
19								S	A	A	A	125	125	120	A	S	S							
20								S	150	H 130	125	135	125	125	125	S	S							
21								S	A	130	125	125	A	A	A	S	S							
22								S	145	130	A	A	125	125	125	S	S							
23								S	A	B 140	130	130	125	125	125	S	S							
24								S	B	B	B	B	B	B	B	S	S							
25								S	A	130	B	130	B	130	130	S	S							
26								S	A	130	130	125	125	125	125	S	S							
27								S	A	B	B	B	B	B	B	S	S							
28								S	A	130	125	125	125	125	125	S 140	S							
29								S	140	125	125	125	120	120	125	S 150	S							
30								S	A	125	125	125	125	B 130	B 125	135	S							
31								S	B	B	B	130	B	B	B	S	S							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									17	25	20	22	21	23	21	8								
MED									135	130	125	125	125	125	125	S 140								
UQ									145	130	128	130	125	125	125	S 145								
LQ									130	125	120	120	120	120	125	S 132								

DEC. 1987 | H'E (KM)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | H'ES (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station WAKKANAI Lat. 45° 23.5' N, Long. 141° 41.2' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	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	S	S	S	S	G	130	130	G	110	G	G	105	110	100	S	100	S	S	S	S
2	S	105	105	105	S	110	S	S	G	G	120	G	G	120	110	105	S	105	105	100	S	S	S	S
3	S	S	S	S	S	S	105	105	B	G	G	G	G	G	G	135	S	105	105	100	S	S	S	S
4	S	S	E	125	115	S	125	S	G	G	130	125	125	125	115	120	105	105	105	105	105	105	105	105
5	S	S	125	110	105	110	105	S	B	B	B	B	B	130	115	130	S	S	110	105	105	105	105	S
6	S	S	S	120	115	105	105	110	G	B	B	B	B	110	105	125	S	110	105	105	105	105	105	105
7	105	105	105	105	S	S	110	105	120	G	G	B	B	G	B	120	105	105	105	105	S	100	S	S
8	S	S	S	S	S	S	S	S	180	G	G	G	G	B	G	125	115	S	110	105	S	105	105	105
9	S	105	105	S	S	110	115	145	G	G	B	B	B	G	145	140	135	125	110	105	110	105	S	S
10	S	S	S	S	125	125	120	S	G	G	G	G	G	G	G	125	115	S	S	S	S	105	S	S
11	S	S	S	S	S	S	130	S	150	125	125	125	G	G	G	S	S	S	S	S	110	105	105	105
12	105	105	S	125	110	S	S	S	150	G	G	110	G	120	G	140	S	S	120	105	105	S	S	S
13	S	150	130	120	110	105	110	115	185	G	125	G	G	G	125	110	105	105	105	105	100	100	105	110
14	105	120	110	110	110	S	110	145	145	135	G	G	G	G	G	115	110	105	S	S	S	105	S	S
15	S	S	S	S	S	S	S	S	155	G	G	G	G	135	G	175	150	S	130	105	S	S	S	S
16	S	S	S	S	S	S	S	S	130	G	G	125	125	G	G	175	150	130	130	125	130	S	105	S
17	S	125	120	120	115	110	110	S	140	135	125	130	130	105	120	120	120	100	100	105	105	105	105	105
18	S	S	S	S	S	S	S	S	175	155	105	105	105	G	105	S	S	S	120	110	110	105	105	110
19	120	S	130	130	135	S	S	S	185	105	100	120	120	115	110	125	105	105	105	105	110	S	S	S
20	S	105	S	110	105	110	110	105	G	G	G	G	G	G	125	110	105	105	105	S	S	S	S	S
21	S	S	S	S	E	S	S	S	130	G	125	125	110	110	110	150	125	120	105	105	105	105	105	115
22	S	S	140	S	105	105	S	S	150	125	125	120	125	G	125	120	110	110	105	105	115	S	105	105
23	S	S	S	120	110	105	105	110	105	G	G	140	140	190	G	175	130	110	120	105	105	S	S	100
24	S	S	S	S	S	110	115	110	B	B	B	140	125	125	B	150	150	S	105	105	105	110	105	105
25	105	105	S	125	110	105	S	110	105	G	B	G	185	190	160	150	115	105	105	105	105	105	105	S
26	S	S	S	S	120	120	S	105	110	G	G	G	G	G	175	155	S	125	110	110	105	105	S	S
27	S	S	S	S	S	115	115	110	105	B	B	B	B	B	B	155	S	S	105	105	105	105	105	105
28	105	S	S	S	105	S	110	105	105	G	G	G	G	G	G	G	S	S	S	S	S	S	S	S
29	S	S	S	S	S	S	S	S	G	G	G	G	G	G	G	155	S	105	105	S	S	105	110	105
30	S	S	S	E	S	110	105	105	105	G	G	G	G	G	G	135	120	S	120	S	115	105	105	105
31	100	S	S	S	S	S	S	S	B	105	B	G	B	B	B	S	S	S	110	105	105	105	105	105
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	7	9	9	13	15	15	17	14	19	3	10	11	11	12	14	27	19	19	26	24	20	20	17	15
MED	105	105	120	120	110	110	110	110	140	128	125	125	125	122	118	135	115	105	105	105	105	105	105	105
UQ	105	120	130	125	115	110	115	110	152	135	125	128	128	132	125	152	128	110	110	105	110	105	105	105
LQ	105	105	105	110	108	105	105	105	108	115	120	120	115	112	110	120	108	105	105	105	105	105	105	105

DEC. 1987 | H'ES (KM)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | TYPES OF ES | 135° E Mean Time (G.M.T. + 9 h)

Station WAKKANAI Lat. 45° 23.5' N, Long. 141° 41.2' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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										C 1	C 1		L 2			L 2	L 1	F 3		F 2				
2		F 6	F 2	F 3		F 1					C 2			C 1	L 2	L 1		F 2	F 2	F 2				
3							F 2	L 1								C 1		F 2	F 2	F 2				
4				F 1	F 2		F 1				C 1	C 2	C 1	C 1	C 2	L 1	L 3	F 3	F 3	F 2	F 2	F 2	F 2	F 1
5			F 1	F 2	F 3	F 2	F 4							C 1	C 1	H 1			F 2	F 6	F 2	F 3	F 2	
6				F 2	F 2	F 4	F 4	L 1						L 1	L 1	C 1		F 2	F 2	F 4	F 2	F 5	F 3	F 3
7	F 4	F 2	F 2	F 2			F 3	L 3	C 1							C 2	L 3	F 1	F 4	F 4		F 2		
8									H 1							C 2	L 1		F 3	F 3		F 4	F 2	F 1
9		F 2	F 2			F 1	F 1	C 2							C 1	C 2	C 3	F 4	F 1	F 2	F 2	F 2		
10					F 1	F 1	F 2									C 2	L 2					F 2		
11							F 1		C 2	C 2	C 2	C 1									F 1	F 1	F 1	F 2
12	F 2	F 1		F 1	F 5				C 2			C 2		C 1		C 3			F 1	F 2	F 3			
13		F 1	F 2	F 6	F 2	F 2	F 2	L 2	H 1		C 2				C 1	L 1	L 1	F 2	F 3	F 3	F 2	F 3	F 1	F 1
14	F 2	F 1	F 2	F 3	F 2		F 1	C 1	C 2	C 1						L 1	LC 11	F 1				F 1		
15									C 1					C 1		H 1	H 1		F 2	F 2				
16									C 2			C 2	C 2			H 1	H 2	FF 62	F 1	F 3	F 1		F 2	
17		F 4	F 6	F 6	F 4	F 3	F 4		C 3	C 3	C 3	C 3	CL 21	LH 21	C 4	CL 41	CL 22	F 3	F 1	F 6	F 4	F 3	F 2	F 2
18									H 1	H 1	L 1	L 1	L 1		L 3				FF 11	F 2	F 2	F 3	F 1	F 3
19	F 1		F 2	F 1	F 2				H 2	LH 21	L 3	C 2	C 2	C 2	L 2	C 1	L 5	F 4	F 3	F 1	F 1			
20		F 2		F 5	F 5	F 2	F 2	L 1							C 2	L 3	L 2	F 4	F 2					
21									C 2		C 1	C 2	L 1	L 1	L 1	C 1	C 5	F 2	F 7	F 3	F 2	F 2	F 2	F 2
22			F 1		F 3	F 2			C 2	C 2	CL 22	CL 22	C 1		C 2	C 2	L 3	F 2	F 2	F 2	F 1		F 1	F 1
23				F 1	F 6	F 4	F 2	L 1	L 1			C 1	C 2	H 1		H 1	C 2	F 5	F 1	F 5	F 3			F 2
24						F 2	F 1	L 1				C 1	C 1	C 1		H 1	C 1		F 3	F 3	F 3	F 2	F 2	F 2
25	F 1	F 1		F 1	F 2	F 2		L 1	L 2				H 1	H 1	H 1	C 1	L 2	F 3	F 2	F 1	F 2	F 1	F 1	
26					F 1	F 2		L 2	L 1						H 1	C 1		F 1	F 2	F 2	F 2	F 2		
27						F 2	F 2	L 1	L 2							C 1			F 2	F 3	F 6	F 3	F 1	F 2
28	F 2				F 2		F 1	L 1	L 2															
29																C 1		F 2	F 1			F 2	F 1	F 1
30						F 2	F 4	L 4	L 1							C 1	L 1		F 1		F 1	F 1	F 3	F 2
31	F 2									L 1									F 2	F 4	F 7	F 3	F 2	F 2
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																								
MED																								
UQ																								
LQ																								

The Radio Research Laboratory, Japan

DEC. 1987 | TYPES OF ES

IONOSPHERIC DATA

DEC. 1987 | FXI (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9h)

Station AKITA Lat. 39° 43' 5 N, Long. 140° 08' 0 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	X 35	X 36	X 36	X 36	X 36	X 36	X 34											X 35	X 39	X 42	X 37	38	38	42
2	41	40	X 41	X 42	X 39	X 41	X 40											X 42	X 38	X 37	X 37	X 33	X 35	X 37
3	X 37	X 39	X 39	X 38	X 39	X 38	X 39											X 45	X 41	X 38	X 38	X 34	X 36	38
4	40	X 39	X 39	X 39	43	X 44	X 41											X 48	X 44	X 42	X 36	X 31	X 35	X 36
5	X 37	X 38	X 39	43	50	X 51	X 42											X 53	A	A	X 41	X 38	X 43	X 34
6	X 37	X 39	X 42	X 37	39	A	44											X 52	X 48	X 36	X 36	X 39	X 34	X 38
7	X 38	X 37	38	X 39	X 41	X 38	X 36											X 54	X 55	X 37	X 37	X 38	X 39	X 38
8	X 41	X 37	X 37	X 38	X 39	X 38	X 38											X 50	X 50	H 34	X 37	X 38	X 41	X 44
9	X 43	X 43	X 43	X 42	X 38	X 37	X 36											X 42	A	X 39	X 36	X 37	X 39	X 37
10	X 39	X 38	38	36	38	X 36	36											X 38	X 38	X 38	X 45	X 44	X 45	X 45
11	42	38	37	X 37	X 41	X 42	33											A	X 46	X 43	37	38	42	42
12	X 39	42	X 37	X 39	X 31	X 32	X 36											X 44	X 36	X 41	A	X 40	44	45
13	42	44	43	X 41	X 39	39	38											X 47	X 36	X 34	X 34	40	43	45
14	48	47	48	44	45	38	X 30											X 58	X 42	X 34	X 31	X 32	X 35	X 36
15	X 34	X 36	X 37	X 37	X 38	X 41	X 37											X 43	X 46	X 39	S 32	X 35	X 40	X 36
16	X 38	X 39	X 36	X 36	X 38	X 42	39											X 65	X 59	H 44	X 35	36	43	X 41
17	X 38	38	X 37	40	42	45	45											X 47	X 51	X 42	X 30	35	40	41
18	40	40	X 40	X 38	X 34	X 33	X 38											X 51	X 47	X 39	A	34	X 37	X 36
19	X 37	X 38	A	A	X 31	X 34	X 35											X 40	X 45	A	A	A	A	A
20	36	38	40	37	X 36	A	A											X 45	X 43	X 40	A	A	A	X 36
21	X 36	X 36	X 37	X 35	X 37	X 38	X 39											X 45	X 46	A	X 34	X 31	X 36	39
22	40	X 40	43	39	39	40	X 39											A	A	X 49	X 48	X 37	X 45	X 46
23	X 44	X 45	43	47	X 39	39	40											X 44	X 43	X 51	X 33	A	37	40
24	X 30	33	40	49	49	48	44											X 44	X 35	A	A	A	42	44
25	35	X 34	X 35	36	37	35	X 36											A	A	47	41	A	A	A
26	X 35	X 34	X 36	39	39	39	34											X 62	X 41	X 32	X 35	37	A	38
27	X 36	X 35	X 34	X 32	X 33	X 32	X 37											X 44	X 38	X 36	X 35	38	A	X 36
28	X 37	X 37	X 38	X 38	X 36	X 35	X 36											X 46	X 32	X 32	X 38	X 36	X 33	X 34
29	X 34	X 35	X 37	X 36	X 36	X 33	X 34											X 44	X 40	X 44	X 38	X 37	X 36	X 38
30	X 39	X 41	X 44	46	43	X 40	X 38											S 41	X 38	X 39	X 39	X 36	X 34	X 36
31	X 38	X 38	X 38	X 39	X 38	X 37	X 38											X 41	X 42	X 44	A	X 36	X 36	X 38
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	30	30	31	29	30											28	27	27	25	26	26	29
MED	X 38	X 38	X 38	X 38	X 39	X 38	X 38											X 45	X 42	X 39	X 37	X 37	X 38	X 38
UQ	X 40	X 40	X 41	41	40	X 41	X 39											X 50	X 46	X 42	X 38	X 38	X 42	42
LQ	X 36	X 36	X 37	X 37	X 36	X 36	X 36											X 42	X 38	X 36	X 35	X 35	X 36	X 36

DEC. 1987 | FXI (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FOF2 (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station AKITA Lat. 39° 43.5 N, Long. 140° 08.0 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	29	30	30	30	30	30	28	58	60	60	67	76	81	72	66	64	59	29	33	36	31	F	F 31	F
2	F 33	F 32	35	36	33	35	34	56	73	70	75	84	73	78	74	72	52	36	32	31	31	27	29	31
3	31	33	33	32	33	32	33	52	60	64	63	71	68	82	H 79	79	68	79	35	32	32	28	30	F
4	F	33	33	33	F 36	38	35	49	62	72	72	81	83	H 81	72	72	70	42	38	36	30	25	29	30
5	31	32	33	F 36	F	45	36	56	66	78	61	84	93	89	75	56	56	52	A	A	35	32	37	28
6	31	33	36	31	F	A	F	60	74	91	87	H 79	75	71	H 65	H 61	53	46	42	30	30	33	28	32
7	32	31	F	33	35	32	30	53	73	82	83	72	68	H 72	H 62	49	55	48	49	31	31	32	33	32
8	35	31	31	32	33	32	32	60	62	72	82	90	73	66	H 66	59	V 48	44	44	H 28	31	32	35	33
9	37	37	37	36	32	31	30	49	62	75	76	75	69	57	H 60	54	45	36	A	33	30	31	33	31
10	33	32	F 31	F 28	F	30	F	45	62	60	65	72	68	65	62	54	44	32	32	32	32	38	39	39
11	F	F	F	31	35	36	F 25	45	70	82	105	82	68	65	70	61	47	A	40	37	F 29	F 31	F 35	F
12	33	F	31	33	25	26	30	44	59	77	83	71	74	72	64	58	49	38	30	35	A	34	F	F 35
13	F	F	F 34	35	33	F	F	50	65	73	93	81	H 72	64	61	53	50	41	30	28	28	F 32	F	F 34
14	F	F	F 37	F 37	F	F	24	44	59	68	79	80	64	61	59	57	59	52	36	28	25	26	29	30
15	30	30	31	31	32	35	31	47	50	69	76	V 71	66	61	60	52	46	37	40	33	S 26	29	34	30
16	32	33	30	30	32	36	F	46	58	H 75	85	82	94	90	80	61	H 54	59	53	H 38	29	F	F	35
17	32	F 31	31	F 32	F	F 36	F	50	61	85	113	90	76	72	65	64	60	41	45	36	24	F	F 33	F
18	F 33	F 33	34	32	28	27	32	54	60	67	92	104	95	71	59	58	48	45	41	33	A	F	31	30
19	31	32	A	A	25	28	29	50	61	64	70	74	71	62	60	54	50	34	39	A	A	A	A	A
20	F 29	F 30	F 30	F 30	30	A	A	48	57	60	66	74	73	67	66	60	V 47	39	37	34	A	A	A	30
21	30	30	31	29	31	32	33	49	55	62	81	72	71	64	61	62	48	39	40	A	28	25	30	F 31
22	F 32	34	F 36	F 32	F 33	F 33	33	52	78	90	114	100	74	H 79	72	70	60	A	A	43	42	31	39	40
23	38	39	F	F 39	33	F 30	F 32	51	71	73	100	95	81	72	75	74	56	38	37	45	32	A	F 29	F 32
24	24	F 24	F	F	F	F	F 34	56	68	66	83	98	76	76	70	66	56	38	29	A	A	A	F	F
25	F 28	28	29	F 29	F 29	F	30	55	65	64	82	81	67	67	60	59	45	A	A	F 36	F 32	A	A	A
26	29	28	30	F 30	F 30	F 29	F 25	54	76	73	69	72	68	64	61	62	55	56	35	26	29	F	A	F 29
27	30	29	28	26	27	26	31	45	63	76	87	73	63	65	67	56	52	38	32	30	29	F 29	A	30
28	31	31	32	32	30	29	30	45	62	62	65	69	67	67	58	61	55	40	26	26	32	30	27	28
29	28	29	31	30	30	27	28	48	54	61	81	79	66	61	60	56	55	33	34	38	32	31	30	32
30	33	35	38	F	F 35	34	32	44	58	67	71	72	76	69	65	57	51	S 35	32	33	33	30	28	30
31	32	32	32	33	32	31	32	46	54	S 66	75	73	67	64	61	61	52	35	36	38	A	30	30	32
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	26	28	25	25	25	31	31	31	31	31	31	31	31	31	31	28	27	27	25	21	22	24
MED	31	32	32	32	32	32	31	50	62	70	81	79	72	67	65	60	52	39	36	33	31	31	30	31
UQ	33	33	34	33	33	35	33	54	67	76	86	83	76	72	70	63	56	44	40	36	32	32	34	33
LQ	30	30	31	30	30	29	30	46	59	64	70	72	68	64	60	56	48	36	32	30	29	29	29	30

DEC. 1987 | FOF2 (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FOF1 (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station AKITA Lat. 39° 43.5 N, Long. 140° 08.0 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	L									
3										L	L	L	L	L	L									
4											L	L 400	L	A	A									
5											L	L	L	L	L									
6										L	L	L	L	L	L									
7										L	L	L	L	L										
8										L	L	L	L	L										
9										L	L	L	L	L										
10										L	L	L	L	L	L									
11										L	400	L	400	L	A									
12										L	L	L	L	L	L									
13										L	L	L	400	L	L									
14										L	L	L 390	A	L	330									
15										L	L	400	380	L	L									
16											L	L	L	L	L									
17										A	L	L	L	L										
18											L	L	L	L										
19										L	L	L	L	L	L									
20											L	L	L	L	L									
21											L	L	L	L	L									
22											L	L	L	L										
23											L	L	L	340										
24										L 350	L	L	L	L	L									
25										340	370	L	390	340	L									
26										A	L	L	L	L	L 330									
27											330	L	L	L										
28											L	L	L	L										
29										L	L	L	L	L 360										
30										L	L	L	L	L	L									
31										L	400	L	L	L										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT										2	4	3	4	3	2									
MED										345	385	L 400	395	340	330									
UQ											400	400	400	350										
LQ											350	395	385	340										

DEC. 1987 | FOF1 (0.01 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FOE (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station AKITA Lat. 39° 43.5' N, Long. 140° 08.0' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	230	270	A	A	A	295	255	220	S							
2								S	230	265	285	290	290	A	A	A	S							
3								S	225	270	285	A	A	285	A	S	S							
4								S	220	270	290	295	290	A	A	A	S							
5								S	B	B	275	295	295	285	A	A	S							
6								S	215	255	A	290	300	300	A	A	S							
7								S	220	280	A	300	300	295	265	A	S							
8								185	215	260	295	305	305	300	275	220	S							
9								S	230	280	300	300	305	A	285	A	S							
10								S	A	270	295	305	300	290	260	210	S							
11								S	200	250	275	285	285	270	245	205	S							
12								S	205	255	A	A	A	A	255	230	S							
13								S	A	255	280	295	305	A	A	A	S							
14								S	215	255	280	300	A	A	255	220	S							
15								S	220	265	285	A	300	A	255	210	S							
16								S	235	A	A	A	A	A	A	205	S							
17								S	200	245	285	295	300	290	A	A	S							
18								S	A	A	A	300	300	295	265	A	S							
19								S	A	260	A	A	A	285	255	A	S							
20								S	200	A	A	A	300	290	260	A	S							
21								S	195	255	290	A	A	A	A	A	S							
22								S	A	245	285	300	300	280	255	215	S							
23								S	195	250	285	290	290	290	255	230	S							
24								S	210	255	285	300	300	285	260	220	S							
25								S	A	A	280	300	300	300	A	240	S							
26								S	215	A	A	300	300	290	265	210	S							
27								S	A	A	290	305	300	A	A	S	S							
28								S	210	250	290	300	305	295	270	220	S							
29								S	A	255	295	305	305	290	260	A	S							
30								S	210	A	295	305	305	290	255	230	S							
31								S	A	S	A	A	300	290	260	225	S							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								1	21	22	21	22	24	21	20	16								
MED								185	215	255	285	300	300	290	260	220								
UQ									220	270	290	300	302	295	245	223								
LQ									205	255	285	295	300	285	255	210								

DEC. 1987 | FOE (0.01 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FOES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station AKITA | Lat. 39° 43.5' N, | Long. 140° 08.0' E | Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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 S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 17	G	G	J A 32	J A 44	J A 30	G	G	G	E S 16	E S 16	J A 24	E S 16	E S 16	E S 16	E S 16	E S 15
2	E S 16	E S 15	E S 15	J A 28	J A 20	E S 16	E S 16	E S 17	G	29	31	33	J A 47	33	J A 35	J A 24	E S 16	J A 30	J A 26	E S 16	E S 15	E S 15	E S 16	E S 16
3	E S 15	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	G	G	J A 84	32	J A 40	G	31	J A 32	J A 24	J A 32	J A 31	J A 25	J A 25	J A 24	E S 16	E S 16
4	E S 16	E S 16	E S 15	E S 15	E S 16	E S 16	E S 16	E S 18	G	G	G	G	34	J A 75	J A 113	J A 65	J A 46	J A 25	J A 24	J A 26	J A 23	J A 32	E S 16	J A 24
5	E S 16	E S 16	E S 15	E S 15	J A 21	J A 47	J A 33	J A 34	E B 23	E B 24	29	G	G	G	J A 36	J A 54	J A 51	J A 21	J A 87	J A 60	J A 45	J A 25	J A 29	J A 25
6	J A 25	E S 15	E S 15	E S 15	J A 21	J A 50	J A 31	J A 21	J A 40	G	31	G	G	G	30	27	E S 17	J A 24	J A 26	J A 52	J A 36	J A 32	J A 25	J A 23
7	J A 41	J A 25	J A 23	E S 15	E S 16	J A 26	J A 22	J A 33	J A 40	J A 46	J A 33	G	G	G	G	J A 36	J A 45	J A 80	J A 51	J A 22	J A 30	E S 16	E S 16	E S 16
8	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	G	G	G	G	G	G	G	30	29	J A 25	E S 18	E S 16	E S 16	E S 16	E S 16	J A 20	E S 16
9	J A 25	E S 15	E S 15	E S 16	J A 18	E S 15	E S 16	21	G	G	G	G	34	38	G	J A 38	J A 31	J A 35	J A 50	J A 29	E S 15	J A 21	E S 15	J A 24
10	E S 16	E S 15	E S 15	E S 15	E S 16	E S 16	E S 16	E S 16	J A 26	G	G	G	G	G	G	G	J A 23	E S 16	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16
11	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	24	G	32	J A 41	35	31	35	36	J A 44	J A 37	J A 38	J A 32	J A 22	J A 26	E S 15	J A 41	J A 29
12	J A 18	J A 24	J A 24	E S 16	E S 15	E S 15	J A 20	J A 24	G	32	J A 52	33	J A 36	30	31	29	J A 28	J A 25	J A 28	J A 21	J A 50	J A 24	J A 32	E S 16
13	E S 16	E S 15	J A 29	J A 32	J A 43	J A 28	J A 41	J A 24	J A 29	G	35	36	35	J A 32	J A 28	J A 29	J A 31	J A 29	J A 28	J A 25	J A 25	J A 28	J A 21	J A 24
14	E S 16	E S 16	E S 16	J A 21	J A 25	J A 18	E S 16	24	J A 33	32	34	35	J A 50	36	G	G	E S 17	J A 21	J A 24	J A 24	E S 16	E S 16	E S 15	E S 15
15	J A 23	E S 16	E S 16	E S 15	E S 15	E S 15	E S 16	E S 16	G	30	G	J A 32	G	30	G	G	E S 17	J A 21	J A 20	J A 26	E S 16	E S 15	E S 19	E S 15
16	E S 16	E S 15	E S 15	E S 16	E S 15	E S 16	E S 16	E S 16	G	35	J A 54	36	J A 36	J A 33	J A 30	G	23	J A 24	J A 29	J A 31	E S 16	E S 18	E S 16	E S 16
17	E S 17	E S 15	J A 44	J A 52	J A 22	E S 16	E S 15	E S 16	24	J A 48	35	39	J A 31	J A 26	J A 30	J A 30	J A 37	E S 16	J A 24	J A 33	J A 23	E S 16	J A 26	J A 53
18	J A 45	J A 26	E S 15	E S 15	E S 16	J A 18	E S 16	E S 16	J A 25	J A 33	J A 33	G	G	G	G	J A 31	J A 30	J A 30	J A 29	J A 34	J A 53	J A 42	J A 52	J A 44
19	J A 43	J A 42	J A 62	J A 46	J A 42	E S 16	E S 16	E S 16	27	G	32	33	J A 46	30	G	J A 29	J A 34	J A 29	J A 32	J A 84	J A 87	J A 70	J A 84	J A 44
20	E S 16	E S 15	E S 15	E S 15	J A 24	J A 45	J A 84	J A 20	J A 24	J A 46	J A 44	J A 44	33	G 21	30	J A 36	J A 24	J A 64	J A 52	J A 28	J A 30	J A 46	J A 41	J A 23
21	E S 15	E S 15	E S 16	E S 16	E S 15	J A 18	E S 16	J A 20	G	29	37	J A 32	J A 46	J A 34	J A 30	J A 23	J A 26	J A 18	J A 24	J A 43	J A 27	E S 16	J A 23	J A 24
22	E S 16	E S 15	E S 16	J A 24	J A 50	J A 42	J A 25	J A 23	30	J A 41	36	J A 49	J A 44	30	J A 30	33	J A 29	J A 126	J A 110	J A 30	J A 31	J A 24	E S 15	J A 24
23	E S 15	E S 15	E S 15	J A 49	J A 21	J A 53	J A 47	J A 26	J A 26	J A 29	J A 30	J A 30	G	G	G	G	E S 18	J A 24	J A 52	J A 20	J A 29	J A 40	J A 25	J A 18
24	J A 18	E S 15	J A 22	J A 31	J A 29	J A 24	J A 60	J A 27	G	G	G	G	G	G	G	G	E S 17	J A 30	J A 29	J A 83	J A 63	J A 50	J A 32	J A 24
25	J A 27	E S 16	J A 25	J A 25	J A 44	J A 31	J A 20	E S 18	J A 24	J A 30	G	G	G	G	30	30	J A 44	J A 84	J A 84	J A 84	J A 84	J A 40	J A 37	J A 43
26	J A 34	J A 36	J A 25	E S 15	E S 15	E S 15	J A 49	J A 29	22	J A 64	J A 50	J A 34	G	G	G	J A 28	E S 19	E S 17	J A 44	J A 65	J A 62	J A 43	J A 60	J A 36
27	J A 29	J A 24	J A 28	J A 20	E S 15	E S 15	J A 21	J A 24	J A 41	J A 36	G	J A 53	J A 50	J A 46	32	E S 24	E S 17	E S 16	E S 16	J A 23	J A 24	J A 32	J A 34	J A 26
28	J A 29	J A 25	E S 16	E S 15	E S 15	E S 16	E S 16	J A 23	J A 25	J A 31	J A 44	34	G	G	G	G	E S 18	E S 16	E S 16	E S 15	E S 15	E S 15	J A 24	J A 22
29	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 16	25	G	G	32	33	J A 66	G	J A 28	20	J A 24	J A 20	E S 15	E S 15	J A 20	E S 15	E S 15
30	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	J A 26	J A 32	30	G	G	G	G	G	G	20	J A 20	J A 24	E S 15	E S 15	E S 15	E S 15	J A 24
31	E S 16	E S 15	E S 15	E S 16	E S 15	E S 15	E S 15	E S 16	J A 45	E S 36	J A 45	J A 54	G	G	G	G	E S 19	J A 36	J A 36	J A 32	J A 62	J A 35	J A 24	J A 50
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	20	24	30	32	32	31	G 21	28	28	J A 24	J A 24	J A 28	J A 26	J A 25	J A 24	J A 23	J A 24
UQ	J A 25	E S 16	J A 22	J A 22	J A 22	J A 25	J A 24	J A 24	J A 28	J A 33	J A 39	36	J A 36	33	30	J A 32	J A 31	J A 31	J A 40	J A 34	J A 40	J A 34	J A 32	J A 26
LQ	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15	E S 16	E S 16	G	G	G	G	G	G	G	G	E S 18	J A 19	J A 24	J A 20	E S 16	E S 16	E S 16	E S 16

DEC. 1987 | FOES (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FBES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station AKITA | Lat. 39° 43.5' N, Long. 140° 08.0' E | Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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 S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 17 17	G	G	30	31	30	G	G	G	E S 16 16	E S 16 16	20	E S 16 16	E S 16 16	E S 16 16	E S 16 16	E S 15 15
2	E S 16 15	E S 15 15	E S 15 15	E S 15 15	E S 16 16	E S 16 16	E S 16 16	E S 17 17	G	28	31	33	34	32	30	23	E S 16 16	20	E S 16 16	E S 16 16	E S 15 15	E S 15 15	E S 16 16	E S 16 16
3	E S 15 15	E S 15 15	E S 16 16	E S 16 16	E S 16 16	E S 16 16	E S 16 16	E S 16 16	G	G	G 18 18	32	32	G	31	29	18	20	19	E S 15 15	E S 16 16	E S 15 15	E S 16 16	E S 16 16
4	E S 16 16	E S 16 16	E S 15 15	E S 15 15	E S 16 16	E S 16 16	E S 16 16	E S 18 18	G	G	G	G	34	50	61	28	29	E S 16 16	E S 16 16	18	19	E S 16 16	E S 16 16	E S 16 16
5	E S 16 16	E S 16 16	E S 15 15	E S 15 15	E S 16 16	19	21	25	E B 23 23	E B 24 24	29	G	G	G	32	33	22	20	A A 87 87	A A 60 60	23	19	20	21
6	E S 16 16	E S 15 15	E S 15 15	E S 15 15	E S 15 15	A A 50 50	18	E S 16 16	18	G	31	G	G	G	28	25	E S 17 17	19	23	24	25	26	E S 15 15	E S 15 15
7	29	19	E S 15 15	E S 15 15	E S 16 16	E S 15 15	E S 16 16	19	G 19 19	29	30	G	G	G	G	27	30	26	21	18	E S 15 15	E S 16 16	E S 16 16	E S 16 16
8	E S 16 16	E S 16 16	E S 16 16	E S 16 16	E S 16 16	E S 16 16	E S 16 16	G	G	G	G	G	G	G	30	28	19	E S 13 13	E S 16 16	E S 16 16	E S 16 16	E S 16 16	17	E S 16 16
9	E S 16 16	E S 15 15	E S 15 15	E S 16 16	E S 15 15	E S 15 15	E S 16 16	20	G	G	G	G	34	34	G	26	29	34	A A 50 50	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 15 15
10	E S 16 16	E S 15 15	E S 15 15	E S 15 15	E S 16 16	E S 16 16	E S 16 16	E S 16 16	23	G	G	G	G	G	G	G	18	E S 16 16	E S 16 16	E S 16 16	E S 15 15	E S 16 16	E S 16 16	E S 16 16
11	E S 16 16	E S 16 16	E S 15 15	E S 16 16	E S 16 16	E S 16 16	E S 16 16	20	G	29	35	32	30	35	36	44	37	A A 38 38	32	E S 15 15	E S 15 15	E S 15 15	21	E S 15 15
12	E S 15 15	E S 15 15	E S 15 15	E S 16 16	E S 15 15	E S 15 15	E S 15 15	E S 15 15	G	28	30	30	32	30	31	28	26	20	22	19	A A 50 50	19	E S 15 15	E S 16 16
13	E S 16 16	E S 15 15	E S 15 15	E S 15 15	23	20	18	19	24	G	34	34	G 25 25	30	27	26	19	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 15 15
14	E S 16 16	E S 16 16	E S 16 16	E S 15 15	E S 15 15	E S 15 15	E S 16 16	20	E S 16 16	29	31	31	42	30	G	G	E S 17 17	E S 15 15	E S 15 15	E S 16 16	E S 16 16	E S 16 16	E S 15 15	E S 15 15
15	19	E S 16 16	E S 16 16	E S 15 15	E S 15 15	E S 15 15	E S 16 16	E S 16 16	G	30	G	30	G	29	G	G	E S 17 17	E S 15 15	E S 15 15	20	E S 16 16	E S 15 15	E S 19 19	E S 15 15
16	E S 16 16	E S 15 15	E S 15 15	E S 16 16	E S 15 15	E S 15 16	E S 16 16	E S 16 16	G	32	39	33	30	30	25	G	22	20	17	27	E S 16 16	E S 16 18	E S 16 16	E S 16 16
17	E S 17 17	E S 15 15	26	18	E S 16 16	E S 16 16	E S 15 15	E S 16 16	23	42	32	32	G 28 28	G 21 21	27	24	26	E S 16 16	E S 16 16	31	E S 15 15	E S 16 16	E S 15 15	E S 15 15
18	28	21	E S 15 15	E S 15 15	E S 16 16	E S 16 16	E S 16 16	E S 16 16	22	29	32	G	G	G	G	22	19	17	20	23	A A 53 53	24	E S 16 16	22
19	25	E S 15 15	A A 62 62	A A 46 46	21	E S 16 16	E S 16 16	E S 16 16	23	G	32	32	30	G 23 23	G	25	26	26	24	A A 84 84	A A 87 87	A A 70 70	A A 84 84	A A 44 44
20	E S 16 16	E S 15 15	E S 15 15	E S 15 15	18	A A 45 45	A A 84 84	E S 16 16	G 18 18	30	30	33	32	G 21 21	27	26	E S 16 16	E S 16 16	21	E S 15 15	A A 30 30	A A 46 46	A A 41 41	21
21	E S 15 15	E S 15 15	E S 16 16	E S 16 16	E S 15 15	E S 15 15	E S 16 16	18	G	29	32	31	31	29	26	23	18	E S 15 15	E S 15 15	A A 43 43	E S 15 15	E S 16 16	E S 15 15	E S 15 15
22	E S 16 16	E S 15 15	E S 16 16	17	29	19	18	18	22	34	33	40	G 28 28	G 22 22	G 23 23	31	29	A A 126 126	A A 110 110	E S 15 15	20	E S 15 15	E S 15 15	E S 15 15
23	E S 15 15	E S 15 15	E S 15 15	20	E S 15 15	E S 15 15	E S 15 15	E S 15 15	G 18 18	G 19 19	G 21 21	G 20 20	G	G	G	G	E S 18 18	20	25	E S 15 15	22	A A 40 40	18	E S 15 15
24	E S 15 15	E S 15 15	19	25	21	E S 15 15	E S 15 15	21	G	G	G	G	G	G	G	G	E S 17 17	29	E S 16 16	A A 83 83	A A 63 63	A A 50 50	20	E S 15 15
25	18	E S 16 16	19	21	E S 15 15	20	E S 16 16	E S 18 18	21	29	G	G	G	G	23	29	32	A A 84 84	A A 84 84	E S 15 15	25	A A 40 40	A A 37 37	A A 43 43
26	24	22	E S 15 15	E S 15 15	E S 15 15	E S 15 15	20	E S 15 15	E S 17 17	37	30	G 22 22	G	G	G	G 20 20	E S 19 19	E S 17 17	E S 16 16	E S 15 15	21	21	A A 60 60	22
27	23	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 15 15	19	18	23	28	G	G 25 25	G 25 25	30	30	E S 24 24	E S 17 17	E S 16 16	E S 16 16	E S 15 15	E S 15 15	19	A A 34 34	E S 15 15
28	18	18	E S 16 16	E S 15 15	E S 15 15	E S 16 16	E S 16 16	19	19	G 20 20	G 26 26	G 23 23	G	G	G	G	E S 18 18	E S 16 16	E S 16 16	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 15 15
29	E S 16 16	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 16 16	23	G	G	G 20 20	G 21 21	G 20 20	G	23	20	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 15 15
30	E S 16 16	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 15 15	18	G 20 20	30	G	G	G	G	G	G	18	18	E S 16 16	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 15 15
31	E S 16 16	E S 15 15	E S 15 15	E S 16 16	E S 15 15	E S 15 15	E S 15 15	E S 16 16	21	E S 36 36	30	G 28 28	G	G	G	G	E S 19 19	26	30	22	A A 62 62	E S 15 15	E S 15 15	22
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	E S 16 16	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 16 16	E S 16 16	E S 17 17	G 18 18	28	30	G 25 25	G 25 25	G 20 20	G 23 23	24	19	18	17	E S 16 16	E S 16 16	E S 16 16	E S 16 16	E S 15 15
UQ	18	E S 16 16	E S 16 16	E S 16 16	E S 16 16	E S 16 16	E S 16 16	18	22	30	32	32	30	30	29	28	26	23	24	22	24	20	20	E S 16 16
LQ	E S 16 16	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 16 16	E S 16 16	G	G	G	G	G	G	G	G	E S 18 18	E S 16 16	E S 16 16	E S 15 15	E S 15 15	E S 15 15	E S 15 15	E S 15 15

DEC. 1987 | FBES (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FMIN (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station AKITA | Lat. 39° 43.5' N, | Long. 140° 08.0' E | Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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 S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 17	17	16	16	16	16	16	16	E S 16	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	E S 15
2	E S 16	E S 15	E S 15	E S 15	E S 16	E S 16	E S 16	E S 17	16	16	16	16	16	17	16	16	E S 16	E S 15	E S 15	E S 16	E S 15	E S 15	E S 16	E S 16
3	E S 15	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	18	18	19	17	16	18	E S 18	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15	E S 16	E S 16
4	E S 16	E S 16	E S 15	E S 15	E S 16	E S 16	E S 16	E S 18	E S 18	20	23	23	22	21	19	E S 16	E S 16	E S 16	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16
5	E S 16	E S 16	E S 15	E S 15	E S 16	E S 15	E S 15	E S 15	23	24	20	23	19	21	21	20	E S 16	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15	E S 16
6	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 16	16	21	23	26	24	20	21	17	E S 17	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15
7	E S 16	E S 15	E S 15	E S 15	E S 16	E S 15	E S 16	E S 16	16	18	20	21	20	19	19	16	E S 16	E S 15	E S 16	E S 15	E S 15	E S 16	E S 16	E S 16
8	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 17	23	20	24	27	23	20	E S 19	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 15	E S 16
9	E S 16	E S 15	E S 15	E S 16	E S 15	E S 15	E S 16	E S 16	E S 16	21	20	24	20	17	16	17	E S 17	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15
10	E S 16	E S 15	E S 15	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	18	16	18	16	16	E S 16	E S 16	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16
11	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	17	16	17	16	16	E S 16	E S 15	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15
12	E S 15	E S 15	E S 15	E S 16	E S 15	E S 15	E S 15	E S 15	16	16	17	17	18	18	18	E S 16	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 16
13	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	16	16	16	16	17	16	16	17	E S 17	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15
14	E S 16	E S 16	E S 16	E S 15	E S 15	E S 15	E S 16	E S 15	E S 16	17	17	17	17	16	16	16	E S 17	E S 15	E S 15	E S 16	E S 16	E S 16	E S 15	E S 15
15	E S 15	E S 16	E S 16	E S 15	E S 15	E S 15	E S 16	E S 16	E S 16	17	17	19	20	16	16	16	E S 17	E S 15	E S 15	E S 15	E S 16	E S 15	E S 19	E S 15
16	E S 16	E S 15	E S 15	E S 16	E S 15	E S 15	E S 16	E S 16	E S 16	16	16	16	16	16	17	16	E S 17	E S 16	E S 15	E S 15	E S 16	E S 18	E S 16	E S 16
17	E S 17	E S 15	E S 15	E S 15	E S 16	E S 16	E S 15	E S 16	E S 16	16	17	16	16	15	16	16	E S 15	E S 16	E S 16	E S 15	E S 15	E S 16	E S 15	E S 15
18	E S 15	E S 15	E S 15	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	16	16	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
19	E S 15	E S 15	E S 15	E S 15	E S 15	E S 16	E S 16	E S 16	E S 18	16	16	17	17	17	17	16	E S 16	E S 15	E S 15	E S 16	E S 15	E S 15	E S 15	E S 15
20	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 16	16	17	17	16	16	16	17	16	E S 16	E S 15	E S 16	E S 15	E S 15	E S 15	E S 15	E S 16
21	E S 15	E S 15	E S 16	E S 16	E S 15	E S 15	E S 16	E S 16	E S 16	16	18	18	18	16	16	17	E S 16	E S 15	E S 15	E S 15	E S 15	E S 16	E S 15	E S 15
22	E S 16	E S 15	E S 16	E S 15	E S 15	E S 15	E S 15	E S 16	E S 16	16	18	16	16	18	18	16	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15
23	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	16	16	15	16	21	20	20	16	E S 18	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15
24	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	16	17	18	21	20	21	20	18	E S 17	E S 16	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15
25	E S 15	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15	E S 16	16	17	17	17	17	18	17	18	E S 17	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15
26	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 17	17	17	18	20	19	19	16	E S 19	E S 17	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15
27	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 16	E S 16	16	16	17	17	19	18	17	E S 24	E S 17	E S 16	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15
28	E S 16	E S 15	E S 16	E S 15	E S 15	E S 16	E S 16	E S 15	17	17	17	16	17	17	18	17	E S 18	E S 16	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15
29	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 16	16	16	17	16	16	16	17	16	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15
30	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 16	16	17	17	22	17	17	13	18	E S 16	E S 17	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15
31	E S 16	E S 15	E S 15	E S 16	E S 15	E S 15	E S 15	E S 16	17	E S 36	20	18	20	23	20	20	E S 19	E S 16	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15	E S 16	E S 16	16	16	17	17	17	17	17	16	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15
UQ	E S 16	E S 15	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	16	13	18	20	20	19	19	18	E S 17	E S 16	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16
LQ	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 16	E S 16	16	16	16	16	16	16	16	E S 16	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15	E S 15

DEC. 1987 | FMIN (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | M(3000)F2 (0.01) | 135° E Mean Time (G.M.T. + 0 h)

Station AKITA Lat. 39° 43.5' N, Long. 140° 08.0' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	300	300	305	300	320	370	375	365	345	355	360	375	380	360	375	310	335	350	320	F	F 295	F
2	F 335	F 335	290	300	325	320	325	340	370	355	355	345	370	350	360	375	385	325	320	320	355	305	270	265
3	290	280	280	295	305	310	340	360	355	365	355	340	380	340	H 315	365	380	350	290	345	345	255	285	F
4	F	295	285	285	F 305	340	355	365	370	335	360	350	360	H 320	345	370	315	355	330	335	335	290	275	290
5	295	295	275	F 305	F	355	335	375	365	355	360	325	345	360	360	380	320	330	A	A	320	310	365	285
6	275	300	325	315	F	A	F	365	370	340	355	H 320	335	345	H 325	H 345	355	325	350	335	325	330	330	330
7	A	310	F	295	285	310	305	360	340	355	380	370	340	H 320	H 370	385	365	285	350	320	290	290	305	295
8	315	290	285	305	305	310	345	345	355	345	340	375	365	380	H 365	360	V 355	335	355	H 330	290	310	340	305
9	300	300	300	350	345	350	305	340	360	350	355	380	380	380	H 355	370	355	A	A	350	300	330	305	290
10	305	310	F 330	F 320	F	310	F	335	360	360	340	350	365	360	370	355	330	320	310	305	290	310	325	300
11	F	F	F	290	285	350	F 265	310	340	305	350	365	350	340	350	365	360	A	340	370	F 310	F 300	F 290	F
12	295	F	325	355	380	305	300	330	340	350	360	365	345	350	360	370	345	340	300	345	A	295	F	F 300
13	F	F	F 320	320	335	F	F	345	355	340	355	335	H 370	365	365	375	360	360	345	375	300	F 320	F	F 320
14	F	F	F 345	F 325	F	F	290	350	355	350	370	370	365	355	370	350	355	360	360	375	320	305	295	315
15	290	300	285	285	300	340	310	360	375	365	355	V 355	365	365	355	370	360	350	350	360	S 330	305	325	310
16	305	300	265	285	310	335	F	345	380	H 335	355	340	330	345	330	345	H 305	330	365	H 345	250	F	F	325
17	305	F 300	A	F 295	F	F 305	F	355	345	315	355	355	350	360	355	360	350	330	335	360	290	F	F 305	F
18	F 295	F 295	325	335	290	295	305	350	360	330	345	355	355	355	365	360	355	320	340	365	A	F	290	300
19	295	305	A	A	305	285	295	380	360	355	360	360	360	350	345	345	340	340	325	A	A	A	A	A
20	F 295	F 300	F 305	F 285	315	A	A	360	375	365	335	350	350	360	355	375	V 340	345	350	375	A	A	A	300
21	285	275	290	280	290	310	340	350	365	325	360	360	355	345	360	365	345	330	355	A	335	280	275	F 290
22	F 300	295	F 325	F 310	F 305	F 295	320	345	340	310	350	370	350	H 315	345	370	360	A	A	320	355	300	295	300
23	295	290	F	F 310	350	F 300	F 335	345	370	340	360	370	370	345	350	360	370	355	330	350	385	A	F 280	F 330
24	335	F 305	F	F	F	F	F 330	350	380	350	325	380	350	345	365	350	365	345	300	A	A	A	F	F
25	F 290	265	280	F 295	F 300	F	310	365	385	360	345	355	355	360	360	350	370	A	A	F 360	F 355	A	A	A
26	305	275	300	F 300	F 305	F 310	F 315	350	380	375	365	350	350	360	345	355	345	355	370	345	315	F	A	F 295
27	335	310	325	315	295	305	340	350	365	355	360	365	355	340	375	345	360	345	360	330	345	F 315	A	300
28	295	290	300	290	300	290	325	375	370	370	365	360	375	375	365	345	365	325	360	340	345	325	315	300
29	290	280	320	315	325	305	325	355	390	325	360	360	375	360	350	340	350	370	325	365	345	330	335	295
30	305	315	320	F	F 315	325	375	355	375	355	360	315	350	360	365	330	370	S 360	345	350	355	340	290	305
31	300	295	305	305	310	305	345	370	370	S 375	350	370	375	360	375	360	370	320	335	325	A	315	295	310
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	27	25	28	25	25	25	31	31	31	31	31	31	31	31	31	31	27	27	27	25	21	22	24
MED	295	300	300	302	305	310	325	350	365	350	355	355	355	355	360	360	355	340	340	345	325	310	295	300
UQ	305	302	325	315	315	325	340	362	375	360	360	369	363	369	365	370	365	352	352	360	345	320	325	310
LQ	290	290	285	292	300	305	305	345	355	338	350	350	350	345	350	350	345	325	328	332	300	300	290	295

The Radio Research Laboratory, Japan

DEC. 1987 | M(3000)F2 (0.01)

IONOSPHERIC DATA

DEC. 1987 | M(3000)F1 (0.01) | 135° E Mean Time (G.M.T. + 9h)

Station AKITA Lat. 39° 43.5' N, Long. 140° 08.0' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	L									
3										L	L	L	L	L	L									
4											L	L 395	L	A	A									
5											L	L	L	L	L									
6										L	L	L	L	L	L									
7										L	L	L	L	L										
8										L	L	L	L	L										
9										L	L	L	L	L										
10										L	L	L	L	L	L									
11										L	390	L	390	L	A									
12										L	L	L	L	L	L									
13										L	L	L	405	L	L									
14										L	L	L 405	A	L	410									
15										L	L	400	425	L	L									
16											L	L	L	L	L									
17										A	L	L	L	L										
18											L	L	L	L										
19										L	L	L	L	L	L									
20											L	L	L	L	L									
21											L	L	L	L	L									
22											L	L	L	L										
23											L	L	L	445										
24										L 435	L	L	L	L	L									
25										390	405	L	395	400	L									
26										A	L	L	L	L	L 420									
27											440	L	L	L										
28											L	L	L	L										
29										L	L	L	L	L 435										
30										L	L	L	L	L	L									
31										L	390	L	L	L										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT										2	4	3	4	3	2									
MED										412	398	L 400	400	435	415									
UQ											422	402	415	440										
LQ											390	398	392	418										

DEC. 1987 | M(3000)F1 (0.01)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | H'F2 (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station AKITA Lat. 39° 43.5 N, Long. 140° 08.0 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1											230	235	240	230	225									
2										230	230	240	225	235	240									
3										225	240	240	225	270	235H									
4											225	240	225	250	A									
5											225	245	250	230	235									
6										250	240	225	230	230	225									
7										235	220	230	225	225										
8										240	250	225	235	225										
9										230	240	220	240	230										
10										230	245	250	240	230	225									
11										255	245	220	240	260	245									
12										245	235	235	255	250	230									
13										250	245	225	230	225	245									
14										235	235	230	230	250	235									
15										240	235	240	230	230	240									
16											245	255	255	240	245									
17										275	240	235	240	230										
18											250	245	230	225										
19										225	235	235	245	230	220									
20											245	240	245	245	235									
21											235	230	245	245	235									
22											245	225	225	220										
23											240	230	235	240										
24										230	245	230	235	250	235									
25										205	240	230	240	240	230									
26										210	220	235	240	240	240									
27											235	225	235	235										
28											220	235	240	240										
29										225	245	235	230	230										
30										240	240	240	245	240	245									
31										250	250	230	230	240										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT										20	31	31	31	31	19									
MED										235	240	235	235	235	235									
UQ										248	245	240	240	242	240									
LQ										228	235	230	230	230	230									

DEC. 1987 | H'F2 (KM)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | H'F (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station AKITA | Lat. 39° 43.5' N | Long. 140° 08.0' E | Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	ES 305	ES 290	285	270	270	255	240	225	215	215	225	215	225	230	225	210	205	205	255	225	250	270	295	315
2	260	265	275	255	235	245	245	235	225	225	225	205	225	225	240	220	200	245	215	235	230	255	310	305
3	300	300	300	285	265	250	230	205	205	200	225	220	225	240	225	220	205	215	270	220	220	275	295	325
4	300	295	325	300	280	220	230	200	200	210	225	210	230	A	A	215	A 225	215	220	220	205	300	300	305
5	295	290	295	275	270	225	A 230	200	205	230	200	225	200	235	230	210	A 220	225	A	A	A	E A 250	245	A
6	330	285	240	250	260	A	245	210	220	225	220	200	220	230	200	215	210	230	225	A	A	A	225	240
7	A	270	275	285	290	275	260	225	225	230	220	210	200	220	220	200	A 225	A	230	250	290	285	245	280
8	255	270	285	275	265	235	235	240	H 215	230	220	230	215	235	225	225	205	230	215	210	255	265	250	250
9	255	255	245	225	245	225	260	230	225	230	220	215	A	220	225	225	220	A	A	220	255	230	270	E S 325
10	265	260	245	245	250	250	270	240	230	215	220	195	225	230	220	220	210	225	250	280	270	250	245	270
11	230	240	245	295	275	220	E S 305	250	240	235	A	210	210	A	A	225	A 225	A	A	220	E S 300	E S 290	A	E S 285
12	280	245	235	215	195	280	270	230	230	240	220	220	220	240	A	230	220	225	A	230	A	E A 280	E S 300	250
13	305	270	255	255	A	E A 275	E A 290	230	225	210	A	A	205	200	220	215	210	205	220	210	E S 285	260	250	270
14	280	245	235	250	245	225	E S 275	225	225	225	210	210	A	205	200	240	225	220	210	210	240	E S 300	E S 290	260
15	290	290	290	290	270	235	245	220	210	235	220	200	200	200	200	225	210	220	235	230	E S 250	270	250	255
16	280	290	E S 350	300	260	240	220	205	210	225	A	H 210	H 200	215	H 200	225	230	245	220	A 230	330	295	290	240
17	265	280	A	300	310	255	240	225	240	A	240	230	210	215	235	230	225	215	240	A	A 255	300	270	310
18	A	A 320	245	230	255	290	260	235	215	220	240	225	230	210	220	215	205	240	225	A 230	A	A	290	A
19	A	265	A	A	A	275	275	210	220	210	225	225	215	210	210	220	215	A	A	A	A	A	A	A
20	265	E S 275	250	E S 310	260	A	A	210	210	215	235	225	225	225	210	220	200	240	240	220	A	A	A	A
21	290	300	295	295	285	250	235	215	210	225	230	215	200	200	235	235	205	225	210	A	230	E S 305	E S 320	E S 320
22	285	290	255	260	A	290	255	235	230	230	240	A	210	205	240	220	215	A	A	240	225	250	285	265
23	275	285	260	275	225	E S 305	260	220	215	210	245	235	235	200	245	230	200	210	A	240	205	A	E A 320	245
24	250	E S 300	E A 300	A	E A 300	E S 290	270	220	205	200	220	230	210	195	225	220	205	A	E S 230	A	A	A	E A 330	265
25	240	E S 325	E A 325	A	295	A	260	225	H 210	205	200	H 200	200	205	205	220	220	A	A	230	A	A	A	A
26	A	A	E S 310	280	280	245	E A 310	235	220	A	205	195	205	H 200	205	230	220	220	205	230	A	A	A	A
27	A	250	250	270	E S 300	E S 300	250	205	225	230	195	220	210	210	240	210	210	225	210	245	220	E A 275	A	E S 305
28	295	295	280	290	255	280	240	210	205	205	200	200	220	220	225	235	215	210	210	235	235	230	255	E S 300
29	E S 295	E S 300	270	275	245	270	255	220	205	200	200	230	220	200	230	230	225	205	235	220	225	220	230	E S 300
30	270	260	260	245	275	250	200	210	210	225	200	200	235	220	225	220	200	225	230	220	230	220	E S 280	E S 300
31	275	E S 310	E S 290	260	275	260	230	205	200	E S 230	200	225	200	200	230	230	210	A	A	A 250	A	270	E S 325	A
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	30	29	28	28	28	30	31	31	29	28	29	29	29	28	31	31	23	22	25	21	23	25	24
MED	278	276	265	274	265	250	247	220	215	225	220	215	215	215	225	220	210	225	224	230	235	260	U 268	U 267
UQ	292	292	288	289	278	272	265	230	225	230	225	225	225	225	239	230	220	228	235	235	255	279	292	E S 305
LQ	265	262	250	252	252	238	235	210	210	210	202	205	205	200	210	218	205	215	215	220	225	250	250	258

DEC. 1987 | H'F (KM)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | H'E (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station AKITA Lat. 39° 43.5' N, Long. 140° 08.0' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	E B 120	110	105	105	105	105	105	E S 120	S							
2								S	115	110	110	110	110	105	A	105	S							
3								S	E S 120	115	110	110	110	110	115	S	S							
4								S	S	E B 120	E B 125	E B 125	E B 120	E B 115	110	S	S							
5								S	B	B	E B 115	E B 120	110	E B 115	E B 115	110	S							
6								S	A	E B 120	E B 125	E B 120	C B 125	105	E B 120	E B 120	S							
7								S	A	A	A	110	110	115	110	110	S							
8								S	E S 120	E B 125	E B 120	E B 120	E B 120	E B 115	E B 115	E S 120	S							
9								S	E S 120	110	110	E B 125	110	110	110	115	S							
10								S	E S 115	110	110	110	110	110	110	110	S							
11								S	E S 115	110	110	110	110	110	110	110	S							
12								S	110	110	110	110	110	110	110	E S 120	S							
13								S	A	110	115	105	A	A	A	A	S							
14								S	E S 120	120	110	110	110	110	110	115	S							
15								S	S	120	115	115	110	110	110	120	S							
16								S	E S 120	110	110	110	110	110	110	110	S							
17								S	S	115	A	A	A	A	A	A	S							
18								S	E S 120	110	A	105	105	110	110	A	S							
19								S	S	120	115	110	A	A	105	105	S							
20								S	A	A	105	A	A	A	110	110	S							
21								S	E S 125	120	115	115	110	110	110	A	S							
22								S	E S 120	115	110	110	A	A	A	120	S							
23								S	A	A	A	A	110	110	115	115	S							
24								S	105	105	105	E B 120	105	F B 120	E B 120	F B 125	S							
25								S	110	A	105	100	100	100	A	100	S							
26								S	E S 125	A	A	A	115	115	120	A	S							
27								S	A	A	105	A	A	A	A	S	S							
28								S	A	A	A	A	110	115	120	120	S							
29								S	115	110	110	110	110	110	105	A	S							
30								S	A	105	105	115	105	105	115	120	S							
31								S	A	S	A	A	115	E B 120	115	E B 120	S							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									17	22	24	24	25	25	25	22								
MED									E S 120	110	110	110	110	110	110	112								
UQ									E S 120	118	112	114	110	112	112	E E 120								
LQ									110	110	108	110	110	110	110	110								

DEC. 1987 | H'E (KM)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | H'ES (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station AKITA Lat. 39° 43.5' N, Long. 140° 08.0' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	S	S	S	S	S	S	S	S	G	G	115	110	110	G	G	G	S	S	95	S	S	S	S	S
2	S	S	S	105	105	S	S	S	G	135	130	125	120	115	105	105	S	100	100	S	S	S	S	S
3	S	S	S	S	S	S	S	S	G	G	100	115	115	G	115	110	105	100	100	95	100	95	S	S
4	S	S	S	S	S	S	S	S	G	G	G	G	125	110	110	105	105	110	110	105	100	105	S	100
5	S	S	S	S	110	110	105	100	B	B	135	G	G	G	115	110	105	105	105	100	100	100	100	95
6	100	S	S	S	115	105	105	105	105	G	130	G	G	G	125	120	S	110	105	100	100	100	110	100
7	100	100	105	S	S	100	100	110	105	105	105	G	G	G	G	115	105	105	100	100	100	S	S	S
8	S	S	S	S	S	S	S	G	G	G	G	G	G	G	135	125	115	S	S	S	S	S	100	S
9	105	S	S	S	100	S	S	150	G	G	G	G	145	135	G	135	130	120	115	110	S	105	S	105
10	S	S	S	S	S	S	S	S	120	G	G	G	G	G	G	G	105	S	S	S	S	S	S	S
11	S	S	S	S	S	S	S	150	G	130	125	110	110	160	140	130	120	120	110	110	110	S	100	100
12	100	100	120	S	S	S	105	110	G	130	110	120	110	115	145	135	120	115	115	110	110	100	110	S
13	S	S	120	110	110	105	105	100	100	G	120	125	100	100	100	100	110	110	105	105	100	100	100	100
14	S	S	S	95	100	105	S	145	100	140	130	130	115	115	G	G	S	105	105	120	S	S	S	S
15	120	S	S	S	S	S	S	S	G	150	G	115	G	120	G	G	S	140	130	105	S	S	S	S
16	S	S	S	S	S	S	S	S	G	130	120	115	115	110	110	G	150	130	125	115	S	S	S	S
17	S	S	115	115	120	S	S	S	135	120	105	135	100	100	105	100	95	S	130	120	120	S	115	110
18	110	110	S	S	S	140	S	S	130	115	105	G	G	G	G	105	105	100	105	110	105	105	105	100
19	105	110	105	105	105	S	S	S	120	G	120	120	100	100	G	110	100	100	100	100	100	100	100	100
20	S	S	S	S	110	110	105	105	105	100	110	105	125	100	120	110	120	110	100	100	100	95	95	95
21	S	S	S	S	S	115	S	110	G	150	125	125	110	110	110	105	105	105	110	105	100	S	95	100
22	S	S	S	110	105	105	105	105	145	120	130	115	100	100	100	135	125	110	105	105	100	100	S	105
23	S	S	S	115	110	110	105	105	105	100	100	100	G	G	G	G	S	110	105	105	100	100	100	100
24	100	S	125	115	110	110	105	105	G	G	G	G	G	G	G	G	S	140	130	105	100	100	95	100
25	105	S	115	110	110	110	120	S	115	105	G	G	G	G	100	150	110	105	105	105	100	100	100	100
26	100	100	100	S	S	S	110	115	105	100	100	100	G	G	G	100	S	S	110	105	105	105	100	100
27	100	105	105	105	S	S	115	105	105	100	G	95	100	95	95	S	S	S	S	105	100	100	100	100
28	100	100	S	S	S	S	S	105	105	105	100	100	G	G	G	G	S	S	S	S	S	S	100	100
29	S	S	S	S	S	S	S	S	130	G	G	100	100	105	G	100	150	100	100	S	S	100	S	S
30	S	S	S	S	S	S	S	110	105	110	G	G	G	G	G	G	130	100	100	S	S	S	S	100
31	S	S	S	S	S	S	S	S	105	S	110	100	G	G	G	G	S	110	105	105	100	105	105	100
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	12	7	9	10	13	12	12	17	18	18	21	20	17	16	16	20	20	24	27	24	20	18	18	20
MED	100	100	115	110	110	110	105	105	105	113	115	115	110	110	110	110	110	110	105	105	100	100	100	100
UQ	105	108	120	115	110	110	108	110	120	130	125	122	115	115	122	128	122	112	110	110	102	105	105	100
LQ	100	100	105	105	105	105	105	105	105	105	105	100	100	100	102	105	105	102	100	102	100	100	100	100

DEC. 1987 | H'ES (KM)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | TYPES OF ES | 135° E Mean Time (G.M.T. + 9 h)

Station AKITA | Lat. 39° 43.5' N, Long. 140° 08.0' E | Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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											C 2	C 2	C 1						F 2					
2				F 2	F 1					H 2	C 2	C 2	C 1	C 2	L 2	C 1		F 4	F 1					
3											L 1	C 2	C 2		C 2	C 3	L 1	F 2	F 2	F 2	F 2	F 1		
4													C 1	C 3	C 3	L 2	L 2	F 1	F 1	F 2	F 2	F 2		F 1
5					F 2	F 3	F 3	L 3			H 1				C 1	C 2	L 1	F 2	F 3	F 2	F 2	F 2	F 2	F 1
6	F 1				F 2	F 3	F 3	L 1	L 1		C 1				C 1	C 1		F 2	F 2	F 3	F 3	F 3	F 2	F 1
7	F 4	F 3	F 2			F 2	F 1	C 1	L 1	L 2	L 1					C 3	L 3	F 3	F 3	F 2	F 2			
8															H 1	C 1	C 1						F 2	
9	F 2				F 2			H 1					H 1	H 1		H 2	C 4	F 2	F 2	F 1		F 1		F 2
10									C 1								L 2							
11								H 1		C 2	C 4	CL 21	CL 12	H 1	H 2	C 3	C 5	F 5	F 4	F 1	F 2		F 3	F 2
12	F 1	F 2	F 1				F 2	C 1		C 1	C 2	C 1	C 2	C 2	H 2	H 2	C 4	F 2	F 4	F 2	F 4	F 2	F 2	
13			F 2	F 3	F 3	F 2	F 2	L 1	L 1		C 2	C 2	L 2	L 2	L 2	L 2	C 1	F 1	F 1	F 1	F 2	F 2	F 1	F 2
14				F 1	F 2	F 1		H 2	LH 11	H 2	C 2	C 1	C 2	C 2				F 1	F 1	F 1				
15	F 3									H 1		C 1		C 2				F 1	F 1	F 3				
16										C 2	C 2	C 3	C 2	C 2	C 1		H 2	F 4	F 4	F 3				
17			F 7	F 3	F 2				HL 21	C 2	HL 11	HL 22	L 2	L 2	L 1	L 2	L 2		F 1	F 7	F 2		F 2	F 2
18	F 3	F 2				F 1			C 1	C 2	L 1					L 1	L 2	F 3	F 2	F 2	F 2	F 3	F 2	F 2
19	F 4	F 2	F 4	F 5	F 7				C 2		C 2	C 1	L 1	L 1		C 2	L 3	F 4	F 3	F 4	F 3	F 2	F 2	F 3
20					F 3	F 6	F 3	L 1	L 2	L 2	C 2	L 2	CL 11	L 1	C 1	C 2	CH 21	F 2	F 3	F 2	F 3	F 4	F 4	F 1
21						F 1		C 1		H 2	C 2	C 1	C 2	C 1	C 1	L 1	L 1	F 1	F 1	F 2	F 2		F 2	F 1
22				F 4	F 5	F 7	F 3	L 1	H 1	C 4	CL 21	CL 21	LC 11	L 1	L 1	H 3	C 2	F 4	F 4	F 2	F 3	F 2		F 1
23				F 3	F 2	F 2	F 3	L 1	L 1	L 1	L 1	L 1						F 2	F 3	F 1	F 5	F 5	F 2	F 1
24	F 1		F 2	F 4	F 6	F 2	F 3	L 2										F 4	F 3	F 3	F 3	F 3	F 3	F 1
25	F 1		F 2	F 4	F 2	F 5	F 1		C 1	L 2					L 1	H 2	C 2	F 3	F 3	F 3	F 4	F 3	F 2	F 3
26	F 3	F 2	F 2				F 2	C 1	L 1	L 2	L 1	L 1				L 1			F 1	F 2	F 2	F 2	F 3	F 2
27	F 2	F 2	F 1	F 1			F 2	L 1	L 1	L 2		L 1	L 1	L 1	L 1					F 1	F 1	F 2	F 2	F 2
28	F 2	F 2						L 4	L 1	L 2	L 2	L 1											F 1	F 1
29									C 1			L 1	L 1	L 1		L 1	HL 11	F 1	F 1			F 1		
30								C 1	L 1	C 2							C 1	F 1	F 1					F 1
31									L 1		CL 11	LH 11						F 2	F 4	F 3	F 3	F 2	F 2	F 2
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																								
MED																								
UQ																								
LQ																								

The Radio Research Laboratory, Japan

DEC. 1987 | TYPES OF ES

IONOSPHERIC DATA

DEC. 1987 | FXI (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	X 34	35	X 36	X 36	X 36	X 36	X 36											X 39	X 37	X 41	X 37	36	36	X 36
2	41	X 38	X 39	X 39	X 45	X 35	X 39											X 51	X 35	X 36	X 33	X 31	X 33	X 36
3	X 36	X 38	X 38	X 38	X 40	X 40	X 41											X 48	X 42	X 41	X 37	X 31	X 35	X 36
4	S	X 39	X 33	X 39	X 42	X 49	X 33											A	X 53	X 41	X 35	A	A	X 36
5	X 37	X 37	X 38	X 40	X 41	X 41	X 33											X 61	X 61	X 47	X 36	X 39	X 42	X 32
6	X 35	X 38	X 40	X 32	X 35	X 36	X 42											X 53	X 44	X 42	X 39	X 35	X 32	X 35
7	X 35	X 36	X 38	X 39	X 38	X 38	X 40											X 50	X 60	X 45	X 41	X 41	X 36	X 36
8	X 37	X 38	X 36	X 36	X 38	X 39	X 40											X 39	X 43	X 38	X 36	X 38	X 38	X 39
9	X 42	X 43	X 45	X 39	X 38	X 32	X 37											X 43	X 39	A	X 35	X 35	X 34	X 34
10	X 36	X 36	X 34	X 32	X 31	X 31	X 28											X 42	X 37	X 39	X 42	X 46	X 39	X 40
11	X 42	X 32	X 30	X 31	X 35	X 38	X 30											X 42	U X 45	A	A	X 35	X 38	X 39
12	X 38	X 36	X 39	X 41	O X 28	X 29	A											X 46	X 38	X 38	X 34	A	X 42	45
13	49	X 40	S	X 41	X 37	X 34	X 34											X 55	X 38	X 31	X 32	37	X 35	X 37
14	X 37	X 37	X 38	X 40	X 37	X 31	X 37											X 57	X 47	X 35	X 30	X 32	X 35	X 37
15	X 36	X 37	X 36	X 37	X 37	X 36	X 41											X 45	X 42	X 46	X 32	X 31	X 35	X 36
16	X 37	X 37	X 34	X 35	X 39	X 46	X 29											X 63	X 74	X 37	X 30	X 34	X 39	X 41
17	X 32	X 31	X 32	X 36	X 36	X 40	X 43											X 52	X 42	X 43	X 36	X 33	X 35	X 35
18	X 37	X 38	X 44	X 33	X 30	X 33	X 35											X 50	X 57	X 44	X 35	X 34	X 34	A
19	X 37	X 38	X 41	X 32	X 30	X 31	X 32											X 51	X 41	X 43	X 39	X 33	X 34	X 38
20	X 38	X 33	X 33	X 34	X 30	X 36	X 37											X 44	X 50	X 40	X 30	X 27	X 32	X 34
21	X 36	X 35	X 36	X 34	X 35	X 37	X 36											X 47	X 48	X 45	X 32	S	X 31	X 34
22	X 35	X 36	X 40	X 38	X 38	X 38	X 40											X 46	A	A	A	A	O X 37	O X 40
23	A	X 40	X 38	X 39	A	A	A											X 43	X 44	X 48	X 41	X 27	A	X 35
24	X 33	X 27	X 30	A	X 31	X 37	X 38											X 46	X 40	A	A	A	A	A
25	O X 35	X 31	X 32	X 34	X 33	X 33	A											X 46	A	X 43	X 40	X 27	X 32	X 31
26	X 34	X 33	X 34	X 35	X 36	X 35	X 34											X 60	X 56	X 36	X 29	X 31	X 33	A
27	X 36	X 33	X 32	X 32	34	X 30	X 35											X 44	X 39	X 36	X 39	X 31	X 34	X 35
28	X 37	X 36	X 36	X 35	X 35	X 34	X 36											C	X 41	X 35	X 37	X 36	C	C
29	O R 31	C	C	X 36	C	C	C											X 54	X 42	X 49	X 39	X 35	X 30	X 34
30	X 36	X 37	X 43	45	X 39	X 38	X 41											X 47	X 37	X 44	X 39	X 36	X 30	X 33
31	X 36	X 38	X 40	X 40	44	X 40	X 33											X 44	X 40	X 44	X 41	X 34	X 35	40
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	29	30	29	29	27											29	29	27	28	26	27	27
MED	X 36	X 37	X 38	X 36	X 36	X 36	X 37											X 47	X 42	X 41	X 36	X 34	X 35	X 36
UQ	X 37	X 38	X 39	X 39	X 38	X 38	X 40											X 52	X 48	X 44	X 39	X 36	X 36	X 38
LQ	X 35	X 35	X 34	X 34	X 34	X 33	X 34											X 44	X 39	X 38	X 32	X 31	X 33	X 34

DEC. 1987 | FXI (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FOF2 (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	28	F 29	30	30	30	30	30	54	76	63	73	83	71	80	63	62	63	33	31	35	31	F 27	F 28	30
2	F 32	32	33	33	S 39	29	33	62	R 78	79	80	84	77	79	82	75	56	45	29	30	27	25	27	30
3	30	32	32	32	34	34	35	56	68	61	71	68	72	73	93	79	61	42	36	35	31	25	29	30
4	I S 31	33	32	33	U S 36	J S 43	27	U R 64	60	66	83	74	83	73	R 79	81	70	A	47	35	29	A	A	30
5	31	31	32	34	35	35	27	67	V 57	65	J R 75	80	89	R 89	70	70	54	55	55	41	30	33	36	26
6	29	32	34	H 26	J R 29	30	36	66	75	J R 85	94	H 87	H 75	83	J R 76	73	54	47	38	36	33	29	26	29
7	29	30	32	33	32	32	34	58	71	90	89	74	70	60	64	66	49	44	54	39	35	35	30	30
8	31	32	30	30	32	33	34	50	77	80	91	83	80	66	60	58	58	33	37	32	30	32	32	33
9	36	37	39	33	32	H 26	31	J S 53	60	79	94	73	60	66	53	H 58	48	37	33	A	29	29	28	28
10	30	30	28	26	25	25	22	47	67	62	64	67	71	65	63	51	49	36	31	33	36	40	33	34
11	36	26	24	25	29	32	24	46	S 70	89	109	75	68	65	70	63	49	36	U S 39	A	A	29	32	33
12	32	30	33	35	22	23	A	47	59	77	96	79	68	73	64	59	55	40	32	32	23	A	36	F 35
13	F 39	S 34	I S 36	S 35	31	28	28	52	63	70	98	101	73	61	59	58	45	49	32	25	26	F 28	29	31
14	31	31	32	34	31	25	31	46	61	74	82	72	72	64	60	63	57	51	41	29	24	26	29	31
15	30	31	30	31	31	30	35	J S 52	53	61	86	U S 90	66	64	62	57	47	39	36	40	26	25	29	30
16	31	31	28	29	33	40	23	56	60	67	J S 76	80	92	S 94	33	69	58	57	68	31	24	26	33	S 35
17	26	U S 25	26	30	30	34	37	51	63	77	114	103	80	70	63	64	62	46	S 36	37	30	27	U S 29	29
18	31	32	38	27	24	27	29	55	68	72	83	95	99	72	62	58	52	44	51	32	U S 29	26	28	A
19	31	32	35	26	24	25	26	58	J R 62	72	71	70	75	65	63	56	55	45	35	42	33	27	23	32
20	32	27	27	28	27	30	31	53	62	61	61	76	75	H 71	J R 69	62	50	V 33	44	34	24	21	26	28
21	S 30	29	30	S 28	29	31	30	52	56	52	77	79	66	70	64	57	49	41	42	39	26	I S 22	25	28
22	29	30	34	32	32	32	34	52	74	93	115	103	76	74	70	73	57	40	A	A	A	A	S 31	S 34
23	A	34	32	33	A	A	A	60	64	69	94	95	81	72	73	75	63	37	38	42	35	21	A	29
24	27	21	24	A	25	31	32	60	U S 73	73	79	84	85	76	73	67	58	40	34	A	A	A	A	A
25	29	25	26	28	27	27	A	S 51	75	62	72	76	70	74	65	61	52	40	A	37	34	21	26	25
26	28	27	23	29	30	29	28	57	86	76	59	71	77	73	61	65	51	54	50	30	23	25	27	A
27	30	27	26	26	F 25	24	29	54	62	72	86	79	74	71	67	65	52	38	33	30	33	25	28	29
28	31	30	30	29	29	28	30	50	64	C	C	C	72	C	C	C	C	C	35	29	31	30	C	C
29	25	C	C	30	C	C	C	C	C	58	81	82	69	60	62	64	53	48	36	43	33	29	24	23
30	30	31	37	F 33	33	32	35	44	62	62	R 75	70	74	85	Z 65	61	61	41	31	30	33	30	24	27
31	30	32	34	F 35	34	32	51	61	57	74	J R 79	66	67	64	61	60	38	34	38	35	28	29	F 31
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	29	29	27	30	30	30	30	30	31	30	30	30	30	29	29	27	28	27	27	27
MED	30	31	32	30	30	30	31	53	64	71	82	79	74	72	64	63	54	41	36	35	30	28	29	30
UQ	31	32	34	33	32	32	34	58	73	79	94	86	78	74	70	69	58	46	42	38	33	29	30	32
LQ	29	29	28	28	27	27	28	51	61	62	74	74	70	65	62	58	50	33	33	32	26	25	27	28

DEC. 1987 | FOF2 (0.1 MHZ)

IONOSPHERIC DATA

DEC. 1987 | FOF1 (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42·4 N, Long. 139° 29·3 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	L	A	A								
3									L	L	L	L	L	L	L									
4									L		L	L	L	A	A	A								
5								A	L	L	L	L 390	L	L										
6									L	L	L	L	L	L	L	L								
7									L	L	L	L	L	A	L									
8										L	L	L	L	L	L									
9										L	L	L	L	L	L									
10									L	L	L	L	L	L	L	L	200							
11									L	L	L 410	L	L	L	L		A							
12										L	L	L	L	L	L									
13										L 390	L 440	L	L	L	A	L								
14										L	L	L	L	L	L									
15									260	L	L	L 430	L	L	L									
16											A	L	L	L	L									
17											L	L	L	L	L	310								
18									L		L	L	L	L	L									
19										L	L	L	L	L	L	A	A							
20										L	L	L	L	L	A	L								
21											L	A	L	L	L									
22										L	L	L	A	A	A	L								
23								A		340	L	L	L	L	L									
24								A	A		L	L	L	L	A									
25										L	L	L	L	L	L									
26								A	L	L	L	L	L	L	L									
27										L	L	L	L	L		L								
28										C	C	C	C	C	C	C	C							
29								C	C		L	L	L	L	L									
30									280		L	L	L	L	L	L								
31										L	A	L	L	L	L	L								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									2	2	2	2				1	1							
MED									270	365	L 425	L 410				310	200							
UQ																								
LQ																								

DEC. 1987 | FOF1 (0.01 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1937 | FOE (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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								185	245	275	280	A	A	300	275	225	B							
2								175	260	305	310	310	300	290	A	A	A							
3								B	235	275	295	295	285	A	270	A	A							
4								A	A	285	320	320	R 320	290	A	A	A							
5								A	A	A	300	315	295	A	A	245	195							
6								A	250	275	305	A	R 320	305	290	245	170							
7								A	A	A	A	315	A	A	A	A	A							
8								160	245	R	R 305	A	A	320	275	250	A							
9								165	240	285	A	320	315	300	280	220	180							
10								165	245	280	305	315	315	A	A	240	A							
11								175	220	265	290	305	305	290	265	240	190							
12								A	A	A	A	A	A	A	275	H 245	175							
13								A	A	280	U A 300	310	320	A	A	A	U A 185							
14								A	U A 240	A	300	320	A	A	A	A	A							
15								A	A	230	305	R	A	A	290	240	200							
16								170	245	290	A	A	A	A	A	A	A							
17								B	210	A	300	R	305	A	275	230	R							
18								B	230	A	A	310	315	300	A	A	A							
19								A	A	A	A	A	A	225	A	A	A							
20								A	A	275	300	310	315	300	255	A	195							
21								170	220	275	A	A	A	A	A	A	A							
22								B	220	265	290	300	305	295	270	240	R							
23								A	A	260	290	300	305	285	270	230	S							
24								A	A	A	295	300	A	A	A	A	R							
25								R	230	A	A	A	A	A	A	A	A							
26								A	A	280	300	315	310	305	280	A	A							
27								A	A	A	A	A	A	305	290	245	205							
28								A	230	C	C	C	C	C	C	C	C							
29								C	C	275	300	315	320	310	280	R 260	B							
30								170	240	A	A	325	320	305	280	250	A							
31								170	H 245	270	A	A	A	310	290	250	190							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								10	18	13	19	18	17	17	17	16	10							
MED								170	240	275	300	312	315	300	275	242	190							
UQ								175	245	280	305	315	320	305	280	248	195							
LQ								165	230	275	295	305	305	295	270	235	180							

DEC. 1987 | FOE (0.01 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FOES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	18	E B 14	19	21	19	E B 15	E B 15	G	G	G	32	35	J A 36	32	G	25	21	20	19	19	E B 14	E B 13	E B 13	E B 14
2	E B 14	19	18	J A 16	20	J A 17	18	G 17	G	60	36	37	34	33	48	J A 34	27	25	20	22	18	18	19	F B 14
3	E B 15	E B 15	E B 14	E B 12	21	20	18	17	G	G	33	32	33	31	29	33	J A 39	J A 31	44	25	24	21	18	E B 14
4	E S 15	19	E B 14	E B 15	19	18	E B 13	20	26	35	37	37	36	J A 54	J A 72	108	J A 66	J A 67	J A 51	J A 51	J A 33	36	J A 34	25
5	E B 14	E B 14	18	20	J A 21	20	39	J A 80	J A 65	J A 51	G	G 23	G 27	35	J A 31	G 21	G	J A 53	J A 61	J A 32	J A 49	20	J A 22	J A 21
6	E B 15	17	E B 14	E B 13	E B 14	J A 18	J A 29	J A 31	G 22	30	G	33	G	G	G	G	G	J A 17	J A 33	J A 26	J A 19	J A 18	J A 26	J A 29
7	J A 28	J A 26	J A 23	J A 21	13	13	19	J A 24	33	38	J A 32	33	31	J A 41	31	28	21	J A 27	J A 53	23	E B 15	27	E B 15	E B 14
8	E B 15	E B 15	E B 14	E B 14	E B 14	E B 15	E B 16	27	G	29	G	33	34	G 30	22	G	22	J A 18	E B 13	22	E B 14	19	J A 17	E B 14
9	E B 15	E B 14	E B 15	19	18	18	18	G	28	31	32	G	36	34	30	28	26	J A 29	J A 21	J A 32	J A 28	E B 15	E B 15	E B 14
10	E B 15	E B 15	E B 14	E B 15	18	E B 15	J A 22	22	G	G	G	G	G	31	30	24	17	19	19	E B 12	E B 15	E B 15	E B 14	E B 15
11	E B 15	J A 14	E B 13	E B 15	E B 14	18	E B 15	24	G	30	G	32	G	G	34	36	36	J A 27	J A 22	J A 84	J A 64	J A 33	J A 25	J A 19
12	J A 20	J A 15	18	19	22	18	J A 39	J A 32	30	J A 56	J A 34	34	J A 38	36	33	29	28	J A 27	23	J A 25	J A 50	34	J A 21	23
13	J A 19	E B 14	18	19	J A 50	J A 62	J A 51	J A 78	J A 43	J A 33	J A 44	35	34	J A 47	J A 46	J A 43	28	J A 21	J A 25	19	J A 22	19	J A 22	J A 18
14	J A 19	J A 18	19	22	J A 24	J A 22	J A 19	J A 26	29	42	32	G	33	33	J A 29	J A 30	J A 47	J A 25	25	J A 29	J A 32	J A 30	J A 17	19
15	J A 18	17	J A 23	J A 23	E B 15	E B 15	E B 15	J A 18	24	31	G	G	34	35	G	G	G	18	E B 14	E B 14	18	E B 14	E B 14	18
16	E B 14	E B 13	E B 13	E B 12	18	J A 20	J A 20	G	G	35	J A 80	J A 84	J A 47	J A 42	J A 30	25	22	24	J A 21	J A 46	E B 14	E B 14	E B 13	E B 15
17	E B 15	E B 12	E B 14	19	20	E B 13	20	E B 15	G	J A 29	G	G	G	J A 33	G 25	G	G	19	18	J A 27	J A 34	J A 21	20	E B 15
18	J A 27	J A 25	J A 30	J A 25	J A 17	18	E B 14	E B 16	G	J A 41	J A 34	G 29	G	G	J A 30	J A 29	25	J A 24	J A 32	J A 25	J A 17	J A 27	J A 51	J A 47
19	J A 17	J A 59	J A 29	J A 27	J A 36	J A 25	J A 22	20	27	J A 29	35	32	J A 34	G 25	J A 33	J A 40	J A 48	J A 39	J A 29	J A 22	J A 21	J A 22	J A 21	J A 22
20	J A 17	18	18	16	E B 15	E B 15	J A 30	J A 30	J A 43	23	37	38	32	39	J A 62	J A 51	J A 24	J A 30	J A 38	J A 31	J A 33	20	E B 15	E B 15
21	E S 19	E B 14	17	17	18	J A 12	J A 14	17	G	31	35	J A 81	J A 74	J A 49	J A 50	J A 39	J A 29	J A 33	J A 30	J A 25	J A 16	19	J A 13	J A 14
22	E B 15	E B 13	J A 16	J A 16	J A 29	J A 22	J A 31	J A 22	G	32	41	42	J A 47	45	37	34	35	54	J A 56	J A 64	J A 51	J A 31	J A 32	J A 37
23	37	J A 29	18	31	J A 59	J A 36	J A 66	J A 86	J A 29	G	G	G	G	G	G	25	18	20	J A 29	J A 51	25	J A 23	33	J A 18
24	J A 30	J A 30	23	J A 47	J A 83	J A 25	J A 32	J A 42	J A 110	J A 53	31	G	32	40	38	31	G	J A 50	J A 30	J A 52	J A 51	J A 53	J A 43	J A 48
25	J A 29	J A 26	17	J A 25	J A 25	J A 49	J A 30	G	G	J A 46	36	37	J A 44	J A 41	36	J A 28	J A 26	J A 126	J A 112	J A 84	24	21	J A 21	18
26	J A 19	19	E B 13	E B 12	19	E S 17	J A 32	J A 64	36	G 23	G 22	G 24	G	G 23	28	J A 30	J A 29	J A 23	J A 36	J A 38	J A 25	J A 51	J A 26	J A 50
27	J A 31	J A 28	20	E B 13	J A 17	J A 16	J A 24	J A 21	J A 44	J A 44	J A 39	J A 36	52	32	G J A 22	J A 29	J A 26	J A 19	J A 18	J A 20	J A 22	J A 18	J A 18	J A 17
28	19	18	E B 14	E B 15	E B 12	E B 13	E B 14	J A 22	J A 27	C	C	C	C	C	C	C	C	C	19	E B 15	E B 15	E B 15	C	C
29	J A 34	C	C	20	C	C	C	C	C	J A 29	G 29	G 26	33	G	G	28	E B 24	J A 23	J A 20	19	E B 13	E B 13	13	J A 27
30	J A 22	J A 18	J A 16	E B 13	19	E B 13	E B 13	G	J A 26	J A 50	J A 32	G	G	G 20	G 19	G 17	J A 36	J A 30	J A 19	J A 17	19	20	J A 18	E B 16
31	18	19	J A 19	E B 13	E B 14	E B 14	E B 15	J A 24	G	G	J A 44	46	J A 44	32	G 12	G	G	17	19	J A 19	J A 27	J A 31	J A 26	J A 27
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	30	31	30	30	30	30	30	30	30	30	30	30	30	30	30	30	31	31	31	31	30	30
MED	18	18	18	17	19	18	20	22	25	31	32	32	34	33	30	28	26	J A 25	J A 25	J A 25	J A 22	20	J A 20	18
UQ	J A 21	J A 19	19	21	J A 22	J A 20	J A 30	J A 30	J A 30	J A 42	36	37	38	40	36	J A 34	J A 29	J A 31	J A 34	J A 35	J A 32	28	J A 26	J A 25
LQ	E B 15	E B 14	E B 14	E B 14	17	E B 15	E B 15	17	G	29	G	G	G	G 25	G 22	24	18	J A 20	19	20	16	18	15	E B 15

DEC. 1987 | FOES (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FBES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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 B 15	E B 14	E B 14	E B 13	E B 14	E B 15	E B 15	G	G	G	29	35	34	32	G	25	20	E B 14	E B 14	E B 14	E B 14	E B 13	E B 13	E B 14
2	E B 14	E B 13	E B 13	E B 13	E B 13	E B 14	E B 12	G 14	G	G	33	36	32	31	40	32	21	16	19	E B 15	E B 15	E B 14	E B 15	E B 14
3	E B 15	E B 15	E B 14	E B 12	E B 16	E B 16	E B 15	17	G	G	33	32	31	30	29	30	U A 38	31	23	20	20	E B 15	E B 15	E B 14
4	E S 15	E B 15	E B 14	E B 15	E B 14	E B 13	E B 13	19	25	34	37	36	36	53	50	64	41	A A 67	25	21	21	A A 36	A A 34	19
5	E B 14	E B 14	E B 14	E B 13	E B 13	E B 14	23	41	26	29	G	G 22	G 24	31	30	G 21	G	27	33	E B 14	E B 14	E B 14	19	E B 15
6	E B 15	E B 13	E B 14	E B 13	E B 14	E B 14	18	21	G 20	30	G	32	G	G	G	G	G	E B 15	21	E B 13	E B 13	E B 14	19	24
7	21	18	20	18	E B 12	E B 16	E B 14	18	24	34	30	G 30	U S 31	40	28	27	21	24	32	16	E B 15	E B 15	E B 15	E B 14
8	E B 15	E B 15	E B 14	E B 14	E B 14	E B 15	E B 16	G	G	29	G	33	33	G 30	29	G	21	E B 14	E B 13	E B 14	E B 14	E B 14	E B 15	E B 14
9	E B 15	E B 14	E B 15	E B 14	E B 14	E B 14	E B 14	G	26	31	32	G	35	33	30	28	23	27	U A 21	A A 32	16	E B 15	E B 15	E B 14
10	E B 15	E B 15	E B 14	E B 15	E B 15	E B 15	E B 14	20	G	G	G	G	G	31	29	G 23	15	E B 15	E B 15	E B 15	E B 15	E B 15	E B 14	E B 15
11	E B 15	E B 14	E B 13	E B 15	E B 14	E B 14	E B 15	20	G	29	G	G	G	G	33	35	35	24	21	A A 34	A A 64	17	E B 14	E B 14
12	16	E B 12	E B 12	E B 12	20	E B 14	A A 39	25	27	31	31	32	34	33	30	28	26	27	E B 15	20	19	A A 34	17	E B 14
13	E B 13	E B 14	E B 13	E B 14	E B 14	22	E B 15	32	28	23	30	32	33	33	39	29	G 17	21	17	E B 13	17	E B 13	E B 14	E B 15
14	E B 14	E B 13	E B 12	E B 14	16	16	E B 14	20	G 23	31	32	G	32	31	22	29	20	E B 15	E B 16	22	E B 16	E B 15	E B 14	E B 16
15	17	E B 15	E B 15	E B 14	E B 15	E B 15	E B 15	18	22	30	G	G	33	32	G	G	G	16	E B 14	E B 14	E B 15	E B 14	E B 14	E B 13
16	E B 14	E B 13	E B 13	E B 12	E B 14	E B 14	E B 14	G	G	30	43	39	33	31	27	23	21	15	18	28	E B 14	E B 14	E B 13	E B 15
17	E B 15	E B 12	E B 14	E B 13	E B 14	E B 13	E B 15	E B 15	G	28	G	G	G	30	G 25	G	G	17	16	20	21	17	E B 14	E B 15
18	E B 14	E B 15	E B 14	16	E B 14	E B 15	E B 14	E B 16	G	27	30	G 24	G	30	29	27	21	16	18	19	E B 14	E B 14	20	A A 47
19	E B 14	21	18	E B 13	20	19	15	16	24	28	33	31	32	G 21	28	34	41	33	21	15	E B 14	17	E B 15	16
20	E B 13	E B 13	E B 13	E B 13	E B 15	E B 13	18	23	28	G	33	34	35	36	52	26	16	18	21	18	20	E B 15	E B 15	E B 15
21	E S 19	E B 14	E B 14	E B 12	E B 12	E B 12	E S 14	15	G	30	33	51	40	33	29	23	20	23	19	E B 15	E B 15	E B 15	E B 14	E B 15
22	E B 15	E B 13	E B 14	E B 15	21	18	20	E B 15	G	G	37	40	U A 47	43	36	32	32	33	A A 56	A A 64	A A 51	A A 31	22	29
23	A A 37	23	E B 16	E B 14	A A 59	A A 36	A A 66	39	22	G	G	G	G	G	G	25	18	18	26	24	E B 14	E B 14	A A 33	E B 14
24	E B 15	16	E B 15	A A 47	E B 14	17	19	40	37	33	G	G	31	35	36	30	G	31	24	A A 52	A A 51	A A 53	A A 43	A A 48
25	22	20	E B 14	E B 15	18	20	A A 30	G	G	37	30	33	39	31	29	26	21	20	A A 112	20	E B 15	E B 14	18	E B 13
26	E B 15	E B 14	E B 13	E B 12	E B 12	E B 17	15	35	23	G 22	G 21	G 23	G	G 22	G 25	26	19	E B 15	E B 15	E B 15	E B 14	20	19	A A 50
27	21	19	E B 13	E B 13	E B 13	E B 12	18	17	23	33	32	35	34	G 21	G 19	G	G 17	E S 15	E B 14	14	15	E B 14	E B 12	E B 14
28	E B 14	E B 14	E B 14	E B 15	E B 12	E B 13	E B 14	16	G 19	C	C	C	C	C	C	C	C	C	E B 14	E B 15	E B 15	E B 15	C	C
29	19	C	C	15	C	C	C	C	C	G 22	G 22	G 23	33	G	G	28	E B 21	15	16	14	E B 13	E B 13	E B 14	17
30	16	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	G	G 20	32	30	G	G	G 20	G 18	G 17	26	23	E B 14	E B 15	E B 15	E B 14	15	E B 16
31	E B 15	E B 14	E B 15	E B 13	E B 14	E B 14	E B 15	G 15	G	G	43	31	33	32	G 19	G	G	15	16	16	20	19	E B 14	E B 14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	30	31	30	30	30	30	30	30	30	30	30	30	30	30	30	30	31	31	31	31	30	30
MED	E B 15	E B 14	E B 14	E B 14	E B 14	E B 14	E B 15	17	G 20	29	30	31	32	31	29	26	20	18	18	16	E B 15	E B 15	E B 15	E B 15
UQ	16	E B 15	E B 14	E B 15	E B 15	E E 16	18	21	24	31	33	34	34	33	30	29	23	27	22	20	20	17	19	16
LQ	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	E B 14	E G 15	G	G	G	G	G	G 22	G 21	G 21	G 16	15	E B 15	E B 14	E B 14	E B 14	E B 14	E B 14

DEC. 1987 | FBES (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FMIN (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	15	14	14	13	14	15	15	13	15	14	15	16	14	15	15	13	17	16	14	14	14	13	13	14
2	14	13	13	13	13	14	12	12	14	15	15	15	16	17	16	15	13	13	16	15	15	14	15	14
3	15	15	14	12	16	16	15	15	15	15	16	16	20	16	17	15	15	15	14	15	15	15	15	14
4	E S 15	16	14	15	14	13	13	15	18	17	20	21	21	18	19	18	14	14	13	13	14	14	14	14
5	14	14	14	13	13	14	13	15	15	15	16	17	16	15	20	17	15	13	13	14	14	14	15	15
6	15	13	14	13	14	14	14	15	14	15	19	20	21	21	19	14	12	15	14	13	13	13	13	13
7	13	13	13	13	12	14	14	15	14	20	21	20	21	20	16	14	14	14	15	15	15	15	15	14
8	15	15	14	14	14	15	16	15	15	20	24	24	24	24	20	17	15	14	13	14	14	14	15	14
9	15	14	15	14	14	14	14	13	15	15	17	18	18	17	15	14	14	14	14	14	13	15	15	14
10	15	15	14	15	15	15	14	14	15	15	17	19	21	24	15	14	12	15	15	16	15	15	14	15
11	15	14	13	15	14	14	15	14	15	14	14	16	15	15	16	14	14	13	14	13	14	14	14	14
12	14	12	12	12	14	14	13	13	14	15	15	20	19	18	16	15	14	13	15	12	14	14	13	14
13	13	14	13	14	14	14	15	13	14	14	15	15	15	15	14	14	12	13	14	13	15	13	14	15
14	14	13	12	14	14	13	14	13	14	15	16	20	20	16	16	14	15	15	16	14	16	15	14	16
15	12	15	15	14	15	15	15	16	15	15	16	20	18	15	16	14	14	14	14	14	15	14	14	13
16	14	13	13	12	14	13	14	13	14	15	18	20	17	16	16	16	14	14	14	14	14	14	13	15
17	15	12	14	13	14	13	15	15	15	15	15	15	18	15	15	15	15	14	14	16	15	15	14	15
18	14	15	14	14	14	15	14	16	15	14	15	15	16	16	14	15	14	14	14	13	14	14	15	13
19	14	14	12	13	13	14	13	14	13	15	15	15	19	15	15	13	13	13	13	15	14	14	15	15
20	13	13	13	13	13	13	14	14	14	15	16	19	19	16	16	15	13	14	14	14	14	15	15	15
21	E S 19	14	14	12	12	12	E S 14	E S 14	14	15	16	21	15	17	15	14	15	12	14	15	15	15	14	15
22	15	13	14	15	14	15	15	15	15	14	18	15	21	22	19	15	16	13	15	15	14	15	14	15
23	16	19	16	14	15	15	15	14	13	14	15	16	19	23	21	16	15	14	14	14	14	14	15	14
24	15	15	15	14	14	14	13	15	16	15	20	20	17	17	18	14	15	14	13	14	14	15	15	15
25	14	14	14	15	14	14	15	13	15	18	15	15	16	19	17	14	13	13	13	14	15	14	14	13
26	15	14	13	12	12	E S 17	13	14	14	16	15	16	17	15	14	14	13	15	15	15	14	13	13	13
27	16	14	13	13	13	12	13	12	13	14	16	20	15	14	16	13	14	E S 15	14	13	13	14	13	14
28	14	13	14	15	12	13	14	13	13	C	C	C	C	C	C	C	C	C	14	15	15	15	C	C
29	13	C	C	13	C	C	C	C	C	16	18	16	14	14	14	20	21	13	13	13	13	13	14	13
30	13	13	13	13	13	13	13	12	14	15	17	21	17	14	14	14	13	12	13	15	14	14	14	16
31	15	14	15	13	14	14	15	13	14	15	21	16	20	16	16	19	15	13	13	12	13	13	14	14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	30	31	30	30	30	30	30	30	30	30	30	30	30	30	30	30	31	31	31	31	30	30
MED	14	14	14	13	14	14	14	14	14	15	16	18	18	16	16	14	14	14	14	14	14	14	14	14
UQ	15	15	14	14	14	15	15	15	15	15	18	20	20	18	17	15	15	14	14	15	15	15	15	15
LQ	14	13	13	13	13	13	13	13	14	15	15	16	16	15	15	14	13	13	13	13	14	14	14	14

DEC. 1987 | FMIN (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | M(3000)F2 (0.01) | 135° E Mean Time (G.M.T. + 9h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	315	F 305	305	320	320	320	345	335	350	335	315	325	335	335	345	330	330	365	325	340	350	F 320	F 285	305
2	F 300	315	325	325	S 335	345	310	335	R 350	335	330	330	335	325	325	340	365	355	355	320	350	335	300	295
3	290	295	335	305	320	315	345	335	340	340	340	335	320	315	335	325	345	350	340	335	345	300	305	285
4	I S 295	295	270	290	U S 315	J S 335	335	U R 360	350	340	335	335	320	340	R 330	335	350	A	340	345	335	A	A	305
5	315	315	315	325	330	360	305	350	V 365	350	J R 345	325	320	R 340	340	345	350	330	345	360	335	320	350	295
6	295	315	360	H 330	J R 275	315	325	355	350	J R 330	335	H 310	H 330	320	J R 335	325	350	355	340	335	330	335	315	A
7	330	315	290	295	305	310	335	345	355	325	345	340	335	335	330	350	350	325	325	365	320	335	325	300
8	310	310	315	310	665	310	315	325	325	325	335	335	355	355	355	360	365	370	350	365	320	340	320	320
9	325	320	335	325	355	H 295	325	J S 340	340	320	335	345	340	335	340	H 325	345	315	325	A	320	335	310	305
10	310	320	330	345	310	295	300	320	340	330	350	330	330	330	335	335	345	315	320	285	300	325	320	310
11	335	350	310	290	300	325	275	300	S 335	320	325	325	315	325	320	350	360	340	U S 335	A	A	290	295	315
12	325	315	335	360	A	320	A	345	335	320	340	335	335	340	350	335	350	350	355	335	295	A	300	F 285
13	F 305	S 315	I S 330	S 335	370	A	325	340	335	325	320	325	345	335	335	360	340	350	355	365	320	F 305	320	300
14	300	325	320	345	335	335	335	335	345	320	320	330	340	335	290	330	335	335	350	365	315	295	295	310
15	320	290	305	305	320	315	325	J S 350	350	320	335	U S 335	345	335	335	340	350	335	350	360	355	325	325	315
16	315	310	290	300	335	350	350	350	365	310	J S 320	295	295	S 315	305	335	320	300	335	A	325	280	295	S 295
17	295	U S 275	285	290	295	300	325	330	305	315	315	325	325	325	335	335	325	340	S 300	340	330	305	U S 285	295
18	295	290	325	325	320	295	295	325	345	335	320	325	325	345	355	345	350	335	335	350	U S 305	345	310	A
19	315	310	340	355	A	300	310	350	J R 355	350	335	330	335	340	335	335	345	335	325	340	350	325	330	315
20	345	340	320	320	305	325	325	340	350	350	335	325	330	H 340	J R 335	345	350	V 330	330	360	335	295	305	295
21	S 310	295	310	S 305	315	325	325	350	340	325	315	335	330	325	320	335	340	325	325	345	350	S	290	290
22	300	300	315	305	295	305	315	335	315	300	305	320	320	325	315	315	330	325	A	A	A	A	S 290	S 285
23	A	300	310	310	A	A	A	335	335	340	315	320	320	315	305	320	335	330	325	310	350	275	A	310
24	305	310	310	A	280	285	310	330	U S 330	330	325	320	325	325	330	330	335	330	355	A	A	A	A	A
25	320	285	285	310	315	295	A	S 320	345	360	325	340	335	330	340	345	360	335	A	355	370	350	320	320
26	320	305	315	320	330	315	325	335	350	360	365	340	330	325	350	345	360	335	360	380	380	A	345	A
27	320	335	345	330	F 305	300	335	345	360	350	335	335	350	360	325	365	355	350	345	360	355	335	295	305
28	310	320	300	320	295	320	335	360	360	C	C	C	315	C	C	C	C	C	350	330	330	335	C	C
29	A	C	C	315	C	C	C	C	C	335	330	345	350	350	345	340	355	340	330	340	360	355	310	295
30	315	325	325	F 320	325	315	350	355	355	340	R 330	335	330	350	Z 330	335	345	365	320	340	350	355	345	295
31	310	320	310	305	F 315	325	350	350	340	350	325	J R 335	335	345	325	335	350	365	330	335	370	360	305	F 285
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	30	30	27	28	27	30	30	30	30	30	31	30	30	30	30	29	29	26	28	25	27	26
MED	310	312	315	320	315	315	325	340	345	332	330	330	330	335	335	335	350	335	335	342	335	325	310	300
UQ	320	320	330	325	330	325	335	350	350	340	335	335	335	340	340	345	350	350	350	360	350	335	320	310
LQ	300	300	305	305	305	300	312	335	335	320	320	325	322	325	325	330	340	330	325	335	320	305	295	295

The Radio Research Laboratory, Japan

DEC. 1987 | M(3000)F2 (0.01)

IONOSPHERIC DATA

DEC. 1987 | M(3000)F1 (0.01) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	L	A	A								
3									L	L	L	L	L	L	L									
4									L		L	L	L	A	A	A								
5								A	L	L	L	L 415	L	L										
6									L	L	L	L	L	L	L	L								
7									L	L	L	L	L	A	L									
8										L	L	L	L	L	L									
9										L	L	L	L	L	L									
10									L	L	L	L	L	L	L	L	415							
11									L	L	L 370	L	L	L	L		A							
12										L	L	L	L	L	L									
13										L 415	L 380	L	L	L	A	L								
14										L	L	L	L	L	L									
15									430	L	L	L 390	L	L	L									
16											A	L	L	L	L									
17											L	L	L	L	L	395								
18									L		L	L	L	L	L									
19										L	L	L	L	L	L	A	A							
20										L	L	L	L	L	A	L								
21											L	A	L	L	L									
22										L	L	L	A	A	A	L								
23								A		395	L	L	L	L	L									
24								A	A		L	L	L	L	A									
25										L	L	L	L	L	L									
26								A	L	L	L	L	L	L	L									
27										L	L	L	L	L		L								
28										C	C	C	C	C	C	C	C							
29								C	C		L	L	L	L	L									
30									385		L	L	L	L	L	L								
31										L	A	L	L	L	L	L								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									2	2	2	2				1	1							
MED									408	405	L 375	L 402				395	415							
UQ																								
LQ																								

DEC. 1987 | M(3000)F1 (0.01)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | H'F2 (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	250	240	235	225									
2									230	235	245	240	245	250	240	235								
3									230	220	235	240	255	270	245									
4									220		250	245	265	E A 255	255	E A 265								
5								A 230	220	235	250	255	265	240										
6									235	260	245	H 235	240	250	240	255								
7									220	250	230	235	235	230	235									
8										260	245	250	225	235	235									
9										270	240	230	240	245	230									
10									235	245	230	255	245	245	240	225	215							
11									250	265	255	250	L 270	265	260		220							
12										270	240	245	250	245	235									
13										265	265	245	250	245	245	225								
14										245	250	235	235	240	305									
15									220	265	255	235	240	260	255									
16											255	285	275	250	250									
17											260	245	250	245	240	230								
18									225		255	255	255	235	225									
19										235	245	250	260	240	255	250	E A 255							
20										230	245	265	255	245	E A 260	245								
21											270	250	240	255	255									
22										270	260	240	230	240	250	250								
23								245		235	255	250	255	255	265									
24								250	245		245	245	245	255	240									
25										225	235	245	255	255	240									
26								255	220	220	220	245	265	260	230									
27										235	245	255	230	230		225								
28										C	C	C	C	C	C	C	C							
29								C	C		260	240	235	235	235									
30									225		260	245	265	235	255	240								
31										230	260	260	240	240	245	255								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								4	13	21	30	30	30	30	28	12	3							
MED								248	225	245	250	245	248	245	241	240	218							
UQ								252	235	265	260	250	255	255	255	251	229							
LQ								238	220	235	245	240	240	240	235	228	218							

DEC. 1987 | H'F2 (KM)

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IONOSPHERIC DATA

DEC. 1987 | H'F (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	300	310	270	275	270	235	235	235	225	210	240	210	225	220	225	220	205	260	230	235	270	330	285
2	305	270	265	265	250	240	280	245	230	215	220	215	195	230	A	A	205	220	235	255	225	250	300	305
3	300	300	240	285	260	265	220	220	210	215	235	200	215	H 185	245	245	A 225	235	255	255	240	E B 340	295	315
4	S 295	305	335	320	275	230	230	230	210	235	A 250	235	240	A	A	A	U A 240	A	A 250	A 255	E A 280	A	A	A 325
5	285	290	290	270	260	215	A	A	215	210	200	190	195	215	A 235	230	215	A 245	A 250	225	260	275	235	E B 310
6	325	290	225	H 220	340	280	A 265	230	240	245	230	205	225	H 205	210	210	225	215	245	255	255	255	E A 310	A
7	E A 285	A 290	E A 350	A 320	290	290	245	225	220	250	225	215	E S 230	A	215	230	215	E A 275	265	210	265	240	255	280
8	275	275	265	275	270	270	255	220	230	240	220	210	H 185	240	220	220	210	210	220	215	270	240	270	275
9	260	265	235	255	220	H 280	255	230	225	235	235	235	230	255	220	225	215	E A 270	A 250	A	265	245	270	285
10	295	255	250	245	260	295	305	240	225	220	215	210	220	210	225	215	195	225	250	300	285	245	250	275
11	235	225	265	E B 330	310	245	335	260	210	240	H 230	H 210	H 190	255	A 255	230	A	E A 275	240	A	A	320	305	290
12	270	265	260	220	A	280	A	A 240	235	245	235	225	235	240	230	240	215	E A 260	230	260	E A 340	A	315	330
13	280	280	260	235	215	A	270	A 235	235	215	230	215	230	220	A	A	220	225	225	215	E A 290	275	275	310
14	310	255	260	235	240	E A 260	245	225	235	230	215	210	235	230	H 210	235	230	215	215	A 240	E B 290	E B 325	295	275
15	290	310	295	285	260	260	240	225	180	H 220	205	220	210	195	230	240	215	230	225	220	235	280	275	270
16	290	290	E B 335	310	240	220	250	225	210	220	A	A	230	230	210	230	245	255	225	A	250	310	295	250
17	275	330	310	290	285	265	245	230	235	230	H 195	230	215	225	210	215	230	210	255	225	E A 270	295	310	310
18	290	310	250	270	275	290	295	240	215	240	225	215	220	220	215	225	225	230	240	230	275	250	315	A
19	275	E A 295	255	225	A	E A 335	E A 285	235	215	220	220	210	215	215	225	A	A	E A 265	E A 270	230	225	280	280	230
20	245	250	270	275	290	260	270	A 230	225	225	230	220	245	A 245	A	220	215	A 245	245	225	A	E B 360	E B 310	330
21	290	310	300	290	280	260	260	225	H 200	235	245	A	E A 240	240	235	235	220	245	240	220	230	S	320	320
22	300	300	265	260	E A 340	310	275	225	235	245	250	E A 255	A	A	A	235	230	E A 285	A	A	A	A	E A 385	E A 355
23	A	E A 325	275	275	A	A	A	A	230	215	240	235	245	230	240	245	220	230	E A 265	E A 275	210	E B 360	A	255
24	285	E A 320	E B 305	A	E B 345	325	285	A	A	230	215	210	205	240	A	230	220	260	235	A	A	A	A	A
25	310	E A 365	305	280	280	E A 345	A	240	225	A	205	H 210	A	240	225	A 230	210	235	A	240	210	E B 365	E A 290	285
26	290	305	305	275	265	E S 305	280	A	A 225	220	205	205	H 205	235	230	230	210	235	220	215	210	A	260	A
27	A 305	A 275	255	270	310	315	265	225	220	E A 245	A 230	225	225	230	215	235	215	220	235	220	230	265	310	315
28	290	275	305	280	315	285	250	210	215	C	C	C	C	C	C	C	C	C	220	240	250	230	C	C
29	A	C	C	280	C	C	C	C	C	210	180	225	225	200	200	245	215	225	255	230	215	225	H 320	340
30	305	260	255	255	270	280	230	220	225	A 240	205	205	H 190	H 195	215	210	225	215	270	240	230	230	E A 255	E B 340
31	305	270	285	285	275	265	225	215	H 210	200	A	230	210	215	210	220	H 225	205	255	245	220	250	305	320
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	30	30	27	28	26	26	29	29	28	28	28	27	24	26	28	29	29	26	27	25	27	26
MED	290	282	266	274	272	270	256	230	225	228	222	215	218	230	220	230	220	225	242	230	240	258	288	296
UQ	300	302	300	285	286	287	278	235	230	240	232	226	230	240	230	235	225	A 245	252	250	261	285	309	318
LQ	278	270	255	255	260	260	245	225	215	220	208	210	208	215	212	220	215	220	230	220	228	245	271	280

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IONOSPHERIC DATA

DEC. 1987 | H'E (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								140	125	115	120	A	A	110	110	110	B							
2								A 135	125	115	115	115	115	115	115	A	A							
3								B	120	115	115	115	120	115	125	125	A							
4								A	A	125	130	125	125	125	120	115	A							
5								A	A	A	115	E A 125	E A 125	A	A	E A 135	125							
6								A	E A 140	E A 140	125	125	125	125	125	125	125							
7								A	A	A	A	E A 145	A	120	115	115	A							
8								B	130	A	130	125	130	E A 145	A	130	A							
9								E B 150	130	E A 150	125	120	115	120	120	115	E B 140							
10								E B 135	120	120	115	115	120	A	A	E A 165	A							
11								E B 145	120	115	115	115	115	120	120	120	E B 140							
12								A	A	A	A	A	A	A	120	120	130							
13								A	A	E A 145	A	125	A	A	A	A	A							
14								A	A	A	120	120	A	A	A	A	A							
15								A	A	E A 135	120	B 130	A	A	120	125	145							
16								E B 195	125	120	120	125	120	A	A	A	A							
17								B	120	A	120	110	115	A	E A 130	E B 125	E B 165							
18								B	120	115	A	E A 135	120	115	A	A	A							
19								A	120	120	120	120	120	A 120	A	A	A							
20								A	A	125	125	120	125	125	120	120	E A 145							
21								E S 145	120	E A 145	120	120	A	A	A	A	A							
22								B	125	120	125	110	120	125	125	125	125							
23								A	A	110	115	110	115	125	125	110	S							
24								A	A	A	125	105	A	A	A	A	115							
25								B	135	115	A	A	A	A	A	A	A							
26								A	A	E A 130	E A 120	E A 120	120	E A 120	E A 135	A	A							
27								A	A	A	A	A	A	A 120	E A 120	E A 125	E A 140							
28								A	E A 135	C	C	C	C	C	C	C	C							
29								C	C	A 120	A 120	115	120	110	110	130	B							
30								E B 165	E A 135	A	A	120	115	A 115	A 120	E A 120	A							
31								E B 150	125	120	A	A	A	E A 135	125	125	130							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								9	18	21	22	25	19	19	17	20	12							
MED								E B 145	122	113	120	113	120	120	120	122	128							
UQ								E B 150	128	E A 130	125	122	121	124	124	125	E E 142							
LQ								E E 140	120	115	115	115	115	115	120	116	125							

DEC. 1987 | H'E (KM)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | H'ES (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	110	B	120	110	110	B	B	G	G	G	135	115	115	E G 190	G	160	115	105	100	100	B	B	B	B
2	B	120	105	120	115	115	120	115	G	125	130	120	125	125	110	110	110	105	105	110	105	110	110	B
3	B	B	B	B	110	115	110	150	G	G	E G 185	125	120	125	140	115	115	110	100	95	100	100	105	B
4	S	110	B	B	115	115	B	150	160	E G 175	E G 180	160	E G 185	115	110	110	110	105	110	105	105	105	105	95
5	B	B	115	110	105	120	110	110	105	105	G	110	105	120	125	115	G	115	110	115	110	105	110	105
6	B	110	B	B	B	115	105	110	125	E G 170	G	130	G	G	G	G	G	150	110	125	115	135	110	110
7	110	105	105	105	105	110	110	130	120	120	115	120	120	120	130	130	E G 160	115	110	115	B	105	B	B
8	B	B	B	B	B	B	B	110	G	130	G	135	125	130	155	G	120	120	B	110	B	105	105	B
9	B	B	B	105	110	105	110	G	165	165	125	G	150	160	E G 170	145	135	125	125	115	115	B	B	B
10	B	B	B	B	120	B	120	145	G	G	G	G	G	120	115	115	115	115	110	B	B	B	B	B
11	B	140	B	B	B	120	B	165	G	E G 165	G	125	G	G	155	135	125	125	115	125	110	115	105	110
12	105	110	115	125	115	120	115	115	115	115	115	115	115	115	145	140	120	120	120	110	110	110	105	105
13	120	B	140	120	115	115	110	110	105	110	110	130	155	105	105	105	110	115	115	110	110	110	110	115
14	110	110	110	110	105	110	110	120	160	110	140	G	125	120	120	120	120	110	110	110	110	105	105	110
15	130	120	115	120	B	B	B	105	125	130	G	G	120	115	G	G	G	145	B	B	110	B	B	105
16	B	B	B	B	145	125	120	G	G	135	125	125	120	L 125	120	115	E G 180	120	130	120	B	B	B	B
17	B	B	B	125	120	B	120	B	G	125	G	G	G	105	105	G	G	155	130	125	120	105	100	B
18	120	115	120	110	110	110	B	B	G	125	120	115	G	G	115	115	110	110	110	115	115	110	110	110
19	125	115	110	120	110	110	110	105	130	130	115	125	120	110	110	105	105	100	105	110	105	105	105	105
20	105	105	115	120	B	B	110	110	105	E G 165	135	130	125	125	115	115	115	110	110	110	105	100	B	B
21	S	B	125	125	135	120	S	110	G	110	130	120	115	115	115	110	110	110	110	110	105	105	110	105
22	B	B	130	125	115	115	110	110	G	140	130	125	125	125	130	145	130	120	115	105	105	110	100	105
23	105	105	105	120	120	115	110	105	110	G	G	G	G	G	G	150	130	115	110	110	110	110	105	110
24	105	110	105	115	130	120	120	110	105	110	145	G	105	125	120	105	G	135	110	115	105	105	100	100
25	100	110	115	110	115	115	115	G	G	110	110	105	105	100	110	110	105	135	110	105	115	105	105	105
26	100	105	B	B	125	S	110	110	110	115	110	110	G	105	100	100	110	105	115	115	110	110	110	105
27	115	110	105	B	110	120	115	115	115	110	110	110	110	E G 175	105	110	110	110	110	110	110	110	105	110
28	95	100	B	B	B	B	B	120	110	C	C	C	C	C	C	C	C	C	110	B	B	B	C	C
29	105	C	C	110	C	C	C	C	C	110	110	110	E G 185	G	G	E G 175	B	105	105	105	B	B	105	110
30	115	115	115	B	115	B	B	G	115	110	110	G	G	100	105	110	100	105	105	105	105	105	105	B
31	105	95	100	B	B	B	B	130	G	G	105	105	100	E G 160	105	G	G	105	115	110	105	105	120	115
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	18	19	19	19	23	20	20	23	17	25	22	22	22	25	25	25	23	30	29	28	24	24	23	19
MED	108	110	115	120	115	115	110	110	115	U 113	118	120	120	118	115	115	112	115	110	110	110	105	105	105
UQ	115	115	118	122	120	120	118	125	125	130	132	125	125	125	128	132	121	120	115	115	110	110	110	110
LQ	105	105	105	110	110	112	110	110	110	110	110	110	115	115	113	110	110	105	110	108	105	105	105	105

DEC. 1987 | H'ES (KM)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | TYPES OF ES | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	F1		F1	F1	F2						H1	C2	C2	H1		H2	C2	F1	F1	F1				
2		F1	F1	F2	F2	F1	F1	L1		H1	H2	H1	H2	H1	C3	L3	L3	L3	F3	F2	F1	F1	F2	
3					F3	F1	F1	H1			H1	C1	C1	C1	H2	C3	L3	F4	F3	F3	F2	F1	F1	
4		F1			F2	F1		H1	HL11	H2	H1	HC21	HC11	C2	C3	C4	L2	F4	F3	F3	F3	F4	F3	F2
5			F1	F2	F2	F1	F4	L4	L2	L2		L1	L1	CL11	L1	L1		F3	F4	F2	F2	F2	F2	F1
6		F1				F2	F2	L2	L1	HL11		C1						F1	F3	FF12	F2	F2	F2	F5
7	F4	F3	F5	F4	F2	F1	F1	CL11	L1	L2	L2	L1	L1	C2	C2	CH21	H1	F4	F3	F3		F1		
8								L1		C1		C1	C1	L1	HL11		L1	F1		F1		F1	F2	
9				F2	F1	F2	F1		H1	HL11	C1		H1	H2	H1	H2	C2	L4	F4	F4	F4			
10					F1		F1	H1						L1	L1	L2	L1	F1	F1					
11		F2				F1		HL11		H1		C2			H2	H4	H4	FF54	F2	FF24	F3	F3	F2	F2
12	F2	F2	F2	F2	F4	F2	F5	L4	L3	L2	L2	L2	L3	L3	H1	H3	C3	F4	F1	F4	F2	F2	F3	F3
13	F1		F1	F1	F2	F4	F2	L3	L3	LH21	LH21	HL21	HL12	L3	L2	L3	L2	F2	F1	F1	F2	F2	F2	F2
14	F2	F2	F1	F1	F3	F3	F2	L2	HL22	L1	H1		L1	L1	L1	L2	L2	F1	F1	F4	F2	F2	F1	F1
15	F2	F2	F3	F1				L1	L1	H1			L1	L2				F1			F1			F1
16					F1	FF11	FF11			H1	C3	C2	C2	L2	L2	L2	HL13	F2	F3	F4				
17				F1	F1		F1			L1				L3	L2			F1	F1	FF32	FF32	F2	F2	
18	F1	F3	F3	F5	F2	F2				C2	L2	L1			L2	L2	L2	F1	F2	F3	F1	F2	F2	F3
19	FF11	F3	F3	F2	F2	F3	F2	LC11	C2	C2	CL21	CL21	C2	L2	L2	L2	L3	F4	F3	F2	F2	F2	F2	F2
20	F1	F1	F1	F1			F3	L3	L2	H1	H1	C2	C2	C2	C2	CH21	L2	F2	F3	F3	F2	F2		
21			F1	F2	F1	F1	F1	L1		LH21	C2	C3	L2	L2	L2	L2	L1	F3	F3	F3	F2	F2	F2	F2
22			F1	F3	F4	F4	F3	L1		H1	C2	H2	C2	C2	C3	H3	C3	F3	F5	F4	F5	F4	F4	F3
23	F3	F2	F2	F2	F4	F5	F6	L4	L2							H1	H1	F2	F6	F4	F3	F2	F4	
24	F3	F1	F2	F2	FF23	F2	F5	L3	L4	L3	H1		LH11	CL21	CL22	L2		F5	F4	F3	F5	F5	F4	F3
25	F3	F2	F1	F2	F4	F5	F5			L2	L2	L2	L2	L2	L1	L2	L2	FF23	F3	F3	F1	F2	F3	F1
26	F1	F1			F1		F3	L3	L2	L2	L2	L1		L1	L1	L2	LH11	F1	FF11	F1	F1	F3	F2	F2
27	FF21	F2	F1		F1	F1	F4	L3	L3	L3	L3	L3	L3	HL11	L1	L2	L1	F1	F1	F2	F2	F2	F1	F1
28	F2	F1						L1	L2															
29										L2	L1	L1	H1			H1		F1	F1	F1			F1	F2
30	F1	F1	F1		F1				L2	L2	L2			L1	L1	L1	L3	F3	F1	F1	F2	F1	F2	
31	F1	F2	F2					L1			L1	LH21	L2	HL11	L1			F1	F2	F2	F3	F3	F1	F2
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																								
MED																								
UQ																								
LQ																								

DEC. 1987 | TYPES OF ES

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FXI (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station YAMAGAWA | Lat. 31° 12' 1 N | Long. 130° 37' 1 E | Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	X 35	X 35	X 35	X 36	X 37	X 37	X 37												X 41	X 40	X 38	X 35	X 36	X 34
2	X 36	X 37	X 39	X 38	X 43	X 35	X 33												X 45	X 37	X 37	X 38	X 37	X 33
3	X 34	X 36	X 37	X 39	X 39	X 38	X 38												X 47	X 45	X 46	X 38	X 36	X 36
4	X 37	X 39	X 39	X 41	X 50	X 34	X 30												X 60	A	A	A	X 43	X 38
5	X 39	X 39	X 40	X 40	X 44	X 39	X 33												X 74	X 70	X 46	X 44	X 42	X 39
6	X 36	X 39	X 47	X 27	X 33	X 34	X 47												X 55	X 53	X 53	X 46	X 39	X 46
7	X 40	X 36	X 33	X 33	X 35	X 35	X 35												X 50	X 71	X 58	X 61	X 50	X 44
8	X 44	X 45	X 44	X 36	X 35	X 33	X 32												X 43	X 48	X 49	X 39	X 34	X 34
9	X 37	X 37	X 40	X 35	X 34	X 32	X 34												X 38	X 44	51	59	X 53	47
10	X 49	X 47	X 41	X 33	X 31	25	A												X 40	X 43	X 44	X 52	X 43	X 37
11	X 36	X 41	X 32	X 31	X 30	X 32	X 32												X 50	X 43	X 35	X 33	X 34	X 36
12	X 37	X 36	X 39	U X 40	X 26	X 25	X 27												A	X 38	X 37	X 38	X 35	X 39
13	X 38	X 39	U X 46	X 46	X 33	X 30	X 31												X 46	X 44	O X 37	X 34	X 34	X 34
14	X 37	X 39	X 42	X 34	X 28	X 28	X 30												X 64	X 49	X 39	X 38	X 38	X 40
15	X 38	X 34	X 36	X 38	X 36	X 37	X 40												X 54	X 55	X 49	X 44	X 38	X 39
16	X 39	X 38	X 36	X 36	X 41	X 40	X 34												X 93	X 58	X 39	X 39	X 36	X 46
17	X 31	X 31	X 32	X 33	X 34	X 39	X 32												X 59	X 56	X 49	X 44	X 38	X 34
18	X 36	X 37	X 40	X 30	X 32	X 35	X 33												X 72	X 70	X 56	X 37	X 31	X 32
19	X 32	A	X 41	X 33	X 32	X 30	X 31												X 48	X 59	X 47	X 43	X 38	X 35
20	X 39	X 31	X 29	X 31	X 35	X 37	X 36												X 57	X 46	X 39	X 33	X 30	X 32
21	X 36	X 36	X 37	X 38	40	X 37	X 35												X 54	X 60	X 52	X 42	X 39	X 36
22	X 37	X 38	X 39	X 33	X 35	X 36	X 39												A	X 43	X 42	X 36	A	X 35
23	X 38	X 40	X 39	X 38	X 41	40	X 38												X 57	X 46	X 50	A	A	44
24	40	X 36	X 32	X 29	32	31	F 30												X 56	X 52	X 55	64	X 61	X 43
25	X 32	X 32	33	35	34	36	X 35												X 52	X 55	X 52	X 53	X 38	X 32
26	X 30	X 33	X 33	X 35	X 37	X 35	X 35												X 63	X 48	X 35	X 37	X 39	X 39
27	X 36	X 32	X 28	X 35	X 35	33	32												X 51	X 47	X 42	X 39	X 34	X 32
28	X 35	X 37	X 36	X 36	X 36	X 39	X 32												X 43	X 40	X 45	X 44	X 39	X 31
29	X 31	X 31	X 34	X 35	X 37	X 33	X 29												X 56	X 48	X 45	X 41	X 31	X 29
30	X 34	X 36	X 37	40	45	43	40	40											X 50	X 37	X 40	X 40	X 34	X 31
31	X 34	X 36	X 39	X 40	X 41	X 38	X 36	X 42											X 44	X 50	X 57	X 47	X 34	X 35
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	31	31	31	31	30	2											29	30	30	29	29	31
MED	X 37	X 36	X 37	X 35	X 35	X 35	X 34	41											X 52	X 48	X 46	X 40	X 38	X 36
UQ	X 38	X 39	X 40	X 38	X 40	X 38	X 36												X 57	X 55	X 51	X 44	X 39	X 39
LQ	X 35	X 35	X 34	X 33	X 33	X 32	X 32												X 46	X 43	X 39	X 38	X 34	X 34

DEC. 1987 | FXI (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FOF2 (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9h)

Station YAMAGAWA Lat. 31° 12.1' N, Long. 130° 37.1' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	29	29	29	30	31	31	31	45	63	71	68	76	73	78	77	63	67	61	35	34	32	29	30	28
2	30	31	33	32	37	29	27	43	75	83	76	84	80	77	90	82	63	60	39	31	31	32	31	27
3	28	30	31	33	33	32	32	46	72	66	73	H 71	H 69	85	97	83	H 79	78	41	39	40	32	30	30
4	31	33	33	35	44	28	24	44	67	61	76	81	82	82	75	90	83	66	54	A	A	A	37	32
5	33	33	34	34	38	33	27	42	60	67	70	94	88	91	94	82	72	71	68	64	40	38	36	33
6	30	33	41	21	27	28	41	J R 47	61	70	91	109	92	83	88	H 92	72	74	49	47	S 47	40	33	40
7	34	30	27	27	30	29	29	48	64	74	89	82	74	71	64	64	67	56	44	64	S 52	55	44	S 38
8	37	39	U S 38	30	29	23	26	40	65	79	95	91	H 87	74	R 62	62	H 67	50	37	42	43	32	H 28	23
9	31	31	34	30	29	26	28	40	62	65	98	122	98	66	62	58	59	47	31	S 38	44	F	47	F
10	S 43	41	35	27	25	20	A	32	66	90	85	70	69	66	65	60	55	49	33	36	39	S 46	37	31
11	30	35	26	26	25	27	27	40	S 74	90	102	94	77	76	74	71	56	49	44	37	30	27	23	31
12	31	31	34	34	20	19	22	37	68	76	78	78	76	87	94	S 71	68	56	A	32	31	S 32	30	33
13	32	S 33	U S 40	J S 40	F 27	24	25	39	63	H 75	106	108	105	J R 77	60	63	59	A	40	38	31	28	28	29
14	31	33	36	28	22	22	24	36	60	74	88	77	77	77	86	R 102	67	60	58	43	33	32	32	34
15	32	28	30	32	30	31	36	42	63	58	H 67	99	98	76	76	77	66	50	48	49	43	38	32	33
16	33	32	30	30	35	34	28	45	61	62	63	82	114	120	117	108	104	95	87	52	33	33	30	40
17	25	25	26	27	28	33	26	43	67	77	99	101	108	103	83	31	76	67	53	50	43	38	32	28
18	30	31	34	24	26	29	27	35	75	77	79	85	98	104	R 96	73	73	63	66	64	S 50	31	25	26
19	26	A	35	27	26	24	25	40	73	61	74	73	88	79	72	70	58	54	42	53	41	37	32	29
20	33	25	23	25	29	31	30	38	64	62	68	79	79	83	79	64	63	59	51	40	33	27	24	26
21	30	30	31	32	F 31	31	29	38	69	73	75	90	J R 94	88	89	75	65	55	48	54	S 46	S 36	S 33	30
22	S 31	32	33	27	29	30	33	42	60	71	110	116	92	78	83	74	68	A	A	37	36	30	A	29
23	32	34	33	32	35	F 31	32	43	J S 74	S 78	76	35	89	97	85	83	68	62	51	40	44	A	A	F
24	F 31	30	25	23	F 24	J F 25	F 24	42	77	80	87	89	80	89	102	R 96	67	63	50	46	42	F 54	55	37
25	31	26	F 23	F 25	F 25	F 23	28	40	90	63	70	72	79	89	93	H 90	70	53	46	49	S 43	S 46	32	26
26	24	27	27	29	31	29	29	38	82	73	72	72	H 33	J R 100	95	H 77	65	69	57	42	29	31	S 33	32
27	30	26	J A 22	S 29	29	F 24	F 23	S 38	68	R 78	75	H 77	H 87	R 85	71	70	65	53	45	41	36	33	28	26
28	29	31	30	30	30	33	26	38	66	67	68	67	71	J R 85	J R 84	H 71	72	60	37	34	39	38	33	25
29	25	25	28	29	31	27	23	33	68	74	71	73	76	R 80	77	72	H 63	55	50	42	32	35	25	23
30	28	30	31	F 30	F 35	U F 35	F	F 40	61	66	78	66	84	83	72	62	71	H 53	44	31	34	S 34	29	25
31	28	30	33	35	35	32	31	36	61	64	66	76	69	72	H 77	67	H 70	59	38	S 44	50	S 40	28	29
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	31	31	31	31	29	31	31	31	31	31	31	31	31	31	31	29	29	30	30	28	29	29
MED	31	31	31	30	29	29	27	40	66	73	76	82	83	83	83	73	67	59	46	42	40	34	32	29
UQ	32	33	34	32	32	31	30	43	72	77	88	92	90	88	92	82	72	63	51	49	44	38	33	33
LQ	29	29	28	27	26	26	25	38	62	66	70	74	76	77	73	66	64	54	40	37	33	32	28	27

DEC. 1987 | FOF2 (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FOF1 (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station YAMAGAWA Lat. 31° 12' 1 N, Long. 130° 37' 1 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	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 450	U L 420	L								
2									L	L	L	L	L	L	L	L								
3											L 400	L	L	L	L	L	L							
4									L	L	L	L	440	L 440	L	A	L	A						
5										L	L 430	L 430	L	L 380	L	L								
6									L	L	L	L	L	L	L	L	L							
7									300	L	L 410	L	L	H 440	L	340								
8									L	L	430	L	450	410	550	L								
9										L	450	L	L	L	L	L								
10									L	L	410	440	450	L	L	L	280							
11									L	L	450	420	H 410	L	L	L								
12										L	450	450	450	L	L	L								
13										400	440	450	A	460	410	L								
14										L	L	L 430	L 470	L	L	L	L							
15											L 400	L 420	L	L	U L 430	L								
16											L	L 440	L	L	L	L								
17										L	L 420	U L 420	L	L	L	L								
18										L	L	L	L	U L 430	L	L								
19										L	L	L	L	L	L	L								
20										L	L	400	A	L	L	L	A							
21										L	L	U L 460	U L 460	L 440	L	L	A							
22										L	L	U L 430	U L 450	L	L	A	A	A						
23										L	L	U L 430	L	L	L	L	L							
24										L	L	U L 440	U L 410	L 450	L 430	L	L							
25									L	L	L	U L 430	U L 440	L	A	L								
26									L	A	L	U L 430	L	L 450	U L 440	L								
27											L	L	L	L	L	L	U L 300							
28										L	L	L	U L 450	U L 450	L	L	L							
29										L	L	U L 450	U L 460	L 450	U L 440	L								
30										L	430	L	420	L	L	490	L							
31											L	450	L	L	L	L								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									1	1	12	18	13	12	7	2	2							
MED									300	400	430	L 430	L 450	L 445	U L 430	415	290							
UQ											445	L 450	L 450	L 450	U L 440									
LQ											L 410	U L 430	U L 440	L 435	L 425									

DEC. 1987 | FOF1 (0.01 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FOE (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station YAMAGAWA Lat. 31° 12.1 N, Long. 130° 37.1 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	210	270	300	310	A	A	A	A	240	S						
2								S	A	270	305	320	A	A	A	A	220	S						
3								S	225	275	295	305	A	A	A	275	A	S						
4								S	200	A	A	A	A	320	A	A	A	S						
5								S	205	275	295	325	A	305	295	275	A	S						
6								S	205	270	A	320	A	A	A	A	235	S						
7								S	205	260	300	310	320	A	R	290	240	S						
8								S	230	270	300	310	315	310	305	290	A	S						
9								S	230	H 270	305	A	A	320	305	290	H 230	S						
10								S	A	A	A	A	A	A	A	A	A	S						
11								S	200	270	300	A	R	R 350	H 295	280	235	S						
12								S	200	H 260	H 300	A	A	A	305	280	H 250	S						
13								S	A	285	H 295	320	A	A	310	280	H 250	S						
14								S	A	H 230	300	A	325	A	305	285	A	S						
15								S	200	270	305	325	A	A	A	275	A	S						
16								S	210	270	A	A	A	A	A	A	A	S						
17								S	200	A	A	305	320	315	A	280	240	S						
18								S	205	275	A	A	A	A	A	275	A	S						
19								S	195	A	A	A	A	A	300	A	A	S						
20								S	205	275	305	A	A	A	A	A	A	S						
21								S	210	265	A	A	A	A	A	A	A	S						
22								S	210	275	300	305	305	310	305	270	A	S						
23								S	A	A	A	305	310	310	300	270	A	S						
24								S	A	A	A	A	320	A	A	A	A	S						
25								S	A	280	A	A	A	A	A	235	230	S						
26								S	200	A	A	A	325	A	305	275	A	S						
27								S	A	A	295	310	315	310	305	285	245	S						
28								S	210	270	300	320	325	325	310	290	240	S						
29								S	200	A	290	U A 310	325	320	300	A	H 240	S						
30								S	195	260	300	310	310	310	300	290	240	S						
31								S	200	H 260	300	310	340	335	305	290	A	S						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									23	22	19	17	13	13	16	20	14							
MED									205	270	300	310	320	315	305	290	240							
UQ									210	275	300	320	325	320	305	288	240							
LQ									200	270	298	310	315	310	300	275	235							

DEC. 1987 | FOE (0.01 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FOES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station YAMAGAWA Lat. 31° 12.1' N, Long. 130° 37.1' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	G	G	33	G	37	J A 41	J A 41	J A 33	G	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
2	E S 16	E S 16	E S 16	J A 17	E S 16	J A 18	J A 17	J A 22	J A 25	G 18	G	36	J A 42	J A 36	J A 50	J A 46	J A 31	J A 30	J A 36	J A 21	E S 16	J A 17	J A 17	E S 16
3	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	G	G	35	36	42	44	J A 37	33	J A 65	J A 43	J A 41	J A 18	J A 20	J A 24	J A 18	E S 16
4	E S 16	E S 16	E S 16	E S 16	E S 16	J A 20	J A 17	E S 16	23	28	37	J A 39	J A 36	G	J A 48	J A 100	J A 38	J A 101	J A 89	J A 80	J A 70	J A 50	J A 33	J A 23
5	J A 20	J A 21	J A 21	J A 18	J A 18	E S 16	E S 16	E S 16	G	33	G	G	G 26	34	32	G 23	J A 40	J A 30	J A 26	J A 29	J A 20	J A 25	J A 22	E S 16
6	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	G	G	J A 35	G	34	34	J A 39	34	G	22	J A 21	J A 25	J A 21	J A 24	E S 16	E S 16
7	J A 18	E S 16	E S 16	J A 20	J A 22	J A 21	J A 17	E S 16	G	31	34	34	35	J A 39	G 30	31	J A 29	J A 22	17	J A 23	J A 25	J A 23	J A 20	E S 16
8	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	G	31	34	34	34	36	38	G	J A 45	E S 16	J A 18	J A 18	J A 24	J A 17	E S 16	E S 16
9	E S 16	E S 16	E S 16	E S 16	E S 16	J A 36	E S 16	E S 16	G	G	G	33	34	36	G	G 25	28	22	E S 16	E S 16	J A 23	J A 26	E S 16	E S 16
10	E S 16	E S 16	E S 16	J A 22	J A 23	E S 16	J A 26	24	26	J A 39	J A 39	J A 46	40	J A 38	35	38	24	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
11	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	19	29	G	G	31	G 31	G 30	G 27	32	29	21	J A 24	J A 24	J A 25	E S 16	21	27
12	22	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	18	26	35	31	34	35	36	G	G	G	J A 36	J A 49	J A 32	J A 19	J A 24	J A 20	J A 19
13	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	24	G	31	J A 53	J A 47	J A 88	G	G	32	J A 49	J A 23	J A 38	J A 31	J A 17	31	J A 18
14	J A 32	J A 35	J A 19	J A 21	J A 22	J A 17	E S 16	E S 16	J A 30	G 27	G	J A 48	G 26	J A 35	35	G	J A 30	J A 74	J A 36	J A 63	J A 23	J A 27	J A 24	J A 23
15	J A 19	J A 17	J A 31	J A 37	J A 29	E S 16	J A 17	E S 16	29	G	G	36	35	36	37	G	J A 30	J A 27	J A 33	J A 34	J A 25	E S 16	E S 16	E S 16
16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	G	G	32	J A 43	J A 51	J A 50	J A 40	J A 40	J A 61	J A 45	E S 16	J A 21	E S 16	E S 16	E S 16	E S 16
17	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	24	J A 38	37	37	34	42	38	G	G	G 17	J A 24	J A 22	E S 16	J A 17	J A 31	32
18	J A 29	E S 16	J A 24	E S 16	J A 25	J A 26	J A 18	E S 16	G	G	J A 46	J A 36	J A 57	J A 37	J A 35	J A 40	J A 32	J A 42	J A 30	J A 26	E S 16	E S 16	J A 20	J A 18
19	E S 16	J A 80	J A 23	J A 23	E S 16	E S 16	J A 18	E S 16	J A 32	21	36	33	J A 40	J A 36	G 28	J A 32	J A 38	J A 39	J A 32	J A 37	J A 20	E S 16	E S 16	E S 16
20	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	G	G	G	J A 40	J A 64	36	33	J A 50	J A 41	J A 53	J A 63	J A 24	E S 16	E S 16	E S 16	E S 16
21	E S 16	E S 16	E S 16	E S 16	E S 16	J A 24	E S 16	E S 16	G	J A 36	J A 44	J A 39	J A 53	J A 51	J A 60	J A 52	J A 84	J A 40	J A 37	J A 26	20	E S 16	E S 16	20
22	20	E S 16	E S 16	E S 15	J A 21	J A 17	18	J A 22	G 18	J A 32	J A 39	J A 33	33	39	J A 42	J A 49	J A 55	J A 73	J A 46	J A 29	J A 30	J A 84	J A 54	23
23	E S 16	E S 16	E S 16	21	E S 16	J A 24	E S 16	E S 16	J A 84	J A 33	J A 44	G 29	36	J G 24	J G 23	G 25	J A 24	J A 20	22	J A 27	J A 51	J A 87	J A 44	21
24	J A 24	J A 26	J A 20	J A 18	J A 19	J A 17	J A 20	J A 51	J A 49	J A 45	J A 53	J A 37	J A 61	J A 39	J A 35	J A 42	J A 25	21	E S 15	J A 41	37	19	E S 16	20
25	E S 15	E S 15	J A 18	E S 16	E S 16	J A 25	J A 25	J A 18	J A 39	J A 33	J A 33	J A 40	J A 40	J A 38	J A 55	G 22	25	J A 37	J A 37	J A 38	J A 28	J A 31	J A 22	J A 25
26	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	G 18	J A 44	J A 44	J A 38	J A 33	J A 54	J A 39	J A 33	J A 33	J A 30	J A 32	J A 22	J A 18	18	J A 32	J A 24
27	J A 31	22	J A 44	22	J A 18	J A 17	20	J A 22	J A 41	J A 43	J A 36	G 24	G 21	34	J G 22	J A 39	G	17	J A 22	J A 19	J A 17	J A 21	J A 19	J A 19
28	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	J A 25	J A 31	J G 25	G 25	G 26	G 21	G 21	G	G	E S 16	J A 17	J A 15	22	J A 17	E S 16	E S 15
29	E S 15	E S 15	E S 16	E S 15	E S 16	E S 16	E S 16	E S 15	J A 22	27	J A 61	J A 45	33	34	G 24	J A 37	24	J A 20	J A 18	J A 25	20	J A 18	18	E S 16
30	J A 19	J A 21	J A 13	E S 16	E S 16	E S 15	E S 16	E S 16	G	G	G	G	G	34	G 20	J G 23	J A 33	E S 16	E S 16	J A 18	J A 17	E S 16	E S 16	E S 16
31	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	G	G	32	G	G 27	J A 62	G 26	G 27	J A 32	29	25	J A 25	19	E S 16	E S 16	E S 16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	22	27	33	36	35	36	35	32	J A 30	J A 29	J A 24	J A 25	J A 20	J A 17	18	E S 16
UQ	19	E S 16	J A 18	18	J A 18	J A 18	J A 17	17	J A 28	J A 34	J A 37	J A 39	J A 41	J A 40	J A 39	J A 40	J A 38	J A 41	J A 36	J A 30	J A 26	J A 24	J A 22	20
LQ	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	G	G	E G 25	30	33	34	G 26	G 22	24	20	18	J A 20	17	E S 16	E S 16	E S 16

DEC. 1987 | FOES (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FBES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station YAMAGAWA Lat. 31° 12.1' N, Long. 130° 37.1' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	G	G	33	G	35	32	31	28	G	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16
2	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 15	ES 16	22	G 18	G	36	39	35	42	40	G 20	18	28	ES 16	ES 16	ES 16	ES 16	ES 16
3	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	G	G	34	35	40	42	34	33	22	22	17	ES 16	17	ES 16	ES 16	ES 16
4	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	22	27	35	38	32	G	37	84	28	52	40	AA 80	AA 70	AA 50	21	20
5	19	20	20	ES 16	ES 16	ES 16	ES 16	ES 16	G	G	G	G	G 26	33	32	G 22	26	20	25	18	19	ES 16	ES 16	ES 16
6	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	G	G	30	G	33	34	34	33	G	19	19	ES 16	ES 16	ES 16	ES 16	ES 16
7	ES 16	ES 16	ES 16	19	ES 16	ES 16	ES 16	ES 16	G	29	33	34	34	34	G 30	G 28	G 21	17	ES 16	ES 16	ES 16	19	18	ES 16
8	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	G	30	33	33	33	34	35	G	26	ES 16	ES 16	ES 16	19	ES 16	ES 16	ES 16
9	ES 16	ES 16	ES 16	ES 16	ES 16	19	ES 16	ES 16	G	G	G	32	34	36	G	G 25	26	20	ES 16	ES 16	19	ES 16	ES 16	ES 16
10	ES 16	ES 16	ES 16	ES 16	21	ES 16	AA 26	17	25	34	35	35	35	35	31	37	G 22	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16
11	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	18	25	G	G	31	G 31	G 30	G 27	30	27	20	22	24	19	ES 16	ES 16	19
12	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	26	33	31	33	35	35	G	G	G	25	AA 49	24	ES 16	21	ES 16	ES 16
13	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	22	G	31	42	45	44	G	G	32	AA 49	17	28	25	ES 16	23	ES 16
14	20	24	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	25	G 26	G	37	G 25	34	34	G	25	35	ES 16	38	ES 16	25	22	23
15	18	ES 16	25	20	20	ES 16	ES 16	ES 16	13	G	G	35	33	35	34	G	24	24	33	28	ES 16	ES 16	ES 16	ES 16
16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	G	G	32	33	37	35	31	37	25	18	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16
17	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	22	27	31	32	33	39	35	G	G	G	21	19	ES 16	ES 16	18	19
18	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	G	G	30	32	37	32	32	G 25	G 23	27	20	20	ES 16	ES 16	ES 16	ES 16
19	ES 16	AA 80	18	ES 16	ES 16	ES 16	ES 16	ES 16	30	G 20	33	32	33	32	G 27	29	25	23	24	25	ES 16	ES 16	ES 16	ES 16
20	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	G	G	G	37	53	34	37	37	38	43	33	20	ES 16	ES 16	ES 16	ES 16
21	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	G	G	30	34	32	32	32	34	47	39	27	21	17	ES 16	ES 16	ES 16
22	ES 16	ES 16	ES 16	ES 15	17	ES 16	ES 16	G	G 17	29	33	32	33	38	42	40	52	AA 78	AA 46	27	24	ES 16	AA 54	ES 16
23	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	53	34	31	G 23	36	G 24	G 25	G 24	G 22	20	ES 16	24	21	AA 87	AA 44	ES 16
24	ES 16	19	ES 16	ES 15	ES 16	ES 15	18	26	44	29	30	33	32	32	31	29	G 21	20	ES 15	17	18	ES 16	ES 16	ES 16
25	ES 15	ES 15	ES 16	ES 16	ES 16	ES 16	ES 15	G	24	27	31	32	37	37	53	G 20	G 20	29	25	13	20	26	ES 16	21
26	ES 16	ES 16	ES 15	ES 16	ES 16	ES 16	ES 16	ES 16	G 18	40	30	32	G 23	G 23	32	G 25	24	24	22	19	ES 16	ES 15	22	ES 16
27	ES 16	ES 15	EA 44	ES 16	ES 16	ES 16	ES 16	19	38	32	G 28	G 23	G 20	34	G 21	G 20	G	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16
28	ES 16	ES 15	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	20	G 23	G 24	G 20	G 22	G 19	G 19	G	G	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 15
29	ES 15	ES 15	ES 16	ES 15	ES 16	ES 16	ES 16	ES 15	G 19	27	G 23	31	G	G 24	G 24	G 26	G 20	G	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16
30	ES 16	ES 16	ES 15	ES 16	ES 16	ES 15	ES 16	ES 16	G	G	G	G	G	G	G 20	G 17	G 20	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16
31	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	G	G	31	G	G 27	G 27	G 25	G 27	26	22	17	20	19	ES 16	ES 16	ES 16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	G 18	G 20	30	32	33	34	31	G 26	23	20	17	18	ES 16	ES 16	ES 16	ES 16
UQ	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	24	29	32	34	36	35	34	33	26	26	25	24	19	ES 16	17	ES 16
LQ	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	G	G	EG 23	27	G 29	31	G 25	G 18	G 20	16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16

DEC. 1987 | FBES (0.1 MHZ)

IONOSPHERIC DATA

DEC. 1987 | FMIN (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station YAMAGAWA Lat. 31° 12.1' N, Long. 130° 37.1' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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 S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	15	16	16	16	16	16	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
2	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	15	16	18	16	16	16	16	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
3	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	17	17	16	17	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
4	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	17	16	17	17	18	17	17	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
5	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	17	17	18	16	17	16	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
6	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	18	18	18	18	17	15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
7	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	17	18	18	18	19	16	14	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
8	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	18	18	21	21	20	18	15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
9	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	15	18	16	20	20	20	16	15	E S 16	E S 16	R S 16	E S 16	E S 16	E S 16	E S 16
10	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	15	16	16	16	16	15	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
11	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	17	17	21	16	15	15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
12	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	17	20	19	17	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
13	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	15	16	15	19	19	16	15	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
14	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	16	16	18	17	15	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	16	16	16	17	15	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	17	17	18	17	16	15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
17	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	15	16	16	17	18	17	16	16	15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
18	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	18	17	18	16	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
19	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	16	16	16	16	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
20	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	18	18	16	16	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
21	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 15	16	15	15	16	16	16	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
22	E S 16	E S 16	E S 16	E S 15	12	E S 16	E S 16	E S 16	12	14	14	16	19	17	15	16	14	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
23	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	14	16	15	16	15	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
24	E S 16	E S 16	E S 16	E S 15	E S 16	E S 15	E S 16	E S 16	E S 15	17	17	20	18	19	21	16	15	E S 16	E S 15	E S 16	E S 15	E S 16	E S 16	E S 15
25	E S 15	E S 15	E S 16	E S 16	E S 16	E S 16	E S 15	E S 16	E S 16	16	17	18	20	20	19	16	15	E S 16	E S 15	E S 16	E S 15	E S 16	E S 16	E S 16
26	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 15	16	16	16	16	16	16	16	15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 15	E S 16
27	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	12	E S 16	16	16	17	17	17	16	15	16	13	E S 16	E S 16	E S 16	E S 16	E S 15	E S 16
28	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	17	16	16	18	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 15
29	E S 15	E S 15	E S 16	E S 15	E S 16	E S 16	E S 16	E S 15	E S 16	16	16	17	16	16	16	16	15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
30	E S 16	E S 16	E S 16	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16	16	16	19	20	16	15	15	15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
31	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	15	16	15	16	17	17	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	17	17	17	16	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
UQ	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	18	18	18	17	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
LQ	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	16	16	16	16	15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16

DEC. 1987 | FMIN (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | M(3000)F2 (0.01) | 135° E Mean Time (G.M.T. + 9 h)

Station YAMAGAWA Lat. 31° 12.1' N, Long. 130° 37.1' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	295	295	300	320	320	320	345	365	350	380	340	370	345	365	355	360	350	340	325	330	295	300	305
2	300	320	320	310	335	360	295	325	355	375	355	340	360	320	345	370	365	375	360	340	305	330	340	295
3	305	285	305	305	320	310	310	325	375	355	365	H 340	H 305	335	345	335	H 340	370	330	320	350	330	300	285
4	290	285	270	285	340	375	335	330	375	335	355	350	340	345	325	350	345	350	315	A	A	A	285	295
5	285	305	295	310	330	350	390	335	360	360	375	340	320	335	360	340	340	340	330	350	325	300	320	320
6	285	305	355	285	275	285	340	J R 350	360	320	305	355	320	335	335	H 330	305	365	365	320	S 330	325	335	310
7	325	335	295	295	285	310	310	335	365	345	360	360	365	375	350	335	360	375	295	335	S 325	320	350	S 250
8	295	305	U S 315	335	310	285	305	325	375	340	345	355	H 355	365	R 380	320	H 350	360	325	335	325	330	H 320	285
9	305	320	325	335	345	305	305	325	355	340	320	350	335	350	370	345	365	370	355	S 300	320	F	320	F
10	S 300	330	340	335	340	300	A	330	345	355	370	355	345	350	340	365	345	345	335	305	295	S 325	325	340
11	315	355	305	270	280	295	295	310	S 330	340	325	350	320	320	330	350	355	325	340	335	300	315	305	320
12	340	290	310	365	400	265	295	325	350	355	345	345	340	315	340	S 340	350	355	A	345	320	S 310	285	320
13	310	S 320	U S 325	J S 375	F 370	290	320	305	340	H 295	330	340	340	J R 350	335	340	370	A	350	340	355	305	285	275
14	290	320	335	375	365	340	335	345	360	365	370	355	335	320	315	R 340	350	340	360	335	365	310	310	310
15	310	305	300	310	335	305	350	345	375	370	H 290	350	350	350	300	350	360	370	345	355	335	315	310	305
16	320	310	285	285	330	350	320	345	375	360	350	235	330	325	300	305	315	325	335	345	320	305	285	325
17	340	280	305	315	285	320	325	350	350	335	345	345	335	350	335	325	340	360	330	330	335	330	330	305
18	285	290	350	290	290	310	295	315	365	355	360	340	340	330	R 320	340	365	335	325	335	S 330	340	320	325
19	305	A	340	295	305	290	300	335	370	370	365	355	340	350	335	350	355	360	310	340	340	310	310	310
20	350	340	305	300	310	340	315	330	360	360	345	350	340	335	365	350	340	355	350	350	350	335	355	325
21	285	300	305	310	F 305	320	310	320	355	355	340	335	J R 315	325	335	350	340	345	315	340	S 360	S 305	S 305	285
22	S 275	310	350	315	295	300	320	345	340	285	330	335	340	335	335	330	345	A	A	330	340	315	A	280
23	310	325	320	310	330	F 305	310	350	J S 360	S 340	335	330	330	340	330	335	355	355	350	305	320	A	A	F
24	F 275	300	340	280	F 290	F 290	F 310	320	360	345	340	365	330	325	330	R 360	350	355	350	315	305	F 325	335	295
25	305	305	F 280	F 280	F 300	F 305	325	310	360	365	355	345	330	325	340	H 315	350	375	325	350	S 325	S 315	320	305
26	290	295	305	295	320	310	295	320	370	345	365	325	H 295	J R 335	340	H 325	330	355	355	380	275	290	S 305	310
27	335	305	A	S 310	325	F 290	F 305	S 320	350	R 340	H 355	305	H 305	R 345	350	340	360	340	335	365	310	365	320	275
28	295	305	300	300	295	340	305	320	380	375	365	365	325	J R 330	J R 335	H 340	360	360	350	300	320	340	365	310
29	290	290	315	310	330	335	285	320	365	365	360	340	350	R 330	310	335	H 315	350	350	340	335	325	330	235
30	290	315	320	F 335	F 340	U F 340	F	F 330	370	355	360	380	335	330	345	320	365	H 335	365	320	325	S 325	310	300
31	305	315	320	315	315	330	320	320	360	360	365	355	325	335	H 335	330	H 340	365	330	S 295	S 340	S 300	305	310
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	30	31	31	31	29	31	31	31	31	31	31	31	31	31	31	29	29	30	30	28	29	29
MED	305	305	312	310	320	310	310	325	360	355	355	345	335	335	335	340	350	355	340	335	325	318	320	305
UQ	310	320	325	315	335	338	320	340	370	360	362	355	340	348	343	350	360	365	350	345	340	330	330	310
LQ	290	295	300	295	298	298	305	320	355	340	338	340	325	328	332	330	340	345	330	320	320	308	305	285

DEC. 1987 | M(3000)F2 (0.01)

IONOSPHERIC DATA

DEC. 1987 | M(3000)F1 (0.01) | 135° E Mean Time (G.M.T. + 9 h)

Station YAMAGAWA Lat. 31° 12' 1 N, Long. 130° 37' 1 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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 375	U L 380	L								
2									L	L	L	L	L	L	L	L								
3											L 400	L	L	L	L	L	L							
4									L	L	L	L	L 385	L 385	L	A	L	A						
5										L	L 395	L 395	L	L 395	L	L								
6									L	L	L	L	L	L	L	L	L							
7									400	L	L 365	L	L	H 365	L	410								
8									L	L	360	L	375	415	380	L								
9										L	355	L	L	L	L	L								
10									L	L	390	385	375	L	L	L	410							
11									L	L	365	405	H 440	L	L	L								
12										L	355	375	375	L	L	L								
13										375	365	A	A	A	415	L								
14										L	L	L 395	L 370	L	L	L	L							
15											L 410	L 380	L	L	U L 370	L								
16											L	L 385	L	L	L	L								
17										L	L 390	U L 380	L	L	L	L								
18										L	L	L	L	U L 370	L	L								
19										L	L	L	L	L	L	L								
20										L	L	410	A	L	L	L	A							
21										L	L	U L 360	U L 360	L 365	L	L	A							
22										L	L	U L 370	U L 375	L	L	A	A	A						
23										L	L	U L 370	L	L	L	L	L							
24										L	L	U L 365	U L 410	L 365	L 360	L	L							
25									L	L	L	U L 370	U L 375	L	A	L								
26									L	A	L	U L 395	L	L 355	U L 350	L								
27											L	L	L	L	L	L	U L 400							
28										L	L	L	U L 375	U L 360	L	L	L							
29										L	L	U L 365	U L 370	L 375	U L 365	L								
30										L	360	L	415	L	L	355	L							
31											L	375	L	L	L	L								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									1	1	12	17	13	11	7	2	2							
MED									400	375	365	L 380	L 375	L 370	U L 370	382	405							
UQ											L 392	L 395	385	L 380	380									
LQ											360	U L 370	U L 375	L 365	U L 362									

DEC. 1987 | M(3000)F1 (0.01)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | H*F2 (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station YAMAGAWA Lat. 31° 12' 1 N Long. 130° 37' 1 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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										235	230	240	230	250	240	230								
2									235	230	240	250	240	275	250	225								
3											240	240	245	280	255	240	230							
4									225	230	245	250	255	250	270	A	230	A 240						
5										230	255	260	245	250	240	240								
6									225	260	290	240	250	245	260	250	220							
7									215	240	240	240	240	240	230	230								
8									220	255	250	240	240	240	260	240								
9										265	265	230	235	245	240	240								
10									L 245	240	220	240	255	245	245	230	225							
11									260	240	260	240	250	280	260	240								
12										240	250	235	250	270	250	250								
13										255	250	240	245	240	245	255								
14										240	240	240	275	240	280	245	225							
15											250	250	240	240	270	250								
16											250	330	265	250	250	240								
17										250	250	240	255	240	240	270								
18										240	240	255	240	250	230	240								
19										230	225	235	260	250	250	250								
20										230	250	250	255	260	245	250	250							
21										235	245	260	255	260	250	245	235							
22										250	255	245	230	270	250	A 245	A 245	A						
23										225	235	255	260	255	255	230	225							
24										250	235	235	245	270	250	230	210							
25									230	220	240	235	255	255	250	245								
26									235	230	220	245	L 275	250	250	240								
27											230	225	L 245	230	255	255	225							
28										220	235	235	260	255	250	235	235							
29										230	240	250	245	245	L 265	240								
30										235	250	235	275	255	250	320								
31											240	260	250	260	250	250								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									9	26	31	31	31	31	31	30	12	1						
MED									230	238	240	240	250	250	250	240	228	A 240						
UQ									235	250	250	250	255	260	255	250	235							
LQ									225	230	238	238	242	245	245	240	225							

The Radio Research Laboratory, Japan

DEC. 1987 | H*F2 (KM)

IONOSPHERIC DATA

DEC. 1987 | H'F (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station YAMAGAWA Lat. 31° 12.1' N, Long. 130° 37.1' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	ES 280	ES 295	ES 290	ES 290	ES 270	ES 250	ES 270	230	220	H 180	225	210	220	H 200	H 200	H 195	H 190	215	210	ES 245	ES 230	ES 240	ES 265	ES 275
2	ES 295	ES 265	ES 270	ES 270	ES 240	220	ES 295	250	230	H 195	215	225	H 195	H 200	A	230	220	205	A 220	S 225	ES 260	ES 240	ES 240	ES 260
3	ES 300	ES 310	ES 295	ES 275	ES 270	ES 260	ES 250	230	230	H 225	H 200	215	A	A	255	210	230	215	210	220	225	ES 250	ES 290	ES 300
4	ES 290	ES 305	ES 330	ES 320	240	190	ES 270	245	220	H 190	230	230	H 180	200	230	A	EA 230	A	EA 230	A	A	A	EA 280	EA 310
5	EA 320	EA 305	EA 305	ES 280	ES 250	S 240	195	220	H 205	H 180	H 200	H 200	200	H 200	225	220	230	225	230	230	EA 245	ES 240	ES 250	ES 270
6	ES 310	ES 290	225	ES 320	ES 320	ES 345	230	200	225	H 190	H 210	215	215	215	210	EA 240	210	215	210	230	230	ES 245	230	ES 260
7	250	245	ES 270	EA 310	285	ES 280	ES 280	235	215	225	205	220	210	200	210	195	H 240	220	240	230	200	235	230	260
8	ES 295	265	240	S 245	S 270	ES 290	ES 265	245	220	A 215	220	215	220	200	H 220	H 220	215	215	230	250	230	S 235	S 230	S 310
9	S 275	S 260	240	210	S 215	EA 280	S 260	250	230	225	215	H 190	220	220	H 235	235	230	205	200	245	265	220	230	270
10	260	230	240	230	A	A	A	260	240	235	A 215	220	200	215	220	215	210	205	230	255	290	240	220	235
11	S 270	230	260	S 335	ES 290	S 295	S 285	275	240	H 230	230	200	180	H 170	240	240	220	220	235	A 230	EA 260	S 250	ES 285	295
12	245	300	250	220	195	ES 400	ES 305	255	235	240	215	205	200	215	250	H 215	230	220	A	EA 240	265	A 285	ES 295	S 260
13	S 255	260	250	215	195	ES 290	ES 285	265	235	H 205	220	A	A	A	195	240	225	A	210	A 235	EA 235	S 250	A	315
14	EA 330	EA 300	ES 240	215	210	ES 320	ES 260	240	230	235	230	220	H 200	210	H 200	H 200	225	A 230	215	EA 280	210	EA 320	EA 320	EA 320
15	EA 270	ES 300	EA 350	EA 300	EA 275	ES 270	225	230	H 195	H 200	H 180	230	H 200	215	200	H 220	230	210	EA 245	A 235	220	220	ES 260	ES 280
16	ES 290	ES 280	ES 320	ES 330	ES 250	225	ES 250	235	H 205	H 195	H 205	H 190	EA 250	H 205	230	A	245	225	220	200	ES 240	ES 275	ES 320	ES 250
17	225	ES 320	ES 295	ES 320	ES 300	ES 255	ES 250	235	245	225	205	H 200	220	A	225	H 205	H 220	H 210	225	A 230	220	ES 240	ES 255	EA 310
18	ES 300	ES 280	S 240	ES 250	ES 305	ES 280	ES 290	ES 280	H 205	A 235	215	H 190	EA 235	H 195	230	220	H 220	220	A 240	220	200	S 230	ES 260	ES 310
19	ES 300	A	EA 245	ES 270	ES 250	ES 315	ES 295	235	230	225	225	200	220	210	H 200	H 200	220	220	EA 250	EA 250	220	ES 245	ES 250	ES 290
20	230	ES 240	ES 270	ES 300	ES 280	ES 250	ES 270	ES 250	225	220	215	215	A	210	A	A	A	A 240	225	225	230	230	ES 280	ES 320
21	ES 295	S 280	270	265	275	255	250	255	H 230	220	H 180	210	190	H 195	H 195	A	A	225	245	225	205	S 235	S 245	ES 295
22	ES 300	S 275	235	ES 255	EA 275	ES 300	S 270	215	H 220	225	245	215	H 205	A 235	A	A	A	A	A	EA 260	250	250	A	ES 280
23	ES 275	255	245	265	245	ES 300	260	220	250	A 225	H 195	H 180	235	H 200	215	H 225	H 205	220	220	EA 255	EA 255	A	A	255
24	265	EA 230	245	ES 290	ES 335	ES 350	A 310	260	245	A 230	215	200	195	195	H 195	225	H 215	H 220	220	220	205	225	225	235
25	255	255	ES 340	ES 325	ES 305	295	260	255	A 245	215	200	205	A 220	A 220	A	H 205	220	205	A 245	220	235	A 225	245	EA 310
26	ES 300	ES 275	ES 275	ES 290	270	275	280	255	225	A	200	200	200	210	225	220	H 195	220	220	200	200	S 270	EA 305	S 270
27	245	ES 270	A	ES 280	245	ES 350	ES 280	A 250	225	230	225	205	225	225	205	205	220	200	220	205	S 245	205	275	ES 295
28	S 300	S 275	S 260	S 275	S 295	235	S 240	225	220	225	H 180	210	195	200	205	220	H 220	210	200	S 245	230	225	220	S 270
29	S 290	S 300	S 270	250	250	215	ES 290	250	225	H 185	H 195	205	205	210	175	H 180	225	215	215	235	220	205	S 225	ES 315
30	S 300	265	250	205	235	205	S 270	230	220	210	H 205	H 205	H 135	230	210	205	H 240	205	200	S 230	230	250	S 255	ES 280
31	ES 290	260	265	255	250	240	250	230	230	230	220	205	195	210	H 200	210	H 225	210	210	240	240	210	ES 265	S 280
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	30	31	30	30	30	31	31	30	31	30	28	28	27	26	28	28	29	30	30	29	28	31
MED	ES 290	US 252	U 246	ES 275	US 232	ES 278	ES 270	240	225	225	215	205	201	210	210	216	220	215	220	228	225	232	ES 255	ES 280
UQ	ES 300	ES 300	ES 270	ES 305	ES 385	ES 390	ES 285	254	232	230	220	215	220	215	228	222	230	220	232	240	238	ES 250	ES 260	ES 310
LQ	254	258	245	U 232	U 223	U 223	US 233	230	220	H 200	H 200	200	195	H 200	200	H 205	218	210	210	225	220	225	223	US 250

DEC. 1987 | H'F (KM)

IONOSPHERIC DATA

DEC. 1987 | H'E (KM) | 135° E Mean Time (G.M.T. + 0 h)

Station YAMAGAWA Lat. 31° 12.1' N Long. 130° 37.1' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	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	115	110	110	105	105	105	A	110	115	S						
2								S	A	115	110	110	110	110	105	105	A	S						
3								S	120	115	110	110	110	105	105	110	115	S						
4								S	125	120	115	115	115	110	115	115	120	S						
5								S	120	115	115	110	105	110	105	A	A	S						
6								S	115	120	A	120	120	115	110	115	115	S						
7								S	120	115	115	120	115	A	A	A	A	S						
8								S	120	120	115	115	115	115	115	115	A	S						
9								S	120	115	115	115	115	115	115	A 110	H 110	S						
10								S	A	A	A	A	110	110	110	110	A	S						
11								S	120	110	110	110	A	A 110	A 120	110	115	S						
12								S	120	115	110	110	110	A	110	115	115	S						
13								S	E A 130	110	A 115	H 110	115	115	110	110	115	S						
14								S	120	110	110	A	A	110	110	110	115	S						
15								S	A	110	110	115	A	110	105	105	105	S						
16								S	120	120	115	115	115	115	110	110	A	S						
17								S	120	105	110	110	110	110	115	120	120	S						
18								S	115	115	110	115	110	110	110	A	A	S						
19								S	120	115	115	A	A	A	A	A	A	S						
20								S	125	120	115	120	115	110	105	110	A	S						
21								S	125	115	110	110	110	A	A	A	A	S						
22								S	E A 125	E A 130	115	120	110	115	110	115	A	S						
23								S	A	A	A	115	120	120	E A 120	A	A	S						
24								S	A	A	A	A	E A 125	A	105	A	A	S						
25								S	A	A	120	120	115	115	A	110	120	S						
26								S	E A 120	120	115	A	120	A	E A 120	E A 125	A	S						
27								S	A	A	A	110	110	110	115	E A 125	115	S						
28								S	A	A	A 120	120	120	115	115	115	115	S						
29								S	A	A	A	A	110	A 115	115	A	A	S						
30								S	S 120	110	110	115	115	A 115	A 115	A 115	A	S						
31								S	E S 140	110	110	110	A	A 115	A 115	E A 120	A	S						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									22	24	25	25	26	25	26	23	14							
MED									120	115	115	115	114	110	110	110	115							
UQ									122	119	115	115	115	115	115	115	115							
LQ									120	110	110	110	110	110	110	110	115							

DEC. 1987 | H'E (KM)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | H'ES (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station YAMAGAWA | Lat. 31° 12' 1 N | Long. 130° 37' 1 E | Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	S	S	S	S	S	S	S	S	G	G	130	G	120	115	105	120	G	S	S	S	S	S	S	S
2	S	S	S	100	S	100	100	100	100	100	G	125	115	120	110	105	100	100	100	100	S	100	100	S
3	S	S	S	S	S	S	S	S	G	G	125	120	105	110	125	125	110	100	100	100	100	100	100	S
4	S	S	S	S	S	100	100	S	E G 170	120	115	115	115	G	120	115	110	100	100	100	100	100	100	100
5	100	100	100	100	100	S	S	S	G	125	G	G	100	125	140	100	100	100	100	100	100	100	100	S
6	S	S	S	S	S	S	S	S	G	G	100	G	125	120	115	115	G	170	135	110	105	105	S	S
7	110	S	S	100	105	105	100	S	G	120	120	120	120	115	115	105	105	110	105	100	105	100	100	S
8	S	S	S	S	S	S	S	S	G	130	120	125	120	145	125	G	110	S	110	105	100	100	S	S
9	S	S	S	S	S	115	S	S	G	G	G	120	120	150	G	105	E G 155	140	S	S	105	105	S	S
10	S	S	S	120	115	S	110	110	110	110	110	110	115	110	110	110	110	S	S	S	S	S	S	S
11	S	S	S	S	S	S	S	140	140	G	G	115	110	110	110	150	145	130	115	110	105	S	105	100
12	105	S	S	S	S	S	S	135	140	125	E G 140	115	110	110	G	G	G	115	110	110	110	100	100	100
13	S	S	S	S	S	S	S	S	115	G	145	120	120	115	G	G	145	135	120	110	105	110	105	100
14	105	105	105	105	105	105	S	S	115	105	G	100	100	110	E G 120	G	120	110	105	100	100	100	100	100
15	95	95	120	120	105	S	100	S	100	G	G	150	120	115	105	G	105	105	100	100	100	S	S	S
16	S	S	S	S	S	S	S	S	G	G	125	125	110	110	120	110	100	100	S	140	S	S	S	S
17	S	S	S	S	S	S	S	S	150	115	125	125	130	120	120	G	G	100	100	100	S	100	100	105
18	105	S	105	S	100	100	100	S	G	G	115	120	110	110	105	100	100	100	100	100	S	S	100	100
19	S	105	105	105	S	S	100	S	120	120	120	120	110	100	100	100	100	100	100	100	100	S	S	S
20	S	S	S	S	S	S	S	S	G	G	G	125	110	115	110	110	100	100	100	100	S	S	S	S
21	S	S	S	S	S	120	S	S	G	125	120	115	120	110	105	105	100	100	100	100	100	S	S	100
22	100	S	S	S	105	110	115	105	110	100	120	125	140	120	120	120	110	105	105	105	105	105	95	95
23	S	S	S	115	S	120	S	S	105	105	100	100	150	100	95	95	100	100	100	105	100	100	100	100
24	150	105	105	120	120	120	120	110	110	110	110	110	105	105	120	130	105	E G 165	S	105	105	100	S	100
25	S	S	125	S	S	120	105	105	105	120	115	115	115	105	105	105	100	100	100	100	105	100	100	95
26	S	S	S	S	S	S	S	S	105	105	110	105	105	100	100	100	100	95	95	100	100	130	105	105
27	105	105	105	110	105	105	125	110	105	105	100	110	105	E G 175	95	95	G	105	105	105	105	105	125	95
28	S	S	S	S	S	S	S	S	110	105	105	105	105	105	105	G	G	S	105	100	100	100	S	S
29	S	S	S	S	S	S	S	S	105	105	105	105	E G 130	105	105	100	100	105	100	120	100	105	110	S
30	120	105	140	S	S	S	S	S	G	G	G	G	G	E G 170	100	100	100	S	S	100	100	S	S	S
31	S	S	S	S	S	S	S	S	G	G	E G 145	G	100	110	105	115	110	110	100	110	110	S	S	S
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	10	7	9	10	9	12	11	8	13	19	23	26	30	30	28	24	25	26	25	28	24	20	17	14
MED	105	105	105	108	105	108	100	110	110	110	118	118	114	110	109	105	102	101	100	100	100	100	100	100
UQ	110	105	123	120	105	120	112	122	118	120	122	125	120	118	120	115	110	110	105	108	105	105	105	100
LQ	100	102	105	100	105	102	100	105	105	105	110	110	105	110	105	100	100	100	100	100	100	100	100	100

DEC. 1987 | H'ES (KM)

IONOSPHERIC DATA

DEC. 1987 | TYPES OF ES | 135° E Mean Time (G.M.T. + 9 h)

Station YAMAGAWA Lat. 31° 12.1' N, Long. 130° 37.1' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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											C 2		C 2	C 2	L 2	C 2								
2				F 2		F 2	F 4	L 3	L 3	L 2		C 2	C 3	C 2	C 3	C 2	L 3	L 4	F 4	F 3		F 2	F 2	
3											C 2	C 3	C 2	C 3	C 2	C 3	C 3	L 3	F 5	F 5	F 3	F 4	F 2	
4						F 1	F 1		H 2	C 2	C 3	C 3	C 2		C 2	C 4	C 3	L 3	F 4	F 5	F 4	F 4	F 2	F 2
5	F 5	F 4	F 4	F 2	F 1					C 2			L 1	C 1	H 1	L 2	L 2	L 2	F 4	F 4	F 2	F 2	F 2	
6											L 2		C 1	C 1	C 2	C 2		H 2	F 2	F 2	F 2	F 3		
7	F 2			F 5	F 2	F 1	F 2			C 2	C 2	C 1	C 1	L 1	L 2	L 2	L 1	L 2	F 4	F 1	F 1	F 2	F 3	
8										H 2	C 1	C 1	C 1	H 1	C 2		L 2		F 2	F 1	F 3	F 1		
9						F 4						C 1	C 1	H 1		L 1	H 2	H 2		F 1	F 6	F 2		
10		F 1	F 1	F 1	F 7	F 1	F 4	L 2	L 4	L 4	L 3	L 2	C 2	C 2	C 2	C 2	L 5							
11						F 1	F 1	H 5	H 3			C 1	C 1	L 2	L 2	H 1	H 4	C 4	F 7	F 8	F 4	F 1	F 1	F 4
12	F 2	F 1	F 1	F 1	F 1	F 1	F 1	H 1	H 4	C 2	H 1	C 1	C 1	L 2				C 7	F 7	F 5	F 2	F 3	F 2	F 3
13	F 1				F 1	FF 11	F 1	H 1	L 2		HL 11	C 4	C 3	C 3			H 2	H 5	F 4	F 8	F 4	F 3	F 5	F 2
14	F 5	F 6	F 4	F 2	F 1	F 2			C 5	L 2		L 2	L 1	C 2	H 2		C 4	C 3	F 1	F 6	F 2	F 2	F 3	F 3
15	F 2	F 1	FF 32	FF 11	F 2		F 2		L 2			HL 11	CL 21	C 3	C 3		C 3	C 3	F 8	F 4	F 2			
16											C 2	C 2	C 3	C 2	C 2	C 4	L 4	L 2		F 2				
17									H 3	C 3	C 2	C 1	C 1	C 2	C 3			L 1	F 2	F 3		F 2	F 2	FF 22
18	F 2		F 2		F 2	F 6	F 3				C 2	C 2	C 2	C 2	C 2	L 2	L 2	L 4	F 3	F 4			F 2	F 2
19		F 4	F 3	F 5			F 3		C 6	C 3	C 2	CL 22	CL 23	L 2	L 3	L 3	L 3	L 3	F 4	F 6	F 2			
20												C 2	C 5	C 2	C 3	C 3	L 5	L 4	F 4	F 3				
21						F 2				C 1	C 1	C 3	C 2	L 2	L 2	L 4	L 5	L 4	F 5	F 4	F 2			F 1
22	F 1				F 5	F 2	F 1	L 1	L 1	L 3	CL 22	CL 11	H 1	CL 21	CL 41	CL 34	CL 42	LL 32	F 5	F 5	F 5	F 3	F 5	F 2
23				F 2		F 2			L 2	L 2	L 2	L 1	HL 11	L 1	L 2	L 2	L 1	L 1	F 1	F 4	F 5	F 4	F 5	F 2
24	F 1	F 3	F 2	F 2	F 2	F 2	F 3	L 4	L 4	L 2	L 2	L 2	L 2	L 1	C 1	CL 13	L 2	H 2		F 4	F 3	F 2		F 2
25			F 1			F 2	FF 23	LL 21	L 5	L 2	C 2	C 2	C 2	C 2	L 6	L 1	L 2	L 4	F 5	F 5	F 4	F 6	F 2	F 4
26									L 2	C 5	C 2	LL 21	L 2	L 2	L 2	L 3	LL 21	L 3	F 2	F 2	F 1	F 1	F 4	F 1
27	F 2	F 1	F 2	F 1	F 2	F 2	F 1	L 5	L 3	L 5	L 1	L 1	L 1	HL 11	L 2	L 2		L 1	F 2	F 1	F 1	F 2	FF 11	F 2
28									L 2	L 2	L 2	L 1	L 1	L 1	L 1				F 1	F 2	F 1	F 1		
29									L 3	L 4	L 2	LH 21	HL 12	L 2	L 1	L 2	L 2	L 1	F 2	FF 11	F 2	F 1	F 1	
30	F 1	F 2	F 1											HL 11	L 2	L 1	L 2		F 1	F 1	F 1			
31								L 1			H 1		L 3	L 1	L 1	L 2	CL 32	C 3	F 3	FF 32	F 4			F 1
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																								
MED																								
UQ																								
LQ																								

DEC. 1987 | TYPES OF ES

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FXI (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station OKINAWA Lat. 26° 16.9' N, Long. 127° 48.4' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	X 44	X 43	X 44	X 43	X 43	X 40	X 42												X 70	O X 46	X 56	X 58	X 43	X 37
2	X 33	X 34	X 34	X 38	X 38	X 29	X 31												X 70	X 57	X 51	U X 50	X 50	X 46
3	X 34	X 34	X 36	X 38	X 41	X 37	X 30												X 79	X 61	X 56	X 52	X 44	X 38
4	X 38	X 39	X 39	X 39	X 67	X 26	X 27												X 98	X 92	X 83	X 73	X 65	X 50
5	X 47	X 46	X 46	X 47	X 56	X 40	X 30												X 126	X 90	X 71	X 81	X 49	X 46
6	X 41	X 43	X 38	X 25	X 27	X 32	X 38												U X 122	X 89	X 83	X 84	X 70	X 71
7	X 72	X 60	X 50	X 42	X 41	X 31	X 29												X 66	X 82	X 95	X 94	X 74	X 64
8	X 62	X 63	X 63	X 44	X 38	X 33	X 33												X 58	X 67	X 75	X 67	X 67	X 40
9	X 39	X 39	X 37	X 31	X 29	X 30	X 28												X 57	X 58	X 61	X 64	X 57	X 56
10	X 56	X 56	X 51	X 37	X 31	X 27	X 23												X 56	X 51	X 61	X 72	X 57	X 43
11	X 39	X 36	X 30	X 31	X 31	X 29	X 32												X 54	X 48	X 40	X 41	X 38	X 38
12	X 38	X 37	X 36	X 41	X 26	O X 27	X 23												X 76	X 54	X 62	U X 40	X 47	X 41
13	X 42	X 38	X 35	X 35	X 26	X 25	X 28												X 62	X 64	X 64	X 55	X 41	X 36
14	X 36	X 42	X 54	X 37	A	X 23	X 25												X 86	X 84	X 50	X 45	X 44	X 43
15	X 43	X 40	X 40	X 43	X 44	X 37	X 35	X 46											X 53	X 66	X 74	X 84	X 67	X 60
16	X 56	X 52	X 42	X 37	X 46	X 30	X 30	X 47											X 108	X 88	X 62	X 49	X 47	X 59
17	X 49	X 35	X 39	X 38	X 37	X 41	X 31	X 49											X 97	X 91	X 78	X 67	X 77	X 57
18	X 48	X 47	X 39	X 39	X 37	X 35	X 31	X 38											X 38	X 38	X 85	X 58	X 40	X 33
19	X 32	X 35	X 36	A	32	31	30	X 40											X 80	X 68	X 81	X 84	X 67	X 41
20	X 41	X 35	X 29	X 28	X 32	X 34	X 31	X 38											X 70	X 50	X 65	X 67	X 52	X 37
21	X 36	X 37	39	X 41	X 38	X 37	X 36	X 42											X 70	X 71	X 73	X 66	X 55	X 42
22	X 39	X 41	X 40	X 36	X 34	X 37	X 37	X 47											X 53	X 46	X 51	X 42	X 37	X 31
23	X 34	X 37	X 39	X 31	X 33	X 32	35	X 43											X 77	X 63	X 56	X 56	X 38	X 34
24	X 30	X 32	X 34	X 32	29	30	31	X 41											X 71	X 72	X 76	X 76	X 71	X 46
25	X 40	X 39	X 40	37	39	38	34	X 41											X 61	X 67	X 72	X 71	X 41	U X 37
26	X 31	X 34	X 34	X 35	X 36	X 35	X 34	X 42											X 98	X 65	X 61	X 50	X 49	X 48
27	X 37	X 34	X 36	X 36	33	34	34	X 43											X 62	X 60	X 56	X 55	X 47	X 43
28	X 40	X 33	X 33	X 32	X 34	X 34	X 30	X 40											X 71	X 56	X 60	X 67	X 46	X 38
29	X 31	X 32	X 33	X 33	X 34	X 34	X 32	X 38											X 77	X 54	X 59	X 56	X 40	X 34
30	X 32	X 33	X 36	X 39	X 38	X 34	X 26	X 40											X 62	X 53	X 49	X 51	X 47	X 38
31	X 30	X 33	X 34	X 35	X 37	X 37	X 29	X 38											C	C	C	C	C	C
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	30	30	31	31	17											30	30	30	30	30	30
MED	X 39	X 38	X 38	X 37	X 36	X 34	X 31	X 41											X 70	X 64	X 62	X 61	X 43	X 42
UQ	X 44	X 42	X 40	X 39	X 39	X 37	X 34	X 43											X 86	X 82	X 75	X 73	X 65	X 48
LQ	X 34	X 34	X 36	X 33	X 32	X 30	X 29	X 40											X 62	X 56	X 56	X 51	X 43	X 37

DEC. 1987 | FXI (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FOF2 (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station OKINAWA Lat. 26° 16.9' N, Long. 127° 48.4' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	38	S 37	S 38	37	S 37	34	S 36	48	73	63	79	79	81	84	90	85	68	72	64	40	50	52	37	31
2	27	28	28	S 32	32	23	25	39	79	R 98	92	101	102	R 108	103	104	U R 109	R 76	S 64	51	45	U S 44	S 44	S 40
3	28	28	30	32	35	31	J S 24	42	65	78	73	71	103	87	112	124	U R 109	102	U R 73	55	U S 50	46	38	32
4	32	S 33	33	33	S 61	20	21	42	64	84	73	94	84	91	97	112	117	R 113	S 92	86	S 77	67	S 59	S 44
5	41	40	40	41	50	34	24	38	65	60	78	105	100	107	R 117	R 120	R 123	R 108	U S 120	84	S 65	S 75	43	S 40
6	35	37	32	19	21	F 23	F 29	60	63	56	90	110	103	97	103	110	124	R 125	S 116	S 80	77	78	S 64	63
7	66	54	S 44	36	S 35	25	23	46	69	74	88	82	80	80	77	77	74	R 85	S 60	76	39	S 38	68	58
8	56	F 59	57	38	32	27	27	38	67	88	98	124	116	91	81	83	70	R 62	52	S 61	69	61	61	34
9	33	33	31	25	23	24	22	34	66	83	105	149	135	103	H 71	62	61	57	51	F 50	55	58	F 43	U S 50
10	S 50	50	45	31	25	21	17	30	64	R 100	R 117	77	77	77	73	82	66	62	50	S 45	55	66	51	37
11	33	30	24	25	25	23	26	42	84	R 118	106	115	U R 113	R 103	102	79	60	56	43	42	S 34	S 35	32	32
12	32	31	30	35	20	21	17	35	75	92	S 97	101	94	R 110	126	122	98	H 72	70	58	56	U S 34	S 41	35
13	36	32	29	29	20	19	22	32	61	87	117	117	U R 120	145	104	87	65	R 62	56	55	58	U S 49	35	30
14	S 30	36	43	S 31	A	17	19	34	67	93	94	85	R 114	130	132	145	123	81	80	S 73	44	39	38	37
15	37	34	34	37	R 33	31	29	40	64	63	68	86	106	R 110	R 120	R 120	115	68	57	60	68	S 78	61	S 54
16	50	46	36	S 31	40	24	S 24	41	72	70	64	78	144	U R 156	140	R 136	134	R 128	S 102	82	S 56	S 43	41	53
17	43	29	33	32	31	35	25	43	80	91	R 112	92	R 118	147	R 155	R 133	R 127	115	91	85	72	S 61	71	51
18	U S 42	41	33	33	31	29	U S 25	32	81	105	97	96	109	U R 130	145	125	116	96	82	82	79	52	34	27
19	26	29	30	A	F	F	F	34	75	89	97	78	106	U R 123	R 132	113	95	R 76	S 74	62	S 75	78	S 61	35
20	S 35	29	23	22	26	28	25	32	69	74	86	96	R 95	116	116	U R 102	89	75	U S 64	S 44	59	61	46	31
21	30	31	F	35	32	31	30	36	66	94	R 106	R 96	J R 120	R 137	135	J R 112	R 105	R 91	S 64	65	S 67	60	49	36
22	S 33	35	34	31	28	31	31	S 41	64	70	111	116	114	89	91	72	84	80	47	S 40	45	36	S 31	25
23	28	31	33	25	27	26	F	S 37	67	88	93	C	C	C	C	C	77	76	71	57	S 50	50	S 32	23
24	24	26	28	S 26	F	F	F 20	35	70	94	R 115	100	88	116	R 143	144	R 113	75	65	66	S 70	70	65	S 40
25	34	33	34	F	F	F	F	S 33	80	81	85	72	104	134	R 154	150	125	87	55	61	66	65	35	31
26	25	28	28	29	30	29	28	36	76	R 92	R 97	86	124	R 157	150	132	108	81	92	59	55	44	43	42
27	31	28	30	30	F	F	F 24	37	72	80	94	77	103	110	R 105	R 96	84	68	56	54	S 50	49	41	37
28	34	32	32	26	28	28	S 24	34	63	71	74	75	92	109	143	H 144	114	R 95	65	50	54	61	40	32
29	25	26	27	27	28	28	26	32	62	83	R 100	73	75	94	R 114	129	120	R 110	71	S 43	S 53	50	34	28
30	26	27	30	33	32	28	S 20	34	62	74	82	82	75	91	95	78	72	79	56	47	S 43	S 45	S 41	32
31	24	27	28	29	31	31	23	32	62	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	30	29	26	27	28	31	31	30	30	29	29	29	29	29	30	30	30	30	30	30	30	30
MED	33	32	32	31	31	28	24	36	67	84	94	92	103	109	114	112	106	80	64	58	56	55	42	36
UQ	38	36	34	33	35	31	26	41	74	92	105	101	116	130	135	129	117	R 96	80	76	69	66	59	42
LQ	28	28	29	27	26	23	22	34	64	74	82	78	92	91	97	85	74	72	56	50	50	45	37	31

DEC. 1987 | FOF2 (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FOF1 (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station OKINAWA Lat. 26° 16' 9" N, Long. 127° 48' 4" E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	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	UL 470	L	UL 470	L	UL 430	L							
2									L	L	L	L 460	UL 470	440	UL 430	A	A							
3										L	L	L	UL 460	UL 470	450	UL 420	L							
4										L	L	UL 470	UL 480	L	L	L	L							
5										L	UL 460	UL 470	UL 460	L	UL 440	L	L							
6									L	L	L	L	L	L	L	L	L							
7										L	L	L	UL 450	L	L	L								
8									L	L	L	L 440	L 440	L	UL 410	UL 420	A							
9									L	L	UL 440	UL 450	UL 450	L	L	L	L							
10									L	L	L	L	A	L	L	L	L	L						
11									L	L	UL 430	L	L	L	L	L	A							
12									L	L	L	UL 450	UL 460	L	L	L	L							
13									L	L	440	450	L	470	UL 430	L	L							
14										L	UL 440	UL 440	L	L 460	L 450	L 440	L							
15									L	L	L	UL 440	L	L	L 450	L	L							
16										L	UL 440	L	440	L	L	L	L							
17									L	L	L 390	L 460	L	UL 440	L	L	L							
18									L	L	A	UL 500	430	500	UL 430	430	A	A						
19									L	L	L	UL 450	UL 460	UL 470	430	L	L	A						
20									L	L	L	L	UL 470	UL 460	L	A	A	A						
21										L	L	L	UL 450	UL 480	UL 450	A	L	A						
22										L	L	L	L	L	A	L	A	A						
23										L	A	C	C	C	C	C	L	A						
24									L	L	L	L	L	L	L	L	L							
25									L	L	L	L	L	UL 460	L	L	L							
26										L	L	UL 440	UL 470	UL 430	L	L	L							
27										L	L	L	L	UL 460	L	L	L							
28										L	L	UL 450	UL 480	L	UL 470	L	L							
29										L	L	UL 440	UL 450	L	L	L	L							
30										L	L	L	L	L	L	L	L							
31										C	C	C	C	C	C	C	C	C						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT											7	16	16	13	11	5								
MED											UL 440	UL 450	UL 460	UL 470	UL 450	UL 430								
UQ											UL 440	UL 465	UL 470	UL 470	L 450	L 430								
LQ											UL 435	UL 440	UL 450	UL 460	UL 430	UL 420								

DEC. 1987 | FOF1 (0.01 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FOE (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station OKINAWA Lat. 26° 16.2' N, Long. 127° 48.4' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	200	A	300	310	320	310	A	A	A	S						
2								S	A	260	A	310	320	A	A	A	A	S						
3								S	200	A	A	A	A	305	A	A	A	S						
4								S	A	A	A	A	A	A	A	A	A	A						
5								170	R 220	R 275	305	305	A	A	A	A	A	A						
6								S	210	A	A	A	320	R 320	A	A	A	A						
7								S	A	A	A	A	A	A	A	A	A	S						
8								S	235	A	A	335	R 340	330	A	A	A	160						
9								S	A	275	305	320	A	A	320	A	245	170						
10								S	A	A	A	A	A	A	A	A	A	A						
11								S	190	A	295	A	A	A	300	290	260	A						
12								S	195	250	A	300	310	320	A	A	260	190						
13								S	210	260	300	A	320	330	A	A	250	190						
14								S	R 225	A	A	A	A	A	U A 320	A	A	A						
15									R 210	A	A	U A 315	335	A	A	U A 280	255	200						
16									A	A	A	A	A	A	A	A	A	A						
17									190	250	290	315	A	A	A	300	260	190						
18									210	270	A	A	A	A	A	A	A	A						
19									195	250	290	A	320	A	A	A	A	A						
20									190	260	A	A	A	A	A	A	A	A						
21									200	250	A	A	R 320	R 325	A	A	A	A						
22									200	250	300	310	320	A	A	A	A	A						
23									200	A	A	C	C	C	C	C	A	A						
24									S	A	A	A	A	A	A	A	A	A						
25									A	R 225	A	R 300	A	A	A	A	A	A						
26									200	R 260	A	A	335	A	A	A	A	A						
27									220	285	305	R 330	335	R 330	U A 315	300	265	A						
28									S	A	A	A	A	A	325	305	R 275	A						
29									R 215	A	300	A	A	R 325	A	A	A	A						
30									200	265	R 300	320	335	340	315	295	265	A						
31									205	C	C	C	C	C	C	C	C	C						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								1	22	15	11	12	13	10	6	6	9	6						
MED								170	200	260	300	312	320	325	318	298	260	185						
UQ									210	263	302	320	335	330	320	300	265	190						
LQ									200	250	298	308	320	320	315	290	255	170						

The Radio Research Laboratory, Japan

DEC. 1987 | FOE (0.01 MHZ)

IONOSPHERIC DATA

DEC. 1987 | FOES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station OKINAWA Lat. 26° 16.9' N Long. 127° 48.4' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E S 16	E S 16	E S 16	E S 16	E S 16	J A 20	20	18	G	30	32	39	42	J A 40	J A 54	J A 40	J A 40	J A 32	J A 26	J A 25	J A 20	22	E S 16	E S 16
2	E S 16	E S 16	E S 16	18	18	J A 21	22	J A 24	J A 24	G 24	J A 30	G	G	40	39	J A 76	J A 65	J A 27	J A 30	J A 24	J A 20	J A 20	20	E S 16
3	E S 16	E S 16	18	E S 16	E S 16	E S 16	20	19	G	32	J A 31	J A 34	38	38	J A 53	J A 40	J A 28	J A 30	20	J A 22	21	22	E S 16	E S 16
4	E S 16	E S 16	E S 16	E S 16	E S 16	J A 23	J A 22	23	24	32	J A 31	J A 34	J A 37	J A 35	J A 31	J A 36	J A 37	J A 41	J A 89	J A 24	E S 16	E S 16	E S 16	J A 22
5	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	G	27	33	35	40	J A 41	J A 35	J A 35	J A 43	J A 26	J A 54	J A 36	J A 26	22	J A 21	E S 16	E S 16
6	E S 16	E S 16	E S 16	E S 16	E S 15	E S 15	E S 16	J A 17	24	J A 27	J A 33	34	36	J A 36	J A 37	J A 43	31	J A 33	J A 31	J A 37	E S 16	E S 16	E S 16	E S 16
7	22	21	E S 16	E S 16	23	23	23	20	J A 26	31	J A 34	J A 35	J A 40	J A 35	J A 33	J A 32	J A 35	22	J A 27	J A 28	21	22	21	E S 16
8	E S 16	23	20	E S 16	19	J A 22	J A 18	E S 16	G	J A 19	J A 32	G	G	G	J A 39	J A 37	J A 43	G	J A 25	E S 16	E S 16	E S 15	E S 16	E S 16
9	20	E S 16	E S 16	18	E S 16	18	E S 16	J A 17	25	G	G	G	35	J A 34	36	J A 31	G	G	18	22	J A 26	23	23	22
10	22	20	E S 16	J A 20	18	23	18	E S 16	J A 26	33	J A 40	J A 44	J A 50	J A 43	40	J A 36	28	J A 20	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
11	18	E S 16	E S 16	E S 16	E S 16	E S 16	22	20	24	J A 31	G	33	J A 36	J A 33	40	35	37	30	J A 40	J A 22	J A 22	E S 16	E S 16	E S 16
12	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	22	26	35	J A 43	37	37	G	J A 40	J A 40	G	G	E S 16	E S 16	J A 26	22	J A 28	J A 22
13	22	20	22	18	18	19	18	22	25	29	35	34	G	G	J A 38	J A 36	30	24	J A 26	J A 40	J A 24	J A 25	J A 25	20
14	J A 20	23	J A 22	J A 23	J A 26	J A 24	23	E S 15	26	J A 33	J A 43	J A 42	J A 35	J A 38	38	J A 36	J A 30	J A 50	J A 50	J A 50	J A 24	J A 22	J A 26	J A 26
15	J A 26	22	J A 26	22	E S 16	E S 16	E S 16	E S 16	J A 26	J A 29	J A 33	38	G	38	J A 34	31	G	G	23	J A 44	J A 44	J A 32	J A 25	22
16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	J A 25	J A 31	J A 34	J A 34	J A 41	J A 65	J A 44	J A 41	J A 44	J A 23	J A 27	J A 41	J A 26	J A 21	24	J A 22
17	J A 38	J A 29	23	E S 15	E S 16	E S 16	19	19	22	G	G	G	J A 36	33	32	43	G	G	E S 16	J A 23	J A 24	J A 32	E S 16	J A 21
18	E S 16	E S 16	J A 25	J A 29	23	E S 16	E S 16	E S 16	G	31	J A 44	J A 37	J A 37	J A 36	J A 33	J A 71	J A 84	J A 65	J A 53	J A 40	J A 25	J A 30	J A 25	18
19	E S 16	E S 16	E S 16	J A 52	J A 26	J A 24	22	E S 16	G	23	G	J A 38	G	J A 40	J A 64	J A 80	J A 64	J A 74	J A 65	J A 30	J A 40	J A 26	24	19
20	E S 16	E S 16	E S 16	E S 16	E S	20	18	20	G	G	J A 37	J A 36	J A 50	J A 43	J A 65	J A 110	J A 91	J A 50	J A 41	J A 21	J A 24	23	E S 16	E S 16
21	E S 16	E S 16	E S 16	E S 16	19	21	18	E S 16	G	G	J A 30	J A 34	G	G	J A 53	J A 65	J A 34	J A 85	J A 36	J A 24	J A 26	J A 25	22	E S 16
22	E S 16	E S 16	E S 16	18	J A 24	J A 30	13	E S 16	G	30	33	38	34	J A 50	J A 80	J A 40	J A 44	J A 51	J A 54	J A 75	J A 27	E S 16	E S 16	E S 16
23	E S 16	E S 16	E S 16	E S 16	J A 23	18	E S 16	E S 16	23	J A 30	J A 75	C	C	C	C	C	J A 37	J A 45	J A 40	J A 25	J A 50	J A 25	20	E S 16
24	E S 16	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16	22	J A 25	J A 64	J A 86	J A 88	J A 85	J A 84	J A 57	J A 42	J A 35	J A 65	J A 30	J A 25	23	J A 25	22	22
25	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	22	J A 30	J A 32	J A 60	J A 44	J A 50	J A 43	J A 33	J A 38	J A 44	J A 57	J A 54	J A 33	J A 23	J A 25	J A 26	J A 26
26	23	22	E S 15	E S 15	23	E S 16	E S 16	E S 16	J A 26	32	J A 32	J A 34	G	J A 40	J A 41	J A 43	J A 40	J A 31	J A 24	J A 26	J A 34	J A 26	J A 24	J A 22
27	J A 26	J A 25	E S 16	J A 24	J A 25	J A 25	23	21	G	G	G	G	G	G	34	32	32	J A 22	22	23	J A 24	J A 25	22	E S 16
28	23	23	E S 16	E S 16	E S 16	E S 15	E S 15	E S 16	J A 26	J A 30	J A 35	J A 38	J A 36	J A 37	G	G	G	J A 36	J A 24	J A 22	21	E S 16	E S 16	E S 16
29	E S 16	E S 16	E S 16	E S 16	E S 15	E S 16	E S 15	E S 16	G	J A 29	35	J A 36	J A 44	G	J A 34	J A 29	J A 33	J A 34	J A 37	J A 26	J A 23	J A 26	E S 16	E S 16
30	E S 16	23	E S 16	E S 15	24	J A 22	23	22	G	G	G	G	G	G	G	32	G	J A 24	J A 30	23	E S 16	E S 16	E S 16	E S 16
31	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	G	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	30	30	29	29	29	29	29	30	30	30	30	30	30	30	30
MED	E S 16	E S 16	E S 16	E S 16	E S 16	18	18	17	24	30	J A 33	J A 35	36	J A 36	J A 33	J A 40	J A 35	J A 32	J A 30	J A 25	J A 24	J A 22	20	E S 16
UQ	21	22	E S 16	18	23	J A 22	21	20	J A 26	32	J A 37	J A 38	J A 41	J A 40	J A 44	J A 43	J A 44	50	J A 40	J A 33	J A 26	J A 25	J A 24	22
LQ	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	G	24	30	34	G	33	J A 34	J A 35	28	22	J A 24	J A 22	21	E S 16	E S 16	E S 16

DEC. 1987 | FOES (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FBES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station OKINAWA Lat. 26° 16.9' N, Long. 127° 48.4' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	18	G	30	32	39	40	38	40	31	26	25	ES 16	25	ES 16	ES 16	ES 16	ES 16
2	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	20	24	G 24	30	G	G	40	39	48	42	23	17	ES 16	ES 16	ES 16	ES 16	ES 16
3	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	18	G	32	31	34	38	38	33	30	28	27	ES 16	21	ES 16	ES 16	ES 16	ES 16
4	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	24	29	31	32	36	33	31	33	32	32	44	ES 16	ES 16	ES 16	ES 16	18
5	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	G	24	30	33	38	35	35	35	34	25	42	33	ES 16	ES 16	ES 16	ES 16	ES 16
6	ES 16	ES 16	ES 16	ES 16	ES 15	ES 15	ES 16	ES 15	24	27	33	34	35	35	35	34	27	23	25	33	ES 16	ES 16	ES 16	ES 16
7	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	22	30	32	34	34	34	33	30	28	21	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16
8	ES 16	ES 16	ES 16	ES 16	ES 16	ES 15	18	ES 16	G	19	32	G	G	G	32	33	20	G	18	ES 16	ES 16	ES 15	ES 16	ES 16
9	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	24	G	G	G	34	33	36	30	G	G	17	ES 15	UA 22	ES 16	ES 16	ES 16
10	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	26	32	38	43	45	42	39	34	28	20	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16
11	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	20	24	30	G	33	35	33	40	35	37	30	40	22	19	ES 16	ES 16	ES 16
12	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	19	26	35	41	37	37	G	40	40	G	G	ES 16	ES 16	26	ES 16	ES 16	ES 16
13	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	18	25	29	35	34	G	G	35	33	30	24	26	25	17	25	ES 16	ES 16
14	ES 16	ES 16	ES 16	18	AA 26	ES 16	ES 16	ES 15	24	28	33	34	34	33	36	32	29	29	31	46	ES 16	ES 16	ES 16	ES 16
15	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	22	29	30	37	G	36	34	31	G	G	ES 16	40	42	32	24	ES 16
16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	23	29	32	33	37	34	42	38	31	22	19	34	24	ES 16	13	20
17	29	27	ES 16	ES 15	ES 16	ES 15	ES 16	ES 16	21	G	G	G	34	33	32	G	G	G	ES 16	22	24	26	ES 16	
18	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	G	30	44	32	33	33	32	37	46	41	30	37	21	27	21	ES 15
19	ES 16	ES 16	ES 16	AA 52	22	ES 16	ES 16	ES 16	G	27	G	32	G	34	36	35	30	53	35	25	25	26	ES 16	ES 16
20	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	17	G	G	30	44	28	41	40	76	48	50	30	20	22	ES 16	ES 16	ES 16
21	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	G	G	31	34	G	G	40	52	30	40	30	ES 16	26	20	ES 16	ES 16
22	ES 16	ES 16	ES 16	ES 16	ES 16	25	ES 16	ES 16	G	30	33	38	34	40	76	32	43	37	25	22	21	ES 16	ES 16	ES 16
23	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	23	27	55	C	C	C	C	C	30	39	30	ES 16	30	ES 16	ES 16	ES 16
24	ES 16	ES 16	ES 16	ES 15	ES 16	ES 16	ES 16	ES 16	21	34	43	41	43	34	32	37	33	45	30	20	ES 16	20	ES 16	ES 16
25	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	21	27	40	38	42	40	33	32	33	50	44	20	21	19	21	21
26	ES 16	ES 16	ES 15	ES 15	ES 16	ES 16	ES 16	ES 16	22	27	30	33	G	35	34	30	29	22	18	ES 16	22	18	ES 16	13
27	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	G	G	G	G	G	G	34	31	28	21	ES 16	ES 16	20	ES 16	ES 16	ES 16
28	ES 16	ES 16	ES 16	ES 16	ES 16	ES 15	ES 15	ES 16	26	30	32	33	34	34	G	G	G	22	ES 16	ES 15	ES 16	ES 16	ES 16	ES 16
29	ES 16	ES 16	ES 16	ES 16	ES 15	ES 16	ES 15	ES 16	G	29	34	33	34	G	34	29	28	24	30	24	18	ES 16	ES 16	ES 16
30	ES 16	ES 16	ES 16	ES 15	ES 15	ES 16	ES 16	ES 16	G	G	G	G	G	G	G	31	G	23	22	ES 16	ES 16	ES 16	ES 16	ES 16
31	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	G	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	30	30	29	29	29	29	29	30	30	30	30	30	30	30	29
MED	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	22	29	32	34	34	34	35	33	28	24	24	20	18	ES 16	ES 16	ES 16
UQ	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	24	30	34	37	36	36	39	35	32	39	30	25	22	19	ES 16	ES 16
LQ	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16	G	24	30	32	G	33	33	31	25	21	ES 16	ES 16	ES 16	ES 16	ES 16	ES 16

DEC. 1987 | FBES (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | FMIN (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9h)

Station OKINAWA Lat. 26° 16.9' N, Long. 127° 48.4' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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 S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	15	15	15	14	14	15	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
2	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	15	14	15	15	16	16	15	15	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
3	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	16	18	17	16	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
4	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	18	19	16	19	20	18	15	15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
5	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	15	16	16	16	16	16	17	16	15	14	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
6	E S 16	E S 16	E S 16	E S 16	E S 15	E S 15	E S 16	E S 15	14	16	16	20	20	18	17	18	15	13	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
7	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	15	15	14	18	18	18	18	17	15	E S 14	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
8	E S 16	E S 16	E S 16	E S 16	E S 16	E S 15	E S 16	E S 16	16	16	18	18	23	24	23	18	16	15	E S 15	E S 16	E S 16	E S 15	E S 16	E S 16
9	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	24	26	26	23	22	17	16	15	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16
10	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	15	16	18	18	26	18	16	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
11	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	20	16	18	17	16	15	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
12	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	17	17	20	16	16	15	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
13	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	23	22	25	18	16	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
14	E S 16	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16	E S 15	15	14	15	17	18	17	18	16	15	14	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16
15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	15	16	15	16	17	16	16	16	14	E S 16	E S 16	E S 15	E S 15	E S 16	E S 16	E S 16
16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	14	16	19	17	19	18	20	16	15	14	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16
17	E S 16	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	16	15	15	16	24	28	24	20	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
18	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	15	16	16	16	16	16	15	15	15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
19	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	15	16	16	15	15	15	15	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
20	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	18	19	18	16	15	16	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
21	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	16	16	16	17	15	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
22	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	15	16	16	16	15	20	16	16	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
23	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	C	C	C	C	C		16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
24	E S 16	E S 16	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16	16	19	18	22	20	18	17	16	15	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16
25	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	15	16	17	23	17	23	18	16	15	15	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
26	E S 16	E S 16	E S 15	E S 15	E S 16	E S 16	E S 16	E S 16	14	14	16	16	17	14	15	14	14	14	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16
27	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	15	14	15	17	16	16	14	16	14	13	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
28	E S 16	E S 16	E S 16	E S 16	E S 16	E S 15	E S 15	E S 16	E S 16	16	23	18	17	17	16	16	15	15	E S 16	E S 15	E S 16	E S 16	E S 16	E S 16
29	E S 16	E S 16	E S 16	E S 16	E S 15	E S 16	E S 15	E S 16	14	15	14	15	15	17	14	14	14	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
30	E S 16	E S 16	E S 16	E S 15	E S 15	E S 16	E S 16	E S 16	E S 16	16	16	18	23	16	18	15	14	14	E S 15	E S 16	E S 16	E S 16	E S 16	E S 16
31	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	15	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	30	30	29	29	29	29	29	30	30	30	30	30	30	30	30
MED	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	16	17	17	17	17	16	15	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
UQ	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	16	16	18	18	19	20	18	16	16	16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16
LQ	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16	15	15	15	16	16	16	16	15	15	14	E S 16	E S 16	E S 16	E S 16	E S 16	E S 16

DEC. 1987 | FMIN (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | M(3000)F2 (0.01) | 135° E Mean Time (G.M.T. + 9 h)

Station OKINAWA Lat. 26° 16.9' N, Long. 127° 48.4' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	315	S 310	S 315	295	S 310	325	S 320	330	365	380	365	355	340	335	345	350	340	345	350	330	320	345	335	355
2	315	320	320	S 330	360	325	320	320	340	R 345	340	335	325	R 325	330	330	U R 340	R 370	S 330	315	310	U S 320	S 340	S 350
3	340	305	300	330	355	380	J S 335	345	345	360	340	340	320	310	320	345	U R 330	315	U R 365	300	U S 330	325	330	310
4	295	S 285	285	305	S 350	350	310	345	335	365	330	340	335	325	320	330	340	R 360	S 320	320	S 300	300	S 305	S 295
5	280	300	310	305	360	365	310	330	360	360	325	330	340	315	R 325	R 325	R 335	R 315	U S 365	345	S 305	S 325	300	S 300
6	300	310	360	340	285	F 280	F 325	365	375	320	315	330	325	320	320	315	330	R 365	S 355	S 295	310	325	S 295	285
7	325	290	S 285	305	S 330	300	305	345	360	350	355	355	345	335	335	330	325	R 370	S 310	310	325	S 350	330	295
8	275	F 315	350	315	330	295	315	315	335	335	310	325	335	350	315	365	365	R 355	325	S 295	335	325	360	295
9	305	320	340	320	345	355	295	340	340	325	325	330	330	320	H 325	370	360	370	360	F 310	310	325	F 320	U S 300
10	S 300	320	345	340	340	335	S	300	330	R 340	R 380	370	350	330	320	345	350	360	320	S 310	290	335	350	325
11	350	335	355	320	300	305	290	310	320	R 365	330	315	U R 320	R 305	325	340	365	355	330	335	S 340	S 330	330	310
12	300	305	325	340	370	325	325	330	360	345	S 340	345	320	R 300	325	345	345	H 335	340	310	285	U S 395	S 315	315
13	360	360	345	365	350	315	320	330	325	300	335	340	U R 320	335	355	365	355	R 355	320	345	345	U S 305	315	300
14	S 300	320	345	S 290	A	295	315	325	365	355	365	365	R 300	315	320	335	355	345	345	S 360	340	345	330	295
15	310	310	295	310	R 315	340	325	335	360	355	340	325	345	R 305	R 320	R 325	355	360	335	350	315	S 280	S 325	S 295
16	300	305	305	S 290	360	355	S 335	330	360	365	320	270	300	U R 280	295	R 305	315	R 330	S 325	330	S 350	S 290	280	310
17	360	275	305	310	290	340	320	325	350	335	R 350	305	R 305	315	R 310	R 310	R 330	345	320	335	335	S 325	330	325
18	U S 310	340	305	305	305	310	U S 300	295	345	350	350	320	330	U R 305	325	330	345	335	330	330	340	345	350	295
19	305	345	335	A	F	F	F	325	365	355	360	305	320	U R 310	R 335	335	345	R 355	S 325	290	S 305	320	S 350	315
20	S 355	345	365	295	295	310	320	310	345	350	335	320	R 315	320	335	U R 330	335	345	U S 350	S 340	320	325	345	305
21	300	305	F	340	330	320	335	320	335	330	R 345	R 310	J R 310	R 320	305	J R 330	R 365	R 350	S 330	325	S 330	340	335	305
22	S 285	315	350	325	320	290	320	S 340	345	320	325	325	340	335	340	335	345	365	340	S 335	320	335	S 355	300
23	305	320	350	340	335	325	F	S 350	335	350	355	C	C	C	C	C	350	340	340	350	S 360	340	S 360	340
24	290	305	340	S 345	F	F	F 325	315	335	335	R 365	355	325	310	R 325	340	R 345	335	340	340	S 305	320	355	S 360
25	310	335	310	F	F	F	F	S 330	360	365	365	310	300	305	R 310	330	350	345	365	335	325	345	340	320
26	300	305	320	310	315	345	340	320	355	R 360	R 345	330	305	R 310	325	335	350	340	365	365	345	285	300	335
27	305	305	335	335	F	F	F 310	325	345	360	345	335	345	340	R 330	R 330	365	360	355	350	S 330	315	330	335
28	310	295	330	325	320	320	S 310	340	350	360	365	345	320	310	315	H 275	335	R 350	360	320	305	345	360	295
29	320	305	315	315	320	320	325	310	345	350	R 365	355	320	355	R 320	325	315	R 335	350	S 355	S 320	340	340	320
30	305	295	315	350	330	355	S 300	325	355	365	355	355	320	330	345	320	345	360	365	330	S 315	S 320	S 340	345
31	335	295	320	295	320	340	305	310	355	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	30	29	26	27	27	31	31	30	30	29	29	29	29	29	30	30	30	30	30	30	30	30
MED	305	310	322	320	330	325	320	325	345	350	345	330	320	320	325	330	345	350	340	330	320	325	332	310
UQ	318	320	345	340	350	342	325	338	360	360	360	345	335	330	330	340	355	R 360	355	345	335	340	350	325
LQ	300	305	310	305	315	310	310	318	338	335	330	320	320	R 310	320	325	335	340	325	310	310	320	320	295

DEC. 1987 | M(3000)F2 (0.01)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | M(3000)F1 (0.01) | 135° E Mean Time (G.M.T. + 9h)

Station OKINAWA Lat. 26° 16.9' N, Long. 127° 48.4' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	UL 395	L	UL 395	L	UL 385	L							
2									L	L	L	L 390	UL 395	385	UL 405	A	A							
3										L	L	L	UL 390	UL 380	375	UL 380	L							
4										L	L	UL 360	UL 385	L	L	L	L							
5										L	UL 370	UL 370	UL 370	L	UL 375	L	L							
6									L	L	L	L	L	L	L	L	L							
7										L	L	L	UL 390	L	L	L								
8									L	L	L	L 385	L 385	L	UL 415	UL 380	A							
9									L	L	UL 365	UL 375	UL 375	L	L	L	L							
10									L	L	L	L	A	L	L	L	L	L						
11									L	L	UL 395	L	L	L	L	L	A							
12									L	L	L	UL 400	UL 390	L	L	L	L							
13									L	L	385	390	L	380	UL 405	L	L							
14										L	UL 385	UL 395	L	L 380	L 375	L 365	L							
15									L	L	L	UL 385	L	L	L 375	L	L							
16										L	UL 385	L	395	L	L	L	L							
17									L	L	L 410	L 390	L	UL 385	L	L	L							
18									L	L	A	UL 400	395	370	UL 385	395	A	A						
19									L	L	L	UL 400	UL 390	UL 380	395	L	L	A						
20									L	L	L	L	UL 395	UL 400	L	A	A	A						
21										L	L	L	UL 390	UL 385	UL 390	A	L	A						
22										L	L	L	L	L	A	L	A	A						
23										L	A	C	C	C	C	C	L	A						
24									L	L	L	L	L	L	L	L	L							
25									L	L	L	L	L	UL 370	L	L	L							
26										L	L	UL 410	UL 380	UL 375	L	L	L							
27										L	L	L	L	UL 380	L	L	L							
28										L	L	UL 390	UL 375	L	UL 360	L	L							
29										L	L	UL 395	UL 400	L	L	L	L							
30										L	L	L	L	L	L	L	L							
31										C	C	C	C	C	C	C	C	C						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT											7	16	16	13	11	5								
MED											UL 385	UL 390	UL 390	UL 380	UL 385	UL 380								
UQ											L 390	UL 398	UL 395	UL 385	UL 400	UL 385								
LQ											UL 378	UL 385	UL 382	UL 380	L 375	UL 330								

DEC. 1987 | M(3000)F1 (0.01)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | H'F2 (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station OKINAWA Lat. 26° 16.9' N, Long. 127° 48.4' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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									230	230	240	250	250	260	255	240	245							
2									250	255	255	250	250	240	240	A	A							
3										240	240	240	240	280	285	240	240							
4										225	275	260	250	265	270	265	245							
5										230	275	265	245	270	250	245	230							
6									225	235	295	270	250	265	265	265	250							
7										230	230	245	245	240	270	245								
8									U L 245	250	240	240	240	240	250	235	225							
9									L 245	255	250	260	230	240	250	230	240							
10									275	250	225	225	250	255	270	250	230	225						
11									280	240	250	240	240	270	260	250	230							
12									245	250	250	230	250	270	260	240	240							
13									270	280	255	235	260	250	225	240	235							
14										245	230	220	295	275	270	255	220							
15									225	230	235	250	245	265	265	255	235							
16										235	275	330	300	250	280	270	260							
17									260	255	250	240	240	255	260	245	245							
18									260	235	240	250	240	275	265	240	240	A						
19									235	245	230	250	260	260	245	240	230	A						
20									245	240	250	260	275	250	250	A	A	A						
21										265	240	240	235	250	260	A	240	220						
22										L 260	265	250	250	240	A	240	A	220						
23										250	A	C	C	C	C	C	220	230						
24									250	270	235	235	245	265	255	235	220							
25									235	230	245	265	290	265	250	235	225							
26										240	250	235	275	270	245	235	220							
27										245	245	240	255	250	235	240	225							
28										235	240	250	270	275	255	235	220							
29										250	225	250	265	270	245	260	230							
30										245	255	250	270	270	255	235	230							
31										C	C	C	C	C	C	C	C	C						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									16	30	29	29	29	29	28	26	26	4						
MED									245	245	245	250	250	265	255	240	232	222						
UQ									260	250	255	250	265	270	265	250	240	228						
LQ									235	235	240	240	245	250	250	235	225	220						

DEC. 1987 | H'F2 (KM)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | H'F (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station OKINAWA Lat. 26° 16' 9" N, Long. 127° 48' 4" E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	235	E S 270	S 265	S 255	S 255	240	S 260	240	215	A 220	210	210	A 230	210	A	205	230	235	200	A 220	240	230	230	230
2	S	S 260	S 255	S 260	210	S	E S 265	A 260	240	H 200	H 200	H 190	205	A 225	A	A	A	210	210	205	240	255	240	230
3	240	S	S	S 270	240	210	S	240	230	A 220	210	210	A 220	210	A 230	200	A 230	210	190	A 225	215	240	240	E S 275
4	300	300	320	320	225	190	S	245	220	225	205	200	210	200	195	230	245	220	235	200	200	230	230	290
5	295	285	270	270	220	205	S 245	230	230	205	200	235	205	200	215	230	220	215	215	200	220	205	220	270
6	275	260	205	S	S	S 335	220	220	230	215	210	205	200	215	200	220	200	215	195	250	205	220	225	250
7	230	220	230	255	230	S	S 295	240	220	220	215	200	200	215	200	200	235	220	200	250	205	205	205	240
8	S 295	250	225	S 210	230	S	A	S 250	225	225	200	190	H 190	H 190	H 180	230	A	200	250	S 225	230	210	200	E S 280
9	S 290	S 260	215	E S 270	S 250	S 245	E S 280	245	225	225	205	H 190	230	235	220	205	H 200	215	200	210	235	230	250	255
10	S 265	240	225	235	S 240	E S 275	S	260	245	230	225	A	A	A	A	A	A	A	S 205	S 230	255	230	210	S 225
11	230	240	S 260	S	S	S	S	A	A 240	A 230	210	210	190	H 190	A	A	A	230	A	A 220	A 240	S 260	S 240	E S 260
12	E S 260	E S 260	E S 270	230	S	S	S	A 260	A	A 240	A	210	200	H 200	A	A	A 220	H 210	200	215	A 260	S 260	S 260	250
13	230	S 240	S 240	210	S	S	S	A 260	240	A 230	215	H 200	H 190	A 220	210	A 230	A 220	225	230	220	205	A 230	S 250	S
14	S	270	230	230	A	S	E S 310	250	230	230	215	205	200	190	215	235	210	200	225	225	200	230	250	S 270
15	280	275	290	265	230	230	S 225	245	205	205	190	215	195	200	220	210	250	215	200	240	270	265	240	255
16	285	270	250	S	230	230	S	260	220	205	200	200	200	200	A	A 250	A 250	230	205	220	205	S 270	305	275
17	230	A	S 275	S 260	S 260	S 245	E S 275	250	245	230	200	205	200	225	H 185	235	240	220	200	220	220	245	230	225
18	250	230	S 250	S	E S 280	E S 270	S	S 270	240	A	A	210	190	190	H 190	A	A	A	210	A 230	230	A 230	A 250	S
19	S	S 270	S 240	A	A	S	S	250	230	220	210	200	190	200	A 220	A	A	A	A 260	A 230	A 250	230	215	S 235
20	240	240	S 235	S	S	A 240	E S 275	E S 270	225	210	H 200	200	210	A	A	A	A	A	200	200	E A 250	220	215	S 250
21	S	S	270	240	260	275	235	260	240	220	210	210	H 190	H 190	A	A	A 225	A	210	S 230	240	225	225	S 240
22	S	S 260	240	S 240	E S 260	A	S	240	240	230	A 230	A 235	200	A	A	A 220	A	A	A 220	A 240	A 240	210	210	S
23	S	S 265	225	S 250	S 250	S	S 240	250	240	220	A	C	C	C	C	C	A	A	210	200	A	230	220	S 240
24	S 305	S 295	245	230	S 300	S 350	310	260	240	245	A	A 240	A	195	200	A 240	A 230	235	220	200	220	215	230	205
25	285	260	255	S 300	295	280	280	270	230	205	A 225	215	A 240	A 240	215	235	A 250	225	230	230	210	215	230	A 255
26	S 315	295	250	250	260	250	250	255	240	220	200	200	190	190	220	220	230	215	205	200	220	245	255	240
27	S 250	265	255	245	240	300	280	235	235	225	220	200	190	210	220	205	230	220	200	200	215	240	215	220
28	255	270	240	S 220	S 275	260	S 270	245	220	220	220	200	200	200	200	220	215	215	190	190	240	205	210	A 230
29	S 250	S 300	265	250	250	250	S 260	S 245	225	230	230	200	200	190	220	200	230	220	200	A 210	235	205	215	245
30	S 285	S 280	265	235	240	220	S	250	235	230	210	205	200	220	205	210	220	225	205	200	205	240	225	230
31	S 280	S 300	270	265	265	235	S	245	230	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	28	30	25	24	21	18	30	30	29	26	28	27	26	20	21	21	23	29	30	29	30	30	27
MED	265	264	250	250	245	242	U S 255	250	230	220	210	205	200	200	212	220	230	220	205	220	225	230	230	242
UQ	S 285	278	265	S 262	S 260	275	S 275	260	240	230	215	210	205	215	220	230	235	225	220	230	240	240	240	255
LQ	240	250	235	235	230	230	S 242	245	225	220	200	200	190	190	200	205	220	215	200	200	210	215	215	230

DEC. 1987 | H'F (KM)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | H'E (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station OKINAWA | Lat. 26° 16.9' N | Long. 127° 48.4' E | Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / 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	110	A	110	110	105	105	A	A	A	S						
2								S	A	A 115	A	105	105	A	A	A	A	S						
3								S	110	110	A	A	105	105	105	A	A	S						
4								S	105	110	105	105	A	A	A	A	A	A						
5								S	105	105	105	100	100	A	100	105	A	A						
6								S	105	110	110	105	105	105	105	105	105	A						
7								S	110	110	105	110	105	105	105	A	A	S						
8								S	115	115	115	115	110	115	115	115	A	S						
9								S	120	115	120	115	120	115	115	115	115	S						
10								S	120	115	115	115	110	B 120	115	105	A	A						
11								S	115	110	110	105	105	A	110	110	110	110						
12								S	110	110	110	110	110	110	110	110	110	B 120						
13								S	110	110	105	110	110	B 120	110	105	110	B 120						
14								S	110	A	A	A	A	A	A	A	A	A						
15									110	105	A	A	105	100	105	A	100	S						
16									110	110	110	105	110	A	A	A	A	A						
17									115	110	110	110	115	B 120	115	115	110	125						
18									110	110	105	A	A	A	A	A	A	A						
19									110	110	110	A	105	A	A	A	A	A						
20									B 120	110	110	110	105	105	105	A	A	A						
21									B 120	110	A	A	110	110	A	A	A	A						
22									110	110	110	110	A 115	A	105	110	110	A						
23									A 120	A	A	C	C	C	C	C	A	A						
24									S	A	A	A	A	A	A	A	A	A						
25									A	110	110	110	A	A	A	A	A	A						
26									110	100	105	105	105	A	A	A	A	A						
27									115	105	100	105	105	100	100	100	100	A						
28									S	110	A	105	A	A	100	100	105	A						
29									105	A	105	105	A	100	A	A	A	A						
30									S	105	105	105	105	100	105	100	100	A						
31									125	C	C	C	C	C	C	C	C	C						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									26	25	22	22	22	16	17	13	11	4						
MED									110	110	110	108	105	105	105	105	110	120						
UQ									115	110	110	110	110	115	110	110	110	122						
LQ									110	110	105	105	105	102	105	105	102	115						

The Radio Research Laboratory, Japan

DEC. 1987 | H'E (KM)

IONOSPHERIC DATA

DEC. 1987 | H'ES (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station OKINAWA Lat. 26° 16.9' N, Long. 127° 48.4' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	S	S	S	S	S	100	110	110	G	E G 160	E G 160	140	135	130	110	110	110	110	100	100	100	100	S	S
2	S	S	S	110	110	110	110	100	110	100	100	G	G	E G 165	E G 165	110	110	110	110	110	100	105	100	S
3	S	S	100	S	S	S	110	110	G	120	110	110	120	115	115	110	110	110	105	100	100	100	S	S
4	S	S	S	S	S	105	100	105	125	125	120	110	105	105	110	105	105	105	100	105	S	S	S	100
5	S	S	S	S	S	S	S	G	150	145	145	125	125	100	120	120	105	100	100	100	100	125	S	S
6	S	S	S	S	S	S	S	120	145	120	115	120	115	115	115	115	110	105	100	100	S	S	S	S
7	100	100	S	S	100	100	100	130	120	120	115	125	120	120	115	105	105	130	110	100	100	100	100	S
8	S	145	145	S	140	130	120	S	G	115	120	G	G	G	120	115	105	G	100	S	S	S	S	S
9	125	S	S	125	S	145	S	120	120	G	G	G	120	120	E G 150	120	G	G	140	160	120	105	100	100
10	100	100	S	120	120	120	115	S	120	115	115	115	110	110	115	105	105	110	S	S	S	S	S	S
11	115	S	S	S	S	S	135	140	125	125	G	115	120	110	150	140	150	130	115	110	105	S	S	S
12	S	S	S	S	S	S	S	140	140	135	120	120	120	G	120	120	G	G	S	S	110	110	110	110
13	110	105	105	105	105	105	105	105	E G 165	E G 165	140	120	G	G	125	125	130	130	115	110	110	105	105	105
14	100	100	105	100	105	100	100	S	130	105	105	100	105	105	150	105	105	110	105	100	105	100	100	100
15	100	100	100	100	S	S	S	S	120	120	110	145	G	110	115	150	G	G	150	100	100	100	100	100
16	S	S	S	S	S	S	S	S	120	120	125	120	120	105	105	105	105	105	100	100	100	100	100	140
17	125	125	120	S	S	S	105	110	140	G	G	G	120	120	115	120	G	G	S	145	115	105	S	100
18	S	S	100	100	100	S	S	S	G	140	115	110	110	110	110	115	115	100	100	100	100	100	100	100
19	S	S	S	100	105	105	105	S	G	120	G	110	G	105	100	115	100	100	100	100	100	100	100	100
20	S	S	S	S	S	105	105	100	G	G	125	125	115	115	110	100	100	100	100	100	100	100	S	S
21	S	S	S	S	100	105	100	S	G	G	110	110	G	G	105	100	120	100	100	100	100	100	100	S
22	S	S	S	110	105	105	110	S	G	145	E G 145	125	E G 140	140	115	120	120	110	110	100	100	S	S	S
23	S	S	S	S	115	110	S	S	150	110	100	C	C	C	C	C	100	100	100	100	100	100	100	S
24	S	S	S	S	S	S	S	110	115	110	105	105	105	105	105	100	100	100	100	100	100	100	100	100
25	S	S	S	S	S	S	S	105	100	120	115	110	105	105	105	100	100	100	100	100	100	100	100	100
26	100	100	S	S	100	S	S	S	140	120	115	120	G	100	100	100	100	100	100	100	100	100	100	105
27	105	100	S	100	100	105	105	105	G	G	G	G	G	G	150	150	135	100	100	100	100	100	100	S
28	100	100	S	S	S	S	S	S	120	110	105	120	105	105	G	G	G	100	115	100	100	S	S	S
29	S	S	S	S	S	S	S	S	G	105	150	115	100	G	105	100	100	100	100	100	110	100	S	S
30	S	100	S	S	110	100	100	105	G	G	G	G	G	G	G	150	G	100	100	100	S	S	S	S
31	S	S	S	S	S	S	S	S	G	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	11	11	7	10	14	16	17	16	19	24	24	23	20	22	27	28	24	25	27	27	25	22	16	13
MED	100	100	105	102	105	105	105	110	122	120	115	120	116	110	115	112	105	100	100	100	100	100	100	100
UQ	112	102	112	110	110	110	110	120	140	126	122	122	120	118	119	120	112	110	110	100	105	105	100	105
LQ	100	100	100	100	100	102	100	105	120	112	110	110	105	105	108	105	100	100	100	100	100	100	100	100

DEC. 1987 | H'ES (KM)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

DEC. 1987 | TYPES OF ES | 135° E Mean Time (G.M.T. + 9 h)

Station OKINAWA Lat. 26° 16.9' N, Long. 127° 48.4' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

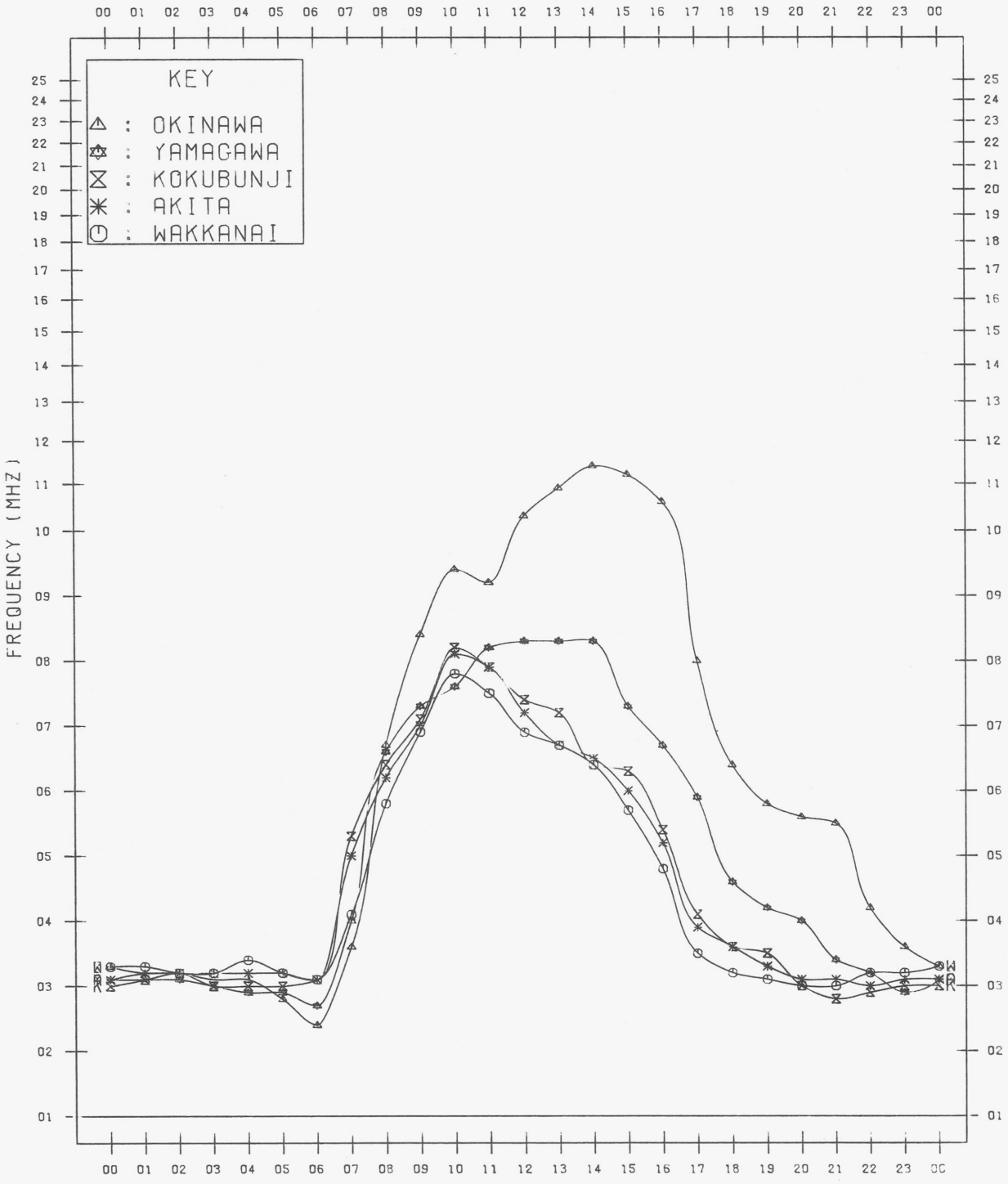
Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1						F 2	F 1	L 1		HL 11	H 2	H 2	H 3	C 1	L 3	L 2	L 1	L 1	F 1	F 2	F 2	F 1		
2				F 1	F 1	F 1	L 2	L 2	L 2	L 2	L 3			HL 21	HL 11	L 4	L 2	L 2	F 1	F 1	F 2	F 2	F 1	
3			F 2				F 2	L 1		C 2	L 1	L 1	C 2	C 2	C 2	L 1	L 1	L 2	F 2	F 4	F 2	F 2		
4						F 1	F 2	L 1	C 1	C 1	C 1	C 2	L 3	L 2	L 1	L 3	L 4	L 4	F 4	F 3				F 1
5									HL 21	H 2	H 2	CL 31	C 1	L 3	C 1	CL 22	L 2	L 6	F 4	F 3	F 1	F 2		
6								C 1	H 2	C 1	C 2	C 2	C 1	C 1	C 2	C 2	C 2	L 3	F 4	F 6				
7	F 1	F 1			F 3	F 1	F 2	CL 12	C 2	C 2	C 2	C 2	C 1	C 2	C 2	L 2	L 3	C 3	F 3	F 4	F 1	F 2	F 1	
8		F 1	F 1		F 1	F 4	F 3			C 2	C 2				C 1	C 2	L 3		F 4					
9	F 1			F 1		F 1		C 2	C 2				C 1	C 1	H 2	C 2			F 3	F 1	F 5	F 1	F 2	F 1
10	F 1	F 2		F 2	F 1	F 3	F 1		C 2	C 3	C 3	C 4	C 3	C 2	C 2	L 3	L 2	L 1						
11	F 1						F 2	H 2	C 2	C 2		C 2	C 1	L 1	H 2	H 2	H 3	C 4	F 6	F 6	F 6			
12								H 1	H 1	H 3	C 2	C 2	C 1		C 1	C 1					F 7	F 2	F 3	F 3
13	F 2	F 1	F 4	F 1	F 1	F 1	F 1	L 2	H 1	H 1	H 2	C 2			C 1	C 1	C 1	C 1	F 1	F 5	F 1	F 4	F 2	F 1
14	F 1	F 2	F 2	F 3	F 3	F 1	F 1		C 2	L 2	L 2	L 2	L 1	L 2	HL 12	L 2	L 3	L 4	F 4	F 4	F 1	F 3	F 2	F 2
15	F 2	F 1	F 1	F 1					C 2	CL 21	L 2	HL 22		C 3	C 1	HL 11			F 1	F 5	F 4	F 4	F 3	F 1
16									C 2	C 2	C 1	C 1	C 2	L 3	L 4	L 4	L 4	L 4	F 7	F 3	F 2	F 2	F 2	F 5
17	F 6	F 5	F 1				F 1	F 1	H 1				C 1	C 1	C 1	C 1				F 2	F 3	F 2		1E 6S
18			F 2	F 2	F 1					H 1	C 3	L 1	L 1	L 1	L 1	CL 23	CL 32	L 3	F 5	F 6	F 3	F 3	F 1	F 1
19				F 3	F 3	F 1	F 1			C 1		L 2		L 2	L 3	CL 34	L 3	L 5	F 7	F 4	F 4	F 3	F 1	F 1
20						F 2	F 1	F 1			C 1	C 1	C 2	C 4	C 3	L 4	L 5	L 5	F 5	F 3	F 2	F 1		
21					F 1	F 1	F 1				L 1	L 2			L 4	L 4	CL 23	L 4	F 4	F 3	F 3	F 1	F 1	
22				F 1	F 2	F 6	F 1			H 1	H 1	C 2	CL 11	HL 11	C 5	C 2	C 3	L 4	F 2	F 3	F 5			
23					F 1	F 1			HL 11	L 1	L 4						L 1	L 4	F 3	F 3	F 4	F 2	F 1	
24								F 1	C 2	L 5	L 3	L 3	L 3	L 2	L 2	L 4	L 5	L 4	F 5	F 3	F 2	F 3	F 1	F 1
25								F 1	L 1	C 2	C 3	C 2	L 3	L 2	L 2	L 3	L 4	L 5	F 7	F 6	F 5	F 6	F 6	F 2
26	F 1	F 1			F 1				H 2	C 1	C 2	C 1		L 3	L 3	L 3	L 2	L 1	F 2	F 2	F 2	F 1	F 1	F 1
27	F 2	F 1		F 2	F 1	F 2	F 1	F 1							HL 11	H 1	C 3	L 3	F 1	F 3	F 2	F 1	F 1	
28	F 2	F 2							C 3	C 2	L 2	C 1	L 2	L 1				L 3	F 3	F 3	F 2			
29										L 2	H 2	C 1	L 2		L 1	L 2	L 3	L 4	F 5	F 4	FF 33	F 3		
30		F 1			F 2	F 3	F 3	F 1								H 1		L 2	F 4	F 1				
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																								
MED																								
UQ																								
LQ																								

DEC. 1987 | TYPES OF ES

The Radio Research Laboratory, Japan

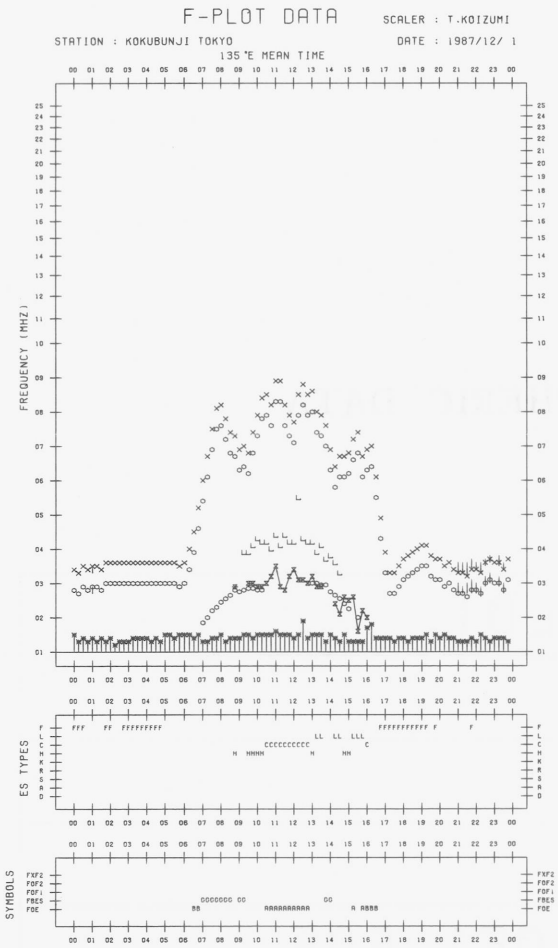
MONTHLY MEDIAN VALUES OF FOF2

135 °E MEAN TIME DEC. 1987



f-PLOTS OF IONOSPHERIC DATA

KEY OF F-PLOT	
I	SPREAD
○	FOF2, FOF1, FOE
×	FXF2
✳	DOUBTFUL FOF2, FOF1, FOE
⧖	FBES
⌊	ESTIMATED FOF1
↑, ↓	FMIN
∧	GREATER THAN
∨	LESS THAN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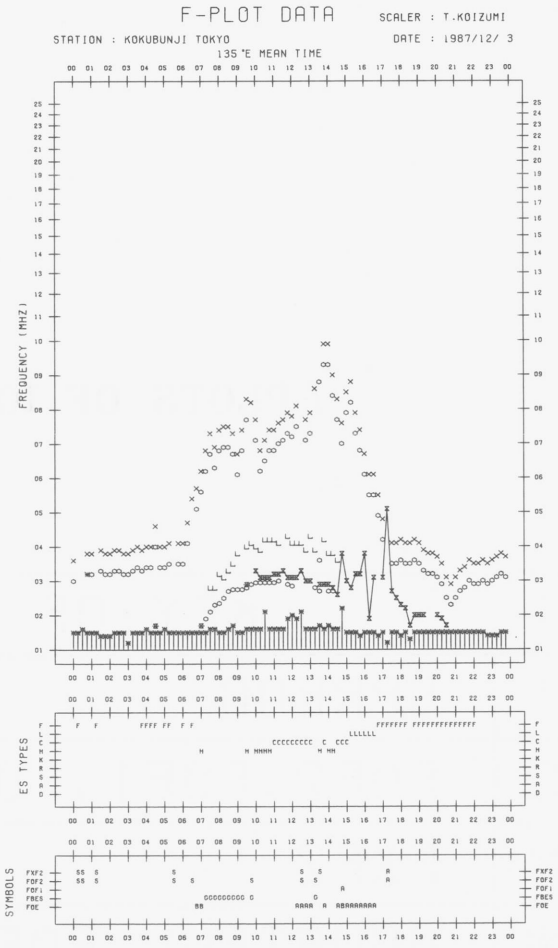
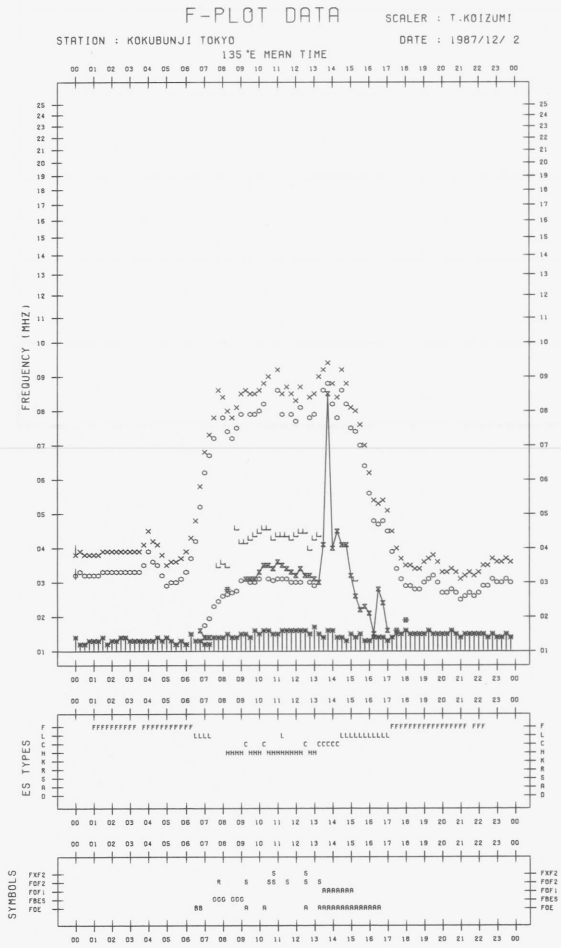
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/ 1
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/ 3
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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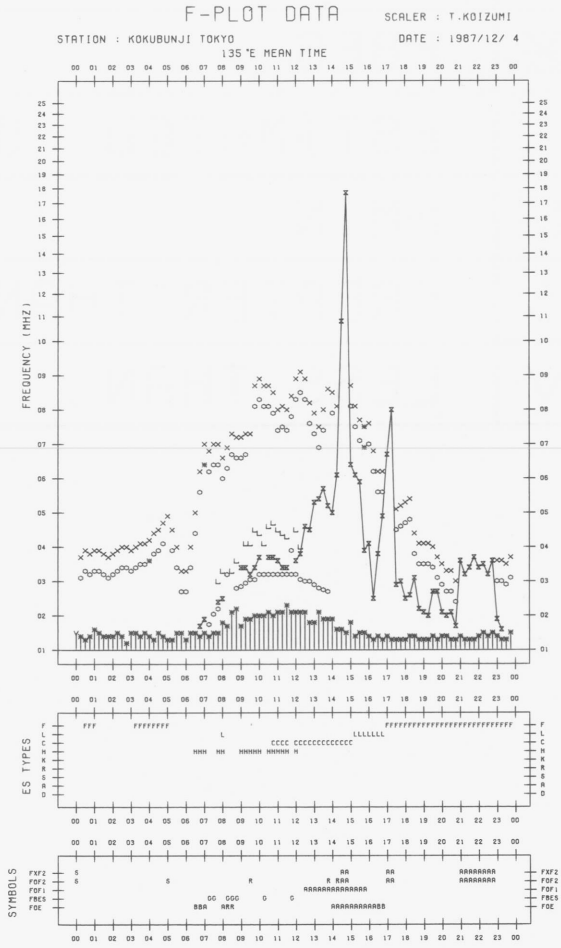
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/ 2
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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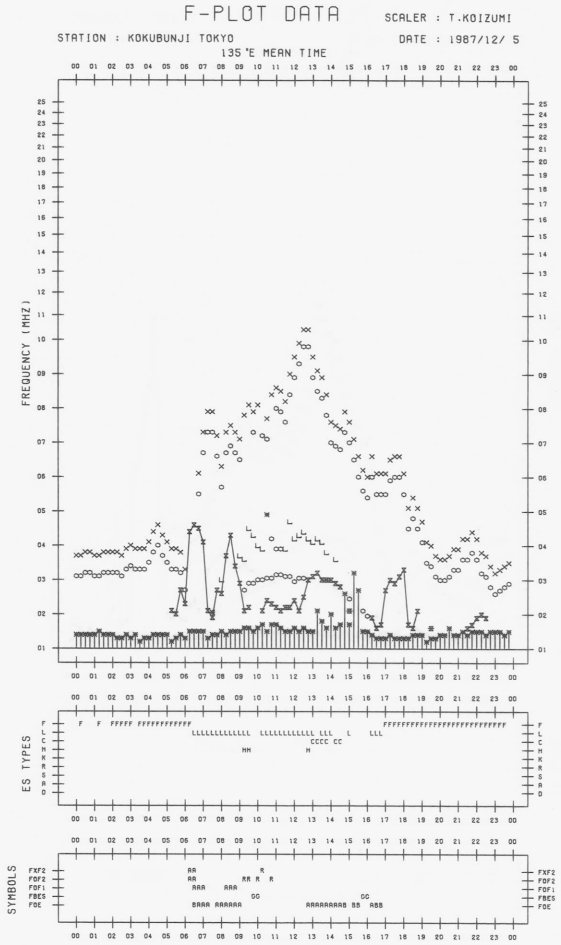
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/ 4
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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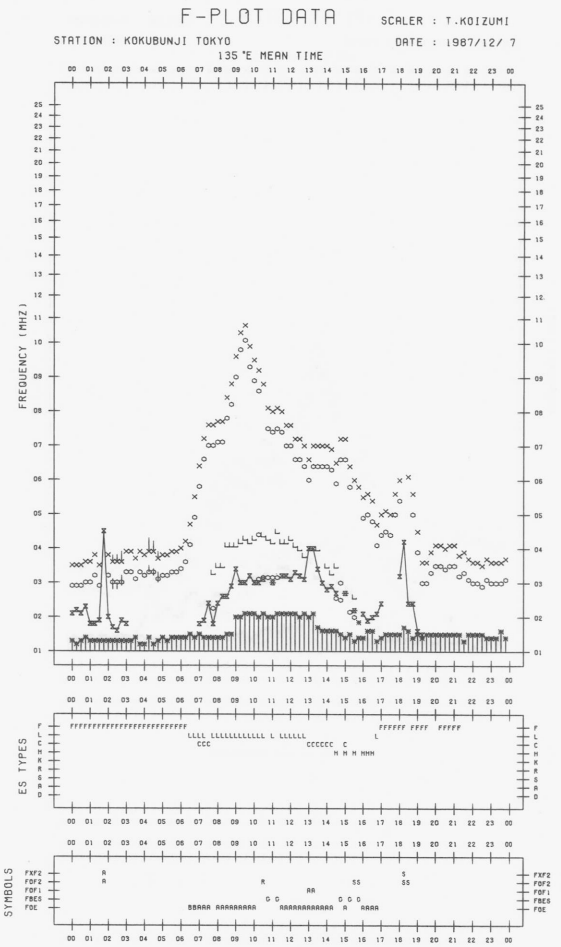
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/ 5
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE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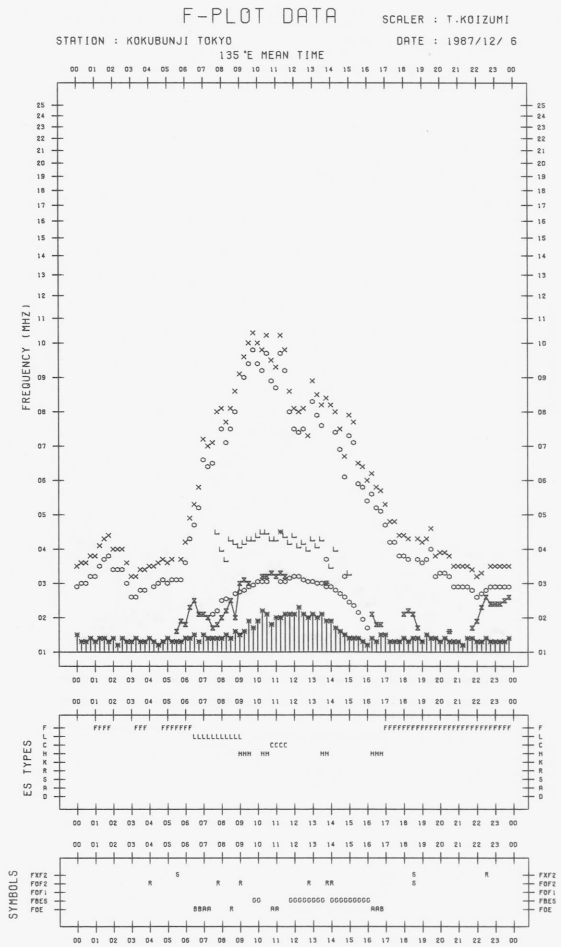
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/ 7
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE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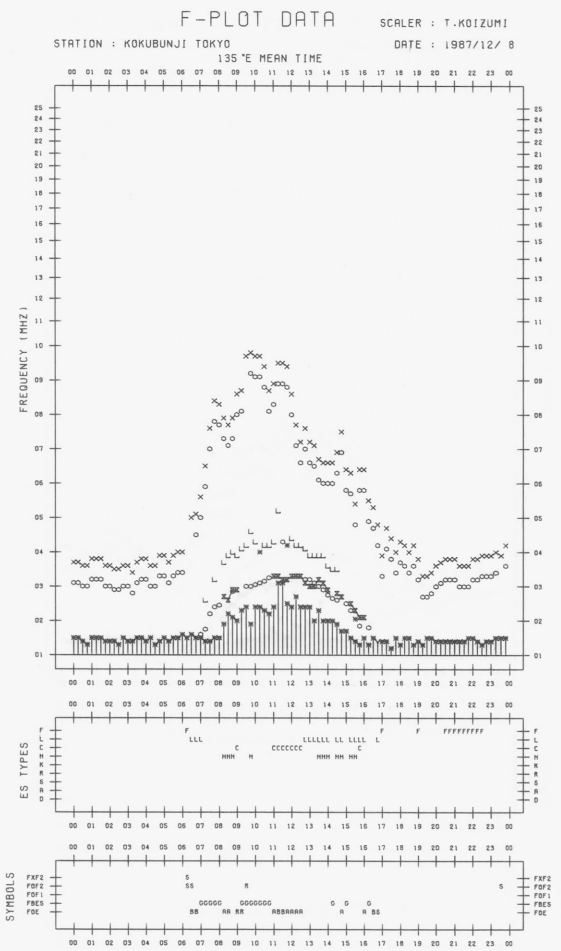
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/ 6
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE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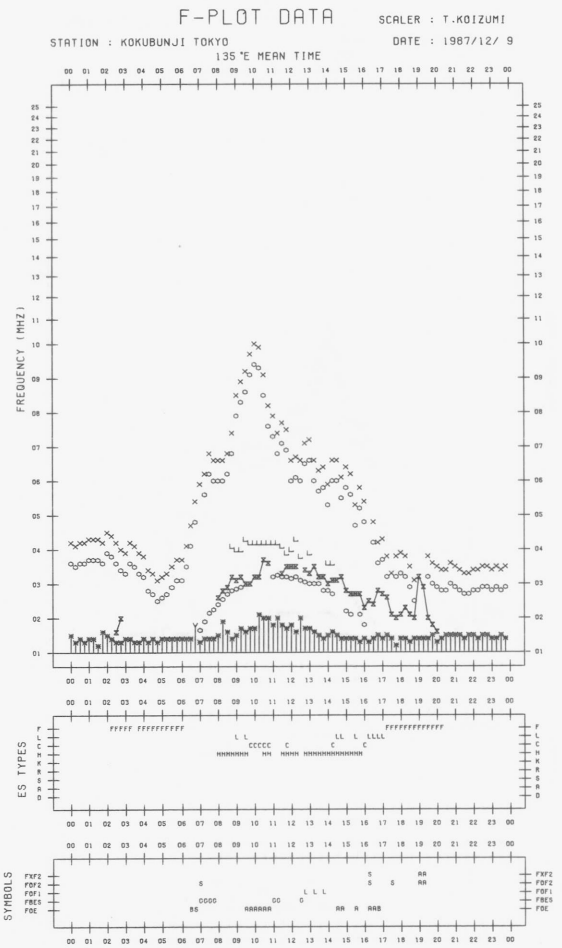
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/ 8
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE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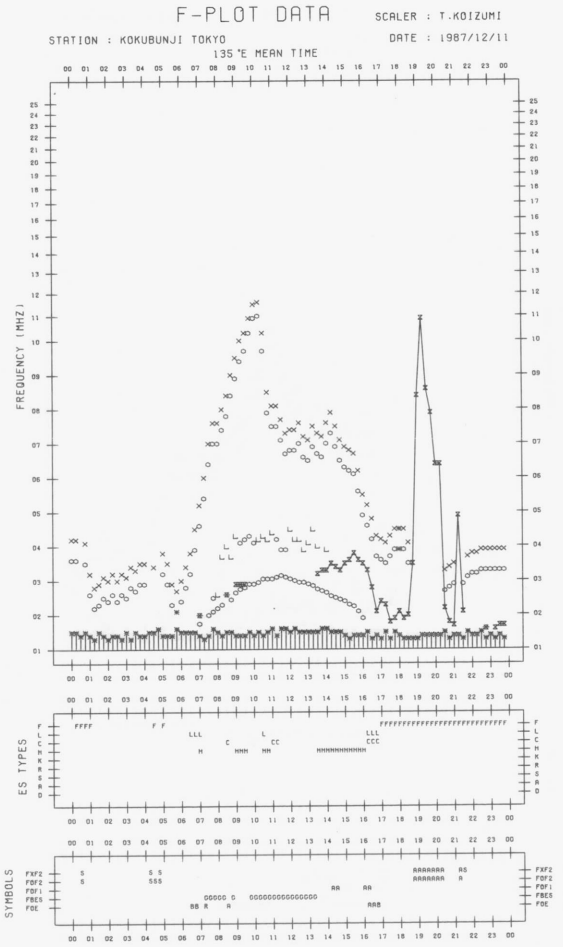
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/ 9
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FOE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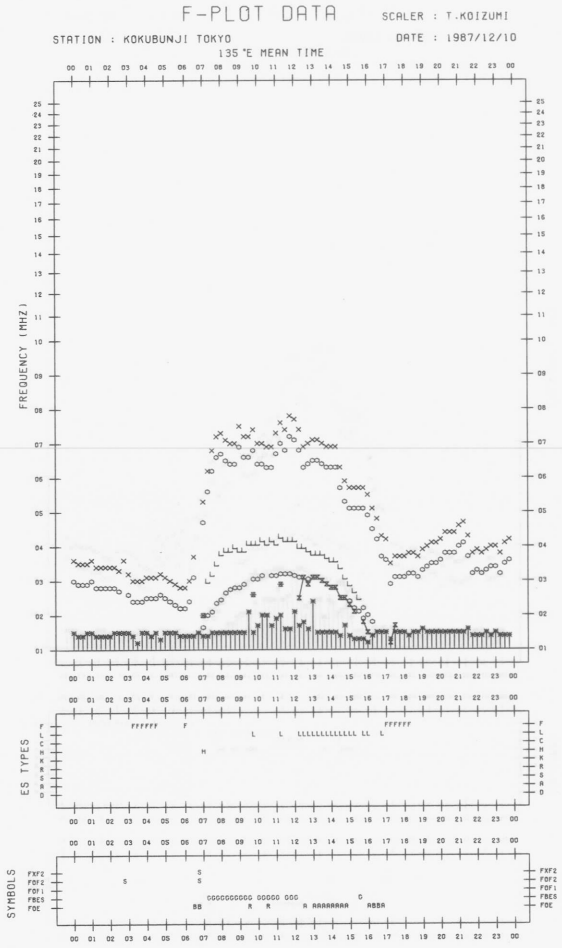
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/11
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FOE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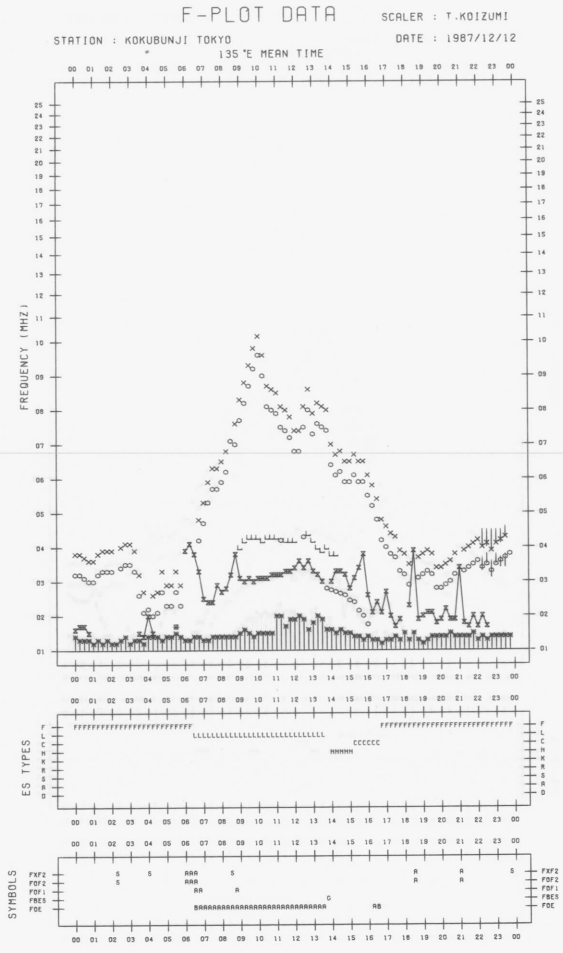
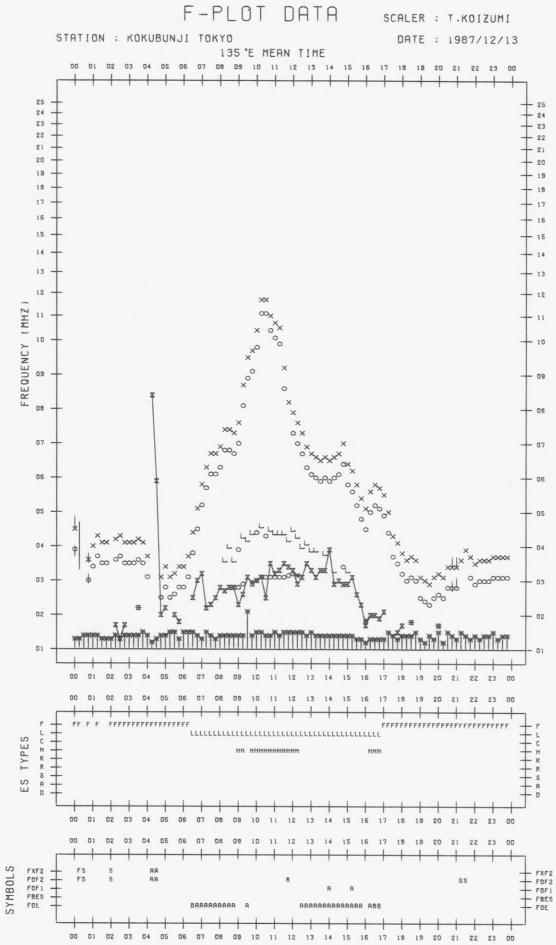
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/10
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/12
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FOE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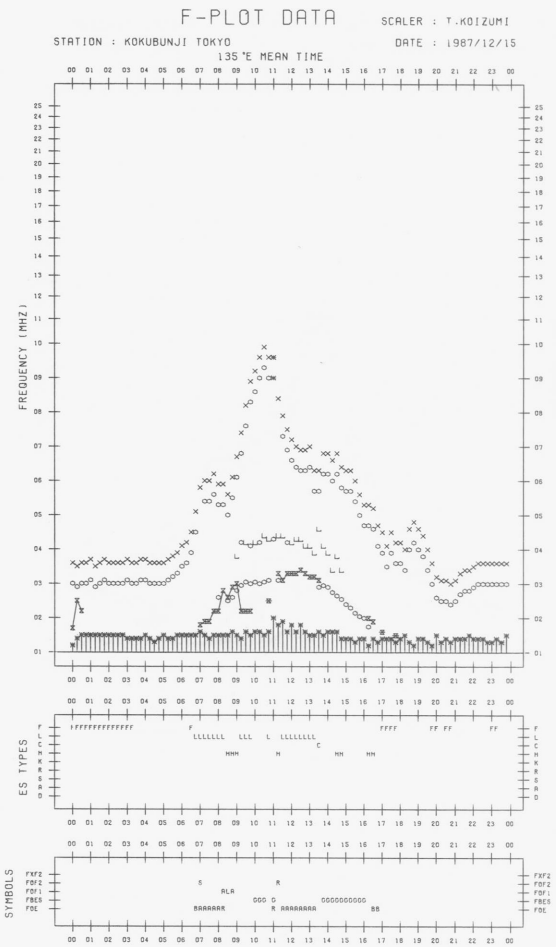
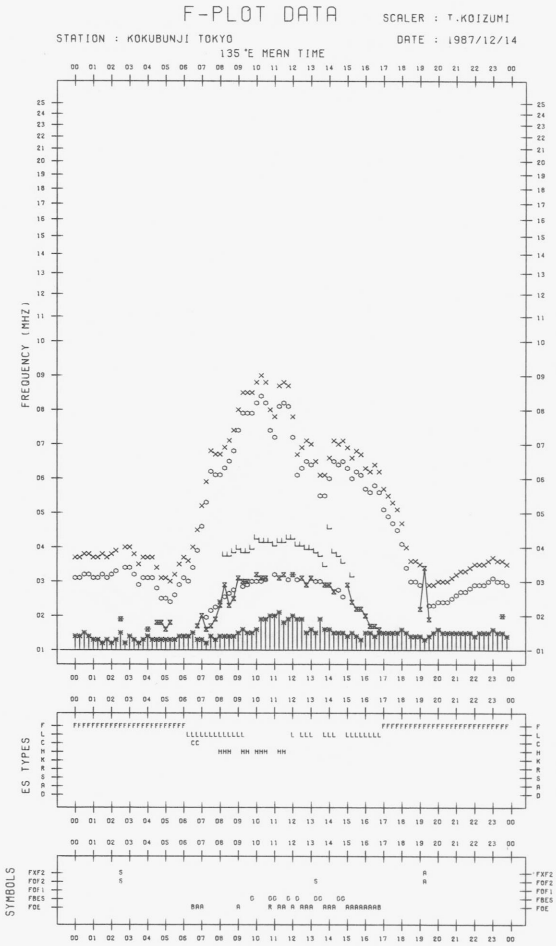
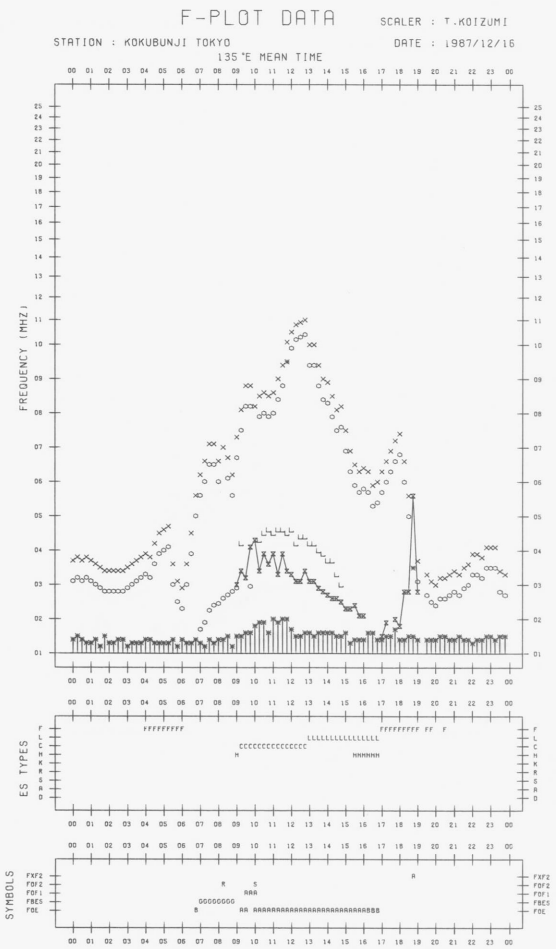
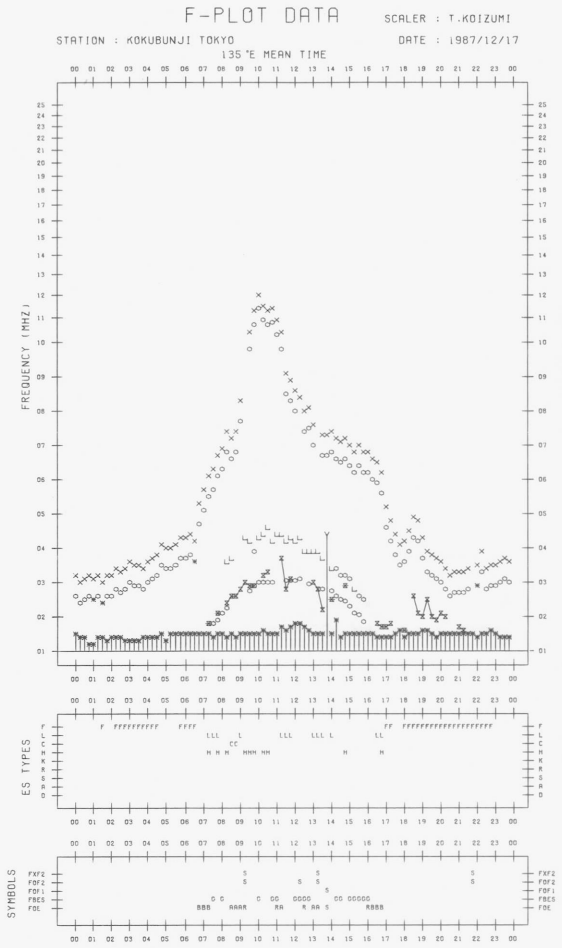
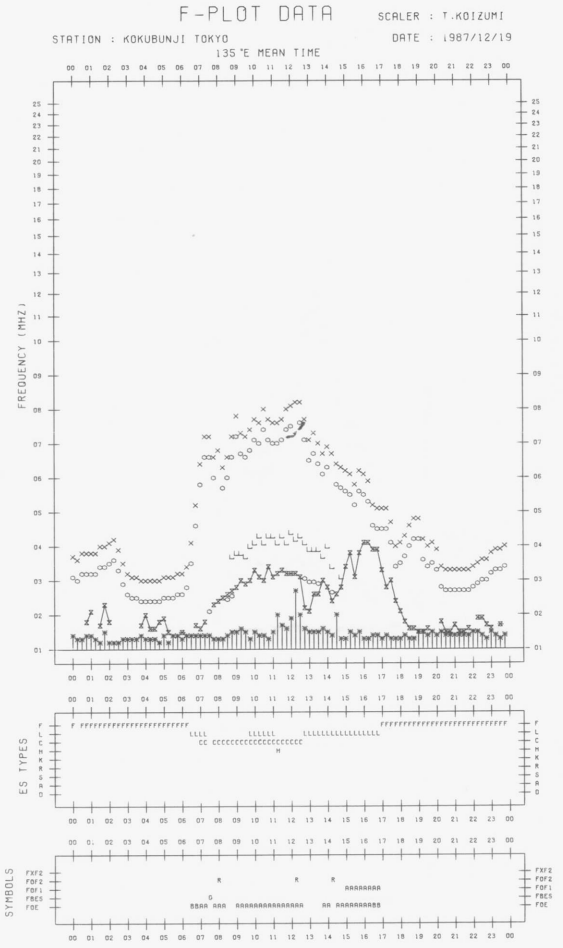
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/13
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

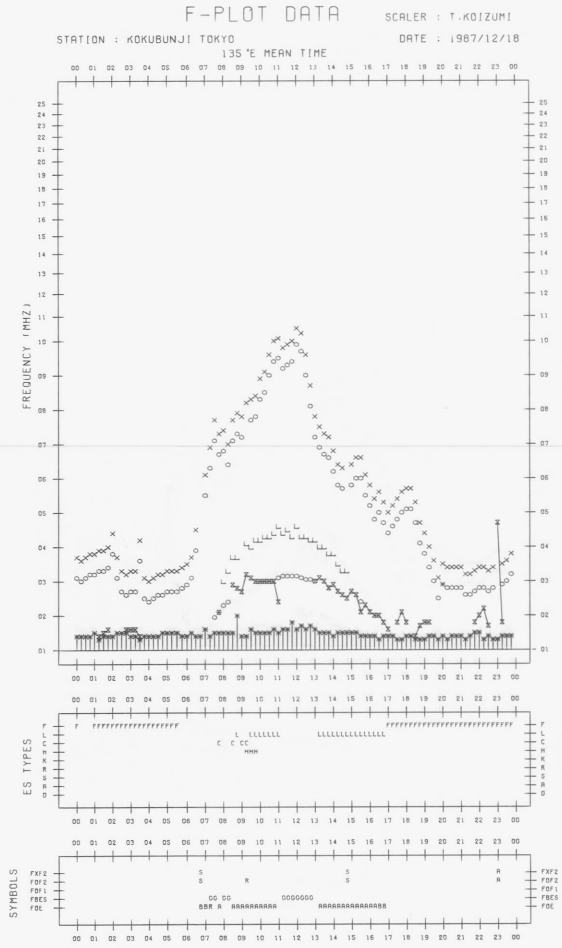

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/15
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/14
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/16
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/17
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/19
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/18
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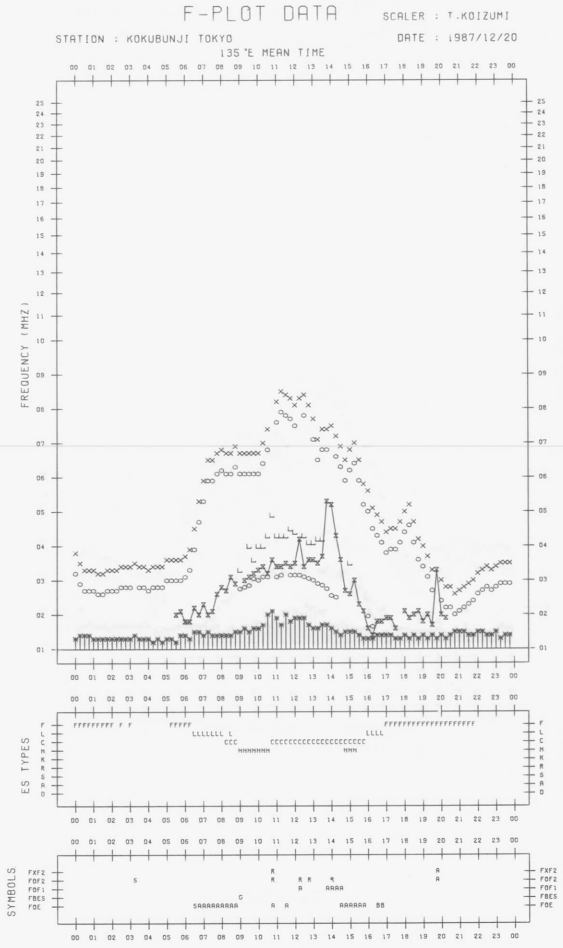
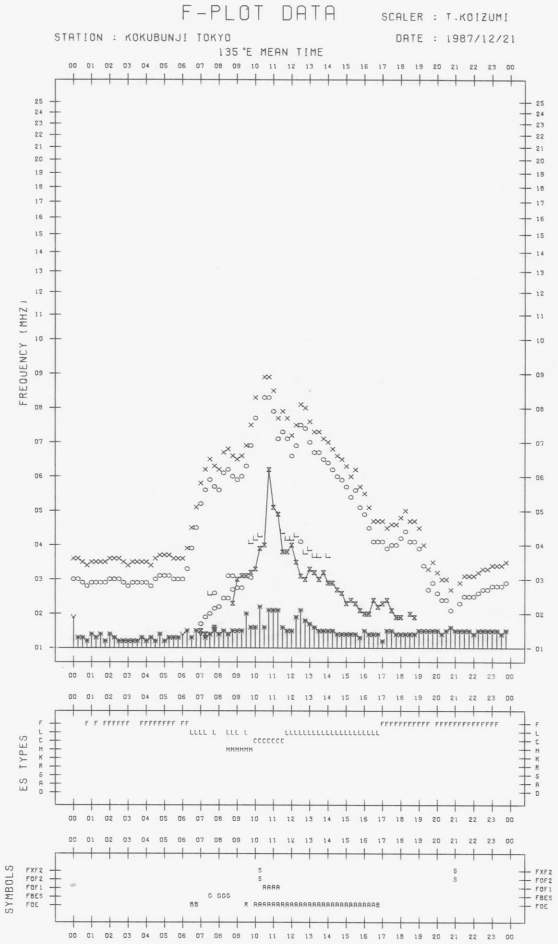
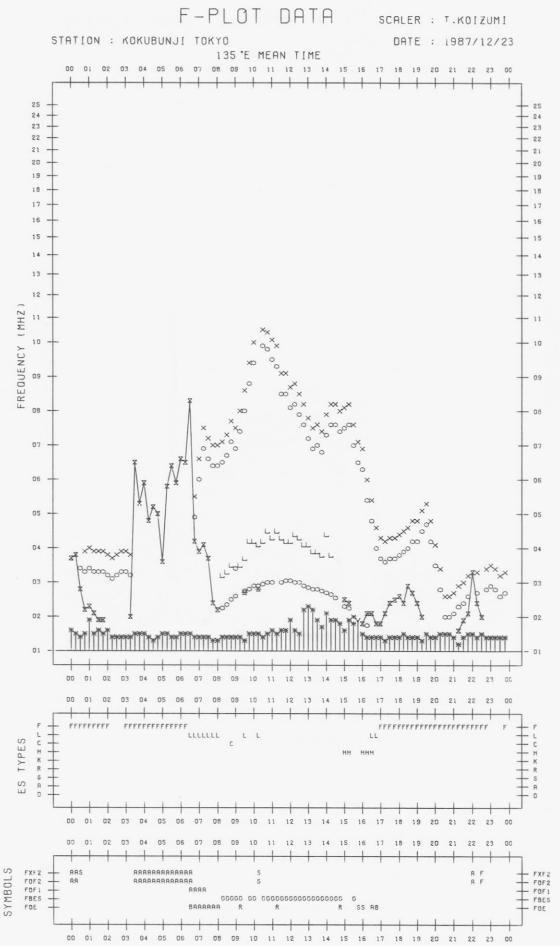
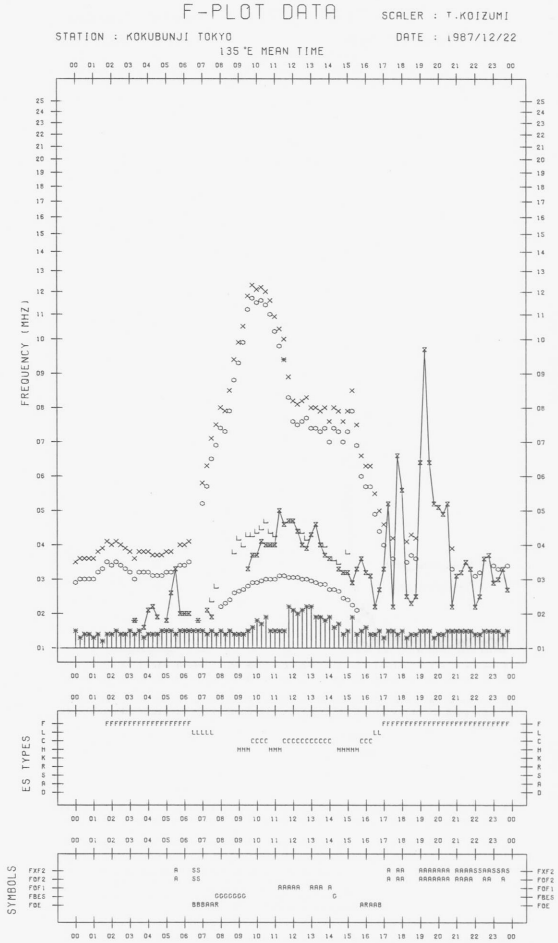
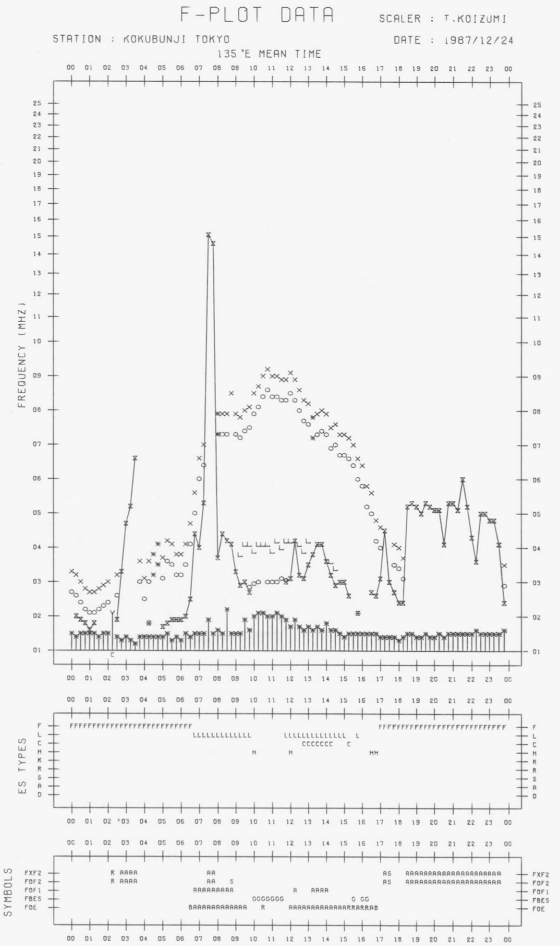
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

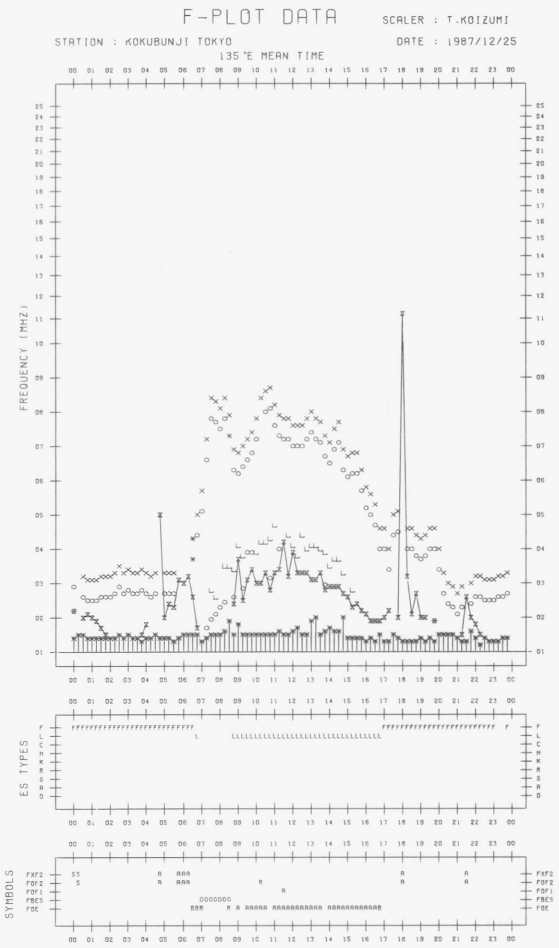

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/20
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

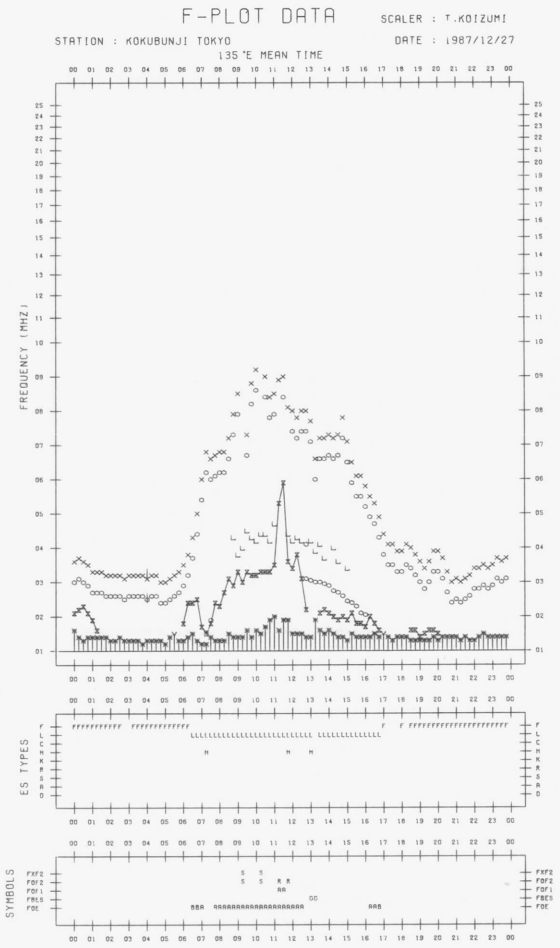

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/21
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

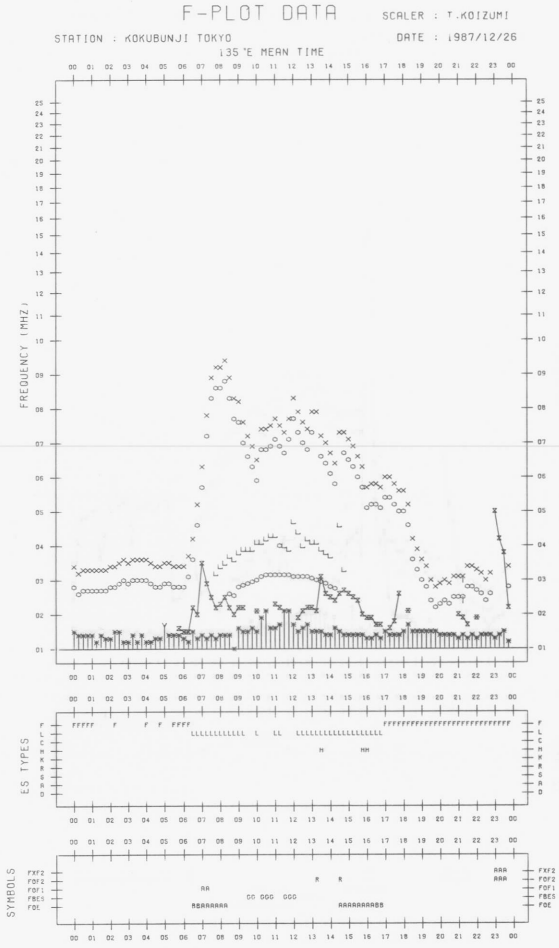

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/23
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

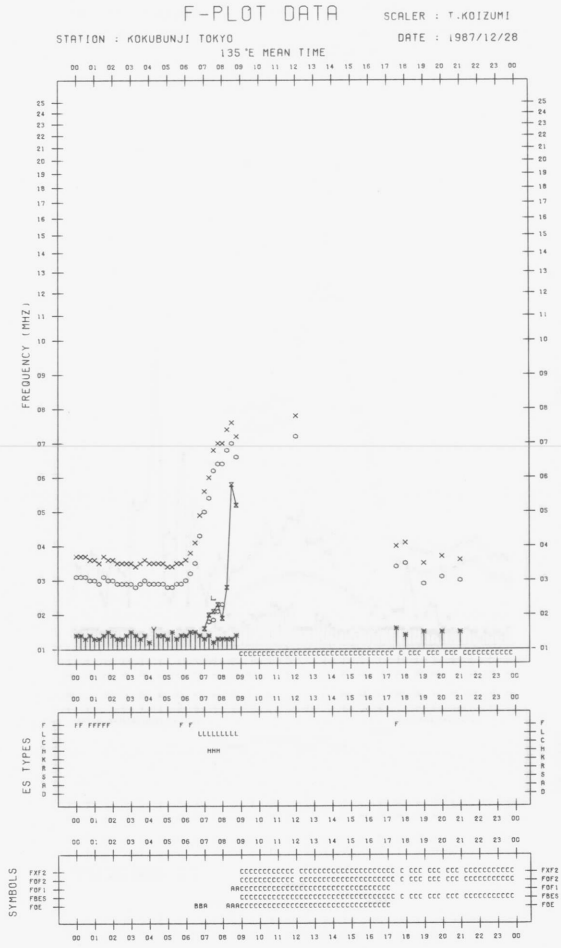

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/22
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

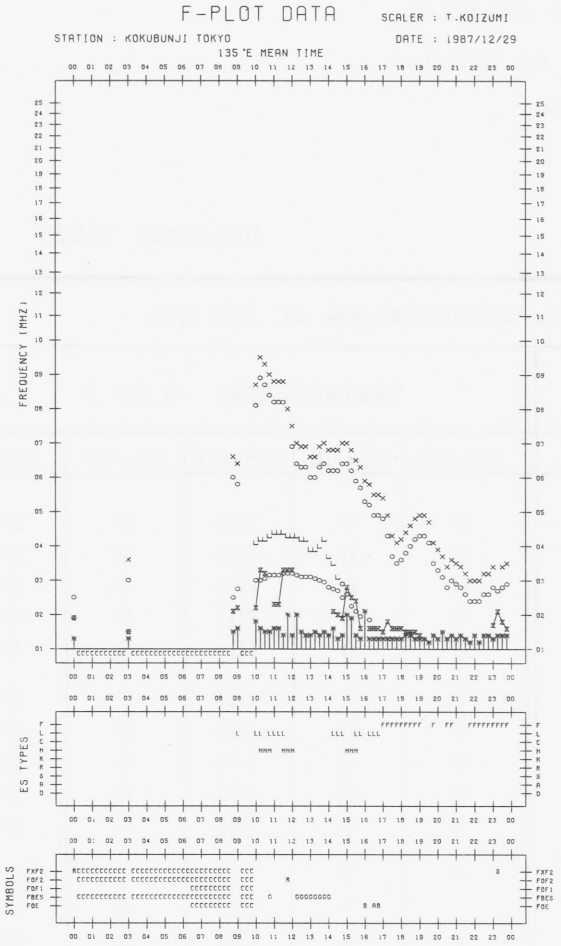

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/24
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

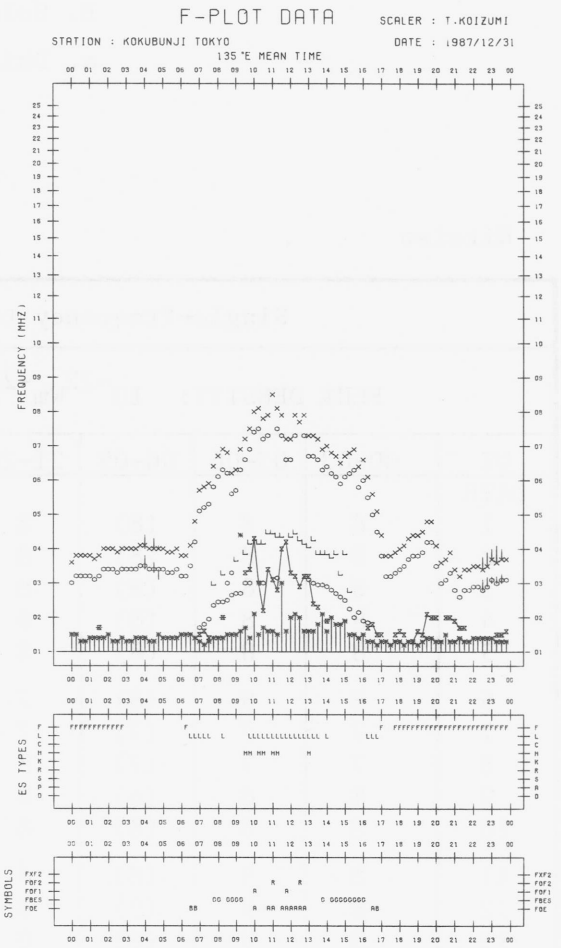

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/25
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE

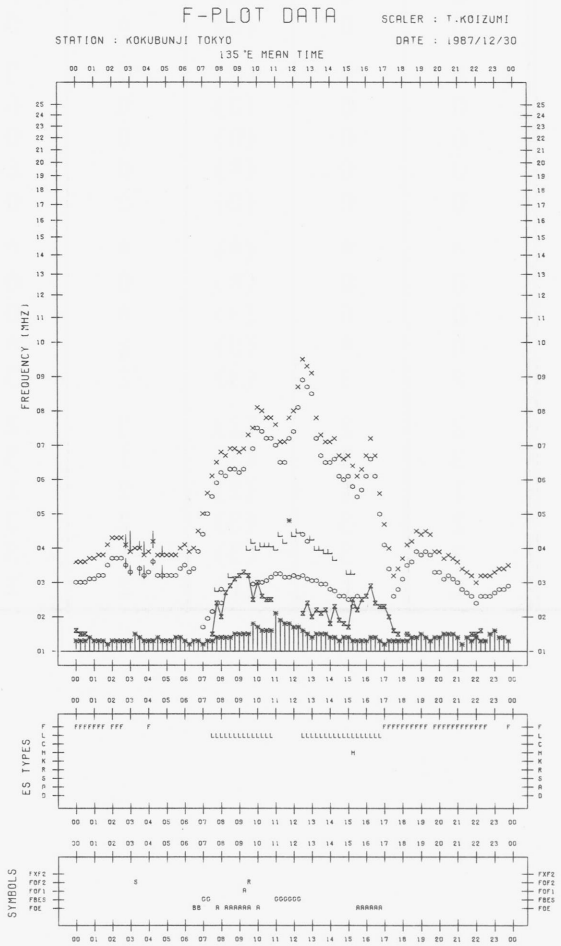

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/27
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/26
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/28
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/29
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/31
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1987/12/30
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

B. Solar Radio Emission

a. Daily Data at Hiraiso

200 MHz

Hiraiso December 1987

Single-frequency total flux observations at 200 MHz										
	FLUX DENSITY: 10^{-22}Wm^{-2}Hz^{-1}					VARIABILITY: 0 TO 3				
UT	00-03	03-06	06-09	21-24	DAY	00-03	03-06	06-09	21-24	DAY
DATE										
1	8	8	(8)	8	8	0	0	(0)	0	0
2	8	8	(8)	8	8	0	0	(0)	0	0
3	8	8	(8)	8	8	0	0	(0)	0	0
4	8	8	(8)	8	8	0	0	(0)	0	0
5	8	8	(8)	8	8	0	0	(0)	0	0
6	8	8	(8)	7	8	0	0	(0)	0	0
7	7	7	(7)	7	7	0	0	(0)	0	0
8	7	7	(7)	8	7	0	0	(0)	0	0
9	8	8	(q)	8	8	0	0	(*)	0	0
10	8	8	(8)	8	8	*	0	(0)	*	0
11	8	9	(8)	8	8	*	0	(*)	*	*
12	8	9	(9)	8	9	*	*	(0)	0	*
13	8	8	(8)	8	8	0	0	(0)	0	0
14	8	8	(8)	8	8	0	0	(0)	0	0
15	8	8	(8)	8	8	0	0	(0)	*	0
16	8	9	(9)	9	9	0	0	(0)	0	0
17	9	9	(9)	9	9	0	0	(0)	0	0
18	9	9	(9)	9	9	0	0	(0)	0	0
19	9	9	(9)	9	9	0	0	(*)	0	0
20	9	9	(9)	9	9	0	0	(0)	0	0
21	9	q	(q)	q	9	*	*	(*)	*	*
22	9	9	(9)	9	9	0	0	(*)	0	0
23	9	9	(q)	9	9	0	0	(*)	*	0
24	10	10	(10)	10	10	0	*	(0)	2	*
25	10	10	(10)	10	10	2	3	(3)	2	3
26	10	10	(10)	10	10	2	2	(1)	3	2
27	10	10	(10)	10	10	3	3	(3)	1	3
28	10	10	(10)	10	10	1	1	(2)	2	1
29	10	10	(10)	10	10	2	3	(3)	2	3
30	10	10	(10)	10	10	3	3	(3)	1	3
31	10	10	(10)	10	10	1	1	(1)	2	1

Notes: 1. (q) likely quiet.

2. (*) interference.

B. Solar Radio Emission

a. Daily Data at Hiratso

500 MHz

Hiraiso December 1987

Single-frequency total flux observations at 500 MHz					
FLUX DENSITY: 10^{-22}Wm^{-2}Hz^{-1}					
UT	00-03	03-06	06-09	21-24	DAY
DATE					
1	32	31	(30)	32	31
2	32	32	(30)	31	32
3	32	32	(30)	-	31
4	32	33	(32)	-	32
5	32	33	(32)	32	32
6	32	32	(31)	32	32
7	32	32	(31)	31	32
8	31	30	(30)	31	31
9	32	32	(32)	33	32
10	33	32	(31)	32	32
11	33	33	(32)	33	32
12	33	33	(32)	32	33
13	32	31	(31)	33	32
14	33	32	(32)	33	33
15	33	33	(32)	33	33
16	33	33	(33)	-	33
17	34	34	(33)	34	34
18	34	34	(34)	34	34
19	34	34	(34)	35	34
20	35	34	(34)	35	35
21	35	34	(34)	35	35
22	35	35	(34)	35	35
23	34	33	(33)	35	34
24	34	34	(33)	36	34
25	38	40	(38)	39	38
26	37	35	(34)	44	36
27	45	41	(37)	34	42
28	34	33	(33)	33	33
29	34	34	(33)	35	34
30	35	34	(35)	34	35
31	34	34	(34)	35	34

Note: No observations during the following periods.

3rd 2130 - 2340
4th 2130 - 2400
16th 2138 - 2345

B. Solar Radio Emission

b. Outstanding Occurrences at Hiraiso

Hiraiso December 1987

Single-frequency observations

Normal observing period: 2145 - 0730 U.T. (sunrise to sunset)

DEC 1987	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY (10^{-22} Wm^{-2}Hz^{-1}) PEAK	FLUX DENSITY (10^{-22} Wm^{-2}Hz^{-1}) MEAN	POLARIZATION REMARKS
3	500	6 S	0233.9	0234.3	3.5	6	1	WL
14	100	46 C	0420.6	0423.1	4.6	2600	520	O
	200	46 C	0422.4	0423.5	2.0	240	65	O
16	200	42 SER	0326.8	0347.5	21.8	2600	-	ML
	100	42 SER	0327.0	0341.2	22.	3200	-	WL
	100	41 F	0436.7	0438.0	3.0	2700	-	ML
	200	41 F	0436.8	0438.2	2.1	4500	-	ML
	200	42 SER	0515.1	0552.8	42	1030	-	-
	100	42 SER	0515.2	0553.2	41	1000D	-	-
17	500	45 C	0017.2	0018.0	2.5	13	3	O
	200	46 C	0224.6	0226.5	3.0	900	135	O
	500	46 C	0226.5	0226.7	2.0	24	18	O
	500	41 F	0409.1	0409.3	2.5	14	-	O
24	200	44 NS	2144E	0343	580D	33	11	WL
25	100	44 NS	2144E	2256	130	90	24	-
	200	44 NS	2144E	0014	580D	18	5	WL
26	100	42 SER	2144E	2215U	42	140	-	-
	200	27 RF	2144E	-	150D	-	25	ML SUNRISE
	500	27 RF	2144E	-	200D	-	17	ML SUNRISE
	200	44 NS	2144E	0137	580D	34	25	ML
	100	44 NS	2144E	0148	580D	160	60	-
27	200	44 NS	2144E	0116	580D	11	6	WL
	100	46 C	0640.7	0641.2	2.6	440	130	-
28	100	44 NS	2145E	0328	580D	95	62	-
	200	44 NS	2145E	0400	580D	48	20	ML
29	100	44 NS	2147E	0007	580D	320	130	-
	200	44 NS	2147E	0012	580D	66	30	SL
	500	27 RF	2348	0140	240	9	3	WL
30	100	42 SER	0044.8	0045.5	28.4	390	-	-
	200	44 NS	2147E	2331	580D	15	9	ML
	100	44 NS	2147E	2350	580D	24	8	-
	500	6 S	2310.4	2310.6	1.0	4	-	O
31	500	42 SER	0227	0231.8	6.5	29	-	O
	200	44 NS	2147E	2330	580D	27	21	ML
	100	44 NS	2147E	0319	580D	84	39	-

RADIO PROPAGATION

MEASUREMENT OF H.F. FIELD STRENGTH (UPPER SIDE-BAND OF WWV)

DEC 1987 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

UT DAY	00H 15M	01H 15M	02H 15M	03H 15M	04H 15M	05H 15M	06H 15M	07H 15M	08H 15M	09H 15M	10H 15M	11H 15M	12H 15M	13H 15M	14H 15M	15H 15M	16H 15M	17H 15M	18H 15M	19H 15M	20H 15M	21H 15M	22H 15M	23H 15M
1	10	13	ES -6	-1	0	ES -4	ES -1	ES -6	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	C	C	C
2	12	3	3	-4	ES -4	ES -4	ES -6	ES -23	ES -23	ES -23	ES -23	ES -23	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	6	7	6
3	5	ES 1	ES 1	8	3	ES -4	ES -2	ES -4	ES -22	ES -22	ES -22	ES -22	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	-9	4	4
4	3	3	-2	0	ES 3	ES -2	ES 0	ES -2	ES -8	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	-2	-2	0	3	8
5	4	ES -23	ES -23	ES -14	0	ES -2	ES -23	ES -23	ES -23	ES -8	ES -8	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	2	3	3
6	-2	ES -2	ES -14	ES -14	ES -14	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	-1	4	2
7	2	ES -12	ES -12	ES -12	C	C	C	C	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	-6	4	2
8	ES -23	ES -1	ES -4	ES -23	ES -23	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	2	13	8
9	2	ES -2	ES -10	ES -10	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	20	11
10	15	15	9	ES 3	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	C	C	C	C	C	C
11	16	16	ES -4	ES -2	ES -4	ES -4	ES 1	ES -22	ES -2	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	-4	8	6
12	10	10	ES -4	ES -22	ES -22	ES -22	ES -10	ES -10	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	-4	ES -22	ES -22	ES -22	ES -22	1	12	7
13	10	ES -22	ES 1	ES 1	-4	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	5	11	12
14	10	4	ES -22	ES -3	ES -22	ES -22	ES -22	ES 2	ES 2	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	-1	12	12
15	11	4	ES 3	ES -3	ES 2	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	9	4	4
16	9	6	ES 1	ES -4	ES -2	C	C	C	C	C	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	-1	8	3	9	7
17	8	4	ES 1	ES -4	ES -4	ES 1	ES 1	ES 1	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	1	14	14
18	15	9	ES -5	ES -21	ES -5	ES -5	ES -22	ES -22	-3	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	2	9	16
19	8	ES -1	ES -6	ES -6	ES -1	ES -1	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	-4	7	10	11
20	9	ES -4	ES -6	ES -4	-1	ES -1	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	-1	5	9	7
21	7	-1	ES -6	ES -1	ES 4	C	ES -6	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	7	12	11
22	17	11	ES -2	ES -4	ES 0	ES -5	ES -2	ES -2	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	-3	ES -23	4	-2	4	7
23	3	2	ES -5	ES -2	ES -2	ES -2	ES -2	ES -5	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	0	0	-5	3	3
24	ES -6	ES -6	ES -6	ES -1	ES -1	ES -6	ES -6	ES 1	ES -4	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	-6	ES 1
25	ES -22	ES 3	ES 3	ES -4	ES 1	ES -4	ES 3	ES -22	ES -22	ES -7	ES 1	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22
26	ES -6	ES -1	ES -6	ES -1	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	1	0
27	ES -7	ES -4	ES -4	ES -4	ES -4	ES -4	ES -4	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	1
28	ES -3	ES 2	ES -3	ES -3	ES 3	ES 3	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	4	-1
29	12	ES 4	ES -4	ES -2	ES -4	ES 1	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	7	9
30	4	ES 2	ES -4	ES -4	ES -4	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	1	-2
31	2	ES -1	ES -1	ES -3	ES 2	ES -3	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	-3	-2
CNT	31	31	31	31	30	28	29	29	30	30	31	31	31	31	31	31	31	31	30	30	30	29	29	29
MED	7	ES 2	ES -4	ES -4	ES -3	ES -4	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	-1	4	6
UD	15	13	ES 3	ES 1	ES 3	ES 1	ES 1	ES 1	ES -3	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	-2	0	7	13	12
LD	ES -7	ES -12	ES -14	ES -21	ES -22	ES -22	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -22	-6	ES -2

RADIO PROPAGATION

MEASUREMENT OF H.F. FIELD STRENGTH (UPPER SIDE-BAND OF WWVH)

DEC 1987 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

UT DAY	00H 45M	01H 45M	02H 45M	03H 45M	04H 45M	05H 45M	06H 45M	07H 45M	08H 45M	09H 45M	10H 45M	11H 45M	12H 45M	13H 45M	14H 45M	15H 45M	16H 45M	17H 45M	18H 45M	19H 45M	20H 45M	21H 45M	22H 45M	23H 45M
1	18	22	22	25	23	17	9	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	9	C	C	19
2	23	18	22	25	22	11	1	ES -23	ES -23	ES -23	ES -23	ES -23	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	20	16	21	20
3	20	20	22	27	20	21	6	ES -22	ES -22	ES -22	ES -22	ES -22	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	-1	21	11	18	10
4	12	10	14	18	18	4	3	3	ES -8	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	7	14	15	15	14
5	14	14	18	16	19	ES -2	ES -23	ES -23	2	7	6	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	13	22	14	16
6	14	14	13	18	21	9	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	12	21	15	10
7	15	10	19	18	C	C	C	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	12	21	20	20
8	8	11	13	14	11	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	22	18	15	16
9	20	20	16	16	17	15	4	-2	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	16	14	24	19
10	18	16	21	22	11	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	C	C	C	C	C	11
11	14	19	24	25	20	20	14	5	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	-4	-2	12	15	13	13
12	15	15	16	16	24	7	4	-4	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	9	11	10	14	17	15
13	14	16	19	18	15	6	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	10	19	23	14
14	17	20	20	23	17	10	10	-1	ES -1	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	14	13	17	19
15	21	19	20	18	2	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	1	24	20	17
16	17	18	19	21	C	C	C	C	C	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	9	9	18	23	21	17
17	15	23	18	24	18	18	17	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	11	24	24	23
18	19	19	19	20	9	7	14	1	-3	-3	ES -22	0	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	4	23	20	18
19	16	15	19	21	18	12	3	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	7	18	19	19	20
20	16	16	18	24	17	-1	ES -23	ES -23	9	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	-6	12	23	13	13
21	17	15	18	24	18	C	4	3	-9	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	8	24	22	20
22	21	11	14	14	30	5	ES -2	ES -2	ES -23	ES -23	0	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	1	7	17	17	18	14
23	16	13	13	20	17	16	14	10	9	-6	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	7	6	13	17	16	16
24	13	17	18	14	12	17	17	7	6	6	-4	-6	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	4	21	21	18	14
25	20	16	16	14	21	20	13	13	13	7	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	-3	10	16	16	20	16
26	18	10	13	14	21	17	17	13	16	4	-1	-4	-6	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	11	14	15	17
27	14	15	14	19	14	8	3	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	10	16	19	24
28	17	13	21	21	21	15	8	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	15	24	21	19
29	14	14	21	15	21	19	9	ES -22	12	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	14	23	14	16
30	12	17	21	20	18	11	17	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	7	16	23	16
31	17	18	15	19	15	7	10	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	16	11	14	12
CNT	31	31	31	31	29	28	29	30	30	31	31	31	31	31	31	31	31	31	30	30	30	29	29	31
MED	16	16	18	19	18	10	4	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	13	18	18	16
UD	21	20	22	25	23	20	17	10	12	6	-1	-6	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	7	9	21	24	23	20
LD	12	10	13	14	11	ES -22	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	7	13	14	11

C. Radio Propagation

b. Radio Propagation Quality Figures at Hiraiso

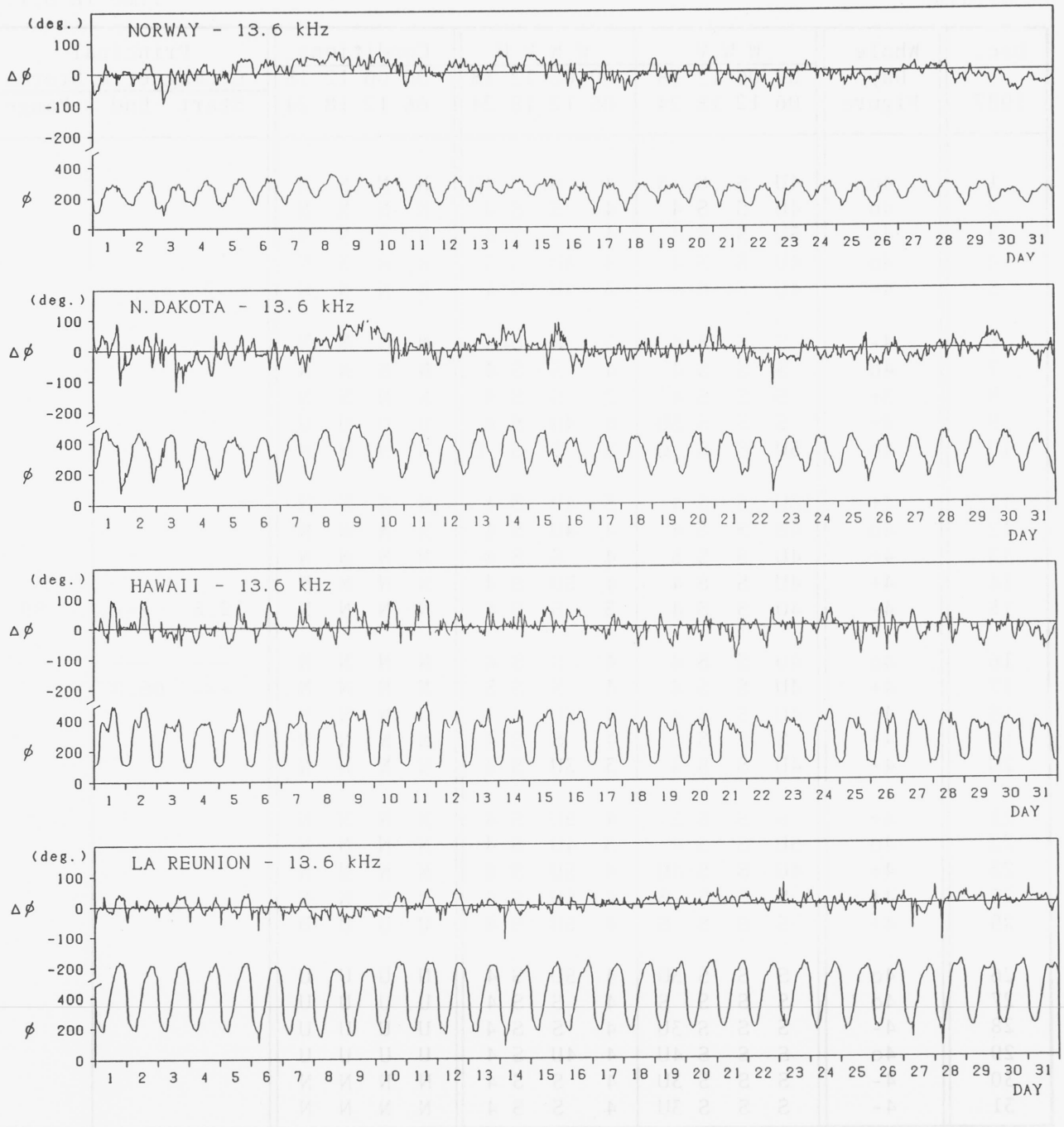
Hiraiso — Time in U.T.

Dec. 1987	Whole Day Figure	W W V 00 06 12 18 / 06 12 18 24	W W V H 00 06 12 18 / 06 12 18 24	Conditions 00 06 12 18 / 06 12 18 24	Principal Geomagnetic Storms Start	End	Range
1	4o	4U S S S	4 S S 4U	N N N N			
2	4o	4U S S 4	4 S S 4	N N N N			
3	4+	5U S S 4	4 S S 4	N N N N			
4	4o	4U S S 4	4 4U S 4	N N N N			
5	4-	4U S S 4	3 4U S 4	N N N N			
6	4-	S S S 4	3 S S 4	N N N N			
7	4o	S S S 4	4 S S 4	N N N N			
8	3+	S S S 4	2 S S 4	N N N N			
9	4+	S S S 5U	4 4U S 4	U U U U			
10	4o	5U S S C	3 S S C	N N N N			
11	4+	5U S S 4	5 4U S 4	N N N N			
12	4o	4U S S 4	4 4U S 4	N N N N			
13	4+	4U S S 5	4 S S 4	N N N N			
14	4+	4U S S 4	4 5U S 4	N N N N			
15	4-	4U S S 4	3 S S 4	N N N N	12.5	---	89
16	4o	4U S S 4	4 S S 4	N N N N	---	---	
17	4+	4U S S 4	4 S S 5	N N N N	---	06.0	
18	4+	4U S S 4	4 5U S 4	N N N N			
19	4+	S S S 5	4 S S 4	N N N N			
20	4-	4U S S 4	3 3U S 4	N N N N			
21	4+	S S S 5	4 5U S 4	N N N N			
22	4o	5U S S 4	3 4U S 4	N N N N			
23	4+	4U S S 4U	4 5U S 4	N N N N			
24	4+	S S S S	4 5U S 4	N N N N			
25	4+	S S S S	4 5U S 4	U U U U			
26	4o	S S S 3U	4 5U S 4	U U U U			
27	4o	S S S S	4 S S 4	U U U U			
28	4-	S S S 3U	4 S S 4	U U U U			
29	4o	S S S 4U	4 4U S 4	U U U U			
30	4-	S S S 3U	4 S S 4	N N N N			
31	4-	S S S 3U	4 S S 4	N N N N			

C. Radio Propagation

c. Phase Variations in OMEGA Radio Wave at Inubo

Inubo December 1987



Polar Cap Phase Anomaly (PCPA) on Norway-Inubo Circuit

Start (U.T.)	End (U.T.)	Max. (U.T.)	Max. Phase Deviation (negative value, deg.)
Dec.29/2000	Jan.01/0115	Dec.30/2030	68

C. Radio Propagation

d. Sudden Ionospheric Disturbance

(i) Short Wave Fade-out (SWF) at Hiraiso

Hiraiso

Time in U.T.

Dec. 1987	S W F						Correspondence		
	Drop-out Intensities (dB) CO HA 1) 2)		Start	Duration	Type	Imp.	Solar Flare	Solar Noise	Geomag. Crochet
14	6		0421	17	S	1-	0420	x	
28	12		0608	27	SL	1		x	

Notes CO: Colorado(WWV) HA: Hawaii(WWVH) 1): Australia 2): London

(ii) Sudden Phase Anomaly (SPA) at Inubo

Inubo

Dec. 1987	S P A							
	Phase Advance (degrees)					Time (U.T.)		
Date	Ω/N	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
6			8	5		0242	0319	0251
6		58	39			0551	0656	0600
9		16	8			0111	0145	0116
9			5			0242	0303	0246
10			5			0107	0117	0109
11			10	9		0017	0152	0053
11			14	—		2314	2335	2320
11			11	—		2339	0044	2358
12			10	5		0057	0136	0108
12		32	31	21		0148	0337	0230
12		39	16			0600	0738	0609
12			31	22		2251	2341	2259
13		27	17	19	22	0345	0456	0354
13		29	10			0630	0745	0635
14	12	104	—	61		0422	0551	0429
14				14		2116	2143	2123
15				12		2131	2213	2146
17		15				0753	0813	0803
22		16	—			0722	0803	0740
23			—	5		0133	0208	0147
24		30	—			0438	0611	0454
24		10	—	17		2348	0043	2354
25			—	4		0106	0119D	0107
25			—	5		0119E	0156	0134
25		5	—	5	7	0216	0232	0220
25		19	—	14		0335	0459	0353
26	16	56	—	37		0157	0311	0223
26		18	—			0457	0547	0507
26		13	—			0641	0710	0649
26			—	5		2212	2231	2216
26			—	8		2333	0010	2337
27			—	4		0121	0143	0125
27		8	—			0651	0715D	0658
27		116	—			0715E	0823	0724
27		13	—			0825	0853	0827
27		20	—			1015	1030D	1020
27		75	—			1030E	1139	1049
27			—	42		2130	2243	2148
27			—	4		2302	2327	2305
28		17	—	8		0148	0220	0154
28	8	38	—	32		0415	0517	0421
28	25	157	—	16	11	0607	0747	0619
29		14	13			0708	0808	0716
29			18	15		2324	0035	2338
30			6	5	12	0050	0117	0059
30	10	44	57	32	20	0142	0346	0158

IONOSPHERIC DATA IN JAPAN FOR DECEMBER 1987

F-468 Vol. 39 No. 12 (Not for Sale)

電離層月報（1987年12月）

第39巻 第12号（非売品）

1988年3月19日 印刷

1988年3月25日 発行

編集兼 郵政省電波研究所

発行所 〒184 東京都小金井市貫井北町4丁目2－1

☎（0423）（21）1211（代）

Queries about. "Ionospheric Date in Japan" should be forwarded to:
The Radio Research Laboratory, Ministry of Posts and Telecommunications,
2-1 Nukui-Kitamachi 4-chome, Koganei-shi, Tokyo 184 JAPAN.