

# IONOSPHERIC DATA IN JAPAN

FOR NOVEMBER 1987

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RADIO RESEARCH LABORATORY  
 MINISTRY OF POSTS AND TELECOMMUNICATIONS  
 TOKYO, JAPAN

## BRIEFING

This Series contains data on ionosphere (I), solar radio emis-

sion (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) " (I) " (I) " (I) " (I) Radio Receiving (S, P) " (P)
Akita	39°43.5'N	140°08.0'E	29.5°N	205.9°	
Kokubunji	35°42.4'N	139°29.3'E	25.5°N	205.8°	
Yamagawa	31°12.1'N	130°37.1'E	20.4°N	198.3°	
Okinawa	26°16.9'N	127°48.4'E	15.3°N	196.0°	
Hiraiso	36°22.0'N	140°37.5'E	26.3°N	206.8°	
Inubo	35°42.2'N	140°51.5'E	25.6°N	207.0°	

## 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

$f_xI$	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 atmospheric.
- 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  $10^{-22} \text{ Wm}^{-2} \text{ Hz}^{-1}$  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
	WWV	WWVH	
Station Call	WWV	WWVH	Hiraiso, Ibaraki
Location	Fort Collins, Colorado	Kauai, Hawaii	
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	$\lambda / 2$ vertical	$\lambda / 2$ 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 10, 1+, 2-, 20, 2+, 3-, 30, 3+, 4-, 40, 4+, 5-, 50 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 ( $\phi$ ) and those in phase deviation ( $\Delta\phi$ ) are shown in the lower part and the upper one, respectively. Variations in phase ( $\phi$ ) 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 ( $\Delta\phi$ ) 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

NOV. 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	00	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	X	X	X	X	X	X											X	X	X	X	X	X	X												
2	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
3	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
4	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
5	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
6	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
7	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
8	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
9	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
10	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
11	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
12	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
13	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
14	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
15	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
16	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
17	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
18	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
19	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
20	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
21	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
22	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
23	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
24	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
25	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
26	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
27	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
28	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
29	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
30	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
31	X	X	X	X	X	X	X											X	X	X	X	X	X	X												
CNT																																				
MED																																				
UQ																																				
LQ																																				

NOV. 1987

FXI (0.1 MHz)

# IONOSPHERIC DATA

NOV. 1987
FOF2 (0.1 MHz)
135° E Mean Time (G.M.T. + 9 h)

Hour Day	Station WAKKANAI				Lat. 45° 23' 5" N	Long. 141° 41' 2" E						Sweep 1		MHz to 25		MHz in 24		sec in		automatic operation						
	00	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	31	31	33	34	31	35	68	68	74	81	80	90	80	74	80	72	52	43	43	44	F	F	F		
2	42	F	47	45	47	43	43	66	70	74	90	82	77	77	73	75	64	51	40	34	36	36	39	S		
3	F	40	F	F	F	F	31	39	53	F	F	73	73	74	76	79	77	S	60	49	43	F	A	F		
4	F	F	F	F	21	23	35	53	65	70	73	77	64	64	73	76	62	51	38	32	31	31	32	31		
5	S	S	S	A	S	30	35	61	64	67	71	90	74	66	76	67	58	53	44	31	31	H	33	34		
6	34	34	35	35	35	36	39	63	H	67	76	95	95	78	72	92	78	71	69	33	A	A	32	40		
7	40	S	43	45	51	51	49	63	81	83	87	101	90	92	75	71	71	A	48	40	37	42	41	43		
8	46	43	44	44	44	45	41	66	82	71	72	H	H	84	72	79	72	42	36	A	A	36	37	39		
9	39	39	41	41	42	44	43	65	81	77	72	H	94	80	72	71	67	65	46	41	34	34	36	35	F	
10	37	38	33	38	37	38	36	60	75	74	84	114	83	82	88	79	72	53	43	44	44	48	50	53		
11	51	53	56	56	53	45	36	65	71	84	99	109	90	84	91	88	71	57	47	47	39	39	41	42		
12	44	45	44	44	44	44	39	63	80	92	104	104	94	84	75	71	71	48	50	47	47	34	34	36		
13	37	37	37	36	36	32	28	58	69	80	99	80	78	77	72	80	74	40	34	31	32	32	33	34		
14	36	36	34	35	38	34	30	52	71	84	89	101	86	84	69	67	65	48	43	30	32	34	34	35		
15	37	37	38	37	37	37	35	62	64	82	90	94	83	71	65	70	66	42	43	37	40	38	40	42		
16	42	43	43	48	44	44	F	51	61	70	69	84	92	72	60	35	72	45	35	31	F	F	31	F		
17	35	F	F	F	F	38	31	59	68	70	80	85	86	67	68	74	61	44	31	32	37	36	36	36		
18	36	41	42	37	38	40	32	53	66	73	75	78	80	72	71	68	61	34	H	36	35	36	37	41		
19	H	F	F	F	F	40	34	55	66	61	71	85	85	80	65	71	68	42	44	38	34	36	36	37		
20	36	33	39	F	38	35	32	64	58	92	92	H	77	81	80	73	73	H	57	41	34	31	35	28	31	32
21	32	32	34	35	35	39	H	H	76	83	91	94	88	79	68	67	61	36	29	30	36	34	36	36		
22	39	39	41	43	44	46	30	50	69	80	87	94	96	H	80	81	71	66	49	33	29	30	31	35	36	
23	37	39	40	41	39	40	31	54	84	100	111	101	95	82	86	87	68	55	35	31	32	34	31	34		
24	25	28	A	A	26	25	25	46	70	71	80	77	84	77	80	75	63	44	34	35	32	32	30	32		
25	30	A	26	28	28	25	A	44	J	R	84	79	82	67	64	61	65	50	47	29	23	A	A	A	30	
26	29	31	32	32	31	22	21	47	64	89	98	89	75	68	62	70	50	38	33	32	31	34	34	34		
27	35	34	35	34	32	33	31	56	70	83	98	85	79	76	62	68	63	33	28	30	31	32	36	33		
28	33	31	29	31	31	30	33	61	73	86	94	90	79	81	74	64	54	A	A	25	25	26	29	30		
29	31	31	30	28	29	29	28	53	60	65	86	84	74	65	74	60	62	42	28	26	30	31	31	33		
30	31	31	32	31	32	31	30	55	63	74	71	81	75	H	H	H	66	60	51	42	25	25	31	26	29	29
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	27	27	25	28	29	28	30	30	30	30	30	30	30	33	30	30	28	29	28	27	27	28	28		
MED	36	37	38	36	36	37	32	58	69	76	86	87	82	77	74	71	65	46	36	32	34	34	35	36		
UQ	39	40	42	43	43	43	36	63	73	84	94	94	88	81	77	79	71	52	43	38	36	36	38	38		
LQ	32	32	33	34	32	31	30	53	64	71	78	81	77	72	68	67	61	42	33	30	31	31	32	32		

# IONOSPHERIC DATA

NOV. 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	410	410	420	L	A														
2										L	420	410	400	400	300														
3									390	400	L	420	L	410															
4									410	430	610	610	L	A	A														
5									L	360	A	A	420	L	350														
6									L	440	430		L	380	L														
7											410	L	380	380															
8										410	L	L	380	A	A														
9									L	390	410		L	L															
10									L	440	H	L	L	L	350														
11												390	A	A															
12												420	420	L															
13											400	400	L																
14										350	A	A	A	A															
15										A	A	L	410	410	340														
16												L	L	L															
17										L	400	H	340	L	L														
18											L	L	350																
19													L	L															
20										L	L	L	400																
21													A																
22													L																
23											L	400	L																
24										370	390	390	L																
25										360	L	L	380	360															
26										L	410	A	400	L	320														
27											L	L	370	320															
28											L	L	340																
29												L	L	350															
30										L		390																	
31												390																	
	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	7	12	15	15	9	3														
MED									390	360	410	410	400	360	320														
UQ									385	425	410	410	380	335															
LQ									345	400	395	375	350	310															

NOV. 1987

FOF1 (0.01 MHz)

# IONOSPHERIC DATA

NOV. 1937

FOE (0.01 MHz)

135° E Mean Time (G.M.T. + 9 h)

Station	WAKKANAI							Lat.	Long.	Sweep	MHz to		MHz in		sec in		automatic operation							
	00	01	02	03	04	05	06	07	45 23' 5" N	141 41' 2" E	1	25	24	19	20	21	22	23						
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								180	235	255	A	A	A	A	A	S								
2								A	235	260	275		A	A	A	215	S							
3								195	H 230	255	280	A	A	A	A	H 205	S							
4								190	230	H 260	270		A	A	A	A	S							
5								190	225	265	275		A	A	A	A	S							
6								195	A	275		A	A	A	A	A	S							
7								S	230	285		A	A	295	280	A	A	A						
8								195	245	290	300		A	A	A	A	S							
9								S	235	H 260	285	305	295	285	250	A	S							
10								160	225	255	265		A	A	A	250	215	S						
11								S	H 230	255		A	A	A	A	A	S							
12								S	225	260	275		A	A	A	260	A	S						
13								S	H 230	260	265		A	A	H 275	240	A	S						
14								S	210	245	260	275		A	260	245	190	S						
15								S	A	235		A	A	A	A	230	195	S						
16								S	A	U A 255	275	280	280	265	225	A	S							
17								S	215	250	270	275	275	255	235	195	S							
18								190	H 215	255	275	280	285	265	245	S	S							
19								S	210	U A 260	275	B	290	275	240	195	S							
20								S	225	A	280	B	B	280	B	200	S							
21								S	225	B	B	285	A	A	B	B	S							
22								S	B	B	B	B	B	B	B	B	S							
23								S	230	275	B	B	B	B	235	B	S							
24								S	A	A	A	270	A	A	230	190	S							
25								S	215	A	A	A	270	255	235	200	S							
26								S	220	A	275	A	275	260	230	A	S							
27								S	210	250	A	280	275	260	230	A	S							
28								S	205	255	275	A	A	A	245	A	S							
29								S	205	250	270	A	270	255	H 235	190	S							
30								S	215	250	270	280	280	255	235	190	S							
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								8	25	24	19	9	11	14	19	12								
MED								190	225	255	275	280	280	262	235	195								
UQ								195	230	260	275	280	288	275	245	202								
LQ								135	215	252	270	275	275	255	232	190								

NOV. 1937

FOE (0.01 MHz)



## IONOSPHERIC DATA

NOV. 1987

FOES (0.1 MHz)

135° E Mean Time (G.M.T. + 9 h)

Station	WAKKANAI	Lat. 45° 23' 5" N						Long. 141° 41' 7" E					Sweep	MHz to		MHz in		sec in		automatic operation						
		00	01	02	03	04	05	06	07	08	09	10		11	12	13	14	15	16	17	18	19	20	21	22	23
1	J A	J A	J A	J A	J A	J A	J A	G	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
2	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
3	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
4	J A	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
5	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
6	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
7	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
8	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
9	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
10	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
11	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
12	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
13	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
14	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
15	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
16	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
17	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
18	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
19	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
20	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
21	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
22	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
23	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
24	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
25	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
26	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
27	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
28	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
29	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
30	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
31	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
MED	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	
UQ	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
LQ	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	E S	

NOV. 1987

FOES (0.1 MHz)

# IONOSPHERIC DATA

NOV. 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 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	26	24	E S	16	16	16	G	G	31	38	31	31	30	37	27	22	23	20	E S	16	24	19	16	16							
2	E S	16	E S	E S	E S	16	16	17	25	20	G	G	35	32	31	33	26	G	E S	18	41	22	23	25	24	20	E S	16					
3	E S	16	E S	E S	E S	16	17	17	G	G	29	35	34	36	32	28	29	G	E S	17	38	32	27	13	A A	E S	16	22					
4	22	E S	15	E S	E S	15	15	E S	19	E S	16	24	31	36	32	32	32	41	45	32	23	21	E S	16	E S	16	E S	13	E S	15			
5	20	18	E S	A A	E S	E S	E S	G	G	G	G	40	53	28	36	30	22	E S	18	E S	19	E S	17	21	20	24	17	E S	17				
6	E S	16	E S	E S	E S	16	21	18	22	E S	16	G	28	31	35	32	32	28	26	24	E S	16	E S	16	A A	90	25	52	17	E S	17		
7	E S	16	E S	E S	E S	16	16	E S	15	E S	16	E S	19	G	G	30	35	28	G	G	31	32	31	A A	61	26	20	29	37	18	E S	16	
8	19	E S	16	E S	E S	15	15	E S	16	16	G	G	G	G	39	34	31	39	34	34	30	21	16	44	42	20	E S	16	E S	16			
9	E S	16	E S	E S	E S	16	16	E S	16	16	21	G	G	G	G	G	25	24	G	24	24	E S	16	21	24	19	E S	17	E S	16	16		
10	E S	15	E S	E S	E S	16	16	E S	16	16	16	G	G	G	G	31	33	31	G	G	19	19	19	21	E S	18	E S	E S	E S	16	16		
11	E S	16	E S	E S	E S	16	16	E S	16	16	21	G	G	33	36	67	63	29	28	20	19	22	21	16	19	25	19	E S	16	16			
12	E S	16	E S	E S	E S	15	15	E S	16	16	21	29	34	G	32	30	33	29	34	E S	16	21	19	24	24	E S	15	E S	16	17			
13	E S	16	E S	E S	E S	16	16	E S	16	16	20	G	G	G	30	30	G	G	30	23	25	16	16	15	16	16	16	16	16	16	16		
14	E S	15	20	E S	E S	16	16	E S	17	E S	16	E S	17	G	G	49	64	46	64	G	G	24	E S	16	E S	16	21	19	27	E S	16	16	
15	E S	15	E S	E S	E S	16	16	E S	16	16	21	30	41	31	35	30	30	21	G	E S	16	16	25	E S	16	24	19	22	E S	16	16		
16	30	26	18	E S	16	16	E S	16	21	48	25	G	G	G	G	G	G	G	G	26	21	16	19	20	19	15	16	16	E S	16	16		
17	E S	16	E S	E S	E S	16	15	E S	16	16	20	26	G	G	G	G	G	G	G	E S	16	16	E S	16	16	E S	16	E S	E S	E S	16	16	
18	E S	15	E S	E S	E S	16	16	16	G	G	G	G	G	G	G	G	G	G	G	E S	16	16	16	16	16	16	16	16	16	16	16	16	
19	E S	16	E S	E S	E S	15	15	E S	16	16	16	10	G	23	G	E B	31	G	G	G	G	E S	17	15	16	16	E S	17	16	E S	15	E S	16
20	E S	15	E S	E S	E S	16	16	E S	16	16	18	G	26	G	E B	E B	G	E B	G	E S	18	17	16	15	16	16	15	15	E S	16	16		
21	E S	15	E S	E S	E S	16	15	E S	17	E S	15	18	G	E B	E B	G	48	29	27	E B	E B	20	20	22	15	17	16	16	E S	16	15		
22	E S	16	E S	E S	E S	16	16	E S	16	20	E B	25	E B	E B	E B	E B	E B	E B	G	E B	E S	16	16	16	16	16	20	28	16	16	16	16	
23	20	E S	16	E S	E S	16	16	E S	16	16	19	G	G	E B	31	35	30	28	G	E B	E S	16	16	16	16	16	13	15	16	17	E S	16	
24	18	E S	A A	A A	E S	16	16	E S	16	16	19	26	26	28	G	28	32	G	G	E S	16	21	16	19	16	15	16	29	E S	16	16		
25	E S	15	A A	E S	E S	16	16	E S	19	A A	E S	18	G	27	28	29	23	23	G	G	E S	16	16	17	E S	A A	A A	A A	E S	16	16		
26	E S	16	E S	E S	E S	16	13	E S	15	E S	16	16	19	G	32	40	25	23	G	G	26	18	24	16	18	16	16	15	16	E S	16	16	
27	E S	15	17	22	21	18	20	E S	16	17	G	G	28	G	G	25	24	G	G	21	28	16	16	16	16	16	16	16	16	16	16	16	
28	E S	16	E S	E S	E S	16	16	E S	16	16	17	18	21	20	32	29	31	24	28	19	47	37	16	16	16	19	16	16	E S	16	16		
29	E S	16	E S	E S	E S	16	16	E S	16	16	17	G	28	G	30	G	G	G	G	E S	16	16	16	16	16	16	13	15	16	E S	16	16	
30	E S	16	E S	E S	E S	16	16	E S	16	16	16	G	G	G	G	G	G	G	G	E S	16	16	18	16	16	16	16	16	16	16	16	16	
31																																	
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
MED	E S	16	E S	E S	E S	16	16	E S	16	16	18	G	E G	U	23	25	32	29	28	E G	22	22	18	17	17	16	17	16	16	16	16	16	
UQ	E S	16	E S	E S	E S	16	16	E S	16	16	20	26	30	33	35	32	32	28	27	22	21	22	21	20	24	E S	16	17	E S	16	16		
LQ	E S	15	E S	E S	E S	16	16	E S	16	16	10	G	G	G	G	E G	23	G	G	G	E S	16	16	16	16	16	16	16	16	16	16	16	

The Radio Research Laboratory, Japan

NOV. 1987

FBES (0.1 MHZ)

# IONOSPHERIC DATA

NOV. 1937

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

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FMIN (0.1 MHz)

The Radio Research Laboratory, Japan

# IONOSPHERIC DATA

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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	280	A	290	305	300	320	315	315	350	340	345	330	355	335	330	340	345	350	305	300	300	F	F	F	
2	285	F	295	295	295	320	325	350	355	340	345	340	335	335	335	340	345	345	325	300	300	310	300	305	
3	F	285	F	F	F	F	290	315	300	F	F	335	310	335	335	335	S	320	315	325	F	A	F	F	
4	F	F	F	F	270	345	305	350	335	330	320	355	340	320	340	340	345	345	320	315	285	290	285	275	
5	S	S	S	A	S	285	335	345	350	355	335	355	345	325	340	345	350	340	340	305	295	H	285	285	
6	290	295	295	295	290	325	315	345	H	325	340	330	335	345	325	340	345	350	340	335	A	A	295	295	
7	295	S	285	285	315	F	345	305	330	350	340	320	330	320	325	335	340	350	A	335	330	A	300	290	
8	280	285	295	295	295	330	310	360	355	340	345	H	H	305	345	330	340	360	335	310	A	A	305	310	280
9	280	290	280	285	285	320	325	350	335	365	H	300	345	340	310	340	330	355	325	320	310	295	300	310	F
10	300	300	295	310	300	330	325	360	350	355	315	335	335	345	330	340	345	350	300	300	295	290	285	285	
11	275	300	300	305	315	315	315	365	340	330	325	350	335	345	330	340	355	335	320	320	290	290	285	285	
12	285	285	290	290	295	320	330	345	355	340	345	345	330	350	335	340	335	305	315	310	315	315	275	285	
13	290	295	290	300	310	330	295	335	350	340	355	335	345	325	350	335	365	325	325	290	305	285	285	280	
14	310	305	295	285	295	330	305	345	340	345	335	355	350	350	355	345	350	335	330	310	285	A	280	260	
15	295	310	315	325	290	310	310	345	345	345	335	355	350	335	355	340	350	335	330	305	300	300	295	295	
16	295	300	295	290	300	380	F	350	355	320	350	325	355	345	345	340	350	345	320	320	F	F	300	F	
17	290	F	F	F	F	340	330	355	370	350	355	330	345	345	350	340	345	350	315	305	315	315	305	305	
18	305	290	290	310	295	320	345	365	365	350	340	360	350	335	355	350	360	350	H	300	340	325	305	300	290
19	H	F	F	F	F	330	350	365	380	375	320	315	340	360	330	340	355	330	335	310	315	305	300	300	
20	290	290	295	F	295	315	320	360	345	345	350	H	340	310	315	350	340	H	345	325	300	320	290	295	305
21	310	295	285	285	295	345	H	H	365	350	350	355	350	315	330	330	340	320	310	295	315	300	300	305	
22	300	305	295	305	320	355	310	345	345	350	345	340	335	H	310	350	350	335	355	340	320	285	A	285	285
23	300	285	285	305	295	310	330	335	350	340	340	340	355	335	345	350	345	350	335	290	295	280	280	295	
24	370	275	A	A	270	290	280	325	345	340	340	345	345	335	340	350	340	340	295	290	290	280	265	A	
25	310	A	260	265	290	290	A	300	335	J R	345	305	355	365	360	340	365	325	335	315	310	A	A	A	275
26	285	275	280	290	330	365	270	340	345	345	345	355	345	340	315	330	360	315	305	310	290	295	285	295	
27	285	295	285	315	280	310	320	340	345	330	340	350	305	340	325	340	340	310	285	300	270	260	305	280	
28	325	280	275	280	315	295	325	350	330	315	355	355	330	340	350	330	350	A	A	320	310	275	270	285	
29	305	320	295	290	275	305	320	345	335	330	350	355	355	355	345	350	340	340	355	300	300	295	305	295	
30	305	300	295	295	305	320	320	365	370	355	325	350	335	H	H	H	350	355	345	310	335	300	280	285	
31																									
CNT	29	26	27	25	28	29	28	30	30	30	30	30	30	30	30	30	30	28	29	28	27	24	28	27	
MED	295	295	295	295	295	320	318	345	348	340	340	345	342	335	340	340	348	340	320	310	300	298	292	285	
UQ	305	300	295	305	302	330	325	355	355	350	345	355	350	345	350	345	350	348	335	310	312	305	300	295	
LQ	285	285	285	285	290	310	308	335	340	340	325	335	335	325	330	340	340	328	310	300	292	290	285	282	

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M(3000)F2 (0.01)

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M(3000)F1 (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										L	A	L	390	L	A										
2										L		380	390	400	375	425									
3									320	350	L	L	380	L	365										
4										A		350	365	380	L	A	A								
5									L	430	A	A	355	L	A										
6									L		L	365	370	L	370	L									
7												A		395	335										
8											A	L	395	L	A	A									
9										L		415	400	L	L										
10									L	H	325	L	L	L	400										
11												A	A	A											
12												L	355	L	350	L									
13											L	360	L	375	L										
14									L	355	A	A	A	A	A										
15									A	A	A	A	L	L	360	380									
16												L	L	L											
17									L	405	L	370	H	370	L	L									
18										L	L	L	405	L											
19												L	L												
20									L	L	L	L	330												
21												A													
22												L													
23											L	A	L												
24									L	345	L	360	L	365	L										
25									L	350	L	L	L	375	385										
26									L	L	360	A	L	L	375										
27										L	L	L	360	L	375										
28										L	L	L	340	L	385	385									
29										L	L	L	330	L											
30										L	L	L	L	L	370										
31									L	L	L	325	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	-6	-10	-11	-15	-9	-2										
MED									320	352	360	370	380	375	400										
UQ									405	370	385	395	385												
LQ									350	350	365	358	370												

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M(3000)F1 (0.01)

### IONOSPHERIC DATA

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H<sup>o</sup>F<sub>2</sub> (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										235	230	235	245	240	240										
2										235	240	230	235	235	240										
3									325	265	260	255	250	250											
4										255	280	240	245	250	265										
5									220	240	235	240	230	235	250										
6										235	255	235	235	250	250										
7												245	235	245											
8											240	250	230	230	240										
9																									
10									220	220	240	230	280												
11										235	270	240	230	235											
12												240	A	A											
13													235	245	225										
14																									
15										230	240	240	235	240											
16																									
17																									
18																									
19																									
20																									
21																									
22																									
23																									
24																									
25																									
26																									
27																									
28																									
29																									
30																									
31																									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT										2	16	21	27	28	21	7									
MED										272	235	240	235	230	235	240									
UQ										242	245	240	235	245	250										
LQ										232	230	230	230	230	240										

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H<sup>o</sup>F<sub>2</sub> (KM)

# IONOSPHERIC DATA

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H<sup>+</sup>F (KM)

135° E Mean Time (G.M.T. + 9 h)

Hour Day	Station WAKKANAI				Lat. 45° 23' 5" N				Long. 141° 41' 2" E				Sweep 1 MHz to 25 MHz in 24 sec in automatic operation														
	00	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	A	A	285	285	240	230	240	215	210	A	205	215	215	A	230	210	215	230	250	260	A	230	230	285		
2	290	295	260	250	265	245	245	220	225	225	220	A	205	205	225	220	230	215	A	240	A	A	A	275	280		
3	300	280	255	260	325	355	245	240	270	A	A	A	A	215	225	245	240	225	A	A	245	300	A	280	A		
4	A	350	305	265	310	375	285	260	225	245	A	205	225	220	A	A	245	210	220	230	255	275	290	285	300		
5	A	350	290	270	A	290	285	280	220	210	190	A	A	210	A	A	225	210	225	215	275	A	290	295	300	300	
6	295	290	315	325	290	245	240	210	220	215	A	A	220	225	210	245	220	220	210	235	A	A	350	A	275	290	
7	265	265	280	270	250	205	225	215	230	H	235	235	A	200	200	H	235	230	220	A	250	245	A	A	275	285	
8	295	285	275	250	255	225	230	225	225	225	A	235	200	A	A	235	210	205	230	A	A	A	275	280	280		
9	295	290	280	255	275	240	220	205	225	210	195	210	225	200	235	225	210	220	235	A	285	280	270	260	330		
10	290	255	260	255	275	235	230	205	220	215	200	230	205	200	230	225	220	220	240	255	255	275	270	270			
11	300	255	255	255	245	210	220	210	215	220	230	A	A	A	245	225	205	220	240	245	250	290	305	300			
12	285	300	285	270	270	230	230	205	235	225	235	215	205	215	230	225	205	235	250	250	265	210	300	310			
13	300	290	300	295	260	210	255	230	225	235	225	205	220	220	230	230	205	225	A	230	270	270	305	300	320		
14	255	305	300	305	280	215	240	215	235	205	A	A	A	A	225	215	210	205	225	255	295	A	A	A	305	325	
15	280	275	240	250	305	245	230	225	210	A	A	A	205	200	225	230	210	205	245	A	250	275	255	280	280		
16	A	305	A	280	280	265	200	255	220	A	220	220	225	230	225	210	245	205	210	245	A	280	285	260	280	290	
17	285	290	275	260	255	205	240	220	205	200	205	195	200	225	225	H	225	205	205	240	250	255	245	270	265		
18	295	275	270	250	290	225	205	205	210	215	205	225	195	225	230	210	210	205	245	220	250	250	255	285			
19	275	255	270	255	255	230	200	205	200	210	200	225	230	235	225	225	215	205	230	230	250	260	275	255			
20	290	300	295	290	270	230	250	215	210	235	235	215	200	H	240	230	230	210	230	245	255	250	255	290	275		
21	270	290	310	300	285	240	220	215	220	230	230	225	A	220	225	220	205	215	260	A	250	260	280	270			
22	270	285	270	245	250	205	240	205	205	225	225	225	225	220	225	220	205	205	210	250	280	A	300	290			
23	300	295	300	255	250	245	205	215	220	225	220	A	225	225	230	225	205	215	215	320	260	295	305	305			
24	220	330	A	A	350	305	305	235	250	H	230	205	210	230	230	230	210	210	225	240	275	300	325	345	A		
25	260	A	325	325	285	310	A	250	H	255	205	205	H	230	220	220	210	H	210	225	225	245	E	A	A	A	305
26	325	310	320	275	245	220	E	A	225	230	235	205	A	220	210	205	225	210	250	215	255	260	295	290	305		
27	300	290	315	275	305	255	265	225	225	220	225	225	205	200	225	225	225	235	290	275	305	340	270	300			
28	235	300	255	305	270	275	255	225	220	200	H	225	225	200	235	230	210	225	A	A	255	260	350	325	305		
29	275	250	275	280	305	275	240	210	205	205	H	235	235	210	200	220	210	210	215	210	255	265	270	275	290		
30	285	270	275	275	275	250	255	215	205	H	205	H	200	H	220	215	205	205	205	E	A	E	A	245	255	295	300
31																											
CNT	30	28	23	28	30	30	29	30	29	27	25	23	27	25	26	30	30	27	29	27	26	23	29	29			
MED	290	290	275	270	275	240	240	218	220	220	220	225	215	220	228	225	210	215	240	255	265	275	280	290			
UQ	300	298	300	292	290	255	255	225	230	225	230	225	222	225	230	230	215	225	245	267	285	295	300	305			
LQ	275	275	268	255	255	220	230	210	210	203	205	210	205	210	225	220	205	205	230	250	255	258	275	280			

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H<sup>+</sup>F (KM)

### IONOSPHERIC DATA

NOV. 1937

H'E (KM)

135° E Mean Time (G.M.T. + 9 h)

Station	WAKKANAI							Lat.	Long.				Sweep	MHz to		MHz in		sec in		automatic operation			
Hour Day	00	01	02	03	04	05	06	07	45° 23' 5" N	141° 41' 2" E	1	25	25	24	24	20	21	22	23				
1								S						A	A	A	S						
2								A	A					A	A	A	H	S					
3								S						A	A	A		S					
4								S						A	A	A		S					
5								S						A	A	A	A	S					
6								S						A	A	A	A	S					
7								S						A	A	A	A	A					
8								S						A		A		S					
9								S	H	H				A	A	A		S					
10								S						A				S					
11								S	H					A	A	A	A	S					
12								S						A		A		S					
13								S						A			A	S					
14								S						A				S					
15								S						A	A	A	A	S					
16								S	A	A							A	S					
17								S									S	S					
18								S									S	S					
19								S									S	S					
20								S	E	A							S	S					
21								S	A	B	B						S	S					
22								S	B	B	B						A	B	S				
23								S			B	B					B	S					
24								S		A	A						S						
25								S	H	A	A	A					S						
26								S		A	A	A					S						
27								S									S						
28								S	A	A							S						
29								S									S						
30								S									S						
31								S									S						
	00	01	02	03	04	05	06	07															
CNT								7	28	22	23	23	16	12	17	12							
MED								S	140	125	120	115	120	118	125	125	132						
UQ								S	142	131	120	120	120	122	128	130	135						
LQ								S	135	120	115	115	115	115	120	120	130						

NOV. 1987

H'E (KM)



### IONOSPHERIC DATA

NOV. 1987

H<sup>+</sup>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							
	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	Day																		
1	105	105	105	105	100	105	120	155	G	115	110	110	110	105	105	105	100	100	100	100	100	105	100	S																				
2	S	120	105	105	100	100	100	100	100	125	110	110	110	110	105	G	S	100	100	105	100	110	110	S																				
3	S	S	S	100	100	100	100	135	125	120	115	110	115	110	110	155	110	105	110	110	110	110	110	110																				
4	110	S	S	105	110	115	S	130	125	120	115	110	110	100	100	100	110	100	S	S	S	S	105	110																				
5	110	105	105	105	105	115	S	150	140	G	115	110	105	100	105	115	S	S	S	105	105	105	105	100																				
6	100	100	105	105	105	105	105	G	125	120	120	110	110	115	115	110	110	S	110	110	110	110	110	115																				
7	S	S	S	S	S	S	S	S	G	G	120	110	110	105	105	105	120	100	100	105	100	105	105	115																				
8	105	110	110	S	105	S	S	130	G	125	115	115	115	110	110	110	105	105	105	110	105	105	S	S																				
9	S	S	S	E	105	S	S	180	G	G	G	G	G	105	105	105	105	S	105	105	105	S	S	S																				
10	S	S	S	S	115	S	S	170	G	G	G	115	110	110	G	G	120	105	105	105	105	105	S	S																				
11	S	S	S	S	S	S	105	155	G	G	150	110	105	105	110	105	105	105	100	105	105	105	105	105																				
12	110	105	S	105	S	S	S	105	150	135	135	110	110	105	120	105	105	105	105	105	100	120	125	120																				
13	S	S	S	S	S	S	S	180	G	G	125	115	105	G	G	110	140	125	S	S	S	S	S	105																				
14	110	105	105	110	S	S	S	S	G	125	120	115	110	115	G	125	120	S	120	105	105	105	105	105																				
15	110	105	110	110	115	115	S	110	110	105	105	175	105	105	105	G	S	115	105	110	105	105	105	105																				
16	100	105	100	105	105	105	S	125	105	105	150	G	135	130	G	110	105	120	110	105	105	S	S	105																				
17	S	125	105	105	105	105	105	155	145	G	G	G	G	G	G	G	S	S	S	S	S	S	S	S																				
18	S	S	S	120	100	100	S	G	G	G	105	G	G	G	G	155	S	105	S	S	S	S	S	S																				
19	S	S	S	S	S	S	S	S	G	150	G	B	G	G	G	G	S	S	S	100	S	S	S	S																				
20	S	S	S	S	S	S	S	S	G	130	G	B	B	G	B	G	S	S	S	S	S	S	S	S																				
21	S	S	S	105	105	S	S	S	155	B	B	G	105	110	B	B	105	100	100	S	S	S	S	S																				
22	S	110	S	E	S	S	S	S	B	B	B	B	B	B	G	B	105	105	S	S	105	105	105	S																				
23	105	100	100	105	S	S	S	S	G	G	B	110	B	B	G	B	S	S	S	S	S	S	S	S																				
24	105	105	105	100	100	105	S	115	115	110	115	G	110	105	G	G	S	120	S	105	105	105	105	105																				
25	105	105	105	115	110	110	105	125	G	105	105	105	105	105	G	G	S	S	110	110	140	105	105	105																				
26	105	105	105	105	110	S	S	S	150	105	G	105	105	105	G	105	105	100	105	105	105	100	S	105																				
27	120	105	105	105	105	105	105	S	G	G	110	G	100	105	110	110	105	S	110	105	105	105	105	105																				
28	S	S	E	115	110	105	S	S	105	105	105	110	110	105	110	105	105	105	105	S	S	105	S	S																				
29	S	S	120	110	S	S	105	105	G	115	115	120	G	G	G	145	S	S	S	S	S	S	S	S																				
30	S	S	105	S	105	S	S	105	G	125	G	G	G	G	G	G	S	S	105	S	S	S	S	S																				
31																																												
CNT	14	16	16	20	20	14	9	18	13	13	20	19	21	21	14	18	18	18	19	19	19	18	13	15																				
MED	105	105	105	105	105	105	105	130	125	120	115	140	140	105	103	110	105	105	105	105	105	105	105	105																				
UQ	110	108	105	110	110	110	105	155	145	125	120	115	110	110	110	115	110	105	110	108	105	105	105	110																				
LQ	105	105	105	105	102	105	105	110	110	105	110	110	105	105	105	105	105	100	102	105	105	105	105	105																				

NOV. 1987

H<sup>+</sup>ES (KM)

### IONOSPHERIC DATA

NOV. 1937

TYPES OF ES

135° E Mean Time (G.M.T. + 7 h)

Station		WAKKANAI							Lat.	45° 23' 54" 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		F <sub>3</sub>	F <sub>3</sub>	F <sub>4</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>2</sub>	FF <sub>12</sub>	C <sub>2</sub>				C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	L <sub>3</sub>	F <sub>3</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>3</sub>	FF <sub>42</sub>	F <sub>2</sub>			
2			F <sub>1</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>	L <sub>2</sub>	L <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>1</sub>	L <sub>1</sub>	L <sub>2</sub>			F <sub>5</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>	FF <sub>23</sub>	FF <sub>21</sub>		
3					F <sub>2</sub>	F <sub>3</sub>	F <sub>3</sub>	F <sub>2</sub>	C <sub>1</sub>	C <sub>3</sub>	C <sub>3</sub>	C <sub>2</sub>	C <sub>2</sub>	L <sub>2</sub>	L <sub>2</sub>	L <sub>2</sub>	H <sub>1</sub>	L <sub>1</sub>	F <sub>5</sub>	F <sub>4</sub>	F <sub>5</sub>	F <sub>7</sub>	F <sub>4</sub>	F <sub>4</sub>	F <sub>3</sub>	
4		F <sub>7</sub>			F <sub>2</sub>	F <sub>2</sub>	F <sub>1</sub>		C <sub>4</sub>	C <sub>3</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	L <sub>3</sub>	L <sub>5</sub>	L <sub>2</sub>	L <sub>1</sub>	F <sub>1</sub>					F <sub>2</sub>	F <sub>2</sub>		
5		F <sub>4</sub>	F <sub>4</sub>	F <sub>4</sub>	F <sub>7</sub>	F <sub>2</sub>	F <sub>1</sub>		C <sub>1</sub>	C <sub>1</sub>		CL <sub>31</sub>	C <sub>3</sub>	L <sub>2</sub>	L <sub>4</sub>	L <sub>5</sub>	L <sub>1</sub>				F <sub>3</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>2</sub>	F <sub>1</sub>	
6		F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>5</sub>	F <sub>2</sub>	F <sub>4</sub>	F <sub>1</sub>		C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	HL <sub>12</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>2</sub>	L <sub>1</sub>		F <sub>2</sub>	F <sub>3</sub>	F <sub>4</sub>	F <sub>6</sub>	F <sub>1</sub>		
7											C <sub>1</sub>	C <sub>3</sub>	C <sub>1</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	C <sub>13</sub>	F <sub>4</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>3</sub>	F <sub>2</sub>	F <sub>2</sub>		
8		F <sub>5</sub>	F <sub>1</sub>	F <sub>1</sub>		F <sub>1</sub>			C <sub>3</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	L <sub>2</sub>	C <sub>3</sub>	L <sub>3</sub>	L <sub>5</sub>	F <sub>3</sub>	F <sub>2</sub>	F <sub>6</sub>	F <sub>4</sub>	F <sub>2</sub>				
9						F <sub>2</sub>			H <sub>1</sub>					L <sub>2</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>2</sub>			F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>				
10					F <sub>1</sub>				H <sub>1</sub>			C <sub>2</sub>	C <sub>2</sub>	L <sub>2</sub>			L <sub>2</sub>	F <sub>3</sub>	F <sub>5</sub>	F <sub>5</sub>	F <sub>2</sub>	F <sub>2</sub>				
11						F <sub>2</sub>	C <sub>2</sub>				HC <sub>21</sub>	C <sub>2</sub>	L <sub>4</sub>	L <sub>2</sub>	L <sub>2</sub>	L <sub>4</sub>	L <sub>3</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>3</sub>	F <sub>3</sub>	F <sub>4</sub>	F <sub>3</sub>		
12		F <sub>1</sub>	F <sub>2</sub>		F <sub>2</sub>			L <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	L <sub>2</sub>	C <sub>1</sub>	L <sub>5</sub>	L <sub>1</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>3</sub>	F <sub>1</sub>	F <sub>2</sub>	FF <sub>22</sub>		
13									H <sub>1</sub>			C <sub>1</sub>	C <sub>2</sub>	L <sub>2</sub>			C <sub>2</sub>	FF <sub>32</sub>						F <sub>2</sub>		
14		F <sub>2</sub>	F <sub>3</sub>	F <sub>3</sub>	F <sub>2</sub>					C <sub>2</sub>	C <sub>3</sub>	C <sub>4</sub>	C <sub>2</sub>	C <sub>4</sub>		C <sub>2</sub>	L <sub>5</sub>		F <sub>2</sub>	F <sub>3</sub>	F <sub>3</sub>	F <sub>4</sub>	F <sub>2</sub>	F <sub>2</sub>		
15		F <sub>2</sub>	F <sub>6</sub>	F <sub>3</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>	L <sub>2</sub>	C <sub>3</sub>	C <sub>3</sub>	L <sub>3</sub>	HL <sub>22</sub>	L <sub>3</sub>	L <sub>2</sub>	L <sub>2</sub>			F <sub>1</sub>	F <sub>4</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>4</sub>	F <sub>3</sub>	F <sub>3</sub>		
16		F <sub>3</sub>	F <sub>6</sub>	F <sub>3</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>1</sub>		CH <sub>11</sub>	L <sub>3</sub>	LH <sub>31</sub>	H <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>		L <sub>2</sub>	L <sub>2</sub>	F <sub>1</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>			F <sub>1</sub>		
17			FF <sub>11</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>1</sub>	C <sub>3</sub>	C <sub>1</sub>																
18					F <sub>1</sub>	F <sub>2</sub>	F <sub>1</sub>				L <sub>1</sub>					C <sub>1</sub>			F <sub>1</sub>							
19										H <sub>1</sub>											F <sub>1</sub>					
20										C <sub>1</sub>																
21				F <sub>2</sub>	F <sub>1</sub>				C <sub>1</sub>				L <sub>2</sub>	L <sub>1</sub>			L <sub>2</sub>	F <sub>2</sub>	F <sub>1</sub>							
22			F <sub>2</sub>														L <sub>1</sub>	F <sub>2</sub>				F <sub>2</sub>	F <sub>5</sub>	F <sub>2</sub>		
23		F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>							L <sub>1</sub>														
24		F <sub>3</sub>	F <sub>2</sub>	F <sub>4</sub>	F <sub>3</sub>	F <sub>2</sub>	F <sub>1</sub>		L <sub>3</sub>	C <sub>2</sub>	L <sub>2</sub>	L <sub>1</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>2</sub>			F <sub>2</sub>		F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>3</sub>		
25		F <sub>2</sub>	F <sub>4</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>3</sub>	C <sub>1</sub>		L <sub>2</sub>	L <sub>2</sub>	L <sub>2</sub>	L <sub>1</sub>	L <sub>2</sub>				F <sub>2</sub>	F <sub>2</sub>	FF <sub>24</sub>	F <sub>5</sub>	F <sub>3</sub>	F <sub>2</sub>		
26		F <sub>2</sub>	F <sub>2</sub>	F <sub>1</sub>	F <sub>2</sub>	F <sub>1</sub>				H <sub>1</sub>	L <sub>2</sub>		L <sub>2</sub>	L <sub>1</sub>		L <sub>3</sub>	L <sub>3</sub>	F <sub>2</sub>	F <sub>1</sub>	F <sub>1</sub>	F <sub>1</sub>	F <sub>1</sub>	F <sub>1</sub>	F <sub>1</sub>		
27		FF <sub>12</sub>	F <sub>1</sub>	F <sub>4</sub>	F <sub>5</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>4</sub>				C <sub>2</sub>		L <sub>1</sub>	L <sub>2</sub>	L <sub>2</sub>	LH <sub>11</sub>	L <sub>3</sub>		F <sub>1</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>		
28					F <sub>1</sub>	F <sub>2</sub>	F <sub>2</sub>			L <sub>2</sub>	L <sub>2</sub>	L <sub>1</sub>	CL <sub>31</sub>	C <sub>2</sub>	L <sub>2</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>2</sub>	F <sub>3</sub>	F <sub>3</sub>			F <sub>2</sub>			
29			F <sub>2</sub>	F <sub>2</sub>		F <sub>2</sub>	L <sub>1</sub>			C <sub>3</sub>	C <sub>2</sub>	C <sub>2</sub>					C <sub>1</sub>									
30			F <sub>1</sub>		F <sub>2</sub>			L <sub>1</sub>		C <sub>1</sub>										F <sub>1</sub>						
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																										

NOV. 1937

TYPES OF ES

# IONOSPHERIC DATA

NOV. 1987

FXI (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	X	35	38	39	X	37	X	X										X	X	X	X	X	X	X		
2	X	45	44	45	X	45	X	X										X	X	X	X	A	X	X		
3	X	41	42	45	X	44	43	52										X	X	X	X	X	64	63		
4		62	61	64	59	58	52											X	X	X	41	42	52	52		
5		51	50	49	48	48	46											X	X	X	X	X	61	62		
6	X	41	41	44	42	44	43											X	X	X	X	X	X	X		
7	X	46	44	45	47	50	42											X	X	X	X	39	40	42		
8		49	50	51	58	52	50											X	A	X	37	40	41	41		
9	X	38	40	43	44	45	45											X	X	X	X	42	42	42		
10	X	44	45	45	44	42	41											X	X	X	X	47	46	48		
11	X	54	51	52	56	48	49											X	X	X	X	40	42	44		
12	X	45	46	46	50	43	41											X	X	X	X	41	38	40		
13	X	42	44	42	43	48	39											X	41	37	38	37	41	39		
14		44	39	A	36	38	37											X	X	X	X	37	38	39		
15	X	42	41	43	42	46	42											X	X	X	X	40	41	40		
16	X	45	44	44	44	40	39											A	A	A	X	36	37	36		
17	A	A	X	42	41	43	40											X	X	X	X	41	37	38		
18	X	39	41	42	42	40	43											X	X	X	X	38	38	39		
19	X	41	43	43	42	41	41											X	X	X	X	38	38	38		
20	X	39	40	40	39	40	39											X	X	X	X	39	39	38		
21	X	38	38	38	41	39	38											X	X	X	X	38	39	41		
22	X	42	42	43	43	46	44											X	X	X	X	37	37	40		
23		44	45	42	42	41	40											X	X	X	X	38	39	40		
24	X	43	31	36	35	29	28											X	X	X	X	C	X	40		
25	X	39	36	A	36	38	33											A	X	X	X	33	33	A		
26	X	36	37	36	36	34	34											A	X	X	X	38	40	40		
27	X	42	41	41	42	37	35											X	X	X	X	40	43	42		
28	X	42	36	40	36	39	38											X	X	X	X	32	35	36		
29	X	40	40	35	36	35	34											X	X	X	X	35	35	39		
30	X	38	39	39	39	38	38											X	X	X	X	36	36	34		
31																										
CNT	29	29	28	30	30	30												27	28	29	30	29	29	29		
MED	X	42	41	43	42	41	40											X	X	X	X	40	40	40		
UQ	X	45	44	45	44	48	43											X	X	X	X	41	41	42		
LQ	X	39	39	40	39	38	38											X	X	X	X	37	37	39		

NOV. 1987

FXI (0.1 MHz)

### IONOSPHERIC DATA

NOV. 1937

FOF2 (0.1 MHz)

135° E Mean Time (G.M.T. + 9 h)

Hour Day	Station AKITA				Lat. 39° 43' 5" N				Long. 140° 08' 0" E				Sweep 1 MHz to 25 MHz		in 24 sec in		automatic operation									
	00	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	F 30	F 32	31	32	32	42	64	92	77	76	87	89	88	84	77	77	61	42	40	39	38	37	38		
2	39	33	39	39	39	36	43	72	88	83	79	94	87	80	83	80	76	52	42	38	34	A	36	38		
3	35	36	39	38	F 35	F 35	52	64	65	83	94	83	78	80	83	96	33	65	53	49	39	47	F	F		
4	F	F	F	F	F	F	42	36	63	77	74	94	93	76	73	74	102	86	52	46	40	F	F	F		
5	F	F	F	F	F	F	39	40	41	58	79	77	79	82	81	78	77	32	68	54	45	38	32	33	35	36
6	35	35	38	36	38	37	41	65	70	80	89	108	93	80	97	94	69	64	38	32	34	39	41	32		
7	40	38	39	41	44	36	43	59	84	90	86	96	96	89	84	30	69	54	38	32	37	34	36	F		
8	F	F	F	F	F	F	44	66	78	89	84	91	88	86	H 37	74	79	43	A	32	31	34	35	35		
9	32	34	37	38	39	F 38	43	65	78	86	83	71	82	88	63	76	73	49	39	32	34	36	36	36		
10	38	39	39	38	36	35	40	68	73	79	82	101	94	79	85	90	74	56	36	38	41	40	42	45		
11	48	45	46	50	42	43	43	60	71	87	95	97	92	91	91	98	86	53	40	40	36	34	36	38		
12	39	40	40	F 41	42	35	39	66	82	91	90	108	96	87	30	77	63	56	51	53	44	35	32	34		
13	36	33	36	37	42	33	32	66	75	30	104	A	91	90	80	85	74	48	35	31	32	31	35	33		
14	F	F	A	30	32	31	32	59	72	112	91	91	102	82	77	72	71	52	43	32	30	31	32	33		
15	36	35	37	36	34	36	38	60	71	80	96	96	88	82	68	66	69	50	36	33	34	35	34	36		
16	39	38	38	38	34	33	32	59	71	72	79	89	89	98	80	63	64	A	A	A	30	31	30	31		
17	A	A	36	35	37	34	33	59	72	72	78	H 80	88	74	31	66	62	H 50	33	32	34	35	31	32		
18	33	35	36	36	34	37	31	61	59	63	31	81	76	86	31	68	67	36	32	37	32	32	32	33		
19	35	37	37	36	35	34	33	59	63	60	70	76	84	85	30	68	60	50	39	39	35	32	32	32		
20	33	34	34	33	34	33	30	67	63	81	100	96	72	85	90	74	62	50	36	33	33	33	32	33		
21	32	32	32	35	33	32	33	61	71	85	98	90	83	79	82	69	61	49	30	31	32	32	33	35		
22	36	36	37	37	40	38	29	58	67	74	87	97	100	39	37	30	62	43	34	26	29	31	31	34		
23	F	F	36	36	35	34	32	59	75	91	113	106	97	92	30	89	74	54	44	32	34	32	33	34		
24	42	25	30	29	23	22	27	74	93	114	93	94	87	96	87	76	66	59	36	33	35	35	I C 34	34		
25	33	30	A	30	32	27	28	59	74	99	106	90	75	71	68	69	54	A	44	25	27	27	27	A		
26	30	31	30	30	28	28	23	55	62	90	100	94	76	73	71	68	70	A	36	38	32	32	34	34		
27	36	35	35	36	31	29	32	66	76	77	94	104	74	75	70	67	65	36	29	32	34	34	37	36		
28	36	30	34	30	33	32	36	75	76	85	100	92	76	79	H 76	74	59	37	35	32	26	29	30	32		
29	34	34	29	30	29	28	32	58	65	68	69	103	83	69	68	68	58	41	39	30	29	29	30	F 31		
30	32	33	33	33	32	32	33	59	68	62	78	79	70	72	77	63	55	36	31	26	30	30	27	28		
31																										
CNT	27	26	26	28	28	28	30	30	30	30	30	29	30	30	30	30	30	27	28	29	30	28	28	27		
MED	36	35	36	36	34	34	33	62	72	80	88	93	87	82	80	75	68	50	38	33	34	33	34	34		
UQ	39	38	39	38	39	36	41	66	78	89	96	97	92	88	85	82	74	54	42	38	35	35	36	36		
LQ	33	32	34	32	32	32	32	59	68	74	79	87	76	78	76	68	62	48	35	32	31	31	32	33		

NOV. 1937

FOF2 (0.1 MHz)

### IONOSPHERIC DATA

NOV. 1987

FOF1 (0.01 MHz)

135° E Mean Time (G.M.T. + 9h)

Station	AKITA							Lat.	39° 43' 5" N				Long.	140° 08' 0" E				Sweep	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
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	A	L																										
2									L	L	L	L	L	L	L																										
3									L	L	L	L	A	L	L	A																									
4									L	L	L	L	A	L		L																									
5									L	L	L	L	L	L	L																										
6																																									
7									L	L	L	L	L	L	L																										
8									L	L	L	L	L	L	L																										
9									L	L	L	L	L	L	L																										
10									L	L	L	L	L	L	L																										
11									L	L	L	L	A	A	L																										
12									L	L	L	L	L	L	L																										
13									L	A	A	A	A	A																											
14									L	L	L	L	L	L	L																										
15									L	L	L	L	L	L	L																										
16									L	L	L	L	L	L	L																										
17									L	L	L	L	L	L	L																										
18									L	L	L	L	L	L	L																										
19									L	L	L	L	L	L	L																										
20									L	L	L	L	L	L	L																										
21									L	L	L	L	L	L	L																										
22									L	L	L	L	L	L	L																										
23									L	L	L	L	L	L	L																										
24									L	A	L	L	L	L	L																										
25									L	L	L	L	L	L	L	A																									
26									L	L	L	L	L	L	L																										
27									L	L	L	L	L	A																											
28									L	L	L	L	L	L	L																										
29									L	L	L	L	L	L	L																										
30									L	L	L	L	L	L	L																										
31									L	L	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	3	5	3	2		5																										
MED									L	375	340	420	410	395		310																									
UQ										375	420	415			340																										
LQ										340	400	410			300																										

NOV. 1987

FOF1 (0.01 MHz)

# IONOSPHERIC DATA

NOV. 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	215	250	280	290	A	A	A	A	A	S							
2							S	200	255	280		A	A	A	A	A	S							
3							S	205	255		A	A	A	A	A	A	S							
4							S	205		A	285	290	A	A	A	A	S							
5							S	210		A	A	295	A	315	305	290	240	200						
6							S	210		A	280	A	300	A	A	A	A	200						
7							S	S	A		300	A	A	310	305	280	250	205						
8							S	205	275		A	A	A	A	A	A	S							
9							S	185		A	A	A	A	305	300	280	250							
10							S	190	235	270	295	305	310		A	280	240							
11							S	S	230	280	295	305	305	300		A	245							
12							S	205	240	285		A	A	A	A	A	S							
13							S	190	245	280	295	305		A	A	A	A	S						
14							S	205	235	285		A	295	295	295		245							
15							S	185		A	A	A	A	A	A	A	240							
16							S	U A	180	A	A	A	A	300	300		A	A	S					
17							S	S		220	265		A	295	300	295	270	220						
18							S	200	255	275		A	295	300	285	260		A	S					
19							S	200	255	290	300	300		A	310	285	220							
20							S	S	B	255	300	305	305	300	290		A	S						
21							S	S	240		A	A	305	310	295		A	A	S					
22							S	S	240	230		A	300	310	300	275	235							
23							S	S	B	B	A	A		A	300	275		B	S					
24							S	S	A	A	A		300	300	300		A	A	S					
25							S	S	A	A		290		A	A	A		A	S					
26							S	S	A	A	A		300		A	A	A	A	S					
27							S	S	A	A	A	A		A	A	A	A	A	S					
28							S	S	215	255		A	A	A	A	A	A	S						
29							S	S	A	A		270		A	A	280	255	225						
30							S	S		A		295		A		305	290	260		A	S			
31									230		295		305	290	260									
	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	16	16	11	13	14	16	12	12	3							
MED								202	240	280	295	300	305	300	278	240	200							
UQ								205	255	285	295	305	310	300	282	245	202							
LQ								190	232	272	290	300	300	295	265	222	200							

NOV. 1987

FOE (0.01 MHz)

# IONOSPHERIC DATA

NOV. 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	J 33	J 52	J 30	J 29	J 24	E 16	E 16	G	28	33	33	35	32	J 54	J 42	J 36	21	J 42	J 32	J 24	J 19	E 15	E 15	E 15
2	J 45	E 15	J 23	J 41	J 24	J 29	J 18	G	G	33	34	35	J 66	J 52	J 61	J 44	J 52	J 45	J 23	J 23	J 30	J 40	J 51	J 53
3	J 32	J 44	J 25	J 33	J 23	J 24	J 25	30	33	39	J 44	J 41	J 76	J 83	J 52	J 46	J 36	J 64	J 32	J 24	J 24	J 24	J 23	J 61
4	J 40	J 52	J 32	J 53	E 16	E 16	J 25	28	34	39	J 45	J 44	J 60	J 97	J 48	J 44	20	J 44	J 24	E 15	J 24	E 15	E 16	E 15
5	E 16	J 29	J 25	E 16	E 16	E 16	E 16	G	J 31	J 34	J 35	J 38	G	G	31	G	G	J 21	J 23	J 25	J 25	J 30	J 22	J 25
6	J 26	J 24	J 25	J 26	J 24	J 18	E 16	G	J 29	J 45	J 46	J 44	J 51	J 43	J 54	J 51	G	E 16	J 46	J 28	J 24	J 25	J 30	J 30
7	J 32	J 24	J 24	E 16	E 16	E 15	E 16	34	38	32	J 53	G	G	G	J 26	J 24	E 16	E 15	E 15	E 15	E 15	J 23	J 33	J 36
8	J 24	J 22	J 30	E 15	J 18	E 16	E 16	G	G	J 33	J 37	J 38	J 45	J 32	J 33	J 32	J 40	J 50	J 53	J 28	J 24	J 22	J 24	J 26
9	E 16	E 15	J 22	E 16	E 16	E 16	E 16	G	J 29	J 31	J 72	35	35	36	G	G	30	E 15	E 15	J 21	E 15	E 15	J 25	J 19
10	E 16	E 16	E 16	E 15	E 16	E 16	J 19	J 22	G	J 50	G	G	G	33	40	70	J 50	J 27	E 16	E 16	J 29	J 23	E 15	E 15
11	E 16	E 16	E 15	E 15	E 15	E 16	E 16	E 16	G	32	32	G	J 60	J 50	J 33	G	J 28	J 28	J 20	E 16	J 18	J 21	E 15	E 15
12	J 28	E 16	J 22	J 24	J 21	E 15	E 16	G	G	32	J 44	J 45	J 44	J 40	J 41	J 40	J 29	J 28	J 50	J 23	J 25	J 20	J 19	E 15
13	E 16	E 15	E 16	E 16	E 16	E 16	E 16	G	G	35	J 49	J 101	J 74	J 50	J 44	J 50	J 32	J 26	E 16	J 31	J 32	J 24	E 16	J 24
14	J 24	J 22	J 51	E 15	E 15	E 15	E 16	26	G	32	33	J 43	J 40	J 35	J 41	G	E 17	E 17	J 18	J 30	J 47	J 25	J 33	J 34
15	J 25	J 19	J 16	J 28	J 24	J 16	E 16	G	J 27	J 35	J 51	J 43	J 35	J 33	J 28	G	E 16	J 32	J 54	J 30	J 24	J 16	J 16	E 15
16	J 25	J 24	J 41	J 28	J 24	J 20	E 16	J 22	J 44	J 32	J 47	J 33	G	G	31	J 45	J 32	J 106	J 90	J 65	J 65	J 26	J 26	J 51
17	J 62	J 45	J 23	J 26	E 15	E 15	E 15	E 16	30	G	J 33	G	G	G	J 28	G	E 17	E 16	J 24	E 16	E 16	E 16	E 16	E 15
18	E 16	E 16	E 16	E 16	E 15	E 16	E 15	G	G	G	30	G	G	G	J 31	J 30	J 29	J 25	E 16	E 15	E 15	E 15	E 15	J 25
19	E 16	E 16	E 15	J 20	E 15	E 16	E 15	G	G	G	G	G	J 24	J 33	G	G	J 23	J 24	J 22	J 22	E 16	E 16	E 16	E 15
20	E 16	E 16	E 16	E 15	E 15	E 15	E 15	E 18	E 24	J 33	G	G	G	G	J 22	J 28	J 29	J 25	J 23	J 16	E 16	E 16	E 16	E 16
21	E 15	E 16	E 16	E 16	E 15	E 15	E 15	E 16	G	31	30	G	G	G	32	J 46	J 36	J 27	J 29	J 23	E 16	E 15	E 15	E 15
22	E 16	E 15	E 16	E 15	E 16	E 26	E 24	E 17	G	G	30	35	34	G	G	G	E 18	E 15	E 15	E 22	E 16	E 15	E 29	E 24
23	J 60	J 21	J 24	J 19	J 20	E 15	E 15	E 17	E 26	E 30	36	36	32	G	G	E 26	J 30	E 15	E 15	E 15	E 15	E 15	E 15	E 15
24	J 24	J 26	J 20	J 29	J 20	E 15	E 15	20	J 38	J 37	J 74	G	G	G	32	J 28	E 17	J 20	J 20	E 15	E 16	E 20	C	J 24
25	E 15	J 46	J 48	J 64	J 36	E 16	E 16	E 16	E 26	J 41	J 30	J 32	J 62	J 54	J 65	G	J 26	J 83	J 76	J 88	J 41	J 25	J 33	J 65
26	J 36	J 43	J 29	J 24	J 18	E 15	E 16	E 16	29	30	30	G	J 50	J 44	J 50	J 32	J 44	J 72	J 41	J 26	J 32	J 73	J 29	J 24
27	J 36	J 21	J 21	J 20	J 18	J 24	E 16	E 17	25	27	31	35	33	J 42	J 30	J 26	J 36	J 28	J 28	J 29	J 26	J 18	J 15	J 24
28	E 15	E 15	E 15	E 15	J 19	J 36	J 21	J 24	G	23	38	J 44	J 41	J 32	J 31	J 29	E 16	J 23	J 20	J 18	E 15	J 31	J 24	E 15
29	E 15	E 15	E 15	E 15	E 15	E 16	E 16	E 17	J 25	J 29	J 34	J 35	31	G	G	26	E 17	E 16	E 15	E 15	E 15	E 15	E 15	E 15
30	E 16	E 15	E 15	J 22	J 24	J 21	E 16	E 18	G	J 30	G	J 35	G	G	G	J 29	J 27	J 24	J 16	J 16	E 15	E 15	E 15	E 15
31																								
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	39	30	30	30	30	29	30
MED	J 24	J 20	J 22	J 20	17	E 16	E 16	E 16	24	32	34	35	34	32	32	J 28	J 28	J 26	J 23	J 22	J 22	J 20	E 16	J 22
UQ	J 32	J 26	J 29	J 28	J 24	J 18	E 16	20	30	35	44	43	50	44	42	44	36	42	32	28	26	25	J 26	J 26
LQ	E 16	E 16	E 16	E 15	E 15	E 15	E 16	G	G	23	30	G	G	G	G	G	E 17	E 17	E 16	E 16	E 16	E 15	E 15	E 15

NOV. 1937

FOES (0.1 MHz)

The Radio Research Laboratory, Japan

### IONOSPHERIC DATA

NOV. 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 16	S 15	20	19	E 16	S 16	E 16	G	28	33	33	35	32	45	29	26	20	E 16	S 16	20	22	E 15	S 15	E 15	E 15	
2	18	E 15	24	18	E 15	S 15	E 16	G	G	33	33	34	39	38	29	33	22	19	E 16	S 16	20	40	29	29		
3	21	18	19	24	20	17	E 16	28	31	35	34	39	46	40	35	38	31	35	29	22	21	21	23	E 15		
4	25	E 15	E 15	18	E 16	E 16	E 16	28	32	34	42	35	48	32	29	26	19	E 16	S 16	E 15	19	E 15	E 16	E 15		
5	E 16	18	E 15	E 16	E 15	E 16	E 16	G	28	32	33	36	G	G	G	G	E 17	S 18	E 16	19	19	E 16	E 16			
6	18	21	19	19	E 15	E 16	E 16	G	27	40	34	35	36	33	45	25	G	E 16	S 16	E 16	19	E 15	E 16	18		
7	23	E 15	E 15	16	E 16	E 15	E 16	33	28	G	32	34	G	G	G	G	E 16	S 16	E 15	E 15	E 15	E 15	23	19		
8	E 16	E 15	19	E 15	E 16	E 16	E 16	G	G	33	35	33	38	32	31	29	28	E 16	A 53	A 24	21	22	E 15	19		
9	E 16	E 15	E 16	E 16	E 16	E 16	E 16	G	29	31	31	32	G	36	G	G	29	E 15	E 15	E 15	E 15	E 15	E 15	E 15		
10	E 16	E 16	E 16	E 15	E 16	E 16	E 16	E 16	G	28	G	G	G	32	36	69	29	E 16	E 16	E 16	E 15	E 15	E 15	E 15		
11	E 16	E 16	E 15	E 15	E 15	E 16	E 16	E 16	G	G	32	G	50	49	35	G	E 16	E 15	E 15	E 15	E 15	21	E 15	E 15		
12	E 15	E 16	E 15	E 15	E 15	E 15	E 16	G	G	31	38	40	37	35	34	29	27	24	27	E 15	23	E 15	19	E 15		
13	E 16	E 15	E 16	E 16	E 16	E 16	E 16	G	G	35	49	A 101	72	42	35	35	20	E 15	E 16	27	29	21	E 16	E 15		
14	E 15	E 15	A 51	E 15	E 15	E 15	E 16	25	G	30	32	34	36	34	29	G	E 17	E 17	E 16	28	21	17	17	28		
15	E 16	E 15	E 16	E 15	E 15	E 16	E 16	G	27	30	30	31	31	30	28	G	E 16	24	24	19	19	E 16	E 16	E 15		
16	E 16	E 16	27	E 16	26	E 15	E 16	18	27	30	31	22	G	G	29	45	52	A 106	A 90	A 65	26	E 16	20	20		
17	A 62	A 45	E 16	E 16	E 15	E 15	E 15	E 16	27	G	33	G	G	G	G	G	E 17	E 16	E 15	E 16	E 16	E 16	E 16	E 15		
18	E 16	E 16	E 16	E 16	E 15	E 16	E 15	G	G	G	30	G	G	G	G	20	25	25	19	E 16	E 15	E 15	E 15	E 15		
19	E 16	E 16	E 15	E 16	E 15	E 16	E 15	G	G	G	G	G	24	33	G	G	G	20	20	E 16	E 17	E 16	E 16	E 16		
20	E 16	E 16	E 16	E 15	E 15	E 15	E 15	E 15	E 15	E 15	E 15	E 15	E 15	E 15	E 15	E 15	E 15	E 15	E 15	E 15	E 15	E 15	E 15	E 15		
21	E 15	E 16	E 16	E 16	E 15	E 15	E 15	E 16	G	31	30	G	G	G	23	26	20	E 16	23	23	E 16	E 15	E 15	E 15		
22	E 16	E 15	E 16	E 15	E 16	E 15	E 15	E 17	G	G	30	35	34	G	G	G	E 18	E 15	E 15	E 15	E 15	E 16	E 15	E 15		
23	21	E 15	E 15	E 15	E 15	E 15	E 15	E 17	E 16	E 16	36	34	32	G	G	E 16	20	E 15	E 15	E 15	E 15	E 15	E 15	E 15		
24	20	E 15	E 15	E 15	E 15	E 15	E 15	18	35	35	34	G	G	G	30	24	E 17	E 15	E 15	E 15	E 15	E 15	E 15	E 15		
25	E 15	26	A 46	E 15	18	E 16	E 16	E 16	24	36	30	30	37	33	40	G	22	A 83	30	20	23	E 16	E 15	65		
26	24	19	19	E 15	E 15	E 15	E 16	E 16	28	30	30	G	38	32	28	25	30	A 72	21	20	27	E 15	22	22		
27	E 15	E 15	E 15	19	E 15	20	E 16	E 17	24	27	30	35	32	40	27	25	21	E 15	E 15	20	21	E 15	E 15	E 15		
28	E 15	E 15	E 15	E 15	E 15	E 15	E 15	17	23	33	31	31	29	29	28	E 16	E 15	E 15	E 15	E 15	E 15	21	E 15	E 15		
29	E 15	E 15	E 15	E 15	E 15	E 16	E 16	E 17	24	29	34	34	31	G	G	25	E 17	E 16	E 15	E 15	E 15	E 15	E 15	E 15		
30	E 16	E 15	E 15	E 16	E 16	E 16	E 16	E 18	G	28	G	34	G	G	G	29	24	20	E 16	E 16	E 15	E 15	E 15	E 15		
31																										
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30		
MED	E 16	E 15	E 16	E 16	E 15	E 16	E 16	E 16	24	30	32	34	32	31	29	25	20	E 16	E 16	E 16	E 16	E 16	E 16	E 15		
UQ	18	E 16	19	E 16	E 16	E 16	E 16	E 18	28	33	34	35	37	35	31	29	25	20	21	20	21	17	E 16	18		
LQ	E 16	E 15	E 15	E 15	E 15	E 15	E 15	G	G	28	30	G	G	G	G	G	E 17	E 15	E 15	E 15	E 15	E 15	E 15	E 15		

NOV. 1987

FBES (0.1 MHz)



# IONOSPHERIC DATA

NOV. 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	MHz to 25 MHz in 24 sec in automatic operation									
	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	E S	E S	E S	E S	E S	E S	E S	E S	16	16	17	17	17	17	17	16	E S	E S	E S	E S	E S	E S	E S	E S
2	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	17	19	17	18	18	16	15	E S	E S	E S	E S	E S	E S	E S	E S
3	E S	E S	E S	E S	E S	E S	E S	E S	E S	17	16	17	17	17	16	17	17	E S	E S	E S	E S	E S	E S	E S	E S
4	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	17	18	17	17	17	16	17	E S	E S	E S	E S	E S	E S	E S	E S
5	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	16	16	17	16	16	E S	E S	E S	E S	E S	E S	E S	E S
6	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	18	19	20	18	20	16	17	E S	E S	E S	E S	E S	E S	E S	E S
7	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	17	17	18	16	17	17	16	E S	E S	E S	E S	E S	E S	E S	E S
8	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	18	18	17	19	17	17	17	E S	E S	E S	E S	E S	E S	E S	E S
9	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	17	18	17	17	17	16	16	E S	E S	E S	E S	E S	E S	E S	E S
10	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	17	17	17	17	17	16	17	E S	E S	E S	E S	E S	E S	E S	E S
11	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	17	16	17	17	16	E S	E S	E S	E S	E S	E S	E S	E S
12	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	17	17	18	17	17	17	16	E S	E S	E S	E S	E S	E S	E S	E S
13	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	16	17	17	17	16	16	16	E S	E S	E S	E S	E S	E S	E S	E S
14	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	16	18	18	16	16	17	16	E S	E S	E S	E S	E S	E S	E S	E S
15	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	17	16	16	16	16	E S	E S	E S	E S	E S	E S	E S	E S
16	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	16	16	16	16	16	E S	E S	E S	E S	E S	E S	E S	E S
17	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	15	16	16	16	16	E S	E S	E S	E S	E S	E S	E S	E S
18	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	17	17	18	18	17	16	16	E S	E S	E S	E S	E S	E S	E S	E S
19	E S	E S	E S	E S	E S	E S	E S	E S	E S	18	17	20	19	16	18	21	16	E S	E S	E S	E S	E S	E S	E S	E S
20	E S	E S	E S	E S	E S	E S	E S	E S	E S	24	20	20	18	18	18	16	16	E S	E S	E S	E S	E S	E S	E S	E S
21	E S	E S	E S	E S	E S	E S	E S	E S	E S	20	22	22	22	23	23	20	17	E S	E S	E S	E S	E S	E S	E S	E S
22	E S	E S	E S	E S	E S	E S	E S	E S	E S	19	19	26	24	24	21	20	20	E S	E S	E S	E S	E S	E S	E S	E S
23	E S	E S	E S	E S	E S	E S	E S	E S	E S	26	30	24	22	25	20	21	26	E S	E S	E S	E S	E S	E S	E S	E S
24	E S	E S	E S	E S	E S	E S	E S	E S	E S	17	18	17	18	20	20	17	16	E S	E S	E S	E S	E S	E S	E S	E S
25	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	16	17	16	16	16	E S	E S	E S	E S	E S	E S	E S	E S
26	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	16	17	17	17	17	17	17	E S	E S	E S	E S	E S	E S	E S	E S
27	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	17	16	16	16	17	16	16	E S	E S	E S	E S	E S	E S	E S	E S
28	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	17	17	16	17	16	17	16	E S	E S	E S	E S	E S	E S	E S	E S
29	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	16	17	17	18	16	16	16	E S	E S	E S	E S	E S	E S	E S	E S
30	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	17	16	17	16	15	E S	E S	E S	E S	E S	E S	E S	E S
31																									
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30	
MED	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	17	17	17	17	17	16	16	E S	E S	E S	E S	E S	E S	E S	E S
UQ	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	16	18	18	18	18	17	17	E S	E S	E S	E S	E S	E S	E S	E S
LQ	E S	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	17	16	16	16	16	E S	E S	E S	E S	E S	E S	E S	E S

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FMIN (0.1 MHz)

# IONOSPHERIC DATA

NOV. 1987

M(3000)F2 (0.01)

135° E Mean Time (G.M.T. + 9 h)

Station	AKITA																													
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23						
1	275	F	F	295	310	315	335	355	370	R	330	340	335	340	355	340	345	360	325	290	295	295	290	290						
2	285	295	295	300	290	325	325	350	365	350	325	330	340	320	345	355	355	345	310	330	295		A	275	285					
3	285	295	285	280	F	F		345	365	310	345	360	330	335	330	320	350	350	335	320	345	300	295	F	F					
4	F	F	F	F	F	F		300	305	350	365	335	320	335	350	345	325	345	375	340	330	300	F	F	F	F				
5	F	F	F	F	F	F		285	285	290	295	280	300	310	345	340	335	350	345	335	325	355	350	330	335	345	280	295	290	305
6	285	275	280	270	280	335	325	360	370	315	325	340	335	310	330	360	360	370	370	255	280	285	290	290						
7	285	280	285	300	320	310	310	345	340	340	335	340	330	320	330	335	345	360	320	315	305	295	295	F						
8	F	F	F	F	F	F		340	350	345	345	345	360	340	330	H	345	365	350	A	300	295	295	300	285					
9	260	285	300	295	295	F		300	350	370	360	355	360	325	330	355	350	355	365	355	335	305	300	305	295	305				
10	270	290	300	285	320	320	340	355	340	340	335	330	360	315	350	340	350	340	305	295	295	290	285	295						
11	275	295	295	315	315	320	350	360	365	345	345	355	355	330	330	350	365	335	320	315	335	270	285	285						
12	275	290	290	F	305	315	330	335	355	355	330	355	345	345	345	350	340	335	310	330	320	320	285	280						
13	305	280	295	285	310	400	300	340	365	350	335	A	340	340	340	350	360	370	330	295	A	275	300	280						
14	F	F	A	290	310	295	305	355	310	350	375	350	370	340	350	360	365	340	350	315	275	275	295	A						
15	300	315	345	310	280	310	325	385	350	335	345	375	355	345	365	360	330	370	310	320	295	315	295	305						
16	300	290	295	300	310	305	300	355	365	360	330	335	315	340	370	350	330	A	A	A	A	310	300	265						
17	A	A	295	285	325	325	335	355	375	360	350	350	340	365	365	355	H	320	H	350	365	305	300	355	295	300				
18	290	290	295	320	305	355	305	375	380	345	360	340	370	355	365	345	375	370	310	350	330	310	310	290						
19	290	295	285	305	310	340	355	380	365	350	345	330	325	345	360	350	365	365	290	335	315	300	305	280						
20	280	295	290	290	295	350	300	345	330	335	360	320	350	325	355	365	370	335	340	340	305	335	290	305						
21	305	295	290	295	295	310	310	355	365	355	350	320	330	335	355	365	360	350	315	330	290	310	295	290						
22	295	305	295	305	315	375	305	370	350	335	320	340	345	340	350	350	355	340	345	345	285	290	285	280						
23	F	F	285	310	310	330	320	360	345	360	340	340	340	340	340	355	350	360	350	340	315	325	285	285	270					
24	340	255	300	380	265	270	275	360	335	370	380	365	325	360	360	365	355	360	340	305	290	285	I C	275	265					
25	305	295	A	270	305	275	270	340	325	335	350	345	360	365	355	335	350	A	340	320	305	295	260	A						
26	A	275	265	295	290	320	305	365	340	345	350	355	350	355	345	330	370	A	325	335	320	295	295	285						
27	275	290	290	325	310	295	295	360	365	340	330	360	350	350	340	330	345	360	310	295	285	265	285	305						
28	285	295	315	290	285	285	305	355	365	345	345	345	365	325	330	H	355	350	350	350	360	305	275	275	285					
29	295	340	310	305	280	300	345	380	355	380	320	370	360	360	350	365	365	325	360	335	310	310	295	F	300					
30	290	290	305	305	310	295	315	355	355	360	345	360	350	350	370	360	365	315	340	315	310	335	300	295						
31																														
CNT	26	26	26	28	28	28	30	30	30	30	30	29	30	30	30	30	30	27	28	29	28	28	28	26						
MED	285	292	295	298	305	312	312	355	355	345	345	340	342	340	350	350	352	350	330	315	300	295	292	290						
UQ	300	295	300	305	310	328	335	365	365	355	350	355	355	350	355	360	365	360	340	335	310	310	295	300						
LQ	280	285	285	290	288	300	305	350	340	340	330	335	335	330	340	345	350	338	312	305	292	285	285	280						

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M(3000)F2 (0.01)

# IONOSPHERIC DATA

NOV. 1987

M(3000)F1 (0.01)

135° E Mean Time (G.M.T. + 9 h)

Station	AKITA							Lat.	32° 43' 5" N				Long.	140° 03' 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	A	L											
2									L	L	L	L	L	L	L											
3									L	L	L	A	A	L	L	A										
4									360	390																
5									L	L	L	L	L	L	L											
6										405	410															
7									A	L	L	L	L	L	A											
8									L	L	L	L	L	L	L											
9									L	L	L	L	L	L	L											
10									L	L	L	L	L	L	L											
11									400																	
12									L	L	L	L	A	A	L											
13									L	L	L	L	L	L	390											
14									L	A	A	A	A	A	A											
15									L	L	L	L	L	L	L											
16									L	L	L	L	L	L	L											
17									L	L	L	L	L	L												
18									L	L	L	L	L	L	L											
19										425	L	L	L	L	L											
20									L	L	L	L	L	L	L											
21									L	L	L	L	L	L	L											
22										440	430		L	L	L	L										
23										L	L	L	L	L	L											
24									L	A	L	L	425													
25									L	L	L	L	L	L	A											
26									L	L	L	L	L	L	L											
27										L	L	L	L	A	410											
28										L	L	L	L	L	L											
29									L	L	L	L	L	L	425											
30									L	L	L	L	L	L	440											
31																										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT										2	3	5	2	2		5										
MED									L	380	425	410	425	435	410											
UQ										432	420				425											
LQ										403	405				410											

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M(3000)F1 (0.01)

### IONOSPHERIC DATA

NOV. 1987

H<sup>o</sup>F2 (KM)

135° E Mean Time (G.M.T. + 3 h)

Station	AKITA							Lat.	39° 43' 5" N				Long.	140° 02' 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												240	220	245	240	250	250	235							
2												235	235	230	245	240	250	235							
3												320	245	245	245	250	250	260	245						
4												235	250	260	240	240	245	245							
5												240	240	235	250	235	250	240							
6												240	250	250	245	250	260								
7												230	230	245	250	250	230	240							
8												225	235	270	245	245	270	240							
9												225	240	220	240	245	245	245							
10												230	245	250	260	230	240	240							
11												245	245	240	245	255	250								
12												230	250	240	235	240	245								
13												230	245	A	A	245	240								
14												H	245	225	235	235	240	235							
15												250	250	220	245	270	225								
16												225	275	250	245	240	230								
17												230	235	235	250	235									
18												240	240	240	230	245	235								
19												225	245	235	220	250	240								
20												265	245	240	215	220	240								
21												235	250	235	230	240	240								
22												230	225	260	235	245	230								
23												245	230	240	235	240									
24												225	220	215	230	240									
25												250	255	240	240	230	230	230							
26												245	240	230	225	240	240								
27												235	250	240	235	230	230								
28												250	230	230	235	230									
29												220	230	240	235	230	225								
30												220	255	230	230	240	230								
31																									
CNT												11	23	30	29	29	27	2							
MED												235	235	245	240	240	240	245							
UQ												240	245	250	245	245	250	240							
LQ												228	230	235	235	230	235	230							

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H<sup>o</sup>F2 (KM)

# IONOSPHERIC DATA

NOV. 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	
	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	300	A	A	270	245	235	225	210	225	200	230	210	A	230	230	230	205	225	A	245	255	280	285		
2	295	275	A	A	275	230	240	230	230	220	200	215	A	A	225	230	225	205	240	235	A	A	A	A		
3	A	235	230	A	A	335	240	230	225	225	220	A	A	A	A	A	225	225	A	A	A	A	260			
4	A	255	260	255	275	230	270	230	235	225	A	215	A	220	235	245	210	200	210	225	255	270	270	255		
5	275	270	265	275	265	240	225	220	225	205	195	200	220	220	235	240	220	220	220	215	A	295	285	275		
6	285	A	300	305	285	225	230	210	230	A	225	200	A	A	A	225	215	215	200	A	290	285	275	285		
7	300	285	290	270	245	205	245	225	200	220	195	210	195	220	220	235	220	200	220	230	245	275	A	E A		
8	285	280	285	260	250	235	225	220	230	225	220	215	A	200	200	240	220	210	A	A	A	A	290	A		
9	300	300	275	255	265	255	230	220	220	200	200	195	195	A	230	245	220	205	220	245	245	255	280	270		
10	305	285	250	250	245	230	225	230	200	210	195	205	200	220	A	A	220	210	205	245	260	280	285	285		
11	285	260	260	250	230	245	205	215	220	205	210	195	A	A	A	235	210	215	205	240	220	A	290	280		
12	295	280	290	275	270	205	235	215	215	225	220	A	225	225	220	225	200	220	270	225	245	225	E A	E S		
13	285	290	235	300	265	190	250	230	220	A	A	A	A	A	A	230	210	200	235	A	A	A	275	320		
14	260	260	A	310	310	260	260	230	230	235	225	230	245	220	220	220	210	205	210	A	A	310	320	310	A	
15	230	230	240	260	310	245	225	215	225	215	200	205	195	220	200	225	210	210	250	A	295	245	265	270		
16	275	235	A	260	A	250	245	225	225	215	200	230	220	245	230	A	A	A	A	A	A	250	290	A	A	
17	A	A	275	255	250	210	225	215	225	210	215	220	205	210	240	220	200	200	225	245	250	225	275	280		
18	235	275	230	245	255	215	230	210	205	200	195	200	220	230	230	230	210	195	260	225	225	245	270	290		
19	270	260	275	260	250	230	220	200	200	200	210	220	220	235	235	225	205	205	245	230	235	275	270	285		
20	300	285	290	295	280	225	220	235	200	245	235	220	210	200	245	225	210	210	210	240	250	245	290	265		
21	260	270	295	275	275	245	245	220	215	230	225	210	220	220	225	235	235	200	A	A	275	255	285	290		
22	270	265	230	260	245	195	290	215	220	195	195	225	A	210	230	220	210	200	210	225	265	250	290	300		
23	A	290	300	255	260	225	240	205	210	235	A	220	210	230	220	230	205	205	220	245	245	290	295	320		
24	230	360	295	220	E S	E S	315	230	A	A	225	205	195	225	225	220	210	200	225	260	285	230	I C	325		
25	255	A	A	325	285	300	295	240	225	A	225	210	A	A	A	225	200	A	A	280	A	250	305	A		
26	A	340	340	270	280	240	295	225	225	240	200	220	220	220	200	225	220	A	255	250	A	275	A	A		
27	310	280	280	260	E A	310	260	230	225	220	200	230	210	A	215	220	210	200	235	E A	E A	E S	300	290		
28	250	270	270	280	275	A	275	230	215	230	220	200	210	215	220	240	215	195	H	210	210	280	A	310	300	
29	270	230	260	250	E S	300	275	225	220	210	210	205	210	205	200	210	220	205	200	210	220	245	245	290	280	
30	270	280	265	265	245	260	235	220	215	200	220	220	210	230	209	215	215	210	215	245	260	230	E S	E S		
31																										
CNT	26	28	26	29	28	29	30	30	29	26	27	27	22	22	24	28	29	27	26	24	26	26	26	26		
MED	282	280	280	260	266	235	238	222	220	220	210	215	210	220	225	225	210	205	220	239	255	258	286	286		
UQ	295	288	290	275	278	250	260	230	225	225	220	220	220	225	230	232	220	210	240	245	282	280	292	295		
LQ	270	268	265	255	250	225	225	215	210	205	200	205	205	215	218	222	205	200	210	225	245	245	275	280		

NOV. 1987

H\*F (KM)

### IONOSPHERIC DATA

NOV. 1987

H<sup>+</sup>E (KM)

135° E Mean Time (G.M.T. + 9 h)

Station	AKITA				Lat.	39° 43' 5" N							Long.	141° 03' 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	S							A	A	A	S																	
2							S	S	110	105	105	100	100		A	A	A	A	S																
3							S	S	110	110	110	110			A	A	A	A	S																
4							S	S	110	110	110	105			A	A	A	A	S																
5							S	S	105	105	105	105	110	105	115	E S	120	S																	
6							S	E S	125	110	110	110	110	110		A	A	S																	
7							S	S	110	110	105	105	105	110	110		A	S																	
8							S	S	110	110	110	105	105	105	105	110		S																	
9							S	S	110	110		A	100		A	110	110	115	S																
10							S	S	110	110	110	110	110	110	110	115		S																	
11							S	S	110	110	110	110	110	110	110	120		S																	
12							S	S	115	105	110	110	110	110	110	110		S																	
13							S	S	110	110	110	110	105	100		A	A	S																	
14							S	S	110	110	110	110	110	110	110	110		S																	
15							S	S	115	110	110		A	105	105	105	115	S																	
16							S	S	A	A	A	A	105	105	110	110	S																		
17							S	S	115	110	110	105	100	110	110	E S	120	S																	
18							S	S	110	110	110	110	105	100	105		A	S																	
19							S	S	E S	120	110	110		A	A	E B	115	100	S																
20							S	S	E B	115	110	110		A	105	110		A	S																
21							S	S	E B	115	120	110	105	105	105	105		A	S																
22							S	S	E B	115	115	E B	125	115	110	105	115	E B	125	S															
23							S	S	E B	120	120	E B	120	120	110	E B	120	E B	125	S															
24							S	S			A	105	110	115		A	120	S																	
25							S	S	110	105	110		A	A	A	A	E S	115	S																
26							S	S	110	110	110	110			A	A	A	A	S																
27							S	S	E S	120	110	110	110	110	110	110		A	S																
28							S	S	110	110	100		A	A	A		110		S																
29							S	S	110	110	110	105	105	105	105	105	E B	125	S																
30							S	S	110	110	110	110	110	110	110		A	S																	
31																																			
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23											
CNT								1	27	28	27	25	21	23	21	15																			
MED							E S	125	110	110	110	110	108	110	110	112																			
UQ									111	110	110	110	110	110	110	118																			
LQ									110	110	110	105	105	105	110	110																			

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H<sup>+</sup>E (KM)

# IONOSPHERIC DATA

NOV. 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									
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	100	100	100	100	100	S	S	G	130	120	115	110	110	105	105	100	100	105	100	95	95	S	S	S
2	105	S	100	100	100	100	100	G	G	115	115	110	105	100	100	100	100	100	110	110	100	105	105	105
3	100	100	100	100	100	100	105	130	125	120	110	105	100	100	105	105	105	105	105	105	105	105	105	105
4	105	100	105	100	S	S	100	130	120	115	110	105	105	100	100	100	125	110	115	S	105	S	S	S
5	S	105	105	S	S	S	S	G	110	115	120	110	G	G	125	G	G	100	110	110	105	105	105	100
6	100	100	100	100	100	100	S	G	115	115	115	115	110	110	105	105	G	S	115	110	110	110	105	105
7	105	105	105	S	S	S	S	110	110	G	120	115	G	G	G	100	100	S	S	S	S	110	110	105
8	110	105	105	S	100	S	S	G	G	115	115	120	110	120	115	110	110	105	105	105	100	100	105	105
9	S	S	110	S	S	S	S	G	110	110	100	110	100	150	G	G	145	S	S	110	S	S	110	105
10	S	S	S	S	S	S	S	100	105	G	120	G	G	G	120	135	125	115	105	S	S	100	100	S
11	S	S	S	S	S	S	S	S	G	105	150	G	125	120	120	G	110	105	105	S	105	110	S	S
12	105	S	100	105	100	S	S	G	G	125	110	110	110	110	110	110	105	100	105	110	100	100	100	S
13	S	S	S	S	S	S	S	G	G	125	110	110	110	110	100	100	100	100	S	105	105	105	S	125
14	130	125	110	S	S	S	S	155	G	145	120	115	115	125	135	G	S	S	105	105	105	105	100	100
15	105	100	S	110	110	S	S	G	120	110	110	105	105	110	110	G	S	110	110	110	110	S	S	S
16	100	100	100	100	95	100	S	100	105	105	105	105	G	G	115	110	105	100	100	100	100	100	100	100
17	105	100	105	100	S	S	S	S	145	G	115	G	G	G	95	G	S	S	S	S	S	S	S	S
18	S	S	S	S	S	S	S	G	G	G	120	G	G	G	100	100	100	105	S	S	S	S	S	100
19	S	S	S	100	S	S	S	G	G	G	G	100	95	G	G	G	100	95	95	95	S	S	S	S
20	S	S	S	S	S	S	S	S	B	115	G	G	100	G	100	100	100	95	105	S	S	S	S	S
21	S	S	S	S	S	S	S	S	G	125	110	G	G	G	120	105	110	120	95	95	S	S	S	S
22	S	S	S	S	S	100	105	S	G	G	120	145	145	G	G	G	S	S	S	110	S	S	100	100
23	100	100	100	100	100	S	S	S	B	B	110	110	110	G	G	B	105	S	S	S	S	S	S	S
24	105	105	105	105	100	S	S	120	110	110	105	G	G	G	120	125	S	120	115	S	S	105	105	
25	S	105	110	110	110	S	S	S	115	105	110	105	105	100	100	G	120	110	110	105	105	105	100	100
26	100	100	100	105	105	S	S	S	115	115	115	G	105	100	100	100	100	100	105	105	110	105	95	100
27	105	100	100	105	105	100	S	S	125	120	115	115	115	110	110	105	105	105	105	105	100	105	S	100
28	S	S	S	S	110	105	105	110	G	130	125	100	100	100	110	105	S	105	110	105	S	100	100	S
29	S	S	S	S	S	S	S	S	120	115	115	110	110	G	G	130	S	S	S	S	S	S	S	S
30	S	S	S	100	100	100	S	S	G	110	G	110	G	G	G	100	95	100	S	S	S	S	S	S
31																								
CNT	16	16	18	16	15	8	6	8	15	24	26	22	21	17	23	20	21	22	21	19	17	17	14	16
MED	105	100	102	100	100	100	102	115	115	115	115	110	110	110	110	105	105	105	105	105	105	102	102	
UQ	105	105	105	105	105	100	105	130	122	120	120	115	110	120	113	110	110	105	110	110	105	105	105	
LQ	100	100	100	100	100	100	100	108	110	110	110	105	105	100	100	100	100	100	105	105	100	100	100	100

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H°ES (KM)

IONOSPHERIC DATA

NOV. 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	F <sub>2</sub>	F <sub>4</sub>	F <sub>5</sub>	F <sub>3</sub>	F <sub>2</sub>				C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	L <sub>2</sub>	L <sub>2</sub>	L <sub>1</sub>	L <sub>2</sub>	F <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>1</sub>					
2	F <sub>4</sub>		F <sub>3</sub>	F <sub>3</sub>	F <sub>2</sub>	F <sub>1</sub>	L <sub>2</sub>		C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	L <sub>2</sub>	L <sub>2</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	F <sub>2</sub>	F <sub>1</sub>	F <sub>1</sub>	F <sub>2</sub>	F <sub>7</sub>	F <sub>5</sub>	F <sub>4</sub>		
3	F <sub>6</sub>	F <sub>2</sub>	F <sub>6</sub>	F <sub>4</sub>	F <sub>3</sub>	F <sub>4</sub>	L <sub>1</sub>	C <sub>4</sub>	C <sub>3</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>3</sub>	L <sub>2</sub>	L <sub>2</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>3</sub>	F <sub>4</sub>	F <sub>5</sub>	F <sub>4</sub>	F <sub>5</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>3</sub>		
4	F <sub>7</sub>	F <sub>4</sub>	F <sub>3</sub>	F <sub>4</sub>			L <sub>1</sub>	C <sub>3</sub>	C <sub>3</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	L <sub>2</sub>	L <sub>2</sub>	L <sub>2</sub>	L <sub>2</sub>	C <sub>1</sub>	F <sub>1</sub>	F <sub>2</sub>		F <sub>2</sub>					
5		F <sub>2</sub>	F <sub>2</sub>						C <sub>1</sub>	C <sub>2</sub>	C <sub>1</sub>	C <sub>1</sub>			C <sub>1</sub>			F <sub>1</sub>	F <sub>1</sub>	F <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>2</sub>	F <sub>2</sub>		
6	F <sub>2</sub>	F <sub>2</sub>	F <sub>4</sub>	F <sub>3</sub>	F <sub>3</sub>	F <sub>1</sub>			C <sub>3</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	L <sub>1</sub>	L <sub>2</sub>			F <sub>1</sub>	F <sub>2</sub>	F <sub>1</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>		
7	F <sub>4</sub>	F <sub>2</sub>	F <sub>2</sub>					C <sub>2</sub>	C <sub>2</sub>		C <sub>1</sub>	C <sub>1</sub>				L <sub>1</sub>	L <sub>1</sub>					F <sub>2</sub>	F <sub>3</sub>	F <sub>2</sub>		
8	F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>		F <sub>1</sub>				C <sub>2</sub>	C <sub>1</sub>	C <sub>1</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>3</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>		
9			F <sub>1</sub>						C <sub>1</sub>	C <sub>2</sub>	L <sub>1</sub>	C <sub>1</sub>	L <sub>1</sub>	HL <sub>11</sub>			H <sub>3</sub>			F <sub>2</sub>			F <sub>2</sub>	F <sub>1</sub>		
10							L <sub>2</sub>	L <sub>1</sub>		C <sub>1</sub>					C <sub>2</sub>	H <sub>2</sub>	C <sub>6</sub>	C <sub>2</sub>	F <sub>1</sub>			F <sub>1</sub>	F <sub>2</sub>			
11									L <sub>1</sub>	H <sub>1</sub>			C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>			C <sub>2</sub>	F <sub>1</sub>	F <sub>1</sub>		F <sub>2</sub>	F <sub>3</sub>			
12	F <sub>2</sub>		F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>				C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	L <sub>3</sub>	F <sub>3</sub>	F <sub>3</sub>	F <sub>1</sub>	F <sub>3</sub>	F <sub>2</sub>	F <sub>1</sub>			
13									C <sub>2</sub>	C <sub>3</sub>	C <sub>3</sub>	C <sub>4</sub>	C <sub>4</sub>	L <sub>2</sub>	L <sub>2</sub>	L <sub>1</sub>	F <sub>1</sub>			F <sub>4</sub>	F <sub>4</sub>	F <sub>5</sub>		FF <sub>23</sub>		
14	F <sub>2</sub>	F <sub>1</sub>	F <sub>6</sub>				H <sub>2</sub>		H <sub>1</sub>	C <sub>1</sub>	C <sub>1</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>1</sub>	H <sub>2</sub>				F <sub>1</sub>	F <sub>3</sub>	F <sub>3</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>3</sub>		
15	F <sub>3</sub>	F <sub>3</sub>		F <sub>2</sub>	F <sub>2</sub>				C <sub>1</sub>	C <sub>3</sub>	C <sub>3</sub>	L <sub>2</sub>	C <sub>2</sub>	C <sub>1</sub>	C <sub>1</sub>			F <sub>4</sub>	F <sub>4</sub>	F <sub>4</sub>	F <sub>3</sub>					
16	F <sub>2</sub>	F <sub>2</sub>	F <sub>6</sub>	F <sub>2</sub>	F <sub>4</sub>	F <sub>2</sub>	LH <sub>11</sub>	L <sub>2</sub>	L <sub>2</sub>	L <sub>2</sub>	L <sub>2</sub>				C <sub>2</sub>	C <sub>4</sub>	L <sub>3</sub>	F <sub>3</sub>	F <sub>3</sub>	F <sub>4</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>3</sub>		
17	F <sub>3</sub>	F <sub>3</sub>	F <sub>2</sub>	F <sub>2</sub>				H <sub>2</sub>		C <sub>1</sub>					L <sub>1</sub>				F <sub>1</sub>							
18										C <sub>1</sub>					L <sub>1</sub>	L <sub>1</sub>	L <sub>2</sub>	F <sub>1</sub>						F <sub>2</sub>		
19				F <sub>2</sub>								L <sub>1</sub>	L <sub>2</sub>				L <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>1</sub>						
20									C <sub>1</sub>				L <sub>1</sub>		L <sub>1</sub>	L <sub>3</sub>	L <sub>1</sub>	F <sub>3</sub>	F <sub>1</sub>							
21									C <sub>1</sub>	C <sub>1</sub>					C <sub>4</sub>	L <sub>4</sub>	C <sub>1</sub>	F <sub>1</sub>	F <sub>2</sub>	F <sub>1</sub>						
22					F <sub>4</sub>	L <sub>1</sub>				C <sub>1</sub>	H <sub>1</sub>	H <sub>1</sub>	H <sub>1</sub>						F <sub>1</sub>				F <sub>4</sub>	F <sub>4</sub>		
23	F <sub>2</sub>	F <sub>1</sub>	F <sub>1</sub>	F <sub>1</sub>	F <sub>1</sub>					C <sub>1</sub>	C <sub>1</sub>	C <sub>1</sub>					L <sub>1</sub>									
24	F <sub>3</sub>	F <sub>1</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>2</sub>		C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	L <sub>2</sub>					CL <sub>21</sub>	C <sub>1</sub>		F <sub>1</sub>	F <sub>1</sub>			F <sub>1</sub>	F <sub>1</sub>			
25		F <sub>4</sub>	F <sub>7</sub>	F <sub>2</sub>	F <sub>4</sub>				C <sub>1</sub>	C <sub>4</sub>	C <sub>1</sub>	L <sub>1</sub>	L <sub>3</sub>	L <sub>3</sub>	L <sub>4</sub>		C <sub>4</sub>	F <sub>4</sub>	F <sub>3</sub>	F <sub>3</sub>	F <sub>3</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>3</sub>		
26	F <sub>6</sub>	F <sub>3</sub>	F <sub>3</sub>	F <sub>2</sub>	F <sub>2</sub>				C <sub>3</sub>	C <sub>2</sub>	C <sub>2</sub>		L <sub>4</sub>	L <sub>3</sub>	L <sub>2</sub>	L <sub>2</sub>	L <sub>3</sub>	F <sub>7</sub>	F <sub>3</sub>	F <sub>3</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>2</sub>		
27	F <sub>2</sub>	F <sub>2</sub>	F <sub>1</sub>	F <sub>2</sub>	F <sub>2</sub>	F <sub>5</sub>			C <sub>1</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	L <sub>3</sub>	L <sub>2</sub>	F <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>2</sub>	F <sub>1</sub>	F <sub>1</sub>			
28				F <sub>1</sub>	F <sub>4</sub>	L <sub>4</sub>	C <sub>1</sub>		C <sub>2</sub>	C <sub>2</sub>	L <sub>2</sub>		L <sub>1</sub>	L <sub>1</sub>	C <sub>2</sub>	L <sub>3</sub>		F <sub>1</sub>	F <sub>1</sub>	F <sub>1</sub>		F <sub>2</sub>	F <sub>2</sub>			
29									C <sub>1</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>				C <sub>1</sub>									
30				F <sub>1</sub>	F <sub>2</sub>	F <sub>2</sub>				C <sub>1</sub>		C <sub>2</sub>				L <sub>3</sub>	L <sub>3</sub>	F <sub>1</sub>								
31																										

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TYPES OF ES



# IONOSPHERIC DATA

NOV. 1987

FXI (0.1 MHz)

135° E Mean Time (G.M.T. + 9 h)

Hour Day	Station				Lat.		Long.					Sweep		MHz to		MHz in		sec in		automatic operation				
	00	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	A	X 36	X 37	X 39	X 38											X 73	X 49	X 46	X 44	X 40	X 40	X 41	X 41
2	X 41	X 43	X 42	X 41	X 41	X 40											X 62	X 43	X 45	X 39	X 41	X 41	X 41	X 42
3	X 41	X 42	X 42	X 38	X 39	X 37	.61				107						U 74	X 59	X 57	X 49	X 48	X 51	X 52	
4	58	61	64	55	57	48											X 60	X 42	X 44	X 47	X 44	X 44	X 45	X 45
5	X 43	X 42	X 40	X 41	X 41	X 39											X 65	X 47	X 45	X 39	X 41	X 43	X 43	X 43
6	X 42	X 41	X 43	X 43	X 44	X 44											X 61	X 49	X 36	X 40	X 44	X 48	X 44	X 44
7	X 45	X 45	X 45	X 49	X 54	X 37											X 64	X 41	X 42	X 40	X 39	X 40	X 40	X 42
8	A	X 42	X 42	X 42	X 42	X 40											X 63	A	X 36	A	A	X 39	X 41	X 41
9	X 39	X 40	X 41	X 41	X 42	X 42											X 68	X 38	X 39	X 39	X 39	X 39	X 39	X 39
10	X 39	X 41	X 43	X 43	X 44	X 38											X 69	X 43	X 41	X 43	X 44	X 46	X 46	X 48
11	X 43	X 47	S	X 51	X 47	S											X 61	X 47	X 44	X 49	X 34	X 40	X 40	X 42
12	X 41	X 43	X 44	X 45	X 46	X 39											X 66	X 55	X 63	X 41	X 42	X 37	X 37	X 38
13	X 40	X 41	X 39	X 42	X 47	X 36											X 59	X 37	X 38	X 41	X 39	X 39	X 39	X 38
14	X 41	X 39	X 39	X 36	X 38	X 32											X 68	X 42	X 38	X 32	X 33	A	X 37	X 37
15	X 38	X 41	X 36	X 36	X 36	X 38											X 61	X 40	A	X 38	X 41	X 39	X 39	X 39
16	X 39	X 41	X 40	X 40	X 36	X 35											X 72	A	A	A	X 36	X 35	X 36	X 36
17	X 38	X 39	X 39	X 40	X 41	X 36												A	X 45	X 37	X 40	X 39	X 36	X 37
18	X 37	X 38	X 40	X 42	X 43	X 38											X 60	X 32	X 41	X 34	X 35	X 34	X 36	X 36
19	X 38	X 38	X 38	X 40	X 39	X 34											X 53	X 47	X 46	X 42	X 35	X 33	X 37	X 37
20	X 38	X 38	X 38	X 38	X 40	X 41											X 55	X 47	X 41	X 40	X 42	X 39	X 37	X 37
21	X 40	X 39	X 38	X 40	X 40	X 36	X 39										X 56	X 38	X 37	X 34	X 39	X 39	X 39	X 39
22	X 41	X 42	X 41	X 44	X 49	X 39	X 33										X 54	X 46	X 32	X 33	X 35	X 34	X 37	X 37
23	X 40	X 37	X 40	X 41	X 43	X 35	X 39										X 55	X 49	X 44	X 44	X 42	X 44	X 46	X 46
24	X 53	X 39	X 39	X 45	X 28	X 27	X 33										X 60	X 48	X 38	X 39	X 42	X 43	X 37	X 37
25	X 42	A	X 38	X 36	X 39	X 34	X 36										X 50	X 53	X 34	X 31	X 32	X 30	X 33	X 33
26	X 33	X 34	X 35	A	X 31	X 31	X 33										X 53	X 40	X 42	X 46	X 36	X 40	X 40	X 40
27	X 40	X 40	X 42	X 42	X 36	X 33	X 36										X 56	X 39	X 37	X 42	X 44	X 39	X 52	X 52
28	X 37	X 37	X 40	X 34	X 37	X 38	X 41											A	A	A	A	X 36	X 35	A
29	X 39	X 38	X 36	X 33	X 33	X 32	X 39										X 46	X 44	X 43	X 33	X 34	X 33	X 35	X 35
30	X 37	X 37	X 40	X 39	X 35	X 34	X 36										X 46	X 37	X 36	X 35	X 39	X 33	X 34	X 34
31																								
CNT	29	28	29	29	30	29	11				1								28	27	27	27	29	29
MED	X 40	X 40	X 40	X 41	X 49	X 37	X 38				107						X 69	X 44	X 41	X 40	X 39	X 39	X 39	X 39
UQ	X 41	X 42	X 42	X 43	X 44	X 39	X 39										X 66	X 48	X 44	X 42	X 42	X 41	X 42	X 42
LQ	X 38	X 38	X 38	X 38	X 37	X 34	X 36										X 56	X 40	X 37	X 35	X 36	X 36	X 36	X 37

NOV. 1987

FXI (0.1 MHz)

# IONOSPHERIC DATA

NOV. 1987

FOF2 (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	29	A	30	31	33	32	42	63	80	81	72	90	91	93	89	76	J R	78	67	43	40	38	34	34	35		
2	35	37	36	35	35	34	43	73	89	89	86	90	87	90	87	83	78	56	37	39	33	35	35	36			
3	35	36	36	32	33	31	F	75	70	F	V	91	81	84	J R	87	I S	U S	68	53	51	43	39	F	F	F	
4	F	F	F	F	F	F		40	70	82	U S	97	113	85	80	80	102	90	54	36	38	41	38	S	39		
5	37	36	34	35	35	33	38	59	84	85	77	79	80	84	77	82	U S	74	59	41	39	33	35	37	S		
6	36	35	37	37	38	38	44	66	72	82	S	100	102	87	96	94	110	R	78	55	43	30	34	38	42	38	
7	39	39	39	43	43	31	44	U S	74	83	91	95	99	90	105	97	92	81	58	35	36	34	33	34	36		
8	A	36	36	36	36	34	42	66	81	91	85	88	87	85	91	S	77	73	57	A	30	A	A	33	35		
9	33	34	35	35	36	36	45	68	78	84	92	69	81	84	82	75	70	62	32	33	33	33	33	33	33		
10	33	35	37	37	38	32	40	64	73	89	94	89	92	83	86	84	76	63	37	35	37	38	40	42			
11	42	41	I S	44	45	41	I S	40	41	61	79	85	92	93	92	88	94	105	91	55	41	38	43	28	34	36	
12	35	37	38	39	40	33	39	65	J R	78	79	91	100	94	I S	94	83	75	70	60	49	57	35	36	31	32	
13	34	35	33	S	41	30	36	65	76	U S	81	83	95	102	R	98	89	83	73	53	31	32	35	33	33	32	
14	35	33	33	30	32	26	S	36	60	87	100	107	85	S	85	89	76	69	62	36	32	26	27	A	31		
15	32	35	30	30	30	32	37	62	69	83	106	115	79	H	89	71	66	67	55	34	U A	31	32	S	33	33	
16	33	35	34	34	30	29	32	64	76	J R	81	R	79	84	93	103	105	63	64	66	A	A	A	30	29	30	
17	32	33	33	34	35	30	33	55	69	R	77	82	83	80	80	I S	R	73	75	68	A	39	31	34	33	30	31
18	31	S	34	36	37	32	31	55	70	67	80	79	77	J R	R	80	81	67	64	54	H	26	35	28	29	28	30
19	32	32	32	34	33	28	32	53	65	S	63	67	78	74	J R	I C	R	80	62	47	41	40	36	29	32	31	
20	32	S	32	32	34	35	32	57	82	65	111	94	79	72	96	81	R	65	49	41	35	34	36	33	S	31	
21	34	33	32	34	34	30	33	63	85	94	85	94	91	91	83	73	64	50	32	31	23	33	33	33	33		
22	35	36	35	38	43	33	32	57	70	73	93	91	107	98	93	81	74	48	40	26	27	29	28	31			
23	34	33	34	35	37	H	29	33	60	74	82	89	117	101	105	93	87	78	50	43	38	38	36	38	40		
24	47	33	33	39	22	S	21	27	78	101	103	91	88	90	110	J R	89	81	74	54	42	32	33	36	37	31	
25	36	A	S	32	30	33	28	30	60	81	109	120	92	83	81	69	70	64	44	47	28	25	26	24	27		
26	27	28	29	A	25	25	27	60	S	72	84	118	91	85	79	69	73	75	47	34	36	40	30	34	34		
27	34	34	36	36	30	27	30	69	82	90	90	107	93	78	72	71	67	50	33	31	36	38	33	46			
28	31	31	34	28	31	32	35	72	S	81	91	99	106	89	73	80	68	74	A	A	A	A	30	29	A		
29	33	32	30	27	27	26	33	61	65	70	71	91	79	70	H	67	71	63	40	38	37	27	V	28	27	29	
30	31	31	34	33	29	28	30	57	69	76	78	91	69	72	74	69	56	40	31	30	29	33	27	28			
31																											
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
CNT	29	28	30	29	30	29	30	30	30	30	30	30	30	30	30	30	30	30	28	27	28	27	29	29	29		
MED	34	34	34	35	34	31	36	63	78	84	91	91	87	85	86	76	73	54	38	35	34	33	33	33			
UQ	35	36	36	37	38	33	41	68	82	91	99	99	92	94	91	83	78	60	42	38	36	36	35	36			
LQ	32	32	32	32	31	28	32	60	70	77	82	88	80	80	77	71	65	50	34	31	30	30	30	31			

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FOF2 (0.1 MHz)

# IONOSPHERIC DATA

NOV. 1987

FOF1 (0.01 MHz)

135° E Mean Time (G.M.T. + 9 h)

Station	Tokubunji Tokyo				Lat.	35 42' 4" N							Long.	139 29' 3" E							Sweep	1 MHz to 25 MHz		in sec in		automatic operation		
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	L	L	L												
2									L	L	L	A		L	L	L												
3									L	L	L	L	A	L	L	L												
4									L		L	L	A		L	U L 330												
5									L	L	L	L	L	L	L	L												
6									L	L	L	L	A	A	A	L												
7								L	L	L	L	L	L	L	L	L												
8									L	L	L	L	L	L	L		A											
9									L	L	L	L	L	L	L													
10									L	L	L	L	L	L	L	L												
11									L	L	L	U L 490	L	U L 450	L	L												
12										L	L	A	A	A	L	A												
13										L	L	A	L	L	L	L												
14									L	L	A	L		L	L	L												
15										L	450	L	U L 480	L	A													
16										L	L	L	L	L	L	A	A											
17									L		L	L	L	L	L													
18											L	L	U L 460	L	L	L												
19										L	L	L	L	L	C	L												
20											L	L	U L 430	L	L													
21										L	L	L	L	L	L													
22										L	L	L	L	L	L	L												
23											L	L	L	L	L													
24									L	L	L	L	L	L	L													
25									L	L	L	L	L	L	A	L												
26									L	L	L	L	L	L	L	A												
27									L	L	L	L	L	L	A	A												
28									L	L	L	L	L	L	L													
29									L	L	L	L	L	L	L	L												
30										L	L	L	L	L	L													
31																												
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
CNT											2	5	4	1		1												
MED											435	450	470	450		330												
UQ											460	495																
LQ											430	445																

NOV. 1987

FOF1 (0.01 MHz)

### IONOSPHERIC DATA

NOV. 1937

FOE (0.01 MHz)

135° E Mean Time (G.M.T. + 9 h)

Station	Tokubunji 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							B	200	260	295	300	310	A	A	A	A	B							
2							B	220	265	A	A	A	A	A	A	A	205							
3							B	220	265	295	310	A	A	A	300	A	A							
4							B	205	U A 270	A	A	A	A	A	A	A	200							
5							B	225	270	300	315	325	340	325	B	A	210							
6							B	210	A	A	320	A	A	A	A	A	A							
7							B	A	A	A	320	320	325	310	295	260	190							
8							B	210	275	A	A	340	A	A	300	A	A							
9							B	195	U A 255	A	310	310	325	325	310	265	A							
10							B	205	260	295	310	325	320	320	290	255	A							
11							B	205	250	300	320	325	325	315	A	260	A							
12							B	195	265	290	315	325	320	A	A	A	A							
13							B	195	260	295	315	325	315	300	A	A	A							
14							B	215	235	290	305	315	320	305	290	255	200							
15							B	200	A	A	A	A	A	A	A	245	180							
16							B	U A 195	A	A	A	A	A	A	A	240	A							
17							B	175	250	280	S	300	310	295	275	235	A							
18							B	175	240	295	310	305	310	305	A	A	190							
19							B	205	275	290	305	310	A	310	C	A	A							
20							B	180	255	300	315	A	315	305	295	255	A							
21								200	255	A	A	315	315	310	295	250	190							
22								190	250	H	A	310	320	335	320	290	245	180	S					
23							B	255	A	A	A	A	A	315	A	A	A							
24								185	A	A	310	320	310	300	U A 285	A	160							
25							S	195	245	H 285	R	315	320	A	A	A	180							
26							A	U A 235	270	295	A	A	A	310	A	A	A							
27								180	260	A	275	295	A	A	A	A	A							
28							A	250	275	295	A	310	A	A	A	A	A							
29								185	250	285	A	A	310	295	275	250	190							
30								190	260	A	A	A	320	300	280	A	B							
31								185	250	285	305	310	310	300	285	245	180							
	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	17	19	17	18	18	13	12	12							
MED								198	255	290	310	320	320	310	290	252	190							
UQ								205	265	295	315	325	325	315	295	258	200							
LQ								185	250	285	305	310	310	300	285	245	180							

The Radio Research Laboratory, Japan

NOV. 1937

FOE (0.01 MHz)

# IONOSPHERIC DATA

NOV. 1987

FOES (0.1 MHz)

135° E Mean Time (G.M.T. + 9 h)

Station		ROKUBUNJI 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	J A	J A	J A	J A	J A	J A	J A	J A	G	29	36	38	38	35	33	35	26	26	J A	E B	E B	E B	E B	E B	E B
2	E B	J A	J A	E B	E B	E B	E B	G	28	36	37	44	52	50	47	27	G	E B	21	20	J A	J A	J A	J A	J A
3	J A	21	21	22	19	E B	13	20	18	J A	26	35	42	J A	45	33	J A	J A	J A	J A	J A	J A	J A	J A	
4	J A	29	29	27	J A	J A	J A	19	25	J A	J A	J A	J A	J A	J A	J A	G	J A	E B	19	E B	J A	J A	E B	
5	E B	E B	J A	J A	J A	E B	E B	G	19	31	33	34	37	34	34	29	G	J A	J A	J A	J A	J A	J A	J A	
6	22	J A	J A	19	J A	J A	J A	23	J A	29	36	J A	J A	J A	J A	J A	J A	22	19	23	J A	J A	J A	E B	
7	J A	J A	23	26	E B	E B	E B	23	J A	43	33	G	G	G	G	G	J A	20	19	18	E B	20	E B	E B	
8	J A	J A	J A	J A	E B	E B	E B	G	29	35	36	26	37	J A	49	41	J A	J A	J A	J A	J A	J A	J A	J A	
9	J A	J A	J A	E B	17	20	E B	G	27	35	22	33	40	39	39	33	J A	J A	J A	E B	J A	J A	J A	E B	
10	23	E B	14	18	J A	J A	J A	G	28	34	37	38	37	38	41	31	19	J A	J A	J A	J A	J A	J A	J A	
11	J A	17	19	19	E B	E B	E B	G	G	31	36	34	38	33	36	J A	20	J A	J A	J A	J A	J A	J A	J A	
12	18	J A	21	22	J A	J A	J A	25	31	34	37	58	68	82	39	35	J A	J A	J A	J A	J A	J A	J A	E B	
13	22	20	E B	12	E B	E B	E B	G	22	31	40	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	E B	
14	18	E B	E B	E B	E B	E B	J A	G	27	36	66	J A	47	37	G	32	29	G	E B	13	19	21	J A	J A	
15	J A	J A	J A	J A	J A	J A	J A	G	30	30	38	37	36	39	48	23	G	19	42	51	19	16	19	J A	
16	J A	J A	J A	J A	J A	J A	J A	G	37	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
17	J A	J A	J A	J A	20	19	J A	G	22	31	34	31	G	30	30	28	23	J A	J A	J A	J A	J A	E B	E B	
18	E B	14	19	17	19	J A	17	17	E B	13	G	21	32	J A	44	G	J A	45	28	25	G	J A	E B	E B	
19	J A	J A	J A	J A	20	18	E B	G	19	G	21	34	33	J A	43	32	C	30	J A	J A	26	21	E B	E B	
20	17	E B	J A	22	E B	E B	E B	G	J A	G	J A	J A	G	G	G	J A	J A	J A	E B	E B	E B	E B	E B	J A	
21	E B	E B	E B	18	18	E B	E B	G	26	32	36	31	G	G	G	G	G	14	20	E B	E B	E B	E B	E B	
22	E B	E B	E B	E B	J A	E B	E B	G	G	J A	32	33	35	34	G	G	G	G	E B	E B	E B	E B	E B	E B	
23	20	J A	J A	J A	E B	13	12	19	E B	20	G	30	49	36	41	28	29	30	J A	J A	J A	J A	J A	J A	
24	J A	J A	J A	J A	J A	E B	15	19	18	41	30	32	35	G	32	33	J A	19	E B	E B	E B	E B	J A	J A	
25	J A	J A	J A	J A	21	23	19	25	22	G	G	G	G	G	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
26	20	19	E B	J A	J A	J A	J A	24	28	32	35	37	36	30	35	53	J A	J A	J A	J A	J A	J A	E B	J A	
27	J A	J A	J A	J A	J A	J A	J A	21	J A	32	31	32	35	37	30	44	47	26	35	34	26	27	20	28	
28	20	20	18	E B	E B	J A	J A	J A	J A	29	G	33	36	34	34	30	J A	J A	J A	J A	J A	J A	J A	J A	
29	J A	J A	E B	18	E B	19	24	G	26	G	J A	35	30	G	G	G	J A	E B	19	J A	E B	J A	E B	J A	
30	18	E B	J A	16	17	12	13	13	24	29	36	32	32	31	G	G	J A	G	18	20	17	19	15	14	
31																									
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30	30	30	30	30	30	30	30	30	30
MED	20	J A	20	19	18	18	16	18	28	32	36	35	37	33	34	30	22	J A	J A	J A	J A	J A	18	19	J A
UQ	J A	J A	J A	J A	J A	J A	J A	23	J A	30	35	42	44	43	41	40	36	30	33	31	44	J A	J A	J A	J A
LQ	18	19	16	E B	E B	E B	E B	G	22	30	33	33	G	G	29	27	G	18	16	E B	17	E B	E B	E B	

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FOES (0.1 MHz)

The Radio Research Laboratory, Japan

# IONOSPHERIC DATA

NOV. 1987

FBES (0.1 MHz)

135 E Mean Time (G.M.T. + 9 h)

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

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FBES (0.1 MHz)

# IONOSPHERIC DATA

NOV. 1987

FMIN (0.1 MHz)

135° E Mean Time (G.M.T. + 9 h)

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

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FMIN (0.1 MHz)

The Radio Research Laboratory, Japan

### IONOSPHERIC DATA

NOV. 1937

M(3000)F2 (0.01)

135 E Mean Time (G.M.T. + 9 h)

Station	ROKUBUNJI TOKYO		Lat.	35 42' 4" N		Long	139 29' 3" E		Sweep	1 MHz to 25 MHz		in 24 sec in		automatic operation													
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	310	A	300	300	325	330	340	360	340	335	345	325	325	320	325	350	J R	350	350	350	320	325	325	305	295		
2	295	315	310	320	320	325	325	340	340	335	335	320	325	315	325	330	335	355	345	335	305	305	310	285			
3	290	300	325	315	290	275	F	340	325	F	V	325	335	320	J R	325	I S	U S	350	335	335	335	F	F	F		
4	F	F	F	F	F	F			U S	350	325	320	320	320	325	330	345	365	350	305	325	310	305	S	315		
5	315	315	320	315	325	330	350	335	335	335	320	R	335	315	320	320	U S	345	350	340	335	290	305	305	S	300	
6	305	305	300	295	315	335	345	350	330	315	325	S	315	325	315	320	335	R	345	350	350	335	310	300	315	320	
7	290	295	290	305	355	345	330	U S	340	345	320	325	330	305	325	315	330	345	355	360	320	340	310	305	305		
8	A	310	310	305	330	320	335	350	335	300	340	330	340	320	320	350	S	345	365		A		A		A	285	305
9	310	300	305	320	320	320	350	350	345	335	345	345	305	320	335	345	345	350	350	335	325	305	315	295			
10	280	285	320	325	330	340	340	350	335	315	335	315	335	320	325	335	335	355	345	315	320	305	300	295			
11	305	320	I S	325	335	I S	340	350	340	350	330	335	320	335	320	320	325	350	355	340	310	350	310	300	295		
12	300	305	305	315	325	335	350	345	J R	350	325	330	320	325	I S	330	335	345	350	325	310	325	330	335	315	295	
13	295	305	300	S	325	355	345	340	350	U S	345	315	325	320	R	330	335	335	345		A	A	300	305	315	295	315
14	310	310	320	310	335	300	325	S	335	330	325	340	330	320	R	340	330	345	340	355	335	350	315		A	A	300
15	305	335	355	315	295	310	360	335	350	325	325	335	335	H	350	345	345	350	355		A	A	300	315	S	315	315
16	325	315	305	325	350	315	340	335	340	J R	R	335	320	325	330	340	350	330	335		A	A	A		320	300	305
17	320	305	305	320	350	345	340	355	350	R	335	325	345	300	330	I S	R	360		A		355	335	315	330	320	315
18	325	S	320	325	340	350	325	350	350	335	325	315	320	J R	325	335	355	345	360	355	H	310	370	325	325	300	
19	315	315	315	325	335	365	365	355	335	S	340	335	315	320	J R	I C	R	350	325	325	340	335	305	315	320		
20	300	S	310	305	305	300	330	325	320	350	335	325	335	325	R	330	315	335	350	350	335	325	320	320	325	S	300
21	315	305	310	320	340	315	320	340	345	330	350	330	320	320	335	335	360	350	365	350	325	315	310	305			
22	310	320	315	315	345	390	325	350	340	335	325	325	320	325	320	340	355	360	360	365	320	315	315	305			
23	295	305	305	315	330	H	335	350	350	350	340	320	320	325	335	350	355	355	350	345	315	315	300	315			
24	310	340	300	345	285	285	315	325	350	335	335	345	315	320	325	J R	330	330	340	340	335	310	300	325	285		
25	315	A	S	305	290	310	300	310	325	320	320	325	345	335	325	340	340	345	330	340	360	375	320	305	290		
26	295	285	295		315	325	330	330	360	S	325	335	335	330	325	350	330	345	350	320	320	325	330	290	300		
27	300	315	305	335	325	305	320	345	335	330	325	325	335	325	325	345	330	355	355	300	300	295	290	325			
28	325	325	315	335	300	320	320	S	335	325	325	335	335	335	340	325	350	345		A	A	A	A	A	300	A	
29	320	325	335	340	325	315	340	355	355	345	340	325	355	350	350	H	345	350	365	335	350	355	335	335	295		
30	300	320	325	340	355	335	330	355	355	325	325	335	330	335	330	340	355	345	335	350	340	335	335	315			
31																											
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
CNT	29	28	30	29	30	29	30	30	30	30	30	30	30	30	30	30	30	27	25	27	27	27	27	29	29		
MED	305	310	310	320	325	330	332	342	345	330	332	325	325	325	328	340	345	350	345	335	320	315	305	300			
UQ	315	320	320	325	335	340	345	350	350	335	335	335	335	330	335	345	350	355	350	342	332	322	315	315			
LQ	295	305	305	310	315	315	325	335	335	325	325	320	320	320	320	330	345	350	335	318	310	305	300	295			

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M(3000)F2 (0.01)



# IONOSPHERIC DATA

NOV. 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 <th>Sweep</th> <td>1</td> <th>MHz to</th> <td>25</td> <th>MHz in</th> <td>24</td> <th>sec in</th> <td colspan="7">automatic operation</td>							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	L	L	L														
2								L	L	L	A		L	L	L														
3								L	L	L	L	A	L	L	L														
4								L		L	L	A		L	U L														
5								L	L	L	L	L	L	L	L	370													
6								L	L	L	L	A	A	A	L														
7							L	L	L	L	L	L	L	L	L														
8								L	L	L	L	395	L	L	L			A											
9								L	L	L	L	395	L		L														
10								L	L	L	L	L	L	L	L	L													
11								L	L	L	U L	390	L	U L	390	L	L												
12									L	L	A	A	A	L	A														
13									L	L	A	L	L	L	L														
14								L	L	A	L		L	L	L														
15									L		L	U L	390	L	A														
16									L	L	L	L	L	L	A	A													
17								L		L	L	395	L	L															
18										L	L	U L	390	L	L	L													
19									L	L	L	380	L	L	C	L													
20										L	L	U L	395	L	L														
21									L	L	L	L	L	L															
22										L	L	L	L	L	L	L													
23											L	L	L	L	L														
24								L	L	L	L	L	L	L	L														
25									L	L	L	L	L	L	A	L													
26									L	L	L	L	L	L	L	A													
27									L	L	L	L	L	L	A	A													
28									L	L	L	L	L	L	L														
29									L	L	L	L	L	L	L	L													
30										L	L	L	L	L	L														
31																													
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					
CNT											2	5	4	1		1													
MED											392	395	392	390		370													
UQ											395	395																	
LQ											390	U L	390																

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M(3000)F1 (0.01)

### IONOSPHERIC DATA

NOV. 1987

H<sup>o</sup>F<sub>2</sub> (KM)

135° E Mean Time (G.M.T. + 9 h)

Station		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									240	245	240	265	260	260	255	225								
2									245	245	240	245		275	255	245								
3									260	245	255	245	245	260	255	235								
4									230		270	250	A		260	255								
5									250	245	265	240	L	285	260	260	255							
6									225	260	265	265	A	260	275	265	245							
7								240	230	260	255	255	L	280	260	265	245							
8									240	260	235	255	235	265	255		235							
9									225	245	245	240	L	275		255								
10									240	270	250	260	245	260	260	240								
11									235	240	260	260	245	270	260	260								
12										235	255	255	A	260	260	240	230							
13										230	L	265	255	270	245	245	235							
14									255	250	235	255		235	255	235								
15									255	265	250	265	235	240										
16									245	245	265	260	255	235	A	E	A	230	245					
17									230		260	235	305	245	245									
18										250	255	260	260	260	235	220								
19									235	245	275	255	265	I	C	255	240							
20									260	240	240	245	260											
21									245	230	245	265	260	240										
22									235	265	255	270	255	260	235									
23									240	265	255	260	235											
24									225	230	235	225	255	245	235									
25									260	265	260	235	240	250	A	245	235							
26									220	255	245	235	250	245	235	250								
27									235	245	250	255	240	260	260	245								
28									255	260	235	245	245	240	255									
29									225	240	250	265	240	235	235	230								
30									260	250	245	235	235	235										
31																								
63	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	19	25	30	30	28	28	30	20	2							
MED								240	235	245	250	255	258	260	255	240	238							
UQ								248	260	260	260	265	260	260	260	248								
LQ								228	240	240	245	245	245	245	240	232								

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H<sup>o</sup>F<sub>2</sub> (KM)

# IONOSPHERIC DATA

NOV. 1987

H\*F (KM)

135 E Mean Time (G.M.T. + 9 h)

Station		ROKUBUNJI 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		300	A	305	E A	E A																									
2		305	270	A	265	270	265	255	235	225	245	220	A	E A	245	245	240	230	230	210	215	240	270	275	280	E A					
3		305	295	260	270	310	355	265	230	245	E A	A		A	240	230	240	230	225	235	235	255	265	280	295						
4		290	305	255	250	260	250	260	230	235	A	A	E A	A	245	230	235	220	210	220	275	255	290	290	275						
5		275	270	270	275	255	255	220	230	220	H	H	H	220	205	H	210	245	235	225	215	225	240	A	290	285	290				
6		290	290	300	305	280	250	220	225	215	H	A	A	A	A	A	E A	250	220	220	210	E A	A	A	300	275	265				
7		E A	A	A	325	295	220	E B	240	245	H																				
8		A	295	A	E A	280	255	255	235	220	225	225	230	205	225	E A	250	A	225	A	220	A	A	A	A	A	305				
9		285	325	285	265	260	265	225	225	205	H																				
10		340	325	260	260	255	240	235	230	205	235	235	245	230	E A	A	A	235	225	210	215	270	260	310	305	315					
11		280	255	265	240	250	235	215	225	210	H																				
12		300	290	290	265	260	E A	220	230	225	230	235	H	A	A	A	230	A	225	A	E A	260	270	230	260	240	290	315			
13		315	295	300	300	260	H	215	240	235	220	220	235	A	E A	255	A	A	A	225	A	A	E A	A	A	280	E A	285			
14		275	280	265	290	260	315	245	225	245	235	A	A																		
15		E A	A	A	330	240	280	315	285	210	235	225	205	H	205	210	220	230	A	225	220										
16		E A	290	280	E A	320	275	225	280	240	240	235	230	205	H	210	E A	255	225	235		A	A	A	A	A	265	305	305		
17		275	325	A	E A	325	275	245	225	220	215	215	240	H	215	205	210	205	H	210	230	215	A	230	240	270	240	270	285		
18		275	280	270	260	235	225	220	215	210	H																				
19		295	265	280	260	255	215	210	210	230	215	220	225	230	230	C	A	250	225	235	240	225	235	285	280	275	310				
20		310	295	280	290	295	275	250	235	230	225	210	H	225	210	210	225	235	215	210	225	240	255	265	275	E A	330				
21		265	280	290	265	240	275	265	220	225	240	220	205	H	210	240	230	235	215	215	215	230	270	270	285	E B	315				
22		285	265	270	275	235	195	255	220	225	210	205	H	230	210	H	230	220	240	215	215	220	220	280	280	280	300				
23		300	300	E A	315	270	255	215	235	225	225	230	A	225	215	225	H	230	215	210	230	235	275	265	305	265					
24		275	235	305	240	365	E B	370	305	250	225	215	H	225	220	200	H	215	225	225	225	210	220	245	265	295	255	320			
25		275	A	A	330	280	310	290	230	215	H	220	220	220	205	A	275	220	220	240	230	E B	265	270	E B	E B	340				
26		325	340	310	A	E A	A	315	290	265	245	235	225	220	225	205	220	230	A	A	E A	E A	E A	E A	255	260	310	A			
27		300	295	290	250	E A	280	310	270	240	225	210	H	210	210	225	H	210	A	A	235	225	225	E A	E A	E A	E A	320	E A	365	255
28		255	260	275	255	310	280	280	255	235	240	215	215	205	215	220	225	230	A	A	A	A	A	A	A	A	310	A			
29		E A	A	A	310	290	250	245	280	305	240	215	220	220	225	H	H	195	215	210	230	230	220	210	245	220	230	275	285	325	
30		305	275	260	255	225	260	250	225	225	195	H	245	225	210	225	230	225	210	210	230	235	290	255	255	295					
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	27	29	29	30	30	30	30	30	30	27	24	26	26	21	25	28	26	25	26	25	27	28	28						
MED		290	290	278	268	258	258	240	228	225	224	218	212	214	220	230	230	220	212	225	238	260	270	285	294						
UQ		302	298	298	280	280	282	260	235	230	235	226	225	228	232	230	235	228	220	232	260	272	288	300	310						
LQ		275	272	265	260	250	240	220	220	220	H	215	210	205	210	210	225	230	220	210	220	235	252	265	280	285					

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H\*F (KM)

### IONOSPHERIC DATA

NOV. 1937

H<sup>o</sup>E (KM)

135° E Mean Time (G.M.T. + 7 h)

Station	ROKUBUNJI TOKYO				Lat.	35 42' 4" N							Long.	139 29' 3" E							Sweep	1 MHz to 25 MHz in 24 sec in automatic operation				
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							B	125	115	115	115	115	125	120	120	A	B									
2							B	125	120	120	225	115	115	115	120	A	125									
3							B	120	115	115	115	A	A	A	E A	A	A									
4							B	120	115	115	110	110	A	A	A		120	120								
5							B	130	E A	E A	E A	E A	125	120	B	120	125									
6							B	120	A	125	115	115	115	A	A	A	A									
7							B	A	A	A	115	115	115	115	120	120	E A	135								
8							B	125	115	120	115	125	A	110	115	115	A	110								
9							B	E A	A	A	A	E A	E A	E A	A	A	A									
10							B	145			115	115	130	130	130	125	A									
11							B	125	120	E A	125	115	E A	125	120	120	115	120								
12							B	130	120	120	115	120	120	120	115	120	A	A								
13							B	E A	E A																	
14							B	125	135	120	120	120	120	115	120	120	A									
15							B	155	115	115	110	120	120	120	120	120	130									
16							B	125	120	A	120	A	A	A	A	120	130									
17							B	A	A	115	115	120	A	A	A	120	A									
18							B	125	E A	130	S	115	115	115	125	120	A									
19							B	130	E A	E A	A	125	115	115	120	A	A	E B	140							
20							B	140	E A	130	125	120	120	A	E A	C	A	A								
21							B	E B	E A	145	140	125	120	A	E A	150	125	120	E A	130	A					
22								130	115	A	110	A	120	115	120	120	125									
23								E B	150	120	110	E A	130	120	120	E A	140	125	135							
24								B	130	A	A	A	A	E A	A	A	A									
25								E A	160	A	115	120	115	120	120	120	125	125								
26								120	E A	135	115	120	125	A	E A	A	A	A	E A	150						
27								130	115	120	115	A	120	A	A	A	A	A								
28								135	125	125	115	115	A	A	A	A	A									
29								A	E A	E A	140	130	120	115	E A	125	120	120	A	A						
30								130	120	125	A	A	A	E A	A	A	A	E A	145							
31								E A	E A	165	155	A	A	A	A	135	110	115	A	B						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT									26	25	24	26	22	23	22	19	16	13								
MED									128	118	113	115	116	120	119	120	120	128								
UQ									135	E A	130	122	120	120	122	120	120	124	E E							
LQ									125	115	115	115	115	118	115	120	120	125								

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H<sup>o</sup>E (KM)

# IONOSPHERIC DATA

NOV. 1987

H<sup>o</sup>ES (KM)

135° E Mean Time (G.M.T. + 9 h)

Station		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	110	110	105	105	105	105	105	G	140	125	120	120	120	125	115	115	115	115	B	B	B	B	B	120		
2	B	110	105	B	B	B	B	G	E G 150	125	115	110	110	110	110	120	G	B	115	115	115	115	110	110		
3	110	105	100	100	B	105	115	110	130	125	115	115	105	105	105	105	115	115	115	110	110	110	115	110		
4	105	110	105	105	105	110	105	135	120	120	115	110	105	105	120	120	G	B	B	B	B	110	115	B		
5	B	B	110	120	B	110	B	G	105	150	140	150	135	135	140	125	G	105	120	115	110	115	110	105		
6	105	105	100	105	105	110	120	140	120	135	120	110	115	110	110	115	120	120	120	115	110	110	B	110		
7	110	105	105	110	B	B	B	120	120	115	G	G	G	G	G	G	120	100	105	B	120	B	B	120		
8	105	105	105	105	105	B	B	G	130	125	120	115	120	115	140	115	110	105	105	110	110	110	115	110		
9	110	105	110	B	110	110	B	120	115	170	110	155	180	160	155	135	105	110	110	B	140	130	120	B		
10	110	B	110	110	110	115	110	G	145	170	145	155	145	150	125	125	120	110	115	110	110	105	105	105		
11	110	105	105	B	B	B	B	G	G	E G 200	150	E G 175	140	140	130	130	125	115	115	110	110	110	115	105		
12	105	110	105	105	110	105	110	155	140	125	125	115	120	115	120	115	110	105	110	110	110	110	B	105		
13	105	105	B	B	B	B	B	G	115	E G 155	125	115	120	115	115	115	115	110	110	115	110	110	105	B		
14	110	B	B	B	B	B	B	150	120	155	135	120	125	E G 190	G	E G 190	155	G	B	B	115	110	110	105	110	105
15	105	120	105	120	120	120	115	G	120	115	115	115	110	110	115	115	G	125	115	115	110	115	110	105		
16	110	110	110	105	105	105	110	125	120	120	115	125	110	115	120	110	110	115	110	105	105	B	110	105		
17	105	105	110	110	105	105	105	G	115	E G 165	115	E G 160	G	E G 165	E G 145	125	115	110	110	110	115	B	B	B		
18	B	105	110	105	110	110	B	G	120	E G 190	115	G	G	130	110	115	G	115	B	115	110	105	110	110		
19	105	105	105	105	105	110	B	G	110	110	140	140	110	E G 150	C	100	100	100	100	105	B	B	B	B		
20	155	B	110	B	110	B	B	G	120	G	120	115	110	110	105	105	115	105	B	B	B	B	110	110		
21	B	B	B	115	115	B	B	G	130	125	115	115	G	G	105	G	G	105	105	B	B	B	105	B		
22	B	B	B	B	110	B	B	G	G	120	135	E G 185	E G 180	G	125	G	G	B	B	B	B	B	B	115		
23	115	105	110	105	B	B	110	B	G	125	120	115	110	115	120	120	115	120	120	110	110	110	110	125		
24	110	110	110	110	110	B	115	120	115	115	E G 195	E G 170	G	130	120	125	135	B	B	B	B	115	105	115		
25	110	115	120	115	115	115	120	120	115	G	G	115	115	120	110	115	115	120	115	115	115	110	115	105		
26	105	110	B	110	110	105	125	120	120	115	115	110	115	110	110	105	110	105	110	115	115	B	110	105		
27	105	105	105	115	105	110	110	170	115	125	125	115	115	120	115	110	110	110	110	110	105	110	105	105		
28	105	105	110	B	B	115	105	110	115	115	120	120	125	115	120	100	115	110	110	105	110	105	110	105		
29	110	110	B	110	110	110	110	G	140	110	115	115	115	110	110	115	105	B	110	120	B	B	120	120		
30	120	B	115	110	B	B	B	110	115	115	165	110	115	G	G	110	G	110	110	100	105	B	B	B		
31																										
CNT	25	23	24	22	19	18	17	14	27	28	28	28	25	25	27	27	21	25	24	22	23	20	22	23		
MED	110	105	108	110	110	110	110	120	120	122	120	115	115	115	113	115	115	110	110	110	110	110	110	110		
UQ	110	110	110	110	110	110	115	135	130	U 134	128	U 132	122	123	122	122	115	115	115	115	115	115	115	112		
LQ	105	105	105	105	105	105	110	120	115	115	115	115	110	110	110	110	110	105	110	110	110	110	105	105		

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H<sup>o</sup>ES (KM)

# IONOSPHERIC DATA

NOV. 1987

TYPES OF ES

135° E Mean Time (G.M.T. + 9 h)

Station	Lat. 35° 42' 4" N							Long. 139° 29' 3" E				Sweep	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	F2	F5	F2	F4	F2	F2	L2		H1	H2	C2	C2	C2	C2	C2	L2	L3	FF11						F1
2		F3	F5						H1	C2	C3	C2	C3	C3	C2	L2			F1	F2	F2	F2	F2	F3
3	F2	F2	F2	F2		F2	L1	LH12	H3	C2	C2	L2	L4	L3	L1	LC31	CL21	F2	F3	F3	F5	F2	F2	F2
4	F4	F5	F4	F3	F2	F2	LH11	H3	C3	C2	C3	C2	L3	L3	L2	C2		F1		F2		F3	F1	
5			F1	F2		F1			L1	HL11	HL11	HL12	HL11	HL11	H1	C2		FF11	F1	F3	F4	F2	F2	F2
6	F2	F2	F2	F2	F2	F2	L1	H1	L2	CL21	C2	C2	C3	L3	L2	L2	L1	F1	F1	F3	F4	F2		F2
7	F3	F2	F3	F3				L1	L3	L2							L1	F1	F1		F1			F2
8	F5	F4	F4	F2	F1				H1	C1	C2	L1	C2	C3	H3	L3	C4	F4	FF42	F4	F4	FF35	F4	F2
9	F2	F3	F1		F1	F1		L1	L2	HL11	L1	HL11	HL11	HL11	HL22	HL22	L2	F1	F1		F1	F2	F1	
10	F2		F2	F3	F2	F2	L2		H1	HL12	HL22	HL11	HL11	HL21	C3	C3	L2	F1	F1	F3	F2	F5	F4	F3
11	F2	F2	F1						H1	H1	H1	H1	H2	H1	C2	C3	L1	F2	F2	F3	F5	F1	F2	F2
12	F1	F2	F2	F3	F2	F4	L1	CL21	HL21	C2	C2	CL21	CL21	C2	C1	C3	L5	F4	F5	F4	F1	F1		F2
13	F3	F2							L2	H1	C2	C2	C2	C3	C2	C3	L3	F5	F4	FF24	F4	F2	F3	
14	F2					HL11	L1		H1	H2	H2	H3	H2		H1	H2			F1	F3	F2	F4	F4	F4
15	F4	FF2	F3	F2	F2	F2	L1		C3	L2	C3	L1	L3	L2	L2	L1		F3	F4	F5	F2	F1	F2	F4
16	F4	F3	F3	F5	F2	F2	LH11	L1	L2	C2	C2	C2	L2	L1	L2	C4	C3	FF22	F2	F4	F4		F2	F2
17	F3	F3	F4	F2	F2	F2	L1		L2	H1	L1	H1		HL11	H1	C2	C2	F4	F3	F2	F2			
18		F2	F1	F2	F1	F1			L1	HL11	LH11			L1	L1	L3		F1		F1	F1	F1	F3	F2
19	F2	F2	F2	F2	F2	F1			L1	L1	H1	H1	L2	HL11		L2	L3	F4	F1		F1		F2	
20	F1		F1		F1				L1		CH11	L2	L1	L1	L1	L3	L2	F1					F2	F3
21			F1	F1					L1	CL11	C2	L1			L1				F1				F1	
22				F1					C1	CL11	H1	H1			L1									F2
23	F2	F2	F3	F2		F1			L1	L1	L1	L2	L1	L2	L1	L2	L2	F1	F1	F2	F2	F3	F3	F1
24	F2	F3	F2	F2	F1	F1	L1		L2	C1	H1	H1		H1	C1	C2	C2					F2	F2	F2
25	F1	F5	F2	F2	F3	F2	F1	L1	L1			L2	L1	L2	L3	L3	L1	F3	F2	F3	F2	F2	F2	F3
26	F3	F1		F2	F4	F2	F2	C2	C2	C2	C3	C1	C2	L2	L2	L4	L2	F4	F4	F4	F3		F3	F4
27	F2	F2	F2	F1	F3	F2	F1	H1	L1	CL21	C1	C2	L2	L2	L4	L3	L3	F4	F1	F3	F4	F4	F4	F4
28	F2	F2	F2		F2	F3	L4		L2	L2	CL21	CL22	CL21	CL22	CL11	L3	LL21	F4	F4	F4	F4	F4	F2	F5
29	F4	F4		F1	F1	F2			H1	L2	L2	L2	L3	L2	L1	L1	L1		F1	F1		F2		F1
30	F1		F1	F1					LC11	L2	L2	HL12	L2	L1		L1		F1	F1	F2	F1			
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																								

NOV. 1987

TYPES OF ES

IONOSPHERIC DATA

NOV. 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 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	X	X	X	X	X	X												X	X	X	X	X	X								
2	X	X	X	X	X	X	X												X	X	X	X	X	X								
3	X	X	X	X	X	X	X												X	X	X	X	X	X								
4	A	0	X	X	X	X	X												X	X	X	X	X	X								
5	X	X	X	X	X	X	X												X	X	X	X	X	X								
6	X	X	X	X	X	X	X												X	X	X	X	X	X								
7	X	X	X	X	X	X	X												X	X	X	X	X	X								
8	0	X	0	X	X	X	X												X	X	X	A	A	X								
9	X	X	X	X	X	X	X												X	X	X	X	X	X								
10	X	X	X	X	X	X	X												X	X	X	X	X	X								
11	X	X	X	X	X	X	X												X	X	X	X	X	X								
12	X	X	X	X	X	X	X												X	X	X	X	X	X								
13	X	X	X	X	X	X	X												X	X	X	X	X	X								
14	X	X	X	X	X	X	X												X	X	X	X	X	X								
15	X	X	X	X	X	X	X												X	X	X	X	X	X								
16	X	X	X	X	X	X	X												X	X	X	X	X	X								
17	X	X	X	X	X	X	X												A	X	X	X	X	X								
18	X	X	X	X	X	X	X												X	X	X	X	X	X								
19	X	X	X	X	X	X	X												X	X	X	X	X	X								
20	X	X	X	X	X	X	X												X	X	X	X	X	X								
21	X	X	X	X	X	X	X												X	X	X	X	X	X								
22	X	U	X	X	X	X	X												X	X	X	X	X	X								
23	X	X	X	X	X	X	X												U	X	X	X	X	X								
24	X	X	X	X	X	X	X												X	X	X	0	X	X								
25	X	X	X	X	X	X	X												X	X	X	X	X	X								
26	X	X	X	X	X	X	X												X	X	X	X	X	X								
27	X	U	X	0	X	X	X												X	X	X	X	X	X								
28	X	X	X	X	X	X	X												0	X	X	X	X	X								
29	X	X	X	X	X	X	X												X	X	X	0	X	X								
30	X	X	X	X	X	X	X												X	X	X	X	X	X								
31	X	X	X	X	X	X	X												X	X	X	X	X	X								
CNT	29	30	30	30	30	30	30											1	29	29	30	29	29	30								
MED	X	X	X	X	X	X	X												X	X	X	X	X	X								
UQ	X	X	X	X	X	X	X												X	X	X	X	X	X								
LQ	X	X	X	X	X	X	X												X	X	X	X	X	X								

NOV. 1987

FXI (0.1 MHz)

# IONOSPHERIC DATA

NOV. 1987      FOF2 (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	00	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	33	34	32	31	58	72	73	78	89	93	93	98	99	93	89	81	67	53	43	36	36			
2		40	40	32	32	34	32	32	60	87	73	93	105	99	109	113	119	106	91	67	50	42	41	39	39			
3		39	39	37	36	36	31	33	71	71	105	100	108	97	101	105	109	101	86	78	65	60	35	34	34			
4		38	38	38	34	F	F	F	74	71	77	102	125	102	83	97	107	111	70	44	45	47	48	44	42			
5		42	41	39	38	39	24	28	61	76	80	87	91	80	86	97	108	93	69	55	48	42	44	40	38			
6		38	35	35	34	S			39	28	53	67	81	96	115	93	93	103	127	93	66	53	44	39	41	42	34	
7		32	33	33	36	41	23	30	60	71	82	85	99	92	94	117	124	108	70	51	40	43	33	33	38			
8		37	34	35	36	41	35	30	56	73	85	102	111	H	H	94	108	111	H	75	60	43	J S	A	A	S		
9		36	35	34	35	38	34	33	57	68	77	87	90	71	83	96	101	83	76	57	35	41	39	33	32			
10		32	33	35	37	42	31	26	53	70	87	97	99	87	83	91	93	86	76	55	37	36	35	38	35			
11		38	37	37	39	47	32	28	50	67	76	85	95	84	93	106	116	106	A	55	39	43	36	36	35			
12		37	37	38	35	41	32	30	58	66	77	82	102	94	97	107	87	94	73	61	54	45	42	35	29			
13		30	31	32	35	42	28	24	50	75	68	78	94	96	116	125	119	101	74	49	47	50	47	37	37			
14		31	35	37		F	H		26	54	81	83	102	92	82	91	114	92	76	71	45	41	38	33	33			
15		32	37	26	29	28	27	24	48	68	83	107	111	91	83	94	78	65	62	52	37	33	38	36	38			
16		38	39	37	38	40	28	30	51	74	77	85	83	99	118	122	99	70	72	66	45	34	35	29	31			
17		30	32	30	32	35	26	22	48	67	75	100	80	75	89	85	80	73	61		41	36	40	35	30			
18		32	33	33	31	34	26	26	47	65	78	76	80	78	82	94	86	S	69	69	H	34	45	46	28	29		
19		29	30	32	32	34	32	25	47	68	73	69	84	76	90	104	93	76	I C	72	50	49	56	39	S	S		
20		31	32	33	33	35	34	26	49	82	82	94	118	104	94	115	133	127	H	H	79	59	52	49	44	39	31	
21		31	31	33	34	35	27	30	47	86	109	91	89	97	107	102	100	85	64	42	32	34	35	35	35			
22		34	35	36	36	40	35	24	49	70	75	79	93	112	112	115	104	H	85	67	47	36	36	31	S	30		
23		31	34	33	35	39	30	30	52	69	78	84	104	113	125	128	114	103	73	U H	55	65	H J S	65	J S	50		
24		44	49	34	35	H			25	22	60	91	83	81	87	109	111	103	91	84	79	54	44	39	S	44	29	
25		32	31	33	30	34	33	28	51	83	114	131	111	91	92	88	78	78	69	60	47	37	37	26	26			
26		27	27	29	31	28	21	22	47	86	87	101	104	R	J R	97	97	113	91	30	H	77	51	42	52	44	39	39
27		36	32	35	36	33	33	31	50	86	113	103	112	R	U R	98	98	99	105	79	83	71	41	51	J S	41	S	
28		35	32	27	29	29	30	28	48	76	93	111	105	R J R	J R	U H	98	103	99	J R	71	71	53	A	S	44	35	31
29		35	35	34	30	24	25	27	45	66	71	77	80	U H		85	70	79	70	76	62	44	55	37	U S	29	28	
30		30	30	30	31	32	30	29	43	65	87	94	93	81	81	85	83	82	60	45	44	47	40	37	32			
31		31	32	32	32	34	27	26	48	68	77	82	89	84	86	96	91	76	69	50	40	37	35	33	31			
CNT		29	30	30	29	29	29	29	30	30	30	30	30	30	30	30	30	30	29	29	29	30	29	29	30			
MED		32	34	34	34	35	30	28	51	71	80	92	97	94	94	104	100	85	72	55	44	42	40	36	34			
UQ		37	37	36	36	40	32	30	58	81	87	101	108	99	103	113	111	101	77	60	49	49	44	39	38			
LQ		31	32	32	32	34	27	26	48	68	77	82	89	84	86	96	91	76	69	50	40	37	35	33	31			



# IONOSPHERIC DATA

NOV. 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				
	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	440	460	L	450	L	L	L	L						
2										L		450	L	460	L	L	A	L							
3										L		450	L	460	L	L	L	L							
4											L	470	490	520	460	430	L								
5										L	L	500	460	450	L	L	L								
6									L	L	L	490	470	460	L	L	L								
7									L	L	L	480	420	L	L	L									
8									L	L	L	470	L	480	L	L									
9									L	L	L	L	L	L	L	L									
10									L	L	L	L	450	L	L	430	L								
11									L	L	L	L	450	450	L	L				A					
12									L	L	L	450	L	L	L	A	L								
13											L	460	L	L	L	L	L								
14									L	L	L	440	L	L	L	L	L								
15									L	L	L	460	L	L	L	L	L								
16									L	L	L	450	430	450	L	L	A								
17									L	L	L	L	L	430	430	A	L								
18									L	L	L	470	480	470	L	L									
19										L	L	480	L	L	L	L	A								
20									L	L	L	L	L	L	L	L	A								
21									L	L	L	L	510	L	L	L									
22									L	L	L	350	L	L	L	L									
23										L	L	L	L	410	440	420	L								
24									L	L	L	450	L	L	L	L									
25									L	L	L	470	L	460	L	L									
26									L	L	L	360	450	A	L	L	450	L							
27									L	L	L	470	L	460	460	L									
28										L	A	L	450	L	L	L									
29										L	L	460	L	L	420	L	L								
30									L	L	L	L	L	L	L	L									
31																									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT											2	5	14	14	11	9	3								
MED											380	450	465	460	450	455	430								
UQ											450	480	470	460	465	430									
LQ											460	460	450	450	435	425									

NOV. 1987

FOF1 (0.01 MHz)

### IONOSPHERIC DATA

NOV. 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								195	250	285	305	A	A	A	A	A	A	A						
2								195	240	295	305	I S	A	A	A	A	A	A						
3								190	245	290	305	H R	330	325	A	A	A	A						
4								195	245	275	A	A	A	330	315	U A	300	250	180					
5								205	250	300	310	320	A	A	3	300	U A	250	A					
6								195	240	290	315	315	330	A	A	A	A	A						
7								S	250	280	310	R	R	325	320	310	295	250	S					
8								170	260	300	320	330	335	A	U A	A	A	A	S					
9								S	255	280	315	325	330	325	310	290	245	A						
10								S	245	275	310	325	330	315	305	285	A	S						
11								200	250	275	305	A	330	325	300	A	A	S						
12								S	245	A	A	A	A	A	A	A	A	A						
13								S	245	280	305	315	325	320	A	A	230	180						
14								S	220	260	295	320	330	325	310	275	A	S						
15								S	A	A	A	A	A	A	A	A	240	180						
16								S	225	270	300	A	A	A	A	A	A	A	S					
17								S	240	280	300	305	310	300	300	290	230	S						
18								S	235	290	305	310	310	A	A	A	225	S						
19								S	A	290	305	320	A	310	A	A	A	C						
20								S	220	270	305	A	A	A	A	220	240	S						
21								S	245	300	305	305	A	A	A	A	A	S						
22								S	245	270	A	A	H	340	320	305	290	A	S					
23								S	240	A	A	A	A	A	A	220	A	S						
24								S	A	270	305	H	A	U A	305	U A	A	S						
25								S	220	260	295	310	320	A	A	A	A	S						
26								S	A	A	A	A	A	A	A	A	230	S						
27								S	A	U A	U A	A	A	A	A	A	A	S						
28								S	U A	U A	A	A	A	A	A	A	A	S						
29								S	H	H	H	A	A	A	A	A	A	S						
30								S	A	A	A	A	A	A	A	A	A	S						
31																								
CNT								8	24	25	23	16	15	14	10	11	10	3						
MED								195	245	280	305	318	330	320	308	290	240	180						
UQ								198	248	290	308	322	330	325	310	292	250	180						
LQ								192	230	270	300	312	322	315	305	288	230	180						

NOV. 1987

FOE (0.01 MHz)

IONOSPHERIC DATA

NOV. 1987

FOES (0.1 MHz)

135 E Mean Time (G.M.T. + 9 h)

Hour Day	Station YAMAGAWA				Lat. 31 12' 1" N				Long. 130 37' 1" E				Sweep 1		MHz to 25		MHz in 24		sec in		automatic operation				
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	J A	J A	E S	E S	E S	J A	J A	J A	G	G			J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A		
2	J A	E S	E S	E S	E S	E S	E S	G	28	34	37	42	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	E S		
3	E S	16	18	22	20	E S	E S	E S	G	28	39	34	35	36	36	J A	J A	J A	J A	J A	J A	J A	J A		
4	J A	J A	J A	J A	J A	J A	J A				J A	J A	J A	G				G	J A	J A	J A	J A	J A		
5	J A	20	21	E S	E S	E S	E S	G	G	31	34	39	37	39	E 40	G		29	24	24	20	E S	J A	E S	
6	E S	J A	J A	J A		J A	J A	J A		26	34	38	35	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A		
7	E S	E S	E S	E S	E S	E S	E S	E S	G	23	22	35	34	23	G	37	36	34	19	E S	E S	E S	J A	J A	
8	J A	J A	J A	J A		J A	J A	G	29	33	36	44	J A	J A		33	42	31	17	E S	E S		J A	J A	
9	J A	J A	E S	E S	E S	E S	E S	E S	G	J A	G							J A	J A	J A	J A	E S	J A	E S	
10	E S	E S	E S	E S	E S	E S	E S	E S	G	33	34	41	45	G	J A	J A		J A	J A	J A	J A	J A	J A	J A	
11	J A	E S	E S	E S	E S	E S	E S	E S	G	G				G	G	J A	J A	J A	J A	J A	J A	J A	J A	E S	
12	E S	E S	E S	E S	E S	E S	E S	E S			J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	E S	
13	E S	E S	E S	E S	E S	E S	E S	E S	G	G				J A				G	G	E S	E S	E S	E S	J A	
14	J A	J A	J A	E S	E S	E S	E S	E S			J A	G	G	G				J A	E S	J A	J A	J A	J A	J A	
15	J A	J A	J A	E S	J A	J A	J A	E S	J A		J A	J A	J A	J A	J A	J A	G		G	J A	J A	J A	J A	J A	
16	J A	J A	22	E S	E S	E S	E S	E S		34	33	36	39	J A	J A	J A	J A	J A	J A	J A	E S	E S	E S	J A	
17	J A	E S	E S	E S	E S	J A	E S	18	27	30	G	21	21	33	34	39	25	23	J A	51	49	25	J A	J A	
18	E S	E S	E S	E S	E S	E S	E S	E S			G	G	G	G	J A							J A		J A	E S
19	J A		E S	E S	E S	E S	E S	E S		30	30	35	40	35	36	41	37	39		C	E S	E S	E S	J A	
20	E S	E S	E S	E S	E S	E S	J A	E S	G	33	42	40	37	J A	J A	G		25	39	J A	J A	J A	J A	J A	
21	E S	J A	E S	E S	E S	E S	E S	E S		29	33	35	36	34	36	34	30	25	E S	E S	E S	E S	E S	E S	
22	E S	E S	E S	E S	E S	J A	E S	E S	G		J A	39	35	G		35	G	31	25	E S	16	16	16	16	
23	E S	E S	E S	E S	E S	E S	E S	E S	G	J A				J A	J A	J A	G		E S	J A	J A	E S	E S	E S	
24	E S		J A	E S	J A	J A	J A	J A	J A								J A	J A	J A	J A	J A		J A	J A	
25		J A	J A	J A	J A	J A	E S	18	G	G				J A	J A	J A	J A		E S		22	22	18	J A	J A
26		E S	J A	J A	J A	J A	E S	E S		24	23	31	J A	J A	J A	J A	J A	G			E S		J A	E S	
27	E S	E S	E S	J A	J A	J A	J A	J A			J A			J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	E S	
28	E S	E S	E S	E S	J A	E S	E S	J A		29	34	71	78	62	38	38	29	28	J A	26	65	52	51	17	25
29	J A	J A	J A	J A	E S	E S	E S	E S		29	31	34	39	39	35	36	34	29	30	24	25	13	51	22	
30	J A	E S	J A	E S	E S	E S	E S	E S	J A	J A	J A				G	J A	J A	J A	J A	J A	J A	J A	J A	E S	
31										27	31	33	36	39		33	47	33	51	40	23	16	16	16	
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30	30	30	30	30	
MED	17	16	16	16	16	16	16	16	26	31	35	37	38	36	38	36	30	21	24	21	22	18	18	16	
UQ	J A	J A	J A	J A	J A	J A	J A	J A	29	33	37	41	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
LQ	E S	E S	E S	E S	E S	E S	E S	E S	G	28	33	35	35	33	34	30	25	17	17	E S	E S	J A	E S	E S	

NOV. 1937

FOES (0.1 MHz)

IONOSPHERIC DATA

NOV. 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 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 16	S 16	E 16	S 16	E 16	S 16	E 16	S 16	G	G	G	35	40	39	35	34	32	25	18	37	20	43	32	20	24
2	18	E 16	S 16	E 16	S 15	E 15	S 16	E 16	G	28	33	37	39	42	43	43	45	26	23	20	24	19	18	16	16
3	E 16	S 16	E 16	S 16	E 16	S 16	E 16	G	28	37	33	35	36	35	33	31	30	20	28	26	34	29	16	16	16
4	A 84	A 32	22	E 16	19	E 16	S 16	G	26	30	35	33	33	19	G	33	28	18	31	30	20	24	21	16	16
5	E 16	S 16	E 16	S 16	E 16	S 16	E 16	G	G	G	33	34	34	33	E 40	G	25	18	23	19	E 16	E 16	E 16	E 16	E 16
6	E 16	S 16	E 16	S 21	E 22	S 21	E 16	S 16	26	31	32	34	34	35	41	32	26	21	26	E 16	E 16	18	19	E 16	E 16
7	E 16	S 16	E 16	S 16	E 16	S 16	E 16	G	G	23	22	35	34	23	37	35	33	19	16	16	16	19	16	16	16
8	26	E 16	30	18	17	E 16	S 16	G	29	33	35	35	37	38	37	35	29	G	E 16	E 16	E 16	A 56	A 52	A 16	E 16
9	E 16	S 16	E 16	S 16	E 16	S 16	E 16	G	G	G	33	33	40	45	G	45	43	29	29	24	20	21	E 16	E 16	30
10	E 16	S 16	E 16	S 16	E 16	S 16	E 16	G	21	G	G	35	33	G	G	41	42	47	77	16	19	30	E 16	E 16	E 16
11	E 16	S 16	E 16	S 16	E 16	S 16	E 16	G	28	31	33	34	34	35	32	50	28	20	23	23	16	16	16	16	16
12	E 16	S 16	E 16	S 16	E 16	S 16	E 16	G	G	36	46	40	40	33	30	G	G	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16
13	E 16	S 16	E 16	S 16	E 16	S 16	E 16	G	26	34	34	44	G	G	G	30	24	16	16	25	20	30	20	16	16
14	E 16	S 16	E 16	S 18	E 16	S 16	E 16	G	26	30	32	33	35	37	33	30	G	17	26	29	17	E 16	24	E 16	E 16
15	E 16	31	18	E 16	S 16	E 16	S 16	E 16	26	30	32	33	35	37	33	30	G	17	26	29	17	E 16	24	E 16	E 16
16	19	17	E 16	S 16	E 16	S 16	E 16	S 16	34	31	34	38	39	32	36	29	32	30	E 16	E 16	E 16	E 16	E 16	17	19
17	22	E 16	S 16	E 16	S 16	E 16	S 16	E 16	26	30	G	21	21	32	33	39	25	23	51	22	16	19	16	16	16
18	E 16	S 16	E 16	S 16	E 16	S 16	E 16	G	29	23	29	26	30	31	40	29	25	19	22	19	19	16	19	16	16
19	E 16	18	E 16	S 16	E 16	S 16	E 16	G	28	30	34	38	35	34	33	29	38	16	16	16	16	16	16	21	16
20	E 16	S 16	E 16	S 16	E 16	S 16	E 16	G	32	40	39	35	30	32	G	26	G	22	39	44	35	21	E 16	E 16	E 16
21	E 16	S 16	E 16	S 16	E 16	S 16	E 16	G	31	34	35	34	36	33	30	20	16	16	16	16	16	16	16	16	16
22	E 16	S 16	E 16	S 16	E 16	S 16	E 16	G	30	32	33	G	34	G	30	25	16	16	16	16	16	16	16	16	16
23	E 16	S 16	E 16	S 16	E 16	S 16	E 16	G	28	32	32	33	35	32	G	24	E 16	16	17	E 16	16	16	16	16	16
24	E 16	S 16	E 16	S 16	E 16	S 16	E 16	G	22	25	G	G	G	38	33	32	25	16	16	16	16	16	16	16	16
25	E 16	S 16	E 16	S 16	E 16	S 16	E 16	G	G	G	G	33	43	34	31	28	23	16	16	16	16	16	16	16	16
26	18	E 16	S 16	E 16	S 16	E 16	S 16	E 16	23	23	31	47	46	36	31	29	G	22	21	17	E 16	E 16	E 16	E 16	E 16
27	E 16	S 16	E 16	S 17	E 16	S 16	E 16	G	23	30	32	32	33	33	31	G	24	16	20	16	16	16	16	16	16
28	E 16	S 16	E 16	S 16	E 16	S 16	E 16	G	23	22	34	55	35	34	38	29	26	26	41	52	A 29	E 16	22	E 16	E 16
29	E 16	20	E 16	S 16	E 16	S 16	E 16	E 16	28	31	33	38	37	35	32	31	26	27	21	24	E 16	21	E 16	E 16	E 16
30	E 16	S 16	E 16	S 16	E 16	S 16	E 16	G	25	30	31	34	33	G	30	32	26	47	30	20	E 16	16	16	16	16
31																									
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30	30	30	30	30	30	30
MED	E 16	S 16	E 16	S 16	E 16	S 16	E 16	S 16	24	30	33	35	34	34	33	30	26	19	20	16	E 16	E 16	E 16	E 16	E 16
UQ	E 16	S 16	E 16	S 16	E 16	S 16	E 16	G	23	31	34	39	37	35	37	35	28	23	26	22	24	19	19	16	16
LQ	E 16	S 16	E 16	S 16	E 16	S 16	E 16	G	G	G	31	33	33	30	32	29	24	16	E 16	E 16	E 16	E 16	E 16	E 16	E 16

The Radio Research Laboratory, Japan

NOV. 1987

FBES (0.1 MHz)

# IONOSPHERIC DATA

NOV. 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	00	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	E S	E S	E S	E S	E S	E S	E S	16	16	15	15	16	17	17	17	16	16	16	E S	E S	E S	E S	E S	E S
2	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	31	16	17	17	18	16	14	16	E S	E S	E S	E S	E S	E S
3	E S	E S	E S	E S	E S	E S	E S	E S	16	16	17	17	16	18	17	16	17	16	15	E S	E S	E S	E S	E S	E S
4	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	16	16	16	16	17	16	15	16	E S	E S	E S	E S	E S	E S
5	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	16	16	16	16	17	16	16	16	E S	E S	E S	E S	E S	E S
6	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	16	16	17	16	14	16	16	16	E S	E S	E S	E S	E S	E S
7	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	16	16	17	16	14	16	13	16	E S	E S	E S	E S	E S	E S
8	E S	E S	E S	E S	E S	E S	E S	E S	16	16	17	17	17	17	20	16	15	15	16	E S	E S	E S	E S	E S	E S
9	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	16	16	17	16	15	16	15	16	E S	E S	E S	E S	E S	E S
10	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	16	16	15	16	15	16	16	16	E S	E S	E S	E S	E S	E S
11	E S	E S	E S	E S	E S	E S	E S	E S	16	15	16	16	18	17	17	16	16	16	16	E S	E S	E S	E S	E S	E S
12	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	16	16	17	16	17	16	16	16	E S	E S	E S	E S	E S	E S
13	E S	E S	E S	E S	E S	E S	E S	E S	16	16	17	18	18	18	15	16	16	16	16	E S	E S	E S	E S	E S	E S
14	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	17	16	17	16	16	16	16	16	E S	E S	E S	E S	E S	E S
15	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	16	16	16	18	17	16	16	15	E S	E S	E S	E S	E S	E S
16	E S	E S	E S	E S	E S	E S	E S	E S	16	15	16	17	16	16	16	15	16	16	16	E S	E S	E S	E S	E S	E S
17	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	16	16	16	17	16	16	16	16	E S	E S	E S	E S	E S	E S
18	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	19	19	17	17	15	15	15	16	E S	E S	E S	E S	E S	E S
19	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	17	16	16	14	16	16	16	16	E S	C	E S	E S	E S	E S
20	E S	E S	E S	E S	E S	E S	E S	E S	16	16	17	17	16	16	18	16	16	16	16	E S	E S	E S	E S	E S	E S
21	E S	E S	E S	E S	E S	E S	E S	E S	16	19	17	16	16	16	17	16	16	16	16	E S	E S	E S	E S	E S	E S
22	E S	E S	E S	E S	E S	E S	E S	E S	16	16	15	16	16	16	16	19	21	18	16	E S	E S	E S	E S	E S	E S
23	E S	E S	E S	E S	E S	E S	E S	E S	16	16	17	17	17	17	16	15	16	16	16	E S	E S	E S	E S	E S	E S
24	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	16	16	16	16	16	16	16	16	E S	E S	E S	E S	E S	E S
25	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	16	16	17	17	17	16	16	16	E S	E S	E S	E S	E S	E S
26	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	16	16	16	16	17	16	16	16	E S	E S	E S	E S	E S	E S
27	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	17	17	19	16	16	16	16	16	E S	E S	E S	E S	E S	E S
28	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	16	16	16	16	16	16	16	16	E S	E S	E S	E S	E S	E S
29	E S	E S	E S	E S	E S	E S	E S	E S	16	16	15	16	17	16	16	16	16	16	13	E S	E S	E S	E S	E S	E S
30	E S	E S	E S	E S	E S	E S	E S	E S	16	15	16	16	17	17	16	16	16	16	16	E S	E S	E S	E S	E S	E S
31																									
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30	30	30	30	30	30
MED	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	16	16	17	16	15	16	16	16	E S	E S	E S	E S	E S	E S
UQ	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	17	17	17	17	16	16	16	16	E S	E S	E S	E S	E S	E S
LQ	E S	E S	E S	E S	E S	E S	E S	E S	16	16	16	16	16	16	16	16	16	16	16	E S	E S	E S	E S	E S	E S

NOV. 1987

FMIN (0.1 MHz)

The Radio Research Laboratory, Japan

# IONOSPHERIC DATA

NOV. 1987

M(3000)F2 (0.01)

135° E Mean Time (G.M.T. + 9 h)

Station	YAMAGAWA																							
	00	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	300	300	305	280	310	340	355	375	365	350	335	340	310	325	330	345	340	345	315	300	350	305	290
2	S 300	330	300	295	310	295	320	340	350	345	335	340	320	315	R 310	325	335	375	360	300	285	290	305	295
3	U S 295	295	290	305	305	260	280	355	345	330	340	340	320	310	315	330	340	345	335	315	350	330	295	295
4	A 275	S 320	340	F	F	F	F	350	370	330	R 315	340	355	320	J R 310	330	355	360	295	290	295	310	305	295
5	J S 295	S 305	305	300	310	S 355	305	345	370	350	340	355	335	320	P 310	330	J R 335	360	355	320	S 275	295	305	290
6	295	300	300	295	310	S 360	305	345	335	325	R 310	335	335	295	300	330	365	325	325	320	280	290	320	310
7	230	285	270	300	365	255	315	350	360	345	330	330	330	290	315	335	350	350	350	295	315	335	305	315
8	300	310	300	300	315	355	315	350	350	345	335	H 350	H 330	300	320	335	H 340	355	355	290	J S 340	A	A	S 290
9	305	300	295	300	330	340	320	350	365	345	350	355	340	325	320	335	345	355	350	300	305	320	350	280
10	295	305	300	310	355	355	325	330	350	345	340	345	355	335	330	345	350	350	355	310	305	315	300	300
11	300	295	295	320	340	345	305	340	360	340	350	340	345	325	320	340	350	A	335	295	325	320	305	300
12	295	295	315	300	330	375	335	370	355	345	340	335	345	320	335	335	345	335	345	315	310	320	315	310
13	285	290	280	300	335	390	335	340	365	350	335	330	310	325	330	330	350	360	335	295	300	320	285	335
14	290	300	310	F	365	H 310	305	350	360	345	350	355	340	325	350	360	290	360	345	315	315	285	305	255
15	295	335	325	310	285	295	355	365	350	335	345	350	350	335	350	370	355	355	345	350	305	315	320	315
16	315	320	325	315	360	285	335	R 345	350	350	340	315	325	330	335	350	335	345	365	335	310	315	295	305
17	300	310	300	330	340	365	340	335	365	335	365	350	345	350	335	350	385	370	A J S 340	320	325	330	300	
18	295	320	335	340	350	345	305	340	345	345	370	360	325	340	345	S 360	345	360	345	H 295	S 310	345	285	295
19	295	300	330	330	340	345	360	340	350	335	360	335	335	315	335	345	335	I C 345	320	305	350	305	280	S 320
20	275	S 295	305	305	315	350	290	325	355	335	320	340	315	320	305	325	H 320	H 305	320	345	305	320	320	290
21	290	305	305	310	340	295	285	320	335	350	345	330	310	315	325	340	365	375	355	310	310	300	315	315
22	310	315	305	305	325	355	290	335	350	345	330	325	320	320	330	H 335	360	375	370	335	320	305	S 320	300
23	290	300	305	290	335	300	315	345	335	335	335	315	310	325	340	335	365	350	U H 335	H J S 270	250	J S 300	J S 290	
24	290	325	295	310	H 295	270	270	335	355	355	350	315	320	325	335	340	340	355	325	340	S 320	335	305	260
25	285	295	305	285	310	350	265	325	335	335	350	345	340	350	370	340	345	340	325	360	285	325	305	270
26	290	265	295	330	320	285	295	320	355	345	350	340	330	R 315	J R 320	330	330	H 350	315	310	310	295	280	295
27	U S 290	335	310	305	305	285	295	320	335	340	330	340	315	U R 325	320	305	330	330	355	290	280	J S 305	S 300	
28	330	330	295	295	295	300	290	315	340	320	R J R 335	J R 330	J R 310	U H 315	325	305	J R 360	365	S 330	A	S 295	S 305	315	275
29	285	310	325	365	295	285	315	335	335	345	350	335	335	U H 339	355	330	355	J P 370	300	345	350	325	295	290
30	300	300	335	320	330	335	345	325	340	345	350	355	345	340	340	350	355	365	335	320	310	310	335	330
31	290	295	295	300	310	295	295	330	340	335	335	330	320	315	320	330	335	345	325	295	295	305	295	290
CNT	29	30	30	29	29	29	29	30	30	30	30	30	30	30	30	30	30	29	29	29	30	29	29	30
MED	295	300	305	305	325	335	315	340	350	345	340	340	332	322	323	335	345	355	345	315	310	315	305	295
UQ	300	315	315	320	340	355	335	350	360	345	350	350	340	330	335	345	355	360	355	335	320	325	315	310
LQ	290	295	295	300	310	295	295	330	340	335	335	330	320	315	320	330	335	345	325	295	295	305	295	290

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M(3000)F2 (0.01)

# IONOSPHERIC DATA

NOV. 1937

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

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M(3000)F1 (0.01)

# IONOSPHERIC DATA

NOV. 1987

H\*F2 (KM)

135° E Mean Time (G.M.T. + 5 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										240	260	260	250	270	265	250	240							
2									240		260	245	250	275	265	250	245							
3									245	245	245	270	275	255	250	235								
4										255	250	235	275	270	250	225								
5									245	250	245	240	255	275	255	230								
6									225	255	265	255	240	230	230	245	215							
7									220	245	260	245	235	250	285	245								
8									250	260	235	255	245	275	255	230								
9									230	250	240	250	270	230	250									
10									265	250	255	245	270	230	245	240								
11									240	270	260	240	270	275	250			A						
12									265	250	265	245	275	250	245	250								
13									270	260	250	280	255	245	230									
14									240	240	240	245	280	260	230	230								
15									250	240	240	260	250	230	220									
16									235	250	255	265	260	250	230	215								
17									L 250	240	250	250	260	260	230	220								
18									240	230	240	265	250	255	230									
19									240	230	260	230	255	250	230									
20									245	275	250	265	250	285	250	225	210							
21									245	240	240	240	285	245	250	235								
22									U L 235	225	260	285	265	250	240									
23									255	280	275	255	245	245	220									
24									225	245	250	260	250	245	240									
25									255	235	230	235	245	250	235									
26									230	245	250	265	250	245	230									
27									250	245	245	240	240	255	270	245								
28									240	245	250	250	260	245										
29									235	250	235	L 235	240	225	225									
30									250	250	240	240	260	265	250									
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									5	22	30	30	30	30	30	30	18	1						
MED									240	245	250	250	250	260	260	245	230	210						
UQ									245	250	260	255	265	275	275	250	235							
LQ									225	240	240	240	240	250	250	235	220							

NOV. 1987

H\*F2 (KM)



# IONOSPHERIC DATA

NOV. 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	MHz to		MHz in		sec in		automatic operation				
	00	01	02	03	04	05	06	07	08	09	10	11		12	13	14	15	16	17	18	19	20	21	22
1	E S	E S	E S	E S	E S	E A	215	225	H	215	215	E A	215	205	230	230	225	230	220	210	E A	E A	E A	A
2	A	245	250	E S	270	255	230	230	230	225	220	230	225	E A	A	A	245	215	200	240	270	280	255	285
3	295	280	250	260	270	E S	E S	230	230	245	200	205	H	H	215	245	A	220	225	235	225	E A	E S	E S
4	A	A	E A	275	255	285	295	275	220	220	215	225	200	195	205	200	225	240	200	220	295	E A	280	290
5	275	255	245	270	245	S	E S	235	220	H	220	H	195	H	180	E S	235	235	215	210	220	235	250	265
6	S	S	E A	E A	270	220	210	S	215	H	230	215	H	H	205	E A	245	225	215	230	220	E S	E A	250
7	E S	E S	E S	285	220	E S	S	230	200	H	H	205	200	205	H	230	250	230	205	205	225	245	235	285
8	E A	E A	E A	240	260	215	S	190	H	235	235	245	235	H	215	230	220	A	225	H	205	200	S	A
9	E S	E S	E S	E S	E S	E S	S	230	175	H	H	205	180	230	220	230	245	A	A	230	225	210	S	E S
10	S	S	E S	E S	230	225	E S	235	190	H	235	235	E A	A	205	E A	250	A	A	225	200	E A	E A	E S
11	E S	E S	E S	E S	E S	200	E S	225	H	H	215	205	H	H	195	A	A	230	A	200	E A	E A	E S	E S
12	E S	E S	E S	E S	E S	205	E S	260	220	220	230	220	215	200	220	220	A	240	210	215	E A	230	E S	E
13	E S	E S	E S	E S	240	195	E S	235	225	220	225	A	E A	E A	H	225	220	220	210	220	E S	E S	E S	E S
14	E S	E S	E A	E S	220	E S	E S	230	235	225	225	A	H	H	200	220	240	230	220	205	205	240	E A	E A
15	E S	E A	E A	E S	E S	E S	220	225	230	230	215	200	195	H	220	240	225	220	205	220	E S	E S	E A	E S
16	A	265	260	245	210	S	240	235	230	220	225	210	205	205	240	210	A	220	205	210	S	S	A	E A
17	E A	S	S	255	230	225	E S	225	225	215	190	205	215	200	205	A	230	210	A	245	245	255	235	E S
18	S	275	245	240	240	215	E S	220	220	235	225	220	205	200	A	210	230	220	200	E A	300	250	215	A
19	S	E A	250	255	240	230	200	220	235	230	230	230	220	210	220	215	A	A	I C	210	210	230	210	215
20	S	290	265	295	270	S	265	E S	255	235	235	245	240	A	210	210	210	205	240	A	E A	E A	260	255
21	275	290	290	275	230	S	290	240	240	240	220	220	200	245	210	230	230	210	205	235	250	270	255	260
22	S	280	275	270	270	240	205	E S	275	240	230	220	205	195	215	235	225	220	215	205	200	220	240	260
23	S	290	270	S	295	235	245	270	220	210	H	185	200	200	235	220	210	220	200	195	230	230	250	230
24	270	235	E S	265	E S	E S	E S	245	220	215	220	210	245	235	220	A	230	215	205	210	220	270	255	E S
25	300	E S	E S	E S	270	235	E S	245	195	H	H	205	A	205	210	210	H	H	220	210	200	235	235	E S
26	E A	S	S	245	E S	E S	E S	245	220	195	175	A	E A	220	205	220	H	210	220	225	235	245	275	270
27	270	285	270	280	280	S	305	290	245	220	230	220	205	200	210	190	235	220	205	205	215	270	250	270
28	235	250	E S	270	E S	E S	E S	255	245	230	235	A	210	220	230	220	220	215	E A	A	E A	280	235	E A
29	E S	E A	240	225	E S	E S	S	220	225	230	230	215	215	205	205	225	A	205	E A	230	200	300	285	305
30	E S	E S	E S	E S	E S	E S	E S	230	220	H	230	220	225	210	205	H	H	A	230	A	E A	E A	215	E S
31	300	300	275	270	270	290	235	230	220	230	220	225	210	205	200	220	230	230	240	240	215	250	225	230
CNT	29	29	30	30	30	30	30	30	30	30	30	26	28	30	27	24	26	28	29	29	30	29	27	28
MED	262	265	258	255	240	225	230	230	220	225	220	208	208	209	213	225	228	212	208	225	236	242	255	258
UQ	E S	E S	E S	E S	E S	E S	E S	240	230	230	225	225	215	225	234	232	230	220	215	235	A	270	260	E S
LQ	S	262	255	248	235	218	S	220	H	220	215	210	200	205	210	218	220	205	205	220	230	240	250	254

NOV. 1987

H \* F (KM)

# IONOSPHERIC DATA

NOV. 1987

H°E (KM)

135° E Mean Time (G.M.T. + 9 h)

Station	YAMAGAWA							Lat.	Long.				Sweep		MHz to		MHz in		sec in		automatic operation			
	00	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																	
2							ES																	
3							ES																	
4							ES																	
5							ES																	
6							ES																	
7							S																	
8							ES																	
9							S																	
10							S																	
11							EG																	
12							S																	
13							S																	
14							S																	
15							S																	
16							S																	
17							S																	
18							S																	
19							S																	
20							S																	
21							S																	
22							S																	
23							S																	
24							S																	
25							S																	
26							S																	
27							S																	
28							S																	
29							S																	
30							S																	
31							S																	
CNT																								
MED																								
UQ																								
LQ																								

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H°E (KM)

IONOSPHERIC DATA

NOV. 1987

H°ES (KM)

135° E Mean Time (G.M.T. + 9 h)

Station Hour Day	YAMAGAWA				Lat. 31° 12' 1" N				Long. 130° 37' 1" E				Sweep	MHz to	MHz in	sec in	automatic operation							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	100	105	S	S	S	100	100	100	G	140	130	120	115	120	120	115	110	110	100	105	100	100	100	100
2	115	S	S	S	S	S	S	G	145	125	120	115	115	110	110	105	110	105	105	105	105	105	S	105
3	S	105	100	100	S	S	S	G	140	125	125	155	145	145	125	120	110	115	105	105	105	105	105	105
4	105	105	100	100	100	105	105	E G 175	125	120	110	115	105	100	145	150	150	G	105	105	105	105	105	105
5	105	110	S	S	S	S	105	G	G E 165	135	120	120	125	G	125	120	110	105	S	105	S	S	S	
6	S	105	100	100	105	100	105	100	145	130	120	125	120	120	110	115	115	115	105	105	105	105	100	100
7	S	S	S	100	S	S	S	S	G	105	105	145	150	100	E G 170	145	130	125	S	S	S	105	105	105
8	100	120	105	100	105	105	100	G E G E G E G	180	160	155	140	120	120	145	130	115	105	S	S	145	115	105	105
9	110	105	S	S	S	S	S	G	110	G	155	155	170	E G 160	140	140	140	100	100	100	S	120	S	S
10	S	S	S	S	S	S	S	155	G E G E G	160	170	140	130	G	125	110	110	100	100	100	100	100	100	100
11	100	S	S	S	S	S	S	G	105	G	170	115	G	G	120	110	110	105	115	150	115	100	S	S
12	S	S	S	S	S	S	S	145	150	125	115	120	125	115	120	110	105	110	105	100	105	100	S	S
13	S	S	S	S	S	S	S	S	G	G	130	125	125	115	120	110	G	G	S	S	S	S	100	S
14	100	100	100	S	S	S	S	150	150	130	125	120	G	G	G	125	115	120	110	S	100	100	100	100
15	100	115	120	S	120	115	120	S	110	115	120	120	115	120	125	120	G	110	115	100	100	100	100	100
16	105	100	100	S	S	S	S	S	130	120	115	115	110	110	110	110	110	110	105	S	S	S	105	105
17	100	S	S	S	S	S	S	E G E G G	160	165	G	110	105	E G 170	140	115	115	115	110	105	105	105	S	S
18	S	S	S	S	S	S	S	S	E G 165	120	110	110	110	105	105	110	120	105	105	105	105	105	100	S
19	100	100	S	S	S	S	S	125	125	140	110	115	120	130	95	100	110	C	S	S	S	S	S	100
20	S	S	S	S	S	S	100	S	G	140	120	120	115	110	115	110	110	105	100	100	100	100	S	S
21	S	110	S	S	S	S	S	S	140	130	120	115	130	115	115	115	110	S	S	S	S	S	S	S
22	S	S	S	S	S	S	S	S	G	130	120	120	125	G	G	115	S	S	S	S	S	S	S	S
23	S	S	S	S	S	S	S	S	G	105	110	125	115	105	105	110	115	S	105	105	S	S	S	S
24	S	115	105	S	105	105	105	120	110	105	E G 155	160	140	125	125	120	120	120	S	110	110	105	105	105
25	105	125	110	105	105	105	105	105	G	G E G 150	130	120	120	120	120	110	S	115	110	110	105	105	105	105
26	100	S	120	110	105	110	S	S	120	120	115	105	105	105	110	110	110	E G 150	130	S	100	105	S	S
27	S	S	S	100	100	100	105	105	125	120	115	115	120	120	110	110	105	115	105	S	115	100	105	S
28	S	S	S	S	110	S	S	120	150	130	110	105	115	115	110	120	110	110	110	105	105	100	105	S
29	105	105	105	105	S	S	S	S	E G E G 160	155	145	125	120	125	120	125	95	95	95	95	110	105	110	105
30	105	S	105	S	S	S	S	S	125	125	125	115	115	G	105	100	100	100	100	S	S	S	S	S
31																								
CNT	16	15	12	9	9	11	9	12	20	27	28	30	27	26	27	29	28	23	23	29	20	23	17	15
MED	102	105	105	100	105	105	105	116	132	122	119	120	120	118	118	115	110	110	105	105	105	105	105	105
UQ	105	112	108	105	105	108	105	142	146	135	128	125	125	122	124	120	115	115	110	105	110	105	105	105
LQ	100	105	100	100	105	100	100	105	125	120	115	115	115	110	110	110	110	105	102	100	100	100	100	100

The Radio Research Laboratory, Japan

NOV. 1987

H°ES (KM)

# IONOSPHERIC DATA

NOV. 1987 TYPES OF ES

135 E Mean Time (G.M.T. + 9 h)

Station		YAMAGAWA							Sweep 1 MHz to 25 MHz in 24 sec in automatic operation																
		Lat. 31° 12' 14' N							Long. 130° 37' 1 E																
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	F5	F1				F4	F3	L2		HL22	H1	C2	C2	C2	C2	C2	C3	L2	F4	F4	F5	F5	F3	F3	
2	FF11									H2	CL21	C3	CL31	CL21	CL31	C4	CL51	L3	L5	F4	F3	F4	F3	F1	
3		F1	F1	F1						H3	C3	CL21	HL11	H1	HL11	CL2	C4	L2	F4	F6	F5	F5	F2	F2	
4	F4	F8	F7	F3	F5	F2	F2	H1	C5	CL21	CL31	CL22	L1	L1	H1	HC21	HL23		F2	F5	F3	F2	F4	F3	
5	F2	F1								HL12	HL21	CL11	CL11	CL11			C1	L3	F5	F4			F2		
6		F2	F3	F6	F1	F3	F1	L2	H2	CL12	CL11	CL12	CL11	CL12	CL11	CL21	CL21	LL11	FF31	F2	F3	F3	F3	F1	
7				F2						L1	L1	HL11	HL11	L2	HL12	HL21	HLL31	L2				F2	F2	F1	
8	FF24	FF11	F4	F4	F4	F1	F2		H2	H1	H1	H3	C2	C1	HCL22	HCL31	CL22	L1			F1	F7	F4	F4	
9	F3	F3								LL21		H2	HL12	HL22	HL21	H3	HL22	L2	F3	F2		F4			
10								H2	H2	H1	HL21	H3		C3	C3	C5	L3	F4	F4	F4	F2	F2	F2	F8	
11	F2								L2		H2	CL21			C4	C6	C4	L4	F1	F3	F3	F1			
12							H4	H2	C2	C2	C1	C1	C1	C2	C1	C4	C3	L4	F2	F3	F3	F2			
13													C2	C2	C5	C4	CL32	C2						F2	
14	F5	F2	F4				H3	H3	C2	C2	C3					C2	C4	C1	F4		F6	F5	F6	F5	
15	F2	FF62	F3		F2	F2	F1		C4	C3	C1	C1	C2	C3	C1	C3		L1	F2	F6	F5	F3	F4	F3	
16	F5	F6	F2				F1		C2	C2	C1	C2	C2	L2	L2	L2	L3	L4	F2	F1		F1	F2	F3	
17	F5	F1	F1		F4		L1	HL22	H1		L1	L1	H1	H1	C2	C3	L4	F6	F3	F3	F3	F1	F1	F1	
18	F1			F1					H2	C2	L2	L1	L2	L2	L3	L3	CL23	L3	F4	F6	F3	F1	F7	F1	
19	F1	F1					F1	H5	C2	C1	CL21	CL22	CL12	CL12	L4	L1	L2				F1	F1		F3	
20	F1		F1				F1		H2	C3	CL21	CL21	L1	L1	L2	L2	L3	F4	F5	F3	F2				
21		F5							C1	H1	C1	C2	C1	C2	C2	C2	L2								
22			F1			F1	F1	H1		CL11	C2	C1			C1		C1								
23										L1	C1	CL11	CL11	CL11	CL21	CL21	L2	L2		F4	F3				
24		F1	F2		F1	F1	F3	C1	L2	L3	HL12	HL11	HL11	CL21	CL21	C2	C2	C1		F1	F2	F2	F1	F2	
25	F2	F2	F3	F2	F2	F2		L1			HL11	CL11	CL31	CL21	C1	C2	C3		F1	F1	F1	F1	F2	F2	
26	F4		F1	F2	F3	F2			C2	C2	C1	C4	C3	CL22	C3	C3	L3	L1	FF21		F1	F2			
27				F3	F1	F1	F1	L1	C2	C2	C2	C1	C3	C1	C2	CHL31	L3	L1	F3		FF22	F1	F2		
28					F2			C1	HCL33	CL22	C2	CL21	CL21	CL21	CL32	CL43	CL21	C4	CL23	F3	F5	F4	F2	F5	
29	F2	F8	F2	F3					H4	HL23	HL22	CL22	CL21	CL11	CL21	CL32	L4	L5	F5	F4	F1	F3	F2	F2	
30	F1		F2						C2	C2	C2	C2	C2	C2	C3	L3	L3	L5	F4	F2					
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																									

NOV. 1987 TYPES OF ES

# IONOSPHERIC DATA

NOV. 1937

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	X	X	X	X	X	X												U X	X	X	X	U X	U X	
2	X	X	X	X	X	X	X													X	X	X	H	H	
3	X	X	X	X	X	X	X													X	X	X	X	X	
4	X	X	U X	X	X	X	X													X	X	X	X	X	
5	X	X	X	X	X	X	X													X	X	X	X	X	
6	X	X	X	X	X	X	X													X	X	X	X	X	
7	X	X	X	X	X	X	X													U X	U X	X	X	U X	X
8	X	X	X	X	X	X	X													X	X	X	X	X	
9	X	X	X	X	X	X	X													U X	X	X	X	X	
10	X	X	X	X	X	X	X													X	X	X	X	X	
11	X	X	X	X	X	X	X													X	X	X	X	X	
12	X	X	X	X	X	X	X													X	X	X	X	X	
13	X	X	X	X	X	X	X													U X	U X	X	X	X	
14	X	X	X	X	X	X	X													S	U X	X	X	X	
15	X	S	X	X	X	X	X													X	X	X	S	X	
16	U X	X	X	X	X	X	X													U X	U X	X	X	X	
17	U X	U X	X	X	U X	X	X													X	X	X	X	X	
18	X	X	X	X	X	X	X													X	U X	X	X	X	
19	X	X	X	X	X	X	X													U X	X	X	X	X	
20	X	X	X	X	X	X	X													X	U X	X	X	X	
21	X	X	X	X	X	X	X													X	U X	X	X	X	
22	X	X	X	X	X	X	X													X	X	X	X	U X	
23	X	X	X	X	X	X	X													X	U X	U X	U X	X	
24	X	X	X	X	X	X	X													X	X	X	X	X	
25	X	X	X	X	X	X	X													X	X	X	X	X	
26	X	X	X	X	X	X	S													X	X	X	X	X	
27	X	X	X	X	X	X	X													U X	X	X	X	X	
28	X	X	X	X	X	X	X													X	U X	X	X	X	
29	X	X	X	X	X	X	X													X	X	U X	X	X	
30	X	X	X	X	X	X	X													X	X	X	X	X	
31	X	X	X	X	X	X	X													X	X	X	X	X	
CNT	30	29	30	30	30	30	29													30	30	30	30	29	30
MED	X	X	X	X	X	X	X													X	X	X	X	X	X
UQ	X	X	X	X	X	X	X													X	X	X	X	X	X
LQ	X	X	X	X	X	X	X													X	X	X	X	X	X

NOV. 1937

FXI (0.1 MHz)

### IONOSPHERIC DATA

NOV. 1937

FOF2 (0.1 MHz)

135° E Mean Time (G.M.T. + 9 h)

Station	Lat. 26° 16' 2" N							Long. 127° 42' 4" E				Sweep	MHz to		MHz in		sec in		automatic operation						
	00	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 34	33	32	40	28	27	54	73	73	75	95	102	100	112	132	R 117	R 122	S 150	S 165	S 145	S 110	S 83	U S 77	
2	64	S 67	S 46	33	33	29	28	56	90	31	100	120	110	130	S 164	R 170	R 160	R 162	144	115	S 84	S 78	J H 76	H 53	
3	48	47	43	39	36	29	30	70	73	90	H 106	103	87	107	116	116	R 114	103	109	101	94	64	51	R 49	
4	43	47	H 56	32	28	F 29	F 72	70	71	113	124	99	98	112	122	112	38	R 63	49	55	60	52	51		
5	S 52	46	41	34	35	26	26	56	86	87	87	97	85	94	123	132	R 126	93	73	70	S 65	70	66	55	
6	52	48	41	37	40	38	21	50	R 72	30	94	124	109	108	133	148	R 119	95	90	R 75	55	60	51	R 44	
7	35	32	31	35	41	S 23	S 23	55	36	79	33	110	100	U R 120	R 137	R 156	J R 140	U R 112	U S 93	U S 84	U S 64	S 51	S 35	S 33	
8	41	35	32	34	38	32	25	52	69	80	103	U R 120	113	U R 123	R 148	U R 152	R 155	U R 120	U R 107	39	S 75	S 77	60	44	
9	41	39	32	35	40	37	27	52	71	75	89	115	95	95	115	131	U R 128	U R 104	91	U S 70	60	66	S 43	34	
10	34	S 34	S 37	42	S 36	S 32	22	50	79	84	110	104	95	96	97	111	R 107	91	92	S 58	55	52	44	40	
11	40	40	S 40	S 42	S 52	S 21	22	53	74	80	R 94	96	93	100	U R 122	R 135	R 130	110	S 92	S 77	55	56	57	56	
12	S 54	48	42	38	50	S 25	S 21	52	64	77	80	92	115	110	125	146	R 140	R 143	U S 121	114	S 80	S 74	S 75	U S 44	
13	S 33	30	30	S 38	S 54	20	21	49	78	79	72	97	107	123	150	R 160	R 163	R 140	P 117	S 114	S 103	90	80	77	
14	56	S 41	S 33	S 50	31	S 23	S 24	52	32	36	94	100	92	105	133	142	R 115	92	S 36	U S 30	S 65	S 61	S 41	S 38	
15	36	S 22	24	S 25	F 23	F 27	44	66	83	110	113	87	95	118	120	R 77	66	65	51	47	U S 43	S 50			
16	U S 41	S 40	36	35	31	S 22	S 25	50	70	85	96	97	117	117	133	149	R 154	U R 123	U S 104	U S 95	S 77	70	S 65	S 53	
17	U S 46	U S 44	U S 40	S 38	U S 40	30	20	44	67	75	92	102	86	92	100	90	78	63	64	57	56	53	60	52	
18	40	39	35	29	32	27	20	47	70	85	79	85	89	97	107	97	97	81	79	U S 79	65	64	54	39	
19	35	32	U S 33	S 36	U S 41	36	23	47	67	73	87	75	99	110	133	132	126	115	U S 104	S 77	89	82	S 53	S 45	
20	41	36	41	37	45	23	28	49	85	101	109	120	137	151	145	168	175	142	115	U S 111	90	U S 76	S 61	S 50	
21	S 41	34	31	33	38	24	24	44	31	104	110	111	111	140	145	146	110	R 81	S 62	44	52	56	48	S 44	
22	S 43	31	35	34	38	23	23	46	69	82	86	91	93	124	133	133	117	R 85	R 63	59	52	50	47	S 39	
23	31	31	33	32	37	28	23	47	69	75	89	96	117	134	145	144	138	U R 140	115	U S 120	U S 104	U S 103	112	S 67	
24	S 44	54	S 41	31	34	S 26	S 23	61	91	75	82	98	114	109	114	113	110	106	78	S 66	S 64	54	S 61	S 54	
25	S 33	37	37	36	33	26	23	48	90	U R 117	130	117	112	120	R 124	135	R 121	U R 102	102	77	64	57	36	32	
26	31	30	33	37	35	22	A 45	87	92	96	98	125	145	168	173	146	126	110	84	77	S 73	S 63	S 58		
27	U S 50	S 40	S 39	34	30	30	30	44	79	111	114	118	U R 120	U R 143	U R 146	U R 148	R 132	R 123	115	95	77	85	U S 76	S 77	
28	52	55	31	28	26	28	30	44	77	101	J R 128	116	117	U R 132	144	U R 155	U R 130	R 97	U R 102	76	71	82	53	53	
29	S 52	47	43	35	30	25	24	48	67	83	92	90	87	94	H 90	34	34	80	59	64	S 75	U S 44	S 32	30	
30	29	32	36	33	32	33	30	43	64	86	J R 117	110	105	U R 121	125	U R 126	R 127	U R 114	90	78	S 76	65	61	47	
31																									
CNT	30	29	30	30	30	30	28	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30	
MED	41	39	36	35	36	23	24	50	74	82	94	102	104	110	129	135	R 126	R 108	92	S 78	63	64	53	50	
UQ	50	47	41	37	40	30	27	53	82	83	110	116	114	124	145	149	R 140	R 123	110	S 95	80	77	65	55	
LQ	35	34	33	33	32	23	22	46	69	77	87	96	93	93	115	122	R 112	91	78	66	59	56	43	40	

NOV. 1937

FOF2 (0.1 MHz)

# IONOSPHERIC DATA

NOV. 1987      FOF1 (0.01 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 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	U L 490	U L 480	L	U L 480	L											
2										L	L	U L 490	U L 480	L	L	L	A	A										
3											A	L	L	L	L	L	L	L										
4										L	L	U L 470	U L 400	U L 510	A	A	L											
5										L	L	U L 500	U L 490	L	B	L	L											
6										L	L	L	L	L	U L 460	U L 450	L	L										
7										L	L	U L 470	U L 450	L	L	L	L											
8										L	L	L	U L 490	L	A	L	U L 340											
9										L	L	U L 470	U L 480	U L 470	U L 510	U L 460	L											
10										L	U L 470	U L 470	A	L	U L 470	L	L											
11										L	L	L	U L 450	U L 440	U L 450	L	L											
12										L	U L 440	U L 470	U L 480	U L 480	U L 480	L	A											
13										L	U L 470	L	U L 500	L	L	L	A											
14										L	L	L	A	L	U L 460	L	L	L										
15										L	A	A	L	A	L	L	L											
16										L	U L 470	U L 480	U L 470	L	U L 500	U L 450	A											
17										L	L	U L 480	U L 470	U L 460	U L 460	L	L											
18										L	L	U L 480	U L 480	U L 470	U L 470	L	L											
19										L	L	L	U L 480	U L 490	U L 500	L	L	A										
20										L	L	U L 500	U L 500	U L 500	L	U L 500	L	A										
21										L	L	L	L	U L 490	L	L	L											
22										L	L	L	L	U L 480	L	L	L	L										
23										L	L	L	L	U L 500	L	U L 470	U L 450	L										
24										L	L	L	L	A	A	L	L											
25										L	L	U L 500	L	U L 480	L	A	L											
26										L	L	L	U L 510	U L 480	U L 480	L	A											
27										L	L	U L 500	U L 480	U L 470	A	L	L											
28										L	L	U L 430	U L 480	U L 500	A	U L 460	A											
29										L	L	L	L	L	U L 440	L	L											
30										L	L	L	L	U L 460	U L 450	L	L											
31																												
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
CNT												7	16	19	14	15	5	1										
MED												U L 470	U L 480	U L 480	U L 480	U L 470	U L 450	U L 340										
UQ												U L 475	U L 495	U L 495	U L 490	U L 480	U L 460											
LQ												U L 455	U L 470	U L 470	U L 470	U L 460	U L 450											

NOV. 1987      FOF1 (0.01 MHz)      The Radio Research Laboratory, Japan

# IONOSPHERIC DATA

NOV. 1987

FOE (0.01 MHz)

135° E Mean Time (G.M.T. + 9 h)

Station	OKINAWA							Lat.	Long				Sweep	MHz to		MHz in		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								A	R	260	300	315	325	330	R	320	A	A	A					
2								R	200	255	300	320	335	340	340	R	330	R	A	A				
3								S	A	A	A	320	335	345	330	A	A	A	A					
4								A	U	A	U	A	225	270	290	300	345	340	330	R	320	R	250	195
5								190	255	290	320	340	340	A	B	A	A	A						
6								195	235	300	320	330	335	330	R	300	R	A	A					
7								S	230	280	310	320	330	330	320	300	U	A	S					
8								190	220	280	310	320	330	330	A	300	260	A						
9								185	225	270	300	310	320	330	320	A	270	195						
10								S	215	280	310	330	330	335	320	A	A	A						
11								195	R	A	315	340	340	330	R	315	A	A	A					
12								195	240	295	315	320	R	A	A	A	A	A						
13								R	A	A	A	A	330	340	330	A	A	A	A					
14								180	225	265	300	315	330	A	A	A	A	205						
15								A	A	A	A	A	A	A	A	A	295	A	190					
16								175	250	275	305	A	330	A	A	A	A	A						
17								S	230	280	300	310	320	320	315	A	A	S						
18								185	220	270	A	A	A	A	A	A	A	A						
19								180	230	A	A	A	R	330	A	310	230	240	S					
20								190	220	280	300	A	320	A	A	A	A	S						
21								170	215	275	A	330	R	335	A	A	A	A	A					
22								170	240	285	305	320	335	335	325	300	R	A	S					
23								S	230	280	A	A	A	A	A	A	A	A	S					
24								A	R	A	A	330	335	330	R	A	A	A	S					
25								S	225	270	290	315	320	325	A	A	A	A						
26								S	A	275	A	A	320	330	320	A	A	A						
27								S	225	270	A	A	A	A	A	A	A	A	S					
28								S	A	A	A	A	A	H	325	315	A	A	235	A				
29								S	220	A	300	320	330	320	A	A	A	185						
30								S	235	A	A	320	A	A	A	A	A	A						
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								15	25	21	19	21	24	18	12	8	6	5						
MED								185	230	230	310	320	330	330	320	300	255	195						
UQ								192	240	285	315	330	338	330	322	300	270	195						
LQ								180	220	270	300	320	328	330	315	290	240	190						

The Radio Research Laboratory, Japan

NOV. 1987

FOE (0.01 MHz)



# IONOSPHERIC DATA

NOV. 1987

FOES (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	J A	J A	E S	E S	E S	J A	E S	J A	G						J A	J A	J A	J A	J A	J A	J A	J A	J A	J A													
2		J A	J A	E S	E S	E S	E S	E S	G						J A	J A	J A	J A	J A	J A	J A	J A	J A	J A													
3	J A	E S	E S	E S	E S	E S	E S	17	24	32	38	42	40	45	41	J A	J A	J A	J A	J A	J A	J A	J A	J A													
4	E S	E S		J A	J A	J A		J A							G	J A	J A			J A	J A	J A	J A	J A													
5	E S	J A	J A	J A	E S	E S	E S	G								J A	E S	J A	J A	J A	J A	J A	J A	E S													
6	E S	E S	E S	E S	E S		J A	G	G							J A	J A	J A	J A	J A	J A	E S	E S	E S													
7	E S	E S	E S	E S	E S	E S	J A	E S	G	G						G	G			J A	J A	E S	E S	E S													
8	E S	E S	J A	E S	E S		E S	G								J A	G	G		J A	E S	E S	J A	J A													
9	J A			E S	E S	E S	E S	G	G	G						G				J A	E S	E S	E S	E S													
10			J A	J A	E S	E S	E S									J A	J A	J A	J A	J A	J A	J A	J A	J A													
11	E S	E S	E S	E S	E S	E S	E S	23		G	J A		G			J A	J A	J A	J A	J A	J A	J A	J A	J A													
12	E S	E S	E S	E S	E S	E S	E S	G								J A	J A	J A	J A	J A	J A	J A	E S	E S													
13		E S	E S	E S	E S	E S	E S	G								J A	J A	J A	J A	J A	J A	E S	E S	E S													
14	E S	E S	J A			E S	E S	23								J A	J A	J A			E S	E S	J A	E S													
15					J A	E S	E S	23								J A	J A	J A	J A	J A	J A	E S	E S	E S													
16	J A		E S	E S				G								J A	J A	J A	J A	J A	J A	E S	E S	E S													
17	E S			J A			E S		G							G	J A				J A	J A	J A	J A													
18			E S	E S	E S	E S	E S	G	G							J A	J A	J A	J A	J A	J A	J A	E S	E S													
19	E S	E S	E S	E S	E S	E S	E S	G								J A	J A	J A	J A	J A	J A	J A	J A	J A													
20	E S	E S			E S	E S	E S	G								J A	J A	J A	J A	J A	J A	J A	E S	E S													
21	E S	J A	J A	J A	J A	E S	E S	G								J A	J A	J A	J A	J A	J A	E S	E S	E S													
22	E S	E S	E S	E S	E S	E S	E S	G	G	G						J A	J A	J A	J A	J A	J A	J A	E S	E S													
23	E S	E S	E S	E S	E S	E S		E S	G							J A	J A	J A	J A	J A	J A	E S	E S	E S													
24	E S	E S	E S	E S	E S		J A	J A	G	J A	J A					J A	J A	J A	J A	J A	J A	J A	J A	E S													
25	J A				J A			E S	G	G						J A	J A	J A	J A	J A	J A	J A	J A	J A													
26		E S	J A	J A		J A	J A	E S	J A		J A		G			J A	J A	J A	J A	J A	J A	J A	J A	J A													
27			E S	E S	E S	E S	E S		G	G						J A	J A	J A	J A	J A	J A	J A	J A	E S													
28	E S	E S	E S	J A	J A		E S	E S	J A	J A	J A					J A	J A	J A	J A	J A	J A	J A	E S	J A													
29		E S	E S	J A			E S	E S	E S											G	E S		E S	E S													
30	E S	E S			E S	E S	E S		G							J A	J A	J A	J A	J A	J A	J A	E S	E S													
31																																					
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30													
MED	E S	E S	E S	E S	E S	E S	E S	16	24	32	37	40	42	41	J A	J A	J A	J A	J A	J A	J A	J A	20	E S													
UQ			J A													J A	J A	J A	J A	J A	J A	J A	J A	J A													
LQ	E S	E S	E S	E S	E S	E S	E S	G	G							J A	J A	J A	J A	J A	J A	E S	E S	E S													

NOV. 1987

FOES (0.1 MHz)

The Radio Research Laboratory, Japan

### IONOSPHERIC DATA

NOV. 1987

FBES (0.1 MHz)

135 ° E Mean Time (G.M.T. + 0 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	E S	E S	E S	E S	E S	E S	E S	E S	G	31	38	41	40	40	44	36	28	23	27	24	18	E S	18	E S			
2	E S	E S	E S	E S	E S	E S	E S	E S	G	27	34	37	40	42	43	44	45	44	32	E S	21	22	E S	E S			
3	E S	E S	E S	E S	E S	E S	E S	E S	24	29	37	41	39	43	41	34	34	29	22	A	31	A	33	22	19		
4	E S	E S	E S	E S	E S	E S	E S	E S	22	26	29	32	34	G	37	52	50	28	22	18	18	31	18	20	20		
5	E S	E S	E S	E S	E S	E S	E S	E S	G	26	G	36	37	38	35	E 3	47	40	37	26	U A	24	36	19	18	21	E S
6	E S	E S	E S	E S	E S	E S	E S	E S	G	G	32	36	41	43	40	32	32	27	22	18	21	E S	E S	E S	E S		
7	E S	E S	E S	E S	E S	E S	E S	E S	G	G	G	G	G	G	42	43	33	28	25	E S	E S	E S	E S	E S	E S		
8	E S	E S	E S	E S	E S	E S	E S	E S	G	29	32	38	40	40	40	50	G	G	23	17	E S	E S	25	30	E S		
9	E S	E S	E S	E S	E S	E S	E S	E S	G	G	G	G	G	G	35	34	20	18	16	E S	E S	E S	E S	E S	E S		
10	E S	E S	E S	E S	E S	E S	E S	E S	21	23	34	36	40	48	44	39	40	36	28	27	30	30	37	24	E S		
11	E S	E S	E S	E S	E S	E S	E S	E S	G	33	34	G	G	34	32	34	24	24	60	26	20	20	18	18			
12	E S	E S	E S	E S	E S	E S	E S	E S	G	28	34	34	35	34	36	34	37	45	37	21	20	E S	E S	E S	E S		
13	E S	E S	E S	E S	E S	E S	E S	E S	G	28	32	35	37	45	44	36	29	36	28	31	E S	E S	E S	E S	E S		
14	E S	E S	E S	E S	E S	E S	E S	E S	G	33	37	44	46	36	33	35	28	21	E S	E S	E S	E S	17	17	E S		
15	E S	E S	E S	E S	E S	E S	E S	E S	U A	22	26	34	43	53	38	38	36	38	28	G	E S	E S	E S	E S	E S		
16	U A	E S	E S	E S	E S	E S	E S	E S	G	26	31	36	40	40	43	33	34	38	U A	U A	U A	U A	25	29	E S	E S	E S
17	E S	E S	E S	E S	E S	E S	E S	E S	G	30	32	34	38	35	G	40	30	24	21	30	20	E S	E S	E S	E S		
18	E S	E S	E S	E S	E S	E S	E S	E S	G	32	33	37	35	40	35	40	30	25	E S	E S	19	20	E S	E S	E S		
19	E S	E S	E S	E S	E S	E S	E S	E S	G	28	30	34	36	40	37	40	41	37	43	20	32	30	20	21	E S		
20	E S	E S	E S	E S	E S	E S	E S	E S	G	27	33	36	40	44	43	40	30	30	61	E S	E S	E S	E S	E S	E S		
21	E S	E S	E S	E S	E S	E S	E S	E S	G	25	31	34	35	39	40	36	33	29	25	20	E S	E S	E S	E S	E S		
22	E S	E S	E S	E S	E S	E S	E S	E S	G	G	G	34	38	36	35	34	33	28	20	E S	E S	E S	E S	E S	E S		
23	E S	E S	E S	E S	E S	E S	E S	E S	G	32	33	38	35	40	34	30	28	21	20	E S	E S	E S	E S	E S	E S		
24	E S	E S	E S	E S	E S	E S	E S	E S	G	29	34	37	41	56	45	34	30	22	17	E S	E S	15	27	24	E S		
25	E S	E S	E S	E S	E S	E S	E S	E S	G	G	G	42	43	43	38	60	30	20	E S	E S	20	20	16	16	16		
26	E S	E S	E S	E S	E S	E S	E S	E S	A A	E S	24	31	32	34	G	36	34	38	35	30	23	46	25	19	E S	E S	
27	E S	E S	E S	E S	E S	E S	E S	E S	G	G	33	35	35	33	54	37	30	21	20	E S	E S	E S	E S	E S	E S		
28	E S	E S	E S	E S	E S	E S	E S	E S	26	33	33	36	41	49	38	43	43	53	47	20	21	E S	E S	25	E S		
29	E S	E S	E S	E S	E S	E S	E S	E S	24	31	37	38	38	36	32	32	27	G	E S	E S	E S	E S	E S	E S	E S		
30	E S	E S	E S	E S	E S	E S	E S	E S	G	29	33	37	33	35	34	30	30	37	39	36	26	16	16	16	16		
31																											
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30		
MED	E S	E S	E S	E S	E S	E S	E S	E S	16	24	31	34	37	38	39	36	34	30	24	20	18	20	E S	E S	E S	E S	
UQ	E S	E S	E S	E S	E S	E S	E S	E S	18	27	33	37	40	42	43	41	40	36	30	27	26	25	20	20	16	E S	
LQ	E S	E S	E S	E S	E S	E S	E S	E S	G	G	29	33	35	35	35	34	33	28	21	E S	E S	E S	E S	E S	E S	E S	

The Radio Research Laboratory, Japan

NOV. 1987

FBES (0.1 MHz)

IONOSPHERIC DATA

NOV. 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	E	S	E	S	E	S	14	14	14	16	16	22	19	17	16	16	16	E	S	E	S	E	S	E	S
2	E	S	E	S	E	S	E	S	15	15	16	19	18	18	18	21	16	15	14	E	S	E	S	E	S	E	S
3	E	S	E	S	E	S	E	S	16	15	15	16	22	23	23	22	19	16	16	E	S	E	S	E	S	E	S
4	E	S	E	S	E	S	E	S	14	15	16	16	16	16	17	16	17	17	16	E	S	E	S	E	S	E	S
5	E	S	E	S	E	S	E	S	16	16	16	18	22	22	47	18	19	16	16	E	S	E	S	E	S	E	S
6	E	S	E	S	E	S	E	S	15	16	16	16	18	16	18	16	16	16	16	E	S	E	S	E	S	E	S
7	E	S	E	S	E	S	E	S	16	16	16	16	18	19	21	20	15	15	16	E	S	E	S	E	S	E	S
8	E	S	E	S	E	S	E	S	16	15	15	20	20	17	16	16	18	15	15	E	S	E	S	E	S	E	S
9	E	S	E	S	E	S	E	S	15	15	16	17	15	15	15	14	15	15	16	E	S	E	S	E	S	E	S
10	E	S	E	S	E	S	E	S	14	14	15	17	16	19	15	14	15	14	15	E	S	E	S	E	S	E	S
11	E	S	E	S	E	S	E	S	15	16	14	18	21	21	20	17	15	14	16	E	S	E	S	E	S	E	S
12	E	S	E	S	E	S	E	S	14	14	15	19	18	20	19	16	15	14	16	E	S	E	S	E	S	E	S
13	E	S	E	S	E	S	E	S	16	14	16	22	16	19	17	16	14	14	16	E	S	E	S	E	S	E	S
14	E	S	E	S	E	S	E	S	15	15	16	15	18	24	21	21	15	16	16	E	S	E	S	E	S	E	S
15	E	S	E	S	E	S	E	S	15	14	15	16	19	17	24	23	22	18	16	E	S	E	S	E	S	E	S
16	E	S	E	S	E	S	E	S	16	15	16	16	17	23	21	16	16	16	16	E	S	E	S	E	S	E	S
17	E	S	E	S	E	S	E	S	16	15	14	17	18	25	18	17	16	16	16	E	S	E	S	E	S	E	S
18	E	S	E	S	E	S	E	S	15	14	15	15	15	16	13	16	16	15	16	E	S	E	S	E	S	E	S
19	E	S	E	S	E	S	E	S	16	14	15	16	22	20	23	17	16	16	16	E	S	E	S	E	S	E	S
20	E	S	E	S	E	S	E	S	16	15	16	16	16	14	23	16	16	15	16	E	S	E	S	E	S	E	S
21	E	S	E	S	E	S	E	S	15	21	17	17	17	19	17	16	16	16	16	E	S	E	S	E	S	E	S
22	E	S	E	S	E	S	E	S	14	14	16	19	17	20	21	13	17	16	16	E	S	E	S	E	S	E	S
23	E	S	E	S	E	S	E	S	16	15	17	16	16	16	15	16	16	16	16	E	S	E	S	E	S	E	S
24	E	S	E	S	E	S	E	S	16	17	16	17	16	15	15	16	16	14	14	E	S	E	S	E	S	E	S
25	E	S	E	S	E	S	E	S	15	15	16	16	17	18	16	16	16	16	16	E	S	E	S	E	S	E	S
26	E	S	E	S	E	S	E	S	16	16	16	16	20	20	24	24	15	15	15	E	S	E	S	E	S	E	S
27	E	S	E	S	E	S	E	S	16	16	16	16	16	20	17	16	16	16	16	E	S	E	S	E	S	E	S
28	E	S	E	S	E	S	E	S	16	16	16	16	16	16	16	17	16	16	16	E	S	E	S	E	S	E	S
29	E	S	E	S	E	S	E	S	16	16	16	16	16	16	23	13	15	18	17	E	S	E	S	E	S	E	S
30	E	S	E	S	E	S	E	S	15	16	16	17	16	18	18	16	16	16	16	E	S	E	S	E	S	E	S
31																											
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
MED	E	S	E	S	E	S	E	S	15	15	16	17	17	19	18	16	16	16	16	E	S	E	S	E	S	E	S
UQ	E	S	E	S	E	S	E	S	16	16	16	18	19	21	21	17	16	16	16	E	S	E	S	E	S	E	S
LQ	E	S	E	S	E	S	E	S	15	15	16	16	16	16	16	16	15	14	16	E	S	E	S	E	S	E	S

NOV. 1987

FMIN (0.1 MHz)

# IONOSPHERIC DATA

NOV. 1987

M(3000)F2 (0.01)

135° E Mean Time (G.M.T. + 9 h)

Station	Oktawa												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	275	295 <sup>S</sup>	285	310	350	355	335	360	365	375	335	335	335	320	310	330	R	R	S	S	S	S	U	S	U	S																									
2	280	315 <sup>S</sup>	325 <sup>S</sup>	305	320	345	320	340	365	345	325	350	325	305	305	325	R	R	R	R	S	S	J	H	H																										
3	290	310	335	335	320	260	285	340	315	320	H	340	305	310	320	315	R	R	S	S	345	345	275	285	R																										
4	290	295	310	330	320	295	F	F	375	365	325	325	340	325	300	305	320	330	350	340	R	295	290	325	325	305																									
5	315 <sup>S</sup>	325	340	350	340	290	305	345	360	360	345	350	325	285	315	335	R	R	S	S	305	315	320	280	R																										
6	300	310	305	295	325	340	355	340	R	355	350	305	335	320	290	310	295	R	R	S	S	280	315	315	340	R																									
7	315	295	290	315	375	325	305	345	375	355	335	325	300	310	315	315	U	R	J	R	U	U	S	S	S	U	S	S																							
8	340	330	360	310	330	320	340	345	345	335	330	U	R	340	310	300	315	U	R	U	R	S	S	295	325	335	295	S																							
9	305	305	330	315	335	365	315	345	365	345	335	345	345	300	305	320	U	R	U	R	U	S	295	340	350	S	280																								
10	280	295 <sup>S</sup>	310 <sup>S</sup>	320	355	360	295	320	350	335	350	340	320	345	310	310	R	R	S	S	285	315	295	285	S	285																									
11	310	310	310	310	365	335	295	340	360	345	R	345	330	320	300	325	335	R	R	S	S	270	295	290	285	S																									
12	285	300	320	300	330	360	310	345	350	335	350	315	335	320	320	320	R	R	U	S	S	295	295	300	305	S	U	S																							
13	285	285	285	300	340	S	325	285	325	350	365	320	320	300	295	315	R	R	R	U	S	S	310	310	325	325	S																								
14	320	290	275	340	355	280	310	S	335	360	355	350	345	325	310	325	R	R	S	U	S	S	285	285	305	290	S	300																							
15	305	S	365	310	280	F	F	335	340	325	335	325	360	325	320	325	R	R	S	S	285	315	S	310	S	S	310																								
16	U	S	340	335	335	330	355	295	320	S	350	355	350	345	340	290	310	310	320	R	U	R	U	S	305	305	300	315	S	290	S																				
17	U	S	315	305	310	315	U	S	365	350	370	350	360	360	335	350	U	R	345	325	340	350	365	345	345	325	295	320	335	345	S																				
18	310	320	340	345	345	385	340	340	355	365	330	320	335	325	335	340	360	360	340	U	S	320	330	335	305	S	S	310	S																						
19	315	310	U	S	335	345	U	S	365	375	325	350	345	340	360	345	335	310	325	320	325	340	305	300	315	340	300	S	310	S																					
20	305	290	330	295	335	375	305	R	305	310	325	340	U	R	315	320	315	295	305	325	335	340	335	345	320	310	300	S	S	S																					
21	290	S	310	305	305	370	335	310	S	320	335	305	325	340	290	315	R	330	335	340	R	340	355	305	300	320	300	330	S	S																					
22	260	S	305	340	340	355	355	325	335	360	355	350	335	295	315	330	340	R	R	S	S	340	315	310	320	320	320	S	S	S																					
23	290	290	320	310	335	320	305	340	360	345	335	320	305	315	335	335	340	U	R	U	R	340	320	330	290	U	S	300	330	315	S																				
24	295	S	325	365	305	310	290	S	280	335	375	345	335	320	335	315	315	320	335	355	360	340	S	280	285	310	350	S	S	S																					
25	285	S	310	310	320	350	330	305	320	345	U	R	335	375	340	320	315	R	330	325	305	330	360	310	295	315	335	295	S	S																					
26	290	285	305	310	340	375	A	320	345	355	345	325	320	305	315	315	R	U	R	320	335	345	335	305	310	S	285	295	S	S																					
27	U	S	300	285	320	325	335	300	300	315	315	335	335	340	315	300	U	R	U	R	340	315	305	305	310	345	325	345	300	325	S																				
28	315	345	305	285	290	305	335	320	325	325	J	R	305	305	305	305	U	R	U	R	345	325	345	360	290	315	300	300	S	S																					
29	300	S	285	320	340	335	320	290	355	350	355	355	360	345	340	325	H	335	340	370	340	305	350	S	350	345	285	S	S	S																					
30	310	295	320	305	310	320	315	350	R	335	320	350	345	365	325	310	330	U	R	U	R	350	350	320	315	325	335	340	S	S	S																				
31																																																			
CNT	30	29	30	30	30	30	28	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30																							
MED	300	305	320	312	338	328	310	340	352	345	335	340	322	310	315	320	R	335	335	340	318	295	315	315	300	S	S	S	S	S	S																				
UQ	315	310	335	330	355	355	330	345	360	355	350	345	335	320	325	335	R	340	345	345	335	315	325	330	320	S	S	S	S	S	S																				
LQ	290	S	295	305	305	325	300	302	325	345	335	325	325	305	305	310	315	R	R	S	S	285	305	300	285	S	S	S	S	S	S																				

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M(3000)F2 (0.01)

### IONOSPHERIC DATA

NOV. 1987

M(3000)F1 (0.01)

135° E Mean Time (G.M.T. + 9 h)

Station		OKINAWA							Lat. 26 15.9 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	U L	U L	L	A	L	L														
2										L	L	U L	U L	L	L	L	A	A														
3											A	L	L	L	L	L	L	L														
4											L	L	U L	U L	A	A	L															
5											L	L	U L	U L	L	B	L	L														
6										L	L	L	L	L	U L	U L	L	L														
7										L	L	L	U L	U L	L	L	L	L														
8											L	L	L	U L	L	A	L	U L														
9										L	L	L	U L	U L	U L	L	L															
10											L	U L	U L	A	L	U L	L	L														
11											L	L	L	U L	L	L	L	L														
12											L	U L	U L	U L	U L	U L	L	A														
13											L	U L	L	U L	L	L	L	A														
14											L	L	L	A	L	U L	L	L	L													
15											L	A	A	L	A	L	L	L														
16											L	U L	U L	U L	L	U L	U L	A														
17											L	L	U L	L	L	L	L	L														
18											L	L	U L	U L	U L	L	L	L														
19											L	L	L	L	U L	U L	L	L	A													
20											L	L	U L	L	L	L	L	A														
21												L	L	L	U L	L	L	L														
22												L	L	L	L	U L	L	L	L													
23											L	L	L	L	U L	L	U L	L														
24											L	L	L	L	A	A	L	L														
25											L	L	L	U L	L	U L	L	A														
26											L	L	L	U L	U L	U L	L	A														
27											L	L	L	U L	U L	U L	A	L	L													
28											L	L	U L	U L	U L	A	U L	A														
29											L	L	L	L	L	U L	L	L														
30											L	L	L	L	U L	U L	L	L														
31												L	L	L	U L	U 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												7	16	19	14	14	5	1														
MED												U L	U L	U L	U L	U L	U L	U L														
UQ												3.80	3.80	3.85	3.85	3.75	3.75	4.05														
LQ												3.82	3.95	3.95	3.95	3.85	3.90															
												3.65	3.75	3.80	3.75	3.65	3.75															

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M(3000)F1 (0.01)

### IONOSPHERIC DATA

NOV. 1987

H<sup>o</sup>F<sub>2</sub> (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 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	220	265	265	255	270	300	255	230								
2									235	245	280	245	240	275	270	245	240								
3									230	245	245	260	275	270	260 <sup>L</sup>	250									
4									240 <sup>L</sup>	270	250	240	280	280	260	235									
5									235	250	245	250 <sup>L</sup>	240 <sup>L</sup>	280	255	240									
6									245	250	280	270	260	270	280	255	225	225							
7									230	240	265	265	240	280	275	265	270								
8									240	265	255	260	265	260	240	240									
9									230	240	260	260	240	265	300	260	235								
10									250	250	255	255	250	275	250	230									
11									255	250	255	255	275	270	255	230									
12									245	230	280	260	255	275	250	235									
13									220	270	270	300	300	270	255	220									
14									245	245	250	270	270	270	235	225	210								
15									245	265	230	250	270 <sup>L</sup>	255	230	215									
16									245	265	250	275	285	280	245	225									
17									240	260	240	255	260	240	245	225									
18									240	260	260	265	275	260	255	230									
19									240	240	260	275	260	260	250	240	225								
20									260	240	280	260	260	260	275	240									
21									255	265	245	290	280	255	250	215									
22									245	245	250	290	280	265	240	220	210								
23									225	240	260	280	290	280	260	240	230								
24									240	255	270	255	255	255	250	235									
25									260	265	240	240	240	250	250										
26									240	250	260	270	270	260	240	230									
27									250	250	250	255	260	275											
28									270 <sup>L</sup>	265	260	245	250	260	250	245									
29									250	250	235	245	255	250	250	235									
30									280 <sup>U L</sup>	250	245	250	250	245	230	230									
31																									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT									9	30	30	30	30	30	29	29	29	4							
MED									235	245	258	255	258	270	265	250	230	218							
UQ									250	250	265	265	270	275	275	255	240	225							
LQ									230	240	250	245	250	260	255	245	225	210							

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H<sup>o</sup>F<sub>2</sub> (KM)

# IONOSPHERIC DATA

NOV. 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	S	S										A		A										
2				S								A		A		A								
3					E	S					A		A		A									
4	E	S	S	S		A	S														A	E	A	
5				E	S	S	S														A			E
6				S		E	S					A		A										
7		E	S	S		S																		
8			E	A																				
9	S	S	E	S	S																			
10																								
11																								
12																								
13																								
14																								
15																								
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22																								
23																								
24																								
25																								
26																								
27																								
28																								
29																								
30																								
31																								
CNT	27	26	27	30	28	22	10	30	30	26	26	21	20	19	21	17	17	26	30	29	30	30	30	28
MED	262	258	248	255	240	225	228	232	230	220	215	210	208	210	215	220	225	220	205	205	215	230	231	245
UQ	271	272	262	272	252	248	275	245	230	230	220	220	218	222	220	225	230	230	215	210	248	245	248	266
LQ	250	250	230	245	225	215	230	225	220	210	205	205	200	200	210	210	220	210	200	200	210	220	225	232

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H\*F (KM)

### IONOSPHERIC DATA

NOV. 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								A	100	100	100	100	105	105	105	105	A	A							
2								S	105	105	100	105	105	105	110	105	A	A							
3								S	105	105	105	105	110	115	115	115		A							
4								A	110	A	A	105	100	105	105	110	115	115							
5								E S 150	120	115	A	A	A	A	3	A	A	A							
6								S	110	110	105	105	105	105	105	105	A	A							
7								S	110	110	110	110	110	110	110		A	A	S						
8								E S 140	110	120	A	110	110	110	105	105	110	105	105						
9								E S 140	110	110	120	110	110	110	100		A	A	A						
10								S	105	105	100	100	100	100	100		A	A							
11								S	105	105	105	105	105	105	105		A	A	A						
12								S	110	105	105	105	105		A	A	A	A	A						
13								S	110	105	105	105	105	105	105		A	A	A						
14								14S	120	105	105	105	110		A	A	A		115	115					
15								A	110	105	105	105	105		A	110	115	115	115						
16								S	115	H	H	110	105	110	110	110	110	115		A					
17								S	110	110	110	110	110	110	110	110	110	105		S					
18								110	110	110	105		A	A	A	A	A	A	A						
19								S	110	105	105	105	105	105	110	105	105	105		S					
20								S	110	A	105	105	105	105	105		A	A	S						
21								S	105	110	105	105	105	105	105	105		A	A						
22								S	110	105	105	105	105	105	105	105		A	S						
23								S	110	110	105	105	105	105		A	A	A	S						
24								A	105	A	A	105	105	105	100	105	105		S						
25								S	110	110	110	110	110	110		A	A	A	A						
26								S	A	110	A	105	110	110	110	105	105		A						
27								S	110	110	105	105	105		A	A	A	A	S						
28								S	110	110	105	105	105	105	105	110	115		A						
29								S	115	A	105	100	100	110		A	A	B	B						
30								S	115	110	105	105	105	105	110	110		A	A						
31																									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT								5	29	27	26	23	28	24	22	17	14	6							
MED								E S 140	110	110	105	105	105	105	105	105	115	115							
UQ								E S 145	110	110	105	105	110	110	110	110	115	120							
LQ								E S 140	110	105	105	105	105	105	105	105	105	115							

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H°E (KM)



# IONOSPHERIC DATA

NOV. 1937

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				
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	105	100	S	S	S	105	S	100	G	130	120	120	120	115	115	115	105	105	105	100	100	100	100	100					
2	100	100	100	S	S	S	S	G	135	120	120	120	120	120	120	110	105	105	105	100	100	105	100	105					
3	105	S	S	S	S	S	110	150	125	125	125	130	125	175	120	120	115	110	100	105	105	100	100	100					
4	S	S	105	100	100	100	100	140	E G 150	110	120	G	E G 155	125	115	115	E G 160	105	105	105	105	105	100	100					
5	S	100	100	100	S	S	S	G	180	100	125	125	125	110	B	125	120	105	110	100	155	105	100	S					
6	S	S	S	S	S	100	100	G	G	150	130	120	115	115	115	110	110	110	95	95	S	S	S	S					
7	S	S	S	S	S	S	100	S	G	G	150	G	G	G	150	140	125	100	95	S	S	S	S	S					
8	S	S	100	S	S	100	S	G	E G 160	E G 160	155	150	150	125	115	G	G	120	100	S	S	110	110	105					
9	110	110	110	S	S	S	S	G	G	G	E G 165	E G 160	E G 160	G	125	E G 160	100	100	S	100	S	S	110	S					
10	105	100	100	100	S	S	S	E G 160	E G 170	150	145	145	125	130	120	110	105	105	100	100	100	100	100	100					
11	S	S	S	S	S	S	S	E G 155	G	120	E G 160	G	G	125	110	105	105	105	105	105	100	100	100	100					
12	S	S	S	S	S	S	S	G	155	130	120	120	115	105	110	105	105	100	100	100	100	S	S	S					
13	100	S	S	S	S	S	S	G	115	120	120	130	120	115	105	110	100	100	100	S	S	S	S	S					
14	S	S	100	100	100	S	S	155	G	135	130	125	115	110	110	110	115	115	S	S	125	120	120	S					
15	105	100	105	100	110	S	S	110	110	105	100	105	105	110	115	110	115	G	110	S	S	S	S	S					
16	100	100	S	S	100	95	S	G	E G 170	120	120	115	115	110	115	110	105	105	100	100	100	S	S	S					
17	S	100	100	100	100	100	S	100	G	E G 160	E G 140	125	125	125	G	115	115	115	110	110	110	110	105	105					
18	100	100	S	S	S	S	S	G	G	125	120	110	E G 140	130	110	110	105	110	110	105	100	S	100	S					
19	S	S	S	S	S	S	S	G	120	125	125	125	125	125	120	115	115	110	110	100	105	100	100	100					
20	S	S	100	S	110	S	S	G	E G 160	135	135	120	115	115	115	110	110	100	110	S	120	S	110	110					
21	S	100	100	100	100	S	S	G	135	135	120	130	120	120	120	120	105	105	105	S	S	S	S	S					
22	S	S	S	S	S	S	S	G	G	G	125	120	120	125	125	115	105	120	110	105	100	100	S	S					
23	S	S	S	S	S	110	S	G	120	115	115	120	115	110	110	110	110	110	110	S	S	S	S	S					
24	S	S	S	S	S	105	105	105	G	105	105	150	130	120	115	115	115	115	105	105	100	100	105	S					
25	110	110	105	S	100	105	105	S	G	G	G	135	135	125	110	110	110	110	110	105	105	105	105	100					
26	100	S	110	105	105	110	110	S	110	140	110	120	G	E G 140	120	120	110	155	105	100	100	100	100	100					
27	100	S	S	S	S	S	100	100	G	G	115	115	115	110	105	110	110	110	110	100	100	100	100	S					
28	S	S	S	100	100	100	S	S	120	115	115	120	115	110	115	110	105	105	105	100	100	S	100	105					
29	105	S	S	105	105	S	S	S	115	E G 145	130	130	125	125	115	120	120	G	S	105	S	S	100	S					
30	S	S	S	S	S	S	100	100	G	115	110	115	110	110	110	105	105	100	100	100	95	S	S	S					
31																													
CNT	13	11	14	10	11	10	10	11	16	25	29	28	26	28	28	29	29	28	27	22	21	16	20	13					
MED	105	100	100	100	100	100	102	102	U 126	122	120	120	120	118	115	110	110	106	105	100	100	102	100	100					
UQ	105	100	105	100	105	105	110	130	U 148	132	128	130	125	125	120	115	115	111	110	105	105	105	105	105					
LQ	100	100	100	100	100	100	100	100	118	120	115	120	115	110	110	110	105	105	100	100	100	100	100	100					

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# IONOSPHERIC DATA

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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	F2	F3			F1		L4			CL12	C2	C3	CL11	C2	C3	C3	L2	L4	F4	F7	F3	F3	F3	F1		
2	F2	F1	F2						C1	C1	C2	C2	C3	C3	C4	L4	L5	F6	F3	F3	F2	F3	F3	F1		
3	F1					F1	H2		C2	C2	C3	C2	C2	H1	C1	C2	L1	L2	F3	F5	F5	F4	F4	F2		
4			F1	F3	F2	F3	F2	L4	H1	CL11	CL11	C1		H1	C3	C5	C1	H1	F3	F3	F3	F3	F4	F4		
5		F1	F1	F1					H1	L1	CL21	CL21	CL11	L1		CL21	L3	L5	F5	F6	FF21	F3	F3			
6					F1	F2			H1	C2	C2	C2	C2	C1	C1	L1	L1	F2	F2							
7						F3					H1				H2	HL21	CL22	L1	F2							
8			F1		F1				H1	HL11	H2	H1	H2	C2	C4			C2	F1			F4	F6	F5		
9	F3	F2	F2								HL11	H1	H1		C1	HL11	L1	L1		F1			F1			
10	F1	F1	F1	F1				H3	H2	H2	H1	H2	C2	C2	C2	C3	L4	L4	F3	F5	F4	F8	F6	F2		
11								H2		C2	H1			C1	C2	L3	L2	L4	F7	F4	F2	F1	F2	F2		
12								H2	C2	C1	C2	C1	L1	L2	L2	L5	L5	F3	F4	F1						
13	F1							C2	C2	C2	C2	C3	C4	C2	L1	L3	L3	F4								
14			F3	F3	F1			H1	H3	C2	C3	C3	L2	L2	L2	C1	L1				F4	F1	F2			
15	F1	F1	F1	F1	F2			L3	C2	C3	L4	C3	L3	L2	C2	C3	C1		F1							
16	F3	F2			F1	F3			H1	C1	C2	C2	C2	C3	L1	L2	L3	L3	F3	F5	F5					
17		F1	F1	F2	F1	F1		L1	H1	C1	C1	C2	C1		C2	C3	C2	F3	F4	F2	F2	F3	F2			
18	F1	F1							C1	C1	L2	CL11	CL22	L2	L3	L2	L2	F1	F3	F3		F1				
19									C2	C1	C1	C1	C2	C1	C2	C3	C4	L5	FF43	F5	F5	F1	F4	F1		
20			F3		F1				H1	HL11	H1	C2	C2	C3	C2	L2	L3	L6	F2		FF32	F1	F2			
21		F5	F3	F3	F3				C1	C1	C1	C1	C2	C3	C2	C2	L3	L3	F5							
22									C1	C2	C2	C2	C1	C1	C2	L1	L1	C1	F3	F3	F3	F3				
23									C2	C2	C3	C2	C2	C2	L2	L1	L1	L2	F1							
24					F2	F5	L3		L2	L2	H2	C3	C4	C5	C3	C3	C3	F5	F1	F3	F4	F4				
25	F1	F2	F1		F3	F1	F2				H2	H2	C3	L2	L2	L2	L2	L2	F1	F3	F2	F3	F1	F1		
26	F1		F1	F2	F2	F4	F7		L2	H2	L1	C2		H1	C1	C3	C4	HL32	F4	F4	F2	F1	F1	F1		
27	F2					F1	L1			C3	C2	C2	C2	L2	L4	L3	L2	L1	F1	F1	F2	F1	F2			
28				F2	F4	F2			C2	C3	C2	C2	C2	C3	C3	C3	L4	L5	F6	F5	F3		F4	F2		
29	F1			F3	F1				LH11	HL21	H3	H2	C2	C1	L1	CL11	C1			F3			F2			
30			F1			F2	L1		C1	C1	C2	C1	C1	C2	L3	L3	L5	F5	F4	F2						
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																										

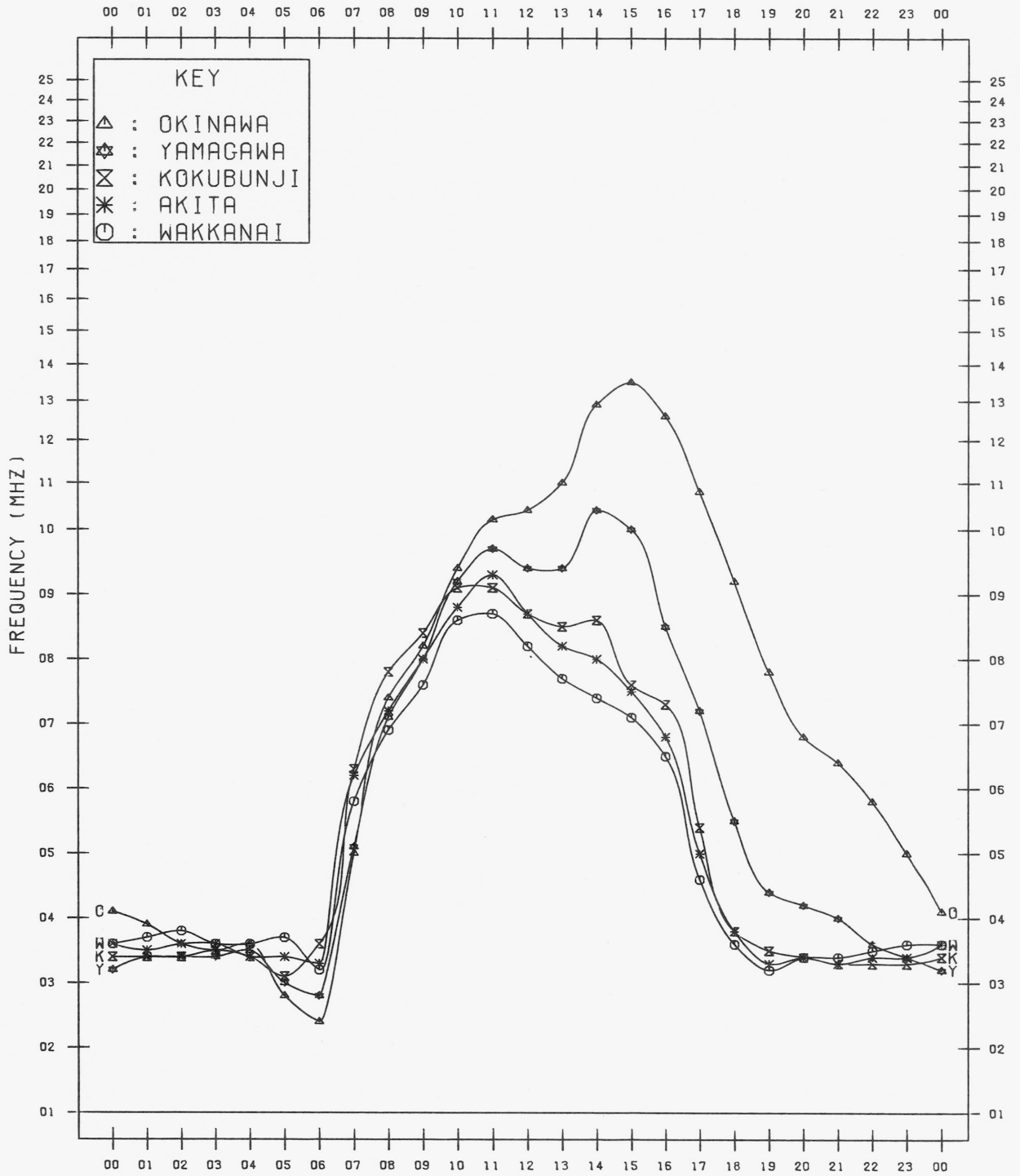
NOV. 1987

TYPES OF ES

# MONTHLY MEDIAN VALUES OF FOF2

135 °E MEAN TIME

NOV. 1987



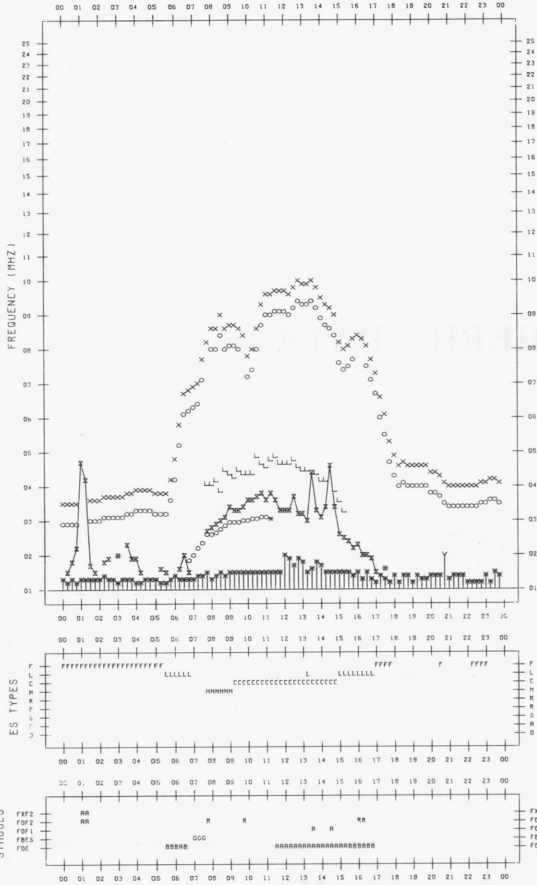
*f*-PLOTS OF IONOSPHERIC DATA

KEY OF F-PLOT	
I	SPREAD
○	F <sub>0</sub> F <sub>2</sub> , F <sub>0</sub> F <sub>1</sub> , F <sub>0</sub> E
×	F <sub>X</sub> F <sub>2</sub>
*	DOUBTFUL F <sub>0</sub> F <sub>2</sub> , F <sub>0</sub> F <sub>1</sub> , F <sub>0</sub> E
⊗	F <sub>B</sub> E <sub>S</sub>
L	ESTIMATED F <sub>0</sub> F <sub>1</sub>
*.Y	F <sub>MIN</sub>
^	GREATER THAN
v	LESS THAN

F-PLOT DATA

SCALER : T.KOIZUMI

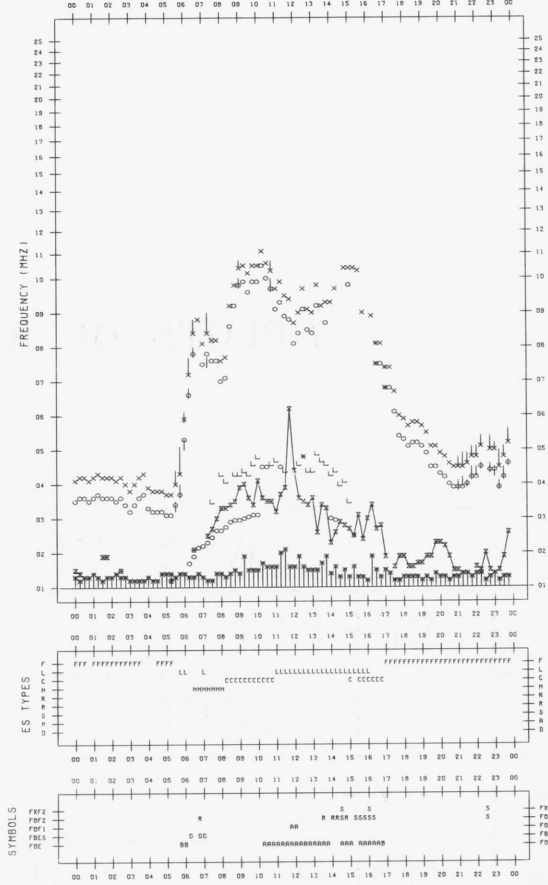
STATION : KOKUBUNJI TOKYO 135°E MEAN TIME DATE : 1987/11/ 1



F-PLOT DATA

SCALER : T.KOIZUMI

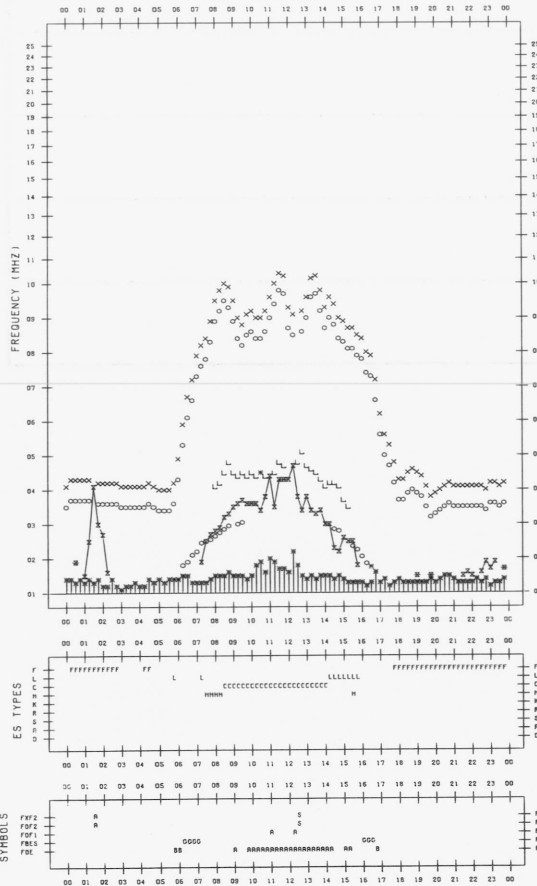
STATION : KOKUBUNJI TOKYO 135°E MEAN TIME DATE : 1987/11/ 3



F-PLOT DATA

SCALER : T.KOIZUMI

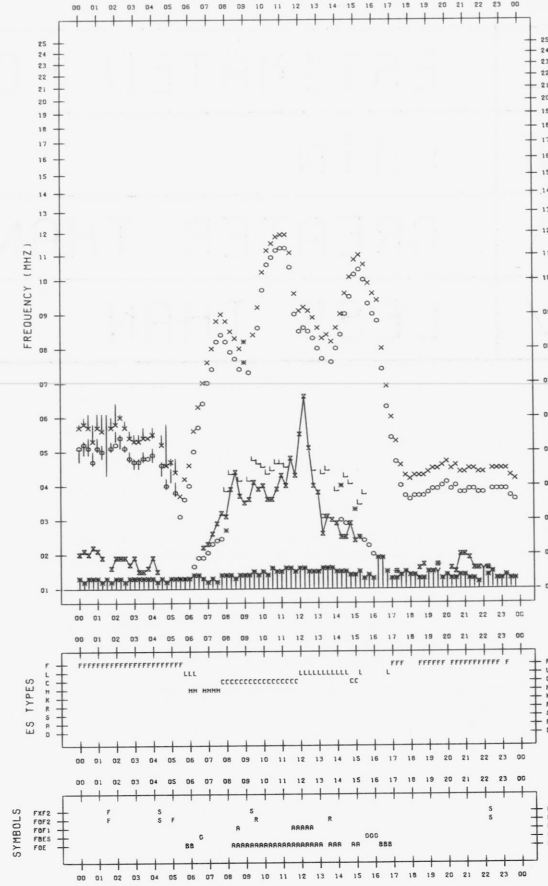
STATION : KOKUBUNJI TOKYO 135°E MEAN TIME DATE : 1987/11/ 2

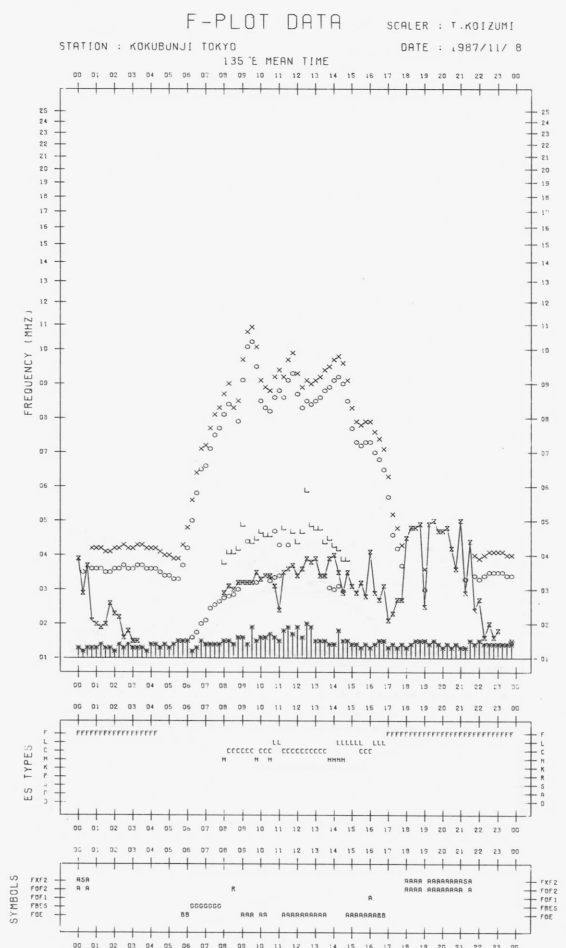
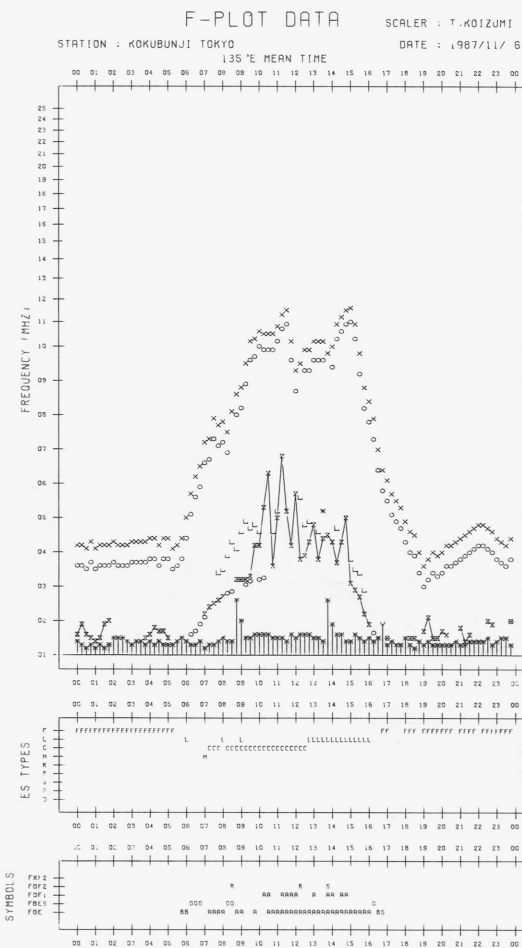
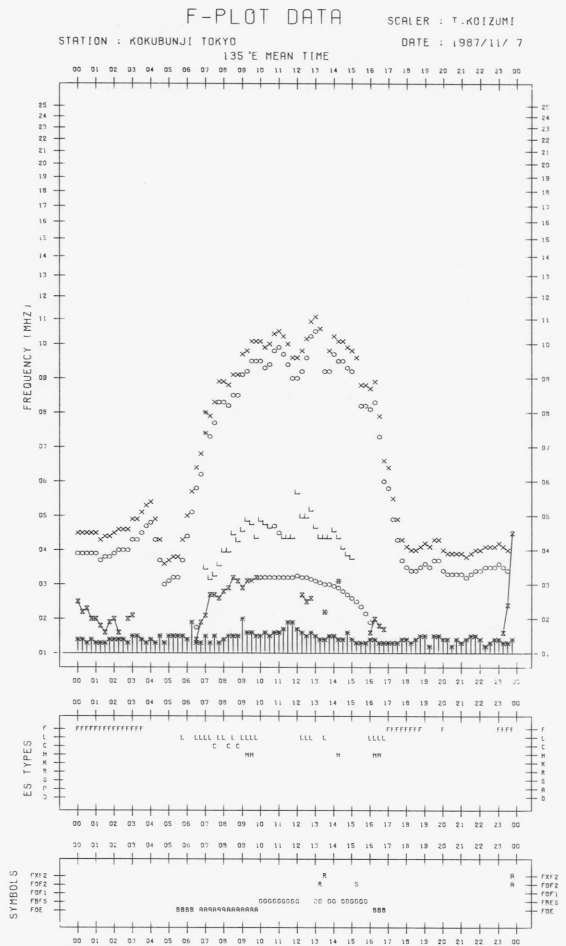
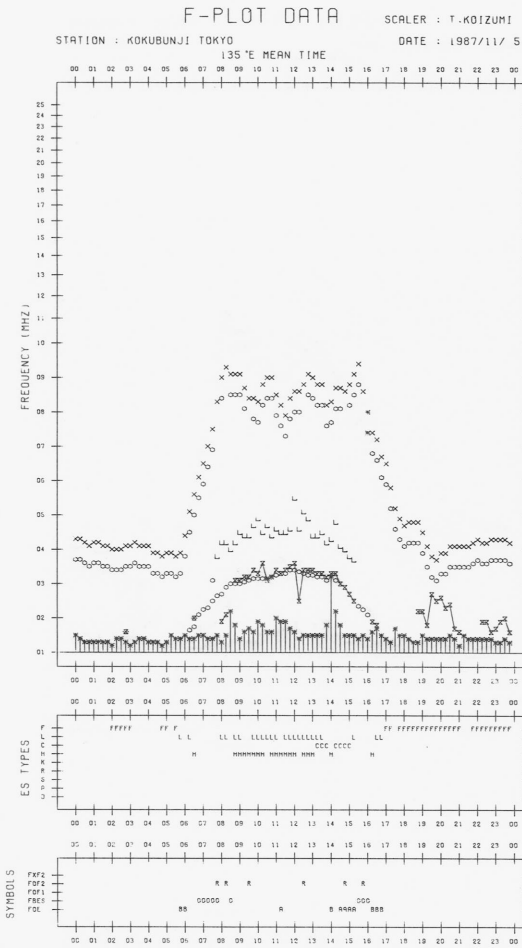


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO 135°E MEAN TIME DATE : 1987/11/ 4





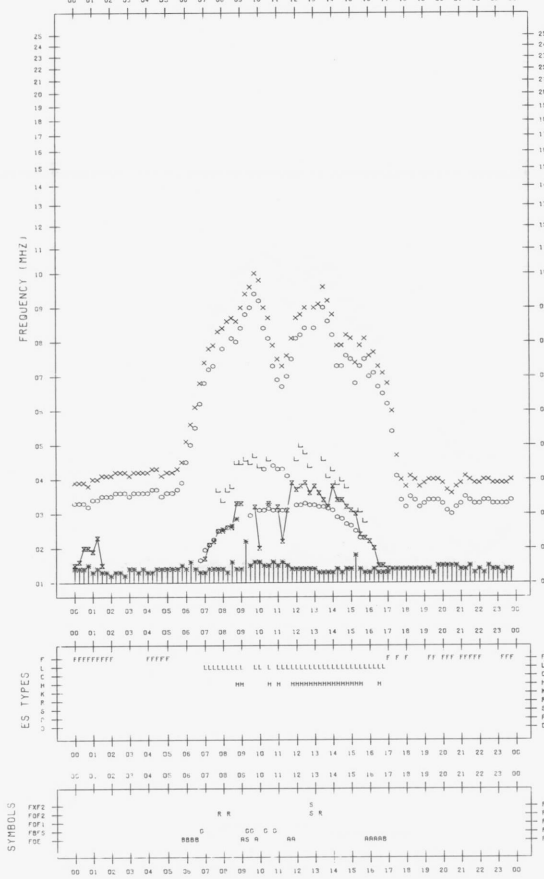
F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO

DATE : 1987/11/9

135°E MEAN TIME



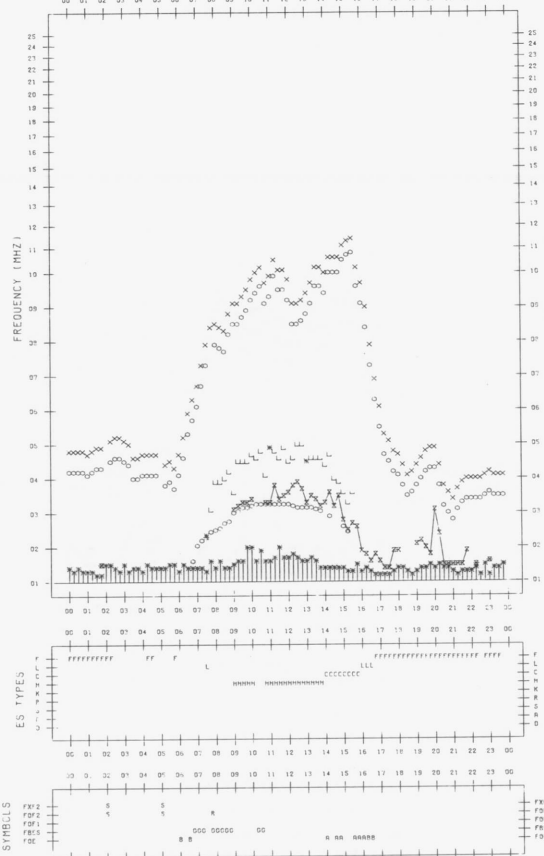
F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO

DATE : 1987/11/11

135°E MEAN TIME



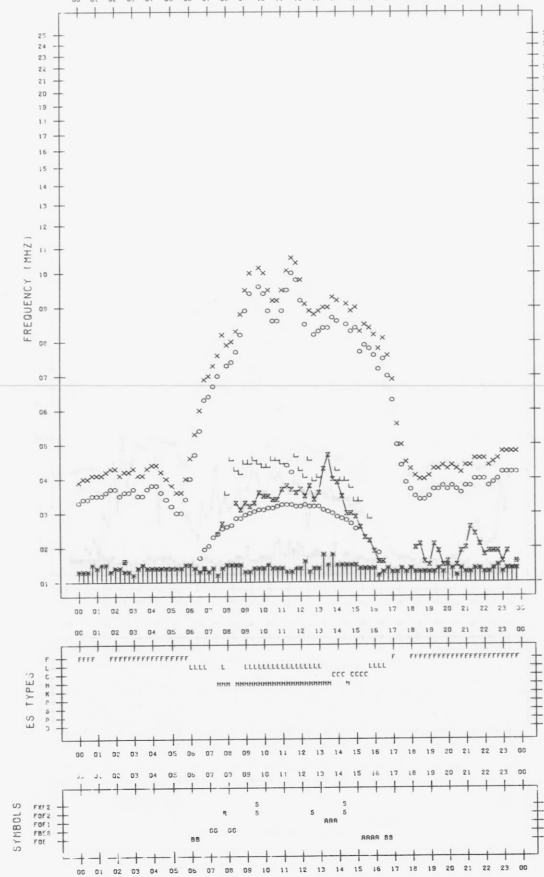
F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO

DATE : 1987/11/10

135°E MEAN TIME



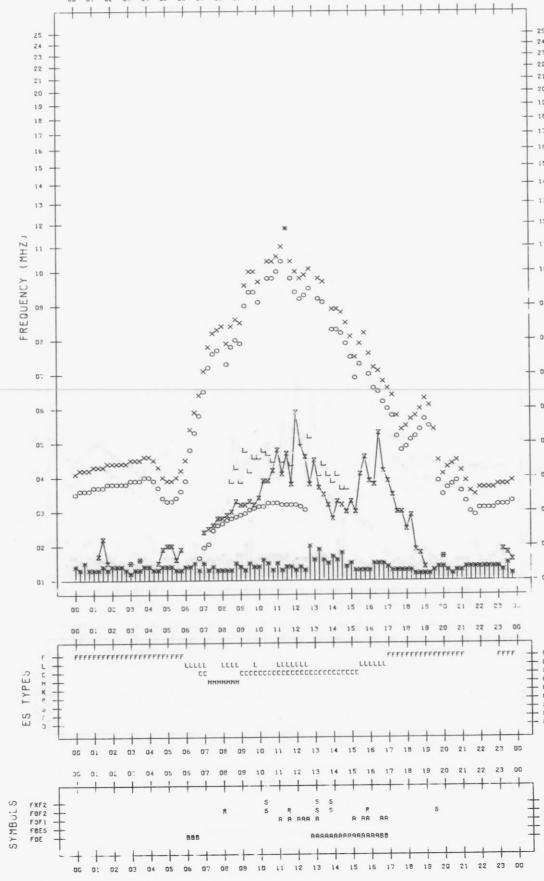
F-PLOT DATA

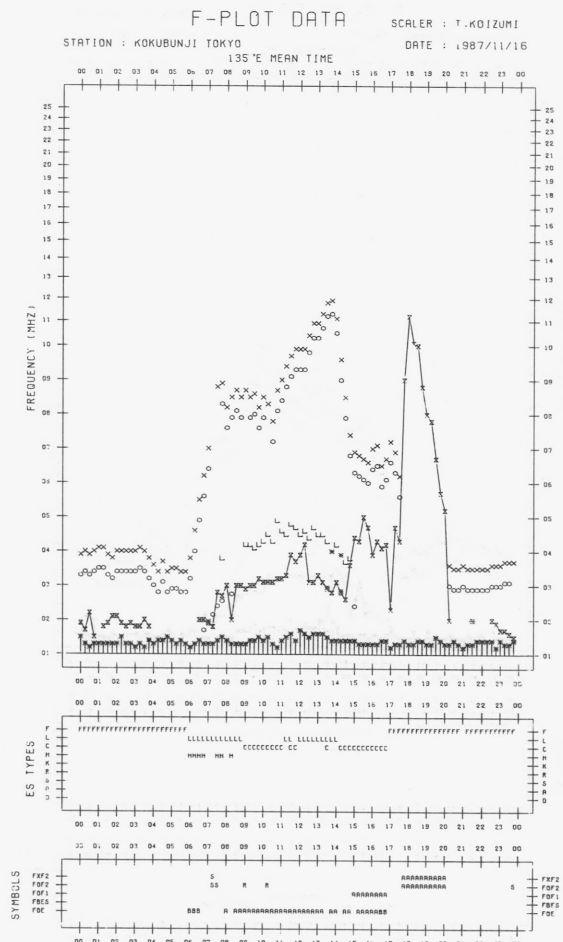
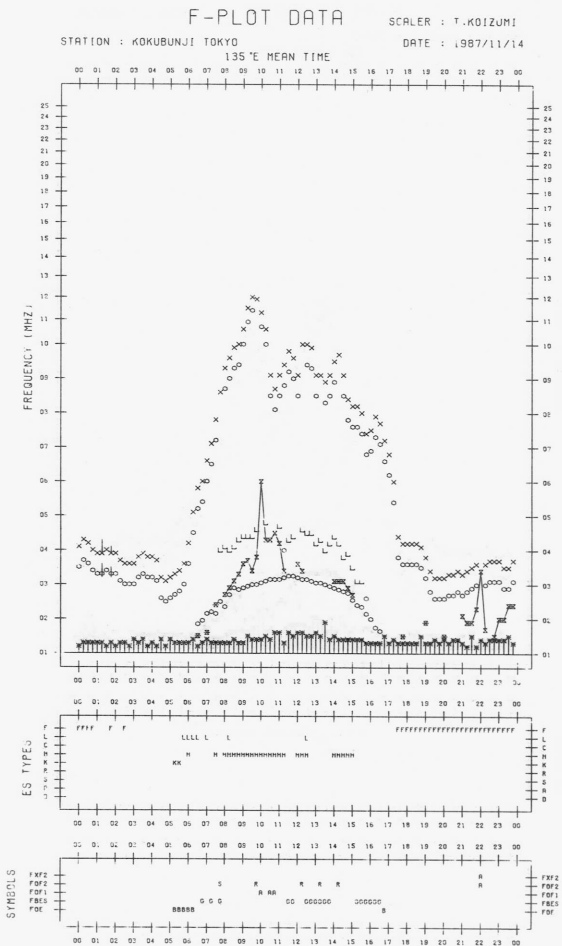
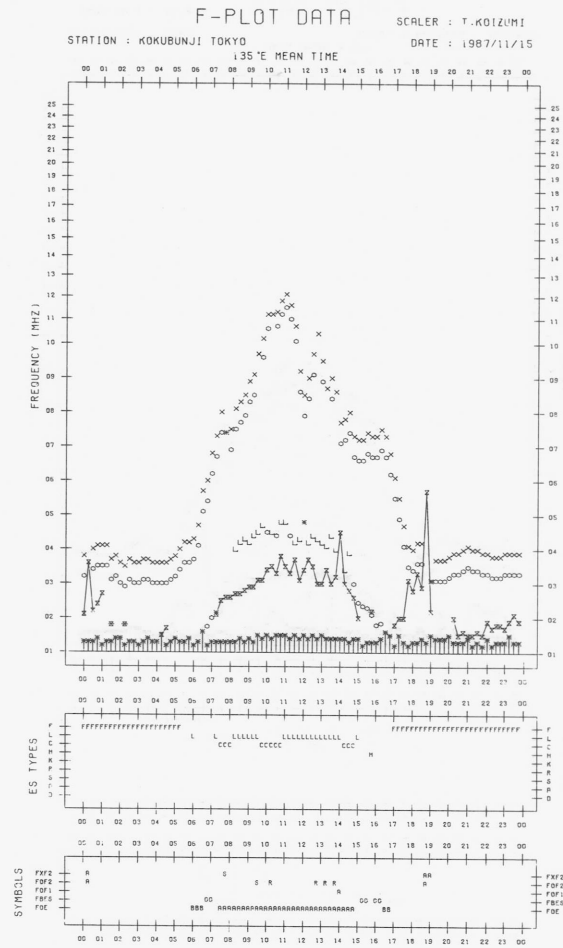
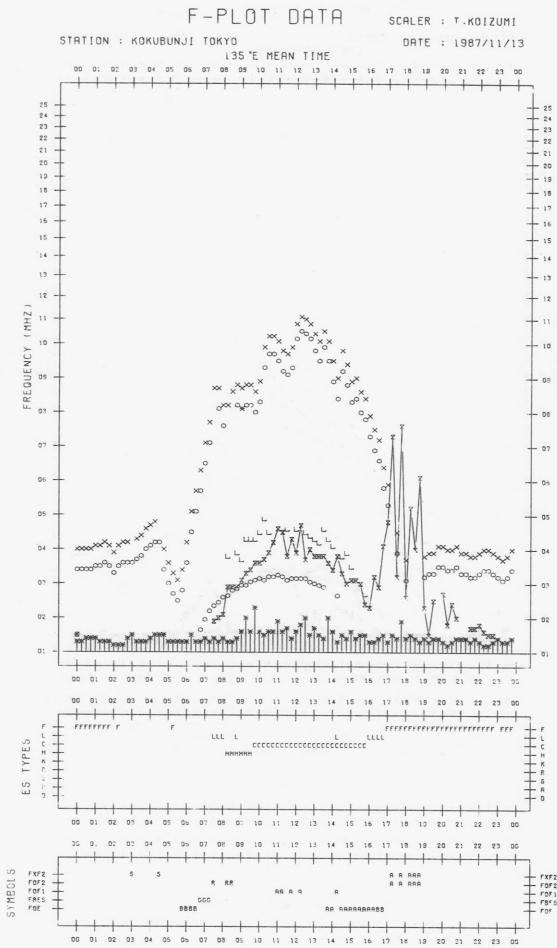
SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO

DATE : 1987/11/12

135°E MEAN TIME



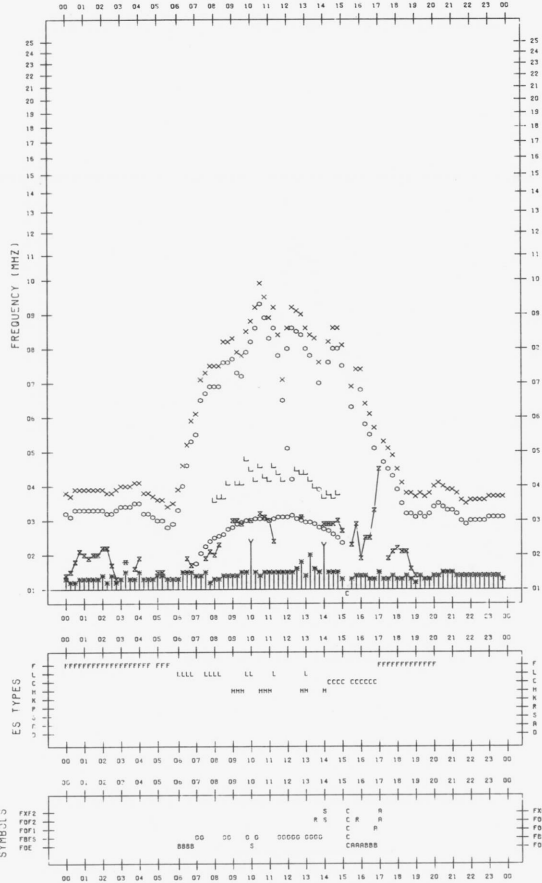




F-PLOT DATA

SCALER : T.KOIZUMI

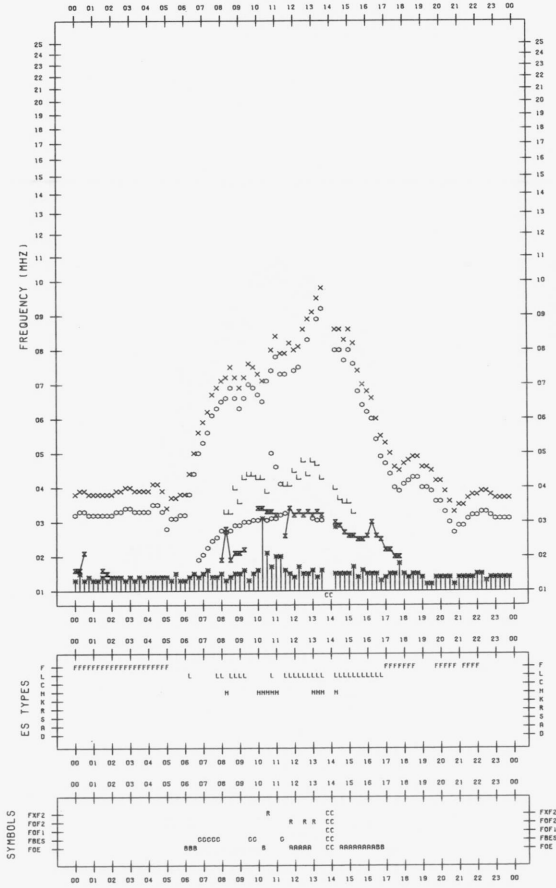
STATION : KOKUBUNJI TOKYO DATE : 1987/11/17  
135°E MEAN TIME



F-PLOT DATA

SCALER :

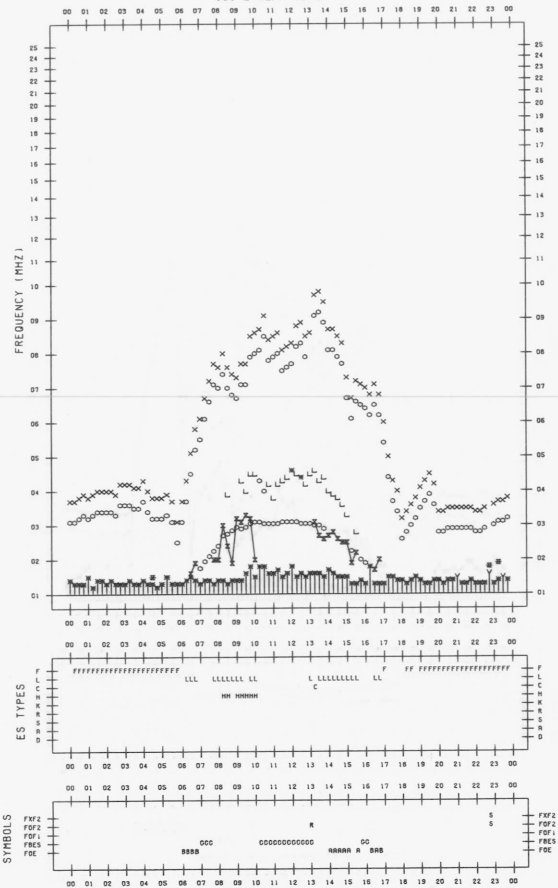
STATION : KOKUBUNJI TOKYO DATE : 1987/11/19  
135°E MEAN TIME



F-PLOT DATA

SCALER : T.KOIZUMI

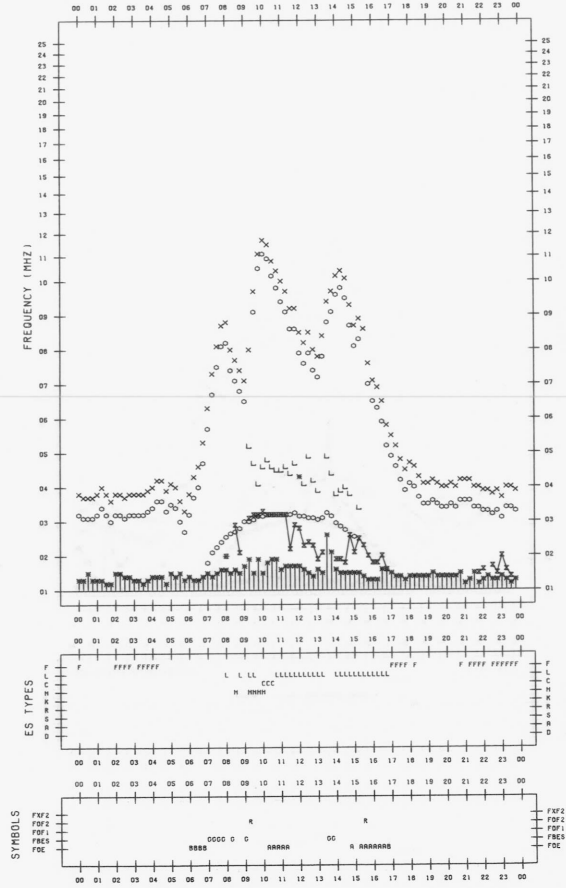
STATION : KOKUBUNJI TOKYO DATE : 1987/11/18  
135°E MEAN TIME

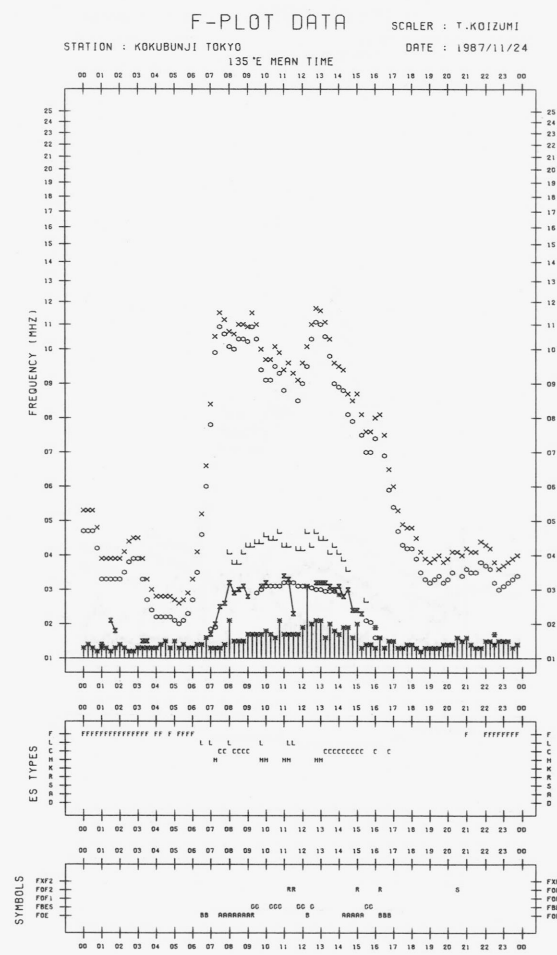
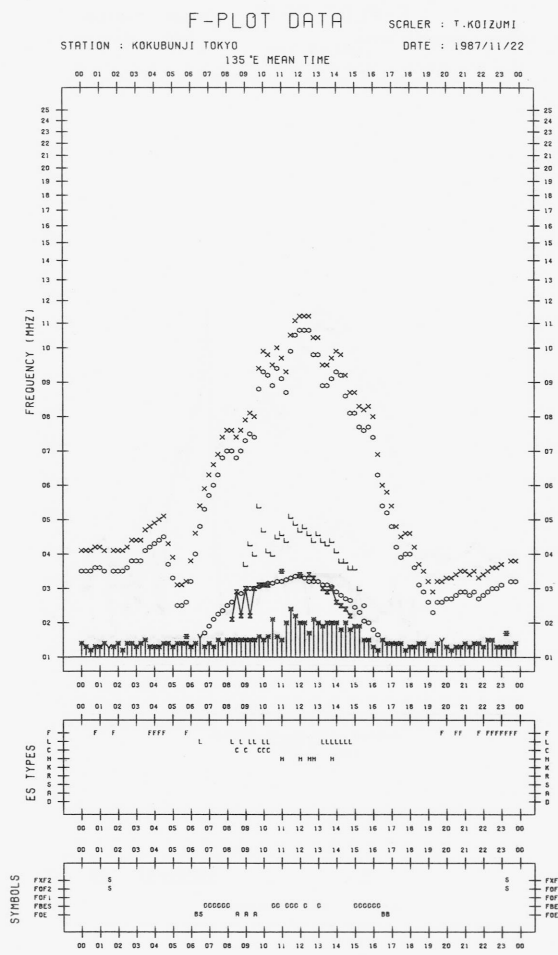
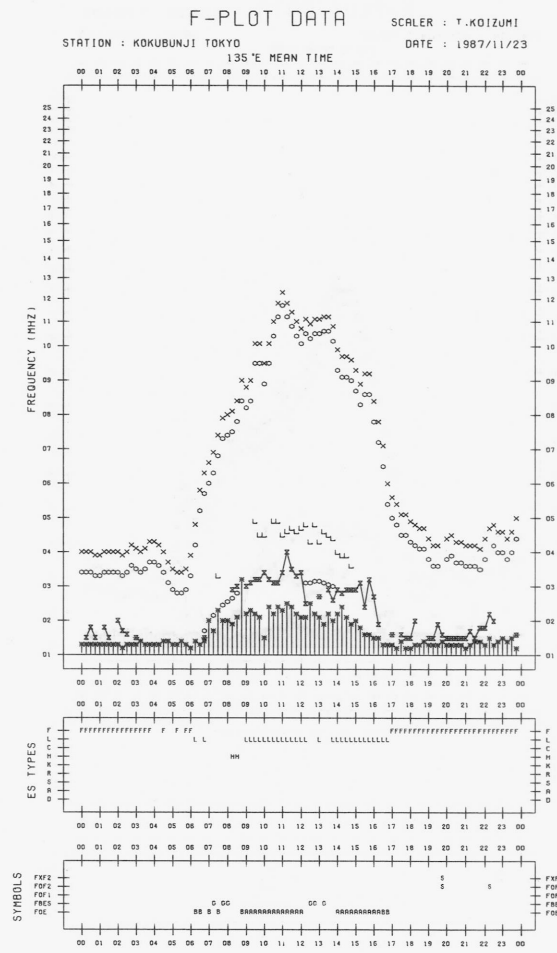
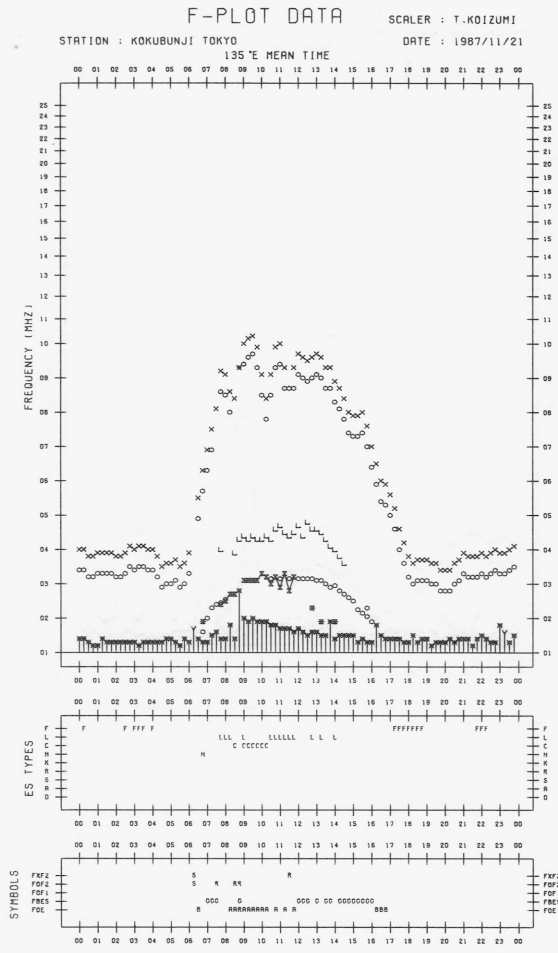


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1987/11/20  
135°E MEAN TIME



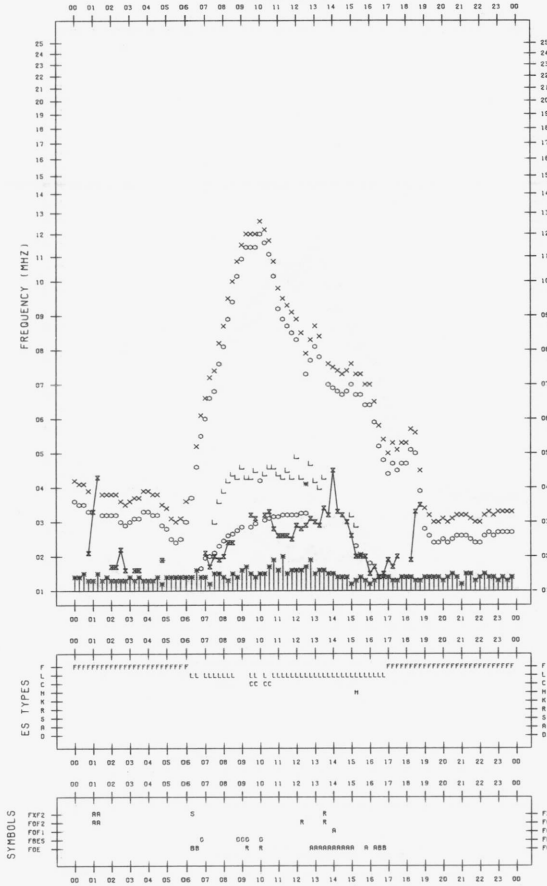


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1987/11/25

135°E MEAN TIME

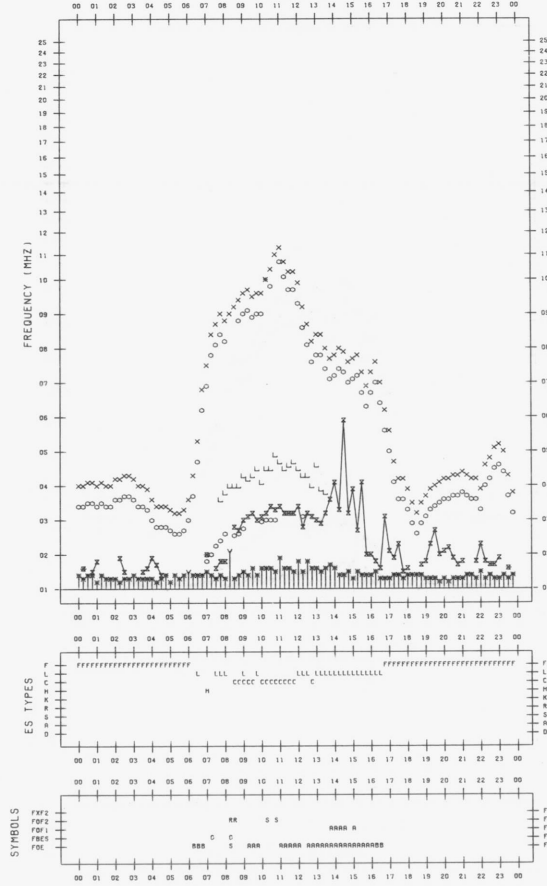


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1987/11/27

135°E MEAN TIME

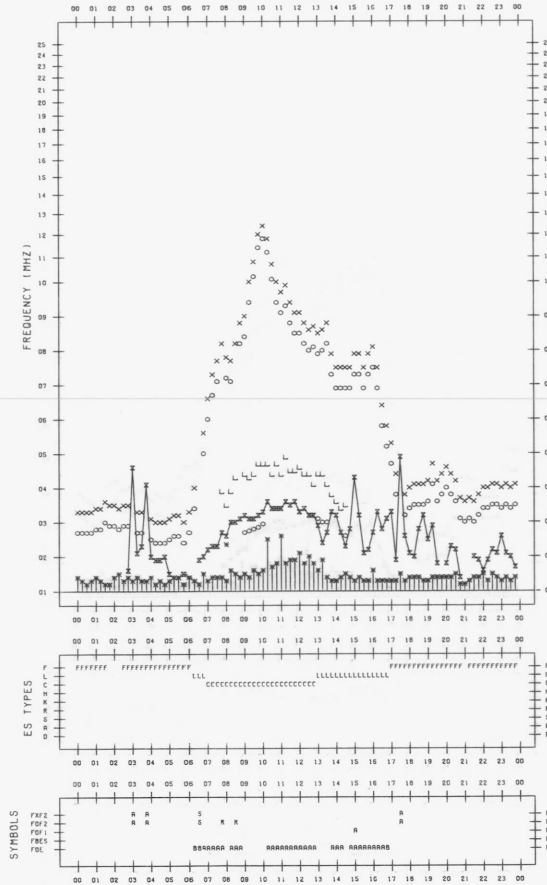


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1987/11/26

135°E MEAN TIME

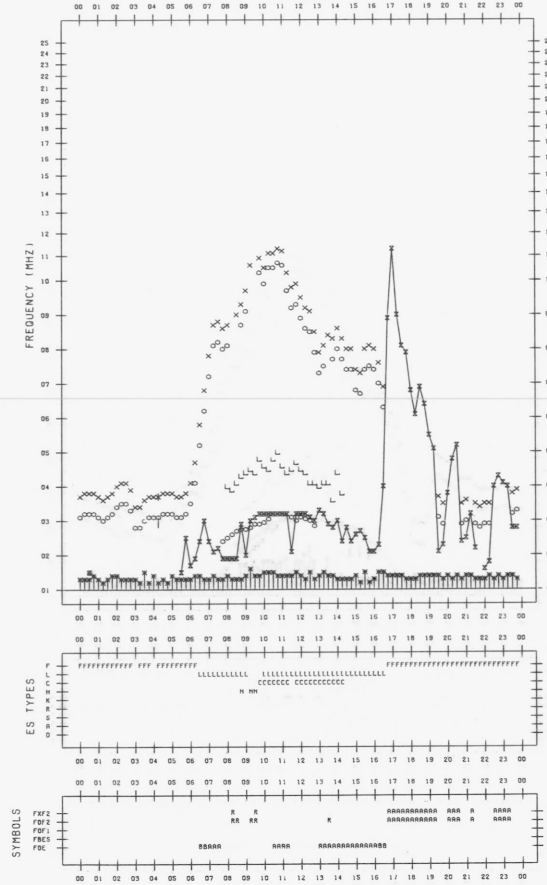


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1987/11/28

135°E MEAN TIME

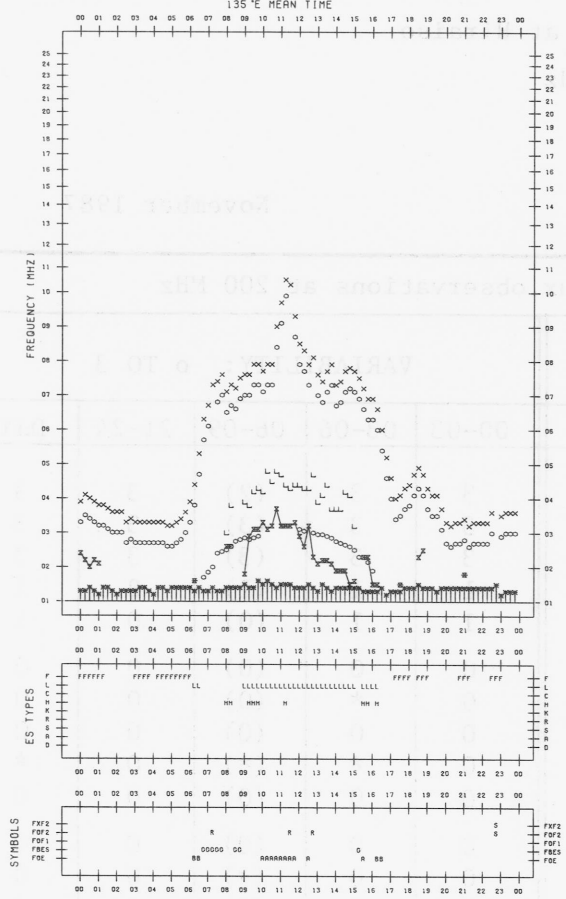


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO

DATE : 1987/11/29

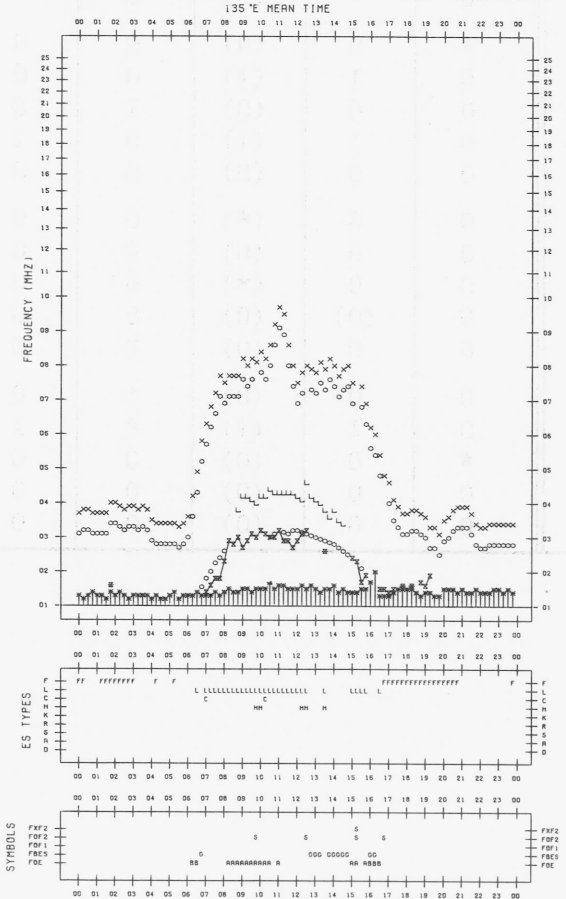


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO

DATE : 1987/11/30



## B. Solar Radio Emission

## A. Daily Data at Hiraiso

200 MHz

Hiraiso

November 1987

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

Notes: 1. (q) likely quiet.

2. (\*) interference.

B. Solar Radio Emission  
 a. Daily Data at Hiraiso  
 500 MHz

Hiraiso

November 1987

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

Note: No observations during the following periods.

3rd 2123 - 2343  
 4th 2123 - 2353  
 30th 0020 - 0107

B. Solar Radio Emission  
b. Outstanding Occurrences at Hiraiso

Hiraiso

November 1987

Single-frequency observations								
Normal observing period: 2120 - 0735 U.T. (sunrise to sunset)								
NOV 1987	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY ( $10^{-22} W_m^{-2} Hz^{-1}$ )		POLARIZATION REMARKS
						PEAK	MEAN	
1	100	44 NS	2100E	2204	620D	38	15	-
	200	44 NS	2100E	2251	620D	48	28	0
2	200	6 S	2210.1	2210.5	1.2	420	-	0
	100	44 NS	2100E	2330	620D	130	17	-
3	200	44 NS	2100E	0004	620D	93	38	MR
	200	6 S	2246.3	2246.6	1.8	190	45	WR
3	200	42 SER	0046	0100	12	340	-	WR
	500	41 F	0048.5	0057.5	12.5	56	-	ML
3	200	6 S	0215.6	0216.0	1.1	70	36	WR
	100	46 C	0215.8	0216.7	2.6	740	310	-
3	500	6 S	0216.3	0216.5	1.4	3	1	0
	200	8 S	0245.8	0246.0	0.5	160	-	MR
3	100	41 F	0509.2	0511.7	5.3	390	-	-
	200	42 SER	0533.7	0534.5	5.9	710	-	0
3	500	42 SER	0534.0	0536.4	6.5	8	-	WL
	200	46 C	0605.3	0607.2	4.6	80	27	WR
3	200	42 SER	0644.6	0645.5	7.3	740	-	0
	500	42 SER	0645.6	0646.8	6.0	13	-	WL
4	200	44 NS	2100E	2200	620D	14	3	MR
	200	42 SER	0117.8	0124.2	10	780	-	0
4	500	42 SER	0122.0	0137.5	21.5	28	-	ML
	100	46 C	0213.2	0213.9	4.0	6700	500	0
4	500	41 F	0317.5	0318.3	2.5	25	-	ML
	100	46 C	0348.8	0349.5	2.8	850	120	0
4	500	42 SER	0351.0	0355.5	9.6	72	-	ML
	200	42 SER	0354.7	0400	5.4	84	-	0
4	100	41 F	0533.1	0534.2	4.2	1000D	-	-
	200	44 NS	2100E	2205	620D	28	5	MR
4	100	46 C	2232.3	2233.7	2.6	410	130	-
	200	41 F	2246.5	2250.6	5.9	63	-	MR
4	200	46 C	2320.3	2323.4	5.3	49	21	WR
	100	42 SER	2320.3	2332.1	39	715	-	WR
5	500	6 S	0430.8	0432.2	2.5	3	1	0
	200	46 C	0454.4	0455.8	5.9	28	7	WR
5	100	46 C	0454.5	0454.7	12	1000D	450D	ML
5	500	45 C	0455.7	0457.6	5.0	3	1	0
	200	42 SER	2323.8	2324.4	13.5	150	-	0
5	100	42 SER	2323.8	2340.5	26.4	2500	-	0
	500	7 C	2332.7	2333.2	4.5	7	2	0
9	500	6 S	0519.5	0519.7	2.0	18	8	WL
18	200	42 SER	0127.0	0315.8	113	5000	-	0
	100	42 SER	0127.3	0316.0	112	8000D	-	-
18	500	6 S	0156.0	0156.5	2.0	1	-	-
	500	46 C	0315.8	0318.0	6.2	48	8	ML
19	100	42 SER	0107.1	0133.0	28	1000D	-	-
	200	41 F	0107.3	0114.4	9.2	150	-	0
19	200	8 S	0132.3	0132.5	0.6	910	-	0
	200	42 SER	0216.5	0217.3	2.8	790	-	0
20	100	42 SER	0217.0	0217.2	4.0	6300	-	WL
	500	46 C	0410.4	0417.0	34	33	5	WL
20	200	46 C	0411.9	0414.9	31.0	150	21	0
	100	6 S	0414.4	0421.8	1.2	140	32	-
20	100	46 C	0417.8	0418.0	41.0	4800	120	WL
	500	46 C	2325.3	2333.5	20	67	13	WL
20	200	8 S	2328.3	2328.4	0.6	105	-	0
	200	46 C	2330.6	2337.9	40	26	4	WL
20	100	46 C	2340.4	2344.6	7.3	125	46	-
	200	45 C	0004.4	0006.1	4.2	53	21	0
21	500	45 C	0004.5	0005.3	11	37	12	WL
	200	43 NS	0352	0430	180D	8	2	WL







C. Radio Propagation

b. Radio Propagation Quality Figures at Hiraiso

Hiraiso

Time in U.T.

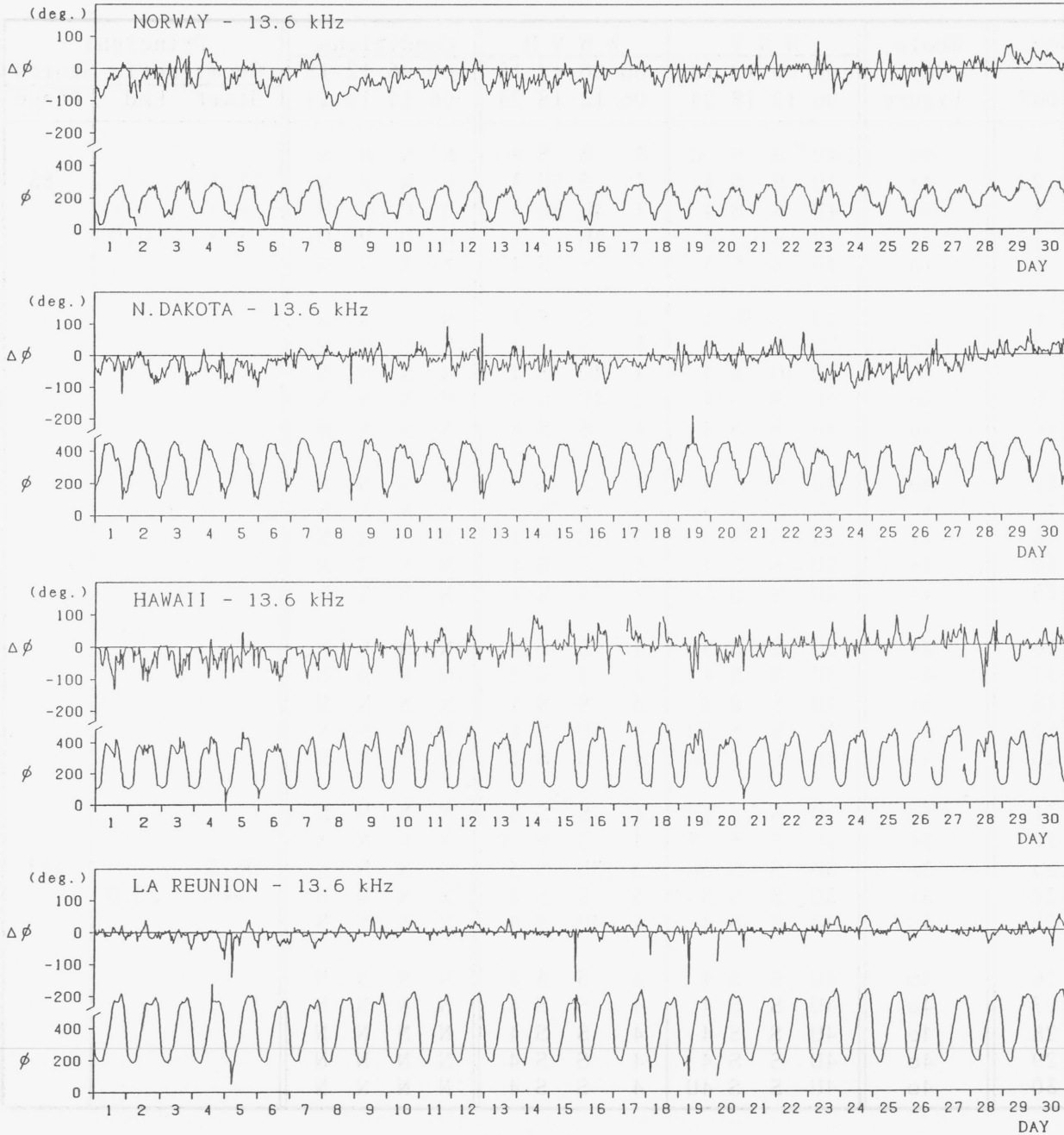
Nov. 1987	Whole Day Figure	W W V				W W V H				Conditions				Principal Geomagnetic Storms		
		00	06	12	18	00	06	12	18	00	06	12	18	Start	End	Range
		06	12	18	24	06	12	18	24	06	12	18	24			
1	4o	4U	S	S	C	4	S	S	4U	N	N	N	N	11.1	---	85
2	4+	4U	S	S	4	4	S	S	5U 4	N	N	N	N			
3	4o	4U	S	S	4	4	4U	5U	4	U	U	U	U			
4	4o	4U	S	S	4	4	4U	S	4	U	U	U	U			
5	4o	4U	S	S	4	4	S	S	4	N	N	N	N			
6	4+	4U	S	5U	4	4	S	S	4	N	N	N	N			
7	4+	5U	S	S	4	4	S	S	4	N	N	N	N			
8	4o	4U	4U	S	4	4	4U	S	4	N	N	N	N			
9	4o	4U	S	S	4	4	4U	S	4	N	N	N	N			
10	4o	4U	S	S	4	4	S	S	4	N	N	N	N			
11	4o	4U	S	S	4	4	S	S	4	N	N	N	N			
12	4-	4U	S	S	3U	4	S	S	4	N	N	N	N			
13	4+	5U	S	S	4	4	4U	S	4	N	N	N	N			
14	4+	5U	S	S	4	4	S	S	4	N	N	N	N			
15	4+	4U	S	S	5	4	S	S	4	N	N	N	N			
16	4+	5U	S	S	5	4	S	S	4	N	N	N	N			
17	4-	3U	S	S	4	4	S	S	4	N	N	N	N			
18	3+	4U	S	S	3	3	S	S	4	N	N	N	N			
19	4-	4U	S	S	3U	4	4U	S	4	N	N	N	N			
20	3+	3U	S	S	3U	4	S	S	3	N	N	N	N			
21	3o	3U	S	S	1U	4	S	S	4	N	N	N	N			
22	3+	3U	S	S	S	4	S	S	C	N	N	N	N			
23	3o	3U	S	S	3U	3	3U	S	3	N	N	N	N			
24	3+	3U	S	S	3	3	S	S	4	N	N	N	N			
25	4o	4U	S	S	4	4	4U	S	4	N	N	N	N			
26	4o	4U	S	S	4	4	S	S	4	N	N	N	N			
27	4o	4U	S	S	4	4	S	S	4	N	N	N	N			
28	4o	4U	S	S	4	4	S	S	4	N	N	N	N			
29	4o	4U	S	S	4	4	S	S	4	N	N	N	N			
30	4o	4U	S	S	4U	4	S	S	4	N	N	N	N			
														06.5	---	111
														---	22.0	

C. Radio Propagation

c. Phase Variations in OMEGA Radio Waves at Inubo

Inubo

November 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.)
Nov.07/2337	Nov.09/0110	Nov.08/0851	145.4

## C. Radio Propagation

## d. Sudden Ionospheric Disturbance

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

Hiraiso

Time in U.T.

Nov. 1987	S W F							Correspondence			
	Drop-out Intensities (dB)				Start	Duration	Type	Imp.	Solar Flare	Solar Noise	Geomag. Crochet
	CO	HA	1)	2)							
4		31			2324	18	S	3			
5		15	<u>25</u>		0459	18	S	2		x	
5	x	23			2333	15	SL	2+	2323	x	
18		x	12		0315	15	SL	1	0317	x	
19			7		0415	21	SL	1-	0414	x	
20			15		0414	46	SL	1	0412	x	
20		18			2330	57	SL	2	2330	x	
22			14	x	0235	25	SL	1	0242		

Notes

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

## (ii) Sudden Phase Anomaly (SPA) at Inubo

Inubo

Nov. 1987	S P A					Time (U.T.)			
	Phase Advance (degrees)					Start	End	Maximum	
	Date	$\Omega/N$	$\Omega/LR$	NWC	$\Omega/H$				$\Omega/ND$
2			17			1016	1045	1025	
3				5		0310	0340	0314	
3			8	<u>10</u>	10	0401	0446	0407	
3			11			0704	0743	0712	
3			23			0912	1021	0924	
4	52		37	112	<u>110</u>	65	2325	0144	2334
5	41		<u>235</u>	136	81	49	0456	0736	0507
5	22		<u>33</u>				1004	1128	1015
5	25		43	107	<u>105</u>	61	2335	0142	2343
6			11	<u>13</u>			0747	0819	0756
11			<u>19</u>	13			0504	0532	0510
13			26	<u>23</u>	15	10	0033	0113	0036
13			15	<u>20</u>	12		0156	0306	0203
15				7			0515	0535	0521
16				—	6		0031	0108	0035
18	23		<u>106</u>	78	35	27	0318	0456	0323
19			18	<u>21</u>			0112	0148	0116
19			<u>46</u>	34		12	0415	0457	0422
19			<u>151</u>	47			0743	1052	0752
20				<u>10</u>	6		0051	0115	0057
20			<u>5</u>	3	2		0155	0214	0201
20			<u>8</u>	6			0313	0333	0318
20	29		<u>166</u>	110	73	23	0414	0630	0432
20					14		2209	2257	2217
20	27		38	<u>96</u>	91	48	2332	0137	2345
21			5	<u>6</u>			0233	0243	0235
21			<u>8</u>	6			0315	0343	0321
22			<u>20</u>	18	9		0240	0340	0251
22			<u>22</u>	13	9		0526	0610	0542
22			<u>14*</u>	14			0716	0752	0737
23			12	—			0502	0559	0520
23			9	—			0720	0742	0727
26			<u>51</u>	35	19		0315	0402	0324

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IONOSPHERIC DATA IN JAPAN FOR NOVEMBER 1987

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☎ (0423) (21) 1 2 1 1 (代)

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Queries about "Ionospheric Data 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.