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IONOSPHERIC DATA IN JAPAN

FOR DECEMBER 1972

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RADIO RESEARCH LABORATORIES

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SITE OF THE RADIO WAVE OBSERVATORIES AND HIRAIISO BRANCH

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

	Latitude	Longitude	Site
Wakkanai	45°23.6'N.	141°41.1'E.	Midori-cho, Wakkanai-shi, Hokkaido
Akita	39°43.5'N.	140°08.2'E.	Tegata Sumiyoshi-cho, Akita-shi, Akita-ken
Kokubunji	35°42.4'N.	139°29.3'E.	Nukui-Kitamachi, Koganei-shi, Tokyo-to
Yamagawa	31°12.1'N.	130°37.1'E.	Yamagawa-machi, Ibusuki-gun, Kagoshima-ken

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

	Latitude	Longitude	Site
Hiraiso	36°22.0'N.	140°37.5'E.	Isozaki-machi, Nakaminato-shi, Ibaraki-ken
Inubo	35°42.2'N.	140°51.5'E.	9912 Tennodai, Choshi-shi, Chiba-ken

SYMBOLS AND TERMINOLOGY

A. IONOSPHERE

All symbols and terminology in the table of ionospheric data are used in accordance with the "URSI Handbook of Ionogram Interpretation and Reduction," 1961.

Terminology

f_oF2 f_oF1 f_oE	}	The ordinary wave critical frequency for the $F2$, $F1$ and E layers, respectively.
f_oEs		The ordinary wave top frequency corresponding to highest frequency at which a mainly continuous trace is observed.
$fbEs$		The lowest ordinary wave frequency at which the Es layer begins to become transparent. This is usually determined from the minimum frequency at which reflections from layers at greater heights are observed.
f -min		The frequency below which no echoes are observed.
$M(3000)F2$		The maximum usable frequency factor for a path of 3000 km for transmission by $F2$ layer.
$M(3000)F1$		The maximum usable frequency factor for a path of 3000 km for transmission by $F1$ layer.
$h'F2$		The minimum virtual height, $h'F2$, refers to the highest, most stable stratification observed in the F region and can only be scaled when such stratification is present.
$h'F$		The natural and most significant F region virtual height parameter is that for lowest F region stratification. This will be denoted by $h'F$. Thus $h'F$ is identical with the current $h'F2$ when F region stratification is absent, e.g., at night, and with the current $h'F1$ when $F1$ stratification is present.
$h'Es$		The lowest virtual height of the trace used to give the f_oEs .
$hpF2$		The virtual height of the $F2$ layer measured on the ordinary

$ypF2$ wave component at a frequency equal to $0.834f_oF2$.
 The semi-thickness of the $F2$ layer deduced from a parabolic fit to the "nose" of the electron density distribution with height and based on the observed $h'f$ trace. (The difference between $hpF2$ and the virtual height at $0.969f_oF2$).

a. 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 E_s .
B	Measurement influenced by, or impossible because of, absorption in the vicinity of f -min.
C	Measurement influenced by, or impossible because of, any non-ionospheric reason.
D	Measurement influenced by, or impossible because of, the upper limit of the normal frequency range. Used in a qualifying sense, see below.
E	Measurement influenced by, or impossible because of, the lower limit of the normal frequency range. Used in a qualifying sense, see below.
F	Measurement influenced by, or impossible because of, the presence of spread echoes.
G	Measurement influenced or impossible because the ionization density 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.
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.
R	Measurement influenced by, or impossible because of, attenuation in the vicinity of a critical frequency.
S	Measurement influenced by, or impossible because of, interference or atmospherics.
T	Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.
V	Forked trace which may influence the measurement.
W	Measurement influenced or impossible because the echo lies outside the height range recorded.
X	Measurement refers to the extraordinary component.
Y	Intermittent trace.
Z	Third magneto-ionic component present.

b. Qualifying Letters

The following letters are entered in the first column before a numerical value on

the monthly tabulation sheets.

D	greater than.
E	less than.
I	Missing value has been replaced by an interpolated value.
J	Ordinary component characteristic deduced from the extraordinary component.
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-ionic component.

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.

d. Description of Standard Types of *Es*

The eight standard types of *Es* are identified by corresponding capital letters: *F*, *L*, *C*, *H*, *Q*, *R*, *A*, *S*. These letters suggest the names flat, low, cusp, high, equatorial, retardation, auroral and slant, respectively. The letter 'N' is used to designate any *Es* trace that does not correspond to any of the eight types.

- F* An *Es* trace which shows no appreciable increase of height with frequency. The trace is usually relatively solid at most latitudes. This classification may only be used at night; apparently flat *Es* traces observed in the daytime are classified according to their virtual height: *H* or *L*.
- L* A flat *Es* trace at or below the normal *E* layer minimum virtual height in the day or below the night *E* layer minimum virtual height at night.
- C* An *Es* trace showing a relatively symmetrical cusp at or below f_oE . This is usually continuous with the normal *E* trace, although when the deviative absorption is large, part or all of the cusp may be missing. (Usually a daytime type.)
- H* An *Es* trace showing a discontinuity in height with the normal *E* layer trace at or above f_oE . 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. The spread is most pronounced at the upper edge of the trace. (This type is common in daytime in the vicinity of the magnetic equator.)

R An *Es* trace showing an increase in virtual height at the high frequency end similar to group retardation but which is nonblanketing over part or all of its frequency range. This is distinguished from the usual group retardation (as in the case of an occulting thick *E* layer) by the lack of group retardation in the *F* layer traces at corresponding frequencies and the lack of complete blanketing.

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

S A diffuse *Es* trace which rises steadily with frequency and usually emerges from another type *Es* trace. The rising trace alone is classified as 'S'; the horizontal trace is classified separately. At high latitudes the slant trace usually starts to rise from a horizontal *Es* trace such as *Es-L*, or *Es-F*, at frequencies which greatly exceed the *E* layer critical frequency, whereas at low latitudes it usually rises from *Es-Q* *Es-C* or *Es-H* at frequencies near the regular *E* critical frequency. Type *S* is never used to determine f_oEs and $h'Es$. The slant trace is sometimes observed to start at f_oE without echoes clearly identifiable as *Es* echoes being seen.

N The designation 'N' is used to denote an *Es* trace which cannot be classified into one of the standard types. When a trace appears to be intermediate between any two classes a choice should be made whenever possible even if it is uncertain. 'N' should be used sparingly.

e. Multiple Reflections from *Es*

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

B. SOLAR RADIO EMISSION

Solar radio observations are carried out on 200 and 500 MHz at Hiraïso Branch. Antennas are two parabolic reflectors: 10 meter for 200 MHz and 5 meter for 500 MHz, each having the total power receiver. Observations are feasible almost from sunrise to sunset.

a. Time and Unit

The time is expressed as U.T.

The unit is $10^{-22} \text{W} \cdot \text{m}^{-2} \text{Hz}^{-1}$ for both components of polarization.

b. Daily Data

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 flux level is counted. Bracket means that observation time does not exceed one third of the period.

c. Distinctive Events

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.

Starting time and *Time of maximum* are given to nearest minute in general, but to nearest a tenth minute for short intense occurrences or clear commencements.

Duration is given in minutes and to nearest a tenth minute, if short or clear.

Descriptive type is denoted by the following symbols:

S = Simple rise and fall of intensity;

C = Complex variation of intensity,

C+ = Prolonged broad-band enhancement of radiation, generally of spectral type IV;

F = Group of bursts: multiple peaks probably belonging to the same event, but separated by relatively short period of quietness;

RF = More or less irregular rise and fall of intensity, at metric or decimetric wavelengths;

e = Sudden beginning of burst with steep rise of intensity;

E = Steep rise of intensity of continuum background;

p.i. = post-burst increase;

onset storm = clear-cut beginning of a noise storm.

Peak intensity is the flux density of the highest peak reached during the occurrence, measured above the pre-burst level.

Mean intensity is the flux density averaged over the burst's duration, measured above the pre-burst level; therefore, multiplying the duration, the total energy of the occurrence can be estimated.

C. RADIO PROPAGATION CONDITIONS

a. Field Strengths of WWV and WWVH

Field Strengths observations of WWV and WWVH transmitted from Fort Collins, Colorado and Hawaii, respectively, are carried out at Hiraio Branch. In order to avoid interferences with other standard frequency waves on the same frequency, the upper side-band of 440 Hz is picked up by the use of a narrow band pass filter with

± 40 Hz bandwidth.

The *tabulated field strength* is the average of peak value of the incident upper side-band field intensity in dB above one microvolt per meter. The *duration* of observation is two minutes for WWV and three minutes for WWVH following the time indicated in universal time on the table.

Particulars of the transmitter and receiver are summarized in the following tables:

Transmitter

	WWV	WWVH
Location	Fort Collins, Colorado Long. 105°02'W Lat. 40°41'N	Maui, Hawaii Long. 156°28'W Lat. 20°46'N
Power	3 kW for the upper side-band	0.5 kW* for the upper side-band
Antenna	$\lambda/2$ vertical	$\lambda/2$ vertical
Distance	9150 km	6270 km

* Reduced from the carrier power of 2 kW with amplitude modulation of 100%.

Receiver

Antenna	4.5m vertical rod
Bandwidth	± 40 Hz for the upper side-band
Calibration	every half an hour

The meaning of *Descriptive symbols* is as follows:

- C : Measurement influenced by, or impossible because of, any non-propagational reasons.
- S : Measurement influenced by, or impossible because of, interferences or atmospheric.
- U : Inaccurate measurement influenced by interferences, atmospheric, or non-propagational reasons.
- E : Less than the following figure.

b. Radio Propagation Quality Figures

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

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

The tabulated circuits contain Hamburg (commercial circuit), WWV (10, 15 and 20 MHz frequencies broadcast from Fort Collins, Colorado), Lima (commercial circuit) and WWVH (10 and 15 MHz frequencies broadcast from Hawaii), which are received at Hiraiso Branch.

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

N = normal
 U = unstable
 W = disturbed

The letter W expresses HF propagation disturbances which are expected to occur during the following 12 hours after issue. The letter U and N also means unstable and normal conditions, respectively.

Whole day radio quality indices stand for the averages of the 6-hourly indices of the circuits of Hamburg, WWV and Lima.

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

c. Sudden Ionospheric Disturbances (S.I.D's.)

(i) SWF

The data of short wave fade-out (SWF) are prepared from the records of field intensities at Hiraiso, of the following circuits. Start-time, Duration, Type and Importance are obtained from the data of a circuit whose Drop-out Intensity is underlined. Drop-out Intensities of 10, 15 and 20 MHz are indicated by ('), (none), and (''), respectively. Characteristics of the phenomenon are classified as follows.

Circuits and Drop-out intensities

CO WWV 20, 15 and 10 MHz (Fort Collins, Colorado)
 LM Various frequencies of commercial circuit (Lima)
 HA WWVH 15 and 10 MHz (Hawaii)
 TO JJY 15 and 10 MHz (Tokyo)
 SH BPV 15 and 10 MHz (Shanghai)
 HB Various frequencies of commercial circuit (Hamburg)

Start-time and Duration

Types

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

Importances

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

1 -	1	1 +
2 -	2	2 +
3 -	3	3 +

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

(ii) SPA

The data of sudden phase anomaly (SPA) are prepared from the records of phase measurement of VLF radio wave propagation received at Inubo Radio Wave Observa-

tory. Characteristics of the VLF radio wave propagation are as the following table. In the last column, a spherical earth with a radius of 6371.2 km is assumed.

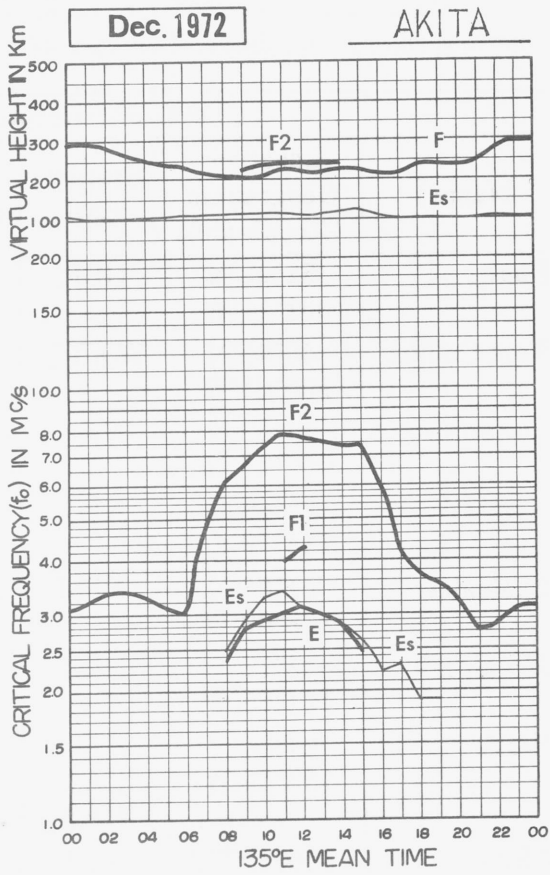
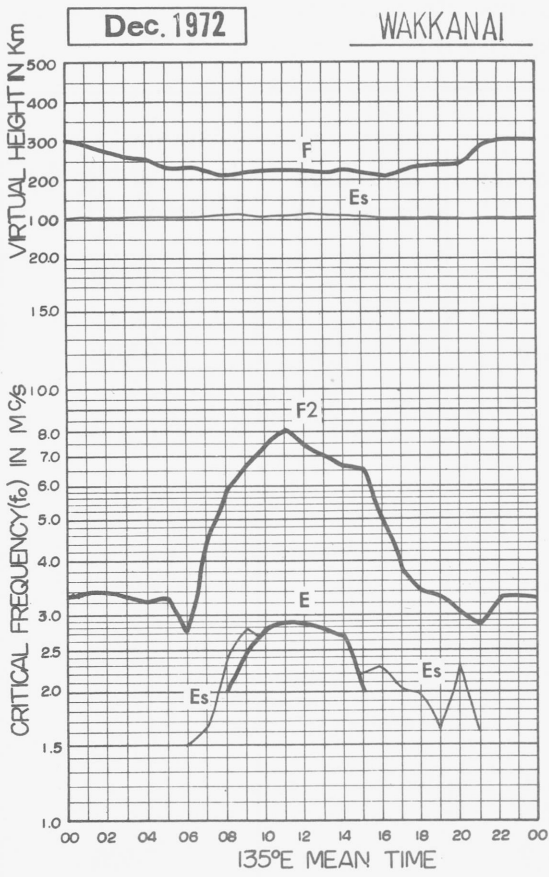
Transmitting Site					Distance (km) to Inubo along the Great Circle
Name	Location (Geographic Coordinate)	Station Call	Frequency (kHz-UTC)	Radiation Power (kW)	
Rugby	52°22'N 001°11'W	GBR	16.0	40	9550
Fort Collins	40°41'N 105°03'W	WWVL	20.0	1.8	9190
Cutler	44°39'N 067°17'W	NAA	17.8	1000	10640
North West Cape	21°49'S 114°10'E	NWC	22.3	1000	6990
Lualualei	21°26'N 158°09'W	NPM	23.4	300	6070
Jim Creek	48°12'N 121°55'W	NPG	18.6	250	7620
Haiku	21°24'N 157°50'W	HA0	10.2	2	6100
		HA2	12.2		
		HA3	13.6		
Aldra	66°25'N 013°09'E	AL0	10.2	4	7820
		AL2	12.2		
		AL3	13.6		

The phase advance is shown in its maximum stage. In the column 'Phase Advance', — means no transmission or no reception during the period, and blank means indistinguishable record.

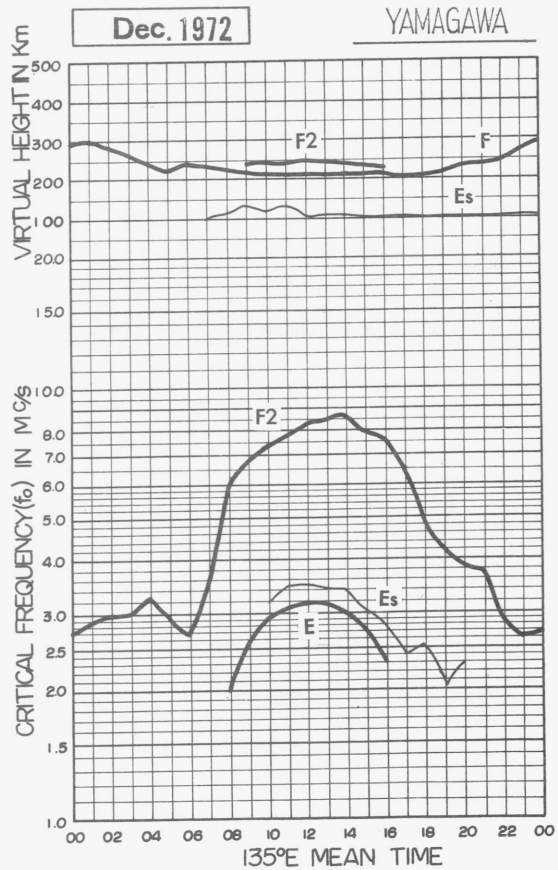
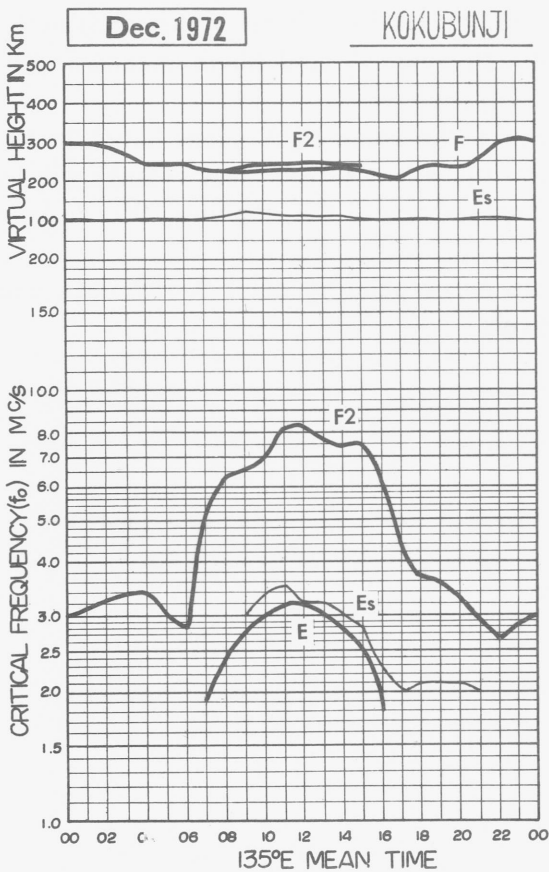
Out of more than two circuits to have observed the same SPA event listed in the text, the phase advance on some circuit on which the event is the most remarkable or distinct is underlined. As for the underlined phase advance, the starting, the ending, and the maximum times are described.

In the column 'Remarks', the event with its corresponding solar X-ray data and solar radio data is shown by 'X' and 'R', respectively.

IONOSPHERIC DATA
MONTHLY MEDIAN CHARACTERISTICS



IONOSPHERIC DATA
MONTHLY MEDIAN CHARACTERISTICS



IONOSPHERIC DATA

DEC. 1972

FOF2 (0.1 MHz)

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

Station	WAKKANAI				Lat 45 23 6 N				Long 141 41 1 E				Sweep 1		MHz to 20		MHz in 20		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	F	F	F	F	F	F ₃₈	53	70	72	73	73	C	C	C	C	C	C	C	C	C	C	C	C	
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
3	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
5	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
6	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	63	66	39	29	29	32	29	27	29	F ₃₃
7	30	F ₃₁	F ₃₅	F ₃₅	F ₃₁	29	26	40	56	56	65	66	C	C	C	61	43	36	30	28	33	34	33	36	
8	36	38	39	40	C	C	C	C	C	C	C	66	76	C	C	53	45	30	31	36	30	27	33	37	
9	36	39	F	F	F ₃₀	29	25	44	57	63	69	65	67	60	61	59	45	31	28	29	28	25	29	30	
10	F ₃₁	F ₃₀	F ₂₈	30	29	32	31	39	56	68	62	66	73	60	63	55	48	31	30	31	27	27	F	F	
11	F	F ₃₆	33	33	32	30	26	46	62	58	60	72	66	62	63	57	46	37	28	32	30	28	33	F	
12	F	F	F	F	F	33	23	45	53	57	70	75	69	63	66	59	C	C	C	C	C	C	C	C	
13	C	C	C	C	C	C	C	C	C	70	71	81	67	70	66	73	50	45	40	46	37	34	36	C	
14	C	C	C	C	32	28	31	43	60	107	87	93	72	76	81	64	54	45	44	38	35	33	33	34	
15	35	35	36	36	36	37	23	40	75	71	75	96	76	75	63	67	49	47	35	36	34	33	33	34	
16	36	34	34	30	26	26	36	54	71	76	108	82	75	72	78	76	60	49	39	38	32	29	S ₂₈	F ₃₃	
17	F	34	33	30	30	A	33	46	68	R	84	76	76	73	83	68	53	A	A	A	30	24	33	A	
18	33	A	35	35	I ₃₁	A	27	27	45	71	72	66	89	72	66	R	62	53	36	33	30	A	22	F	F
19	F	F	F	F	37	A	33	53	63	68	84	83	76	74	66	77	A	A	A	34	28	A	29	33	
20	F ₃₃	F ₃₃	F ₃₅	33	36	34	47	C	57	65	72	81	81	75	76	66	46	33	34	32	27	24	28	30	
21	32	33	33	32	33	40	24	41	56	69	70	86	83	65	77	69	52	37	33	33	33	F	F	F	
22	F	F	38	38	38	43	33	43	62	62	81	89	67	70	70	72	50	36	34	S	A	S ₃₀	S ₃₃	F	
23	F ₃₀	30	33	29	F ₃₀	F ₃₄	32	50	58	76	110	95	79	I ₈₆	R	89	71	63	57	42	41	31	32	38	38
24	36	36	40	37	40	34	F ₂₃	48	63	86	93	97	R	80	85	68	59	48	55	F	F	A	A	F	
25	F	F	F	F ₅₇	F	F	F ₂₅	38	57	60	74	103	78	76	69	70	53	39	37	34	38	F ₃₀	F ₂₈	F ₃₃	
26	F ₃₅	F ₃₀	32	32	32	F	F	43	52	54	76	83	66	73	66	67	56	43	27	27	24	24	28	F ₃₀	
27	F	F	F	F	F	F ₃₅	24	37	53	65	73	R	80	70	64	62	46	43	A	A	A	A	24	27	
28	28	30	30	30	28	30	28	38	60	65	71	79	R	64	63	53	49	36	30	31	26	23	26	29	
29	29	30	33	34	29	31	25	40	54	63	74	83	74	68	63	57	50	38	37	34	30	28	33	34	
30	35	36	37	F	F ₃₈	F ₃₇	20	35	47	58	76	76	64	74	76	64	48	39	43	35	29	30	33	F ₃₇	
31	F	F ₄₀	38	43	40	F ₄₆	31	37	52	61	63	79	67	66	75	82	44	38	44	28	A	A	F	F	
CNT	15	17	18	18	20	19	23	23	24	24	25	25	22	23	23	26	24	23	22	21	20	20	20	16	
MED	33	34	34	33	32	33	27	43	58	65	73	81	74	70	66	66	50	38	34	33	30	28	33	33	
UQ	36	36	37	37	36	36	32	46	63	72	81	89	76	74	76	70	53	44	40	36	33	31	33	35	
LQ	30	30	33	30	30	30	24	40	55	60	70	75	67	66	63	59	46	36	30	31	28	24	28	30	

DEC. 1972

FOF2 (0.1 MHz)

IONOSPHERIC DATA

DEC. 1972

FOF1 (0.01 MHz)

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

Station **WAKKANAI** Lat. **45 23 6 N** Long. **141 41 1 E** Sweep 1 MHz to 20 MHz in 20 sec in automatic operation

Hour Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1													C	C										
2											C	C	C	C										
3											C	C	C	C										
4											C	C	C	C										
5											C	C	C	C										
6											C	C	C	C										
7													C	C										
8											C			C										
9																								
10																								
11																								
12												L												
13											400													
14											L													
15																								
16																								
17																								
18																								
19																								
20																								
21																								
22																								
23																								
24																								
25											L													
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												1												
MED											400													
UQ																								
LQ																								

DEC. 1972

FOF1 (0.01 MHz)

IONOSPHERIC DATA

DEC. 1972

FOE (0.01 MHz)

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

Station		WAKKANAI												Lat. 45 23.6 N · Long. 141 41.1 E												Sweep 1 MHz to 20 MHz in 20 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	A	250	280	280	C	C	C	C													
2								C	C	C	C	C	C	C	C	C													
3								C	C	C	C	C	C	C	C	C													
4								C	C	C	C	C	C	C	C	C													
5								C	C	C	C	C	C	C	C	C													
6								C	C	C	C	C	C	C	225	190	E												
7								S		200	250	280	290	C	C	C	200	S											
8								C	C	C	C	C	285	290	C	C	185	A											
9								S	A	265	280	280	275	255	230	200	S												
10								A		200	245	270	295	290	280	230	180	S											
11								S		200	245	270	280	280	280	250	A	A											
12								E	A	A	280	290	290	270	250	185	C												
13								C	C	C	265	290	290	295	280	230	185	S											
14								S		200	265	280	A	A	275	245	190	S											
15								S		200	240	A	A	280	275	245	205	S											
16								S		200	225	265	285	280	B	A	200	S											
17								S		200	A	A	A	A	A	240	200	A											
18								E		200	250	270	290	280	280	A	A	E											
19								S	A	A	A	A	A	285	250	A	A	A											
20								C	A	245	275	290	270	A	A	A	E												
21								A	A	A	285	295	B	B	255	210	A												
22								A	B	B	B	B	B	B	B	190	A												
23								E	A	255	285	295	290	275	235	190	S												
24								S		200	A	A	A	280	265	240	205	S											
25								A	A	A	275	290	290	285	245	A	S												
26								S		195	235	280	290	B	B	B	B	A											
27								A	B	A	A	A	A	A	A	235	A	A											
28								S		200	A	A	A	285	285	250	205	S											
29								S		180	250	280	290	295	265	240	215	S											
30								S	A	250	280	295	290	275	A	A	A												
31								S		150	245	270	285	290	265	240	A	A											
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								3	13	16	18	18	17	16	18	17	3												
MED								E	200	250	280	290	290	275	240	200	E												
UQ								E	200	252	280	290	290	280	250	205	E												
LQ								E	200	245	270	285	280	268	235	190	E												

DEC. 1972

FOE (0.01 MHz)

IONOSPHERIC DATA

DEC. 1972

FOES (0.1 MHz)

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

Station WAKKANAI Lat. 45 23.6 N Long. 141 41.1 E Sweep 1 MHz to 20 MHz in 20 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	E	17	18	E	E	J ₂₁ X	J ₂₈ X	28	G	G ₂₅	G ₂₃	C	C	C	C	C	C	C	C	C	C	C	C	
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
3	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
5	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
6	C	C	C	C	C	C	C	C	C	C	C	C	C	C	G	G	15	E	E ₁₆ S	26	E ₁₇ S	E ₁₅ S	E	E	
7	E	E	21	16	E	E ₁₅ S	E ₁₅ S	E ₁₆ S	G	G	G ₂₃	G	C	C	C	G	E ₁₅ S	20	E ₁₅ S	E	E ₁₅ S	E	E ₁₅ S	J ₂₁ X	
8	25	E	E	E	C	C	C	C	C	C	C	32	G	C	C	22	J ₂₈ X	J ₂₁ X	E ₁₆ S	E ₁₄ S	E	E ₁₅ S	E	E	
9	E ₁₅ S	E	24	E	E	E	J ₆₀ X	E ₁₅ S	25	G	G ₂₅	G ₂₀	G	G	29	G	E ₁₅ S	E ₁₅ S	E	E	24	E ₁₅ S	E	E ₁₅ S	
10	E	E	E	E	E	E	E ₁₅ S	J ₂₂ X	G	G	G	G	G	G	G	30	24	J ₂₀ X	E ₁₆ S	E	E ₁₅ S	E ₁₆ S	26	J ₂₅ X	
11	E ₁₅ S	E	E	E	E	E	E ₁₅ S	E ₁₅ S	G	G	G ₁₉	G ₂₁	G ₂₃	28	30	J ₂₅ X	J ₂₀ X	J ₂₃ X	J ₂₅ X	J ₂₀ X	J ₂₅ X	24	E ₁₆ S	E ₁₅ S	
12	24	20	J ₁₈ X	E	E	E ₁₄ S	24	16	J ₃₃ X	J ₃₃ X	G ₂₁	G	G	30	29	G	C	C	C	C	C	C	C	C	
13	C	C	C	C	C	C	C	C	C	31	G	G	G	G	G	25	23	E ₁₅ S	E ₁₃ S	E ₁₆ S	E ₁₆ S	E ₁₆ S	E ₁₅ S	C	
14	C	C	C	C	E	E ₁₃ S	E ₁₅ S	E ₁₅ S	27	G	G	31	34	G	G	G	24	20	20	E	E ₁₅ S	E ₁₆ S	E ₁₆ S	E ₁₅ S	
15	E ₁₆ S	E ₁₄ S	E ₁₃ S	18	E	E	E ₁₅ S	E ₁₅ S	27	J ₄₃ X	J ₃₃ X	J ₃₃ X	G	G	G	23	E ₁₅ S	E	E ₁₅ S	E ₁₅ S	E ₁₅ S	24	E ₁₅ S	24	
16	E ₁₅ S	E ₁₅ S	E	15	J ₂₃ X	J ₂₅ X	E ₁₅ S	E ₁₆ S	J ₃₃ X	34	40	J ₅₃ X	38	33	J ₄₀ X	G	E ₁₅ S	E	E	E ₁₆ S	J ₂₁ X	E	J ₂₃ X	J ₃₀ X	
17	J ₆₃ X	J ₅₅ X	J ₃₁ X	E	J ₂₅ X	J ₃₃ X	E ₁₅ S	G	J ₅₅ X	J ₇₂ X	J ₉₆ X	30	J ₃₈ X	J ₅₈ X	G ₂₂	G	J ₃₁ X	J ₆₃ X	J ₆₁ X	J ₅₅ X	J ₆₁ X	J ₃₁ X	J ₂₃ X	41	
18	30	J ₆₀ X	23	18	37	J ₂₄ X	J ₆₄ X	J ₃₅ X	G	G ₂₃	G	G	G	27	32	25	J ₃₀ X	J ₅₀ X	J ₃₄ X	J ₂₅ X	38	24	E ₁₅ S	E	
19	J ₂₈ X	J ₆₀ X	J ₅₈ X	J ₅₃ X	J ₈₃ X	J ₇₅ X	J ₃₃ X	J ₃₄ X	J ₁₀₃ X	J ₄₁ X	J ₄₃ X	38	47	45	35	J ₃₃ X	J ₁₀₈ X	J ₇₅ X	J ₈₄ X	20	J ₂₃ X	J ₃₁ X	J ₂₅ X	24	
20	E ₁₄ S	E	E	J ₂₅ X	J ₂₆ X	J ₆₃ X	J ₃₁ X	C	26	G	G	G	J ₄₁ X	J ₇₃ X	J ₅₈ X	J ₃₃ X	J ₃₆ X	22	E ₁₅ S	E ₁₅ S	J ₂₃ X	J ₂₃ X	J ₃₁ X	E ₁₅ S	
21	E ₁₄ S	E	E ₁₃ S	E ₁₃ S	E ₁₃ S	E ₁₄ S	J ₂₈ X	J ₃₅ X	J ₃₃ X	J ₅₅ X	G	G	E ₃₄ S	E ₃₀ S	28	G	22	E ₁₄ S	E ₁₆ S	J ₂₃ X	26	E ₁₄ S	E ₁₅ S	E ₁₅ S	
22	E ₁₄ S	E ₁₄ S	E ₁₃ S	E	E	E	E	16	E ₂₀ S	E ₂₈ S	E ₃₆ S	E ₃₅ S	E ₃₇ S	E ₃₆ S	33	30	21	E ₁₄ S	22	J ₆₅ X	J ₆₂ X	J ₄₀ X	J ₃₁ X	E ₁₅ S	
23	E ₁₅ S	E ₁₃ S	E	E	E	E	J ₂₃ X	J ₂₄ X	21	28	G	G	G	G	G	G	E ₁₅ S	E ₁₃ S	J ₃₅ X	J ₄₄ X	J ₃₃ X	J ₂₈ X	E ₁₆ S	E ₁₅ S	
24	21	E	25	E ₁₃ S	E ₁₃ S	E	E ₁₄ S	E ₁₅ S	23	J ₄₁ X	J ₇₃ X	32	30	24	G	G	E ₁₄ S	23	J ₂₃ X	J ₂₈ X	J ₄₁ X	J ₅₉ X	J ₄₄ X	E ₁₅ S	
25	J ₂₃ X	J ₂₅ X	E ₁₃ S	E	E	E	J ₆₁ X	J ₃₃ X	J ₆₁ X	J ₃₅ X	G	G	28	G	G	23	J ₂₃ X	23	23	20	E ₁₆ S	E ₁₄ S	E ₁₅ S	E ₁₅ S	
26	E ₁₃ S	24	E	E	E	E	E ₁₅ S	E ₁₅ S	G	28	31	G	E ₃₀ S	E ₂₈ S	E ₂₉ S	E ₂₅ S	26	E ₁₃ S	E ₁₅ S	E ₁₅ S	24	E ₁₅ S	E ₁₄ S	E ₁₅ S	
27	E ₁₅ S	E ₁₂ S	E ₁₃ S	E	E	E	E ₁₄ S	J ₂₁ X	24	34	J ₄₀ X	J ₆₆ X	39	39	26	28	J ₃₃ X	J ₃₄ X	J ₄₀ X	J ₄₃ X	41	J ₄₃ X	29	28	
28	J ₂₇ X	J ₂₄ X	J ₂₅ X	21	E	E ₁₃ S	E ₁₄ S	E ₁₄ S	G	32	J ₃₃ X	42	G	G	G	G	G	E ₁₄ S	22	E ₁₅ S	E ₁₅ S	E ₁₆ S	E ₁₆ S	E	
29	E ₁₅ S	E	E ₁₄ S	E	E	E ₁₄ S	E	E ₁₄ S	G	G	31	G	G	30	24	G	E ₁₇ S	E	26	E ₁₅ S	E	E ₁₆ S	E ₁₅ S	E ₁₅ S	
30	E	E	J ₂₂ X	15	J ₂₀ X	E ₁₄ S	E ₁₃ S	E ₁₆ S	J ₃₅ X	30	G	G	34	36	29	J ₆₈ X	J ₄₀ X	E ₁₄ S	28	J ₃₃ X	28	E ₁₆ S	E ₁₅ S	E ₁₆ S	
31	E ₁₅ S	E	E	E	E	E	E	J ₃₀ X	G	G	G	34	J ₅₃ X	31	32	J ₄₁ X	J ₃₃ X	J ₃₀ X	J ₂₀ X	E	J ₃₃ X	J ₄₀ X	E ₁₅ S	20	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	24	24	24	24	24	24	24	23	24	25	25	26	24	23	24	26	25	25	25	25	25	25	25	24	
MED	E ₁₅ S	E ₁₂ S	E ₁₃ S	E	E	E ₁₃ S	15	16	24	28	24	20	E ₂₉ S	U	26	26	22	23	20	20	16	23	16	E ₁₅ S	E ₁₅ S
UQ	24	22	22	17	16	E ₁₄ S	J ₂₆ X	J ₂₆ X	J ₃₃ X	J ₃₄ X	33	32	38	33	31	28	J ₃₀ X	J ₂₃ X	J ₂₆ X	J ₂₆ X	J ₃₃ X	J ₂₈ X	23	22	
LQ	E ₁₄ S	E	E	E	E	E	E ₁₄ S	E ₁₅ S	G	G	G	G	G	G	G	G	E ₁₅ S	E ₁₄ S	E ₁₅ S	E ₁₅ S	E ₁₅ S	E ₁₅ S	E ₁₅ S	E ₁₅ S	

The Radio Research Laboratories, Japan

DEC. 1972

FOES (0.1 MHz)

IONOSPHERIC DATA

DEC. 1972

FBES (0.1 MHz)

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

Station	WAKKANAI				Lat. 45 23.6 N . Long. 141 41.1 E				Sweep 1 MHz to 20 MHz in 20 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	E	E	E	E	E	E	18	25	G	G	G	C	C	C	C	C	C	C	C	C	C	C	C
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
3	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
6	C	C	C	C	C	C	C	C	C	C	C	C	C	C	G	G	G	E	E	E	E	E	E	E
7	E	E	E	E	E	E	E	E	G	G	G	G	C	C	C	G	E	E	E	E	E	E	E	E
8	E	E	E	E	C	C	C	C	C	C	C	G	G	C	C	G	17	17	E	E	E	E	E	E
9	E	E	E	E	E	E	E	E	23	G	G	G	G	G	G	G	E	E	E	E	E	E	E	E
10	E	E	E	E	E	E	E	14	G	G	G	G	G	G	G	E	E	E	E	E	E	E	E	E
11	E	E	E	E	E	E	E	E	G	G	G	G	G	G	G	15	E	E	E	E	E	E	E	E
12	E	E	E	E	E	E	E	14	25	28	G	G	G	G	G	C	C	C	C	C	C	C	C	C
13	C	C	C	C	C	C	C	C	14	G	G	G	G	G	G	20	E	E	E	E	E	E	E	C
14	C	C	C	C	E	S	S	S	G	G	G	28	28	G	G	G	E	E	E	E	E	E	E	E
15	E	E	E	E	E	E	E	E	G	G	28	28	G	G	G	16	E	E	E	E	E	E	E	E
16	E	E	E	E	15	15	E	E	G	G	G	46	G	G	33	G	E	E	E	E	E	E	E	E
17	16	15	E	E	20	A	E	G	50	53	52	28	30	31	21	G	16	A	A	A	E	E	E	A
18	E	A	E	15	A	18	20	16	G	G	G	G	G	20	27	21	18	18	19	E	A	E	E	E
19	E	17	17	20	23	A	20	16	22	30	32	33	40	40	G	26	A	A	A	E	19	A	18	E
20	E	E	E	E	15	16	26	C	24	G	G	G	G	36	24	21	20	E	E	E	E	E	E	E
21	E	E	E	E	E	E	E	E	24	28	G	G	E	E	E	G	17	E	E	E	E	E	E	E
22	E	E	E	E	E	E	E	14	E	E	E	E	E	E	E	G	15	E	E	E	E	E	E	E
23	E	E	E	E	E	E	E	16	21	G	G	G	G	G	G	E	E	E	E	E	E	E	E	E
24	E	E	E	E	E	E	E	E	G	28	34	28	22	20	G	G	E	E	E	E	E	E	E	E
25	E	18	E	E	E	E	E	16	22	28	G	G	G	G	G	22	15	E	20	E	E	E	E	
26	E	E	E	E	E	E	E	E	G	G	G	G	E	E	E	E	15	E	E	E	E	E	E	E
27	E	E	E	E	E	E	E	14	G	33	47	65	37	30	20	25	21	18	A	A	A	A	E	E
28	E	E	14	E	E	E	E	E	G	27	30	32	G	G	G	G	E	E	E	E	E	E	E	E
29	E	E	E	E	E	E	E	E	G	G	G	G	G	G	G	E	E	E	E	E	E	E	E	E
30	E	E	14	E	12	E	E	E	23	20	G	G	G	G	24	27	30	17	E	E	21	15	E	E
31	E	E	E	E	E	E	E	E	G	G	G	G	40	G	28	21	25	16	E	E	A	A	E	E
CNT	24	24	24	24	24	23	23	22	24	25	25	26	24	23	24	26	25	25	25	25	25	25	25	24
MED	E	E	E	E	E	E	E	E	G	G	E	G	G	G	G	15	E	E	E	E	E	E	E	E
UQ	E	E	E	E	13	E	E	E	23	28	U	26	28	U	26	U	24	22	21	17	16	19	E	E
LQ	E	E	E	E	E	E	E	E	G	G	G	G	G	G	G	15	E	E	E	E	E	E	E	E

The Radio Research Laboratories, Japan

DEC. 1972

FBES (0.1 MHz)

IONOSPHERIC DATA

DEC. 1972

F-MIN (0.1 MHz)

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

Station WAKKANAI Lat. 45 23.6 N Long. 141 41.1 E Sweep 1 MHz to 20 MHz in 20 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	E	E	E	E	E	E	E	15	18	18	20	C	C	C	C	C	C	C	C	C	C	C	C
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
3	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
6	C	C	C	C	C	C	C	C	C	C	C	C	C	C	15	14	E	E	E ₁₆	E ₁₅	E ₁₅	E ₁₅	E	E
7	E	E	E ₁₅	E	E	E ₁₅	E ₁₅	E ₁₆	14	17	14	19	C	C	C	11	E ₁₅	E ₁₅	E ₁₅	E	E ₁₅	E	E ₁₅	E ₁₅
8	E ₁₅	E	E	E	C	C	C	C	C	C	C	16	16	C	C	11	E	E ₁₅	E ₁₆	E ₁₄	E	E ₁₅	E	E
9	E ₁₅	E	E ₁₅	E	E	E	E ₁₅	E ₁₅	11	11	11	12	11	11	11	11	E ₁₅	E ₁₅	E	E	E ₁₅	E ₁₅	E	E ₁₅
10	E	E	E	E	E	E	E ₁₅	E	11	11	22	17	12	12	11	E	E ₁₅	E	E ₁₆	E	E ₁₅	E ₁₆	E	E
11	E ₁₅	E	E	E	E	E	E ₁₅	E ₁₅	E	11	12	11	E	11	11	E	E	E	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₆	E ₁₅
12	E ₁₅	E ₁₃	E	E	E	E ₁₅	E ₁₅	E	E	11	12	12	11	12	12	12	C	C	C	C	C	C	C	C
13	C	C	C	C	C	C	C	C	C	11	11	11	11	11	11	13	E ₁₂	E ₁₅	E ₁₃	E ₁₆	E ₁₆	E ₁₆	E ₁₅	C
14	C	C	C	C	E	E ₁₃	E ₁₅	E ₁₅	11	11	12	12	11	11	12	E	E ₁₄	E ₁₃	E ₁₃	E	E ₁₅	E ₁₆	E ₁₆	E ₁₅
15	E ₁₆	E ₁₄	E ₁₃	E	E	E	E ₁₅	E ₁₅	11	E	E	11	11	11	11	E	E ₁₅	E	E ₁₅	E ₁₅	E ₁₅	E ₁₆	E ₁₅	E ₁₅
16	E ₁₅	E ₁₅	E	E	E	E	E ₁₅	E ₁₆	11	13	16	15	16	31	13	11	E ₁₅	E	E	E ₁₆	E ₁₅	E	E ₁₆	E ₁₅
17	E ₁₅	E	E ₁₆	E	E	E	E ₁₅	E ₁₅	15	17	17	16	19	16	14	15	E	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₆	E ₁₆	E ₁₅
18	E ₁₅	E ₁₄	E ₁₄	E	E	E ₁₄	E ₁₅	E	16	15	13	16	16	15	16	14	E	E	E ₁₂	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E
19	E ₁₅	E	E	E	E	E	E	E ₁₅	15	17	18	12	20	18	18	16	E ₁₅	E ₁₄	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₄	E ₁₆
20	E ₁₄	E	E	E	E	E ₁₄	E ₁₃	C	13	18	18	20	16	17	16	15	E	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₆	E ₁₅	E ₁₅
21	E ₁₄	E	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₄	E	15	20	20	24	34	30	20	20	12	E ₁₄	E ₁₆	E ₁₅	E ₁₅	E ₁₄	E ₁₄	E ₁₅
22	E ₁₄	E ₁₄	E ₁₅	E	E	E	E	E	20	28	36	35	37	36	25	16	E	E ₁₄	E ₁₅	E ₁₂	E ₁₅	E ₁₅	E ₁₅	E ₁₅
23	E ₁₅	E ₁₃	E	E	E	E	E ₁₅	E	12	16	20	20	18	16	16	14	E ₁₅	E ₁₃	E ₁₆	E ₁₅	E ₁₅	E ₁₅	E ₁₆	E ₁₅
24	E ₁₅	E	E ₁₃	E ₁₃	E ₁₃	E	E ₁₄	E ₁₅	12	13	15	16	16	17	17	14	E ₁₄	E ₁₅	E ₁₅	E ₁₄	E ₁₄	E ₁₅	E ₁₅	E ₁₅
25	E ₁₅	E ₁₄	E ₁₃	E	E	E	E ₁₄	E	14	16	16	19	16	17	16	15	E ₁₃	E ₁₅	E	E ₁₅	E ₁₆	E ₁₄	E ₁₅	E ₁₅
26	E ₁₅	E	E	E	E	E	E ₁₅	E ₁₅	16	17	21	23	30	28	29	25	E	E ₁₃	E ₁₃	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₅
27	E ₁₅	E ₁₅	E ₁₅	E	E	E	E ₁₄	E	19	19	21	26	21	20	19	16	E	E ₁₃	E ₁₄	E ₁₅	E ₁₅	E ₁₆	E ₁₅	E ₁₅
28	E ₁₅	E ₁₄	E	E ₁₄	E	E ₁₃	E ₁₄	E ₁₄	15	18	20	19	16	16	18	16	E ₁₃	E ₁₄	E ₁₄	E ₁₅	E ₁₅	E ₁₆	E ₁₆	E
29	E ₁₅	E	E ₁₄	E	E	E ₁₄	E	E ₁₄	16	18	18	20	22	20	19	18	E ₁₇	E	E ₁₄	E ₁₅	E	E ₁₆	E ₁₅	E ₁₅
30	E	E	E	E	E	E ₁₄	E ₁₃	E ₁₆	E	15	17	17	17	17	16	11	E	E ₁₄	E	E	E	E ₁₆	E ₁₅	E ₁₆
31	E ₁₅	E	E	E	E	E	E	E ₁₅	11	16	19	17	19	17	18	16	E	E	E ₁₅	E	E	E	E ₁₅	E ₁₅
CNT	24	24	24	24	24	24	24	23	24	25	25	26	24	23	24	26	25	25	25	25	25	25	25	24
MED	E ₁₅	E	E	E	E	E	E ₁₄	E ₁₄	14	16	17	17	16	17	16	14	E ₁₂	E ₁₄	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅
UQ	E ₁₅	E ₁₄	E ₁₃	E	E	E ₁₄	E ₁₅	E ₁₅	15	18	20	20	20	19	18	16	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₆	E ₁₆	E ₁₅
LQ	E ₁₄	E	E	E	E	E	E ₁₃	E	11	11	13	12	12	12	12	11	E	E	E ₁₃	E ₁₂	E ₁₄	E ₁₄	E ₁₅	E ₁₅

The Radio Research Laboratories, Japan

DEC. 1972

F-MIN (0.1 MHz)

IONOSPHERIC DATA

DEC. 1972

M(3000)F2 (0.01)

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

Station		WAKKANAI												Lat. 45 23.6 N, Long. 141 41.1 E												Sweep 1 MHz to 20 MHz in 20 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	F	F	F	F	F	F	F	F	F	F	F	F	C	C	C	C	C	C	C	C	C	C	C	C				
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C				
3	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C				
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C				
5	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C				
6	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C				
7	300	305	295	295	315	320	355	335	340	375	360	360	C	C	C	375	390	335	360	330	305	325	290	300					
8	285	305	310	340	C	C	C	C	C	C	C	335	370	C	C	380	370	335	315	355	350	315	285	285					
9	305	290	F	F	300	345	355	365	370	340	370	355	345	365	360	355	380	325	350	345	355	280	310	285					
10	290	300	315	305	315	320	350	360	340	360	345	360	340	370	350	345	365	330	335	350	350	335	F	F					
11	F	280	290	300	305	335	330	360	380	360	375	360	350	345	360	350	310	350	330	320	350	340	290	F					
12	F	F	F	F	F	345	305	355	360	340	335	365	350	365	355	375	C	C	C	C	C	C	C	C					
13	C	C	C	C	C	C	C	C	C	345	325	340	345	355	350	355	300	320	315	315	300	305	295	C					
14	C	C	C	C	280	305	315	330	315	355	365	355	345	340	360	345	355	330	325	340	335	280	290	290					
15	290	285	285	295	305	325	315	350	345	380	360	365	355	330	335	360	355	355	335	325	305	275	280	280					
16	290	295	325	315	285	270	305	330	325	355	345	365	380	350	345	355	335	340	330	335	315	310	285	275					
17	F	295	290	285	295	A	305	350	355	R	345	340	355	355	360	350	335	A	A	A	345	335	300	A					
18	280	A	305	315	305	A	305	305	325	350	355	320	330	370	350	R	370	360	335	335	355	A	275	F	F				
19	F	F	F	F	320	A	305	340	375	325	345	335	360	355	350	325	A	A	A	345	330	A	295	275					
20	275	275	280	290	325	375	340	C	350	360	350	345	335	345	355	365	350	350	330	345	325	285	275	280					
21	280	290	280	290	280	350	335	325	340	365	335	335	365	340	350	375	360	335	310	335	335	F	F	F					
22	F	F	290	280	280	325	330	335	370	340	335	360	350	335	345	360	300	335	325	S	A	S	S	F					
23	265	265	305	305	295	295	295	355	345	340	355	340	335	I	R	360	340	335	340	325	325	355	265	290	300				
24	280	280	300	325	300	340	350	335	340	350	345	360	R	350	360	370	365	300	325	F	F	A	A	F					
25	F	F	F	300	F	F	375	330	370	370	340	350	355	360	350	370	340	325	325	325	340	295	285	275					
26	280	300	280	295	280	F	F	335	365	345	355	360	370	370	365	350	330	340	305	335	365	290	280	300					
27	F	F	F	F	F	315	345	335	360	355	350	R	360	350	330	330	365	315	A	A	A	A	285	280					
28	320	280	295	300	315	325	350	355	340	360	360	355	R	335	365	350	335	330	330	340	345	290	280	305					
29	275	300	305	345	295	315	295	325	355	345	350	350	365	355	335	320	340	325	325	355	325	290	290	280					
30	270	290	285	F	315	380	350	325	355	310	340	390	350	335	365	380	355	315	335	335	310	285	290	280					
31	F	295	295	300	315	365	270	325	350	360	350	355	345	330	335	365	365	310	340	325	A	A	F	F					
	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	17	18	18	20	19	23	23	24	24	25	25	22	23	23	26	24	23	22	21	20	20	20	16					
MED	280	290	295	300	302	325	330	335	352	355	350	355	352	350	355	358	355	335	328	335	338	292	288	282					
UQ	290	300	305	315	315	345	350	352	362	360	360	360	365	355	360	370	365	340	335	345	350	318	290	300					
LQ	278	280	285	295	290	315	305	330	340	342	340	340	345	338	348	350	335	325	325	325	320	282	280	280					

DEC. 1972

M(3000)F2 (0.01)

IONOSPHERIC DATA

DEC. 1972

M(3000)F1 (0.01)

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

Station **WAKKANAI** Lat. **45° 23' 6" N** Long. **141° 41' 1" E** Sweep **1** MHz to **20** MHz in **20** sec in automatio operation

Hour Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1													C	C										
2											C	C	C	C										
3											C	C	C	C										
4											C	C	C	C										
5											C	C	C	C										
6											C	C	C	C										
7													C	C										
8											C			C										
9																								
10																								
11																								
12												L												
13												375												
14												L												
15																								
16																								
17																								
18																								
19																								
20																								
21																								
22																								
23																								
24																								
25												L												
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												1												
MED											375													
UQ																								
LQ																								

DEC. 1972

M(3000)F1 (0.01)

IONOSPHERIC DATA

DEC. 1972

H^oF₂ (KM)

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

Station **WAKKANAI** Lat. **45 23.6 N** Long. **141 41.1 E** Sweep **1** MHz to **20** MHz in **20** sec in automatio operation

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

DEC. 1972

H^oF₂ (KM)

IONOSPHERIC DATA

DEC. 1972

H^oF (KM)

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

Station WAKKANAI Lat. 45° 23.6' N. Long. 141° 41.1' E Sweep 1 MHz to 20 MHz in 20 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	285	275	290	265	250	250	215	205	205	220	220	C	C	C	C	C	C	C	C	C	C	C	C
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
3	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
6	C	C	C	C	C	C	C	C	C	C	C	C	C	C	225	225	200	200	250	245	215	270	300	270
7	260	275	255	260	250	230	220	220	215	215	230	225	C	C	C	215	200	230	205	235	250	250	300	280
8	280	260	250	200	C	C	C	C	C	C	C	220	215	C	C	210	200	220	255	220	210	235	310	300
9	300	295	280	260	250	230	210	210	210	215	230	220	210	220	225	215	210	235	220	220	215	285	280	305
10	290	285	270	215	260	225	220	200	200	210	205	210	225	210	220	220	195	250	240	215	235	235	285	250
11	275	300	290	270	250	205	250	220	205	215	215	230	225	215	230	220	205	220	230	225	220	250	290	305
12	300	290	300	275	260	220	250	205	210	215	225	230	225	215	225	215	C	C	C	C	C	C	C	C
13	C	C	C	C	C	C	C	C	C	225	215	220	225	210	210	220	245	255	250	260	230	255	285	C
14	C	C	C	C	300	245	245	200	215	235	220	215	220	230	230	220	210	220	245	210	220	275	305	295
15	285	270	275	250	250	220	245	220	220	205	215	235	200	210	215	220	210	210	210	265	275	300	345	300
16	280	250	225	240	300	305	260	230	225	220	230	A	215	230	230	220	210	210	220	245	250	270	285	300
17	310	270	265	295	325	A	235	200	215	A	A	210	220	220	225	220	215	A	A	A	235	250	320	A
18	315	A	280	245	A	285	295	230	215	220	215	225	225	220	225	215	210	230	270	220	A	320	335	290
19	345	350	325	315	285	A	280	225	205	215	240	220	225	220	215	220	A	A	A	230	245	A	320	310
20	300	315	300	290	250	205	240	C	200	215	230	230	220	250	225	220	200	200	245	235	255	350	350	325
21	300	300	295	265	270	210	250	225	210	220	220	235	245	215	245	220	200	210	250	250	225	245	300	300
22	300	270	275	275	275	230	205	220	210	215	250	230	230	215	240	220	200	210	245	255	A	340	300	260
23	335	305	260	250	300	250	250	200	205	230	240	230	225	220	220	220	220	205	235	225	215	300	295	260
24	290	300	270	225	270	200	250	225	205	230	225	225	200	225	225	205	210	250	250	230	250	A	A	330
25	325	290	260	240	245	220	200	225	210	205	235	245	215	225	210	210	205	225	250	250	235	285	285	300
26	310	300	300	270	270	250	225	220	200	205	225	240	225	225	210	220	200	220	220	240	235	320	305	290
27	300	290	250	250	250	230	200	225	205	220	A	A	235	225	200	220	200	255	A	A	A	A	335	340
28	265	300	300	290	245	250	210	215	215	215	235	240	210	220	215	210	210	210	220	230	225	290	335	300
29	300	280	270	225	250	245	185	230	210	205	220	260	230	230	210	215	220	210	265	225	230	280	300	300
30	300	300	300	280	250	200	215	260	205	215	220	215	225	225	230	215	200	220	230	250	275	300	290	305
31	300	280	255	230	220	200	220	230	210	215	220	230	225	235	240	220	195	245	220	225	A	A	325	300
	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	24	23	24	24	23	22	24	23	24	24	23	24	24	23	24	26	24	23	22	23	21	21	24	23
MED	300	290	275	260	260	230	238	220	210	215	225	228	225	220	225	220	205	220	242	230	235	280	300	300
UQ	305	300	298	278	272	250	250	225	215	220	230	232	225	225	230	220	210	232	250	248	250	300	322	305
LQ	282	278	260	240	250	210	212	212	205	212	220	220	215	215	215	215	200	210	220	225	220	250	290	290

The Radio Research Laboratories, Japan

DEC. 1972

H^oF (KM)

IONOSPHERIC DATA

DEC. 1972

H^oES (KM)

135° E Mean Time (G. M. T. + 9h)

Station	WAKKANAI																								
	Lat. 45° 23.6' N, Long. 141° 41.1' E Sweep 1 MHz to 20 MHz in 20 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	E	110	100	E	E	110	105	105	G	105	105	C	C	C	C	C	C	C	C	C	C	C	C	
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
3	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
5	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
6	C	C	C	C	C	C	C	C	C	C	C	C	C	C	G	G	125	E	S	105	S	S	E	E	
7	E	E	100	100	E	S	S	S	G	G	105	G	C	C	C	G	S	110	S	E	S	E	S	115	
8	105	E	E	E	C	C	C	C	C	C	C	130	G	C	C	140	100	100	S	S	E	S	E	E	
9	S	E	100	E	E	E	100	S	110	G	105	100	G	G	100	G	S	S	E	E	110	S	E	S	
10	E	E	E	E	E	E	S	110	G	G	G	G	G	G	G	120	100	100	S	E	S	S	105	105	
11	S	E	E	E	E	E	S	S	G	G	105	105	100	100	100	100	100	110	110	110	110	110	110	S	S
12	105	100	100	E	E	S	110	110	105	105	105	G	G	155	135	G	C	C	C	C	C	C	C	C	
13	C	C	C	C	C	C	C	C	C	140	G	G	G	G	G	150	120	S	S	S	S	S	S	C	
14	C	C	C	C	E	S	S	S	115	G	G	110	105	G	G	G	100	100	100	E	S	S	S	S	
15	S	S	S	110	E	E	S	S	125	115	110	105	G	G	G	100	S	E	S	S	S	105	S	105	
16	S	S	E	110	115	115	S	S	115	120	120	110	115	120	110	G	S	E	E	S	105	E	105	100	
17	105	105	105	E	100	100	S	G	115	110	105	110	110	105	105	G	115	105	105	105	110	100	100	105	
18	105	105	115	125	110	110	110	105	G	110	G	G	G	100	100	115	110	105	100	105	100	100	S	E	
19	105	115	110	105	105	105	105	105	105	100	100	130	120	120	120	110	105	100	100	100	100	100	100	100	
20	S	E	E	110	105	100	100	C	100	G	G	G	110	110	110	110	105	105	S	S	100	100	100	S	
21	S	E	S	S	S	S	105	105	105	105	G	G	B	B	160	G	105	S	S	100	100	S	S	S	
22	S	S	S	E	E	E	E	105	B	B	B	B	B	B	125	125	100	S	110	110	105	105	105	S	
23	S	S	E	E	E	E	115	110	110	175	G	G	G	G	G	G	S	S	110	110	105	105	S	S	
24	100	E	100	S	S	E	S	S	150	105	105	105	105	105	G	G	S	100	100	100	110	105	105	S	
25	105	100	S	E	E	E	110	110	110	110	110	G	105	G	G	100	100	105	100	100	S	S	S	S	
26	S	100	E	E	E	E	S	S	G	165	155	G	B	B	B	B	100	S	S	S	125	S	S	S	
27	S	S	S	E	E	E	S	110	160	150	110	105	105	105	105	100	100	100	100	100	100	100	100	100	
28	100	105	100	100	E	S	S	S	G	110	110	105	G	G	G	G	G	S	100	S	S	S	S	E	
29	S	E	S	E	E	S	E	S	G	G	140	G	G	125	100	G	S	E	105	S	E	S	S	S	
30	E	E	110	105	105	S	S	S	105	105	G	G	120	125	110	110	105	S	100	100	100	S	S	S	
31	S	E	E	E	E	E	E	110	G	G	G	120	115	125	115	110	105	105	105	E	100	100	S	115	
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	8	7	10	9	6	5	9	11	15	15	15	13	11	12	14	13	17	13	14	12	15	11	8	8	
MED	105	105	102	105	105	105	110	110	110	110	105	105	110	115	110	110	105	105	100	102	105	100	102	105	
UQ	105	105	110	110	110	110	110	110	115	130	110	110	115	125	120	120	105	105	105	108	110	105	105	110	
LQ	102	100	100	100	105	100	105	105	105	105	105	105	105	105	100	100	100	100	100	100	100	100	100	100	

DEC. 1972

H^oES (KM)

IONOSPHERIC DATA

DEC. 1972

TYPES OF ES

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

Station **WAKKANAI** Lat. **45° 23.6' N.** Long. **141° 41.1' E** Sweep **1 MHz to 20 MHz** in **20 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	F			F	z	t		t	t												
2																								
3																								
4																								
5																								
6																	f			F				
7			F	F							t							F						F
8	F										H					H	z	E						
9			F				F		t		t	t			t						F			
10								t								f	t	F					F	F
11										t	z	t	t	t	z	t	F	F	F	F	E	F		
12	F	F	F				F	t	z	z	t			H	H									
13																H		E						
14									E		t	t					t	F	F					
15				E					f	E	z	z				t						F		F
16				F	E	E			E	f	f	E	f	f	z						F		E	F
17	F	F	F		F	F			E	z	z	t	z	z	t		t	F	F	E	F	F	F	F
18	F	F	F	F	F	F	F	t						t	t	F	t	F	F	F	F	F		
19	F	F	F	F	F	F	F	z	t	t	t	H	F	f	f	t	z	F	F	F	F	F	F	F
20				F	E	F	E		t				f	z	t	t	t	F			F	F	F	
21							F	z	t	t						H		t			F	F		
22								t							f	f	t		F	E	E	E	E	
23							F	t	t	H									F	F	F	F	F	
24	F		F						H	z	z	t	t	t				F	F	F	F	F	F	F
25	F	F					F	t	t	z	t		t			t	t	F	F	F				
26		F								H	H							t				F		
27								t	H	H	z	z	t	t	t	t	z	F	F	F	F	F	F	F
28	F	F	E	F						t	t	t							F					
29											H					f	t		F					
30			E	F	E				z	t					f	F	t	z	t		F	F	E	
31								t					f	t	f	t	t	z	E	F		E	F	F

CNT
MED
UQ
LQ

DEC. 1972

TYPES OF ES

IONOSPHERIC DATA

DEC. 1972

FOF2 (0.1 MHz)

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

Station	AKITA																							Lat. 39 43.5 N.	Long. 140 08.2 E	Sweep 1 MHz to 20 MHz in 20 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	F	F ₄₁	F ₄₄	F	F	F	74	68	67	71	76	76	80	86	74	71	44	33	31	33	34	34	33																								
2	34	32	36	39	41	33	36	58	71	65	88	78	89	69	71	74	57	47	39	31	31	I ₂₈ ^R	31	34																								
3	32	32	34	35	34	36	40	59	74	65	79	82	80	78	Z ₇₈	76	54	38	33	28	31	31	I ₃₀ ^A	31																								
4	32	33	33	34	34	31	34	52	63	74	74	70	68	H ₇₆	73	70	56	I ₄₂ ^A	38	34	31	27	26	27																								
5	29	30	31	33	31	31	35	56	56	71	77	91	70	63	68	66	53	33	34	36	28	25	F ₂₆	28																								
6	F	F ₃₁	F ₃₄	34	36	29	30	48	61	62	65	80	66	65	72	60	60	I ₃₀ ^A	30	31	29	24	26	30																								
7	31	32	32	32	32	25	25	46	53	57	66	67	63	65	65	65	60	30	32	28	31	32	29	30																								
8	32	34	37	39	28	28	30	50	61	66	73	Z ₇₇	71	68	62	69	54	31	30	40	35	27	30	I ₃₁ ^R																								
9	33	36	36	36	33	31	27	48	61	56	66	80	67	67	H ₆₆	66	50	32	29	35	32	I ₂₄ ^A	26	29																								
10	29	30	31	32	31	28	28	48	58	56	65	73	72	64	61	61	57	44	31	38	30	26	F	32																								
11	33	34	31	31	31	26	29	49	61	60	H ₆₉	H ₆₉	67	68	63	63	51	41	35	34	29	27	30	31																								
12	F ₃₁	F ₃₅	F ₃₄	34	34	32	25	48	64	57	61	81	84	70	61	63	54	34	31	32	28	31	F ₃₃	34																								
13	35	35	34	34	31	30	26	49	56	67	H ₇₄	76	75	77	70	65	59	54	46	48	42	37	36	43																								
14	35	31	34	31	32	33	33	49	65	101	99	90	74	71	82	79	64	46	45	48	32	28	31	F ₃₁																								
15	59	36	36	34	34	34	33	49	59	86	81	96	76	77	67	78	71	41	37	36	38	34	F ₃₁	36																								
16	33	32	34	24	I ₂₅ ^R	25	28	55	74	87	95	91	71	84	67	85	62	54	41	41	37	27	F	F ₃₂																								
17	31	33	I ₃₃ ^A	31	31	31	34	55	62	85	106	84	79	78	75	75	62	53	I ₃₈ ^A	30	29	A	A	A																								
18	29	31	32	38	27	A	A	A	66	82	87	76	86	76	H ₆₁	92	61	36	I ₃₅ ^A	34	31	26	F	28																								
19	27	F	F	F ₃₂	39	33	F ₃₄	54	79	71	76	90	94	87	75	79	68	47	35	35	34	27	28	29																								
20	31	31	32	35	42	30	24	48	65	66	75	89	85	H ₈₀	84	75	58	39	35	34	33	26	27	29																								
21	31	32	34	32	36	30	26	48	64	64	78	H ₈₀	94	82	74	86	58	38	39	34	36	25	27	31																								
22	32	33	34	F	F	F ₃₇	F ₃₆	59	64	69	71	95	92	H ₈₅	H ₇₄	74	59	41	36	39	37	36	I ₃₂ ^A	31																								
23	32	34	36	38	30	31	36	60	61	71	101	115	H ₈₁	87	H ₈₆	86	67	57	48	46	40	28	32	35																								
24	34	36	37	40	36	38	37	49	75	76	96	91	87	78	89	84	61	42	38	H ₄₅	45	F ₅₀	F ₄₅	51																								
25	57	F ₅₈	F	H ₆₃	F	F	F	F ₄₆	74	72	64	91	115	86	H ₇₇	C	C	C	C	V ₄₃	42	25	F ₂₆	F ₃₀																								
26	F ₃₁	F	F	F	F ₃₆	F ₃₄	31	43	58	60	67	78	84	71	68	65	68	46	39	31	34	25	28	F																								
27	F ₃₁	F	F	F ₃₄	F	34	29	50	62	59	79	H ₉₃	91	H ₈₄	67	81	58	34	46	35	31	26	I ₂₄ ^A	28																								
28	30	31	30	32	31	30	30	51	H ₅₉	57	66	71	76	76	73	72	50	42	37	32	33	22	F ₂₆	F ₂₈																								
29	29	31	37	39	26	F ₂₈	F ₃₂	45	62	61	65	Z ₈₄	89	84	73	64	57	42	41	37	30	24	26	28																								
30	31	34	34	F ₃₁	F ₄₀	28	26	40	50	70	86	77	H ₇₀	H ₆₈	84	78	56	40	46	39	27	25	27	27																								
31	29	32	36	37	37	F ₃₆	26	44	64	66	66	77	64	69	81	84	56	36	44	44	26	24	26	F ₂₆																								
	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	29	27	28	28	30	31	31	31	31	31	31	31	30	30	30	30	31	31	30	27	29																								
MED	31	32	34	34	33	31	30	49	62	66	74	80	76	76	73	74	58	41	37	35	32	27	28	31																								
UQ	33	34	36	38	36	34	34	55	66	72	84	90	86	81	78	79	62	46	41	40	36	31	31	32																								
LQ	31	31	32	32	31	28	26	48	60	60	66	76	70	68	67	65	56	36	33	32	30	25	26	28																								

DEC. 1972

FOF2 (0.1 MHz)

IONOSPHERIC DATA

DEC. 1972

FOF1 (0.01 MHz)

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

Station **AKITA** Lat. **39 43.5 N** Long. **140 08.2 E** Sweep **1** MHz to **20** MHz in **20** 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	A										
2										L	L	L	370	390 ^H	350									
3										L	L	390	L	L	L									
4										L	L	390	L	L	L									
5										L	L	L	L	L										
6																								
7											L	L	L	L		L								
8									L	U 350	L	L	L	360	L									
9									L	U 380	L	L	L	L	L									
10									L	380	L	L	L	L	L									
11									L	L	L	L	L	L										
12										L	L	L	L	L										
13										L	L	U 420	L	L										
14										L	L	L	L	U 400										
15										L	L	L	L	L										
16									A	L	L	U 430	L	L										
17										A	L	L	A	L										
18										L	L	L	L	L										
19										L	L	L	L	L										
20									280	320	L	410	L	L	400									
21											L	L	L	L										
22											L	L	L	L										
23										L	L	L	L	L	L									
24										L	L	L	A	L	L									
25										L	A	400	L	L	L									
26										L	L	L	L	U 360										
27										L	L	440	L	U 380										
28									L	L	L	430 ^H	L	L										
29										L	U 450	L	L	L										
30										460	L	L	L	U 390	L									
31											L	L	L	A	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	3	3	5	5	2	6									
MED									280	320	380	400	430	375	U 385									
UQ									335	420	410	430			U 400									
LQ									320	380	390	420			U 360									

DEC. 1972

FOF1 (0.01 MHz)

IONOSPHERIC DATA

DEC. 1972

FOE (0.01 MHz)

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

Station **AKITA** Lat. **39 43.5 N**, Long. **140 08.2 E** Sweep **1 MHz to 20 MHz** in **20 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	245	I A 280	I A 295	A	A	A	275	A	A								
2								B	250	280	A	A	320	300	270	230		B							
3								B	245	285	295	300	305	300	285	235		A							
4								A	A	A	295	300	310	295	275	235		A							
5								B	225	260	280	285	295	275	255	220		B							
6								A	210	250	I 270	280	295	280	265	225		S							
7								S	215	260	285	290	295	280	265	215		S							
8								S	205	275	285	290	295	280	255	230		S							
9								S	240	280	290	I A 300	305	300	275	235		S							
10								B	245	280	290	305	310	290	280	250	185								
11								B	235	275	285	300	310	305	280	230		A							
12								B	245	280	295	305	310	300	285	250	180								
13								B	245	280	300	310	315	295	285	260		A							
14								B	245	I A 280	I A 290	I A 300	315	300	270		A	S							
15								B	240	275	290	I A 305	315	305	280	245	195								
16								S	A	275	I A 290	I A 305	310	I B 300	I A 280		A	A							
17								B	A	A	A	A	A	A	A	I A 250		B							
18								A	A	A	I A 290	305	315	A	A	A	A								
19								B	240	275	I A 290	I A 305	315	I A 300	290		A	S							
20								B	235	280	295	310	315	305	285	245	180								
21								B	240	280	290	I A 300	315	310	290	260		A							
22								B	B	280	I B 290	I B 300		B	A	B	A	B							
23								S	I A 230	275	295	300	310	300	280	250		A							
24								S	230	280	290	A	A	A	A	A	A								
25								S	225	A	A	A	I A 295	290	275		C	C							
26								S	215	275	285	300	310	305	285		B	B							
27								S	235	I A 275	290	300	I A 300	300	280		A	A							
28								B	220	265	280	300	310	300	290	260		B							
29								B	230	A	A	A	A	305	275		C	195							
30								B	A	280	295	300	315	310	280	245		A							
31								B	245	275	290	300	315	300	280	250		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									25	26	27	25	26	26	27	20	5								
MED									235	278	290	300	310	300	280	245	185								
UQ									245	280	295	305	315	305	285	250	195								
LQ									225	275	288	300	305	295	275	230	180								

DEC. 1972

FOE (0.01 MHz)

IONOSPHERIC DATA

DEC. 1972

FOES (0.1 MHz)

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

Station **AKITA** Lat. **39 43.5 N.** Long. **140 08.2 E** Sweep **1 MHz to 20 MHz** in **20 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 ₂₀ X	J ₂₇ X	J ₂₅ X	E	E	E ₁₃ S	E ₁₃ S	E ₁₈ B	26	29	33	J ₃₆ X	33	J ₈₉ X	J ₄₀ X	J ₃₀ X	J ₂₉ X	J ₂₃ X	J ₄₄ X	J ₄₄ X	J ₂₅ X	J ₂₃ X	J ₃₃ X	J ₂₉ X	
2	J ₂₂ X	J ₂₀ X	E ₁₄ S	E ₁₃ S	J ₁₈ X	J ₁₉ X	E ₁₄ S	E ₁₉ B	G	38	J ₅₁ X	34	G	27	29	J ₄₃ X	E ₁₈ B	J ₂₄ X	J ₂₈ X	J ₃₉ X	J ₂₇ X	J ₂₂ X	J ₁₈ X	E ₁₄ S	
3	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	J ₂₀ X	E ₁₄ S	J ₁₉ X	E ₂₀ B	G	G	G	G	G	35	33	28	J ₂₀ X	J ₂₀ X	J ₁₀₃ X	J ₂₁ X	J ₁₉ X	J ₂₄ X	J ₄₁ X	E ₁₄ S	
4	J ₂₁ X	J ₂₃ X	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	J ₂₀ X	J ₂₀ X	J ₃₉ X	J ₃₄ X	G	27	32	G	G	G	J ₂₈ X	J ₃₉ X	J ₁₈ X	J ₂₅ X	J ₁₉ X	E ₁₄ S	J ₂₇ X	J ₂₅ X	
5	E ₁₄ S	E ₁₄ S	J ₁₈ X	J ₂₇ X	J ₂₄ X	E ₁₄ S	E ₁₄ S	E ₁₉ B	G	G	G	22	G	23	20	G	E ₁₈ B	E ₁₅ S	J ₂₂ X	E ₁₄ S	J ₁₉ X	J ₁₉ X	E ₁₄ S	E ₁₄ S	
6	E ₁₄ S	E ₁₄ S	E ₁₄ S	M ₁₉	E ₁₄ S	E ₁₄ S	J ₁₉ X	J ₁₉ X	J ₂₅ X	G	J ₃₁ X	35	33	33	30	27	22	J ₃₀ X	J ₃₁ X	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	
7	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₆ S	25	G	G	33	G	G	25	25	19	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	M ₂₂	E ₁₄ S	E ₁₄ S
8	E ₁₄ S	M ₂₀	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	G	29	J ₄₂ X	31	33	32	28	26	21	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	
9	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	J ₁₉ X	G	G	G	J ₅₂ X	J ₂₇ X	J ₂₇ X	J ₂₈ X	J ₂₉ X	J ₂₈ X	E ₁₄ S	J ₁₉ X	J ₃₀ X	E ₁₄ S	J ₃₀ X	E ₁₄ S	E ₁₄ S	
10	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₉ B	G	G	G	G	G	31	G	G	G	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	
11	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₈ B	J ₃₀ X	G	G	G	G	33	29	27	23	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	J ₂₉ X	E ₁₄ S	E ₁₄ S	
12	E ₁₄ S	E ₁₄ S	E ₁₃ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₈ B	E ₁₈ B	21	J ₃₇ X	J ₂₉ X	G	G	J ₂₈ X	G	G	G	M ₂₀	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	
13	E ₁₄ S	E ₁₄ S	E	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₈ B	E ₁₈ B	G	J ₃₉ X	34	G	G	G	G	G	24	J ₁₈ X	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	J ₁₉ X	
14	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	J ₂₃ X	E ₁₉ B	27	J ₄₇ X	34	39	G	G	G	J ₄₈ X	J ₂₉ X	J ₃₄ X	J ₁₈ X	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	
15	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₈ B	28	35	J ₄₉ X	J ₅₂ X	G	G	29	G	G	E ₁₄ S	J ₁₉ X	J ₃₈ X	J ₂₃ X	E ₁₄ S	J ₂₀ X	E ₁₄ S	
16	J ₂₉ X	J ₁₉ X	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₅ S	E ₁₅ S	J ₄₇ X	J ₅₀ X	J ₆₇ X	J ₄₄ X	30	E ₃₈ B	32	27	J ₂₀ X	M ₂₀	J ₁₈ X	M ₁₉	E ₁₄ S	E ₁₄ S	E ₁₄ S	J ₂₃ X	
17	J ₁₈ X	J ₃₉ X	J ₄₅ X	J ₃₀ X	J ₁₇ X	E ₁₄ S	J ₁₉ X	E ₁₈ B	26	J ₄₂ X	J ₁₁₂ X	J ₄₅ X	J ₄₆ X	J ₈₆ X	J ₅₃ X	J ₃₅ X	E ₁₈ B	J ₃₆ X	J ₄₃ X	J ₄₅ X	J ₂₉ X	J ₂₉ X	J ₃₃ X	J ₃₃ X	
18	J ₃₄ X	J ₂₂ X	J ₂₆ X	E ₁₄ S	J ₂₆ X	J ₄₆ X	J ₄₉ X	J ₁₀₄ X	J ₉₆ X	J ₅₃ X	J ₄₄ X	26	J ₃₃ X	J ₄₄ X	J ₃₈ X	27	J ₆₄ X	J ₅₃ X	J ₄₈ X	J ₃₆ X	J ₂₅ X	J ₁₉ X	E ₁₄ S	E ₁₄ S	
19	E ₁₄ S	E ₁₃ S	E ₁₄ S	J ₂₉ X	J ₄₃ X	J ₃₃ X	E ₁₄ S	E ₁₉ B	G	G	32	J ₃₄ X	35	J ₃₉ X	J ₃₀ X	27	J ₂₉ X	J ₃₉ X	J ₃₂ X	J ₂₂ X	J ₂₅ X	E ₁₄ S	E ₁₈ B	E ₁₄ S	
20	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	J ₁₉ X	E ₁₄ S	E ₁₈ B	G	J ₂₈ X	33	34	G	G	G	J ₃₄ X	J ₆₉ X	J ₇₄ X	J ₄₃ X	J ₃₀ X	E ₁₄ S	E ₁₉ B	E ₁₄ S	E ₁₄ S	
21	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₈ B	E ₁₈ B	J ₃₂ X	32	35	J ₃₅ X	G	G	G	G	22	J ₂₅ X	E ₁₄ S	J ₂₀ X	E ₁₄ S	E ₁₈ B	E ₁₄ S	E ₁₄ S	
22	E ₁₄ S	E ₁₄ S	M ₂₀	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₉ B	E ₁₉ B	E ₂₅ B	34	36	37	36	J ₃₄ X	E ₃₄ B	32	E ₂₀ B	E ₁₄ S	J ₁₉ X	J ₂₃ X	J ₄₄ X	J ₂₈ X	J ₅₄ X	E ₁₉ B	
23	J ₁₉ X	E ₁₄ S	M ₂₀	E ₁₄ S	E ₁₄ S	J ₂₀ X	E ₁₄ S	J ₁₉ X	J ₃₇ X	G	J ₃₃ X	34	G	J ₃₀ X	27	J ₂₅ X	J ₂₅ X	J ₂₇ X	J ₂₈ X	J ₂₉ X	J ₄₅ X	E ₁₄ S	J ₃₅ X	E ₁₈ B	
24	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₅ S	E ₁₅ S	G	G	J ₂₇ X	J ₄₈ X	J ₈₁ X	J ₅₈ X	J ₃₈ X	J ₅₀ X	J ₂₈ X	J ₂₉ X	E ₁₄ S	E ₁₉ B	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	
25	E ₁₄ S	J ₂₅ X	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	J ₂₈ X	J ₄₃ X	J ₇₅ X	J ₅₃ X	J ₃₈ X	J ₂₉ X	23	C	C	C	C	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	
26	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₇ S	E ₁₇ S	G	G	G	J ₂₈ X	G	G	G	G	27	E ₁₉ B	J ₂₅ X	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	
27	J ₂₃ X	E ₁₄ S	E ₁₄ S	E	E	E ₁₄ S	J ₃₉ X	E ₁₆ S	G	29	36	J ₃₄ X	J ₃₃ X	33	30	26	J ₂₅ X	J ₃₃ X	J ₂₄ X	J ₂₃ X	J ₂₀ X	J ₁₈ X	J ₄₄ X	E ₁₄ S	
28	E ₁₄ S	J ₂₇ X	J ₂₇ X	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	J ₂₄ X	26	G	J ₃₄ X	34	G	33	G	G	E ₂₀ B	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	
29	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₈ B	E ₁₈ B	25	29	32	34	J ₃₄ X	G	G	E ₄₈ C	G	E ₁₄ S	E ₁₄ S	M ₂₂	M ₁₉	E ₁₄ S	E	E ₁₄ S	
30	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E	E ₁₄ S	E ₁₄ S	20	29	33	32	33	G	28	32	G	J ₂₉ X	J ₂₃ X	J ₁₉ X	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E	
31	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₈ B	E ₁₈ B	G	G	G	34	G	G	J ₄₃ X	G	E ₂₀ B	J ₃₃ X	J ₂₇ X	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	30	30	30	31	31	31	31	31	
MED	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₈ B	E ₁₈ B	25	29	33	34	G	28	28	26	22	J ₂₃ X	J ₁₉ X	19	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	
UQ	16	20	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₉ B	E ₁₉ B	28	36	J ₃₆ X	J ₃₆ X	33	34	32	30	J ₂₈ X	J ₃₃ X	J ₂₈ X	J ₂₇ X	J ₂₂ X	J ₂₀ X	J ₁₉ X	E ₁₄ S	
LQ	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₈ B	E ₁₈ B	G	G	E ₂₇ X	30	G	G	G	G	E ₁₉ B	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	E ₁₄ S	

The Radio Research Laboratories, Japan

DEC. 1972

FOES (0.1 MHz)

IONOSPHERIC DATA

DEC. 1972

FBES (0.1 MHz)

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

Station	AKITA							Lat. 39° 43.5' N.		Long. 140° 08.2' E		Sweep 1 MHz to 20 MHz in 20 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	18	E	E	E	E ₁₃	E ₁₃	E ₁₈	26	28	32	35	32	45	24	26	21	22	19	20	E	E	20	18
2	19	E	E ₁₄	E ₁₃	E	E	E ₁₄	E ₁₉	G	31	32	33	G	G ₂₅	29	27	E ₁₈	18	17	19	21	22	17	E ₁₄
3	E ₁₄	E ₁₄	E ₁₄	E ₁₄	17	E ₁₄	E	E ₂₀	G	G	G	G	G	34	32	27	19	18	17	E	E	E	A	E ₁₄
4	E	18	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E	20	28	29	G ₂₅	32	G	G	G	G	20	A	E	16	17	E ₁₄	18	18
5	E ₁₄	E ₁₄	E	20	16	E ₁₄	E ₁₄	E ₁₉	G	G	G	G ₂₁	G	G ₂₂	G ₁₉	G	E ₁₈	E ₁₅	21	E ₁₄	17	18	E ₁₄	E ₁₄
6	E ₁₄	E ₁₄	E ₁₄	E	E ₁₄	E ₁₄	17	18	18	G	28	35	33	33	30	27	22	A	23	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
7	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₆	24	G	G	33	G	G	G ₂₃	25	17	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E	E ₁₄	E ₁₄
8	E ₁₄	E	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	G	28	G	31	33	32	28	26	20	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
9	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	19	G	G	G	35	G ₂₅	G ₂₂	20	18	20	E ₁₄	E	E	E ₁₄	A	E ₁₄	E ₁₄
10	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₉	G	G	G	G	G	31	G	G	G	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
11	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₈	15	G	G	G	G	33	29	27	23	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E	E ₁₄	E ₁₄
12	E ₁₄	E ₁₄	E ₁₃	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₈	G ₂₀	24	G ₂₂	G	G	G ₁₈	G	G	G	E	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
13	E ₁₄	E ₁₄	E	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₈	G	18	32	G	G	G	G	G	22	E	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E
14	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	19	E ₁₉	G	38	31	32	G	G	G	32	24	25	18	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
15	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₈	27	30	35	31	G	G	G	G	G	E ₁₄	E	19	18	E ₁₄	E	E ₁₄
16	E	E	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₅	29	41	36	38	G ₂₇	E ₃₈	31	27	19	E	E	E	E ₁₄	E ₁₄	E ₁₄	E
17	E	18	A	23	15	E ₁₄	E	E ₁₈	26	38	52	39	38	44	29	23	E ₁₈	19	A	20	25	A	A	A
18	22	19	E	E ₁₄	16	A	A	A	45	34	31	G ₂₅	24	32	34	27	32	25	A	27	18	E	E ₁₄	E ₁₄
19	E ₁₄	E ₁₃	E ₁₄	15	20	19	E ₁₄	E ₁₉	G	G	31	32	34	33	G	26	20	19	20	18	E	E ₁₄	E ₁₈	E ₁₄
20	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E	E ₁₄	E ₁₈	G	G ₁₈	33	33	G	G	G	27	16	E	18	21	E ₁₄	E ₁₉	E ₁₄	E ₁₄
21	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₈	22	32	34	34	G	G	G	G	21	17	E ₁₄	18	E ₁₄	E ₁₈	E ₁₄	E ₁₄
22	E ₁₄	E ₁₄	E	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₉	E ₂₅	34	35	35	35	33	E ₃₄	30	E ₂₀	E ₁₄	E	18	20	18	A	E ₁₉
23	E	E ₁₄	E	E ₁₄	E ₁₄	E	E ₁₄	E	26	G	25	33	G	G ₂₄	G ₂₁	G ₂₂	20	E	20	22	21	E ₁₄	22	E ₁₈
24	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₅	G	G	G ₂₂	32	44	38	30	40	20	19	E ₁₄	E ₁₉	E ₁₄	E ₁₄	E ₁₄	E ₁₄
25	E ₁₄	17	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	20	28	37	31	32	G ₂₇	G ₂₂	C	C	C	C	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
26	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₇	G	G	G	G ₂₅	G	G	G	27	E ₁₉	E	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
27	E	E ₁₄	E ₁₄	E	E	E ₁₄	E	E ₁₆	G	29	36	31	33	33	30	26	19	20	E	E	E	E	A	E ₁₄
28	E ₁₄	19	E	E ₁₄	E ₁₄	E ₁₄	E ₁₄	18	26	G	25	33	G	32	G	G	E ₂₀	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
29	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₈	25	28	31	31	32	G	G	E ₄₈	G	E ₁₄	E ₁₄	E	E	E ₁₄	E	E ₁₄
30	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E	E ₁₄	E ₁₄	19	27	33	32	33	G	G ₂₈	31	G	20	20	E	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E
31	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₈	G	G	G	34	G	G	42	G	E ₂₀	20	20	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	30	30	30	31	31	31	31	31
MED	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₈	16	24	31	32	G	G ₂₆	G ₂₂	26	20	E ₁₄	14	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
UQ	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₉	26	30	32	34	32	33	30	27	20	20	19	18	16	E ₁₄	18	E ₁₄
LQ	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₈	G	G	G	28	G	G	G	G	E ₁₈	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄

The Radio Research Laboratories, Japan

DEC. 1972

FBES (0.1 MHz)

IONOSPHERIC DATA

DEC. 1972

F-MIN (0.1 MHz)

135° E Mean Time (G. M. T. + 9h)

Station **AKITA** Lat. **39° 43.5' N**, Long. **140° 08.2' E** Sweep **1 MHz** to **20 MHz** in **20 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 ₁₄	E ₁₄	E ₁₄	E	E	E ₁₃	E ₁₃	18	15	16	18	15	15	16	17	15	14	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₃
2	E	E ₁₄	E ₁₄	E ₁₃	E ₁₄	E ₁₄	E ₁₄	19	15	18	18	19	19	17	18	18	18	E ₁₄	E ₁₄	E ₁₃	E ₁₄	E ₁₄	E ₁₄	E ₁₄
3	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E	E ₁₄	E ₁₄	20	17	18	18	15	18	19	16	16	14	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₃	E ₁₄
4	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	15	16	18	20	20	20	19	15	17	14	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
5	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E	E ₁₄	E ₁₄	19	15	17	16	15	18	17	15	17	18	E ₁₅	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
6	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	14	16	17	16	18	18	16	16	17	E ₁₅	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
7	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₆	16	16	17	18	18	19	16	16	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
8	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	16	15	16	16	17	15	14	13	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
9	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	15	14	16	15	15	15	14	15	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
10	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	19	15	15	22	18	14	15	15	14	14	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
11	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	18	15	15	15	15	15	15	15	15	14	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
12	E ₁₄	E ₁₄	E ₁₃	E ₁₄	E ₁₄	E ₁₄	E ₁₄	18	14	15	17	15	15	15	15	15	15	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
13	E ₁₄	E ₁₄	E	E ₁₄	E ₁₄	E ₁₄	E ₁₄	18	15	16	16	19	15	15	14	15	15	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
14	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	19	16	17	16	17	17	15	15	14	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
15	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	18	18	15	15	16	16	15	15	15	15	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
16	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₅	15	15	16	18	16	38	17	15	14	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
17	E ₁₄	E ₁₄	E ₁₄	E	E	E ₁₄	E ₁₄	18	15	15	15	17	20	18	14	15	18	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
18	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E	E ₁₄	E ₁₄	14	15	17	16	18	15	15	15	17	14	E ₁₃	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
19	E ₁₄	E ₁₃	E ₁₄	E	E	E	E ₁₄	19	18	18	18	18	18	18	19	17	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	18	E ₁₄
20	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	18	17	18	18	18	19	19	18	18	14	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	19	E ₁₄
21	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	18	18	18	18	20	24	25	24	19	16	E ₁₄	E ₁₄	E ₁₄	E ₁₄	18	E ₁₄	E ₁₄
22	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	19	25	19	31	32	33	29	34	21	20	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	19
23	E ₁₄	E ₁₄	E ₁₃	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₇	15	17	18	15	16	14	18	15	14	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	18
24	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₅	16	16	18	18	18	19	19	14	14	E ₁₄	E ₁₄	19	E ₁₄	E ₁₄	E ₁₄	E ₁₄
25	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	16	20	19	20	20	20	19	C	C	C	C	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
26	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₇	19	19	19	20	20	23	21	24	19	E ₁₅	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
27	E ₁₄	E ₁₄	E ₁₄	E	E	E ₁₄	E ₁₄	E ₁₆	18	22	23	23	21	21	20	16	15	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
28	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	18	16	17	18	18	18	18	18	17	20	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
29	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	18	18	16	20	19	21	20	20	E ₄₈	15	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E	E ₁₄
30	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E	E ₁₄	E ₁₄	18	19	18	20	19	24	23	20	20	15	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E
31	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	18	19	19	20	23	22	22	18	18	20	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	30	30	30	31	31	31	31
MED	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	18	16	17	18	18	18	18	17	16	14	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
UQ	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	18	18	18	19	19	20	20	19	18	16	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄
LQ	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₆	15	16	16	16	16	16	15	15	15	14	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄

The Radio Research Laboratories, Japan

DEC. 1972

F-MIN (0.1 MHz)

IONOSPHERIC DATA

DEC. 1972

M(3000)F2 (0.01)

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

Station AKITA Lat. 39° 43.5' N, Long. 140° 08.2' E Sweep 1 MHz to 20 MHz in 20 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	F	F ^E	F ^E	F	F	F	350	355	345	340	340	345	325	340	350	350	315	335	315	305	330	295	295	
2	290	295	290	305	320	305	310	355	350	355	340	345	335	350	340	355	365	320	335	305	335	I ^R 310	295	300	
3	305	295	295	295	295	310	340	350	360	355	335	335	340	330	350 ^Z	350	355	330	325	335	295	320	I ^A 300	295	
4	295	295	290	295	310	325	325	340	350	350	355	350	325	335 ^H	355	345	345	I ^A 340	325	320	315	320	275	290	
5	285	285	305	310	325	325	320	345	355	355	335	360	350	325	335	360	360	350	320	340	360	290	285 ^F	295	
6	F	F ^E	F ^E	F ^E	320	340	365	355	360	365	360	340	360	370	380	360	350	355	I ^A 330	335	350	350	295	295	285
7	295	295	310	325	330	330	305	335	370	365	350	360	365	345	355	355	360	365	320	325	310	315	290	295	
8	285	305	315	345	325	295	315	320	355	350	340	330 ^Z	345	355	340	350	355	330	310	330	345	295	285	I ^R 290	
9	285	285	300	310	315	315	335	365	365	360	350	345	330	355	345 ^H	360	340	355	325	330	345	I ^A 335	280	290	
10	300	295	290	295	295	320	335	340	360	365	315	345	345	360	335	345	350	345	315	320	325	270	F	285	
11	295	295	290	295	325	305	315	360	360	360	325 ^H	335 ^H	330	340	350	350	355	310	340	330	310	310	300	295	
12	F ^E	F ^E	F ^E	300	295	340	320	335	360	360	330	340	340	355	355	345	355	320	325	340	335	305	305 ^F	295	
13	285	290	290	295	305	325	310	345	340	355	325 ^H	350	325	330	345	340	345	315	310	295	330	295	295	300	
14	315	295	275	290	295	295	305	335	330	320	355	350	335	340	330	345	345	325	325	335	335	290	290	260 ^F	
15	350	285	305	305	295	320	335	340	350	355	340	350	345	340	345	355	350	315	320	305	315	320	265 ^F	290	
16	305	310	325	290	I ^R 280	285	300	335	340	350	340	350	315	340	345	335	330	310	335	315	325	300	F	290 ^F	
17	290	285	I ^A 300	285	275	285	320	335	350	340	330	335	340	350	335	355	350	335	I ^A 335	335	305	A	A	A	
18	290	305	295	335	325	A	A	A	335	350	345	345	330	340	310 ^H	360	355	330	I ^A 310	320	330	290	F	315	
19	290	F	F	F ^E	310	305	325 ^F	335	360	350	330	340	340	340	345	340	330	325	310	330	325	295	300	275	
20	270	290	285	305	330	355	310	335	345	350	335	325	370	330 ^H	335	330	340	320	325	305	330	275	280	270	
21	280	285	285	285	305	340	315	335	345	340	340	305 ^H	320	340	305	340	355	295	315	310	335	300	290	265	
22	280	280	265	F	F	F ^E	315 ^F	340	340	345	325	330	350	330 ^H	340 ^H	340	365	330	315	325	330	325	I ^A 305	265	
23	280	275	285	320	300	295	335	340	345	310	315	330	320 ^H	320	305 ^H	330	330	310	310	350	325	290	285	275	
24	280	270	290	320	290	325	325	345	335	350	340	330	350	335	330	340	345	315	315	310 ^H	310	320 ^F	270 ^F	295	
25	295	295 ^E	F	F ^H	F	F	F	325 ^E	330	365	360	340	340	360	345 ^H	C	C	C	C	335 ^V	350	365	295 ^F	285 ^F	
26	295 ^E	F	F	F	F ^E	305 ^E	330	345	365	350	320	345	330	335	340	345	375	335	305	300	320	305	305	F	
27	290 ^F	F	F	F ^E	F	315	315	335	345	360	335	335	330	325 ^H	325	345	340	295	320	345	330	325	I ^A 290	285	
28	295	290	280	290	305	305	315	335	335 ^H	365	345	325	335	340	315	360	360	330	325	330	335	305	275 ^F	300 ^F	
29	280	305	310	340	285	300 ^F	310 ^F	315	350	350	340	325 ^Z	330	350	330	340	335	300	300	315	315	295	290	280	
30	270	275	265	270 ^F	340 ^F	345	260	320	340	350	305	315	310 ^H	355 ^H	320	345	350	300	320	315	285	320	290	280	
31	275	280	285	325	310	320 ^F	300	300	325	330	350	335	335	335	310	330	355	290	320	325	345	285	270	275 ^F	
CNT	29	27	27	29	27	28	28	30	31	31	31	31	31	31	31	30	30	30	30	31	31	30	27	29	
MED	290	290	290	305	305	318	315	338	350	350	340	340	335	340	340	345	350	322	320	325	330	305	290	290	
UQ	295	295	302	320	325	325	328	345	360	360	342	348	345	350	345	355	355	330	325	335	335	320	295	295	
LQ	280	285	285	295	295	305	310	335	340	350	330	330	330	332	330	340	345	310	315	315	315	295	282	280	

DEC. 1972

M(3000)F2 (0.01)

IONOSPHERIC DATA

DEC. 1972

M(3000)F1 (0.01)

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

Station **AKITA** Lat. **39° 43.5' N.** Long. **140° 08.2' E** Sweep **1 MHz to 20 MHz** in **20 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	A										
2										L	L	L	405	405 ^H	395									
3										L	L	395	L	L	L									
4										L	L	405	L	L	L									
5										L	L	L	L	L										
6										435	L	L		L										
7											L	L	L	L		L								
8									L	430	L	L	L	400	L									
9										L	405	L	L	L	L									
10										L	415	L	L	L	L									
11										L	L	L	L	L										
12											L	L	L	L										
13											L	L	355	L	L									
14											L	L	L	L	350									
15											L	L	L	L										
16										A	L	L	375	L										
17											A	L	L	A	L									
18											L	L	L	L										
19										L	L	L	L	L										
20									430	445	L	365	L	L	375									
21											L	L	L	L										
22												L	L	L	L									
23										L	L	L	L	L	L									
24										L	L	L	A	L	L									
25										L	A	375	L	L	L									
26											L	L	L	L	415									
27											L	L	365	L	385									
28										L	L	L	360	L	L									
29											L	335	L	L	L									
30											345	L	L	L	380	L								
31												L	L	L	A	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	3	3	5	5	2	6									
MED									430	435	405	375	365	402	382									
UQ									440	410	395	375		395										
LQ									432	375	365	360		375										

The Radio Research Laboratories, Japan

DEC. 1972

M(3000)F1 (0.01)

IONOSPHERIC DATA

DEC. 1972

H'F2 (KM)

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

Station	AKITA																							
Lat.	39° 43.5' N																							
Long.	140° 08.2' E																							
Sweep	1 MHz to 20 MHz in 20 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										210	240	235	240	250										
2										255	255	215	240	225	215									
3										220	250	240	235	250	230									
4										230	225	230	245	230	235									
5										245	265	245	225	240										
6										220	250	240		215										
7											240	235	240	245		235								
8									235	235	250	255	220	240	235									
9										235	240	240	240	245	230									
10										215	245	235	240	230	230									
11										205	235	225	240	250										
12											230	255	240	225										
13											220	240	255	235	235									
14											230	245	240	230	250									
15											230	240	210	230										
16										230	235	225	245	245										
17											260	225	235	230	225									
18											240	230	250	230										
19										215	225	250	240	245										
20									220	220	240	255	240	245	245									
21											240	245	250	240										
22												250	235	235	235									
23										215	280	245	230	240	255									
24										220	250	235	230	250	250									
25										220	230	255	250	240	240									
26											235	240	245	230	245									
27											260	255	270	230	245									
28										215	230	240	255	240	260									
29											250	255	250	240	240									
30											290	230	235	230	250	230								
31												250	245	245	240	235								
CNT										2	17	29	31	30	31	20	3							
MED										228	220	240	240	240	240	240	235							
UQ										230	250	250	245	245	248	235								
LQ										215	230	235	235	230	232	232								

DEC. 1972

H'F2 (KM)

IONOSPHERIC DATA

DEC. 1972

H^oF (KM)

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

Station **AKITA** Lat. 39° 43.5' N. Long. 140° 08.2' E Sweep 1 MHz to 20 MHz in 20 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	270	280	285	260	250	255	240	215	205	205	180 ^H	210 ^I	195 ^H	220 ^I	235	210	215	210	230	250	235	240	300	290
2	290	300	290	240	235	245	245	220	215	205	195 ^H	220	190	280 ^H	190	215	200	240	215	240	250	A	290	285
3	290	300	290	270	270	255	205	215	215	200	180 ^H	190	230	250	230 ^I	235	200	210	230	235	270	250	275 ^I	290
4	300	290	290	275	245	230	245	215	215	230	210	205	220	220	235	220	215	230 ^I	245	230	250	250	315 ^I	320 ^A
5	310	305	290	260	235	240	225	215	200	180 ^H	190 ^H	240	220	195	240	240	215	205	255	225	220	265 ^I	310	310
6	305	295	270	250	240	210	230	220	220	190	180 ^H	210 ^I	230	215	235	230	220	235 ^I	260	220	220	255	270	290
7	290	280	270	250	240	210	250	210	225	220	230	230	200	240	245	230	210	195	245	230	250	240	270	290
8	305	270	245	220	240	280	240	240	180 ^H	180	235	195 ^H	210 ^I	190	215	220	205	205	240	230	215	290	290	305
9	305	300	290	250	255	240	240	200	215	200 ^H	190	230 ^I	220	220	220	225	210	200	250	230	220	230 ^I	300 ^S	305
10	290	290	290	280	280	235	220	210	210	200	195	235	235	220	215 ^I	230	215	215	240	230	210	300 ^S	280	305
11	290	300	305	290	245	250	240	205	215	190	190	190	220	235	230	225	215	240	215	215	205	240	250	290
12	290	300	280	270	275	215	230	225	205	225	210	230	240	220	215	225	205	200	240	220	230	280	260	290
13	290	290	300	260	270	225	230	210	210	215	215	230	205	225	230	220	215	230	240	240	230	250	265	280
14	225	240	290	310	300	250	250	215	225	225	230	235	235	215	205	230	215	235	235	225	200	290	290	340
15	300	290	280	240	255	230	230	205	205	230	215 ^I	230	200	210	235	230	220	210	210	265	250	220	340 ^S	300
16	260 ^I	255	240	250	260	320 ^S	250	240	230	A	A	230 ^I	205	240 ^B	230	245	210	215	245	220	240	200	300	300
17	290	290	A	A	325	290	240	215	210	230	A	A	A	200 ^I	220 ^I	180 ^H	210	225	230 ^I	240	A	A	A	A
18	A	300 ^A	290	230	220	A	A	A	240	220	210	225	235	225	220	210	210	235	245 ^I	235 ^I	230	290 ^S	340 ^S	280
19	250	350 ^S	320 ^S	270	240	250	240	225	215	190	205	215	240	235	230	230	215	200	245	230	230	275	B	310 ^S
20	340 ^S	320 ^S	300	255	230	190	350 ^S	225	190	180	230	205	180 ^H	220	215	220	210	205	230	255	240	B	305 ^S	340 ^S
21	330 ^S	300	290	275	245	190	240	220	215	225	235	230	220	235	230	230	200	230	240	240	215	B	300 ^S	330 ^S
22	310 ^S	300	290	280	285	230	240	225	210	215	230	235	240	220 ^I	225 ^B	220	205	210	240	240	240	230	A	B
23	320 ^S	325 ^S	270	230	260	260	240	210	210	190	190 ^H	245	205	220	215 ^H	225	215	240	240	215	220	250	260 ^I	280 ^B
24	290	280	290	230	260	255	220	230	225	180	235	230	225 ^I	220 ^I	240	230	205	220	220	230	230	230	235	260
25	275	270	275	250	215	205	215	215	225	220	220 ^I	200	245	240	235	C	C	C	C	235	230	220	300 ^S	290 ^S
26	305	300	295	275	270	255	240	215	215	220	190 ^H	230	235	230	200	220	200	225	230	255	240	255	275	250
27	290	310	290	250	255	230	240	210	210	205	210 ^I	240	210	215	200	235	215	240	240	210	220	220	A	320 ^S
28	290	310	310	260	270	250	240	215	205	210	200	235	210 ^H	230	230	220	205	230	230	220	205	290 ^S	350 ^S	300 ^S
29	310 ^S	280	255	205	290 ^S	280	235	215	215	220	230	220	240	215	230	250 ^C	230	220	215	230	220	240	310 ^S	320 ^S
30	330 ^S	295	305	295	220	205	300	230	225	235	230	225	210	225	215	220	200	240	240	220	250	240	330 ^S	300
31	315 ^S	300	280	205	245	210	250	215	225	230	230	240	230	230	240 ^I	235	195	250	250	220	210	250	340 ^S	340 ^S
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	31	30	30	31	30	30	30	31	30	29	30	30	31	31	30	30	30	30	31	30	27	27	29
MED	290	295	290	258	252	239	240	215	215	212	210	230	220	220	230	225	210	222	240	230	230	245	280 ^U	295
UQ	300	300	290	275	270	255	242	225	222	225	230	235	235	232	235	230	215	235	245	240	240	261	310 ^S	305
LQ	290	285	280	240	240	215	230	210	210	190	190	210	205	218	215	220	205	210	230	220	220	235	271	288

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H^oF (KM)

IONOSPHERIC DATA

DEC. 1972

H^oES (KM)

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

Station **AKITA** Lat. 39° 43.5' N. Long. 140° 08.2' E Sweep 1 MHz to 20 MHz in 20 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	105	E	E	S	S	B	150	115	120	115	110	110	110	110	110	105	110	100	110	110	105	100
2	105	105	S	S	100	105	S	B	G	130	115	115	G	105	155	100	B	105	105	105	100	100	100	S
3	S	S	S	S	110	S	100	B	G	G	G	G	G	155	140	170	100	100	100	105	100	115	100	S
4	110	100	S	S	S	S	110	110	110	110	105	140	G	G	G	G	110	110	100	100	100	S	110	110
5	S	S	100	110	110	S	S	B	G	G	G	100	G	100	100	G	B	S	120	S	120	110	S	S
6	S	S	S	100	S	S	115	110	110	G	105	150	145	155	145	135	125	120	115	S	S	S	S	S
7	S	S	S	S	S	S	S	S	155	G	G	145	G	G	100	145	145	S	S	S	S	135	S	S
8	S	105	S	S	S	S	S	S	G	150	115	150	155	155	155	150	140	S	S	S	S	S	S	S
9	S	S	S	S	S	S	S	110	G	G	G	100	100	100	100	100	100	S	115	110	S	100	S	S
10	S	S	S	S	S	S	S	B	G	G	G	G	G	130	G	G	G	S	S	S	S	S	S	S
11	S	S	S	S	S	S	S	B	100	G	G	G	G	165	160	130	115	S	S	S	S	105	S	S
12	S	S	S	S	S	S	S	B	110	110	105	G	G	100	G	G	G	100	S	S	S	S	S	S
13	S	S	E	S	S	S	S	B	G	110	140	G	G	G	G	G	140	140	S	S	S	S	S	100
14	S	S	S	S	S	S	120	B	140	115	120	120	G	G	G	100	100	100	100	S	S	S	S	S
15	S	S	S	S	S	S	S	B	130	130	115	115	G	G	120	G	G	S	110	110	110	S	110	S
16	100	100	S	S	S	S	S	S	115	115	115	110	110	B	130	125	100	100	100	100	S	S	S	105
17	105	105	100	100	105	S	110	B	155	115	115	115	115	110	115	115	B	110	110	100	100	100	100	100
18	100	105	115	S	105	110	105	105	105	105	105	105	100	100	105	160	105	100	100	100	100	100	S	S
19	S	S	S	110	100	105	S	B	G	G	120	115	155	115	120	115	110	100	100	100	100	S	B	S
20	S	S	S	S	S	100	S	B	G	100	155	125	G	G	G	115	110	105	105	100	S	B	S	S
21	S	S	S	S	S	S	S	B	100	155	150	100	G	G	G	G	140	100	S	100	S	B	S	S
22	S	S	105	S	S	S	S	B	B	155	140	140	140	140	B	125	B	S	100	105	105	100	100	B
23	105	S	105	S	S	120	S	110	110	G	105	150	G	105	105	100	105	100	100	100	110	S	105	B
24	S	S	S	S	S	S	S	S	G	G	105	105	100	100	100	100	100	100	S	B	S	S	S	S
25	S	100	S	S	S	S	S	S	110	110	105	105	100	105	105	C	C	C	C	S	S	S	S	S
26	S	S	S	S	S	S	S	S	G	G	G	105	G	G	G	150	B	100	S	S	S	S	S	S
27	110	S	S	E	E	S	110	S	G	115	150	105	105	150	155	140	105	100	100	100	100	100	110	S
28	S	100	105	S	S	S	S	105	155	G	110	150	G	130	G	G	B	S	S	S	S	S	S	S
29	S	S	S	S	S	S	S	B	155	120	120	115	110	G	G	C	G	S	S	100	100	S	E	S
30	S	S	S	S	E	S	S	150	150	140	155	150	G	110	120	G	110	105	105	S	S	S	S	E
31	S	S	S	S	S	S	S	B	G	G	G	130	G	G	120	G	B	105	100	S	S	S	S	S
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	8	9	7	4	6	5	7	7	17	18	23	26	13	20	20	19	19	20	19	16	13	11	9	5
MED	105	100	105	105	105	105	110	110	115	115	115	115	110	110	120	125	110	100	100	100	100	100	105	100
UQ	108	105	105	110	110	110	112	110	150	130	130	140	140	145	142	142	120	105	110	105	110	110	110	105
LQ	102	100	102	100	100	105	108	108	110	110	105	105	100	102	105	105	102	100	100	100	100	100	100	100

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DEC. 1972

H^oES (KM)

IONOSPHERIC DATA

DEC. 1972
TYPES OF ES
135 E Mean Time (G. M. T. + 9h)

Station **AKITA** Lat. **39° 43.5' N**, Long. **140° 08.2' E** Sweep **1 MHz to 20 MHz** in **20 sec** in automatic operation

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

DEC. 1972
TYPES OF ES

IONOSPHERIC DATA

DEC. 1972

FOF2 (0.1 MHz)

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

Station KOKUBUNJI TOKYO Lat. 35 42.4 N. Long. 139 29.3 E Sweep 1 MHz to 20 MHz in 20 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	31	34	F ₄₀	J ₄₂	F	J ₄₂	F ₄₇	S	64	64	71	82	87	74	90	82	66	44	34	34	31	30	31	32	
2	35	34	35	39	34	30	36	67	65	C	C	96	79	85	78	86	56	40	50	34	32	I ₂₉ ^A	30	31	
3	34	33	35	35	32	35	40	J ₆₇	69	64	75	90	99	79	77	80	64	41	37	32	28	30	30	32	
4	33	33	33	34	38	28	30	62	61	71	70	71	70	I ₇₆ ^R	J ₇₅ ^R	86	61	42	36	I ₃₄ ^A	J ₃₃ ^R	28	28	27	
5	30	30	33	30	33	30	33	58	63	64	J ₉₀ ^R	85	70	72	69	61	58	47	30	37	28	25	23	30	
6	F ₂₈	F ₃₀	F ₃₀	33	37	I ₃₆ ^C	25	I ₅₀ ^C	C	60	62	91	70	I ₆₉ ^R	73	66	60	36	29	I ₂₈ ^A	I ₂₇ ^R	J ₃₀ ^R	26	27	
7	29	30	32	33	37	24	25	51	61	58	61	61	71	61	66	67	J ₆₅ ^R	35	31	31	34	33	27	28	
8	29	31	38	36	27	25	26	52	J ₇₃ ^R	73	70	72	82	69	68	61	61	35	28	30	34	26	27	29	
9	30	33	34	36	35	30	31	50	56	65	66	79	67	67	62	60	57	40	28	32	35	24	25	25	
10	29	29	30	30	31	30	27	50	58	64	65	87	66	62	65	H ₅₇	62	41	30	30	28	24	26	30	
11	30	31	31	34	31	26	28	55	57	61	66	67	65	66	69	64	S ₄ ^R	37	34	27	28	25	28	30	
12	F ₃₀	F ₃₄	F ₃₂	31	35	29	25	48	55	61	65	70	86	77	67	62	58	41	31	31	29	27	31	F	
13	34	34	34	34	33	30	26	49	56	65	67	J ₇₃ ^R	69	84	J ₇₅ ^R	66	59	54	54	I ₄₄ ^R	B ₄₂ ^R	S	R	35	
14	31	30	31	31	31	30	C	C	R ₇₃	90	111	J ₇₉ ^R	J ₇₅ ^R	79	82	J ₇₅ ^R	68	49	41	I ₃₉ ^R	35	28	31	R	
15	29	30	34	31	31	29	29	49	U ₆₈ ^R	79	86	76	89	81	68	67	65	47	41	37	41	33	F ₃₀	F ₃₂	
16	F ₃₅	34	29	26	24	24	26	56	66	83	91	80	73	R	J ₇₄ ^R	79	67	56	40	42	39	R ₃₂ ^R	I ₂₆ ^R	31	
17	31	27	F	F	30	31	30	53	61	J ₇₆ ^R	89	106	A	A	68	79	71	49	35	28	25	31	26	28	
18	29	33	35	39	24	23	25	56	72	U ₇₉ ^R	81	85	81	75	77	94	70	44	34	37	34	27	24	28	
19	26	26	F ₂₇	F ₃₁	36	F ₃₁	34	59	J ₇₆ ^S	79	70	88	95	90	87	72	64	56	45	36	34	31	29	28	
20	30	31	32	38	40	22	23	51	64	70	76	85	J ₁₀₀ ^R	86	R ₇₈ ^R	J ₇₉ ^R	70	46	38	30	36	30	25	27	
21	29	31	32	35	38	I ₂₆ ^R	25	51	63	67	75	86	80	82	79	95	61	40	35	36	37	26	25	F ₂₆	
22	29	31	34	31	34	31	33	56	71	73	69	83	90	R	R	J ₇₅ ^R	71	47	41	41	42	36	26	26	
23	31	31	33	36	27	R ₃₀	39	53	56	67	91	122	94	82	85	90	61	54	51	53	30	35	28	A	
24	33	35	34	36	34	37	35	C	C	78	81	J ₁₀₄ ^R	99	79	J ₈₁ ^R	86	66	42	41	35	35	34	F ₂₅	F ₃₂	
25	F ₃₆	F ₄₀	F ₃₇	F ₄₁	39	F ₃₇	44	60	73	74	75	82	106	94	75	81	64	41	43	42	35	30	25	30	
26	30	32	33	36	36	31	31	43	63	68	64	75	86	78	75	79	65	43	42	33	37	31	25	30	
27	32	F	34	35	34	28	35	53	59	62	55	91	I ₈₇ ^R	81	69	75	61	41	36	41	33	25	22	25	
28	30	30	30	I ₃₀ ^R	35	28	26	25	R ₆₆	56	60	J ₇₇ ^R	R ₈₆	J ₇₃ ^R	J ₆₉ ^R	79	56	36	41	36	30	23	23	26	
29	28	31	38	29	26	26	28	46	60	65	J ₇₉ ^R	71	89	J ₇₄ ^R	73	61	53	51	41	37	28	29	24	26	
30	31	31	31	I ₃₈ ^R	R ₃₆	25	I ₂₂ ^R	45	60	56	74	91	67	72	70	70	56	40	42	42	29	25	25	27	
31	27	29	31	33	29	26	23	42	56	65	67	68	J ₇₄ ^R	J ₇₄ ^R	81	91	83	39	37	48	26	25	23	27	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	31	30	30	30	30	31	30	28	29	30	30	31	30	28	30	31	31	31	31	31	31	31	30	30	28
MED	30	31	33	34	34	30	28	52	63	66	70	82	82	76	74	75	62	42	37	36	33	29	26	28	
UQ	32	33	34	36	36	31	34	56	68	74	81	89	89	82	78	82	66	47	41	40	35	31	28	30	
LQ	29	30	31	31	31	26	25	49	59	64	66	74	70	72	69	66	58	40	34	32	28	25	25	27	

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FOF2 (0.1 MHz)

IONOSPHERIC DATA

DEC. 1972

FOF1 (0.01 MHz)

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

Station KOKUBUNJI TOKYO Lat. 35 42.4 N. Long. 139 29.3 E Sweep 1 MHz to 20 MHz in 20 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								
2										C	C	L	L	410	L	L								
3									L	L	L	L	L	L	A									
4										L	A	L	360	L	L									
5									L	L	L	L	L		L									
6									L			A	L	L	L									
7									L	L	L		L	L										
8									L	L	L	L	450	L	L	L								
9									L	L	L	L	L	L	L									
10									L		L	L	L	L	L									
11									L	470	L	L	L	L	L	L	A							
12									L	L	L	L	L	L	L									
13										L	L	L	L	L	L	L								
14									A	A	L	L	L	L	L									
15									L	L	L	L	L	L	L									
16									L	L	L	A	B	L										
17										A	A	A	A											
18									L	A	L	L	A	L	A									
19								U 210	L	L	L	L	L	L	L	L								
20									L	L	L	L	L	L	320									
21									L	L	L	L	L	L	L	L								
22									L	350	B	L	L	A		A								
23									U 350	L	L	L	500	L	L									
24									L	U 470	L	L	L	L										
25									L	L	L	L	L	L	A									
26									L	L	L	L	L	L	L	L								
27									L	L		L	L	L	L	L								
28									L			L	L	L	L									
29									320	L	L	L	410	L	L									
30										L	L	L	L	L	L	L	L							
31									270			L	L	L	L	L								
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								1	1	3	2		3	2	1									
MED								U 210	270	350	470		410	455	320									
UQ										350			430											
LQ										335			385											

DEC. 1972

FOF1 (0.01 MHz)

IONOSPHERIC DATA

DEC. 1972

FOE (0.01 MHz)

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

Station KOKUBUNJI TOKYO Lat. 35 42.4 N. Long. 139 29.3 E Sweep 1 MHz to 20 MHz in 20 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								170	I A 240	280	A	A	330	I A 300	285	I A 235	I A 170							
2							B	160	240	C	C	I R 315	I A 315	I A 300	275	I A 250	180							
3							B	190	I A 250	280	310	325	320	300	I A 275	A	A							
4							B	230	255	290	I A 290	295	R	A	A	A	A							
5							B	I R 240	260	300	310	320	290	280	245	180								
6							B	I C 190	C	260	290	300	290	290	280	240	A							
7							B	230	275	295	295	300	R 295	270	230	B								
8							B	240	275	305	315	305	300	275	240	175								
9							B	B	A	270	295	320	305	290	280	245	180							
10								190	250	260	B	I R 325	315	305	280	245	180							
11								175	250	280	305	325	310	305	275	250	A							
12							B	205	255	280	305	325	320	305	285	240	175							
13								170	250	290	I A 300	I A 305	I A 320	300	I R 280	250	190							
14							C	C	230	270	A	A	310	I R 300	260	235	A							
15								B	230	275	A	A	A	A	285	270	A							
16							B	A	A	A	A	A	A	B	290	250	A							
17								B	R	A	A	265	A	A	A	A	A							
18								A	A	I A 275	I A 315	330	A	A	A	A	A							
19								A	250	280	I B 300	A	A	A	A	A	180							
20								200	230	260	290	I A 310	I R 310	I R 290	I R 280	250	B							
21								B	R	275	310	I R 330	R	R	280	B	B							
22								180	230	B	B	B	B	B	B	B	B							
23								170	A	A	300	I A 315	320	305	280	A	A							
24								B	C	C	R	295	330	325	I R 310	I A 290	I A 250	A						
25								B	190	230	I R 280	300	310	315	A	A	A	A						
26								B	I R 230	275	290	I R 330	I R 330	R	B	B	B							
27								B	R	R	R	B	R	B	280	B	R							
28								190	275	A	A	A	I B 310	310	290	A	A							
29								B	240	275	A	A	A	290	295	I R 250	200							
30								A	230	285	300	I R 320	310	I R 310	I R 285	I A 255	190							
31								180	220	290	290	305	I R 320	310	290	250	175							
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								15	22	23	20	22	21	20	24	19	12							
MED								190	240	275	300	315	315	300	280	250	180							
UQ								190	250	280	305	325	320	305	285	250	185							
LQ								172	230	272	292	305	310	292	278	240	175							

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DEC. 1972

FOE (0.01 MHz)

IONOSPHERIC DATA

DEC. 1972

FOES (0.1 MHz)

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

Station KOKUBUNJI TOKYO Lat. 35 42.4 N. Long. 139 29.3 E Sweep 1 MHz to 20 MHz in 20 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 ₂₄	J ₂₄	M ₂₂	24	J ₁₉	M ₂₁	E ₁₂	G	J ₂₈	J ₂₅	36	J ₃₇	35	J ₅₄	31	J ₂₉	26	E ₁₂	E ₁₂	M ₂₁	J ₂₅	J ₂₇	J ₂₁	J ₂₅	
2	J ₄₂	J ₂₆	J ₁₇	M ₂₁	19	J ₁₉	M ₂₀	G	28	C	C	G	33	J ₅₅	30	J ₃₈	25	J ₄₃	J ₂₅	M ₂₄	J ₁₈	J ₄₂	J ₃₀	M ₂₀	
3	18	E ₁₂	E ₁₄	E ₁₂	E ₁₂	J ₁₉	E ₁₂	G	25	G	G	36	36	35	J ₄₉	31	22	J ₂₅	J ₂₁	J ₁₉	E ₁₄	M ₁₉	E ₁₅	J ₃₀	
4	J ₂₅	J ₂₆	J ₂₄	J ₂₁	J ₁₉	J ₂₄	21	G	30	35	38	J ₃₉	G	J ₃₅	34	J ₃₅	J ₂₅	J ₁₉	M ₂₁	50	M ₂₂	M ₂₃	E ₁₅	E ₁₃	
5	E ₁₅	E ₁₅	J ₂₀	J ₂₀	J ₂₅	M ₂₂	E ₁₃	E ₁₃	G	G	35	36	G	35	30	28	20	M ₂₀	E ₁₅	J ₁₈	E ₁₂	J ₂₂	E ₁₅	M ₂₀	
6	M ₂₀	J ₂₅	E ₁₄	J ₁₈	E ₁₂	C	E ₁₂	C	C	G	20	37	36	38	36	34	J ₃₇	40	J ₂₉	J ₂₁	J ₅₉	J ₂₅	J ₂₅	M ₂₀	E ₁₃
7	E ₁₅	E ₁₅	E ₁₃	E ₁₃	E ₁₂	E ₁₅	E ₁₅	G	26	35	32	G	20	32	30	29	E ₂₅	E ₁₃	J ₂₁	E ₁₃	21	J ₃₀	J ₁₉	E ₁₅	
8	19	E ₁₅	E ₁₂	E ₁₂	E ₁₃	E ₁₅	E ₁₅	E ₁₄	G	31	36	33	G	34	G	28	J ₂₄	20	E ₁₅	E ₁₅	24	J ₁₈	E ₁₂	E ₁₅	
9	E ₁₅	E ₁₂	E ₁₂	E ₁₅	E ₁₂	E ₁₂	E ₁₂	E ₁₅	25	31	31	J ₃₉	33	31	31	29	20	E ₁₄	M ₂₀	M ₁₉	M ₂₁	M ₂₀	M ₁₈	M ₂₀	
10	E ₁₅	E ₁₅	J ₂₂	E ₁₂	E ₁₅	E ₁₅	E ₁₅	G	21	G	E ₃₄	G	G	G	G	18	G	E ₁₂	E ₁₂	E ₁₂	E ₁₅	E ₁₅	E ₁₅	E ₁₂	
11	E ₁₂	E ₁₅	E ₁₅	E ₁₂	E ₁₂	E ₁₄	E ₁₅	G	G	G	36	G	36	33	33	28	J ₅₀	J ₁₈	E ₁₂	J ₁₉	J ₁₉	M ₁₉	M ₂₁	E ₁₅	
12	E ₁₃	E ₁₅	E ₁₂	E ₁₅	17	E ₁₅	E ₁₅	G	G	30	33	J ₃₀	24	20	J ₂₅	G	J ₁₇	20	E ₁₅	18	E ₁₃	M ₂₁	E ₁₅	M ₂₀	
13	E ₁₅	E ₁₅	E ₁₂	E ₁₄	E ₁₂	J ₁₆	E ₁₅	G	G	35	35	34	38	20	G	23	G	22	J ₂₄	M ₂₀	E ₁₃	M ₂₀	E ₁₅	E ₁₃	
14	E ₁₅	E ₁₅	20	19	E ₁₃	E ₁₅	C	C	26	J ₅₄	J ₄₃	J ₃₄	G	G	G	G	24	22	22	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₈	
15	E ₁₅	E ₁₅	E ₁₄	E ₁₃	E ₁₂	E ₁₅	E ₁₅	E ₁₄	28	30	J ₄₁	48	47	J ₃₁	G	G	J ₄₀	J ₃₃	J ₃₀	J ₂₅	J ₂₃	J ₂₅	M ₂₀	J ₂₉	
16	J ₃₀	M ₂₁	J ₂₉	J ₂₄	19	20	22	17	25	33	36	J ₅₄	J ₇₅	E ₅₈	36	21	J ₂₅	J ₂₁	M ₂₃	M ₂₃	M ₂₁	E ₁₅	E ₁₅	E ₁₅	
17	E ₁₃	E ₁₃	M ₂₂	M ₁₉	J ₂₃	J ₂₅	E ₁₅	E ₁₅	G	J ₃₆	J ₆₅	J ₅₁	J ₁₀₅	J ₇₀	J ₅₄	J ₃₉	J ₄₁	J ₂₉	J ₂₄	J ₂₅	E ₁₂	J ₂₅	M ₂₀	M ₂₀	
18	M ₂₁	M ₂₀	J ₂₄	J ₂₅	16	M ₂₁	21	J ₄₁	J ₅₃	J ₄₃	J ₁₁₀	J ₃₉	J ₃₈	J ₅₃	37	J ₅₀	J ₃₉	J ₄₄	J ₃₉	J ₂₄	M ₂₁	M ₂₄	M ₂₀	M ₂₁	
19	20	20	E ₁₂	E ₁₅	E ₁₄	E ₁₅	M ₂₀	17	G	30	E ₃₄	36	39	36	J ₃₄	27	21	19	J ₂₁	M ₂₄	24	M ₂₀	E ₁₅	21	
20	E ₁₅	E ₁₅	E ₁₄	E ₁₂	E ₁₂	E ₁₂	E ₁₄	G	G	31	G	36	G	G	G	21	21	20	E ₁₅	M ₂₀	M ₂₂	19	M ₂₀	E ₁₅	
21	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₃	E ₁₅	16	E ₁₅	G	G	33	G	29	30	25	E ₂₈	E ₂₂	19	J ₂₉	J ₂₂	M ₂₁	E ₁₅	19	20	
22	J ₁₉	E ₁₅	E ₁₅	E ₁₅	E ₁₂	E ₁₂	E ₁₄	G	G	E ₂₈	E ₄₄	E ₃₇	E ₄₀	60	35	48	E ₂₅	J ₂₄	J ₁₉	J ₂₂	J ₂₆	J ₂₅	M ₂₁	J ₄₁	
23	J ₂₈	J ₁₉	E ₁₅	E ₁₃	E ₁₅	E ₁₅	E ₁₂	G	J ₃₅	J ₅₄	J ₃₀	J ₅₄	25	31	G	J ₃₀	J ₃₀	J ₃₆	J ₃₀	J ₂₉	J ₃₀	E ₁₄	J ₂₄	J ₆₀	
24	J ₃₈	E ₁₅	J ₁₉	E ₁₂	E ₁₂	E ₁₃	E ₁₄	C	C	G	21	J ₂₆	33	29	36	J ₂₉	J ₃₀	J ₂₂	J ₂₄	J ₂₃	E ₁₅	E ₁₅	E ₁₃	J ₂₄	
25	E ₁₅	E ₁₄	E ₁₄	E ₁₅	E ₁₃	E ₁₂	E ₁₄	G	G	G	G	G	G	36	J ₄₃	J ₄₁	J ₂₉	J ₂₉	J ₂₄	M ₂₀	E ₁₅	E ₁₅	E ₁₅	E ₁₅	
26	E ₁₆	E ₁₅	E ₁₅	E ₁₅	E ₁₃	E ₁₅	21	G	G	G	G	G	30	G	E ₃₂	E ₂₅	E ₂₃	J ₂₄	M ₂₁	21	E ₁₅	M ₂₀	E ₁₅	E ₁₅	
27	E ₁₅	E ₁₅	E ₁₃	E ₁₃	E ₁₄	E ₁₃	E ₁₃	E ₁₄	21	G	G	E ₃₉	G	E ₃₃	31	E ₂₆	19	J ₂₄	J ₁₉	M ₂₁	M ₂₀	M ₂₁	J ₂₅	J ₂₅	
28	J ₂₅	M ₂₁	J ₂₄	J ₂₅	J ₂₅	J ₁₉	J ₂₃	G	J ₃₁	35	J ₃₆	J ₄₄	E ₃₈	35	J ₂₄	J ₃₁	30	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	
29	E ₁₅	E ₁₃	E ₁₃	E ₁₆	E ₁₃	E ₁₃	E ₁₅	E ₁₃	G	G	35	36	35	G	G	G	G	E ₁₃	21	J ₂₂	J ₂₃	M ₂₁	E ₁₅	20	
30	E ₁₅	E ₁₅	E ₁₂	E ₁₅	E ₁₃	19	24	25	29	32	30	G	33	G	E ₃₀	25	20	E ₁₄	E ₁₃	M ₂₁	M ₂₁	M ₂₀	E ₁₅	E ₁₅	
31	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₃	E ₁₄	J ₁₉	G	G	31	32	33	G	G	J ₂₉	G	G	20	20	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₅	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	31	31	31	31	31	30	30	28	29	30	30	31	31	31	31	31	31	31	31	31	31	31	31	31	
MED	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₃	E ₁₅	E ₁₅	G	G	21	30	34	35	32	32	30	28	23	20	21	21	21	20	E ₁₅	20
UQ	20	20	20	19	16	19	20	E ₁₅	28	35	36	39	37	36	34	J ₃₁	J ₃₀	J ₂₄	J ₂₄	J ₂₄	22	24	20	21	
LQ	E ₁₅	E ₁₅	E ₁₃	E ₁₃	E ₁₂	E ₁₄	E ₁₄	G	G	G	U ₂₆	E ₂₆	G	G	G	E ₂₂	20	18	E ₁₅	18	E ₁₅	E ₁₅	E ₁₅	E ₁₅	

The Radio Research Laboratories, Japan

DEC. 1972

FOES (0.1 MHz)

IONOSPHERIC DATA

DEC. 1972

FBES (0.1 MHz)

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

Station KOKUBUNJI TOKYO Lat. 35 42.4 N Long. 139 29.3 E Sweep 1 MHz to 20 MHz in 20 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		17	15	E	16	E	E	E ₁₂	G	26	22	35	35	34	34	30	29	25	E ₁₂	E ₁₂	E	18	17	E	E	
2		16	16	E	E	E	E	G	G	27	C	C	G	31	38	29	35	22	22	17	17	16	A	20	17	
3		E	E ₁₂	E ₁₄	E ₁₂	E ₁₂	E	E ₁₂	G	25	26	G	36	35	35	45	29	22	24	18	E	E ₁₄	E	E ₁₅	E	
4		23	19	E	E	16	E	16	G	30	34	37	25	G	35	34	35	21	16	E	A	E	E	E ₁₅	E ₁₃	
5		E ₁₅	E ₁₅	E	16	E	E	E ₁₃	E ₁₅	G	G	34	36	G	35	29	27	G	E	E ₁₅	E	E ₁₂	E	E ₁₅	E	
6		E	E	E ₁₄	E	E ₁₂	C	E ₁₂	C	C	19	G	36	34	37	32	34	34	39	23	E	A	16	E	E	E ₁₃
7		E ₁₅	E ₁₅	E ₁₃	E ₁₃	E ₁₂	E ₁₅	E ₁₅	G	25	31	30	G	E ₂₀	31	29	28	E ₂₅	E ₁₃	18	E ₁₃	E	E	16	E ₁₅	
8		E	E ₁₅	E ₁₂	E ₁₂	E ₁₃	E ₁₅	E ₁₅	E ₁₄	G	31	35	33	G	34	G	28	16	E	E ₁₅	E ₁₅	E	E	E ₁₂	E ₁₅	
9		E ₁₅	E ₁₂	E ₁₂	E ₁₅	E ₁₂	E ₁₂	E ₁₂	E ₁₅	25	31	31	25	34	31	31	28	19	E ₁₄	E	E	E	E	E	E	
10		E ₁₅	E ₁₅	E	E ₁₂	E ₁₅	E ₁₅	E ₁₅	G	G	G	E ₃₄	G	G	G	G	G	E ₁₂	E ₁₂	E ₁₂	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₂	
11		E ₁₂	E ₁₅	E ₁₅	E ₁₂	E ₁₂	E ₁₄	E ₁₅	G	G	G	36	G	36	33	33	28	49	17	E ₁₂	E	15	E	17	E ₁₅	
12		E ₁₃	E ₁₅	E ₁₂	E ₁₅	E	E ₁₅	E ₁₅	G	G	30	31	29	22	20	19	G	15	E	E ₁₅	E	E ₁₃	E	E ₁₅	E	
13		E ₁₅	E ₁₅	E ₁₂	E ₁₄	E ₁₂	E	E ₁₅	G	G	33	35	34	34	19	G	21	G	16	E	E	E ₁₃	E	E ₁₅	E ₁₃	
14		E ₁₅	E ₁₅	E	E	E ₁₃	E ₁₅	C	C	26	49	38	32	G	G	G	G	19	15	E	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₈	
15		E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₂	E ₁₅	E ₁₅	E ₁₄	27	30	39	38	32	31	G	G	26	17	16	16	19	17	E	24	
16		20	E	16	E	E	E	G	16	25	28	34	32	43	E ₅₈	32	16	G	20	20	17	E	E	E ₁₅	E ₁₅	E ₁₅
17		E ₁₃	E ₁₃	E	E	20	20	E ₁₅	E ₁₅	G	34	51	37	A	A	35	34	35	20	24	16	E ₁₂	E	E	E	
18		E	E	18	E	E	E	15	35	41	33	75	29	35	51	32	40	26	25	22	21	E	16	E	E	
19		E	E	E ₁₂	E ₁₅	E ₁₄	E ₁₅	E	17	G	30	E ₃₄	36	38	34	30	27	G	17	18	E	E	E	E ₁₅	E	
20		E ₁₅	E ₁₅	E ₁₄	E ₁₂	E ₁₂	E ₁₂	E ₁₄	G	G	30	G	34	G	G	G	G	19	20	E	E ₁₅	E	E	E	E ₁₅	
21		E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₃	E ₁₅	E	E ₁₅	G	G	33	G	26	E ₃₀	25	E ₂₈	E ₂₂	E	22	18	E	E ₁₅	E	E	
22		E	E ₁₅	E ₁₅	E ₁₅	E ₁₂	E ₁₂	E ₁₄	G	G	E ₂₈	E ₄₄	E ₃₇	E ₄₀	E ₆₀	35	E ₄₈	E ₂₅	18	E	17	20	20	E	17	
23		22	16	E ₁₅	E ₁₃	E ₁₅	E ₁₅	E ₁₂	G	30	29	26	33	25	28	21	27	25	27	25	26	19	E ₁₄	18	A	
24		E	E ₁₅	E	E ₁₂	E ₁₂	E ₁₃	E ₁₄	C	C	G	21	26	E ₃₃	G	30	E ₂₉	26	E ₂₂	E	E	E ₁₅	E ₁₅	E ₁₃	E	
25		E ₁₅	E ₁₄	E ₁₄	E ₁₅	E ₁₃	E ₁₂	E ₁₄	G	G	G	G	G	G	32	38	32	22	19	E	E	E ₁₅	E ₁₅	E ₁₅	E ₁₅	
26		E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₃	E ₁₅	E	G	G	G	G	G	30	G	E ₃₂	E ₂₅	E ₂₃	14	16	E	E ₁₅	E	E ₁₅	E ₁₅	
27		E ₁₅	E ₁₅	E ₁₃	E ₁₃	E ₁₄	E ₁₃	E ₁₄	E ₂₁	G	G	E ₃₅	G	E ₃₃	31	E ₂₈	G	19	16	E	E	E	E	16	16	
28		16	E	19	25	23	15	16	G	23	32	35	36	E ₃₈	33	24	30	23	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	
29		E ₁₅	E ₁₅	E ₁₃	E ₁₆	E ₁₃	E ₁₃	E ₁₅	E ₁₃	G	G	35	36	34	G	G	G	G	E ₁₃	E	18	19	E	E ₁₅	E	
30		E ₁₅	E ₁₅	E ₁₂	E ₁₅	E ₁₃	E	16	21	26	30	26	G	33	G	E ₃₀	25	G	E ₁₄	E ₁₃	E	E	E	E ₁₅	E ₁₅	
31		E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₃	E ₁₄	E	G	G	31	32	33	G	G	26	G	G	E	E	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₅	
CNT		31	31	31	31	31	30	30	28	29	30	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED		E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₂	E ₁₃	E ₁₄	G	21	30	33	32	U ₂₉	32	30	28	20	16	15	E ₁₂	E ₁₄	E	E ₁₅	E ₁₅	
UQ		E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₃	E ₁₅	E ₁₅	E ₁₅	26	31	36	35	34	34	32	30	25	19	17	16	15	E ₁₅	E ₁₅	E ₁₅	
LQ		E ₁₂	E ₁₃	E ₁₂	E ₁₂	E ₁₂	E	E ₁₂	G	G	G	U ₂₄	E ₂₅	G	E ₁₉	G	E ₂₆	16	E ₁₂	E	E	E	E	E	E	

DEC. 1972

FBES (0.1 MHz)

IONOSPHERIC DATA

DEC. 1972

F-MIN (0.1 MHZ)

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

Station KOKUBUNJI TOKYO Lat. 35 42.4 N. Long. 139 29.3 E Sweep 1 MHz to 20 MHz in 20 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	14	14	12	12	12	12	12	15	14	14	15	15	15	15	15	15	15	12	12	14	14	12	12	12	
2	12	12	13	12	12	12	14	15	15	C	C	26	19	24	15	15	14	12	12	12	12	12	12	E ₁₅ ^S	
3	E ₁₅ ^S	12	14	12	12	14	12	14	14	15	18	22	15	15	15	14	12	14	E ₁₅ ^S	14	14	14	E ₁₅ ^S	E ₁₅ ^S	
4	14	12	12	12	12	14	14	16	15	22	15	18	17	13	14	12	12	12	13	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	13	
5	E ₁₅ ^S	E ₁₅ ^S	13	12	E ₁₅ ^S	E ₁₅ ^S	13	15	16	14	15	15	15	15	15	16	14	14	E ₁₅ ^S	14	12	E ₁₅ ^S	E ₁₅ ^S	13	
6	12	12	14	12	12	C	12	C	C	14	15	12	14	13	15	13	13	E ₁₅ ^S	13	E ₁₅ ^S	12	E ₁₅ ^S	E ₁₅ ^S	13	
7	E ₁₅ ^S	E ₁₅ ^S	13	13	12	E ₁₅ ^S	E ₁₅ ^S	15	13	13	15	16	15	14	14	14	25	13	13	13	E ₁₅ ^S	E ₁₅ ^S	13	E ₁₅ ^S	
8	E ₁₅ ^S	E ₁₅ ^S	12	12	13	E ₁₅ ^S	E ₁₅ ^S	14	15	14	14	13	14	12	16	15	12	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	12	E ₁₅ ^S	
9	E ₁₅ ^S	12	12	E ₁₅ ^S	12	12	12	15	15	14	15	14	14	13	12	15	14	14	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	
10	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	12	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	14	13	14	34	22	15	15	13	14	14	12	12	12	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	12	
11	12	E ₁₅ ^S	E ₁₅ ^S	12	12	14	E ₁₅ ^S	15	15	15	15	16	15	15	15	12	12	13	12	E ₁₅ ^S	12	14	14	E ₁₅ ^S	
12	13	E ₁₅ ^S	12	E ₁₅ ^S	12	E ₁₅ ^S	15	16	12	15	14	14	14	12	12	15	12	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	13	14	E ₁₅ ^S	E ₁₅ ^S	
13	E ₁₅ ^S	E ₁₅ ^S	12	14	12	12	E ₁₅ ^S	14	14	13	15	15	15	13	15	15	15	13	12	E ₁₅ ^S	13	E ₁₅ ^S	E ₁₅ ^S	13	
14	E ₁₅ ^S	E ₁₅ ^S	12	E ₁₅ ^S	13	E ₁₅ ^S	C	C	15	13	15	15	15	15	15	14	13	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	
15	E ₁₅ ^S	E ₁₅ ^S	14	13	12	E ₁₅ ^S	E ₁₅ ^S	14	13	14	15	14	14	15	15	15	14	12	14	E ₁₅ ^S	12	12	14	12	
16	E ₁₅ ^S	14	14	14	12	E ₁₅ ^S	14	13	14	15	15	15	15	58	14	13	13	13	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	
17	13	13	E ₁₅ ^S	E ₁₅ ^S	12	12	E ₁₅ ^S	15	15	13	15	12	18	15	14	14	15	14	13	14	12	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	
18	E ₁₅ ^S	E ₁₅ ^S	15	E ₁₅ ^S	13	E ₁₅ ^S	13	14	13	15	15	18	21	21	19	19	15	12	14	E ₁₅ ^S	E ₁₅ ^S	12	E ₁₅ ^S	E ₁₅ ^S	
19	E ₁₅ ^S	E ₁₅ ^S	12	E ₁₅ ^S	14	E ₁₅ ^S	E ₁₅ ^S	14	14	17	34	25	16	26	17	15	14	E ₁₅ ^S	12	14	12	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	
20	E ₁₅ ^S	E ₁₅ ^S	14	12	12	12	14	12	14	17	15	18	18	17	16	16	15	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	
21	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	13	E ₁₅ ^S	E ₁₅ ^S	15	15	16	25	22	20	26	22	28	22	12	E ₁₅ ^S	14	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	
22	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	12	12	14	14	18	28	44	37	40	35	32	26	25	13	12	E ₁₅ ^S	13	12	E ₁₅ ^S	E ₁₅ ^S	
23	E ₁₅ ^S	12	15	13	E ₁₅ ^S	E ₁₅ ^S	12	15	15	15	15	16	16	15	15	14	14	12	E ₁₅ ^S	14	14	14	E ₁₅ ^S	E ₁₅ ^S	
24	E ₁₅ ^S	E ₁₅ ^S	13	12	12	13	14	C	C	15	16	15	22	28	18	15	14	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	13	14	
25	E ₁₅ ^S	14	14	E ₁₅ ^S	13	12	14	16	15	16	26	22	25	19	18	15	14	13	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	
26	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	13	E ₁₅ ^S	12	14	15	15	18	22	25	25	32	25	23	12	13	12	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	
27	E ₁₅ ^S	E ₁₅ ^S	13	13	14	13	13	14	15	19	25	39	23	33	25	26	16	12	E ₁₅ ^S	E ₁₅ ^S	13	12	E ₁₅ ^S	E ₁₅ ^S	
28	E ₁₅ ^S	E ₁₅ ^S	12	13	12	12	12	15	15	15	15	22	38	15	15	15	15	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	
29	E ₁₅ ^S	13	13	E ₁₅ ^S	13	13	E ₁₅ ^S	13	15	15	24	15	25	26	15	15	15	13	12	12	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	
30	E ₁₅ ^S	E ₁₅ ^S	12	E ₁₅ ^S	13	14	12	15	14	15	15	16	15	25	30	15	15	14	13	E ₁₅ ^S	E ₁₅ ^S	14	E ₁₅ ^S	E ₁₅ ^S	
31	14	14	14	14	13	14	E ₁₅ ^S	14	15	15	16	18	28	16	19	15	13	14	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	14	E ₁₅ ^S	E ₁₅ ^S	
CNT	31	31	31	31	31	30	30	28	29	30	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	E ₁₅ ^S	E ₁₅ ^S	12	12	12	13	13	14	15	15	15	16	16	15	15	15	14	12	13	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	
UQ	E ₁₅ ^S	E ₁₅ ^S	14	E ₁₅ ^S	13	E ₁₅ ^S	E ₁₅ ^S	15	15	15	18	22	22	25	18	15	15	14	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	E ₁₅ ^S	
LQ	13	13	12	12	12	12	12	14	14	14	15	15	15	15	15	14	13	12	12	13	12	13	E ₁₅ ^S	13	

The Radio Research Laboratories, Japan

DEC. 1972

F-MIN (0.1 MHZ)

IONOSPHERIC DATA

DEC. 1972

M(3000)F2 (0.01)

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

Station KOKUBUNJI TOKYO Lat. 35 42.4 N. Long. 139 29.3 E Sweep 1 MHz to 20 MHz in 20 sec in automatic operation

Hour Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23									
1	290	275	275	F	J	F	F	S	360	345	350	355	355	325	335	340	335	360	340	320	305	300	275	270									
2	275	280	305	310	340	280	320	345	350	C	C	335	315	365	335	320	355	305	340	335	350	I	A	270	285								
3	280	275	290	315	295	270	335	J	S	350	360	330	335	340	340	350	365	360	310	335	290	290	280	280	290								
4	290	295	275	275	335	300	295	355	330	340	345	340	330	I	R	335	325	365	340	335	I	A	I	R	345	325	260						
5	285	270	275	305	325	305	335	365	355	340	J	R	355	340	365	365	350	360	345	370	295	325	320	320	285	270							
6	F	F	F	300	345	I	C	300	I	C	C	355	325	340	345	I	R	350	325	350	350	365	315	I	A	I	R	I	R	315	300	275	
7	280	270	315	335	325	380	305	355	360	350	315	360	325	315	360	345	J	R	345	345	325	295	305	305	300	270							
8	285	290	335	335	335	290	310	340	R	J	R	345	350	345	345	335	335	345	340	375	330	285	315	320	290	295	280						
9	300	275	290	290	330	305	325	375	355	355	335	330	345	355	350	355	370	350	320	315	355	295	275	F	290								
10	275	280	280	285	320	315	335	350	345	345	345	365	350	355	330	365	H	355	330	345	330	320	290	265	285								
11	295	275	275	280	305	310	320	355	370	345	345	335	350	360	365	340	I	A	345	350	350	365	335	300	290	315							
12	F	F	F	295	315	330	305	355	330	345	345	330	345	350	355	355	365	340	325	325	330	335	295	F									
13	270	275	270	295	300	305	305	345	360	340	340	J	R	290	345	310	J	R	360	350	340	310	340	I	R	I	R	S	R	315			
14	335	300	270	285	305	300	C	C	315	310	350	J	R	J	R	J	R	335	330	330	J	R	335	335	330	320	I	R	315	315	335	295	R
15	245	285	320	295	330	300	335	355	U	R	370	340	350	355	325	310	340	335	355	340	340	315	315	330	265	F	255	F					
16	F	310	315	325	275	275	290	340	350	340	330	335	325	R	J	R	325	335	345	325	305	315	335	345	I	R	250	260					
17	295	255	F	F	275	295	305	345	260	J	R	315	310	345	A	A	355	320	355	335	355	315	285	285	260	270							
18	260	275	315	320	320	280	290	345	R	U	R	360	335	355	335	345	355	305	345	340	320	325	325	330	290	255							
19	290	270	F	F	335	325	290	355	J	S	340	340	355	320	330	355	355	360	360	330	355	315	320	320	270	270							
20	265	260	290	305	355	320	285	330	345	335	330	330	J	R	350	360	310	J	R	330	360	350	335	270	260								
21	255	295	295	290	345	R	290	335	335	345	330	330	360	335	330	340	360	340	305	310	325	345	270	265	F								
22	260	275	275	290	300	290	305	340	350	345	335	325	325	R	R	J	R	335	355	345	320	320	335	365	310	260							
23	260	260	305	335	335	300	R	335	325	390	325	300	345	330	305	325	345	345	300	315	360	295	345	270	A								
24	280	295	280	305	295	315	315	C	C	330	310	J	R	335	335	310	J	R	320	350	365	310	295	345	320	310	365	F	265	F			
25	275	260	285	290	325	285	320	335	335	340	335	305	310	340	360	360	360	335	305	335	345	325	295	285									
26	270	280	290	280	305	315	330	350	350	340	345	320	315	320	335	345	340	305	355	295	325	360	285	280									
27	315	F	290	295	360	320	290	340	340	340	365	330	I	R	350	320	305	325	345	320	310	345	335	320	285	270							
28	280	300	280	I	R	315	315	350	320	355	360	345	J	R	325	340	305	J	R	325	355	360	365	345	335	335	305	280	285				
29	265	295	315	345	310	285	325	350	350	310	J	R	330	310	325	J	R	325	345	365	340	335	345	325	290	315	265	275					
30	260	285	285	I	R	320	330	325	I	R	300	315	320	365	310	350	345	330	310	345	355	340	320	340	330	320	275	275					
31	275	270	295	345	330	325	310	335	330	350	345	340	J	R	335	J	R	325	320	340	365	350	305	350	330	275	260	275					
CNT	31	30	30	30	30	30	30	28	29	30	30	31	30	28	30	31	31	31	31	31	31	31	31	31	30	30	28						
MED	280	275	288	298	325	305	308	345	350	342	338	335	335	332	335	345	355	340	325	320	325	320	280	272									
UQ	288	290	305	320	335	320	325	355	355	350	345	345	345	352	355	355	360	348	340	335	335	335	295	285									
LQ	268	270	275	290	305	290	300	338	335	340	330	330	325	320	325	335	345	328	312	315	318	300	270	265									

DEC. 1972

M(3000)F2 (0.01)

IONOSPHERIC DATA

DEC. 1972

M(3000)F1 (0.01)

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

Station KOKUBUNJI TOKYO Lat. 35 42.4 N. Long. 139 29.3 E Sweep 1 MHz to 20 MHz in 20 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								
2										C	C	L	L	A	L	L								
3									L	L	L	L	L	L	A									
4										L	A	L	470	L	L									
5									L	L	L	L	L		L									
6									L		A	L	L	L										
7									L	L	L		L	L										
8									L	L	L	355	L	L	L									
9									L	L	L	L	L	L										
10									L		L	L	L	L										
11									L	365	L	L	L	L	L	L	A							
12									L	L	L	L	L	L	L									
13										L	L	L	L	L	L	L								
14									A	A	L	L	L	L	L									
15									L	L	L	L	L	L	L									
16									L	L	L	A	B	L										
17										A	A	A	A											
18									L	A	L	L	A	L	A									
19								L	L	L	L	L	L	L	L	L								
20									L	L	L	L	L	L	440									
21									L	L	L	L	L	L	L	L								
22									L	400	B	L	L	A		A								
23									U	400	L	L	L	350	L	L								
24									L	U	380	L	L	L	L									
25									L	L	L	L	L	L	A									
26								L	L	L	L	L	L	L	L	L								
27								L	L		L	L	L	L	L	L								
28									L		L	L	L	L										
29									430	L	L	L	410	L	L									
30										L	L	L	L	L	L	L	L							
31									440			L	L	L	L	L								
CNT										1	3	2		3	1	1								
MED									440	400	372		410	350	440									
UQ										415			440											
LQ									400				382											

DEC. 1972

M(3000)F1 (0.01)

IONOSPHERIC DATA

DEC. 1972

H⁺F₂ (KM)

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

Station KOKUBUNJI TOKYO Lat. 35 42.4 N. Long. 139 29.3 E Sweep 1 MHz to 20 MHz in 20 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											220	230	230	240	240	255	240								
2												C	C	250	230	235	240	250							
3										220	210	260	260	255	250	240									
4											235	240	240	250	255	250									
5										230	220	230	240	225		240									
6										235		260	240	240	265	260									
7										240	240	235			250	220									
8										230	240	240	270	230	240	240									
9										235	230	250	240	230	230										
10										245		240	230	230	230										
11										220	255	230	240	230	230	230		A							
12										230	255	250	250	240	230										
13											240	235	250	250	250	240									
14										275	240	250	250	250	250										
15										240	230	230	255	240	230										
16										235	240	230	240	250	250										
17												280	240	A	A										
18										220	I A	250	240	245	240	230	290								
19								220	225	225	225	270	255	245	230	220									
20										230	250	260	250	250	230										
21										230	255	250	230	250	240	240									
22									220	240	240	250	255	R		240									
23										240	295	250	230	310	250	225									
24										230	275	255	245	260	230										
25										240	290	290	250	250	230										
26									230	240	240	250	260	250	230	250									
27									220	220		260	260	250	280	250									
28									220		270	250	280	240											
29									240	240	250	280	240	250											
30											260	235	230	260	250	225	210								
31									220			250	260	260	255	230									
		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	26	25	31	29	28	29	14	1							
MED									220	220	232	240	250	250	250	240	240	210							
UQ									228	240	255	252	255	252	250	250									
LQ									220	220	240	240	240	240	240	230	230								

DEC. 1972

H⁺F₂ (KM)

IONOSPHERIC DATA

DEC. 1972

H^oF (KM)

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

Station KOKUBUNJI TOKYO Lat. 35 42.4 N. Long. 139 29.3 E Sweep 1 MHz to 20 MHz in 20 sec in automatic operation

Hour Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	310	300	300	270	245	260	245	210	210	190	220	230	225	220	240	220	210	205	220	230	250	260	260	350
2	300	300	275	250	225	300	245	230	220	C	C	205	180	I ^A ₂₂₀	205	I ^A ₂₂₀	200	240	220	230	220	I ^A ₂₈₅	330	310
3	300	300	275	250	240	300	220	210	210	205	195	240	225	230	I ^A ₂₃₀	230	210	210	220	240	280	250	290	290
4	310	300	300	290	240	245	270	230	220	220	I ^A ₂₂₀	210	195	240	240	240	210	200	240	I ^A ₂₇₀	240	250	250	300
5	300	300	290	250	245	250	240	210	205	195 ^H	240	250	220	235	225	220	215	205	280	240	210	225	290	310
6	305	320	310	270	230	I ^C ₂₁₀	250	I ^C ₂₂₀	C	200	230	I ^A ₂₃₅	240	210	240	230	235	200	265	I ^A ₂₂₀	300	235	270	300
7	295	300	260	235	225	200	250	220	235	225	210	220	250	200	235	245	210	200	250	250	250	250	280	310
8	290	290	220	225	230	260	280	245	240	230	220	210	190	230	230	220	210	190	240	240	220	260	280	300
9	275	305	290	255	245	240	225	210	220	230	200 ^H	205 ^H	230	225	220	230	210	200	245	245	210	200	300	300
10	290	300	300	290	255	245	220	215	215	195	230	230	210	205	210	220 ^H	225	195	200	225	245	300	310	280
11	300	310	300	275	250	240	245	220	220	200	220	220	230	230	230	220	I ^A ₂₂₅	220	220	205	220	260	260	255
12	300	275	305	290	245	220	255	210	220	225	210	225	225	205	230	220	210	220	220	220	210	240	260	300
13	305	305	300	270	250	225	225	220	215	240	220	220 ^H	240	240	240	235	210	250	220	240	220	300	300	285
14	240	260	310	300	290	260	C	C	250	I ^A ₂₄₀	I ^A ₂₅₀	240	210	220	230	245	220	205	235	240	210	250	260	400
15	390	300	250	250	240	240	220	210	225	230	230	220	220	205	220	220	220	205	230	255	240	240	310	400 ^A
16	300	240	250	250	310	345	290	230	220	230	210	230	I ^A ₂₄₀	B	240	235	210	240	220	240	240	220	350	315
17	250	310	305	300	310	305	250	235	210	240	I ^A ₂₄₅	A	A	A	230	250	210	205	230	260	260	300	340	300
18	390	300	270	240	240	340	300	240	240	230	I ^A ₂₂₀	200	230	I ^A ₂₃₀	240	I ^A ₂₂₅	220	205	260	245	255	250	290	345
19	290	320	340	260	210	215	255	230	210	210	205	245	245	250	230	220	205	220	205	245	220	240	300	310
20	310	340	300	260	210	200	290	230	230	230	220	200	240	240	200	230	205	205	230	280	240	245	350	360
21	350	300	290	270	240	205	290	230	220	220	230	225	225	205	230	240	210	200	260	255	220	250	305	350
22	350	295	290	270	255	225	250	220	225	195	B	240	250	I ^A ₂₃₅	240	I ^A ₂₃₀	210	210	240	240	240	240	250	380
23	380	350	260	250	240	300	210	230	205	205	180 ^H	230	230	210	220	230	210	245	255	220	300	220	320	A
24	300	260	255	250	245	250	240	C	C	225	195	205	220	205	220	230	205	230	250	210	230	220	210	300
25	300	290	290	280	220	210 ^H	200	220	220	240	210	210	240	210	I ^A ₂₃₅	240	220	210	240	240	220	240	270	290
26	320	300	300	290	260	250	240	200	220	220	220	200	250	250	230	250	220	240	210	250	240	220	280	300
27	270	305	295	260	240	240	240	210	205	205	235	260	250	220	200	210	235	200	240	210	220	240	340	340
28	300	300	330	380	270	250	250	210	230	210	240	250	250	200	240	235	210	200	230	230	210	290	350	340
29	300	290	240	205	240	300	240	220	220	200	240	210	200	240	200	240	230	220	210	280	240	250	300	310
30	300	300	310	250	240	200	390	250	230	230	195	240	220	210	220	230	200	205	250	220	220	245	310	315
31	315	310	275	220	230	220	250	230	195	230	230	240	230	205	220	220	220	205	240	220	205	300	E ^S ₃₅₅	325
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	30	29	29	30	29	30	30	29	31	31	31	31	31	31	31	31	31	30
MED	300	300	290	260	240	245	248	220	220	222	220	225	230	220	230	230	210	205	235	240	230	250	295	310
UQ	310	305	300	278	250	260	255	230	225	230	230	240	240	235	238	238	220	220	248	248	242	260	312	340
LQ	298	298	272	250	235	220	240	210	210	205	210	210	220	205	220	220	210	200	220	222	220	240	270	300

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H^oF (KM)

IONOSPHERIC DATA

DEC. 1972

H^oES (KM)

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

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N. Long. 139° 29.3' E Sweep 1 MHz to 20 MHz in 20 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	105	105	100	100	100	B	G	110	110	170	110	150	110	150	105	115	B	B	115	110	105	105	110
2	110	100	100	105	100	100	100	G	125	C	C	G	110	110	140	105	130	105	105	105	105	105	105	100
3	100	B	B	B	B	105	B	G	110	105	G	160	160	145	115	120	100	100	100	100	B	100	S	115
4	100	100	100	105	105	105	100	G	150	140	120	105	G	100	110	110	105	100	100	100	100	100	S	B
5	S	S	100	100	100	100	B	B	G	G	195	160	G	160	170	145	100	100	S	115	B	110	S	105
6	100	110	B	110	B	C	B	C	C	100	120	150	140	140	140	115	110	100	110	110	105	100	100	B
7	S	S	B	B	B	S	S	G	160	140	150	G	100	150	160	130	B	B	150	B	100	100	100	S
8	100	S	B	B	B	S	S	B	G	180	150	170	G	155	G	140	100	95	S	S	100	105	B	S
9	S	B	B	S	B	B	B	B	110	170	170	100	150	180	140	130	130	B	140	130	105	100	100	100
10	S	S	105	B	S	S	S	G	115	G	B	G	G	G	105	G	G	B	B	B	S	S	S	B
11	B	S	S	B	B	B	S	G	G	G	160	G	155	160	140	130	120	115	B	105	100	100	100	S
12	B	S	B	S	105	S	B	G	G	170	140	100	100	100	100	G	100	100	S	115	B	105	S	105
13	S	S	B	B	B	100	S	G	G	150	150	105	105	100	G	100	G	100	100	100	B	105	S	B
14	S	S	110	110	B	S	C	C	150	115	110	110	G	G	G	G	100	100	100	S	S	S	S	S
15	S	S	B	B	B	S	S	B	140	130	110	110	110	110	G	G	100	100	100	100	100	100	100	100
16	105	105	115	100	110	110	110	110	110	110	110	105	100	B	140	100	100	100	100	100	100	S	S	S
17	B	B	100	100	100	100	S	B	G	100	105	100	105	100	105	100	100	100	100	100	B	100	100	100
18	100	100	100	100	100	110	110	100	100	100	100	100	105	105	105	100	120	105	100	100	95	100	100	95
19	100	95	B	S	B	S	105	100	G	130	B	110	155	110	105	125	105	100	100	100	95	100	S	95
20	S	S	B	B	B	B	B	G	G	120	G	120	G	G	G	105	140	100	S	100	100	95	100	S
21	S	S	S	S	B	S	100	B	G	G	170	G	100	100	100	B	B	100	100	100	100	S	100	95
22	100	S	S	S	B	B	B	G	G	B	B	B	B	110	140	120	B	100	100	100	100	100	100	100
23	100	100	S	B	S	S	B	G	105	105	105	100	100	100	105	100	100	100	100	95	115	B	100	100
24	120	S	100	B	B	B	B	C	C	G	105	100	180	100	100	100	100	100	100	100	S	S	B	100
25	S	B	B	S	B	B	B	G	G	G	G	G	G	100	100	100	100	100	100	100	S	S	S	S
26	S	S	S	S	B	S	100	G	G	G	G	G	100	G	B	B	B	100	100	100	S	100	S	S
27	S	S	B	B	B	B	B	B	100	G	G	B	G	B	150	B	100	100	100	100	100	100	100	110
28	100	110	100	100	100	100	100	G	100	100	100	100	B	150	100	100	100	S	S	S	S	S	S	S
29	S	B	B	S	B	B	S	B	G	G	110	110	110	G	G	G	G	B	100	100	100	100	S	100
30	S	S	B	S	B	100	150	150	150	150	105	G	130	G	B	105	105	B	B	100	100	100	S	S
31	B	B	B	B	B	B	100	G	G	160	160	150	G	G	105	G	G	100	100	S	S	B	S	S
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	13	9	11	10	9	11	10	4	15	20	22	21	20	22	23	22	23	24	22	25	19	22	14	16
MED	100	100	100	100	100	100	100	105	110	125	120	110	110	110	110	105	100	100	100	100	100	100	100	100
UQ	105	105	105	105	105	105	110	130	145	150	160	120	150	150	140	125	112	100	100	105	102	105	100	105
LQ	100	100	100	100	100	100	100	100	108	105	105	100	100	100	105	100	100	100	100	100	100	100	100	100

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DEC. 1972

H^oES (KM)

IONOSPHERIC DATA

DEC. 1972

TYPES OF ES

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

Station KOKUBUNJI TOKYO Lat. 35 42.4 N. Long. 139 29.3 E Sweep 1 MHz to 20 MHz in 20 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	F	F	F	F	F			F	F	HF	F	H	S	HF	F	S			F	F	F	F	F	
2	F	F	F	F	F	F	F		H				F	F	HF	F	H	F	F	F	F	F	F	F	
3	F					F			F	F		H	HF	F	S	HF	F	F	F	F		F		F	
4	F	F	F	F	F	F	F		H	H	F	HF		F	F	HF	F	F	F	F	F	F			
5			F	F	F	F					H	H		H	HF	HF	F	F		F		F		F	
6	F	F		F					F	H	HF	HF	H	F	H	S	HF	HF	F	F	F	F	F	F	
7									H	H	H		F	F	HF	HF			F		F	F	F		
8	F									H	H	H		HF		H	F	F		F	F				
9									F	HF	F	F	HF	HF	HF	F	H		F	F	F	F	F	F	
10			F						F						F										
11											H		H	H	H	H	H	F		F	F	F	F		
12					F				HF	HF	F	F	F	F			F	F		F		F		F	
13					F				H	HF	S	F	F		F		F	F	F		F				
14			F						H	F	S	S					F	F	F						
15									H	H	S	S	F	F			F	F	F	F	F	F	F	F	
16	F	F	F	F	F	F	F	F	F	F	F	F	S		H	F	F	F	F	F	F	F	F	F	
17			F	F	F	F			S	S	F	S	S	F	F	F	F	F	F	F		F	F	F	
18	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
19	F	F				F	F		H		F	HF	F	F	HF	F	H	F	F	F	F	F	F	F	
20									H		H				F	H	F		F	F	F	F	F	F	
21						F				H			F	F	F		F	F	F	F	F	F	F	F	
22	F												F	F	H	H		F	F	F	F	F	F	F	
23	F	F							S	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
24	F		F								F	F	H	F	F	F	F	F	F	F				F	
25													F	F	F	F	F	F							
26						F							F				F	F	F	F	F	F	F	F	
27									F						H		F	F	F	F	F	F	F	FF	
28	F	F	F	F	F	F			F	F	F	F		HF	F	F	F								
29											F	F	F						F	F	F	F	F	F	
30					F	F	H		HF	H	F		HF		F	F			F	F	F				
31						F				H	H	H			F		F	F							
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																									
MED																									
UQ																									
LQ																									

DEC. 1972

TYPES OF ES

IONOSPHERIC DATA

DEC. 1972

HPF2 (KM)

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

Station KOKUBUNJI TOKYO Lat. 35 42.4 N. Long. 139 29.3 E Sweep 1 MHz to 20 MHz in 20 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	350	350	355 ^F	320 ^J	F	320 ^J	300 ^F	S	240	250	250	250	250	290	270	260	250	230	250	290	305	300	350	380
2	350	350	310	300	250	350	290	250	250	C	C	270	280	240	270	280	250	300	270	280	250	310 ^A	360	360
3	350	350	320	305	300	355	250	250 ^J	240	230	270	285	260	260	255	240	230	295	260	290	310	330	325	320
4	345	345	350	340	250	300	310	250	260	255	250	260	280	280 ^I	260 ^R	260	250	250	250	290 ^I	260 ^J	260	260	370
5	340	360	340	300	290	290	255	240	250	250	250 ^J	255	235	245	250	240	240	230	330	275	290	280	330	380
6	390 ^F	360 ^F	370 ^F	310	250	245 ^I	300	250 ^I	C	250	290	270	250	250 ^I	270	250	260	245	290	255 ^I	300 ^I	270 ^J	300	340
7	350	350	300	260	260	205	290	250	240	250	290	235	260	290	230	260	250 ^J	250	300	300	300	290	350	350
8	350	325	260	250	260	300	300	260 ^R	250 ^J	250	260	250	280	250	250	280	230	220	300	290	280	300	310	340
9	315	370	320	315	290	295	260	240	240	250	260	270	250	250	250	250	230	240	260	295	245	300	350 ^F	330
10	345	345	330	320	290	280	250	240	250	260	250	245	245	250	270	230 ^H	250	250	240	290	280	315	360	330
11	350	350	350	325	300	290	280	240	220	240	250	260	250	250	250	260	250 ^I	250	250	230	250	300	300	300
12	350 ^F	320 ^F	355 ^F	330	290	250	290	240	255	250	260	280	250	250	250	240	230	260	260	260	250	290	310	F
13	360	360	360	320	310	290	290	250	220	250	260	260 ^J	260	280	250 ^J	240	250	300	260	290 ^I	260 ^R	S	R	310
14	290	300	360	360	340	300	C	C	300 ^R	300	250	260 ^J	290 ^J	260	290	260 ^J	260	260	290	280 ^I	270	270	300	R
15	410	350	300	300	250	290	250	240	235 ^U	260	250	240	285	300	250	250	250	250	250	300	290	280	380 ^F	400 ^F
16	340 ^F	290	300	300	350	350	305	250	250	250	290	260 ^R	265	R	290 ^J	260	250	290	290	290	290	250	400 ^I	370
17	300	380	F	F	360	315	300	260	220	300 ^J	300	250	A	A	250	300	250	290	250	290	360	360	390	360
18	370	370	300	260	250	360	360	250	310 ^R	240 ^U	A	250	260	250	250	320	250	250	300	280	250	290	340	400
19	305	355	390 ^F	305 ^F	250	250	300	250	250 ^J	250	250	300	280	250	250	240	240	280	240	290	270	290	350	370
20	360	390	340	305	240	280	340	260	245	250	265	290	250 ^J	250	300 ^R	260 ^J	240	250	260	350	260	260	365	390
21	390	360	340	300	260	R	300	250	260	250	280	290	250	270	260	260	240	250	300	300	290	270	350	395 ^F
22	400	345	350	315	305	300	290	250	250	250	250	300	290	R	R	260 ^J	250	250	290	290	260	250	290	395
23	390	400	300	260	260	350 ^R	250	260	210	270	315	280	260	315	290	260	240	290	300	240	315	250	360	A
24	350	310	310	305	300	300	280	C	C	270	300	280 ^J	260	300 ^V	300 ^J	250	220	290	300	250	290	290	240 ^F	365 ^F
25	390 ^F	395 ^F	340 ^F	330 ^F	280	330 ^F	260	260	250	250	250	310	300	265	250	250	250	250	290	280	250	260	300	350
26	390	360	350	360	300	290	260	250	250	260	260	280	300	290	300	290	260	300	250	300	260	225	320	350
27	300	F	340	300	260	300	280	250 ^R	250	250	240	290	250 ^I	300	290	290	255	260	300	250	250	290	360	350
28	350	360	360	370 ^I	300	300	250	260	250 ^R	240	250	300 ^J	260 ^R	300 ^J	290 ^J	250	250	250	270	290	250	300	390	350
29	360	300	270	250	300	350	280	250	250	300	260 ^J	290	300	290 ^J	250	270	280	290	290	290	300	300	360	350
30	390	350	360	290 ^I	250 ^R	200	300 ^I	300	300	250	295	250	250	280	315	250	240	260	300	250	250	295	350	355
31	370	355	310	250	250	290	290	250	260	250	250	260	270 ^J	290 ^J	290	250	240	240	305	250	280	345	400	360
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	30	30	30	30	30	28	29	30	29	31	30	28	30	31	31	31	31	31	31	30	30	28
MED	350	350	340	305	285	300	290	250	250	250	260	270	260	268	260	260	250	250	290	290	270	290	350	358
UQ	380	360	355	320	300	320	300	255	250	260	280	290	280	290	290	260	250	290	300	290	290	300	360	375
LQ	345	345	310	300	250	290	260	250	240	250	250	252	250	250	250	250	240	250	255	268	250	270	310	345

DEC. 1972

HPF2 (KM)

IONOSPHERIC DATA

DEC. 1972

YPF2 (KM)

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

Station KOKUBUNJI TOKYO Lat. 35 42.4 N. Long. 139 29.3 E Sweep 1 MHz to 20 MHz in 20 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	65	95	115	JF80	F	JF80	F60	S	55	55	50	45	50	70	55	50	75	50	60	70	95	95	100	70	
2	100	95	80	55	60	95	60	50	60	C	C	50	95	40	50	45	60	100	50	70	60	115	95	90	
3	95	100	80	65	100	95	65	J50	60	70	55	40	50	40	45	50	50	90	65	70	90	70	90	90	
4	100	60	110	120	70	100	95	50	40	85	100	100	110	I00	R100	100	90	110	110	I90	A100	100	100	90	
5	100	100	100	90	90	100	105	80	100	50	J50	55	65	40	50	55	70	60	120	70	110	80	115	70	
6	F100	F100	F80	100	60	I70	75	I40	C	100	100	90	90	I90	80	100	90	95	90	I90	A100	J90	90	120	
7	110	110	90	100	100	75	90	90	110	90	100	75	100	100	85	90	J70	100	90	90	90	100	90	110	
8	90	85	80	100	100	90	90	100	J90	50	80	60	40	105	50	40	50	75	90	105	75	95	90	100	
9	85	80	85	85	50	100	85	60	60	40	60	90	50	50	60	55	45	70	70	50	50	100	100	80	
10	100	70	115	80	60	80	65	60	100	50	60	40	55	50	70	H60	50	105	65	65	120	130	100	115	
11	100	95	100	115	95	65	75	50	55	65	50	60	50	50	45	60	I70	50	50	65	95	70	100	75	
12	F95	F85	F90	70	55	50	70	60	100	50	50	70	60	50	50	65	65	70	90	80	70	60	90	F	
13	90	90	120	85	90	110	110	50	75	90	100	J00	100	100	J00	100	90	90	100	I90	100	S	R	100	
14	90	90	100	100	120	90	C	C	90	90	90	J00	J90	100	90	J00	100	80	100	I90	90	90	90	R	
15	80	110	80	90	90	100	100	100	U80	50	50	60	60	70	55	100	45	60	60	55	60	70	100	F100	
16	F100	60	100	55	120	95	95	60	50	100	100	100	95	R	J00	100	100	100	100	100	100	100	100	90	
17	90	110	F	F	100	75	90	100	90	J90	90	100	A	A	100	90	90	100	90	100	100	100	100	100	
18	90	90	90	100	100	100	100	90	100	U50	A	50	50	50	40	90	50	70	50	45	95	60	110	100	
19	95	100	F100	F95	90	F60	100	50	J60	60	50	55	60	50	50	40	40	40	60	80	90	60	95	100	
20	100	80	100	95	60	100	110	70	60	100	95	100	J10	110	90	J00	100	90	100	100	100	100	95	100	
21	100	100	100	90	100	R	90	100	100	50	50	60	40	60	70	50	50	105	100	55	65	80	120	F100	
22	100	100	95	85	85	100	70	60	50	100	100	90	100	R	R	J00	100	100	90	100	100	90	100	95	
23	100	90	90	100	100	110	100	100	80	80	80	80	80	80	80	60	55	100	55	60	110	55	90	A	
24	95	90	100	90	100	60	55	C	C	50	60	J35	60	55	J70	50	55	65	60	55	70	100	F70	F85	
25	F100	F105	F110	F75	65	F115	65	65	65	100	100	80	90	95	100	100	100	110	100	100	100	100	90	110	
26	100	100	110	100	90	100	100	100	100	100	100	110	90	100	90	100	100	90	100	90	100	95	120	90	
27	90	F	100	90	100	90	80	100	70	100	70	100	I00	90	100	90	95	90	90	90	100	90	100	100	
28	100	100	100	I10	90	90	110	100	90	75	100	J90	100	J90	J00	100	100	110	110	100	100	100	100	110	
29	100	90	80	100	90	100	100	100	100	90	J90	100	90	J00	100	110	110	100	100	100	90	90	90	100	
30	70	100	100	I90	100	R80	I90	90	90	100	85	50	50	40	85	55	60	90	70	50	75	60	100	95	
31	90	95	90	50	60	60	70	60	100	50	50	50	J50	J55	65	60	35	60	95	50	70	100	100	90	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	31	30	30	30	30	30	30	28	29	30	29	31	30	28	30	31	31	31	31	31	31	31	30	30	28
MED	100	95	100	90	90	92	90	68	80	78	80	75	72	70	75	90	70	90	90	80	95	90	100	100	
UQ	100	100	100	100	100	100	100	100	100	100	100	100	95	100	100	100	98	100	100	95	100	100	100	100	
LQ	90	90	90	80	65	75	70	60	60	50	50	52	50	50	50	55	50	70	62	62	75	70	90	90	

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DEC. 1972

YPF2 (KM)

IONOSPHERIC DATA

DEC. 1972

FOF2 (0.1 MHZ)

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

Station	YAMAGAWA				Lat. 31 12.1 N. Long. 130 37.1 E				Sweep 1 MHz to 20 MHz in 20 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	28	29	29	31	30	29	30	50	64	66	67	76	83	81	83	91	86	68	I ^Z ₅₄	C ^H ₅₃	36	31	37	31				
2	31	31	34	F ^S ₃₂	S ^S ₃₃	S ^S ₃₃	30	47	75	79	H ^H ₇₇	H ^H ₇₁	J ^S ₉₁	88	R ^R ₈₄	88	98	H ^H ₇₁	J ^S ₅₄	S ^S ₅₄	S ^S ₄₄	38	28	29				
3	31	32	H ^H ₃₂	S ^S ₃₃	33	31	S ^S ₃₆	S ^S ₅₃	67	65	74	Z ^Z ₉₄	88	93	V ^V ₇₇	88	92	74	47	H ^H ₄₄	41	36	28	29				
4	31	30	32	31	34	41	28	49	S	66	69	67	S ^S ₈₂	83	I ^S ₉₂	Y ^S ₁₀₃	91	J ^S ₇₄	46	I ^S ₄₆	48	J ^S ₅₀	41	25				
5	28	28	30	31	34	32	27	41	J ^S ₆₄	S ^S ₇₂	72	86	82	S ^S ₈₄	74	70	S ^S ₇₄	I ^S ₆₅	R ^R ₄₀	37	40	30	24	23				
6	25	27	30	30	37	36	20	35	57	63	52	70	72	74	65	78	72	51	39	28	27	32	32	24				
7	24	25	28	31	35	25	20	34	54	59	72	67	66	62	74	80	73	63	41	44	38	36	33	28				
8	30	31	43	27	26	23	24	38	65	S ^S ₈₁	S ^S ₈₀	77	78	80	H ^H ₇₇	H ^H ₇₁	67	53	37	27	31	29	29	30				
9	32	31	32	34	43	29	29	39	57	69	62	84	H ^H ₇₁	H ^H ₈₀	71	67	68	S ^S ₆₀	34	32	36	U ^S ₃₀	25	23				
10	25	28	28	28	32	33	23	38	56	S ^S ₇₆	73	88	87	69	73	H ^H ₇₇	66	69	S ^S ₅₄	S ^S ₃₇	33	29	27	24				
11	27	30	29	31	38	28	24	S ^S ₄₂	S ^S ₅₇	64	65	H ^H ₆₃	70	76	68	67	62	60	S ^S ₄₃	H ^H ₂₉	27	27	25	26				
12	26	28	F ^F ₂₈	28	33	29	26	38	56	62	69	68	H ^H ₇₈	90	69	70	58	55	46	31	29	31	24	25				
13	28	28	F ^F ₃₁	31	34	32	21	35	58	62	73	77	71	85	88	65	62	59	85	44	38	32	F	35				
14	27	31	F	30	34	S ^S ₃₁	32	43	61	90	J ^S ₉₆	75	U ^S ₈₃	87	92	81	81	73	U ^S ₄₈	U ^S ₃₇	J ^S ₅₁	56	27	25				
15	26	28	30	29	35	23	22	37	63	78	91	79	99	106	88	81	75	68	54	S ^S ₄₇	63	60	S ^S ₄₉	33				
16	33	33	32	24	24	24	26	46	S ^S ₆₅	72	82	84	Y ^Y ₇₄	R ^R ₈₀	89	100	75	62	49	52	47	45	S ^S ₄₀	F				
17	J ^S ₂₈	24	21	25	26	F ^F ₂₇	F ^F ₂₈	50	61	70	101	97	S ^S ₉₆	S ^S ₈₄	73	82	S ^S ₉₄	65	62	S	S ^S ₃₅	U ^S ₄₁	S ^S ₃₃	28				
18	27	27	34	26	27	23	22	J ^S ₄₀	J ^S ₇₆	79	Y ^S ₁₀₀	89	102	J ^S ₉₇	86	77	93	69	S ^S ₅₂	46	56	60	31	23				
19	26	25	29	30	F	27	25	39	78	80	94	79	95	U ^S ₁₁₅	Y ^S ₁₁₀	76	68	72	C	C	S ^S ₅₂	S ^S ₅₄	37	27				
20	28	28	28	32	35	26	H ^H ₂₁	35	S ^S ₆₄	79	91	89	97	105	S ^S ₁₀₁	76	84	80	45	40	43	39	27	28				
21	28	32	36	36	44	18	19	37	66	65	86	87	C	C	C	C	C	62	52	47	52	45	26	24				
22	23	27	31	F ^F ₃₁	33	27	27	38	66	80	76	76	H ^H ₈₅	Y ^Y ₉₀	87	76	77	64	48	47	51	41	S ^S ₃₃	26				
23	S ^S ₂₇	30	32	33	31	24	32	42	62	70	75	112	99	86	J ^S ₈₉	S ^S ₉₅	76	S ^S ₆₅	57	58	40	38	J ^S ₂₂	S ^S ₂₄				
24	I ^A ₂₇	29	29	29	32	26	34	S ^S ₄₈	S ^S ₆₂	67	87	98	U ^S ₁₀₅	102	103	105	100	S ^S ₆₃	H ^H ₄₄	44	35	S ^S ₃₇	Y ^Y ₃₁	27				
25	32	35	S ^S ₃₉	41	41	36	33	S ^S ₄₂	S ^S ₆₄	73	77	H ^H ₈₂	94	97	94	90	78	59	58	S ^S ₃₉	39	S ^S ₄₈	S ^S ₃₃	27				
26	30	29	31	F ^F ₃₃	34	33	30	H ^H ₃₄	55	65	69	70	81	78	89	89	87	60	50	33	36	37	26	22				
27	F	28	F ^F ₃₀	30	33	32	28	34	73	67	67	73	91	112	S ^S ₈₇	77	81	74	43	F ^F ₄₂	F ^F ₃₈	41	35	F ^F ₂₈				
28	27	29	29	28	32	S ^S ₃₄	28	33	58	65	63	59	76	73	80	101	S ^S ₆₆	49	41	39	32	32	28	25				
29	27	29	34	F ^F ₂₇	S ^S ₃₁	F ^F ₂₈	27	34	57	65	66	68	83	84	93	73	65	68	59	S ^S ₄₀	38	37	27	25				
30	26	27	28	29	I ^S ₄₄	S ^S ₃₁	H ^H ₂₁	S ^S ₂₉	55	68	76	69	64	77	65	69	67	53	45	S ^S ₄₄	37	28	21	21				
31	21	23	24	27	28	23	R ^R ₂₂	33	55	J ^S ₆₃	S ^S ₇₇	63	75	92	Y ^S ₁₀₃	Y ^S ₁₀₁	S ^S ₉₀	J ^S ₇₈	40	S ^S ₄₁	S ^S ₄₂	J ^S ₃₆	27	26				
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
CNT	30	31	30	31	30	31	31	31	30	31	31	31	30	30	30	30	30	31	30	29	31	31	30	30				
MED	27	29	30	30	33	29	27	38	62	68	75	77	83	84	86	79	76	65	48	42	38	37	28	26				
UQ	30	30	32	32	35	32	30	42	65	77	84	86	94	93	92	90	87	70	54	46	46	43	33	28				
LQ	26	28	29	28	31	26	22	35	57	65	69	70	75	80	74	73	67	60	43	37	36	32	26	24				

The Radio Research Laboratories, Japan

DEC. 1972

FOF2 (0.1 MHZ)

IONOSPHERIC DATA

DEC. 1972

FOF1 (0.01 MHz)

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

Station **YAMAGAWA** Lat. **31 12.1 N.** Long. **130 37.1 E** Sweep **1 MHz to 20 MHz** in **20 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	A	L								
2										L	L	L	L	L	A	L	L							
3										L	L	L	380	L	L	L								
4											L	L	L	L	L	L								
5										L	L	L	L	L	L	L								
6										C	L	L	L	L	L	L								
7											L	A	460	L	L		L							
8										L	L	400	460	L	L	L	A							
9										L	L	L	L	L	A	A	A							
10										L	L	L	L	430	L	L								
11										L	L	L	L	L	L	L								
12										L	L	L	L	A	L	L								
13										L	L	L	L	L	L	L								
14											A	L	L	L	L	L								
15										L	L	420	500	430	L	A	A							
16										370	L	L	400	B	L	L								
17											L	L	L	L	A	A								
18											L	L	L	L	L	L								
19										L	L	L	L	L	L	L	L							
20										L	L	L	L	L	L	L	L							
21											L	L	C	C	C	C	C							
22										L	L	L	L	L	L	L								
23										300	L	L	L	L	L	L								
24										330	L	L	L	L	L	L								
25										L	L	L	470	L	L	L								
26											L	L	L	L	L	L								
27										L	L	L	460	L	L	L	320							
28											L	380	L	L	L	L	L	L						
29											L	L	L	L	L	370	L							
30											L	L	L	440	L	L	L							
31											L	L	L	L	L	L	L							
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										3		3	7	3		1	1							
MED										330		400	460	430		370	320							
UQ										350		410	465	435										
LQ										315		390	430	430										

DEC. 1972

FOF1 (0.01 MHz)

IONOSPHERIC DATA

DEC. 1972

FOE (0.01 MHz)

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

Station	YAMAGAWA				Lat. 31 12.1 N. Long. 130 37.1 E				Sweep 1 MHz to 20 MHz in 20 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	I ^A 210	280	I ^A 295	310	315	320	300	A	A	A						
2								S	200	260	290	300 ^H	320	315	300	280	A	A						
3								S	190	260	300	310	320	310	300	I ^A 270	230	A						
4								S	A	270	290	A	A	A	A	A	A	S						
5								S	210	260	295 ^H	310	310	300	275	255	195	C						
6								S	205	I ^C 245	280	305	315	315	295	275	230 ^H	B						
7								S	200	240	300	310	315	305	295	270	220	S						
8								S	220	260	280	300	310	310	295	270	240 ^H	S						
9								S	180	265 ^H	280 ^H	310 ^H	310	310	300	270	230	S						
10								S	200	I ^C 270	310	320	320	320	310	280	230	S						
11								S	220	250	295 ^H	315	320	310	295	I ^A 280	240	S						
12								S	215	270	300	310	I ^A 315	I ^A 315	300	I ^A 265	I ^A 215	S						
13								S	225	270	300	320	325	320	300	275	230	S						
14								S	180	265	285	A	A	A	A	275	230	S						
15								S	A	A	A	320	A	310	320	I ^A 305	A	A						
16								S	210	260	290	300	I ^A 320	I ^B 320	315	290	250	170						
17								S	190 ^H	265	300 ^H	310	A	A	A	A	A	A						
18								S	195	270	300	I ^A 320	325	330	I ^A 300	I ^A 270	I ^A 255	A						
19								S	200	260	305	320	A	A	A	A	240	A						
20								S	185	250	290	310	310	310	300	275	230	S						
21								S	210	270	295	310	C	C	C	C	C	S						
22								S	180	270 ^H	300	310	330	330	320	290	230	S						
23								S	230 ^H	270 ^H	300	310	330	320	315	290	I ^A 240	S						
24								S	200	260	I ^A 295	310	320	310	310	285	230	A						
25								S	210 ^H	270	300	310	320	320	300	275	230	S						
26								S	200 ^H	260	290	310	310	315	300	270	220	S						
27								S	200	260	290	300	315	310	300	290	250 ^H	S						
28								S	180 ^H	255	290	310	325	320	310	290	250	S						
29								S	195	270 ^H	I ^A 290	I ^A 305	320	320	I ^A 300	290	250	A						
30								S	200 ^H	260 ^H	280	A	330	320	310	290	250	S						
31								S	180	250	285	305	315	I ^A 310	300	270	240	S						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									29	30	30	28	25	26	26	26	25	1						
MED									200	260	295	310	320	315	300	275	230	170						
UQ									210	270	300	310	320	320	310	290	240							
LQ									190	260	290	308	315	310	300	270	230							

The Radio Research Laboratories, Japan

DEC. 1972

FOE (0.01 MHz)

IONOSPHERIC DATA

DEC. 1972

FOES (0.1 MHz)

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

Station YAMAGAWA Lat. 31 12.1 N. Long. 130 37.1 E Sweep 1 MHz to 20 MHz in 20 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	24	20	19	23	18	E ₁₅	E ₁₃	E ₁₃	24	G	32	34	35	38	J ₅₃	J ₄₈	28	J ₂₆	J ₃₉	26	E ₁₅	E ₁₅	E ₁₅	E ₁₄	
2	E ₁₅	E ₁₄	E ₁₄	22	J ₃₅	E ₁₄	J ₂₅	J ₂₂	G	G	32	33	37	35	J ₇₀	49	37	J ₃₅	J ₂₆	J ₅₄	J ₂₅	J ₃₂	J ₂₄	J ₂₇	
3	E ₁₅	E ₁₂	E ₁₃	E ₁₄	E ₁₂	E ₁₂	E ₁₄	E ₁₄	G	28	G	G	G	G	36	31	17	J ₃₀	16	22	23	E ₁₄	24	E ₁₁	
4	E ₁₅	E ₁₄	E ₁₄	J ₂₂	E	E ₁₄	E ₁₄	E ₁₂	J ₃₂	30	59	45	34	J ₆₃	34	26	32	J ₄₁	J ₂₆	E ₁₇	E ₁₄	E ₁₅	E ₁₄	E ₁₄	
5	24	E ₁₅	E ₁₄	E ₁₄	E ₁₄	E ₁₃	E ₁₅	20	G	G	33	37	29	36	J ₂₉	G	25	C	E ₃₂	E ₁₅	31	E ₁₅	26	E ₁₅	
6	29	E ₂₀	27	23	E ₁₅	E ₁₄	E ₁₈	E ₁₄	G	E ₄₉	G	38	35	35	34	31	27	E ₁₃	E ₁₅	E ₁₆	E ₁₅	E ₁₂	E ₁₄	E ₁₂	
7	E	E ₁₂	E ₁₂	E ₁₄	E	E ₁₃	E ₁₃	E ₁₃	19	29	32	J ₅₀	39	J ₃₀	34	32	26	E ₁₅	E ₁₅	E ₁₅	25	J ₂₅	24	21	
8	E ₁₄	E ₁₄	E ₁₄	E	E ₁₄	E ₁₄	23	22	G	31	34	36	33	35	19	31	31	23	25	E ₁₄	24	E ₁₃	E ₁₅	E ₁₅	
9	E ₁₄	E ₁₃	E ₁₂	E ₁₄	E	E	E ₁₄	E ₁₅	27	29	G	38	42	43	42	J ₅₁	J ₄₆	E ₁₅	J ₂₈	E ₁₄	25	J ₂₆	E ₁₃	E ₁₅	
10	E ₁₅	E ₁₃	E ₁₄	E ₁₅	16	E ₁₅	E ₁₅	E ₁₅	G	E ₃₆	33	G	G	G	G	G	G	E ₁₅	25	22	E ₁₅	E ₁₅	E ₁₆	E ₁₅	
11	E ₁₅	E ₁₄	E ₁₅	E ₁₅	E	E ₁₅	E ₁₃	E ₁₄	G	G	32	G	G	G	G	29	30	E ₁₅	21	E ₁₄	E ₁₅	E ₁₅	E ₁₄	E ₁₅	
12	E ₁₄	E ₁₄	E ₁₂	20	E ₁₄	E ₁₅	E ₁₅	23	30	G	34	30	J ₃₅	44	J ₂₃	J ₃₆	J ₃₇	25	25	24	23	E ₁₄	E ₁₅	18	
13	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₂	E ₁₄	E ₁₃	E ₁₃	G	31	33	34	G	G	G	G	G	J ₂₈	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₄
14	E ₁₄	E ₁₄	E ₁₅	E ₁₃	E ₁₅	E ₁₄	E ₁₅	23	G	30	J ₅₁	J ₈₄	J ₄₁	J ₃₉	J ₃₅	20	G	E ₁₅	E ₁₅	E ₁₅	E ₁₅	J ₂₀	E ₁₄	19	
15	E ₁₄	E ₁₅	E ₁₄	E ₁₄	E ₁₅	E ₁₄	E ₁₅	E ₁₅	23	38	38	35	J ₆₄	34	J ₃₅	J ₆₄	J ₆₅	J ₃₇	J ₃₀	J ₂₇	J ₂₁	J ₂₂	E ₁₅	E ₁₅	
16	17	E ₁₄	E ₁₅	J ₃₀	23	24	E ₁₄	25	G	29	36	32	J ₅₉	E ₅₀	37	J ₃₄	J ₂₈	J ₂₈	J ₂₆	25	J ₂₄	J ₃₇	25	24	
17	E ₁₄	E ₁₄	E ₁₄	J ₂₀	23	E ₁₄	E ₁₄	25	G	G	G	41	49	J ₅₃	J ₆₂	J ₈₄	J ₅₆	J ₆₅	J ₅₁	J ₄₈	J ₃₂	J ₂₅	22	19	
18	E ₁₅	E ₁₄	E ₁₂	23	23	E ₁₄	E ₁₃	17 ^M	26	G	33	39	J ₃₅	J ₃₈	J ₄₈	J ₃₆	48	J ₃₇	J ₂₆	J ₂₆	J ₂₂	E ₁₄	E ₁₄	E ₁₅	
19	E ₁₅	E ₁₄	E ₁₄	E ₁₅	E ₁₂	E ₁₅	E ₁₃	E ₁₃	G	G	J ₃₄	37	37	34	J ₃₈	J ₃₅	J ₃₂	J ₅₂	C	C	26	E ₁₇	E ₁₈	E ₁₆	
20	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₅	G	G	G	G	40	G	G	G	J ₃₀	31	26	E ₁₅	E ₁₄	E ₁₄	E ₁₄	E ₁₄	
21	E ₁₄	E ₁₄	E ₁₄	E ₁₅	E ₁₄	E ₁₁	E ₁₃	E ₁₄	G	G	33	35	C	C	C	C	C	17	J ₃₀	18	24	25	20	E ₁₅	
22	E ₁₅	26	E ₁₅	E ₁₄	E ₁₄	E ₁₅	E ₁₅	E ₁₅	G	G	G	35	37	40	40	J ₇₃	J ₅₄	19	J ₃₁	J ₂₆	24	24	E ₁₅	E ₁₅	
23	E ₁₄	J ₃₆	J ₂₆	J ₃₀	E ₁₁	J ₂₀	E ₁₅	24	G	G	G	34	J ₆₈	21	21	J ₂₆	J ₃₄	J ₂₈	J ₂₄	J ₂₅	24	E ₁₄	E ₁₈	E ₁₅	
24	J ₄₄	J ₃₄	33	J ₃₁	E ₁₁	J ₁₇	E ₁₄	23	G	G	30	G	G	G	G	G	G	J ₂₈	J ₃₇	J ₂₈	E ₁₅	E ₁₄	E ₁₅	25	
25	J ₂₄	E ₁₆	E ₁₃	E ₁₆	E ₁₄	E ₁₄	E ₁₄	E ₁₃	G	20	J ₂₈	J ₃₅	G	25	20	J ₃₀	J ₃₀	J ₂₉	J ₂₇	E ₁₄	26	23	E ₁₄	E ₁₅	
26	E ₁₅	E ₁₃	E ₁₅	E ₁₄	E ₁₄	E ₁₅	E ₁₄	E ₁₄	G	G	30	G	G	G	G	G	G	E ₁₄	23	26	24	24	E ₁₄	E ₁₅	
27	E ₁₅	E ₁₄	E ₁₄	E ₁₅	E ₁₂	E ₁₅	E ₁₄	E ₁₅	G	28	32	J ₃₈	35	35	35	G	G	E ₁₅	24	J ₂₇	25	E ₁₅	E ₁₅	E ₁₅	
28	E ₁₅	E ₁₄	E ₁₄	E ₁₄	E ₁₃	E ₁₄	E ₁₅	E ₁₅	G	G	32	34	32	G	J ₃₂	25	J ₂₆	E ₁₅	J ₂₆	E ₁₅	F ₁₄	E ₁₄	E ₁₅	E ₁₅	
29	E ₁₄	E ₁₄	E ₁₄	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₄	G	30	32	33	G	37	J ₄₆	J ₃₃	J ₂₉	21	J ₂₆	J ₂₁	J ₁₉	20	E ₁₅	E ₁₅	
30	E ₁₅	E ₁₄	E ₁₅	E ₁₄	E ₁₅	E ₁₄	E ₁₅	E ₁₅	G	31	35	J ₃₇	J ₄₆	J ₃₄	30	21	G	E ₁₅	E ₁₅	E ₁₅	E ₁₆	E ₁₄	E ₁₄	E ₁₄	
31	E ₁₂	E ₁₁	E ₁₄	E ₁₅	E ₁₅	E	E ₁₇	E ₁₅	G	G	G	37	38	40	30	G	G	E ₁₄	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	
CNT	31	31	31	31	31	31	31	31	31	31	31	31	30	30	30	30	30	30	30	30	30	31	31	31	31
MED	E ₁₅	E ₁₄	E ₁₄	E ₁₅	E ₁₄	E ₁₄	E ₁₄	E ₁₅	G	E ₂₀	32	35	35	34	34	30	28	24	26	20	23	E ₁₅	E ₁₅	E ₁₅	
UQ	E ₁₅	E ₁₅	E ₁₅	21	E ₁₅	E ₁₅	E ₁₅	22	G	30	34	38	40	38	J ₃₈	J ₃₆	J ₃₄	J ₃₀	J ₂₈	J ₂₆	24	24	E ₁₈	E ₁₆	
LQ	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₂	E ₁₄	E ₁₄	E ₁₄	G	G	22	32	G	21	G	G	G	E ₁₅	21	E ₁₅	E ₁₅	E ₁₄	E ₁₄	E ₁₅	

The Radio Research Laboratories, Japan

DEC. 1972

FOES (0.1 MHz)

IONOSPHERIC DATA

DEC. 1972

FBES (0.1 MHz)

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

Station		YAMAGAWA							Lat. 31 12.1' N.		Long. 130 37.1 E		Sweep 1 MHz to 20 MHz in 20 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	E	E	E	E	E ₁₅	E ₁₃	E ₁₃		22	G	30	33	34	37	49	30	27	E ₂₆	29	24	E ₁₅	E ₁₅	E ₁₅	E ₁₄			
2	E ₁₅	E ₁₄	E ₁₄	E	14	E ₁₄	20	16		G	G	G	G	35	34	61	G	32	17	24	42	E	24	18	E			
3	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₂	E ₁₂	E ₁₄	E ₁₄		G	G	G	G	G	G	35	30	G	17	17	16	E	E	E ₁₄	E	E ₁₁		
4	E ₁₅	E ₁₄	E ₁₄	13	E	E ₁₄	E ₁₄	E ₁₂		23	30	32	32	33	43	32	25	27	40	21	E ₁₇	E ₁₄	E ₁₅	E ₁₄	E ₁₄			
5	16	E ₁₅	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₃	E ₁₅	G	G	G	33	36	G	27	35	22	G	25	C	E ₃₂	E ₁₅	18	E ₁₅	E	E ₁₅		
6	17	E ₂₀	20	E	E ₁₅	E ₁₄	E ₁₈	E ₁₄		G	E ₄₉	G	37	33	34	34	30	27	E ₁₃	E ₁₅	E ₁₈	E ₁₅	E ₁₅	E ₁₄	E ₁₂			
7	E	E ₁₅	E ₁₅	E ₁₄	E	E ₁₅	E ₁₃	E ₁₃		19	G	32	47	38	28	33	32	G	E ₁₅	E ₁₅	E ₁₅	E	17	E	E			
8	E ₁₄	E ₁₄	E ₁₄	E	E ₁₄	E ₁₄	E	G		G	G	33	34	G	34	18	30	30	20	E	E ₁₄	16	E ₁₃	E ₁₅	E ₁₅			
9	E ₁₄	E ₁₃	E ₁₂	E ₁₄	E	E	E ₁₂	E ₁₅		G	G	G	37	40	42	41	47	45	E ₁₅	19	E ₁₄	E	16	E ₁₃	E ₁₅			
10	E ₁₅	E ₁₃	E ₁₄	E ₁₅	E	E ₁₅	E ₁₅	E ₁₅		G	E ₃₆	G	G	G	G	G	G	E ₁₅	E	E	E ₁₅	E ₁₅	E ₁₆	E ₁₅				
11	E ₁₅	E ₁₄	E ₁₅	E ₁₅	E	E ₁₅	E ₁₃	E ₁₄		G	G	G	G	G	G	G	28	29	E ₁₅	E	E ₁₄	E ₁₅	E ₁₅	E ₁₄	E ₁₅			
12	E ₁₄	E ₁₄	E ₁₂	E	E ₁₄	E ₁₅	E ₁₅	G		G	G	33	29	34	44	20	30	25	S	E	E	E	E ₁₄	E ₁₅	E			
13	E ₁₅	E ₁₅	E ₁₅	E ₁₂	E ₁₅	E ₁₄	E ₁₅	E ₁₅		G	30	33	G	G	G	G	G	G	18	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₄			
14	E ₁₄	E ₁₄	E ₁₅	E ₁₃	E ₁₅	E ₁₄	E ₁₅	G		G	29	46	36	33	33	30	20	G	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E	E ₁₄	E			
15	E ₁₄	E ₁₅	E ₁₄	E ₁₄	E ₁₅	E ₁₄	E ₁₅	E ₁₅		23	30	31	G	35	30	29	48	60	26	26	21	16	E	E ₁₅	E ₁₅			
16	E	E ₁₄	E ₁₅	E	E	E	E ₁₄	G		G	G	33	G	35	E ₅₀	34	23	20	16	E	E	E	16	E	E			
17	E ₁₄	E ₁₄	E ₁₄	15	E	E ₁₄	E ₁₄	G		G	G	G	39	34	34	53	54	49	25	30	E ₄₈	27	21	E	E			
18	E ₁₄	E ₁₂	E ₁₂	E	E	E ₁₂	E ₁₅	G		25	G	G	37	32	31	43	33	42	30	20	18	20	E ₁₄	E ₁₄	E ₁₅			
19	E ₁₅	E ₁₄	E ₁₄	E ₁₅	E ₁₂	E ₁₅	E ₁₃	E ₁₃		G	G	24	36	36	33	33	30	16	25	C	C	16	E ₁₇	E ₁₈	E ₁₆			
20	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₅		G	G	G	G	37	G	G	G	19	18	E	E ₁₅	E ₁₄	E ₁₄	E ₁₄	E ₁₄			
21	E ₁₄	E ₁₄	E ₁₄	E ₁₅	E ₁₄	E ₁₁	E ₁₃	E ₁₄		G	G	G	G	C	C	C	C	C	S		22	17	E	16	19	E ₁₅		
22	E ₁₅	E	E ₁₅	E ₁₄	E ₁₄	E ₁₅	E ₁₃	E ₁₅		G	G	G	G	35	37	E ₄₀	34	34	19	E	16	E	17	E ₁₅	E ₁₅			
23	E ₁₄	20	17	17	E ₁₁	E	E ₁₅	G		G	G	G	34	27	21	G	G	G	25	16	E	18	E	E ₁₄	E ₁₈	E ₁₅		
24	A	17	15	23	E ₁₁	15	E ₁₄	G		G	G	30	G	G	G	G	G	G	25	28	16	E ₁₅	E ₁₄	E ₁₅	E			
25	18	E ₁₆	E ₁₃	E ₁₆	E ₁₄	E ₁₄	E ₁₄	E ₁₃		G	G	20	G	24	25	G	24	G	20	24	20	17	E	E ₁₄	18	E	E ₁₄	E ₁₃
26	E ₁₅	E ₁₃	E ₁₅	E ₁₄	E ₁₄	E ₁₅	E ₁₄	E ₁₄		G	G	24	G	G	G	G	G	G	E ₁₄	E	E	16	16	E ₁₄	E ₁₅			
27	E ₁₅	E ₁₄	E ₁₄	E ₁₅	E ₁₂	E ₁₅	E ₁₄	E ₁₅		G	G	26	28	G	G	34	G	G	E ₁₅	E	17	E	E ₁₅	E ₁₅	E ₁₅			
28	E ₁₅	E ₁₄	E ₁₄	E ₁₄	E ₁₃	E ₁₄	E ₁₅	E ₁₅		G	G	G	G	30	G	28	23	18	E ₁₅	E	E ₁₅	E ₁₄	E ₁₄	E ₁₅	E ₁₅			
29	E ₁₄	E ₁₄	E ₁₄	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₄		G	G	30	31	G	35	36	27	21	19	22	E	16	E	E ₁₅	E ₁₅			
30	E ₁₅	E ₁₄	E ₁₅	E ₁₄	E ₁₅	E ₁₄	E ₁₅	E ₁₅		G	G	G	31	31	30	G	29	G	E ₁₅	E ₁₅	E ₁₅	E ₁₆	E ₁₄	E ₁₄	E ₁₄			
31	E ₁₂	E ₁₁	E ₁₄	E ₁₅	E ₁₅	E	E ₁₇	E ₁₅		G	G	G	34	37	39	G	29	G	E ₁₄	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅			
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	30	30	30	30	30	28	30	30	31	31	31	31			
MED	E ₁₅	E ₁₄	E ₁₄	E ₁₄	E ₁₃	E ₁₄	E ₁₄	E ₁₄	G	G	G	24	29	32	31	30	24	20	16	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₃			
UQ	E ₁₅	E ₁₄	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₅	E ₁₅	G	E ₂₀	32	35	35	35	34	30	29	21	22	16	16	16	E ₁₅	E ₁₅				
LQ	E ₁₄	E ₁₃	E ₁₄	E ₁₅	E	E ₁₄	E ₁₃	G	G	G	G	G	G	G	G	G	G	G	E ₁₅	E	E ₁₄	E	E ₁₄	E ₁₄	E ₁₂			

DEC. 1972

FBES (0.1 MHz)

IONOSPHERIC DATA

DEC. 1972

F-MIN (0.1 MHZ)

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

Station **YAMAGAWA** Lat. **31 12.1 N.** Long. **130 37.1 E** Sweep **1 MHz to 20 MHz** in **20 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 ₁₅	15	E ₁₃	E ₁₅	14	E ₁₅	E ₁₃	E ₁₃	E ₁₄	14	14	17	16	17	16	14	E ₁₄	E ₁₄	E ₁₃	E ₁₅	E ₁₅	E ₁₅	E ₁₄		
2	E ₁₅	E ₁₄	E ₁₄	E ₁₄	E	E ₁₄	E ₁₅	E ₁₄	14	E ₁₅	19	23	18	19	15	19	15	12	E ₁₇	E ₁₅	E ₁₅	E ₁₄	E ₁₅		
3	E ₁₅	E ₁₂	E ₁₃	E ₁₄	12	E ₁₂	E ₁₄	E ₁₄	12	15	14	15	20	24	17	18	14	12	12	12	12	E ₁₄	E ₁₄	11	
4	E ₁₅	E ₁₄	14	E	E	E ₁₄	E ₁₄	E ₁₂	14	15	16	18	15	20	15	14	15	E ₁₄	E ₁₅	E ₁₇	E ₁₄	E ₁₅	E ₁₄		
5	E ₁₅	E ₁₅	E ₁₄	E ₁₄	14	E ₁₃	E ₁₅	E ₁₅	13	17	16	17	19	16	14	15	15	C	E ₃₂	15	E ₁₅	E ₁₅	E ₁₅	E ₁₅	
6	E ₁₅	20	E ₁₂	E ₁₄	E ₁₅	E ₁₄	E ₁₈	E ₁₄	E ₁₄	E ₄₉	14	17	13	16	16	18	14	13	E ₁₅	E ₁₈	E ₁₅	12	E ₁₄	E ₁₂	
7	E	E ₁₂	E ₁₂	E ₁₄	E	E ₁₃	E ₁₃	E ₁₃	14	15	15	15	14	14	15	15	13	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	
8	E ₁₄	E ₁₄	E ₁₄	E	E ₁₄	E ₁₄	E ₁₅	E ₁₄	E ₁₅	14	14	15	15	11	11	11	11	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₃	E ₁₅	E ₁₅	
9	E ₁₄	E ₁₃	E ₁₂	E ₁₄	E	E	E ₁₄	E ₁₅	11	15	15	15	14	15	12	12	15	E ₁₅	E ₁₅	E ₁₄	E ₁₄	E ₁₄	E ₁₃	E ₁₅	
10	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₄	E ₁₅	E ₁₅	E ₁₅	15	E ₃₆	24	17	14	15	15	14	11	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₆	E ₁₅	
11	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E	15	E ₁₃	E ₁₄	14	15	15	15	15	14	15	13	13	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₅	E ₁₄	E ₁₅	
12	E ₁₄	E ₁₄	12	E ₁₄	E ₁₄	E ₁₅	E ₁₅	E ₁₅	E ₁₅	15	15	14	15	15	12	15	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₅	
13	E ₁₅	E ₁₃	E ₁₅	E ₁₄	E ₁₂	E ₁₄	E ₁₃	E ₁₃	E ₁₄	13	14	15	16	14	15	14	14	E ₁₄	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₄	
14	E ₁₄	E ₁₄	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₄	E ₁₅	12	14	14	12	12	14	14	13	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₅	
15	E ₁₄	E ₁₅	E ₁₄	E ₁₄	E ₁₅	E ₁₄	E ₁₅	E ₁₅	E ₁₅	14	14	14	14	15	14	17	15	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₄	E ₁₅	E ₁₅	
16	E ₁₄	E ₁₄	E ₁₅	E ₁₂	E ₁₄	E ₁₃	E ₁₄	E ₁₅	14	15	14	13	15	50	15	15	15	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₅	
17	E ₁₄	E ₁₄	E ₁₄	E ₁₂	E ₁₄	E ₁₄	E ₁₄	E ₁₅	14	14	16	14	17	15	16	16	14	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₅	E ₁₄	
18	E ₁₅	E ₁₄	12	12	12	E ₁₄	E ₁₅	E ₁₅	14	14	15	18	15	15	16	14	14	E ₁₄	E ₁₄	E ₁₅	E ₁₅	E ₁₄	E ₁₄	E ₁₅	
19	E ₁₅	E ₁₄	E ₁₄	E ₁₅	12	15	13	E ₁₃	E ₁₄	13	15	16	19	16	16	14	15	15	C	C	E ₁₄	17	18	16	
20	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₅	E ₁₄	14	15	17	16	16	18	16	15	E ₁₅	E ₁₄	E ₁₅	E ₁₄	E ₁₄	E ₁₄	E ₁₄	
21	E ₁₄	E ₁₄	E ₁₄	E ₁₅	E ₁₄	E ₁₁	E ₁₃	E ₁₄	E ₁₅	15	15	15	C	C	C	C	C	E ₁₅	E ₁₄	E ₁₅	E ₁₅	E ₁₃	E ₁₅	E ₁₅	
22	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₄	E ₁₅	E ₁₃	E ₁₅	E ₁₅	15	19	18	19	24	23	18	18	E ₁₅	E ₁₅	E ₁₄	E ₁₄	E ₁₃	E ₁₅	E ₁₅	
23	E ₁₄	E ₁₅	E ₁₄	E ₁₄	11	E ₁₅	E ₁₅	E ₁₅	13	14	14	14	14	15	15	15	14	E ₁₄	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₈	E ₁₅	
24	E ₁₅	E ₁₅	E	14	11	E ₁₄	E ₁₄	E ₁₅	15	15	15	14	15	15	15	16	15	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₅	
25	E ₁₅	16	13	E ₁₆	14	14	E ₁₄	E ₁₃	14	15	15	15	15	15	15	15	14	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₅	E ₁₄	E ₁₅	
26	E ₁₅	13	E ₁₅	14	14	E ₁₅	E ₁₄	E ₁₄	13	15	15	15	15	16	16	16	15	E ₁₄	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₄	E ₁₅	
27	E ₁₅	E ₁₄	E ₁₄	E ₁₅	12	E ₁₅	E ₁₄	E ₁₅	E ₁₄	15	14	14	16	17	15	18	16	E ₁₅	E ₁₄	E ₁₄	E ₁₃	E ₁₅	E ₁₅	E ₁₅	
28	E ₁₅	E ₁₄	E ₁₄	E ₁₄	13	E ₁₄	15	E ₁₅	14	15	15	16	17	18	18	14	14	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₄	E ₁₅	E ₁₅	
29	E ₁₄	E ₁₄	E ₁₄	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₄	E ₁₄	12	14	15	15	15	15	14	15	E ₁₄	E ₁₄	E ₁₅	E ₁₄	E ₁₄	E ₁₅	E ₁₅	
30	E ₁₅	E ₁₄	E ₁₅	E ₁₄	E ₁₅	E ₁₄	E ₁₅	E ₁₅	E ₁₅	14	15	15	16	15	15	14	13	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₆	E ₁₄	E ₁₄	E ₁₄
31	E ₁₂	11	E ₁₄	15	15	E	17	E ₁₅	14	15	14	15	18	18	15	16	15	E ₁₄	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	31	31	31	31	31	31	31	31	31	31	31	31	30	30	30	30	30	30	30	30	31	31	31	31	
MED	E ₁₅	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₅	13	15	15	15	15	15	15	15	14	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₅
UQ	E ₁₅	E ₁₅	E ₁₄	E ₁₅	E ₁₄	E ₁₅	E ₁₅	E ₁₅	15	15	15	16	17	17	16	16	15	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅	E ₁₅
LQ	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₂	E ₁₄	E ₁₄	E ₁₄	14	14	14	14	15	15	15	14	14	E ₁₄	E ₁₅	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄	E ₁₄

The Radio Research Laboratories, Japan

DEC. 1972

F-MIN (0.1 MHZ)

IONOSPHERIC DATA

DEC. 1972

M(3000)F2 (0.01)

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

Station	YAMAGAWA				Lat. 31 12.1' N. Long. 130 37.1' E				Sweep 1 MHz to 20 MHz in 20 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	280	275	290	290	290	300	340	365	355	335	335	345	345	325	330	345	340	Z	I	C	340	285	290	295	285	
2	285	295	305	285 ^F	305 ^S	280 ^S	285	320	345	355	365 ^H	340 ^H	J	S	340	285 ^R	340	355	325 ^H	J	S	340 ^S	295 ^S	305	270	275	
3	275	280	315 ^H	305 ^S	305	260	305 ^S	320 ^S	345	355	335	330 ^Z	325	335	330 ^V	335	350	365	285	280 ^H			270	305	290	285	
4	290	295	285	265	295	340	285	335	S	365	360	345	340 ^S	335	I	S	J	S	310	I	S	300	J	S	340	250	
5	285	285	295	315	330	345	305	315	J	S	345 ^S	360 ^S	350	365	340	360 ^S	355	330	S	I	C	360 ^R	310	335	365	325	305
6	290	300	320	305	350	390	250	345	355	370	385	360	330	360	355	385	375	370	385	370			310	320	350	375	
7	310	310	320	340	370	400	310	345	360	365	355	355	345	335	350	370	365	375	330	330			305	310	320	295	
8	300	295	375	360	335	285	310	330	345	345 ^S	360 ^S	365	335	355	325 ^H	315 ^H	350	360	335	275			290	275	275	280	
9	280	285	285	295	305	345	305	335	350	355	355	335	315 ^H	335 ^H	360	355	345	355 ^S	325	295			330	320	320	270	
10	280	280	280	285	305	345	325	315	340	330 ^S	345	350	345	345	330	325 ^H	340	350	335 ^S	335 ^S			305	315	305	270	
11	280	300	290	290	310	355	290	320 ^S	335 ^S	330	355	330 ^H	315	370	350	345	370	365	375 ^S	325 ^H			305	335	295	280	
12	305	295	285 ^F	290	325	345	305	320	360	385	365	345	320 ^H	355	335	360	350	380	325	355			310	340	260	315	
13	285	280	265 ^F	290	325	325	370	340	345	340	370	365	325	330	365	360	350	330	355	370			315	310	F	300	
14	295	300	F	270	325	265 ^S	285	315	330	335	355 ^S	355	340 ^S	320	335	335	350	365 ^S	345 ^S	305 ^S	J	S	300 ^S	365	320	295	
15	255	285	305	295	350	325	295	335	335	360	340	355	315	340	340	325	335	340	335	285 ^S			285	315	325 ^S	275	
16	285	305	310	310	270	265	290	325	345 ^S	355	340	345	310 ^V	340 ^R	275	330	345	345	305	310			300	295	285 ^S	F	
17	295 ^S	335	285	260	250	260 ^F	265 ^F	290	345	345	345	340 ^S	340	345 ^S	360	330 ^S	350 ^S	370	355	S			270	315 ^S	305	290	
18	215	290	345	305	320	265	275	315 ^S	355 ^S	330	350 ^S	325	335 ^S	350 ^S	330	325	355	355	305 ^S	285			320	350	345	265	
19	295	280	275	300	F	370	280	305	345	355	350	335	320	315 ^S	350 ^S	395	375	350	C	C			315 ^S	335 ^S	345	265	
20	280	270	295	310	345	350	280 ^H	325	345 ^S	340	360	310	300	310 ^S	315	290	310	320	300	290			280	310	260	255	
21	245	255	265	280	320	330	260	280	320	350	340	360	C	C	C	C	C	345	355	305			350	345	325	265	
22	260	285	310	300 ^F	335	370	310	295	340	370	350	345	300 ^H	335 ^V	340	340	350	345	335	300			315	315	305 ^H	270	
23	275 ^S	235	315	305	340	285	315	295	350	330	310	320	335	305	300 ^S	335 ^S	320	315 ^S	305	330			325	295	275 ^S	250 ^S	
24	I	A	250	275	280	310	330	280	325	280 ^S	355 ^S	330	340	310 ^S	335 ^S	305	310	335 ^S	350 ^S	335 ^S	305 ^H			315	285 ^S	325 ^V	250
25	255	270	285 ^S	295	315	315	305	310 ^S	330 ^S	355	345	305 ^H	320	340	340	365	360	325	355	335 ^H			280	310 ^S	315 ^F	295	
26	265	270	290	305 ^F	300	335	335	325 ^H	345	360	360	340	335	320	340	340	360	340	305	320			310	340	365	265	
27	F	285	295 ^F	310	330	345	340	320	355	345	330	310	305	340 ^S	325	335	330	350	325	310 ^F			300 ^F	305	315	270 ^F	
28	260	275	310	280	285	325 ^S	355	305	365	355	365	360	320	330	315	355 ^S	370	365	320	355			320	285	305	280	
29	290	285	325	290 ^F	320 ^S	295 ^F	295	310	335	355	365	355	325	330	355	345 ^S	345	330	375	350 ^S			290	340	320	270	
30	270	280	280	280	I	S	340	380	290 ^H	315 ^S	345	345	355	345	335	335	330	345	345	340	315	305 ^S	295	300	310	285	
31	245	260	290	305	320	390	315 ^R	305	335	350 ^S	365 ^S	335	320	310	340 ^S	335 ^S	335 ^S	360 ^S	370	300 ^S			275 ^S	280 ^S	325	275	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
CNT	30	31	30	31	30	31	31	31	30	31	31	31	30	30	30	30	30	31	30	29	31	31	30	30			
MED	280	285	292	295	320	330	305	320	345	355	355	345	325	335	335	338	350	350	328	310	305	315	315	275			
UQ	290	295	310	305	335	348	312	328	355	358	360	355	335	345	350	355	355	365	355	335	315	335	325	290			
LQ	260	278	285	288	305	285	285	308	340	342	342	332	320	330	325	330	345	338	310	300	290	302	295	265			

DEC. 1972

M(3000)F2 (0.01)

IONOSPHERIC DATA

DEC. 1972

M(3000)F1 (0.01)

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

Station **YAMAGAWA** Lat. **31° 12.1' N** Long. **130° 37.1' E** Sweep **1** MHz to **20** MHz in **20** 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	A	L								
2										L	L	L	L	L	A	L	L							
3										L	L	L	435	L	L	L								
4											L	L	L	L	L	L								
5										L	L	L	L	L	L	L								
6									C	L	L	L	L	L	L	L								
7											L	A	375	L	L		L							
8										L	L	425	385	L	L	L	A							
9										L	L	L	L	L	A	A	A							
10										L	L	L	L	370	L	L								
11										L	L	L	L	L	L	L								
12										L	L	L	L	A	L	L								
13										L	L	L	L	L	L	L								
14											A	L	L	L	L	L								
15										L	L	405	340	375	L	A	A							
16									410	L	L	L	405	B	L	L								
17										L	L	L	L	L	A	A								
18										L	L	L	L	L	L	L								
19										L	L	L	L	L	L	L	L							
20										L	L	L	L	L	L	L	L							
21											L	L	C	C	C	C	C							
22										L	L	L	L	L	L	L								
23										435	L	L	L	L	L	L								
24										425	L	L	L	L	L	L								
25										L	L	L	385	L	L	L								
26											L	L	L	L	L	L								
27										L	L	L	395	L	L	L	385							
28											L	425	L	L	L	L	L	L						
29											L	L	L	L	L	405	L							
30											L	L	L	365	L	L	L							
31											L	L	L	L	L	L	L							
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										3		3	7	3		1	1							
MED										425		420	385	370		405	385							
UQ										430		422	398	372										
LQ										418		412	378	368										

The Radio Research Laboratories, Japan

DEC. 1972

M(3000)F1 (0.01)

IONOSPHERIC DATA

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H^oF₂ (KM)

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

Station	YAMAGAWA				Lat. 31 12.1 N. Long. 130 37.1 E				Sweep 1 MHz to 20 MHz in 20 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									220	225	230	240	250	245	245	250																			
2										235	220 ^H	240 ^H	225	250	E ^A 280	260	235																		
3										225	260	240	240	240	225	250																			
4											220	240	250	260	245	240																			
5												245	250	240	250	240	250	235																	
6													245	225	250	250	250	245	225	235															
7														240	235	280	240	255		230															
8															250	225	235	275	240	235 ^H	225 ^H	225													
9																245	235	255	235 ^H	255 ^H	235	240	230												
10																	255	250	240	235	240	275	235 ^H												
11																		230	235	230	310	235	240	255											
12																			230	235	245	265 ^H	250	255	235										
13																				265	210	235	280	265	245	230									
14																					230	245	255	260	255	250									
15																						225	245	225	280	245	235	230	E ^A 250						
16																							225	255	230	240	260	250	250						
17																								250	240	230	240	245	275						
18																									235	235	255	225	255	225					
19																										235	250	280	290	255	245	205	210		
20																											240	240	245	245	240	245	220	230	
21																												255	250		C	C	C	C	C
22																																			
23																																			
24																																			
25																																			
26																																			
27																																			
28																																			
29																																			
30																																			
31																																			
CNT																																			
MED																																			
UQ																																			
LQ																																			

DEC. 1972

H^oF₂ (KM)

IONOSPHERIC DATA

DEC. 1972

H^oF (KM)

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

Station **YAMAGAWA** Lat. **31 12.1 N**, Long. **130 37.1 E** Sweep **1** MHz to **20** MHz in **20** 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	315	325	300	280	290	270	225	205 ^H	200 ^H	185 ^H	215	225	240	A	225 ^H	220	220	225	225 ^H	225	250	250	265	
2	270	260	250	250	E ^A 300	E ^S 300	E ^A 295	250	230	200 ^H	215 ^H	200 ^H	225	225 ^H	I ^A 240	250	I ^A 220	185 ^H	210 ^C	240	205	E ^A 250	E ^A 300	315	
3	300	295	260 ^H	255	260	E ^S 320	225	220	215	210	190 ^H	210	190	210 ^H	220	230	230 ^H	205	200	200 ^H	240	230	250	250	
4	280	275	250	315	260	215	300	250	225 ^H	210	205	200	200 ^H	A	210	205 ^H	230	210	220	250	250	230	225	E ^S 330	
5	E ^A 310	300	295	255	250	225	250	230	220	215	230	220	200	250	190 ^H	200	210	I ^C 200	E ^C 220	255	250	205	260	285	
6	330	E ^B 320	275	295	240	200	C	240	215	I ^C 240	200	E ^A 240	220	230	225	240	240	200	200	210	310	250	240	220	
7	300	275	270	245	220	190	260	220	220	225	220	A	220	210	225	235	230	205	200	220	250	250	240	300	
8	280	295	215	215	240	305	290	235	250	235	225	205	195	220 ^H	230 ^H	220	I ^A 220	205	245	300	245	270	275	295	
9	275	270	280	255	235	210	225	230	225	225	225	250	240	A	A	A	A	210	230	230	225	215	265	E ^S 300	
10	E ^S 300	300	310	300	250	200	240	240	225	E ^C 240	245	230	210	200	200 ^H	230	215	210	190	220	240	225	E ^S 265	E ^S 310	
11	E ^S 310	275	290	260	240	200	230	225	205	195 ^H	220	195 ^H	225 ^H	220	230	210	225	205	200	210	240	250	E ^S 290	E ^S 275	
12	E ^S 290	E ^S 295	300	305	260	230	E ^S 250	230	225	225	230	200 ^H	225	I ^A 215	200	235	210	205	230	210	260	230	340	255	
13	320	320	315	280	255	215	200	230	230	220	240	225	210	210	215	220	210	240	220	200	230	250	270	240	
14	270	290	300	310	255	305	250	235	240	250	I ^A 230	225	225	210	225	215	205 ^H	215	200	220	240	205	250	280	
15	360	320	275	300	225	210	275	230	215	225	210 ^H	200	205	205	200 ^H	A	A	A	225	210	220	260	220	210	295
16	275	265	250	245	E ^S 320	E ^S 345	300	235	220	200	200 ^H	215 ^H	210	I ^A 240	235	225 ^H	225	215	215	220	225	230	240	275	
17	240	230	E ^S 245	350	350	350	300	235	220	230	240	235	220	200	A	I ^A 240	235	200	230	A	E ^A 260	250	240	295	
18	350	325	230	255	255	E ^S 290	E ^S 340	260	230	225	205	205	200 ^H	225	I ^A 220	225	240	210	195	255	250	220	230	E ^S 350	
19	E ^S 300	320	325	295	250	210	240	260	240	200 ^H	190 ^H	205 ^H	195 ^H	205 ^H	235	210	215	220	C	C	235	235	230	335	
20	345	340	300	265	245	215	S	255	230	240	235	210	215	195	200 ^H	205	230	205	195	240	230	220	245	305	
21	350	310	280	270	220	200	360	260	230	225	225	240	C	C	C	C	C	205	210	240	225	220	E ^A 250	305	
22	365	325	270	275	250	215	270	240	220	225	195 ^H	205	230	210 ^H	250	225	230	225	200	225	205	220	200 ^H	E ^S 345	
23	E ^S 320	E ^A 370	275	275	220	E ^S 300	245	220	215	210	225	230	225	210 ^H	220 ^H	225 ^H	220	220	225	225	205	225	E ^S 410	E ^S 375	
24	A	325	300	E ^A 300	235	E ^A 300	245	210	205	190 ^H	215 ^H	195 ^H	220 ^H	205	215 ^H	200 ^H	235	200	E ^A 225	225	235	225	220	E ^S 350	
25	E ^A 345	300	285	250	240	215	225	225	215	225	220	195 ^H	195 ^H	230	205	190 ^H	225	200 ^H	205	200 ^H	265	245	225	255	
26	E ^S 345	320	290	250	255	240	225	215 ^H	200	235	210	195	195	210	240	205	235	205	200	210	275	235	210	350	
27	305	310	270	245	245	225	240	230	225	175 ^H	210	215	210	180 ^H	225	220 ^H	220	205	195	250	220	225	250	250	
28	E ^S 350	310	265	300	265	240	200	250	215	225	220	200	195	230	195 ^H	255	225	200	220	205	230	240	250	E ^S 340	
29	315	310	250	E ^A 240	250	275	E ^S 290	250	225	230	230	220	220	210	I ^A 230	210	240	225	205	210	280	220	250	E ^S 305	
30	350	320	330	305	240	190	S	250	230	240	245	230	215	210	210	235	235	210	225	220	225	270	250	E ^S 290	
31	E ^S 360	E ^B 340	300	250	255	195	E ^B 300	250	225	225	230	220	230	240	220 ^H	205	215	215	200	245	240	240	245	E ^S 305	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	30	31	31	31	31	31	28	31	31	31	31	30	30	28	27	28	28	31	30	29	31	31	31	31	
MED	U ² 94	305	280	268	250	218	245	235	225	225	220	211	215	210	220	222	225	205	208	220	240	230	245	U ² 75	
UQ	332	320	300	300	256	U ² 62	281	250	230	229	230	225	225	228	230	232	232	215	225	240	250	250	256	E ^S 322	
LQ	282	287	262	250	240	210	232	228	215	210	208	200	200	208	208	208	218	205	200	210	225	220	232	265	

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H^oF (KM)

IONOSPHERIC DATA

DEC. 1972

H^oES (KM)

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

Station	YAMAGAWA				Lat. 31 12.1' N. Long. 303 71. E 1				Sweep 2 MHz to 02 MHz in 0 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	105	105	100	S	S	S	110	G	110	120	150	130	120	105	100	100	95	95		S	S	S	S
2	S	S	S	105	100	S	100	100	G	G	150	150	140	150	115	115	155	110	100	100	100	100	100	100	
3	S	S	S	S	B	S	S	S	G	160	100	G	G	G	130	120	100	100	100	100	100	S	100	B	
4	S	S	B	100	E	S	S	S	120	150	120	130	105	105	105	105	100	100	100	C	S	S	S	S	
5	105	S	S	S	B	S	S	100	G	G	170	150	110	160	105	G	180	C	C	B	115	S	110	S	
6	105	B	100	100	S	S	C	S	G	C	G	130	140	150	140	140	125	B	S	C	C	B	S	S	
7	E	S	S	S	E	S	S	S	115	150	150	125	120	105	150	155	165	S	S	S	150	105	115	110	
8	S	S	S	E	S	S	100	115	G	165	145	135	140	150	100	155	125	90	95	S	125	S	S	S	
9	S	S	S	S	E	E	S	S	175	170	G	145	135	125	120	120	115	S	145	S	105	100	S	S	
10	S	S	S	S	100	S	S	S	G	C	170	G	G	105	G	G	G	S	100	100	S	S	S	S	
11	S	S	S	S	E	B	S	S	G	G	150	G	G	G	G	105	110	S	110	S	S	S	S	S	
12	S	S	B	100	S	S	S	100	100	G	140	105	105	135	100	100	100	100	100	100	100	S	S	100	
13	S	S	S	S	S	S	S	S	G	115	155	150	G	G	G	G	G	100	S	S	S	S	S	S	
14	S	S	S	S	S	S	S	150	G	125	115	105	105	100	100	100	G	S	S	S	S	105	S	110	
15	S	S	S	S	S	S	S	S	120	115	110	125	110	115	105	100	100	100	100	100	95	105	S	S	
16	100	S	S	100	105	110	S	100	G	120	110	125	100	B	125	95	100	100	100	100	100	105	110	105	
17	S	S	S	100	100	S	S	110	G	G	G	110	105	105	105	100	100	100	100	100	100	95	95	95	
18	S	S	B	105	105	S	S	105	145	G	125	105	105	100	100	100	100	100	100	100	100	S	S	S	
19	S	S	S	S	B	B	B	S	G	G	110	170	165	110	110	105	105	100	C	C	100	B	B	B	
20	S	S	S	S	S	S	S	S	G	G	G	G	105	G	G	G	95	100	100	S	S	S	S	S	
21	S	S	S	S	S	S	S	S	G	G	160	150	C	C	C	C	C	100	100	100	100	100	100	S	
22	S	100	S	S	S	S	S	S	G	G	G	150	145	135	130	130	115	165	100	100	100	100	S	S	
23	S	105	100	100	B	100	S	100	G	G	G	140	100	100	100	100	100	100	95	100	S	S	S		
24	100	100	100	100	B	100	S	100	G	120	115	G	G	G	G	G	G	100	100	100	S	S	S	95	
25	95	B	B	S	B	B	S	S	G	105	105	105	G	100	100	100	100	95	100	S	100	100	S	S	
26	S	B	S	B	B	S	S	S	G	G	105	G	G	G	G	G	G	S	100	100	100	100	S	S	
27	S	S	S	S	B	S	S	S	G	130	105	100	150	150	150	G	G	S	100	100	100	S	S	S	
28	S	S	S	S	B	S	B	S	G	G	175	155	105	G	100	100	100	S	100	S	S	S	S	S	
29	S	S	S	S	S	S	S	S	G	155	120	100	G	125	100	100	100	100	100	100	100	100	S	S	
30	S	S	S	S	S	S	S	S	G	150	120	105	105	100	100	100	G	S	S	S	S	S	S	S	
31	S	B	S	B	B	E	B	S	G	G	G	130	115	105	105	G	G	S	S	S	S	S	S	S	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	6	4	4	10	6	3	2	10	7	14	24	25	22	22	24	22	22	19	23	16	19	12	7	7	
MED	102	100	100	100	100	100	100	100	120	140	120	130	110	112	105	102	100	100	100	100	100	100	100	100	
UQ	105	102	102	105	105	105		110	132	155	150	150	140	135	122	120	115	100	100	100	100	105	110	108	
LQ	100	100	100	100	100	100		100	112	120	110	105	105	105	100	100	100	100	100	100	100	100	100	98	

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H^oES (KM)

IONOSPHERIC DATA

DEC. 1972

TYPES OF ES

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

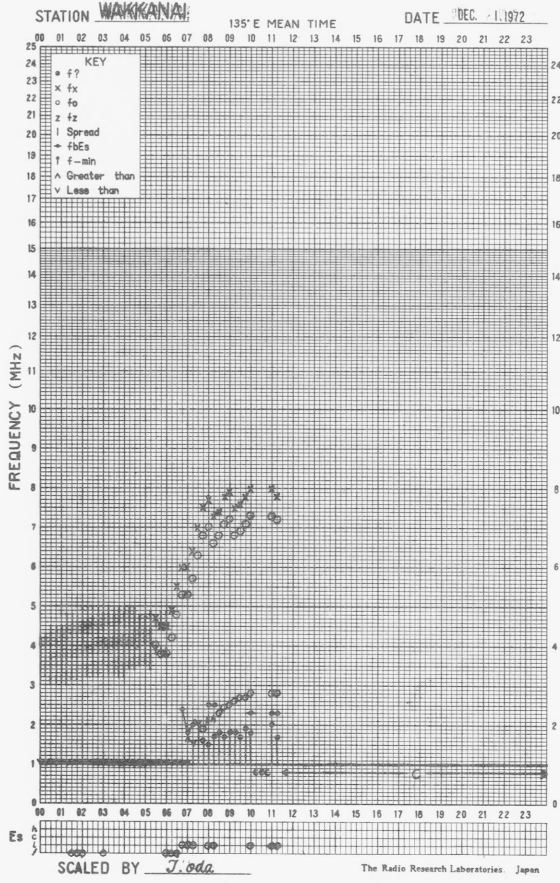
Station **YAMAGAWA** Lat. **31 12.1 N.** Long. **130 37.1 E** Sweep **1 MHz to 20 MHz** in **20 sec** in **automatic operation**

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

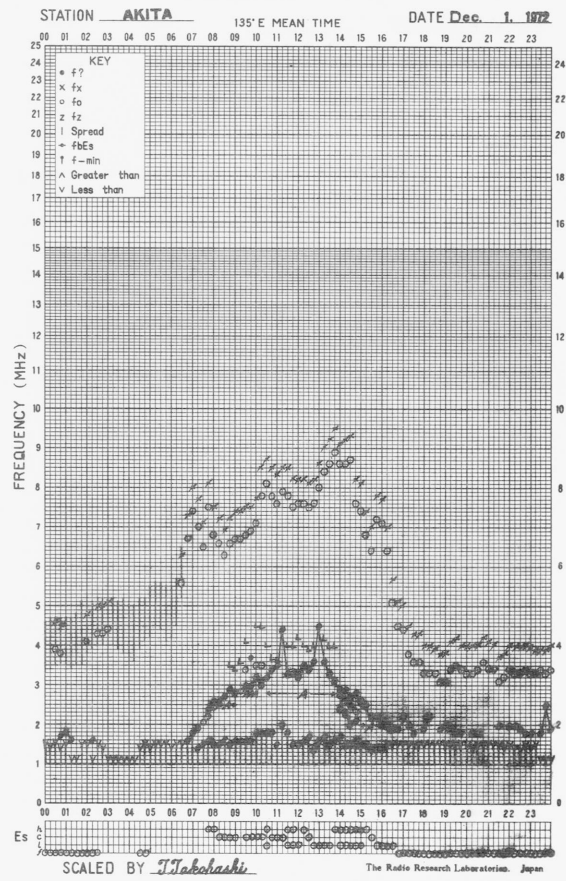
DEC. 1972

TYPES OF ES

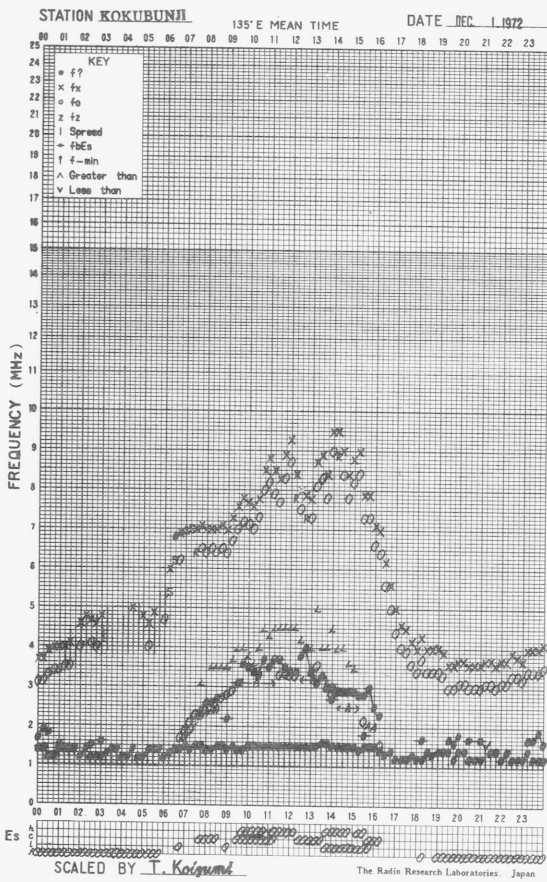
f-PLOT OF IONOSPHERIC DATA



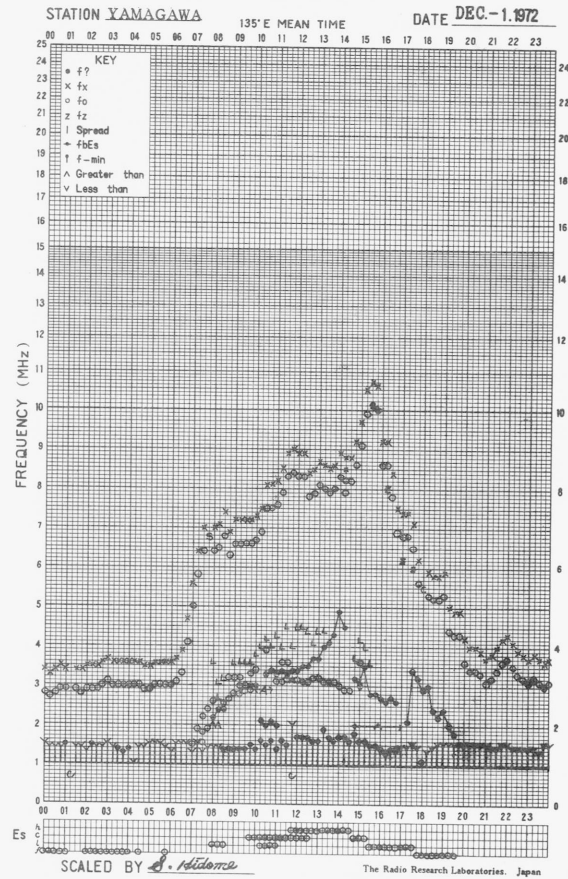
f-PLOT OF IONOSPHERIC DATA



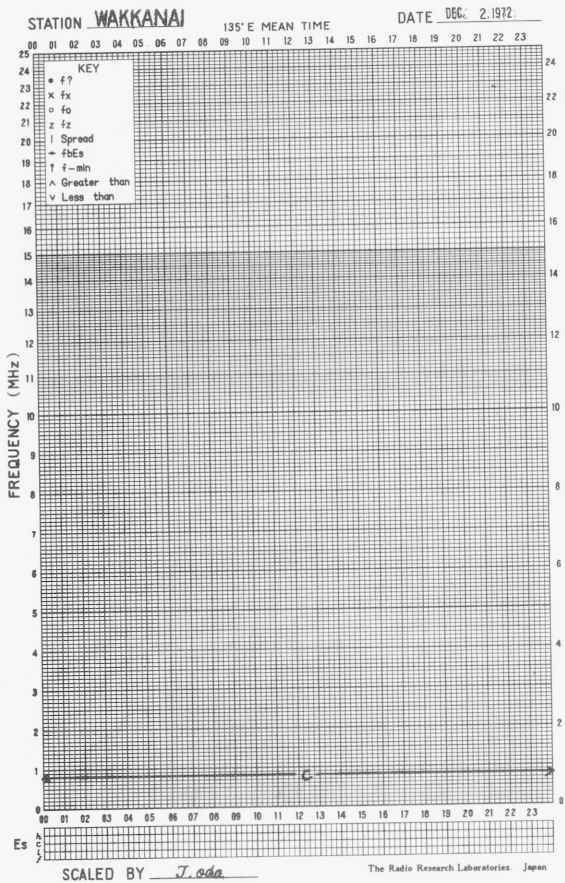
f-PLOT OF IONOSPHERIC DATA



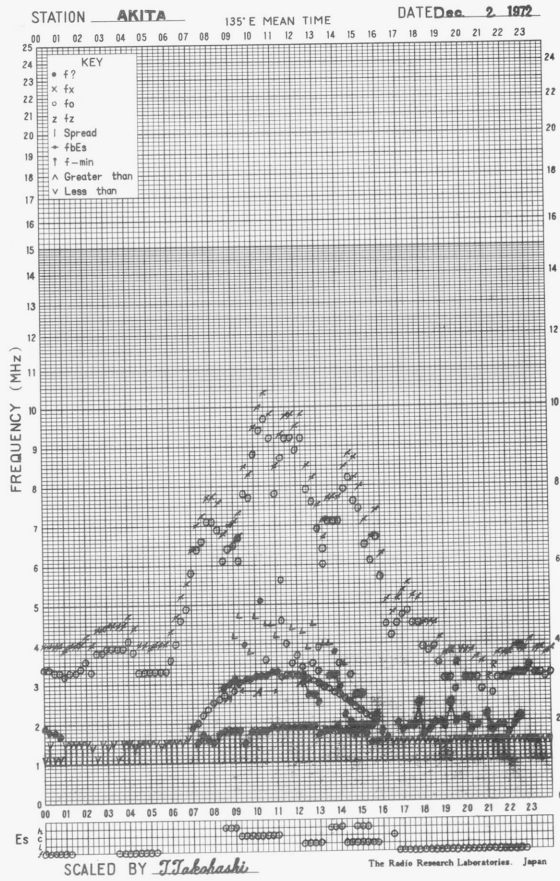
f-PLOT OF IONOSPHERIC DATA



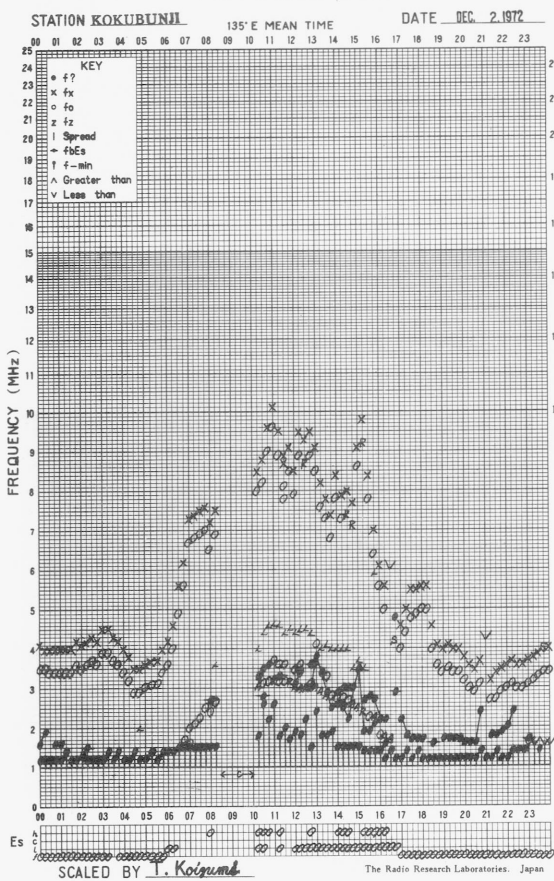
f-PLOT OF IONOSPHERIC DATA



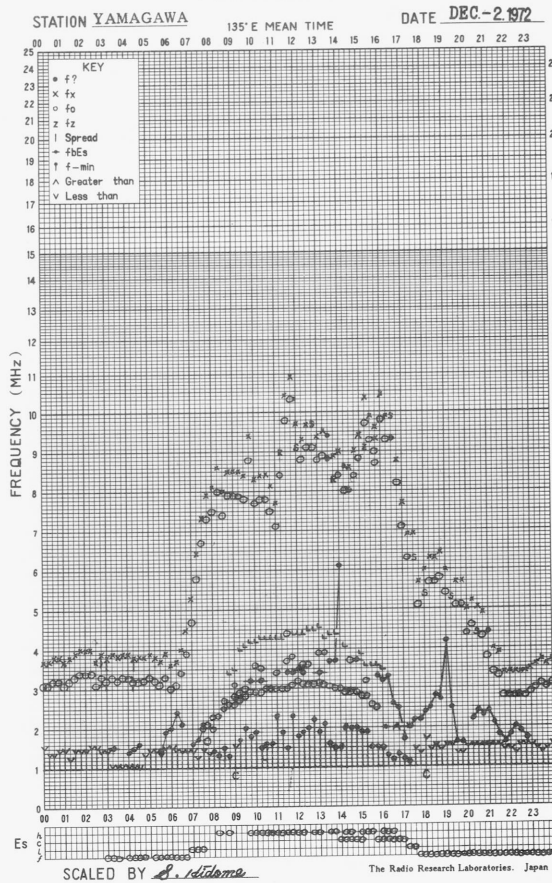
f-PLOT OF IONOSPHERIC DATA



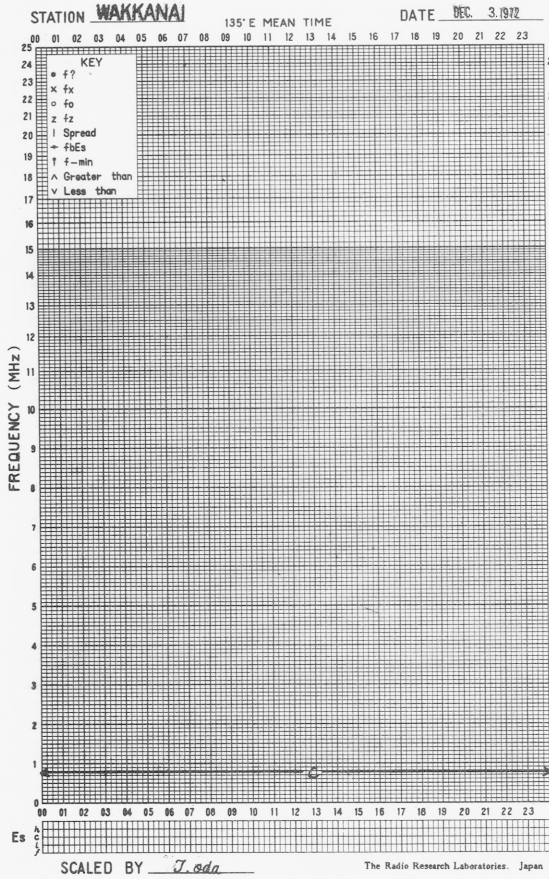
f-PLOT OF IONOSPHERIC DATA



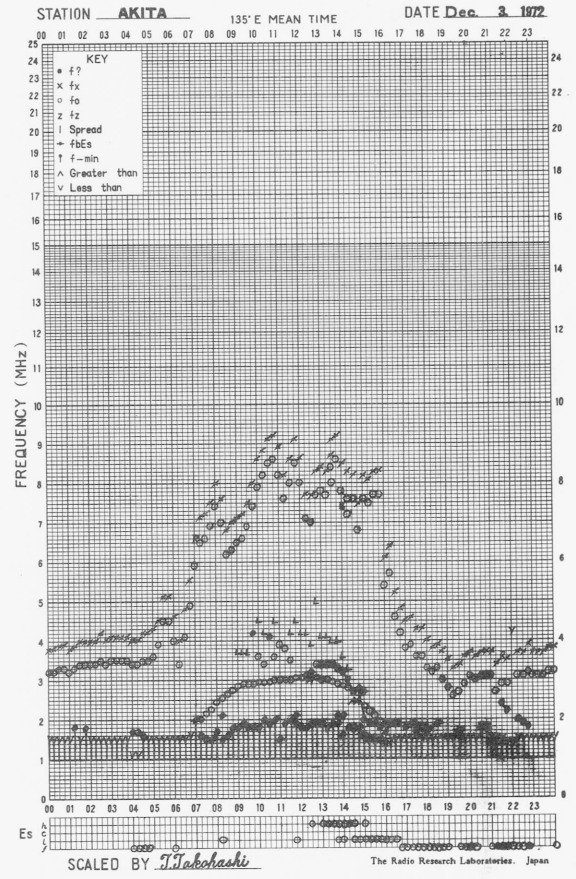
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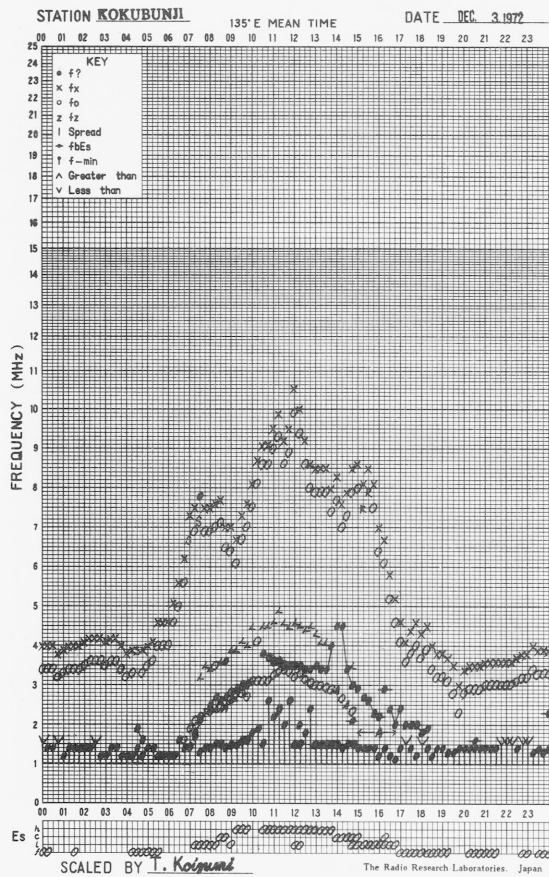
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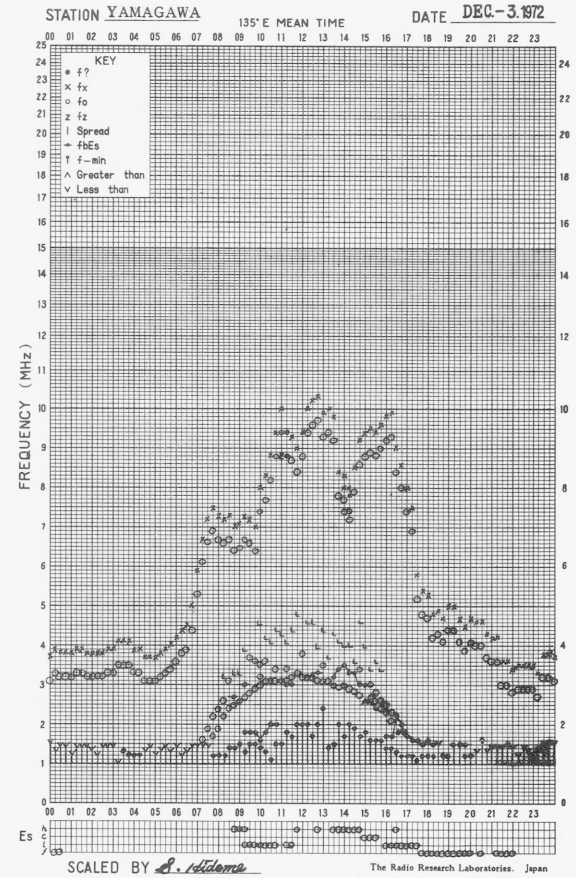
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f-PLOT OF IONOSPHERIC DATA

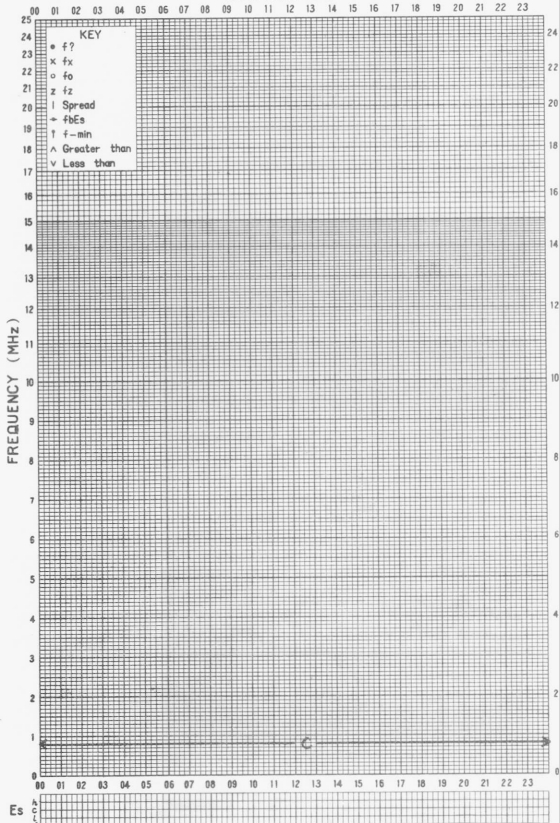


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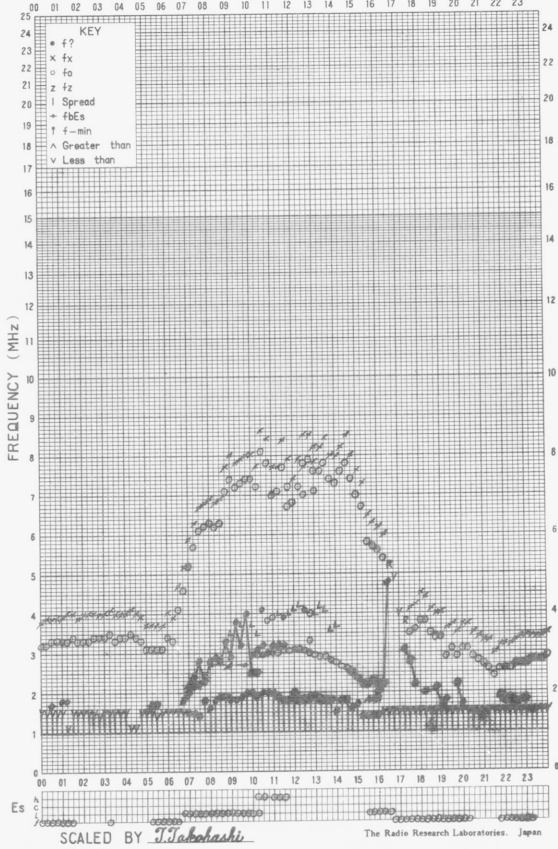
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STATION WAKKANAI 135°E MEAN TIME DATE DEC. 4 1972



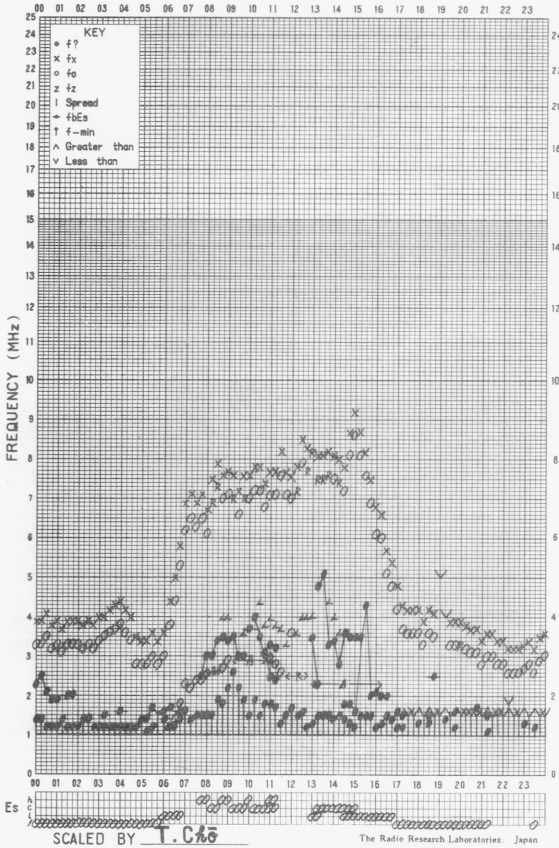
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STATION AKITA 135°E MEAN TIME DATE Dec 4 1972



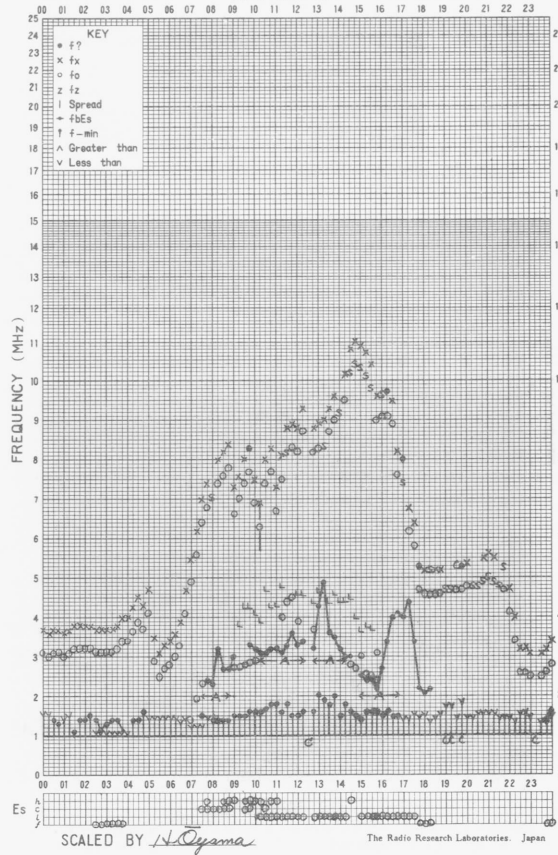
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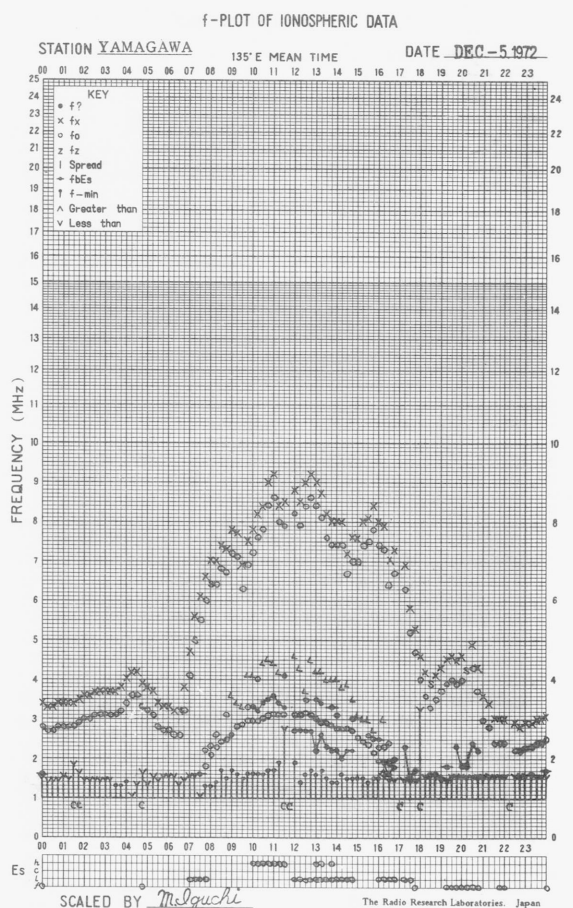
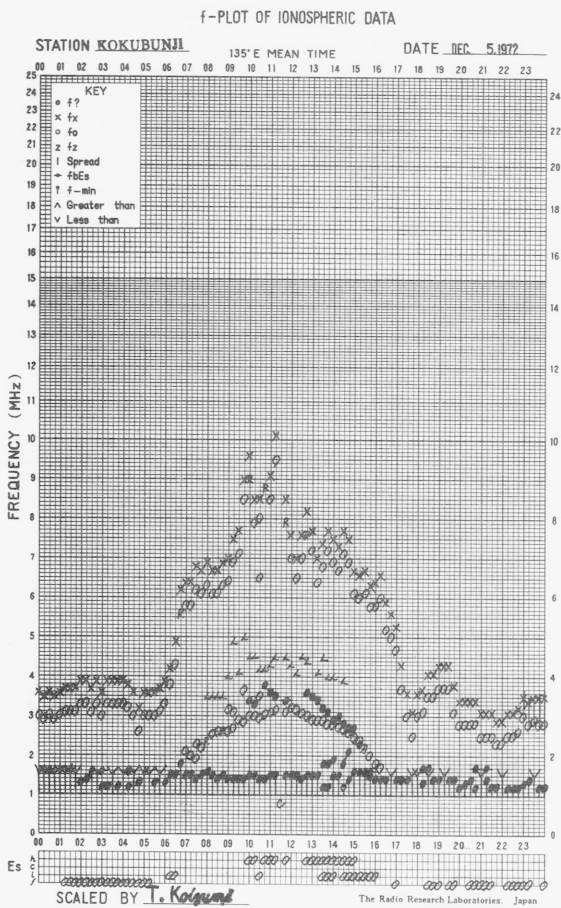
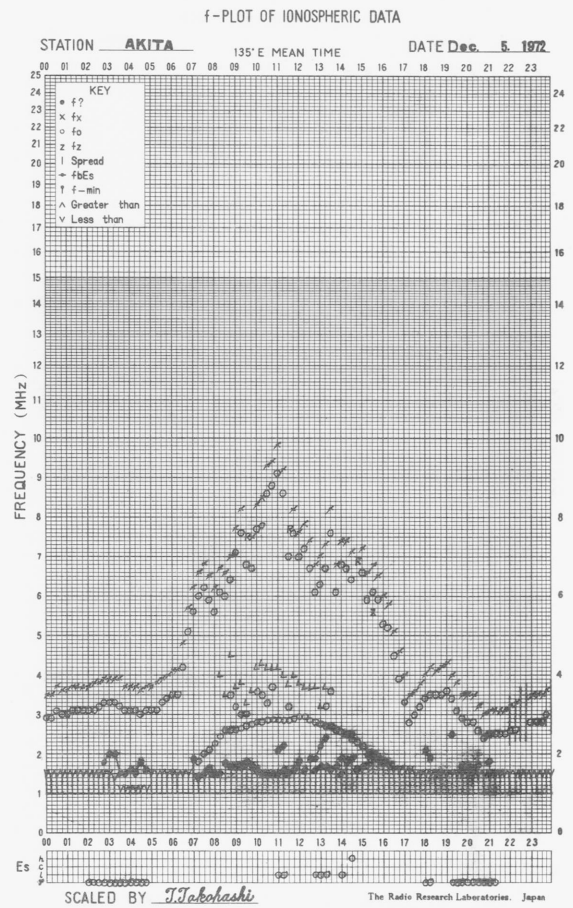
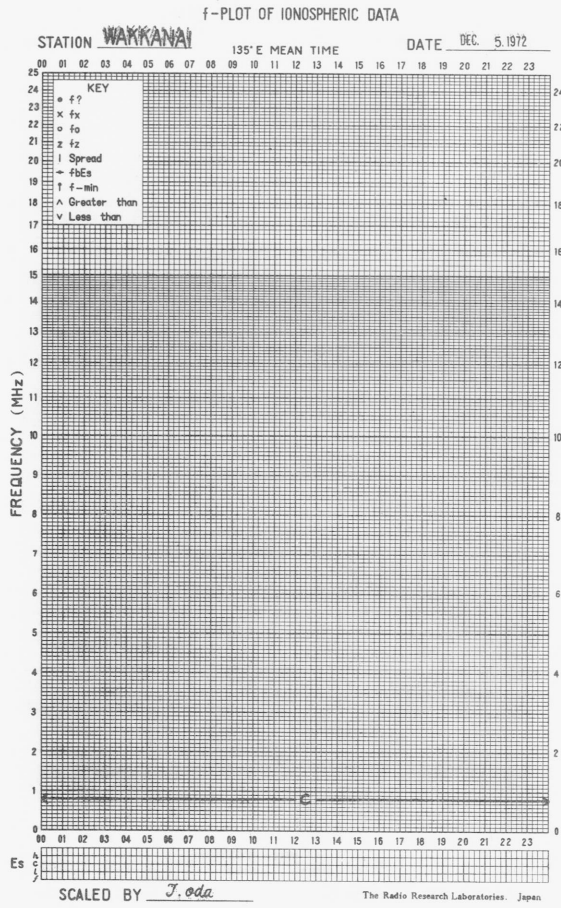
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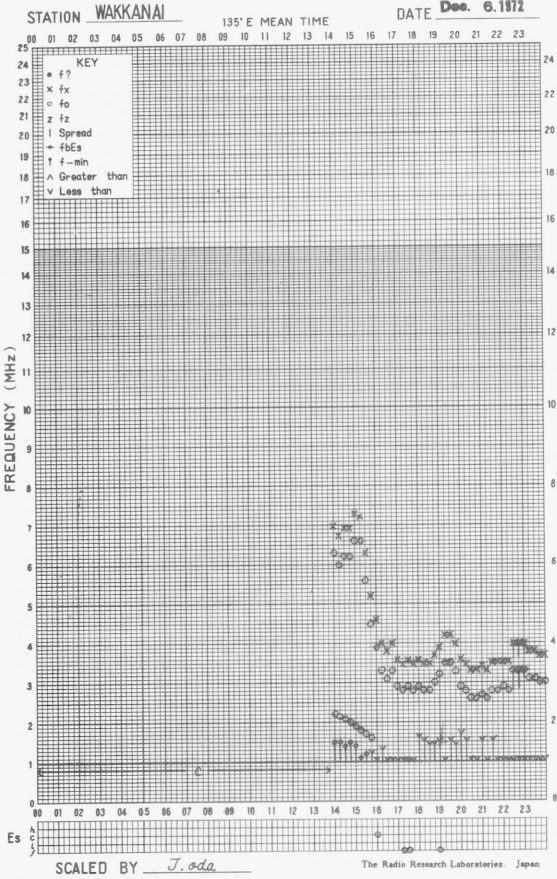
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STATION YAMAGAWA 135°E MEAN TIME DATE DEC-4-1972

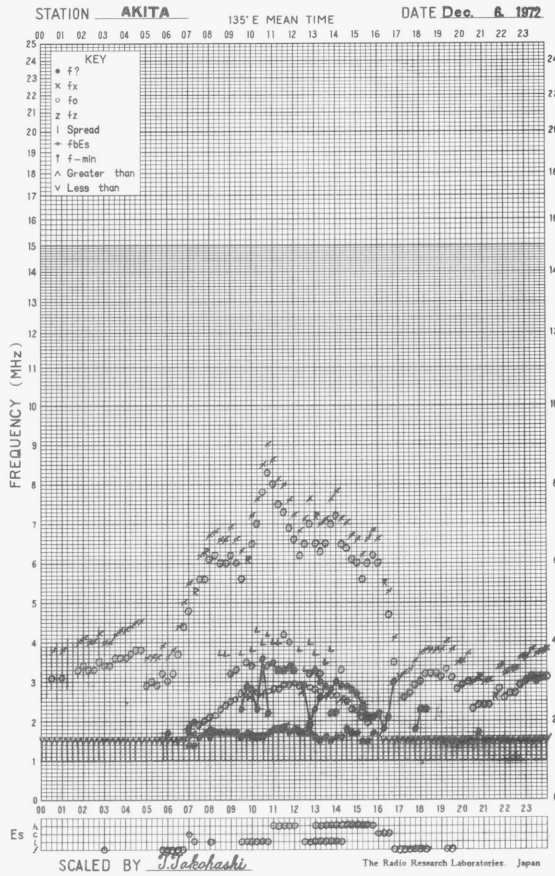




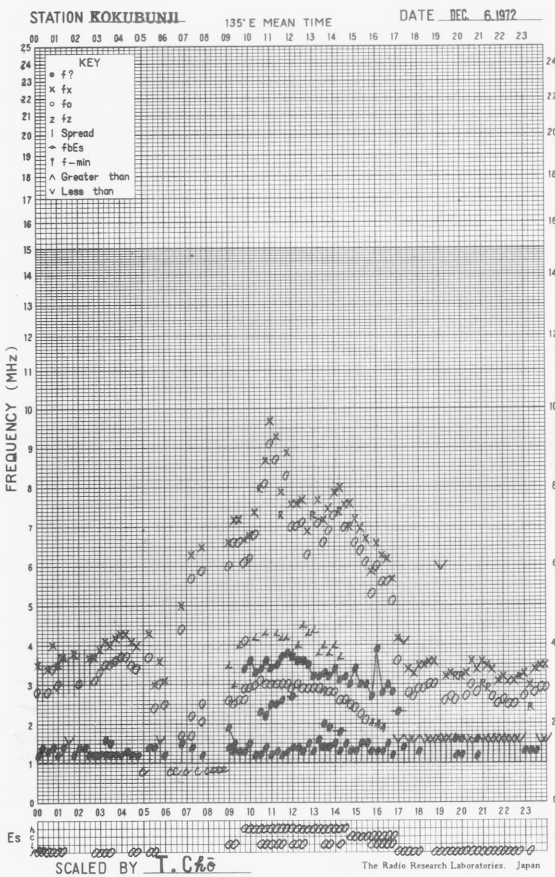
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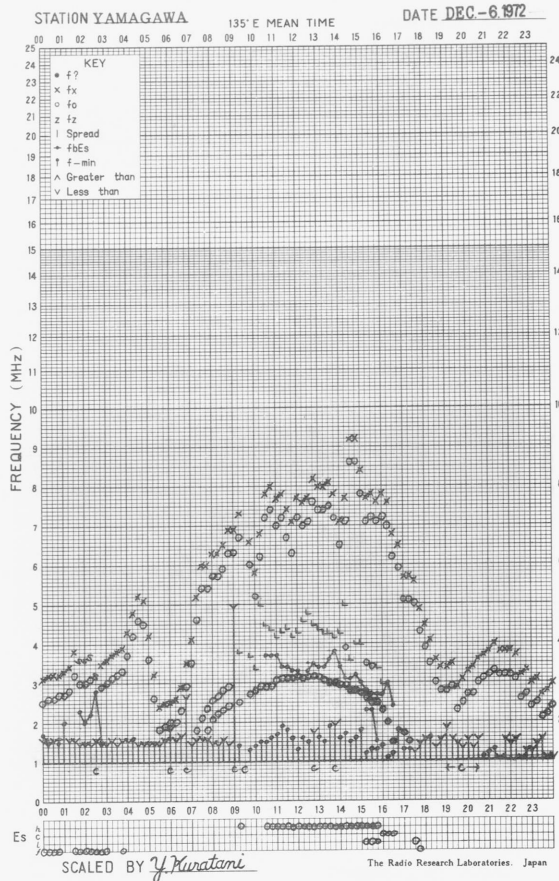
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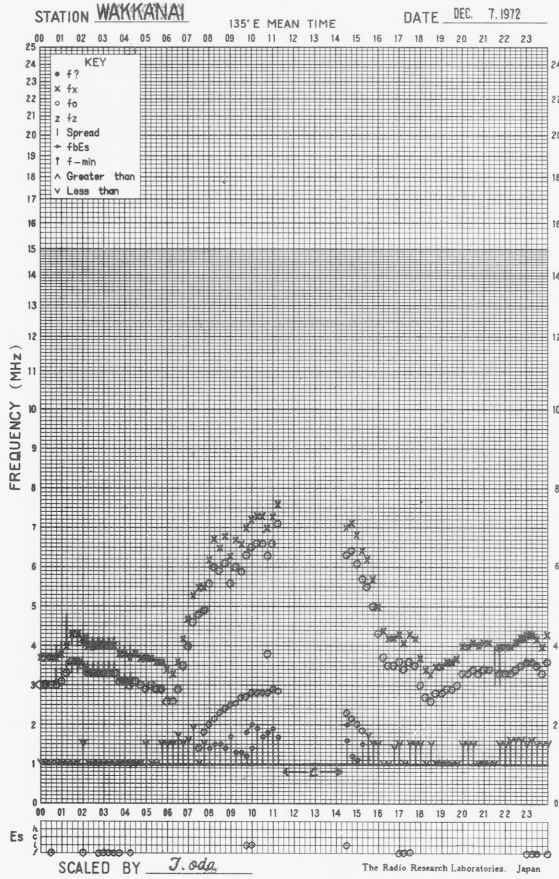
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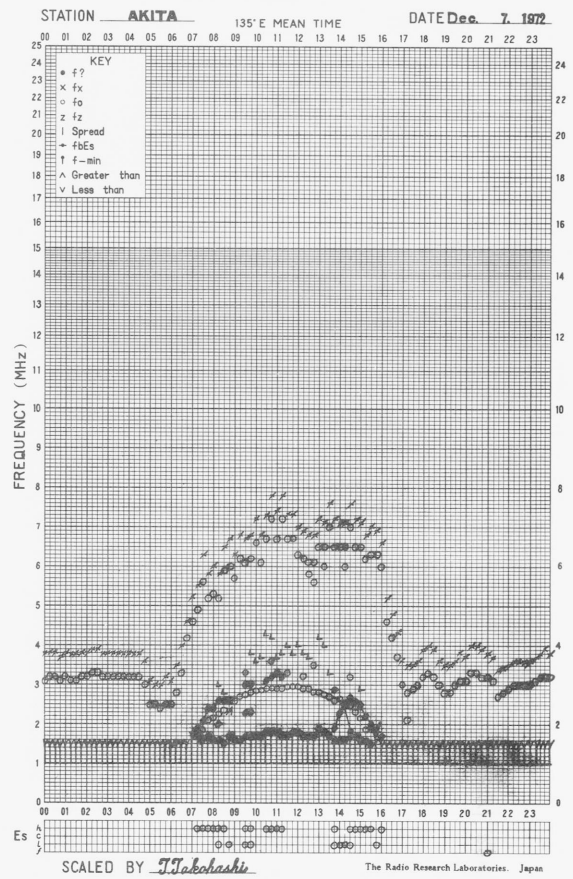
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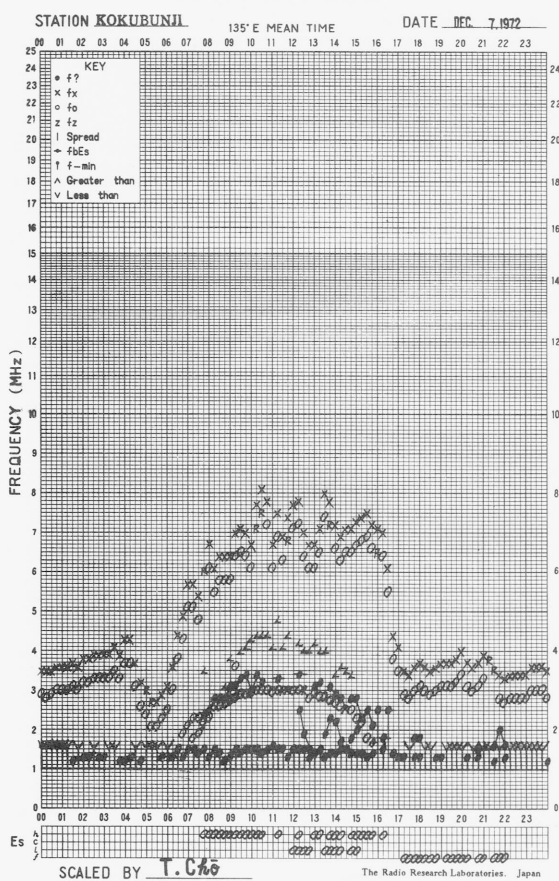
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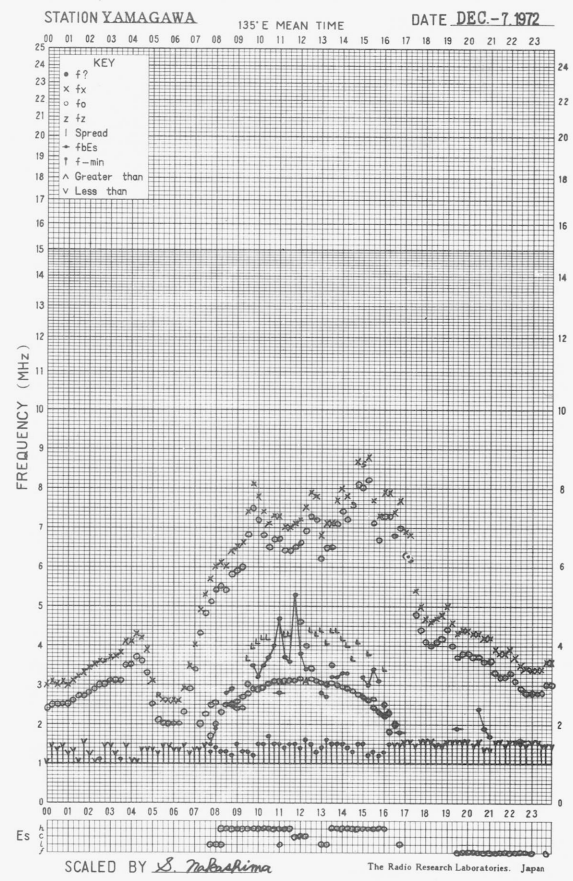
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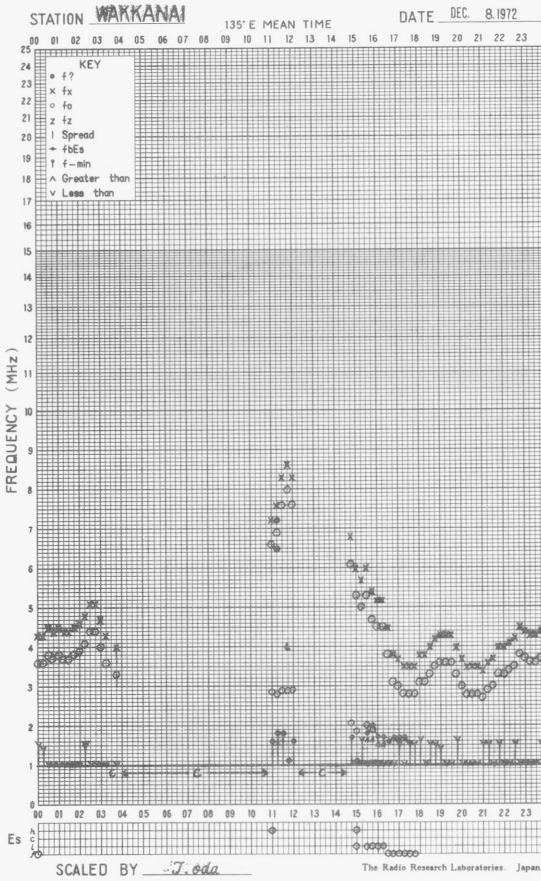
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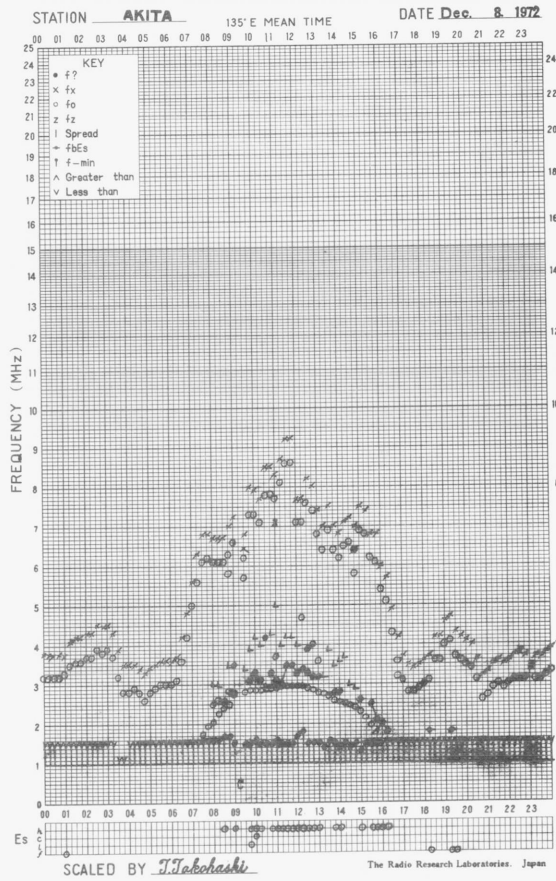
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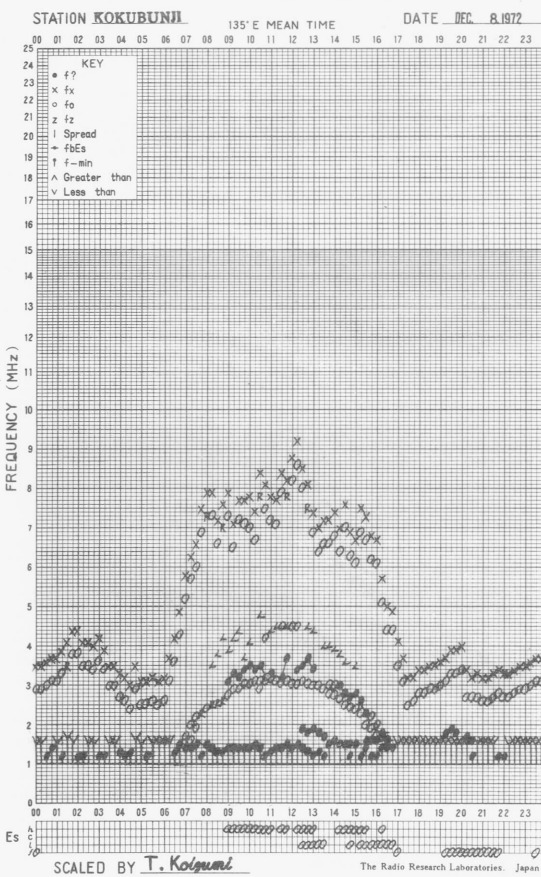
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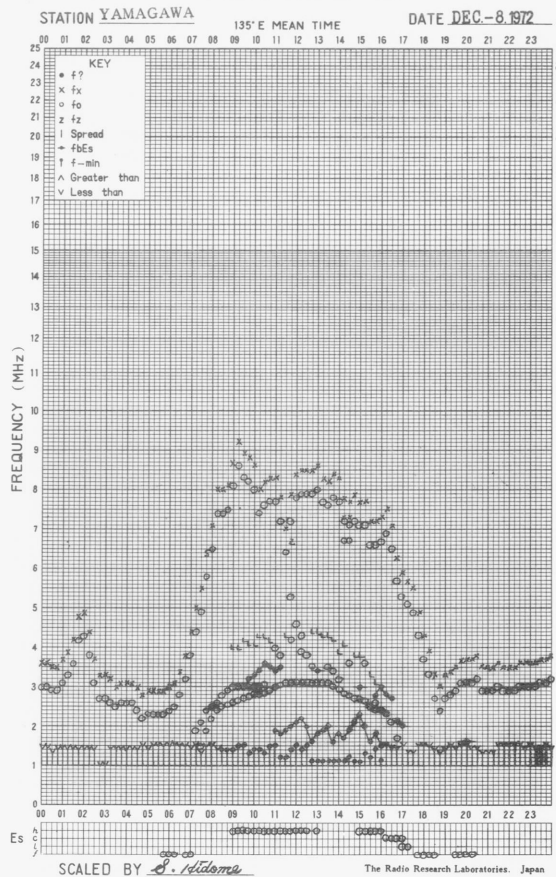
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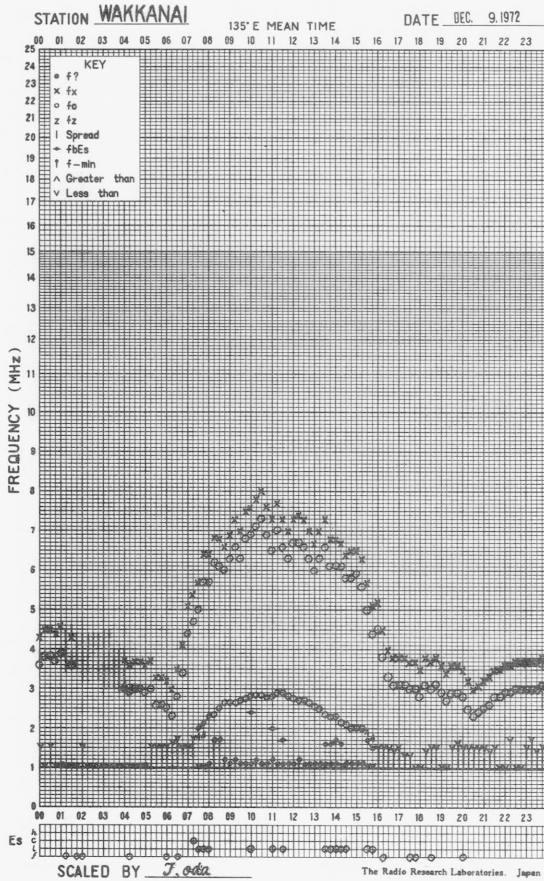
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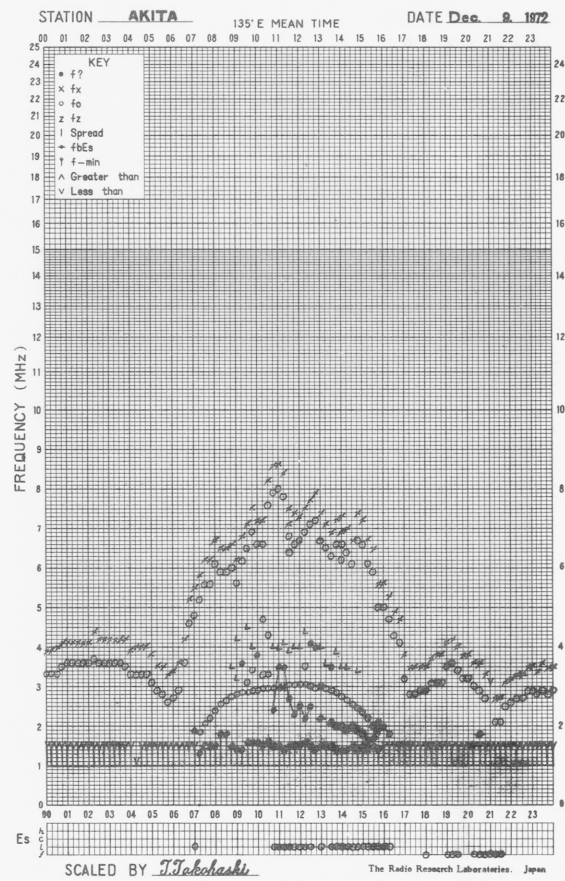
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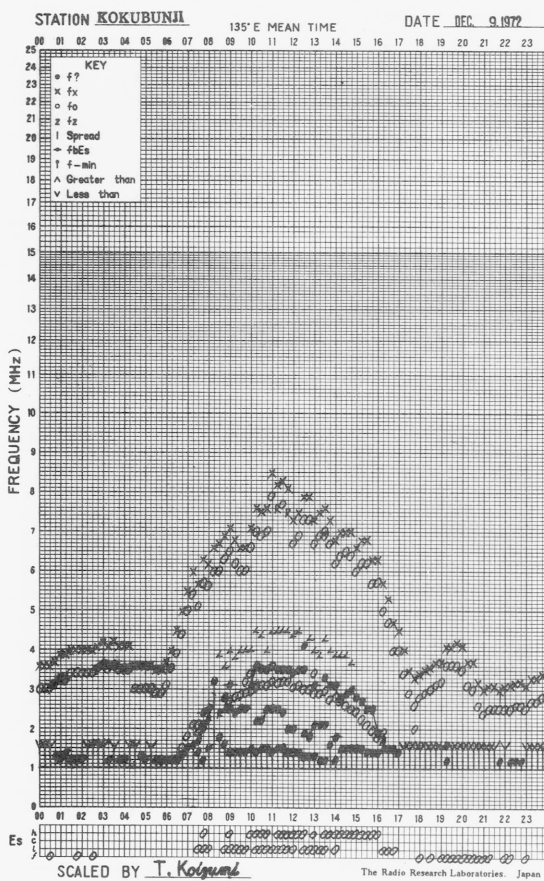
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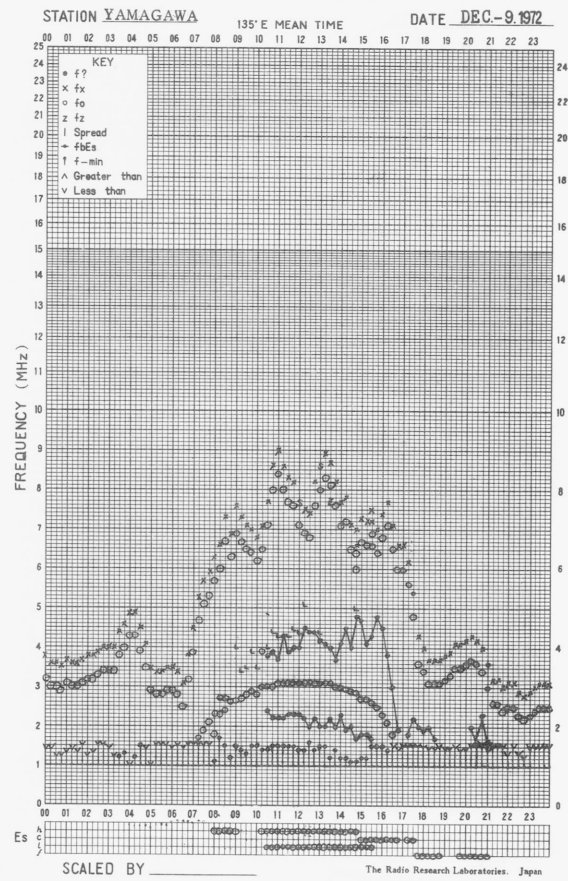
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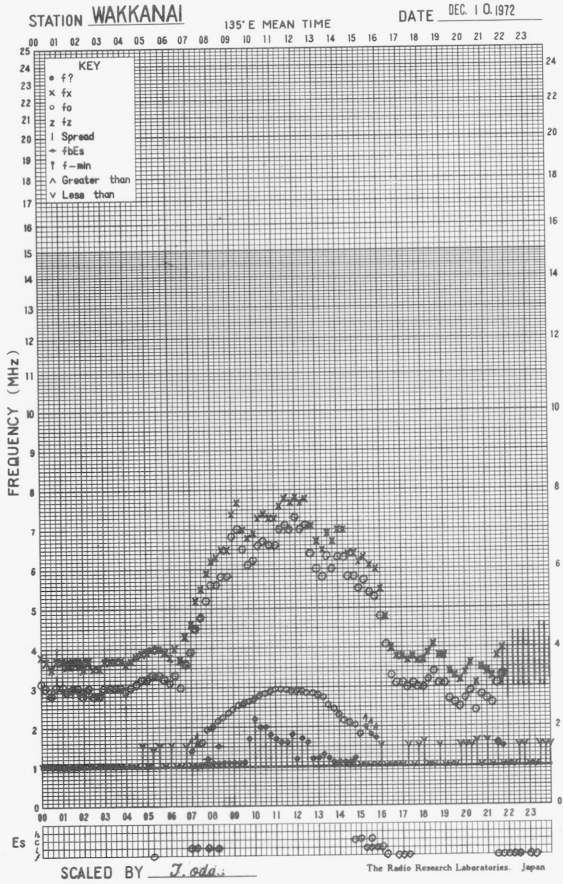
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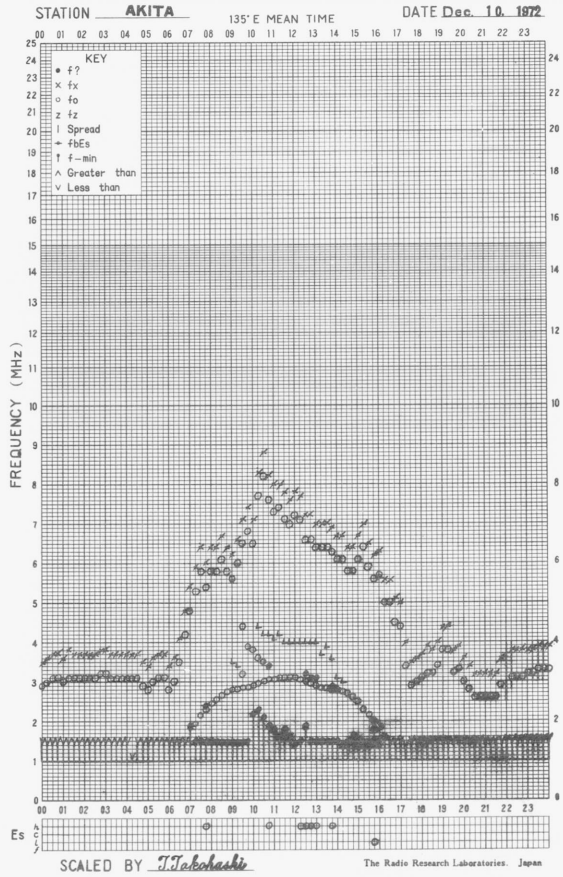
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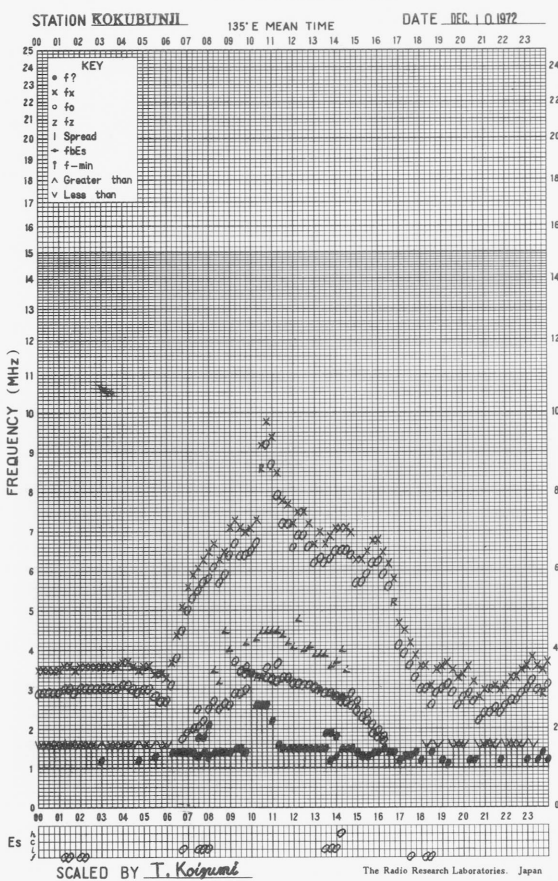
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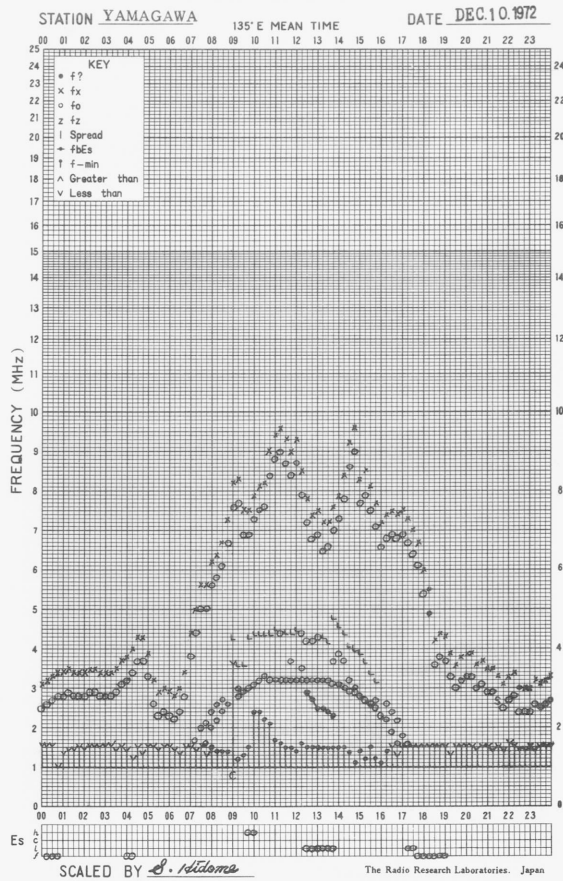
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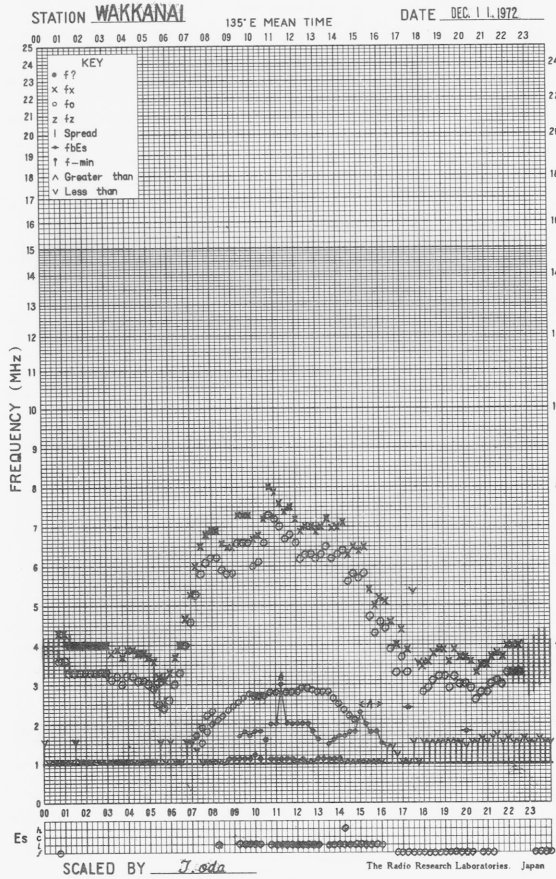
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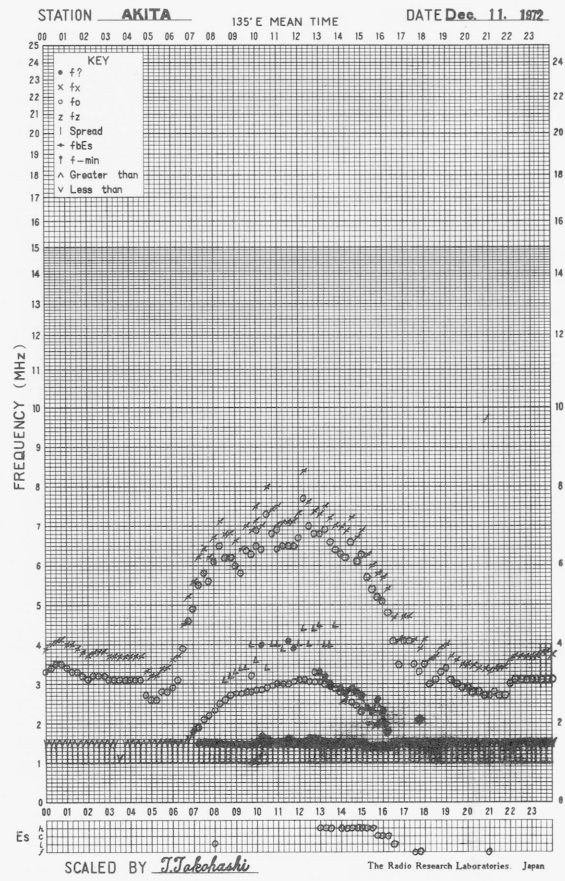
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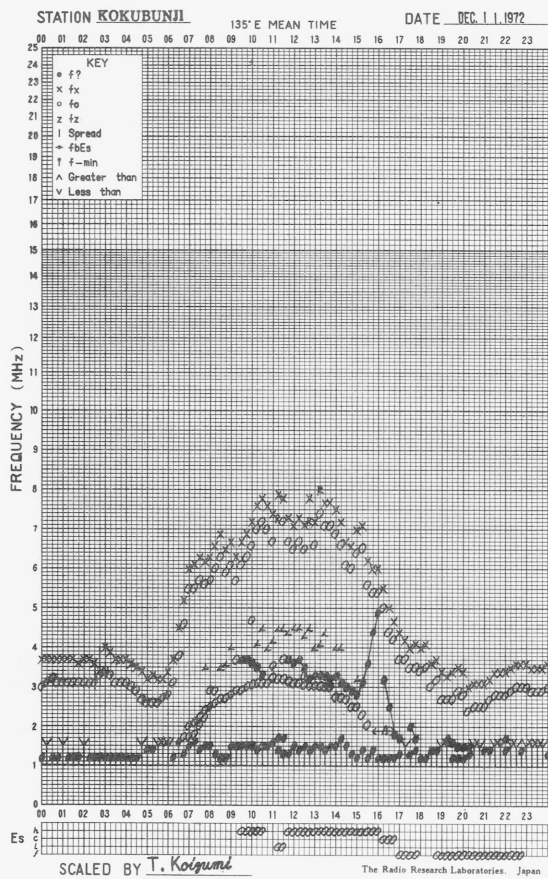
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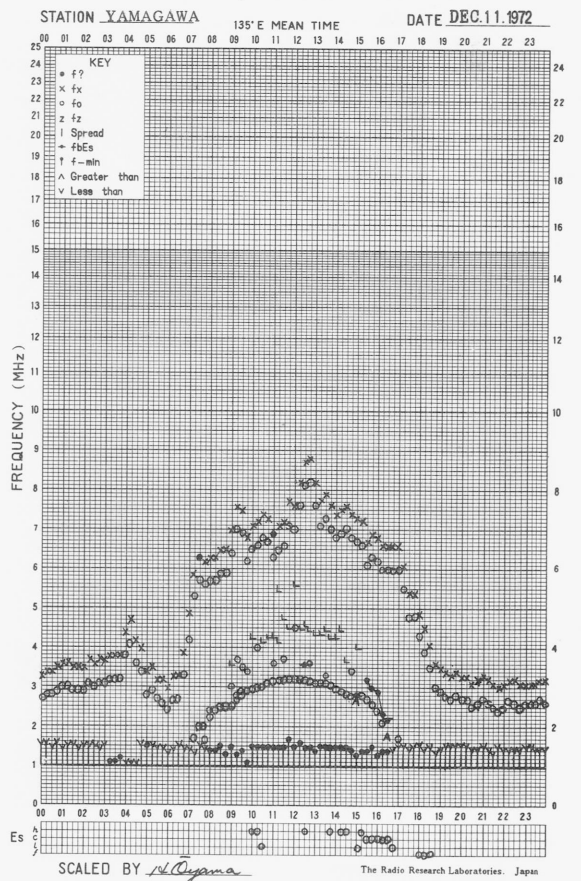
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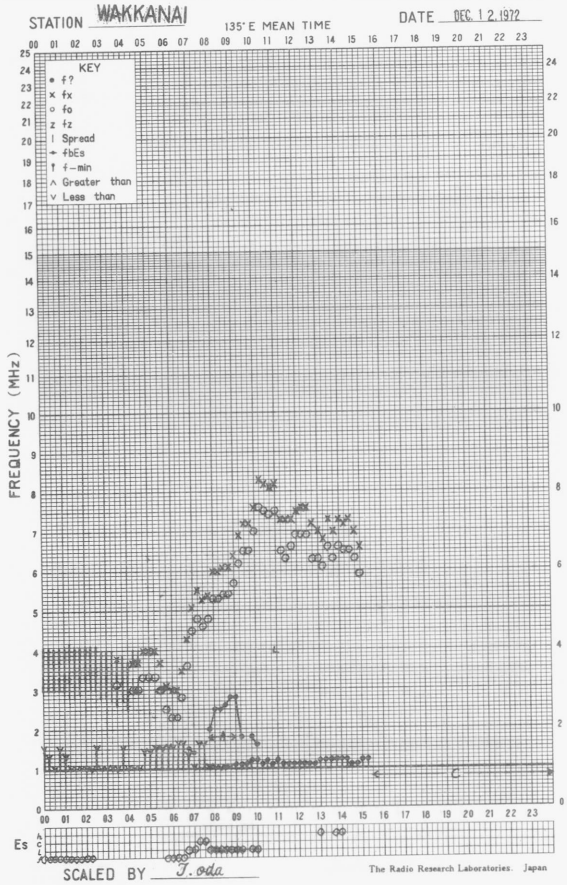
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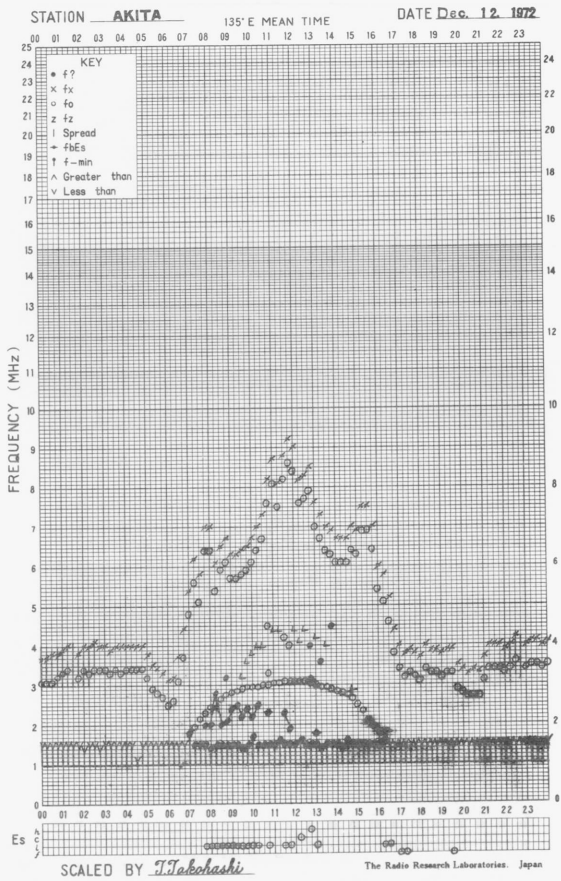
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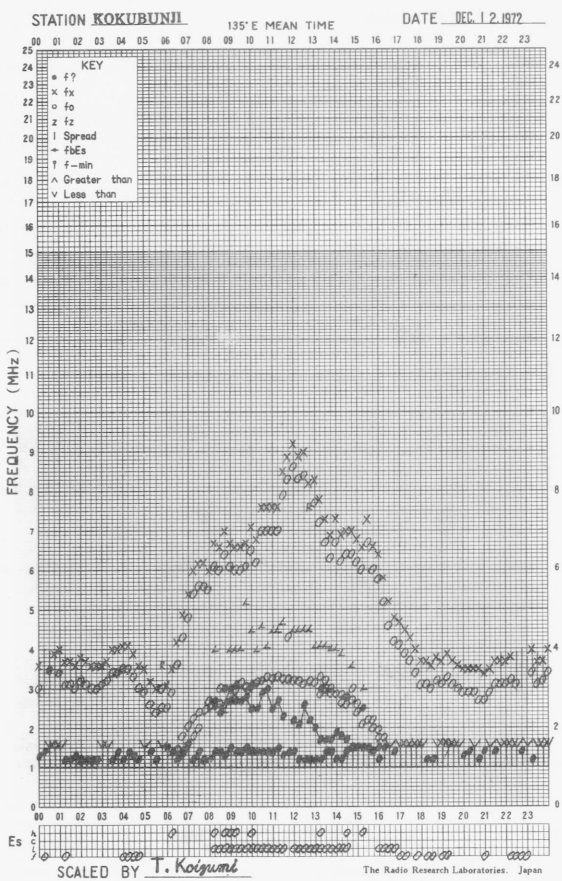
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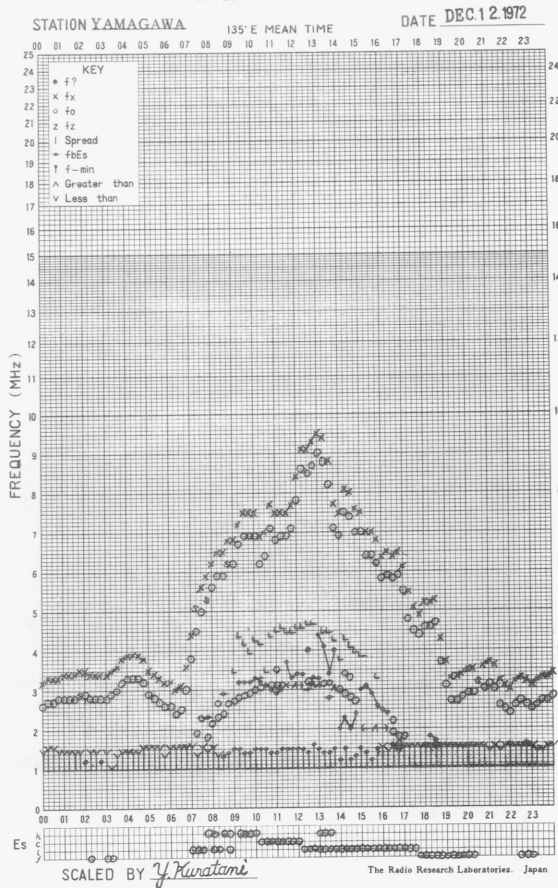
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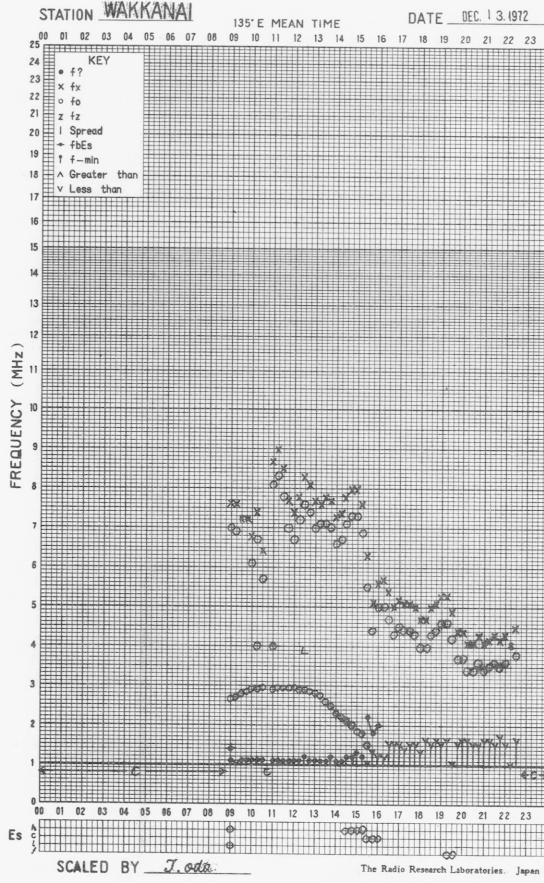
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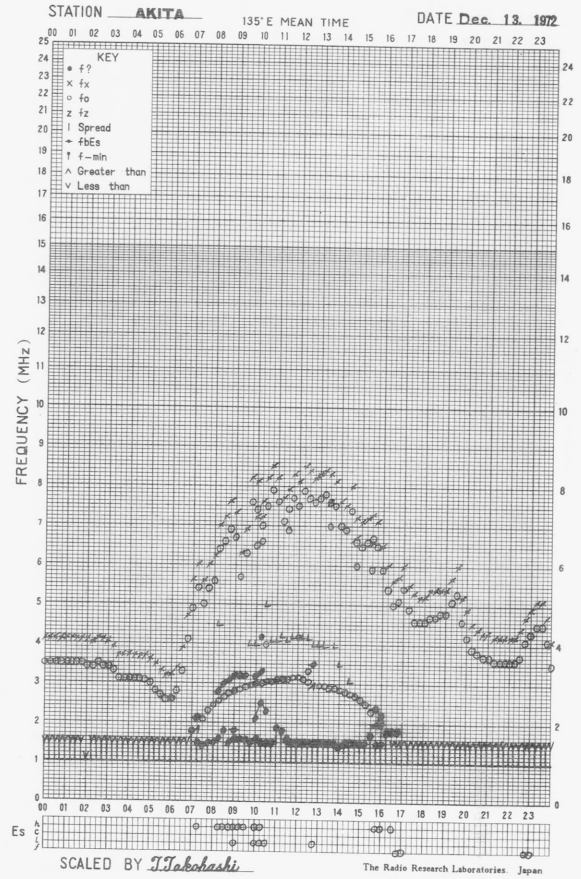
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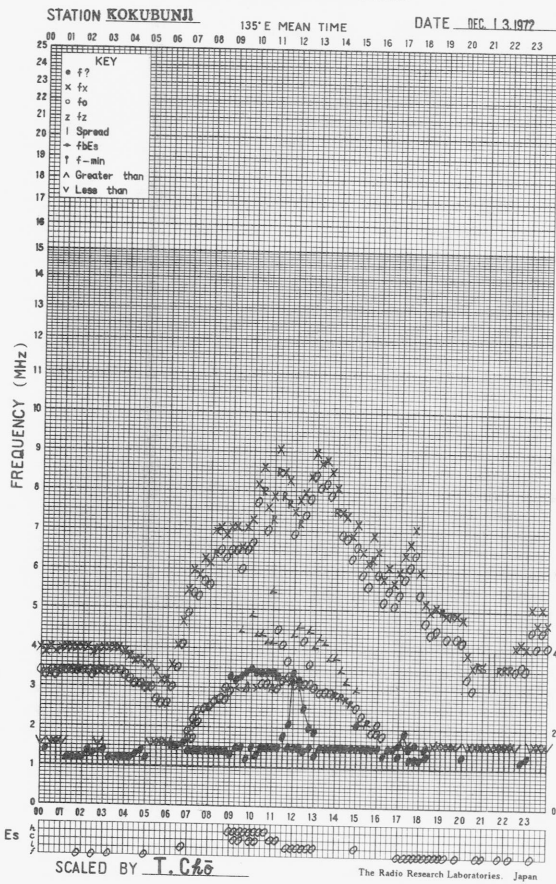
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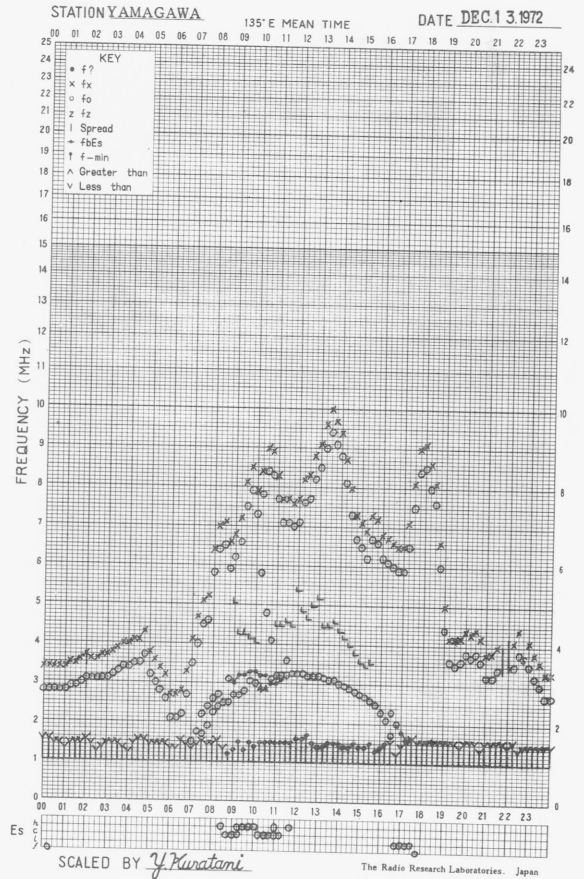
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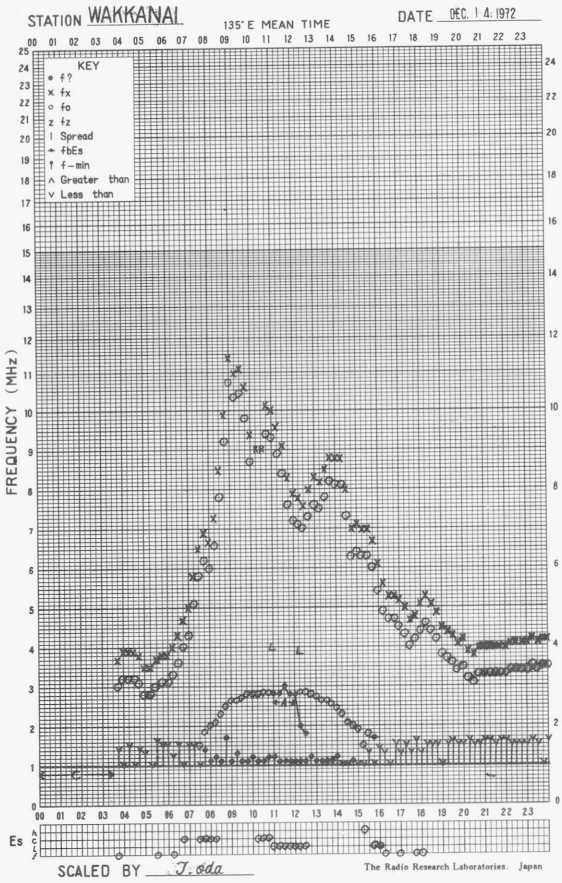
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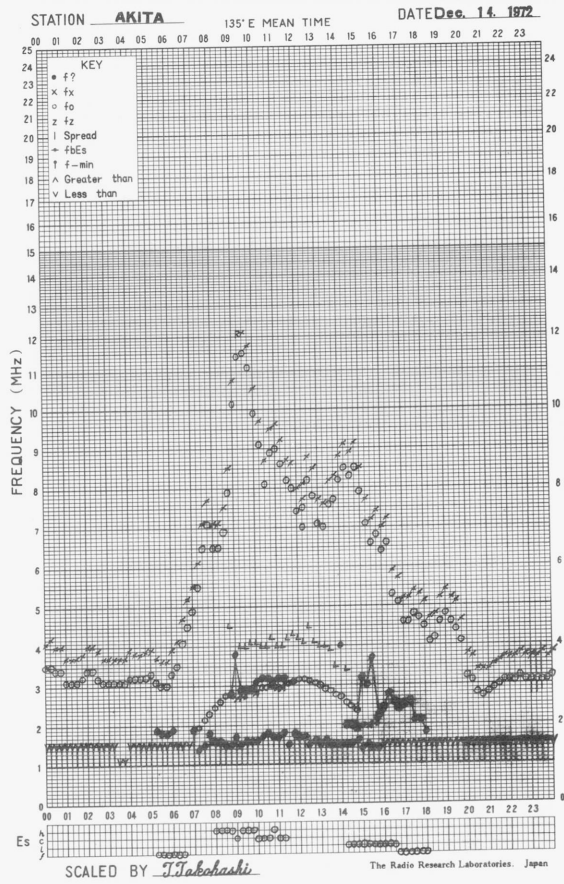
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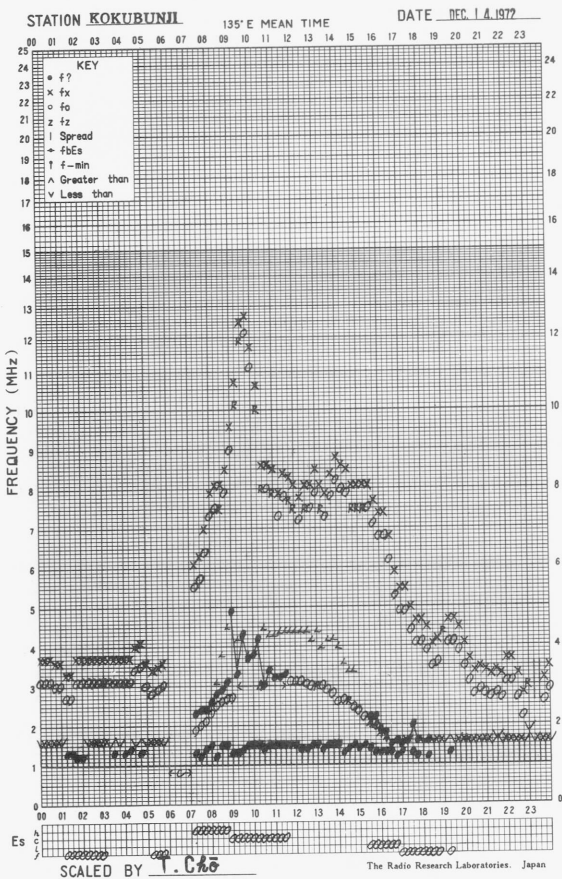
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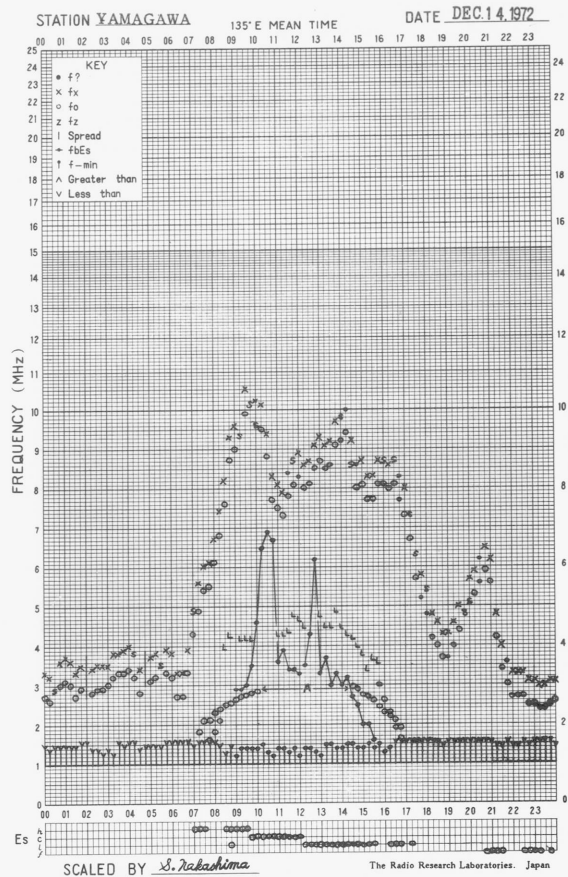
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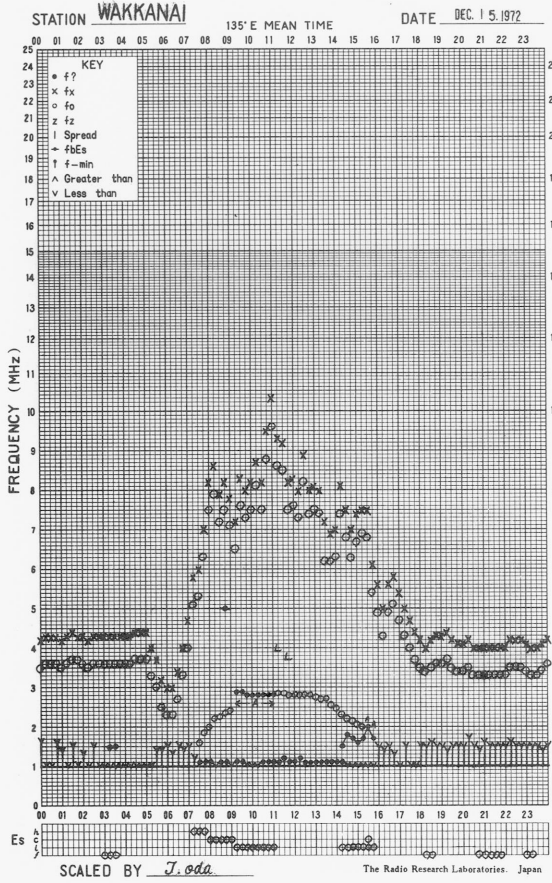
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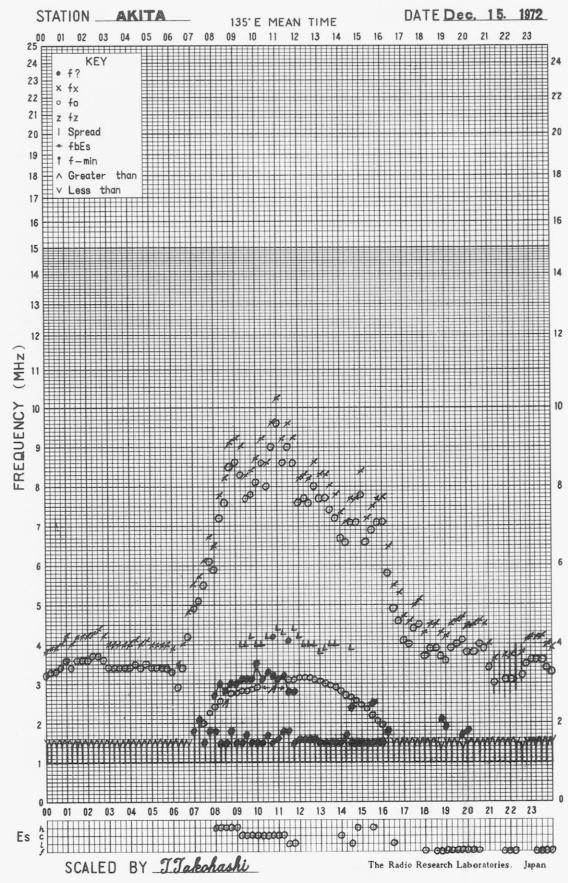
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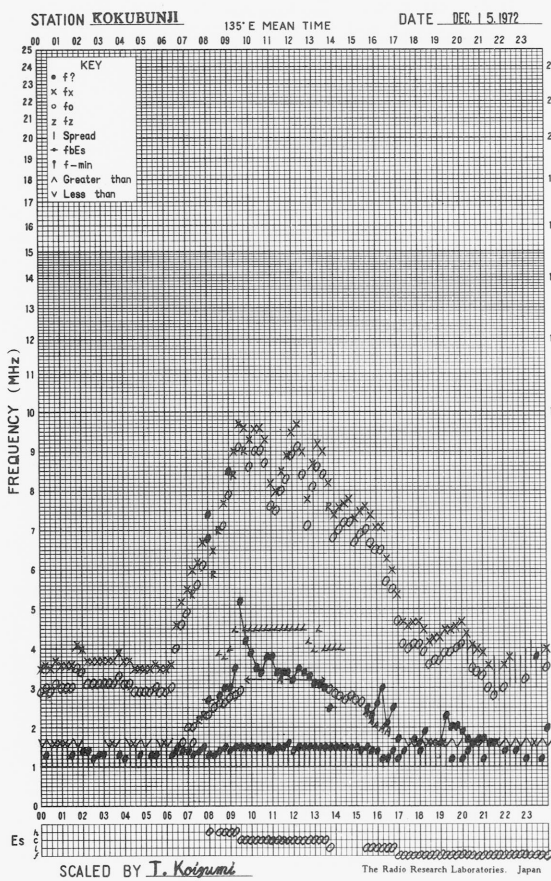
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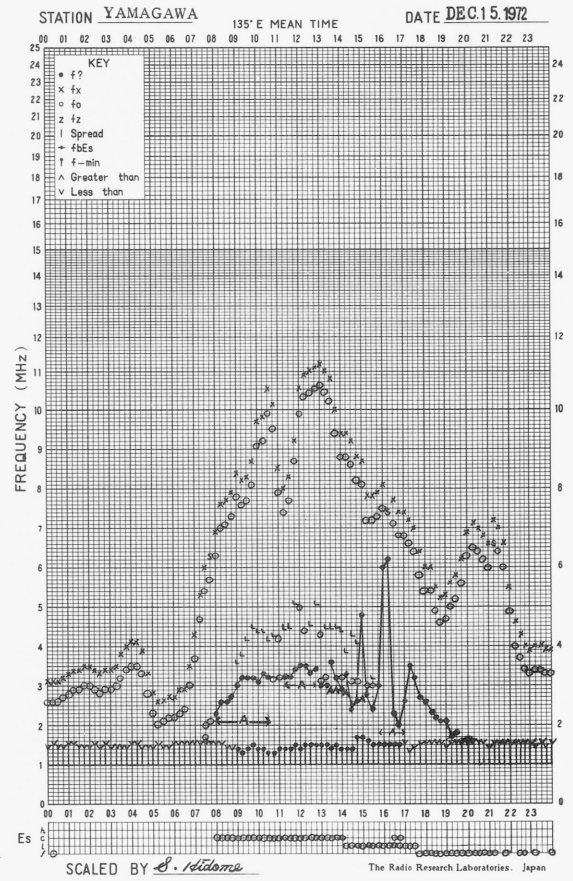
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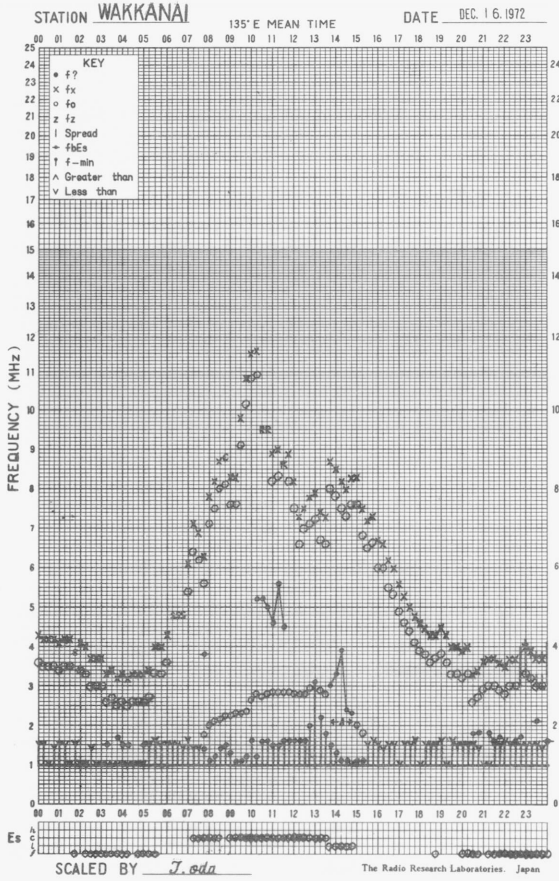
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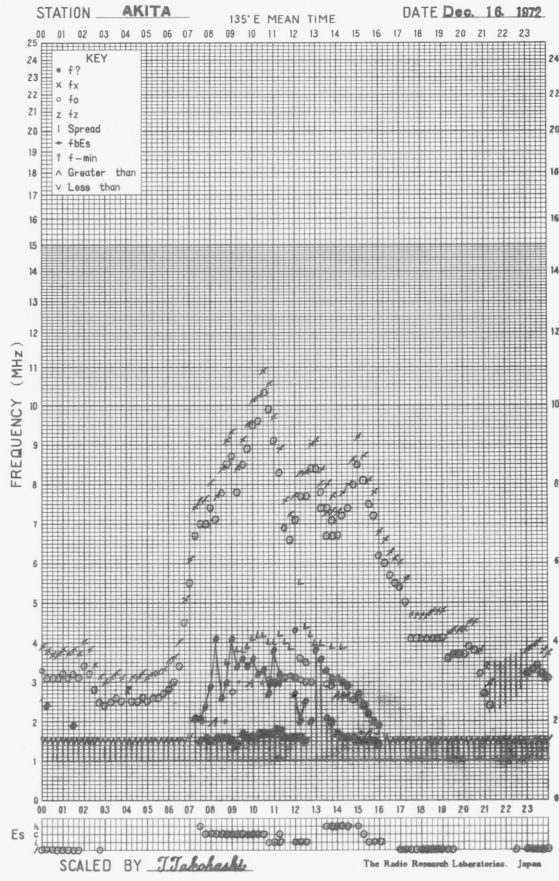
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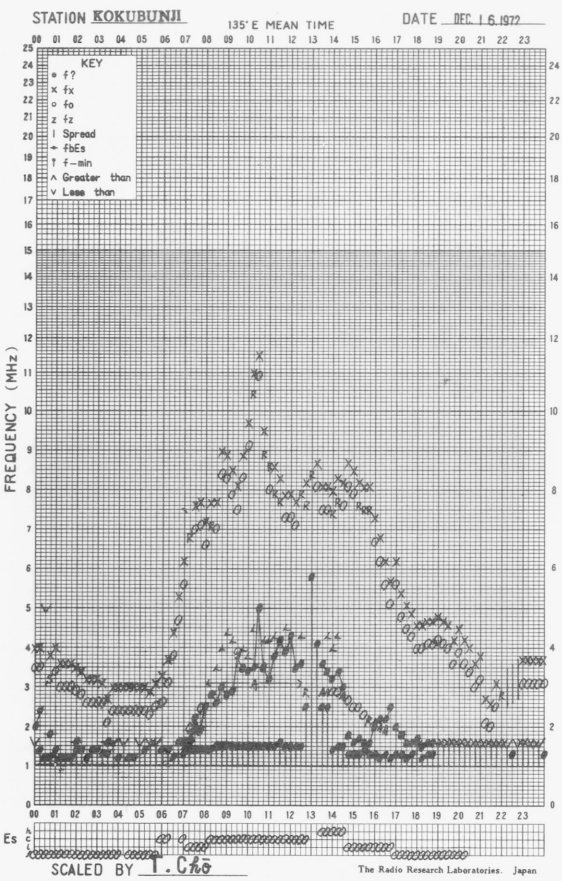
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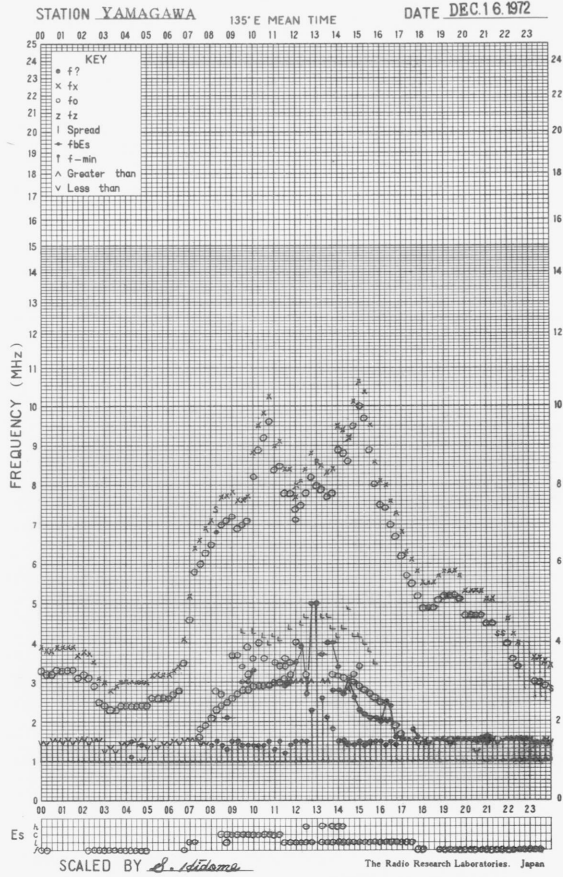
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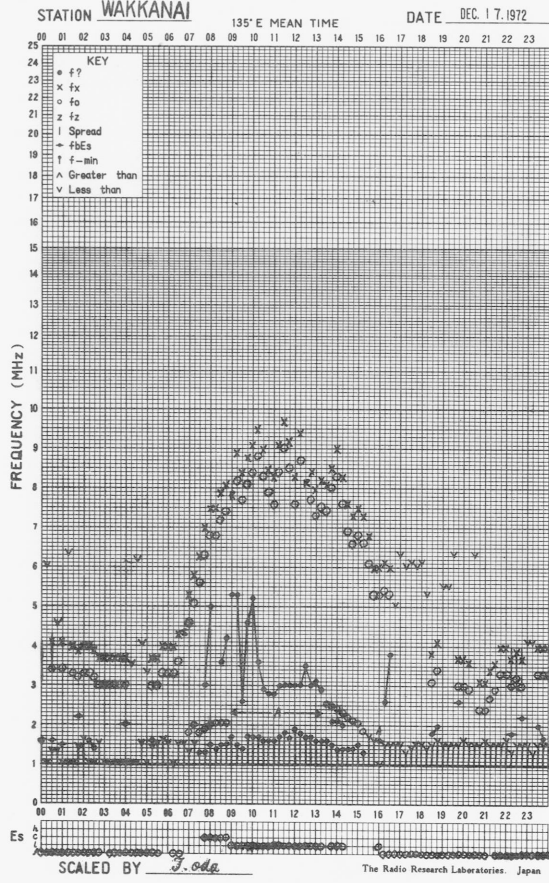
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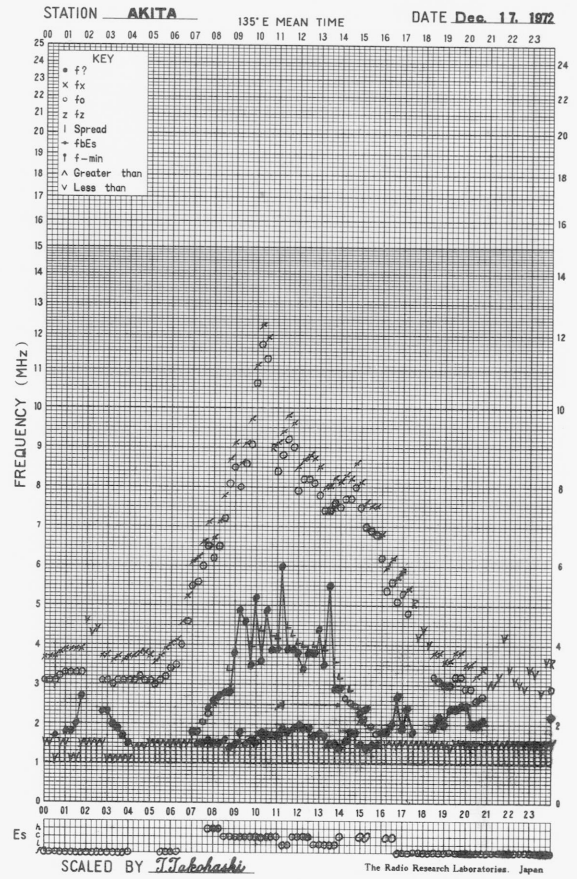
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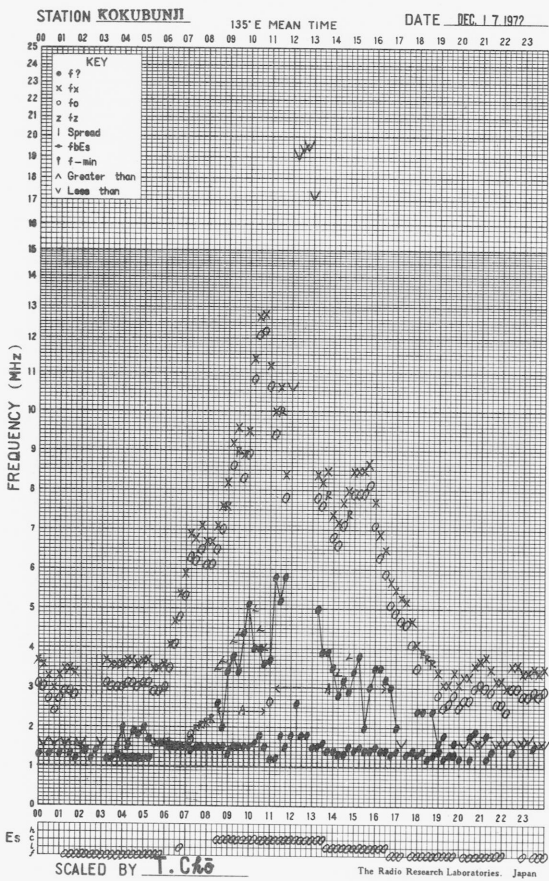
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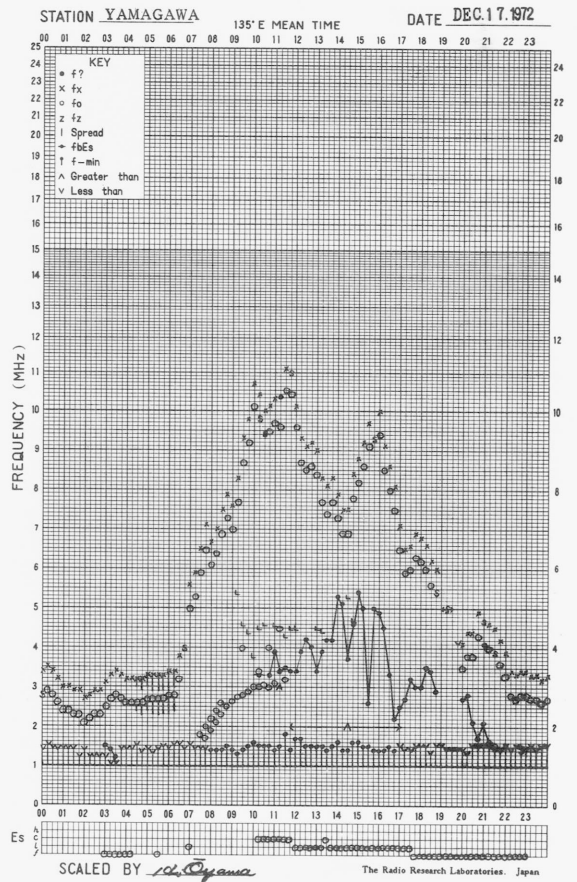
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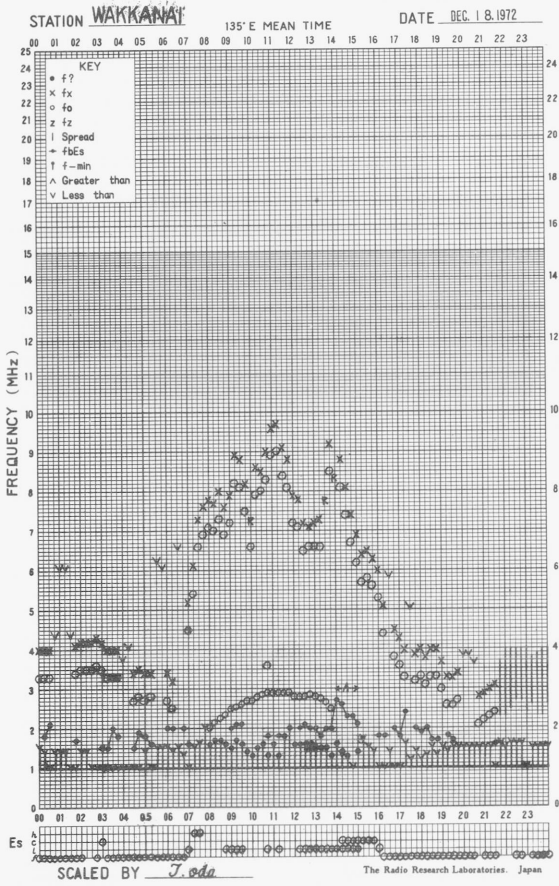
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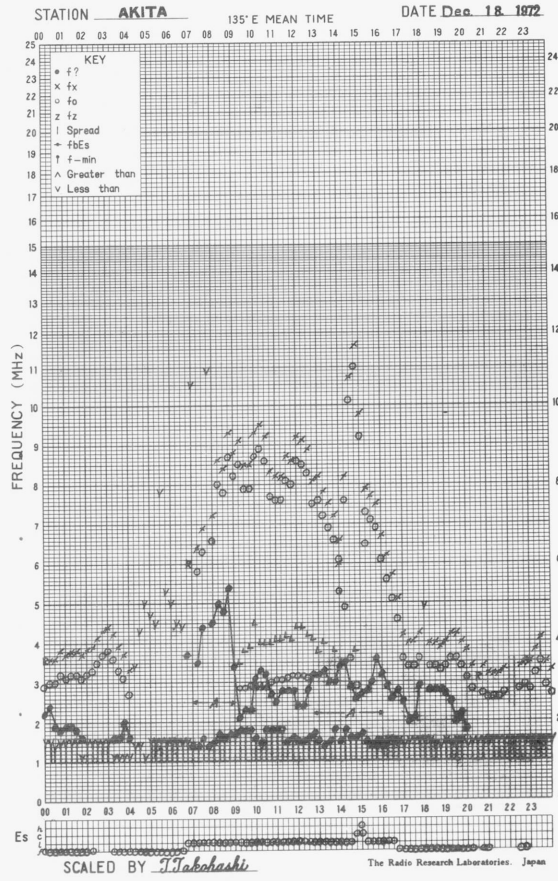
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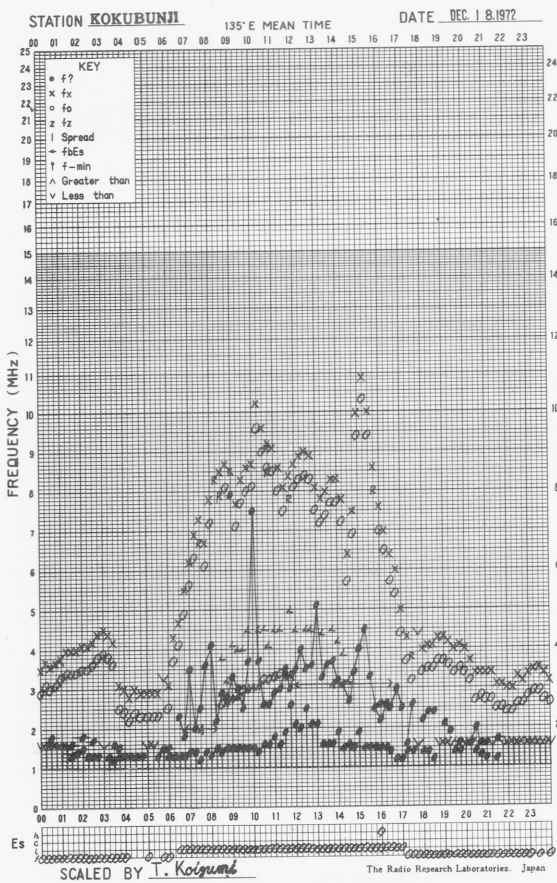
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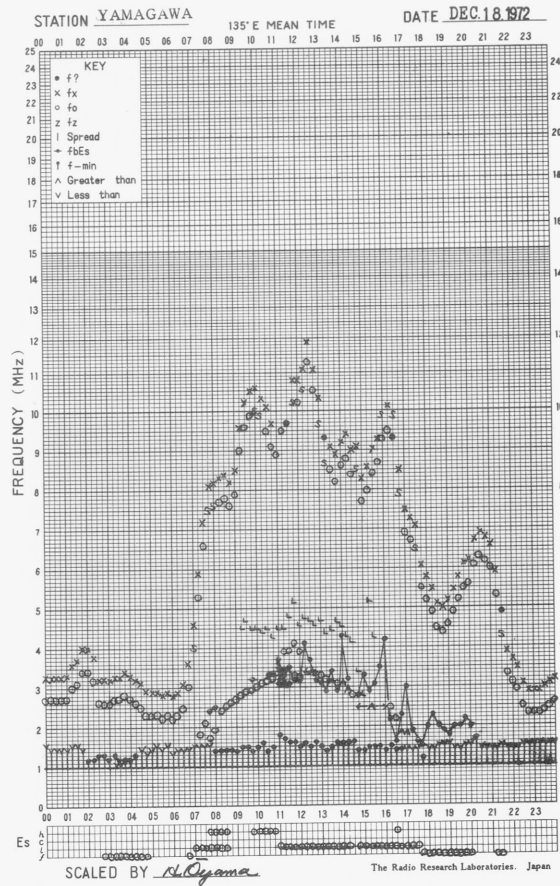
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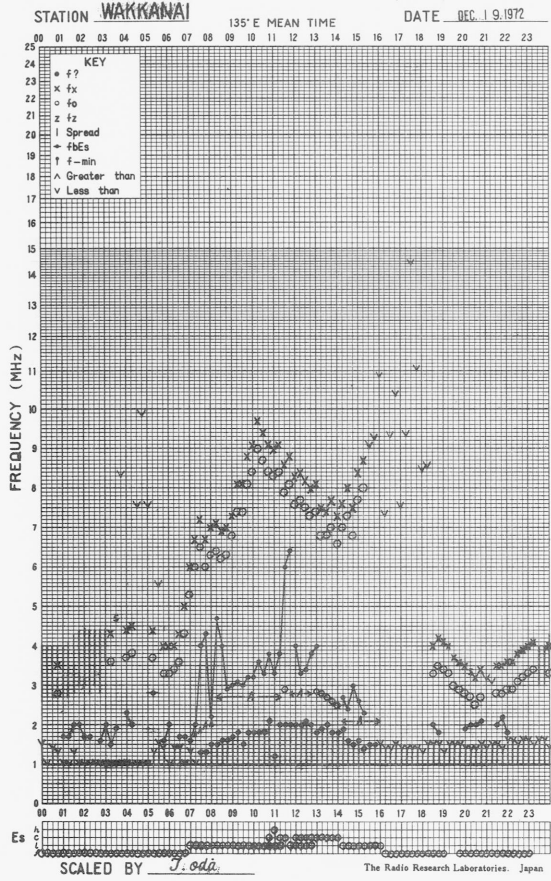
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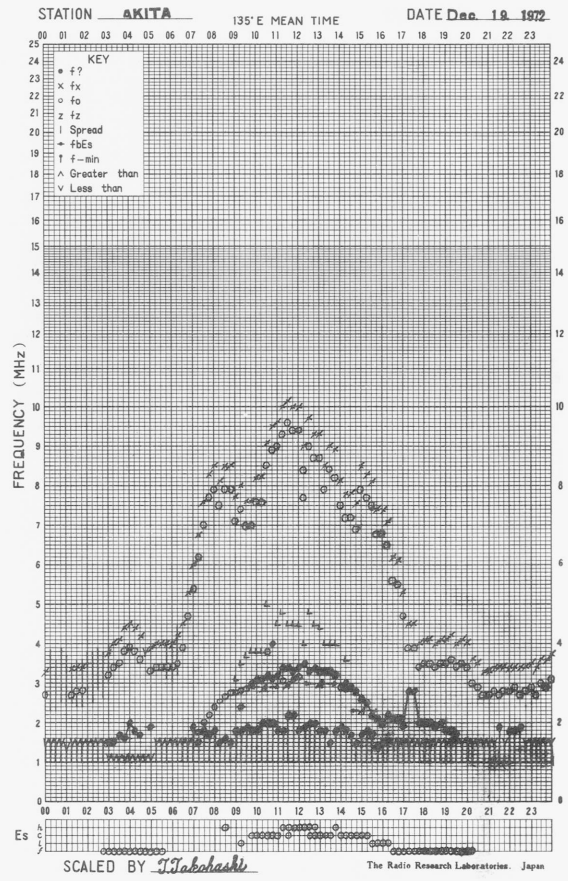
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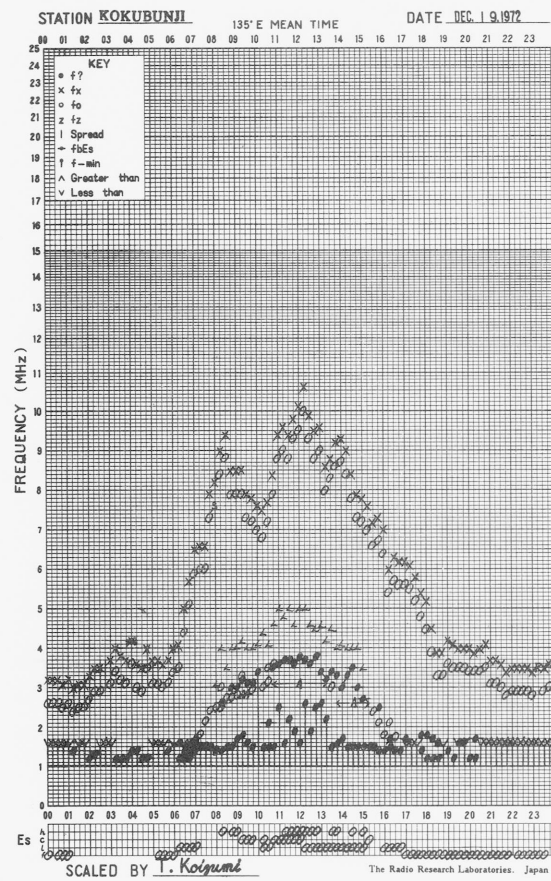
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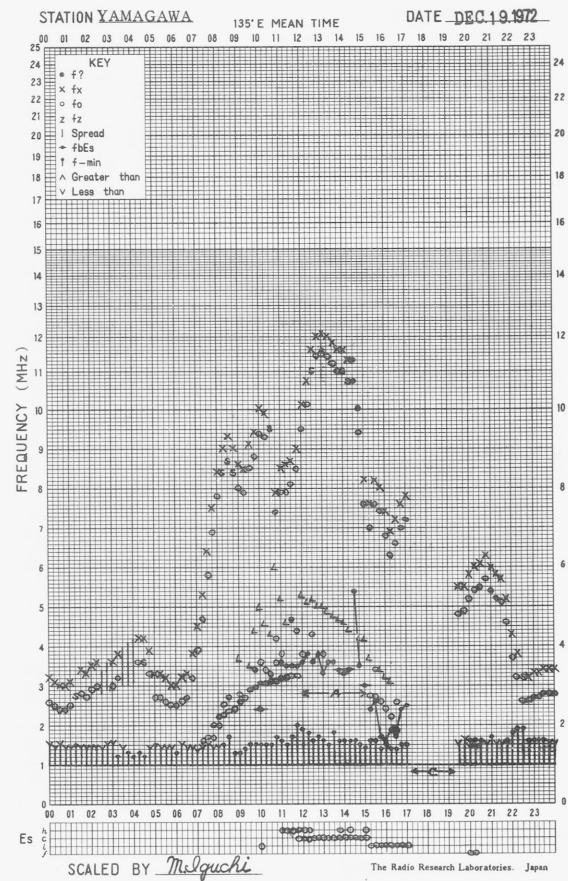
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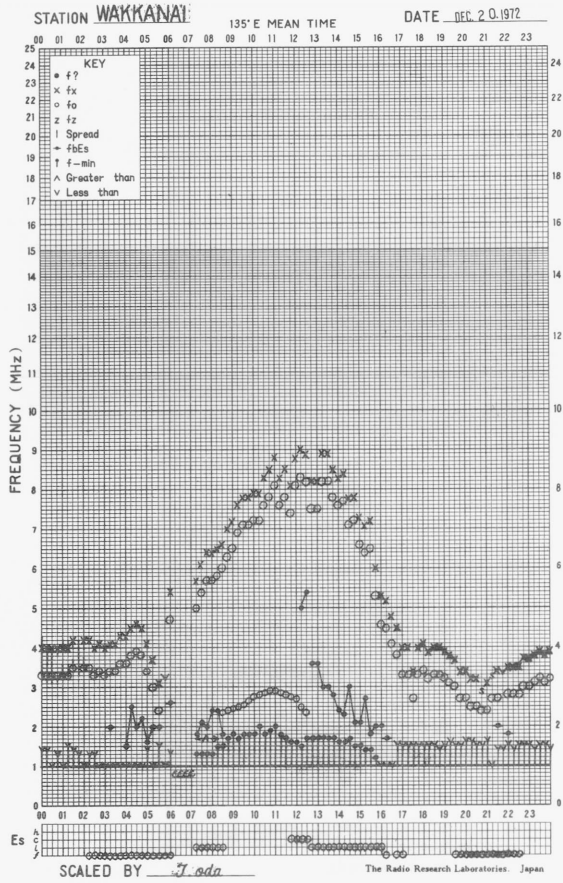
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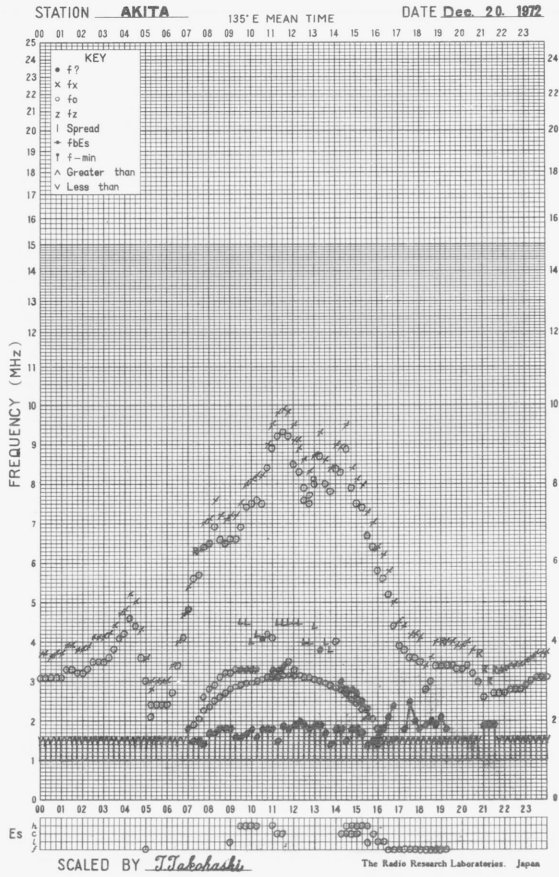
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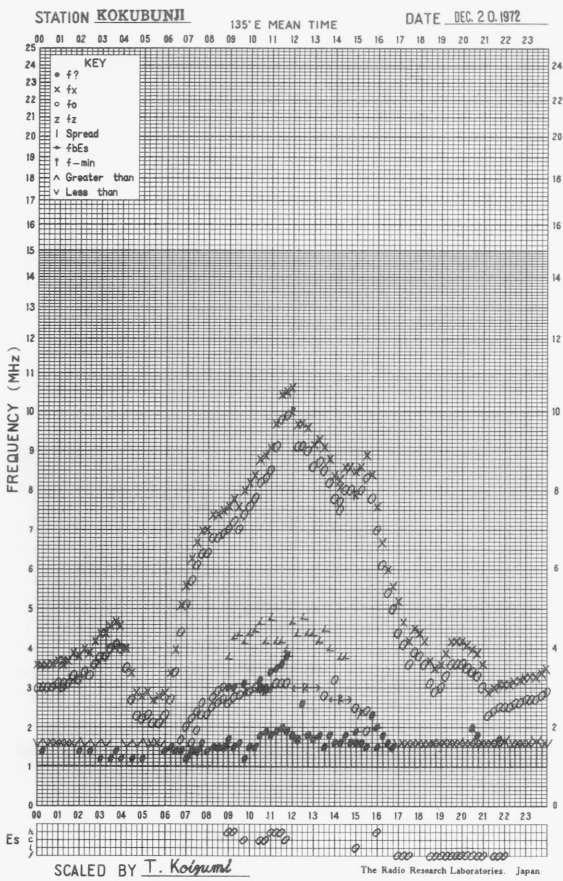
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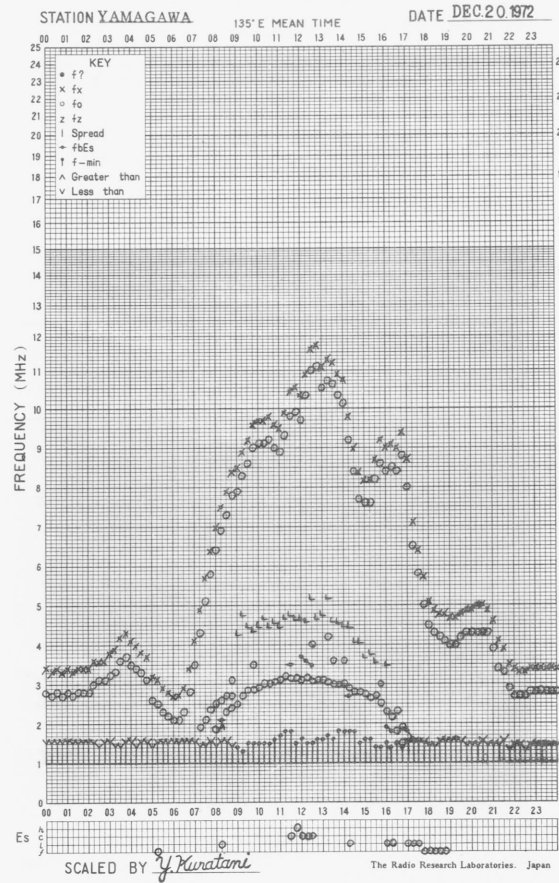
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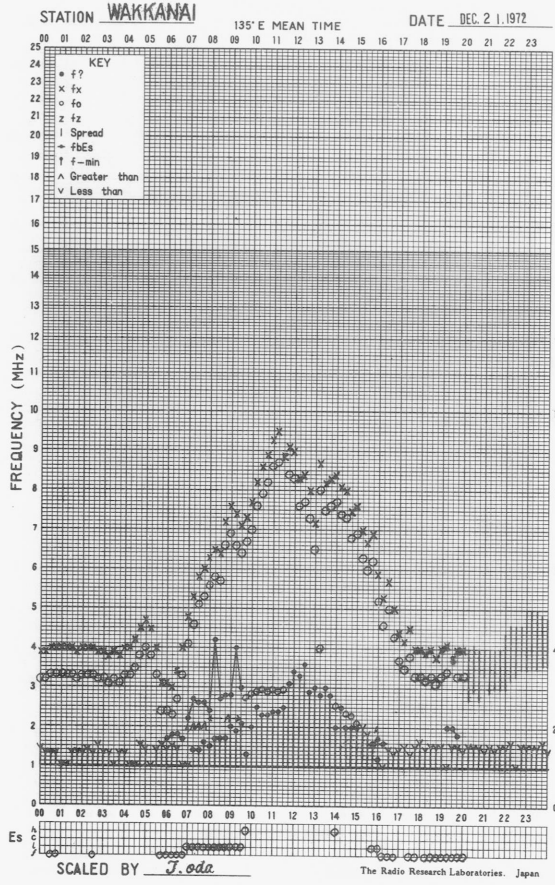
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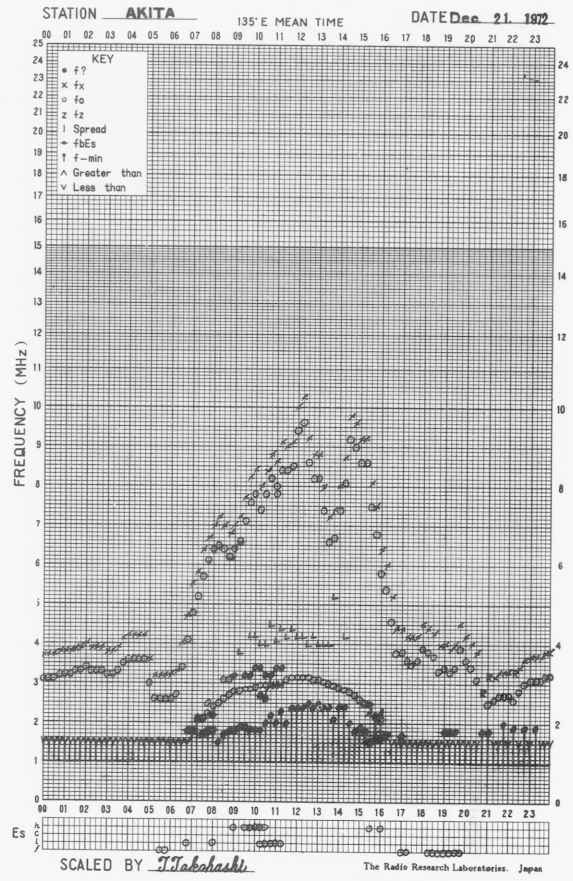
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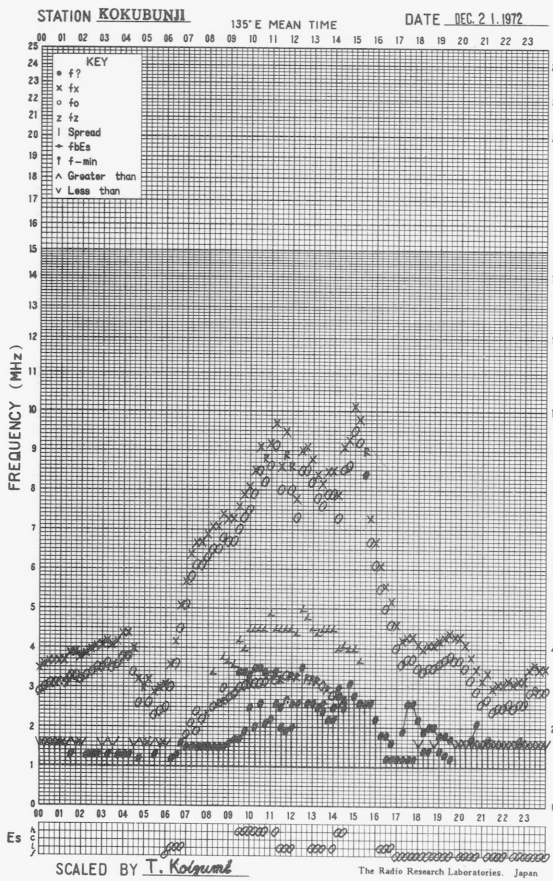
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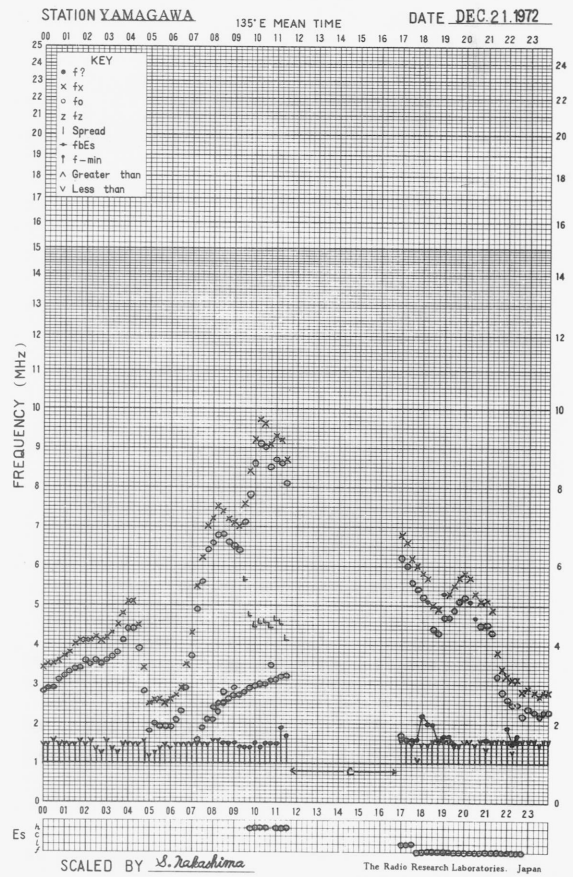
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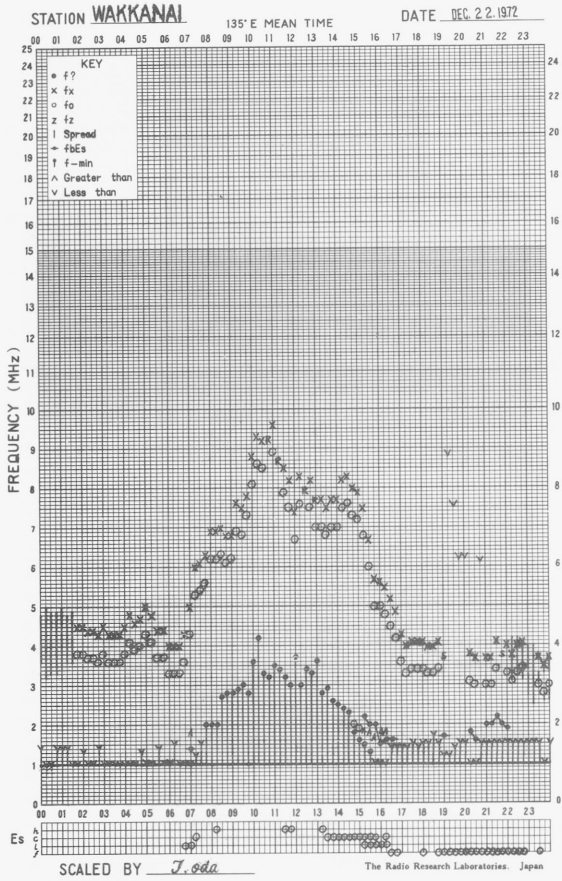
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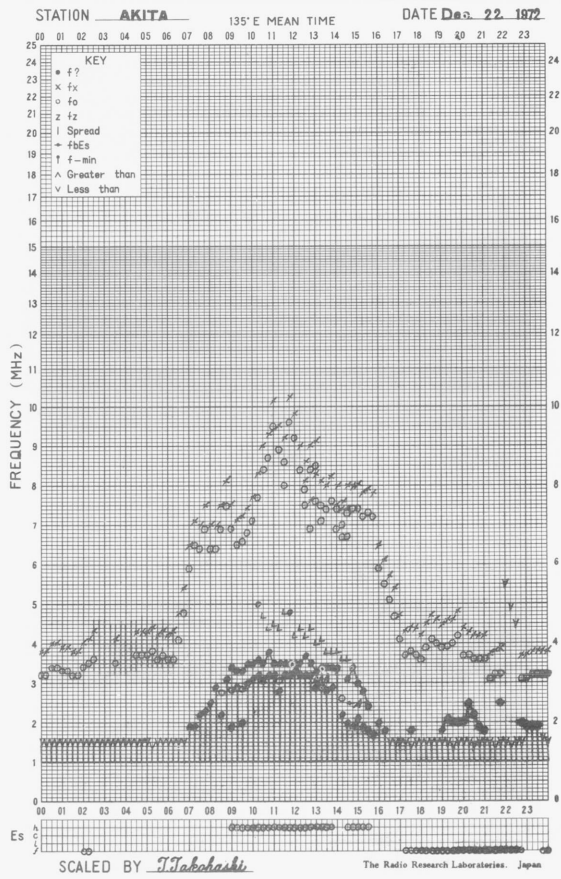
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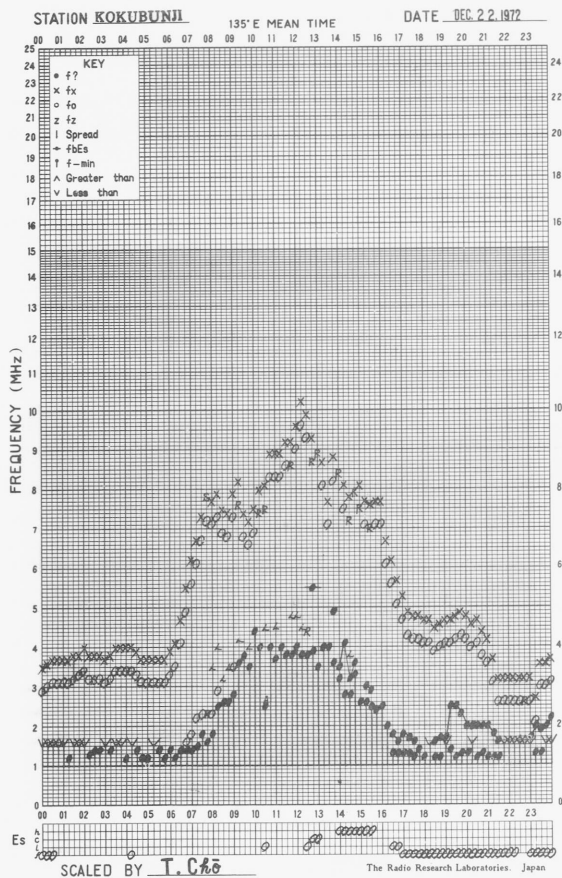
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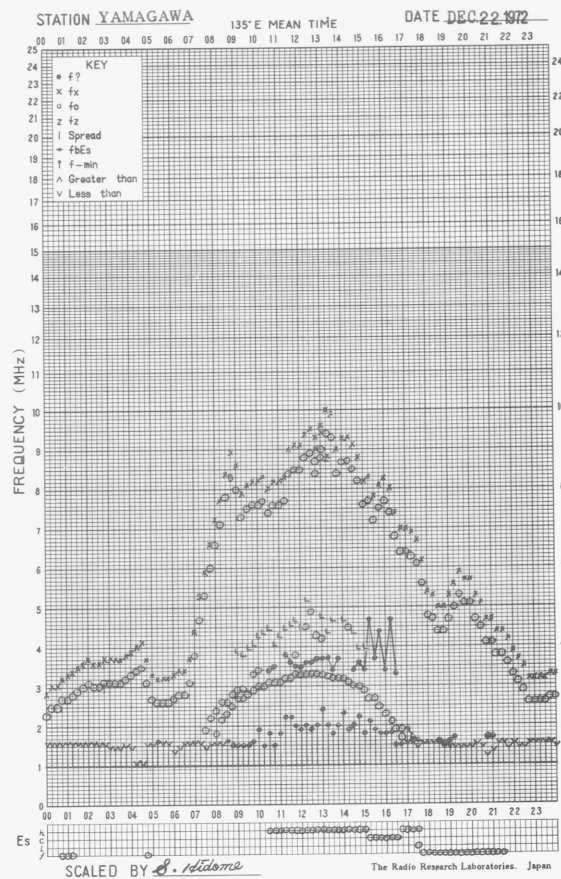
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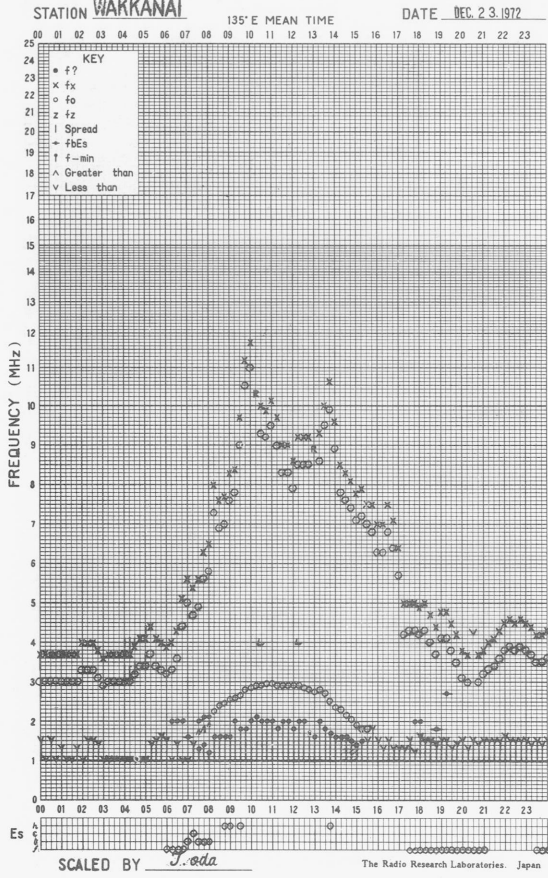
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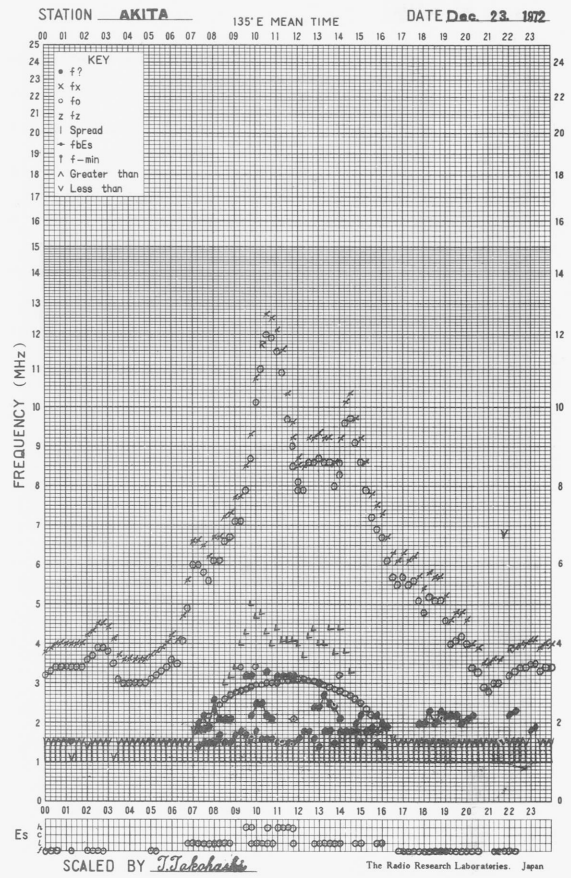
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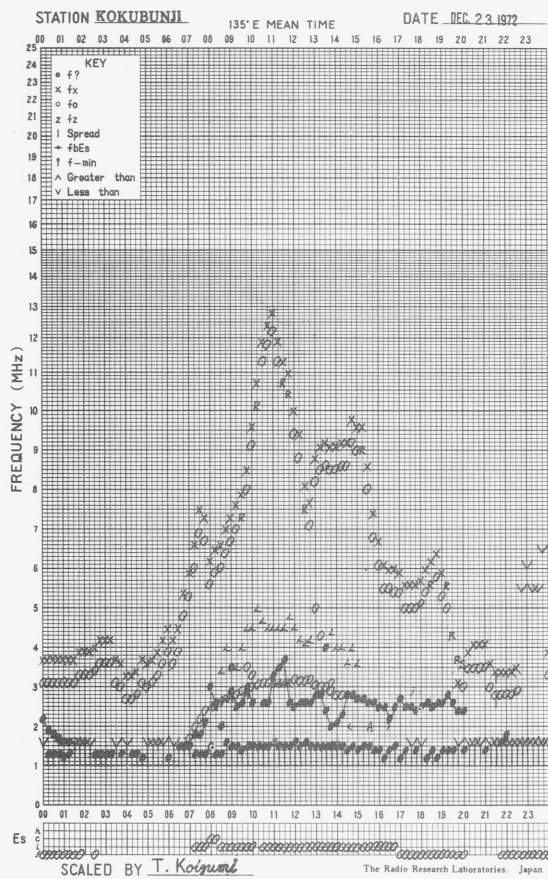
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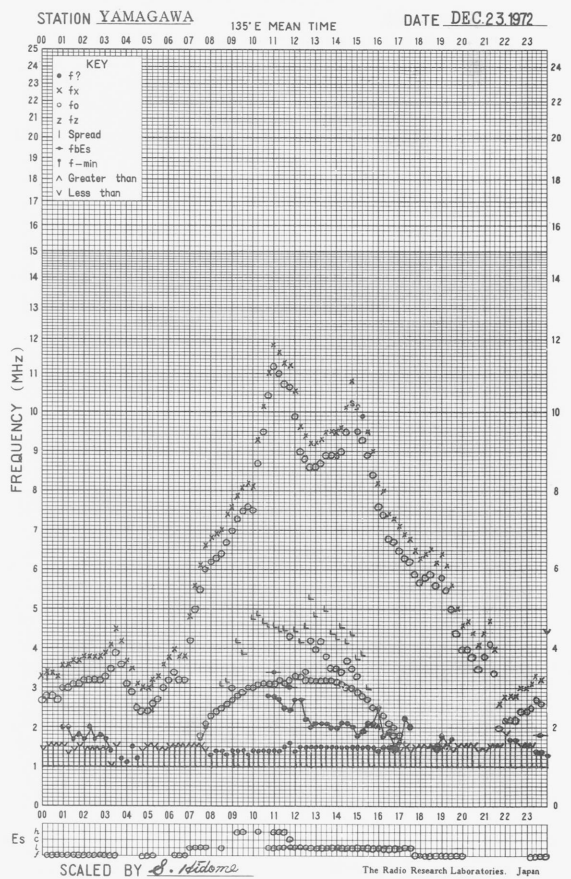
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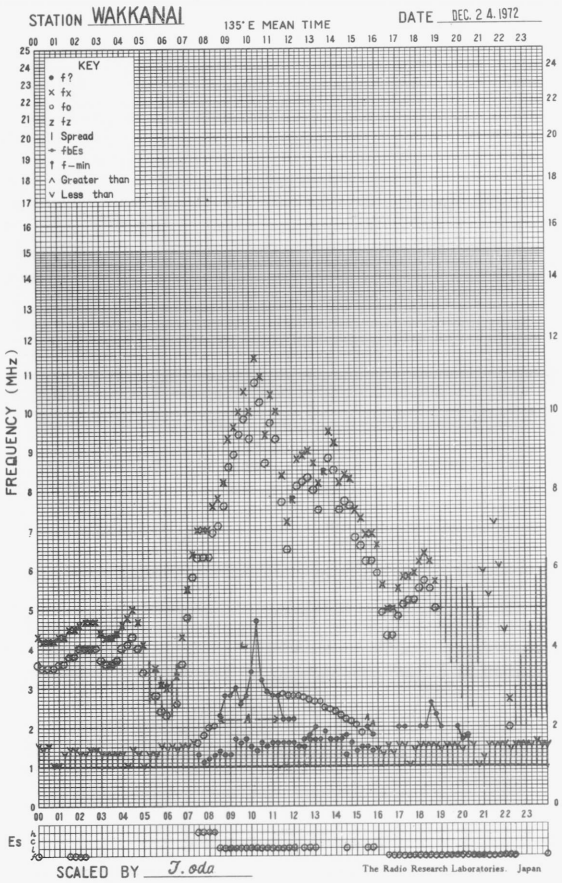
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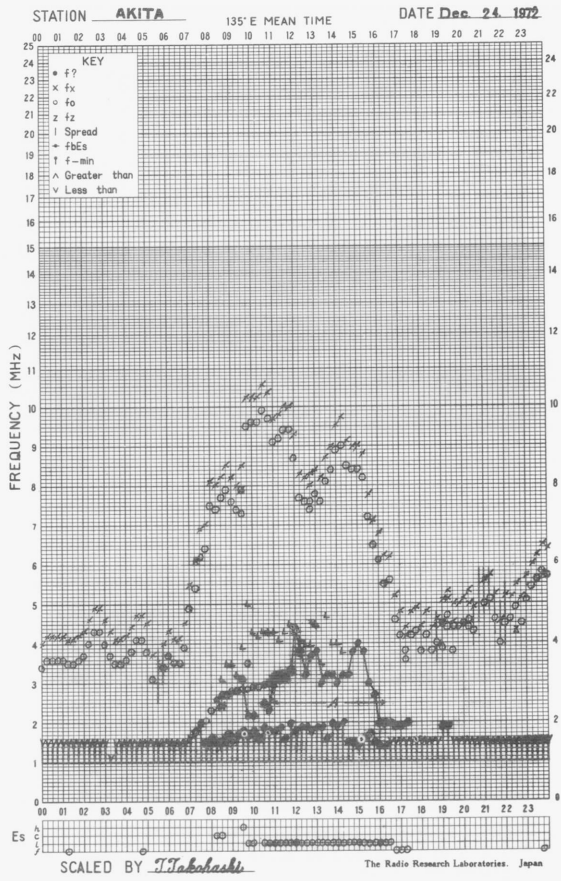
f-PLOT OF IONOSPHERIC DATA



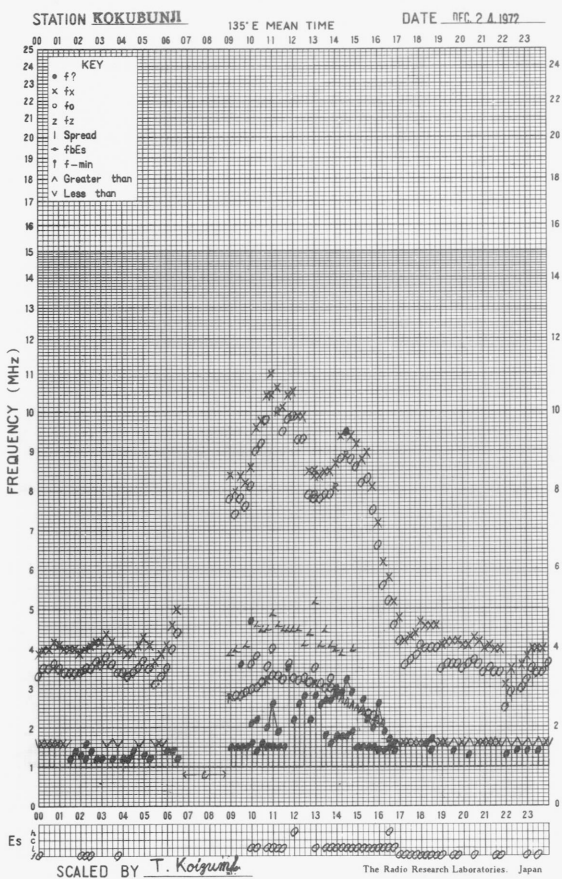
f-PLOT OF IONOSPHERIC DATA



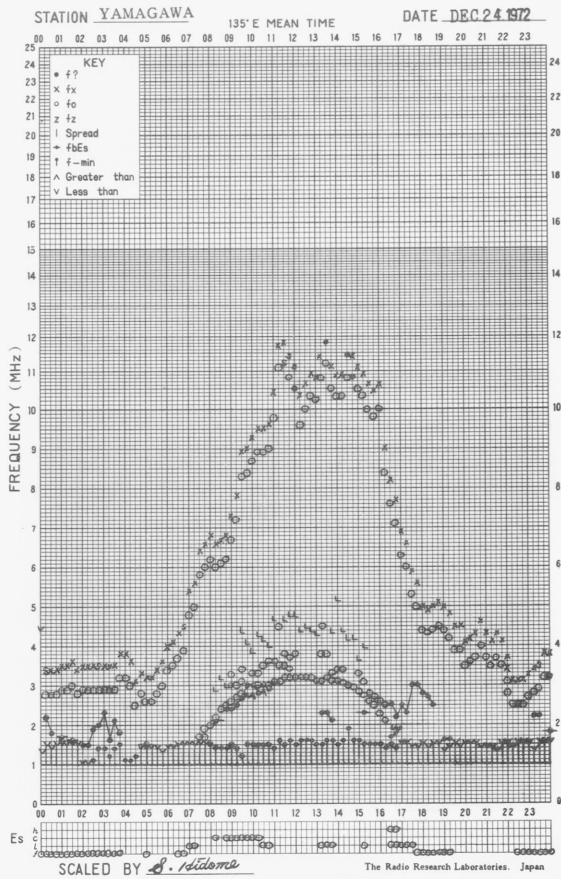
f-PLOT OF IONOSPHERIC DATA



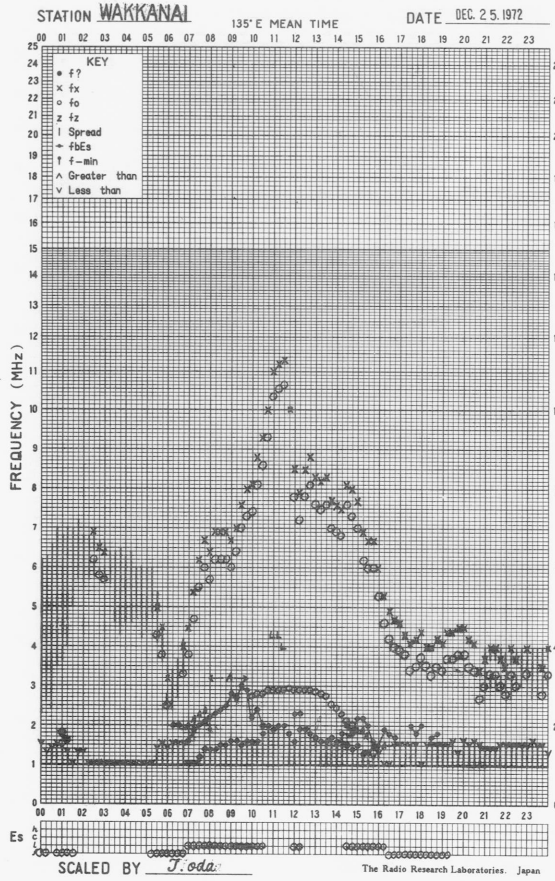
f-PLOT OF IONOSPHERIC DATA



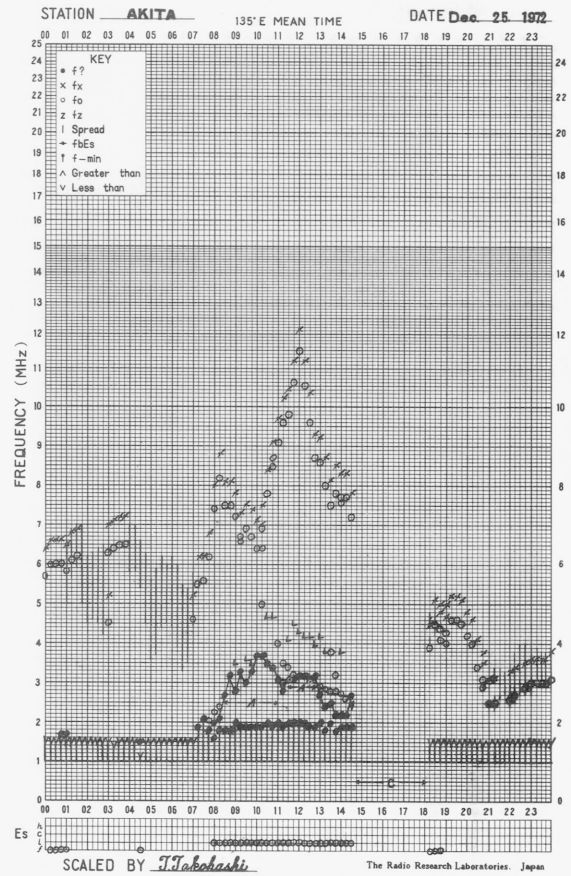
f-PLOT OF IONOSPHERIC DATA



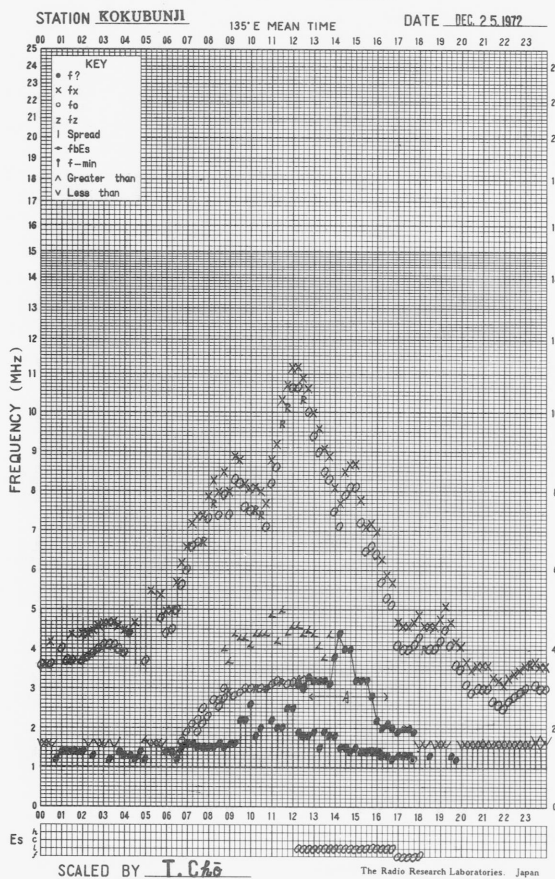
f-PLOT OF IONOSPHERIC DATA



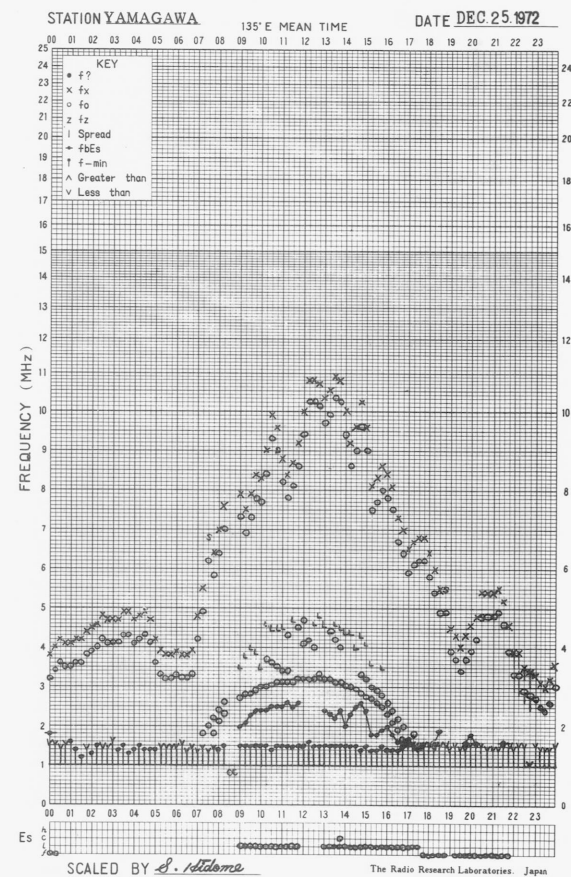
f-PLOT OF IONOSPHERIC DATA



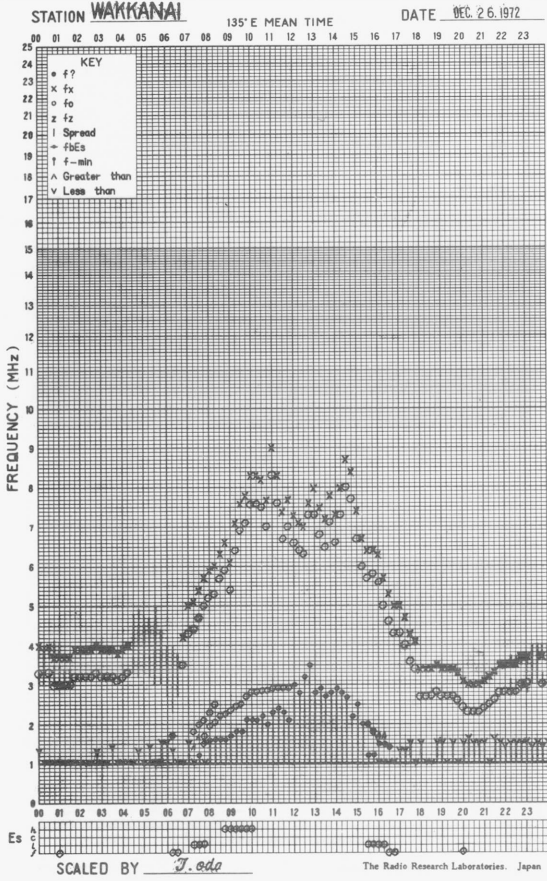
f-PLOT OF IONOSPHERIC DATA



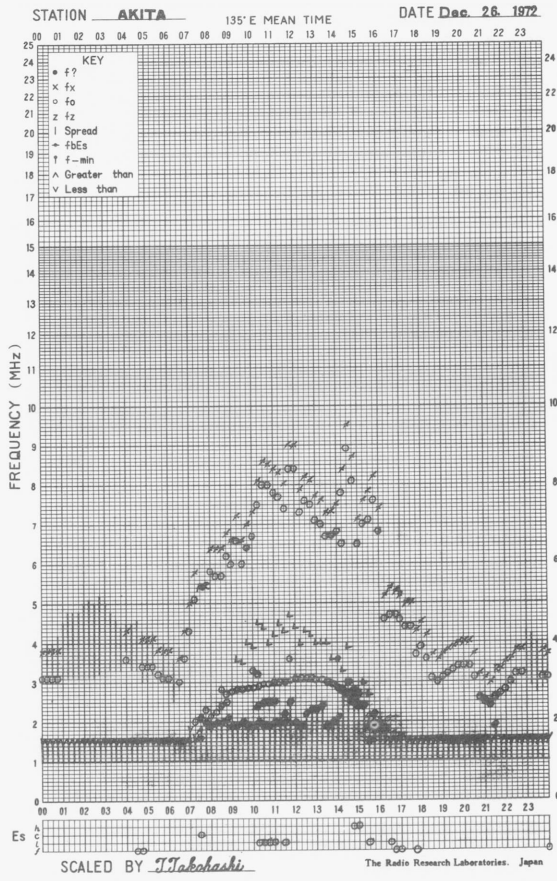
f-PLOT OF IONOSPHERIC DATA



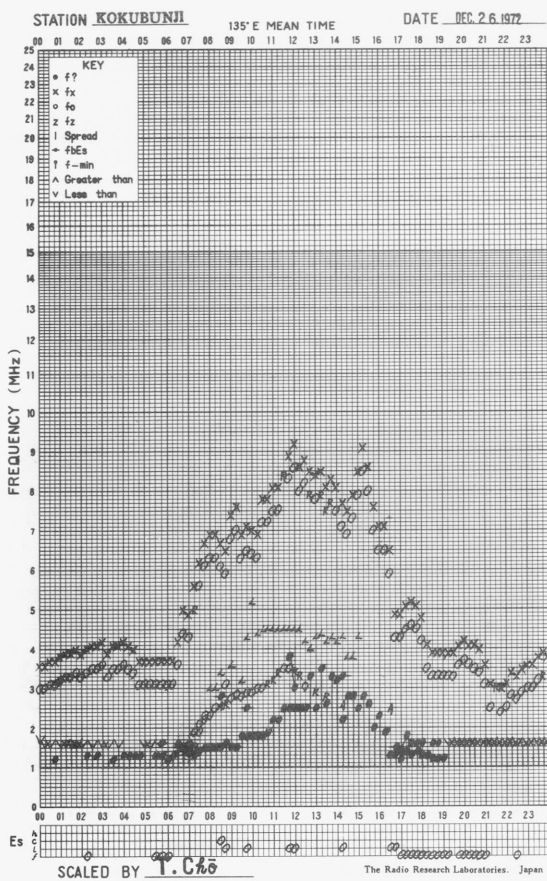
f-PLOT OF IONOSPHERIC DATA



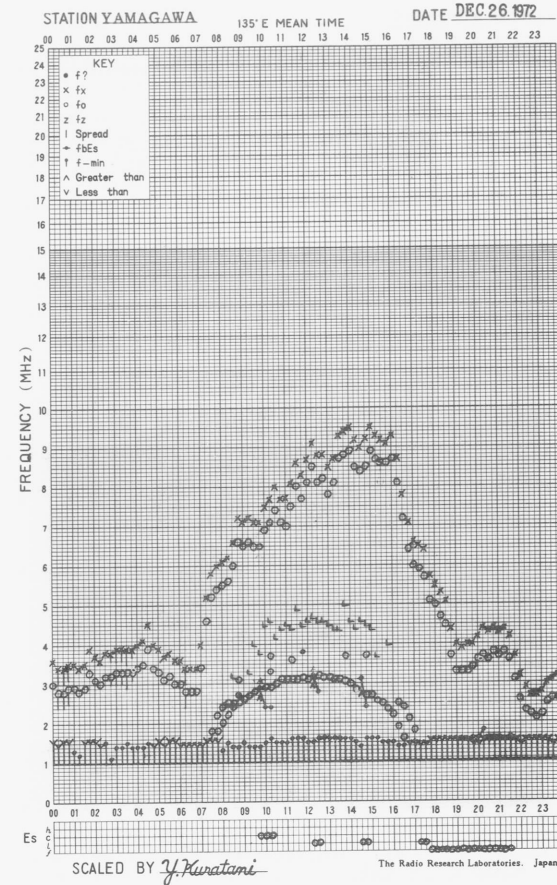
f-PLOT OF IONOSPHERIC DATA



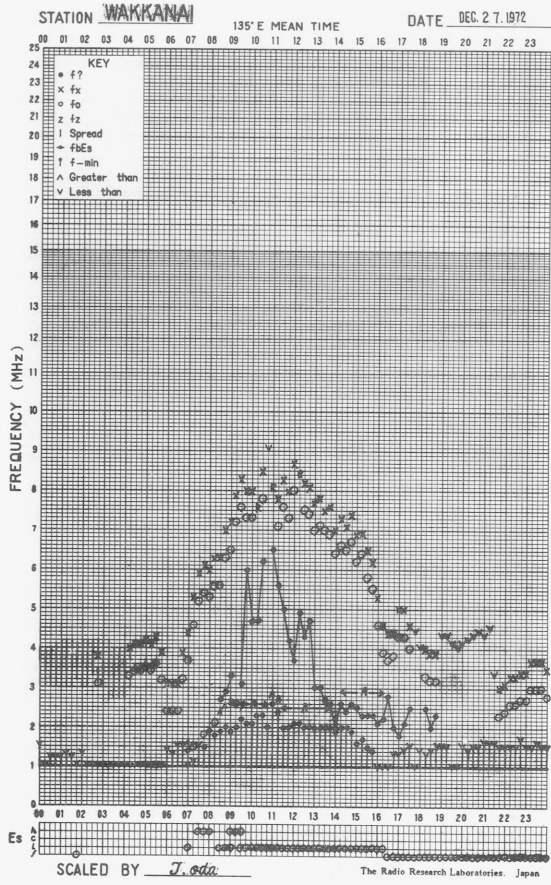
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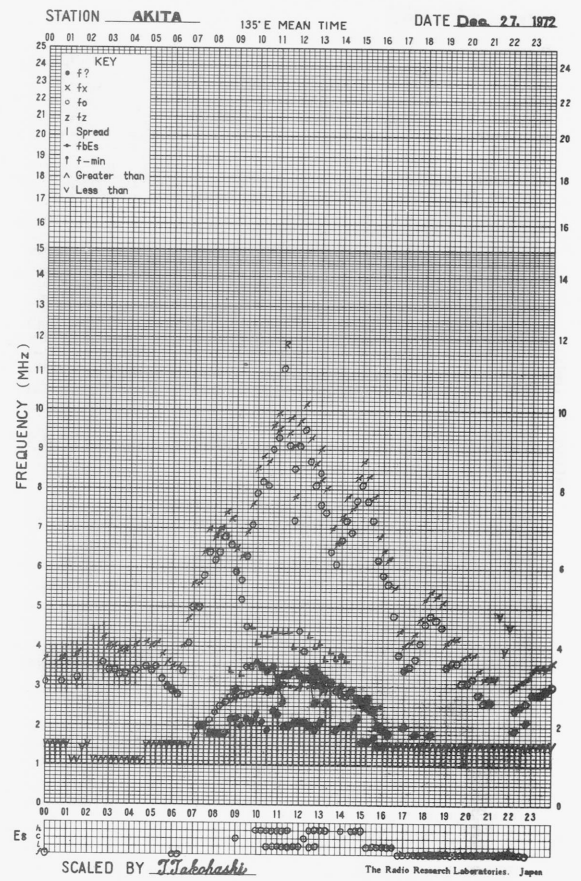
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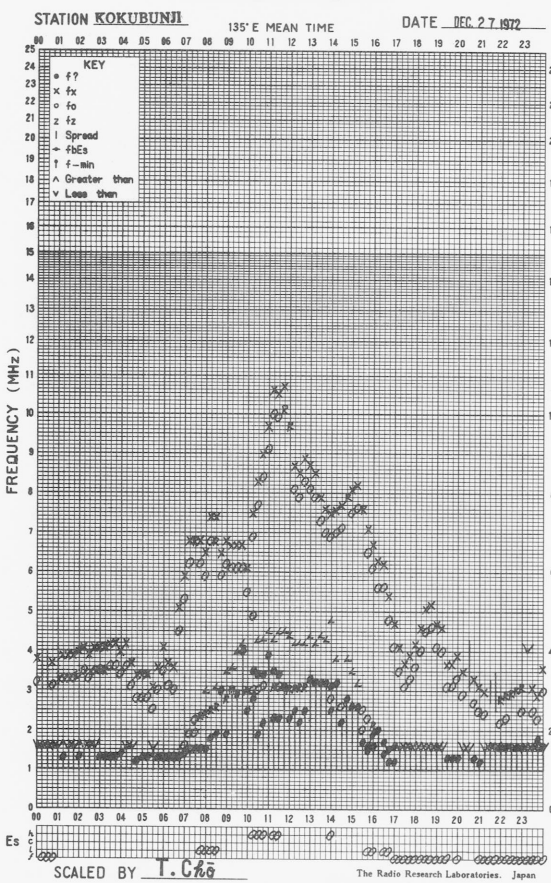
f-PLOT OF IONOSPHERIC DATA



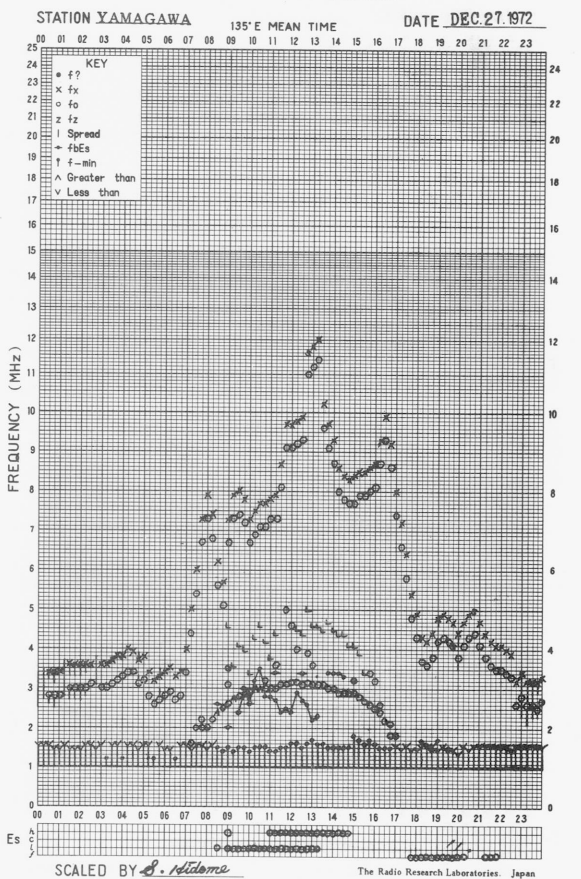
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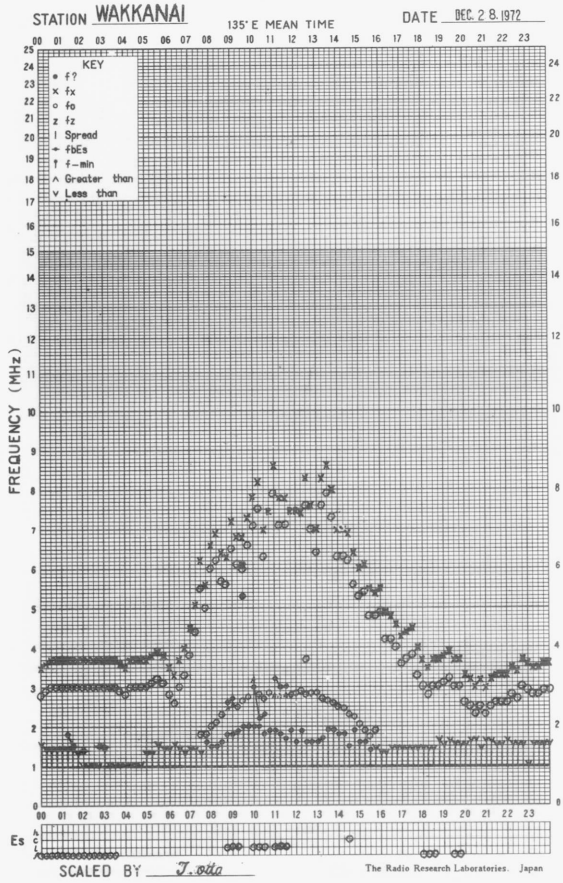
f-PLOT OF IONOSPHERIC DATA



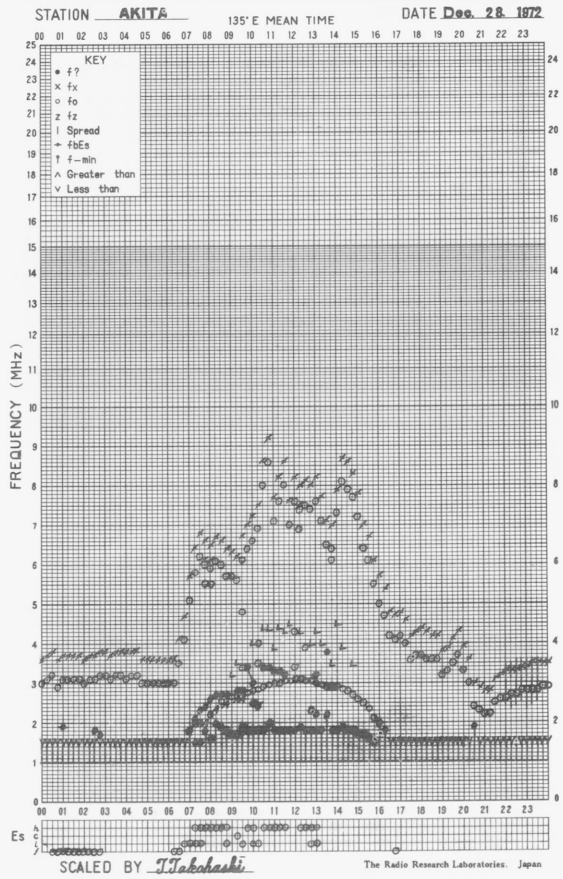
f-PLOT OF IONOSPHERIC DATA



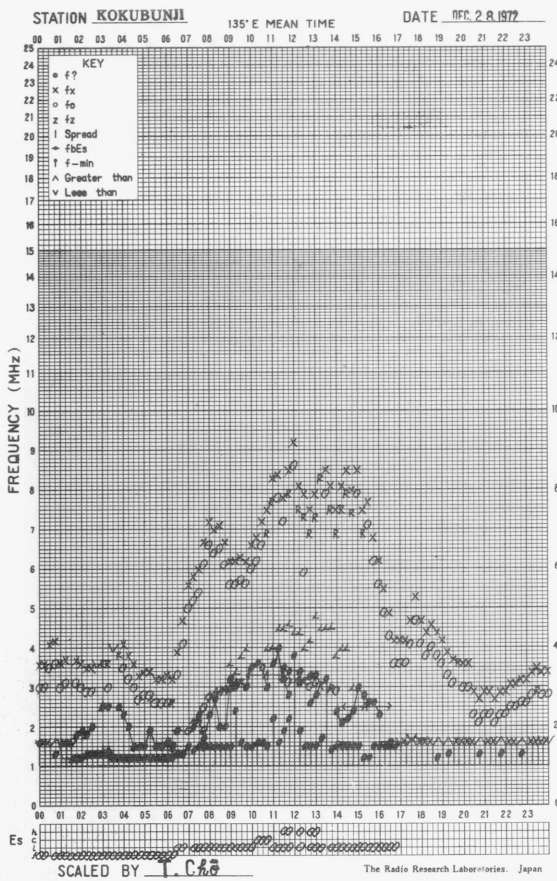
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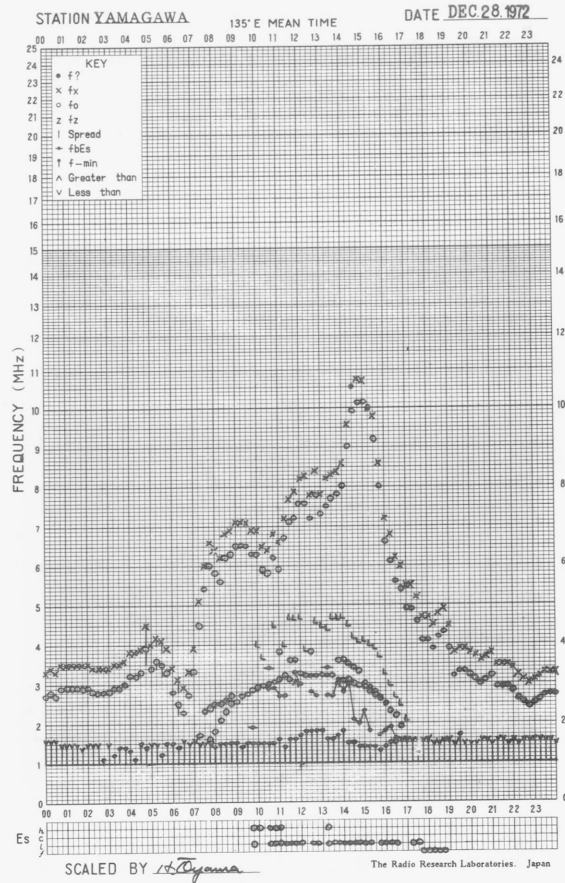
f-PLOT OF IONOSPHERIC DATA



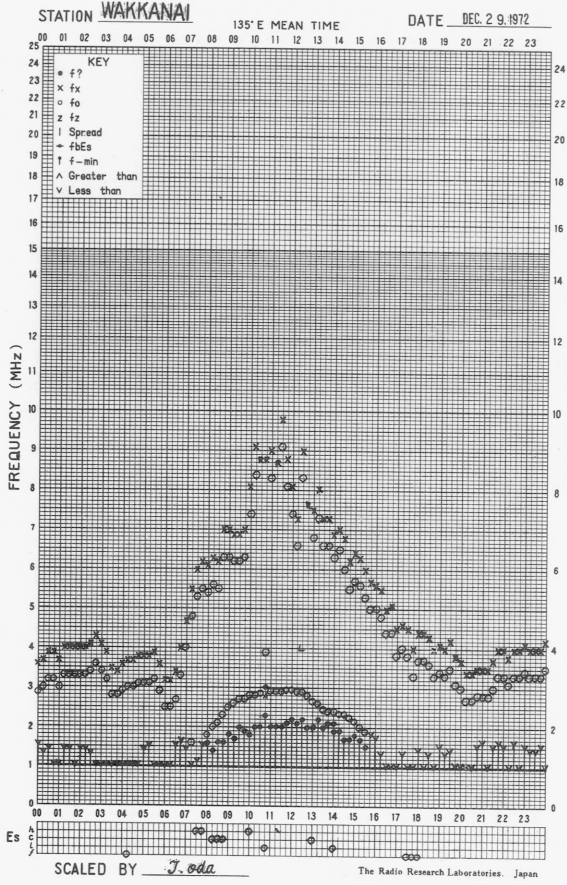
f-PLOT OF IONOSPHERIC DATA



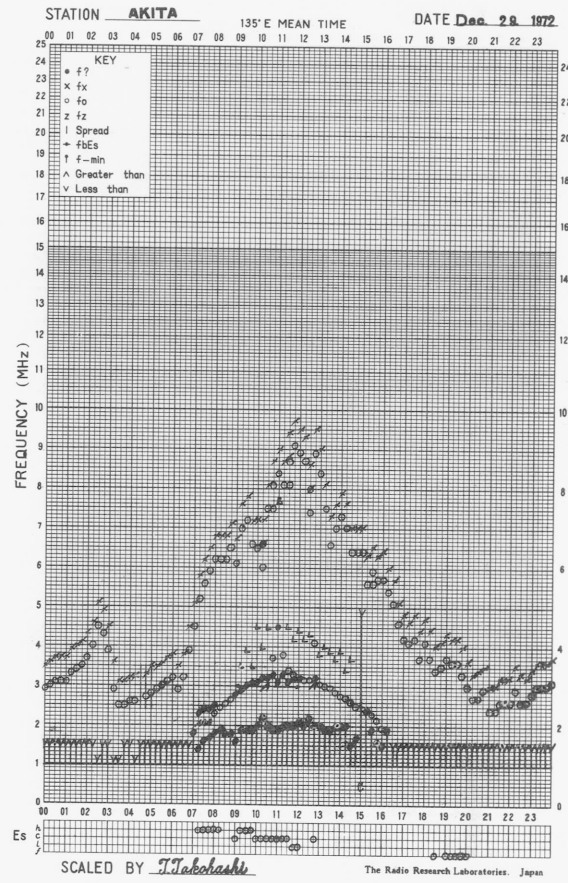
f-PLOT OF IONOSPHERIC DATA



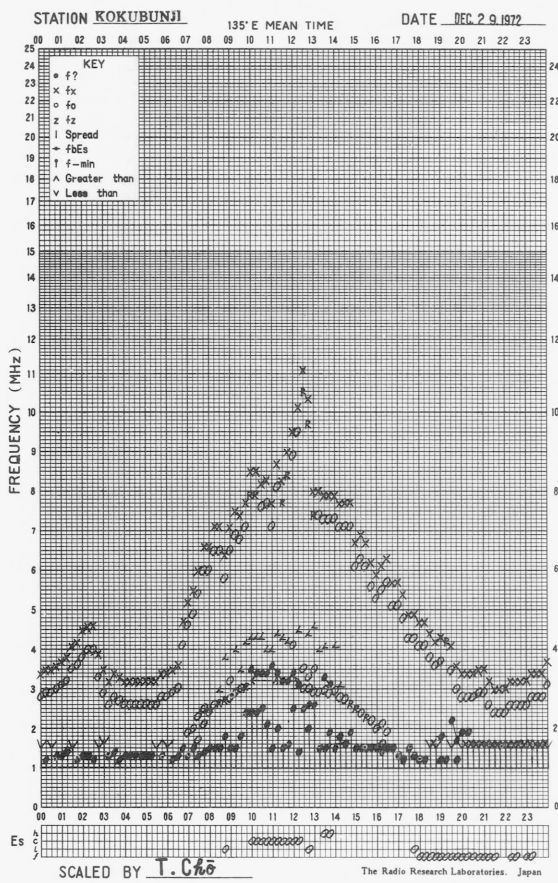
f-PLOT OF IONOSPHERIC DATA



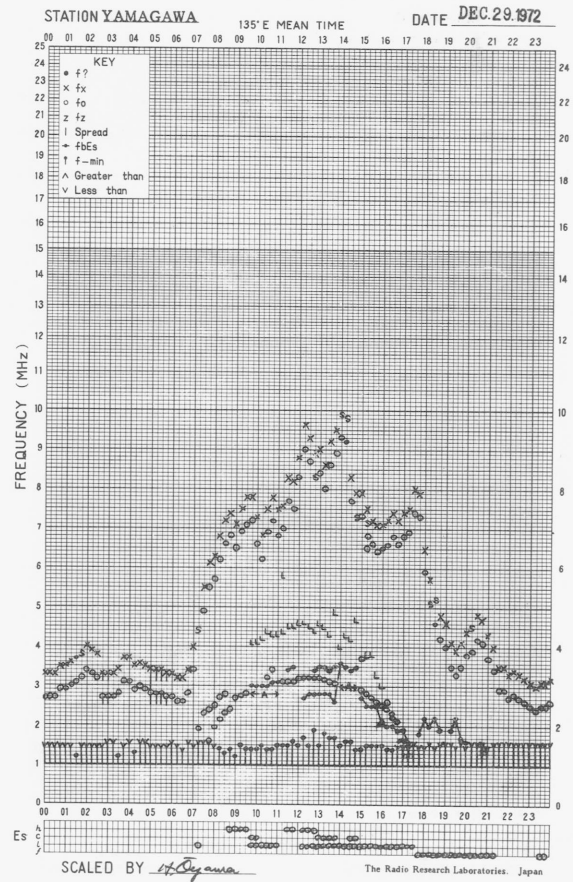
f-PLOT OF IONOSPHERIC DATA



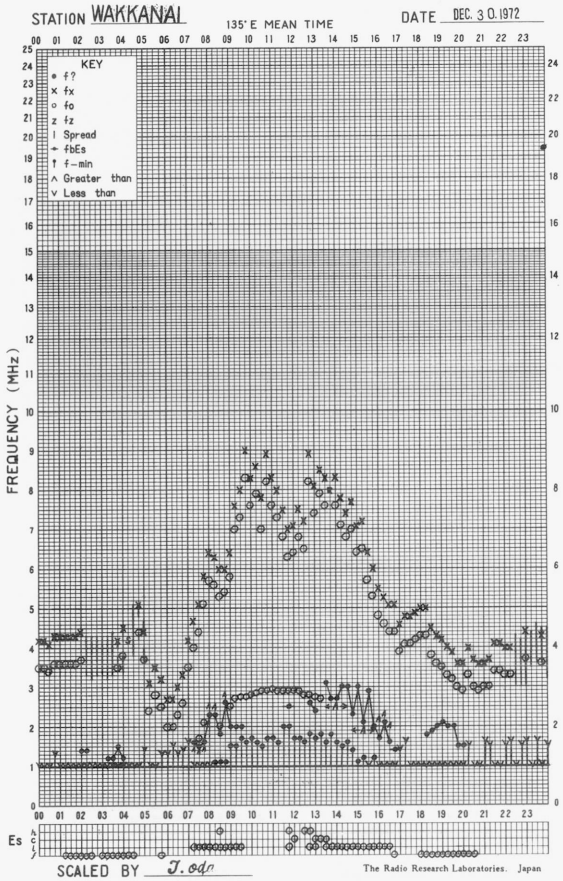
f-PLOT OF IONOSPHERIC DATA



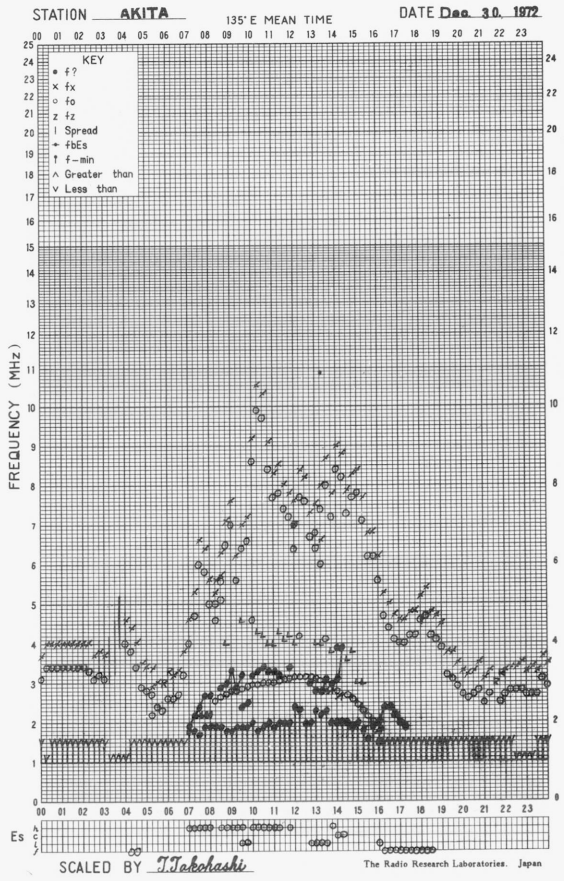
f-PLOT OF IONOSPHERIC DATA



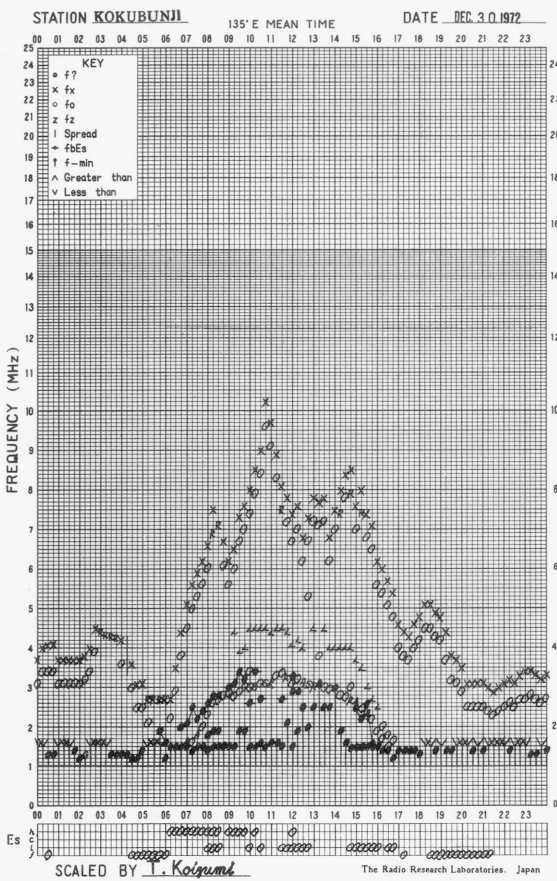
f-PLOT OF IONOSPHERIC DATA



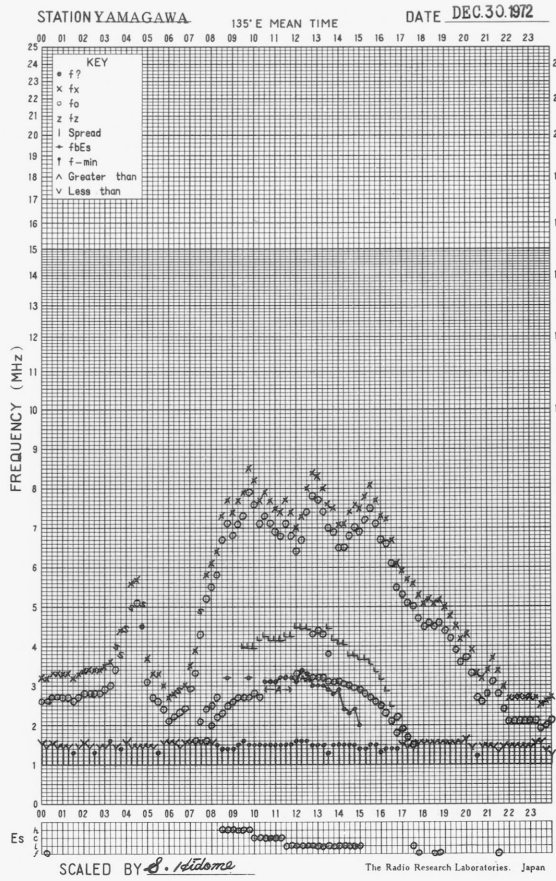
f-PLOT OF IONOSPHERIC DATA



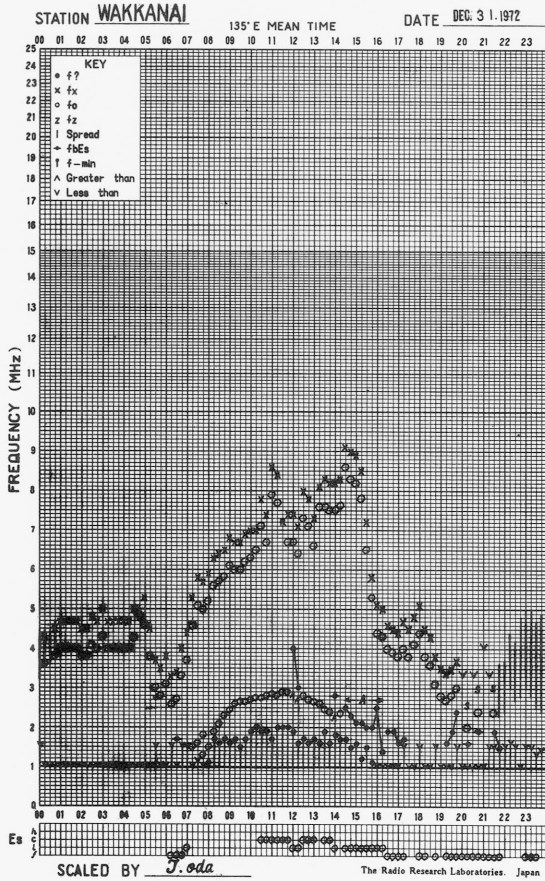
f-PLOT OF IONOSPHERIC DATA



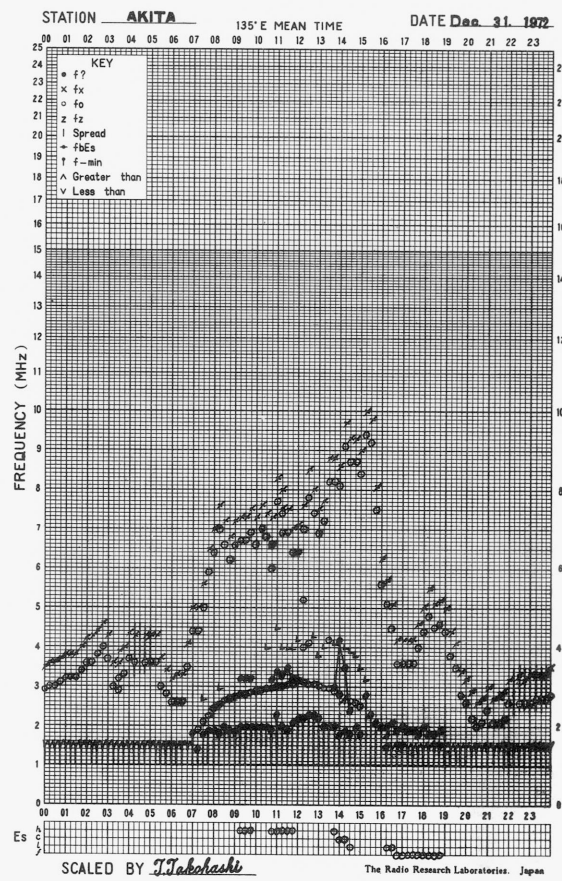
f-PLOT OF IONOSPHERIC DATA



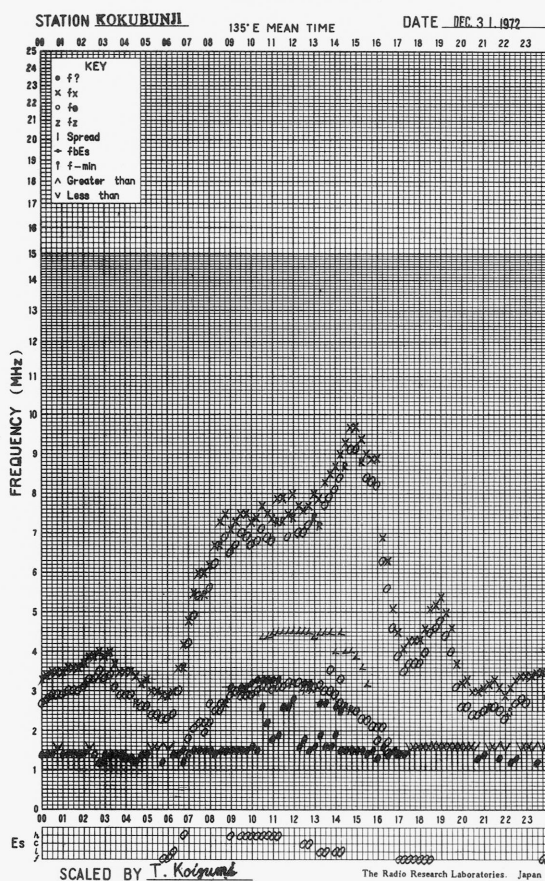
f-PLOT OF IONOSPHERIC DATA



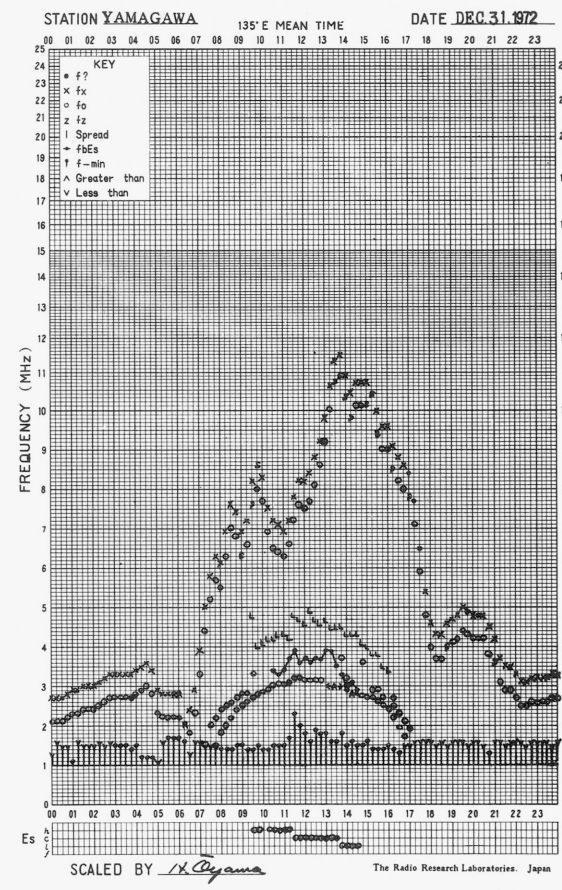
f-PLOT OF IONOSPHERIC DATA



f-PLOT OF IONOSPHERIC DATA



f-PLOT OF IONOSPHERIC DATA



SOLAR RADIO EMISSION

<u>Flux Density and Variability</u>										
Month: December 1972						Frequency: 200 MHz				
Observing station: Hiraiso										
Flux density $10^{-22} \text{ W m}^{-2} \text{ Hz}^{-1}$						Variability 0 to 3				
UT	00-03	03-06	06-09	21-24	Day	00-03	03-06	06-09	21-24	Day
Date										
1	6	6	(7)	7	6	0	0	(0)	0	0
2	7	7	(7)	6	7	0	0	(0)	0	0
3	6	7	(7)	6	7	0	0	(0)	0	0
4	7	-	-	-	(6)	0	-	-	-	(0)
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-
8	-	-	-	10	-	-	-	-	1	-
9	11	11	(10)	9	11	0	0	(0)	0	0
10	13	23	(18)	10	16	1	0	(0)	0	0
11	9	8	(9)	q	9	0	0	(0)	0	0
12	q	q	(q)	q	q	0	0	(0)	0	0
13	q	q	(q)	q	q	0	0	(0)	0	0
14	q	q	(q)	q	q	0	0	(0)	0	0
15	q	q	(q)	q	q	0	0	(0)	0	0
16	q	q	(q)	q	q	0	1	(0)	0	0
17	q	q	(q)	q	q	0	0	(0)	0	0
18	q	q	(q)	q	q	0	0	(0)	0	0
19	q	q	(q)	q	q	0	0	(0)	0	0
20	q	q	(q)	q	q	0	0	(0)	2	0
21	q	q	(q)	q	q	1	0	(0)	0	1
22	q	q	(q)	q	q	0	0	(0)	1	0
23	q	q	(q)	q	q	0	0	(0)	0	0
24	q	q	-	-	q	*	0	-	-	0
25	-	-	(q)	q	(q)	-	-	(0)	0	(0)
26	q	q	(q)	q	q	0	0	(0)	0	0
27	q	q	(q)	q	q	0	0	(0)	0	0
28	q	q	(q)	q	q	0	0	(0)	0	0
29	q	q	(q)	q	q	0	0	(0)	0	0
30	q	q	(q)	q	q	0	0	(0)	0	0
31	q	q	(q)	q	q	0	0	(0)	0	0

Note No observations during the following periods:

1st	0225-	0305	16th	0200-	0240
4th	0235-	0730	17th	0020-	0100
12th	0000-	0100	24th	0550-	25th 0545

q: means the quiet sun level, owing to immersion of the sun into the galaxy.

*: interference by atmospherics.

SOLAR RADIO EMISSION

<u>Flux Density</u>					
Month: December 1972					
Observing station: Hiraiso			Frequency: 500 MHz		
Flux density $10^{-22} \text{ Wm}^{-2} \text{ Hz}^{-1}$					
UT	00-03	03-06	06-09	21-24	Day
Date					
1	(26)	26	(25)	25	25
2	25	24	(23)	25	24
3	25	22	(21)	24	23
4	22	21	(20)	24	22
5	21	20	(20)	21	21
6	21	21	(21)	22	21
7	22	20	(19)	23	21
8	22	23	(22)	26	23
9	27	26	(26)	24	26
10	26	28	(28)	25	27
11	26	26	(25)	26	26
12	28	28	(27)	25	27
13	27	28	(27)	27	27
14	30	28	(26)	30	28
15	32	28	(31)	26	30
16	30	32	(31)	32	30
17	32	30	(28)	28	28
18	29	30	(29)	32	29
19	32	30	(31)	32	31
20	33	32	(33)	33	32
21	31	31	(30)	32	32
22	34	30	(28)	34	32
23	35	30	(31)	31	33
24	32	31	-	-	31
25	34	31	(29)	29	32
26	30	29	(27)	27	29
27	27	27	(25)	26	27
28	26	26	(25)	25	26
29	26	26	(27)	23	26
30	27	26	(26)	27	26
31	27	25	(24)	23	26

Note No observations during the following periods:

1st 0015- 0140
 24th 0555- 25th 0030

<u>Distinctive Events</u>								
(single-frequency observations)								
Month: December 1972								
Observing station: Hiraíso								
Normal observing period: 2140 - 0730 (sunrise to sunset)								
Date	Frequency	Starting time	Time of maximum	Duration	Type	Flux density		Remarks
	MHz	UT	UT	minutes		$10^{-22} \text{ Wm}^{-2} \text{ Hz}^{-1}$	peak	
8	500	2257.0	2300.4	41	C	200	30	1st peak
			2315.3			80		2nd peak
	200	2258.5	2259.5	70	C	1500	120	1st peak
			2306.5			300		2nd peak
			2316.0			440		3rd peak
			2340.0			240		4th peak
			2347.0			260		5th peak
	100	2259.0	(2301.2)	5.0	C	260	120	P: 1, * 2300-01
		2305	2315	71	RF	180	60	P: r
10	500	0033.8	0034.0	1.5	C	50	15	1st peak
			0034.9			40		2nd peak
	200	0034.5	0035.0	1.0	C	70	40	
	100	0034.5	0035.2	1.0	C	170	70	P: r
	500	0037.5	0041.5	9.0	C	50	10	
	100	0040	0157	265	RF	600	90	P: r
	200	0042	0112	70	RF	30	15	
	500	0046.5	0112.0	6.0	pi	10	5	
13	100	0329.5	0332.0	3.0	C	150	60	P: r
16	500	0341.5	0347.2	75	C	170	60	1st peak
			0359.7			220		2nd peak
			0402.6			280		3rd peak
			0410.0			350		4th peak
			0412.0			380		5th peak
			0418.7			370		6th peak
			0423.6			300		7th peak
	200	0343.0	0347.5	80	C	240	50	1st peak
			0407.2			480		2nd peak
			0411.8			470		3rd peak
			0419.5			470		4th peak
	100	0343.0	0345.0	40	C	80	7	P: rlrl
27	200	0254.8	0255.0	1.0	C	500	110	
30	100	<2150	2222	>635	Ns	70	40	P: R

P: means polarization degree.

*: interrupted by calibration.

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

DEC 1972		FREQUENCY 15 MHZ															BANDWIDTH 80 HZ															RECEIVING ANTENNA ROD 4.5 M															MEASURED AT HIRAISSO			
UT DAY	00H 45M	01H 45M	02H 45M	03H 45M	04H 45M	05H 45M	06H 45M	07H 45M	08H 45M	09H 45M	10H 45M	11H 45M	12H 45M	13H 45M	14H 45M	15H 45M	16H 45M	17H 45M	18H 45M	19H 45M	20H 45M	21H 45M	22H 45M	23H 45M																										
1	14	13	14	15	15	12	ES -4	ES 2	ES 1	ES -6	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	7	13	14	12																						
2	16	12	15	17	17	1	ES -2	ES -3	ES -3	ES -10	ES -25	ES -25	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	14	16	15	14																						
3	12	15	15	14	15	ES -4	ES -3	ES -5	ES -2	ES -8	ES -15	ES 5	ES 5	ES 9	ES 9	ES 9	ES 9	ES 9	ES 9	ES 9	ES 9	ES 9	ES 9	ES 9	1	8	11	15																						
4	11	11	13	18	11	5	ES -1	ES -1	ES 8	ES -12	ES 4	ES -26	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	15	20	12	16																						
5	15	14	15	11	11	ES 0	ES 0	ES -7	ES 3	ES -16	ES -25	ES -25	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	15	12	8	12																						
6	12	13	14	17	14	8	-1	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	8	12	10	12																						
7	12	14	13	15	11	6	5	ES -5	ES -21	ES 8	ES -10	ES -16	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	12	13	17	12																						
8	12	16	17	C	C	ES -4	ES -3	ES -4	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	6	14	8	10																						
9	13	12	15	16	12	12	6	ES 8	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	15	14	14	15																						
10	12	11	16	15	15	14	ES 11	ES -3	ES -25	ES -25	ES -25	ES -25	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	18	12	17	13																						
11	15	13	15	15	16	4	ES 5	ES -3	ES -25	ES -13	ES -25	ES -16	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	11	16	13	7																						
12	12	12	15	16	22	12	12	ES 3	ES 8	ES -25	ES -25	ES -25	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	7	15	12	13																						
13	11	12	16	17	20	17	ES 3	ES -3	-4	ES -3	16	-10	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	16	19	13	14																						
14	16	18	14	14	20	17	14	ES -1	ES -1	ES -7	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	16	16	10	9																						
15	11	18	15	19	18	14	10	ES 4	4	5	4	-4	-11	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	14	18	17	11																						
16	13	15	17	6	20	21	14	ES 2	ES -2	ES 0	ES -6	ES -20	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	13	19	13	15																						
17	18	18	17	18	20	12	14	8	ES 3	ES -7	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	6	8	13	9	9																					
18	9	10	11	20	8	18	ES 1	ES 1	0	ES 0	ES -5	ES -18	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	11	20	13	10																						
19	10	7	11	17	16	13	2	ES 0	ES -4	ES -2	ES -6	ES -6	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	0	8	19	14																						
20	10	12	13	15	20	15	-2	-10	-21	-18	-21	ES -21	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	6	14	20	7																						
21	8	13	14	18	15	17	0	ES -1	ES -6	ES -5	ES -6	ES -15	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	2	9	10	3																						
22	4	11	9	8	17	15	11	ES -2	ES -15	-6	ES -8	ES -8	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	3	18	14	10																						
23	8	11	13	20	20	19	3	ES -2	ES -3	ES 3	ES 3	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	13	17	13	14																						
24	13	18	17	20	24	18	ES 7	ES -2	ES -3	ES 1	ES 2	ES 3	ES -5	-12	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	9	21	10	ES 9																						
25	10	14	12	16	18	4	0	ES -2	ES -2	ES 0	ES -6	ES -12	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	2	13	9	6																						
26	11	11	10	17	18	-3	ES -8	-6	1	-8	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	5	11	8	11																						
27	9	11	13	19	14	14	6	ES -2	ES -3	-11	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	0	13	11	11																						
28	19	10	15	12	18	-1	ES -4	ES -4	ES -26	ES -26	ES -26	ES -26	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	7	10	4	4																						
29	7	9	13	20	17	15	2	ES 3	ES -3	ES -15	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	-2	7	7	7																						
30	13	14	18	17	19	9	ES 1	ES -4	ES -26	ES -26	ES -26	ES -26	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	-2	6	19	15																						
31	18	15	12	17	17	5	19	ES -2	ES -8	ES -2	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	11	18	13	9																						
CNT	31	31	31	30	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31																					
MED	12	13	14	17	17	12	ES 2	ES -2	ES -4	ES -8	ES -25	ES -25	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	9	14	13	11																						
UD	18	18	17	20	20	18	14	ES 3	0	ES 1	ES 2	ES -5	-11	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	16	20	19	15																						
LD	8	10	11	11	11	ES -3	ES -4	ES -8	ES -25	ES -25	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	0	8	8	ES 6																						

RADIO PROPAGATION QUALITY FIGURES

HIRAISO

Time in U.T.

Dec. 1972	Whole Day Index	W W V				W W V H				Warning				Principal magnetic storms		
		00	06	12	18	00	06	12	18	00	06	12	18	Start	End	ΔH
1	4+	(4)	-	(5)	4	4	-	-	4	N	N	N	N			
2	4°	(4)	-	-	(4)	4	-	-	4	N	N	N	N			
3	4°	(4)	-	-	4	4	-	-	4	N	N	N	N			
4	4°	(4)	-	-	4	4	-	-	4	N	N	N	N			
5	3°	(2)	-	-	4	3	-	-	4	N	N	N	N			
6	4-	(3)	-	-	4	4	(4)	-	4	N	N	N	N			
7	4°	(4)	-	-	4	4	(4)	-	4	N	N	N	N			
8	4°	(4)	-	-	4	(3)	-	-	4	N	N	N	N			
9	4°	(4)	-	-	4	4	(4)	-	4	N	N	N	N			
10	4°	(3)	-	-	5	4	-	-	4	N	N	N	N			
11	4-	(3)	-	-	4	4	-	-	4	N	N	N	N			
12	4°	(4)	-	-	4	4	(5)	-	4	N	N	N	N	21.45	---	118 ^Y
13	5°	(5)	-	-	(5)	4	-	-	4	N	N	N	N	---	---	
14*	4°	(4)	-	-	(4)	4	(5)	-	4	N	N	N	N	---	---	
15	5°	(5)	-	-	(5)	4	(5)	-	4	N	N	N	N	---	---	
16	5-	(5)	-	-	(4)	4	(5)	-	4	N	N	N	N	---	---	
17	4°	(4)	-	-	4	4	(5)	-	4	N	N	N	N	---	21.0	
18	4+	(4)	-	(5)	(4)	4	-	-	4	N	N	N	N			
[19]	4°	(4)	-	-	4	4	(4)	-	4	N	N	N	N			
[20]	4°	(4)	-	-	4	4	(3)	-	4	N	N	N	N			
[21]	3°	(3)	-	-	3	4	(4)	-	3	N	N	N	N			
22	3°	(3)	-	-	3	4	(5)	-	4	N	N	N	N	09.26	---	78 ^Y
23	4°	(4)	-	-	4	4	(4)	-	4	N	N	N	N	---	---	
24	4+	(4)	-	(5)	(4)	4	-	-	4	N	N	N	N	---	18.0	
25	4-	(4)	-	-	(3)	4	(4)	-	4	N	N	N	N			
26	5-	(5)	-	-	4	4	(4)	-	4	N	N	N	N			
27	2+	(3)	-	-	(2)	4	(4)	-	4	N	N	N	N			
28	2+	(3)	-	-	(2)	4	-	-	3	N	N	N	N			
29	4°	(4)	-	-	4	4	(4)	-	3	N	N	N	N			
30	4°	(4)	-	-	4	4	-	-	4	N	N	N	N			
31	4°	(4)	-	-	(4)	4	(5)	-	4	N	N	N	N			

GEOALERT

" = PROTON FLARE
 * = MAGSTORM
 ° = MAGCALME
 ' = COSMIC EVENT

[] = Regular World Day
 - = impossible to evaluate
 () = inaccurate

C = artificial accident
 --- = continuing magnetic storm

SUDDEN IONOSPHERIC DISTURBANCES

(S.I.D.)

HIRAISO

Time in U.T.

Dec.	S W F							Correspondence				
	Drop-out Intensities (db)					Start-time	Duration	Type	Imp	Flare	Solar Noise	Mag.
1972	CO	LM	HA	TO	SH							
8			33			23.00	30	S	2+	23.00	×	
10			18			00.48	56	G	2	00.34		
16			23			03.42	47	Slow	2	03.40	×	

I N U B O

1972	S P A									Remarks
Dec.	Phase Advance (degrees)						Time (U.T.)			
DATE	GBR	NAA	NWC	NPG	HA3	AL3	Start	End	Maximum	
8			<u>16</u>	7			0244	0348	0253	
8	27	44	124	121	<u>142</u>	34	2257	0218	2309	
10	12	47	<u>123</u>	60	94	29	0029	0326	0106	
11	12						0151	0214	0153	
11			10	<u>11</u>			0502	0525	0505	
13			<u>10</u>	5	5		2342	0001	2347	
14			4	<u>6</u>	8		2252	2312	2256	
15			82*				0539	0755	0612	X
15	<u>69</u>	47		8		58	2122	2300	2203	
16	89	51	<u>161</u>	84	112	97	0341	0654	0354	
18	16		<u>31</u>				0654	0800	0707	X
18		8	<u>9</u>				2340	0000	2345	
20	<u>26</u>					23	0655	0743	0701	
23			14				0521	0602	0533	
24				10	—	—	2204	2217	2206	
25			<u>8</u>		5		0042	0107	0051	
30			<u>40</u>	17	29		0020	0122	0029	
30			10				0548	0614	0552	
30			21				0756	0812	0800	
30	36						1856	1946	1859	
31	20	24	<u>83</u>	18	59	25	0220	0406	0230	X
31			56				0426	0538	0434	X
31			31				0542	0630	0548	
31	44						0722	0820	0736	

NOTES (1) : The letter E or D attached to a time shows that the Pertinent time is earlier or more delayed than the given time, respectively.

(2) : The mark * shows a multi-peak event.

(3) : The mark ** shows a time on the day before the pertinent day.

IONOSPHERIC DATA IN JAPAN FOR DECEMBER 1972

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