

F-231

IONOSPHERIC DATA IN JAPAN

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KOKUBUNJI, TOKYO, JAPAN

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SITE OF THE RADIO WAVE OBSERVATORIES

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

	Latitude	Longitude	Site
Wakkanai	45°23.6'N.	141°41.1'E.	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.	Nukuikita-machi, 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.

	Latitude	Longitude	Site
Hiraiso	36°22.0'N.	140°37.5'E.	Isozaki-machi, Nakaminato-shi, Ibaraki-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	} The ordinary wave critical frequency for the $F2$, $F1$ and E layers, respectively.
f_oF1	
f_oE	
f_oE_s	The ordinary wave top frequency corresponding to highest frequency at which a mainly continuous trace is observed.
f_oE_o	The lowest ordinary wave frequency at which the E_s 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.
$h'E_s$	The lowest virtual height of the trace used to give the f_oE_s .
h_pF2	The virtual height of the $F2$ layer measured on the ordinary

$ypF2$ wave branch at a frequency equal to $0.834f_0F2$.

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 $0.969f_0F2$).

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 atmospheric.
- T Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.
- V Forked trace which may influence the measurement.
- W Measurement influenced or impossible because the echo lies outside the height range recorded.
- X Measurement refers to the extraordinary component.
- Y 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. Description of Standard Types of E_s

The eight standard types of E_s are identified by corresponding lower case letters: f, l, c, h, q, r, a, s . These letters suggest the names flat, low, cusp, high, equatorial, retardation, auroral and slant, respectively. It is strongly emphasized that these names are not restrictive. The letter 'n' is used to designate any E_s trace that does not correspond to any of the eight types.

f An E_s trace which shows no appreciable increase of height with frequency. The trace is usually relatively solid at most latitudes. This classification may only be used at night; apparently flat E_s traces observed in the daytime are classified according to their virtual height: h or l .

l A flat E_s 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 E_s 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 E_s 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 E_s trace lying clearly above the high frequency end of the normal E trace. (Usually a daytime type.)

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

r An E_s trace showing an increase in virtual height at the high frequency end similar to group retardation but which is non-blanketing 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 E_s 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 E_s trace which rises steadily with frequency and usually emerges from another type E_s 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 E_s trace such as E_s-l or E_s-f , at frequencies which greatly exceed the E layer critical frequency, whereas at low latitudes it usually rises from E_s-q , E_s-c , or E_s-h at frequencies near the regular E critical frequency. Type s is never used to determine f_oE_s and $h'E_s$. The slant trace is sometimes observed to start at f_oE without echoes clearly identifiable as E_s echoes being seen.

n The designation 'n' is used to denote an E_s 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.

d. Multiple Reflections from E_s

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

B. SOLAR RADIO EMISSION

Solar radio observations are carried out on 200 and 500 Mc/s at Hiraiso Radio Wave Observatory.

Antennas are two parabolic reflectors : 10 meter for 200 Mc/s and 5 meter for 500 Mc/s, 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 $10^{-22} \text{ W} \cdot \text{m}^{-2} \cdot (\text{c/s})^{-1}$ 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 Mc/s 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.

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 Intensities of WWV and WWVH

Field intensity 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 c/s is picked up by the use of a narrow band pass filter with ± 40 c/s bandwidth.

The *tabulated field intensity* 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	4.5 m vertical rod
Bandwidth	± 40 c/s 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.
- (): Inaccurate measurement influenced by interferences, atmospheric, or non-propagational reasons.
- <: 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) | 4=normal |
| 2=poor (disturbed) | 5=good |
| 3=rather poor (unstable) | |

The tabulated circuits contain Hamburg (commercial circuit), WWV (10, 15 and 20 Mc/s frequencies broadcast from Fort Collins, Colorado), San Francisco (commercial circuit) and WWVH (10 and 15 Mc frequencies broadcast from Hawaii), which are received at Hiraiso Branch (Lat. 36°22' N, Long. 140°38' E).

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 San Francisco.

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

c. Sudden Ionospheric Disturbance (S. I. D.)

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 Mc/s 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 Mc/s (Fort Collins, Colorado)
 SF Various frequencies of commercial circuit (San Francisco)
 HA WWVH 15 and 10 Mc/s (Hawaii)
 TO JJY 15 and 10 Mc/s (Tokyo)
 SH BPV 15 and 10 Mc/s (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

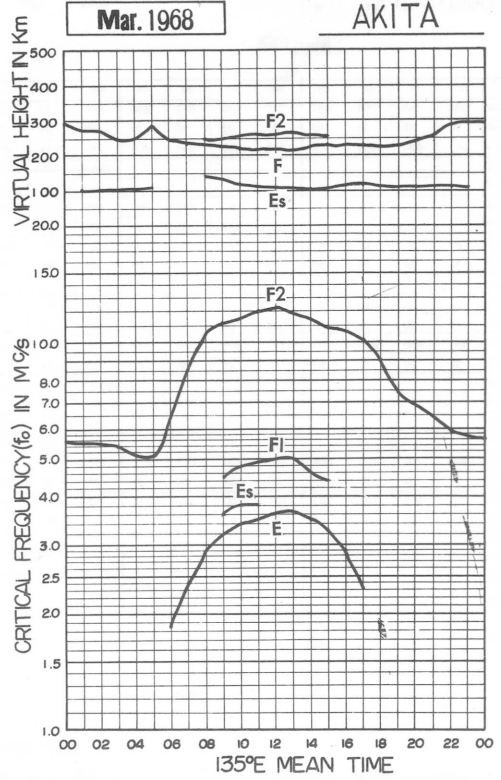
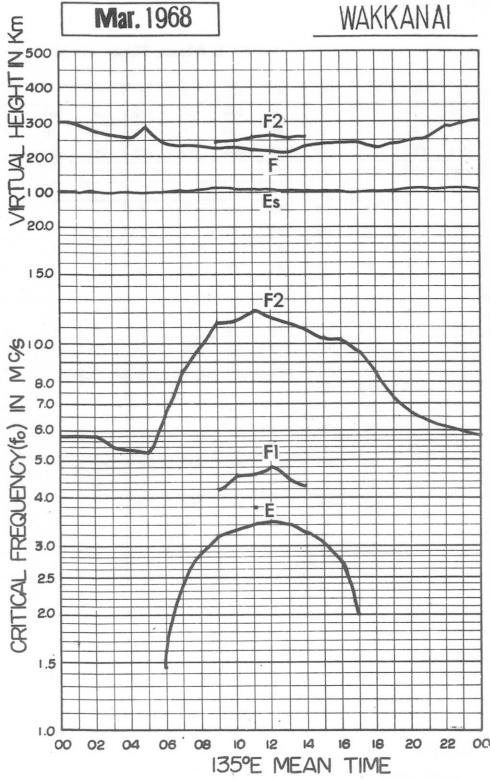
Importances

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

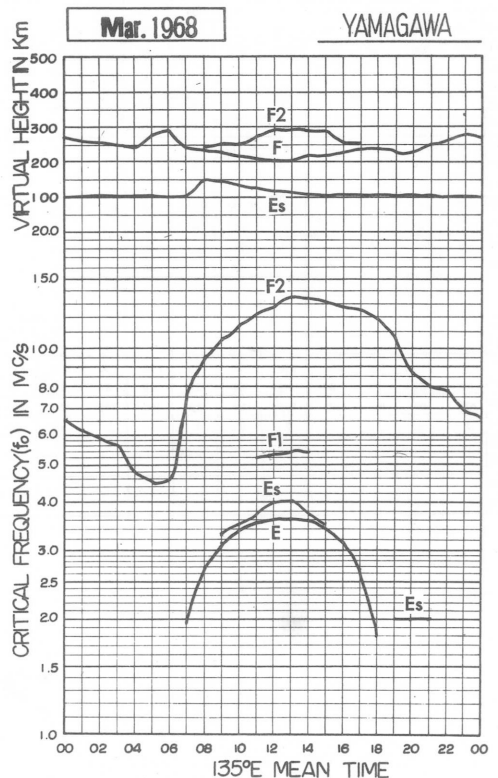
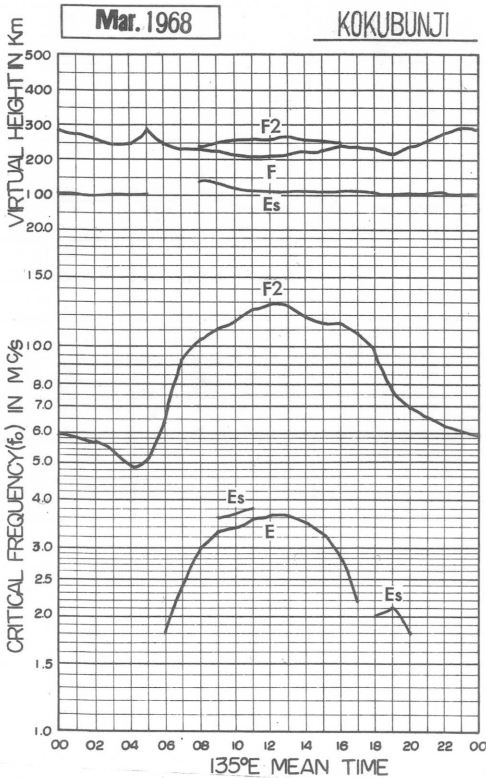
1-	1	1+
2-	2	2+
3-	3	3+

Besides, the time associated phenomena 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.

IONOSPHERIC DATA
MONTHLY MEDIAN CHARACTERISTICS



IONOSPHERIC DATA
MONTHLY MEDIAN CHARACTERISTICS



IONOSPHERIC DATA

Lat. 45° 23.6'N
Long. 141° 41.1'E

Wakkanai

foF2 0.1Mc 135° E Mean Time (G.M.T. +9h)

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	060F	061	058	057	058F	053	070	086	096	095	113	113	112	113	108	117	103	091	077	071	060	062	062	060	
2	062	063	056	051	053	051	060	076	094	102	118	127	127	110	096	098	097	090	077	069	064	063	058	060	
3	060	060	059	057	054	054	060	087	097	097	112	121	111	111	104	097	094	090	078	075	067	063	063	057	
4	059	057	059	055	046F	046	054	082	091	088	109	113	116H	116	107	101	103	1098C	086	069	064	064	062	063	
5	063	061	059	058F	054F	050F	064	077	090	113	105	121	128H	125	105	101	100	096	078	068	067	063	060	060	
6	062	058	059	060	050	045	057	093	110	118	117	133	123	111	103	106	096	102	085	067	053	053	053	053	
7	053	053	051	050	048	048	053	081	096	113	108	107	112	106	C	C	C	093	C	F	C	C	C	C	
8	C	C	C	C	C	C	C	C	C	C	109	I104C	107	108	C	C	C	096	081	066	057F	055F	050F	050F	
9	U053F	055F	U055F	U053F	F	U053F	061F	095	095	103	105	113	114	100	103	098	104	093	083	060	053	053	052	051	
10	053	054	052	051	048	047	061	079	089	098	107	106	111	104	101	101	093	094	095	069	060	059	058	058	
11	057	056	053F	050F	050	048	061	087	116	110	119H	128	120	106	108	095	095	096	081	072	056	054	053	053F	
12	053	053F	052F	049F	044	059	083	096	112	C	C	C	C	C	C	C	C	C	C	079	064	057	056	055	
13	056	055	054	050	046	042	055	075	093	098	115	115	113H	118	107	101	093	086	075	063	055	053	053	049	
14	049	048	048	046	043	043	058	085	088	110	109	106	108	097	107	099	104	093	078	066	065	066	063	064	
15	060	054	053	053	C	C	C	C	C	123	134	143	125	111	107	105	091	I086C	092	083	063	058	055	050	
16	046	047	050	046	038	040	064	081	097	096	098	103	106	101	114	102	105	094	080	069	065	062	055	051	
17	053	057	055	047	041	040	060	078	096	113	121	113	113	112	103	099	105	104	091	073	066	059	060	059	
18	058	057	057	055	053	054	066	089	103	114	113	123H	123	114	114	106	103	097	085	070	068	066	063	061	
19	U058F	060S	060	056F	054	058	078	088	101	103	108	121	120	114	111	108	104	096	086	081	082	065	061	058	
20	057	057	056	054	053	058	066	083	088	086	098	105	109	105	107	098	099	096	081	070	068	061	055	056	
21	055	057	054	053	050	050	068	081	100	103	103	116	112H	110	109	097	096	097	085	074	071	064	062	061	
22	055	054	053	053	051	050	067	081	103	113	112	111	112H	119	108	103	098	096	095	075	074	063	063	060	
23	057	059	058	058	058	056	075	091	100	113	123	118	121	116	106	104	097	099	093	077	073	068	067	065	
24	063	064	064	063	057	054	070	086	C	C	C	C	C	C	C	C	110	101	096	089	078	074	065	064	
25	063	065	066	063	058	059	073	095	109	113	119	122	109	109H	113	110	109	102	093	075	070	070	071	066	
26	067	065	066	060	055	055	078	090	104	123	126	121	120	113	111	110	106	104	098	081	I078C	I076C	075	073	
27	073	070	I068C	069	C	C	C	090	103	I112C	I115C	123	133	128	119	109	104	103	098	087	076	071	066	064	
28	063	058	058	059	056	I063C	083	090	109	126	130	I121C	I123C	125	123	120	117	113	099	084	080	074	071	071	
29	073	073	068	065	062	063	087	094	114	120	115	118	121	117	116	114	114	109	101	084	075	076	076	074	
30	070	062	065	060	050	057	085	103	109	114H	119	125	130	137	123	110	100	100	104	093	078	073	067	068	
31	064	064	059	053	058	058	085	086	090	111	113	123	120	123	118	116	104	095	093	087	083	077	075	073	
Count	30	30	30	30	27	28	28	29	28	29	29	29	29	29	27	27	28	30	31	30	30	30	30	30	30
Median	058	058	058	054	053	052	065	086	097	112	113	121	116	112	108	103	103	096	085	072	067	063	062	060	
U. Q.	063	062	059	059	056	056	074	090	104	114	119	123	123	118	114	110	104	101	095	081	075	070	066	064	
L. Q.	055	055	053	051	048	046	060	081	094	100	108	112	111	107	105	099	096	093	079	069	063	059	055	055	
Q. R.	008	007	006	008	008	010	014	009	010	014	011	011	011	011	009	011	008	008	016	012	012	011	011	009	

The Radio Research Laboratories, Japan

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

foF2

W 1

IONOSPHERIC DATA

Lat. 45° 23.6'N
Long. 141° 41.1'E

Wakkanai

0.01Mc f_oF₁ 135° E Mean Time (G.M.T. +9h)

f_oF₁

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1										410	430	U460L		L											
2										410L	L	L	U500L	400	380										
3										430L	420	L	L	430L											
4										U410L		400		410	430	400									
5											400L	400	460L	450L											
6										380	L	450			C	C									
7									C	C	I460C	440	440	430	C	C									
8									420L	L	460L			L	L										
9									L	400				L	L										
10											L	U450L			U470L										
11											C	C	C	C	C	C									
12										L	L	U450L		L											
13										L	L	L	430	U460L	420L										
14										L	L		460L	U440L											
15									C	L	L														
16										U440L		L	U510L	460L	430										
17											L	U480L	U470L	U450L	410L										
18										L	L		U500L	U460L	U430L	L									
19									U410L	370		410	U460L	U460L	L	350									
20									L	L		L	U480L	L	L										
21									L		L	L													
22											L	L		L											
23										L	U500L		L	L	U470L										
24									C	C	C	C	C	C	C	C									
25											L	L	L												
26									410L		L		U480L												
27										C	C	L	U480L	U500L	U480L										
28										U480L	C	C	U470L	440											
29									L	L	U490L	L	U490L												
30										U460L	U510L	460	U500L	U510L											
31										U500L	480	430													
Count									2	8	10	11	16	15	10	2									
Median									U410L	420L	U460L	460	U480L	U450L	430L	380									
U. Q.																									
L. Q.																									
Q. R.																									

The Radio Research Laboratories, Japan

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

f_oF₁

W 2

IONOSPHERIC DATA

Lat. 45° 23.6'N
Long. 141° 41.1'E

Wakkanai

foE 0.01Mc 135° E Mean Time (G.M.T. +9h)

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							S	200	270	305	330	345	350	330	315	300	I245A	S	E					
2							S	205	290	315	325	350	350	345	325	305	255	190	E					
3							S	205	I285A	320	325	335	355	350	325	300	260	180						
4								110	230	290	315	I320A	I330A	355	335	320	265	I190C	E					
5							E	120	210	290	310	330	345	335	310	295	260	195	S					
6							E	120	215	290	I315A	315	330	345	335	325	300	260	200	E				
7							E	215	280	305	325	330	340	330	C	C	C	200	A	C				
8							C	C	C	C	335	I340C	340	345	C	C	C	200	E					
9								160	225	290	310	320	330	340	325	290	250	190	E					
10								125	I220A	280	300	325	340	335	330	285	255	180	S					
11							E	170	245	290	A	A	335	335	320	290	250	195	E					
12							E	E	240	I285A	305	C	C	C	C	C	C	C	E					
13							S	E	230	295	320	I325A	I330A	330	320	300	245	190	S					
14							E	115	230	290	I305A	330	340	345	330	305	255	190	S					
15							C	-	C	C	305	320	300	340	335	320	295	265	I195C	A				
16							E	E	145	230	290	310	320	340	330	315	290	250	200	A				
17							E	E	230	290	305	320	340	340	325	300	270	200	S					
18							E	140	235	295	320	325	345	345	330	I310A	I270A	200	A					
19							E	145	240	295	305	I315A	I330A	345	340	325	275	200	S					
20							E	A	250	295	315	320	310	I330A	335	315	260	205	A					
21							E	170	255	305	325	I335A	350	340	330	305	270	210	S					
22							E	A	250	300	325	340	355	370	350	315	270	215	S					
23							E	185	250	300	325	335	350	350	335	305	275	220	S					
24							E	200	250	C	C	C	C	C	C	C	275	215	S					
25							A	190	260	305	325	335	340	325	340	330	280	220	130					
26							E	195	265	295	310	345	345	340	350	340	290	230	S					
27							C	C	270	300	I330C	I345C	360	I350A	350	345	330	I280A	215	S	E			
28							C	190	270	305	325	335	I345C	I355R	335	320	280	210	A					
29							S	205	270	300	330	340	345	350	345	335	315	285	230	A				
30							S	200	280	310	330	345	350	365	350	335	315	285	235	A				
31							S	215	270	305	335	350	330	330	A	A	290	230	I155S					
Count					1	15	23	29	28	28	28	28	29	28	26	26	28	29	10	1				
Median					E	E	145	240	290	315	330	340	345	340	325	305	270	200	E	E				
U. Q.																								
L. Q.																								
Q. R.																								

The Radio Research Laboratories, Japan

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

foE

W 3

IONOSPHERIC DATA

Lat. 45° 23.6'N
Long. 141° 41.1'E

Wakkanai

foEs 0.1Mc 1 3.5° E Mean Time (G.M.T. +9h)

Mar. 1968

Day	00	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 016	E	E	E	E	E015S	G	G	G	G	G	G	025G	G	G	031	023	E	E	E	E015S	E012S	E
2	E	E J025	J025	E	E	E015S	E015S	J030	G	G	G	038	039	G	G	G	G	J033	E	E	E016S	E	J023	J021
3	E	E 013	018	E	018	E	E015S	023	030	G	J043	G	G	G	G	G	G	G	E013S	E	E	E	E	024
4	J024	E	E	E	E	E015S	G	J030	G	G	046	053	G	J040	G	031	G	C	E	E	E	E014S	E012S	E
5	E	E	E	E	E	E	G	G	G	G	043	031G	G	G	041	038	G	J024	E014S	J023	E	E	J024	E016S
6	E	E	E	E	E	E012S	G	027	G	041M	040	G	G	G	G	G	G	G	E	E	E	E	E	E015S
7	E	017	E	E	E	E	G	G	G	G	G	G	G	G	C	C	C	020G	015	C	E	C	C	C
8	C	C	C	C	C	C	C	C	C	C	C	C	C	039	C	C	C	C	G	E	E	E	E	E
9	E	E	E	E	E	E	G	G	G	036	039	G	G	G	G	G	G	G	015	E	E	E	E014S	E
10	E	J020	E	E	E	E	G	025	030	G	G	G	G	025G	G	G	G	G	E012S	E	E	E	E	E
11	020	015	E	E	E	E	G	G	G	035	041	043	G	G	G	G	034	G	E	E	E	E	E015S	018
12	E	E	E	J021	E	E	G	027	J038	033	C	C	C	C	C	C	C	C	E	E	E	E012S	E	E015S
13	E016S	E015S	E	E	E	E015S	G	G	G	G	040	042	044	G	G	G	G	G	E013S	E	E	E	E	E
14	E	E	E	015	E	E	G	G	G	040	G	G	031G	G	025G	G	G	G	E012S	E	E	E	E	E
15	E	E	E	016	C	C	C	C	C	G	040	040	033G	029G	G	G	020G	C	015	018	E	E017S	E	E015S
16	E	016	017	J020	E	E	G	G	G	G	040	G	G	G	G	G	031	018G	J023	017	E	E	E	E
17	E016S	E	E	E	E	E	E	G	G	G	G	G	G	G	G	G	G	E012S	E	E	E	E	E	E
18	E015S	E	E	E	E	E	G	G	033	035	039	044	G	031G	032G	032	028	G	021M	E	E	E	E	E012S
19	E	E	E	J021	015	E	G	030	G	G	040	044	033G	031G	030G	G	G	014G	E013S	E	E	E	E	E012S
20	E	E	J023	E	013	018	020	G	G	040	043	043	039	040	G	G	G	G	016	015	E	J031	E	E
21	E	E	E	E	E	E	G	G	G	G	035	G	G	G	G	G	G	G	E012S	E	E	E	E	E
22	E	015	J020	J023	J020	J024	J023	G	G	G	G	G	G	G	G	G	021G	015G	E015S	E	E013S	E	E013S	E
23	E	013	E	016	E	E	G	G	G	G	G	034G	034G	033G	022G	030G	016G	018G	E015S	E	E015S	E	E	E014S
24	E	E	E	E	E	E	G	G	C	C	C	C	C	C	C	C	G	G	E016S	E015S	E	E	E	E
25	E	E	015	E	J020	016	G	G	G	038	040	J071	039	G	030G	024G	018G	020G	018	J050	J033	J026	020	018
26	E015S	018	013	E	J021	J020	G	J030	G	040	040	040	G	G	G	G	023G	G	E015S	E	C	C	E016S	E
27	014	J020	C	016	C	C	C	J073	G	C	C	G	038	G	G	G	031	G	E015S	E	E	020	E	E
28	E	E	E	E	014	E020C	G	G	G	G	038	C	C	G	G	G	G	G	029	016	E015S	E	E	E
29	E	E	E	E	E	E012S	G	G	G	G	G	G	G	G	G	G	036	018G	015	018	E	E	E	E
30	E	E	E	J023	015	E013S	030	G	G	G	040	G	G	029G	G	023G	018G	015G	J020	E012S	E	E	E	E
31	E	E	E	016	J020	E013S	G	G	G	045	J053	G	043	J043	035	066	G	G	E016S	E	J021	020	J021	E015S
Count	30	30	29	30	28	28	28	29	28	28	28	27	28	29	27	27	28	28	31	30	30	29	30	30
Median	E	E	E	E	E	E	E	G	G	G	040	G	G	G	G	G	G	G	E015	E	E	E	E	E
U. Q.	E	015	E	016	014	E014	G	026	G	036	040	042	G	G	G	G	G	G	E016	015	E	E013	E013	E015
L. Q.	E	E	E	E	E	E	G	G	G	G	G	G	G	G	G	G	G	G	E012	E	E	E	E	E
G. R.																								

The Radio Research Laboratories, Japan
Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation
W4

foEs

IONOSPHERIC DATA

Lat. 45° 23.6'N
Long. 141° 41.1'E

Wakkanai

0.1Mc 135° E Mean Time (G. M. T. +9h)

fbEs

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		E				S	S	G			028G	G		025G		026	021			S	S	S		
2			E	E		S	S	G			040							G	S		S	018	012	
3		E	E		E	S	S	G	028		034	035		025		G	C				S	S	E	
4	015					S		G			G	030G			020G	018G	G	S	021			015	S	
5						S		G		033	G												S	
6																								S
7		E			C	C	C	C	C	C		C		G	C	C	C	018G	014	C	C	C	C	
8	C	C	C	C	C	C	C	C		G	G								E				S	
9									022					025G					S					
10		E							025										S					
11	E	E								032	034	035				G						S	E	
12			E					G	020	G	C	C	C	C	C	C	C	C			S	S	S	
13	S	S			S						G	035	030G					S						
14			E							033			030G	025G				S						
15			E	E	C	C	C	C	C		G	G	030G	028G			018G	C	014	015	S	S	S	
16		E	E								G					G	012G	012	016					
17	S																	S						
18	S								G	027G	G	G		030G	030G	031	027		012				S	
19				012	E			G			036	036	030G	027G	030G			G	S				S	
20			E		E	015	015			G	G	G	G	035					015	012	016			
21											034								S					
22		015	015	012	013	016	020										020G	015G	S		S	S		
23		E		E								033G	030G	029G	020G	023G	016G	017G	S		S	S		
24									C	C	C	C	C	C	C	C			S	S				
25					E	014				G	G	G	G		030G	020G	017G	019G	G	047	025	021	017	016
26	S	011	E		012	012		G		G	G	G				020G		S		C	C	C	S	
27	014	017	C	E	C	C	C	G		C	C	C	037			030			S		020			
28					E	C					G	C	C					026	015					
29						S											G	015G	015	017				
30				012	E	S	016				G			027G		022G	018G	014G	017	S				
31				E	E	S			G	G	G	G	G	042	035	032			S		018	018	E	S
Count																								
Median																								
U. Q.																								
L. Q.																								
Q. R.																								

The Radio Research Laboratories, Japan

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

fbEs

W 5

Lat. 45° 23.6'N
Long. 141° 41.1'E

Wakkanai

IONOSPHERIC DATA

f-min

Mar. 1968

0.1Mc 1 35° E Mean Time (G.M.T. +9h)

Day	00	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	E015S	015	012	015	018	017	018	017	019	018	011	E017S	E	E	E	E015S	E012S	E
2	E	E	E	E	E	E013S	E015S	011	011	015	017	017	017	017	013	012	012	013	E	E	E016S	E	E	E
3	E	E	E	E	E	E	E015S	011	011	011	016	013	018	018	016	012	012	012	E013S	E	E	E	E	E016S
4	E	E	E	E	E	E015S	E	015	016	011	016	017	018	011	011	011	011	C	E	E	E	E014S	E012S	E
5	E	E	E	E	E	E	E	011	011	016	017	018	015	017	011	E	011	014	E014S	E	E	E	E	E016S
6	E	E	E	E	E	E012S	E	E	E	012	011	017	017	017	017	016	012	016	E	E	E	E	E	E015S
7	E	E	E	E	E	E	E	011	011	011	017	020	019	017	C	C	C	011	E	C	E	C	C	C
8	C	C	C	C	C	C	C	C	C	C	017	C	017	018	C	C	C	012	E	E	E	E	E	E
9	E	E	E	E	E	E	011	E	011	013	015	017	018	021	018	011	011	011	E	E	E	E	E014S	E
10	E	E	E	E	E	E	E	011	011	012	017	017	012	015	011	011	E	011	E012S	E	E	E	E	E
11	E015S	E	E	E	E	E	E	E	011	012	012	016	017	018	015	012	E	E	E	E	E	E	E015S	E
12	E	E	E	E	E	E	E	011	E	011	C	C	C	C	C	C	C	C	E	E	E	E012S	E	E015S
13	E016S	E015S	E	E	E	E015S	E	012	E	011	012	017	015	016	012	015	011	012	E013S	E	E	E	E	E
14	E	E	E	E	E	E	E	E	011	E	017	018	017	017	017	011	E	E	E012S	E	E	E	E	E
15	E	E	E	E	E	C	C	C	C	012	012	016	017	011	018	011	E	C	E	E	E	E017S	E	E015S
16	E	E	E	E	E	E	E	E	011	011	016	012	018	017	016	012	E	E	E	E	E	E	E	E
17	E016S	E	E	E	E	E	E	E	E	012	012	017	016	016	015	011	012	E	E012S	E	E	E	E	E
18	E015S	E	E	E	E	E	E	011	011	012	016	015	017	012	012	012	011	012	E	E	E	E	E	E012S
19	E	E	E	E	E	E	E	012	012	011	016	012	017	016	016	011	E	E013S	E	E	E	E	E	E012
20	E	E	E	E	E	E	E	E	015	011	012	012	016	012	015	012	012	011	E	E	E	E	E	E
21	E	E	E	E	E	E	E	012	012	017	017	018	017	017	017	011	011	012	E012S	E	E	E	E	E
22	E	E	E	E	E	E	E	012	012	016	017	017	018	017	011	016	011	E	E015S	E	E013S	E	E	E
23	E	E	E	E	E	E	E	E	011	017	018	020	017	017	012	011	E	E	E015S	E	E015S	E	E	E014S
24	E	E	E	E	E	E	E	011	016	C	C	C	C	C	C	C	011	012	E016S	E015S	E	E	E	E
25	E	E	E	E	E	E	E	013	015	011	012	018	017	018	018	016	017	011	E	E	E012S	E	E015S	E
26	E015S	E	E	E	E	E	E	E	015	015	012	017	018	018	020	017	016	011	E	E015S	E	C	E016S	E
27	E	E	E	E	E	C	C	E	012	C	C	020	016	015	017	015	016	012	E015S	E	E	E	E	E
28	E	E	E	E	E	E020C	E	011	012	017	017	C	C	020	020	013	016	E	E	E015S	E	E	E	E
29	E	E	E	E	E	E012S	E	011	012	012	013	017	016	012	016	012	012	E	E	E	E	E	E	E
30	E	E	E	E	E	E013S	E	E	012	012	017	017	016	018	017	012	011	E	E	E012S	E	E	E	E
31	E	E	E	E	E	E013S	012	011	013	016	015	017	020	017	017	017	013	011	E016S	E	E	E	E	E015S
Count	30	30	29	30	28	28	28	29	28	28	28	27	28	29	27	27	28	28	31	30	30	29	30	30
Median	E	E	E	E	E	E	E	011	011	012	016	017	017	017	016	012	011	011	E	E	E	E	E	E
U. Q.																								
L. Q.																								
Q. R.																								

f-min

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

The Radio Research Laboratories, Japan

W6

IONOSPHERIC DATA

Lat. 45° 23.6'N
Long. 141° 41.1'E

Wakkanai

135° E Mean Time (G. M. T. +9h)

M(3000) F2^{0.01}

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	250F	260	265	255	270F	270	315	320	330	290	300	300	295	300	285	310	320	315	290	285	255	265	260	240
2	245	245	240	245	250	275	305	325	315	300	295	310	310	305	295	315	310	320	300	280	275	275	255	265
3	255	250	255	250	250	265	285	325	330	310	295	315	295	295	310	300	305	320	290	280	275	280	270	245
4	250	245	255	265	240F	250	295	315	320	315	310	295	290H	295	315	295	295	I305C	295	280	280	265	245	255
5	260	260	245	255F	250F	260F	290	335	305	300	295	305	295H	315	295	300	310	315	320	255	255	255	250	250
6	250	255	265	275	270	260	295	310	310	320	300	310	305	305	300	310	290	310	290	275	285	260	265	265
7	250	260	260	270	265	260	280	315	320	325	315	305	305	300	C	C	C	320	320	280	265F	260F	260F	260F
8	C	C	C	C	C	C	C	C	C	C	315	I310C	310	305	C	C	C	320	320	280	265F	260F	260F	260F
9	U250F	260F	265F	U260F	F	U265F	295F	340	315	310	315	320	305	310	295	310	315	310	325	290	270	270	280	260
10	270	275	285	280	280	275	310	340	315	325	320	305	300	310	305	300	310	305	315	295	265	270	270	260
11	265	260	255F	250F	280	250	290	310	330	300	295H	315	310	310	315	315	315	305	315	305	275	280	270	265F
12	270	270F	275F	280F	290F	275	305	335	290	305	C	C	C	C	C	C	C	C	315	295	275	265	255	250
13	260	270	265	280	275	255	300	305	320	305	315	320	310H	310	310	315	315	325	305	285	275	280	275	270
14	265	265	270	300	280	275	310	330	320	315	310	310	295	300	295	305	315	325	310	265	270	270	270	270
15	285	270	255	255	C	C	C	C	C	300	300	305	320	295	310	310	310	I305C	300	305	295	265	300	260
16	250	255	265	305	275	255	315	335	320	300	295	310	310	305	315	295	315	310	305	280	275	265	260	255
17	245	270	280	300	270	270	315	330	315	320	305	315	320	315	305	295	310	315	310	295	290	275	265	280
18	270	255	265	275	275	275	315	310	310	315	300	300H	310	300	315	305	310	310	320	285	285	290	285	265
19	U275F	265S	275	265F	265	275	320	330	320	320	300	310	305	300	295	300	310	315	315	290	305	290	270	270
20	265	255	265	265	260	280	310	300	320	310	295	305	310	305	310	310	310	325	320	285	290	280	255	255
21	255	285	275	270	270	275	310	320	320	310	310	310	295H	310	310	305	310	320	320	290	290	280	285	295
22	270	265	265	275	285	285	330	320	320	320	315	305	305H	305	305	305	305	315	305	300	295	285	270	265
23	255	270	265	265	285	270	310	305	315	300	315	295	305	310	300	310	305	305	305	300	290	280	270	275
24	265	270	270	285	285	270	315	300	C	C	C	C	C	C	C	C	300	295	295	285	280	260	250	250
25	255	255	260	270	260	275	300	325	320	310	305	305	305	280H	305	285	295	305	315	280	275	255	270	265
26	260	265	275	270	270	270	265	310	295	310	320	300	300	300	290	290	300	300	305	295	I285C	I270C	255	260
27	275	270	I265C	265	C	C	C	310	310	I305C	I290C	285	290	290	295	295	295	290	300	285	275	270	270	265
28	265	255	245	270	265	I280C	325	310	285	295	305	I295C	290	295	295	285	290	285	295	285	280	270	260	255
29	260	265	275	275	265	255	305	305	315	310	310	295	280	275	280	275	280	295	295	290	285	255	260	255
30	275	260	260	275	250	245	295	330	270	270H	265	270	275	290	290	290	290	285	300	285	285	275	265	250
31	260	240	240	230	235	240	300	305	295	290	285	275	265	285	285	295	295	295	290	285	285	275	255	250
Count	30	30	30	30	27	28	28	29	28	29	29	29	29	29	27	27	27	28	30	31	30	30	30	30
Median	260	260	265	270	270	270	310	320	315	310	305	305	300	300	300	300	310	310	310	285	280	270	265	260
U. G.																								
L. G.																								
Q. R.																								

The Radio Research Laboratories, Japan

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

M(3000) F2

IONOSPHERIC DATA

Mar. 1968

M(3000) F1^{0.01}

135° E Mean Time (G. M. T. +9h)

Wakkanai

Lat. 45° 23.6'N
Long. 141° 41.1'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1																										
2										415	405	U390L			L											
3										415L	L	L	U380L	405	415											
4										395L	420	L	L	395L												
5										U390L	420	420	L	410	395	370										
6											400L	430	400L	400L												
7											450	L	390		C	C										
8									C	C	I395C	395	400	400	C	C										
9										400L	L	380L	L	L	L											
10										L	445		L	L	L											
11											L	U380L			U380L											
12											C	C	C	C	C	C										
13										L	L	U400L	L	L												
14											L	L	400	U400L	370L											
15										C	L	L	390L	U405L												
16										U410L		L	U375L	395L	375											
17											L	U395L	U405L	U400L	390L											
18										L	L		U380L	U390L	U390L	L										
19										U385L	405	415	U390L	U385L	L	400										
20										L		L	U390L	L	L											
21											L	L														
22											L	L		L												
23										L	U360L		L	L	U385L											
24										C	C	C	C	C	C	C										
25											L	L	L													
26										395L		L	U385L													
27										C	C	L	U375L	U380L	U380L											
28											U385L	C	C	U390L	390											
29										L	L	U370L	L	U370L												
30										U385L	U375L	390	U370L	U370L												
31											U380L	395	420													
Count									2	8	10	11	16	15	10	2										
Median									U390L	400L	U390L	395	U390L	U400L	390L	385										
U. Q.																										
L. Q.																										
Q. R.																										

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

The Radio Research Laboratories, Japan

M(3000) F1

W8

IONOSPHERIC DATA

Lat. 45° 23.6'N
Long. 141° 41.1'E

Wakkanai

135° E Mean Time (G.M.T. +9h)

km
f_oF₂

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1										225	240	250		245											
2															240	235									
3										225	245	260	240	245											
4										250	250	250	245H	250											
5										245		250		260	245	245									
6											245	260	240	260											
7											245	245	260		C	C									
8									C	C	I245C	250	250	C	C	C									
9										240	245	270		250	265										
10										235	230			260	250										
11											240H	265			265										
12											C	C	C	C	C	C									
13											245	245	260		245										
14											250	250	250	250	260										
15										C	275	265		250	245										
16											245		275	285	260	270									
17											250	240	255	260	250										
18											250	250	260	250	255	245									
19											245	235	260	260	260	245									
20											270L	260	260	260	260										
21											250	270													
22											250	250													
23											245	270	260	250	260										
24											C	C	C	C	C	C									
25											255	265	255												
26											240	260	250												
27											C	C	270	265	255										
28											260	I250C	I260C	260	270										
29											250	250	250L	270											
30											250H	270	260	275											
31											250	260	250												
Count									4	16	21	23	20	22	14	3									
Median									250	245	250	260	260	255	260	245									
U. Q.																									
L. Q.																									
Q. R.																									

f_oF₂

IONOSPHERIC DATA

Lat. 45° 23.6'N
Long. 141° 41.1'E

Wakkanai

1 3.5° E Mean Time (G. M. T. +9h)

km

h'F

Mar. 1968

Day	.00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	285	260	265	290	260	285	250	220	220	210	200	225	230	240	225	245	240	230	210	240	250	280	290	315
2	305	295	310	310	300	270	240	225	235	225	230	230	210E	220	225	235	240	240	230	250	260	260	305	295
3	300	300	295	300	305	275	245	250	235	210	240	215	240	215	240	240	245	240	240	240	250	250	265	290
4	320	300	290	255	280	325	255	235	245	220	200	215	220	235	230	225	245	I240C	225	225	250	285	310	295
5	280	280	295	290	275	280	245	225	240	235	240	205	225E	215	220	235	240	245	215	295	295	285	310	310
6	295	275	270	250	200	300	260	250	240	240	225	200	220	210	235	240	240	245	205	250	245	255	295	300
7	300	285	290	275	270	300	250	245	205E	225	200	235	225	235	C	C	C	225	210	C	265	C	C	C
8	C	C	C	C	C	C	C	C	C	C	230	I225C	210	215	C	C	C	240	215	225	240	270	290	305
9	300	285	275	260	270	260	250	240	225	220	210	210	230	225	230	235	260	225	220	215	240	275	295	290
10	300	270	250	260	250	260	230	220	225	200	195	225	215E	235	220	240	240	245	225	210	240	275	280	290
11	300	300	290	270	260	300	265	240	240	215	215	210	215	230	225	240	250	240	225	225	230	265	265	280
12	295	280	260	250	240	220	240	230	225	235	C	C	C	C	C	C	C	C	210	225	245	280	310	325
13	310	295	255	250	225	320	260	240	230	225	235	220	210E	210	240	220	240	225	225	235	240	250	260	275
14	225	300	270	250	240	270	240	240	225	225	230	215	205	210	200	240	245	240	225	245	270	285	275	280
15	260	275	300	300	C	C	C	C	C	245	225	245	220	215	240	230	245	I240C	245	225	230	250	250	310
16	325	300	290	240	265	330	245	230	250	220	225	210	225	220	225	220	240	235	210	230	245	280	305	315
17	350	275	250	225	245	300	245	240	240	240	230	225	210	200	210	240	250	245	210	230	245	245	290	270
18	290	290	270	250	245	260	230	235	240	225	220	210E	215	220	215	225	245	240	220	245	255	255	260	270
19	285	280	260	270	275	285	235	225	225	205	230	210	225	225	230	215	245	245	235	245	245	240	260	275
20	290	295	275	290	290	270	230	225	240	240	245	245	215	210	230	240	240	240	220	225	245	260	290	305
21	330	275	255	255	250	285	245	240	240	240	220	235	210E	215	245	230	250	245	220	240	250	250	265	265
22	275	320	310	275	290	270	240	230	225	225	215	220	220E	225	240	245	245	245	245	220	250	240	275	300
23	300	300	280	290	255	275	245	225	225	215	215	235	220	220	225	225	245	245	220	235	255	250	275	295
24	300	300	275	250	235	275	240	235	C	C	C	C	C	C	C	C	245	245	245	240	250	230	300	320
25	275	320	290	260	260	265	240	245	240	225	215	225	240	210E	235	240	250	250	240	I260A	275	310	290	295
26	300	290	260	280	245	295	240	225	215	230	235	225	210	210	220	240	250	250	240	225	I255C	I285C	310	300
27	290	275	I275C	275	C	C	C	240	225	I225C	I220C	225	225	240	235	240	240	255	240	240	270	265	285	285
28	290	295	305	275	250	I275C	230	240	235	225	235	I215C	I220C	225	215	230	250	250	240	240	260	250	275	300
29	300	270	260	255	260	315	240	225	235	215	220	215	220	230	215	240	245	245	245	245	265	295	300	275
30	250	270	285	235	295	320	245	245	240	215	240	220	225	225	240	240	245	260	250	235	245	245	270	300
31	300	320	310	315	330	315	245	235	240	240	220	210	210	245	240	240	245	245	245	245	260	265	265	310
Count	30	30	30	30	28	28	28	29	28	29	29	29	29	29	27	27	28	30	31	30	31	30	30	30
Median	300	290	275	265	260	280	245	235	235	225	225	220	220	220	230	240	245	245	245	240	250	260	285	295
U. Q.																								
L. Q.																								
G. R.																								

The Radio Research Laboratories, Japan

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

h'F

W10

IONOSPHERIC DATA

Lat. 45° 23.6'N
Long. 141° 41.1'E

Wakkanai

135° E Mean Time (G.M.T. +9h)

km
h'Es

Mar. 1968

Day	00	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	100	E	E	E	E	S	G	G	G	G	G	G	105	G	G	110	110	E	E	E	S	S	E
2	E	E	100	105	E	S	S	110	G	G	170	160	G	G	G	G	G	120	E	E	S	E	110	105
3	E	105	110	E	105	E	S	115	110	G	110	G	G	G	G	G	G	G	S	E	E	S	E	110
4	105	E	E	E	E	S	G	100	G	G	110	110	G	105	G	105	G	C	E	E	E	S	S	E
5	E	E	E	E	E	E	G	G	G	G	125	110	G	G	125	120	G	105	S	120	E	E	125	S
6	E	E	E	E	E	S	G	150	G	110	115	G	G	G	G	G	G	G	E	E	E	E	S	S
7	E	110	E	E	E	E	G	G	G	G	G	G	G	G	C	C	C	110	110	C	E	C	C	C
8	C	C	C	C	C	C	C	C	C	C	G	C	G	115	C	C	C	G	E	E	E	E	E	E
9	E	E	E	E	E	E	G	G	G	125	120	G	G	G	G	G	G	G	120	E	E	E	S	E
10	E	100	E	E	E	E	G	110	110	G	G	G	G	105	G	G	G	G	S	E	E	E	E	E
11	110	100	E	E	E	E	G	G	G	110	110	110	G	G	G	G	100	G	E	E	E	S	S	110
12	E	E	E	100	E	E	G	160	110	115	C	C	C	C	C	C	C	C	E	E	S	E	S	S
13	S	S	E	E	E	S	G	G	G	G	110	110	110	G	G	G	G	G	S	E	E	E	E	E
14	E	E	E	105	E	E	G	G	G	110	G	G	110	G	105	G	G	G	S	E	E	E	E	E
15	E	E	E	100	C	C	C	C	C	G	110	110	110	110	G	G	105	C	100	100	E	S	E	S
16	E	110	105	100	E	E	G	G	G	G	110	G	G	G	G	G	115	100	100	100	E	E	E	E
17	S	E	E	E	E	E	G	G	G	G	G	G	G	G	G	G	G	G	S	E	E	E	E	E
18	S	E	E	E	E	E	G	G	150	140	120	110	G	110	110	110	110	G	105	E	E	E	S	S
19	E	E	E	105	105	E	G	150	G	G	110	105	105	105	105	G	G	100	S	E	E	E	S	S
20	E	E	100	E	105	105	105	G	G	120	115	110	110	110	G	G	G	G	105	110	E	110	E	E
21	E	E	E	E	E	E	G	G	G	G	110	G	G	G	G	G	G	G	S	E	E	E	E	E
22	E	105	105	100	105	100	100	G	G	G	G	G	G	G	G	G	105	100	S	E	S	E	S	E
23	E	105	E	105	E	E	G	G	G	G	110	110	105	105	100	100	100	100	S	E	S	E	E	S
24	E	E	E	E	E	E	G	G	C	C	C	C	C	C	C	C	C	G	S	S	E	E	E	E
25	E	E	105	E	100	100	G	G	G	120	115	120	110	G	105	105	105	105	120	110	110	110	110	105
26	S	100	100	E	100	105	G	100	G	110	115	115	G	G	G	G	105	G	S	E	C	C	S	E
27	105	105	C	100	C	C	C	100	G	C	C	G	110	G	G	G	110	G	S	E	E	110	E	E
28	E	E	E	E	100	C	G	G	G	G	115	C	C	G	G	G	G	G	110	105	S	E	E	E
29	E	E	E	E	E	S	G	G	G	G	G	G	G	G	G	G	135	100	100	105	E	E	E	E
30	E	E	E	100	100	S	100	G	G	G	120	G	G	105	G	100	105	100	100	S	E	E	E	E
31	E	E	E	105	105	S	G	G	G	120	120	G	110	110	105	105	G	G	S	E	105	110	115	S
Count	3	10	7	11	9	4	3	9	4	10	19	12	9	11	7	7	12	11	10	7	2	4	4	4
Median	105	105	105	100	105	100	100	110	110	120	115	110	110	105	105	105	105	100	105	105	110	110	110	110
U. Q.																								
L. Q.																								
Q. R.																								

h'Es

IONOSPHERIC DATA

Lat. 45° 23.6'N
Long. 141° 41.1'E

Wakkanai

Types of Es
135° E Mean Time (G.M.T. +9h)

Mar. 1968

Day	00	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											l				l	l							
2		f	f					l		h l	h							c					f2	f	
3		f	f		f2			l	l	c														f	
4		f2						l		l	l	l				l									
5								c	l	c	l		c l	c l			l		f					f	
6								h		l	c						l	l							
7														c					c						
8										c	c														
9								l	l				l												
10								h	h	l2	c														
11		f	f2							f	l	l					l							f	
12																									
13										c	l	l													
14										l			l												
15										c	c	l	l				l	l	l	f					
16										l							c	l	l	f					
17																									
18									h	h l	c	c		l	l	l	l		l						
19								h			l	l	l	l											
20										c	c	c	l						l	f		f2			
21										l															
22																	l	l							
23													l	l2	l	l	l	l							
24																									
25										c	c	c	c		l	l	l	l	c	f4	f5	f4	f	f	
26										c	c	c	c				l								
27																	l					f2			
28																			l4	f					
29																	h	l	l	f					
30																			l	l	l				
31										c	c	c	c	l	l	l					f2	f	f		
Count																									
Median																									
U. Q.																									
L. Q.																									
Q. R.																									

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

Types of Es

The Radio Research Laboratories, Japan

W12

IONOSPHERIC DATA

Lat. 39° 43.5'N
Long. 140° 08.2'E

Akita

0.1Mc **135° E Mean Time** (G.M.T. +9h)

f_oF₂

Mar. 1968

Day	00	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	054	055	053	051	050	062	080	092	097	I109C	116	121	I122C	I116C	115	108	083	077	068	064	062	I062C	057
2	056	058	058	057	058	I058C	059	081	100	117	115	122	129	121	107	104	097	099	080	062	061	058	056	057
3	054	052	052	052	051	053	062	082	108	103	104	121	119	115	110	098	098	097	078	C	C	058	054	054
4	052	052	053	053	046	047	058	082	I094C	100	106	124	129	126	118	105	107	103	088	070	065	055	054	061
5	057	062	057	056	053	054	064	083	095	116	119	120	127	129	116	105	101	097	087	063	068	069	061	059
6	058	060	060	059	051	044	058	093	I112C	112	109	124	120	111	108	103	108	101	086	061	063	058	057	056
7	054	055	055	051	049	051	059	086	109	113	120	116	104	119	107	104	099	086	C	C	C	C	C	C
8	C	055	053	054	054	053	064	084	093	097	106	104	110	104	103	099	106R	098	080	064	054	054	055	053
9	054	054	053	048	046	048	056	082	099	I101R	113	112	116	116	099	108	096	098	081	057	053	054	054	055
10	053	054	055	051	047	045	056	072	I088C	I092R	102	116	114	111	101	096	094R	I093C	I090C	075	056	054	054	056
11	056	055	051	048	050	048	058	085	118	124	110	119	129	114	113	112	096	097	087	071	056	053	054	055
12	053	053	051	047	047	045	058	082	096	109	119	122	122	116	114	110	119	099	083	062	061	059	058	056
13	055	056	054	054	049	045	057	086	099	116	119	124	118	123	126	111	106	091	077	068	061	054	053	050
14	049	050	052	051	043	041	057	082	I094C	I097C	108	125	109	112	097	108	104	095	086	064	059	063	064	063
15	055	054	051	049	050	051	056	084	I104C	129	140	146	132	118	109	106	106	093	091	088	068	054	057	049
16	049	050	049	048	037H	038	061	091	105	114	103	I111R	126	116	112	116	109	108	089	072	063	061	058	055
17	056	059	064	052	044	045	057	087	I102R	116	119	125	123	112	107	103	I108R	113	I106R	076	065	064	062	063
18	058	055	055	053	054	049	068	087	I104C	112	109	121	129	129	115	114	107	104	093	071	069	067	066	063
19	061	060	058	056	055	055	075	I090C	096	097	103	119	127	128	116	110	109	108	093	083	082	071	057	056
20	055	055	054	052	052	055	075	093	094	102	116	117	122	117	114	109	104	104	089	073	068	062	057	056
21	055	058	054	054	051	050	067	091	I103R	111	C	C	C	C	C	104	104	103	093	076	069	066	062	063
22	058	054	055	054	054	050	066	088	104	115	113	113	113	114	116	104	106	103	094	082	072	068	060	057
23	058	059	059	055	053	053	073	I099R	107	102	116	122	126	124	113	099	104	101	058	082	070	069	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
26	069	067	071	064	057	057	081	096	I106C	119	119	124	122	118	114	116	114	107	103	087	073	079	076	075
27	076	072	071	068	066	066	092	C	R	118	118	126	133	136	I126C	I116C	109	111	I100C	082	068	068	067	067
28	068	066	061	063	059	055	081	091	I110C	119	124	121	126	131	129	123	122	118	114	089	080	076	073	071
29	074	076	074	062	060	060	088	097R	107	109	119	119	119	121	117	116	116	116	105	081	I075C	I074C	075	076
30	076	066	062	060	052	053	084	I106R	118	122	126	129	131	142	136	119	114	101	114	I096R	072	069	069	069
31	067	059	060	057	058	059	083	I106R	104	119	131	114	127	129	123	116	113	100	098	089	081	074	074	074
Count	27	29	29	29	29	29	29	28	28	29	28	28	28	29	29	30	30	30	29	28	28	28	28	28
Median	056	055	055	054	051	051	064	086	104	112	114	120	122	118	114	108	106	101	090	074	068	064	059	057
U. Q.	061	060	060	057	054	055	075	092	107	118	119	124	128	127	118	116	109	106	098	082	072	069	066	065
L. Q.	054	054	053	051	047	046	058	082	096	102	108	116	117	114	108	104	104	097	084	066	061	056	056	056
Q. R.	007	006	007	006	007	009	017	010	011	016	011	008	011	013	010	012	005	009	014	016	011	013	010	009

Sweep 1.0 Mc to 20.0 Mc in 15 sec in automatic operation

f_oF₂

The Radio Research Laboratories, Japan

A1

IONOSPHERIC DATA

Lat. 39° 43.5'N
Long. 140° 08.2'E

Akita

foF1 0.01Mc 1.35° E Mean Time (G.M.T. +9h)

foF1

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									340	LH	I480C	L	L	C	C	L								
2										L	450	500	L	L	L	L								
3									L	L	LH	500	L	L	480L	L								
4									L	L	L	500L	500	480	L	L								
5									L	L	490	470	450	460L	L	L								
6										L	L	550H	420	L	L	L								
7										L	L	L	L	520	440	450L								
8										400	L	L	440	580H	L	L								
9								L		L	480	470	480	500	440L	L								
10									L	410L	500L	LH	500	L	L	L								
11										L	450	430	480L	L	L	420L								
12										480L	470	470	480L	460	460L	L								
13										L	450	500L	L	480	430	L								
14										C	600H	450	L	500L	L	400								
15										450	470	460	L	480L	L	L								
16									L	430L	L	L	500	480	450L	L								
17									L	L	480L	450	500L	L	460	L								
18									C	460	L	510	LH	500	L	440								
19									L	L	400	510	500	480L	L	430L								
20									L	L	L	460	470L	500L	470	L								
21									L	460	C	C	C	C	C	460L								
22									400	L	L	L	470	450	L	L								
23									L	L	480L	490	L	490	460	L								
24									C	C	C	C	C	C	C	C								
25									C	C	C	C	C	500L	510L	L								
26									C	L	460	490	500L	L	LH	L								
27									L	L	L	500L	500	500	C	C								
28									C	L	470	480L	510L	500	490L	L								
29									L	L	L	500	500	530	L	L								
30									L	L	500	490	L	510L	L	L	L							
31									L	L	L	480L	610H	500L	L	L	L							
Count									2	7	16	22	18	21	11	6								
Median									370	450	480	490	500	500	460L	440L								
U. Q.																								
L. Q.																								
Q. R.																								

Sweep 1.0 Mc to 20.0 Mc in 15 sec in automatic operation

The Radio Research Laboratories, Japan

foF1

A2

Mar. 1968

foE

0.01Mc 135° E Mean Time (G.M. T. +9h)

Akita

Lat. 39° 48.5'N
Long. 140° 08.2'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1						B	220	275	315	I330C	350	355	I360C	I350C	330	285	A	A						
2						B	230	280	315	335	355	360	360	345	320	285	A	B						
3						B	235	290	315	I340A	I360A	370	360	350	325	I260A	210	B						
4						B	225	I280C	315	I330A	I350A	360	365	355	325	275	220	B						
5						155	230	285	320	I340A	I350A	365	I360A	345	I310A	265	A	A						
6						160	225	280	320	I335A	I350A	360	360	345	325	285	220	B						
7						B	225	275	315	335	350	360	365	345	315	275	210	C						
8						B	235	285	320	345	355	365	360	345	320	290	A	B						
9						B	235	285	A	A	360	365	365	345	315	275	B	A						
10						B	I240A	I280C	320	340	350	355	355	325	310	260	C	C						
11						B	245	295	I320A	A	A	360	365	345	315	275	220	B						
12						155	I230A	280	I315A	340	I355A	360	360	345	325	285	220	B						
13						B	235	290	320	335	355	365	355	340	325	280	215	B						
14						170	240	I280C	I310C	330	350	355	360	345	315	275	215	B						
15						165	245	I295C	325	340	I350A	360	360	345	315	275	205	B						
16						170R	240	290	325	I335A	I345A	355	365	340	315R	270	225	B						
17						B	235	285	320	I335A	350	I355A	365	350	320	285	235	B						
18						185	235	I290C	325	A	A	A	A	I345A	330	280	A	A						
19						190	I235C	290	325	I335A	345	I360A	365	345	325	I285A	230	A						
20						170	250	300	325	A	A	A	A	A	A	A	A	230	A					
21						B	250	305	330	C	C	C	C	C	335	300	245	B						
22						180	250	300	330	345	355	370	365	360	335	300	240	A						
23						190	250	300	330	I340A	A	A	365	360	325	290	240	A						
24						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
25						C	C	C	C	C	C	C	C	370	355	345	I300A	240	A					
26						195	260	I300C	330	345	A	A	A	370	355	340	305	250	B					
27						200	I265C	310	335	345	355	370	375	I370C	I345C	320	250	B						
28						225	275	I315C	335	345	I350A	I360A	370	370	345	A	A	A						
29						210	265	310	330	340	345	360	365	355	345	300	250	B						
30						I215A	265	310	335	I340A	I355A	370	370	360	340	300	250	B						
31						225	275	310	330	350	I360A	I370A	375	360	350	310	250	B						
Count						17	29	29	28	24	23	24	27	28	29	28	22							
Median						185	240	290	320	340	350	360	365	345	325	285	230							
U. Q.																								
L. Q.																								
Q. R.																								

foE

Sweep 1.0 Mc to 20.0 Mc in 15 sec in automatic operation

The Radio Research Laboratories, Japan

A3

IONOSPHERIC DATA

Lat. 39° 43.5'N
Long. 140° 08.2'E

Akita

foEs

Mar. 1968

0.1Mc 1.35° E Mean Time (G.M.T. +9h)

Day	00	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	E	J016	J024	J023	E	E019B	G	G	G	C	G	G	C	C	G	G	J025	J025	E017B	E013S	E019B	C	E019B
2	E019B	E013S	E	E	E	C	E017B	G	031	G	G	G	G	G	G	G	G	023	E019B	E013S	E014S	022M	E018B	E018B
3	E014S	J023	J018	E	E	E012S	E017B	G	033	039	040	J044	G	G	G	G	028	G	E019B	C	C	C	E013S	E019B
4	E013S	J019	J024	E	E012S	E013S	E019B	G	C	036	038	038	G	G	G	G	G	G	E018B	E012S	J020	E019B	E018B	E020B
5	E019B	E	E	E	E	J023	G	G	032	G	035	036	G	J038	G	032	G	J033	J025	J025	022M	E018B	J019	J025
6	E014S	E012S	E	E	E	E012S	G	G	G	G	037	040	039	G	0278	G	G	G	E016B	E013S	J022	E013S	E019B	E013S
7	E012S	E	E	E	E	E013S	E019B	G	030	034	G	G	G	G	G	G	G	G	C	C	C	C	C	C
8	C	E	E	E	E	J027	E019B	G	G	036	G	G	G	G	G	033	G	025	E019B	E013S	E013S	E013S	E013S	E013S
9	E014S	E	E	E	E	E013S	E018B	G	J035	039	039	G	G	G	G	G	G	E022B	J023	E018B	E014S	E018B	E014S	E018B
10	E018B	E013S	E013S	E	E	E013S	E017B	E026B	C	G	G	G	G	G	G	G	G	C	E018B	E014S	E014S	E013S	E018B	E013S
11	E017B	E	E013S	E013S	E	E013S	E020B	G	G	035	038	038	G	G	G	G	G	G	E014B	J019	J016	E013S	E013S	E019B
12	E020B	J018	E	E	E	E	G	J025	G	038	J050	J050	J048	J040	J034G	G	G	G	E018B	E014S	E014S	E017B	E020B	E019B
13	J020	E013S	J018	J013	E	E018B	E019B	G	G	036	036	G	G	J036	G	G	G	G	E019B	E014S	E018B	E018B	E019B	E018B
14	E020B	E	E	J015	J012	E	G	G	C	C	036	G	G	036	029G	G	G	G	E021B	E018B	E019B	E018B	E018B	E018B
15	E013S	E012S	E	E	E	E	G	G	C	G	043	037	G	J034G	031G	025G	G	G	E018B	E014S	E014S	E013S	E018B	E019B
16	E019B	E	J016	J019	J017	017M	G	G	031	G	040	J048	G	G	G	G	G	G	E018B	E014S	E018B	E014S	E012S	E012S
17	E019B	E013S	E	E013S	E013S	E012S	E018B	G	G	G	035	G	G	G	G	G	G	G	E018B	E021B	J020	E018B	E014S	E018B
18	E018B	E013S	E	E	E	E014S	G	E018B	C	038	041	J046	040	037	044	G	G	025	J022	E013S	E014S	E013S	E013S	J030
19	E018B	E	E	E	E	E013S	G	C	G	035	035	037	039	G	G	G	J029	023G	J017	J020	J025	J030	J021	J020
20	E018B	J018	023M	017M	J018	E013S	G	G	038	045	J046	038	J041	J037	J057	J058	J070	G	J021	J019	J018	E013S	E014S	J039
21	J040	J025	J020	E	J018	E013S	E021B	G	G	C	C	C	C	C	C	G	G	G	E019B	E013S	E019B	E014S	E014S	E014S
22	E020B	E	017M	E	E	E	G	G	G	G	038	G	G	G	G	G	G	G	022M	E020B	E014S	E020B	E020B	E020B
23	E020B	E013S	E012S	E	E	J020	G	G	G	036	J036	J042	J054	J039	J034G	G	G	G	J021	E018B	J041	J020	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	C	C	C	C	C	C	C	C	C	C	C	035G	J040	J031G	J031	G	J025	E013S	E012S	J020	J035	J050
26	J018	E013S	E	J014	J016	E013S	G	G	C	036	039	J044	J043	J038	G	G	G	G	E019B	E014S	J016	E014S	J021	J024
27	E014S	E013S	E	J021	E	J013	G	C	G	039	040	039	G	G	C	C	G	G	E018B	C	J021	E013S	J021	J018
28	E018B	E	E	E	E	E013S	G	G	C	039	040	040	039	G	038	G	J039	J048	J033	J020	J044	J056	E012S	E013S
29	E014S	E	J012	E	E	E013S	G	G	G	039	038	040	G	G	G	G	G	G	E018B	J016	C	C	E014S	E014S
30	E013S	E	E	E	E	E	024	030	G	039	038	038	G	G	G	031G	G	G	E019B	J016	J018	E	E013S	E012S
31	E013S	E	E	E	E	E013S	G	030	035	038	043	J061	038	G	G	G	G	G	E018B	E014S	E014S	J020	J017	J026
Count	27	29	29	29	29	28	29	27	22	28	27	28	28	28	27	29	30	29	28	27	27	27	27	28
Median	E018B	E012	E	E	E	E013S	G	G	G	036	038	038	G	G	G	G	G	G	E019B	E014S	E018	E018	E018	E019
U. Q.	E019	E013S	016	E013	E012	E014	E019	G	031	038	040	041	039	G	G	G	G	G	022	018	020	020	E019	020
L. Q.	E014	E	E	E	E	E012	G	G	G	G	035	G	G	G	G	G	G	G	E018	E013	E014	E013	E013	E014
Q. R.											005								D004	D005	D006	D007	D006	

Sweep 1.0 Mc to 20.0 Mc in 15 sec in automatic operation

foEs

The Radio Research Laboratories, Japan

IONOSPHERIC DATA

Lat. 39° 43.5'N
Long. 140° 08.2'E

Akita

0.1Mc **fbEs** 135° E Mean Time (G.M.T. +9h)

Mar. 1968

Day	00	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		E	E	E		B			C				C	C			023	019	B	S	S	B	B	
2	B	S				C	B		030									023	B	S	S	S	E	B	
3	S	E	E			S	B		032	038	038						028	B	C	C	C	C	S	B	
4	S	E	012		S	S	B		C	034	038	036							B	S	019	B	B	B	
5	B					E			031		035	036		038		032		027	022	020	E	B	018	022	
6	S	S			S	S	B			029	034		024		027G				B	S	E	S	B	S	
7	S				S	B				033									C	C	C	C	C	C	
8	C				017	B				033					G			025	B	S	S	S	S	S	
9	S				S	B			034	034	037							B	022	S	B	B	S	B	
10	B	S	S		S	B	B	C										C	C	B	S	S	B	S	
11	B		S	S	S	B			035	035	037								B	018	016	S	S	B	
12	B	E						025		034	G	037	030	033	029E				B	S	S	B	B	B	
13	020	S	012	E		B	B		034	035				030					B	S	B	B	B	B	
14	B			014	E				C	C	035			032G	028				B	B	B	B	B	B	
15	S	S							C		036	037		032G	028G	025G			B	S	S	S	B	B	
16	B		014	E	E	E			031		037	045							B	S	B	S	S	S	
17	B	S		S	S	S	B				035		037						B	B	020	B	S	B	
18	B	S				S		B	C	037	040	039	038	037	039			024	019	S	S	S	S	027	
19	B					S		C		034	035	037	038				029	020G	017	020	020	024	018	019	
20	B	015	E	E	013	E			035	043	044	038	037	037	037	038	032		020	018	018	S	S	E	
21	018	017	014		014	S	B				C	C	C	C					B	S	B	S	S	S	
22	B		E								038								020	B	S	B	B	B	
23	B	S	S			015				035	036	038	043	032	032G				020	B	036	E	C	C	
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
25	C	C	C	C	C	C	C	C	C	C	C	C	C	032G	028	030G	030		024	S	S	S	E	021	
26	E	S		012	012	S			C	036	039	038	039	033					B	S	016	S	018	020	
27	S	S		013		013		C		037	038	039			C	C			B	C	S	S	020	018	
28	B				E	S			C	038	039	039	038		G		036	044	030	018	018	044	S	S	
29	S					S				035	038	039							B	014	C	C	S	S	
30	S							024	030	038	037	038				031G			B	016	015	S	S	S	
31	S					S		030	034	037	041	040	038						B	S	S	S	018	E	
Count																									
Median																									
U. Q.																									
L. Q.																									
Q. R.																									

IONOSPHERIC DATA

Lat. 39° 43.5'N
Long. 140° 08.2'E

Akita

f-min 0.1Mc 135° E Mean Time (G.M.T. +9h)

f-min

Mar. 1968

Day	00	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	E	E	E	E012S	E	019	019	020	019	C	019	020	C	C	020	020	020	E013S	E013S	E013S	019	C	019
2	019	E013S	E	E	E	C	017	019	019	021	024	021	019	021	024	020	019	019	E013S	E014S	018	018	018	018
3	E014S	E	E012S	E	E	E012S	017	013	014	019	021	020	021	020	021	020	019	019	C	C	C	E013S	019	019
4	E013S	E	E	E	E012S	E013S	019	021	C	019	020	020	023	022	020	019	019	019	018	E012S	E012S	019	018	020
5	019	E	E	E	E	E012S	012	013	020	020	020	021	020	021	020	014	018	014	E013S	E	E014S	018	E012S	E012S
6	E014S	E012S	E	E	E	E012S	E012S	018	019	019	020	024	023	024	021	020	019	019	013	E013S	E013S	019	E013S	E013S
7	E012S	E	E	E	E	E013S	019	019	019	019	020	021	023	019	022	019	019	019	C	C	C	C	C	C
8	C	E	E	E	E	E	019	019	019	020	019	020	019	021	019	019	019	014	E013S	E013S	E013S	E013S	E013S	E013S
9	E014S	E	E	E	E	E013S	018	018	018	021	023	023	024	023	024	021	021	022	012	E013S	018	018	E014S	018
10	018	E013S	E013S	E	E	E013S	017	026	C	019	023	023	022	024	020	020	020	C	C	018	E014S	E013S	018	E013S
11	017	E	E013S	E013S	E	E013S	020	014	014	018	020	022	023	021	020	019	020	012	014	E	E012S	E013S	E013S	019
12	020	E	E	E	E	E	012	017	020	019	020	020	022	023	021	020	019	019	018	E014S	E014S	017	020	019
13	E	E013S	E	E	E	E	018	019	018	021	022	021	022	020	020	020	019	020	019	E014S	018	018	019	018
14	020	E	E	E	E	E	E012S	017	C	C	020	024	023	025	021	020	019	013	021	018	E014S	E013S	018	018
15	E013S	E012S	E	E	E	E	013	014	C	020	022	020	020	021	020	014	012	013	018	E014S	E014S	E013S	018	019
16	019	E	E	E	E	E013S	014	012	014	014	021	023	025	023	019	021	019	014	018	E014S	018	E014S	E012S	E012S
17	019	E013S	E	E013S	E013S	E012S	018	014	018	021	022	023	024	023	020	023	019	015	018	021	E012S	E013S	E014S	018
18	018	E013S	E	E	E	E014S	014	018	C	019	021	023	024	023	026	021	020	019	E012S	E013S	E013S	E013S	E012S	E012S
19	018	E	E	E	E	E013S	014	C	018	019	020	021	022	020	022	019	018	014	012	E012S	E012S	E012S	E012S	E012S
20	018	E013S	E012S	E	E	E	014	014	020	020	020	020	020	021	023	019	014	013	E	E012S	E013S	E013S	E014S	018
21	E012S	E	E	E	E	E013S	021	019	019	020	C	C	C	C	C	020	020	019	E013S	019	E014S	E014S	E014S	E014S
22	020	E	E013S	E	E	E	014	014	020	022	022	021	025	024	020	020	019	020	012	020	E014S	020	020	020
23	020	E013S	E012S	E	E	E013S	014	019	020	019	023	020	023	021	019	018	018	014	E012S	018	E013S	018	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	C	C	C	C	C	C	C	C	C	C	C	020	023	018	018	018	012	E013S	E012S	E014S	E014S	E014S
26	E012S	E013S	E	E	E	E013S	013	019	C	020	020	023	020	022	019	019	013	012	019	E014S	E012S	E012S	E013S	E013S
27	E014S	E013S	E	E	E	E	014	C	018	023	020	022	023	023	C	C	020	019	018	C	E013S	E	E	E012S
28	018	E	E	E	E	E013S	013	019	C	020	025	025	022	025	020	019	018	014	012	E014S	E012S	E	E	E012S
29	E014S	E	E	E	E	E013S	014	019	019	019	021	020	022	022	020	022	018	018	018	E	C	E014S	E013S	E013S
30	E013S	E	E	E	E	E	019	019	018	020	021	020	018	018	018	018	018	014	019	E012S	E013S	E	E013S	E012S
31	E013S	E	E	E	E	E013S	018	018	018	019	019	025	024	027	020	020	013	012	018	E014S	E014S	E	E012S	E012S
Count	27	29	29	29	29	28	29	27	22	28	27	28	28	28	27	29	30	29	28	27	27	27	27	28
Median	017	E	E	E	E	E013S	014	018	019	020	021	021	022	022	020	020	019	014	018	E013S	E013S	E014S	E014S	E014S
U. Q.																								
L. Q.																								
Q. R.																								

Sweep 1.0 Mc to 20.0 Mc in 15 sec in automatic operation

f-min

The Radio Research Laboratories, Japan

IONOSPHERIC DATA

Lat. 39° 43.5'N
Long. 140° 08.2'E

Akita

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

Mar. 1968

Day	00	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	280	285	280	295	300	305	345	320	330	I320C	300	300	I295C	I310C	300	325	315	300	285	290	I275C	275	275
2	270	280	280	265	275	I285C	305	315	310	315	305	295	310	305	300	300	305	320	315	275	290	280	275	275
3	285	270	285	270	255	275	305	305	320	320	320	305	300	305	310	300	305	310	295	C	C	C	290	280
4	270	270	270	285	260	265	300	320	I315C	315	305	305	315	290	295	305	300	310	320	295	275	270	280	270
5	280	275	285	285	265	265	300	325	315	310	305	300	295	295	300	295	305	310	310	265	280	280	265	270
6	275	265	270	290	315	265	305	325	I320C	315	305	305	300	290	295	310	305	320	305	295	290	290	280	280
7	280	285	275	295	280	265	290	315	320	315	310	320	310	315	310	310	315	310	C	C	C	C	C	C
8	C	280	275	280	275	275	310	340	335	325	320	290	310	315	300	310	310R	315	310	295	295	265	275	275
9	295	280	285	295	285	285	305	320	325	I315R	320	305	305	315	305	315	315	320	310	325	275	280	295	280
10	285	295	295	295	300	295	320	335	I320C	I320R	325	305	305	315	300	315	310R	I315C	I310C	320	285	285	285	280
11	295	285	275	265	280	270	290	305	320	325	290	310	280	300	300	315	315	315	315	305	285	275	285	290
12	285	285	290	300	285	280	310	320	325	310	310	305	300	300	300	300	320	325	325	305	285	280	275	280
13	275	295	280	280	290	260	300	325	325	315	310	315	305	305	310	305	310	320	315	310	300	295	285	285
14	280	280	290	295	305	285	300	325	I305C	I300C	295	315	300	310	295	300	325	325	315	295	280	280	270	280
15	310	285	275	260	265	280	280	295	I285C	295	305	310	305	305	295	305	310	305	305	305	315	285	280	275
16	265	275	265	310	265H	270	310	320	325	305	300	I290R	310	305	295	310	305	315	325	295	285	280	280	280
17	255	275	315	305	275	270	300	325	I320R	320	310	310	315	300	300	300	I300R	310	I310R	295	280	285	280	285
18	280	275	280	275	310	280	320	320	I320C	305	310	300	305	310	300	305	300	310	315	295	285	290	285	285
19	280	285	285	285	270	275	330	I325C	315	310	300	310	300	305	300	290	300	315	315	290	295	310	280	280
20	275	275	280	270	270	280	320	330	320	305	300	300	305	305	300	305	315	315	315	300	295	290	285	270
21	265	285	280	280	275	280	315	320	I320R	315	C	C	C	C	C	300	305	310	305	290	290	285	285	285
22	290	270	275	280	295	280	315	330	305	320	310	310	295	295	305	295	300	310	315	290	290	285	275	275
23	275	275	275	285	285	285	300	I315R	315	305	300	305	295	305	300	295	300	305	315	310	280	275	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	280	290	300	285	270	260	270	275
26	275	285	285	280	280	275	310	320	I320C	310	305	300	295	290	290	295	300	305	310	295	280	275	260	265
27	275	280	275	265	270	270	305	C	R	305	295	295	285	295	I290C	I295C	290	290	I300C	305	265	270	270	270
28	275	280	265	275	285	285	315	310	I305C	300	300	295	285	285	280	275	295	295	295	300	275	280	265	295
29	270	290	290	290	270	265	320	325R	310	320	295	295	285	290	285	285	285	300	305	295	I285C	I275C	265	285
30	290	280	275	285	250	260	300	I305R	310	310	295	295	285	285	285	285	285	290	300	I310R	285	265	265	290
31	270	300	270	260	260	270	290	I305R	305	295	305	285	280	285	295	290	285	300	305	305	280	265	270	255
Count	27	29	29	29	29	29	29	28	28	29	28	28	28	29	29	30	30	30	30	28	28	28	28	28
Median	275	280	280	280	275	275	305	320	320	315	305	305	300	305	300	300	305	310	310	300	285	280	280	280
U. Q.																								
L. Q.																								
Q. R.																								

The Radio Research Laboratories, Japan

Sweep 1.0 Mc to 20.0 Mc in 15 sec in automatic operation

M(3000)F2

A7

IONOSPHERIC DATA

Lat. 39° 43.5'N
Long. 140° 08.2'E

Akita

M(3000)F1_{0.01} 135° E Mean Time (G.M.T. +9h)

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									415	LH	I375C	L	L	C	C	L								
2									L	L	400	380	L	L	L	L								
3									L	L	LH	380	L	L	L	375L	L							
4									L	L	L	390L	380	375	L	L								
5									L	L	385	380	405	375L	L	L								
6									L	L	L	365H	420	L	L	L								
7									L	L	L	L	L	L	360	380	370L							
8									415	L	L	L	385	345H	L	L								
9									L	L	375	385	375	365	380L	L								
10									L	L	395L	360L	LH	360	L	L								
11									L	L	385	390	375L	L	L	375L								
12									375L	385	385	385	375L	390	385L	L								
13									L	L	380	360L	L	375	375	L								
14									C	L	345H	380	L	360L	L	395								
15									375	375	375	375	L	375L	L	L								
16									L	375L	L	L	365	375	380L	L								
17									L	L	375L	400	380L	L	370	L								
18									C	385	L	375	LH	380	L	380								
19									L	L	415	360	360	360L	L	375L								
20									L	L	L	375	385L	365L	370	L								
21									L	385	C	C	C	C	C	370L								
22									400	L	L	L	385	400	L	L								
23									L	L	375L	370	L	375	370	L								
24									C	C	C	C	C	C	C	C								
25									C	C	C	C	C	370	355L	L								
26									C	L	390	390	380L	L	LH	L								
27									L	L	L	380L	375	365	C	C								
28									C	L	385	375L	370	365L	L	L								
29									L	L	L	365	380	360	L	L								
30									L	L	380	380	L	360L	L	L	L							
31									L	L	L	375L	350H	365L	L	L	L							
Count									2	7	16	22	18	21	11	6								
Median									410	385	380	380	380	370	375L	375L								
U. Q.																								
L. Q.																								
Q. R.																								

Sweep 1.0 Mc to 20.0 Mc in 15 sec in automatic operation

The Radio Research Laboratories, Japan

A 8

M(3000)F1

IONOSPHERIC DATA

Lat. 39° 43.5'N
Long. 140° 08.2'E

Akita

135° E Mean Time (G.M.T. +9h)

km

f_oF₂

Mar. 1968

Day	00	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	245	12450	250	255	12550	12600	260									
2										250	240	230	265	245	270	250									
3									240	230	270	260	255	260	250	245									
4										245	255	285	250	255	250	250									
5									250	260	260	255	245	265	255	240									
6										230	235	275	240	235	255	245									
7										250	255	250	245	280	250	245									
8										230	260	240	255	285	260	250									
9									245	255	260	255	265	265	250	255									
10										245	255	280	260	255	260	245									
11										270	245	250	260	255	270	255									
12										255	265	250	245	260	250	255									
13										250	255	260	255	270	265	250									
14										C	290	250	245	265	255	265									
15										275	270	260	245	260	245	255									
16									250	245	245	260	270	260	265	255									
17									250	255	255	250	255	255	245	255									
18									C	250	240	275	260	255	250	260									
19									240	235	235	280	260	265	255	265									
20									250	255	255	255	255	265	265	255									
21									255	255	C	C	C	C	C	255									
22									235	240	255	255	265	265	265	250									
23									245	250	255	265	255	265	255	250									
24									C	C	C	C	C	C	C	C									
25									C	C	C	C	C	C	275	255									
26									C	255	245	265	265	265	295	270									
27									245	245	260	265	270	270	12550	12500									
28									C	255	250	270	285	265	285	265									
29									250	245	260	270	275	280	260	275									
30									250	255	275	280	270	275	275	250	255								
31									250	265	265	250	310	290	265	270	250								
Count									15	28	28	28	28	29	29	29	2								
Median									250	250	255	260	260	265	260	255	250								
U. Q.																									
L. Q.																									
Q. R.																									

f_oF₂

Lat. 39° 43.5'N
Long. 140° 08.2'E

Akita

IONOSPHERIC DATA

135° E Mean Time (G.M.T. +9h)

km
f'F

Mar. 1968

Day	00	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	280	270	270	240	240	255	215	200	190H	I210C	210	230	I225C	230	240	215	220	235	250	270	I295C	310	
2	310	285	280	295	285	I250C	230	220	230	230	200	190	225	225	235	220	220	240	220	215	240	260	285	290
3	260	290	285	300	290	280	240	215	235	230	205H	195	230	220	220	220	230	235	220	C	C	C	250	290
4	300	290	280	240	260	330	245	230	I230C	215	220	210	230	210	230	230	240	235	220	215	265	300	285	290
5	285	260	275	280	250	280	250	225	230	220	225	220	200	225	220	220	230	230	220	245	265	275	300	290
6	290	270	255	245	220	290	260	240	235	225	225	185H	190	230	220	230	245	235	210	220	240	255	295	285
7	280	280	265	265	250	300	265	240	235	225	230	215	210	210	230	215	230	220	C	C	C	C	C	C
8	C	275	270	275	270	285	255	215	230	200	215	210	200	195H	240	230	245	225	215	220	225	270	290	285
9	290	270	255	245	260	270	245	225	230	230	215	205	210	225	215	215	235	230	215	205	260	290	280	290
10	290	265	245	235	245	260	230	220	I230C	200	195	190H	230	220	215	235	230	I230C	I225C	215	240	255	285	290
11	275	285	290	240	275	295	245	230	230	230	210	215	210	230	220	230	230	235	220	215	230	260	280	280
12	260	270	245	235	235	255	230	225	230	210	200	205	200	210	195	225	240	225	210	220	240	275	300	310
13	310	270	255	250	230	325	250	235	230	220	210	225	225	215	210	230	235	225	210	230	240	255	270	275
14	300	280	250	240	220	260	240	230	I230C	I220C	205H	205	225	205	230	210	250	235	230	220	280	290	285	270
15	240	250	295	290	290	265	255	230	I230C	230	210	205	210	210	230	230	235	240	230	225	220	245	285	295
16	305	285	270	230	215H	300	245	240	230	225	230	240	205	220	205	230	235	230	215	220	245	250	265	300
17	340	290	240	210	250	290	245	230	230	225	220	200	215	220	220	230	235	240	215	215	240	245	270	280
18	280	280	275	245	235	270	240	225	I230C	220	230	200	200H	225	230	205	235	230	220	210	250	240	250	280
19	280	270	265	245	275	295	230	I230C	230	225	195	190	215	215	225	215	240	235	230	230	240	245	255	
20	290	290	280	280	290	280	230	230	230	240	240	215	220	230	225	240	240	240	220	225	250	240	265	300
21	310	275	250	255	245	280	240	230	230	215	C	C	C	C	C	220	235	240	230	225	240	245	270	265
22	280	300	290	265	230	255	230	230	220	225	220	230	205	210	230	240	240	240	230	230	245	245	265	300
23	305	290	275	255	235	275	245	240	230	215	205	210	230	215	210	220	240	240	235	230	I240A	270	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
26	285	270	250	250	220	280	240	230	I230C	220	215	220	225	220	220H	220	240	235	245	225	240	265	305	295
27	280	255	275	260	270	290	235	I220C	215	225	230	220	220	215	I230C	I230C	235	250	245	I225C	220	260	280	290
28	285	270	290	270	225	250	240	230	I230C	220	225	225	225	220	230	230	245	240	235	230	255	I260A	260	300
29	295	270	245	235	265	290	240	225	225	225	215	210	210	210	225	220	245	245	240	225	I230C	I260C	290	275
30	260	250	260	220	260	340	250	240	230	230	215	205	220	220	230	240	230	255	255	230	215	265	290	290
31	290	295	300	320	340	310	245	250	240	225	230	210	205H	230	235	230	230	240	245	245	240	255	285	300
Count	27	29	29	29	29	29	29	29	28	28	28	28	28	29	29	30	30	30	29	28	28	28	28	28
Median	275	270	270	250	250	280	245	230	230	225	215	210	215	220	225	230	235	235	220	225	240	260	285	290
U. Q.																								
L. Q.																								
Q. R.																								

f'F

Sweep 1.0 Mc to 20.0 Mc in 15 sec in automatic operation

The Radio Research Laboratories, Japan

A10

IONOSPHERIC DATA

Lat. 39° 43.5'N
Long. 140° 08.2'E

Akita

135° E Mean Time (G.M.T. +9h)

km
f_oF₂

Mar. 1968

Day	00	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	E	100	100	100	E	B	G	G	G	C	G	G	C	C	G	G	115	100	B	S	B	C	B	
2	B	S	E	E	E	C	B	G	E170G	G	G	G	G	G	G	G	G	155	B	S	S	140	B	B	
3	S	105	110	E	E	S	B	G	150	130	120	115	G	G	G	G	155	G	B	C	C	C	S	B	
4	S	105	105	E	S	S	B	G	C	125	120	115	G	G	G	G	G	G	B	S	115	B	B	B	
5	B	E	E	E	E	110	G	G	155	G	125	115	G	105	G	105	G	105	115	110	110	B	110	115	
6	S	S	E	E	E	S	G	G	G	G	120	115	110	G	110	G	G	G	B	S	110	S	B	S	
7	S	E	E	E	E	S	B	G	E160G	140	G	G	G	G	G	G	G	G	C	C	C	C	C	C	
8	C	E	E	E	E	105	B	G	G	120	G	G	G	G	G	125	G	140	B	S	S	S	S	S	
9	S	E	E	E	E	S	B	G	G	130	120	G	G	G	G	G	G	B	115	S	B	B	S	B	
10	B	S	S	E	E	S	B	B	C	G	G	G	G	G	G	G	G	C	C	B	S	S	B	S	
11	B	E	S	S	E	S	B	G	G	130	115	110	G	G	G	G	G	G	B	105	105	S	S	B	
12	B	110	E	E	E	E	G	120	G	115	130	105	105	105	105	G	G	G	B	S	S	B	B	B	
13	105	S	105	100	E	B	B	G	G	115	115	G	G	G	G	G	G	G	B	S	B	B	B	B	
14	B	E	E	105	105	E	G	G	C	C	120	G	G	105	105	G	G	G	B	B	B	B	B	B	
15	S	S	E	E	E	E	G	G	C	G	115	115	G	105	105	105	G	G	B	S	S	S	B	B	
16	B	E	105	105	110	110	G	G	140	G	125	115	G	G	G	G	G	G	B	S	B	S	S	S	
17	B	S	E	S	S	S	B	G	G	G	115	G	115	G	G	G	G	G	B	B	105	B	S	B	
18	B	S	E	E	E	S	G	B	C	130	125	115	120	120	115	G	G	115	110	S	S	S	S	105	
19	B	E	E	E	E	S	G	C	G	130	125	125	115	G	G	G	115	105	110	110	115	105	105	105	
20	B	105	115	110	105	110	G	G	130	120	115	120	110	110	105	105	115	G	105	110	105	S	S	110	
21	105	100	105	E	100	S	B	G	G	G	G	C	C	C	C	G	G	G	B	S	B	S	S	S	
22	B	E	105	E	E	E	G	G	G	G	125	G	G	G	G	G	G	G	100	B	S	B	B	B	B
23	B	S	S	E	E	105	G	G	G	125	120	110	105	105	105	G	G	G	100	B	110	110	C	C	
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
25	C	C	C	C	C	C	C	C	C	C	C	C	C	C	105	105	110	G	105	S	S	115	115	110	
26	105	S	E	100	100	S	G	G	C	140	130	120	110	105	G	G	G	G	B	S	130	S	120	110	
27	S	S	E	105	E	110	G	C	G	130	125	130	G	G	C	C	G	G	B	C	S	110	110	105	
28	B	E	E	E	105	S	G	G	C	125	125	120	120	G	125	G	105	105	110	110	115	115	S	S	
29	S	E	100	E	E	S	G	G	G	125	120	120	G	G	G	G	G	G	105	C	C	S	S	S	
30	S	E	E	E	E	E	155	155	G	130	125	115	G	G	G	105	G	G	B	110	115	E	S	S	
31	S	E	E	E	E	S	G	150	140	130	120	125	125	G	G	G	G	G	B	S	S	105	105	115	
Count	3	5	9	7	7	6	1	3	7	18	23	18	10	10	9	6	5	7	10	7	11	7	6	8	
Median	105	105	105	105	105	110	155	150	145	130	120	115	110	105	105	105	115	115	110	110	110	110	110	110	
U. Q.																									
L. Q.																									
Q. R.																									

f_oF₂

Sweep 1.0 Mc to 20.0 Mc in 15 sec in automatic operation

The Radio Research Laboratories, Japan

A11

IONOSPHERIC DATA

Lat. 39° 43.5'N
Long. 140° 08.2'E

Akita

135° E Mean Time (G.M.T. +9h)

Types of Es

Mar. 1968

Day	00	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												e2	1							
2								h	h	h2	c	c				h		h				f			
3		f	f					h	h	h	c2	c													
4		f2	f2					h	h	h	h	c													
5					f			h	h	h	c	c	12	1	12	12	13	e3	f3		f		f2	f2	
6								h	h	h	c2	c	12								f2				
7								h	h	h															
8								c	c	c					h		h2								
9								h	h	h	c						c								
10																									
11									h	h	c	12							f2						
12		f					c	c	h	h	1	12	1	12											
13	f2		f	f			c	c	c	c			1	1											
14				f2	f		c	c	c	c			1	1											
15							c	c	c	c			12	13	12										
16		f	f	f	f		c	h	h	h	c														
17							c		h2	h2	c	e2									f				
18							h2	h2	h	h	c	c	c2	c	e2		c	13						f2	
19							h	h	h	h	h	h	e2	12	1	e2	12	1	f	f3	f3	f		f2	
20		f	f	f	f		h2	e2	e2	e2	e2	e2	12	12	14	14	e2	1	f	f	f		f		
21	f2	f2	f	f	f2																				
22			f							h	h							1							
23									h	c	c2	c2	12	12	12			1			f4				
24																									
25													1	12	12	1	1	13				f	f2	f2	
26	f2			f	f			h	h	h	c	c	12	1								f	f2	f2	
27				f				h	h	h	h	h	c			12	13	12				f2	f2	f2	
28								h	h	h	h	h	c	h								f2	f2	f2	
29								h	h	h	h	h	c		h	12	13	12	f	f		f2	f2	f2	
30							h	h	h	h	h	h	c						f						
31							h	h	h	h	h2	h	h		1				f	f		f2	f	f	
Count																									
Median																									
U. Q.																									
L. Q.																									
G. R.																									

Sweep 1.0 Mc to 20.0 Mc in 15 sec in automatic operation

The Radio Research Laboratories, Japan

Types of Es

A12

IONOSPHERIC DATA

Lat. 35° 42.4'N
Long. 139° 29.3'E

Kokubunji Tokyo

0.1Mc 1 3.5° E Mean Time (G.M.T. +9h)

foF2

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	056	056	058	055	049	046	052	084	089	103	112	121	131	133	124	115	113	093	081	072	065	062	061	059
2	058	060	057	054	056	057	058	080	101	125	122	123	126	129	116	111	107	088	088	067	063	061	059	057
3	056	053	052	J052R	049	052	061	J084R	107	110	C	118	121	117	115	J106R	103	098	088	074	075R	063	058	057
4	053	053	055	056	044	048	061	078	101	113	114	132	138	138	136	126	117	121	100	074	066	060	067	065
5	064	064	062	059	054	054	067	091	100	108	122	120	128	131	123	115	108	098	090	070	073	070	064	064
6	060	060	059	058	048	044	058	096	120	119	110	117	126	123	117	115	117	104R	090	068	064	060	059	060
7	057	056	057	052	049	051	061	093	108	108	114	121	113	112	118	109	103	093	080	068	059	060	059	059
8	058	054	053	054	049	051	063	084	092	086	100	114	115	113	I108C	112	J106R	098	080R	066	059	053	056	057
9	057	056	056	053	045	047	055	072	090	110	110	114	121	123	I110C	110	099	098	083	063	058	058	063	062
10	058	058	059	051	044	043	054	074	088	097	111	108	114	119	106	105	096	093	092	078	057	056	058	057
11	059	056	052	047	050	048	056	085	117	119Z	115	126	127	125	117	121	104	099	093	080Z	060	054	057	056
12	057	054	053	046	044	043	057	J083R	097	113	118	130	132	123	122	119	123	114	095	085	066	066	063	059
13	059	059	056	049	048	C	C	092	108	114	123	129	128	126	130	124	116	115	092	074	064	059	054	054
14	052	053	052	051	045	040	053	082	099	108	106	I132C	127	117	109	111	C	C	089	067	060	063	064	064
15	058	052	048	048	048	051	054	081	103	124	141	143	134	126	113	113	116	105	103	088	068	054	J056R	051
16	049	050	049	048	039	039	060	094	108	101	111	120	130	127	112	118	115	121	098	073	065	064	061	058
17	057	060	062	048	042	043	058	092	108	108	116	126	126	119	114	113	111	124	I116A	076	068	069	068	065
18	061	057	057	058	052	048	067	091	106	109	117	123	137	138	127	115	116	115	100	078	068	070	064	064
19	060	059	057	054	050	052	073	095	103	099	103	119	134	135	134	124	123	122	109	094	084	078	060	058
20	057	056	056	053	051	054	076	088	099	J107R	116	130	135	130	117	119	114	104	098	074	065	065	060	058
21	059	057	054	054	049	049	069	094	102	109	112	123	124	125	118	113	113	108	103	082	068	068	064	061
22	059	053	055	054	049	047	065	094	103	110	115	118	113	114	116	113	113	108	100	085	070	071	063	061
23	060	060	060	054	050	053	068	103	109	107	112	129	132	132	120	108	111	105	104R	087	070	069	069	069
24	067	068	069	057	045	044	063	095	J107R	113	118	127	124	119	123	120	123	118	103	090	073	079	069	069
25	068	069	070	057	057	058	079	J107R	114	121	123	123	122	125	124	127	121	110	103R	085	072	073	074	078
26	078	072	U075R	062	058	058	074R	J102R	110	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
27	C	C	C	C	C	C	C	C	C	112	123	134	138	141	134	128	118	123	126	J111R	090	069	069	071
28	071	070	064	062	057	051	072	098	117	120	120	129	136	139	134	129	130	129	125	099	077	078R	I076S	071
29	078	U080R	080R	062	057	057	081	J106R	100	104	107	120	128	128	125	125	128	130	113	085	074	074	074	082
30	J079R	071	064	060	051	052	J082R	118	126	122	122	134	140	142	I136G	130	122	115	122	099	073	070	073	071
31	072	070	065	061	063	067	082	109	120	132	128	123	130	142	139	127	120	112	106	092	073	074	U074S	074S
Count	30	30	30	30	30	29	29	30	30	30	29	30	30	30	30	30	29	29	30	30	30	30	30	30
Median	059	058	057	054	049	051	063	092	104	110	115	123	128	126	118	115	115	108	099	077	068	065	063	061
U. Q.	064	064	062	058	052	054	072	096	109	119	122	129	134	133	126	124	120	120	104	087	073	070	068	069
L. Q.	057	054	054	051	045	045	058	084	100	107	111	120	124	119	114	112	108	098	089	070	064	060	059	058
Q. R.	007	010	008	007	007	009	014	012	009	012	011	009	010	014	012	012	012	022	015	017	009	010	009	011

The Radio Research Laboratories, Japan

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

foF2

K1

IONOSPHERIC DATA

Lat. 35° 42.4'N
Long. 139° 28.3'E

Kokubunji Tokyo

foF1 0.01Mc 135° E Mean Time (G. M. T. +9h)

foF1

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									U370L	C	L	L	L	L	L	L								
2										L	L	L	L	L	L	L	L							
3										L	C	L	L	L	L	L	L							
4										L	L	L	L	L	L	L	L							
5										L	L	L	L	L	L	L	L							
6										L	U580L	L	L	U720L	L	L	L							
7										L	L	L	L	L	L	L	L							
8									L	L	L	L	L	L	C	U420L	L							
9									L	L	L	L	L	L	C	L	L							
10									L	L	L	L	L	L	L	L	L							
11									L	L	L	L	L	L	L	L	L							
12										L	L	L	L	L	L	L	L							
13									L	L	L	L	L	L	L	L	L							
14									L	L	L	C	L	L	L	L	C	C						
15									L	L	L	L	L	L	L	L	L							
16									L	L	L	L	L	L	L	L	L							
17									L	L	L	L	L	L	L	L	L							
18									L	L	L	L	510L	L	L	L	L							
19									L	L	L	L	L	L	L	L	A							
20									L	L	L	L	L	L	L	L	L							
21									L	L	L	U500L	L	L	L	L	L							
22									L	L	L	L	L	L	L	L	L							
23									L	L	L	L	L	L	L	L	L							
24									L	L	L	L	L	L	L	L	L							
25									L	L	L	L	L	L	L	L	L							
26										C	C	C	C	C	C	C	C	C						
27									C	L	L	L	L	L	L	L	L							
28									L	L	L	L	L	L	L	L	L	A						
29									L	L	L	L	L	L	L	L	L							
30									L	L	L	L	L	L	C	L	L							
31									L	L	L	L	L	L	L	L	L							
Count									1	1	1	1	1	1	1	1								
Median									U370L	U580L	U500L	510L	U720L	U720L	U420L	U420L								
U. Q.																								
L. Q.																								
Q. R.																								

foF1

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

The Radio Research Laboratories, Japan

K2

IONOSPHERIC DATA

Mar. 1968

foE

0.01Mc **135° E Mean Time** (G.M.T. +9h)

Kokubunji Tokyo

Lat. 35° 42.4'N
Long. 139° 29.3'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							B	215	280	I310C	I340R	370	370	365	355	330	280	220						
2							B	200	280	330	345	365	370	365	350	330	280	230						
3							B	230	300	340	C	I350A	I380A	I380A	360	325R	280	220						
4							B	230	300	325	350	355	365	365	360	325	A	A						
5							B	230	280	325	345	A	A	A	A	A	A	A						
6							B	240	300	325	340	360	I370A	I365A	I355A	I335A	290	220						
7							B	250	300	325	340	I355A	I370R	I360A	350	325	270	220						
8							B	220	270	325	335	355	I360R	I360R	I335C	325	280	230						
9							B	240	290	320	340	I355A	355	355	I330C	320	280	205						
10							B	225	285	300	345	355	365	I330R	335	I320A	275	220						
11							B	240	285	315	A	A	A	A	A	A	275	220						
12							E	240	290	325	335	365	365	365	330	320	280	200						
13							C	245	I300A	I320A	335	I350A	I360A	355	350	320	280	220H						
14							B	230	300	330	345R	C	365	365	365	I325R	C	C						
15							B	235	300	320	A	A	355	I355A	350	320	280	225						
16							155	240	I280A	325	330	330	A	A	340	325	285	225						
17							B	245	290	325	340	360	360R	350	350	325	285	220						
18							B	240	295	300	335	345	360	R	A	A	A	A						
19							B	260R	300	330	340	335	A	A	A	A	A	A						
20							155	255	300	330	345	A	A	A	A	A	290	225	E					
21							155	255	300	330	I340A	370	I370R	365	I340C	I320C	285	R	B					
22							180	I260R	310	I340C	R	C	C	C	R	I335R	280	A	A					
23							B	R	C	C	I340R	350	I365R	I370A	350	340	290	230	B					
24							180	I230A	305	340	355	360	365	360	I350A	335	300	250	B					
25							155	250	305	335	350	A	A	A	A	335	I300A	225	B					
26							190	265	320	330	C	C	C	C	C	C	C	C	C					
27							C	C	C	350	360	370	370	I370A	350	A	A	A	B					
28							180	265	320	340	I365R	370	A	A	A	A	A	A	S					
29							175	275	305	340	350	350	365R	I360A	355	330	300	245	S					
30							180	270	I315A	335	A	A	I375R	C	340	305	250	B						
31							190	270	310	345	360	360	I370A	375	I365R	335	A	R	B					
Count							12	29	29	30	25	22	21	22	21	23	22	20	1					
Median							180	240	300	330	340	355	365	365	350	325	280	220	E					
U. Q.																								
L. Q.																								
G. R.																								

The Radio Research Laboratories, Japan
K3

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

foE

IONOSPHERIC DATA

Lat. 35° 42.4'N
Long. 139° 29.3'E

Kokubunji Tokyo

foEs 0.1Mc 1.35° E Mean Time (G. M. T. +9h)

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	018	E	E	E	E	E	E013B	G	G	C	J029G	031G	G	030G	022G	G	032	028	J029	E016G	E015S	E016S	J018	E012B
2	E015S	E	E	E012B	E	E	E015B	G	J025G	036	030G	020G	G	G	G	G	G	G	E015S	E012B	020M	E013B	E012B	023M
3	E013B	E013B	E012B	021M	E	E	019	G	G	037	C	J043	037	J043	G	G	G	G	E012B	021M	017	E015S	E012B	018
4	E015S	018	E	J016	021	E011B	E015B	G	G	038	043	J043	044	J044G	G	G	028	J024	029M	J028	020M	E015S	E012B	023M
5	E011B	E	E012B	E011B	E012B	E015B	G	G	033	035	G	J037	039	039	J038	J036	J033	J027	028	J018	E015S	E015S	021M	019
6	019	J038	E	J015S	021M	019	G	G	G	036	G	038	039	038	042M	033G	025G	024	J025	J028	J024	021M	022M	E012B
7	019	020M	020M	E	E011B	E011B	E016B	G	G	G	G	037	G	037	G	036	032	028	019	021M	022M	E012B	E014B	E015S
8	E	E012B	E	E	E	E	E016B	G	G	G	G	G	G	G	C	032	032	022G	019	018	020M	E013B	E015S	E012B
9	E012B	E	E	018	019	E013B	E013B	G	G	G	G	J042	G	G	C	036	G	G	E014B	022M	J038	E013B	021M	E012B
10	E012B	E	E	E012B	E	E012B	E014B	G	J029	G	028G	G	G	J030G	037	J038	G	G	E013B	E012B	035	024M	018M	E015S
11	E012B	E	E012B	E	E	E012B	E016B	G	031	036	037	J038	J041	037	043M	036	G	G	024	022M	022	021M	E016S	E015S
12	E013B	E011B	022M	021M	E011B	E012B	E	G	G	G	G	G	G	025G	036	036	G	024	E015S	E014B	E012B	E011B	E015S	E015S
13	E015S	E011B	024M	022M	022M	C	C	G	J030	036	038	J038	J037	G	G	G	G	G	E013B	E012B	E013B	E012B	E013B	E013B
14	E013B	E	E012B	J016	E	J018	E015B	G	G	G	G	C	G	G	G	G	C	C	J052	023	E015S	E012B	E013B	E016S
15	E015S	E012B	E012B	E	017	E013B	E014B	G	G	G	J032	J038	J038	042M	J033G	J035	G	021G	014S	E015S	E012B	018	E013B	E015S
16	E015S	E013B	E	021M	021M	E011B	G	G	J029	J040	039	044	037	039	030G	G	J016G	G	020	021M	020M	E013B	E012B	E014B
17	E013B	E012B	E014B	E014B	E012B	E	E015B	G	G	035	038	J038	028G	034G	034G	G	021G	017G	J146	021M	023	027	020M	019
18	E015S	E	E	E	E	E013B	E013B	G	033	039	044	040	023G	035	036	034	029	023	J018	022M	J022	019M	021M	E
19	024M	J022	021	E	E	E011B	E013B	G	032	036	037	037	041	037	037	J038	J053	J031	J025	J021	029	020	E014B	021M
20	E012B	E011B	E012B	J019	022	E012B	G	028	G	039	043	J077	042	J042	J038	J033	031	028	J029	J042	020M	022M	E012B	E015S
21	J015	E	E	J016	032	020M	G	G	G	037	038	G	G	G	C	C	G	G	J029	018	E013B	E013B	E015S	E013B
22	E014B	E011B	E012B	E011B	E012B	E014B	G	G	G	E035C	G	E029C	E040C	E039C	G	G	021G	021	022	E013B	E013B	E014B	E011B	E014B
23	E014B	E013B	E011B	E	E014B	E013B	E015B	G	E035C	E037C	038	G	G	J040	030G	024G	020G	G	021	021M	E015S	E015S	E013B	E015S
24	E013B	021	E	E	E	E012B	G	J029	048Y	J028G	027G	G	G	G	036	G	G	G	017	E016S	019M	E011B	E016S	E013B
25	021M	E030B	E	021	020M	E011B	G	G	035	J043	039	039	043M	044	043	024G	J032	026	020	017	E015S	E014B	E013B	024
26	J029	J026	J023	J021	020	018	G	G	G	040	C	C	C	C	C	C	C	C	C	C	C	C	C	C
27	C	C	C	C	C	C	C	C	C	038	040	042	043	044	044Y	036	036	J029	E015B	023	032M	E013B	022M	023
28	024M	023	023M	024	024M	J023	G	G	G	G	G	G	039	038	J046	041M	J042	J052	E015S	E012B	E012B	J024	J053	
29	E012B	019M	E011B	021	E	E	G	G	034	039	039	038	038	020G	G	G	G	E016S	022	018	020M	E012B	E013B	
30	E011B	E	E	E	E011B	E011B	025	031	037	044Y	041	039	039	G	C	C	J029G	018G	J032	J025	E014B	044	J024	E013B
31	020M	E011B	020M	E	E	E011B	G	G	034	041	044	045	039	G	036G	J038	032	G	017	022M	022M	030M	E012B	E015S
Count	30	30	30	30	30	29	29	30	30	30	29	29	30	30	26	29	29	29	30	30	30	30	30	30
Median	E014	E012	E012	E013	E012	E012B	E016B	G	G	036	037	038	G	G	G	G	G	G	020	021	018	E015	E014B	E015
U. Q.	018	018	E014	021	020	E013	G	G	032	039	040	041	039	039	038	036	032	026	028	022	022	020	020	019
L. Q.	E013	E	E	E	E	E	E014	G	G	G	G	G	G	G	G	G	G	G	G	E016	E016	E015	E013	E013
G. R.	D005																		D012	D006	D007	D008	D008	D006

The Radio Research Laboratories, Japan

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

foEs

IONOSPHERIC DATA

Lat. 35° 42.4'N
Long. 139° 23.3'E

Kokubunji Tokyo

0.1Mc 135° E Mean Time (G.M.T. +9h)

f_bEs

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	E						B		C	026G	029G			029G	022G		030	026	016	S	S	S	E	B	
2	S			B			B		016G	035	025G	E020R							S	B	E	S	B	016	
3	B	B	B	E			G			036	C	040	E037R	040					B	E	E	S	B	E	
4	S	E		E	013	B	B			025G	038	039	038	029G			028	024	024	016	E	S	B	016	
5	B		B	B	B	B	B		032	034	037	039	037	037	037	033	032	025	026	E	S	S	E	E	
6	E	025		E	014	E	G			035		038	039	037	038	033G	025G	024	016	016	016	E	E	B	
7	E	E	E		B	B	B				037		037		C	034	029	025	E	E	E	B	B	S	
8		B					B								C	030	030	016G	016	E	E	S	S	B	
9	B			E	E	B	B		026		040				C	035			B	E	016	B	E	B	
10	B		B	B	B	B	B			027G			027G	028	032				B	B	S	017	E	S	
11	B		B		B	B	B		030	033	036	037	040	032	037	033			016	015	017	E	S	S	
12	B	B	E	015	B	B			030					025G	E036R	G		023	S	B	B	B	S	S	
13	S	B	016	016	013	C	C			034	038	037	037				C	C	040	E	S	B	B	S	
14	B		B	E	E	B	B				C								040	E	S	B	B	S	
15	S	B	B		E	B	B				036	038	033	038	030G	020			019G	014	S	B	E	B	
16	S	B	B	014	016	B			029	034	037	040	037	038	027G		016G		E	E	017	B	B	B	
17	B	B	B	B	B	B	B			034	038	038	028G	033G	033G		021G		A	019	018	018	014	E	
18	S				B	B			032	038	041	039	E023R	E035R	E036R	032	028	023	015	E	019	E	015		
19	017	017	E		B	B			031	036	037	037	040	037	037	037	050	025	022	020	021	E	B	E	
20	B	B	B	E	013	B		027		038	043	047	041	037	038	032	030	025	025	040	E	016	B	S	
21	E			E	025	013				034	038				C	C			018	E	B	B	S	B	
22	B	B	B	B	B	B	B			C	C	C	C	C	C	C	E021R	E021R	017	B	B	B	B	B	
23	B	B	B		B	B	B		C	C	E038R			040	026G	024G	017G		G	E	S	S	B	S	
24	B	E			B	B		027	025	028G	026G			036					016	S	E	S	B	B	
25	E	B		E	E	B			033	036	038	039	040	038	037	024G	030	024	G	016	S	B	B	E	
26	023	017	016	016	012	E				038	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
27	C	C	C	C	C	C	C	C	C	038	040	040	040	040	040	025	035	026	B	015	017	B	E	E	
28	016	E	045	017	018	015				037	039	038	038	038	040	040	038	042	S	B	B	E	042		
29	B	E	B	E					034	037	039	038		038	019G				S	E	E	B	B	B	
30	B				B	B	025	031	033	036	040	039	039		C		026G	015G	030	015	B	022	016	B	
31	E	B	014		B	B			033	040	040	044	039		E036R	032	032		017	E	E	016	B	S	
Count																									
Median																									
U. Q.																									
L. Q.																									
G. R.																									

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

The Radio Research Laboratories, Japan

f_bEs

K 5

IONOSPHERIC DATA

Lat. 35° 42.4'N
Long. 139° 29.3'E

Kokubunji Tokyo

0.1Mc 1.35° E Mean Time (G.M.T. +9h)

f-min

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	011	010	010	010	E	010	013	016	016	E060C	015	016	016	015	015	016	016	015	012	E016S	E015S	E016S	E015S	012	
2	E015S	010	010	012	010	010	015	013	012	013	017	016	016	016	025	016	016	014	E015S	012	014	013	012	010	
3	013	013	012	E	010	010	014	013	015	014	C	016	016	022	019	015	012	014	012	E015S	013	E015S	012	E015S	
4	E015S	012	010	E	E	011	015	014	013	014	016	016	017	024	016	015	015	012	011	011	011	E015S	012	011	
5	011	010	012	011	012	012	012	013	010	015	014	015	018	019	016	015	012	012	010	012	E015S	E015S	E015S	013	
6	011	011	010	012	010	011	014	015	014	015	016	016	017	015	017	014	014	015	012	011	012	E015S	012	012	
7	013	013	012	010	011	011	016	013	014	015	016	016	017	016	016	018	013	014	E015S	E015S	011	012	014	E015S	
8	010	012	010	010	010	010	010	016	014	014	016	018	025	017	C	015	014	014	014	014	014	E015S	E015S	012	
9	012	010	010	010	010	013	013	014	016	016	016	016	020	016	C	016	014	014	013	014	013	012	013	E015S	012
10	012	010	010	012	010	012	014	012	014	016	015	025	019	016	013	018	015	016	013	012	E015S	013	012	E015S	
11	012	010	012	E	010	012	016	011	012	015	016	016	018	016	018	017	015	014	010	010	E015S	E015S	E016S	E015S	
12	013	011	012	E	011	012	010	014	012	017	016	023	019	019	016	016	014	014	E015S	014	012	011	E015S	E015S	
13	E015S	011	012	E	010	C	C	014	012	014	015	014	016	018	016	015	016	014	E015S	012	013	012	012	013	
14	013	010	012	010	010	E	015	013	012	014	016	C	026	018	018	016	C	C	E016S	013	E015S	012	013	E016S	
15	E015S	012	012	E	010	013	014	014	015	016	014	019	025	019	016	015	016	010	010	E015S	012	E015S	013	E015S	
16	E015S	013	E	E	010	011	012	012	014	016	015	017	018	017	020	016	010	010	013	014	014	013	012	014	
17	013	012	014	014	012	010	015	012	014	016	016	018	016	020	025	016	015	012	012	013	E015S	012	010	014	
18	E015S	010	010	E	010	013	013	013	015	016	016	015	019	026	025	015	015	012	011	011	013	014	E015S	011	010
19	012	E	010	010	010	011	013	015	012	016	015	016	022	025	025	016	012	013	011	011	013	E015S	014	E015S	
20	013	011	012	012	010	012	011	013	015	016	016	026	019	019	018	014	014	012	010	012	012	013	013	E015S	
21	012	010	010	010	E	010	013	013	014	016	018	025	026	026	E040C	E040C	018	014	012	013	013	013	E015S	013	
22	014	011	012	011	012	014	013	016	019	E035C	E027C	E029C	E040C	E039C	028	025	013	014	010	013	013	014	011	014	
23	014	013	011	010	014	013	015	015	E035C	E037C	E026C	E025C	E029C	016	016	015	012	012	016	E015S	E015S	E015S	013	E015S	
24	013	014	010	010	E	012	014	014	014	012	016	018	020	016	015	016	012	014	013	E016S	E015S	011	E016S	013	
25	012	030	010	E	E	011	014	014	015	016	016	016	025	023	021	016	016	014	014	013	E015S	014	013	E015S	
26	013	012	014	010	010	014	013	016	014	015	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
27	C	C	C	C	C	C	C	C	C	016	018	018	019	018	015	016	015	015	015	012	011	012	013	014	E015S
28	011	012	011	E	011	012	013	015	015	018	019	020	021	018	016	019	015	013	E015S	E015S	012	012	013	E015S	012
29	012	012	011	010	010	010	014	013	014	015	016	018	019	016	014	015	016	016	015	013	E015S	013	E015S	012	013
30	011	010	010	010	011	011	014	011	015	014	021	026	025	025	C	019	014	012	013	014	014	014	E015S	011	013
31	013	011	E	010	010	010	015	014	015	016	016	018	022	028	022	016	013	016	013	014	E015S	011	012	E015S	
Count	30	30	30	30	30	29	30	30	30	31	29	29	30	30	27	30	29	29	30	30	30	30	30	30	
Median	012	011	010	010	010	011	014	014	014	016	016	017	019	018	016	016	014	014	012	012	013	012	012	012	
U. Q.																									
L. Q.																									
G. R.																									

The Radio Research Laboratories, Japan

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

f-min

K 6

IONOSPHERIC DATA

Lat. 35° 42.4'N
Long. 139° 29.3'E

Kokubunji Tokyo

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

Mar. 1968

Day	00	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	295	300	310	305	310	345	330	310	305	305	300	300	305	305	320	315	295	305	290	290	275	270
2	270	280	280	260	270	280	320	330	315	310	315	300	285	300	300	305	315	315	315	300	285	295	285	280
3	290	280	285	J275R	280	270	310	J335R	305	315	C	295	305	290	305	J300R	300	315	330	295	305R	310	275	280
4	270	270	275	300	265	250	325	345	325	320	300	305	295	295	295	295	300	315	310	305	285	275	290	285
5	280	295	280	285	275	275	300	320	340	315	310	300	295	290	310	300	305	305	315	300	290	295	275	280
6	275	290	285	290	275	270	290	315	340	345	300	300	300	305	295	305	305	325R	300	305	280	285	280	290
7	290	285	290	285	265	265	310	330	325	325	325	320	320	305	315	315	330	335	310	300	285	280	285	285
8	295	280	285	290	285	275	315	330	345	335	300	325	315	325	1300C	325	J320R	335	320R	310	285	280	285	290
9	285	295	305	305	290	280	310	345	310	345	335	310	315	310	1320C	310	335	325	315	310	275	275	280	285
10	290	300	305	315	285	290	320	355	320	330	325	305	305	310	310	315	310	310	315	310	280	285	280	280
11	290	290	275	270	275	270	290	320	325	310Z	305	300	300	310	300	315	310	320	310	310Z	300	280	290	290
12	295	305	305	290	280	285	315	J335R	330	320	310	305	310	305	300	310	310	335	320	295	290	290	270	280
13	280	295	300	290	280	C	C	315	325	320	315	320	305	295	300	315	315	330	315	320	285	300	305	280
14	290	295	305	315	315	280	315	340	330	335	305	1315C	315	295	305	305	C	C	325	290	270	275	290	295
15	310	290	265	260	260	275	290	300	290	300	310	310	315	310	295	300	310	315	310	305	330	295	J275R	280
16	255	270	295	295	270	270	315	330	335	320	305	300	310	315	295	295	310	330	325	300	290	290	285	275
17	245	280	325	325	260	270	315	335	335	325	315	310	300	315	305	305	295	315	1330A	310	295	290	295	295
18	285	280	280	290	295	290	315	325	320	320	315	300	315	310	305	295	300	325	320	310	290	285	290	290
19	295	290	290	295	280	270	320	345	340	315	305	295	310	305	300	300	300	310	320	315	295	315	300	285
20	270	285	285	280	275	285	340	340	335	J325R	300	315	305	310	300	305	315	325	335	320	290	310	300	275
21	280	285	295	295	300	280	320	340	320	330	315	300	300	305	295	300	310	315	325	315	295	295	290	280
22	290	275	285	295	295	275	315	330	330	315	315	305	300	300	300	300	305	315	315	310	295	305	285	275
23	275	275	290	280	285	280	310	330	330	320	295	310	305	305	300	295	305	305	315R	310	300	285	275	280
24	275	280	315	315	290	265	315	325	J325R	320	305	300	300	285	290	290	300	305	310	300	300	295	280	265
25	265	275	305	280	255	275	305	J325R	325	315	310	295	285	290	285	300	300	310	310R	300	280	275	285	285
26	260	285	U305R	325	270	280	330R	J330R	335	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
27	C	C	C	C	C	C	C	C	C	295	295	295	290	290	290	290	285	295	310	J305R	300	270	270	270
28	295	295	280	280	290	280	315	305	310	305	290	280	265	280	285	285	290	300	300	315	290	280R	1280S	275
29	280	U300R	310R	300	270	270	315	J335R	330	320	290	290	290	280	280	280	285	300	310	290	285	285	275	280
30	J290R	295	280	280	260	250	J305R	320	320	300	280	290	290	285	1285C	290	290	295	305	315	300	270	275	275
31	280	270	270	250	250	270	295	310	310	310	295	285	275	290	285	285	300	305	310	305	295	270	1280S	275S
Count	30	30	30	30	30	29	29	30	30	30	29	30	30	30	30	30	29	29	30	30	30	30	30	30
Median	280	285	290	290	280	275	315	330	325	320	305	300	300	300	300	300	305	315	315	305	290	285	280	280
U. Q.																								
L. Q.																								
Q. R.																								

The Radio Research Laboratories, Japan

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

M(3000)F2

K 7

IONOSPHERIC DATA

Lat. 35° 42.4'N
Long. 139° 29.3'E

Kokubunji Tokyo

M(3000) F1_{0.01} 135° E Mean Time (G.M.T. +9h)

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									U410L	C	L	L	L	L	L	L								
2										L	L	L	L	L	L	L	L							
3										L	C	L	L	L	L	L	L							
4										L	L	L	L	L	L	L	L							
5										L	L	L	L	L	L	L	L							
6										L	U365L	L	L	U355L	L	L								
7										L	L	L	L	L	L	L	L							
8										L	L	L	L	L	C	U390L	L							
9										L	L	L	L	L	C	L	L							
10										L	L	L	L	L	L	L	L							
11										L	L	L	L	L	L	L	L							
12										L	L	L	L	L	L	L	L							
13										L	L	L	L	L	L	L	L							
14										L	L	C	L	L	L	L	C	C						
15										L	L	L	L	L	L	L	L							
16										L	L	L	L	L	L	L	L							
17										L	L	L	L	L	L	L	L							
18										L	L	L	L	L	L	L	L							
19										L	L	L	370L	L	L	L	L							
20										L	L	L	L	L	L	L	A							
21										L	L	L	L	L	L	L	L							
22										L	L	U385L	L	L	L	L	L							
23										L	L	L	L	L	L	L	L							
24										L	L	L	L	L	L	L	L							
25										L	L	L	L	L	L	L	L							
26										C	C	C	C	C	C	C	C	C						
27										C	L	L	L	L	L	L	L							
28										L	L	L	L	L	L	L	L							
29										L	L	L	L	L	L	L	L							
30										L	L	L	L	L	L	C								
31										L	L	L	L	L	L	L	L							
Count									1	1	1	1	1	1	1	1								
Median									U410L	U365L	U385L	370L	U355L	U390L										
U. Q.																								
L. Q.																								
G. R.																								

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

M(3000) F1

The Radio Research Laboratories, Japan

K 8

IONOSPHERIC DATA

Lat. 35° 42.4'N
Long. 139° 29.3'E

Kokubunji Tokyo

135° E Mean Time (G.M.T. +9h)

km **h'F2**

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									225	E240C	240	260	275	250	255	245								
2										255	240	255	275	270	250	240	240							
3										250	C	280	260	250	250	260								
4										245	250	260	280	260	250	260								
5										245	270	250	260	290	250	255								
6										230	280	260	255	300	255	260								
7										240	260	265	245	255	260	245	240							
8									230	240	270	255	275	265	1280C	245	250							
9									225	250	240	250	265	270	1250C	250	240							
10										245	255	270	255	260	260	250								
11									245	240	245	285	260	255	275	260	240							
12										255	260	275	260	255	270	260	255							
13									240	250	260	270	260	270	265	245	240							
14										240	250	1280C	250	260	260	275	C	C						
15										255	270	260	255	255	275	260	255							
16									230	240	260	255	275	255	250	250	250							
17									240	250	255	260	255	265	260	260								
18									245	250	255	260	280	260	250	245	255							
19										225	245	290	270	275	260	250	250							
20									240	255	250	270	260	270	255	260	245							
21									230	250	260	270	260	270	290	260	270							
22									240	260	260	255	260	275	290	260								
23									240	245	250	280	275	260	255	250	260							
24									240	245	260	260	260	280	275	260	270							
25										245	250	260	295	280	260	270	240							
26										C	C	C	C	C	C	C	C							
27									C	250	260	270	265	280	260	260								
28									255	250	250	275	295	300	280	295	250							
29										245	250	260	295	260	260	295	270							
30									245	255	280	280	280	280	C									
31									255	250	250	255	320	280	270	250								
Count									16	30	29	30	30	30	28	28	18							
Median									240	250	255	260	260	270	260	260	250							
U. G.																								
L. G.																								
Q. R.																								

The Radio Research Laboratories, Japan

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

h'F2

IONOSPHERIC DATA

Lat. 35° 42.4'N
Long. 139° 29.3'E

Kokubunji Tokyo

135° E Mean Time (G.M.T. +9h)

h'F km

Mar. 1968

Day	00	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	270	260	250	E220E	240	245	220	200	I210C	220	220	205	205	240	230	240	230	210	230	255	255	300	295
2	310	290	270	295	280	245	250	230	245	245	220	205H	195H	200	235	220	235	230	210	220	260	255	255	280
3	245	260	295	E290E	280	300	245	230	240	205	C	220	195H	230	230	225	210H	240	220	255	245	225	255	285
4	295	300	275	E240E	250	345	245	220	230	205	210	205	200	200	220	220	240	245	220	220	270	250	270	275
5	280	255	265	260	255	270	260	225	240	225	225H	205H	210H	205H	240	210	240	230	240	220	260	265	290	260
6	270	280	260	250	220	305	275	245	250	230	220	210	205	240	230	230	240	220	205	215	260	255	275	275
7	270	290	270	250	255	310	260	240	240	220	205	195H	220	205	220	220	220	220	230	240	240	255	270	280
8	250	280	260	275	245	295	250	225	210	220	210	210	200H	200H	1200C	210	230	240	210	210	250	275	290	290
9	270	255	250	240	240	275	245	220	210	220	220	205	200H	225	1230C	225	220	240	210	210	260	275	290	275
10	275	255	245	220	245	270	240	225	225	210	195H	220	240	210	210H	200	240	245	235	210	225	270	300	295
11	270	275	280	E240E	290	295	260	230	230	225	210	210	210	225	210	230	240	225	210	235	255	295	290	275
12	270	255	250	240	240	260	250	225	225	225	205	205	200H	205	210	205	240	235	210	210	245	255	295	300
13	290	255	250	240	245	C	C	240	220	220	205H	205	230	210	210	240	230	240	210	210	240	240	260	280
14	280	270	240	230	230	E240E	245	235	230	220	220	I205C	240	225	220	205H	C	C	240A	220	255	295	270	270
15	235	255	305	E300E	310	280	255	240	240	225	200	195H	205H	225	225	210	240	240	240	220	210	245	295	280
16	300	290	E245E	250	255	305	250	230	230	220	200H	240	205	200H	200	240	230	240	220	220	245	250	255	305
17	325	295	220	210	275	295	255	230	230	225	215	200	215	205	230	210	240	245	I240A	205	245	255	255	270
18	270	260	275	E275E	275	240	240	230	225	225	210	210	200	195H	220	205	230	245	220	220	245	255	255	270
19	270	275	260	250	275	295	240	230	230	220	220	205	200H	190H	230	230	I240A	240	230	230	240	225	230	260
20	295	270	280	275	280	285	230	225	225	225	230	I200A	220	195H	210	210	225	240	225	240	225	245	295	305
21	275	255	245	250	I245A	280	245	230	220	220	180H	210	205	195	240	230	240	240	230	220	230	245	260	255
22	270	295	290	255	230	275	245	230	230	220	205H	210	210	210	205	245	240	240	240	220	230	255	240	290
23	300	295	270	245	255	280	240	240	230	225	205	205	225	225	210	220	225	245	240	210	230	260	290	290
24	295	275	245	210	E195E	290	250	245	225	200	185H	205	200H	210	205	210	230	245	225	230	240	245	255	320
25	305	E310B	250	E205E	275	295	240	240	240	225	210	205	205	210	225	230	240	240	220	220	245	290	295	280
26	300A	275	250	220	240	285	240	240	230	220	C	C	C	C	C	C	C	C	C	C	C	C	C	C
27	C	C	C	C	C	C	C	C	C	220	210	205	210	205	225	240	240	250	245	210	220	245	280	300
28	280	260	290	270	240	250	245	240	225	220	210	210	220	210	210	240	250A	A	E245A	210	240	255	275	E360A
29	300	260	240	210	260	300	240	230	230	210	205	205	205H	225	210	230	240	245	230	225	255	290	290	270
30	255	290	255	210	280	350	245	240	230	220	210	195	220	1225C	230	240	255	255	220	210	290	280	300	300
31	295	250	290	320	350	290	240	240	230	230	230	230	200	215	240	230	240	245	240	240	240	280	290	300
Count	30	30	30	30	30	29	29	30	30	31	29	30	30	30	30	30	29	28	30	30	30	30	30	30
Median	280	270	260	245	250	285	245	230	230	220	210	205	205	210	220	220	240	240	230	220	240	255	275	280
U. Q.																								
L. Q.																								
Q. R.																								

The Radio Research Laboratories, Japan

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

h'F

K 10

IONOSPHERIC DATA

Lat. 35° 42.4'N
Long. 139° 29.3'E

Kokubunji Tokyo

1 35° E Mean Time (G. M. T. +9h)

km **f_oF₂**

Mar. 1968

Day	00	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	E	E	E	E	E	B	G	G	C	105	105	G	105	100	G	155	145	115	S	S	S	110	B
2	S	E	E	E	E	E	B	G	110	200	105	105	G	G	G	G	G	G	S	B	145	B	B	130
3	B	B	100	E	E	E	105	G	G	130	C	110	110	110	G	G	G	G	B	110	110	S	B	105
4	S	105	E	105	105	B	B	G	G	140	130	120	115	105	G	G	110	105	105	105	100	S	B	110
5	B	E	B	B	B	B	B	G	160	155	G	120	115	115	115	120	110	110	110	110	S	S	125	140
6	110	110	E	105	100	105	100	G	G	130	G	140	120	115	115	110	110	180	100	100	100	100	110	B
7	105	100	100	E	B	B	B	G	G	G	G	G	G	G	C	G	150	125	100	100	115	B	B	S
8	E	B	E	E	E	E	B	G	G	G	G	G	G	G	C	G	150	115	125	100	100	S	S	B
9	B	E	E	105	105	B	B	G	G	G	G	105	G	G	C	145	G	G	B	115	100	B	100	B
10	B	E	E	B	E	B	B	G	110	G	110	G	G	105	100	115	G	G	B	B	S	110	115	S
11	B	E	B	E	E	B	B	G	145	120	110	110	105	105	105	105	G	G	105	105	105	105	S	S
12	B	B	105	105	B	B	E	G	G	G	G	G	G	105	130	125	G	145	S	B	B	B	S	S
13	S	B	100	100	100	C	C	G	115	110	120	105	105	G	G	G	G	G	S	B	B	B	B	B
14	B	E	B	105	E	110	B	G	G	G	G	C	G	G	G	G	C	C	110	130	S	B	B	S
15	S	B	B	E	120	B	B	G	G	G	115	110	105	105	105	100	G	100	100	S	B	115	B	S
16	S	B	E	105	105	B	G	G	110	115	120	120	120	105	105	G	100	G	100	100	100	B	B	B
17	B	B	B	B	B	E	B	110	G	130	120	115	105	110	110	G	110	105	110	100	100	100	100	100
18	S	E	E	E	E	B	B	G	145	130	120	120	105	120	115	115	115	110	110	100	115	105	105	E
19	105	105	105	E	E	B	B	G	145	130	125	115	115	115	110	105	105	115	110	105	105	105	B	100
20	B	B	B	105	105	B	G	170	G	125	115	115	110	105	105	105	175	130	115	115	105	100	B	S
21	105	E	E	105	105	105	G	G	110	110	G	G	G	G	C	C	G	G	100	100	B	B	S	B
22	B	B	B	B	B	B	G	G	G	C	G	C	C	C	G	G	100	100	100	B	B	B	B	B
23	B	B	B	E	B	B	B	G	C	C	130	G	G	110	105	105	105	G	110	100	S	S	B	S
24	B	100	E	E	E	B	G	115	110	105	105	G	G	G	125	G	G	G	115	S	110	B	S	B
25	105	B	E	100	100	B	G	G	150	115	125	115	115	105	110	115	110	145	115	115	S	B	B	115
26	105	105	100	100	105	105	G	G	G	130	C	C	C	C	C	C	C	C	C	C	C	C	C	C
27	C	C	C	C	C	C	C	C	140	130	125	115	115	115	100	115	115	110	B	105	105	B	110	105
28	105	105	100	100	100	100	G	G	G	G	G	G	110	110	110	110	110	105	105	S	B	B	105	105
29	B	100	B	100	E	E	G	G	145	125	125	120	G	105	100	G	G	G	S	105	105	100	B	B
30	B	E	E	E	B	B	150	150	110	115	115	110	110	G	C	G	105	105	115	120	B	105	105	B
31	100	B	100	E	E	B	G	G	140	125	115	115	125	G	110	105	115	G	130	120	110	105	B	S
Count	9	8	7	14	11	5	3	4	13	20	20	21	17	20	19	16	18	17	22	21	17	11	10	9
Median	105	105	100	105	105	105	105	130	140	130	120	115	110	110	110	110	110	110	110	105	105	105	110	105
U. Q.																								
L. Q.																								
Q. R.																								

f_oF₂

IONOSPHERIC DATA

Lat. 35° 42.4'N
Long. 139° 29.3'E

Kokubunji Tokyo

135° E Mean Time (G.M.T. +9h)

Mar. 1968

Types of Es

Day	00	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																h	h	f				f		
2								l2	h1	l	l										f			f	
3			f				l		h	h1	h	h	l	l2					f	f3	f3			f	
4		f	f		f2				h	h	h1	h	c	l	c	c2	c3	l3	f6	f				f2	
5									h	h	h	h	l	l	c	h	h	h	f2	f2	f2	f		f	
6	f	f3		f	f2	f	l		h2			c				h	h	h	f	f	f			f	
7	f	f	f									c				h	h	l	f2	f	f			f	
8				f	f2							l2			h		h		f	f3				f	
9								l	h	c1	l	l	l2	l	l2	c							f2	f	
10								h	h		l	l	l2	l	l2	h			f2	f	f			f	
11																									
12			f	f2							h1	l			h1	h		h							
13			f2	f	f				l2	l	h1	l	l												
14				f		f						c	l	l2	l	l	l3		f3	f					
15					f						c	c	l	l2	l	l	l3					f			
16				f2	f2			l	h	c	h	c	l	l	l	l	l	l	f	f2	f				
17							l2		h	h	h	c	l	l	l		l	l	f3	f2	f2	f3	f	f	
18									h	h	h2	h	l	h	c	c2	c2	l2	f	f2	f2	f3	f	f	
19	f2	f3	f						h	h	h	c	c	c	l2	l2	l4	l2	f5	f4	f3	f		f2	
20				f	f2		h		h	c2	c2	c2	l	l2	l2	h1	h212	c3	f4	f4	f	f			
21	f		f		f4	f			c	c							l	l	l	f					
22																	l	l	l						
23										h			l	l2	l	l	l	l	l	f					
24								c	l	l	l			c				l			f				
25	f2			f	f		h	h	h	l2h	h1	c	c	l2	l2	l	l3	h	l2	f				f2	
26	f4	f4	f3	f3	f	f			h																
27									h	h	h	h	c	c	l	c	c2	l2	l2	f	f3		f	f2	
28	f3	f2	f2	f3	f2	f2				h	h	c	l	l	l2	l2	l2	l2	l2	l2			f2	f3	
29		f	f	f					h1	h	h	c	l	l1	l				f	f	f	f			
30							h2	h21	l	lh	c	c	l			l2	l	l3	f2f	f3	f3				
31	f		f2					h	h	h	c	c	h	l	l2	c2	c2	l	l	ff	f	f3			
Count																									
Median																									
U. Q.																									
L. Q.																									
Q. R.																									

Types of Es

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

The Radio Research Laboratories, Japan

K12

IONOSPHERIC DATA

Lat. 35° 42.4'N
Long. 139° 28.3'E

Kokubunji Tokyo

135° E Mean Time (G.M.T. +9h)

km
f_oF₂

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	370	370	350	330	295	305	310	250	260	305	320	220	315	320	310	310	295	300	320	320	350	355	385	390
2	410	385	355	405	400	360	315	280	300	305	280	315	315	315	305	330	300	305	295	320	355	350	360	380
3	350	360	380	J380R	365	395	305	J250R	305	300	C	335	305	330	310	J330R	320	300	280	350	315R	300	370	380
4	385	390	390	335	400	445	290	250	280	300	320	305	340	340	340	335	320	300	300	305	365	390	355	360
5	370	340	360	360	380	380	330	285	270	300	305	320	325	350	305	325	305	305	300	330	350	350	390	380
6	385	350	370	345	350	390	335	280	280	260	325	320	310	340	335	315	310	290R	310	310	360	350	370	355
7	355	380	350	370	390	400	315	265	280	290	300	295	300	310	300	300	280	265	305	330	350	360	360	350
8	340	380	370	350	350	380	300	250	255	260	320	290	300	295	I320C	295	J300R	280	280R	305	350	385	375	360
9	360	350	330	315	345	355	300	250	300	260	290	315	300	305	I300C	300	270	280	280	300	380	370	360	360
10	360	330	315	300	345	350	290	245	295	290	295	305	310	300	305	305	305	305	295	295	370	360	380	380
11	350	360	385	385	390	395	350	290	295	300Z	300	330	310	305	320	300	305	305	295	300Z	325	345	360	350
12	345	325	320	340	360	355	300	J250R	290	300	305	305	310	305	320	300	300	270	290	335	345	345	380	380
13	375	340	315	345	350	C	C	290	290	295	295	300	305	330	310	300	305	280	295	295	340	335	320	360
14	360	350	330	305	300	350	300	280	290	280	310	I310C	300	330	320	325	C	C	270	340	380	350	340	
15	300	340	395	410	410	370	340	305	330	320	305	300	300	305	330	320	310	305	300	300	275	340	J365R	370
16	390	390	330	335	380	385	300	275	265	300	320	315	305	300	330	310	305	270	290	305	350	350	360	385
17	450	380	280	290	395	385	300	260	275	280	300	300	310	300	320	310	340	300	I275A	300	350	340	345	340
18	350	360	370	360	335	355	280	280	295	295	300	320	315	305	305	320	310	285	290	295	345	345	345	345
19	345	345	350	345	380	395	290	255	265	295	305	330	305	310	320	325	315	300	290	300	345	290	315	355
20	390	360	360	370	385	360	260	255	280	J295R	320	305	310	305	320	315	300	290	280	280	340	330	345	340
21	375	355	345	345	340	370	290	260	290	290	305	305	315	315	325	320	310	305	280	280	340	330	345	340
22	345	385	360	345	335	370	295	270	270	305	305	305	320	320	320	310	315	300	300	295	330	320	340	380
23	380	390	345	340	360	375	290	290	280	290	330	315	310	310	305	335	315	310	295R	290	325	365	375	370
24	380	365	305	300	335	390	300	290	J290R	300	305	315	310	345	335	320	320	305	300	335	330	340	360	410
25	410	390	320	345	420	395	295	J290R	290	300	305	330	350	340	355	330	310	305	300R	315	360	385	375	355
26	400	355	U310R	290	385	380	270R	J280R	280	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
27	C	C	C	C	C	C	C	C	C	320	325	345	36	350	345	345	350	320	305	J305R	305	380	395	390
28	345	345	380	360	340	365	300	300	300	305	340	355	390	360	350	350	340	305	300	290	310	355R	I360S	365
29	360	U320R	290R	300	380	380	290	J260R	275	300	330	325	345	350	355	365	350	305	300	320	360	370	380	360
30	J355R	345	365	360	405	445	J300R	295	290	305	350	350	350	350	I350C	345	345	340	305	300	310	395	380	390
31	370	390	390	440	450	390	320	305	305	300	320	350	385	350	355	350	320	310	305	300	345	380	I380S	385S
Count	30	30	30	30	30	29	29	30	30	30	29	30	30	30	30	30	29	29	30	30	30	30	30	30
Median	365	360	350	345	370	380	300	280	290	300	305	315	310	320	320	320	310	300	295	300	345	350	360	370
U. Q.																								
L. Q.																								
G. R.																								

The Radio Research Laboratories, Japan

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

f_oF₂

K13

IONOSPHERIC DATA

Lat. 35° 42.4'N
Long. 139° 29.3'E

Kokubunji Tokyo

1 35° E Mean Time (G.M. T. +9h)

km ypF2

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	085	085	090	080	065	095	085	070	085	090	100	110	085	080	090	100	065	095	080	080	095	095	075	080
2	080	070	095	090	090	105	085	065	095	070	115	095	095	090	140	070	095	090	100	095	090	070	100	100
3	095	085	065	J070R	080	100	090	J075R	095	085	C	090	090	115	095	J085R	090	085	075	060	080R	095	090	110
4	085	100	080	065	095	070	070	055	085	060	100	095	075	070	085	110	125	095	095	085	080	100	090	085
5	075	070	095	085	110	090	080	070	075	095	085	105	105	095	100	100	090	085	095	085	070	095	065	085
6	105	095	080	100	150	100	060	070	065	080	075	130	090	065	110	105	085	100R	095	100	090	095	090	090
7	090	080	075	095	100	090	080	080	075	055	095	065	080	095	085	080	080	080	095	075	095	090	085	095
8	070	080	080	070	095	090	070	090	065	085	080	080	080	065	I080C	060	J055R	070	075R	090	100	080	080	080
9	085	090	065	085	070	090	070	070	100	055	065	090	095	080	I090C	060	075	070	090	095	110	080	090	085
10	085	070	080	095	100	095	065	090	065	065	095	105	080	090	070	090	090	090	075	095	125	095	075	075
11	090	085	105	105	100	100	095	080	060	070Z	100	075	100	080	120	080	095	090	100	095Z	080	100	085	095
12	100	075	080	065	095	090	060	J070R	060	060	090	060	070	100	090	095	075	075	065	110	100	100	070	075
13	075	060	085	100	095	C	C	085	070	085	080	065	075	085	090	080	095	080	090	100	105	075	080	085
14	085	070	070	090	070	100	095	060	055	055	090	1065C	075	105	080	080	C	C	085	105	110	085	090	100
15	095	100	085	095	090	085	105	090	090	090	090	095	075	075	105	100	100	095	095	095	070	105	J080R	085
16	060	100	070	110	075	075	095	060	075	075	075	095	090	080	090	105	095	080	080	090	095	095	085	085
17	100	075	070	100	100	085	090	080	070	070	105	030	090	095	080	095	080	060	I080A	095	095	105	100	080
18	095	085	090	085	110	090	080	075	060	075	095	085	055	090	090	125	135	085	080	070	100	100	060	100
19	100	070	095	070	075	085	055	070	055	100	090	115	085	085	090	100	110	095	070	095	085	070	130	090
20	100	085	095	085	105	095	060	065	060	J055R	095	080	085	080	125	095	080	065	065	060	085	080	070	100
21	075	090	100	100	060	085	060	065	065	055	090	100	100	090	090	100	085	090	075	080	095	075	100	070
22	100	075	085	100	065	075	070	075	085	090	095	100	115	095	125	100	090	085	095	100	080	075	105	075
23	080	105	100	065	085	120	070	055	065	065	105	080	085	090	100	110	100	105	070R	075	075	080	075	075
24	070	080	060	080	110	100	080	060	J060R	095	100	030	095	100	110	125	095	095	095	090	070	060	090	085
25	085	070	075	105	095	065	060	J060R	070	095	090	110	095	095	090	070	095	095	095R	080	085	065	070	090
26	100	090	U070R	070	110	085	075R	J065R	075	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
27	C	C	C	C	C	C	C	C	C	120	115	070	095	095	085	085	105	115	090	J115R	100	085	095	105
28	060	100	075	095	105	085	070	095	095	100	105	100	095	130	100	090	090	090	090	070	090	075R	I030S	085
29	090	U080R	060R	095	085	075	070	J085R	070	090	115	130	090	095	110	105	095	100	095	100	085	075	070	090
30	J065R	070	090	110	090	100	J095R	075	070	105	120	095	095	095	I095C	080	100	105	095	090	085	100	115	070
31	080	075	100	105	090	105	125	090	095	095	085	095	095	095	095	105	100	105	100	095	100	100	U065S	065S
Count	30	30	30	30	30	29	29	30	30	30	29	30	30	30	30	30	29	29	30	30	30	30	30	30
Median	085	080	080	090	095	090	075	070	070	080	095	095	090	090	095	095	095	090	090	090	090	090	085	085
U. Q.																								
L. Q.																								
Q. R.																								

IONOSPHERIC DATA

Lat. 31° 12.1'N
Long. 130° 37.1'E

Yamagawa

foF2 0.1Mc 135° E Mean Time (G.M.T. +9h)

foF2

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	060	057	058	061	062	046	033S	060	086	096	116	123	135	138	134	122	121	111	105	I092S	080	I075S	073S	067
2	063S	062	059	054	052	049	043S	066S	095S	115	135	129	124	127	130	130	127	122	114	112	I097S	U090S	088	065S
3	064	060	053	054	050S	048	U048S	U072S	J096S	116	117	108	115	124	126	119	109	113	113	097S	087	I077S	089	057
4	J054S	052	051	052	042	041S	041	U068S	096S	103S	128	130	122	137S	147S	137	128	125	116	J100S	U088S	087S	082S	U069S
5	068S	066S	061	059	048	047	046	I075S	J101S	106	121	119	123	136S	130	122	118	113	113	J099S	I084S	J076S	I072S	U071S
6	068S	066	054	054	048	038	042S	U071S	105	113	106S	111	120V	138	132	135	128	120	109R	085	068S	U070S	068S	067
7	063	059	055	050	043	044	045	U072S	U097S	106	110	123	132	127	138	125	120	120	108	086S	J078S	I071S	070S	070S
8	I068S	062S	055	056	052	046	051	J079S	080	091	105	112	115	120	125	125	113	109	107	098S	087S	080S	J079S	075S
9	071S	065S	057	055	047	043	042S	065S	084	098S	125	117	127	141	141	132	115	109	111	I103S	084S	I081S	I080S	I077S
10	072S	063	060	056	045	037	038	063S	084	090	110	116	123	129	115	114	100H	099S	104	093S	073S	066	064	060S
11	058	057	054	050	045	045	046S	069S	099	120	114R	118	129	132R	129	133	122	110	111	J097S	I077S	J064S	063	I064S
12	063	061	056	049	042	039	041	070S	U094S	111	114	125	J137S	146S	142	142	136S	130	116	110	s	s	089R	s
13	s	069	063	054S	045	036	037S	068S	096	105	118	125	136S	141	150	142	137S	140	125	J104R	U086S	J084S	U073S	065
14	060	058	060	057	048	033	033S	J064S	086	I107C	115	122	132	133	138	128	131	128	115	I103S	090S	s	s	J080S
15	068S	052	045	043	041	043	040S	063S	094S	120	136	136	135	128	124	129	133	126	123	106	085	065	061	061
16	055	054	057	048	041	039	038S	080S	093S	098	105	125	142	143	126	132	127	128	121	110S	091S	J078S	071S	061S
17	058	059	066	044	036	037	039S	081S	J088S	104	116	111	120	123	120	119	118	127	128R	113	I098S	J082S	082	068S
18	067S	065S	063	064	059	051	054	080S	095S	104	115	122	128	136	130	118	116	121	119S	112	085	U071S	U070S	U082S
19	063	056	052	054	047	045	054S	U079S	086S	094	098	116	126	136S	145	146S	145S	146S	144R	126	113	090	086	066
20	056	056	056	055	050	051	050	088	091	105S	123	133	145	139	136	133	128	126S	123	099	087	084S	U084S	U070S
21	s	U069S	067S	063	055	046	U050S	080S	102S	113	108	120	123	123	123	119	113	119	118S	098S	086	I083C	J080S	074S
22	068S	060	057	054	048	044	046	085	103	102	107	114	118	116	c	c	c	c	113	108	092S	082S	078S	U072S
23	066	063	064	060	052	051	051	081	106	121	112	122	132	141	124	114	I114C	116	119	110	089S	I080S	078S	I080S
24	078S	J077S	084	I074S	046	038S	039	076S	106	106	103	120	126	129	128	130	128	131	119	112	102S	I095S	090S	083S
25	084	I084S	087S	069S	052	054	060	U095S	112	120	121	123	128	138S	138S	141	130	120	121	114	J096S	088S	086S	085
26	J081S	J083S	089	U073S	055	053	056	087S	113	111	110	c	c	c	c	c	c	c	c	J126S	s	s	s	s
27	D070S	U075S	066	066	058S	058	061S	I082S	I101S	U107S	J122R	135	144	149S	147	144	143	144	U150S	U147R	s	s	U084S	s
28	s	D073S	076	076S	063	043	047	I076S	I100S	098S	I109S	126	141	U154S	150S	145	146S	148S	144	J127S	s	s	s	s
29	s	s	s	s	063	057	059	s	s	s	I117S	134	142	I143C	146S	150S	146S	136S	s	s	s	s	s	s
30	s	s	s	071	056	051	057S	I088S	I107S	I105S	I109S	132	138	141	146	141	131	129	130	s	s	s	s	s
31	s	s	s	063	064	068	U067S	J085S	J126S	129	120	124	136	151S	151S	143	140	134	128	s	s	s	s	s
Count	25	28	29	30	31	31	31	30	30	30	31	30	30	30	29	29	29	29	30	28	24	23	25	24
Median	066S	062	059	056	048	045	046S	076S	096S	106	114	122	128	136	134	132	128	125	119	107	087S	080S	078S	068S
U. Q.	070	068	066	063	055	051	054	081	103	113	121	125	136	141	144	142	134	130	125	112	092	084	084	074
L. Q.	060	058	055	054	045	039	040	068	091	102	108	117	123	128	126	122	117	114	113	098	084	075	070	064
Q. R.	010	010	011	009	010	012	014	013	012	011	013	008	013	013	018	020	017	016	012	014	008	009	014	010

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

The Radio Research Laboratories, Japan

foF2

Y 1

IONOSPHERIC DATA

Lat. 31° 12.1' N
Long. 130° 37.1' E

Yamagawa

0.01Mc 135° E Mean Time (G.M.T. +9h)

foF1

Mar. 1968

Day	00	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	L	L	L	L	L	LH	L	L							
2										L	LH	LH	LH	LH	LH	L	LH	L						
3										L	LH	LH	LH	LH	L	LH	410							
4										L	LH	500L	540	LH	L	LH	L	L						
5										LH	L	L	L	LH	L	L	LH	310						
6										L	L	LH	LH	LH	U540L	LH	360							
7										L	L	L	LH	L	L	L	L	300						
8										380	LH	L	500L	LH	L	L	LH	LH						
9										L	L	L	530	LH	L	L	400H	320H						
10									320	400	LH	LH	LH	LH	LH	L	L							
11										L	L	520L	L	L	LH	L	L	L						
12										L	L	LH	L	520L	480L	LH	LH	320L						
13										L	LH	540L	LH	560L	540L	L	L	LH						
14										C	L	L	L	L	LH	LH	LH	LH						
15										L	LH	LH	500	LH	LH	500H	LH	L						
16										LH	LH	L	L	A	L	LH	L	LH						
17										L	L	L	LH	LH	L	LH	A	L						
18										LH	450	530L	570L	LH	LH	LH	LH	L						
19										L	LH	LH	500L	U520L	LH	L	L	L						
20										U480L	L	510L	LH	LH	LH	510L	L	400L						
21										L	LH	LH	LH	LH	LH	L	LH	LH						
22										LH	LH	LH	L	L	C	C	C	C						
23										L	L	LH	L	LH	L	LH	G	L						
24										L	L	LH	L	L	550L	LH	LH	L						
25										L	L	LH	LH	LH	U570L	L	L	A						
26										L	L	L	C	C	C	C	C	C						
27										L	L	LH	610L	520L	LH	L	LH	L						
28										L	L	L	LH	L	LH	LH	L	L						
29										L	LH	470	LH	L	580	C	LH	LH						
30										L	LH	LH	LH	LH	L	L	LH	L						
31										L	L	L	LH	LH	LH	LH	L	L						
Count									2	4	2	6	7	6	5	1	4	4						
Median									310	390	460	520L	530L	540L	540L	500H	400	320						
U. Q.																								
L. Q.																								
Q. R.																								

foF1

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

The Radio Research Laboratories, Japan

Y 2

IONOSPHERIC DATA

Lat. 31°12.1'N
Long. 130°37.1'E

Yamagawa

0.01Mc **f_oE** 135° E Mean Time (G.M.T. +9h)

f_oE

Mar. 1968

Day	00	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	250H	310	350	365	370	380	365	345	305	270	B					
2								S	260H	310H	340H	360R	370	370R	370	350	320	260	160					
3								A	250	310	335	355H	340	A	370	350	320	270	B					
4								190	270	315	340	360	360	A	A	A	A	A	A					
5								165	275	320	335	350H	350R	350	360	345	310	270	B					
6								170	260	310	335	350	350	365	1355A	345	315	265	170					
7								150	265	320H	340H	360	370	370H	355	1340A	315	255	180					
8								S	250H	290	315	350	360	360	355	340	310	260H	B					
9								S	265H	305H	330	350H	350	360	360	330	300	250	B					
10								190	260	310	340	360	365	370	360	340	305	260H	190					
11								140	260H	315	340	A	A	360	360	345	1300A	270	A					
12								170	265H	310	325	335	1345A	1360A	365	340	310	255	A					
13								165	265	300	330	350	1360A	365	355	340	310	270	A					
14								145	260	1320C	340	350	350H	350	355H	345	320H	270	165					
15								160	260	310	340	340	340	350	350	330	305	265	160					
16								A	250	300	340	350	350	1350A	1350A	340	310	260	B					
17								150	260	300	330	330	340	330	1355A	1335A	320	A	A					
18								180	270H	315	335	340	340	340	335	320	290	250	B					
19								200	290	315	345	350	350	350	345	310	310	270	A					
20								210	280	315	335	350	355	350	350	340	1310A	A	A					
21								210H	290	320	340H	350H	375	380	370H	350	320	260	190					
22								195H	280	330	345	360H	360	350	G	G	G	C	180					
23								200H	270H	320	345	360H	1350A	1350A	350	340	G	A	180H					
24								205H	280H	320	350	365	370R	380	370	350	320	250	A					
25								220H	290	325	350	360	1360A	360	350	340	320	260	A					
26								210H	290H	330	350	G	G	G	G	G	G	G	C					
27								220	295	335	360	375R	375	375	370	345	325	1260A	185H					
28								210H	290	330	350	365H	365	1360A	1360A	355	330	280	150					
29								220	290	330	345	360	360	A	G	A	330	290	200					
30								230H	290	330	350	360	1365R	1370R	1380R	1360A	340	300	210					
31								230H	290H	330	350	355	1355A	1375A	380	360	1325A	280	190					
Count								25	31	31	31	29	29	27	27	27	27	25	14					
Median								195	270	315	340	355	360	360	360	340	315	265	180					
U. Q.																								
L. Q.																								
G. R.																								

The Radio Research Laboratories, Japan

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

f_oE

Y 3

IONOSPHERIC DATA

Mar. 1968

f_oEs

0.1Mc 1 3.5° E Mean Time (G. M. T. +9h)

Yamagawa

Lat. 31° 12.1' N
Long. 130° 37.1' E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E013B	E018B	E016B	E015B	E014B	E015B	E012S	E015S	G	028G	031G	034G	039G	034G	039	022G	033	025G	E017B	023	E015B	021	J020	022
2	021	020	J020	E015B	E015B	E015B	E015S	E015S	G	G	G	G	034G	G	G	G	G	G	E015B	E015B	E015B	E015B	E015B	022
3	E015B	E015B	E017B	E015B	E014B	E016B	020	024	G	G	G	G	038	041	041	G	G	G	E018B	E015B	E015B	J022	E017B	J021
4	022	020	E017B	E016B	E015B	E015B	E015S	G	G	035	035	G	041	J046	J041	J049	J048	J031	025	E016B	E018B	021	E016B	E015B
5	E017B	E015B	E015B	E017B	E018B	E015B	E015S	G	G	G	G	036	038	037	G	036	034	029	E020B	E015S	E017B	E024B	E015B	E018B
6	E015B	E017B	E015B	E015B	E017B	E016B	E015S	G	029	034	035	037	039	037	036	032G	G	024G	G	021	020	020	E015B	E015B
7	E014B	E014B	020	020	E	E015B	E015S	020	G	033	036	047	040	043	038	035	029G	027	G	E015B	022	022	022	020
8	E015B	E014B	E011B	E011B	E	E014B	E015S	E014S	G	031	036	038	040	025G	023G	039	025G	G	025	J027	E015B	E015B	E015B	E015B
9	E015B	E015B	E011B	E	E011B	E012B	E015S	E015S	028	033	035	G	034G	J054	039	027G	024G	G	E015B	020	020	019	019	021
10	020	E015B	E013B	E011B	E	E012B	E015S	G	027	035	036	040	J054	026G	047	043	035	020G	G	E015B	E015B	E012S	021	021
11	J025	024	020	E	E	E011B	E015S	G	G	G	031G	037	J047	034G	J046	J044	J039	032M	J026	020	020	020	E015S	E015S
12	020	023	E015B	E	E	021	E015S	G	G	G	G	037	043	040	027G	025G	019G	J026	J020	021	E015S	E015S	E015S	E015S
13	E015S	E015B	E012B	E	020	021	E015S	021	G	031	035	038	J041	040	G	G	020G	022G	J021	021	019	E015S	E015B	E015S
14	E015S	E011S	020	E	E	E015B	E015S	G	G	G	G	G	043	040	038	038	G	G	G	E015S	E015B	022	E015S	E015S
15	E014S	E015B	E011B	E	E	E	E015S	G	G	G	G	G	032G	034G	034G	J035	020G	029	021	014	020	019	E015B	E015B
16	E015B	E015B	E012B	E	E	E015B	E015S	020	G	G	G	G	J053	J066	J048	J029G	035	017G	E017B	E015S	J025	E015S	E015S	E013S
17	E015B	E015B	E011B	E	E	E015B	E015S	G	029	033	035	037	038	040	037	J044	J058	038	J043	J037	J025	E015B	022	J021
18	021	E015B	E014B	E	E	E011B	E015S	G	030	034	039	036	038	040	037	039	035	J038	J042	022	021	J020	023	J022
19	022	021	021	022	022	021	E015S	G	G	G	G	G	036	037	037	034	G	026G	J028	J030	J026	J020	018	E014S
20	E015S	E013B	J028	022	021	E014B	E015S	G	G	034	035	037	040	040	034G	039G	033	J036	J058	020	021	023	023	021
21	022	E015S	E011B	E013B	E	E014B	E015S	J026	030	019G	027G	026G	025G	029G	G	021G	020G	029	G	023	E014S	G	E015S	E015S
22	E015S	E012S	E012B	E011B	E	E013B	E014S	G	G	035	036	040	040	040	G	G	G	G	J091	J049	J028	J027	E015S	018
23	E014S	E013S	019	E011B	E	E012B	E015S	G	G	035	040	038	040	040	037	039	G	J031	G	J012S	E014S	020	E014S	E015S
24	E015S	E011S	E014B	E011B	E011B	E013B	E015S	G	G	023G	029G	030G	028G	028G	027G	023G	021G	029	020	018	J015S	E014S	E014S	019
25	E015S	E013S	E015B	E011B	E	E011B	E015S	G	031	036	040	042	J045	046	J051	043	J040	J045	J037	J033	J020	020	E015S	J026
26	J025	J029	019	E	E	E013B	E015S	G	G	036	038	G	G	G	G	G	G	G	G	021	E015S	022	E015S	022
27	E015S	E014B	E011B	E	E011B	E	E015S	G	G	036	034G	G	G	043	G	J052	039	032	G	E015S	J024	022	J018	J021
28	J021	J018	020	E013B	E011B	E013B	E015S	G	032	035	038	042	045	043	040	J054	049	038	028	018	J015	J012S	E015S	E015S
29	J054	J027	J024	E012B	E011B	E011B	E015S	G	G	036	043	044	050	049	G	036	027G	J024G	019G	J025	J025	E015B	J023	E015B
30	E015S	E012S	E	E	E	E011B	E015S	026	031	036	037	039	036G	036G	038	J042	024G	015G	G	J024	020	E015S	021	E015B
31	024	E012B	E012B	E011B	E	E015S	E015S	G	032	036	041	043	042	041	035G	029G	J041	J029	G	E012S	E015S	E014S	E015S	E014S
Count	31	31	31	31	31	31	31	31	31	30	31	30	30	30	28	29	28	29	30	31	31	30	31	31
Median	E015	E015B	E015B	E011B	E	E014B	E015S	G	G	033	035	037	040	040	037	035	G	027	G	020	020	020	E015	E015
U. Q.	021	018	020	E015	E014	E015	E015	G	029	035	037	039	043	043	040	042	037	032	026	023	022	021	020	021
L. Q.	E015	E013	E012	E	E	E012	E015	G	G	G	G	G	G	G	G	G	G	G	G	E015	E015	E015	E015	E015
Q. R.	D006	D005	D008																	D008	D007	D006	D005	D006

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

f_oEs

The Radio Research Laboratories, Japan

IONOSPHERIC DATA

Lat. 31° 12.1' N
Long. 130° 37.1' E

Y a m a g a w a

0.1Mc **f_oE_s** 135° E Mean Time (G.M.T. +9h)

f_oE_s

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	B	B	B	B	B	B	S	S		027G	030G	034G	033G	030G	027G	022G	019G	025G	B	E	B	E	018	E	
2	E	E	016	B	B	B	S	S					032G						B	B	B	B	B	B	
3	B	B	B	B	B	B	E	G					E038R	E041R	041				B	B	B	018	B	019	
4	019	E	B	B	B	B	S		G	G			041	041	040	040	047	030	021	B	E	E	B	B	
5	B	B	B	B	B	B	S					E036R	E038R	G		E036R	033	G	B	S	B	B	B	B	
6	B	B	B	B	B	B	S		G	G	G	037	G	E037R	036	031G	023G		015	016	E	E	B	B	
7	B	B	E	E		B	S	G		G	G	044	G	042	G	035	029G	023G	B	E	E	E	E	E	
8	B	B	B	B	B	B	S	S		G	027G	028G	040	025G	022G	029G	025G		G	016	E	B	B	B	
9	B	B	B	B	B	B	S	S		G	032	G	033G	042	G	027G	023G		B	E	E	E	E	017	
10	E	B	B	B	B	B	S		G	G	G	G	044	026G	043	042	020G	018G		B	B	B	S	E	
11	E	015	E		B	B	S			031G	036	046	033G	031	033	032	022	021	017	E	E	S	S	S	
12	E	015	B		E	S	S			G	043	040	027G	025G		017G	017	017	E	S	S	S	S	S	
13	S	B	B	B	E	E	S	G		E031R	G	027G	038	039		020G	017G	018	E	E	B	E	S	S	
14	S	S	E		B	B	S			G			G	039	G	037			S	B	B	E	S	S	
15	S	B	B				S			G			032G	032G	028G	028	020G	021G	G	E014R	E	E	B	B	
16	B	B	B		B	B	S	S					043	056	040	027G	019G	017G	B	S	016	S	S	S	
17	B	B	B		B	B	S		G	G	G	020G	G	039	036	035	056	038	043	031	022	B	016	018	
18	016	B	B		B	B	S		G	G	038	028G	038	039	G	037	035	038	027	015	E	018	E	021	
19	016	E	E	013		E	S		G				E036R	E037R	G	E034R	025G	028	027	018	016	E	S	S	
20	S	B	026	012	E	B	S			033	G	G	039	039	034G	033G	032	034	056	E	E	E	017	E	
21	E	S	B	B	B	B	S	015		G	019G	027G	026G	026G		020G	016G	015		E	S	C	S	S	
22	S	S	B	B	B	B	S			G	027G	040	039	039	C	C	C	C	047	046	021	025	S	E	
23	S	S	E	B	B	B	S			024G	039	027G	038	038	017G	038	C	028	3	S	E	S	S	S	
24	S	S	B	B	B	B	S			023G	029G	029G	028G	028G	027G	023G	021G	G	019	014	E	S	E	E	
25	S	S	B	B	B	B	S		G	035	039	041	039	044	046	042	038	040	037	031	018	E	S	025	
26	020	023	E		B	B	S			036	G	C	C	C	C	C	C	C	C	E	S	E	S	E	
27	S	B	B		B		S			G	034G			041		048	037	030		S	E	019	E	020	
28	018	E	E	B	B	B	S		G	G	G	041	044	040	038	045	047	036	026	016	014	S	S	S	
29	E	020	E	B	B	B	S			G	042	043	049	047	C	035	025G	021G	015G	022	025	B	018	B	
30	S	S	S		B	B	S	G		G	029G	032G	G	E036R	038	040	024G	015G	020	E	S	E	S	S	
31	E	B	B	B	B	B	S		G	G	G	042	039	040	034G	028G	040	026		S	S	S	S	S	
Count																									
Median																									
U. Q.																									
L. Q.																									
Q. R.																									

The Radio Research Laboratories, Japan
Y 5

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

f_oE_s

Lat. 31° 12.1' N
Long. 130° 37.1' E

Yamagawa

IONOSPHERIC DATA

0.1Mc 135° E Mean Time (G.M.T. +9h)

f-min

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E013	E018	E016	E015	E014	E015	E012S	E015S	E015	E015	E022	E022	E022	E022	E017	E018	E015	E015	E017	E015	E015	E017	E015	E015
2	E015	E015	E015	E015	E015	E015	E015S	E015S	E012	E015	E017	E022	E019	E025	E024	E022	E020	E015	E015	E015	E015	E015	E015	E015
3	E015	E015	E017	E015	E014	E016	E015S	E015S	E015	E016	E022	E023	E022	E026	E023	E023	E018	E015	E018	E015	E015	E015S	E017	E015
4	E015	E016	E017	E016	E015	E015	E015S	E015S	E015	E016	E023	E019	E026	E024	E023	E021	E021	E015	E015	E016	E018	E017	E016	E015
5	E017	E015	E015	E017	E018	E015	E015S	E015S	E015	E016	E019	E023	E023	E023	E024	E023	E017	E016	E020	E015S	E017	E024	E015	E018
6	E015	E017	E015	E015	E017	E016	E015S	E015S	E018	E017	E015	E016	E018	E023	E018	E017	E015	E012	E015	E011S	E015	E015	E015	E015
7	E014	E014	E014	E	E	E015	E015S	E012S	E012	E014	E015	E015	E024	E022	E016	E015	E015	E012	E014	E015	E014	E015	E015	E014
8	E015	E014	E011	E011	E	E014	E015S	E014S	E015	E015	E015	E017	E017	E017	E015	E017	E017	E015	E015	E015	E015	E015	E015	E015
9	E015	E015	E011	E	E011	E012	E015S	E015S	E014	E015	E015	E017	E017	E018	E023	E017	E016	E015	E015	E015	E015	E015	E015	E015
10	E015	E015	E013	E011	E	E012	E015S	E012	E012	E015	E015	E022	E018	E018	E017	E015	E011	E015S	E015	E015	E015	E012S	E015S	E015S
11	E015S	E011	E014	E	E	E011	E015S	E012	E012	E015	E016	E018	E022	E022	E017	E016	E015	E012	E011S	E016	E015	E015S	E012S	E015S
12	E015	E	E015	E	E	E012	E015S	E015S	E012	E015	E017	E022	E019	E018	E022	E018	E012	E012	E015S	E015	E015S	E015S	E015S	E015S
13	E015S	E015	E012	E	E012	E012	E015S	E015S	E015	E018	E016	E018	E021	E022	E021	E017	E015	E012	E	E015S	E015S	E015S	E015	E015S
14	E015S	E011S	E013	E	E	E015	E015S	E012S	E015	E	E017	E019	E018	E018	E018	E017	E015	E012	E015S	E015S	E015	E015S	E015S	E015S
15	E014S	E015	E011	E	E	E	E015S	E014S	E015	E015	E015	E022	E018	E018	E023	E018	E015	E012	E015	E011S	E015	E015S	E015	E015
16	E015	E015	E012	E	E	E015	E015S	E015S	E012	E015	E015	E017	E018	E022	E018	E015	E012	E012	E017	E015S	E012S	E015S	E015S	E013S
17	E015	E015	E011	E	E	E015	E015S	E013S	E012	E013	E015	E017	E018	E021	E015	E015	E012	E012	E015	E015S	E015S	E015	E015	E015
18	E015	E015	E014	E	E	E011	E015S	E015S	E012	E015	E017	E016	E018	E017	E019	E017	E017	E014	E015	E015S	E012S	E015S	E015S	E012
19	E015S	E015S	E012	E	E012	E014	E012S	E014S	E016	E015	E016	E018	E018	E018	E018	E015	E015	E012	E015	E015S	E012S	E015S	E015S	E013S
20	E015S	E013	E011	E	E012	E014	E012S	E014S	E012	E012	E016	E018	E017	E017	E017	E016	E012	E011	E015S	E014S	E015S	E015S	E014S	E015S
21	E015S	E015S	E011	E013	E	E014	E015S	E012S	E012	E015	E015	E017	E019	E017	E017	E016	E012	E012	E015S	E014S	E015S	E015S	E015S	E015S
22	E015S	E012S	E012	E011	E	E013	E014S	E012	E015	E015	E015	E017	E016	E024	E	E	E	E	E	E015S	E015S	E015S	E014S	E014S
23	E014S	E013S	E011	E011	E	E012	E015S	E014S	E012	E014	E015	E016	E016	E015	E014	E017	E	E014S	E013S	E012S	E014S	E014S	E014S	E015S
24	E015S	E011S	E014	E011	E011	E013	E015S	E013S	E012	E015	E015	E016	E019	E019	E016	E015	E015	E015	E012	E012S	E015S	E014S	E014S	E014S
25	E015S	E013S	E015	E011	E	E011	E015S	E012	E014	E013	E015	E015	E020	E022	E022	E018	E016	E015	E015S	E015S	E015S	E015S	E015S	E015S
26	E015S	E015	E013	E	E	E013	E015S	E015S	E015	E016	E017	E	E	E	E	E	E	E	E	E	E015	E015S	E015S	E015
27	E015S	E014	E011	E	E011	E	E015S	E015	E015	E015	E021	E022	E022	E020	E020	E018	E016	E015	E012	E015S	E015S	E015S	E015S	E015
28	E015S	E015S	E015	E013	E011	E013	E015S	E014S	E015	E015	E016	E019	E018	E019	E020	E019	E015	E012S	E013S	E012S	E015S	E015S	E015S	E015S
29	E015S	E013S	E015	E012	E011	E011	E015S	E014	E014	E014	E015	E017	E022	E020	E	E016	E016	E012	E011	E012S	E015S	E015S	E015S	E015
30	E015S	E012S	E	E	E	E011	E015S	E012	E012	E016	E022	E021	E020	E020	E022	E021	E016	E011	E015S	E015S	E015S	E015S	E015	E015S
31	E015S	E012	E012	E011	E	E015S	E015S	E015S	E016	E015	E020	E021	E020	E021	E020	E020	E016	E012	E011	E012S	E015S	E014S	E014S	E014S
Count	31	31	31	31	31	31	31	31	31	30	31	30	30	30	28	29	28	29	30	31	31	30	31	31
Median	E015S	E014	E013	E011	E	E013	E015S	E014S	E014	E015	E016	E018	E019	E020	E018	E017	E015	E012	E014	E015S	E015S	E015S	E015S	E015S
U. Q.																								
L. Q.																								
Q. R.																								

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

f-min

The Radio Research Laboratories, Japan

IONOSPHERIC DATA

Lat. 31° 12.1' N
Long. 130° 37.1' E

Yamagawa

135° E Mean Time (G.M.T. + 9h)

0.01

M(3000)F2

Mar. 1968

Day	00	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	265	275	295	320	360	245S	305	325	310	295	295	295	295	300	285	290	290	295	I300S	270	I280S	280S	260	
2	255S	270	270	260	260	265	265S	305S	310S	305	310	320	295	285	285	295	300	295	300	300	I280S	U270S	290	285S	
3	290	280	265	265	275S	265	U275S	U310S	J310S	310	325	290	290	290	300	295	285	290	310	285S	305	I285S	280	270	
4	J260S	260	260	295	275	250S	255	U315S	J35S	305S	310	305	290	290S	295S	285	290	295	305	J285S	U275S	285S	290S	U275S	
5	280S	290S	285	290	285	275	275	I310S	J35S	310	315	305	295	300S	290	295	300	295	305	J295S	I270S	J265S	I280S	U295S	
6	280S	295	285	280	300	265	275S	I310S	305	335	320S	310	285V	295	295	295	300	305	310R	310	275S	U290S	295S	290	
7	295	285	300	295	275	270	285	U320S	U35S	340	320	305	305	300	305	295	290	290	295	305	290S	J275S	I285S	280S	
8	I295S	275S	270	285	310	285	295	J330S	350	310	305	310	305	290	290	305	305	305	310	295S	275S	265S	J270S	270S	
9	280S	310S	295	300	300	280	280S	325S	320	305S	320	305	290	300	290	310	305	305	305	335	I300S	275S	I260S	I275S	
10	275S	300	315	320	335	270	275	335S	345	320	320	330	305	310	295	300	290H	310S	310	325S	280S	275	280	275S	
11	280	290	280	285	265	265	265S	320S	315	315	310R	295	305	295R	290	300	305	305	305	J315S	I295S	J280S	285	I295S	
12	300	310	305	325	290	285	295	325S	U325S	320	310	300	J305S	305S	295	300	300S	310	310	295	S	S	245R	S	
13	S	305	315	305S	300	280	260S	320S	320	310	315	295	300S	295	295	300	300S	310	315	J305R	U270S	J280S	U290S	285	
14	295	290	300	325	320	305	275S	J320S	320	I315C	315	300	295	295	295	290	290	295	300	315	290S	280S	S	J300S	
15	310S	300	260	265	265	280	280S	305S	295S	300	315	300	310	295	290	290	290	295	300	315	310	290S	280S	S	
16	260	265	310	290	295	265	265S	340S	325S	315	300	295	305	300	290	290	290	295	300	310	305	285	275	280	
17	260	275	335	320	280	275	270S	335S	J340S	325	325	310	300	300	290	290	300	305	310	310S	295S	J285S	285S	260S	
18	280S	275S	270	295	325	280	295	330S	330S	315	310	305	305	300	290	285	290	300	315R	315	I295S	J270S	285	280S	
19	295	285	285	295	295	285	285	U350S	335S	325	305	300	295	295S	295	300S	295S	300S	310S	315	305	U280S	U310S	U290S	
20	265	275	285	290	275	275	300	340	330	305S	305	300	310	295	295	295	280	305S	315R	310	315	300	305	300	
21	S	U285S	290S	305	305	285	I290S	320S	335S	320	305	300	300	295	295	295	285	305	315	325	290	275S	U295S	U275S	
22	285S	280	280	295	290	275	265	330	335	325	315	300	300	290	C	C	C	C	C	315S	305S	290	I295C	J300S	280S
23	275	270	280	285	270	280	280	320	315	315	305	305	295	300	300	C	C	C	C	300	305	295S	270S	285S	U270S
24	270S	J275S	310	I325S	305	260S	260	315S	325	335	300	295	290	290	280	280	I290C	290	305	310	300S	I270S	270S	270S	
25	260	I275S	300S	325S	255	260	285	U305S	315	310	305	290	280	285S	285S	290	290	290	295	295	300	J285S	270S	275S	285
26	J285S	J295S	305	U325S	265	280	280	325S	330	335	295	C	C	C	C	C	C	C	C	C	J305S	S	S	S	S
27	S	U295S	285	295	270S	265	270S	I295S	I315S	U305S	J295R	290	285	290S	290	280	280	285	U300S	U305R	S	S	U275S	S	
28	S	S	310	305S	315	255	280	I320S	I320S	315S	I290S	275	285	U280S	275S	270	275S	285S	290	J300S	S	S	S	S	S
29	S	S	S	S	285	285	280	S	S	S	290S	I280S	285	280	I275C	275S	275S	290S	295S	S	S	S	S	S	S
30	S	S	S	280S	280	270	255	265S	I320S	I310S	I280S	285	290	275	280	285	280	280	295	S	S	S	S	S	S
31	S	S	S	245	235	265	U260S	J305S	J310S	320	290	280	275	280S	280S	275	285	285	295	S	S	S	S	S	S
Count	24	27	29	30	31	31	31	30	30	30	31	30	30	30	29	29	29	29	29	30	28	24	23	25	24
Median	280S	285	285	295	285	275	275S	320S	325S	315	310	300	295	290	290	290	290	295	305	305	290S	280S	285S	280S	280S
U. Q.																									
L. Q.																									
Q. R.																									

The Radio Research Laboratories, Japan

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

M(3000)F2

IONOSPHERIC DATA

Lat. 31°12.1'N
Long. 130°37.1'E

Y a m a g a w a

M(3000)F1 ^{0.01} **135° E Mean Time** (G.M.T. +9h)

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									415		L	L	L	L	LH	L	L							
2										L	LH	LH	LH	LH	LH	L	LH	L						
3										L	LH	LH	LH	LH	L	LH	400							
4										L	LH	395L	380	LH	L	LH	L	L						
5										LH	L	L	L	LH	L	L	LH	405						
6										L	L	LH	LH	LH	U360L	LH	415							
7										L	L	L	L	L	L	L	L	400						
8										410	LH	L	380L	LH	L	L	LH	LH						
9										L	L	L	360	LH	L	L	400H	405H						
10									405	400	LH	LH	LH	LH	LH	L	L							
11										L	L	365L	A	L	LH	L	L	L						
12										L	L	L	L	365L	395L	LH	LH	390L						
13										L	LH	365L	LH	350L	360L	L	L	LH						
14										C	L	L	L	L	LH	LH	LH	LH						
15										L	LH	LH	380	LH	LH	365H	LH	L						
16										LH	LH	L	L	A	L	LH	L	LH						
17										L	L	L	LH	LH	L	LH	A	L						
18										LH	405	365L	350L	LH	LH	LH	LH	L						
19										L	LH	LH	385L	U365L	LH	L	L	L						
20										U365L	L	375L	LH	LH	370L	L	400L							
21										L	LH	LH	LH	LH	LH	L	LH	LH						
22										LH	LH	LH	L	L	C	C	C	C						
23										L	L	L	L	LH	L	LH	C	L						
24										L	L	LH	L	L	385L	LH	LH	L						
25										L	L	L	LH	LH	U350L	L	L	A						
26										L	L	C	C	C	C	C	C	C						
27										L	L	LH	375L	345L	380L	LH	L	LH	L					
28										L	L	L	L	LH	LH	LH	L	L						
29										L	LH	405	LH	L	345	C	LH	L						
30										L	LH	LH	LH	LH	L	L	LH	L						
31										L	L	L	LH	LH	LH	LH	L	L						
Count									2	4	2	6	7	6	5	1	4	4						
Median									410	405	405	370L	380L	365L	360L	365H	400	400						
U. Q.																								
L. Q.																								
Q. R.																								

M(3000)F1

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

The Radio Research Laboratories, Japan

Y 8

IONOSPHERIC DATA

Lat. 31° 12.1' N
Long. 130° 37.1' E

Yamagawa

135° E Mean Time (G. M. T. +9h)

km

h'F2

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									230	230	270	250	265	280	270	250	250							
2										260	280	255	280	300	295	255	250	245						
3										250	250	250	290	300	280	280	235							
4										235	280	255	255	300	285	300	270	250						
5										255	250	255	295	285	250	260	270	250						
6										245	245	265	295	305	270	265	240							
7										255	265	280	275	275	285	250	245	240						
8										230	250	255	275	300	280	275	250	250						
9										250	275	250	300	290	260	260	250	250						
10									240	240	260	275	305	275	280	270	240							
11										250	250	270	260	260	300	260	255	250						
12										255	245	300	275	275	250	265	255	250						
13										240	270	290	280	285	290	250	255	260						
14										I2600	260	275	280	280	280	280	280	235						
15										275	275	280	255	280	250	290	275	245						
16										250	255	290	280	275	255	285	250	255						
17										225	255	255	265	270	275	300	280	270						
18										245	250	260	285	295	250	300	300	260						
19										250	300	290	270	270	295	265	255	260						
20										255	265	255	270	300	275	270	250							
21										250	295	290	275	285	280	280	290	270						
22										245	265	275	280	270	0	0	0	0						
23										255	260	245	275	285	260	290	I2900	275						
24										245	245	250	290	260	290	270	300	270						
25										250	245	250	275	305	295	290	255	250						
26										250	240	245	0	0	0	0	0	0						
27										245	250	265	300	280	300	300	295	295						
28										255	240	250	290	295	300	300	300	280						
29										240	250	255	300	330	I3200	325	300	280						
30										245	250	300	300	275	310	300	280	295						
31										250	245	250	270	305	300	305	290							
Count									12	31	31	30	30	30	29	29	29	23						
Median									245	250	255	275	280	285	280	280	255	255						
U. Q.																								
L. Q.																								
Q. R.																								

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

h'F2

The Radio Research Laboratories, Japan

Y 9

IONOSPHERIC DATA

Mar. 1968

f_oF

km

1 3.5° E Mean Time (G. M. T. +9h)

Yamagawa

Lat. 31°12.1'N
Long. 130°37.1'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	260	255	290	270	245	205	E2553	245	220	200	230	230	230	215	195H	220	230	230	230	225	240	260	250	280
2	305	295	290	300	250	240	275	255	240	230	230H	200H	205H	195H	225H	230	230H	230	235	235	230	270	250	260
3	250	255	300	295	280	300	245	240	240	220	205H	200H	200H	230H	250	230H	225	240	240	225	230	240	230	290
4	305	300	300	245	275	360	325	220	235	225	205H	220	205	190H	235	215H	250	245	240	225	250	255	250	245
5	275	260	260	265	255	260	280	245	240	200H	230	220	210	200H	240	240	220H	220	240	220	245	300	280	275
6	250	250	250	250	250	310	245	245	250	230	225	230H	205H	200H	190H	200H	215	240	225	215	250	270	250	260
7	260	260	250	250	235	300	295	280	250H	235	225	230	200H	225	240	225	225	225	235	225	220	250	245	265
8	255	250	275	275	240	280	270	230	220	220	220H	220	215	200H	195	230	215H	240H	235	220	220	250	255	270
9	265	240	240	250	230	250	280	230	230	220	230	205	195	235H	230	215	215H	225H	240	215	220	295	280	270
10	270	250	245	230	205	280	290	230	230	225	200H	230H	230H	215H	235H	250	240	240	255	220	225	280	260	295
11	290	270	290	245	270	275	320	245	240	230	235	215	I200A	255	235H	210	220	230	240	225	220	255	260	265
12	265	250	240	225	240	250	265	245	235	225	210	200H	245	225	225	210H	220H	240	230	225	220	230	285	300
13	270	245	240	225	220	250	350	250	240	220	220H	230	200H	215H	210	215	225	225H	225	205	230	255	250	260
14	270	255	255	240	220	240	270	245	230	I225C	225	215	205	220	225H	220H	220H	240H	230	225	225	270	280	250
15	230	245	300	300	275	280	250	250	245	240	215H	205H	200	200H	200H	195H	225H	230	255	215	225	220	275	275
16	300	310	245	220	240	300	345	225	225	205H	190H	205	A	A	220	205H	225	225H	235	230	220	250	240	280
17	310	300	215	195H	250	300	300	240	225	225	220	205	200H	180H	225	225H	A	E255A	E250A	230	230	225	250	275
18	290	280	290	255	220	250	275	230	225	200H	205	200H	200H	195H	200H	210H	225H	E255A	245	225	215	245	245	265
19	270	275	280	270	240	290	250	225	225	220	210H	200H	195H	205	200H	240	220	225	245	230	215	230	240	230
20	255	295	305	270	280	300	255	225	230	E230A	210	205	200H	210H	210	220	220	250	250	220	230	240	250	290
21	270	255	245	245	225	255	290	240	240	230	215H	200H	190H	200H	195H	205	245H	230H	245	225	230	I240C	245	250
22	250	280	290	250	220	270	325	240	230	200H	215H	225H	205	210	G	G	G	E250A	250	240	250	250	255	255
23	295	290	275	250	225	260	275	235	230	225	225	210H	210	200H	225	220H	I220C	235	250	240	225	240	290	290
24	295	280	250	215	190	290	305	245	240	225	205H	200	205	215	215H	220H	230	245	240	245	230	270	270	295
25	300	280	245	205	260	300	280	240	240	225	215	210H	195H	E240A	E250A	230	240	A	255	245	235	270	290	285
26	295	290	240	205	180H	265	290	240	240	220	210	G	G	G	G	G	G	G	G	250	220	250	295	290
27	260	250	250	250	250	290	305	235	235	220	220H	205	200H	200H	220H	250	225H	245	270	225	205	225	295	300
28	280	250	265	250	205	200H	300	250	240	230	225	210H	200H	220H	250H	250H	250	250	250	230	225	250	260	290
29	300	290	245	230	215	250	300	235	230	225H	200	200H	250	E250A	C	210H	225H	250	245	235	260	275	290	280
30	275	250	245	230	230	325	300	245	230C	225H	215H	200H	200H	200H	225	230	230H	250	260	230	225	240	275	295
31	295	270	270	300	360	290	270	240	240	230	220	205	200H	200H	225H	225H	245	245	250	235	225	250	275	295
Count	31	31	31	31	31	31	31	31	31	31	31	30	29	29	28	29	28	28	30	31	31	31	31	31
Median	270	260	255	250	240	275	290	240	235	225	215	205H	200H	200H	220H	220	225	240	240	225	225	250	260	275
U. Q.																								
L. Q.																								
Q. R.																								

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

f_oF

The Radio Research Laboratories, Japan

Y 10

IONOSPHERIC DATA

Lat. 31°12.1'N
Long. 130°37.1'E

Yamagawa

135° E Mean Time (G.M.T. +9h)

h'Es
km

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	B	B	B	B	B	B	S	S	G	105	105	100	100	100	130	100	120	110	B	100	B	105	100	100	
2	100	105	100	B	B	B	S	S	G	G	G	G	100	G	G	G	G	G	G	B	B	B	B	100	
3	B	B	B	B	B	B	100	100	G	G	G	G	120	105	E175G	G	G	G	B	B	B	105	B	100	
4	100	105	B	B	B	B	S	G	G	130	135	G	125	110	105	105	105	105	100	B	B	110	B	B	
5	B	B	B	B	B	B	S	G	G	G	G	140	120	150	G	125	120	115	B	S	B	B	B	B	
6	B	B	B	B	B	B	S	G	120	120	140	130	120	125	115	105	G	105	G	095	095	095	B	B	
7	B	B	100	100	E	B	S	100	G	E175G	170	125	125	120	125	115	105	140	G	B	100	100	100	100	
8	B	B	B	B	E	B	S	S	G	E145G	125	170	150	100	100	160	105	G	150	115	105	B	B	B	
9	B	B	B	E	B	B	S	S	G	150	145	135	G	100	100	170	105	G	B	100	100	095	110	095	
10	095	B	B	B	E	B	S	G	120	E175G	155	150	130	100	165	160	155	095	G	B	B	B	S	100	
11	100	100	100	E	E	B	S	G	G	G	105	110	105	105	100	100	100	100	100	100	095	110	S	S	
12	100	100	B	E	E	E	S	G	G	G	G	115	165	160	105	105	100	100	100	100	S	S	S	S	
13	S	B	B	E	100	100	S	095	G	150	135	120	100	155	G	G	100	100	095	100	S	B	B	S	
14	S	S	100	E	E	B	S	G	G	C	G	G	125	125	135	125	G	G	G	S	B	B	105	S	
15	S	B	B	E	E	E	S	G	G	G	G	G	105	100	100	100	100	150	120	120	110	110	B	B	
16	B	B	B	E	E	B	S	095	G	G	G	G	125	115	100	100	130	100	B	S	110	S	S	S	
17	B	B	B	E	E	B	S	G	150	140	130	125	125	115	105	105	125	125	110	110	105	B	095	095	
18	095	B	B	E	E	B	S	G	150	140	125	120	115	115	110	110	110	110	105	105	105	105	105	100	
19	100	100	120	105	105	105	S	G	165	G	G	G	130	120	115	110	G	105	105	105	100	100	100	S	
20	S	B	100	100	100	B	S	G	G	125	130	135	120	115	105	105	105	105	105	105	105	100	100	095	
21	100	S	B	B	E	B	S	100	140	100	100	100	100	100	G	100	100	145	G	095	S	C	S	S	
22	S	S	B	B	E	B	S	G	G	150	150	130	125	120	G	G	C	C	115	110	105	100	S	S	
23	S	S	100	B	E	B	S	G	G	160	140	145	120	120	125	120	C	110	G	S	S	105	S	S	
24	S	S	B	B	B	B	S	G	G	100	100	100	100	100	100	105	105	120	110	105	S	S	S	100	
25	S	S	B	B	E	B	S	G	155	145	130	115	110	115	110	115	115	110	105	105	105	105	S	100	
26	100	100	105	E	E	B	S	G	G	150	140	G	G	G	G	C	C	C	C	105	S	105	S	125	
27	S	B	B	E	B	E	S	G	G	135	105	G	G	115	G	110	110	105	G	S	100	100	100	100	
28	100	100	100	B	B	B	S	G	155	150	145	125	115	115	115	115	115	115	110	105	S	S	S	S	
29	105	100	100	B	B	B	S	G	G	125	125	115	110	105	C	100	100	100	095	100	115	B	100	B	
30	S	S	E	E	E	B	S	150	145	140	125	100	100	100	100	100	100	100	100	G	095	S	105	S	
31	100	B	B	B	E	S	S	G	150	140	125	120	115	100	100	100	100	100	G	S	S	S	S	S	
Count	12	8	10	3	3	3	1	6	11	22	23	21	29	29	23	26	23	24	15	20	18	16	11	13	
Median	100	100	100	100	100	105	100	100	150	140	130	125	120	115	110	105	105	105	105	105	105	105	105	100	100
U. Q.																									
L. Q.																									
G. R.																									

The Radio Research Laboratories, Japan

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

h'Es

IONOSPHERIC DATA

Lat. 31°12.1'N
Long. 130°37.1'E

Yamagawa

Types of Es 1 35° E Mean Time (G.M.T. +9h)

Mar. 1968

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1									1	1	1	1	1	1	h 1	1	h 1	1		f		f	f	f2	
2	f	f	f										1												
3							f	1					c	1	h 1							f2		f	
4	f4	f							h	h	h	h	h	1	1	12	13	13	12				f		
5										h		h	c	h	h	h	c								
6			f	f				1	c	h	h	h	c	h	c	1	12	12		f2	f2	f		f	
7									h	h	h	h	h	h	h	e21	12	h212							
8									h	h	h	h	h	1	1	h 1	1		h	f2	f				
9									h2	h	h	h	h21	1	h 1	1	1			f	f2	f	f	f	
10	f									h	h	h2	h21	1	h 1	h21	1								
11	f	f	f						1	c	1	c	12	1	12	12	12	13	12	f	f	f			
12	f	f2			f					c	h	c	h	c	1	1	1	1	1	f					
13					f			1	h	h	c	1	1	h	1		1	12	13	f					
14			f							h	h	h	h	h	h	h								f	
15										1	1	1	1	1	1	12	1	h 12	e2	f	f	f			
16							1						h2	e2	1	12	h212	1			f2				
17									h	h	h	h	h	c	1	12	h51212	e412	e31	f7f	f4f		f3	f	
18	f2								h	h	h	c	12	c	1	e2	e2	e4	13	f	f	f2	f2	f4	
19	f2	f	f	f	f2	f			h	h	h	c	1	h	c	c		12	14	f7	f3	f	f		
20			f4	f2	f				h	h	h	h	c	c	1	1	12	14	14	f	f	f	f	f	
21	f							1	h	1	1	1	1	1	1	1	1	h 1		f					
22										h	h	h	h	c					e7	f6f2	f4f	f7		f	
23			f						h	h	h	h	h	c	h 1	c		12		f		f			
24									1	1	1	1	1	1	1	1	1	c	13	f2	f		f		
25									h	h	h	c	c	e2	e2	c	e2	e2	13	f7	f2	f	f4		
26	f4	f3	f						h	h	h									f		f	f	f2	
27									h	h	1			c		e2	e2	13		f	f	f2	f	f2	
28	f	f	f						h2	h	h	h	c	c	c	e3	e3	e5	e6	f	f	f			
29	f2	f4	f						h	h	h	h	c3	12	12	12	12	12	1	f7	f5		f2		
30								h2	h	h21	h	h	1	1	12	12	12	1	1	f3	f		f		
31	f								h2	h	h	h2	c	12	1	13	13								
Count																									
Median																									
U. G.																									
L. Q.																									
Q. R.																									

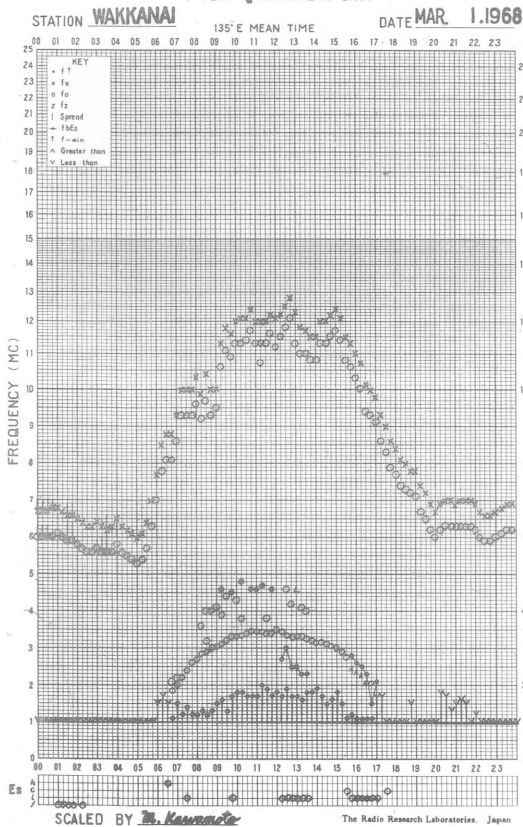
The Radio Research Laboratories, Japan

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

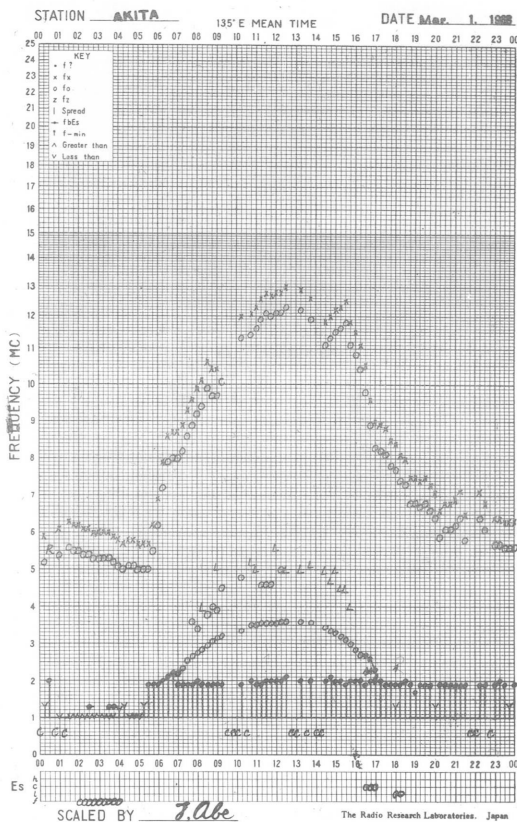
Types of Es

Y 12

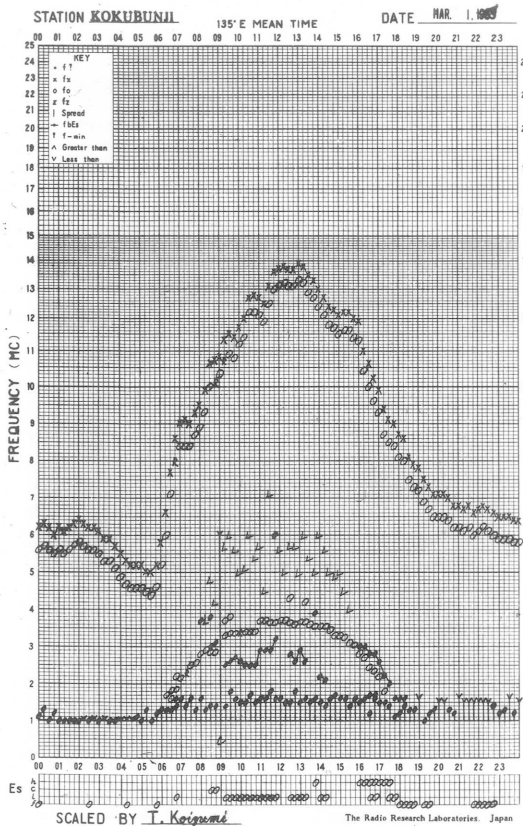
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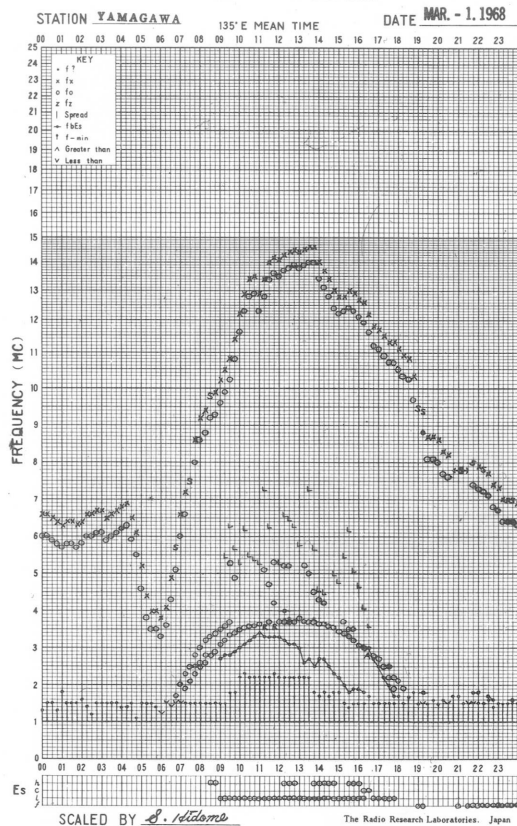
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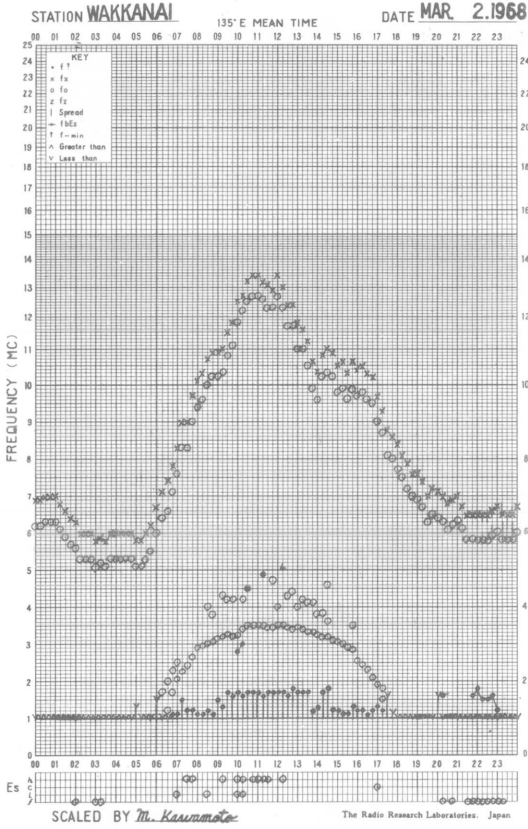
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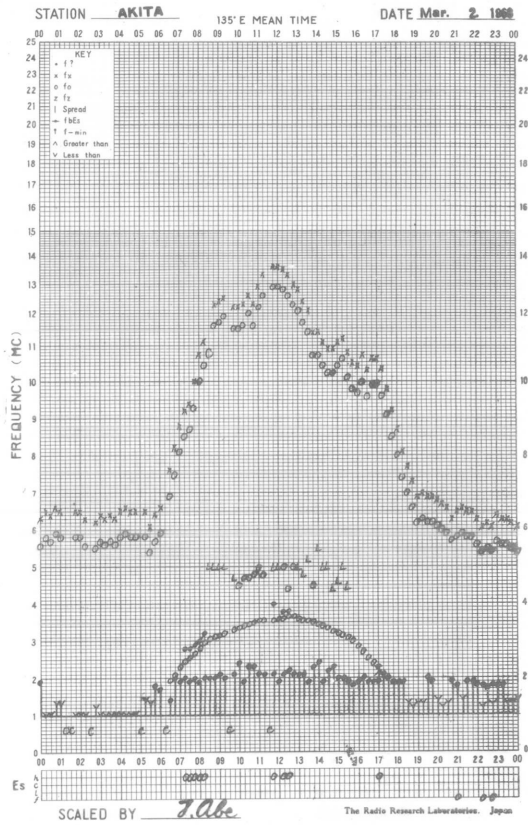
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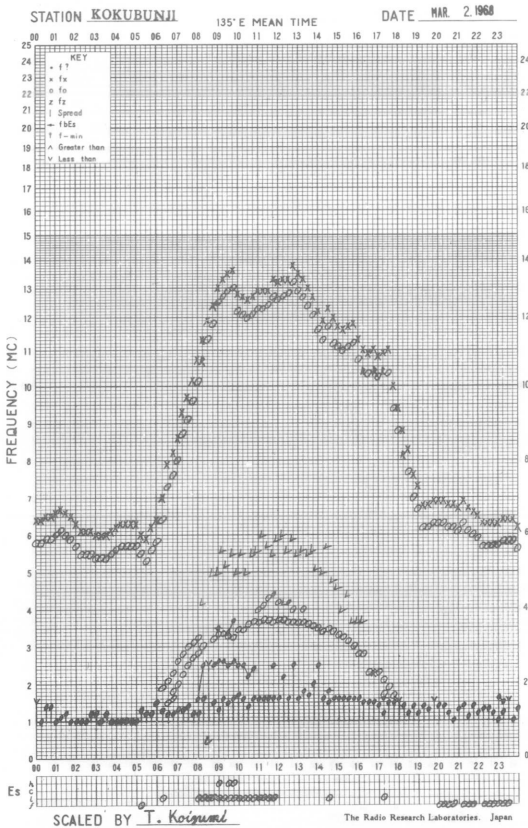
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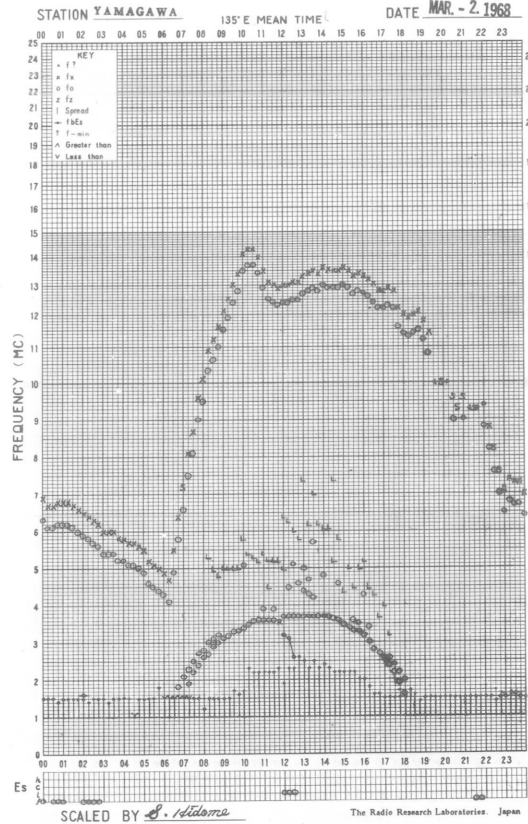
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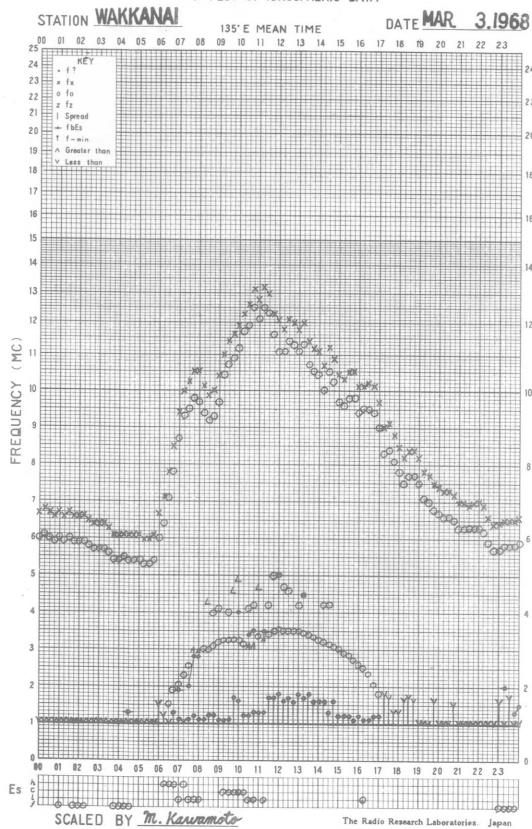
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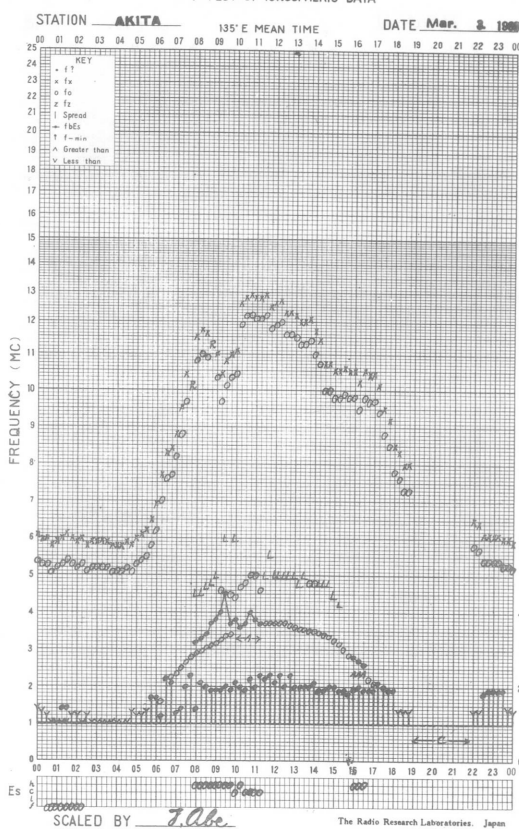
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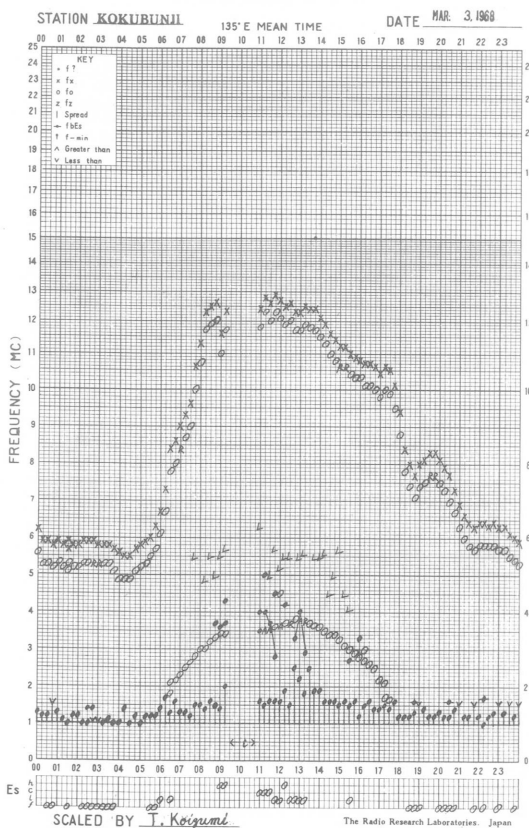
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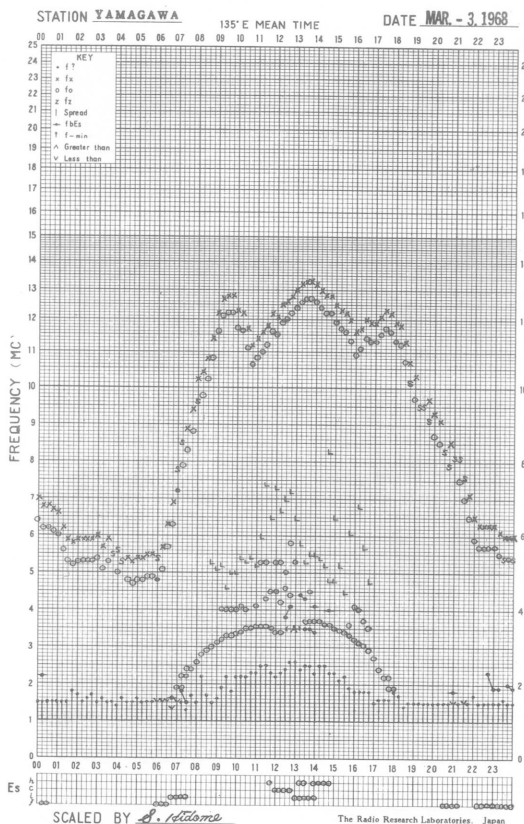
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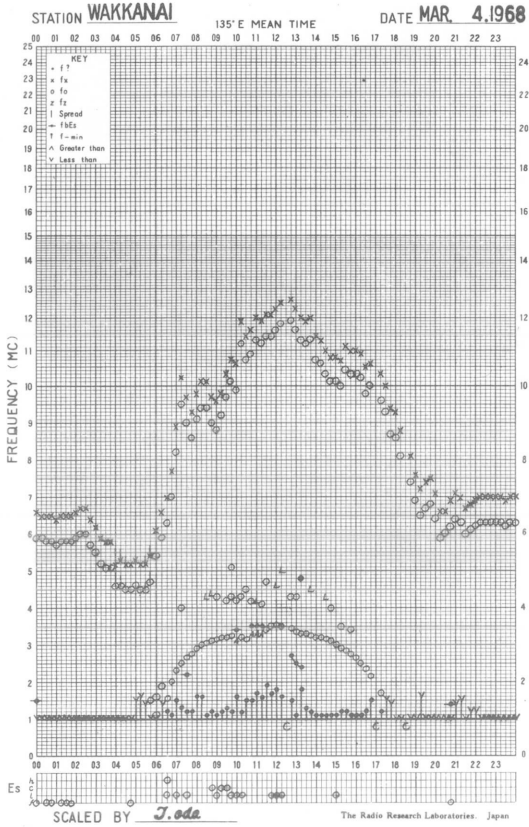
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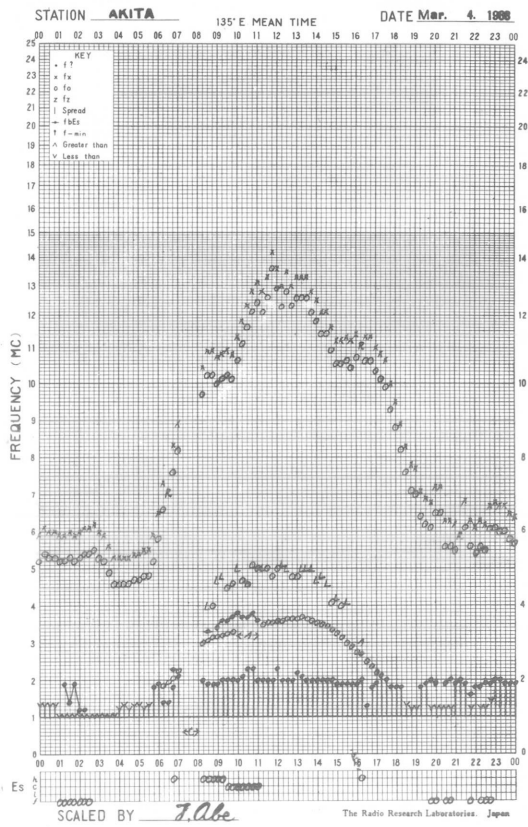
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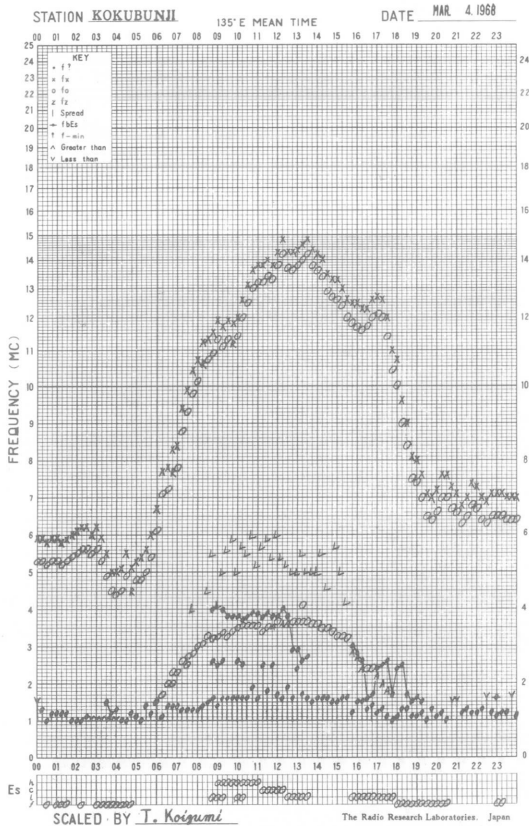
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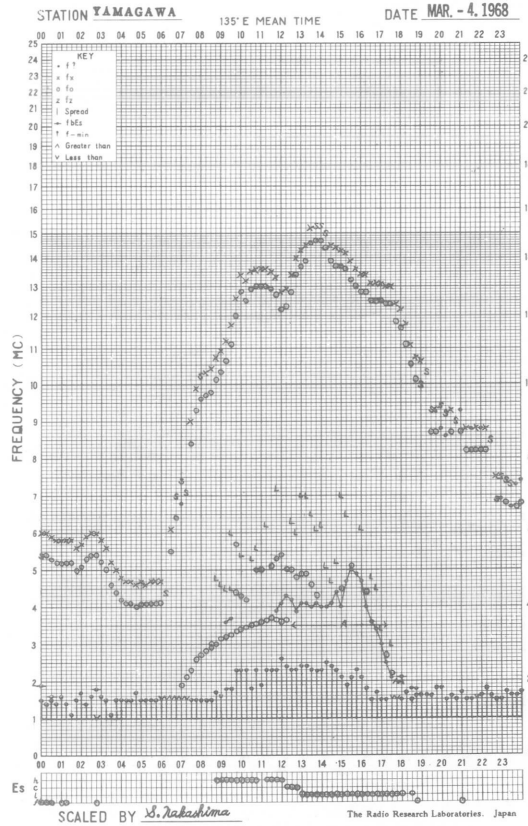
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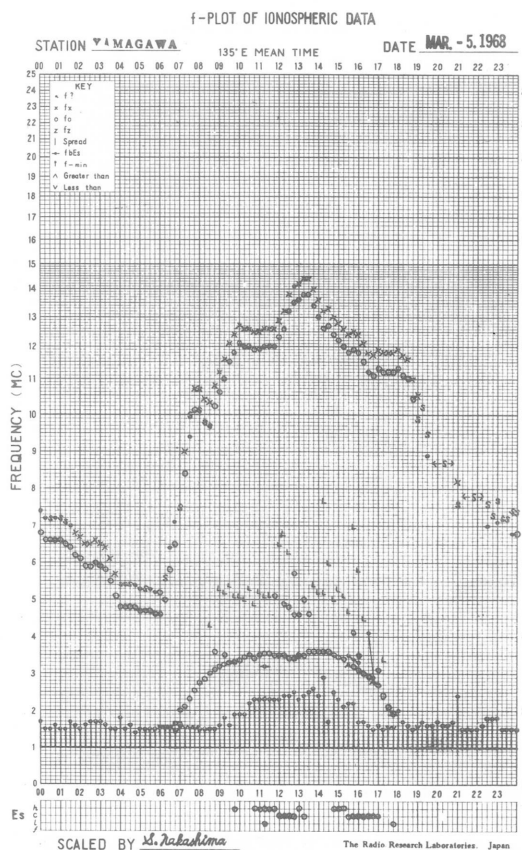
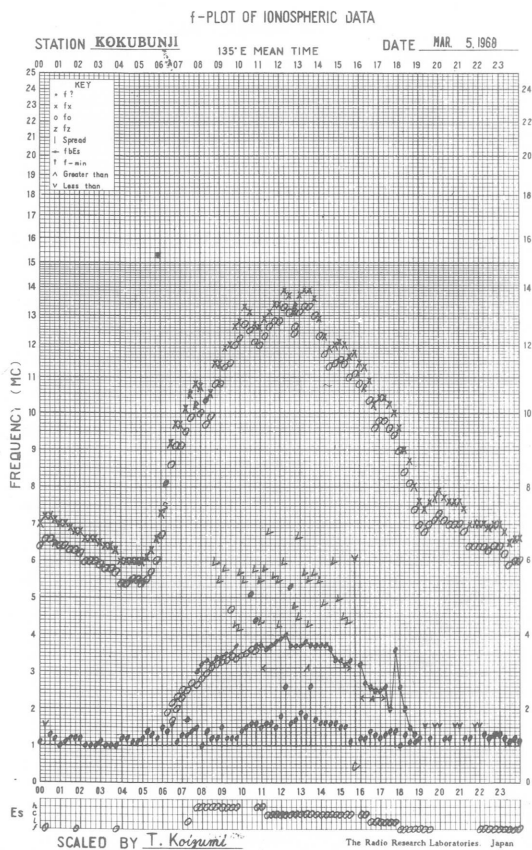
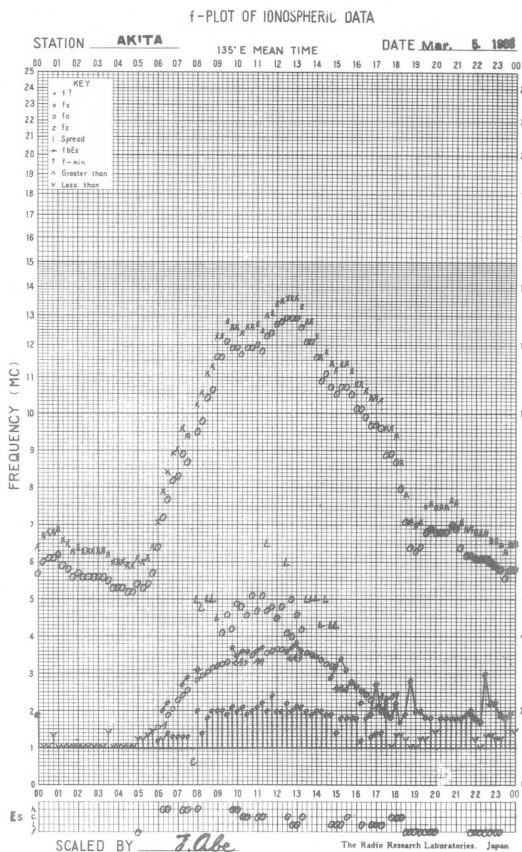
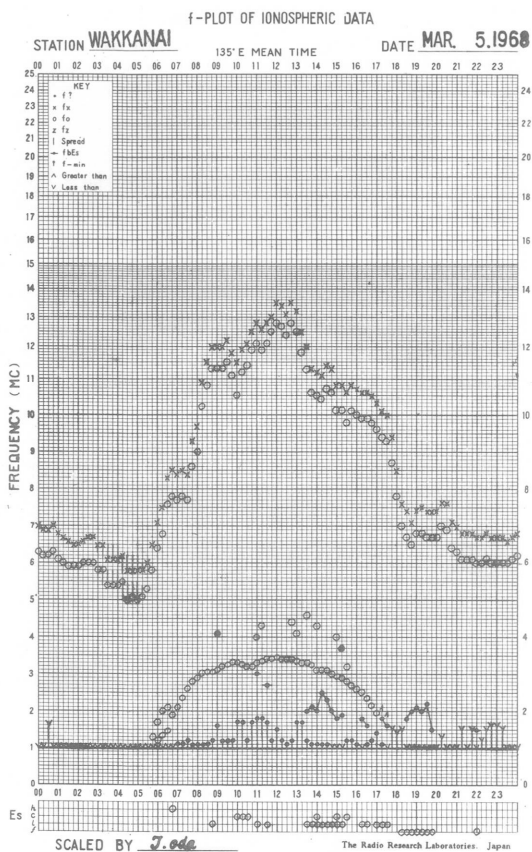


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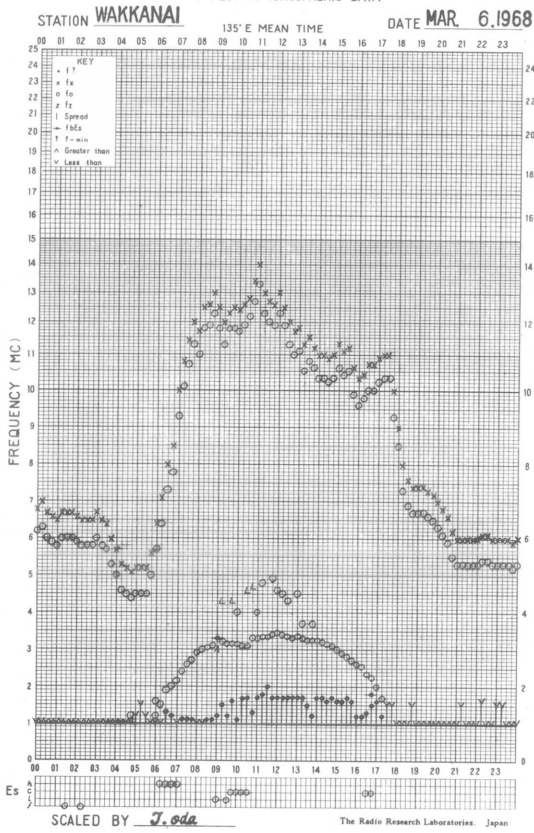


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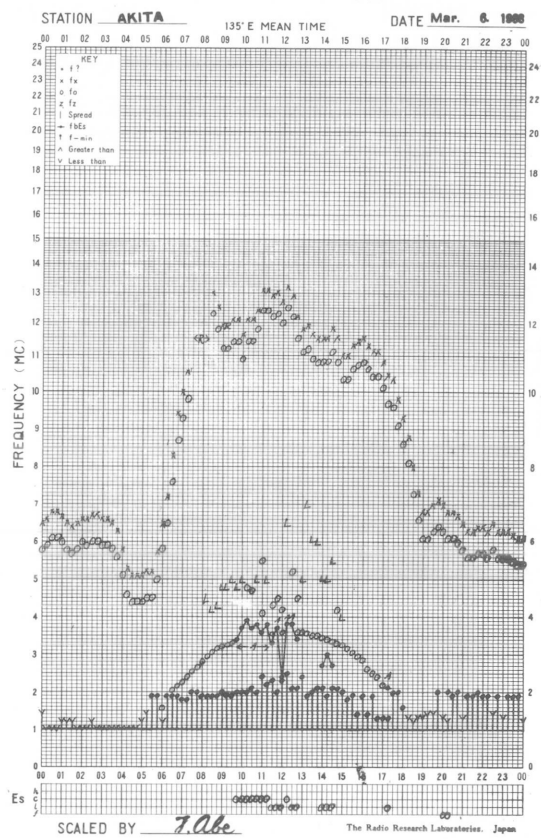




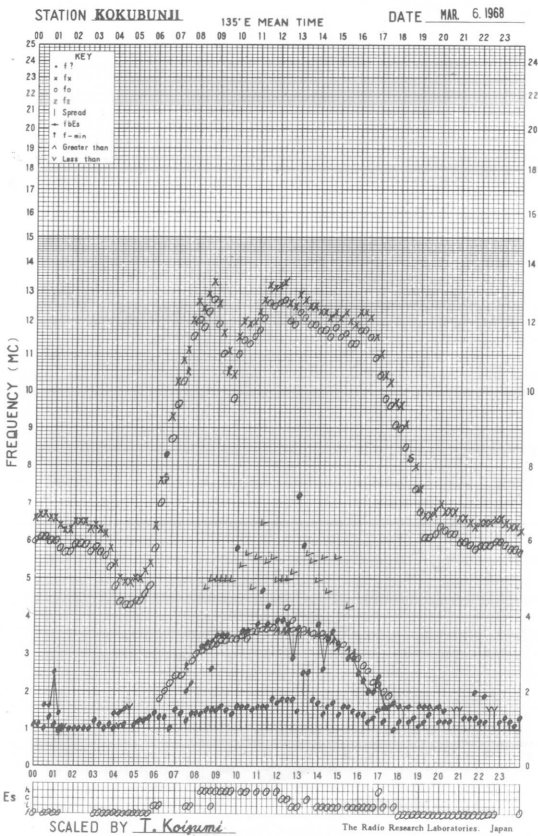
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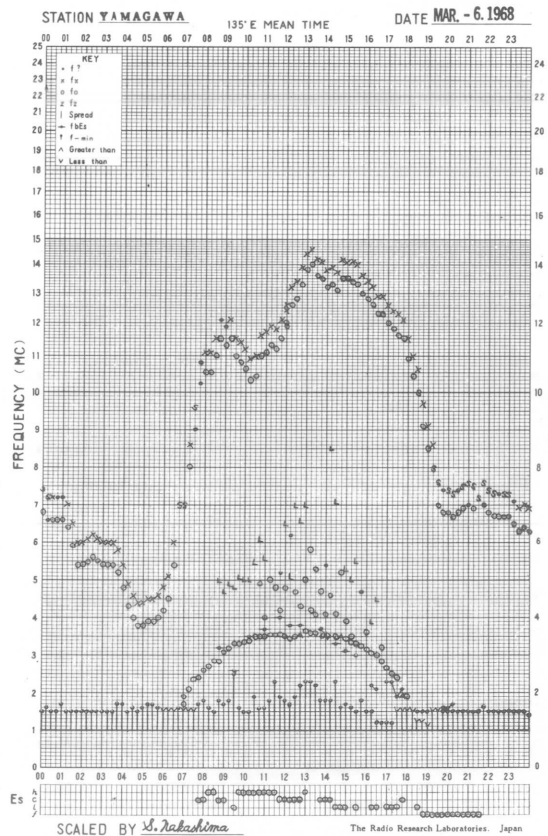
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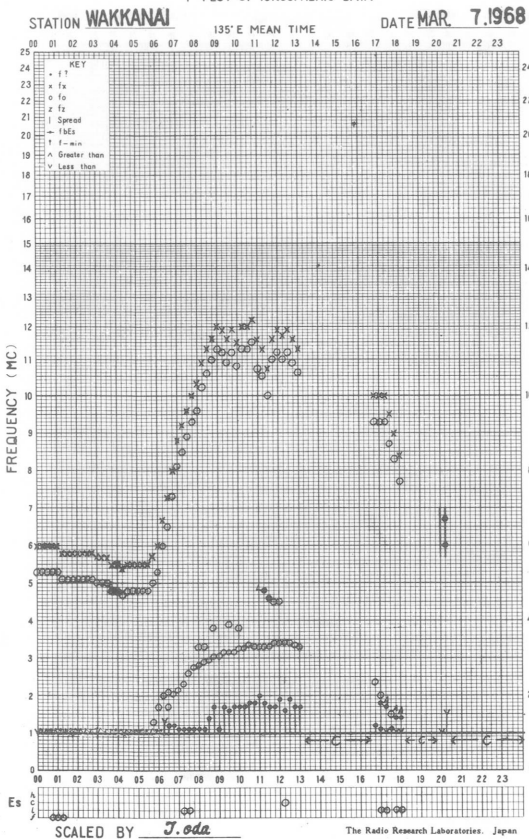
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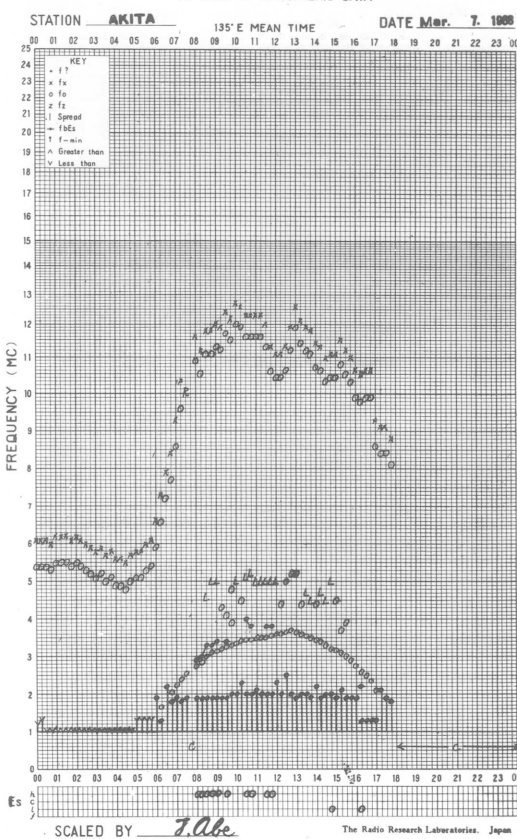
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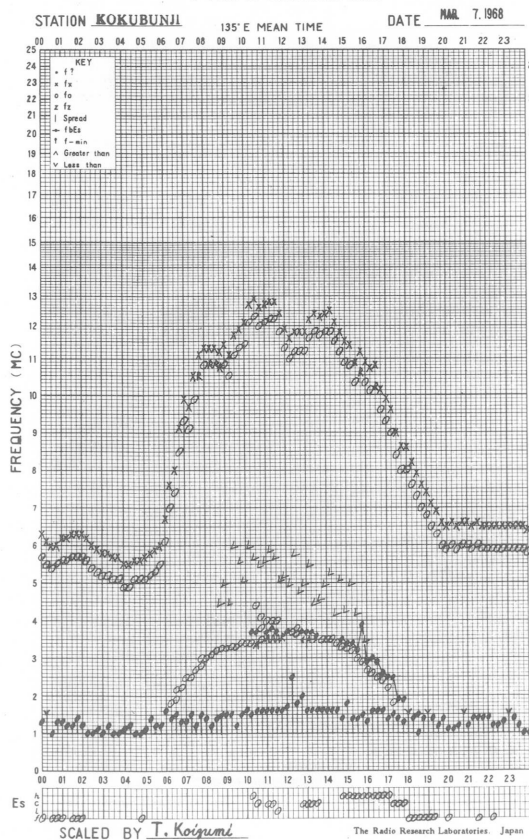
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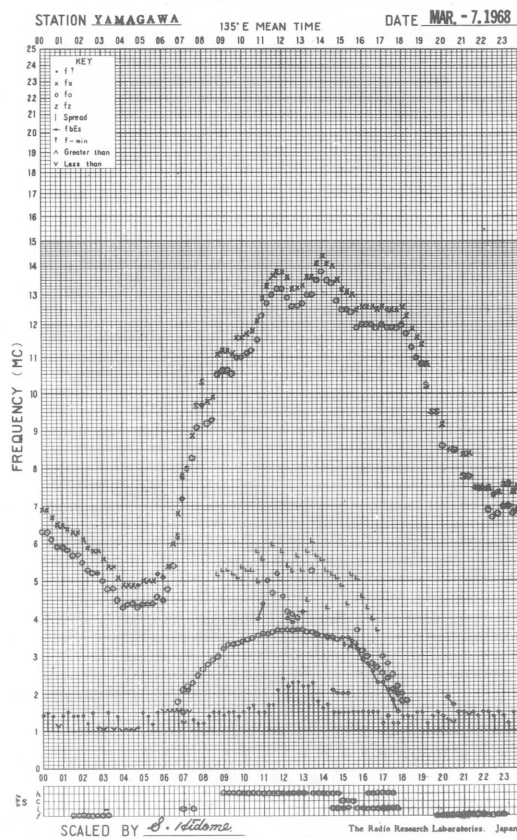
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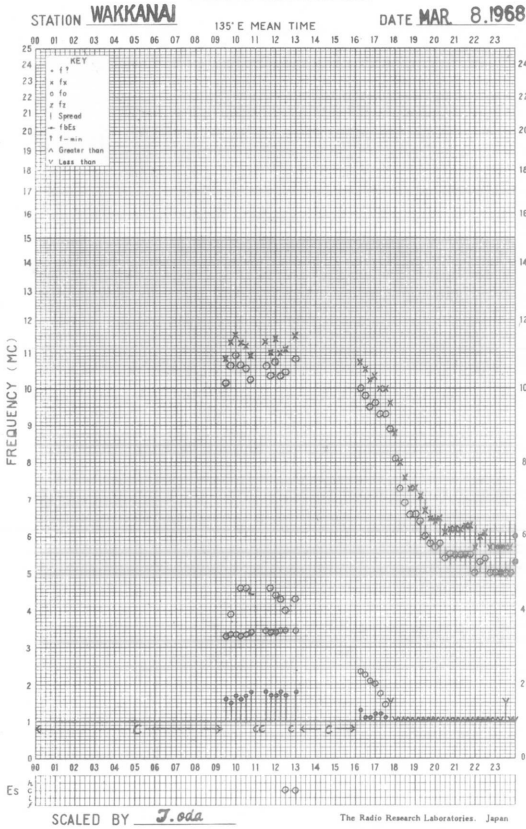
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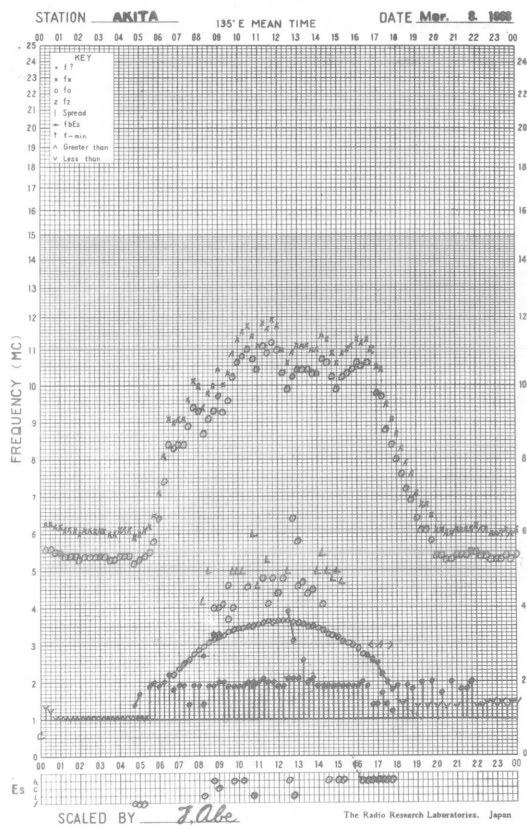
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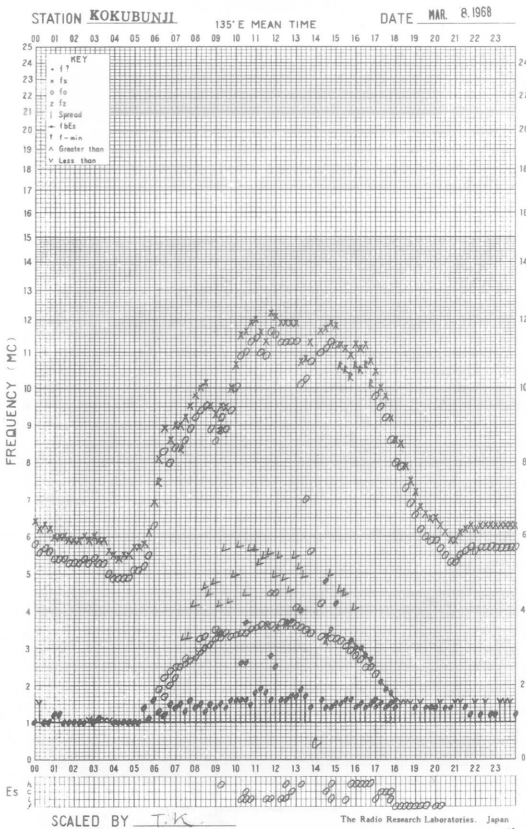
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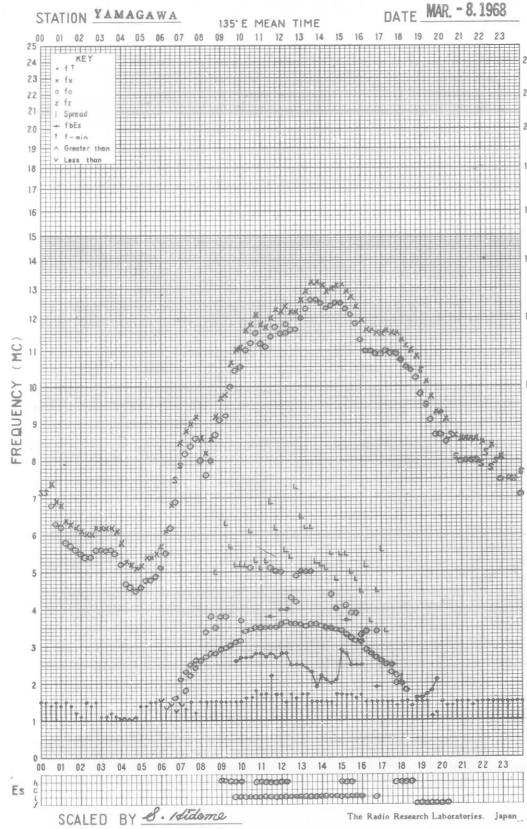
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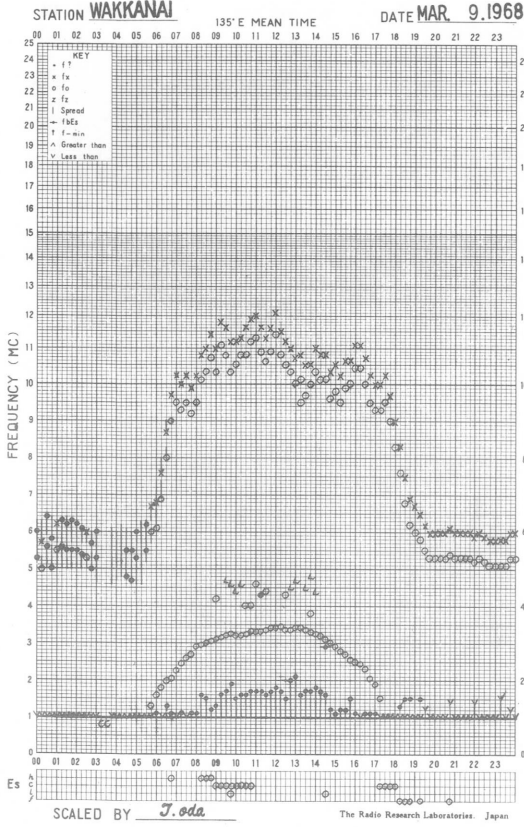
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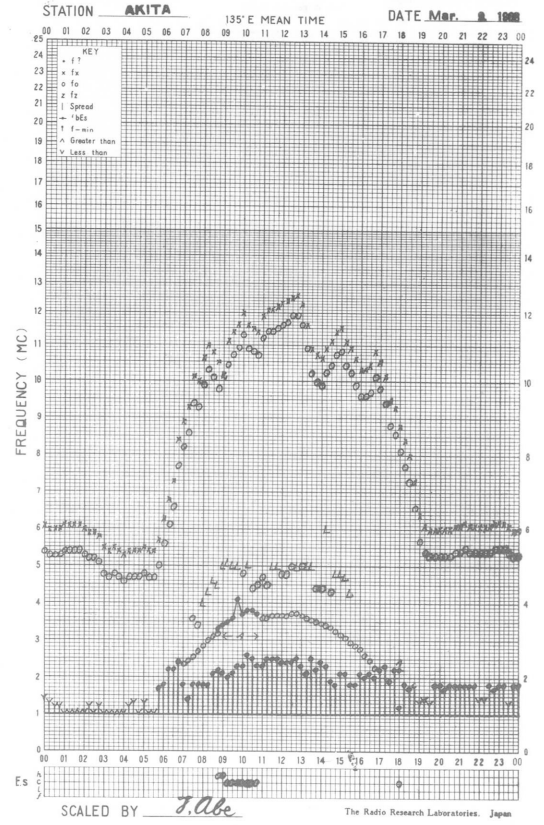
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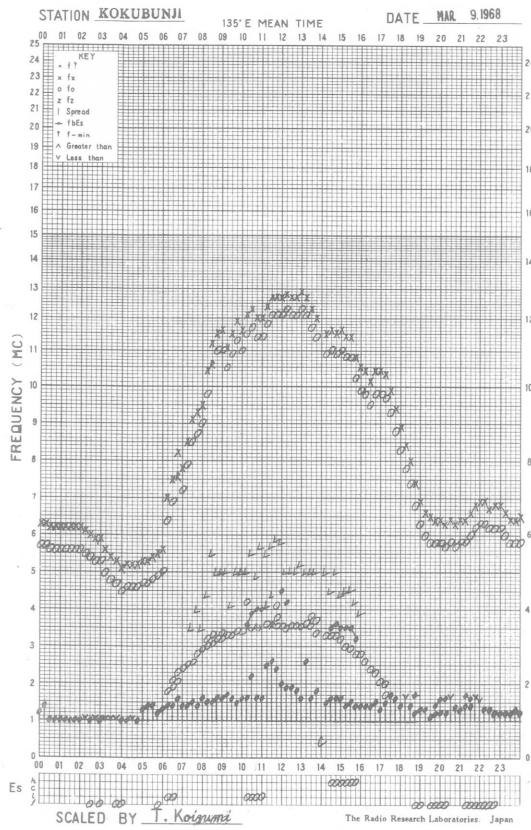
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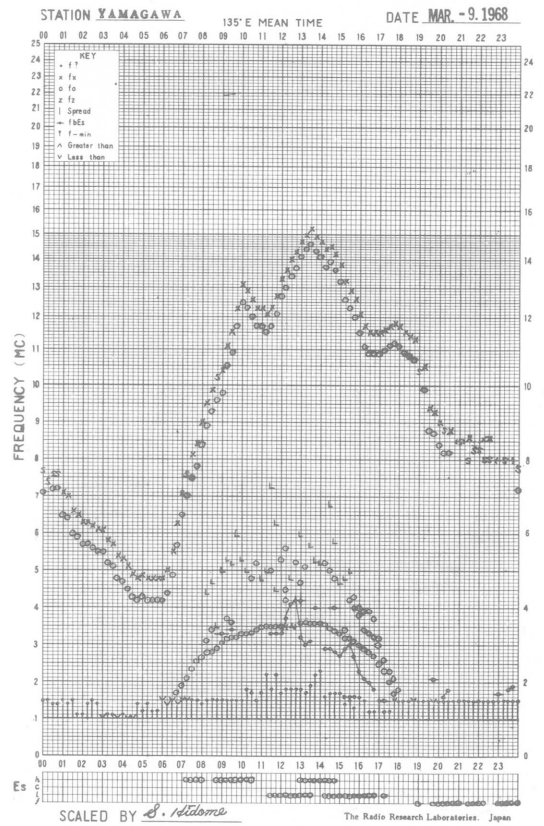
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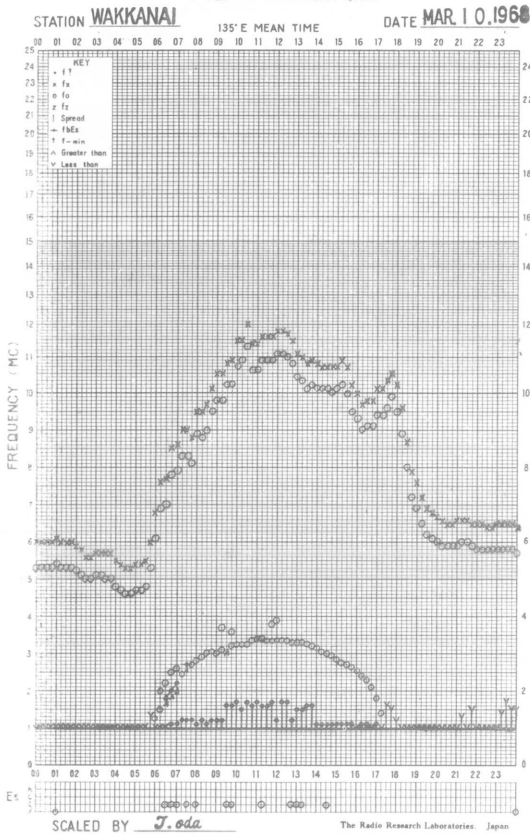
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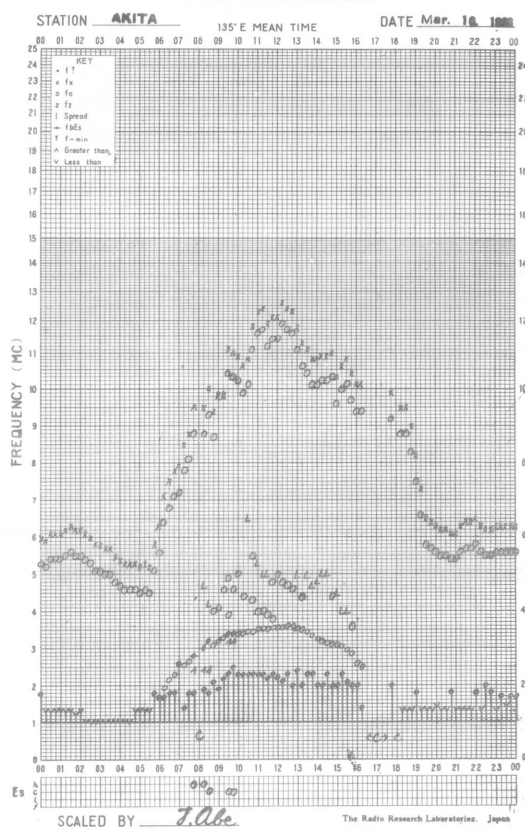
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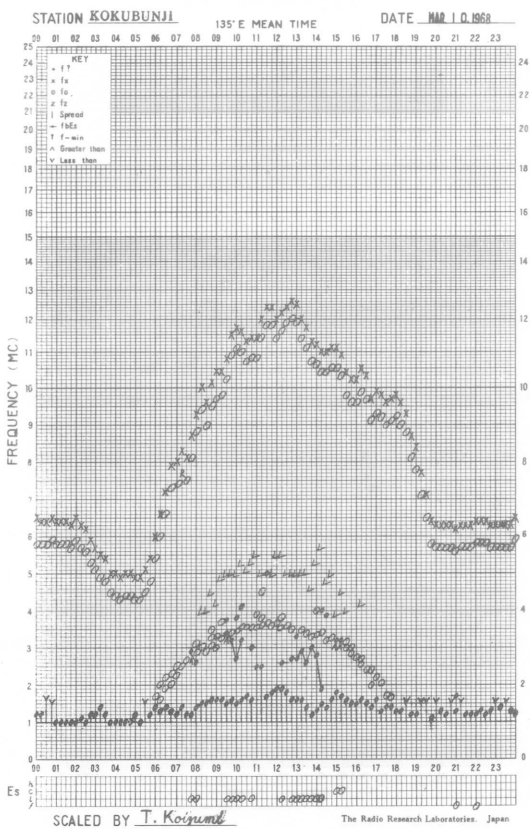
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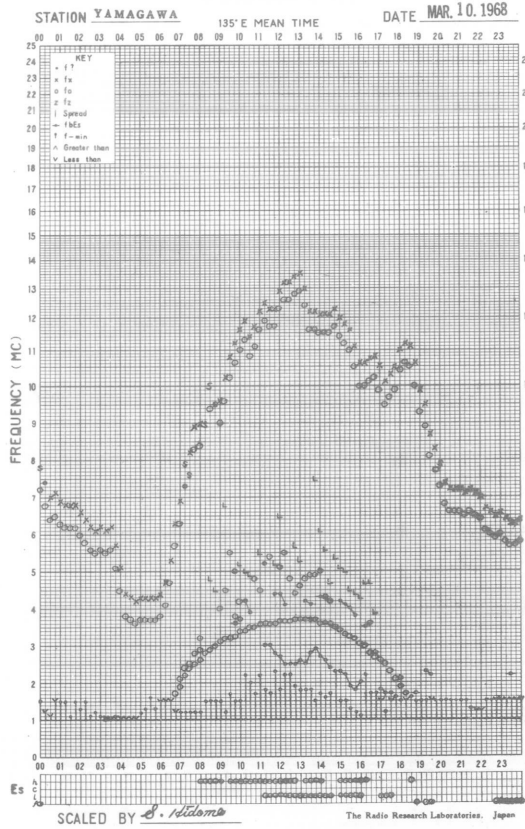
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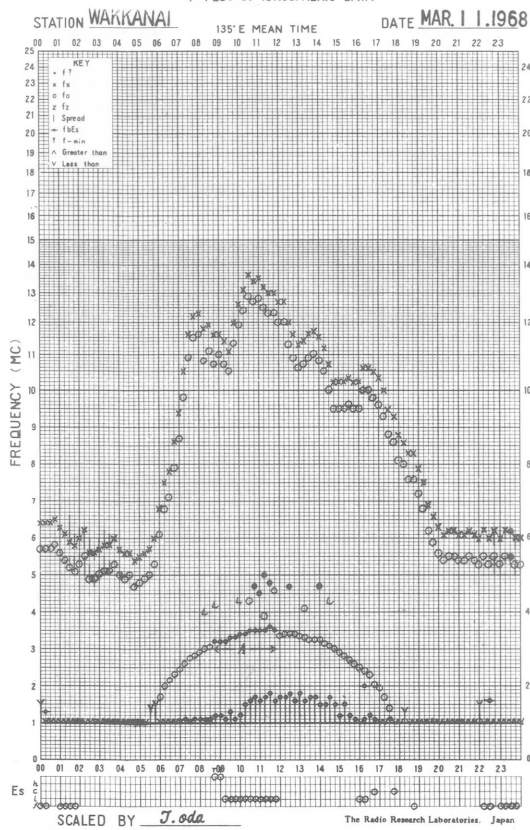
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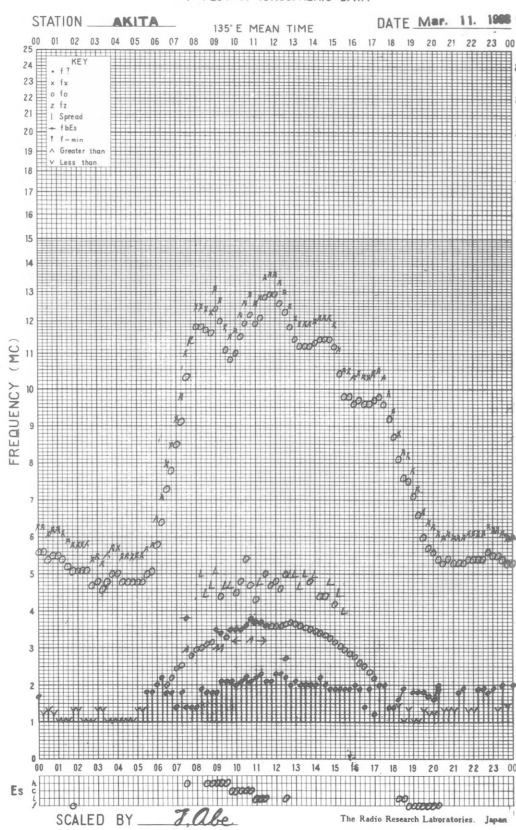
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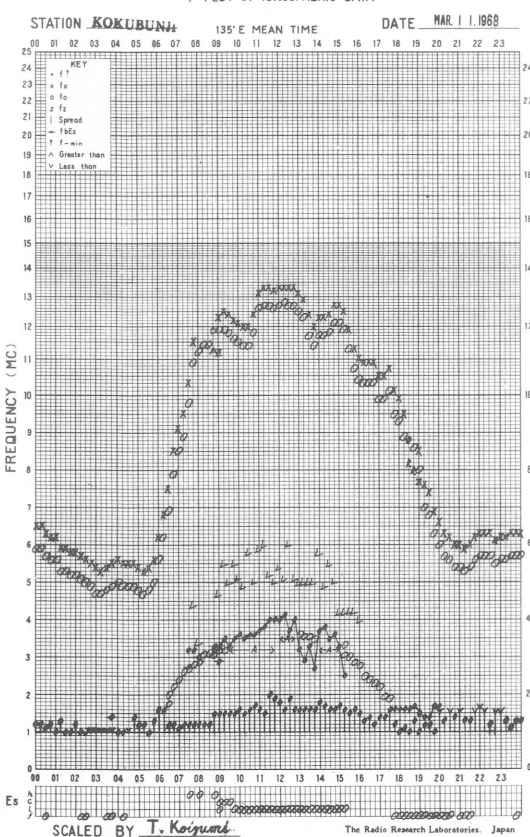
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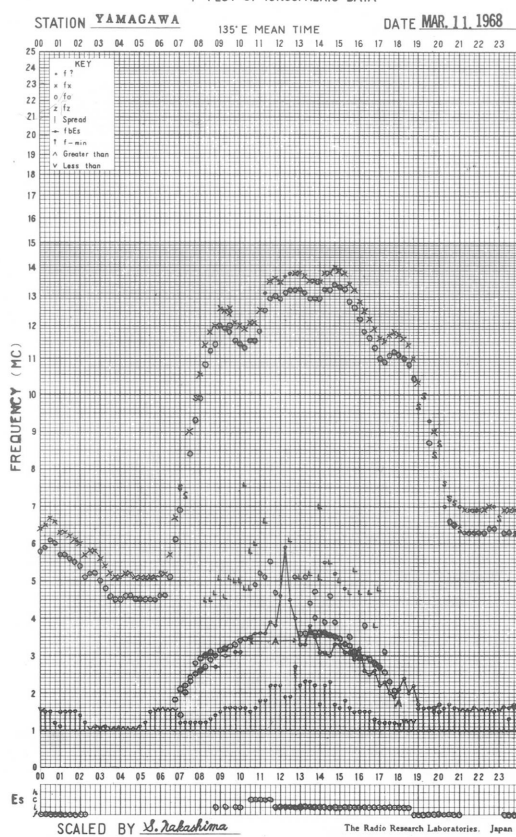
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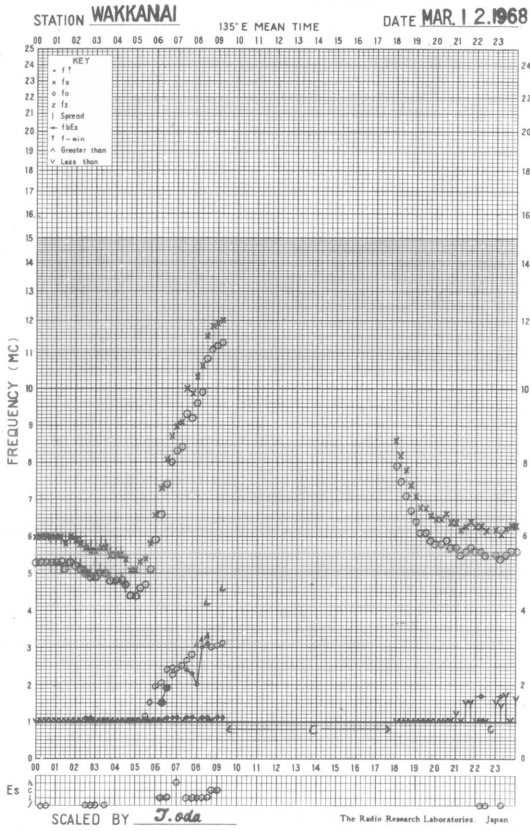
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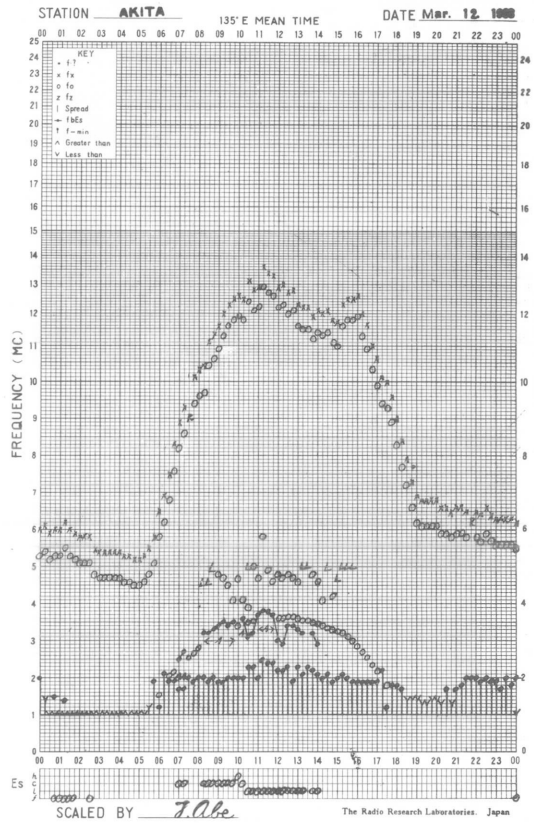
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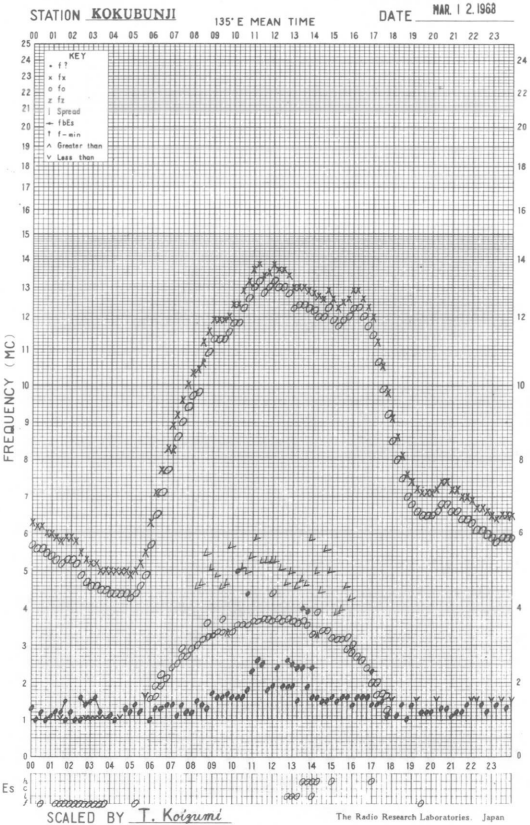
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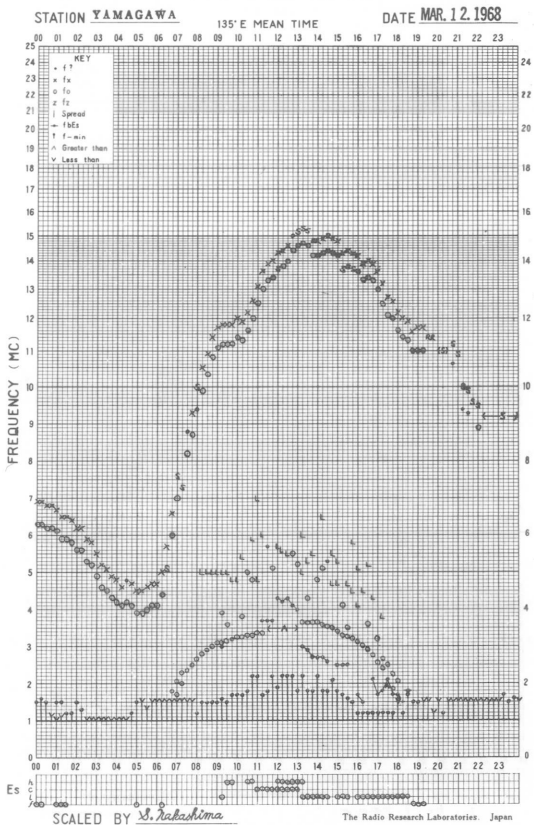
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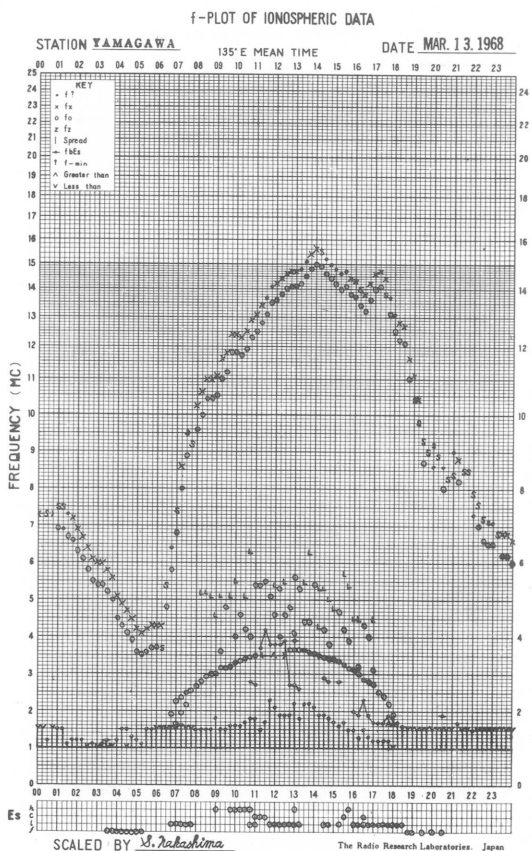
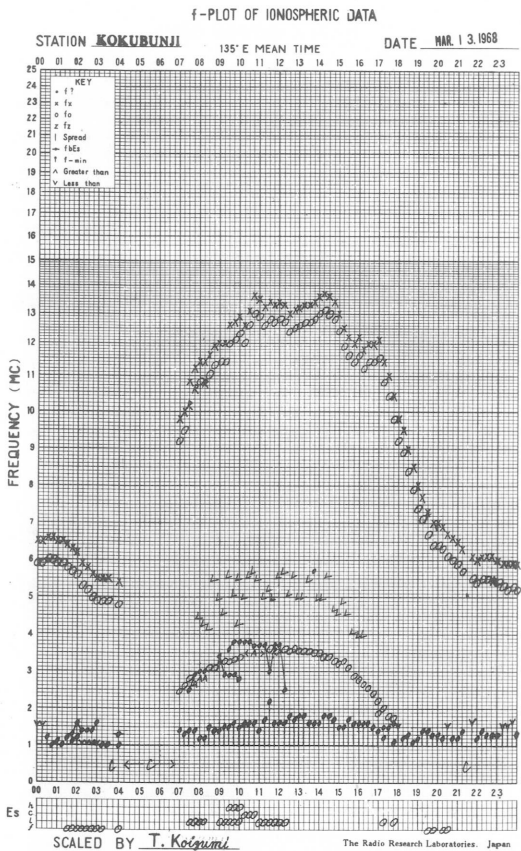
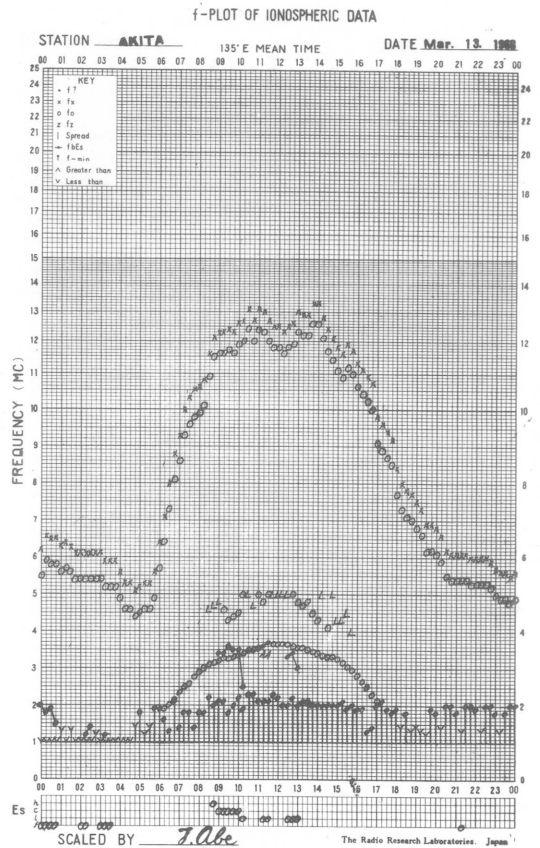
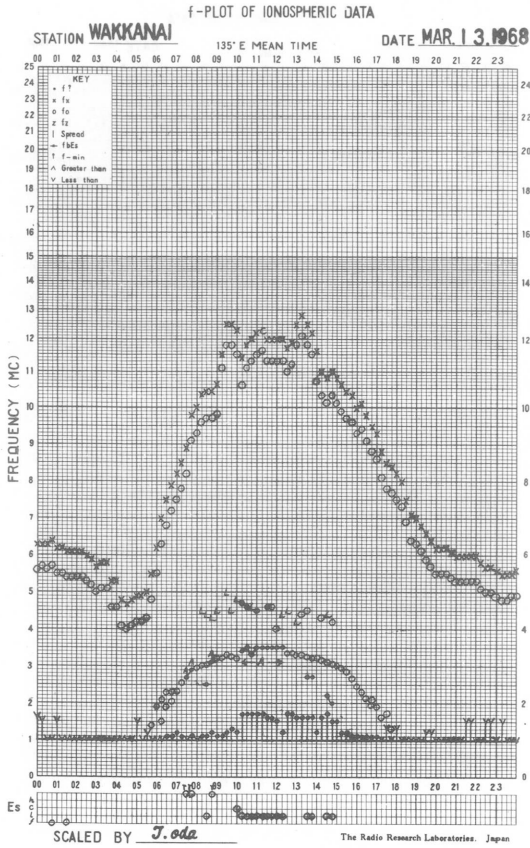


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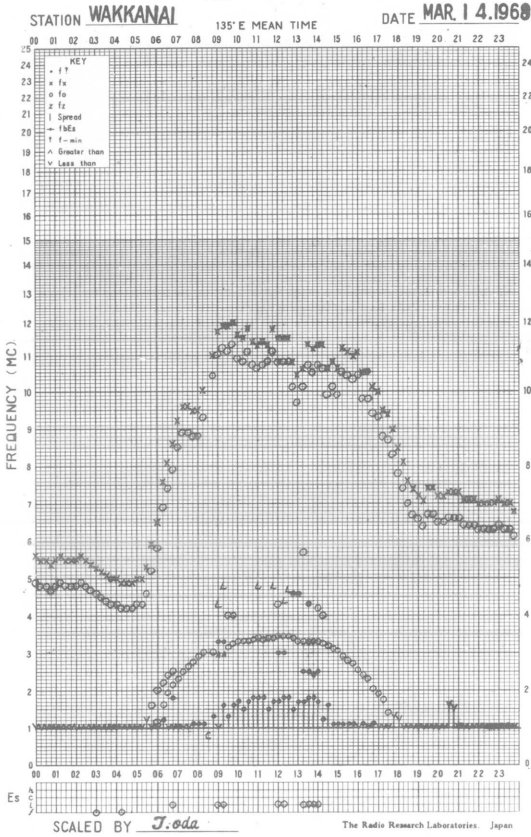


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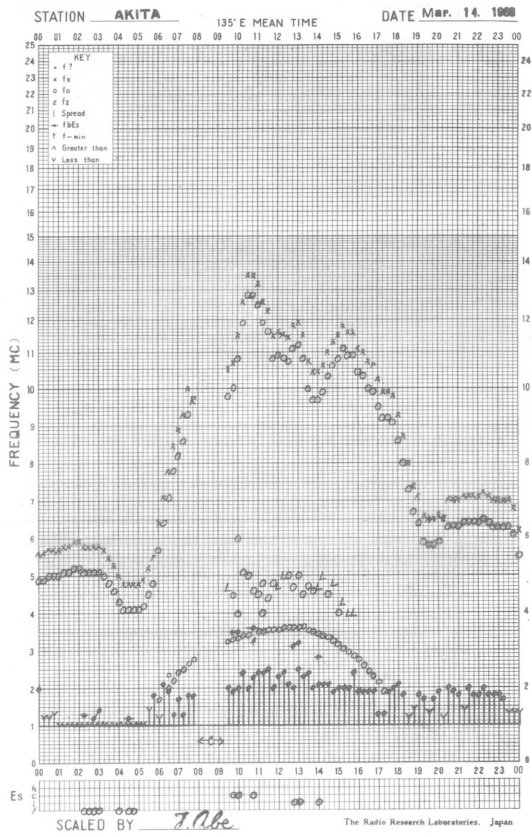




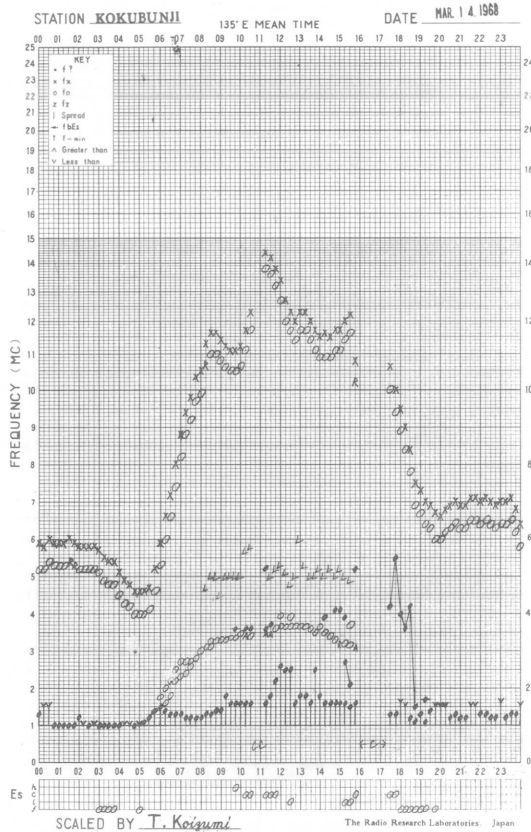
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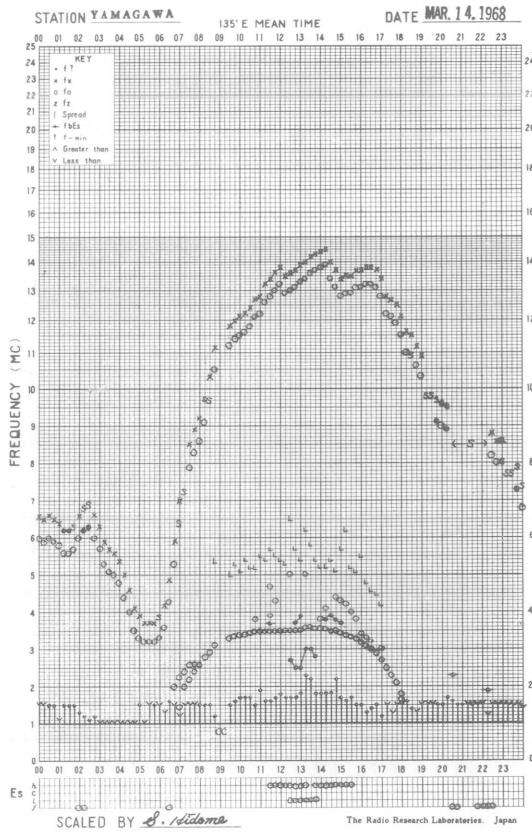
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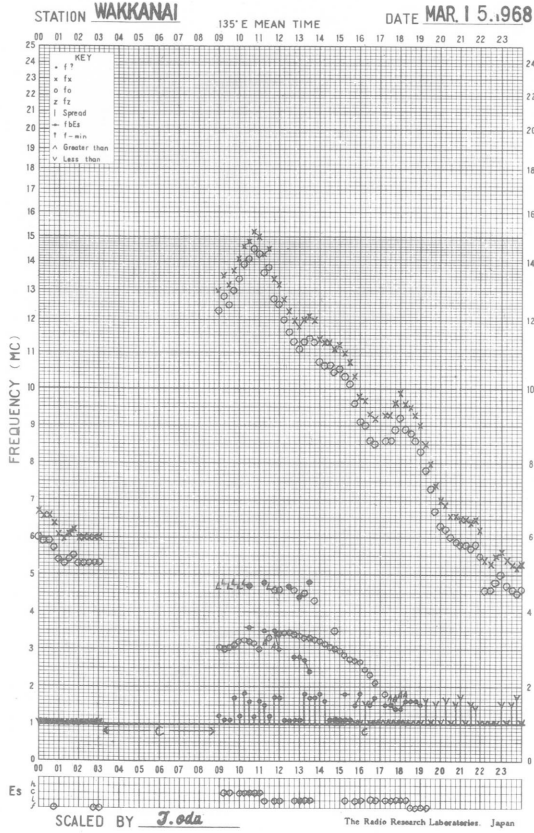
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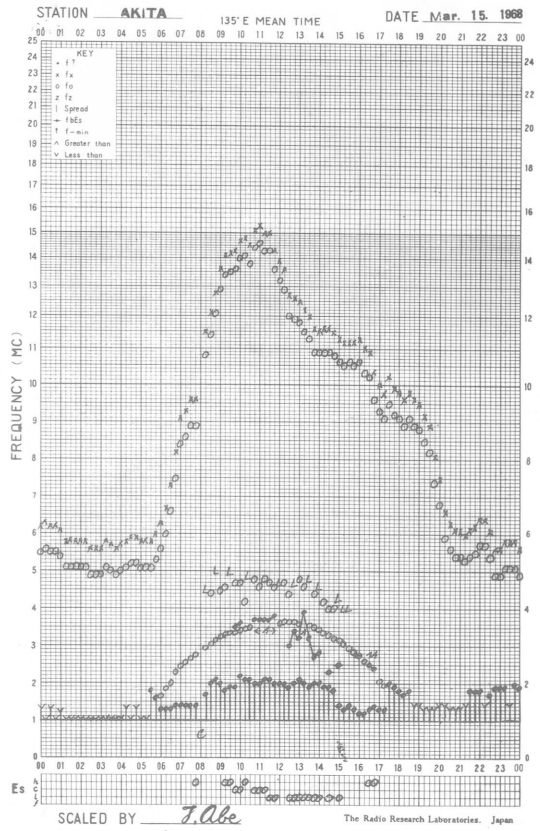
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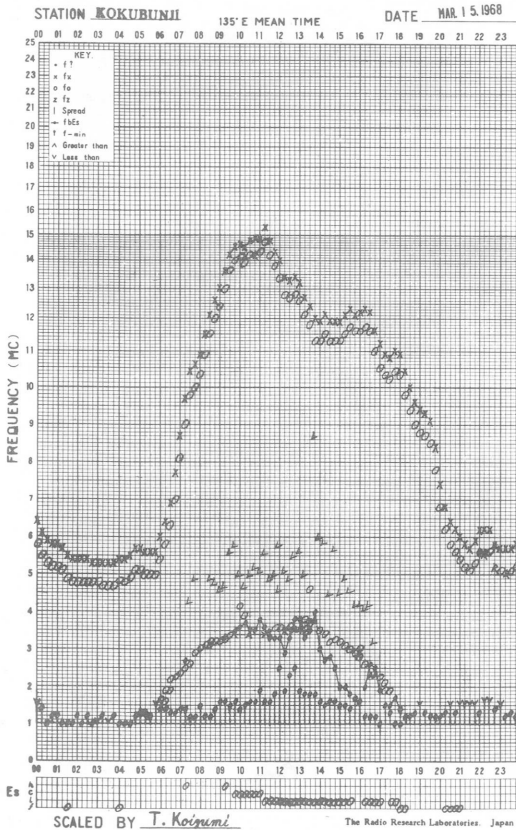
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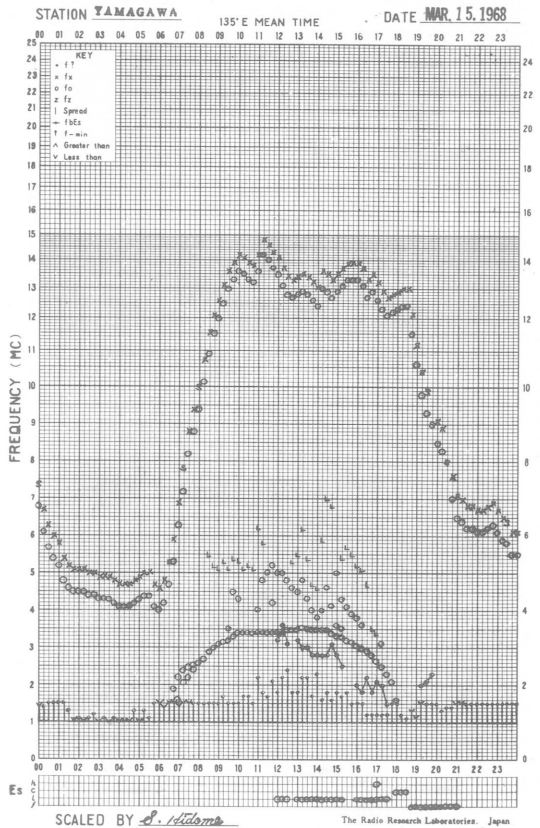
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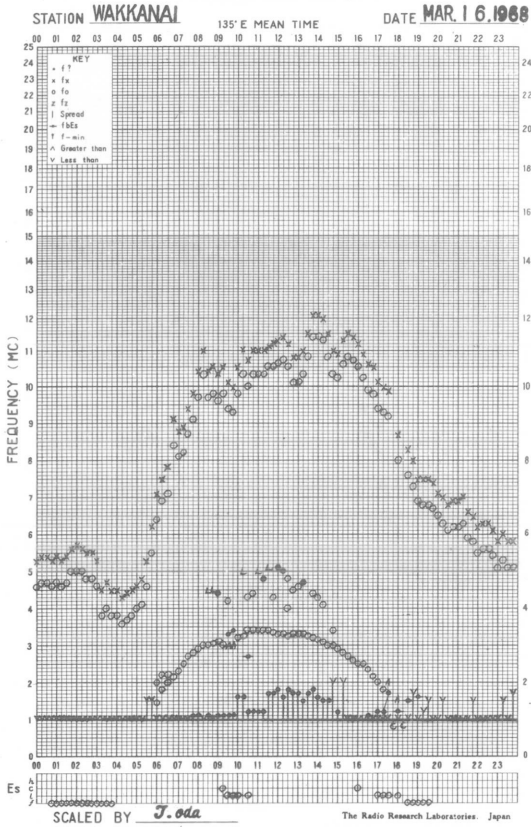
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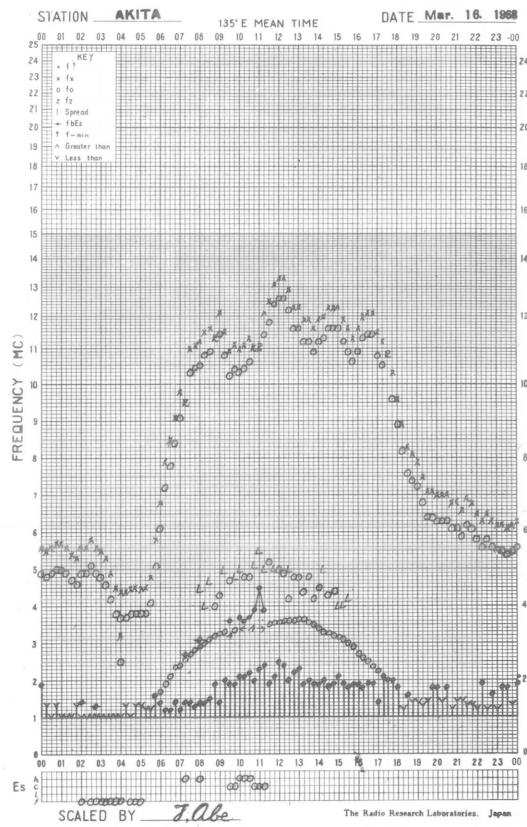
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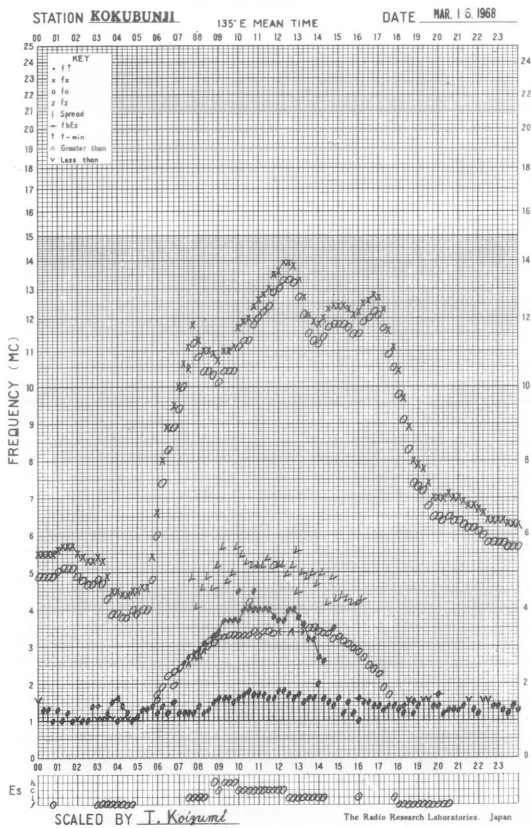
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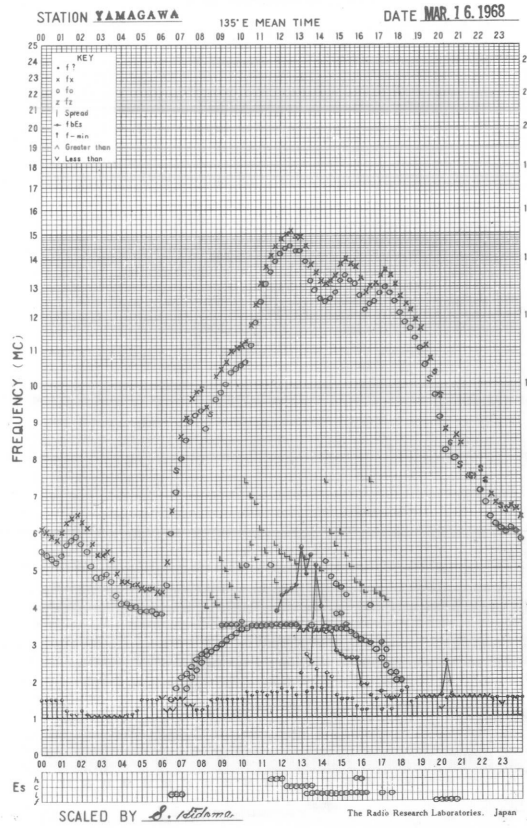
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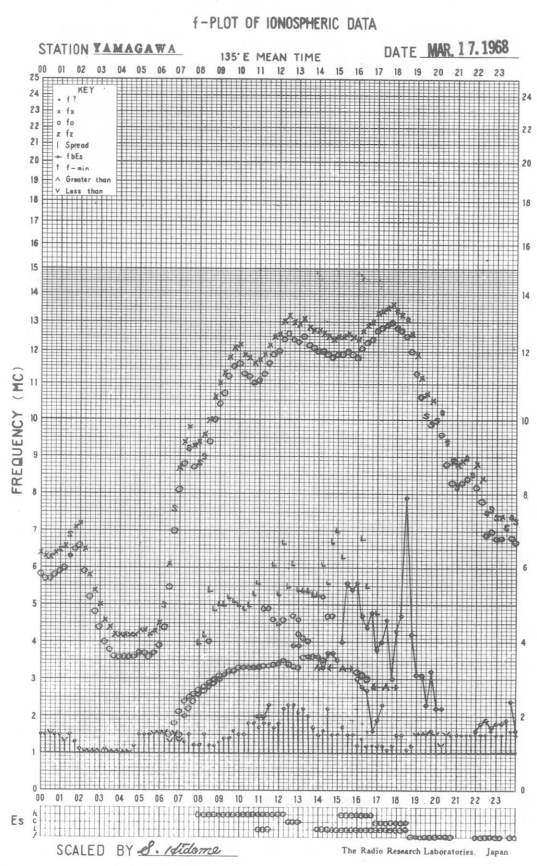
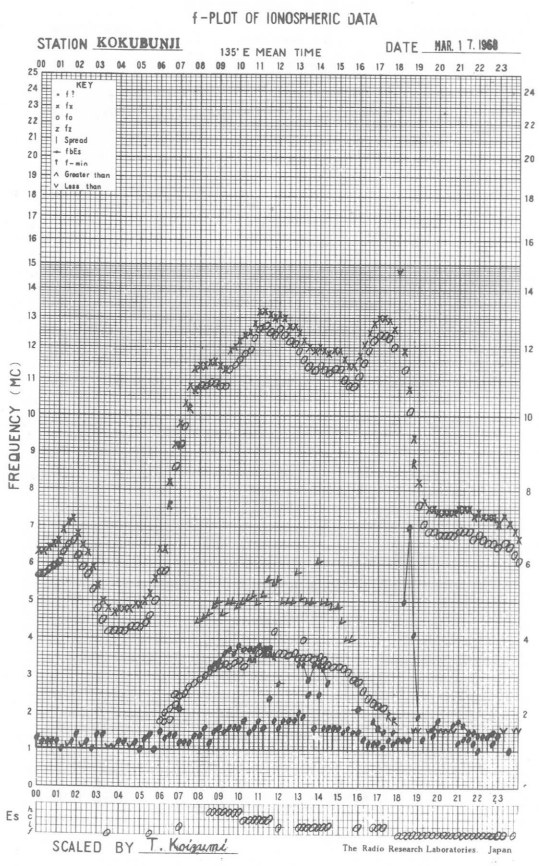
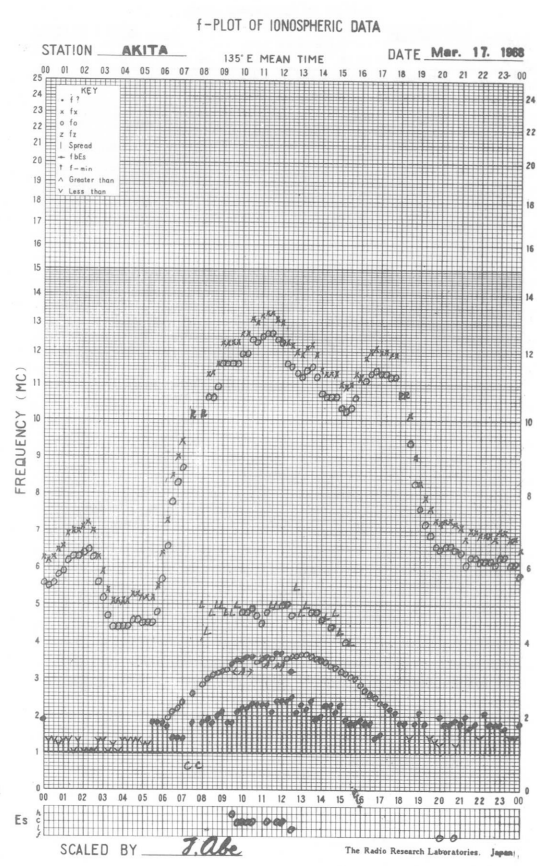
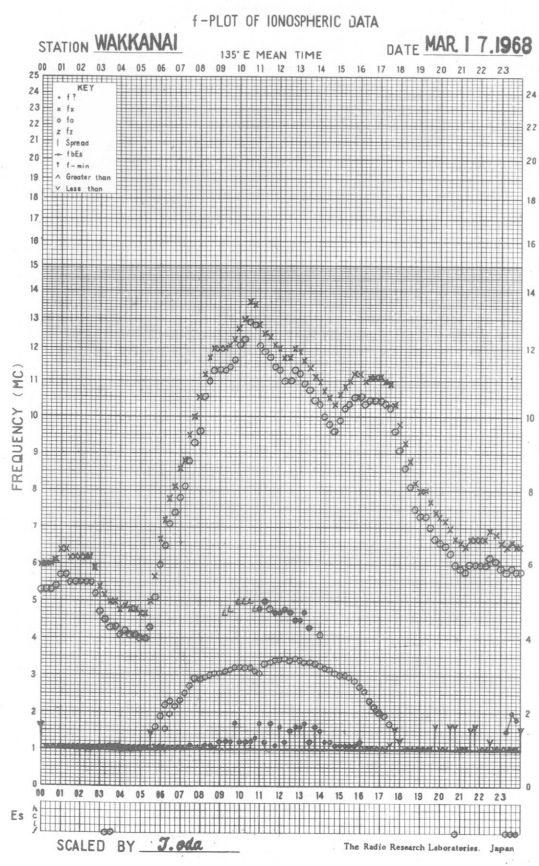


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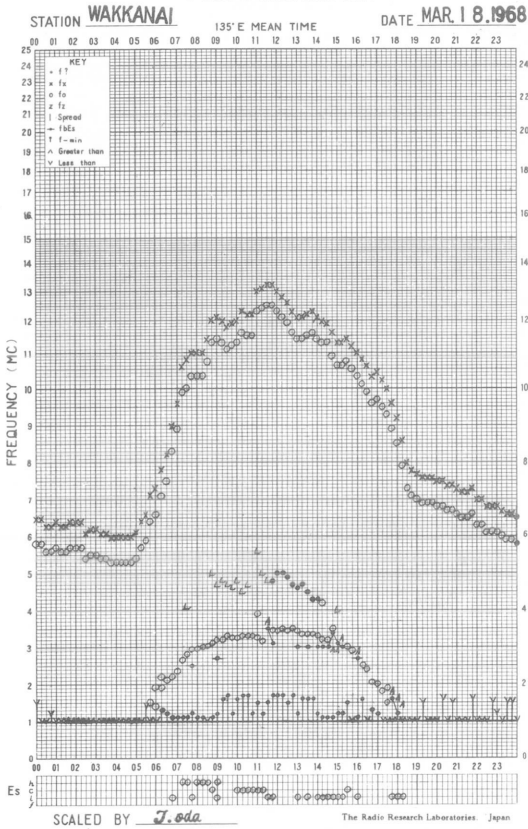


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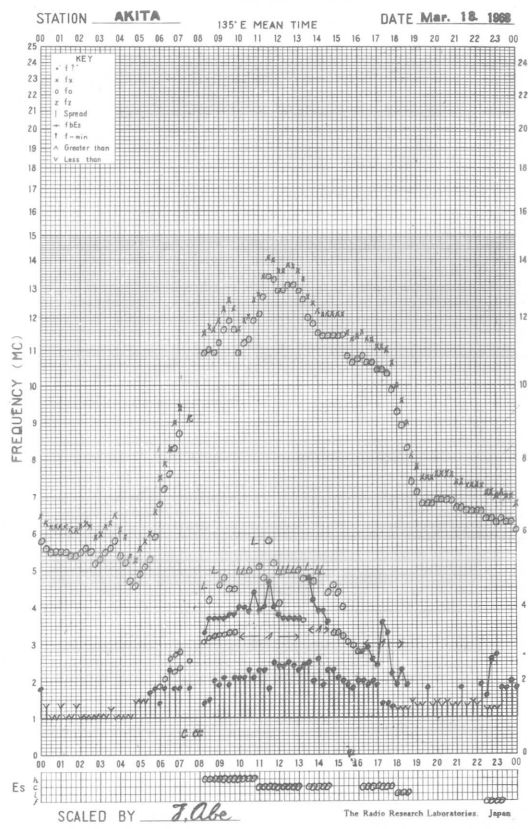




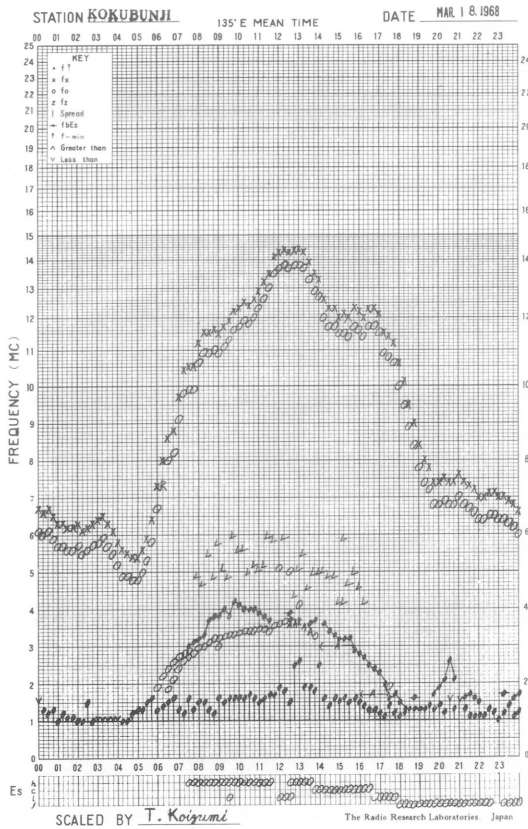
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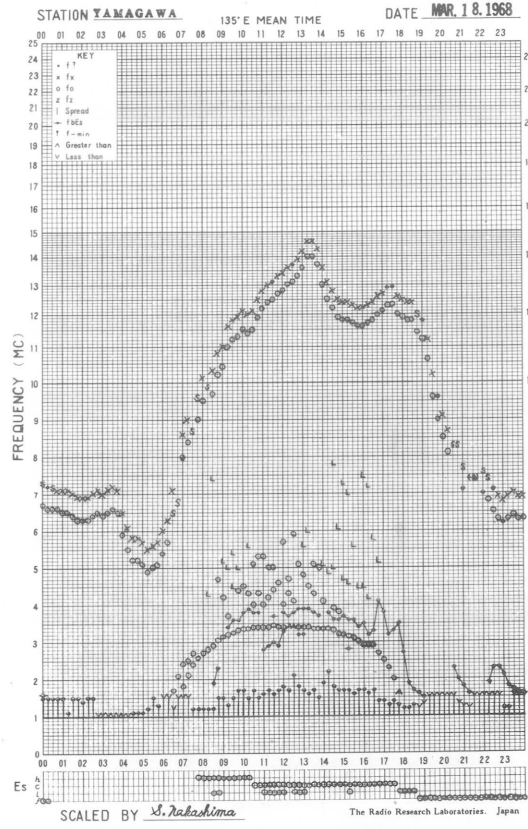
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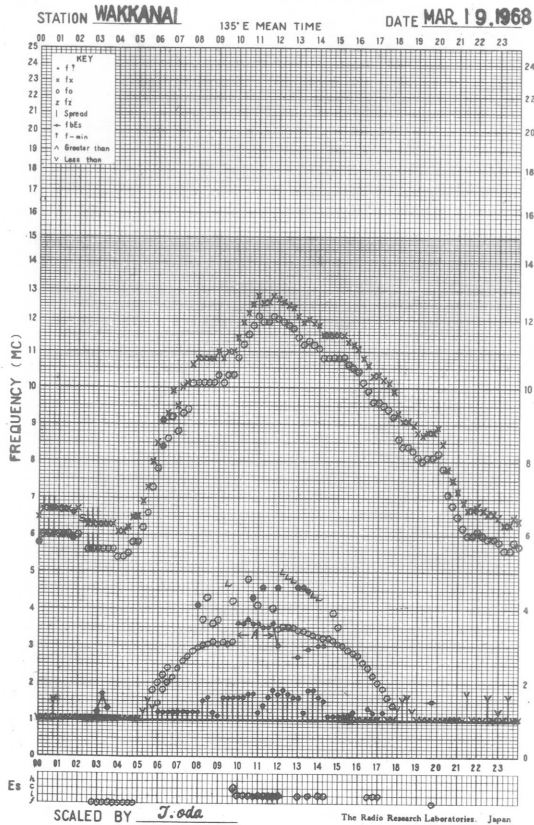
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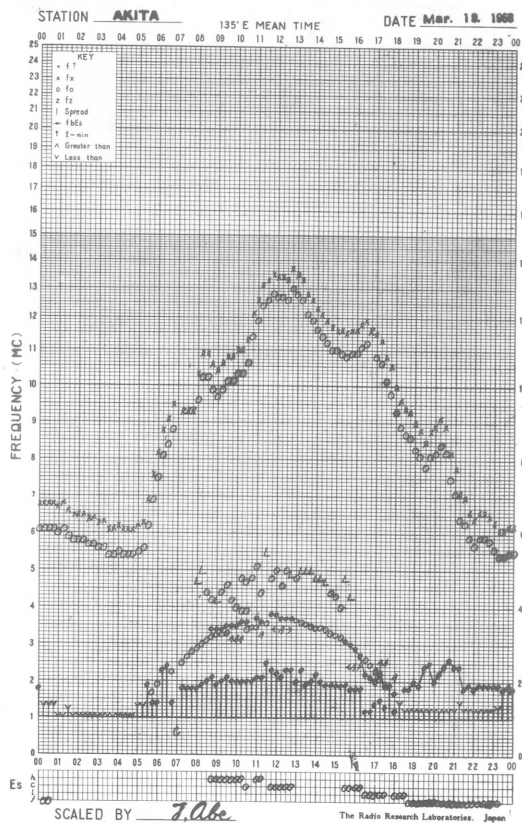
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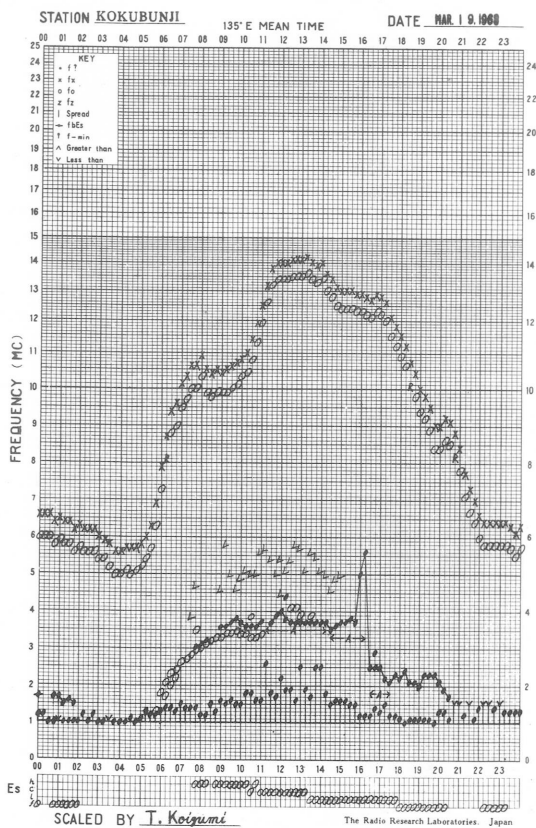
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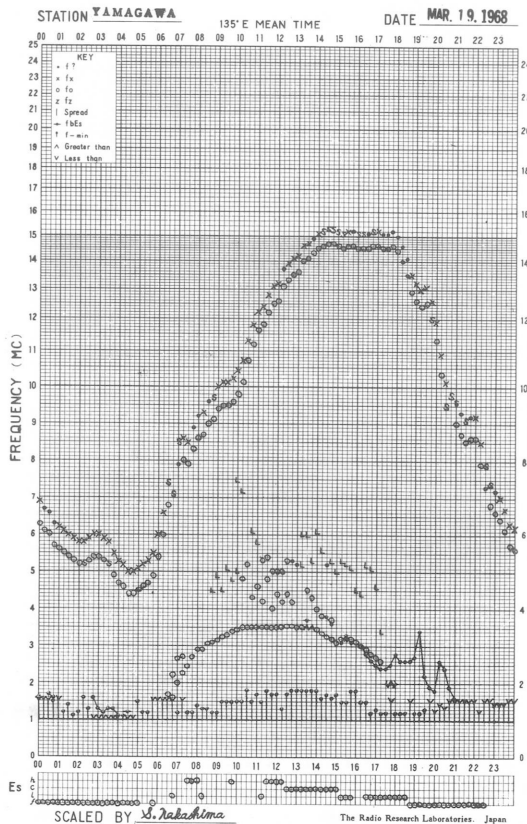
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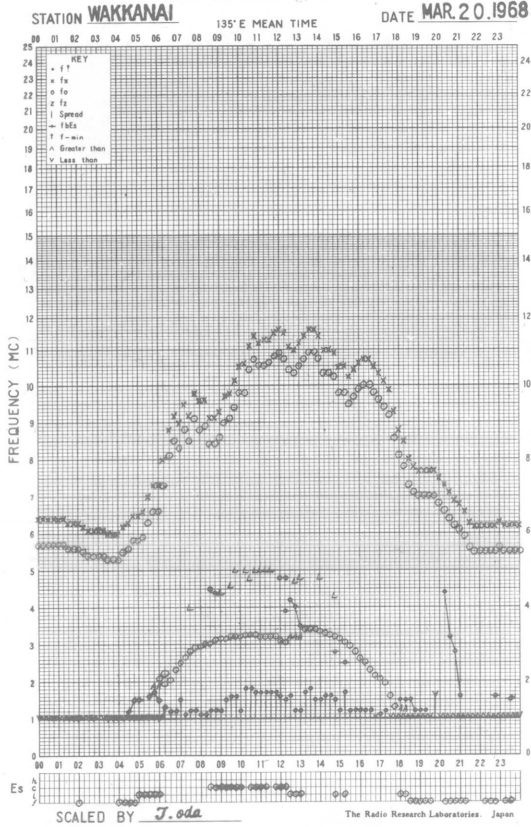
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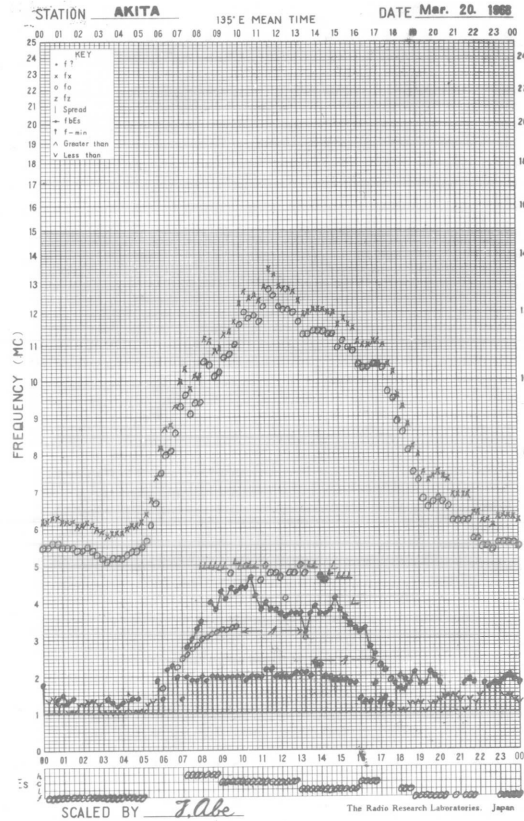
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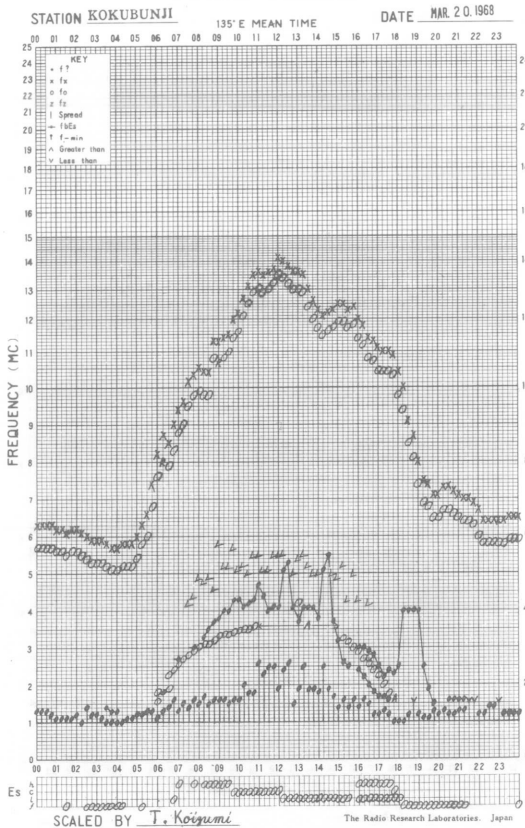
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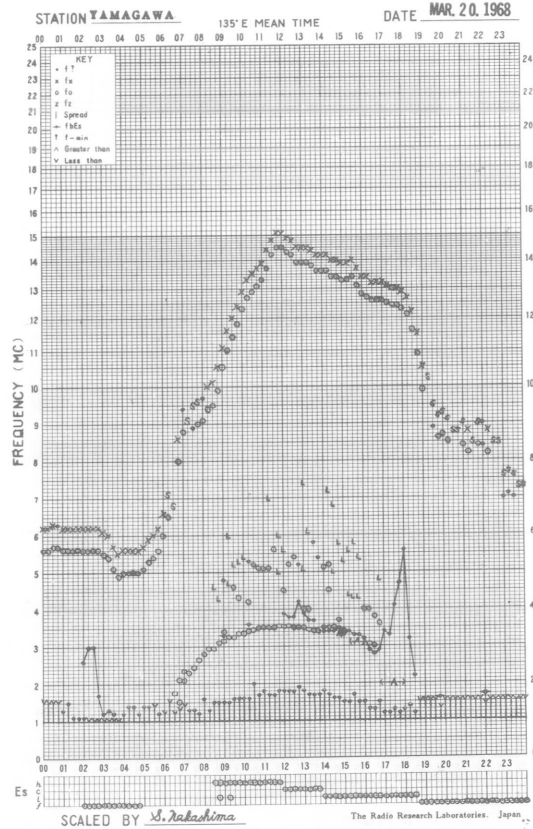
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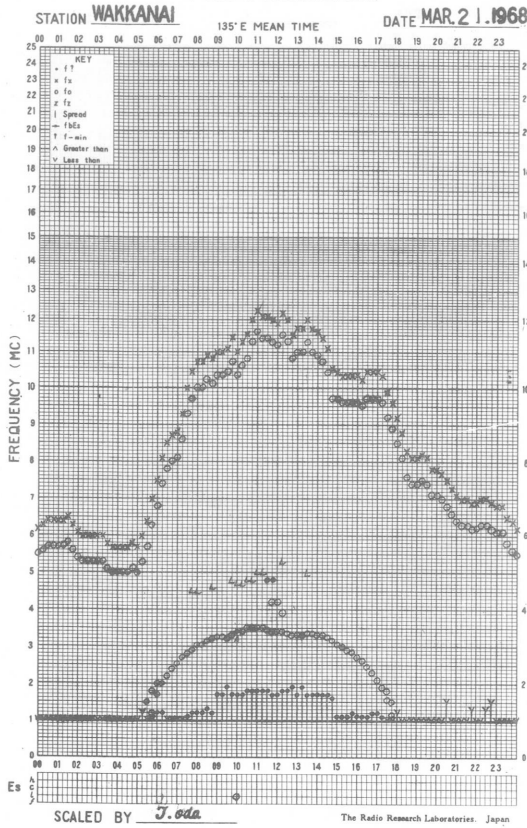
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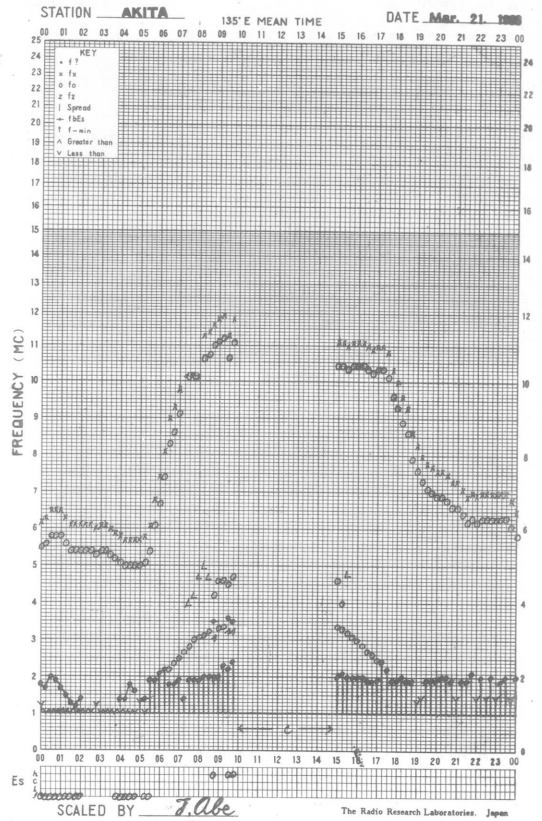
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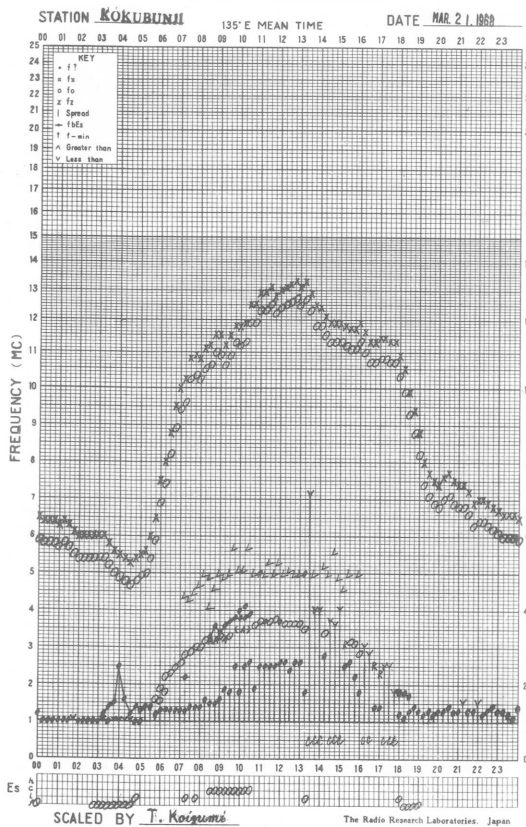
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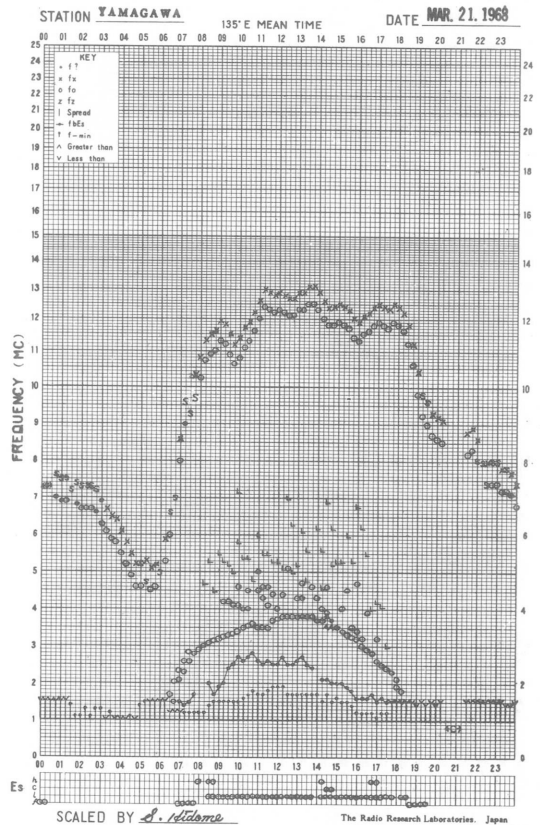
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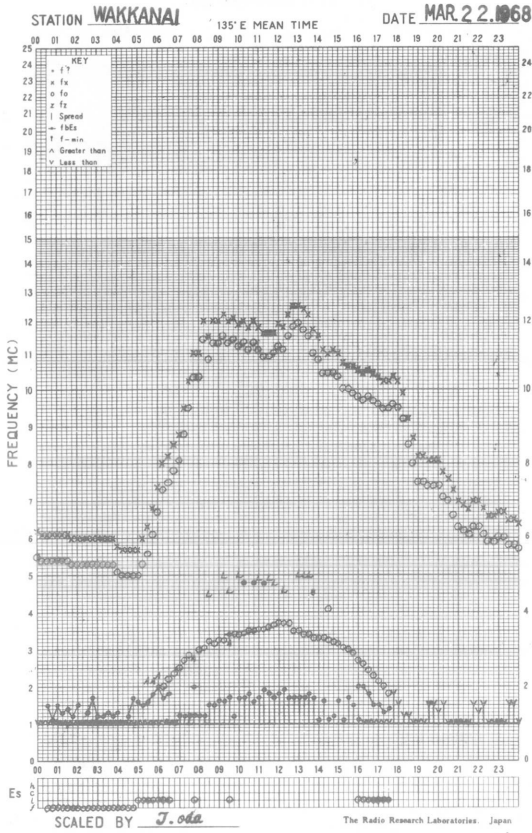
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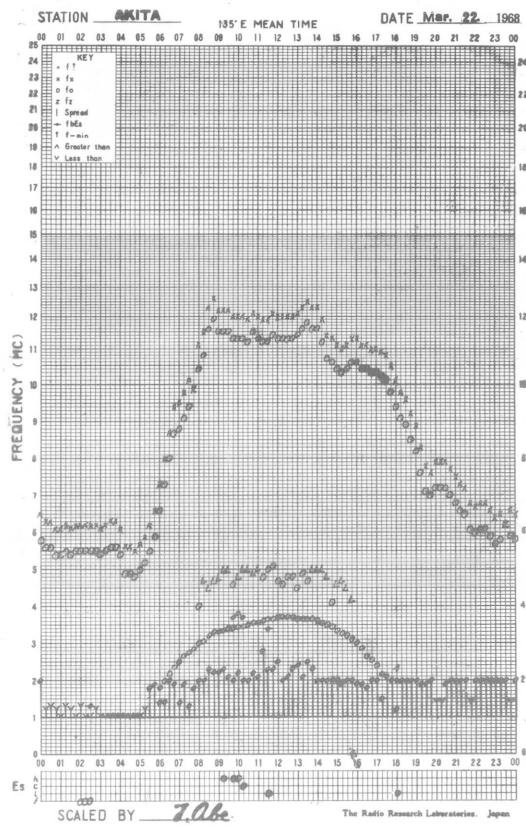
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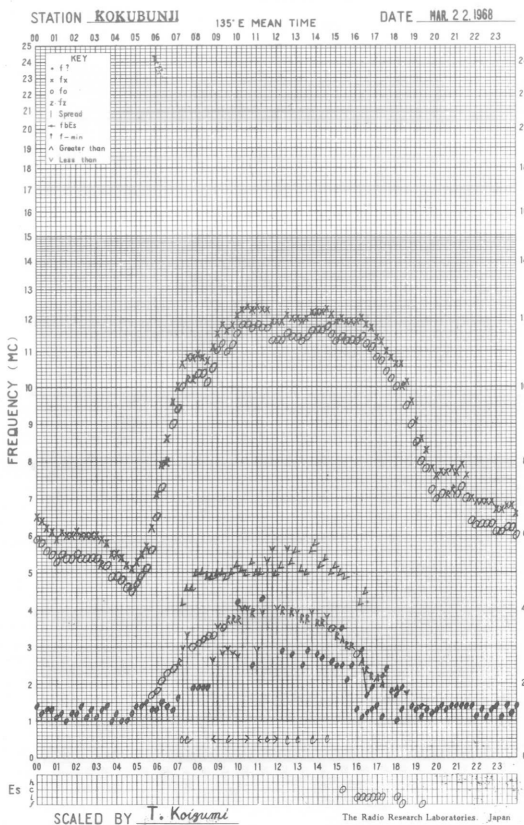
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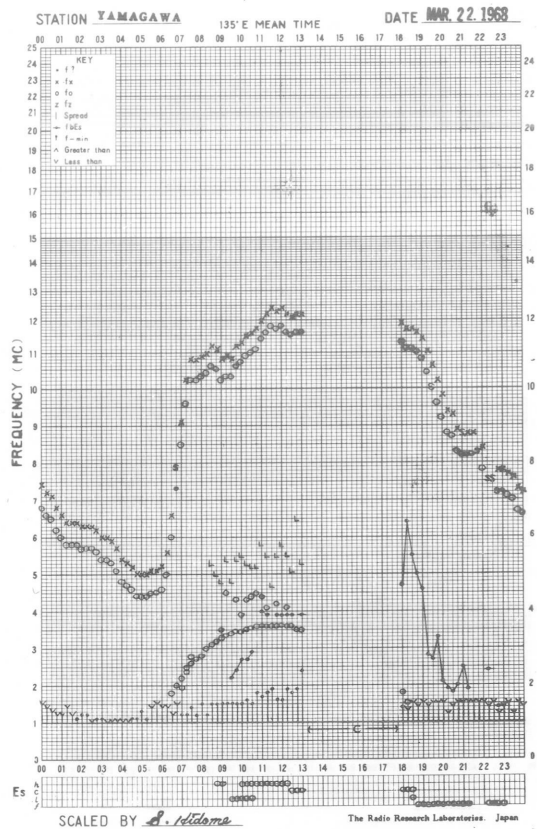
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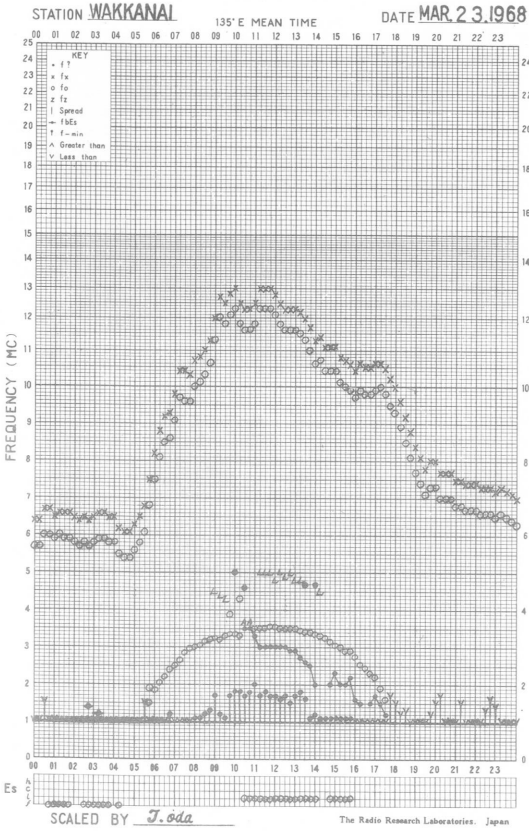
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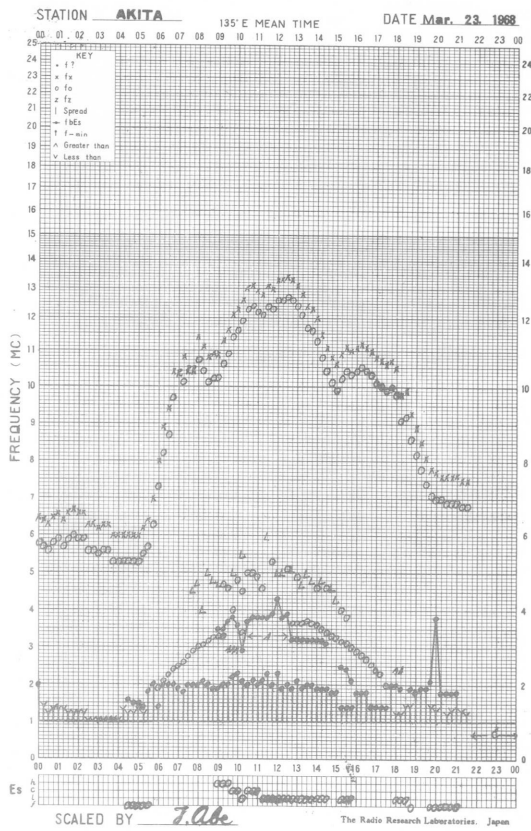
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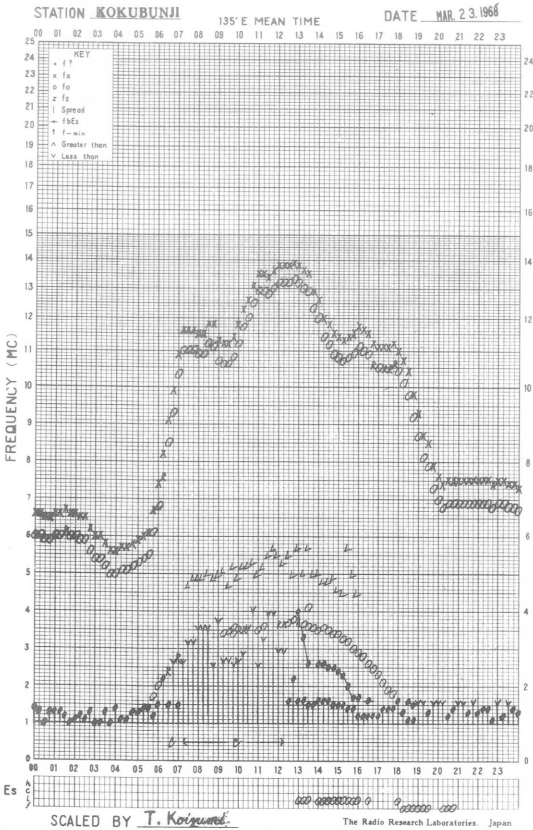
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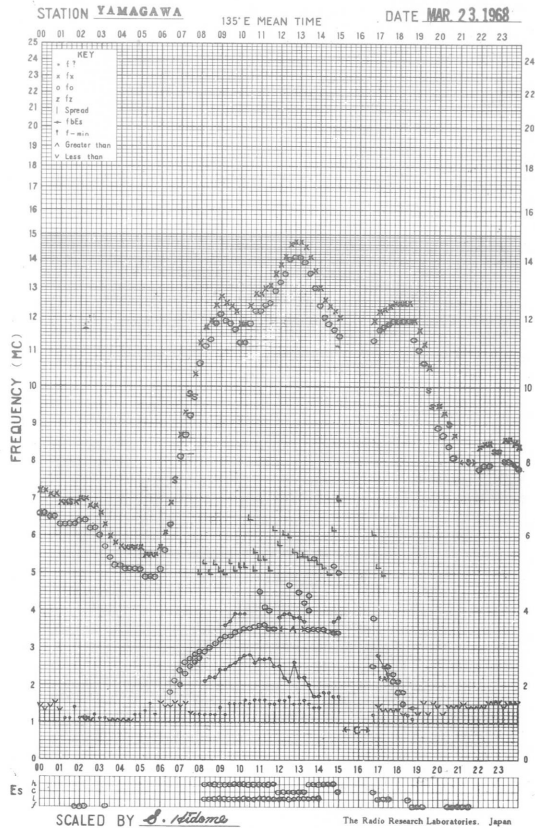
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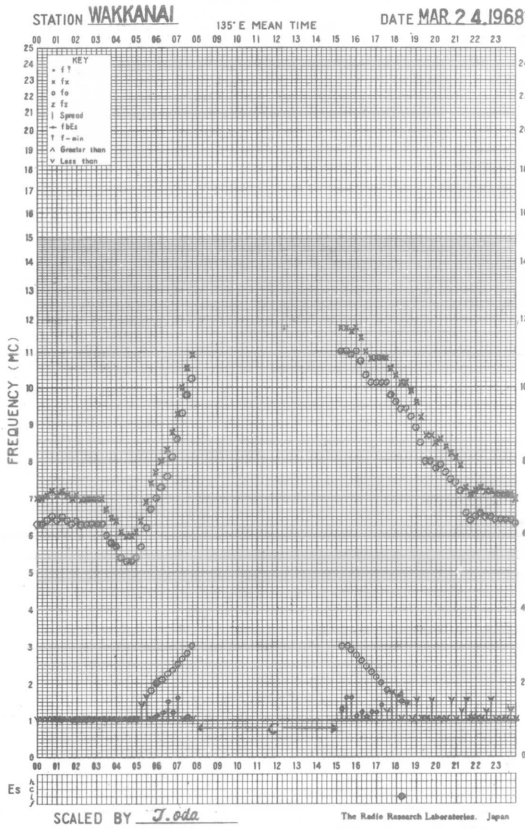
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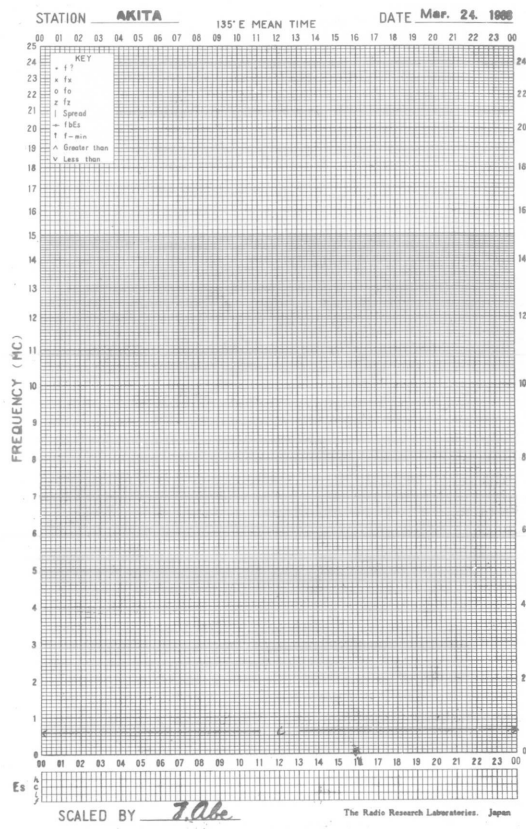
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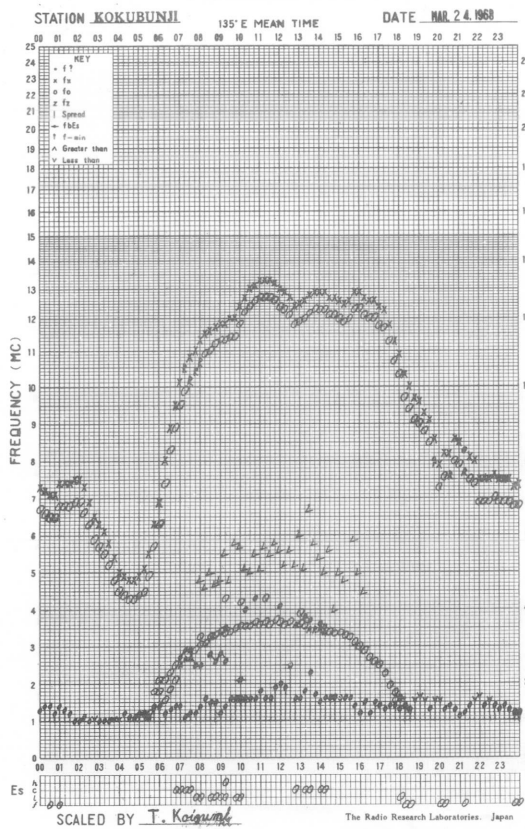
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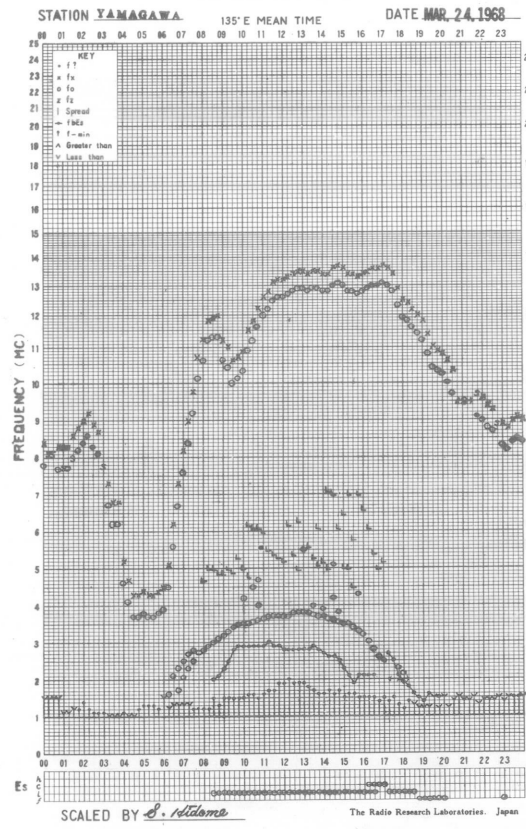
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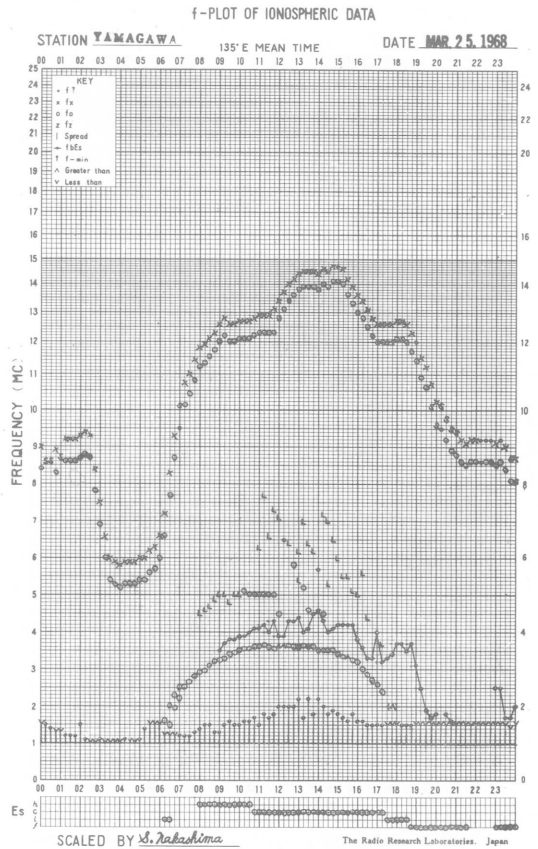
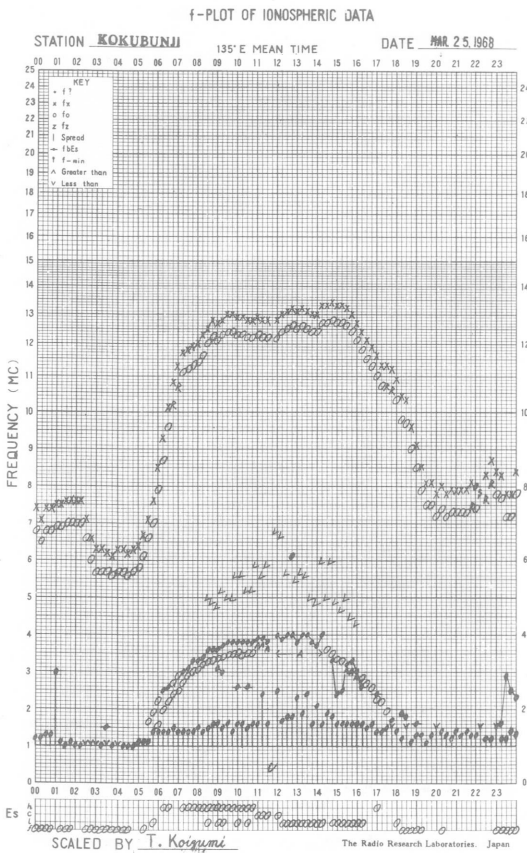
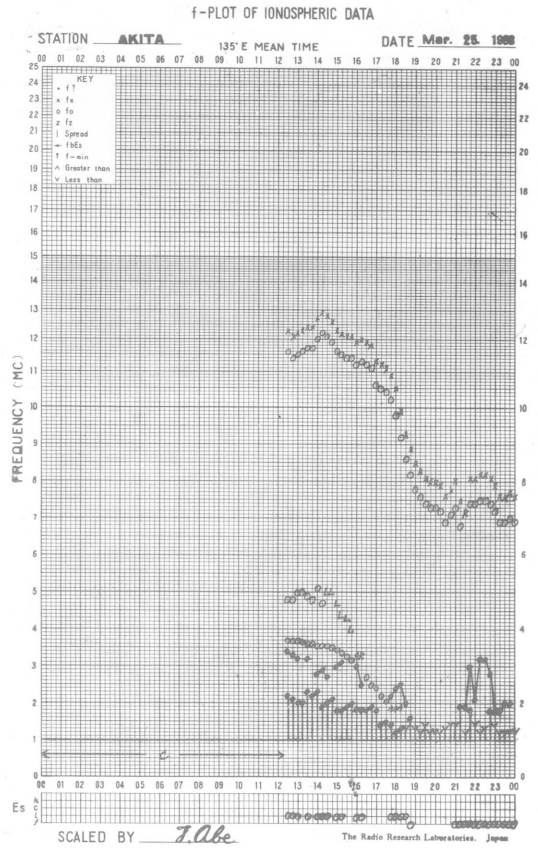
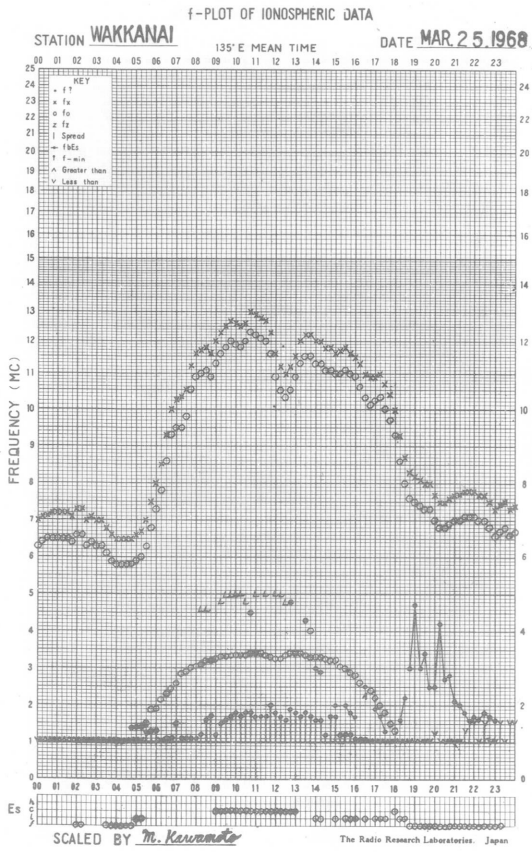


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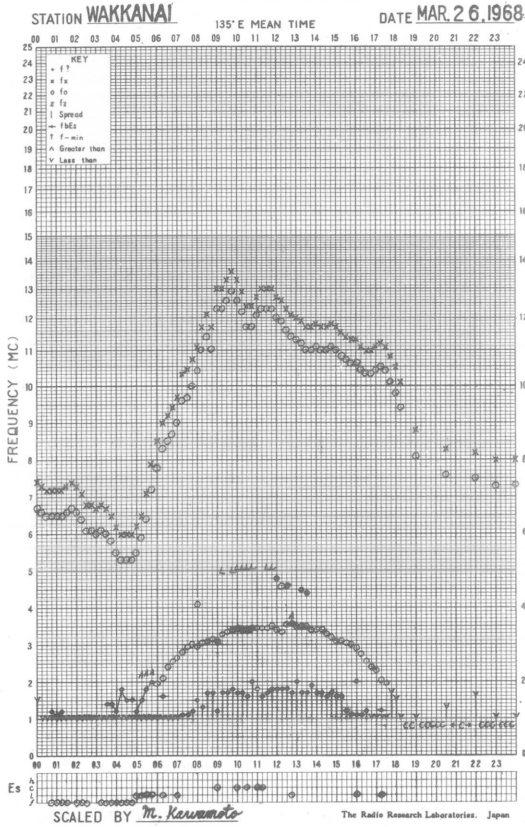


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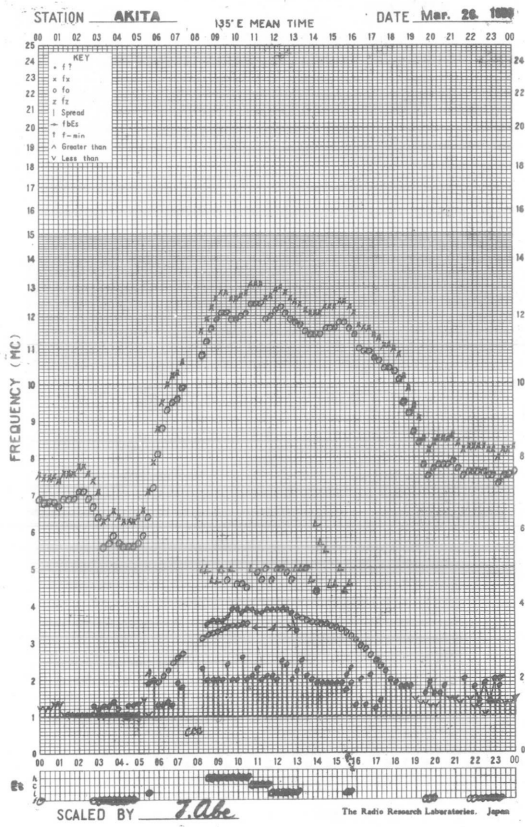




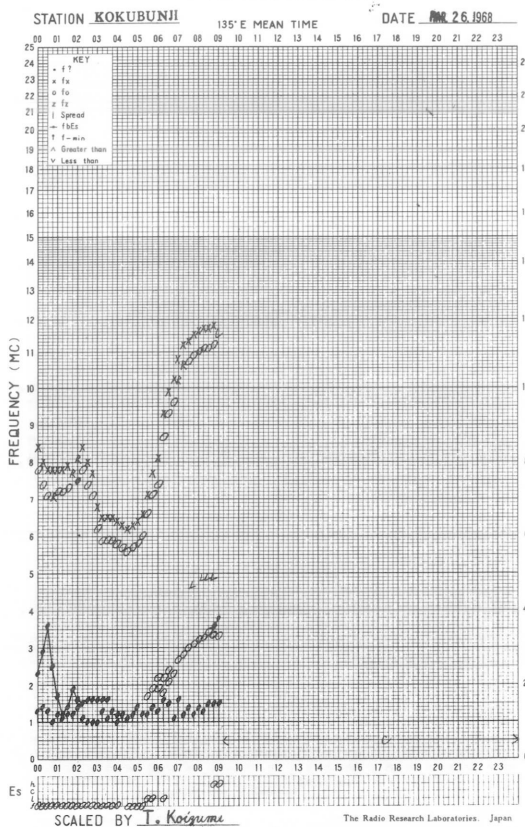
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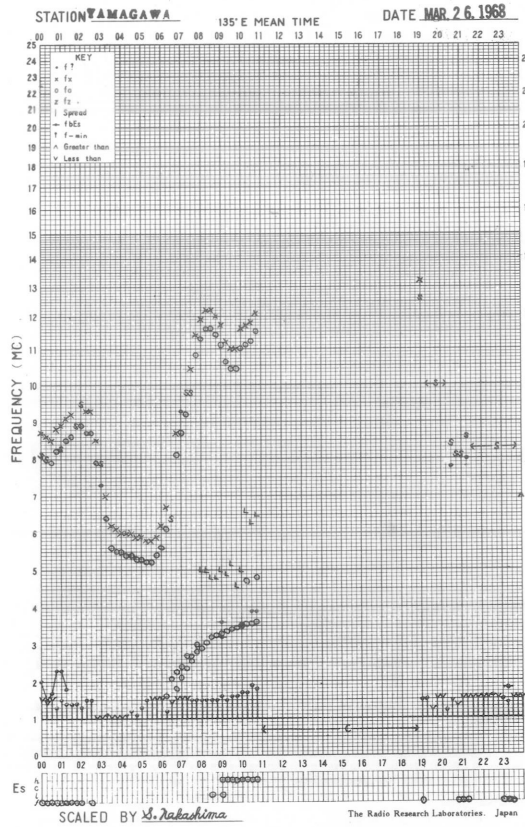
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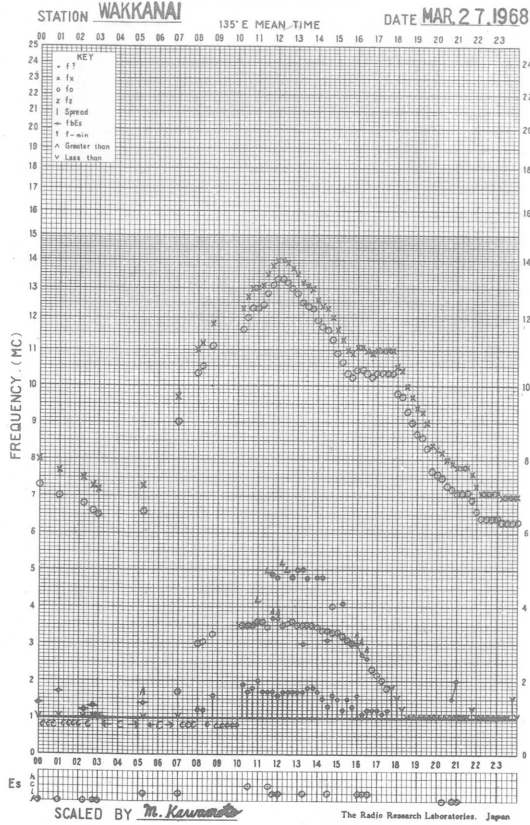
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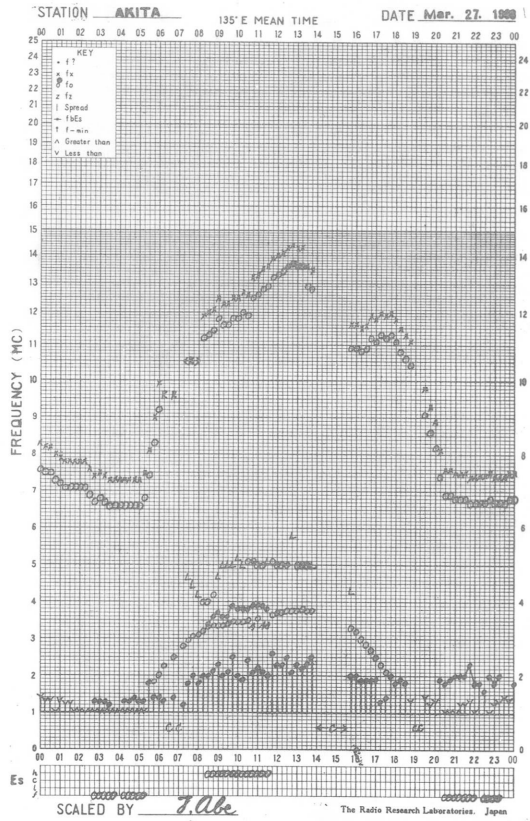
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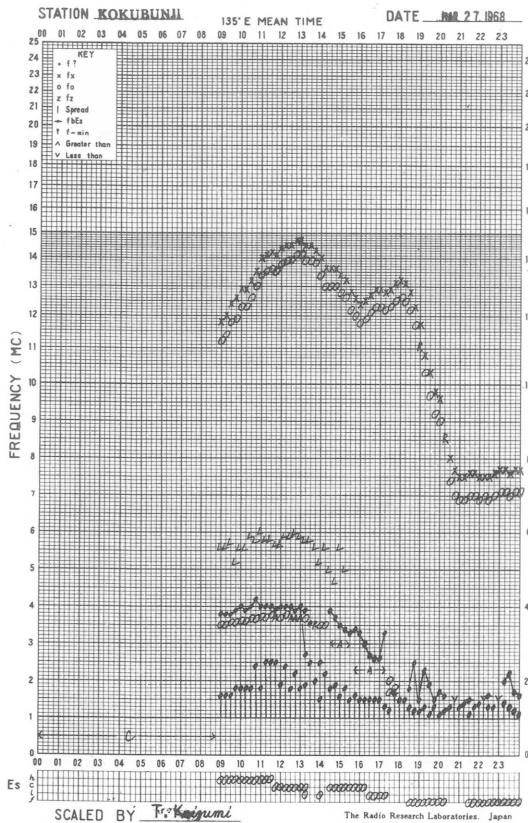
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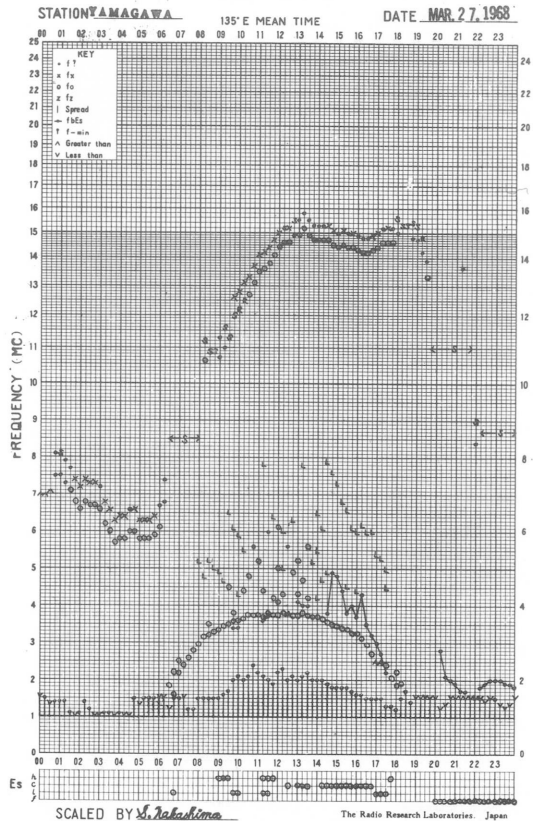
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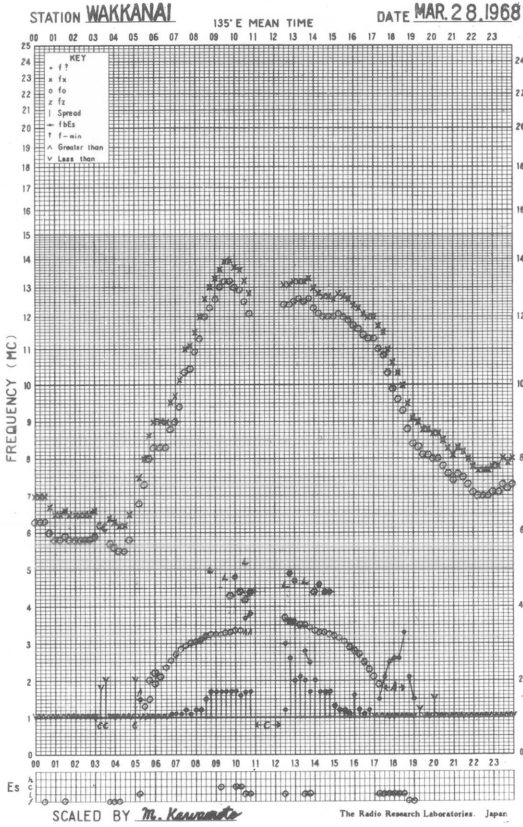
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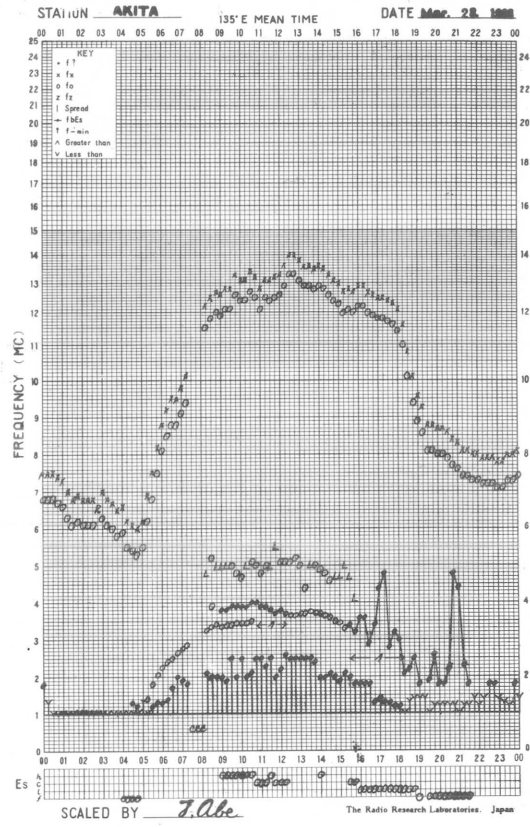
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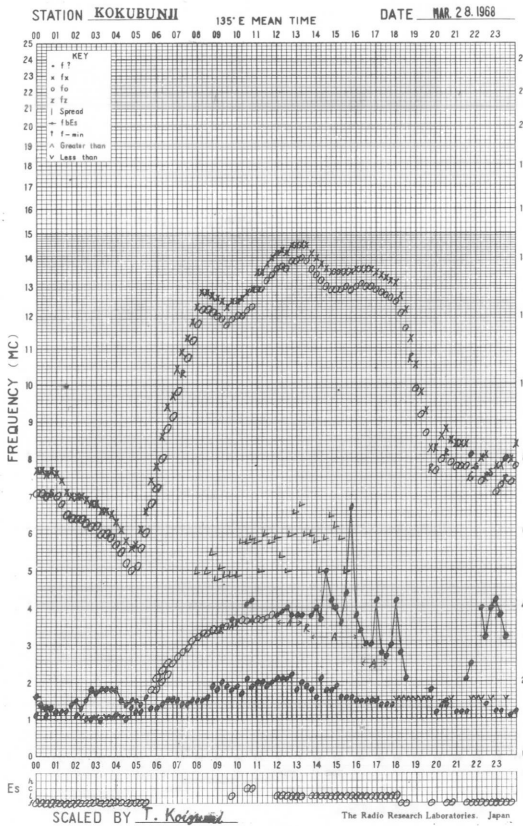
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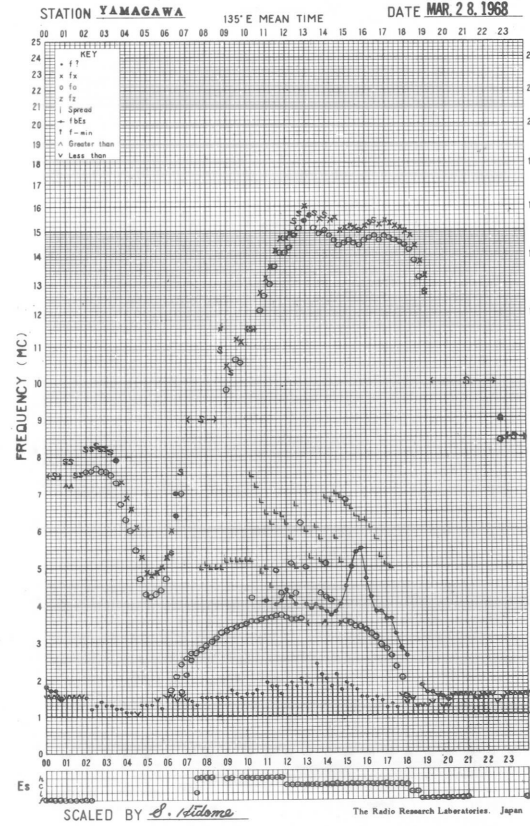
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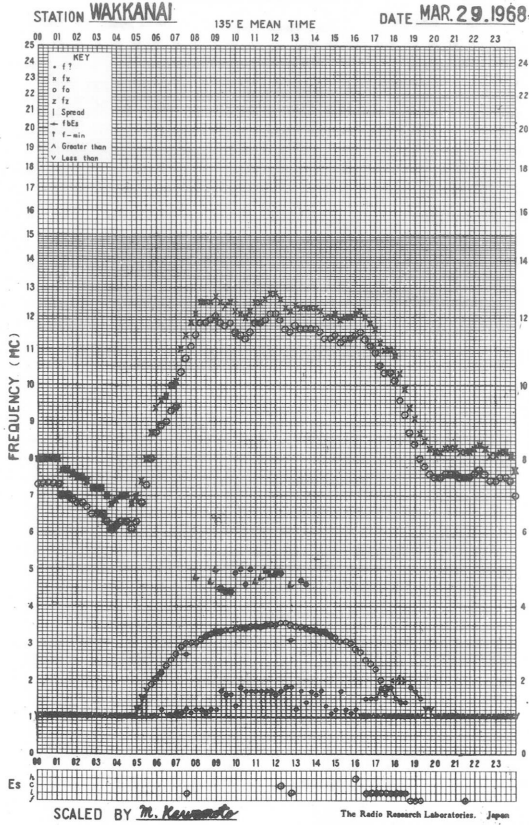
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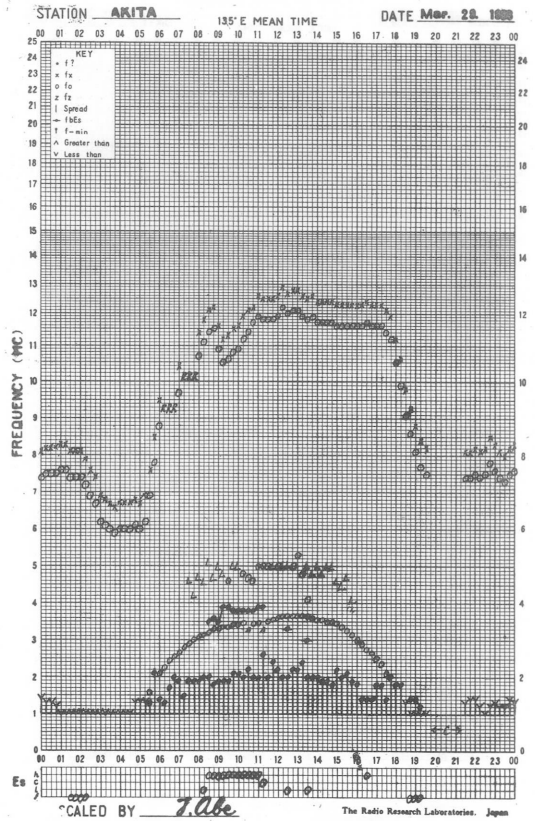
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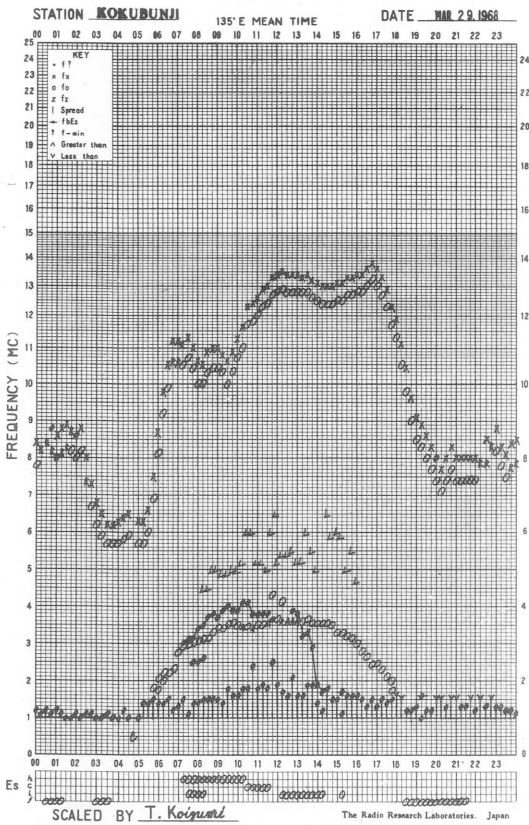
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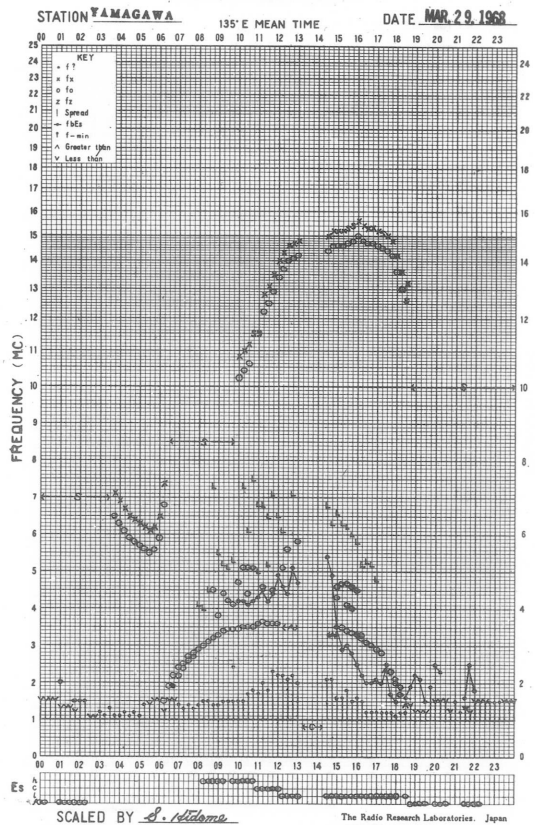
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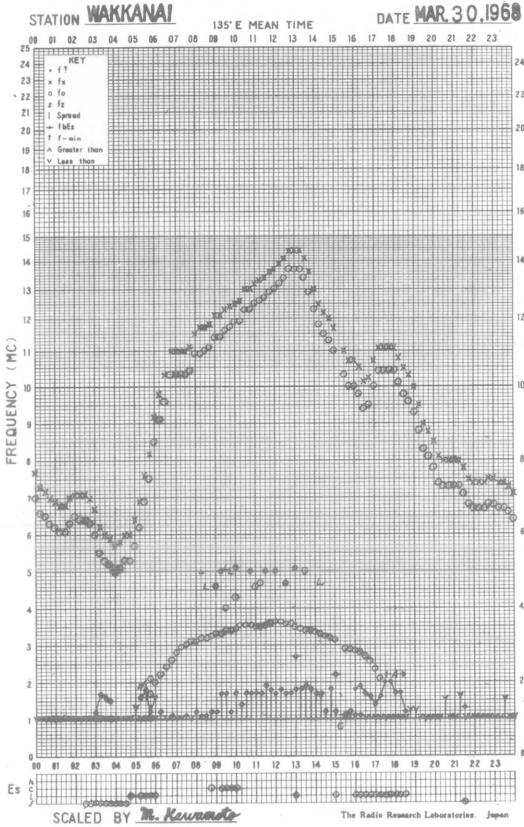
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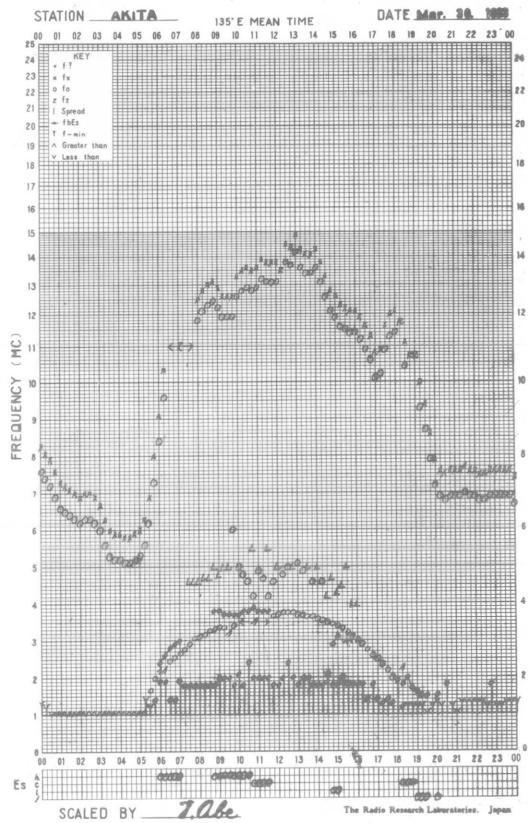
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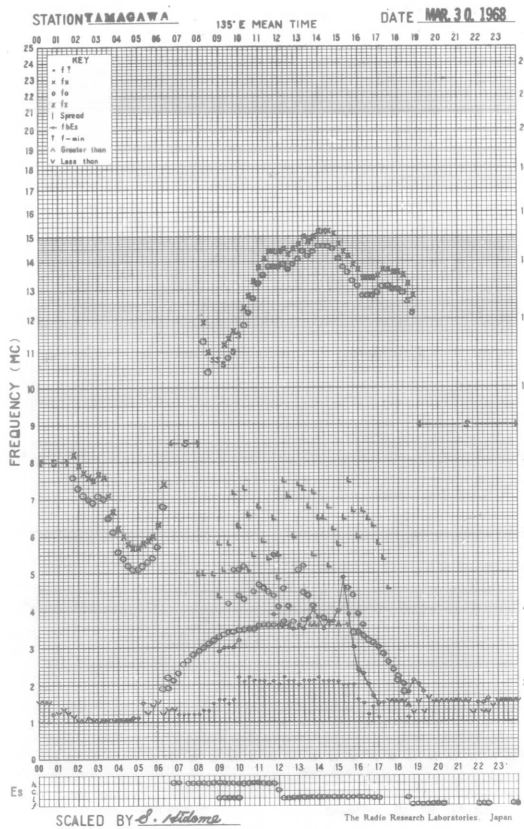
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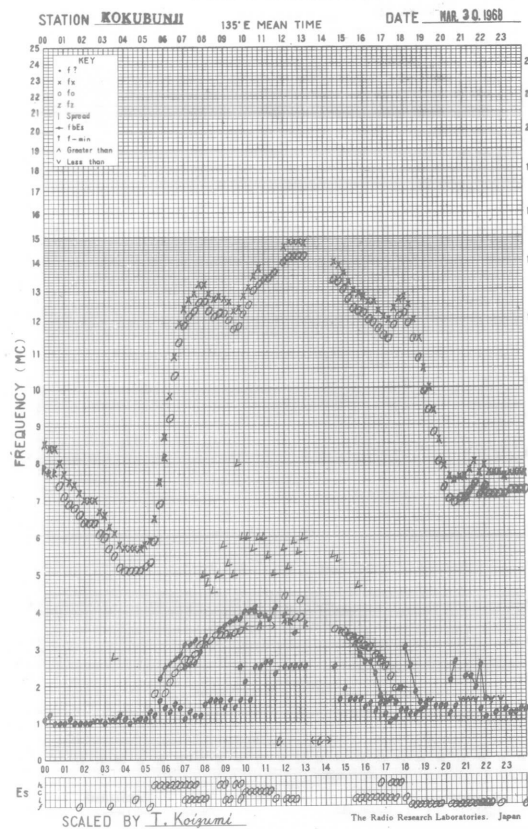
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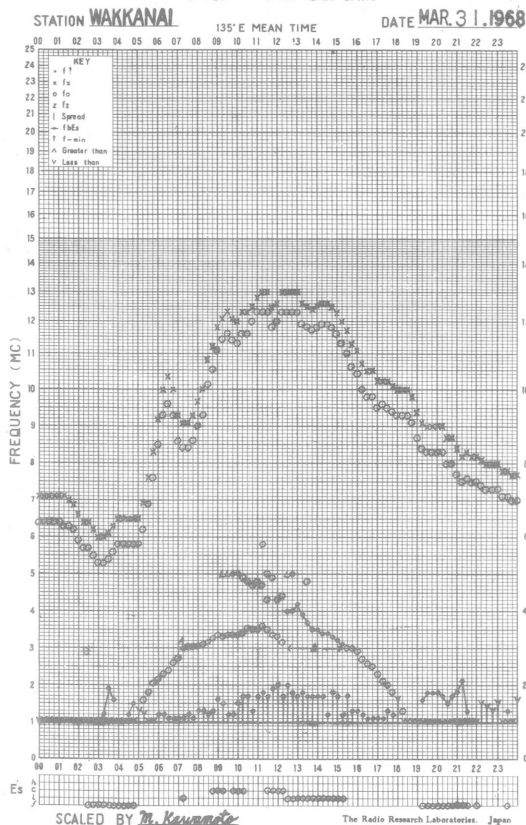
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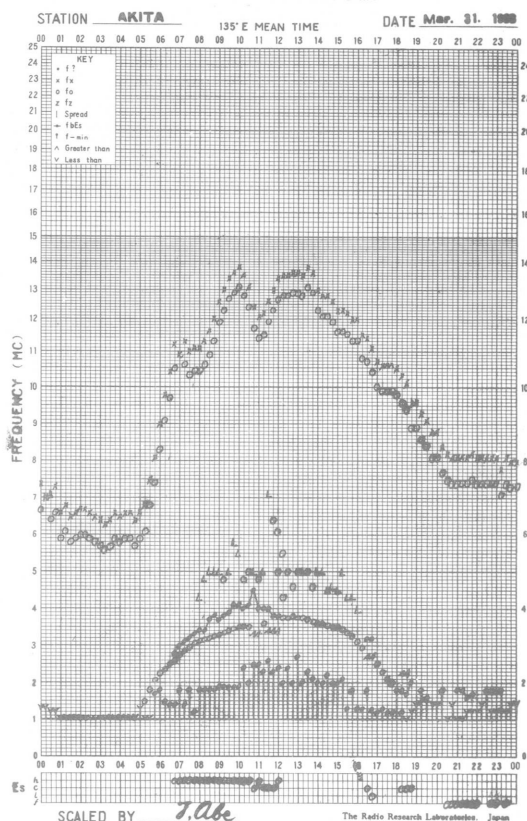
f-PLOT OF IONOSPHERIC DATA



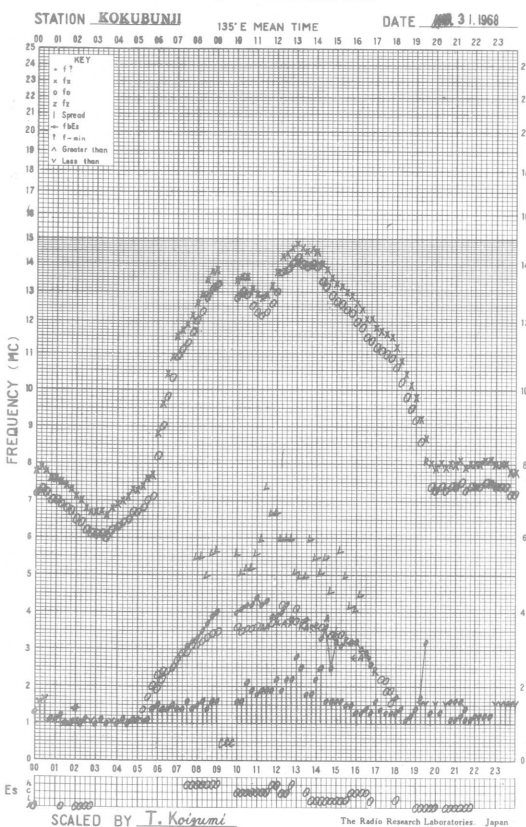
f- PLOT OF IONOSPHERIC DATA



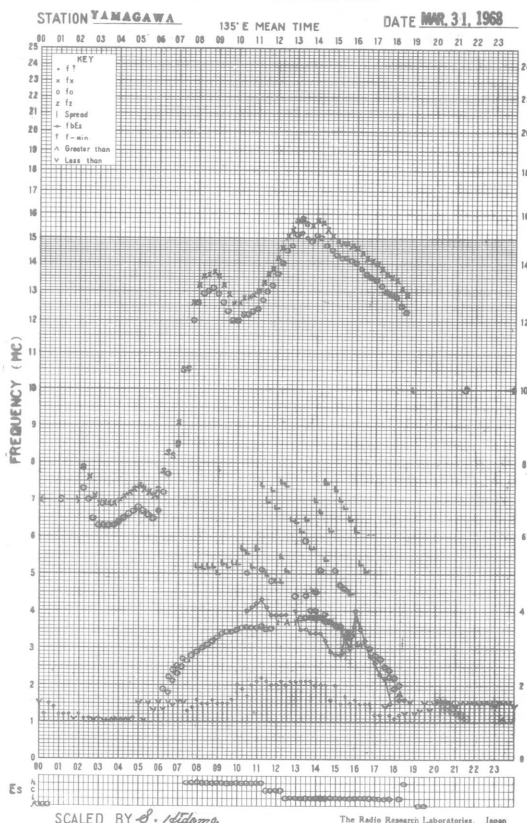
f- PLOT OF IONOSPHERIC DATA



f- PLOT OF IONOSPHERIC DATA



f- PLOT OF IONOSPHERIC DATA



SOLAR RADIO EMISSION

<u>Flux Density and Variability</u>										
Month: March 1968					Frequency: 200 MHz					
Observing station: Hiraiso										
Flux density $10^{-22} \text{ Wm}^{-2} (\text{Hz})^{-1}$						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	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-
15	-	5	5	-	5	-	0	0	-	0
16	6	6	6	-	6	0	0	0	-	0
17	5	5	5	(5)	5	0	0	0	(0)	0
18	6	6	(6)	-	6	0	0	(0)	-	0
19	21	19	8	8	17	2	1	1	0	1
20	7	7	9	23	8	0	0	1	2	0
21	12	8	8	9	12	1	1	1	1	1
22	8	8	8	9	8	1	1	0	1	1
23	8	8	9	10	8	0	0	1	1	1
24	11	9	10	7	10	1	1	1	1	1
25	7	7	7	-	7	1	0	1	-	1
26	10	7	12	8	9	1	1	1	1	1
27	16	9	(10)	13	11	1	1	(1)	1	1
28	11	13	9	9	11	1	1	1	0	1
29	8	10	9	11	9	1	1	1	1	1
30	11	-	-	-	(11)	1	-	-	-	(1)
31	-	-	-	-	-	-	-	-	-	-

Note No observations during the following periods:

1st 0000-	15th 0300	23rd 0000-	0100
15th 2050-	2400	25th 2050-	2400
16th 2050-	2400	27th 0600-	0700
17th 2050-	2300	28th 0300-	0400
18th 0700-	2400	30th 0245-	31st 2400
19th 0450-	0600		

SOLAR RADIO EMISSION

<u>Flux Density</u>					
Month: March 1968					
Observing station: Hiraiso			Frequency: 500 MHz		
Flux density $10^{-22} W_m^{-2} (Hz)^{-1}$					
UT	00-03	03-06	06-09	21-24	Day
Date					
1	-	36	(44)	32	(38)
2	32	33	-	34	33
3	33	33	(35)	30	34
4	34	32	-	34	32
5	32	32	(33)	29	33
6	31	31	(30)	30	31
7	30	30	(33)	28	30
8	31	29	(29)	28	30
9	29	31	(30)	-	30
10	-	-	-	27	-
11	30	28	-	28	28
12	28	29	29	27	28
13	27	27	26	26	27
14	-	-	-	-	(26)
15	27	27	27	25	27
16	25	27	28	24	26
17	27	27	27	26	26
18	27	28	29	29	27
19	30	31	29	28	30
20	27	31	28	-	29
21	32	31	31	28	32
22	28	29	27	-	28
23	33	33	30	-	32
24	-	33	32	-	33
25	37	38	35	35	37
26	35	34	35	(33)	35
27	37	35	34	(31)	35
28	33	34	34	(30)	34
29	31	30	32	(29)	31
30	31	-	-	-	(31)
31	-	-	-	-	-

Note No observations during the following periods:

1st	0000-	0300	11th	0600-	0800
2nd	0500-	0840	14th	0000-	2400
3rd	0100-	0200	20th	2050-	2400
4th	0000-	0100	22nd	2050-	23rd 0100
4th	0500-	0840	23rd	2050-	24th 0300
6th	0000-	0100	24th	2050-	25th 0100
9th	2050-	10th 0840	30th	0300-	31st 2400

Distinctive Events

(single-frequency observations)

Month: March 1968

Observing station: Hiraiso

Normal observing period: 2050 - 0840 (sunrise to sunset)

Date	Frequency	Starting time	Time of maximum	Duration	Type	Flux density $10^{-22} \text{ W m}^{-2} (\text{Hz})^{-1}$		Remarks
	MHz	UT	UT	minutes		peak	mean	
22	200	0415.0	0415.9	2.5	C	410	40	

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

MAR	1968																									
UT DAY	FREQUENCY 15 MHZ												BANDWIDTH 80 HZ				RECEIVING ANTENNA ROD 4.5 M						MEASURED AT HIRAIISO			
	00H 15M	01H 15M	02H 15M	03H 15M	04H 15M	05H 15M	06H 15M	07H 15M	08H 15M	09H 15M	10H 15M	11H 15M	12H 15M	13H 15M	14H 15M	15H 15M	16H 15M	17H 15M	18H 15M	19H 15M	20H 15M	21H 15M	22H 15M	23H 15M		
1	2	4	5	9	15	6	ES -16	ES -13	ES -7	ES 3	ES -1	-6	ES -6	5	13	13	11	-17	ES -23	ES -25	3	3	6	6		
2	5	6	7	17	22	8	-10	-12	-11	ES -3	ES -4	ES -4	-6	ES -6	13	20	-2	-3	-23	ES -27	-2	4	4	6		
3	5	5	8	12	19	15	ES -5	ES -9	-12	-1	ES 2	ES -2	9	ES -7	11	1	-8	16	-9	ES -29	1	7	6	4		
4	9	8	UC 9	UC 14	UC 18	UC 14	UC -9	EU -7	UC -7	EU 3	EU 3	UC 13	UC 15	UC 9	UC 18	UC 10	UC 13	UC 16	UC -5	EU -9	UC 4	UC 9	UC 7	UC 4		
5	4	7	9	17	25	7	-15	ES -12	ES -10	ES 0	ES 10	ES -8	ES -5	7	33	18	12	13	11	-20	2	11	10	8		
6	9	7	14	14	20	6	ES -4	-3	ES -2	ES -2	ES 13	ES -13	ES -7	ES -5	6	-2	-6	ES -5	-11	ES -23	3	11	8	6		
7	6	9	9	17	20	0	-5	-4	-10	-5	ES 3	ES -15	ES -4	ES -14	14	2	7	12	8	6	1	8	6	9		
8	7	8	9	12	19	8	-10	-7	-8	-5	ES -5	ES -13	ES -11	ES -7	1	0	4	12	5	-7	10	8	12	11		
9	7	8	12	13	22	6	-11	-5	-6	-6	ES -3	ES -9	ES -9	ES -7	-3	7	7	3	16	-6	-1	5	7	14		
10	8	12	12	14	27	28	20	11	7	2	4	-13	ES -5	ES -2	9	6	12	17	9	4	2	9	12	7		
11	8	12	14	16	22	7	-5	-6	-6	-2	-8	ES -13	-9	-8	-1	-3	2	17	11	-22	3	10	8	8		
12	7	13	19	20	27	26	2	ES -11	ES -7	ES -3	ES -4	ES -12	ES -11	ES -7	ES -2	-3	-5	ES -4	ES -8	ES -27	12	9	10	12		
13	7	14	26	18	18	-1	-7	-4	-5	-8	ES -4	ES -14	ES -9	ES -9	-1	-3	0	2	-9	ES -27	4	8	11	16		
14	10	14	15	14	21	8	-5	-7	-10	ES -7	ES -7	ES -13	ES -11	ES -8	-2	-5	-10	5	-19	-19	17	19	19	15		
15	12	14	18	19	4	ES -12	-14	ES -8	ES -5	ES -1	ES 0	ES 3	ES -14	ES -6	-10	-12	ES -7	3	-14	ES -27	-3	14	7	11		
16	13	12	12	17	18	ES -9	-10	-5	-9	4	ES -4	ES -2	ES -11	ES -8	ES -10	ES -4	4	7	ES -6	ES -26	5	16	11	9		
17	8	11	12	17	7	-3	-15	ES -15	-8	ES 3	ES -6	ES -3	ES -12	ES -10	1	4	2	12	11	7	6	5	8	12		
18	8	12	15	13	23	-7	-6	-14	ES -11	ES 2	ES -1	ES -5	ES -2	-6	4	-2	4	17	5	ES -15	7	12	10	9		
19	11	11	11	17	17	-4	-3	ES 1	ES 0	ES 2	ES -3	ES 3	ES -2	6	5	4	1	12	5	-5	15	12	14	12		
20	8	3	14	21	15	10	3	-3	0	0	ES 3	ES -1	ES 1	ES -12	7	-3	24	13	9	-18	5	6	8	7		
21	7	8	10	14	23	16	1	2	-2	2	1	ES 10	ES -2	ES -1	4	5	-8	-9	3	ES -16	6	7	-3	7		
22	9	12	9	16	17	21	19	0	1	1	ES 0	ES -1	ES 8	-2	2	-3	8	12	9	-17	7	6	8	7		
23	8	9	16	11	14	20	16	-3	-3	ES 3	ES -2	9	ES -11	-4	1	-2	2	8	11	5	5	2	3	6		
24	5	4	9	12	15	21	-4	ES -7	-9	1	5	C	ES 3	9	22	12	14	11	14	-6	6	6	5	2		
25	7	9	14	8	20	17	-1	-4	-4	ES 0	ES 0	-3	-9	ES 3	1	-3	17	15	13	-3	1	3	1	7		
26	6	5	6	16	9	1	6	-8	ES 0	-2	-5	-2	5	7	10	8	3	8	12	0	6	5	5	4		
27	6	6	6	17	12	12	-2	-8	-1	ES 3	5	5	-6	1	6	0	9	15	5	9	4	8	7	7		
28	2	6	5	14	23	17	7	7	0	2	0	1	-1	13	7	2	8	10	14	1	6	4	3	7		
29	4	5	6	13	16	16	6	4	6	3	0	-1	ES 6	3	18	2	6	6	8	-10	4	8	6	8		
30	11	11	11	11	17	11	ES -19	ES -20	ES -3	ES 3	3	ES -3	ES -8	ES -3	20	12	7	ES -14	ES -29	-8	17	13	18	5		
31	6	C	C	11	20	20	19	-3	ES -18	ES -2	ES 5	ES -6	ES 7	2	23	11	15	13	6	-11	2	6	2	ES -5		
CNT	31	30	30	31	31	31	31	31	31	31	31	30	31	31	31	31	31	30	30	31	31	31	31	31		
MED	7	8	11	14	19	8	US -5	US -6	ES -6	EU 0	EU 0	ES -3	ES -6	ES -4	6	2	4	12	6	US -11	4	8	7	7		
UD	11	14	18	19	25	21	19	4	1	ES 3	ES 5	ES 9	ES 8	9	22	13	15	17	14	6	15	14	14	14		
LD	4	4	6	11	9	-7	ES -15	EU -14	ES -11	EU -6	EU -6	ES -13	ES -11	ES -10	ES -3	ES -4	ES -8	ES -9	ES -23	EU -27	-1	3	2	4		

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

MAR 1968	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	4	0	2	9	17	17	19	20	22	33	5	-3	1	-5	-14	-17	-13	ES -25	ES -25	-8	3	0	1	-1				
2	-3	-4	0	6	13	16	24	23	24	16	7	0	2	13	4	-16	-21	6	ES -27	-7	9	2	-11	ES -2				
3	ES -6	-4	-2	5	12	17	22	23	26	18	14	17	14	11	ES -19	ES -29	-25	4	-12	-13	1	2	0	-3				
4	ES -4	-9	UC 3	UC 10	UC 12	UC 23	UC 19	UC 21	UC 25	UC 23	UC 22	UC 12	UC 3	UC 16	UC 13	UC 6	UC -7	UC -9	EU -26	UC -9	UC 11	UC 1	UC 1	UC -2				
5	0	-1	0	7	14	22	21	39	26	20	18	ES -2	-1	-3	-6	-5	-7	14	7	-1	9	2	2	3				
6	ES -6	6	2	10	8	21	25	20	26	25	-4	-2	-4	ES -10	ES -4	ES -7	-19	24	-21	-9	3	4	-2	ES -1				
7	1	-1	1	6	15	19	23	26	13	15	ES -4	ES -6	ES -8	ES -15	ES -13	ES -18	ES -24	25	9	-4	3	1	-2	1				
8	-1	0	-3	3	10	15	14	23	13	22	ES -4	ES -5	ES -7	ES -2	ES -7	ES -8	-15	20	-19	1	11	9	5	ES -4				
9	2	1	3	8	15	20	23	23	8	ES -3	-5	ES -5	ES -3	ES -8	ES -8	ES -8	3	25	-5	-8	8	0	-3	10				
10	-2	ES -2	1	11	16	20	23	29	19	30	-2	ES -17	ES -5	ES -4	ES -6	ES -14	ES -12	-10	ES -25	-10	3	7	4	ES 5				
11	-5	-1	3	8	15	14	15	7	25	17	-2	-4	5	25	-10	-15	ES -18	ES -13	ES -20	ES -28	6	1	-3	-5				
12	-4	0	8	10	16	19	26	30	30	27	ES 5	14	3	-2	ES -4	-11	-11	ES -5	ES -12	3	6	3	-3	2				
13	-1	-4	12	11	15	23	20	9	5	8	ES 2	-2	-1	ES -9	ES -1	ES -7	ES -14	ES -14	ES -17	3	11	1	6	1				
14	-1	-3	8	11	15	23	14	2	-5	ES -2	ES 6	ES -3	ES -4	13	-10	ES -4	ES -27	ES -23	ES -23	-8	6	2	6	5				
15	ES -4	-3	3	9	9	18	16	23	16	15	10	25	ES -4	ES -12	ES -21	ES -27	-16	-1	9	2	7	6	-2	ES -6				
16	-2	-2	4	8	15	20	20	21	20	-3	ES -4	ES -3	-4	ES -5	ES -9	ES -9	-4	ES -2	ES -26	-9	11	6	5	0				
17	1	2	2	13	19	22	21	21	17	4	0	ES 2	-4	ES -10	ES -10	ES -13	-15	-7	-13	7	10	4	-2	ES -1				
18	1	-2	4	6	17	23	22	18	28	6	ES 4	ES 15	18	ES -7	ES -7	ES -7	ES -18	14	ES -12	-2	10	6	4	4				
19	-1	ES -2	6	11	12	20	26	26	24	10	24	30	ES 0	-7	ES -12	ES -6	-11	5	-16	-4	13	0	8	3				
20	0	1	3	14	17	21	22	23	26	26	ES 0	ES 6	ES -5	ES -5	ES 0	ES -3	-4	ES 2	-3	13	9	2	-3	ES -4				
21	ES -5	-3	4	8	17	23	19	24	26	20	26	29	23	2	-15	ES -4	ES -16	19	11	9	8	6	1	ES -2				
22	-2	-1	1	10	13	16	23	25	24	30	17	25	-2	ES -9	ES -11	ES -4	-9	27	13	5	12	2	5	-3				
23	-2	-3	0	7	12	19	17	23	18	24	34	5	9	-2	-4	-6	-2	24	12	1	2	-1	-3	ES -1				
24	ES -4	0	-1	3	10	18	21	22	21	24	C	C	13	-4	-2	ES -2	23	33	13	6	9	3	2	ES 2				
25	-3	-3	0	5	10	14	18	24	20	25	18	20	14	22	ES -1	ES -5	6	14	-9	6	11	5	0	-5				
26	-1	ES -5	2	7	13	20	20	20	29	26	24	14	-1	0	-6	-7	-4	21	15	3	7	2	-4	ES -8				
27	-4	-3	1	8	18	17	21	24	19	21	28	27	16	28	ES -8	ES -7	-10	27	10	4	2	4	1	ES -7				
28	ES -5	-5	-2	1	15	17	18	27	20	26	32	27	21	3	ES -19	-10	7	20	16	3	6	-2	-2	ES -5				
29	-1	-5	2	7	12	18	24	26	24	28	14	23	13	1	ES -4	ES -4	-19	19	14	4	4	0	-2	ES -5				
30	ES -6	-4	-2	3	9	14	17	23	18	21	21	9	18	ES -3	ES -6	ES -8	-8	ES -29	ES -29	3	5	-1	-6	-5				
31	ES -9	C	C	7	16	17	25	22	22	27	6	24	19	17	ES -1	-3	12	33	13	2	6	6	-2	0				
CNT	31	30	30	31	31	31	31	31	31	31	30	30	31	31	31	31	31	31	31	31	31	31	31	31				
MED	-2	US -2	2	8	15	19	21	23	22	21	6	US 8	1	US -3	ES -7	ES -7	-11	14	-12	1	7	2	0	ES -1				
UD	1	1	8	11	17	23	25	29	28	30	28	27	19	22	ES 0	ES -3	7	27	14	7	11	6	6	ES 5				
LD	ES -6	ES -5	-2	3	9	14	15	9	8	ES -2	ES -4	ES -5	ES -5	ES -10	ES -19	ES -18	ES -24	ES -23	EU -26	-10	2	-1	-4	ES -6				

RADIO PROPAGATION QUALITY FIGURES

HIRAISO

Time in U.T.

Mar. 1968	Whole Day Index	H B			W W V				S F				W W V H				Warning				Principal magnetic storms			
		06	12	18	00	06	12	18	00	06	12	18	00	06	12	18	00	06	12	18	Start	End	ΔH	
		12	18	24	06	12	18	24	06	12	18	24	06	12	18	24	06	12	18	24				
1	4o	4	4	C	4	4	4	4	4	4	4	4	4	4	4	4	N	N	N	N				
2	4o	(4)	C	C	4	5	4	4	4	4	4	4	4	4	4	4	N	N	N	N				
3	4+	(5)	C	C	5	4	5	4	4	4	4	4	4	4	4	4	N	N	N	N				
4	4o	3	4	4	4	4	5	4	4	4	4	4	4	3	4	5	4	N	N	N	N			
5	4o	4	4	3	4	4	4	4	4	4	4	4	4	4	4	4	4	N	N	N	N			
6	4o	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	N	N	N	N			
7	4+	4	5	4	4	5	4	5	4	4	4	4	4	4	4	4	4	N	N	N	N			
8	4o	4	4	4	4	4	(4)	4	4	4	4	4	4	4	4	C (4)	4	N	N	N	N			
9	4o	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	N	N	N	N			
10	4o	4	4	C	4	4	4	4	4	4	4	4	4	4	4	4	4	N	N	N	N			
11	4o	4	C	C	4	5	4	4	4	4	(4)	4	4	4	4	4	4	N	N	N	N			
(12)	4o	4	4	4	4	4	4	4	4	4	(4)	4	4	4	4	4	4	N	N	N	N			
(13)	4o	4	4	C	4	4	4	4	4	4	4	4	4	4	4	4	4	N	N	N	N			
(14)	4o	5	4	4	4	4	4	3	4	4	4	4	4	4	4	4	4	N	N	N	N			
15	4-	3	4	3	3	4	4	3	3	4	4	4	4	4	4	3	4	N	U	U	U			
16	4o	4	4	4	4	4	4	4	4	4	(4)	4	4	4	4	4	4	N	N	N	N			
17	4o	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	N	N	N	N			
18	4o	4	4	4	4	4	4	(4)	4	4	4	4	4	4	4	4	4	N	N	N	N			
19	4o	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	N	N	N	N			
20	4o	4	4	4	4	4	4	4	3	4	4	4	4	4	4	4	4	N	N	N	N			
21	4+	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	N	N	N	N			
22	4+	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	N	N	N	N			
23	4+	5	5	5	4	4	4	4	4	4	(4)	4	4	4	4	4	4	N	N	N	N			
24	4o	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	N	N	N	N			
25	4o	4	4	4	4	4	4	3	4	4	4	4	4	4	4	5	4	N	N	N	N			
26	4o	4	C	4	3	4	4	4	4	4	4	C	4	4	4	4	4	N	N	N	N			
27	4o	4	C	C	4	4	4	4	4	4	(4)	C	4	4	4	4	4	N	N	N	N			
28	4+	4	5	C	4	5	4	4	4	4	4	C	4	4	5	4	4	N	N	N	N			
29	4o	(4)	4	C	4	5	4	4	(4)	4	4	C	4	4	4	4	4	N	N	N	N			
30	4-	3	4	C	3	4	4	3	4	4	4	C	4	4	4	3	4	N	N	N	N			
31	4o	4	5	C	3	4	4	4	4	4	4	C	4	4	4	4	4	N	N	N	N			

IQSY GEOALERT and ADALERT (Western Pacific Region)

- * = MAGSTORM
- o = MAGCALME
- Δ = 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.

Mar 1968	S W F							Correspondence					
	Drop-out Intensities (db)						Start- time	Dura- tion	Type	Imp.	Flare	Solar Noise	Mag.
CO	SF	HA	TO	HB	SH								
2		15	-				22.38	33	S	1	x	x	
21		-	23	-			22.05	35	S	2-		x	
		-'											
		-''											
22		10					01.25	21	S	1-	x		

IONOSPHERIC DATA IN JAPAN FOR MARCH 1968

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發 行 所 郵 政 省 電 波 研 究 所

東京都小金井市貫井北町4の573
電 話 国 分 寺 (0423) (21) 1211 (代)

印 刷 所 (有) 丸 井 工 文 社

東京都千代田区神田猿樂町2の8
電 話 (292) 0841 (代)
