F—228

IONOSPHERIC DATA IN JAPAN

FOR DECEMBER 1967

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THE RADIO RESEARCH LABORATORIES
MINISTRY OF POSTS AND TELECOMMUNICATIONS
KOKUBUNJI, TOKYO, JAPAN

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THE RADIO RESEARCH LABORATORIES

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CONTENTS

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_0F2, f_0F1, f_0E — The ordinary wave critical frequency for the $F2$, $F1$ and E layers, respectively.

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

f_bE_s — The 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_0E_s.

$hpF2$ — The virtual height of the $F2$ layer measured on the ordinary

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

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

a. Descriptive Letters

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

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

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

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

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

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

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

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

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

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

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

N Conditions are such that the measurement cannot be interpreted.

O Measurement refers to the ordinary component.

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

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

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

V Forked trace which may influence the measurement.

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

X Measurement refers to the extraordinary component.

Y Intermittent trace.

Z Third magneto-ionic component present.

b. Qualifying Letters

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

value on the monthly tabulation sheets.

D — greater than.

E — less than.

I — Missing value has been replaced by an interpolated value.

J — Ordinary component characteristic deduced from the extraordinary component.

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

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

U — Uncertain or doubtful numerical value.

Z — Measurement deduced from the third magneto-ionic component.

c. 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 hight: *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_0E. 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_0E. The cusp is not symmetrical, the low frequency end of the E_s trace lying clearly above the high frequency end of the normal *E* trace. (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 grealy 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_0E_s and $h'E_s$. The slant trace is sometimes observed to start at f_0E 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} W·m^{-2}·(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 Hiraiso 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 atmospherics.

( ): Inaccurate measurement influenced by interferences, atmospherics, 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)
2=poor (disturbed)
3=rather poor (unstable)
4=normal
5=good

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

C O .....WWV 20, 15 and 10 Mc/s (Fort Collins, Colorado)
S F .....Various frequencies of commercial circuit (San Francisco)
H A .....WWVH 15 and 10 Mc/s (Hawaii)
T O .....JJY 15 and 10 Mc/s (Tokyo)
S H.....BPV 15 and 10 Mc/s (Shanghai)
H B .....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

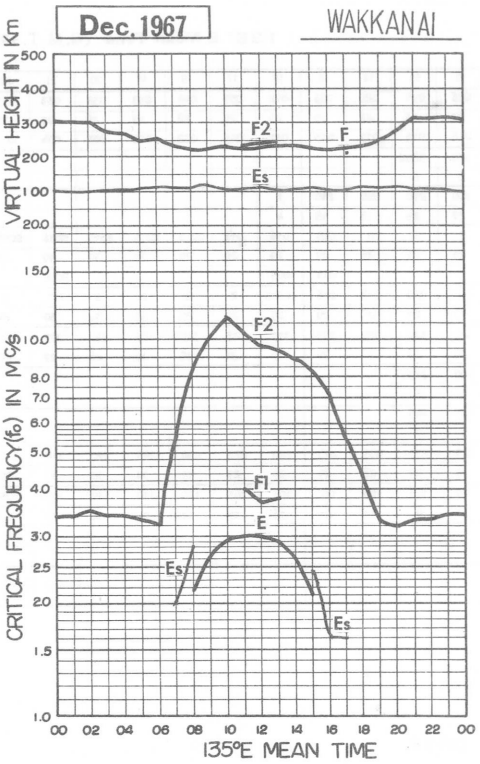
Importances

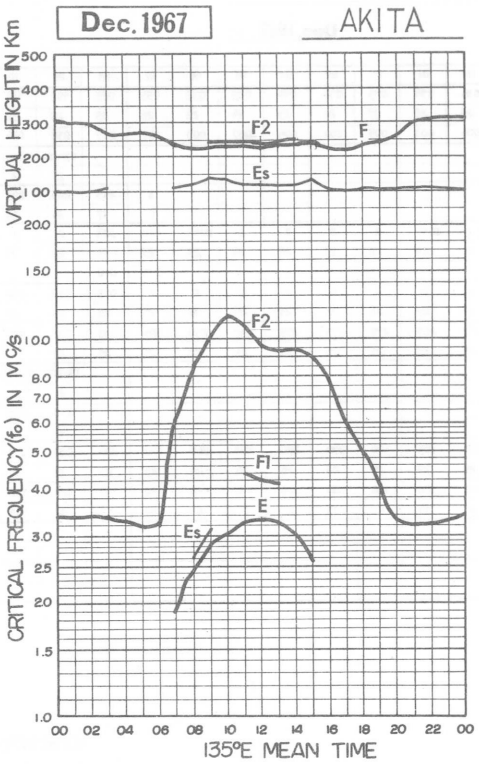
Degrees of SWF are classified into 9 grades according to the amplitude of fade-out;

1−	1	1+
2−	2	2+
3−	3	3+

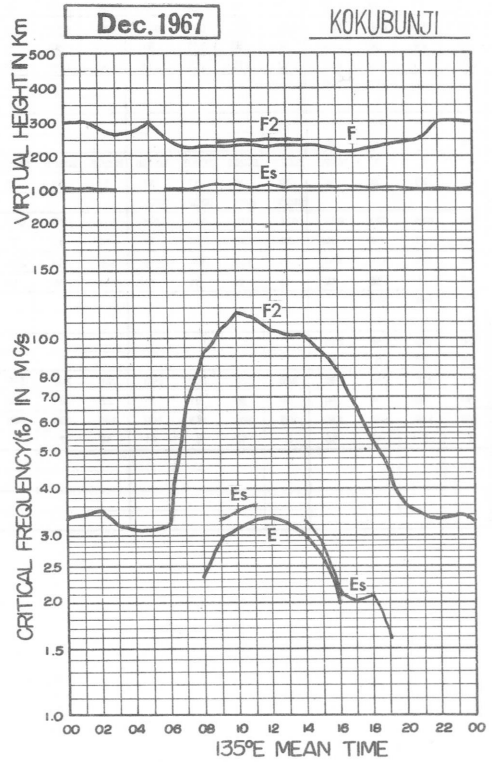
Besides, the time associated phenomena with SID's, that is, solar flare, solar radio noise outburst and crochet (solar flare effect in magnetic record), are given in this table from interchange messages of IUWDS or measurements at Hiraiso.

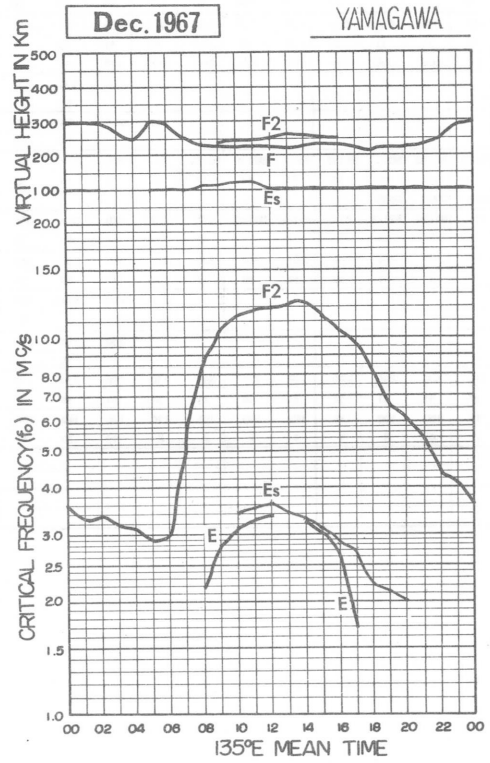
IONOSPHERIC DATA
MONTHLY MEDIAN CHARACTERISTICS





IONOSPHERIC DATA
MONTHLY MEDIAN CHARACTERISTICS





IONOSPHERIC DATA
LIST OF MEDIAN VALUES

OBSERVED AT: WAKKANAI

Dec. 1967

135° E Mean Time (G.M.T. +9h)

CHAR \ HR		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
foF2	MED	034	034	035	034	034	033	032	055	085	101	114	103	096	094	088	083	072	055	044	033	032	033	033	034
	CNT	28	28	27	26	25	24	22	25	25	29	30	29	29	29	28	29	29	29	28	29	28	29	27	28
	Q R	004	003	005	004	004	007	003	007	017	031	034	022	018	015	017	013	017	013	012	010	005	004	003	004
foF1	MED										U340L	U400L	U400L	370	380L										
	CNT										2	2	7	8	6										
foE	MED								E	215	265	295	300	300	290	260	210	E							
	CNT								6	17	24	28	28	27	29	28	18	4							
foEs	MED	E012	E017	E	E	E	E	E015	020	028	G	G	G	G	G	G	024	016	016	E015	E014	E015	E016	E015	018
	CNT	28	29	28	28	26	26	25	25	25	29	29	29	29	29	28	29	29	29	29	30	30	30	29	29
	Q R								015	010							014	D009					D009		D011
f-min	MED	E	E	E	E	E	E	E	E	015	018	020	020	020	020	018	016	E014S	E	E	E	E	E	E	E
	CNT	28	29	28	28	26	26	25	25	25	29	29	29	29	29	28	29	29	29	29	30	30	30	29	29
M (3000) F2	MED	265	265	270	275	275	290	290	305	335	330	330	325	320	320	325	325	315	315	315	305	290	275	265	265
	CNT	28	28	27	26	25	24	22	25	25	29	30	29	29	29	28	29	29	29	28	29	28	29	27	28
M (3000) F1	MED										U400L	U390L	U400L	400	385L										
	CNT										2	2	7	8	6										
h'F2	MED										240	235	230	235	245										
	CNT										2	5	12	9	7										
h'F	MED	310	305	300	270	270	250	260	230	220	225	235	225	225	235	235	225	220	220	230	245	270	310	310	315
	CNT	29	29	28	28	26	26	24	25	25	29	30	30	29	29	28	29	29	29	29	30	30	30	29	29
h'Es	MED	100	100	100	100	105	110	110	110	110	120	110	110	110	105	105	110	105	105	110	110	110	105	105	105
	CNT	9	14	9	13	9	7	6	19	19	12	11	14	11	9	11	21	16	15	12	9	12	14	12	17
hpF2	MED																								
	CNT																								
ypF2	MED																								
	CNT																								

IONOSPHERIC DATA
LIST OF MEDIAN VALUES

OBSERVED AT: AKITA

Dec. 1967

135° E Mean Time (G.M.T. +9h)

CHAR \ HR		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
foF2	MED	034	034	034	034	033	032	032	061	086	101	115	108	096	093	094	089	078	060	049	041	033	032	032	033
	CNT	31	31	31	30	31	30	31	31	31	30	30	30	29	29	30	30	30	30	31	31	31	30	31	31
	Q R	004	004	004	005	004	004	005	008	017	032	022	020	018	019	016	017	012	016	008	013	006	005	003	004
foF1	MED									290	450L	420	440L	420	410	480L	270								
	CNT									1	5	2	8	9	6	1	1								
foE	MED								190	245	285	305	325	330	325	305	255	195							
	CNT								11	27	29	27	26	28	27	25	24	3							
foEs	MED	E020B	E013S	E013	E012S	E012	E013S	E018B	G	026	031	G	G	G	G	G	E027G	E022B	E020B	E020B	E019B	E020B	E020B	E018B	E020B
	CNT	31	31	31	31	31	31	31	31	31	30	30	30	29	29	30	30	30	30	31	31	31	31	31	31
	Q R	D003	D008	D006														D003	D004	D002	D006				D003
f-min	MED	019	E013S	E012S	E012S	E012S	E012S	018	017	020	022	023	023	024	023	021	020	022	018	019	018	019	018	018	019
	CNT	31	31	31	31	31	31	31	31	31	30	30	30	29	29	30	30	30	30	31	31	31	31	31	31
M (3000) F2	MED	275	275	280	280	285	280	300	325	340	330	325	330	320	325	325	330	325	315	320	315	300	280	270	275
	CNT	31	31	31	30	31	30	31	31	31	30	30	30	29	29	30	30	30	30	31	31	31	30	31	31
M (3000) F1	MED									410	390L	380	380L	385	390	335									
	CNT									1	5	2	8	9	6	1									
h'F2	MED									230	240	240	235	240	240	250	230								
	CNT									1	15	30	30	30	27	9	1								
h'F	MED	315	300	295	270	270	275	265	230	220	230	230	230	225	230	230	230	220	220	230	240	260	300	310	310
	CNT	31	31	31	31	31	30	29	31	31	30	30	30	30	30	30	30	30	30	31	31	28	24	30	30
h'Es	MED	100	100	100	110	105	105	105	110	120	140	130	120	120	120	120	130	105	100	105	105	105	105	105	105
	CNT	7	9	8	5	3	4	2	8	19	20	15	15	8	8	13	16	8	12	8	11	17	7	5	9
hpF2	MED																								
	CNT																								
ypF2	MED																								
	CNT																								

IONOSPHERIC DATA
LIST OF MEDIAN VALUES

OBSERVED AT: KOKUBUNJI

Dec. 1967

135° E Mean Time (G.M.T. +9h)

CHAR	HR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
foF2	MED	033	034	035	032	031	031	032	065	090	104	116	113	104	102	102	092	082	067	054	045	036	034	033	034
	CNT	29	30	30	28	28	29	29	28	28	29	30	29	29	28	28	28	28	28	28	28	28	30	30	30
	Q R	006	004	003	006	003	005	006	007	021	027	032	025	026	026	014	020	012	020	009	008	007	006	009	010
foF1	MED													400L	410L										
	CNT													1	1										
foE	MED								165	235	295	315	330	335	320	300	260	200							
	CNT								3	20	21	19	20	19	21	20	13	9							
foEs	MED	E015	E015	E012	E011	E	E013	E015	G	G	033	035	036	G	G	033	028	021	020	021	016	E016	E016	E016	E016
	CNT	29	29	30	29	29	29	28	28	28	28	30	29	28	28	28	26	28	26	28	27	27	30	29	29
	Q R	D006	D005						D006									005	D009	D009	D009	D007	D008	D006	D004
f-min	MED	013	012	010	010	010	012	013	015	015	016	024	019	026	025	017	015	015	012	013	012	012	013	E016S	E016S
	CNT	29	29	30	29	29	29	28	28	28	28	30	29	28	28	28	26	28	26	28	27	27	30	29	29
M (3000) F2	MED	275	275	280	285	275	280	295	335	335	325	325	320	315	310	320	320	325	325	320	315	305	290	275	275
	CNT	29	30	30	28	28	29	29	28	28	29	30	29	29	28	28	28	28	28	28	28	28	30	30	30
M (3000) F1	MED													410L	400L										
	CNT													1	1										
h'F2	MED									240	240	245	245	250	245	250	250	250							
	CNT									1	12	25	23	29	22	19	2	1							
h'F	MED	300	305	280	265	270	300	255	230	230	230	230	230	225	230	230	230	225	220	225	230	245	265	300	300
	CNT	29	30	30	29	29	29	29	28	28	28	29	29	29	28	28	28	28	28	28	28	28	30	30	30
h'Es	MED	110	110	105	105	110	105	110	110	120	125	125	115	120	115	115	110	110	110	105	110	110	105	105	105
	CNT	9	8	6	7	4	3	5	14	14	21	23	25	16	17	19	18	21	19	20	14	12	13	12	8
hpF2	MED	370	380	350	350	360	365	330	280	270	285	285	295	305	305	295	290	290	290	300	300	320	340	370	370
	CNT	29	30	30	28	28	29	29	28	28	29	30	29	29	27	28	28	28	28	28	28	28	30	30	30
ypF2	MED	075	075	070	075	070	080	075	060	060	070	070	075	070	080	070	070	065	065	070	075	080	080	075	075
	CNT	29	30	30	28	28	29	29	28	28	29	30	29	29	27	28	28	28	28	28	28	28	30	30	30

IONOSPHERIC DATA
LIST OF MEDIAN VALUES

OBSERVED AT: YAMAGAWA

Dec. 1967

135° E Mean Time (G.M.T. +9h)

CHAR	HR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
foF2	MED	036	033	034	032	031	029	030	049S	087	103	114	116	119	122	123	113	103	096S	081	067S	061S	053S	043	041
	CNT	30	31	31	31	31	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31
	Q R	014	009	007	005	008	006	006	008	014	024	029	031	023	020	024	030	022	018	020	016	013	013	013	015
foF1	MED									290	360	400L	U450L	U470L	U480L	500L	310	290							
	CNT									1	1	5	1	2	4	4	1	3							
foE	MED									220	280	315	330	340	340	325	300	260	170						
	CNT									31	30	30	31	28	28	29	27	27	5						
foEs	MED	E015B	E015B	E015B	E015B	E012B	E014B	E015S	E015S	G	G	034	035	036	G	033	031	028	J027	022	021	020	E015	E015	E015
	CNT	31	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	29	31	31	31	31	31
	Q R		D005					D005	D005										010	010	005	D006	D005	D005	D005
f-min	MED	014	015	014	014	011	013	E015S	E015S	014	015	016	017	017	019	016	015	015	E015S	E015S	E015S	E015S	E015S	E015S	014
	CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	29	31	31	31	31	31
M (3000) F2	MED	275	275	290	285	295	260	280	305S	340	330	325	315	310	305	305	310	310	320S	315	310S	310S	290S	285	280
	CNT	30	31	31	31	31	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31
M (3000) F1	MED									400	420	400L	U400L	U390L	U375L	370L	420	415							
	CNT									1	1	5	1	2	4	4	1	3							
h'F2	MED									220	240	245	250	250	265	255	250	250							
	CNT									1	20	30	31	31	31	31	30	10							
h'F	MED	290	300	290	270	250	U300	290	255	230	230	225	225	220	220H	225	230	230	220	215	220	225	230	250	285
	CNT	31	31	31	31	31	29	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31	31
h'Es	MED	100	100	100	100	115	100	100	100	115	110	120	125	105	105	100	100	100	100	100	100	100	100	100	100
	CNT	7	8	7	4	3	7	8	15	15	18	26	21	24	25	26	28	25	27	22	25	18	12	12	10
hpF2	MED																								
	CNT																								
ypF2	MED																								
	CNT																								

IONOSPHERIC DATA

Dec. 1967 | foF2 | 0.1Mc | 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	031	033	034	037	034	024	027	059	086	090	122	100	099	091	097	088	083	045H	040	041	031	030	033	034F
2	036F	035F	033F	034F	033F	031	033	055	077	120	114	120	098	098	097	104	071	052	041	033	S	033F	040F	041F
3	F	U036F	U041F	U038F	F	038F	033F	059	075	094	086	092	088H	091	091	081	068	050	032	030	026	027	028	031
4	032F	034F	U033F	U037F	034	033	I032A	052	074	081H	097	101	096	096	089	080	072	050	032	033	033	034	U033F	U035F
5	035F	034F	C	C	C	C	C	C	C	090	093	094	078	080	084	080	065	050	039	029	030	030	031	032
6	033	033	035	033	032	030F	029	051	075	081	091	093	091	090	099	083	073	057	048S	037	033	033	034	035
7	035	U033F	032	033F	032F	U032F	032	050	068	080	110	113	095	098	086	083	063	067	057	048	047	040	033	036
8	035	036	036	037	036	037	038	053	076	098	093	114	090	089H	083	083	060	056H	050	043	033	036	036	032
9	033	034	036	033	035	033	C	C	C	101	092	094	102	083	086	085	067	053	049	038	035	035	034	037
10	035	038	037	035	033	032	030	057	078	091	093	095H	098	094	077	071	061	047	035	033	033	033	035	036
11	034	033	034	035	038	037	035	055	076	086	091	086	087	086	082	094	058	043	040	032	033	030	033	033
12	034	033	034	034	036	039	026	050	066	080H	I084C	I088C	091	091	090	075	065	043	043	043S	028	030	033	034
13	036	037	038	035	036	037	033	047	075	084	080	103	091	096	077	077H	067	040	047	040	028	028	030	030
14	I031C	033	035	034	034	036	032	055	073H	077	084	093	085	087	088	075	062	052	033	028	028	030	C	C
15	C	C	C	C	C	C	C	C	C	084	108	103	081	087	090	096	069H	055	047	036	031F	U031F	U034F	034
16	035	036	035	035	035	036	031	058	093	108	129	115	111	110	107	090	080	062	047	040	032	033	036	038
17	039	040	040	038	039	040	034H	060	093	121	134	132	119	109	110	107	083	066	055	038	033	033	034	033F
18	036	036	034	032	033	029	030	064	095	C	C	C	C	C	C	092	076	056	050	044	044	034	033	033
19	031	030	028	029	029	I028A	026	057	092	129	131	117	114	113H	113	096	100	078	043	026	031	036	038	040F
20	038	037	038F	U029F	U030F	030F	A	058	084	109	126	138	120	105	103	108	097	083	073S	F	F	FS	FS	F
21	039F	U037F	F	F	C	C	C	C	C	C	135	146	125	111	C	C	C	C	C	U040S	038	U040F	SF	046
22	045	043	038	039	040	042	040	055	090	118	119	117	111	107	100	086	073	058	046	036	032	036	038	040
23	040	041	039	040	036	033	033	050H	103	106	118	C	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	112	123	132	106	114	103	090	083	055	036	033	033	036F	038	U042F
25	043F	F	048F	F	038F	U035F	U035F	058	096	119	133	103	121	085	100	088	078	060	S	030	028	032	034	034
26	033	036F	033F	033F	032	032	030	051	088	132	128	096H	104	096	079	082	078	052	037	026	028	030	033	033
27	032	032	033	032	033	032	031	055	087	091	122	105	106	101	076	079	083	069	043	028	027	028	030	031
28	031	031	033	034	028F	F	F	053	089	115	113	107	087	089	083	075	070	053	038	030	027	028	032	033
29	034	032	033	032	030	027	026F	052	085	108	127	105	096H	100	087	077	083	076	055	030	026	030	029	032
30	033	032	035F	037F	C	C	C	C	C	106	107	103	096	091	078	073	072	063	047	035	031F	U030F	033F	030F
31	029	028F	U032F	U030F	U030F	F	F	047	107	123	128	115	096	085	083	090	086	063	053	033	033	033	037	035
Count	28	28	27	26	25	24	22	25	25	29	30	29	29	29	28	29	29	29	28	29	28	29	27	28
Median	034	034	035	034	034	033	032	055	085	101	114	103	096	094	088	083	072	055	044	033	032	033	033	034
U.Q.	036	036	038	037	036	037	033	058	092	116	127	116	108	103	100	091	083	063	050	040	033	034	036	036
L.Q.	032	033	033	033	032	030	030	051	075	085	093	094	090	088	083	078	066	050	038	030	028	030	033	032
Q.R.	004	003	005	004	004	007	003	007	017	031	034	022	018	015	017	013	017	013	012	010	005	004	003	004

The Radio Research Laboratories, Japan

foF2 | Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation | W1

IONOSPHERIC DATA

Dec. 1967 | foF1 | 0.01Mc | 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											L		360											
2																								
3										320														
4											L	U400L	390											
5											U400L	U400L	360											
6																								
7										U360L			I390A	330										
8													360	U370L										
9													360											
10																								
11											400L	350												
12											C	C												
13												L												
14																								
15																								
16																								
17												U430L												
18										C	C	C	C	C										
19												L	U390L											
20																								
21										C														
22																								
23													C	C										
24													L	L										
25												380		400L										
26												U410L		U390L										
27											L	L												
28												A												
29														380L										
30												A		360										
31												U400L	U380L											
Count										2	2	7	8	6										
Median										U340L	U400L	U400L	370	380L										
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

W 2

IONOSPHERIC DATA

Dec. 1967 | foE | 0.01MC | 135° E Mean Time (G. M. T. +9h) | Wakkanai | Lat. 45° 23.6'N | Long. 141° 41.1'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								E	220	275	I300A	310	295	305	280	I155A	S							
2								S	250	270	295	300	305	290	260	210	E							
3								E	225	270	295	305	300	290	280	205	S							
4								S	A	275	295	300	300	290	255	220	S							
5								C	C	A	295	300	295	280	245	205	S							
6								A	I210A	255	290	300	300	280	260	215	S							
7								A	230	250	280	I290C	I290A	275	260	A	S							
8								A	225	265	295	295	300	270	250	195	S							
9								C	C	275	285	295	295	270	250	A	A							
10								145	205	260	290	I295A	300	290	260	S	S							
11								A	210	255	280	290	290	285	260	S	E							
12								S	205	285	I290C	I300C	305	300	260	210	S							
13								S	190	240	280	285	295	290	260	210	S							
14								E	220	B	I300S	300	B	300	260	205	S							
15								C	C	B	300	I300A	B	300	260	S	E							
16								A	200	265	295	300	320	315	280	S	E							
17								A	205	280	300	315	315	I295A	260	225	A							
18								A	A	C	C	C	C	C	C	210	S							
19								A	A	290	300	310	315	300	260	I205A	S							
20								A	A	270	300	310	305	300	265	220	S							
21								C	C	C	300	305	305	295	C	C	C							
22								A	A	270	300	I305A	320	300	265	A	S							
23								A	A	A	300	C	C	C	C	C	C							
24								C	C	260	290	295	300	300	270	S	S							
25								A	A	B	B	300	305	290	255	A	A							
26								E	205	260	290	300	305	300	265	B	A							
27								130	230	270	290	300	300	290	255	215	S							
28								A	215	265	295	300	300	290	250	A	A							
29								A	215	265	295	300	305	295	265	225	A							
30								C	C	260	290	300	300	290	260	225	S							
31								A	B	255	B	B	300	285	270	230	A							
Count								6	17	24	28	28	27	29	28	18	4							
Median								E	215	265	295	300	300	290	260	210	E							
U. Q.																								
L. Q.																								
Q. R.																								

foE

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

The Radio Research Laboratories, Japan

W 3

IONOSPHERIC DATA

Dec. 1967 | foEs | 0.1Mc | 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	E017S	E	J026	J023	015	E	E016S	G	025	G	033	G	034	035	037	030	E015S	E	E014S	E012S	E016S	E015S	E	E012S
2	E	E	E	015	E	E	E015S	G	027	G	028G	032	033	032	031	023	014	043	E012S	020	E017S	E	E	E
3	E	E	E	E	E	J053	E	G	033	G	032	G	025G	029G	G	016G	E014S	E015S	J033	E015S	E017S	E014S	E016S	E013S
4	E	J024	E	E	E	021	J046	J030	030	020G	024G	G	G	G	032	J033	E015S	E015S	023	J023	J023	J024	E015S	E016S
5	E012S	J023	C	C	C	C	C	C	C	033	024G	025G	G	020G	023G	020G	E016S	E	J023	J023	J021	E017S	021	E013S
6	E	E017S	E012S	E	E	J025	018	J038	024	G	G	G	G	G	G	033	E015S	025	J053	E012S	E015S	J030	J023	J024
7	J043	J023	013	020	014	J025	022	023	030	G	032	026	J045	030	058	J033	J028	E011S	E	J033	E	E	E	J025
8	J023	E	E	E	E	E	E015S	018	030	033	G	G	G	G	G	024	E015S	E014S	E015S	E	E	E	E	E016S
9	E	J023	J020	016	E	015	C	C	C	G	032	033	023G	033	G	026	J025	E	E016S	E016S	E	J025	J025	J023
10	J031	E	E	E	E	E	E013S	020	032	J048	043	033	031	G	022G	024	E016S	016	E017S	E015S	018	J080	E018S	E
11	E017S	J023	J024	J020	J021	E	E	021	G	G	G	G	G	G	G	G	015	J030	J024	E015S	J035	J033	J035	J031
12	E012S	E	J030	E	E	E	E	E015S	030	034	C	C	G	G	G	G	E015S	020	E	J024	015	E016S	E015S	J030
13	E	E	E	E	E	E	E012S	E015S	G	G	G	G	G	G	G	G	E016S	E013S	E	E	J020	020	E012S	J024
14	C	018	E	E	E	E	E	014	G	E029B	E030S	G	E034B	G	G	G	E016S	J023	E015S	E	E017S	J035	C	C
15	C	C	C	C	C	C	C	C	C	E030B	G	037M	E032B	G	030	032	J030	017	020	E	J030	J023	J023	J023
16	E012S	E	018	E	E	E	E	015	022	G	G	G	G	027G	G	032	025	J036	E015S	E	E015S	E015S	E015S	E014S
17	E016S	E	E	E	E	E	E	J030	028	025G	G	028G	025G	032	023G	023	023	J030	E	J025	E	019	J031	J025
18	E	018	E	E	E	E	E015S	J025	J036	C	C	C	C	C	C	025	E015S	J025	J021	E	015	E	E	J031
19	023	J021	E	J025	020	J033	E015S	J031	J055	028G	G	G	G	G	G	024	E016S	E	E	E	J043	J023	J040	E
20	E	E	E	021	016	J043	J043	J051	025	020G	G	G	G	G	G	G	E014S	E	E	E	E	E015S	E	E015S
21	E	J023	016	020	C	C	C	C	C	C	G	G	G	G	C	C	C	C	C	E	E	J020	J023	015
22	J023	J031	J025	J026	016	E	J025	017	024	G	029G	040	026G	041	032	J032	J023	E	E	E	E	E	J043	J024
23	J031	018	J023	015	E	E	E	020	031	032	G	E035C	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	033	030	038	040	G	027G	E022S	J033	J030	J025	E015S	E015S	E015S	J023	J025
25	J024	J020	E	020	015	E	E013S	J033	033	E029B	E030B	G	G	G	G	025	J032	J030	J023	E012S	E015S	E016S	E	E
26	E016S	E	E	E	E	E	E	015	035	G	G	G	G	G	G	E023B	020	E	E	J043	020	E014S	E	019
27	E	E	E	E	E	E	E015S	G	G	G	G	024G	G	G	G	025	018	E	021	E013S	E	E	E	016
28	E	E	E	E	E	E	E015S	030	G	G	G	042	035	G	037	038	024	020	E	E015S	E	018	018	020
29	J021	J023	E	E	013	E	018	015	028	030	G	032	G	G	G	022G	018	E	E012S	017	J033	020	J040	J031
30	J024	020	E	J040	C	C	C	C	C	031	034	043	036	G	G	G	021	J028	019	015	020	020	E	018
31	E	E	E	J023	J043	E	E	J023	E023B	G	E032B	033	G	G	G	034	024	J070	035	E	E015S	E	E	E012S
Count	28	29	28	28	26	26	25	25	25	29	29	29	29	29	28	29	29	29	29	30	30	30	29	29
Median	E012	E017	E	E	E	E	E015	020	028	G	G	G	G	G	G	024	016	016	E015	E014	E015	E016	E015	018
U.Q.	023	023	017	020	015	015	E017	030	032	030	031	033	032	G	028	032	024	029	023	017	020	023	023	024
L.Q.	E	E	E	E	E	E	E	015	022	G	G	G	G	G	G	018	E015	E	E	E	E	E014	E	E013
Q.R.								015	010							014	D009					D009		D011

foEs

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

The Radio Research Laboratories, Japan

W4

IONOSPHERIC DATA

Dec. 1967 | **f_bEs** 0.1Mc | **135° E Mean Time** (G.M.T. +9h) | Wakkanai | Lat. 45° 23.6'N, Long. 141° 41.1'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	S		015	012	E		S		G		030		G	G	026	026	S		S	S	S	S		S
2				E			S		020		022G	G	G	G	G	G	G	017	S	015	S			
3						E			020		025		022G	022G		016G	S	S	017	S	S	S	S	S
4		E				014	A	021	025	020G	020G				G	G	S	S	015	017	020	016	S	S
5	S	014	C	C	C	C	C	C	C	029	023G	023G		020G	022G	019G	S		017	017	017	S	S	S
6		S	S			017	015	019	024							G	S	015	020	S	S	018	017	018
7	021	016	013	011	E	012	E	017	020		022	E026C	040	022	022G	023	E	S		016				020
8	E						S	016	G	021						G	S	S	S					S
9		012	E	E		012	C	C	C		G	025	022G	G		022	021		S	S		E	016	017
10	E						S	G	G	G	G	032	025		021G	G	S	016	S	S	017	015	S	
11	S	017	017	012	E			015									G	018	018	S	012	016	025	017
12	S		E					S	G	G	C	C					S	016		S	015	S	S	S
13							S	S									S	S			015	016	S	017
14	C	E						G		B	S		B				S	017	S		S	015	C	C
15	C	C	C	C	C	C	C	C	C	B		034	B		G	028	020	016	015		016	017	015	012
16	S		E					015	017					025G		026	017	020	S		S	S	S	S
17	S							017	G	024G		026G	024G	030	021G	020	016	E		015		015	020	020
18		011					S	017	025	C	C	C	C	C	C	G	S	015	015		012			016
19	S	012		014	015	A	S	018	025	021G						023	S				016	016	026	
20				E	E	020	A	025	023	020G							S					S		S
21		015	E	E	C	C	C	C	C	C					C	C	C	C	C			013	012	015
22	018	020	020	021	E		020	017	024		024G	031	023G	024	020	023	S						016	022
23	023	015	016	E				015	025	028		C	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	023	025	032	G		020G	S	025	016	016	S	S	S	018	017
25	016	011		015	E		S	021	026	B	B					025	024	021	020	S	S	S		
26	S							G	G							B	017			E	012	S		016
27							S					022				G	G		012	S				015
28							S	015				042	G		G	036	021	020		S		015	016	E
29	E	017			E		E	015	G	G		G				019G	016		S	E	017	015	018	017
30	016	012		020	C	C	C	C	C	G	G	041	G				G	025	016	012	014	013		012
31				E	023			015	B		B	G				G	018	045	020		S			S
Count																								
Median																								
U.Q.																								
L.Q.																								
Q.R.																								

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

The Radio Research Laboratories, Japan

W5

IONOSPHERIC DATA

Dec. 1967 | f-min | 0.1Mc | 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	E0175	E	E	E	E	E	E0165	E	011	016	017	017	020	025	017	012	E0155	E	E0145	E0125	E0165	E0155	E	E0125
2	E	E	E	E	E	E	E0155	E0125	012	018	018	017	017	019	017	018	E	E	E0125	E	E0175	E	E	E
3	E	E	E	E	E	E	E	E	011	017	017	018	017	017	020	011	E0145	E0155	E0155	E0155	E0175	E0145	E0165	E0135
4	E	E	E	E	E	E	E	E0135	013	017	019	020	019	017	016	018	E0155	E0155	E	E	E	E0155	E0155	E0165
5	E0125	E	C	C	C	C	C	C	C	018	017	020	020	018	017	012	E0165	E	E0155	E	E	E0175	E0155	E0135
6	E	E0175	E0125	E	E	E	E	E	017	020	021	021	023	021	021	018	E0155	E	E	E0125	E0155	E	E	E0125
7	E0115	E	E	E	E	E	E	E	015	017	020	020	020	020	018	012	E0155	E0115	E	E	E	E	E	E
8	E0155	E	E	E	E	E	E0155	E	017	017	019	020	020	017	018	015	E0155	E0145	E0155	E	E	E	E	E0165
9	E	E	E	E	E	E	C	C	C	018	020	017	017	020	018	012	E	E	E0165	E0165	E	E0145	E	E
10	E0155	E	E	E	E	E	E0135	E	016	018	018	020	020	020	018	E0175	E0165	E	E0175	E0155	E	E	E0185	E
11	E0175	E	E	E	E	E	E	E	016	017	022	020	020	019	020	E0175	E	E	E	E0155	E	E	E	E
12	E0125	E	E	E	E	E	E	E0155	016	020	C	C	023	022	022	017	E0155	E	E	E0145	E	E0165	E0155	E0155
13	E	E	E	E	E	E	E0125	E0155	017	017	020	022	020	021	022	018	E0165	E0135	E	E	E	E	E0125	E
14	C	E	E	E	E	E	E	E	018	029	E0305	025	034	024	020	019	E0165	E	E0155	E	E0175	E	C	C
15	C	C	C	C	C	C	C	C	C	030	024	023	032	024	020	E0165	E	E	E	E	E	E	E	E
16	E0125	E	E	E	E	E	E	E	012	020	020	020	024	020	018	E0175	E	E	E0155	E	E0155	E0155	E0155	E0145
17	E0165	E	E	E	E	E	E	E	012	018	017	018	017	016	017	012	E	E	E	E	E	E	E	E
18	E	E	E	E	E	E	E0155	E	012	C	C	C	C	C	C	015	E0155	E	E	E	E	E	E	E
19	E0155	E	E	E	E	E	E0155	E	012	018	017	018	017	018	018	015	E0165	E	E	E	E	E	E	E
20	E	E	E	E	E	E	E	E	012	017	017	018	020	019	017	018	E0145	E	E	E	E	E0155	E	E0155
21	E	E	E	E	C	C	C	C	C	C	020	021	022	020	C	C	C	C	C	E	E	E	E	E
22	E	E	E	E	E	E	E	E	012	016	018	017	017	017	017	012	E0165	E	E	E	E	E	E	E0145
23	E	E	E	E	E	E	E	E	015	018	022	E035C	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	017	020	019	019	020	016	E022S	E015S	E015S	E	E015S	E015S	E015S	E	E
25	E	E	E	E	E	E	E0135	E	016	029	030	028	028	021	021	018	E	E	E	E0125	E015S	E0165	E	E
26	E0165	E	E	E	E	E	E	E	012	021	021	020	023	022	021	023	E	E	E	E	E	E0145	E	E
27	E	E	E	E	E	E	E0155	E	017	017	019	015	020	019	017	E	E0125	E	E	E0135	E	E	E	E
28	E	E	E	E	E	E	E0155	E	018	018	020	021	022	023	020	017	E	E	E	E0155	E	E	E	E
29	E	E	E	E	E	E	E	E	015	018	020	020	020	020	016	016	E	E	E0125	E	E	E	E	E
30	E	E	E	E	C	C	C	C	C	020	020	022	022	020	019	017	E0125	E	E	E	E	E	E	E
31	E	E	E	E	E	E	E	E	023	020	032	030	026	023	021	017	E	E	E	E	E0155	E	E	E0125
Count	28	29	28	28	26	26	25	25	25	29	29	29	29	29	28	29	29	29	29	30	30	30	29	29
Median	E	E	E	E	E	E	E	E	015	018	020	020	020	020	018	016	E0145	E	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

IONOSPHERIC DATA

Dec. 1967 | M(3000) F2 | 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	260	250	265	295	315	335	275	315	325	310	330	320	325	310	310	320	345	310H	290	310	290	245	250	250F
2	260F	255F	250F	280F	275F	315	265	290	330	335	335	315	320	330	290	345	300	310	315	295	S	260F	255F	245F
3	F	270F	U270F	U290F	F	310F	295F	320	365	340	330	320	330H	320	325	335	335	320	305	295	290	305	270	260
4	260F	260F	U240F	U255F	265	295	I325A	315	340	315H	325	335	320	330	330	340	320	340	305	290	290	310	U295F	U275F
5	250F	255F	C	C	C	C	C	C	C	335	345	345	335	315	320	350	340	335	325	305	295	275	285	270
6	265	275	280	275	270	300F	310	340	345	335	330	330	320	315	335	325	295	315	315S	320	305	250	255	255
7	265	U275F	250	240F	260F	U260F	300	295	325	325	310	305	310	310	320	335	315	285	290	295	310	310	260	265
8	265	260	255	270	280	295	325	325	355	335	315	345	305	310H	325	325	335	285H	300	315	275	285	305	265
9	275	265	265	270	280	290	C	C	C	325	325	340	315	330	335	320	315	300	320	325	295	290	265	270
10	260	265	270	285	260	280	270	325	355	320	340	300H	325	330	350	350	330	325	345	305	305	265	275	280
11	280	275	270	275	270	300	325	345	340	330	340	335	325	325	335	350	330	285	325	280	305	295	275	280
12	270	275	275	275	285	335	345	335	335	340H	I340C	I335C	340	335	340	335	345	300	325	360S	300	285	265	275
13	280	275	290	280	290	305	345	320	345	320	340	320	325	305	325	290H	325	325	335	360	285	285	275	275
14	I270C	275	270	275	275	295	305	325	310H	340	330	340	320	315	320	360	305	325	300	305	280	265	C	C
15	C	C	C	C	C	C	C	C	C	345	330	330	335	325	300	350	305H	300	320	315	290F	U240F	U255F	275
16	265	265	270	295	295	310	290	305	315	315	325	320	285	310	310	325	330	325	310	325	250	285	260	260
17	255	260	265	265	255	270	265H	305	310	325	315	310	305	300	310	310	325	290	315	315	290	250	265	250F
18	255	285	275	265	285	260	275	315	340	C	C	C	C	C	C	315	315	305	300	330	320	275	275	250
19	250	235	230	260	250	I270A	270	305	315	335	325	310	310	300H	320	310	310	335	340	260	265	260	250	245F
20	255	265	255F	U250F	U235F	255F	A	295	320	330	315	305	300	310	300	305	290	295	335S	F	F	FS	FS	F
21	275F	U245F	F	F	C	C	C	C	C	C	315	315	330	310	C	C	C	C	C	U310S	265	U250F	SF	270
22	285	280	260	255	260	275	315	305	335	330	325	325	310	320	320	325	315	310	305	305	260	270	265	255
23	270	270	275	275	280	265	305	285H	335	325	325	C	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	330	315	335	340	315	330	305	315	315	330	290	280	280F	290	U260F
25	275F	F	285F	F	280F	U270F	U265F	310	340	330	365	320	345	325	335	340	300	320	S	300	260	275	290	275
26	275	265F	280F	295F	295	290	275	280	335	330	360	310H	315	335	345	315	315	325	280	265	270	275	275	275
27	260	255	255	275	265	280	275	290	335	320	330	315	315	325	310	305	265	305	330	295	295	280	265	255
28	245	250	275	305	320F	F	F	290	325	340	350	335	330	325	325	330	305	340	325	300	290	270	260	265
29	280	275	270	295	275	280	275F	300	340	315	340	330	325H	325	325	310	295	290	340	310	270	300	270	255
30	275	280	280F	310F	C	C	C	C	C	310	345	350	335	330	335	315	305	315	315	315	275F	U245F	280F	265F
31	255	255F	U255F	U275F	U275F	F	F	275	320	325	335	330	315	315	315	310	315	315	300	290	250	250	255	265
Count	28	28	27	26	25	24	22	25	25	29	30	29	29	29	28	29	29	29	28	29	28	29	27	28
Median	265	265	270	275	275	290	290	305	335	330	330	325	320	320	325	325	315	315	315	305	290	275	265	265
U.Q.																								
L.Q.																								
Q.R.																								

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

The Radio Research Laboratories, Japan

W7

IONOSPHERIC DATA

Dec. 1967 | 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											L		405											
2																								
3										415														
4											L	U375L	410											
5											U380L	U400L	410											
6																								
7										U390L			I400A	425										
8													400	U370L										
9													390											
10																								
11											400L	405												
12											C	C												
13												L												
14																								
15																								
16																								
17												U400L												
18										C	C	C	C	C										
19												L	U385L											
20																								
21										C														
22																								
23													C	C										
24													L	L										
25												400		420L										
26												U405L		U370L										
27											L	L												
28												A												
29														375L										
30												A		395										
31												U400L	U395L											
Count										2	2	7	8	6										
Median										U400L	U390L	U400L	400	385L										
U.Q.																								
L.Q.																								
Q.R.																								

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

IONOSPHERIC DATA

Dec. 1967 | h'F2 km | 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											260		235											
2																								
3										235														
4											230	235	240											
5											230	230	225											
6																								
7										245			225	245										
8													235	225H										
9													240											
10																								
11											235	235												
12											C	C												
13												260L												
14																								
15																								
16																								
17												225												
18										C	C	C	C	C										
19												225	225											
20																								
21										C														
22																								
23													C	C										
24													220	260										
25												215		210										
26												215		230										
27											250	230												
28												235												
29														245										
30												230		245										
31												240	235											
Count										2	5	12	9	7										
Median										240	235	230	235	245										
U.Q.																								
L.Q.																								
Q.R.																								

h'F2 Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

W9

IONOSPHERIC DATA

Dec. 1957 | h'F | km | 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	360	340	340	250	220	205	300	240	220	225	245	225	225	235	240	220	220	195H	265	240	250	360	345	345
2	300	300	320	280	280	210	300	225	220	235	235	225	240	235	220	220	200H	210	210	230	245S	310	300	340
3	325	290	275	245	250	240	225	220	210	210	230	225	220H	225	235	225	205	215	225	265	300	250	320	325
4	345	320	340	310	295	255	I250A	220	220	220	240	225	210	240	240	215	220	210	240	275	275	265	280	275
5	345	340	C	C	C	C	C	C	C	235	225	230	210	240	235	220	220	220	245	285	290	310	310	320
6	310	320	295	300	325	240	245	230	225	220	235	240	240	235	245	225	220	230	240	250	255	320	345	340
7	330	300	300	330	295	270	260	215	220	225	250	245	I235A	210	230	235	215	255	250	255	240	245	275	320
8	300	320	325	270	265	260	250	240	220	205H	225	240	215	220	240	225	210	220	245	230	250	265	260	300
9	310	325	290	300	285	230	C	C	C	225	225	240	215	220	230	220	220	215	230	235	260	275	310	315
10	305	300	285	250	285	225	290	220	215	235	220	220	225	220	215	220	210	215	235	260	250	300	300	260
11	270	310	315	285	260	245	225	220	210	220	225	205	230	235	225	225	210	240	240	275	250	290	355A	310
12	300	300	305	285	260	210	225	220	205	210	I230C	I230C	230	240	240	220	215	225	250	220	250	340	325	310
13	300	300	285	295	270	245	210	215	225	220	225	225	235	230	225	225	220	215	230	210	300	310	300	300
14	I300C	300	280	275	275	260	230	225	225H	220	220	225	230H	225	235	225	205	210	280	225	300	320	C	C
15	C	C	C	C	C	C	C	C	C	215	235	225	220	235H	240	225	205	240	230	230	275	390	345	300
16	320	305	285	250	245	245	240	240	215	215	240	225	220	240	225	220	210	230	220	225	280	290	300	310
17	325	310	300	270	305	290	210H	230	220	240	235	220	215	220	240	225	215	245	220	240	250	320	350	400
18	325	265	270	250	275	250	280	250	210	C	C	C	C	C	C	220	220	200	245	220	230	260	285	335
19	380	395	370	330	350	I335A	290	260	225	245	235	225	220	215	240	220	240	210	215	260	360	330	400A	350
20	335	300	300	285	380	350	A	245	240	220	240	240	220	235	240	235	210	210	220	225	250	300	310	300
21	260	335	320	325	C	C	C	C	C	C	240	240	230	225	C	C	C	C	C	245	265	350	305	290
22	285	265	305	335	295	270	240	245	240	240	235	235	235	235	235	225	220	220	230	240	280	300	300	345
23	340	285	300	260	250	250	255	220	240	220	235	225	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	230	235	220	220	210H	220	225	210	225	215	250	260	265	260	315
25	280	270	250	235	200	285	275	225	230	235	210	210	245	210	240	240	225	245	210H	260	325	315	270	275
26	300	300	260	250	230	250	260	220	225	240	220	220	240	235	225H	200H	235	220	220	245	315	310	295	315
27	300	320	300	280	265	275	270	250	220	225	240	225	230	240	210	230	240	210	205	290	270	300	310	350
28	350	330	275	235	200	310	360	260	220	240	240	I230A	230	240	235	220A	215	220	205	260	285	345	330	290
29	295	300	275	250	235	260	305	240	220	225	240	230	220H	220	230	225	240	210	215	250	325	285	350	340
30	300	310	275	265	C	C	C	C	C	220	230	I240A	240	210	230	230	240	260	235	240	295	320	275	270
31	310	325	310	255	320A	330	310	295	225	240	245	230	225	235	230	250	230	I240A	270	305	305	325	340	295
Count	29	29	28	28	26	26	24	25	25	29	30	30	29	29	28	29	29	29	29	30	30	30	29	29
Median	310	305	300	270	270	250	260	230	220	225	235	225	225	235	235	225	220	220	230	245	270	310	310	315
U.Q.																								
L.Q.																								
Q.R.																								

h'F Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

W 10

IONOSPHERIC DATA

Dec. 1967 | $h'Es$ km | 135° E Mean Time (G.M.T. +9h) | Wakkanai | Lat. 45° 23.6'N | Long. 141° 41.1'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	S	E	105	100	100	E	S	G	150	G	110	G	115	120	145	105	S	E	S	S	S	S	E	S
2	E	E	E	140	E	E	S	G	110	G	110	120	125	125	120	120	110	120	S	100	S	E	E	E
3	E	E	E	E	E	110	E	G	110	G	105	G	105	100	G	100	S	S	110	S	S	S	S	S
4	E	100	E	E	E	110	110	110	110	110	105	G	G	G	145	100	S	S	115	105	105	105	S	S
5	S	100	C	C	C	C	C	C	C	105	110	105	G	105	105	105	S	E	120	110	105	S	110	S
6	E	S	S	E	E	115	115	110	110	G	G	G	G	G	G	125	S	110	110	S	S	105	100	100
7	100	100	100	105	105	110	125	120	110	G	175	100	100	100	100	100	100	S	E	110	E	E	E	105
8	105	E	E	E	E	E	S	105	120	120	G	G	G	G	G	115	S	S	S	E	E	E	E	S
9	E	100	100	100	E	150	C	C	C	G	125	100	100	115	G	100	100	E	S	S	E	115	105	105
10	120	E	E	E	E	E	S	150	135	125	120	115	110	G	100	145	S	100	S	S	100	100	S	E
11	S	100	100	100	100	E	E	105	G	G	G	G	G	G	G	G	100	100	100	S	110	105	105	100
12	S	E	100	E	E	E	E	S	125	145	C	C	G	G	G	G	S	100	E	125	100	S	S	100
13	E	E	E	E	E	E	S	S	G	G	G	G	G	G	G	G	S	S	E	E	110	110	S	100
14	C	100	E	E	E	E	E	110	G	B	S	G	B	G	G	G	S	100	S	E	S	110	C	C
15	C	C	C	C	C	C	C	C	C	B	G	100	B	G	125	110	105	105	105	E	105	105	105	100
16	S	E	100	E	E	E	E	105	105	G	G	G	G	110	G	110	110	105	S	E	S	S	S	S
17	S	E	E	E	E	E	E	105	165	115	G	110	105	105	105	105	105	105	E	110	E	105	100	100
18	E	100	E	E	E	E	S	110	110	C	C	C	C	C	C	140	S	100	100	E	100	E	E	100
19	100	100	E	110	110	110	S	110	105	100	G	G	G	G	G	100	S	E	E	E	110	105	100	E
20	E	E	E	100	110	110	110	110	140	105	G	G	G	G	G	G	S	E	E	E	E	S	E	S
21	E	100	100	100	C	C	C	C	C	C	G	G	G	G	C	C	C	C	C	E	E	105	105	105
22	100	100	100	100	110	E	110	110	110	G	110	100	100	100	100	100	100	E	E	E	E	E	105	105
23	100	100	100	100	E	E	E	110	100	105	G	C	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	140	105	120	120	G	100	S	105	105	105	S	S	S	100	100
25	100	100	E	100	100	E	S	105	105	B	B	G	G	G	G	100	100	100	100	S	S	S	E	E
26	S	E	E	E	E	E	E	135	115	G	G	G	G	G	G	B	105	E	E	105	110	S	E	105
27	E	E	E	E	E	E	S	G	G	G	G	105	G	G	G	195	150	E	110	S	E	E	E	105
28	E	E	E	E	E	E	S	105	G	G	G	120	120	G	115	110	100	110	E	S	E	105	105	105
29	100	100	E	E	105	E	105	105	150	150	G	145	G	G	G	110	110	E	S	125	110	110	105	110
30	105	105	E	110	C	C	C	C	C	160	145	130	145	G	G	G	160	110	135	125	110	110	E	110
31	E	E	E	105	105	E	E	105	B	G	B	135	G	G	G	155	110	105	145	E	S	E	E	S
Count	9	14	9	13	9	7	6	19	19	12	11	14	11	9	11	21	16	15	12	9	12	14	12	17
Median	100	100	100	100	105	110	110	110	110	120	110	110	110	105	105	110	105	105	110	110	110	105	105	105
U.Q.																								
L.Q.																								
Q.R.																								

$h'Es$ | Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

W11

IONOSPHERIC DATA

Dec. 1967 | Types of Es | 135° E Mean Time (G.M.T. +9h) | Wakkanai | Lat. 45° 23.6'N | Long. 141° 41.1'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1			f2	f2	f				h		1		c	c	h 1	1								
2				f					1		1	c	c	c	c	c	c	f f		f				
3						f			1		1		1	1		1			f					
4		f				f	f4	1	1	1	1				h	1			f	f	f	f		
5		f								1	1	1		1	1	1			f	f	f		f	
6						f2	f	1	1							c		f	f2			f2	f	f
7	f	f	f	f	f	f2	f	1	1		h 1	1	1	1	1 h	1	1			f2				f2
8	f							1	1	1 c						1								
9		f	f	f		h					c	1 c	1	c		1	1					f	f2	f2
10	f							h	h	c	c	1	1		1	h		f			f	f		
11		f	f	f	f			1									1	f	f		f	f2	f2	f2
12			f						c	h								f		f	f			f
13																					f	f		f
14		f						1										f				f2		
15												1			c	c2	1	f	f		f	f	f	f
16			f					1	1					1		c	1	f3						
17								1	h	1		1	1	12	1	1	1	f		f		f	f3	f2
18		f						1	1							h		f	f		f			f
19	f	f		f2	f	f4		1	12	1						1					f2	f2	f3	
20				f	f	f2	f3	12	h 1	1														
21		f	f	f																		f	f	f
22	f2	f2	f2	f3	f		f2	1	1		1	12	1	1	1	1	1						f2	f2
23	f3	f	f2	f				1	1	1														
24										h 1	1	c	c		1		1	f	f				f	f2
25	f	f		f	f			12	1							1	13	f2	f2					
26								h	c								1			f	f			f
27												1				h	h		f					f
28								1				c	c		c	12	1	f				f	f	f
29	f	f			f		f	1	h	h		h				1	1			f	f3	f	f3	f
30	f	f		f2						h	h	h	h				h	f3	f	f	f	f		f
31				f	f2			1				h				h	1	f4	f f					
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

W12

IONOSPHERIC DATA

Dec. 1967 | foF2 | 0.1Mc | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39°43.5'N | Long. 140° 08.2'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	031	032	034	038	034	023	029	063	087	082	112	108	097	105	099	096	084	053	041	043	037	027	032	033
2	034	036	036	036	031	033	032	078	084	123	115	110	111	106	099	111	081	051	045	041	033	031	034F	035
3	036	038	039	037	035	033	032	061	076	083H	101	093	094	091	094	096	073	043	046	033	028	027	026	028
4	027	030	031	030	032	033	029H	056	078	084	091	102	096	093	093	083	066	054	036	036	036	034	033	032
5	031	033	033	F	035	033	035	069	084	079	091	088H	086	082R	084	092	071	050	036	034	035	030	032	032
6	032	033	036	034	033	033	033	056	075	C	C	C	C	C	C	C	C	C	051	041	033	033	034	036S
7	038	034	032	030	029	029	036	058	069	089	106	113	110	088	085	086	077	055	064	057	043	033	031	032
8	034	033	034	036	035	036	035	059	081	089	104R	098	096	086	077H	087	082	052	048	045	036	032	032	033
9	031	033	035	031	032	033	036	066	079	096	089	091	091	100	083	079	075	056	051	043	035	034	034	034
10	034	I036R	038	036	031	031	031	062	079	085	088	097	095	087	083	074	061	044	043	034	037	035	031	033
11	033	031	032	033	033	034	036	065	072	082	087	101	083	086	080	077	078	046	041	039	033	033	029	031
12	031	031	032	033	036	034	028	057	071	077	094	084	082	087	097	086	065	053	049	045	028	027	031	033
13	034	036	037	037	038	036	033	053	071	079	106	093	.092	098	086	089	072	055	046	049	036	028	029	032
14	032	031	033	036	032	031	035	059	067	082	091	094	091	086	087	093	062	054	047	027	026	027	031	031
15	033	033	033	038	032	027	026	059	086	094	101	103	093	084	096	099	072	048	053	036	030	028	029	033
16	033	034	036	039	034	032	033	061	085	106	121	126	108	105	104	101	085	062	049	042	031	031	035	035
17	035	036	036	036	036	036	043	063	086	109	143	134	108	114	119	103	091	064	062	043	034	031	031	033
18	035	039	036	032	032	030	033	066	109	113	131	123	111	105	104	091	082	073	061	052	038	030	029	032
19	032	032	030	031	029	029	031	060	116	124	138	121	114	108	111	103	101	086	051	030	029	034	034	036
20	037	037	033	031	030	031	030	061	096	121	115	124	117	102	105	105	098	080	063	050	044	040	041	044
21	043	036	033	034	034	035	036	066	I095R	116	143	134	131	112	107	092	078	072	061	033	029	033	038S	038
22	036	040	030	031	030	029	031	065	087	116	121	114	100	101	093	091	074	059	053	041	034	033	034	035
23	039	040	036	036	035	033	030	060	103	116	119	111	111	111	101	089	084	069	050	041	039	040S	043	040
24	036	036	035	034	036	036	031	063	096	123	123R	128	121	093	106	086	084	073	041	032	033F	036F	032	I038R
25	041	039F	045	034	034F	F	040F	066S	088	116	138	117	106H	111	092H	I094R	080H	064	053	030	028	032	036	034F
26	034	034	037	032	033	031	030	057	088	116	139	109	C	C	089	074	084	066	036	031	031S	033	033	034
27	034	032	032	031	032	030	033	066	086	099	116	114	095	103	094	076	077H	082	049	031	030	031	032	033
28	031	032	033	032	032	022	023	057	094	101	115	096	096	093	087	078	077	062	I046A	032	034	028	031	033
29	034	034	032	027	028	027	028	059	083	101	121	107	097	087	094	082	076	082	061	031	025	029	028	029
30	033S	033S	033	034	035	029	031	056	104	I106R	102	101	086	086H	080	077	066	061	056	049	031	FS	034	036
31	033	034	034	032	029	027	026	050	106	121	131	108	082	086	085	078	084	067	053	047	042	038	039	042
Count	31	31	31	30	31	30	31	31	31	30	30	30	29	29	30	30	30	30	31	31	31	30	31	31
Median	034	034	034	034	033	032	032	061	086	101	115	108	096	093	094	089	078	060	049	041	033	032	032	033
U.Q.	036	036	036	036	035	033	035	065	095	116	123	117	110	105	101	096	084	069	053	045	036	034	034	036
L.Q.	032	032	032	031	031	029	030	057	078	084	101	097	092	086	085	079	072	053	045	032	030	029	031	032
Q.R.	004	004	004	005	004	004	005	008	017	032	022	020	018	019	016	017	012	016	008	013	006	005	003	004

The Radio Research Laboratories, Japan

foF2

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

A 1

IONOSPHERIC DATA

Dec. 1967 | foF1 | 0.01Mc | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39°43.5'N | Long. 140° 08.2'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1										L	L	L	L											
2										L	L	400	L	L										
3										600	420	L	L											
4										L	L	420L	420L	380										
5										380L	LH	LH	L											
6										C	C	C	C	C										
7										L	L	440	L	L										
8										L	420	450L	400	350										
9									290		L	L	420L	L										
10											L	L	410	400										
11										L	L	390	L	L										
12											L	L	410	460L	L									
13										L	L	L	L	L										
14											L	L	640	L	L									
15											L	L	L	L	480L									
16										L	L	L	L	L										
17											LH	L	L	500H										
18											L	L	420	L										
19											L	L	L	L										
20											L	L	L	L										
21											L	L	L	L	L									
22											L	450L	L	L										
23										440L	L	L	L	L										
24										450L	L	450L	450	L		270								
25											L	L	410	L										
26										460	L	440L	C	C	L									
27											L	L	L	L										
28											L	L	L	L	L									
29										L	L	L	L	420L	L									
30										LH	L	L	L	L	L									
31											L	L	L	L	L									
Count									1	5	2	8	9	6	1	1								
Median									290	450L	420	440L	420	410	480L	270								
U.Q.																								
L.Q.																								
Q.R.																								

foF1

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

The Radio Research Laboratories, Japan

A2

IONOSPHERIC DATA

Dec. 1967 | foE | 0.01Mc | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39°.43.5'N | Long. 140° 08.2'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								195	255	300	A	A	345	A	A	A	180							
2								190	245	300	315	320	325	I310A	I280A	245	A							
3								190	245	285	305	320	330	I330A	I305A	245	B							
4								A	A	295	310	330	325	320	285	I235A	B							
5								I190A	I250A	285	305	325	330	305	290	245	B							
6								A	255	C	C	C	C	C	C	C	C							
7								175	245	285	300	315	325	305	I280A	250	B							
8								B	240	285	305	325	330	310	280	245	B							
9								B	230	290	305	320	325R	325R	I310A	B	B							
10								195	250	285	300	310R	I325R	325	295	245	B							
11								B	I245A	285	300	320	325R	310R	I280A	240	B							
12								B	245	285	B	B	325	315R	295	265	B							
13								185	245	285	300	325	330	315	275	235	B							
14								I190B	I240B	285	300	S	S	S	S	B	B							
15								B	250	290	305	325	335	330	315	275A	B							
16								190	255	285	305	325	I330B	I335A	310	260	B							
17								B	255	290	315	330	335	330	310	A	B							
18								B	255	290	A	A	A	330	305	250	B							
19								195	255A	290	305	325	335	335	310	I260A	B							
20								A	A	A	320	330	335	325	305	255	195							
21								A	245	I290A	315	325	335	330	300	260	200							
22								B	245	285R	310	330	340	335	310	255	B							
23								A	255R	300	315	325	330	320	285	245	B							
24								B	B	280H	305	315	320	285	A	B	B							
25								B	235	290	I310A	325	335	330	B	B	B							
26								200	I245A	275	I305A	I320A	I320C	I315C	295	255	B							
27								B	A	280	310	325	I330A	A	A	265	B							
28								B	245	285	310	325	335	335R	310	270	B							
29								A	235	285	315	325	330	330	305	255	B							
30								B	I240A	285	305	320	I330A	335R	310	260	B							
31								B	230	280	310	320	330A	I325A	I310A	265	A							
Count								11	27	29	27	26	28	27	25	24	3							
Median								190	245	285	305	325	330	325	305	255	195							
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

A 3

IONOSPHERIC DATA

Dec. 1967 | foEs | 0.1Mc | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39°43.5'N | Long. 140° 08.2'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	J028	J023	J025	J014	J013	E014S	E019B	G	027	032	J045	038	G	039	033	J037	025	E021B	E020B	024M	E020B	E018B	E012S	E020B
2	E013S	J022	E012S	E	E012S	E014S	E020B	G	G	033	G	G	G	034	J039	026	J020	J022	E019B	E020B	E020B	E020B	E014S	E013S
3	E019B	E013S	E	E	E	E014S	E016B	G	026	033	G	J024G	J035	J041	J039	J042	E021B	J020	J023	J020	J043	E020B	E020B	E022B
4	E021B	E013S	E012S	E013S	E	E013S	E018B	J029	J041	G	033	G	G	G	032	J032	J029	E019B	E020B	E018B	E018B	J021	E018B	J021
5	J024	J021	J024	E013S	E	E013S	E017B	J024	J036	J065	G	G	G	G	G	027	E020B	E019B	E019B	E020B	E020B	J022	E020B	J023
6	J023	E020B	E014S	E013S	E	E014S	J021	J053	J043	C	C	C	C	C	C	C	C	C	E020B	E019B	E019B	E019B	E017B	E023B
7	E023B	E012S	E014S	E019B	E	E012S	E012S	G	J034	J053	J043	024G	J030G	G	031	J044	J024	E018B	E019B	E019B	E018B	E018B	E017B	E019B
8	E020B	E	E012S	E012S	E012S	E013S	E014S	J022	028	031	032	J038	G	G	G	G	E020B	E017B	E021B	E017B	E021B	E022B	E020B	E021B
9	E020B	E012S	E013S	E013S	E013S	E013S	E015S	E018B	G	G	G	G	G	G	034	E028B	E022B	E021B	E021B	E018B	E018B	E021B	E017B	E022B
10	E022B	E014S	E012S	E013S	E018B	E017B	E017B	G	G	032	G	038	G	G	G	G	E022B	E018B	J023	E014S	E019B	E018B	E021B	E021B
11	E018B	E014S	E014S	E013S	E014S	E012S	E018B	E018B	027	030	030G	G	G	G	J030	G	E022B	J024	E022B	J024	J025	E020B	E020B	E013S
12	E020B	E013S	E016B	E012S	E012S	E012S	E016B	E018B	G	031	E034B	E038B	G	G	G	G	E022B	J020	E020B	025M	J026	J021	E020B	E021B
13	E020B	E018B	E016B	E012S	E	E012S	E017B	G	023G	029	034	G	G	G	033	027	E022B	E019B	E018B	E019B	E021B	E021B	E016B	E016B
14	E018B	E012S	E012S	E	E012S	E012S	E021B	E021B	E026B	030	G	E038S	E038S	E038S	E038S	027	E021B	E020B	E019B	E016B	E020B	J044	E019B	J023
15	E018B	J024	E012S	E012S	E	E012S	E014S	E019B	027	G	G	G	G	G	G	J065	E023B	E023B	E021B	E018B	E019B	E016B	E012S	E020B
16	E018B	E013S	E014S	018M	J022	019M	E018B	G	G	G	G	G	E039B	036	J024G	G	E023B	J034	E020B	J021	J022	E014S	E016B	E020B
17	E020B	E012S	E013S	J028	E012S	E	E017B	E018B	G	G	G	033G	035	029G	G	028	J039	E022B	E020B	J026	E018B	J034	J036	J020
18	018	E013S	J012	E013B	E013B	E013S	E018B	E019B	G	G	J066	J082	J036	G	G	G	E023B	J018	E013S	E013S	E017B	E021B	E020B	E018B
19	E020B	E	E013S	E012S	E	J018	E022B	G	J054	032	039	G	G	G	G	027	E022B	J030	E020B	E013S	E019B	J034	J022	J019
20	J020	J024	J020	J021	E	E012S	E014S	J025	J069	J044	G	035	G	G	G	G	G	J024	J023	E018B	E018B	E021B	E018B	E019B
21	J019	E013S	E	E	E	E	E018B	J023	J025	J043	G	G	G	G	G	J026G	G	J022	J019	E019B	E014S	E016B	E018B	E012S
22	E013S	E013S	E	E012S	E012S	E012S	E020B	E019B	G	G	G	G	G	G	G	J039	E022B	E019B	J018	E018B	E018B	E018B	E019B	E020B
23	J029	J024	J022	E012S	E014S	E012S	E018B	J023	J025G	033	028G	G	G	G	031	029	E020B	E020B	E020B	J031	E016B	E020B	E017B	E020B
24	E020B	E012S	E012B	E014S	E012S	E013S	E018B	E019B	028	033	037	035	J040	J041	J036	028	E025B	E017B	E020B	J022	025M	J023	026M	025M
25	E020B	J023	J018	J020	E013S	E015S	E017B	E020B	G	J032	J044	G	G	G	E033B	E027B	E023B	E020B	E020B	E020B	E018B	E014S	E017B	E016B
26	E018B	E013S	E	E	E012S	E012S	E013S	G	027	031	033	034	C	C	G	G	E024B	E019B	E018B	E018B	E019B	E018B	E018B	J018
27	E018B	E013S	E012S	E012S	E	E	E019B	E020B	029	031	032	037	037	034	033	G	J023	J025	E018B	J029	E020B	E019B	E016B	E019B
28	E019B	J020	E020B	E012S	E013S	E012S	E019B	E018B	J035	G	035	J054	G	G	G	G	E023B	J037	J059	J058	J024	E014S	J030	J023
29	J024	E013S	E014S	E013S	E013S	E014S	E021B	J023	G	032	G	037	G	G	G	G	E022B	E021B	E018B	E014S	E020B	E018B	J025	J020
30	E014S	J023	J021	E012S	J013	J013	E018B	E018B	028	G	035	034	037	G	G	G	J029	E018B	024M	J025	J025	E018B	E018B	E018B
31	E019B	E014S	J023	E012S	E012S	019M	J037	E017B	G	G	G	034	036	036	033	036	027	J029	J023	E017B	E020B	E014S	E014S	E018B
Count	31	31	31	31	31	31	31	31	31	30	30	30	29	29	30	30	30	30	31	31	31	31	31	31
Median	E020B	E013S	E013	E012S	E012	E013S	E018B	G	026	031	G	G	G	G	G	E027G	E022B	E020B	E020B	E019B	E020B	E020B	E018B	E020B
U.Q.	021	021	018	E013	E013	E014	E019	022	029	033	035	036	G	G	033	029	024	023	021	024	E021	E021	E020	021
L.Q.	E018	E013	E012	E012	E	E012	E016	G	G	G	G	G	G	G	G	G	E021	E019	E019	E018	E018	E018	E017	E018
Q.R.	D003	D008	D006														D003	D004	D002	D006				D003

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

The Radio Research Laboratories, Japan

IONOSPHERIC DATA

Dec. 1967 | f_bEs | 0.1Mc | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39° 43.5'N | Long. 140° 08.2'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	020	014	021	013	013	S	B		G	G	034	034		039	032	035	020	B	B	E	B	B	S	B
2	S	E	S		S	S	B			032				034	030	026	020	020	B	B	B	B	S	S
3	B	S				S	B		027	033		024G	023	034	029	026	B	020	019	019	E	B	B	B
4	B	S	S	S		S	B	026	027		033				032	026	020	B	B	B	B	E	B	E
5	021	015	E	S		S	B	020	029	024						027	B	B	B	B	B	E	B	E
6	021	B	S	S		S	E	023	022	C	C	C	C	C	C	C	C	C	B	B	B	B	B	B
7	B	S	S	B		S	S		022	023	023	024G	025G		029	022	E	B	B	B	B	B	B	B
8	B		S	S	S	S	S	021	027	029	032	028					B	B	B	B	B	B	B	B
9	B	S	S	S	S	S	S	B							034	B	B	B	B	B	B	B	B	B
10	B	S	S	S	B	B	B			032		037					B	B	021	S	B	B	B	B
11	B	S	S	S	S	S	B	B	027	G	029G				029		B	020	B	021	021	B	B	S
12	B	S	B	S	S	S	B	B		031	B	B					B	020	B	E	021	020	B	B
13	B	B	B	S		S	B		022G	029	034				033	026	B	B	B	B	B	B	B	B
14	B	S	S		S	S	B	B	B	030		S	S	S	S	027	B	B	B	B	B	020	B	E
15	B	E	S	S		S	S	B	023							028	B	B	B	B	B	B	S	B
16	B	S	S	E	B	E	B						B	036	023G		B	022	B	E	E	S	B	B
17	B	S	S	E	S		B	B				030G	035	026G		028	023	B	B	021	B	020	024	U020R
18	B	S	012	B	B	S	B	B			044	038	036				B	016	S	S	B	B	B	B
19	B		S	S		015	B		026	032	033					027	B	020	B	S	B	021	019	018
20	019	014	014	015		S	S	021	039	031		034						E	E	B	B	B	B	B
21	019	S					B	019	019	038						022G		019	019	B	S	B	B	S
22	S	S		S	S	S	B	B								024	B	B	018	B	B	B	B	B
23	023	020	016	S	S	S	B	021	023G	G	027G				031	028	B	B	B	027	B	B	B	B
24	B	S	B	S	S	S	B	B	027	032	033	035	025	037	034	026	B	B	B	E	E	E	E	021
25	B	017	016	016	S	S	B	B		024	035				B	B	B	B	B	B	B	S	B	B
26	B	S			S	S	S		027	031	033	034	C	C			B	B	B	B	B	B	B	018
27	B	S	S	S			B	B	026	029	032	035	035	034	031		021	E	B	021	B	B	B	B
28	B	E	B	S	S	S	B	B	022		035	040					B	021	A	020	021	S	021	020
29	022	S	S	S	S	S	B	018		030		037					B	B	B	S	B	B	020	020
30	S	016	017	S	013	013	B	B	027		035	034	037				023	B	E	022	022	B	B	B
31	B	S	016	S	S	E	020	B				034	035	034	032	034	023	027	022	B	B	S	S	B
Count																								
Median																								
U.Q.																								
L.Q.																								
Q.R.																								

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

The Radio Research Laboratories, Japan

A5

IONOSPHERIC DATA

Dec. 1967 | f-min | 0.1Mc | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39° 43.5'N | Long. 140° 08.2'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E013S	E	E	E	E	E014S	019	018	016	021	021	021	021	024	021	017	014	021	020	017	020	018	E012S	020
2	E013S	E013S	E012S	E	E012S	E014S	020	016	018	020	020	020	021	021	020	019	012	E012S	019	020	020	020	E014S	E013S
3	019	E013S	E	E	E	E014S	016	017	020	020	021	020	020	019	019	020	021	E	E012S	018	017	020	020	022
4	021	E013S	E012S	E013S	E	E013S	018	013	018	022	020	022	021	020	021	019	020	019	020	018	018	018	018	018
5	019	E012S	E013S	E013S	E	E013S	017	014	019	020	020	022	020	019	020	021	020	019	019	020	020	019	020	020
6	019	020	E014S	E013S	E	E014S	019	012	019	C	C	C	C	C	C	C	C	C	020	019	019	019	017	023
7	020	E012S	E014S	019	E	E012S	E012S	017	013	018	019	017	017	021	020	018	019	018	019	019	018	019	017	019
8	020	E	E012S	E012S	E012S	E013S	E014S	021	020	020	021	020	019	022	021	020	020	017	021	017	021	022	020	021
9	020	E012S	E013S	E013S	E013S	E013S	E015S	018	021	024	024	028	030	025	021	028	022	021	021	018	018	021	017	022
10	022	E014S	E012S	E013S	018	017	017	017	022	025	026	026	025	023	024	022	022	018	017	E014S	019	018	021	021
11	018	E014S	E014S	E013S	E014S	E012S	018	018	023	023	023	023	024	022	020	020	022	E013S	022	E012S	E012S	020	020	E013S
12	020	E013S	016	E012S	E012S	E012S	016	018	022	027	034	038	028	026	024	023	022	E013S	020	019	E014S	E013S	020	021
13	020	018	016	E012S	E	E012S	017	E013S	020	021	021	020	023	022	021	021	022	019	018	019	021	021	016	016
14	018	E012S	E012S	E	E012S	E012S	021	021	026	025	024	E038S	E038S	E038S	E038S	025	021	020	019	016	020	E014S	019	E014S
15	018	E013S	E012S	E012S	E	E012S	E014S	019	021	022	024	025	026	024	024	021	023	023	021	018	019	016	E012S	020
16	018	E013S	E014S	E012S	E	E012S	018	014	021	023	026	023	039	025	022	021	023	E013S	020	E012S	020	E014S	016	020
17	020	E012S	E013S	E	E012S	E	017	018	018	021	021	023	024	021	021	020	022	022	020	E013S	018	E012S	E013S	E013S
18	018	E013S	E	013	013	E013S	018	019	019	022	023	022	025	022	019	020	023	E012S	E013S	E013S	017	021	020	018
19	020	E	E013S	E012S	E	E	022	016	020	023	021	024	025	024	020	019	022	E013S	020	E013S	019	E012S	E014S	E013S
20	E014S	E	E	E	E	E012S	E014S	E012S	020	020	021	020	024	020	020	019	019	019	019	018	018	021	018	019
21	E012S	E013S	E	E	E	E	018	E014S	019	019	024	024	025	023	021	019	019	E013S	E012S	019	E014S	016	018	E012S
22	E013S	E013S	E	E012S	E012S	E012S	020	019	021	022	022	024	026	025	022	019	022	019	E013S	018	018	018	019	020
23	E013S	E012S	E012S	E012S	E014S	E012S	018	E013S	013	021	022	024	025	021	023	022	020	020	020	020	016	020	017	020
24	020	E012S	012	E014S	E012S	E013S	018	019	023	022	025	020	020	024	022	021	025	017	020	018	019	016	020	020
25	020	E	E014S	E013S	E013S	E015S	017	020	022	021	023	025	029	025	033	027	023	020	020	020	018	E014S	017	016
26	018	E013S	E	E	E012S	E012S	E013S	016	021	023	024	025	C	C	021	020	024	019	018	018	019	018	018	E012S
27	018	E013S	E012S	E012S	E	E	019	020	019	021	021	023	024	023	020	021	019	019	018	018	020	019	016	019
28	019	E	020	E012S	E013S	E012S	019	018	020	024	024	024	026	024	022	023	023	E014S	021	E012S	E014S	E014S	E014S	018
29	018	E013S	E014S	E013S	E013S	E014S	021	E014S	021	023	025	024	024	022	021	020	022	021	018	E014S	020	018	018	E014S
30	E014S	E	E	E012S	E	E	018	018	019	022	027	026	026	024	019	023	022	018	019	E014S	E014S	018	018	018
31	019	E014S	E	E012S	E012S	E013S	E013S	017	018	022	024	023	021	023	021	020	019	017	E013S	017	020	E014S	E014S	018
Count	31	31	31	31	31	31	31	31	31	30	30	30	29	29	30	30	30	30	31	31	31	31	31	31
Median	019	E013S	E012S	E012S	E012S	E012S	018	017	020	022	023	023	024	023	021	020	022	018	019	018	019	018	018	019
U.Q.																								
L.Q.																								
Q.R.																								

f-min

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

The Radio Research Laboratories, Japan

A6

IONOSPHERIC DATA

Dec. 1967 | M(3000) F2 $^{0.01}$ | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39°43.5'N | Long. 140° 08.2'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	265	270	275	315	340	285	280	330	345	330	320	315	310	320	325	335	315	315	300	305	310	275	255	265
2	280	275	265	270	280	305	270	325	325	315	325	330	315	310	315	330	335	315	305	305	305	260	255F	280
3	265	285	290	295	290	295	315	330	335	345	320	335	350	330	330	345	355	310	330	310	320	300	260	280
4	275	265	260	265	270	295	335H	340	360	345	310	335	325	320	325	335	335	335	285	310	300	280	280	260
5	275	275	275	F	280	295	350	335	355	345	335	325H	320	330R	300	335	345	300	325	325	305	265	280	280
6	260	265	280	280	275	280	325	325	335	C	C	C	C	C	C	C	C	C	335	320	295	290	265	290S
7	290	275	280	265	265	280	335	355	335	340	320	320	325	320	330	325	330	290	315	335	315	290	290	270
8	280	275	265	280	275	285	315	340	325	365	335	335	335	345	335H	355	345	325	315	325	310	305	280	290
9	265	280	290	275	285	285	310	335	330	335	340	340	310	340	345	335	325	325	325	310	315	300	295	290
10	280	I280R	300	295	285	295	305	335	335	340	335	355	325	335	340	330	330	320	330	305	310	305	290	280
11	290	285	280	280	290	295	310	350	345	360	335	345	320	325	315	340	335	310	310	325	305	325	295	275
12	270	270	280	280	310	325	330	340	345	350	360	335	325	325	340	350	340	320	320	335	320	270	270	275
13	280	285	290	275	295	285	320	345	340	350	335	320	325	335	310	350	335	305	315	325	335	280	255	275
14	280	275	285	300	295	270	300	335	345	325	320	325	310	330	325	355	325	315	345	315	300	270	275	275
15	265	275	280	315	345	335	295	320	360	320	320	330	325	350	320	330	335	295	310	305	310	275	270	270
16	270	265	270	310	330	280	305	320	330	320	325	325	315	305	315	320	320	310	330	315	290	275	270	280
17	265	270	275	275	270	275	330	325	345	310	320	330	305	305	320	330	325	330	320	340	300	265	260	255
18	265	280	315	285	295	285	305	315	335	330	325	335	315	325	325	340	305	320	315	320	325	290	265	250
19	250	245	245	265	265	250	275	300	335	330	320	315	315	310	315	315	325	325	315	310	260	265	265	270
20	270	275	280	250	245	265	280	310	335	330	320	315	315	300	305	315	315	300	305	295	295	285	260	275
21	290	270	265	265	245	270	285	320	I330R	315	320	315	310	305	315	305	320	315	345	310	270	265	280S	275
22	280	300	300	260	255	270	310	295	335	330	325	325	310	305	325	330	325	305	315	310	310	275	285	285
23	280	280	285	285	285	280	300	315	350	325	330	315	310	305	315	315	320	325	310	300	270	275S	315	315
24	305	305	265	280	280	280	295	325	340	340	325R	315	315	315	325	335	325	325	320	330	290F	285F	345F	I305R
25	280	285F	320	370	310F	F	295F	305S	340	340	315	335	340H	330	320H	I335R	325H	295	320	305	285	280	285	280F
26	295	290	305	305	305	280	300	315	360	310	335	330	C	C	335	315	320	330	330	295	265S	285	280	275
27	265	265	270	260	275	275	275	325	340	325	330	320	310	320	350	345	285H	320	335	325	285	275	280	255
28	255	265	275	310	315	275	260	300	350	315	335	330	330	325	335	325	325	335	I320A	305	325	295	260	280
29	285	295	290	290	320	280	280	325	360	325	330	340	335	310	330	320	315	305	350	345	280	285	270	280
30	290S	295S	305	300	320	285	295	300	345	I335R	340	355	335	325H	325	330	315	315	305	335	290	FS	265	300
31	275	265	285	285	295	280	250	290	320	320	330	335	320	325	320	310	315	315	315	320	285	270	260	270
Count	31	31	31	30	31	30	31	31	31	30	30	30	29	29	30	30	30	30	31	31	31	30	31	31
Median	275	275	280	280	285	280	300	325	340	330	325	330	320	325	325	330	325	315	320	315	300	280	270	275
U.Q.																								
L.Q.																								
Q.R.																								

M(3000) F2 Sweep 1.0 Mc to 20.0 Mc in 15 sec in automatic operation

The Radio Research Laboratories, Japan

A7

IONOSPHERIC DATA

Dec. 1967 | M(3000) F1 0.01 | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39° 43.5'N | Long. 140° 08.2'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1										L	L	L	L											
2										L	L	375	L	L										
3										335	380	L	L											
4										L	L	385L	380L	400										
5										400L	LH	LH	L											
6										C	C	C	C	C										
7										L	L	370	L	L										
8										L	380	380L	395	415										
9									410		L	L	380L	L										
10											L	L	395	395										
11										L	L	390	L	L										
12											L	L	395	370L	L									
13										L	L	L	L	L										
14											L	L	365	L	L									
15											L	L	L	L	335									
16										L	L	L	L	L										
17											LH	L	L	365H										
18											L	L	385	L										
19											L	L	L	L										
20											L	L	L	L										
21											L	L	L	L	L									
22											L	380L	L	L										
23										410L	L	L	L	L										
24										390L	L	365L	385	L		A								
25											L	L	390	L										
26										355	L	385L	C	C	L									
27											L	L	L	L										
28											L	L	L	L	L									
29										L	L	L	L	385L	L									
30										LH	L	L	L	L	LH									
31											L	L	L	L	L									
Count									1	5	2	8	9	6	1									
Median									410	390L	380	380L	385	390	335									
U.Q.																								
L.Q.																								
Q.R.																								

M(3000) F1 Sweep 1.0 Mc to 20.0 Mc in 15 sec in automatic operation

The Radio Research Laboratories, Japan

A8

IONOSPHERIC DATA

Dec. 1967 | h'F2 km | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39° 43.5'N, Long. 140° 08.2'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1										225	245	225	235											
2										255	245	235	240	250										
3										270	240	235	235											
4										240	250	235	245	240										
5										225	245	240	250											
6										C	C	C	C	C										
7										250	255	250	250	230										
8										235	250	240	230	235										
9									230		230	230	240	230										
10											240	230	235	230										
11										220	240	240	235	245										
12											230	230	235	260	240									
13										230	255	240	245	245										
14											260	250	285	255	270									
15											240	240	220H	230	265									
16										240	245	235	235	250										
17											250	230	240	255										
18											240	235	235	240										
19											245	235	245	240										
20											235	245	235	245										
21											235	235	240	235	230									
22											235	235	230	235										
23										245	240	240	250	245										
24										240	240	240	250	230		230								
25											250	220	240	250										
26										265	235	230	I245C	I235C	250									
27											235	240	235	260										
28											250	235	255	255	250									
29										250	250	240	245	240	250									
30										285	230	225	235	230	250									
31											250	235	220	255	250									
Count									1	15	30	30	30	27	9	1								
Median									230	240	240	235	240	240	250	230								
U.Q.																								
L.Q.																								
Q.R.																								

h'F2 Sweep 1.0 Mc to 20.0 Mc in 15 sec in automatic operation

The Radio Research Laboratories, Japan

A 9

IONOSPHERIC DATA

Dec. 1967 | h'F km | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39° 43.5'N | Long. 140° 08.2'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	380	350	330	245	210	270S	290	240	225	220	240	225	225	240	245	225	210	205	245	240	250	B	340	340
2	310	290	305	280	250	275	I290B	225	220	250	240	220	230	240	225	240	205	225	240	240	260	B	340	275
3	320	290	255	240	250	250	235	230	220	220	220	225	235	230	230	230	210	205	230	240	260	280	I320B	I310B
4	I340B	330	325	320	300	265	210H	220	220	230	215	220	210	200	230	230	205	205	240	250	275	270	300	320
5	330	300	325	305	300	265	240	230	230	220	200H	190H	230	225	225	235	205	225	230	235	270	330	325	330
6	350	350	300	280	305	280	240	225	230	C	C	C	C	C	C	C	C	C	235	240	265	320	340	315
7	290	280	270	I290B	340	285	240	215	220	240	240	225	235	215	230	245	230	230B	250	235	235	265	270	335
8	315	295	315	295	270	260	240	210	230	230	210	230	215	200	225	230	220	215	245	240	260	B	310B	295
9	350B	310	280	280	300	275	245	230	220	230	230	230	220	240	225	220	215	210	235	240	235	280	270	I300B
10	I300B	300	265	250	I280B	270	250	225	225	225	230	230	215	225	225	225	210	210	230	255	255	245	270B	310
11	290	275	290	290	290	255	245	225	220	215	215	220	220	225	225	225	225	210	245	230	I255A	245	295	300
12	I300B	305	310	290	255	220	225	210	215	225	230	220	220	230	240	220	210	235	235	230	240	A	310	340
13	325	305	305	285	270	230	230	220	220	225	245	230	225	245	230	235	225	240	220	220	230	I320B	I320B	330
14	320	315	290	250	265	275	265	220	215	235	235	235	240	240	255	230	215	225	220	270B	270B	340A	330	300
15	335	335	315	250	205	210	255	240	225	230	230	230	220	230	240	240	215	220	245	225	240	305	340	340B
16	340	330	295	245	220	265	260	225	225	225	235	230	230	235	235	230	220	205	230	225	265	290	325	315
17	320	315	310	270	300	315	225	235	215	230	205H	230	220	200H	240	230	225	220	240	230	245	A	A	A
18	340	295	255	265	270	285	285	240	225	225	225	230	215	225	230	225	225	220	245	235	215	B	I320B	340
19	I350B	355	370	320	290	305	300B	260	245	230	235	225	220	230	240	240	235	215	205	240	B	A	350A	335
20	320	290	290	255	360	310	265	230	230	230	230	235	230	230	240	230	225	220	230	245	245	280B	340	300
21	260	300	310	335	360	295	270	230	220	230	230	230	230	225	225	220	225	225	220	245	300	330	305	290
22	290	230	240	325	330	300	270	230	220	230	230	220	225	230	235	235	220	220	220	240	245	340	295	310
23	310	290	290	260	260	280	280A	245	215	235	235	230	230	230	235	230	230	215	230	I250A	305	310	275	245
24	275	260	315	280	280	295	275	240	230	235	235	230	230	I220A	240	I225A	230	220	230	245	315	310	275	245
25	300	300	250	200	240	280	290	235	220	230	230	220	205	235	230	235	205	205	215	230	B	310	300	310
26	290	285	250	250	260	265	265	230	215	225	235	220	I235C	I230C	235	230	245	210	210	260	320	290	290	305
27	310	300	305	290	290	270	295	245	230	230	235	220	225	230	230	230	230	225	200	265	I280B	300	305	340
28	350	320	300	230	230	S	B	260	220	225	240	230	230	240	225	215	235	210	I240A	250	260	270	I310A	315
29	295	265	265	230	280	290	I305B	230	215	230	240	235	230	220	230	220	215	230	210	210	B	300	290A	330
30	300	290	280	245	230	270	275	240	240	215H	230	230	210	230	210H	240	230	230	240	230	270	310	340	285
31	290	330	290	260	265	310	A	270	235	230	240	230	215	240	235	230	240	230	245	240	270	300	320	300
Count	31	31	31	31	31	30	29	31	31	30	30	30	30	30	30	30	30	30	31	31	28	24	30	30
Median	315	300	295	270	270	275	265	230	220	230	230	230	225	230	230	230	220	220	230	240	260	300	310	310
U.Q.																								
L.Q.																								
Q.R.																								

h'F Sweep 1.0 Mc to 20.0 Mc in 15 sec in automatic operation

IONOSPHERIC DATA

Dec. 1967 | h'Es km | 135° E Mean Time (G.M.T. +9h) | Akita | Lat. 39° 43.5'N | Long. 140° 08.2'E

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

h'Es

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

The Radio Research Laboratories, Japan

A11

IONOSPHERIC DATA

Dec. 1967 | Types of Es | 135° E Mean Time (G. M. T. +9h) | Akita | Lat. 39°43.5'N | Long. 140° 08.2'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	f3	f2	f3	f	f				h	h2	c	c		c	c2	13	c			f				
2		f								h				c	12	h	1	f2						
3									h	h2		1	1	1	1 h	1 h		f	f2	f	f			
4								12	12		h				h	h	1					f		f
5	f	f	f					1	12	1						h2						f		f
6	f						f	13	1															
7									13	12	12	1	12		h	1	1							
8								1	h	h	h	1												
9															c2									
10										h		c							f					
11									c	h	1				12			f		f	f			
12										h								f		f	f	f		
13									1	h	h				h	h								
14										h						h						f2		f
15	f								1							1 h2								
16				f	f	f								1	1			f		f	f			
17				f								1	h	1		h 1	12			f		f2	f3	f2
18			f								13	12	1					f						
19						f2			1 h	h	h					h		f				f3	f	f
20	f	f	f	f				12	12	12		h						f	f					
21	f							1	1	12						1		f	f					
22								1								1			f					
23	f2	f	f					1	1	c	1				h	h				f2				
24									h	h	h	h 1	1	c	c2	c				f	f	f	f	f
25		f2	f	f						1	1													
26									h	h	c	c												f
27									c2	h	h	h	h	h	h		1	f		f				
28		f							1		h	c2						f2	f3	f2	f		f2	f
29	f2							1		h		h2											f	f
30		f2	f2		f	f			h		h	h	h				1		f	f	f			
31			f			f	f2					h	h	h2	h2	h2	h	f2	f2					
Count																								
Median																								
U. Q.																								
L. Q.																								
Q. R.																								

Types of Es

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

IONOSPHERIC DATA

Dec. 1967 | foF2 | 0.1Mc | 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	030	030	033	037	027	021	030	071	092	088	J102R	118	J106R	116	109	J105R	083	067	051	047	048	034	030	U030S
2	032	035	036F	035	030	033	032	081	093S	J105R	124	122	125	120	U111R	U103R	U085S	051	048	043	033	022	028	030
3	031	033	036	030	030	030	031	071	081	J104R	099	098	102	100	094	096	078	055	047	039	030	027	026	028
4	028	030	031	030	032	033	037	069S	073	083	J103R	113	J106R	100	J102R	096	072	057	043	035	033	036	030	030
5	030	031	033	F	F	031	035	070	094	078	085	C	C	C	C	C	C	C	C	C	C	030	032	032
6	031	032	035	035	033	034	035	057	072	C	091	095	095	098	099	C	C	C	C	C	C	032	033	035
7	036	031	033	030	025	029	035	068	064	096	C	C	C	C	C	082	090	067	062	059	041	030	032	030
8	032	034	032	034	031	034	036	063	079	111	086	096	096	084	087	080	081	054	047	048	040	031	031	033
9	033	034	037	C	C	C	C	C	C	C	091	101	103R	123	093	080	083	065	050	048	040	033	035	032
10	033	034	037	033	029F	030	035S	060	076	095	089	098	095	090	094	077	073	052	042	037	042	042	031	030
11	032	032	031	032	033	033	037	063	074	088	093	091	093	084	U098S	078	078	062	042	045	035	035	030	028
12	029	030	031	032	035	032	031	062	074	074	090	091	080	087	U104R	U104R	072	056	056	048	032	028	030	032
13	033	034	036	038	035	034	031	058	075	083	103R	103	095	091	098	092	081	060	058	051	036	033	028	030
14	031	031	033	037	032	028	031	064	074	074	100	108	098	086H	092	093	069	058	052	033	029	028	031	033
15	033	033	034	037	034	024	030	063	076S	100	107	100	113	103R	091	098S	090	054	053	050	036	028	028	032
16	033	034	035	038	032	027V	031	066S	082	099	123	128	122	119	112	111	I098C	070	056	048	032	033	034	035
17	035	035	036	038	034	032	043	062	091	I111C	141	139	I124C	122	128	I111C	095	085	057	058	046	034	036	039
18	043	047	042	035	031	030	035	070	115	134	137	127	119	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	139	143	133	126	116	109	114	U100C	084	058	041	035	036	039	042
20	044	046	035	032	031	033	034	069	094	117	119	120	122	108	108	115	093	078S	062	057	053	044	043	048
21	044	038	035	036	033	032	035	067	110	123	141	138	128	120	115	098	089	I076C	056	044	036	036	042	046S
22	U029F	036	027	027	025	022	028	C	C	113H	130	120	J106R	U103R	097S	089	073	066	061	045	036	031	036	037
23	034	034	031	031	030	030	027	064	116	110	127	119	110	110	107	097	082	076	050	041	043	044	048	048
24	039	038	031	032	034	033	U033S	U068S	U100S	113	132	126	123	121	108	U103R	090	068	051	031	032	034	037	040
25	034	032F	038	029H	030	032	035	068	107	103R	127	123	124	106R	107	092	079	092	053	I044C	I036C	035	I047C	I053C
26	C	I046C	038	030	025	027	I028C	058	093	U105R	152R	130	U104R	U100R	107	I088C	078	088	048	036	040	047	048	046
27	045	038	035	031	031	032	035	070S	093	128	131	114	102	106	J102R	084	078	I079C	069	036	040	038V	039	036
28	038	034	038	034	029	023	024	062	109	095	109	104	096	100	U103R	090	083	U077S	054	046	040	I038A	035	038
29	038	U040S	033	029H	028	028	028	068	087	088	114	108	097	090	095	092	082	092	071S	045	027	029	033	034
30	035	033	035	035	031	027	028	059	090	125	118	100R	082	085	083	075	070	061	055	049	037	032	033	037
31	034	034	033	032	032	031	027	056	107	122	134	098	091	086	090	081	080	078	058	057	049	044	045	049
Count	29	30	30	28	28	29	29	28	28	29	30	29	29	28	28	28	28	28	28	28	28	30	30	30
Median	033	034	035	032	031	031	032	065	090	104	116	113	104	102	102	092	082	067	054	045	036	034	033	034
U.Q.	037	036	036	036	033	033	035	069	097	115	131	124	122	116	108	103	090	078	058	048	040	036	039	040
L.Q.	031	032	033	030	030	028	029	062	076	088	099	099	096	090	094	083	078	058	049	040	033	030	030	030
Q.R.	006	004	003	006	003	005	006	007	021	027	032	025	026	026	014	020	012	020	009	008	007	006	009	010

foF2

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

The Radio Research Laboratories, Japan

K1

IONOSPHERIC DATA

Dec. 1967 | foF1 | 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											L		L	L										
2										L		L	L		L									
3											L	L	L	L										
4											L	L	400L		L									
5										L	L	C	C	C	C	C	C							
6										C	L	L	L	L		C	C							
7										A	C	C	C	C	C									
8										L	L	L	L	L	L									
9									C	C	L	L	L	L	L									
10											L	L	L	L	L									
11										L	L	L	L	L	L									
12										L	L	L	L	410L	L									
13											L	L	L	L										
14											L		L	L										
15										L	L	L	L		L									
16													L		L									
17									L	C	L	L	C	L		C								
18													L	C	C	C	C							
19									C		L	C	L	L	L									
20											A		L		L									
21										L	L	L	L	L	L		L							
22									C	L	L	L	L	L	L									
23											L	L	L		L									
24												L	L	L	L									
25											L	L	L	L		L								
26											L	L	L	L	L	C								
27										L	L	L	L	L	A									
28											L	L	L	L										
29												L	L	L	L									
30										L	L	L	L	L										
31										L	L	L	L	L	L	L								
Count													1	1										
Median													400L	410L										
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

Dec. 1967 | 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	A	305	A	335	A	B	A	A	A							
2								B	240	A	A	A	A	A	A	280	B							
3								165	R	295	315	I325A	335	320	300	235	A							
4								170	240	305	R	A	315	315	295	A	170							
5								B	R	290	310	C	C	C	C	C	C							
6								A	225	C	305	325	330	310	290	C	C							
7								B	A	A	C	C	C	C	C	250	B							
8								B	235	285	315	A	320	315	295	A	A							
9								C	C	C	I300A	320	325	310	285	B	B							
10								B	230	290	305	320	325	315	300	265	180							
11								B	240	290	A	A	330	315	295	A	B							
12								A	235	310	315	B	R	315	285	B	A							
13								A	275	A	A	A	R	320	295	R	B							
14								B	220	285	A	330	335	330	310	A	B							
15								B	205	A	A	335	340	335	320	I260R	B							
16								B	240	285	310	I325A	B	350	A	I260A	A							
17								B	240	I295C	315	335	I335C	A	320	I260C	210							
18								B	A	305	I320A	345	A	C	C	C	C							
19								C	C	A	A	A	345	U330C	A	250	A							
20								A	240	A	A	A	A	325	315	B	A							
21								B	240	305	I330A	350	355	335	305	A	A							
22								C	C	A	320	340	345	335	310	R	215							
23								A	240	300	325	340	345	330	300	245	R							
24								B	230	285	310	340	335	I325R	I305A	240	A							
25								B	R	295	320	I330C	I330R	360	295	R	190							
26								B	R	295	R	330	A	A	A	C	A							
27								B	230	300	335	335	330	I320A	285	I275A	200							
28								A	A	A	A	A	A	A	A	A	R							
29								165	230	300	330	340	340	A	A	260	210							
30								A	230	295	310	325	330	A	285	250	210							
31								B	230	280	315	330	A	320	A	A	185							
Count								3	20	21	19	20	19	21	20	13	9							
Median								165	235	295	315	330	335	320	300	260	200							
U.Q.																								
L.Q.																								
Q.R.																								

foE

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

The Radio Research Laboratories, Japan

K3

IONOSPHERIC DATA

Dec. 1967 | foEs | 0.1Mc | 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	J052	J024	J024	J023	E	E013B	E015S	E016B	J028	G	J042	040	039	E039B	036	J042	J025	J019	E015S	J023	022	020	E014B	E014B
2	E014B	J017	J023	E	E	E014B	E011B	E016B	032	035	J038	J042	038	035	035	G	E016B	E015S	021	020	E015S	E015S	E016S	E015S
3	E014B	E013B	E012B	E	E	E013B	E015S	G	020G	033	035	035	037	G	G	G	021	J024	J025	J024	024	E013B	021	E016S
4	E015S	E014B	E	E	E	E	E014B	024	G	035	G	036	G	G	032	J038	021	020	J024	J025	J025	020	E015S	E016S
5	E014B	019	E013B	E011B	E	E	E014B	E016B	G	G	G	C	C	C	C	C	C	C	C	C	C	022	022	E017S
6	E016S	E015S	E014B	E	E012B	E013B	E016S	J029	G	C	G	036	037	035	034	C	C	C	C	C	C	E013B	E014B	E015S
7	E013B	E012B	E011B	E015S	E	E012B	E013B	022	031	J053	C	C	C	C	C	032	019	020	021	018	E014B	E014B	E015S	E014B
8	E015S	E015S	E011B	E014B	E	E	E014B	E015B	G	032	035	J038	022G	021G	J028G	J030	J024	J017	J028	J036	022	E014B	021	021
9	E014B	E014B	J015	C	C	C	C	C	C	C	034	G	G	G	031	J028	E022B	E016S	E014B	E	E015S	E015S	E016S	E016S
10	E014B	E	E012B	E	E	E011B	022	021	028	G	038	037	J040	034	G	G	G	J025	J024	J017	022	022	E015S	E015S
11	E013B	E	E	E	E	E013B	J016	E016B	G	G	J036	036	G	022G	023G	030	E020B	E014B	J024	020	E014B	E015S	E015S	E014B
12	E016S	E015S	E016S	E	E	E	E012B	020	G	G	035	E038B	G	G	G	E030B	021	J016	E014B	E012B	E015S	020	J028	J016
13	J029	E015S	E015S	E	E013B	E012B	E015S	022	025G	035	034	034	G	G	034	029	026	E016S	E015S	E014B	E011B	E014B	E015S	E015S
14	E015S	E014B	E	E	E	E	E014B	G	029	034	037	036	037	G	G	030	E017B	E014B	E015S	E014B	020	E015S	J027	020
15	024	E015S	E012B	021	E011B	E014B	E011B	021	G	036	035	G	G	G	G	G	G	E013B	E014B	021	E014B	E016S	E013B	E011B
16	021	020	E016S	E012B	E	E011B	E015S	E014B	G	G	G	J038	E040B	G	035	035	J064	J053	J041	E015S	E013B	E014B	021	020
17	E015S	E016S	E012B	E	E	023	E014B	E015B	G	C	030G	030G	C	035	021G	C	025	J027	E014B	E014B	E011B	E012B	E012B	E
18	E016S	E014B	E012B	E	E	E014B	E016S	E016B	032	J030G	J035	J043	J050	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	035	039	044M	G	G	035	024G	020	021	J017	E013B	E016S	020	J024	021
20	021	E014B	E	E014B	E011B	E014B	E011B	022	024G	J033	J052	J043	J038	021G	G	E028B	023	017	022	E015S	E015S	E014B	E016S	E011B
21	E013B	020	E012B	E014B	E	E016S	020	021	G	J028G	J041	034G	G	028G	G	J037	J024	C	021	E011B	E015S	E016S	E016S	E011B
22	E013B	E	E	E011B	E	E	E014B	C	C	035	036	039	G	028G	G	G	021G	022	020	E014B	E016S	E015S	E015S	E016S
23	E014B	J024	J024	J016	E	E	E016S	021	021G	037	030G	J029G	G	035	034	028	G	J018	019	021	022	J017	E013B	E016S
24	021	E	E011B	E	E	E011B	E011B	E015B	030	035	036	J026G	J028G	028G	035	021G	024	J029	J025	J016	J029	022	020	021
25	020	E014B	J017	020	J018	E014B	E015S	E015B	G	020G	G	E045C	G	G	G	G	018G	J025	020	C	C	E015S	C	C
26	C	C	E012B	E013B	E	E012B	C	E016B	G	033	G	036	J036	J038	J055	C	031	J025	022	E016S	J021	023	020	E015S
27	E011B	E012B	E	E	E	E014B	E014B	022	031	034	036	037	035	036	J063	032	J030	C	J030	J028	J038	J026	021M	J019
28	020	022M	021M	023	J016	E012B	E015S	J016	027	035	036	037	J037	J038	035	031	020G	021	J030	J029	J054	046	E015S	E015S
29	J024	J017	E	E	E	E014B	E015S	G	G	033	041	039	038	J038	036	021G	020G	E015S	E015S	E016S	E015S	J025	020	E016S
30	E015S	E	E011B	J016	J021	J019	J025	023	G	032	035	041	038	035	034	031	025	J025	J029	J037	J025	J029	J025	J026
31	E	E015S	E013B	021	J016	022	021	022	020G	G	G	036	J043	J054	J038	J028	030	029	022	E016S	E015S	E015S	E016S	E015S
Count	29	29	30	29	29	29	28	28	28	28	30	29	28	28	28	26	28	26	28	27	27	30	29	29
Median	E015	E015	E012	E011	E	E013	E015	G	G	033	035	036	G	G	033	028	021	020	021	016	E016	E016	E016	E016
U.Q.	020	017	E016	E015	E011	E014	E016	022	028	035	037	040	038	035	035	031	025	025	024	023	022	022	021	018
L.Q.	E014	E012	E011	E	E	E	E014	E016	G	G	G	G	G	G	G	G	020	E016	E015	E014	E015	E014	E015	E014
Q.R.	D006	D005						D006									005	D009	D009	D009	D007	D008	D006	D004

foEs

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

The Radio Research Laboratories, Japan

K4

IONOSPHERIC DATA

Dec. 1967 | f_bEs | 0.1Mc | 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	019	015	016	014		B	S	B	027		039	037	039	B	033	027	021	011	S	016	015	E	B	B
2	B	014	014			B	B	B	027	031	033	040	037	033	033		B	S	E	E	S	S	S	S
3	B	B	B			B	S		019G	033	034	033	034				020	015	018	016	016	B	019	S
4	S	B					S	022		027		033			031	028	019	017	017	016	017	E	S	S
5	B	E	B	B			B	B				C	C	C	C	C	C	C	C	C	C	016	017	S
6	S	S	B		B	B	S	016		C		034	036	034	033	C	C	C	C	C	C	B	B	S
7	B	B	B	S		B	B	021	027	052	C	C	C	C	C	028	017	E	016	016	B	B	S	B
8	S	S	B	B			B	B		031	032	033	022G	021G	025G	027	021	016	016	017	E	B	016	016
9	B	B	013	C	C	C	C	C	C	C	033				036	027	B	S	B		S	S	S	S
10	B		B			B	E	020	027		037	034	038	033				016	015	016	017	E	S	S
11	B					B	E	B			033	033		020G	021G	025	B	B	020	E	B	S	S	B
12	S	S	S				B	019			034	B				B	019	015	B	B	S	E	016	016
13	017	S	S		B	B	S	020	E025R	032	033	033			033	028	026	S	S	B	B	B	S	S
14	S	B					B		028	033	036	035	036			029	B	B	S	B	E	S	016	E
15	E	S	B	E	B	B	B	017		032	033							B	B	016	B	S	B	B
16	E	E	S	B		B	S	B				037	B		033	030	026	017	025	S	B	B	E	017	
17	S	S	B			017	B	B		C	027G	028G	C	033	021G	C	022	025	B	B	B	B	B	
18	S	B	B			B	S	B	030	026G	033	033	041	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	033	035	U044C			033	021G	017	018	015	B	S	E	E	E
20	017	B		B	B	B	B	019	022G	030	051	041	037	E021R		B	022	017	017	S	S	B	S	B
21	B	015	B	B		S	E	021		026G	034	030G		026G		028	022	C	E	B	S	S	S	B
22	B			B			B	C	C	031	036	032		026G			019G	017	E	B	S	S	S	S
23	B	E	016	E			S	020	019G	031	026G	027G		034	033	027		017	E	017	016	016	B	S
24	E		B			B	B	B	029	032	035	025G	027G	027G	031	020G	023	025	025	014	023	016	E	016
25	E	B	011	014	015	B	S	B		020G		C					018G	017	015	C	C	S	C	C
26	C	C	B	B		B	C	B		033		036	035	027	033	C	025	020	017	S	016	016	016	S
27	B	B				B	B	020	029	032	035	036	035	035	062	028	025	C	027	021	020	016	E	E
28	E	E	E	014	E	B	S	015	026	030	034	035	036	036	033	028	017G	016	016	019	025	A	S	S
29	020	015				B	S			031	039	038	037	033	031	018G	017G	S	S	S	S	016	E	S
30	S		B	014	017	014	016	019		031	035	039	037	033	032	029	025	025	015	037	016	016	016	018
31		S	B	015	011	E	E	018	018G			031G	040	043	032	027	030	017	016	S	S	S	S	S
Count																								
Median																								
U.Q.																								
L.Q.																								
Q.R.																								

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

The Radio Research Laboratories, Japan

K5

IONOSPHERIC DATA

Dec. 1967 | f-min | 0.1Mc | 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	014	010	010	010	010	013	E015S	016	013	017	016	016	019	039	018	015	012	010	E015S	011	013	014	014	014
2	014	010	010	010	010	014	011	016	014	015	015	017	015	018	015	019	016	E015S	014	014	E015S	E015S	E016S	E015S
3	014	013	012	010	010	013	E015S	015	016	015	017	017	018	017	015	015	011	012	011	012	014	013	013	E016S
4	E015S	014	010	010	010	010	014	016	016	016	017	018	018	017	014	016	013	E015S	E015S	014	014	014	E015S	E016S
5	014	013	013	011	010	010	014	016	015	017	027	C	C	C	C	C	C	C	C	C	C	012	012	E017S
6	E016S	E015S	014	010	012	013	E016S	013	014	C	025	016	025	026	017	C	C	C	C	C	C	013	014	E015S
7	013	012	011	E015S	010	012	013	015	015	015	C	C	C	C	C	015	016	013	E015S	011	014	014	E015S	014
8	E015S	E015S	011	014	010	010	014	015	016	016	027	016	016	017	015	014	015	013	010	011	014	014	E015S	E015S
9	014	014	010	C	C	C	C	C	C	C	026	026	026	025	026	025	022	E016S	014	010	E015S	E015S	E016S	E016S
10	014	010	012	010	010	011	012	014	017	020	028	013	026	025	025	017	015	013	013	013	E015S	E015S	E015S	E015S
11	013	010	010	010	010	013	012	016	015	017	025	026	027	017	015	015	020	014	014	014	014	E015S	E015S	014
12	E016S	E015S	E016S	010	010	010	012	013	016	028	026	038	026	026	025	030	015	012	014	012	E015S	014	011	012
13	011	E015S	E015S	010	013	012	E015S	012	016	017	026	025	026	025	018	016	017	E016S	E015S	014	011	014	E015S	E015S
14	E015S	014	010	010	010	010	014	014	016	023	025	018	025	027	026	025	017	014	E015S	014	014	E015S	013	013
15	014	E015S	012	012	011	014	011	015	012	013	015	026	025	026	017	015	016	013	014	E015S	014	E016S	013	011
16	012	013	E016S	012	010	011	E015S	014	014	014	026	017	040	025	019	015	014	013	013	E015S	013	014	014	E015S
17	E015S	E016S	012	010	010	012	014	015	013	C	015	017	C	025	017	C	012	014	014	014	011	012	012	010
18	E016S	014	012	010	010	014	E016S	016	012	012	015	025	028	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	019	024	025	026	020	017	014	014	E015S	012	013	E016S	012	013	013
20	014	014	010	014	011	014	011	015	014	014	017	025	026	018	026	028	015	012	012	E015S	E015S	014	E016S	011
21	013	014	012	014	010	E016S	014	014	016	015	016	016	025	018	015	016	012	C	014	011	E015S	E016S	E016S	011
22	013	010	010	011	010	010	014	C	C	017	026	026	026	019	025	014	015	011	014	014	E016S	E015S	E015S	E016S
23	014	010	010	012	010	010	E016S	011	016	013	016	015	026	016	016	016	016	011	014	014	014	013	013	E016S
24	014	010	011	010	010	011	011	015	015	016	016	016	018	025	018	015	016	E015S	013	011	E016S	E015S	013	E015S
25	014	014	010	010	010	014	E015S	015	016	015	025	E045C	028	027	018	017	014	012	012	C	C	E015S	C	C
26	C	C	012	013	010	012	C	016	017	025	028	028	026	026	025	C	014	010	E015S	E016S	E015S	E015S	E015S	E015S
27	011	012	010	010	010	014	014	015	015	016	016	025	026	026	016	014	012	C	E015S	013	E015S	014	013	013
28	E016S	012	012	E	010	012	E015S	014	015	025	026	026	027	026	025	018	014	E015S	E015S	E015S	013	012	E015S	E015S
29	E016S	011	010	010	010	014	E015S	013	015	013	026	017	026	015	016	014	014	E015S	E015S	E016S	E015S	011	012	E016S
30	E015S	010	011	010	010	011	013	011	015	017	026	020	025	019	016	015	015	012	012	011	012	011	E015S	014
31	010	E015S	013	014	010	012	014	016	013	015	017	025	016	016	016	015	012	012	012	E016S	E015S	E015S	E016S	E015S
Count	29	29	30	29	29	29	28	28	28	28	30	29	28	28	28	26	28	26	28	27	27	30	29	29
Median	013	012	010	010	010	012	013	015	015	016	024	019	026	025	017	015	015	012	013	012	012	013	E016S	E016S
U.Q.																								
L.Q.																								
Q.R.																								

f-min

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

The Radio Research Laboratories, Japan

K6

IONOSPHERIC DATA

Dec. 1967 | M(3000) F2 | 0.01 | 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	255	255	280	310	370	275	275	325	340	330	J325R	315	J305R	315	315	J325R	320	320	315	300	315	295	265	U255S
2	270	265	265F	275	275	285	270	325	335S	J295R	325	310	300	315	U335R	U330R	U340S	335	315	330	295	315	275	270
3	280	280	315	300	285	280	315	355	345	J345R	330	315	320	325	315	330	345	330	290	305	325	295	285	270
4	260	255	265	255	270	265	310	355S	335	320	J330R	325	J315R	315	J325R	340	360	330	340	305	320	310	285	280
5	275	270	295	F	F	285	300	345	355	340	340	C	C	C	C	C	C	C	C	C	C	295	280	280
6	285	270	275	290	270	275	315	345	330	C	320	320	320	320	330	C	C	C	C	C	C	275	270	275
7	295	300	280	265	245	285	330	360	345	315	C	C	C	C	C	305	325	320	310	345	320	300	300	265
8	275	275	275	275	300	275	290	335	325	360	325	330	340	320	335	305	325	325	300	335	305	300	290	265
9	260	270	280	C	C	C	C	C	C	C	320	315	320R	330	330	320	335	325	310	330	320	295	295	270
10	280	270	295	310	270F	290	315S	335	330	345	330	335	330	325	335	345	340	335	300	320	305	310	295	280
11	285	290	285	285	280	280	305	345	345	335	335	325	330	310	U340S	330	345	340	300	305	295	305	330	270
12	275	275	280	285	315	320	330	350	350	345	330	325	310	320	U320R	U355R	330	300	320	345	335	280	275	265
13	270	275	285	295	285	295	295	330	340	335	330R	330	320	295	335	325	345	330	335	315	305	305	280	240
14	270	275	295	315	315	260	275	345	345	340	340	340	335	280H	325	325	330	340	345	310	305	265	275	280
15	270	275	280	305	350	290	305	340	335S	325	335	300	315	325R	300	320S	345	315	315	320	305	270	270	255
16	260	265	285	310	355	260V	285	335S	345	315	305	315	310	315	310	315	I330C	315	325	310	325	285	275	260
17	260	265	265	285	270	275	325	335	325	I310C	315	320	I315C	290	310	I310C	325	330	305	340	300	280	235	250
18	265	270	290	295	275	285	290	325	325	325	325	310	315	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	325	325	305	305	300	295	290	U310C	325	335	320	255	255	255	270
20	275	285	285	255	260	275	300	340	315	315	315	305	305	305	295	305	305	315S	320	310	325	295	265	285
21	320	260	250	260	245	270	295	325	345	315	315	310	300	305	310	310	310	I310C	315	315	240	260	285	325S
22	U280F	295	325	250	255	260	295	C	C	305H	315	315	J320R	U300R	310S	320	330	310	320	320	315	260	270	295
23	290	290	285	275	275	270	275	315	335	335	325	315	310	310	310	315	320	330	320	290	285	260	280	305
24	310	305	270	260	265	280	U295S	U325S	U340S	315	320	310	315	305	295	U320R	325	320	335	310	290	280	260	305
25	305	280F	300	295H	275	280	275	335	350	310R	325	320	325	310R	320	310	325	335	325	I310C	I280C	285	I260C	I275C
26	C	I310C	315	270	310	280	I290C	330	320	U330R	325R	335	U320R	U290R	335	I310C	305	325	320	245	260	275	290	285
27	285	275	275	280	260	280	270	315S	335	320	330	325	305	300	J325R	345	320	I325C	335	300	275	300V	260	275
28	280	260	270	310	295	260	250	310	330	315	320	315	300	315	U330R	325	320	U330S	310	320	305	I290A	260	285
29	285	U300S	295	270H	270	270	295	330	345	330	335	335	320	315	325	325	315	315	340S	305	290	265	275	280
30	280	265	290	315	325	305	290	320	315	345	335	350R	330	300	325	320	330	315	315	345	350	305	265	295
31	275	260	275	280	270	275	260	305	335	315	335	335	315	305	310	315	305	320	305	315	285	265	265	275
Count	29	30	30	28	28	29	29	28	28	29	30	29	29	28	28	28	28	28	28	28	28	30	30	30
Median	275	275	280	285	275	280	295	335	335	325	325	320	315	310	320	320	325	325	320	315	305	290	275	275
U.Q.																								
L.Q.																								
Q.R.																								

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

The Radio Research Laboratories, Japan

K7

IONOSPHERIC DATA

Dec. 1967 | M(3000) F1 0.01 | 135° E Mean Time (G.M.T. +9h) | Kokubunji Tokyo | Lat. 35° 42.4'N | Long. 139° 29.3'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1											L		L	L										
2										L		L	L		L									
3											L	L	L	L										
4											L	L	410L		L									
5										L	L	C	C	C	C	C	C							
6										C	L	L	L	L		C	C							
7										A	C	C	C	C	C									
8										L	L	L	L	L	L									
9									C	C	L	L	L	L	L									
10											L	L	L	L	L									
11										L	L	L	L	L	L									
12										L	L	L	L	400L	L									
13											L	L	L	L										
14											L		L	L										
15										L	L	L	L		L									
16													L		L									
17									L	C	L	L	C	L		C								
18													L	C	C	C	C							
19									C		L	C	L	L	L									
20											A		L		L									
21										L	L	L	L	L	L		L							
22									C	L	L	L	L	L	L									
23											L	L	L		L									
24												L	L	L	L									
25											L	L	L	L		L								
26											L	L	L	L	L	C								
27										L	L	L	L	L	A									
28											L	L	L	L										
29												L	L	L	L									
30										L	L	L	L	L										
31										L	L	L	L	L	L	L								
Count													1	1										
Median													410L	400L										
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

K8

IONOSPHERIC DATA

Dec. 1967 | h'F2 km | 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											260		260	255										
2										265		255	255		265									
3											255	240	250	240										
4											250	260	235		255									
5										220	240	C	C	C	C	C	C							
6										C	230	235	255	260		C	C							
7										240	C	C	C	C	C									
8										235	220	245	250	235	250									
9									C	C	230	235	250	260	240									
10											235	250	230	230	250									
11										250	225	230	245	240	240									
12										225	230	235	230	235	250									
13											240	250	255	300										
14											250		245	230H										
15										235	240	230	250		265									
16													245		245									
17									240	C	260	245	I230C	230		C								
18													255	C	C	C	C							
19									C		250	C	240	310	265									
20											230		270		275									
21										245	245	245	245	280	260		250							
22									C	275H	250	245	250	245	240									
23											260	245	255		250									
24												245	235	245	265									
25											255	245	275	265		275								
26											265	235	235	240H	245	C								
27										255	245	240	250	255	250A									
28											230	230	275	260										
29												250	245	230	250									
30										230	255	230	220	230										
31										245	235	235	260	265	245	230								
Count									1	12	25	23	29	22	19	2	1							
Median									240	240	245	245	250	245	250	250	250							
U.Q.																								
L.Q.																								
Q.R.																								

h'F2

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

The Radio Research Laboratories, Japan

K9

IONOSPHERIC DATA

Dec. 1967 | h'F km | 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	380	355	310	250	200	280	300	255	220	230	240	240	230	245	230	235	215	210	235	230	240	230	300	300
2	310	300	305	250	225	290	255	235	220	230	240	230	230	235	235	225	215	200	215	230	250	250	345	350
3	325	295	240	225	255	255	255	225	225	245	230	215	225	230	220	225	205	210	250	220	215	260	310	320
4	345	350	290	305	310	280	230	220	220	225	235	215	205	235	230	230	210	230	215	250	240	260	285	290
5	310	330	280	280	295	280	255	230	230	210	210	C	C	C	C	C	C	C	C	C	C	250	305	300
6	290	325	305	270	305	300	230	225	230	C	220	225	245	230	250	C	C	C	C	C	C	275	320	305
7	250	255	275	300	350	300	230	220	220	A	C	C	C	C	C	C	245	220	260	225	215	260	265	310
8	315	285	305	300	245	265	255	230	225	235	215	230	210	225	230	230	225	205	225	230	240	260	290	330
9	330	310	275	C	C	C	C	C	C	C	215	215	210	240	230	225	230	205	220	220	230	260	265	310
10	300	305	255	215	280	280	235	225	230	235	230	230	225	205	230	230	225	215	210	230	250	240	250	300
11	300	275	270	295	275	265	250	230	225	225	225	210	200	220	230	230	225	215	230	240	240	245	240	295
12	315	305	310	280	245	220	230	220	220	210	225	230	220	205	240	230	220	215	225	215	210	290	300	330
13	335	305	290	265	275	240	225H	230	225	230	235	230	220	230	235	230	220	210	230	225	250	240	315	370
14	330	325	270	250	230	275	295	230	225	230	235	235	225	230	230	230	210	220	220	230	245	320	315	295
15	300	330	300	255	210	300	250	235	220	230	220	220	220H	235	225	235	220	205	245	225	215	305	320	350
16	310	330	280	260	215	320	295	230	220	230	235	235	225	240	230	245	225	210	230	225	225	270	300	325
17	300	330	305	265	270	350	245	215	230	I230C	230	240	I220C	215	240	I230C	225	210	225	225	210	250	350	350
18	315	290	255	245	280	300	265	230	240	230	230	230	245	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	235	230	I230C	230	230	230	240	230	220	220	230	305	330	310	315
20	290	270	230	310	350	355	250	225	230	235	A	240	225	230	240	245	225	220	223	240	230	260	320	280
21	230	305	295	345	365	330	235	235	235	225	225	230	235	215H	230	230	230	I250C	210	210	310	325	280	230
22	305	250	230	355	350	335	270	C	C	215	240	230	230	230	230	235	220	230	230	225	245	305	305	280
23	275	275	295	260	260	290	300	235	235	220	225	230	230	235	230	230	230	225	215	260	265	305	275	250
24	240	250	280	300	285	310	260	240	230	230	240	215	235	225	215H	230	230	220	210	230	315	295	310	260
25	260	330	265	210H	265	290	300	235	235	225	230	I225C	210	210	230	230	220	250	210	I225C	I275C	290	I310C	I305C
26	C	I240C	240	295	225	305	I270C	230	230	230	250	230	220	230	210	I235C	230	230	210	260	300	290	275	270
27	270	280	260	270	300	300	300	260	230	240	225	225	225	225	I230A	240	240	I225C	230	240	280	255	290	300
28	300	320	270	240	250	310	310	255	230	215	225	225	230	230	235	235	230	210	210	245	295	I280A	285	295
29	290	255	250	200H	270	310	300	245	225	225	245	235	220	225	230	230	230	240	210	210	275	315	325	290
30	295	310	260	235	230	275	300	255	215	235	230	230	215	215	235	230	230	235	230	255	205	260	315	280
31	280	345	295	285	300	305	355	265	240	225	225H	235	230	245	225	240	235	230	225	250	250	300	280	280
Count	29	30	30	29	29	29	29	28	28	28	29	29	29	28	28	28	28	28	28	28	28	30	30	30
Median	300	305	280	265	270	300	255	230	230	230	230	230	225	230	230	230	225	220	225	230	245	265	300	300
U.Q.																								
L.Q.																								
Q.R.																								

h'F

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

The Radio Research Laboratories, Japan

K10

IONOSPHERIC DATA

Dec. 1967 | h'Es | km | 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	115	110	110	110	E	B	S	B	115	G	125	125	125	B	120	110	110	110	S	130	130	105	B	B
2	B	110	110	E	E	B	B	B	130	115	115	115	120	120	115	G	B	S	105	105	S	S	S	S
3	B	B	B	E	E	B	S	G	115	160	125	120	165	G	G	G	105	105	105	105	125	B	100	S
4	S	B	E	E	E	E	B	155	G	110	G	115	G	G	110	105	145	120	105	105	105	105	S	S
5	B	100	B	B	E	E	B	B	G	G	G	C	C	C	C	C	C	C	C	C	C	100	100	S
6	S	S	B	E	B	B	S	110	G	C	G	E195G	165	150	140	C	C	C	C	C	C	B	B	S
7	B	B	B	S	E	B	B	150	110	110	C	C	C	C	C	135	130	100	100	140	B	B	S	B
8	S	S	B	B	E	E	B	B	G	155	140	110	110	105	105	105	105	110	110	110	105	B	105	105
9	B	B	100	C	C	C	C	C	C	C	125	G	G	G	160	120	B	S	B	E	S	S	S	S
10	B	E	B	E	E	B	110	150	165	G	135	130	130	130	G	G	G	110	105	105	105	105	S	S
11	B	E	E	E	E	B	110	B	G	G	115	115	G	105	105	100	B	B	105	105	B	S	S	B
12	S	S	S	E	E	E	B	145	G	G	125	B	G	G	G	B	120	105	B	B	S	105	110	110
13	110	S	S	E	B	B	S	115	115	115	115	115	G	G	160	155	140	S	S	B	B	B	S	S
14	S	B	E	E	E	E	B	G	165	175	165	140	150	G	G	110	B	B	S	B	100	S	110	115
15	110	S	B	100	B	B	B	105	G	120	115	G	G	G	G	G	G	B	B	100	B	S	B	B
16	105	110	S	B	E	B	S	B	G	G	G	110	B	G	115	115	120	115	115	S	B	B	105	100
17	S	S	B	E	E	105	B	B	G	C	115	110	C	115	110	C	150	115	B	B	B	B	B	E
18	S	B	B	E	E	B	S	B	120	110	115	115	110	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	125	120	110	G	G	110	110	110	105	105	B	S	105	115	125
20	110	B	E	B	B	B	B	110	115	110	105	110	105	105	G	B	105	105	105	S	S	B	S	B
21	B	100	B	B	E	S	130	110	G	110	110	110	G	115	G	110	110	C	110	B	S	S	S	B
22	B	E	E	B	E	E	B	C	C	115	165	110	G	110	G	G	110	105	120	B	S	S	S	S
23	B	110	105	105	E	E	S	115	110	150	110	105	G	150	140	135	G	100	105	105	105	105	B	S
24	110	E	B	E	E	B	B	B	165	145	130	110	110	110	115	110	120	110	110	110	115	105	105	105
25	105	B	105	100	110	B	S	B	G	110	G	C	G	G	G	G	110	105	100	C	C	S	C	C
26	C	C	B	B	E	B	C	B	G	150	G	130	125	120	115	C	105	100	105	S	110	105	105	S
27	B	B	E	E	E	B	B	130	130	130	130	125	125	115	115	140	140	C	120	115	110	100	100	100
28	100	100	100	100	100	B	S	100	125	135	120	115	115	110	110	110	110	110	110	110	110	110	S	S
29	105	110	E	E	E	B	S	G	G	140	130	125	120	115	110	105	110	S	S	S	S	110	105	S
30	S	E	B	115	115	115	105	110	G	145	135	130	130	110	125	135	145	110	115	110	105	105	110	105
31	E	S	B	105	105	105	105	105	110	G	G	140	120	120	115	120	135	130	110	S	S	S	S	S
Count	9	8	6	7	4	3	5	14	14	21	23	25	16	17	19	18	21	19	20	14	12	13	12	8
Median	110	110	105	105	110	105	110	110	120	125	125	115	120	115	115	110	110	110	105	110	110	105	105	105
U.Q.																								
L.Q.																								
Q.R.																								

h'Es | Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

K11

IONOSPHERIC DATA

Dec. 1967 | Types of Es | 135° E Mean Time (G.M.T. +9h) | Kokubunji Tokyo | Lat. 35° 42.4'N | Long. 139° 29.3'E

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	f3	f2	f2	f2					c		h2	c	c		c2	12	1h	f		ff	f	f		
2		f2	f2						h	c	c	c	c	c	12				f	f2				
3									1	h	h	c	h				1	f2	f2	f2	ff		f2	
4								h2		1		1			1	12	h1	f	f	f	f	f		
5		f																				f2	f	
6								1				h1	h	h	h2									
7								h3	12	13						h1	h	f	f	f				
8										h	h	1	1	1	1	12	1	f	f	f2	f		f	f
9			f								h				h	1								
10							f	h	h		h	h	h	h				f	f	f	f	f		
11							f				c	1		1	1	1			f3	f				
12								h			h						1	f				f	f2	f2
13	f3							1h	1	12	1	1			h	h	h2							
14									h	h	hc	h1	h			1					f		f2	f2
15	f			f				1		c	c									f				
16	f	f										12			c	11	c1	f	f2				f	f
17						f					1	1		1	1		h1	f3						
18	f2								1	1	c	1	12											
19										h	c	1			12	1	1	f2	f			f	f	f
20								1	1	1	12	12	12	1			1	f	f					
21		f					f	1		1	1	1		1		12	12		f					
22										1	hl	1		1			1	f	f					
23		f	f	f				1	1	hl	1	1		hl	hl	h		f	f	f	f2	f2		
24	f								h2	h	h	1	1	1	1	1	1	f3	f3	f	f3	f2	f2	f
25	f		f	f	f					1							1	f2	f					
26										h		h	c	1	1		12	f3	f		f2	f	f	
27								h3	h3	hl	hl	h	h	c	c31	h1	h21		f4f	f3f	f3	f2	f	f2
28	f	f	f	f2	f			1	h	hl	1	1	1	1	1	1	1	f	f	f2	f3	f4		
29	f2	f								h	h	h	c	c	1	1	1					f2	f	
30				f2	f3	f3	f2	1		hl	hl	hl	hl	1h	h	h	h	f2	f	f6	f	f2	f2	f2
31				f2	f2	f	f	1	1			h1	c	c2	c	c	h2	f2	f					
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

IONOSPHERIC DATA

Dec. 1967 | hpF2 km | 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	425	415	355	310	230	380	370	290	260	275	J305R	305	J325R	300	285	J280R	290	295	310	340	300	330	395	U405S
2	370	380	395F	355	350	340	360	290	270S	J330R	280	315	330	300	U280R	U290R	U265S	275	295	290	335	290	390	390
3	400	350	300	300	340	350	300	255	255	J265R	275	300	285	280	295	280	255	290	300	305	260	325	335	380
4	410	410	395	395	395	360	300	245S	270	290	J280R	295	J310R	305	J305R	260	240	290	265	310	290	310	350	355
5	385	395	340	F	F	360	315	270	255	260	275	C	C	C	C	C	C	C	C	C	C	325	345	330
6	360	385	360	345	380	360	295	260	290	C	290	295	295	305	285	C	C	C	C	C	C	360	400	375
7	300	310	355	385	415	365	280	250	255	295	C	C	C	C	C	315	295	295	315	270	295	320	320	395
8	370	350	375	360	305	360	330	285	290	250	280	285	280	280	280	305	280	290	330	280	310	335	345	390
9	400	385	335	C	C	C	C	C	C	C	295	295	290R	285	280	295	285	295	305	285	290	340	320	370
10	355	390	325	295	395F	350	295S	285	280	275	275	285	275	290	280	270	265	285	305	295	325	305	330	360
11	360	350	350	350	355	350	310	270	265	275	265	280	290	300	U280S	285	265	275	305	295	320	310	275	380
12	375	375	360	350	295	295	275	260	255	265	280	280	300	300	U290R	U250R	285	320	300	265	265	350	355	395
13	400	360	355	340	345	345	330	290	270	270	280R	280	295	335	280	290	260	275	275	310	330	310	365	440
14	390	380	345	300	295	385	355	270	265	270	280	275	285	G	270	280	270	295	275	300	300	400	365	345
15	385	395	365	315	245	345	305	275	265S	280	280	305	310	285R	330	295S	255	290	310	300	310	360	395	430
16	400	400	350	315	255	390V	350	270S	270	300	315	295	315	300	305	300	I280C	295	295	300	280	350	370	400
17	395	400	390	350	390	400	295	270	290	I320C	315	295	I310C	340	305	I305C	290	280	315	280	330	350	460	430
18	400	365	345	325	360	355	335	285	295	280	285	305	305	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	280	285	310	325	335	335	320	U310C	285	285	295	400	410	400	395
20	370	350	350	405	425	395	310	270	305	310	295	315	310	325	345	315	300	300S	300	320	295	340	405	360
21	295	400	415	415	455	395	315	285	270	295	305	315	310	325	315	295	305	I310C	295	270	445	410	355	275S
22	U350F	330	275	445	425	405	315	C	C	340H	295	300	J310R	U325R	305S	290	275	310	300	295	300	395	370	345
23	345	350	350	355	360	365	375	300	285	265	290	305	310	315	320	300	295	290	300	350	350	405	355	315
24	300	300	375	395	385	370	U340S	U290S	U275S	305	290	315	295	320	340	U290R	290	295	265	300	320	355	395	320
25	315	385F	330	325H	350	345	360	275	255	300R	295	295	295	315R	300	310	290	290	280	I310C	I370C	340	I400C	I380C
26	C	I320C	300	355	300	365	I340C	280	295	U285R	280R	275	U300R	U340R	295	I300C	305	295	295	415	400	365	345	355
27	350	355	360	355	400	365	370	300S	275	300	290	280	305	330	J280R	250	290	I275C	265	325	355	315V	375	370
28	375	390	360	290	295	370	400	305	270	295	290	295	315	300	U275R	290	295	U290S	300	300	340	I330A	370	350
29	350	U320S	320	385H	375	385	345	290	260	290	280	285	295	300	295	280	300	305	275S	300	330	390	395	355
30	345	380	330	310	275	325	350	305	305	265	285	255R	280	315	285	300	290	315	310	270	255	320	380	345
31	360	415	360	365	375	380	415	330	285	310	275	275	310	320	300	295	310	290	310	310	320	390	395	360
Count	29	30	30	28	28	29	29	28	28	29	30	29	29	27	28	28	28	28	28	28	28	30	30	30
Median	370	380	350	350	360	365	330	280	270	285	285	295	305	305	295	290	290	290	300	300	320	340	370	370
U.Q.																								
L.Q.																								
Q.R.																								

hpF2

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

The Radio Research Laboratories, Japan

K13

IONOSPHERIC DATA

Dec. 1967 | ypF2 km | 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	085	075	085	065	060	080	080	060	070	070	J070R	075	J070R	075	085	J070R	075	065	080	075	075	075	115	U105S
2	075	085	070F	100	130	095	080	065	060S	J080R	070	080	080	085	U060R	U075R	U080S	065	070	065	075	090	070	080
3	080	085	060	105	085	100	060	070	070	J070R	075	060	075	075	055	065	065	060	075	120	090	080	080	045
4	085	095	085	090	065	100	080	060S	055	070	J065R	060	J065R	070	J070R	070	065	055	075	080	070	055	075	090
5	065	065	060	F	F	065	065	055	045	070	065	C	C	C	C	C	C	C	C	C	C	105	060	065
6	075	075	070	050	070	070	080	065	045	C	075	055	055	055	060	C	C	C	C	C	C	095	100	060
7	085	085	090	075	090	080	050	070	075	060	C	C	C	C	C	055	060	070	070	060	090	080	060	100
8	080	075	065	065	090	085	055	060	055	055	080	065	060	090	055	085	065	080	070	065	090	055	065	060
9	085	060	065	C	C	C	C	C	C	C	065	070	085R	060	060	065	050	070	100	070	080	060	055	075
10	070	065	065	075	085F	060	065S	045	055	045	050	045	070	060	065	055	065	090	090	055	065	070	060	090
11	065	065	070	065	080	075	065	060	050	055	095	080	050	085	U055S	055	060	060	090	065	075	075	065	075
12	080	085	065	060	060	050	055	065	055	050	070	090	075	070	U065R	U060R	050	095	065	060	080	095	095	070
13	055	065	065	050	050	055	090	055	055	070	070R	070	055	070	065	060	075	085	070	065	100	075	090	070
14	080	070	050	075	055	100	085	070	065	060	055	055	075	G	090	065	065	070	050	080	140	105	070	070
15	085	055	065	070	060	095	075	055	065S	070	065	095	070	085R	065	065S	080	105	085	075	075	095	055	070
16	070	075	060	065	045	085V	065	060S	060	070	080	075	080	085	095	090	I070C	060	060	075	065	075	075	060
17	070	070	055	055	100	075	060	060	060	I060C	070	070	I080C	075	075	I075C	065	065	070	055	090	090	075	080
18	075	095	065	095	085	090	070	055	060	075	080	075	070	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	080	075	090	075	090	095	075	U080C	085	070	075	115	090	085	085
20	080	085	120	095	075	065	085	060	060	065	080	085	085	095	070	090	095	075S	090	075	070	065	075	080
21	065	095	090	080	090	065	070	080	065	085	070	080	085	080	095	080	090	I065C	085	085	110	085	080	070S
22	U095F	060	100	085	075	090	090	C	C	050H	070	080	J070R	U075R	080S	080	070	070	065	080	055	100	075	055
23	050	060	065	070	095	085	070	065	055	105	065	070	085	085	080	075	070	045	075	095	090	095	085	065
24	055	075	065	070	065	060	U045S	U060S	U060S	070	060	075	090	105	065	U085R	060	060	065	080	080	075	060	055
25	070	070F	070	105H	070	080	085	055	060	080R	060	075	065	080R	080	060	055	050	065	I080C	I080C	090	I090C	I090C
26	C	I065C	080	090	060	085	I075C	070	065	U085R	050R	070	U070R	U100R	055	I080C	085	050	060	095	100	110	095	090
27	080	085	105	075	085	075	075	075S	070	050	045	085	095	070	J065R	050	060	I070C	060	115	090	080V	090	080
28	075	100	090	085	060	090	095	080	065	085	080	070	070	065	U070R	075	065	U060S	080	070	060	I070A	085	080
29	075	U065S	060	115H	090	075	065	070	065	075	060	060	065	095	055	075	080	060	055S	075	085	075	080	075
30	060	070	080	060	055	075	080	065	070	060	045	090R	060	080	085	070	050	065	065	065	075	055	055	050
31	070	085	075	070	065	065	085	055	055	065	060	055	065	065	075	065	085	065	085	070	060	085	100	105
Count	29	30	30	28	28	29	29	28	28	29	30	29	29	27	28	28	28	28	28	28	28	30	30	30
Median	075	075	070	075	070	080	075	060	060	070	070	075	070	080	070	070	065	065	070	075	080	080	075	075
U.Q.																								
L.Q.																								
Q.R.																								

ypF2

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

IONOSPHERIC DATA

Dec. 1967 | foF2 | 0.1Mc | 135° 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	029	031S	035	040	022	018	022	048	094S	081	086	112	115	125	126	112	099S	104S	083	J064S	074S	J080S	030H	035
2	035	035	033	034	033	026	030S	059	083	078	116	133	146	J142S	138	111	112S	106S	058H	062S	051	048H	034	027
3	029	031	038	033	036	027	025	049	087	083	111	097	122	125H	129H	112	108	J103H	061	059	057S	050S	041	031
4	031	029	033	030	032	029	031	053S	084	082V	103	112	127R	126R	122H	114	J098S	087	061H	056	052S	049S	031	030
5	029	030	032	031	031	027	031	056S	088	087	084	097	118	U120S	111	U111R	103	083S	059	071S	053	041S	041S	038
6	036	032	033	034	034	033	038S	049	064S	J099S	095S	091	092	111	124R	106R	101	082	063	049	055S	047	J045S	J042S
7	041H	032	031	032	027	025	026S	052S	079	100	112	104	117	114	090H	097S	102	102	J078S	070	063S	J045S	J038S	028
8	030	032	029	031	039	026H	027	050	080S	103	J098S	094	107H	106	105	088H	090S	101S	I074S	I078S	054	047S	039	034
9	034	035	037S	031	028	029	029	052S	092S	110	090	098	104	120	111H	113	105	102	087	063	069S	053	041	041
10	035S	033	034	032	028	030	032S	047S	074S	096	099	108	105	101	097	099S	085	077S	072S	053	054	061	045	035
11	027	031	030	031	031	029	030	049S	077S	086	100	102	J094S	100	098	102S	085	091S	068	060S	055S	059	042	027
12	025	028	029	031	036	025	027	047	I072S	076	U095S	096	089	100	108	099S	099S	084	I076C	066S	051S	040S	J035S	033
13	032	033	034	035	036	030	031S	U045S	080S	102	120	110	104	123	119	114	092S	082	058S	063S	J065S	057	046	028
14	028	030	031	035	035	022	027	045S	079	083	092S	106	114	113	124	119	102	076	073S	067	054	048S	035S	036
15	036S	036	036	041	044	019H	023	044	080	098	105	097	119	135	139S	130H	129R	U097S	067	075	061	042	034	031
16	033	036	040	J042S	043	024H	028	052S	J077S	099	114	133	130R	124	123	132	123	099	082	062	065S	058S	049	044
17	041	037	036	039	036	031	035	051S	080	106	125	138	133	132	147	138	129	119	095S	J075S	088	070	054	052
18	053	056	057	052	042	044	038	060	107	129R	128	J120H	120	121	119	120	115	096S	J088S	079S	U067S	054	040S	J039S
19	J037S	033	030	031	030	031	031S	J057S	105	144S	U150S	145	145R	145R	142	132	125	091S	I074S	062S	054S	J052S	057	055S
20	J054S	J056S	050S	028	029	030	U037S	057S	086S	105	135S	127	128	133	132	135S	118S	J098S	085	I078S	J074S	U069S	054S	J052S
21	053S	045	039	037	037	042	J052S	J062S	J097S	131	135	138S	J137S	132R	130R	135S	J125S	111	081S	080	066R	060S	J061S	U063S
22	033S	029	030F	025	027F	025F	023	054S	J099S	116	106	135S	120	122	121	107	101	091S	I081S	I074S	057	046	036	J042S
23	J038S	032	033	030	030	030	I030S	U049S	083	114	120	123	121	126	123	119S	115S	092S	085	I069S	U062S	J061S	056S	058
24	I061S	049	030	028	029	031	032S	U051S	I094S	110	124	132	142	128	128R	141	126	104	I106C	U061S	057S	051S	J045S	J036S
25	J043S	036	044S	028H	022R	025	I028S	U045S	090	106	116S	128	127V	111	131	127	096	J100S	099	J078S	068S	056	046	046S
26	I046S	040	034S	030F	026	025F	024F	J045S	088	109	121	134	133	R	U162R	U159S	134	110	092	066S	U063S	U072S	071S	060
27	056	057	052	033	031	033	035	046	J104S	111	129	122	100	104	106	099	082	083	088	086	068	055	051	048
28	F	047	044	032	025	024	025	039	106	136	133	133	137	139	136	134	117	093S	092	063	060	054	048	046
29	048	045	036	027	024H	027	025S	047S	087	092	102	112	114	108	107	113	109	U097S	J095S	I100S	065	047	042	047
30	045	035	034	033	035	030	029	037S	089	108	151S	116	114R	098	102S	J101S	080	080S	070S	I073S	058S	049	043S	042
31	038S	033S	034	033	032	035S	031	U039S	105	119	138	118	115S	106	102	094S	084	U093S	J098S	J097S	I084S	J062S	067	065S
Count	30	31	31	31	31	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31
Median	036	033	034	032	031	029	030	049S	087	103	114	116	119	122	123	113	103	096S	081	067S	061S	053S	043	041
U.Q.	045	040	038	035	036	031	032	053	094	111	128	133	130	128	131	132	118	102	088	078	067	060	051	048
L.Q.	031	031	031	030	028	025	026	045	080	087	099	102	107	108	107	102	096	084	068	062	054	047	038	033
Q.R.	014	009	007	005	008	006	006	008	014	024	029	031	023	020	024	030	022	018	020	016	013	013	013	015

foF2

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

The Radio Research Laboratories, Japan

Y1

IONOSPHERIC DATA

Dec. 1967 | foF1 | 0.01Mc | 135° 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										360	360L	L	L	L	L	L	L							
2										L	L	LH	L	A	390L	L	L							
3										L	L	L	LH	LH	LH	LH	290							
4										LH	LH	LH	LH	U540L	LH	LH								
5										L	LH	L	LH	U470L	LH	L								
6										LH	400	L	L	L	L	L								
7											U430L	L	L	L	LH	LH	LH							
8											L	LH	LH	L	LH	L								
9										L	L	L	U480L	L	L	L	LH							
10										L	L	L	L	450H	LH	L								
11									290	C	L	L	L	L	L	310								
12										L	400L	L	LH	LH	L	L	270							
13										L	L	LH	LH	490L	L	LH								
14											LH	L	L	LH	U520L	L	300							
15										L	L	L	LH	LH	LH	L								
16											L	LH	L	L	LH	L								
17											L	L	LH	L	470	LH								
18											LH	L	L	L	A	L								
19										L	L	L	L	LH	LH	L								
20											L	L	L	LH	L	L								
21											L	L	L	LH	L	L								
22										L	L	A	A	L	LH	LH	L							
23											L	L	LH	LH	L	L								
24											L	L	LH	LH	L	LH								
25										L	L	LH	460L	LH	LH	LH	LH							
26										L	L	L	L	LH	LH	LH								
27										L	450L	L	L	L	L	L								
28										L	L	L	L	LH	520H	L								
29										L		L	L	LH	L	L	L							
30										L	L	L	L	L	L	A								
31											L	U450L	L	L	L									
Count									1	1	5	1	2	4	4	1	3							
Median									290	360	400L	U450L	U470L	U480L	500L	310	290							
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

Y2

IONOSPHERIC DATA

Dec. 1967 | foE | 0.01Mc | 135° 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								S	240	300	320	340	I350A	I350B	330	I295A	260H	160						
2								S	230	285	315	325	A	A	A	A	260	A						
3								S	230	290	320	330	340	340	310	280	230	S						
4								S	230	280H	310	320	320	330	320	280	230	A						
5								S	240	290H	315H	330	340	335	320R	290	230	A						
6								S	230H	270H	300	320	330	335	320H	280	230	170						
7								S	235	275H	305	325	330	320	300	260	230	S						
8								S	210F	280	300	320	330	330	310	280	240	S						
9								S	215	270	310	320	330	330	315	I285A	240	A						
10								S	210	270	295H	320	330H	I325A	320	290	250	150						
11								S	220	I265C	305	320	I330A	335R	325	285	230	A						
12								S	230	295H	315	345	I340A	335	320	I280A	240	S						
13								S	215	280	320	330	335	340	315	295	I260A	S						
14								S	210H	275	310H	330	330	340	340	310	260	S						
15								S	215H	280	310	320	345	345	330	290	245	S						
16								S	215	280	315	335	I340B	345	335	310	265H	170						
17								S	225	290	320	I330A	I345A	350	345	310	260	A						
18								S	220	290	I315A	340R	A	A	A	A	265	A						
19								S	225	A	A	350	360	355	I340A	300	A	A						
20								S	I220A	265	330	350	355	I355A	I345A	305	A	A						
21								S	200	295	325	340	355	350	325	I300A	260	A						
22								S	215	285	I320A	I340A	I350A	345	330	315	270	A						
23								S	I205A	280	320	340	355	345R	325	305H	260	170						
24								S	200	285H	310H	320	I340A	335	I310R	A	A	A						
25								S	I215A	I290A	320	340	345	340	325	300	250	S						
26								S	220	280H	315	340	350	350	330	310	270	S						
27								S	230	285	320	340	350	345	330	300	260	A						
28								S	220	I275A	325	340	355	340	335	A	A	A						
29								S	230	280	325	340	345	340	I330A	I300A	260	A						
30								S	200	260H	315	I330A	I340A	330	320	I300A	260	S						
31								S	210	275	310	330	A	A	320	300	240	S						
Count									31	30	30	31	28	28	29	27	27	5						
Median									220	280	315	330	340	340	325	300	260	170						
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

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

Y3

IONOSPHERIC DATA

Dec. 1967 | foEs | 0.1Mc | 135° 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	020	J046	J034	020	E012B	E012B	E015S	020	G	G	G	G	J055	041	040	041	022G	G	E015S	018	E015S	E015S	020	E012B
2	E014S	E015B	E011B	E012B	E011B	022	021	020	G	032	035	034	047	J064	035	036	021G	J036	J021	020	E014S	E014S	E015B	E014B
3	E014S	E015B	E014B	E	E	E	E014S	020	G	G	J046	G	J040	G	J040	G	G	J030	020	021	J029	021	021	023
4	021	020	E016B	E	E	021	E012B	E014S	022G	G	026G	G	J036	026G	034	J028G	026	J025	J027	J029	J025	J025	020	020
5	020	020	E015B	E015B	027	E021B	E015S	E012S	G	021G	025G	G	031G	033G	033	030	020G	J033	J028	J019	J018	J014S	E015S	E016B
6	E015B	E015B	E011B	E016B	E015B	E011B	E015S	E011S	G	G	020G	037	037	J041	035	031	J035	J028	021	020	021	020	020	E015S
7	E015S	E015B	E014B	E011B	E	E011B	E015S	E015S	G	030	035	035	G	035	G	031	J027	J025	E015B	E012B	E015S	E015S	E011B	024
8	020	020	E014B	E014B	E015B	E013B	E015S	021	J029	020G	033	037	032G	025G	027G	027G	019G	E015S	E015S	E012B	E015B	E011B	030	E015S
9	E016B	E016B	E012B	E	E	E014B	020	E015S	G	G	033	035	G	G	G	035	026	J027	022	020	E015B	E015B	E015B	E015B
10	E015B	E015B	E015B	E015B	E	E015B	E015S	021	G	031	035	037	037	034	G	033	G	G	020	021	E015B	E015S	E015S	E014B
11	E014S	E011B	E013B	E015B	E014B	E013B	E015S	E014S	G	C	029G	037	035	035	G	021G	G	J031	J028	J023	021	020	E015S	E015S
12	E015B	E016B	E016B	E016B	E015B	E014B	J019	020	020G	031	034	037	035	J032G	J039	J044	J028	J027	C	J030	J020	019	E015S	E015S
13	E015S	E015B	E018B	E017B	E015B	E015B	020	020	G	G	G	G	031G	040	035	046M	J044	021	E015S	E016B	E015B	E015S	E015S	E015S
14	E016B	E015B	E015B	E014B	E012B	E013B	020	020	044M	G	035	043	045	J033G	J030G	J032	J029	J030	J027	022	J021	022	021	021
15	020	E015S	020	E011B	E011B	018	020	E015S	G	G	035	037	J040	J038	027G	G	G	G	021	E016B	020	E014B	E016B	E017B
16	E017B	E014B	E011B	E015B	E	E011B	E013B	E014S	G	G	G	G	E043B	034G	026G	G	030	019	020	E015S	021	E015B	E015B	022
17	E015B	E012B	E014B	E015B	E011B	E015B	E011B	E013S	020G	029G	034	036	039	036	G	020G	G	J020	J026	021	E	E015B	E015B	E014B
18	E015B	E014B	E011B	E011B	E	E015B	J024	J024	G	J030	035	034G	J045	J061	063	037	J028	J030	J047	J024	E015S	E015B	E014B	E015B
19	E015B	E015B	E015B	E014B	E	E014B	E015S	020	G	034	J042	033G	G	G	J040	J031	J039	050M	J057	J031	J021	020	E015B	E012B
20	E018B	021	018	E013B	E015B	E018B	E015S	E015S	025	J038	033G	J039	034G	046	045	J031	J032	J033	J026	J020	020	E016B	E015B	E015B
21	E015B	E012B	E015B	E015B	E015B	E015B	E015S	E015S	022	J032	G	G	G	G	J039	J035	J032	J024	J036	J029	020	E012B	E017B	E015S
22	E015S	E015B	E012B	E015B	E012B	E014B	E015S	021	027	032	J043	J065	J057	036	J034	J027G	J030	J027	023	021	E015S	E015S	E016B	E015S
23	E015B	E015B	E015B	E014B	E011B	020	020	020	J029	030	039	036	039	026G	020G	032	028	020	021	020	E015S	E015S	J043	020
24	E015B	E015B	E015B	E015B	E015B	E015B	E015S	E015S	020	G	033	034	036	J057	J031G	J037	J029	J032	C	J042	J035	021	020	018
25	E015S	J041	021	E018B	E	E014B	E013S	E015S	026	030	031G	G	G	G	021G	020G	G	019	021	021	021	021	018	E015S
26	E015S	E015B	E012B	E	E	E011B	E013S	022	J029	067	036	G	G	G	030G	029G	030	032	021	J019	E015B	E015S	E015S	E015B
27	E013B	E014B	E	E	E015B	E014B	E015S	E015S	J026	036	038	038	041	036	039	047	039	J029	J049	J056	J026	J048	J018	020
28	017	J028	J029	J025	021	019	E012S	E013S	J026	038	G	G	030G	027G	035	032	031	J030	E040C	J028	J027	020	020	J031
29	J029	021	J022	019	E011B	017	E015S	E015S	G	G	043	037	041	J046	038	J041	J030	J029	E041C	022	020	E012S	E014S	E015S
30	E011B	E011B	E014B	E	017	J018	E014S	022	G	030	036	037	037	030G	027G	J039	J035	021	E048C	E015S	E015S	E015B	E015B	E015S
31	E015B	E015B	021	J021	E012B	E011B	E015S	020	019G	G	033	041	038	038	031G	028G	030	027	J018	022	J024	020	021	020
Count	31	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	29	31	31	31	31	31
Median	E015B	E015B	E015B	E015B	E012B	E014B	E015S	E015S	G	G	034	035	036	G	033	031	028	J027	022	021	020	E015	E015	E015
U.Q.	E017	020	E018	E016	E015	E018	019	020	026	032	036	037	040	040	039	037	031	030	030	024	021	020	020	020
L.Q.	E015	E015	E012	E011	E	E013	E014	E015	G	G	G	G	G	G	G	G	G	020	020	019	E015	E015	E015	E015
Q.R.		D005					D005	D005										010	010	005	D006	D005	D005	D005

foEs

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

IONOSPHERIC DATA

Dec. 1967 | f_bEs | 0.1Mc | 135° 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	E	022	016	E	B	B	S	G					042	040	037	030	022G		S	015	S	S	E	B
2	S	B	B	B	B	E	E	G		G	G	G	045	044	032	032	021G	024	021	E	S	S	B	B
3	S	B	B				S	G			G		031		027			015	E	E	018	016	E	021
4	E	E	B			E	B	S	022G		024G		025	024G	026	024G	015	016	015	016	019	017	E	E
5	E	E	B	B	E	B	S	S		021G	025G		031G	032G	031	028	020G	025	026	E	016	S	S	B
6	B	B	B	B	B	B	S	S			019G	019G	E020R	028	019G	019G	020	015	E	E	E	017	E	S
7	S	B	B	B		B	S	S		G	034	G		019G		018G	018	017	B	B	S	S	B	016
8	E	E	B	B	B	B	S	G	016G	017G	019G	020G	030G	024G	026G	024G	019G	S	S	B	B	B	016	S
9	B	B	B			B	E	S			G	G				030	021G	020	E	E	B	B	B	B
10	B	B	B	B		B	S	S		G	G	036	036	034		G			E	E	B	S	S	B
11	S	B	B	B	B	B	S	S		C	029G	036	034	033		021G		023	027	019	016	E	S	S
12	B	B	B	B	B	B	E	S	G	G	G	G	035	030G	027	028	023	019	C	023	018	E	S	S
13	S	B	B	B	B	B	E	G					029G	028G	025G	027	027	G	S	B	B	S	S	S
14	B	B	B	B	B	B	E	G	G		G	037	035	030G	025G	022	019	020	017	018	E	017	E	E
15	E	S	E	B	B	013	E	S			G	G	032	031	027G				E	B	E	B	B	B
16	B	B	B	B		B	B	S					B	033G	025G		G	E019R	E	S	E	B	B	E
17	B	B	B	B	B	B	B	S	020G	027G	G	035	035	033		020G		020	E	E		B	B	B
18	B	B	B	B		B	018	016		024	034	033G	041	044	054	032	023	024	040	016	S	B	B	B
19	B	B	B	B		B	S	G		032	034	033G			038	029	035	041	037	029	018	E	B	B
20	B	E	E	B	B	B	S	S	025	030	030G	030	031G	040	035	024	030	030	022	019	E	B	B	B
21	B	B	B	B	B	B	S	S	015	025					031	030	022	018	018	023	E	B	B	S
22	S	B	B	B	B	B	S	G	G	G	038	061	053	021G	025	024G	026	024	016	E	S	S	B	S
23	B	B	B	B	B	E	E	G	022	023	023G	026G	037	025G	020G	018G	019G	G	E	019	S	S	040	E
24	B	B	B	B	B	B	S	S	G		G	G	035	029	E031R	033	029	025	C	038	029	018	E	E
25	S	E	E	B		B	S	S	025	029	031G				021G	019G		G	C	E	E	E	E	S
26	S	B	B			B	S	S	018	025	G				029G	023G	G	029	018	015	B	S	S	B
27	B	B			B	B	S	S	G	034	036	025G	040	E036R	038	035	035	025	E049C	026	021	038	017	E
28	E	015	018	015	014	E	S	S	018	030			029G	027G	035	032	030	025	C	020	018	E	E	019
29	022	018	014	E	B	E	S	S			037	036	040	044	035	031	021	028	C	E	E	S	S	S
30	B	B	B		E	013	S	S		G	035	036	035	029G	026G	036	020	G	C	S	S	B	B	S
31	B	B	E	016	B	B	S	S	018G		G	037	037	036	030G	027G	029	026	017	E	021	E	E	017
Count																								
Median																								
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

f_bEs | Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation | Y5

IONOSPHERIC DATA

Dec. 1967 | f-min | 0.1Mc | 135° 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	E014S	012	011	015	012	012	E015S	E015S	E014S	015	016	015	022	036	023	016	014	E013S	E015S	012	E015S	E015S	E015S	012
2	E014S	015	011	012	011	011	E014S	012	E014S	016	014	015	017	023	015	025	015	E015S	E014S	E015S	E014S	E014S	015	014
3	E014S	015	014	E	E	E	E014S	E012S	016	015	015	016	017	016	015	015	014	012	E015S	E015S	E014S	E015S	E014S	012
4	E015S	015	016	E	E	014	012	E014S	015	015	016	016	016	015	015	013	012	012	012	011	E015S	E015S	E015S	E015S
5	E015S	016	015	015	015	021	E015S	E012S	015	016	023	019	023	022	018	017	016	012	014	E015S	E015S	E015S	E015S	016
6	015	015	011	016	015	011	E015S	E011S	E015S	015	015	015	017	016	015	015	012	012	015	E015S	E015S	E015S	E015S	E015S
7	E015S	015	014	011	E	011	E015S	E015S	012	015	015	017	017	015	016	015	012	E015S	015	012	E015S	E015S	011	012
8	E015S	016	014	014	015	013	E015S	E012S	E015S	012	015	016	015	015	016	015	015	E015S	E015S	012	015	011	E015S	E015S
9	016	016	012	E	E	014	E015S	E015S	013	015	016	017	022	022	022	018	015	012	015	015	015	015	015	015
10	015	015	015	015	E	015	E015S	E014S	012	016	015	015	017	018	017	015	015	012	E015S	E015S	015	E015S	E015S	014
11	E014S	011	013	015	014	013	E015S	E014S	014	E040C	015	017	022	023	017	015	012	012	012	015	012	E015S	E015S	E015S
12	015	016	016	016	015	014	E013S	E015S	012	017	018	024	022	018	015	015	014	E015S	C	015	E015S	E015S	E015S	E015S
13	E015S	015	018	017	015	015	E015S	E012S	E015S	015	023	016	016	022	016	015	015	E015S	E015S	016	015	E015S	E015S	E015S
14	016	015	015	014	012	013	E015S	E015S	E015S	015	015	015	016	016	017	014	015	E015S	E012S	012	E014S	E015S	E015S	E014S
15	E015S	E015S	015	011	011	E	E015S	E015S	015	015	015	015	015	016	015	017	017	E015S	E015S	016	015	014	016	017
16	017	014	011	015	E	011	013	E014S	015	015	016	015	043	028	022	025	015	E015S	E015S	E015S	E015S	015	015	014
17	015	012	014	015	011	015	011	E013S	015	015	017	018	017	019	022	015	022	E015S	E015S	E014S	E	015	015	014
18	015	014	011	011	E	015	E015S	E015S	013	013	017	017	025	019	016	017	015	E015S	E015S	E015S	E015S	015	014	015
19	015	015	015	014	E	014	E015S	E015S	E015S	016	018	023	022	019	018	019	015	E015S	E015S	E015S	E015S	014	015	012
20	018	E018C	E	013	015	018	E015S	E015S	013	014	017	019	021	024	016	015	015	013	013	012	E015S	016	015	015
21	015	012	015	015	015	015	E015S	E015S	012	013	015	018	023	023	017	017	013	012	012	015	015	012	017	E015S
22	E015S	015	012	015	012	014	E015S	E015S	E015S	015	016	017	019	016	015	015	015	012	012	E015S	E015S	E015S	016	E015S
23	015	015	015	014	011	012	E015S	E015S	012	013	013	015	017	015	015	012	015	E015S	E015S	E015S	E015S	E015S	E015S	015
24	015	015	015	015	015	015	E015S	E015S	E015S	015	011	016	019	018	018	017	015	E015S	C	E022C	E012S	E015S	E015S	E015S
25	E015S	015	015	018	E	014	E013S	E015S	E015S	015	016	019	020	022	018	015	015	E015S	E019C	E015S	E015S	E015S	E014S	E015S
26	E015S	015	012	E	E	011	E013S	E013S	E015S	016	016	022	026	029	023	018	017	E013S	E015S	011	015	E015S	E015S	015
27	013	014	E	E	015	014	E015S	E015S	E012S	015	022	017	017	021	018	015	015	012	E031C	E015S	E014S	E013S	E014S	015
28	013	E	012	E	E	013	E012S	E013S	012	015	018	024	025	024	023	019	015	013	E040C	012	E012S	E015S	E015S	E015S
29	015	015	011	015	011	011	E015S	E015S	E014S	014	017	018	017	017	016	015	012	E012S	E041C	E013S	E015S	E012S	E014S	E015S
30	011	011	014	E	E	E	E014S	E014S	014	015	016	017	017	017	016	015	012	E015S	E048C	E015S	E015S	015	015	E015S
31	015	015	015	E	012	011	E015S	E015S	E015S	E015S	016	019	016	018	015	015	012	E015S	E015S	E015S	E015S	E015S	E015S	E015S
Count	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	29	31	31	31	31	31
Median	014	015	014	014	011	013	E015S	E015S	014	015	016	017	017	019	016	015	015	E015S	E015S	E015S	E015S	E015S	E015S	014
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

Y 6

IONOSPHERIC DATA

Dec. 1967 | M(3000) F2 | 0.01 | 135° 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	260S	290	325	365	250	270	295	360S	345	305	330	320	315	315	320	295S	305S	345	J295S	290S	J325S	310H	255
2	285	285	270	295	365	260	280S	305	315	320	300	315	300	J295S	320	315	315S	320S	295H	315S	315	250H	325	265
3	280	275	315	340	335	335	290	305	350	340	335	330	325	315H	310H	310	315	J320H	295	300	315S	245S	320	260
4	260	260	290	285	295	280	320	330S	355	305V	325	305	315R	310R	300H	325	J340S	370	330H	320	310S	330S	285	290
5	270	265	295	305	295	295	290	320S	355	365	320	335	320	U310S	330	U300R	330	335S	305	340S	330	315S	255S	285
6	285	265	275	285	290	270	290S	350	335S	J335S	350S	330	315	305	305R	315R	325	335	325	320	305S	280	J255S	J240S
7	290H	305	280	320	265	250	310S	315S	340	320	350	310	315	335	310H	310S	305	325	J320S	310	345S	J290S	J285S	265
8	255	295	290	275	350	220H	235	310	340S	330	J360S	335	325H	320	335	300H	330S	330S	I305S	I340S	310	285S	305	275
9	270	280	305S	310	280	290	285	320S	325S	345	325	325	305	315	305H	290	310	335	335	290	320S	290	300	290
10	270S	260	305	330	280	260	310S	325S	340S	335	325	335	345	330	305	320S	340	325S	335S	300	295	315	315	315
11	265	275	280	275	300	275	305	305S	355S	345	350	355	J310S	315	320	325S	320	335S	325	310S	295S	325	300	330
12	260	265	280	285	330	350	325	335	I355S	355	U340S	360	315	315	340	325S	340S	330	I320C	325S	325S	275S	J280S	290
13	260	270	270	285	310	330	310S	U305S	330S	335	345	315	300	320	300	350	335S	345	305S	290S	J305S	325	305	275
14	270	270	295	330	335	345	265	315S	365	340	315S	320	305	300	305	320	335	320	300S	320	315	285S	270S	265
15	275S	265	290	305	385	225H	275	320	355	345	340	310	310	305	310S	270H	310R	U320S	300	305	295	285	295	260
16	260	260	285	J285S	340	235H	270	310S	J325S	315	305	310	300R	290	285	305	310	310	310	285	305S	300S	280	275
17	280	255	280	285	290	235	285	315S	325	310	310	310	295	295	305	290	300	295	325S	J285S	320	315	260	240
18	245	270	275	310	285	290	290	300	325	340R	315	J310H	305	300	300	300	315	325S	J340S	320S	U305S	350	250S	J245S
19	J255S	250	255	275	270	240	255S	J265S	300	320S	U315S	305	295R	285R	290	300	310	300S	I350S	300S	280S	J270S	280	270S
20	J275S	J295S	345S	255	250	245	U300S	315S	345S	295	320S	300	295	290	285	295S	305S	J300S	300	I310S	J295S	U315S	300S	J300S
21	300S	280	265	265	250	260	J300S	J320S	J325S	330	320	310S	J305S	295R	290R	295S	J295S	330	300S	320	305R	285S	J295S	U315S
22	295S	295	285F	260	250F	250F	275	305S	J340S	330	325	330S	300	305	300	310	305	300S	I320S	I335S	320	325	260	J255S
23	J315S	300	320	265	265	265	I295S	U315S	340	335	330	310	305	295	300	295S	305S	315S	305	I310S	U290S	J290S	285S	285
24	I320S	350	320	265	270	260	280S	U290S	I330S	330	330	295	315	305	290R	300	325	300	I335C	U340S	315S	255S	J270S	J290S
25	J280S	285	330S	245H	365R	255	I270S	U295S	340	340	320S	315	315V	280	310	325	305	J300S	315	J295S	325S	285	280	280S
26	I290S	325	275S	295F	315	250F	270F	J290S	335	305	340	320	310	R	U295R	U295S	300	305	315	310S	U270S	U290S	295S	285
27	270	285	325	280	250	275	270	280	J330S	310	325	345	300	300	295	335	325	315	295	335	330	290	285	270
28	F	285	295	285	305	275	270	260	325	330	330	300	290	295	295	305	290	310S	315	295	315	300	275	280
29	285	310	345	275	285H	260	260S	295S	365	315	325	315	315	305	300	310	305	U310S	J310S	I310S	325	280	260	290
30	310	285	270	280	315	275	280	280S	325	325	345S	310	315R	310	300S	J320S	300	325S	305S	I350S	305S	305	295S	305
31	295S	275S	275	275	265	270S	250	U255S	340	330	335	300	305S	300	305	310S	295	U305S	J310S	J325S	I315S	J280S	270	285S
Count	30	31	31	31	31	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31
Median	275	275	290	285	295	260	280	305S	340	330	325	315	310	305	305	310	310	320S	315	310S	310S	290S	285	280
U.Q.																								
L.Q.																								
Q.R.																								

The Radio Research Laboratories, Japan

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

Y7

IONOSPHERIC DATA

Dec. 1967 | M(3000) F1 | 0.01 | 135° 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										420	445L	L	L	L	L	L	L							
2										L	L	LH	L	A	400L	L	L							
3										L	L	L	LH	LH	LH	LH	415							
4										LH	LH	LH	LH	U370L	LH	LH								
5										L	LH	L	LH	U385L	LH	L								
6										LH	400	L	L	L	L	L								
7											U380L	L	L	L	LH	LH	LH							
8											L	LH	LH	L	LH	L								
9										L	L	L	U375L	L	L	L	LH							
10										L	L	L	L	380H	LH	L								
11									400	C	L	L	L	L	L	420								
12										L	405L	L	LH	LH	L	L	410							
13										L	L	LH	LH	365L	L	LH								
14											LH	L	L	LH	U335L	L	425							
15										L	L	L	LH	LH	LH	L								
16											L	LH	L	L	LH	L								
17											L	L	LH	L	365	LH								
18											LH	L	L	L	A	L								
19										L	L	L	L	LH	LH	L								
20											L	L	L	LH	L	L								
21											L	L	L	LH	L	L								
22										L	L	A	A	L	LH	LH	L							
23											L	L	LH	LH	L	L								
24											L	L	LH	LH	L	LH								
25										L	L	LH	410L	LH	LH	LH	LH							
26										L	L	L	L	LH	LH	LH								
27										L	375L	L	L	L	L	L								
28										L	L	L	L	LH	370H	L								
29										L		L	L	LH	L	L	L							
30										L	L	L	L	L	L	A								
31											L	U400L	L	L	L									
Count									1	1	5	1	2	4	4	1	3							
Median									400	420	400L	U400L	U390L	U375L	370L	420	415							
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

Dec. 1967 | h'F2 km | 135° 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										230	225	250	275	270	245	240	300L							
2										235	275	275	280	250	250	275	250							
3										225	245	245	260	255	245	230	225							
4										300L	250	250	250	265	275	250								
5										220	245	240	270	245	250	235								
6										250	235	250	250	290	255	250								
7											240	250	250	250	280L	245	250							
8											245	250	255	270	250	225								
9										245	235	245	250	245	240	230	250							
10										250	245	240	235	255	300	245								
11									220	230	245	250	260	260	250	235								
12										225	245	230	280	265	240	270	235							
13										240	250	275	270	275	255	270								
14											250	255	245	275	285	225	225							
15										240	245	230	270	255	250	235								
16											255	265	250	250	280	250								
17											250	245	275	255	275	250								
18											260	235	275	235	250	260								
19										250	240	255	240	245	260	260								
20											245	240	255	290	270	250								
21											245	240	240	300	290	250								
22										230	225	260	240	260	250	250	250							
23											250	240	250	275	250	280								
24											250	250	270	280	285	260								
25										230	255	255	245	330	280	240	265							
26										265	230	255	245	280	280	260								
27										275	255	240	240	255	245	250								
28										245	240	250	235	295	275	250								
29										250		250	250	290	250	250	250							
30										245	245	230	230	250	270	250								
31											245	225	240	275	280									
Count									1	20	30	31	31	31	31	30	10							
Median									220	240	245	250	250	265	255	250	250							
U.Q.																								
L.Q.																								
Q.R.																								

h'F2

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

The Radio Research Laboratories, Japan

Y9

IONOSPHERIC DATA

Dec. 1967 | h'F km | 135° 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	355	E350A	295	230	200	E355B	E345S	290	225	225	205	250	250	260	250	235	225	220	205	225H	250	225	230	305
2	280	280	300	270	210	E345B	295	275	220	230	230	225H	255	I235A	220	225	240	225	200H	240	245	240	220	340
3	300	325	250	230	235	210	300	250	230	225	225	230	200H	200H	200H	225H	225	210	200	230	225	220H	230	E360A
4	350	350	300	255	265	250	230	225	230	200H	220H	230H	230H	210H	220H	200H	230	225	220H	230	240	220	E255S	300
5	340	345	300	265	275	E320B	290	240	230	220	205H	220	200H	220H	200H	235	230	200	220	230	215	215	260	290
6	275	320	310	300	300	330H	250	230	220	230H	205	235	230	230	230	225	235	210	210	220	235	240	280	300
7	250	250	300	250	295	E380B	E250S	235	235	245	220	205	210	210	225H	220H	200H	215	210	235H	205	230	225	E300A
8	355	300	270	305	240	BH	E350S	270	225	240	230	210H	210H	215	200H	225	225	235	200	210	200H	220	250	295
9	335	300	255	235	250	300	295	250	230	230	225	210	200H	230	220	230	210H	230	215	215	220	210	220	250
10	295	330	275	250	250	350	250	240	230	240	230	225	225	210H	200H	235	225	220	205	210	225	230	230	240
11	E340S	300	300	310	275	275	250	245	220	I200C	225	235	205	205	225	215	220	240	210	220	245	230	220	250
12	370	350	325	305	255	210	220	245	220	220	200H	240	205H	215H	235	E245A	240	215	I225C	220	230	250	250	275
13	310	325	320	300	265	220	245	255	240	240	240	210H	200H	240	240	220H	220	215	200	250	220	220	235	E300S
14	E350B	340	290	250	250	220	340	260	210	230	225H	225	225	200H	225H	225	215	205	225	225	220	240	270	320
15	305	300	290	250	205	AH	E325S	255	230	230	225	215	215H	220H	225H	230	245	205	200	240	205	225	265	E350B
16	350	325	275	275	230	E220H	325	250	225	235	225	225H	B	240	230H	240	230	210	205	210	240	225	250	285
17	280	300	300	280	250	E350B	275	245	225	235	230	225	220H	225	225	225H	245	225	200	240	220	205	250	320
18	330	290	280	240	240	275	300	270	245	230	215H	220	230	235	I225A	220	245	210	230	220	200	210	275	345
19	330	350	380	310	270	400	345	275	240	240	235	220	230	220H	225H	225	240	220	225	250	250	270	280	280
20	300	250	220	240	350	400	285	240	215	230	230	225	225	225H	225	240	230	230	245	220	235	230	240	285
21	240	250	260	330	360	355	260	245	240	235	220	210	220	220H	225	240	230	230	215	230	215	250	260	225
22	245	300	300	E355B	320	400	350	250	235	220	225	I225A	I230A	225	225H	225H	225	215	210	210	215	225	350	295
23	250	290	250	270	255	325	290	255	220	230	230	230	230H	220H	220	230	240	215	220	220	245	250	E300A	280
24	230	220	250	315	305	340	300	270	230	240	230	220	200H	220H	210	225H	225	235H	I220C	220	240	270	250	295
25	250	275	245	205H	205	350	320	260	225	230	215	205H	210	210H	205H	225H	220H	225	225	205	220	250	255	250
26	250	240	255	250	225	E310B	E340S	275	225	230	230	230	230	210H	215H	230H	230	220	220	225	250	250	250	250
27	275	275	225	230	E350B	320	300	300	235	230	220	245	225	240	240	245	230	235	E325C	225	220	E290A	250	280
28	300	275	275	E220H	290	300	E350S	310	250	230	230	215	225	220H	215H	245	225	230	235	205	230	225	255	295
29	275	260	225	300	215	E350B	E345S	275	210	225	230	225	230	230H	225	235	240	210	E270C	220	200	205	310	275
30	240	280	300	280	240	305	290	300	230	235	250	220	220	210	220	I235A	220	230	E270C	220	220	225	270	250
31	250	325	310	280	300	310	370	305	250	230	225	215	215	230	230	230	235	250	240	230	240	250	250	250
Count	31	31	31	31	31	29	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31	31
Median	290	300	290	270	250	U300	290	255	230	230	225	225	220	220H	225	230	230	220	215	220	225	230	250	285
U.Q.																								
L.Q.																								
Q.R.																								

h'F

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

The Radio Research Laboratories, Japan

Y10

60

IONOSPHERIC DATA

Dec. 1967 | h'Es km | 135° 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	105	100	100	100	B	B	S	100	G	G	G	G	110	120	115	105	100	G	S	115	S	S	100	B
2	S	B	B	B	B	105	105	100	G	125	125	130	110	105	120	105	100	100	100	150	S	S	B	B
3	S	B	B	E	E	E	S	100	G	G	120	G	105	G	100	G	G	100	100	100	095	095	100	095
4	095	100	B	E	E	100	B	S	120	G	105	G	100	100	100	100	100	100	100	100	100	095	095	100
5	100	100	B	B	140	B	S	S	G	110	110	G	110	105	105	100	105	100	100	100	100	S	S	B
6	B	B	B	B	B	B	S	S	G	G	100	185	170	100	150	150	095	100	095	100	100	095	095	S
7	S	B	B	B	E	B	S	S	G	160	140	125	G	140	G	120	095	095	B	B	S	S	B	100
8	095	100	B	B	B	B	S	100	130	100	E150G	125	100	100	100	100	100	S	S	B	B	B	100	S
9	B	B	B	E	E	B	100	S	G	G	E170G	125	G	G	G	115	120	100	100	100	B	B	B	B
10	B	B	B	B	E	B	S	120	G	150	135	130	125	120	G	120	G	G	100	100	B	S	S	B
11	S	B	B	B	B	B	S	S	G	C	105	140	110	105	G	105	G	100	100	100	100	100	S	S
12	B	B	B	B	B	B	100	100	100	130	125	120	105	105	100	100	100	100	C	100	100	100	S	S
13	S	B	B	B	B	B	100	100	G	G	G	G	100	170	155	095	120	100	S	B	B	S	S	S
14	B	B	B	B	B	B	100	100	100	G	150	125	125	105	100	100	100	100	100	095	095	095	095	095
15	095	S	095	B	B	100	100	S	G	G	125	115	105	105	105	G	G	S	100	B	090	B	B	B
16	B	B	B	B	E	B	B	S	G	G	G	G	B	105	105	G	130	120	100	S	100	B	B	095
17	B	B	B	B	B	B	B	S	110	105	115	110	105	105	G	105	G	095	095	095	E	B	B	B
18	B	B	B	B	E	B	100	100	G	105	105	105	105	100	100	100	100	100	100	100	S	B	B	B
19	B	B	B	B	E	B	S	110	G	110	105	105	G	G	100	100	100	100	100	100	100	100	B	B
20	B	105	105	B	B	B	S	S	155	110	105	105	100	100	100	100	100	095	100	100	100	B	B	B
21	B	B	B	B	B	B	S	S	110	105	G	G	G	G	105	100	105	100	100	100	100	B	B	S
22	S	B	B	B	B	B	S	165	165	145	105	100	100	160	100	100	100	100	100	100	S	S	B	S
23	B	B	B	B	B	100	100	100	105	170	140	150	150	100	100	150	130	100	100	110	S	S	100	100
24	B	B	B	B	B	B	S	S	100	G	145	125	100	100	100	100	100	110	C	100	100	100	100	095
25	S	115	105	B	E	B	S	S	160	115	105	G	G	G	100	100	G	125	100	100	095	095	095	S
26	S	B	B	E	E	B	S	100	100	110	130	G	G	G	105	100	150	120	120	115	B	S	S	B
27	B	B	E	E	B	B	S	S	130	125	125	130	125	140	125	125	115	100	105	105	105	100	100	100
28	100	100	100	100	100	100	S	S	135	105	G	G	105	105	130	115	110	105	C	100	100	100	100	100
29	100	100	100	100	B	100	S	S	G	G	120	125	115	110	105	105	100	100	C	100	100	S	S	S
30	B	B	B	E	115	110	S	100	G	165	150	135	105	105	100	100	100	100	C	S	S	B	B	S
31	B	B	100	100	B	B	S	100	115	G	160	120	105	105	105	105	150	125	120	115	100	100	095	100
Count	7	8	7	4	3	7	8	15	15	18	26	21	24	25	26	28	25	27	22	25	18	12	12	10
Median	100	100	100	100	115	100	100	100	115	110	120	125	105	105	100	100	100	100	100	100	100	100	100	100
U.Q.																								
L.Q.																								
Q.R.																								

h'Es

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

The Radio Research Laboratories, Japan

Y11

IONOSPHERIC DATA

Dec. 1967 | Types of Es | 135° 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	f	f2	f2	f				1					c2	c	c	12	1			f			f	
2						f	f	1		h2	h2	h	c3	12	c	1	1	13	f2	f				
3								1			c		1		12			1	f	f	f2	f	f	f2
4	f	f				f			1		1		1	1	12	1	1	1	f	f2	f	f	f	f
5	f	f			f					1	1		1	1	12	12	1	13	f2	f	f	f		
6											1	h 1	h 1	12h	h 1	h 1	12	1	f	f	f	f	f	
7										h	h	h		h 1		c 1	1	1						f
8	f	f						1	c 1	1	h 1	h 1	12	1	1	1	1						f	
9							f				h	h				c	c 1	1	f	f				
10								c		h2	h	h2	h	c		c			f	f				
11											1	h 1	1	12		1		12	f4	f3	f2	f		
12							f2	1	1	h	h	c	1	1	12	13	12	12		f2	f	f		
13							f	1					1	h 1	h 1	12h	c 12	1						
14							f	1	1		h	h 12	h 1	1	1	1	12	1	f	f2	f	f	f	f
15	f		f			f	f				h2	c	12	12	12				f		f			
16														1	1		h	c	f		f			f
17									12	1	c	1	12	1		1		1	f3	f2				
18							f2	12		12	1	1	1	13	13	12	12	13	f5	f2				
19								1		12	12	1			13	12	12	13	f3	f3	f	f		
20		f	f						h c	c2	1	12	1	12	12	1	13	13	f2	f	f			
21									1	12					1	12	13	12	f3	f3	f			
22								h	h	h	13h	13	12	h 1	1	1	12	13	f	f				
23						f	f	1	12	h 1	h 1	h 1	h 12	1	1	h 1	h212	1	f2	f f			f2	f
24									1		h	h	12	12	12	12	14	c312		f4	f3	f	f	f
25		f2	f						h 1	c2	1				1	1		h	f	f	f	f	f	
26								1	1	1	h2				1	1	h	c31	f	f				
27									h2	h3	h	h 1	h 1	h 1	h 12	h21	c41	14h3	f	f3	f2	f5	f	f
28	f	f	f2	f	f	f			h 1	1			1	1	h	c	13	14		f4	f3	f	f	f
29	f	f	f2	f		f					c	h	c	c3	13	13	12	16		f	f			
30					f	f2		1		h h	h	h 12	12	1	1	13	12c	1						
31			f	f2				1	12		h	c 1	12	1	12	1	h 1	h3	f	f	f2	f2	f	f
Count																								
Median																								
U. Q.																								
L. Q.																								
Q. R.																								

Types of Es

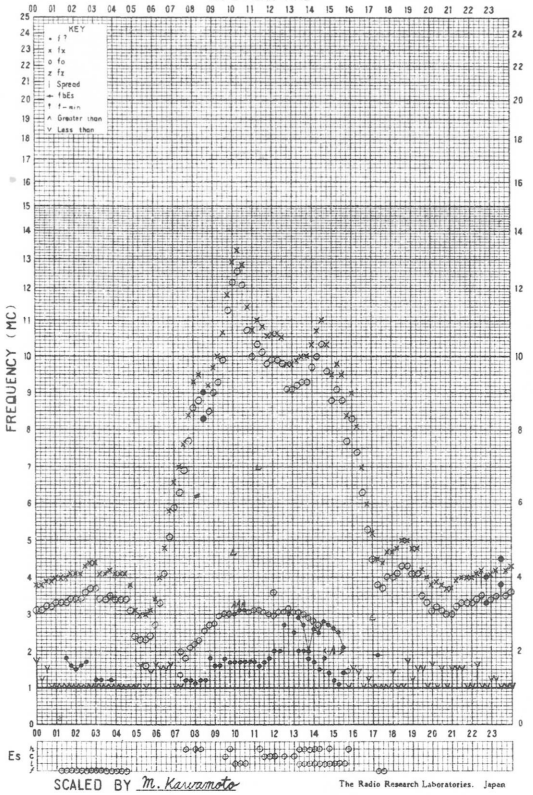
Sweep 1.0 Mc to 20.0 Mc in 20 sec in automatic operation

The Radio Research Laboratories, Japan

Y 12

f-PLOT OF IONOSPHERIC DATA

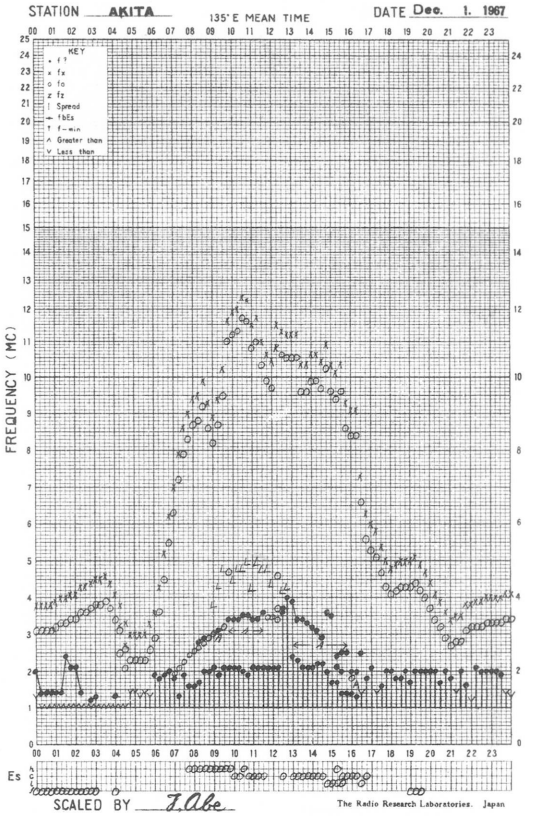
STATION WAKKANAI 135°E MEAN TIME DATE DEC. 1.1967



SCALED BY M. Kawamoto The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

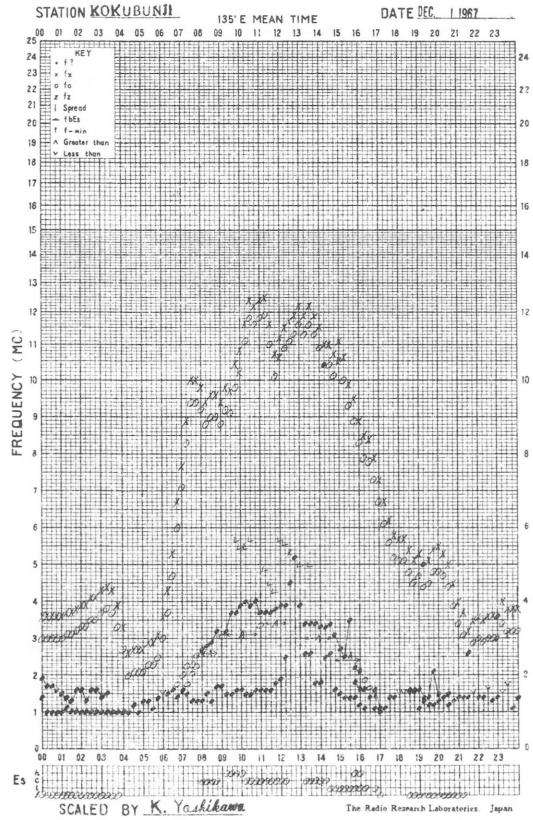
STATION AKITA 135°E MEAN TIME DATE Dec. 1. 1967



SCALED BY T. Abe The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

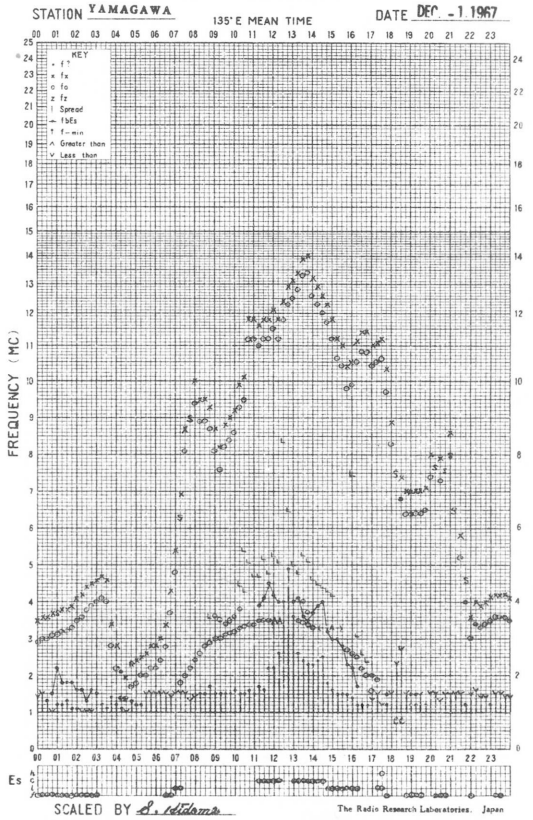
STATION KOKUBUNJI 135°E MEAN TIME DATE DEC. 1 1967



SCALED BY K. Yoshikawa The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

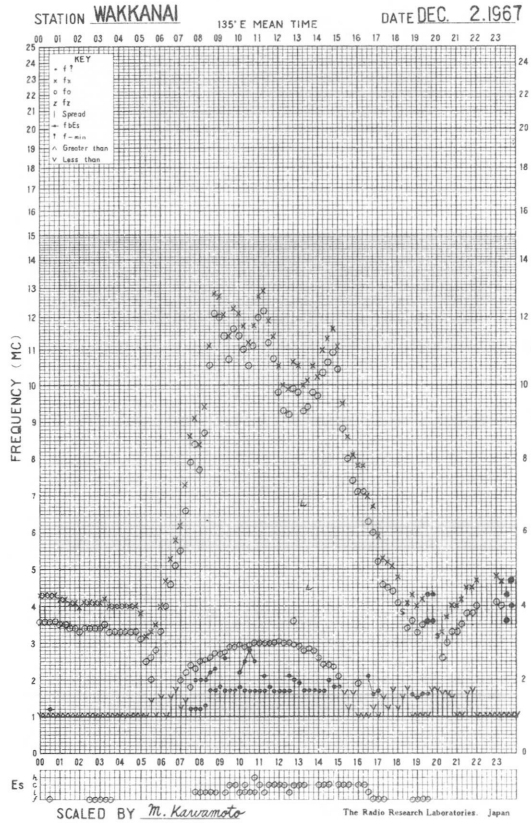
STATION YAMAGAWA 135°E MEAN TIME DATE DEC. 1 1967



SCALED BY S. Ishitomo The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

STATION WAKKANAI 135°E MEAN TIME DATE DEC. 2.1967



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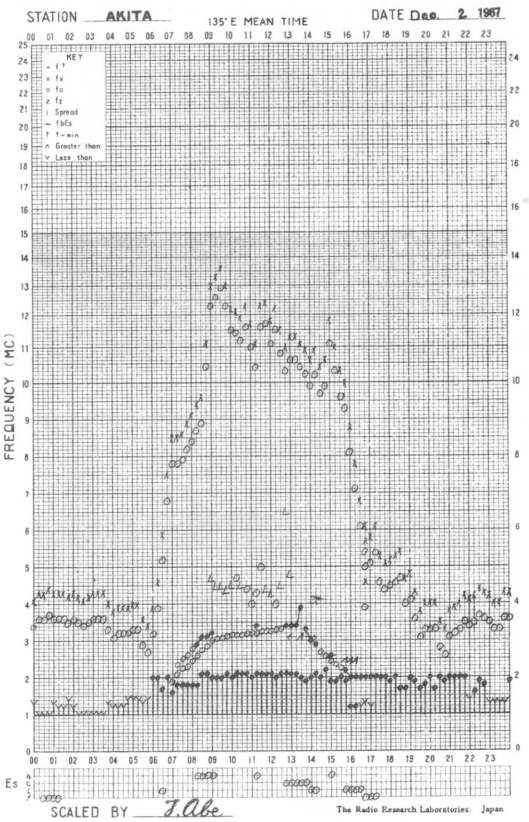

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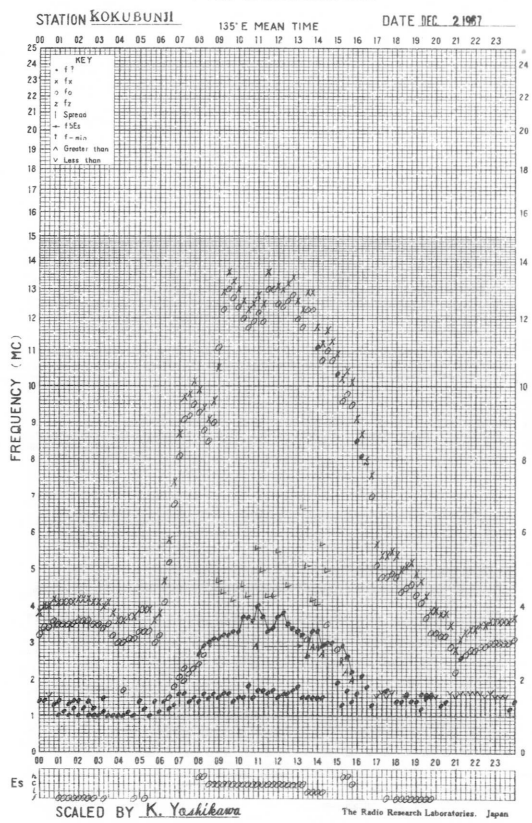

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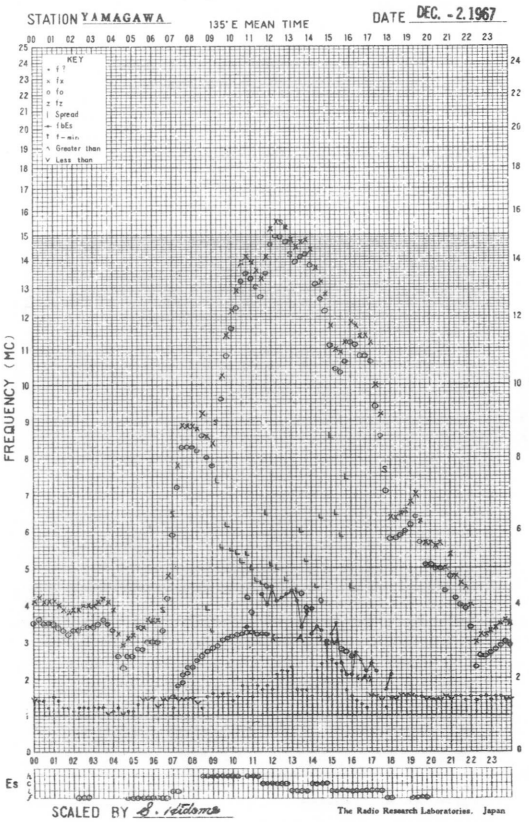

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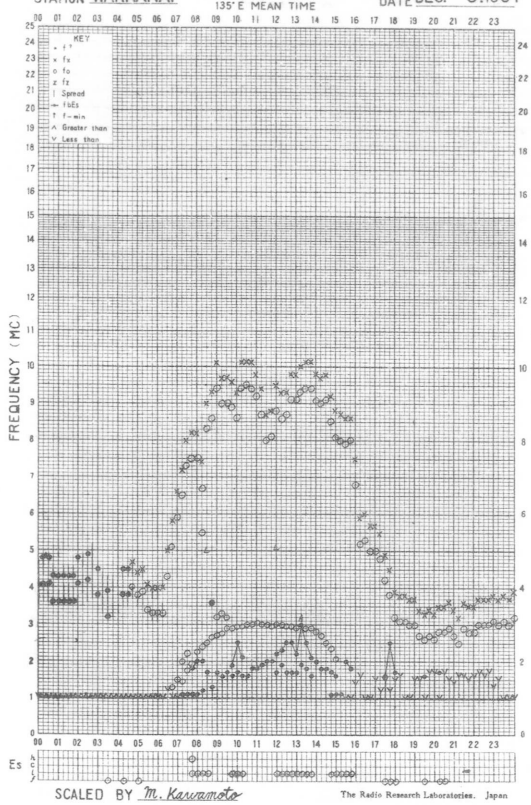

SCALED BY M. Kawamoto The Radio Research Laboratories. Japan

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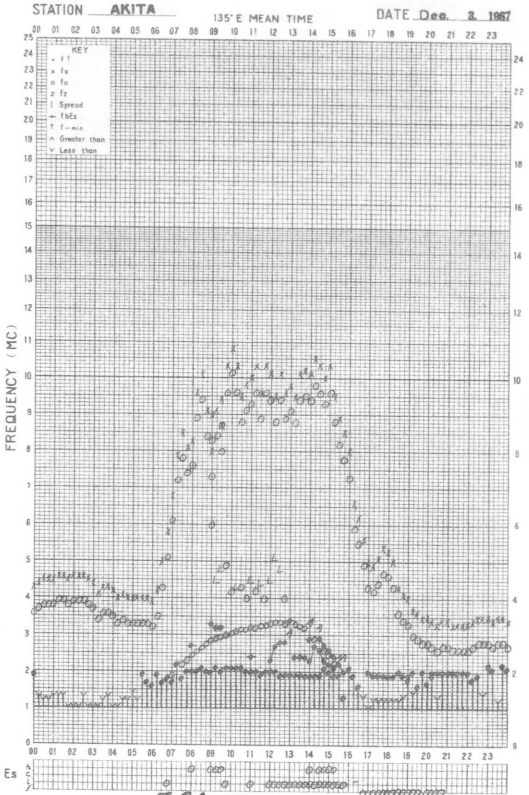

SCALED BY T. Abe The Radio Research Laboratories. Japan

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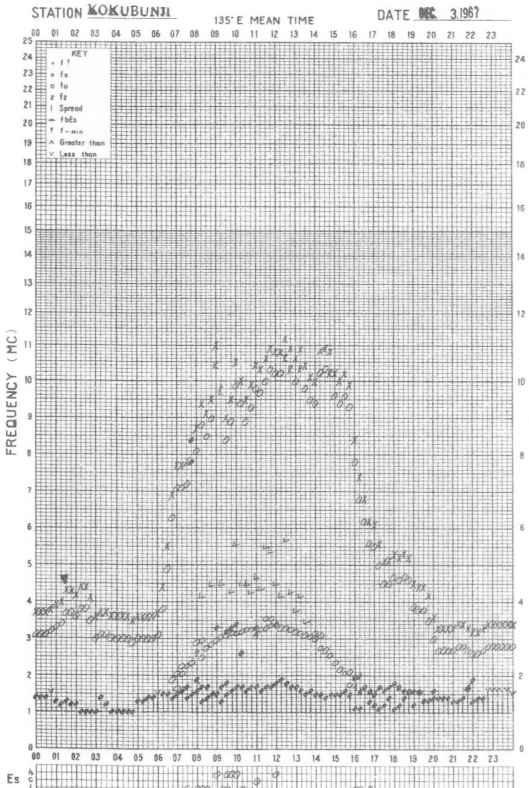

SCALED BY K. Yoshikawa The Radio Research Laboratories

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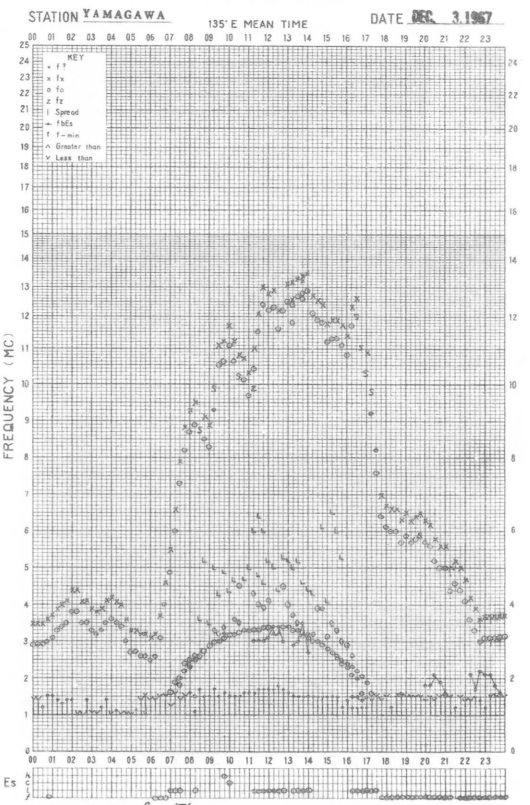

SCALED BY S. Ichidome The Radio Research Laboratories. Japan

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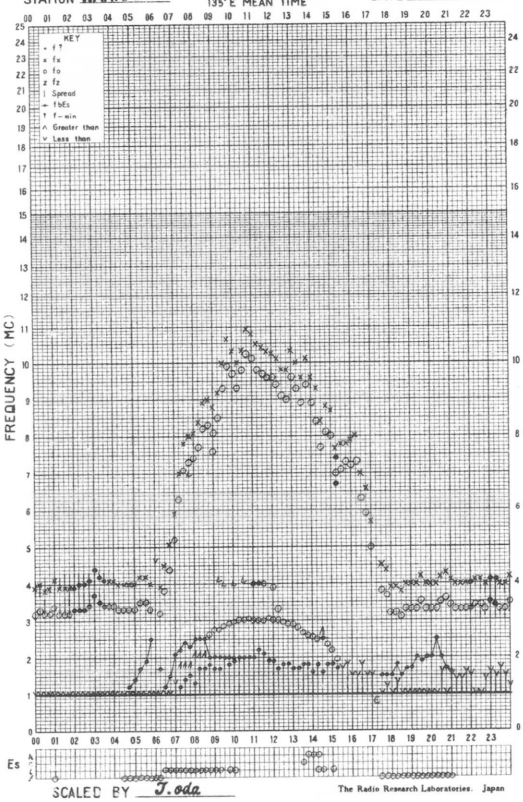

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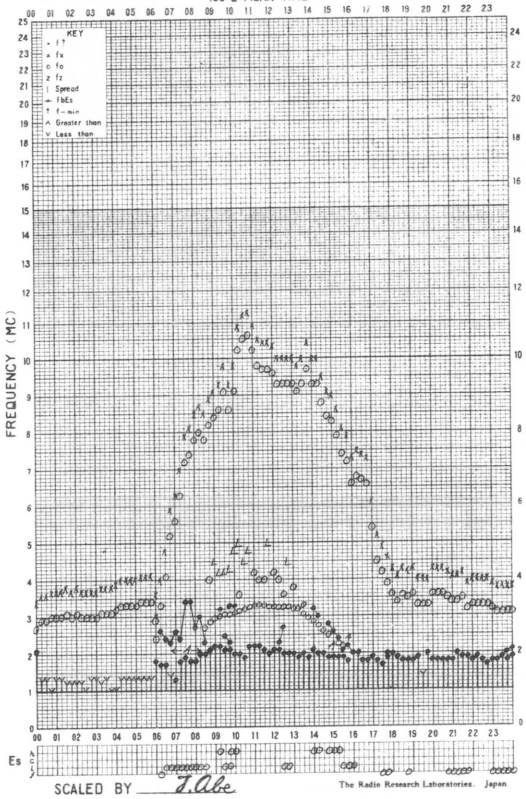

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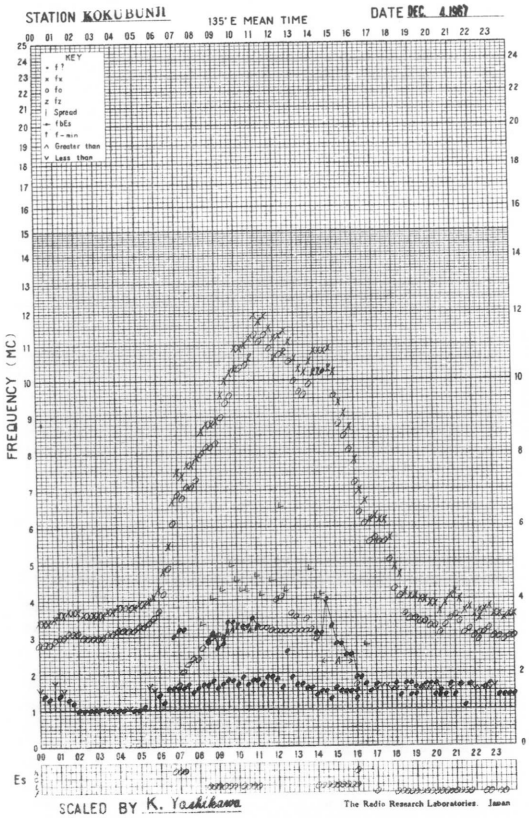

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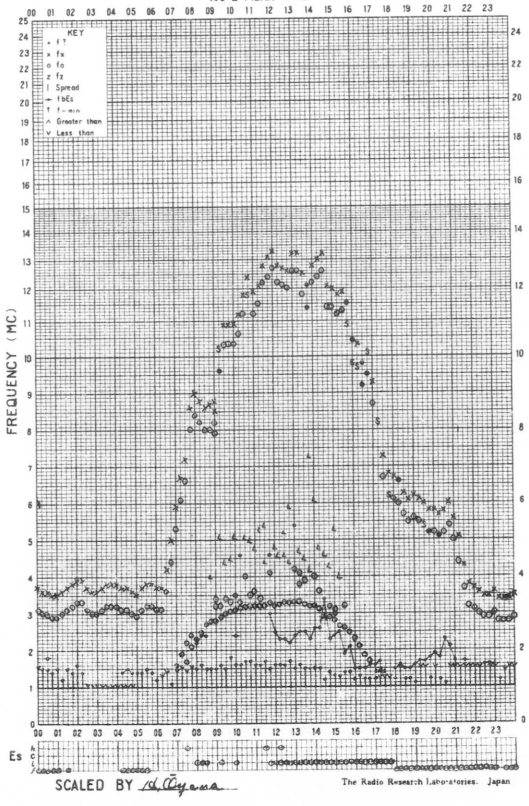

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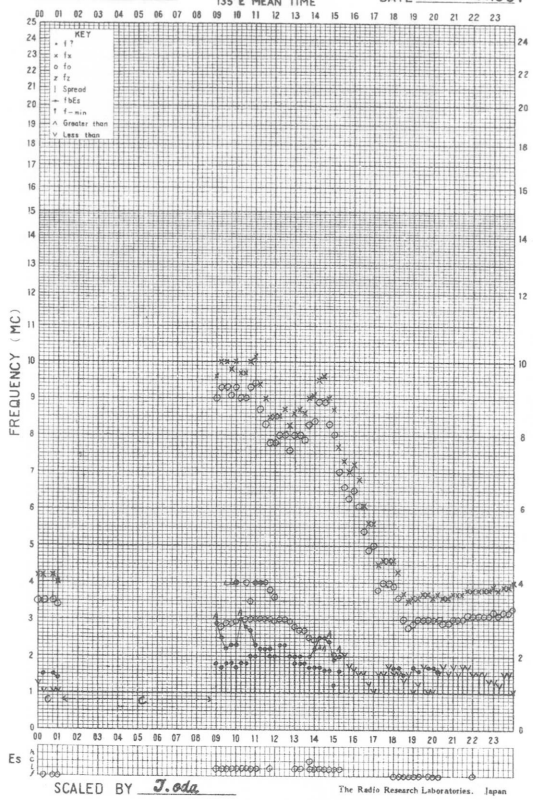

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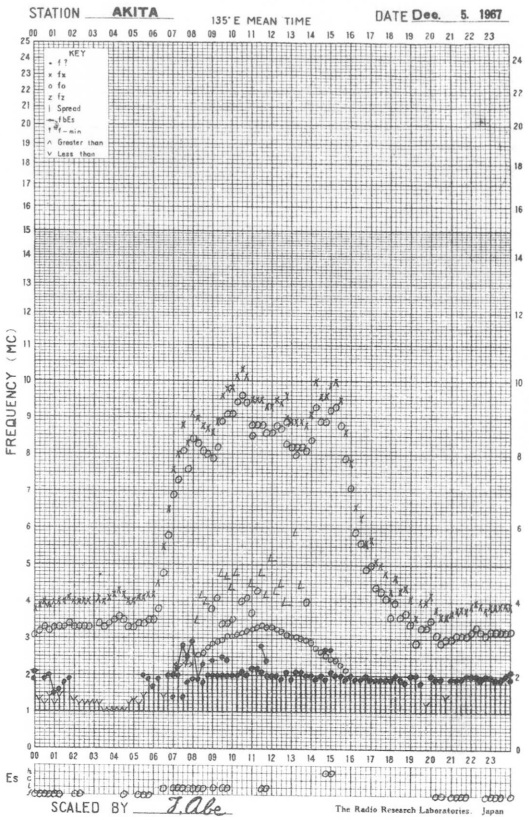

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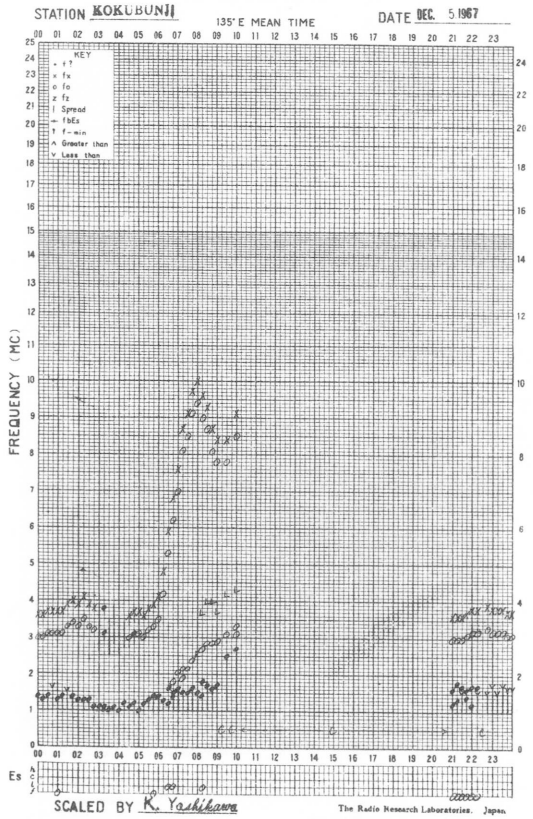

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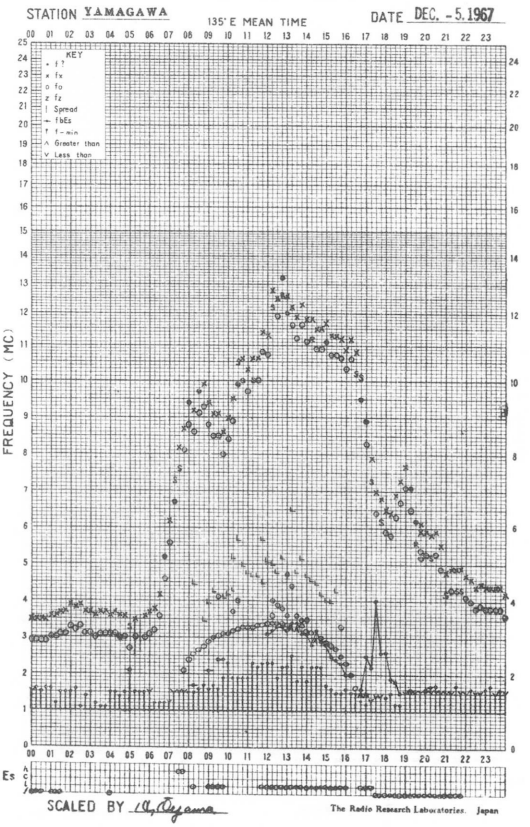

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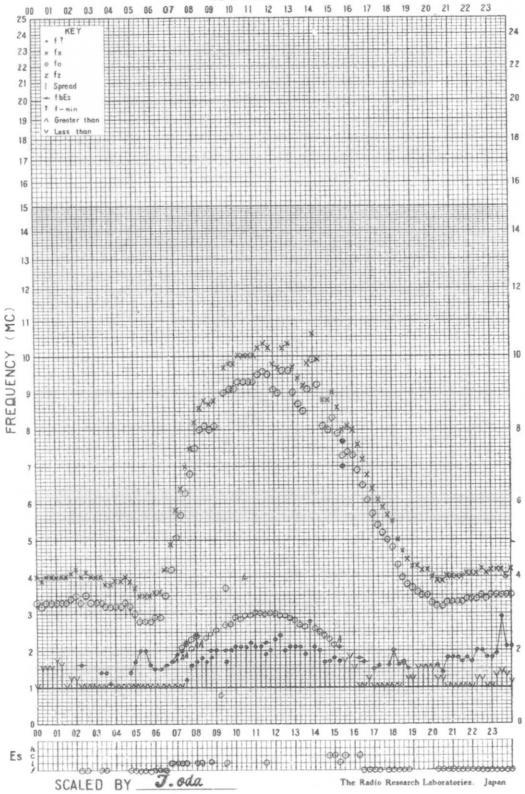

SCALED BY T. Oda

The Radio Research Laboratories. Japan

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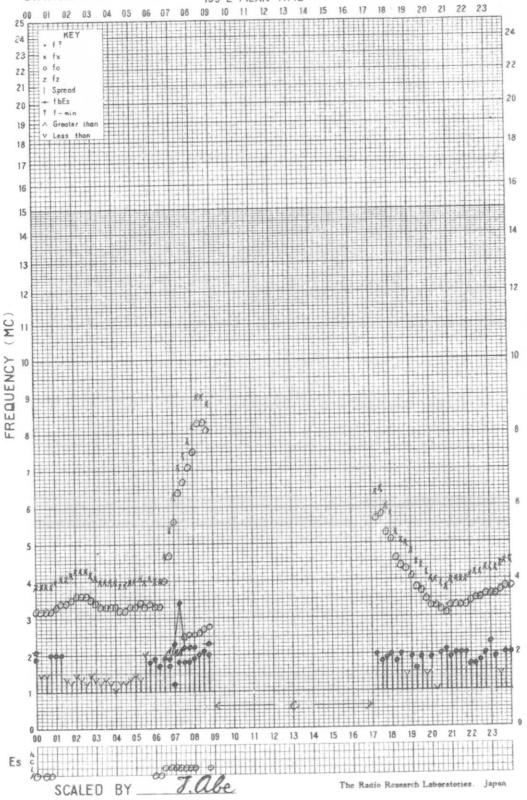

SCALED BY T. Abe

The Radio Research Laboratories. Japan

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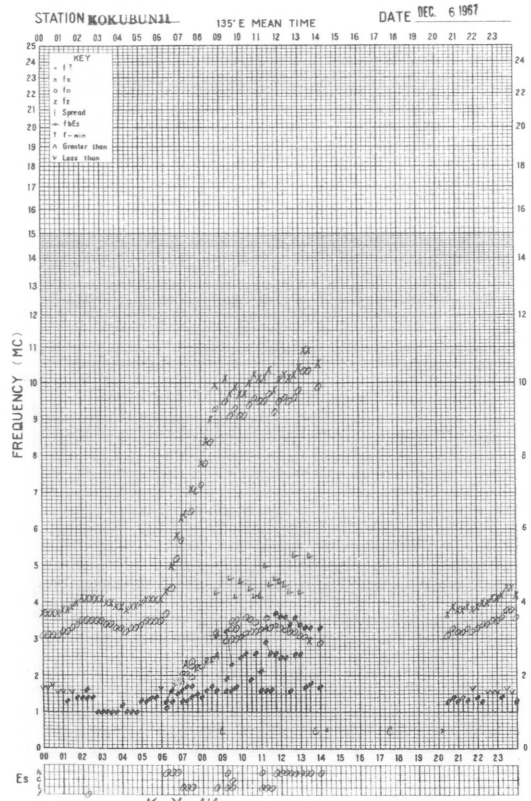

SCALED BY K. Yoshikawa

The Radio Research Laboratories. Japan

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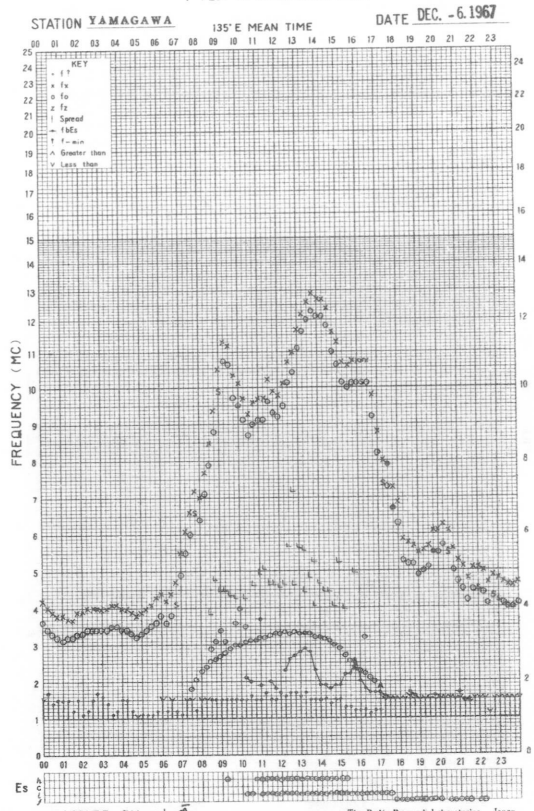

SCALED BY H. Oyama

The Radio Research Laboratories. Japan

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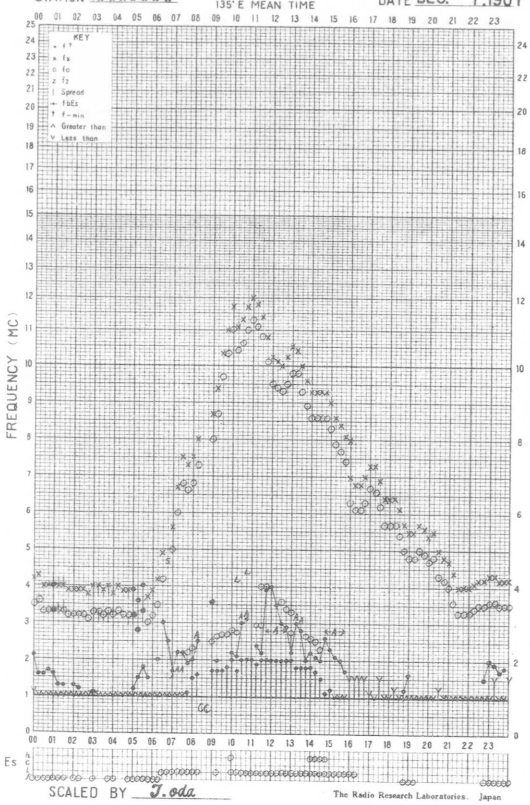

SCALED BY T. Oda

The Radio Research Laboratories. Japan

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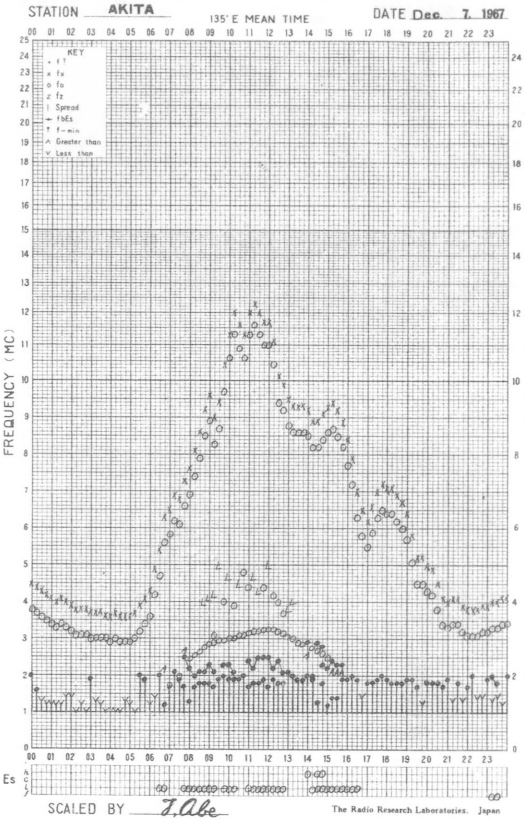

SCALED BY T. Abe

The Radio Research Laboratories. Japan

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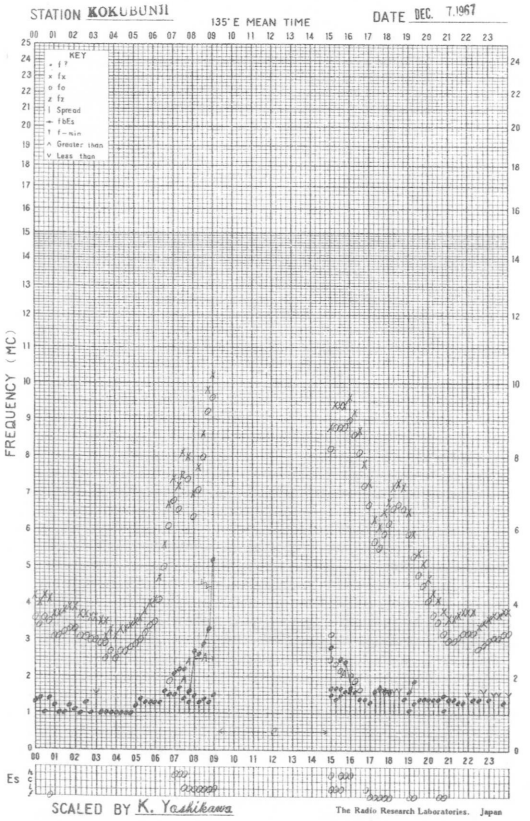

SCALED BY K. Yashikawa

The Radio Research Laboratories. Japan

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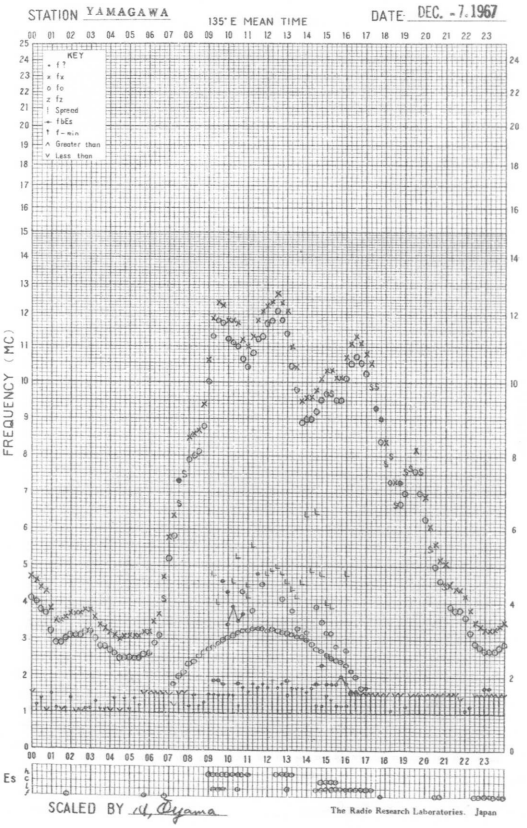

SCALED BY A. Ryoma

The Radio Research Laboratories. Japan

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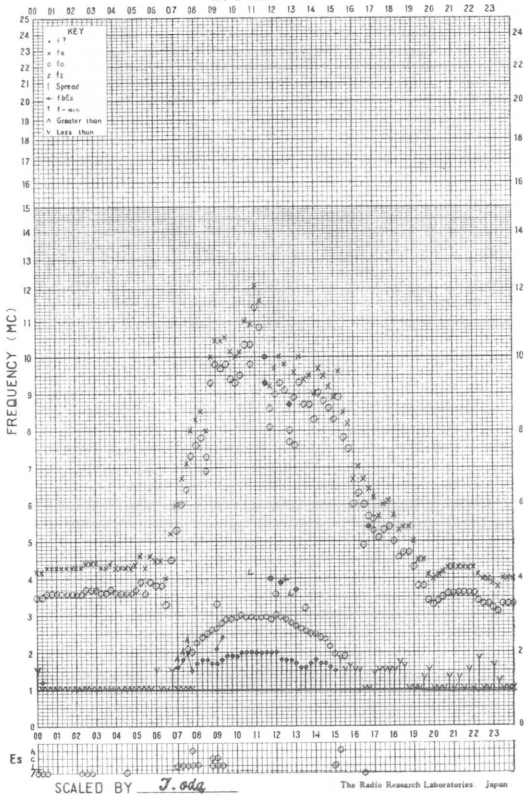

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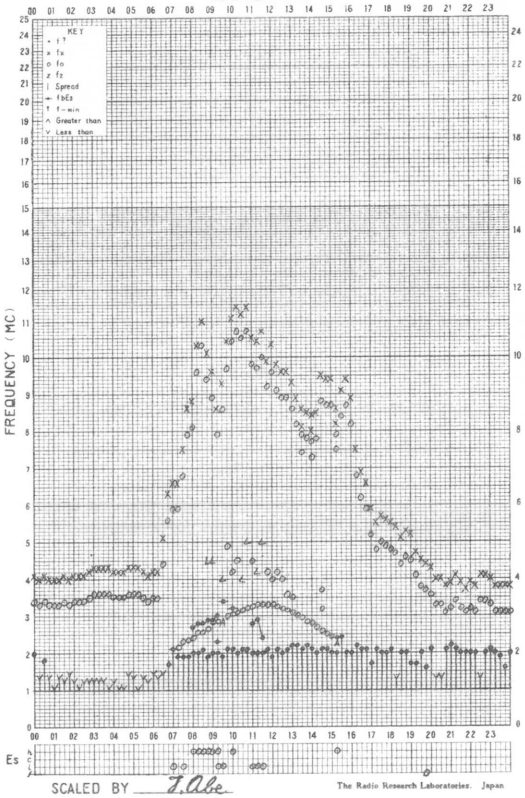

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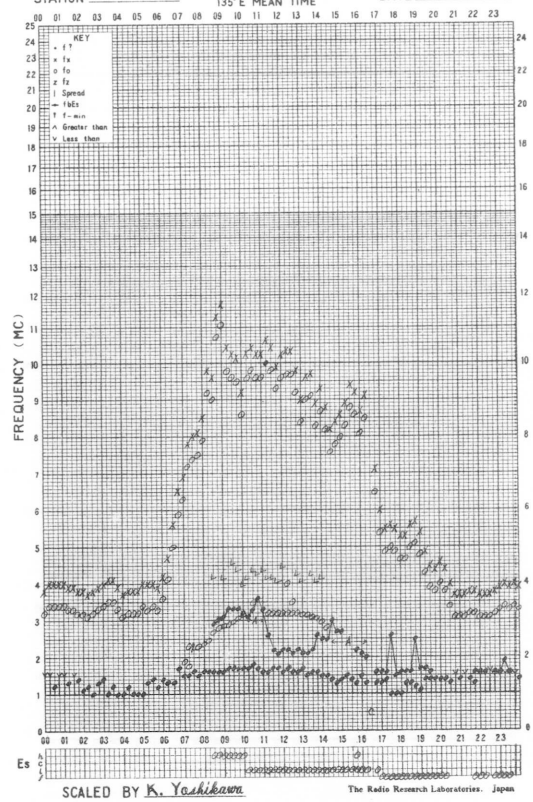

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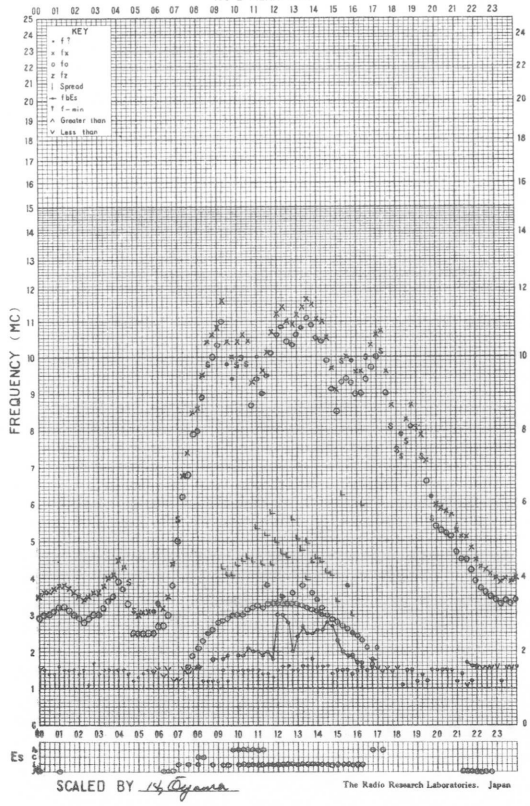

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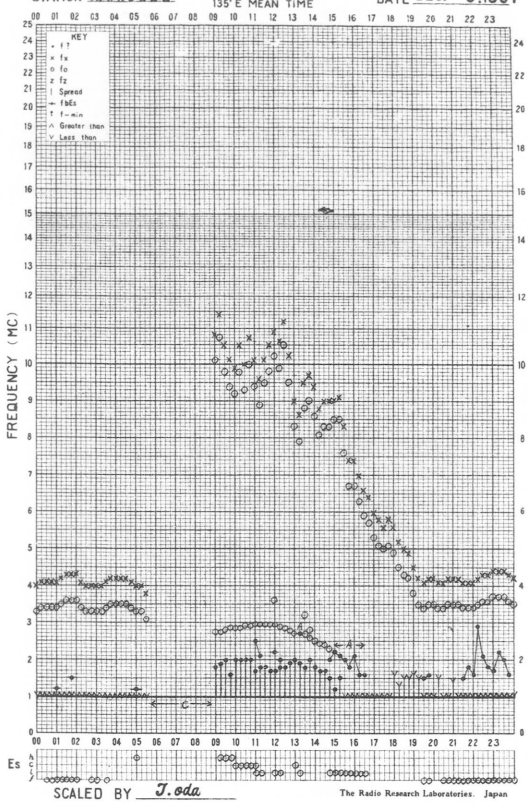

SCALED BY J. Oda The Radio Research Laboratories. Japan

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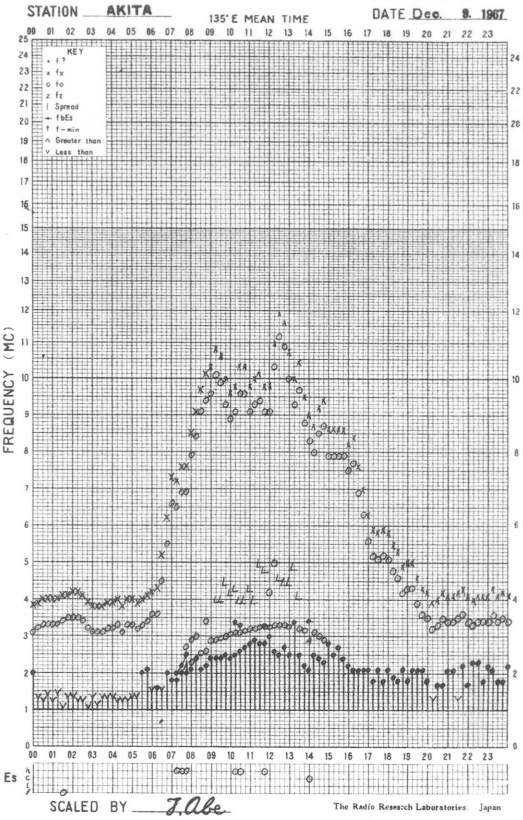

SCALED BY T. Abe The Radio Research Laboratories. Japan

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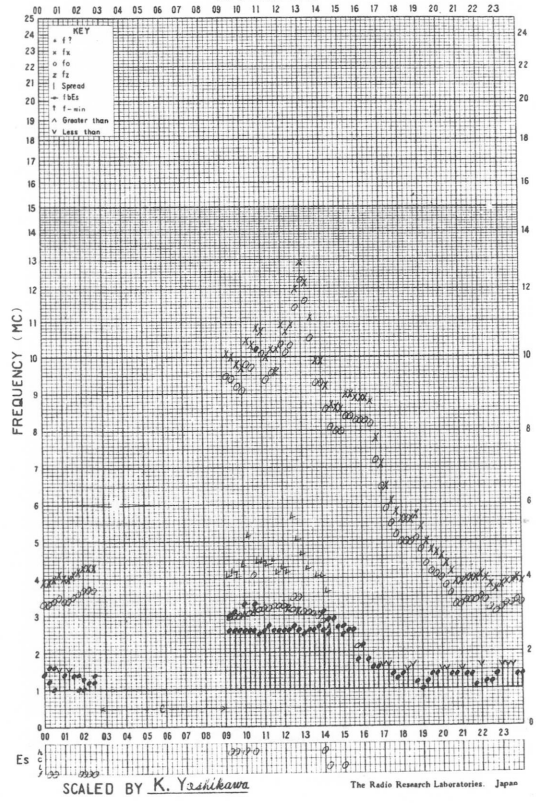

SCALED BY K. Yoshikawa The Radio Research Laboratories. Japan

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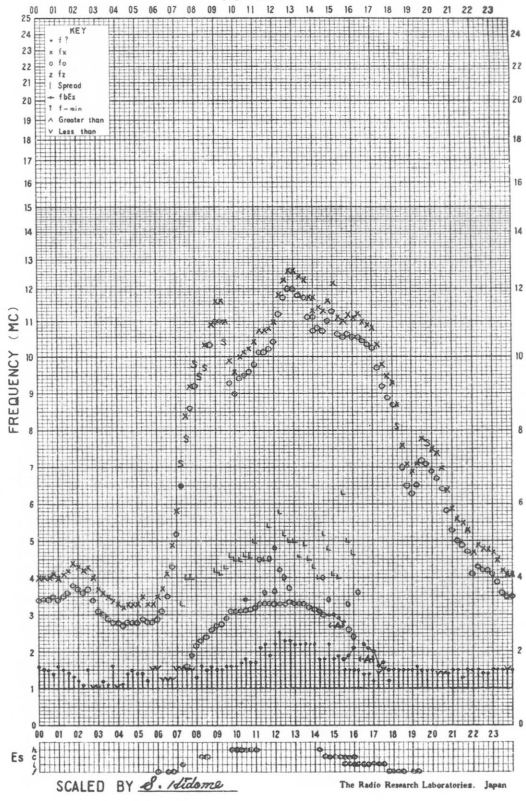

SCALED BY S. Shidomo The Radio Research Laboratories. Japan

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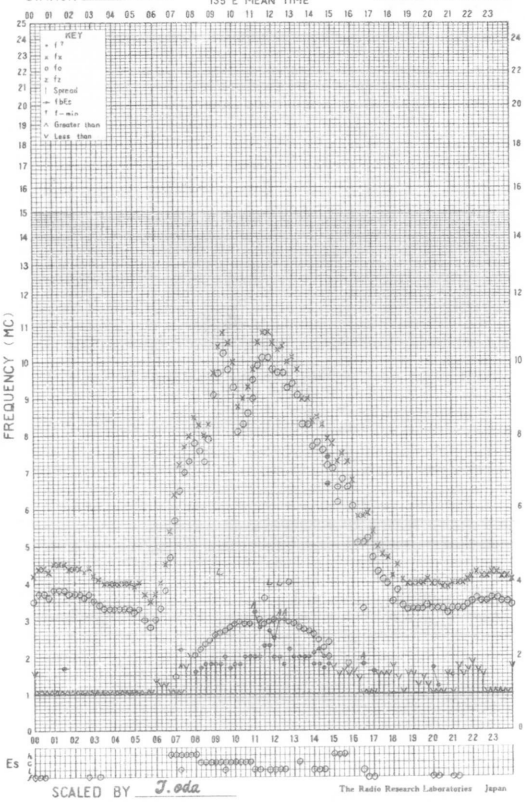

SCALED BY J. Oda

The Radio Research Laboratories Japan

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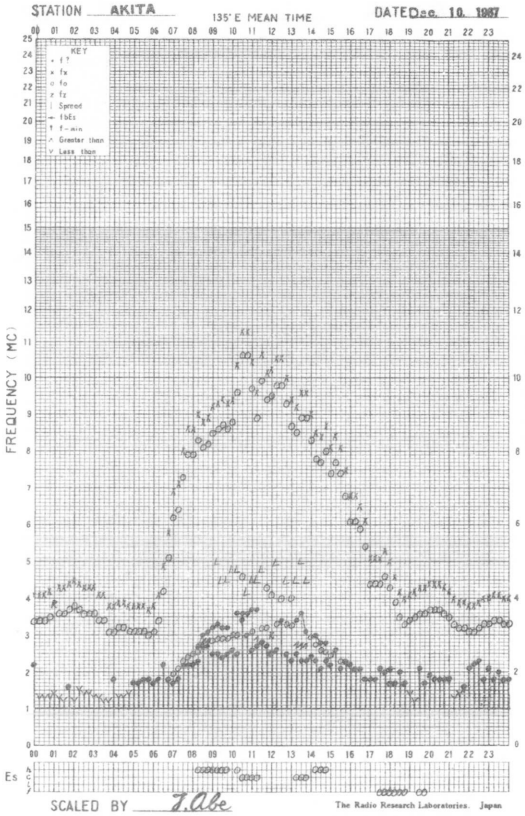

SCALED BY T. Abe

The Radio Research Laboratories Japan

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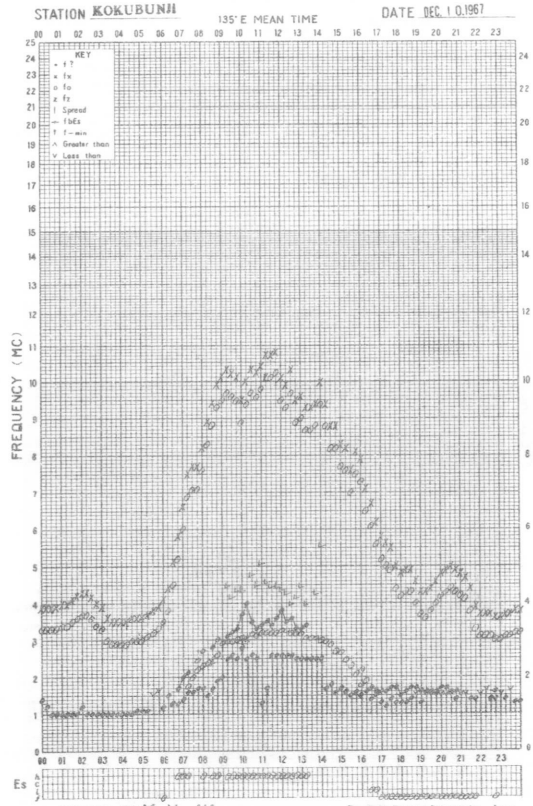

SCALED BY K. Yokohama

The Radio Research Laboratories Japan

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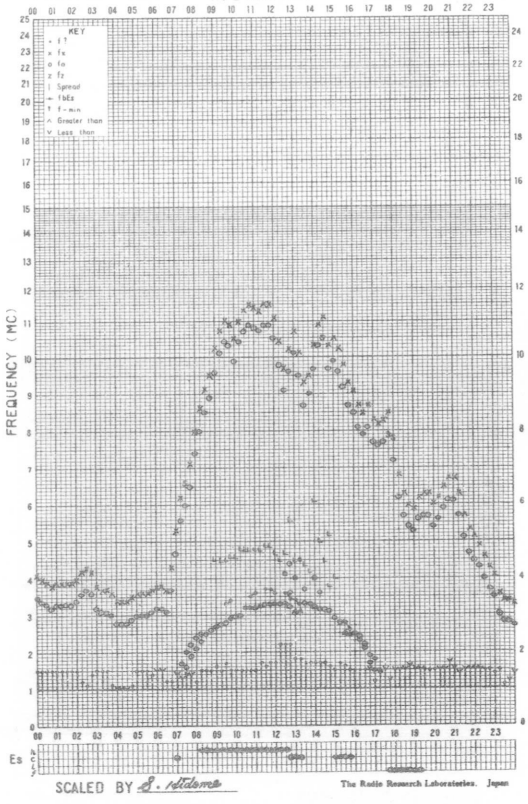

SCALED BY S. Ishikawa

The Radio Research Laboratories Japan

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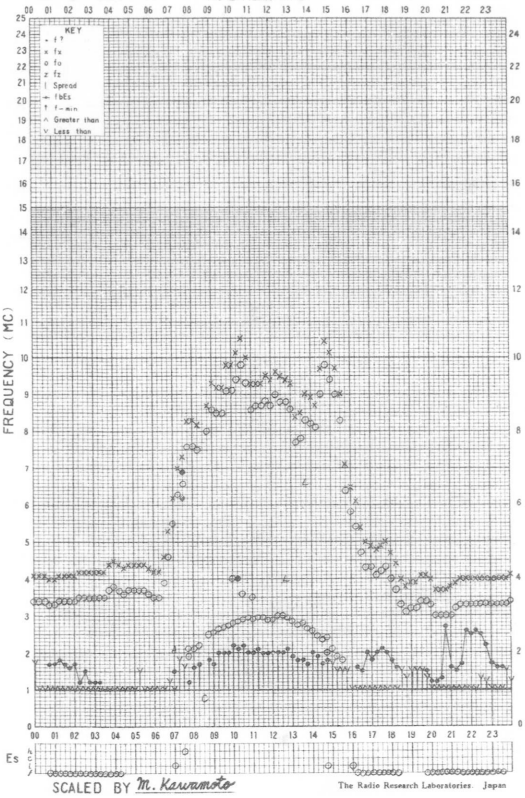

SCALED BY M. Kawamoto The Radio Research Laboratories. Japan

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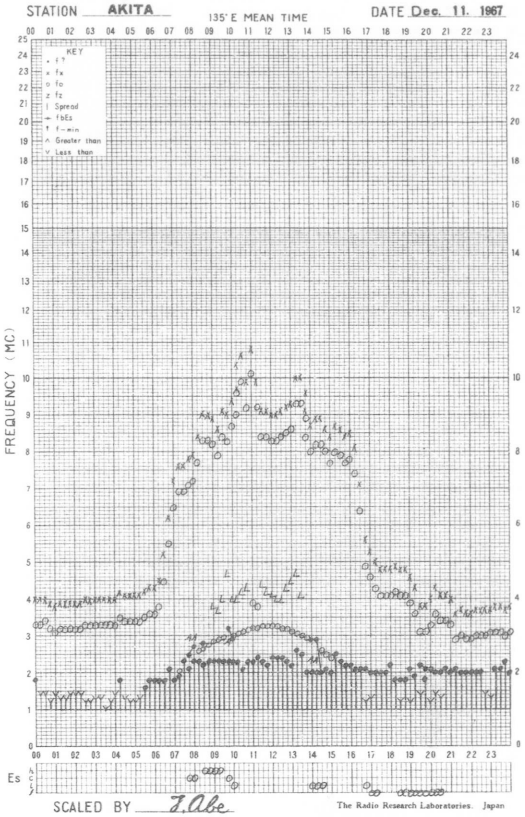

SCALED BY T. Abe The Radio Research Laboratories. Japan

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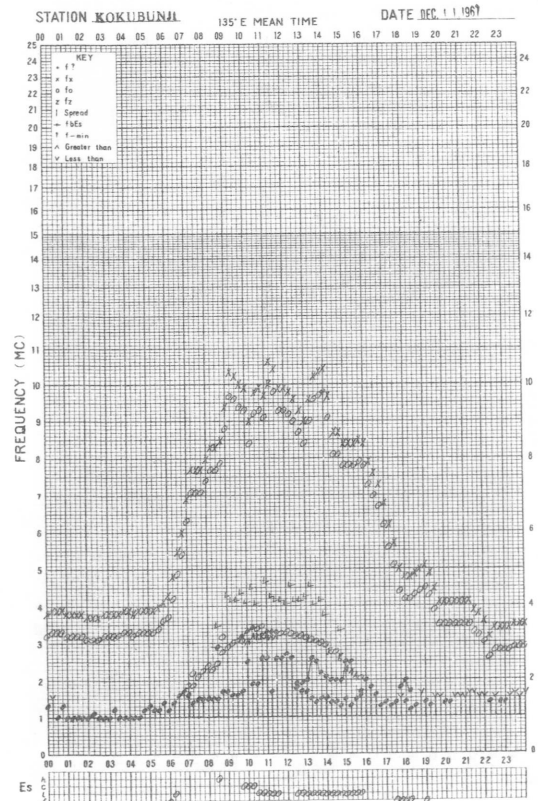

SCALED BY K. Yashikawa The Radio Research Laboratories. Japan

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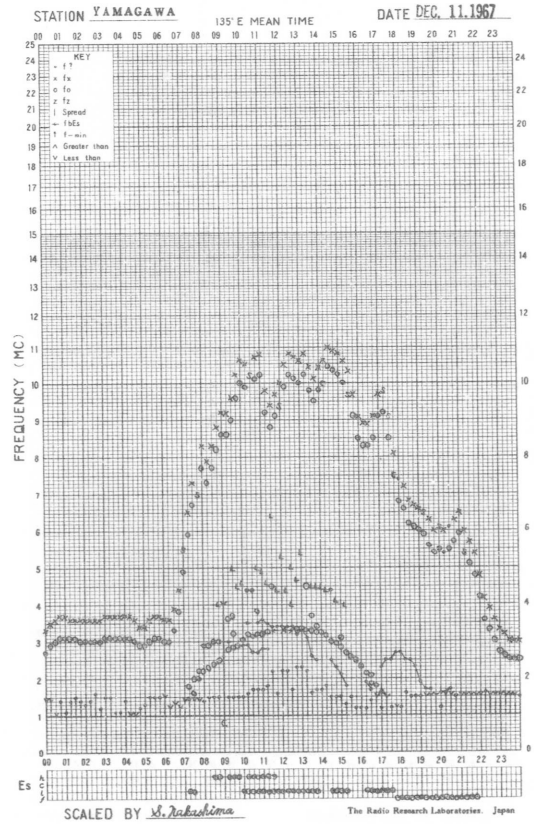

SCALED BY S. Nakashima The Radio Research Laboratories. Japan

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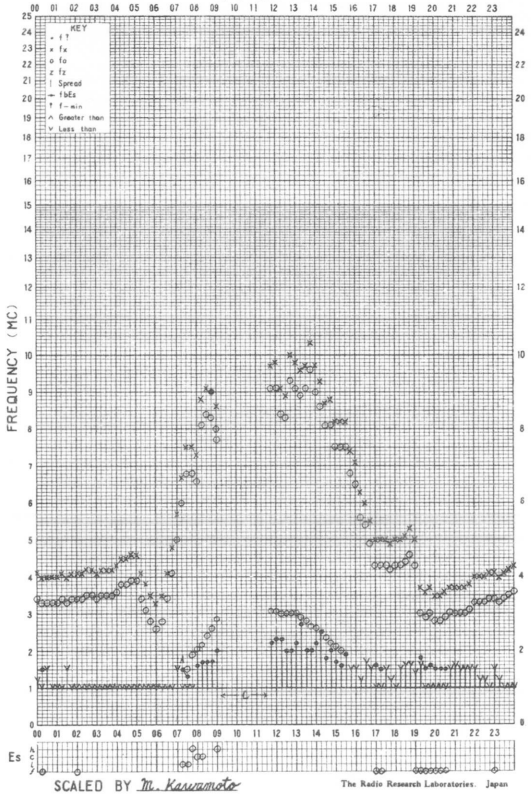

SCALED BY M. Kawamoto

The Radio Research Laboratories. Japan

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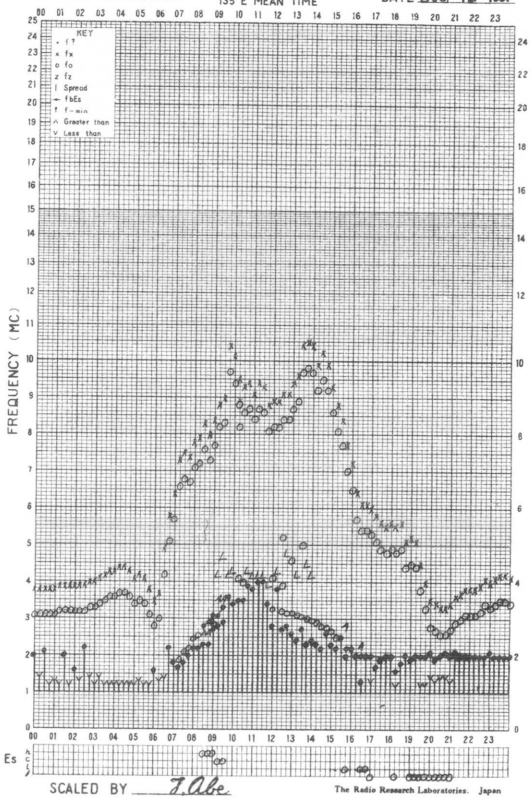

SCALED BY T. Abe

The Radio Research Laboratories. Japan

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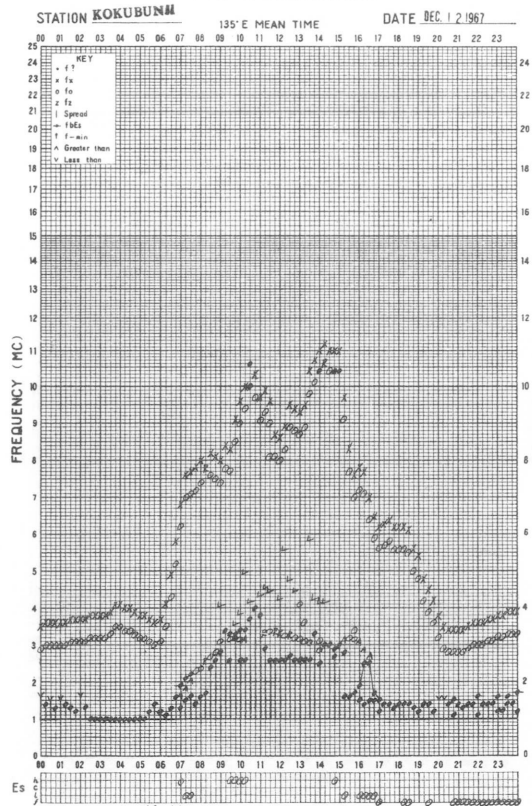

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The Radio Research Laboratories. Japan

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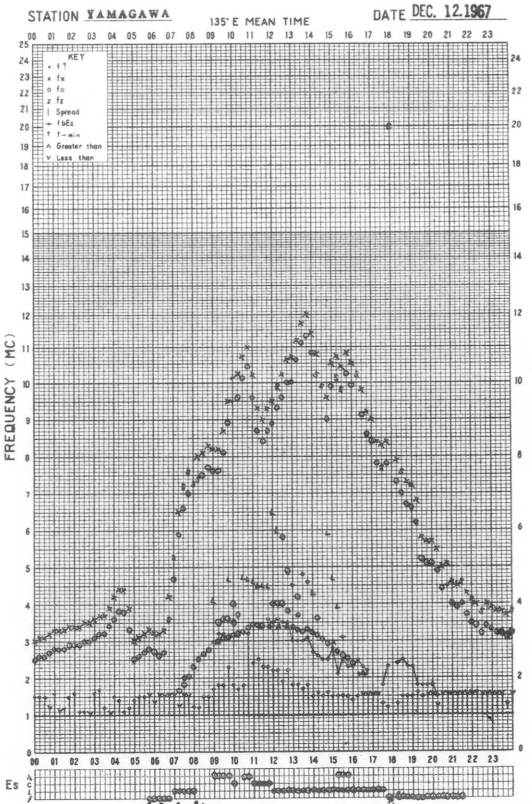

SCALED BY S. Takashima

The Radio Research Laboratories. Japan

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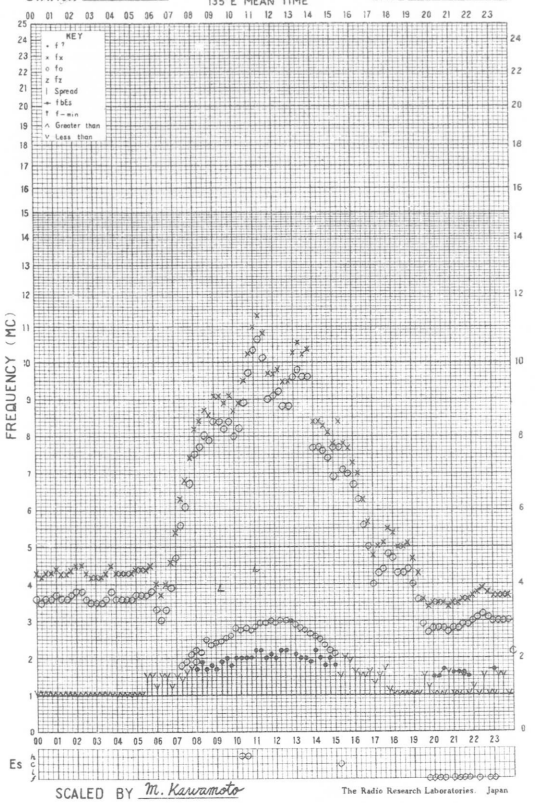

SCALED BY M. Kawamoto The Radio Research Laboratories. Japan

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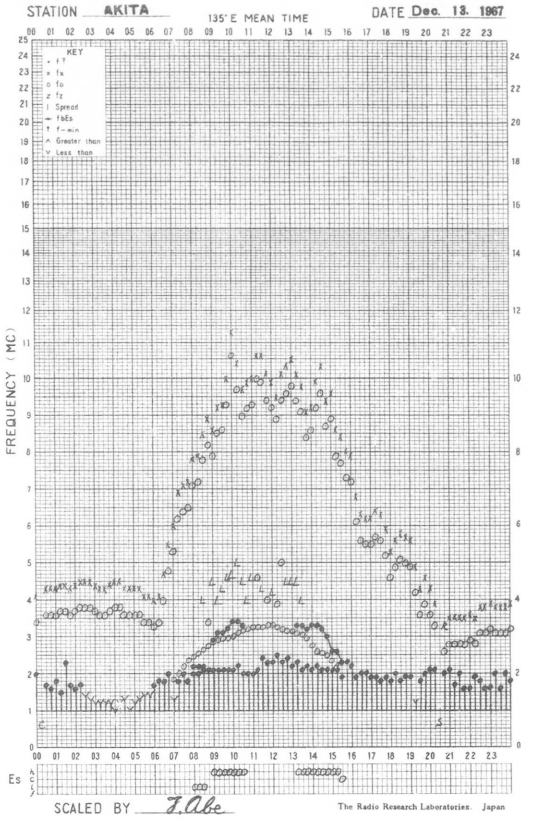

SCALED BY T. Abe The Radio Research Laboratories. Japan

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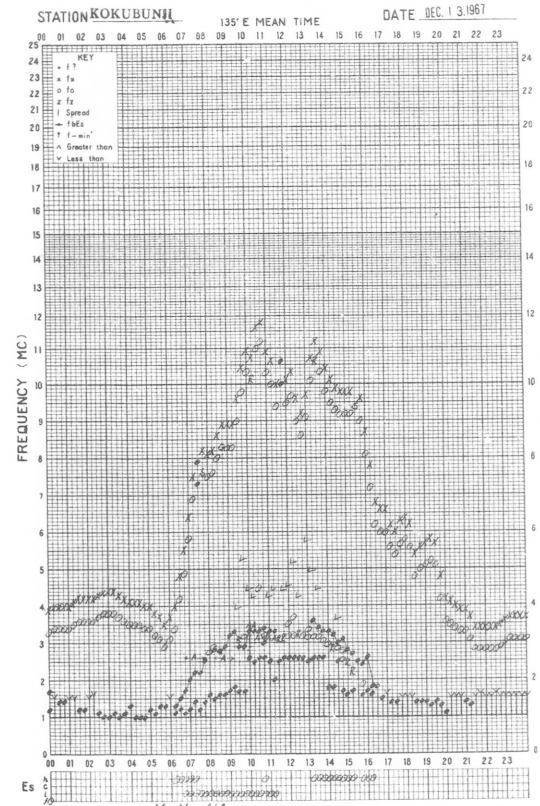

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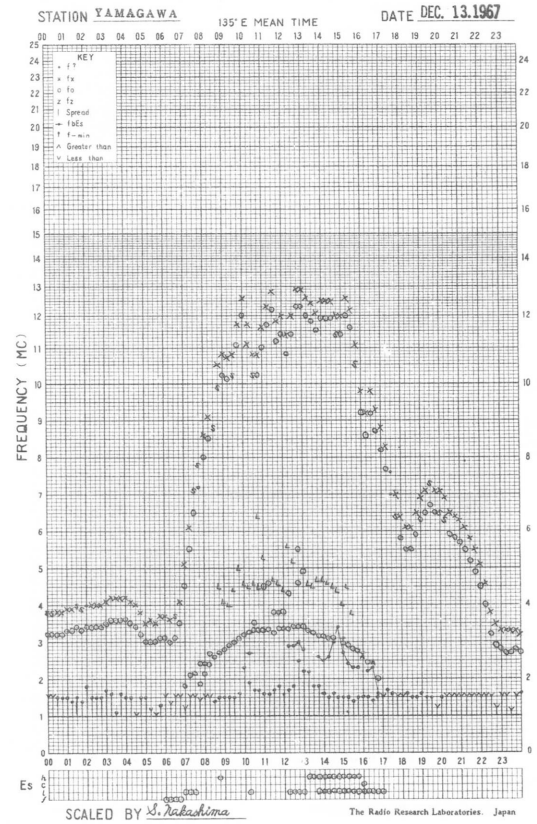
STATION YAMAGAWA 135°E MEAN TIME DATE DEC. 13.1967



SCALED BY S. Takashima The Radio Research Laboratories. Japan

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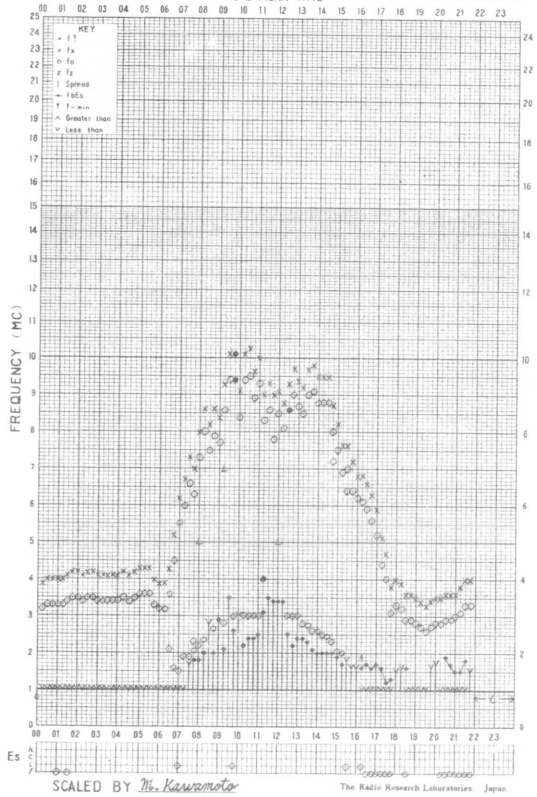

SCALED BY M. Kawamoto

The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

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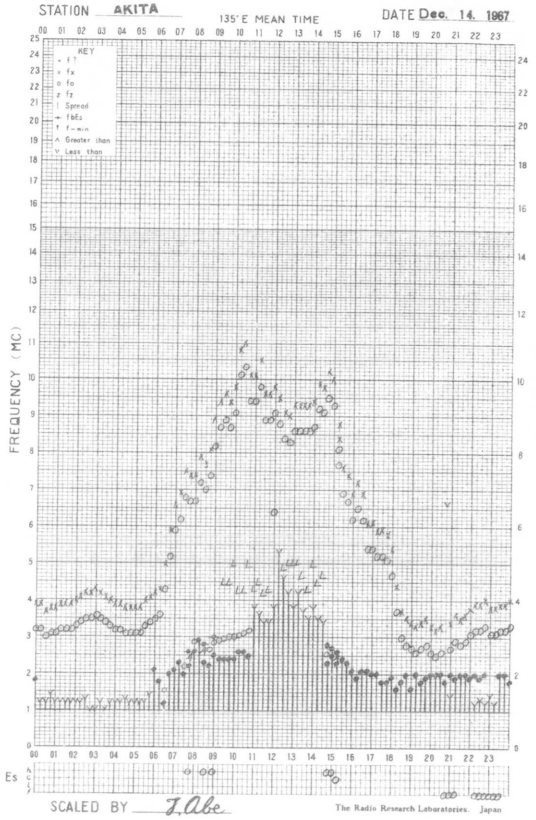

SCALED BY T. Abe

The Radio Research Laboratories. Japan

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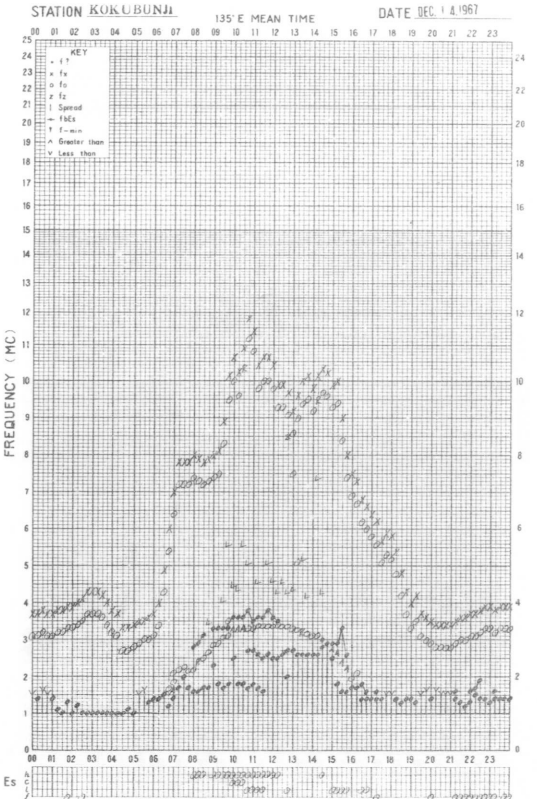

SCALED BY K. Yoshikawa

The Radio Research Laboratories. Japan

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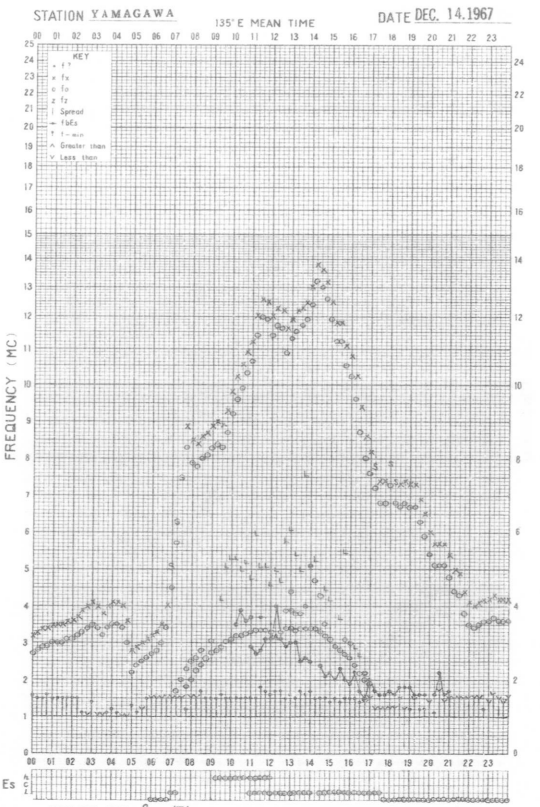

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The Radio Research Laboratories. Japan

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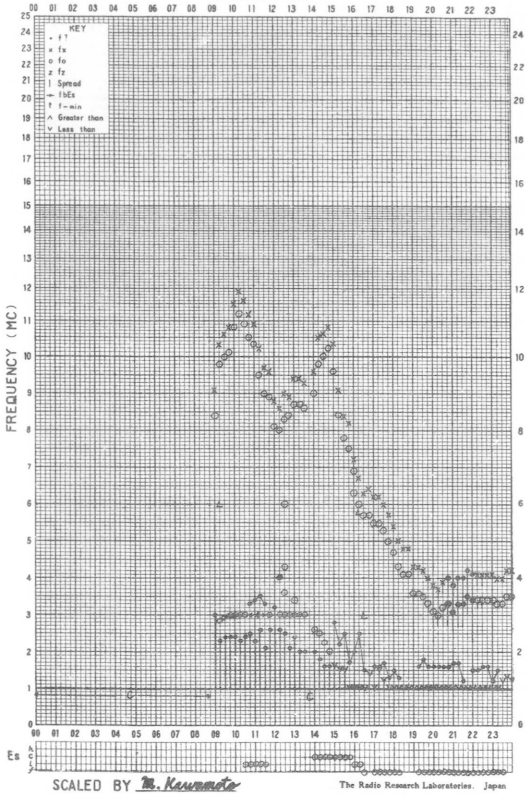

SCALED BY M. Kawamoto The Radio Research Laboratories. Japan

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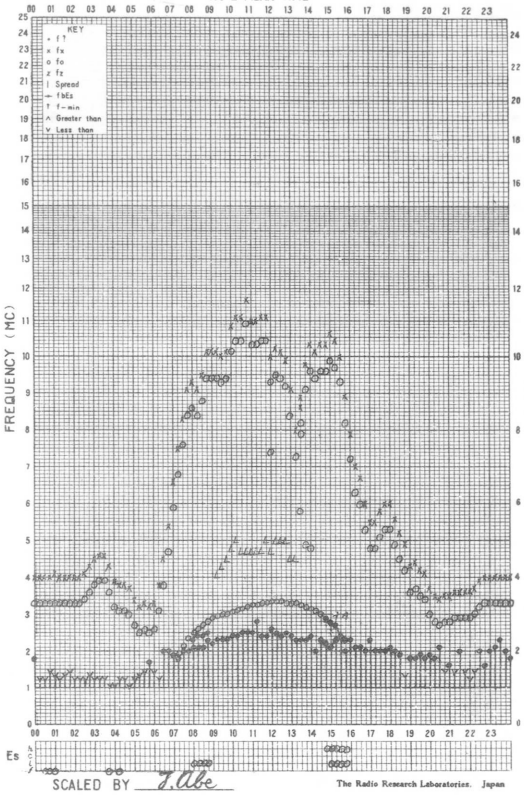

SCALED BY T. Abe The Radio Research Laboratories. Japan

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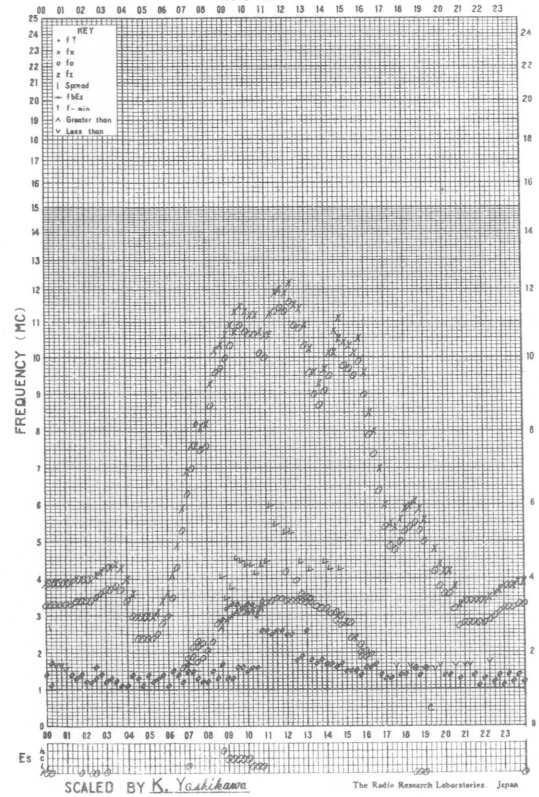

SCALED BY K. Yashikawa The Radio Research Laboratories. Japan

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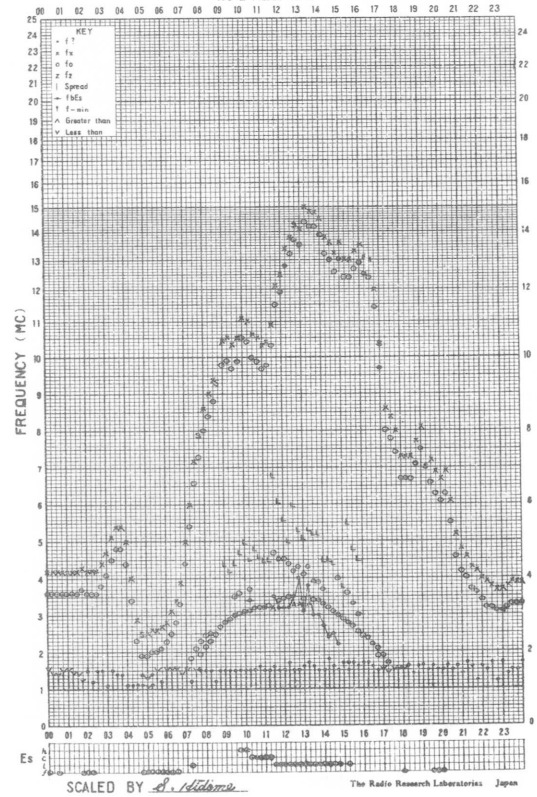

SCALED BY S. Aidomo The Radio Research Laboratories Japan

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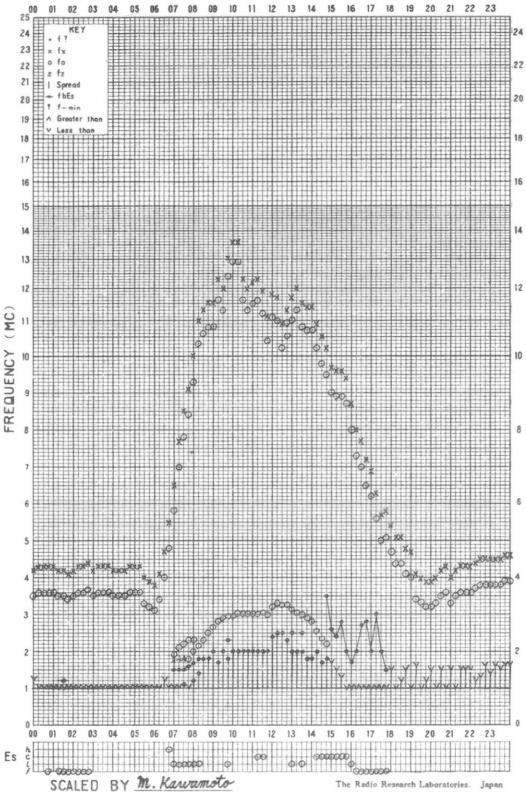

SCALED BY M. Kawamoto

The Radio Research Laboratories. Japan

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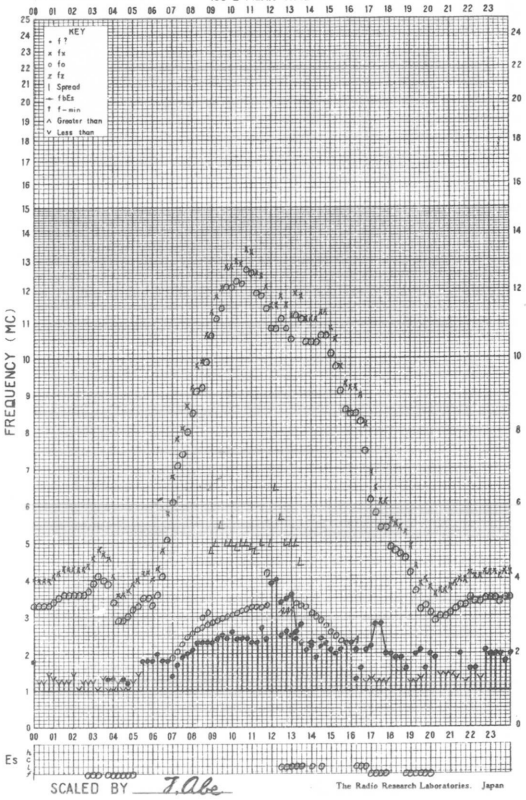

SCALED BY T. Abe

The Radio Research Laboratories. Japan

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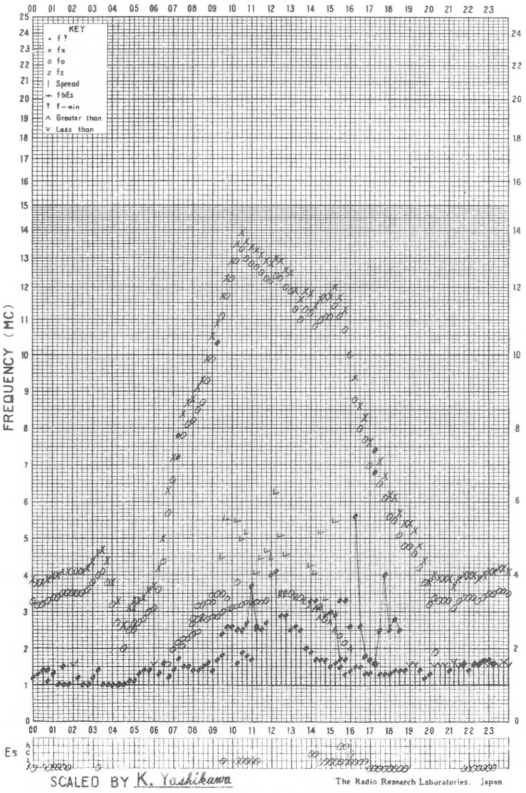

SCALED BY K. Yoshikawa

The Radio Research Laboratories. Japan

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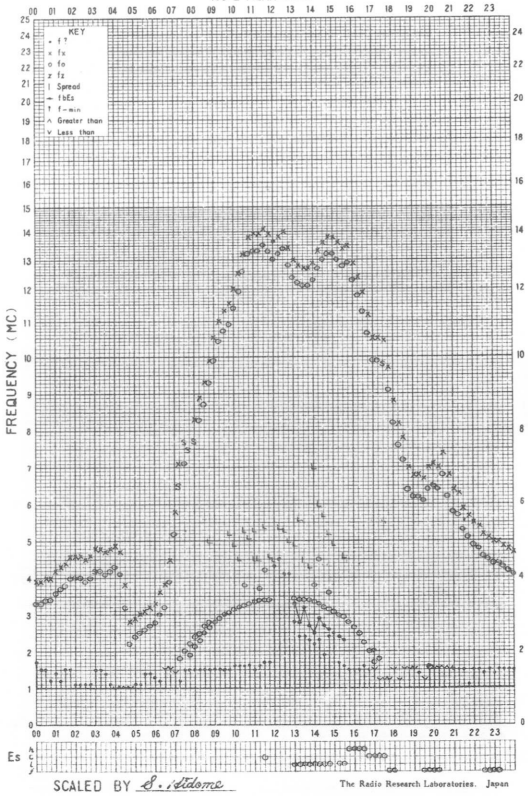

SCALED BY S. Aidome

The Radio Research Laboratories. Japan

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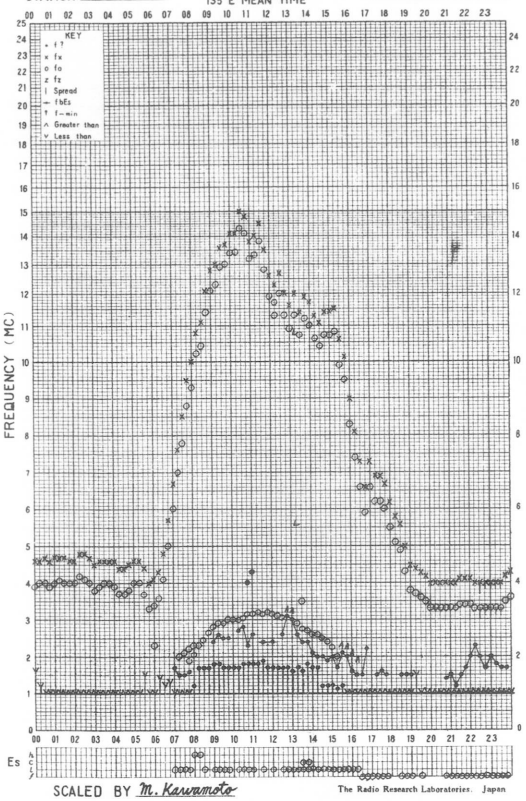

SCALED BY M. Kawamoto

The Radio Research Laboratories. Japan

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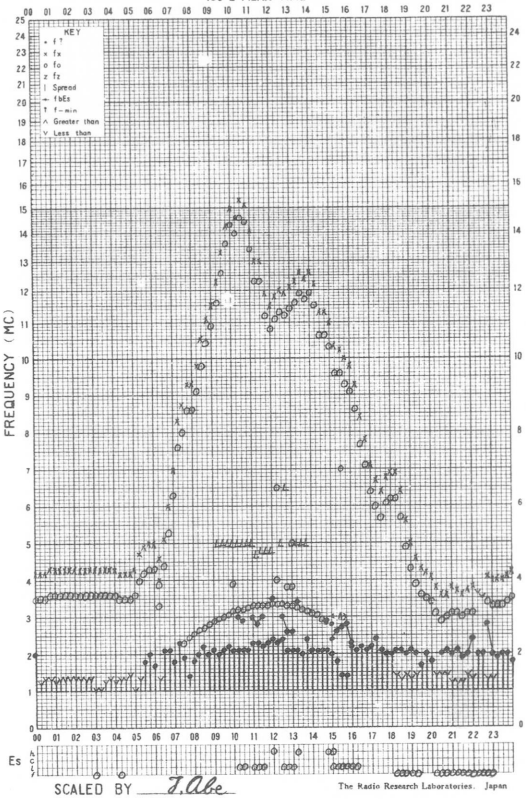

SCALED BY T. Abe

The Radio Research Laboratories. Japan

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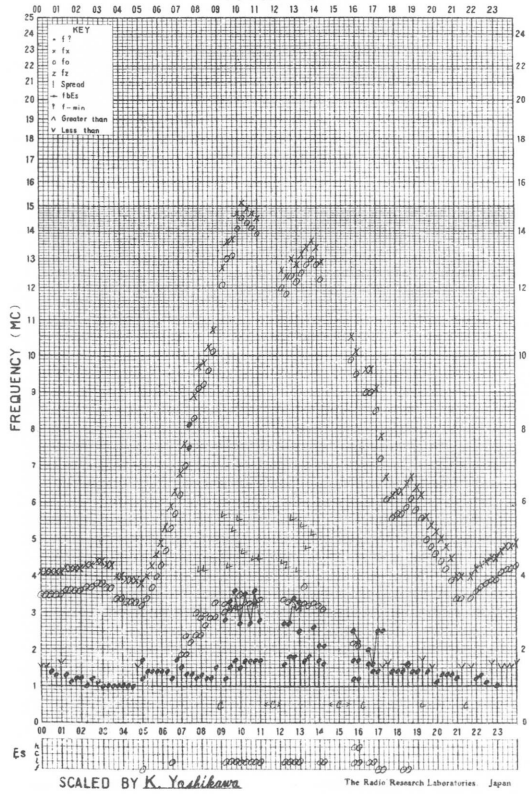

SCALED BY K. Yoshikawa

The Radio Research Laboratories. Japan

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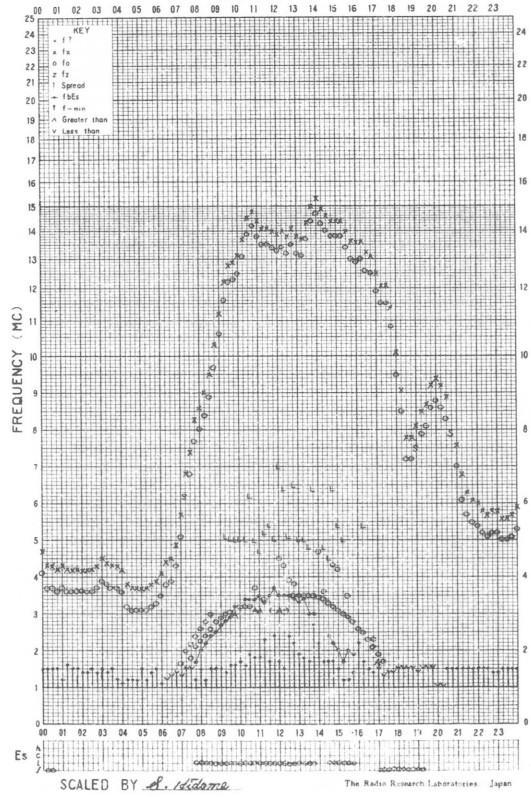

SCALED BY A. Hidoma

The Radio Research Laboratories. Japan

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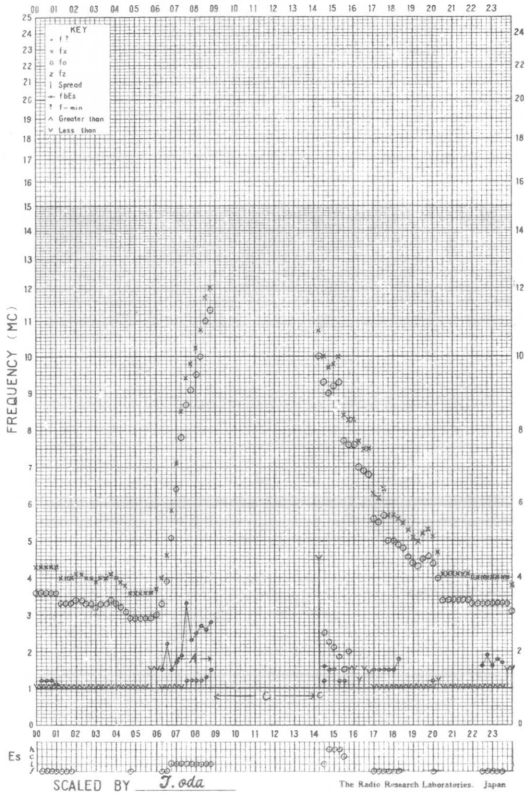

SCALED BY T. Oda

The Radio Research Laboratories. Japan

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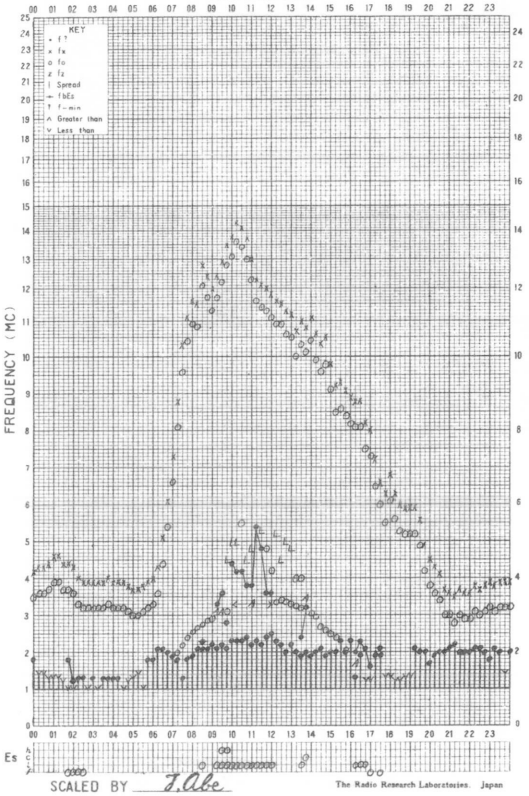

SCALED BY T. Abe

The Radio Research Laboratories. Japan

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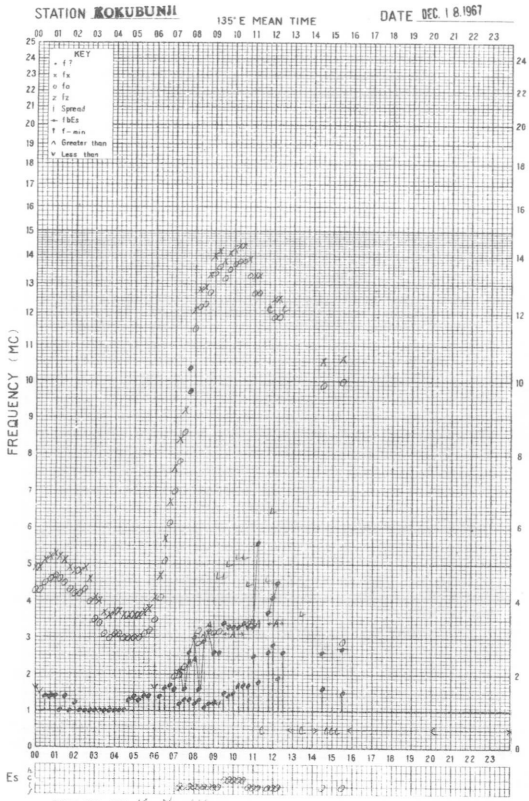

SCALED BY K. Yashikawa

The Radio Research Laboratories. Japan

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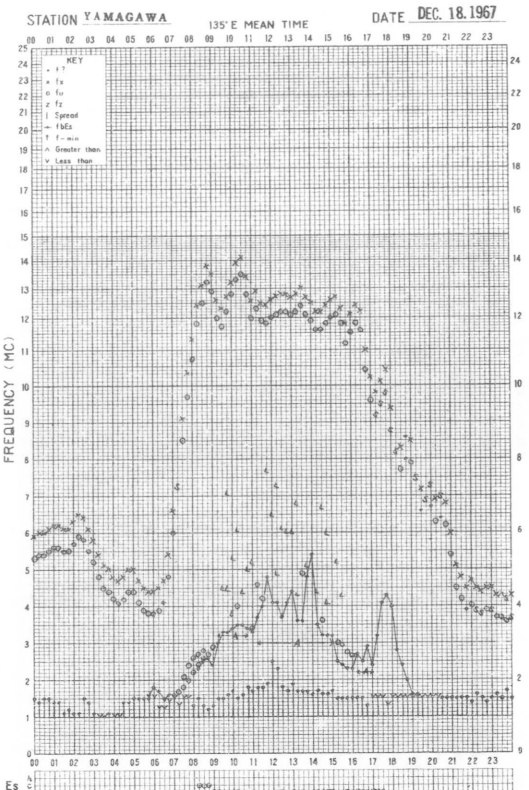

SCALED BY S. Nakashima

The Radio Research Laboratories. Japan

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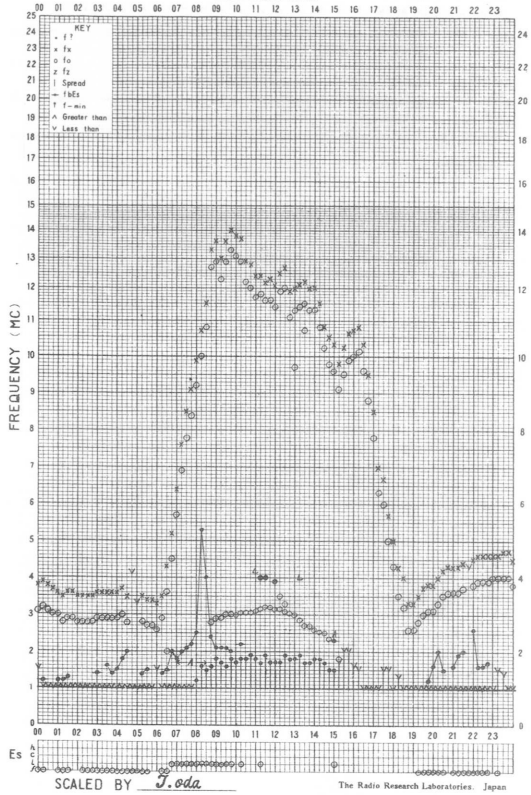

SCALED BY T. Oda

The Radio Research Laboratories. Japan

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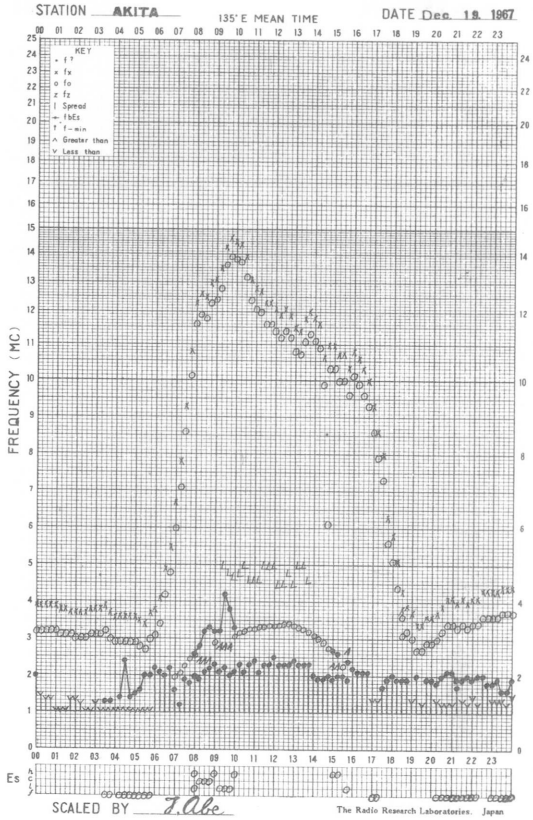

SCALED BY T. Abe

The Radio Research Laboratories. Japan

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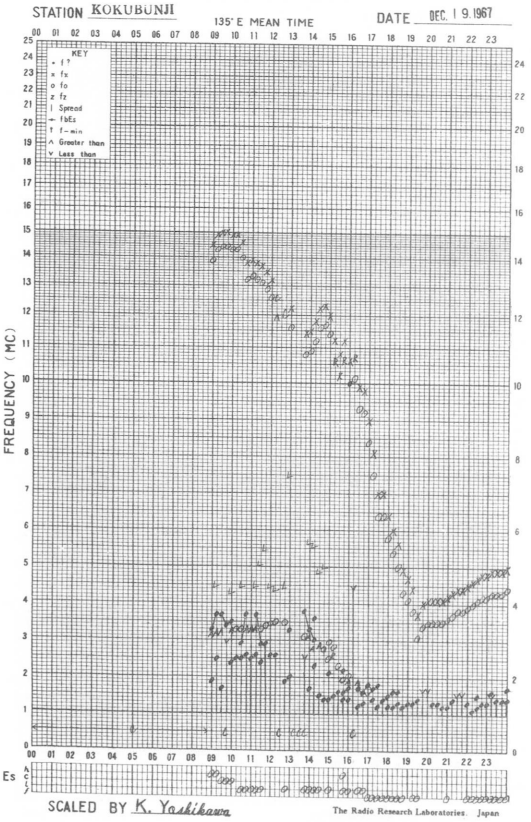

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The Radio Research Laboratories. Japan

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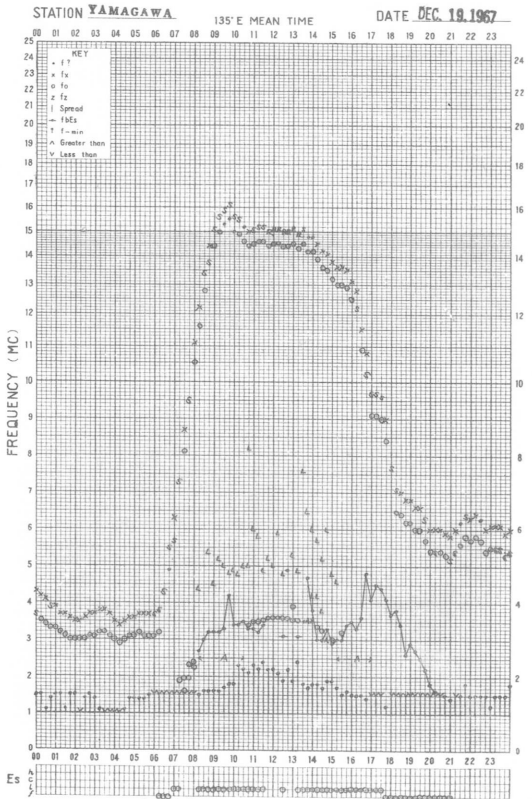

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The Radio Research Laboratories. Japan

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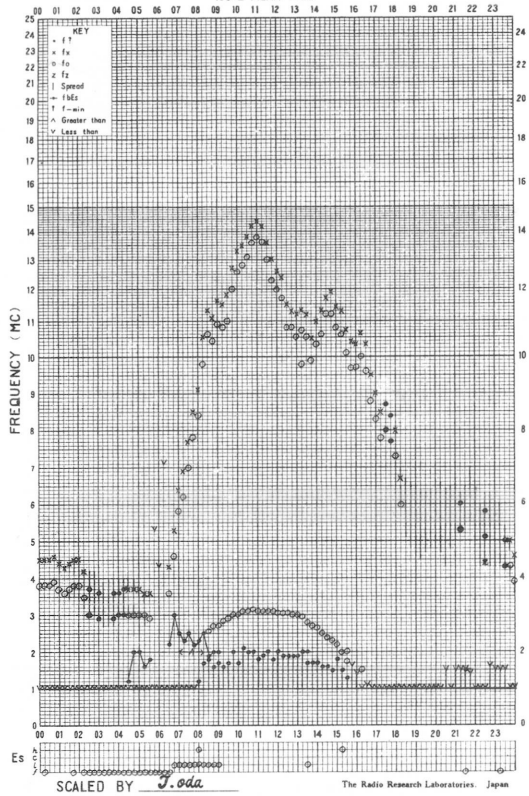

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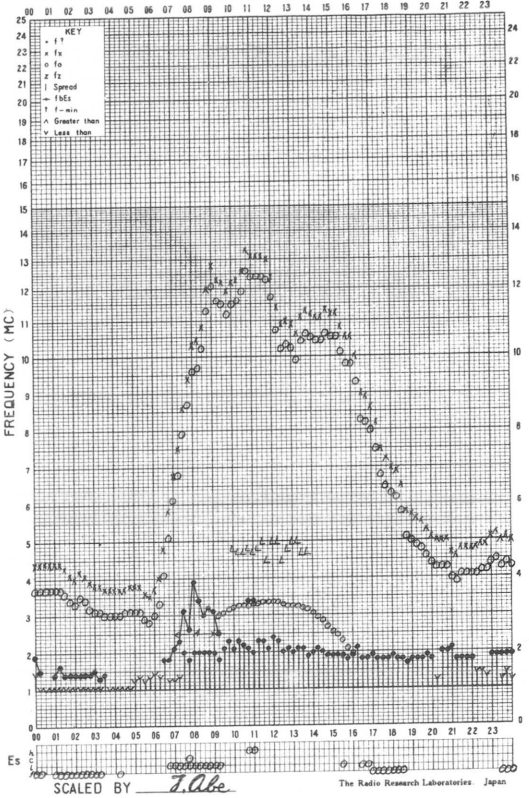

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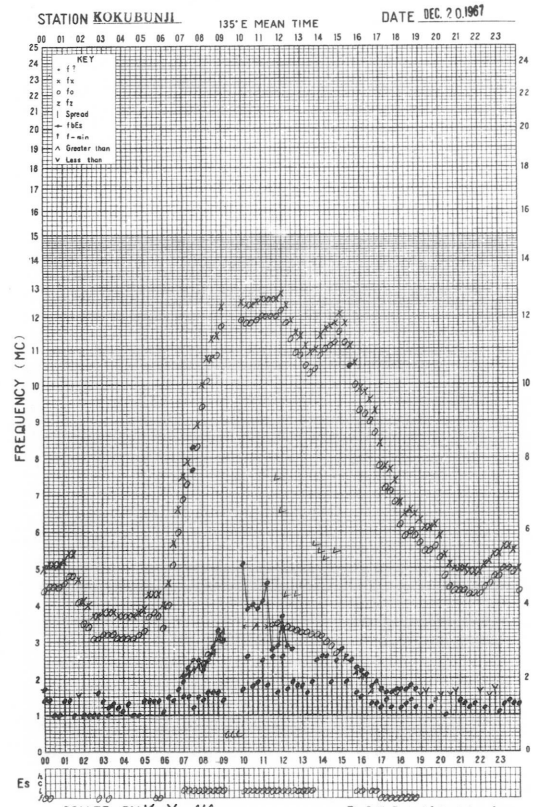

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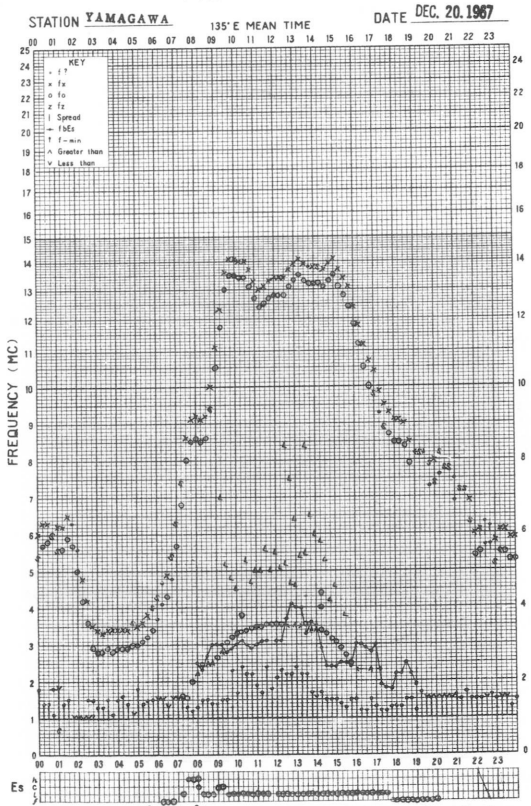

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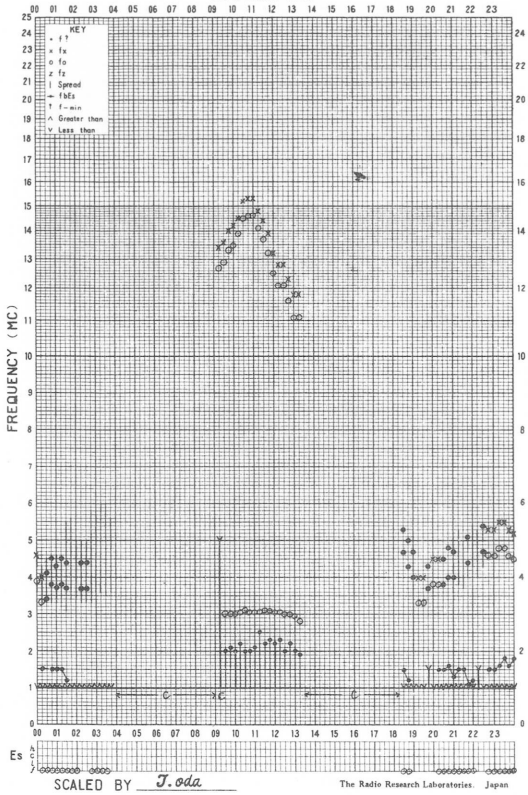

SCALED BY J. oda

The Radio Research Laboratories. Japan

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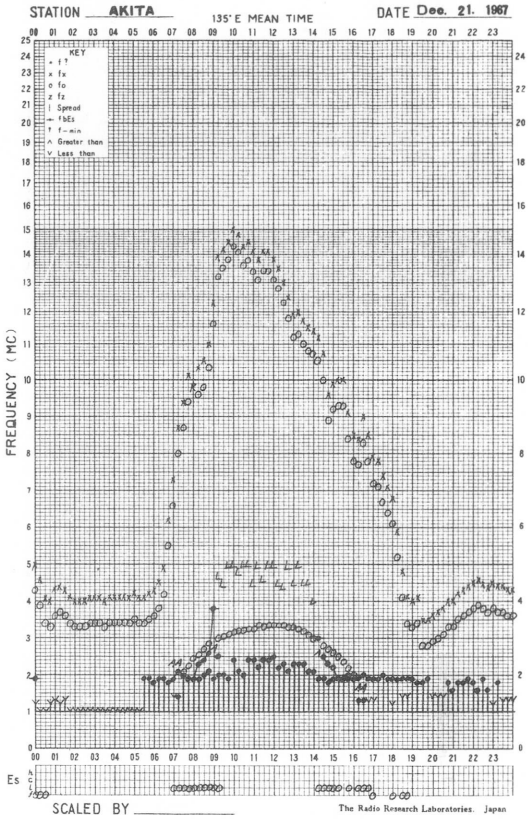

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The Radio Research Laboratories. Japan

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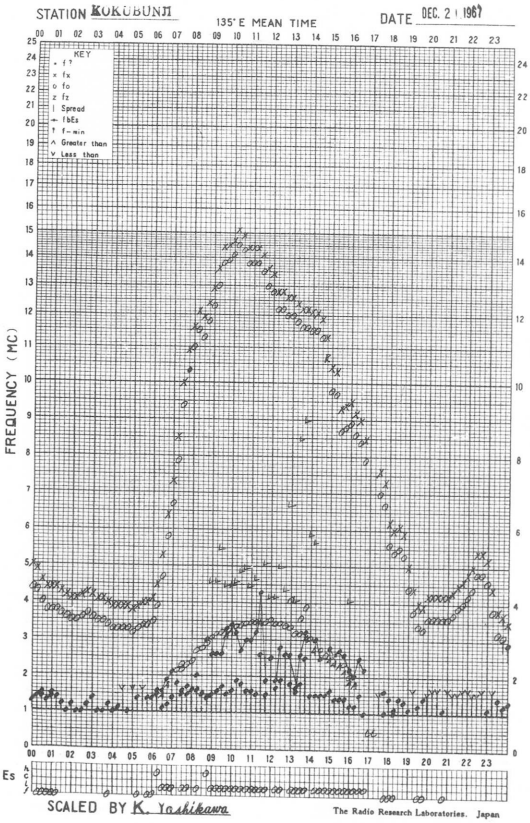

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The Radio Research Laboratories. Japan

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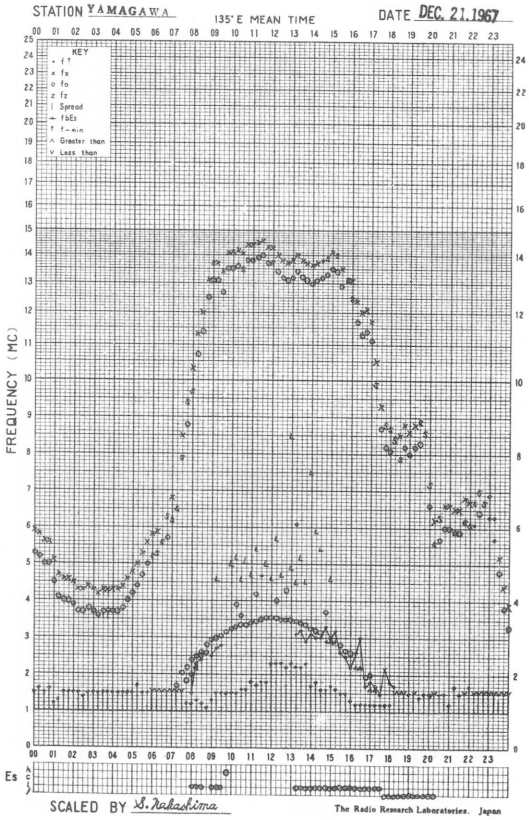

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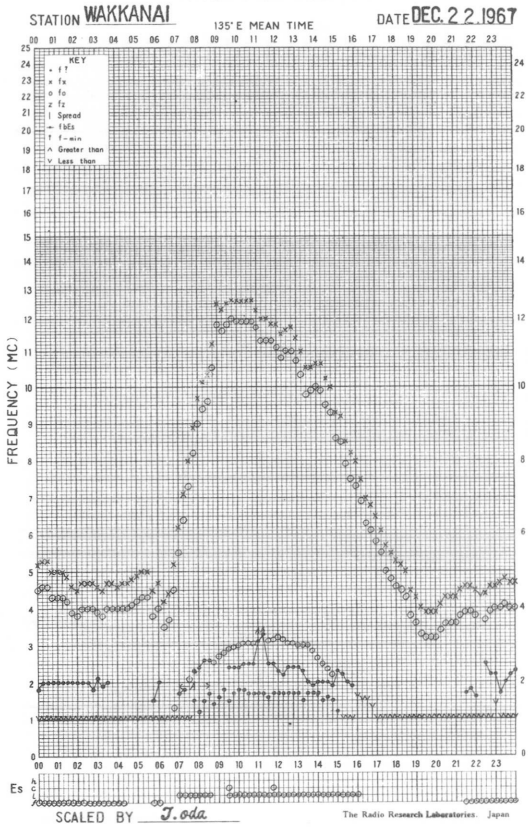

SCALED BY J. Oda

The Radio Research Laboratories. Japan

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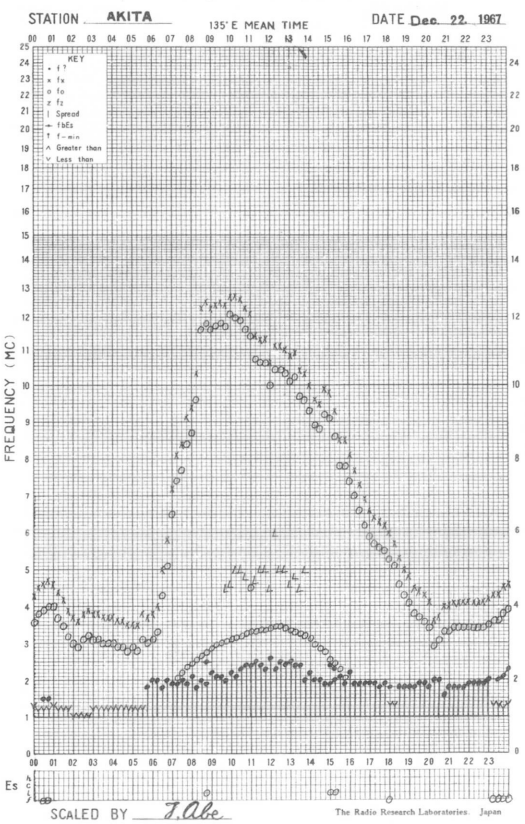

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The Radio Research Laboratories. Japan

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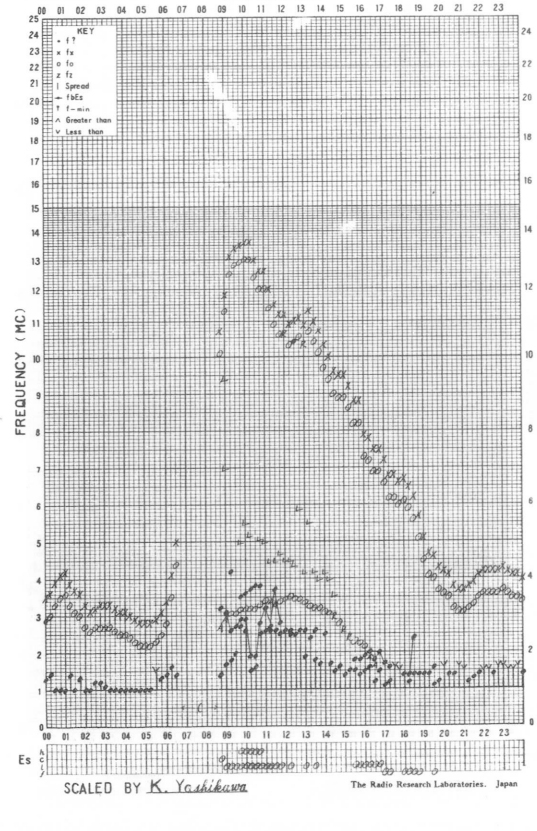

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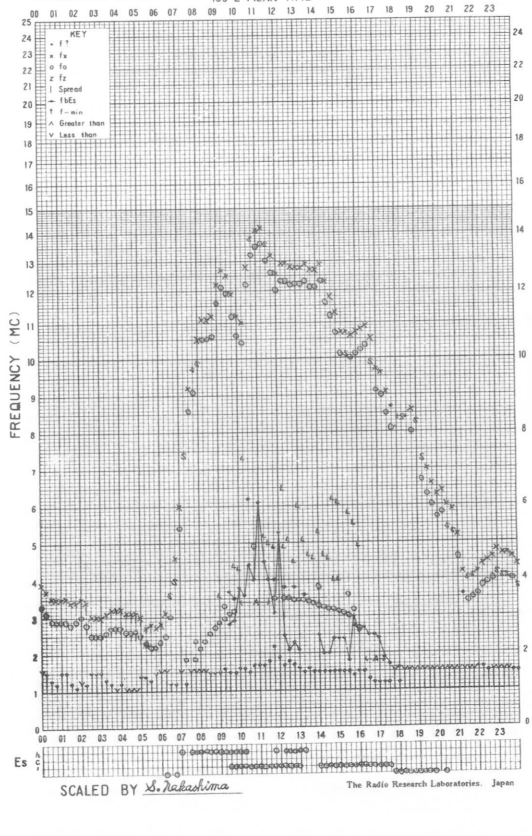

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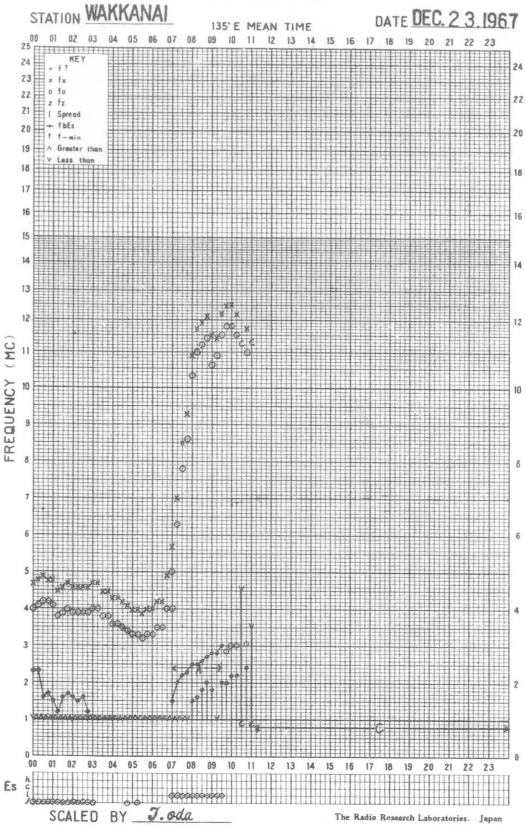

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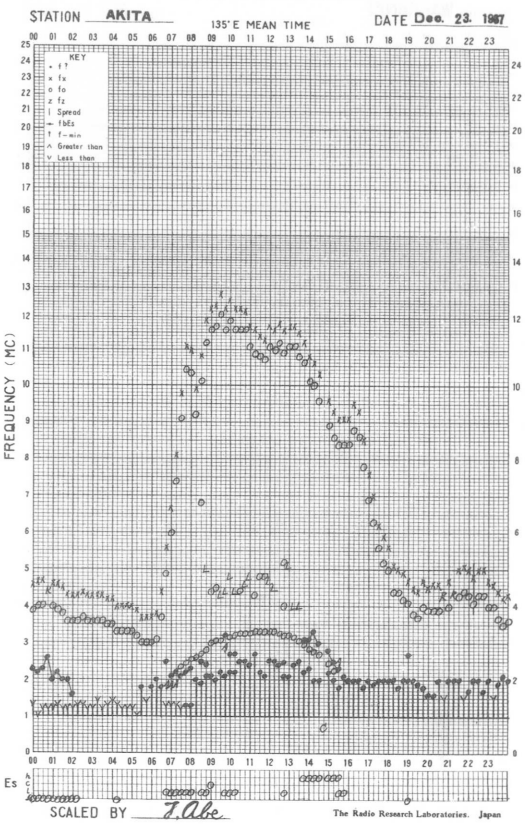

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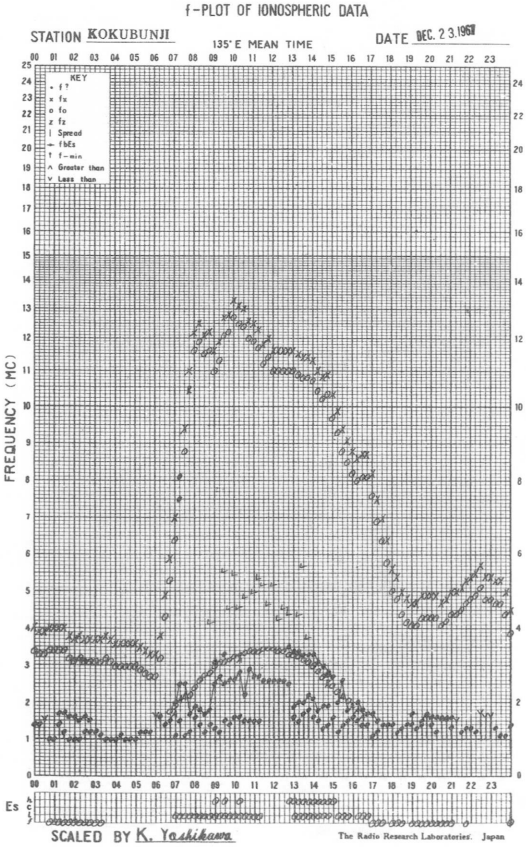

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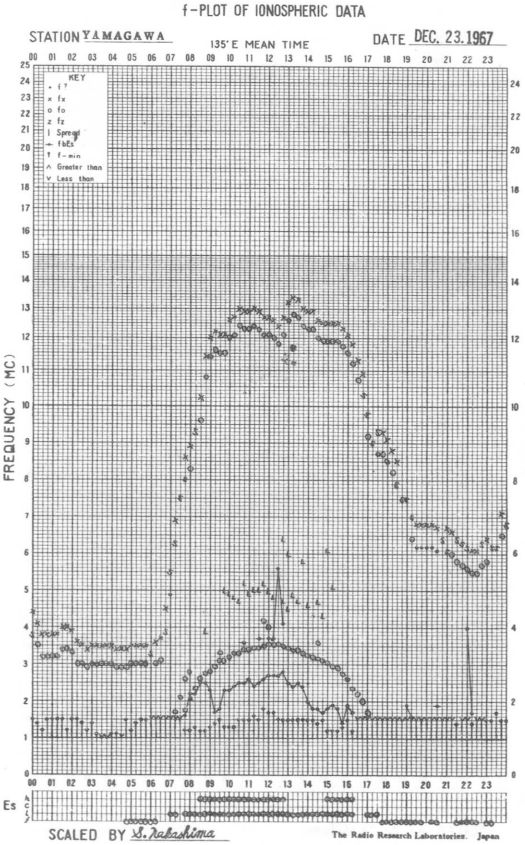

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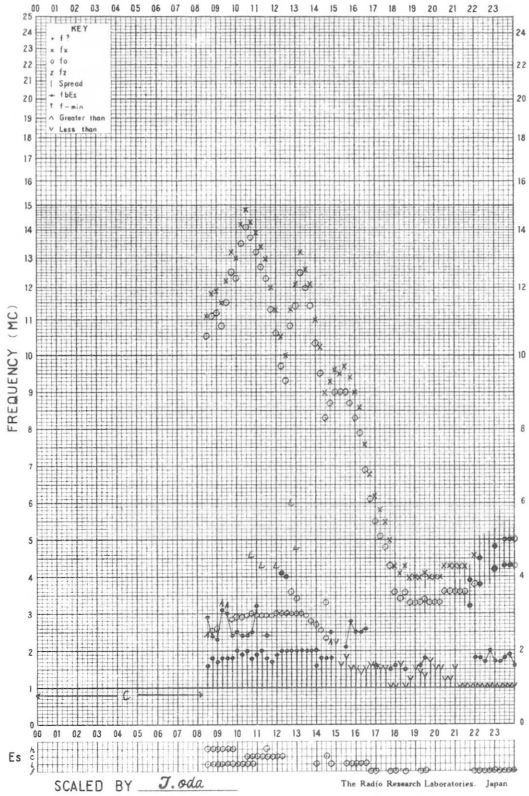

SCALED BY J. Oda

The Radio Research Laboratories. Japan

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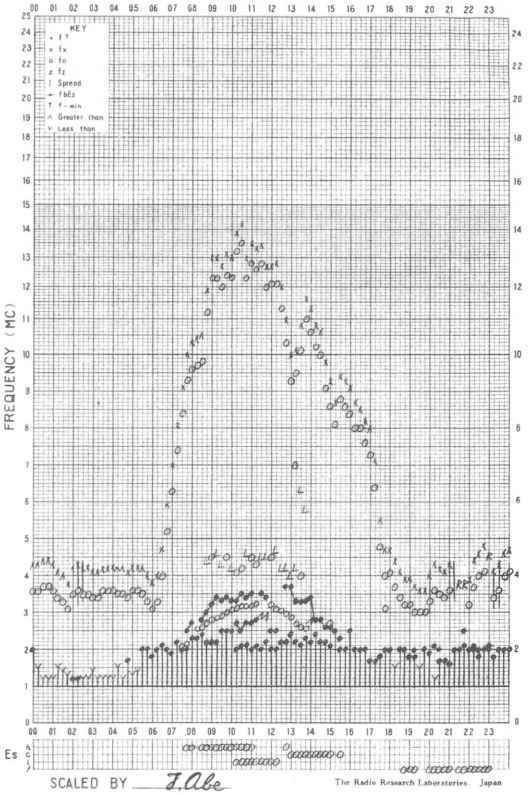

SCALED BY T. Abe

The Radio Research Laboratories. Japan

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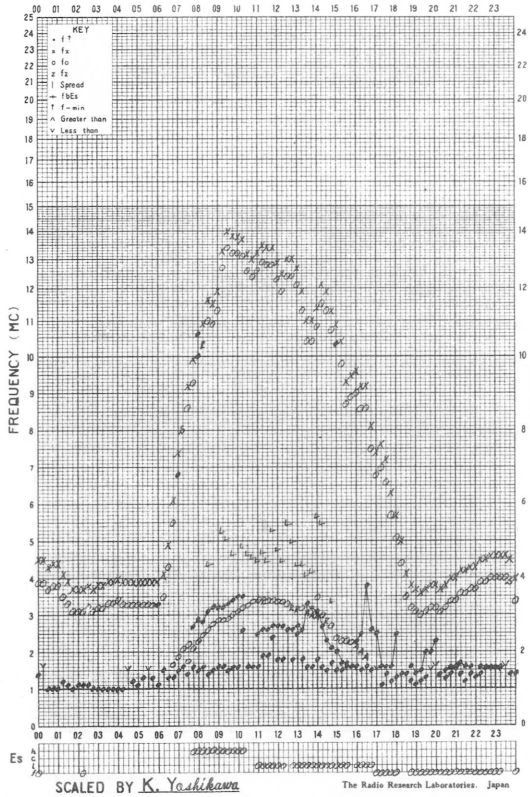

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The Radio Research Laboratories. Japan

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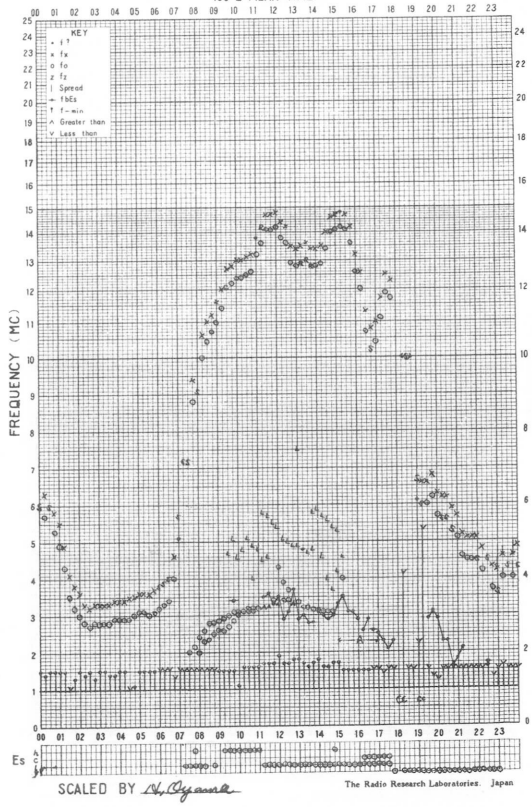

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The Radio Research Laboratories. Japan

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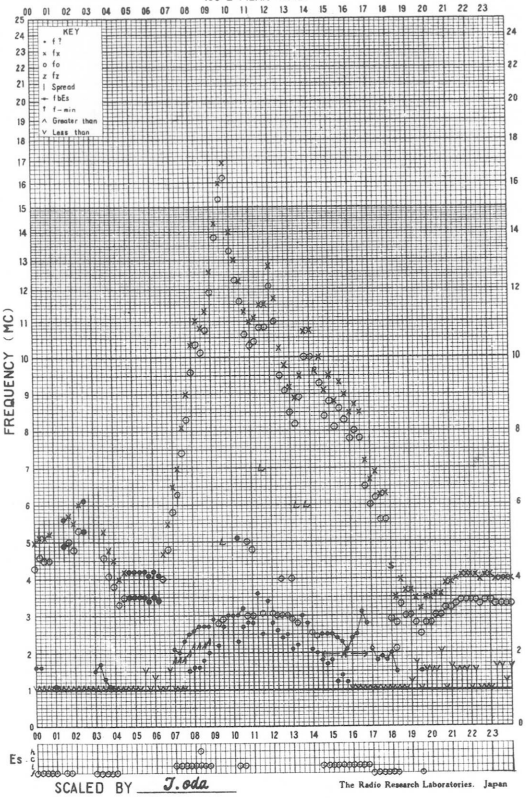

SCALED BY J. oda

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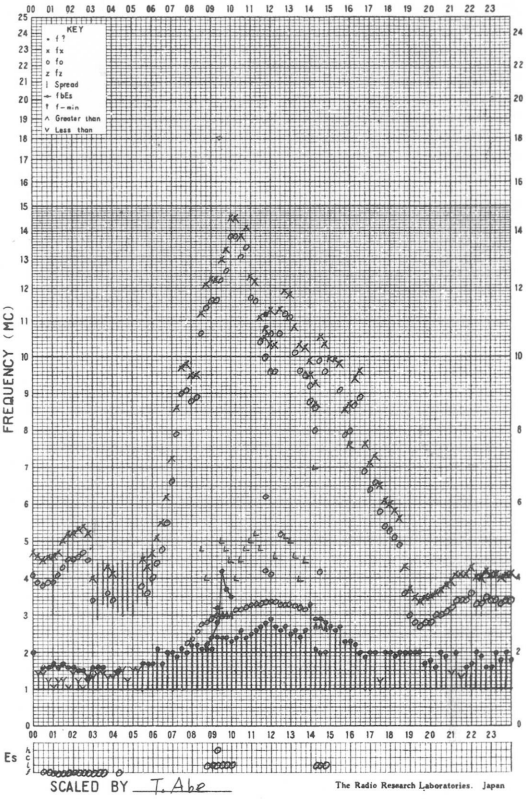
f-PLOT OF IONOSPHERIC DATA

STATION AKITA 135°E MEAN TIME DATE Dec. 25. 1967

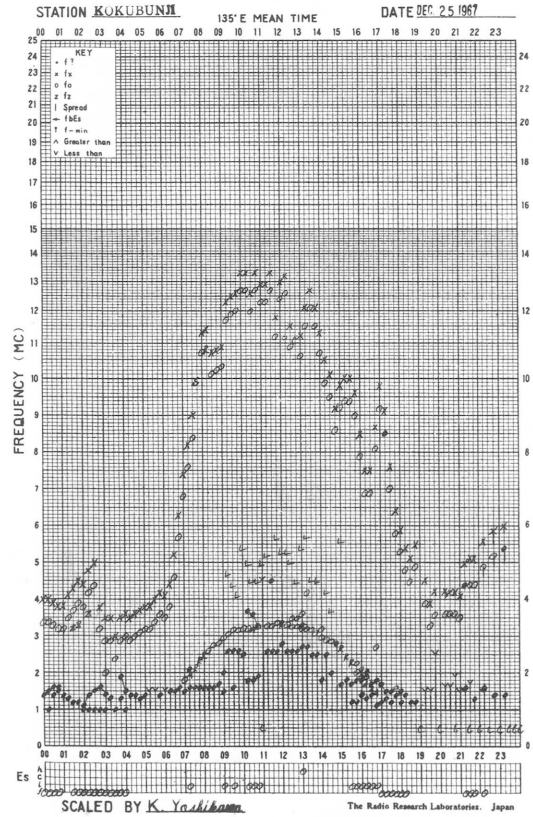


SCALED BY T. Abe

The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

STATION KOKUBUNJI 135°E MEAN TIME DATE DEC. 25. 1967



SCALED BY K. Yoshikawa

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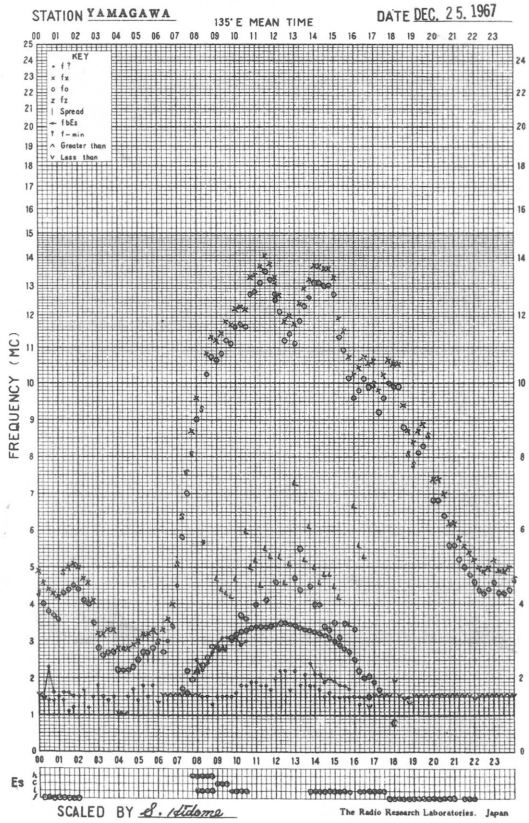
f-PLOT OF IONOSPHERIC DATA

STATION YAMAGAWA 135°E MEAN TIME DATE DEC. 25. 1967

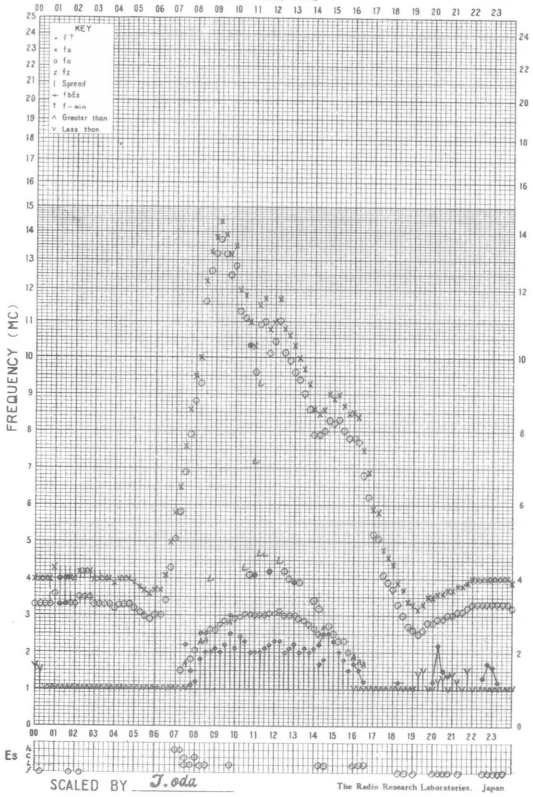


SCALED BY S. Aidoma

The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

STATION WAKKANAI 135° E MEAN TIME DATE DEC. 26, 1967



SCALED BY T. Oda

The Radio Research Laboratories, Japan

f-PLOT OF IONOSPHERIC DATA

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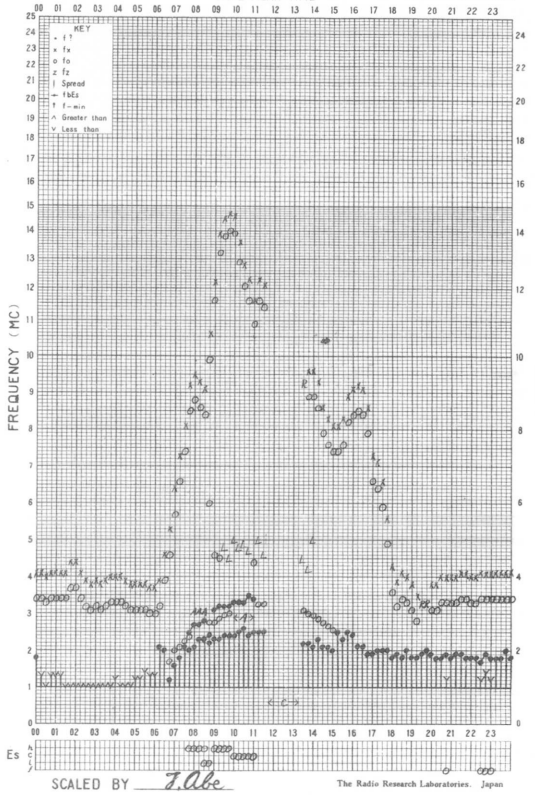
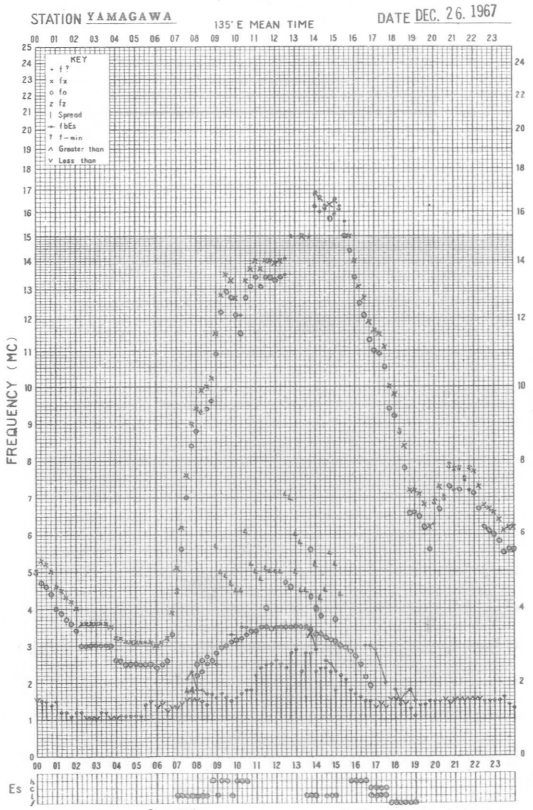


SCALED BY T. Abe

The Radio Research Laboratories, Japan

f-PLOT OF IONOSPHERIC DATA

STATION YAMAGAWA 135° E MEAN TIME DATE DEC. 26, 1967

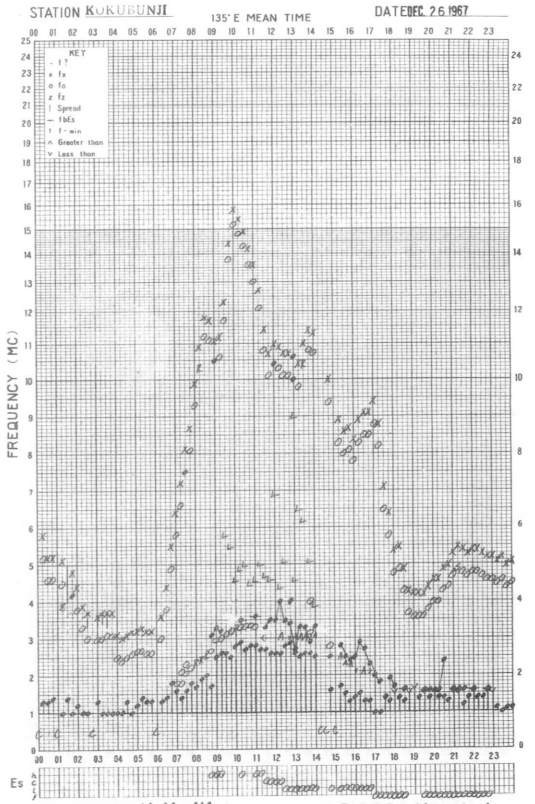


SCALED BY S. Nitsume

The Radio Research Laboratories, Japan

f-PLOT OF IONOSPHERIC DATA

STATION KOKUBUNJI 135° E MEAN TIME DATE DEC. 26, 1967

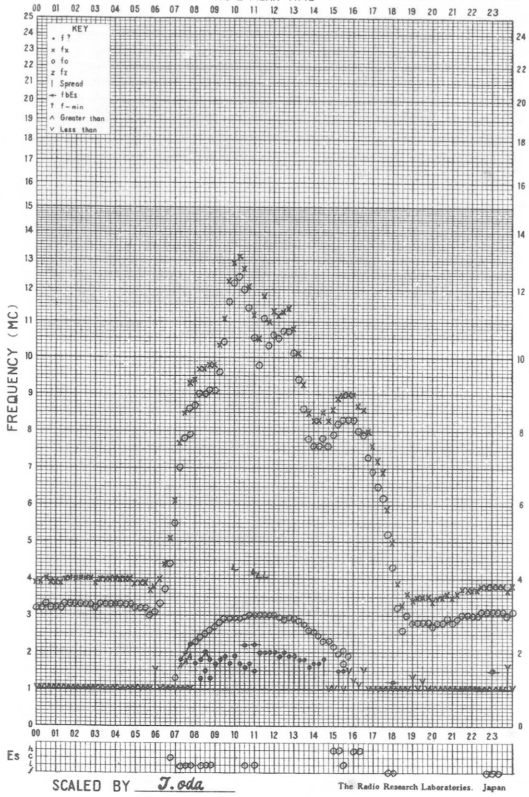


SCALED BY K. Yoshikawa

The Radio Research Laboratories, Japan

f-PLOT OF IONOSPHERIC DATA

STATION WAKKANAI 135°E MEAN TIME DATE DEC. 27. 1967

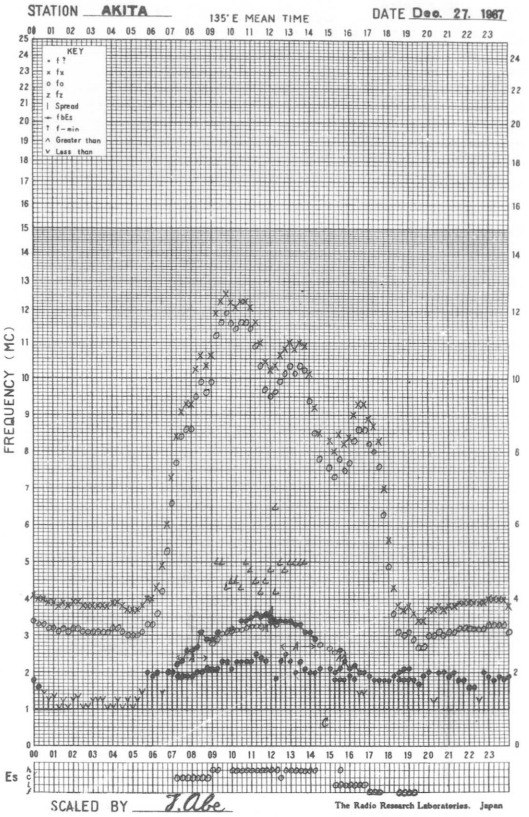


SCALED BY T. Oda

The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

STATION AKITA 135°E MEAN TIME DATE Dec. 27. 1967

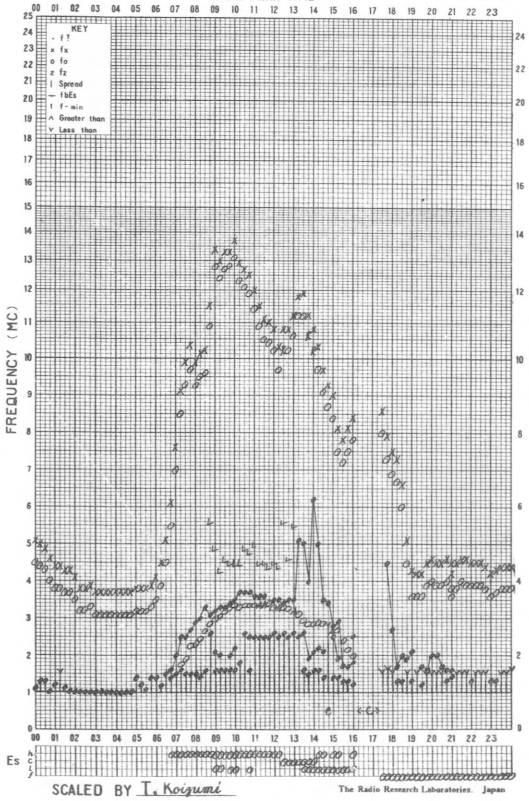


SCALED BY T. Abe

The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

STATION KOKUBUNJI 135°E MEAN TIME DATE DEC. 27. 1967

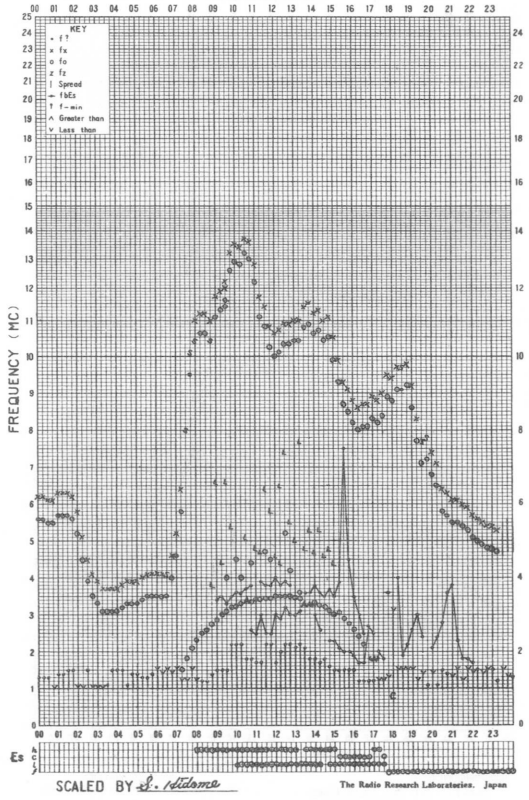


SCALED BY T. Koizumi

The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

STATION YAMAGAWA 135°E MEAN TIME DATE DEC. 27. 1967

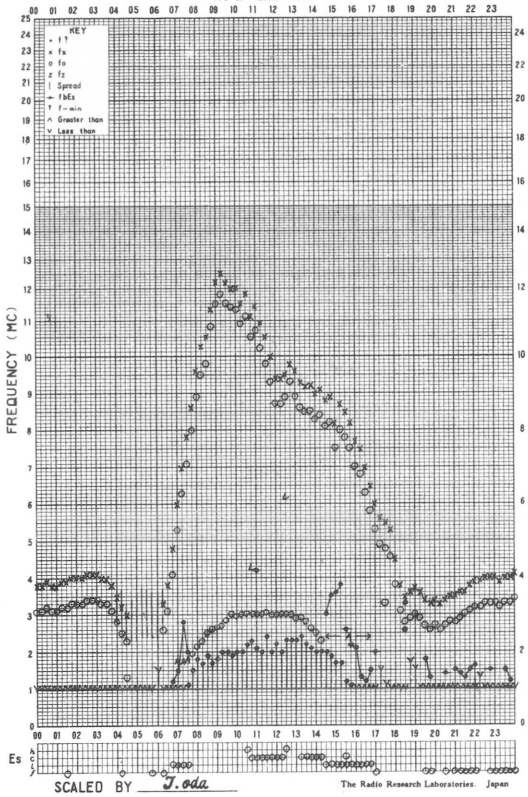


SCALED BY S. Hidoma

The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

STATION WAKKANAI 135°E MEAN TIME DATE DEC. 28, 1967

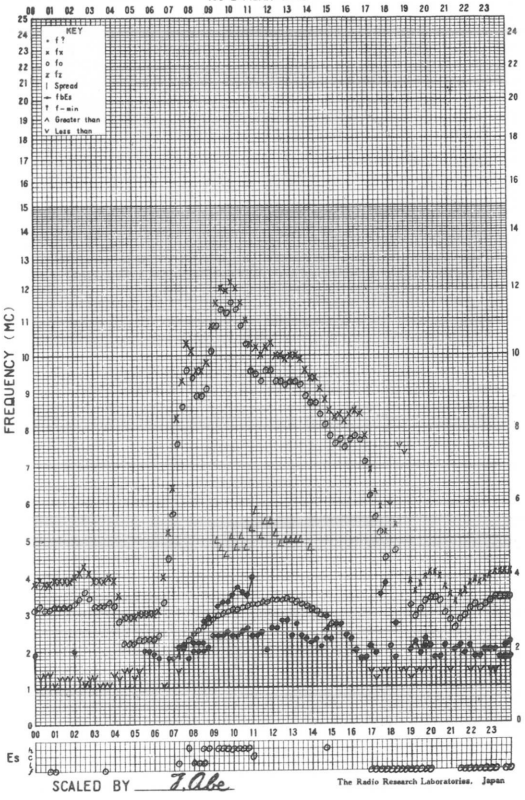


SCALED BY J. Oda

The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

STATION AKITA 135°E MEAN TIME DATE Dec. 28, 1967

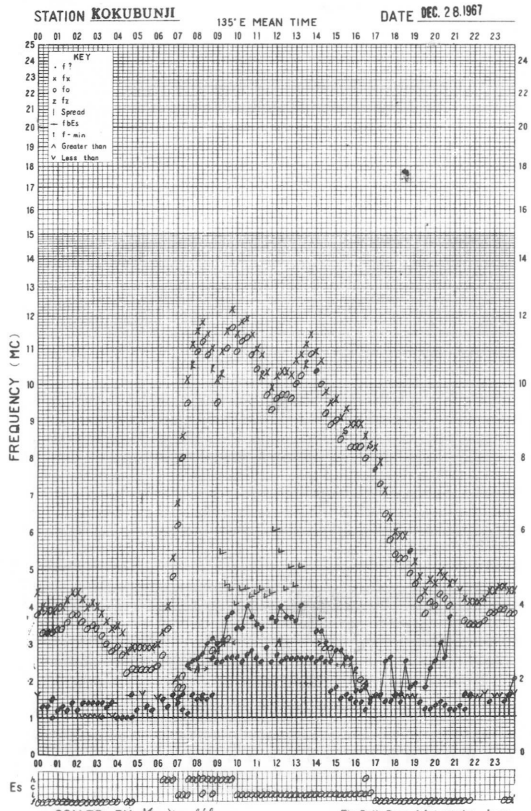


SCALED BY T. Abe

The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

STATION KOKUBUNJI 135°E MEAN TIME DATE DEC. 28, 1967

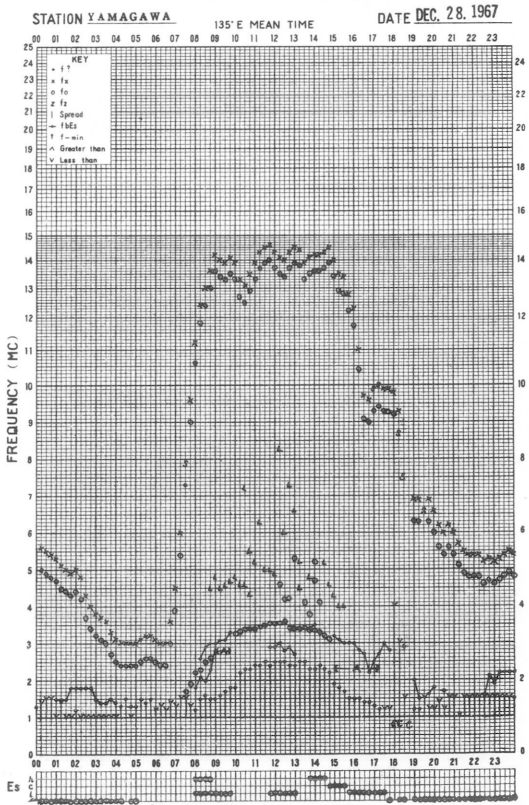


SCALED BY K. Yoshikawa

The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

STATION YAMAGAWA 135°E MEAN TIME DATE DEC. 28, 1967

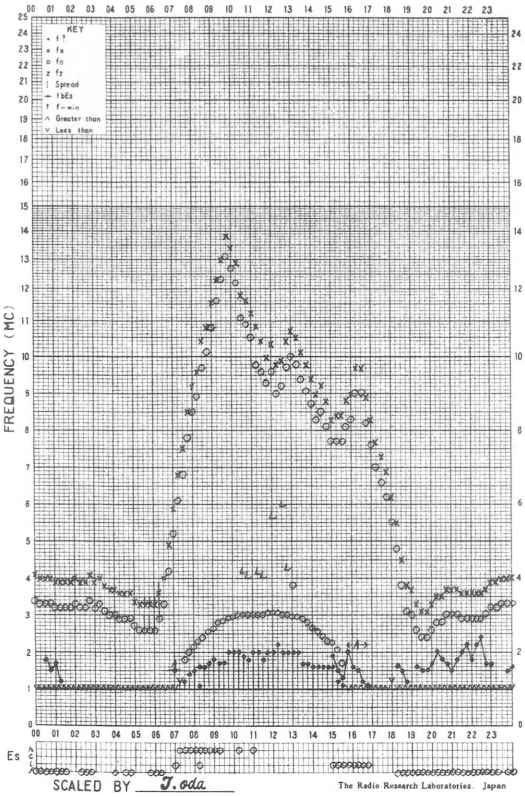


SCALED BY S. Shidoma

The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

STATION WAKKANAI 135°E MEAN TIME DATE DEC. 29, 1967

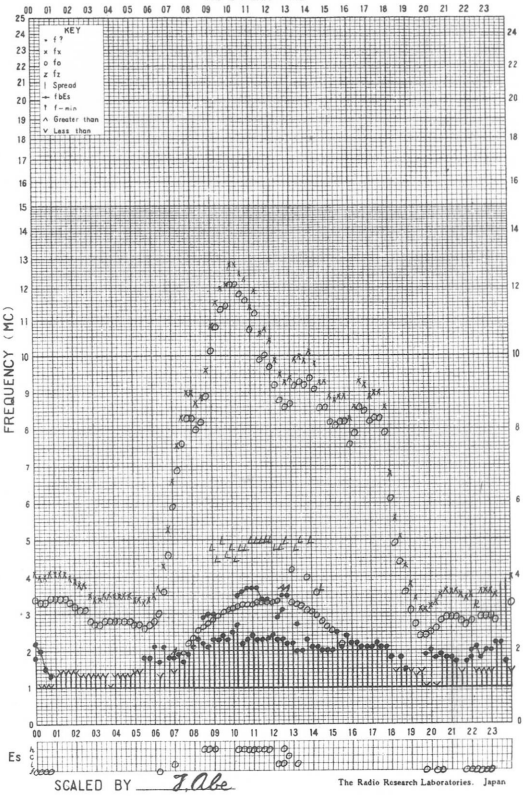


SCALED BY J. Oda

The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

STATION AKITA 135°E MEAN TIME DATE Dec. 29, 1967



SCALED BY T. Abe

The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

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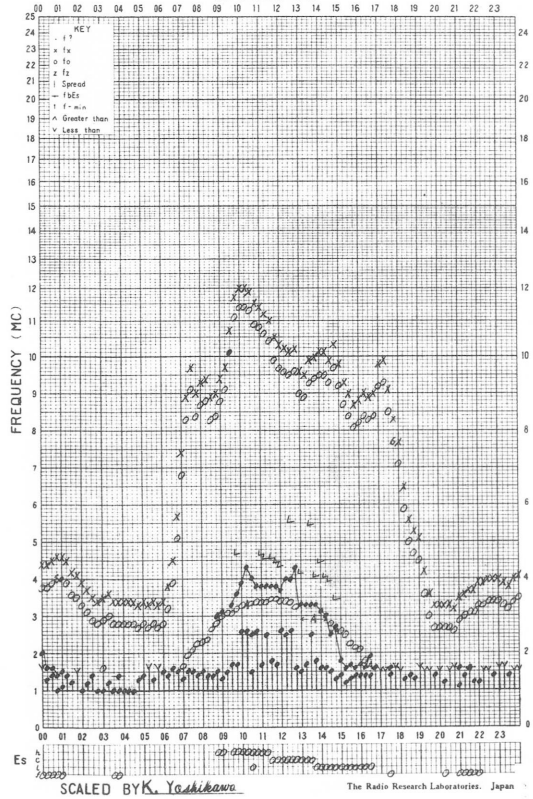
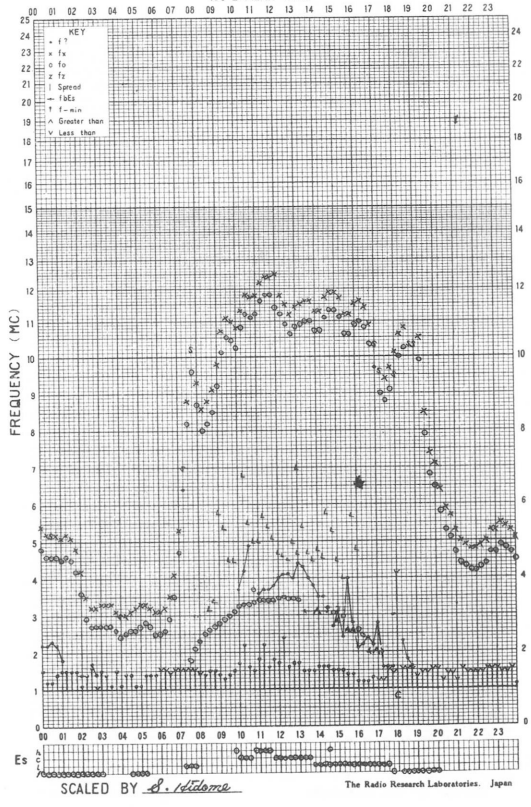


SCALED BY K. Yoshikawa

The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

STATION YAMAGAWA 135°E MEAN TIME DATE DEC. 29, 1967

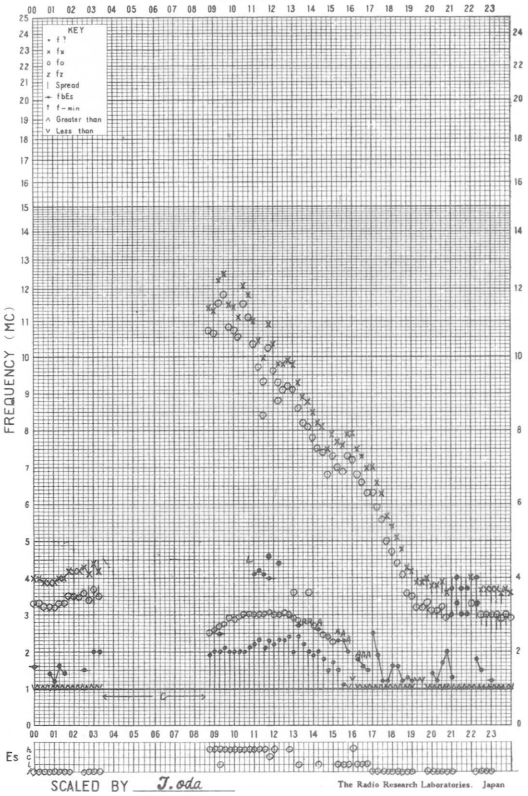


SCALED BY S. Uchiome

The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

STATION WAKKANAI 135°E MEAN TIME DATE DEC. 30. 1967



SCALED BY T. Oda

The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

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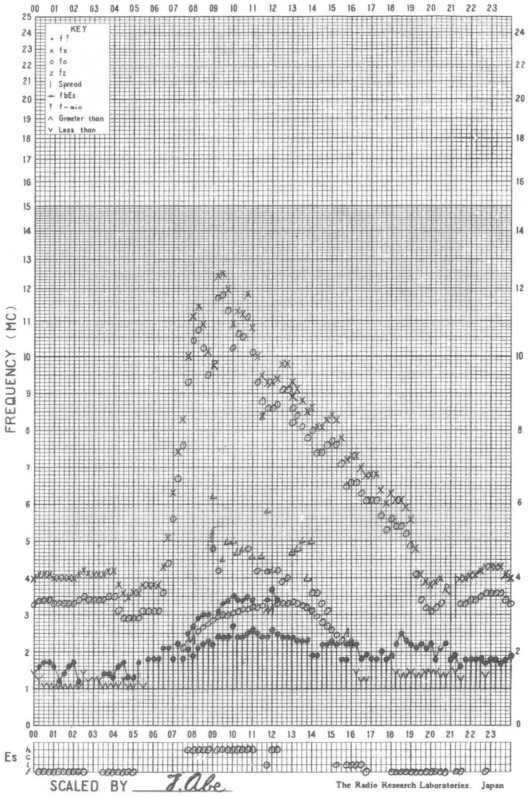
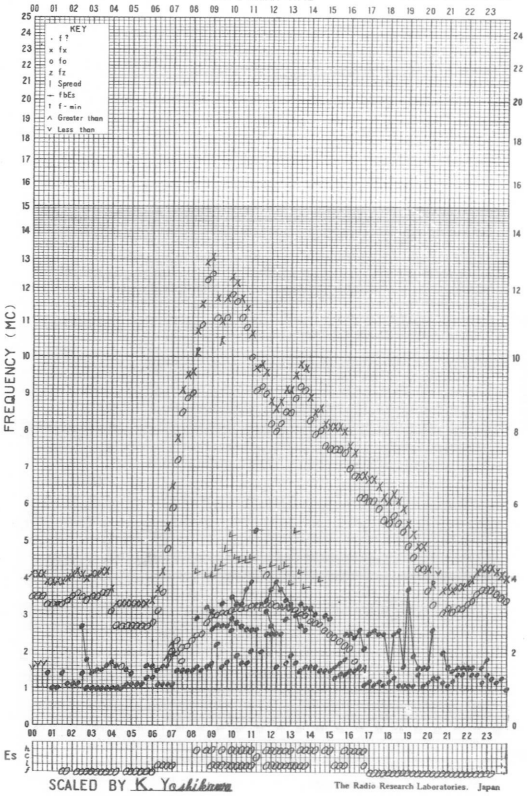


SCALED BY T. Abe

The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

STATION KOKUBUNJI 135°E MEAN TIME DATE DEC. 30 1967

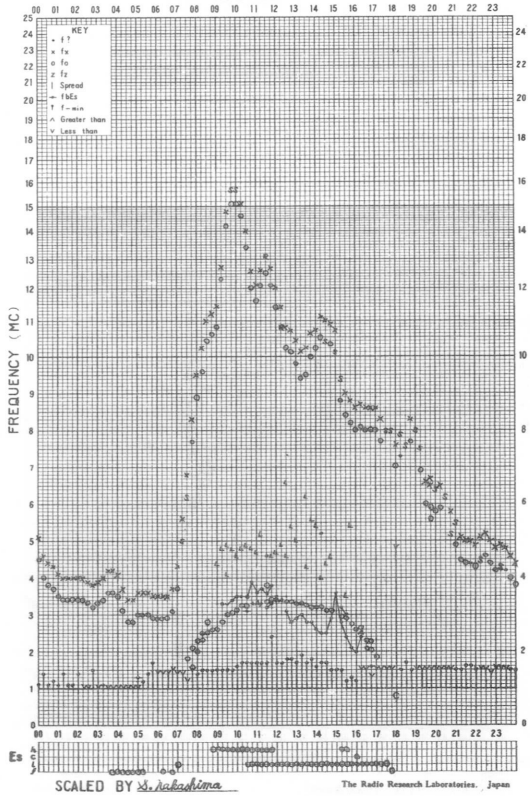


SCALED BY K. Yoshikawa

The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

STATION YAMAGAWA 135°E MEAN TIME DATE DEC 30 1967

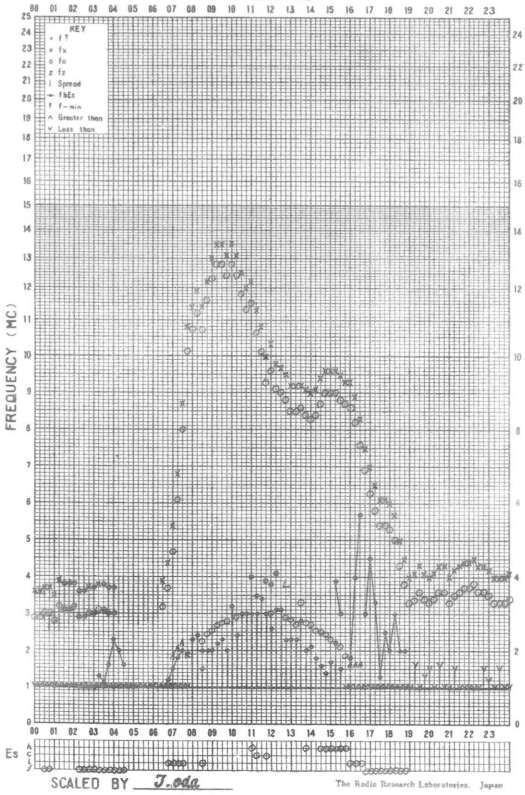


SCALED BY S. Nakashima

The Radio Research Laboratories. Japan

f-PLOT OF IONOSPHERIC DATA

STATION WAKKANAI 135°E MEAN TIME DATE DEC. 3 1.1967



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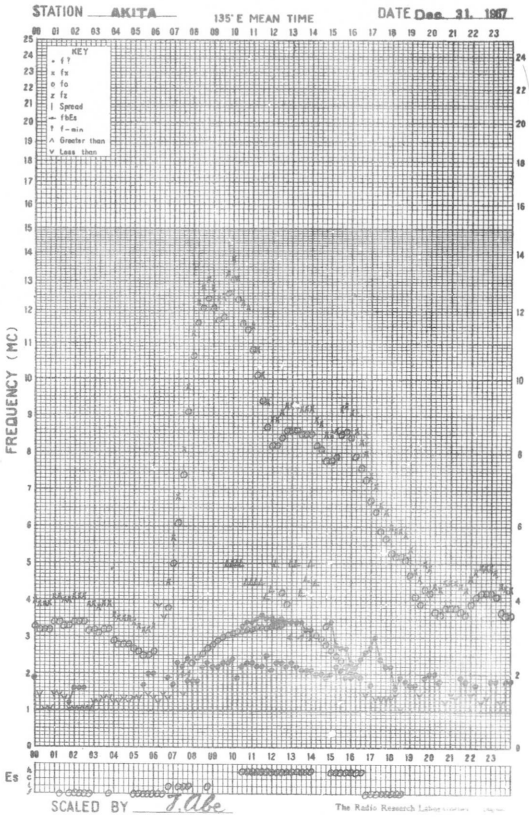

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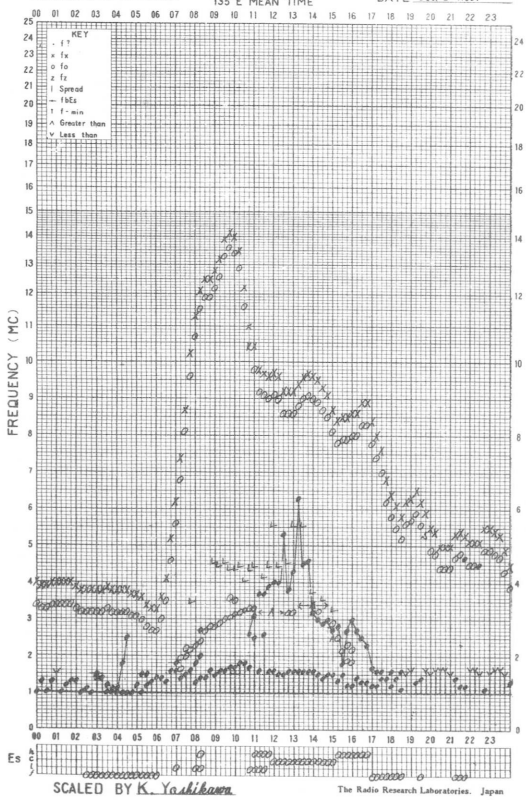

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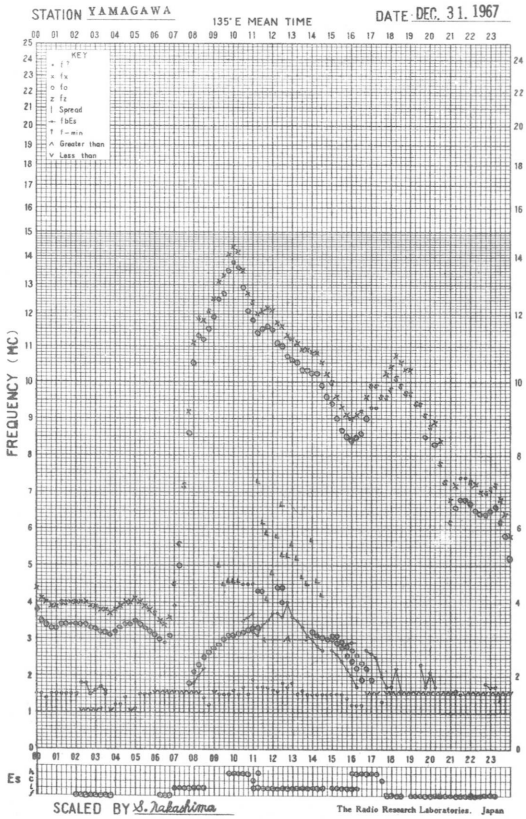

SOLAR RADIO EMISSION

Flux Density and Variability

Month: December 1967
Observing station: Hiraiso
Frequency: 200 MHz

	Flux density 10^{-22} Wm^{-2}(Hz)$^{-1}$					Variability 0 to 3				
UT Date	00-03	03-06	06-09	21-24	Day	00-03	03-06	06-09	21-24	Day
1	7	9	(9)	-	8	1	1	(1)	-	1
2	7	7	-	-	7	1	1	-	-	1
3	7	7	(7)	7	7	1	0	(0)	1	0
4	7	7	-	7	7	1	0	-	0	1
5	8	7	-	7	7	0	0	-	1	0
6	7	8	-	8	7	0	0	-	1	0
7	8	8	-	-	8	0	1	-	-	1
8	8	8	-	-	8	0	1	-	-	1
9	23	22	-	-	22	2	2	-	-	2
10	(8)	7	-	14	7	(1)	1	-	3	1
11	14	8	-	(9)	12	2	2	-	(1)	2
12	17	11	-	-	14	1	1	-	-	1
13	9	9	-	9	9	1	1	-	1	1
14	9	10	-	12	9	0	1	-	1	1
15	11	10	-	9	11	1	1	-	1	1
16	12	10	-	17	11	2	1	-	2	1
17	15	11	-	17	14	1	1	-	2	1
18	23	19	-	22	18	2	1	-	2	2
19	19	15	-	15	19	2	1	-	1	2
20	13	15	-	38	14	1	2	-	2	2
21	78	95	-	22	75	2	2	-	1	2
22	23	19	-	20	21	1	1	-	2	1
23	21	13	-	9	18	2	1	-	1	2
24	10	10	-	8	10	1	0	-	0	1
25	8	8	-	(12)	8	1	0	-	(1)	0
26	11	16	-	-	13	1	2	-	-	1
27	30	57	-	(154)	44	2	2	-	(1)	2
28	73	19	-	(13)	61	1	1	-	(3)	1
29	17	10	-	(9)	13	3	2	-	(1)	3
30	9	8	-	-	9	0	1	-	-	1
31	-	-	-	(6)	-	-	-	-	(0)	-

Note No observations during the following periods:

1st	0200-		0430	11th	2300-	12th	0015
1st	2140-	2nd	0100	12th	2140-		2400
2nd	2140-		2400	14th	0030-		0130
4th	0100-		0200	19th	0500-		0730
7th	2140-		2400	24th	2345-	25th	0005
8th	2140-		2400	26th	2310-	27th	0010
9th	2140-	10th	0200	30th	2140-	31st	0730

SOLAR RADIO EMISSION

Flux Density

Month: December 1967
Observing station: Hiraiso Frequency: 500 MHz

Flux density 10^{-22} $Wm^{-2}(Hz)^{-1}$

UT Date	00-03	03-06	06-09	21-24	Day
1	37	35	(35)	35	36
2	36	36	(37)	36	36
3	34	34	(30)	33	34
4	29	-	-	(28)	(31)
5	31	28	-	30	29
6	30	29	-	30	29
7	29	30	-	29	30
8	29	29	-	30	29
9	33	33	-	32	32
10	34	32	-	33	32
11	36	33	-	(33)	34
12	34	36	-	31	34
13	31	32	-	34	31
14	34	35	-	32	34
15	39	38	-	37	36
16	41	37	-	45	39
17	43	40	-	41	42
18	47	41	-	42	43
19	45	46	-	-	45
20	45	46	-	41	(46)
21	43	42	-	40	42
22	43	43	-	41	42
23	41	41	-	39	40
24	39	39	-	38	39
25	36	34	-	35	36
26	40	39	-	(37)	39
27	36	40	-	(36)	38
28	33	34	-	(33)	34
29	34	35	-	(33)	34
30	31	32	-	(30)	32
31	29	30	-	(28)	29

Note No observations during the following periods:

4th	0200-	0730	19th	2140-	20th 0100
6th	0000-	0100	20th	0500-	0730
11th	2140-	2300	22nd	0600-	0630
17th	0000-	0100	27th	0155-	0222

Distinctive Events

(single-frequency observations)

Month: December 1967
Observing station: Hiraiso
Normal observing period: 2140 - 0730 (sunrise to sunset)

Date	Frequency	Starting time	Time of maximum	Duration	Type	Flux density $10^{-22}Wm^{-2}(Hz)^{-1}$		Remarks
	MHz	UT	UT	minutes		peak	mean	
9	500	0322.3	0322.5	0.7	C	300	35	
11	200	2216.2	2216.9	1.8	C	285	55	
	500	2348.0	0015.7	52.0	C	980	380	
	200	2351.6	2353.5	4.4	C	8700	450	
13	200	0337.0	0338.0	2.0	C	820	170	
16	500	0246.0	0330.5	62.0	C	535	25	
	200	0244.0	0300.0	77.0	C	140	20	

Measurement of H.F. Field Strength (Upper Side-band of WWV)

Dec. 1967 Frequency: 15 MHz, Bandwidth: ± 40 Hz, Receiving Antenna: Rod (4.5 m) Measured at Hiraiso

UT	0015	0115	0215	0315	0415	0515	0615	0715	0815	0915	1015	1115	1215	1315	1415	1515	1615	1715	1815	1915	2015	2115	2215	2315
Date																								
1	15	18	20	7	3	<- 1s	< 3s	< 5s	< 1s	<- 2s	< 5s	<- 2s	<-19s	<-31s	<-27s	-22	<-27s	<-27s	<-25s	-20	-22	12	14	17
2	12	16	20	- 1	- 5	<- 9s	<-15s	<- 5s	<- 5s	<- 7s	- 8	<- 8s	<-19s	-27	-25	-25	-23	-25	<-31s	<-31s	-22	5	11	12
3	10	7	10	5	<- 7s	< 3s	<-14s	<-12s	<-11s	<-17s	<-19s	<-12s	<-21s	<-30s	<-30s	<-30s	<-30s	<-30s	<-30s	<-30s	-22	6	13	12
4	9	10	10	- 5	<- 2s	<- 4s	-10	<-15s	<-13s	<-12s	<-33s	<- 7s	<-22s	<-27s	<-27s	<-27s	<-27s	<-27s	<-27s	<-27s	-18	10	15	11
5	7	9	14	16	- 5	<- 8s	<-22s	<-19s	<-18s	<-12s	<-19s	<- 7s	<-26s	-26	<-35s	<-35s	<-35s	<-35s	<-35s	<-35s	- 1	8	8	0
6	11	11	12	- 8	<- 7s	- 9	<-21s	<- 4s	<-14s	<-10s	<-22s	<-31s	<-31s	<-31s	<-27s	<-31s	<-31s	<-31s	<-31s	<-31s	-11	9	13	11
7	8	7	12	15	- 7	<-11s	<-18s	<-18s	<-12s	< 2s	<-15s	<- 4s	<-30s	<-30s	<-30s	<-31s	<-31s	<-31s	<-31s	<-31s	-22	5	9	10
8	12	12	17	9	- 9	<- 6s	<-20s	<-16s	<- 9s	<- 9s	<-20s	<- 6s	<-32s	<-32s	<-32s	<-32s	<-33s	<-33s	<-33s	<-29s	-27	24	27	27
9	7	11	12	- 2	- 2	-10	<-22s	<-18s	<-11s	<-10s	<-12s	<- 3s	<-20s	<-16s	<-25s	<-30s	<-30s	<-30s	-17	<-30s	<-30s	4	6	6
10	6	9	7	3	- 2	<-10s	<-16s	<-15s	<-13s	<-13s	<-26s	<- 2s	<-14s	<-29s	<-29s	<-29s	<-29s	<-29s	<-29s	<-29s	<-29s	2	8	8
11	5	8	11	3	< 0s	<- 5s	<-12s	<- 8s	S	<-12s	<-22s	<- 9s	<-18s	<-22s	<-32s	<-31s	<-27s	<-27s	<-27s	<-27s	<- 4s	1	- 5	2
12	- 2	- 1	0	- 4	1	- 3	-16	<- 7s	-10	-10	<- 5s	<-14s	<-31s	<-31s	<-31s	<-31s	<-30s	<-30s	<-34s	<-35s	-25	- 1	6	6
13	2	4	7	- 7	<- 1s	- 4	<-12s	<-10s	<- 6s	<- 7s	< 1s	<-19s	<-15s	<-14s	<-29s	-28	<-29s	<-28s	<-29s	<-29s	<-29s	- 3	3	3
14	0	2	3	-12	<- 8s	<- 8s	<-17s	<- 9s	<- 5s	<-11s	<-20s	<-31s	<-32s	<-32s	-23	<-32s	<-32s	<-32s	-18	-23	<-32s	- 4	- 2	- 2
15	- 2	- 1	- 2	- 9	<- 8s	<- 6s	<- 9s	<- 8s	<-11s	<-14s	<-11s	<-25s	<-34s	<-34s	<-30s	-25	-25	<-25s	<-25s	<-25s	<-25s	- 5	0	0
16	0	4	5	<-27s	<- 5s	<- 3s	<- 8s	S	<- 3s	- 5	<- 8s	<-27s	<-26s	<-32s	<-26s	<-26s	<-26s	<-26s	<-26s	<-26s	<-26s	- 3	10	3
17	C	C	C	C	C	C	C	<-10s	<- 5s	<- 6s	<-11s	<- 8s	<-26s	<-32s	-19	-17	-17	-18	<-23s	<-26s	<-26s	0	6	8
18	9	10	13	< 5s	<- 4s	<- 4s	<-10s	<-10s	<- 2s	< 1s	<- 3s	< 5s	<-33s	<-33s	<-33s	<-33s	<-33s	<-33s	<-33s	-24	-21	5	11	8
19	12	12	11	12	- 7	<- 9s	-16	<- 4s	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
20	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
21	C	C	C	< 8s	<- 6s	<- 6s	<-13s	<-13s	<- 7s	< 0s	<-22s	<-31s	<-13s	<-27s	<-27s	<-29s	-14	<-29s	<-29s	<-29s	<-28s	< 7s	12	13
22	8	8	13	- 1	<- 6s	<-13s	<-14s	<-17s	<- 6s	<- 2s	-14	<-29s	<-14s	<-29s	<-29s	<-29s	<-29s	<-29s	<-29s	<-29s	<-29s	- 1	6	5
23	3	10	11	13	<- 1s	<- 3s	<- 8s	<- 8s	- 2	<- 1s	<-19s	<-29s	<-19s	<-25s	<-22s	- 8	<-30s	<-30s	<-30s	<-30s	<-30s	- 2	6	9
24	5	7	6	5	2	- 1	-14	<-14s	<- 8s	<- 3s	<-21s	<-25s	<-28s	<-28s	-26	- 8	- 7	5	-18	<-30s	<-30s	5	11	6
25	3	6	5	3	S	<- 7s	<-16s	-12	<- 6s	<- 3s	<-14s	<-26s	S	<-29s	<-29s	-20	<-25s	<-25s	<-25s	<-25s	<-25s	0	12	10
26	6	3	9	<-13s	13	<-10s	-12	<-12s	<- 5s	<-10s	<-27s	<-31s	<-23s	<-20s	<-29s	-16	<-29s	<-30s	<-29s	<-29s	<-25s	- 1	6	8
27	9	11	9	-13	<- 9s	<- 8s	<-18s	<-18s	<-10s	< 2s	<-10s	<-29s	<-29s	<-29s	<-29s	<-29s	<-29s	<-29s	<-29s	<-29s	<-29s	- 1	10	5
28	5	7	- 2	<-15s	<- 9s	<- 9s	<-24s	<-20s	<-10s	- 4	- 3	<-18s	<-12s	<-30s	<-24s	<-29s	<-29s	<-29s	<-29s	<-29s	<-29s	- 2	7	5
29	8	9	8	- 5	<- 7s	<- 7s	<-15s	<-16s	<- 7s	<- 2s	<-21s	<-27s	-12	<-26s	<-26s	<-26s	<-26s	-19	<-29s	S	<-30s	4	7	9
30	10	12	- 1	- 1	- 2	- 5	-12	-17	<-17s	<- 8s	<- 8s	<-20s	<-29s	<-29s	<-29s	<-29s	<-29s	-15	-11	-10	- 7	- 5	10	7
31	11	13	14	- 3	- 8	-12	-16	<-11s	<- 8s	<- 3s	<- 7s	<-24s	<-11s	-11	<-13s	-12	<-30s	<-30s	<-13s	<-29s	<-29s	4	9	9
Median	8	9	10	< 1s	< 5s	<- 7s	<-15s	<-12s	<- 8s	<- 7s	<-14s	<-19s	<-22s	<-29s	<-29s	<-29s	<-29s	<-29s	<-29s	<-29s	<-26s	< 2s	9	8
Median Count	28	28	28	29	28	29	29	29	28	29	29	29	28	29	29	29	29	29	29	28	29	29	29	29
Upper decile	12	13	17	13	2	<- 1s	<- 8s	<- 4s	<- 2s	< 1s	<- 3s	<- 2s	<-12s	<-16s	<-22s	-12	-17	-18	<-17s	-23	<- 7s	< 10s	14	13
Lower decile	0	2	- 1	<-13s	<- 9s	<-11s	<-22s	<-18s	<-14s	<-13s	<-26s	<-31s	<-32s	<-32s	<-32s	<-32s	<-33s	<-33s	<-33s	<-31s	<-30s	- 4	0	0

Measurement of H.F. Field Strength (Upper Side-band of WWVH)

Dec. 1967 Frequency: 15 MHz, Bandwidth: ±40 Hz, Receiving Antenna: Rod (4.5 m) Measured at Hiraiso

UT Date	0045	0145	0245	0345	0445	0545	0645	0745	0845	0945	1045	1145	1245	1345	1445	1545	1645	1745	1845	1945	2045	2145	2245	2345
1	3	7	11	3	16	19	5	20	8	(1s	<- 5s	<- 1s	-13	-16	-10	-25	<-27s	-22	-25	-25	6	15	9	5
2	5	12	12	18	26	26	14	- 1	- 5	<- 3s	- 8	<-10s	-11	-19	-25	-22	-16	-25	<-31s	-25	9	12	5	8
3	8	7	12	16	23	1	14	- 4	- 7	<-10s	<-11s	-17	<-15s	<-30s	<-30s	<-30s	<-30s	-28	<-30s	-24	3	8	8	8
4	5	12	12	16	28	13	26	0	- 7	- 7	<-14s	<-12s	<-20s	<-27s	<-27s	<-27s	<-27s	<-27s	<-27s	<-27s	8	8	8	8
5	7	7	11	17	20	20	10	4	- 9	-11	-12	<-12s	-17	-26	<-35s	<-35s	<-35s	<-35s	<-35s	<-35s	(11)c	11	8	8
6	9	11	14	21	16	14	2	4	- 9	<- 7s	-16	<- 9s	-22	-17	-12	<-31s	<-31s	<-31s	<-31s	<-31s	5	10	15	9
7	12	10	12	19	15	18	6	26	13	21	- 8	<- 6s	-19	<-30s	<-30s	<-31s	<-31s	<-31s	<-31s	-22	5	10	9	8
8	13	11	17	19	26	25	14	16	6	<- 7s	10	<- 9s	<-32s	<-32s	<-32s	<-32s	<-33s	<-33s	-10	<-29s	23	30	28	27
9	12	11	11	15	20	14	4	18	3	- 1	- 7	<- 4s	-10	-15	-22	<-30s	<-30s	<-30s	<-30s	<-30s	4	9	10	8
10	8	8	17	18	23	20	14	- 1	- 4	- 7	<-10s	<- 2s	-11	-18	<-29s	<-29s	<-29s	<-29s	<-29s	<-29s	11	13	13	7
11	8	10	20	18	18	19	12	- 2	- 3	- 4	- 9	-13	-17	<-18s	<-32s	<-31s	<-20s	<-27s	<-27s	-23	4	12	7	6
12	- 1	<- 8s	10	15	23	21	20	- 5	- 4	<- 9s	-15	-16	-20	-23	<-31s	<-31s	<-30s	<-30s	<-24s	-22	9	11	8	6
13	9	12	11	8	21	29	14	8	- 2	- 4	<- 6s	<-10s	- 9	-15	-17	-15	-16	-17	<-29s	-28	4	12	8	4
14	10	12	13	15	16	11	20	9	- 4	- 6	<-13s	<-31s	-21	-18	<-32s	<-32s	<-32s	<-32s	<-32s	-23	2	16	9	5
15	10	5	13	16	19	19	24	17	0	- 5	-10	-14	-19	-22	-19	-20	<-25s	<-25s	<-25s	<-25s	5	15	9	6
16	7	12	19	10	19	7	7	22	- 2	- 6	<- 6s	-12	<-13s	-17	<-26s	<-26s	<-26s	<-26s	<-26s	-21	12	9	11	6
17	C	C	C	C	C	C	<- 3s	28	15	4	2	<- 3s	- 7	- 6	- 7	-10	- 5	21	-11	-11	9	10	10	7
18	7	6	12	18	22	13	13	30	9	< 1s	- 3	-15	<-33s	<-33s	<-33s	<-33s	<-33s	<-33s	<-33s	<-33s	7	3	5	6
19	5	9	13	18	26	21	23	6	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
20	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
21	C	C	10	18	20	21	25	22	11	- 2	- 6	- 7	- 6	<-27s	<-27s	<-29s	<-29s	<-29s	<-29s	<-29s	5	13	12	7
22	6	9	10	20	18	24	18	5	<- 1s	- 2	- 9	-11	-18	-14	-25	<-29s	<-29s	<-29s	<-29s	<-29s	7	7	11	7
23	9	16	21	27	30	33	28	23	2	1	3	8	4	- 8	-16	<-27s	<-30s	<-30s	<-30s	<-30s	6	15	13	12
24	8	12	14	17	18	15	19	14	- 6	S	4	-10	-13	-14	-21	-22	<-30s	-25	<-31s	<-30s	3	12	16	7
25	11	11	14	23	25	18	23	26	0	- 5	- 1	- 3	- 7	-14	<-29s	-20	<-25s	<-25s	<-25s	<-25s	5	9	10	6
26	6	5	11	13	21	21	25	18	- 2	-10	- 8	- 4	- 2	- 7	- 7	-23	<-29s	<-30s	<-29s	<-29s	- 3	12	11	8
27	10	10	15	22	22	27	0	0	0	7	- 6	- 2	- 6	-20	<-29s	<-29s	<-29s	<-29s	<-29s	<-29s	4	10	7	6
28	5	9	10	13	19	24	22	19	3	- 4	<- 5s	- 6	-15	-16	-21	<-29s	<-29s	<-29s	<-29s	<-29s	5	5	10	4
29	6	9	14	20	24	22	11	- 1	- 2	- 2	- 6	-14	-15	<-26s	<-26s	<-26s	<-26s	<-29s	<-29s	S	6	10	8	10
30	5	9	13	17	23	22	23	11	- 1	18	- 7	<-13s	-20	<-29s	<-29s	<-29s	<-29s	-20	<-29s	-23	0	11	10	9
31	6	12	14	17	23	26	24	9	1	19	10	9	- 2	- 1	12	-11	<-24s	-19	12	9	7	10	12	9
Median	8	10	13	17	21	20	14	11	<- 1s	<- 4s	<- 7s	<-10s	<- 5s	-18	<-26s	<-29s	<-29s	<-29s	<-29s	<-27s	5	11	10	7
Median Count	28	28	29	29	29	29	30	30	29	28	29	29	29	29	29	29	29	29	29	28	29	29	29	29
Upper decile	12	12	19	22	26	27	25	26	11	18	4	<- 1s	- 2	- 7	- 7	-15	-16	-19	-11	-21	11	15	15	10
Lower decile	5	5	10	10	16	11	2	- 2	<- 7s	<-10s	<-14s	<-16s	<-22s	<-30s	<-32s	<-32s	<-33s	<-33s	<-32s	<-31s	2	7	7	5

RADIO PROPAGATION QUALITY FIGURES

HIRAISO

Time in U.T.

Dec. 1967	Whole Day Index	H B 06 12 18 / 12 18 24	W W V 00 06 12 18 / 06 12 18 24	S F 00 06 12 18 / 06 12 18 24	W W V H 00 06 12 18 / 06 12 18 24	Warning 00 06 12 18 / 06 12 18 24	Principal magnetic storms Start	End	ΔH
1	4o	4 4 4	4 (4) 5 4	4 4 4 (4)	4 4 - 4	N N N N			
2	4o	4 4 3	4 (4) 4 4	5 4 4 5	4 4 - 4	N N N N			
3	4o	4 (3 4)	4 - 4 4	4 4 (4 4)	4 4 - 4	N N N N			
4	4o	4 4 4	4 - 4 4	4 4 4 4	4 4 - 4	N N N N			
5	4o	4 4 4	3 - 4 4	4 4 4 (4)	4 4 - 4	N N N N			
6	4o	4 4 4	4 (4) 4 4	4 4 4 (4)	4 3 - 4	N N N N			
7	4+	4 4 4	5 (5) 4 4	5 4 4 4	4 5 - 4	N N N N			
8	4o	4 4 4	4 (4) 4 4	4 4 4 4	4 4 - 4	N N N N			
9	4o	5 4 4	4 - 4 4	4 4 4 (4)	4 5 - 4	N N N N			
10	4o	4 4 (4)	4 - 4 4	4 4 4 4	4 4 - 4	N N N N			
11	4-	4 4 4	3 - 4 4	4 4 4 (3)	4 4 - 4	N N N N			
12	4-	4 4 4	3 - 4 4	(3) 4 4 (3)	3 3 - 4	N N N N			
13	4-	4 4 4	4 - 3 4	4 4 4 (3)	4 4 - 4	N N N N			
(14)	4-	4 4 4	3 - 4 3	3 4 4 (3)	4 4 - 4	N N N N			
(15)	4-	4 4 4	3 - 4 4	3 4 4 (3)	4 4 - 4	N N N N			
(16)	4o	4 (5) 5	4 - 4 4	(3) 4 4 (3)	3 4 - 4	N N N N			
17	4o	4 3 (4)	C - 4 5	C (4) 4 4	C 4 - 5	N N N N			
18	4o	4 4 4	4 (5) 4 4	4 4 (4) 4	4 5 - 3	N N N N	0537	---	110γ
19	4o	(3) 4 4	5 (4) C 4	5 4 4 4	4 4 - C	N N N N	---	---	
20	4+	4 4 4	(4) C C (4)	5 4 5 5	C (4) - C	N N N N	---	---	
21	4o	4 4 4	(4) - 4 4	4 4 4 4	(4 4) - 4	N N N N	---	21XX	
22	4o	4 4 4	4 (4) 4 4	4 4 (4 4)	4 4 - 4	N N N N			
23	4o	(3) 4 4	4 (5) 5 4	4 4 4 (3)	4 5 - 4	N N N N			
24	4+	(4) 4 4	5 (4) 5 4	4 4 5 5	4 4 - 4	N N N N			
25	4o	3 4 4	4 - (4) 4	4 4 4 (4)	4 5 - 4	N N N N			
26	4o	4 4 4	4 - 4 4	4 4 4 (3)	4 4 - 4	N N N N			
27	4-	4 4 4	4 - 3 4	4 4 4 3	4 4 - 4	N N N N			
28	4-	4 4 4	3 - 4 (4)	3 4 4 (3)	4 4 - 4	N N N N			
29	4o	4 4 4	4 - 4 4	4 4 4 3	4 4 - 4	N N N N	22.4	---	166γ
30	4o	4 4 4	4 - 3 (4)	(4) 4 4 4	4 4 - 4	N N N N	---	---	
31	4o	(4 3 3)	5 (5) 4 3	4 4 4 4	4 5 - 5	N N U U	---	---	

IQSY GEOALERT and ADALERT (Western Pacific Region)

* = MAGSTORM

∘ = MAGCALME

△ = COSMIC EVENT

( ) = Regular World Day

\- = impossible to evaluate

( ) = inaccurate

C = artificial accident

--- = continuing magnetic storm

SUDDEN IONOSPHERIC DISTURBANCES

(S.I.D.)

HIRAISO

Time in U.T.

Dec. 1967	S W F									Correspondence		
	Drop-out Intensities (db)						Start-time	Duration	Type	Imp.	Flare	Solar Noise	Mag.
	CO	SF	HA	TO	HB	SH							
1	-	17	17	-			03.24	36	G	1			
11		10	-				22.14	11	S	1-	x	x	
16	18						02.xx	xx	Slow	1+	x	x	

IONOSPHERIC DATA IN JAPAN FOR DECEMBER 1967
第19巻 第12号

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