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IONOSPHERIC DATA IN JAPAN

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CONTENTS

COMMUNICATIONS RESEARCH LABORATORY
MINISTRY OF POSTS AND TELECOMMUNICATIONS
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INTRODUCTION

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

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

A. IONOSPHERE

Ionospheric observations are carried out at the above five stations in Japan by means of vertical sounding using ionosondes. The ionosonde produces ionograms, which are recorded digitally on computer storage medium as well as graphically on 35 mm photographic film. The digitally-recorded ionograms are collected from each station by the central computer and reduced to numerical values and Summary Plots by the automatic processing system. The ionograms obtained at Kokubunji are manually scaled as well by experienced specialists to supplement automatically-scaled parameters.

A1. Automatic Scaling

Digital ionograms are automatically scaled by the pattern recognition method. The following five factors of ionospheric characteristics are published for the present. The reliability of these factors has been ascertained by comparison of the automatically-scaled parameters with the manually-scaled values of large amounts of test ionograms.

The published data consist of tabulations of hourly values of three factors (*foF2, fEs, fmin*) and monthly medians of two factors (*h'Es, h'F*), daily Summary Plots and monthly medians plot of *foF2*.

a. Characteristics of Ionosphere

foF2	Ordinary wave critical frequency for the *F2* layer
fEs	Highest frequency of the *Es* layer whether it may be ordinary or extraordinary
fmin	Lowest frequency which shows vertical ionospheric reflections
h'Es *h'F*	Minimum virtual height on the ordinary wave for the *Es* and *F* layers, respectively

b. Descriptive Letters

The following descriptive letters are used in the tables.

- A Impossible measurement because of the presence of a lower thin layer, for example *Es* (for *foF2*).
- B Impossible measurement because of absorption in the vicinity of *fmin*.
- C Impossible measurement because of any failure in observation.
- G Impossible automatic scaling because of too small ionization density of the layer (for *fEs*).
- N Impossible automatic scaling because of complex echoes.
- Blank No digital record because of trouble in the automatic data processing system, but existence of film record.

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

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

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

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

If CNT is less than 10, there are blank spaces left.

d. Reliability of Automatic Scaling

The results of the comparison between automatically-scaled values and manually-scaled ones showed that hourly values of *foF2*, *fEs* and *fmin* were scaled within a difference of 1 MHz from about 90, 90 and 99 %, respectively of the test ionograms.

e. Summary Plot

Daily Summary Plots which are made from quarter-hourly digital ionograms are published to present general ionosphere conditions. The upper and middle parts of a Summary Plot show the diurnal variation of the frequency range of the echoes reflected from the *F* and *E* regions, respectively. The two solid arcing lines indicate the predicted values of *fxE* and *foE* calculated by the method described in the CCIR report 340. The lower part shows the diurnal variation of the virtual height where the echo traces become horizontal.

A2. Manual Scaling

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

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

a. Characteristics of Ionosphere

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

b. Symbols

(i) Descriptive Letters

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

A Measurement influenced by, or impossible because of, the presence of a lower thin layer, for example *Es*.
B Measurement influenced by, or impossible because of, absorption in the vicinity of *fmin*.
C Measurement influenced by, or impossible because of, any non-ionospheric reason.
D Measurement influenced by, or impossible because of, the upper limit of the normal frequency range in use.
E Measurement influenced by, or impossible because of, the lower limit of the normal frequency range in use.
F Measurement influenced by, or impossible because of, the presence of spread echoes.
G Measurement influenced or impossible because the ionization density of the layer is too small to enable it to be made accurately.
H Measurement influenced by, or impossible because of, the presence of a stratification.
K Presence of particle *E* layer.
L Measurement influenced or impossible because the trace has no sufficiently definite cusp between layers.
M Interpretation of measurement questionable because the ordinary and extraordinary components are not distinguishable.
N Conditions are such that the measurement cannot be interpreted.
O Measurement refers to the ordinary component.
P Man-made perturbations of the observed parameter; or spur type spread *F* present.
Q Range spread present.
R Measurement influenced by, or impossible because of, attenuation in the vicinity of a critical frequency.
S Measurement influenced by, or impossible because of, interference or atmospherics.
T Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.
V Forked trace which may influence the measurement.
W Measurement influenced or impossible because the echo lies outside the height range recorded.
X Measurement refers to the extraordinary component.
Y Lacuna phenomena, severe layer tilt.
Z Third magneto-electronic component present.

(ii) Qualifying Letters

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

A Less than. Used only when *fbEs* is deduced from *foEs* because total blanketing of higher layer is present.
D Greater than.
E Less than.
I Missing value has been replaced by an interpolated value.
J Ordinary component characteristic deduced from the extraordinary component.
M Mode interpretation uncertain.
O Extraordinary component characteristic deduced from the ordinary component. (Used for x-characteristics only.)
T Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.
U Uncertain or doubtful numerical value.
Z Measurement deduced from the third magneto-electronic component.

(iii) Description of Types of *Es*

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

The types are:

f An *Es* trace which shows no appreciable increase of height with frequency.
l A flat *Es* trace at or below the normal *E* layer minimum virtual height or below the particle *E* layer minimum virtual height.
c An *Es* trace showing a relatively symmetrical cusp at or below *foE*. (Usually a daytime type.)
h An *Es* trace showing a discontinuity in height with the normal *E* layer trace at or above *foE*. The cusp is not symmetrical, the low frequency end of the *Es* trace lying clearly above the high frequency end of the normal *E* trace. (Usually a daytime type.)
q An *Es* trace which is diffuse and non-blanketing over a wide frequency range.
r An *Es* trace showing an increase in virtual height at the high frequency end similar to group retardation.
a An *Es* trace having a well-defined flat or gradually rising lower edge with stratified and diffuse traces present above it.
s A diffuse *Es* trace which rises steadily with frequency and usually emerges from another type *Es* trace.
d A weak diffuse trace at heights below 95 km associated with high absorption and large *fmin*.
n The designation 'n' is used to denote an *Es* trace which cannot be classified into one of the standard types.
k The designation 'k' is used to show the presence of particle *E*. When *foEs* > *foE* (particle *E*) the *Es* type precedes k.

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

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

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

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

B. SOLAR RADIO EMISSION

Solar radio observations at 100, 200 and 500 MHz are carried out at Hiraiso. The observation equipment consists of two parabolic antennas, one with 10-meter diameter for 100 and 200 MHz measurements and one with 6-meter diameter for 500 MHz measurements, each being equipped with a pair of crossed doublet antennas as a primary radiator, and three appropriate receivers. Each pair of the crossed doublet antennas is used as a polarimeter. Observations are continuously carried out almost from sunrise to sunset.

B1. Daily Data at Hiraiso

The three-hourly mean and daily mean values of the solar radio emission intensities at the base-level are tabulated separately for 200 and 500 MHz measurements. Here, the base-level intensity is defined as the intensity recorded during the time when no radio emission burst is taking place. The intensities are expressed by the flux density in 10^{-22} Wm^{-2} Hz^{-1} unit.

The table for 200 MHz measurements also presents the variability indices defined by the number of impulsive radio bursts within the three-hour intervals as follows:

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

The daily variability index is defined as the daily mean of three-hourly indices.

The following symbols are used in the tables, when interference or radio bursts prevented measuring the base-level flux densities or determining the variability indices:

* Measurement impossible because of interference.
B Measurement impossible because of bursts.
Daily data within parentheses mean that the observation time does not exceed one third of the period.

B2. Outstanding Occurrences at Hiraiso

The table is a list of outstanding occurrences of solar radio emission bursts observed at Hiraiso during a month. Listed in the table are the date, frequencies, the type of event, the start time and the time of maximum, both in U.T. expressed in hours, minutes and tenths of a minute, the duration in minutes, the peak and mean flux densities in 10^{-22} Wm^{-2} Hz^{-1} unit, and the polarization.

The type of event is expressed by a combination of a numerical code and a letter symbol in accordance with the "Descriptive Text of Solar Geophysical Data, NOAA" as defined by H. Tanaka in the "Instruction Manual for Monthly Report of Solar Radio Emission, WDC-C2" in January 1975:

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

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

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

One of the following symbols may be attached after numerical values, if necessary.

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

C. RADIO PROPAGATION

C1. H.F. Field Strength at Hiraiso

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

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

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

C2. Radio Propagation Quality Figures at Hiraiso

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

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

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

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

C	artificial accident,
S	propagational accident,
U	inaccurate.

The column of conditions presents a record of the forecast of *radio propagation conditions* which is applicable to forthcoming 12 hours and broadcast six times per hour from JJY (Japan Standard Wave) station. The conditions are denoted as follows:

N	normal,
U	unstable,
W	disturbed.

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

Data on *geomagnetic storms* which are often correlated with radio propagation disturbances are tabulated based on reports from observation at Kakioka Magnetic Observatory, Japan Meteorological Agency. *Time* (U.T.) is expressed in hours and minutes (or tenths of an hour), and *range* in nanotesla. When they are uncertain quantitatively, /'s are used to replace the numerical values. Continuation of a geomagnetic storm is denoted by ---.

C3. Phase Variation in OMEGA Radio Waves at Inubo

The phase values of eight OMEGA radio signals as received at Inubo are depicted for an interval of one month, along with the phase deviation defined as a deviation from a value averaged over the six quietest day within the month. Particulars of the received signals are given in the table below.

In each of the four panels of the figure, the phase (ϕ) is shown in the lower part and the phase deviation ($\triangle\phi$) is shown in the upper part. The phase data are sampled every 30 min, so the curves of the phase and phase deviation are composed of 48 data points per day. The phase delay is measured as a positive value.

The polar cap phase anomaly (PCPA) caused by the solar protons are well detected on the Norway signal. The start, end and maximum times of the PCPA are listed in the table next to the figure, where the times are expressed as day/hour & minute in U.T.. The maximum phase deviation in the list is defined as a phase advance (negative values in the figure) in degrees.

C4. Sudden Ionospheric Disturbances

a. Short Wave Fade-out (SWF) at Hiraiso

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

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

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

Types of fade-out are as follows:

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

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

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

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

b. Sudden Phase Anomaly (SPA) at Inubo

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

Phase advance is shown in unit of degree at its maximum stage. No transmission or no reception during the period is indicated by —, an indistinguishable record is spaced out, and a multi-peak event is marked by *. The most remarkable or distinct phase advance is underlined and listed in the column of *Time*.

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

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

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

Transmitting Stations						
Name	Location (Geographic Coordinates)		Call Sign	Frequency (kHz)	Radiation Power (kW)	Arc Distance from Inubo (km)
Norway	66°25'N	013°08'E	Ω/N	13.6	10	7820
Liberia	06°18'N	010°40'W	Ω/L	13.6	10	14480
Hawaii	21°24'N	157°50'W	Ω/H	13.6	10	6100
North Dakota	46°22'N	098°20'W	Ω/ND	13.6	10	9140
La Reunion	20°58'S	055°17'E	Ω/LR	13.6	10	10970
Argentina	43°03'S	065°11'W	Ω/AR	13.6	10	17640
Australia	38°29'S	146°56'E	Ω/AU	13.6	10	8270
Japan	34°37'N	129°27'E	Ω/J	13.6	10	1040
North West Cape	21°49'S	114°10'E	NWC	22.3	1000	6990

HOURLY VALUES OF FOF2 AT WAKKANAI

JAN. 1989

LAT. 45.4N LON. 141.7E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	30	29						A	74	92	111	110	99	109		82	82	57	60	51	36	34	32	32
2	31	32	31	33	32			47	84	C 93	97	105	105	96	98	74	52	58	44	30	25			
3		32	34	34	30	31		60	84	96	100	104	96	89	96	92	84	53	62	48	32			32
4	30	28	30		32	34	26	48	81	84	102	90	95	92	92		66	68	51	38	35		35	35
5	38	A	38		45	50		63	90	95	112	110	100	98	92	105	93	86	65	64	48	43	47	46
6	37	N	21	A			48	59	90	87	132	118	84	112	117	101	83	74	61	55	34	31	A	33
7		36	35	38	40	35	29	64	84	108	114	118	109		94	92	91	74	61	53	43	A	40	N
8	40	38	41	37	40	37	41	73	85	97	120	92	102	94	92	91	73	83	66	42	35		34	
9	A	30	37	36	43	32		50	112	127	138	133	127	114	99	100	95	84	72	52	40	40	38	37
10	36	37	42	46	37	32	30	63	112	133	131	125	96	95	97	92	90	87	78	61	46	33	36	30
11	33	31	37	35	33	34	31	62	97	117	129		113	114	114	100	95	80	65	64	40	40	40	B
12	31	N		26			46		89	110	122	138	132	130	126	126	119	98	94	80	64	60	58	53
13	51		53	54	52	38	38	63	95	118	121	135	132	102	105	103	95	86	66	57	29	36	41	41
14	50	37	31	32	43	N	27	60	97	125	138	124	112	104	99	95		80	76	66	49	44	36	39
15	42	41	38	41	36	37	34	81	112	114	130	129	126	117	97	89	94	91	84	74	52	47	58	38
16	29	32	35	34	22	36	37	61	92	122	138	124	117	114	94		91	88	79		60	A	52	44
17		50	52	50	38	35	36	59	89	121	133	146	130	117	112	118	103	89	90	69	51	50	A	A
18	50	51	48	43	48	45	48	70	107	121	114	128	126	125	123	118	103	93	87	67	55	54	58	51
19	46	39	49	52	61	61	51	80	88	110	125	138		118	118	116	88	82	73	60	49	52	48	52
20	46	42		42	38	33	40	69	100	111	111	117	117	100	111	93	90	73	72	62	51	41	44	44
21	32	31		31	29		30	57	106	139	141	147	134	121	122	120	113		62	54	40	37	43	35
22	A		30	30	35	32	31	64	108	140	147	137	136	133	122	118	111	92	66	57	44	39	47	42
23	37	44	42		46	42	48	60	116	137	136	135	139	135	131	121	104	97	84	72		47	49	38
24	43	47	47	44	46	46	36	82	94	97	122	135	120	110	121	109	96	77	64	61	46	40	40	
25	38	48	42	44	N	52	53	64	84	91	128	126	122	102	116		93	80	82	66	47	36	40	35
26	37	39	44	38		30		62	101	110	125	122	123	120	116	92	88	72	63	62	54	42	37	35
27	38	38	41	38	47	51		63	86	118	127			120	120	115	104	81		68	44	36	40	40
28	39	38	43	43	38		44	67		112	118	111	107	117	96	108	92	73	69	52	50	38	49	38
29		37	38	47	49	35		88	93	121	126	125	121	112	105	107	87	74	82	66	53	47	43	43
30	40	41	37	38	44	49	44	60	105	114	126	128	111	127	115	92	96	82	64	53	37	30	37	36
31	37	36	35	36	41	37	37	65	108	96	125	146	126	110	C	92	98	82	67	70	56	52	49	39
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	26	27	26	26	24	23	29	30	30	31	29	29	30	29	28	30	30	30	30	30	26	27	25
MED	38	38	38	38	40	36	37	63	94	113	125	125	117	113	111	100	93	82	66	61	46	40	41	38
U Q	42	41	43	44	46	45	46	68	106	121	132	135	126	120	119	115	98	87	79	66	51	47	49	43
L Q	32	32	35	34	35	33	31	60	86	97	114	114	103	102	96	92	88	74	63	53	37	36	37	35

HOURLY VALUES OF FES AT WAKKANAI

JAN. 1989

LAT. 45.4N LON. 141.7E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G					62	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
2	G	G	G	G	G	G		G	41	C	G	G	G	G	G	G	G	G	G	G	G	G	29	
3		G	G	G	G	G		G	G	G	G	G	G	G	G	G	G	G	G	G	G			G
4	G	G	G		G	G	G	G	G	G	G	G	G	G	G		41	37	56	32	G		29	G
5	36	67	40		G	G	G	G	G	G	G	G	G	G	G	G	G	G	37	G	G	G	G	G
6	G	24	40	45	G	30	G	G	G	G	G	G	G	G	G	G	G	G	37	28	G	G	38	30
7		G	G	30	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	30	57	G	G
8	G	G	G	G	G	G	G	G	G	G	G	G	G	42	G	G	G	G	G	G	G		G	28
9	40	28	G	G	32	G		G	G	G	G	G	G	G	G	G	G	G	51	33	37	26	31	G
10	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	46	62	62	G	27	30	G
11	G	G	G	G	G	G	27	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	28	B
12	G	G		G			G			G	G	G	G	G	G	G	G	G	G	G	G	G	35	71
13	49		45	30	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
14	G	G	G	G	G	G	G	G		G	G	G	G	G	G	G		G	G	G	G	G	G	32
15	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	29	31
16	G	G	G		G	G	G	G	G	G		G	G	G	G		G	G	G		38	38	G	31
17		G	30	G	G	G	G	G	G	40	G	G	G	G	G	G	G	G	27	32	40	41	37	45
18	35	28	G	G	G	G	G	G	G	G	G	G		G		G	37	36	37	G	30	29	G	G
19	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	31	G	G	G	G
20	32	32		40	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	38	27
21	26	G		G	G	G	G	G	G	G	G	G	G	G	G	G	29		58	G	G	28	G	31
22	36		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
23	G	G	G	G	G	G	G	G	G	38	42	G	G	40	40	G	38	32	G	58		G	28	31
24	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
25	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G		G	G	G	G	G	G	G	G
26	G	G	G	G		G	30	G	G	G	G	97	G	53	G	G	G	G	G	G	G	G	G	G
27	G	31	28	G	G	G		G	G	G	42		G	39	40	G	G	G	G	G	G	33	G	28
28	30	G	G	36	G	32	26	G		G	G	G	70	G	G	G	39	G	G	G	G	G	26	30
29	33	30	G	G	G	G		G	G		G	G	G	G	G	G	G	G	G	G	G	G	G	G
30	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	26	28	G	G	G
31	29	25	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	30	33	30	30	G	G	23
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	29	28	27	28	29	25	30	28	29	30	30	30	31	30	28	30	30	31	30	30	28	30	28
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
U Q	31	24	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	33	28	G	26	29	30
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT WAKKANAI

JAN. 1989

LAT. 45.4N LON. 141.7E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		16						20	27	36	40	33	48	45	46	28	22	15	16	16	16	20	20	18
2	18	15	18	18	17			20	23	C	34	39	26	35	38	28	23	17	20	17	16	22	21	
3		18	17	20	17	17		20	27	34	35	43	36	38	46	45	22	17	18	17	17			18
4	18	15	20		18	15	18	18	33	35	50	48	50	49	34		21	18	18	23	15		17	15
5	17	18	20		17	14	15	18	27	36	38	36	44	44	35	28	21	17	17	18	18	22	16	15
6	16	18	16	17	65	20	16	17	27	32	36	48	50	49	35	30	24	18	17	18	17	22	18	18
7		16	17	16	16	17	17	18	27	34	33	23	40	38	33	28	24	18	17	17	18	17	16	17
8	16	18	15	18	15	17	16	17	27	24	27	39	36	28	30	32	23	16	16	16	18		21	18
9	18		65	17	16	20		18	26	33	46	38	26	38	35	28	22	17	21	15	18	16	18	18
10	16		17	14		18	20	20	28	35	43	38	38	36	34	29	27	17	21	18	16	20	17	16
11	16	16	15	16	18	15	15	18	28	40	48	43	48	50	48	35	26	16	17	17	15	20	16	B
12							23		27	43	49	52	56	50	48	29	24	20	20	15	28	17	15	17
13	18		17	17	16	15	16	21	28	49	56	58	59	50	52	38	26	17	18	20	16	23	16	16
14	16	15				21	17	23	29	33	42	37	50	46	49	33		18	15	15	21	15	16	17
15	18	17	15	15	16	16	18	21	28	35	49	39	38	46	35	30	24	17	18	17	16	17	16	18
16						16	20	20	27	33	32	42	43	36	38		24	15	15		14	18	17	16
17		15	15	16	17		18	18	29	29	42	36	40	43	39	34	26	21	20	18	17	16	18	16
18	18	20	16	17	18	17	16	23	27	33	35	40	35	42	33	34	30	17	17	17	18	20	20	21
19	17	17	16	16	15	15	17	21	30	35	49	50	49	54	52	33	26	18	17	20	17	15	15	17
20	15	16		16	16	14	15	18	27	36	38	39	52	46	38	33	27	16	16	17	17	17	15	15
21				17		17		20	27	33	38	39	48	55	38	33	21		17	17	26	18	17	15
22	16		16	16	16	17	17	23	27	35	36	44	40	50	34	50	26	16	17	16	15	20	17	18
23	16	17	15		15	16	15	22	30	28	33			33	28	27	20	18	15	17		16	20	20
24	20	17	20	16	15	15	15	21	27	45	39	47	51	39	40	33	27	17	20	17	17	18	18	
25	18	14	18	17	15	17	16	20	28	38	49	42	44	43	45		26	15	17	17	17	22	18	18
26	17	15	15	16		21	20	18	29	36	49	48	56	39	49	43	26	16	18	15	18	17	17	16
27	16	15	16	16	16	15		17	26	35	32		39	29	28	29	24	18	18	18	17	14	16	17
28	18	17	34	15	14	21	16	21		30	33	30	32	34	33	28	27	15	16	16	17	15	17	18
29	17	16	15	15	15	18		18	18	30	34	35	35	34	26	30	24	16	17	16	16	16	14	20
30	17	16	16	15	15	16	14	21	30	30	35	44	36	36	33	29	18	16	15	17	16	21	16	17
31	18	17	17	16	15	15	15	20	34	23	21	22	34	22	21	21	23	20	17	16	20	15	21	16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	24	24	25	24	24	27	24	30	30	30	31	29	30	31	31	28	30	30	31	30	30	28	30	28
MED	17	16	16	16	16	17	16	20	27	34	38	39	42	42	35	30	24	17	17	17	17	18	17	17
U Q	18	17	18	17	17	18	18	21	29	36	48	45	50	49	46	33	26	18	18	18	18	20	18	18
L Q	16	15	15	16	15	15	15	18	27	32	34	36	36	36	33	28	22	16	16	16	16	16	16	16

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT AKITA

JAN. 1989

LAT. 39.7N LON. 140.1E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		30	29	32	32	31	22	58	87	97	114	112	110	111	108	103	86	62	55	54	44	32	30	34
2	32	28	32	34	32	29	30		79	102	127	113	104	108	90	106	86	66	52	58	38	35	35	35
3	30	42	36	30	B	N	30		85	102	108	96	110	103	99	102	82	66	60	54	28	30	N	
4	30	30	32	34	29	30	32	60	71	90	96	111	102	92	100	101	82	53	67	44	30	28	30	34
5	32	N	38	36	39	42	39	62	84	88	114	115	105	103	112	103	86		76	66	54	41	33	38
6	46	34	29		31	27	48	63	102	98	121	137	118	86	110	108	87	63	66	54	51	33		32
7	A	38	40	35	35	A		66	86	97	115	106	114	104	100	86	86	87	74	58		40	25	A
8		37	40	35	31	38	40	65	88	90	106	109	107	96	97	90	90	86	78	58	44	30	35	34
9	27	22	N	38	40	N	30	61	110		128	133	114	106	103	102	96	93	80	63		40	A	44
10	42	30	43	49	43	28	32	72	107	131	130	116	108	107	101	96	90	85	82	66		A	35	32
11		35	34	28	31	31	34	66	110	116	121	111	106	109	107	102	84	81	71	66	52	47	41	30
12	A					N	N		99	125	121	120	120	117	117	118	113	112		77	63	60	56	52
13	52	47	53	44	48	45	31	63	99	112	121	116	110	103	106	90	88	82		52	35		34	35
14	38	31	30	29		33		57	88	111	126	121	108	93	103	96	90	84	70	72	66	44		43
15	44	43	A		34	38	46	70	102	124	121	121		102	94	93	90	90		79		48	48	N
16	35	31		30	37	44	55	72	90	127	136	120	115	111	96	96	100	93	84	81	65	A	46	39
17	32	47	51	32	30			66	108	113	136	130	120	118	110	114	97	92	88	73	58	48	53	43
18		50	43	37	35	A	A		102	125	132	129	116	115	115	114	104	96		74	63	48	52	52
19	51	54	58	52	52	54	52	81	90	112	121	131	112	112	109	107	93	78	76	65	53	49	46	48
20	45	47	48	47	47	53	51	74	88	110		122	111	106	102	111	86	76	63	65	54	42	43	46
21	33	31	32	42		39	18	66	128	134	140	144	138	128	120	132	113	103	78	N	46	30	42	45
22	A	A		35	30		30	64			140	132	135	132	129	115	115	99	81	63	48	44	50	48
23	44	41	47	43	35	42	52	71	120	118	136	135	131	130	134	124	110	94	86	54	52	47	A	46
24	42	47	49	50	44	46	40	66	106	109	126	121	121	120	106	111	103	80	66	54	58	47	32	
25	40	43	44	35	38	46	42	71	101	110	103	133	130	107	113	111	93	87	86	86	72	47	30	
26		38	34	32		31	32	66	90	112	118	131	111	118	112	102	85	80	67		59	47	34	42
27	42	44	44	36	35	44	43	64	97	110	118	120	133	107	110	126	106	88	81	76	52	48	39	38
28	34	31	34	42	39	33	31	65	90		111	115	118	106	104	111	103		72	51	49	23	43	35
29	32	31	A		43	31	26	66	103	121	124	115	112	109	93	100	93	80	77	86	62	50	39	39
30	36	38	38	40	44	41	44	66	85	111	118	121	114	117	122	116	93	87	A	50	48	30	26	A
31		37	30	37	35	30	34		111	130	112	132	118		102	97	88	83	54	66	63	47		42
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	22	28	25	27	26	24	26	26	30	28	30	31	30	30	31	31	31	29	26	29	27	28	25	25
MED	37	38	38	36	35	38	34	66	98	112	121	121	114	108	106	103	90	85	75	65	52	44	39	39
U Q	44	43	45	42	43	44	44	70	106	122	128	131	120	117	112	114	103	92	81	73	62	47	46	45
L Q	32	31	32	32	32	31	30	63	88	102	114	115	110	103	100	97	86	79	66	54	46	32	32	34

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT AKITA

JAN. 1989

LAT. 39.7N LON. 140.1E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	36	G	G	G	G	G	G	G	40	59	G	G	G	G	G	G	G	G	G	G	G	G	G	G
2	30	G	G	G	30	24	G		34	40	51	49	G	G	42	G	30	G	G	G	G	G	G	G
3	G	G	G	G	B	G	G		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	
4	G	G	G	29	G	G	G	G	G	G	G	G	G	G	G	G	37	G	G	G	G	G	G	G
5	G	G	G	24	G	G	G	G	G	G	G	G	G	G	G	G	G		24	G	G	G	G	G
6	G	G	G		G	G	G	G	G	G	56	62	44	54	G	46	65	36	33	50	G	G		28
7	25	G	30	30	G	24		G	48	G	G	G	44	60	49	37	47	37	34	28	G	G	29	58
8	28	G	G	G	G	G	G	G	34	39	47	44	49	48	47	38	G	G	G	24	G	23	G	G
9	G	G	G	G	G	G	G	G	37		39	54	G	44	G	G	G	G	G	G	36	24	39	24
10	G	24	G	G	G	G	G	G	G	37	G	G	G	43	44	46	30	36	34	45	41	92	G	29
11	34	26	24	26	G	G	G	29	G	G	G	G	G	41	42	G	G	31	33	34	29	G	G	G
12	35	28		29		G	G		G	G	G	61	52	G	G	51	30	G		29	26	35	33	G
13	G	G	G	G	G	G	G	G	G	G	42	G	G	G	G	G	G	G	G	G	G		G	G
14	G	G	G	G		G		G	40	G	43	61	65	G	G	G	G	G	G	41	29	33	G	G
15	G	G	35	29	29	G	G	G	G	G	G	41		G	70	54	47	G		G		G	G	G
16	40	26		G	G	24	G	G	G	G	40	G	G	G	G	G	G	G	32	45	34	39	32	29
17	G	G	G	26	30			21	G	43	65	42	64	G	G	52	48	G	36	G	32	33	28	G
18		28	G	30	G	32	37		G	58	G	G	G	G	50	54	51	97	36	37	36	32	G	G
19	G	G	G	G	G	G	G	G	G	G	58	G	G	G	G	G	G	G	G	G	G	G	G	34
20	29	26	33	28	32	32	G	G	G	G		G	G	G	G	G	G	G	G	G	G	G	G	G
21	11	G	G	G		G	G	G	G	G	G	G	G	G	G	G	G	G	25	G	36	G	G	G
22	28	53	32	32	G	G	G	G			45	44	G	54	G	G	G	G	24	G	G	29	G	G
23	G	G	G	33	G	G	36	G	G	G	45	74	47	51	49	46	G	31	38	36	G	35	45	G
24	G	G	G	G	G	G	G	29	G	78	G	G	G	G	G	G	G	G	29	33	30	28	28	27
25	G	G	G	G	G	G	G	G	G	G	G	G	50	58	42	G	G	30	35	32	31	27	26	24
26	28	G	G	G		G	G	G	G	G	44	G	G	68	53	G	G	G	G	40	G	G	G	G
27	G	G	34	26	G	G	G	G	33	G	50	91	49	44	41	G	40	G	G	G	G	G	G	G
28	G	G	G	G	G	G	G	G	G		50	69	53	43	G	50	37		30	41	G	34	G	G
29	G	G	30	30	G	G	G	G	G	G	G	45	G	G	G	G	G	28	G	G	G	G	G	G
30	G	G	28	G	G	G	G	G	G	41	44	G	45	44	44	37	39	35	37	29	25	G	G	33
31		30	G	34	26	G	G		G	G	G	46	48		42	37	G	28	28	29	24	G		G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	31	29	30	26	30	28	26	30	28	30	31	30	30	31	31	31	29	29	31	30	30	29	30
MED	G	G	G	G	G	G	G	G	G	G	20	G	G	G	G	G	G	G	24	24	G	G	G	G
U Q	28	24	26	29	G	G	G	G	G	38	45	49	48	44	44	46	37	30	33	36	30	32	27	24
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT AKITA

JAN. 1989

LAT. 39.7N LON. 140.1E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	16	17	16	20	17	17	17	18	18	21	35	21	23	23	22	28	22	16	18	16	16	16	18	18
2	16	16	18	17	16	22	16		18	18	22	23	24	24	18	21	16	18	16	18	20	16	18	16
3	16	17	16	16	B	17	17		29	22	23	27	36	28	24	30	23	16	16	17	16	16	20	
4	16	17	16	18	16	18	16	20	28	33	35	39	36	38	35	35	18	16	15	16	21	17	16	16
5	16	21	16	17	16	16	16	18	26	34	38	44	24	24	24	23	23		16	17	17	17	20	16
6	16	16	20		18		16	20	22	24	24	24	26	23	22	23	16	16	17	16	17	23		21
7	18	17	18	16	16	17		18	17	20	24	24	24	26	18	15	16	17	18	16	27	17	18	16
8	17	17	16	16	20	16	16	20	18	17	21	22	24	22	23	17	17	16	16	16	16	17	16	18
9				16	15	18	21	20	22		24	21	22	23	26	22	24	17	16	16	16	17	15	16
10	16	16	15	15	15	21	17	20	20	22	39	24	24	22	23	21	18	16	16	17	16	16	16	16
11	16	16	15	17	16	18	16	15	16	24	39	22	48	40	32	24	26	16	16	16	17	16	20	18
12	16	15		15			16		29	36	36	35	35	38	36	29	18	17		16	17	16	16	17
13	16	16	15	15	15	16	16	18	29	26	30	42	40	43	26	34	26	16	21	16	16		17	17
14	16	16	16			20		22	32	21	22	28	29	43	53	24	28	16	16	16	16	16		17
15	17	15	15	15	16	16	16	22	32	34	38	32		45	42	24	20	18		16		16	16	16
16	16					16	16	20	28	34	34	32	33	38	35	34	26	17	17	16	16	16	16	18
17	20	15	15	17	15			21	30	22	23	33	28	26	24	21	18	20	17	16	16	16	16	18
18		15	15	16		16	15		28	33	38	24	28	27	24	22	23	17	15	16	16	16	16	16
19	23	15	15	15	15	15	17	20	28	38	29	39	44	38	35	32	21	17	16	16	16	17	17	17
20	15	15	15	15	15	16	16	21	28	21		27	22	24	23	22	28	17	17	16	16	16	16	15
21						16		20	20	20	21	23	39	24	23	21	26	18	18	17	16		16	20
22	16	15	15	15	15		18	22			18	21	26	22	24	22	23	17	16	16	17	17	16	16
23	21	15	15	16	15	16	17	21	17	23	23	42	24	24	21	20	16	16	18	16	16	15	16	17
24	22	15	15	15	15	16	16	16	29	23	26	24	34	40	27	34	26	17	16	16	16	16	17	18
25	17	15	15	16	16	17	16	22	27	34	35	23	29	26	26	34	27	18	16	16	16	16	18	17
26	18	16	15	15		18	18	21	27	20	23	26	26	26	33	21	27	17	16	16	16	16	17	16
27	17	15	15	15	15	20	17	21	16	26	21	23	24	24	21	17	16	17	15	16	16	16	21	18
28	16	15	16	15	15	17	16	22	17		21	21	23	22	21	16	17		17	15	16	17	17	18
29	16	18	15	15	15	18	18	21	17	18	17	22	22	18	17	16	17	21	21	18	16	16	17	16
30	16	15	15	15	15	16	16	22	17	17	21	22	22	23	22	17	16	16	15	16	17	20	21	17
31		15	16	15	16	20	16		16	16	16	17	22		20	17	16	17	16	17	17	16		17
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	28	27	27	24	27	27	26	30	28	30	31	30	30	31	31	31	29	29	31	30	29	28	30
MED	16	16	15	15	15	17	16	20	24	22	24	24	26	25	24	22	21	17	16	16	16	16	17	17
U Q	17	16	16	16	16	18	17	21	28	33	35	32	34	38	32	29	26	17	17	16	17	17	18	18
L Q	16	15	15	15	15	16	16	20	17	20	21	22	24	23	22	20	17	16	16	16	16	16	16	16

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT KOKUBUNJI

JAN. 1989

LAT. 35.7N LON. 139.5E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	31	29	32	36		29	32	62	102	84	106	120	117	111	121	102	95	86	63	58	46	33		30
2	33	36		27	29	30	37	58	82		131	116	107	125	113	110	110	86		69	69	50	41	37
3	31	45	40		N	25	38	60	88	97	122	105	112	124	107	122	96	85	64	60	53	46	35	31
4		34		35	30	28	34	63	86		100	117	100	99	97	102	92	71	73	70	40	41	40	33
5	32	36	36		33	36	37	69	94	99	115	123	104	110	110	107	111	98	80	75	61	45	35	41
6	48	39	37		41	39	48	90	90	119	97	140	125	112	97	112	94	84	66	68	58	44	36	33
7	37	47	45	40	32	30		83	101	97	108	117	116	108	108	93	84	95	85	76		50	40	45
8			46	40		35	38	73	99	107	112	121	108	99	101	98	102	86	93	77		50	50	46
9	31	33	39	34	33	38		72	114	128		128	117	111	102	102	102	96	89	71	52	45	48	49
10		39		44	42	38	41	82	113	116	131	121	120	111	112	103	98	100	92	86		56	54	
11	A	46					34	76		128	124	120	106	108		104	95	89	77	71	74	52	52	50
12		39		29	25	30	26	49	95	141	126	120	114		108	115	115	106		71	64	66	53	54
13	58		51	42	41	45	46	71	98	112	114	120	106	100	120	111	101	92	84	67	64	57	48	46
14	47	34	31	29	32	37	49	72		114	129	125	110	104	105	99		90	76	81	80	67	47	47
15	44	48			33	36	47	76		113	125	131	112	108	104	96	97	98	88		74	57	56	
16	43	44	48	31	57	57	79	88		137	128	124	113	114	105	93		99	88	86	75		50	51
17	51	55	56	37					102		136	137	118	112	118	117	110	112	98		76	52	52	49
18	51		41	37	36	40	36	72	115		130	113	115	118	116	115	110	98	80		69	50	53	48
19	49	58	55	42	42		53	95	102	117	127	126	125		115	108	110	89	75	72	68	57	54	52
20	42	45	44		36	36	45	72	102	117	111	122	124	112	109	114	107		74		63	53	43	
21	32	30	38	29	28	40		70	126	136		145	131		130	138	126	115	94		66	58	N	42
22	37		36	33		36		62	112	147	145	138		135	130	126	115	114	81	76	56	54	49	
23	34	46	44		35	35	40	78	108	126	128			120	140	122	124	102	82	72	52	52	42	47
24			48	46	40	41		64	106	120	127	132	117	117	110	108	110	88	64	64	69	56	54	44
25			40		35	40	39	72		118	118	127	150		124	131	118	104		131		90		67
26	55	48	38	35	29			77	99	114		132	130	122	120	110	91	85	76	65			46	41
27	42	39	45	44	42	40	46	82	89	95	131	130	137	124	118		131	114	94	101		51	52	47
28	45	39	41	41	N	31	38	76	96	102	121	114	120	112	122	115	127	105	84	77	57	57	53	51
29	40			38	38	36	42	81	99	116	128	115	110	110	101	105	101	84	77	91		47	44	46
30	39	40	31	41	45			72	100	102	110	114		121	128	123	110	100	83		62	52	50	48
31		46	49	41	28	40	36	99	102	136	136	111	112	98	95	97	92	88	71	76		58	43	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	23	24	24	23	24	26	23	30	26	27	28	30	28	27	30	30	29	30	28	25	23	29	28	26
MED	42	40	41	37	35	36	39	72	100	116	126	122	116	112	111	109	107	96	80	72	64	52	48	46
U Q	48	46	47	41	41	40	46	81	106	128	129	130	122	120	120	115	113	102	88	79	69	57	52	49
L Q	33	36	37	33	31	31	36	69	95	102	113	117	110	108	105	102	95	86	74	68	56	48	42	41

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT KOKUBUNJI

JAN. 1989

LAT. 35.7N LON. 139.5E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G		G	G	G	G	G	G	G	46	49	G	G	G	G	37	G	G				G	G
2	G	24	G	G	G	26	G	G	34	43	44	86	G	G	G	G	G	31		G	G	G	G	G
3	G	G	28	G		G	G	G	G	44	G	G	G	G	G		G	G	G	25	G	G	G	G
4	G	G	G	G	G	G	G	48	G		G	G	G	G	G	36	31		G	24	24	24		
5	G	G		26	G	G	G	G	G	G	G	G	G	G	G	G	G	34	28	G	G	G	G	G
6	G	G	G	G	G					G	G	G	G	G	57	63	31	34	31	43	G		G	G
7	G	24	29	32	29	24	G	G	G	G	G	45	G	G	44				27	29		G	G	
8	48	28	29	G		G	G	28		44	52	48	51	44	43	40	G							
9	23	G	G	G	25	G	G		G	G	42				G	G	G				G		31	34
10	28	26	G	G		G	G			50	G	G	G	47	48	43	34	31	34	26	G	G		55
11	59	30	26	30	31	33	23	G	G	G	G	G	G	G		G	41	G	G	G		G	G	G
12		G		26	G	G	G	G	G	G	G	G	47	44	58	52	G	38						
13	78		56						G	G	46	49	G	G	40	G	G	G	56			26	25	
14	G	G	G	G	G	G	G		34	47	48	46	48	G	G	G	34	G		27	30		32	24
15	G	G	G	G	G	G	G	G	G	G	G	59	G	G	G	37	G	35	29		G	G	G	G
16	G	34	33	34	24	26	27	28		G	47	49	43	42	G	G		48	60	37	32	29	29	24
17	G	G	G	G		G	38	32	G	G	73	46	G	46	46	G	G	40	55	43	39	38	34	30
18	G	G	G	G	G	G	G	28	G	G	G		48	G	G	41	G	30	31		G	G	G	G
19	G	G	G	G	G	G	G	G	G	G	G	57	G	G		G	G	38	G	G	G	G	G	G
20	G	G	28	60	31	31	G	30		41	44	G	G	52	48	G	G	G	G	G	G	G	G	G
21	G	G	G	G	G	G		G	37	42	G	G	50			G	G	G	G	G	G	G	G	G
22	27	37	33	25		G	G	G		G	G	45	G	48	G	G	G	G	26	G	G	G	G	G
23	G	G	28	G	G	G	29	G	G	G	42	46	G	G	46	G	G	G	G	24		24	G	G
24	G	G	G	G	G	G	G	G	G	G	G	49	G	48	G	G	G	G	G	28	33	32	G	G
25		28	31	27	29	26	24	G	G	G	46	47	G	58	G	59	50	38	37	38	37	29	33	G
26	G	G	G	G	G	G	G	28	G	44	42	45	45	44	G		37	G	36	G	G	G	G	G
27	G	G	G	33	G	25	G	G		G		52	77	50	46	46	G	32	26	G	G	G	G	G
28	G	G	G		24	20	G	G	G	G	G	48		44	61	52	48	G	35	G	G	G	G	G
29	G			G	24	G	G	G	G	G	G		47	G	43	G	G	28	G	G	G		G	G
30	G	G	24	23	G	G	G	G	G	39	G	G	51	53	46		33	G	31		G	24	G	28
31	38	29	28	G		G	24	29	37	39	46		50	47	44	38	G	33	27	28	G	G	G	G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	29	27	29	24	29	28	26	24	30	30	27	29	29	28	27	29	27	26	23	24	24	27	26
MED	G	G	G	G	G	G	G	G	G	G	G	46	G	G	20	G	G	28	27	24	G	G	G	G
U Q	12	25	28	26	24	22	G	28	G	41	46	49	47	47	46	41	33	34	34	28	12	24	G	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT KOKUBUNJI

JAN. 1989

LAT. 35.7N LON. 139.5E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	15	17	17	15	17	14	18	26	21	23	23	29	40	21	21	17	16	15	14	15	15	15	16
2	15	15	15	15	15	15	14	20	16	18	20	22	22	21	18	18		15	16	15	14	14	14	15
3	15	14	15	14	15		15	14	17	23	28	39	41	29	24	30	17	15	15	14	15	15	15	15
4	15	14	18	14	14	14	15	16	27		35	38	38	36	34	27	22	29	15	16	15	15	15	15
5	15	14	15	14	14	15	14	20	28	33	35	38	27	38	23	21	24	14	15	15	14	15	22	14
6	15	15	15	16	15	27	15	18	17	23	28	39	38	29	28	24	16	15	16	15	15	15	15	15
7	15	14	14	15	14	15	14	14	16	22	23	22	28	26	26	14	27	16	15	15		15	15	15
8	15	17	15	15		14	15	15	17	18	20	27	32	23	22	20	17	15	15	15		15	16	15
9	16	14		14	15	15	15	14	16	35	14	43	28	24	28	20	17	17	14	15	15	15	14	14
10	15	14		15	15	16	14	20	17	18	38	29	29	28	26	14	18	14	14	14	15	20	16	15
11	14	15	14	14	14	14	15	17	14	18	40	21	32	23		21	18	17	14	15	15	15	14	15
12		24		15		15	15	16	29	28	38	40	35	33	32	27	18	15		14	15	14		14
13	15	14	14	14	14	14	15	15	36	21	27	33	30	43	28	18	17	16	14	15	15	15	15	15
14	15	14	15			15	15	15	18	21	24	26	30	33	42	22	24	17	15	15	15	15	16	15
15	15	15	14	15	20	15	14	15	33	36	38	27	39	40	39	23	28	14	15		15	15	18	17
16	16	14	14	17	16	16	14	15		33	26	28	34	34	36	33		15	16	15	16	15	15	16
17	15	15	15	15				15	20	14	24	33	39	30	26	23	32	16	15	15	15	15	15	15
18	17	14	15	16	16	14	15	15	20	24	24	26	26	28	24	22	32	15	16		16	17	15	15
19	14	15	16	14	14	15	15	14	21	24	30	33	32	32	24	23	27	15	16	15	15	15	15	15
20	15	14	15	14	14	15	15	15	36	18	21	39	30	22	29	21	20	20	15		15	15	16	14
21				14		14		15	15	17	21	22	34		23	23	27	18	14	17	15	18	16	15
22	15	14	14	15		15	14	21	17	18	22	21	29	21	21	18	14	18	15	15	15	16	15	16
23	15	15	14	17	14	15	15	20	16	20	27	28	14	28	21	21	18	18	15	14	20	15	15	15
24	16	15	14	14	14	15	15	22	17	20	24	28	34	28	36	21	18	17	14	14	15	15	14	15
25		16	14	14	15	14	15	20	32	21	26	23	26	27	24	22	20	15	15	15	15	14	15	15
26	14	15	14	15	16		15	15	16	20	20	27	24	24	38	20	18	18	15	15	15	14	15	15
27	14	15	15	15	17	16	14	18	16	33	18	18	20	24	21	17	16	14	15	15	15	15	14	15
28	15	15	15	14	14	20	15	20	16	21	18	21	22	23	18	16	17	20	15	17	16	14	15	15
29	15			15	15	14	15	14	14	15	16	17	17	22	18	18	15	15	17	15	14	17	15	15
30	15	15	14	15	14	14	14	21	16	17	24	24	24	23	21	15	15	14	15		18	16	17	14
31	14	14	14	14	16	16	15	15	14	15	17	18	18	20	17	16	15	14	14	14	16	15	15	14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	29	26	30	25	28	29	31	30	30	31	31	31	30	30	31	29	31	30	27	29	31	30	31
MED	15	15	15	15	15	15	15	15	17	21	24	27	29	28	24	21	18	15	15	15	15	15	15	15
U Q	15	15	15	15	15	15	15	20	26	24	28	33	34	33	29	23	24	17	15	15	15	15	16	15
L Q	15	14	14	14	14	14	14	15	16	18	20	22	24	23	21	18	17	15	15	14	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT YAMAGAWA

JAN. 1989

LAT. 31.2N LON. 130.6E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	29	32	34	36	29	28	26	42	106	112	101	121	133	134	124	121	116	122	85	61	66	66		31
2	N	31	36	32	N	N	26	49	90	102	109	122	106	129		122	143	145	112	111	110	86	32	34
3	A	24	40	36	31	N	26	44	97	107	95	115	132	142	146	147	146	153	140		106	90	77	52
4	52	33	40	34	31	N	N	42	84	86	108	111	106	107	102	107	109	106	85	89	86	65	53	41
5	31	34	34	29	31	N	30	51	86	94		130	126	113	112	120	121	114	106	88	86	57	52	34
6	42	47	46	24	32	46	28	76	97	112	122	138	144	120	113		110	110	84	79	84	74	52	N
7	43	34	32	40	34	29	24	48	101	109	105	125	117	122	113	108	98	103	109	91	90	86	76	53
8	45	52	32		34	33	40	51	101	127	122	117	127	135	134	136	131	129	131	126	111	113	100	80
9	66	50	56	50		35	38	60	104	132	134	137	133	125	115	109	112	101	98	86	79	80	57	62
10	42	47	N	50	36	30	30	62	107	113	120	126	125	131	133	130	122	133	133	138	131	86	85	64
11	52	54	47	26	24	26	30		102	131	124	128	137	137	N	135	133	135	N	133	128	108	87	82
12	46	40		27	31	36	31	40	85	138	120	111	106	99	107	115	114	105	94	81	78	77	66	52
13	47	54	62	60	53	25	26	42	86	106	115	116	111	112	127	128	130	133	130	130	124	107	87	65
14	61	42	32	34	38	53	66	80	102	121	132	134	114	106	107	104	108	103	102	81	90	86	72	60
15	56	50	48	44	35	30	31	54	88	116	132	140	120	112	111	110	117	111	102	108	100	80	77	76
16	43	A	A	46	71	80	82	88	128	148	126		118	116	111	114	118	120	112	106	108	87	68	59
17	64	78	54	26		N	N	67	84	108	126	129	116	120	122	117	120	124	114	118	107	88	63	62
18	54	52	43	37	36	31	38	64	121	129	125	112	115	118	118	116	121	112	94	80	84	77	69	53
19	52	54	53	47	40	32		29	104	121	133	127	134	128	133	127	136	126	111	109	130	87	66	48
20	55	53	45	52	36		33	50	97	112	110	121	126	124	124	128	130	121	111	85	84	81	62	52
21	35	N	A	48	22	40		44	109	138	170	152	145	146	146	160	167	163	158	143	133	112	78	35
22	43	46	35	33	A	37	30	46	100	126	150	146	136	145	144	144	140	144	128	98	86	77	80	73
23	34	54	46	41	40	37	40	53	101	114	122	136	152	135	138	151	146	146	138	110	111	88	62	48
24	49	40	48	44	40	31	32	49	103	131	132	140	121	127	116	128	118	114	100	77	82	82	79	68
25		42	35	40	25	26	37	48	88	121	124		144	137	142	154	163	166	N	171	189	180	141	85
26	79	68	54	48	37	23	30	53	104	112	125	142	128	127	132	136	124	123	121	97	88	84	72	48
27	52	39	51	48	40	30	40	52	88	104	121	131	140	138	134	142	154	148	145	145	137	98	63	34
28	60	54	51	54	47	41	26	23	98	108	121	126	132	143	162	154	163	170	171	154	141	142	110	86
29	59	50	43	52	49	26	31	54	106	105	117	130	119	120	126	130	126	122	110	110	111	88	76	58
30	34	37	36	36	43		34	43	98	106	121	128	132	134	139	151	145	143	144	137	141	111	86	74
31	64	59	57	53	37	37	N	57	108	126	134	111	112	112	112	116	121	120	104	91	108	111	80	64
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	29	27	30	27	24	26	30	31	31	30	29	31	31	29	30	31	31	29	30	31	31	30	30
MED	50	47	45	40	36	32	31	50	101	113	122	128	126	127	124	128	124	123	111	107	107	86	74	58
U Q	57	54	51	48	40	37	38	57	104	127	132	136	134	135	136	142	143	144	132	130	128	107	80	68
L Q	42	38	35	34	31	28	28	44	88	107	117	119	116	116	112	116	117	112	101	86	86	80	63	48

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT YAMAGAWA

JAN. 1989

LAT. 31.2N LON. 130.6E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	G	G	G	G	42	G	44	42	40	G	G	G	G	G	G		G
2	G	G	G	G	G	G	G	30	G	G	G	60	44	G		42	G	G	24	G	G	G	32	26
3	46	G	G	G	G	G	G	G	G	G	44	48	G	G	G	40	G	G	G	G	G	G	28	G
4	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	30	G	24	24	G	G
5	G	G	G	G	G	G	G	G	G	G		G	64	G	78	G	44	G	G	G	G	G	G	G
6	G	G	G	G	G	26	G	G	G	G	G	52	50	G	G		40	G	G	25	G	G	G	G
7	G	G	G	G	G	G	G	G	G	G	G	G	53	52	45	42	G	G	24	25	G	G	G	G
8	G	G	G	24	26	G	G	G	G	37	43	56	56	56	51	48	54	G	29	G	G	G	G	G
9	G	G	G	G		G	G	G	G	G	41	49	50	45	G	42	38	33	G	G	G	G	G	G
10	G	G	G	G	G	G	G	G	G	43	52	57	58	57	49	48	42	36	34	24	G	28	G	G
11	G	G	G	G	G	G	G	G	G	38	G	44	50	44	50	44	61	37	32	40	34	G	G	G
12	G	G	G	G	G	G	G	24	G	G	G	G	62	64	G	67	72	33	39	37	28	24	24	G
13	G	G	G	G	G	G	G	G	G	43	49	51	50	G	49	43	G	G	G	G	G	G	G	G
14	G	G	G	G	G	G	G	G	31	40	48	50	54	68	G	46	44	G	G	G	G	40	25	G
15	G	G	G	G	G	G	G	G	G	G	G	47	46	G	62	44	G	39	39	28	G	24	G	24
16	G	58	45	37	32	32	24	G	G	G	G		70	60	G	44	68	44	49	39	24	47	26	29
17	G	G	G	27		G	G	G	G	38	49	58	66	66	108	60	47	37	32	29	G	G	G	G
18	G	G	G	G	G	G	G	G	G	38	41	G	50	G	53	G	G	G	G	G	G	G	G	G
19	G	G	G	G	G	G	G	G	G	G	42	49	44	90	57	G	G	G	G	G	G	G	24	28
20	G	G	G	G	G	26	G	G	G	37	G	44	50	51	48	44	G	G	28	39	30	G	G	G
21	G	G	24	31	24	G		G	G	42	44	43	52	52	55	42	G	G	G	G	G	32	24	G
22	G	25	33	34	32	G	G	G	G	37	53	47	G	G	G	41	68	G	G	G	G	G	G	G
23	G	G	G	28	G	26	24	G	G	G	G	G	58	92	63	61	37	G	G	25	27	G	G	G
24	G	G	G	G	G	G	G	G	32	G	41	48	54	45	47	44	44	44	37	25	26	26	G	29
25	26	G	G	G	26	26	G	G	G	42	42	G	50	53	44	44	42	43	24	G	G	G	24	G
26	G	G	G	G	G	G	G	G	G	G	44	43	48	47	G	42	G	G	30	G	G	G	G	G
27	G	G	G	G	G	G	G	G	G	G	G	G	47	G	46	50	50	36	32	26	G	G	G	G
28	G	G	G	G	G	G	G	G	G	37	G	G	63	G	46	61	54	32	30	G	24	G	G	G
29	G	G	G	G	G	G	G	G	31	G	44	51	53	52	49	44	38	G	G	25	G	G	G	G
30	G	G	G	G	G	G	G	G	G	G	G	G	G	G	48	45	43	36	G	24	25	G	G	G
31	G	32	69	G	G	G	G	G	G	37	51	48	50	54	49	43	42	G	G	G	G	G	G	G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	29	31	30	31	31	31	30	30	31	31	30	30	31	31	31	31	31	31	30	31
MED	G	G	G	G	G	G	G	G	G	G	41	46	50	45	48	44	40	G	24	G	G	G	G	G
U Q	G	G	G	G	G	G	G	G	G	38	44	50	56	56	51	46	47	36	32	25	24	24	24	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	46	G	G	42	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT YAMAGAWA

JAN. 1989

LAT. 31.2N LON. 130.6E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

H / D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	15	15	15	15	15	15	15	24	18	21	23	23	20	16	15	15	23	15	15	15	15		15
2	15	15	15	15	16	17	15	15	15	20	16	18	23	21		20	17	17	15	15	15	15	15	15
3	15	15	15	15	15	65	15	15	15	17	21	21	24	30	22	16	16	24	15	15	15	15	15	15
4	15	15	15	15	15	15	15	15	15	20	26	38	39	40	36	34	23	26	15	15	16	15	16	15
5	15	15	15	15	15	15	15	15	17	21		39	34	38	29	34	21	16	15	15	15	15	15	15
6	16	15	15	15	15	16	15	15	16	21	36	38	38	39	38		17	17	20	15	15	15	15	15
7	16	15	15	15	15	15	15	16	15	20	22	22	35	33	30	20	17	16	15	16	15	15	15	15
8	15	15	15	15	15	15	15	16	16	17	21	23	30	32	21	22	24	17	16	15	15	15	15	15
9	15	15	15	15		15	15	15	15	24	27	33	27	28	39	20	16	18	15	15	15	15	15	15
10	15	15	16	15	15	15	15	15	27	18	35	24	33	32	32	26	21	16	15	15	15	16	15	15
11	15	15	15	15	15	15	15	16	16	17	32	28	33	27	35	22	21	15	15	15	15	15	15	15
12	15	15	15	16	16	15	15	16	16	21	38	39	35	35	33	22	18	15	15	15	15	15	15	15
13	15	15	15	15	15	15	15	15	17	18	23	30	27	45	27	20	18	18	15	15	15	15	15	15
14	15	16	15	15	15	15	15	16	15	20	21	29	38	38	44	32	22	26	17	15	15	15	16	15
15	16	16	15	15	15	15	15	15	17	22	40	26	26	33	35	24	34	20	15	15	15	16	15	15
16	15	15	15	15	15	15	15	15	26	33	37		35	36	33	35	23	20	15	15	15	15	15	15
17	15	15	15	15		65	65	15	18	21	21	30	28	23	22	21	17	17	15	15	16	16	15	15
18	15	15	15	15	15	15	15	15	15	16	20	24	23	29	24	21		29	15	15	15	15	16	15
19	15	15	15	15	15	15	15	15	16	20	20	26	32	22	21	20	17	16	15	15	15	15	16	15
20	15	15	15	15	16	16	15	15	16	18	20	21	23	27	30	18	21	20	15	15	15	15	15	15
21	15	65	17	15	17	15			16	16	17	22	23	26	33	28	23	30	16	15	15	15	15	15
22	15	15	15	15	15	15	15	15	16	18	20	21	33	21	18	20	16	17	16	15	15	15	15	15
23	15	15	14	14	15	15	15	15	27	21	28	35	27	29	23	22	21	18	15	15	15	15	15	15
24	15	15	16	15	15	18	15	16	15	17	18	21	29	23	24	23	18	17	15	15	15	15	15	15
25	15	15	15	15	15	15	15	15	16	17	20	21	21	22	20	20	16	15	16	15	15	15	15	15
26	15	15	15	15	15	65	15	16	16	21	22	20	22	24	45	24	17	16	15	15	15	15	15	15
27	15	15	15	15	15	15	15	15	15	33	18	20	22	39	22	20	16	16	15	15	15	15	15	15
28	15	15	15	15	15	15	15	16	18	17	18	20	28	40	27	22	22	16	15	16	15	15	16	15
29	15	14	15	15	15	15	15	16	15	16	17	18	21	21	17	16	16	16	16	15	15	15	15	15
30	15	15	15	15	15	15	15	15	16	15	36	39	27	35	21	17	20	16	17	16	15	15	16	15
31	15	15	15	15	15	15	15	16	15	16	17	20	22	20	18	17	15	15	17	15	15	15	15	15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	29	31	30	30	31	31	30	30	31	31	30	30	30	31	31	31	31	31	30	31
MED	15	15	15	15	15	15	15	15	16	18	21	24	27	29	27	21	18	17	15	15	15	15	15	15
U Q	15	15	15	15	15	15	15	16	17	21	28	30	33	36	33	24	21	20	16	15	15	15	15	15
L Q	15	15	15	15	15	15	15	15	15	17	20	21	23	23	21	20	16	16	15	15	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT OKINAWA

JAN. 1989

LAT. 26.3N LON. 127.8E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	47	54	31	40	40	34	32	52	108	140	118	108	145	157	146	146	164		164	110	87	88	87	52
2	32	29	46	45	29	N	N	43	103	112	112	105	121	132	143	150	177	181	165	162	146	170	125	76
3	65	62	40	44		N		26	90	121	121	119	138	144	169	170	161	170	165	143	138	146	122	50
4	71	62	54	42	35	23		34	86	105	122	101	116	120	121	116	130	145	145	145	164	145	110	79
5										104	120		122	119	134	126	137	134	141	105	125	88	83	78
6	52	58	62	31	31	31	52	79	120	113	130	138	145	143	130	120	118	144	124	86	111	132	90	77
7	54	66	63	52	46		28	50	90	112	119	110	116	124	125	121	111	118	107	107	146	166		88
8	66	66	66	58	44	31	37	56	110	139	145	123	134	162	166	169	172	171	162	162	171	158	143	90
9	84	80	63	77	33	47	44	52	119	130	110	142	140	142	136	138			N	108	N	145	96	86
10	85	66	51	54	42	31	A	62	120		125	124	132	145	151	147	157	162	165	162	170	162	140	86
11	88	90	81	46	42	32	44	53	103	141	145	135	148	164	166	161	167	165	158	145	145	156	143	124
12	84	60	61	31	35	53	26	55	87	120	C	C	87	91	93	111	104	99	90	84	81	90	88	66
13	59														136	159	161	142	146	147	146	146	109	90
14	87	86	67	67	63	85	90	105		131	128	129	121	94	102	112	104	107	105	108		N	103	91
15	66	52	66	66	51	30	32	52	88	137	142	130	94	99	114	A	137	120	108	95	145	105	88	85
16	80	84			86	85	88	73	128	145	112	118	113	86	98	131	136	147	152	145	161	144	88	87
17	87	96	66	31	31			66	108	98	114	112	123	131		121	128	138	140	140	166	146	108	66
18	83	72	53	46	48	37	33	65	121	142	123	109	104	106	120	128	122	130	111	88	98	90	85	71
19	59	66	52	42	33	28	25	43	90		136	130	129	142	148	153	170	166	166	157	162	144	138	88
20	88	79	80	84	52	43	32	38	88	112	133	121	129	141	144	163	164	163	152	142	143	126	94	79
21	52	A	A	60	34	50	53	33	90	146	172	146	145	156	170	178	155	164	166	160	163	161	144	88
22	61	78	80	54	52	A	44	51	104	147	154	144	135	150	165	162	168	171	176	165	145	144	145	109
23		80	82	52	50	43	31	53	97	122	137	141	146	151	144	168	176	176	182	169	166	145	105	
24	78	66	63	66	53	32	32	54	90	138	142	132	121	125	131	126		138	112	N	102	111	107	88
25	79	76	66	60	56	42	43	54	92	127	138	130	142	148	160	186	177	176	168	165	177	184	175	142
26	109	83	80	68	46		31	48	90	118	135	147	128	134	144	160		169	168	166	146	164	144	82
27	85	84	86	84	67	52	53	62	107	120	131	122		147	157	168	177	170	165	164	168	159	84	90
28	80	66	57	66	66	55	25	42	88	108	120	123	134	165	171	164	N	170	176		174	176	145	122
29	85	90	78	84	66	37	31	66	121	102	107	122	121		146	146	166	164	176	168		165	145	90
30	66	66	54	47	60	51	N	34	90	125	111	143	144	149	153	168	181	185	176	170	179	197	177	145
31	87	93	80	80	55	44		77	106	137	120	102	118	138	141	153	164	167	N	164	182	171	163	122
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	28	27	28	28	23	22	29	28	28	29	28	29	29	30	30	27	29	29	29	28	30	30	30
MED	79	69	63	54	47	42	32	53	100	124	125	124	129	142	144	152	161	164	162	145	146	146	110	88
U Q	85	83	80	66	55	51	44	63	109	138	137	136	141	149	157	164	170	170	167	164	167	164	144	90
L Q	60	64	54	44	35	31	31	43	90	112	118	115	119	122	130	126	130	138	132	108	140	132	90	78

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT OKINAWA

JAN. 1989

LAT. 26.3N LON. 127.8E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	G	G	40	41	46	72	G	G	G	G		36	26	G	G	G	G
2	G	G	G	G	G	G	G	G	G	37	G	66	60	45	G	G	38	32	28	33	G	G	25	24
3	28	25	27	G		G		G	G	136	42	55	46	58	G	41	G	32	32	29	G	34	32	25
4	G	G	G	G	G	G		G	33	38	44	55	54	53	48	G	38	G	32	28	G	37	32	G
5										38	G		G	45	G	G	G	45	G	26	G	G	G	G
6	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	43	38	G	G	G	G	G	29	G
7	G	G	G	G	G	25	G	G	31	G	G	49	54	68	G	52	40	32	40	28	27	31		G
8	G	G	G	G	G	G	G	G	G	G	46	51	53	44	51	53	41	G	G	G	42	38	G	G
9	G	G	G	G	G	24	G	G	32	G	G	62	60	53	G	47	42	38	28	G	G	G	G	G
10	G	G	G	G	G	G	24	G	G	123	41	56	57	55	52	48	66	40	38	30	30	34	G	24
11	G	G	G	G	G	G	G	G	G	G	G	54	51	67	51	46	G	34	25	G	G	32	24	G
12	G	G	G	G	G	G	G	24	37	42	C	C	50	58	57	74	40	35	G	G	G	G	G	G
13	G														51	G	40	33	G	G	23	G	G	31
14	G	G	G	G	G	G	G	23	32	38	49	54	G	56	G	G	52	44	37	39	39	39	46	G
15	G	26	28	G	G	G	G	G	G	G	G	46	48	G	48	88	50	39	33	29	33	G	G	G
16	G	G	28	35	32	G	24	G	G	G	G	G	58	59	57	67	G	48	52	33	27	24	G	G
17	32	G	G	G	G	26	24	G	G	G	42	54	56	71	50	64	69	68	40	G	G	G	G	G
18	G	G	G	G	26	30	G	G	G	38	47	57	51	G	G	G	G	G	G	26	G	G	G	G
19	G	G	G	G	G	G	G	G	31	38	42	48	48	52	45	63	92	G	G	G	G	29	G	G
20	G	G	G	G	G	G	G	G	G	G	42	44	53	G	52	45	39	42	G	G	33	32	31	G
21	G	37	32	41	32	29	G	G	G	G	49	64	54	75	45	44	59	72	43	48	G	30	G	G
22	G	G	24	29	39	32	32	G	G	39	42	43	G	G	G	G	39	G	G	G	34	G	G	G
23	G	G	G	28	32	G	G	28	G	38	G	56	83	78	82	64	G	G	G	26	G	G	32	
24	G	G	G	G	G	G	G	G	31	39	43	G	G	G	51	55	62	43	30	G	24	24	G	G
25	G	38	G	G	G	G	G	G	G	G	57	47	48	47	G	G	39	G	30	30	G	G	G	G
26	G	G	G	G	G		G	G	G	38	G	G	G	48	G	45		49	G	32	G	G	G	24
27	G	G	G	G	G	G	G	G	G	G	G	67	G	55	45	G	40	60	37	40	G	28	G	G
28	G	G	G	G	G	G	G	G	G	40	G	50	49	G	54	G	43	G	30	26	24	G	G	G
29	G	G	G	G	G	G	G	G	G	G	G	48	58	88	55	52	85	89	79	72	44	G	G	G
30	G	G	G	G	G	G	G	G	G	G	G	G	G	G	50	52	40	G	G	G	24	24	32	G
31	G	G	27	G	26	28	G	G	G	G	47	55	58	53	54	49	44	48	G	G	G	G	G	G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	29	29	29	28	28	27	29	29	30	29	28	30	30	31	31	30	30	31	31	31	31	30	30
MED	G	G	G	G	G	G	G	G	G	19	41	50	51	52	48	45	40	34	28	26	G	G	G	G
U Q	G	G	G	G	G	12	G	G	16	38	43	55	57	58	52	53	50	45	37	30	27	31	25	G
L Q	G	G	G	G	G	G	G	G	G	G	G	45	G	G	G	G	38	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT OKINAWA

JAN. 1989

LAT. 26.3N LON. 127.8E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	17	15	15	15	15	15	15	15	16	20	22	24	26	23	20	16		15	15	15	15	15	15
2	15	15	16	15	15	15		15	15	20	20	22	26	24	23	24	16	15	15	15	15	15	15	15
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MED	15	15	15	15	15	15	15	15	16	22	26	27	27	28	27	24	22	17	16	15	15	15	15	15
U Q	15	15	15	15	15	15	15	15	26	24	28	28	29	31	30	27	25	22	20	15	15	15	15	15
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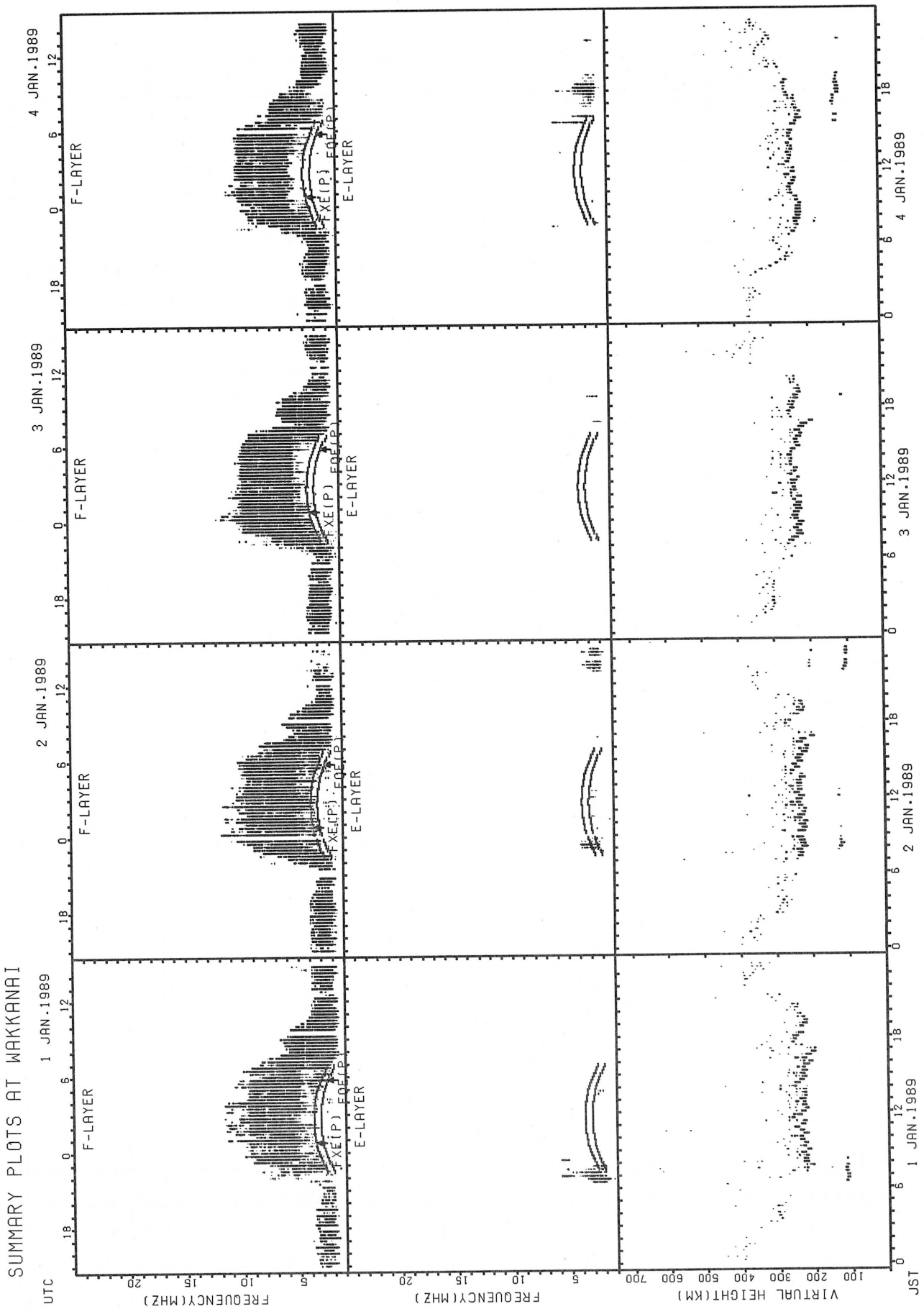
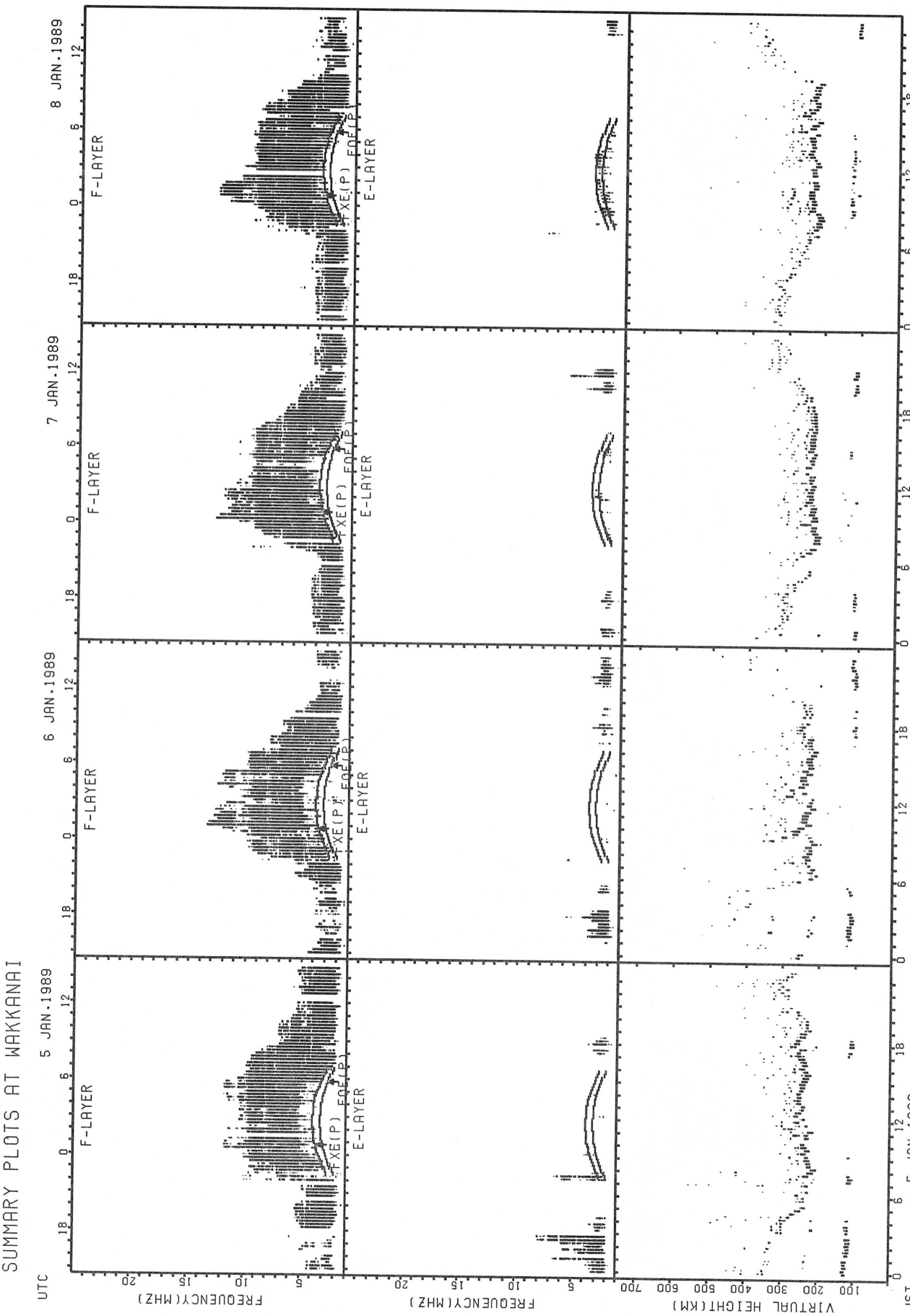
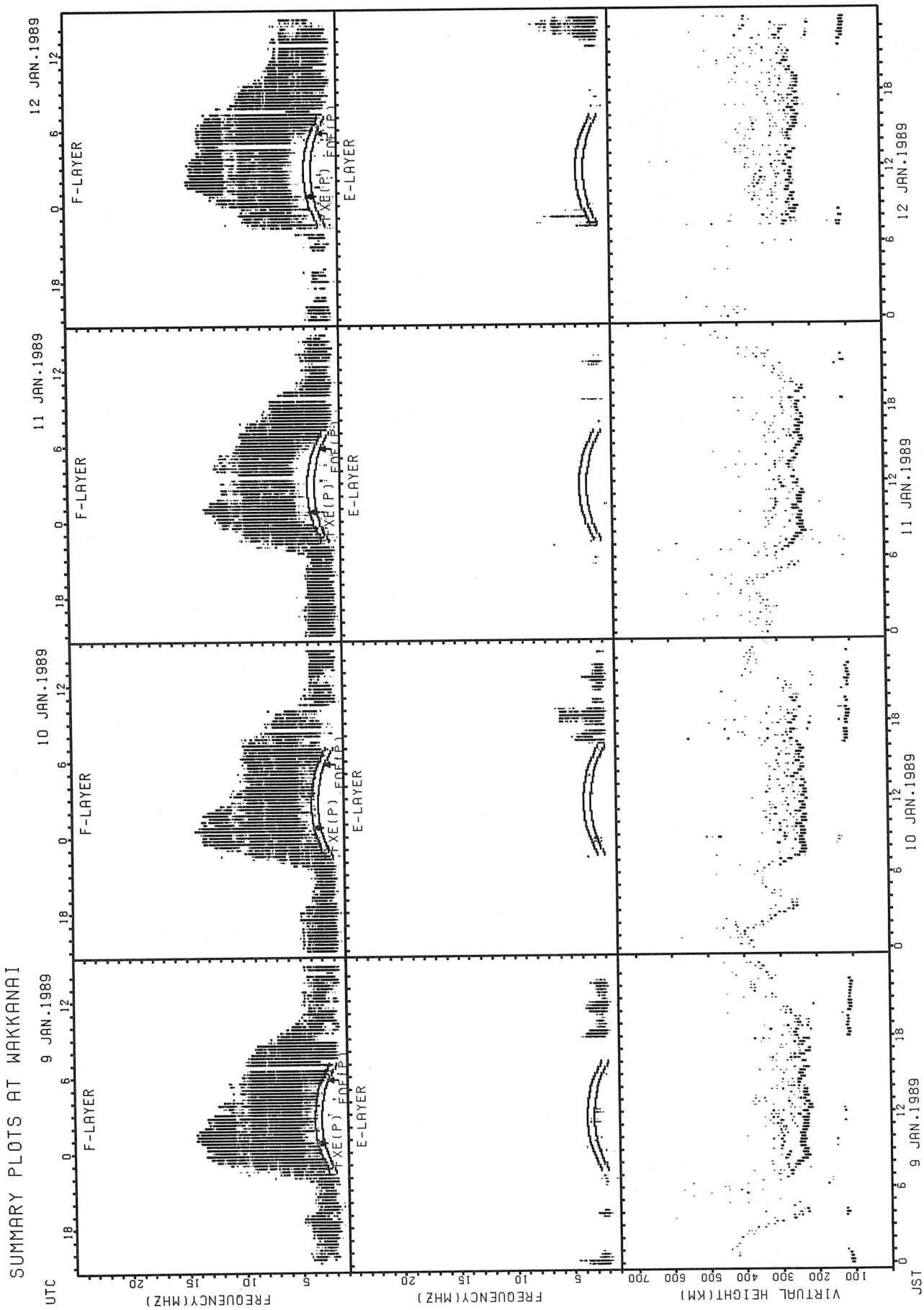
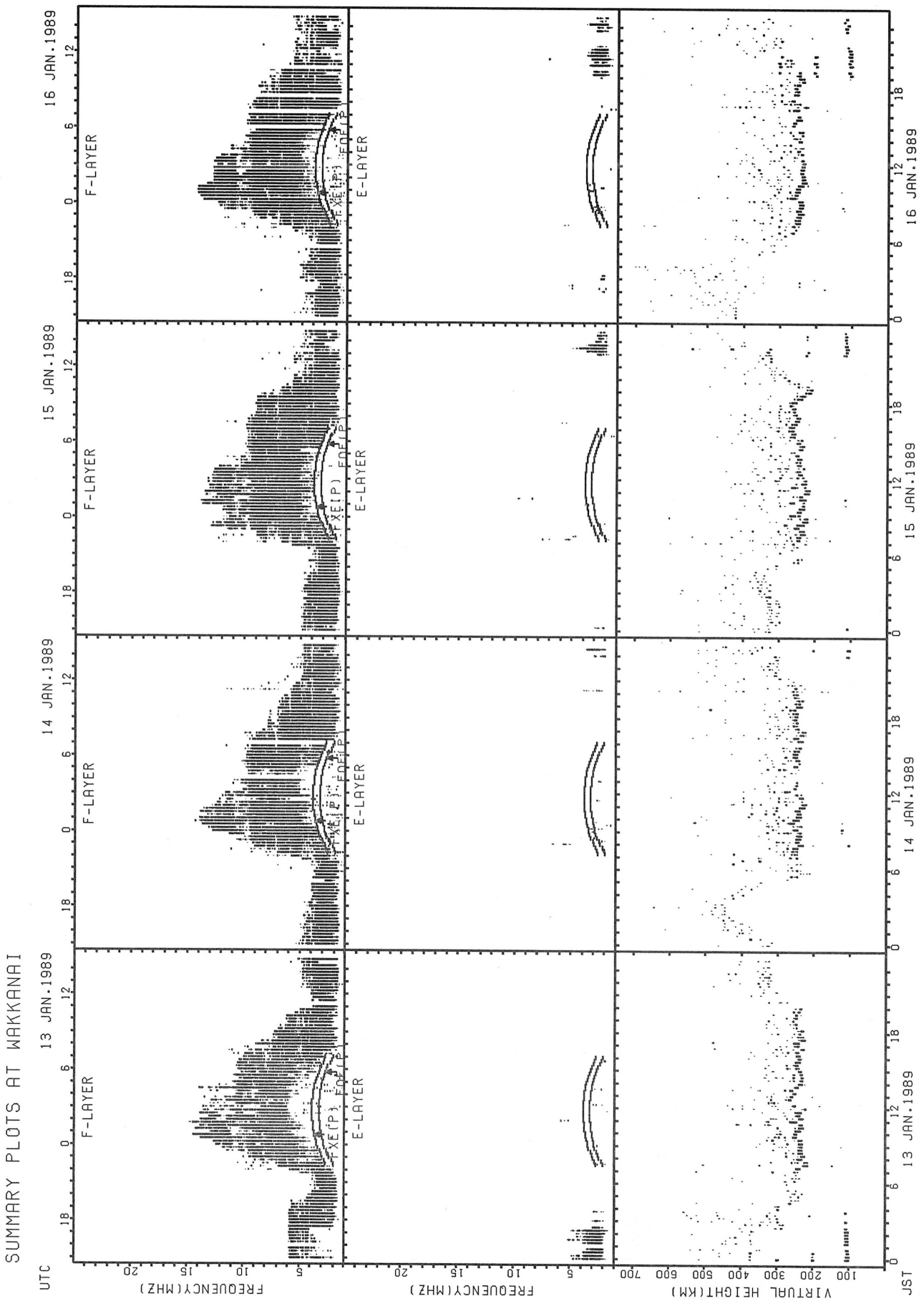
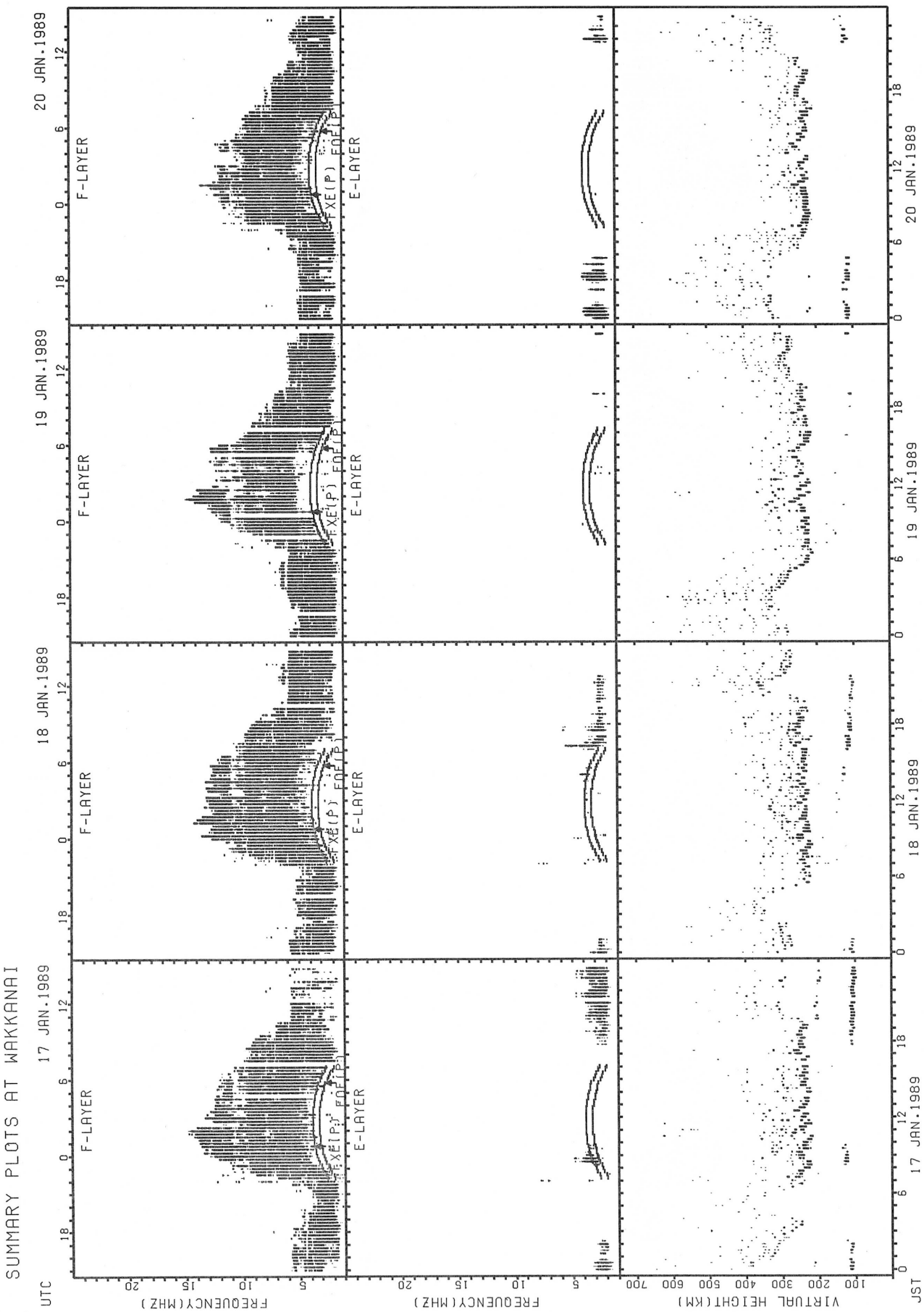
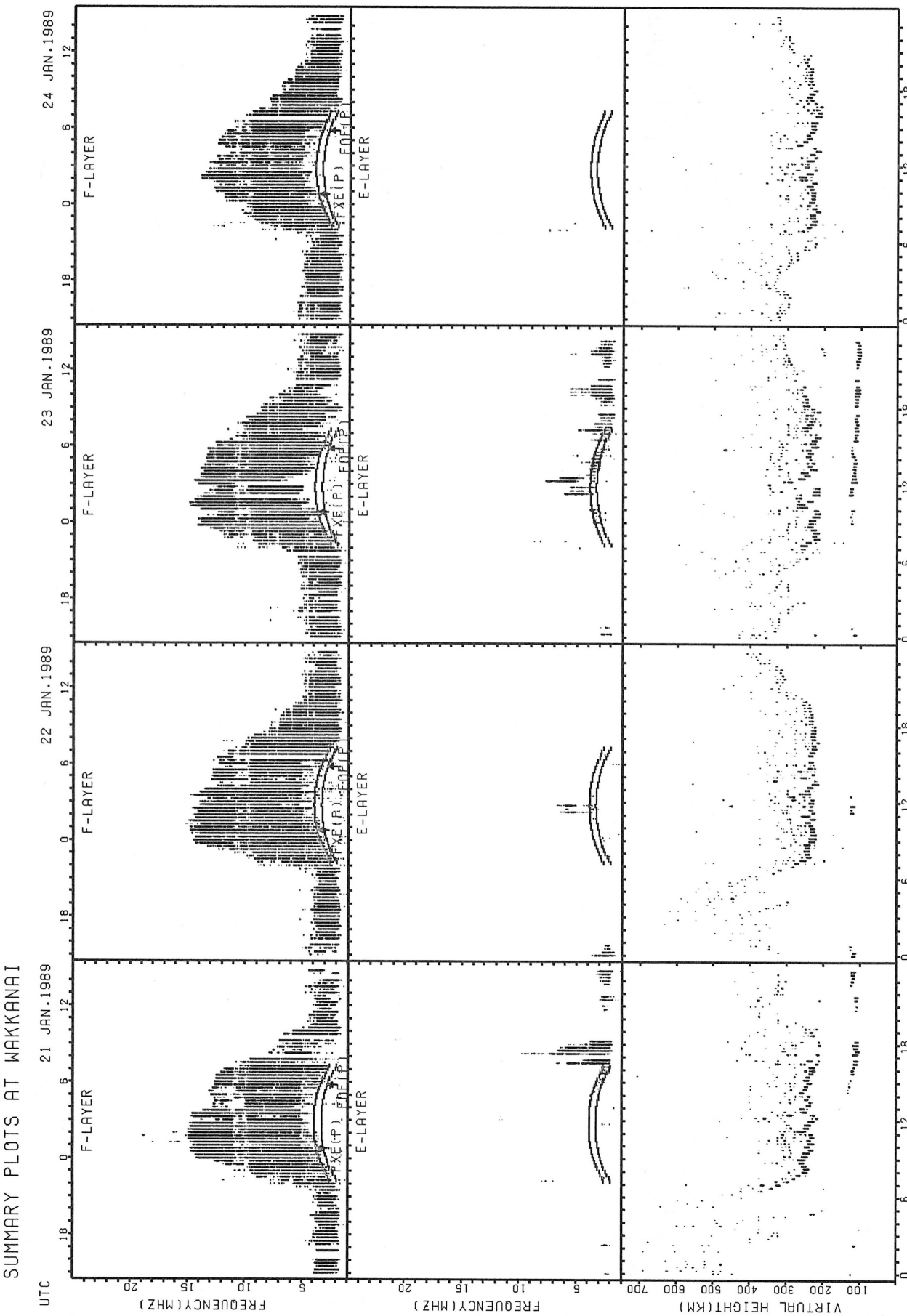

SUMMARY PLOTS AT WAKKANAI
UTC
JST
1 JAN.1989
2 JAN.1989
3 JAN.1989
4 JAN.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

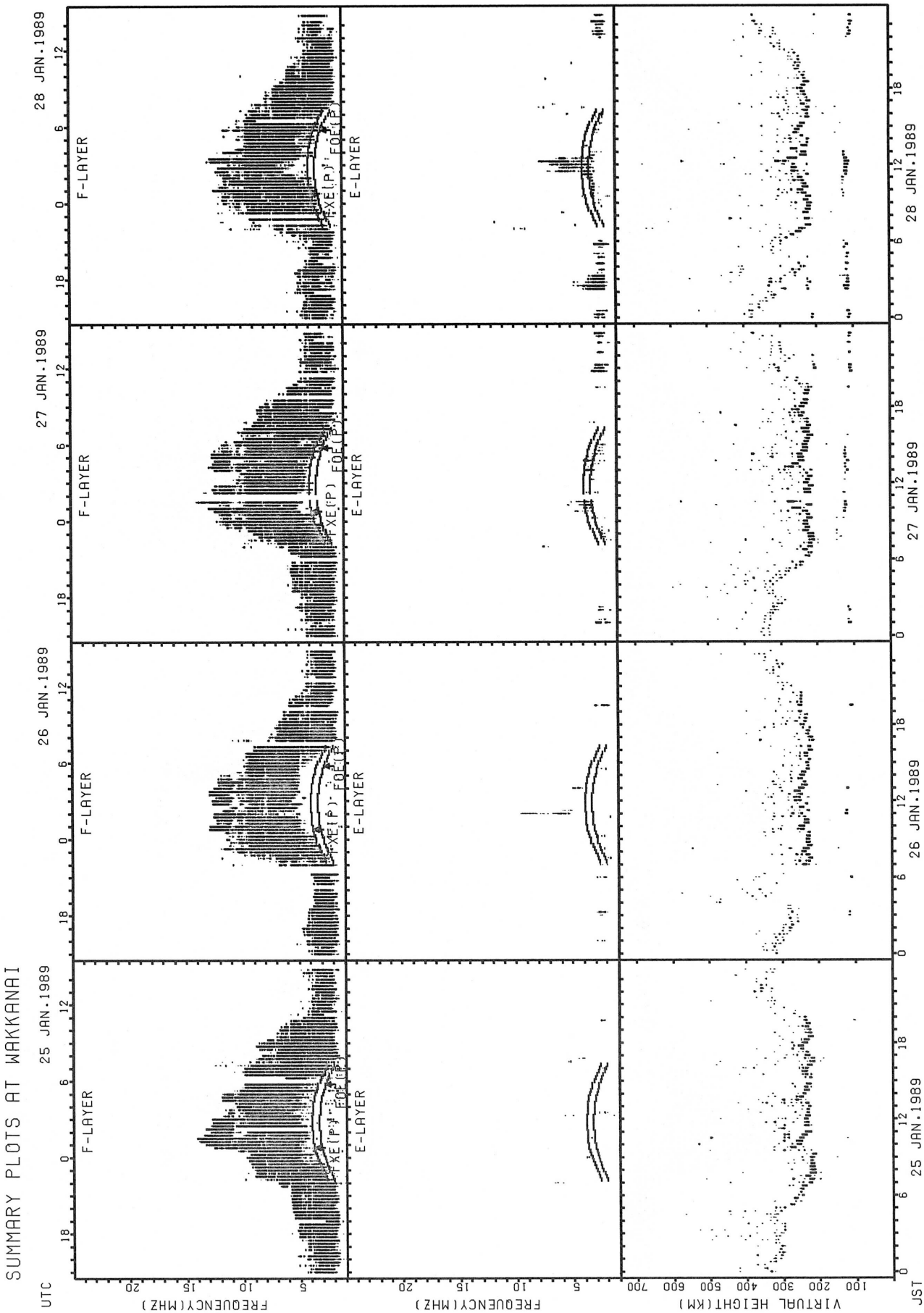

SUMMARY PLOTS AT WAKKANAI
UTC
JST
5 JAN.1989
6 JAN.1989
7 JAN.1989
8 JAN.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
JST
9 JAN.1989
10 JAN.1989
11 JAN.1989
12 JAN.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

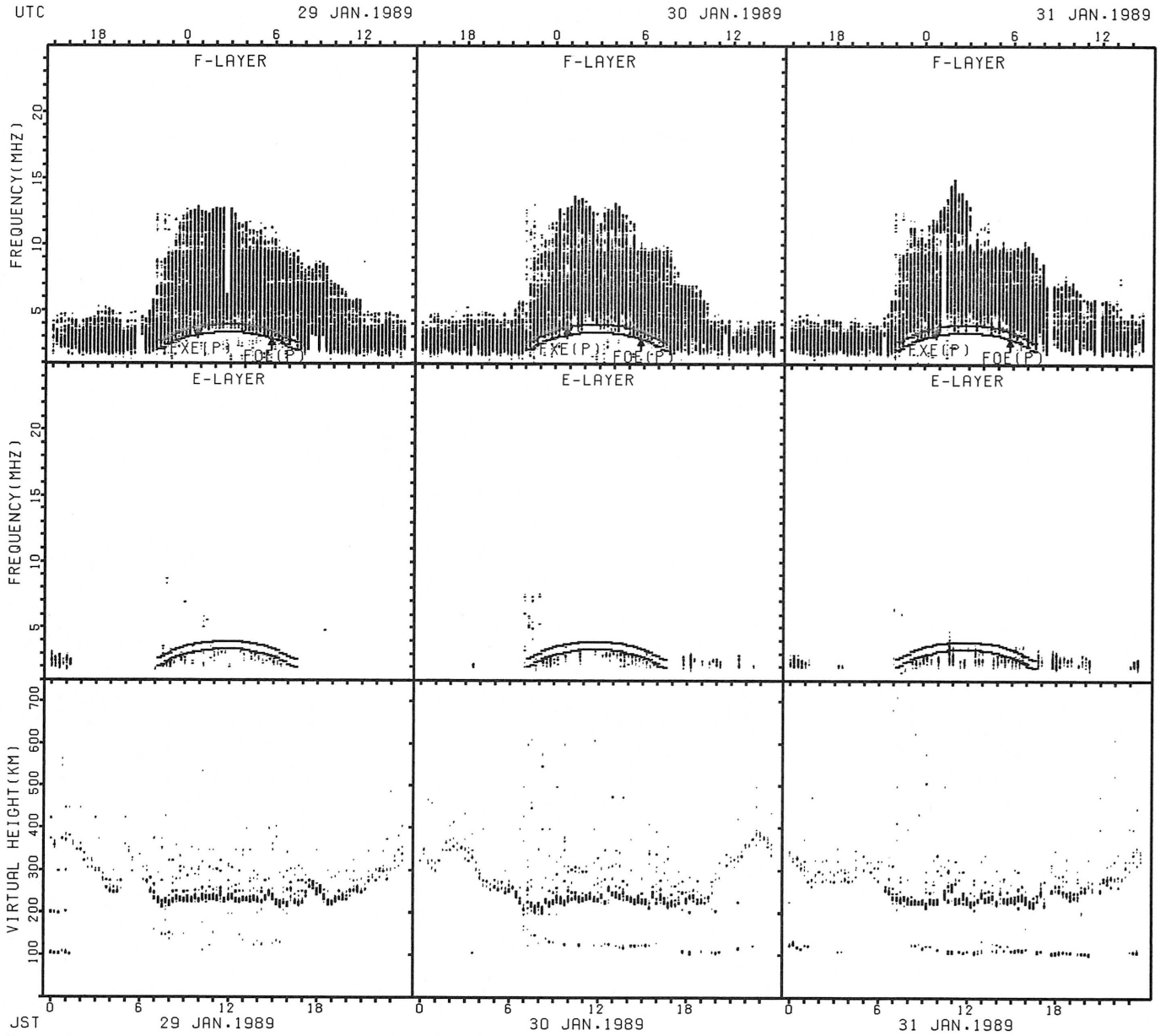

SUMMARY PLOTS AT WAKKANAI
UTC
13 JAN.1989
14 JAN.1989
15 JAN.1989
16 JAN.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
17 JAN.1989
18 JAN.1989
19 JAN.1989
20 JAN.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

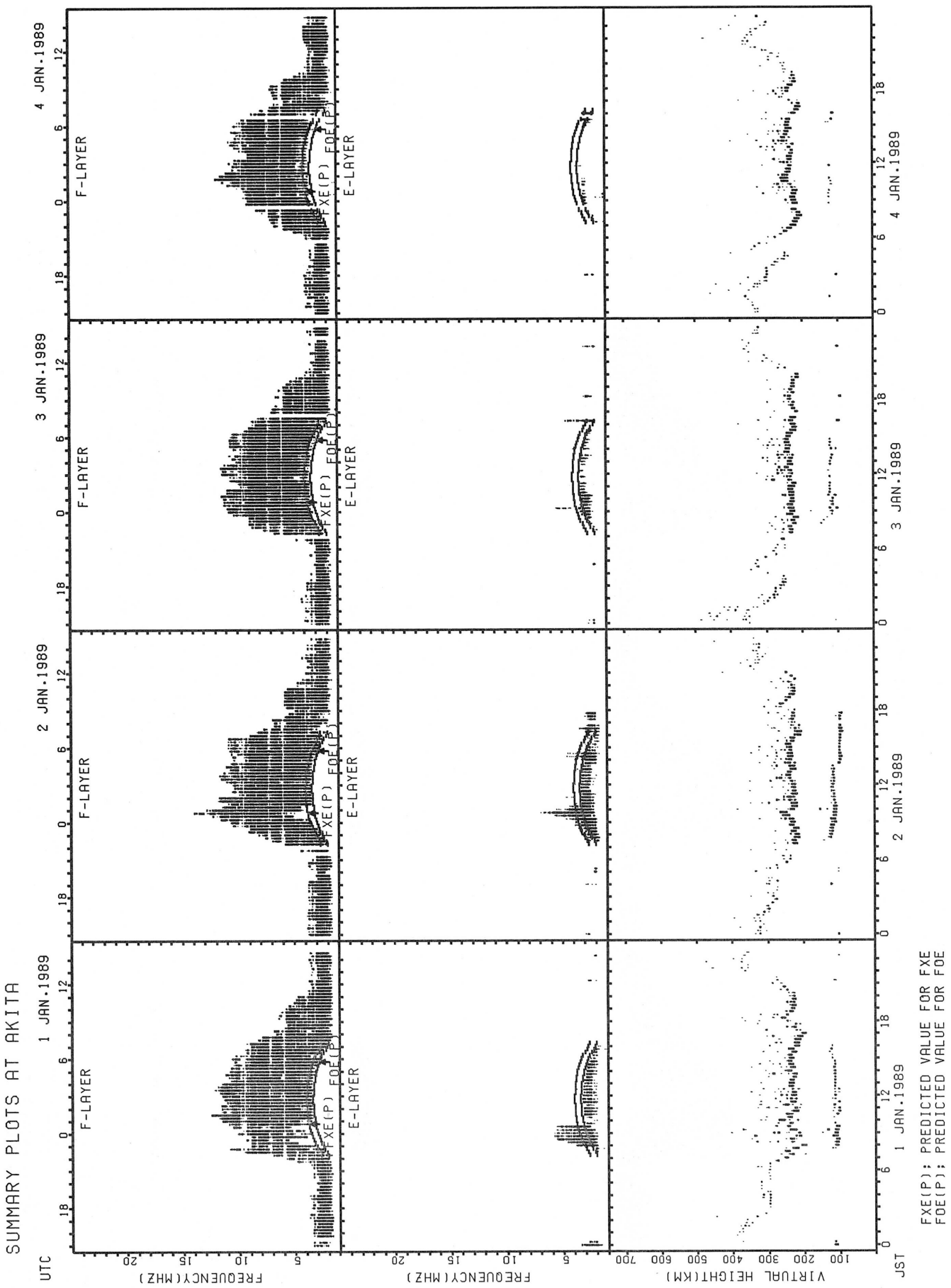

SUMMARY PLOTS AT WAKKANAI
UTC
JST
21 JAN.1989
22 JAN.1989
23 JAN.1989
24 JAN.1989
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P), FOE(P)
FXE(P) FOE(P)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
25 JAN.1989
26 JAN.1989
27 JAN.1989
28 JAN.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

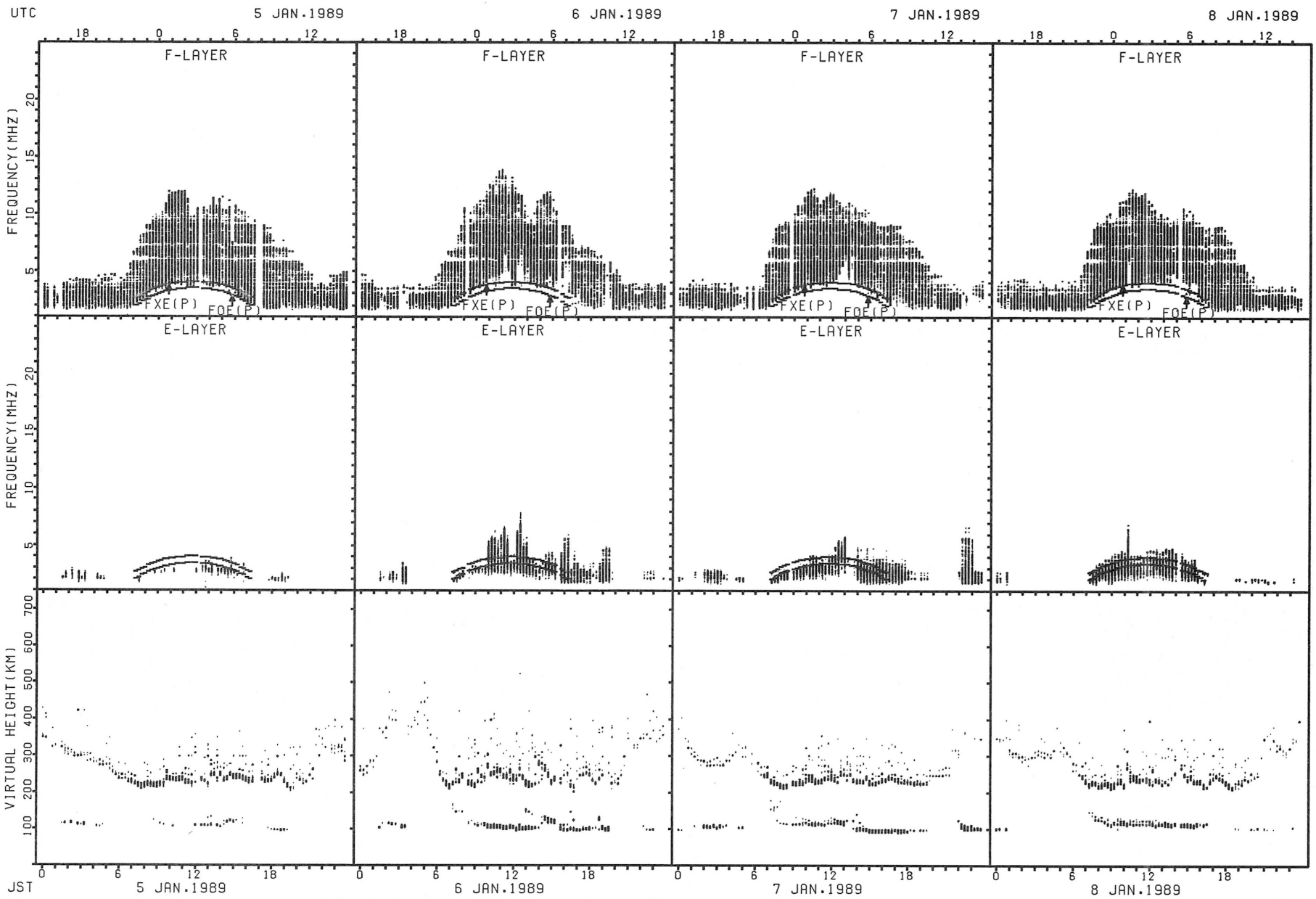
SUMMARY PLOTS AT WAKKANAI



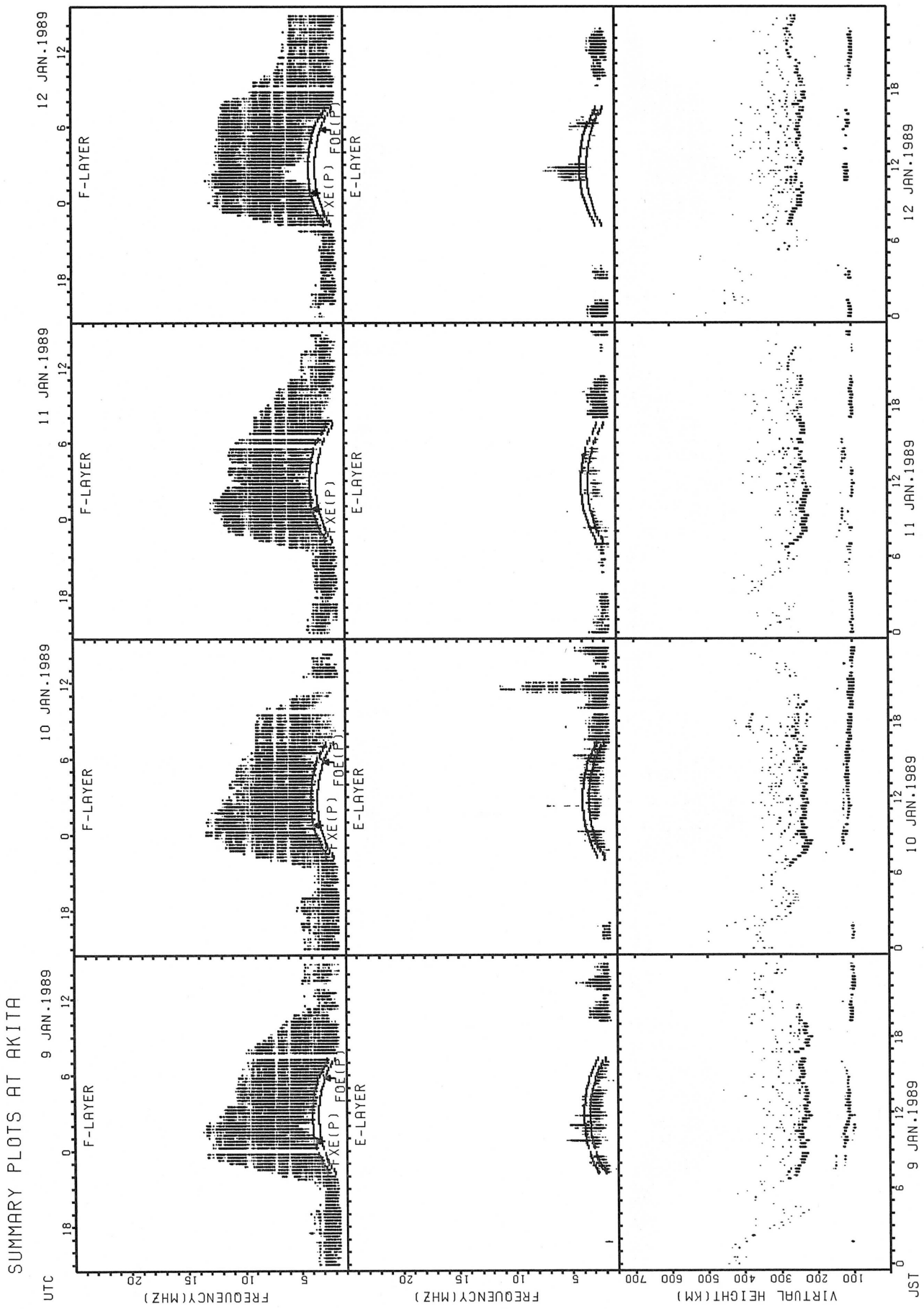
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

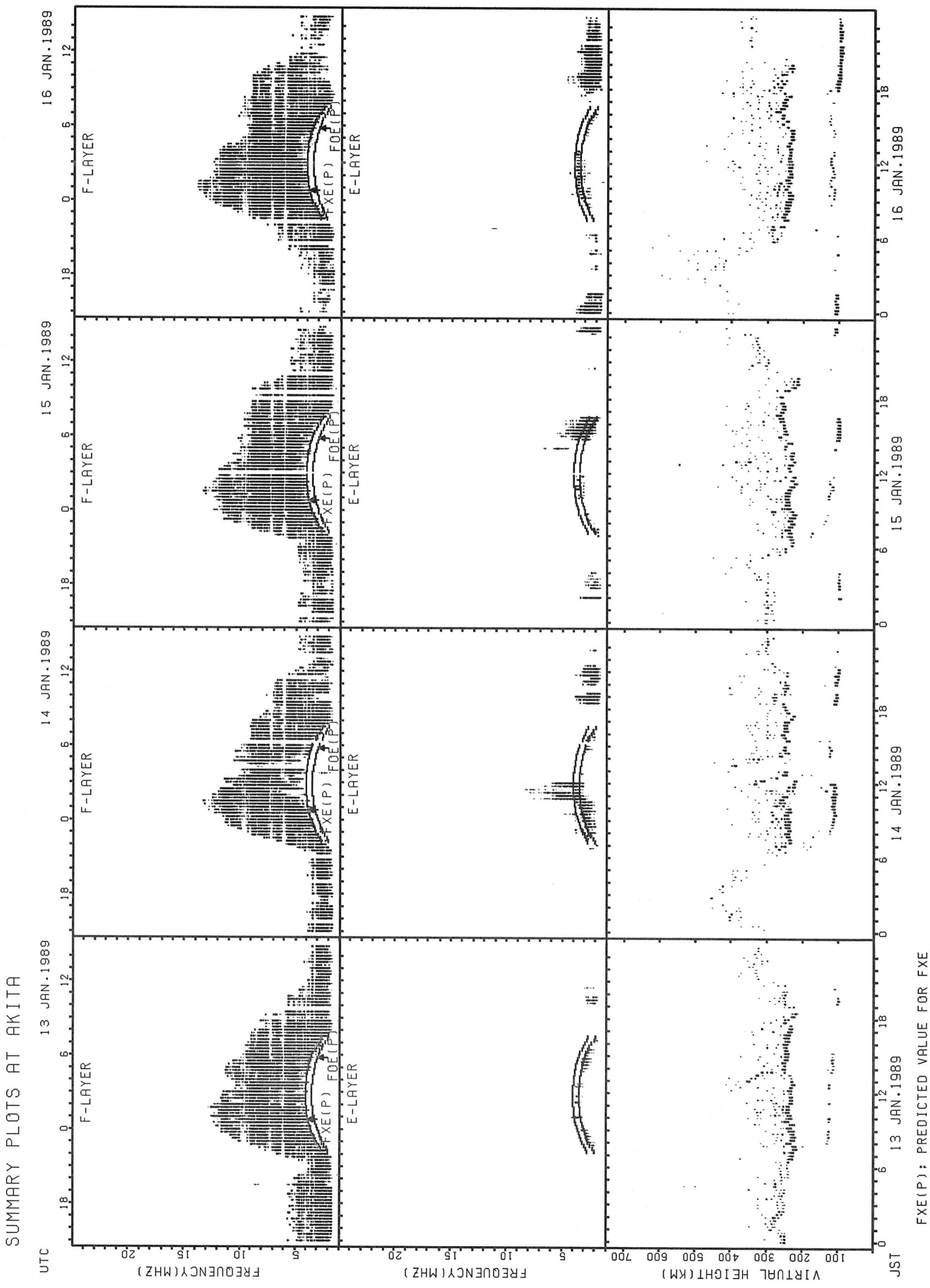

SUMMARY PLOTS AT AKITA
UTC
1 JAN.1989
2 JAN.1989
3 JAN.1989
4 JAN.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

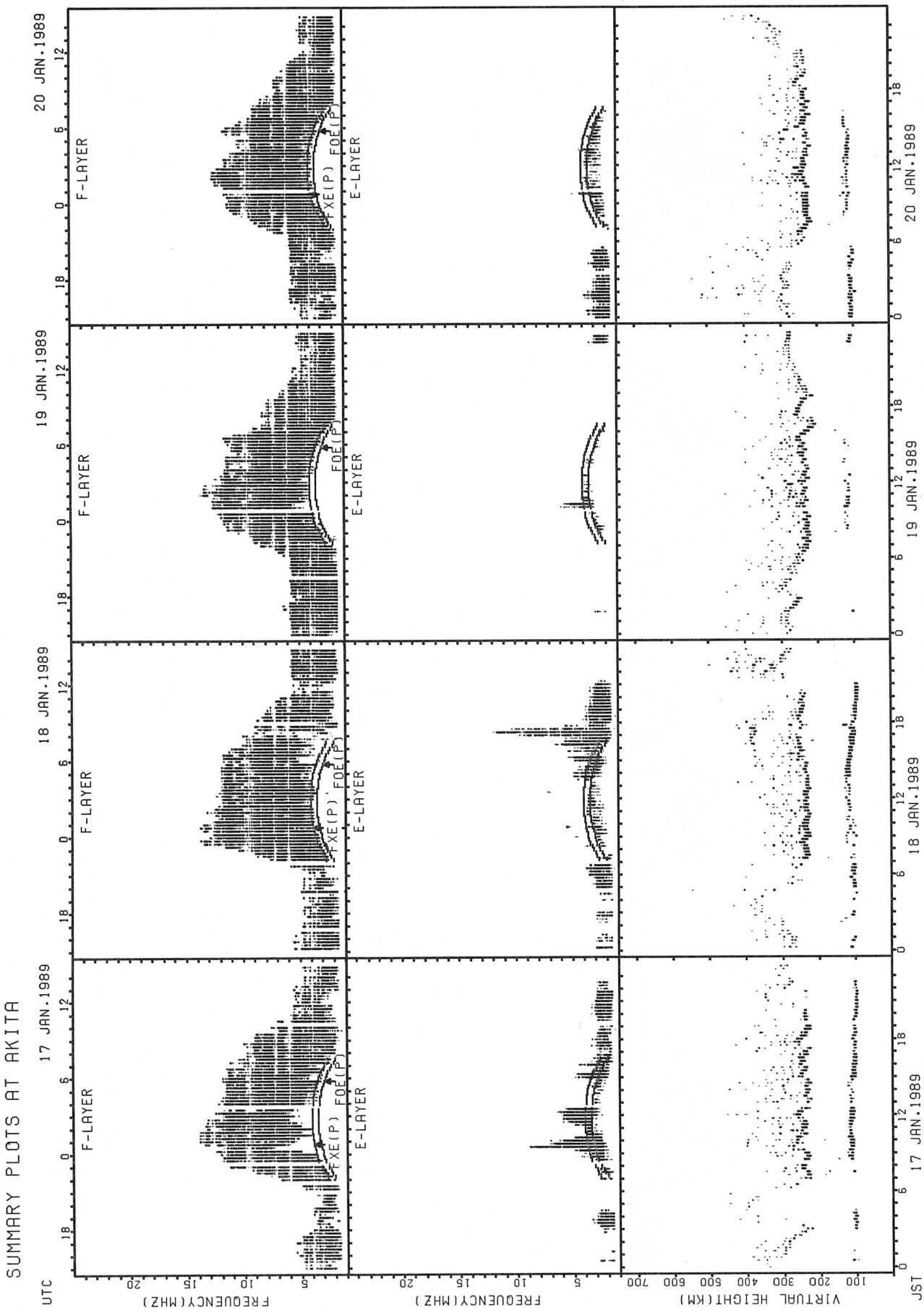
SUMMARY PLOTS AT AKITA



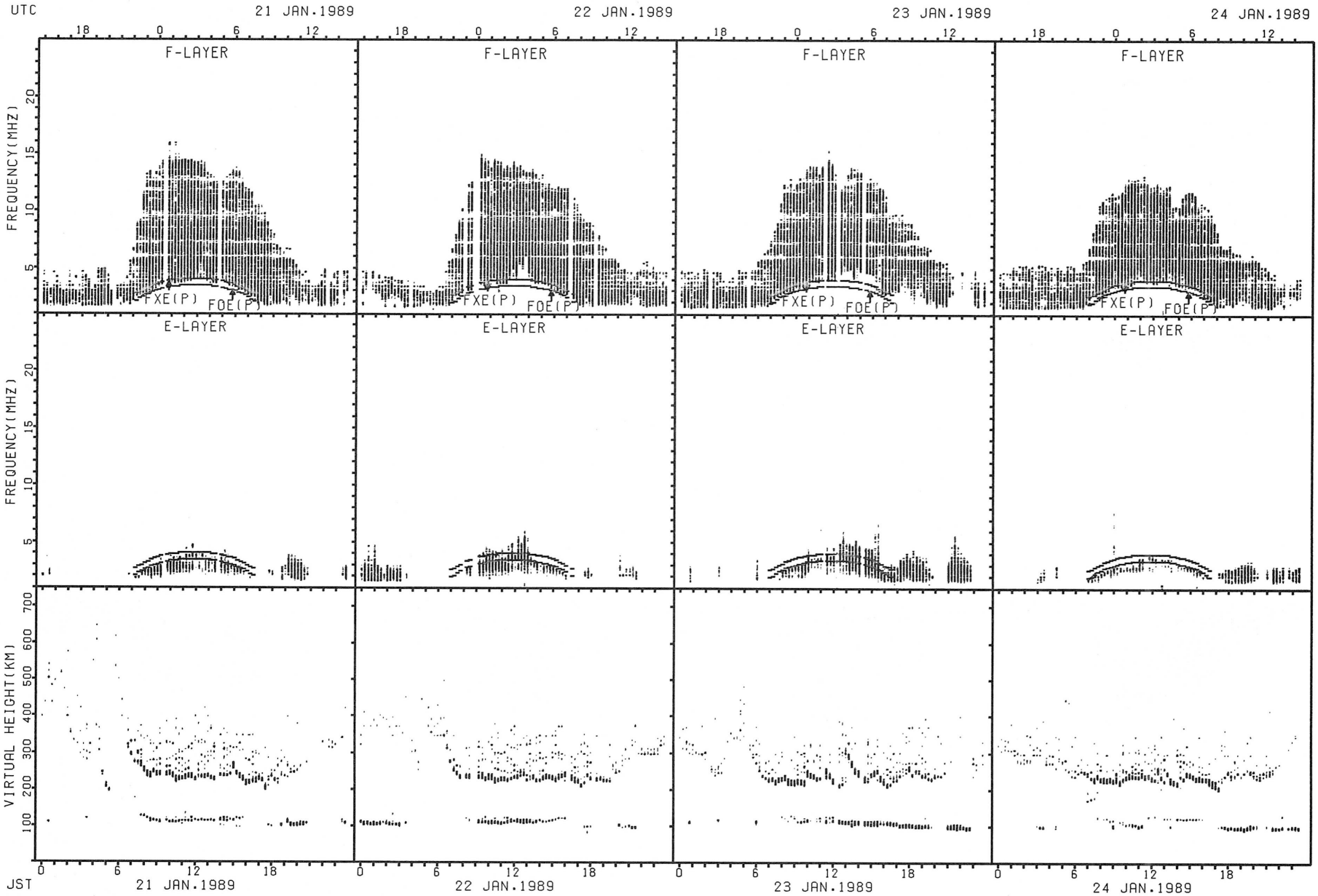
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
UTC
JST
9 JAN.1989
10 JAN.1989
11 JAN.1989
12 JAN.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

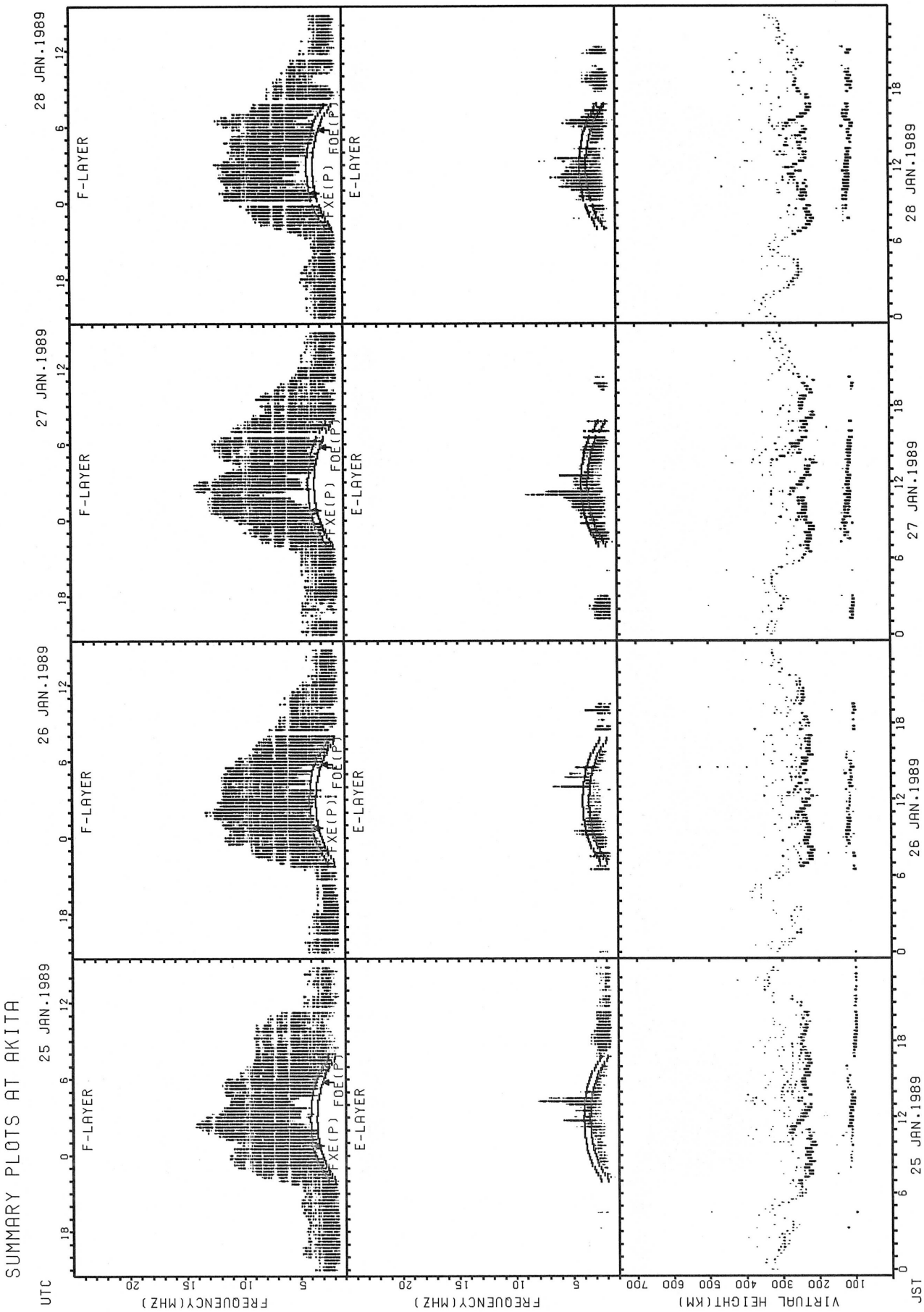

SUMMARY PLOTS AT AKITA
UTC
13 JAN.1989
14 JAN.1989
15 JAN.1989
16 JAN.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
UTC
17 JAN.1989
18 JAN.1989
19 JAN.1989
20 JAN.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
UTC
25 JAN.1989
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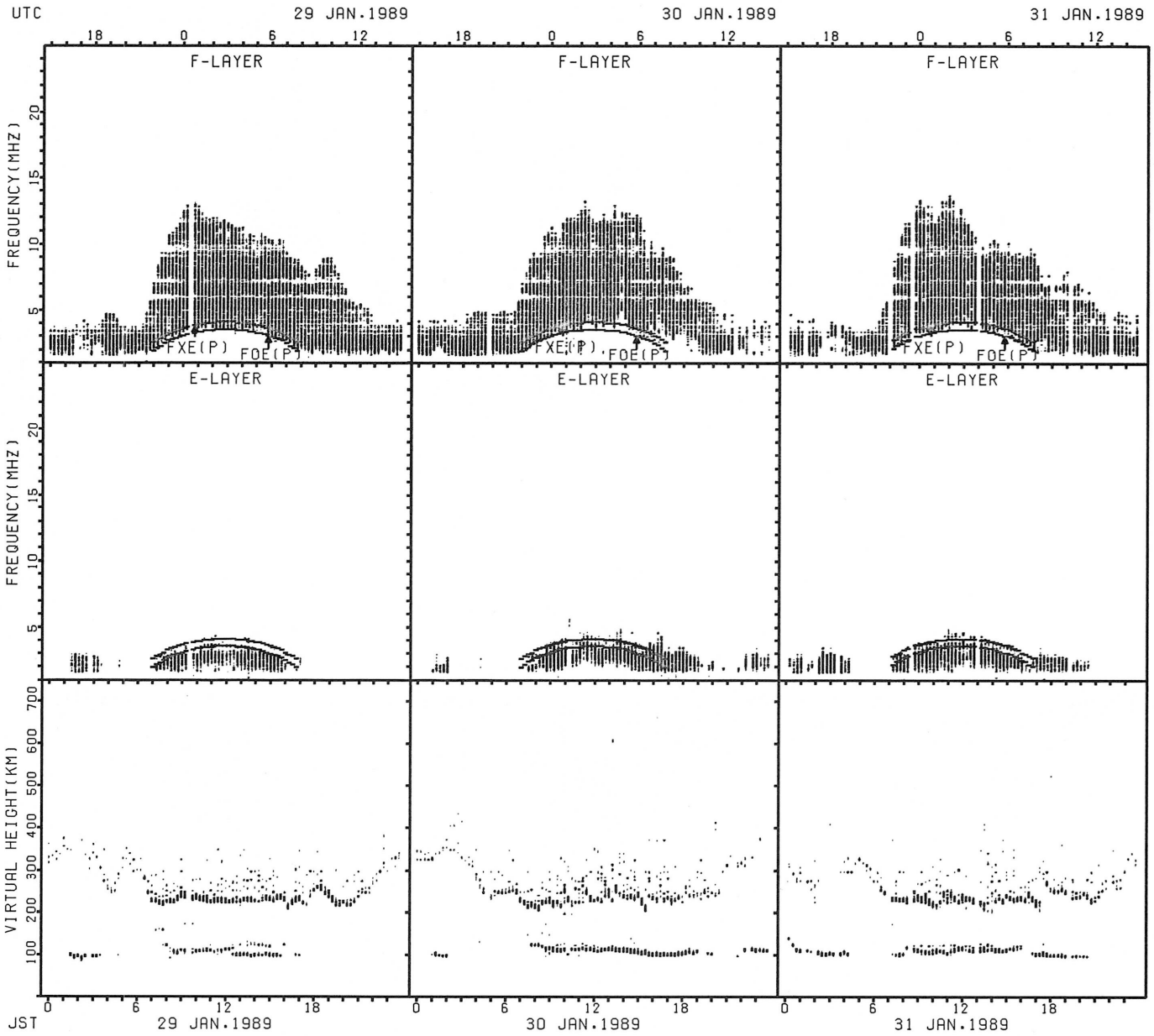
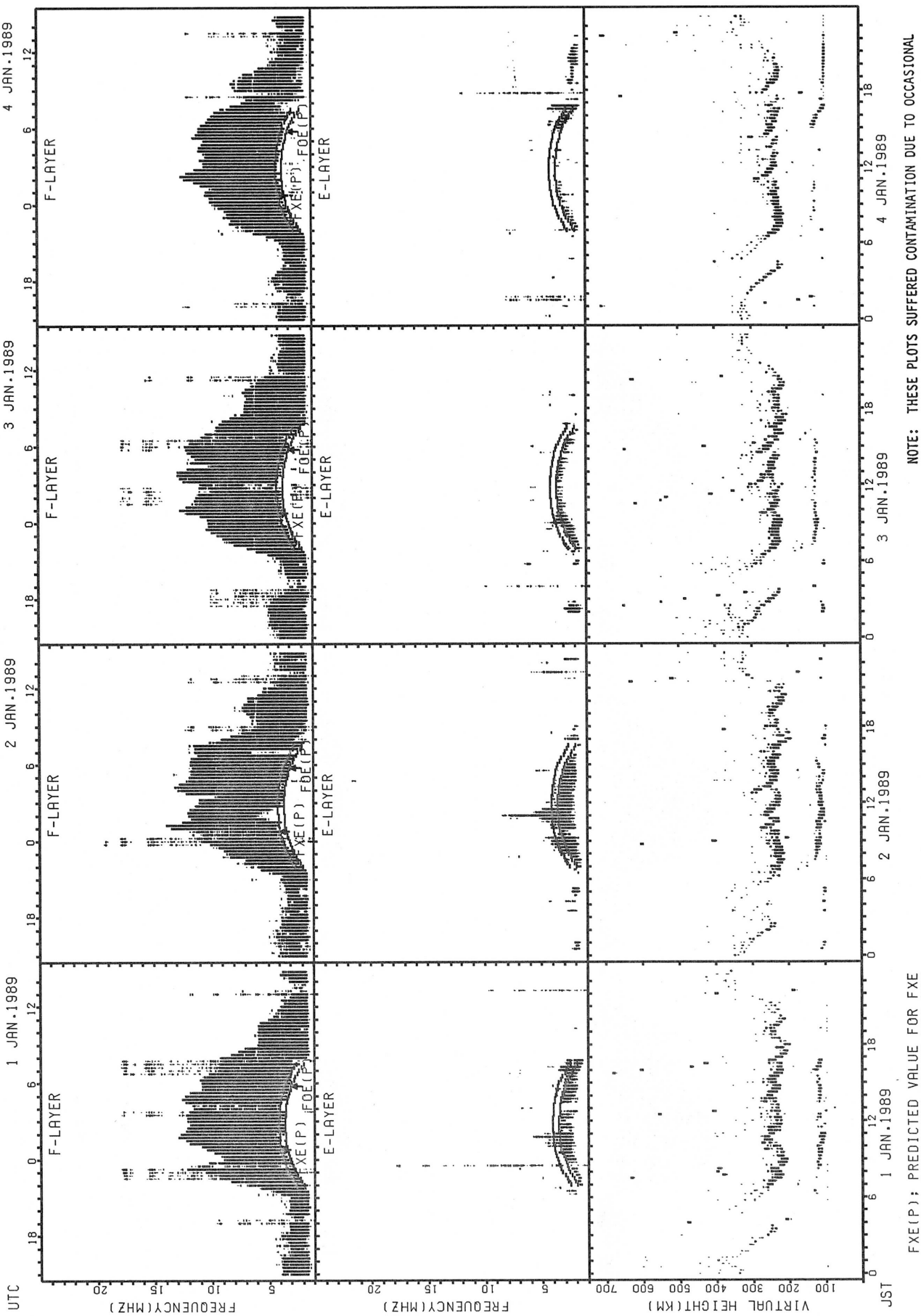
27 JAN.1989
28 JAN.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

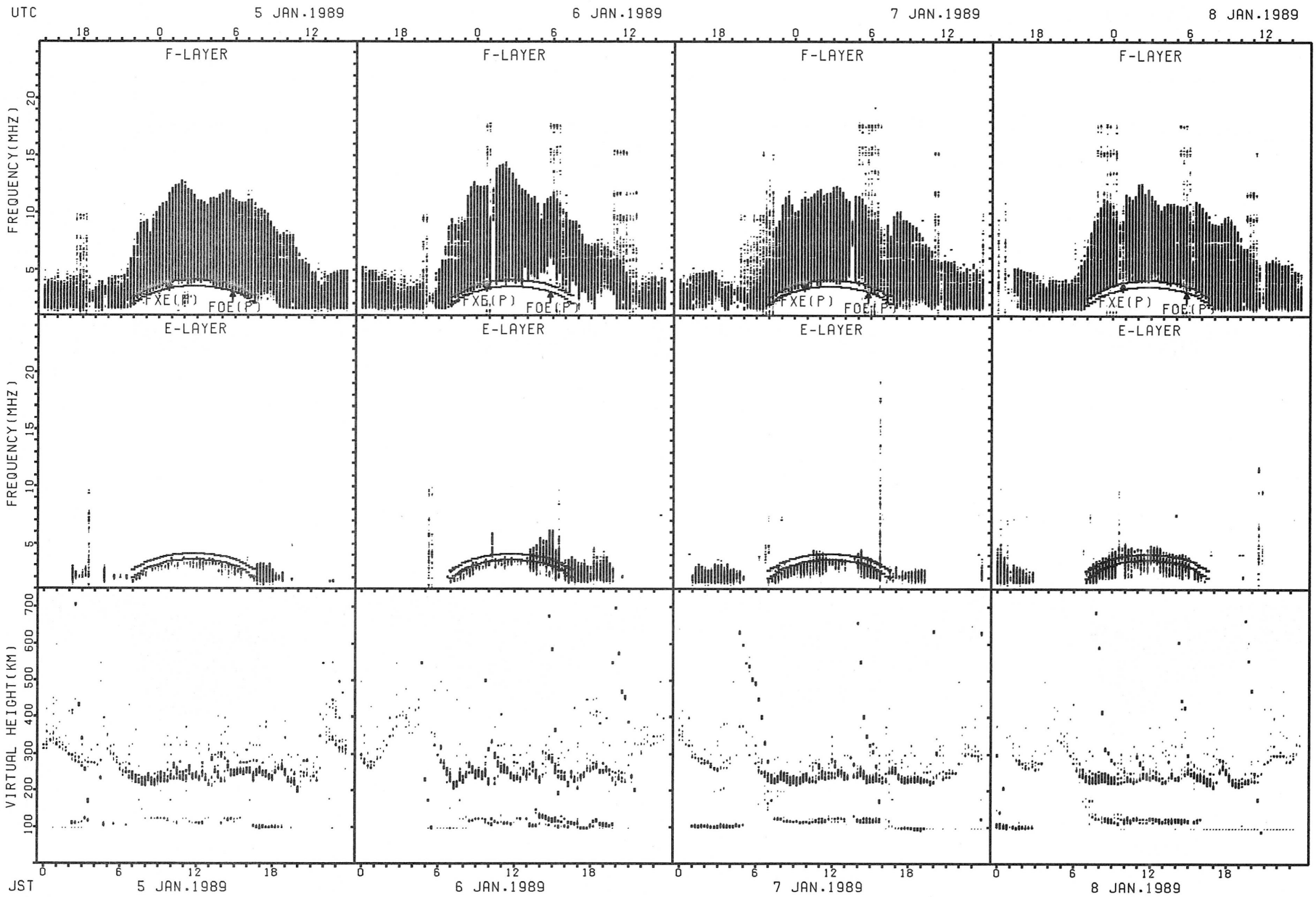
SUMMARY PLOTS AT AKITA



FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

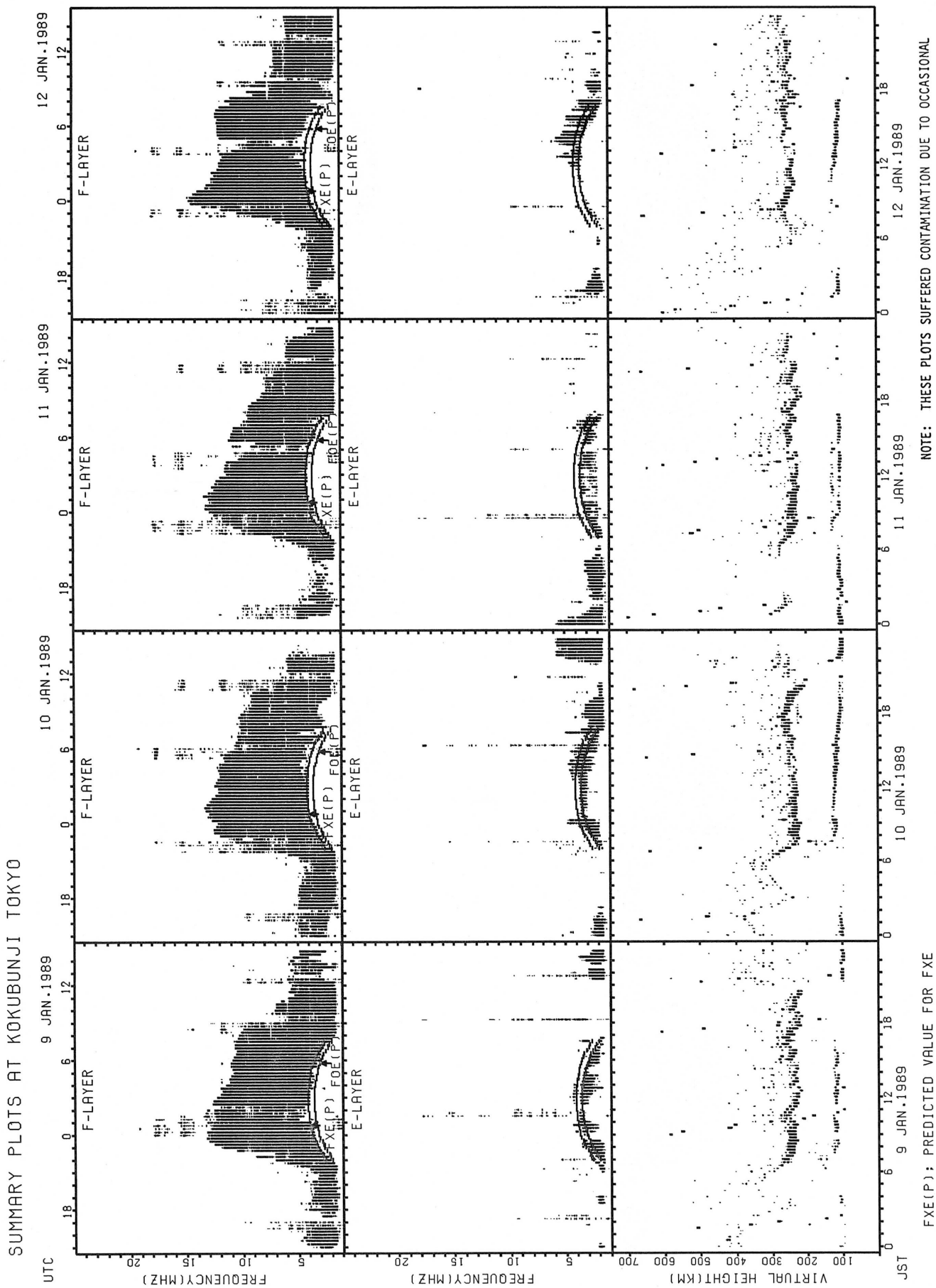

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
1 JAN.1989
2 JAN.1989
3 JAN.1989
4 JAN.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL
MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

SUMMARY PLOTS AT KOKUBUNJI TOKYO

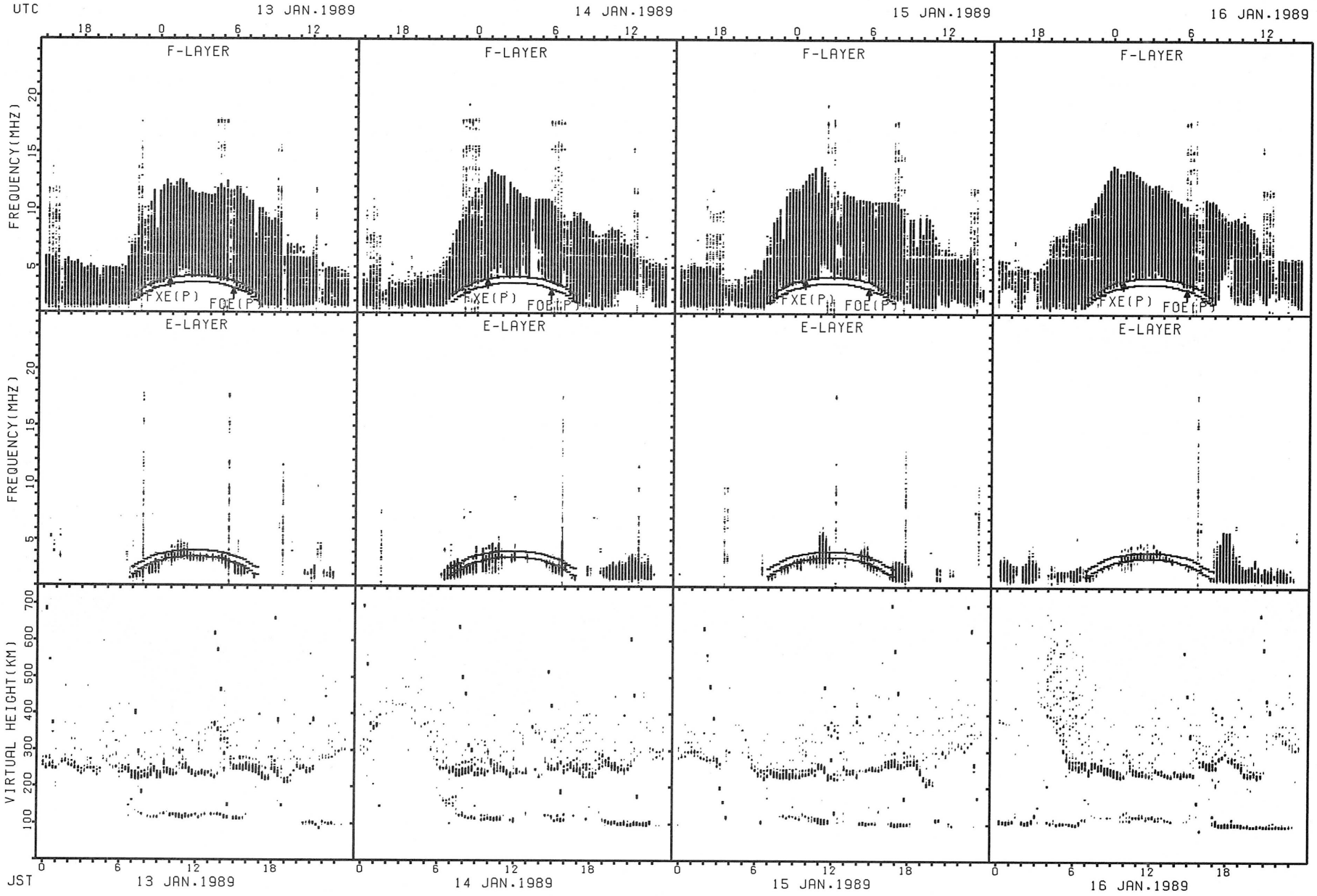


FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

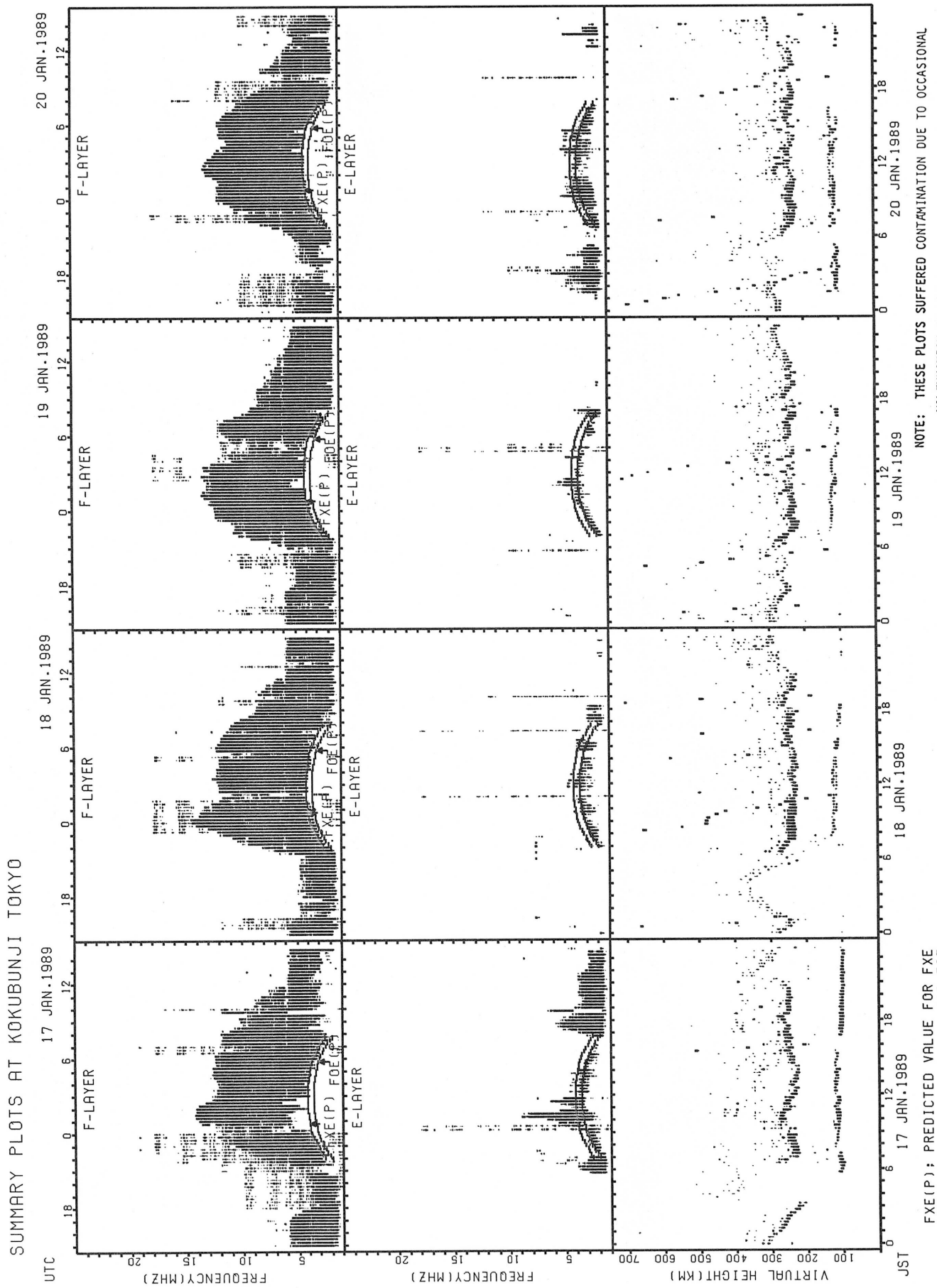

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
9 JAN.1989
10 JAN.1989
11 JAN.1989
12 JAN.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

SUMMARY PLOTS AT KOKUBUNJI TOKYO

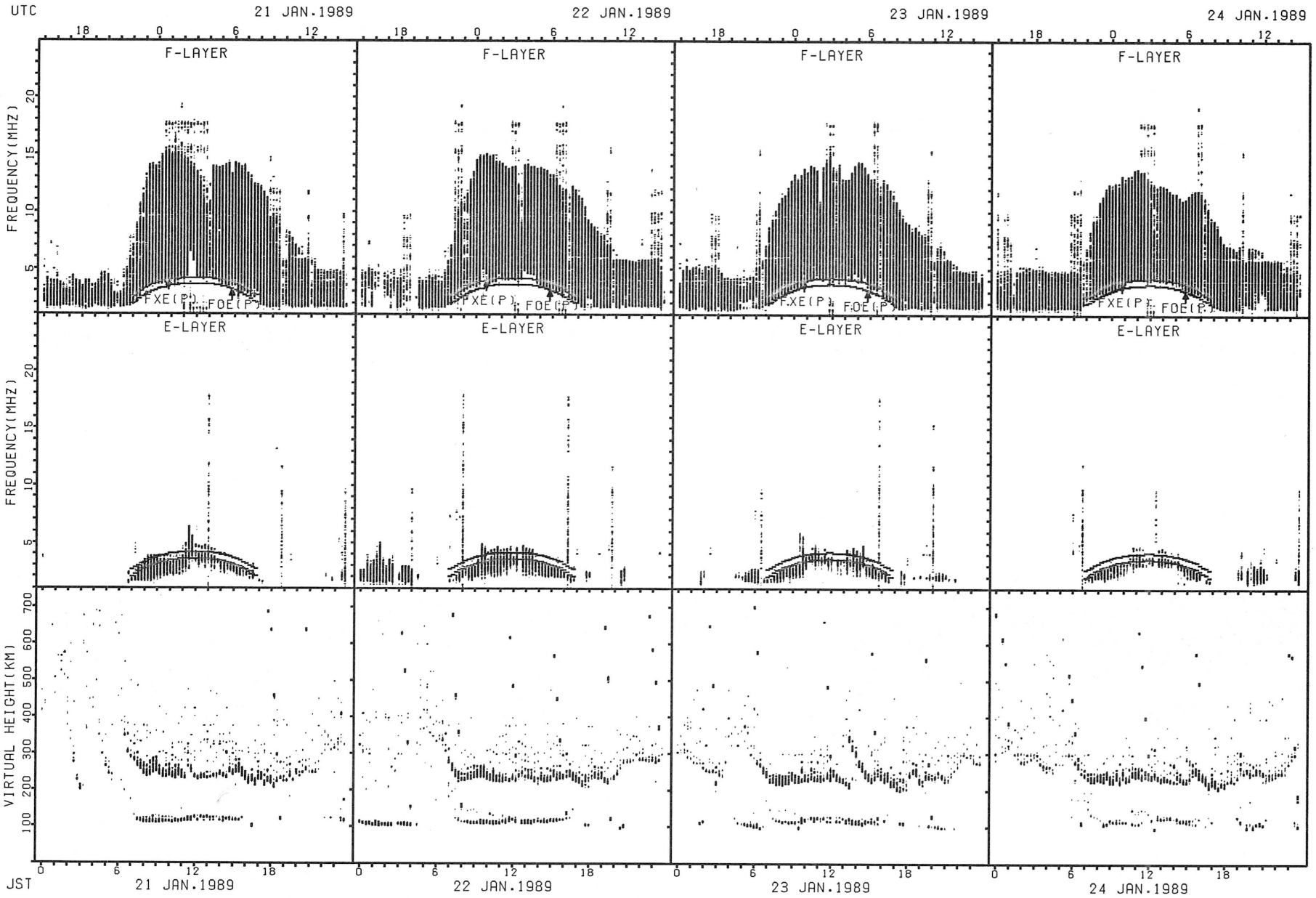


FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

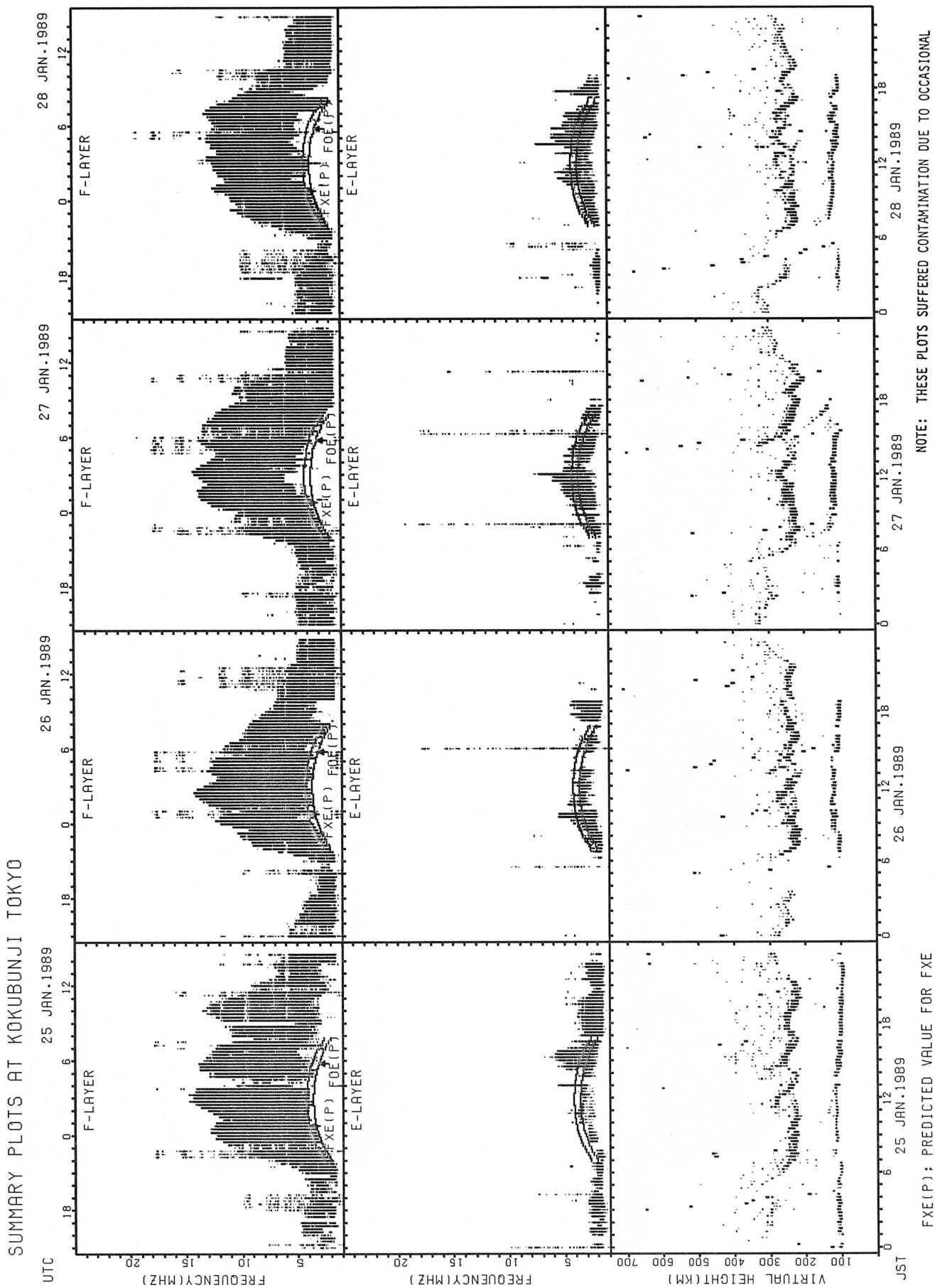

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
17 JAN.1989
18 JAN.1989
19 JAN.1989
20 JAN.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL
MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

SUMMARY PLOTS AT KOKUBUNJI TOKYO

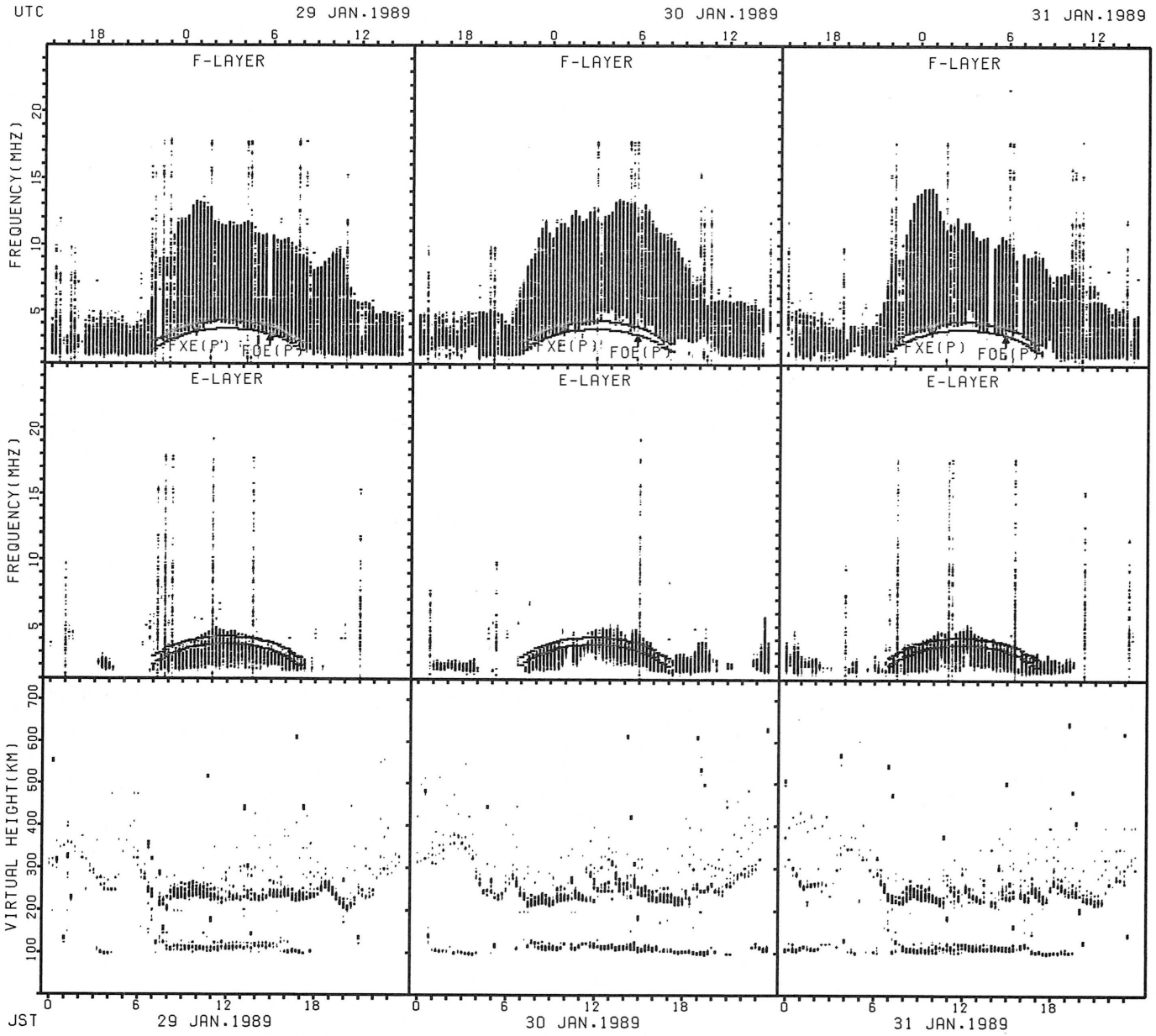


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

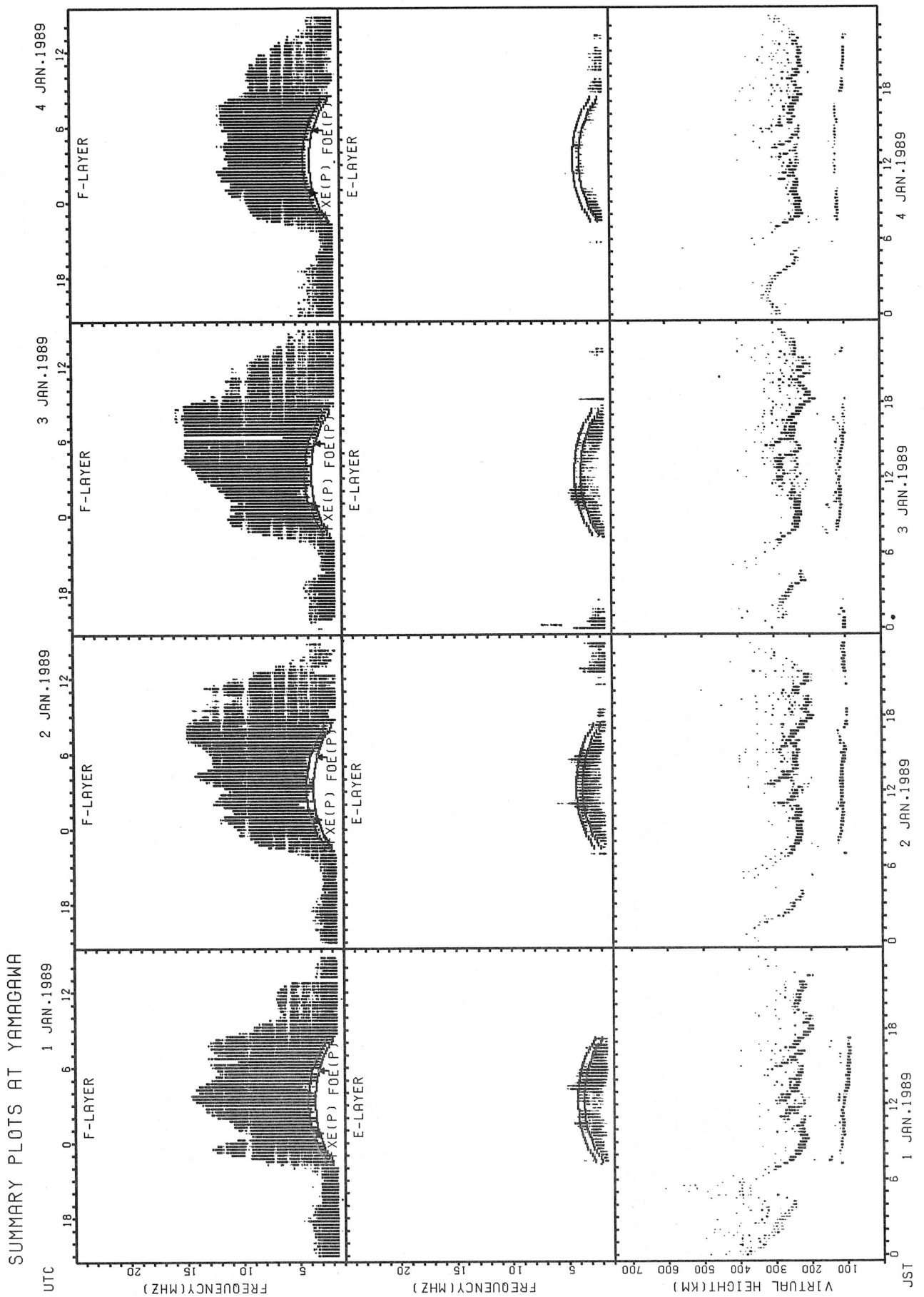

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
25 JAN.1989
26 JAN.1989
27 JAN.1989
28 JAN.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

SUMMARY PLOTS AT KOKUBUNJI TOKYO

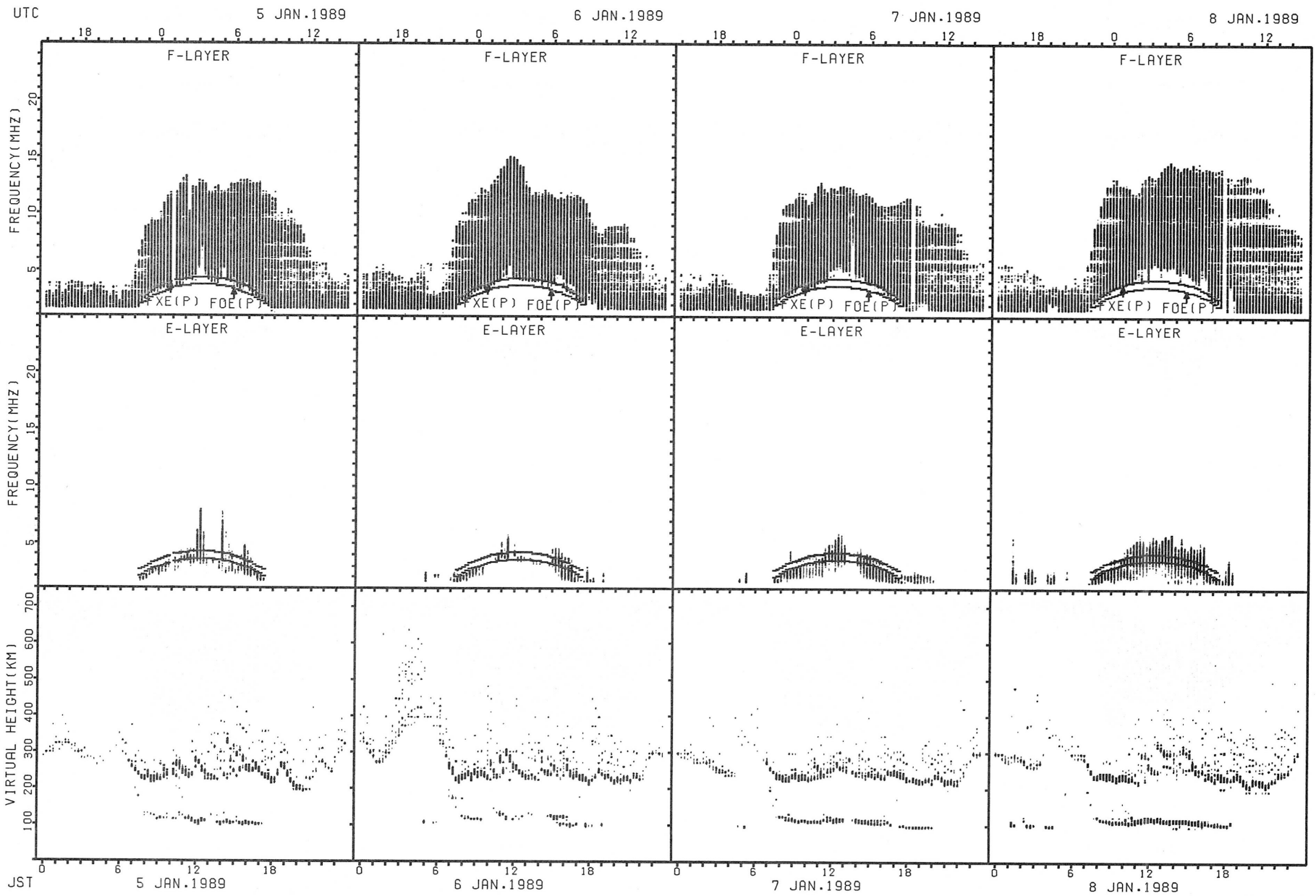


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

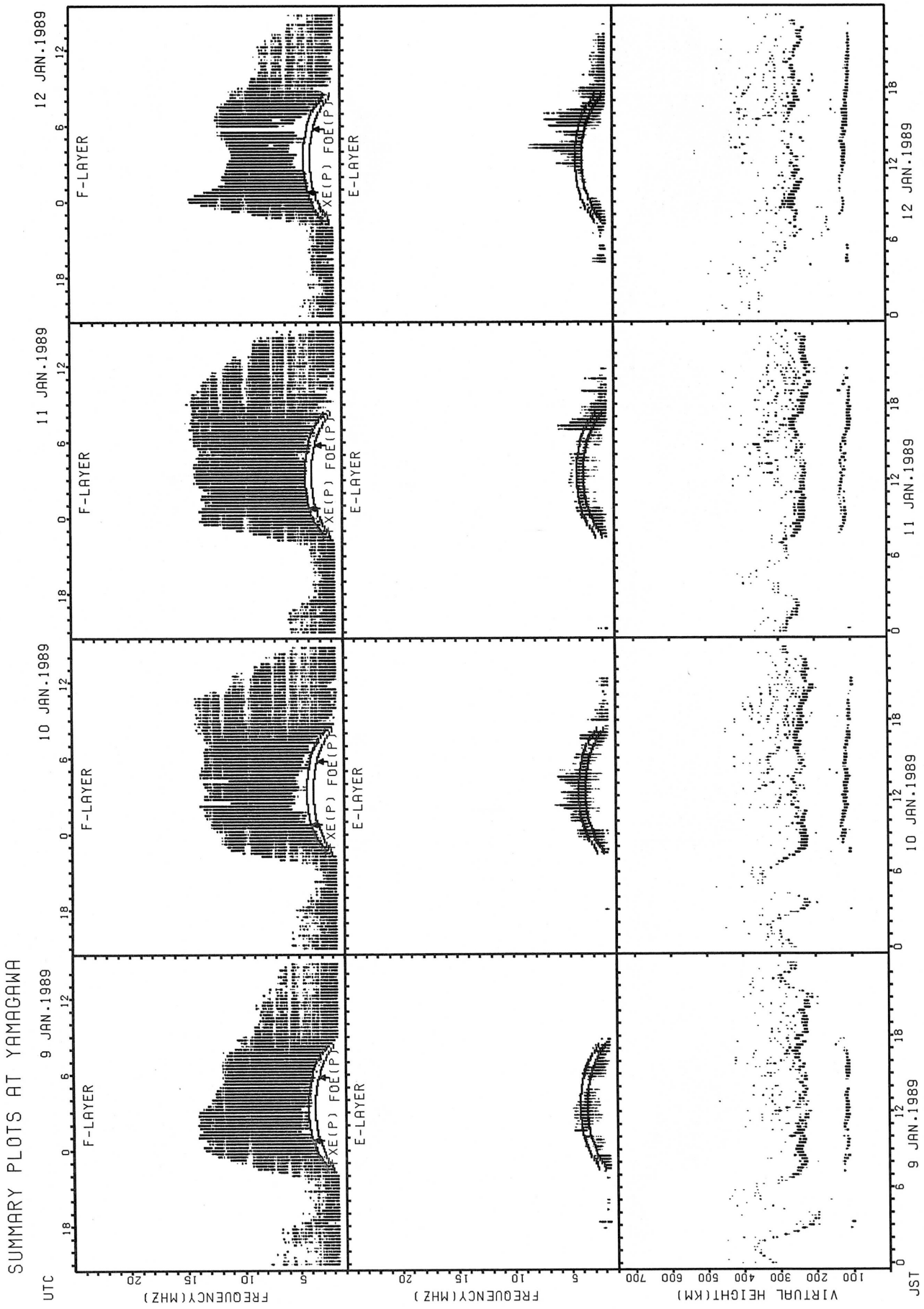
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.


SUMMARY PLOTS AT YAMAGAWA
UTC
JST
1 JAN.1989
2 JAN.1989
3 JAN.1989
4 JAN.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

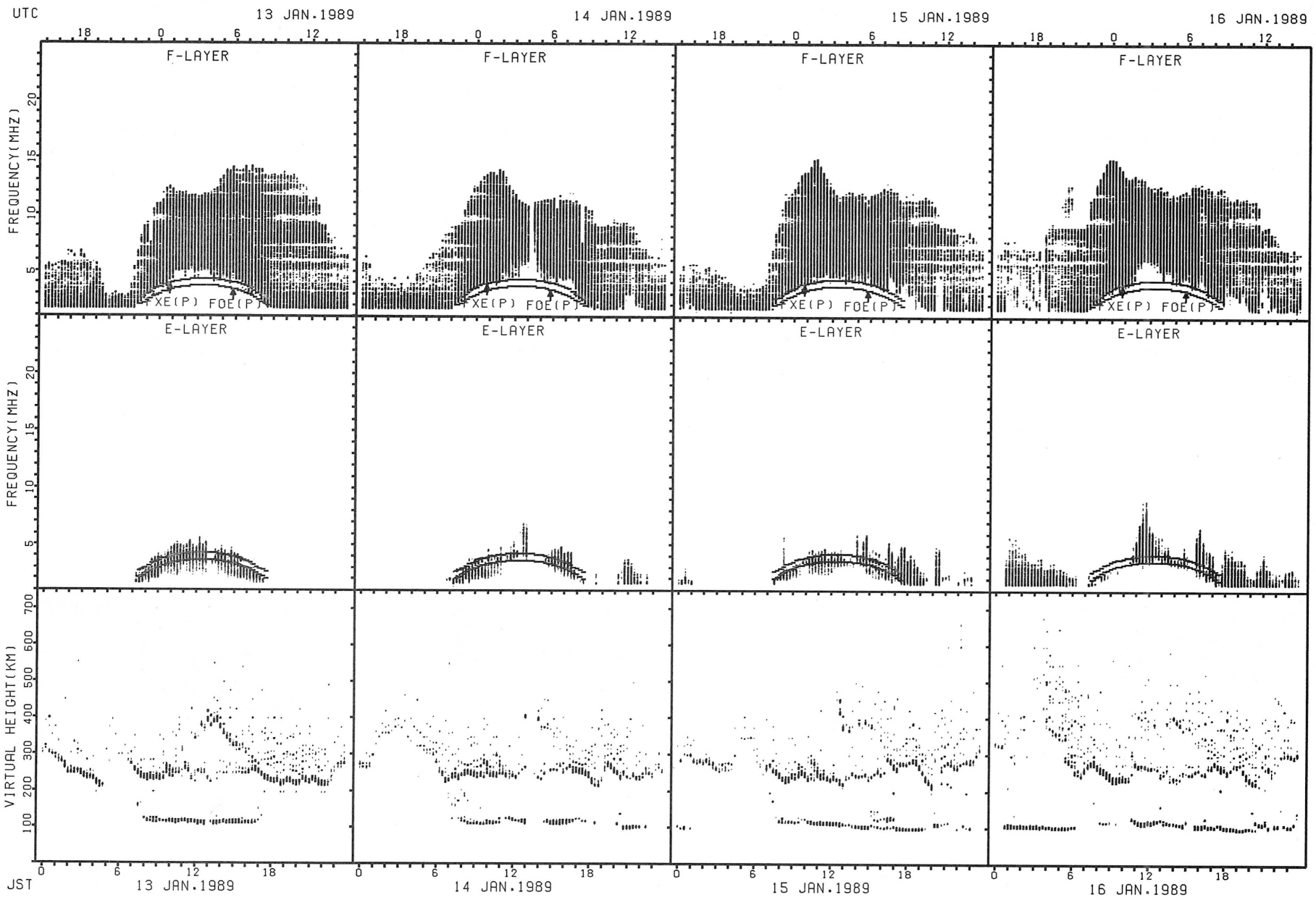
SUMMARY PLOTS AT YAMAGAWA



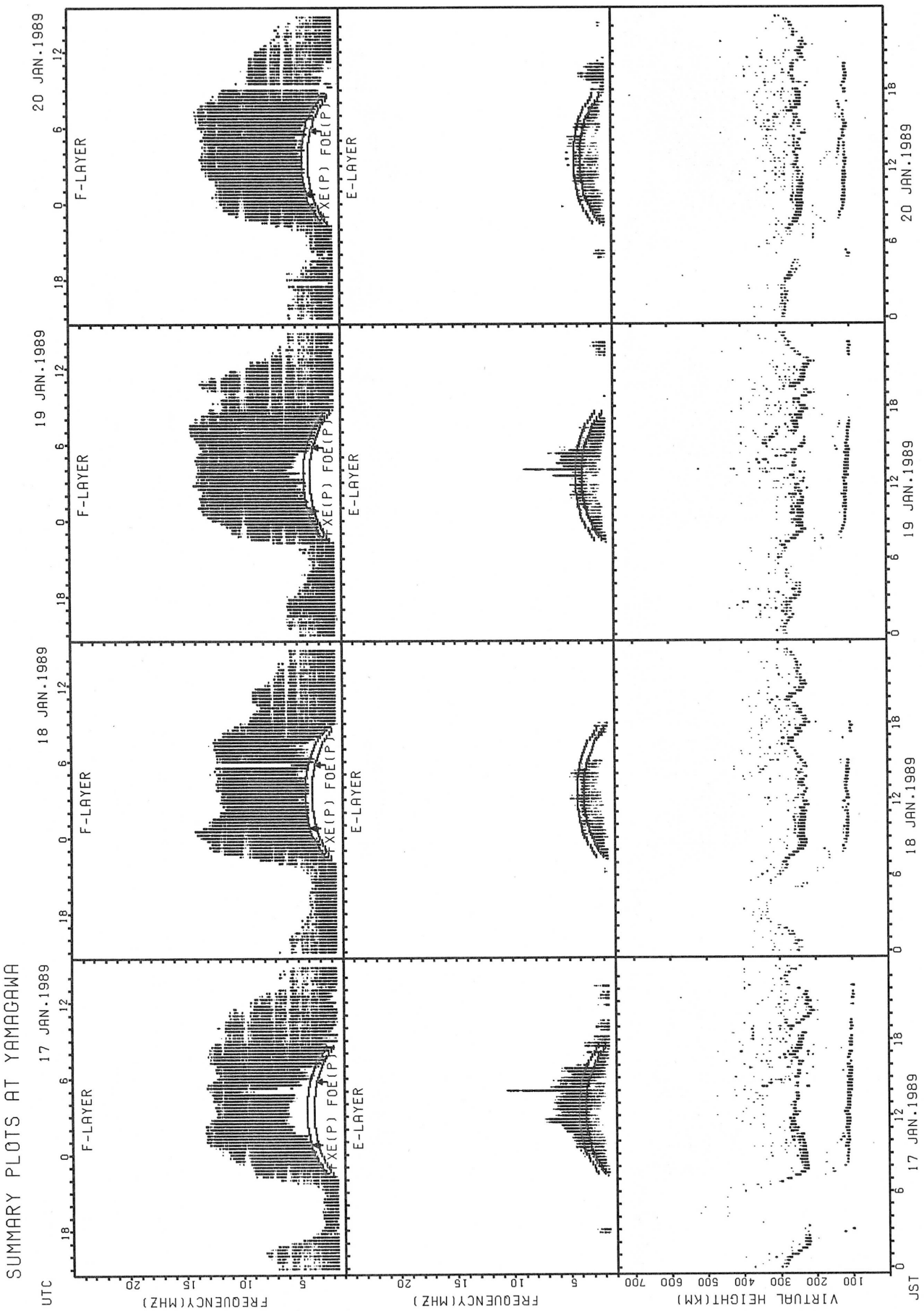
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

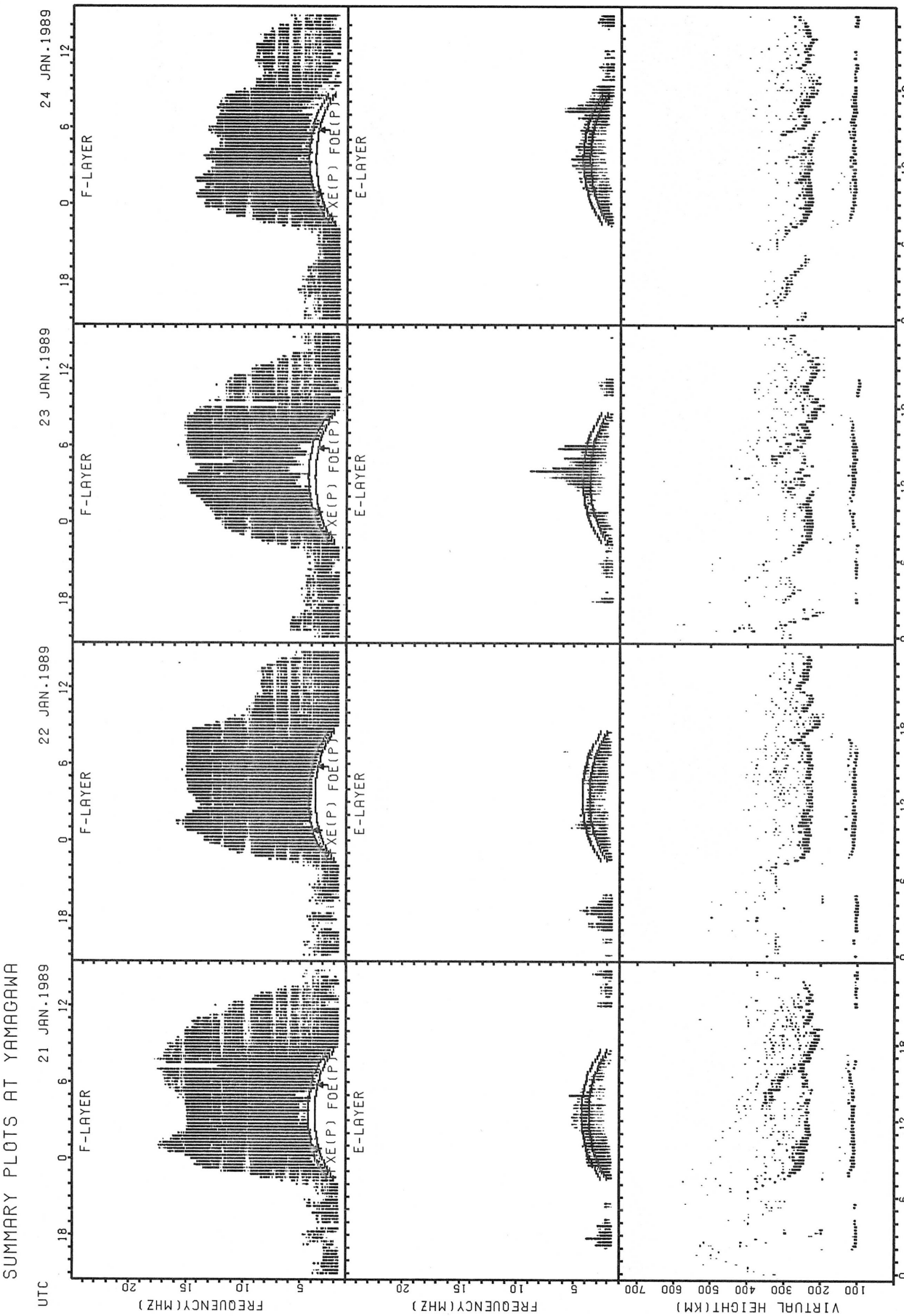

SUMMARY PLOTS AT YAMAGAWA
UTC
9 JAN.1989
10 JAN.1989
11 JAN.1989
12 JAN.1989
F-LAYER
E-LAYER
XE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA

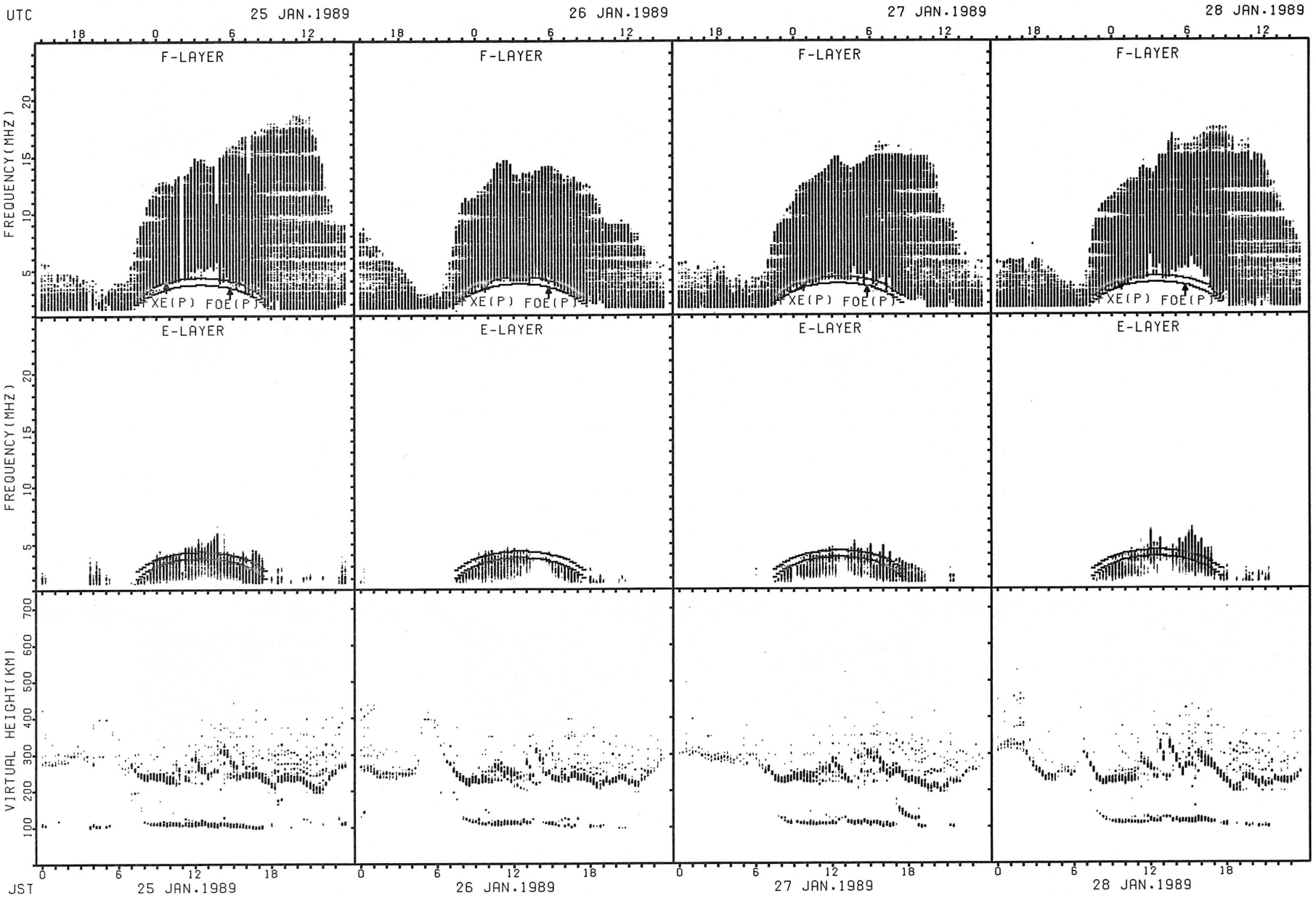


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
UTC
17 JAN.1989
18 JAN.1989
19 JAN.1989
20 JAN.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

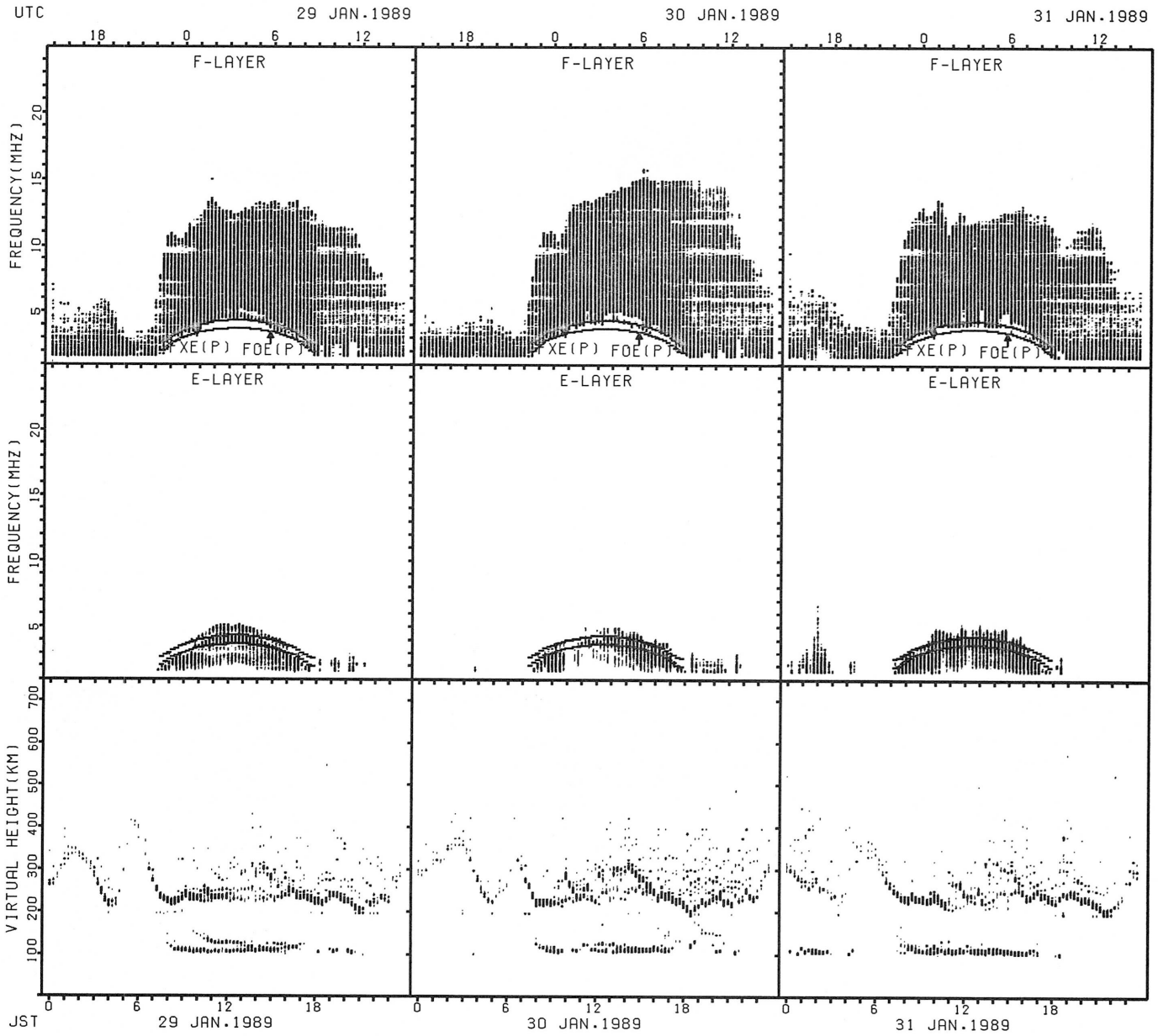

SUMMARY PLOTS AT YAMAGAWA
UTC
21 JAN.1989
22 JAN.1989
23 JAN.1989
24 JAN.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



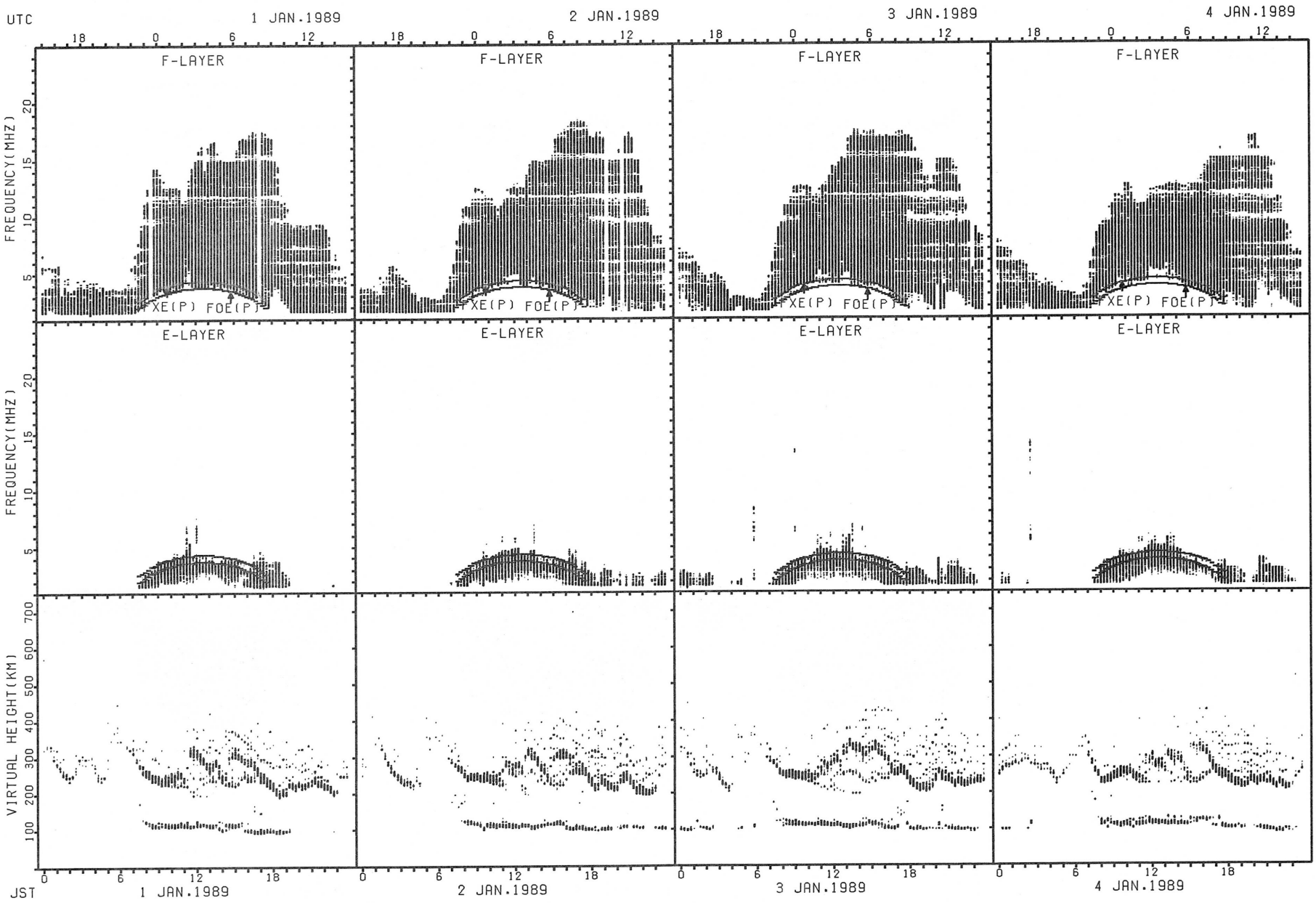
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



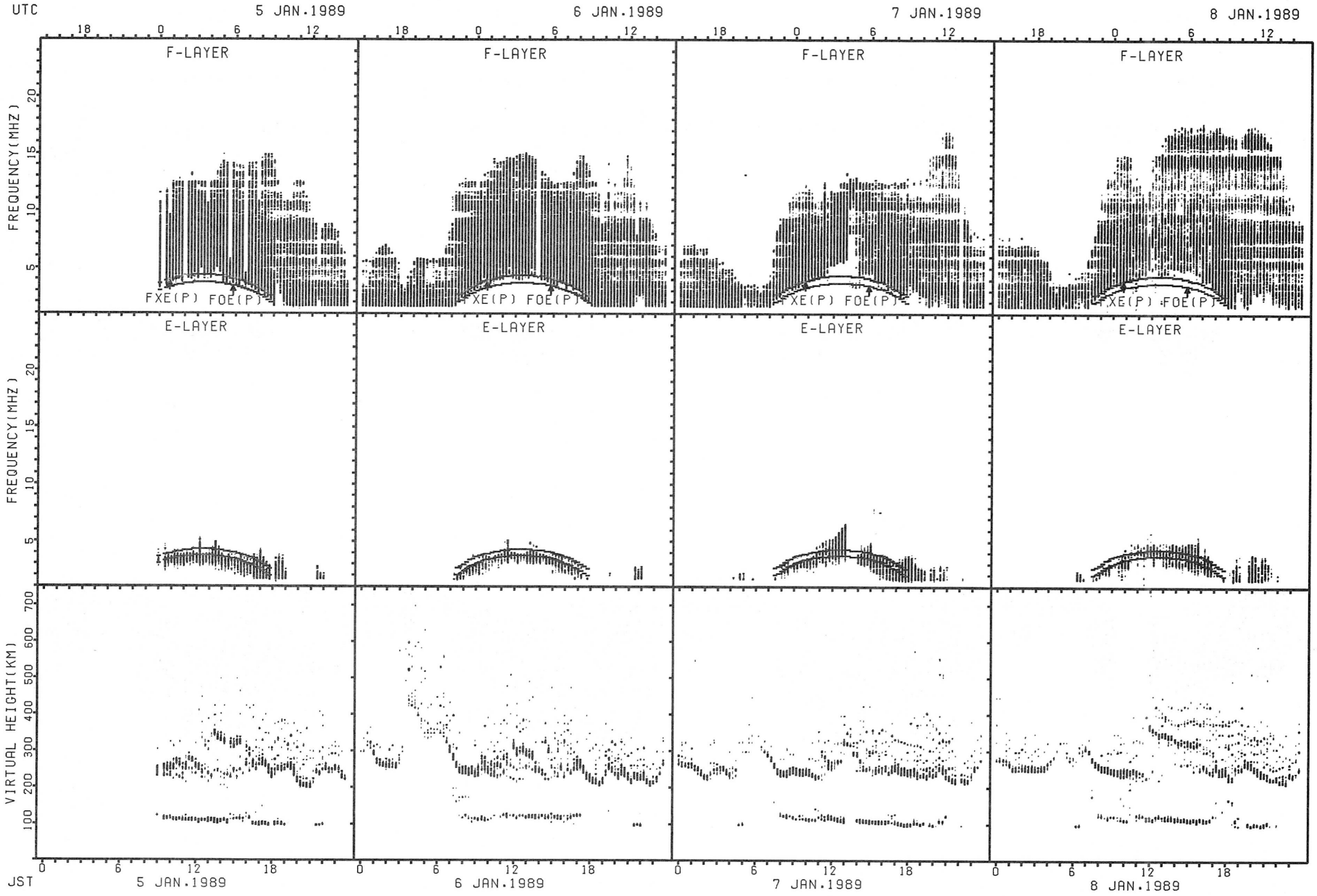
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA

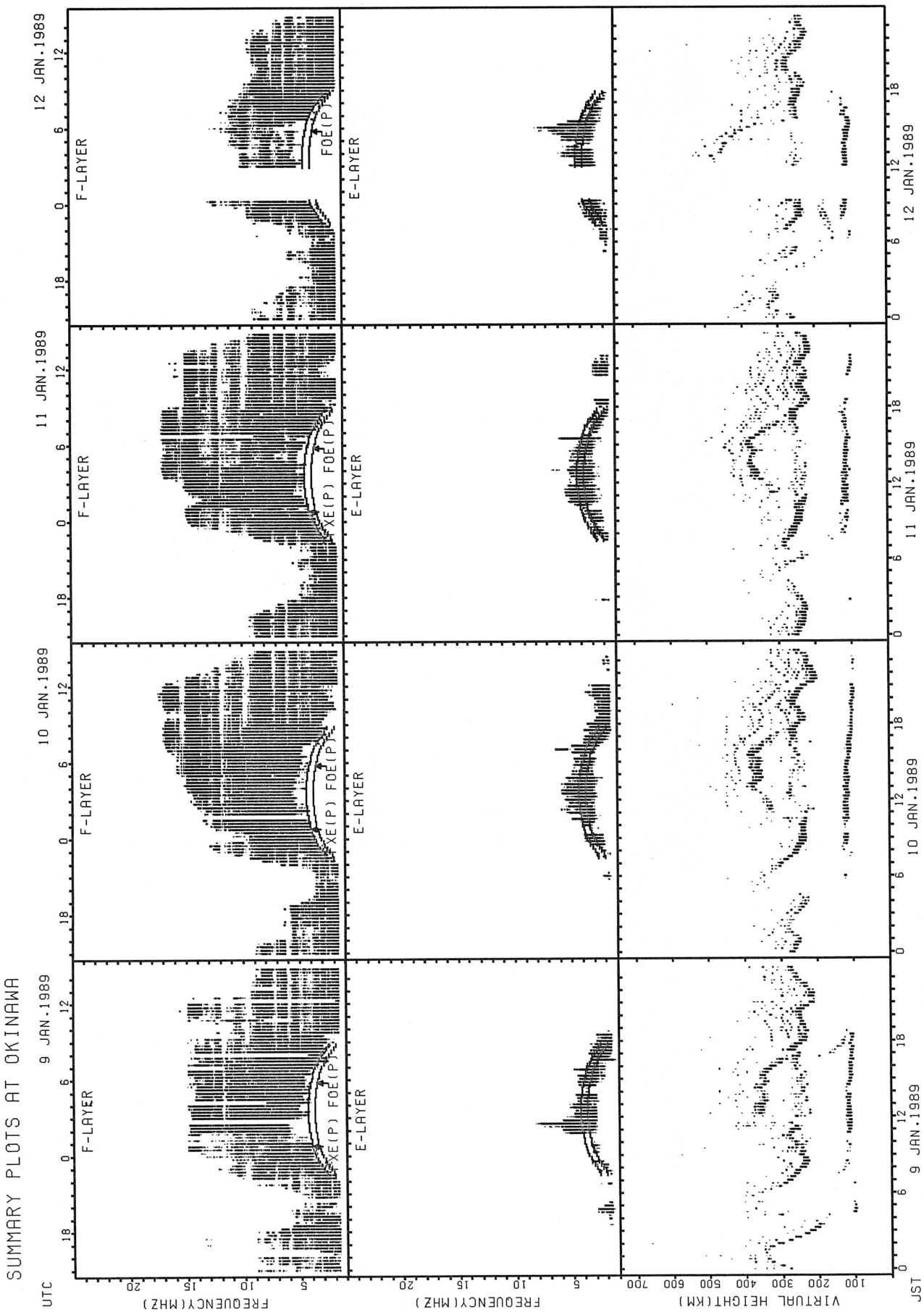


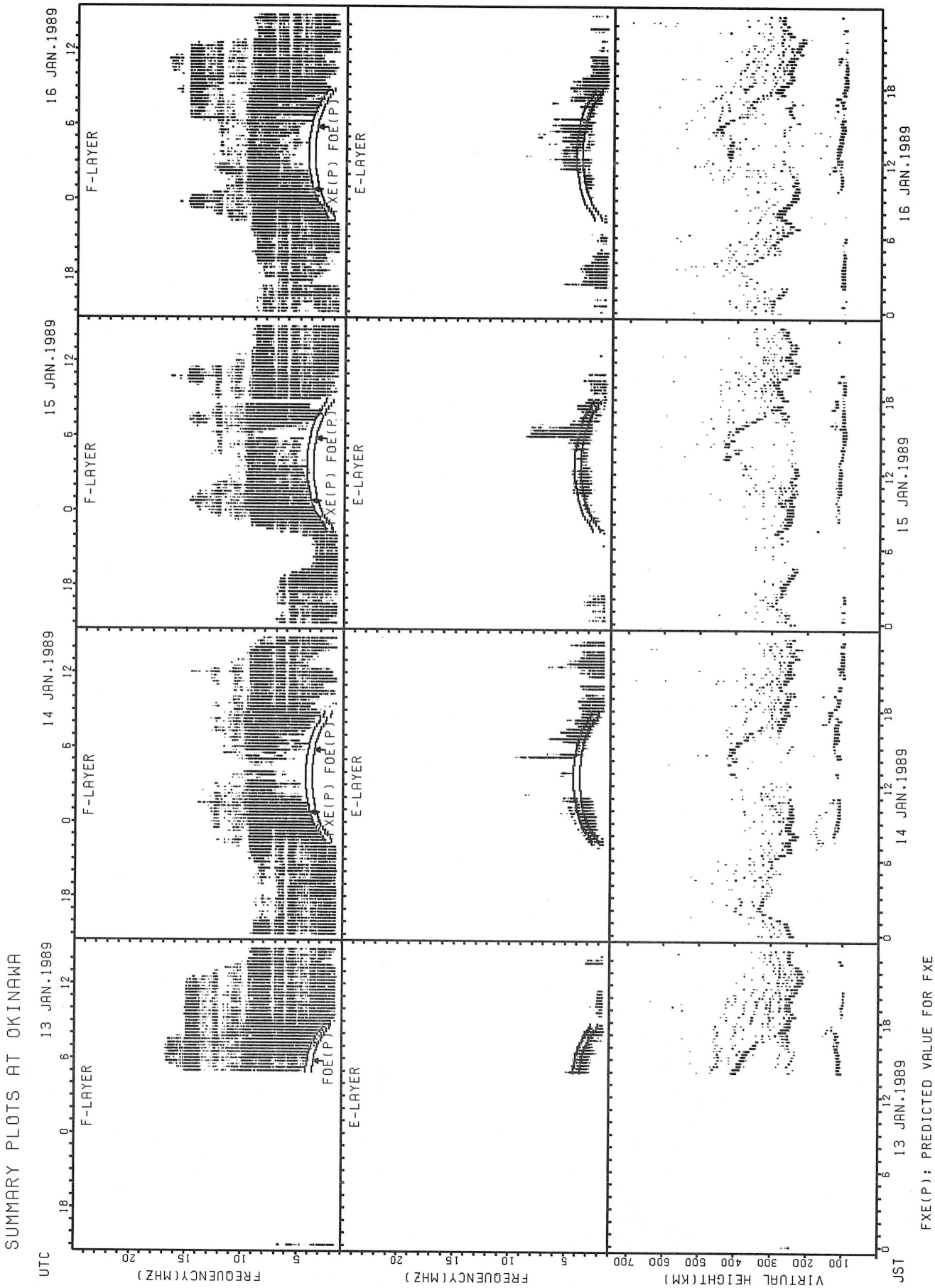
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

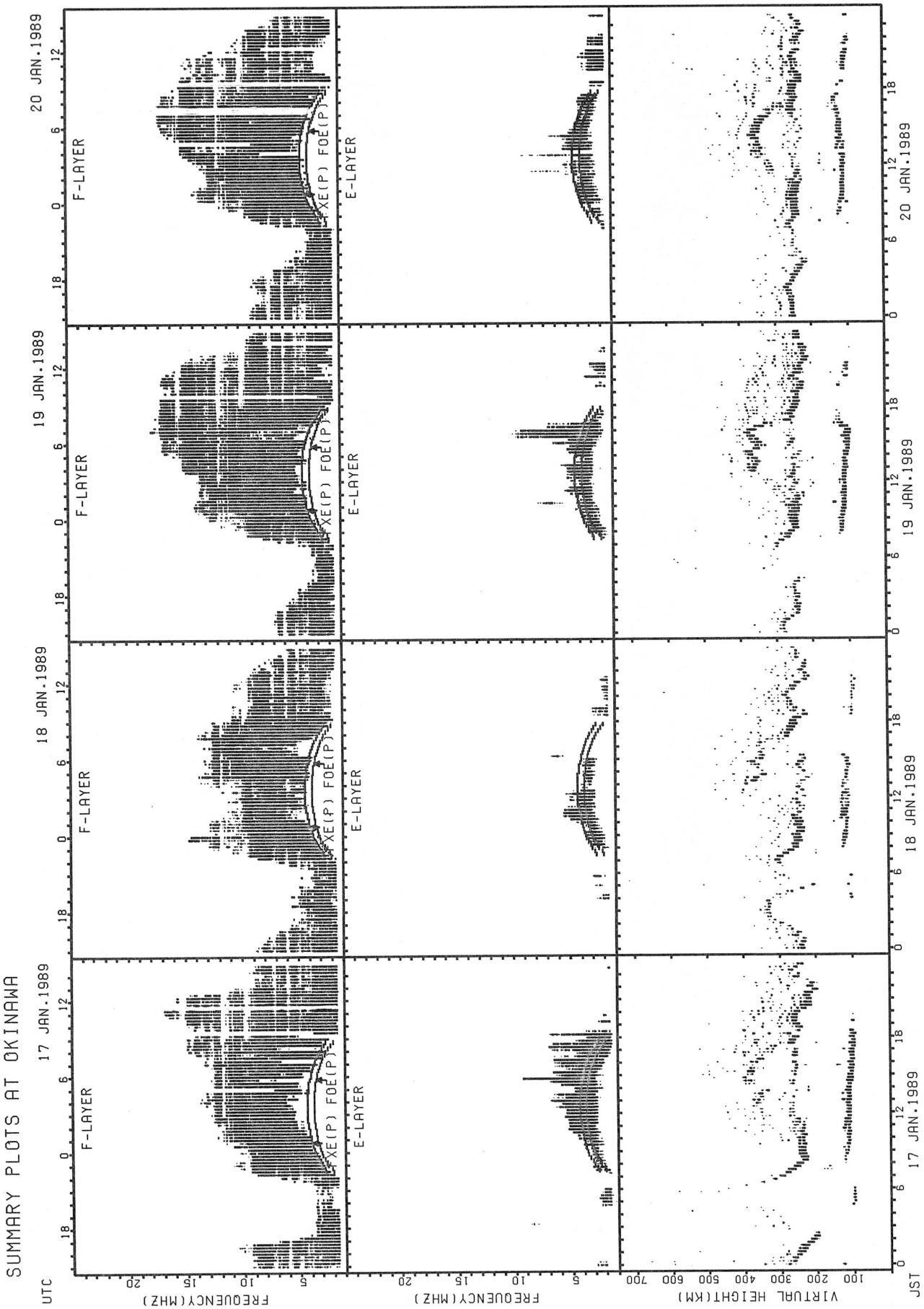
SUMMARY PLOTS AT OKINAWA



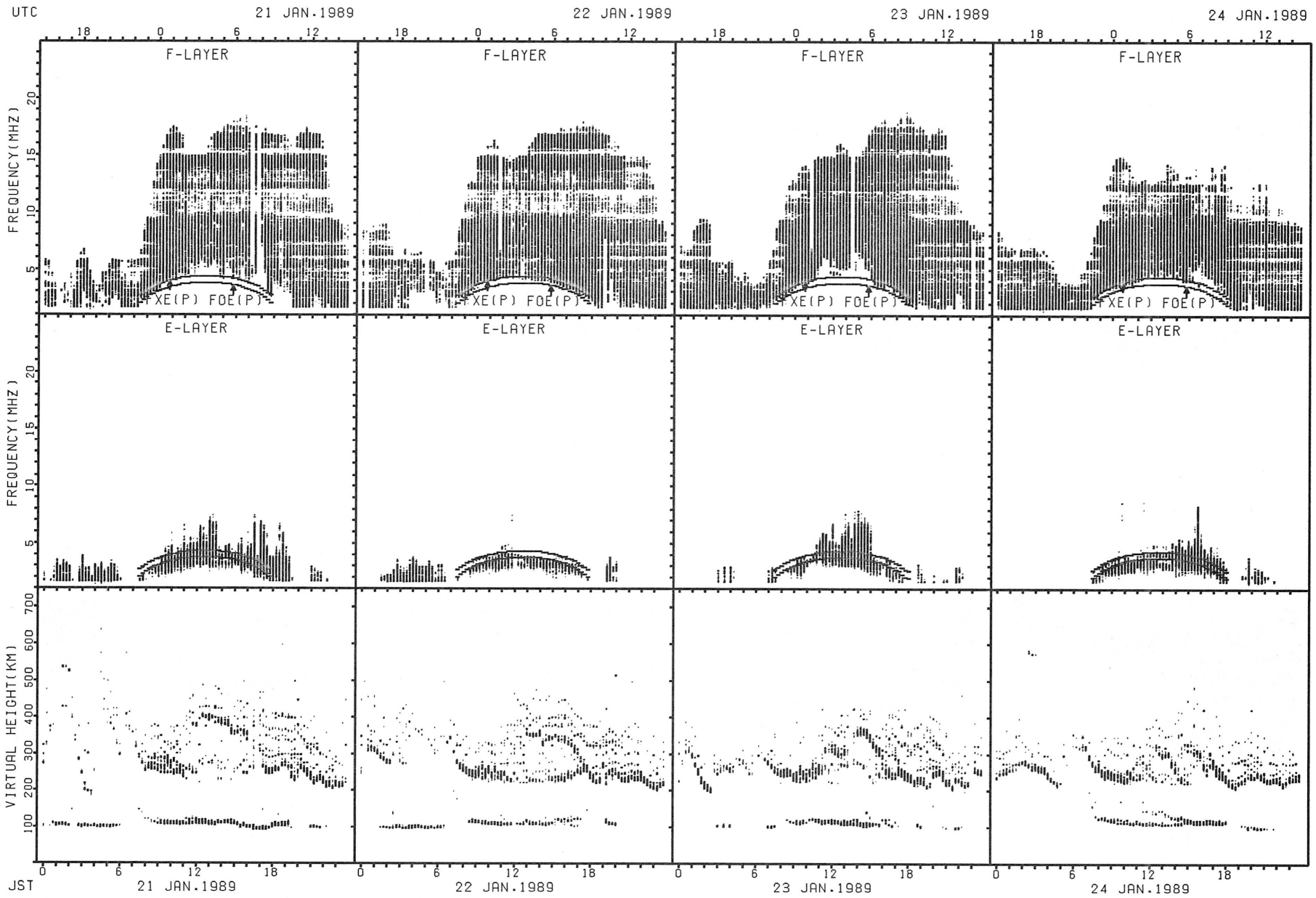
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
9 JAN.1989
10 JAN.1989
11 JAN.1989
12 JAN.1989
F-LAYER
E-LAYER
XE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

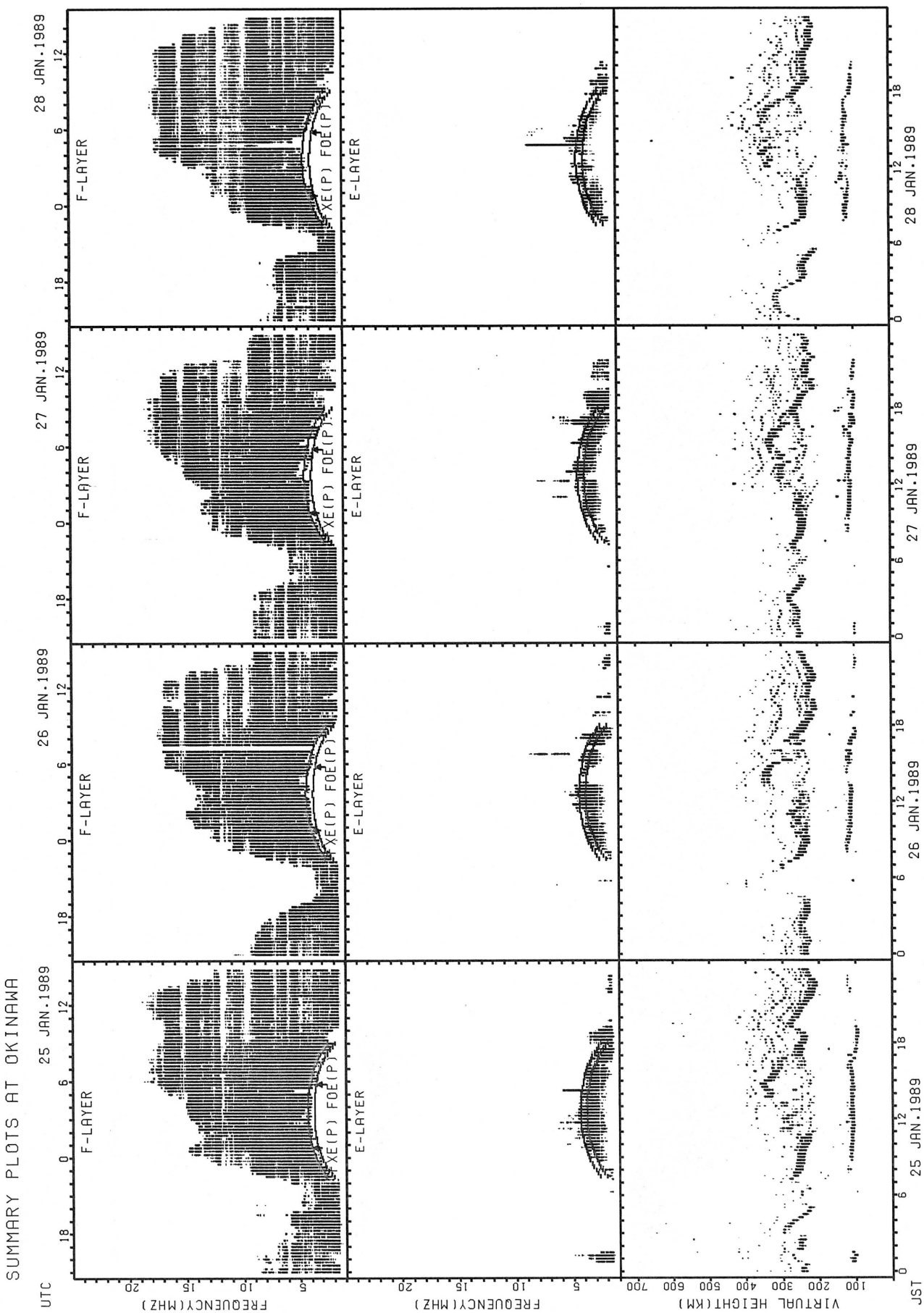

SUMMARY PLOTS AT OKINAWA
UTC
13 JAN.1989
14 JAN.1989
15 JAN.1989
16 JAN.1989
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FOE(P)
FXE(P) FOE(P)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
17 JAN.1989
18 JAN.1989
19 JAN.1989
20 JAN.1989
F-LAYER
E-LAYER
XE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

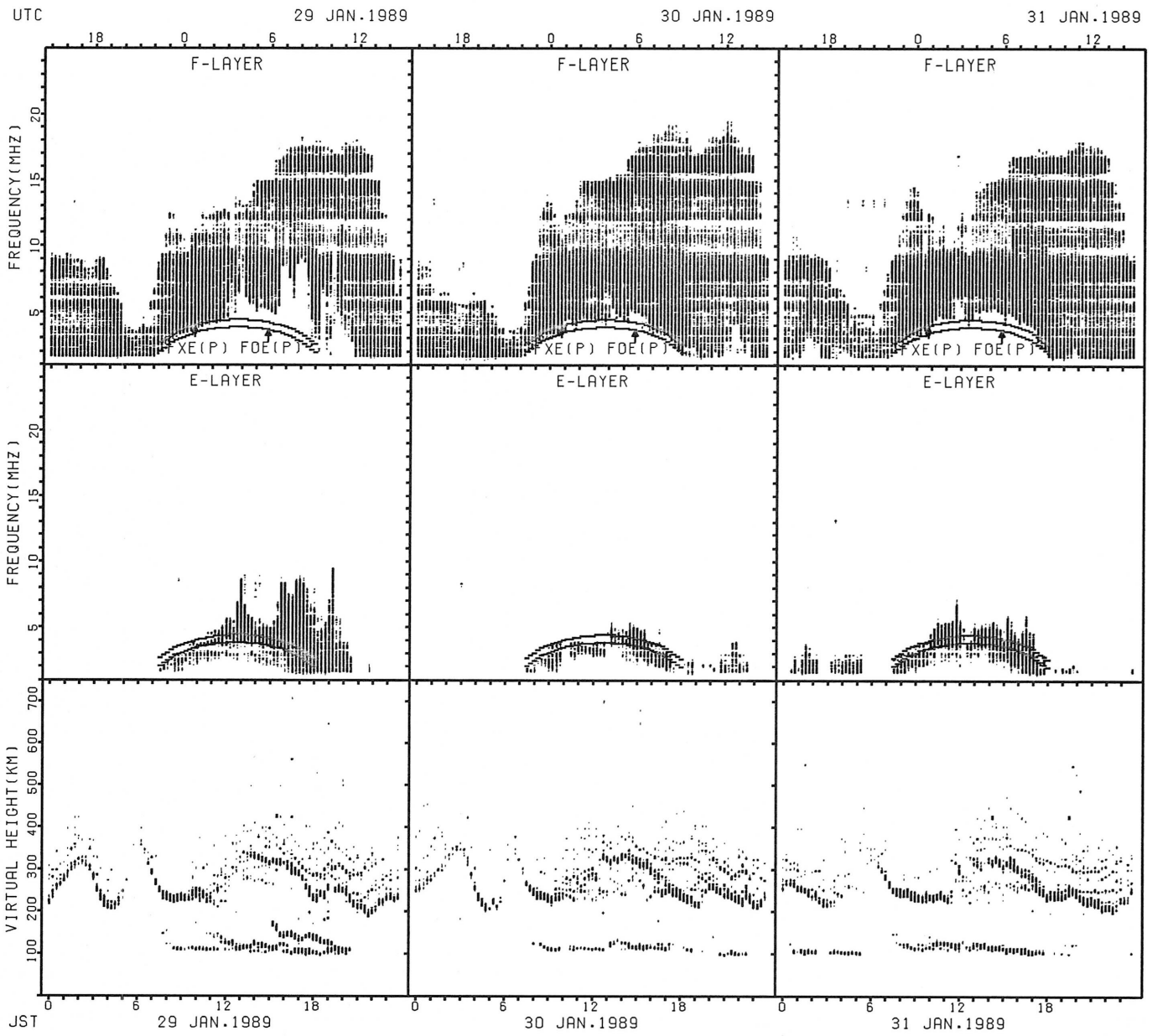
SUMMARY PLOTS AT OKINAWA



FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
25 JAN.1989
26 JAN.1989
27 JAN.1989
28 JAN.1989
F-LAYER
E-LAYER
XE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

MONTHLY MEDIANS OF H'F AND H'ES
JAN.1989 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

H'F STATION WAKKANAI LAT. 45.4N LON. 141.7E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									30	31	31	31	31	31	31	28	29	21	16					
MED									242	234	242	240	244	250	250	246	254	296	283					
U Q									250	244	250	250	266	264	256	269	276	314	333					
L Q									228	228	232	230	232	242	244	238	246	276	275					

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	10																						13	13
MED	115																						113	113
U Q	125																						118	118
L Q	109																						109	109

H'F STATION AKITA LAT. 39.7N LON. 140.1E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									30	29	30	31	30	30	31	31	30	24						
MED									244	236	245	248	250	261	270	266	258	272						
U Q									252	250	258	254	258	292	290	276	276	293						
L Q									234	230	238	240	234	242	250	252	238	259						

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	11			14					22	26	24	27	28	24	25	26	20	11	16	16	14	13		
MED	105			107					134	125	119	119	118	117	117	116	115	103	105	103	105	103		
U Q	113			107					151	137	122	125	121	120	119	125	122	109	106	106	105	107		
L Q	101			105					125	115	116	113	113	113	112	109	106	103	101	99	101	99		

H'F STATION KOKUBUNJI LAT. 35.7N LON. 139.5E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								22	31	30	31	31	31	27	26	31	30	29	19	17				
MED								265	238	238	246	250	252	250	272	278	262	272	306	306				
U Q								282	248	240	256	262	278	284	298	296	276	290	322	315				
L Q								252	230	228	236	236	246	238	250	254	242	259	270	266				

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT		11	12	13	10		13	15	30	29	29	29	28	27	26	29	25	16	16	13		12	10	
MED		107	109	109	109		107	115	129	125	123	121	121	121	119	119	119	107	105	105		102	103	
U Q		113	111	118	111		131	167	137	134	125	127	125	123	123	119	131	109	106	108		105	103	
L Q		105	105	106	105		103	105	125	119	119	116	117	115	113	113	113	104	103	103		99	101	

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

MONTHLY MEDIANS OF H'F AND H'ES

JAN.1989 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

H'F STATION YAMAGAWA LAT. 31.2N LON. 130.6E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									30	31	31	30	30	31	28	30	31	31	31	28	28	23		
MED									238	236	238	253	258	272	283	298	278	256	258	271	267	268		
U Q									248	246	248	256	274	312	313	322	300	266	288	308	295	282		
L Q									232	230	234	248	246	248	254	268	254	246	246	261	257	250		

H'ES

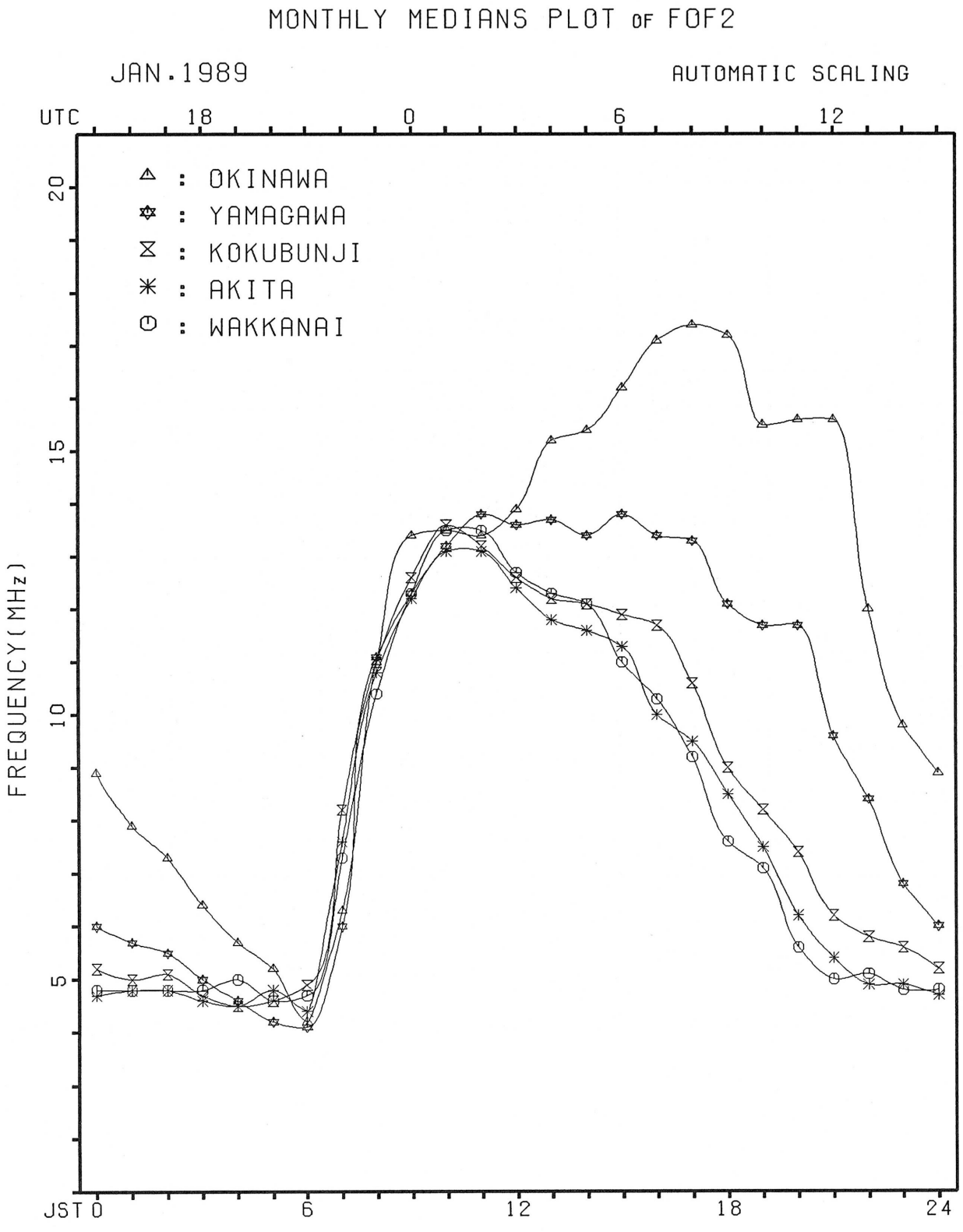
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									30	29	28	30	31	27	26	30	30	28	16	14				
MED									137	119	120	119	117	117	113	113	115	118	105	105				
U Q									169	120	125	123	119	121	117	117	119	142	108	113				
L Q									123	115	113	115	115	113	111	109	111	107	103	101				

H'F STATION OKINAWA LAT. 26.3N LON. 127.8E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	10	11							31	31	31	30	30	28	27	28	31	29	31	30	30	31	30	21
MED	319	318							252	244	246	254	290	342	332	326	324	292	258	265	272	258	257	276
U Q	340	338							278	250	256	268	326	363	366	348	366	324	278	292	288	270	266	308
L Q	302	294							238	236	240	240	268	305	294	312	300	282	242	252	264	244	244	251

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									22	28	29	30	29	29	30	31	30	28	18	18	13	14	10	
MED									127	119	119	122	119	115	118	115	117	120	104	103	107	103	101	
U Q									169	120	137	133	125	119	121	117	119	131	113	107	109	105	105	
L Q									121	115	114	117	116	112	113	111	113	107	101	99	101	101	99	


MONTHLY MEDIANS PLOT OF FOF2
JAN.1989
AUTOMATIC SCALING
UTC
18
0
6
12
△ : OKINAWA
✡ : YAMAGAWA
⧖ : KOKUBUNJI
✳ : AKITA
◷ : WAKKANAI
FREQUENCY(MHz)
20
15
10
5
JST 0
6
12
18
24

IONOSPHERIC DATA

JAN. 1989 | FXI (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	X 38	X 38	X 39	X 40	X 35	X 35	X 37											X 95	X 67	X 63	X 51	X 42	X 38	X 40
2	X 43	X 44	X 45	X 37	X 36	X 37	X 39											X 90	X 67	X 70	X 69	X 54	X 42	X 45
3	X 43	X 47	49	X 45	X 32	X 34	X 37											X 89	X 71	X 69	X 61	X 45	X 44	X 42
4	X 43	X 42	X 42	X 43	X 37	X 37	X 38											X 76	X 79	X 77	X 47	X 44	X 41	X 42
5	X 42	44	X 44	X 42	X 42	X 44	X 45											X 105	X 89	X 83	X 64	X 53	X 46	X 50
6	X 53	X 47	X 45	X 42	X 42	X 43	X 54											X 90	X 75	X 75	X 65	X 46	X 45	X 45
7	X 44	X 49	X 49	X 43	X 37	X 37	X 41												X 93	X 80	X 67	X 62	X 54	X 53
8	X 51	X 52	X 51	X 47	X 43	X 44	X 46												X 99	X 81	X 64	X 59	X 60	X 55
9	X 45	X 45	S	X 42	X 41	X 39	X 39												X 88	X 76	X 64	X 57	X 57	X 57
10	X 53	X 52	X 50	X 54	X 50	X 48	X 46												X 101	X 95	X 77	X 63	X 61	X 49
11	A	X 54	X 47	X 38	X 37	X 39	X 42												X 86	X 78	X 77	X 60	X 60	X 54
12	41	0 X 41	X 42	42	X 38	X 43	X 37												X 96	X 80	X 73	X 72	0 X 65	X 64
13	X 63	X 55	X 57	X 51	X 49	X 51	X 48												X 93	X 77	X 68	X 61	X 55	X 47
14	X 46	X 38	X 41	X 39	X 41	X 43	X 47												X 84	X 82	X 84	X 70	X 56	X 55
15	X 52	X 52	X 52	X 49	X 42	X 43	X 49												X 97	X 101	X 79	X 68	X 65	X 64
16	X 59	X 57	X 53	X 50	X 64	83	84	99											X 97	X 97	X 84	X 61	X 62	X 61
17	X 60	X 64	X 62	X 42	X 40	X 42	X 44												X 103	X 89	X 83	X 67	X 62	X 58
18	X 62	X 57	X 50	X 47	X 48	X 49	X 44												X 89	X 88	X 77	X 62	X 59	59
19	X 56	X 58	X 63	X 53	X 52	X 49	X 58												X 86	X 81	X 72	X 67	X 59	X 54
20	X 52	X 51	X 52	X 48	X 43	X 46	X 50												X 81	X 80	X 71	X 57	X 51	X 52
21	X 42	X 44	X 42	X 34	X 39	X 45	X 37												X 100	X 84	X 69	X 60	X 49	X 51
22	X 51	X 49	X 47	X 43	X 40	X 43	X 44												X 91	X 81	X 65	X 60	X 60	X 62
23	X 53	X 54	X 56	X 53	X 44	X 46	X 50												X 90	X 83	X 68	X 64	X 51	X 50
24	X 47	X 48	X 51	X 52	X 49	X 50	X 52												X 73	X 71	X 71	X 62	X 57	X 52
25	X 50	X 49	X 49	X 46	X 40	X 44	X 49												X 120	X 139	X 127	X 101	X 81	X 69
26	X 63	X 56	X 47	X 43	X 35	X 34	X 37												X 80	X 70	X 68	X 64	X 53	X 51
27	X 51	X 51	X 51	X 49	X 46	X 49	X 52												X 102	X 105	X 77	X 62	X 58	X 55
28	X 53	X 48	X 49	X 50	X 38	X 38	X 40												X 91	X 85	X 71	X 63	X 57	X 54
29	X 48	X 43	S	X 46	X 46	X 42	X 43												X 85	X 99	X 80	X 60	X 50	X 50
30	X 48	X 48	X 46	X 47	X 51	X 56	X 44												X 89	X 77	C	X 66	X 58	X 54
31	X 52	X 53	X 47	X 41	X 38	X 42	X 44												X 78	X 81	X 81	X 67	X 54	X 51
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	31	29	31	31	31	31	1										6	31	31	30	31	31	31
MED	X 51	X 49	X 49	X 45	X 41	X 43	X 44	99										X 90	X 89	X 81	X 71	X 62	X 57	X 53
UQ	X 53	X 54	X 51	X 49	X 46	X 46	X 49											X 95	X 96	X 86	X 77	X 65	X 60	X 56
LQ	X 44	X 44	X 45	X 42	X 38	X 39	X 40											X 89	X 80	X 77	X 65	X 58	X 50	X 50

JAN. 1989 | FXI (0.1 MHZ)

IONOSPHERIC DATA

JAN. 1989 | FOF2 (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	32	32	33	34	29	29	31	64	102	89	107	123	118	115	119	106	93	89	61	57	45	36	32	34
2	37	38	39	31	30	31	33	62	81	106	132	116	107	125	115	113	110	84	61	64	63	48	36	39
3	37	41	F 42	39	26	28	31	63	90	95	123	108	117	122	109	117	96	83	65	63	55	39	38	36
4	37	36	36	37	31	31	32	62	81	87	98	119	102	101	101	105	94	70	73	71	41	38	35	36
5	36	F 36	38	36	36	38	39	68	88	100	117	121	106	109	112	106	106	99	83	77	H 58	47	40	44
6	47	41	39	36	36	37	48	92	93	121	R 101	140	127	112	H 100	114	96	84	69	69	59	40	39	39
7	38	43	43	37	31	31	35	67	103	96	108	117	119	108	110	95	84	97	87	74	61	56	48	47
8	45	R 46	45	41	37	38	40	71	101	106	112	122	111	103	103	107	100	85	93	75	58	53	54	49
9	39	39	I S 37	36	35	33	33	70	113	129	131	129	120	112	106	106	103	99	82	70	58	51	51	51
10	47	46	44	48	44	40	40	83	115	118	130	122	120	115	113	107	99	97	95	89	71	57	55	43
11	A 48	41	32	31	33	36	70	110	125	127	122	110	108	105	105	95	90	80	72	71	54	54	48
12	F 32	S 35	F 32	F 32	32	37	31	56	99	143	127	122	115	113	116	117	119	109	90	74	67	66	S 59	58
13	57	49	51	45	43	45	42	73	98	110	116	119	110	108	119	116	104	93	87	71	62	55	49	41
14	40	32	35	33	35	37	41	70	95	118	131	126	113	107	106	103	94	92	78	76	78	64	50	49
15	46	46	46	43	R 36	37	43	73	103	114	128	135	118	110	107	103	104	101	91	95	73	62	59	58
16	53	51	47	44	58	F 65	F 70	F 86	V 112	134	133	127	120	116	107	100	104	104	91	91	78	55	56	55
17	54	58	56	36	34	36	38	76	105	119	136	139	123	119	123	121	112	112	97	83	77	61	56	52
18	56	51	44	41	42	43	38	77	112	141	129	116	116	119	116	118	111	102	83	82	71	56	53	F 50
19	50	R 52	57	47	46	43	52	94	102	118	128	127	H 127	R 115	114	109	113	90	80	75	66	61	53	48
20	46	45	46	42	37	40	44	75	S 99	115	114	124	126	114	111	116	107	91	75	74	65	51	45	46
21	36	38	36	28	33	39	31	75	129	139	R 162	149	137	134	135	139	131	116	94	S 78	63	54	43	45
22	45	43	41	37	S	37	38	67	111	141	152	139	136	139	134	129	121	112	85	75	59	54	54	56
23	R 47	48	50	47	38	40	44	82	108	129	130	137	R 149	123	142	H 124	122	104	84	77	62	58	45	44
24	41	R 42	45	46	43	44	46	70	105	117	126	133	125	118	112	110	112	89	67	65	65	56	51	46
25	44	43	43	40	34	38	43	71	106	118	119	128	147	128	129	133	124	107	114	133	121	H 95	75	63
26	57	50	41	37	29	28	31	77	96	115	117	134	130	123	123	115	94	89	74	64	62	58	47	45
27	45	45	45	43	40	43	46	76	96	97	133	130	140	128	119	135	130	117	96	99	71	56	52	49
28	47	42	43	44	32	32	34	70	97	101	120	113	121	V 117	125	118	127	108	85	79	65	57	51	48
29	42	U S 37	I S 39	40	40	36	37	76	100	115	128	117	113	111	105	102	102	87	79	93	S 74	54	44	44
30	42	42	40	41	45	50	38	71	102	101	108	113	123	122	128	125	109	101	83	71	I C 62	60	52	48
31	46	47	41	35	32	36	38	79	105	135	135	118	112	101	95	97	91	92	72	75	U S 75	61	48	45
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	31	31	31	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	45	43	42	39	36	37	38	71	102	117	127	123	120	115	113	113	104	97	83	75	65	56	51	47
UQ	47	48	45	43	40	40	43	76	107	127	131	132	126	122	121	118	112	104	90	80	71	59	54	50
LQ	38	38	39	36	32	33	34	69	96	104	116	118	113	110	106	106	96	89	74	71	60	52	44	44

JAN. 1989 | FOF2 (0.1 MHZ)

IONOSPHERIC DATA

JAN. 1989 | FOF1 (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1											L	L	L											
2											L	L	L	L										
3											L	L	L	L										
4										L	L	L	L		L									
5										L				U L 680	U L 590									
6												L	L			A								
7												L	L											
8											L	L		U L 670	L	L								
9											L	L	L	L	L									
10											L		L	L		L								
11										L		L	L	480	L									
12									L	L		L	L	U L 610	L									
13												L	L	L	L									
14											L		L	L	L	L								
15											L		U L 710		L 650									
16											L		L	L	L	L								
17											L		L	L	L	L								
18													L	L	L									
19											L	L	L	U L 510	L									
20												L		L	L	L								
21										L			L	L	L	L								
22										L	L			L	L	L								
23													L	L	U L 540	L								
24											L	L	L	L	L	L								
25												L	L	L	L	L								
26										L	L	L	L	L	L									
27											L	L	L		L	L								
28											L	L	L	L	L									
29											L	L	L		L									
30											L	L	L	L	L									
31											L	L	L	L	L									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT														1	5	3								
MED													U L 710	U L 610	U L 590									
UQ														U L 670	L 620									
LQ														U L 510	U L 565									

JAN. 1989 | FOF1 (0.01 MHZ)

IONOSPHERIC DATA

JAN. 1989 | FOE (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								B 255	A		330	350	355	R 345	330	285	230							
2								B 255	A	A	A		365	350	330	285	B							
3								B 275	A		350	365	B	360	340	290	245							
4								165	265	310	340	355	365	360	330	295	A							
5								B	260	300	340	360	360	360	330	300	220							
6								B 260	315	U A 340	370		370	365	340	290	A							
7								B 255	310	335		A	370	370	A	305	230	B						
8								B 305	335	360	370		380	375	A	A	240	B						
9								B 280	330	A	B		385	370	355	305	240	170						
10								175	275	325	370	375	375	A	A	A	A	B						
11								B 280	330	360	370		380	365	S	315	A	B						
12								H 185	270	A	350	A	A	A	A	A	A	B						
13								165	275	325	350	A	380	330	A	A	240	B						
14								B 280	340	350		A	A	390	375	330	A	B						
15								170	285	335	A	A	380	375	370	330	265	B						
16								170	270	305	355	355	A	A	B	320	S	B						
17								A 285	330	A	A		A	A	A	A	255	B						
18								B 270	320	360	375		370	360	350	A	285	B						
19								B	R S	R	350	A	385	370	355	320	245	B						
20								175		320	350	355	370	370	350	320	265	B						
21								165	280	325	360	360	370	365	350	320	255	B						
22								B 270	H 315	350		A	A	A	350	315	265	B						
23								B 270	H 330	H	A	375	A	345	A	305	260	B						
24								185	270	320	345	360	365	360	A	310	265	A						
25								B	R	310	350	365	370	A	355	A	A	A						
26								B 270	H 315	340		A	A	A	A	A	A	B						
27								B 265	320	350	360		355	A	A	A	245	B						
28								B 260	305	340	350		355	A	A	A	A	B						
29								170	260	310	340	355	355	350	325	300	265	B						
30								B 270	310	355	370		A	A	A	U A 320	260	B						
31								160	280	325	350	370	365	A	A	310	255	A						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								11	28	26	26	20	22	20	16	21	20	1						
MED								170	270	320	350	362	370	365	350	310	255	170						
UQ								175	280	330	355	370	380	370	355	320	265							
LQ								165	262	310	340	355	365	360	330	300	240							

JAN. 1989 | FOE (0.01 MHZ)

IONOSPHERIC DATA

JAN. 1989 | FOES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E B 16	E B 13	E B 15	E B 15	E B 13	E B 14	E B 13	E B 16	G	30	J A 49	J A 47	G	G 28	34	31	31	J A 19	22	E B 14	E B 15	E B 15	E B 15	E B 14
2	E B 13	J A 19	E B 14	E B 15	E B 15	J A 20	E B 14	E B 15	G	J A 41	J A 38	J A 83	G 35	G	G 23	G	E B 34	J A 30	21	E B 14	E B 13	E B 14	E B 16	E B 13
3	E B 15	E B 15	J A 24	E B 15	E B 15	E B 14	20	E B 15	G	J A 45	G	G	E B 37	G	G	G	G	E B 16	E B 16	J A 21	E B 15	E B 15	E B 16	E B 15
4	E B 14	E B 14	E S 17	E B 14	E B 14	J A 22	E B 16	J A 33	G	G	36	G	G	G	34	34	30	E B 28	22	21	22	22	J A 18	E B 15
5	E B 15	E B 14	22	J A 20	E B 14	J A 20	J A 25	E B 15	G	G	37	38	38	38	G 28	G	G	J A 26	J A 21	J A 18	E B 15	E B 14	E B 16	E B 13
6	E B 15	E B 15	E B 14	E B 15	E B 14	E B 15	E B 13	J A 40	G	34	J A 48	G 33	G 35	39	49	J A 56	30	J A 28	J A 25	J A 38	E B 14	E B 15	E B 16	E B 15
7	E B 14	23	J A 22	J A 25	J A 23	22	E B 14	E B 15	G	G	G	J A 40	G	G	38	G	G	J A 24	J A 21	J A 22	19	E B 15	E B 15	E B 15
8	J A 49	J A 24	J A 22	J A 19	E B 15	E B 16	E B 15	E B 16	G	J A 41	J A 46	41	J A 47	39	37	33	G 21	E B 15	E B 15	E B 15	E B 14	E B 16	E B 14	E B 14
9	22	E B 15	E S 21	E B 13	J A 19	E B 15	E B 15	22	31	35	41	E B 40	G	G	G	G	G	G	E B 14	E B 15	E B 15	E B 14	J A 24	J A 29
10	J A 22	J A 19	21	E B 15	E B 15	E B 17	E B 14	J A 19	G	J A 44	G	G	G	40	J A 40	36	27	J A 24	J A 30	J A 19	21	E B 16	J A 28	47
11	J A 53	J A 24	J A 19	J A 23	J A 23	J A 26	21	22	G	G 23	G	G 25	G 32	G 33	E S 40	G 31	J A 41	J A 18	E B 14	E B 13	E B 13	E B 15	E B 15	E B 15
12	E B 13	E B 17	J A 27	24	E B 15	E B 16	J A 21	G	G	35	35	39	46	43	J A 52	J A 47	26	J A 32	J A 22	J A 21	20	E B 13	E S 18	E B 14
13	E B 14	E S 16	E B 14	E B 14	E B 13	E B 13	E B 13	J A 22	G	G	41	J A 42	G	G	J A 51	31	G	E B 16	E B 13	J A 16	E B 15	J A 18	J A 21	J A 17
14	E B 15	E B 16	E B 13	E B 15	E B 15	E B 13	E B 14	25	G	40	40	39	43	G	G	G 32	33	19	J A 20	J A 21	J A 25	J A 32	J A 28	J A 22
15	J A 19	E B 14	E B 14	E B 16	E B 16	E B 15	E B 14	G	G	G	38	J A 54	G 32	G 32	J A 41	36	G	J A 28	J A 22	E B 15	E B 15	18	E B 19	E B 16
16	E B 15	J A 26	J A 25	J A 29	J A 18	24	J A 21	J A 24	G	G	40	42	43	42	E B 35	G 28	E S 30	J A 42	J A 53	J A 29	J A 26	J A 21	J A 29	J A 20
17	E B 14	E B 15	E B 15	E B 14	E B 15	E B 15	J A 32	J A 26	31	G	J A 67	J A 44	39	40	39	32	G 21	J A 35	J A 49	J A 37	J A 33	J A 31	J A 27	J A 23
18	19	E B 15	E B 13	E B 17	E B 14	E B 13	E B 16	J A 22	G	G	G	G	42	G	G	J A 36	G	J A 26	J A 25	E S 17	E B 14	E B 14	E B 16	E B 15
19	E B 14	E B 16	E B 15	E B 13	E B 13	E B 14	E B 16	E B 15	G	G	40	J A 53	G	G 36	G 29	33	G	J A 33	E B 15	J A 22	E B 14	E B 15	E B 15	E B 16
20	E B 15	21	J A 27	J A 54	J A 25	J A 25	E B 13	J A 26	E S 29	37	J A 43	39	38	45	41	G 30	G	E B 15	22	E B 17	E B 15	20	20	22
21	E B 13	E B 15	E B 15	E B 13	E B 15	E B 13	E B 16	G	30	J A 40	G	39	43	41	G	G	G	E B 15	E B 15	E B 15	E B 15	E B 16	E B 15	E B 16
22	J A 21	J A 30	31	23	J A 24	E B 15	E B 13	E B 16	G	G	39	J A 40	40	J A 41	G	G	G	E B 15	24	E B 15	E B 14	E B 15	E B 15	E B 15
23	E B 15	E B 15	J A 21	E B 14	J A 17	21	J A 24	J A 19	G	G	J A 42	44	40	38	39	33	G 24	E B 16	22	23	22	23	18	E B 15
24	E B 16	E B 15	E B 14	E B 14	18	J A 23	E B 15	G	G 21	G	38	43	40	41	37	G 28	G	J A 20	21	J A 25	J A 21	J A 27	E B 13	E B 14
25	J A 23	J A 22	J A 26	J A 26	J A 23	J A 21	22	J A 24	G	G	38	39	G	J A 50	G J A 31	J A 63	J A 43	J A 39	J A 35	J A 33	J A 30	J A 22	31	J A 24
26	19	J A 17	E B 14	E B 16	E B 14	E B 15	20	J A 22	G 22	36	38	J A 39	41	37	36	J A 37	30	E B 17	J A 29	E B 15	E B 15	E B 16	E B 14	E B 14
27	E B 15	E B 15	J A 18	J A 27	E B 17	24	J A 17	E B 15	G	G	G	43	J A 70	43	J A 40	J A 41	G 22	24	J A 24	J A 17	E B 15	E B 14	E B 16	E B 14
28	E B 15	E B 14	19	J A 21	J A 21	18	E B 15	E B 15	G	G	G	41	J A 39	J A 39	60	J A 44	J A 40	E B 16	J A 29	J A 20	E B 16	27	17	17
29	E B 15	E B 15	E S 18	J A 19	J A 22	E B 14	E B 15	G	G	33	36	42	42	41	38	G 29	G 21	J A 26	J A 21	E B 14	E B 14	E B 16	E B 15	E B 15
30	E B 16	J A 18	J A 20	22	20	18	E B 14	E B 16	G	J A 32	G	G	J A 47	J A 49	J A 38	J A 40	G 24	18	J A 24	J A 33	J A 21	23	16	J A 23
31	J A 31	J A 23	J A 21	20	18	20	22	G	30	35	40	42	42	J A 41	37	G	G	J A 28	J A 22	J A 23	E S 17	E B 15	E B 15	E B 14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	E B 15	E B 16	18	E B 16	E B 15	E B 16	E B 15	16	G	G 23	38	40	39	39	37	32	G 21	J A 22	J A 22	J A 19	E B 15	E B 16	E B 16	E B 15
UQ	19	J A 20	J A 22	J A 22	J A 20	J A 21	20	J A 22	G	36	40	42	42	41	40	36	29	J A 28	J A 24	J A 22	21	22	20	18
LQ	E B 14	E B 15	E B 14	E B 14	E B 14	E B 14	E B 14	E B 15	G	G	G	37	E G 32	E G 28	G 27	E G 28	G	E B 16	20	E B 15	E B 14	E B 15	E B 15	E B 14

JAN. 1989 | FOES (0.1 MHZ)

IONOSPHERIC DATA

JAN. 1989 | FBES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E B 16	E B 13	E B 15	E B 15	E B 13	E B 14	E B 13	E B 16	G	30	G 26	G 33	G	G 28	G	31	28	17	E B 14	E B 14	E B 15	E B 15	E B 15	E B 14
2	E B 13	16	E B 14	E B 15	E B 15	E B 14	E B 14	E B 15	G	33	35	38	G 32	G	G 21	G	E B 34	15	E B 15	E B 14	E B 13	E B 14	E B 16	E B 13
3	E B 15	E B 15	E B 14	E B 15	E B 15	E B 14	E B 13	E B 15	G	32	G	G	E B 37	G	G	G	G	E B 16	E B 16	E B 14	E B 15	E B 15	E B 16	E B 15
4	E B 14	E B 14	E S 17	E B 14	E B 14	16	E B 16	E B 14	G	G	35	G	G	G	34	32	26	E B 28	E B 16	E B 16	E B 15	E B 15	E B 15	E B 15
5	E B 15	E B 14	E B 15	E B 13	E B 14	E B 15	E B 15	E B 15	G	G	36	38	37	38	G 27	G	G	20	19	E B 15	E B 15	E B 14	E B 16	E B 13
6	E B 15	E B 15	E B 14	E B 15	E B 14	E B 15	E B 13	E B 15	G	34	G 34	G 32	G 34	38	43	54	29	21	19	26	E B 14	E B 15	E B 16	E B 15
7	E B 14	15	16	19	17	E B 15	E B 14	E B 15	G	G	G	36	G	G	37	G	G	E B 16	16	20	E B 16	E B 15	E B 15	E B 15
8	26	19	E B 15	E B 14	E B 15	E B 16	E B 15	E B 16	G	36	40	39	41	39	35	32	G 20	E B 15	E B 15	E B 15	E B 14	E B 16	E B 14	E B 14
9	18	E B 15	E S 21	E B 13	E B 13	F B 15	E B 15	22	30	35	37	E B 40	G	G	G	G	G	G	E B 14	E B 15	E B 15	E B 14	21	24
10	16	17	E B 16	E B 15	E B 15	E B 17	E B 14	G 15	G	G	G	G	G	37	39	32	26	20	23	17	E B 15	E B 16	E B 15	33
11	A A 53	17	17	18	20	20	E B 15	E B 15	G	G 22	G	G 23	G 27	G 31	E S 40	G 30	27	18	E B 14	E B 13	E B 13	E B 15	E B 15	E B 15
12	E B 13	E B 17	17	E B 14	E B 15	E B 16	E B 15	G	G	34	G 32	38	44	42	45	37	26	25	17	E B 13	E B 13	E B 13	E S 18	E B 14
13	E B 14	E S 16	E B 14	E B 14	E B 13	E B 13	E B 13	G	G	G	38	39	G	G	37	31	G	E B 16	E B 13	E B 15	E B 15	16	E B 16	E B 15
14	E B 15	E B 16	E B 13	E B 15	E B 15	E B 13	E B 14	24	G	36	39	38	43	G	G	G 31	31	18	E B 13	E B 14	16	18	20	E B 14
15	E B 14	E B 14	E B 14	E B 16	E B 16	E B 15	E B 14	G	G	G	38	40	G 31	G 31	G 32	35	G	21	17	E B 15	E B 15	E B 14	E B 19	E B 16
16	E B 15	17	E B 13	E B 14	16	17	15	G 15	G	G	39	41	41	39	E B 35	G 27	E S 30	19	39	19	20	17	16	17
17	E B 14	E B 15	E B 15	E B 14	E B 15	E B 15	27	21	31	G	42	39	39	40	39	32	G 21	27	23	24	26	28	24	19
18	17	E B 15	E B 13	E B 17	E B 14	E B 13	E B 16	E B 16	G	G	G	G	40	G	G	32	G	16	17	E S 17	E B 14	E B 14	E B 16	E B 15
19	E B 14	E B 16	E B 15	E B 13	E B 13	E B 14	E B 16	E B 15	G	G	38	42	G	G 32	G 28	G	G	16	E B 15	E B 15	E B 14	E B 15	E B 15	E B 16
20	E B 15	E B 14	17	22	16	18	E B 13	G 15	E S 29	G	G	39	G 29	41	38	G 28	G	E B 15	E B 14	E B 17	E B 15	E B 14	E B 16	E B 13
21	E B 13	E B 15	E B 15	E B 13	E B 15	E B 13	E B 16	G	G	G 20	G	38	41	40	G	G	G	E B 15	E B 15	E B 15	E B 15	E B 15	E B 16	E B 15	E B 16
22	16	18	18	16	16	E B 15	E B 13	E B 16	G	G	37	38	39	38	G	G	G	E B 15	E B 15	E B 15	E B 14	E B 15	E B 15	E B 15
23	E B 15	E B 15	16	E B 14	E B 13	E B 14	17	E B 15	G	G	37	39	39	37	39	33	G 22	E B 16	E B 15	E B 15	E B 16	E B 15	E B 16	E B 15
24	E B 16	E B 15	E B 14	E B 14	E B 13	E B 16	E B 15	G	G 20	G	37	40	39	39	36	G 26	G	16	E B 14	E B 14	E B 15	E B 14	E B 13	E B 14
25	E B 15	18	17	16	E B 15	E B 14	16	E B 16	G	G	38	39	G	39	G 30	32	27	22	23	19	19	18	23	E B 16
26	E B 15	E B 14	E B 14	E B 16	E B 14	E B 15	E B 15	20	G 21	34	36	37	37	36	35	33	27	E B 17	27	E B 15	E B 15	E B 16	E B 14	E B 14
27	E B 15	E B 15	E B 16	E B 15	E B 17	E B 17	E B 14	E B 15	G	G	G	40	42	40	37	35	G 21	23	17	E B 15	E B 15	E B 14	E B 16	E B 14
28	E B 15	E B 14	E B 14	E B 14	E B 14	E B 15	E B 15	E B 15	G	G	G	39	38	38	45	39	39	E B 16	20	18	E B 16	E B 15	E B 15	E B 13
29	E B 15	E B 15	E S 18	E B 15	E B 15	E B 14	E B 15	G	G	33	36	40	40	38	35	G 24	G 18	20	17	E B 14	E B 14	E B 16	E B 15	E B 15
30	E B 16	E B 15	E B 13	16	E B 13	E B 15	E B 14	E B 16	G	G 21	G	G	40	38	35	G 32	G 21	18	20	U C 27	U C 21	20	E B 16	E B 14
31	E B 15	16	17	E B 13	E B 15	E B 15	E B 15	G	G 28	34	G	41	41	38	36	G	G	17	18	E B 14	E S 17	E B 15	E B 15	E B 14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	E B 15	E B 15	E B 15	E B 15	E B 15	E B 15	E B 15	E B 15	G	G	35	38	37	38	35	G 31	G 20	16	16	E B 15	E B 15	E B 15	E B 16	E B 15
UQ	E B 16	16	16	E B 16	E B 15	E B 16	E B 15	E B 16	G	33	38	40	40	39	38	32	26	20	19	17	E B 16	E B 16	E B 16	E B 16
LQ	E B 14	E B 15	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14	G	G	G	34	E G 27	E G 28	G 22	G	G	E B 16	E B 15	E B 14	E B 14	E B 14	E B 15	E B 14

JAN. 1989 | FBES (0.1 MHZ)

IONOSPHERIC DATA

JAN. 1989 | FMIN (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	16	13	15	15	13	14	13	16	18	18	21	22	23	21	19	18	17	14	14	14	15	15	15	14
2	13	14	14	15	15	14	14	15	15	17	17	18	20	19	18	18	34	13	15	14	13	14	16	13
3	15	15	14	15	15	14	13	15	17	22	24	26	37	26	21	22	17	16	16	14	15	15	16	15
4	14	14	E S 17	14	14	13	16	14	18	22	27	28	28	27	27	25	18	28	16	16	15	15	15	15
5	15	14	15	13	14	15	15	15	19	24	24	24	25	22	21	21	18	13	13	15	15	14	16	13
6	15	15	14	15	14	15	13	15	17	20	22	25	30	25	21	21	16	16	15	14	14	15	16	15
7	14	13	13	13	13	15	14	15	16	20	20	18	24	24	21	16	19	16	14	14	16	15	15	15
8	15	16	15	14	15	16	15	16	16	18	20	21	27	20	21	18	16	15	15	15	14	16	14	14
9	15	15	E S 21	13	13	15	15	16	16	24	23	40	24	22	25	18	16	14	14	15	15	14	13	13
10	14	13	16	15	15	17	14	14	16	17	24	24	24	24	22	20	17	13	15	14	15	16	15	15
11	13	12	12	13	13	13	15	15	15	17	30	19	18	18	E S 40	19	18	14	14	13	13	15	15	15
12	13	E S 17	13	13	15	16	15	15	18	23	29	28	32	33	30	24	16	14	14	13	13	13	E S 18	14
13	14	E S 16	14	14	13	13	13	13	19	19	24	27	28	34	25	17	15	16	13	15	15	13	16	15
14	15	16	13	15	15	13	14	16	17	18	20	21	30	30	33	20	21	15	13	14	13	13	17	14
15	14	14	14	16	16	15	14	15	21	24	28	24	23	26	27	21	21	13	13	15	15	14	19	16
16	15	13	13	14	13	13	13	13	18	21	23	25	26	29	35	23	E S 30	14	15	13	15	15	14	14
17	14	15	15	14	15	15	16	15	19	19	20	31	29	27	19	20	17	16	14	15	14	14	14	14
18	15	15	13	17	14	13	16	16	17	20	20	23	22	24	20	19	22	14	13	E S 17	14	14	16	15
19	14	16	15	13	13	14	16	15	19	22	22	29	28	25	24	21	18	14	15	15	14	15	15	16
20	15	14	14	13	13	15	13	13	E S 29	18	19	22	24	22	22	20	19	15	14	17	15	14	16	13
21	13	15	15	13	15	13	16	13	15	16	17	19	23	26	19	20	18	15	15	15	15	16	15	16
22	13	13	13	13	13	15	13	16	16	17	20	19	24	17	18	17	15	15	15	15	14	15	15	15
23	15	15	13	14	13	14	13	15	16	16	23	25	23	23	19	18	17	16	15	15	16	15	16	15
24	16	15	14	14	13	16	15	15	16	17	20	27	25	26	24	19	17	14	14	14	15	14	13	14
25	15	15	13	13	15	14	14	16	21	22	22	21	21	21	22	20	18	14	14	14	14	14	15	16
26	15	14	14	16	14	15	15	16	15	17	19	22	22	22	28	19	16	17	14	15	15	16	14	14
27	15	15	16	15	17	17	14	15	14	25	18	17	19	22	20	16	15	15	14	15	15	14	16	14
28	15	14	14	14	14	15	15	15	15	18	17	17	20	22	17	16	16	16	15	15	16	15	15	13
29	15	15	E S 18	15	15	14	15	14	13	14	14	18	17	17	15	16	14	15	14	14	14	16	15	15
30	16	15	13	13	13	15	14	16	16	16	18	23	23	22	17	18	15	14	14	E C 19	15	17	16	14
31	15	13	13	13	15	15	15	14	15	15	16	16	17	18	17	16	15	14	14	14	E S 17	15	15	14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	15	14	14	14	14	15	14	15	16	18	20	23	24	23	21	19	17	15	14	14	15	15	15	14
UQ	15	15	14	15	15	15	15	16	18	22	24	26	28	26	24	20	18	16	15	15	15	15	16	15
LQ	14	14	13	13	13	14	14	14	16	17	19	19	22	22	19	18	16	14	14	14	14	14	15	14

JAN. 1989 | FMIN (0.1 MHZ)

IONOSPHERIC DATA

JAN. 1989 | M(3000)F2 (0.01) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	285	265	300	335	320	280	305	315	320	330	305	305	300	300	290	300	305	320	330	310	305	300	280	285
2	275	280	295	305	315	290	310	320	325	310	300	300	305	290	305	300	315	325	325	305	330	335	300	280
3	285	285	F 305	330	345	295	320	330	330	330	315	305	295	305	300	300	325	320	315	315	330	325	295	285
4	290	285	300	315	360	300	310	340	335	315	320	295	315	290	295	300	310	325	300	330	350	335	295	295
5	290	F 285	300	315	315	285	320	325	330	315	305	310	300	275	285	285	295	300	295	300	H 325	315	265	275
6	290	300	275	260	260	260	280	325	305	305	R 320	290	300	295	H 325	295	320	305	300	320	320	310	285	280
7	265	290	310	340	325	280	305	325	320	330	315	305	295	305	305	305	320	315	315	325	325	315	295	285
8	290	R 295	315	320	285	275	310	330	325	325	310	300	310	290	295	300	310	320	310	330	330	305	295	300
9	270	265	I S 280	300	305	290	300	320	325	295	300	290	285	285	280	285	280	285	315	310	320	270	265	285
10	285	270	275	290	285	285	285	315	315	290	290	285	275	270	285	290	290	285	300	305	330	310	315	285
11	A	305	335	270	270	300	305	320	320	305	290	285	280	290	285	285	310	295	310	300	310	305	310	320
12	F 250	S 270	F 255	F 260	265	265	340	305	275	295	285	275	270	260	265	270	280	285	295	300	300	290	S 305	290
13	305	310	310	325	325	295	320	330	320	315	290	290	270	265	270	280	290	300	295	310	300	310	290	295
14	290	285	265	250	255	260	310	315	315	295	285	285	285	285	260	265	295	290	300	300	305	315	290	290
15	290	290	300	320	R 320	270	320	325	310	300	285	285	265	275	260	280	275	285	280	295	300	280	275	275
16	265	280	255	240	240	F 275	F 300	F 305	V 295	290	270	280	270	270	270	265	300	290	285	295	305	310	270	280
17	280	300	315	X 42	260	260	285	325	305	305	285	285	280	270	270	270	285	290	285	315	310	315	285	295
18	295	320	290	265	265	285	340	310	320	305	305	320	285	295	270	285	290	295	285	300	310	315	295	F 285
19	285	R 290	310	320	310	310	300	320	325	310	295	285	H 305	R 315	275	290	300	295	295	320	320	310	300	300
20	315	295	305	320	325	270	315	335	S 335	305	310	285	285	295	275	275	300	305	315	300	315	315	285	290
21	270	230	250	380	250	315	250	275	285	280	R 285	285	275	270	270	275	290	290	315	S 305	305	315	295	280
22	280	285	265	300	S	260	270	290	315	290	300	285	285	285	285	280	295	300	300	315	315	300	295	295
23	R 290	290	305	325	280	275	295	330	325	315	305	290	R 295	275	285	H 305	295	315	300	320	330	325	305	295
24	305	R 280	300	295	320	295	295	320	315	315	315	295	305	300	300	295	310	315	320	305	310	325	315	300
25	290	285	290	300	320	280	310	325	325	315	320	290	300	310	285	290	300	300	295	305	315	H 320	285	290
26	295	315	320	335	305	270	300	335	335	305	310	300	310	285	300	310	315	315	320	320	315	325	315	290
27	280	285	300	300	285	285	325	330	335	320	305	320	285	300	275	300	300	310	315	320	325	305	290	290
28	290	285	295	335	355	310	310	330	325	320	320	305	290	V 280	295	295	290	305	305	310	335	315	310	315
29	290	U S 285	S	305	320	290	290	330	335	315	315	320	295	290	300	305	305	320	310	310	S 350	320	320	295
30	290	285	280	270	300	325	330	325	325	320	315	315	305	285	300	310	315	315	325	315	C	295	300	290
31	290	315	320	325	290	280	295	330	335	315	330	305	300	315	285	305	315	320	295	315	U S 315	335	305	305
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	31	30	31	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	31	31	31
MED	290	285	300	305	305	285	305	325	325	310	305	290	295	290	285	290	300	305	300	310	315	315	295	290
UQ	290	295	310	325	320	295	318	330	328	315	315	305	300	298	293	300	310	315	315	315	330	320	305	295
LQ	280	282	280	280	270	272	295	318	315	302	290	285	282	275	272	280	290	292	295	302	310	305	285	285

JAN. 1989 | M(3000)F2 (0.01)

IONOSPHERIC DATA

JAN. 1989 | M(3000)F1 (0.01) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1											L	L	L											
2											L	L	L	L										
3											L	L	L	L										
4										L	L	L	L		L									
5										L				U L 365	U L 360									
6												L	L			A								
7												L	L											
8											L	L		U L 370	L	L								
9											L	L	L	L	L									
10											L		L	L		L								
11										L		L	L		L									
12									L	L		L	L	390 U L 370	L									
13												L	L	L	L									
14											L		L	L	L	L								
15											L		U L 360		L 375									
16											L		L	L	L	L								
17											L		L	L	L	L								
18													L	L	L									
19											L	L	L	U L 375	L									
20												L		L	L	L								
21										L			L	L	L	L								
22										L	L			L	L	L								
23													L	L	U L 385	L								
24											L	L	L	L	L	L								
25												L	L	L	L	L								
26										L	L	L	L	L	L									
27											L	L	L		L	L								
28											L	L	L	L	L									
29											L	L	L		L									
30											L	L	L	L	L									
31											L	L	L	L	L									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT													1	5	3									
MED													U L 360	U L 370	U L 375									
UQ														U L 375	L 380									
LQ														U L 370	L 368									

JAN. 1989 | M(3000)F1 (0.01)

IONOSPHERIC DATA

JAN. 1989 | H'F2 (KM) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1											255	255	260											
2											275	245	235	280										
3											255	260	290	255										
4										235	235	285	240		240									
5										240				325	305									
6												270	L 270			280								
7												265	L 295											
8											260	L 305		L 335	L 295	L 275								
9											L 270	250	L 300	L 275	L 295									
10											L 260		L 325	L 330		L 285								
11										245		L 285	L 330	280	L 295									
12									L 320	265		260	L 335	L 335	L 345									
13												L 285	L 340	L 370	L 330									
14											300		L 290	L 285	L 340	L								
15											305		355		385									
16											L 310		L	L 345	L 340	L 345								
17											275		L	L	325	L 310								
18													L 290	240	L 320									
19											265	L 285	260	275	L 315									
20												285		255	320	L 310								
21										280			L 290	L 330	L 320	300								
22										265	250			L 290	L 295	L 295								
23													260	L	310	H 235								
24											255	260	260	250	270	L 295								
25												275	285	245	L 305	275								
26										265	260	275	245	300	270									
27											260	235	L 270		L	275								
28											255	265	280	L 345	280									
29											250	240	L 275		240									
30											245	245	265	L 315	260									
31											230	265	L 275	235	L 325									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									1	7	20	21	25	22	24	12								
MED									L 320	265	260	265	L 280	288	L 303	L 290								
UQ										265	272	285	L 295	L 330	L 325	L 305								
LQ										242	252	255	260	255	288	275								

JAN. 1989 | H'F2 (KM)

IONOSPHERIC DATA

JAN. 1989 | H°F (KM) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	335	380	310	260	265	335	285	255	230	215	230	240	225	235	260	245	225	225	205	240	215	245	310	345
2	335	310	255	260	260	320	260	235	220	235	H 215	230	230	235	235	240	230	200	235	245	215	220	310	325
3	310	310	280	240	255	330	275	235	235	225	240	230	235	245	H 230	250	215	210	225	225	215	235	285	325
4	310	315	310	265	220	310	275	225	225	225	230	H 215	230	230	230	240	230	225	260	220	225	245	310	315
5	320	320	295	275	265	315	265	240	220	220	240	235	240	225	230	245	260	245	230	245	205	230	335	325
6	290	265	325	375	360	380	300	240	230	240	225	240	235	240	A 230	A	235	A 220	255	240	215	265	305	335
7	340	300	270	245	270	335	280	235	240	225	235	H 210	245	240	240	230	225	240	220	225	225	240	275	295
8	E A 340	310	270	260	305	335	275	235	235	230	230	230	240	230	240	250	235	H 215	255	220	230	280	300	280
9	380	395	380	260	280	345	315	260	245	250	240	240	230	H 235	240	255	255	245	230	245	230	295	A 345	A 315
10	305	335	330	235	285	315	310	255	235	225	235	240	230	235	240	240	250	245	245	235	210	245	255	A
11	A	275	235	E A 370	E A 385	A 330	275	250	235	230	235	225	230	215	S 245	245	245	255	225	225	240	235	260	240
12	430	370	E A 420	380	375	375	245	235	255	255	240	240	240	230	260	245	255	245	240	240	250	255	255	275
13	265	250	260	240	245	270	240	230	230	235	235	245	235	240	250	255	255	240	255	215	255	240	280	290
14	305	355	365	425	395	365	270	245	240	255	250	250	240	245	230	255	245	250	235	260	240	245	290	285
15	290	300	285	270	280	365	260	240	235	235	240	240	235	260	235	255	260	265	265	245	210	290	315	325
16	340	315	355	455	405	325	265	260	260	250	240	245	240	245	240	240	E S 265	260	E A 290	260	230	250	320	310
17	315	285	265	220	420	385	A	235	240	S 255	250	240	235	240	230	240	245	260	255	235	A 245	E A 265	A 320	300
18	275	250	310	365	360	315	235	260	235	245	235	235	240	235	235	255	260	235	225	260	245	245	275	310
19	285	290	265	250	265	260	275	255	220	235	235	240	230	230	230	240	250	230	255	225	225	245	270	280
20	270	285	285	A 290	260	350	260	235	220	240	230	240	240	235	225	245	245	235	235	260	230	230	295	295
21	380	460	405	205	405	270	455	290	250	260	245	235	240	240	245	245	230	235	225	225	250	255	280	315
22	325	310	A 365	285	330	370	340	280	235	240	235	230	235	235	220	230	240	225	215	240	235	280	285	285
23	310	290	265	250	310	335	300	245	225	240	235	230	230	H 230	220	235	235	220	210	220	230	225	270	295
24	280	315	280	290	265	275	295	250	235	230	230	245	240	235	220	225	240	225	215	240	250	230	245	275
25	305	320	305	290	275	320	275	240	235	230	230	230	240	240	230	245	235	225	245	235	215	225	A 275	280
26	280	245	255	250	300	385	315	235	220	235	225	230	230	215	240	235	220	230	A 245	235	245	240	245	300
27	325	315	285	290	320	325	245	235	225	225	235	230	240	240	235	A 255	240	225	215	220	215	240	285	290
28	300	315	300	245	225	285	280	230	H 225	230	235	225	230	230	E A 265	235	E A 255	220	220	250	225	250	265	260
29	310	340	330	285	255	315	310	240	230	240	240	225	220	220	225	240	H 240	225	235	255	205	240	240	290
30	315	315	330	350	280	250	255	245	220	H 220	225	235	245	240	230	240	225	225	215	250	I C 255	290	290	305
31	305	265	250	245	320	330	285	240	220	240	225	225	215	230	215	235	235	240	235	240	245	220	270	265
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	31	31	31	31	31	30	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	30
MED	310	310	290	262	280	330	275	240	235	235	235	235	235	235	232	242	240	230	235	240	230	245	285	295
UQ	330	320	329	290	335	348	300	252	235	240	240	240	240	240	240	250	250	245	248	245	245	254	308	315
LQ	290	288	268	248	265	315	260	235	225	228	230	230	230	230	230	240	232	225	222	225	215	235	270	280

JAN. 1989 | H°F (KM)

IONOSPHERIC DATA

JAN. 1989 | H'E (KM) | 135° E Mean Time (G.M.T. + 9 h)

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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								B 130		A	E A 130	E A 140	125	E A 135	120	125	130							
2								B 130	115		A	A	E A 130	120	E A 115	120	B							
3								B 135		A	130	125	B	125	120	120	140							
4								E A 150	130	130	130	125	125	125	E B 130	E B 140	A							
5								B 125	120	125	E A 130		E A 135	125	E A 125	125	130							
6								B 130	125		A	E A 135	E A 145	125	E A 125	125	A							
7								B 125	125	120	115		125	125	A	125	125	B						
8								B 125	125	115	120		130	120	A	A	E A 130	B						
9								B 125	130	125		B	125	125	125	125	125	E B 160						
10								E A 135	130	125	125	125	125	A	A	A	A	B						
11								B 125	E A 125	B 135	125		E A 125	E A 130	S	E A 125	A	B						
12								165	130	A	E A 145	A	A	A	A	A	A	B						
13								E B 160	125	125	125	A	130	E B 130	A	A	120	B						
14								B	120	120	125	120	A	135	E B 140	E A 150	A	B						
15								135	125	125	A	A	E A 130	E A 135	E A 135	A	135	B						
16								E A 155	125	120	125	120	A	130	B	E A 135	S	B						
17								A	130	120	115	A	125	125	A	A	E A 130	B						
18								B	130	125	115	125	120	125	120	A	130	B						
19								B	125	125	120	120	120	125	E A 130	E A 135	130	B						
20								E A 145	S	120	120	125	120	120	125	E A 135	130	B						
21								E B 155	E A 130	A 125	120	120	125	125	120	120	125	B						
22								B	120	115	120	A	120	A	120	120	120	B						
23								B	H 120	120	125	125	120	125	115	120	E A 140	B						
24								135	E A 130	120	120	E A 125	125	125	120	E A 130	125	A						
25								B	120	120	120	120	120	A	E A 130	A	A	A						
26								B	E A 125	120	120	120	120	120	A	A	A	B						
27								B	120	130	120	120	115	120	A	A	E A 130	B						
28								B	130	120	120	115	120	115	A	A	A	B						
29								E B 150	120	115	115	115	115	120	120	E A 135	A 125	B						
30								B	125	A 130	120	120	120	A	A	A	E A 125	B						
31								E B 150	A	A 125	A 125	A 125	A 120	115	115	120	125	A						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								11	29	28	28	24	27	26	19	19	20	1						
MED								E E 150	125	125	120	121	122	125	113	122	128	E B 160						
UQ								E B 155	130	125	125	125	125	125	E E 128	E A 135	130							
LQ								E E 140	125	120	120	120	120	120	120	120	125							

JAN. 1989 | H'E (KM)

IONOSPHERIC DATA

JAN. 1989 | H'ES (KM) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	B	B	B	B	B	B	B	B	G	120	125	110	G	115	E G 195	E G 165	125	120	120	B	B	B	B	B
2	B	105	B	B	B	110	B	B	G	120	120	110	110	G	105	G	B	105	100	B	B	B	B	B
3	B	B	110	B	B	B	110	B	G	120	G	G	B	G	G	G	G	B	B	105	B	B	B	B
4	B	B	S	B	B	120	B	110	G	G	120	G	G	G	E G 150	135	120	B	110	100	105	105	115	B
5	B	B	115	120	B	110	115	B	G	G	E G 175	E G 165	150	140	110	G	G	105	105	105	B	B	B	B
6	B	B	B	B	B	B	B	125	G	E G 160	115	115	120	E G 180	130	120	120	125	105	110	B	B	B	B
7	B	110	105	105	105	110	B	B	G	G	G	125	G	G	120	G	G	100	105	100	105	B	B	B
8	110	105	105	115	B	B	B	B	G	135	120	130	125	140	125	120	120	B	B	B	B	B	B	B
9	110	B	S	B	110	B	B	165	E G 160	135	120	B	G	G	G	G	G	G	B	B	B	B	105	105
10	105	110	105	B	B	B	B	115	G	130	G	G	G	120	120	115	120	110	110	110	110	B	130	105
11	105	110	110	105	110	110	110	110	G	110	G	110	110	105	S	110	105	120	B	B	B	B	B	B
12	B	B	110	110	B	B	120	G	G	125	130	120	115	115	110	110	110	105	105	105	110	B	S	B
13	B	S	B	B	B	B	B	110	G	G	125	115	G	G	110	115	G	B	B	115	B	105	110	105
14	B	B	B	B	B	B	B	155	G	140	130	115	110	G	G	120	115	120	130	110	110	100	105	110
15	105	B	B	B	B	B	B	G	G	G	125	115	115	115	110	E G 150	G	105	110	B	B	110	B	B
16	B	110	110	130	115	105	110	115	G	G	130	130	130	120	B	115	S	115	105	110	100	105	100	105
17	B	B	B	B	B	B	110	110	E G 180	G	115	120	125	120	115	125	115	110	110	105	110	105	105	105
18	105	B	B	B	B	B	B	110	G	G	G	G	125	G	G	115	G	110	105	S	B	B	B	B
19	B	B	B	B	B	B	B	B	G	G	120	115	G	125	115	145	G	115	B	105	B	B	B	B
20	B	110	110	110	110	110	B	115	S	125	125	135	120	115	135	110	G	B	105	B	B	120	115	115
21	B	B	B	B	B	B	B	G	135	115	G	145	125	130	G	G	G	B	B	B	B	B	B	B
22	115	110	110	110	105	B	B	B	G	G	140	115	125	115	G	G	G	B	110	B	B	B	B	B
23	B	B	120	B	115	115	105	115	G	G	125	120	125	120	115	E G 190	115	B	115	110	105	105	105	B
24	B	B	B	B	110	125	B	G	115	G	E G 175	140	135	125	125	115	G	115	110	130	110	110	B	B
25	110	105	110	115	110	110	105	115	G	G	E G 150	130	G	110	115	115	110	105	105	105	105	100	100	115
26	105	110	B	B	B	B	110	110	105	130	130	125	115	125	120	105	105	B	110	B	B	B	B	B
27	B	B	105	105	B	105	110	B	G	G	G	115	115	115	115	110	110	140	125	130	B	B	B	B
28	B	B	105	105	105	105	B	B	G	G	G	130	135	110	105	105	120	B	115	110	B	125	105	105
29	B	B	S	110	105	B	B	G	G	E G 195	E G 160	130	125	135	125	115	105	105	105	B	B	B	B	B
30	B	115	110	110	110	110	B	B	G	115	G	G	120	115	115	105	105	110	105	105	120	105	B	120
31	110	115	110	115	115	115	110	G	110	E G 160	135	130	120	125	115	G	G	105	105	105	S	B	B	B
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	10	12	16	14	13	14	11	14	6	16	22	25	22	23	23	23	16	20	24	19	11	12	11	10
MED	108	110	110	110	110	110	110	115	U 116	124	124	120	122	120	115	115	115	110	108	105	110	105	105	105
UQ	110	110	110	115	110	115	110	115	E G 160	134	132	130	125	125	122	120	120	118	110	110	110	110	112	115
LQ	105	108	105	105	105	110	110	110	110	120	120	115	115	115	112	110	108	105	105	105	105	105	105	105

JAN. 1989 | H'ES (KM)

IONOSPHERIC DATA

JAN. 1989 | TYPES OF ES | 135° E Mean Time (G.M.T. + 9 h)

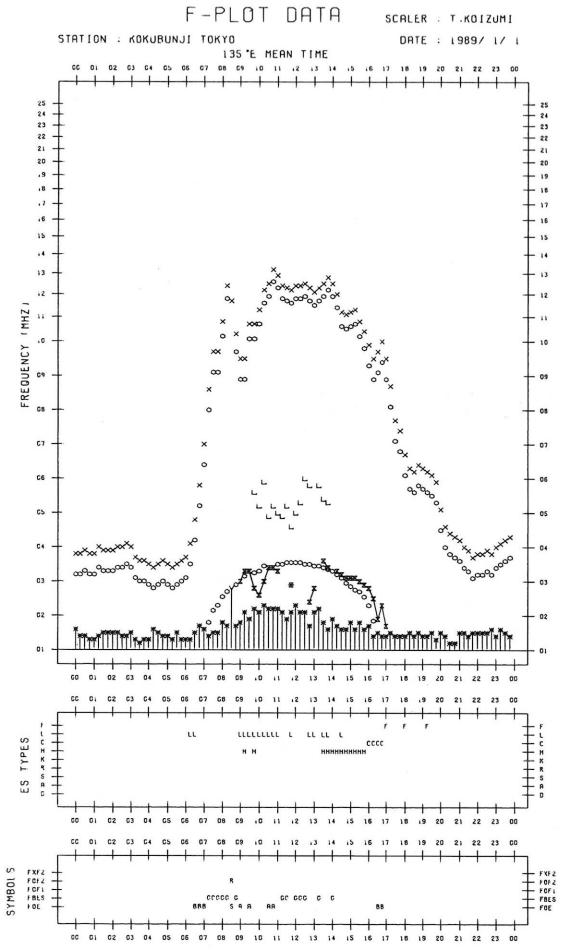
Station KOKUBUNJI TOKYO Lat. 35° 42' 4 N, Long. 139° 29' 3 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

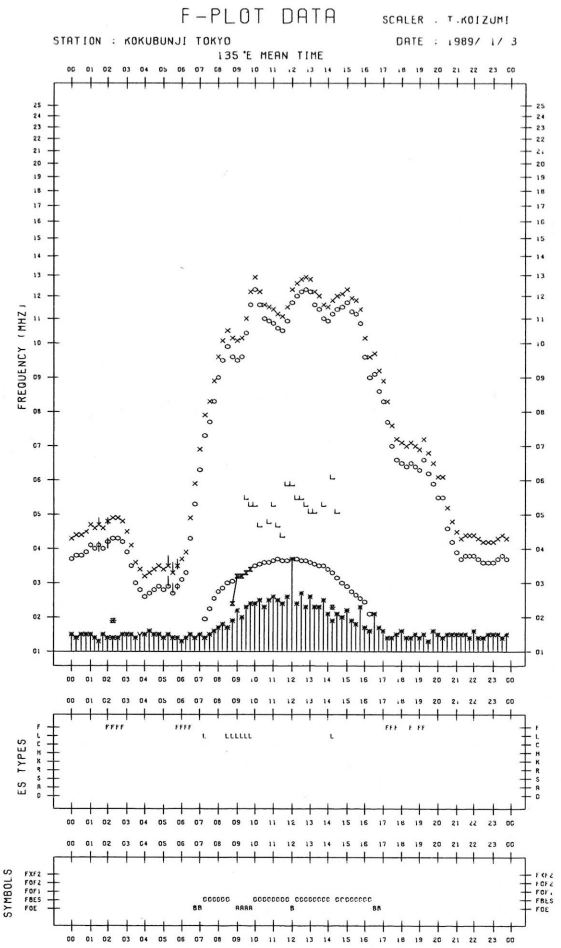
Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1										L 1	L 1	L 2		L 1	H 1	H 1	C 2	F 1	F 1					
2		F 1				F 2				C 2	L 1	L 2	L 2		L 1			F 1	F 1					
3			F 2				F 1			L 1										F 1				
4						F 1		L 1			L 1				H 1	H 1	C 1		F 2	F 1	F 1	F 2	F 1	
5			F 1	F 2		F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

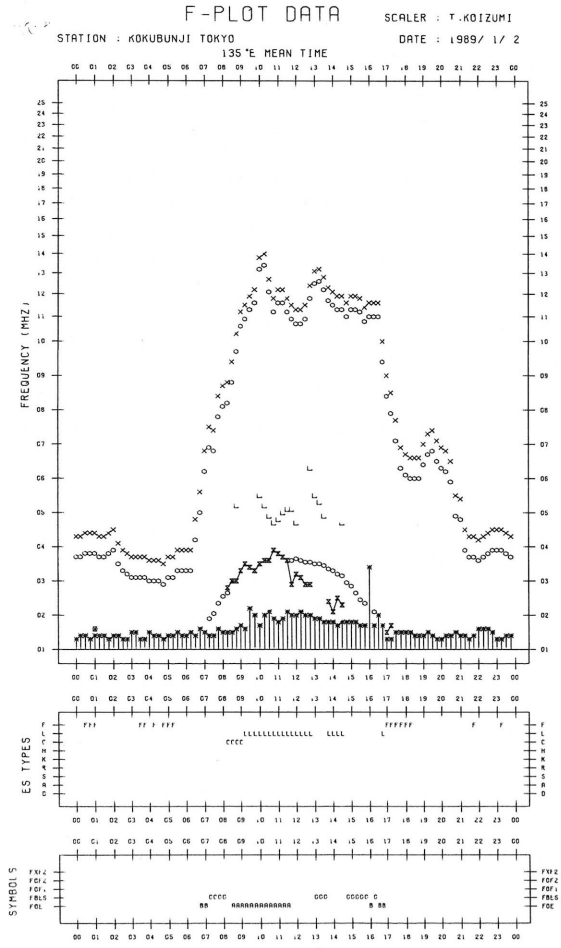
JAN. 1989 | TYPES OF ES

f-PLOTS OF IONOSPHERIC DATA

KEY OF F-PLOT	
I	SPREAD
○	FOF2, FOF1, FOE
×	FXF2
✳	DOUBTFUL FOF2, FOF1, FOE
⧖	FBES
L	ESTIMATED FOF1
⊤, Y	FMIN
∧	GREATER THAN
∨	LESS THAN


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/ 1
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/ 3
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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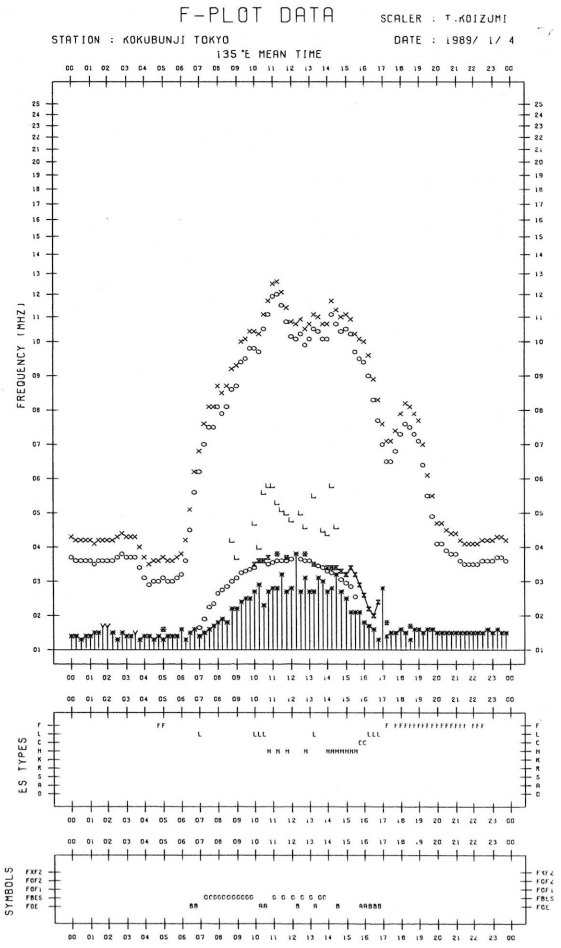
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/ 2
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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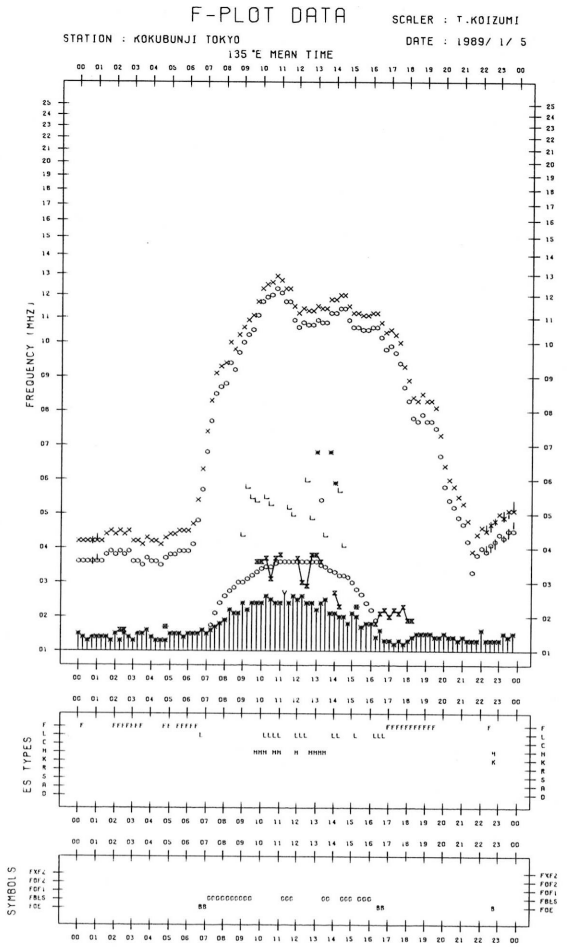
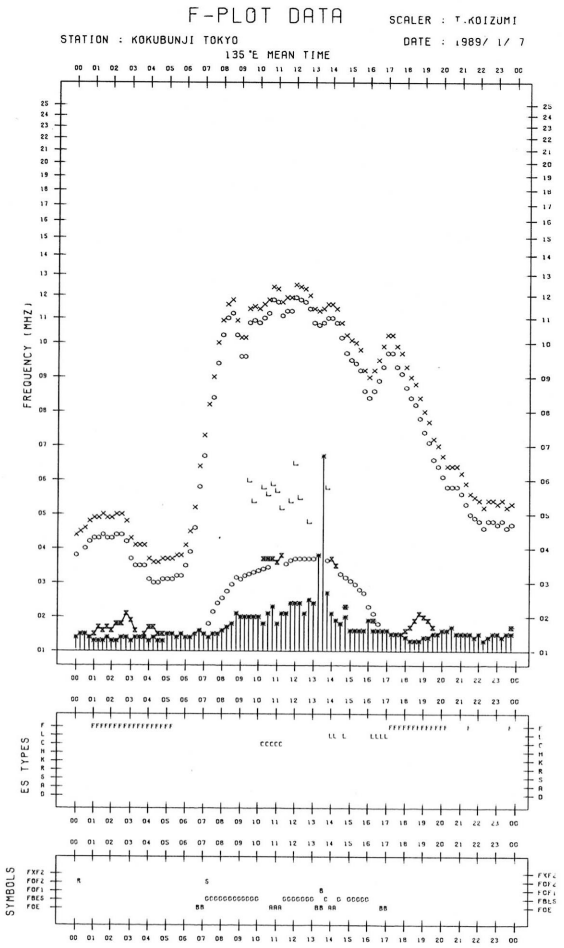
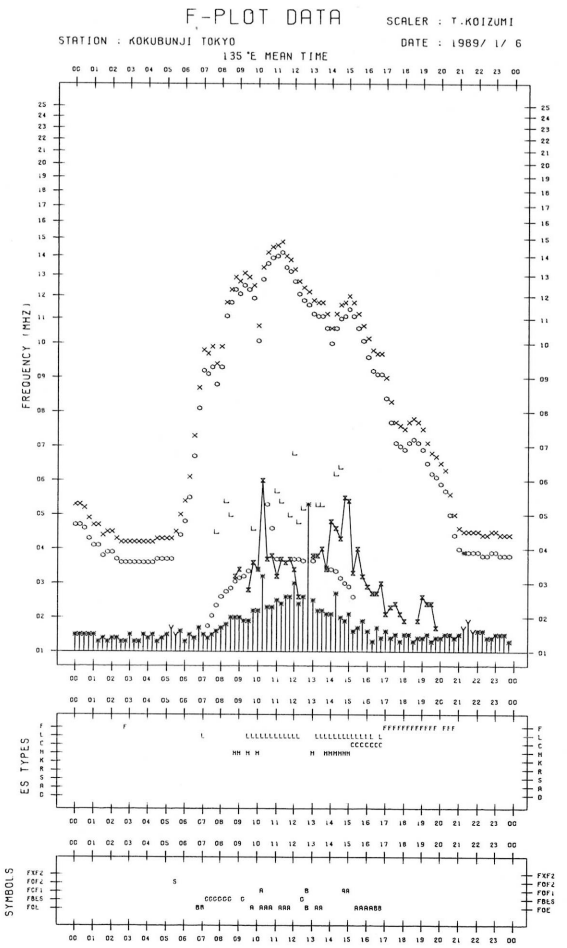
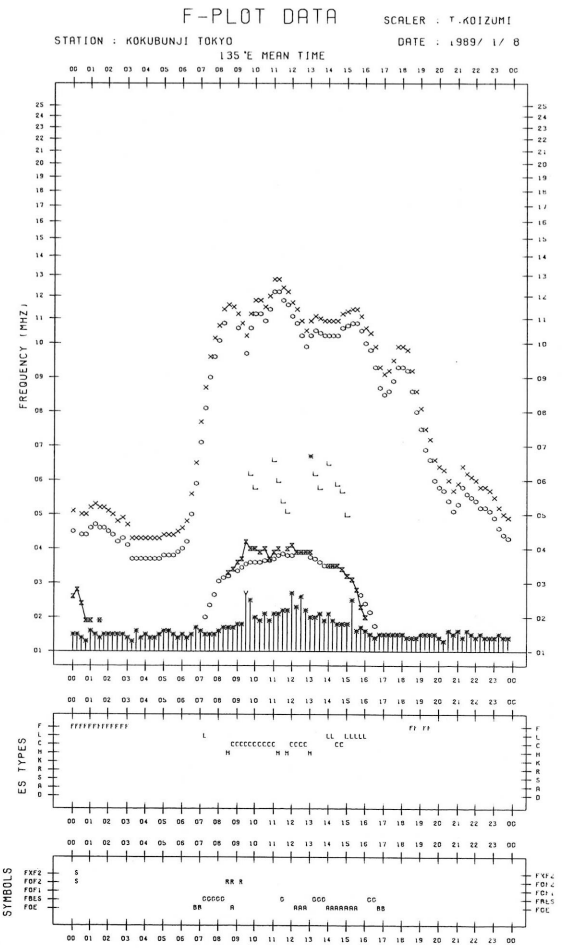
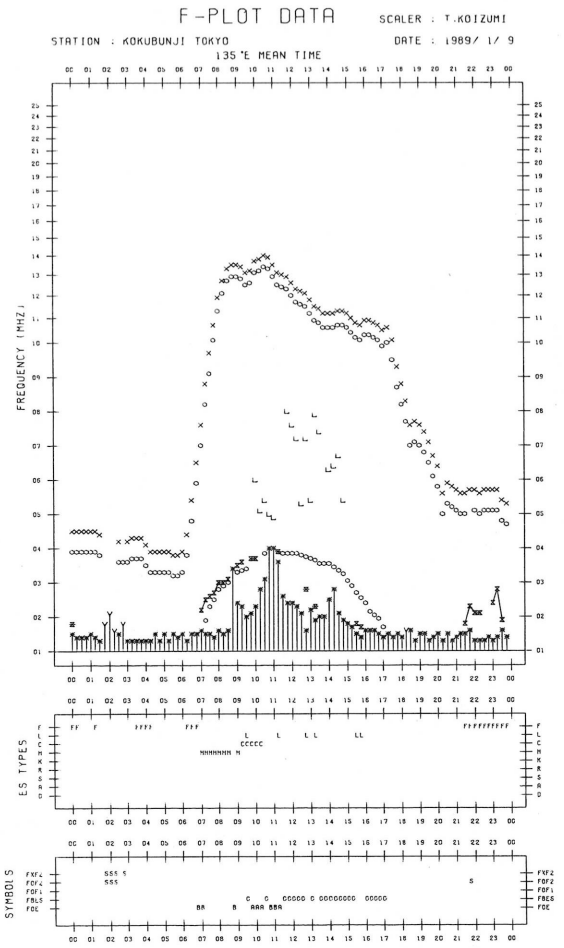
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/ 4
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

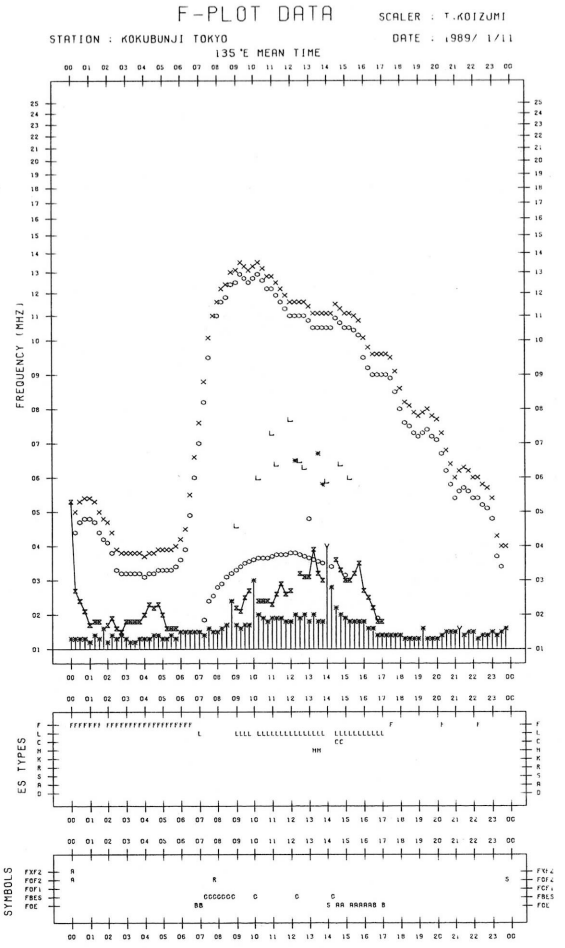

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/ 5
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/ 7
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/ 6
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/ 8
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/ 9
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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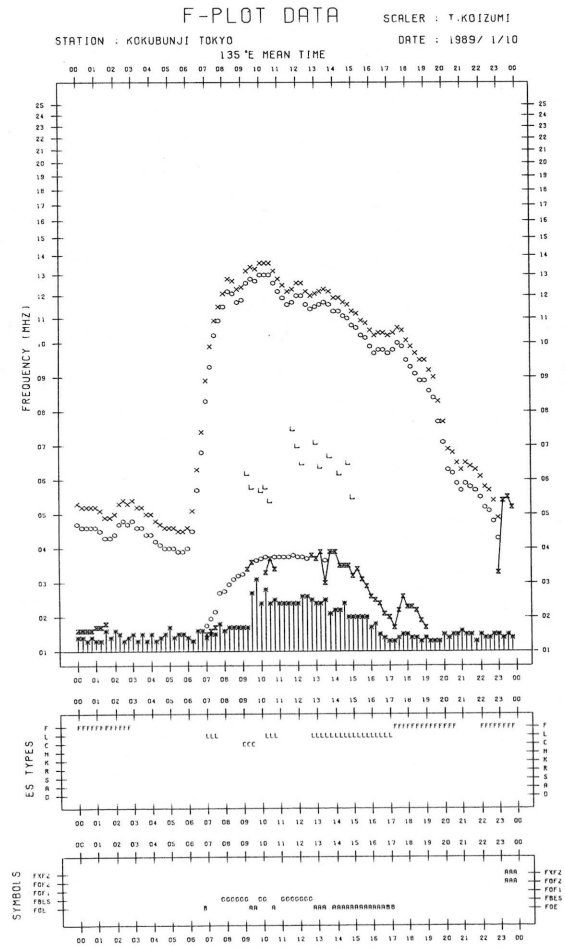
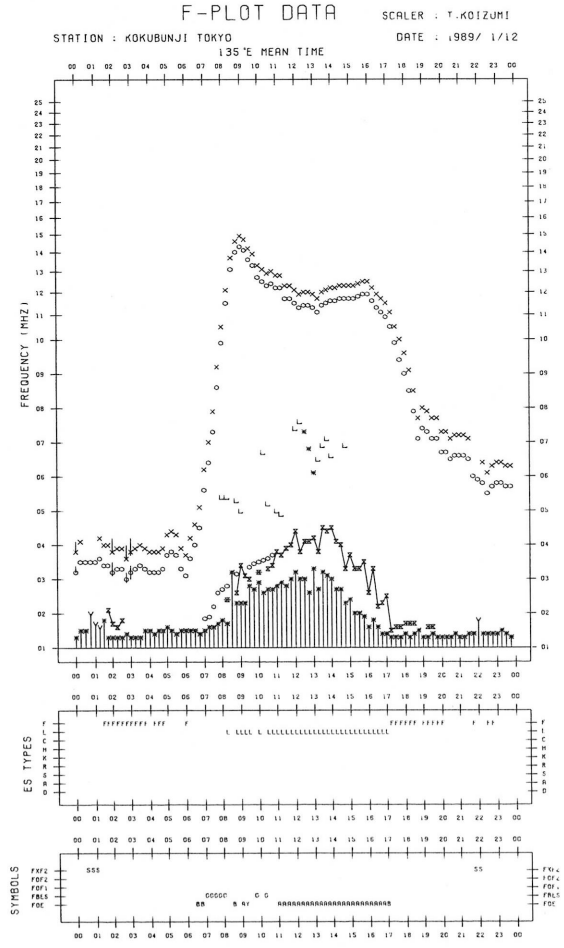
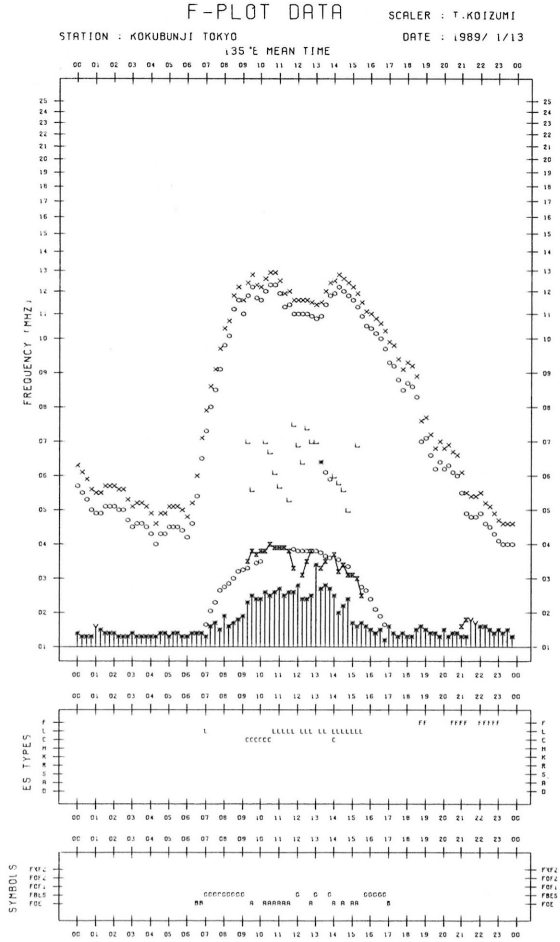
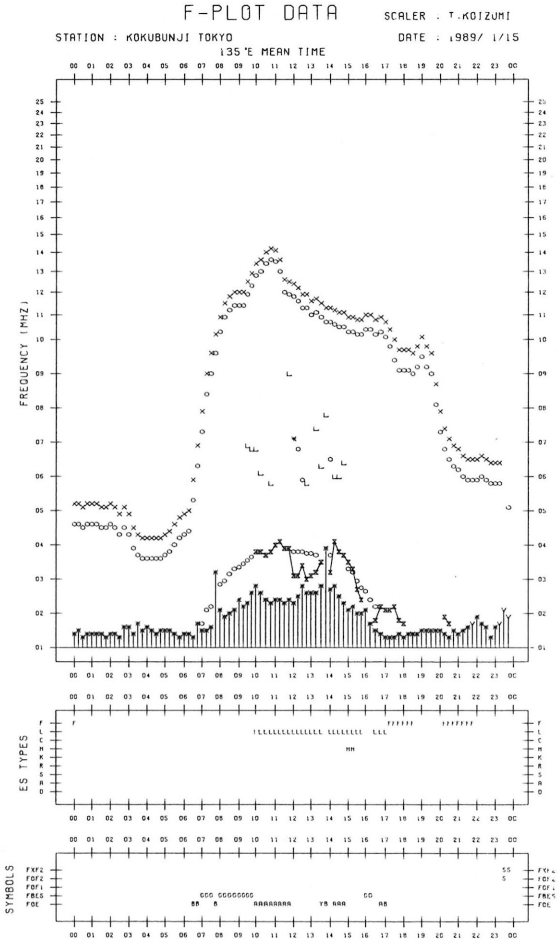
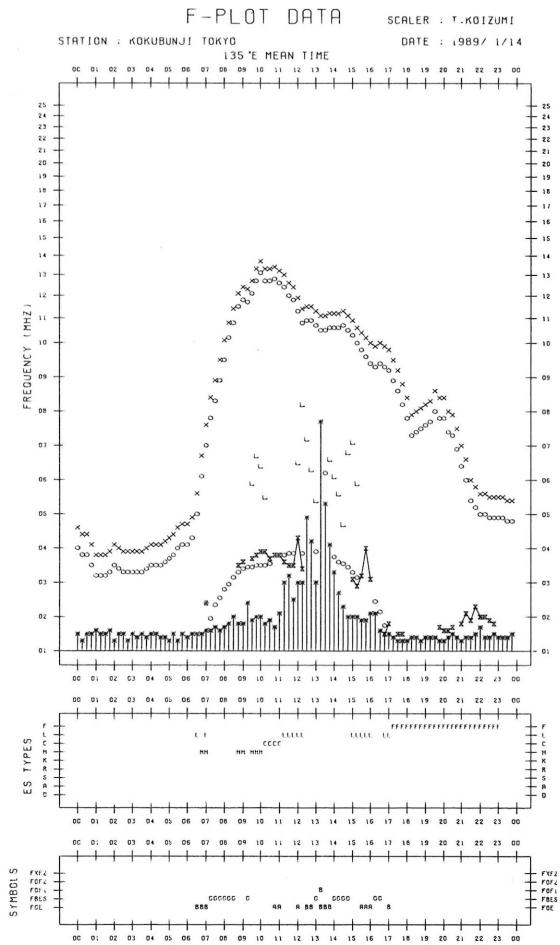
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/11
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

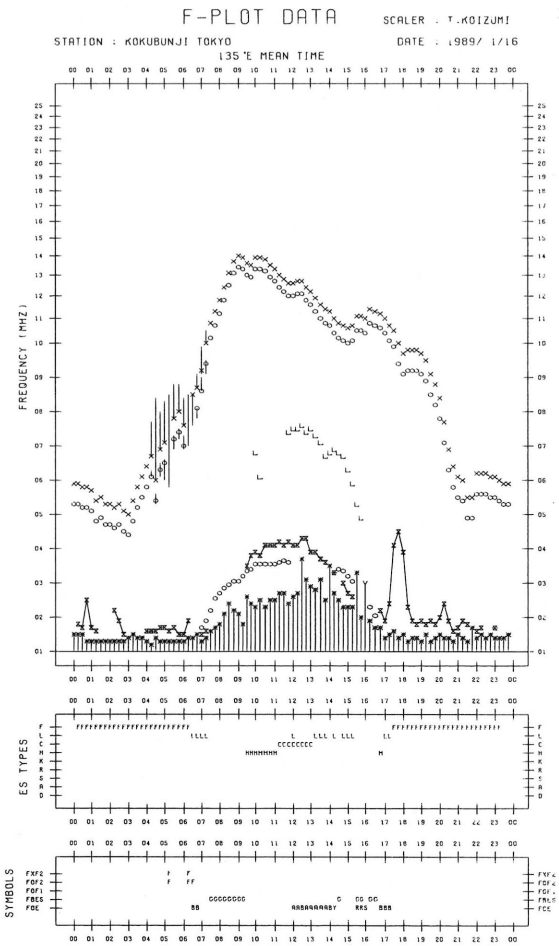

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/10
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

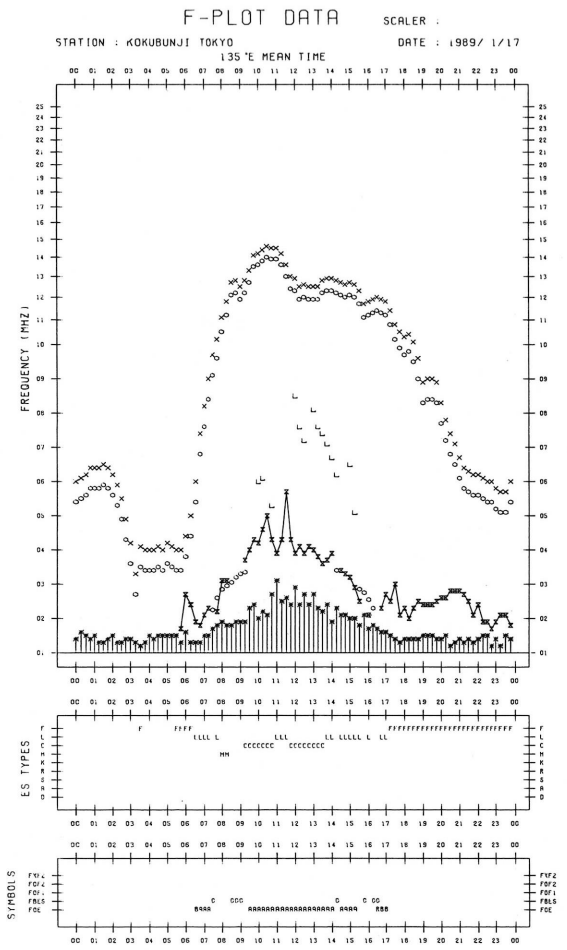

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/12
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

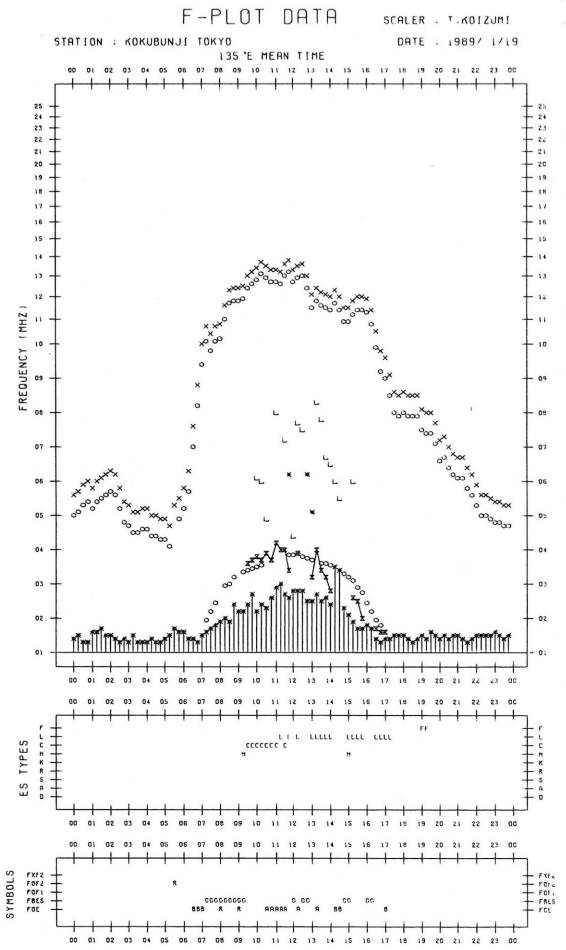

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/13
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

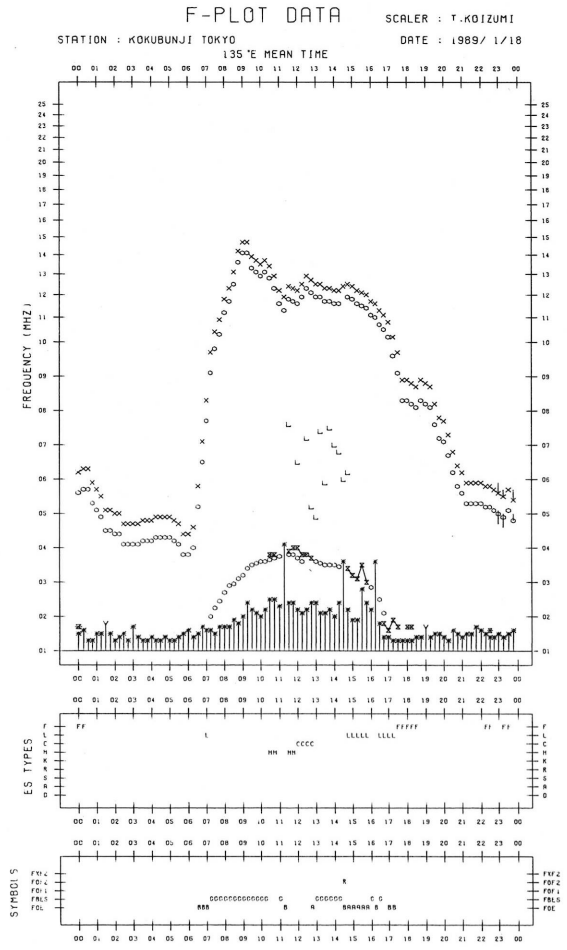

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/15
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

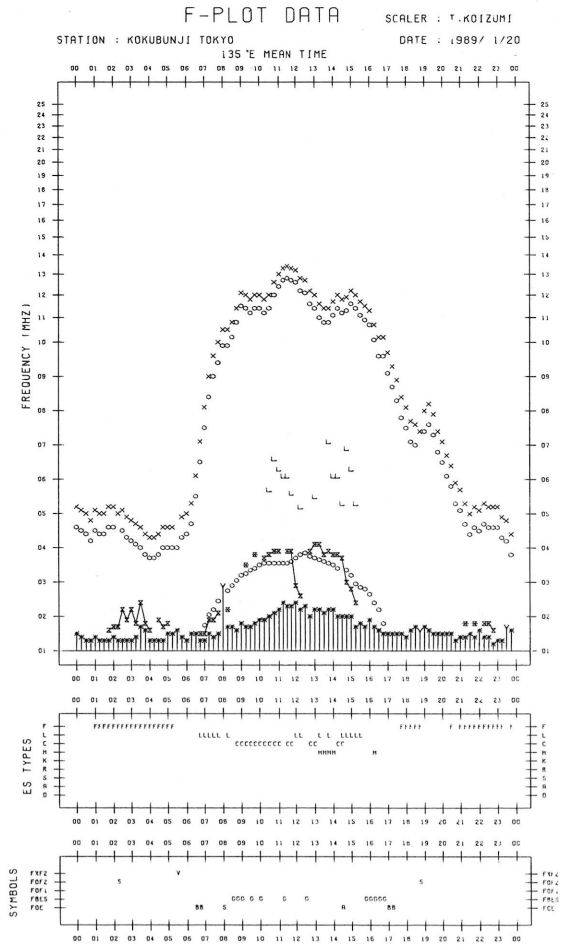

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/14
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

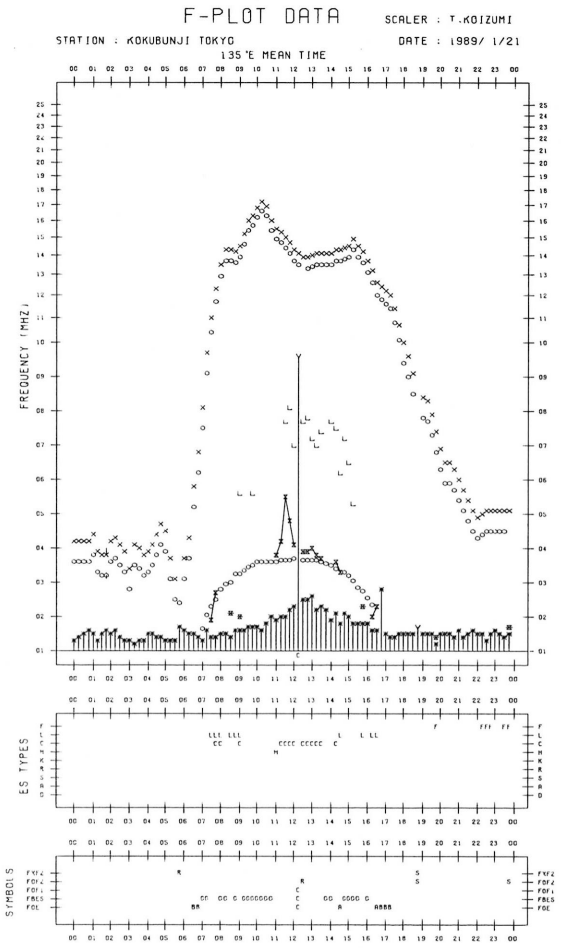

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/16
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

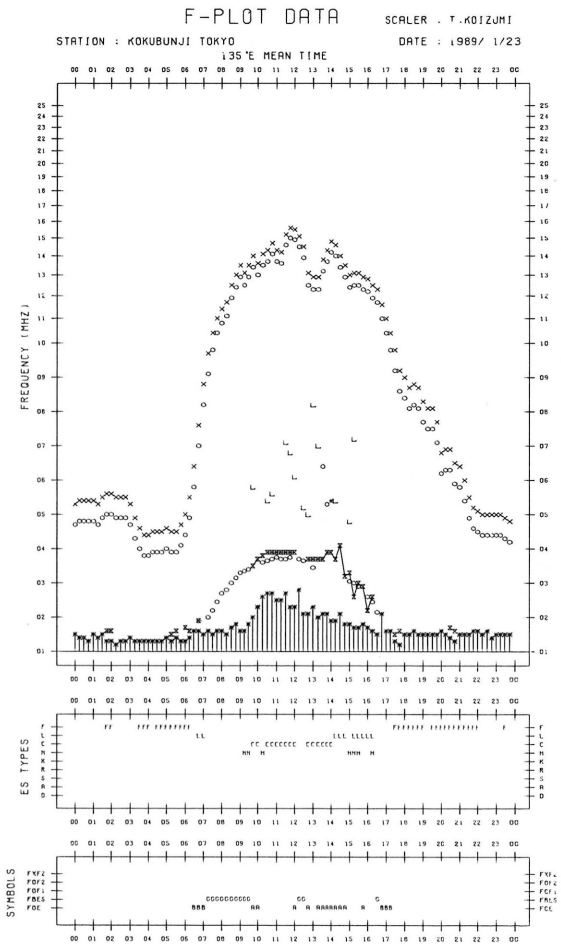

F-PLOT DATA
SCALER :
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/17
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

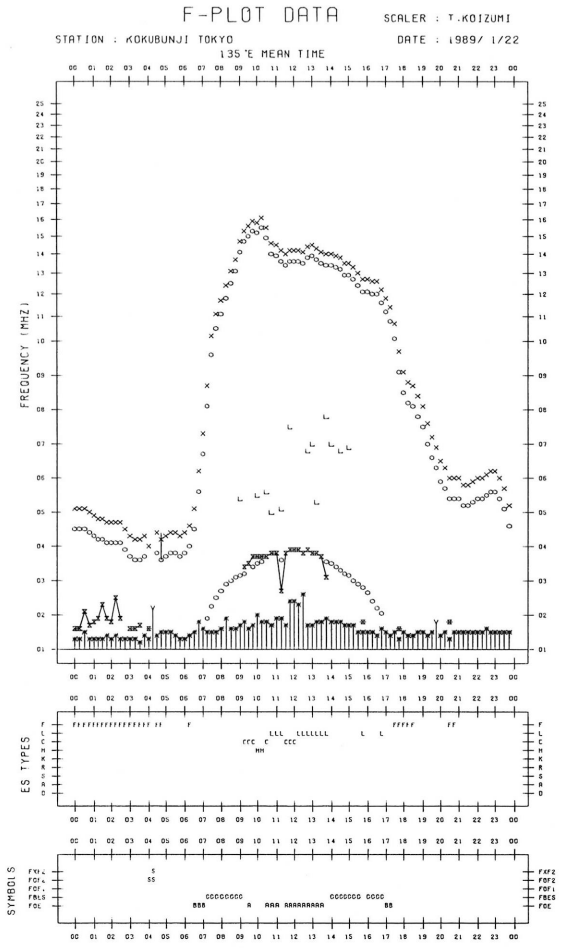

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/19
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

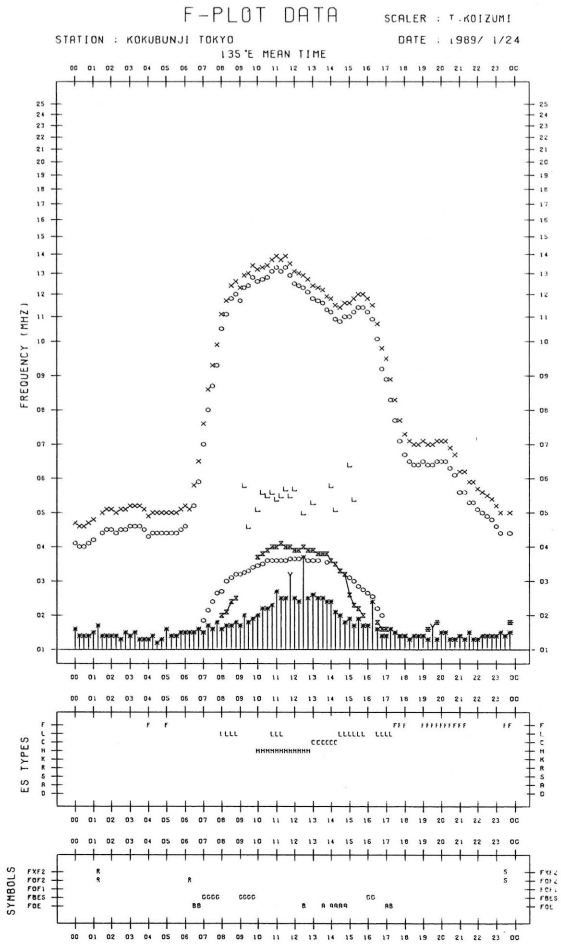

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/18
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

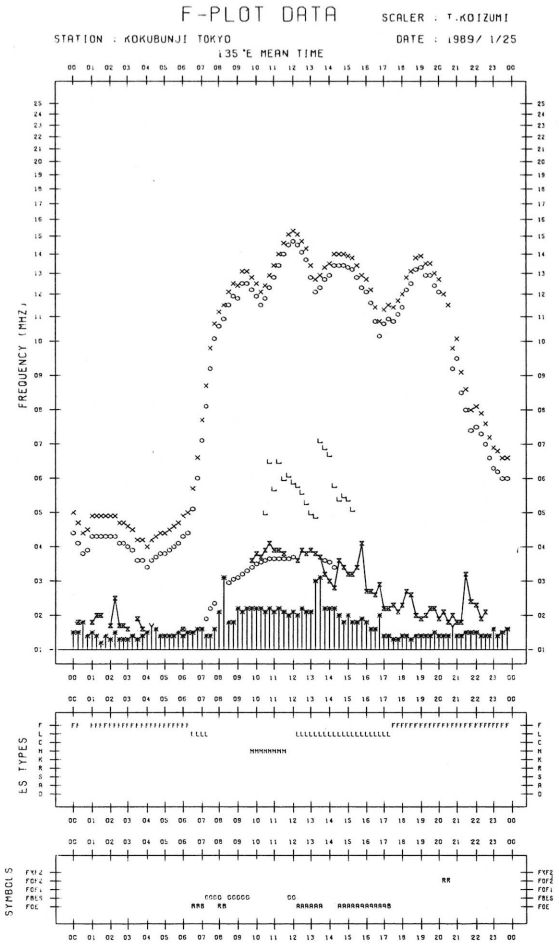

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/20
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

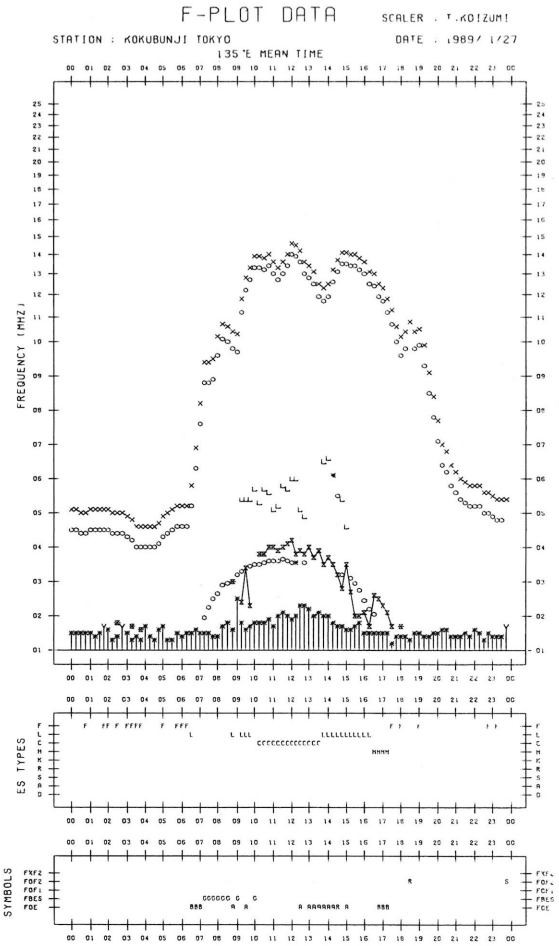

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/21
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

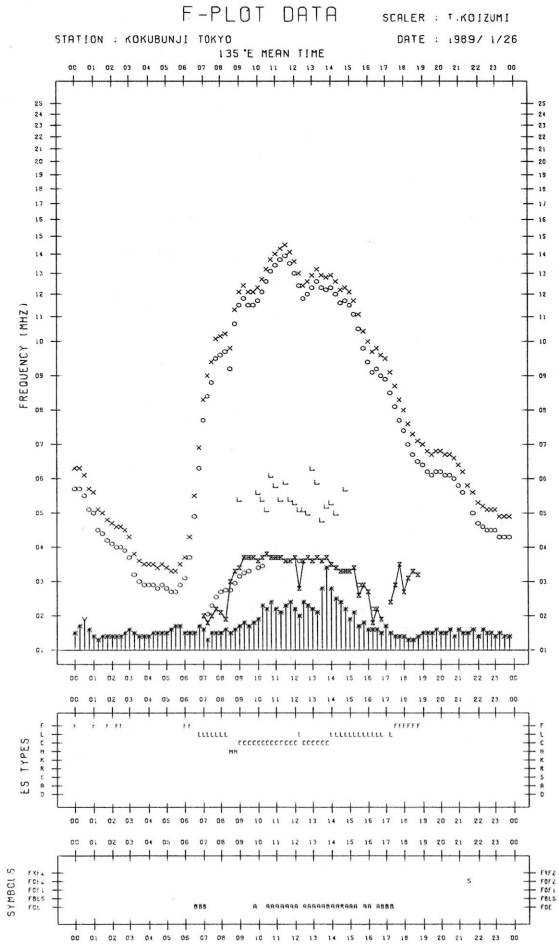

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/23
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

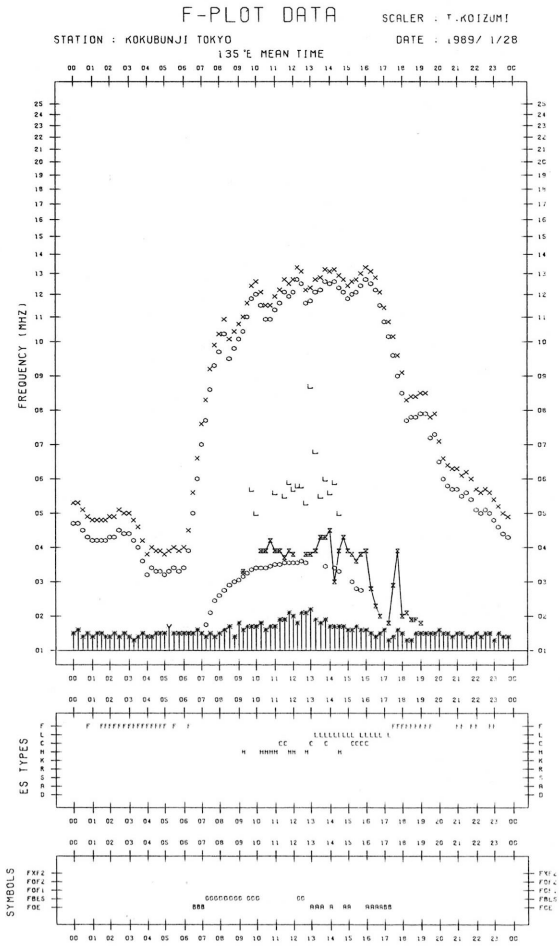

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/22
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

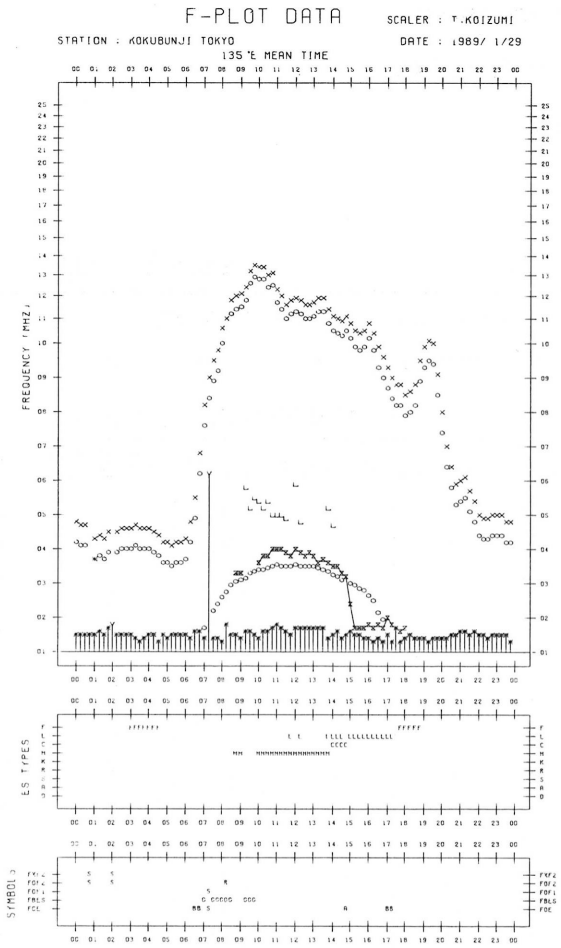

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/24
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

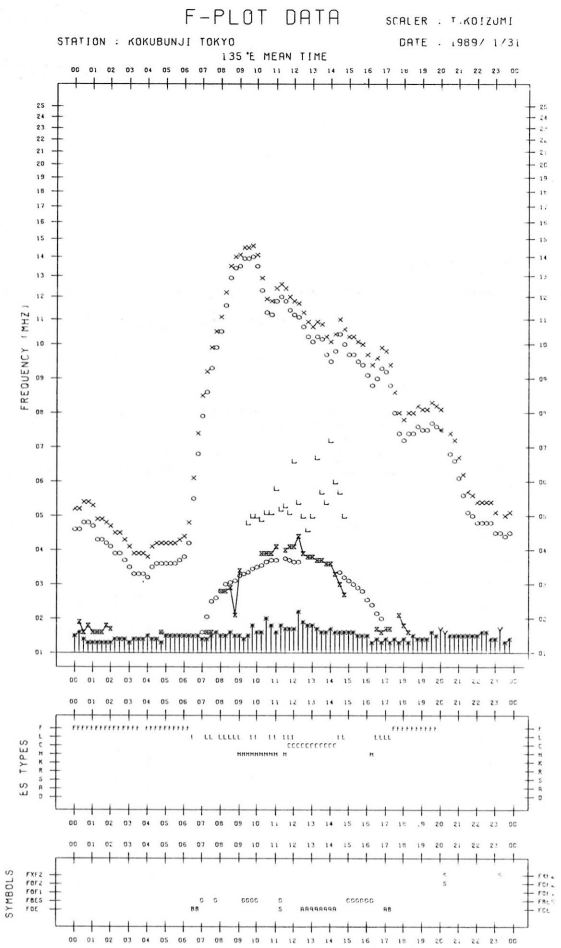

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/25
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

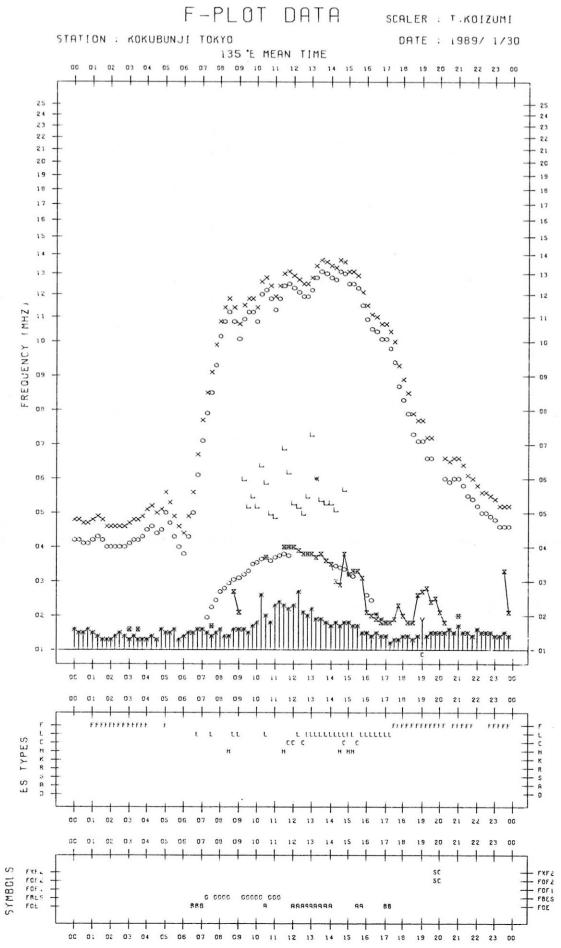

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/27
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/26
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/28
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/29
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/31
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 1/30
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

B.Solar Radio Emission

B1.Daily Data at Hiraiso

200 MHz

Hiraiso January 1989

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

Note: No observations during the following periods.

15th 2149 - 16th 0100

B. Solar Radio Emission

B1. Daily Data at Hiraiso

500 MHz

Hiraiso January 1989

Single-frequency total flux observations at 500 MHz					
FLUX DENSITY: 10^{-22} Wm^{-2}Hz^{-1}					
UT	00-03	03-06	06-09	21-24	DAY
DATE					
1	44	45	(44)	44	44
2	45	47	(46)	45	45
3	45	47	(45)	45	45
4	46	45	(42)	48	44
5	47	46	(45)	49	47
6	51	48	(47)	49	49
7	50	51	(49)	52	50
8	52	49	(47)	54	50
9	57	53	(52)	57	54
10	56	53	(50)	54	54
11	54	53	(54)	52	54
12	53	50	(49)	54	51
13	55	53	(52)	57	53
14	57	55	(55)	54	56
15	54	52	(52)	56	53
16	57	54	(53)	55	55
17	57	55	(54)	56	55
18	57	52	(51)	51	54
19	51	49	(47)	48	49
20	48	47	(47)	48	47
21	49	48	(48)	51	48
22	51	48	(47)	54	49
23	56	53	(50)	53	53
24	53	53	(53)	53	53
25	54	54	(54)	58	54
26	60	59	(58)	51	59
27	54	53	(53)	49	53
28	49	50	(52)	49	50
29	49	49	(49)	46	49
30	46	45	(46)	47	46
31	48	48	(47)	46	47

Note: No observations during the following periods:

none.

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso

January 1989

Singie-frequency observations

Normal observing period: 2150 - 0750 U.T. (sunrise to sunset)

JAN 1989	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY (10^{-22} Wm^{-2}Hz^{-1}) PEAK	MEAN	POLARIZATION REMARKS
1	500	42 SER	0408.1	0413.6	6.5	9	-	WR
	100	44 NS	2147E	0523	580D	130	37	-
	200	44 NS	2147E	0617	580D	74	32	SR
2	500	8 S	0036.5	0036.6	0.8	106	-	0
	200	44 NS	2147E	2245	580D	21	7	MR
3	200	46 C	0048.2	0049.0	2.2	232	-	WR
	100	46 C	0048.2	0049.3	2.3	740	-	-
	200	42 SER	0414.3	0414.5	10.6	60	-	WR
	200	24 R	2149E	0438	580D	18	2	WR
5	200	44 NS	2149E	0014	580D	8	1	0
	500	41 F	2306.0	2306.6	1.1	56	-	0
6	500	2 S/F	0347.5	0348.0	1.2	7	-	0
	200	46 C	0633.2	0636.0	13.9	38	-	0
7	200	42 SER	0003.6	0018.1	15.8	15	-	0
	500	41 F	0010.3	0011.0	1.7	40	-	0
	200	43 NS	0100	0618.5	400D	13	4	WR
	200	42 SER	0137.6	0142.6	8.0	396	-	0
	500	46 C	0141.1	0142.8	6.0	32	14	0
	500	41 F	0556.1	0600.0	11.9	54	-	0
	200	41 F	0556.5	0559U	83D	9	-	0 SUNSET
	100	44 NS	2150E	2235	200D	70	15	-
	200	44 NS	2150E	2243	590D	13	4	WL
8	200	44 NS	2150E	-	590D	-	4	-
9	200	24 R	0434	-	180D	-	55U	- SUNSET
	500	24 R	0514	0657	140D	136	57	SL SUNSET
	200	44 NS	2150E	0233	590D	38	25	ML
10	500	4 S/F	0023.8	0024.9	7.5	5	3	0
	500	46 C	0124.5	0233.0	103.0	24	4	ML
				0135.0		9		WL
11	500	4 S/F	0055.1	0055.3	1.1	12	-	0
	500	21 GRF	0344	-	155	-	8	-
	100	48 C	0447.5	-	7.9	1000D	540D	-
	200	46 C	0506.6	0514.5	31	90	28	WL
				0532.3		63		W1
11	500	46 C	0507.6	0514.5	29	51	17	0
				0509.2		45		0
	100	46 C	0507.9	0515.2	30.4	220	40	-
	500	46 C	2248.0	2255.2	11.0	4	-	0
12	200	27 RF	2150E	-	130D	-	5	MR
	100	27 RF	2150E	-	25D	-	30	-
13	500	41 F	0006.1	0007.3	3.7	9	-	0
	500	46 C	0357.3	0358.6	3.0	55	-	0
	500	46 C	0557.5	0558.3	1.1	7	-	0
	100	41 F	2243.6	2245.5	3.0	170	-	-
	200	41 F	2243.9	2243.9	5.3	240	-	WL
	500	46 C	2245.2	2247.1	5.2	463	87	SL
14	200	41 F	0415.2	0418.2	13.2	17	-	ML
	100	41 F	0415.8	0422.8	8.6	405	-	-
	500	27 RF	0415.2	0445.0	85	7	4	WR
	200	24 R	0430	0451	185D	34	24	MR SUNSET
	100	24 R	0435.0	0458	170D	35	12	-
	200	8 S	0451.5	0451.7	0.9	510	-	0
	500	45 C	0452.3	0452.7	1.1	213	-	SR
15	500	42 SER	0412.8	0415.0	6.5	158	-	0
	200	43 NS	0445	0648	170D	3	2	WR
	500	46 C	0613.8	0620.0	10.3	38	4	0
	200	46 C	0613.9	0613.9	1.3	35	-	0
16	100	44 NS	0100E	0100	400D	230	87	-
	200	44 NS	0100E	0100	400D	75	34	SR
	100	42 SER	0305.9	0307.1	17.8	560	-	-
	500	8 S	0325.5	0325.6	0.8	324	-	0
	100	44 NS	2150E	0028	590D	54	20	-
	200	44 NS	2150E	0449	590D	13	9	MR
17	200	44 NS	2150E	0100	590D	81	44	WR
	100	44 NS	2150E	0106	590D	280	52	-
	100	46 C	2315.2	2317.4	5.4	550	210	-
18	500	46 C	0619.1	0620.3	75D	49U	7U	0 SUNSET
				0651.5		25		0
19	200	46 C	0116.6	0122.4	9.5	4	-	0
	500	46 C	0117.4	0122.8	7.5	12	-	0
20	500	42 SER	0527.1	0529.0	30.5	14	-	0
	200	46 C	0555.8	0556.4	3.3	610	105	0
	100	42 SER	0556.1	0557.2	7.4	245	-	-
21	200	42 SER	0536.6	0537.4	3.0	67	-	0
	200	44 NS	2150E	0100	590D	4	2	0
22	200	42 SER	0303.6	0356.0	53.0	310	-	0
	100	42 SER	0311.9	0354.8	44.9	220	-	-
	200	46 C	0453.0	0453.7	1.5	540	-	0
	100	46 C	0453.1	-	2.6	1000D	340D	-
	500	46 C	0453.2	0454.2	1.5	17	-	0
	200	42 SER	0545.1	0615.8	30.6	305	-	0
	200	44 NS	2150E	0128	590D	23	13	0
23	100	46 C	0402.0	0402.6	4.3	970	120	-
	200	44 NS	2150E	2241	590D	82	17	ML
24	200	44 NS	2150E	0100	590D	118	36	ML
	100	44 NS	2150E	0356	460D	74	17	-
25	100	44 NS	2150E	0056	590D	210	35	-
	200	44 NS	2150E	0308	590D	120	43	MR
26	100	41 F	0348.8	0352.2	4.6	305	-	-
	100	42 SER	0602	0636.3	45.0	620	-	-
	200	44 NS	2150E	2256	590D	128	66	WR
	100	44 NS	2150E	2309	590D	790	587	-
	500	42 SER	2349.8	0002.4	16	56	-	0
27	500	42 SER	0204.0	0251.6	50	19	-	0
	200	8 S	0436.0	0436.4	0.5	1150	-	0
	200	42 SER	0452.5	0453.5	43	185	-	0
	100	44 NS	2150E	0513	590D	54	23	-
	200	44 NS	2150E	0516	590D	46	24	MR
	500	4 S/F	2223.1	2224.3	1.8	11	-	0
28	200	46 C	2142.2U	2144.3	2.2	430U	-	0 SUNRISE
	100	46 C	2143.9	2144.7	2.0	950	-	-
	100	44 NS	2150E	2209	480D	74	12	-
	200	44 NS	2150E	2240	590D	20	9	WR
	500	46 C	2153.5U	2155.4	2.5	112	-	WR SUNRISE
	200	46 C	2300.0	2300.6	2.0	570	-	0
29	200	44 NS	2150E	0300	590D	9	4	WR
	200	46 C	2243.5	2244.8	3.2	45	-	0
	500	41 F	2243.7	2244.8	4.0	21	-	WL
	500	8 S	2304.4	2305.0	0.7	115	-	0
	100	41 F	2325.0	2330.7	11.0	1000D	-	-
	500	41 F	2325.3	2327.5	10.8	420	-	WL
	200	41 F	2326.6	2328.1	8.8	380	-	0
30	500	46 C	0058.8	0106.7	14.5	124	19	WR
	200	46 C	0103.0	0110.8	9.2	860	74	WR
	100	46 C	0109.1	0110.8	4.8	970	480	-
	200	29 PBI	0111.6	0150.4	79	25	13	WL
	500	46 C	0202.0	0206.8	9.5	6	-	WL
	100	42 SER	0227.0	0236.3	31.7	930	-	-
	500	42 SER	0330.5	0353.3	24	235	-	SL
	100	42 SER	0332.3	0350.5U	33.6	1000D	-	-
	200	41 F	0333.0	0336.3	6.7	120	-	0
	200	46 C	0348.2	0349.8	5.1	3500	355	0
	200	44 NS	2150E	2315	600D	7	3	MR
	500	46 C	2357.0	2357.5	3.5	420	-	0

C. RADIO PROPAGATION

C1. H.F. FIELD STRENGTH (UPPER SIDE-BAND OF WWV)

JAN 1989 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

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

C. RADIO PROPAGATION

C1. H.F. FIELD STRENGTH (UPPER SIDE-BAND OF WWVH)

JAN 1989 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

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

C. Radio Propagation

c2. Radio Propagation Quality Figures at Hiraiso

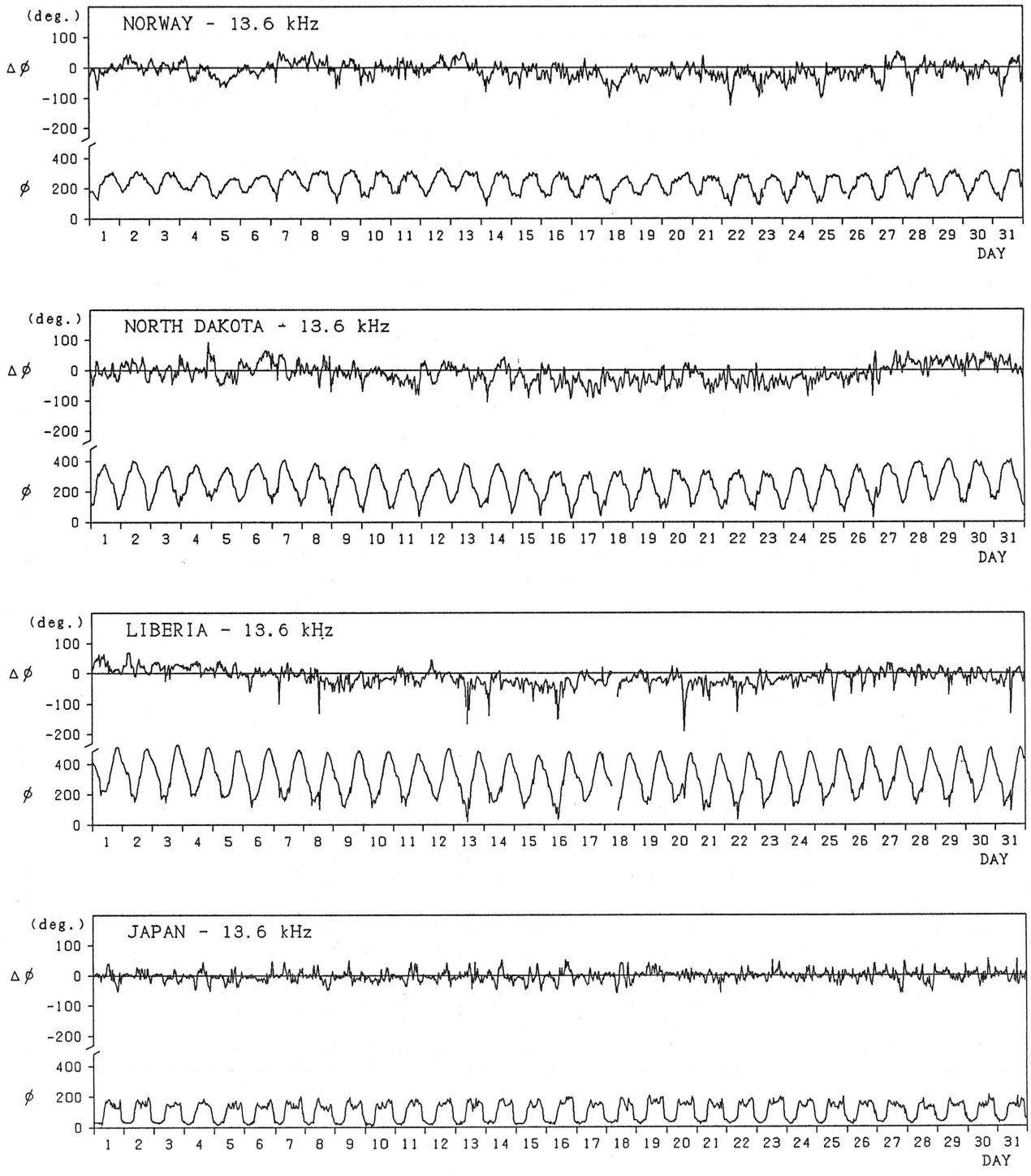
Hiraiso — Time in U.T

Jan.	Whole Day	W W V				W W V H				Conditions				Principal Geomagnetic Storms		
		00 | 06	06 | 12	12 | 18	18 | 24	00 | 06	06 | 12	12 | 18	18 | 24	00 | 06	06 | 12	12 | 18	18 | 24			
1989	Figure															Start	Ene	Range
1	3+	3U	S	S	3U	4U	3	3U	4	U	U	U	U			
2	3+	3U	S	S	3U	4	3	3U	4	N	N	N	N			
3	3+	4U	S	S	3U	4	3	3U	4	N	N	N	N			
4	3o	3U	S	S	4U	3	3	3U	3	N	N	N	N	2305	---	132
5	4o	4U	5U	S	3U	4	5	4U	4	N	N	N	N	---	---	
6	4o	5U	S	S	4U	4	4	3U	4	N	N	N	N	---	15.0	
7	4-	4U	S	S	3U	4	4	3U	4	N	N	N	N			
8	3+	3U	S	S	4U	4	3	3U	3	N	N	N	N			
9	4o	5U	S	S	3U	4	4	5U	4	N	N	N	N			
10	4o	4U	S	S	4U	4	5	4U	3	N	N	N	N			
11	4-	4U	S	S	3U	4	4	4U	4	N	N	N	N	1206	---	115
12	4o	3U	5U	S	4U	4	4	5U	3	N	N	N	N	---	21.0	
13	3+	4U	S	S	3U	3	4	4U	3	N	N	N	N			
14	4o	4U	5U	S	3U	3	5	5U	2U	N	N	N	N	16.1	---	112
15	4+	5U	S	S	4U	4	4	5U	4	N	N	N	N	---	---	
16	4-	4U	S	S	3U	4	4	5U	3U	N	N	N	N	---	---	
17	4+	5U	S	5U	4U	4	4	4U	4	N	N	N	N	---	---	
18	4+	5U	5U	5U	3U	4	4	4U	4	N	N	N	N	---	21.0	
19	4o	4U	4U	5U	5U	4	4	4U	3	N	N	N	N			
20	4o	4U	S	S	4U	4	4U	4U	4	N	N	N	N	1232	---	234
21	4o	4U	S	S	3U	4	4	5U	4	N	N	N	N	---	---	
22	4o	5U	S	S	3U	4	4	4U	4	N	N	N	N	---	24.0	
23	4+	4U	5U	S	4U	4	4	5U	4	N	N	N	N			
24	4-	4U	S	S	3U	4	4	3U	4	N	N	N	N			
25	4o	4U	S	S	4U	4	5	4U	4	N	N	N	N			
26	4o	4U	S	S	5U	4	4	4U	4	N	N	N	N			
27	4o	4U	S	S	5U	4	4	4U	4	N	N	N	N			
28	4o	4U	S	S	3U	4	4	4U	5	N	N	N	N			
29	4o	5U	S	S	4U	4	4	3U	5	N	N	N	N			
30	4o	4U	S	S	5U	4	4	3U	4	N	N	N	N			
31	4+	5U	S	S	5U	4	4	4U	4	N	N	N	N	04.9	---	85

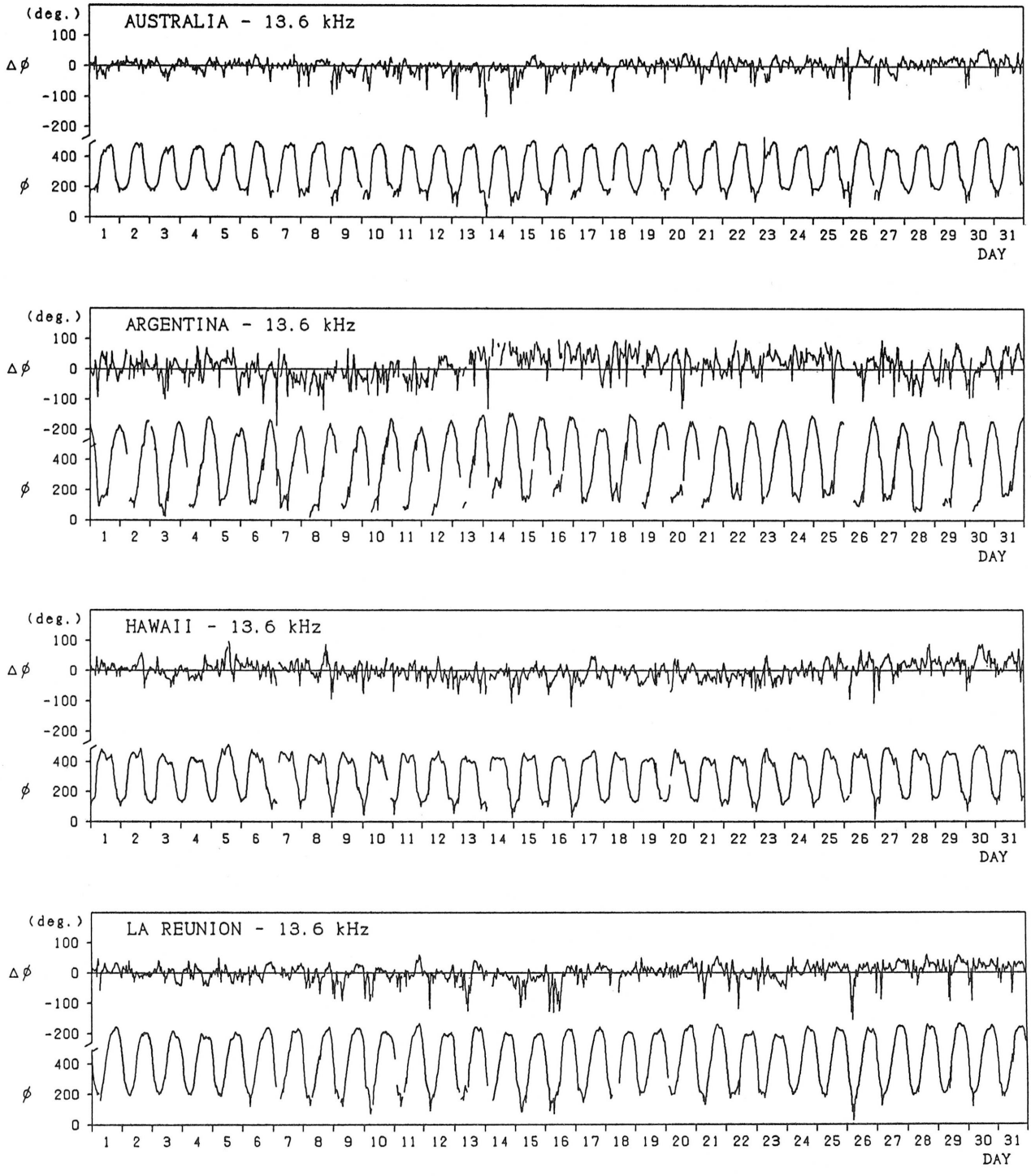
C. Radio Propagation

C3. Phase Variations in OMEGA Radio Waves at Inubo

Inubo January 1989



Inubo January 1989



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

Start (U.T.)	End (U.T.)	Max (U.T.)	Max. Phase Deviation (negative value, deg.)
Jan.04/2123	Jan.05/2130	Jan.05/0910	108.0
Jan.18/0928	Jan.18/2023	Jan.18/1539	43.2

C. Radio Propagation

C4. Sudden Ionospheric Disturbance

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

Hiraiso

Time in U.T.

Jan. 1989	S W F									Correspondence		
	Drop-out Intensities(dB)					Start	Duration	Type	Imp.	Solar Flare	Solar Noise	Geomag. Crochet
	CO	HA	1)	2)	3)							
1			14	x		0808	46	SL	1	0807		
3			5			0300	30	SL	1-	0304		
6			14			0500	30	SL	1		x	
7	x	x	16	x	x	0343	84	G	1+	0408	x	
8			14			0646	21	SL	1			
8	x	x	13			2339	21	SL	1	2325	x	
9	x	x	21			0157	48	SL	2-			
9			13			0452	46	SL	1	0454		
10	x	x	28			0024	64	SL	2	0026	x	
10	x	x	15	x		0620	42	SL	1	0622	x	
11	x	x	20			0051	28	SL	2-	0051	x	
11	x	x	12	x		0832	31	SL	1	0835	x	
13	x	x	10	x		0352	50	SL	1-	0351	x	
13			x	12		0454	48	G	1-	0452		
14	x	x	11		x	0209	38	SL	1-	0215	x	
14	x	x	10		x	0300	20	SL	1-	0254	x	
14	x	x	7		x	0325	30	S	1-		x	
14	x	x	x	13	x	0404	46	SL	1		x	
14				16		1913	90	G	1	1858		
16			15		x	0312	43	SL	1	0307	x	
16			10			0618	32	SL	1-	0616		
18			8			0508	20	SL	1-	0508		
18			17	x		0811	//	SL	1+		x	
18			21	x		////	//	//	2-		x	
18			21	x		////	//	//	2-	0702	x	
18				S		0852	25	SL	1-	0851		
22			6			0255	19	SL	1-			
23			16			0053	57	G	1+			
23			8			0325	23	SL	1-			
26			9	x		0425	42	SL	1	0419	x	
27		x	10		x	0325	40	SL	2-	0327	x	
30			25			0100	30	SL	2	0039	x	
30			15			0350	17	S	1	0347		
31			12			0126	18	S	1		x	
31			10		x	0306	34	S	1-		x	

NOTES CO: Colorado (WWV) HA: Hawaii(WWVH) 1): Australia 2): London 3): Moscow

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

Jan. 1989	S				P		A		
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
1	12			59	49	17	0002	0129	0012
1			23	22			0407	0507	0423
1			131	94			0607	0819	0628
1		26	20				1102	1156	1108
1		36					1336	1428	1352
1		20					1516	1543	1520
1				6	5		2322	2333	2325
1				40	36		2342	0111	2354
2				10	5		0213	0312	0222
2			14	10			0345	0433	0400
2	8		22	13			0444	0533	0457
2			19	12			0543	0641	0550
2			7				0712	0757	0715
2			27			13	0816	0858D	0827
2			18				0858E	0926	0904
2		42	41				0931	1032D	0953
2		39	38				1032E	1107	1040
2		17					1407	1445	1417
2				18	21		2309	0000	2316
3				—	4		0013	0044	0020
3				—	14	9	0047	0142	0100
3	8		51	—	20	13	0305	0411	0317
3			11	—			0526	0600	0530
3			18	—			0628	0717	0642
3			14	—			0747	0819	0754
3			18				0927	0950	0934
3		56	51				1012	1053	1024
3		30	21				1056	1124	1105
3		22	12				1146	1230	1155
3		45					1340	1453	1355
3					8		2304	2351	2311
4				18	11		0050	0129	0058
4			20*	8*			0632	0737	0656
4			11				0751	0849	0806
4		18	6				1111	1141	1117
4		23					1452	1516	1458
5				5			0102	0112	0105
5			13	16	6		0203	0224D	0210
5			10	13	4		0224E	0304	0230
5			26	22			0411	0530	0437
5			14	13			0546	0630	0552
5			37	26			0635	0737	0647
5			7				0952	1002	0957
5		20	10				1159	1241	1211
5					13		2124	2142	2130
5				15	17		2334	0134	2356
6	7		10	16	9		0233	0309	0239
6	26	26	141	99	66	26	0502	0703	0512
6						35	1756	1844	1810
6					47		1937	2024D	1954
6					22		2024E	2047	2036
6					10	23	2123	2208	2127
6				72*	61*	65	2251	0038D	2354
7				36	26		0038E	0125	0047
7			77	67	37		0226	0330D	0300
7			143	93	58		0330E	0403D	0352
7	54	83	328	175	175	50	0403E	0635	0430
7			14				0657	0740	0706
7			32	14			0741	0830	0802
7			11				0937	1009	0951
7			17				1016	1057	1030
7		67	18				1251	1415	1307
7						25	2123	2159	2128
7				35	61*	37	2149	0021	2256
8				10	8		0103	0135	0111
8			37	40	26		0157	0240	0209
8			58	51	36	12	0255	0324D	0306
8			60	46	41		0324E	0507	0336
8	26		79	56			0519	0647D	0550
8	36	71	165	104			0647E	0800	0656
8		21	27				0829	0902	0836
8			24				0914	0947	0923
8		24	22				1117	1200	1126
8		137	62				1227	1400	1251
8		20					1455	1526	1503
8		27					1705	1750	1715
8					33		1855	1930	1908
8					93		1946	2040	1959
8					24		2112	2124	2116
8				6	29		2238	2318	2248
8	39	33	56	148	129	85	2330	0055D	2347
9	30	28	112	—	92	46	0055E	0251	0113
9			43	—	27		0352	0445D	0400
9		65	196	—	81	21	0445E	0634D	0513
9			111	24			0634E	0849	0717
9			13				0941	1007D	0945
9			14				1007E	1025	1010
9		23	6				1216	1253	1229
9		56	11				1351	1536	1405
9		23					1538	1611	1554

Inubo

Jan.	S				P		A		
1989	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
9					72	33	1916	2056	1927
9					23		2113	2152	2123
10		33		132	123	73	0023	0152D	0044
10			28	53	39	32	0152E	0303	0203
10		20	55	44	23	11	0333	0451D	0342
10		26	147*	82*	42*	14	0451E	0620D	0523
10	31	67	189	112		18	0620E	0853	0632
10		21	32				0921	1015	0935
10		71	25				1307	1418	1317
10					24		1741	1830	1803
10					36		1904	1939	1913
10					122*	31	2021	2242	2032
11				10	9		2356	0024	0005
11		22	77	100	90	46	0047	0208D	0058
11			22	33	12	—	0208E	0242D	0214
11			39	40	14		0242E	0343	0305
11		17	88	56	23		0442	0625D	0500
11		60	143	74			0625E	0814	0651
11		52	57				0951	1039D	0956
11		20	17				1039E	1117	1049
11			6				1132	1149	1135
11	46*	30	6				1206	1254	1237
11		20	6				1313	1332	1323
11		27					1531	1605	1537
11		13					1637	1708	1645
11		15					1819	1841	1825
11					13		2134	2147	2138
11				14	49*		2228	2354	2300
12				14	8		0052	0131	0105
12	21	18	109	63	29	13	0408	0520D	0430
12			42	26			0520E	0620	0526
12			23	15			0638	0733	0647
12			12				0756	0818	0803
12			13				0836	0908	0838
12		30	31				1020	1117	1034
12					44		2014	2156	2030
12	18			93	77		2356	0142D	0027
13			28	29	17		0142E	0233	0203
13	30	43	150	99	49	24	0351	0514D	0403
13			30	21		—	0514E	0629D	0520
13		55	50	35			0629E	0752	0657
13		32	71	30			0832	0856D	0839
13		37	68	42			0856E	0931D	0906
13		103	106				0931E	1008D	0952
13		260	222	19			1011E	1043	1029
13		100	50				1225	1358	1241
13		28					1522	1555	1537
13					26		2110	2152D	2120
13					79	18	2152E	2309D	2200
13				6	23	11	2309E	0134	2325
14				10	4		0147	0204	0150
14	16*	21*	118	87*	67	18*	0208	0149D	0233
14	14		148	99	41	11	0249E	0324D	0315
14	25	30	254	154	119	36	0324E	0400D	0333
14	58	87	351	205	166	57	0400E	0812	0419
14		18	21				0927	1016	0934
14		42					1354	1515	1400
14					30		2112	2144D	2121
14					89	21	2144E	2205D	2149
14				90	165	98	2205E	2325D	2242
14				35*	68	65*	2325E	0028D	2354
15				51	71	34	0028E	0248	0051
15			17	20	6		0301	0333D	0311
15			76	55	20		0333E	0402D	0352
15		26	143*	85*	19		0402E	0646D	0511
15			44	7			0646E	0755D	0653
15		35	87	37			0755E	0903	0801
15			13				0906	0932	0910
15			12				0942	1016	0944
15		10	7				1150	1205	1155
15		23					1303	1341	1308
15		49					1547	1626	1557
15					24		2105	2207	2120
15				26	26		2319	0046	2326
16				8*	6		0211	0300	0215
16	27	39	125	86	49		0310	0450D	0332
16			58*	24*			0450E	0620D	0502
16		45	135	74			0620E	0731D	0633
16		31	41	35			0731E	0829D	0743
16		47	78				0829E	0906D	0849
16		83	94	22			0906E	1002D	0916
16		54	52				1002E	1038	1008
16		122	74				1041	1341	1103
16		55					1507	1606	1523
16				24*	115*		2201	0047D	2220
16					14		0047E	0133	0053
17		16	55	—	30	16	0143	0220D	0158
17			30	—	16		0220E	0252	0231
17			29	—			0513	0535D	0524
17			90	—			0535E	0640D	0544
17			44				0640E	0739	0650
17			10	11			0817	0836D	0822
17			14				0836E	0909	0840
18				15*	13*		0021	0125	0046
18			50	44	28		0333	0456	0359
18		24	84	57	20		0509	0609D	0517
18	32	—	253	140			0609E	0656D	0639
18	42	269	302	164			0656E	0849D	0707
18	21	213	225	37			0849E	1100	0905
18		36					1156	1311	1218
18				16	15		2358	0025D	0004
19				12	9	18	0025E	0051	0026
19				21	12		0110	0229	0132
19			43	39	27*	15*	0256	0400	0320
19			9				0821	0848	0832
19		46	55				0934	1037	0947
19		15					1225	1244	1233
20				32	22		0124	0244	0135
20			28	31	9		0415	0501	0421
20			6	10			0604	0627	0608
20			7				0647	0702	0650
20		27	29				0917	1005	0921
20		109					1525	1645	1603
21				12	10		0021	0110	0046
21			14	18	5		0232	0251D	0242

Inubo

Jan.	S				P		A		
1989	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
21	12	10	39	40	17		0251E	0411	0300
21			11	10A			0425	0507	0430
21			46	29			0531	0630D	0600
21			76	40			0630E	0659D	0646
21		54	159	78			0659E	0921	0709
21		18	14				1004	1030	1009
21		43	28				1136	1252	1145
21					40		2211	0030	2253
22			28	26	15		0133	0208	0139
22			30	48	21		0221	0255D	0234
22		16	82	83	45		0255E	0321D	0304
22			44	54			0321E	0409	0330
22			26	21			0729	0820	0736
22		32	35	18			0830	0931	0838
22		130	131				0945	1119	1002
22		49	12				1250	1332	1308
22		44					1348	1447	1358
22					58		2212	2322D	2223
22					8		2322E	2349	2329
23					22		2355	0041	0005
23			88	—	68	57	0053	0154D	0123
23			75	—	46	32	0154E	0304	0205
23			23	—	14		0330	0455	0351
23		43	37	—			0636	0749	0647
23			66	—			0749	0826	0753
23			9	—			1241	1309	1245
23					35		2133	2212D	2148
23					28		2212E	2349	2246
24				6	5		0016	0036	0023
24			14	28			0405	0525	0437
24			7				0608	0635	0618
24		23	11				1015	1030D	1022
24		37					1030E	1133	1042
24			19	45	79	23	2245	0107	2314
25			17	18			0349	0445	0411
25			8	7			0505	0528	0510
25			18	14			0554	0629	0600
25			26	23*			0639	0708D	0655
25		23	62	55			0708E	0758	0713
25		20					1421	1451	1428
25		61					1453	1619	1511
25				12			2313	2331	2318
25	—	—	—	92	—	—	2338	0119	0006
26				4	4		0215	0237	0222
26	—	—	—	31	—	—	0315	0355	0327
26	43	67	197	124	89	46	0426	0518D	0441
26		38	138	97		25	0518E	0631D	0528
26		60	72	59			0631E	0747	0648
26		57					1413	1517	1425
26					24		2138	2208	2145
26	37	29	74	150	140	82	2349	0158	2359
27			14	14	10	55	0235	0326D	0247
27	24	38	163	114	81	94	0327	0553	0338
27		18					1224	1301	1232
27		43					1522	1610	1532
27					70	49	1913	1955	1919
27					46		2149	2234	2152
28				17			0244	0449	0310
28			12	8			0623	0709	0635
28		49	71	35			0811	0851D	0819
28		43	32				0851E	0951	0900
28		46					1256	1352	1313
28	14				83*		2139	2253	2143
28				4	5		2320	2344	2332
29				9	8		0006	0047	0016
29			9	10			0321	0356	0331
29			8	8			0803	0831	0806
29		94	—				1048	1215	1106
29		19	—				1227	1241	1232
29		42					1311	1356	1321
29				5	5		2305	2322	2307
29	13	11		29	35	28	2327	0020	2336
30	37	49	116	143	135	65	0041	0157D	0111
30			53	52	42		0157E	0358	0211
30	30	33	114	74	56	39	0350	0531	0356
30			6				0602	0638	0608
30		30	9				1228	1301	1236
30					100	30	2057	2201	2108
30				4	12	18	2258	2335	2305
30				—	17		2357	0045	0000
31	17	16	66	—	53	36	0125	0242	0132
31	23	29	102	—	61	31	0305	0350D	0315
31			24	—	32	13	0350E	0419	0357
31			13	—			0441	0502	0447
31			22	—			0523	0619	0531
31		170	98				1202	1346	1216
31					59		2104	2218	2120

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