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IONOSPHERIC DATA IN JAPAN

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CONTENTS

COMMUNICATIONS RESEARCH LABORATORY
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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 and X-ray flares, and solar radio burst 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

FEB. 1993

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	34	40	34	36	31	31	76	52	72	106	86	91	87	78	86	80	75	78	72	53	37	A	53	44
2	43	35	35	35	36	34	50	44	57	77	84	86	91	78	73	84	66	50	34	34	30	30	31	31
3	34	35	37	34	36	31		52	64	82	91	78	77	81	86	77	61	54	42	38	34	35	34	38
4	41	34	43	44	47	48	46	52	74	78	80	86	78	83	80	76	63	67	45	38	31	34	38	30
5	40	41	42	51	54	52	52	52	66	73	94	90	88	82	80	75	66	60	51	52	48	47	52	50
6	52	53	51	48	51	52	50	64	76	81	86	86	80	73	77	78	77	61	56	50	35	38	36	34
7	40	43	44	43	43	41	42	64	88	90	78	86	87	80	78	86	74	62	48	32	32	30	38	42
8	37	31	38	38	38	31	71	56	66	105	106	101	91	92	104	106	106	87	55	54	61	63	62	63
9	66	66	63	58	56	40	51	64	82	77	106	111	113	98	86	91	85	78	52	54	30	34	40	38
10	40	43	40	29	37	37	37	66	80	88	88	104	108	98	90	86	72	66	52	43	37	38	34	43
11	43	36	40	37	N	30	34	63	85	88	102	110	86	86	90	90	84	61	54	42	44	40	42	41
12	40	38	43	42	46	38	37	61	77	77	94	100	107	88	87	84	78	74	55	55	36	32	32	34
13	34	31	38	38	35	34	34	54	72	80	105	86	90	90	87	85	73	63	55	48	38	38	38	38
14	38	35	37	37	37	37	34	85	80	74	88	94	87	88	82	84	77	70	51	38	38	42	38	40
15	43	43	43	42	42	40	52	73	78	91	93	108	100	90	91	88	90	62	55	46	35	38	41	38
16	40	38	42	40	37	37	34	65	82	82	86	100	102	90	84	85	77	73	54	52	38	35	35	34
17		38	37	40	43	43	30	63	88	94	112	106	99	90	86	88	82	78	57	49	38	41	37	42
18	38	34	35	40	28		71	95	104	91	111	106	105	104	94	82	88	80	58	60	44	A	32	31
19	38	40	36	40	37	62	40	64	86	87	110	112	111	90	96	87	95	73	60	55	54	52	52	54
20	55	54	54	55	54	53	61	71	87	103	112	111	112	108	91	82	82	74	57	46	51	44	52	51
21	54	54	54	49	40	37	56	55	52		80	85	86	84	80	80	86	71	54	52	43	43	34	34
22	37	38	38	34	32	37	38	66	A	73	86	102	100	88	101	90	81	65	60	50	49	38	50	48
23	50	49	52	53	49	50	51	64	81	78	86	110	90	100	87	90	85	84		C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
26	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C									
27	38	37	A	40	38	38	53	66	87	82	91	88	98	97	97	85	84	73	62	58	44	34	34	37
28	35	34	51	A		A																		
					38		60	94	82	86	97	90	108	104	100	98	89	85	71	60	52	53	44	43
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	24	25	24	24	24	23	24	25	24	24	25	25	25	25	25	25	25	25	24	24	24	22	24	24
MED	40	38	41	40	38	38	50	64	80	82	91	100	91	90	87	85	81	71	55	50	38	38	38	39
U Q	43	43	47	46	46	48	54	66	85	90	105	107	106	97	92	89	85	78	57	54	46	43	47	43
L Q	37	35	37	37	36	34	37	54	72	77	86	86	87	82	81	81	73	62	51	42	35	34	34	34

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT WAKKANAI

FEB. 1993

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	G	G	G	25	24	34	G	G	G	G	G	G	G	G	39	29	28	27	33	28	G
2	G	G	G	G	G	G	G	34	36	39	G	G	G	60	G	G	G	G	28	G	G	G	G	G
3	G	G	25	G	G	G		G	G	G	39	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	G	G	G	G	24	G	G	G	G	32
5	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	46	37	37	31	G	G	30	27
6	G	24	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	25	24	28
7	G	G	G	G	G	G	G	G	G	G	G	G	G	38	38	G	G	G	G	G	G	G	G	G
8	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	41	G	G	G	26	G	G	G
9	G	G	G	G	G	G	11	G	G	35	40	G	G	G	G	G	G	G	G	G	44	28	27	26
10	G	G	G	G	G	28	28	G	G	G	G	G	G	G	G	G	G	41	25	G	G	G	G	G
11	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	26
12	25	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
13	G	G	G	G	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	G	G	G
15	G	G	24	G	28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
16	G	G	25	G	G	G	G	G	G	G	G	G	G	G	G	38	34	G	G	G	G	G	G	G
17	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	29	G	G	G	G	G
18	G	G	G	G	G		G	G	G	G	G	39	G	G	G	36	G	38	42	G	G	64	28	32
19	26	G	G	28	31	G	G	G	G	G	G	G	G	G	G	G	34	34	29	G	G	G	G	G
20	G	G	26	G	G	28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
21	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	40	G	G	G	G	G	28	G
22	G	G	G	G	G	G	G	33	61	38	G	G	G	G	G	G	G	G	G	G	G	G	G	G
23	G	G	G	G	G	G	G	G	G	G	45	G	G	G	G	G	38	G		C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
26	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C									
27	G	23	35	30	30	29	G	G	G	G	44	45	G	G	G	36	G	G	35	38	G	G	G	G
28	G	G	26	36	54	38	25	G	G	G	G	G	G	G	41	G	G	32	24	26	G	G	G	G
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	25	25	25	25	24	24	25	25	25	25	25	25	25	25	25	25	25	24	24	24	24	24	24
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	G	G	12	G	G	G	G	G	G	G	G	G	G	G	G	G	17	16	28	G	G	G	12	13
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

FEB. 1993

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	15	14	14	14	15	16	20	17	23	30	44	47	42	46	30	29	28	16	16	18	17	16	17	16
2	16	15	15	15	15	16	16	16	20	26	30	39	34	28	30	27	24	16	16	15	20	15	15	16
3	15	15	15	15	16	15		20	27	29	28	42	45	47	32	30	26	16	16	15	15	16	16	15
4	15	17	15	15	15	15	17	18	26	40	32	32	32	42	30	29	24	16	16	16	15	17	15	17
5	15	15	15	15	15	15	20	18	29	29	43	46	44	52	46	46	24	15	16	15	15	14	15	15
6	16	16	15	15	14	15	17	21	28	30	34	33	32	30	22	29	23	17	15	15	15	16	16	16
7	16	14	15	15	15	15	17	24	26	30	44	36	44	33	30	32	28	16	15	17	15	16	16	15
8	15	16	14	15	16	16	17	21	28	49	42	45	36	29	34	28	17	17	15	15	15	14	15	15
9	15	16	14	14	14	16	17	21	26	21	22	26	34	27	22	21	26	18	15	15	15	16	14	16
10	16	16	15	18	15	15	15	21	27	33	34	39	37	34	32	24	18	16	17	16	15	16	18	17
11	15	16	15	15	18	15	20	21	27	32	33	40	35	42	34	28	27	17	15	15	15	15	15	16
12	16	17	15	15	14	15	17	23	29	32	42	38	47	44	32	29	27	20	16	15	15	18	17	15
13	15	16	15	16	15	15	16	22	28	33	36	38	47	42	35	29	24	18	16	15	15	16	15	15
14	15	15	15	15	15	15	20	21	29	34	44	46	45	42	42	30	28	21	15	16	16	16	17	14
15	15	15	15	15	15	15	17	22	29	33	44	46	45	46	32	30	27	20	15	15	15	16	15	16
16	15	15	15	15	15	15	16	21	28	32	34	45	33	24	22	21	30	20	22	16	16	15	16	15
17	15	16	16	16	15	16	17	24	29	34	24	35	44	47	32	18	26	20	17	20	17	16	15	15
18	16	16	15	15	16		22	23	23	32	24	33	45	29	33	29	28	18	16	15	15	15	15	15
19	16	16	15	15	15	15	17	22	29	32	34	24	27	24	22	21	20	16	15	16	15	15	16	15
20	15	15	15	15	15	15	17	22	26	30	24	34	27	24	22	29	26	20	15	15	15	16	15	15
21	16	15	15	15	15	15	20	22	28	29	48	46	38	29	29	18	22	22	15	15	14	15	15	17
22	15	15	15	15	15	16	17	17	17	22	32	22	39	44	38	30	17	20	15	15	15	15	15	16
23	16	15	16	15	14	15	18	24	16	18	22	21	21	21	21	24	18	20		C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
26	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C									
27	15	16	15	15	15	16	17	26	29	32	27	28	28	26	23	22	24	17	16	15	16	17	18	16
28	16	17	17	14	16	16	20	24	27	30	45	43	45	22	18	18	27	16	17	15	16	17	16	15
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	25	25	25	25	24	24	25	25	25	25	25	25	25	25	25	25	25	24	24	24	24	24	24
MED	15	16	15	15	15	15	17	21	27	32	34	38	38	33	30	29	26	17	16	15	15	16	15	15
U 0	16	16	15	15	15	16	20	23	29	33	43	45	45	44	33	29	27	20	16	16	16	16	16	16
L 0	15	15	15	15	15	15	17	20	26	29	27	32	32	26	22	21	22	16	15	15	15	15	15	15

HOURLY VALUES OF FOF2 AT AKITA

FEB. 1993

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	43	40	35	36	32	26	35	61	66	90	100	92	77	72	92	86	83	67		48		42	46	48
2	36	30	29	23	A	A	A	52	60	73	80	97	85	75	86	72	60	59	34	34	35	31	34	35
3	38	36	35	30	50	29	N	54	60	78	80	94	80	77	84	80	63	50	40	41	40	37	38	N
4	35	37	37	40	35	31	38	60	67	82	77	81	80	84	78	85	73	52	48	43	31	34	36	38
5	41	40	40	40	42	57	52	66	66	80	85	90	91	84	85	77	67	52	54	52	50	44	48	43
6	49	46	46	53	63	54	48	73	52	77	86	87	91	81	75	77	82	66	54	47	35	35	40	36
7	38	48	48	40	56	42	64	45	78	82	85	81	90	84	87	76	80	67	62	32	51	31	34	42
8	35	64	64	62	36		37	60	82	111	115	95	111	107	103	107	116	76	54	54	56	60	64	68
9	66	70	73	66	62	56	51	73	85	100	109	131	117	112	87	87	95	73	N	51	45	35	43	42
10	43	37	40	37	36	36	37	70	91	90	92	107	107	106	88	85	77	62	51	47	37	38	38	41
11	40	40	41	36		N		65	88	91	105	110	112	91	96	91	78	72	50	48	49	41	43	43
12	40	44	46	48	42	36	35	63	81	80	95	108	116	101	91	87	86	67	63	46	35	31	34	34
13	35	38	40	41	35	30	31	62	68	84	84	106	97	85	86	82	80	66	57	51	40	40		37
14	38	40	37	38	37	37	38	72	78	87	90	97	95	82	86	86	84	75	60	38	38	41	37	43
15	43	46	42	43	44	43	48	73	85	90	94	106	110	93	90	84	80	77	51	50	46	41	42	41
16	43	42	44	45	43	40	41	67	88	90	83	106	111	90	81	74	81	70	52	51	43	40	35	34
17	38	40	38	40	42	40	45	67	87	87	104	110	104	86	87	84	86	75						
18											108	124	111	102	91	91	78	76	57	62	44	45	46	42
19	42	44	41		37	38	42	67	105		114					93	88	77						
20																								
21																								
22										90	102	87				107	85	71	59	64	64	34	43	64
23	43	44	44	55	44	44	46	54	82	90	100	110	111	90	96	95	88	73	54	37	50	59	52	56
24	51	52	54	52	51	41	40	67	87	86	90	102	112	106	92		86	73	50	42	41	38	41	38
25	43	44	51	46	43	34	36	66	82	87	92	98	110	106	106	96	90	81	64	51	43	35	A	32
26																								
27	38	38	40	40	41	41	43	66	78	84	87	96	97	107	102	101	83	79	58	50	46	51	35	35
28	36	38	40	38	37	37	44	70	81	87	90	107	112	105	105	87	97	98	75	58	57	48	44	48
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	23	23	23	22	21	20	20	23	23	23	25	24	23	23	23	24	25	25	21	23	22	23	21	22
MED	40	40	41	40	42	39	42	66	81	87	92	100	107	90	88	86	83	72	54	48	44	40	41	42
U Q	43	46	46	48	47	42	47	70	87	90	103	107	111	106	96	92	87	76	59	51	50	44	45	43
L Q	38	38	38	38	36	35	37	60	67	82	85	93	91	84	86	81	78	66	50	42	38	35	35	36

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT AKITA

FEB. 1993

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	G	G	G	G	G	G	G	G	G	40	60	G	G	G	G	G	50	30		28		40	G	31
2	G	24	G	G	30	32	34	28	40	49	42	50	48	G	G	G	G	G	G	G	G	G	G	29
3	G	G	G	G	G	G	G	G	G	G	G	42	G	G	G	G	G	G	G	G	G	G	G	G
4	G	G	G	G	G	G	G	G	34	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
5	G	G	G	G	G	G	G	26	G	40	G	G	G	G	G	G	G	30	37	33	39	28	G	G
6	G	G	G	G	G	G	G	G	G	36	G	G	G	G	G	G	G	G	26	G	G	G	G	G
7	G	G	G	G	G	G	G	G	G	G	G	G	G	G	43	44	G	30	G	G	G	G	33	30
8	33	27	29	G	G	G	G	26	33	G	46	59	44	57	40	37	G	G	G	G	G	G	G	G
9	G	G	26	58	26	G	G	28	32	42	G	55	44	44	52	46	G	G	28	G	G	G	G	G
10	G	G	G	G	G	G	G	G	G	55	42	51	52	49	51	51	40	29	G	27	40	G	24	G
11	G	G	G	G		G		G	34	37	50	42	40	41	40	37	G	G	G	G	G	G	G	G
12	24	27	G	26	G	G	G	G	G	38	G	40	40	G	40	G	G	G	40	G	G	G	G	G
13	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	40	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	34	33	28	G	G	G	G	G
15	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	37	G	G	G	G	G	G	G	G
16	G	G	G	G	27	28	G	G	G	G	G	G	G	49	G	37	G	G	G	G	G	G	G	G
17	G	G	G	G	24	G	G	G	G	G	G	G	84	41	41	37	G	G						
18											G	G	40	G	G	G	45	G	G	G	29	G	G	G
19	25	G	G	G	G	119	G	G	G		40					53	G	G						
20																								
21																								
22										G	42	58				41	33	G	G	G	G	G	G	G
23	G	G	G	G	G	G	G	G	36	G	G	G	G	50	49	47	40	G	G	G	G	G	G	G
24	G	G	G	28	G	G	G	G	G	G	G	40	50	52	54		G	G	G	G	G	G	G	G
25	G	G	G	G	G	G	G	42	G	40	41	G	42	62	G	G	44	32	36	G	G	26	26	G
26																								
27	G	G	G	G	G	26	26	G	G	G	G	46	49	51	40	38	G	G	G	G	G	G	G	G
28	30	30	G	G	G	G	G	G	G	G	G	G	G	G	G	42	44	40	24	25	29	28	G	G
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	23	23	23	23	22	23	22	23	23	23	25	24	23	23	23	24	25	25	22	23	22	23	23	23
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	37	G	G	G	G	G	G	G	G
U Q	G	G	G	G	G	G	G	G	32	40	41	44	44	49	41	41	37	29	26	G	G	G	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 AKITA

FEB. 1993

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	16	16	18	16	18	29	22	23	35	23	20	20	17	16	16		16		17	18	17
2	18	18	15	15	15	16	17	17	17	18	21	22	24	26	35	17	26	18	18	16	16	17	17	16
3	16	16	16	17	16	17	17	18	24	18	20	20	37	35	24	23	27	17	16	17	17	16	18	20
4	18	16	18	16	16	15	16	17	16	16	17	17	21	20	20	17	26	17	16	16	16	16	17	17
5	16	17	16	17	16	16	17	18	16	17	23	22	34	37	35	36	26	15	16	20	16	18	18	18
6	17	16	16	16	16	15	16	18	16	17	18	21	20	24	20	18	27	17	17	17	18	18	20	18
7	17	16	16	15	16	17	17	18	28	16	26	23	26	21	20	20	27	20	17	16	18	16	16	18
8	16	17	16	17	17	17	17	20	16	20	21	21	21	22	18	16	18	18	16	18	16	16	16	16
9	18	17	15	15	16	16	18	20	16	17	20	23	22	24	21	18	17	20	17	16	17	18	18	16
10	17	17	18	16	17	17	17	16	17	17	18	20	17	17	16	16	16	16	17	16	16	18	17	16
11	18	16	16	17		17		21	17	17	21	18	20	22	20	17	16	20	16	16	16	20	16	16
12	20	17	16	16	16	18	16	16	16	18	20	20	17	22	18	18	26	20	17	18	20	18	16	17
13	16	16	16	16	17	18	16	21	16	20	20	21	18	16	21	17	16	21	16	17	17	18	16	18
14	17	18	15	17	17	17	17	16	17	17	35	18	16	21	23	21	17	20	16	18	17	16	18	18
15	18	17	16	16	18	17	16	22	28	22	23	35	36	21	18	17	17	20	17	17	17	16	18	17
16	15	17	15	16	15	15	17	21	16	20	16	16	16	17	20	16	16	21	16	17	18	17	20	18
17	15	16	17	17	17	16	18	21	16	17	18	17	16	20	16	20	15	20						
18											16	17	18	18	18	17	17	18	16	17	18	16	16	17
19	17	16	17	20	17	16	18	22	17		17					17	17	21						
20																								
21																								
22										17	17	18				17	17	22	16	16	17	15	17	17
23	17	18	15	16	15	16	18	23	17	16	20	20	20	18	21	18	17	16	17	16	15	18	17	17
24	17	16	15	15	15	17	17	20	17	16	20	21	20	20	17		16	21	16	18	16	18	17	17
25	16	18	15	15	15	17	17	23	16	16	17	17	18	20	21	18	16	16	16	17	16	16	17	16
26																								
27	17	18	15	15	16	17	17	17	16	16	17	17	20	17	18	16	16	21	16	17	17	17	17	17
28	16	16	16	16	16	16	17	20	16	16	16	16	20	20	17	16	16	16	17	16	17	16	18	18
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	23	23	23	23	22	23	22	23	23	23	25	24	23	23	23	24	25	25	22	23	22	23	23	23
MED	17	17	16	16	16	17	17	20	16	17	20	20	20	20	20	17	17	20	16	17	17	17	17	17
U 0	18	17	16	17	17	17	17	21	17	18	21	21	23	22	21	18	26	20	17	17	17	18	18	18
L 0	16	16	15	15	16	16	16	17	16	16	17	17	18	18	18	17	16	16	16	16	16	16	16	16

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT KOKUBUNJI

FEB. 1993

LAT. 35.7N LON. 139.5E 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	46	42	35	32	38	32	37	58	71	82	104	115	82	78	86	93	88	72	66	63	56	50	51	52
2	41	32	30	30	30	32	35	58	68	74	92	97	97	91	86	86	78	62	40	32	37	35	35	34
3	40	41	38	41	29	26	28	56	71	67	74	88	85	77	80	81	65	55	41	43	47	46	43	46
4	46	37	41	38	35	29	28	67	72	81	86	78	82	88	80	86	86	57	58	46	44	36	35	36
5	34	37	38	41	35	38	44	60	68	75	91	92	85	82	84	82	67	55	50	56	60	44	42	41
6	36	46	48	48	51	51	49	66	78	77	87	104	92		74	80	81	72	50	46	46	43	41	40
7	44	44	46	43	40	37	38	66	85	92	82	88	101	94	96	90	78	77	58	43	38	35	37	48
8	38	40	37	37	48	36	38	63	68	108	112	96	101	117	110	110	104	77	58	60	54	56	63	61
9	58	67	65	60	54	60	62	77	87	108	116	118	128	112	101	87	98	80	67	60	48	A	45	47
10	44	41	41	40	37	35	47	64	95	102	104	105	117	107	92	88	89	67	62	45	40	40	40	35
11	46	41	40	40		N	26	72	82	92	95	117	124	112	102	97	86	71	62	53	51	45	40	41
12	44	41	44	44	42	A	36	67	85	90	96	110	120	112	96	95	87	80	72	51	37	36	A	36
13	A	A	35	41	31	29	32	64	77	84	86	104	104	95	85	82	86	71	63	60	43	43	40	38
14	44	41	38	43	36	37	47	94	92	98	95	98	104	87	82	85	93	75	71	47	38	38	46	40
15	41	41	46	43	42	42	45	69	90	90	101	97	112	92	90	85	86	84	62	50	46	43	43	41
16	44	48	46	44	43	38	38	64	95	97	91	101	112	102	85	80	85	74	63	49	48	38	38	33
17	40	46	40	37	38	37	40	68	92	102	98	108	106	96	87	78	87	87	66	60	44	41	39	49
18	46	41	40	42	37	35	38	71	101	130	121	122	117	105	105	96	78	72	63	58	50	43	46	43
19	42	45	45	42	33	46	46	70	98	113	107	120	117	110	100	91	91	78	58	48	45	47	54	48
20	47	48	49	52	46	45	45	70	88	123	131	142	148	114	104	96	90	68	66	50	44	43	49	45
21	43	48	44	43	37	46	38	70	94	104	114	144	135	106	92	90	85	77	64	58	46	43	39	42
22	43	48	42	41	36	43	46	72	97	112	104	100	106	104	104	101	82	73	62	54	50	54	42	48
23	54	44	46	46	42	37	46	72	77	100	108	127	110	112	100	102	97	77	56	40	46	43	41	A
24																								
25	43	44	46	50	38	30	46	70	80	92	96	103	121	125	122	122	106	94	72	62	A	40	35	A
26	A	36	38	41	46	26	43	68	80	91	88	101	106	111	111	104	90	75	63	54	55	44	41	44
27	42	34	43	44	41	38	46	72	76	86	90	97	104	107	106	106	90	78	67	64	51	44	33	37
28	38	38	46	40	47	38	46	70	85	92	94	105	117	115	102	92	102	98	83	70	58	53	A	50
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	26	27	27	26	25	27	27	27	27	27	27	27	26	27	27	27	27	27	27	26	26	25	25
MED	43	41	42	42	38	37	43	68	85	92	96	104	106	106	96	90	87	75	63	53	46	43	41	42
U Q	46	46	46	44	43	42	46	71	92	104	107	117	117	112	104	97	91	78	66	60	51	45	45	48
L Q	40	40	38	40	36	32	37	64	76	84	90	97	101	92	85	85	82	71	58	46	44	40	38	37

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT KOKUBUNJI

FEB. 1993

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	28	G	51	57	54	45	54	61	G	G	G	G	G	38	40	28	51
2	44	G	G	G	G	G	24	G	34	62	61	52	44	47	48	37	G	G	27	29	24	G	28	29
3	G	26	G	G	23	G	G	G	G	G	40	G	G	40	G	38	G	G	G	22	26	28	26	27
4	24	G	G	G	G	G	G	26	33	51	G	G	G	G	G	G	G	G	24	G	G	G	G	25
5	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	61	33	28	34	G	25
6	G	G	G	G	G	G	G	28	34	36	41	44	41	G	G	36	G	29	G	G	G	G	G	G
7	G	G	G	G	G	G	G	G	G	G	41	G	G	47	44	G	G	G	G	G	G	G	G	56
8	G	G	G	G	G	G	G	26	G	44	42	42	42	41	40	G	G	G	G	G	G	G	G	G
9	G	24	G	G	G	G	G	G	44	40	49	62	54	42	41	38	G	G	G	G	G	28	G	G
10	G	G	G	G	G	G	G	G	G	G	40	41	G	G	G	G	32	G	G	G	G	24	G	29
11	G	G	G	G		G	G	G	G	37	G	50	G	G	40	G	G	G	G	G	G	G	G	G
12	G	G	28	G	25	28	26	G	G	38	44	45	44	G	G	81	49	28	G	G	G	26	28	24
13	39	46	G	G	G	G	G	G	G	G	44	G	54	G	G	40	G	38	30	26	26	24	G	G
14	G	G	G	G	G	G	G	30	G	G	G	55	G	G	58	47	34	G	G	G	G	25	G	G
15	G	G	G	G	G	G	G	38	G	G	G	G	G	G	G	38	G	G	G	G	G	G	G	G
16	G	G	G	G	G	G	G	29	44	G	G	G	46	G	41	G	G	G	G	G	G	G	G	G
17	G	G	G	G	G	G	G	G	G	G	44	41	43	G	G	38	41	28	24	G	G	G	G	G
18	G	G	G	G	G	G	G	28	G	G	G	G	G	49	G	G	G	28	G	G	28	37	G	G
19	G	G	G	G	23	G	G	30	34	40	42	42	44	43	44	39	34	G	25	G	G	31	G	G
20	G	G	G	G	G	G	G	G	G	G	G	G	42	48	G	G	G	G	G	G	G	G	G	G
21	G	G	G	G	G	G	G	29	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
22	G	G	G	G	41	G	G	G	G	G	G	48	G	44	40	G	44	G	G	G	G	G	G	G
23	G	G	G	G	G	G	G	42	G	G	43	44	49	48	55	48	37	G	G	25	26	23	G	40
24																								
25	G	G	G	36	27	G	G	G	G	G	40	42	49	51	G	G	34	G	G	G	43	G	24	36
26	28	G	G	G	G	G	G	G	G	42	44	48	46	45	42	39	42	G	44	29	G	G	G	G
27	G	G	G	G	G	G	G	G	G	40	46	52	47	50	54	G	G	G	G	G	28	G	G	G
28	G	G	G	G	G	G	G	G	G	G	N	G	49	G	G	G	55	32	G	G	41	24	48	G
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	27	27	26	27	27	27	27	27	26	27	27	27	27	27	27	27	27	27	27	27	27	27
MED	G	G	G	G	G	G	G	G	G	G	40	42	42	40	G	G	G	G	G	G	G	G	G	G
U Q	G	G	G	G	G	G	G	28	G	40	44	48	46	47	44	38	34	G	24	G	26	26	G	27
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

FEB. 1993

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	14	15	15	15	17	15	15	15	17	16	16	29	20	18	18	17	16	18	15	14	15	15	14	15
2	15	15	17	15	14	15	15	15	15	14	18	20	20	27	18	15	16	20	15	15	16	16	15	15
3	15	14	14	14	16	17	17	15	15	16	17	16	20	15	26	18	17	20	15	16	15	16	15	15
4	15	15	15	16	14	15	16	16	15	15	16	16	16	17	16	16	14	20	16	16	15	16	15	15
5	15	15	14	15	15	15	15	17	16	18	18	21	37	36	34	34	20	21	15	15	15	14	15	15
6	15	15	14	14	14	15	15	15	15	15	20	24	20	20	18	17	16	15	15	15	15	15	16	16
7	15	15	15	15	15	16	16	16	15	17	18	39	22	21	22	18	14	21	17	15	15	15	17	15
8	16	16	16	14	16	16	15	14	14	15	17	17	18	23	18	17	15	21	15	15	15	15	14	15
9	15	15	14	14	14	15	15	15	15	17	18	23	22	23	18	17	16	20	15	15	15	15	15	15
10	15	15	15	15	14	15	15	15	16	18	17	16	16	20	18	17	16	22	15	15	14	14	15	15
11	15	16	14	15			17	16	15	15	17	16	18	17	20	17	16	20	16	15	15	15	14	15
12	16	15	15	14	14	14	15	16	16	17	22	20	18	16	20	15	15	15	17	14	15	15	14	15
13	15	14	16	14	15	17	15	17	15	15	15	16	16	16	16	15	14	14	15	14	16	15	15	15
14	15	15	15	14	15	15	15	16	15	16	36	20	17	16	15	15	16	23	17	15	15	16	15	15
15	15	15	15	15	14	16	14	16	17	20	20	28	18	18	18	15	14	21	15	15	16	16	15	15
16	15	15	15	14	15	15	16	16	14	15	15	16	24	21	17	17	16	22	15	15	15	15	16	15
17	15	15	14	15	14	15	15	17	14	15	16	16	17	28	16	16	14	15	15	16	14	16	16	15
18	15	16	14	15	15	15	15	20	15	15	16	17	17	16	17	16	17	16	15	15	14	14	15	15
19	15	15	15	15	16	15	15	17	18	16	16	16	18	17	17	17	15	14	16	15	16	14	14	16
20	15	14	15	14	15	16	15	21	15	14	17	18	18	21	18	20	15	23	15	15	15	15	15	15
21	15	15	14	15	15	15	15	15	15	15	35	17	16	16	35	17	16	22	15	15	15	15	15	20
22	15	14	14	15	14	16	16	14	14	15	16	16	17	16	14	15	14	23	15	15	15	15	15	15
23	15	15	15	14	14	14	15	18	15	15	18	17	23	18	18	16	17	27	15	18	15	15	16	15
24																								
25	15	15	14	15	15	18	15	15	15	16	17	18	18	16	18	20	14	16	15	15	16	15	15	15
26	15	15	14	14	15	16	15	16	15	15	16	17	17	16	16	16	14	17	15	16	15	14	15	16
27	15	15	15	14	14	15	15	21	16	15	17	18	16	18	16	16	16	21	15	14	15	15	15	16
28	16	15	15	15	15	15	16	15	14	14	16	16	16	17	16	16	15	16	15	15	14	15	14	15
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	27	27	26	26	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
MED	15	15	15	15	15	15	15	16	15	15	17	17	18	18	18	17	16	20	15	15	15	15	15	15
U 0	15	15	15	15	15	16	16	17	16	16	18	20	20	21	18	17	16	22	15	15	15	15	15	15
L 0	15	15	14	14	14	15	15	15	15	15	16	16	17	16	16	16	14	16	15	15	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT YAMAGAWA

FEB. 1993

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	62	36	41			51		53	66		112	108	94	84	86	103	90		64	67	66	78	64	52
2		43	35	33	41	34		37	70			110	106	101	108	118	95		73	44		42	44	41
3	34	42	46	46		46	37	52	70	67	66	87		100	87	82	86	82		42	62	52	42	70
4	34		37	36	42	46		38	72		78	90	116	112		105	96	86	77		63		34	37
5	51		36	50	42	46	29	41	62	77	77	95	106	90	97	81	90		62	51	54		31	
6	34		36	41			39	52					100		87	81	90	101	82		72		54	58
7		43			40	46	46	51	77		90		104		130	110	107	108	97	73			61	52
8		41	41	35					74	97	120	91		121	120	112	112	86	75	60	54	51	57	58
9	52		54	52	50			54	85	97		118	137	133	140	124	131	131	111	90	83	59	61	53
10		43	47	50	47	33	34	53	88	102	106	106	116	121	122	130	121	112	86	63		50	37	
11	42	42		40	51	51	47	53	96	90	92	111	122	131	122	134	121		100	85	77	54	41	41
12	37		42	38		36	46		75	97	101	103	121	128	111	103	106	112	87	83				42
13		37	A	45	40		30	42	78	81	97		104	111		95	102	97		76	53	53	50	42
14		29		34	42	37	36	52	84	102	104	103	105	105	92	105		111	104		66	62	61	52
15	32	38		36		31		50		90	104	97	110	108	96		95	91	82	61			38	37
16		66	46	52	50	50	43		84	107	105	96	116	116	107	95	86	97	87		78			
17	42	37	38	40	34	36		42	84	104	115	96	114	112	91	93	96	96	84	64	49			53
18	A	66	43			51		53		128	144	147	135	135	136	133	112	94	85		66	66		48
19		59	62	38	38	42	38		87	108	96	102	124	126	107	105	106	100	81			52	42	
20	50	48	62	50	49			44	77	108	136	137	161	135	131	131	114	91	85		60	60		42
21		53			37	37	37	53	82	102	105	146	154	126		112	103	97	97		60	53	41	53
22	32	60	43	40	51	34	37	53	85	125	111	108	111	117	114	108	101		86	66	53	63		41
23		34		46	46	31	38	60	78	90	108	120	115	108	108	112	115	96		54	52	58	34	
24																								
25	71	47	42	40	51	51			80	78	91	107	122	134	138	140	141	131	109	90	67	52	59	65
26	69		40	47		A		52	70	82	91	105	115	124	119	124	105	98	87	66	62	A	53	
27	31	25	49	42	48	42	34		76	84	97	101	107	122	133	134	131		108	87	87	74		30
28		51		41	42	37	43	61		84		104	111	125	112	97	103	108	105	90	82	73	64	64
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	15	21	19	23	19	21	16	21	23	22	23	24	25	25	24	26	26	21	24	19	21	18	20	21
MED	42	43	42	41	42	42	38	52	78	97	104	104	115	121	112	109	104	97	86	66	63	56	47	52
U Q	52	52	47	47	50	48	43	53	84	104	111	110	122	127	126	124	114	109	98	85	74	63	60	55
L Q	34	37	38	38	40	35	35	43	72	84	91	96	106	108	96	97	95	92	81	60	54	52	39	41

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT YAMAGAWA

FEB. 1993

LAT. 31.2N LON. 130.6E 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	G	G	G			G		G	G		51	50	G	106	95	94	G		27	32	G	G	G	G
2		27	23	G	28	G		G	G			68	74	47	40	49	G		40	G		G	G	G
3	G	G	28	26		G	G	G	G	G	41	50		72	76	66	G	G		24	G	G	G	G
4	G		G	G	G	G		G	G		48	G	G	G		G	39	G	24		G		27	G
5	G		G	G	G	G	G	G	G	41	43	43	G	46	G	G	51		G	G	G		24	
6	G		23	G			G	G					42		G	G	G	G	G		G		G	G
7		G			26	G	G	G	G		42	G	G		G	39	46	G	G	27			G	G
8		G	26	31					G	G	G	46		43	44	40	G	34	G	25	28	26	29	G
9	G		G	G	G			G	G	G		50	50	54	45	G	37	G	G	26	24	26	G	40
10		24	25	29	24	G	G	G	G	G	G	G	62	72	49	G	G	G	G	28		G	31	
11	24	G		G	G	G	G	G	G	G	45	43	G	G	G	G	G		G	G	G	G	G	G
12	G		G	G		G	G		G	36	G	G	G	G	52	G	36	G	G	G				G
13		G	43	25	G		G	G	G	G	G	G	G	G		55	44	40		G	G	G	G	G
14		G		G	G	G	G	G	G	G	G	44	42	43	G	G		G	G		G	G	G	G
15	G	G		G		G		G		G	G	G	46	G	G		G	G	G	26			25	G
16		31	25	G	G	G	G		G	G	G	G	G	G	G	G	38	G	G		G			
17	G	G	G	G	G	G		G	G	G	G	G	G	G	44	G	37	G	G	G	G			26
18	57	G	G			G		G		G	40	G	43	G	G	48	50	G	28		27	G		G
19		G	24	26	G	G	G		G	G	G	G	43	45	46	G	38	G	G			29	G	
20	24	24	24	23	G			G	G	G	G	G	45	43	G	G	G	33	G		37	26		24
21		G			G	G	G	G	32	G	G	46	43	45	G	G	G	G	31		G	G	G	G
22	G	G	G	G	G	G	G	28	G	G	N	G	G	G	50	40	G		G	G	G	G		G
23		G		G	G	G	G	26	G	G	G	G	G	G	G	G	39	34		G	G	G	G	G
24																								
25	G	G	G	G	G	G			G	G	40	G	G	G	44	G	G	G	G	G	G	G	G	G
26	G		23	24		24		G	G	G	G	47	51	45	42	G	39	G	G	G	G	33	G	
27	G	40	24	G	G	G	G		G	G	G	G	48	49	49	G	44		28	24	G	G		G
28		G		G	G	G	G	G		G	G	46	G	G	G	G	G	G	G	G	27	36	G	G
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	16	21	20	23	19	22	16	21	23	22	23	26	25	25	25	26	26	21	24	19	21	19	20	22
MED	G	G	23	G	G	G	G	G	G	G	G	G	G	43	40	G	18	G	G	G	G	G	G	G
U Q	G	12	24	24	G	G	G	G	G	G	41	46	45	46	47	40	39	G	12	26	12	26	12	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 YAMAGAWA

FEB. 1993

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	15	15	15			16		15	16		17	35	27	18	22	20			15	15	15	15	15	15
2		15	15	15	15	15		15	16			16	17	32	23	21	16		15	15		15	15	15
3	15	15	15	15		15	15	15	15	17	16	18		18	18	21	18	16		15	15	16	15	15
4	15		15	15	15	16		15	15		16	20	22	21			18	15	17		15		15	16
5	15		15	15	15	15	15	17	16	16	17	28		34		C	22		15	15	15		15	
6	15		15	15			15	15					23		18	17			16		15		15	15
7		15			15	15	15	15	16		17					17	17	16	17	15			15	15
8		15	15	14					16	16	17	17		30	24	17		15	17	15	15	15	15	15
9	15		15	15	15			16	15	16		29	32	30	21	20	16	16	17	15	15	15	15	15
10		15	15	15	15	15	15	16	16	18		18	36	36	21			15	16	16		16	15	
11	15	15		15	15		15	16	16	15	17	28	20	39	38		17		18	16	15	15	15	15
12	15		15	15		15	16		15	17			38	36	20	16	17	17	16	15				15
13		16	15	16	15		15	17	16	16	16		39			16	16	15		15	15	15	15	15
14		15		15	15	15	15	16	16		21	32	33	26	35	17		16	18		15	15	15	15
15	16	15		15		15		17		15	17	35	33	30	37		16		17	15			15	15
16		15	15	15	15	15	15		16	16	18	36	18				17	16	18		15			
17	15	15	15	15	15	15		17	15	16	16	17			38	16	16	16	16	15	15			15
18	15	15	15			15		15			22	21	39	38		18	15		15		15	15		15
19		15	16	15	15	15	15		16	16	16	35	30	18	20		16	16	18			15	15	
20	15	16	16	15	15			17	15	16	16		29	30	24	18	16	15	17		16	15		15
21		15			15	15	15	17	15	16	35	28	30	26			17	15	15		15	15	15	15
22	15	15	15	15	16	15	15	15	15	15	18	17	28	38	24	16	17		20	15	15	15		15
23		15		15	15	15	15	17	15	16	16	35	38	38	36	34	20	15		15	15	15	15	16
24																								
25	15	15	15	15	15	15			15	16	17	39	41	42	32	39	17	16	23	15	15	15	15	15
26	15		15	16		16		18	15	15	16	27	20	33	27		16		18	15	15	15	15	
27	15	15	15	15	15	15	15		16	16		18	28	34	32		17		15	15	15	16		15
28		15		15	16	15	15	18		15		18	21	36		17	16	16		15	15	15	15	15
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	16	21	20	23	19	21	16	21	23	20	20	22	22	22	19	17	22	17	23	19	21	19	20	22
MED	15	15	15	15	15	15	15	16	16	16	17	28	30	32	24	17	17	16	17	15	15	15	15	15
U 0	15	15	15	15	15	15	15	17	16	16	17	35	36	36	35	20	17	16	18	15	15	15	15	15
L 0	15	15	15	15	15	15	15	15	15	15	16	18	22	26	21	16	16	15	15	15	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT OKINAWA

FEB. 1993

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	61	43	40	46	35	N		54	63	62	105	112	95	88	91	105	107	91	82		80	78	52	37
2	34	31	35	31	34	34	26	34	80	85	92	119	112	120	145	158	121	142	128	104	64	73	66	52
3	53	44	30				A	41	78	73	71	77	108	118	108	108	118	118	107	76	74	78	61	52
4	53	44	37	32	31	N	N	36	63	77	85	103	127	157	161	146	141	146	121	104	88	88	83	66
5	53	34	35	36	34	32		35	65	85	87	90	105	104	110	122	112	104	88	51	66	66	52	42
6	34	34	A	35	31	36	34	32	74	90	90	90	104	105	111	104	106	104	110	106	108	111	86	84
7	66	54	42	31	35	34	29	37	78	91	107	104	111	158	170	166	146	146	144	110	62	54	60	62
8	41	37	31	41	35	36	26	49	77	88	105	99	95	119	120	122	111	91	88	84	67	66		61
9	34	43	43	31	34	37	26	37	81	105	98	111	127	145	167	168	168	167	165	145	146	122	106	88
10	87	64	54	52	29	N		42	80	111	134	111	121	145	161	170	171	168	145	110	104	88	58	39
11	A	51	26	35	N			25	86	90	95	120	122	144	167	170	160	145	146	145	110	88	80	76
12	78	44	62	52	29			37	70	91	111	105	122	145	146	146	159	146	145	108	111	87	73	53
13	35	43	43	47	34	26	28	42	71	86	90	100	94	110	117	110	120	130	108	88	83	80	77	35
14	34	32	34	32	34	32	32	43	76	105	106	107	101	110	117	122	145	164	164	159	111	111	104	86
15	61	35	34	35	32	32	36	42	84	90	88	110	101	111	104	106	107	104	91	90	87	78	58	42
16	35	37	34	38	36	34	37	35	76	104	118	111	111	134	143	122	118	122	146	163	145	110	85	86
17	85	85	78	66	34	29	30	37	82	104	111	122	111	126	139	120	116	107	106	104	78	A	54	52
18	34	A	45	19	35	32	32	36	76	111	146	161	124	157	167	163	153	110	144	110	144	131	128	103
19	86	106	88	61	A	A	38	52	85	108	104	111	121	121	144	111	120	121	110	84	77	73	66	34
20	42	28	A	51	31	31	31	32	78	111	141	166	164	146	152	157	146	121	105	107	88	87	66	66
21	43	73	66	43	35	32	149	139		88	106	144	164	140	121	144	146	147	111		104	88		63
22			53	42	34	32	139	149	189	C	133	112	99	146	137	146	118		122	108	85	80	52	34
23	40	34	42	48	28	N	N	53	81	88	111	111	111	112	112	122	140	121	107	88	87	84	66	52
24																								
25	52	36	32	42	40	28	N	52	77	84	94	121	146	168	156	164	160	161	145	111	108	104	90	87
26	52	53	52	54	66	N	N	43	66	80	88	107	121	134	145	140	145	140	121	104	86	88	86	86
27	62	35	43	23	40	35	30	42	66	86	90	106	111	119	146	167	170	170	160	145	142	111	89	66
28	62	34	37	40	43	40	31	51	72	82	89	105	111	118	110	110	111	110	121	122	107	93	86	86
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	25	25	26	24	18	17	27	26	26	27	27	27	27	27	27	27	26	27	25	27	26	25	27
MED	52	43	42	40	34	32	31	42	77	89	104	111	111	126	143	140	140	126	121	107	88	88	73	62
U Q	62	52	52	48	35	35	36	51	81	104	111	119	122	145	156	163	153	146	145	116	110	104	86	86
L Q	35	34	34	32	31	32	28	36	71	85	90	104	104	112	112	111	116	110	107	89	78	78	59	42

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT OKINAWA

FEB. 1993

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	25	G	G	G	G	G		G	G	36	40	54	48	83	63	47	G	60	G	173	32	G	G	G
2	G	G	G	30	G	25	G	G	30	38	40	49	58	84	42	61	38	37	29	32	28	G	40	32
3	G	G	G			G	24	G	G	41	40	56	61	70	76	58	48	54	60	39	G	24	25	G
4	26	G	G	G	G	G	G	G	G	G	G	44	44	G	G	G	G	G	37	24	33	57	28	G
5	G	G	G	G	G	G		24	32	38	44	56	47	46	48	60	81	37	G	G	G	G	G	G
6	G	G	29	G	24	G	G	G	31	G	G	G	46	44	45	G	G	G	34	G	24	G	33	30
7	G	G	G	G	G	28	G	25	30	36	42	56	47	72	67	G	40	34	G	G	38	29	G	G
8	G	G	G	G	G	G	G	24	G	36	40	54	44	48	50	46	44	46	35	26	G	G	G	G
9	G	G	G	G	29	G	24	G	G	36	40	46	56	59	60	44	40	40	40	24	32	30	G	G
10	G	39	33	28	29	25		G	38	G	45	46	G	G	G	G	43	34	29	G	38	40	25	G
11	45	69	33	G	G			G	G	38	40	51	48	44	44	41	40	G	G	30	29	G	G	28
12	23	G	G	G	G			G	31	38	43	44	44	48	G	G	38	34	32	32	24	G	G	23
13	G	27	28	27	G	G	G	G	G	58	G	G	G	G	G	42	46	36	G	G	G	G	G	G
14	G	G	G	G	G	G	G	G	G	36	G	47	46	43	72	41	38	G	G	24	G	G	G	G
15	G	G	G	G	G	G	G	G	G	G	G	47	G	48	48	59	G	35	G	G	24	G	G	G
16	G	G	G	G	G	G	G	G	31	G	G	G	G	56	G	42	39	G	G	G	24	G	G	30
17	22	29	26	G	G	G	G	G	G	G	G	G	G	51	49	48	57	58	G	G	27	28	G	24
18	26	28	30	25	G	G	G	G	G	40	44	45	47	G	G	61	44	43	29	32	32	G	23	G
19	G	G	G	G	70	30	G	G	G	G	40	G	G	50	43	42	G	G	G	28	28	31	G	G
20	G	G	33	G	G	G	G	G	G	G	G	G	48	58	48	G	38	G	G	26	33	40	30	G
21	G	G	G	G	G	G	241	G		G	G	43	50	43	44	41	G	G	G	G	G	G		165
22	24	G	G	G	G	G	247	24	G	C	G	G	48	G	G	G	39		G	G	G	G	G	G
23	G	G	G	G	23	G	G	24	G	G	G	G	G	G	51	44	39	G	G	G	G	G	G	G
24																								
25	G	G	G	G	G	G	G	25	G	38	40	43	50	G	G	G	38	38	34	G	G	29	25	G
26	G	G	G	G	G	G	G	22	G	37	G	47	58	72	60	G	40	35	G	26	G	G	24	G
27	G	G	G	29	G	G	G	24	G	G	44	49	58	51	53	57	48	47	33	24	G	32	22	24
28	G	G	G	G	G	G	G	G	G	G	46	48	52	50	48	G	G	36	G	24	24	G	G	G
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	27	26	26	25	22	27	26	26	27	27	27	27	27	27	27	26	27	27	27	27	26	27
MED	G	G	G	G	G	G	G	G	G	36	40	46	47	48	48	42	39	35	G	24	24	G	G	G
U Q	22	G	26	G	G	G	G	24	30	38	42	49	50	58	53	48	44	40	33	28	32	29	25	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

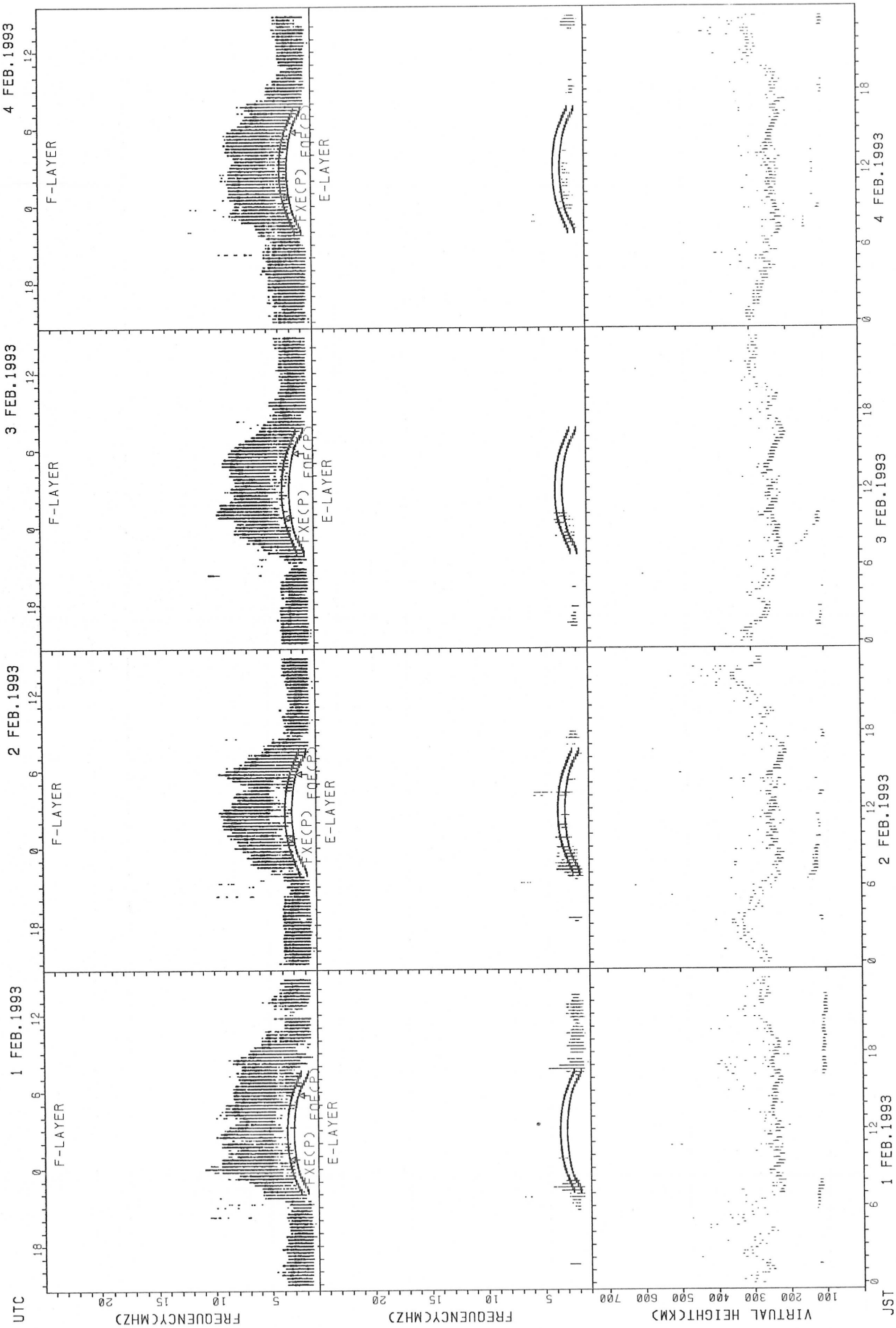
HOURLY VALUES OF FMIN AT OKINAWA

FEB. 1993

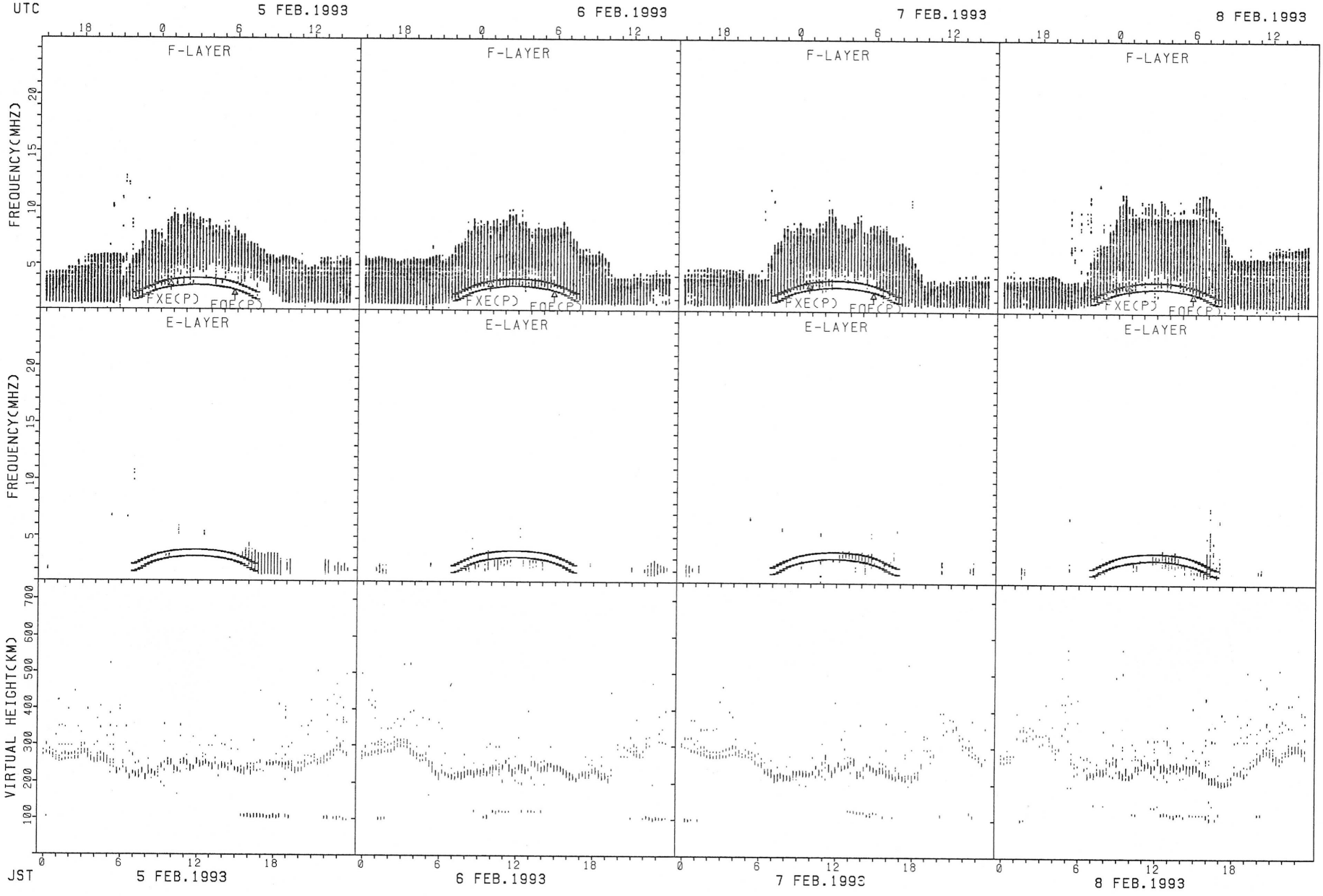
LAT. 26.3N LON. 127.8E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

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

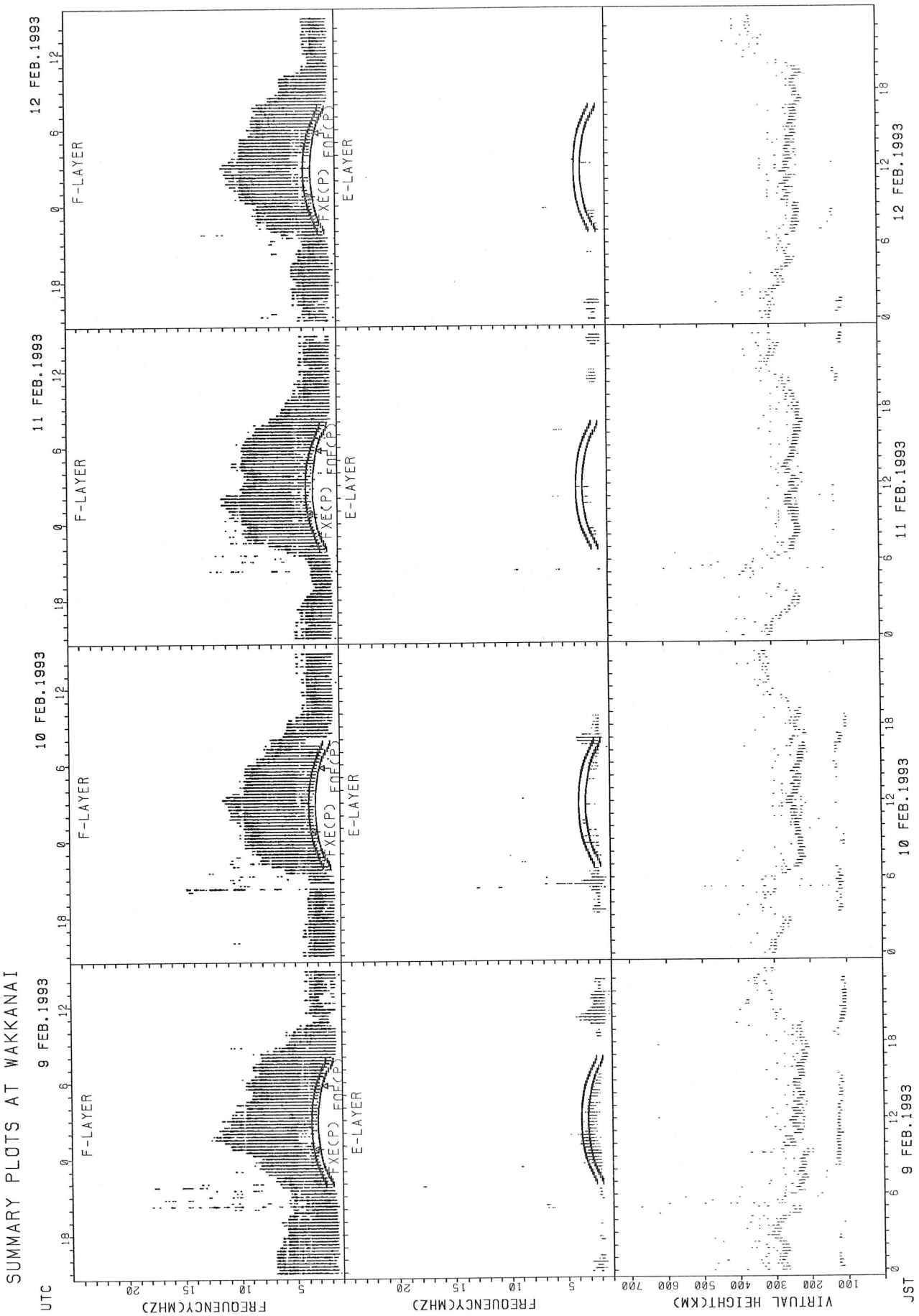
COMMUNICATIONS RESEARCH LABORATORY, JAPAN


SUMMARY PLOTS AT WAKKANAI
1 FEB.1993
2 FEB.1993
3 FEB.1993
4 FEB.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

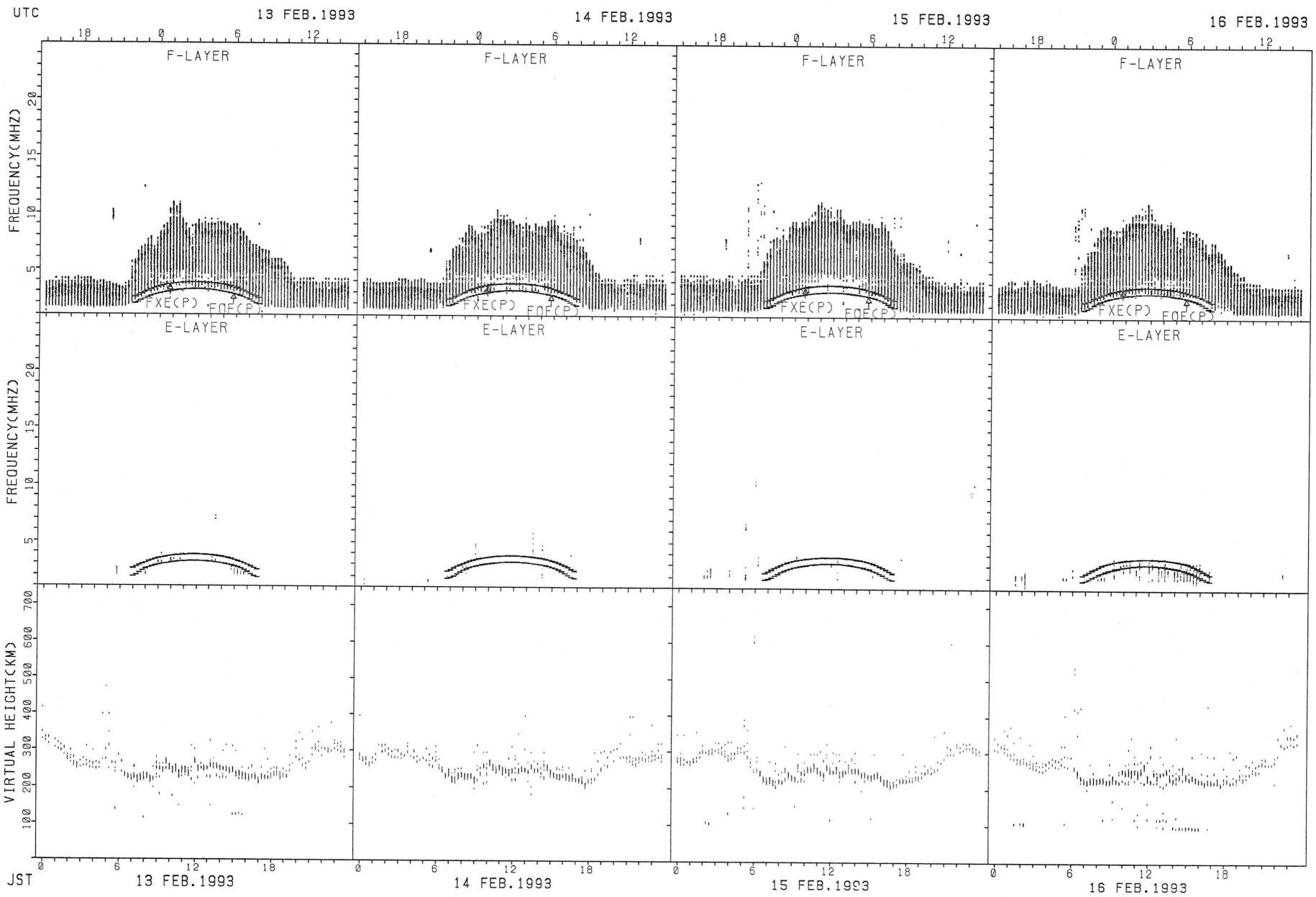
SUMMARY PLOTS AT WAKKANAI



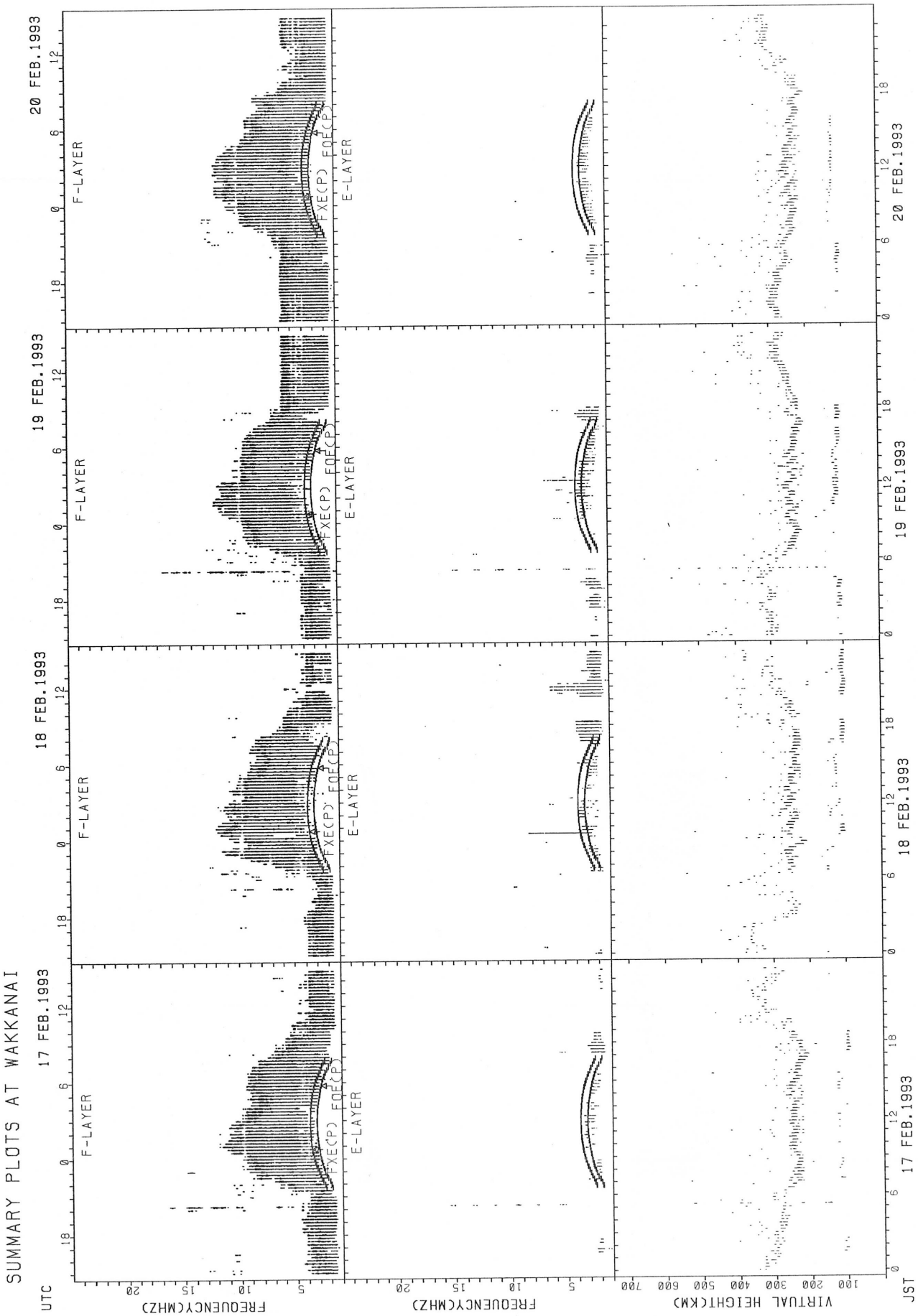
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

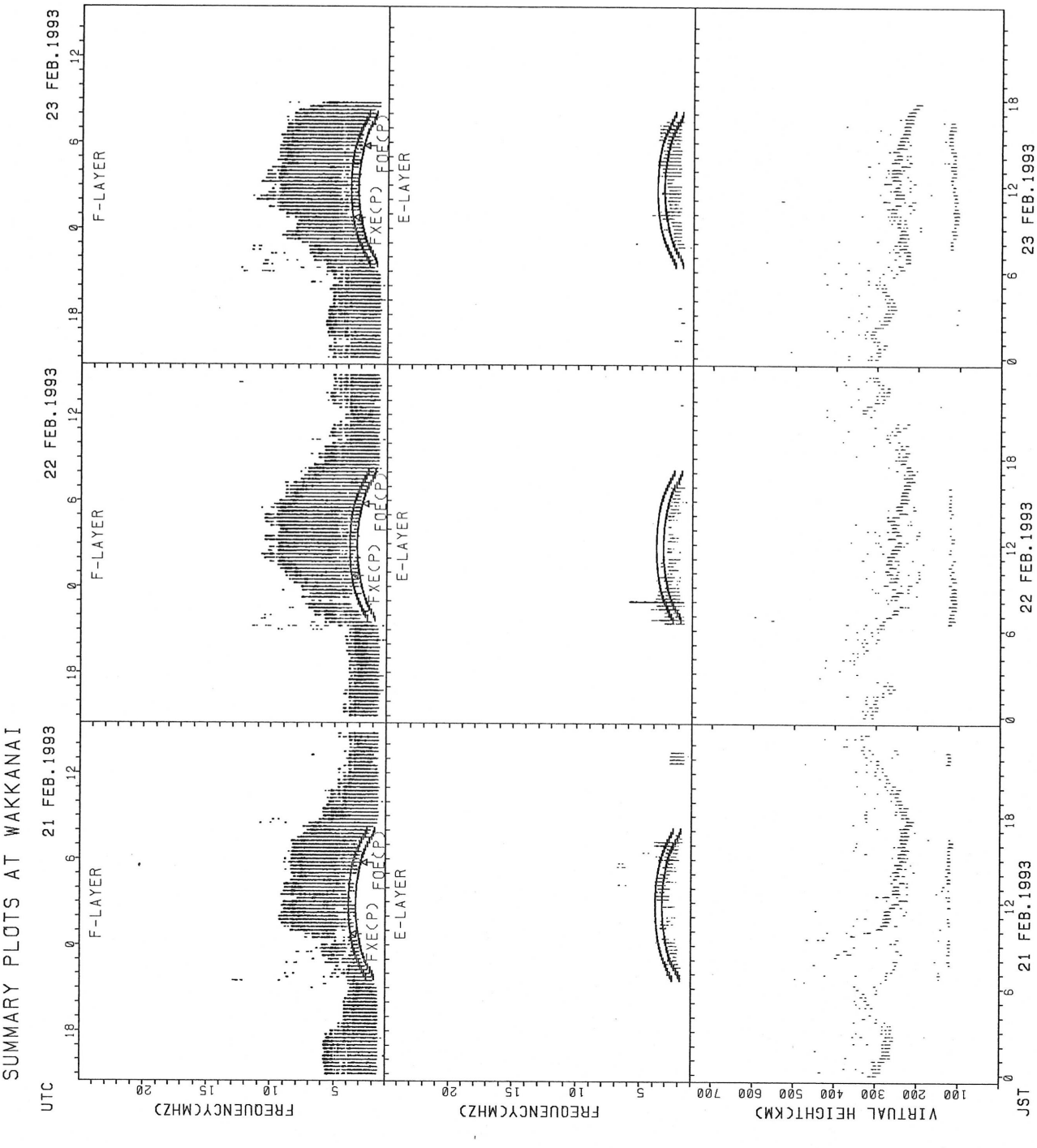

SUMMARY PLOTS AT WAKKANAI
UTC
9 FEB.1993
10 FEB.1993
11 FEB.1993
12 FEB.1993
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT WAKKANAI

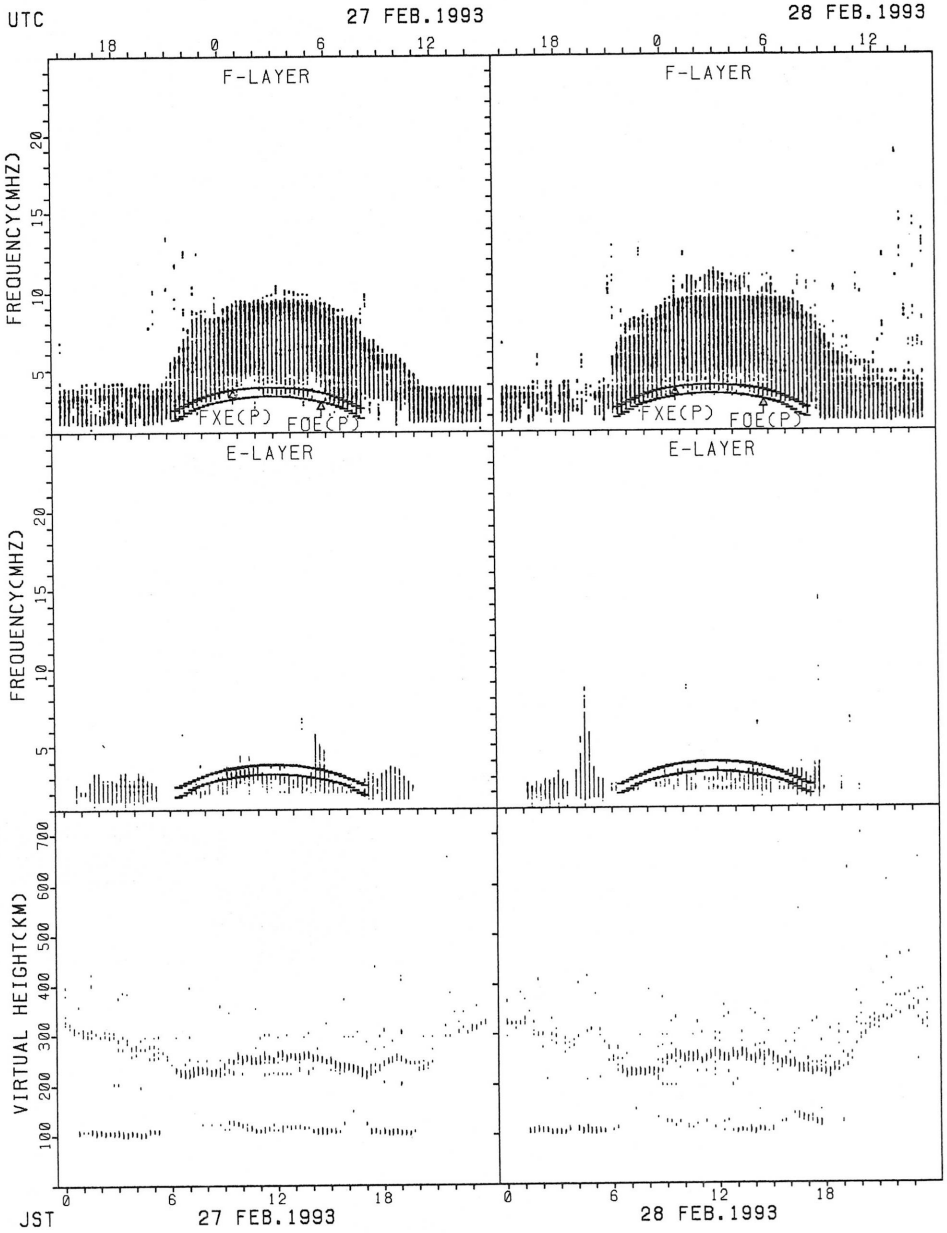


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
17 FEB.1993
18 FEB.1993
19 FEB.1993
20 FEB.1993
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

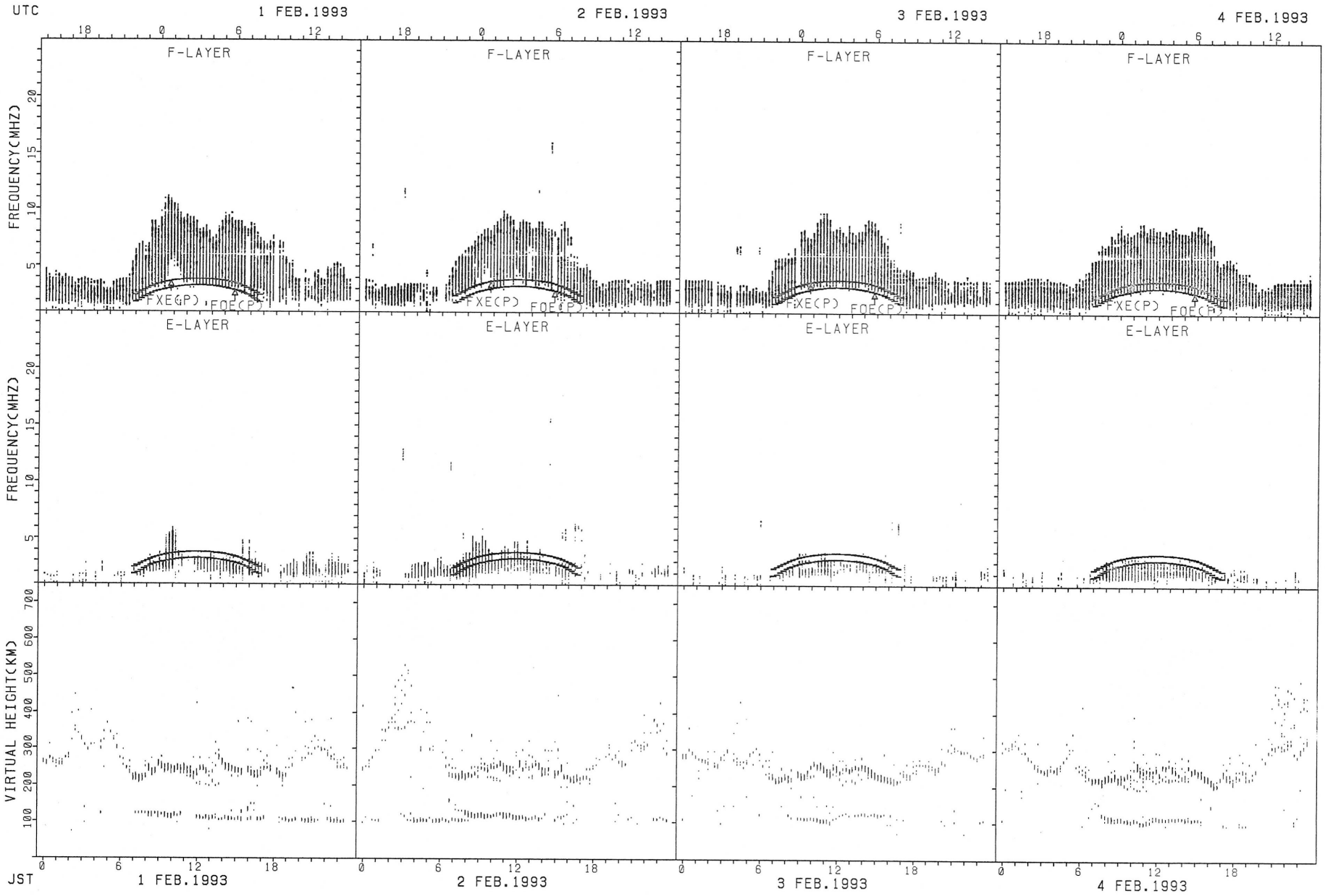

SUMMARY PLOTS AT WAKKANAI
UTC
21 FEB.1993
22 FEB.1993
23 FEB.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT WAKKANAI

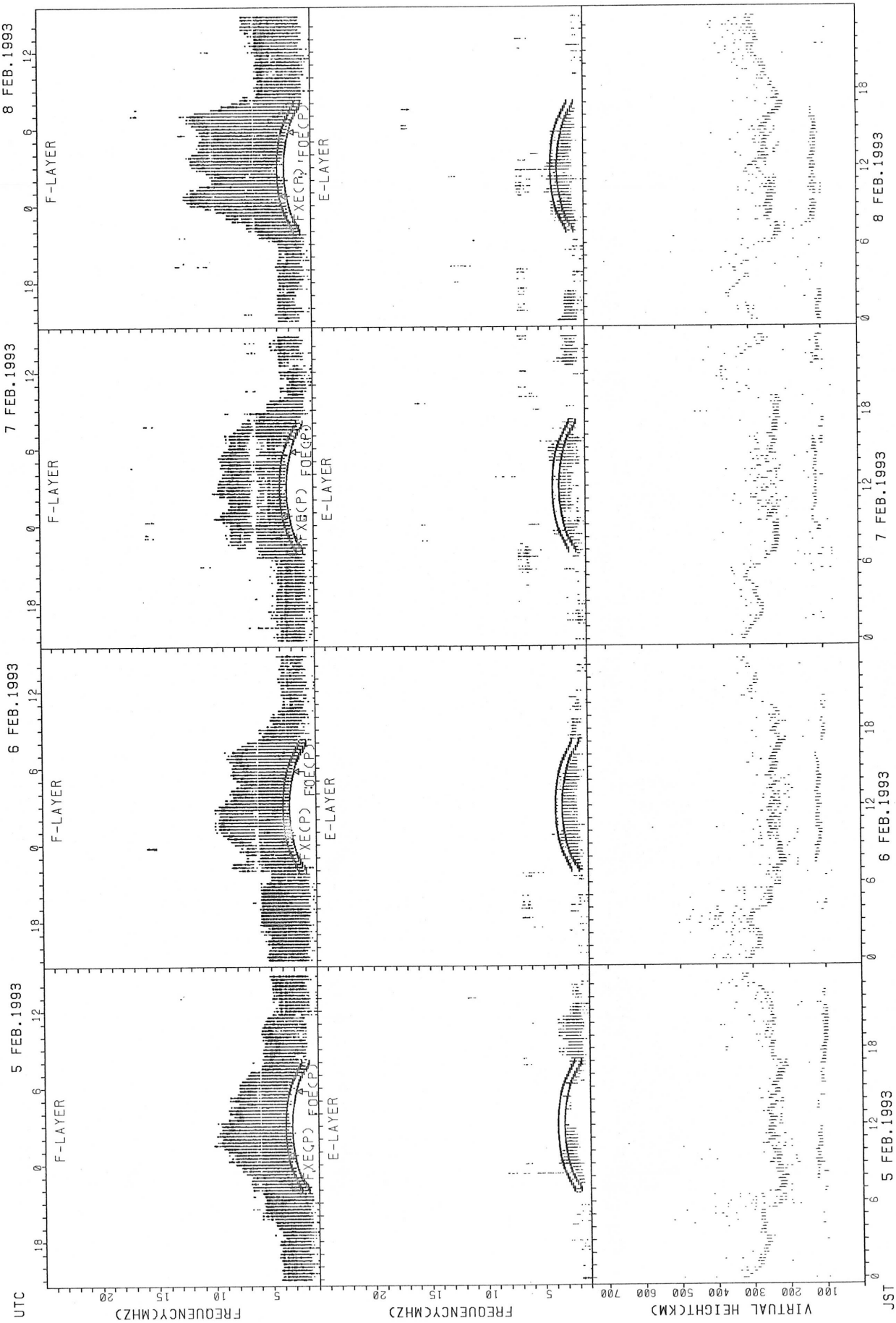


FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

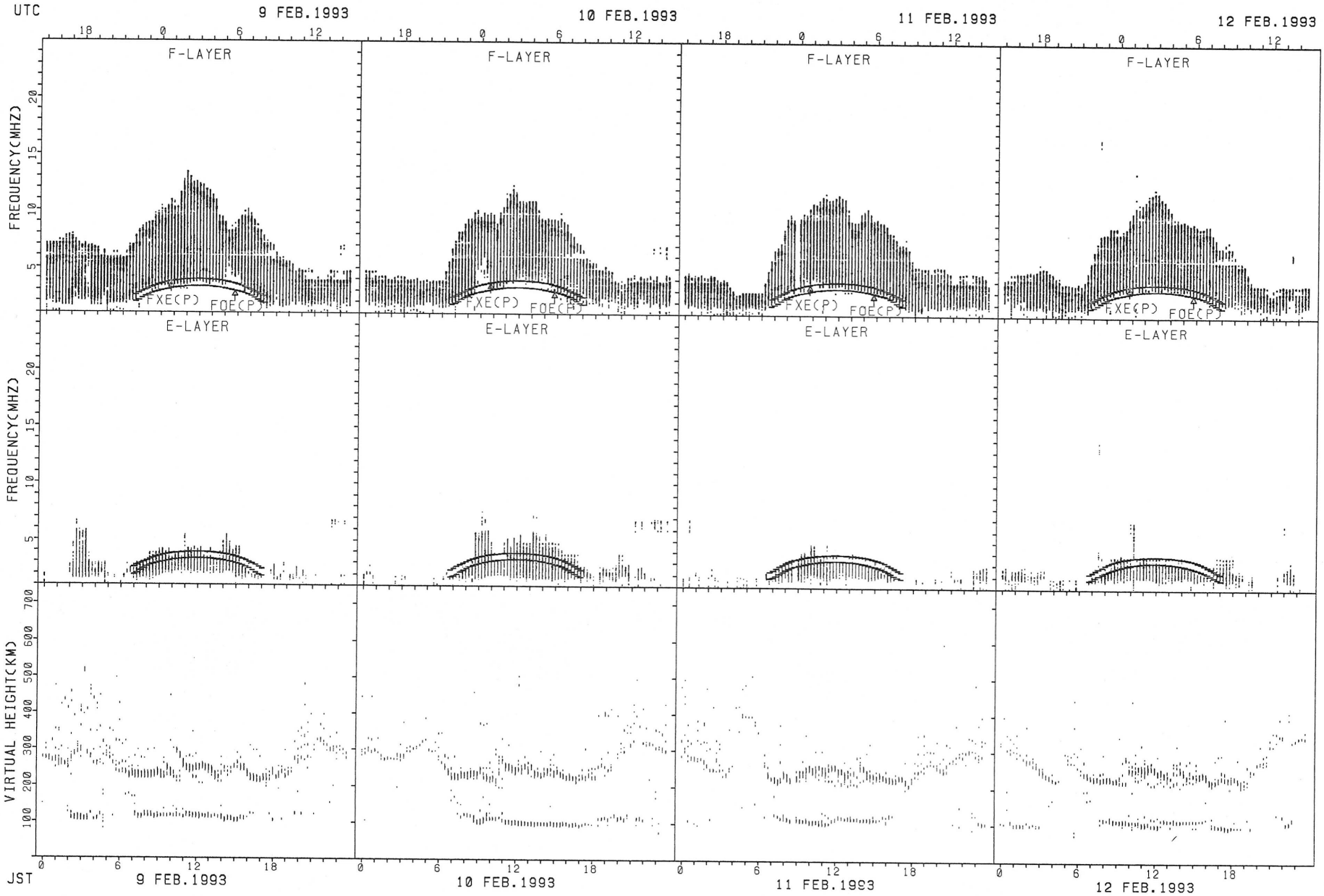
SUMMARY PLOTS AT AKITA



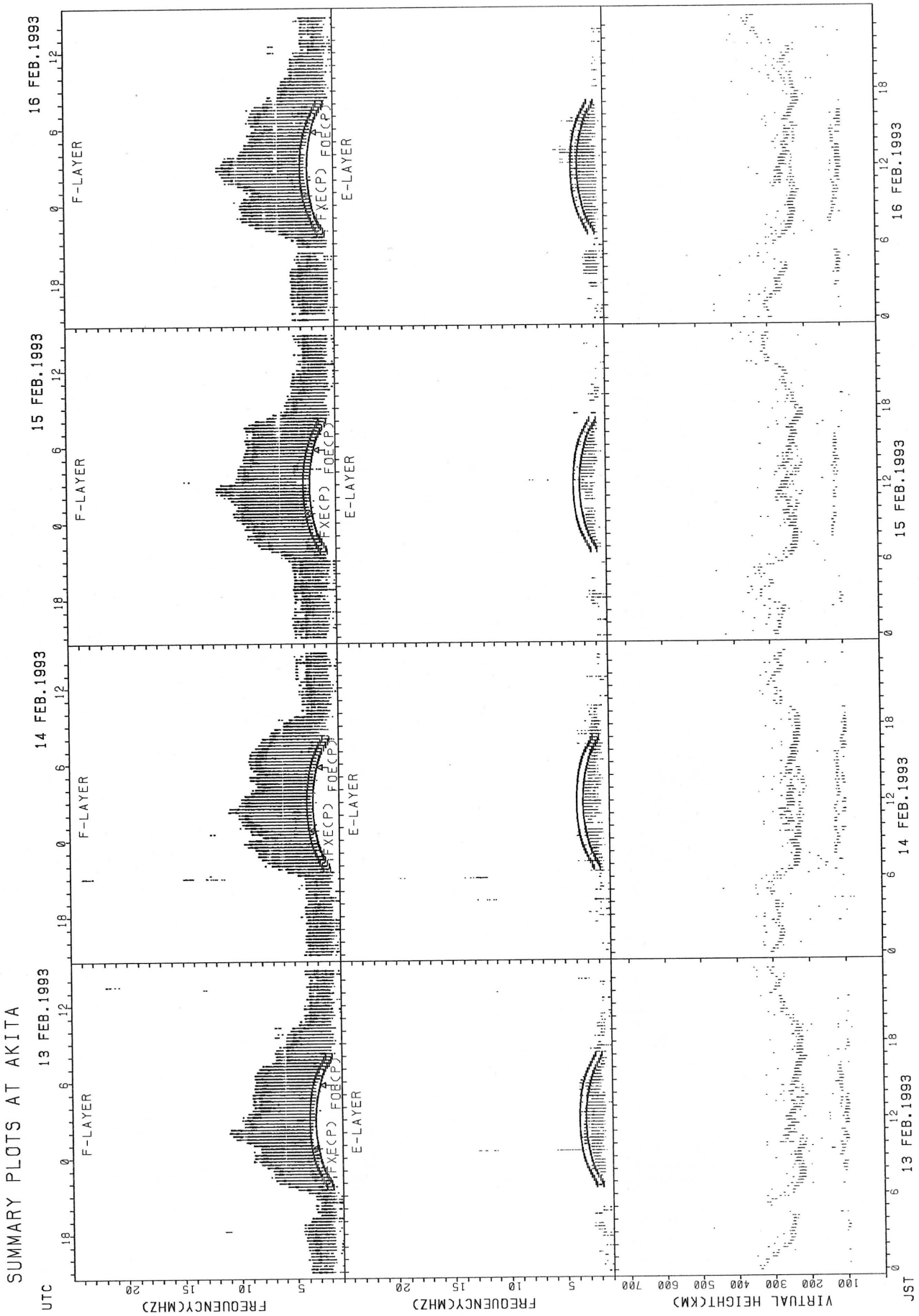
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

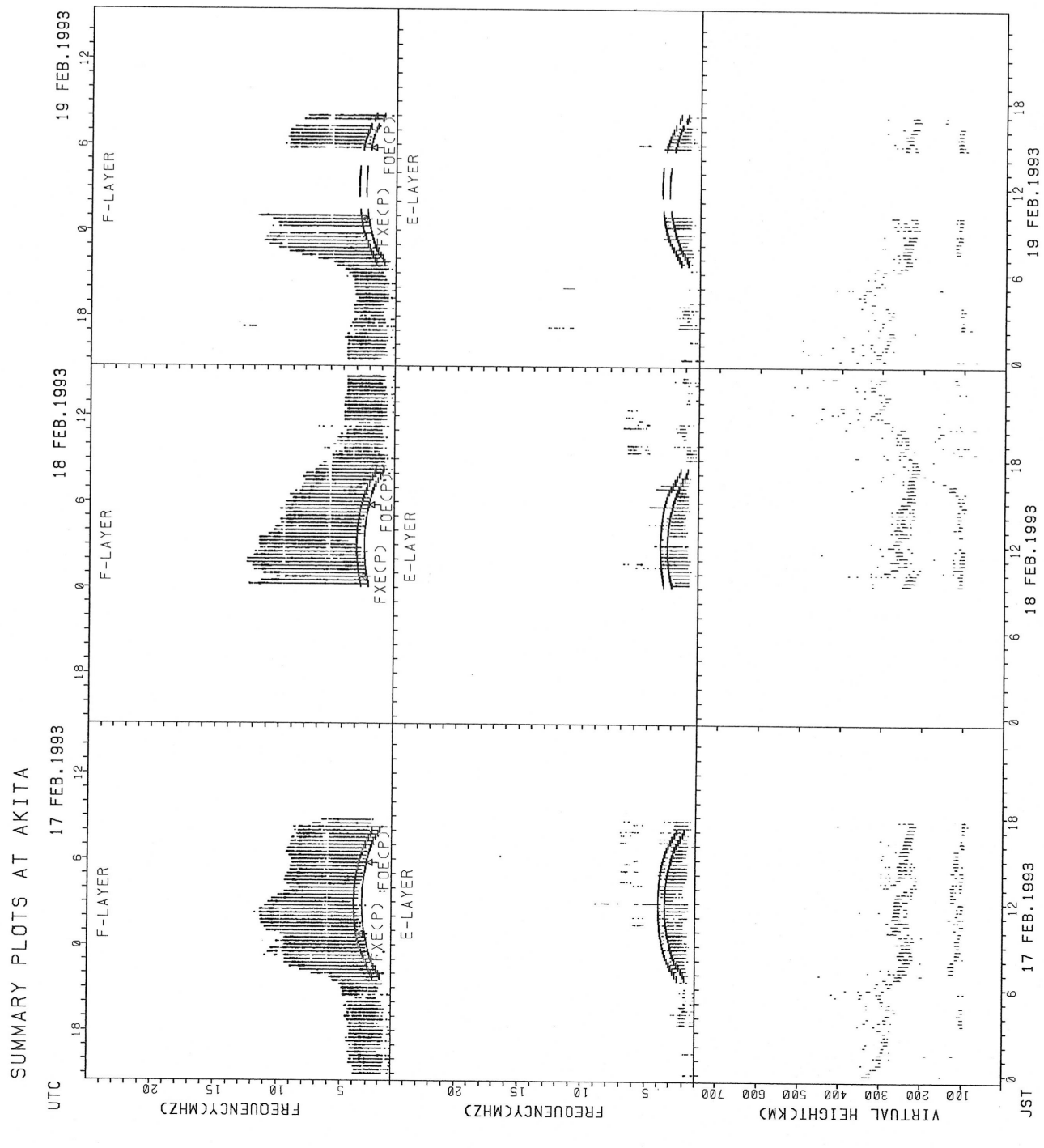

SUMMARY PLOTS AT AKITA
5 FEB.1993
6 FEB.1993
7 FEB.1993
8 FEB.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA

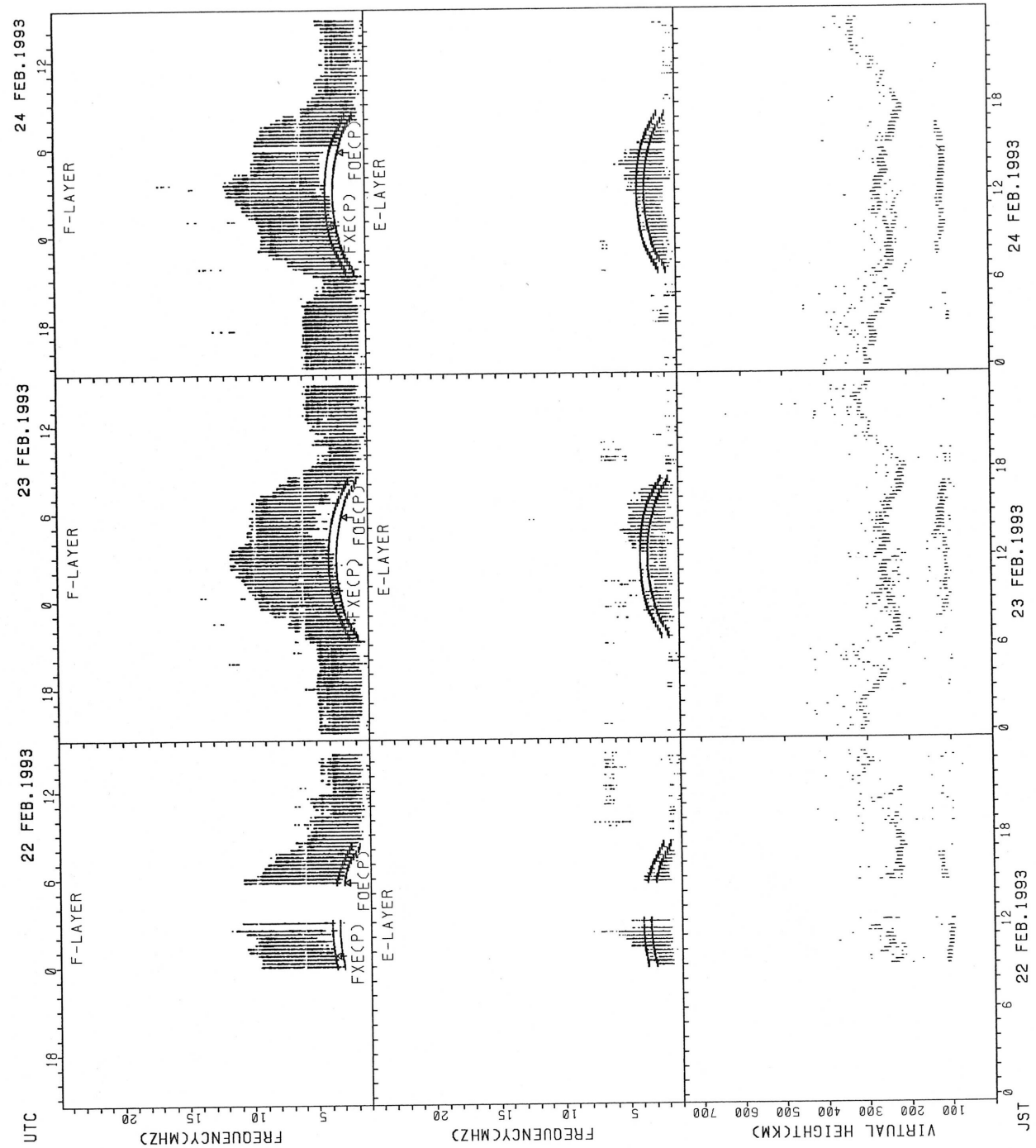


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

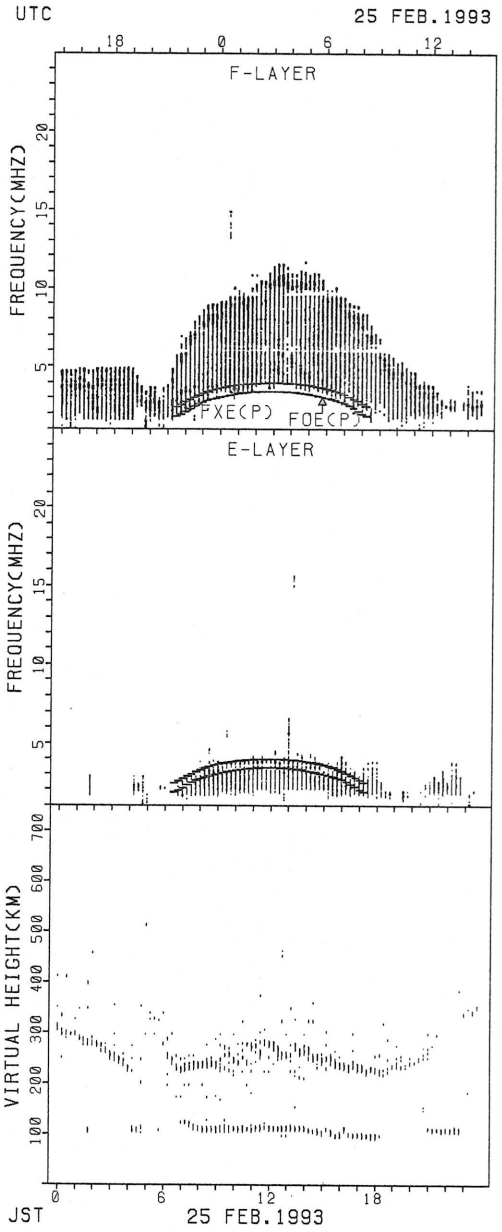

SUMMARY PLOTS AT AKITA
13 FEB.1993
14 FEB.1993
15 FEB.1993
16 FEB.1993
UTC
JST
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
UTC
17 FEB.1993
18 FEB.1993
19 FEB.1993
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

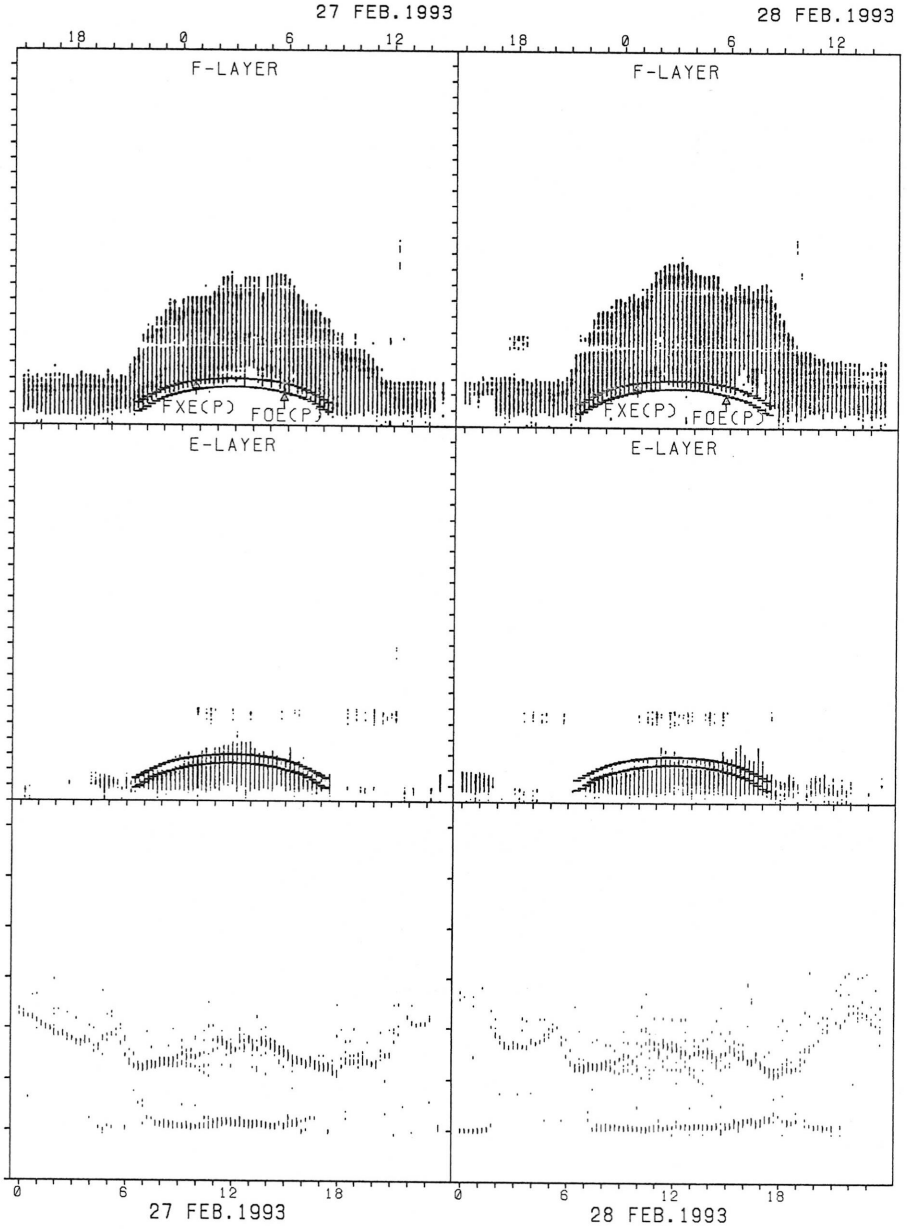
SUMMARY PLOTS AT AKITA

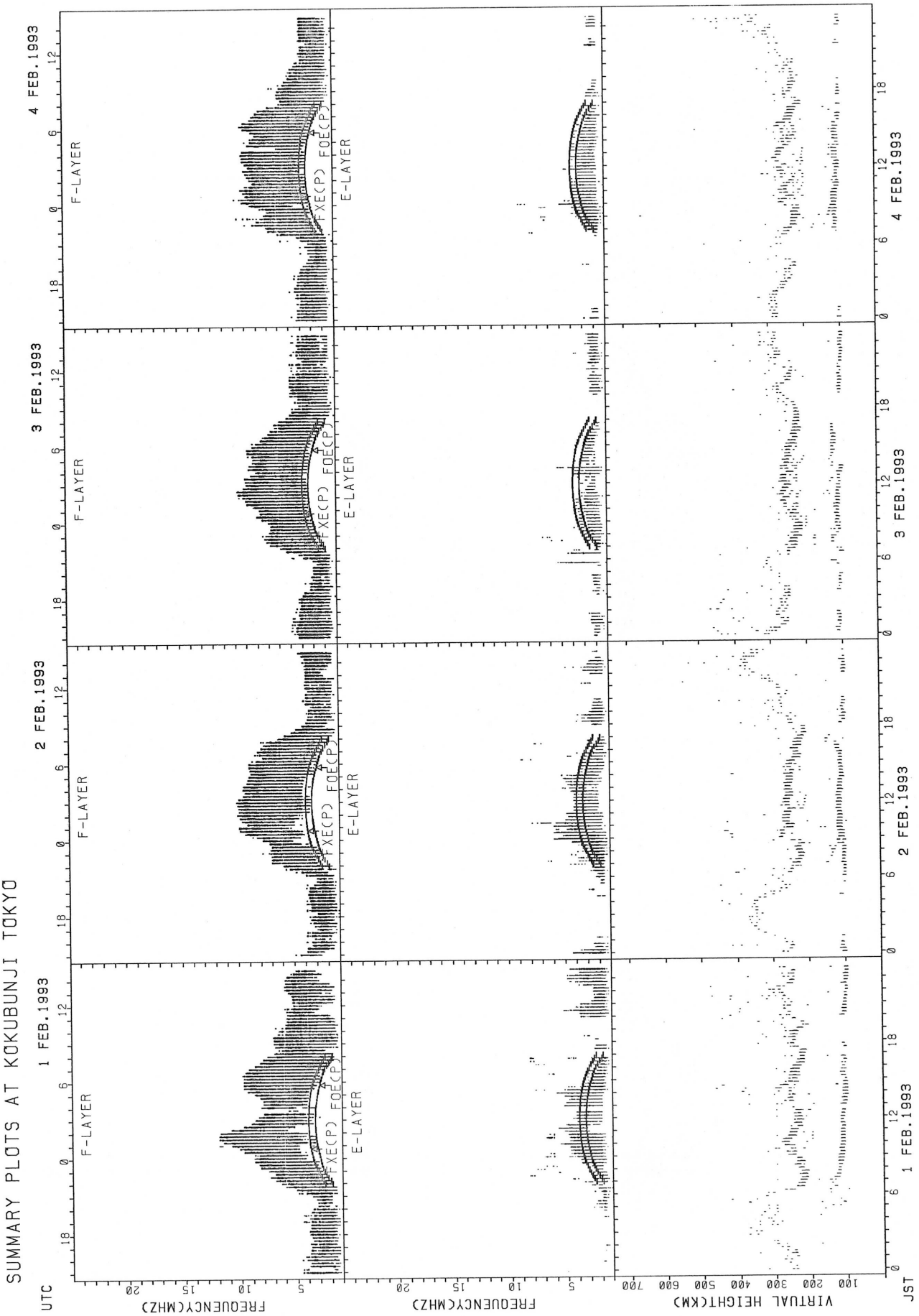


SUMMARY PLOTS AT AKITA

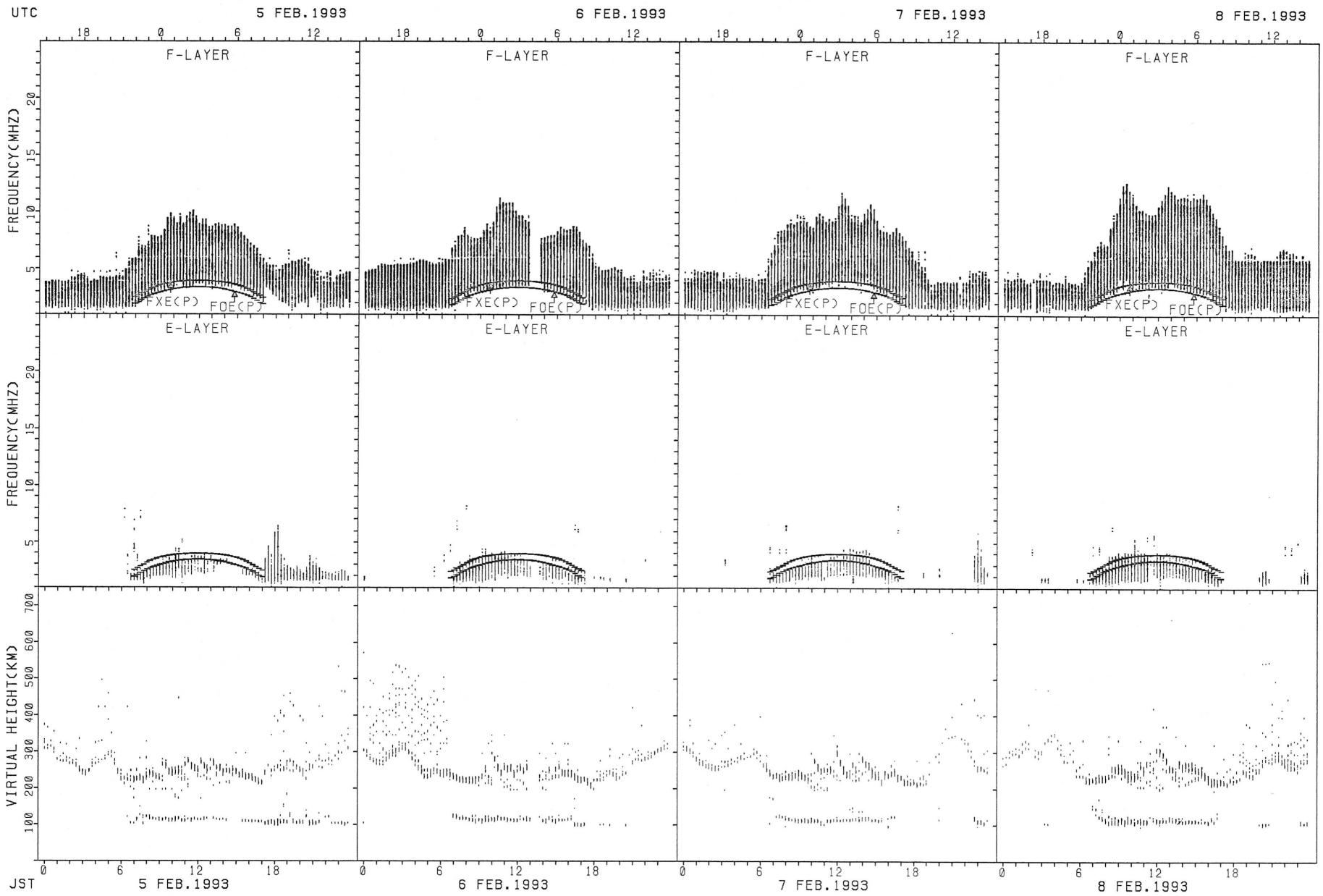


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

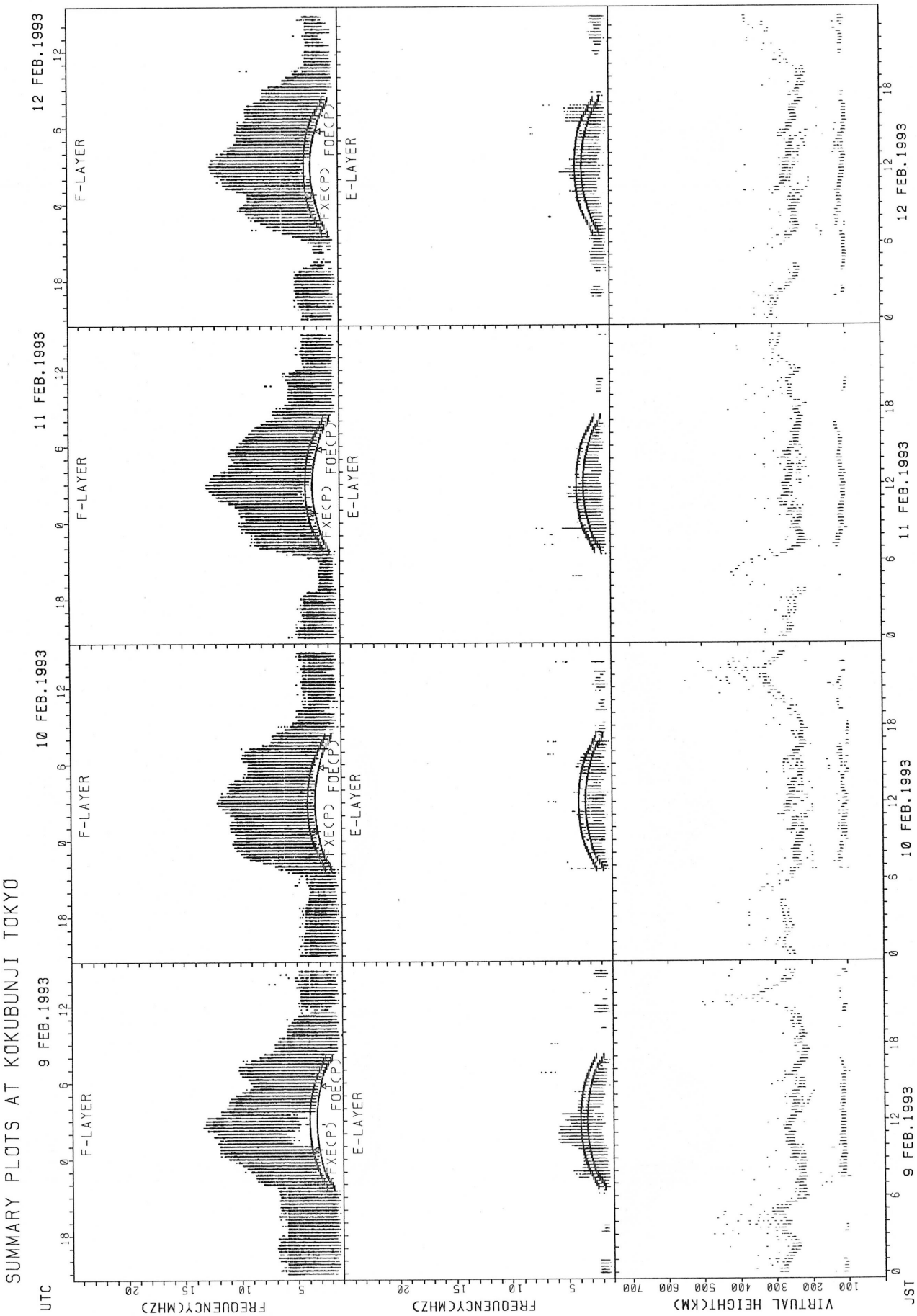



SUMMARY PLOTS AT KOKUBUNJI TOKYO
1 FEB.1993
2 FEB.1993
3 FEB.1993
4 FEB.1993
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

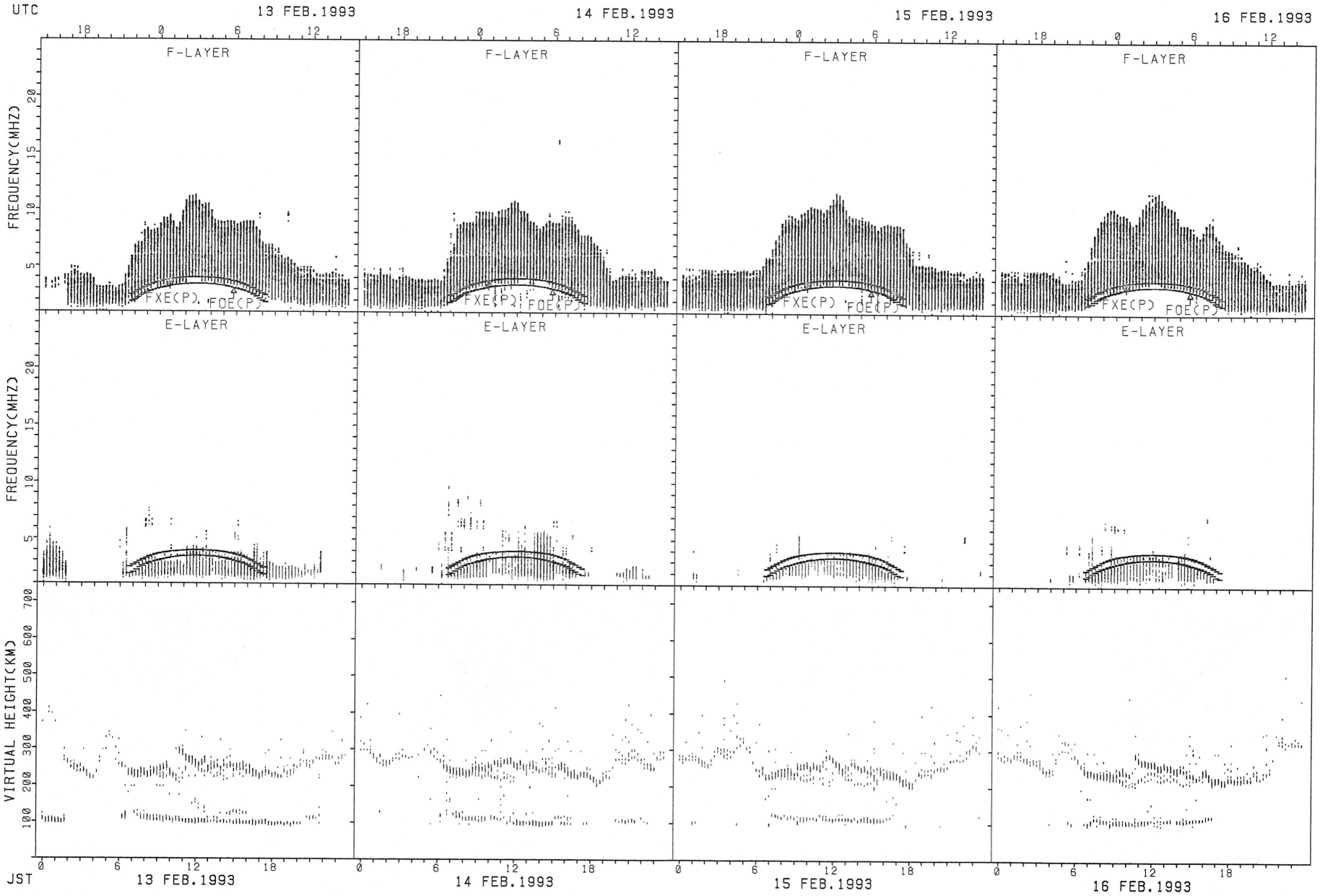
SUMMARY PLOTS AT KOKUBUNJI TOKYO



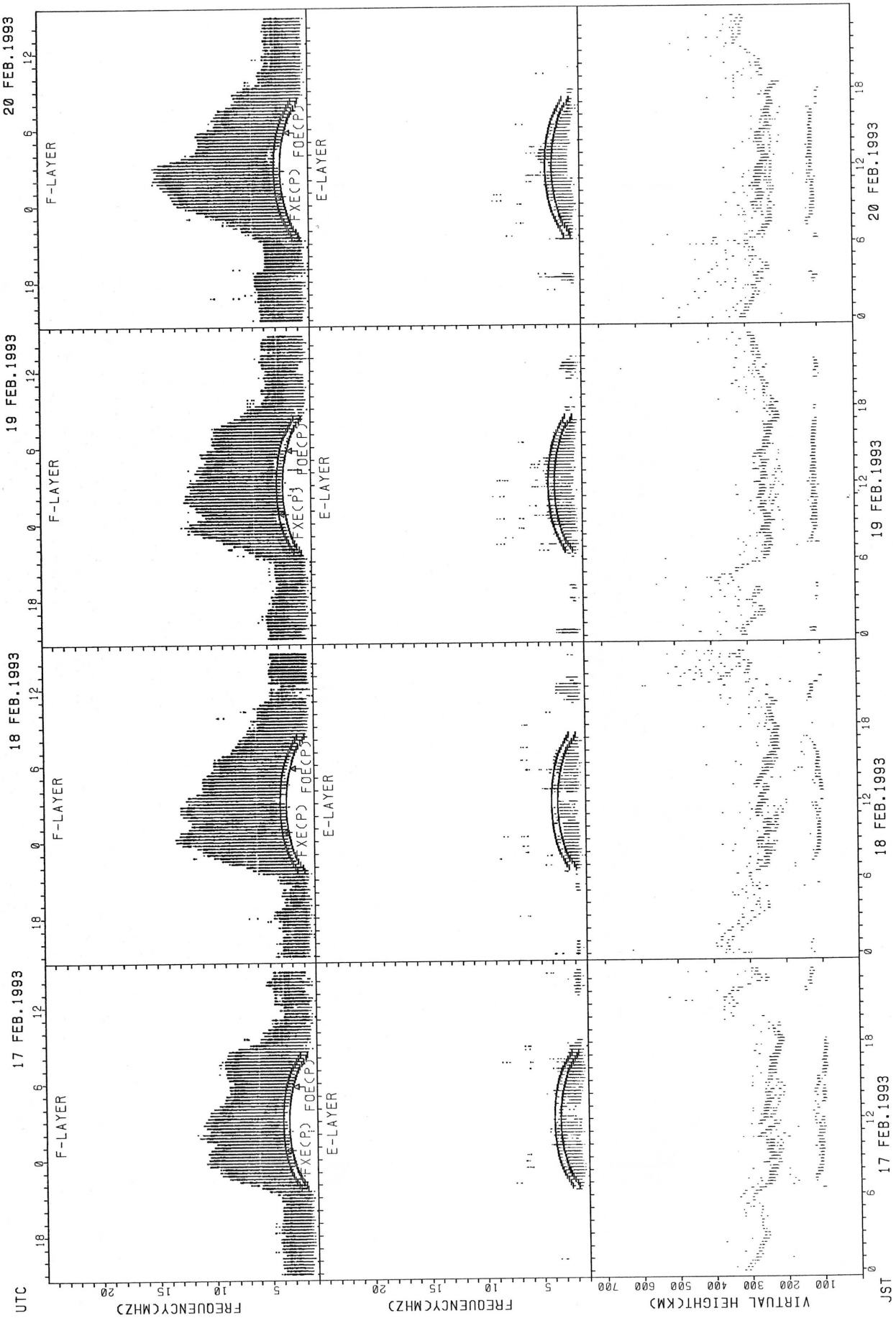
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT KOKUBUNJI TOKYO
9 FEB.1993
10 FEB.1993
11 FEB.1993
12 FEB.1993
UTC
JST
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

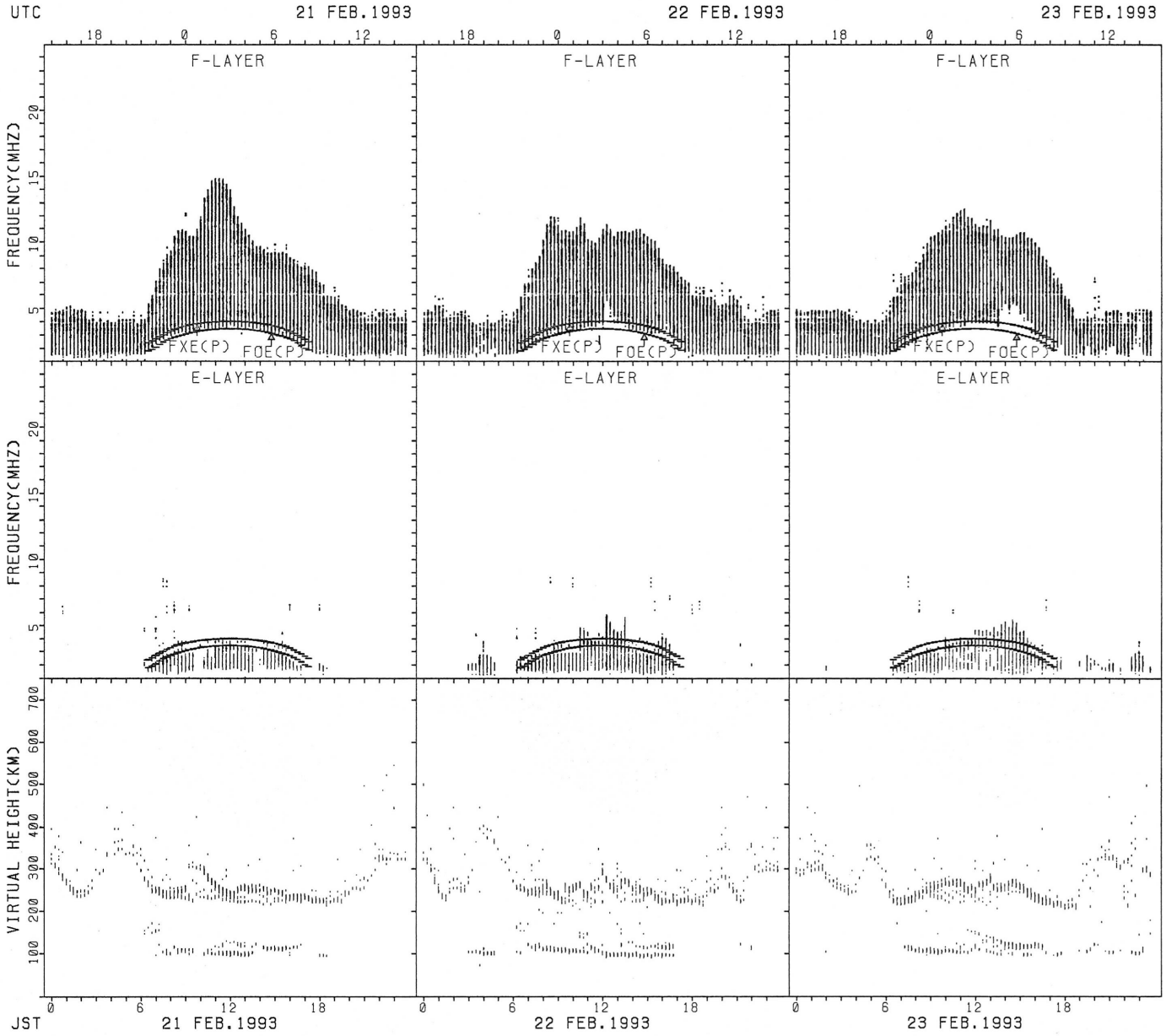
SUMMARY PLOTS AT KOKUBUNJI TOKYO



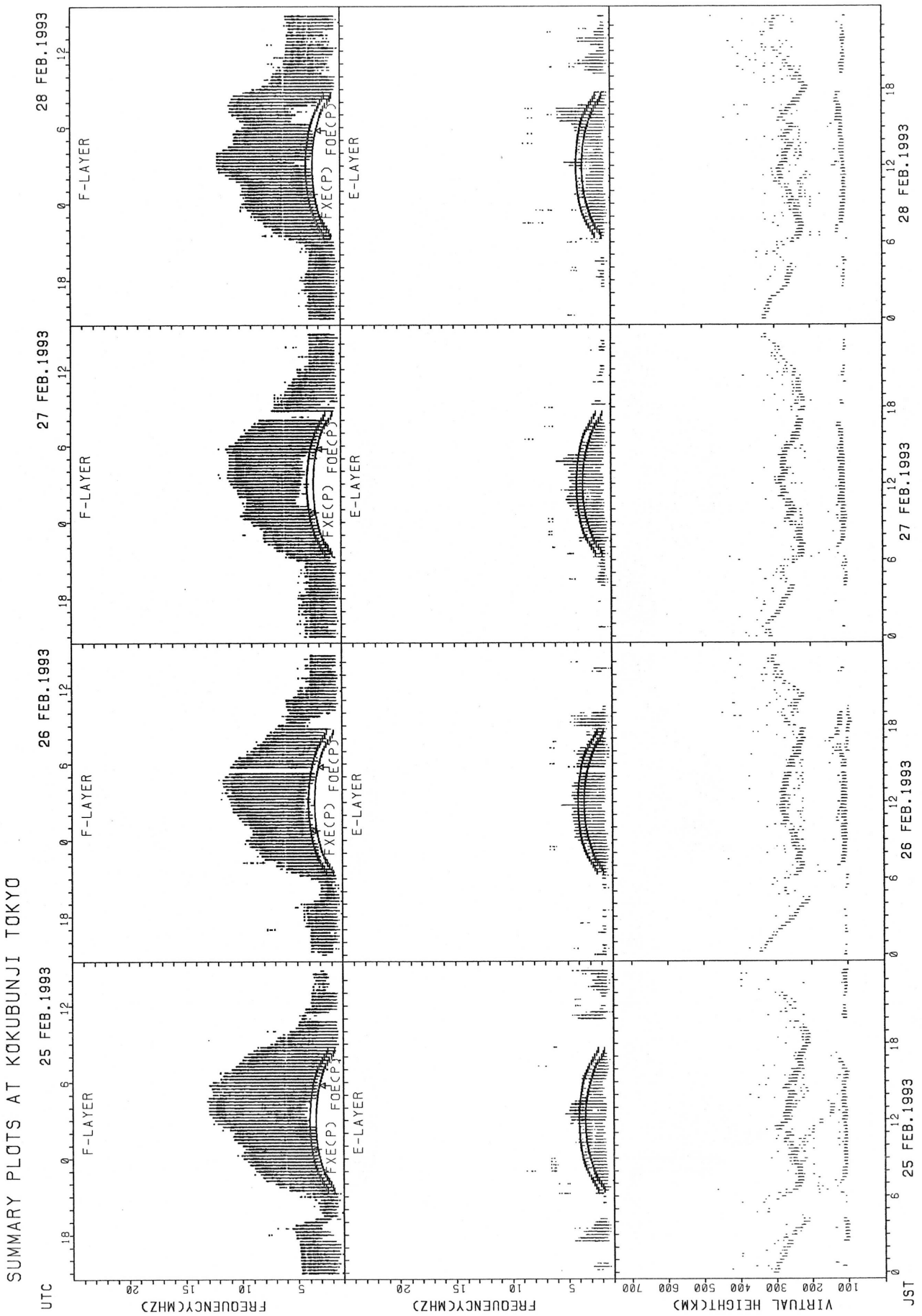
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT KOKUBUNJI TOKYO
17 FEB.1993
18 FEB.1993
19 FEB.1993
20 FEB.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

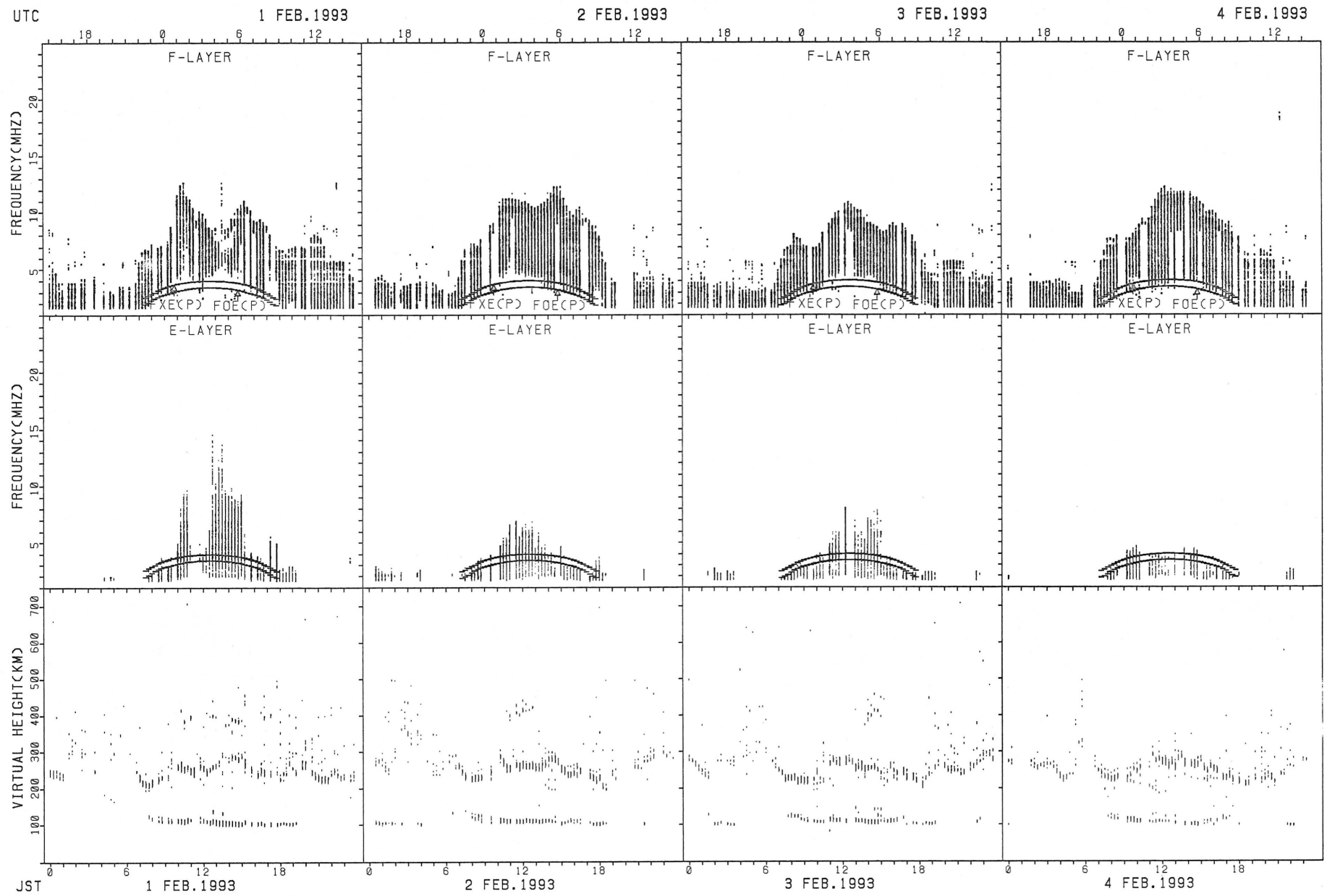
SUMMARY PLOTS AT KOKUBUNJI TOKYO



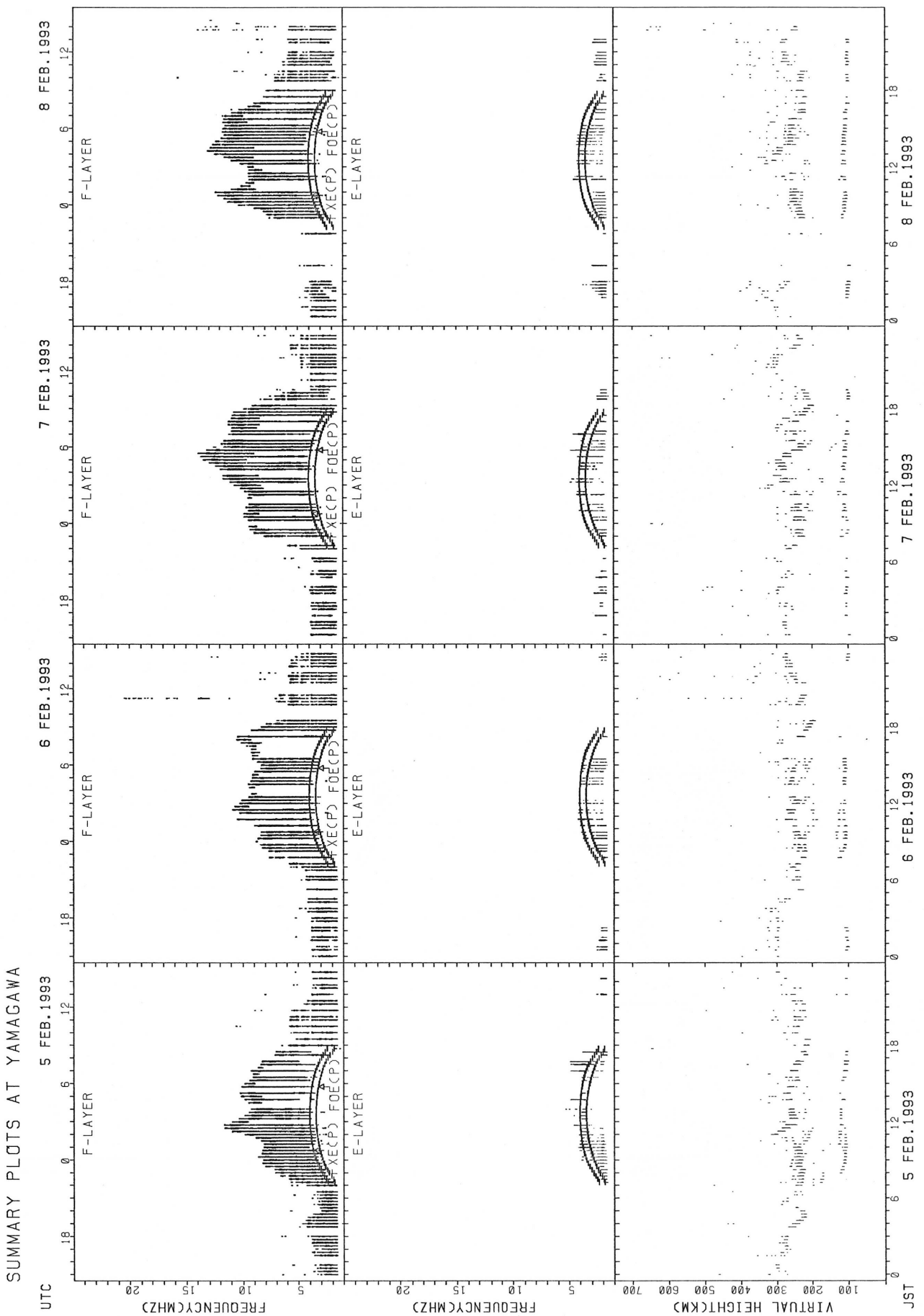
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
25 FEB.1993
26 FEB.1993
27 FEB.1993
28 FEB.1993
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

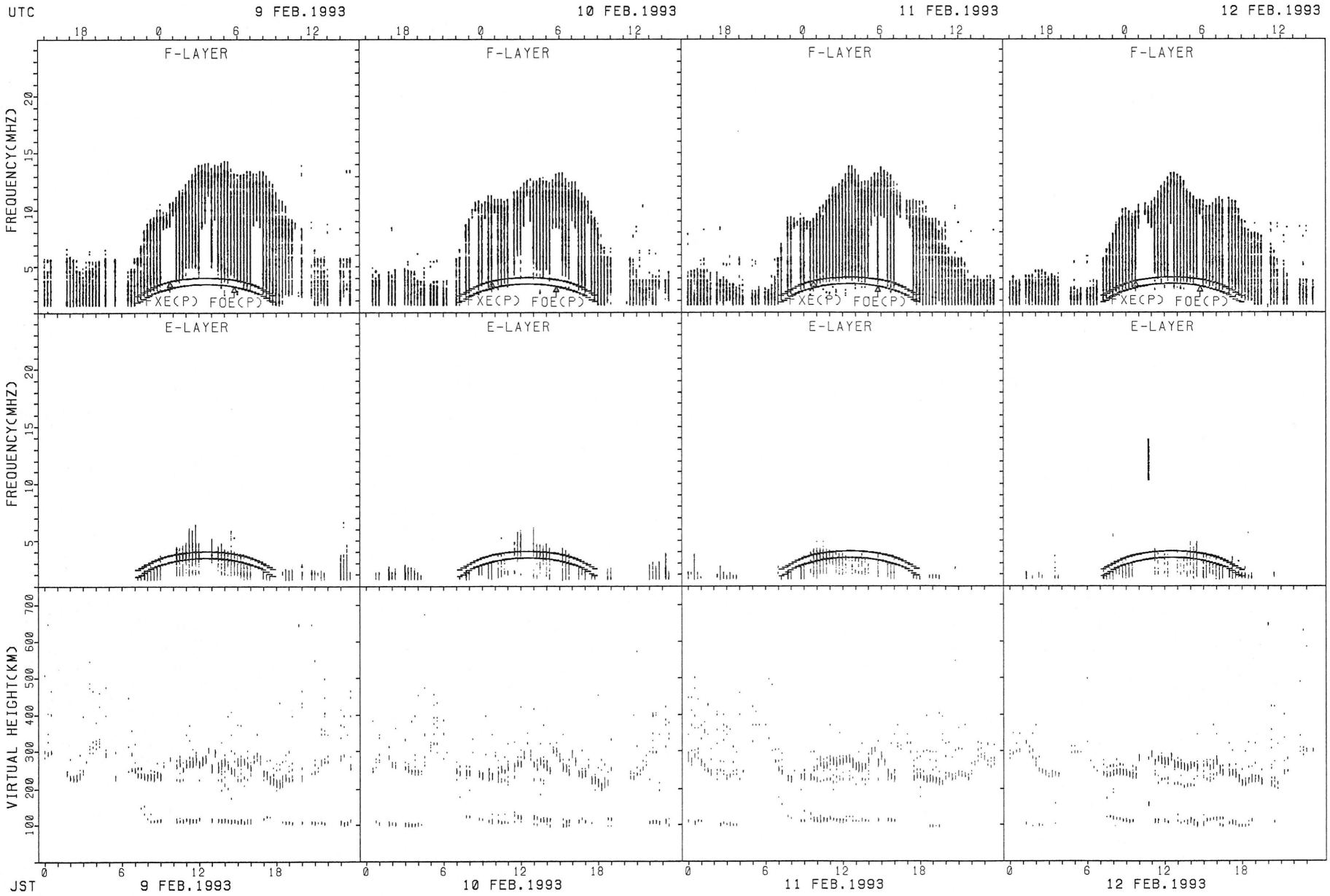
SUMMARY PLOTS AT YAMAGAWA



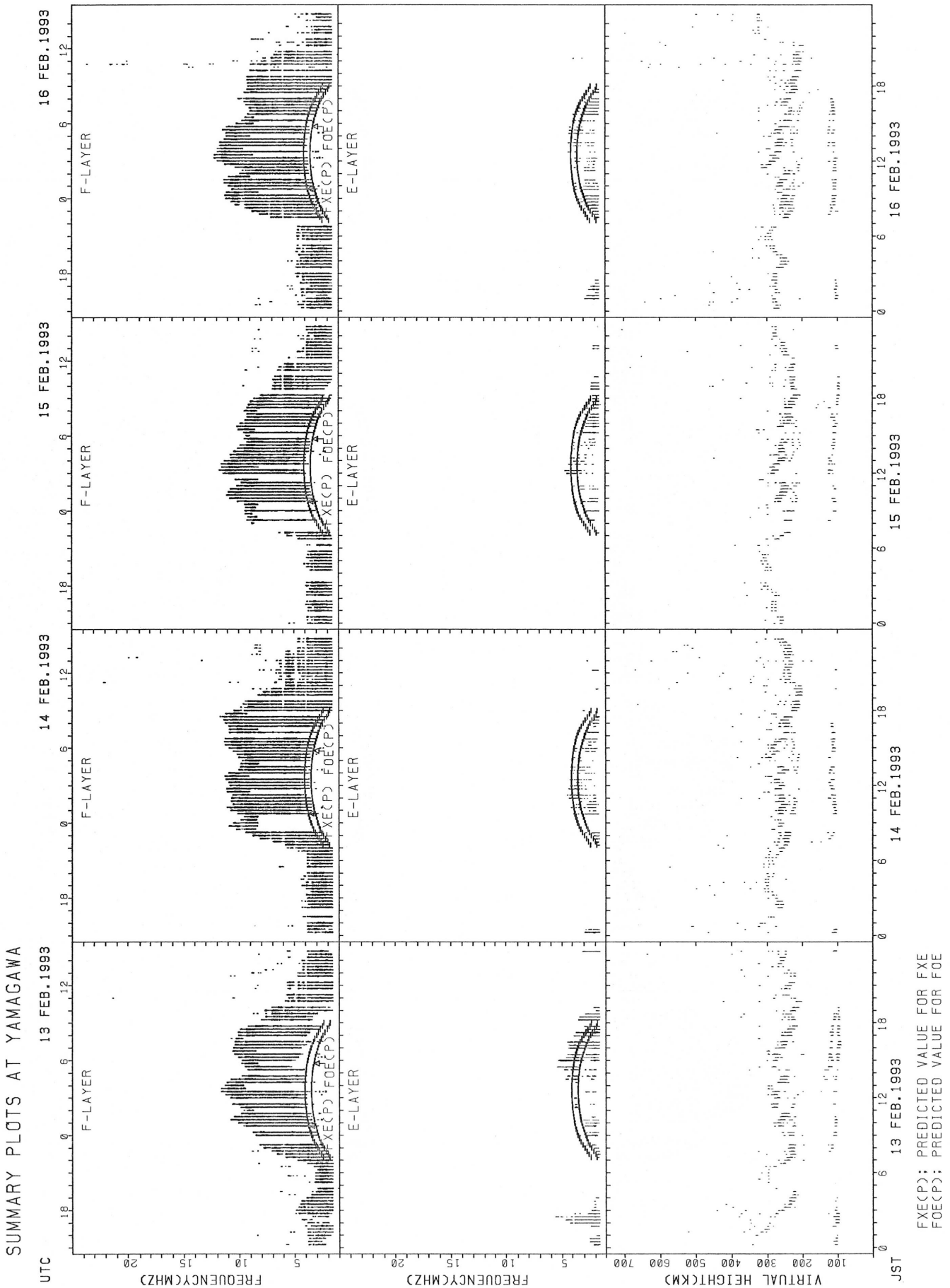
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

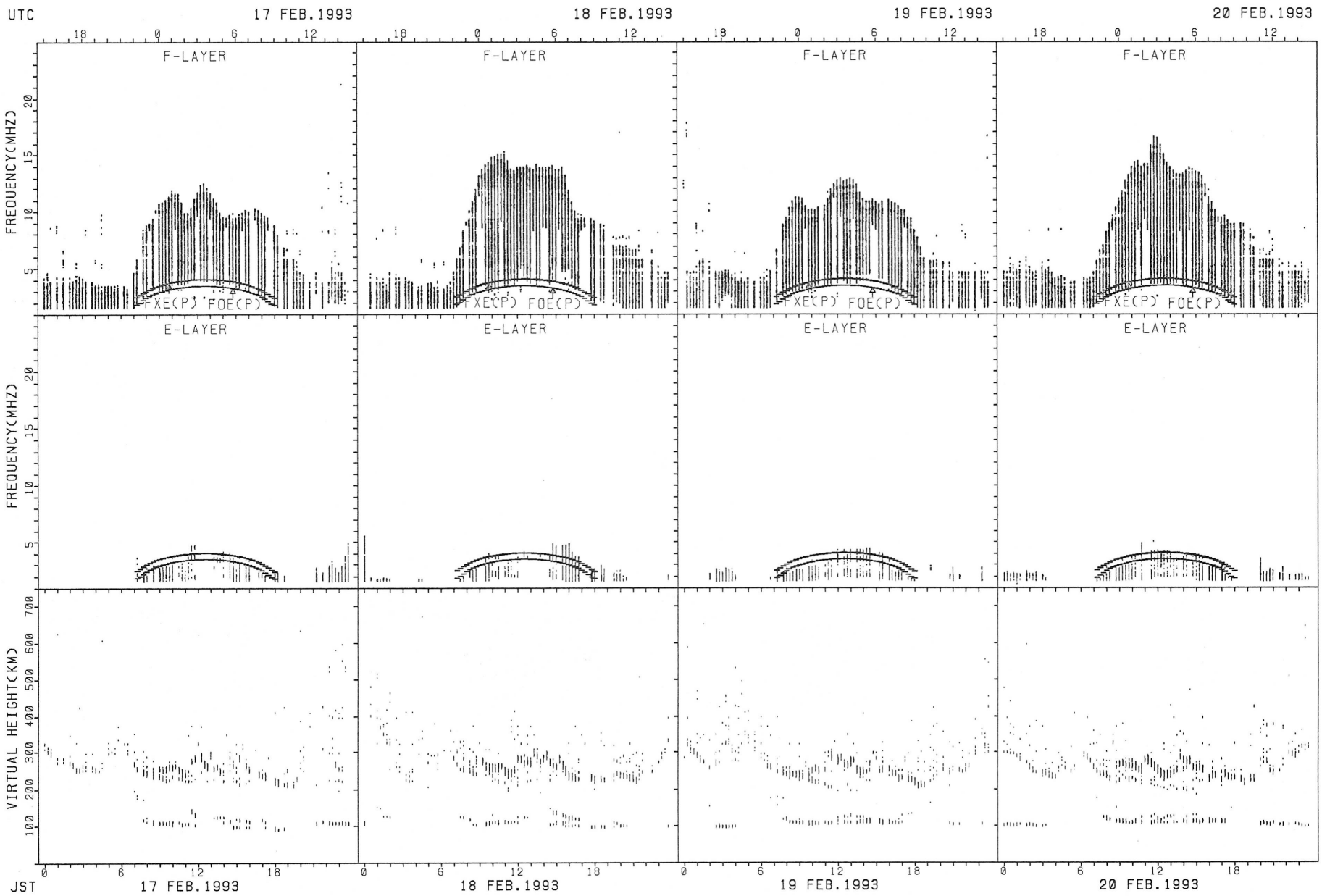

SUMMARY PLOTS AT YAMAGAWA
UTC
JST
5 FEB.1993
6 FEB.1993
7 FEB.1993
8 FEB.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

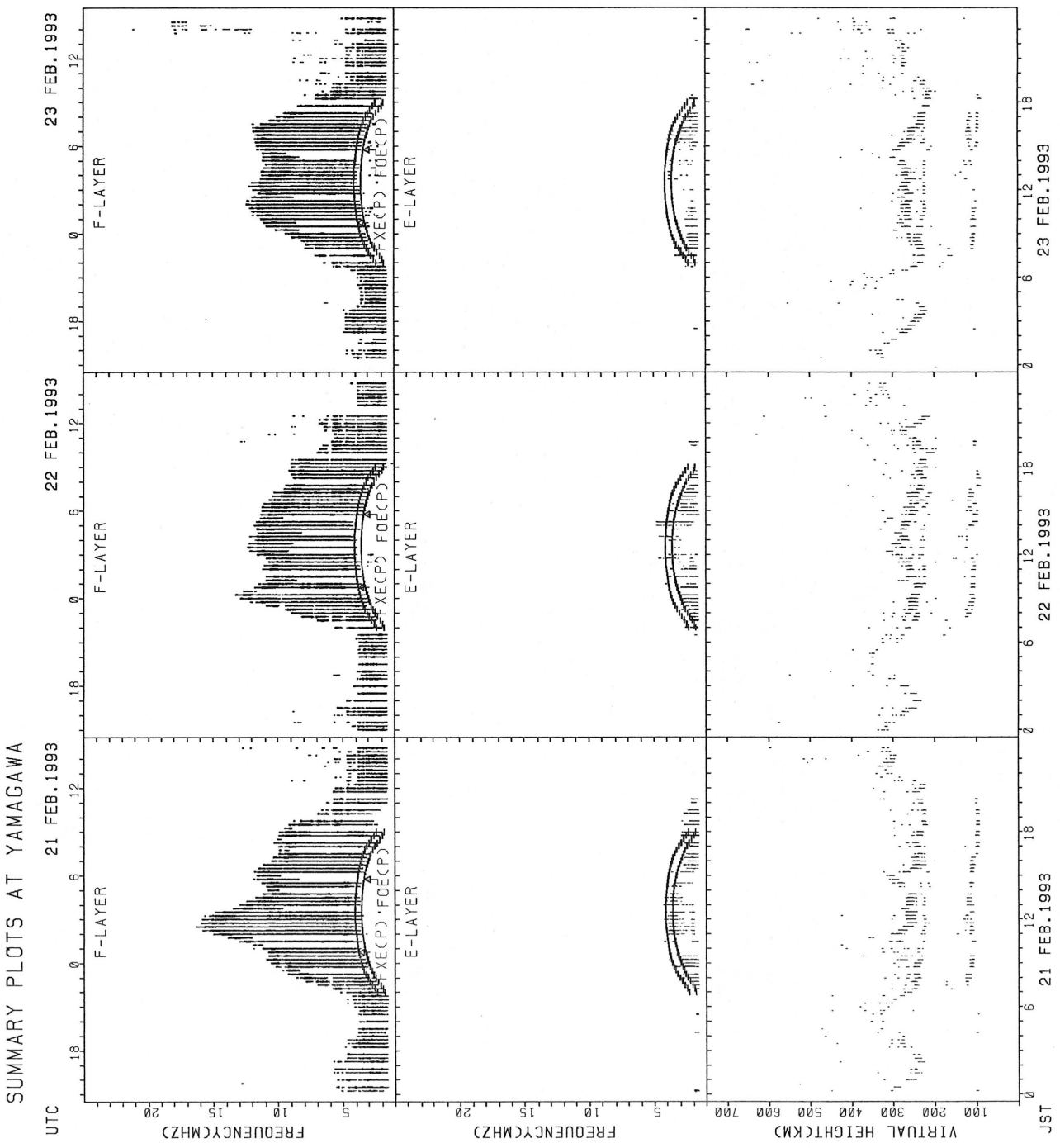
SUMMARY PLOTS AT YAMAGAWA

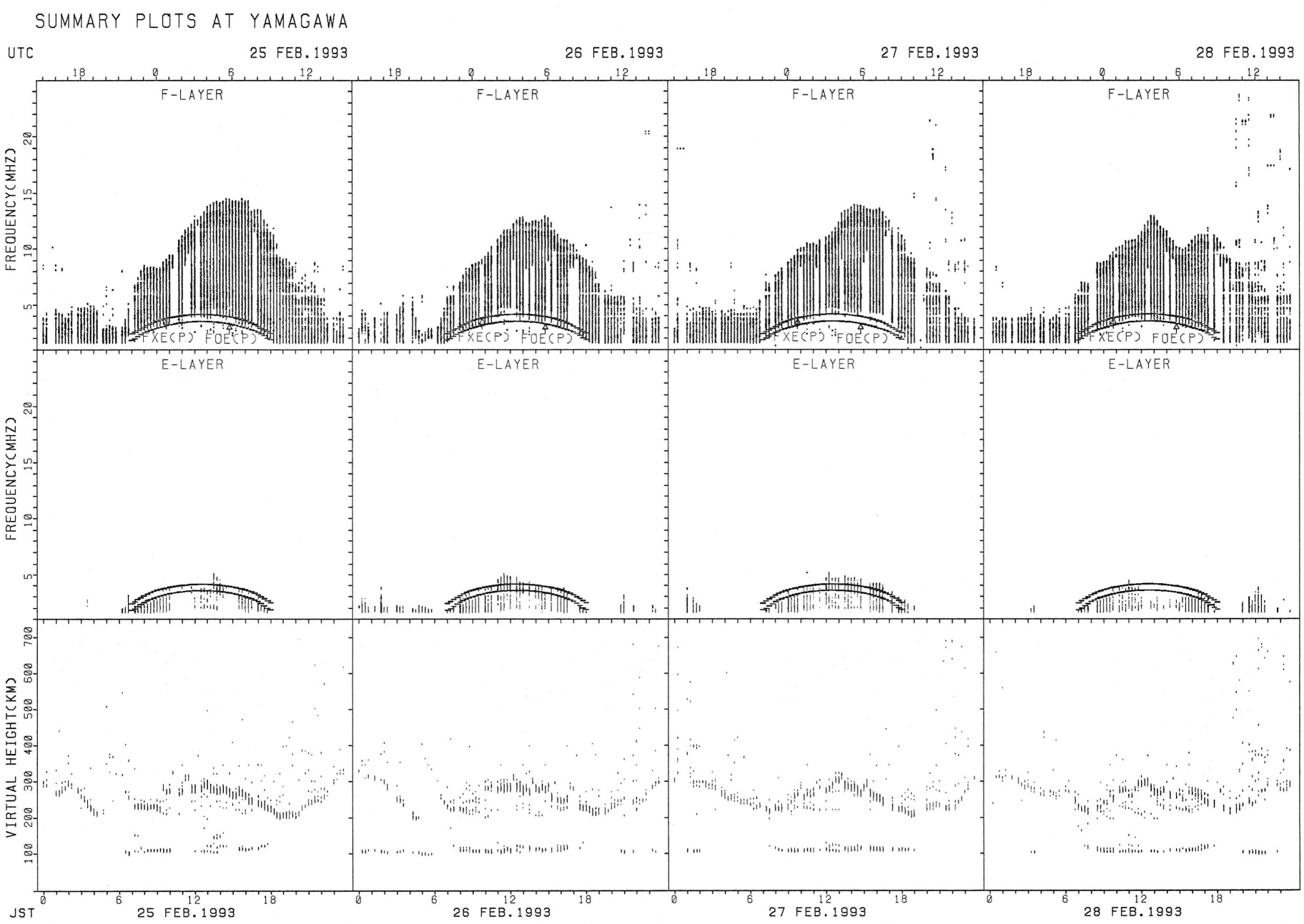


FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

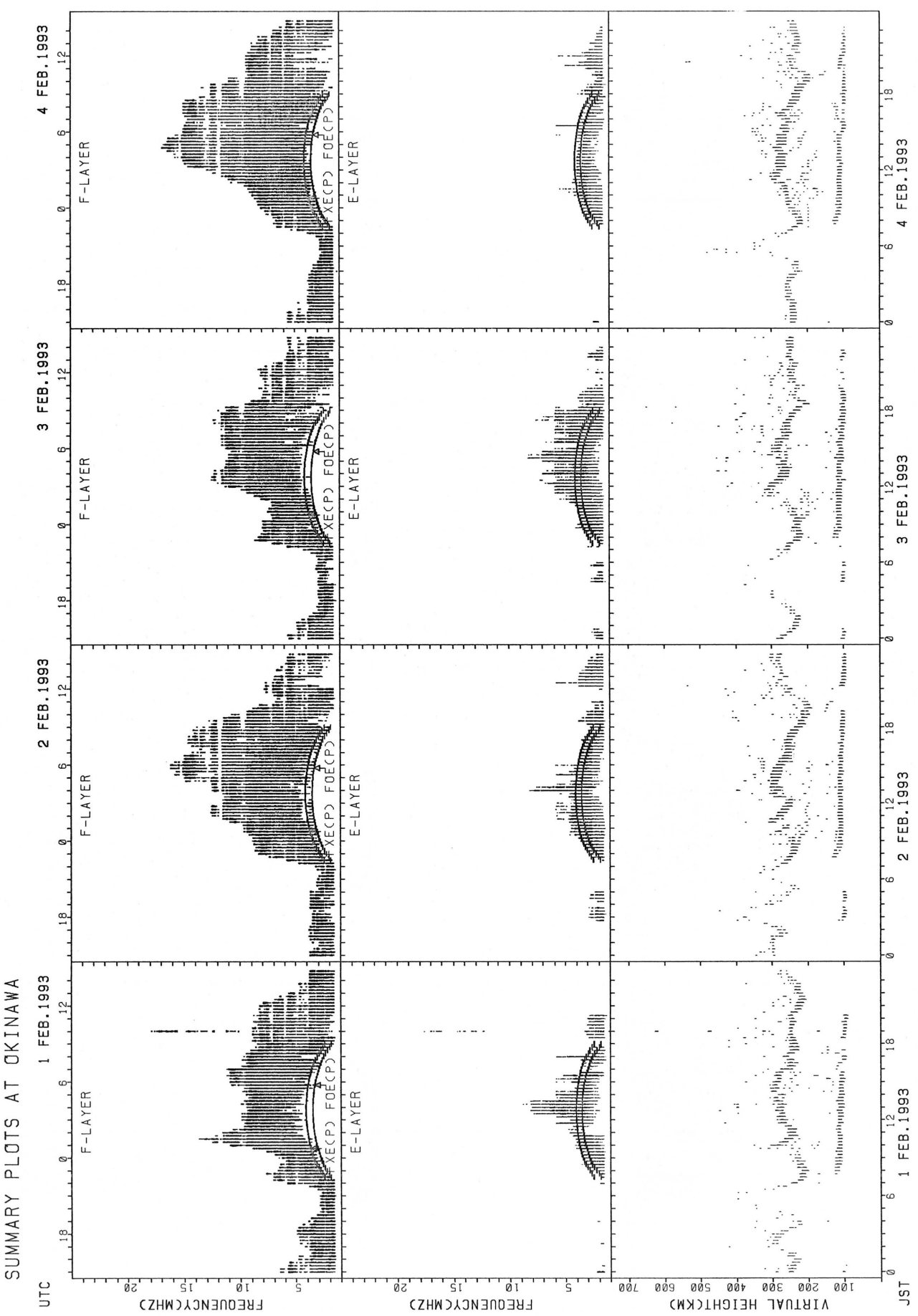

SUMMARY PLOTS AT YAMAGAWA
UTC
13 FEB.1993
14 FEB.1993
15 FEB.1993
16 FEB.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
UTC
17 FEB.1993
18 FEB.1993
19 FEB.1993
20 FEB.1993
F-LAYER
E-LAYER
FREQUENCY(MHZ)
FXE(P) FOE(P)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

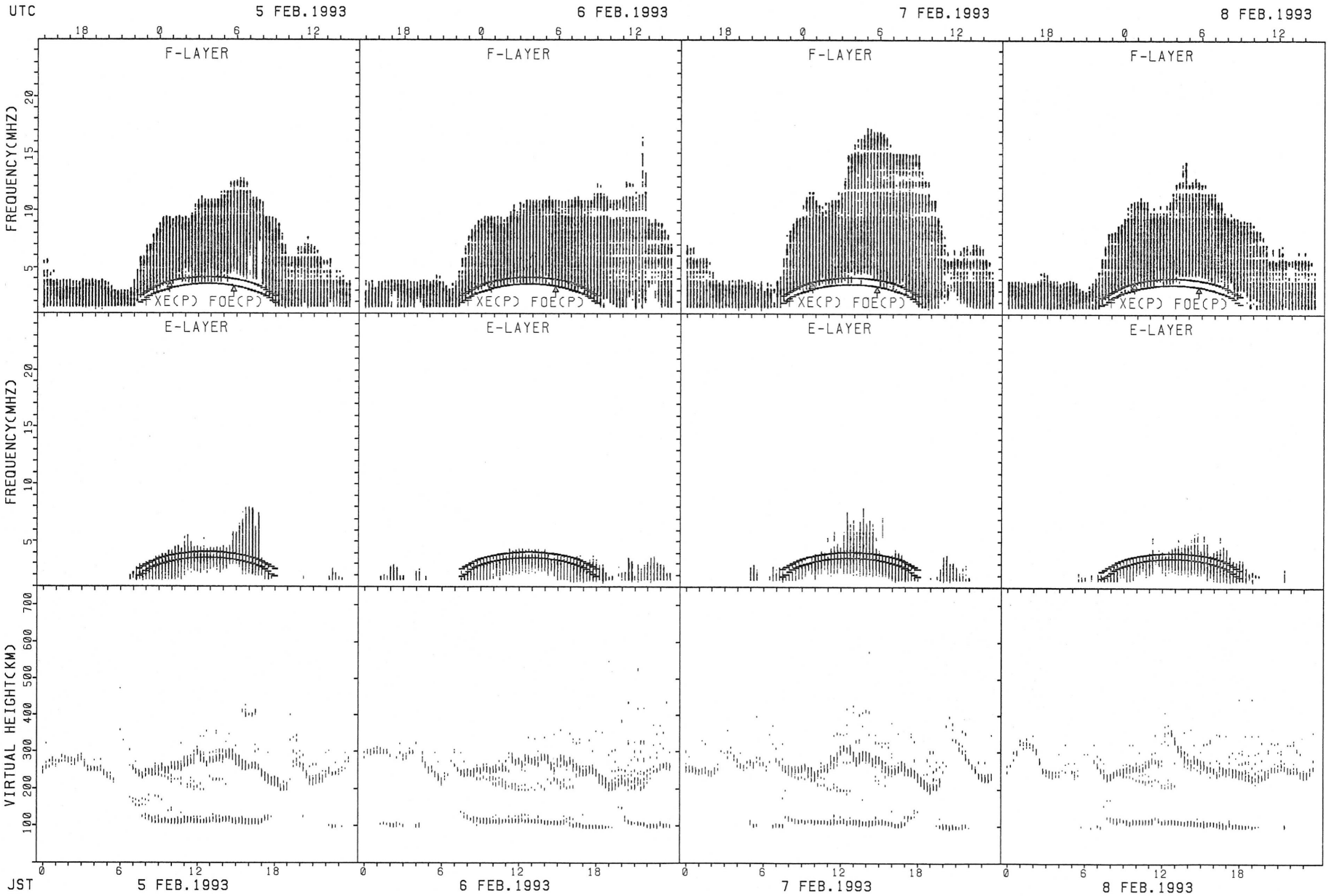

SUMMARY PLOTS AT YAMAGAWA
UTC
21 FEB.1993
22 FEB.1993
23 FEB.1993
F-LAYER
E-LAYER
FXE(P)·FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE



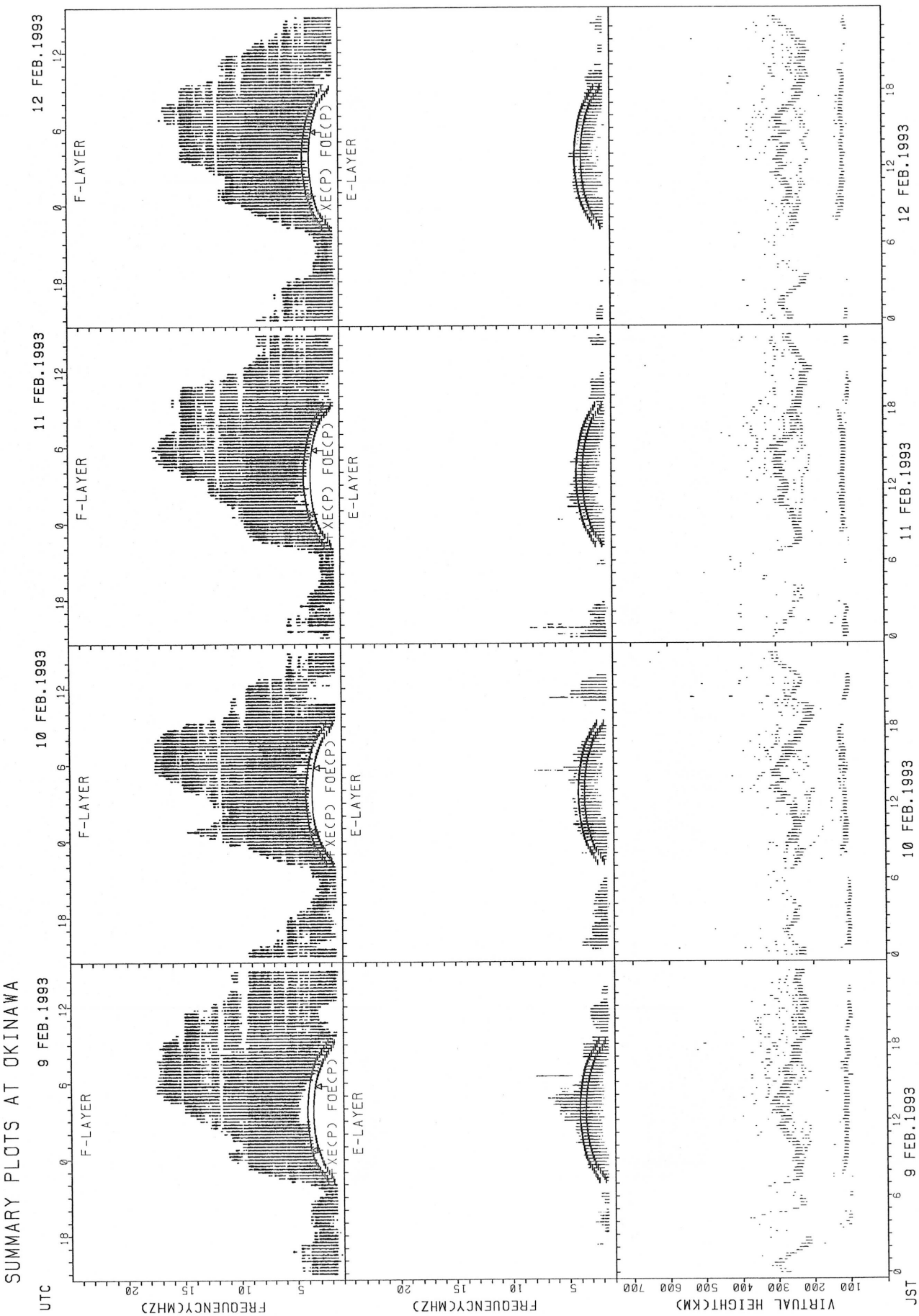
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
1 FEB.1993
2 FEB.1993
3 FEB.1993
4 FEB.1993
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

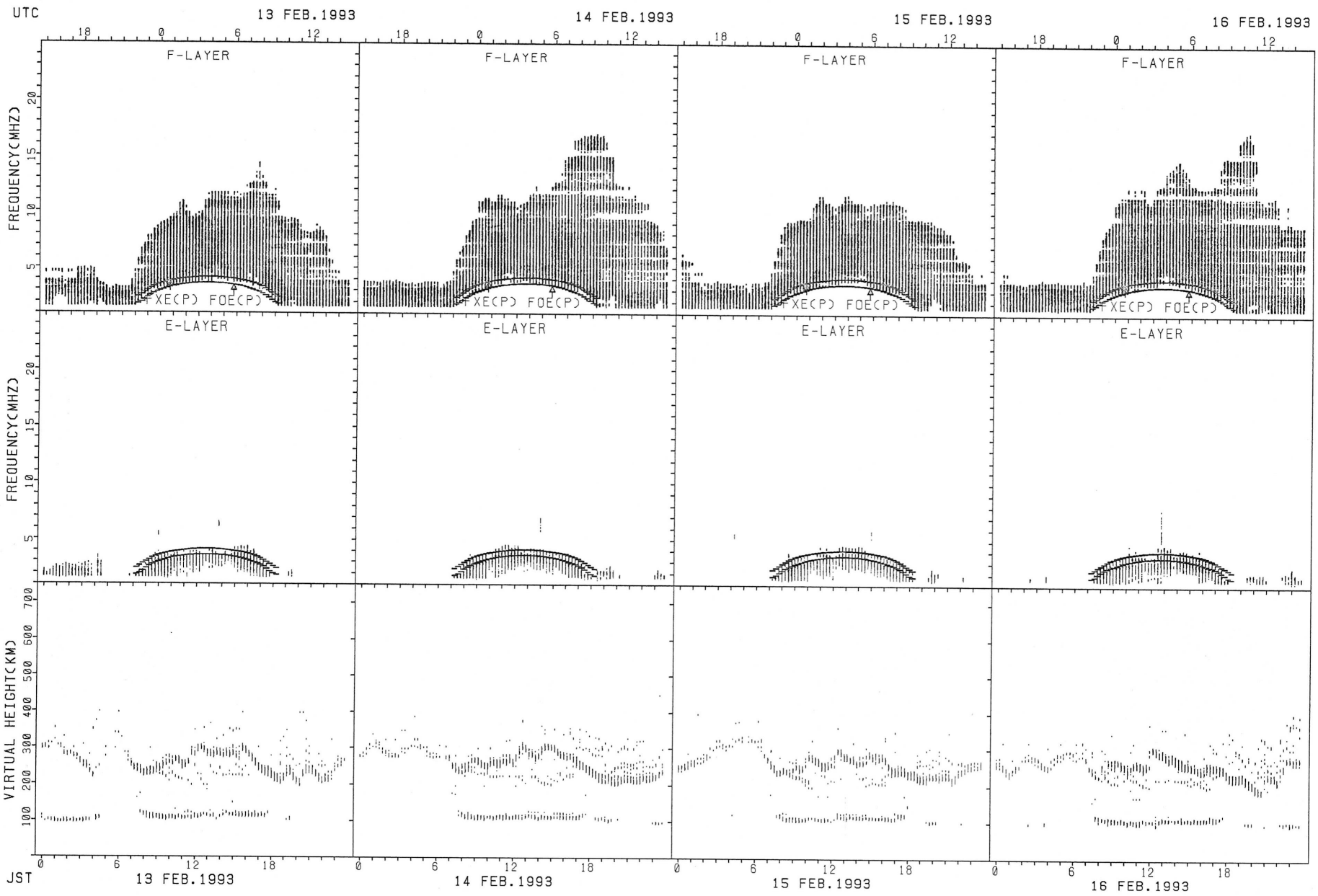
SUMMARY PLOTS AT OKINAWA



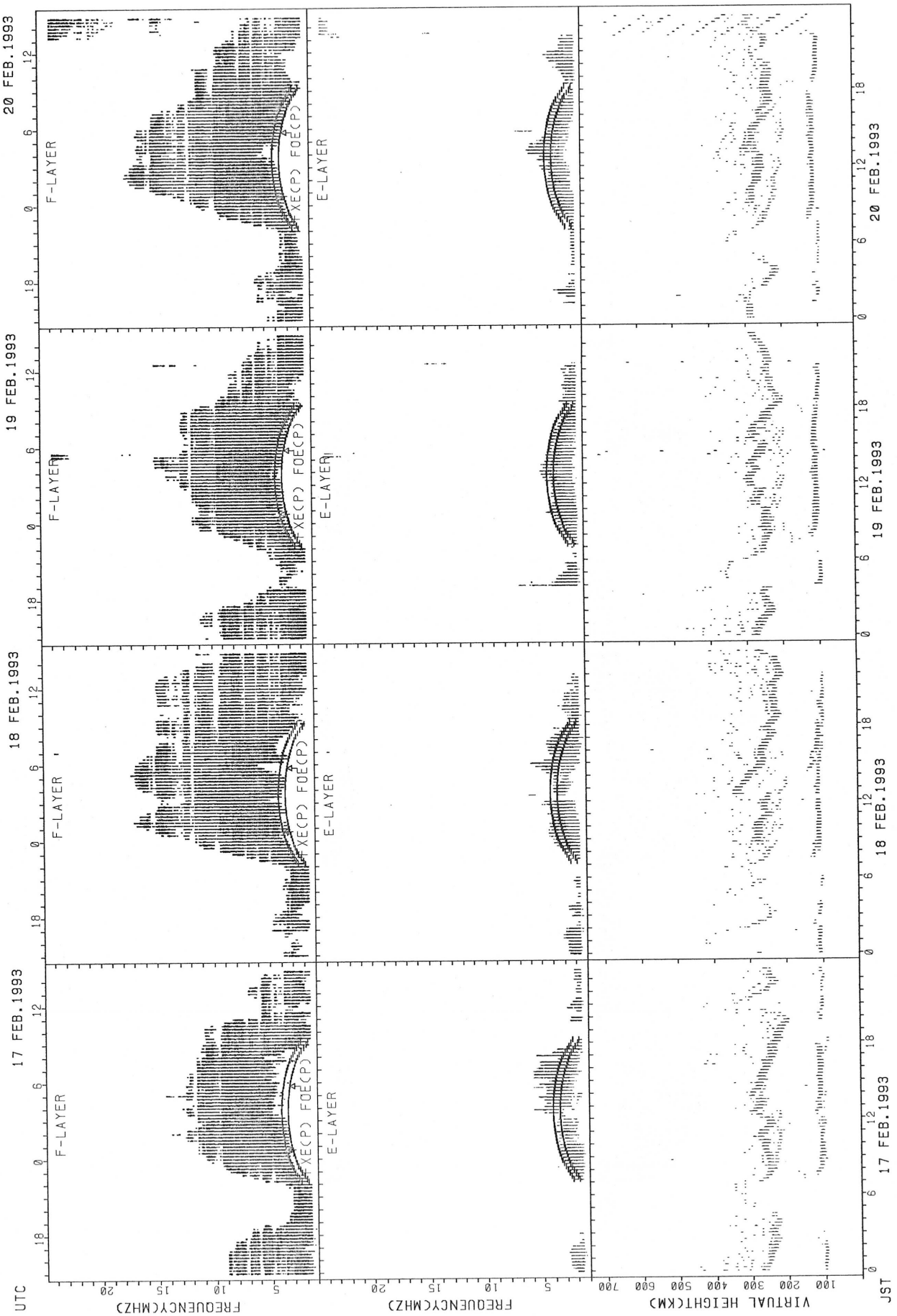
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
9 FEB.1993
10 FEB.1993
11 FEB.1993
12 FEB.1993
UTC
JST
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

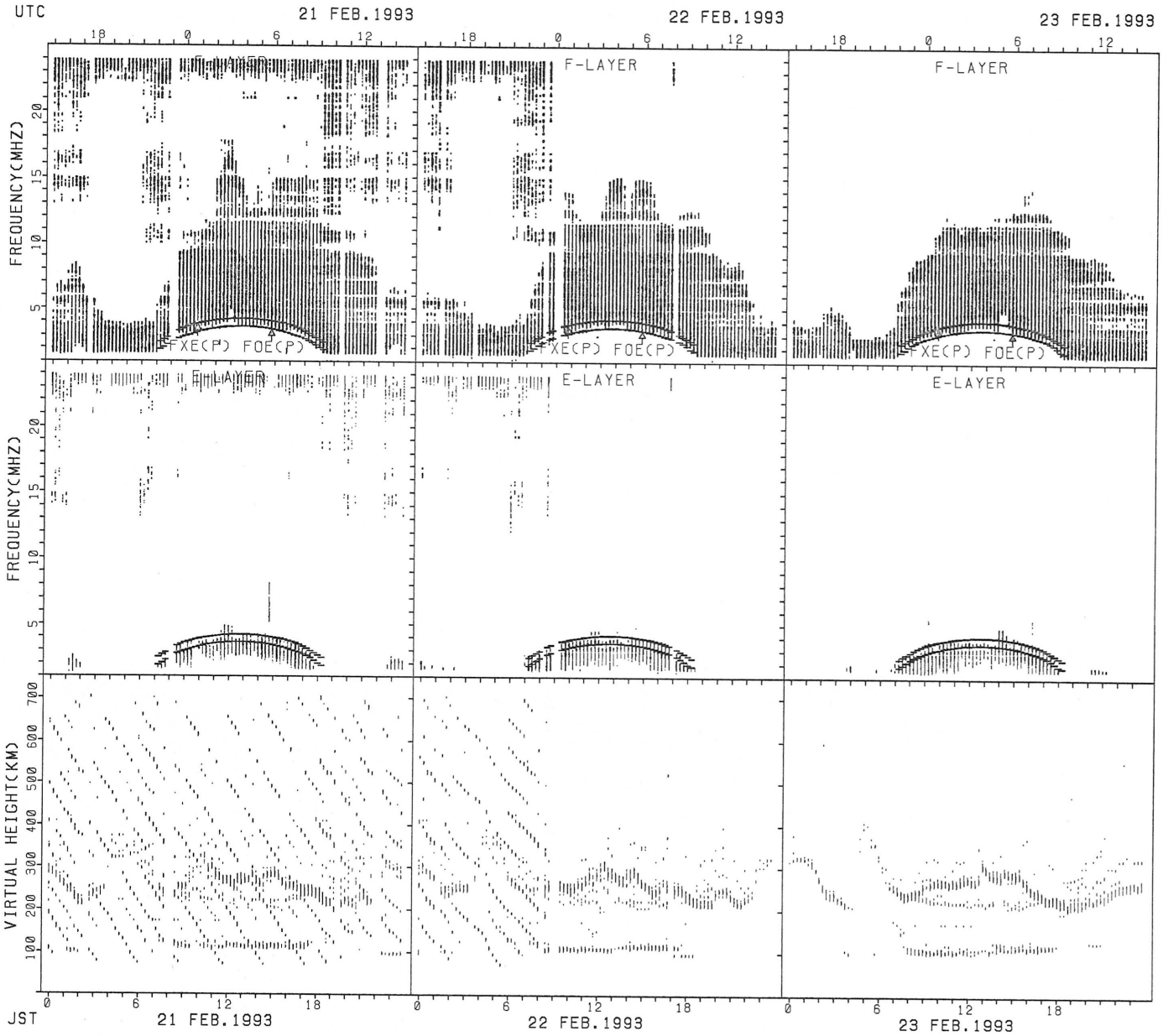
SUMMARY PLOTS AT OKINAWA



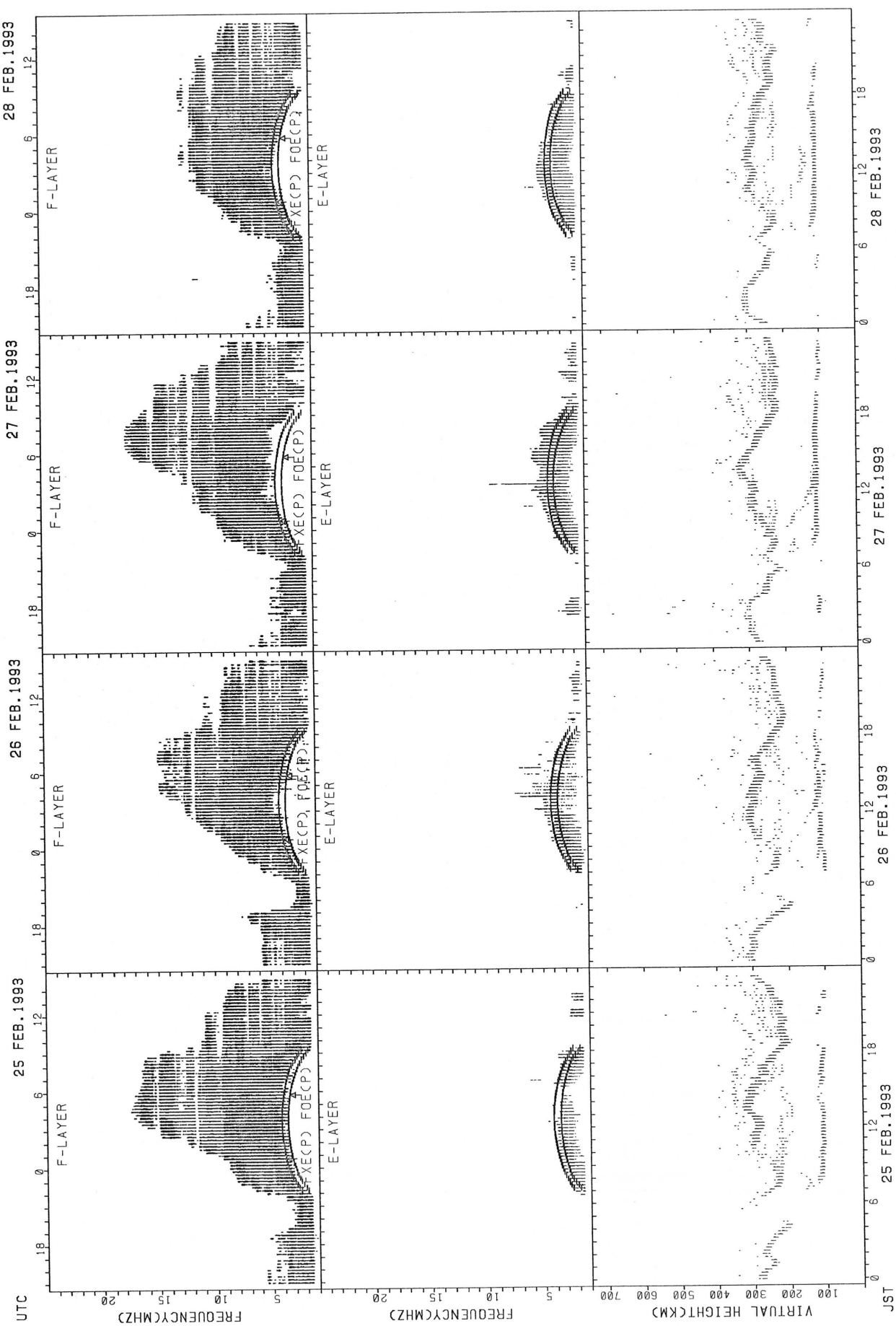
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
17 FEB.1993
18 FEB.1993
19 FEB.1993
20 FEB.1993
F-LAYER
E-LAYER
FXE(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



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


SUMMARY PLOTS AT OKINAWA
25 FEB.1993
26 FEB.1993
27 FEB.1993
28 FEB.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

MONTHLY MEDIANS OF H'F AND H'ES

FEB. 1993 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								15	27	30	31	24	21	28	31	31	27	16						
MED								240	234	240	246	244	242	246	248	240	244	238						
U Q								260	244	246	252	248	250	256	254	250	248	247						
L Q								17	218	224	226	131	31	234	236	230	232	17						

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								10						12	12	16				11	11
MED			108								253						184	184	104				105	103
U Q			111								266						251	249	111				107	107
L Q			15								121						116	111	20				15	15

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								13	20	26	27	15	10	17	27	25	28	19						
MED								264	252	246	256	248	249	262	262	254	250	254						
U Q								270	256	258	270	262	260	268	268	262	257	266						
L Q								251	243	234	242	244	246	249	254	248	246	248						

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								12	14	16	14	17	16	17	18	20	14	13	11					
MED								246	249	125	128	121	117	137	126	119	132	117	105					
U Q								268	254	253	272	249	238	263	264	257	260	267	133					
L Q								174	123	115	115	115	114	116	115	115	117	103	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								19	31	29	27	10			27	31	30	22						
MED								256	242	252	252	264			256	254	246	247						
U Q								270	256	261	266	276			268	268	256	262						
L Q								248	236	235	242	252			250	244	240	240						

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								15	10	15	20	20	19	18	17	16	14	10	11		13	15		13
MED								167	138	113	115	116	125	117	117	121	119	132	111		109	109		109
U Q								264	276	260	154	153	157	167	194	222	256	274	278		123	113		111
L Q								137	119	113	113	113	115	113	112	113	111	101	101		105	105		103

MONTHLY MEDIANS OF H'F AND H'ES

FEB. 1993 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									27	26	24	12				26	27	22	26	11				
MED									254	253	258	263				273	252	245	242	254				
U Q									270	260	278	280				280	260	256	264	264				
L Q									238	238	251	250				258	248	242	234	123				

H'ES

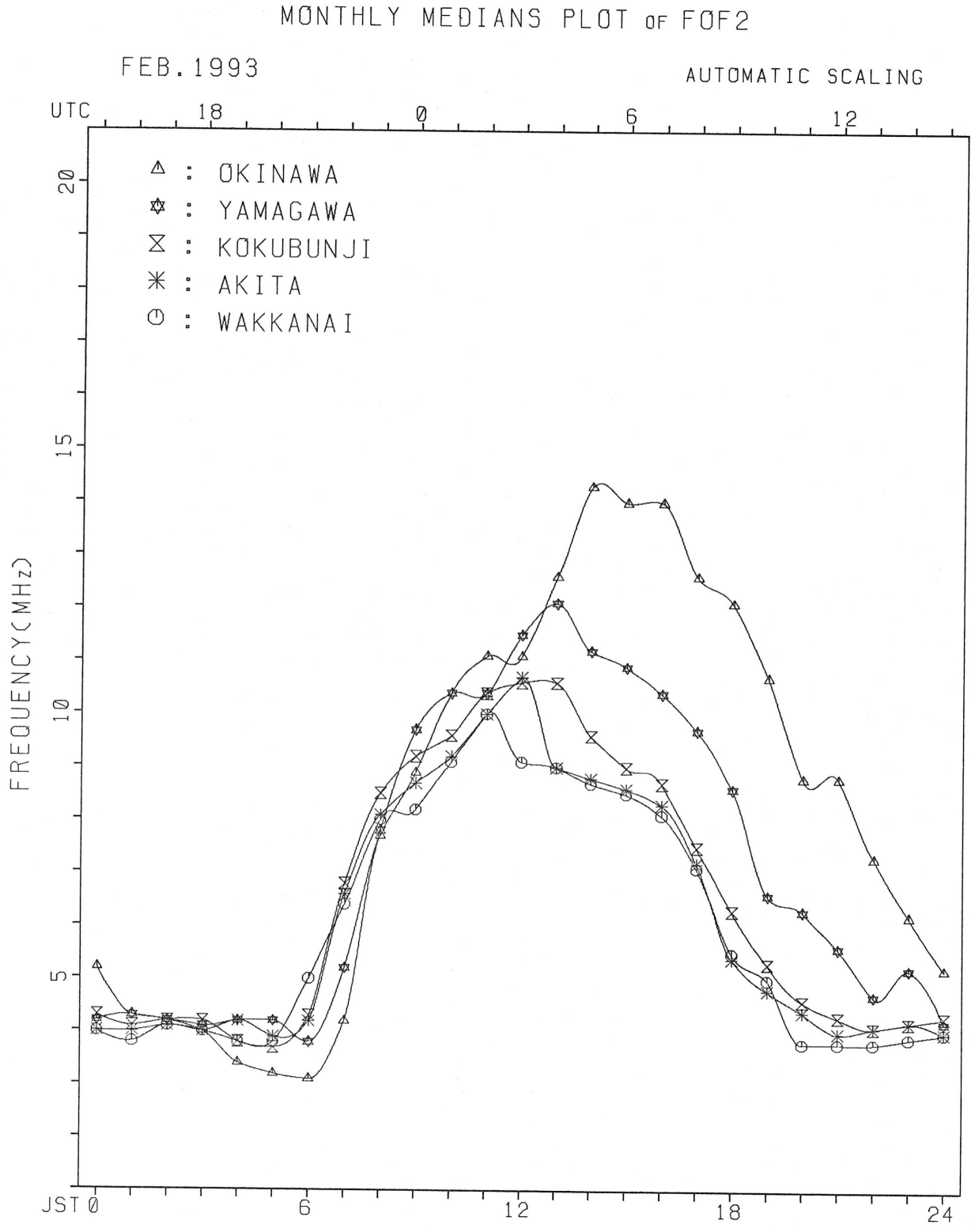
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT			14	10							12	15	15	16	17	12	17		10	12				
MED			108	105							119	123	119	120	117	126	115		109	111				
U Q			111	109							287	262	123	128	129	283	200		280	194				
L Q			105	103							113	117	115	117	115	110	110		101	104				

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									25	28	31	12				28	31	30	31	27	24	22	13	12
MED									262	259	258	267				276	262	249	236	244	260	254	252	301
U Q									285	265	282	280				285	272	258	244	266	284	274	280	328
L Q									244	248	252	250				262	254	240	228	228	240	238	126	256

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		10					11	12	19	19	23	23	23	22	21	24	22	15	19	20	14	15	12
MED	111		103					183	146	119	131	131	115	115	115	117	116	114	109	111	108	107	105	107
U Q	262		282					284	289	262	167	181	153	119	119	144	119	125	244	175	141	272	248	314
L Q	105		101					105	121	115	113	115	113	111	111	113	112	105	103	103	101	103	101	103


MONTHLY MEDIANS PLOT OF FOF2
FEB. 1993
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 STATION KOKUBUNJI

FEB. 1993 FXI (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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	X 47	X 44	X 39	X 40	X 38	X 36	X 39												X 73	X 67	X 58	X 55	X 57	X 61
2	X 47	X 36	X 35	X 35	X 36	X 37	X 31												X 44	X 38	X 40	X 38	X 40	42
3	46	X 45	X 41	X 40	X 33	X 32	X 32												X 45	X 45	X 51	X 43	X 45	X 44
4	X 44	X 42	X 46	X 43	X 40	X 34	X 34												X 60	X 50	X 44	X 38	X 38	40
5	X 39	X 41	X 42	X 44	41	42	X 46												X 55	X 54	X 58	X 48	X 45	X 45
6	49	51	54	55	56	54	56												X 55	X 50	X 48	X 44	X 46	X 44
7	X 46	X 49	X 48	X 46	X 44	X 43	X 43												X 63	X 45	X 40	X 41	X 44	X 50
8	X 44	X 45	X 43	X 41	X 42	X 41	X 39												X 65	X 66	X 61	65	X 69	X 65
9	X 65	X 68	X 69	64	62	70	68												X 72	X 61	X 54	X 48	X 50	X 53
10	X 48	X 47	X 45	X 44	X 41	X 40	X 42												X 55	X 49	X 44	X 45	46	X 47
11	X 48	X 45	X 45	X 44	X 30	X 30	X 33												X 64	X 57	X 57	X 49	X 44	X 46
12	X 44	X 46	X 48	X 49	X 41	X 34	X 39												X 77	X 56	X 41	X 40	X 40	X 41
13	X 41	X 43	X 45	X 45	X 36	X 34	X 36												X 68	X 58	X 48	X 47	X 45	X 44
14	X 42	X 46	X 44	X 42	X 40	X 41	X 42												X 75	X 51	X 44	X 43	X 48	X 44
15	X 45	X 46	X 48	X 47	X 47	X 48	X 49												X 61	X 54	X 50	X 47	X 47	X 46
16	X 48	X 47	X 47	X 49	X 45	X 43	X 43												X 68	X 60	X 53	X 44	X 40	X 41
17	X 42	X 44	X 45	X 42	X 44	X 43													X 72	X 57	X 47	X 47	X 48	X 54
18	X 45	X 47	X 45	X 47	X 39	X 39													X 68	X 62	X 53	X 47	48	50
19	50	X 49	X 50	X 46	X 41	X 44													X 65	X 54	X 51	X 53	X 53	X 54
20	53	X 54	55	X 58	X 50	50													X 75	X 54	X 49	X 48	X 49	X 50
21	X 49	X 52	X 49	X 46	X 43	X 44													X 74	X 60	X 51	X 47	X 47	X 47
22	X 48	X 53	X 45	X 42	X 42	X 44													X 68	X 59	X 54	X 57	X 46	X 48
23	X 48	X 48	X 49	X 49	X 44	X 42													X 63	X 44	X 45	X 48	X 48	X 49
24	X 50	X 50	X 51	52	49	X 43													X 67	X 50	X 48	X 48	X 47	X 47
25	X 48	X 49	X 49	X 54	X 45	X 36													X 77	X 58	X 48	X 44	X 39	X 39
26	X 40	X 41	X 41	X 44	X 42	X 32													X 67	X 58	X 59	X 47	X 47	X 46
27	X 45	X 45	X 47	X 46	X 44	X 43													X 71	X 60	X 55	X 48	X 43	X 42
28	X 41	X 42	X 44	X 44	X 41	X 40													X 87	X 74	X 63	X 58	X 58	X 58
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	28	16												28	28	28	28	28	28
MED	X 46	X 46	X 46	X 46	X 42	X 42	X 40												X 68	X 56	X 50	X 47	X 46	X 46
U Q	X 48	X 49	X 49	X 49	X 44	X 44	X 44												X 72	X 60	X 54	X 48	X 48	X 50
L Q	X 44	X 44	X 44	X 42	X 40	X 36	X 35												X 62	X 50	X 46	X 44	X 44	X 44

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1993 FOF2 (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

LAT. 35° 42.4'N LON. 139° 29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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	41	39	33	34	33	30	33	59	68	82	105	113	81	77	85	92	87	71	67	61	52	49	51	55
2	41	30	29	29	30	31	25	57	64	73	89	96	96	91	84	85	78	61	38	32	34	32	34	33
3	F 37	39	35	34	27	26	26	56	66	67	73	89	84	76	78	80	64	53	39	39	45	37	39	38
4	38	36	40	37	34	28	28	J R 62	71	V 80	84	H 80	81	87	78	87	77	52	54	44	38	32	32	F 33
5	33	35	36	38	F 34	F 34	40	59	69	73	90	93	84	82	83	81	68	54	49	48	52	41	39	39
6	41	42	F 42	F 41	J F 49	J F 48	F 47	67	75	72	88	102	92	U R 85	73	80	81	71	49	44	42	38	40	38
7	40	43	42	40	38	37	37	68	85	88	Z 83	87	101	95	94	88	76	76	57	39	34	36	38	44
8	38	39	37	35	36	35	33	62	68	109	111	96	102	116	109	108	103	76	59	60	55	F 55	63	59
9	59	62	63	F 56	F 53	F 61	F 61	76	87	107	116	118	128	111	101	87	98	79	66	55	48	V 42	44	47
10	42	41	39	38	35	34	36	68	93	101	H 103	105	117	106	92	89	90	66	49	43	38	40	F 38	41
11	42	39	39	38	24	24	27	77	80	92	94	116	122	112	102	97	85	69	58	51	51	43	38	40
12	38	40	42	43	35	28	33	63	82	87	97	110	119	110	94	93	86	78	71	50	35	34	34	35
13	35	37	39	39	30	28	30	63	78	83	84	104	103	93	84	82	85	69	62	52	42	41	39	38
14	35	40	38	36	34	35	36	71	84	94	93	96	102	87	81	83	90	74	69	45	38	37	42	38
15	39	40	42	41	41	42	43	63	89	88	100	96	112	91	88	83	85	82	55	48	44	41	41	40
16	42	40	41	43	39	37	37	66	94	96	89	100	111	100	84	78	84	73	62	54	47	38	34	35
17	36	38	39	36	38	37	39	66	92	101	97	108	105	97	86	81	86	86	66	51	41	41	42	48
18	39	41	39	41	33	33	34	69	98	128	117	122	117	106	104	94	81	71	62	56	47	41	F 41	F 40
19	F 41	43	44	40	35	38	40	69	102	112	107	118	117	109	98	91	91	77	59	48	45	47	47	48
20	F 46	48	F 47	52	44	43	44	68	88	121	130	143	145	111	102	94	88	73	69	48	43	42	43	44
21	43	46	43	39	37	38	38	67	93	102	117	149	134	105	92	88	84	76	68	54	45	41	41	41
22	42	47	39	36	36	38	41	71	97	109	102	99	108	103	103	99	81	72	62	53	48	51	40	42
23	42	42	43	43	38	36	41	64	75	99	107	120	109	J R 112	98	102	95	76	57	38	39	42	42	43
24	44	44	45	F 43	42	38	39	72	87	93	94	101	112	109	95	89	86	77	61	44	42	42	40	41
25	42	43	43	48	39	30	34	70	81	91	95	101	120	124	121	121	104	92	71	52	42	38	33	33
26	J R 34	35	35	38	35	26	34	64	78	89	89	99	105	111	109	102	86	73	61	52	53	41	40	40
27	39	39	41	40	38	37	44	69	75	85	90	96	104	107	105	105	91	78	65	54	49	42	37	36
28	35	36	38	38	36	34	42	69	81	91	92	104	116	115	100	94	101	103	81	68	57	52	52	52
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
MED	40	40	40	39	36	35	37	67	82	92	94	102	108	106	94	89	86	74	62	50	44	41	40	40
U Q	42	43	42	42	38	38	41	69	90	102	106	114	117	111	102	96	90	78	66	54	48	42	42	44
L Q	38	38	38	36	34	30	33	63	75	84	89	96	102	91	84	83	81	70	56	44	40	38	38	38

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1993 FOF1 (0.01MHZ) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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										L	L	L	U L 470	L	L	L	L							
2											L	L	U L 490	U L 480	L	L								
3										370	L		U L 480	U L 470	U L 450	L		190						
4										L	U L 460	L	L	U L 480	L	L	L							
5									L		L	L	L	L	L	L								
6									L	L	L	U L 460	L		L	L								
7									L	L	L	L	520	L	U L 480	L								
8										L	L	L	L	L	L	L	L							
9										L	L	L	L	L	L									
10										L	L	L	U L 480	L	L	L								
11									L	L	L	L	U L 510	L	L	L								
12										L	L	L	L	U L 500	L	U L 360								
13										L	L	L 500	L	L	L	L								
14										L	U L 490	L	U L 510	L		L	L							
15										L	U L 500	L	U L 520	L	L	L	L 290							
16									L	L	L	L 500	L	L	L	L	L							
17									L	L	L	L 480	L	L	L	L								
18									L	L	L	L	U L 480	L	L	L	L							
19									L	L	L	L	L	L	L		L							
20										L	L	U L 500	L 500	L	L	L	310							
21										L	L	U L 520	U L 500	L	L	L	L							
22									L	L	U L 470	L	U L 550	L	L	L								
23									L 320	L	L	U L 510	L	L		L	L							
24										L	L	U L 500	U L 540	U L 510	L	L								
25										L	L	L 490	L	L	L	L	L							
26										L	L	U L 520	U L 500	U L 500	L	L								
27										L	L	L	L	L	U L 500	L	L							
28									L	L	L	U L 500	U L 540	L 500	L	L								
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									1	1	4	11	15	7	3	1	2	1						
MED									L 320	370	U L 480	U L 500	U L 500	U L 500	U L 480	U L 360	300	190						
U Q											U L 495	U L 510	U L 520	U L 500	U L 500									
L Q											U L 465	L 490	U L 480	U L 480	U L 450									

FEB. 1993 FOF1 (0.01MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1993 FOE (0.01MHZ) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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								B 255		A	A	A	340	A	A	290	235	B						
2								190	245	A 285	A	A	A	A	A	300	240	165						
3								165	245	285	A	330	345	340	325	305	240	B						
4								175	250	A	320	335	340	335	325	280	240	A						
5								185	265	290	340	340	345	A 335	A	A	260	A						
6								180	250	305	A	345	345	R	325	305	245	A						
7								170	265	305	335	I R 340	350	340	325	305	255	B						
8								195	255	305	A	340	350	A	330	300	240	A						
9								H 200	A	305	340	A 360	A	355	340	310	255	165						
10								H 205	260	310	335	345	340	345	330	310	255	B						
11								180	260	305	335	350	355	345	335	310	255	180						
12								195	265	A	A	A	345	340	330	300	A	A						
13								H 205	250	300	330	345	A 345	335	320	300	A	A						
14								175	260	315	335	345	350	340	A	300	A	B						
15								175	260	305	340	350	350	340	325	A	250	A 155						
16								170	260	300	330	350	350	345	335	310	265	165						
17							B	175	255	300	A	345	345	350	325	310	A	A						
18						J K 125	B	185	255	295	325	340	345	A 345	320	300	250	170						
19							B	180	270	A	330	A 340	355	A	A	A	250	A 170						
20							A	190	260	305	325	340	345	A 340	A	305	250	150						
21							B	220	H 270	305	335	340	350	340	340	305	250	185						
22							B	H 220	265	305	330	345	350	A	325	300	240	170						
23							B	185	240	H 300	325	345	350	340	330	305	250	B						
24							B	190	260	310	335	340	A	A	A	A	255	180						
25							B	200	265	315	335	345	365	340	335	325	265	170						
26							B	200	275	305	325	335	U A 345	355	340	310	275	200						
27							B	H 215	265	310	335	340	U A 335	A	A	315	255	185						
28							B	210	265	310	335	345	340	345	335	315	265	A						
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						1		27	27	24	21	25	25	20	20	24	24	14						
MED						J K 125		190	260	305	335	345	345	340	330	305	250	170						
U Q								H 200	265	308	335	345	350	345	335	310	255	180						
L Q								175	255	300	328	340	345	340	325	300	242	165						

FEB. 1993 FOE (0.01MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1993 FOES (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

LAT. 35°42.4'N LON. 139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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	J A E B 14 15	16	E B 14	E B J A J A 15 13 14	21	G	J A J A J A 45 51 48	J A J A 40 48	54	24	G E B J A E B 19 16 16	13	J A 28	39	J A J A 21 44									
2	J A E B E B E B 38 13 15	13	E B E B J A J A 13 13 18	21	28	J A J A J A 55 53 44	37	J A J A 40 43	G	G	G J A J A 20 23	23	E B J A 15 27	22										
3	J A J A 21 19 17	21	E B 22 21 13	21	G 17	31	35	G 29	G J A 26 36	G	G	G E B E B 17 13	21	J A 24 21	24	24								
4	J A E B 17 13	21	E B 14	E B E B E B J A 13 13 14 21	G	J A 45	G 30	G 25	G 27	G 23	G 22	G 20	G 22	16	24	E B 15	E B E B J A J A 13 14 17 18							
5	E B E B E B E B 14 14 13 13				E B E B E B 13 14 13	21	G 19	31	G		36	38	37	36	31	G 25	20	J A J A 57 29		J A J A 21 28	24	24		
6	20	E B E B E B 14 13 13			E B E B E B J A 13 14 14 22				G	G	40	J A 37	G	G	G	G	G	22	20	19	18	E B 13	16	E B 15
7	E B E B E B E B 13 13 15 13				E B E B E B G 13 15 15				G	G	G	G 21	39	40	39	G	G E B 20 17		E B E B 16 14		E B E B E B 14 14 14		E B E B 15 54		
8	E B E B E B 16 14 15	19	J A E B E B G 16 15 14						G	J A J A J A 38 36 36			G J A 32 37		G	G 28	J A 24	19	E B E B 15 13		E B E B E B 21 14 13				
9	J A J A E B E B 17 18 13 14		E B E B E B G 13 13 13						J A J A J A J A 41 34 44 54				J A 48	G	G 34	G	G 25	G	E B E B 13 13		J A J A E B E B 16 22 14 13			
10	20	E B E B E B E B 13 13 13 14			E B E B E B G 13 13 13				30	34	35	G 24	37	G	G	35	G	21	21	J A 15	J A J A J A 17 17 19			28
11	E B E B E B E B 13 13 13 14				E B E B E B G 15 14 14				G	G 29	G 30	J A 44	G 30	G	G	G	G	G	E B E B 14 14		21	E B E B E B 14 13 14			
12	E B E B J A E B 14 13 22 13				J A J A J A G 19 21 19				G	30	J A 38	J A 39	J A 38	G 27	G 21	G 27	J A J A 42 23		E B E B 16 14		E B J A J A 13 19 21 23			
13	J A J A E B E B 32 39 15 13				E B E B E B G 14 13 15				G	34	36	36	J A 41	37	G J A 24 34		27	28	J A 22	25	24	23	E B E B 13 14	
14	E B E B E B E B 14 13 13 13				E B E B E B G 13 14 14				G	34	37	G	37	36	J A J A 51 32		28	E B E B 17 16		E B 14	21	20	23	E B 14
15	E B 15	22	E B E B 14 13		E B E B E B J A 13 14 13 31				G	G	G	G	38	38	G 31		G	20	E B E B 14 14		E B E B E B E B 14 14 13			18
16	E B E B E B 14 14 13	21	19	E B 13 21	G	G	G	G	39	38	36	36	G	G	G E B E B 14 13		E B E B E B E B 14 15 15				15			
17	E B E B E B E B 15 14 13 13				E B E B E B G 13 14 13				G	G 25	J A 40	39	38	G	35	G	J A J A 38 21		21	E B 15	E B E B 12 15		21	J A 16
18	20	J A E B E B 13 13 15			E B J K E B G 13 13 15				G	G	35	G	40	J A 43	G 21	35	28	21	E B 13	E B 13	J A J A 21 31		19	E B 13
19	21	E B J A 13 21	22		22	E B E B 15 13		G	G J A 35	34	J A 39	38	37	J A 39	32	G 24	20	J A 19	E B 13	E B J A 13 24		20	E B 14	
20	E B E B E B 14 14 14	20	E B E B E B G 14 14 14						G	G	36	36	40	J A 41	35	G	G 22	G	20	E B 14	E B E B E B E B 15 13 14 14			
21	E B E B E B E B 13 14 13 13				E B E B E B G 13 13 13				29	33	36	G 22	G 33	G 25	G	G	G	16	21	E B 15	E B E B E B E B 13 14 14 13			
22	E B E B E B 14 13 13	21	J A E B E B G 34 15 15		19	G	G	35	42	39	41	G 28	33	36	G E B E B 13 13		E B E B J A E B 16 14 15 13							
23	E B E B 14 13	20	E B 13	E B E B E B G 13 13 14		26	33	J A 37	39	42	41	J A 49	40	31	22	E B 14	23	J A 22	21	17	28			
24	E B E B E B E B 14 13 13 13				18	19	E B 13	G	G	G	35	G	40	41	J A 40	36	J A 33	G	E B E B 13 14		E B E B E B E B 15 14 14 13			
25	E B E B E B J A 14 14 13 30				J A E B J A G 20 15 14				29	G	36	J A 35	42	43	G	G	G	21	E B 15	E B 14	42	21	23	J A 24
26	25	E B 13	19	20	E B E B 13 14	20	G	J G 27	35	39	40	39	J A 40	37	38	35	25	J A 39	22	E B E B J A E B 13 13 20 15					
27	E B E B E B E B 15 14 14 13				20	20	20	G	29	34	39	J A 45	40	J A J A 44 47		G 30	G	21	E B E B 13 13		J A 21	20	J A 15	19
28	E B E B 14 13	16	19		18	E B E B 13 14		G	G	35	36	36	42	G	G	38	J A 48	26	22	20	J A 36	22	31	19
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
MED	E B E B E B E B 14 14 14 14				E B E B E B G 14 14 14				G	32	36	36	38	37	G	G	G	20	E B E B 16 14		18	16	17	16
U O	20	14	16	20	18	15	15	G	G	J A 34	J A 38	J A 40	40	41	J A 39	34	30	21	21	20	22	J A 22	21	24
L O	E B E B E B E B 14 13 13 13				E B E B E B G 13 13 13				G	G	G	G 34	G 37	G	G	G	G 25	G	E B E B 14 13		E B E B E B E B 14 14 14 14			

FEB. 1993 FOES (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1993 FBES (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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	E B 13	E B 15	E B 13	E B 14	E B 15	E B 14	E B 15	17	G	30	34	36	G 30	34	34	G 22	G 17	E B 16	E B 13	E B 13	E B 14	30	19	32
2	26	E B 13	E B 15	E B 13	E B 13	E B 13	16	G	G 17	46	34	35	34	36	34	G	G	G	E B 13	E B 15	E B 15	E B 15	16	E B 14
3	E B 13	E B 13	E B 13	E B 14	E B 13	E B 14	E B 13	G	G 16	31	34	G 28	G 25	G 27	G	G	G	E B 17	E B 13	E B 13	15	16	16	E B 14
4	E B 14	E B 13	E B 14	E B 14	E B 13	E B 13	E B 14	G	G	30	G 28	G 23	G 26	G 22	G 20	G 19	G 20	U Y 15	17	E B 15	E B 13	E B 14	E B 13	15
5	E B 14	E B 14	E B 13	E B 13	E B 13	E B 14	E B 13	G	G 17	30	G	36	37	36	34	U Y 31	G 21	19	21	E B 13	E B 13	19	E B 13	14
6	E B 13	E B 14	E B 13	E B 13	E B 13	E B 14	E B 14	G 15	G	G	34	G 30	G	G	G	G	G	21	E B 13	E B 13	E B 13	E B 13	E B 13	E B 15
7	E B 13	E B 13	E B 15	E B 13	E B 13	E B 15	E B 15	G	G	G	G	G 20	38	38	37	G	G 19	E B 17	E B 16	E B 14	E B 14	E B 14	E B 15	16
8	E B 16	E B 14	E B 15	E B 13	E B 14	E B 15	E B 14	G	G	G	34	G 28	G 28	36	G	G 27	G 20	17	E B 15	E B 13	E B 13	E B 14	E B 13	E B 13
9	E B 13	E B 13	E B 13	E B 14	E B 13	E B 13	E B 13	G	27	G 24	37	40	37	G	G 33	G	G 23	G	E B 13	E B 13	E B 14	E B 19	E B 14	E B 13
10	E B 13	E B 13	E B 13	E B 14	E B 13	E B 13	E B 13	G	29	34	35	G 21	36	G	G	35	G	20	E B 13	E B 14	E B 13	E B 13	E B 13	E B 13
11	E B 13	E B 13	E B 13	E B 14	E B 15	E B 14	E B 14	G	G	G 26	G 27	G 30	G 27	G	G	G	G	G	E B 14	E B 14	E B 14	E B 14	E B 13	E B 14
12	E B 14	E B 13	E B 13	E B 13	E B 13	18	17	G	G	U Y 30	34	35	G 31	G 25	G 21	G 26	27	21	E B 16	E B 14	E B 13	E B 13	16	E B 15
13	17	18	E B 15	E B 13	E B 14	E B 13	E B 15	G	G	34	35	36	G 35	36	G 23	33	27	21	18	17	17	E B 13	E B 13	E B 14
14	E B 14	E B 13	E B 13	E B 13	E B 13	E B 14	E B 14	G	G	33	36	G	37	36	36	G 22	26	E B 17	E B 16	E B 14	E B 13	14	16	E B 14
15	E B 15	E B 13	E B 14	E B 13	E B 13	E B 14	E B 13	G	G	G	G	G	38	35	G	31	G	20	E B 14	E B 14	E B 14	E B 14	E B 13	E B 13
16	E B 14	E B 14	E B 13	E B 13	E B 13	E B 13	16	G	G	G	G	37	38	35	G	G	G	G	E B 14	E B 13	E B 14	E B 15	E B 15	E B 15
17	E B 15	E B 14	E B 13	E B 13	E B 13	E B 14	E B 13	G	G	G 24	34	38	37	G	34	G	27	21	E B 16	E B 15	E B 12	E B 15	E B 14	E B 14
18	E B 13	E B 14	E B 13	E B 15	E B 13	K E B 13	15	G	G	G	34	G	40	G 32	G 20	33	27	20	E B 13	E B 13	17	26	E B 13	E B 13
19	E B 13	E B 13	E B 13	E B 13	E B 13	E B 15	E B 13	G	G	32	G 32	G 34	37	35	34	31	G 23	20	17	E B 13	E B 13	22	E B 13	E B 14
20	E B 14	E B 14	E B 14	E B 13	E B 14	E B 14	E B 14	G	G	G	34	35	36	39	34	G	G 21	G	15	E B 14	E B 15	E B 13	E B 14	E B 14
21	E B 13	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	G	29	32	36	G 22	G 29	G 25	G	G	G	G 15	E B 13	E B 15	E B 13	E B 14	E B 14	E B 13
22	E B 14	E B 13	E B 13	E B 13	18	E B 15	E B 15	G 16	G	G	35	37	38	40	G 23	32	33	G	E B 13	E B 13	E B 16	E B 14	E B 13	E B 13
23	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	E B 14	G	26	32	36	37	40	39	40	38	27	22	E B 14	E B 16	E B 13	E B 16	E B 13	20
24	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	G	35	G	37	36	34	33	G	G	E B 13	E B 14	E B 15	E B 14	E B 14	E B 13
25	E B 14	E B 14	E B 13	19	15	E B 15	E B 13	G	28	G	36	G	41	41	G	G	G	21	E B 15	E B 14	34	E B 15	16	20
26	E B 14	E B 13	E B 13	15	E B 13	E B 14	E B 14	G	G 20	34	36	37	36	G 31	35	35	33	24	34	20	E B 13	E B 13	E B 13	E B 15
27	E B 15	E B 14	E B 14	E B 13	E B 13	E B 13	E B 14	G	29	33	37	43	40	36	34	G 29	G	20	E B 13	E B 13	E B 13	E B 13	E B 13	E B 14
28	E B 14	E B 13	E B 13	16	E B 13	E B 13	E B 14	G	G	34	35	36	39	G	G	36	40	26	E B 13	E B 13	21	E B 13	22	E B 14
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
MED	E B 14	E B 13	E B 13	E B 13	E B 13	E B 14	E B 14	G	G	30	34	G	37	35	G	G	G	18	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14
U Q	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14	E B 15	G	G	32	36	36	38	36	34	32	27	21	16	E B 14	15	16	16	15
L Q	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	G	G	G 30	G 32	G	G	G	G 23	G	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13

FEB. 1993 FBES (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1993 FMIN (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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	13	15	13	14	15	14	15	15	17	17	16	24	19	17	19	17	15	16	13	13	14	13	13	16
2	14	13	15	13	13	13	13	14	13	13	19	17	19	21	18	15	16	13	13	15	15	15	14	14
3	13	13	13	14	13	14	13	14	13	17	16	17	18	15	19	17	17	17	13	13	13	13	14	14
4	14	13	14	14	13	13	14	13	14	16	16	16	17	18	16	17	13	13	13	15	13	14	13	13
5	14	14	13	13	13	14	13	15	14	17	17	20	20	23	30	25	20	13	13	13	13	13	13	13
6	13	14	13	13	13	14	14	13	13	14	16	21	18	20	17	19	16	13	13	13	13	13	13	15
7	13	13	15	13	13	15	15	15	13	17	18	17	19	20	21	17	14	17	16	14	14	14	15	13
8	16	14	15	13	14	15	14	13	13	16	18	17	17	22	18	18	13	14	15	13	13	14	13	13
9	13	13	13	14	13	13	13	13	14	17	17	21	21	22	18	18	17	14	13	13	14	15	14	13
10	13	13	13	14	13	13	13	15	15	17	16	17	16	18	18	18	15	16	13	14	13	13	13	13
11	13	13	13	14	15	14	14	13	14	16	17	17	18	17	20	17	16	16	14	14	14	14	13	14
12	14	13	13	13	13	13	13	14	15	16	21	17	16	18	17	13	16	14	16	14	13	13	14	15
13	14	14	15	13	14	13	15	14	16	17	16	17	18	16	16	16	13	13	13	13	14	13	13	14
14	14	13	13	13	13	14	14	14	13	17	23	18	18	17	14	15	17	17	16	14	13	13	14	14
15	15	13	14	13	13	14	13	15	15	19	19	23	19	18	18	15	14	13	14	14	14	14	13	13
16	14	14	13	13	13	13	15	14	14	15	15	15	22	16	18	17	15	13	14	13	14	15	15	15
17	15	14	13	13	13	14	13	14	14	17	16	16	16	23	17	16	13	14	16	15	12	15	14	14
18	13	14	13	15	13	13	15	14	13	15	16	18	17	16	16	16	17	14	13	13	14	13	13	13
19	13	13	13	13	13	15	13	14	15	17	15	17	18	17	17	16	14	14	13	13	13	13	13	14
20	14	14	14	13	14	14	14	15	15	13	17	15	19	20	18	18	17	13	13	14	15	13	14	14
21	13	14	13	13	13	13	13	15	14	14	30	19	17	16	20	17	16	13	13	15	13	14	14	13
22	14	13	13	13	13	15	15	15	13	14	17	16	17	16	14	13	13	14	13	13	16	14	13	13
23	14	13	13	13	13	13	14	14	14	14	18	18	23	18	16	15	13	17	14	16	13	13	13	13
24	14	13	13	13	13	13	13	15	13	15	16	20	19	17	17	17	16	15	13	14	15	14	14	13
25	14	14	13	15	13	15	13	13	14	16	17	18	18	17	19	20	14	15	15	14	16	15	14	14
26	14	13	13	14	13	14	14	14	15	16	17	17	17	16	17	16	13	14	14	15	13	13	13	15
27	15	14	14	13	13	13	14	13	17	16	17	18	17	18	17	17	16	13	13	13	13	13	13	14
28	14	13	13	13	13	13	14	14	14	14	16	15	16	16	17	17	15	14	13	13	13	13	13	14
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
MED	14	13	13	13	13	14	14	14	14	16	17	17	18	18	18	17	15	14	13	14	13	13	13	14
U Q	14	14	14	14	13	14	14	15	15	17	18	18	19	20	18	18	16	16	14	14	14	14	14	14
L Q	13	13	13	13	13	13	13	14	13	14	16	17	17	16	17	16	14	13	13	13	13	13	13	13

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1993 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9H)

LAT. 35°42.4'N LON. 139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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	315	320	295	270	285	290	300	365	350	340	315	360	340	320	295	325	350	335	300	315	295	300	285	325
2	325	295	275	280	265	305	305	355	360	325	345	330	340	335	330	345	340	350	325	300	315	295	280	265
3	F 290	305	310	325	305	305	325	340	365	340	340	325	340	330	345	345	350	355	320	295	320	295	305	290
4	295	300	305	330	340	295	300	J R 355	380	V 315	340	H 320	325	340	340	325	345	335	325	315	340	305	290	F 300
5	285	305	315	325	F 305	F 300	335	350	320	330	340	325	335	325	335	340	350	335	310	310	335	315	300	285
6	270	310	F 305	F 280	J F 285	J F 300	F 330	340	360	340	295	330	325	U R 335	320	320	325	340	310	300	305	290	285	285
7	280	300	310	300	295	285	305	335	345	345	Z 295	335	320	305	315	340	320	345	335	330	285	255	270	315
8	300	280	275	280	270	295	315	345	325	315	330	320	285	310	310	310	325	335	310	300	295	F 285	290	290
9	290	290	315	F 300	F 285	F 290	F 315	335	325	325	320	315	320	320	325	305	325	330	315	315	305	V 260	270	300
10	315	295	305	300	280	280	310	335	350	335	H 325	310	320	315	315	310	350	335	320	310	290	275	F 275	280
11	300	300	300	320	275	260	275	350	345	355	320	320	325	320	310	320	330	340	330	305	300	320	285	285
12	275	290	300	325	350	275	300	340	340	350	305	310	315	320	310	325	325	335	335	345	305	295	270	285
13	270	290	310	340	330	285	315	345	365	330	350	315	330	345	320	315	330	340	325	320	295	310	300	300
14	290	300	305	295	285	290	310	340	350	340	340	330	330	325	305	320	335	325	340	330	290	280	305	300
15	295	305	305	280	280	270	310	335	340	330	330	310	320	315	325	335	335	345	345	305	300	295	290	275
16	290	295	295	295	310	275	295	325	340	340	340	315	320	325	330	335	330	335	320	320	315	305	275	275
17	280	295	295	295	280	280	285	325	340	335	330	340	330	335	330	320	330	330	345	295	275	265	255	310
18	275	255	260	275	285	310	285	310	315	330	320	305	315	310	325	330	335	330	310	315	310	280	F 290	F 285
19	F 295	300	320	295	275	270	310	330	325	345	320	325	320	320	315	330	330	335	340	290	295	295	295	285
20	F 275	290	F 285	315	315	280	290	325	290	320	320	330	325	325	315	330	330	330	325	290	290	285	265	275
21	275	300	310	265	265	260	275	310	305	305	275	320	335	335	330	330	340	330	330	310	295	285	270	265
22	270	310	295	295	255	265	295	325	320	345	320	325	305	305	300	325	335	330	320	295	275	325	270	280
23	280	285	290	310	290	270	305	345	330	325	320	325	310	J R 315	315	325	345	350	335	280	280	280	265	290
24	290	285	295	F 295	300	280	310	340	340	335	325	310	320	325	325	330	330	340	325	305	300	300	280	265
25	280	295	305	320	370	270	305	340	350	335	305	310	310	310	305	315	320	330	325	330	305	310	280	270
26	J R 280	285	305	315	360	315	310	345	345	335	310	305	305	305	315	325	340	330	325	305	330	310	290	270
27	270	280	285	300	300	300	325	355	350	330	330	310	300		310	325	335	340	320	310	310	305	285	280
28	285	285	295	310	305	290	310	355	345	335	320	295	315	315	305	310	310	330	335	315	290	270	265	265
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	28	28	28	28	28	28	28	28	27	28	28	28	28	28	28	28	28	28	28
MED	285	295	302	300	288	285	308	340	342	335	320	320	320	320	315	325	332	335	325	310	300	295	282	285
U Q	295	300	308	318	308	298	312	348	350	340	335	328	330	330	328	330	340	340	335	315	310	305	290	295
L Q	275	288	295	288	280	272	298	332	325	328	318	310	315	315	310	320	328	330	320	300	290	280	270	275

FEB. 1993 M(3000)F2 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1993 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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										L	L	L	UL 385	L	L	L	L							
2										A	L	L	UL 360	UL 370	L	L								
3										435	L	L	UL 370	UL 370	UL 375	L		440						
4										L	UL 365	L	L	UL 355	L	L	L							
5									L		L	L	L	L	L	L								
6									L	L	L	UL 395	L	Y	L	L								
7									L	L	L	L	360	L	UL 365	L								
8										L	L	L	L	L	L	L	L							
9										L	L	L	L	L	L									
10										L	L	L	UL 385	L	L	L								
11									L	L	L	L	UL 365	L	L	L								
12										L	L	L	L	UL 370	L	UL 400								
13										L	L	L 360	L	L	L	L								
14										L	UL 380	L	UL 360	L		L	L							
15										L	UL 370	L	UL 355	L	L	L	L 415							
16									L	L	L	L 360	L	L	L	L	L							
17									L	L	L	L 370	L	L	L	L								
18									L	L	L	L	UL 375	L	L	L	L							
19									L	L	L	L	L	L	L		L							
20										L	L	UL 380	L 370	L		L	410							
21										L	L	UL 360	UL 370	L	L	L	L							
22									L	L	UL 375	L	UL 355	L	L	L								
23									400	L	L	UL 350	L	L		L	L							
24										L	L	UL 370	UL 335	UL 375	L	L								
25										L	L	L 385	L	L	L	L	L							
26										L	L	UL 345	UL 365	UL 370	L	L								
27										L	L	L	L	L	UL 355	L	L							
28									L	L	L	UL 370	UL 340	L 370	L	L								
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									1	1	4	11	15	7	3	1	2	1						
MED									400	435	UL 372	UL 370	UL 365	UL 370	UL 365	UL 400	412	440						
U Q											UL 378	UL 380	UL 370	UL 370	UL 375									
L Q											UL 368	UL 360	UL 355	L 370	UL 355									

FEB. 1993 M(3000)F1 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1993 H'F2 (KM) 135° E MEAN TIME (G.M.T. + 9H)

LAT. 35° 42.4'N LON. 139° 29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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										250	270	245	235	300	255	250	235							
2										A 255	250	255	260	255	250	245								
3										220	255	265	255	255	245	235		220						
4										260	250	260	250	265	245	275	230							
5									235		240	270	250	255	255	250								
6									220	230	310	260	250	E Y 270	245	260								
7									230	240	250	250	300	255	280	230								
8										255	235	255	310	260	260	255	220							
9										250	255	250	255	250	250									
10										225	245	280	260	250	230	265								
11									220	230	245	265	260	250	270	240								
12										230	290	270	260	250	250	255								
13										250	230	285	260	245	255	250								
14										250	255	260	255	250		270	250							
15										245	260	250	275	250	260	245	235							
16									245	240	245	280	265	265	245	235	250							
17									235	240	245	250	260	260	250	250								
18									250	265	240	275	255	255	260	255	220							
19									250	230	255	255	265	270	260		235							
20										270	255	260	250	245	260	230	230							
21										255	305	260	240	255	250	255	235							
22									265	235	250	240	295	290	260	245								
23									230	260	270	265	250	275		260	230							
24										240	255	265	265	255	250	245								
25										250	260	265	270	265	250	245	240							
26										245	L 285	275	270	275	260	255								
27										260	250	285	285	270	270	255	240							
28									240	255	255	280	280	265	260	255								
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									11	27	28	28	28	28	26	26	13	1						
MED									235	250	255	262	260	255	255	250	235	220						
U Q									250	255	260	272	270	268	260	255	240							
L Q									230	235	245	255	252	250	250	245	230							

FEB. 1993 H'F2 (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1993 H'F (KM) 135°E MEAN TIME (G.M.T. + 9H)

LAT. 35°42.4'N LON. 139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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	250	250	295	345	290	300	290	220	230	235	215	255	220	H 190	230	245	245	225	250	225	260	270	290	260
2	265	260	330	330	340	270	270	230	225	A	230	225	210	220	220	240	235	220	220	265	275	280	320	355
3	310	255	260	245	260	275	270	230	225	200	220	215	225	225	210	225	220	185	230	270	245	240	275	290
4	280	275	270	240	225	275	285	235	210	215	205	200	210	205	220	H 210	240	210	230	220	230	270	270	290
5	315	280	270	245	270	290	225	220	210	H 210	195	225	240	225	H 230	240	230	220	250	250	240	245	260	285
6	310	270	280	310	270	235	240	235	225	215	H 200	210	H 190	Y	210	230	240	220	205	235	235	275	280	305
7	310	280	260	260	275	290	275	235	250	230	H 205	I Y 210	230	235	230	H 220	235	230	220	220	275	350	330	255
8	265	300	315	290	335	275	235	225	225	240	220	210	H 210	250	225	225	235	220	220	245	255	280	270	260
9	275	270	240	265	265	280	220	230	230	225	230	A 240	220	230	205	225	240	220	230	225	230	285	335	260
10	250	275	255	265	265	310	255	225	235	230	220	215	220	H 200	220	225	230	220	215	240	255	305	325	300
11	265	255	240	235	E B 295	360	325	230	220	230	225	225	220	H 220	210	225	230	220	225	250	260	225	280	285
12	290	295	275	240	215	360	270	230	235	225	215	H 205	225	230	215	200	235	225	230	215	255	270	330	310
13	335	325	260	240	220	295	255	230	H 210	230	220	H 210	230	235	230	225	235	220	230	240	255	250	275	260
14	300	280	260	275	270	300	270	240	235	230	H 220	220	220	210	230	H 210	245	225	225	215	275	275	270	250
15	280	280	260	300	285	315	250	230	H 225	H 205	220	225	230	220	215	215	220	230	205	235	245	255	280	310
16	290	280	280	270	240	310	290	245	H 210	H 225	215	220	235	225	225	215	H 220	220	225	220	240	240	330	325
17	310	285	270	255	270	275	295	245	H 200	230	215	210	240	230	210	210	240	230	210	240	270	340	340	255
18	305	355	320	275	250	270	300	250	230	H 235	225	210	210	235	H 210	230	230	220	230	240	235	A 305	305	300
19	305	290	255	275	270	330	250	235	230	225	210	215	210	210	210	230	225	215	220	245	250	275	265	270
20	305	285	260	255	235	270	295	240	225	220	220	225	220	220	210	H 210	210	220	220	250	260	290	320	310
21	315	270	240	275	320	340	300	250	240	235	240	235	225	220	220	225	230	235	220	230	245	260	320	330
22	330	250	255	270	385	330	270	245	H 195	240	220	230	220	H 220	H 220	210	225	220	220	240	285	225	310	295
23	295	300	285	260	255	330	260	220	215	240	230	220	220	H 215	250	A 245	230	220	210	235	265	320	305	320
24	280	295	270	265	255	250	275	240	235	225	220	220	220	230	225	210	230	220	215	235	265	275	320	320
25	305	285	270	245	210	320	285	235	235	220	225	205	E A 250	E A 250	220	A 215	230	230	210	215	E A 310	255	285	A 355
26	335	310	290	250	215	245	270	225	230	230	210	210	230	225	230	230	235	220	A 250	230	235	245	285	310
27	305	320	290	265	250	275	240	220	230	220	230	A 235	220	235	210	220	235	225	220	225	230	245	280	300
28	325	310	285	260	255	290	250	220	H 210	225	215	210	A 235	215	220	235	A 260	235	210	225	260	295	340	305
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	28	28	28	28	27	28	28	28	27	28	28	28	28	28	28	28	28	28	28
MED	305	280	270	265	264	290	270	230	225	225	220	218	220	222	220	225	232	220	220	235	255	272	298	300
U Q	310	298	285	275	280	318	288	240	232	230	225	225	230	230	228	230	238	225	230	242	265	288	322	310
L Q	280	270	260	248	245	275	250	225	H 212	220	215	210	220	215	210	212	230	220	215	225	240	248	278	265

FEB. 1993 H'F (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1993 H'E (KM) 135°E MEAN TIME (G.M.T. + 9H)

LAT. 35° 42.4'N LON. 139° 29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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								B 145	125	120	A 115	A 115	A 130	A	A	120	120	B 140						
2									A 125	A 115	115	115	A	A	A	115	115	140						
3								B 145	115	115	A 115	E A 130	A 125	E A 135	120	120	120	B 140						
4									115	A	A 130	120	A 120	115	115	115	A 130	A 140						
5								A 140	A 125	120	120	140	120	A	A	A	A 130	A 140						
6								140	125	120	A 120	A 135	120	120	120	120	120	A 140						
7								B 155	120	115	115	A 120	120	115	A 135	120	A 120	B 140						
8								150	120	110	A 110	A 130	115	115	115	A 125	A 125	A 140						
9								150	A	A 130	120	120	A	120	A 130	115	A 130	B 140						
10								B 160	120	A 120	115	110	A 115	110	110	110	115	B 140						
11								120	115	A 130	A 130	A 130	120	110	115	115	120	B 140						
12								130	115	A 120	A 120	A 120	A 125	A 120	120	A 125	A 130	A 140						
13								145	115	110	110	A 125	A	A 115	120	E A 130	A 130	A 140						
14								135	115	115	125	120	A 120	120	A 120	A 125	A 130	B 140						
15								E B 180	120	120	115	120	115	115	115	A 115	115	A 140						
16								130	120	110	110	110	120	115	115	110	115	125						
17							B	120	110	A 120	110	115	120	115	A 120	115	A 130	A 140						
18						B	B	130	115	110	110	110	120	A 120	115	110	110	135						
19							B	125	120	110	A 120	A 120	110	A	A	A	E A 140	A 140						
20							B	140	115	110	110	110	120	120	115	115	A 120	125						
21							B	155	120	115	E B 140	120	A 130	A 120	120	120	120	140						
22							B	130	115	110	110	110	115	A	A 120	115	120	130						
23							B	120	110	110	120	A 120	115	110	115	115	120	B 140						
24							B	135	115	115	110	110	110	115	A	115	125	B 140						
25							B	120	A 130	110	A 125	125	110	A	110	115	115	130						
26							B	115	A 120	110	A 130	110	110	A 140	110	A 115	115	140						
27							B	120	110	A 130	110	110	110	A	A	E A 135	115	130						
28							B	130	110	A 120	A 115	110	110	110	110	110	115	130						
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								25	27	26	22	24	25	20	21	25	24	12						
MED								132	115	115	115	119	120	115	115	115	120	132						
U Q								148	A 120	A 120	A 125	A 125	A 120	A 120	A 120	A 120	A 122	140						
L Q								122	115	110	110	110	112	115	115	115	115	130						

FEB. 1993 H'E (KM)

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1993 H'ES (KM) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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	145	B 110	B		B 165	150	140		G 120	115	115		115	110	105	110	110	B 115	B		115	110	105	105
2	105	B	B	B	B	B 105	105		105	115	115	115	120	110	110	G	G	G 110	105		105	B 105	105	
3	110	110	110	120	110	110	B 110		110	E G 195	115	110	110	100	G	G	G	B	B 105		105	105	105	100
4	105	B 110		B	B	B	B 110		G 110	110	110	105	100	110	110	110	100	105	105	B	B	B 110	105	
5	B	B	B	B	B	B	B 115		110	130	G	E G 195	170	160	120	120	115	115	110	110	110	110	110	110
6	110	B	B	B	B	B	B 130		G	G	120	120	G	G	G	G	G	105	105	110	110	B 105		B
7	B	B	B	B	B	B	B	G	G	G	G 110		180	150	130	G	100	B	B	B	B	B	B 110	
8	B	B	B 110		110	B	B	G	G 120	120	110		110	125	G	110	110	130	B	B	110	B	B	B
9	110	115	B	B	B	B	B	G	115	115	125	120	115	G	115	G	115	G	B	B	130	110	B	B
10	115	B	B	B	B	B	B	G	E G 190	E G 175	E G 170	105	140	G	G	140	G	105	100	125	130	120	130	110
11	B	B	B	B	B	B	B	G	G	110	110	105	105	G	G	G	G	G	B	B	100	B	B	B
12	B	B	110	B	105	100	105	G	G	120	120	110	105	105	110	100	100	110	B	B	B	110	110	110
13	110	105	B	B	B	B	B	G	G	E G 195	180	170	105	140	105	135	120	100	100	100	100	120	B	B
14	B	B	B	B	B	B	B	G	G	165	145	G	130	125	100	105	120	B	B	B	115	110	120	B
15	B	110	B	B	B	B	B	100	G	G	G	G	E G 180	130	G	115	G	160	B	B	B	B	B	120
16	B	B	B	120	110	B	115	G	G	G	G	160	150	155	130	G	G	G	B	B	B	B	B	B
17	B	B	B	B	B	B	B	G	G	110	115	175	170	G	130	G	100	100	95	B	B	B	150	135
18	150	130	B	B	B	B	B	G	G	G	E G 170	G	E G 195	105	110	155	150	140	B	B	130	125	105	B
19	125	B 130	110		110	B	B	G	G 120	110	115		140	115	110	110	110	150	110	B	B	105	110	B
20	B	B	B	110	B	B	B	G	G	G	145	150	135	120	120	G	110	G	100	B	B	B	B	B
21	B	B	B	B	B	B	B	G	E G 190	E G 160	150	105	105	100	G	G	G	115	105	B	B	B	B	B
22	B	B	B	110	120	B	B	120	G	G	E G 165	145	140	165	100	150	120	G	B	B	B	B	115	B
23	B	B	110	B	B	B	B	G	E G 155	E G 190	120	155	145	140	125	120	120	100	B	110	120	105	105	105
24	B	B	B	B	110	110	B	G	G	G	E G 195	G	120	115	115	110	110	G	B	B	B	B	B	B
25	B	B	B	105	105	B	110	G	E G 190	G	180	120	165	140	G	G	G	140	B	B	110	115	110	110
26	110	B	110	110	B	B	105	G	110	135	120	120	115	110	160	140	130	140	120	120	B	B	130	B
27	B	B	B	B	105	105	105	G	E G 200	E G 175	130	120	120	115	110	110	G	150	B	B	105	110	115	110
28	B	B	110	110	110	B	B	G	G	190	E G 170	E G 180	125	G	G	140	120	125	125	120	110	110	110	115
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	11	5	8	9	10	5	7	8	10	19	24	24	27	22	19	17	18	17	13	9	16	14	18	14
MED	110	110	110	110	110	110	105	112	135	122	120	118	122	118	110	115	112	115	105	110	110	110	110	110
U Q	125	122	110	115	110	138	115	125	E G 190	E G 175	E G 168	152	150	140	125	140	120	140	112	120	118	115	115	110
L Q	110	108	110	110	105	102	105	108	110	115	115	110	110	110	110	110	110	105	100	105	105	110	105	105

FEB. 1993 H'ES (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1993 TYPES OF ES 135°E MEAN TIME (G.M.T. + 9H)

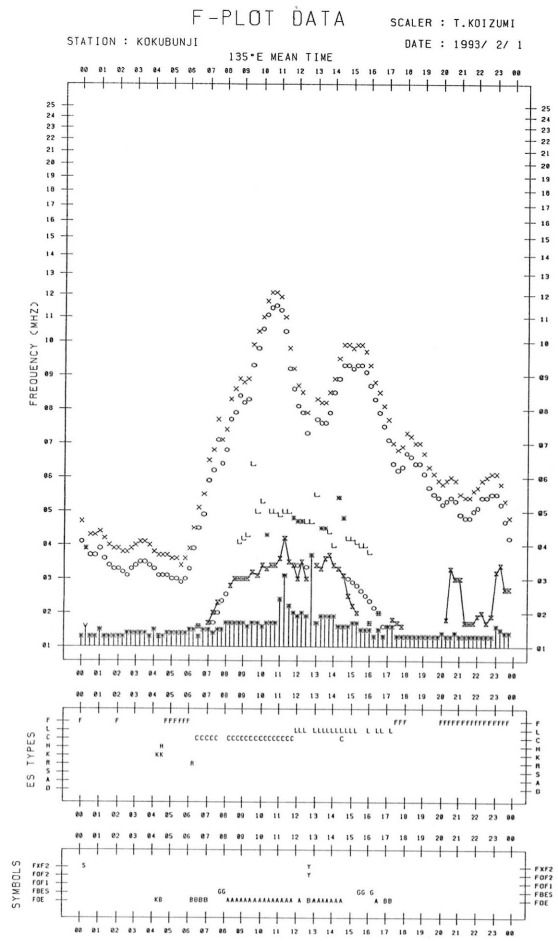
LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

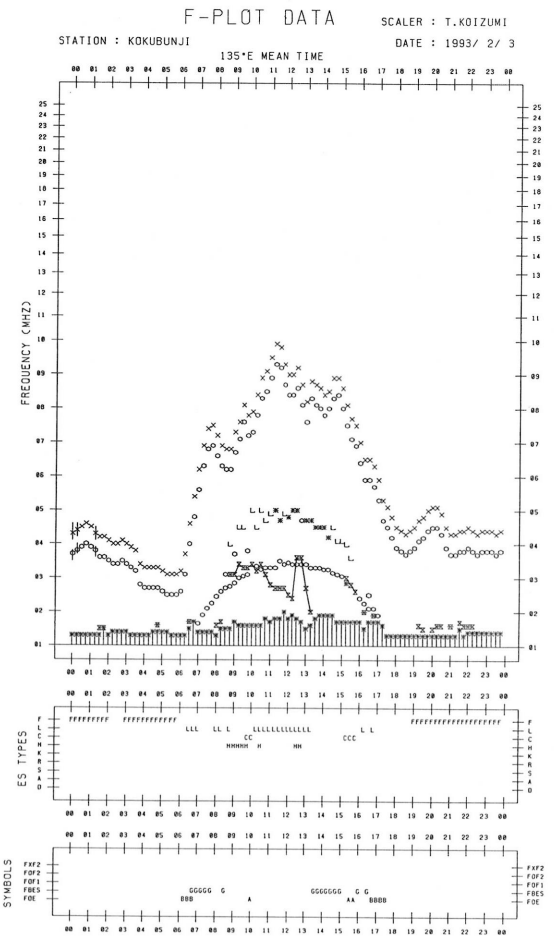
HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	F 1		F 1			F 1	F 1	C 1		C 1	C 1	C 1	L 1	L 2	L 2	L 2	L 1		F 1		F 2	F 4	F 2	F 3
2	F 3						F 2	L 2	L 2	CL 42	C 2	C 1	L 2	L 1	L 2				F 1	F 2	F 1		F 3	F 2
3	F 1	F 2	F 1	F 1	F 2	F 2		L 1	L 1	H 1	C 1	L 1	L 1	L 1						F 2	F 2	F 2	F 2	F 2
4	F 1		F 1					L 1		L 2	L 2	L 1	L 1	L 1	L 1	L 2	L 2	L 1	F 1				F 1	F 1
5								LH 11	L 1	H 1		HL 11	H 1	HL 11	L 1	L 1	L 1	L 1	F 4	F 2	F 1	F 2	F 1	F 1
6	F 1							L 1			L 1	L 1						L 2	F 1	F 1	F 1		F 1	
7												L 1	H 1	H 1	HL 11		L 1							F 2
8				F 1	F 1					C 1	C 1	L 1	L 1	C 1		L 1	L 1	L 1			F 1			
9	F 2	F 1							L 2	L 1	C 1	C 2	C 1		L 1		L 2				F 1	F 3		
10	F 1								H 1	HL 11	HL 11	L 1	HL 11			H 1		L 1	F 1	F 1	F 1	F 1	F 1	F 2
11										L 1	L 1	L 2	L 1								F 1			
12			F 1		F 1	F 2	F 2			C 1	C 2	L 2	L 2	L 2	L 1	L 2	L 2	L 1				F 2	F 4	F 2
13	F 2	F 3								H 1	H 1	HL 11	LH 21	HL 11	L 1	HL 11	CL 22	L 2	F 2	F 2	F 2	F 1		
14										H 1	H 1		HL 11	HL 11	L 2	L 1	CL 21				F 1	F 2	F 2	
15		F 1						L 1					HH 11	H 1		L 1		HL 11						F 1
16				FF 11	F 1		F 1					H 1	H 1	H 1	H 1									
17										L 1	C 1	H 1	HL 11		HL 12		L 2	L 2	F 1				HK 11	F 1
18	FF 11	F 2				K 1					H 1		HL 11	LH 21	L 1	H 1	H 1	H 1			F 1	F 5	F 1	
19	F 1		F 1	F 2	F 2					C 1	L 1	LH 11	HC 11	C 1	L 2	L 2	L 3	HL 12	F 1			F 3	F 1	
20				F 1							H 1	CH 11	H 1	C 2	C 1		L 2		F 1					
21									HL 12	H 1	H 1	L 1	L 2	L 2				L 1	F 1					
22				F 2	FF 13			L 1			H 1	HL 21	HL 11	HL 12	L 2	HL 12	CL 21						F 1	
23			F 2						H 1	H 1	CH 11	HCL 11	H 2	H 2	CL 21	CL 31	CL 11	L 1		F 1	F 1	F 2	F 2	F 5
24					F 1	F 1					HL 11		L 1	C 1	C 1	C 2	L 2							
25				F 3	F 1		L 1		HL 11		HL 11	CL 11	H 1	HC 11				H 1			F 3	F 1	F 2	F 4
26	F 3		F 1	F 1			L 1		L 2	H 1	CL 21	C 1	C 1	L 1	H 1	HL 22	HL 21	HL 21	FF 32	FF 21			F 1	
27					F 1	F 2	L 2		H 1	HL 11	H 2	C 2	C 2	C 2	C 1	L 1		H 1			F 1	F 1	F 1	F 2
28			F 1	F 2	F 1					HL 11	HL 11	H 1	H 2			H 1	C 4	C 3	F 1	F 1	F 4	F 2	F 5	F 2
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																								
MED																								
U Q																								
L Q																								

FEB. 1993 TYPES OF ES COMMUNICATIONS RESEARCH LABORATORY, JAPAN

f-PLOTS OF IONOSPHERIC DATA

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


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 2/ 1
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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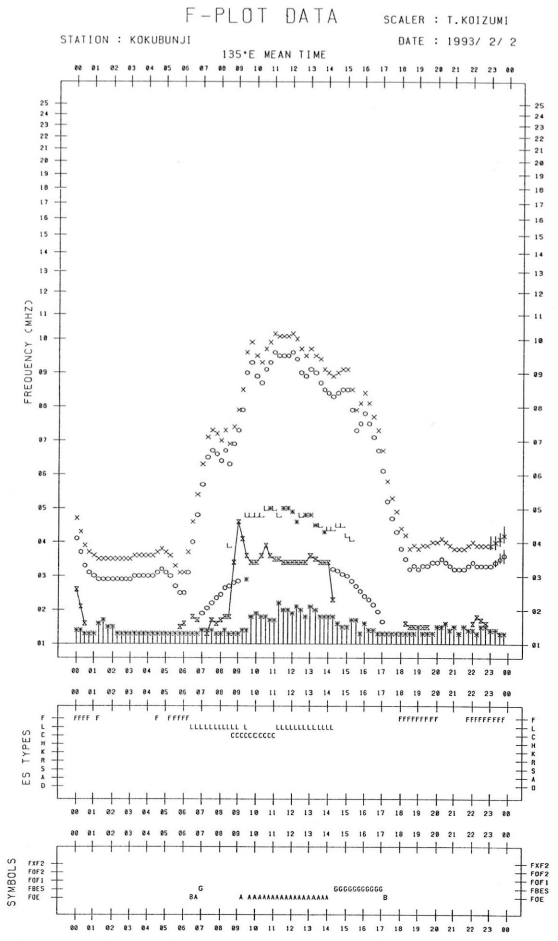
STATION : KOKUBUNJI
DATE : 1993/ 2/ 3
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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DATE : 1993/ 2/ 2
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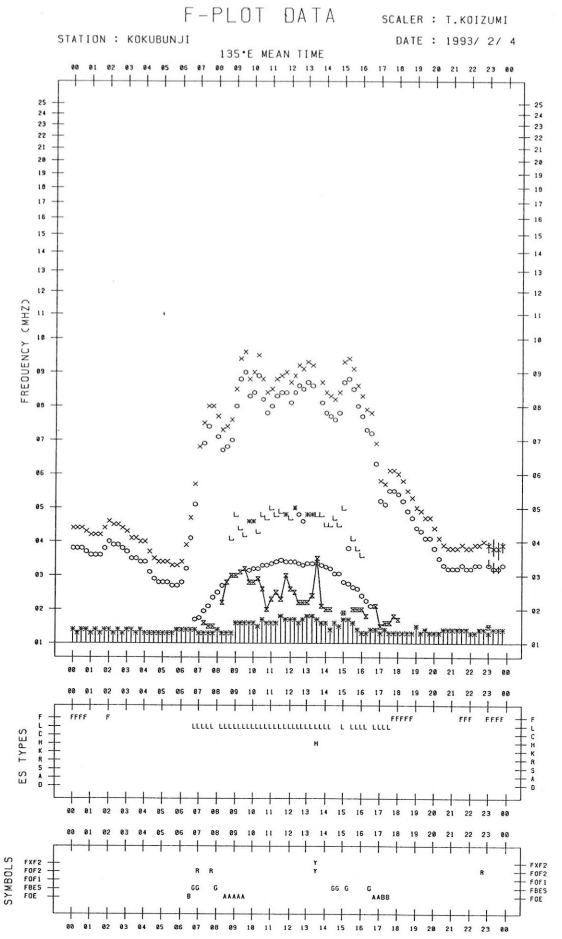
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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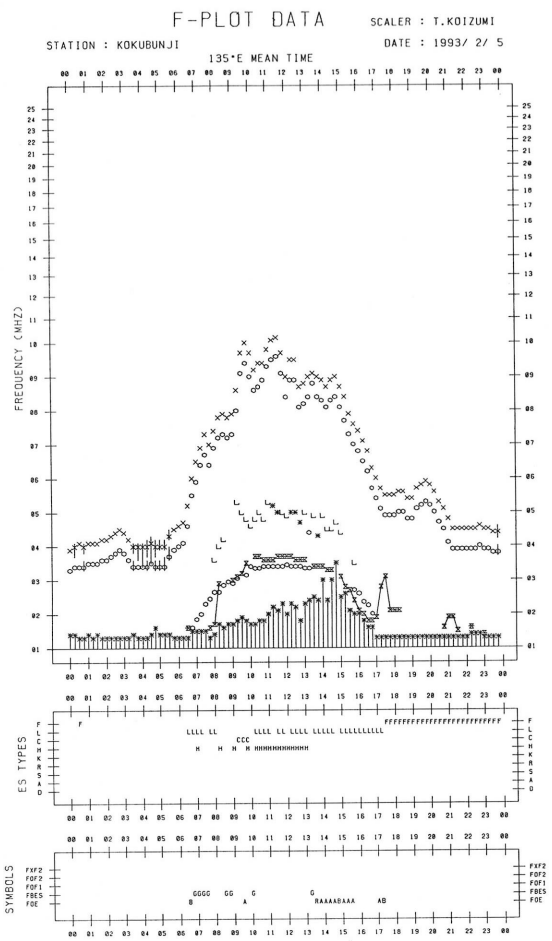
STATION : KOKUBUNJI
DATE : 1993/ 2/ 4
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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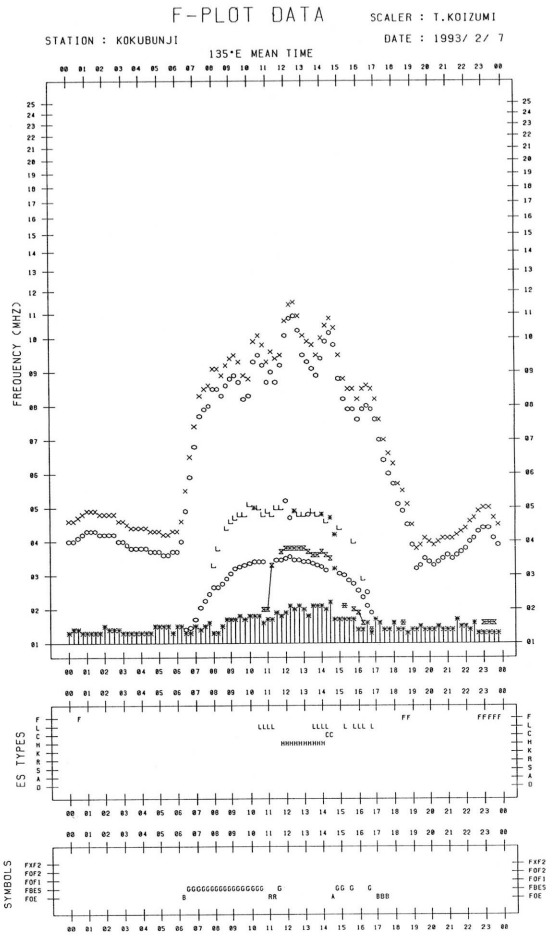
STATION : KOKUBUNJI
DATE : 1993/ 2/ 5
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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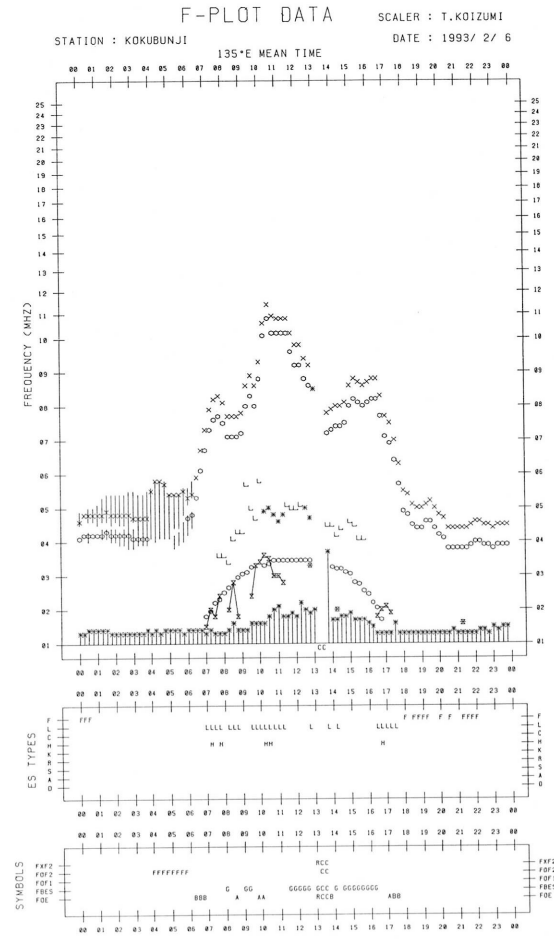
STATION : KOKUBUNJI
DATE : 1993/ 2/ 7
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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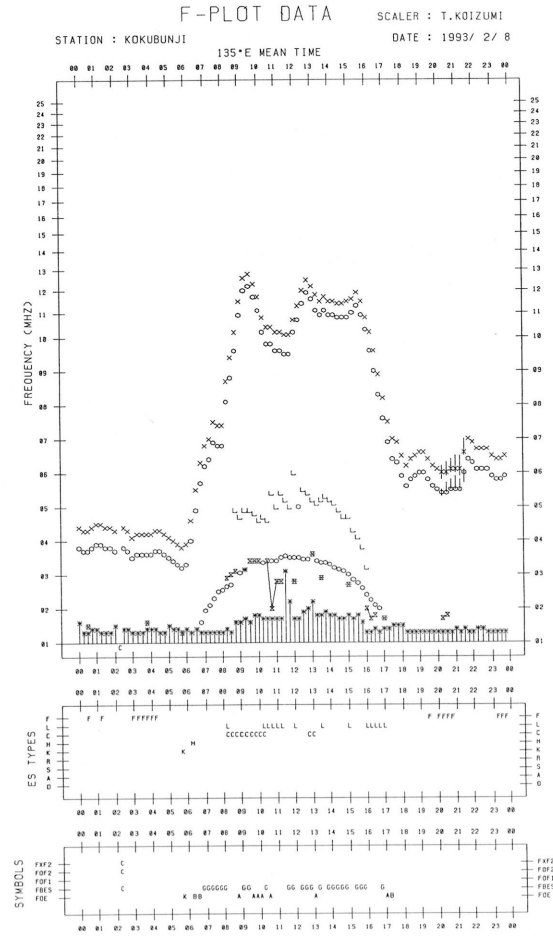
STATION : KOKUBUNJI
DATE : 1993/ 2/ 6
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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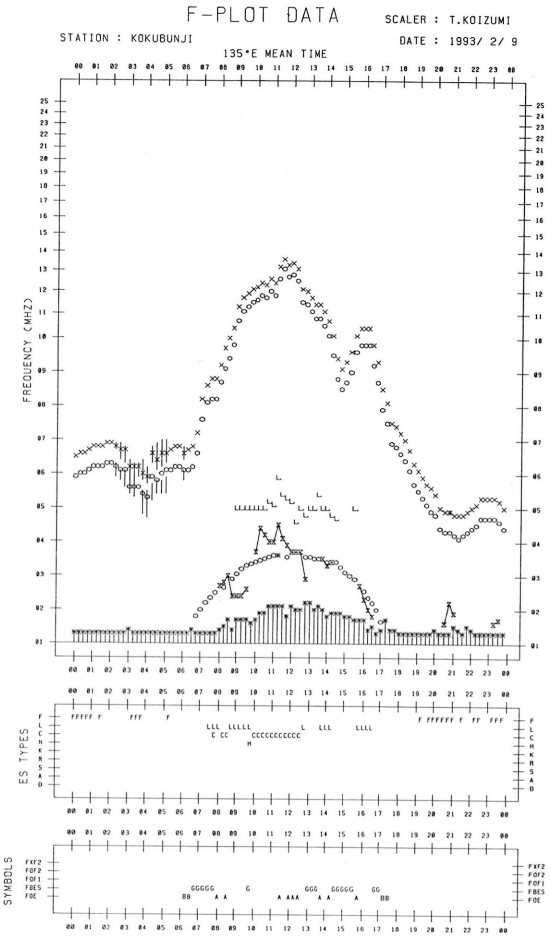
STATION : KOKUBUNJI
DATE : 1993/ 2/ 8
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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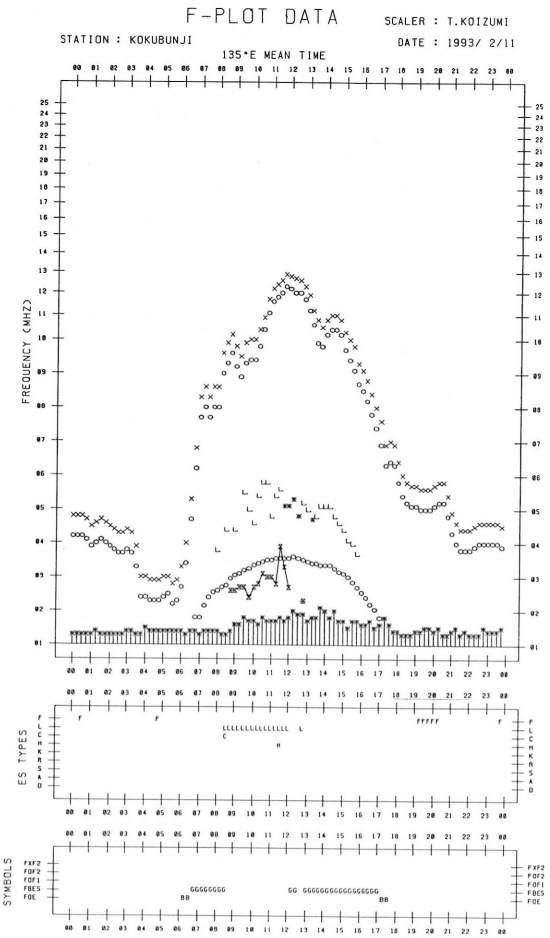
DATE : 1993/ 2/ 9
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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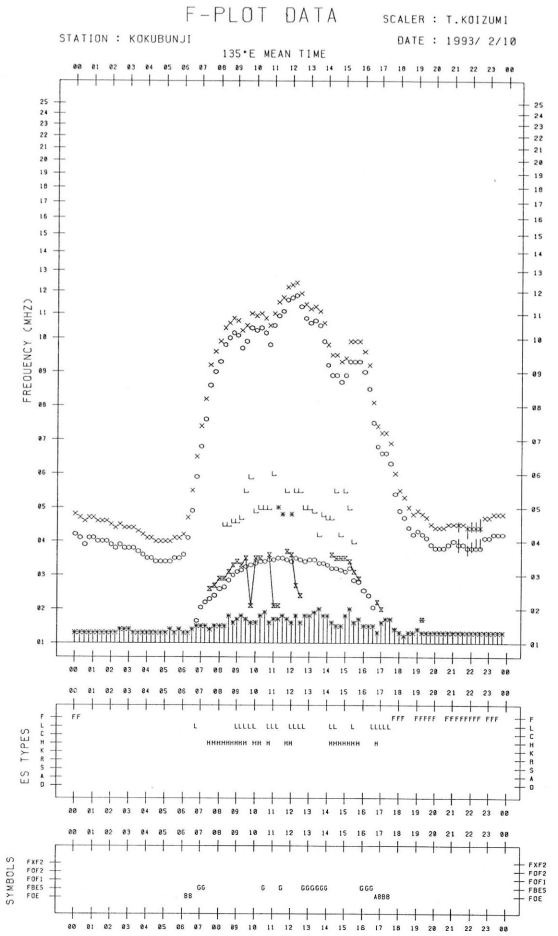
STATION : KOKUBUNJI
DATE : 1993/ 2/11
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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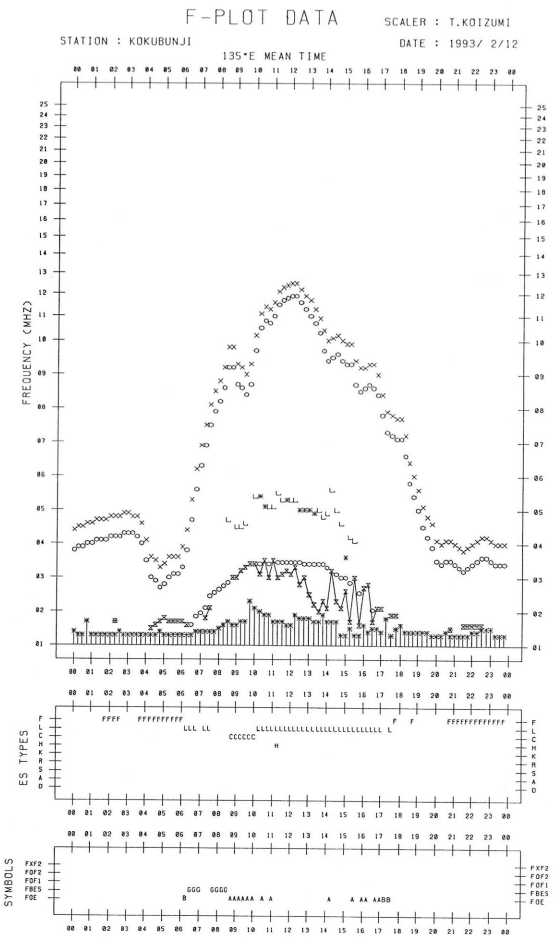
STATION : KOKUBUNJI
DATE : 1993/ 2/10
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
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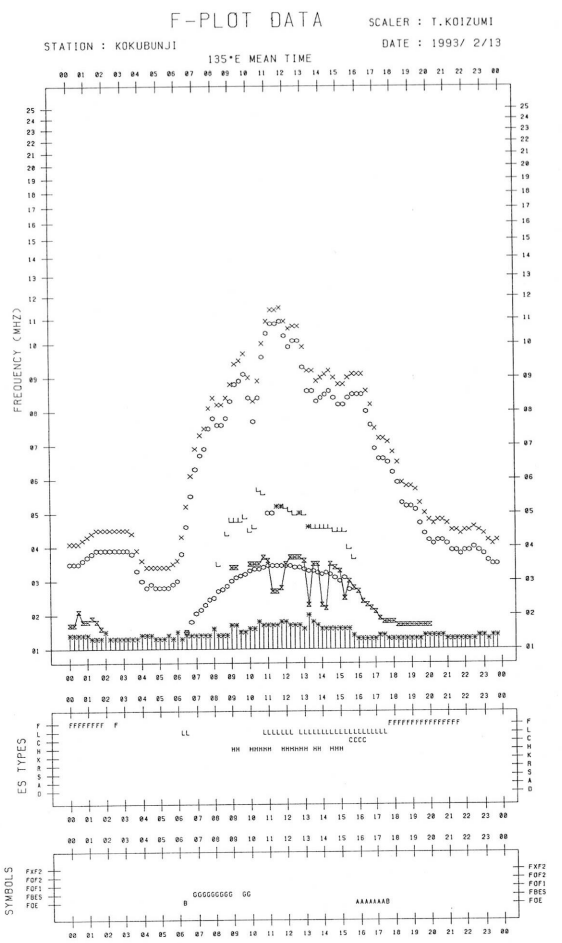
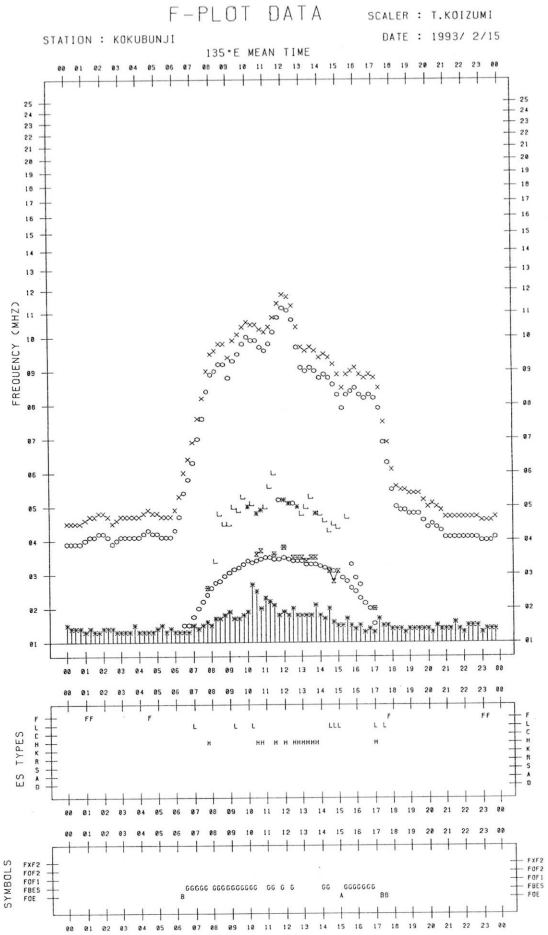
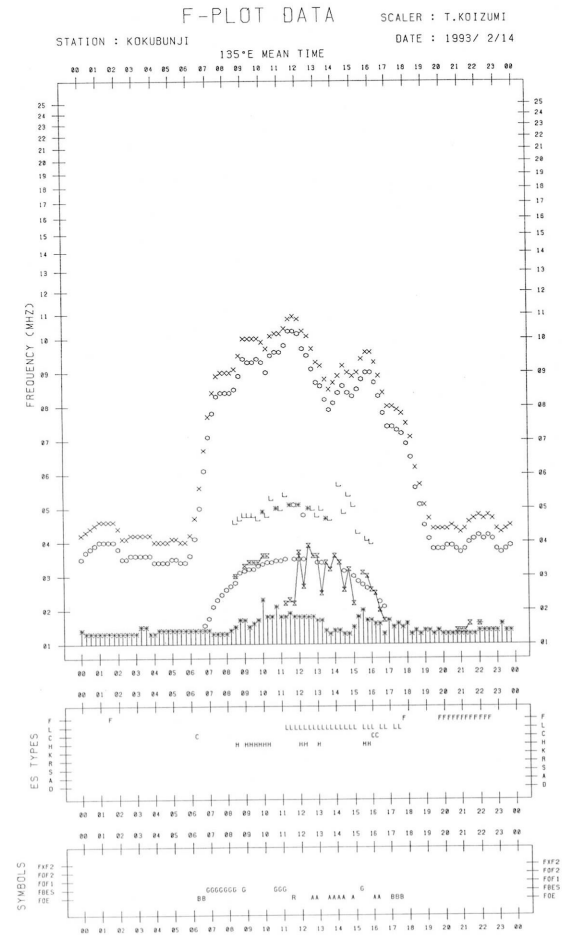
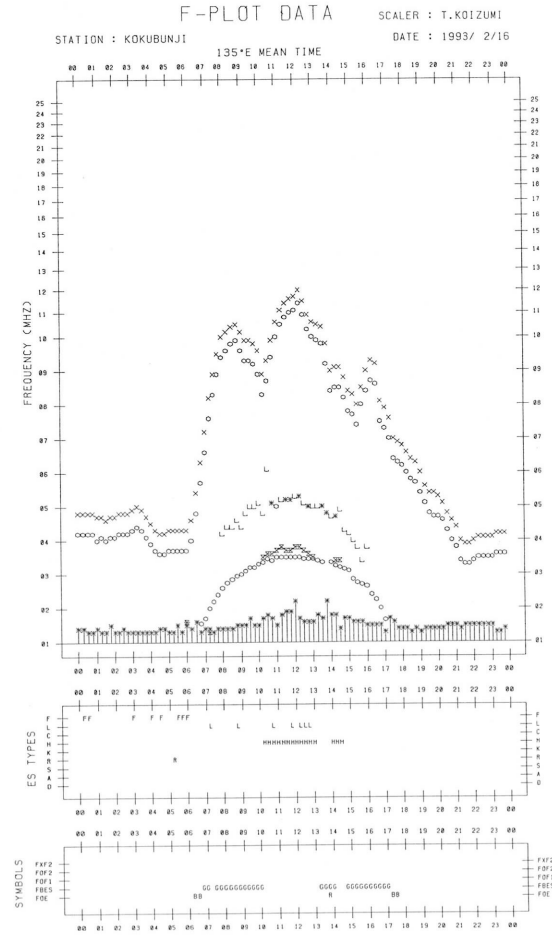
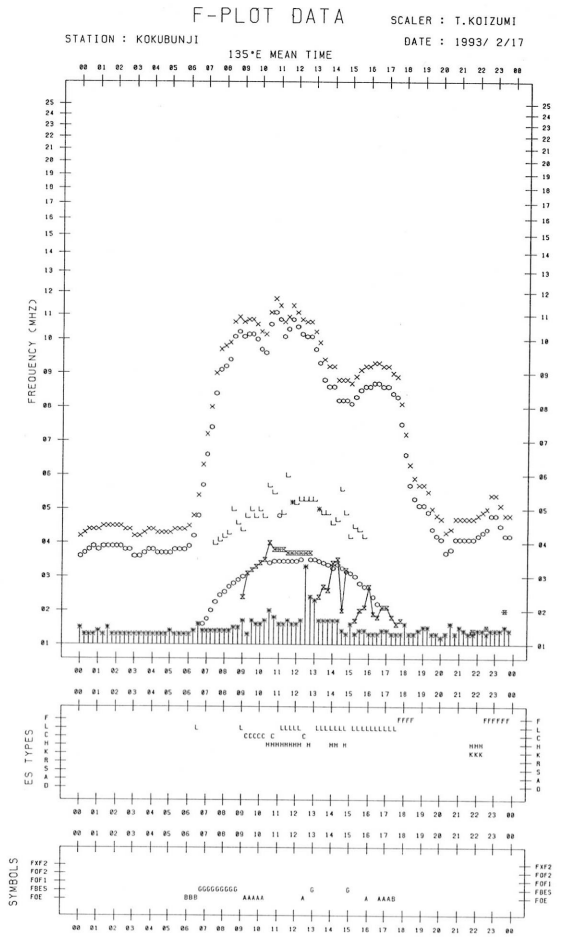
STATION : KOKUBUNJI
DATE : 1993/ 2/12
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

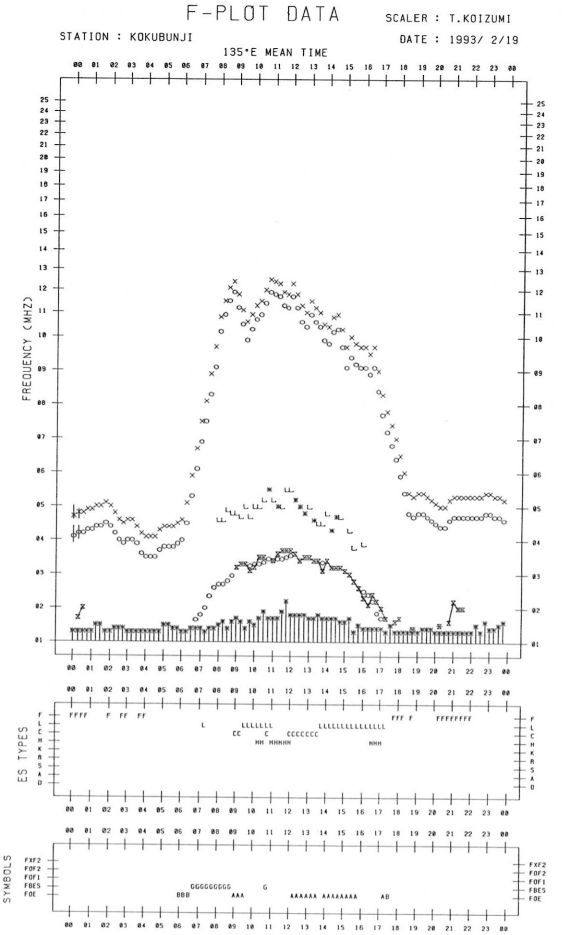

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 2/13
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

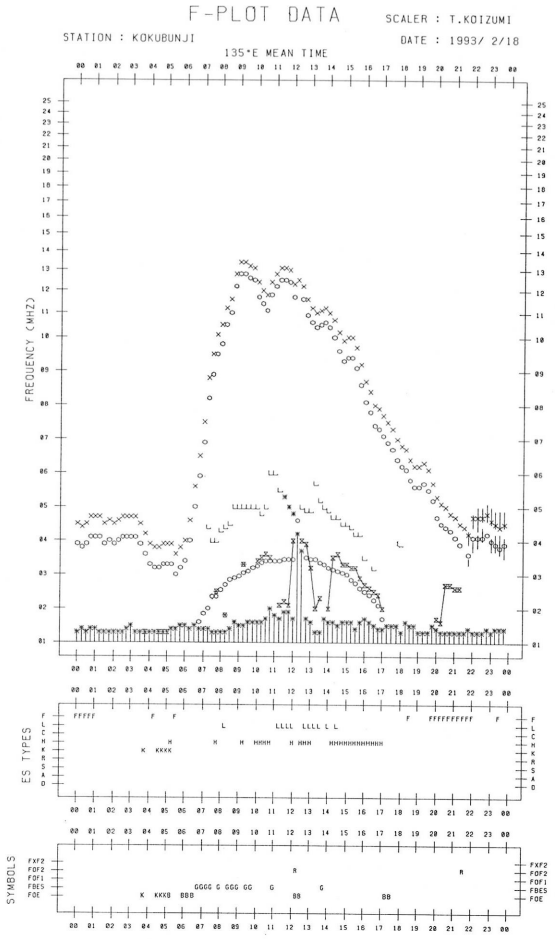

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 2/15
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

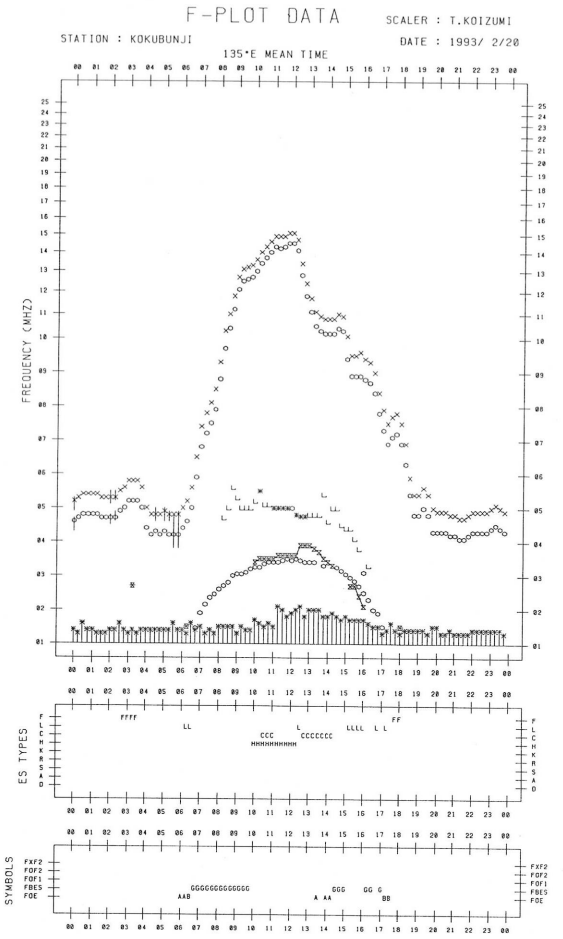

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 2/14
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 2/16
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 2/17
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 2/19
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 2/18
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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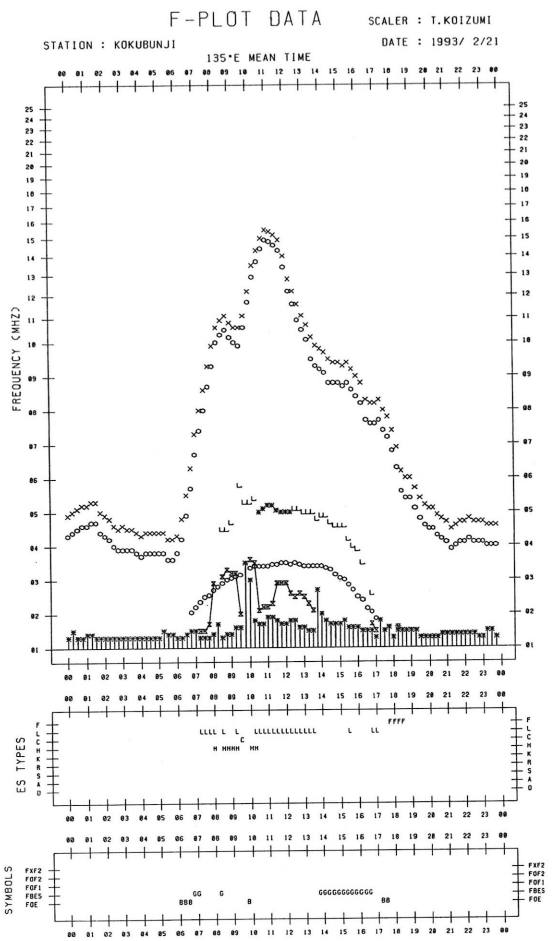
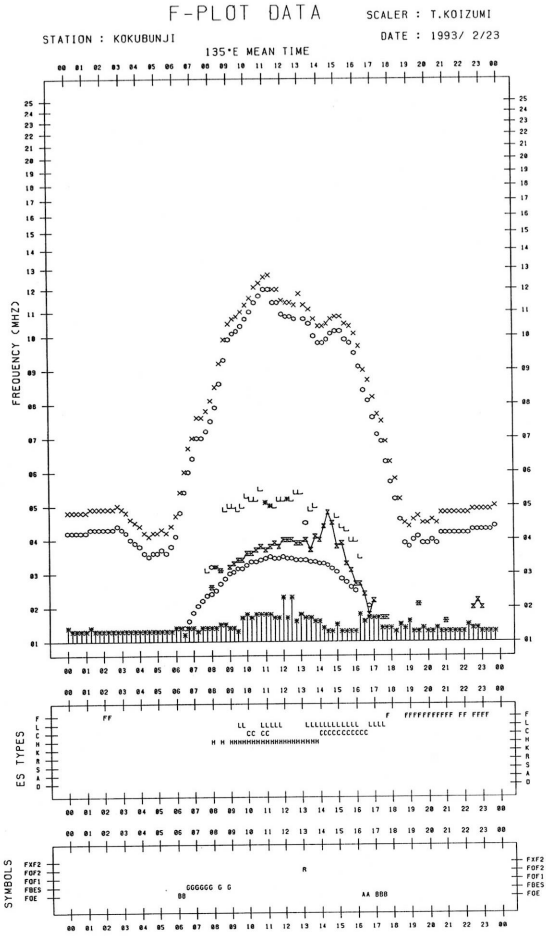
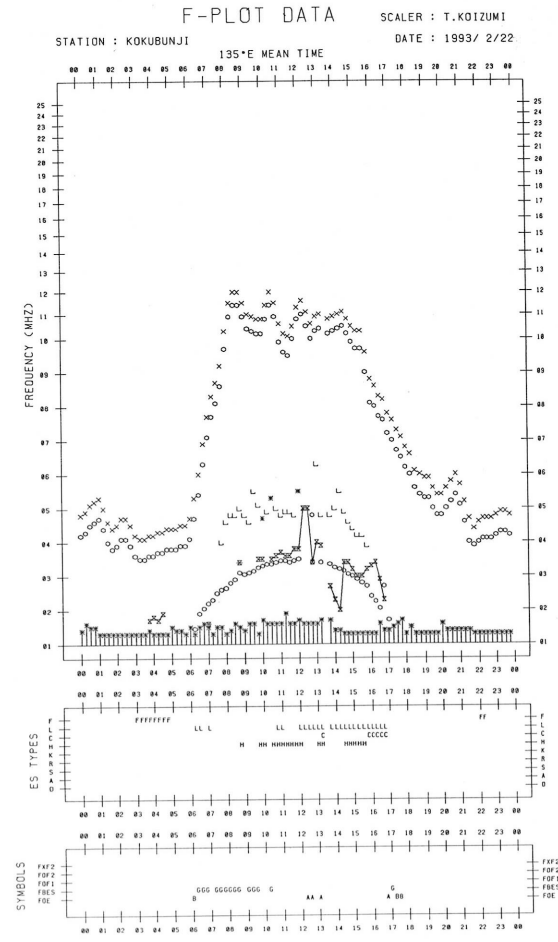
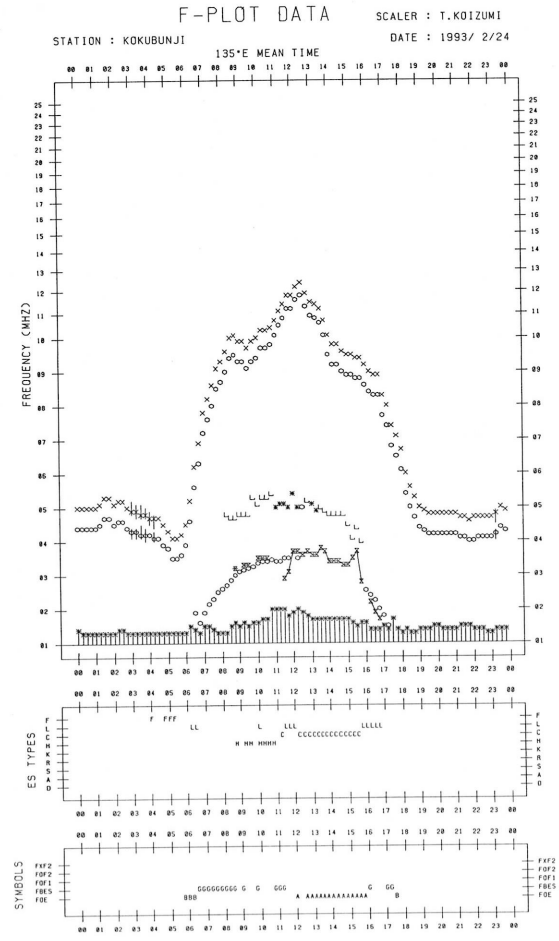
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 2/20
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 2/21
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 2/23
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 2/22
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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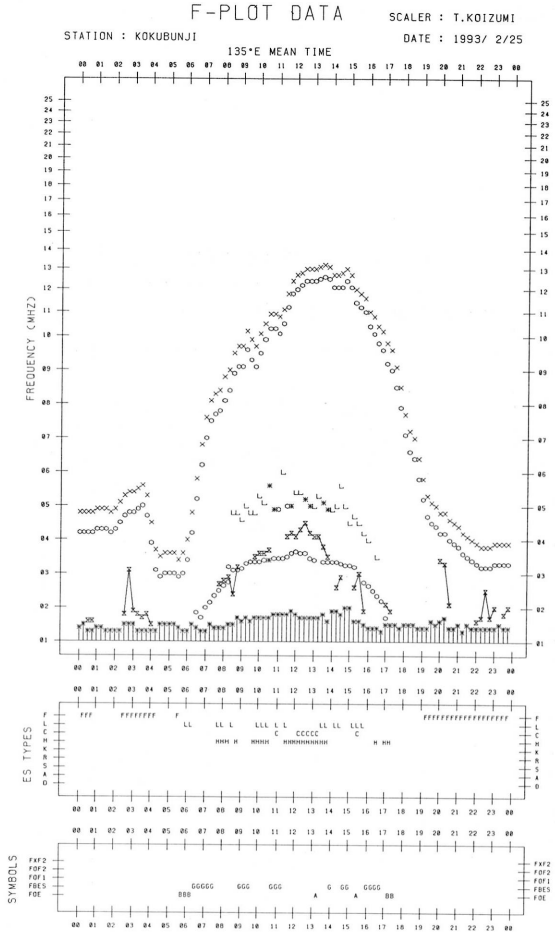
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 2/24
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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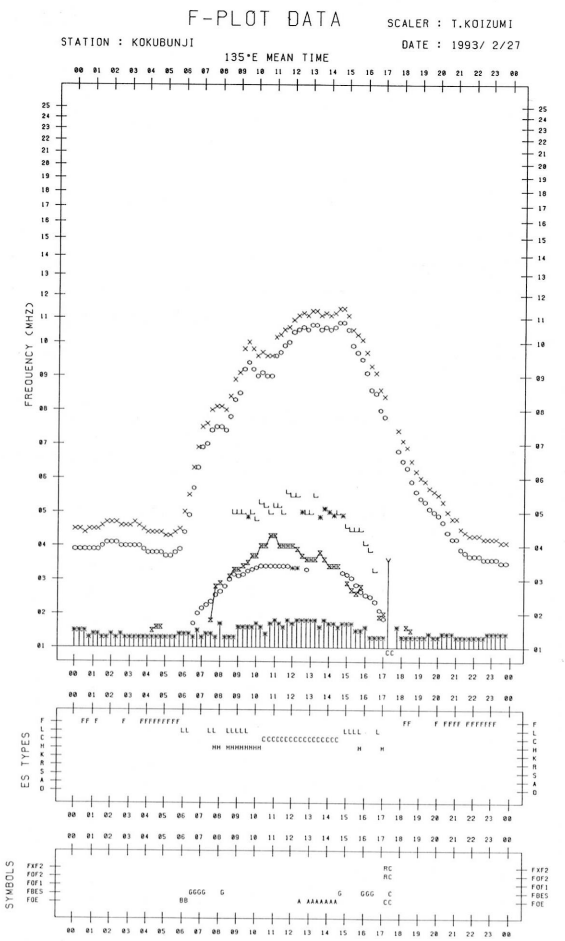
STATION : KOKUBUNJI
DATE : 1993/ 2/25
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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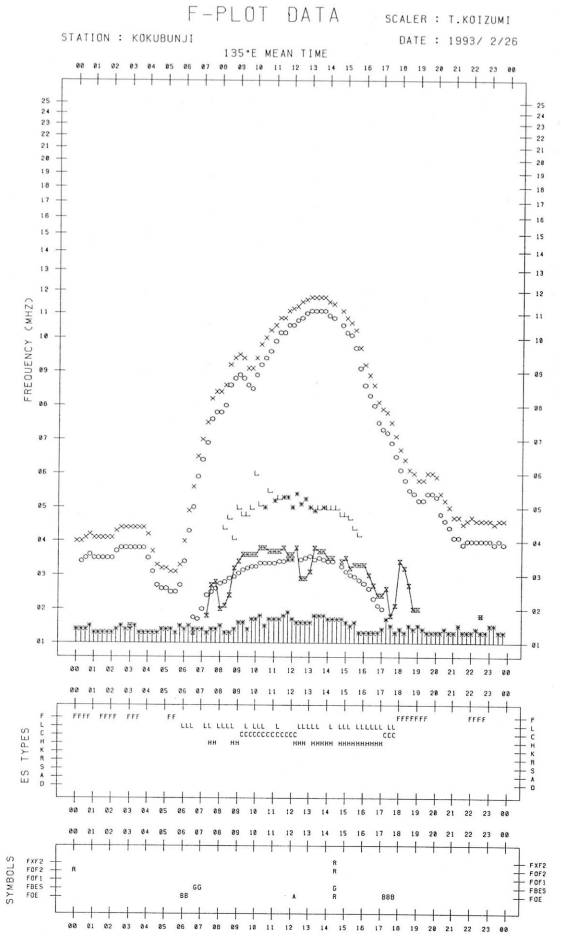
DATE : 1993/ 2/27
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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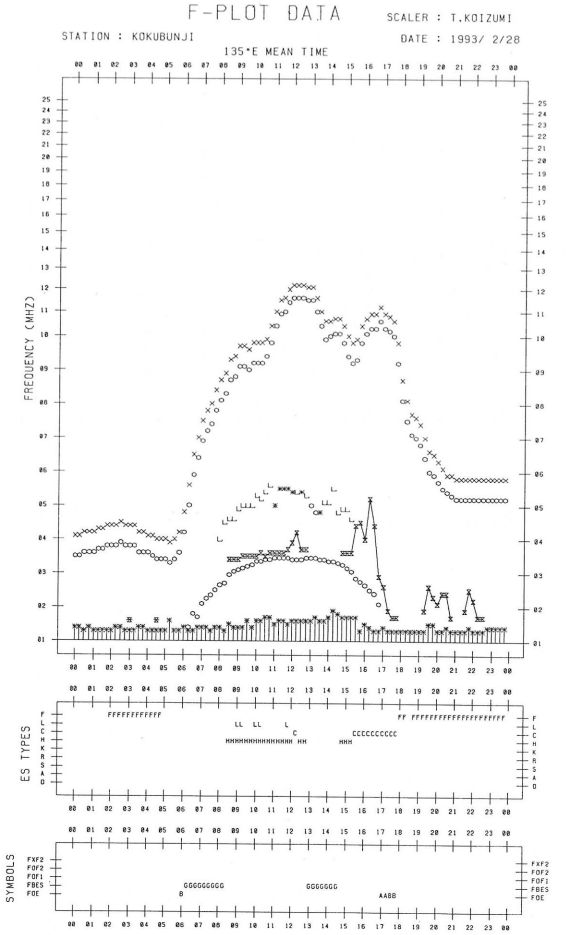
STATION : KOKUBUNJI
DATE : 1993/ 2/26
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 2/28
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

B. Solar Radio Emission

B1. Daily Data at Hiraiso

200 MHz

Hiraiso — February 1993

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	10	10	10	10	10	0	0	0	0	0
2	10	10	10	10	10	0	0	0	0	0
3	10	10	10	10	10	0	0	0	0	0
4	10	9	9	B	10	0	0	0	1	0
5	B	B	B	B	B	1	1	1	1	1
6	B	B	B	B	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	2	1
9	B	B	B	B	B	3	3	1	1	3
10	B	B	B	B	B	1	3	3	3	2
11	B	B	B	B	B	3	3	3	3	3
12	B	B	B	14	B	3	2	1	0	3
13	12	11	10	*	12	0	0	0	*	0
14	8	8	8	11	8	0	0	0	0	0
15	10	10	10	*	10	0	0	0	*	0
16	12	11	11	*	12	0	0	0	*	0
17	12	12	10	*	11	0	0	0	*	0
18	10	11	*	*	10	0	0	*	*	0
19	10	10	10	*	10	0	0	0	*	0
20	10	10	10	*	10	0	0	0	*	0
21	*	*	*	*	*	*	*	*	*	*
22	*	*	*	B	*	*	*	*	2	*
23	B	B	B	*	B	1	2	1	*	2
24	B	B	B	B	B	1	1	1	1	1
25	B	B	B	*	B	1	1	1	*	1
26	B	B	B	*	B	1	1	1	*	1
27	*	*	*	*	*	*	*	*	*	*
28	B	*	*	*	*	1	*	*	*	*

Note: No observations for 500 MHz due to equipment failure by lightning.

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso — February 1993

Single-frequency observations

Normal observing period: 2130 - 0820 U.T. (sunrise to sunset)

FEB. 1993	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) PEAK	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) MEAN	POLARIZATION REMARKS
4	200	44 NS	2140E	0500	620D	40	25	0
5	200	44 NS	2140E	0310	620D	80	40	WR
6	200	44 NS	2140E	0033	620D	40	25	0
7	200	44 NS	2140E	0007	620D	80	30	WR
	200	42 SER	2356.0	2356.0	5	10000	-	0
	100	42 SER	2356.2	0002.6	8	970	-	WL
8	100	42 SER	0203.1	0206.0U	3.7	1000D	-	-
	100	42 SER	0224.8	-	7.6	-	-	-
	200	46 C	0228.0	0231.6	5	40	20	0
	200	8 S	0459.8	0500.0	0.6	300	-	ML
	200	44 NS	2140E	0230	620D	150	50	SL
	100	44 NS	2140E	0343	500D	150	30	WL
9	100	46 C	0514.3	-	1.0	1000D	-	-
	100	42 SER	0713.6	0719.2	13	630	-	WL
	200	46 C	0715.3	0719.8	10	500	80	WL
	200	44 NS	2140E	0313	620D	100	50	SL
10	200	46 C	0735.3	0737.6	4.0	2000	500	WL
	100	46 C	0735.5	-	3.6	1000D	-	-
	200	44 NS	2140E	0435	620D	400	80	SL
	100	44 NS	2140E	0600	620D	600	100	SL
11	100	44 NS	2140E	0020	260D	300	150	SL
	200	44 NS	2140E	0055	620D	600	100	SL
14	100	46 C	2302.2	-	4.7	1000D	-	-
17	200	45 C	0301.6	0322.7	32	28	12	0
	100	46 C	0302.9	0330.1	32	20	8	0
18	200	46 C	0133.2	0134.1	1.0	600	100	0
	100	46 C	0133.6	0133.7	1.0	740	450	WL
	200	46 C	0300.8	0304.3	10	170	50	WL
	100	46 C	0308.0	0309.3	4.0	1000D	-	-
	200	46 C	2241.8	2242.2	3.5	110	40	WL
	100	46 C	2242.4	2245.2	6.0	380	200	WL
22	200	44 NS	2120E	2350	640D	90	40	ML
	100	44 NS	2120E	0008	640D	200	70	ML
23	200	44 NS	2120E	0718	640D	70	30	ML
	100	44 NS	2120E	0732	640D	100	40	ML
24	100	44 NS	2120E	0145	640D	150	50	WR
	200	44 NS	2120E	0600	640D	100	60	WL
25	200	44 NS	2120E	0602	640D	70	20	WR
26	100	46 C	0144.2	0144.2	2.0	1000D	-	-
	200	46 C	0144.3	0144.7	4.0	2300	300	SR
	200	46 C	0304.3	0304.7	1.2	550	70	0
	100	42 SER	0304.7	0304.7	3.3	420	-	WR
	200	48 C	0357.6	0400.0	3.7	7000	500	0
	100	46 C	0357.6	-	4.0	1000D	-	-
27	200	44 NS	2120E	0100	280D	60	25	WR

Note: No observations for 500 MHz due to equipment failure by lightning.

C. RADIO PROPAGATION

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

FEB 1993 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

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

C. RADIO PROPAGATION

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

FEB 1993 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

UT DAY	00H 46M	01H 46M	02H 46M	03H 46M	04H 46M	05H 46M	06H 46M	07H 46M	08H 46M	09H 46M	10H 46M	11H 46M	12H 46M	13H 46M	14H 46M	15H 46M	16H 46M	17H 46M	18H 46M	19H 46M	20H 46M	21H 46M	22H 46M	23H 46M
1	4	1	4	0	9	9	9	6	-18	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	-1	14	10	1
2	3	4	3	8	17	12	-12	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	-4	4	5	-4
3	-1	-4	5	5	9	9	-12	-12	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	-3	-1	10	4
4	-2	-4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5	-1	3	4	11	15	10	-18	5	-18	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27		-3	-18	-1	5	3	-1
6	1	-1	2	7	9	4	-3	-1	1	-23	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	-1	7	-1	-1
7	-1	-1	4	-1	16	1	ES -27	14	4	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	6	8	8	-1
8	6	-3	-4	5	12	11	17	9	ES -27	ES -27	ES -27	ES -27	ES -27	13	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	-5	8	-1	0
9	-1	-3	4	6	15	17	17	7	-12	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	-3	3	-4	-2
10	1	-3	4	4	9	9	-9	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	4	1	-3	-1
11	-1	0	5	5	9	9	11	12	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	-6	4	3	1
12	ES -26	-5	11	5	10	10	-11	12	-11	ES -26	ES -26	ES -26	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	-4	7	6	-4
13	-1	-6	-3	7	6	8	11	11	16	-2	ES -27	ES -27	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	11	10	0	-2
14	-2	0	0	5	5	12	12	18	-17	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	5	6	-2	-1
15	-2	-2	1	5	10	13	13	0	-22	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	4	5	2
16	-2	-2	0	4	4	12	1	-22	-8	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	-11	4	5	0
17	4	-5	5	11	17	0	15	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	0	2	2	-2
18	0	-2	0	10	3	11	10	10	4	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	3	6	-8	2
19	2	3	4	12	16	19	10	20	-2	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	-3	5	-1	12
20	5	0	4	10	7	10	10	-22	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	2	4	4	0
21	-26	-3	2	6	11	18	-9	-8	-8	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	-3	5	4	5
22	-5	4	2	10	7	15	22	-11	-22	-22	ES -26	-17	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	2	11	5	-2
23	0	2	7	5	7	5	10	-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	5	5	5	0
24	4	-2	2	9	10	8	-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	0	2	1	0
25	-1	5	5	10	15	10	5	1	5	-11	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	-2	10	5	2
26	-3	7	5	9	10	7	17	ES -26	ES -26	ES -26	ES -26	-11	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	5	-1	7	1
27	-5	7	2	7	12	13	7	-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	4	2	2	3
28	2	4	5	7	12	17	11	-11	2	5	ES -26	ES -26	ES -26	6	ES -26	ES -26	ES -26	-4	16	ES -26	-5	5	2	5
CNT	28	28	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
MED	-1	-1	4	7	10	10	10	-1	-18	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	-1	5	3	0
UD	4	5	5	11	16	17	17	14	4	-11	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	5	10	8	5
LD	-5	-5	0	4	5	4	-12	ES -26	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	ES -27	-6	1	-3	-2

C. Radio Propagation

C2. Radio Propagation Quality Figures at Hiraiso

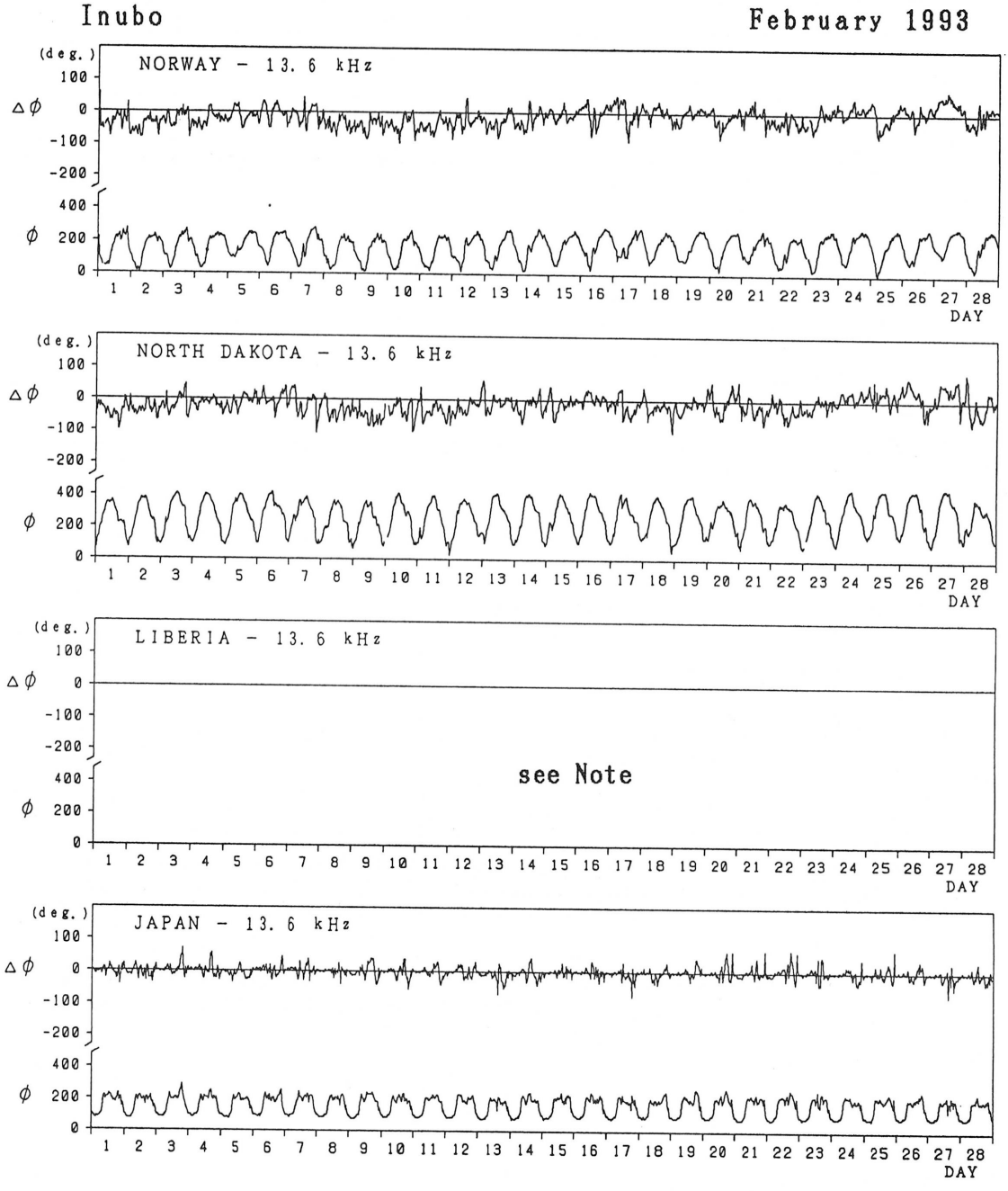
Hiraiso

Time in U.T.

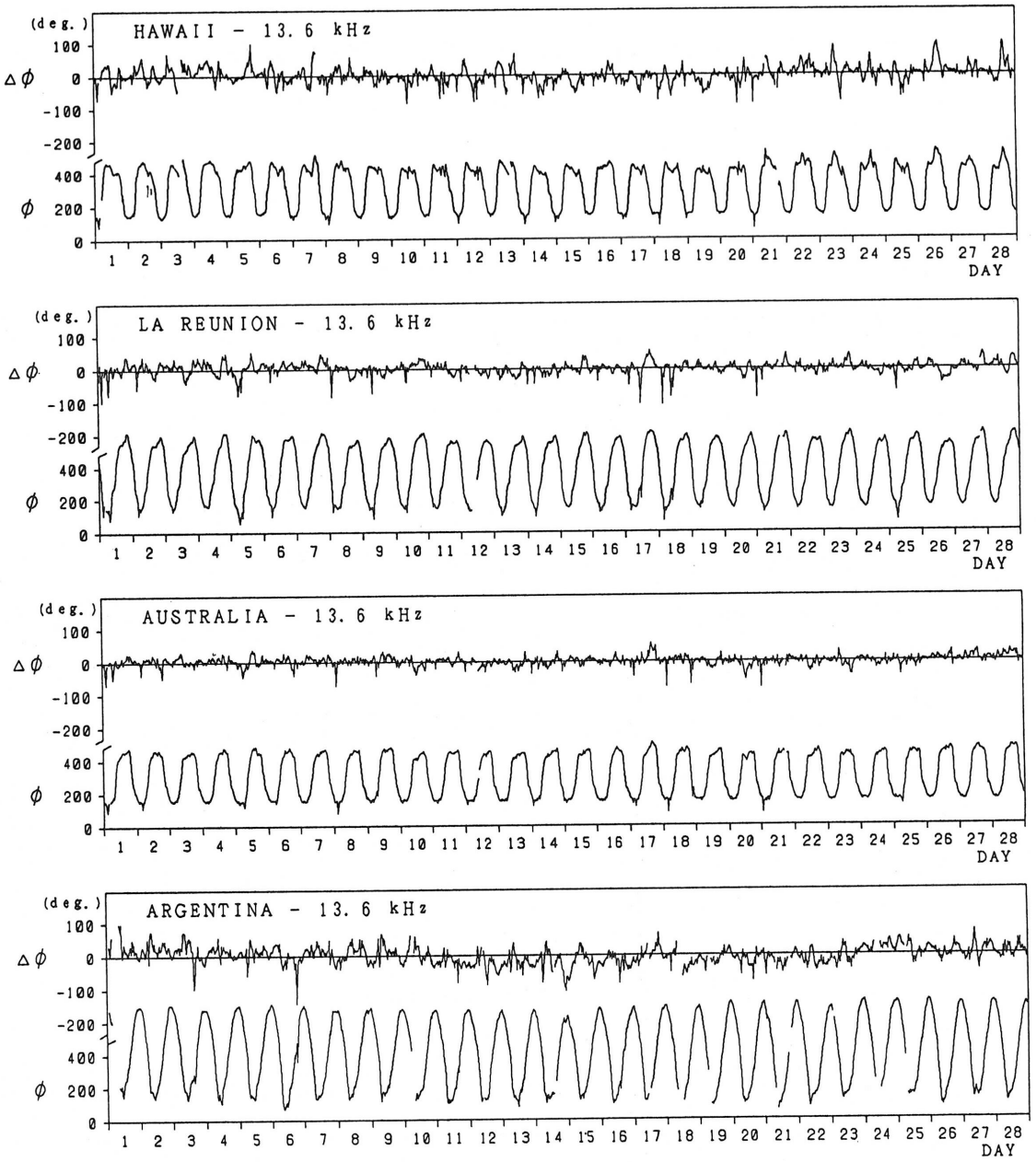
Feb. 1993	Whole Day Figure	W W V 00 06 12 18 / 06 12 18 24	W W V H 00 06 12 18 / 06 12 18 24	Conditions 00 06 12 18 / 06 12 18 24	Principal Geomagnetic Storms Start h m	End h	Range nT
1	4-	3U - - -	4 4 4 4	U U U U			
2	3+	4U - - -	4 2U - 4	N N N N			
3	4-	4U - - -	4 3 - 4	N N N N			
4	C	C C C C	C C C C	N N N N			
5	4-	4U - - -	4 3U - 4	N N N N			
6	4o	3U 5U - -	4 4 - 4	N N N N			
7	4-	3U - - -	4 4U - 4	N N N N			
8	4-	3U - - -	4 4U - 4	N N N N			
9	4+	5U - - -	4 5U - 4	N N N N			
10	4-	5U - - -	4 2U - 4	N N N N			
11	4-	3U - - -	4 4 - 4	N N N N			
12	3+	4U - - -	3 4 - 3	N N N N			
13	4o	3U - - -	4 5 - 4	N N N N			
14	4-	3U - - -	4 4 - 4	N N N N			
15	3+	3U - - -	4 4 - 3	N N N N			
16	3+	3U - - -	4 3U - 4	N N N N			
17	4o	4U - - 5U	4 3U - 4	N N N N	0301	21	172
18	4o	3U - - -	4 5U - 4	N N N N			SSC
19	4+	5U - - -	4 5U - 4	N N N N			
20	4+	5U - - 5U	4 3U - 4	N N N N			
21	4-	5U - - 5U	3 3U - 3	N N N N			
22	4+	5U - - 5U	4 4 - 4	N N N N			
23	4+	5U - - 5U	4 3U - 4	N N N N			
24	4o	5U - - 5U	4 2U - 4	N N N N			
25	4+	5U - - 5U	4 4U - 4	N N N N			
26	4+	5U - - 5U	4 3U - 4	N N N N			
27	4+	5U - - 5U	4 3U - 4	N N N N	2220	---	144
28	4+	5U - - 5U	4 4U 5U 4	N N N N	---	21	SSC

C. Radio Propagation

C3. Phase Variation in OMEGA Radio Waves at Inubo



Inubo February 1993



Note: As for LIBERIA-13.6kHz, no record during 18 October 1992 - 28 February 1993, due to the maintenance of transmitter.

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

NONE

C. Radio Propagation

C4. Sudden Ionospheric Disturbance

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

Hiraiso

Time in U.T.

Feb. 1993	S W F								Correspondence	
	Drop-out Intensities(dB)					Start	Dur.	Type	Imp.	Solar * Flare	Solar Burst
	CO	HA	AUS	MOS	BBC						
1		39	22			0159	23	1	2-	0155	
2			7			0344	15	2	1-	0343	
5			12			0526	31	2	1	0448	x
7		20	17			2358	20	3	1+	2337	
8		9	21			0222	19	2	2-	0230	x
8		14	13			0300	20	2	1	-	
9			9			0718	18	1	1-	0656	x
10			9			0730	8	1	1-	0732	x
10			20			0738	20	1	2-	0732	x
12		20	10			0032	48	2	2+	0033	x
13			9			0527	17	1	1-	0525	
14		>40	13			2302	20	2	1	2305	x
16		12				0439	8	1	1	0437	
18		>40	>33			0259	83	1	3-	0259	x
21			21			0032	29	2	2-	0027	
25			6			0455	10	2	1-	0452	

NOTE CO:Colorado(WWV) HA:Hawaii(WWVH) Aus:Australia Mos:Moscow BBC London

* Optical and X-ray Flares

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

Feb. 1993	S P A								
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	Ω/AU	Ω/H	Ω/ND	Start	End	Max.
1	36	—	155	140	107	24	0158	0318	0207
1		—	7				0456	0512	0500
1		—	7				0516	0536	0526
1		—	22	9			0540	0630	0554
1	18	—	115*	72*	11		0656	0828	0704
1		—	4				0912	0922	0916
1		—	29				1001	1050	1008
1		—	22				1054	1116	1100
1		—			54		1946	2020	1954
1		—		11	9		2214	2246	2224
2		—	81	54	33	15	0344	0446	0352
2		—	40	20			0452	0618	0508
3		—	22	11			0512	0606	0520
3		—	6				0820	0840	0826
4		—	5	5			0326	0342	0330
4		—	22				1038	1112	1046
4		—		5	4		2348	0012	2356
5		—	27	24	21	11	0210	0244	0218
5		—	14	13	7		0252	0318	0300
5		—	5	4			0350	0412	0358
5		—	14	7			0416	0450	0420
5		—	27	10			0448	0514D	0458
5	30	—	117*	76*	29		0514E	0656D	0542
5		—	40	14			0656E	0740	0702
5		—	47	11			0755	0820	0800
5		—	20				0902	0920	0908
5		—	5				1120	1130	1124
5		—		9	5		2155	2212	2200
6		—	7	6	6		0308	0326	0314
6		—	57	37	22		0524	0616	0530
6		—	63				0802	0840	0816
6		—	16				1042	1116	1052
6		—			25		2046	2100	2052
6		—		9	14		2134	2152	2140
6		—		42	35		2202	2238	2210
6		—		10	9		2334	2352	2340
6		—		25	19		2354	0056	0020
7		—		9	6		0106	0124	0110
7		—		6	6		0156	0206	0200
7		—		4	4		0226	0238	0230
7		—	6	4			0256	0318	0302
7		—	4	4			0326	0336	0328
7		—	11	8	5		0412	0438	0418
7		—	12	4			0556	0620D	0606
7		—	12	4			0620E	0640	0626

Inubo

Feb. 1993	S P A								
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	Ω/AU	Ω/H	Ω/ND	Start	End	Max.
7		—	6				1022	1038	1028
7		—	13	50	45		2342	0042	0008
8	26	—	110	82	68	27	0222	0312	0236
8		—	8	4			0418	0432	0422
8		—	54	20			0702	0750	0706
8		—	32				0808	0830	0816
8		—		19	17		2310	2338	2316
9		—		6			0100	0124	0110
9		—	8	11	9		0134	0222	0158
9		—	24	15	8		0416	0452	0426
9		—	12				0520	0614	0542
9		—	86	52			0716	0818	0724
9		—		35	27		2224	2310	2234
9		—	9	18	22		2356	0036	0002
10		—	10	19	15		0116	0148	0124
10		—	31	16			0606	0652	0612
10		—	23	6			0718	0736D	0724
10		—	112	40			0736E	0832	0744
10		—	141	9			0838	0912	0842
10		—			94		2004	2034	2008
10		—		11	11		2344	0006	2348
11		—	11	24*	23*		0022	0100	0034
11		—		5	5		0126	0210	0134
11		—	4	6	4		0224	0248	0228
11		—	43*	27*	22*		0304	0356	0324
11		—	58	36	19		0500	0542	0506
12	24	—	36	65	58		0034	0140	0048
12		—	12	7			0434	0452D	0440
12		—	14	7			0452E	0514	0458
12		—	—	5			0754	0816	0758
13		—	12	30	27		0002	0040	0008
13		—	11	19	17		0134	0212	0140
13		—	10	9	5		0230	0258	0236
13		—	21	13	4		0346	0410D	0352
13		—	30	17	7		0410E	0446	0416
13		—	69	53	53		0526	0606D	0534
13		—	40*	11			0606E	0652D	0612
13		—	22	6			0652E	0722	0658
13		—	6				0732	0748	0736
13		—	20				0752	0810	0800
13		—	24				1036	1110	1042
13		—		6	6		2338	2356	2348
14		—	29	53	48		0054	0146	0102
14		—	30	17	16		0258	0444	0308
14		—	14	7			0454	0526	0458

Inubo

Feb. 1993	S P A								
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	Ω/AU	Ω/H	Ω/ND	Start	End	Max.
14		—	63	38			0608	0718	0620
14		—	22				0746	0820	0800
14		—	16				1027	1058	1032
14		—	23				1254	1346	1300
14		—	24	73	65	23	2305	0008	2314
15		—	6	12	9		0048	0106	0054
15		—	11	31	25		0110	0154	0122
15		—	14	6			0422	0450	0428
15		—	9				0752	0810	0756
15		—			37		1936	2022	1948
15		—		7	7		2306	2330	2312
16		—		6	6		0030	0042	0036
16	24	—	73	48	19	20	0438	0522	0446
16		—	32	12			0534	0622	0540
16		—	27	5			0728	0752	0734
16		—			17		2128	2152	2132
17		—	19	36	32		0112	0202	0118
17		—	51	37	22		0314	0410	0328
17		—	23	10			0704	0736	0710
17		—	17				0938	1012	0948
17		—	126				1034	1144	1046
17		—		22	22		2248	2334	2304
18	48	—	200	155	108	71	0300	0420	0310
18		—	31	15	7		0430	0518	0440
18		—	6				0810	0824	0816
18		—	72				0942	1046	1000
18		—	14				1056	1134	1104
18		—		36	32		2232	2326	2252
20		—		17	17		2256	2328	2302
21	52	—	82	121	125	67	0026	0222	0046
21		—	31	22	17		0300	0336	0310
21	24	—	73	53	28		0432	0520	0440
22		—	33	18	4		0435	0522	0442
22		—	14				0730	0804	0746
23		—		14	12		0038	—	0048
23	14	—	29	24	21		0228	0300	0236
23		—	15	9			0412	0442	0420
25		—	53	29	13	26	0454	0532D	0506
25	22	—	95	59	24	23	0532E	0644	0550

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☎ (0423) (21) 1211(代)

Queries about "Ionospheric 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.